CONDITIONAL LETTER OF MAP REVISION
APPLICATION FOR THE
VANDENBERG DETENTION BASIN

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June 30, 2000

Mr. Max Yuan, P.E.
Federal Emergency Management Agency
Mitigation Hazard Identification Branch
500 C Street, SW
Washington, DC 20472

RE: CONDITIONAL LETTER OF MAP REVISION APPLICATION FOR THE VANDENBERG DETENTION BASIN
PBS&J REFERENCE NUMBER 510607.70

Dear Mr. Yuan:

This is a request for a Conditional Letter of Map Revision (CLOMR) Application for FEMA Flood Hazard Zone A south of the proposed Vandenberg Detention Basin to Las Vegas Boulevard.

In support of our request for a Conditional Letter of Map Revision, we are forwarding the following:

Appendix I which includes the following:

- A FEMA 'Revision Requestor and Community Official - Form 1';
- A FEMA 'Hydrologic Analysis – Form 3';
- A FEMA 'Riverine Hydraulic Analysis – Form 4';
- A FEMA 'Riverine/Coastal Mapping – Form 5';
- A FEMA 'Channelization – Form 6';
- A FEMA 'Bridge/Culvert – Form 7'

Appendix II which includes the following:

- Figure 1: Existing DFIRM
- Figure 2: Annotated DFIRM
- Figure 3: Clark County Regional Flood Control District Master Plan Update Facilities Map
- Figure 4: Vandenberg Watershed Basin Map

Appendix III which includes the following:

- Existing Condition Hydrologic Parameters
  - Figure 5: Vandenberg Watershed Soils Map
  - Figure 6: Vandenberg Watershed Landuse Map
- Range Wash FIS HEC-1 Model
- Existing Condition Curve Number HEC-1 Models with Vandenberg Detention Basin (SDN3 and SDN4)

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Appendix IV which includes the following:

- Normal Depth Cross Section Location and Work Maps for 1997 FIS and this CLOMR
- Range Wash FIS Hydraulic Information
- HEC-RAS of Existing Vandenberg Channel
- WSPG of the Proposed 36" Storm Drain in Vandenberg Road
- Existing Wash Downstream of Craig Road Hydraulic Information

Appendix V which includes the following:

- FIRMS to reflect 1997 FIS Restudy.
- Vandenberg Detention Basin Improvement Plans certified by a Professional Engineer.
- CD containing GIS maps of proposed flood zones, HEC-1 models and HEC-RAS models.

The following studies are being sent in addition to this report:

- A copy of the *Pre-design Report for Vandenberg Detention Basin and Associated Collection and Outfall Facilities* prepared by PBS&J, Inc. in August 1998
- A copy of the *West Range Wash Facility Plan* prepared by PBS&J, Inc. in September 1996.
- A copy of the revised FIS map Community Panels 32003C2180 D and 32003C1790 D

Since the approval of the *Range Wash Flood Insurance Study Restudy* (FIS), FEMA Case Number 96-09-483P, by PBS&J, Inc. in February 1996, the *West Range Wash Facility Plan* (PBS&J, 1996) was completed which determined the flows in the West Range Wash to be greater than originally determined in the FIS. The higher flows calculated in the *West Range Wash Facility Plan* are due to ultimate condition land use assumptions and basin delineation variations. Because the flow increased significantly in the West Range Wash, the Facility Plan proposed a detention basin to be located between the Union Pacific Railroad (UPRR) alignment and Interstate highway I-15 to help alleviate the flooding problems along the western reach of the Range Wash watershed. The detention basin was added to the Clark County Regional Flood Control District Master Plan in the 1996 Master Plan Update for the Las Vegas Valley. The design of the Vandenberg Detention Basin was completed in July 1999. Currently, the detention basin is 90% completed and should be fully functional by early August 2000.

The hydrology submitted in this CLOMR utilizes the subbasin boundaries from the Vandenberg Pre-Design study but uses existing condition curve numbers. Due to the fact that the contributing areas for some of the combination points exceed 8 square miles, both SDN3 and SDN4 storm distributions were computed (607excl3.dat and 607excl4.dat, respectively). Per the Clark County Regional Flood Control District's Hydrologic Criteria and Drainage Design Manual, a Storm Distribution Number 3 is used for contributing drainage areas between 0 and 8 square miles and a Storm Distribution Number 4 is used for contributing drainage areas between 8 and 12 square miles. **Table 1** summarizes the peak 100-year flows for the existing condition for each subbasin and combination point. Curve number and lag time calculations as well as the existing condition HEC-1 models may be found in **Appendix III**. The methodology used to determine these parameters is the same as what was used in the aforementioned Range Wash studies.

Table 1: HEC-1 Summary Table

SUBBASIN/ COMB. POINT	AREA acres	AREA sq. mi.	DARF	FLOW cfs	SUBBASIN/ COMB. POINT	AREA acres	AREA sq. mi.	DARF	FLOW cfs
306A	537.6	0.84	0.973	405	DETV	5984.0	9.35	0.867	247
306B	1177.6	1.84	0.936	900	307B	313.6	0.49	0.980	411
F5	1715.2	2.68	0.923	1200	G3A	6297.6	9.84	0.862	320
307A	1286.4	2.01	0.930	905	307C	313.6	0.49	0.980	263
DBINW	2995.2	4.68	0.907	1996	307D	192.0	0.30	0.988	369
306D	844.8	1.32	0.957	418	G4	512.0	0.80	0.974	566
306E	236.8	0.37	0.985	220	307E	160.0	0.25	0.990	345
F6	1081.6	1.69	0.942	473	G2	6969.6	10.89	0.854	814
306C	1907.2	2.98	0.920	1437	307F	460.8	0.72	0.976	517
F4	2982.4	4.66	0.907	1675	G3	7430.4	11.61	0.849	1091
DBIN	5984.0	9.35	0.867	2896					

SUBBASIN/COMB. POINT	DARF	STAGE
VANDENBERG DETENTION BASIN	0.867	1930.66

The revised hydrologic analysis for this CLOMR was included to establish flow rates for use in determining the limits of the FEMA Special Flood Hazard Areas between Craig Road and Las Vegas Boulevard. As can be seen on **Figure 1**, two different watersheds are tributary to the flood zone between Craig Road and Las Vegas Boulevard – one downstream of the Vandenberg Detention Basin and one further to the west that drains along Walnut Road. For this reason, it was decided that the impact to the flood zone between Craig and Las Vegas Boulevard should be determined for not only the construction of the Vandenberg Detention Basin but for the flows tributary to this area from the northwestern/Walnut tributary watershed. This CLOMR does not suggest revising the Walnut leg of the flood zone between Craig and the Union Pacific Railroad. However, this area is included in the hydrologic analysis to better determine the flood zone downstream of Craig Road.

The Zone A flood zone between the Vandenberg Detention Basin and Lone Mountain Road is proposed to be removed. The 100-year flow for this reach from the detention basin is contained within the 8'x6' RCB culvert being constructed with the detention basin. The location of the culverts can be seen in the Vandenberg Detention Basin Improvement Plans included in **Appendix V**. The hydraulic analysis for the culverts is included in the Predesign Report for the Vandenberg Detention Basin. Please note that the flow rate used in the hydraulic analysis for the culverts is higher than the flow rate generated from the existing condition HEC-1 model discussed above. The hydraulic analysis was not revised based on the existing condition HEC-1 flow rate since the flow used is higher and still contained within the culvert.

The flow rates generated in the HEC-1 model were used in the HEC-RAS model for the Vandenberg Channel that lies within the median of Vandenberg Drive from Lone Mountain Road to Craig Road and in the normal depth calculations for the existing wash downstream of Craig Road. The HEC-RAS model is excerpted from the *Pre-design Report for the Vandenberg Detention Basin and Associated Collection and Outfall Facilities.* Note that the flow rates used in the HEC-RAS model (included in **Appendix IV**) have been modified from what was used in the Predesign Report based on the existing condition hydrologic analysis included in **Appendix III**. The HEC-RAS program models the performance of the existing Vandenberg Channel from just upstream of Lone Mountain Road to just downstream of Craig Road. The flow rate used includes the discharge from the Vandenberg Detention Basin high-level outlet. For this reach, PBS&J proposes to classify the flood zone as AE based on the water surface elevations determined by the HEC-RAS model (**Figure 29R**). Normal depth calculations were used to delineate a Zone A flood zone for the reach of the wash from Craig Road to Las Vegas

Boulevard. This is consistent with the methodology used in the FIS. The FIS cross sections were updated with the new CLOMR flows and a Zone A flood zone for the wash was determined. Both FIS and CLOMR hydraulic calculations can be found in **Appendix IV**.

There are two sets of work maps (**Figures 29** and **35** and **Figures 29R** and **35R**) included in the beginning of **Appendix IV** which depict the cross section locations and effective and proposed 100-year floodplains for both the 1997 FIS restudy and this CLOMR. **Figures 29** and **35** are excerpted from the 1997 FIS restudy for the Range Wash. These figures show the effective Zone A flood zone established in the FIS between Lone Mountain Road and Las Vegas Boulevard and the cross section locations used in the delineation of the flood zone for the FIS. **Figures 29R** and **35R** are revised to show the proposed Zone AE and Zone A flood zones for this CLOMR. These figures also show the 1997 FIS floodplain boundary and the HEC-RAS and normal depth cross-section locations. Please note that the only portions of the flood zones being revised in this CLOMR (see **Figures 29R** and **35R)** are between the Vandenberg Detention Basin site and Craig Road and then from Alexander Road to Las Vegas Boulevard. No flood zone revisions are proposed at this time for the FEMA Zone A along Walnut Road and upstream of the detention basin site. The portion of FEMA Zone A between Craig Road and Alexander Road was removed in the 1997 FIS and no revisions to this reach are proposed at this time.

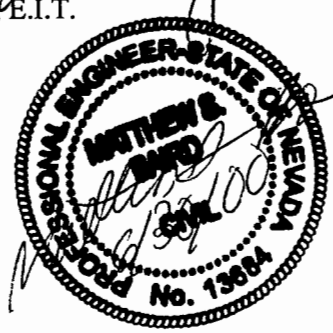
The hydraulic analysis determined that all the 100-year flows are contained within all the storm drains, channels, and natural washes between the Vandenberg Detention Basin and Las Vegas Boulevard. Therefore, all the FEMA Special Flood Hazard areas have been reduced or eliminated in the reach from the Vandenberg Detention Basin to Las Vegas Boulevard. Please contact Matt Baird or myself at 702/263-7275 if you have any questions regarding this CLOMR.

Sincerely,

PBS&J, Inc.

Jennifer E. Doody, E.I.T.
Hydrologist

Matt Baird, P.E.
Project Manager



APPENDIX I

FEMA Forms

Revision Requestor and Community Official – Form 1

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

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

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

1. REQUESTED RESPONSE FROM FEMA

This request is for a:

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

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

☐ Other Describe: _____

2. OVERVIEW

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

☒ Physical Change ☒ Improved Methodology/Data ☐ Floodway Revision

☐ Other Describe: _____

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

2. Flooding Source: Range Wash

3. Project Name/Identifier: Vandenburg Detention Basin Study

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

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

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Ex: 480301 480287	Katy, City Harris County	TX TX	480301 48201C	0005D 0220G	02/08/83 09/28/90
32003 32007	Clark County North Las Vegas, City	NV	320003	2180D	1/28/97
32007	North Las Vegas, City	NV	320003	1790D	1/28/97

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

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

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

4. ENCROACHMENT INFORMATION

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

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

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

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

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

5. MAINTENANCE RESPONSIBILITY

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

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

6. REVIEW FEE

The review fee for the appropriate request category has been included. ☒ Yes Fee amount: $4000

OR

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

Please see Instructions for Fee Amounts

7. SIGNATURE

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

Signature of Revision Requester

Darren Schultz, P.E., Project Manager
Printed Name and Title of Revision Requester

City of North Las Vegas
Company Name

Telephone No.: 702-633-1000 Date: _____

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

Signature of Community Official

Darren Schultz, P.E., Project Manager
Printed Name and Title of Community Official

City of North Las Vegas
Community Name

Telephone No.: 702-633-1000 Date: _____

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

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

Signature

Matthew Baird, P.E., Project Manager
Printed Name and Title of Revision Requester

Registr No. 13684 Expires (Date) January 2001 State Nevada

Type of License/Expertise: Professional Engineer - Civil

Check which forms have been included with this request

Form Name and (Number)	Required if .....
☒ **Hydrologic** (3)	new or revised discharges
☒ **Hydraulic** (4)	new or revised water-surface elevations
☒ **Mapping** (5)	floodplain/floodway changes
☒ **Channelization** (6)	channel is modified
☒ **Bridge/Culvert** (7)	addition/revision of bridge/culvert
☐ **Levee/Floodwall** (8)	addition/revision of levee/floodwall
☐ **Coastal** (9)	new or revised coastal elevations
☐ **Coastal Structures** (10)	addition/revision of coastal structure
☐ **Dam** (11)	addition/revision of dam
☐ **Alluvial Fan** (12)	structures proposed on alluvial fan

Hydrologic Analysis – Form 3

FEDERAL EMERGENCY MANAGEMENT AGENCY **HYDROLOGIC ANALYSIS**	O.M.B No. 3067-0148 Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average **3.67** hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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

Note: Fill out one form for each flooding source studied

Community Name: Clark County, Nevada and Incorporated Areas, City of North Las Vegas

Flooding Source: Range Wash

Project Name/Identifier: Vandenberg Detention Basin Study

1. REASON FOR NEW HYDROLOGIC ANALYSIS

☐ No existing analysis ☒ Improved data ☒ Changed physical condition of watershed

☐ Alternative methodology ☒ Proposed Conditions (CLOMR) ☐ Other

For the reason stated above, please attach a detailed explanation. If a computer program/model was used in revising the hydrologic analysis, **please provide a diskette with the input files** for the same flood recurrence intervals contained in the FIS for that stream; and at least for the 1% annual chance (base) flood where no detailed study exists.

Explanation provided: ☒ Yes ☐ No **Diskettes provided:** ☒ Yes ☐ No

2. METHODOLOGY FOR NEW ANALYSIS

Indicate Method	Required Data	Data Included
☐ Statistical Analysis of Gage Records	Form 3 - Attachment A	☐ Yes ☒ No
☐ Regional Regression Equations	Form 3 - Attachment C	☐ Yes ☒ No
☒ Precipitation/Runoff Model	Form 3 - Attachment D	☒ Yes ☐ No
☐ Other	Back-up computations and supporting data	☐ Yes ☒ No

3. APPROVAL OF ANALYSIS

The hydrologic analysis has already been approved by a local, state, or Federal Agency. ☒ Yes ☐ No ☐ Not Required

If Yes, attach evidence of approval. ☒ **Approval attached.** If No, attach explanation. ☐ **Explanation attached.**

4. COMPARISON OF BASE FLOOD DISCHARGES

Location:	Drainage Area (SqMi)	FIS(cfs)	Revised (cfs)
East Branch of Zone A - Craig to Las Vegas Boulevard	8.75	1550	1091
3- 12'x10' RCBCs at I-15	8.05	1470	247

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

If only a portion of a detailed study area was revised please attach an explanation describing the transition from the proposed discharges to the effective discharges. ☐ **Explanation Included** ☒ **Explanation Not Required**

5. HISTORICAL FLOODING INFORMATION

If historical data are available for the flooding source please provide: Location, peak discharges/water-surface elevations and dates, and source of information. ☐ **Data Attached** ☒ **Data Not Available**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

ATTACHMENT A: STATISTICAL ANALYSIS OF GAGE RECORDS

Gaging Station: _____

Gage Location (latitude and longitude): _____

		FIS:		Revised:	
1.	Number of years of data	_____		_____	
	Systematic	_____		_____	
	Historical	_____		_____	
2.	Homogeneous data	☐ Yes	☐ No	☐ Yes	☐ No
3.	Data adjustments	☐ Yes	☐ No	☐ Yes	☐ No
4.	Number of high outliers	_____		_____	
	Low outliers	_____		_____	
	Zero events	_____		_____	
5.	Generalized skew	_____		_____	
6.	Station skew	_____		_____	
7.	Adopted skew	_____		_____	
8.	Probability distribution used (justify if log-Pearson III was not used)	_____		_____	
9.	Transfer equations to ungaged sites			☐ Yes	☐ No
	If Yes, specify method				
_____					
10.	Expected probability*			☐ Yes	☐ No
11.	Comparison of results with other analyses			☐ Yes	☐ No
	If Yes, describe comparison				
_____					

12. **Attach analysis including plot of flood-frequency curve. Analysis Attached?** ☐ Yes ☐ No

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

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

ATTACHMENT B: CONFIDENCE LIMITS EVALUATION

Stream: _____

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

1. Discharges for selected location:

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

2. 1% Annual Chance (Base) Flood Confidence Intervals

90% Confidence Interval:	5% limit	_____ cfs
	95% limit	_____ cfs
50% Confidence Interval:	25% limit	_____ cfs
	75% limit	_____ cfs

3. If the discharge of the base flood in the FIS is beyond the 50% confidence interval but within the 90% confidence interval, does the base flood elevation change by 1.0 foot or more? ☐ Yes ☐ No

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

4. **Confidence Limits Analysis Attached?** ☐ Yes ☐ No

ATTACHMENT C: REGIONAL REGRESSION EQUATIONS

1. Bibliographical Reference:

_____

_____

_____

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

2. Gaged or ungaged stream: _____

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

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

_____

_____

_____

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

If the answer to 5, 7, or 8 is Yes, explain methdology below. If data are not available, indicate with N/A.

Comments

_____

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

Computation and Supporting Maps provided? ☐ Yes ☐ No

ATTACHMENT D: PRECIPITATION/RUNOFF MODEL

		FIS:	Revised:
1.	Method or model used:	HEC-1	HEC-1
	Version:	———	4.0
	Date:	———	September 1990
2.	Source of rainfall depth:	CCRFCD	CCRFCD
3.	Source of rainfall distribution:	CCRFCD	CCRFCD
4.	Rainfall duration:	6 hours	6 hours
5.	Areal adjustment to precipitation (%):	CCRFCD DARF's	CCRFCD DARF's
6.	Maximum overland flow length	500 ft.	500 ft
7.	Hydrograph development method:	SCS Unit Hydrograph	SCS Unit Hydrograph
8.	Loss rate method:	SCS	SCS
	Source of soils information:	SCS	CCRFCD MPU
	Source of land use information:	———	Muskingum
9.	Channel routing method:	Muskingum	
10.	Reservoir routing:	☐ Yes ☒ No	☒ Yes ☐ No
11.	Baseflow considerations: **If Yes, explain below how baseflow was determined:**	☐ Yes ☒ No	☐ Yes ☒ No
	———		
12.	Snowmelt considerations:	☐ Yes ☒ No	☐ Yes ☒ No
13.	Model calibration: **If Yes, explain below how calibration was performed**	☐ Yes ☒ No	☐ Yes ☒ No
	———		
14.	Future land use condition: **If Yes, explain why below**	☐ Yes ☒ No	☐ Yes ☒ No
	———		

15. **Attach precipitation/runoff model, hydrologic model schematic, curve number calculations, time of concentration calculations, and supporting maps, delineating the watershed boundary and drainage area divides.**

Information and Maps provided? ☒ Yes ☐ No

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

Riverine Hydraulic Analysis – Form 4

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE HYDRAULIC ANALYSIS**	O.M.B No. 3067-0148 Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2.25 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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

Note: Fill out one form for each flooding source studied

Community Name: Clark County, Nevada and Incorporated Areas, City of North Las Vegas

Flooding Source: Range Wash

Project Name/Identifier: Vandenberg Detention Basin Study

1. REACH TO BE REVISED

Describe the limits of the revision OR submit a copy of the FIRM with the revision area clearly highlighted.
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? ☒ Yes

Downstream Limit: _____

Upstream Limit: _____

2. MODELS SUBMITTED

Requirements: for areas which have detailed flooding:	for areas which do not have detailed flooding:
Full input and output listings along with files on diskette for each of the models listed below (items 1-4) and a summary of the source of input parameters used in the models must be provided. The summary must include a description of any changes made from model to model (e.g., Duplicate Effective model to Corrected Effective model). At a minimum, the Duplicate Effective (item 1) and the Revised or Post-Project Conditions (item 4) models must be submitted. See instructions for directions on when other models may be required.	Only the 100-year (Base) flood profile is required. A hydraulic model is not required for areas which do not have detailed flooding; however, BFEs may not be added to the revised FIRM. If a hydraulic model is developed for the area, items 3 and 4 described below must be submitted.

If hydraulic models are not developed, hydraulic analyses (including all calculations) for existing or pre-project conditions and revised or post-project conditions must be submitted.

1. Duplicate Effective Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name** _____

Copies of the hydraulic analysis used in the effective FIS, referred to as the effective models (10-, 50-, 100-, and 500-year multi-profile runs and the floodway run) must be obtained and then reproduced on the requester's equipment to produce the Duplicate Effective model. This is required to assure that the effective models input data has been transferred correctly to the requester's equipment and to assure that the revised data will be integrated into the effective data to provide a continuous FIS model upstream and downstream of the revised reach.

2. Corrected Effective Model ☐ **Natural** **File Name** _____ ☐ **Floodway** **File Name** _____

The Corrected Effective model is the model that corrects any errors that occur in the Duplicate Effective model, adds any additional cross sections to the Duplicate Effective model, or incorporates more detailed topographic information than that used in the currently effective model. The Corrected Effective model must not reflect any man-made physical changes since the date of the effective model. An error could be a technical error in the modeling procedures, or any construction in the floodplain that occurred prior to the date of the effective model but was not incorporated into the effective model.

3. Existing or Pre-Project Conditions Model ☒ **Natural** **File Name** rfis-g7 ☐ **Floodway** **File Name** _____

The Duplicate Effective model or Corrective Effective model is modified to produce the Existing or Pre-Project Conditions model to reflect any modifications that have occurred within the floodplain since the date of the Effective model but prior to the construction of the project for which the revision is being requested. If no modification has occurred since the date of the effective model, then this model would be identical to the Corrected Effective model or Duplicate Effective model.

4. Revised or Post-Project Conditions Model ☒ **Natural** **File Name** 607excl ☐ **Floodway File Name** _____

The Existing or Pre-Project Conditions model (or Duplicate Effective model or Corrected Effective model, as appropriate) is revised to reflect revised or post-project conditions. This model must incorporate any physical changes to the floodplain since the effective model was produced as well as the effects of the project. When the request is for the proposed project this model must reflect proposed conditions.

5. Other – Please attach a sheet describing all other models submitted along with the file names. ☐ **Natural** ☐ **Floodway**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. STARTING WATER-SURFACE ELEVATIONS

Explain how they were determined. Explanation Attached? ☒ Yes ☐ No

NOTE: If the effective study is an approximate study, the slope/area method is recommended. For detailed analysis studies, using a known water-surface elevation is recommended.

4. RESULTS (from the model used to revise the 100-year water surface elevations)

If the results indicate any of the following, attach an explanation - to this form, or to the hydraulic model printout- as to the reasonableness of the situation.

☒ Supercritical depth ☒ Critical Depth ☐ Drawdowns ☐ Negative Floodway Surcharges

☐ Floodway Surcharges Greater Than Maximum Allowed by Community/State

☐ Water surface elevations higher than the end points of cross sections.

☐ Floodway discharge is different than the Natural 100-year (base) flood discharge.

☐ Project causes 100-year floodplain or floodway elevations to increase (state if increases are located off the requester's property)

Explanation attached with Form ☐ **Explanation provided on attached printout** ☐

If Hydraulic model used is HEC-2, has it been checked with FEMA'S CHECK-2 computer program? ☐ **Yes** ☒ **No**
(see instructions for information on how to obtain CHECK-2)

5. REVISED FIRM/FBFM AND FLOOD PROFILES

1. Profile Transition

a. 100-Year Water-Surface Elevations - indicate the difference in water surface elevations where the project 100-year elevations tie into the existing 100-year water surface elevations at each end of the project.

Downstream End _____ within _____ (feet) Upstream End _____ within _____ (feet)
Cross-Section # *Cross-Section #*

b. Floodway Elevations - indicate the difference in water surface elevations where the project floodway elevations tie into the existing floodway water surface elevations at each end of the project.

Downstream End _____ within _____ (feet) Upstream End _____ within _____ (feet)
Cross-Section # *Cross-Section #*

c. Floodway widths - indicate the difference in floodway widths where the project floodway widths tie into the existing floodway width at each end of the project.

Downstream End _____ within _____ (feet) Upstream End _____ within _____ (feet)
Cross-Section # *Cross-Section #*

2. Profile Checklist (check box if information has been provided on profile)

The following information (unless in parentheses) must be included at the same scale as the existing profiles for this project:

☒ Stream Name ☐ Community Name ☐ Corporate Limits labeled ☐ Study limits labeled

☐ Confluences labeled ☒ Channel Stationing ☒ Streambed profiled ☒ Cross Sections labeled

☒ Horizontal/Vertical Scales indicated ☒ 100-year elevs profiled*

☒ Road Crossings ☐ Labeled ☐ Low Chord Elevations ☐ Top of Road Elevations

*All recurrence intervals in the effective study must also be profiled.

Floodway Data Table

Attach a Floodway Data Table for each cross section listed in the published Floodway Data table in the FIS report.

Floodway Data Table Attached ☐ **Yes** ☒ **Not Required**

Riverine/Coastal Mapping – Form 5

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE / COASTAL MAPPING**	O.M.B No. 3067-0148 Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1.5 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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

Note: Fill out one form for each flooding source studied

Community Name: Clark County, Nevada and Incorporated Areas, City of North Las Vegas

Flooding Source: Range Wash

Project Name/Identifier: Vandenberg Detention Basin Study

This is a ☒ Manual ☐ Digital submission. *Digital map submissions may be used to update digital FIRMs (DFIRMs). For updating DFIRMs, these submissions must be coordinated with FEMA Headquarters as far in advance as possible.*

1. MAPPING CHANGES

1. A topographic workmap must be submitted showing the following information (check N/A when not applicable):

a. Revised approximate 100-year floodplain boundaries (Zone A)	☒ Yes	☐ No	☐ N/A
b. Revised detailed 100- and 500-year floodplain boundaries.	☐ Yes	☐ No	☒ N/A
c. Revised floodway boundaries	☐ Yes	☐ No	☒ N/A
d. Location and alignment of all cross sections with stationing control indicated.	☒ Yes	☐ No	☐ N/A
e. Stream alignments, road alignments and dam alignments.	☒ Yes	☐ No	☐ N/A
f. Current community boundaries.	☒ Yes	☐ No	☐ N/A
g. Effective 100- year floodplain and floodway boundaries from FIRM/FBFM reduced or enlarged to the scale of the topographic workmap	☒ Yes	☐ No	☐ N/A
h. Tie-ins between the effective and revised 100-, 500-year and floodway boundaries	☐ Yes	☐ No	☒ N/A
i. The requester's property boundaries and community easements	☐ Yes	☐ No	☒ N/A
j. The signed certification of a registered professional engineer	☒ Yes	☐ No	☐ N/A
k. Location and description of reference marks	☐ Yes	☐ No	☒ N/A
l. Vertical datum (example: NGVD, NAVD)	☒ Yes	☐ No	☐ N/A
m. Coastal zone designations tie into adjacent areas not being revised	☐ Yes	☐ No	☒ N/A
n. Location and alignment of all coastal transects used to revise the coastal analyze	☐ Yes	☐ No	☒ N/A
o. V-zone has been delineated to extend landward to the heel of the primary frontal dune	☐ Yes	☐ No	☒ N/A

If any items are marked No or N/A please attach an explanation.

2. What is the source and date of the updated topographic information (example: orthophoto maps, July 1985; filed survey, May 1979, beach profile, June 1987 etc.)? orthophoto map 3/15/95

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

Effective FIS Scale 1"=400' Contour Interval 4 ft.

Revision Request Scale 1"=400' Contour Interval 2 ft.

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

4. Attach an annotated FIRM/FBFM at the scale of the effective FIRM/FBFM showing the revised 100- and 500-year floodplain and the floodway boundaries and how they tie into those shown on the effective FIRM/FBFM downstream and upstream of the revisions or adjacent to the area of revision for coastal studies. **FIRM/FBFM attached?** ☒ **Yes** ☐ **No**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. EARTH FILL PLACEMENT

1. The fill is: ☐ Existing ☒ Proposed

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

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

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

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

If Yes, justify steeper slopes _____

b. Is adequate erosion protection provided for fill slopes exposed to moving flood waters? (*Slopes exposed to flows with velocities of up to 5 feet per second (fps) during the 100-year flood must, at a minimum, be protected by a cover of grass, vines, weeds, or similar vegetation; slopes exposed to flows with velocities greater than 5 fps during the 100-year flood must, at a minimum, be protected by stone or rock riprap.)*

☐ Yes ☐ No

If No, describe erosion protection provided _____

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

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

If Yes, attach certification of fill compaction (item 3c. above) by the community's NFIP permit official, a registered professional engineer, or an accredited soils engineer in accordance with Subparagraph 65.5(a)(6) of the NFIP regulations.

Fill certification attached ☐ **Yes** ☐ **No**

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

If Yes, is the fill protected from erosion by a flood control structure such as a revetment or seawall?

☐ Yes ☐ No

If Yes, attach the Coastal Structures Form (Form 10).

Channelization – Form 6

FEDERAL EMERGENCY MANAGEMENT AGENCY **CHANNELIZATION**	O.M.B. Burden No. 3067-0148 Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1.75 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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

Community Name: Clark County, Nevada and Incorporated Areas, City of North Las Vegas

Flooding Source: Range Wash

Project Name/Identifier: Vandenberg Detention Basin Study

1. REACH TO BE REVISED

Describe the limits of the revision **OR** submit a copy of the FIRM with the revision area clearly highlighted.
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? ☒ Yes

Downstream Limit: _____

Upstream Limit: _____

2. CHANNEL DESCRIPTION

Attach the following information about the channel (check box if information has been provided):

☐ Description of the inlet and outlet

☒ Description of the shape of the channel *(both cross sectional and planimetric configuration)* and its lining *(channel bottom and sides)*:

3. ACCESSORY STRUCTURES

The channelization includes:

☐ Levees *(Attach Levee/Floodwall System Analysis Form - Form 8)*
☐ Drop structures
☐ Superelevated sections
☒ Transitions in cross sectional geometry
☒ Debris basin/detention basin
☐ Energy dissipater
☐ Other (Describe):

4. DRAWING CHECKLIST

Attach the plans of the channelization certified by a registered professional engineer. The plan detail and information should include (check box if information has been provided):

☒ Channel alignment and locations of inlet, outlet, and accessory structures

☒ Channel lining

☒ Typical cross sections and profiles of channel banks and invert

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

5. HYDRAULIC CONSIDERATIONS

1. The channel was designed to carry 200 (cfs) and/or the 100-year flood.

2. The design elevation in the channel based on:

   ☒ Subcritical flow

   ☐ Critical flow

   ☒ Supercritical flow

   ☐ Energy grade line

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

Inlet to channel?	☐ Yes
Outlet of channel?	☐ Yes
At Drop Structures?	☐ Yes
At Transitions?	☒ Yes
Other locations?	☒ Yes

Explanation Attached? ☐ **Yes** ☐ **No** ☒ **N/A**

6. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood water-surface elevations, then provide the following information **(Check the box if provided):**

☐ Estimated sediment load

☐ Method used to estimate sediment transport

☐ Method used to estimate scour and/or deposition

☐ Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

Bridge/Culvert – Form 7

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT**	O.M.B. Burden No. 3067-0148 Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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

Community Name: Clark County, Nevada and Incorporated Areas, City of North Las Vegas

Flooding Source: Range Wash

Project Name/Identifier: Vandenberg Detention Basin Study

1. IDENTIFIER

1. Name of structure (roadway, railroad, etc.): Intermediate Culvert #2, Intermediate Culvert #2, and Craig Road Culvert

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):

   Station 46+50, Station 53+37.50, and 56+00

3. This revision reflects (check one of the following):

   ☒ New bridge/culvert not modeled in the FIS

   ☐ Modified bridge/culvert previously modeled in the FIS

   ☐ New analysis of bridge/culvert previously modeled in the FIS

4. Hydraulic model used to analyze the structure *(e.g., HEC-2 with special bridge routine, WSPRO, HY8)*

   HEC-RAS

   If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

   Justification attached ☐ **Yes** ☐ **No** ☒ **N/A**

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. DRAWING CHECKLIST

Attach plans of the structure(s) certified by a registered professional engineer. The plan detail and information should include the following (check the boxes if the information has been provided):

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

3. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information **(Check the box if provided):**

- ☐ Estimated sediment load
- ☐ Method used to estimate sediment transport
- ☐ Method used to estimate scour and/or deposition
- ☐ Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

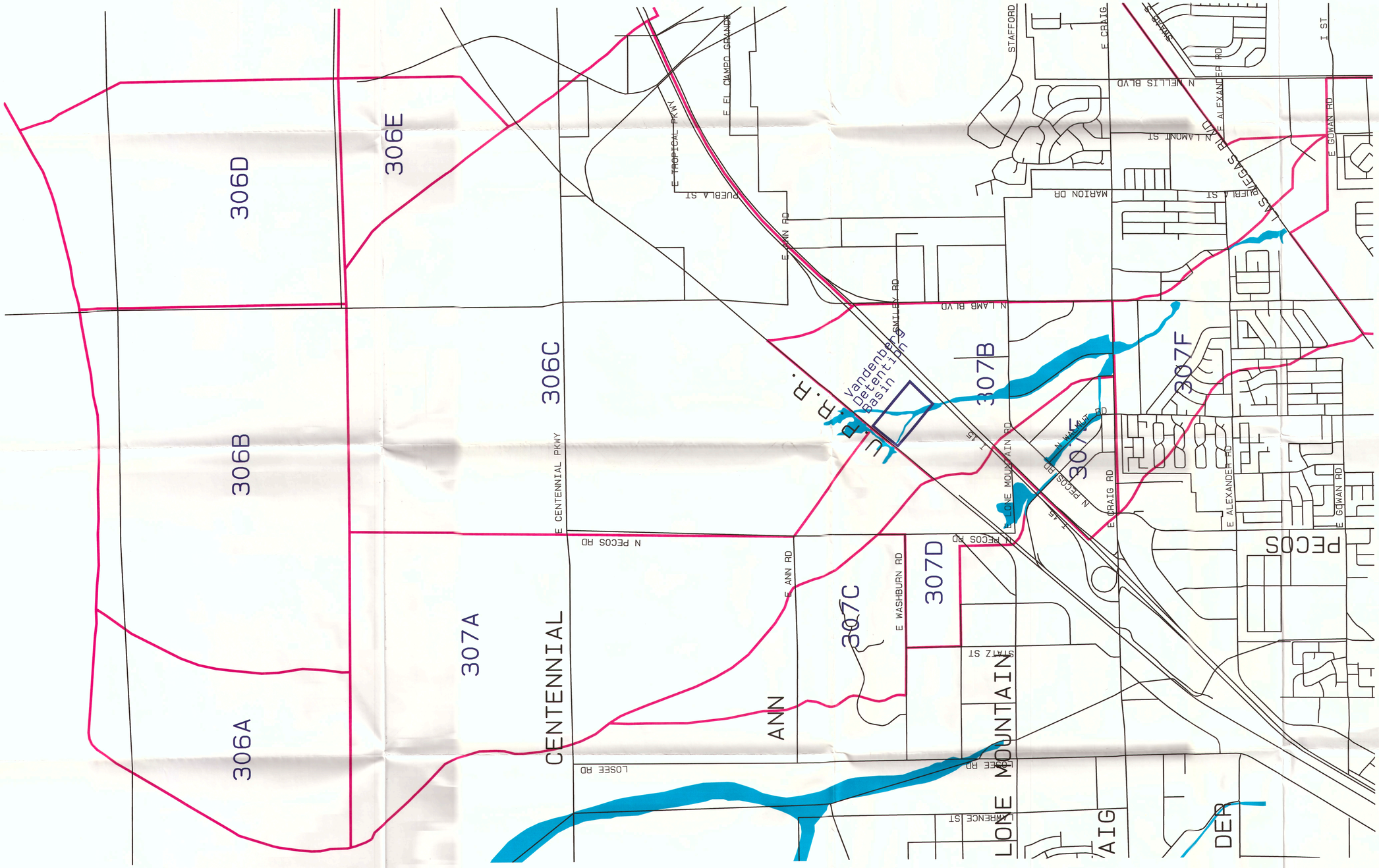
APPENDIX II

Figures

Existing FEMA Flood Zone Map

Figure 1:

Existing DFIRM



Drainage Subbasin Boundaries

Existing FEMA Flood Zone A (as revised in 1997 FIS)

1 INCH = 1200 FEET

PBS&J
ENGINEERING PLANNING GIS SURVEYING CONSTRUCTION SERVICES
901 North Green Valley Parkway, Suite 100
Henderson, Nevada 89014-6139
Phone: 702/263-7275
Fax: 702/263-7200

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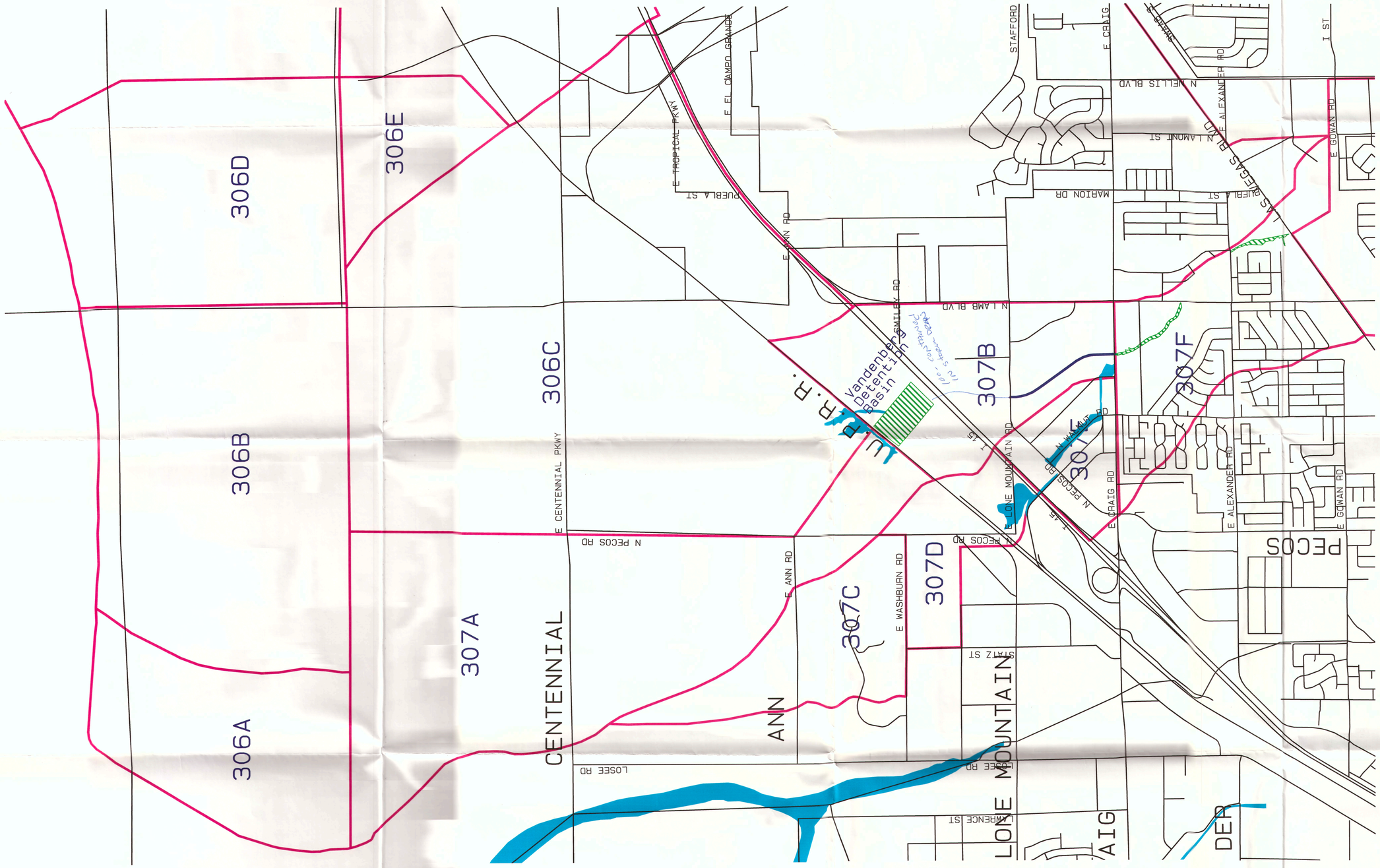
Figure 2:

Annotated DFIRM



- Drainage Subbasin Boundaries
- Existing FEMA Flood Zone A (as revised in 1997 FIS)
- Proposed FEMA Flood Zone AE
- Proposed FEMA Flood Zone A

N E S W

1 INCH = 1200 FEET

PBS&J
901 North Green Valley Parkway, Suite 100
Henderson, Nevada 89014-6139
Phone: 702/263-7275
Fax: 702/263-7200
ENGINEERING PLANNING GIS SURVEYING CONSTRUCTION SERVICES

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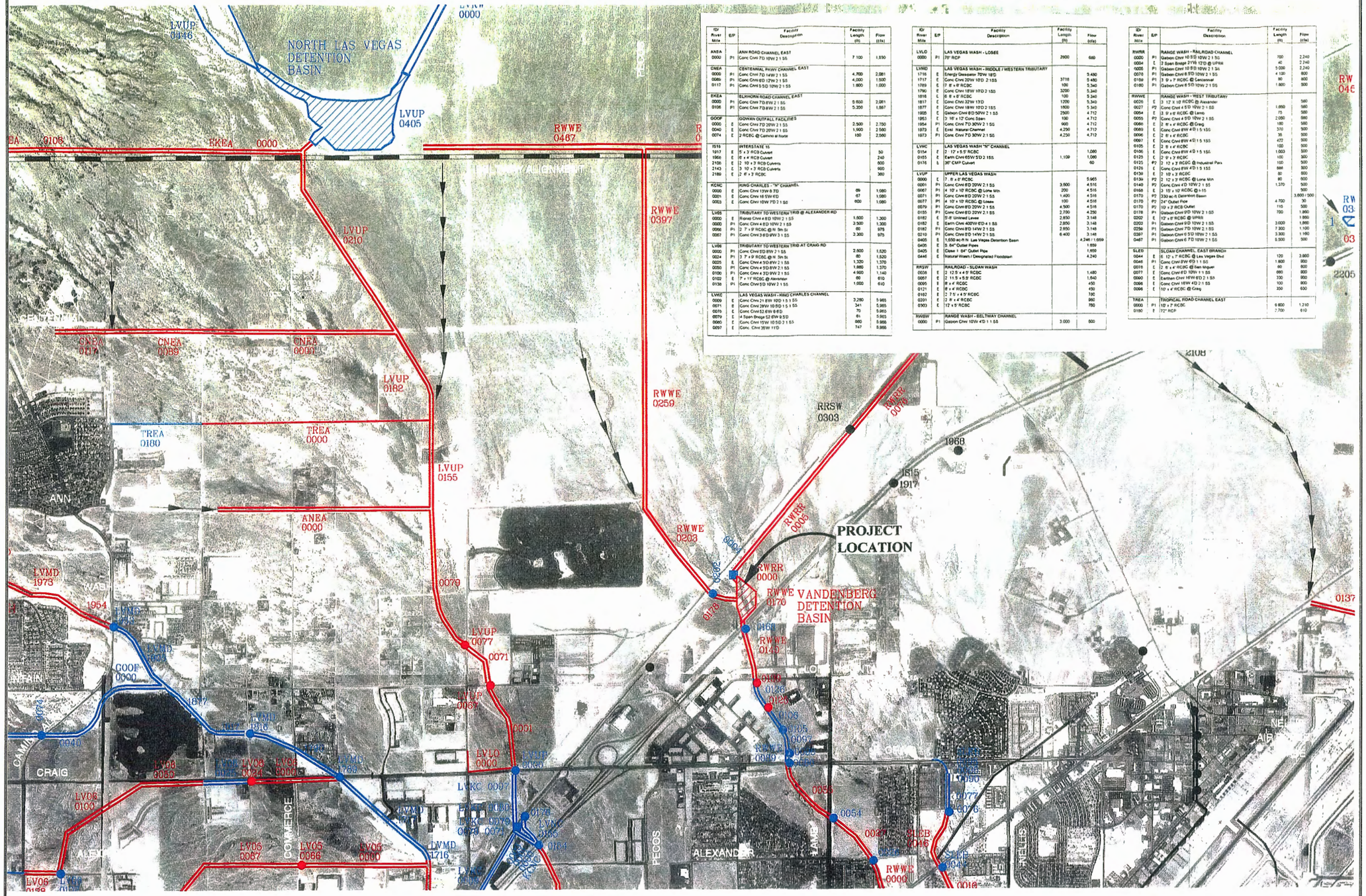
CCRFCD Master Plan Update Facilities Map



ID/ River Mile	E/P	Facility Description	Facility Length (ft)	Flow (cfs)
ANEA 0000	P1	ANN ROAD CHANNEL EAST Conc Cnvt 7D 10W 2 1 SS	7 100	1,550
CNEA 0000	P1	CENTENNIAL PKWY CHANNEL EAST Conc Cnvt 7D 14W 2 1 SS	4,700	2,081
0089	P1	Conc Cnvt 6D 12W 2 1 SS	4,000	1,500
0117	P1	Conc Cnvt 5 5D 10W 2 1 SS	1,800	1,000
EKEA 0000	P1	ELKHORN ROAD CHANNEL EAST Conc Cnvt 7D 8W 2 1 SS	5 600	2,081
0106	P1	Conc Cnvt 7D 8W 2 1 SS	5,350	1,887
GOOF 0000	E	GOWAN OUTFALL FACILITIES Conc Cnvt 7D 20W 2 1 SS	2,500	2,750
0040	E	Conc Cnvt 7D 20W 2 1 SS	1,500	2,500
0074	E	2 RCBC @ Camino al Norte	100	2,500
I515 1917	E	INTERSTATE 15 5 x 3 RCB Culvert		50
1956	E	6 x 4 RCB Culvert		240
2106	E	10 x 3 RCB Culverts		600
2143	E	10 x 3 RCB Culverts		600
2189	E	6' x 3' RCBC		360
KCNC 0000	E	KING CHARLES - "N" CHANNEL Conc Cnvt 13W 9 7D	69	1,080
0060	E	Conc Cnvt 16 5W 6D	67	1,080
0063	E	Conc Cnvt 10W 7D 7 1 SS	600	1,080
LV05 0000	E	TRIBUTARY TO WESTERN TRIB @ ALEXANDER RD Riprap Cnvt 4 8D 10W 2 1 SS	1,500	1,300
0002	P1	Conc Cnvt 4 8D 10W 2 1 SS	2,300	1,300
0056	P1	2' 7 x 9' RCBC @ N 5th St	60	975
0061	P1	Conc Cnvt 3 6D 9W 3 1 SS	2,300	975
LV06 0000	P1	TRIBUTARY TO WESTERN TRIB AT CRAIG RD Conc Cnvt 5D 8W 2 1 SS	2,500	1,520
0024	P1	3' 7 x 9' RCBC @ N 5th St	60	1,520
0025	E	Conc Cnvt 4 5D 8W 2 1 SS	1,320	1,370
0050	P1	Conc Cnvt 4 5D 8W 2 1 SS	1,860	1,370
0100	P1	Conc Cnvt 4 3D 9W 2 1 SS	4 900	1,140
0102	P1	7' 11" RCBC @ Allenridge	60	610
0138	P1	Conc Cnvt 5D 10W 2 1 SS	1,000	610
LVKC 0009	E	LAS VEGAS WASH - KING CHARLES CHANNEL Conc Cnvt 21 8W 10D 1 5 1 SS	3,280	5,965
0071	E	Conc Cnvt 28W 10 6D 1 5 1 SS	341	5,965
0075	E	Conc Cnvt 52 6W 8 6D	70	5,965
0078	E	4 Span Bridge 52 6W 9 5D	81	5,965
0080	E	Conc Cnvt 15W 10 5D 2 1 SS	860	5,966
0097	E	Conc Cnvt 35W 11D	747	5,966

ID/ River Mile	E/P	Facility Description	Facility Length (ft)	Flow (cfs)
LVLD 0000	P1	LAS VEGAS WASH - LOSEE 78" RCP	2900	680
LVMD 1716	E	LAS VEGAS WASH - MIDDLE / WESTERN TRIBUTARY Energy Dissipator 78"W 18"D		5,480
1717	E	Conc Cnvt 20W 10D 2 1SS	3718	5,480
1769	E	9' 6" x 6' RCBC	100	5,340
1790	E	Conc Cnvt 18W 10D 2 1SS	3200	5,340
1816	E	6' 6 x 6' RCBC	100	5,340
1817	E	Conc Cnvt 32W 13D	1700	5,340
1877	E	Conc Cnvt 18W 10D 2 1SS	1800	5,340
1908	E	Gibson Cnvt 8 D 50W 2 1 SS	2500	4,712
1953	E	16' x 12' Conc Span	100	4,712
1954	P1	Conc Cnvt 7D 30W 2 1 SS	900	4,712
1973	E	Exist Natural Culvert	4,250	4,712
1973	P1	Conc Cnvt 7D 30W 2 1 SS	4,250	4,712
LVMC 0154	E	LAS VEGAS WASH "N" CHANNEL 2 12' x 5.5' RCBC		1,080
0155	E	Earth Cnvt 65W 5D 2 1SS	1,100	1,080
0176	L	36" CMP Culvert		60
LVUP 0000	E	UPPER LAS VEGAS WASH 7 - 8 x 6' RCBC		5,965
0001	P1	Conc Cnvt 8D 20W 2 1 SS	3,600	4,516
0067	P1	4 10' x 10' RCBC @ Lone Mtn	200	4,516
0071	P1	Conc Cnvt 8D 20W 2 1 SS	1,400	4,516
0077	P1	4 10' x 10' RCBC @ Lowes	100	4,516
0079	P1	Conc Cnvt 8D 20W 2 1 SS	4 500	4,516
0155	P1	Conc Cnvt 8D 20W 2 1 SS	2,700	4,250
0182	E	5'-8' Unlined Levee	2,850	3,148
0182	E	Earth Cnvt 40DW 6D 4 1 SS	2,850	3,148
0182	P1	Conc Cnvt 8D 14W 2 1 SS	2,850	3,148
0210	P1	Conc Cnvt 8D 14W 2 1 SS	6 400	3,148
0405	E	1,650 ac-ft N Las Vegas Detention Basin		4,246 / 1,659
0405	E	5 84" Outlet Pipes		1,659
0405	E	Culvert 1 84" Outlet Pipe		1,659
0446	E	Natural Wash / Designated Floodplain		4,240
RRSW 0038	E	RAILROAD - SLOAN WASH 2 12.5' x 4.5' RCBC		1,480
0057	E	2 11.5' x 5.5' RCBC		1,540
0095	E	8' x 4' RCBC		450
0121	E	6' x 4' RCBC		450
0182	E	2 7.5' x 4.5' RCBC		760
0220	E	2 8' x 4' RCBC		860
0303	E	12' x 5' RCBC		760
RWSW 0000	P1	RANGE WASH - BELTWAY CHANNEL Gibson Cnvt 10W 4D 1 1 SS	3,000	600

ID/ River Mile	E/P	Facility Description	Facility Length (ft)	Flow (cfs)
RWRR 0000	P1	RANGE WASH - RAILROAD CHANNEL Gibson Cnvt 10 5D 10W 2 1 SS	700	2,240
0004	E	2 Span Bridge 21W 12D @ UPRR	40	2,240
0005	P1	Gibson Cnvt 10 8D 10W 2 1 SS	5,000	2,240
0078	P1	Gibson Cnvt 8 5D 10W 2 1 SS	4 100	800
0159	P1	3 9' x 7' RCBC @ Sandamar	80	800
0165	P1	Gibson Cnvt 6 5D 10W 2 1 SS	1,800	500
RWWE 0035	E	RANGE WASH - WEST TRIBUTARY 3 12' x 10' RCBC @ Alexander		580
0027	P2	Conc Cnvt 4 5D 10W 2 1 SS	1,850	580
0054	E	3 9' x 6' RCBC @ Lamb	75	580
0055	P2	Conc Cnvt 4 5D 10W 2 1 SS	2,050	580
0086	E	2 6' x 4' RCBC @ Craig	100	580
0089	E	Conc Cnvt 8W 4 D 1 5 1SS	310	500
0096	E	2 6' x 4' RCBC	35	500
0097	E	Conc Cnvt 8W 4 D 1 5 1SS	472	500
0105	E	2 6' x 4' RCBC	100	500
0106	E	Conc Cnvt 8W 4 D 1 5 1SS	1,603	500
0125	E	2 6' x 3' RCBC	100	500
0125	P2	2 12' x 3' RCBC @ Industrial Park	100	500
0126	E	Conc Cnvt 8W 4 D 1 5 1SS	898	500
0139	E	2 10' x 3' RCBC	80	500
0139	P2	2 12' x 3' RCBC @ Lone Mtn	80	500
0140	P2	Conc Cnvt 4 D 10W 2 1 SS	1,370	500
0168	E	3 15' x 10' RCBC @ I-15		500
0170	P2	330 ac-ft Detention Basin		3,600 / 500
0170	P2	24" Outlet Pipe	4 700	30
0170	P2	10' x 3' RCB Outlet	115	500
0178	P1	Gibson Cnvt 9 D 10W 2 1 SS	700	1,860
0202	E	12' x 9' RCBC @ UPRR		1,860
0203	E	Gibson Cnvt 8 D 10W 2 1 SS	3,600	1,860
0256	P1	Gibson Cnvt 7D 10W 2 1 SS	7 300	1,100
0267	P1	Gibson Cnvt 6 5D 10W 2 1 SS	3,300	1,160
0487	P1	Gibson Cnvt 6 7D 10W 2 1 SS	5,500	500
SLEB 0044	E	SLOAN CHANNEL EAST BRANCH 6 12' x 7' RCBC @ Las Vegas Blvd	120	3,860
0046	P1	Conc Cnvt 9W 4 D 1 1 SS	1,800	950
0018	E	2 6' x 4' RCBC @ San Miguel	80	800
0077	E	Conc Cnvt 6 D 10W 1 1 SS	690	800
0080	E	Earthen Cnvt 16W 6D 2 1 SS	330	800
0086	E	Conc Cnvt 16W 4D 2 1 SS	100	800
0094	E	10' x 4' RCBC @ Greg	200	630
TREA 0000	P1	TROPICAL ROAD CHANNEL EAST 10' x 7' RCBC	6 600	1,210
0180	E	72" RCP	7 700	610

PHOTOS BY LANDISCOR
DATED: AUGUST 1995

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	

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

FLOOD CONTROL MASTER PLAN UPDATE LAS VEGAS VALLEY 1996

LEGEND

- EXISTING MASTER PLAN FACILITIES
- PROPOSED MASTER PLAN FACILITIES
- LOCAL OR UNSTUDIED FACILITIES
- DETENTION/DEBRIS BASIN
- CULVERT
- BRIDGE
- PIPELINE
- LINED CHANNEL
- UNLINED CHANNEL
- DIKE
- NATURAL WASH
- ULTIMATE DEVELOPMENT BOUNDARY
- SECONDARY FACILITIES

GRAPHIC SCALE

3000 1500 0 1000 2000 3000
(IN FEET)
SCALE: 1 INCH = 3000 FEET

FLOOD CONTROL FACILITIES

FIGURE F-7

POST, BUCKLEY, SCHUH & JERNIGAN, INC.

VTN nevada

FIGURE 3

Vandenberg Watershed Basin Map

306A

306B

306D

306E

307A

306C

307C

307D

307B

307E

307F

Vandenberg Detention Basin

UPRR

I-15

E LONE MOUNTAIN RD

N WALNUT RD

E CRAIG RD

E ALEXANDER RD

LAS VEGAS BLVD

Figure 4:
Vandenberg
Watershed

Basin Boundaries

1 INCH = 1200 FEET

d:\westrange\westrange.gra

APPENDIX III

Hydrology

Developed Conditions Hydrologic Parameters

Soils Data

The SCS methodology divides soils into four hydrological groups defined below:

A – High infiltration rate, low runoff potential
B – Moderate infiltration rate, moderately low runoff potential
C – Slow infiltration rate, moderately high runoff potential
D – Very slow infiltration rate, high runoff potential

The soil classification for this site was obtained from the CCRFCD MPU, which compiled the soil information in a GIS format. This GIS format produced the soils map that displays the soil classifications and hydrologic soil groups for the study area (see **Figure 5**).

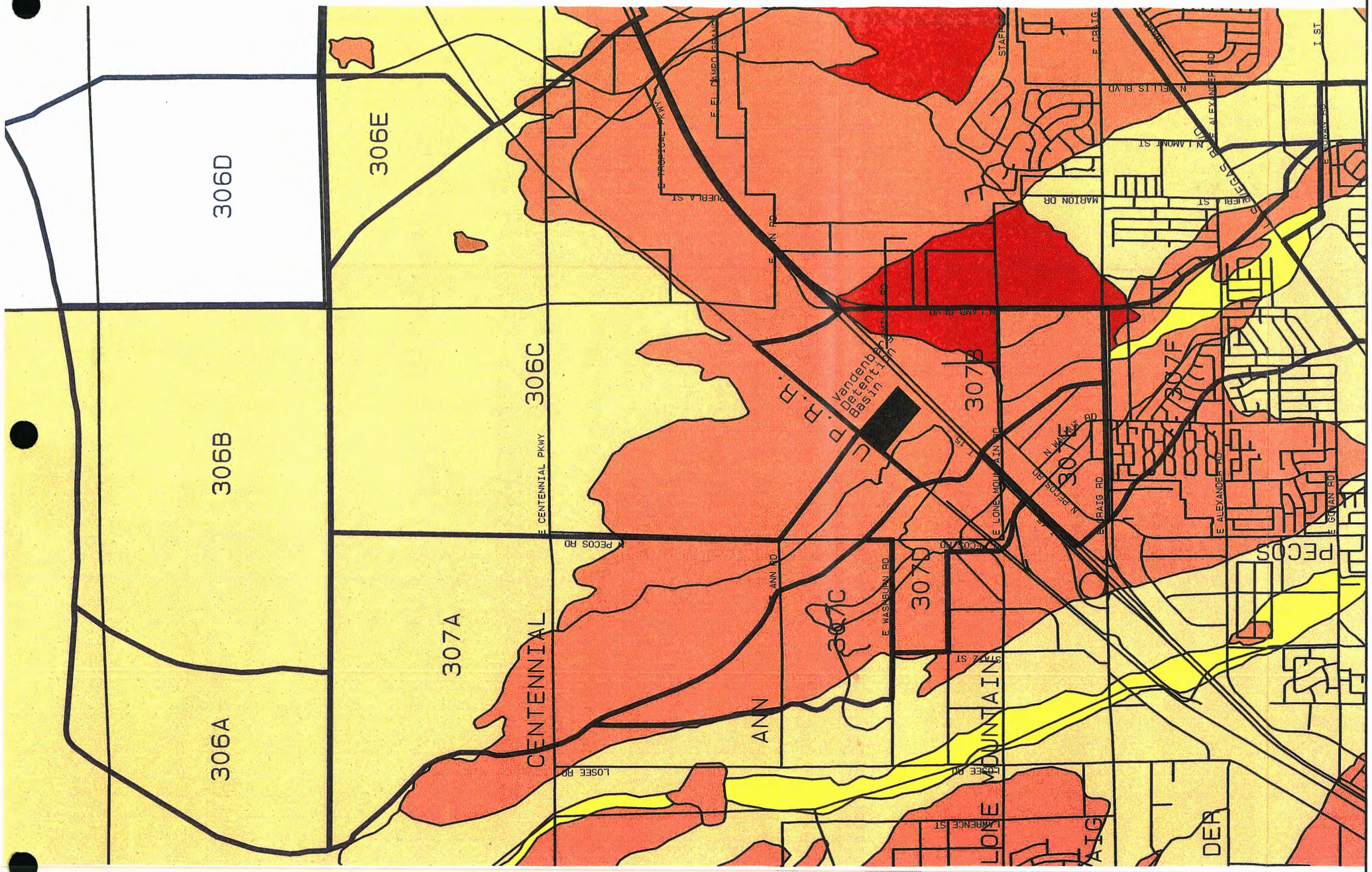
Land Use Data

Figure 6 is a land use map from the CCRFCD MPU for the Vandenberg Watershed. The land use map has 16 categories of land use that are summarized in **Land Use Categories Table** . Each category is defined by a specified percentage of amount of impervious area, amount of ground cover (good hydrologic condition), and amount of desert shrub (poor hydrologic condition). A matrix is developed that defines a curve number for a given soil classification and a given land use.

Land Use Categories Table

Description	Directly Connected Impervious (%)	Landscaped (%)	Desert Shrub (%)
Area Outside Ultimate Development Boundary	0	0	100
Undeveloped Land	0	0	100
Parks, Golf Courses	5	85	10
Airport, Non-landscaped Parks	5	10	85
Rural Residential - Low Density	20	20	60
Rural Residential - Medium Density	25	40	35
Medium Low Density Residential	25	75	0
Medium High Density Residential	38	62	0
High Density Residential, Mobile Home Parks	65	35	0
Multi-family Public Facility	70	30	0
Commercial	90	10	0
Industrial - Low Impervious	70	15	15

FIGURE 5
Vandenberg Watershed Soils



Basin Boundaries

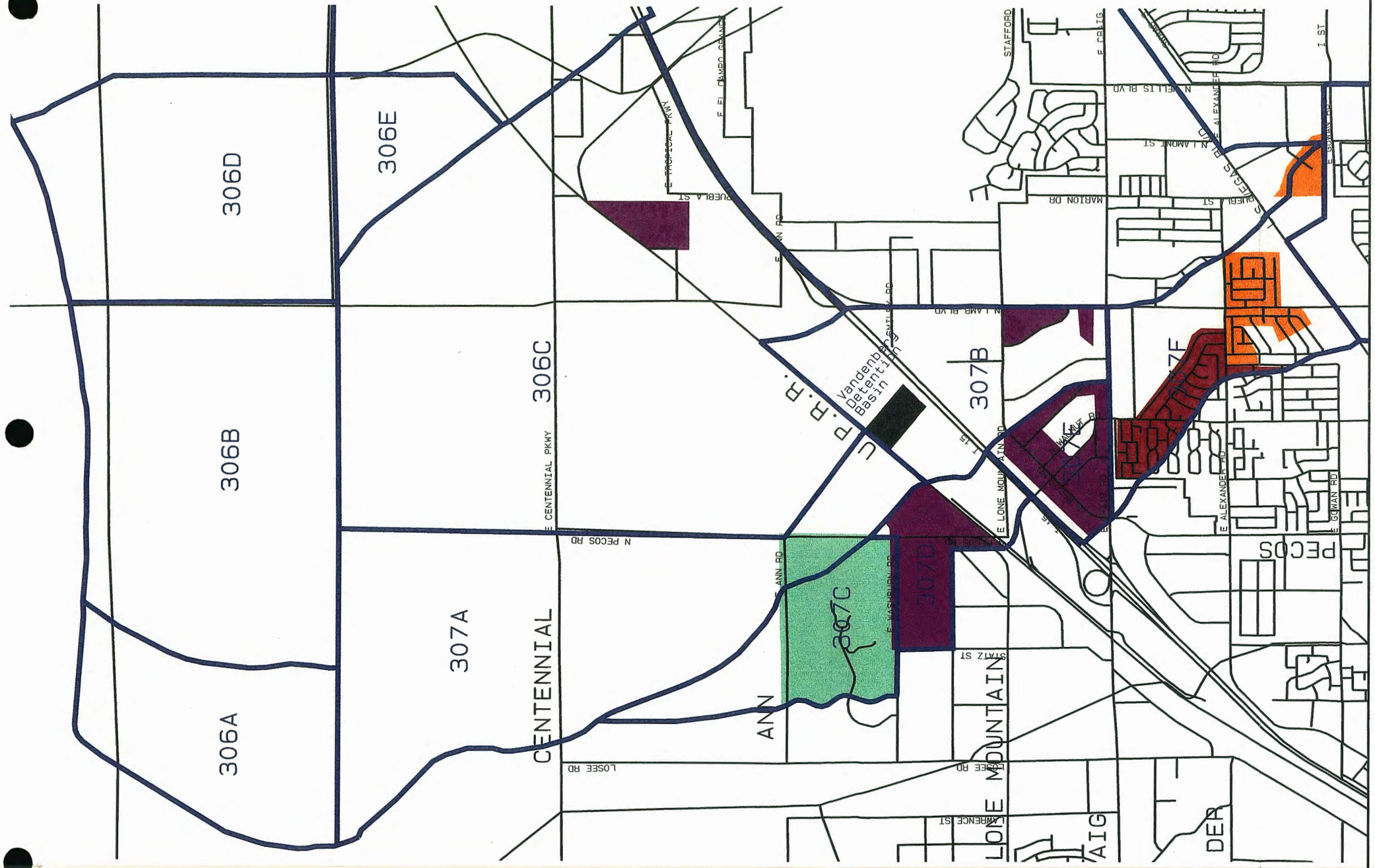
- Group A
- Group B
- Group C
- Group D

1 INCH = 2400 FEET

PBSJ
901 North Green Valley Parkway, Suite 100
Henderson, Nevada 89014-6139
Phone: 702/263-7275
Fax: 702/263-7209
ENGINEERING PLANNING GIS SURVEYING CONSTRUCTION SERVICES

d:\westrange\vandsoilr.gra

FIGURE 6
Vandenberg Watershed Landuse



Basin Boundaries

- Undeveloped Land
- Parks, Golf Courses
- Rural Residential
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Public Facility
- Commercial Retail,Casino (High Imp)
- Industrial (Low Imp.)
- Industrial (High Imp.)

N E S W

1 INCH = 2400 FEET

PBSJ
901 North Green Valley Parkway, Suite 100
Henderson, Nevada 89014-6139
Phone: 702/263-7275
Fax: 702/263-7200
ENGINEERING PLANNING GIS SURVEYING CONSTRUCTION SERVICES

d:\westrange\vandlur.gra

LAG TIME CALCULATIONS

VANDENBERG DETENTION BASIN CLOMR

INPUT												CALCULATED												
BASIN	AREA	CN	CALC	S ave.	S init.	L tot.	Lc	URB	n	CHAN	Q	K	L init.	Ti	Q	y	V	Tt	Tc CALCD	Tc CHECK	Tc	LAG Tc	LAG_{USBR}	LAG
306A	0.841	77	Y	0.0135	0.0100	8250	4125	Y	0.025	M	0	0.626	300	14.77	562	0.52	5.24	25.27	40.04	55.83	40.04	0.40	0.26	0.40
306B	1.837	77	Y	0.0126	0.0200	11500	5750	Y	0.025	M	0	0.626	300	11.72	1227	0.70	6.21	30.05	41.77	73.89	41.77	0.42	0.33	0.33
306C	2.976	78.9	Y	0 0102	0.0100	14378	7189	Y	0.025	M	0	0.651	300	13.98	2180	0.91	6.62	35.42	49.40	89.88	49.40	0 49	0.40	0.40
306D	1.316	77	Y	0.0203	0.0340	9500	4750	N	0.07	M	0	0.626	500	12.68	776	0.38	4.28	35.07	47.75	62.78	47.75	0.48	0.75	0.75
306E	0.372	77	Y	0.0200	0.0200	5000	2500	Y	0.025	M	0	0.626	300	11.72	248	0.35	4.95	15.81	27.53	37.78	27.53	0.28	0.18	0.28
307A	2.006	79.6	Y	0.0071	0.0100	19060	9530	Y	0.025	S	0	0.661	300	13.70	1517	1.43	7.47	41.86	55.55	115.89	55.55	0.56	0.51	0.51
307B	0.490	83.7	Y	0.0083	0.0100	6000	3000	Y	0.025	S	0	0.715	300	12.01	439	0.87	5.81	16.35	28.36	43.33	28.36	0.28	0.23	0.28
307C	0.492	77.2	Y	0 0113	0.0100	7667	3833.5	Y	0.025	S	0	0.629	300	14.68	332	0.74	6.08	20.19	34.87	52.59	34.87	0.35	0.26	0.35
307D	0.304	90.9	Y	0.0084	0.0100	5887	2943.5	Y	0.025	S	0	0.810	300	9.05	347	0.79	5.50	16.93	25.97	42.71	25.97	0.26	0.23	0.26
307E	0 254	92.5	Y	0.0068	0.0100	4400	2200	Y	0.025	S	0	0.831	300	8.39	304	0.79	4.92	13.90	22.28	34.44	22.28	0.22	0.19	0 22
307F	0.721	80.2	Y	0.0080	0.0100	5000	2500	Y	0.02	S	0	0.669	300	13.45	560	0.96	6.09	12 87	26.31	37.78	26.31	0.26	0.16	0.26

Range Wash FIS HEC-1 Model (rfis-g7.dat)

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*          SEPTEMBER 1990               *
*           VERSION 4.0                 *
*                                       *
*  RUN DATE  01/31/1996  TIME  10:18:05 *
*                                       *
*****************************************
```


```
*****************************************
*                                       *
*    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                    RANGE WASH - FLOOD INSURANCE RESTUDY
    2     ID               FOR: CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
    3     ID                  BY: POST, BUCKLEY, SCHUH & JERNIGAN, INC.
    4     ID                              JOB. NO. 51804
    5     ID                          HEC-1 FILE: RFIS-G7.DAT
    6     ID                              JANUARY 1996
    7     ID
    8     ID          EXISTING CONDITIONS WITH WEST RANGE WASH DIVERSION DIKE
    9     ID                    STORM CENTERING FOR NODES F4 AND F3
   10     ID             STORM CENTERING FOR NODES G4, G7, G1 AND G3
   11     ID
   12     ID   ************************************************************************
   13     ID   *             FROM: CCRFCD LAS VEGAS VALLEY MASTER PLAN UPDATE         *
   14     ID   *                          RANGE WASH WATERSHED                        *
   15     ID   *               JAMES M. MONTGOMERY, CONSULTING ENGINEERS, INC.        *
   16     ID   *                              JANUARY 1991                            *
   17     ID   *                 PRESENT CONDITIONS, EXISTING FACILITIES              *
   18     ID   *                  BASED ON RANGE WASH FACILITIES STUDY                *
   19     ID   *                     BOYLE ENGINEERS CORP-JULY 1989                   *
   20     ID   *                                                                      *
   21     ID   *                  (CONVERTED RK TO RM IN UPLAND SUBAREAS)             *
   22     ID   *MODIFIED TO REMOVE SUBAREAS TRIBUTARY TO WEST RANGE DIVERSION DIKE (1/91)*
   23     ID   ************************************************************************
   24     ID   *                        100-YEAR, 6-HOUR STORM, AMC 2.0               *
   25     ID   ************************************************************************
   26     ID   *  STORM DISTRIBUTION 3 (SDN 3) FOR CONTRIBUTING AREA LESS THAN 10 SQ.MI. *
   27     ID   *     JR DARF RATIOS 0.97 AT G4, 0.95 AT G7, 0.92 AT F4,                *
   28     ID   *     JR DARF RATIOS 0.90 AT F3, 0.88 AT G1, AND 0.87 AT G3.            *
   29     ID   ************************************************************************
   30     ID
   31     IT     05       0       0     200
   32     IO      5       0       0
   33     JR   PREC    1.00    0.97    0.95    0.92    0.90    0.88    0.87

   34     KK  306B-M
   35     KM   BASIN 306B-M CONTRIBUTES FLOW TO NODE F3, THE BRIDGE AT THE UPRR,
   36     KM   MPU FACILITY RWWB 0027,(2) 21'X12' BRIDGE OPENINGS.
   37     BA   5.528
   38     PB    2.77
   39     PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
   40     PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
   41     PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
   42     PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
   43     PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
   44     PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
   45     PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
   46     PC    .998    .999   1.000
   47     LS      0      74
   48     UD   0.93
          *
```

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

  49      KK  307A-M
  50      KM   BASIN 307A-M CONTRIBUTES FLOW TO NODE F4, THE BOX CULVERT AT THE UPRR,
  51      KM   MPU FACILITY RWWE 0202, A 12'X8' RCB.
  52      BA   2.516
  53      PB    2.77
  54      LS       0      76
  55      UD    1.10
          *

  56      KK NODE.G1
  57      KM   COMBINE FLOW FROM F3 AND F4, NODE G1 IS THE BOX CULVERT AT INTERSTATE 15,
  58      KM   MPU FACILITY RWWE 0168, (3) 15'X10' RCBS.
  59      HC       2
          *

  60      KK   G1-G3
  61      KM   ROUTE FLOW FROM G1 THROUGH BASIN 307B-M TO G3.
  62      RM       5     .40      .3
          *

  63      KK  307B-M
  64      KM   BASIN 307B-M CONTRIBUTES FLOW TO NODE G3.
  65      BA   0.677
  66      PB    2.77
  67      LS       0      81
  68      UD    0.79
          *

  69      KK NODE.G3
  70      KM   COMBINE FLOW FROM G1 WITH FLOW FROM BASIN 307B-M.
  71      KM   NODE G3 REPRESENTS EAST TRIB TO NODE G2 AT LAS VEGAS BLVD.
  72      HC       2
          *

  73      KK    307C
  74      KM   307C MODIFIED DUE TO GOLDEN TRIANGLE INDUSTRIAL PARK
  75      KM   BASIN 307C CONTRIBUTES FLOW TO UPSTREAM OF INDUSTRIAL PARK
  76      BA    .503
  77      PB    2.77
  78      LS       0      77
  79      UD     .79
          *

  80      KK    TOG4
  81      KM   ROUTE FLOW THROUGH INDUSTRIAL PARK
  82      RK    6000   0.010   0.020       0    TRAP       3      50
          *

  83      KK    307D
  84      KM   AREA OF GOLDEN TRIANGLE INDUSTRIAL PARK
  85      BA    .323
  86      PB    2.77
  87      LS       0      88
  88      UD     .30
          *
```

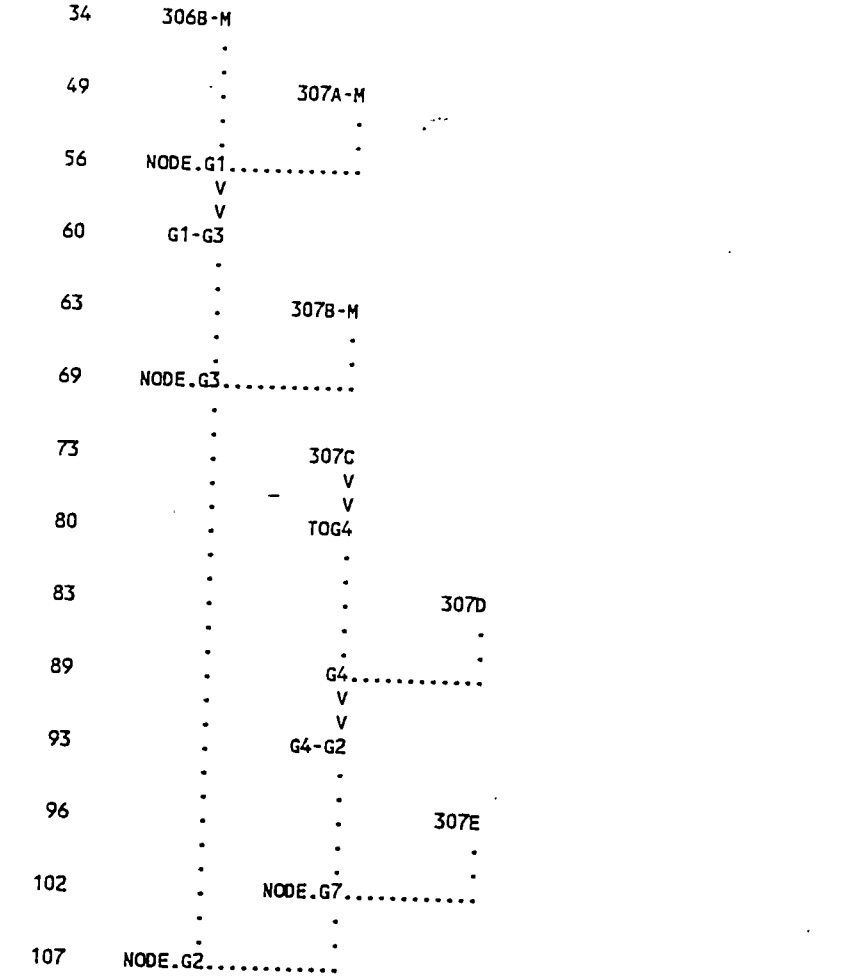
```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  89      KK      G4
  90      KM   NODE G4 AT WALNUT AND MITCHELL
  91      KM   ASSUMES NO STORAGE OR CULVERT CAPACTIY RESTRICTION
  92      HC       2
          *

  93      KK   G4-G2
  94      KM   ROUTE FLOW FROM NODE G4 TO NODE G2.
  95      RK    8600   0.008   0.025       0    TRAP       3      50
          *

  96      KK    307E
  97      KM   BASIN 307E CONTRIBUTES FLOW TO NODE G7.
  98      BA   0.766
  99      PB    2.77
 100      LS       0      79
 101      UD    0.60
          *

 102      KK NODE.G7
 103      KM   COMBINE FLOW FROM NODE G4 AND BASIN 307E.
 104      KM   NODE G7, LOCATED NEAR THE ALEXANDER/LAMB INTERSECTION,
 105      KM   REPRESENTS THE TOTAL FLOW IN THE WESTERN TRIBUTARY TO NODE G2.
 106      HC       2
          *

 107      KK NODE.G2
 108      KM   COMBINE FLOW FROM NODES G3 AND G7; GIVES TOTAL FLOW TO G2.
 109      KM   NODE G2 IS MPU FACILITY RWSL 0745, (7) 10'X7' RCBS AT LAS VEGAS BLVD.
 110      HC       2
          *
 111      ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.

(V) ROUTING
(.) CONNECTOR
(---->) DIVERSION OR PUMP FLOW
(<---) RETURN OF DIVERTED OR PUMPED FLOW



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*         SEPTEMBER 1990                *
*           VERSION 4.0                 *
*                                       *
*  UN DATE  01/31/1996  TIME  10:18:05  *
*                                       *
*****************************************
```


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


RANGE WASH - FLOOD INSURANCE RESTUDY
FOR: CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
BY: POST, BUCKLEY, SCHUH & JERNIGAN, INC.
JOB. NO. 51804
HEC-1 FILE: RFIS-G7.DAT
JANUARY 1996

EXISTING CONDITIONS WITH WEST RANGE WASH DIVERSION DIKE
STORM CENTERING FOR NODES F4 AND F3
STORM CENTERING FOR NODES G4, G7, G1 AND G3

```
*************************************************************************
*             FROM: CCRFCD LAS VEGAS VALLEY MASTER PLAN UPDATE          *
*                          RANGE WASH WATERSHED                         *
*               JAMES M. MONTGOMERY, CONSULTING ENGINEERS, INC.         *
*                               JANUARY 1991                            *
*                 PRESENT CONDITIONS, EXISTING FACILITIES               *
*       -           BASED ON RANGE WASH FACILITIES STUDY                *
*                      BOYLE ENGINEERS CORP-JULY 1989                   *
*                                                                       *
*                 (CONVERTED RK TO RM IN UPLAND SUBAREAS)               *
*MODIFIED TO REMOVE SUBAREAS TRIBUTARY TO WEST RANGE DIVERSION DIKE (1/91)*
*************************************************************************
*                     100-YEAR, 6-HOUR STORM, AMC 2.0                   *
*************************************************************************
*  STORM DISTRIBUTION 3 (SDN 3) FOR CONTRIBUTING AREA LESS THAN 10 SQ.MI. *
*     JR DARF RATIOS 0.97 AT G4, 0.95 AT G7, 0.92 AT F4,                *
*     JR DARF RATIOS 0.90 AT F3, 0.88 AT G1, AND 0.87 AT G3.            *
*************************************************************************
```

```
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         200  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE      1    0  ENDING DATE
                   NDTIME        1635  ENDING TIME
                   ICENT           19  CENTURY MARK

                 COMPUTATION INTERVAL     .08 HOURS
                      TOTAL TIME BASE   16.58 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       .97       .95       .92       .90       .88       .87
```

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 .97	RATIO 3 .95	RATIO 4 .92	RATIO 5 .90	RATIO 6 .88	RATIO 7 .87
HYDROGRAPH AT											
+	306B-M	5.53	1	FLOW	1368.	1274.	1213.	1123.	1064.	1006.	977.
				TIME	4.50	4.50	4.50	4.50	4.50	4.50	4.50
HYDROGRAPH AT											
+	307A-M	2.52	1	FLOW	632.	592.	565.	526.	501.	476.	463.
				TIME	4.67	4.67	4.67	4.67	4.67	4.75	4.75
2 COMBINED AT											
+	NODE.G1	8.04	1	FLOW	1979.	1848.	1762.	1634.	1551.	1469.	1428.
				TIME	4.58	4.58	4.58	4.58	4.58	4.58	4.58
ROUTED TO											
+	G1-G3	8.04	1	FLOW	1952.	1823.	1738.	1613.	1531.	1450.	1410.
				TIME	5.00	5.00	5.00	5.00	5.00	5.00	5.00
HYDROGRAPH AT											
+	307B-M	.68	1	FLOW	285.	270.	260.	244.	234.	224.	219.
				TIME	4.25	4.25	4.25	4.25	4.25	4.33	4.33
2 COMBINED AT											
+	NODE.G3	8.72	1	FLOW	2135.	1995.	1903.	1767.	1679.	1592.	1549.
				TIME	4.92	4.92	4.92	4.92	5.00	5.00	5.00
HYDROGRAPH AT											
+	307C	.50	1	FLOW	169.	159.	152.	142.	135.	128.	125.
				TIME	4.33	4.33	4.33	4.33	4.33	4.33	4.33
ROUTED TO											
+	TOG4	.50	1	FLOW	168.	158.	151.	141.	134.	128.	124.
				TIME	4.50	4.50	4.50	4.58	4.58	4.58	4.58
HYDROGRAPH AT											
+	307D	.32	1	FLOW	332.	317.	308.	294.	284.	275.	270.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT											
+	G4	.83	1	FLOW	343.	321.	311.	296.	286.	276.	271.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO											
+	G4-G2	.83	1	FLOW	336.	314.	305.	289.	278.	269.	266.
				TIME	4.08	4.08	4.08	4.17	4.17	4.17	4.17
HYDROGRAPH AT											
+	307E	.77	1	FLOW	348.	328.	315.	295.	282.	269.	263.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08
2 COMBINED AT											
+	NODE.G7	1.59	1	FLOW	684.	642.	620.	581.	555.	534.	526.
				TIME	4.08	4.08	4.08	4.08	4.17	4.17	4.08
2 COMBINED AT											
+	NODE.G2	10.31	1	FLOW	2538.	2376.	2271.	2113.	2010.	1910.	1860.
				TIME	4.92	4.92	4.92	4.92	4.92	5.00	5.00

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= 1.00									
TOG4	MANE	5.00	168.69	269.03	.91	5.00	168.34	270.00	.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2454E+02 EXCESS= .0000E+00 OUTFLOW= .2454E+02 BASIN STORAGE= .1632E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .97									
TOG4	MANE	4.56	158.09	270.72	.86	5.00	157.68	270.00	.86

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2307E+02 EXCESS= .0000E+00 OUTFLOW= .2306E+02 BASIN STORAGE= .1897E-03 PERCENT ERROR= .1

FOR PLAN = 1 RATIO= .95									
TOG4	MANE	4.55	151.34	274.19	.82	5.00	151.10	270.00	.82

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2211E+02 EXCESS= .0000E+00 OUTFLOW= .2210E+02 BASIN STORAGE= .1840E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .92									
TOG4	MANE	4.62	141.04	270.90	.77	5.00	140.68	275.00	.77

INUITY SUMMARY (AC-FT) - INFLOW= .2068E+02 EXCESS= .0000E+00 OUTFLOW= .2067E+02 BASIN STORAGE= .1994E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .90									
TOG4	MANE	4.73	134.64	273.09	.74	5.00	133.94	275.00	.74

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1974E+02 EXCESS= .0000E+00 OUTFLOW= .1974E+02 BASIN STORAGE= .1884E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .88									
TOG4	MANE	4.76	127.85	275.24	.70	5.00	127.83	275.00	.70

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1882E+02 EXCESS= .0000E+00 OUTFLOW= .1881E+02 BASIN STORAGE= .2419E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .87									
TOG4	MANE	4.71	124.42	271.16	.68	5.00	124.40	275.00	.68

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1836E+02 EXCESS= .0000E+00 OUTFLOW= .1835E+02 BASIN STORAGE= .1808E-03 PERCENT ERROR= .1

FOR PLAN = 1 RATIO= 1.00									
G4-G2	MANE	5.00	335.65	244.23	1.19	5.00	335.58	245.00	1.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5237E+02 EXCESS= .0000E+00 OUTFLOW= .5235E+02 BASIN STORAGE= .5019E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .97									
G4-G2	MANE	5.00	316.24	248.67	1.13	5.00	313.82	245.00	1.13

INUITY SUMMARY (AC-FT) - INFLOW= .4963E+02 EXCESS= .0000E+00 OUTFLOW= .4978E+02 BASIN STORAGE= .4991E-02 PERCENT ERROR= -.3

```
          FOR PLAN = 1  RATIO=  .95
             G4-G2  MANE          5.00    305.45    244.58      1.09      5.00    305.23    245.00         1.09

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4786E+02 EXCESS= .0000E+00 OUTFLOW= .4792E+02 BASIN STORAGE= .4287E-02 PERCENT ERROR=   -.1


          FOR PLAN = 1  RATIO=  .92
             G4-G2  MANE          4.73    293.33    247.74      1.03      5.00    288.66    250.00         1.03

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4519E+02 EXCESS= .0000E+00 OUTFLOW= .4531E+02 BASIN STORAGE= .5048E-02 PERCENT ERROR=   -.3


          FOR PLAN = 1  RATIO=  .90
             G4-G2  MANE          4.83    279.72    246.17       .99      5.00    278.10    250.00          .99

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4342E+02 EXCESS= .0000E+00 OUTFLOW= .4361E+02 BASIN STORAGE= .4781E-02 PERCENT ERROR=   -.5


          FOR PLAN = 1  RATIO=  .88
             G4-G2  MANE          4.84    272.60    247.92       .95      5.00    268.89    250.00          .95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4170E+02 EXCESS= .0000E+00 OUTFLOW= .4183E+02 BASIN STORAGE= .4838E-02 PERCENT ERROR=   -.3


          FOR PLAN = 1  RATIO=  .87
             G4-G2  MANE          4.79    270.09    248.55       .93      5.00    266.06    250.00          .93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4083E+02 EXCESS= .0000E+00 OUTFLOW= .4098E+02 BASIN STORAGE= .4214E-02 PERCENT ERROR=   -.4


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

Existing Condition Curve Number HEC-1 Models

VANDENBERG DETENTION BASIN CLOMR - EXISTING CURVE NUMBERS 06/26/2000
607EXCL3.DAT, 607EXCL4.DAT

HEC-1 OUTPUT RESULTS
FLOW FOR VARIOUS AREA & DARF RATIOS

												INTERPOLATED RESULTS	
	SDN:	3	3	3	3	3	3	3	4	4	4		
	AREA:	0	0.5	1	2	4	6	8	8	10	20		
	DARF:	1	0.98	0.97	0.93	0.91	0.9	0.88	0.88	0.86	0.79		
NAME	AREA											DARF	FLOW
306A	0.84	428	411	402	368	351	343	103	283	269	220	0.973	405
306A-B	0.84	425	410	399	365	349	340	102	281	265	218	0.973	403
306B	1.84	1031	989	969	887	847	827	249	681	646	529	0.936	900
F5	2.68	1423	1368	1336	1218	1164	1133	328	928	880	721	0.923	1200
F5-F4	2.68	1392	1338	1309	1198	1145	1116	321	913	865	712	0.923	1180
307A	2.01	1041	1002	982	905	867	848	288	722	690	579	0.930	905
DBINW	4.68	2431	2340	2291	2103	2012	1964	595	1635	1555	1292	0.907	1996
306D	1.32	458	439	430	393	374	365	110	310	295	241	0.957	418
306D-E	1.32	456	437	428	391	373	364	109	309	294	241	0.957	416
306E	0.37	227	218	214	196	187	182	54	148	140	115	0.985	220
F6	1.69	536	514	503	459	437	427	127	366	347	284	0.942	473
306E-C	1.69	535	511	501	457	435	425	127	364	347	283	0.942	471
306C	2.98	1697	1631	1598	1468	1404	1372	459	1146	1092	909	0.920	1437
F4	4.66	2065	1983	1939	1770	1688	1648	467	1374	1306	1067	0.907	1675
DBIN	9.35	4480	4299	4205	3837	3661	3574	1051	2998	2847	2339	0.867	2896
DETV	9.35	311	301	297	277	268	263	48	254	244	200	0.867	247
												DARF	STAGE
VANDENBERG DETENTION BASIN		1936	1935.2	1934.8	1933.2	1932.4	1932	1918	1931.2	1930.4	1927.4	0.867	1930.7
F4-G3	9.35	311	301	297	277	268	263	48	254	244	200	0.867	247
307B	0.49	425	411	404	377	363	356	147	299	287	246	0.980	411
G3A	9.84	461	445	438	407	390	382	147	334	319	271	0.862	320
307C	0.49	274	263	257	236	225	220	66	176	167	138	0.980	263
307C-D	0.49	271	259	255	233	224	217	66	175	166	137	0.980	259
307D	0.30	375	365	360	341	331	326	167	270	262	233	0.988	369
G4	0.80	592	573	562	521	503	492	195	405	389	332	0.974	566
G4-G3	0.80	584	565	555	513	495	488	191	402	383	325	0.974	559
307E	0.25	349	341	336	319	311	306	166	255	248	223	0.990	345
G2	10.89	1224	1186	1177	1086	1056	1032	420	862	825	707	0.854	814
G3-G2	10.89	1215	1173	1159	1072	1041	1020	417	861	824	701	0.854	813
307F	0.72	541	521	511	471	451	441	159	364	347	291	0.976	517
G3	11.61	1694	1635	1613	1492	1437	1406	557	1168	1118	950	0.849	1091

```
1*************************************
*                                   *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             SEPTEMBER 1990        *
*              VERSION 4.0          *
*                                   *
*  RUN DATE  06/26/2000  TIME  14:17:54 *
*                                   *
*************************************
```

```
*************************************
*                                   *
*    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   FILE: 607CLMR.DAT
             2         ID   AREA TRIBUTARY TO VANDENBURG DETENTION BASIN AND
             3         ID   DOWNSTREAM TO LAS VEGAS BOULEVARD
             4         ID   **************************************************
             5         ID   FILE MODIFIED FROM:
             6         ID   FILE: VD817.DAT
             7         ID
             8         ID  FUTURE CONDITIONS MODEL
             9         ID  8ASED ON DATA LINKED TO GIS
            10         ID  100-YEAR,  6-HOUR STORM,  SDN3
            11         IT       5       0       0     300
            12         IO       5       0       0
            13         JR    PREC       1    0.98    0.97    0.93    0.91     0.9    0.57
                       *

            14         KK    306A
            15         BA   0.841
            16         P8    2.77
            17         PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
            18         PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
            19         PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
            20         PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
            21         PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
            22         PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
            23         PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
            24         PC    .998    .999   1.00
            25         LS       0      77
            26         UD    0.40
                       *

            27         KK   306A-B
            28         RK    3500   0.002    0.02       0    TRAP      20       2
                       *

            29         KK    306B
            30         BA   1.837
            31         P8    2.77
            32         LS       0      77
            33         UD    0.33
                       *

            34         KK      F5
            35         HC       2
                       *

            36         KK   F5-F4
            37         RK   13500   0.012    0 02       0    TRAP      25       2
                       *
```



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

            38         KK    307A
            39         BA   2.006
            40         PB    2.77
            41         LS       0    79.6
            42         UD    0.51
                       *

            43         KK    DBINW
            44         KM   COMBINED FLOW INTO VANDENBURG FROM WEST
            45         HC       2
                       *

            46         KK    306D
            47         BA   1.316
```

```
 48          PB    2.77
 49          LS       0      77
 50          UD    0.75
             *

 51          KK  306D-E
 52          RK    5000    0.02     0.02        0    TRAP       10        2
             *

 53          KK    306E
 54          BA   0.372
 55          PB    2.77
 56          LS       0      77
 57          UD    0.28
             *

 58          KK      F6
 59          HC       2
             *

 60          KK  306E-C
 61          RK   12100  0.0083     0.02        0    TRAP       10        2
             *

 62          KK    306C
 63          BA   2.976
 64          PB    2.77
 65          LS       0    78.9
 66          UD    0 40
             *

 67          KK      F4
 68          KM   COMBINED FLOW INTO VANDENBURG FROM THE EAST
 69          HC       2
             *
```



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

 70          KK    DBIN
 71          KM   TOTAL FLOW INTO THE BASIN
 72          HC       2
             *

 73          KK    DETV
 74          KM   LOW LEVEL 36"RCP
 75          KM   HIGH LEVEL 5' X 2.75' RC8
 76          KO       3
 77          RS       1    ELEV        0        0
 78          SV       0     2.1      6.4     19.5       39       66       93      122      150      166
 79          SV     181     212      228      243      274      291      308      325      342      352
 80          SQ       0    20.0     36.1     38.6     41.0     43.3     45.5     47.6     49.6     50.5
 81          SQ    67.3     126      157      176      210      225      239      251      263      269
 82          SE    1904    1906     1908     1910     1912     1914     1916     1918     1920     1921
 83          SE    1922    1924     1925     1926     1928     1929     1930     1931     1932   1932.5
             *

 84          KK   F4-G3
 85          RK    6000  0.0083     0.02        0    TRAP       85        2
             *

 86          KK    307B
 87          BA   0 490
 88          PB    2.77
 89          LS       0    83.7
 90          UD    0.28
             *

 91          KK     G3A
 92          KM   COMBINE 307B-M AND 4-G3
 93          HC       2
             *

 94          KK    307C
 95          BA   0.492
 96          PB    2.77
 97          LS       0    77.2
 98          UD    0.35
             *

 99          KK  307C-D
100          RK    4000   0.005     0.02        0    TRAP       10        2
             *

101          KK    307D
102          BA   0.304
103          PB    2.77
104          LS       0    90.9
105          UD    0.26
             *
```



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

106          KK      G4
107          HC       2
             *

108          KK   G4-G3
109          RK    4400  0.0068    0.025        0    TRAP        3       50
             *

110          KK    307E
111          BA   0.254
112          PB    2.77
```

```
113             LS       0     92.5
114             UD    0.22
                *

115             KK      G2
116             HC       3
                *

117             KK    G3-G2       0
118             RK    5000   0.008   0 02       0    TRAP      65       2
                *

119             KK    307F
120             BA   0.721
121             PB    2.77
122             LS       0     80.2
123             UD    0 26
                *

124             KK      G3
125             HC       2
                *
126             ZZ
```

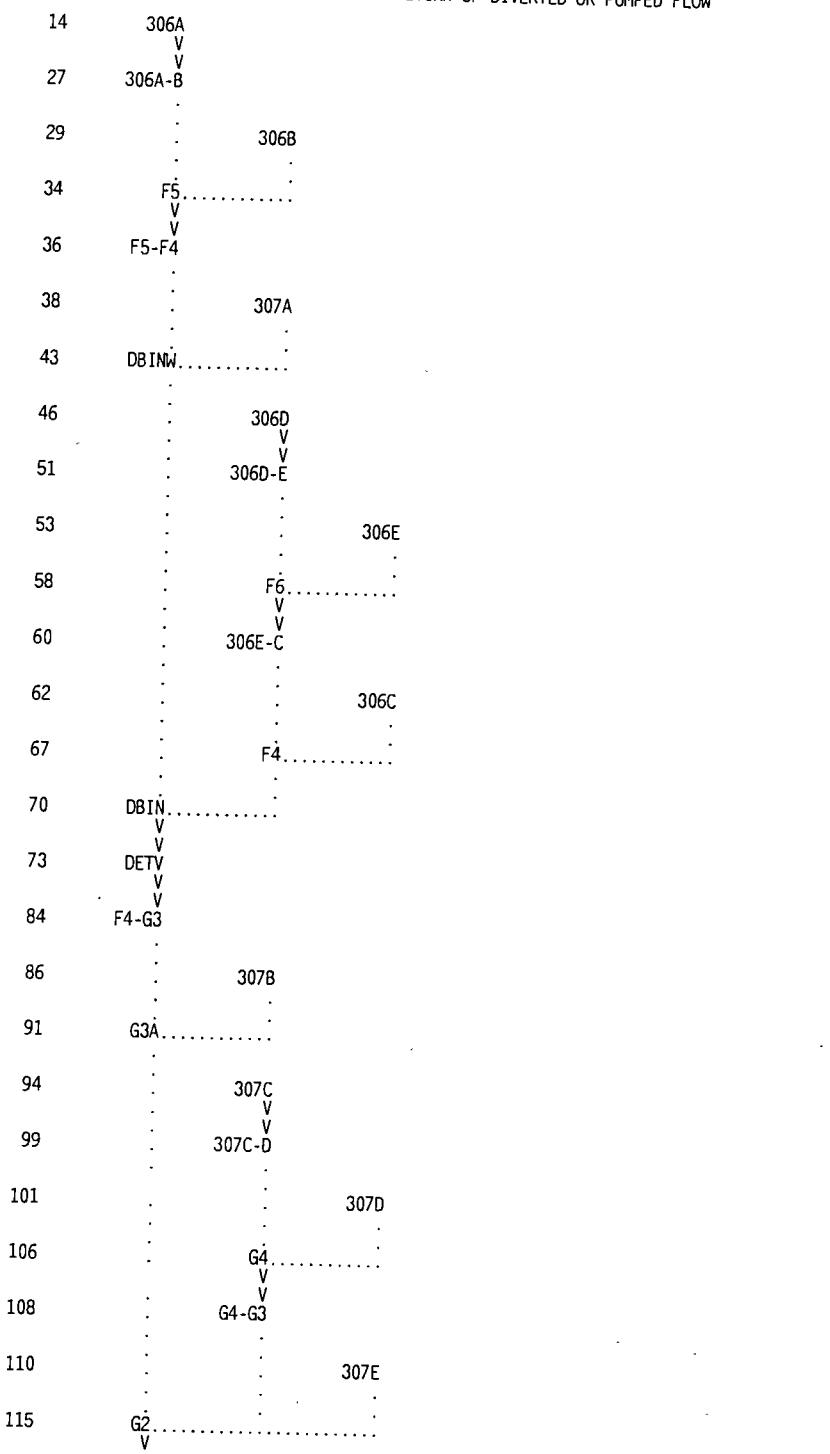
1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.

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

(.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW



```
                V
 117       G3-G2
                .
                .
 119            .        307F
                .          .
                .          .
 124          G3............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            SEPTEMBER 1990             *
*             VERSION 4.0               *
*                                       *
*  RUN DATE  06/26/2000  TIME  14:17:54 *
*                                       *
*****************************************
```

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

```
                        FILE: 607CLMR DAT
                        AREA TRIBUTARY TO VANDENBURG DETENTION BASIN AND
                        DOWNSTREAM TO LAS VEGAS BOULEVARD
                        ************************************************
                        FILE MODIFIED FROM:
                        FILE: VDB17.DAT

                       FUTURE CONDITIONS MODEL
                       BASED ON DATA LINKED TO GIS
                       100-YEAR,  6-HOUR STORM,  SDN3

 12 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       .98       .97       .93       .91       .90       .57
```

*** ***

```
           **************
           *            *
 73 KK     *      DETV  *
           *            *
           **************

 76 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          3  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

              HYDROGRAPH ROUTING DATA

 77 RS          STORAGE ROUTING
                      NSTPS          1  NUMBER OF SUBREACHES
                       ITYP       ELEV  TYPE OF INITIAL CONDITION
                     RSVRIC        .00  INITIAL CONDITION
                          X        .00 WORKING R AND D COEFFICIENT

 78 SV            STORAGE         .0       2.1       6.4      19.5      39.0      66.0      93.0     122.0     150.0     166.0
                                181.0     212.0     228.0     243.0     274.0     291.0     308.0     325.0     342.0     352.0

 80 SQ          DISCHARGE         0.       20.       36.       39.       41.       43.       46.       48.       50.       51.
                                  67.      126.      157.      176.      210.      225.      239.      251.      263.      269.

 82 SE          ELEVATION     1904.00   1906.00   1908.00   1910.00   1912.00   1914.00   1916.00   1918.00   1920 00   1921.00
                              1922.00   1924.00   1925.00   1926.00   1928.00   1929.00   1930.00   1931.00   1932.00   1932.50
                                                                      ***

WARNING --- ROUTED OUTFLOW (    272.) IS GREATER THAN MAXIMUM OUTFLOW (    269.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (    279.) IS GREATER THAN MAXIMUM OUTFLOW (    269.) IN STORAGE-OUTFLOW TABLE
```

WARNING --- ROUTED OUTFLOW (285.) IS GREATER THAN MAXIMUM OUTFLOW (269.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (290.) IS GREATER THAN MAXIMUM OUTFLOW (269.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (295.) IS GREATER THAN MAXIMUM OUTFLOW (269.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (298.) IS GREATER THAN MAXIMUM OUTFLOW (269.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (302.) IS GREATER THAN MAXIMUM OUTFLOW (269.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (304.) IS GREATER THAN MAXIMUM OUTFLOW (269.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (306.) IS GREATER THAN MAXIMUM OUTFLOW (269.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (308.) IS GREATER THAN MAXIMUM OUTFLOW (269.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (309.) IS GREATER THAN MAXIMUM OUTFLOW (269.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (310.) IS GREATER THAN MAXIMUM OUTFLOW (269.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (311.) IS GREATER THAN MAXIMUM OUTFLOW (269.) IN STORAGE-OUTFLOW TABLE
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WARNING --- ROUTED OUTFLOW (308.) IS GREATER THAN MAXIMUM OUTFLOW (269.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (307.) IS GREATER THAN MAXIMUM OUTFLOW (269.) IN STORAGE-OUTFLOW TABLE
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HYDROGRAPH AT STATION DETV
FOR PLAN 1, RATIO = 1.00

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 311.	6.33		287.	161.	155.	155.
		(INCHES)	.286	.642	.642	.642
		(AC-FT)	143.	320.	320	320.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
422.	6.33	383.	239.	230.	230

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1936.02	6.33	1934.03	1924 86	1924.09	1924.09

CUMULATIVE AREA = 9.35 SQ MI

WARNING --- ROUTED OUTFLOW (270.) IS GREATER THAN MAXIMUM OUTFLOW (269.) IN STORAGE-OUTFLOW TABLE
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HYDROGRAPH AT STATION DETV
FOR PLAN 1, RATIO = .98

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 301.	6.33		278.	153.	148.	148.
		(INCHES)	.277	.610	.610	.610
		(AC-FT)	138.	304	304.	304

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
406.	6.33	368.	231.	222.	222.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1935.21	6.33	1933.26	1924.36	1923.61	1923.61

CUMULATIVE AREA = 9.35 SQ MI

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HYDROGRAPH AT STATION DETV
FOR PLAN 1, RATIO = .97

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 297.	6.33		273.	149.	144.	144.
		(INCHES)	.272	.594	.594	.594
		(AC-FT)	136.	296.	296.	296.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
398.	6.33	360.	226.	218.	218.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1934.80	6.33	1932.87	1924.12	1923.38	1923.38

CUMULATIVE AREA = 9.35 SQ MI

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HYDROGRAPH AT STATION DETV
FOR PLAN 1, RATIO = .93

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 277.	6.33		254.	133.	128.	128.
		(INCHES)	.253	.530	.530	.530
		(AC-FT)	126.	264.	264.	264.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				

366.	6.33	331.	211.	203.	203.	

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1933.19	6.33	1931.29	1923.16	1922.45	1922.45

CUMULATIVE AREA = 9.35 SQ MI

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HYDROGRAPH AT STATION DETV
FOR PLAN 1, RATIO = .91

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 268.	6.33		244.	126.	121.	121.
		(INCHES)	.243	.500	.500	.500
		(AC-FT)	121.	249.	249.	249.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
350.	6.33	317.	203.	196.	196.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1932.42	6.33	1930.50	1922.70	1922.02	1922.02

CUMULATIVE AREA = 9.35 SQ MI

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HYDROGRAPH AT STATION DETV
FOR PLAN 1, RATIO = .90

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 263.	6.33		239.	122.	117.	117.
		(INCHES)	.238	.485	.485	.485
		(AC-FT)	118.	242.	242.	242.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
343.	6.33	310.	199.	192.	192.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1932.04	6.33	1930.10	1922.48	1921.80	1921.80

CUMULATIVE AREA = 9.35 SQ MI

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HYDROGRAPH AT STATION DETV
FOR PLAN 1, RATIO = .57

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 48.	6.83		47.	40.	39.	39.
		(INCHES)	.047	.159	.159	.159
		(AC-FT)	23.	79.	79.	79.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
122.	6.92	116.	79.	76.	76.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1917.99	6.92	1917.57	1914.35	1913.97	1913.97

CUMULATIVE AREA = 9.35 SQ MI

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION						
					RATIO 1 1.00	RATIO 2 .98	RATIO 3 .97	RATIO 4 .93	RATIO 5 .91	RATIO 6 .90	RATIO 7 .57
HYDROGRAPH AT											
+	306A	.84	1	FLOW	428.	411.	402.	368.	351.	343.	103.
				TIME	3.83	3.83	3.92	3.92	3.92	3.92	3.92
ROUTED TO											
+	306A-B	.84	1	FLOW	425.	410.	399.	365.	349.	340.	102.
				TIME	3.92	3.92	3.92	4.00	4.00	4.00	4.08

HYDROGRAPH AT

+	306B	1.84	1	FLOW	1031.	989.	969.	887.	847.	827.	249.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83
2 COMBINED AT											
+	F5	2.68	1	FLOW	1423.	1368.	1336.	1218.	1164.	1133.	328.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92
ROUTED TO											
+	F5-F4	2.68	1	FLOW	1392.	1338.	1309.	1198.	1145.	1116.	321.
				TIME	3.92	4.00	4.00	4.00	4 00	4.00	4.17
HYDROGRAPH AT											
+	307A	2.01	1	FLOW	1041.	1002.	982.	905.	867.	848.	288.
				TIME	4 00	4.00	4.00	4.00	4.00	4.00	4.00
2 COMBINED AT											
+	DBINW	4.68	1	FLOW	2431.	2340.	2291.	2103.	2012.	1964.	595
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.17
HYDROGRAPH AT											
+	306D	1.32	1	FLOW	458.	439.	430.	393.	374.	365.	110.
				TIME	4.25	4.25	4.25	4.25	4 25	4 25	4.33
ROUTED TO											
+	306D-E	1.32	1	FLOW	456.	437.	428.	391.	373.	364.	109.
				TIME	4.33	4.33	4.33	4.33	4.33	4.33	4.42
HYDROGRAPH AT											
+	306E	.37	1	FLOW	227.	218.	214.	196.	187.	182.	54.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83
2 COMBINED AT											
+	F6	1.69	1	FLOW	536.	514.	503.	459.	437.	427.	127.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.33
ROUTED TO											
+	306E-C	1.69	1	FLOW	535.	511.	501.	457.	435.	425.	127.
				TIME	4.33	4.33	4.33	4.33	4.33	4 33	4.58
HYDROGRAPH AT											
+	306C	2.98	1	FLOW	1697.	1631.	1598.	1468.	1404.	1372.	459.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92
2 COMBINED AT											
+	F4	4.66	1	FLOW	2065.	1983.	1939.	1770.	1688.	1648.	467.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
2 COMBINED AT											
+	DBIN	9.35	1	FLOW	4480.	4299.	4205.	3837.	3661.	3574.	1051.
				TIME	3.92	3.92	3.92	3.92	3.92	4.00	4.08
ROUTED TO											
+	DETV	9.35	1	FLOW	311.	301.	297.	277.	268.	263.	48.
				TIME	6.33	6.33	6.33	6.33	6.33	6.33	6.83
			** PEAK STAGES IN FEET **								
			1	STAGE	1936.02	1935.21	1934.80	1933.19	1932.42	1932.04	1917.99
				TIME	6.33	6.33	6.33	6.33	6.33	6.33	6.92
ROUTED TO											
+	F4-G3	9.35	1	FLOW	311.	301.	297.	277.	268.	263.	48.
				TIME	6.42	6.42	6.42	6.42	6.42	6.42	7.17
HYDROGRAPH AT											
+	3078	.49	1	FLOW	425.	411.	404.	377.	363.	356.	147.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT											
+	G3A	9.84	1	FLOW	461.	445.	438.	407.	390.	382.	147.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT											
+	307C	.49	1	FLOW	274.	263.	257.	236.	225.	220.	66.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.92
ROUTED TO											
+	307C-D	.49	1	FLOW	271.	259.	255.	233.	224.	217.	66.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
HYDROGRAPH AT											
+	307D	.30	1	FLOW	375.	365.	360.	341.	331.	326.	167.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT											
+	G4	.80	1	FLOW	592.	573.	562.	521.	503.	492.	195.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.83
ROUTED TO											
+	G4-G3	.80	1	FLOW	584.	565.	555.	513.	495.	488.	191.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	4.00
HYDROGRAPH AT											
+	307E	25	1	FLOW	349.	341.	336.	319.	311.	306.	166.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
3 COMBINED AT											
+	G2	10.89	1	FLOW	1224.	1186.	1177.	1086.	1056.	1032.	420.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83
ROUTED TO											
+	G3-G2	10.89	1	FLOW	1215.	1173.	1159.	1072.	1041.	1020.	417.
				TIME	3.83	3.83	3.83	3.92	3.92	3.92	3.92
HYDROGRAPH AT											
+	307F	.72	1	FLOW	541.	521.	511.	471.	451.	441.	159.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.75

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 2 COMBINED AT
+                G3     11.61     1  FLOW      1694.   1635.   1613    1492.   1437.   1406.    557.
                                     TIME       3.83    3.83    3.83    3.83    3.83    3 83    3.83
1
                                  SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                      (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                                 INTERPOLATED TO
                                                                                 COMPUTATION INTERVAL
        ISTAQ    ELEMENT      DT       PEAK     TIME TO PEAK     VOLUME      DT       PEAK     TIME TO PEAK     VOLUME
                              (MIN)     (CFS)      (MIN)         (IN)      (MIN)     (CFS)      (MIN)           (IN)
          FOR PLAN = 1  RATIO= 1.00
            306A-8  MANE       2.50    428.18     236.12         .91       5.00    424.62     235.00           .91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4103E+02 EXCESS= .0000E+00 OUTFLOW= .4103E+02 BASIN STORAGE= .1719E-03 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .98
            306A-B  MANE       2.47    410.50     237.28         .88       5.00    409.80     235.00           .88

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3939E+02 EXCESS= .0000E+00 OUTFLOW= .3939E+02 BASIN STORAGE= .1783E-03 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .97
            306A-B  MANE       2.51    401.71     235.65         .86       5.00    398.82     235.00           .86

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3858E+02 EXCESS= .0000E+00 OUTFLOW= .3B5BE+02 BASIN STORAGE= .2131E-03 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .93
            306A-B  MANE       2.58    367.11     239.11         .79       5.00    364.54     240.00           .79

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3536E+02 EXCESS= .0000E+00 OUTFLOW= .3536E+02 BASIN STORAGE= .2181E-03 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .91
            306A-B  MANE       2.64    350.34     238.07         .75       5.00    348.77     240.00           .75

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3379E+02 EXCESS= .0000E+00 OUTFLOW= .3380E+02 BASIN STORAGE= .2368E-03 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .90
            306A-B  MANE       2.59    342.17     238.61         .74       5.00    339.98     240.00           .74

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3301E+02 EXCESS= .0000E+00 OUTFLOW= .3301E+02 BASIN STORAGE= .2043E-03 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .57
            306A-B  MANE       3.79    102.92     243.22         .24       5.00    102.33     245.00           .24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1089E+02 EXCESS= .0000E+00 OUTFLOW= .1091E+02 BASIN STORAGE= .1877E-03 PERCENT ERROR=   -.2

          FOR PLAN = 1  RATIO= 1.00
              F5-F4  MANE       3.45   1413.36     236.29         .92       5.00   1391.76     235.00           .91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1306E+03 EXCESS= .0000E+00 OUTFLOW= .1307E+03 BASIN STORAGE= .3122E-02 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .98
              F5-F4  MANE       3.59   1358.79     237.89         .88       5.00   1338.43     240.00           .88

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1255E+03 EXCESS= .0000E+00 OUTFLOW= .1256E+03 BASIN STORAGE= .3712E-02 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .97
              F5-F4  MANE       3.60   1323.06     238.41         .86       5.00   1308.85     240.00           .86

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1228E+03 EXCESS= .0000E+00 OUTFLOW= .1230E+03 BASIN STORAGE= .4202E-02 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .93
              F5-F4  MANE       3.75   1209.80     238.40         .79       5.00   1197 66     240.00           .79

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1126E+03 EXCESS= .0000E+00 OUTFLOW= .1127E+03 BASIN STORAGE= .3211E-02 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .91
              F5-F4  MANE       3.76   1148.68     239.59          75       5.00   1144.81     240.00           .75

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1076E+03 EXCESS= .0000E+00 OUTFLOW= .1078E+03 BASIN STORAGE= .4243E-02 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .90
              F5-F4  MANE       3 77   1116.57     236.48         .74       5.00   1115.55     240.00           .74

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1051E+03 EXCESS= .0000E+00 OUTFLOW= .1053E+03 BASIN STORAGE= .3820E-02 PERCENT ERROR=   -.2

          FOR PLAN = 1  RATIO=  .57
              F5-F4  MANE       5.00    322.53     249.53         .24       5.00    320.63     250.00           .24
```

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3469E+02 EXCESS= .0000E+00 OUTFLOW= .3486E+02 BASIN STORAGE= .3777E-02 PERCENT ERROR= -.5

FOR PLAN = 1 RATIO= 1.00

306D-E	MANE	1.54	457.79	258.30	.91	5.00	456 05	260.00	.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6421E+02 EXCESS= .0000E+00 OUTFLOW= .6422E+02 BASIN STORAGE= .1355E-04 PERCENT ERROR= 0

FOR PLAN = 1 RATIO= .98

306D-E	MANE	1.56	438.73	258.50	.8B	5.00	437.35	260.00	88

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6164E+02 EXCESS= .0000E+00 OUTFLOW= .6165E+02 BASIN STORAGE= .1154E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .97

306D-E	MANE	1.49	429.01	257.44	.86	5.00	428.07	260.00	.86

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6036E+02 EXCESS= .0000E+00 OUTFLOW= .6037E+02 BASIN STORAGE= .1230E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .93

306D-E	MANE	1.59	392.52	258.14	.79	5.00	391.35	260.00	.79

CONTINUITY SUMMARY (AC-FT) - INFLOW= 5534E+02 EXCESS= .0000E+00 OUTFLOW= .5535E+02 BASIN STORAGE= .1334E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .91

306D-E	MANE	1.59	374.21	258.35	.75	5.00	373.28	260.00	.75

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5287E+02 EXCESS= .0000E+00 OUTFLOW= .5288E+02 BASIN STORAGE= .1596E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .90

306D-E	MANE	1.59	364.78	259.10	.74	5.00	364.31	260.00	.74

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5165E+02 EXCESS= .0000E+00 OUTFLOW= .5165E+02 BASIN STORAGE= .1347E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .57

306D-E	MANE	2.30	109.44	265.17	.24	5.00	109.39	265.00	.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1704E+02 EXCESS= .0000E+00 OUTFLOW= .1704E+02 BASIN STORAGE= .1304E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= 1.00

306E-C	MANE	4.45	535.73	258.68	.91	5.00	535.02	260.00	.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8233E+02 EXCESS= .0000E+00 OUTFLOW= .8232E+02 BASIN STORAGE= .8249E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .98

306E-C	MANE	4.54	512.21	261.71	.88	5.00	511.46	260.00	.88

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7905E+02 EXCESS= .0000E+00 OUTFLOW= .7905E+02 BASIN STORAGE= .7951E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .97

306E-C	MANE	4.58	501.51	261.26	.86	5.00	500.56	260.00	.86

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7742E+02 EXCESS= .0000E+00 OUTFLOW= .7741E+02 BASIN STORAGE= .7597E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .93

306E-C	MANE	4.74	458.28	260.86	.79	5.00	457.24	260.00	.79

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7097E+02 EXCESS= .0000E+00 OUTFLOW= .7095E+02 BASIN STORAGE= .8580E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .91

306E-C	MANE	4.80	436.51	262.37	.75	5.00	434.99	260.00	.75

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6782E+02 EXCESS= .0000E+00 OUTFLOW= .6782E+02 BASIN STORAGE= .6150E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .90

306E-C	MANE	4.84	425.75	263.36	.74	5.00	424.78	260.00	.74

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6624E+02 EXCESS= .0000E+00 OUTFLOW= .6627E+02 BASIN STORAGE= .8108E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .57

306E-C	MANE	5.00	126.93	273.67	.24	5.00	126.92	275.00	.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2186E+02 EXCESS= .0000E+00 OUTFLOW= 2188E+02 8ASIN STORAGE= .5899E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= 1.00

F4-G3	MANE	4.10	311.22	386.71	.64	5.00	311.21	385.00	.64

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3201E+03 EXCESS= .0000E+00 OUTFLOW= .3183E+03 BASIN STORAGE= .1724E+01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .98
F4-G3 MANE 4.11 301.47 385.65 .61 5.00 301.46 385.00 .61

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3041E+03 EXCESS= .0000E+00 OUTFLOW= .3024E+03 BASIN STORAGE= .1671E+01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .97
F4-G3 MANE 4.15 296.57 388.08 .59 5.00 296.57 385.00 .59

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2961E+03 EXCESS= .0000E+00 OUTFLOW= .2945E+03 BASIN STORAGE= .1669E+01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .93
F4-G3 MANE 4.25 277.32 387.37 .53 5 00 277.31 385.00 .53

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2645E+03 EXCESS= .0000E+00 OUTFLOW= .2626E+03 BASIN STORAGE= .1663E+01 PERCENT ERROR= .1

FOR PLAN = 1 RATIO= .91
F4-G3 MANE 4.31 268.08 387.90 .50 5 00 268 07 385.00 .50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2493E+03 EXCESS= .0000E+00 OUTFLOW= .2479E+03 BASIN STORAGE= .1659E+01 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .90
F4-G3 MANE 4.34 263.49 386.01 .48 5.00 263.47 385.00 .48

CONTINUITY SUMMARY (AC-FT) - INFLOW= 2418E+03 EXCESS= .0000E+00 OUTFLOW= .2403E+03 BASIN STORAGE= .1657E+01 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .57
F4-G3 MANE 4.88 47.59 431.37 .16 5.00 47.59 435.00 .16

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7949E+02 EXCESS= .0000E+00 OUTFLOW= .7755E+02 BASIN STORAGE= .1863E+01 PERCENT ERROR= .1

FOR PLAN = 1 RATIO= 1.00
307C-D MANE 2.12 273.48 234.00 .93 5.00 270.80 235.00 .93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2428E+02 EXCESS= .0000E+00 OUTFLOW= .2430E+02 BASIN STORAGE= .2147E-04 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .98
307C-D MANE 2.27 261.13 233.59 .89 5.00 259.27 235.00 .89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2331E+02 EXCESS= .0000E+00 OUTFLOW= .2332E+02 BASIN STORAGE= .2513E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .97
307C-D MANE 2.30 256.36 234.42 .87 5.00 254.85 235.00 .87

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2283E+02 EXCESS= .0000E+00 OUTFLOW= .2284E+02 BASIN STORAGE= .3000E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .93
307C-D MANE 2.32 233.33 235.34 .80 5.00 233.31 235.00 .80

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2094E+02 EXCESS= .0000E+00 OUTFLOW= .2095E+02 BASIN STORAGE= .2429E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .91
307C-D MANE 2.37 224.13 234.83 .76 5.00 223.72 235.00 .76

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2002E+02 EXCESS= .0000E+00 OUTFLOW= .2002E+02 BASIN STORAGE= .2042E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .90
307C-D MANE 2.38 217.23 233.23 .75 5.00 217.18 235.00 .75

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1956E+02 EXCESS= .0000E+00 OUTFLOW= .1956E+02 BASIN STORAGE= .2472E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= 57
307C-D MANE 3.29 65.84 239.84 .25 5.00 65.77 240.00 .25

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6501E+01 EXCESS= .0000E+00 OUTFLOW= .6515E+01 BASIN STORAGE= .2671E-04 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= 1.00
G4-G3 MANE 4.27 585.72 235.69 1.28 5 00 583.72 235.00 1.28

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5429E+02 EXCESS= .0000E+00 OUTFLOW= .5445E+02 BASIN STORAGE= .7174E-04 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .98
G4-G3 MANE 4.31 566.78 235.59 1.24 5.00 564.88 235.00 1.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5248E+02 EXCESS= .0000E+00 OUTFLOW= .5254E+02 BASIN STORAGE= .9993E-04 PERCENT ERROR= -.1

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         FOR PLAN = 1  RATIO=  .97
            G4-G3  MANE          4.41    558.35    233.39      1.22      5.00    555.48    235.00        1.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5161E+02 EXCESS= .0000E+00 OUTFLOW= .5185E+02 BASIN STORAGE= .9302E-04 PERCENT ERROR=   -.5

         FOR PLAN = 1  RATIO=  .93
            G4-G3  MANE          4.37    516.27    235.92      1.14      5.00    512.99    235.00        1.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4806E+02 EXCESS= .0000E+00 OUTFLOW= .4826E+02 BASIN STORAGE= .9164E-04 PERCENT ERROR=   -.4

         FOR PLAN = 1  RATIO=  .91
            G4-G3  MANE          4.56    496.15    233.25      1.10      5.00    495.17    235.00        1.09

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4632E+02 EXCESS= .0000E+00 OUTFLOW= .4652E+02 BASIN STORAGE= .8751E-04 PERCENT ERROR=   -.4

         FOR PLAN = 1  RATIO=  .90
            G4-G3  MANE          4.44    490.59    233.71      1.07      5.00    488.28    235.00        1.07

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4543E+02 EXCESS= .0000E+00 OUTFLOW= .4563E+02 BASIN STORAGE= .9795E-04 PERCENT ERROR=   -.4

         FOR PLAN = 1  RATIO=  .57
            G4-G3  MANE          5.00    192.78    238.14       .46      5.00    191.03    240.00         .46

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1946E+02 EXCESS= .0000E+00 OUTFLOW= .1955E+02 BASIN STORAGE= .9472E-04 PERCENT ERROR=   -.4

         FOR PLAN = 1  RATIO= 1.00
            G3-G2  MANE          2.00   1219.75    233.70       .74      5.00   1214.95    230.00         .74

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4338E+03 EXCESS= .0000E+00 OUTFLOW= .4325E+03 BASIN STORAGE= .1320E+01 PERCENT ERROR=    .0

         FOR PLAN = 1  RATIO=  .98
            G3-G2  MANE          1.89   1181.77    232.51       .71      5.00   1172.63    230.00         .71

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4140E+03 EXCESS= .0000E+00 OUTFLOW= .4128E+03 BASIN STORAGE= .1272E+01 PERCENT ERROR=    .0

         FOR PLAN = 1  RATIO=  .97
            G3-G2  MANE          1.98   1172.37    233.56       .69      5.00   1159.04    230.00         .69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4044E+03 EXCESS= .0000E+00 OUTFLOW= .4033E+03 BASIN STORAGE= .1265E+01 PERCENT ERROR=    .0

         FOR PLAN = 1  RATIO=  .93
            G3-G2  MANE          2.03   1081.18    232.51       .63      5.00   1071.61    235.00         .63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3656E+03 EXCESS= .0000E+00 OUTFLOW= .3645E+03 BASIN STORAGE= .1260E+01 PERCENT ERROR=    .0

         FOR PLAN = 1  RATIO=  .91
            G3-G2  MANE          2.07   1050.51    234.35       .60      5.00   1041.37    235.00         .59

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3467E+03 EXCESS= .0000E+00 OUTFLOW= .3456E+03 BASIN STORAGE= .1258E+01 PERCENT ERROR=    .0

         FOR PLAN = 1  RATIO=  .90
            G3-G2  MANE          2.00   1025.48    234.54       .58      5.00   1019.85    235.00         .58

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3375E+03 EXCESS= .0000E+00 OUTFLOW= .3361E+03 BASIN STORAGE= .1256E+01 PERCENT ERROR=    .0

         FOR PLAN = 1  RATIO=  .57
            G3-G2  MANE          2.84    417.01    233.49       .21      5.00    416.94    235.00         .21

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1211E+03 EXCESS= .0000E+00 OUTFLOW= .1200E+03 BASIN STORAGE= .1139E+01 PERCENT ERROR=   -.1


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

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             SEPTEMBER 1990            *
*              VERSION 4 0              *
*                                       *
*  RUN DATE  06/26/2000  TIME  14.27:23 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    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, HEC1D8, 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   FILE: 607CLMR.DAT
             2         ID   AREA TRIBUTARY TO VANDENBURG DETENTION BASIN AND
             3         ID   DOWNSTREAM TO LAS VEGAS BOULEVARD
             4         ID   **************************************************
             5         ID   FILE MODIFIED FROM:
             6         ID   FILE: VDB17.DAT
             7         ID
             8         ID  FUTURE CONDITIONS MODEL
             9         ID  BASED ON DATA LINKED TO GIS
            10         ID  100-YEAR,  6-HOUR STORM,  SDN4
            11         IT       5       0       0     300
            12         IO       5       0       0
            13         JR    PREC    0.88    0.86    0.79
                       *
            14         KK    306A
            15         BA   0.841
            16         P8    2.77
            17         PC    .000    .020    .058    .075    .099    .126    .137    .145    .149    .151
            18         PC    .155    .156    .159    .162    .169    .172    .179    .189    .201    .211
            19         PC    .220    .228    .232    .240    .246    .252    .260    .269    .276    .283
            20         PC    .286    .292    .302    .312    .321    .332    .352    .376    .415    .462
            21         PC    .530    .610    .710    .732    .756    .782    .799    .813    .823    .830
            22         PC    .835    .844    .851    .864    .885    .908    .924    .944    .968    .973
            23         PC    .978    .982    .984    .986    .988    .991    .992    .993    .994    .997
            24         PC    .998    .999   1.00
            25         LS     .0      77
            26         UD    0.40
                       *
            27         KK   306A-B
            28         RK    3500   0.002    0.02       0    TRAP      20       2
                       *
            29         KK    306B
            30         BA   1.837
            31         PB    2.77
            32         LS       0      77
            33         UD    0.33
                       *
            34         KK      F5
            35         HC       2
                       *
            36         KK   F5-F4
            37         RK   13500   0.012    0.02       0    TRAP      25       2
                       *
```



```
         LINE          ID.....1.....2.....3.....4. ... .5.....6.....7... ...8.....9.....10
            38         KK    307A
            39         BA   2.006
            40         PB    2.77
            41         LS       0      80
            42         UD    0.51
                       *
            43         KK   DBINW
            44         KM   COMBINED FLOW INTO VANDENBURG FROM WEST
            45         HC       2
                       *
            46         KK    306D
            47         BA   1.316
```

```
48          PB    2.77
49          LS      0       77
50          UD    0.75
            *

51          KK  306D-E
52          RK    5000    0.02    0.02       0    TRAP      10       2
            *

53          KK    306E
54          BA   0.372
55          PB    2.77
56          LS       0      77
57          UD    0.28
            *

58          KK      F6
59          HC       2
            *

60          KK  306E-C
61          RK   12100  0.0083    0.02       0    TRAP      10       2
            *

62          KK    306C
63          BA   2.976
64          PB    2.77
65          LS       0      79
66          UD    0.40
            *

67          KK      F4
68          KM   COMBINED FLOW INTO VANDENBURG FROM THE EAST
69          HC       2
            *
```

1 HEC-1 INPUT PAGE 3

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

70          KK    DBIN
71          KM   TOTAL FLOW INTO THE BASIN
72          HC       2
            *

73          KK    DETV
74          KM   LOW LEVEL 36"RCP
75          KM   HIGH LEVEL 5' X 2.75' RC8
76          KO       3
77          RS       1    ELEV       0       0
78          SV       0     2.1     6.4    19.5      39      66      93     122     150     166
79          SV     181     212     228     243     274     291     308     325     342     352
80          SQ       0    20.0    36.1    38.6    41.0    43.3    45.5    47.6    49.6    50.5
81          SQ    67.3     126     157     176     210     225     239     251     263     269
82          SE    1904    1906    1908    1910    1912    1914    1916    1918    1920    1921
83          SE    1922    1924    1925    1926    1928    1929    1930    1931    1932  1932.5
            *

84          KK   F4-G3
85          RK    6000  0.0083    0.02       0    TRAP      85       2
            *

86          KK    307B
87          BA   0.490
88          PB    2.77
89          LS       0      84
90          UD    0.28
            *

91          KK     G3A
92          KM   COMBINE 307B-M AND 4-G3
93          HC       2
            *

94          KK    307C
95          BA   0.492
96          PB    2.77
97          LS       0      77
98          UD    0.35
            *

99          KK  307C-D
100         RK    4000   0.005    0.02       0    TRAP      10       2
            *

101         KK    307D
102         BA   0.304
103         PB    2.77
104         LS       0      91
105         UD    0.26
            *
```

1 HEC-1 INPUT PAGE 4

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

106         KK      G4
107         HC       2
            *

108         KK   G4-G3
109         RK    4400  0.0068   0.025       0    TRAP       3      50
            *

110         KK    307E
111         BA   0.254
112         PB    2.77
```

```
113             LS       0       93
114             UD    0.22
                *

115             KK      G2
116             HC       3
                *

117             KK    G3-G2        0
118             RK     5000   0.008    0.02        0    TRAP      65        2
                *

119             KK     307F
120             BA    0.721
121             PB     2.77
122             LS        0       80
123             UD     0.26
                *

124             KK       G3
125             HC        2
                *
126             ZZ
```

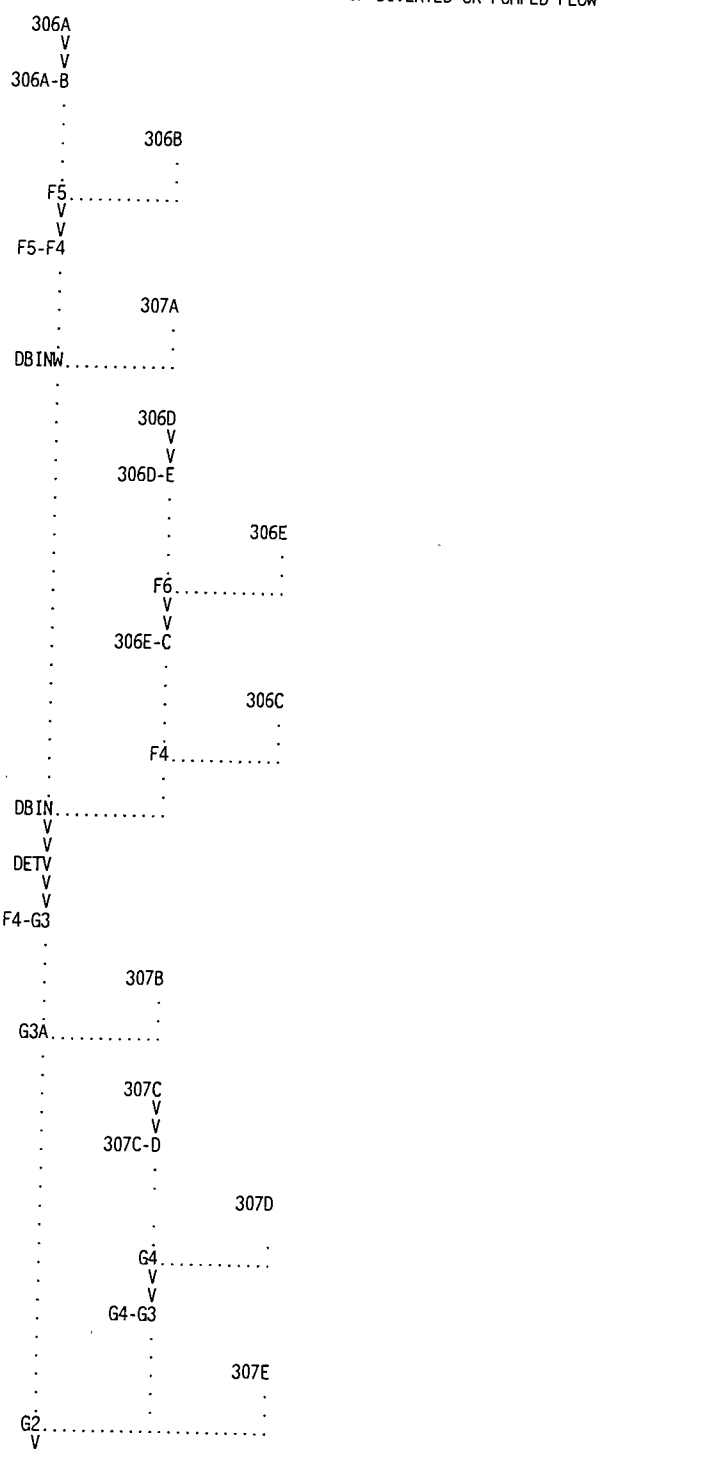
1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.

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

(.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW



```
                V
117       G3-G2
                .
                .
119             .         307F
                .           .
                .           .
124           G3.............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             SEPTEMBER 1990            *
*              VERSION 4.0              *
*                                       *
*  RUN DATE  06/26/2000  TIME  14:27:23 *
*                                       *
*****************************************
```

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

```
                        FILE: 607CLMR.DAT
                        AREA TRIBUTARY TO VANDENBURG DETENTION BASIN AND
                        DOWNSTREAM TO LAS VEGAS BOULEVARD
                        ************************************************
                        FILE MODIFIED FROM:
                        FILE: VDB17.DAT

                       FUTURE CONDITIONS MODEL
                       BASED ON DATA LINKED TO GIS
                       100-YEAR, 6-HOUR STORM.  SDN4

 12 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
                     .88       .86       .79
```

*** ***

```
          **************
          *            *
 73 KK    *      DETV  *
          *            *
          **************

 76 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          3  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

               HYDROGRAPH ROUTING DATA

 77 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       ELEV  TYPE OF INITIAL CONDITION
                    RSVRIC        .00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

 78 SV            STORAGE          .0       2.1       6.4      19.5      39.0      66.0      93.0     122.0     150.0     166.0
                                181.0     212.0     228.0     243.0     274.0     291.0     308.0     325.0     342.0     352.0

 80 SQ          DISCHARGE          0.       20.       36.       39.       41.       43.       46.       48.       50.       51.
                                   67       126.      157.      176.      210.      225.      239.      251.      263.      269.

 82 SE          ELEVATION     1904.00   1906.00   1908.00   1910.00   1912.00   1914.00   1916.00   1918.00   1920.00   1921.00
                              1922.00   1924.00   1925.00   1926.00   1928.00   1929.00   1930.00   1931.00   1932.00   1932.50
                                                                     ***

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

                       HYDROGRAPH AT STATION     DETV
                         FOR PLAN 1, RATIO =  .88
```

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 254.	6.42		229.	115.	111.	111.
		(INCHES)	.227	.459	.459	.459
		(AC-FT)	113.	229.	229.	229.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24 92-HR
+ (AC-FT)	(HR)				
329.	6.42	297.	193.	186	186.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1931.24	6.42	1929.35	1922.14	1921.47	1921.47

CUMULATIVE AREA = 9.35 SQ MI

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

HYDROGRAPH AT STATION DETV
FOR PLAN 1, RATIO = .86

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 244.	6.42		217.	108.	104.	104.
		(INCHES)	.216	.430	.430	.430
		(AC-FT)	108.	214.	214.	214.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
314.	6.42	284.	186.	180.	180.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1930.38	6.42	1928.56	1921.70	1921.05	1921.05

CUMULATIVE AREA = 9.35 SQ MI

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

HYDROGRAPH AT STATION DETV
FOR PLAN 1, RATIO = .79

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 200	6.42		170.	83.	80.	80.
		(INCHES)	.169	.331	.331	.331
		(AC-FT)	84.	165.	165.	165.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
265.	6.42	241.	165.	159.	159.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1927.42	6.42	1925.85	1920.28	1919.68	1919.68

CUMULATIVE AREA = 9.35 SQ MI

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .88	RATIO 2 .86	RATIO 3 .79
HYDROGRAPH AT							
+	306A	.84	1	FLOW	283.	269.	220.
				TIME	3.83	3.83	3.83
ROUTED TO							
+	306A-B	.84	1	FLOW	281.	265.	218.
				TIME	3.92	3.92	4.00
HYDROGRAPH AT							
+	306B	1.84	1	FLOW	681.	646.	529.
				TIME	3.75	3.75	3.75
2 COMBINED AT							
+	F5	2.68	1	FLOW	928.	880.	721.
				TIME	3.83	3.83	3.83
ROUTED TO							
+	F5-F4	2 68	1	FLOW	913.	865.	712.
				TIME	4.00	4.00	4.00
HYDROGRAPH AT							
+	307A	2.01	1	FLOW	722.	690.	579.
				TIME	4.00	4.00	4.00

2 COMBINED AT							
+	DBINW	4.68	1	FLOW	1635.	1555	1292.
				TIME	4.00	4.00	4.00
HYDROGRAPH AT							
+	306D	1.32	1	FLOW	310.	295.	241.
				TIME	4.25	4.25	4.25
ROUTED TO							
+	306D-E	1.32	1	FLOW	309.	294.	241.
				TIME	4.33	4.33	4.33
HYDROGRAPH AT							
+	306E	.37	1	FLOW	148	140.	115.
				TIME	3.75	3.75	3.75
2 COMBINED AT							
+	F6	1.69	1	FLOW	366.	347.	284.
				TIME	4.17	4.17	4.17
ROUTED TO							
+	306E-C	1 69	1	FLOW	364	347.	283.
				TIME	4.33	4.33	4.42
HYDROGRAPH AT							
+	306C	2.98	1	FLOW	1146.	1092.	909.
				TIME	3.83	3.83	3.83
2 COMBINED AT							
+	F4	4.66	1	FLOW	1374.	1306.	1067.
				TIME	3.92	3.92	3.92
2 COMBINED AT							
+	DBIN	9 35	1	FLOW	2998.	2847.	2339.
				TIME	3.92	3.92	4.00
ROUTED TO							
+	DETV	9.35	1	FLOW	254.	244.	200.
				TIME	6.42	6.42	6.42
			** PEAK STAGES IN FEET **				
			1	STAGE	1931.24	1930.38	1927.42
				TIME	6.42	6.42	6.42
ROUTED TO							
+	F4-G3	9.35	1	FLOW	254.	244.	200.
				TIME	6.50	6.50	6.58
HYDROGRAPH AT							
+	307B	.49	1	FLOW	299.	287.	246.
				TIME	3.67	3.67	3.67
2 COMBINED AT							
+	G3A	9.84	1	FLOW	334.	319.	271.
				TIME	3.67	3.67	3.75
HYDROGRAPH AT							
+	307C	.49	1	FLOW	176.	167.	138.
				TIME	3.83	3.83	3.83
ROUTED TO							
+	307C-D	.49	1	FLOW	175.	166.	137.
				TIME	3.92	3.92	3.92
HYDROGRAPH AT							
+	307D	.30	1	FLOW	270.	262.	233.
				TIME	3.67	3.67	3.67
2 COMBINED AT							
+	G4	.80	1	FLOW	405.	389.	332.
				TIME	3.75	3.75	3.75
ROUTED TO							
+	G4-G3	.80	1	FLOW	402.	383.	325.
				TIME	3.92	3.92	3.92
HYDROGRAPH AT							
+	307E	.25	1	FLOW	255.	248.	223.
				TIME	3.58	3.58	3.58
3 COMBINED AT							
+	G2	10.89	1	FLOW	862.	825.	707.
				TIME	3.83	3.75	3.83
ROUTED TO							
+	G3-G2	10.89	1	FLOW	861.	824.	701.
				TIME	3.83	3.83	3.92
HYDROGRAPH AT							
+	307F	.72	1	FLOW	364.	347.	291.
				TIME	3.67	3.67	3.67
2 COMBINED AT							
+	G3	11.61	1	FLOW	1168.	1118.	950.
				TIME	3.83	3.83	3.83

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)

FOR PLAN = 1 RATIO= .88

306A-B MANE 2.77 281.53 237.48 .70 5.00 280.62 235.00 .70

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3146E+02 EXCESS= .0000E+00 OUTFLOW= .3148E+02 BASIN STORAGE= .1849E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .86
306A-B MANE 2.81 267.79 237.01 .67 5.00 265.46 235.00 .67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2994E+02 EXCESS= .0000E+00 OUTFLOW= .2997E+02 BASIN STORAGE= .2302E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .79
306A-B MANE 3.00 219.79 236.59 .55 5.00 218.43 240.00 .55

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2480E+02 EXCESS= .0000E+00 OUTFLOW= .2482E+02 BASIN STORAGE= .2103E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .88
F5-F4 MANE 3.96 927.10 238.07 70 5.00 913.12 240.00 .70

CONTINUITY SUMMARY (AC-FT) - INFLOW= 1002E+03 EXCESS= .0000E+00 OUTFLOW= .1001E+03 BASIN STORAGE= .3566E-02 PERCENT ERROR= .1

FOR PLAN = 1 RATIO= .86
F5-F4 MANE 4.10 869.28 236.50 .67 5.00 864.86 240.00 .67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9538E+02 EXCESS= .0000E+00 OUTFLOW= .9551E+02 BASIN STORAGE= .3257E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .79
F5-F4 MANE 4.31 713.82 240.41 .55 5.00 712.48 240.00 .55

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7899E+02 EXCESS= .0000E+00 OUTFLOW= .7923E+02 BASIN STORAGE= .3538E-02 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .88
306D-E MANE 1.71 309.68 257.65 .70 5.00 309.06 260.00 .70

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4924E+02 EXCESS= .0000E+00 OUTFLOW= .4924E+02 BASIN STORAGE= .1491E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .86
306D-E MANE 1.71 294.47 258.25 .67 5.00 293.58 260.00 .67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4685E+02 EXCESS= .0000E+00 OUTFLOW= .4686E+02 BASIN STORAGE= .1347E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .79
306D-E MANE 1.79 241.35 258.63 .55 5.00 240.88 260.00 .55

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3880E+02 EXCESS= .0000E+00 OUTFLOW= .3880E+02 BASIN STORAGE= .1176E-04 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .88
306E-C MANE 5.00 364.47 262.34 .70 5.00 363.67 260.00 .70

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6315E+02 EXCESS= .0000E+00 OUTFLOW= .6314E+02 BASIN STORAGE= .6094E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .86
306E-C MANE 5.00 346.65 259.77 .67 5.00 346.59 260.00 .67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6010E+02 EXCESS= .0000E+00 OUTFLOW= .6010E+02 BASIN STORAGE= .6427E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .79
306E-C MANE 5.00 283.29 264.27 .55 5.00 282.77 265.00 .55

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4977E+02 EXCESS= .0000E+00 OUTFLOW= .4981E+02 BASIN STORAGE= .8334E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .88
F4-G3 MANE 4.44 253.93 393.66 .46 5.00 253.91 390.00 .46

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2289E+03 EXCESS= .0000E+00 OUTFLOW= .2273E+03 BASIN STORAGE= .1655E+01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .86
F4-G3 MANE 4.48 243.54 394.21 .43 5.00 243.53 390.00 .43

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2142E+03 EXCESS= .0000E+00 OUTFLOW= .2124E+03 BASIN STORAGE= .1651E+01 PERCENT ERROR= .1

FOR PLAN = 1 RATIO= .79
F4-G3 MANE 4.85 200.05 393.23 .33 5.00 200.05 395.00 .33

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1651E+03 EXCESS= .0000E+00 OUTFLOW= .1636E+03 BASIN STORAGE= .1635E+01 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .88
307C-D MANE 2.46 175.81 233.38 .70 5.00 174.63 235.00 .70

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1841E+02 EXCESS= .0000E+00 OUTFLOW= .1842E+02 BASIN STORAGE= .2822E-04 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .86

307C-D	MANE	2.47	167.08	233.52	.67	5.00	165.98	235.00	.67

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1752E+02 EXCESS= .0000E+00 OUTFLOW= .1753E+02 BASIN STORAGE= .1911E-04 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .79

307C-D	MANE	2.63	137.24	234.02	.55	5.00	136.63	235.00	.55

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1451E+02 EXCESS= .0000E+00 OUTFLOW= .1452E+02 BASIN STORAGE= .2850E-04 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .88

G4-G3	MANE	4.76	404.00	234.47	1.03	5.00	402.21	235.00	1.03

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4361E+02 EXCESS= .0000E+00 OUTFLOW= .4382E+02 BASIN STORAGE= .8726E-04 PERCENT ERROR= -.5

FOR PLAN = 1 RATIO= .86

G4-G3	MANE	4.74	384.36	235.81	.99	5.00	383.07	235.00	.99

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4190E+02 EXCESS= .0000E+00 OUTFLOW= .4203E+02 BASIN STORAGE= .9572E-04 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .79

G4-G3	MANE	4.92	325.84	237.27	.85	5.00	325.24	235.00	.85

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3607E+02 EXCESS= .0000E+00 OUTFLOW= .3616E+02 BASIN STORAGE= .9730E-04 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .88

G3-G2	MANE	2.20	861.55	232.04	.55	5.00	861.33	230.00	.55

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3221E+03 EXCESS= .0000E+00 OUTFLOW= .3208E+03 BASIN STORAGE= .1254E+01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .86

G3-G2	MANE	2.24	824.55	229.59	.52	5.00	824.32	230.00	.52

CONTINUITY SUMMARY (AC-FT) - INFLOW= .303BE+03 EXCESS= .0000E+00 OUTFLOW= .3028E+03 BASIN STORAGE= .1251E+01 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .79

G3-G2	MANE	2.32	706.38	233.45	.42	5.00	701.22	235.00	.42

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2426E+03 EXCESS= .0000E+00 OUTFLOW= .2414E+03 BASIN STORAGE= .1239E+01 PERCENT ERROR= .0

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

APPENDIX IV

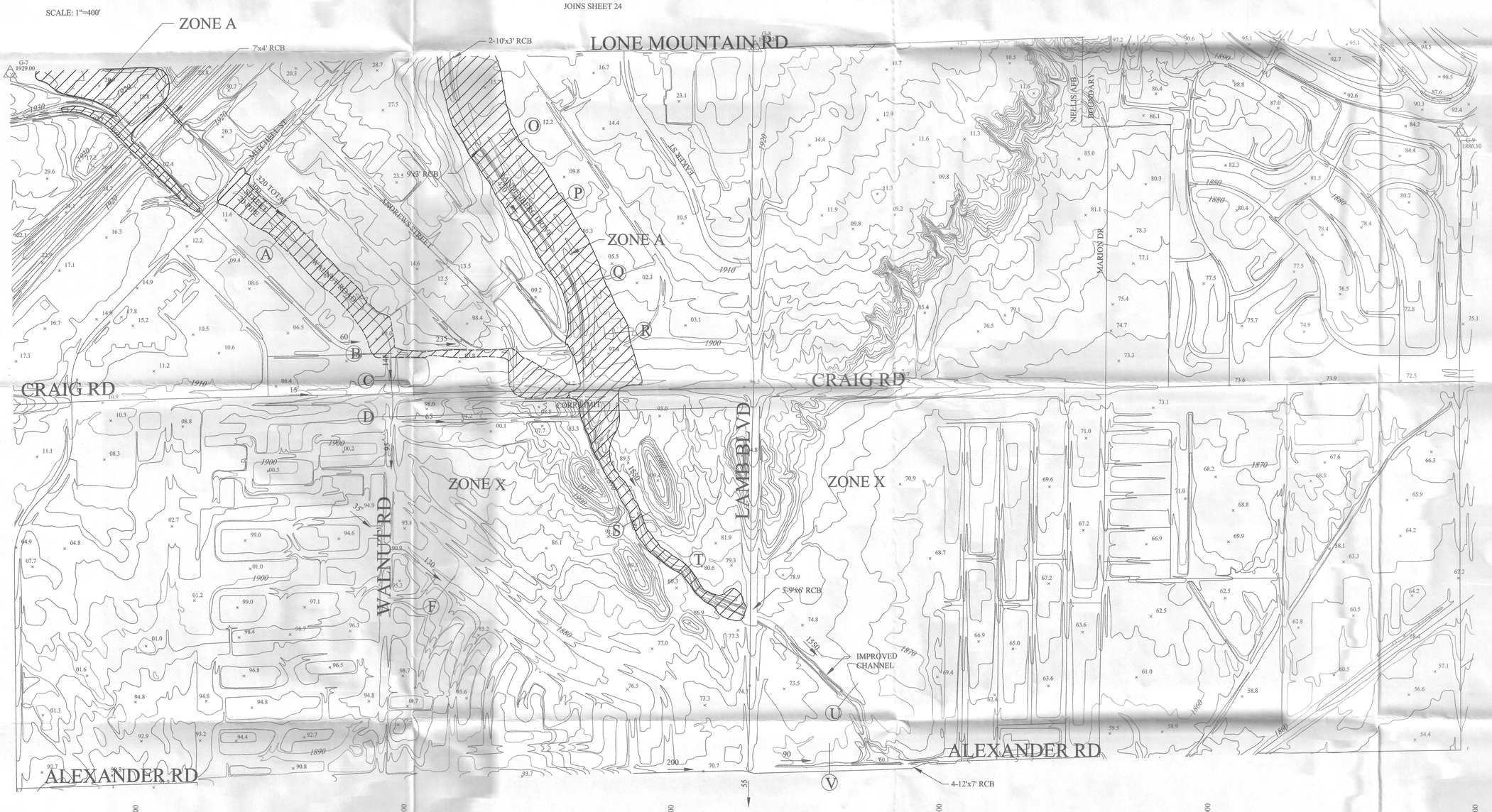
Hydraulics

Normal Depth Cross Section Location Maps

For Range Wash FIS and Developed Condition FlowMaster Runs

1988 Datum (NAVD88)
1929 Datum (NGVD29) = 1988 elevation - 2.4 feet

SCALE: 1"=400'



LEGEND

- APPROXIMATE (100-YEAR) FLOOD PLAIN BOUNDARY PROPOSED IN THE FIS
- (A) CROSS SECTION
- 530 → 100-YEAR DISCHARGE (CFS)

WORK MAP
RANGE WASH
FLOOD INSURANCE STUDY RESTUDY

CITY OF NORTH LAS VEGAS AND UNINCORPORATED
CLARK COUNTY, NEVADA

PBS&J
901 Green Valley Parkway
Suite 100
Henderson, Nevada 89014
Telephone: 702/263-7275
Fax: 702/263-7200
ENGINEERING • PLANNING • SURVEYING • CONSTRUCTION SERVICES

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CONTROL SURVEY BY:
CITY OF NORTH LAS VEGAS
SURVEY DIVISION

ELEVATIONS: CITY OF NORTH LAS VEGAS VERTICAL CONTROL
GRID SYSTEM: NEVADA STATE PLANE COORDINATES

CITY OF NORTH LAS VEGAS
DEPARTMENT OF PUBLIC WORKS

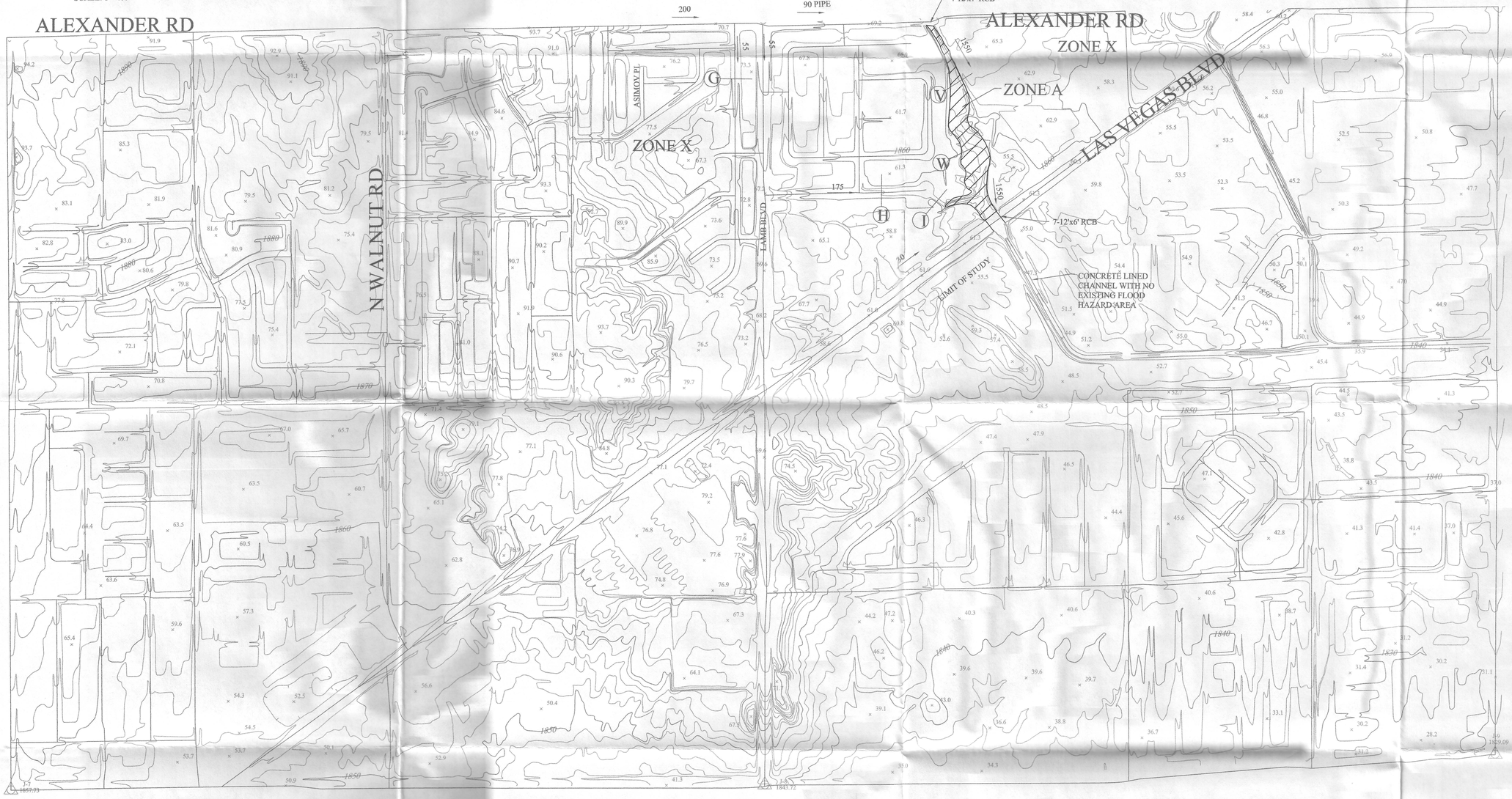
CONTOUR INTERVAL: 2'
SCALE: 1"=400'
PHOTO DATE: 3/15/95

SHEET NO.
29
OF __ SHEETS 47

ENNEY AERIAL MAPPING INC.
PHOENIX, ARIZONA/LAS VEGAS, NEVADA

1988 Datum (NAVD88)
1929 Datum (NGVD29) = 1988 elevation - 2.4 feet

SCALE: 1"=400'



LEGEND

- APPROXIMATE (100-YEAR) FLOOD PLAIN BOUNDARY PROPOSED IN FIS
- (A) CROSS SECTION
- 530 100-YEAR DISCHARGE (CFS)

WORK MAP
RANGE WASH
FLOOD INSURANCE STUDY RESTUDY

CITY OF NORTH LAS VEGAS AND UNICORPORATED
CLARK COUNTY, NEVADA

PBS&J
ENGINEERING • PLANNING • SURVEYING • CONSTRUCTION SERVICES
901 Green Valley Parkway
Suite 100
Henderson, Nevada 89014
Telephone: 702/263-7275
Fax: 702/263-7200

KENNEY AERIAL MAPPING INC.
PHOENIX, ARIZONA/LAS VEGAS, NEVADA

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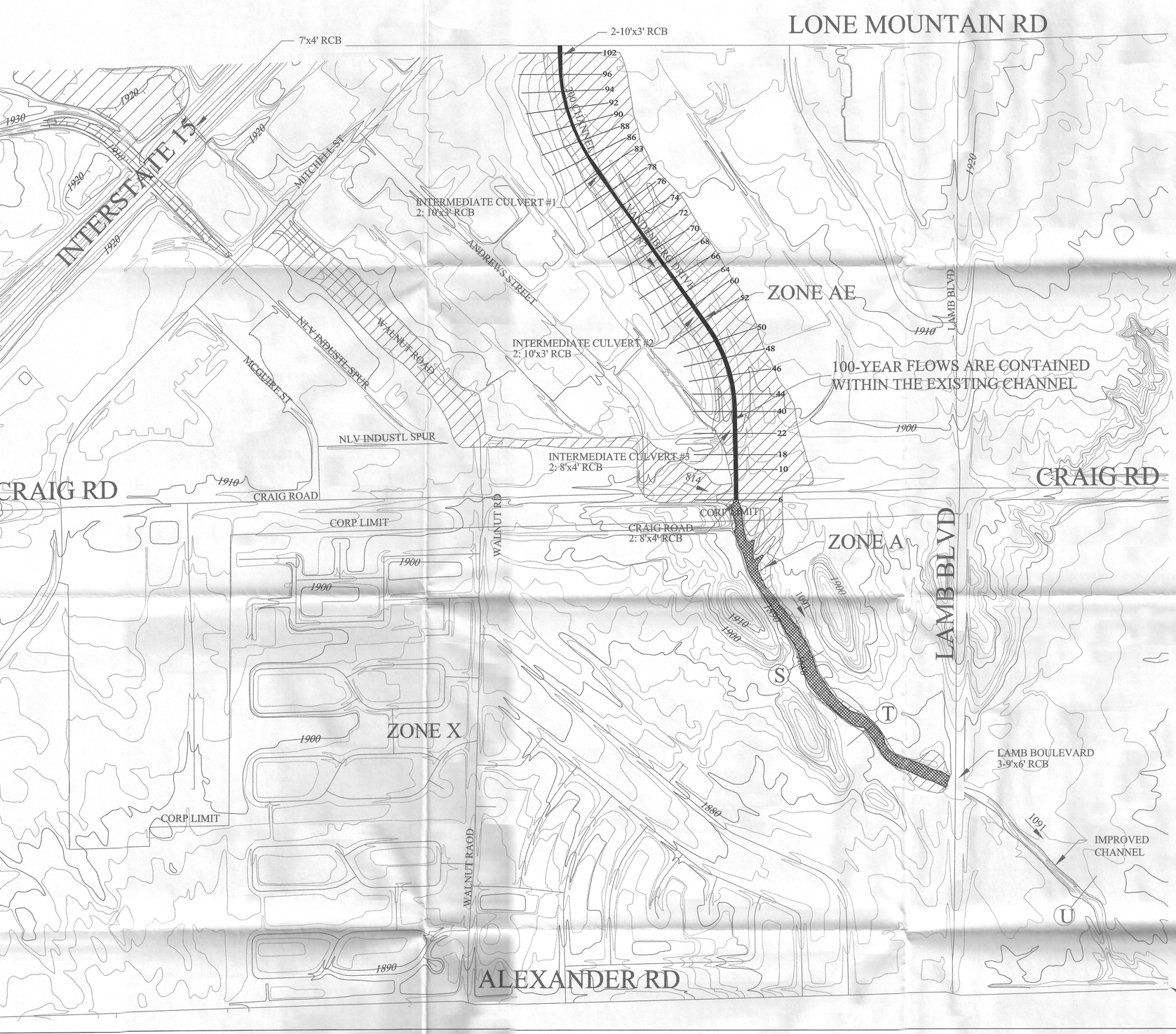
CONTROL SURVEY BY:
CITY OF NORTH LAS VEGAS
SURVEY DIVISION

ELEVATIONS: CITY OF NORTH LAS VEGAS VERTICAL CONTROL
GRID SYSTEM: NEVADA STATE PLANE COORDINATES

CITY OF NORTH LAS VEGAS
DEPARTMENT OF PUBLIC WORKS

CONTOUR INTERVAL: 2'
SCALE: 1"=400'
PHOTO DATE: 3/15/95

SHEET NO.
35
OF 47 SHEETS



LEGEND

- PROPOSED FEMA ZONE AE
- PROPOSED FEMA ZONE A
- EFFECTIVE 1997 FIS FLOODPLAIN
- 1 —— HEC-RAS CROSS SECTION
- (A) —— NORMAL DEPTH CROSS SECTION
- 530 ——→ 100-YEAR DISCHARGE (CFS)

GRAPHIC SCALE

300 0 150 300 600 1200

(IN FEET)

1 inch = 300 ft.

STATION	1988 DATUM B.F.E.	1929 DATUM B.F.E.	STATION	1988 DATUM B.F.E.	1929 DATUM B.F.E.
102	1915.21	1912.81	66	1905.37	1902.97
96	1914.14	1911.74	64	1904.20	1901.80
94	1913.74	1911.34	60	1902.89	1900.49
92	1913.39	1910.99	52	1903.82	1901.42
90	1913.10	1910.70	50	1901.60	1899.20
88	1912.06	1909.66	48	1900.88	1898.48
86	1912.03	1909.63	46	1899.85	1897.45
83	1912.11	1909.71	44	1898.97	1896.57
78	1910.44	1908.04	40	1896.75	1894.35
76	1909.38	1906.98	22	1893.93	1891.53
74	1908.83	1906.43	18	1891.64	1889.24
72	1908.23	1905.83	10	1889.81	1887.41
70	1906.94	1904.54	6	1887.44	1885.04
68	1906.26	1903.86			

CONTROL SURVEY BY:
CITY OF NORTH LAS VEGAS
SURVEY DIVISION

ELEVATIONS: CITY OF NORTH LAS VEGAS VERTICAL CONTROL
SPECIFICALLY, NAVD 88 DATUM BENCHMARK COORDINATES

CITY OF NORTH LAS VEGAS
DEPARTMENT OF PUBLIC WORKS

WORK MAP
VANDENBERG DETENTION BASIN
CONDITIONAL LETTER OF MAP REVISION

1988 Datum (NAVD88)
1929 Datum (NGVD29) = 1988 elevation - 2.4 feet

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31	32	33	34	35	36
37	38	39	40	41	
42	43	44	45	46	47

CONTOUR INTERVAL: 2'
SCALE: 1"= 300'
PHOTO DATE: 3/15/95

SHEET NO.
29R
OF 47 SHEETS

PBS&J
901 Green Valley Parkway
Suite 100
Henderson, Nevada 89014
Telephone: 702/263-7275
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ENGINEERING PLANNING • SURVEYING • CONSTRUCTION SERVICES

KENNEY AERIAL MAPPING INC.
PHOENIX, ARIZONA \ LAS VEGAS, NEVADA

LEGEND

PROPOSED FEMA ZONE A

EFFECTIVE 1997 FIS FLOODPLAIN

(A) CROSS SECTION

530 → 100-YEAR DISCHARGE (CFS)

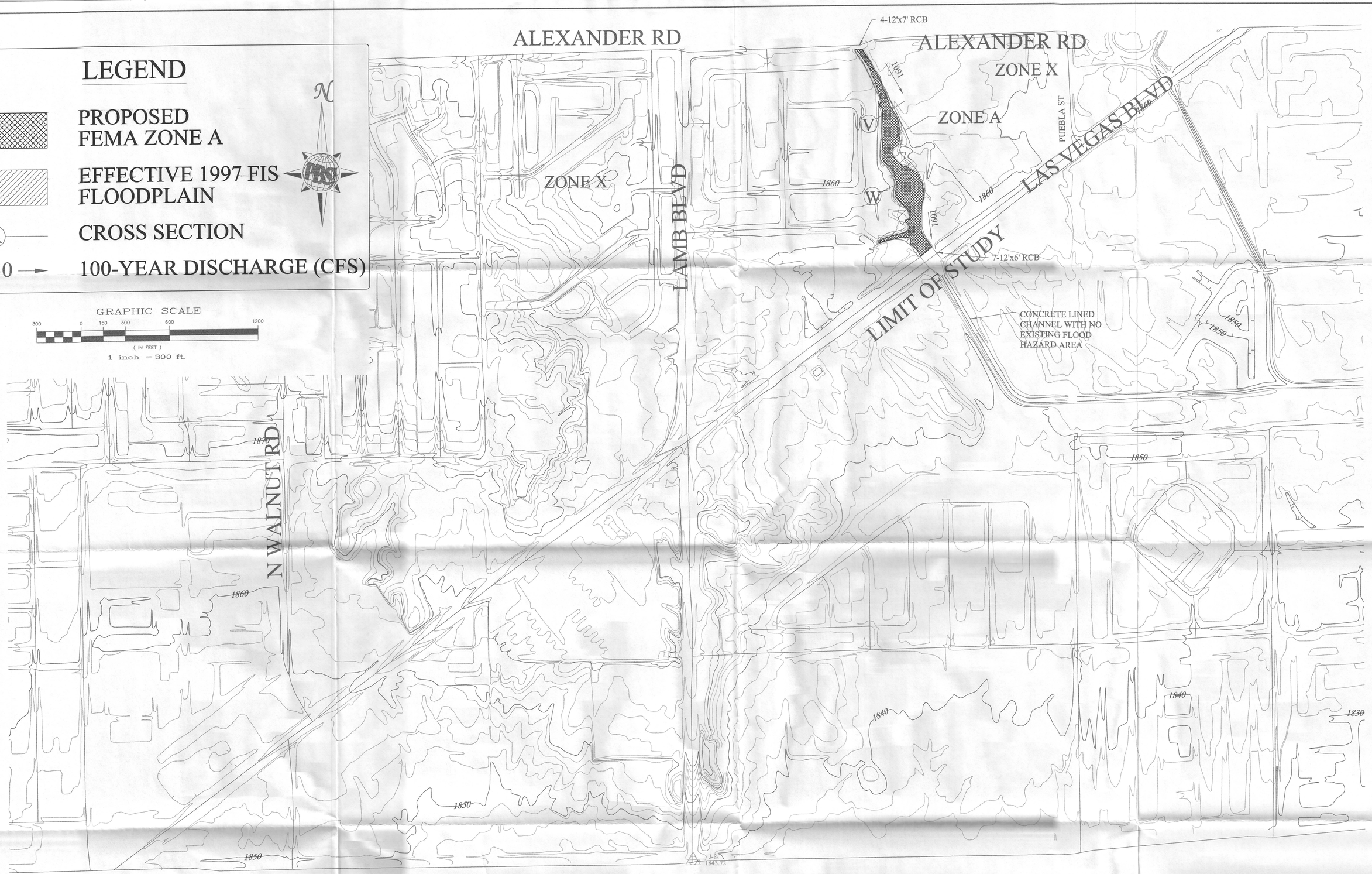
N

GRAPHIC SCALE

300 0 150 300 600 1200

(IN FEET)

1 inch = 300 ft.



WORK MAP
VANDENBERG DETENTION BASIN
CONDITIONAL LETTER OF MAP REVISION

1988 Datum (NAVD88)
1929 Datum (NGVD29) = 1988 elevation - 2.4 feet

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CONTROL SURVEY BY:
CITY OF NORTH LAS VEGAS
SURVEY DIVISION

ELEVATIONS: CITY OF NORTH LAS VEGAS VERTICAL CONTROL
GRID SYSTEM: NEVADA STATE PLANE COORDINATES

CITY OF NORTH LAS VEGAS
DEPARTMENT OF PUBLIC WORKS

CONTOUR INTERVAL: 2'
SCALE: 1"= 300'
PHOTO DATE: 3/15/95

SHEET NO.
35R
OF 47 SHEETS

Range Wash FIS Hydraulic Analysis

2 - 10 x 3 CULVERTS AT LONE MOUNTAIN ROAD
UPSTREAM END OF VANDENBERG CHANNEL

CURRENT DATE: 01-16-1996
CURRENT TIME: 11:19:09

FILE DATE: 12-26-1995
FILE NAME: VAND1

FHWA CULVERT ANALYSIS
HY-8, VERSION 3.2

CULV	SITE DATA: INLET ELEV. (FT)	SITE DATA: OUTLET ELEV. (FT)	SITE DATA: CULVERT LENGTH (FT)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (FT)	RISE (FT)	MANNING n	INLET TYPE
1	13.50	13.23	90.00	2 RCB	10.00	3.00	.013	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (CFS) FILE: VAND1 DATE: 12-26-1995

ELEV (FT)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
13.50	0	0	0	0	0	0	0	0	1
15.64	147	147	0	0	0	0	0	0	1
16.85	294	294	0	0	0	0	0	0	1
18.34	441	441	0	0	0	0	0	0	1
19.29	588	501	0	0	0	0	0	86	4
19.30	600	503	0	0	0	0	0	93	3
19.64	882	502	0	0	0	0	0	373	5
19.77	1029	499	0	0	0	0	0	526	5
19.87	1176	494	0	0	0	0	0	673	4
19.97	1323	490	0	0	0	0	0	826	4
20.06	1470	485	0	0	0	0	0	979	4
19.00	502	502	0	0	0	0	0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: VAND1 DATE: 12-26-1995

HEAD ELEV(FT)	HEAD ERROR(FT)	TOTAL FLOW(CFS)	FLOW ERROR(CFS)	% FLOW ERROR
13.50	0.00	0	0	0.00
15.64	0.00	147	0	0.00
16.85	0.00	294	0	0.00
18.34	0.00	441	0	0.00
19.29	-0.01	588	0	0.07
19.30	-0.00	600	4	0.65
19.64	-0.00	882	7	0.78
19.77	-0.01	1029	4	0.40
19.87	-0.00	1176	9	0.75
19.97	-0.01	1323	8	0.58
20.06	-0.01	1470	6	0.44

<1> TOLERANCE (FT) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 01-16-1996
CURRENT TIME: 15:08:10

FILE DATE: 12-26-1995
FILE NAME: VAND1

CULVERT # 1

PERFORMANCE CURVE FOR 2 BARREL(S)

Q (cfs)	HWE (ft)	TWE (ft)	ICH (ft)	OCH (ft)	FLOW TYPE	CCE (ft)	FCE (ft)	TCE (ft)	VO (fps)
0	13.00	12.50	0.00	-0.36	0-NF	0.00	13.00	0.00	0.00
147	15.01	14.35	2.01	1.91	6-FF	0.00	0.00	0.00	6.76
294	16.21	15.18	3.21	2.60	5-S2	0.00	0.00	0.00	8.38
405	17.16	15.82	4.16	4.14	4-FF	0.00	0.00	0.00	6.75
420	17.42	16.00	4.30	4.42	4-FF	0.00	0.00	0.00	7.00
422	17.43	16.00	4.32	4.43	4-FF	0.00	0.00	0.00	7.03
456	17.67	16.00	4.66	4.67	4-FF	0.00	0.00	0.00	7.61
468	17.79	16.00	4.79	4.76	4-FF	0.00	0.00	0.00	7.80
477	17.88	16.00	4.88	4.83	4-FF	0.00	0.00	0.00	7.96
485	17.97	16.00	4.97	4.89	4-FF	0.00	0.00	0.00	8.09
493	18.05	16.00	5.05	4.95	4-FF	0.00	0.00	0.00	8.21

El. inlet face invert 13.00 ft El. outlet invert 12.64 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION (FT)	0.00
INLET ELEVATION (FT)	13.00
OUTLET STATION (FT)	90.00
OUTLET ELEVATION (FT)	12.64
NUMBER OF BARRELS	2.00
SLOPE (V-FT/H-FT)	0.0040
CULVERT LENGTH ALONG SLOPE (FT)	90.00

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	10.00 FT
BARREL RISE	3.00 FT
BARREL MATERIAL	CONCRETE
BARREL MANNING'S N	0.013
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (90-45 DEG.)
INLET DEPRESSION	NONE

CURRENT DATE: 01-16-1996
CURRENT TIME: 15:08:10

FILE DATE: 12-26-1995
FILE NAME: VAND1

TAILWATER

TAILWATER RATING CURVE

FLOW(CFS)	W.S.E.(FT)
0	12.50
147	14.35
294	15.18
441	15.82
588	16.00
600	16.00
882	16.00
1029	16.00
1176	16.00
1323	16.00
1470	16.00

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE PAVED
EMBANKMENT TOP WIDTH (FT) 90.00
***** USER DEFINED ROADWAY PROFILE

CROSS-SECTION COORD. NO.	X (FT)	Y (FT)
1	0.00	20.00
2	100.00	18.00
3	200.00	17.00
4	350.00	17.00
5	600.00	18.00
6	800.00	19.00

VANDENBERG SECTION 1
Worksheet for Irregular Channel

(O)

Project Description	
Project File	c:\haestad\fmw\range1.fm2
Worksheet	VANDENBERG SEC. 1
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data		
Channel Slope	0.010000	ft/ft
Elevation range: 12.00 ft to 14.00 ft.		

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	14.00	0.00	350.00	0.030
60.00	12.00			
80.00	13.00			
130.00	13.00			
160.00	12.00			
240.00	12.00			
290.00	13.00			
350.00	13.75			

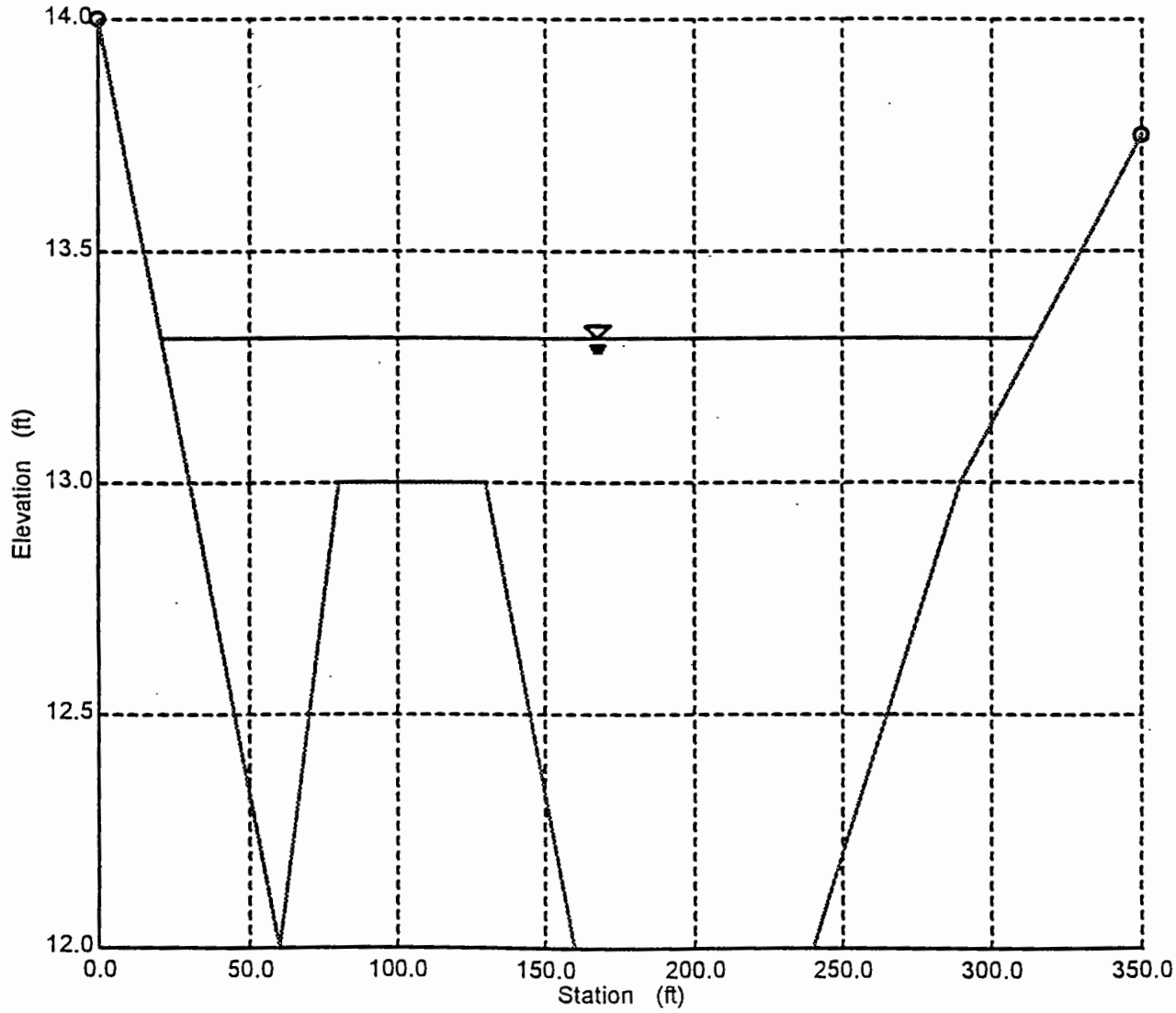
Discharge	970.00	cfs

Results		
Wtd. Mannings Coefficient	0.030	
Water Surface Elevation	13.31	ft
Flow Area	230.39	ft²
Wetted Perimeter	293.99	ft
Top Width	293.92	ft
Height	1.31	ft
Critical Depth	13.21	ft
Critical Slope	0.014676	ft/ft
Velocity	4.21	ft/s
Velocity Head	0.28	ft
Specific Energy	13.58	ft
Froude Number	0.84	
Flow is subcritical.		

VANDENBERG SECTION 1
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\range1.fm2
Worksheet	VANDENBERG SEC. 1
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.030	
Channel Slope	0.010000	ft/ft
Water Surface Elevation	13.31	ft
Discharge	970.00	cfs



2 - 9 x 3 CULVERTS ON VANDENBERG CHANNEL

CURRENT DATE: 01-16-1996
CURRENT TIME: 11:20:54

FILE DATE: 12-26-1995
FILE NAME: VAND2

FHWA CULVERT ANALYSIS
HY-8, VERSION 3.2

CULV	SITE DATA: INLET ELEV. (FT)	SITE DATA: OUTLET ELEV. (FT)	SITE DATA: CULVERT LENGTH (FT)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (FT)	RISE (FT)	MANNING n	INLET TYPE
1	25.04	24.92	90.00	2 RCB	9.00	3.00	.013	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (CFS) FILE: VAND2 DATE: 12-26-1995

ELEV (FT)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
25.04	0	0	0	0	0	0	0	0	1
26.15	50	50	0	0	0	0	0	0	1
26.78	100	100	0	0	0	0	0	0	1
27.26	150	150	0	0	0	0	0	0	1
27.73	200	200	0	0	0	0	0	0	1
28.16	250	250	0	0	0	0	0	0	1
28.58	300	300	0	0	0	0	0	0	1
29.06	350	350	0	0	0	0	0	0	1
29.70	400	350	0	0	0	0	0	19	12
29.89	450	400	0	0	0	0	0	62	12
30.06	500	400	0	0	0	0	0	115	11
29.54	350	350	0	0	0	0	0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: VAND2 DATE: 12-26-1995

HEAD ELEV(FT)	HEAD ERROR(FT)	TOTAL FLOW(CFS)	FLOW ERROR(CFS)	% FLOW ERROR
25.04	0.00	0	0	0.00
26.15	0.00	50	0	0.00
26.78	0.00	100	0	0.00
27.26	0.00	150	0	0.00
27.73	0.00	200	0	0.00
28.16	0.00	250	0	0.00
28.58	0.00	300	0	0.00
29.06	0.00	350	0	0.00
29.70	-0.00	400	31	7.67
29.89	0.00	450	-12	-2.60
30.06	0.00	500	-15	-2.91

<1> TOLERANCE (FT) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 01-16-1996
CURRENT TIME: 11:20:54

FILE DATE: 12-26-1995
FILE NAME: VAND2

CULVERT # 1

PERFORMANCE CURVE FOR 2 BARREL(S)

Q (cfs)	HWE (ft)	TWE (ft)	ICH (ft)	OCH (ft)	FLOW TYPE	CCE (ft)	FCE (ft)	TCE (ft)	VO (fps)
0	25.04	24.92	0.00	-0.12	0-NF	0.00	25.04	0.00	0.00
50	26.15	25.82	1.07	1.11	3-M1	0.00	0.00	0.00	3.10
100	26.78	26.26	1.68	1.74	3-M1	0.00	0.00	0.00	4.16
150	27.26	26.60	2.19	2.22	3-M2	0.00	0.00	0.00	4.96
200	27.73	26.89	2.65	2.69	3-M2	0.00	0.00	0.00	5.63
250	28.16	27.15	3.09	3.12	3-M2	0.00	0.00	0.00	6.22
300	28.58	27.39	3.54	3.52	3-M2	0.00	0.00	0.00	6.76
350	29.06	27.60	4.02	3.91	3-M2	0.00	0.00	0.00	7.26
350	29.06	27.80	4.02	3.91	3-M2	0.00	0.00	0.00	6.76
400	29.58	27.98	4.54	4.54	4-FF	0.00	0.00	0.00	7.41
400	29.76	28.16	4.54	4.72	4-FF	0.00	0.00	0.00	7.41

El. inlet face invert 25.04 ft El. outlet invert 24.92 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION (FT)	0.00
INLET ELEVATION (FT)	25.04
OUTLET STATION (FT)	90.00
OUTLET ELEVATION (FT)	24.92
NUMBER OF BARRELS	2.00
SLOPE (V-FT/H-FT)	0.0013
CULVERT LENGTH ALONG SLOPE (FT)	90.00

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	9.00 FT
BARREL RISE	3.00 FT
BARREL MATERIAL	CONCRETE
BARREL MANNING'S N	0.013
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (90-45 DEG.)
INLET DEPRESSION	NONE

CURRENT DATE: 01-16-1996 FILE DATE: 12-26-1995
CURRENT TIME: 11:20:54 FILE NAME: VAND2

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH (FT)	8.00
SIDE SLOPE H/V (X:1)	1.5
CHANNEL SLOPE V/H (FT/FT)	0.005
MANNING'S N (.01-0.1)	0.015
CHANNEL INVERT ELEVATION (FT)	24.92
CULVERT NO.1 OUTLET INVERT ELEVATION	24.92 FT

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (CFS)	W.S.E. (FT)	FROUDE NUMBER	VEL. (FPS)	SHEAR (PSF)
0.00	24.92	0.000	0.00	0.00
50.00	25.82	1.114	5.98	0.30
100.00	26.26	1.140	7.48	0.45
150.00	26.60	1.153	8.48	0.57
200.00	26.89	1.160	9.25	0.67
250.00	27.15	1.164	9.87	0.75
300.00	27.39	1.168	10.40	0.83
350.00	27.60	1.170	10.87	0.90
400.00	27.80	1.172	11.28	0.97
450.00	27.98	1.174	11.66	1.03
500.00	28.16	1.175	12.00	1.09

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH (FT)	90.00
CREST LENGTH (FT)	100.00
OVERTOPPING CREST ELEVATION (FT)	29.54

VANDENBERG SECTION 2
Worksheet for Irregular Channel

(P)

Project Description	
Project File	c:\haestad\fmw\range1.fm2
Worksheet	VANDENBERG SEC 2
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data		
Channel Slope	0.006700	ft/ft
Elevation range: 5.50 ft to 8.00 ft.		

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	8.00	0.00	50.00	0.018
50.00	5.50	50.00	240.00	0.030
90.00	7.00			
120.00	7.00			
140.00	6.50			
160.00	7.00			
240.00	8.00			

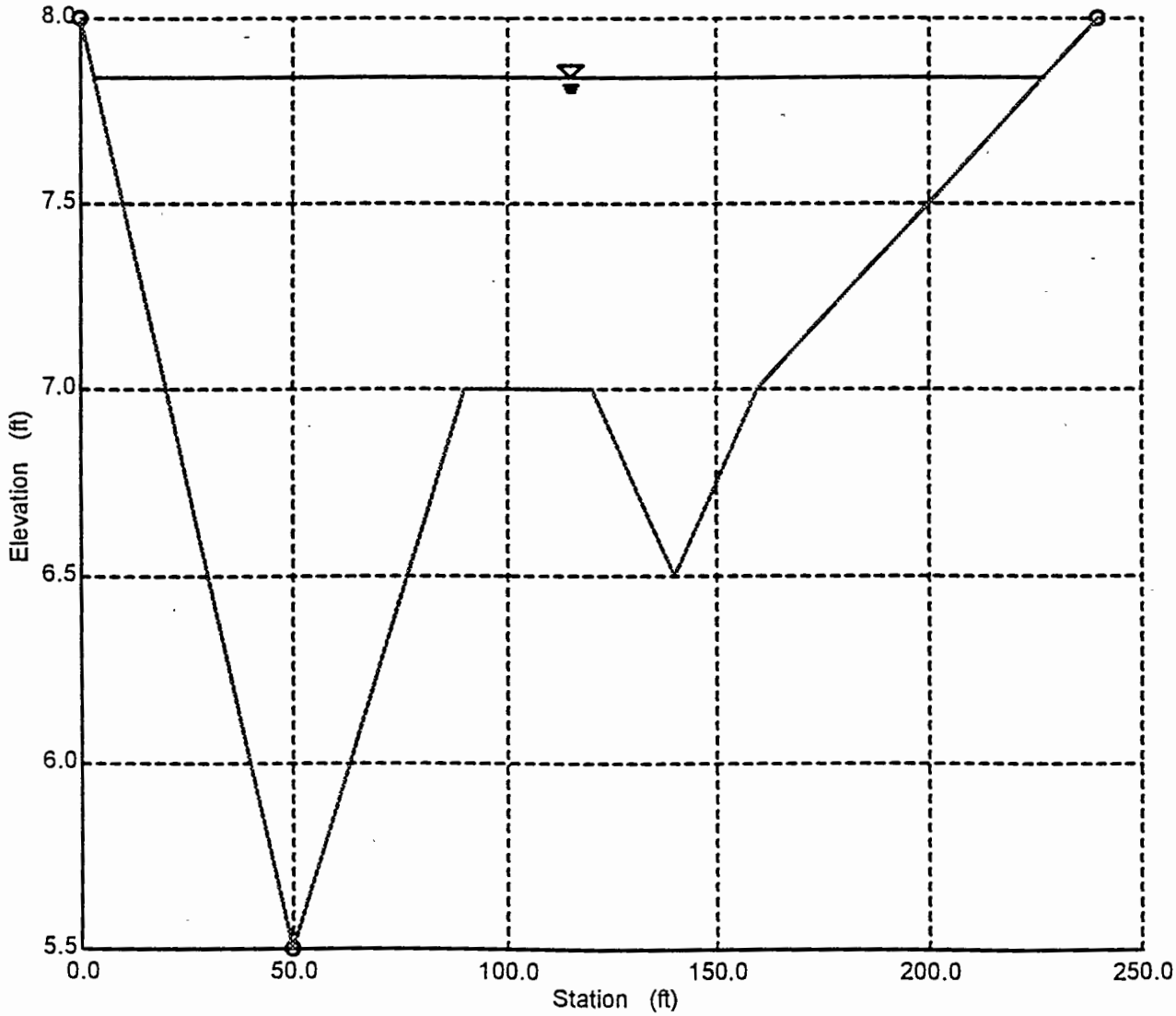
Discharge	1,020.00	cfs

Results		
Wtd. Mannings Coefficient	0.025	
Water Surface Elevation	7.84	ft
Flow Area	215.33	ft²
Wetted Perimeter	224.08	ft
Top Width	223.98	ft
Height	2.34	ft
Critical Depth	7.72	ft
Critical Slope	0.009319	ft/ft
Velocity	4.74	ft/s
Velocity Head	0.35	ft
Specific Energy	8.19	ft
Froude Number	0.85	
Flow is subcritical.		

VANDENBERG SECTION 2
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\range1.fm2
Worksheet	VANDENBERG SEC 2
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.025	
Channel Slope	0.006700	ft/ft
Water Surface Elevation	7.84	ft
Discharge	1,020.00	cfs



VANDENBERG SECTION 3
Worksheet for Irregular Channel

Q

Project Description	
Project File	c:\haestad\fmw\range1.fm2
Worksheet	VANDENBERG SECTION 3
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data		
Channel Slope	0.008000	ft/ft
Elevation range: 1.00 ft to 4.00 ft.		
Discharge	1,020.00	cfs

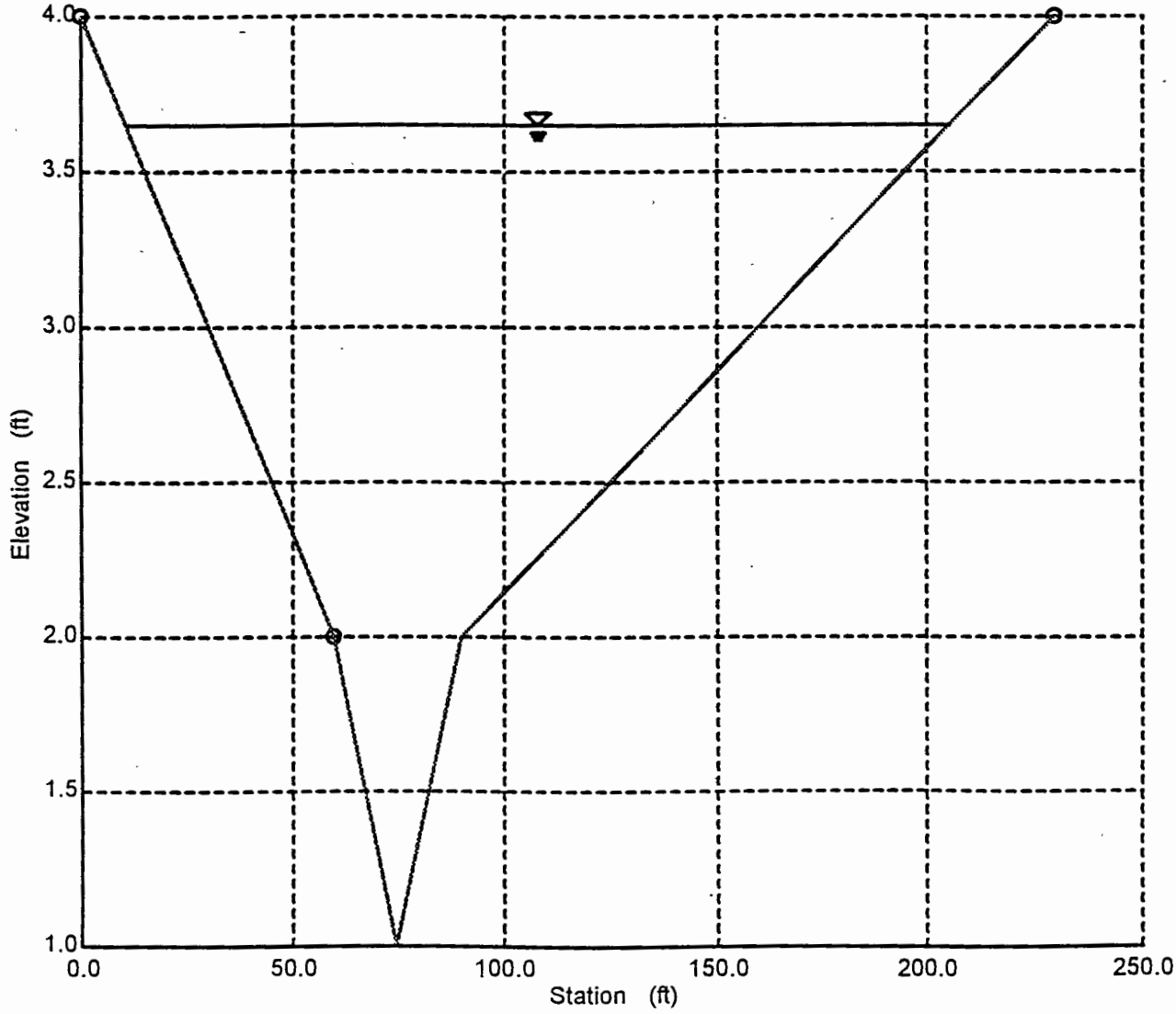
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	4.00	0.00	60.00	0.018
60.00	2.00	60.00	230.00	0.030
75.00	1.00			
90.00	2.00			
230.00	4.00			

Results		
Wtd. Mannings Coefficient	0.027	
Water Surface Elevation	3.65	ft
Flow Area	200.86	ft²
Wetted Perimeter	195.23	ft
Top Width	195.12	ft
Height	2.65	ft
Critical Depth	3.55	ft
Critical Slope	0.010502	ft/ft
Velocity	5.08	ft/s
Velocity Head	0.40	ft
Specific Energy	4.05	ft
Froude Number	0.88	
Flow is subcritical.		

VANDENBERG SECTION 3
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\range1.fm2
Worksheet	VANDENBERG SECTION 3
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.027	
Channel Slope	0.008000	ft/ft
Water Surface Elevation	3.65	ft
Discharge	1,020.00	cfs



VANDENBERG SECTION 4
Worksheet for Irregular Channel

(R)

Project Description	
Project File	c:\haestad\fmw\range1.fm2
Worksheet	VANDENBERG SEC 4
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

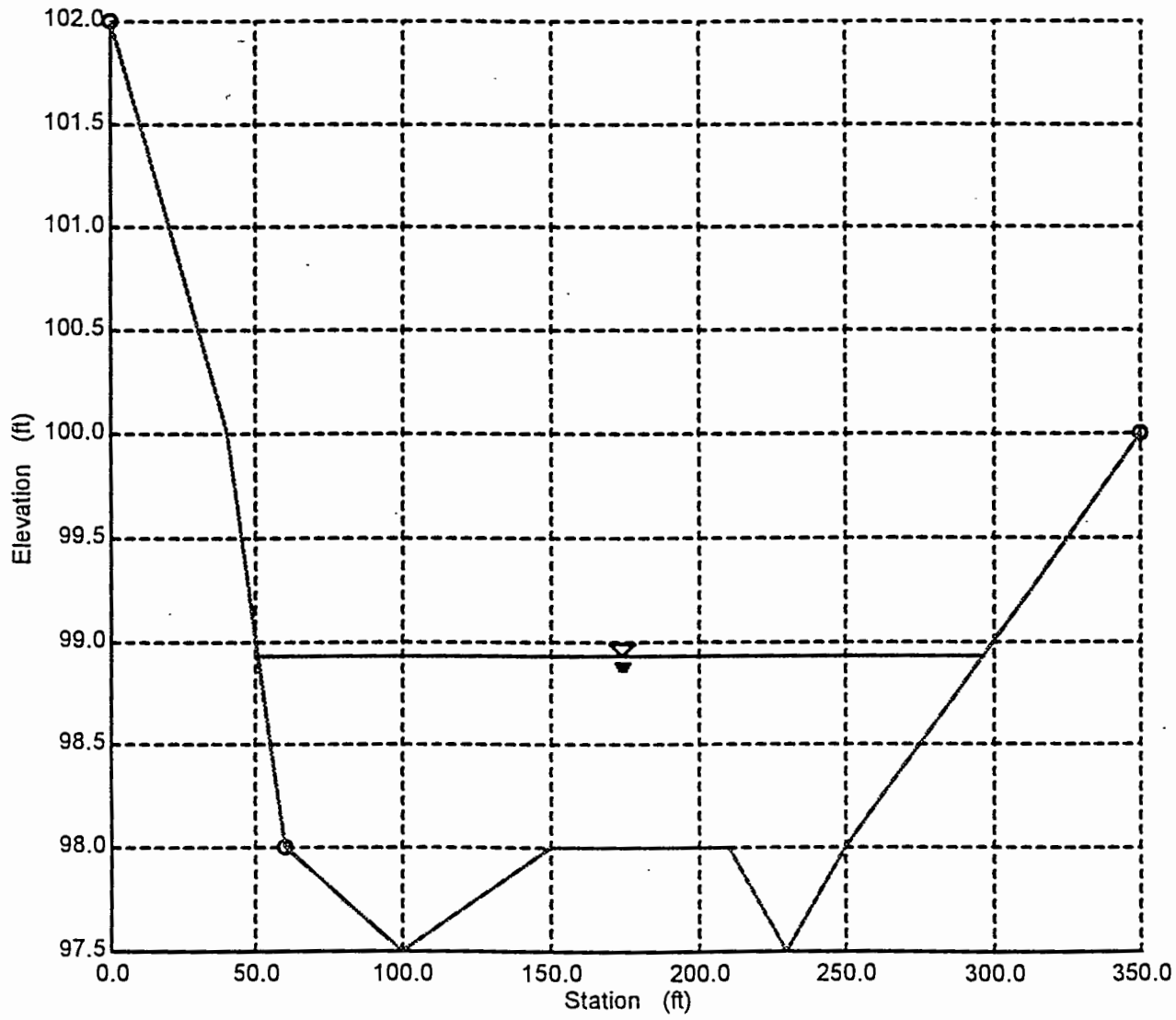
Input Data				
Channel Slope	0.008000 ft/ft			
Elevation range: 97.50 ft to 102.00 ft.				
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	102.00	0.00	60.00	0.018
40.00	100.00	60.00	350.00	0.030
60.00	98.00			
100.00	97.50			
150.00	98.00			
210.00	98.00			
230.00	97.50			
250.00	98.00			
350.00	100.00			
Discharge	1,020.00 cfs			

Results		
Wtd. Mannings Coefficient	0.030	
Water Surface Elevation	98.93	ft
Flow Area	234.37	ft²
Wetted Perimeter	245.68	ft
Top Width	245.61	ft
Height	1.43	ft
Critical Depth	98.77	ft
Critical Slope	0.013615	ft/ft
Velocity	4.35	ft/s
Velocity Head	0.29	ft
Specific Energy	99.22	ft
Froude Number	0.79	
Flow is subcritical.		

VANDENBERG SECTION 4
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\range1.fm2
Worksheet	VANDENBERG SEC 4
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.030	
Channel Slope	0.008000	ft/ft
Water Surface Elevation	98.93	ft
Discharge	1,020.00	cfs



RANGE WASH - CRAIG TO LAMB - SEC 1
Worksheet for Irregular Channel

(S)

Project Description	
Project File	c:\haestad\fmw\range3.fm2
Worksheet	RANGE WASH - CRAIG TO LAMB SEC 1
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data		
Channel Slope	0.005000	ft/ft

Elevation range: 78.00 ft to 90.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	90.00	0.00	190.00	0.025
40.00	80.00			
90.00	78.00			
100.00	78.00			
110.00	80.00			
140.00	86.00			
190.00	88.00			

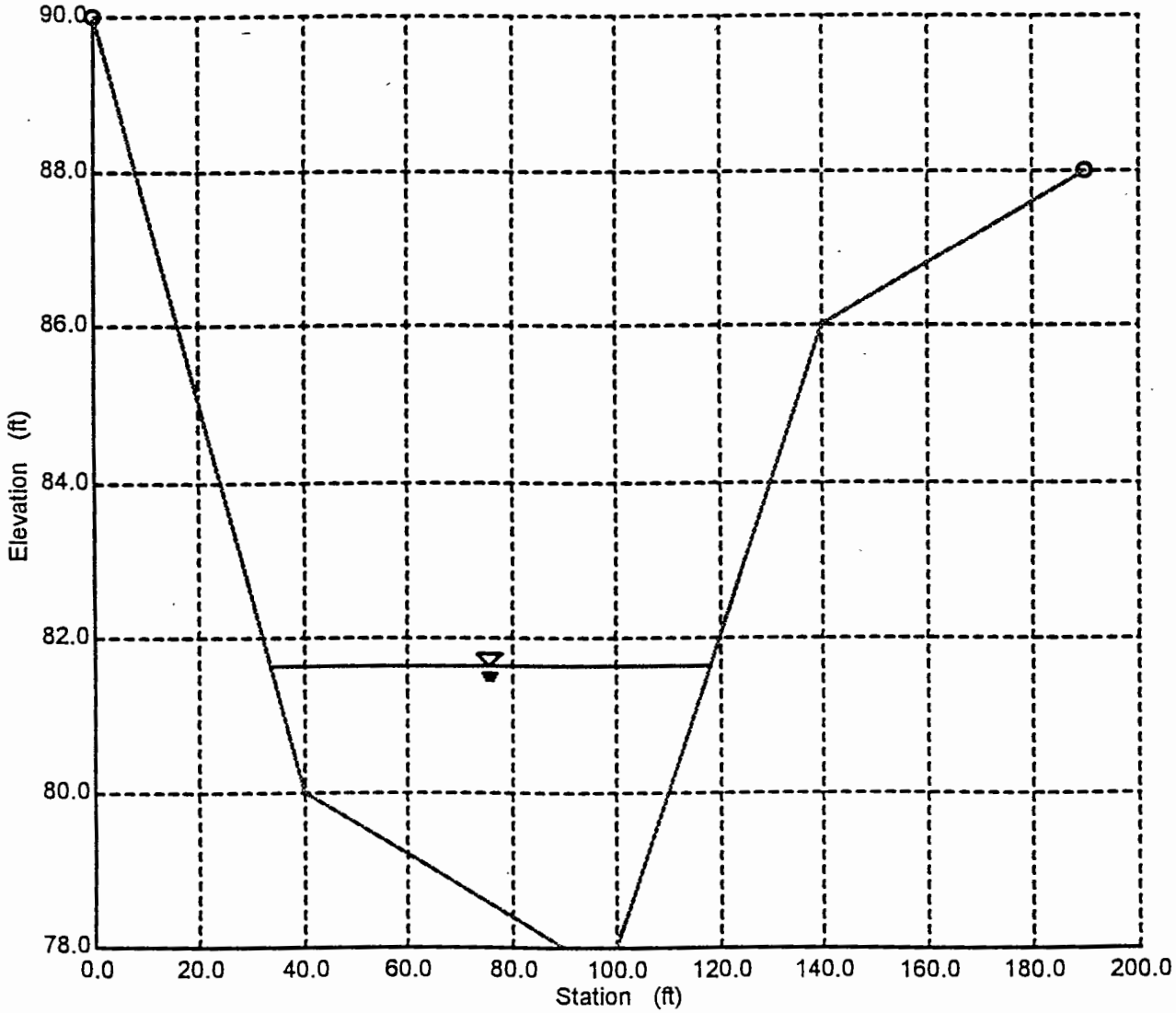
Discharge	1,550.00	cfs

Results		
Wtd. Mannings Coefficient	0.025	
Water Surface Elevation	81.62	ft
Flow Area	205.21	ft²
Wetted Perimeter	85.18	ft
Top Width	84.58	ft
Height	3.62	ft
Critical Depth	81.35	ft
Critical Slope	0.007035	ft/ft
Velocity	7.55	ft/s
Velocity Head	0.89	ft
Specific Energy	82.51	ft
Froude Number	0.85	
Flow is subcritical.		

RANGE WASH - CRAIG TO LAMB - SEC 1
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\range3.fm2
Worksheet	RANGE WASH - CRAIG TO LAMB SEC 1
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.025	
Channel Slope	0.005000	ft/ft
Water Surface Elevation	81.62	ft
Discharge	1,550.00	cfs



RANGE WASH - CRAIG TO LAMB - SEC 2
Worksheet for Irregular Channel

(T)

Project Description	
Project File	c:\haestad\fmw\range3.fm2
Worksheet	RANGE WASH - CRAIG TO LAMB - SEC 2
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

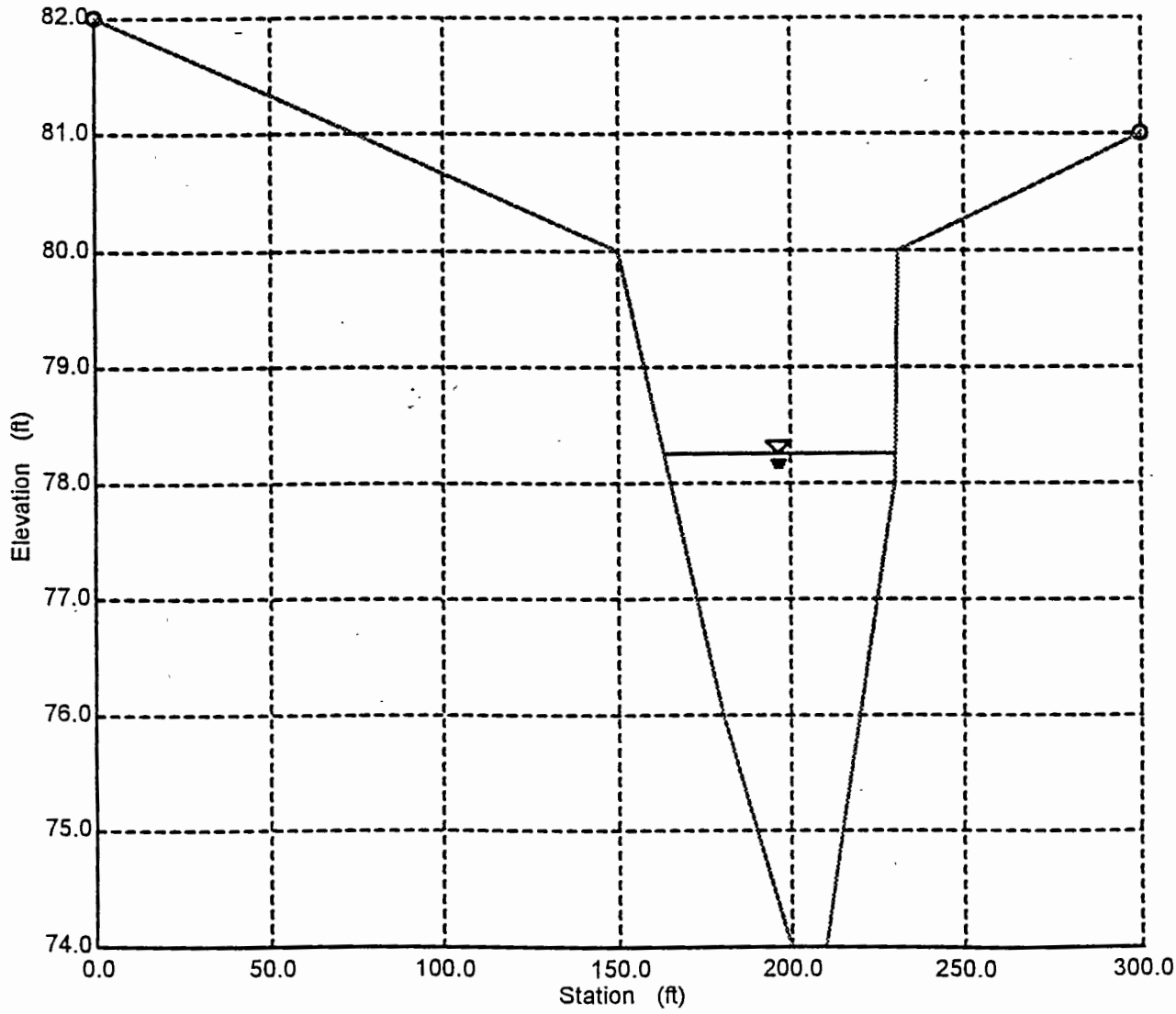
Input Data				
Channel Slope	0.006700 ft/ft			
Elevation range: 74.00 ft to 82.00 ft.				
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	82.00	0.00	300.00	0.025
150.00	80.00			
180.00	76.00			
200.00	74.00			
210.00	74.00			
220.00	76.00			
230.00	78.00			
231.00	80.00			
300.00	81.00			
Discharge	1,550.00	cfs		

Results		
Wtd. Mannings Coefficient	0.025	
Water Surface Elevation	78.25	ft
Flow Area	171.58	ft²
Wetted Perimeter	67.81	ft
Top Width	67.01	ft
Height	4.25	ft
Critical Depth	78.24	ft
Critical Slope	0.006768	ft/ft
Velocity	9.03	ft/s
Velocity Head	1.27	ft
Specific Energy	79.52	ft
Froude Number	1.00	
Flow is subcritical.		

RANGE WASH - CRAIG TO LAMB - SEC 2
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\range3.fm2
Worksheet	RANGE WASH - CRAIG TO LAMB - SEC 2
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.025	
Channel Slope	0.006700	ft/ft
Water Surface Elevation	78.25	ft
Discharge	1,550.00	cfs



3 - 9 x 6 CULVERTS AT LAMB

CURRENT DATE: 01-15-1996
CURRENT TIME: 13:22:07

FILE DATE: 01-12-1996
FILE NAME: LAMB

FHWA CULVERT ANALYSIS
HY-8, VERSION 3.2

CULV	SITE DATA: INLET ELEV. (FT)	SITE DATA: OUTLET ELEV. (FT)	SITE DATA: CULVERT LENGTH (FT)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (FT)	RISE (FT)	MANNING n	INLET TYPE
1	70.00	69.00	100.01	3 RCB	9.00	6.00	.015	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (CFS) FILE: LAMB DATE: 01-12-1996

ELEV (FT)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
70.00	0	0	0	0	0	0	0	0	1
72.53	155	155	0	0	0	0	0	0	1
72.90	310	310	0	0	0	0	0	0	1
73.55	465	465	0	0	0	0	0	0	1
74.28	620	620	0	0	0	0	0	0	1
74.96	775	775	0	0	0	0	0	0	1
75.60	930	930	0	0	0	0	0	0	1
76.25	1085	1085	0	0	0	0	0	0	1
76.90	1240	1240	0	0	0	0	0	0	1
77.59	1395	1395	0	0	0	0	0	0	1
78.18	1550	1520	0	0	0	0	0	30	4
78.00	1482	1482	0	0	0	0	0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: LAMB DATE: 01-12-1996

HEAD ELEV(FT)	HEAD ERROR(FT)	TOTAL FLOW(CFS)	FLOW ERROR(CFS)	% FLOW ERROR
70.00	0.00	0	0	0.00
72.53	0.00	155	0	0.00
72.90	0.00	310	0	0.00
73.55	0.00	465	0	0.00
74.28	0.00	620	0	0.00
74.96	0.00	775	0	0.00
75.60	0.00	930	0	0.00
76.25	0.00	1085	0	0.00
76.90	0.00	1240	0	0.00
77.59	0.00	1395	0	0.00
78.18	-0.00	1550	0	0.01

<1> TOLERANCE (FT) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 01-15-1996
CURRENT TIME: 13:22:07

FILE DATE: 01-12-1996
FILE NAME: LAMB

CULVERT # 1

PERFORMANCE CURVE FOR 3 BARREL(S)

Q (cfs)	HWE (ft)	TWE (ft)	ICH (ft)	OCH (ft)	FLOW TYPE	CCE (ft)	FCE (ft)	TCE (ft)	VO (fps)
0	70.00	69.00	0.00	-1.00	0-NF	0.00	70.00	0.00	0.00
155	72.53	69.90	1.72	2.53	6-FF	0.00	0.00	0.00	5.68
310	72.90	70.34	2.73	2.90	6-FF	0.00	0.00	0.00	7.16
465	73.55	70.69	3.55	3.28	6-FF	0.00	0.00	0.00	10.59
620	74.28	70.99	4.28	3.68	6-FF	0.00	0.00	0.00	11.48
775	74.96	71.25	4.96	4.12	6-FF	0.00	0.00	0.00	12.26
930	75.60	71.49	5.60	4.59	6-FF	0.00	0.00	0.00	12.89
1085	76.25	71.71	6.25	5.10	6-FF	0.00	0.00	0.00	13.45
1240	76.90	71.92	6.90	5.66	6-FF	0.00	0.00	0.00	13.93
1395	77.59	72.11	7.59	6.26	6-FF	0.00	0.00	0.00	14.38
1520	78.18	72.29	8.18	6.77	6-FF	0.00	0.00	0.00	14.72

El. inlet face invert 70.00 ft El. outlet invert 69.00 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION (FT)	0.00
INLET ELEVATION (FT)	70.00
OUTLET STATION (FT)	100.00
OUTLET ELEVATION (FT)	69.00
NUMBER OF BARRELS	3.00
SLOPE (V-FT/H-FT)	0.0100
CULVERT LENGTH ALONG SLOPE (FT)	100.01

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	9.00 FT
BARREL RISE	6.00 FT
BARREL MATERIAL	CONCRETE
BARREL MANNING'S N	0.015
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (90-45 DEG.)
INLET DEPRESSION	NONE

CURRENT DATE: 01-15-1996 FILE DATE: 01-12-1996
CURRENT TIME: 13:22:07 FILE NAME: LAMB

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH (FT)	30.00
SIDE SLOPE H/V (X:1)	4.0
CHANNEL SLOPE V/H (FT/FT)	0.010
MANNING'S N (.01-0.1)	0.025
CHANNEL INVERT ELEVATION (FT)	69.00
CULVERT NO.1 OUTLET INVERT ELEVATION	69.00 FT

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (CFS)	W.S.E. (FT)	FROUDE NUMBER	VEL. (FPS)	SHEAR (PSF)
0.00	69.00	0.000	0.00	0.00
155.00	69.90	0.957	5.14	0.56
310.00	70.34	0.995	6.54	0.84
465.00	70.69	1.015	7.49	1.05
620.00	70.99	1.028	8.22	1.24
775.00	71.25	1.036	8.82	1.40
930.00	71.49	1.043	9.34	1.55
1085.00	71.71	1.048	9.80	1.69
1240.00	71.92	1.053	10.20	1.82
1395.00	72.11	1.057	10.57	1.94
1550.00	72.29	1.060	10.91	2.05

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	GRAVEL
EMBANKMENT TOP WIDTH (FT)	500.00
CREST LENGTH (FT)	150.00
OVERTOPPING CREST ELEVATION (FT)	78.00

RANGE WASH CHANNEL - LAMB TO ALEXANDER
Worksheet for Trapezoidal Channel

U

Project Description	
Project File	c:\haestad\fmw\range3.fm2
Worksheet	RANGE WASH - LAMB TO ALEXANDER
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.015	
Channel Slope	0.007800	ft/ft
Left Side Slope	2.000000	H : V
Right Side Slope	2.000000	H : V
Bottom Width	32.00	ft
Discharge	1,550.00	cfs

Results		
Depth	2.71	ft
Flow Area	101.62	ft²
Wetted Perimeter	44.14	ft
Top Width	42.86	ft
Critical Depth	3.84	ft
Critical Slope	0.002335	ft/ft
Velocity	15.25	ft/s
Velocity Head	3.62	ft
Specific Energy	6.33	ft
Froude Number	1.75	
Flow is supercritical.		

4 - 12 x 7 CULVERTS AT ALEXANDER ROAD

CURRENT DATE: 01-15-1996
CURRENT TIME: 14:24:06

FILE DATE: 01-15-1996
FILE NAME: ALEX

FHWA CULVERT ANALYSIS
HY-8, VERSION 3.2

CULV	SITE DATA: INLET ELEV. (FT)	SITE DATA: OUTLET ELEV. (FT)	SITE DATA: CULVERT LENGTH (FT)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (FT)	RISE (FT)	MANNING n	INLET TYPE
1	60.00	58.80	50.01	4 RCB	12.00	7.00	.013	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (CFS) FILE: ALEX DATE: 01-15-1996

ELEV (FT)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
60.00	0	0	0	0	0	0	0	0	1
62.65	155	155	0	0	0	0	0	0	1
62.86	310	310	0	0	0	0	0	0	1
63.05	465	465	0	0	0	0	0	0	1
63.23	620	620	0	0	0	0	0	0	1
63.41	775	775	0	0	0	0	0	0	1
63.59	930	930	0	0	0	0	0	0	1
63.89	1085	1085	0	0	0	0	0	0	1
64.23	1240	1240	0	0	0	0	0	0	1
64.57	1395	1395	0	0	0	0	0	0	1
64.89	1550	1550	0	0	0	0	0	0	1
67.00	2599	2599	0	0	0	0	0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: ALEX DATE: 01-15-1996

HEAD ELEV(FT)	HEAD ERROR(FT)	TOTAL FLOW(CFS)	FLOW ERROR(CFS)	% FLOW ERROR
60.00	0.00	0	0	0.00
62.65	0.00	155	0	0.00
62.86	0.00	310	0	0.00
63.05	0.00	465	0	0.00
63.23	0.00	620	0	0.00
63.41	0.00	775	0	0.00
63.59	0.00	930	0	0.00
63.89	0.00	1085	0	0.00
64.23	0.00	1240	0	0.00
64.57	0.00	1395	0	0.00
64.89	0.00	1550	0	0.00

<1> TOLERANCE (FT) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 01-15-1996
CURRENT TIME: 14:24:06

FILE DATE: 01-15-1996
FILE NAME: ALEX

CULVERT # 1

PERFORMANCE CURVE FOR 4 BARREL(S)

Q (cfs)	HWE (ft)	TWE (ft)	ICH (ft)	OCH (ft)	FLOW TYPE	CCE (ft)	FCE (ft)	TCE (ft)	VO (fps)
0	60.00	58.80	0.00	-1.20	0-NF	0.00	60.00	0.00	0.00
155	62.65	59.65	1.07	2.65	6-FF	0.00	0.00	0.00	3.80
310	62.86	60.09	1.70	2.86	6-FF	0.00	0.00	0.00	5.03
465	63.05	60.44	2.22	3.05	6-FF	0.00	0.00	0.00	5.92
620	63.23	60.74	2.70	3.23	6-FF	0.00	0.00	0.00	6.66
775	63.41	61.01	3.13	3.41	6-FF	0.00	0.00	0.00	7.30
930	63.59	61.26	3.53	3.59	6-FF	0.00	0.00	0.00	7.86
1085	63.89	61.50	3.89	3.77	6-FF	0.00	0.00	0.00	13.79
1240	64.23	61.72	4.23	3.95	6-FF	0.00	0.00	0.00	14.21
1395	64.57	61.93	4.57	4.13	6-FF	0.00	0.00	0.00	14.62
1550	64.89	62.13	4.89	4.32	6-FF	0.00	0.00	0.00	14.97

El. inlet face invert 60.00 ft El. outlet invert 58.80 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION (FT)	0.00
INLET ELEVATION (FT)	60.00
OUTLET STATION (FT)	50.00
OUTLET ELEVATION (FT)	58.80
NUMBER OF BARRELS	4.00
SLOPE (V-FT/H-FT)	0.0240
CULVERT LENGTH ALONG SLOPE (FT)	50.01

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	12.00 FT
BARREL RISE	7.00 FT
BARREL MATERIAL	CONCRETE
BARREL MANNING'S N	0.013
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	1:1 BEVEL
INLET DEPRESSION	NONE

CURRENT DATE: 01-15-1996 FILE DATE: 01-15-1996
CURRENT TIME: 14:24:06 FILE NAME: ALEX

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH (FT)	48.00
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (FT/FT)	0.005
MANNING'S N (.01-0.1)	0.025
CHANNEL INVERT ELEVATION (FT)	58.80
CULVERT NO.1 OUTLET INVERT ELEVATION	58.80 FT

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (CFS)	W.S.E. (FT)	FROUDE NUMBER	VEL. (FPS)	SHEAR (PSF)
0.00	58.80	0.000	0.00	0.00
155.00	59.65	0.701	3.67	0.27
310.00	60.09	0.742	4.77	0.40
465.00	60.44	0.764	5.55	0.51
620.00	60.74	0.780	6.16	0.61
775.00	61.01	0.792	6.68	0.69
930.00	61.26	0.801	7.13	0.77
1085.00	61.50	0.808	7.53	0.84
1240.00	61.72	0.814	7.89	0.91
1395.00	61.93	0.820	8.22	0.98
1550.00	62.13	0.824	8.53	1.04

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	GRAVEL
EMBANKMENT TOP WIDTH (FT)	50.00
CREST LENGTH (FT)	50.00
OVERTOPPING CREST ELEVATION (FT)	67.00

RANGE WASH - ALEX. TO LV BLVD - SEC 1
Worksheet for Irregular Channel

(V)

Project Description	
Project File	c:\haestad\fmw\range3.fm2
Worksheet	RANGE WASH - ALEX. TO LV BLVD - SEC 1
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

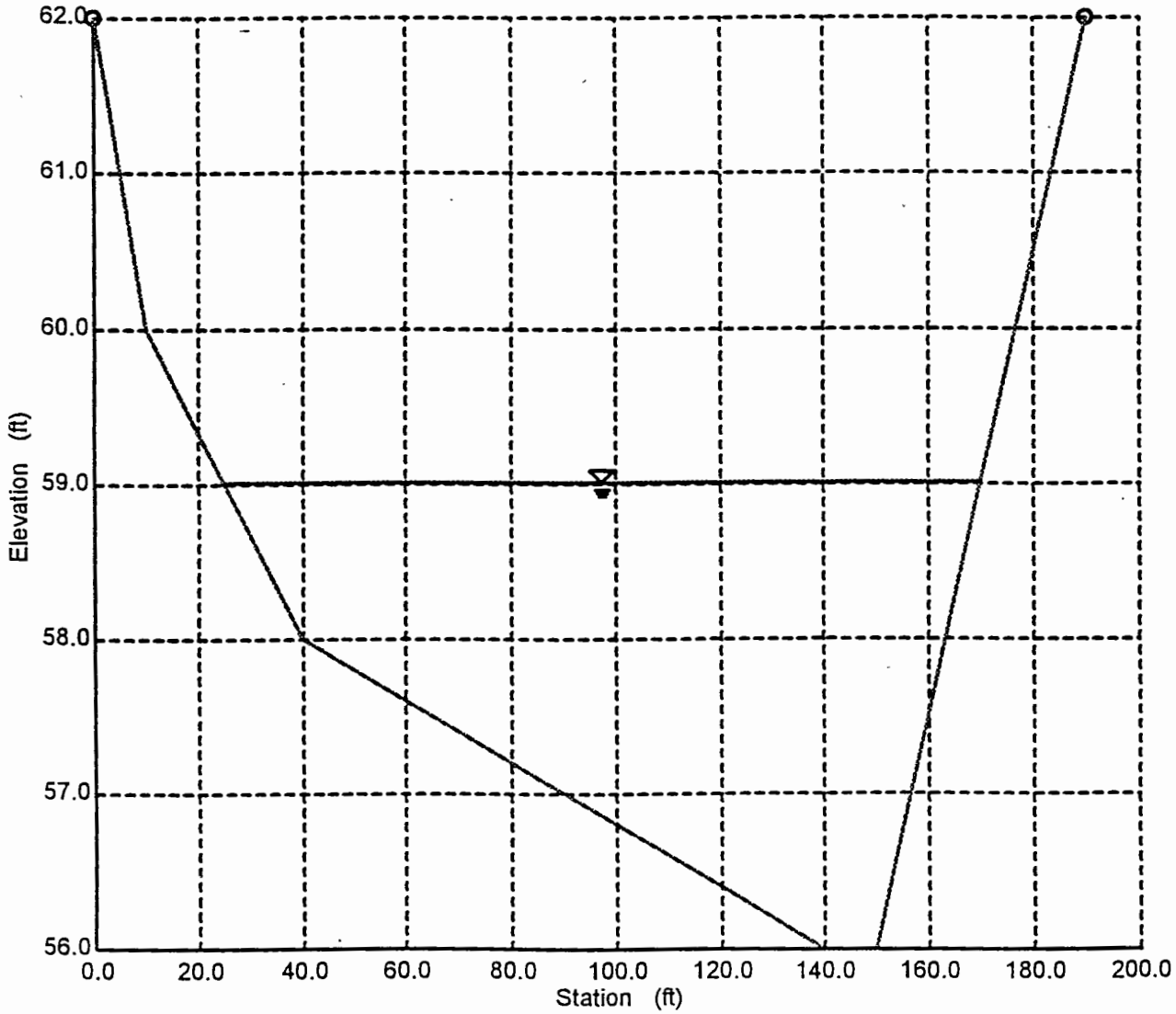
Input Data				
Channel Slope	0.006000 ft/ft			
Elevation range: 56.00 ft to 62.00 ft.				
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	62.00	0.00	190.00	0.030
10.00	60.00			
40.00	58.00			
140.00	56.00			
150.00	56.00			
190.00	62.00			
Discharge	1,550.00 cfs			

Results		
Wtd. Mannings Coefficient	0.030	
Water Surface Elevation	59.01	ft
Flow Area	268.46	ft²
Wetted Perimeter	145.42	ft
Top Width	145.14	ft
Height	3.01	ft
Critical Depth	58.64	ft
Critical Slope	0.011281	ft/ft
Velocity	5.77	ft/s
Velocity Head	0.52	ft
Specific Energy	59.52	ft
Froude Number	0.75	
Flow is subcritical.		

RANGE WASH - ALEX. TO LV BLVD - SEC 1
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\range3.fm2
Worksheet	RANGE WASH - ALEX. TO LV BLVD - SEC 1
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.030	
Channel Slope	0.006000	ft/ft
Water Surface Elevation	59.01	ft
Discharge	1,550.00	cfs



RANGE WASH - ALEX TO LV BLVD - SEC 2
Worksheet for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\range3.fm2
Worksheet	ALEX TO LV BLVD SEC 2
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

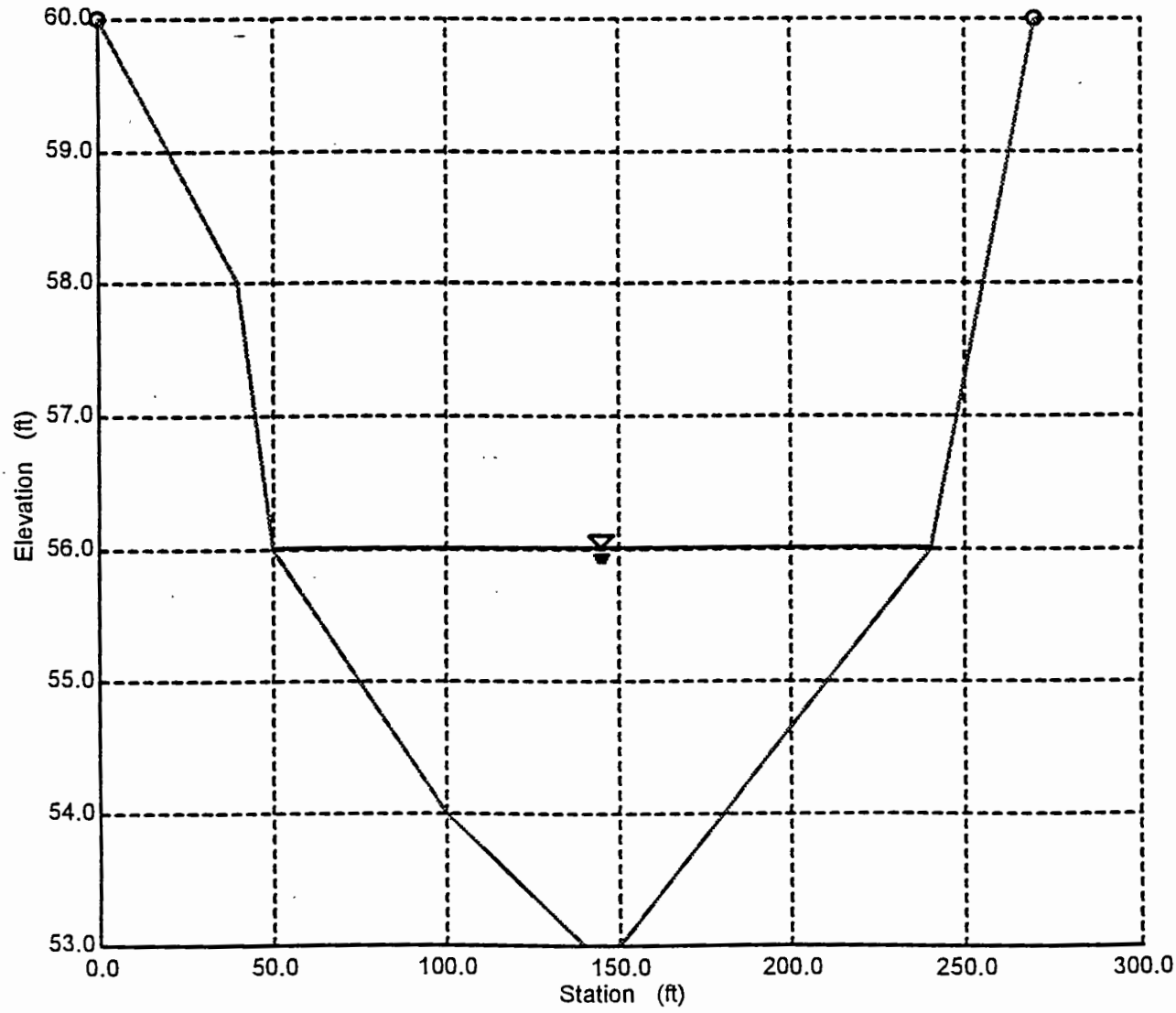
Input Data				
Channel Slope	0.005000 ft/ft			
Elevation range: 53.00 ft to 60.00 ft.				
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	60.00	0.00	270.00	0.030
40.00	58.00			
50.00	56.00			
100.00	54.00			
140.00	53.00			
150.00	53.00			
180.00	54.00			
240.00	56.00			
270.00	60.00			
Discharge	1,550.00 cfs			

Results		
Wtd. Mannings Coefficient	0.030	
Water Surface Elevation	56.00	ft
Flow Area	315.66	ft²
Wetted Perimeter	190.15	ft
Top Width	190.04	ft
Height	3.00	ft
Critical Depth	55.52	ft
Critical Slope	0.011711	ft/ft
Velocity	4.91	ft/s
Velocity Head	0.37	ft
Specific Energy	56.38	ft
Froude Number	0.67	
Flow is subcritical.		

RANGE WASH - ALEX TO LV BLVD - SEC 2
Cross Section for Irregular Channel

Project Description	
Project File	c:\haestad\fmw\range3.fm2
Worksheet	ALEX TO LV BLVD SEC 2
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.030	
Channel Slope	0.005000	ft/ft
Water Surface Elevation	56.00	ft
Discharge	1,550.00	cfs



7 - 12 x 6 CULVERTS AT LAS VEGAS BLVD.

CURRENT DATE: 01-15-1996
CURRENT TIME: 15:01:56

FILE DATE: 01-15-1996
FILE NAME: LASV

FHWA CULVERT ANALYSIS
HY-8, VERSION 3.2

CULV	SITE DATA: INLET ELEV. (FT)	SITE DATA: OUTLET ELEV. (FT)	SITE DATA: CULVERT LENGTH (FT)	CULVERT SHAPE, MATERIAL, INLET: BARRELS	SHAPE	SPAN (FT)	RISE (FT)	MANNING n	INLET TYPE
1	51.00	50.00	100.01	7	RCB	12.00	6.00	.015	CONVENTIONAL
2									
3									
4									
5									
6									

SUMMARY OF CULVERT FLOWS (CFS) FILE: LASV DATE: 01-15-1996

ELEV (FT)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
51.00	0	0	0	0	0	0	0	0	1
53.24	155	155	0	0	0	0	0	0	1
53.38	310	310	0	0	0	0	0	0	1
53.51	465	465	0	0	0	0	0	0	1
53.63	620	620	0	0	0	0	0	0	1
53.75	775	775	0	0	0	0	0	0	1
53.86	930	930	0	0	0	0	0	0	1
53.97	1085	1085	0	0	0	0	0	0	1
54.08	1240	1240	0	0	0	0	0	0	1
54.21	1395	1395	0	0	0	0	0	0	1
54.43	1550	1550	0	0	0	0	0	0	1
61.00	6468	6468	0	0	0	0	0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: LASV DATE: 01-15-1996

HEAD ELEV(FT)	HEAD ERROR(FT)	TOTAL FLOW(CFS)	FLOW ERROR(CFS)	% FLOW ERROR
51.00	0.00	0	0	0.00
53.24	0.00	155	0	0.00
53.38	0.00	310	0	0.00
53.51	0.00	465	0	0.00
53.63	0.00	620	0	0.00
53.75	0.00	775	0	0.00
53.86	0.00	930	0	0.00
53.97	0.00	1085	0	0.00
54.08	0.00	1240	0	0.00
54.21	0.00	1395	0	0.00
54.43	0.00	1550	0	0.00

<1> TOLERANCE (FT) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 01-15-1996
CURRENT TIME: 15:01:56

FILE DATE: 01-15-1996
FILE NAME: LASV

CULVERT # 1

PERFORMANCE CURVE FOR 7 BARREL(S)

Q (cfs)	HWE (ft)	TWE (ft)	ICH (ft)	OCH (ft)	FLOW TYPE	CCE (ft)	FCE (ft)	TCE (ft)	VO (fps)
0	51.00	49.00	0.00	-1.00	0-NF	0.00	51.00	0.00	0.00
155	53.24	49.85	0.77	2.24	6-FF	0.00	0.00	0.00	3.89
310	53.38	50.28	1.19	2.38	6-FF	0.00	0.00	0.00	4.91
465	53.51	50.62	1.56	2.51	6-FF	0.00	0.00	0.00	5.62
620	53.63	50.92	1.88	2.63	6-FF	0.00	0.00	0.00	6.18
775	53.75	51.18	2.19	2.75	6-FF	0.00	0.00	0.00	6.66
930	53.86	51.42	2.47	2.86	6-FF	0.00	0.00	0.00	7.08
1085	53.97	51.64	2.74	2.97	6-FF	0.00	0.00	0.00	7.45
1240	54.08	51.85	2.99	3.08	6-FF	0.00	0.00	0.00	7.79
1395	54.21	52.04	3.21	3.20	6-FF	0.00	0.00	0.00	10.72
1550	54.43	52.23	3.43	3.31	6-FF	0.00	0.00	0.00	10.98

El. inlet face invert 51.00 ft El. outlet invert 50.00 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION (FT)	0.00
INLET ELEVATION (FT)	51.00
OUTLET STATION (FT)	100.00
OUTLET ELEVATION (FT)	50.00
NUMBER OF BARRELS	7.00
SLOPE (V-FT/H-FT)	0.0100
CULVERT LENGTH ALONG SLOPE (FT)	100.01

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	12.00 FT
BARREL RISE	6.00 FT
BARREL MATERIAL	CONCRETE
BARREL MANNING'S N	0.015
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	1:1 BEVEL
INLET DEPRESSION	NONE

CURRENT DATE: 01-15-1996 FILE DATE: 01-15-1996
CURRENT TIME: 15:01:56 FILE NAME: LASV

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH (FT)	20.00
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (FT/FT)	0.010
MANNING'S N (.01-0.1)	0.015
CHANNEL INVERT ELEVATION (FT)	49.00
CULVERT NO.1 OUTLET INVERT ELEVATION	50.00 FT

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (CFS)	W.S.E. (FT)	FROUDE NUMBER	VEL. (FPS)	SHEAR (PSF)
0.00	49.00	0.000	0.00	0.00
155.00	49.85	1.598	8.37	0.53
310.00	50.28	1.667	10.71	0.80
465.00	50.62	1.702	12.31	1.01
620.00	50.92	1.724	13.55	1.20
775.00	51.18	1.739	14.58	1.36
930.00	51.42	1.752	15.47	1.51
1085.00	51.64	1.762	16.25	1.65
1240.00	51.85	1.769	16.94	1.78
1395.00	52.04	1.775	17.57	1.90
1550.00	52.23	1.781	18.15	2.01

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH (FT)	50.00
CREST LENGTH (FT)	1000.00
OVERTOPPING CREST ELEVATION (FT)	61.00

Existing Vandenberg Channel HEC-RAS Model

HEC-RAS Version 2.0 April 1997
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: Vandenberg_New
Project File : vannew.prj
Run Date and Time: 6/26/2000 3:08:46 PM

Project in English units

PLAN DATA

Plan Title: Vandenburg 2000 Plan
Plan File : c:\hec\ras\vannew.p01

Geometry Title: vnew
Geometry File : c:\hec\ras\vannew.g01

Flow Title : Vandenburg Channel Flow
Flow File : c:\hec\ras\vannew.f02

Plan Summary Information:
Number of: Cross Sections = 41 Mulitple Openings = 0
Culverts = 0 Inline Weirs = 0
Bridges = 5

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculaton tolerance = 0.01
Maximum number of interations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: Vandenburg Channel Flow
Flow File : c:\hec\ras\vannew.f02

Flow Data (cfs)

River	Reach	RS	Developed	Existing
Vandenberg	Channel	110	200	187
Vandenberg	Channel	32	277	247

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Vandenberg	Channel	Developed	Normal S = 0.005	Normal S = 0.005

```
GEOMETRY DATA

Geometry Title: vnew
Geometry File : c:\hec\ras\vannew.g01

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 110

INPUT
Description: Station 28+23
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     -12 1916.68      -4 1912.39       0 1912.39       4 1912.39      12 1916.56

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     -12    .015     -12    .015      12    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -12      12               27      27      27             .1       .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 108

INPUT
Description: Station 28+50
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     -12 1916.18      -4 1912.29       0 1912.29       4 1912.29      12 1916.26

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     -12    .015     -12    .015      12    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -12      12             8.99    8.99    8.99             .1       .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 106

INPUT
Description: Station 28+8.99
Upstream of Lone Mountain Road (Culvert #1)
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -11.275 1916.78 -11.275 1912.26       0 1912.26  11.275 1912.26  11.275 1916.86

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -11.275    .015 -11.275    .015  11.275    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       -11.275  11.275             86      86      86             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
   -.425    .425 1916.83

BRIDGE                 RIVER: Vandenberg
REACH: Channel            RS: 104

INPUT
Description:
Distance from Upstream XS =       1
Deck/Roadway Width        =      85
Weir Coefficient          =     2.6
Bridge Deck/Roadway Skew  =
Upstream  Deck/Roadway Coordinates
    num=      12
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
 -11.275 1916.78 1912.18 -10.425 1916.78 1912.18 -10.425 1916.78 1915.38
    -1.3 1916.83 1915.43   -.425 1916.83 1914.93   -.425 1916.83 1912.23
    .425 1916.83 1912.23    .425 1916.83 1914.93     1.3 1916.83 1915.43
  10.425 1916.86 1915.43  10.425 1916.86 1912.26  11.275 1916.86 1912.26
```

```
Upstream Bridge Cross Section Data
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -11.275 1916.78 -11.275 1912.26       0 1912.26  11.275 1912.26  11.275 1916.86

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -11.275    .015 -11.275    .015  11.275    .015

Bank Sta: Left   Right    Coeff Contr.   Expan.
       -11.275  11.275            .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R  Elev
   -.425    .425 1916.83

Downstream  Deck/Roadway Coordinates
    num=      12
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
 -11.725 1916.58 1912.02 -10.425 1916.58 1912.02 -10.425 1916.58 1915.18
    -1.3 1916.59 1915.19   -.425 1916.59 1914.69   -.425 1916.59 1912.09
    .425 1916.59 1912.09    .425 1916.59 1914.69     1.3 1916.59 1915.19
  10.425 1916.66 1915.26  10.425 1916.66 1912.15  11.275 1916.66 1912.15

Downstream Bridge Cross Section Data
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -11.275 1916.58 -11.275 1912.02       0 1912.09  11.275 1912.15  11.275 1916.66

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -11.275    .015 -11.275    .015  11.275    .015

Bank Sta: Left   Right    Coeff Contr.   Expan.
       -11.275  11.275            .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
   -.425    .425 1916.59

Upstream Embankment side slope             =       0 horiz. to 1.0 vertical
Downstream Embankment side slope           =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins        =
Energy head used in spillway design        =
Spillway height used in design             =
Weir crest shape                           = Broad Crested

Number of Bridge Coefficient Sets =  2

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Do not add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the downstream end
       Criteria to check for pressure flow = Upstream water surface

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 102

INPUT
Description: Station 29+44.99
Downstream of Lone Mountain Road (Culvert #1)
```

```
Station Elevation Data    num=       5
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
 -11.275 1916.58 -11.275 1912.02        0 1912.09  11.275 1912.15  11.275 1916.66

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
 -11.275    .015 -11.275    .015  11.275    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       -11.275  11.275              20      20      20             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
   -.425    .425 1916.59

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 98

INPUT
Description: Station 29+65
Station Elevation Data    num=       6
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
     -14 1916.38      -10 1916.38       -4     1912       4     1912       10 1916.16
      14 1916.16

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
     -14    .015      -10    .015       10    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -10      10              100     100     100             .1       .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 96

INPUT
Description: Station 30+65
Station Elevation Data    num=       6
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
     -14 1915.94      -10 1915.94       -4   1911.8       4   1911.8       10 1915.95
      14 1915.95

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
     -14    .015      -10    .015       10    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -10      10               95      95      95             .1       .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 94

INPUT
Description: Station 31+60
Station Elevation Data    num=       6
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
   -14.5 1915.71   -10.5 1915.71       -3   1911.4       4   1911.4      9.5 1915.57
    13.5 1915.57

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
   -14.5    .015   -10.5    .015      9.5    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -10.5     9.5               98      98      98             .1       .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 92

INPUT
Description: Station 32+58
Station Elevation Data    num=       6
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
   -14.5 1915.15   -10.5 1915.15       -4   1911.1       3   1911.1      9.5  1915.3
    13.5  1915.3

Manning's n Values        num=       3
```

```
     Sta   n Val     Sta   n Val     Sta   n Val
   -14.5    .015   -10.5    .015     9.5    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          -10.5     9.5               99      99      99             .1      .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 90

INPUT
Description: Station 33+57
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     -14 1914.55     -10 1914.55      -4 1910.82       3 1910.82      10 1914.69
      14 1914.69

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     -14    .015     -10    .015      10    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            -10      10               98      98      98             .1      .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 88

INPUT
Description: Station 34+55
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     -14 1914.29     -10 1914.29      -4 1910.11       3 1910.11      10 1914.33
      14 1914.33

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     -14    .015     -10    .015      10    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            -10      10              100     100     100             .1      .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 86

INPUT
Description: Station 35+55
20' Upstream of Intermediate Culvert #1 (Culvert #2)
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     -14 1913.75     -10 1913.75      -5  1909.9       3  1909.9     9.5 1913.81
    13.5 1913.81

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     -14    .015     -10    .015     9.5    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            -10     9.5               20      20      20             .1      .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 85

INPUT
Description: Station 35+75
Upstream of Intermediate Culvert #1 (Culvert #2)
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -11.275 1913.53 -11.275 1909.69       0 1909.69  11.275 1909.69  11.275 1913.56

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -11.275    .015 -11.275    .015  11.275    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       -11.275  11.275               85      85      85             .3      .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
```

```
   -.425    .425 1913.55

BRIDGE                  RIVER: Vandenberg
REACH: Channel             RS: 84

INPUT
Description:
Distance from Upstream XS =       1
Deck/Roadway Width        =      84
Weir Coefficient          =     2.6
Bridge Deck/Roadway Skew  =
Upstream  Deck/Roadway Coordinates
    num=      12
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
 -11.275 1913.53 1908.13 -10.425 1913.53 1908.13 -10.425 1913.53 1912.16
    -1.3 1913.55 1912.15   -.425 1913.55 1911.65   -.425 1913.55       0
    .425 1913.55       0    .425 1913.55 1911.65     1.3 1913.55 1912.15
  10.425 1913.56 1912.13  10.425 1913.56 1908.16  11.275 1913.56 1908.16

Upstream Bridge Cross Section Data
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -11.275 1913.53 -11.275 1909.69       0 1909.69  11.275 1909.69  11.275 1913.56

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -11.275    .015 -11.275    .015  11.275    .015

Bank Sta: Left   Right    Coeff Contr.   Expan.
       -11.275  11.275            .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
   -.425    .425 1913.55

Downstream  Deck/Roadway Coordinates
    num=      12
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
 -11.275 1913.02 1907.62 -10.425 1913.02 1907.62 -10.425 1913.02 1911.62
    -1.3 1913.07 1911.67   -.425 1913.07 1911.17   -.425 1913.07       0
    .425 1913.07       0    .425 1913.07 1911.17     1.3 1913.07 1911.67
  10.425 1913.07 1911.67  10.425 1913.07 1907.67  11.275 1913.07 1907.67

Downstream Bridge Cross Section Data
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -11.275 1913.02 -11.275    1909       0    1909  11.275    1909  11.275 1913.07

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -11.275    .015 -11.275    .015  11.275    .015

Bank Sta: Left   Right    Coeff Contr.   Expan.
       -11.275  11.275            .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
   -.425    .425 1913.07

Upstream Embankment side slope             =       0 horiz. to 1.0 vertical
Downstream Embankment side slope           =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins        =
Energy head used in spillway design        =
Spillway height used in design             =
Weir crest shape                           = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Do not add Friction component to Momentum
```

```
      Do not add Weight component to Momentum
      Class B flow critical depth computations use critical depth
          inside the bridge at the downstream end
      Criteria to check for pressure flow = Upstream water surface

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 83

INPUT
Description: Station 36+60
Downstream of Intermediate Culvert #1 (Culvert #2)
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -11.275 1913.02 -11.275    1909       0    1909  11.275    1909  11.275 1913.07

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -11.275    .015 -11.275    .015  11.275    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       -11.275  11.275              20      20      20             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
   -.425    .425 1913.07

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 80

INPUT
Description: Station 36+80
20' Downstream of Intermediate Culvert #1 (Culvert
          #2)
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     -14 1913.04     -10 1913.04      -4 1908.91       4 1908.91      10 1912.81
      14 1912.81

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     -14    .015     -10    .015      10    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          -10      10              101     101     101             .1       .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 78

INPUT
Description: Station 37+81
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -14.5 1912.07   -10.5 1912.07      -4 1908.39       3 1908.39     9.5 1912.03
    13.5 1912.03

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   -14.5    .015   -10.5    .015     9.5    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -10.5     9.5              107     107     107             .1       .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 76

INPUT
Description: Station 38+88
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     -14 1911.33     -10 1911.33      -4 1907.67       4 1907.67      10 1911.05
      14 1911.05

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     -14    .015     -10    .015      10    .015

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

```
          -10       10              103      103      103             .1        .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 74

INPUT
Description: Station 39+91
Station Elevation Data    num=       6
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
   -14.5 1910.43    -10.5 1910.43    -4.5 1906.95     2.5 1906.95     9.5 1910.26
    13.5 1910.26

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
   -14.5    .015    -14.5    .015      9.5    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -14.5     9.5              102      102      102             .1        .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 72

INPUT
Description: Station 40+93
Station Elevation Data    num=       6
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
     -14 1909.58      -10 1909.58    -1.5 1906.05       3 1906.05     9.5  1909.5
    13.5  1909.5

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
     -14    .015      -10    .015      9.5    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          -10     9.5              103      103      103             .1        .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 70

INPUT
Description: Station 41+96
Station Elevation Data    num=       6
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
     -14 1908.64      -10 1908.64       -4 1905.25       3 1905.25     9.5  1908.6
    13.5  1908.6

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
     -14    .015      -10    .015      9.5    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          -10     9.5               98       98       98             .1        .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 68

INPUT
Description: Station 42+94
Station Elevation Data    num=       6
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
     -14 1907.95      -10 1907.95       -4  1904.5       3  1904.5      10  1907.8
      14  1907.8

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
     -14    .015      -10    .015       10    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          -10      10              100      100      100             .1        .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 66

INPUT
Description: Station 43+94
Station Elevation Data    num=       6
```

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     -14  1907.2     -10  1907.2      -4 1903.63       3 1903.63      10 1907.06
      14 1907.06

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     -14    .015     -10    .015      10    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -10      10              102     102     102             .1       .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 64

INPUT
Description: Station 44+96
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     -14 1906.16     -10 1906.16    -4.5 1902.57       3 1902.57     9.5 1906.08
    13.5 1906.08

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     -14    .015     -10    .015     9.5    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -10     9.5              92      92      92             .1       .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 60

INPUT
Description: Station 45+88
20' Upstream of Intermediate Culvert #2 (Culvert #3)
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     -14 1905.29     -10 1905.29    -4.5 1901.37     3.5 1901.37      10 1905.31
      14 1905.31

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     -14    .015     -10    .015      10    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -10      10              20      20      20             .1       .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 58

INPUT
Description: Station 46+08
Upstream of Intermediate Culvert #2 (Culvert #3)
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -11.275 1905.29 -11.275 1900.87       0 1900.87  11.275 1900.87  11.275 1905.38

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -11.275    .015 -11.275    .015  11.275    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       -11.275  11.275              85      85      85             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
   -.425    .425 1905.34

BRIDGE                 RIVER: Vandenberg
REACH: Channel            RS: 54

INPUT
Description:
Distance from Upstream XS =       1
Deck/Roadway Width        =      84
Weir Coefficient          =     2.6
Bridge Deck/Roadway Skew  =
Upstream  Deck/Roadway Coordinates
```

```
    num=      12
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
 -11.275 1905.29 1900.87 -10.425 1905.29 1900.87 -10.425 1905.29 1904.37
    -1.3 1905.34 1904.37   -.425 1905.34 1903.87   -.425 1905.34       0
    .425 1905.34       0    .425 1905.34 1903.87     1.3 1905.34 1904.37
  10.425 1905.39 1904.37  10.425 1905.39 1900.87  11.275 1905.39 1900.87

Upstream Bridge Cross Section Data
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -11.275 1905.29 -11.275 1900.87       0 1900.87  11.275 1900.87  11.275 1905.38

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -11.275    .015 -11.275    .015  11.275    .015

Bank Sta: Left   Right    Coeff Contr.   Expan.
       -11.275  11.275             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
   -.425    .425 1905.34

Downstream  Deck/Roadway Coordinates
    num=      12
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
 -11.275 1904.78 1900.31 -10.425 1904.78 1900.31 -10.425 1904.78 1903.81
    -1.3 1904.84 1903.79   -.425 1904.84 1903.29   -.425 1904.84       0
    .425 1904.84       0    .425 1904.84 1903.29     1.3 1904.84 1903.79
  10.425 1904.77 1903.77  10.425 1904.77 1900.27  11.275 1904.77 1900.27

Downstream Bridge Cross Section Data
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -11.275 1904.78 -11.275  1900.4       0  1900.4  11.275  1900.4  11.275 1904.77

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -11.275    .015 -11.275    .015  11.275    .015

Bank Sta: Left   Right    Coeff Contr.   Expan.
       -11.275  11.275             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
   -.425    .425 1904.84

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Do not add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the downstream end
       Criteria to check for pressure flow = Upstream water surface

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 52

INPUT
Description: Station 46+93
Downstream of Intermediate Culvert #2 (Culvert #3)
Station Elevation Data    num=       5
```

```
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
 -11.275 1904.78 -11.275  1900.4        0  1900.4  11.275  1900.4  11.275 1904.77

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
 -11.275    .015 -11.275    .015  11.275    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       -11.275  11.275              20      20      20            .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
   -.425    .425 1904.84

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 51

INPUT
Description: Station 47+13
20' Downstream of Intermediate Culvert #2 (Culvert
            #3)
Station Elevation Data    num=       6
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
     -14 1905.27      -10 1905.27    -3.5 1900.35      3.5 1900.35       10 1905.29
      14 1905.29

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
     -14    .015      -10    .015       10    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -10      10              107     107     107             .1       .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 50

INPUT
Description: Station 48+20
Station Elevation Data    num=       6
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
     -14 1903.56      -10 1903.56       -5 1899.75        2 1899.75       10 1903.39
      14 1903.39

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
     -14    .015      -10    .015       10    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -10      10              106     106     106             .1       .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 48

INPUT
Description: Station 49+26
Station Elevation Data    num=       6
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
     -14 1902.67      -10 1902.67       -4 1899.04        3 1899.04       10 1902.61
      14 1902.61

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
     -14    .015      -10    .015       10    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -10      10              102     102      10             .1       .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 46

INPUT
Description: Station 50+28
Station Elevation Data    num=       6
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
     -14 1901.87      -10 1901.87       -4  1898.1        3  1898.1       10 1901.68
      14 1901.68
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     -14    .015     -10    .015      10    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -10      10              108     108      18             .1       .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 44

INPUT
Description: Station 51+36
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     -14 1900.86     -10 1900.86      -4 1897.22       3 1897.22      10 1900.67
      14 1900.67

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     -14    .015     -10    .015      10    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -10      10                98      98      98             .1       .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 40

INPUT
Description: Station 52+34
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -14.5 1899.71     -10 1899.66    -4.5 1895.15       2 1895.15     9.5 1899.53
      14 1899.63

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   -14.5    .015   -14.5    .015      14    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -14.5      14                20      20      20             .1       .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 36

INPUT
Description: Station 52+54
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     -13 1899.24      -5 1893.97     4.5 1893.97      13 1899.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     -13    .015     -13    .015      13    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -13      13                48      48      48             .1       .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 32

INPUT
Description: Station 53+02
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     -10    1894      -5 1891.13       5 1891.13      10    1894

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     -10    .015     -10    .015      10    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -10      10                18      18      18             .1       .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 28
```

```
INPUT
Description: Station 53+20
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -10.5 1897.91   -10.5  1890.9       0  1890.9    10.5  1890.9    10.5  1898.1

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   -10.5    .015   -10.5    .015    10.5    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -10.5    10.5                 37      37      37             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
     -.5      .5    1898

BRIDGE                   RIVER: Vandenberg
REACH: Channel           RS: 24

INPUT
Description:
Distance from Upstream XS =       1
Deck/Roadway Width        =      36
Weir Coefficient          =     2.6
Bridge Deck/Roadway Skew  =
Upstream  Deck/Roadway Coordinates
    num=      10
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
   -10.5    1898  1890.6   -10.5    1898    1895    -1.5    1898    1895
     -.5    1898    1894     -.5    1898  1890.6      .5    1898  1890.6
      .5    1898    1894     1.5    1898    1895    10.5    1898    1895
    10.5    1898  1890.6

Upstream Bridge Cross Section Data
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -10.5 1897.91   -10.5  1890.9       0  1890.9    10.5  1890.9    10.5  1898.1

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   -10.5    .015   -10.5    .015    10.5    .015

Bank Sta: Left   Right    Coeff Contr.   Expan.
         -10.5    10.5             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
     -.5      .5    1898

Downstream  Deck/Roadway Coordinates
    num=      10
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
   -10.5 1897.62  1890.4   -10.5 1897.62 1894.62    -1.5 1897.62 1894.62
     -.5 1897.62 1893.62     -.5 1897.62  1890.4      .5 1897.62  1890.4
      .5 1897.62 1893.62     1.5 1897.62 1894.62    10.5 1897.62 1894.62
    10.5 1897.62  1890.4

Downstream Bridge Cross Section Data
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -10.5 1897.56   -10.5  1890.6       0  1890.6    10.5  1890.6    10.5 1897.67

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   -10.5    .015   -10.5    .015    10.5    .015

Bank Sta: Left   Right    Coeff Contr.   Expan.
         -10.5    10.5             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
     -.5      .5 1897.62

Upstream Embankment side slope             =       0 horiz. to 1.0 vertical
Downstream Embankment side slope           =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins        =
Energy head used in spillway design        =
```

```
Spillway height used in design                =
Weir crest shape                              = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Do not add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the downstream end
       Criteria to check for pressure flow = Upstream water surface

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 22

INPUT
Description: Station 53+57
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -10.5 1897.56   -10.5  1890.6       0  1890.6    10.5  1890.6    10.5 1897.67

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   -10.5    .015   -10.5    .015    10.5    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -10.5    10.5                 19      19      19             .3      .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
     -.5      .5 1897.62

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 20

INPUT
Description: Station 53+76
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     -14 1897.56      -5 1890.45     4.5 1890.45    13.5 1897.56

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     -14    .015     -14    .015    13.5    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -14    13.5                 99      99      99             .1      .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 18

INPUT
Description: Station 54+75
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -13.5 1895.84      -5 1889.65       4 1889.65      13 1895.94

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   -13.5    .015   -13.5    .015      13    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -13.5      13                 62      62      62             .1      .3

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 14

INPUT
Description: Station 55+37
Station Elevation Data    num=       4
```

```
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
     -13  1894.8       -6 1889.05        5 1889.05       13  1894.9

Manning's n Values         num=       3
     Sta    n Val      Sta    n Val      Sta    n Val
     -13     .015      -13     .015       13     .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           -13      13                19      19      19             .1       .3

CROSS SECTION           RIVER: Vandenberg
REACH: Channel             RS: 10

INPUT
Description: Station 55+56
Station Elevation Data     num=       5
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
   -10.5  1894.1    -10.5 1888.86        0 1888.86     10.5 1888.86     10.5 1894.03

Manning's n Values         num=       3
     Sta    n Val      Sta    n Val      Sta    n Val
   -10.5     .015    -10.5     .015     10.5     .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -10.5    10.5                170     170     170             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
     -.5       .5  1894.1

BRIDGE                  RIVER: Vandenberg
REACH: Channel             RS: 8

INPUT
Description:
Distance from Upstream XS =       1
Deck/Roadway Width        =     169
Weir Coefficient          =     2.6
Bridge Deck/Roadway Skew  =
Upstream  Deck/Roadway Coordinates
    num=       10
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
   -10.5  1894.1 1888.57    -10.5  1894.1 1892.57     -1.5  1894.1 1892.57
     -.5  1894.1 1891.57      -.5  1894.1 1888.57       .5  1894.1 1888.57
      .5  1894.1 1891.57       1.5  1894.1 1892.57     10.5  1894.1 1892.57
    10.5  1894.1 1888.57

Upstream Bridge Cross Section Data
Station Elevation Data     num=       5
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
   -10.5  1894.1    -10.5 1888.86        0 1888.86     10.5 1888.86     10.5 1894.03

Manning's n Values         num=       3
     Sta    n Val      Sta    n Val      Sta    n Val
   -10.5     .015    -10.5     .015     10.5     .015

Bank Sta: Left   Right    Coeff Contr.   Expan.
         -10.5    10.5             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
     -.5       .5  1894.1

Downstream  Deck/Roadway Coordinates
    num=       10
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
   -10.5 1891.16 1885.75    -10.5 1891.16 1889.75     -1.5 1891.16 1889.75
     -.5 1891.16 1888.75      -.5 1891.16 1885.75       .5 1891.16 1885.75
      .5 1891.16 1888.75       1.5 1891.16 1889.75     10.5 1891.16 1889.75
    10.5 1891.16 1885.75

Downstream Bridge Cross Section Data
Station Elevation Data     num=       5
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
   -10.5 1891.16    -10.5 1885.75        0 1885.75     10.5 1885.75     10.5 1891.16

Manning's n Values         num=       3
     Sta    n Val      Sta    n Val      Sta    n Val
```

```
   -10.5    .015   -10.5    .015    10.5    .015

Bank Sta: Left   Right    Coeff Contr.   Expan.
         -10.5    10.5            .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
     -.5      .5 1891.16

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Do not add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the downstream end
       Criteria to check for pressure flow = Upstream water surface

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 6

INPUT
Description: Station 57+26
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -10.5 1891.16   -10.5 1885.75       0 1885.75    10.5 1885.75    10.5 1891.16

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   -10.5    .015   -10.5    .015    10.5    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -10.5    10.5              100     100     100             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
     -.5      .5 1891.16

CROSS SECTION          RIVER: Vandenberg
REACH: Channel            RS: 0

INPUT
Description: Station 58+26
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -10.5 1891.16   -10.5 1883.92       0 1883.92    10.5 1883.92    10.5 1891.16

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   -10.5    .015   -10.5    .015    10.5    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         -10.5    10.5                0       0       0             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev
     -.5      .5 1891.16


SUMMARY OF MANNING'S N VALUES

River:Vandenberg
```

Reach	River Sta.	n1	n2	n3
Channel	110	.015	.015	.015
Channel	108	.015	.015	.015
Channel	106	.015	.015	.015
Channel	104	Bridge		
Channel	102	.015	.015	.015
Channel	98	.015	.015	.015
Channel	96	.015	.015	.015
Channel	94	.015	.015	.015
Channel	92	.015	.015	.015
Channel	90	.015	.015	.015
Channel	88	.015	.015	.015
Channel	86	.015	.015	.015
Channel	85	.015	.015	.015
Channel	84	Bridge		
Channel	83	.015	.015	.015
Channel	80	.015	.015	.015
Channel	78	.015	.015	.015
Channel	76	.015	.015	.015
Channel	74	.015	.015	.015
Channel	72	.015	.015	.015
Channel	70	.015	.015	.015
Channel	68	.015	.015	.015
Channel	66	.015	.015	.015
Channel	64	.015	.015	.015
Channel	60	.015	.015	.015
Channel	58	.015	.015	.015
Channel	54	Bridge		
Channel	52	.015	.015	.015
Channel	51	.015	.015	.015
Channel	50	.015	.015	.015
Channel	48	.015	.015	.015
Channel	46	.015	.015	.015
Channel	44	.015	.015	.015
Channel	40	.015	.015	.015
Channel	36	.015	.015	.015
Channel	32	.015	.015	.015
Channel	28	.015	.015	.015
Channel	24	Bridge		
Channel	22	.015	.015	.015
Channel	20	.015	.015	.015
Channel	18	.015	.015	.015
Channel	14	.015	.015	.015
Channel	10	.015	.015	.015
Channel	8	Bridge		
Channel	6	.015	.015	.015
Channel	0	.015	.015	.015

SUMMARY OF REACH LENGTHS

River: Vandenberg

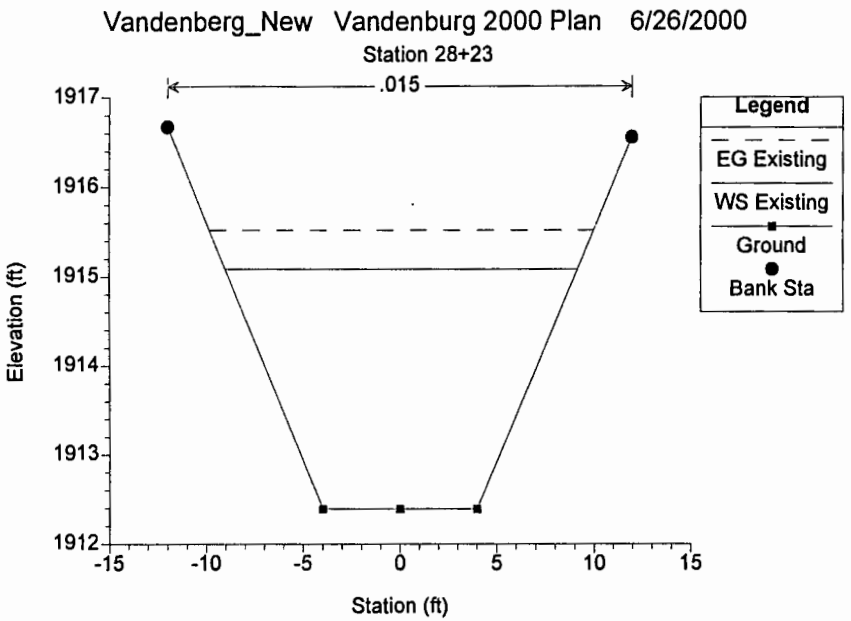
Reach	River Sta.	Left	Channel	Right
Channel	110	27	27	27
Channel	108	8.99	8.99	8.99
Channel	106	86	86	86
Channel	104	Bridge		
Channel	102	20	20	20
Channel	98	100	100	100
Channel	96	95	95	95
Channel	94	98	98	98
Channel	92	99	99	99
Channel	90	98	98	98
Channel	88	100	100	100
Channel	86	20	20	20
Channel	85	85	85	85
Channel	84	Bridge		
Channel	83	20	20	20
Channel	80	101	101	101
Channel	78	107	107	107
Channel	76	103	103	103

Channel	74	102	102	102
Channel	72	103	103	103
Channel	70	98	98	98
Channel	68	100	100	100
Channel	66	102	102	102
Channel	64	92	92	92
Channel	60	20	20	20
Channel	58	85	85	85
Channel	54	Bridge		
Channel	52	20	20	20
Channel	51	107	107	107
Channel	50	106	106	106
Channel	48	102	102	10
Channel	46	108	108	18
Channel	44	98	98	98
Channel	40	20	20	20
Channel	36	48	48	48
Channel	32	18	18	18
Channel	28	37	37	37
Channel	24	Bridge		
Channel	22	19	19	19
Channel	20	99	99	99
Channel	18	62	62	62
Channel	14	19	19	19
Channel	10	170	170	170
Channel	8	Bridge		
Channel	6	100	100	100
Channel	0	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Vandenberg

Reach	River Sta.	Contr.	Expan.
Channel	110	.1	.3
Channel	108	.1	.3
Channel	106	.3	.5
Channel	104	Bridge	
Channel	102	.3	.5
Channel	98	.1	.3
Channel	96	.1	.3
Channel	94	.1	.3
Channel	92	.1	.3
Channel	90	.1	.3
Channel	88	.1	.3
Channel	86	.1	.3
Channel	85	.3	.5
Channel	84	Bridge	
Channel	83	.3	.5
Channel	80	.1	.3
Channel	78	.1	.3
Channel	76	.1	.3
Channel	74	.1	.3
Channel	72	.1	.3
Channel	70	.1	.3
Channel	68	.1	.3
Channel	66	.1	.3
Channel	64	.1	.3
Channel	60	.1	.3
Channel	58	.3	.5
Channel	54	Bridge	
Channel	52	.3	.5
Channel	51	.1	.3
Channel	50	.1	.3
Channel	48	.1	.3
Channel	46	.1	.3
Channel	44	.1	.3
Channel	40	.1	.3
Channel	36	.1	.3
Channel	32	.1	.3
Channel	28	.3	.5
Channel	24	Bridge	

Channel	22		.3	.5
Channel	20		.1	.3
Channel	18		.1	.3
Channel	14		.1	.3
Channel	10		.3	.5
Channel	8	Bridge		
Channel	6		.3	.5
Channel	0		.1	.3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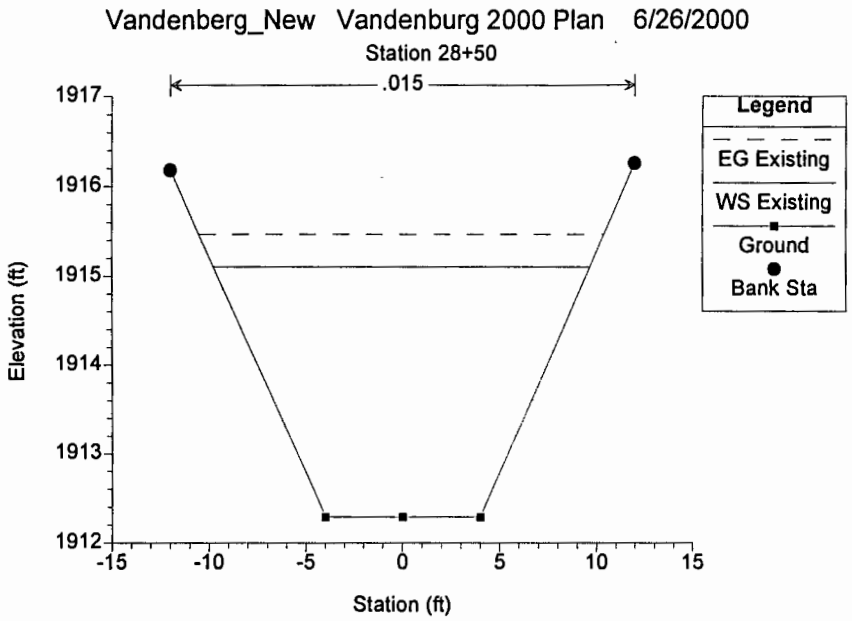
Station 28+23
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1917
1916
1915
1914
1913
1912
-15
-10
-5
0
5
10
15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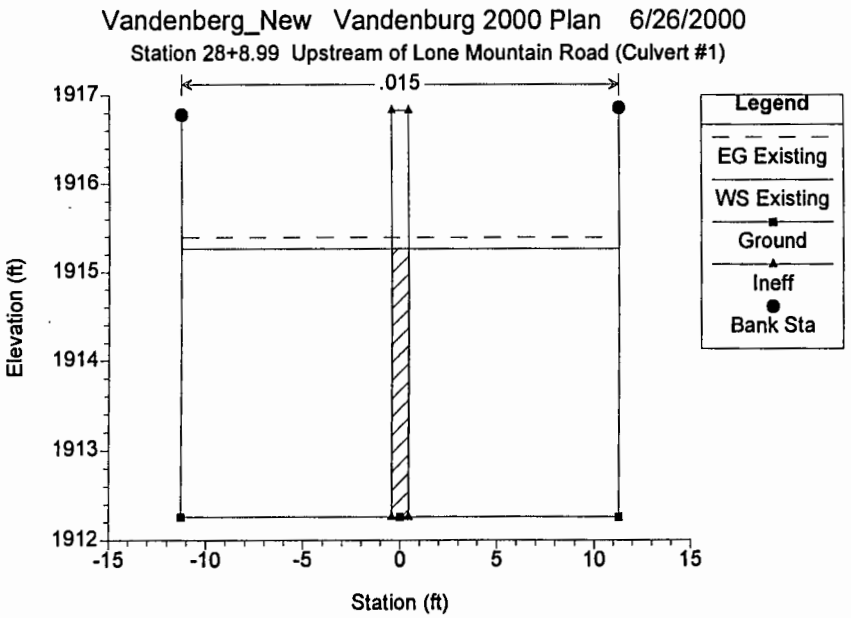
Station 28+50
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1917
1916
1915
1914
1913
1912
-15
-10
-5
0
5
10
15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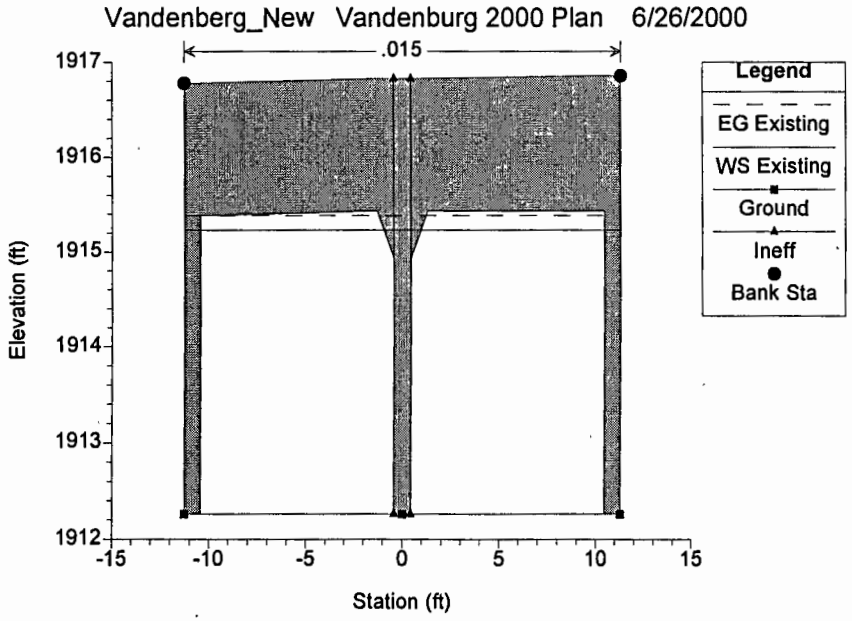
Station 28+8.99 Upstream of Lone Mountain Road (Culvert #1)
.015
Legend
EG Existing
WS Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1917
1916
1915
1914
1913
1912
-15
-10
-5
0
5
10
15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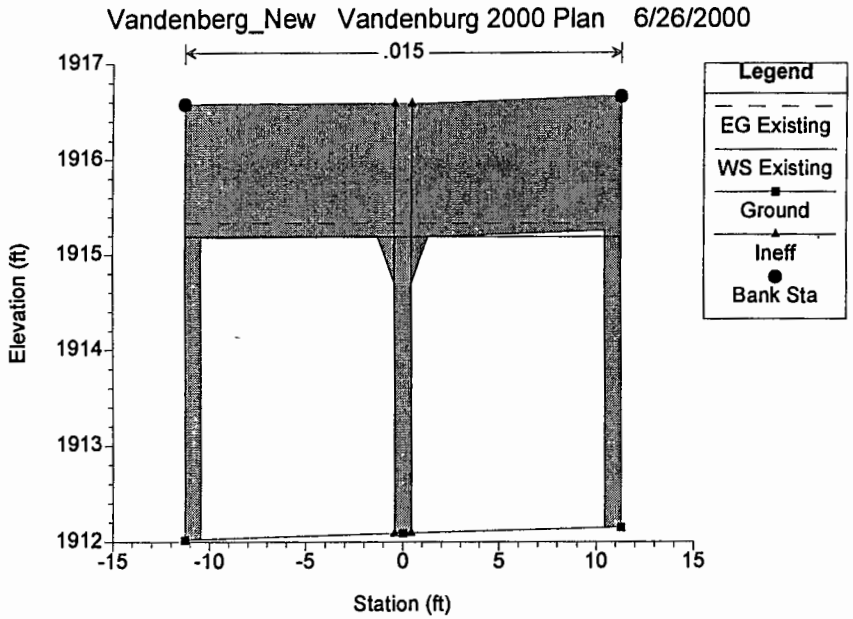
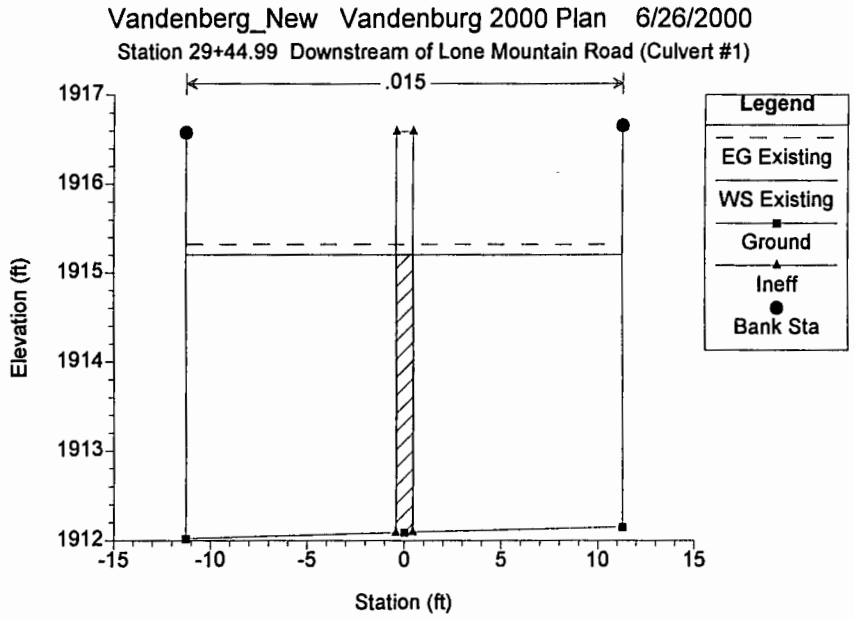
.015
Legend
EG Existing
WS Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1917
1916
1915
1914
1913
1912
-15
-10
-5
0
5
10
15


Vandenberg_New Vandenburg 2000 Plan 6/26/2000
.015
Legend
EG Existing
WS Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1917
1916
1915
1914
1913
1912
-15
-10
-5
0
5
10
15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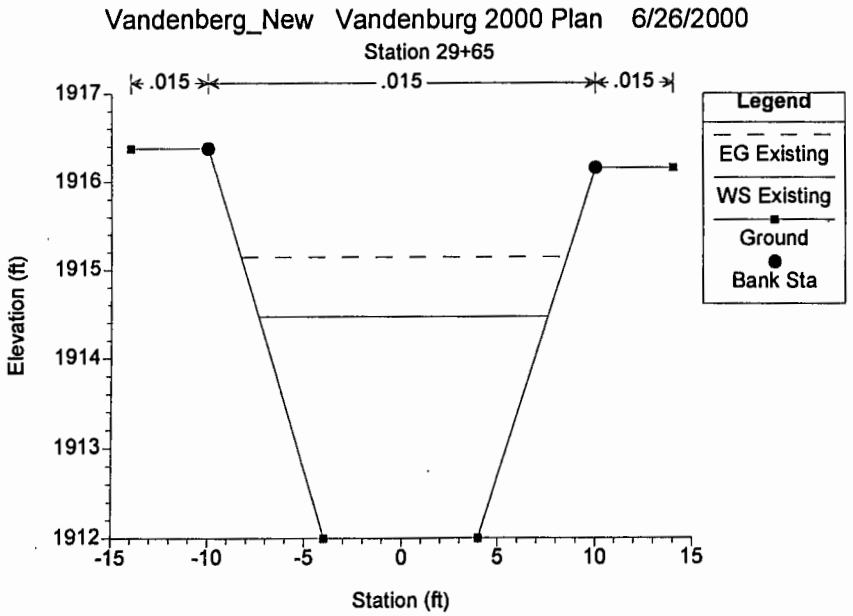
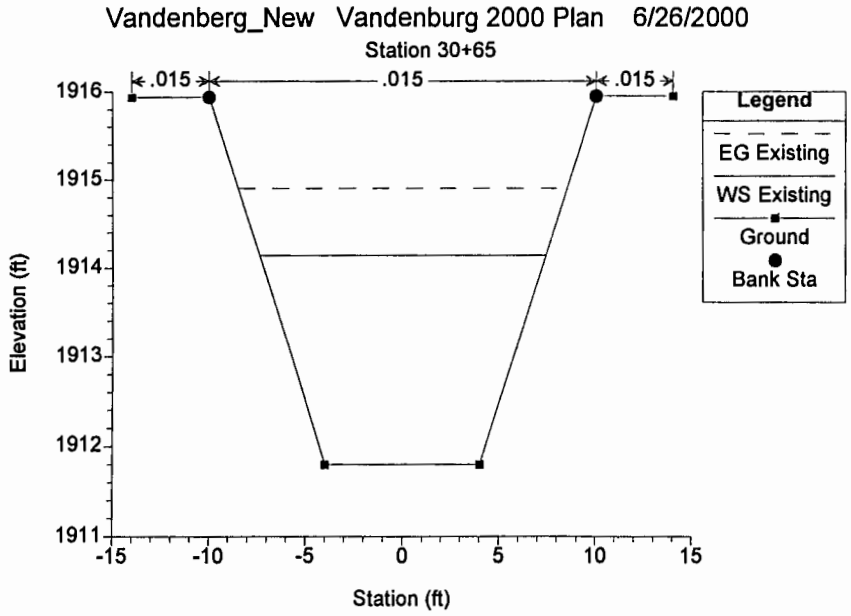
Station 29+44.99 Downstream of Lone Mountain Road (Culvert #1)
.015
Legend
EG Existing
WS Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1917
1916
1915
1914
1913
1912
-15
-10
-5
0
5
10
15


Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 29+65
.015
.015
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1917
1916
1915
1914
1913
1912
-15
-10
-5
0
5
10
15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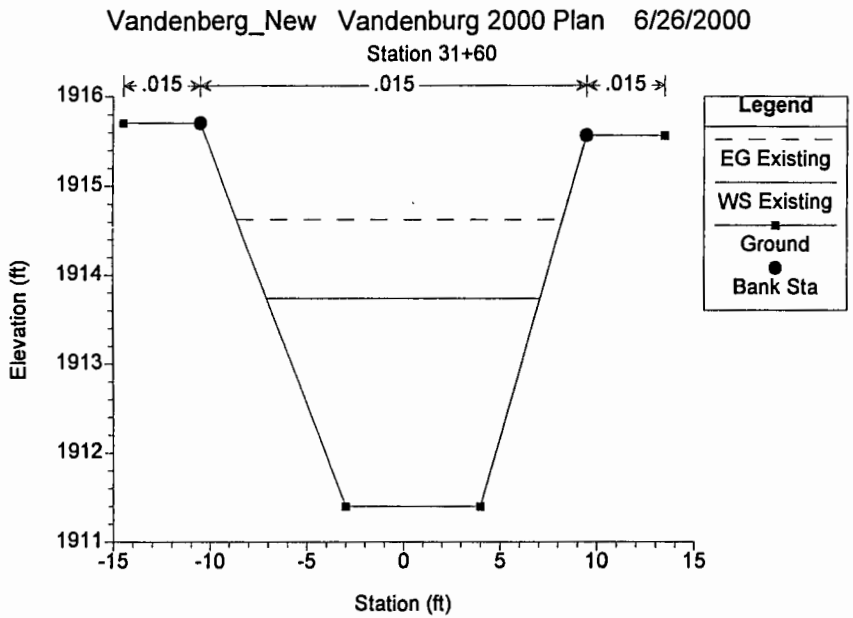
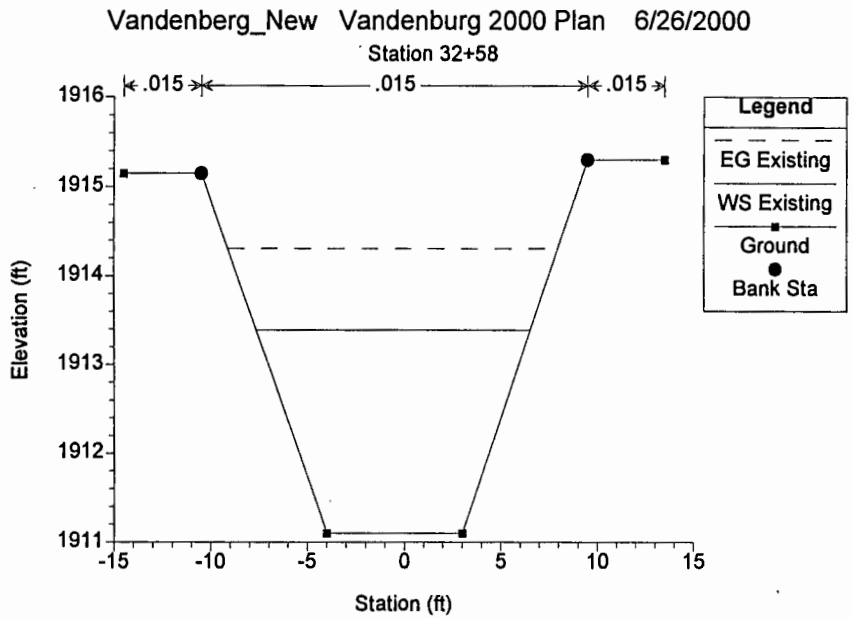
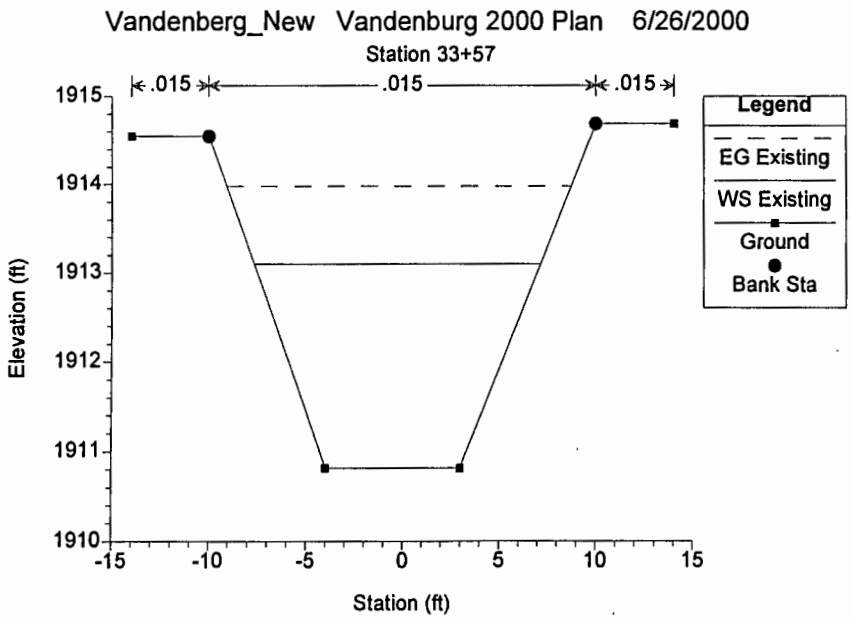
Station 30+65
.015
.015
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1916
1915
1914
1913
1912
1911
-15
-10
-5
0
5
10
15


Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 31+60
.015
.015
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1916
1915
1914
1913
1912
1911
-15
-10
-5
0
5
10
15


Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 32+58
.015
.015
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1916
1915
1914
1913
1912
1911
-15
-10
-5
0
5
10
15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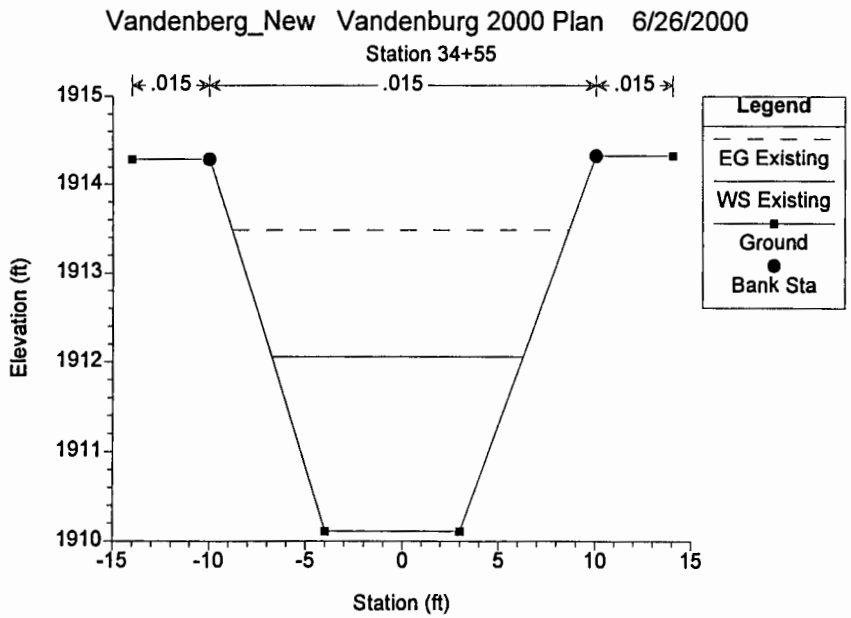
Station 33+57
.015
.015
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1915
1914
1913
1912
1911
1910
-15
-10
-5
0
5
10
15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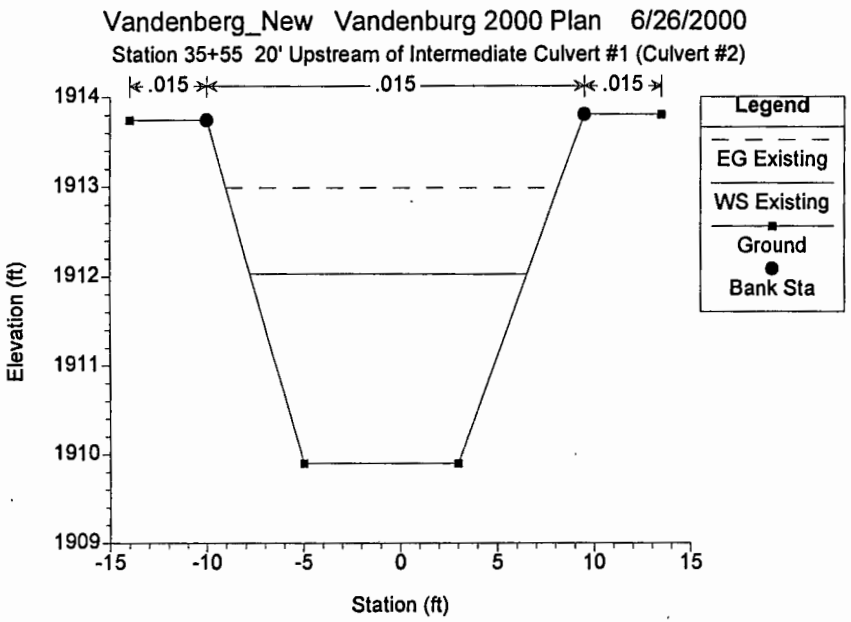
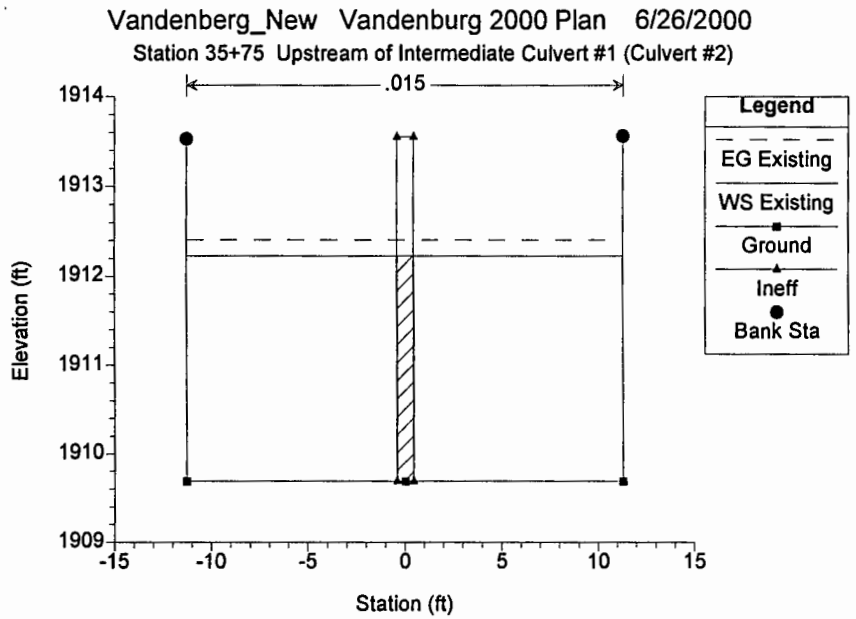
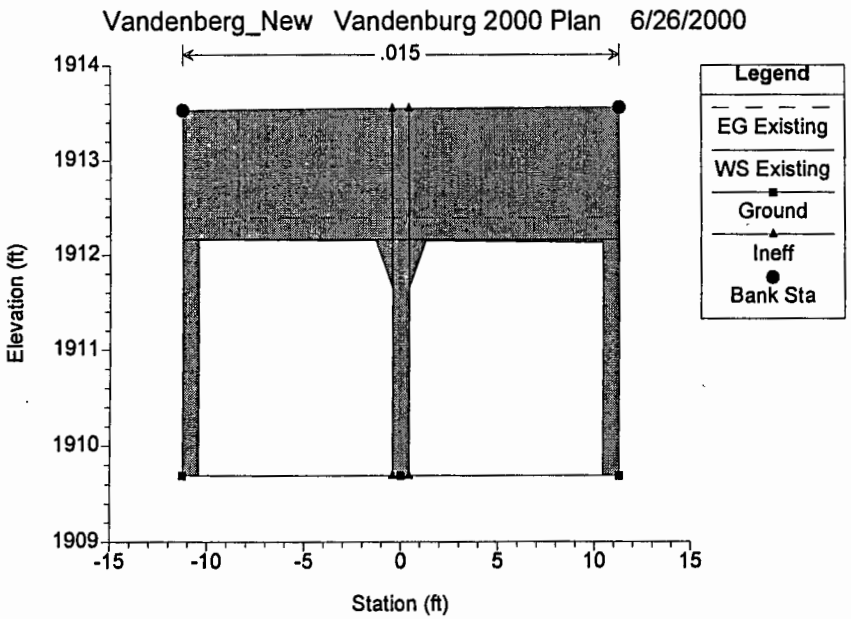
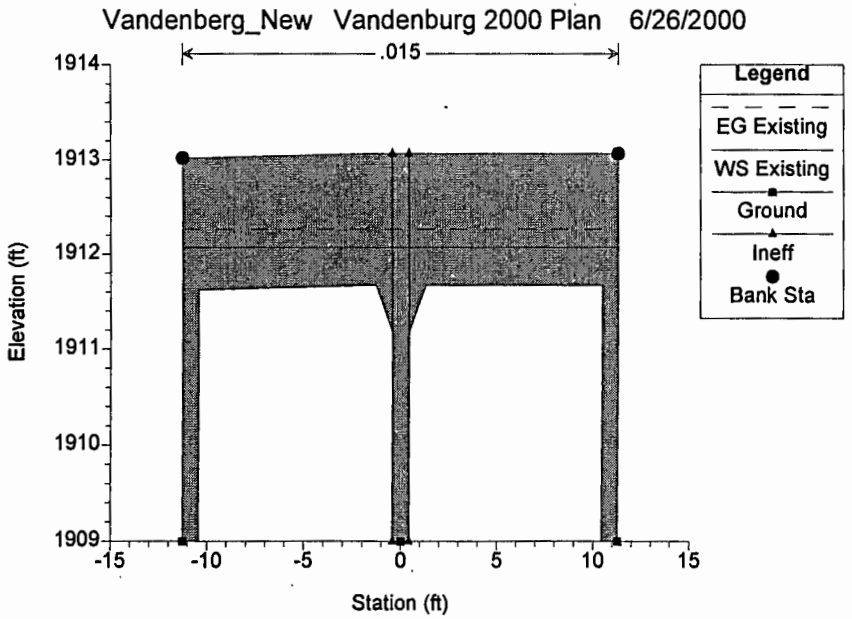
Station 34+55
.015
.015
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1915
1914
1913
1912
1911
1910
-15
-10
-5
0
5
10
15


Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 35+55 20' Upstream of Intermediate Culvert #1 (Culvert #2)
.015
.015
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1914
1913
1912
1911
1910
1909
-15
-10
-5
0
5
10
15

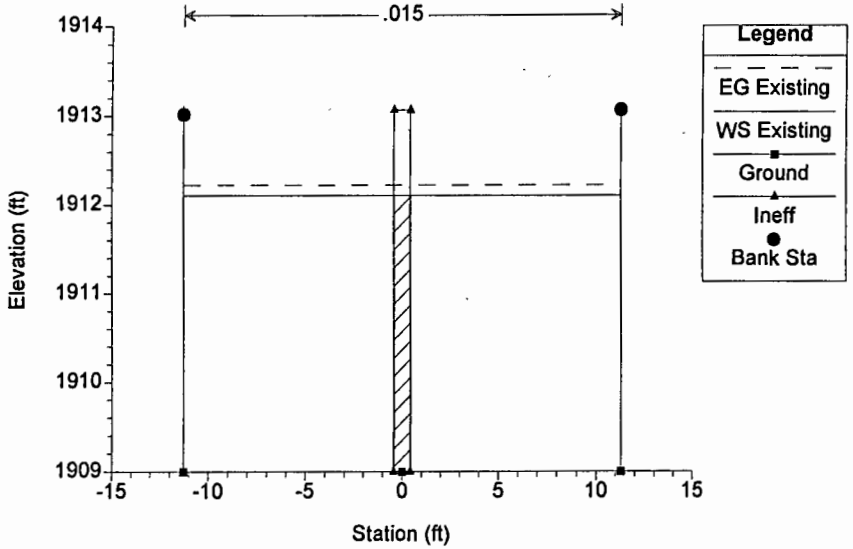

Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 35+75 Upstream of Intermediate Culvert #1 (Culvert #2)
.015
Legend
EG Existing
WS Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1914
1913
1912
1911
1910
1909
-15
-10
-5
0
5
10
15


Vandenberg_New Vandenburg 2000 Plan 6/26/2000
.015
Legend
EG Existing
WS Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1914
1913
1912
1911
1910
1909
-15
-10
-5
0
5
10
15


Vandenberg_New Vandenburg 2000 Plan 6/26/2000
.015
Legend
EG Existing
WS Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1914
1913
1912
1911
1910
1909
-15
-10
-5
0
5
10
15

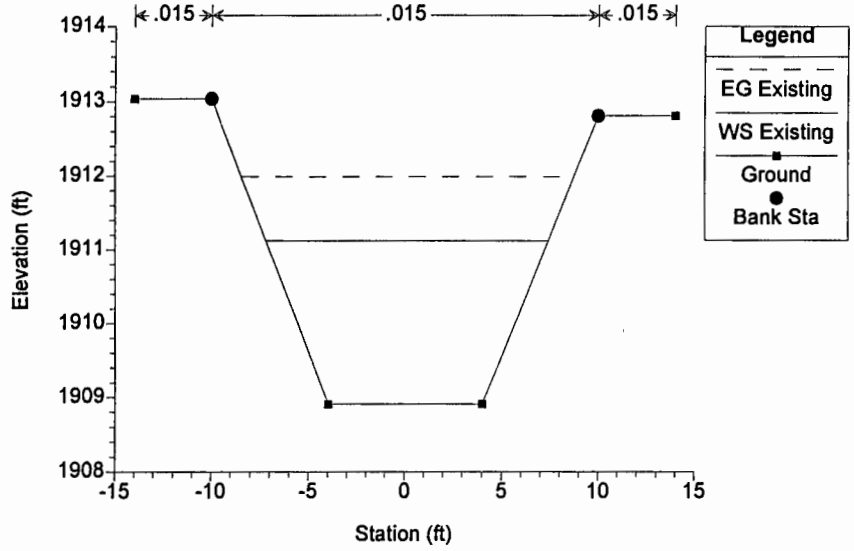
Vandenberg_New Vandenburg 2000 Plan 6/26/2000

Station 36+60 Downstream of Intermediate Culvert #1 (Culvert #2)



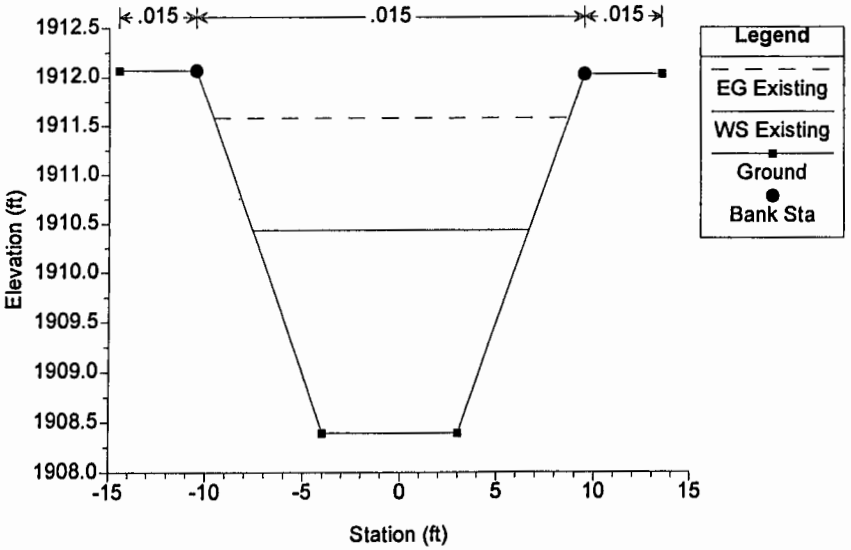
Vandenberg_New Vandenburg 2000 Plan 6/26/2000

Station 36+80 20' Downstream of Intermediate Culvert #1 (Culvert #2)



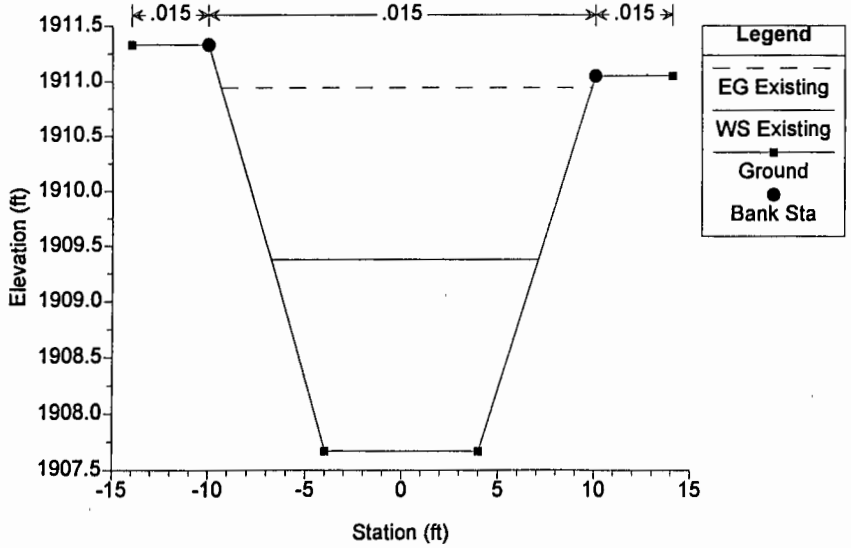
Vandenberg_New Vandenburg 2000 Plan 6/26/2000

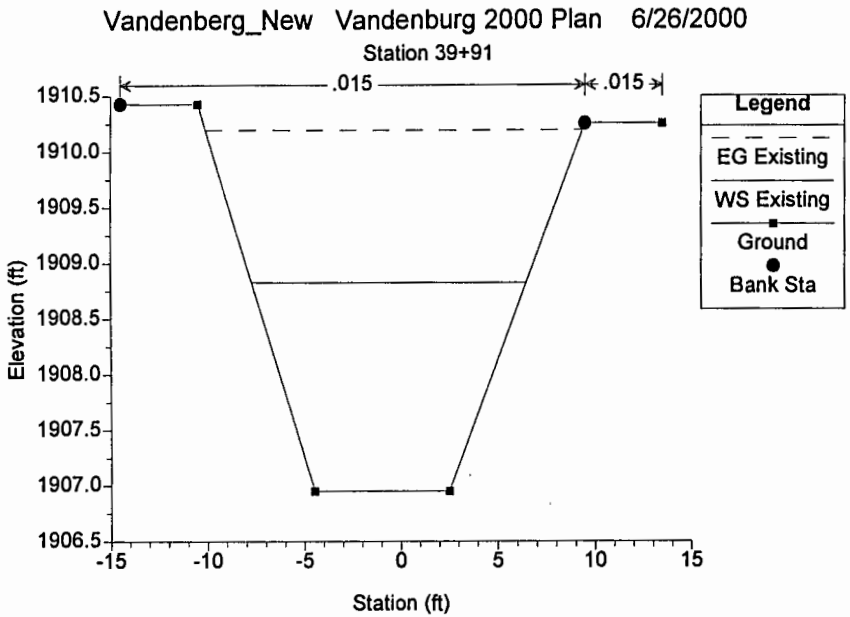
Station 37+81

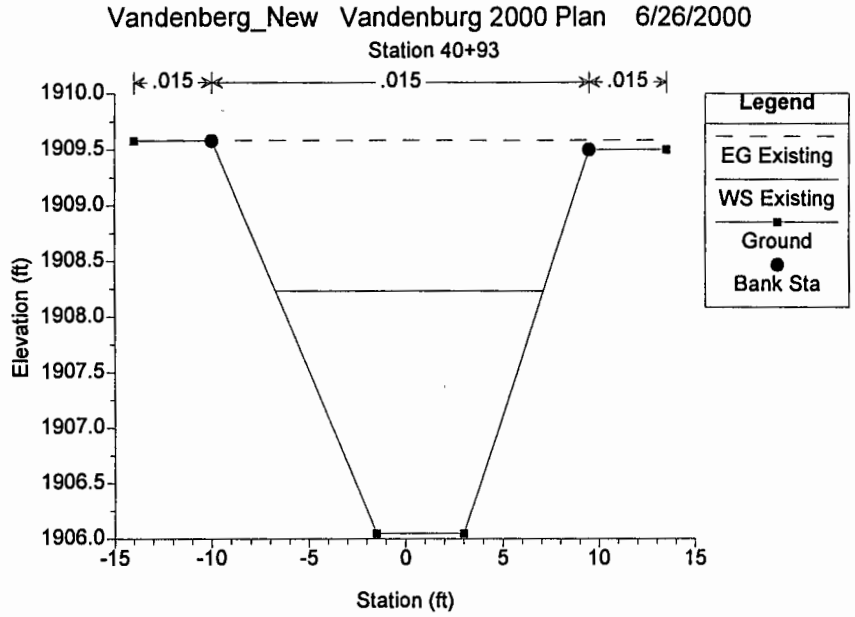


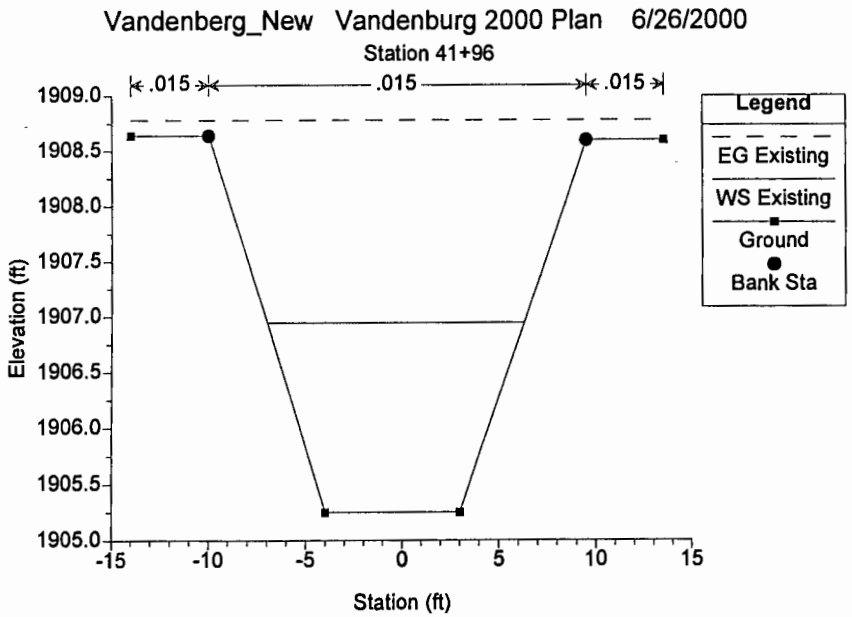
Vandenberg_New Vandenburg 2000 Plan 6/26/2000

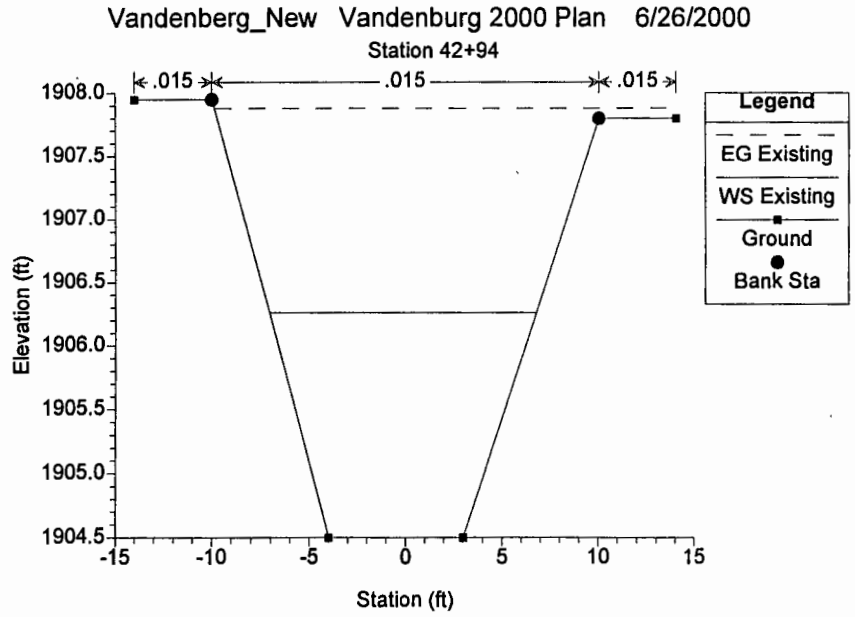
Station 38+88




Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 39+91
.015
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)

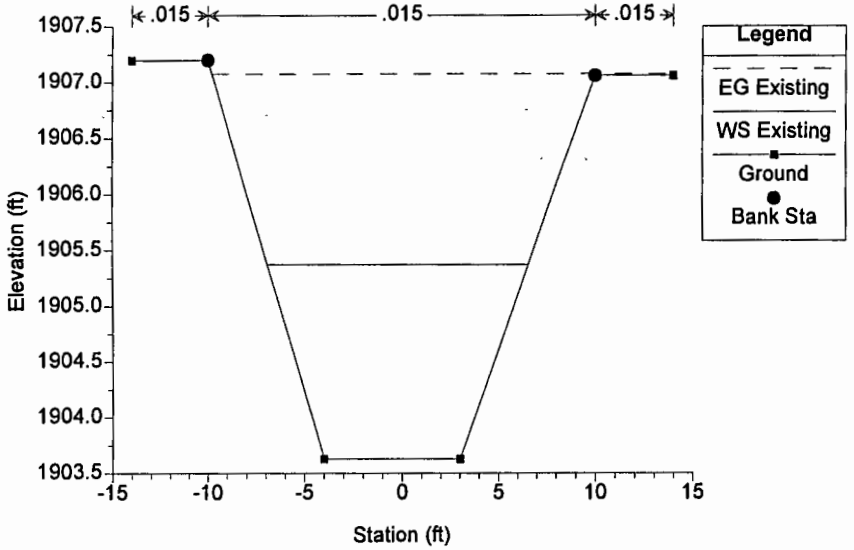

Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 40+93
.015
.015
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)


Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 41+96
.015
.015
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)


Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 42+94
.015
.015
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)

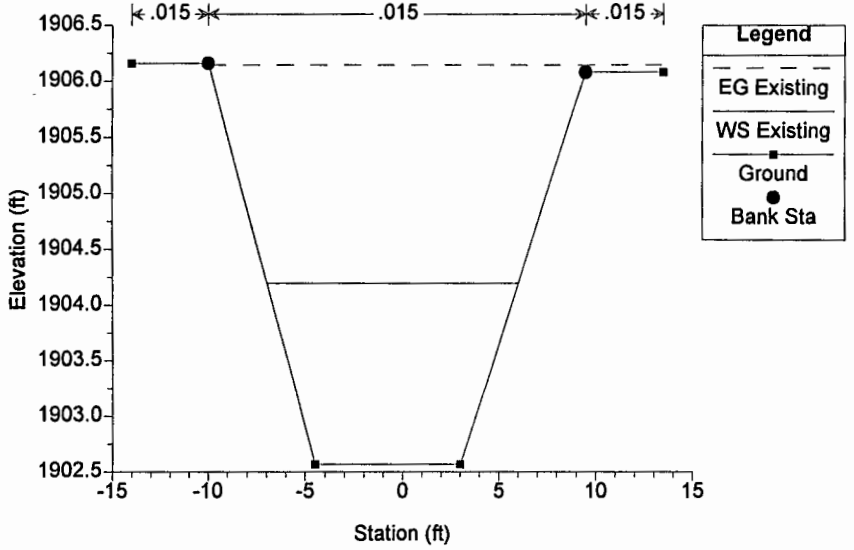
Vandenberg_New Vandenburg 2000 Plan 6/26/2000

Station 43+94



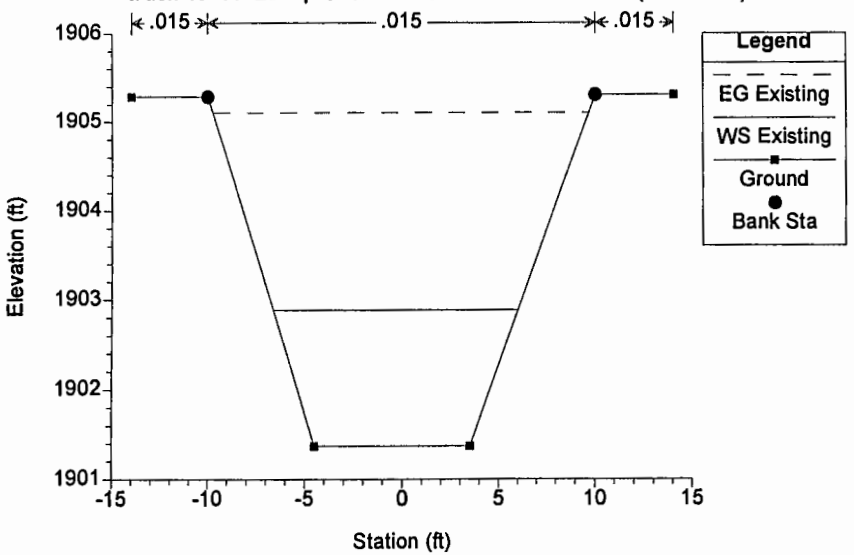
Vandenberg_New Vandenburg 2000 Plan 6/26/2000

Station 44+96



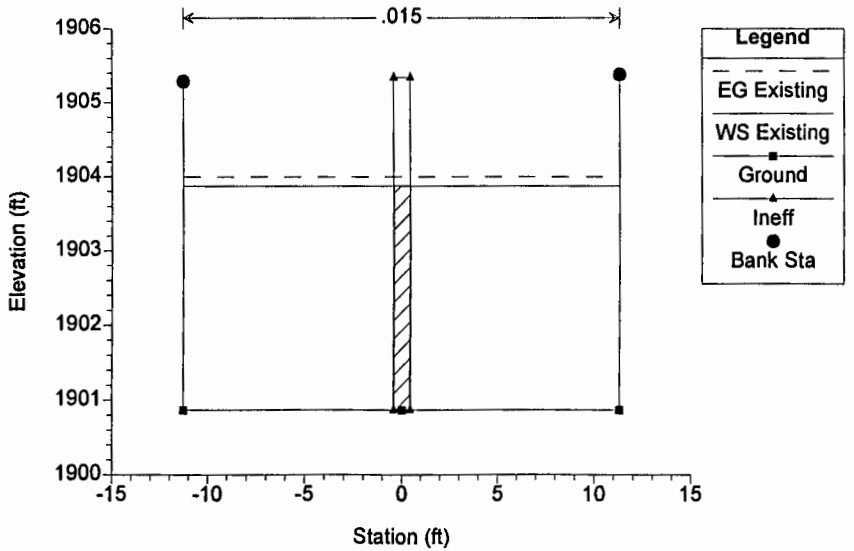
Vandenberg_New Vandenburg 2000 Plan 6/26/2000

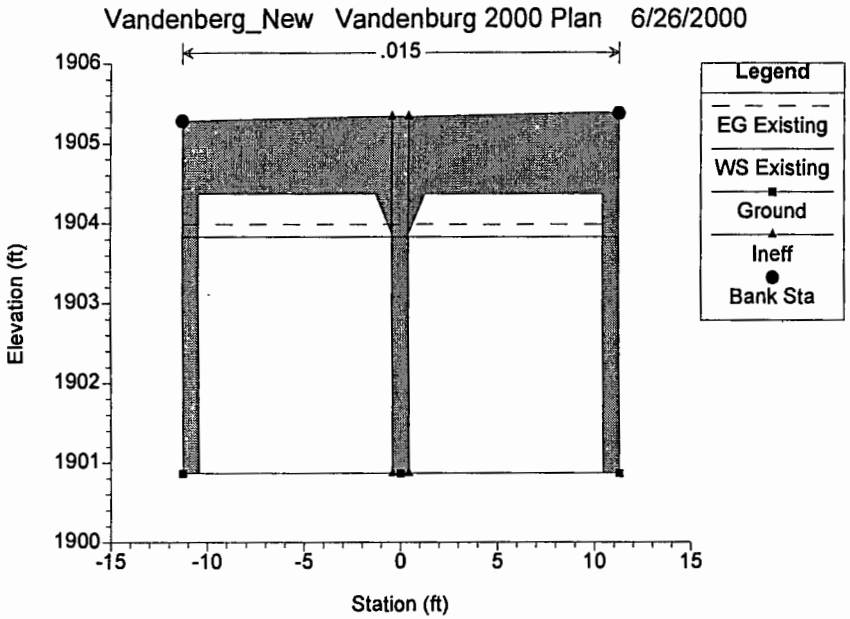
Station 45+88 20' Upstream of Intermediate Culvert #2 (Culvert #3)

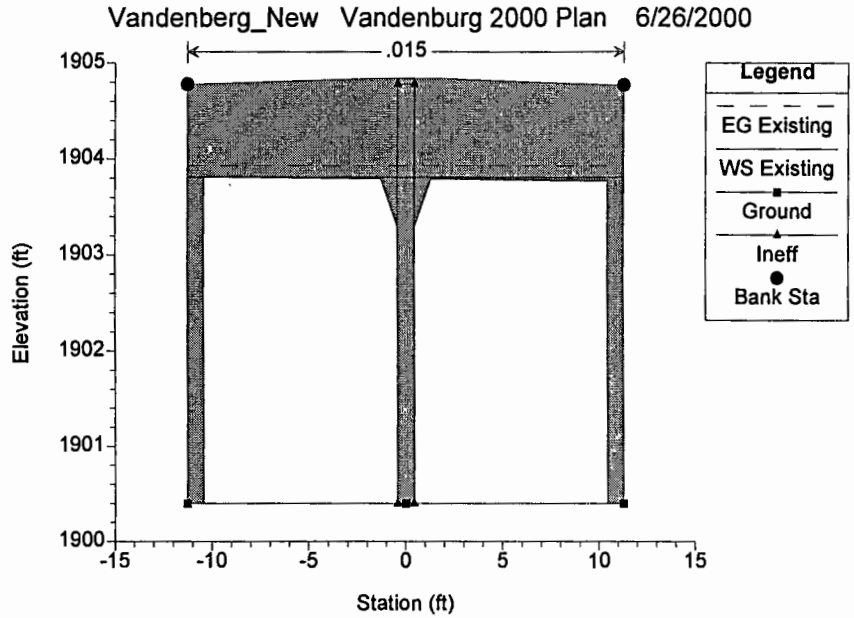


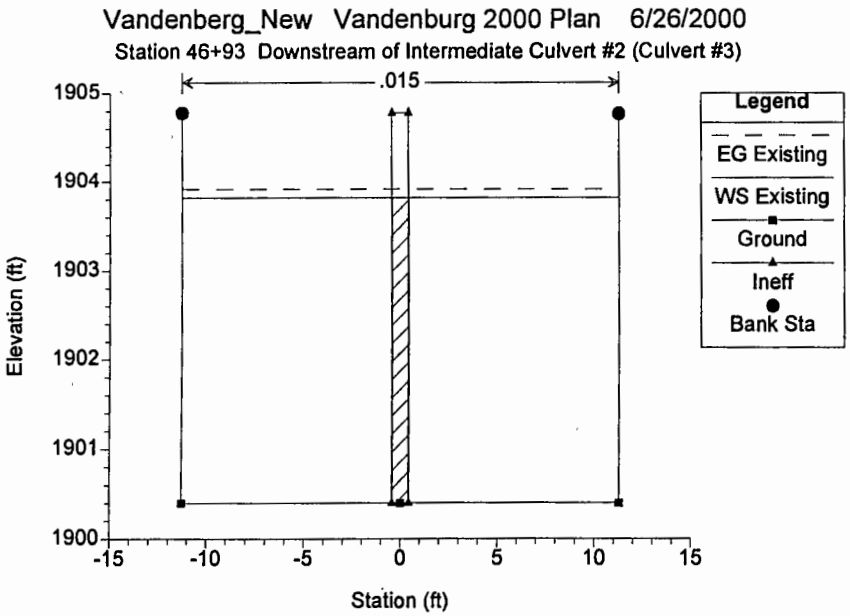
Vandenberg_New Vandenburg 2000 Plan 6/26/2000

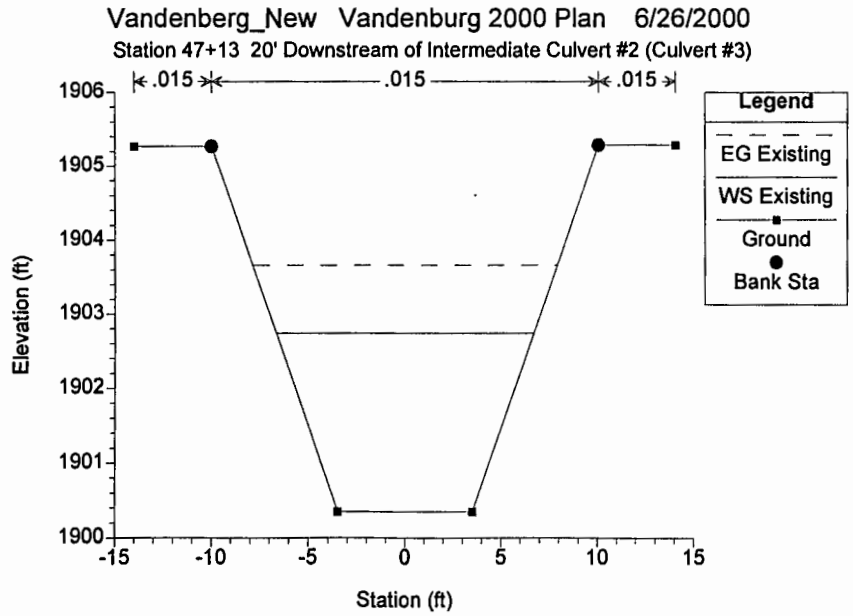
Station 46+08 Upstream of Intermediate Culvert #2 (Culvert #3)

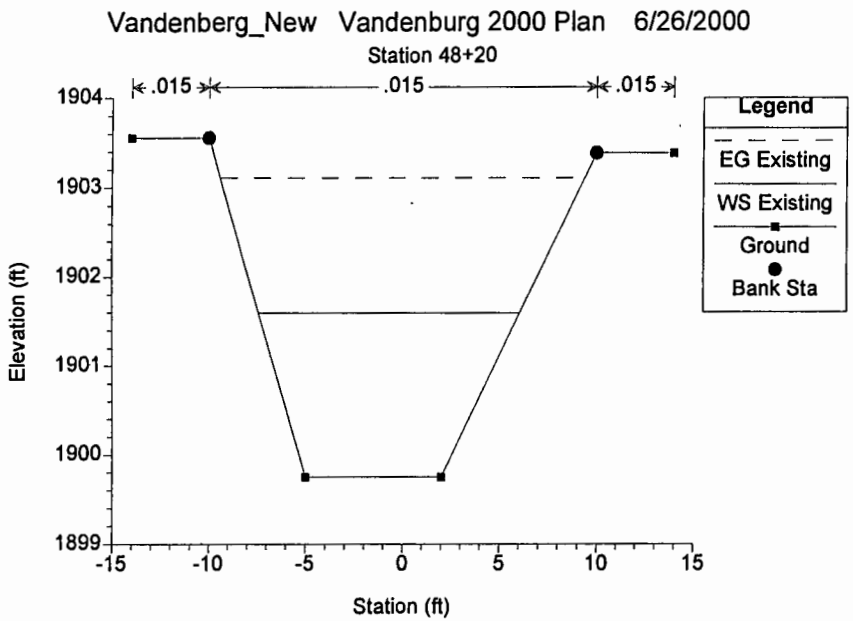


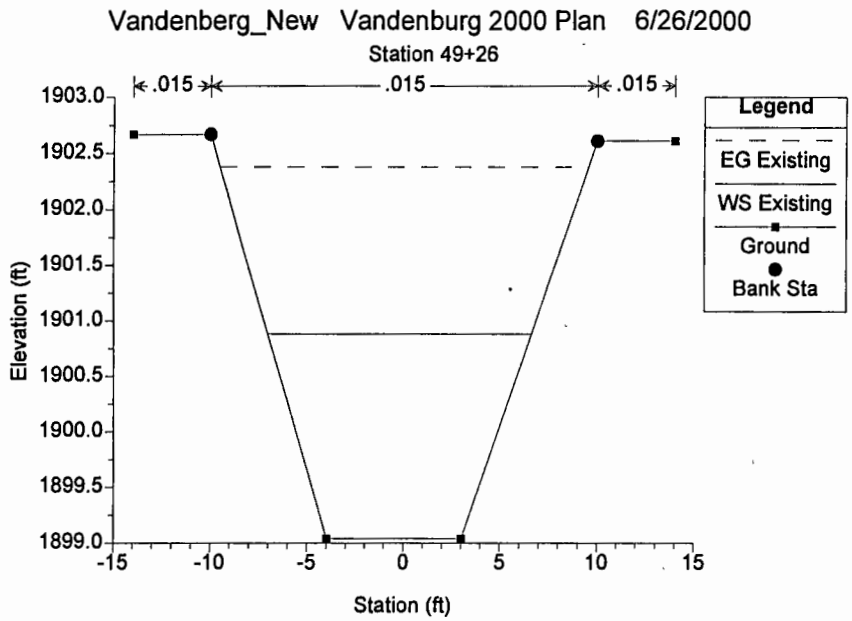

Vandenberg_New Vandenburg 2000 Plan 6/26/2000
.015
Legend
EG Existing
WS Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1906
1905
1904
1903
1902
1901
1900
-15
-10
-5
0
5
10
15

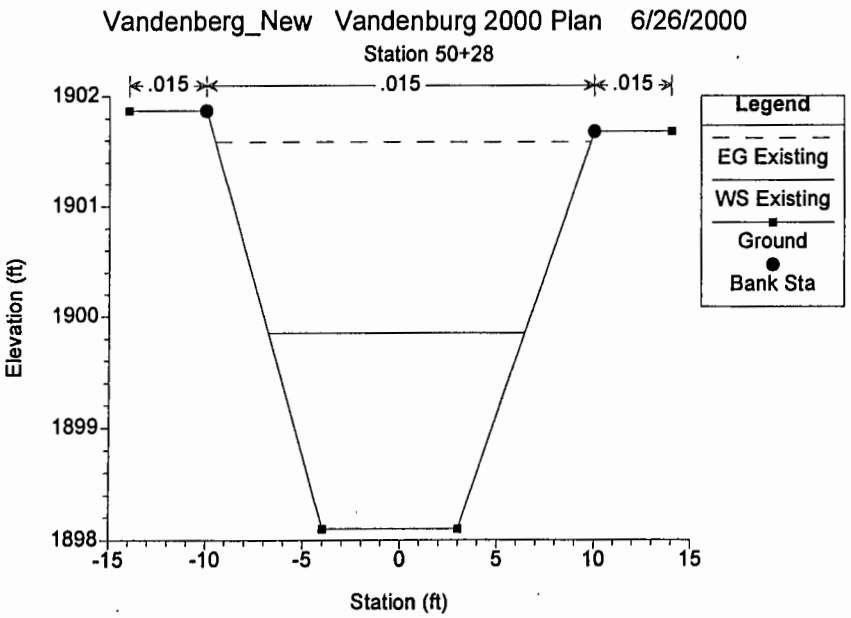

Vandenberg_New Vandenburg 2000 Plan 6/26/2000
.015
Legend
EG Existing
WS Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1905
1904
1903
1902
1901
1900
-15
-10
-5
0
5
10
15

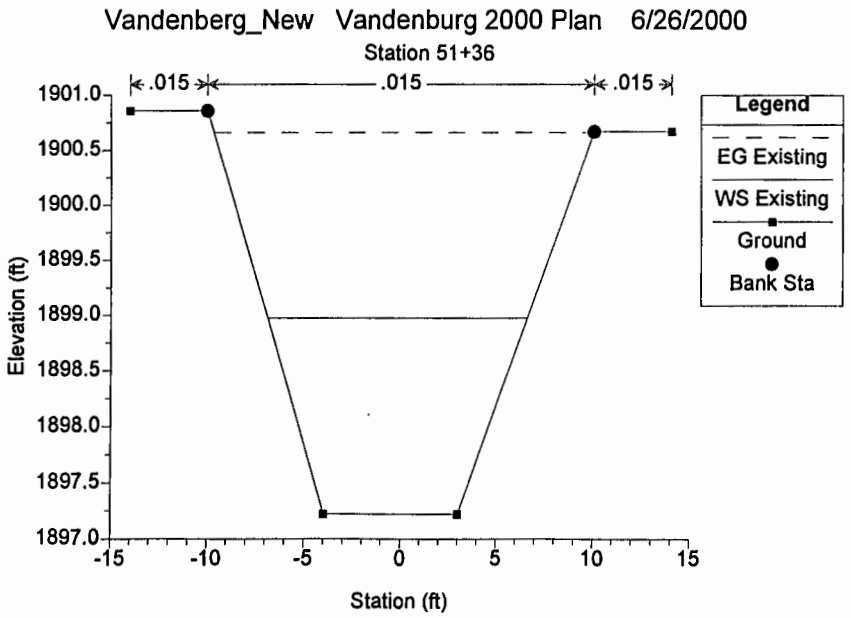

Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 46+93 Downstream of Intermediate Culvert #2 (Culvert #3)
.015
Legend
EG Existing
WS Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1905
1904
1903
1902
1901
1900
-15
-10
-5
0
5
10
15

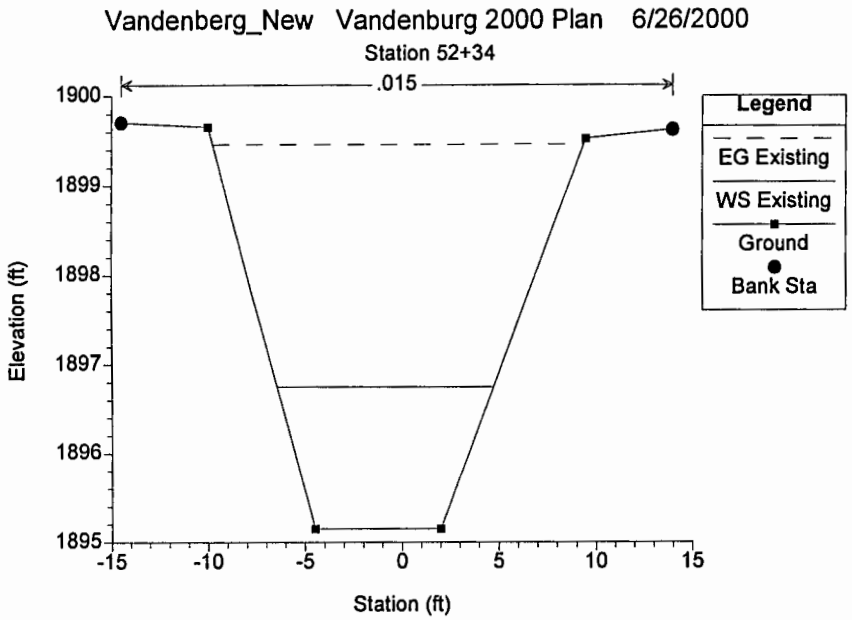

Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 47+13 20' Downstream of Intermediate Culvert #2 (Culvert #3)
.015
.015
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1906
1905
1904
1903
1902
1901
1900
-15
-10
-5
0
5
10
15

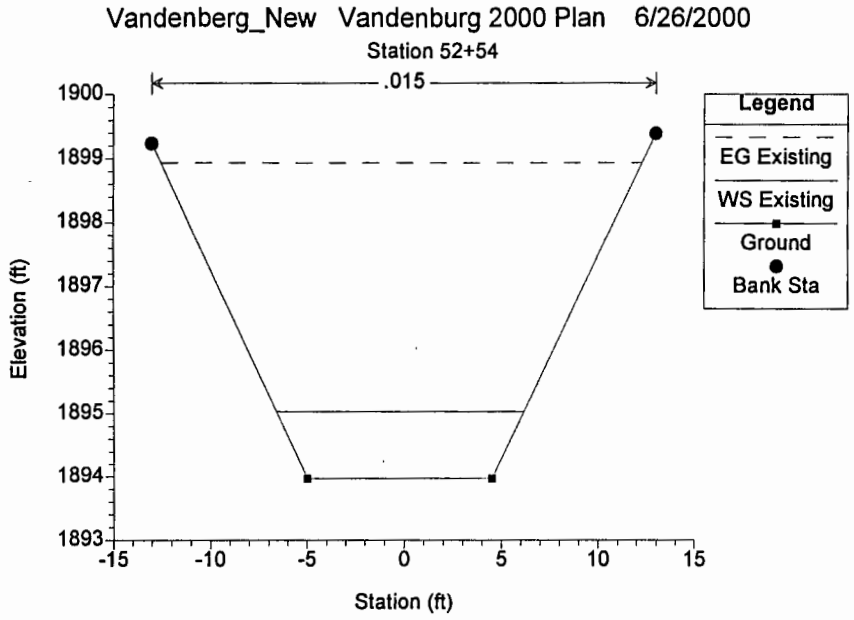

Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 48+20
.015
.015
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1904
1903
1902
1901
1900
1899
-15
-10
-5
0
5
10
15

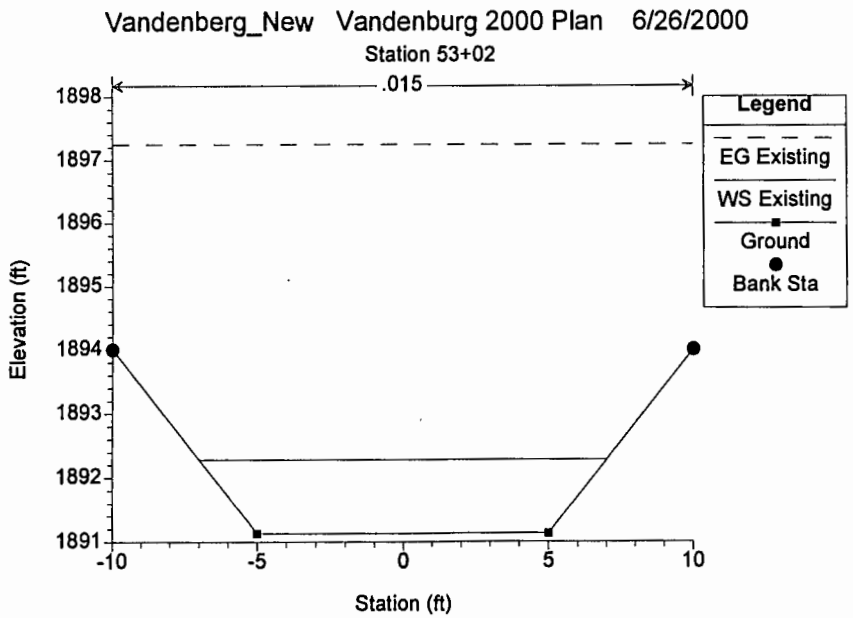

Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 49+26
.015
.015
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1903.0
1902.5
1902.0
1901.5
1901.0
1900.5
1900.0
1899.5
1899.0
-15
-10
-5
0
5
10
15

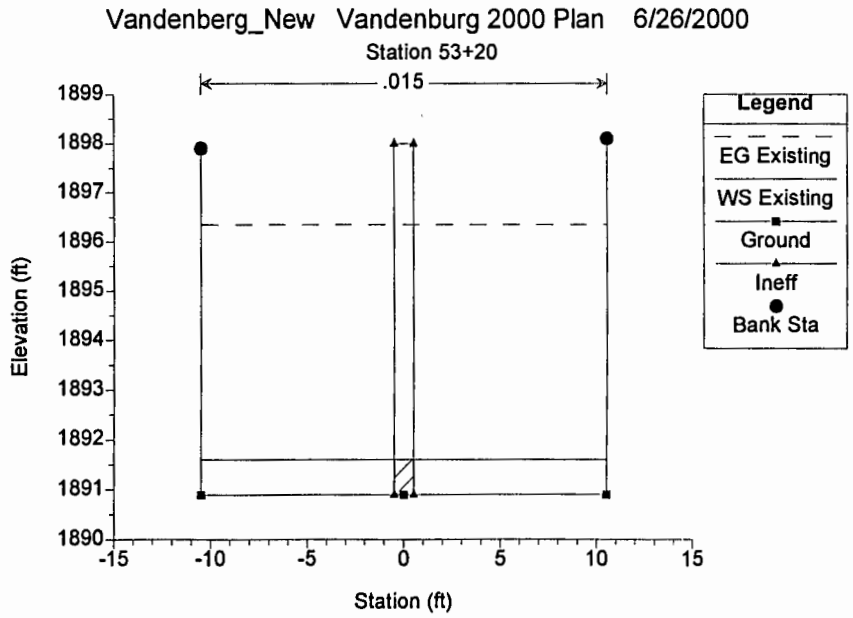

Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 50+28
.015
.015
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1902
1901
1900
1899
1898
-15
-10
-5
0
5
10
15

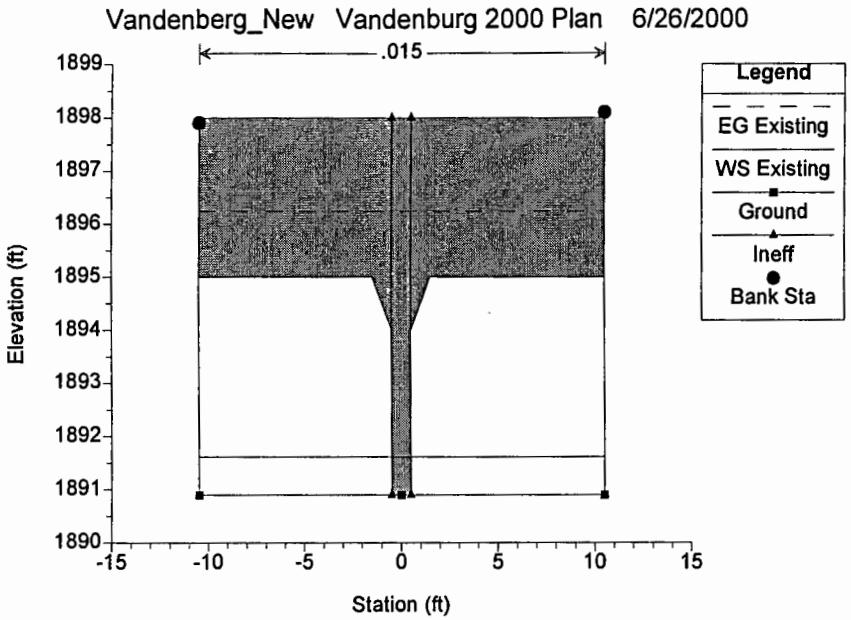

Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 51+36
.015
.015
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1901.0
1900.5
1900.0
1899.5
1899.0
1898.5
1898.0
1897.5
1897.0
-15
-10
-5
0
5
10
15

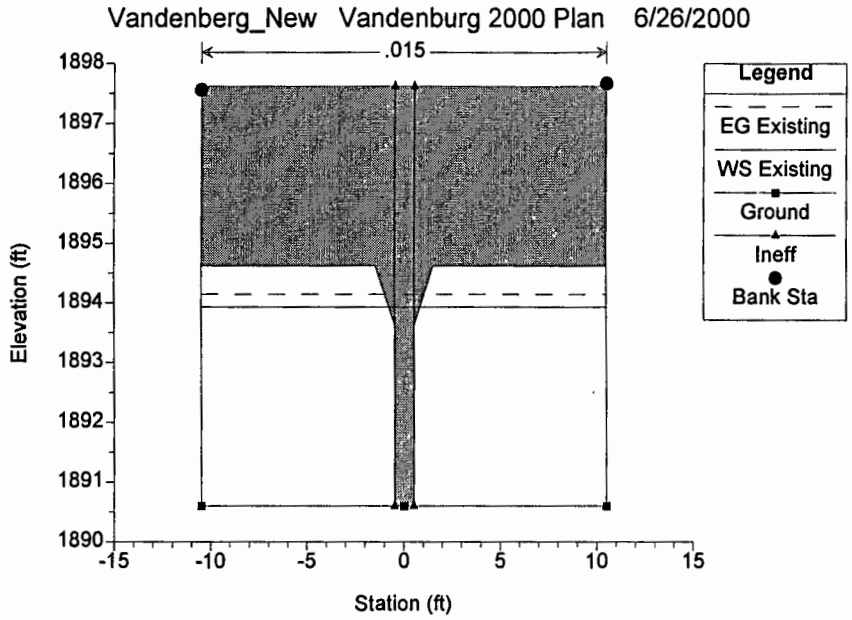

Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 52+34
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1900
1899
1898
1897
1896
1895
-15
-10
-5
0
5
10
15

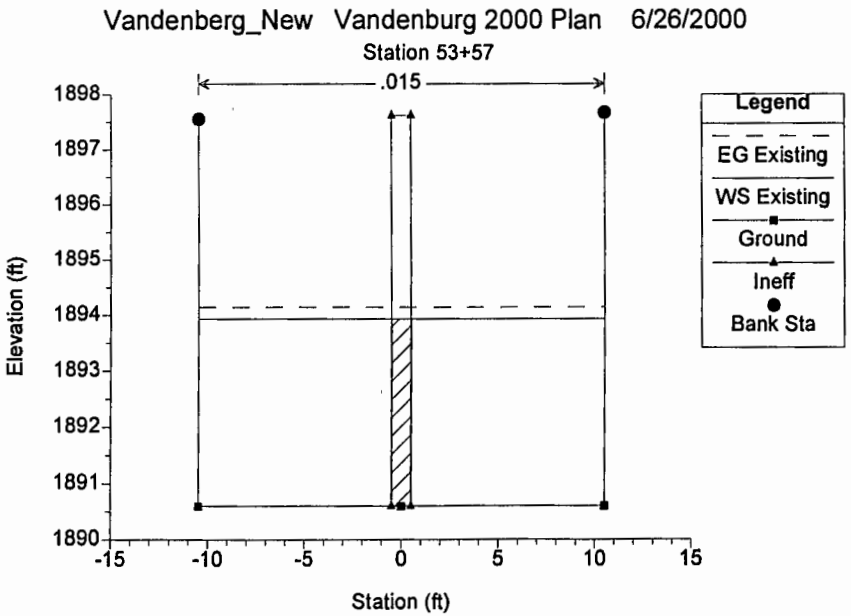

Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 52+54
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1900
1899
1898
1897
1896
1895
1894
1893
-15
-10
-5
0
5
10
15

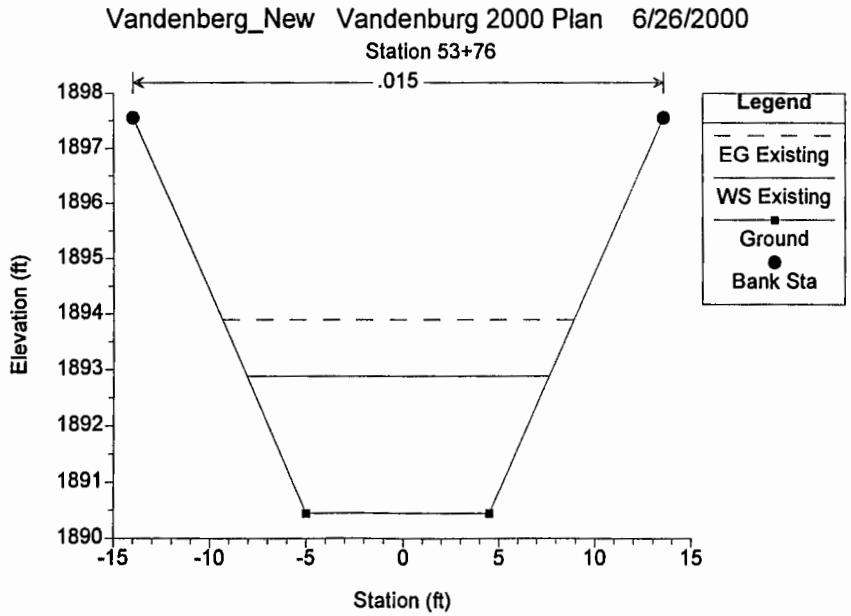

Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 53+02
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1898
1897
1896
1895
1894
1893
1892
1891
-10
-5
0
5
10

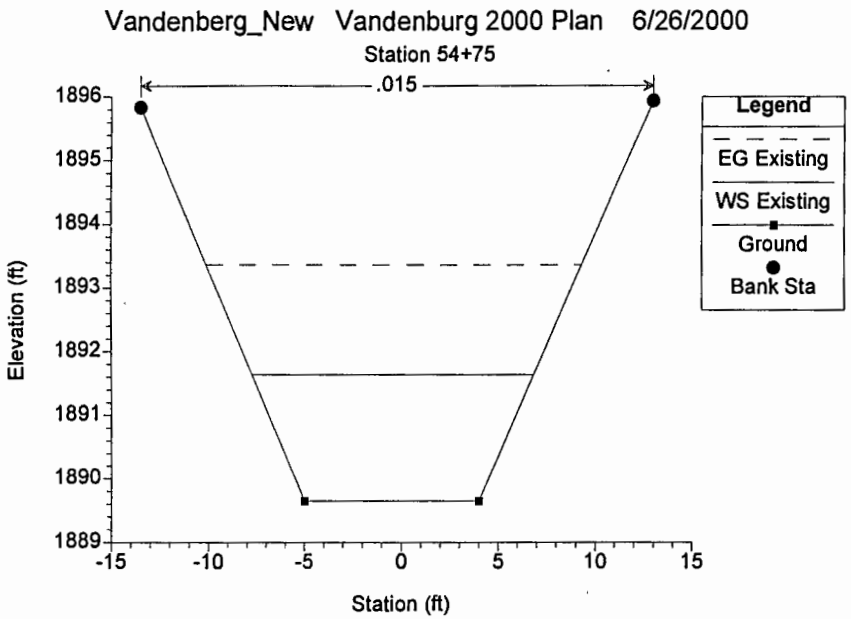

Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 53+20
.015
Legend
EG Existing
WS Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1899
1898
1897
1896
1895
1894
1893
1892
1891
1890
-15
-10
-5
0
5
10
15

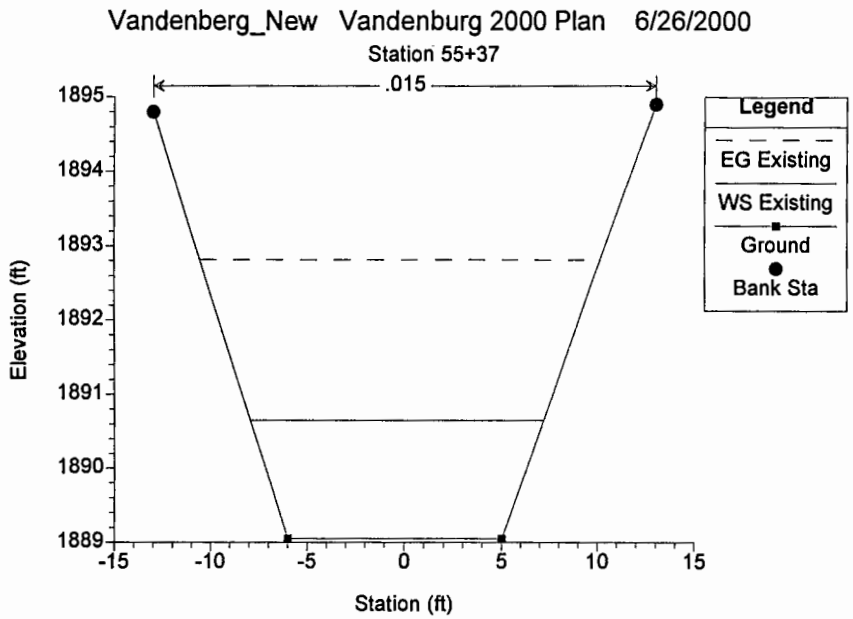

Vandenberg_New Vandenburg 2000 Plan 6/26/2000
.015
Legend
EG Existing
WS Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1899
1898
1897
1896
1895
1894
1893
1892
1891
1890
-15
-10
-5
0
5
10
15

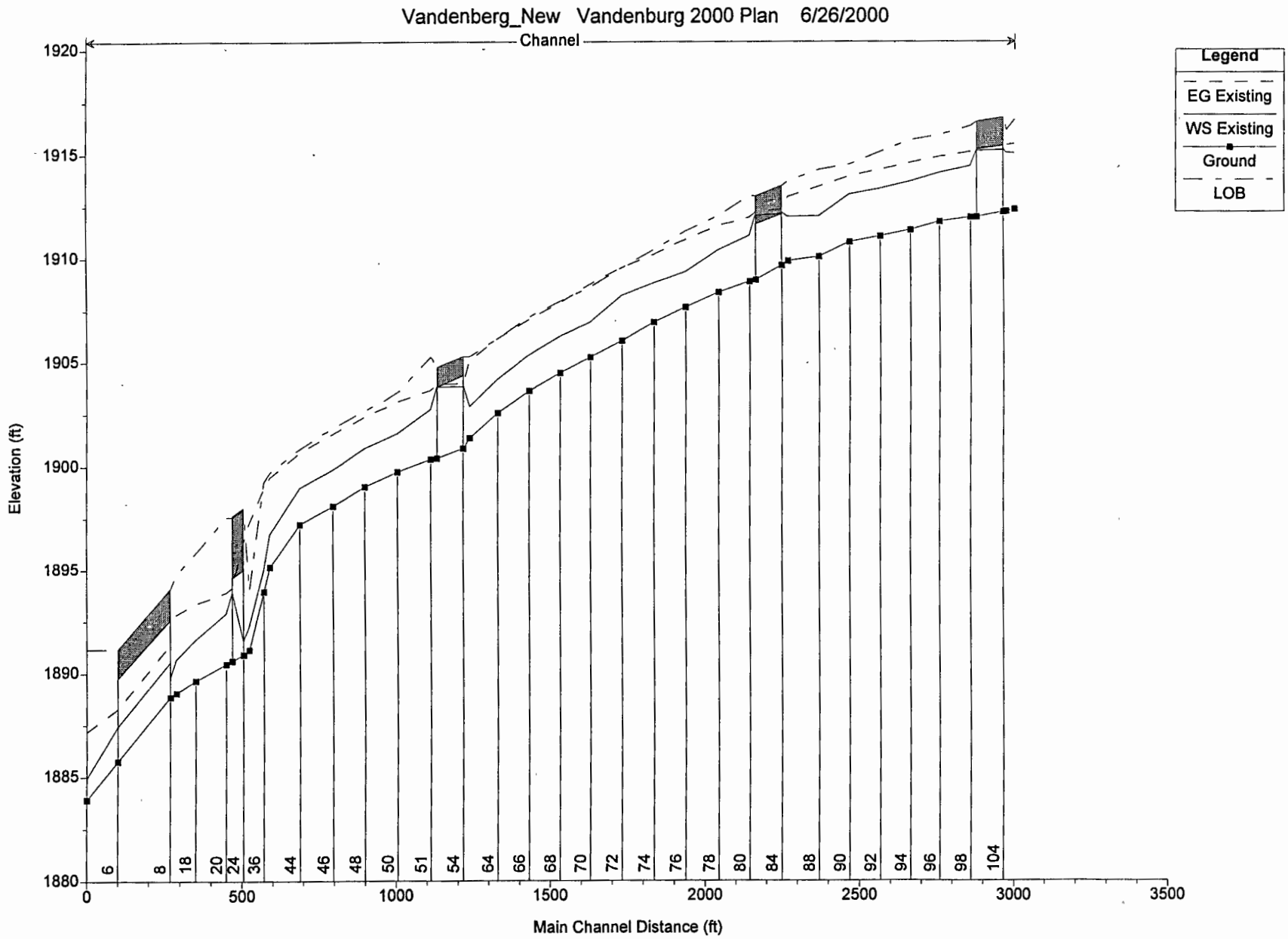

Vandenberg_New Vandenburg 2000 Plan 6/26/2000
.015
Legend
EG Existing
WS Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1898
1897
1896
1895
1894
1893
1892
1891
1890
-15
-10
-5
0
5
10
15


Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 53+57
.015
Legend
EG Existing
WS Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1898
1897
1896
1895
1894
1893
1892
1891
1890
-15
-10
-5
0
5
10
15


Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 53+76
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1898
1897
1896
1895
1894
1893
1892
1891
1890
-15
-10
-5
0
5
10
15


Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 54+75
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1896
1895
1894
1893
1892
1891
1890
1889
-15
-10
-5
0
5
10
15


Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Station 55+37
.015
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1895
1894
1893
1892
1891
1890
1889
-15
-10
-5
0
5
10
15


Vandenberg_New Vandenburg 2000 Plan 6/26/2000
Channel
Legend
EG Existing
WS Existing
Ground
LOB
Elevation (ft)
1920
1915
1910
1905
1900
1895
1890
1885
1880
0
500
1000
1500
2000
2500
3000
3500
Main Channel Distance (ft)
6
8
18
20
24
36
44
46
48
50
51
54
64
66
68
70
72
74
76
78
80
84
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90
92
94
96
98
104

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 110 Profile: Existing

W.S. Elev (ft)	1915.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.43	Wt. n-Val.		0.015	
E.G. Elev (ft)	1915.52	Reach Len. (ft)	27.00	27.00	27.00
Crit W.S. (ft)		Flow Area (sq ft)		35.35	
E.G. Slope (ft/ft)	0.001294	Area (sq ft)		35.35	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	18.21	Top Width (ft)		18.21	
Vel Total (ft/s)	5.29	Avg. Vel. (ft/s)		5.29	
Max Chl Dpth (ft)	2.70	Hydr. Depth (ft)		1.94	
Conv. Total (cfs)	5198.1	Conv. (cfs)		5198.1	
Length Wtd. (ft)	27.00	Wetted Per. (ft)		19.54	
Min Ch El (ft)	1912.39	Shear (lb/sq ft)		0.15	
Alpha	1.00	Stream Power (lb/ft s)		0.77	
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)		1.68	
C & E Loss (ft)	0.02	Cum SA (acres)		0.91	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 108 Profile: Existing

W.S. Elev (ft)	1915.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.36	Wt. n-Val.		0.015	
E.G. Elev (ft)	1915.47	Reach Len. (ft)	8.99	8.99	8.99
Crit W.S. (ft)		Flow Area (sq ft)		38.68	
E.G. Slope (ft/ft)	0.001040	Area (sq ft)		38.68	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	19.47	Top Width (ft)		19.47	
Vel Total (ft/s)	4.83	Avg. Vel. (ft/s)		4.83	
Max Chl Dpth (ft)	2.82	Hydr. Depth (ft)		1.99	
Conv. Total (cfs)	5798.2	Conv. (cfs)		5798.2	
Length Wtd. (ft)	8.99	Wetted Per. (ft)		20.78	
Min Ch El (ft)	1912.29	Shear (lb/sq ft)		0.12	
Alpha	1.00	Stream Power (lb/ft s)		0.58	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		1.66	
C & E Loss (ft)	0.07	Cum SA (acres)		0.90	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 106 Profile: Existing

W.S. Elev (ft)	1915.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.		0.015	
E.G. Elev (ft)	1915.39	Reach Len. (ft)	1.00	1.00	1.00
Crit W.S. (ft)	1913.58	Flow Area (sq ft)		65.24	
E.G. Slope (ft/ft)	0.000267	Area (sq ft)		67.79	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	22.55	Top Width (ft)		22.55	
Vel Total (ft/s)	2.87	Avg. Vel. (ft/s)		2.87	
Max Chl Dpth (ft)	3.01	Hydr. Depth (ft)		3.01	
Conv. Total (cfs)	11436.2	Conv. (cfs)		11436.2	
Length Wtd. (ft)	1.00	Wetted Per. (ft)		27.71	
Min Ch El (ft)	1912.26	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.11	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		1.65	
C & E Loss (ft)	0.01	Cum SA (acres)		0.89	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 104 BR U Profile: Existing

W.S. Elev (ft)	1915.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.015	
E.G. Elev (ft)	1915.39	Reach Len. (ft)	85.00	85.00	85.00
Crit W.S. (ft)	1913.65	Flow Area (sq ft)		59.26	
E.G. Slope (ft/ft)	0.000455	Area (sq ft)		59.26	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	18.95	Top Width (ft)		18.95	
Vel Total (ft/s)	3.16	Avg. Vel. (ft/s)		3.16	
Max Chl Dpth (ft)	2.97	Hydr. Depth (ft)		3.13	
Conv. Total (cfs)	8762.6	Conv. (cfs)		8762.6	
Length Wtd. (ft)	85.00	Wetted Per. (ft)		32.49	
Min Ch El (ft)	1912.26	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.16	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)		1.64	
C & E Loss (ft)	0.01	Cum SA (acres)		0.89	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 104 BR D Profile: Existing

W.S. Elev (ft)	1915.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.015	
E.G. Elev (ft)	1915.34	Reach Len. (ft)	0.00	0.00	0.00
Crit W.S. (ft)	1913.48	Flow Area (sq ft)		61.56	
E.G. Slope (ft/ft)	0.000582	Area (sq ft)		61.56	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	8.70	Top Width (ft)		8.70	
Vel Total (ft/s)	3.04	Avg. Vel. (ft/s)		3.04	
Max Chl Dpth (ft)	3.17	Hydr. Depth (ft)		7.08	
Conv. Total (cfs)	7750.3	Conv. (cfs)		7750.3	
Length Wtd. (ft)	0.00	Wetted Per. (ft)		42.97	
Min Ch El (ft)	1912.03	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.16	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		1.53	
C & E Loss (ft)	0.01	Cum SA (acres)		0.86	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 102 Profile: Existing

W.S. Elev (ft)	1915.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.		0.015	
E.G. Elev (ft)	1915.32	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1913.40	Flow Area (sq ft)		67.66	
E.G. Slope (ft/ft)	0.000239	Area (sq ft)		70.31	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	22.55	Top Width (ft)		22.55	
Vel Total (ft/s)	2.76	Avg. Vel. (ft/s)		2.76	
Max Chl Dpth (ft)	3.19	Hydr. Depth (ft)		3.12	
Conv. Total (cfs)	12086.8	Conv. (cfs)		12086.8	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		27.94	
Min Ch El (ft)	1912.02	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.10	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		1.53	
C & E Loss (ft)	0.17	Cum SA (acres)		0.86	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 98 Profile: Existing

W.S. Elev (ft)	1914.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.68	Wt. n-Val.		0.015	
E.G. Elev (ft)	1915.15	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)		28.31	
E.G. Slope (ft/ft)	0.002168	Area (sq ft)		28.31	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	14.94	Top Width (ft)		14.94	
Vel Total (ft/s)	6.61	Avg. Vel. (ft/s)		6.61	
Max Chl Dpth (ft)	2.47	Hydr. Depth (ft)		1.89	
Conv. Total (cfs)	4015.8	Conv. (cfs)		4015.8	
Length Wtd. (ft)	100.00	Wetted Per. (ft)		16.52	
Min Ch El (ft)	1912.00	Shear (lb/sq ft)		0.23	
Alpha	1.00	Stream Power (lb/ft s)		1.53	
Frctn Loss (ft)	0.24	Cum Volume (acre-ft)		1.50	
C & E Loss (ft)	0.01	Cum SA (acres)		0.85	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 96 Profile: Existing

W.S. Elev (ft)	1914.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.76	Wt. n-Val.		0.015	
E.G. Elev (ft)	1914.91	Reach Len. (ft)	95.00	95.00	95.00
Crit W.S. (ft)		Flow Area (sq ft)		26.70	
E.G. Slope (ft/ft)	0.002578	Area (sq ft)		26.70	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	14.78	Top Width (ft)		14.78	
Vel Total (ft/s)	7.00	Avg. Vel. (ft/s)		7.00	
Max Chl Dpth (ft)	2.34	Hydr. Depth (ft)		1.81	
Conv. Total (cfs)	3683.0	Conv. (cfs)		3683.0	
Length Wtd. (ft)	95.00	Wetted Per. (ft)		16.25	
Min Ch El (ft)	1911.80	Shear (lb/sq ft)		0.26	
Alpha	1.00	Stream Power (lb/ft s)		1.85	
Frctn Loss (ft)	0.27	Cum Volume (acre-ft)		1.44	
C & E Loss (ft)	0.01	Cum SA (acres)		0.82	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 94 Profile: Existing

W.S. Elev (ft)	1913.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.89	Wt. n-Val.		0.015	
E.G. Elev (ft)	1914.63	Reach Len. (ft)	98.00	98.00	98.00
Crit W.S. (ft)	1913.74	Flow Area (sq ft)		24.75	
E.G. Slope (ft/ft)	0.003134	Area (sq ft)		24.75	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	14.16	Top Width (ft)		14.16	
Vel Total (ft/s)	7.55	Avg. Vel. (ft/s)		7.55	
Max Chl Dpth (ft)	2.34	Hydr. Depth (ft)		1.75	
Conv. Total (cfs)	3340.2	Conv. (cfs)		3340.2	
Length Wtd. (ft)	98.00	Wetted Per. (ft)		15.57	
Min Ch El (ft)	1911.40	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		2.35	
Frctn Loss (ft)		Cum Volume (acre-ft)		1.38	
C & E Loss (ft)		Cum SA (acres)		0.79	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 92 Profile: Existing

W.S. Elev (ft)	1913.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.92	Wt. n-Val.		0.015	
E.G. Elev (ft)	1914.31	Reach Len. (ft)	99.00	99.00	99.00
Crit W.S. (ft)	1913.43	Flow Area (sq ft)		24.30	
E.G. Slope (ft/ft)	0.003329	Area (sq ft)		24.30	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	14.22	Top Width (ft)		14.22	
Vel Total (ft/s)	7.70	Avg. Vel. (ft/s)		7.70	
Max Chl Dpth (ft)	2.29	Hydr. Depth (ft)		1.71	
Conv. Total (cfs)	3241.2	Conv. (cfs)		3241.2	
Length Wtd. (ft)	99.00	Wetted Per. (ft)		15.55	
Min Ch El (ft)	1911.10	Shear (lb/sq ft)		0.32	
Alpha	1.00	Stream Power (lb/ft s)		2.50	
Frctn Loss (ft)	0.32	Cum Volume (acre-ft)		1.33	
C & E Loss (ft)	0.00	Cum SA (acres)		0.76	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 90 Profile: Existing

W.S. Elev (ft)	1913.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.88	Wt. n-Val.		0.015	
E.G. Elev (ft)	1913.98	Reach Len. (ft)	98.00	98.00	98.00
Crit W.S. (ft)	1913.12	Flow Area (sq ft)		24.90	
E.G. Slope (ft/ft)	0.003198	Area (sq ft)		24.90	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	14.81	Top Width (ft)		14.81	
Vel Total (ft/s)	7.51	Avg. Vel. (ft/s)		7.51	
Max Chl Dpth (ft)	2.28	Hydr. Depth (ft)		1.68	
Conv. Total (cfs)	3306.9	Conv. (cfs)		3306.9	
Length Wtd. (ft)	98.00	Wetted Per. (ft)		16.05	
Min Ch El (ft)	1910.82	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		2.33	
Frctn Loss (ft)	0.32	Cum Volume (acre-ft)		1.27	
C & E Loss (ft)	0.02	Cum SA (acres)		0.72	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 88 Profile: Existing

W.S. Elev (ft)	1912.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.42	Wt. n-Val.		0.015	
E.G. Elev (ft)	1913.48	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	1912.45	Flow Area (sq ft)		19.53	
E.G. Slope (ft/ft)	0.006101	Area (sq ft)		19.53	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	13.03	Top Width (ft)		13.03	
Vel Total (ft/s)	9.57	Avg. Vel. (ft/s)		9.57	
Max Chl Dpth (ft)	1.95	Hydr. Depth (ft)		1.50	
Conv. Total (cfs)	2394.2	Conv. (cfs)		2394.2	
Length Wtd. (ft)	100.00	Wetted Per. (ft)		14.19	
Min Ch El (ft)	1910.11	Shear (lb/sq ft)		0.52	
Alpha	1.00	Stream Power (lb/ft s)		5.02	
Frctn Loss (ft)	0.42	Cum Volume (acre-ft)		1.22	
C & E Loss (ft)	0.06	Cum SA (acres)		0.69	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 86 Profile: Existing

W.S. Elev (ft)	1912.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.96	Wt. n-Val.		0.015	
E.G. Elev (ft)	1912.99	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1912.12	Flow Area (sq ft)		23.78	
E.G. Slope (ft/ft)	0.003600	Area (sq ft)		23.78	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	14.31	Top Width (ft)		14.31	
Vel Total (ft/s)	7.86	Avg. Vel. (ft/s)		7.86	
Max Chl Dpth (ft)	2.13	Hydr. Depth (ft)		1.66	
Conv. Total (cfs)	3116.9	Conv. (cfs)		3116.9	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		15.63	
Min Ch El (ft)	1909.90	Shear (lb/sq ft)		0.34	
Alpha	1.00	Stream Power (lb/ft s)		2.69	
Frctn Loss (ft)	0.42	Cum Volume (acre-ft)		1.17	
C & E Loss (ft)	0.17	Cum SA (acres)		0.66	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 85 Profile: Existing

W.S. Elev (ft)	1912.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.		0.015	
E.G. Elev (ft)	1912.41	Reach Len. (ft)	1.00	1.00	1.00
Crit W.S. (ft)	1911.01	Flow Area (sq ft)		55.13	
E.G. Slope (ft/ft)	0.000448	Area (sq ft)		57.29	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	22.55	Top Width (ft)		22.55	
Vel Total (ft/s)	3.39	Avg. Vel. (ft/s)		3.39	
Max Chl Dpth (ft)	2.54	Hydr. Depth (ft)		2.54	
Conv. Total (cfs)	8836.8	Conv. (cfs)		8836.8	
Length Wtd. (ft)	1.00	Wetted Per. (ft)		26.78	
Min Ch El (ft)	1909.69	Shear (lb/sq ft)		0.06	
Alpha	1.00	Stream Power (lb/ft s)		0.20	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		1.15	
C & E Loss (ft)	0.02	Cum SA (acres)		0.65	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 84 BR U Profile: Existing

W.S. Elev (ft)	1912.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.		0.015	
E.G. Elev (ft)	1912.39	Reach Len. (ft)	84.00	84.00	84.00
Crit W.S. (ft)	1911.08	Flow Area (sq ft)		48.72	
E.G. Slope (ft/ft)	0.001517	Area (sq ft)		48.72	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)		Top Width (ft)			
Vel Total (ft/s)	3.84	Avg. Vel. (ft/s)		3.84	
Max Chl Dpth (ft)	2.47	Hydr. Depth (ft)			
Conv. Total (cfs)	4801.4	Conv. (cfs)		4801.4	
Length Wtd. (ft)	84.00	Wetted Per. (ft)		49.10	
Min Ch El (ft)	1909.69	Shear (lb/sq ft)		0.09	
Alpha	1.00	Stream Power (lb/ft s)		0.36	
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)		1.15	
C & E Loss (ft)	0.02	Cum SA (acres)		0.65	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 84 BR D Profile: Existing

W.S. Elev (ft)	1912.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.		0.015	
E.G. Elev (ft)	1912.26	Reach Len. (ft)	0.00	0.00	0.00
Crit W.S. (ft)	1910.39	Flow Area (sq ft)		52.74	
E.G. Slope (ft/ft)	0.001190	Area (sq ft)		52.74	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)		Top Width (ft)			
Vel Total (ft/s)	3.55	Avg. Vel. (ft/s)		3.55	
Max Chl Dpth (ft)	3.07	Hydr. Depth (ft)			
Conv. Total (cfs)	5420.3	Conv. (cfs)		5420.3	
Length Wtd. (ft)	0.00	Wetted Per. (ft)		49.90	
Min Ch El (ft)	1909.00	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)		0.28	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		1.06	
C & E Loss (ft)	0.04	Cum SA (acres)		0.65	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 83 Profile: Existing

W.S. Elev (ft)	1912.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.		0.015	
E.G. Elev (ft)	1912.23	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1910.32	Flow Area (sq ft)		67.42	
E.G. Slope (ft/ft)	0.000242	Area (sq ft)		70.06	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	22.55	Top Width (ft)		22.55	
Vel Total (ft/s)	2.77	Avg. Vel. (ft/s)		2.77	
Max Chl Dpth (ft)	3.11	Hydr. Depth (ft)		3.11	
Conv. Total (cfs)	12021.5	Conv. (cfs)		12021.5	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		27.91	
Min Ch El (ft)	1909.00	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.10	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		1.06	
C & E Loss (ft)	0.22	Cum SA (acres)		0.65	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 80 Profile: Existing

W.S. Elev (ft)	1911.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.87	Wt. n-Val.		0.015	
E.G. Elev (ft)	1911.99	Reach Len. (ft)	101.00	101.00	101.00
Crit W.S. (ft)	1911.12	Flow Area (sq ft)		25.02	
E.G. Slope (ft/ft)	0.003128	Area (sq ft)		25.02	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	14.62	Top Width (ft)		14.62	
Vel Total (ft/s)	7.48	Avg. Vel. (ft/s)		7.48	
Max Chl Dpth (ft)	2.21	Hydr. Depth (ft)		1.71	
Conv. Total (cfs)	3343.8	Conv. (cfs)		3343.8	
Length Wtd. (ft)	101.00	Wetted Per. (ft)		15.96	
Min Ch El (ft)	1908.91	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		2.29	
Frctn Loss (ft)	0.31	Cum Volume (acre-ft)		1.03	
C & E Loss (ft)	0.01	Cum SA (acres)		0.64	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 78 Profile: Existing

W.S. Elev (ft)	1910.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.15	Wt. n-Val.		0.015	
E.G. Elev (ft)	1911.58	Reach Len. (ft)	107.00	107.00	107.00
Crit W.S. (ft)	1910.68	Flow Area (sq ft)		21.75	
E.G. Slope (ft/ft)	0.004731	Area (sq ft)		21.75	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	14.26	Top Width (ft)		14.26	
Vel Total (ft/s)	8.60	Avg. Vel. (ft/s)		8.60	
Max Chl Dpth (ft)	2.05	Hydr. Depth (ft)		1.52	
Conv. Total (cfs)	2718.8	Conv. (cfs)		2718.8	
Length Wtd. (ft)	107.00	Wetted Per. (ft)		15.34	
Min Ch El (ft)	1908.39	Shear (lb/sq ft)		0.42	
Alpha	1.00	Stream Power (lb/ft s)		3.60	
Frctn Loss (ft)	0.38	Cum Volume (acre-ft)		0.98	
C & E Loss (ft)	0.03	Cum SA (acres)		0.61	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 76 Profile: Existing

W.S. Elev (ft)	1909.38	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.56	Wt. n-Val.		0.015	
E.G. Elev (ft)	1910.94	Reach Len. (ft)	103.00	103.00	103.00
Crit W.S. (ft)	1909.85	Flow Area (sq ft)		18.63	
E.G. Slope (ft/ft)	0.007521	Area (sq ft)		18.63	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	13.83	Top Width (ft)		13.83	
Vel Total (ft/s)	10.04	Avg. Vel. (ft/s)		10.04	
Max Chl Dpth (ft)	1.71	Hydr. Depth (ft)		1.35	
Conv. Total (cfs)	2156.3	Conv. (cfs)		2156.3	
Length Wtd. (ft)	103.00	Wetted Per. (ft)		14.76	
Min Ch El (ft)	1907.67	Shear (lb/sq ft)		0.59	
Alpha	1.00	Stream Power (lb/ft s)		5.95	
Frctn Loss (ft)	0.62	Cum Volume (acre-ft)		0.93	
C & E Loss (ft)	0.04	Cum SA (acres)		0.58	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 74 Profile: Existing

W.S. Elev (ft)	1908.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.37	Wt. n-Val.		0.015	
E.G. Elev (ft)	1910.20	Reach Len. (ft)	102.00	102.00	102.00
Crit W.S. (ft)	1909.21	Flow Area (sq ft)		19.90	
E.G. Slope (ft/ft)	0.006249	Area (sq ft)		19.90	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	14.20	Top Width (ft)		14.20	
Vel Total (ft/s)	9.40	Avg. Vel. (ft/s)		9.40	
Max Chl Dpth (ft)	1.88	Hydr. Depth (ft)		1.40	
Conv. Total (cfs)	2365.6	Conv. (cfs)		2365.6	
Length Wtd. (ft)	102.00	Wetted Per. (ft)		15.13	
Min Ch El (ft)	1906.95	Shear (lb/sq ft)		0.51	
Alpha	1.00	Stream Power (lb/ft s)		4.82	
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)		0.88	
C & E Loss (ft)	0.06	Cum SA (acres)		0.54	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 72 Profile: Existing

W.S. Elev (ft)	1908.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.35	Wt. n-Val.		0.015	
E.G. Elev (ft)	1909.58	Reach Len. (ft)	103.00	103.00	103.00
Crit W.S. (ft)	1908.60	Flow Area (sq ft)		20.06	
E.G. Slope (ft/ft)	0.005929	Area (sq ft)		20.06	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	13.87	Top Width (ft)		13.87	
Vel Total (ft/s)	9.32	Avg. Vel. (ft/s)		9.32	
Max Chl Dpth (ft)	2.18	Hydr. Depth (ft)		1.45	
Conv. Total (cfs)	2428.5	Conv. (cfs)		2428.5	
Length Wtd. (ft)	103.00	Wetted Per. (ft)		14.85	
Min Ch El (ft)	1906.05	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		4.66	
Frctn Loss (ft)	0.62	Cum Volume (acre-ft)		0.84	
C & E Loss (ft)	0.01	Cum SA (acres)		0.51	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 70 Profile: Existing

W.S. Elev (ft)	1906.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.84	Wt. n-Val.		0.015	
E.G. Elev (ft)	1908.78	Reach Len. (ft)	98.00	98.00	98.00
Crit W.S. (ft)	1907.52	Flow Area (sq ft)		17.19	
E.G. Slope (ft/ft)	0.009292	Area (sq ft)		17.19	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	13.29	Top Width (ft)		13.29	
Vel Total (ft/s)	10.88	Avg. Vel. (ft/s)		10.88	
Max Chl Dpth (ft)	1.69	Hydr. Depth (ft)		1.29	
Conv. Total (cfs)	1940.0	Conv. (cfs)		1940.0	
Length Wtd. (ft)	98.00	Wetted Per. (ft)		14.15	
Min Ch El (ft)	1905.25	Shear (lb/sq ft)		0.71	
Alpha	1.00	Stream Power (lb/ft s)		7.67	
Frctn Loss (ft)	0.75	Cum Volume (acre-ft)		0.79	
C & E Loss (ft)	0.05	Cum SA (acres)		0.48	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 68 Profile: Existing

W.S. Elev (ft)	1906.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.62	Wt. n-Val.		0.015	
E.G. Elev (ft)	1907.88	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	1906.76	Flow Area (sq ft)		18.32	
E.G. Slope (ft/ft)	0.007897	Area (sq ft)		18.32	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	13.80	Top Width (ft)		13.80	
Vel Total (ft/s)	10.21	Avg. Vel. (ft/s)		10.21	
Max Chl Dpth (ft)	1.76	Hydr. Depth (ft)		1.33	
Conv. Total (cfs)	2104.4	Conv. (cfs)		2104.4	
Length Wtd. (ft)	100.00	Wetted Per. (ft)		14.66	
Min Ch El (ft)	1904.50	Shear (lb/sq ft)		0.62	
Alpha	1.00	Stream Power (lb/ft s)		6.29	
Frctn Loss (ft)	0.84	Cum Volume (acre-ft)		0.75	
C & E Loss (ft)	0.07	Cum SA (acres)		0.45	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 66 Profile: Existing

W.S. Elev (ft)	1905.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.70	Wt. n-Val.		0.015	
E.G. Elev (ft)	1907.08	Reach Len. (ft)	102.00	102.00	102.00
Crit W.S. (ft)	1905.90	Flow Area (sq ft)		17.86	
E.G. Slope (ft/ft)	0.008358	Area (sq ft)		17.86	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	13.49	Top Width (ft)		13.49	
Vel Total (ft/s)	10.47	Avg. Vel. (ft/s)		10.47	
Max Chl Dpth (ft)	1.74	Hydr. Depth (ft)		1.32	
Conv. Total (cfs)	2045.5	Conv. (cfs)		2045.5	
Length Wtd. (ft)	102.00	Wetted Per. (ft)		14.37	
Min Ch El (ft)	1903.63	Shear (lb/sq ft)		0.65	
Alpha	1.00	Stream Power (lb/ft s)		6.79	
Frctn Loss (ft)	0.81	Cum Volume (acre-ft)		0.71	
C & E Loss (ft)	0.01	Cum SA (acres)		0.42	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 64 Profile: Existing

W.S. Elev (ft)	1904.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.94	Wt. n-Val.		0.015	
E.G. Elev (ft)	1906.14	Reach Len. (ft)	92.00	92.00	92.00
Crit W.S. (ft)	1904.81	Flow Area (sq ft)		16.71	
E.G. Slope (ft/ft)	0.009986	Area (sq ft)		16.71	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	13.01	Top Width (ft)		13.01	
Vel Total (ft/s)	11.19	Avg. Vel. (ft/s)		11.19	
Max Chl Dpth (ft)	1.63	Hydr. Depth (ft)		1.28	
Conv. Total (cfs)	1871.3	Conv. (cfs)		1871.3	
Length Wtd. (ft)	92.00	Wetted Per. (ft)		13.91	
Min Ch El (ft)	1902.57	Shear (lb/sq ft)		0.75	
Alpha	1.00	Stream Power (lb/ft s)		8.38	
Frctn Loss (ft)	0.92	Cum Volume (acre-ft)		0.67	
C & E Loss (ft)	0.02	Cum SA (acres)		0.39	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 60 Profile: Existing

W.S. Elev (ft)	1902.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.22	Wt. n-Val.		0.015	
E.G. Elev (ft)	1905.11	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1903.58	Flow Area (sq ft)		15.64	
E.G. Slope (ft/ft)	0.012009	Area (sq ft)		15.64	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	12.63	Top Width (ft)		12.63	
Vel Total (ft/s)	11.95	Avg. Vel. (ft/s)		11.95	
Max Chl Dpth (ft)	1.52	Hydr. Depth (ft)		1.24	
Conv. Total (cfs)	1706.4	Conv. (cfs)		1706.4	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		13.54	
Min Ch El (ft)	1901.37	Shear (lb/sq ft)		0.87	
Alpha	1.00	Stream Power (lb/ft s)		10.36	
Frctn Loss (ft)	1.01	Cum Volume (acre-ft)		0.64	
C & E Loss (ft)	0.03	Cum SA (acres)		0.36	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 58 Profile: Existing

W.S. Elev (ft)	1903.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.		0.015	
E.G. Elev (ft)	1904.00	Reach Len. (ft)	1.00	1.00	1.00
Crit W.S. (ft)	1902.19	Flow Area (sq ft)		65.07	
E.G. Slope (ft/ft)	0.000269	Area (sq ft)		67.62	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	22.55	Top Width (ft)		22.55	
Vel Total (ft/s)	2.87	Avg. Vel. (ft/s)		2.87	
Max Chl Dpth (ft)	3.00	Hydr. Depth (ft)		3.00	
Conv. Total (cfs)	11392.4	Conv. (cfs)		11392.4	
Length Wtd. (ft)	1.00	Wetted Per. (ft)		27.70	
Min Ch El (ft)	1900.87	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.11	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.62	
C & E Loss (ft)	0.01	Cum SA (acres)		0.35	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 54 BR U Profile: Existing

W.S. Elev (ft)	1903.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.015	
E.G. Elev (ft)	1903.99	Reach Len. (ft)	84.00	84.00	84.00
Crit W.S. (ft)	1902.26	Flow Area (sq ft)		59.29	
E.G. Slope (ft/ft)	0.000443	Area (sq ft)		59.29	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	20.00	Top Width (ft)		20.00	
Vel Total (ft/s)	3.15	Avg. Vel. (ft/s)		3.15	
Max Chl Dpth (ft)	2.96	Hydr. Depth (ft)		2.96	
Conv. Total (cfs)	8885.8	Conv. (cfs)		8885.8	
Length Wtd. (ft)	84.00	Wetted Per. (ft)		31.86	
Min Ch El (ft)	1900.87	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.16	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)		0.62	
C & E Loss (ft)	0.02	Cum SA (acres)		0.35	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 54 BR D Profile: Existing

W.S. Elev (ft)	1903.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.		0.015	
E.G. Elev (ft)	1903.93	Reach Len. (ft)	0.00	0.00	0.00
Crit W.S. (ft)	1901.79	Flow Area (sq ft)		67.36	
E.G. Slope (ft/ft)	0.000566	Area (sq ft)		67.36	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	0.11	Top Width (ft)		0.11	
Vel Total (ft/s)	2.78	Avg. Vel. (ft/s)		2.78	
Max Chl Dpth (ft)	3.41	Hydr. Depth (ft)		605.34	
Conv. Total (cfs)	7858.1	Conv. (cfs)		7858.1	
Length Wtd. (ft)	0.00	Wetted Per. (ft)		52.71	
Min Ch El (ft)	1900.40	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.13	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.49	
C & E Loss (ft)	0.01	Cum SA (acres)		0.33	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 52 Profile: Existing

W.S. Elev (ft)	1903.82	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.015	
E.G. Elev (ft)	1903.92	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1901.72	Flow Area (sq ft)		74.22	
E.G. Slope (ft/ft)	0.000181	Area (sq ft)		77.13	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	22.55	Top Width (ft)		22.55	
Vel Total (ft/s)	2.52	Avg. Vel. (ft/s)		2.52	
Max Chl Dpth (ft)	3.42	Hydr. Depth (ft)		3.42	
Conv. Total (cfs)	13904.5	Conv. (cfs)		13904.5	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		28.54	
Min Ch El (ft)	1900.40	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.07	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.49	
C & E Loss (ft)	0.25	Cum SA (acres)		0.33	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 51 Profile: Existing

W.S. Elev (ft)	1902.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.92	Wt. n-Val.		0.015	
E.G. Elev (ft)	1903.66	Reach Len. (ft)	107.00	107.00	107.00
Crit W.S. (ft)	1902.74	Flow Area (sq ft)		24.26	
E.G. Slope (ft/ft)	0.003162	Area (sq ft)		24.26	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	13.30	Top Width (ft)		13.30	
Vel Total (ft/s)	7.71	Avg. Vel. (ft/s)		7.71	
Max Chl Dpth (ft)	2.39	Hydr. Depth (ft)		1.82	
Conv. Total (cfs)	3325.5	Conv. (cfs)		3325.5	
Length Wtd. (ft)	107.00	Wetted Per. (ft)		14.91	
Min Ch El (ft)	1900.35	Shear (lb/sq ft)		0.32	
Alpha	1.00	Stream Power (lb/ft s)		2.48	
Frctn Loss (ft)	0.34	Cum Volume (acre-ft)		0.47	
C & E Loss (ft)	0.02	Cum SA (acres)		0.32	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 50 Profile: Existing

W.S. Elev (ft)	1901.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.52	Wt. n-Val.		0.015	
E.G. Elev (ft)	1903.11	Reach Len. (ft)	106.00	106.00	106.00
Crit W.S. (ft)	1902.04	Flow Area (sq ft)		18.92	
E.G. Slope (ft/ft)	0.006987	Area (sq ft)		18.92	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	13.48	Top Width (ft)		13.48	
Vel Total (ft/s)	9.88	Avg. Vel. (ft/s)		9.88	
Max Chl Dpth (ft)	1.85	Hydr. Depth (ft)		1.40	
Conv. Total (cfs)	2237.2	Conv. (cfs)		2237.2	
Length Wtd. (ft)	106.00	Wetted Per. (ft)		14.51	
Min Ch El (ft)	1899.75	Shear (lb/sq ft)		0.57	
Alpha	1.00	Stream Power (lb/ft s)		5.62	
Frctn Loss (ft)	0.48	Cum Volume (acre-ft)		0.42	
C & E Loss (ft)	0.06	Cum SA (acres)		0.29	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 48 Profile: Existing

W.S. Elev (ft)	1900.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.50	Wt. n-Val.		0.015	
E.G. Elev (ft)	1902.38	Reach Len. (ft)	102.00	102.00	10.00
Crit W.S. (ft)	1901.32	Flow Area (sq ft)		19.04	
E.G. Slope (ft/ft)	0.006907	Area (sq ft)		19.04	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	13.66	Top Width (ft)		13.66	
Vel Total (ft/s)	9.82	Avg. Vel. (ft/s)		9.82	
Max Chl Dpth (ft)	1.84	Hydr. Depth (ft)		1.39	
Conv. Total (cfs)	2250.1	Conv. (cfs)		2250.1	
Length Wtd. (ft)	102.00	Wetted Per. (ft)		14.62	
Min Ch El (ft)	1899.04	Shear (lb/sq ft)		0.56	
Alpha	1.00	Stream Power (lb/ft s)		5.52	
Frctn Loss (ft)	0.73	Cum Volume (acre-ft)		0.37	
C & E Loss (ft)	0.01	Cum SA (acres)		0.26	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 46 Profile: Existing

W.S. Elev (ft)	1899.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.74	Wt. n-Val.		0.015	
E.G. Elev (ft)	1901.59	Reach Len. (ft)	108.00	108.00	18.00
Crit W.S. (ft)	1900.39	Flow Area (sq ft)		17.69	
E.G. Slope (ft/ft)	0.008443	Area (sq ft)		17.69	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	13.21	Top Width (ft)		13.21	
Vel Total (ft/s)	10.57	Avg. Vel. (ft/s)		10.57	
Max Chl Dpth (ft)	1.75	Hydr. Depth (ft)		1.34	
Conv. Total (cfs)	2035.2	Conv. (cfs)		2035.2	
Length Wtd. (ft)	108.00	Wetted Per. (ft)		14.14	
Min Ch El (ft)	1898.10	Shear (lb/sq ft)		0.66	
Alpha	1.00	Stream Power (lb/ft s)		6.97	
Frctn Loss (ft)	0.78	Cum Volume (acre-ft)		0.33	
C & E Loss (ft)	0.02	Cum SA (acres)		0.22	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 44 Profile: Existing

W.S. Elev (ft)	1898.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.69	Wt. n-Val.		0.015	
E.G. Elev (ft)	1900.66	Reach Len. (ft)	98.00	98.00	98.00
Crit W.S. (ft)	1899.50	Flow Area (sq ft)		17.94	
E.G. Slope (ft/ft)	0.008220	Area (sq ft)		17.94	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	13.45	Top Width (ft)		13.45	
Vel Total (ft/s)	10.42	Avg. Vel. (ft/s)		10.42	
Max Chl Dpth (ft)	1.75	Hydr. Depth (ft)		1.33	
Conv. Total (cfs)	2062.6	Conv. (cfs)		2062.6	
Length Wtd. (ft)	98.00	Wetted Per. (ft)		14.35	
Min Ch El (ft)	1897.22	Shear (lb/sq ft)		0.64	
Alpha	1.00	Stream Power (lb/ft s)		6.69	
Frctn Loss (ft)	0.90	Cum Volume (acre-ft)		0.29	
C & E Loss (ft)	0.01	Cum SA (acres)		0.19	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 40 Profile: Existing

W.S. Elev (ft)	1896.75	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.72	Wt. n-Val.		0.015	
E.G. Elev (ft)	1899.47	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1897.59	Flow Area (sq ft)		14.14	
E.G. Slope (ft/ft)	0.014638	Area (sq ft)		14.14	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	11.19	Top Width (ft)		11.19	
Vel Total (ft/s)	13.23	Avg. Vel. (ft/s)		13.23	
Max Chl Dpth (ft)	1.60	Hydr. Depth (ft)		1.26	
Conv. Total (cfs)	1545.6	Conv. (cfs)		1545.6	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		12.19	
Min Ch El (ft)	1895.15	Shear (lb/sq ft)		1.06	
Alpha	1.00	Stream Power (lb/ft s)		14.02	
Frctn Loss (ft)	1.06	Cum Volume (acre-ft)		0.25	
C & E Loss (ft)	0.11	Cum SA (acres)		0.16	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 36 Profile: Existing

W.S. Elev (ft)	1895.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.90	Wt. n-Val.		0.015	
E.G. Elev (ft)	1898.93	Reach Len. (ft)	48.00	48.00	48.00
Crit W.S. (ft)	1896.01	Flow Area (sq ft)		11.80	
E.G. Slope (ft/ft)	0.030349	Area (sq ft)		11.80	
Q Total (cfs)	187.00	Flow (cfs)		187.00	
Top Width (ft)	12.77	Top Width (ft)		12.77	
Vel Total (ft/s)	15.85	Avg. Vel. (ft/s)		15.85	
Max Chl Dpth (ft)	1.06	Hydr. Depth (ft)		0.92	
Conv. Total (cfs)	1073.4	Conv. (cfs)		1073.4	
Length Wtd. (ft)	48.00	Wetted Per. (ft)		13.40	
Min Ch El (ft)	1893.97	Shear (lb/sq ft)		1.67	
Alpha	1.00	Stream Power (lb/ft s)		26.45	
Frctn Loss (ft)	0.41	Cum Volume (acre-ft)		0.24	
C & E Loss (ft)	0.12	Cum SA (acres)		0.16	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 32 Profile: Existing

W.S. Elev (ft)	1892.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.97	Wt. n-Val.		0.015	
E.G. Elev (ft)	1897.25	Reach Len. (ft)	18.00	18.00	18.00
Crit W.S. (ft)	1893.44	Flow Area (sq ft)		13.81	
E.G. Slope (ft/ft)	0.035170	Area (sq ft)		13.81	
Q Total (cfs)	247.00	Flow (cfs)		247.00	
Top Width (ft)	14.01	Top Width (ft)		14.01	
Vel Total (ft/s)	17.88	Avg. Vel. (ft/s)		17.88	
Max Chl Dpth (ft)	1.15	Hydr. Depth (ft)		0.99	
Conv. Total (cfs)	1317.1	Conv. (cfs)		1317.1	
Length Wtd. (ft)	18.00	Wetted Per. (ft)		14.62	
Min Ch El (ft)	1891.13	Shear (lb/sq ft)		2.07	
Alpha	1.00	Stream Power (lb/ft s)		37.09	
Frctn Loss (ft)	1.58	Cum Volume (acre-ft)		0.23	
C & E Loss (ft)	0.11	Cum SA (acres)		0.14	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 28 Profile: Existing

W.S. Elev (ft)	1891.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.74	Wt. n-Val.		0.015	
E.G. Elev (ft)	1896.35	Reach Len. (ft)	1.00	1.00	1.00
Crit W.S. (ft)	1892.57	Flow Area (sq ft)		14.13	
E.G. Slope (ft/ft)	0.054191	Area (sq ft)		14.84	
Q Total (cfs)	247.00	Flow (cfs)		247.00	
Top Width (ft)	21.00	Top Width (ft)		21.00	
Vel Total (ft/s)	17.48	Avg. Vel. (ft/s)		17.48	
Max Chl Dpth (ft)	0.71	Hydr. Depth (ft)		0.71	
Conv. Total (cfs)	1061.0	Conv. (cfs)		1061.0	
Length Wtd. (ft)	1.00	Wetted Per. (ft)		21.41	
Min Ch El (ft)	1890.90	Shear (lb/sq ft)		2.23	
Alpha	1.00	Stream Power (lb/ft s)		39.02	
Frctn Loss (ft)	0.78	Cum Volume (acre-ft)		0.22	
C & E Loss (ft)	0.05	Cum SA (acres)		0.14	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 24 BR U Profile: Existing

W.S. Elev (ft)	1891.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.63	Wt. n-Val.		0.015	
E.G. Elev (ft)	1896.24	Reach Len. (ft)	36.00	36.00	36.00
Crit W.S. (ft)	1892.57	Flow Area (sq ft)		14.31	
E.G. Slope (ft/ft)	0.052032	Area (sq ft)		14.31	
Q Total (cfs)	247.00	Flow (cfs)		247.00	
Top Width (ft)	20.00	Top Width (ft)		20.00	
Vel Total (ft/s)	17.26	Avg. Vel. (ft/s)		17.26	
Max Chl Dpth (ft)	0.72	Hydr. Depth (ft)		0.72	
Conv. Total (cfs)	1082.8	Conv. (cfs)		1082.8	
Length Wtd. (ft)	36.00	Wetted Per. (ft)		21.43	
Min Ch El (ft)	1890.90	Shear (lb/sq ft)		2.17	
Alpha	1.00	Stream Power (lb/ft s)		37.44	
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)		0.22	
C & E Loss (ft)	0.06	Cum SA (acres)		0.14	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 24 BR D Profile: Existing

W.S. Elev (ft)	1893.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.015	
E.G. Elev (ft)	1894.14	Reach Len. (ft)	0.00	0.00	0.00
Crit W.S. (ft)	1892.28	Flow Area (sq ft)		66.51	
E.G. Slope (ft/ft)	0.000565	Area (sq ft)		66.51	
Q Total (cfs)	247.00	Flow (cfs)		247.00	
Top Width (ft)	19.38	Top Width (ft)		19.38	
Vel Total (ft/s)	3.71	Avg. Vel. (ft/s)		3.71	
Max Chl Dpth (ft)	3.33	Hydr. Depth (ft)		3.43	
Conv. Total (cfs)	10391.5	Conv. (cfs)		10391.5	
Length Wtd. (ft)	0.00	Wetted Per. (ft)		33.58	
Min Ch El (ft)	1890.60	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)		0.26	
Frctn Loss (ft)	1.10	Cum Volume (acre-ft)		0.19	
C & E Loss (ft)	1.04	Cum SA (acres)		0.12	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 22 Profile: Existing

W.S. Elev (ft)	1893.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.015	
E.G. Elev (ft)	1894.14	Reach Len. (ft)	19.00	19.00	19.00
Crit W.S. (ft)	1892.27	Flow Area (sq ft)		66.61	
E.G. Slope (ft/ft)	0.000413	Area (sq ft)		69.94	
Q Total (cfs)	247.00	Flow (cfs)		247.00	
Top Width (ft)	21.00	Top Width (ft)		21.00	
Vel Total (ft/s)	3.71	Avg. Vel. (ft/s)		3.71	
Max Chl Dpth (ft)	3.33	Hydr. Depth (ft)		3.33	
Conv. Total (cfs)	12149.7	Conv. (cfs)		12149.7	
Length Wtd. (ft)	19.00	Wetted Per. (ft)		26.66	
Min Ch El (ft)	1890.60	Shear (lb/sq ft)		0.06	
Alpha	1.00	Stream Power (lb/ft s)		0.24	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.19	
C & E Loss (ft)	0.00	Cum SA (acres)		0.12	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 20 Profile: Existing

W.S. Elev (ft)	1892.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.01	Wt. n-Val.		0.015	
E.G. Elev (ft)	1893.89	Reach Len. (ft)	99.00	99.00	99.00
Crit W.S. (ft)	1892.90	Flow Area (sq ft)		30.66	
E.G. Slope (ft/ft)	0.003099	Area (sq ft)		30.66	
Q Total (cfs)	247.00	Flow (cfs)		247.00	
Top Width (ft)	15.67	Top Width (ft)		15.67	
Vel Total (ft/s)	8.06	Avg. Vel. (ft/s)		8.06	
Max Chl Dpth (ft)	2.44	Hydr. Depth (ft)		1.96	
Conv. Total (cfs)	4437.1	Conv. (cfs)		4437.1	
Length Wtd. (ft)	99.00	Wetted Per. (ft)		17.36	
Min Ch El (ft)	1890.45	Shear (lb/sq ft)		0.34	
Alpha	1.00	Stream Power (lb/ft s)		2.75	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		0.17	
C & E Loss (ft)	0.24	Cum SA (acres)		0.11	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 18 Profile: Existing

W.S. Elev (ft)	1891.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.73	Wt. n-Val.		0.015	
E.G. Elev (ft)	1893.36	Reach Len. (ft)	62.00	62.00	62.00
Crit W.S. (ft)	1892.14	Flow Area (sq ft)		23.43	
E.G. Slope (ft/ft)	0.006726	Area (sq ft)		23.43	
Q Total (cfs)	247.00	Flow (cfs)		247.00	
Top Width (ft)	14.57	Top Width (ft)		14.57	
Vel Total (ft/s)	10.54	Avg. Vel. (ft/s)		10.54	
Max Chl Dpth (ft)	1.99	Hydr. Depth (ft)		1.61	
Conv. Total (cfs)	3011.6	Conv. (cfs)		3011.6	
Length Wtd. (ft)	62.00	Wetted Per. (ft)		15.85	
Min Ch El (ft)	1889.65	Shear (lb/sq ft)		0.62	
Alpha	1.00	Stream Power (lb/ft s)		6.55	
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)		0.11	
C & E Loss (ft)	0.07	Cum SA (acres)		0.08	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 14 Profile: Existing

W.S. Elev (ft)	1890.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.16	Wt. n-Val.		0.015	
E.G. Elev (ft)	1892.81	Reach Len. (ft)	19.00	19.00	19.00
Crit W.S. (ft)	1891.32	Flow Area (sq ft)		20.94	
E.G. Slope (ft/ft)	0.010104	Area (sq ft)		20.94	
Q Total (cfs)	247.00	Flow (cfs)		247.00	
Top Width (ft)	15.14	Top Width (ft)		15.14	
Vel Total (ft/s)	11.80	Avg. Vel. (ft/s)		11.80	
Max Chl Dpth (ft)	1.60	Hydr. Depth (ft)		1.38	
Conv. Total (cfs)	2457.2	Conv. (cfs)		2457.2	
Length Wtd. (ft)	19.00	Wetted Per. (ft)		16.24	
Min Ch El (ft)	1889.05	Shear (lb/sq ft)		0.81	
Alpha	1.00	Stream Power (lb/ft s)		9.60	
Frctn Loss (ft)	0.51	Cum Volume (acre-ft)		0.07	
C & E Loss (ft)	0.04	Cum SA (acres)		0.06	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 10 Profile: Existing

W.S. Elev (ft)	1889.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.65	Wt. n-Val.		0.015	
E.G. Elev (ft)	1892.45	Reach Len. (ft)	1.02	0.00	0.00
Crit W.S. (ft)	1890.53	Flow Area (sq ft)		18.92	
E.G. Slope (ft/ft)	0.021112	Area (sq ft)		19.86	
Q Total (cfs)	247.00	Flow (cfs)		247.00	
Top Width (ft)	21.00	Top Width (ft)		21.00	
Vel Total (ft/s)	13.06	Avg. Vel. (ft/s)		13.06	
Max Chl Dpth (ft)	0.95	Hydr. Depth (ft)		0.95	
Conv. Total (cfs)	1699.9	Conv. (cfs)		1699.9	
Length Wtd. (ft)	26.35	Wetted Per. (ft)		21.89	
Min Ch El (ft)	1888.86	Shear (lb/sq ft)		1.14	
Alpha	1.00	Stream Power (lb/ft s)		14.87	
Frctn Loss (ft)	0.27	Cum Volume (acre-ft)		0.07	
C & E Loss (ft)	0.05	Cum SA (acres)		0.05	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 8 BR U Profile: Existing

W.S. Elev (ft)	1890.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.84	Wt. n-Val.		0.015	
E.G. Elev (ft)	1891.38	Reach Len. (ft)	0.00	0.00	0.00
Crit W.S. (ft)	1890.54	Flow Area (sq ft)		33.51	
E.G. Slope (ft/ft)	0.003422	Area (sq ft)		33.51	
Q Total (cfs)	247.00	Flow (cfs)		247.00	
Top Width (ft)	20.00	Top Width (ft)		20.00	
Vel Total (ft/s)	7.37	Avg. Vel. (ft/s)		7.37	
Max Chl Dpth (ft)	1.68	Hydr. Depth (ft)		1.68	
Conv. Total (cfs)	4222.5	Conv. (cfs)		4222.5	
Length Wtd. (ft)	0.00	Wetted Per. (ft)		23.35	
Min Ch El (ft)	1888.86	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		2.26	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.07	
C & E Loss (ft)	0.00	Cum SA (acres)		0.05	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 8 BR D Profile: Existing

W.S. Elev (ft)	1887.43	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.84	Wt. n-Val.		0.015	
E.G. Elev (ft)	1888.27	Reach Len. (ft)	0.00	0.00	0.00
Crit W.S. (ft)	1887.43	Flow Area (sq ft)		33.51	
E.G. Slope (ft/ft)	0.003422	Area (sq ft)		33.51	
Q Total (cfs)	247.00	Flow (cfs)		247.00	
Top Width (ft)	20.00	Top Width (ft)		20.00	
Vel Total (ft/s)	7.37	Avg. Vel. (ft/s)		7.37	
Max Chl Dpth (ft)	1.68	Hydr. Depth (ft)		1.68	
Conv. Total (cfs)	4222.5	Conv. (cfs)		4222.5	
Length Wtd. (ft)	0.00	Wetted Per. (ft)		23.35	
Min Ch El (ft)	1885.75	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		2.26	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.07	
C & E Loss (ft)	0.00	Cum SA (acres)		0.05	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 6 Profile: Existing

W.S. Elev (ft)	1887.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.83	Wt. n-Val.		0.015	
E.G. Elev (ft)	1888.27	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	1887.43	Flow Area (sq ft)		33.76	
E.G. Slope (ft/ft)	0.003340	Area (sq ft)		35.45	
Q Total (cfs)	247.00	Flow (cfs)		247.00	
Top Width (ft)	21.00	Top Width (ft)		21.00	
Vel Total (ft/s)	7.32	Avg. Vel. (ft/s)		7.32	
Max Chl Dpth (ft)	1.69	Hydr. Depth (ft)		1.69	
Conv. Total (cfs)	4273.9	Conv. (cfs)		4273.9	
Length Wtd. (ft)	100.00	Wetted Per. (ft)		23.38	
Min Ch El (ft)	1885.75	Shear (lb/sq ft)		0.30	
Alpha	1.00	Stream Power (lb/ft s)		2.20	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.07	
C & E Loss (ft)	0.00	Cum SA (acres)		0.05	

Plan: Vandenburg River: Vandenberg Reach:Channel Riv Sta: 0 Profile: Existing

W.S. Elev (ft)	1884.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.23	Wt. n-Val.		0.015	
E.G. Elev (ft)	1887.18	Reach Len. (ft)			
Crit W.S. (ft)	1885.59	Flow Area (sq ft)		20.59	
E.G. Slope (ft/ft)	0.016074	Area (sq ft)		21.62	
Q Total (cfs)	247.00	Flow (cfs)		247.00	
Top Width (ft)	21.00	Top Width (ft)		21.00	
Vel Total (ft/s)	12.00	Avg. Vel. (ft/s)		12.00	
Max Chl Dpth (ft)	1.03	Hydr. Depth (ft)		1.03	
Conv. Total (cfs)	1948.2	Conv. (cfs)		1948.2	
Length Wtd. (ft)		Wetted Per. (ft)		22.06	
Min Ch El (ft)	1883.92	Shear (lb/sq ft)		0.94	
Alpha	1.00	Stream Power (lb/ft s)		11.24	
Frctn Loss (ft)	0.63	Cum Volume (acre-ft)			
C & E Loss (ft)	0.43	Cum SA (acres)			

HEC-RAS Plan: Vandenburg River: Vandenberg Reach: Channel

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Channel	110	187.00	1912.39	1915.09		1915.52	0.001294	5.29	35.35	18.21	0.67
Channel	108	187.00	1912.29	1915.11		1915.47	0.001040	4.83	38.68	19.47	0.60
Channel	106	187.00	1912.26	1915 27	1913.58	1915.39	0.000267	2.87	65.24	22.55	0.29
Channel	104	Bridge									
Channel	102	187.00	1912.02	1915.21	1913.40	1915.32	0 000239	2.76	67.66	22.55	0.28
Channel	98	187.00	1912.00	1914.47		1915.15	0.002168	6.61	28.31	14.94	0.85
Channel	96	187.00	1911 80	1914.14		1914.91	0.002578	7.00	26.70	14.78	0.92
Channel	94	187.00	1911.40	1913.74	1913.74	1914 63	0.003134	7 55	24 75	14.16	1.01
Channel	92	187.00	1911.10	1913 39	1913.43	1914.31	0.003329	7.70	24.30	14 22	1.04
Channel	90	187.00	1910.82	1913.10	1913.12	1913.98	0.003198	7.51	24.90	14.81	1.02
Channel	88	187.00	1910.11	1912.06	1912.45	1913.48	0.006101	9.57	19.53	13.03	1.38
Channel	86	187 00	1909.90	1912.03	1912.12	1912 99	0 003600	7.86	23.78	14.31	1.07
Channel	85	187.00	1909.69	1912.23	1911.01	1912.41	0.000448	3.39	55.13	22.55	0.38
Channel	84	Bridge									
Channel	83	187.00	1909.00	1912.11	1910.32	1912.23	0.000242	2.77	67.42	22.55	0.28
Channel	80	187.00	1908 91	1911.12	1911.12	1911.99	0.003128	7.48	25.02	14 62	1.01
Channel	78	187.00	1908.39	1910.44	1910.68	1911.58	0.004731	8.60	21.75	14.26	1.23
Channel	76	187.00	1907.67	1909.38	1909.85	1910.94	0.007521	10.04	18.63	13 83	1.52
Channel	74	187.00	1906.95	1908.83	1909 21	1910.20	0.006249	9.40	19.90	14.20	1.40
Channel	72	187.00	1906.05	1908.23	1908.60	1909.58	0.005929	9.32	20.06	13.87	1.37
Channel	70	187.00	1905 25	1906.94	1907.52	1908.78	0.009292	10.88	17.19	13.29	1.68
Channel	68	187.00	1904.50	1906.26	1906.76	1907.88	0.007897	10.21	18.32	13.80	1.56
Channel	66	187.00	1903.63	1905 37	1905.90	1907.08	0.008358	10.47	17.86	13 49	1.60
Channel	64	187 00	1902.57	1904.20	1904.81	1906 14	0.009986	11.19	16.71	13.01	1.74
Channel	60	187.00	1901.37	1902.89	1903.58	1905.11	0.012009	11.95	15.64	12.63	1.89
Channel	58	187.00	1900.87	1903.87	1902.19	1904.00	0.000269	2 87	65.07	22.55	0.29
Channel	54	Bridge									
Channel	52	187.00	1900.40	1903 82	1901.72	1903.92	0.000181	2.52	74 22	22.55	0.24
Channel	51	187.00	1900.35	1902.74	1902.74	1903.66	0.003162	7.71	24.26	13.30	1.01
Channel	50	187.00	1899 75	1901.60	1902.04	1903.11	0.006987	9.88	18.92	13.48	1.47
Channel	48	187.00	1899.04	1900.88	1901.32	1902.38	0.006907	9.82	19.04	13.66	1.47
Channel	46	187.00	1898.10	1899.85	1900.39	1901.59	0.008443	10.57	17.69	13.21	1.61
Channel	44	187.00	1897.22	1898.97	1899.50	1900.66	0.008220	10.42	17.94	13.45	1.59
Channel	40	187.00	1895.15	1896.75	1897.59	1899.47	0.014638	13.23	14.14	11.19	2.07
Channel	36	187.00	1893.97	1895.03	1896.01	1898.93	0.030349	15.85	11.80	12.77	2.91
Channel	32	247.00	1891.13	1892.28	1893.44	1897.25	0.035170	17.88	13.81	14.01	3.17
Channel	28	247.00	1890.90	1891.61	1892.57	1896.35	0.054191	17.48	14.13	21.00	3.66
Channel	24	Bridge									
Channel	22	247.00	1890.60	1893.93	1892 27	1894.14	0.000413	3.71	66.61	21.00	0.36
Channel	20	247.00	1890.45	1892.89	1892.90	1893.89	0.003099	8.06	30.66	15.67	1.01
Channel	18	247.00	1889.65	1891.64	1892.14	1893.36	0.006726	10.54	23.43	14.57	1.47
Channel	14	247.00	1889.05	1890 65	1891.32	1892.81	0.010104	11.80	20.94	15.14	1.77
Channel	10	247 00	1888.86	1889.81	1890.53	1892.45	0.021112	13.06	18.92	21.00	2.37
Channel	8	Bridge									
Channel	6	247.00	1885.75	1887.44	1887.43	1888.27	0.003340	7.32	33.76	21.00	0.99
Channel	0	247.00	1883.92	1884.95	1885 59	1887.18	0 016074	12.00	20.59	21.00	2.08

Freeboard Calculation

River Station	Channel Elevation	WSEL (ft)	Critical WSEL	Velocity (fps)	Flow Type	Freeboard (ft)	Freeboard Elevation	Top of Channel Elevation	Freeboard Provided	Freeboard Sufficient?
110	1912.39	1915.09		5.29	Subcritical	1.00	1916.09	1916.56	1.47	YES
108	1912.29	1915.11		4.83	Subcritical	1.00	1916.11	1916.18	1.07	YES
106	1912.26	1915.27	1913.58	2.87	Subcritical	1.00	1916.27	1916.78	1.51	YES
104										
102	1912.02	1915.21	1913.40	2.76	Subcritical	1.00	1916.21	1916.58	1.37	YES
98	1912.00	1914.47		6.61	Subcritical	1.18	1915.65	1916.16	1.69	YES
96	1911.80	1914.14		7.00	Subcritical	1.26	1915.40	1915.94	1.80	YES
94	1911.40	1913.74	1913.74	7.55	Critical	1.39	1915.13	1915.57	1.83	YES
92	1911.10	1913.39	1913.43	7.70	Supercritical	1.25	1914.64	1915.15	1.76	YES
90	1910.82	1913.10	1913.12	7.51	Supercritical	1.25	1914.35	1914.55	1.45	YES
88	1910.11	1912.06	1912.45	9.57	Supercritical	1.30	1913.36	1914.29	2.23	YES
86	1909.90	1912.03	1912.12	7.86	Supercritical	1.25	1913.28	1913.75	1.72	YES
85	1909.69	1912.23	1911.01	3.39	Subcritical	1.00	1913.23	1913.53	1.30	YES
84										
83	1909.00	1912.11	1910.32	2.77	Subcritical	1.00	1913.11	1913.11	1.00	YES
80	1908.91	1911.12	1911.12	7.48	Critical	1.37	1912.49	1912.81	1.69	YES
78	1908.39	1910.44	1910.68	8.60	Supercritical	1.27	1911.71	1912.03	1.59	YES
76	1907.67	1909.38	1909.85	10.04	Supercritical	1.30	1910.68	1911.05	1.67	YES
74	1906.95	1908.83	1909.21	9.40	Supercritical	1.29	1910.12	1910.26	1.43	YES
72	1906.05	1908.23	1908.60	9.32	Supercritical	1.30	1909.53	1909.53	1.30	YES
70	1905.25	1906.94	1907.52	10.88	Supercritical	1.32	1908.26	1908.60	1.66	YES
68	1904.50	1906.26	1906.76	10.21	Supercritical	1.31	1907.57	1907.80	1.54	YES
66	1903.63	1905.37	1905.90	10.47	Supercritical	1.31	1906.68	1907.06	1.69	YES
64	1902.57	1904.20	1904.81	11.19	Supercritical	1.33	1905.53	1906.08	1.88	YES
60	1901.37	1902.89	1903.58	11.95	Supercritical	1.34	1904.23	1905.29	2.40	YES
58	1900.87	1903.87	1902.19	2.87	Subcritical	1.00	1904.87	1905.29	1.42	YES
54										
52	1900.40	1903.82	1901.72	2.52	Subcritical	1.00	1904.82	1904.82	1.00	YES
51	1900.35	1902.74	1902.74	7.71	Critical	1.42	1904.16	1905.27	2.53	YES
50	1899.75	1901.60	1902.04	9.88	Supercritical	1.30	1902.90	1903.39	1.79	YES
48	1899.04	1900.88	1901.32	9.82	Supercritical	1.30	1902.18	1902.61	1.73	YES
46	1898.10	1899.85	1900.39	10.57	Supercritical	1.32	1901.17	1901.68	1.83	YES
44	1897.22	1898.97	1899.50	10.42	Supercritical	1.31	1900.28	1900.67	1.70	YES
40	1895.15	1896.75	1897.59	13.23	Supercritical	1.39	1898.14	1899.63	2.88	YES
36	1893.97	1895.03	1896.01	15.85	Supercritical	1.40	1896.43	1899.24	4.21	YES
32	1891.13	1892.28	1893.44	17.88	Supercritical	1.47	1893.75	1894.00	1.72	YES
28	1890.90	1891.61	1892.57	17.48	Supercritical	1.39	1893.00	1897.91	6.30	YES
24										
22	1890.60	1893.93	1892.27	3.71	Subcritical	1.00	1894.93	1897.56	3.63	YES
20	1890.45	1892.89	1892.90	8.06	Supercritical	1.27	1894.16	1897.56	4.67	YES
18	1889.65	1891.64	1892.14	10.54	Supercritical	1.33	1892.97	1895.84	4.20	YES
14	1889.05	1890.65	1891.32	11.80	Supercritical	1.35	1892.00	1894.80	4.15	YES
10	1888.86	1889.81	1890.53	13.06	Supercritical	1.32	1891.13	1894.03	4.22	YES
8										
6	1885.75	1887.44	1887.43	7.32	Subcritical	1.33	1888.77	1891.16	3.72	YES
0	1883.92	1884.95	1885.59	12.00	Supercritical	1.30	1886.25	1891.16	6.21	YES

Downstream of Craig Road Revised Hydraulic Information

RANGE WASH - CRAIG TO LAMB SECTION S
Worksheet for Irregular Channel

Project Description	
Project File	c:\public works\607 - vandenburg clomr\rngwash.fm2
Worksheet	RANGE WASH - CRAIG TO LAMB SECTION S
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data				
Channel Slope	0.005000 ft/ft			
Elevation range: 78.00 ft to 90.00 ft.				
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	90.00	0.00	190.00	0.025
40.00	80.00			
90.00	78.00			
100.00	78.00			
110.00	80.00			
140.00	86.00			
190.00	88.00			
Discharge	1,091.00 cfs			

Results		
Wtd. Mannings Coefficient	0.025	
Water Surface Elevation	81.10	ft
Flow Area	162.42	ft²
Wetted Perimeter	80.38	ft
Top Width	79.90	ft
Height	3.10	ft
Critical Depth	80.84	ft
Critical Slope	0.007498	ft/ft
Velocity	6.72	ft/s
Velocity Head	0.70	ft
Specific Energy	81.80	ft
Froude Number	0.83	
Flow is subcritical.		

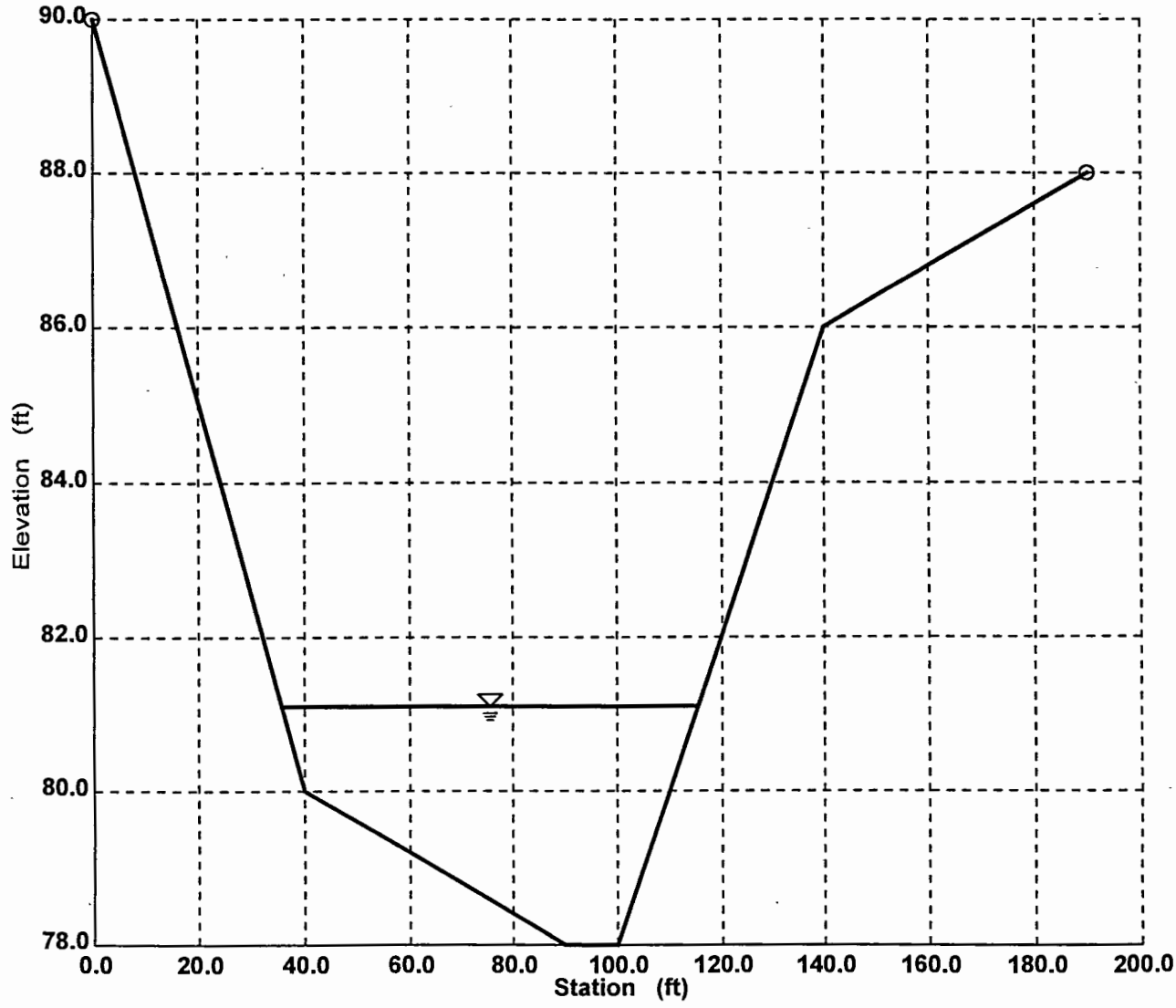
Notes:

FLOW FROM HEC-1 NODE G3

RANGE WASH - CRAIG TO LAMB SECTION S
Cross Section for Irregular Channel

Project Description	
Project File	c:\public works\607 - vandenburg clomr\rngwash.fm2
Worksheet	RANGE WASH - CRAIG TO LAMB SECTION S
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.025	
Channel Slope	0.005000	ft/ft
Water Surface Elevation	81.10	ft
Discharge	1,091.00	cfs



RANGE WASH - CRAIG TO LAMB SECTION T
Worksheet for Irregular Channel

Project Description	
Project File	c:\public works\607 - vandenburg clomr\rngwash.fm2
Worksheet	RANGE WASH - CRAIG TO LAMB SECTION T
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data				
Channel Slope	0.006700 ft/ft			
Elevation range: 74.00 ft to 82.00 ft.				
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	82.00	0.00	300.00	0.025
150.00	80.00			
180.00	76.00			
200.00	74.00			
210.00	74.00			
220.00	76.00			
230.00	78.00			
231.00	80.00			
300.00	81.00			
Discharge	1,091.00 cfs			

Results		
Wtd. Mannings Coefficient	0.025	
Water Surface Elevation	77.66	ft
Flow Area	133.47	ft²
Wetted Perimeter	61.29	ft
Top Width	60.72	ft
Height	3.66	ft
Critical Depth	77.61	ft
Critical Slope	0.007121	ft/ft
Velocity	8.17	ft/s
Velocity Head	1.04	ft
Specific Energy	78.70	ft
Froude Number	0.97	
Flow is subcritical.		

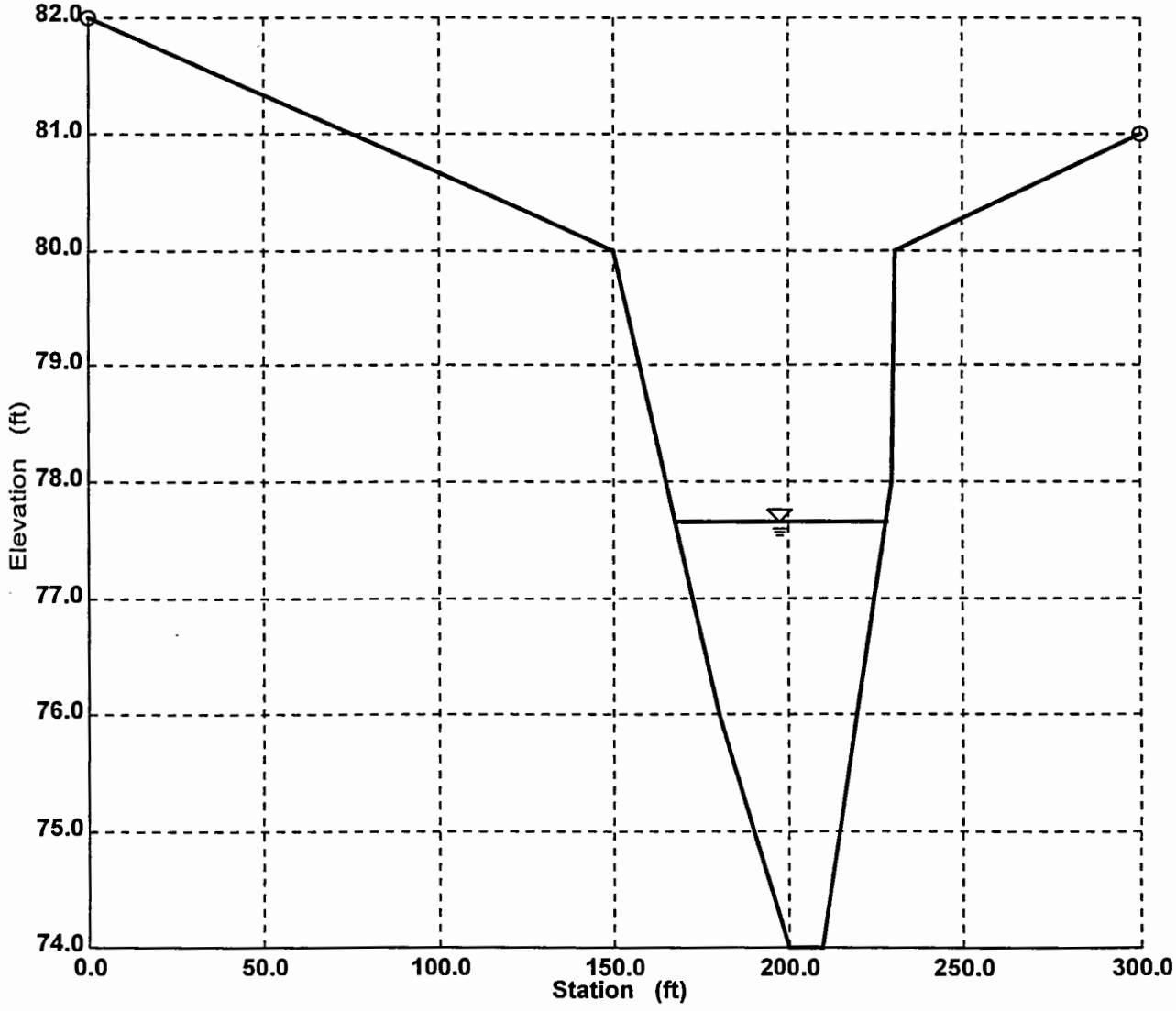
Notes:

FLOW FROM HEC-1 NODE G3

RANGE WASH - CRAIG TO LAMB SECTION T
Cross Section for Irregular Channel

Project Description	
Project File	c:\public works\607 - vandenburg clomr\rngwash.fm2
Worksheet	RANGE WASH - CRAIG TO LAMB SECTION T
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.025	
Channel Slope	0.006700	ft/ft
Water Surface Elevation	77.66	ft
Discharge	1,091.00	cfs



3 - 9 x 6 CULVERTS AT LAMB

CURRENT DATE: 01-15-1996
CURRENT TIME: 13:22:07

FILE DATE: 01-12-1996
FILE NAME: LAMB

FHWA CULVERT ANALYSIS
HY-8, VERSION 3.2

CULV	SITE DATA: INLET ELEV. (FT)	SITE DATA: OUTLET ELEV. (FT)	SITE DATA: CULVERT LENGTH (FT)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (FT)	RISE (FT)	MANNING n	INLET TYPE
1	70.00	69.00	100.01	3 RCB	9.00	6.00	.015	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (CFS) FILE: LAMB DATE: 01-12-1996

ELEV (FT)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
70.00	0	0	0	0	0	0	0	0	1
72.53	155	155	0	0	0	0	0	0	1
72.90	310	310	0	0	0	0	0	0	1
73.55	465	465	0	0	0	0	0	0	1
74.28	620	620	0	0	0	0	0	0	1
74.96	775	775	0	0	0	0	0	0	1
75.60	930	930	0	0	0	0	0	0	1
76.25	1085	1085	0	0	0	0	0	0	1
76.90	1240	1240	0	0	0	0	0	0	1
77.59	1395	1395	0	0	0	0	0	0	1
78.18	1550	1520	0	0	0	0	0	30	4
78.00	1482	1482	0	0	0	0	0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: LAMB DATE: 01-12-1996

HEAD ELEV(FT)	HEAD ERROR(FT)	TOTAL FLOW(CFS)	FLOW ERROR(CFS)	% FLOW ERROR
70.00	0.00	0	0	0.00
72.53	0.00	155	0	0.00
72.90	0.00	310	0	0.00
73.55	0.00	465	0	0.00
74.28	0.00	620	0	0.00
74.96	0.00	775	0	0.00
75.60	0.00	930	0	0.00
76.25	0.00	1085	0	0.00
76.90	0.00	1240	0	0.00
77.59	0.00	1395	0	0.00
78.18	-0.00	1550	0	0.01

<1> TOLERANCE (FT) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 01-15-1996 FILE DATE: 01-12-1996
CURRENT TIME: 13:22:07 FILE NAME: LAMB

CULVERT # 1

PERFORMANCE CURVE FOR 3 BARREL(S)

Q (cfs)	HWE (ft)	TWE (ft)	ICH (ft)	OCH (ft)	FLOW TYPE	CCE (ft)	FCE (ft)	TCE (ft)	VO (fps)
0	70.00	69.00	0.00	-1.00	0-NF	0.00	70.00	0.00	0.00
155	72.53	69.90	1.72	2.53	6-FF	0.00	0.00	0.00	5.68
310	72.90	70.34	2.73	2.90	6-FF	0.00	0.00	0.00	7.16
465	73.55	70.69	3.55	3.28	6-FF	0.00	0.00	0.00	10.59
620	74.28	70.99	4.28	3.68	6-FF	0.00	0.00	0.00	11.48
775	74.96	71.25	4.96	4.12	6-FF	0.00	0.00	0.00	12.26
930	75.60	71.49	5.60	4.59	6-FF	0.00	0.00	0.00	12.89
1085	76.25	71.71	6.25	5.10	6-FF	0.00	0.00	0.00	13.45
1240	76.90	71.92	6.90	5.66	6-FF	0.00	0.00	0.00	13.93
1395	77.59	72.11	7.59	6.26	6-FF	0.00	0.00	0.00	14.38
1520	78.18	72.29	8.18	6.77	6-FF	0.00	0.00	0.00	14.72

El. inlet face invert 70.00 ft El. outlet invert 69.00 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION (FT)	0.00
INLET ELEVATION (FT)	70.00
OUTLET STATION (FT)	100.00
OUTLET ELEVATION (FT)	69.00
NUMBER OF BARRELS	3.00
SLOPE (V-FT/H-FT)	0.0100
CULVERT LENGTH ALONG SLOPE (FT)	100.01

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	9.00 FT
BARREL RISE	6.00 FT
BARREL MATERIAL	CONCRETE
BARREL MANNING'S N	0.015
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (90-45 DEG.)
INLET DEPRESSION	NONE

CURRENT DATE: 01-15-1996 FILE DATE: 01-12-1996
CURRENT TIME: 13:22:07 FILE NAME: LAMB

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH (FT)	30.00
SIDE SLOPE H/V (X:1)	4.0
CHANNEL SLOPE V/H (FT/FT)	0.010
MANNING'S N (.01-0.1)	0.025
CHANNEL INVERT ELEVATION (FT)	69.00
CULVERT NO.1 OUTLET INVERT ELEVATION	69.00 FT

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (CFS)	W.S.E. (FT)	FROUDE NUMBER	VEL. (FPS)	SHEAR (PSF)
0.00	69.00	0.000	0.00	0.00
155.00	69.90	0.957	5.14	0.56
310.00	70.34	0.995	6.54	0.84
465.00	70.69	1.015	7.49	1.05
620.00	70.99	1.028	8.22	1.24
775.00	71.25	1.036	8.82	1.40
930.00	71.49	1.043	9.34	1.55
1085.00	71.71	1.048	9.80	1.69
1240.00	71.92	1.053	10.20	1.82
1395.00	72.11	1.057	10.57	1.94
1550.00	72.29	1.060	10.91	2.05

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	GRAVEL
EMBANKMENT TOP WIDTH (FT)	500.00
CREST LENGTH (FT)	150.00
OVERTOPPING CREST ELEVATION (FT)	78.00

RANGE WASH - LAMB TO ALEXANDER SECTION U
Worksheet for Trapezoidal Channel

Project Description	
Project File	c:\public works\607 - vandenburg clomr\rngwash.fm2
Worksheet	RANGE WASH - LAMB TO ALEXANDER SECTION U
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.015	
Channel Slope	0.007800	ft/ft
Left Side Slope	2.000000	H : V
Right Side Slope	2.000000	H : V
Bottom Width	32.00	ft
Discharge	1,091.00	cfs

Results		
Depth	2.21	ft
Flow Area	80.61	ft²
Wetted Perimeter	41.90	ft
Top Width	40.85	ft
Critical Depth	3.09	ft
Critical Slope	0.002471	ft/ft
Velocity	13.53	ft/s
Velocity Head	2.85	ft
Specific Energy	5.06	ft
Froude Number	1.70	
Flow is supercritical.		

Notes:

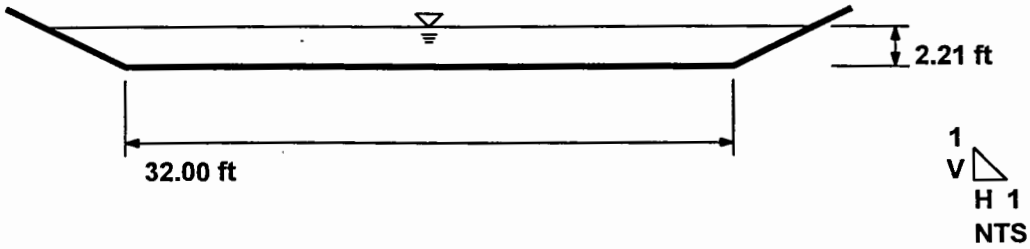
FLOW FROM HEC-1 NODE G3

IMPROVED CONCRETE LINED CHANNEL

RANGE WASH - LAMB TO ALEXANDER SECTION U
Cross Section for Trapezoidal Channel

Project Description	
Project File	c:\public works\607 - vandenburg clomr\rngwash.fm2
Worksheet	RANGE WASH - LAMB TO ALEXANDER SECTION U
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.015	
Channel Slope	0.007800	ft/ft
Depth	2.21	ft
Left Side Slope	2.000000	H : V
Right Side Slope	2.000000	H : V
Bottom Width	32.00	ft
Discharge	1,091.00	cfs



4 - 12 x 7 CULVERTS AT ALEXANDER ROAD

CURRENT DATE: 01-15-1996
CURRENT TIME: 14:24:06

FILE DATE: 01-15-1996
FILE NAME: ALEX

FHWA CULVERT ANALYSIS
HY-8, VERSION 3.2

CULV	SITE DATA: INLET ELEV. (FT)	SITE DATA: OUTLET ELEV. (FT)	SITE DATA: CULVERT LENGTH (FT)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (FT)	RISE (FT)	MANNING n	INLET TYPE
1	60.00	58.80	50.01	4 RCB	12.00	7.00	.013	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (CFS) FILE: ALEX DATE: 01-15-1996

ELEV (FT)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
60.00	0	0	0	0	0	0	0	0	1
62.65	155	155	0	0	0	0	0	0	1
62.86	310	310	0	0	0	0	0	0	1
63.05	465	465	0	0	0	0	0	0	1
63.23	620	620	0	0	0	0	0	0	1
63.41	775	775	0	0	0	0	0	0	1
63.59	930	930	0	0	0	0	0	0	1
63.89	1085	1085	0	0	0	0	0	0	1
64.23	1240	1240	0	0	0	0	0	0	1
64.57	1395	1395	0	0	0	0	0	0	1
64.89	1550	1550	0	0	0	0	0	0	1
67.00	2599	2599	0	0	0	0	0	0	OVERTOPPING

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: ALEX DATE: 01-15-1996

HEAD ELEV(FT)	HEAD ERROR(FT)	TOTAL FLOW(CFS)	FLOW ERROR(CFS)	% FLOW ERROR
60.00	0.00	0	0	0.00
62.65	0.00	155	0	0.00
62.86	0.00	310	0	0.00
63.05	0.00	465	0	0.00
63.23	0.00	620	0	0.00
63.41	0.00	775	0	0.00
63.59	0.00	930	0	0.00
63.89	0.00	1085	0	0.00
64.23	0.00	1240	0	0.00
64.57	0.00	1395	0	0.00
64.89	0.00	1550	0	0.00

<1> TOLERANCE (FT) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 01-15-1996 FILE DATE: 01-15-1996
CURRENT TIME: 14:24:06 FILE NAME: ALEX

CULVERT # 1

PERFORMANCE CURVE FOR 4 BARREL(S)

Q (cfs)	HWE (ft)	TWE (ft)	ICH (ft)	OCH (ft)	FLOW TYPE	CCE (ft)	FCE (ft)	TCE (ft)	VO (fps)
0	60.00	58.80	0.00	-1.20	0-NF	0.00	60.00	0.00	0.00
155	62.65	59.65	1.07	2.65	6-FF	0.00	0.00	0.00	3.80
310	62.86	60.09	1.70	2.86	6-FF	0.00	0.00	0.00	5.03
465	63.05	60.44	2.22	3.05	6-FF	0.00	0.00	0.00	5.92
620	63.23	60.74	2.70	3.23	6-FF	0.00	0.00	0.00	6.66
775	63.41	61.01	3.13	3.41	6-FF	0.00	0.00	0.00	7.30
930	63.59	61.26	3.53	3.59	6-FF	0.00	0.00	0.00	7.86
1085	63.89	61.50	3.89	3.77	6-FF	0.00	0.00	0.00	13.79
1240	64.23	61.72	4.23	3.95	6-FF	0.00	0.00	0.00	14.21
1395	64.57	61.93	4.57	4.13	6-FF	0.00	0.00	0.00	14.62
1550	64.89	62.13	4.89	4.32	6-FF	0.00	0.00	0.00	14.97

El. inlet face invert 60.00 ft El. outlet invert 58.80 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION (FT)	0.00
INLET ELEVATION (FT)	60.00
OUTLET STATION (FT)	50.00
OUTLET ELEVATION (FT)	58.80
NUMBER OF BARRELS	4.00
SLOPE (V-FT/H-FT)	0.0240
CULVERT LENGTH ALONG SLOPE (FT)	50.01

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	12.00 FT
BARREL RISE	7.00 FT
BARREL MATERIAL	CONCRETE
BARREL MANNING'S N	0.013
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	1:1 BEVEL
INLET DEPRESSION	NONE

CURRENT DATE: 01-15-1996 FILE DATE: 01-15-1996
CURRENT TIME: 14:24:06 FILE NAME: ALEX

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH (FT)	48.00
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (FT/FT)	0.005
MANNING'S N (.01-0.1)	0.025
CHANNEL INVERT ELEVATION (FT)	58.80
CULVERT NO.1 OUTLET INVERT ELEVATION	58.80 FT

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (CFS)	W.S.E. (FT)	FROUDE NUMBER	VEL. (FPS)	SHEAR (PSF)
0.00	58.80	0.000	0.00	0.00
155.00	59.65	0.701	3.67	0.27
310.00	60.09	0.742	4.77	0.40
465.00	60.44	0.764	5.55	0.51
620.00	60.74	0.780	6.16	0.61
775.00	61.01	0.792	6.68	0.69
930.00	61.26	0.801	7.13	0.77
1085.00	61.50	0.808	7.53	0.84
1240.00	61.72	0.814	7.89	0.91
1395.00	61.93	0.820	8.22	0.98
1550.00	62.13	0.824	8.53	1.04

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	GRAVEL
EMBANKMENT TOP WIDTH (FT)	50.00
CREST LENGTH (FT)	50.00
OVERTOPPING CREST ELEVATION (FT)	67.00

RANGE WASH - ALEXANDER TO LV BLVD SEC. V
Worksheet for Irregular Channel

Project Description	
Project File	c:\public works\607 - vandenburg clomr\rngwash.fm2
Worksheet	RANGE WASH - ALEXANDER TO LV BLVD SEC. V
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data				
Channel Slope	0.006000 ft/ft			
Elevation range: 56.00 ft to 62.00 ft.				
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	62.00	0.00	190.00	0.030
10.00	60.00			
40.00	58.00			
140.00	56.00			
150.00	56.00			
190.00	62.00			
Discharge	1,091.00 cfs			

Results		
Wtd. Mannings Coefficient	0.030	
Water Surface Elevation	58.61	ft
Flow Area	212.15	ft²
Wetted Perimeter	136.71	ft
Top Width	136.48	ft
Height	2.61	ft
Critical Depth	58.28	ft
Critical Slope	0.012033	ft/ft
Velocity	5.14	ft/s
Velocity Head	0.41	ft
Specific Energy	59.02	ft
Froude Number	0.73	
Flow is subcritical.		

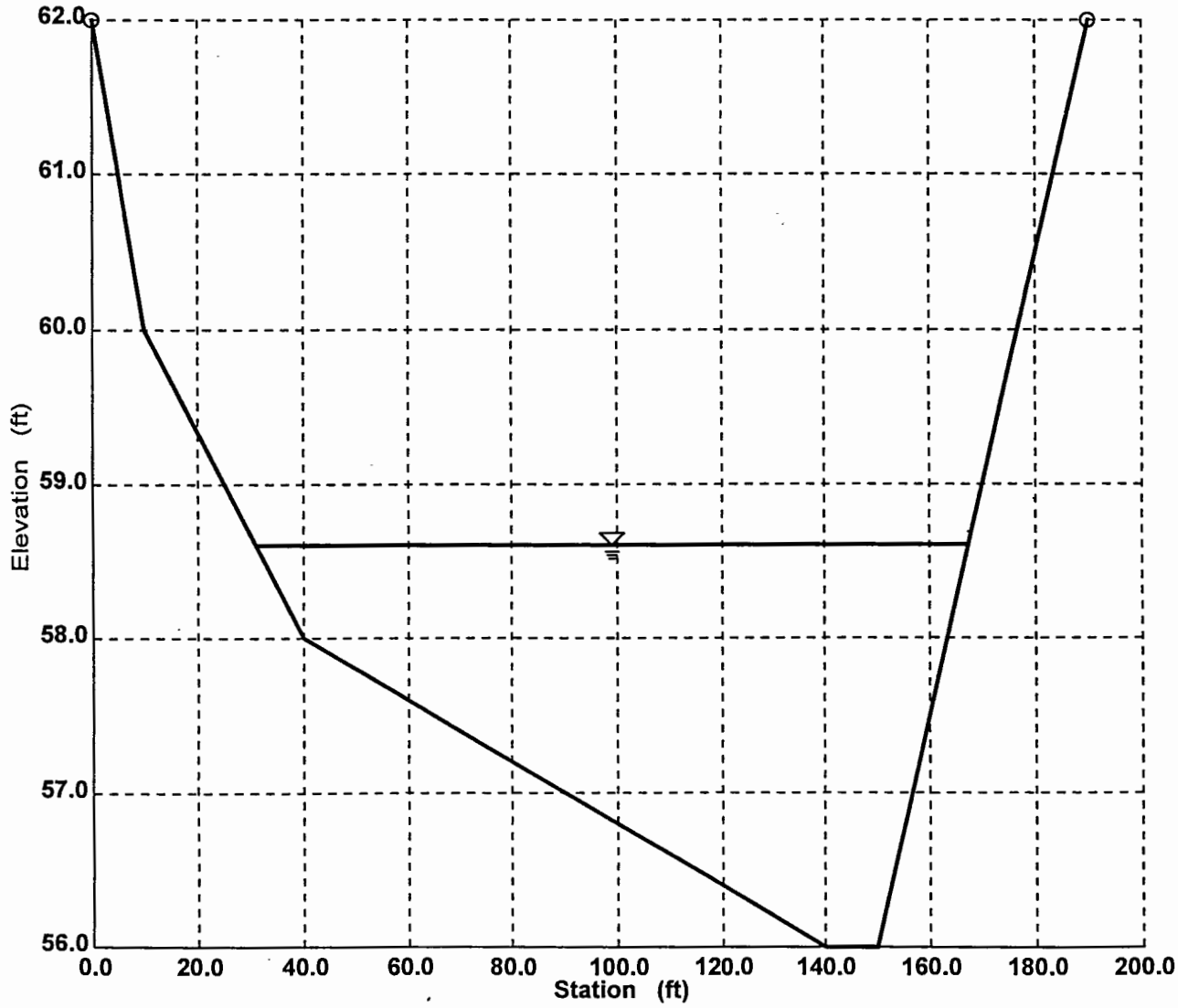
Notes:

FLOW FROM HEC-1 NODE G3

RANGE WASH - ALEXANDER TO LV BLVD SEC. V
Cross Section for Irregular Channel

Project Description	
Project File	c:\public works\607 - vandenburg clomr\rngwash.fm2
Worksheet	RANGE WASH - ALEXANDER TO LV BLVD SEC. V
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.030	
Channel Slope	0.006000	ft/ft
Water Surface Elevation	58.61	ft
Discharge	1,091.00	cfs



RANGE WASH - ALEXANDER TO LV BLVD SEC W
Worksheet for Irregular Channel

Project Description	
Project File	c:\public works\607 - vandenburg clomr\rngwash.fm2
Worksheet	RANGE WASH - ALEXANDER TO LV BLVD SEC W
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data		
Channel Slope	0.005000	ft/ft
Elevation range: 53.00 ft to 60.00 ft.		
Discharge	1,091.00	cfs

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	60.00	0.00	270.00	0.030
40.00	58.00			
50.00	56.00			
100.00	54.00			
140.00	53.00			
150.00	53.00			
180.00	54.00			
240.00	56.00			
270.00	60.00			

Results		
Wtd. Mannings Coefficient	0.030	
Water Surface Elevation	55.60	ft
Flow Area	243.38	ft²
Wetted Perimeter	168.08	ft
Top Width	167.99	ft
Height	2.60	ft
Critical Depth	55.16	ft
Critical Slope	0.012300	ft/ft
Velocity	4.48	ft/s
Velocity Head	0.31	ft
Specific Energy	55.91	ft
Froude Number	0.66	
Flow is subcritical.		

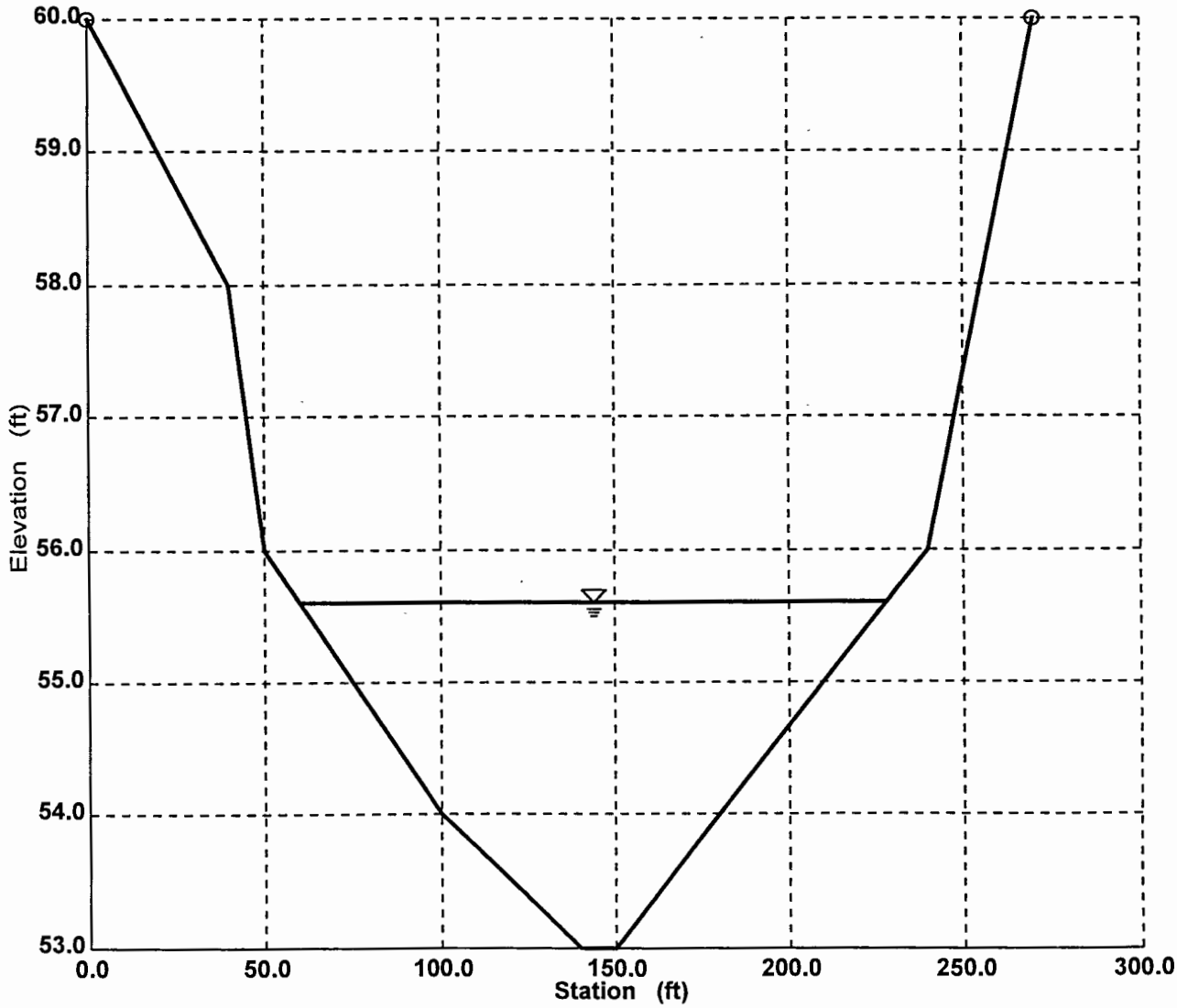
Notes:

FROM HEC-1 NODE G3

RANGE WASH - ALEXANDER TO LV BLVD SEC W
Cross Section for Irregular Channel

Project Description	
Project File	c:\public works\607 - vandenburg clomr\rngwash.fm2
Worksheet	RANGE WASH - ALEXANDER TO LV BLVD SEC W
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.030	
Channel Slope	0.005000	ft/ft
Water Surface Elevation	55.60	ft
Discharge	1,091.00	cfs



7 - 12 x 6 CULVERTS AT LAS VEGAS BLVD.

CURRENT DATE: 01-15-1996
CURRENT TIME: 15:01:56

FILE DATE: 01-15-1996
FILE NAME: LASV

FHWA CULVERT ANALYSIS
HY-8, VERSION 3.2

CULV	SITE DATA: INLET ELEV. (FT)	SITE DATA: OUTLET ELEV. (FT)	SITE DATA: CULVERT LENGTH (FT)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (FT)	RISE (FT)	MANNING n	INLET TYPE
1	51.00	50.00	100.01	7 RCB	12.00	6.00	.015	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (CFS) FILE: LASV DATE: 01-15-1996

ELEV (FT)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
51.00	0	0	0	0	0	0	0	0	1
53.24	155	155	0	0	0	0	0	0	1
53.38	310	310	0	0	0	0	0	0	1
53.51	465	465	0	0	0	0	0	0	1
53.63	620	620	0	0	0	0	0	0	1
53.75	775	775	0	0	0	0	0	0	1
53.86	930	930	0	0	0	0	0	0	1
53.97	1085	1085	0	0	0	0	0	0	1
54.08	1240	1240	0	0	0	0	0	0	1
54.21	1395	1395	0	0	0	0	0	0	1
54.43	1550	1550	0	0	0	0	0	0	1
61.00	6468	6468	0	0	0	0	0	0	OVERTOPPING

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: LASV DATE: 01-15-1996

HEAD ELEV(FT)	HEAD ERROR(FT)	TOTAL FLOW(CFS)	FLOW ERROR(CFS)	% FLOW ERROR
51.00	0.00	0	0	0.00
53.24	0.00	155	0	0.00
53.38	0.00	310	0	0.00
53.51	0.00	465	0	0.00
53.63	0.00	620	0	0.00
53.75	0.00	775	0	0.00
53.86	0.00	930	0	0.00
53.97	0.00	1085	0	0.00
54.08	0.00	1240	0	0.00
54.21	0.00	1395	0	0.00
54.43	0.00	1550	0	0.00

<1> TOLERANCE (FT) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 01-15-1996 FILE DATE: 01-15-1996
CURRENT TIME: 15:01:56 FILE NAME: LASV

CULVERT # 1

PERFORMANCE CURVE FOR 7 BARREL(S)

Q (cfs)	HWE (ft)	TWE (ft)	ICH (ft)	OCH (ft)	FLOW TYPE	CCE (ft)	FCE (ft)	TCE (ft)	VO (fps)
0	51.00	49.00	0.00	-1.00	0-NF	0.00	51.00	0.00	0.00
155	53.24	49.85	0.77	2.24	6-FF	0.00	0.00	0.00	3.89
310	53.38	50.28	1.19	2.38	6-FF	0.00	0.00	0.00	4.91
465	53.51	50.62	1.56	2.51	6-FF	0.00	0.00	0.00	5.62
620	53.63	50.92	1.88	2.63	6-FF	0.00	0.00	0.00	6.18
775	53.75	51.18	2.19	2.75	6-FF	0.00	0.00	0.00	6.66
930	53.86	51.42	2.47	2.86	6-FF	0.00	0.00	0.00	7.08
1085	53.97	51.64	2.74	2.97	6-FF	0.00	0.00	0.00	7.45
1240	54.08	51.85	2.99	3.08	6-FF	0.00	0.00	0.00	7.79
1395	54.21	52.04	3.21	3.20	6-FF	0.00	0.00	0.00	10.72
1550	54.43	52.23	3.43	3.31	6-FF	0.00	0.00	0.00	10.98

El. inlet face invert 51.00 ft El. outlet invert 50.00 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION (FT)	0.00
INLET ELEVATION (FT)	51.00
OUTLET STATION (FT)	100.00
OUTLET ELEVATION (FT)	50.00
NUMBER OF BARRELS	7.00
SLOPE (V-FT/H-FT)	0.0100
CULVERT LENGTH ALONG SLOPE (FT)	100.01

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	12.00 FT
BARREL RISE	6.00 FT
BARREL MATERIAL	CONCRETE
BARREL MANNING'S N	0.015
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	1:1 BEVEL
INLET DEPRESSION	NONE

CURRENT DATE: 01-15-1996 FILE DATE: 01-15-1996
CURRENT TIME: 15:01:56 FILE NAME: LASV

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH (FT)	20.00
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (FT/FT)	0.010
MANNING'S N (.01-0.1)	0.015
CHANNEL INVERT ELEVATION (FT)	49.00
CULVERT NO.1 OUTLET INVERT ELEVATION	50.00 FT

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (CFS)	W.S.E. (FT)	FROUDE NUMBER	VEL. (FPS)	SHEAR (PSF)
0.00	49.00	0.000	0.00	0.00
155.00	49.85	1.598	8.37	0.53
310.00	50.28	1.667	10.71	0.80
465.00	50.62	1.702	12.31	1.01
620.00	50.92	1.724	13.55	1.20
775.00	51.18	1.739	14.58	1.36
930.00	51.42	1.752	15.47	1.51
1085.00	51.64	1.762	16.25	1.65
1240.00	51.85	1.769	16.94	1.78
1395.00	52.04	1.775	17.57	1.90
1550.00	52.23	1.781	18.15	2.01

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH (FT)	50.00
CREST LENGTH (FT)	1000.00
OVERTOPPING CREST ELEVATION (FT)	61.00

APPENDIX V

Grading Plans

FIRMs to Reflect 1997 FIS Restudy

SHEET INDEX

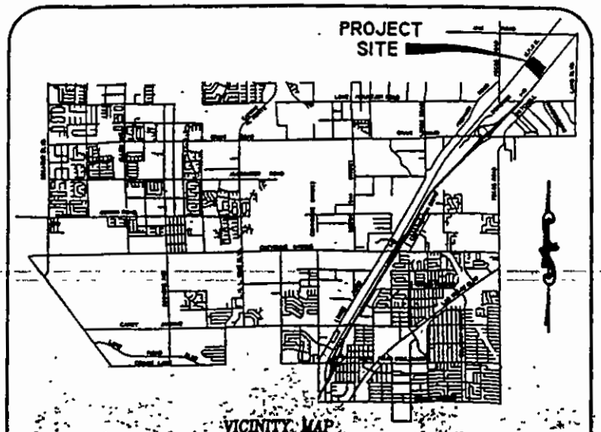
DWG.#	DRAWING TITLE
1	COVER SHEET
2	GENERAL NOTES, QUANTITIES, LEGEND & ABBREVIATIONS
3	WATERSHED BOUNDARY MAP
4	CAPACITY CURVES & HYDROLOGIC INFORMATION
5	GEOTECHNICAL TESTING LOCATIONS – PLAN VIEW
6	GEOTECHNICAL TESTING – ALIGNMENTS #1, #2, & #3 PROFILES
7	GEOTECHNICAL TESTING – ALIGNMENTS #4, #5, & #6 PROFILES
8	GEOTECHNICAL TESTING – OUTFALL ALIGNMENT
9	SURVEY CONTROL MAP
10	COORDINATE TABLE
11	DETENTION BASIN GRADING – PLAN 1
12	DETENTION BASIN GRADING – PLAN 2
13	DETENTION BASIN GRADING – PLAN 3
14	DETENTION BASIN GRADING – PLAN 4
15	DETENTION BASIN GRADING – PLAN 5
16	INFLOW STRUCTURE #1 – PLAN AND PROFILE
17	INFLOW STRUCTURE #2 – PLAN AND PROFILE
18	LOW-LEVEL OUTFALL – PLAN AND PROFILE STA 84+52.72 TO STA 17+00.00
19	HIGH-LEVEL OUTFALL – PLAN AND PROFILE STA 94+40.84 TO STA 17+00.00
20	OUTFALL – PLAN AND PROFILE STA 17+00.00 TO STA 21+00.00
21	OUTFALL – PLAN AND PROFILE STA 21+00.00 TO STA 30+00.00
22	OUTFALL – PLAN AND PROFILE STA 30+00.00 TO STA 39+00.00
23	OUTFALL – PLAN AND PROFILE STA 39+00.00 TO STA 48+00.00
24	OUTFALL – PLAN AND PROFILE STA 48+00.00 TO STA 57+00.00
25	DONOVAN WAY – PLAN AND PROFILE STA 9+00.00 TO STA 18+00.00
26	DONOVAN WAY – PLAN AND PROFILE STA 18+00.00 TO STA 27+00.00
27	DONOVAN WAY – PLAN AND PROFILE STA 27+00.00 TO STA 36+00.00
28	DONOVAN WAY – PLAN AND PROFILE STA 36+00.00 TO STA 45+00.00
29	TYPICAL SECTIONS – DETENTION BASIN
30	TYPICAL SECTIONS – ROADWAY, INFLOW & CHANNEL STRUCTURES
31	ENLARGEMENTS & SECTIONS – RAILROAD CROSSINGS
32	ENLARGEMENTS & SECTIONS – INFLOW STRUCTURES
33	MISCELLANEOUS ENLARGEMENTS
34	MISCELLANEOUS DETAILS
35	MISCELLANEOUS DETAILS
36	MISCELLANEOUS DETAILS
37	DETENTION BASIN – FENCING PLAN
38	DETENTION BASIN – STOCKPILE LOCATION PLAN
39	CROSS-SECTION PLAN VIEW
40	CENTERLINE EMBANKMENT STA 10+00.00 TO STA 49+15.30
41	CENTERLINE OF BASIN / CROSS-SECTIONS – STA 10+00.00 & STA 11+00.00
42	CROSS-SECTIONS – STA 12+00.00 TO STA 18+00.00
43	CROSS-SECTIONS – STA 16+00.00 TO STA 19+00.00
44	CROSS-SECTIONS – STA 20+00.00 TO STA 22+00.00
45	CROSS-SECTIONS – STA 23+00.00
46	GENERAL NOTES AND TYPICAL DETAILS
47	INFLOW STRUCTURES #1 AND #2 PLANS
48	OUTLET CHANNEL PLANS
49	RCB TYPICAL SECTIONS
50	RCB TRANSITION SECTIONS AND MISCELLANEOUS DETAILS
51	OPEN CHANNEL SECTIONS AND DETAILS
52	BAFFLE SECTIONS AND DETAILS
53	HIGH LEVEL OUTLET
54	LOW LEVEL OUTLET
55	TRASH RACK DETAILS
56	MISCELLANEOUS STRUCTURAL DETAILS
57	DONOVAN WAY – PLAN AND PROFILE STA 9+00.00 TO 18+00.00
58	DONOVAN WAY – PLAN AND PROFILE STA 18+00.00 TO 27+00.00
59	DONOVAN WAY – PLAN AND PROFILE STA 27+00.00 TO 36+00.00
60	TYPICAL SECTIONS & MISCELLANEOUS DETAILS
61	DONOVAN WAY – SIGNAGE, STRIPING AND STREETLIGHTING PLAN
62	SOIL NAIL WALL GENERAL NOTES AND SITE PLAN
63	SOIL NAIL WALL ELEVATIONS
64	DETAILS

BASIS OF BEARINGS

THE PROJECT BASIS OF BEARING IS BETWEEN THE SOUTH QUARTER CORNER AND THE SOUTHEAST CORNER OF SECTION 31, TOWNSHIP 19 SOUTH, RANGE 62 EAST, MDM, CITY OF NORTH LAS VEGAS, CLARK COUNTY, NEVADA. THIS BEARING N89°33'14"E IS BASED UPON PLAT MAP BOOK 10 PAGE 76, ON RECORD IN THE CLARK COUNTY RECORDERS OFFICE.

NAVD88 BENCHMARK

THE PROJECT BENCHMARK IS NAVD 88 BENCHMARK NO. 30627 ELEVATION OF 584.412 METERS (1917.356 FT), BEING 1"ø DIAMETER CONCRETE MONUMENT 6.5 FT BACK OF CURB IN THE CENTER RETURN ON THE SOUTHWEST CORNER OF VANDENBERG DRIVE AND LONE MOUNTAIN ROAD.



VICINITY MAP

NOT TO SCALE

CITY OF NORTH LAS VEGAS, NEVADA

DEPARTMENT OF PUBLIC WORKS

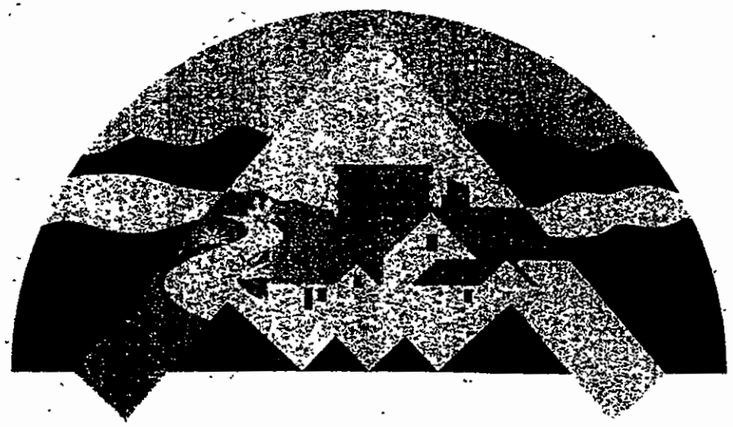
VANDENBERG DETENTION BASIN

BID NO. 1046

LABOR COMMISSION NO. CL-1999-564

FUNDED BY:

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT



CITY OF NORTH LAS VEGAS

PBSJ

501 North Green Valley Pkwy
Suite 100
Henderson, Nevada 89014
Telephone 702/263-7275
Fax 702/263-7200

ENGINEERING • PLANNING • SURVEYING • CONSTRUCTION SERVICES

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)

APPROVALS:

GARY W. HOLLER, P.E. DIRECTOR OF PUBLIC WORKS	7-27-99 DATE
JAMES A. BELL, P.E. DEPUTY DIRECTOR OF PUBLIC WORKS / CITY ENGINEER	7/27/99 DATE
ROBERT M. HARARY, P.E. PRINCIPAL CIVIL ENGINEER	7/27/99 DATE
GALE WM. FRASER II, P.E. GENERAL MANAGER / CHIEF ENGINEER CCRFCD	7/21/99 DATE

REVIEWED BY:

KENNETH A. ALBRIGHT, P.E. FIELD OPERATIONS MANAGER	7/21/99 DATE
RAYMOND H. BURKE MANAGER, TRANSPORTATION SERVICES	7/21/99 DATE
RANDAL CAGLE MANAGER, PROPERTY MANAGEMENT	7-20-99 DATE
KELLY R. CHIMA, P.E. MANAGER, DEVELOPMENT & FLOOD CONTROL	7/27/99 DATE
DALE DAFFERN, P.E. MANAGER, QUALITY CONTROL	7-22-99 DATE
BARTLETT C DALTON, P.L.S. CITY SURVEYOR	7-27-99 DATE
JAMES FITZPATRICK MANAGER, STREET MAINTENANCE	7-27-99 DATE
COX COMMUNICATIONS	7-19-99 DATE
NEVADA POWER COMPANY	7-19-99 DATE
SOUTHWEST GAS	7-20-99 DATE
SPRINT	7-19-99 DATE

CITY OF NORTH LAS VEGAS - PUBLIC WORKS - ENGINEERING DIVISION

REVISIONS

NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			

SCALE NO SCALE
DESIGN: A. SPATA
DRAWN: A. SPATA
CHECKED: D. DAVIS
APPROVED: T. BRADY
DATE JULY 19 1999

DEPARTMENT OF PUBLIC WORKS

VANDENBERG DETENTION BASIN

INTERSTATE 15 AT VANDENBERG DRIVE

COVER SHEET

SHEET NO. 1

ABBREVIATIONS

@	AT	MAX	MAXIMUM
AB	ABANDONED UTILITY	MH	MANHOLE
AC	ASPHALTIC CONCRETE	MIN	MINIMUM
A.D.	ALGEBRAIC DIFFERENCE	MON	MONUMENT
AGG	AGGREGATE	MTL	MATERIAL
AL	ALUMINUM	N	NORTH / MANNINGS ROUGHNESS COEFFICIENT
BMI	BASIC MANAGEMENT INC.	NAP	NOT A PART
BC	BACK OF CURB	N.D.O.T.	NEVADA DEPARTMENT OF TRANSPORTATION
BCR	BACK OF CURB RADIUS	NG	NUMBER OF GRATES / NATURAL GRADE
BM	BENCHMARK	NIC	NOT IN CONTRACT
BSW	BACK OF SIDEWALK	NTS	NOT TO SCALE
BVC	BEGIN VERTICAL CURVE	OC	ON CENTER
CATV	CABLE T.V	OD	OUTSIDE DIAMETER
CLR	CLEAR	OH	OVER HEAD
CORFCD	CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT	OH P	OVER HEAD POWER
C/E	CONSTRUCTION EASEMENT	PVMT.	PAVEMENT
CNLV	CITY OF NORTH LAS VEGAS	PC	POINT OF CURVE
CLV	CITY OF LAS VEGAS	PI	POINT OF INTERSECTION
CONC, PCC	CONCRETE	PT	POINT OF TANGENCY
CONST	CONSTRUCTION	PB	PULL BOX
CCSD	CLARK COUNTY STANDARD DRAWING	PET	EXISTING GAL/MEV PETROLEUM LINE (CAUTION)
CNDT	CONDUIT	PH	POT HOLE (LOCATION)
C&G	CURB & GUTTER		PROPERTY LINE
℄	CENTERLINE	PLCS	PLACES
D	DEPTH	PLS	PROFESSIONAL LAND SURVEYOR
DET	DETAIL	PRVC	POINT OF REVERSE VERTICAL CURVE
DG	DESIGN GRADE	PVC	POLYVINYL CHLORIDE
DIA	DIAMETER	PVI	POINT OF VERTICAL INTERSECTION
DIAG	DIAGONAL	P.U.E.	PUBLIC UTILITY EASEMENT
DI	DROP INLET	R	RADIUS
D/W	DRIVEWAY	(R)	RADIAL
DWG	DRAWING	RCC	ROLLER COMPACTED CONCRETE
E	EAST	RCP	REINFORCED CONCRETE PIPE
EA.	EACH	RCB	REINFORCED CONCRETE BOX
EF	EACH FACE	RE	REGISTERED ENGINEER
EG	EXISTING GROUND	RT	RIGHT
EP	EDGE OF PAVEMENT	R/W	RIGHT OF WAY
ELEC	UNDERGROUND POWER	RP	RADIUS POINT
ELEV	ELEVATION	S	SOUTH / SLOPE
EQ.	EQUAL	SD	STORM DRAIN
EVC	END VERTICAL CURVE	SDMH	STORM DRAIN MANHOLE
EW	EACH WAY	SF	SQUARE FOOT
EXIST	EXISTING	SHT	SHEET
EXP. JT.	EXPANSION JOINT	SIM	SIMULAR
FF	FINISH FLOOR	SS	SANITARY SEWER
FOC	FACE OF CURB	ST	STREET
FL	FLOW LINE	STA	STATION
FG	FINISHED GRADE	STD	STANDARD
FH	FIRE HYDRANT	STL	STEEL
FT	FOOT/FEET	SY	SQUARE YARD
GB	GRADE BREAK	S/W	SIDEWALK
GL	GRATE LENGTH	TC	TOP OF CURB
GM	GAS METER	TEMP	TEMPORARY
GV	GATE VALVE	TW	TOP OF WALL
H	HEIGHT	TYP	TYPICAL
HE	HORIZONTAL ELLIPTICAL	UPRR	UNION PACIFIC RAILROAD
HOR/HORIZ	HORIZONTAL	UDACS	STD FOR WATER DISTRIBUTION SYSTEMS UNIFORM DESIGN AND CONSTRUCTION
HP	HIGH POINT	USD	UNIFORM STANDARD DRAWING
ID	INSIDE DIAMETER	UNO	UNLESS NOTED OTHERWISE
INV	INVERT	VC	VERTICAL CURVE
K	RATE OF VERTICAL CURVATURE	VG	VALLEY GUTTER
KV	KILOVOLT	VERT	VERTICAL
L	LENGTH	W	WEST / WATER
LF	LINEAR FEET	WM	WATER METER
LP	LOW POINT	W	WEAKENED PLANE JOINT
LVVWD	LAS VEGAS VALLEY WATER DISTRICT	WV	WATER VALVE
		W/	WITH

LEGEND

EXISTING CHAIN LINK FENCE

EXISTING BLOCK WALL

EXISTING POWER — P —

EXISTING SEWER — 10"SS —

EXISTING WATER — 10"W —

EXISTING GAS — 2"G —

EXISTING OVERHEAD ELECTRIC — E —

EXISTING UNDERGROUND ELECTRIC — UE —

EXISTING CABLE T.V — CATV —

EXISTING STORM DRAIN — EX 24"SD —

EXISTING UNDERGROUND TELEPHONE — EX T —

EXISTING DRIVEWAY

EXISTING CURB AND GUTTER

EXISTING EDGE OF PAVEMENT

EXISTING GUARDRAIL

EXISTING FIRE HYDRANT

EXISTING UTILITY VALVE

EXISTING SEWER MANHOLE (S)

EXISTING STORM DRAIN MANHOLE (D)

EXISTING ELECTRICAL MANHOLE (E)

EXISTING TELEPHONE MANHOLE (T)

EXISTING STREETLIGHT

EXISTING POWER POLE

EXISTING ELEVATION (90.23 TC)

COORDINATE POINT NUMBER (1)

NEW AC PAVEMENT

NEW BLOCK WALL

NEW STORM DRAIN W/MANHOLE 18"SD

NEW UNDERGROUND TELEPHONE — T —

NEW CHAIN LINK FENCE — x — x —

NEW STREETLIGHT CONDUIT

NEW DRIVEWAY

NEW CURB AND GUTTER

NEW FIRE HYDRANT

NEW WATER VALVE

NEW ELEVATION 90.23 TC

DIRECTION OF FLOW OR SLOPE

EDGE OF PAVEMENT

CENTERLINE

RIGHT-OF-WAY LINE

PROPERTY LINE

POT HOLE LOCATION & NUMBER PH-1

GEOTECHNICAL BORING LOCATION & NUMBER B-1

WOOD OVERHEAD POWER LINE CONTACT. IT'S COSTLY

Call before you Overhead

WOOD OUTING UNDERGROUND UTILITY LINES. IT'S COSTLY

Call before you Dig

BASIS OF BEARING

THE PROJECT BASIS OF BEARING IS BETWEEN THE SOUTH QUARTER CORNER AND THE SOUTHEAST CORNER OF SECTION 31, TOWNSHIP 19 SOUTH, RANGE 62 EAST, MDM, CITY OF NORTH LAS VEGAS, CLARK COUNTY, NEVADA. THIS BEARING N89°33'14"E IS BASED UPON PLAT MAP BOOK 10 PAGE 76, ON RECORD IN THE CLARK COUNTY RECORDER'S OFFICE.

BENCHMARK

THE PROJECT BENCHMARK IS NAVD 88 BENCHMARK NO. J0627 ELEVATION OF 584.412 METERS

CITY OF NORTH LAS VEGAS GENERAL TRAFFIC NOTES

1. ALL BARRICADING, CONSTRUCTION SIGNING AND 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 CONTRACTORS' RESPONSIBILITY TO SEE THAT ALL TRAFFIC CONTROL DEVICES ARE PROPERLY INSTALLED AND MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT. CONTACT THE CITY'S TRANSPORTATION SERVICES MANAGER FOR SPECIFIC TRAFFIC CONTROL REQUIREMENTS.

2. IF THE PROJECT IMPROVEMENTS NECESSITATE THE ERADICATION, TEMPORARY REMOVAL AND/OR RELOCATION OF TRAFFIC CONTROL SIGNS OR 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 TRANSPORTATION SERVICES MANAGER.

3. PERMANENT PAVEMENT MARKINGS SHALL BE REQUIRED FOR ALL 80-FOOT RIGHTS-OF-WAY OR MORE WHICH INCLUDES HALF STREET IMPROVEMENTS. NEW PAVEMENT MARKING DESIGNS SHALL INCORPORATE INTO ANY EXISTING BORDERING MARKINGS. 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 DRAWINGS 240 THROUGH 248 AND MEET THE SATISFACTION OF THE TRANSPORTATION SERVICES MANAGER.

4. ALL PERMANENT TRAFFIC CONTROL DEVICES REQUIRED BY THE TRANSPORTATION SERVICES MANAGER SHALL BE PROPERLY INSTALLED IN ACCORDANCE TO THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES AND/OR THE REGIONAL TRANSPORTATION COMMISSION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE STREETS REGARDLESS OF THE STATUS OF THEIR COMPLETION

CITY OF NORTH LAS VEGAS GENERAL GRADING 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 633-1318.

5. A SEPARATE PERMIT IS REQUIRED FOR ANY OFF-SITE CONSTRUCTION

6. 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.

PBSJ
901 North Green Valley Pkwy
Suite 120
Henderson, Nevada 89014
Telephone: 702/363-7725
Fax: 702/363-7200
ENGINEERING • PLANNING • SURVEYING • CONSTRUCTION SERVICES

CITY OF NORTH LAS VEGAS DEPARTMENT OF PUBLIC WORKS GENERAL WATER LINE CONSTRUCTION NOTES

1. ALL WORK WILL CONFORM TO CITY OF NORTH LAS VEGAS STANDARDS AND THE MOST CURRENT EDITION OF THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS, CLARK COUNTY AREA, NEVADA. IN ALL CASES, THE CITY OF NORTH LAS VEGAS STANDARDS WILL SUPERSEDE THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS. WHEN NOT IN CONFLICT WITH THE CITY OF NORTH LAS VEGAS STANDARDS AND NOT SPECIFICALLY COVERED BY THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS, ALL CONSTRUCTION WILL CONFORM TO THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATION BOOKS.

2. NOTICE WILL BE GIVEN TO THE PUBLIC WORKS DEPARTMENT FORTY EIGHT (48) HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.

3. NO MAIN MAY BE SHUT DOWN TO MAKE CONNECTIONS WITHOUT PRIOR APPROVAL OF THE MANAGER OF MAINTENANCE/OPERATIONS.

4. ALL WATER MAINS WILL BE FILLED, PRESSURE TESTED TO 200 PSI, DISINFECTED, FLUSHED, REFILLED AND AN ACCEPTABLE WATER SAMPLE OBTAINED, PRIOR TO CONNECTION TO THE CITY OF NORTH LAS VEGAS' DISTRIBUTION SYSTEM.

5. ALL WATER FACILITY CONSTRUCTION MATERIALS USED WILL BE AS LISTED ON THE CITY OF NORTH LAS VEGAS APPROVED MATERIALS LIST, LATEST REVISION, OR SPECIFICALLY APPROVED ON THESE PLANS.

6. A SINGLE PIPE MATERIAL WILL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE CITY OF NORTH LAS VEGAS.

7. TRENCH BACKFILL MATERIAL WILL BE APPROVED, TESTED AND INSTALLED PER THE CITY OF NORTH LAS VEGAS TRENCH BACKFILL POLICY.

8. ALL VALVE BOXES WILL HAVE AN 8 INCH THICK CONCRETE COLLAR AS SHOWN ON CLARK COUNTY UNIFORM STANDARD DRAWING NO. 517 OR MAY BE RAISED AFTER PAVING WITH A NEAT CUT ON A TWELVE (12) INCH RADIUS FROM THE CENTER OF THE VALVE BOX AND CONCRETE POURED FLUSH WITH THE FINISH PAVING GRADE.

9. ALL VALVES WILL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY AND CURB GUTTERS.

10. THE FOLLOWING REQUIREMENTS MUST BE MET IN THE EVENT A WATER LINE AND SANITARY OR STORM SEWER LINE CROSS:

A MINIMUM EIGHTEEN (18) INCH VERTICAL SEPARATION (OUTSIDE TO OUTSIDE) MUST BE MAINTAINED WHEN THE WATER LINE IS INSTALLED OVER THE SANITARY OR STORM SEWER LINE. IF THE VERTICAL SEPARATION CANNOT BE MAINTAINED OR THE WATER LINE MUST BE PLACED UNDER THE SANITARY OR STORM SEWER LINE, THE SANITARY OR STORM SEWER LINE MUST BE CONSTRUCTED WITH ONE OF THE FOLLOWING OR, AS OTHERWISE APPROVED ON THESE PLANS:

A. POTABLE WATER SUPPLY QUALITY MATERIAL
B. ENCASEMENT WITH FOUR (4) INCHES OF CONCRETE (MINIMUM)
C. SLEEVING WITH POTABLE WATER SUPPLY QUALITY PIPE

EACH PROVISION MUST EXTEND ALONG THE SANITARY OR STORM SEWER, ON EITHER SIDE OF THE WATER MAIN, A MINIMUM TEN (10) FOOT DISTANCE PERPENDICULAR TO THE WATER MAIN EXTERIOR.

11. ALL SERVICE LATERALS TWO (2) INCHES AND SMALLER WILL BE COPPER TUBING WITH APPROVED SERVICE SADDLES. CORPORATION STOP AND ANGLE METER STOPS WILL BE THE SAME SIZE AS THE SERVICE LATERAL. ANGLE METER STOPS AND METER WILL BE CENTERED IN THE METER BOX.

12. WARNING TAPE WILL BE REQUIRED OVER ALL MAINS, ALL SIX (6) INCH DIAMETER AND LARGER SERVICE LATERALS AND ANY SERVICE LATERAL NOT INSTALLED PERPENDICULAR TO THE MAIN IN ACCORDANCE WITH UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS PLATE NO. 27.

13. AS-BUILT DRAWINGS, PER CITY OF NORTH LAS VEGAS STANDARDS, WILL BE SUBMITTED FOR APPROVAL TO THE QUALITY CONTROL DIVISION THEN FORWARDED TO THE MAINTENANCE OPERATIONS DIVISION FOR APPROVAL PRIOR TO FINAL ACCEPTANCE OF WATER FACILITIES CONSTRUCTED WITHIN THE CITY OF NORTH LAS VEGAS. FOR FACILITIES CONSTRUCTED OUTSIDE THE CITY LIMITS OF NORTH LAS VEGAS, AS-BUILT DRAWINGS ARE SUBMITTED DIRECTLY TO THE MAINTENANCE OPERATIONS DIVISION

CITY OF NORTH LAS VEGAS 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 TESTED AS SOON AS POSSIBLE AFTER CONSTRUCTION.

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 EACH MANHOLE. 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. THIS IS TO PREVENT PONDING OF LANDSCAPE IRRIGATION WATER AND INFILTRATION INTO THE BOXES OR VAULTS.

5. WHERE OTHER AGENCIES, SUCH AS THE NEVADA DEPARTMENT OF TRANSPORTATION, HAVE JURISDICTION WITHIN THE PROJECT AREA, IT IS THE CONTRACTOR'S RESPONSIBILITY TO COMPLY W/ ENCROACHMENT PERMITS AND LICENSE AGREEMENTS.

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 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. CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURE TO PROTECT THE UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THESE DRAWINGS. EXISTING UTILITIES ARE LOCATED ON THE PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS ARE NOT SHOWN ON THE PLAN AND 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 FROM DAMAGE, AND ALL 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 SHALL BE DESIGNED FOR A 6.5 SACK MIX WITH A MAXIMUM WATER/CEMENT RATIO OF 0.45 (OR AS DESIGNATED BY THE SOILS ENGINEER). MIX DESIGN MUST BE APPROVED BY THE QUALITY CONTROL DIVISION PRIOR TO USE ON THE PROJECT.

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

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

13. AC PAVEMENT SHALL BE FINISHED 0.5 INCHES ABOVE LIP OF CURB GUTTERS OR VALLEY GUTTERS AFTER COMPACTION.

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

15. 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 LOCATION.

16. 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.

17. 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.

18. CONTRACTOR SHALL CONFORM TO CITY OF NORTH LAS VEGAS TRENCH BACKFILL POLICY

19. ALL CONSTRUCTION PROJECTS 5 ACRES AND LARGER MUST OBTAIN A NOEP PERMIT. CONTACT BOB SAUNDERS, NEVADA DIVISION OF ENVIRONMENTAL PROTECTION AT 702-687-6870 EXT 3149.

20. CONTROL INFORMATION IS BASED UPON THE CONTROL DRAWING SUPPLIED BY THE CITY OF NORTH LAS VEGAS SURVEY DIVISION DATED MARCH 05, 1998.

REVISIONS			
NO	DESCRIPTION	DATE	BY
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SCALE NO SCALE
DESIGN A SPATA
DRAWN A SPATA
CHECKED D DAVIS
APPROVED T BRADY
DATE JULY 19, 1999

PROFESSIONAL ENGINEER STATE OF NEVADA DONALD V. DAVIS CIVIL No. 8087

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

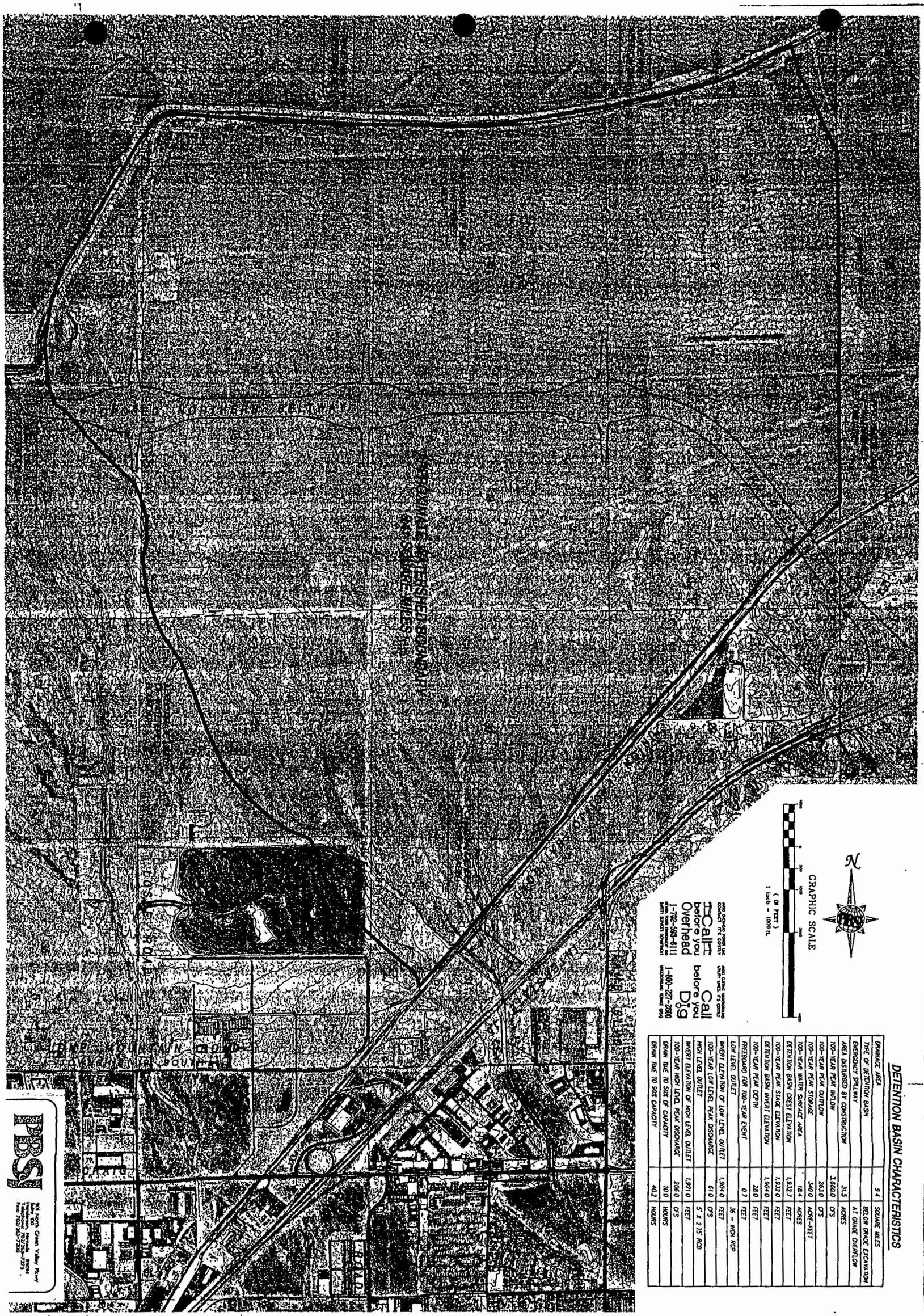
GENERAL NOTES, LEGEND, ABBREVIATIONS & QUANTITIES

(DRAWING TITLE)

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

(PROJECT TITLE)

SHEET NO. 2



DETENTION BASIN CHARACTERISTICS

DRAINAGE AREA	9.4	SQUARE MILES
TYPE OF DETENTION BASIN		BELOW GRADE EXCAVATION
EMERGENCY SPILLWAY		AT GRADE OVERFLOW
AREA DISTURBED BY CONSTRUCTION	31.3	ACRES
100-YEAR PEAK INFLOW	3,660.0	CFS
100-YEAR PEAK OUTFLOW	263.0	CFS
100-YEAR PEAK STORAGE	340.0	ACRE-FEET
100-YEAR WATER SURFACE AREA	18.4	ACRES
DETENTION BASIN CREST ELEVATION	1,932.7	FEET
100-YEAR PEAK STAGE ELEVATION	1,932.0	FEET
DETENTION BASIN INVERT ELEVATION	1,904.0	FEET
100-YEAR PEAK DEPTH	28.0	FEET
FREEBOARD FOR 100-YEAR EVENT	0.7	FEET
LOW LEVEL OUTLET	36 - INCH RCP	
INVERT ELEVATION OF LOW LEVEL OUTLET	1,904.0	FEET
100-YEAR LOW LEVEL PEAK DISCHARGE	61.0	CFS
HIGH LEVEL OUTLET	5' X 2.75' RCB	
INVERT ELEVATION OF HIGH LEVEL OUTLET	1,921.0	FEET
100-YEAR HIGH LEVEL PEAK DISCHARGE	206.0	CFS
DRAIN TIME TO 90% OF CAPACITY	10.0	HOURS
DRAIN TIME TO 90% OF CAPACITY	40.2	HOURS

PBSJ
501 North Green Valley Parkway
Suite 100
Henderson, Nevada 89014
Phone 702/434-7200
Fax 702/434-7201

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

SHEET NO.

(DRAWING TITLE)
WATERSHED BOUNDARY MAP

(PROJECT TITLE)
VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

(LOCATION)

PROFESSIONAL ENGINEER
STATE OF NEVADA

SCALE	1" = 1000'
DESIGN:	A SPATA
DRAWN	A SPATA
CHECKED	D DAVIS
APPROVED:	T BRADY
DATE	JUNE 19 1999

REVISIONS

NO	DESCRIPTION	DATE	BY
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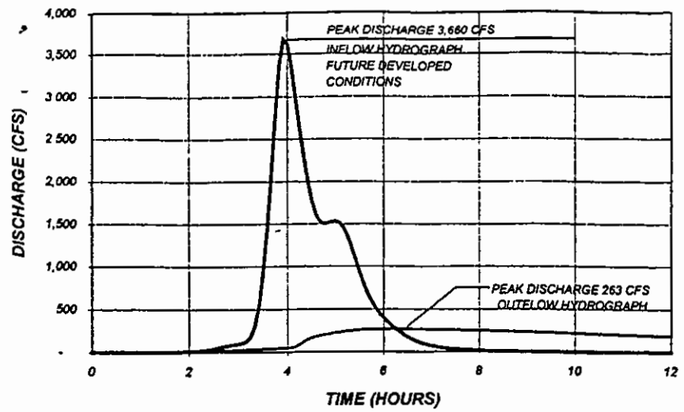
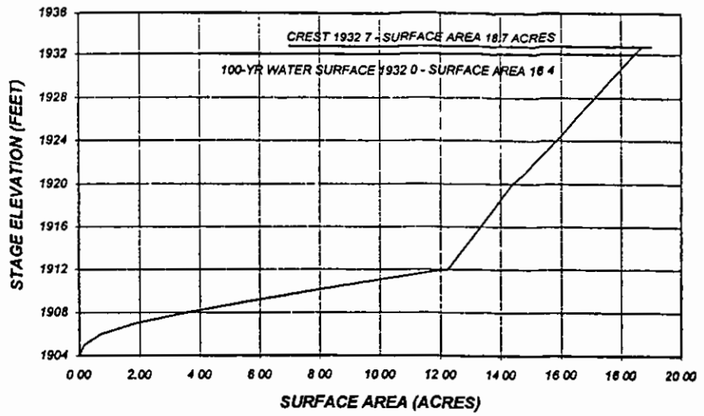
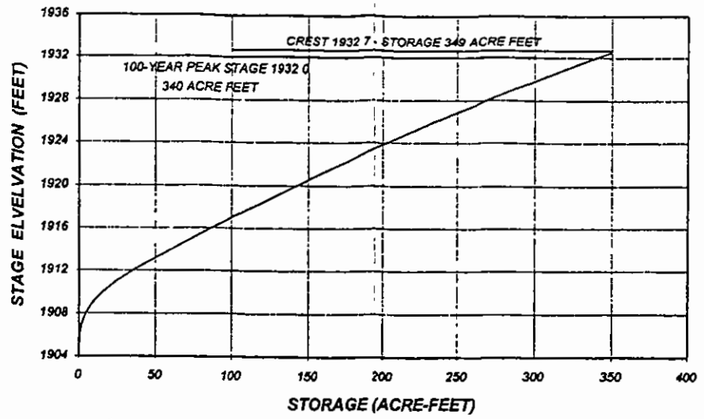
Call before you Dig
1-800-227-2600



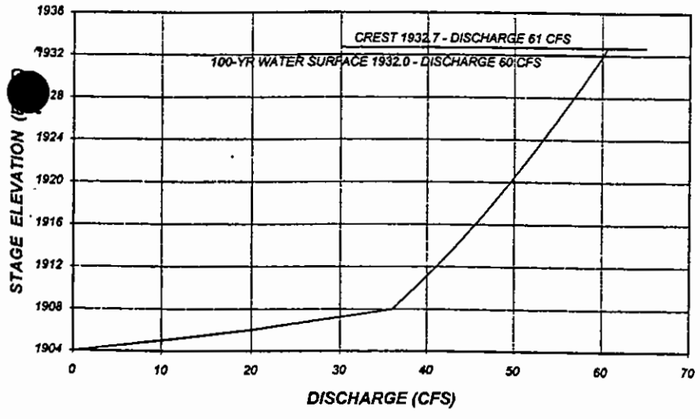
INFLOW AND OUTFLOW HYDROGRAPHS



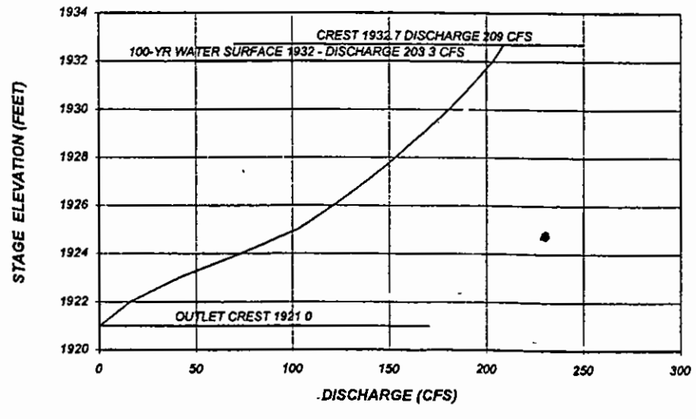
STAGE/SURFACE AREA CURVE



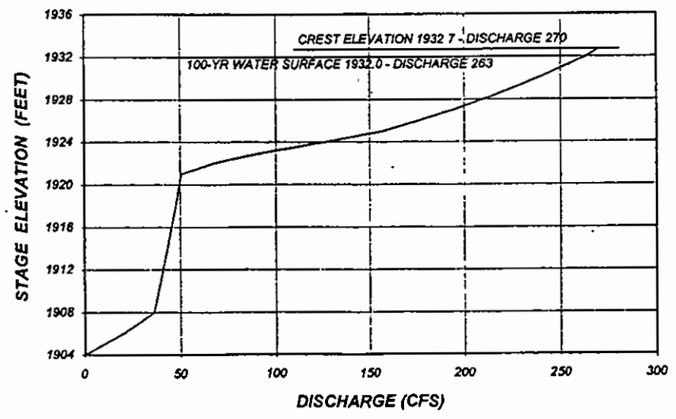
STAGE /STORAGE CURVE



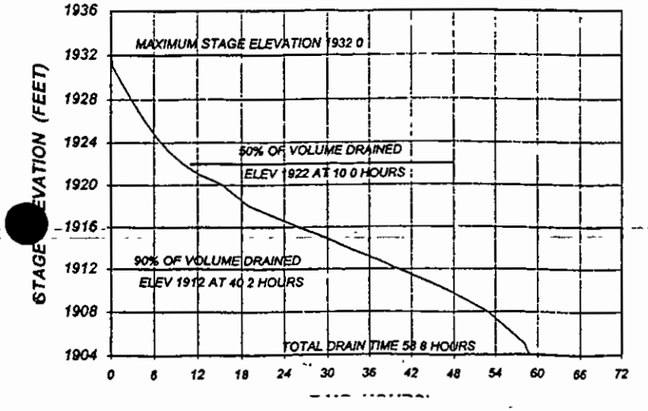
LOW LEVEL OUTLET STAGE/DISCHARGE CURVE



HIGH LEVEL OUTLET STAGE/DISCHARGE CURVE



COMBINED OUTLETS STAGE/DISCHARGE CURVE



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Suite 150
Henderson, Nevada 89014
Telephone 702/263-7273
Fax 702/263-7200

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

CAPACITY CURVES & HYDROLOGIC INFORMATION

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

REVISIONS		
NO	DESCRIPTION	DATE BY
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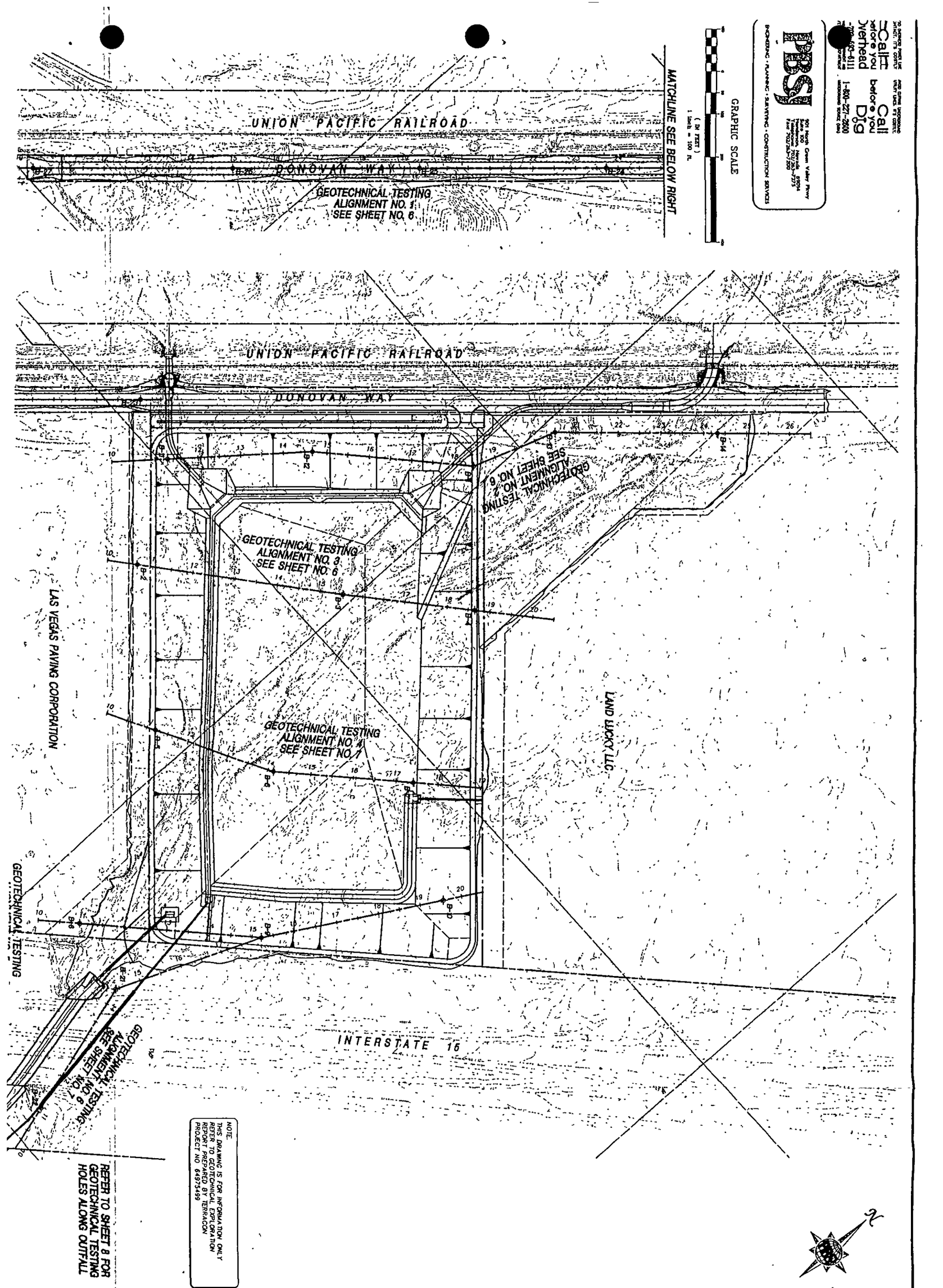
SCALE: NO SCALE
DESIGN: A SPATA
DRAWN A SPATA
CHECKED: D DAVIS
APPROVED T BRADY
DATE: JULY 19, 1999

ERNEST V. DAVIS CIVIL No. 8967

SHEET NO.



NOTE:
THIS DRAWING IS FOR INFORMATION ONLY
REFER TO GEOTECHNICAL EXPLORATION REPORT PREPARED BY TERRACON PROJECT NO 64975499

REFER TO SHEET 8 FOR GEOTECHNICAL TESTING HOLES ALONG OUTFALL

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

SHEET NO.

(DRAWING TITLE) GEOTECHNICAL TESTING LOCATIONS - PLAN VIEW

(PROJECT TITLE) VANDENBERG DETENTION BASIN

(LOCATION) INTERSTATE 15 AT VANDENBERG DRIVE

PROFESSIONAL ENGINEER STATE OF NEVADA

SCALE:	1" = 100'
DESIGN	A SPATA
DRAWN:	A SPATA
CHECKED	D DAWS
APPROVED.	T BRADY
DATE.	JULY 19, 1999

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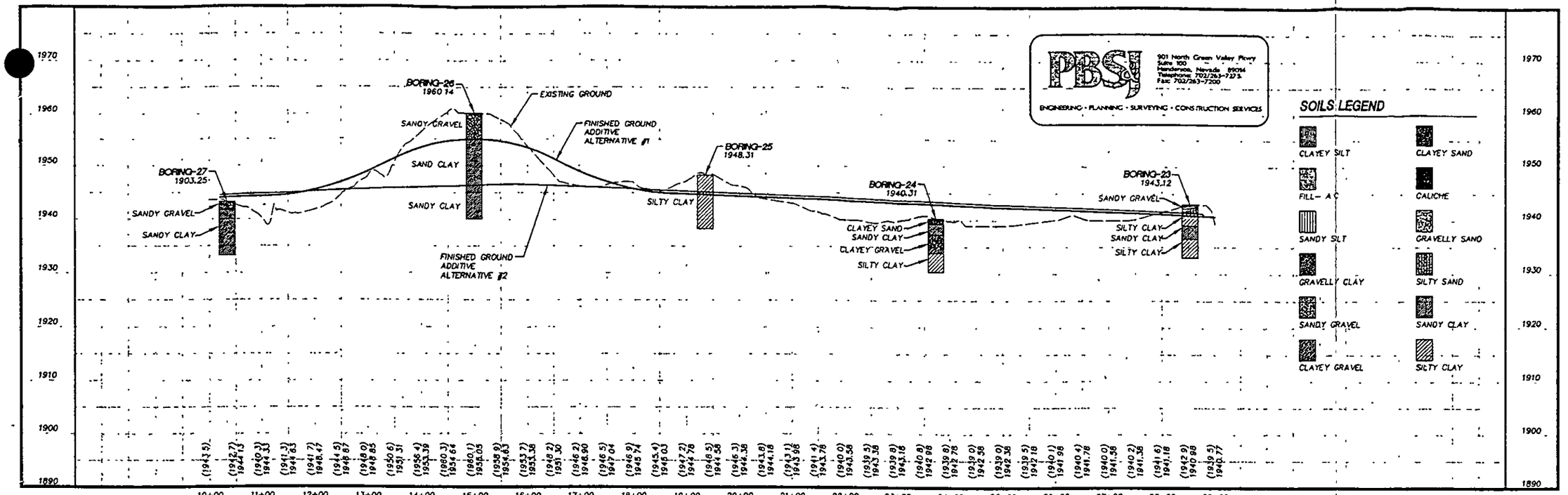


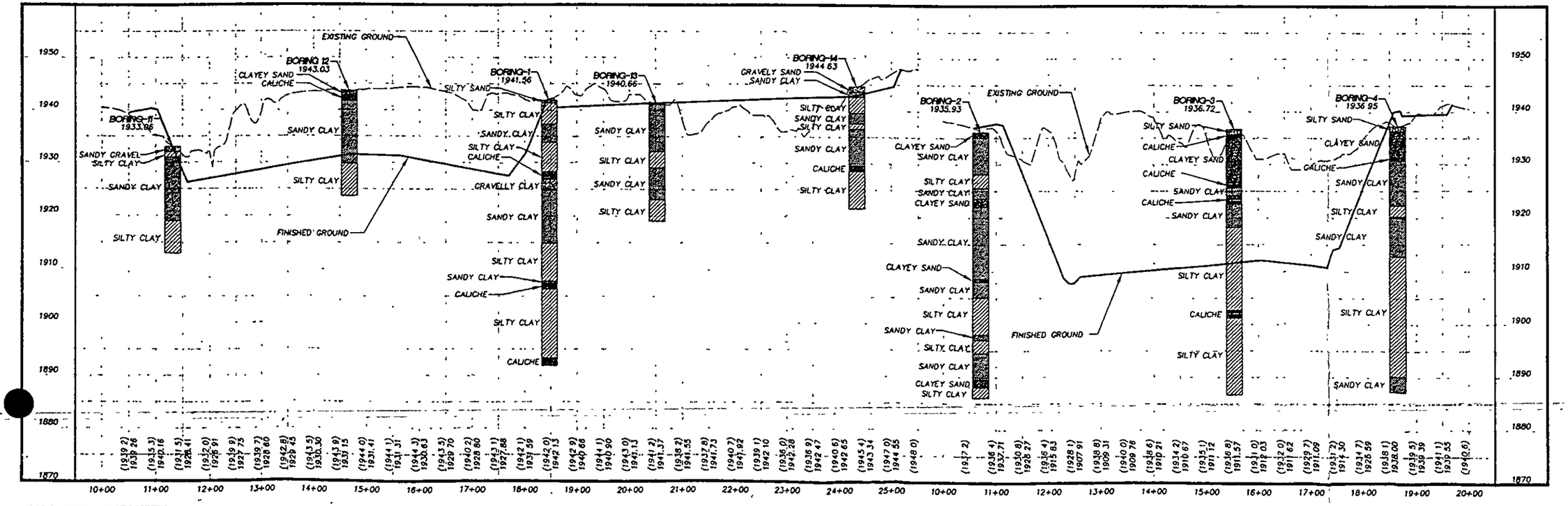
GEOTECHNICAL TESTING ALIGNMENT NO. 1

PBSJ
901 North Green Valley Pkwy
Suite 100
Henderson, Nevada 89014
Telephone: 702/263-7273
Fax: 702/263-7200
ENGINEERING · PLANNING · SURVEYING · CONSTRUCTION SERVICES

SOILS LEGEND

- CLAYEY SILT
- CLAYEY SAND
- FILL – A C
- CALICHE
- SANDY SILT
- GRAVELLY SAND
- GRAVELLY CLAY
- SILTY SAND
- SANDY GRAVEL
- SANDY CLAY
- CLAYEY GRAVEL
- SILTY CLAY

NOTE
THIS DRAWING IS FOR INFORMATION ONLY
REFER TO GEOTECHNICAL EXPLORATION REPORT PREPARED BY TERRACON
PROJECT NO 64975499



GEOTECHNICAL TESTING ALIGNMENT NO. 2

GEOTECHNICAL TESTING ALIGNMENT NO. 3

GRAPHIC SCALE

HOLD OVERHEAD POWER LINE CONTACT IT'S OWNER
HOLD OUTSIDE UNDERGROUND UTILITY LINES. IT'S OWNER

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

REVISIONS			
NO	DESCRIPTION	DATE	BY
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2			
3			
4			
5			

SCALE: 1" = 100'
DESIGN A SPATA
DRAWN A SPATA
CHECKED: D DAVIS
APPROVED T BRADY
DATE: JULY 19, 1999

PROFESSIONAL ENGINEER STATE OF NEVADA
DONALD V. DAVIS
CIVIL
No. 8087

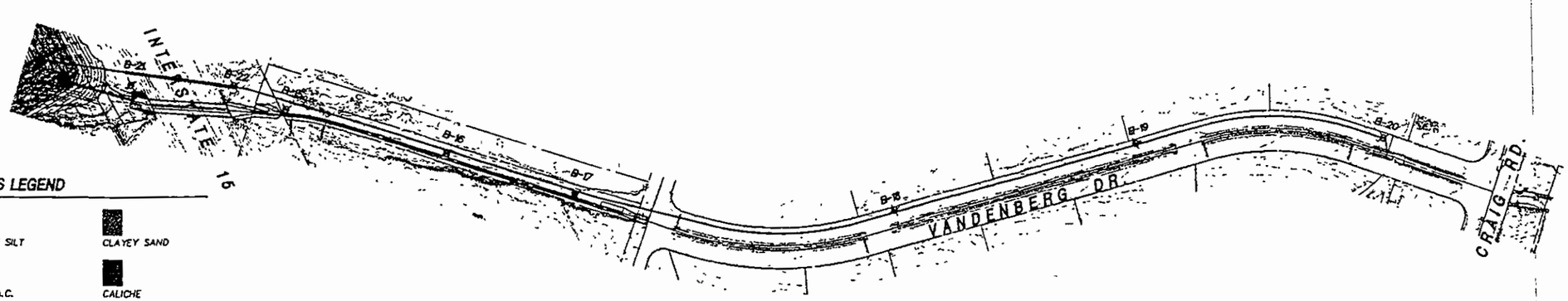
GEOTECHNICAL TESTING - ALIGNMENTS #1, #2 & #3 PROFILES

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

(DRAWING TITLE)
(PROJECT TITLE)
(LOCATION)

SHEET NO.

EFER TO SHEETS 5 THRU 7 FOR
EOTECHNICAL TESTING HOLES
ITHIN DETENTION BASIN

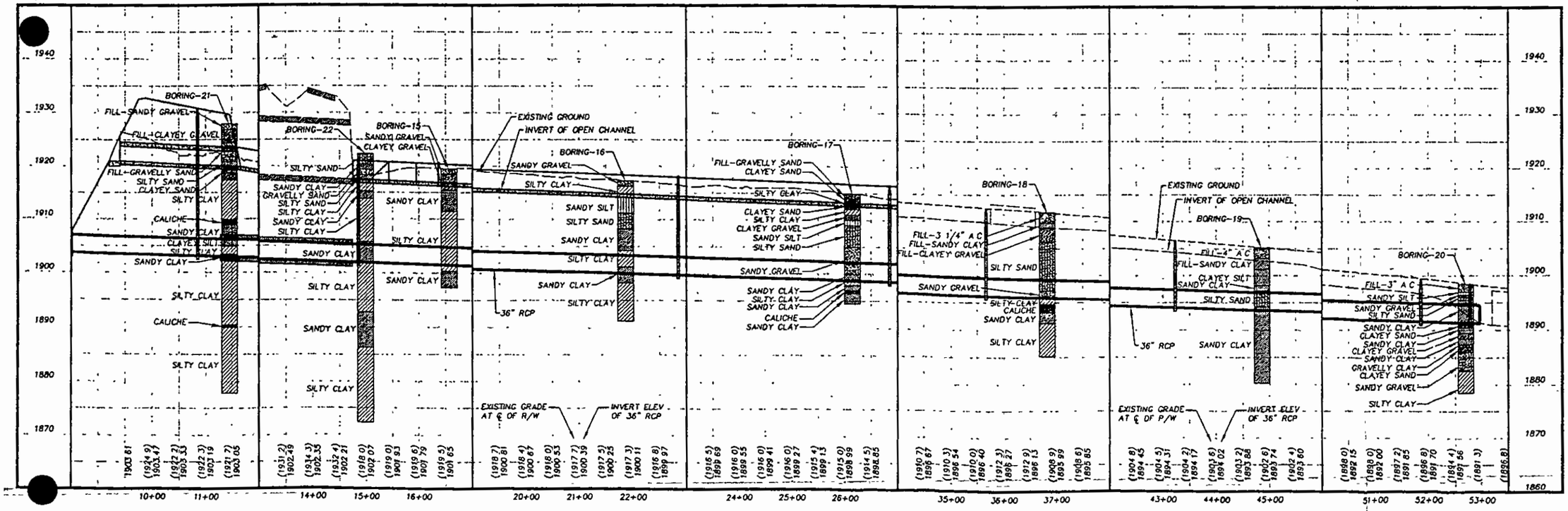


SOILS LEGEND

- CLAYEY SILT
- CLAYEY SAND
- FILL- A.C.
- CALICHE
- SANDY SILT
- GRAVELLY SAND
- GRAVELLY CLAY
- SILTY SAND
- SANDY GRAVEL
- SANDY CLAY
- CLAYEY GRAVEL
- SILTY CLAY

GRAPHIC SCALE

(IN FEET)
1 inch = 200 ft.



GEOTECHNICAL TESTING ALIGNMENT

GRAPHIC SCALE

(IN FEET)

Call before you Overhead

Call before you Dig

PBS

901 North Green Valley Pkwy
Suite 100
Henderson, Nevada 89014
Telephone 703/263-7273
Fax 703/263-7200

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

NO	DESCRIPTION	DATE	BY
△			
△			
△			
△			

REVISIONS

SCALE: AS SHOWN
DESIGN: A. SPATA
DRAWN: A. SPATA
CHECKED: D. DAVIS
APPROVED: T. BRADY
DATE: JULY 19, 1999

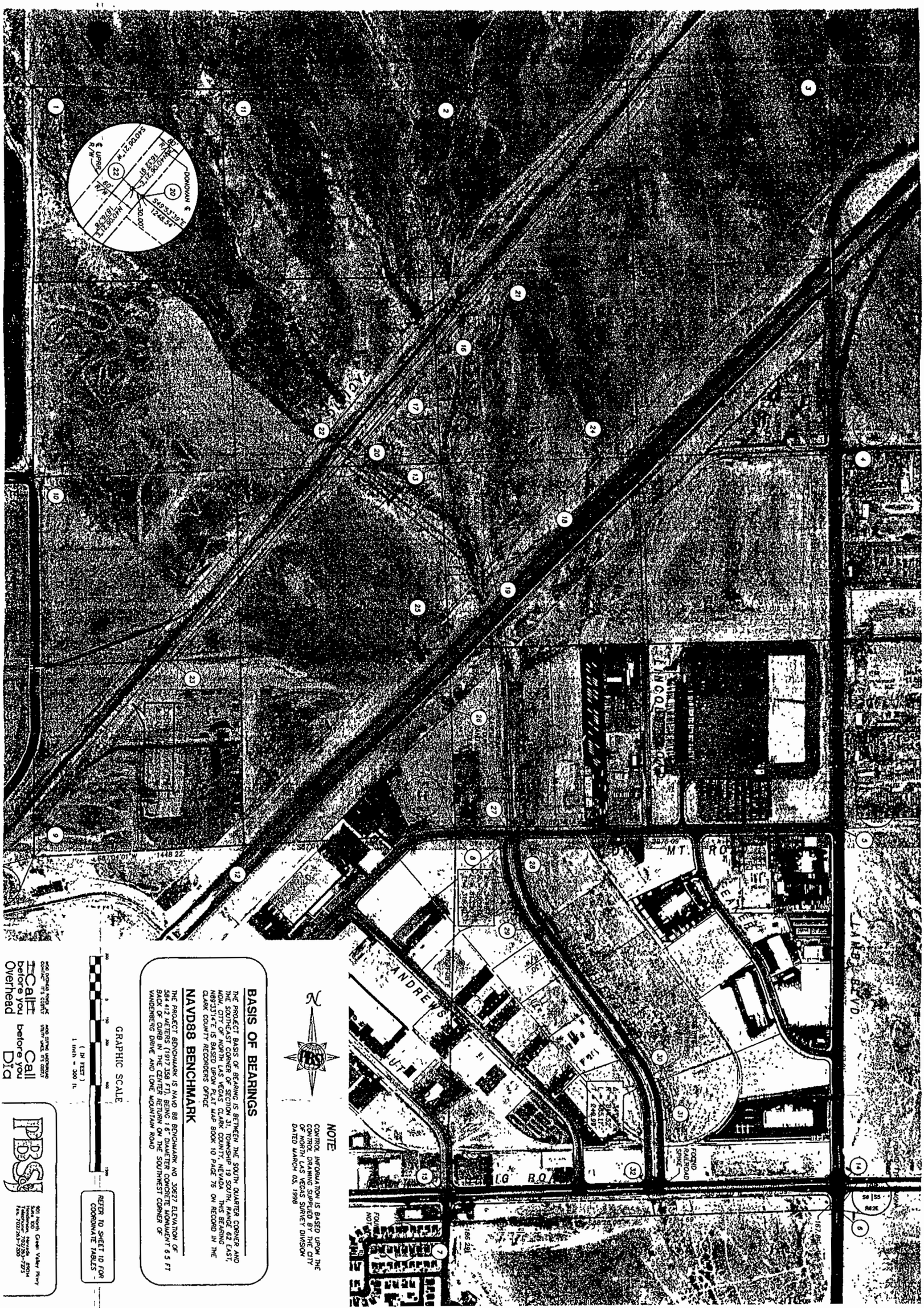
PROFESSIONAL ENGINEER - STATE OF NEVADA - RONALD V. DAVIS - CIVIL - No. 9067

GEOTECHNICAL TESTING - OUTFALL ALIGNMENT

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

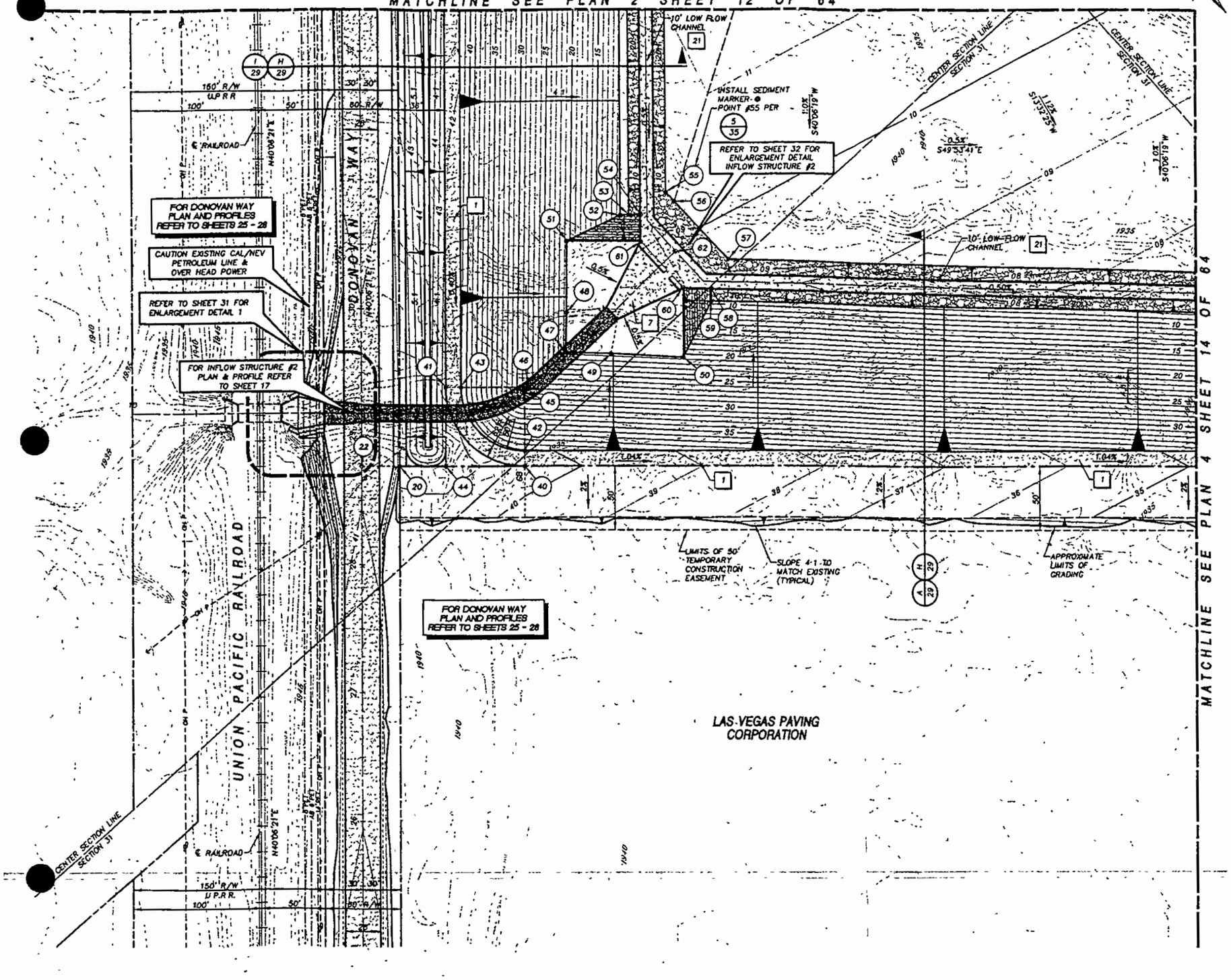
(DRAWING TITLE)
(PROJECT TITLE)
(LOCATION)

SHEET NO.


DONOVAN ℄
S49°53'19"E
1248.34'
S40°06'41"W
30.00'
N49°53'19"W
1248.34'
N40°06'41"E
30.00'
S40°06'41"W
1448.22'
N49°53'19"W
1248.34'
S49°53'19"E
1248.34'
N40°06'41"E
30.00'
S40°06'41"W
1448.22'
S40°06'41"W
2676.69'
N40°06'41"E
2676.69'
S40°06'41"W
1448.22'
N49°53'19"W
1248.34'
S49°53'19"E
1248.34'
N40°06'41"E
30.00

Call before you Dig
1-800-227-2600
UNDERGROUND SERVICE ALERT

MATCHLINE SEE PLAN 2 SHEET 12 OF 64



KEY NOTES

1. DETENTION BASIN PERIMETER ROAD – 6" TYPE II AGGREGATE BASE
2. DONOVAN WAY (28' WIDE) – 6" TYPE II AGGREGATE BASE
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26. INSTALL 60" STL JACK & BORE CASING PER DETAIL 4 SHEET 35
27. INSTALL CONCRETE DEPTH GAGE PER DETAIL 7 SHEET 35

GRAPHIC SCALE

(IN FEET)
HORZ: 1 inch = 40 ft.
VERT: 1 inch = 4 ft.

PBSJ
901 North Green Valley Pkwy
Suite 100
Henderson, Nevada 89014
Telephone 702/263-7275
Fax 702/263-7300
ENGINEERING • PLANNING • SURVEYING • CONSTRUCTION SERVICES

BASIS OF BEARING

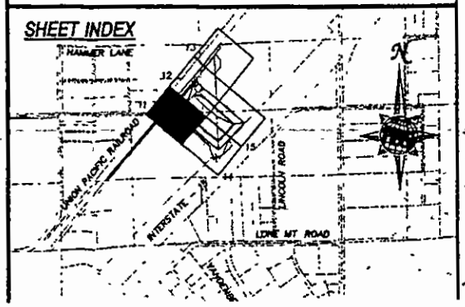
THE PROJECT BASIS OF BEARING IS BETWEEN THE SOUTH QUARTER CORNER AND THE SOUTHEAST CORNER OF SECTION 31, TOWNSHIP 19 SOUTH RANGE 62 EAST, MDM, CITY OF NORTH LAS VEGAS, CLARK COUNTY, NEVADA. THIS BEARING N89°33'14"E IS BASED UPON PLAT MAP BOOK 10 PAGE 78, ON RECORD IN THE CLARK COUNTY RECORDERS OFFICE.

BENCHMARK

THE PROJECT BENCHMARK IS NAVD 88 BENCHMARK NO. 30827 ELEVATION OF 584.412 METERS (1917.356 FT) BEING 1.8" DIAMETER CONCRETE MONUMENT 6.5 FT BACK OF CURB IN THE CENTER RETURN ON THE SOUTHWEST CORNER OF VANDENBERG DRIVE AND LONE MOUNTAIN ROAD.

CAUTION
EXISTING UTILITIES ARE LOCATED ON THE PLANS FROM A SEARCH OF AVAILABLE RECORDS. CONTRACTOR TO VERIFY LOCATIONS AND DEPTHS PRIOR TO CONSTRUCTION.

SHEET INDEX



REVISIONS			
NO	DESCRIPTION	DATE	BY
△			
△			
△			
△			

SCALE: 1" = 40'
DESIGN: A. SPATA
DRAWN: A. SPATA
CHECKED: D. DAVIS
APPROVED: T. BRADY
DATE: JULY 19, 1999

PROFESSIONAL ENGINEER-STATE OF NEVADA
DONALD V. DAVIS
CIVIL
No. 8987

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

DETENTION BASIN GRADING – PLAN 1

VANDENBERG DETENTION BASIN

INTERSTATE 15 AT VANDENBERG DRIVE

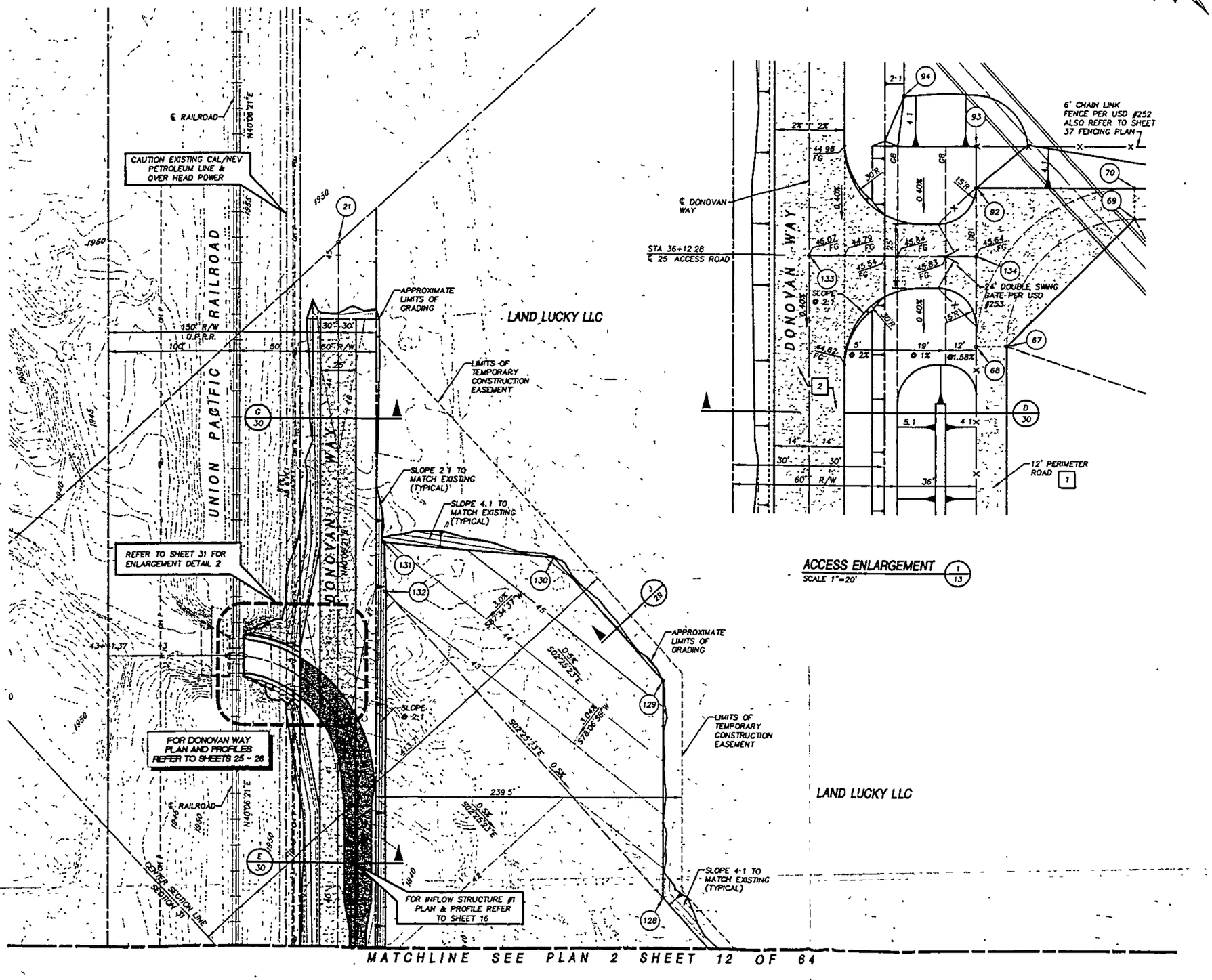
SHEET NO.

ADD OVERHEAD POWER LINE CONTACT IT'S COSTLY

Call before you Overhead
1-702-593-6111
NEVADA POWER COMPANY dba SIERRA PACIFIC POWER COMPANY

ADD OTHER UNDERGROUND UTILITY LINES IT'S COSTLY

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



ACCESS ENLARGEMENT (1/13)
SCALE 1"=20'

KEY NOTES

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GRAPHIC SCALE
(IN FEET)
HORZ. 1 inch = 40 ft.
VERT. 1 inch = 4 ft.

PBSJ
901 North Green Valley Pkwy
Suite 100
Henderson, Nevada 89014
Telephone: 702/263-7275
Fax: 702/263-7200
ENGINEERING · PLANNING · SURVEYING · CONSTRUCTION SERVICES

BASIS OF BEARING

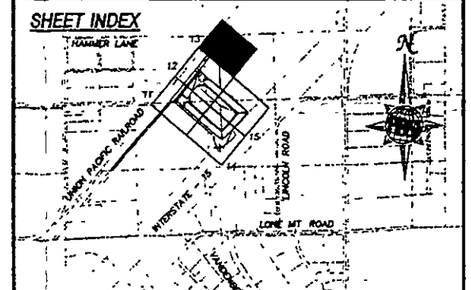
THE PROJECT BASIS OF BEARING IS BETWEEN THE SOUTH QUARTER CORNER AND THE SOUTHEAST CORNER OF SECTION 31, TOWNSHIP 19 SOUTH, RANGE 62 EAST MDM, CITY OF NORTH LAS VEGAS, CLARK COUNTY, NEVADA. THIS BEARING N89°33'14"E IS BASED UPON PLAT MAP BOOK 10 PAGE 76, ON RECORD IN THE CLARK COUNTY RECORDERS OFFICE

BENCHMARK

THE PROJECT BENCHMARK IS NAVD 88 BENCHMARK NO 30627 ELEVATION OF 564.412 METERS (1917.358 FT), BEING 1'8" DIAMETER CONCRETE MONUMENT 6.5 FT BACK OF CURB IN THE CENTER RETURN ON THE SOUTHWEST CORNER OF VANDENBERG DRIVE AND LONE MOUNTAIN ROAD

CAUTION
EXISTING UTILITIES ARE LOCATED ON THE PLANS FROM A SEARCH OF AVAILABLE RECORDS. CONTRACTOR TO VERIFY LOCATIONS AND DEPTHS PRIOR TO CONSTRUCTION

SHEET INDEX



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

REVISIONS			
NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			

SCALE: 1" = 40'
DESIGN A. SPATA
DRAWN A. SPATA
CHECKED D. DAVIS
APPROVED T. BRADY
DATE 11/10/2009

PROFESSIONAL ENGINEER – STATE OF NEVADA – RONALD V. DAVIS – CIVIL – No. 9987

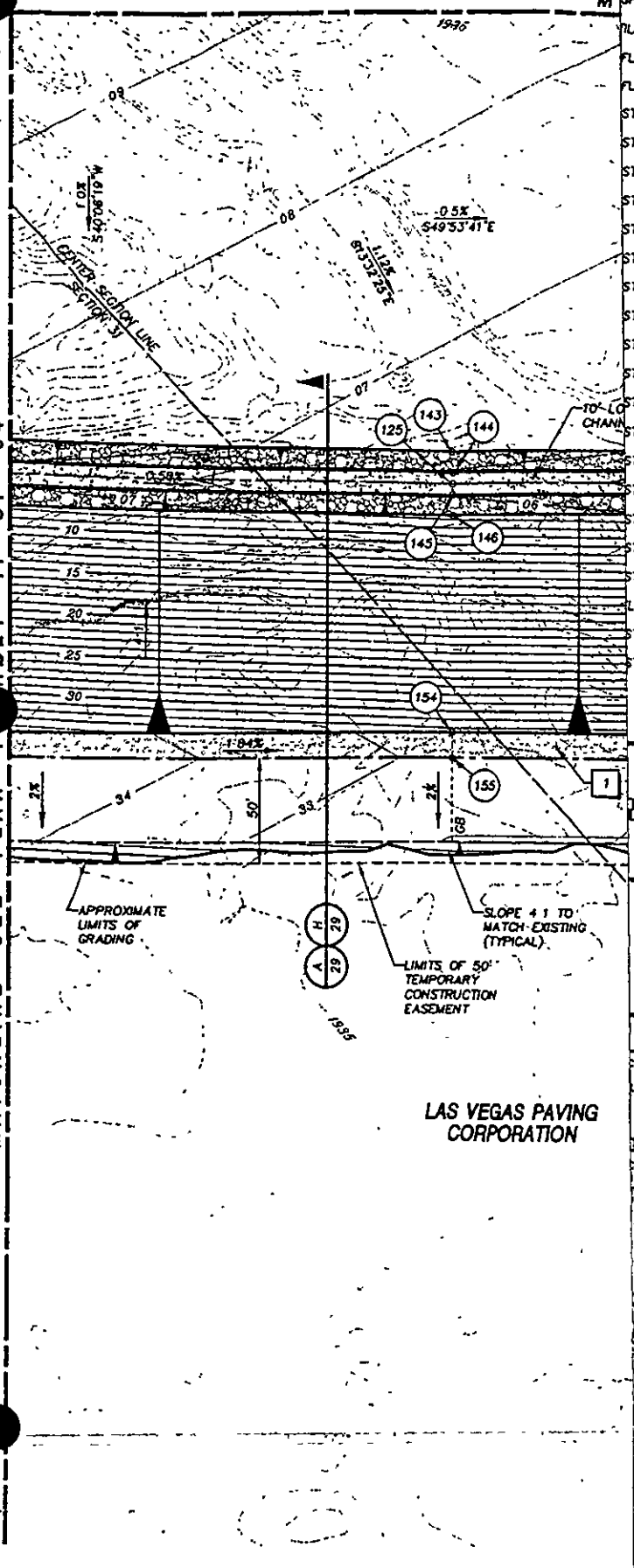
DETENTION BASIN GRADING – PLAN 3

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

(DRAWING TITLE)
(PROJECT TITLE)

SHEET NO

Call before you Dig
1-800-227-2600
Call before you Dig
1-702-593-6111



NOTES

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ONOVAN WAY (28' WIDE) – 6" TYPE II AGGREGATE BASE

W–LEVEL OUTLET STRUCTURE PER DETAIL 2 SHEET 34
PER SHEET 55

GH LEVEL OUTLET STRUCTURE PER SHEET 54

ILLING WELL PER DETAIL 1 SHEET 36

FLOW STRUCTURE #1 PER SHEET 32 & 47

FLOW STRUCTURE #2 PER SHEET 32 & 47

STALL (2) 12'x8' RCB PER SECTION F SHEET 49

STALL (2) 10'x6' RCB PER SECTION C SHEET 49

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STALL (2) 10'x3' RCB PER SECTION D SHEET 49

STALL 12'x8' RCB PER SECTION E SHEET 49

STALL 12'x8' CORRUGATED RCB PER SECTION E SHEET 49

STALL 8'x6' RCB PER SECTION G SHEET 49

STALL 5'x2 75' RCB PER SECTION B SHEET 49

STALL RCB TRANSITION STRUCTURE PER SECTION D SHEET 50

STALL RCB TRANSITION STRUCTURE PER SECTION B&C SHEET 50

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LOCATE 8" WATERLINE PER DETAIL 1 SHEET 35

STALL 60" STL JACK & BORE CASING PER DETAIL 4 SHEET 35

STALL CONCRETE DEPTH GAGE PER DETAIL 7 SHEET 35

GRAPHIC SCALE

0 20 40 80 160

(IN FEET)
HORZ. 1 inch = 40 ft.
VERT. 1 inch = 4 ft.

PBSJ
901 North Green Valley Pkwy
Suite 100
Henderson, Nevada 89014
Telephone: 702/263-7275
Fax: 702/263-7200
ENGINEERING • PLANNING • SURVEYING • CONSTRUCTION SERVICES

OF BEARING

CT BASIS OF BEARING IS BETWEEN THE SOUTH QUARTER CORNER AND THE
CORNER OF SECTION 31, TOWNSHIP 19 SOUTH RANGE 62 EAST MDM, CITY
LAS VEGAS, CLARK COUNTY NEVADA. THIS BEARING N89°33'14"E IS BASED
MAP BOOK 10 PAGE 76, ON RECORD IN THE CLARK COUNTY RECORDERS

HMARK

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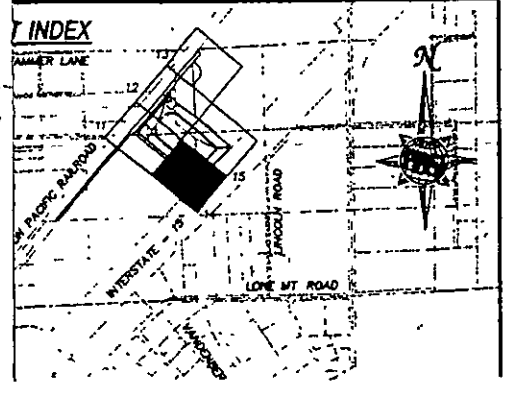
T INDEX



REVISIONS

NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			

SCALE 1" = 40'
DESIGN A. SPATA
DRAWN A SPATA
CHECKED D DAVIS
APPROVED T BRADY
DATE JULY 19, 1999

PROFESSIONAL ENGINEER – STATE OF NEVADA
DONALD V. DAVIS
CIVIL
No. 8087

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

DETENTION BASIN GRADING – PLAN 4

VANDENBERG DETENTION BASIN

INTERSTATE 15 AT VANDENBERG DRIVE

(DRAWING TITLE) (PROJECT TITLE) (LOCATION)

SHEET NO

NOTE FENCING NOT SHOWN FOR CLARITY REFER TO FENCING PLAN-SHEET 37

REFER TO SHEET 10 FOR COORDINATE TABLE & SHEET 9 FOR SURVEY CONTROL DATA

UNION PACIFIC RAILROAD

DONOVAN WAY

LAND LUCKY LLC

℄ CURVE DATA
Δ = 42°36'44"
R = 100.00'
L = 74.23'
T = 38.92'

℄ DATA
N02°25'23"W
302.03'

℄ DATA
S49°53'39"E
96.00'

℄ DATA
N40°06'21"E
314.88'

℄ CURVE DATA
Δ = 90°00'00"
R = 100.00'
L = 157.08'
T = 100.00'

℄ RAILROAD

N40°06'21"E

CENTER SECTION LINE SECTION 31

150' R/W UPRR

DONOVAN R/W ℄

EXISTING BRIDGE STRUCTURE

REFER TO SHEET 31 FOR ENLARGEMENT DETAIL 2

CAUTION EXISTING CAL/NEV PETROLEUM LINE & OVER HEAD POWER

PH-7A
PH-6A
PH-5A

FOR DONOVAN WAY IMPROVEMENTS REFER TO PLAN AND PROFILE SHEETS 25 THRU 28

REFER TO SHEET 32 FOR FOR ENLARGEMENT DETAIL INFLOW STRUCTURE #1

STA 38+27.74 SOUTH ℄ SDMH #1

Call before you Overhead 1-702-593-6111 NEVADA POWER (EMERGENCY AND SAFETY SERVICES DEPARTMENT)

Call before you Dig 1-800-227-2600 UNDERGROUND SERVICE (NSA)

KEY NOTES

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(IN FEET)
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VERT. 1 inch = 4 ft.

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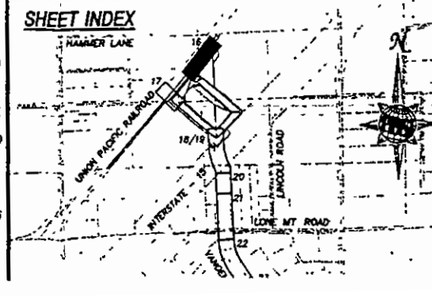


EXISTING GRADE ℄ RCB

PROPOSED FINISH GRADE ℄ RCB

ENERGY GRADE LINE

HYDRAULIC GRADE LINE

INFLOW STRUCTURE #1 REFER TO DETAIL & SECTION A/32 2/47

STA 34+12.15 BEGIN INFLOW STRUCTURE #1 INV = 1911.83

STA 34+67.15 BEGIN 12'x8' RCB (CORRUGATED) INV = 1912.10

STA 34+92.15 GB INV = 1912.23

TOP OF WALL 1922.82

105LF 12'x8' RCB (CORRUGATED) Q_{cc}=2100cfs S=0.72%

25LF 12'x8' RCB (CORRUGATED) S=0.50%

STA 35+97.15 GB INV = 1921.02

102.03LF 12'x8' RCB (CORRUGATED) Q_{cc}=2100cfs

74.23LF 12'x8' RCB Q_{cc}=2100cfs

S=1.40%

24LF RCB TRANSITION STRUCTURE S=14.00%

202.59LF 12'x8' RCB Q_{cc}=2100cfs

73.29LF (2) 10'x6' RCB'S Q_{cc}=2100cfs

S=3.71%

15LF RCB TRANSITION STRUCTURE S=6.80%

100.04LF (2) 12'x8' RCB'S Q_{cc}=2100cfs

S=2.70% (RT)

S=4.23% (LT)

S=1.03%

S=3.19%

STA 36+99.18 P.C. TO CORRUGATED RCB BEGIN 100' RADIUS INV = 1922.45

STA 37+73.41 PT END 100' RADIUS INV = 1923.49

STA 38+27.74 SOUTH ℄ RIM = 1945.74

EXISTING GRADE ℄ RCB

PROPOSED

STA 39+78.00 END 12'x8' RCB AND BEGIN TRANSITION STRUCTURE INV = 1926.33

STA 39+82.00 BEGIN CENTER WALL WITHIN TRANSITION STRUCTURE INV = 1927.17

STA 40+00.00 END TRANSITION STRUCTURE AND BEGIN (2) 10'x6' RCB'S INV = 1929.69

STA 40+73.59 GB END (2) 10'x6' RCB'S & BEGIN TRANSITION STRUCTURE INV = 1932.04

STA 40+88.29 GB P/C END TRANSITION STRUCTURE, BEGIN (2) 12'x8' RCB'S & BEGIN 100' RADIUS INV = 1933.36

STA 41+50.00 GB LEFT & RIGHT INVERTS OF RCB TO MATCH GABION OPEN CHANNEL INV = 1935.33

STA 41+88.33 GB END (2) 12'x8' RCB'S & BEGIN GABION OPEN CHANNEL PER D/53 INV = 1936.55

STA 41+94± EX 14" PET TOP=(33.4±)

STA 41+99± EX AB 6"PET TOP=(33.6±)

STA 424+04± EX 8"PET TOP=(34.4±)

STA 424+13.53 CONNECT TO EXISTING CONCRETE STRUCTURE PER 6/46 SIM INV = 1936.81

STA 424+35.45 BRIDGE ENTRANCE & CONNECT TO EXISTING

CAUTION EXISTING CAL/NEV PETROLEUM LINE & OVERHEAD POWER

GABION OPEN CHANNEL TRANSITION STRUCTURE PER DETAIL 2/31

UPRR R/W

944 940 936 932 928 924 920 916 1944 1940 1936 1932 1928 1924 1920 1916

REVISIONS

NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			

SCALE: 1" = 40'
DESIGN A. SPATA
DRAWN A. SPATA
CHECKED D. DAVIS
APPROVED T. BRADY
DATE JULY 19, 1999

PROFESSIONAL ENGINEER - STATE OF NEVADA
No. 9087
RONALD V. DAVIS
CIVIL
12/31/99

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

INFLOW STRUCTURE #1 - PLAN AND PROFILE

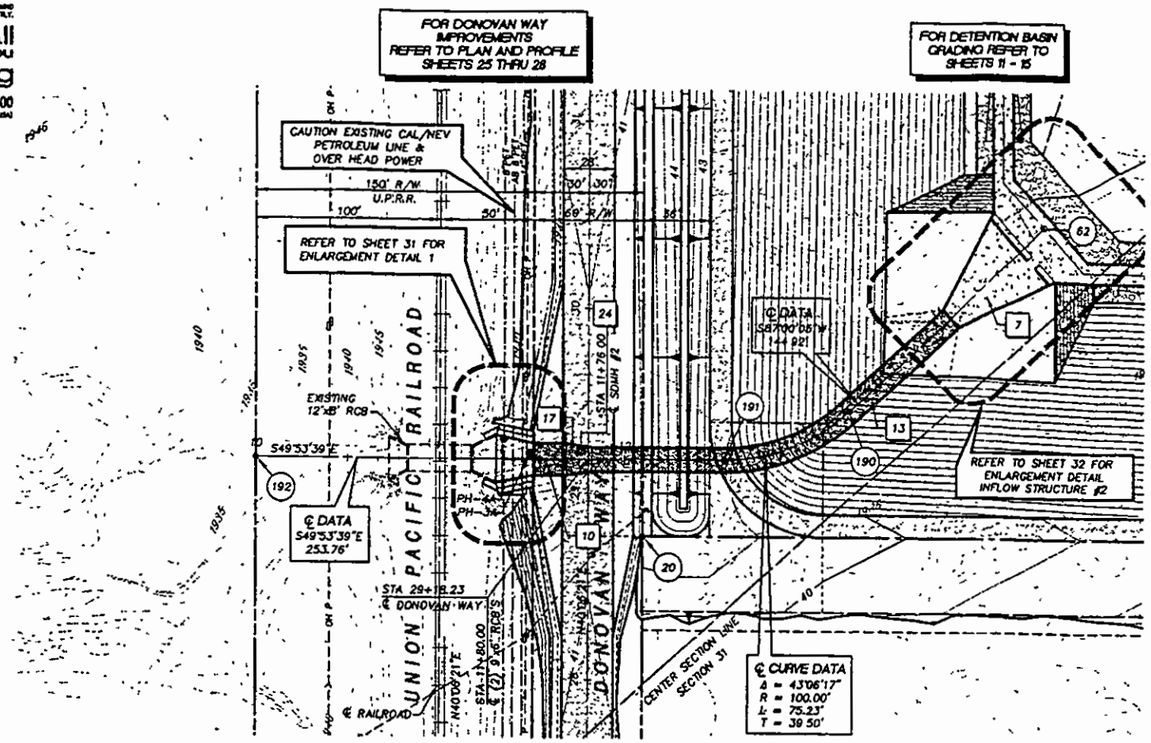
VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

(DRAWING TITLE)
(PROJECT TITLE)
(LOCATION)

SHEET NO.

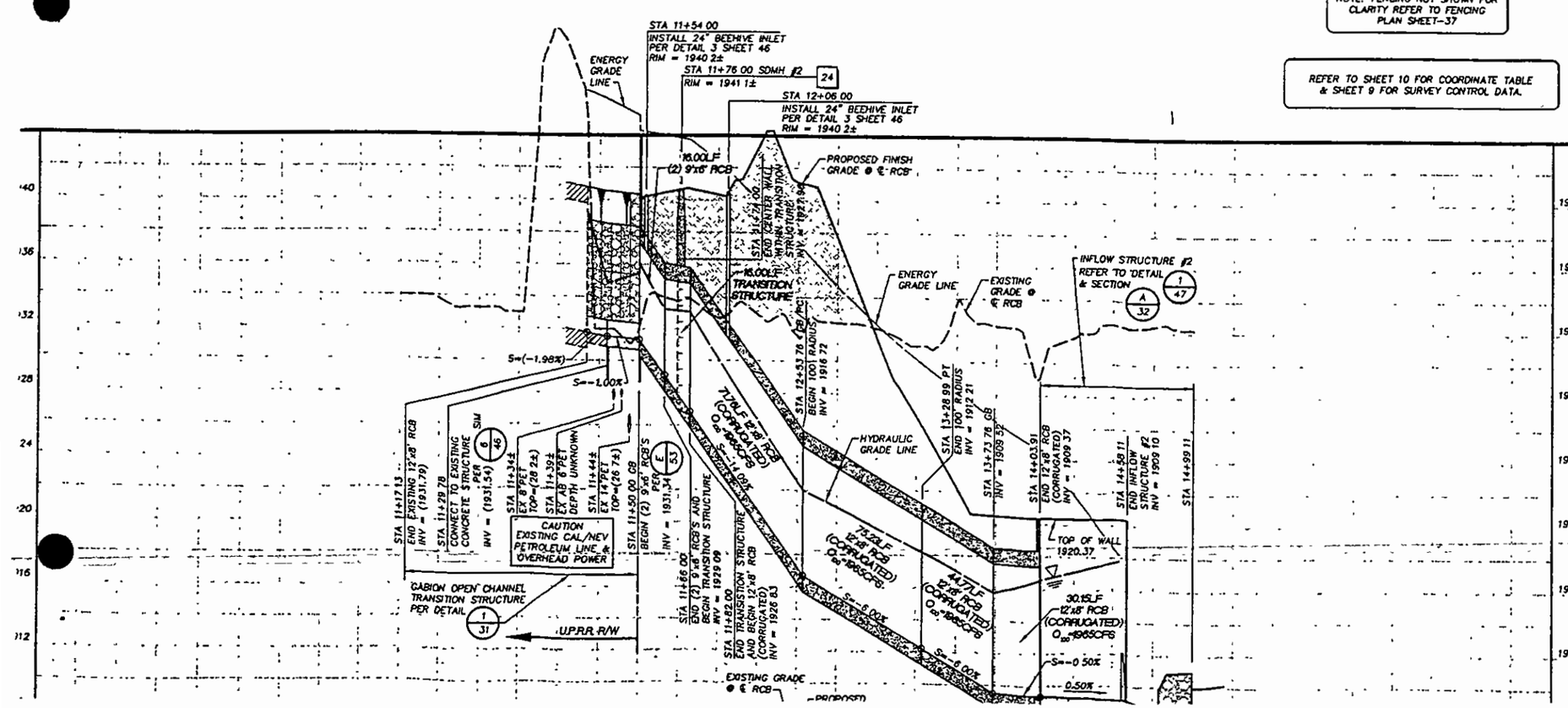
Call before you Overhead 1-702-593-6111

Call before you Dig 1-800-227-2600



NOTE. FENCING NOT SHOWN FOR CLARITY REFER TO FENCING PLAN SHEET-37

REFER TO SHEET 10 FOR COORDINATE TABLE & SHEET 9 FOR SURVEY CONTROL DATA.



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GRAPHIC SCALE

(IN FEET)
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VERT. 1 inch = 4 ft.

PBSJ
901 North Green Valley Pkwy
Suite 100
Henderson, Nevada 89014
Telephone 702/263-7275
Fax 702/263-7200
ENGINEERING · PLANNING · SURVEYING · CONSTRUCTION SERVICES

BASIS OF BEARING

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BENCHMARK

THE PROJECT BENCHMARK IS NAVD 88 BENCHMARK NO. 30627 ELEVATION OF 584.412 METERS (1917.358 FT), BEING 1 6" DIAMETER CONCRETE MONUMENT 6.5 FT BACK OF CURB IN THE CENTER RETURN ON THE SOUTHWEST CORNER OF VANDENBERG DRIVE AND LONE MOUNTAIN ROAD

CAUTION

EXISTING UTILITIES ARE LOCATED ON THE PLANS FROM A SEARCH OF AVAILABLE RECORDS. CONTRACTOR TO VERIFY LOCATIONS AND DEPTHS PRIOR TO CONSTRUCTION

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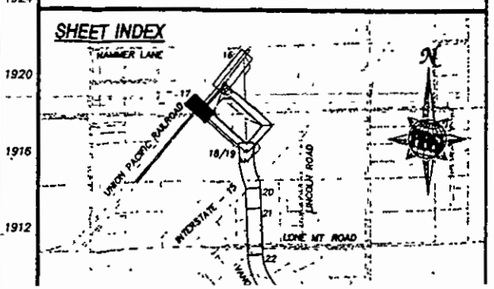

NO	REVISIONS DESCRIPTION	DATE	BY
△			
△			
△			

SCALE: 1" = 40'
DESIGN: A. SPATA
DRAWN: A. SPATA
CHECKED: D. DAVIS
APPROVED: T. BRADY
DATE: JULY 19, 1999

PROFESSIONAL ENGINEER – STATE OF NEVADA – DONALD V. DAVIS – CIVIL – No. 9867 – 7/19/99

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

INFLOW STRUCTURE #2 – PLAN AND PROFILE

VANDENBERG DETENTION BASIN

INTERSTATE 15 AT VANDENBERG DRIVE

(DRAWING TITLE) (PROJECT TITLE) (LOCATION)

SHEET NO.

AVOID OVERHEAD POWER LINE CONTACT... IT'S COSTLY

Call before you Overhead
1-702-593-8111

AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY

Call before you Dig
1-800-227-2600

GRADING PER CITY OF NORTH LAS VEGAS SURVEY OF MARCH 23, 1999 REFLECTS THE APPROXIMATE LATEST CONDITIONS.

INTERSTATE 15

NORTH BOUND I-15

SOUTH BOUND I-15

DENMAN DONALD L.
APN 123-31-801-001

FOR FENCING REFER TO SHEET 32 N.D.O.T. EAST R/W

APPROXIMATE LIMITS OF GRADING

36" RCP

REFER TO SHEET 18 OF 64 FOR LOW-LEVEL OUTFALL PLAN AND PROFILE

50' N.D.O.T. R/W

EXISTING (3) 12'x10' RCB'S

5'x2.75' RCB

℄ DATA
S03°45'32"E
286.91'

℄ DATA
S15°00'41"E
448.64'

REFER TO SHEET 33 FOR ENLARGEMENT DETAIL 1

REFER TO SHEET 33 FOR ENLARGEMENT DETAIL 1

8'x6' RCB

MATCHLINE SEE SHEET 20 OF 64
STATION 17+00.00

NOTE: FENCING NOT SHOWN FOR CLARITY REFER TO FENCING PLAN SHEET-37

PIPE LENGTHS ARE GIVEN ALONG THE CENTERLINE OF PIPE FROM CENTER OF MANHOLE TO CENTER OF MANHOLE

REFER TO SHEET 10 FOR COORDINATE TABLE & SHEET 9 FOR SURVEY CONTROL DATA.

KEY NOTES

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GRAPHIC SCALE

(IN FEET)
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VERT 1 inch = 4 ft.

REFER TO DETAILS B/49 1/33 2/48
REFER TO SECTIONS
REFER TO DETAILS G/53 182 A/52
REFER TO DETAILS 1/33 2/48
REFER TO SECTIONS H/30 G/49
N.D.O.T. R/W
INTERSTATE 15
N.D.O.T. R/W
181 4
184
183
182

REMOVE & REPLACE 6' CHAIN LINK FENCE PER NDOT STD DWG R-6.1

STA 11+71.95 END 5'x2.75' RCB & BEGIN OPEN CHANNEL TRANSITION STRUCTURE W/ ACCESS RAMP PER DG = 1919.87

STA 12+18.03 GB DG = 1919.09

STA 12+31.95 END OPEN CHANNEL TRANSITION STRUCTURE W/ ACCESS RAMP & CONNECT TO EXISTING (3) 12'x10' RCB'S PER DG = (1918.78)

STA 14+80.58 CONNECT TO EXISTING (3) 12'x10' RCB'S AND BEGIN OPEN CHANNEL TRANSITION STRUCTURE W/ ACCESS RAMP PER DG = (1917.22)

STA 15+62.55 BEGIN ACCESS RAMP DG=1916.93

STA 16+03.00 END ACCESS RAMP DG=1916.78

STA 16+43.00 END TRANSITION STRUCTURE AND BEGIN 8'x6' RCB TW=1926.84 / FINISH GRADE DG=1916.64

STA 16+60.58 PC BEGIN 500' RADIUS DG=1916.50

EXISTING GRADE ℄ OF CHANNEL

PROPOSED FINISH GRADE ● ℄ OF PIPE PER GRADING PLAN

ENERGY GRADE LINE

HYDRAULIC GRADE LINE

TOP OF CHANNEL

HIGH-LEVEL OUTLET 4

STA 9+46.04 INV OUT = 1911.60

225.90LF 5'x2.75' RCB Q_{25}=200cfs S=-0.50%

2' OVEREXCAVATION WITH 6" SCARIFIED AND RECOMPACTED NATIVE MATERIAL AND 18" STRUCTURAL BACKFILL PER SPECIFICATIONS

PROPOSED DESIGN GRADE (DG) ● ℄

S=-2.23%

S=-1.89%

S=-0.63%

EXISTING (3) 12'x10' RCB'S

S=-0.36%

S=-0.36%

57LF 8'x6' RCB Q_{25}=200cfs

PROPOSED GRADE ● ℄ RCB 0.36%

PROPOSED DESIGN GRADE (DG) ● ℄

ACCESS RAMP (LEFT) 12.4%

EXISTING GRADE ● ℄ OF RCB

EXISTING ELEVATION ● ℄ OF CHANNEL

PROPOSED CHANNEL (DG)

STA 9+60.84 INSTALL 1' THICK CONCRETE "CUT-OFF WALL" 1' BEYOND ALL LIMITS OF TRENCH EXCAVATION & 2' CLR ABOVE RCB REFER TO 10/35

MATCHLINE SEE SHEET 20 OF 64
STATION 17+00.00

344 940 936 932 928 924 920 1916 1912 1944 1940 1936 1932 1928 1924 1920 1916 1912

PBSJ
901 North Green Valley Pkwy
Suite 100
Henderson, Nevada 89014
Telephone: 702/263-7272
Fax: 702/263-7200
ENGINEERING • PLANNING • SURVEYING • CONSTRUCTION SERVICES

BASIS OF BEARING

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THE PROJECT BENCHMARK IS NAVD 88 BENCHMARK NO. 30627 ELEVATION OF 584.412 METERS (1917.358 FT), BEING 16" DIAMETER CONCRETE MONUMENT 6.5 FT BACK OF CURB IN THE CENTER RETURN ON THE SOUTHWEST CORNER OF VANDENBERG DRIVE AND LONE MOUNTAIN ROAD.

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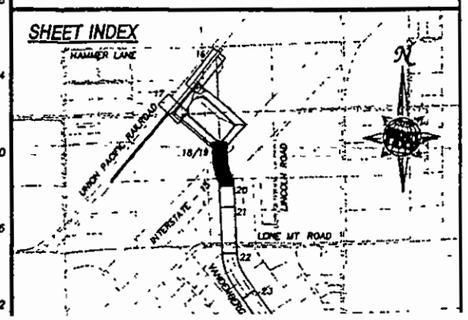
SHEET INDEX



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

HIGH-LEVEL OUTFALL - PLAN AND PROFILE STA 9+40.84 TO STA 17+00.00

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

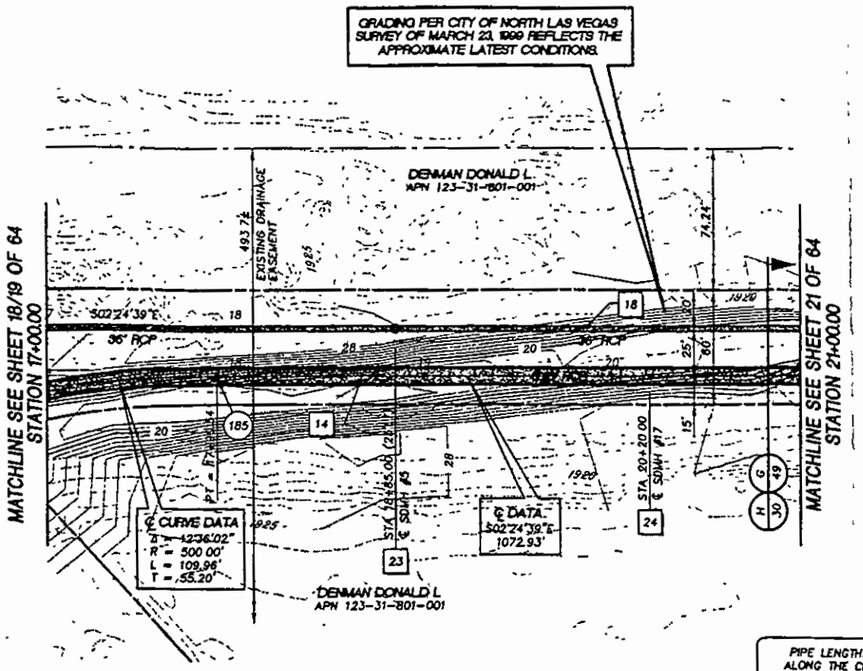
NO	REVISIONS DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			

SCALE 1" = 40'
DESIGN A SPATA
DRAWN A SPATA
CHECKED D DAVIS
APPROVED T BRADY
DATE JULY 19, 1999

PROFESSIONAL ENGINEER - STATE OF NEVADA - DAVID V DAVIS - CIVIL - No. 9887

SHEET NO

Call before you Overhead
-702-593-8111
Call before you Dig
1-800-227-2600



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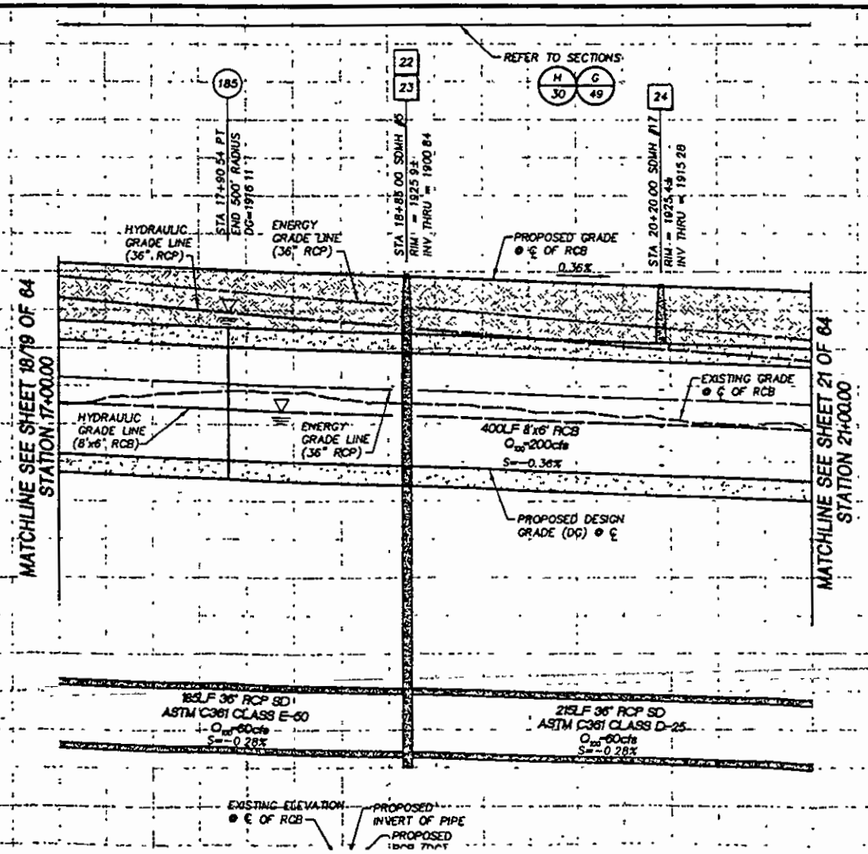

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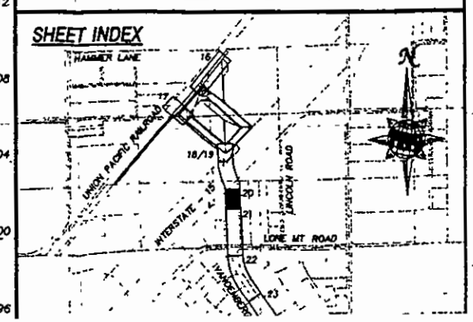

SHEET NO.

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

OUTFALL - PLAN AND PROFILE STA 17+00.00 TO STA 21+00.00

VANDENBERG DETENTION BASIN

INTERSTATE 15 AT VANDENBERG DRIVE

REVISIONS			
NO	DESCRIPTION	DATE	BY
Δ			
Δ			
Δ			
Δ			

SCALE 1" = 40'
DESIGN A. SPATA
DRAWN A. SPATA
CHECKED D. DAVIS
APPROVED T. BRADY
DATE: JULY 19, 1999

PROFESSIONAL ENGINEER - STATE OF NEVADA
DONALD V. DAVIS
CIVIL
No. 8067
7/19/99

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CLARK COUNTY DEPARTMENT OF AVIATION

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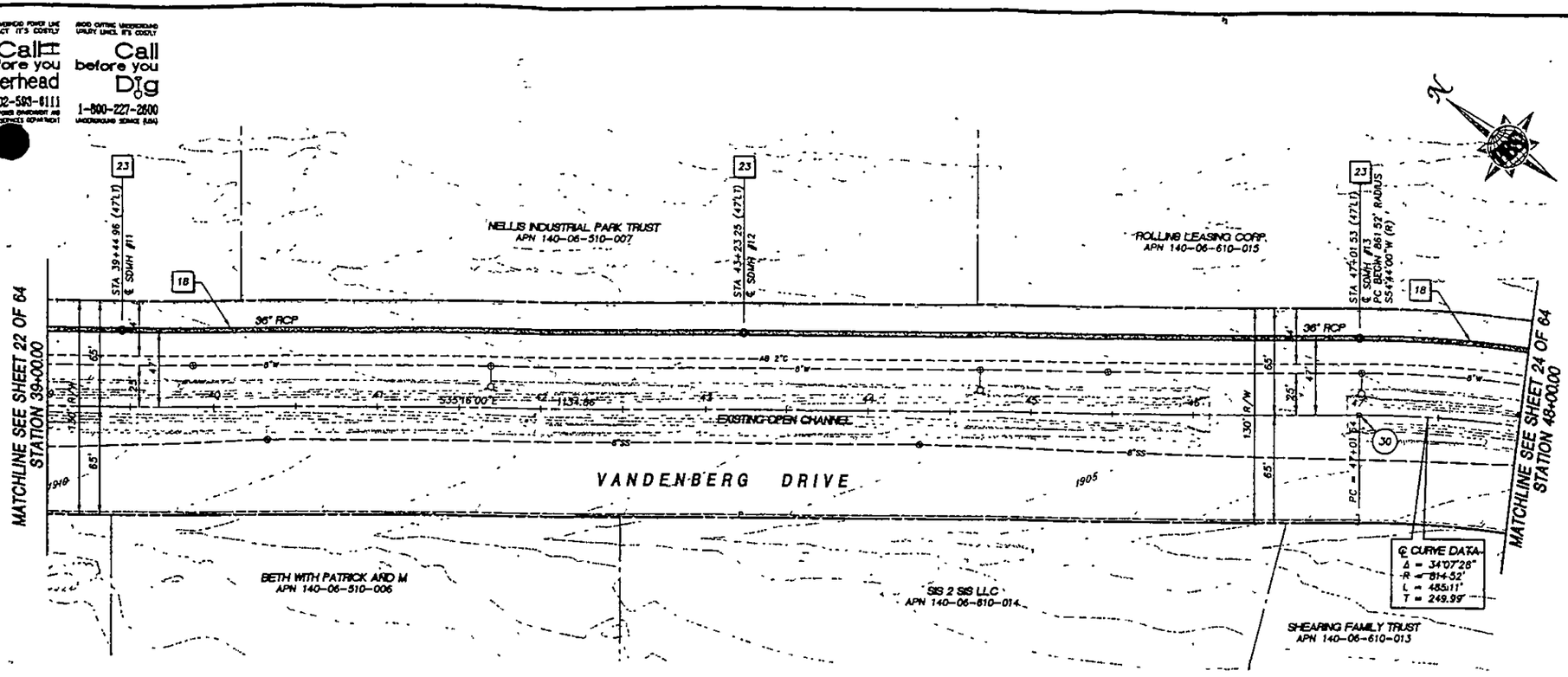
1-800-227-2600
UNDERGROUND SERVICE (USA)



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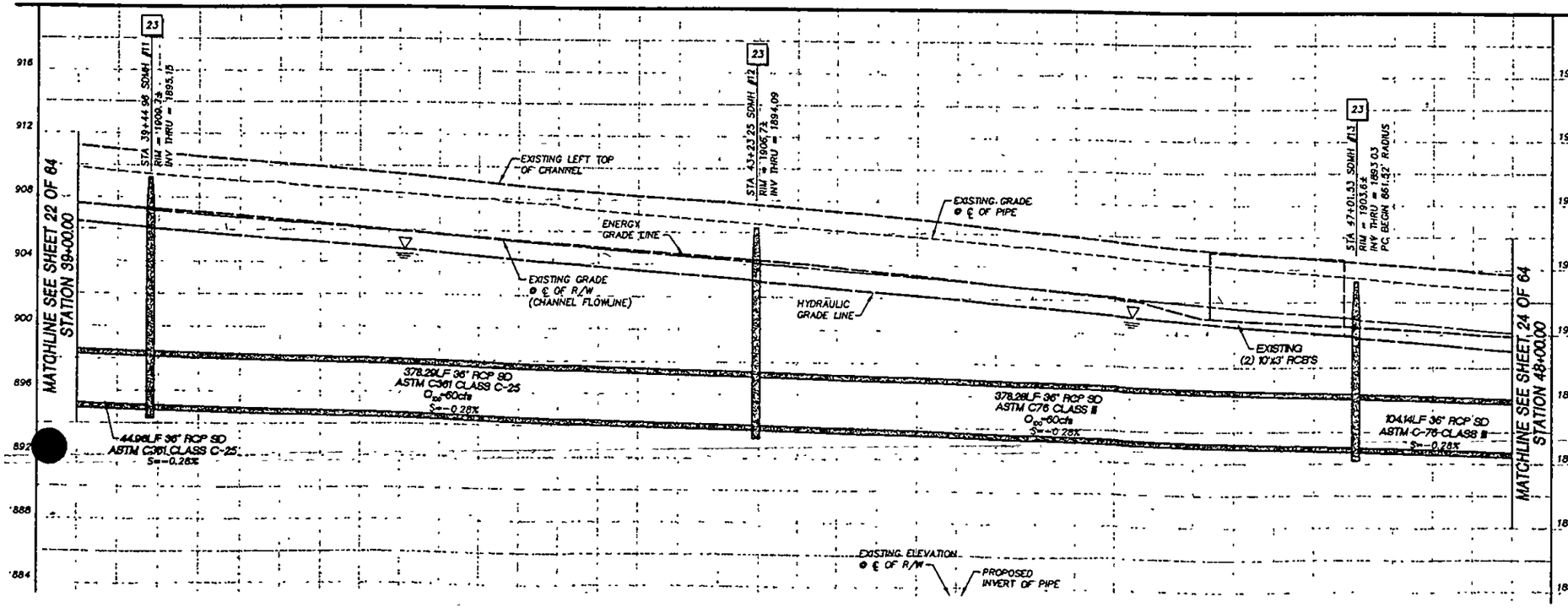

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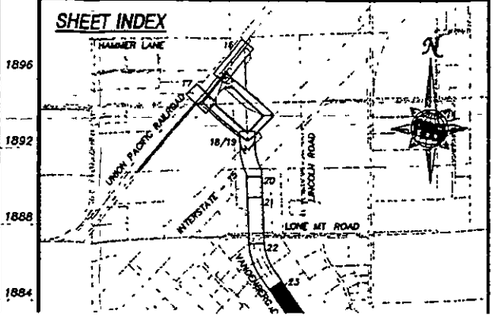


REVISIONS

NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			

SCALE: 1" = 40'
DESIGN A SPATA
DRAWN A SPATA
CHECKED D DAVIS
APPROVED T. BRADY
DATE: JULY 19, 1999

PROFESSIONAL ENGINEER STATE OF NEVADA DOUGLAS V. DAVIS CIVIL No. 8997

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

OUTFALL - PLAN AND PROFILE STA 39+00.00 TO STA 48+00.00

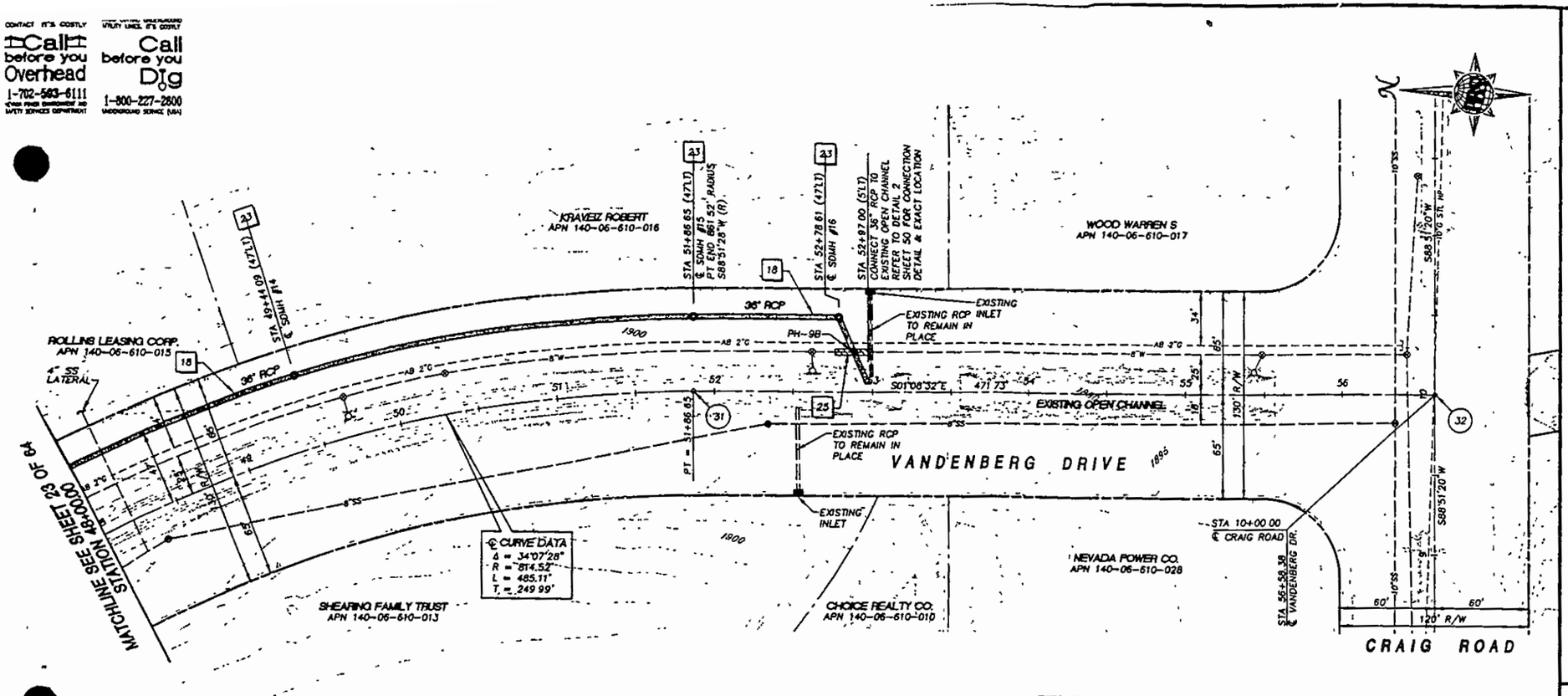
VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

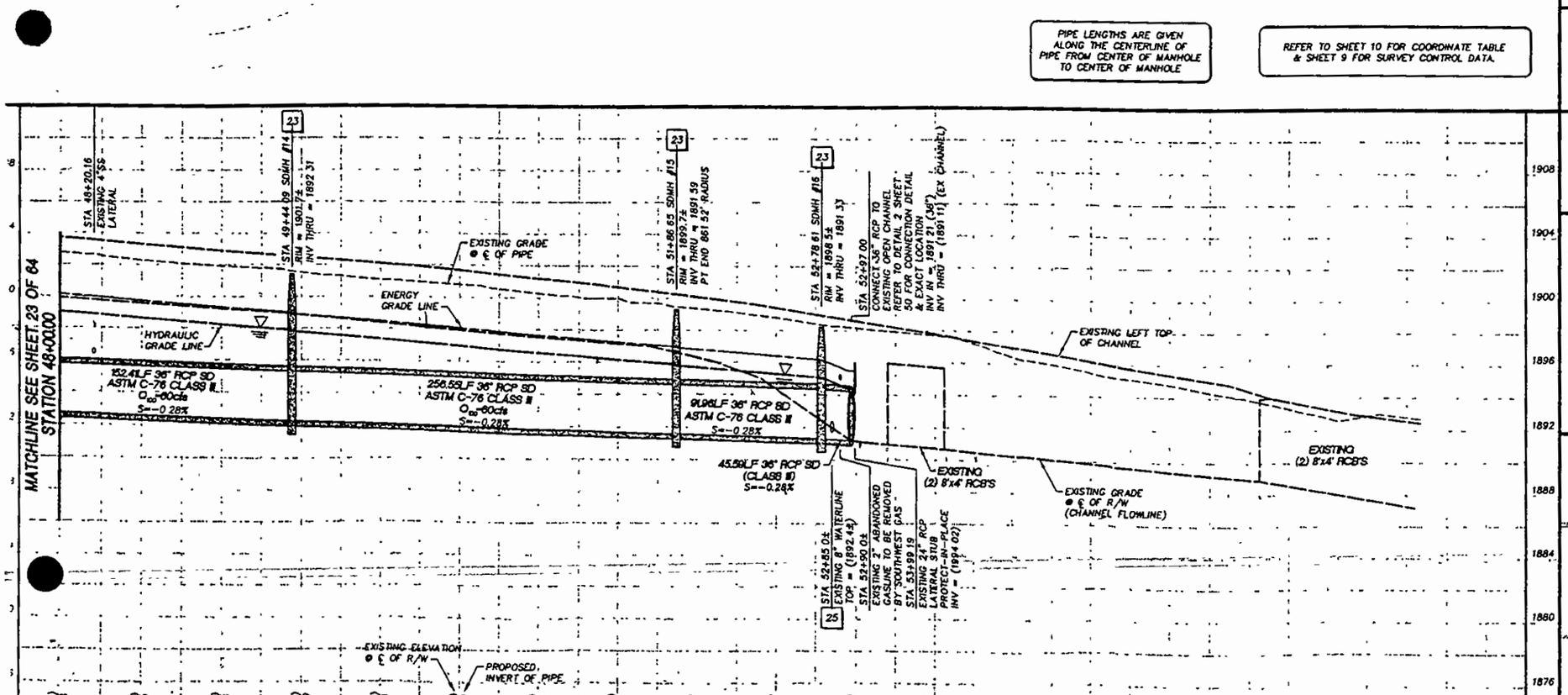
(DRAWING TITLE) (PROJECT TITLE) (LOCATION)

SHEET NO. 2

CONTACT IT'S COSTLY
Call before you Overhead
1-702-563-6111
(CLARK COUNTY DEPARTMENT OF AVIATION SAFETY SERVICES DEPARTMENT)

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





PIPE LENGTHS ARE GIVEN ALONG THE CENTERLINE OF PIPE FROM CENTER OF MANHOLE TO CENTER OF MANHOLE

REFER TO SHEET 10 FOR COORDINATE TABLE & SHEET 9 FOR SURVEY CONTROL DATA.

KEY NOTES

1. DETENTION BASIN PERIMETER ROAD – 6" TYPE II AGGREGATE BASE
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15. INSTALL 5'x2.75' RCB PER SECTION B SHEET 49
16. INSTALL RCB TRANSITION STRUCTURE PER SECTION D SHEET 50
17. INSTALL RCB TRANSITION STRUCTURE PER SECTION B&C SHEET 50
18. INSTALL 36" RCP SD PER TRENCH SECTION 1 SHEET 34
19. INSTALL 36" END SECTION W/ RIP-RAP PER DETAIL 3 SHEET 34
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27. INSTALL CONCRETE DEPTH GAGE PER DETAIL 7 SHEET 35

GRAPHIC SCALE

(IN FEET)
HORZ. 1 inch = 40 ft.
VERT. 1 inch = 4 ft.

PBS&J
901 North Green Valley Pkwy
Suite 100
Henderson, Nevada 89014
Telephone: 702/263-7275
Fax: 702/263-7300
ENGINEERING • PLANNING • SURVEYING • CONSTRUCTION SERVICES

BASIS OF BEARING

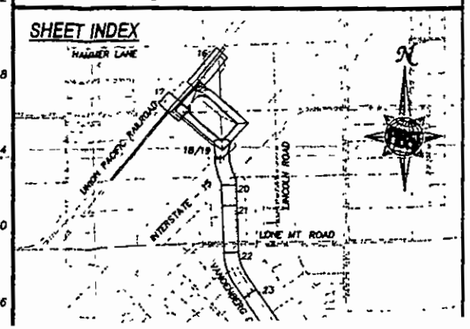
THE PROJECT BASIS OF BEARING IS BETWEEN THE SOUTH QUARTER CORNER AND THE SOUTHEAST CORNER OF SECTION 31, TOWNSHIP 19 SOUTH, RANGE 61 EAST MDM, CITY OF NORTH LAS VEGAS, CLARK COUNTY NEVADA. THIS BEARING N89°33'14"E IS BASED UPON PLAT MAP BOOK 10 PAGE 78 ON RECORD IN THE CLARK COUNTY RECORDERS OFFICE.

BENCHMARK

THE PROJECT BENCHMARK IS NAVD 88 BENCHMARK NO. 30627 ELEVATION OF 584.412 METERS (1917.338 FT), BEING 16" DIAMETER CONCRETE MONUMENT 6.5 FT BACK OF CURB IN THE CENTER RETURN ON THE SOUTHWEST CORNER OF VANDENBERG DRIVE AND LONE MOUNTAIN ROAD

CAUTION!
EXISTING UTILITIES ARE LOCATED ON THE PLANS FROM A SEARCH OF AVAILABLE RECORDS. CONTRACTOR TO VERIFY LOCATIONS AND DEPTHS PRIOR TO CONSTRUCTION

SHEET INDEX



SHEET NO.

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

OUTFALL – PLAN AND PROFILE STA 48+00.00 TO STA 57+00.00

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

REVISIONS	NO	DESCRIPTION	DATE	BY
	1			
	2			
	3			
	4			

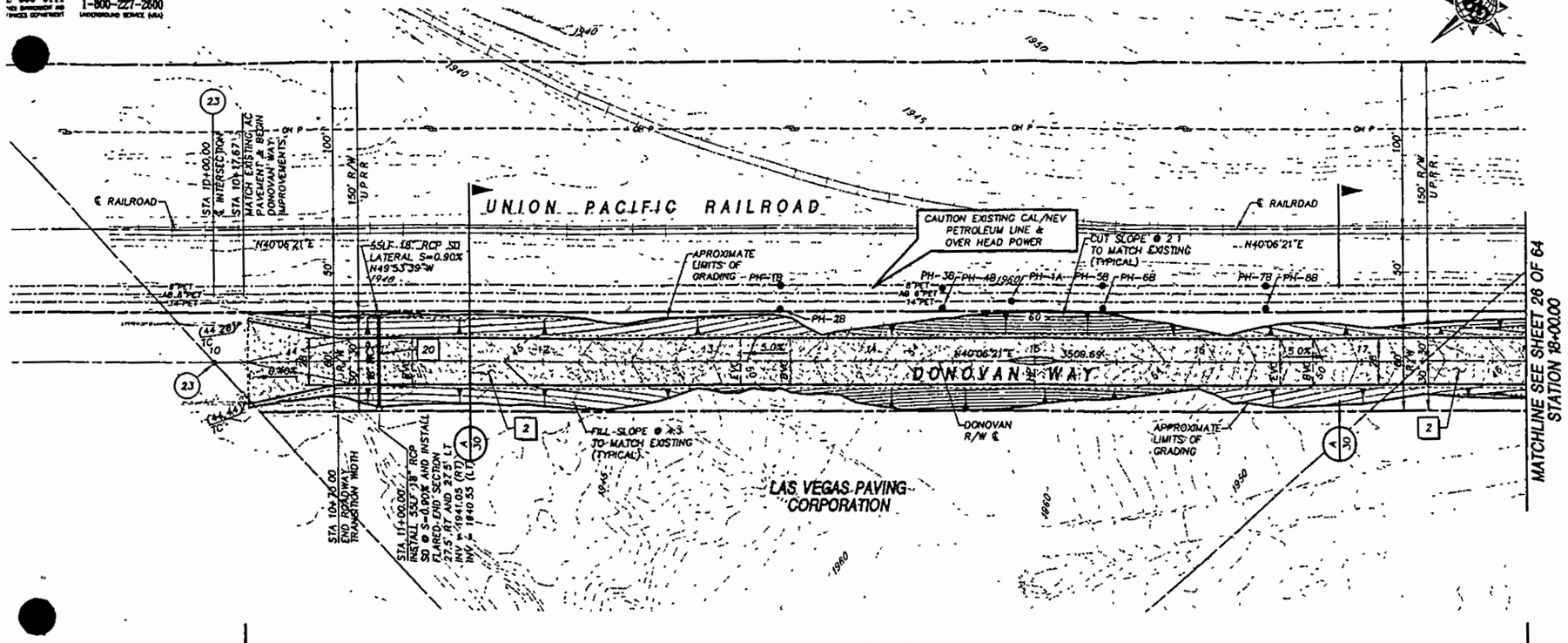
SCALE: 1" = 40'
DESIGN: A. SPATA
DRAWN: A. SPATA
CHECKED: D. DAVIS
APPROVED: T. BRADY
DATE: JULY 19, 1999

PROFESSIONAL ENGINEER - STATE OF NEVADA
DAVID V. DAVIS
CIVIL
No. 8087
7/19/99

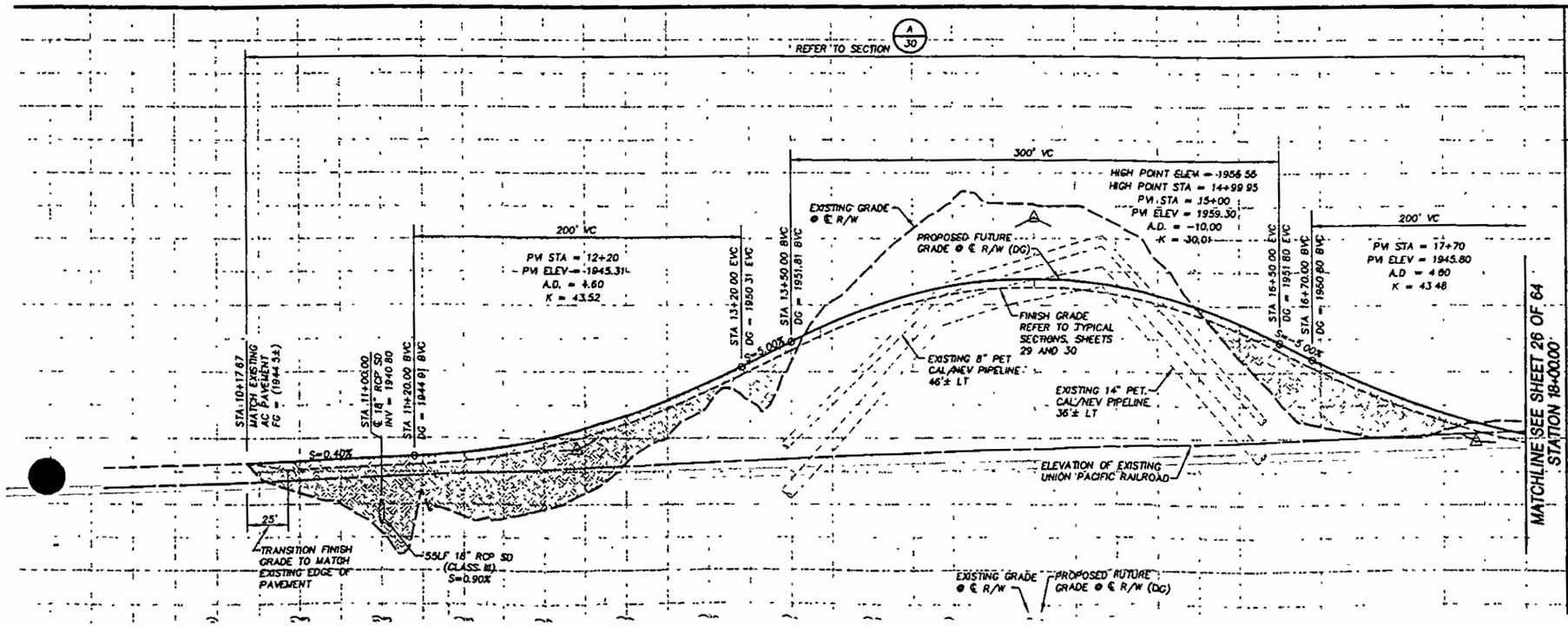
(DRAWING TITLE) (PROJECT TASK) (LOCATION)

Call before you Dig
1-800-227-2600

REFER TO SHEET 10 FOR COORDINATE TABLE & SHEET 9 FOR SURVEY CONTROL DATA.



ADDITIVE ALTERNATE #1 - TEMPORARY ACCESS



KEY NOTES

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GRAPHIC SCALE

(IN FEET)
HORZ. 1 inch = 40 ft.
VERT 1 inch = 4 ft.

PBSJ
901 North Green Valley Pkwy
Suite 100
Henderson, Nevada 89014
Telephone 702/263-7273
Fax 702/263-7200
ENGINEERING • PLANNING • SURVEYING • CONSTRUCTION SERVICES

BASIS OF BEARING

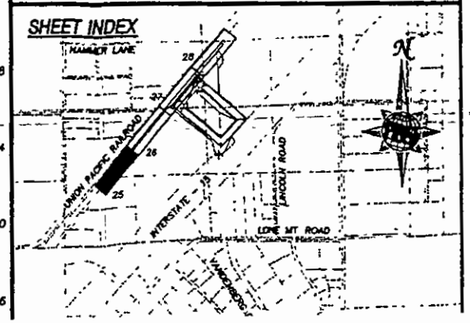
THE PROJECT BASIS OF BEARING IS BETWEEN THE SOUTH QUARTER CORNER AND THE SOUTHEAST CORNER OF SECTION 31, TOWNSHIP 19 SOUTH, RANGE 62 EAST, MDM, CITY OF NORTH LAS VEGAS, CLARK COUNTY, NEVADA. THIS BEARING N89°33'14"E IS BASED UPON PLAT MAP BOOK 10 PAGE 76 ON RECORD IN THE CLARK COUNTY RECORDERS OFFICE.

BENCHMARK

THE PROJECT BENCHMARK IS NAVD 88 BENCHMARK NO. 30627 ELEVATION OF 584.412 METERS (1917.358 FT), BEING 16" DIAMETER CONCRETE MONUMENT 8.5 FT BACK OF CURB IN THE CENTER RETURN ON THE SOUTHWEST CORNER OF VANDENBERG DRIVE AND LONE MOUNTAIN ROAD

CAUTION
EXISTING UTILITIES ARE LOCATED ON THE PLANS FROM A SEARCH OF AVAILABLE RECORDS. CONTRACTOR TO VERIFY LOCATIONS AND DEPTHS PRIOR TO CONSTRUCTION

SHEET INDEX



REVISIONS

NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			

SCALE: 1" = 40'
DESIGN: A. SPATA
DRAWN: A. SPATA
CHECKED: D. DAVIS
APPROVED: T. BRADY
DATE: JULY 19, 1999

PROFESSIONAL ENGINEER STATE OF NEVADA
REINHILD V. DAVIS
CIVIL
No. 8987

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

DONOVAN WAY - PLAN AND PROFILE STA 9+00.00 TO STA 18+00.00
(CONSTRUCTION TITLE)

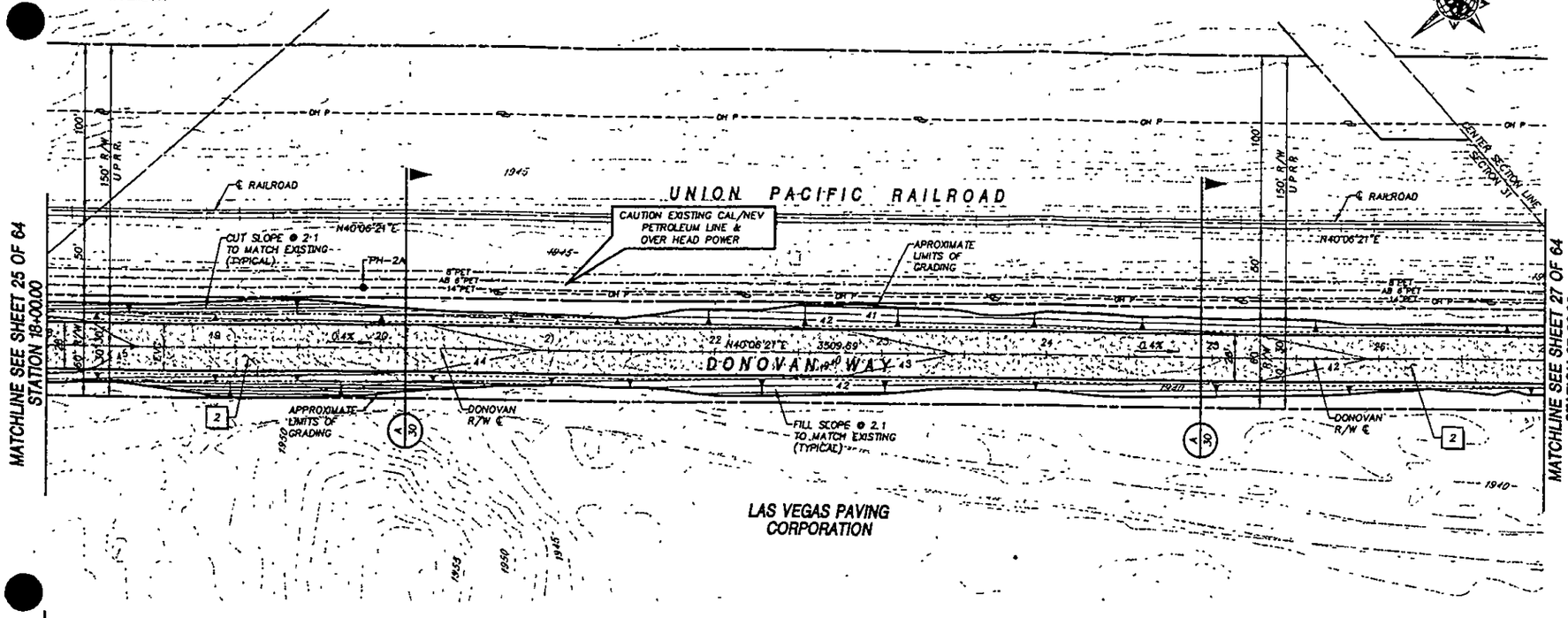
VANDENBERG DETENTION BASIN
(PROJECT TITLE)

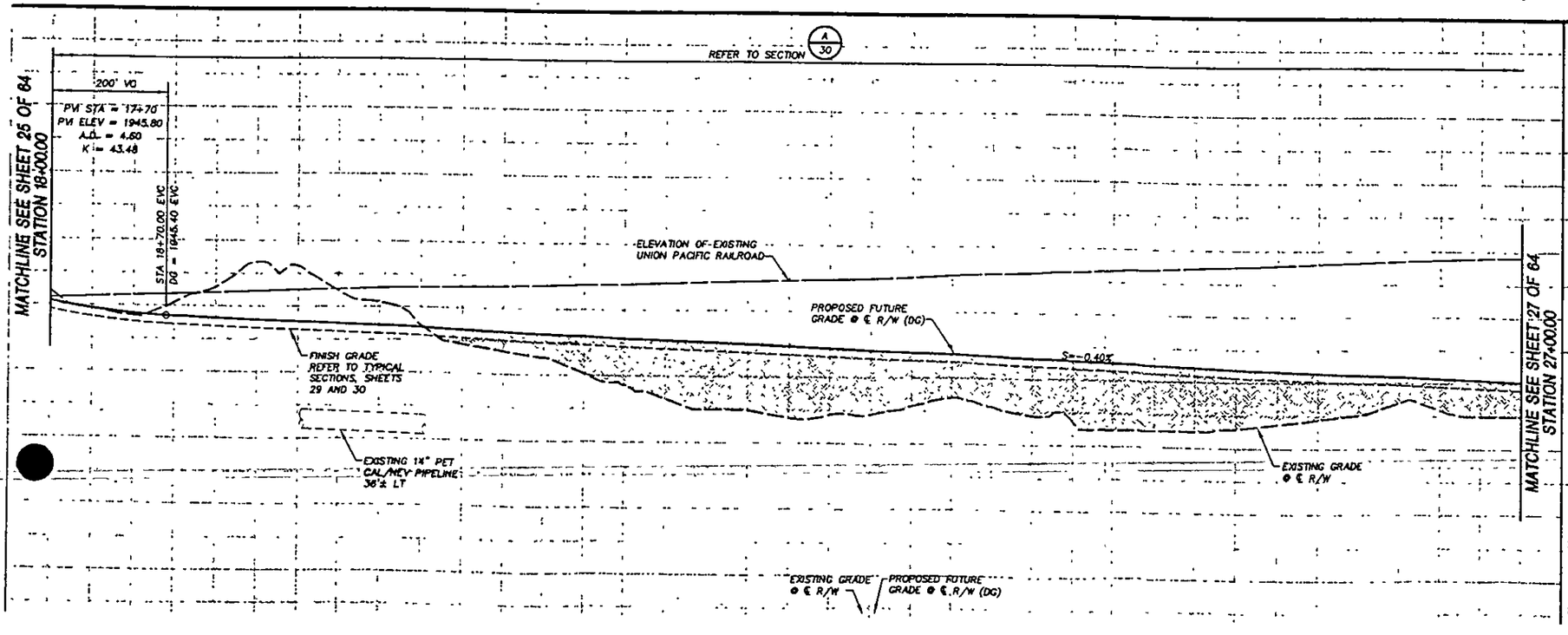
INTERSTATE 15 AT VANDENBERG DRIVE
(LOCATION)

SHEET NO.

Call before you Dig
1-800-227-2600

REFER TO SHEET 10 FOR COORDINATE TABLE & SHEET 9 FOR SURVEY CONTROL DATA.





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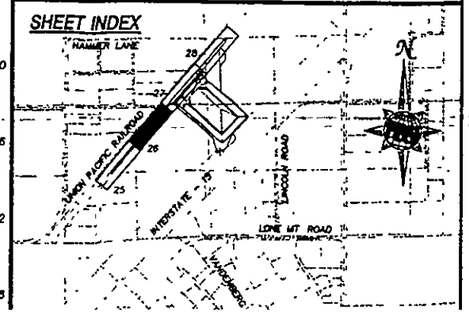
SHEET INDEX



SHEET NO.

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

DONOVAN WAY – PLAN AND PROFILE STA 18+00.00 TO STA 27+00.00

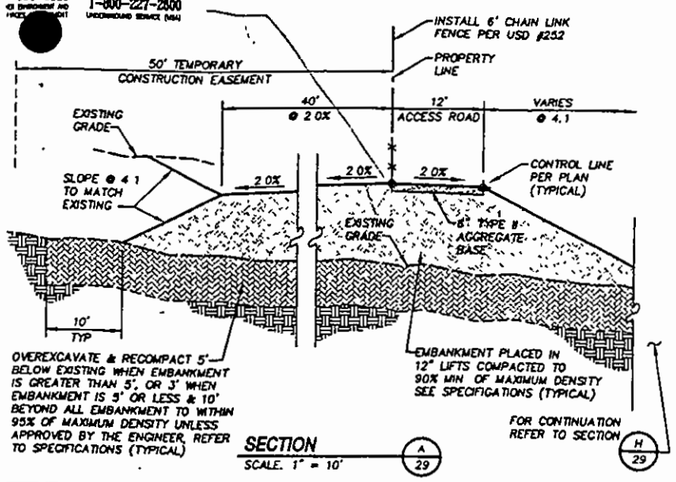
VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

REVISIONS			
NO	DESCRIPTION	DATE	BY
Δ			
Δ			
Δ			
Δ			

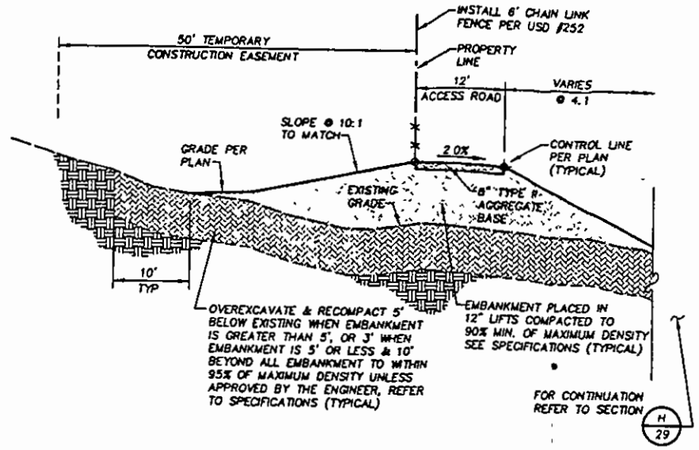
SCALE 1" = 40'
DESIGN A SPATA
DRAWN A SPATA
CHECKED D DAVIS
APPROVED T BRADY
DATE JULY 19, 1999

PROFESSIONAL ENGINEER STATE OF NEVADA
RONALD V. DAVIS
CIVIL
No. 9987

Call before you Dig
1-800-227-2600
UNDERGROUND SERVICE (NSA)



SECTION A 29
SCALE. 1" = 10'



SECTION B 29
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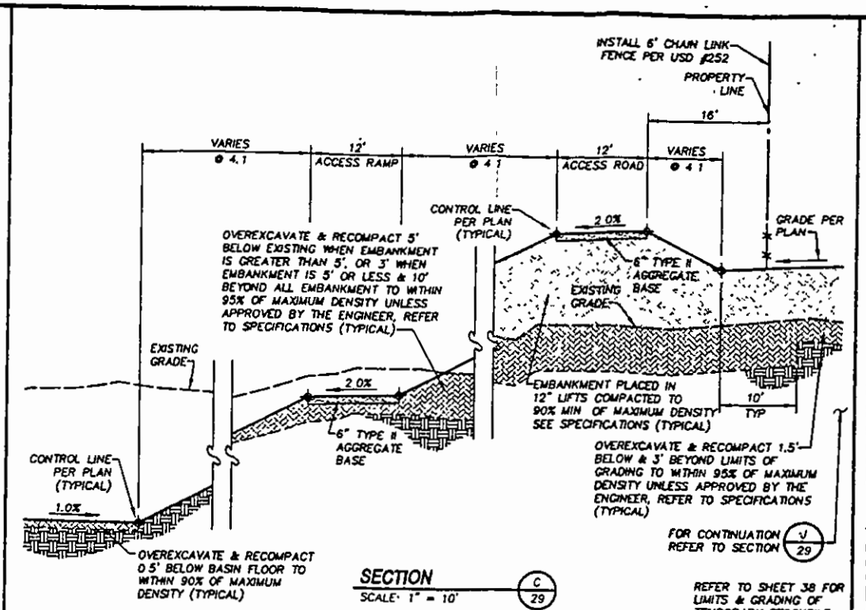
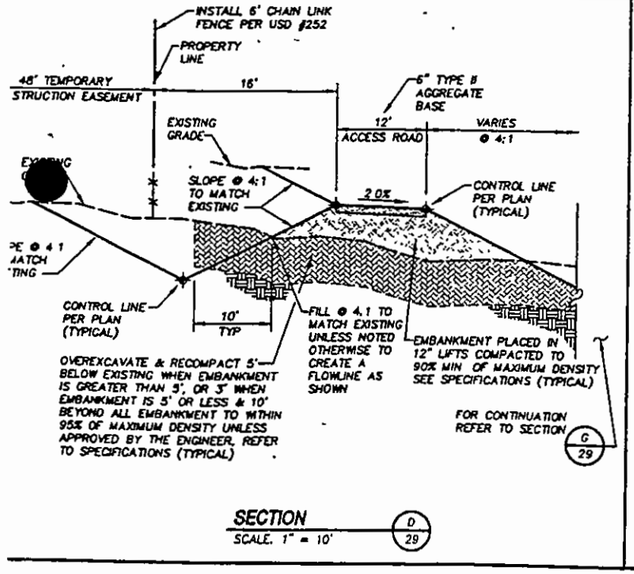
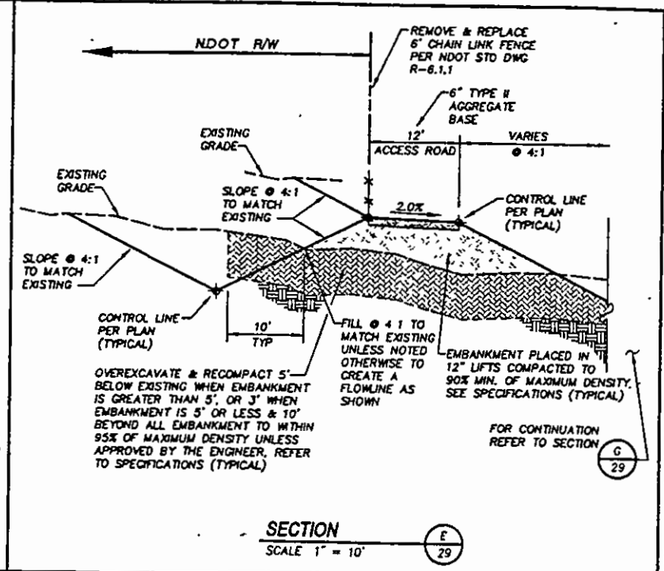


SECTION C 29
SCALE 1" = 10'

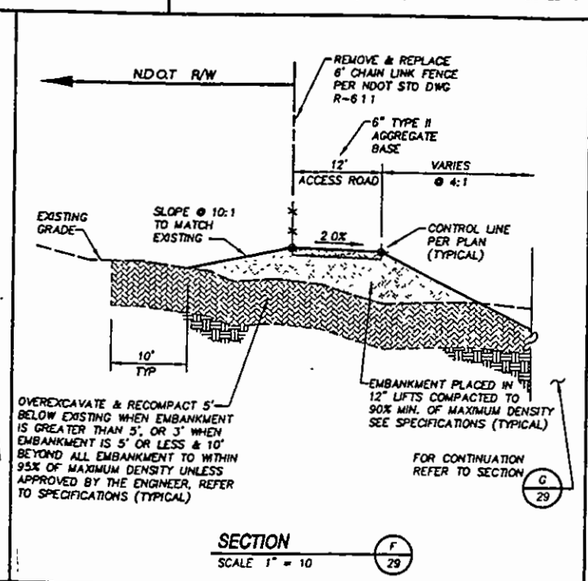
REFER TO SHEET 38 FOR LIMITS & GRADING OF TEMPORARY STOCKPILE



SECTION D 29
SCALE. 1" = 10'

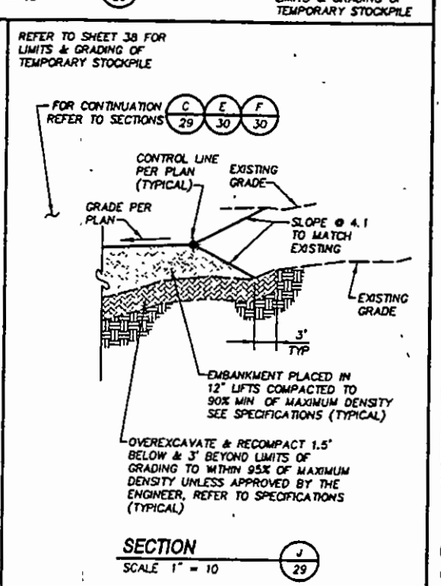


SECTION E 29
SCALE 1" = 10'

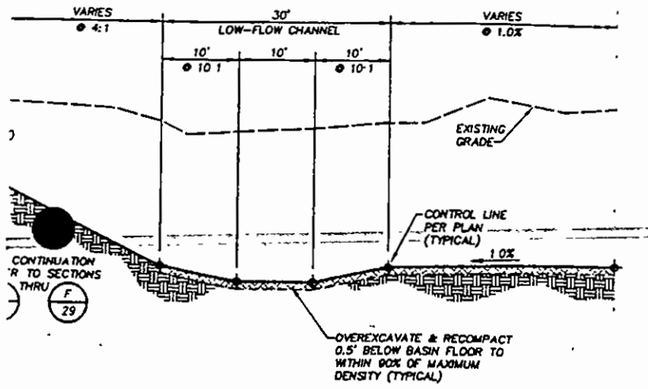


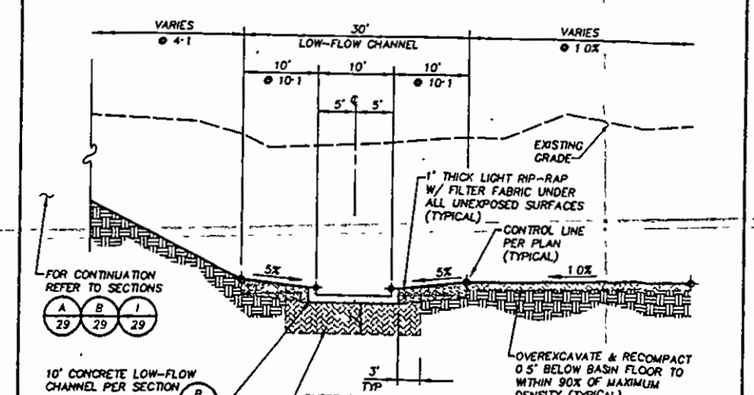
SECTION F 29
SCALE 1" = 10

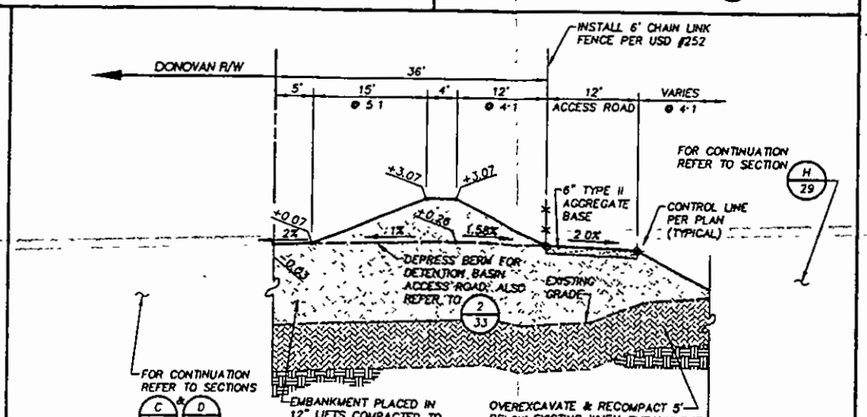
REFER TO SHEET 38 FOR LIMITS & GRADING OF TEMPORARY STOCKPILE



SECTION J 29
SCALE 1" = 10







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

REVISIONS

NO.	DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			

SCALE: 1" = 10'
DESIGN: A SPATA
DRAWN: A SPATA
CHECKED: D DAVIS
APPROVED: T BRADY
DATE: JULY 19, 1999

PROFESSIONAL ENGINEER - STATE OF NEVADA - JOHN V. DAVIS - CIVIL - No. 9887 - 7/2/99

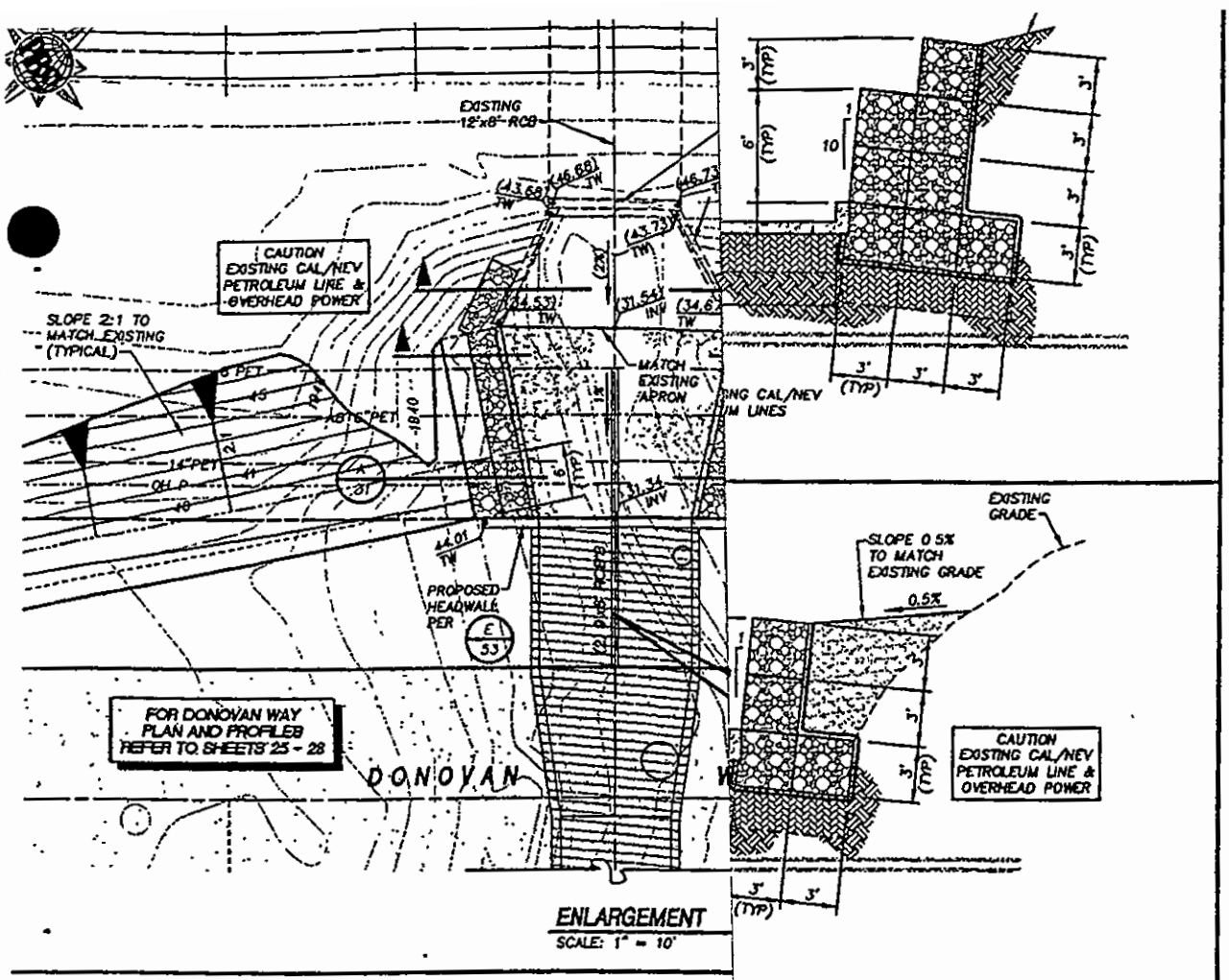
TYPICAL SECTIONS - DETENTION BASIN

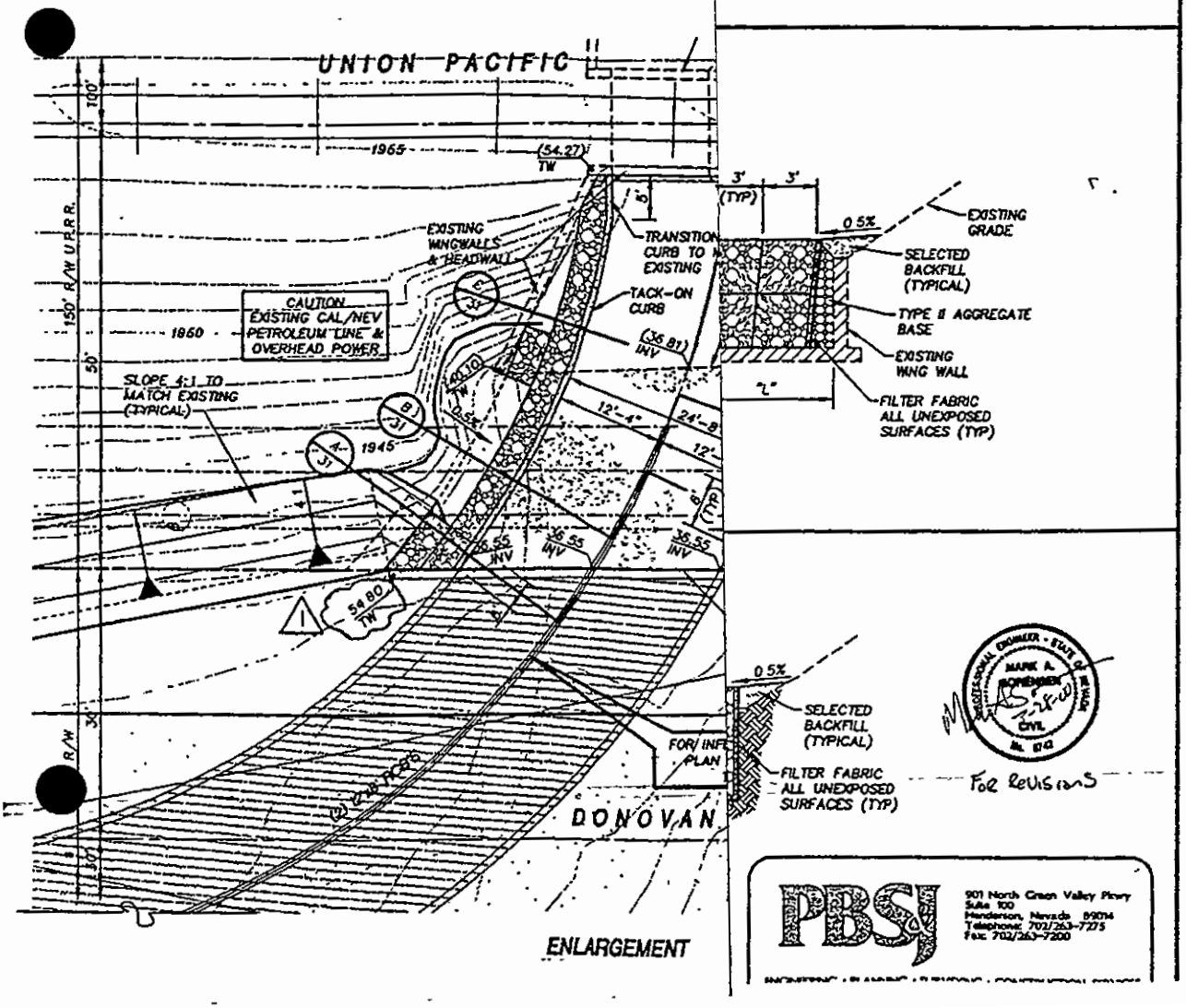
VANDENBERG DETENTION BASIN

INTERSTATE 15 AT VANDENBERG DRIVE

(DRAWING TITLE) (PROJECT TITLE) (LOCATION)

SHEET NO.





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

ENLARGEMENTS & SECTION - RAILROAD CROSSINGS

VANDENBERG DETENTION BASIN

INTERSTATE 15 AT VANDENBERG DRIVE

REVISIONS		
NO	DESCRIPTION	DATE
1	HEADWALL MODIFICATION	5/28/00

SCALE: AS SHOWN
DESIGN: A. SPATA
DRAWN: A. SPATA
CHECKED: D. DAVIS
APPROVED: T. BRADY
DATE: JULY 19, 1999

PROFESSIONAL ENGINEER - STATE OF NEVADA - DONALD V. DAVIS - CIVIL - No. 8867

PROFESSIONAL ENGINEER - STATE OF NEVADA - MARK A. ROMEIN - CIVIL - No. 9142

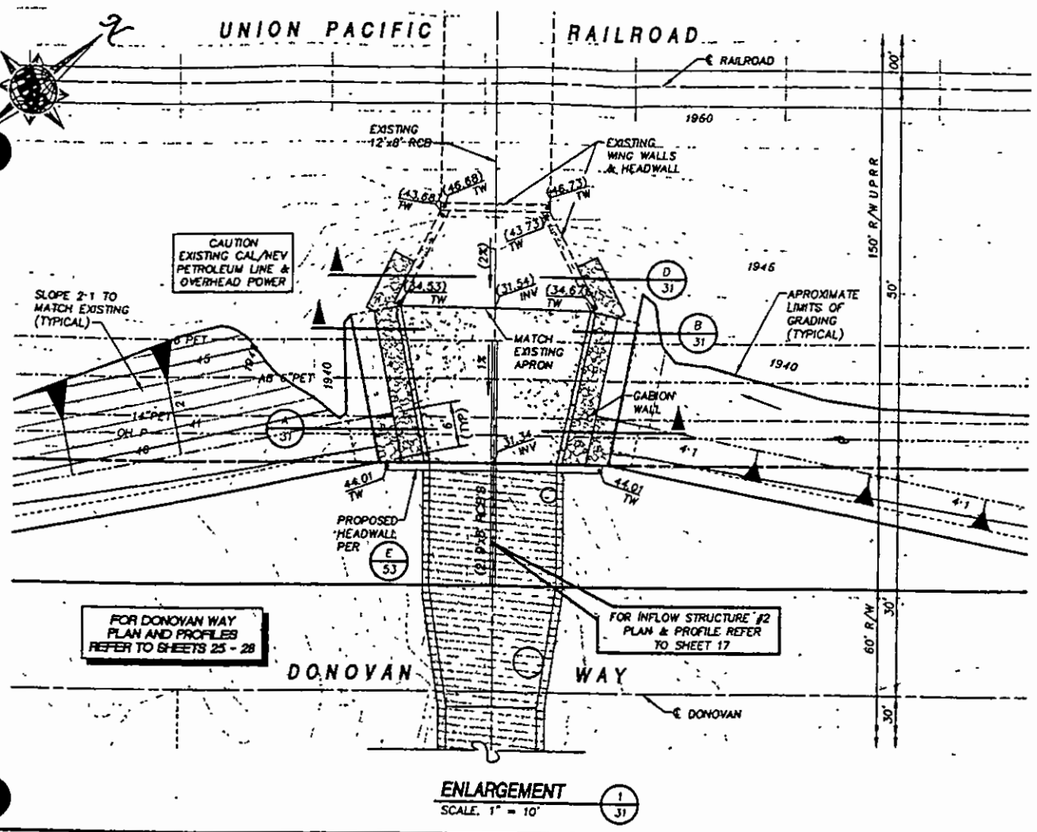
For Revisions

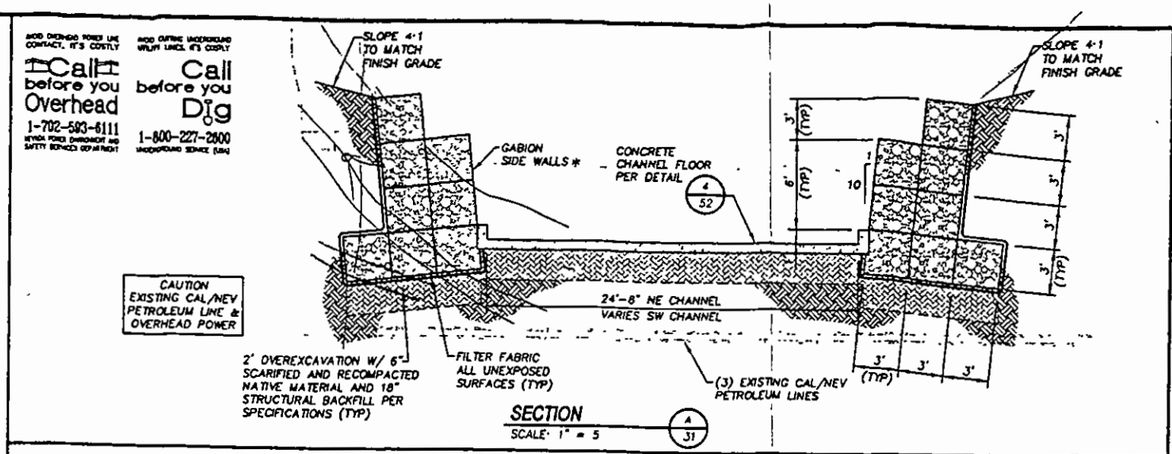
(DRAWING TITLE) (PROJECT TITLE) (LOCATION)

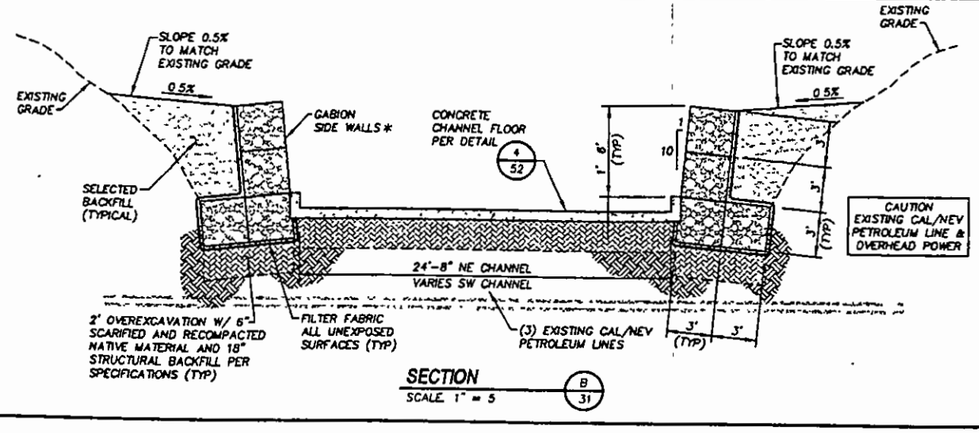
SHEET NO.

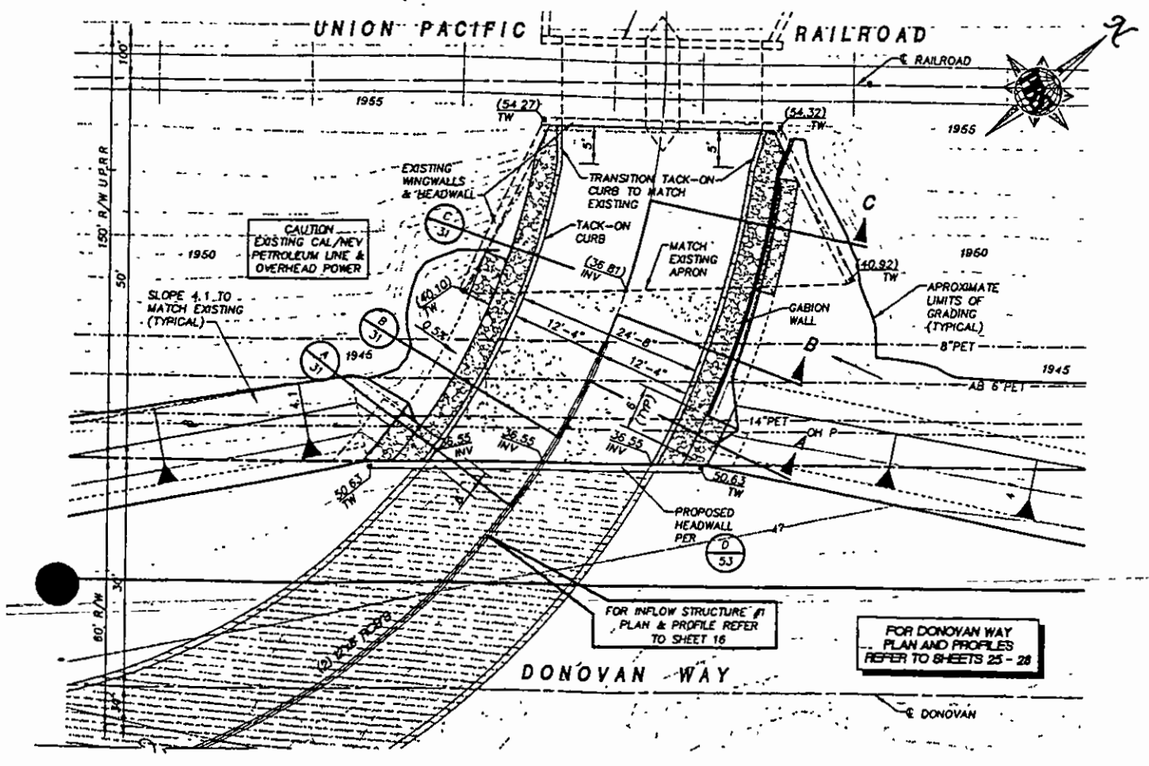
31

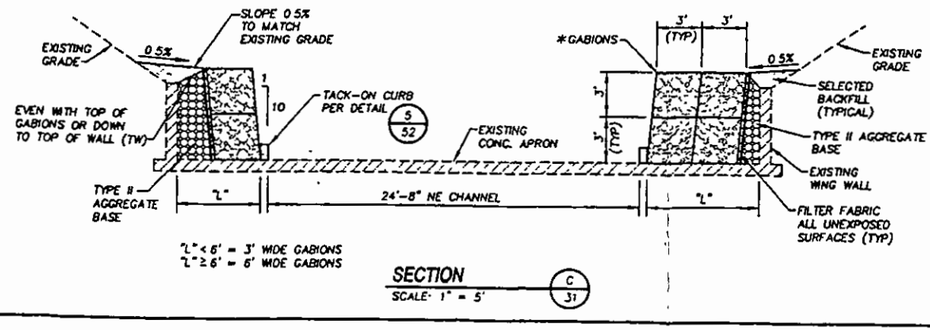
PBSJ
901 North Green Valley Pkwy
Suite 100
Henderson, Nevada 89014
Telephone: 702/263-7275
Fax: 702/263-7200

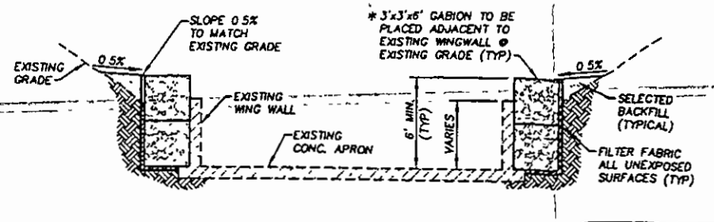












* CONTRACTOR MUST FIELD FABRICATE GABION BASKETS TO FIT EXISTING AND PROPOSED SITE CONDITIONS

PBSJ
901 North Green Valley Pkwy
Suite 100
Henderson, Nevada 89014
Telephone: 702/263-7275

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

ENLARGEMENTS & SECTION - RAILROAD CROSSINGS

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

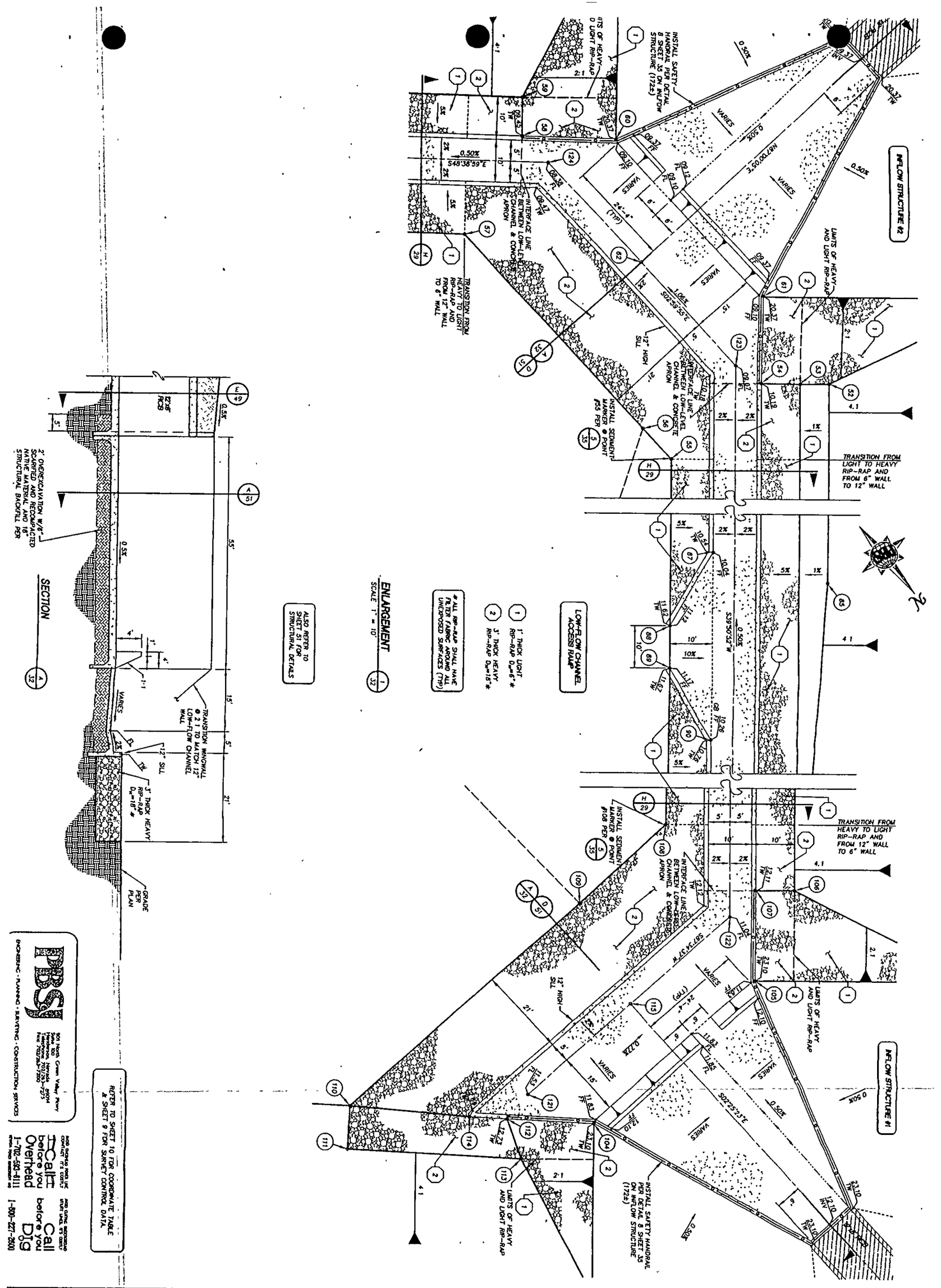
NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			

SCALE: AS SHOWN
DESIGN: A. SPATA
DRAWN: A. SPATA
CHECKED: D. DAVIS
APPROVED: T. BRADY
DATE: JULY 19, 1999

PROFESSIONAL ENGINEER STATE OF NEVADA DONALD V. DAVIS CIVIL No. 8087

(PROJECT NO.)
(DRAWING NO.)
(LOCATION)

SHEET NO.



PBSJ
ENGINEERING · PLANNING · SURVEYING · CONSTRUCTION SERVICES
501 North Green Valley Pkwy, Suite 200, Henderson, Nevada 89074
Phone (702) 740-7200 Fax (702) 740-7300

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Call before you Overhead 1-702-564-4111

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

(DRAWING TITLE) MISCELLANEOUS ENLARGEMENTS

(PROJECT TITLE) VANDENBERG DETENTION BASIN

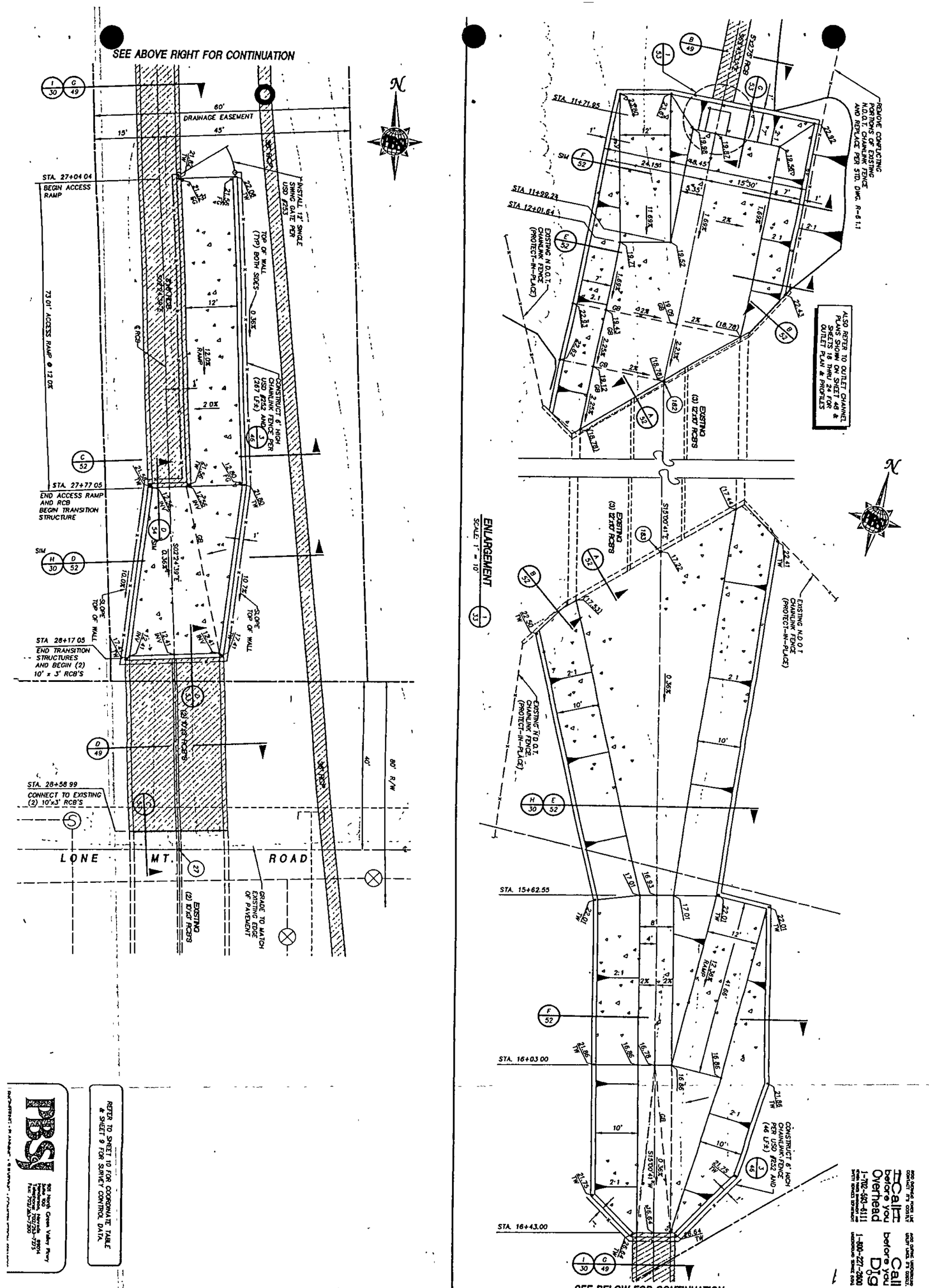
(LOCATION) INTERSTATE 15 AT VANDENBERG DRIVE

SHEET NO. 32

PROFESSIONAL ENGINEER STATE OF NEVADA No. 9867 DONALD V. DAVIS CIVIL

SCALE:	1" = 10'
DESIGN:	A. SPATA
DRAWN	A. SPATA
CHECKED	D. DAVIS
APPROVED	T. BRADY
DATE:	JULY 19, 1999

REVISIONS			
NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			



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

(DRAWING TITLE) **MISCELLANEOUS ENLARGEMENTS**

(PROJECT TITLE) **VANDENBERG DETENTION BASIN**

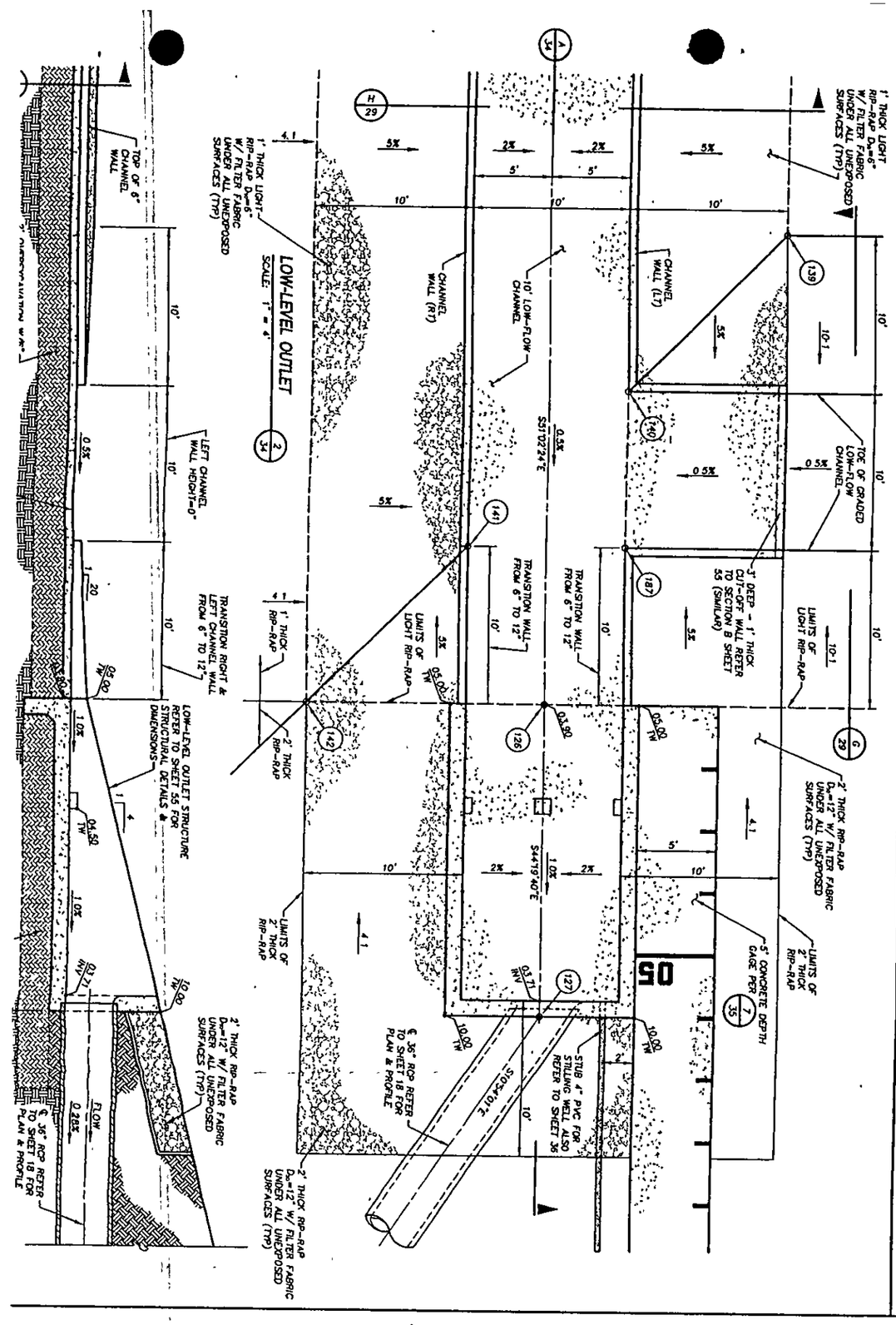
(LOCATION) **INTERSTATE 15 AT VANDENBERG DRIVE**

SHEET NO. 33

PROFESSIONAL ENGINEER — STATE OF NEVADA — No. 8887 — DOUGLAS V. DAVIS

SCALE:	1" = 10'
DESIGN	A SPATA
DRAWN	A SPATA
CHECKED	D DAVIS
APPROVED	T BRADY
DATE.	JULY 19, 1999

REVISIONS			
NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			



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

(DRAWING TITLE)
MISCELLANEOUS DETAILS

(PROJECT TITLE)
VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

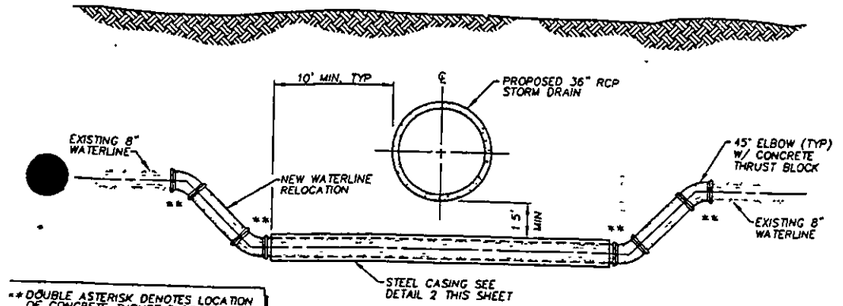
SHEET NO.

(LOCATION)

PROFESSIONAL ENGINEER — STATE OF NEVADA — CIVIL — No. 9857 — DANIEL V. BRADY

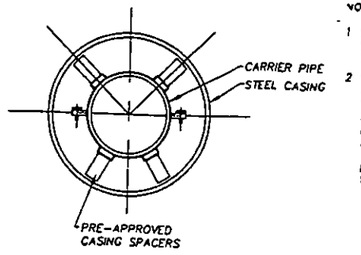
SCALE	NO SCALE
DESIGN.	A. SPATA
DRAWN	J BOLDEN
CHECKED.	D DAVIS
APPROVED	T BRADY
DATE	JULY 19, 1999

REVISIONS			
NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			



NOTE
ALL PIPING MATERIALS USED FOR RELOCATION SHALL BE FROM NEW STOCK AND NOT SALVAGED FROM EXISTING PIPE

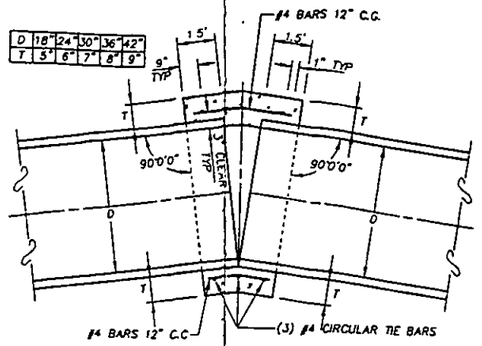
TYPICAL WATERLINE RELOCATION 1/35
N.T.S.



NOTES
1 STEEL PIPE CASING SYMETRICAL ABOUT ℄ OF PIPE.
2 PRE-APPROVED CASING SPACERS AND PREAPPROVED AND SEALS INSTALLED PER MANUFACTURER'S SPECIFICATIONS. (REDWOOD SKIDS NOT ALLOWED, UDACS SECTION 3.26 NOT APPLICABLE) USE A "CENTERED" CONFIURATION AND PROVIDE THE MANUFACTURER WITH THE FOLLOWING
PIPE OD
CASING ID
CASING LENGTH

1 STEEL PIPE CASING SHALL BE FABRICATED FROM A MINIMUM OF 1/4" THICK STEEL PLATES, CONFORMING TO THE REQUIREMENTS OF 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 C201, "AWWA STANDARD FOR FABRICATED ELECTRICALLY WELDED STEEL WATER PIPE" BITUMINUOUS COATING PER AASHTO M-190
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 OF EACH JOINT WITH SKIDS. THE ANNULAR SPACE BETWEEN THE PIPE AND THE CASING SHALL BE BACKFILLED WITH SAND. AFTER INSTALLATION OF THE PIPE, THE CASING SHALL BE SEALED AT BOTH ENDS WITH MORTARED BRICK OR CEMENT BRICK

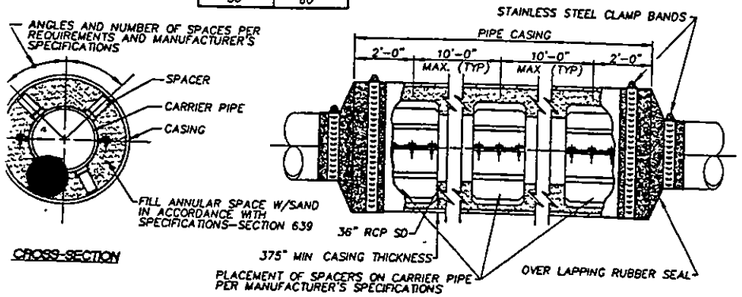
TYPICAL SPLIT CASING SECTION 2/35
N.T.S.



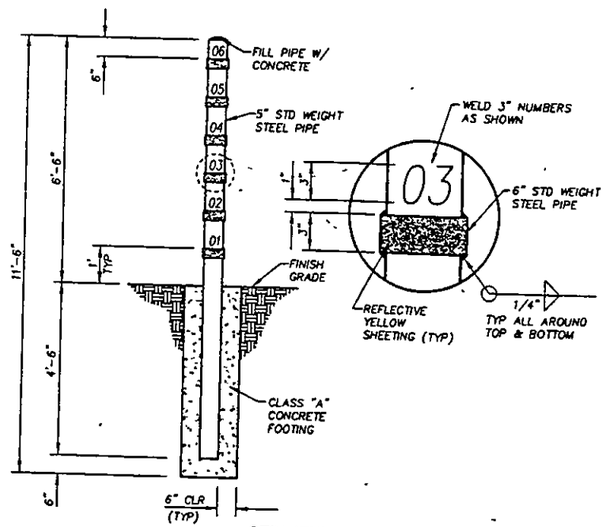
D	18"	24"	30"	36"	42"
T	5"	6"	7"	8"	9"

CONCRETE COLLAR 3/35

STEEL CARRIER PIPE	
PIPE SIZE	CASING ID
36"	60"

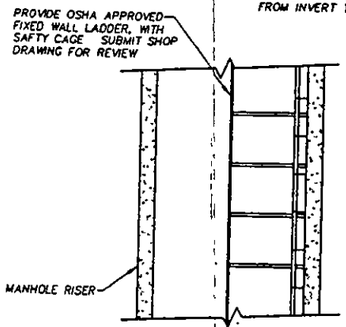


CASING ASSEMBLY DETAIL 4/35
NOT TO SCALE

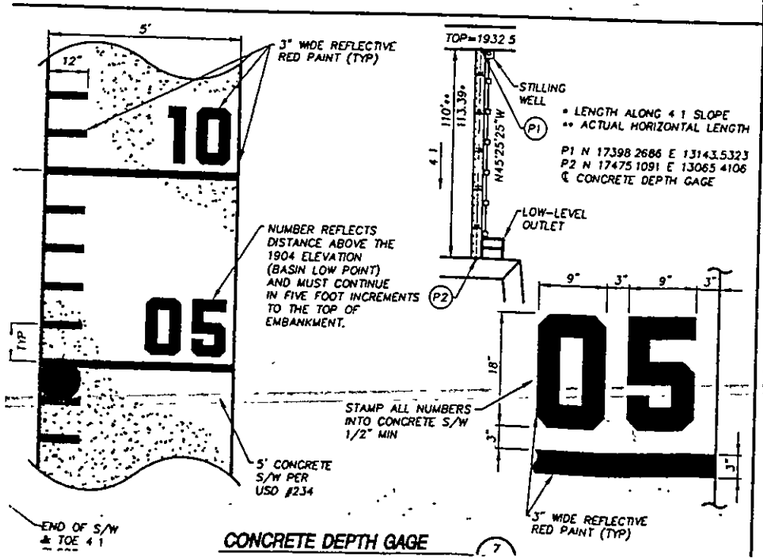


SEDIMENT MARKER 5/35
NO SCALE

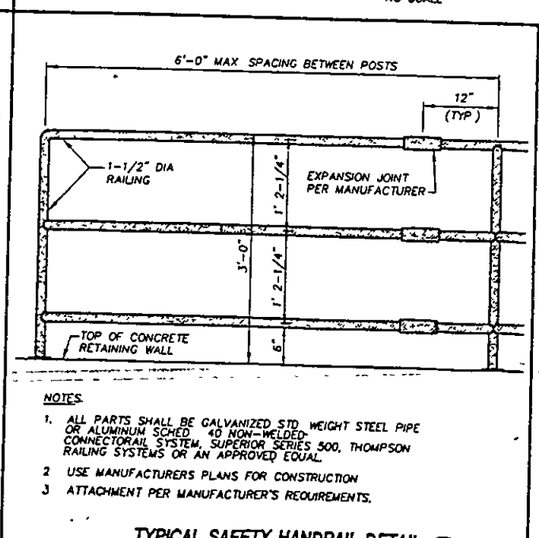
NOTE:
TO BE USED WHEN MANHOLE RISER IS GREATER THAN 20' MEASURED FROM INVERT TO RIM



MANHOLE SAFETY CAGE 6/35
NOT TO SCALE

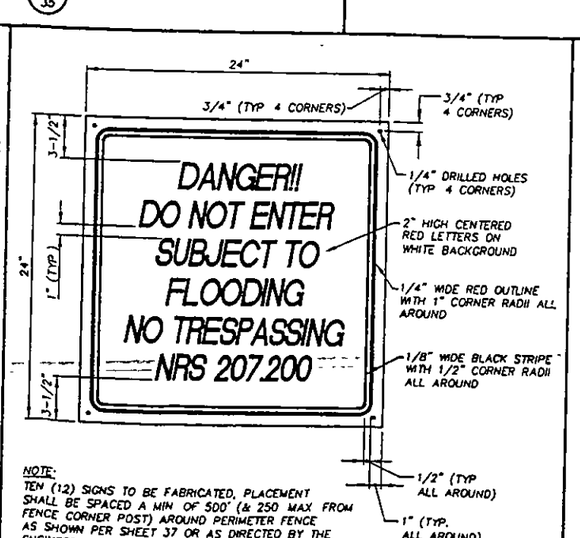


CONCRETE DEPTH GAGE 7

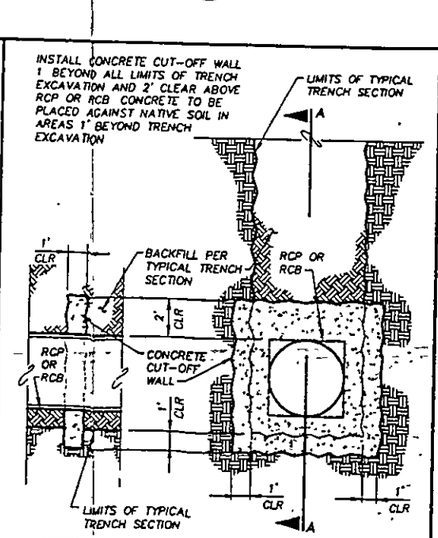


NOTES:
1. ALL PARTS SHALL BE GALVANIZED STD. WEIGHT STEEL PIPE OR ALUMINUM SCHED. 40 NON-WELDED CONNECTORAIL SYSTEM, SUPERIOR SERIES 500, THOMPSON RAILING SYSTEMS OR AN APPROVED EQUAL.
2 USE MANUFACTURERS PLANS FOR CONSTRUCTION
3 ATTACHMENT PER MANUFACTURER'S REQUIREMENTS.

TYPICAL SAFETY HANDRAIL DETAIL 8



NOTE:
TEN (12) SIGNS TO BE FABRICATED. PLACEMENT SHALL BE SPACED A MIN OF 500' (& 250 MAX FROM FENCE CORNER POST) AROUND PERIMETER FENCE AS SHOWN PER SHEET 37 OR AS DIRECTED BY THE ENGINEER



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

REVISIONS		
NO	DESCRIPTION	DATE
Δ		
Δ		
Δ		
Δ		

SCALE NO SCALE
DESIGN A. SPATA
DRAWN A. SPATA
CHECKED D. DAVIS
APPROVED T. BRADY
DATE: JULY 19, 1999

PROFESSIONAL ENGINEER STATE OF NEVADA TRENT V. DAVIS No. 9867 CIVIL

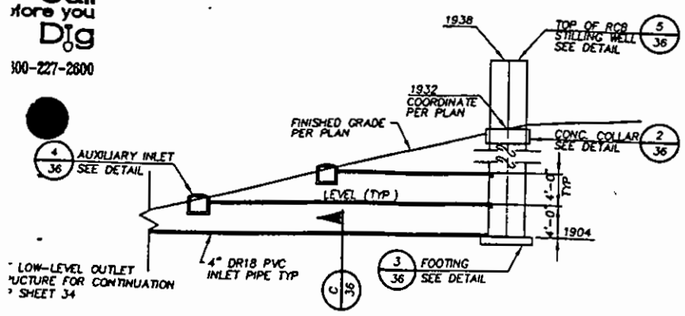
MISCELLANEOUS

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

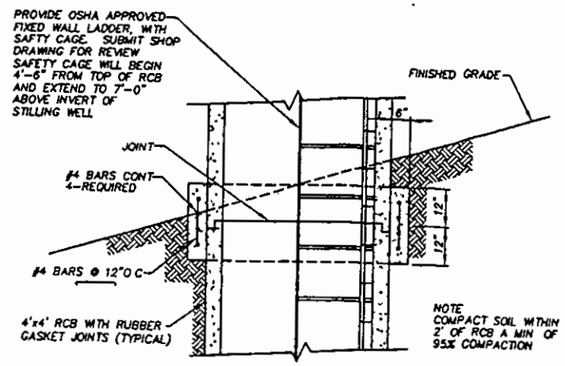
(DRAWING TITLE)
(PROJECT TITLE)
(LOCATION)

SHEET NO.

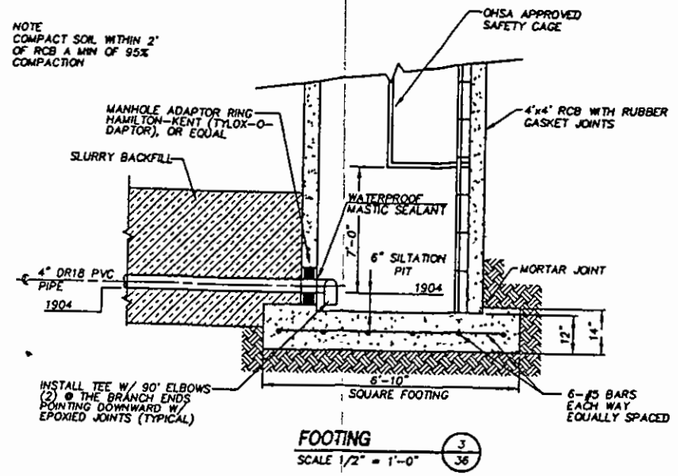
Call before you Dig
800-227-2600



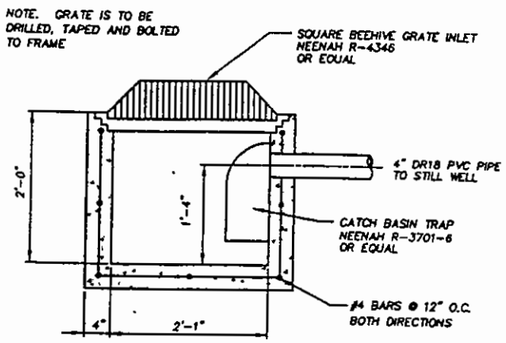
STILLING WELL 1/36
SCALE 1" = 10'-0"



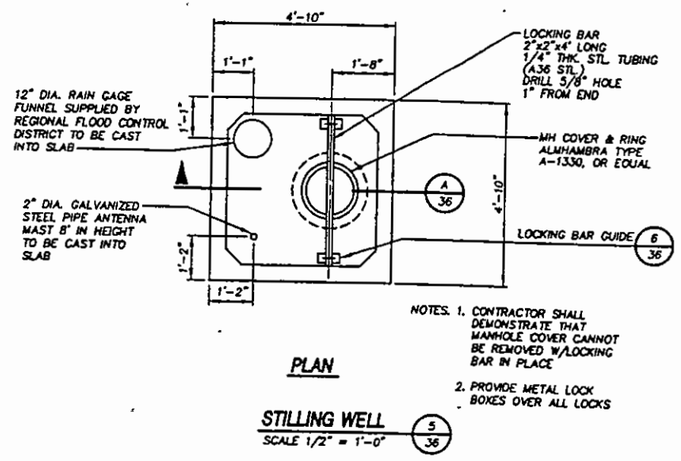
CONCRETE COLLAR 2/36
SCALE 1/2" = 1'-0"



FOOTING 3/36
SCALE 1/2" = 1'-0"

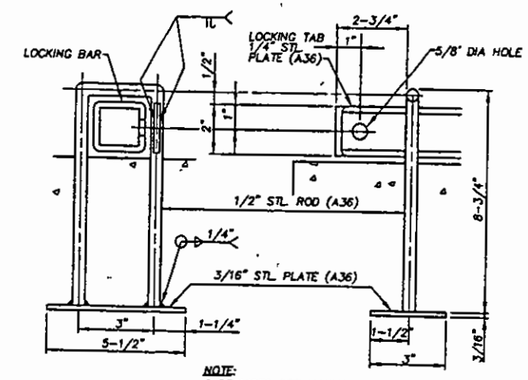


AUXILIARY INLET 4/36
SCALE 1/2" = 1'-0"

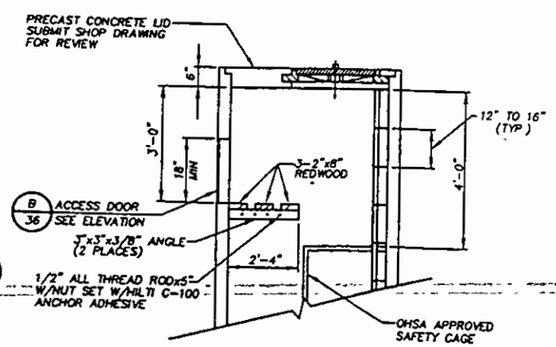


PLAN

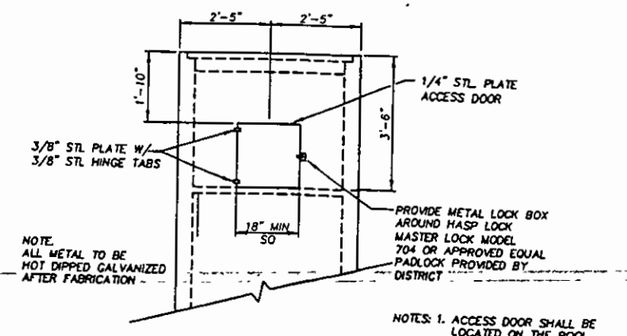
STILLING WELL 5/36
SCALE 1/2" = 1'-0"



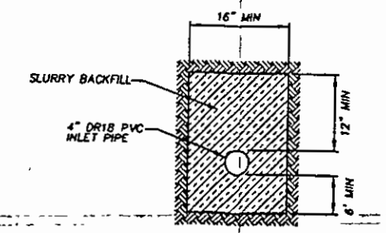
LOCKING BAR GUIDE 6/36
SCALE 1" = 3"



SECTION A/36
SCALE 1/2" = 1'-0"



ELEVATION B/36
SCALE 1/2" = 1'-0"



SECTION C/36
N.T.S.

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

REVISIONS			
NO	DESCRIPTION	DATE	BY
Δ			
Δ			
Δ			
Δ			

SCALE NO SCALE
DESIGN A. SPATA
DRAWN A. SPATA
CHECKED D. DAVIS
APPROVED T. BRADY
DATE: JULY 19, 1999

PROFESSIONAL ENGINEER STATE OF NEVADA RONALD V. DAVIS CIVIL No. 8887

MISCELLANEOUS

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

(DRAWING TITLE) (PROJECT TITLE) (LOCATION)

SHEET NO.:
36

UNION PACIFIC RAILROAD

DONOVAN WAY

LAND LUCKY LLC

LAS VEGAS PAVING CORPORATION

INTERSTATE I-15

INSTALL 24' DOUBLE SWING GATE PER USD #253
ALSO REFER TO SHEET 13 FOR LOCATION

INSTALL SIGN ON GATE

INSTALL 172LF± SAFETY HANDRAIL PER DETAIL B SHEET 35 ON INFLOW STRUCTURE

INSTALL 730LF± 6' CHAIN LINK FENCE PER USD #252 @ TOP OF EMBANKMENT

INSTALL 1273LF± 6' CHAIN LINK FENCE PER USD #252 @ EAST PROPERTY LINE

INSTALL 172LF± SAFETY HANDRAIL PER DETAIL B SHEET 35 ON INFLOW STRUCTURE

INSTALL 1213LF± 6' CHAIN LINK FENCE PER USD #252 @ WEST PROPERTY LINE

EXISTING CHAIN LINK FENCE TO REMAIN

BEGIN REMOVAL AND REPLACEMENT OF N.D.O.T. FENCE & CONNECT PROPOSED FENCE TO EXISTING

REMOVE & REPLACE 757LF± OF EXISTING N.D.O.T CHAIN LINK FENCE PER STD. DWG R-611 ON N.D.O.T R/W

INSTALL 24' DOUBLE SWING GATE PER USD #253

REMOVE AND REPLACE CONFLICTING PORTIONS OF EXISTING N.D.O.T. CHAIN LINK FENCE 200'± PER STD DWG R-6 1.1

EXISTING CHAIN LINK FENCE TO REMAIN

66'

42.5'

12'

93 44 18 19

LEGEND

- N.D.O.T. – EXISTING CHAIN LINK FENCE TO REMAIN
- N.D.O.T. – EXISTING 6' CHAIN LINK FENCE TO BE REMOVED
- REMOVE & REPLACE N.D.O.T. EXISTING 6' CHAIN LINK FENCE @ R/W PER N.D.O.T STD DWG R-6.1.1
- PROPOSED SAFETY HANDRAIL TO BE PLACED @ TOP OF DROP STRUCTURE PER SHEET 32
- PROPOSED 6' CHAIN LINK FENCE PER USD #252
- PROPOSED 6' HIGH DOUBLE SWING GATE PER USD #253
- APPROXIMATE LOCATION OF FLOOD WARNING SIGN PER DETAIL 9 SHEET 35 (12 TOTAL)

GRAPHIC SCALE

(IN FEET)
1 inch = 60 ft.

Call before you Dig
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901 North Green Valley Pkwy
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Henderson, Nevada 89014
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CITY OF NORTH LAS VEGAS - DEPARTMENT OF PUBLIC WORKS - ENGINEERING DIVISION

REVISIONS			
NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			

SCALE 1" = 60'
DESIGN A. SPATA
DRAWN A. SPATA
CHECKED D. DAVIS
APPROVED T. BRADY
DATE JULY 19, 1999

PROFESSIONAL ENGINEER STATE OF NEVADA
KENNETH V. MAYER
CIVIL
No. 9267
7/19/99

DETENTION BASIN - FENCING PLAN

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

SHEET NO.
37

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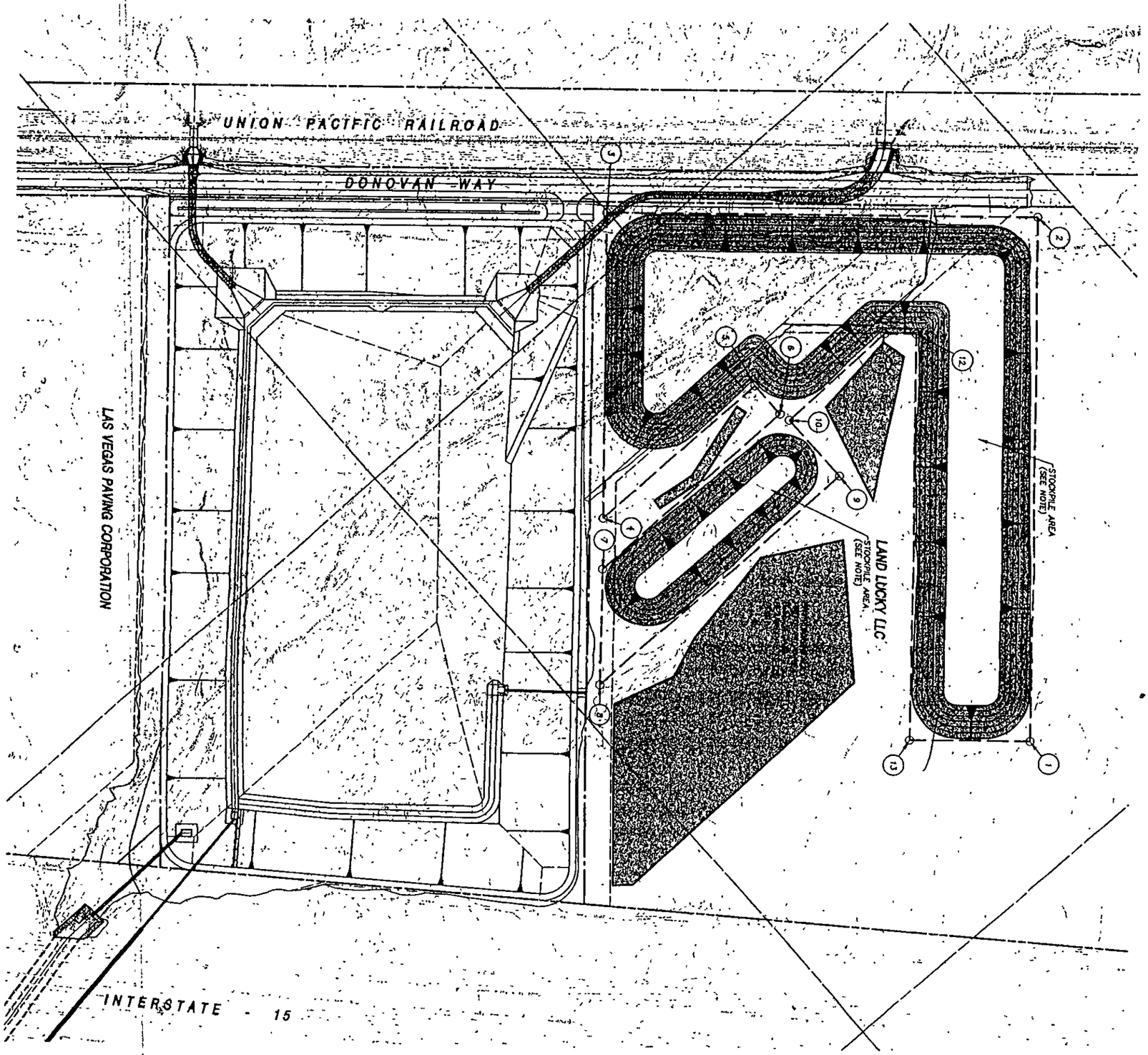

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.

LIMITS OF STOCKPILE AREA COORDINATES

POINT	NORTHING	EASTING
1	18675.0113	13888.3047
2	18303.1094	13143.5716
3	18698.3018	12634.1689
4	19332.2389	13668.7909
5	18703.1126	13053.0979
6	18706.0719	13123.0353
7	18271.0473	13141.4427
8	18131.1813	13307.5041
9	18717.8315	13282.8809
10	18711.9129	13142.8061
11	18948.7929	13132.7829
12	18953.1167	13170.1149
13	18506.7433	13747.5800

COORDINATE POINT NUMBERS REFERENCED ARE TO BE USED FOR THIS SHEET ONLY (DETENTION BASIN-STOCKPILE PLAN)

NOTE:
STOCKPILE AREAS SHOWN REPRESENT AN APPROXIMATE AMOUNT OF 300,000 CY WITH A MAXIMUM HEIGHT OF 30 FEET AND 2:1 SIDE SLOPES. STOCKPILE AREAS SHOWN ARE SET TO AVOID DISTURBANCE OF EXISTING LAS VEGAS WASH FLOOD FIELDS. LIMITS OF STOCKPILE AREAS MAY BE ADJUSTED BY MUTUAL AGREEMENT BETWEEN THE CONTRACTOR AND THE PROPERTY OWNER. NO STOCKPILE AREAS SHALL BE A SEPARATE PERMIT TO TAKE PLACE IF OBTAINED BY THE PROPERTY OWNER. ADJUSTMENTS TO DESIGNATED STOCKPILE AREAS SHALL BE SUBJECT TO PERMITS FROM THE DIVISION OF FORESTRY.

RSI
901 North Green Valley Pkwy
Henderson, Nevada 89014
Telephone (702) 263-7251
Fax (702) 263-7259

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

DETENTION BASIN - STOCKPILE LOCATION PLAN

VANDENBERG DETENTION BASIN

INTERSTATE 15 AT VANDENBERG DRIVE

SHEET NO. 2 OF

SCALE:	1" = 100'
DESIGN	A SPATA
DRAWN	A SPATA
CHECKED	D DAVIS
APPROVED	T BRADY
DATE:	JULY 19, 1999

REVISIONS			
NO	DESCRIPTION	DATE	BY
1			
2			
3			
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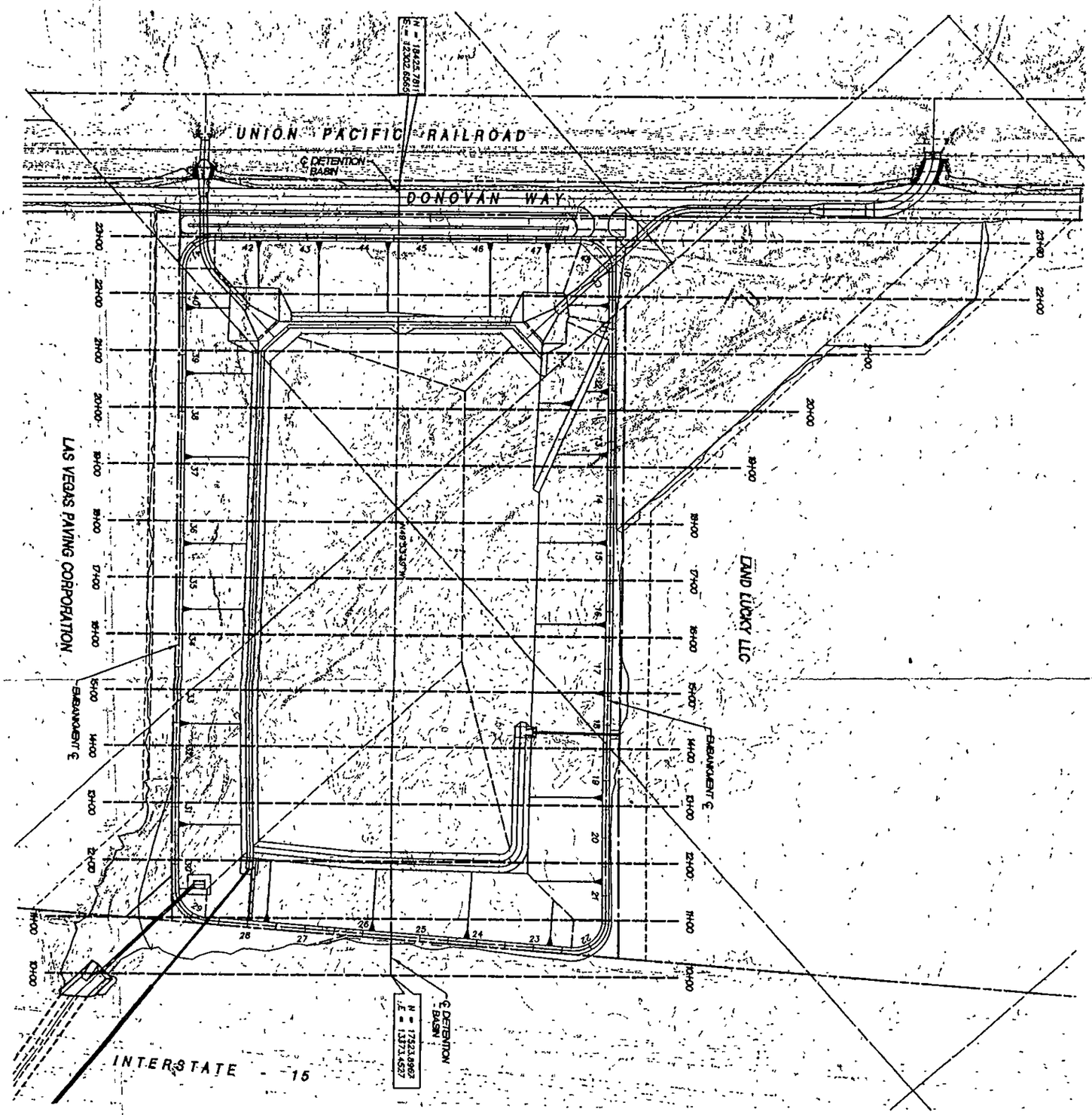
5			



GRAPHIC SCALE

(IN FEET)
1 inch = 100 ft.

N

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

DETENTION BASIN - CROSS-SECTION PLAN VIEW

VANDENBERG DETENTION BASIN

INTERSTATE 15 AT VANDENBERG DRIVE

SHEET NO.

SCALE:	1" = 100'
DESIGN:	A. SPATA
DRAWN:	A. SPATA
CHECKED	D. DAVIS
APPROVED:	T. BRADY
DATE	JULY 19, 1999

REVISIONS			
NO	DESCRIPTION	DATE	BY
△			
△			
△			
△			

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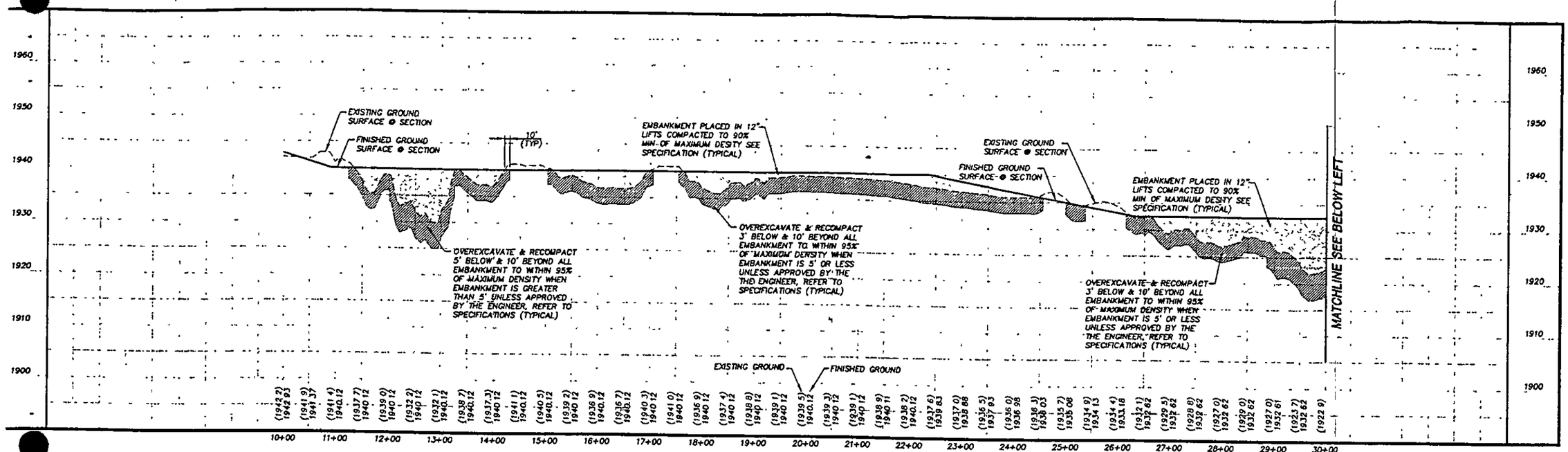
1-800-227-2600

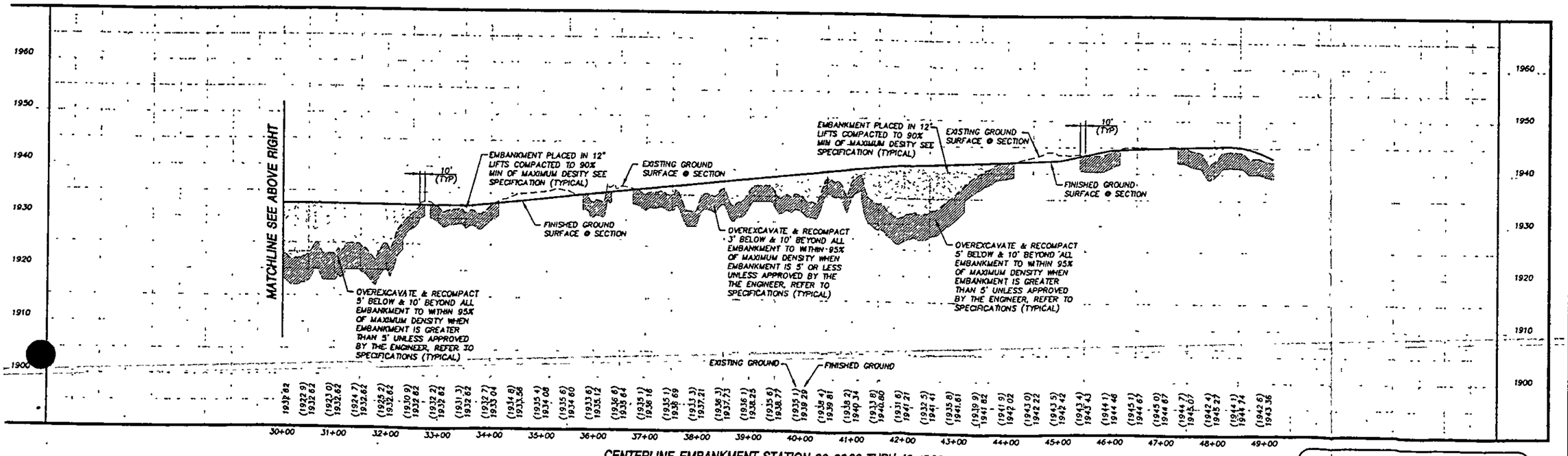
GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.

THIS DRAWING IS FOR INFORMATION PURPOSES ONLY REFER TO DETENTION BASIN GRADING PLANS 1-3 SHOWN ON SHEETS 11 THRU 15



CENTERLINE EMBANKMENT STATION 10+00.00 THRU 29+50.00

SCALE HORIZ. 1"=100'
VERT.: 1"=10'



CENTERLINE EMBANKMENT STATION 30+00.00 THRU 49+15.30

ENGSI 901 North Green Valley Pkwy Suite 100

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

CENTERLINE EMBANKMENT STA 10+00.00 TO STA 49+15.30

VANDENBERG DETENTION BASIN

INTERSTATE 15 AT VANDENBERG DRIVE

REVISIONS			
NO	DESCRIPTION	DATE	BY

SCALE 1" = 100'
DESIGN A SPATA
DRAWN A SPATA
CHECKED D DAVIS
APPROVED T BRADY
DATE: JULY 19, 1999

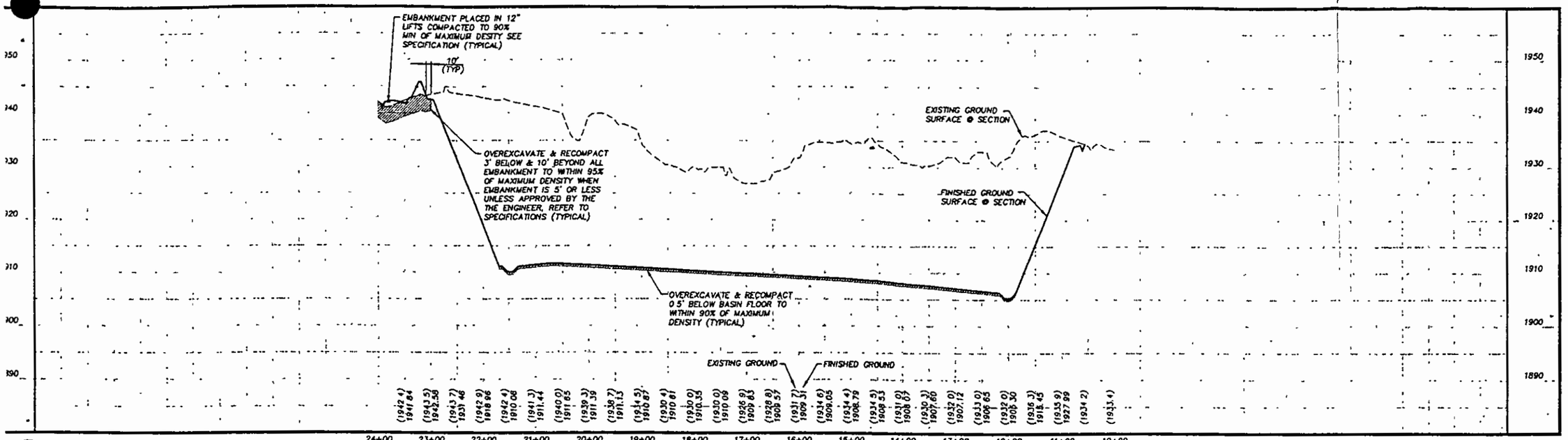
PROFESSIONAL ENGINEER STATE OF NEVADA DONALD V. DAVIS CIVIL No. 8987

(DRAWING NO.)
(PROJECT NO.)
SHEET NO.
(JOB NO.)

Call before you Dig
1-800-227-2600

GRAPHIC SCALE
(IN FEET)
1 Inch = 100 ft.

THIS DRAWING IS FOR INFORMATION PURPOSES ONLY REFER TO DETENTION BASIN GRADING PLANS 1-5 SHOWN ON SHEETS 11 THRU 15



CROSS SECTION CENTERLINE STATION 10+00.00 THRU 24+00.00

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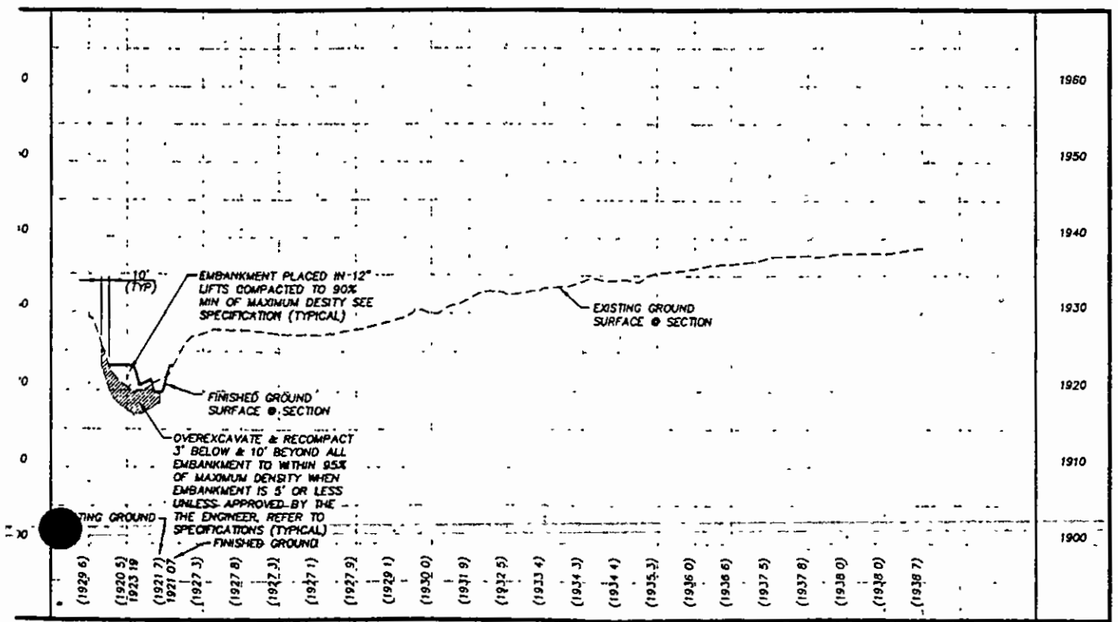
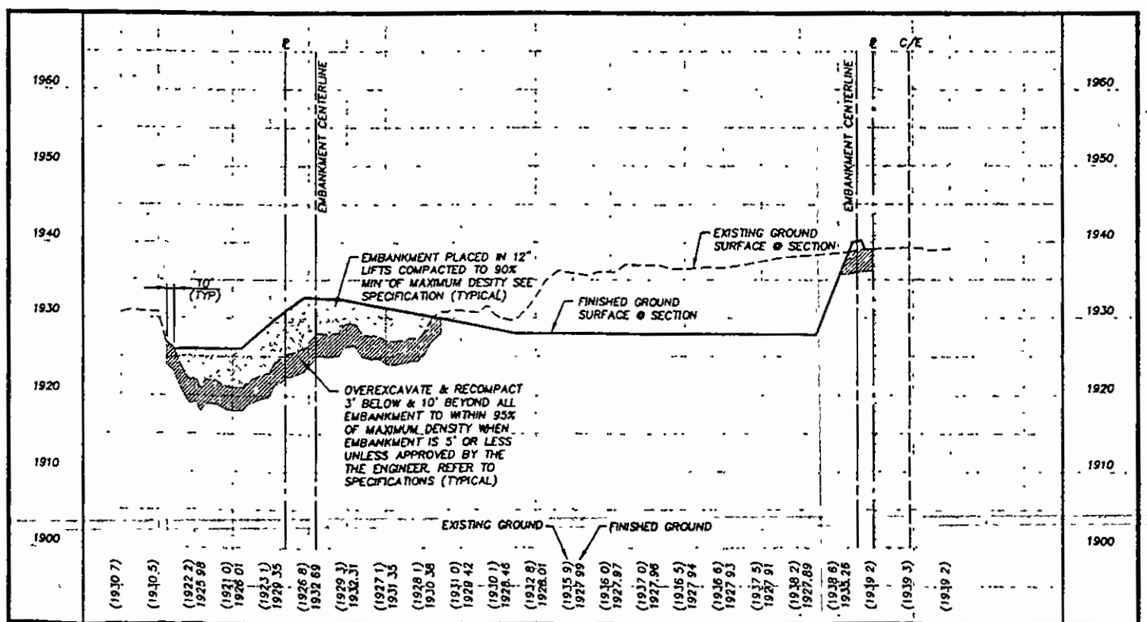
VERT.: 1"=10'



CROSS SECTION STATION 10+00.00

SCALE: HORIZ.: 1"=100'



CROSS SECTION STATION 11+00.00

SCALE: HORIZ.: 1"=100'

DRCI
901 North Green Valley Pkwy
Suite 100
Henderson, Nevada 89014

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

REVISIONS

NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			

SCALE: 1" = 100'
DESIGN: A. SPATA
DRAWN: A. SPATA
CHECKED: D. DAVIS
APPROVED: T. BRADY
DATE: JULY 18, 1999

PROFESSIONAL ENGINEER - STATE OF NEVADA - THOMAS V. DAVIS - CIVIL - No. 9087

CENTERLINE OF BASIN / CROSS-SECTIONS - STA 10+00.00 & STA 11+00.00

VANDENBERG DETENTION BASIN

INTERSTATE 15 AT VANDENBERG DRIVE

DRAWING TITLE

PROJECT TITLE

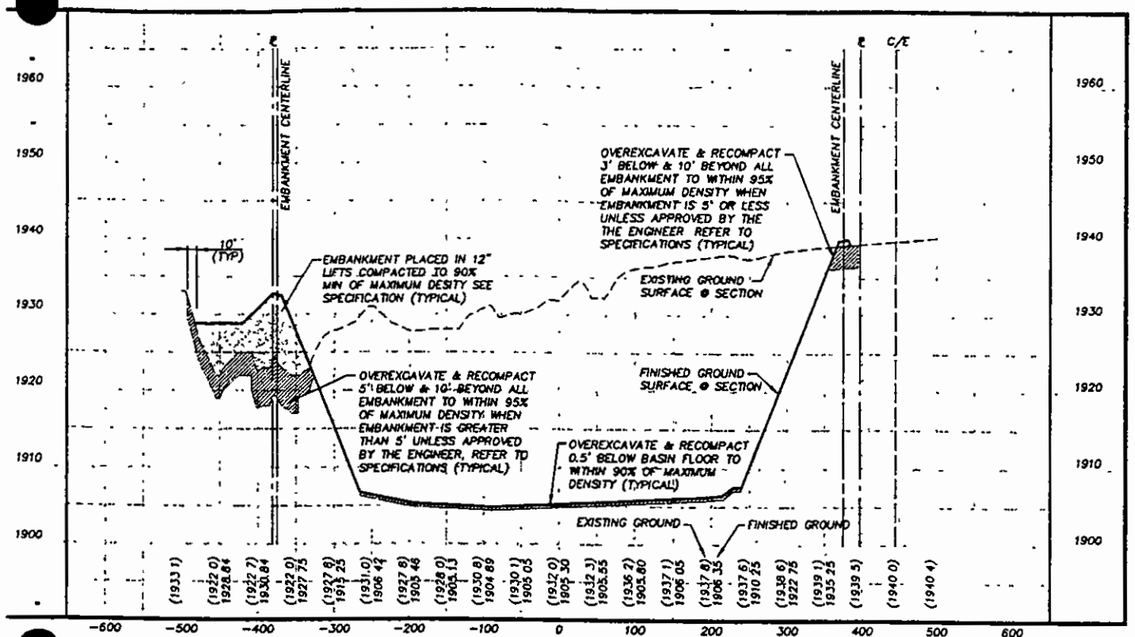
LOCATION

SHEET NO.

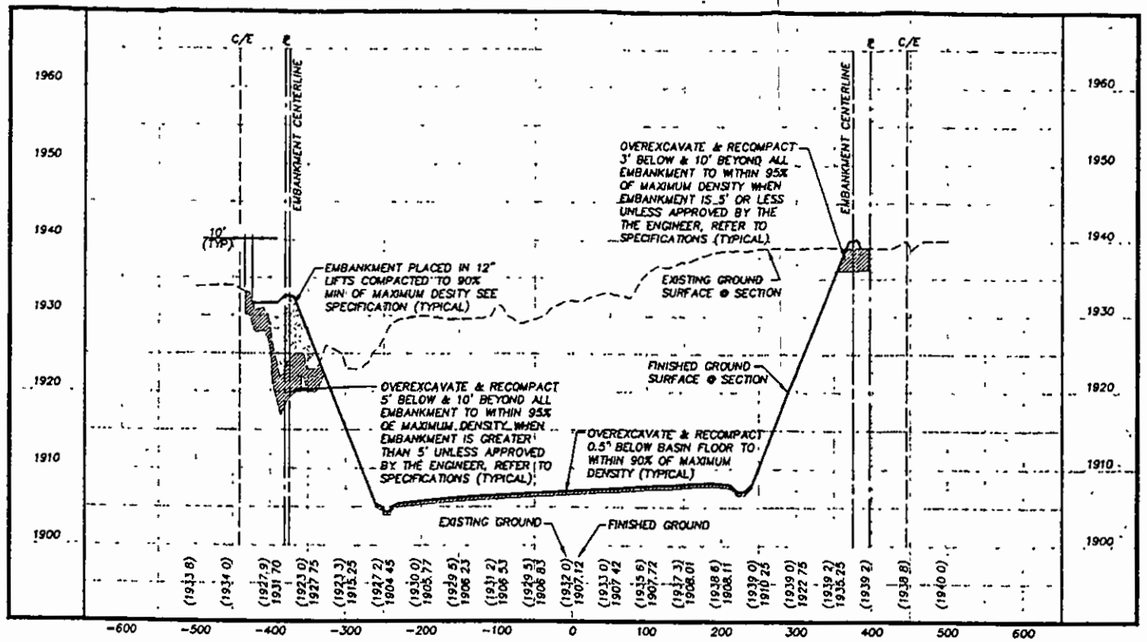
Call before you Dig
1-800-227-2600
Call before you Dig
1-702-593-6111

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.

THIS DRAWING IS FOR INFORMATION PURPOSES ONLY REFER TO DETENTION BASIN GRADING PLANS 1-9 SHOWN ON SHEETS 11 THRU 16

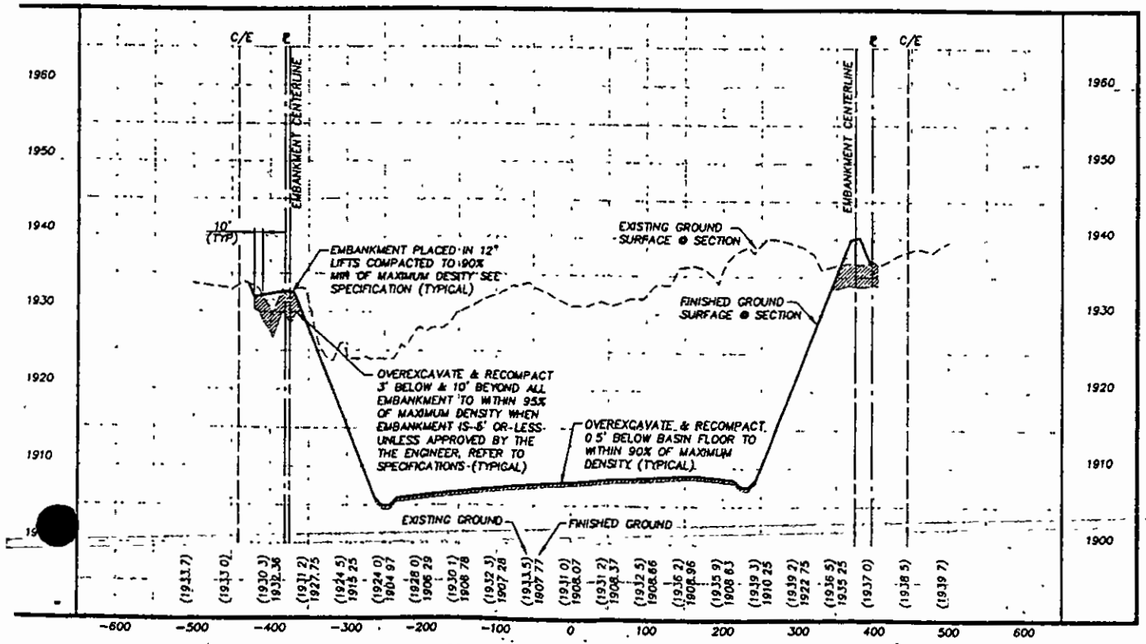


CROSS SECTION STATION 12+00

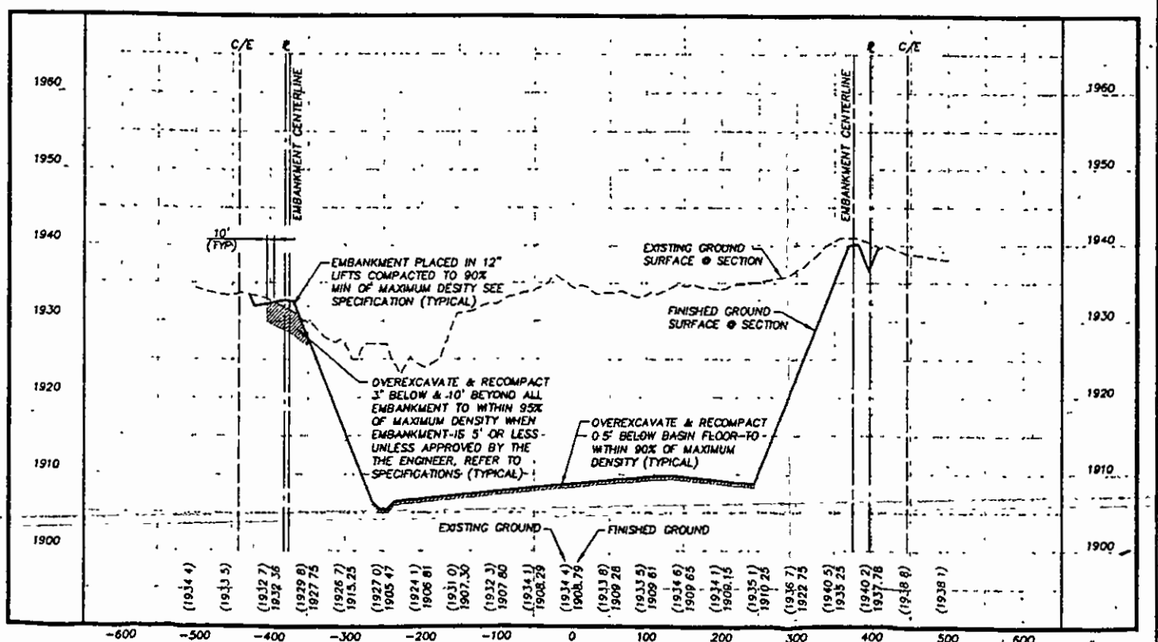


CROSS SECTION STATION 13+00

SCALE: HORIZ., 1"=100'
VERT., 1"=10'



CROSS SECTION STATION 14+00



CROSS SECTION STATION 15+00

BRS
101 North Green Valley Pkwy
Suite 100

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

REVISIONS			
NO	DESCRIPTION	DATE	BY
△			
△			
△			

SCALE: 1" = 100'
DESIGN: A. SPATA
DRAWN: A. SPATA
CHECKED: D. DAVIS
APPROVED: T. BRADY
DATE: JULY 19, 1999

PROFESSIONAL ENGINEER STATE OF NEVADA
RONALD V. DAVIS
CIVIL
No. 8967

CROSS-SECTIONS - STA. 12+00.00 TO STA 15+00.00

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

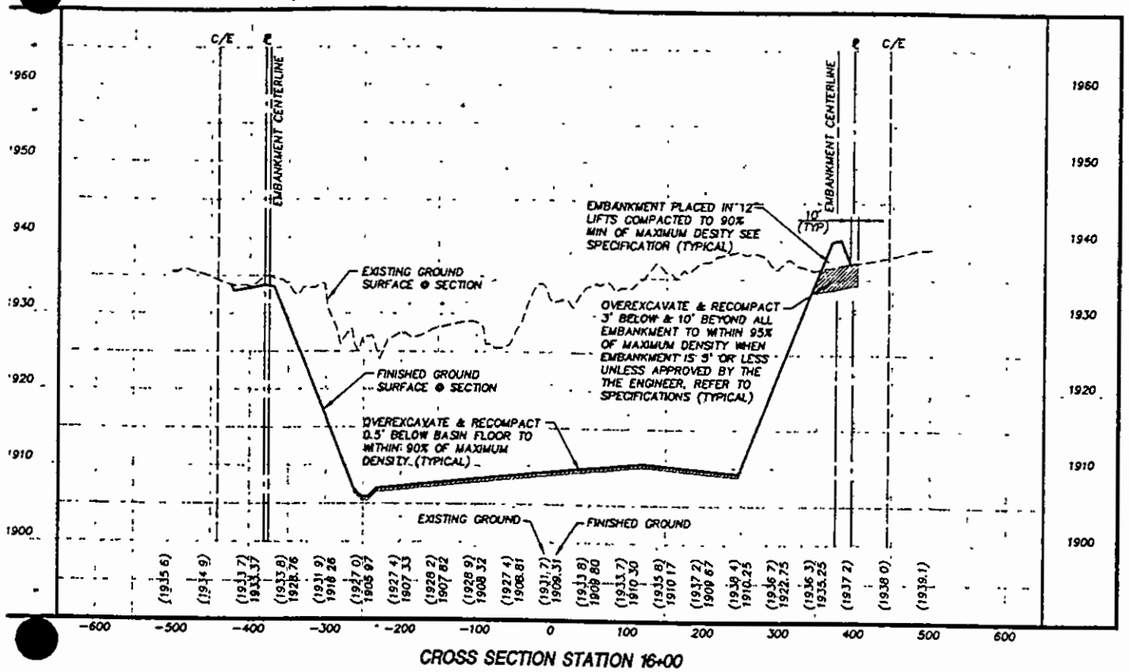
(DRAWING TITLE)
(PROJECT TITLE)
(LOCATION)

SHEET NO.

Call before you Overhead
-702-593-6111
Call before you Dig
1-800-227-2800

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.

THIS DRAWING IS FOR INFORMATION PURPOSES ONLY REFER TO DETENTION BASIN GRADING PLANS 1-5 SHOWN ON SHEETS 11 THRU 15



CROSS SECTION STATION 16+00

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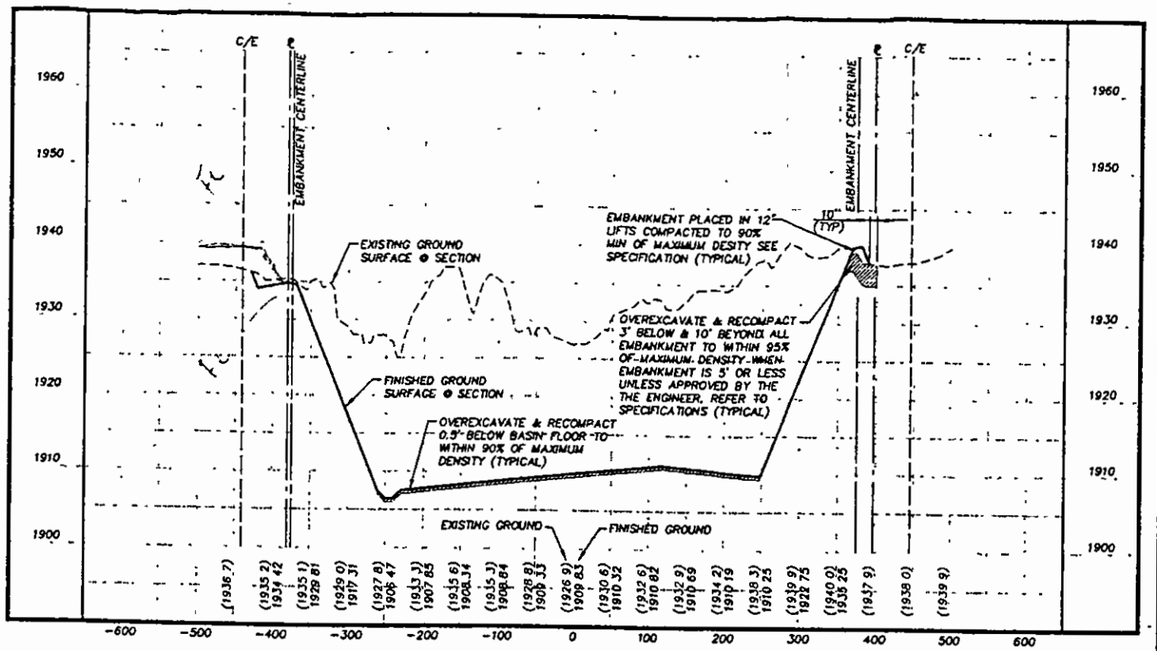
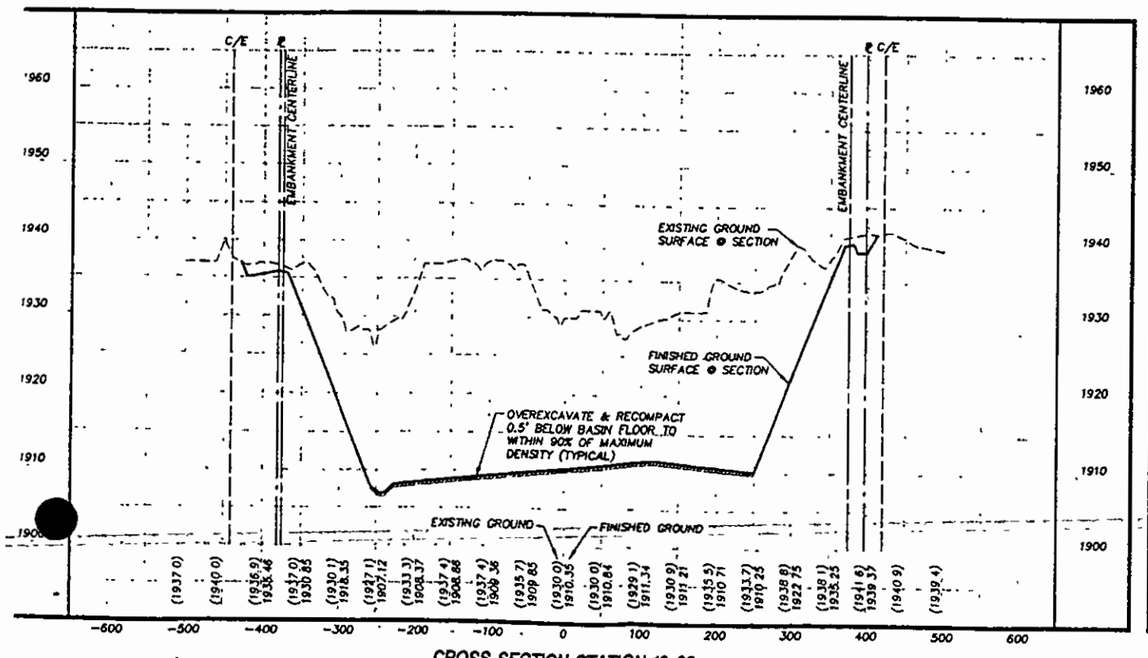
VERT.: 1"=10'

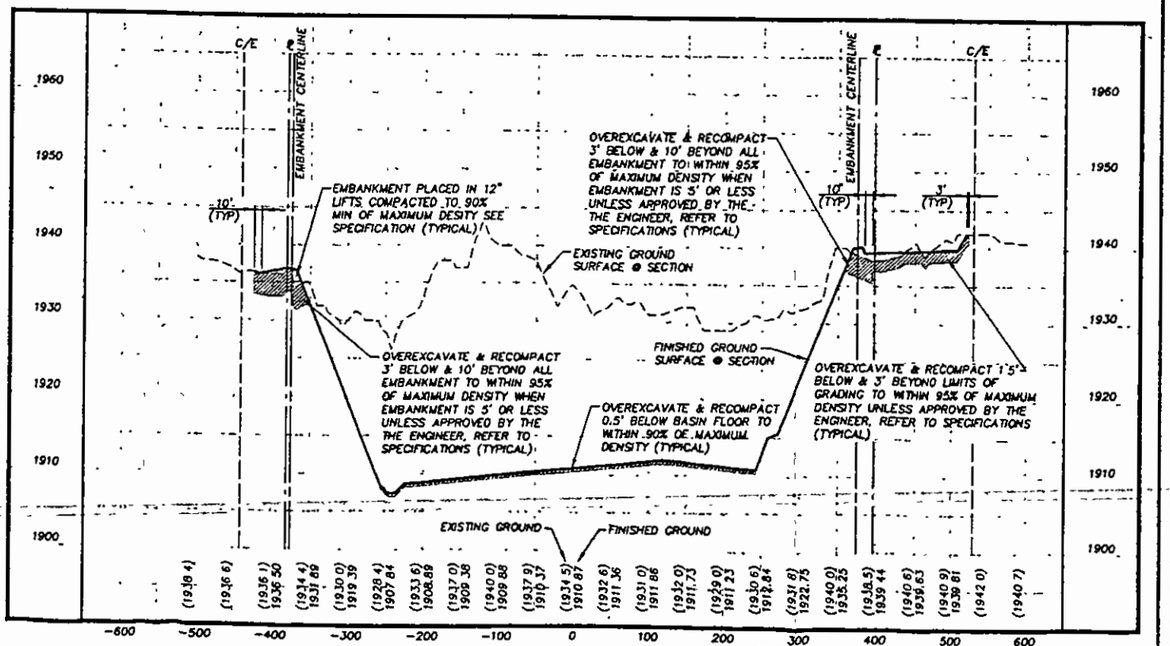


CROSS SECTION STATION 17+00

SCALE: HORIZ., 1"=100'
VERT., 1"=10'



CROSS SECTION STATION 18+00



CROSS SECTION STATION 19+00

BRC
101 North Green Valley Pkwy
Suite 100

REVISIONS

NO	DESCRIPTION	DATE	BY
△			
△			
△			
△			

SCALE: 1" = 100'
DESIGN: A. SPATA
DRAWN: A. SPATA
CHECKED: D. DAVIS
APPROVED: T. BRADY
DATE: JULY 19, 1999

PROFESSIONAL ENGINEER STATE OF NEVADA
DONALD V. DAVIS
CIVIL
No. 8087

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

CROSS-SECTIONS - STA 16+00.00 TO STA 19+00.00

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

(DRAWING TITLE)
(PROJECT TITLE)
(LOCATION)

SHEET NO.

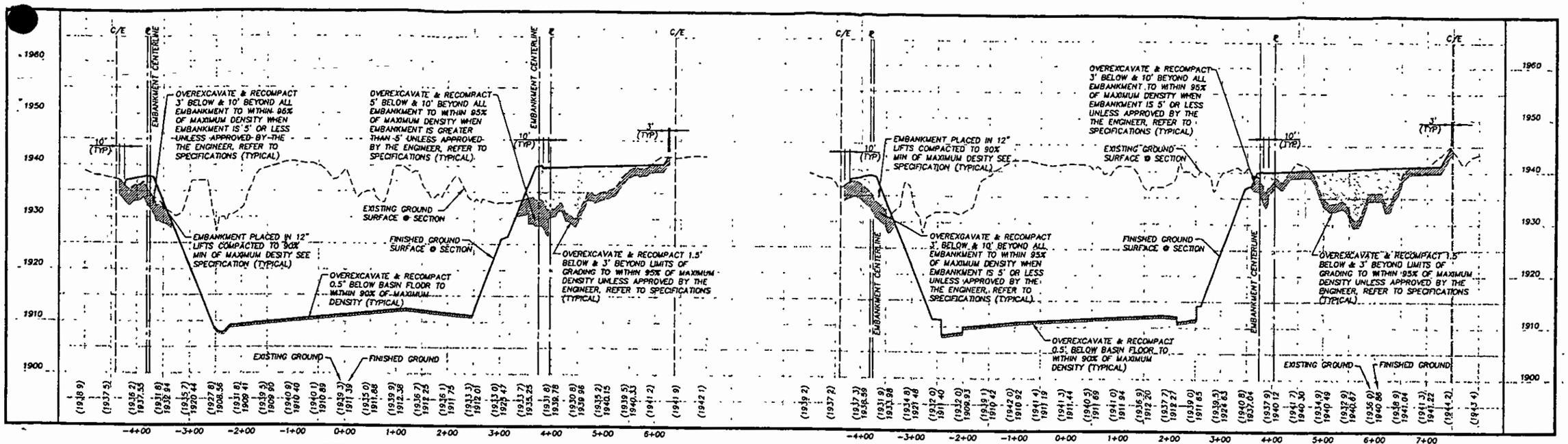
Call before you Overhead 1-702-593-8111

Call before you Dig 1-800-227-2600

GRAPHIC SCALE

(IN FEET)
1 inch = 100 ft.

THIS DRAWING IS FOR INFORMATION PURPOSES ONLY REFER TO DETENTION BASIN GRADING PLANS 1-5 SHOWN ON SHEETS 11 THRU 15

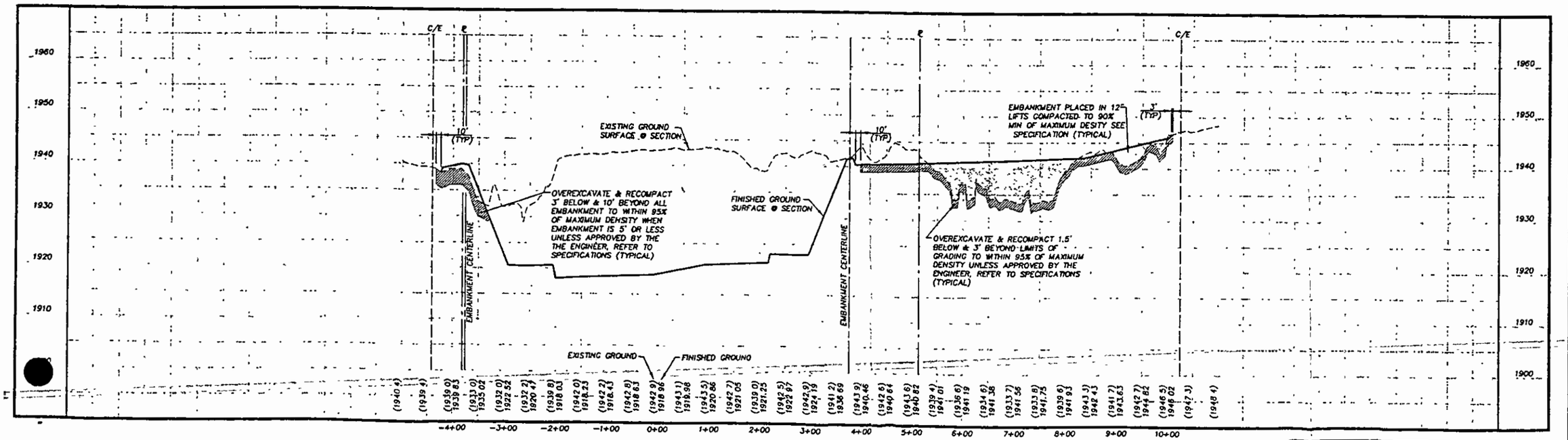


CROSS SECTION STATION 20+00

SCALE: HORIZ.: 1"=100'
VERT.: 1"=10'

CROSS SECTION STATION 21+00

SCALE: HORIZ.: 1"=100'
VERT.: 1"=10'



CROSS SECTION STATION 22+00

SCALE: HORIZ.: 1"=100'
VERT.: 1"=10'

PBS&J
601 North Green Valley Pkwy
Suite 100
Henderson, Nevada 89014
Telephone 702/263-7375
Fax 702/263-7200

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

NO	DESCRIPTION	DATE	BY
	REVISIONS		

SCALE: 1" = 100'
DESIGN A. SPATA
DRAWN A. SPATA
CHECKED D. DAMS
APPROVED T. BRADY
DATE: JULY 19, 1999

PROFESSIONAL ENGINEER STATE OF NEVADA
DENNIS V. MYERS
CIVIL
No. 9887

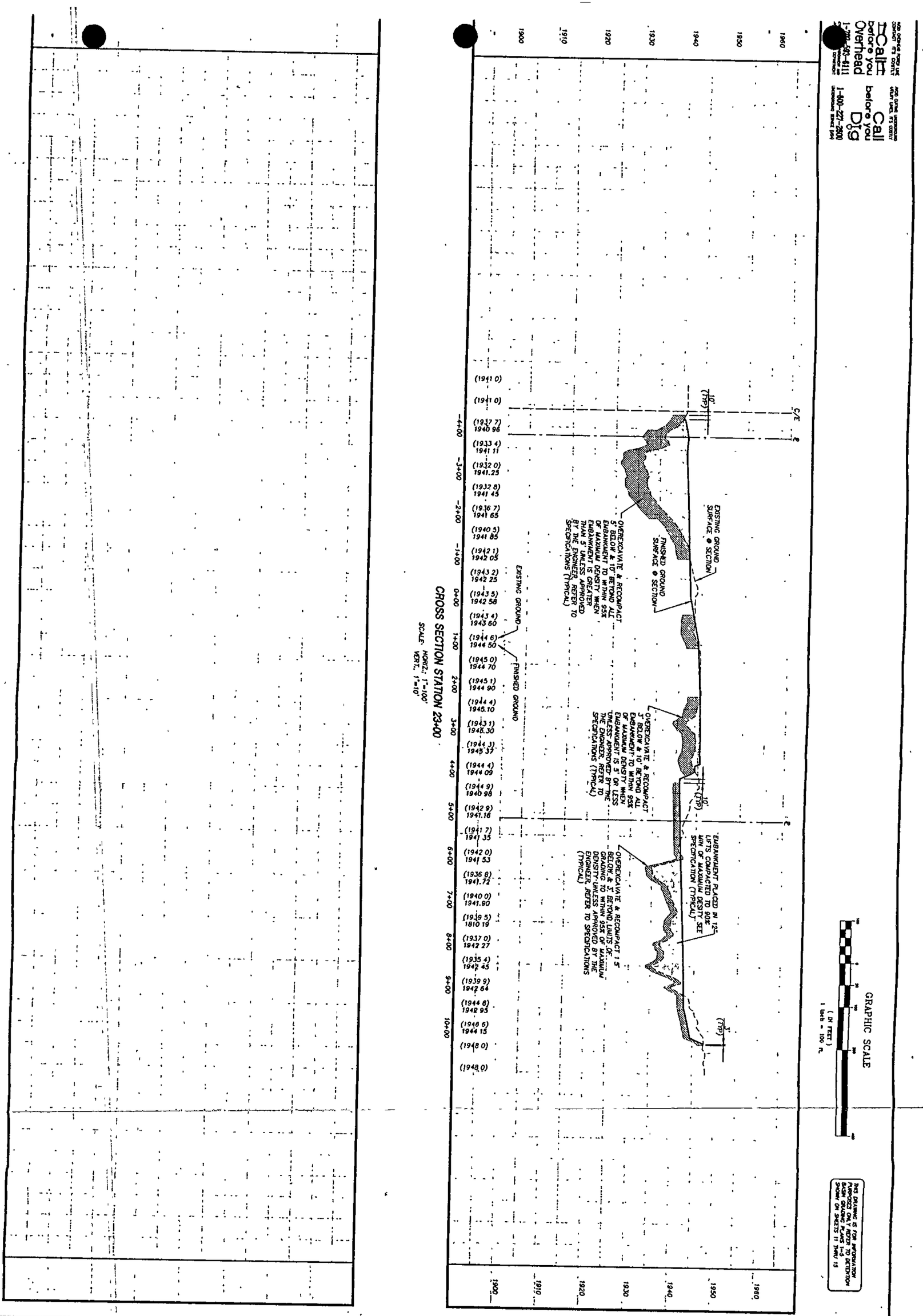
CROSS-SECTIONS - STA 20+00.00 TO STA 22+00.00

VANDENBERG DETENTION BASIN

INTERSTATE 15 AT VANDENBERG DRIVE

(DRAWING TITLE) (PROJECT TITLE) (LOCATION)

SHEET NO.
11



TY OF NORTH LAS VEGAS - DEPARTMENT OF PUBLIC WORKS - ENGINEERING DIVISION

(DRAWING TITLE)
CROSS-SECTION - STA 23+00.00

(PROJECT TITLE)
VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

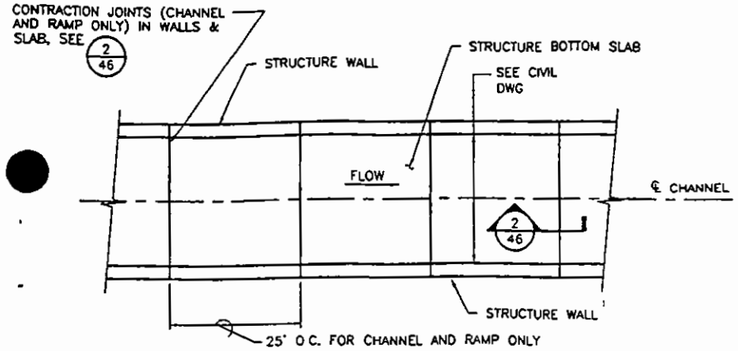
(LOCATION)

SHEET NO.

PROFESSIONAL ENGINEER STATE OF NEVADA

SCALE:	1" = 100'
DESIGN:	A. SPATA
DRAWN:	A SPATA
CHECKED:	D DAVIS
APPROVED:	T BRADY
DATE:	JULY 19, 1999

REVISIONS			
NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			

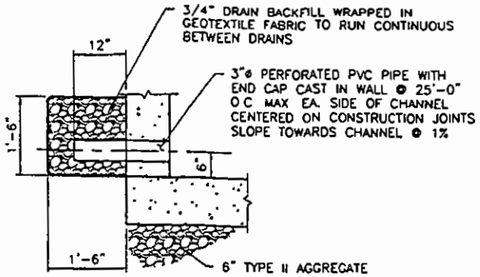


NOTES.

TRANSVERSE JOINTS AROUND CURVES SHALL BE ON RADIAL LINES AT 15' O.C. SPACED ALONG STRUCTURE CENTERLINE. DETAIL SHALL BE USED FOR CHANNEL SECTION, AND TRANSITION CHANNEL SECTIONS

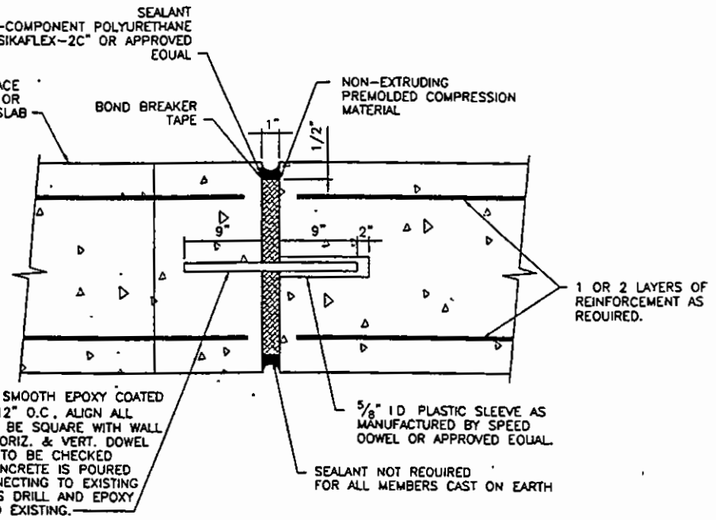
TYPICAL PLAN VIEW FOR JOINTS IN CHANNEL (7/46)

SCALE: N.T.S.



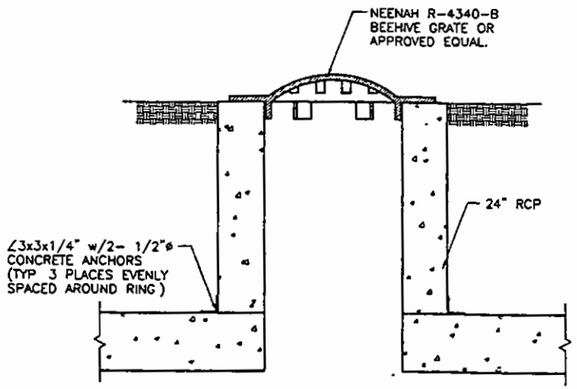
WALL DRAIN TYPICAL DETAIL (4/46)

SCALE 3/4" = 1'-0"



EXPANSION JOINT DETAIL (6/46)

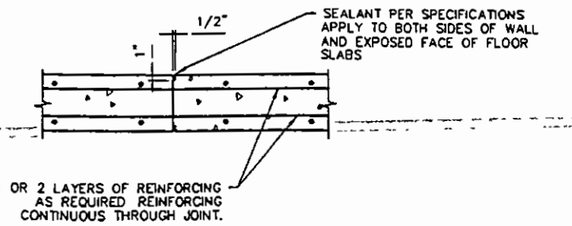
SCALE: N.T.S



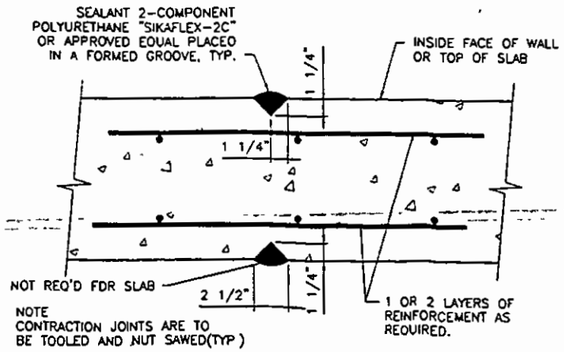
NOTE. SEE DETAIL 1/50 FOR ADDITIONAL REINF. AT RCB PENETRATION.

24" BEEHIVE INLET DETAIL (3/46)

SCALE. N.T.S.



WALL AND SLAB CONSTRUCTION JOINT DETAIL (5/46)



NOTE
CONTRACTION JOINTS ARE TO BE TOOLED AND NUT SAWED(TYP)

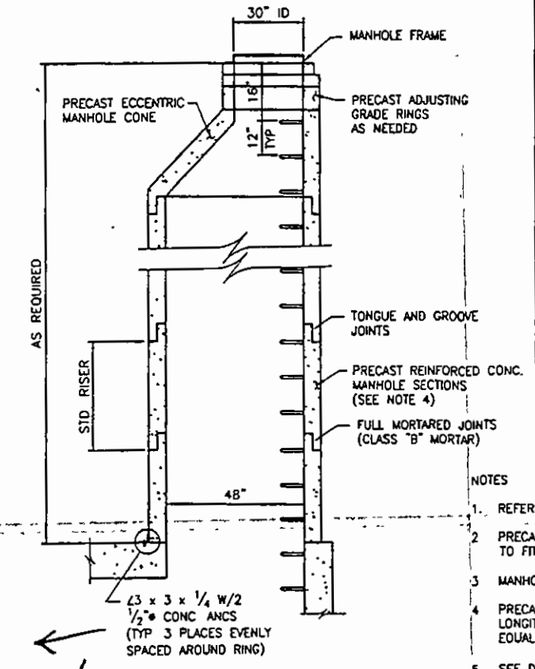
CONTRACTION JOINT DETAIL (2/46)

GENERAL NOTES:

1. DESIGN CRITERIA: ACI 318-95, AASHTO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 16TH EDITION" DESIGN LIVE LOAD IS AASHTO HS20-44 TRUCK LOADING
2. PORTLAND CEMENT SHALL CONFORM TO A.S.T.M. C-150, TYPE V
3. AGGREGATE SHALL CONFORM TO A.S.T.M C-33
4. ALL STRUCTURAL CONCRETE SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS.
5. ALL REINFORCEMENT STEEL SHALL BE ASTM DESIGNATION A615 GRADE 60.
6. COVERAGE FOR REINFORCING BARS, EXCEPT WHERE OTHERWISE SHOWN, SHALL BE 3" FOR CONCRETE PLACED AGAINST EARTH, 2" FOR OTHERS.
7. DOWELS, PIPES, WATERSTOPS AND OTHER INSTALLED MATERIALS OR ACCESSORIES SHALL BE HELD SECURELY IN POSITION WHILE CONCRETE IS BEING PLACED
8. ALL KEYWAYS AND CONSTRUCTION JOINTS IN CONCRETE SHALL BE CLEAN FOR BOND CONSTRUCTION JOINTS BETWEEN FOOTINGS AND WALLS SHALL BE COVERED WITH POLYETHYLENE-COATED BURLAP MATS WHICH SHALL BE KEPT WET WITH WATER UNTIL CONCRETE IN WALLS IS PLACED. NO CURING COMPOUND SHALL BE APPLIED IN CONSTRUCTION JOINTS BETWEEN FOOTINGS AND WALLS.
9. USE 3/4" CHAMFER ON ALL EXPOSED CORNERS
10. REINFORCING BARS AND ACCRESSORIES SHALL NOT BE IN CONTACT WITH ANY PIPE, PIPE FLANGE OR METAL PART EMBEDDED IN CONCRETE
11. ALL REINFORCING BAR LAP SPLICES SHALL CONFORM TO AASHTO-16TH EDITION, AND THE ATTACHED TABLE
12. SPLICE LENGTHS OF DIFFERENT BARS SHALL BE THE SPLICE LENGTH OF THE SMALLER BAR
13. ALL SPLICES SHALL BE TYPE B AND SHALL BE STAGGERED SUCH THAT NO MORE THAN 50 % OF THE BARS IN A LAYER ARE SPLICED WITHIN THE REQUIRED LAP LENGTH IF MORE THAN 50% ARE SPLICED USE TYPE C SPLICE.
14. TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12 INCHES OF CONCRETE BELOW THE BAR
15. TRANSVERSE AND LONGITUDINAL CONSTRUCTION JOINTS ARE REQUIRED AT THE END OF EACH CONTINUOUS POUR AND SHALL BE AS SHOWN IN DETAIL 5/46
16. EXPANSION JOINTS ARE LOCATED AS SHOWN ON PLAN VIEWS.

MINIMUM BAR LAPS:

BAR SIZE	LAP CLASS	TOP BARS (INCHES)	OTHER BARS (INCHES)
#3	B	16	12
	C	20	15
#4	B	22	16
	C	29	20
#5	B	27	20
	C	36	26
#6	B	33	23
	C	43	31
#7	B	42	29
	C	55	39
#8	B	55	39
	C	71	51
#9	B	69	49
	C	90	65
#10	B	87	62
	C	114	82



NOTES

1. REFERENCE USD NO. 403
2. PRECAST PIPE SECTION LENGTHS ARRANGED TO FIT DEPTH
3. MANHOLE STEPS PER USD NO. 410
4. PRECAST MANHOLE SECTIONS SHALL HAVE LONGITUDINAL REINFORCEMENT GREATER THAN OR EQUAL TO .0018 TIMES THE GROSS AREA OF THE RING
5. SEE DETAIL 1/50 FOR ADDITIONAL REINFORCEMENT AT SLAB PENETRATION

48" MANHOLE RISER DETAIL (1/46)

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

NO	REVISIONS DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			

SCALE: AS NOTED
DESIGN: DAA
DRAWN: ALA
CHECKED: D. DAWS
APPROVED: T. BRADY
DATE: July 18, 1999

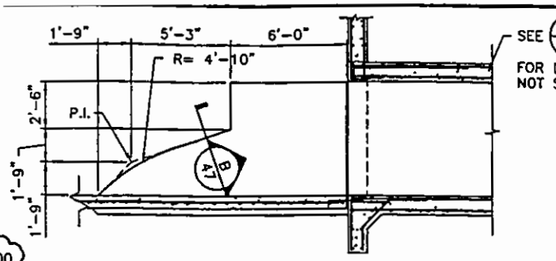
PROFESSIONAL ENGINEER STATE OF NEVADA DANA A. AMES CIVIL & STRUCTURAL No. 10712 7-19-99

GENERAL NOTES AND TYPICAL DETAILS

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

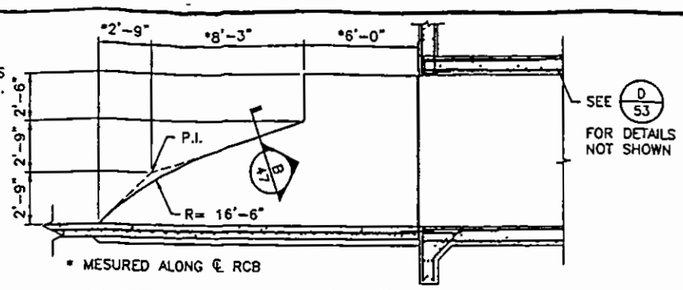
(DRAWING NO.)
(PROJECT NO.)
(LOCATION)

SHEET NO. 46



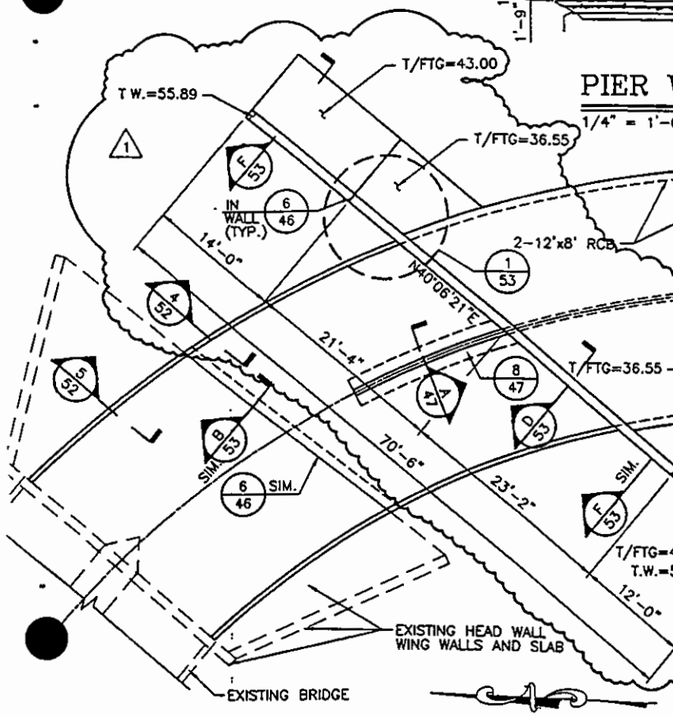
PIER WALL @ 6'-0" RCB

1/4" = 1'-0" (9/47)



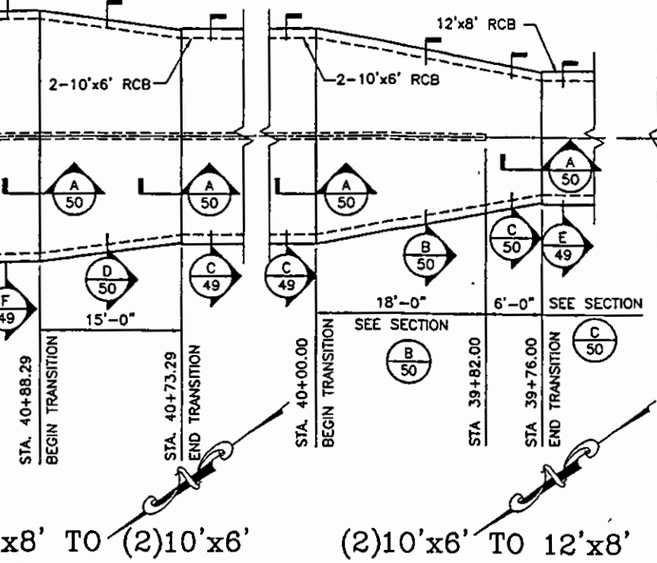
PIER WALL @ 8'-0" RCB

1/4" = 1'-0" (8/47)



INLET CHANNEL PLAN

1/8" = 1'-0" (6/47)



(2)12'x8' TO (2)10'x6'

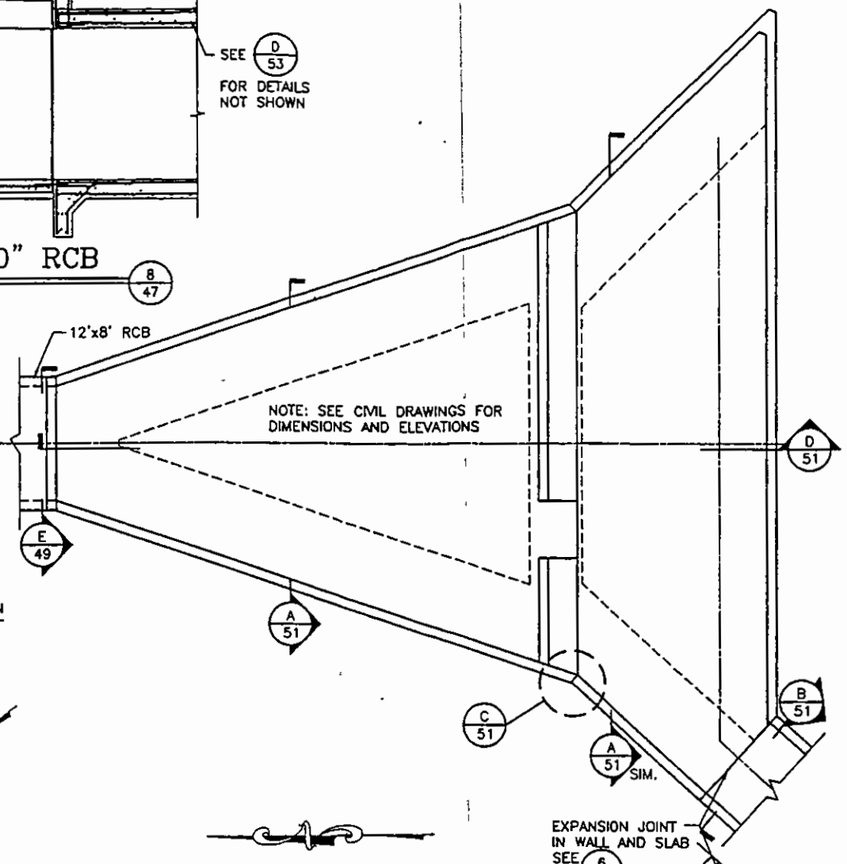
RCB TRANSITION PLAN

1/8" = 1'-0" (5/47)

(2)10'x6' TO 12'x8'

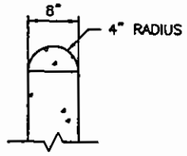
RCB TRANSITION PLAN

1/8" = 1'-0" (3/47)



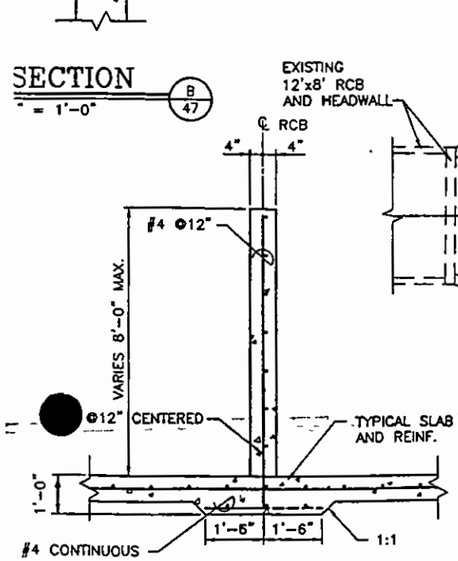
INFLOW STRUCTURE #1

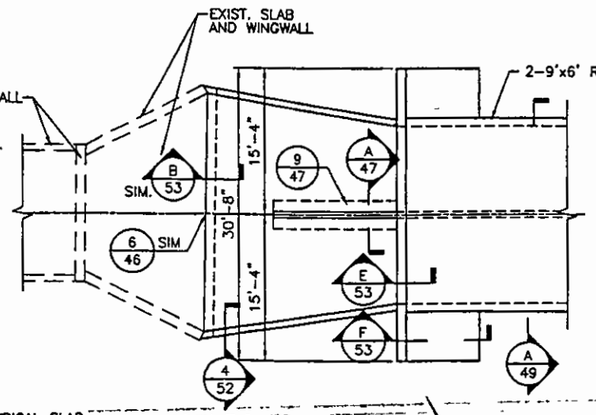
1/8" = 1'-0" (2/47)

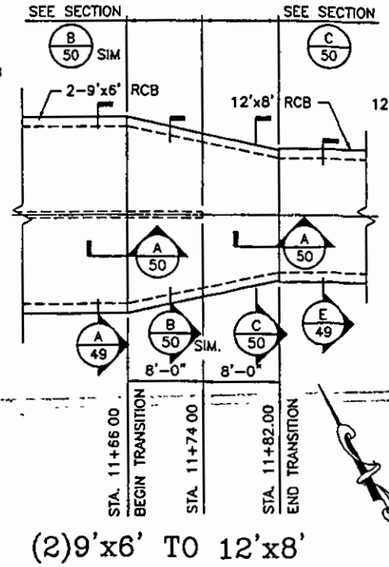


SECTION

" = 1'-0" (B/47)

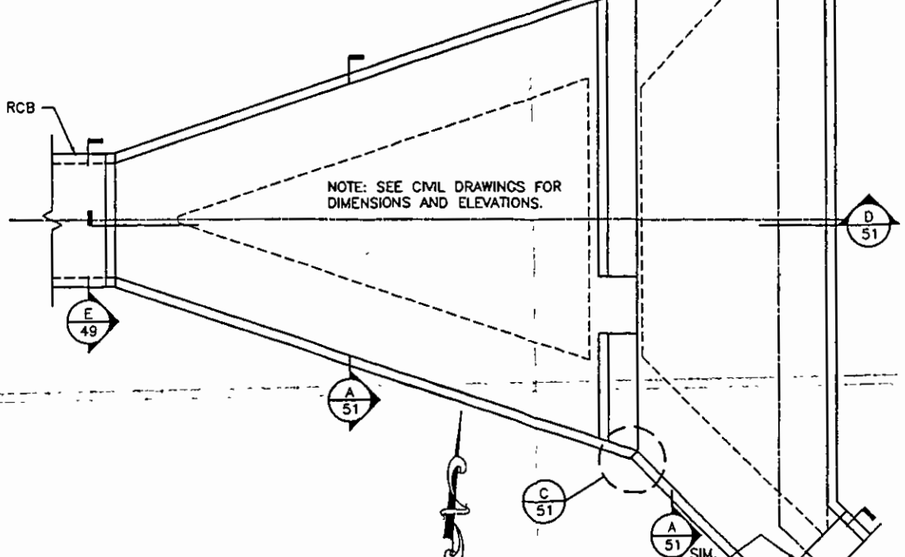






(2)9'x6' TO 12'x8'

RCB TRANSITION PLAN



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

REVISIONS			
NO	DESCRIPTION	DATE	BY
A	HEADWALL AND RCB REVISIONS	12/22/99	DAA

SCALE AS NOTED
DESIGN DAA
DRAWN ALA
CHECKED D DAVIS
APPROVED T BRADY
DATE July 19, 1999

PROFESSIONAL ENGINEER STATE OF NEVADA DANA A AMES CIVIL & STRUCTURAL No 10712 12-29-00

INFLOW STRUCTURES #1 AND #2 PLANS

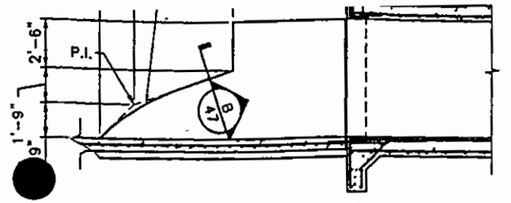
VANDENBERG DETENTION BASIN

INTERSTATE 15 AT VANDENBERG DRIVE

(DRAWING TITLE) (PROJECT TITLE) (LOCATION)

SHEET NO.

17

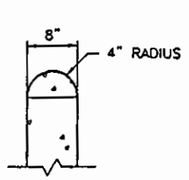


PIER WALL @ 6'-0" RCB

9/47

1/4" = 1'-0"

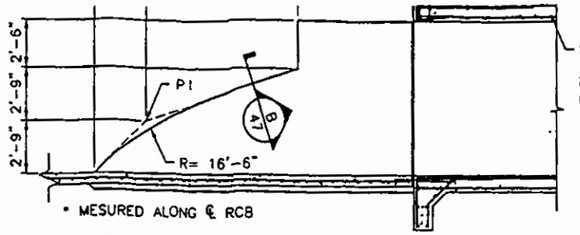
FOR DETAILS NOT SHOWN.



SECTION

B/47

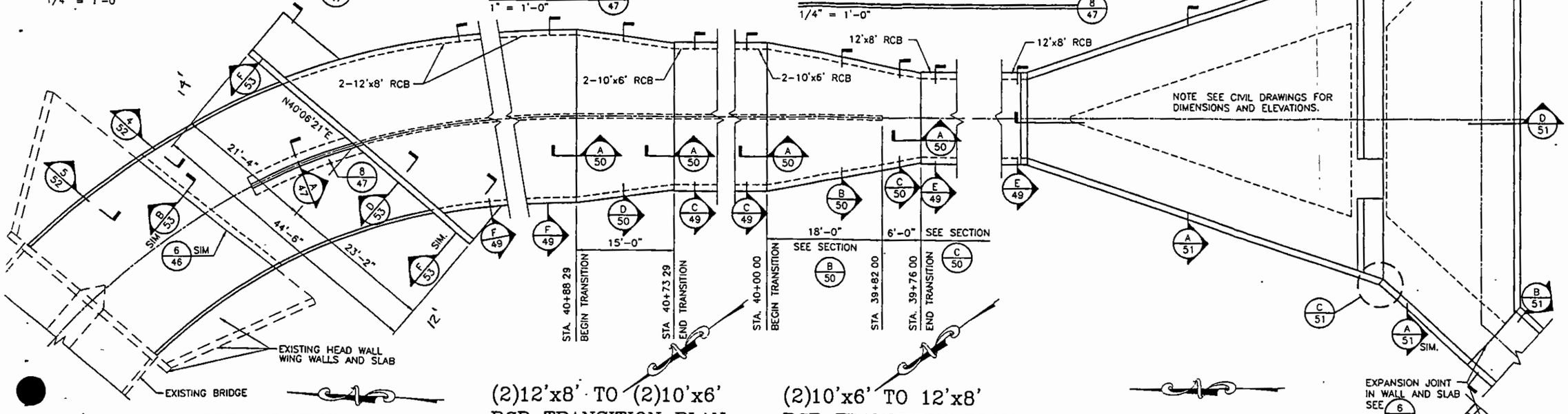
1" = 1'-0"



PIER WALL @ 8'-0" RCB

8/47

1/4" = 1'-0"



INLET CHANNEL PLAN

6/47

1/8" = 1'-0"

(2)12'x8' TO (2)10'x6'
RCB TRANSITION PLAN

5/47

1/8" = 1'-0"

(2)10'x6' TO 12'x8'
RCB TRANSITION PLAN

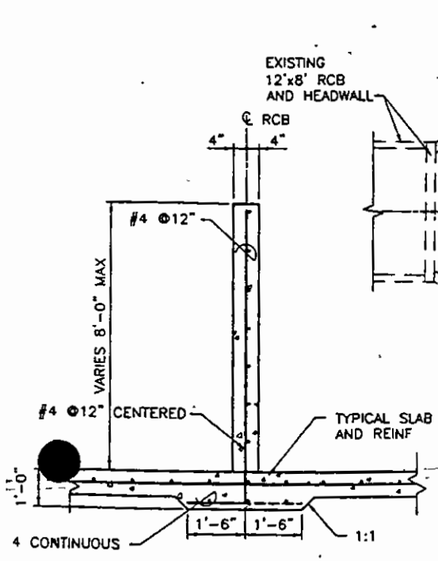
3/47

1/8" = 1'-0"

INFLOW STRUCTURE #1

2/47

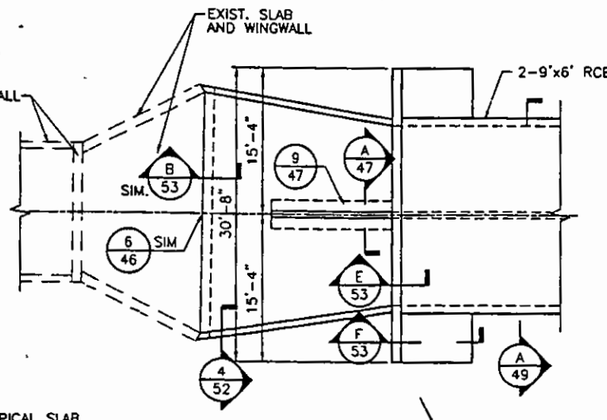
1/8" = 1'-0"



SECTION

A/47

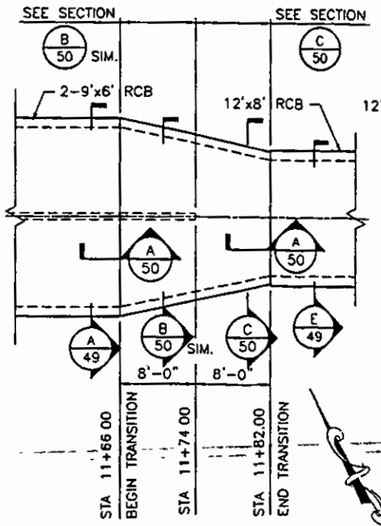
1/2" = 1'-0"



INLET CHANNEL PLAN

7/47

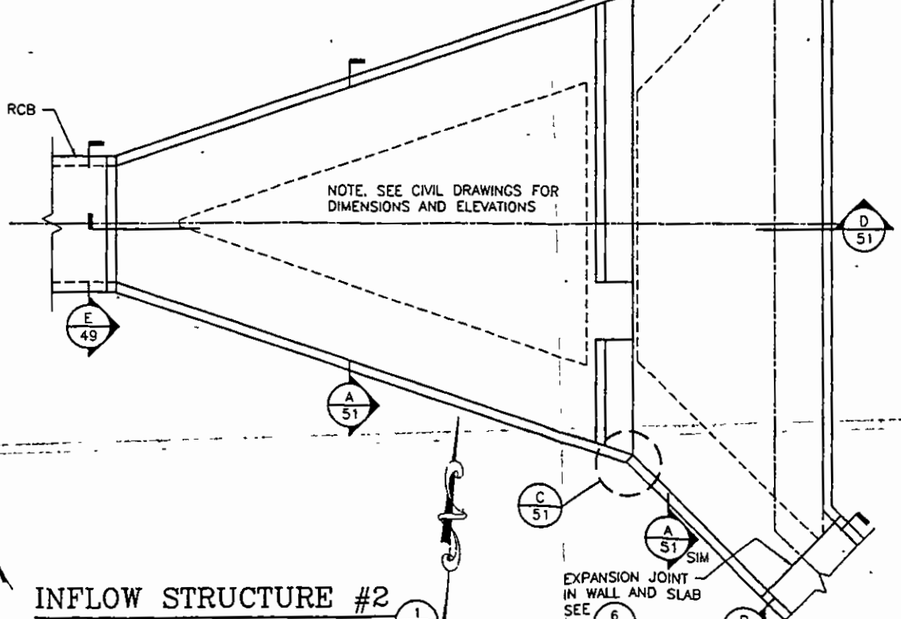
1/8" = 1'-0"



(2)9'x6' TO 12'x8'
RCB TRANSITION PLAN

4/47

1/8" = 1'-0"



INFLOW STRUCTURE #2

1/47

1/8" = 1'-0"

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

NO	DESCRIPTION	DATE
1		
2		
3		
4		

REVISIONS

SCALE: AS NOTED
DESIGN DAA
DRAWN ALA
CHECKED D. DAVIS
APPROVED T. BRADY
DATE: July 19, 1999

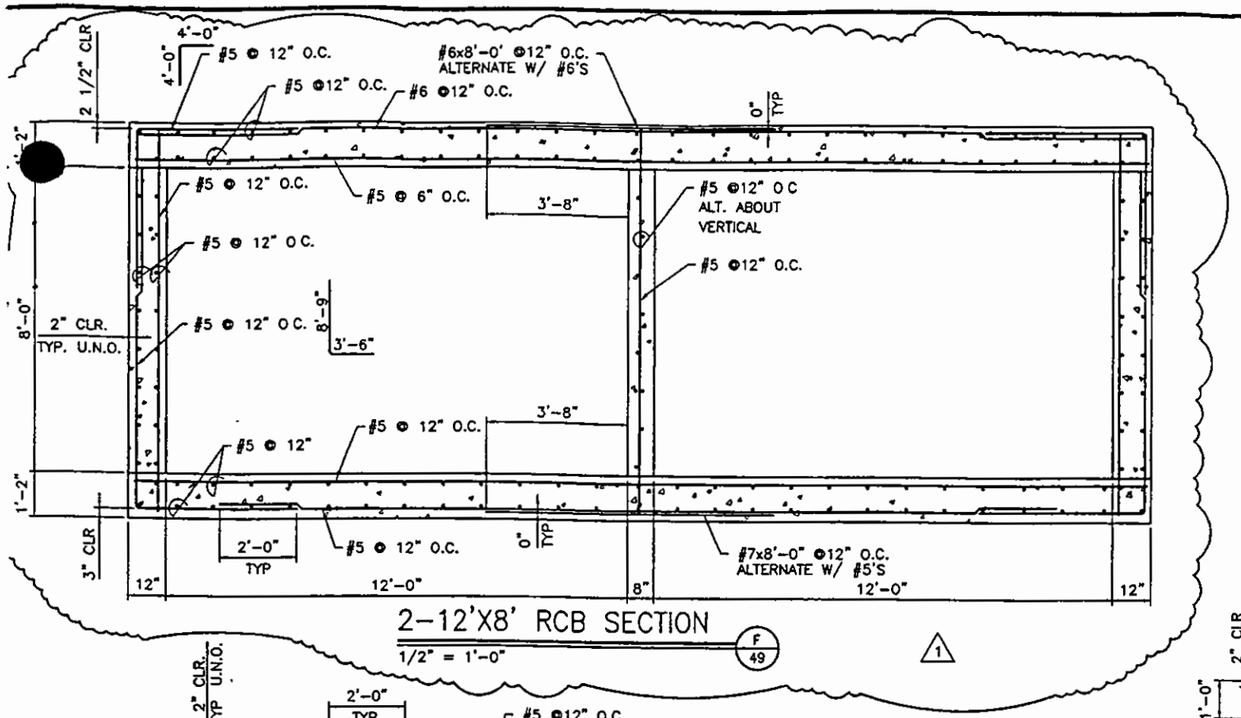
PROFESSIONAL ENGINEER DANA A. AMES CIVIL & STRUCTURAL No. 10712 STATE OF NEVADA 7-19-99

INFLOW STRUCTURES #1 AND #2 PLANS

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

DRAWING TITLE
PROJECT TITLE
LOCATION

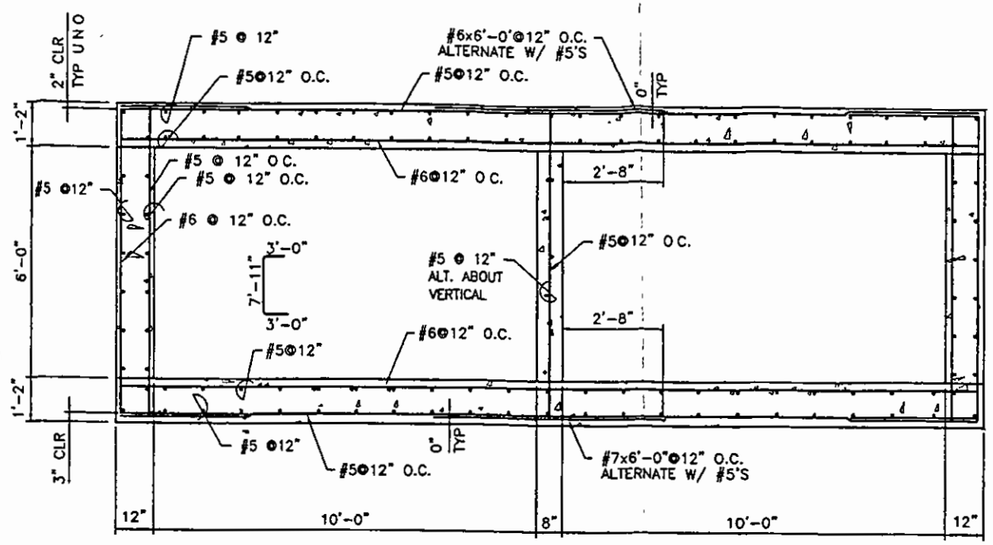
SHEET NO.
47



2–12'X8' RCB SECTION

1/2" = 1'-0"

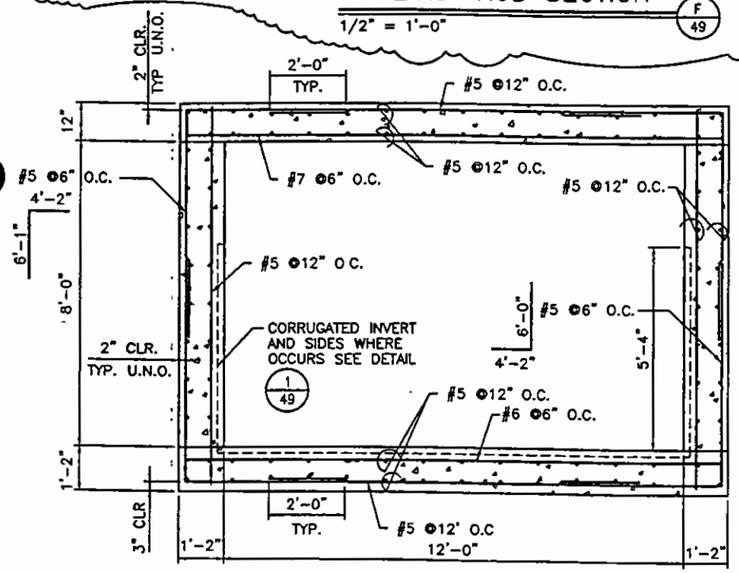
F 49



2–10'X6' RCB SECTION

1/2" = 1'-0"

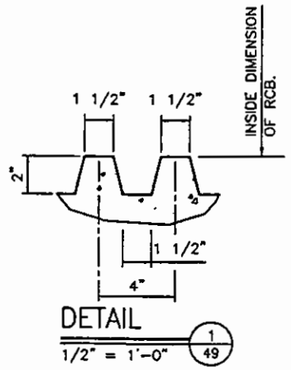
C 49



12'X8' RCB SECTION

1/2" = 1'-0"

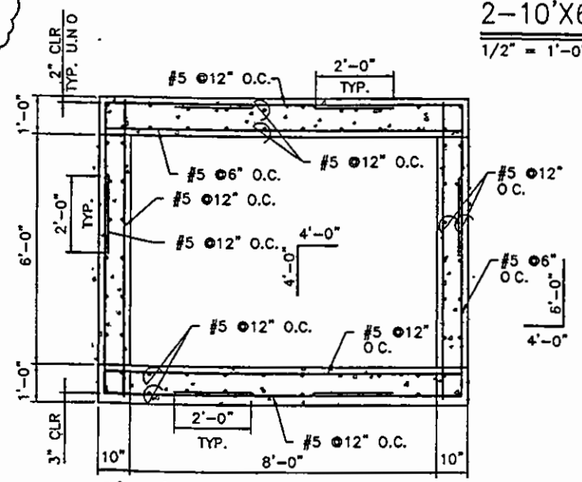
E 49



DETAIL

1/2" = 1'-0"

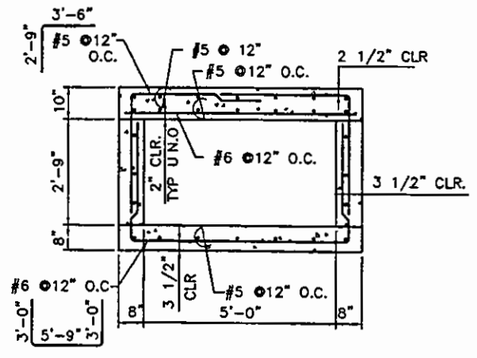
1/49



8'x6' RCB SECTION

1/2" = 1'-0"

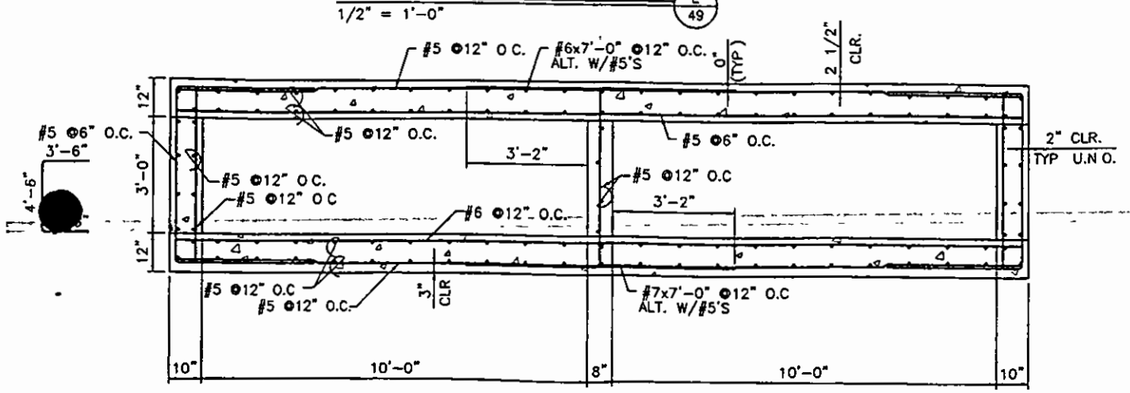
G 49

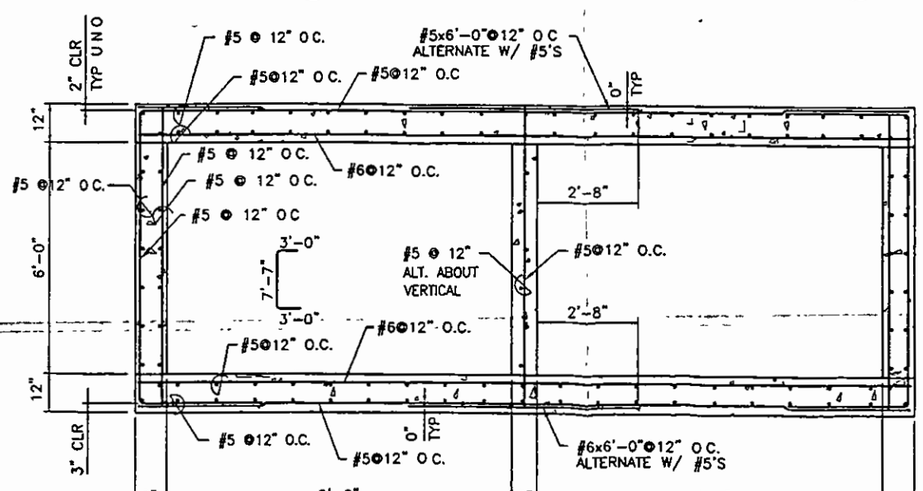


5'X2'-9" RCB SECTION

1/2" = 1'-0"

B 49





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

NO	REVISIONS DESCRIPTION	DATE	BY
	HEADWALL AND RCB REVISIONS	12/22/99	DAA

SCALE AS NOTED
DESIGN: DAA
DRAWN ALA
CHECKED D DAVIS
APPROVED: T BRADY
DATE July 19, 1999

PROFESSIONAL ENGINEER DANA A. AMES CIVIL & STRUCTURAL No. 10712 STATE OF NEVADA 7-9-00

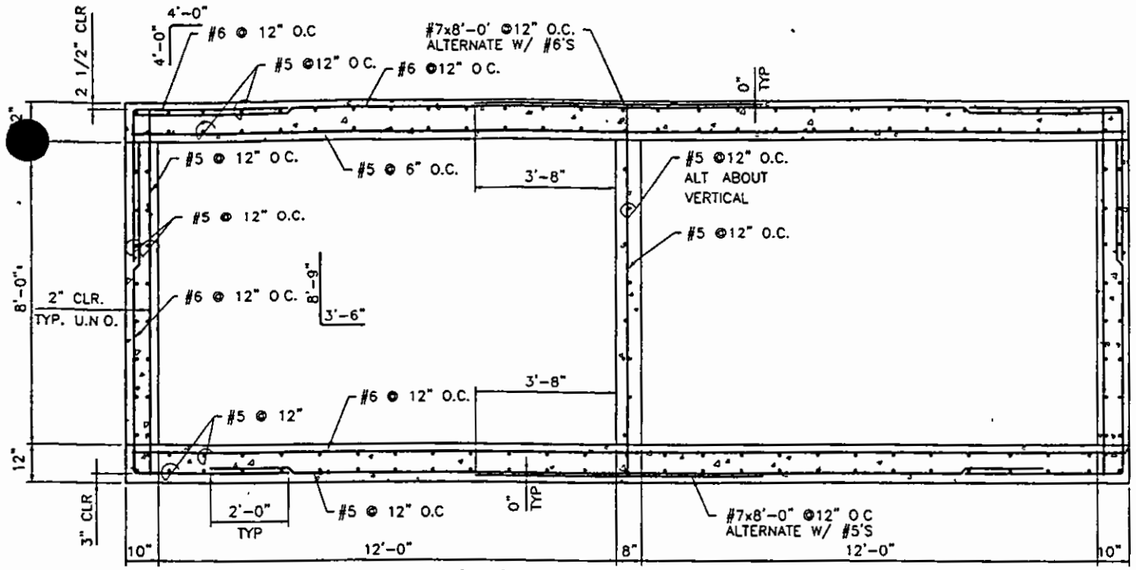
RCB TYPICAL SECTIONS

VANDENBERG DETENTION BASIN

INTERSTATE 15 AT VANDENBERG DRIVE

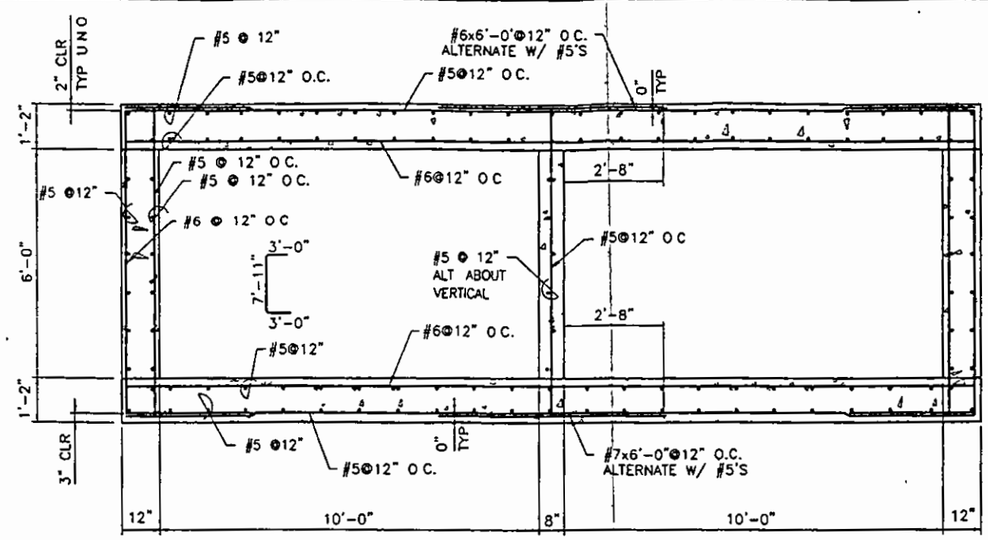
(DRAWING TITLE) (PROJECT TITLE) (LOCATION)

SHEET NO



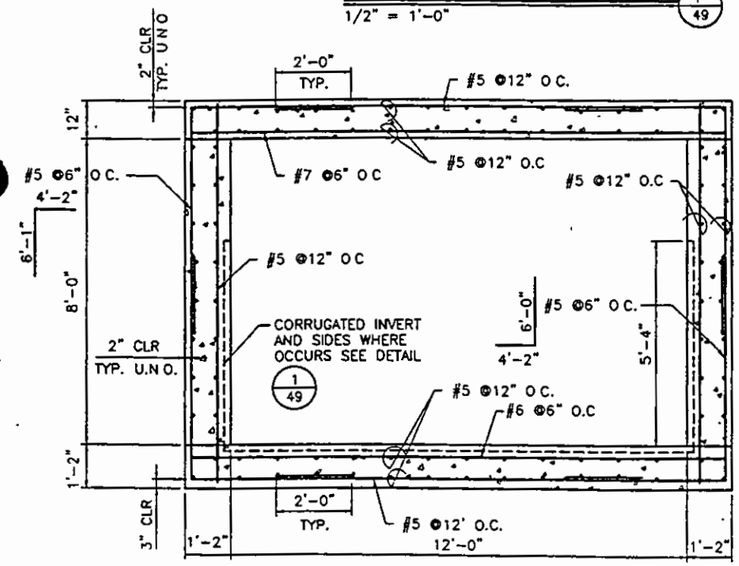
2–12'X8' RCB SECTION (F / 49)

1/2" = 1'-0"



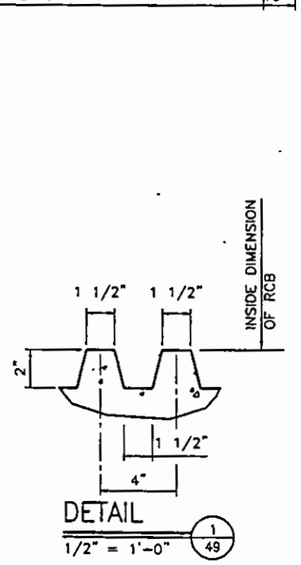
2–10'X6' RCB SECTION (C / 49)

1/2" = 1'-0"



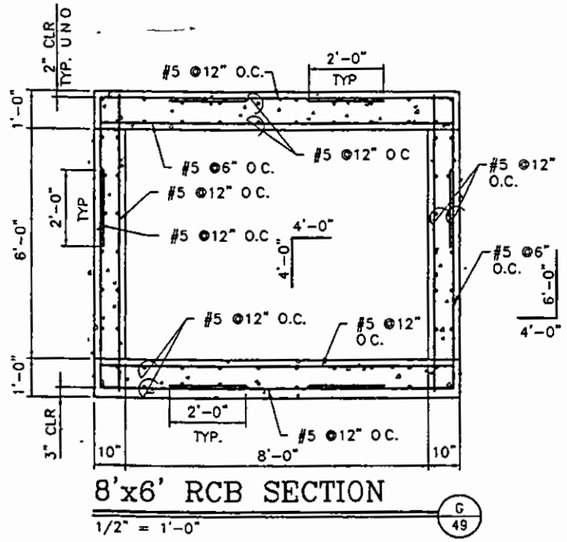
12'X8' RCB SECTION (E / 49)

1/2" = 1'-0"



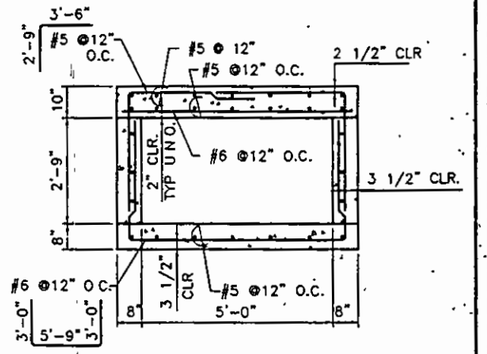
DETAIL (1 / 49)

1/2" = 1'-0"



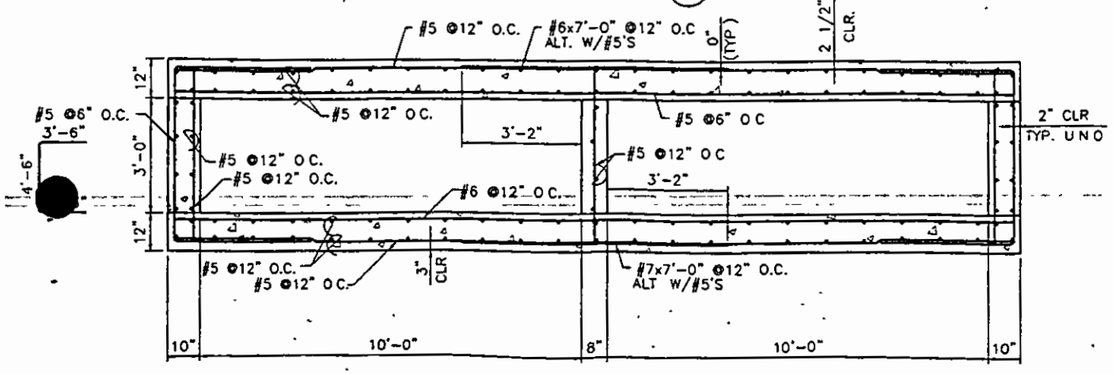
8'x6' RCB SECTION (G / 49)

1/2" = 1'-0"



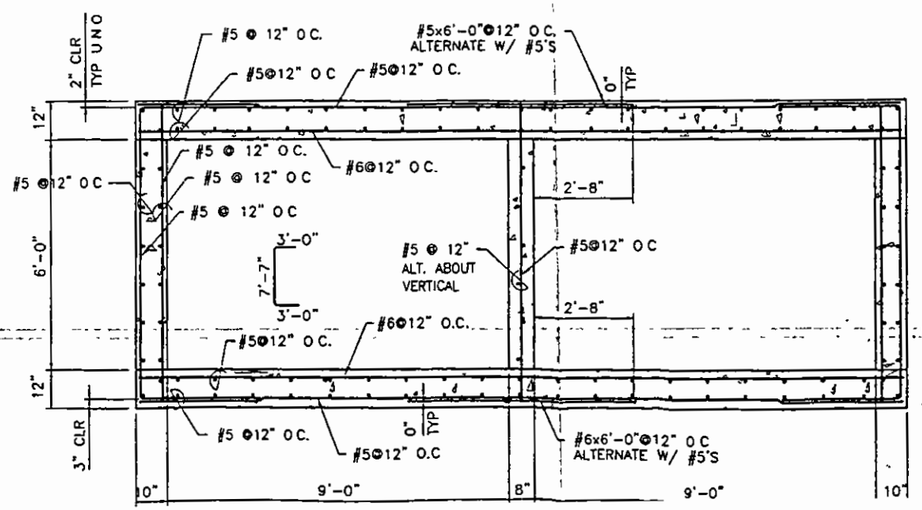
5'X2'-9" RCB SECTION (B / 49)

1/2" = 1'-0"



3–10'X7' RCB SECTION (D / 49)

1/2" = 1'-0"



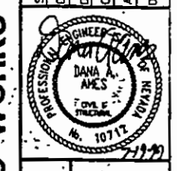
3–9'X7' RCB SECTION (A / 49)

1/2" = 1'-0"

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

REVISIONS			
NO	DESCRIPTION	DATE	BY
Δ			
Δ			
Δ			
Δ			

SCALE: AS NOTED
DESIGN DAA
DRAWN ALA
CHECKED D DAVIS
APPROVED T BRADY
DATE: July 19, 1999

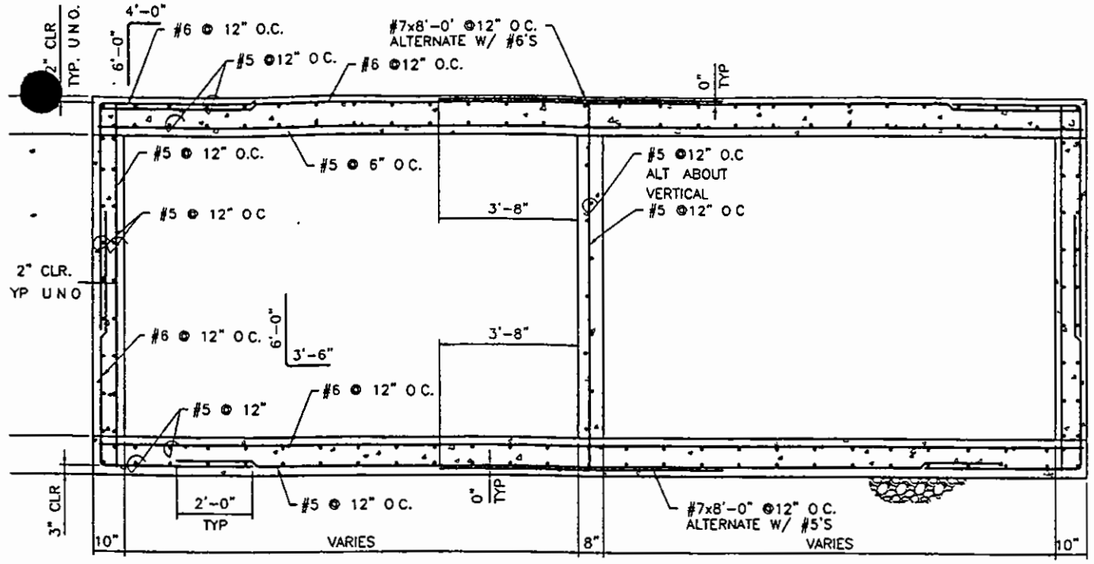


RCB TYPICAL SECTIONS

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

(DRAWING NUMBER) (PROJECT TITLE) (LOCATION)

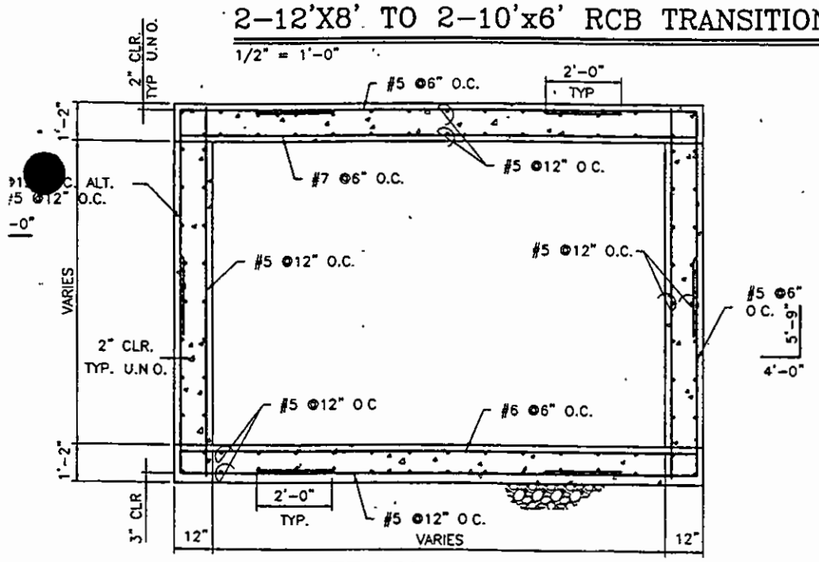
SHEET NO.



2-12'X8' TO 2-10'x6' RCB TRANSITION SECTION

1/2" = 1'-0"

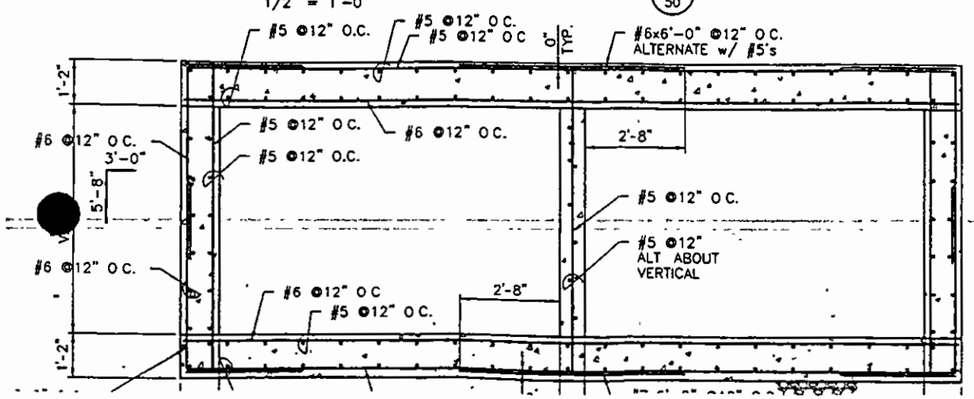
D / 50



RCB TRANSITION SECTION

1/2" = 1'-0"

C / 50



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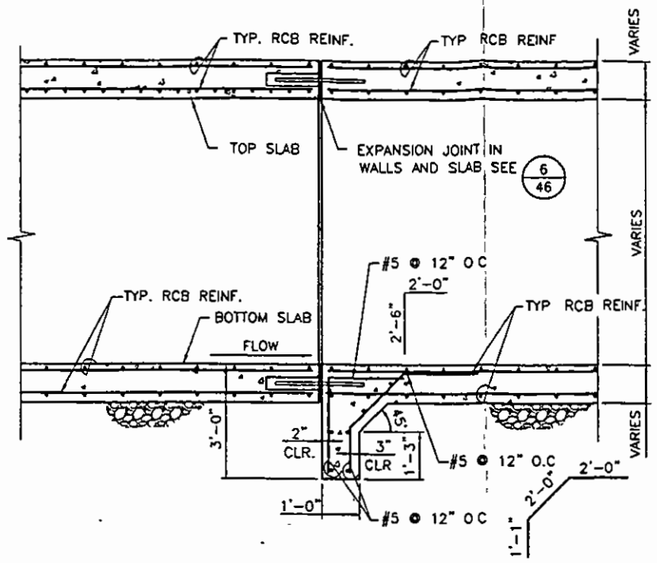
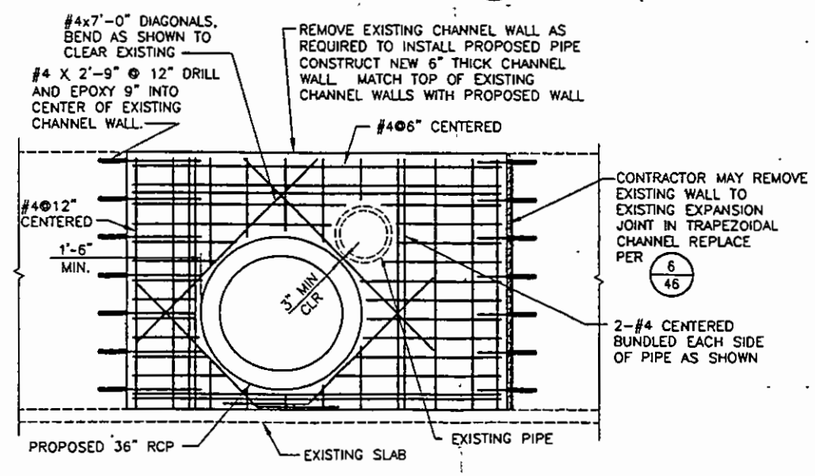


EXPANSION JOINT SECTION

1/2" = 1'-0"

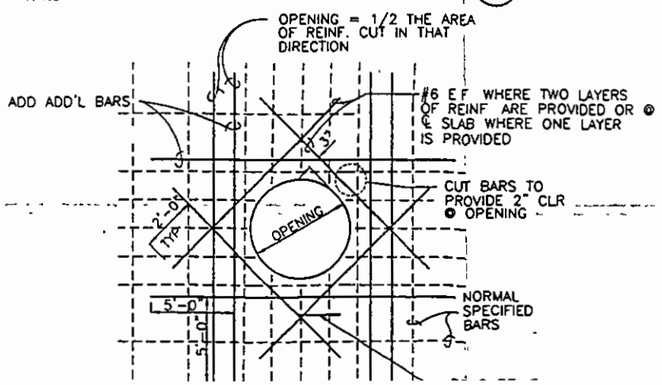
A / 50



RCP JUNCTION

N.T.S

2 / 50



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

NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			

REVISIONS

SCALE: AS NOTED
DESIGN: DAA
DRAWN: ALA
CHECKED: D DAVIS
APPROVED: T BRADY
DATE: July 19, 1999

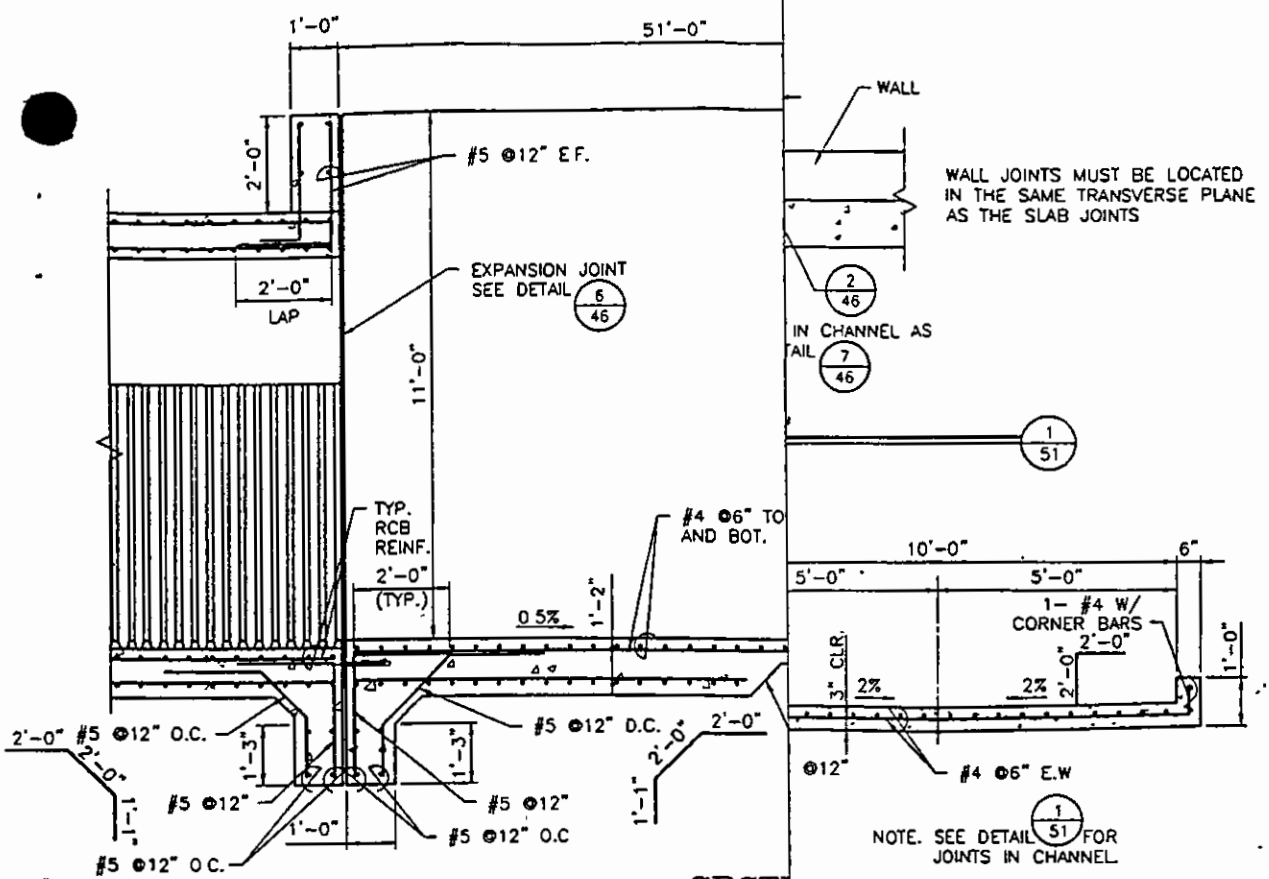
DANA A. AMES — CIVIL & DIRECTOR — No. 10712 — PROFESSIONAL ENGINEER — STATE OF NEVADA

RCB TRANSITION SECTIONS AND MISCELLANEOUS DETAILS

VANDENBERG DETENTION BASIN

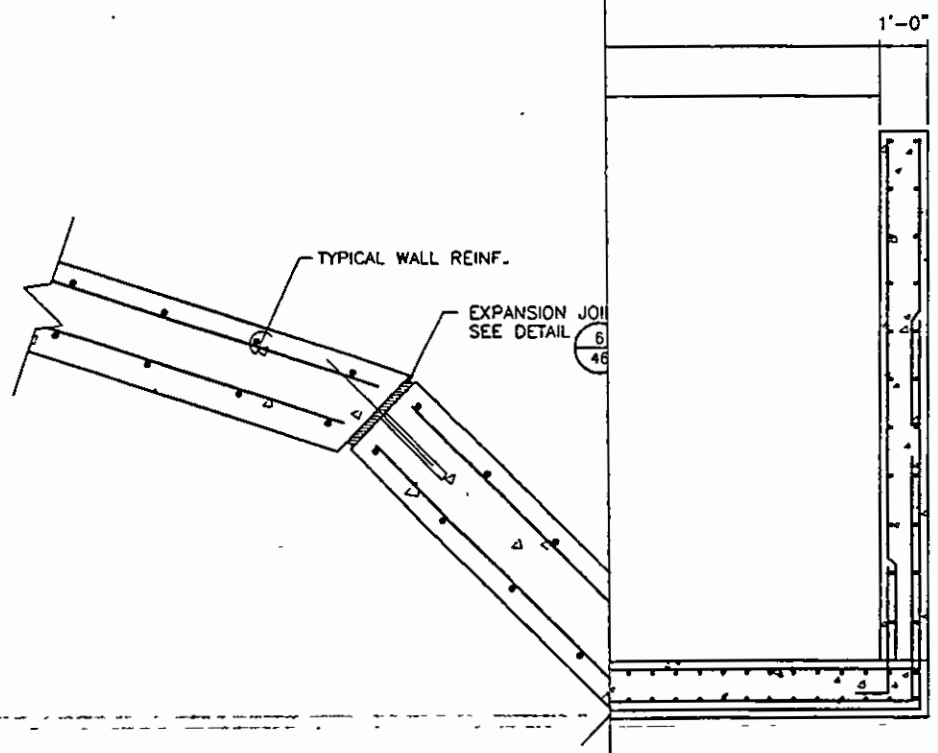
INTERSTATE 15 AT VANDENBERG DRIVE

SHEET NO.



SECTION

1/2" = 1'-0" B/51



DETAIL C/51

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

REVISIONS			
NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			

SCALE: AS NOTED
DESIGN: DAA
DRAWN: ALA
CHECKED: D DAVIS
APPROVED: T BRADY
DATE: July 19, 1999

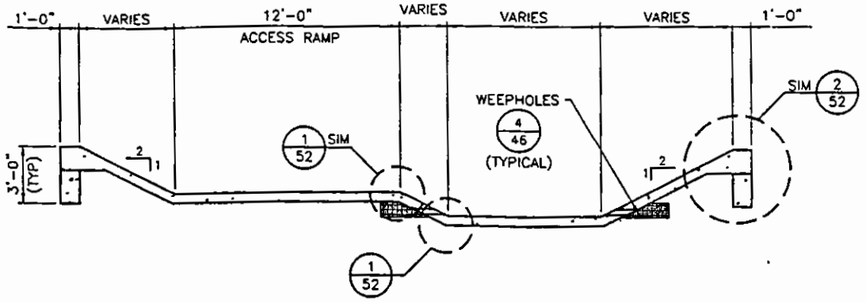
PROFESSIONAL ENGINEER DIANA A. AMES CIVIL No. 10712 STATE OF NEVADA

BAFFLE SECTIONS AND DETAILS

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

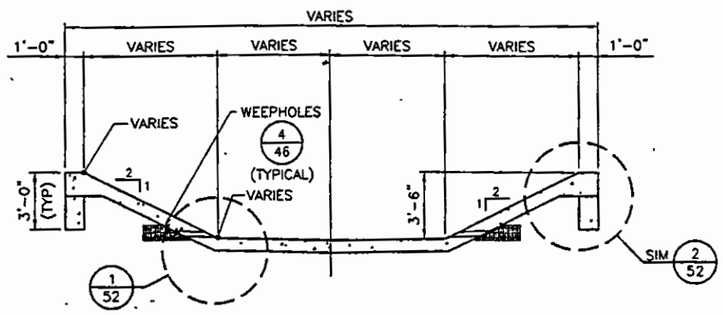
DRAWING TITLE
PROJECT TITLE
LOCATION

SHEET NO.



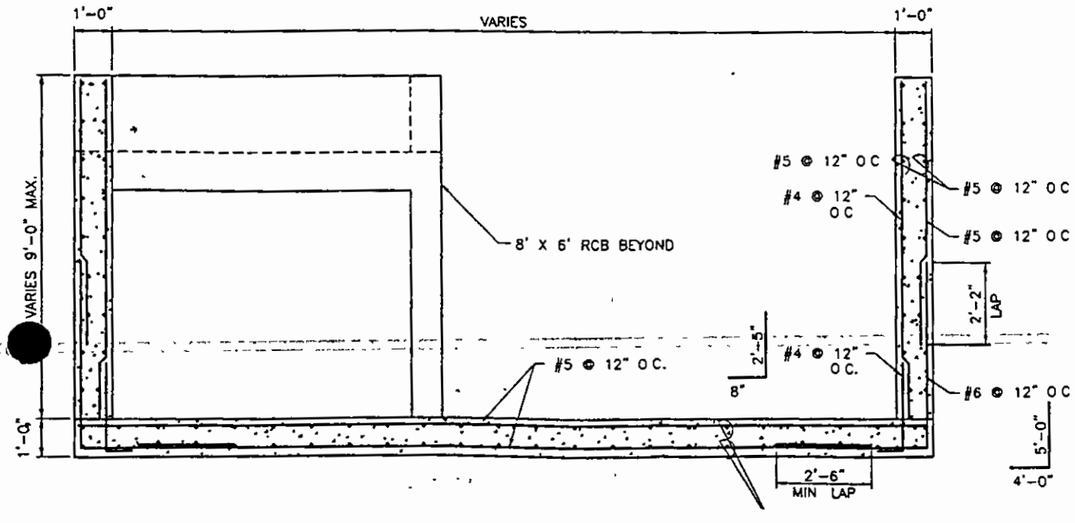
TRAPEZOIDAL SECTION

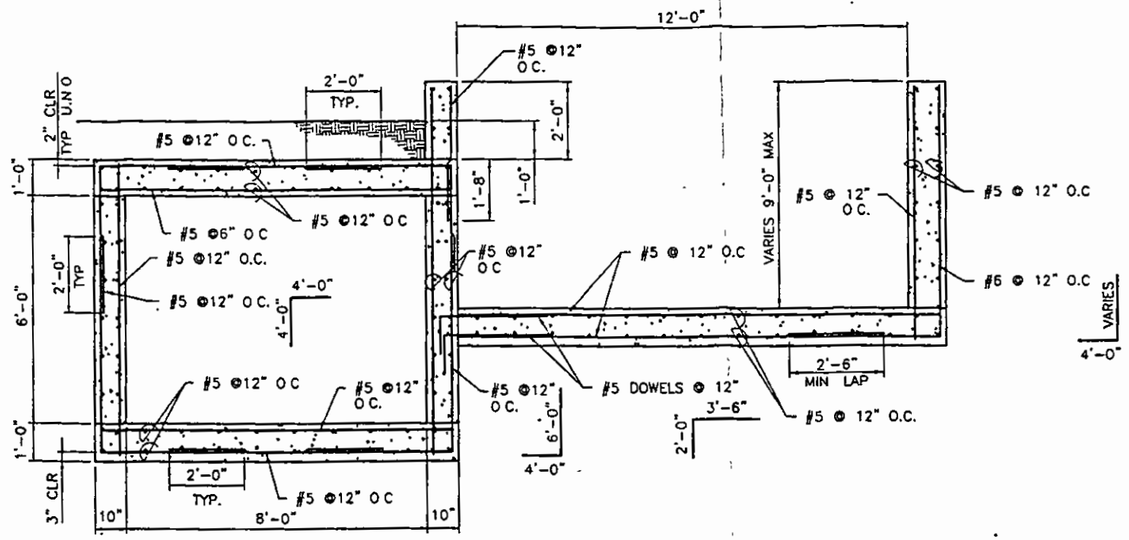
1/4" = 1'-0" — F/52



TRAPEZOIDAL SECTION

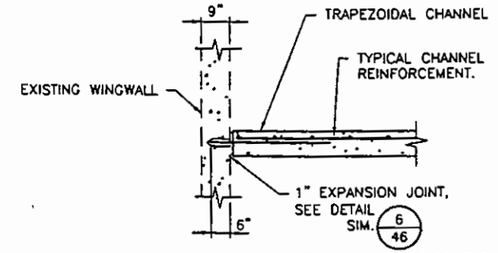
1/4" = 1'-0" — E/52





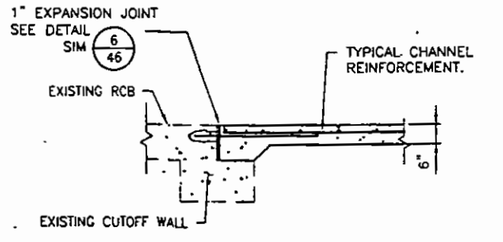
8"x6" RCB & RAMP SECTION

1/2" = 1'-0" — C/52



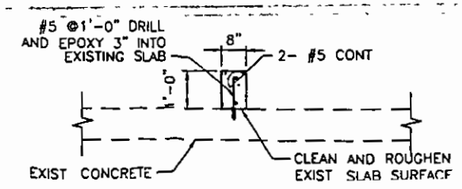
SECTION

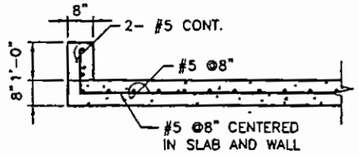
1/2" = 1'-0" — B/52



SECTION

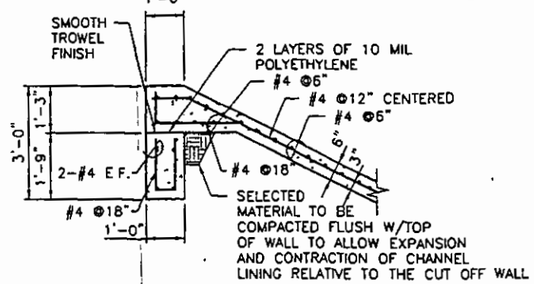
1/2" = 1'-0" — A/52





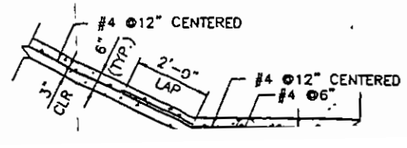
SECTION AT PROPOSED

1/2" = 1'-0" — 4/52



CUT OFF WALL DETAIL

1/2" = 1'-0" — 2/52



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

OPEN CHANNEL SECTIONS & DETAILS

VANDENBERG DETENTION BASIN

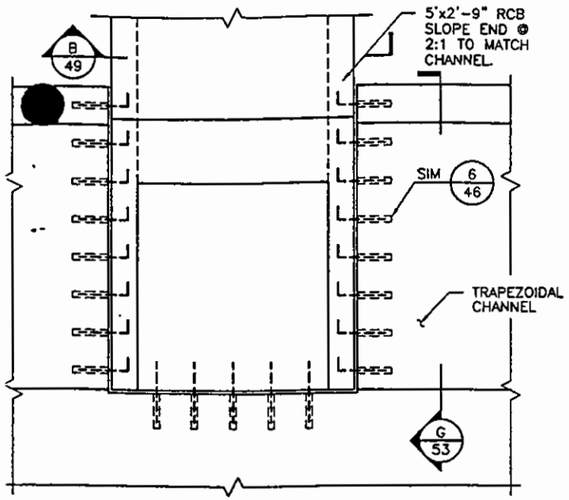
INTERSTATE 15 AT VANDENBERG DRIVE

REVISIONS			
NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			

SCALE: AS NOTED
DESIGN: DAA
DRAWN: AJA
CHECKED: D DAVIS
APPROVED: T BRADY
DATE: July 19, 1999

PROFESSIONAL ENGINEER — STATE OF NEVADA — DANIEL A. AMES — CIVIL & STRUCTURAL — No. 10717

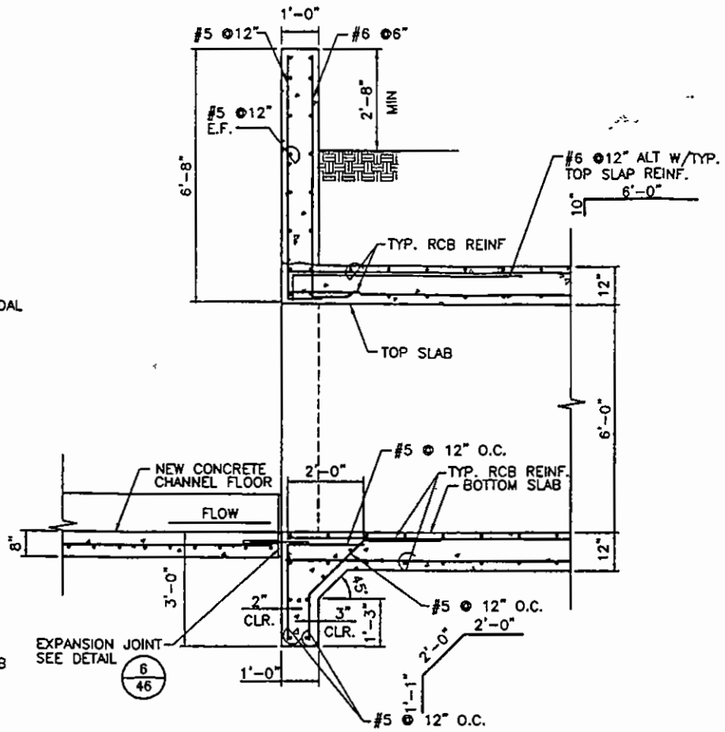
SHEET NO:



PLAN

1/2" = 1'-0"

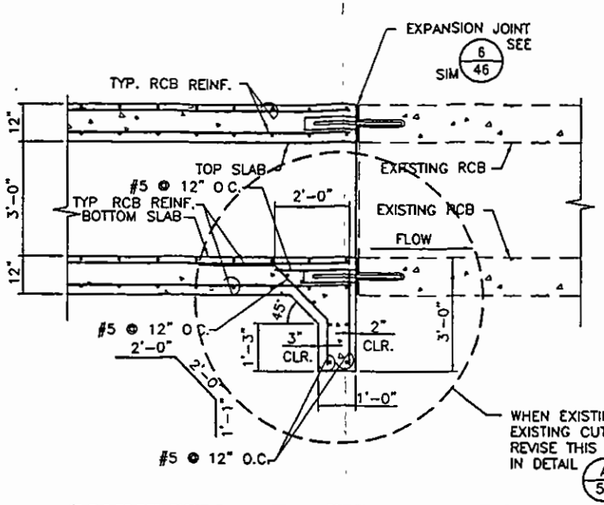
1
53



6'-0" RCB HEADWALL

1/2" = 1'-0"

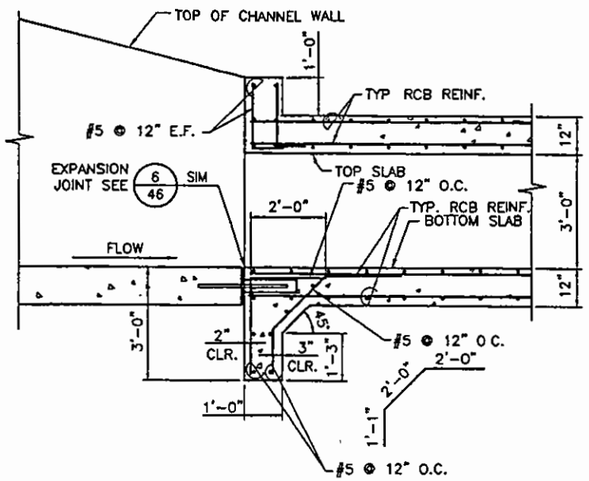
E
53



CONNECTION TO EXISTING RCB

1/2" = 1'-0"

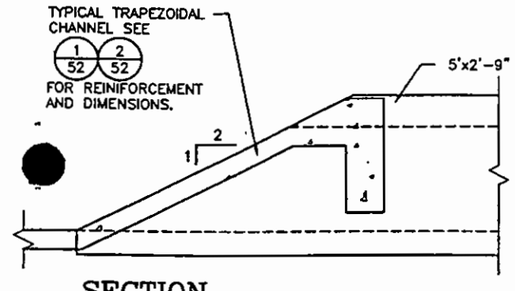
C
53



OPEN CHANNEL TO RCB

1/2" = 1'-0"

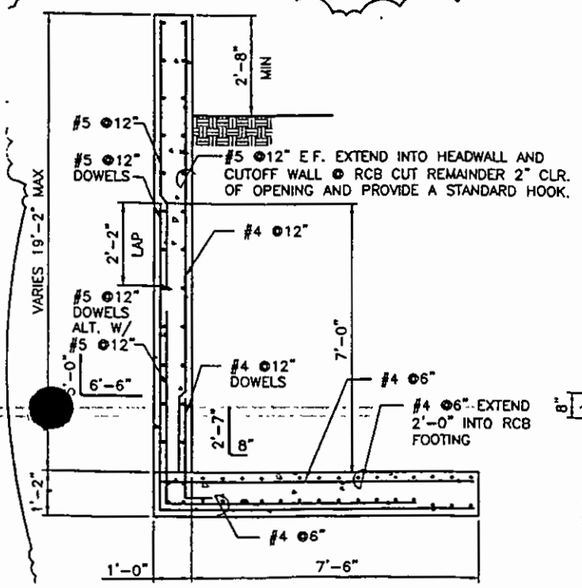
B
53

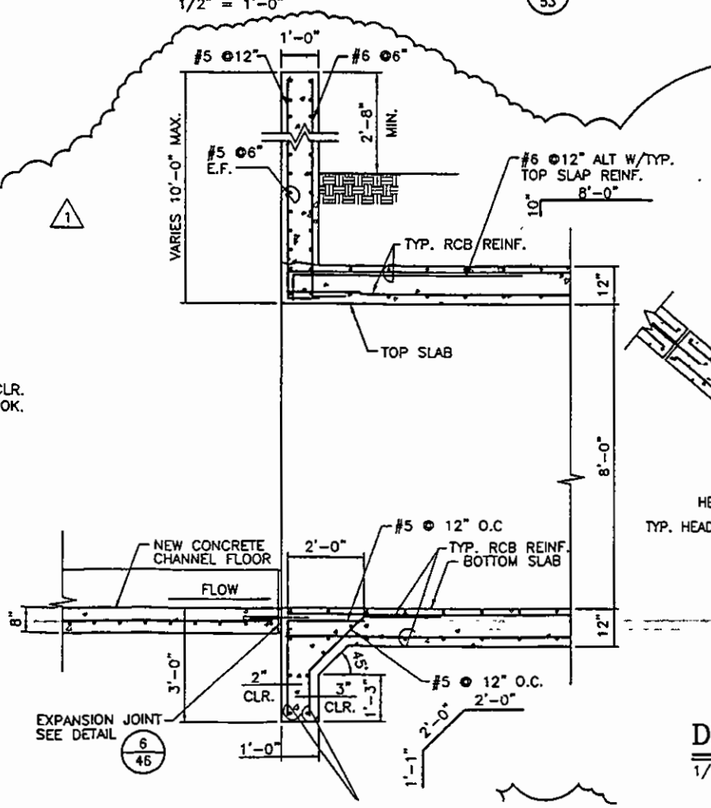


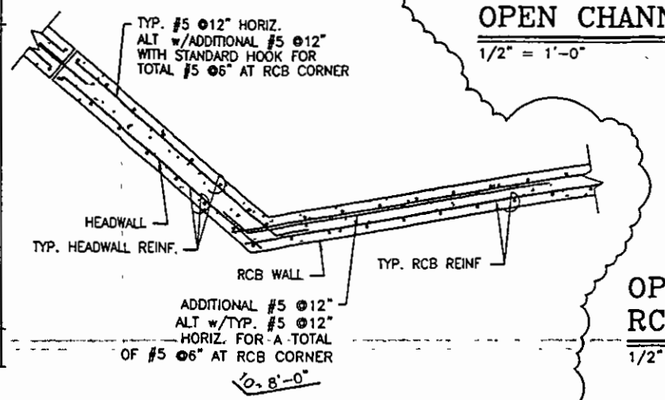
SECTION

1/2" = 1'-0"

G
53





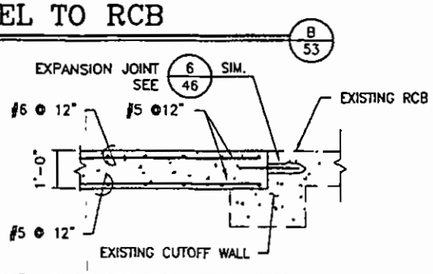


NOTE. PLAN SHOWN BELOW TOP OF RCB.

DETAIL

1/2" = 1'-0"

1
53



OPEN CHANNEL TO EXISTING RCB CUTOFF WALL

1/2" = 1'-0"

A
53

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

NO	DESCRIPTION	DATE	BY
	HEADWALL AND RCB REVISIONS	12/23/99	DAA

SCALE AS NOTED
DESIGN DAA
DRAWN ALA
CHECKED D DAVIS
APPROVED T BRADY
DATE July 19, 1999

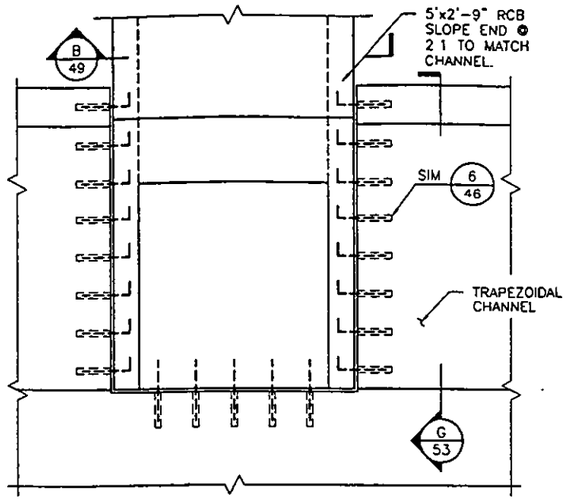
PROFESSIONAL ENGINEER STATE OF NEVADA DANA A. AMES CIVIL & STRUCTURAL No. 10712 3-9-00

MISCELLANEOUS STRUCTURAL DETAILS

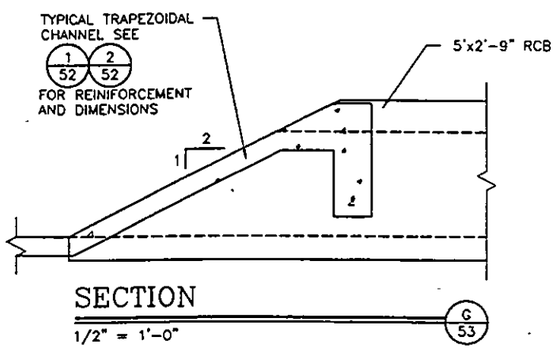
VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

(DRAWING TITLE) (PROJECT TITLE) (LOCATION)

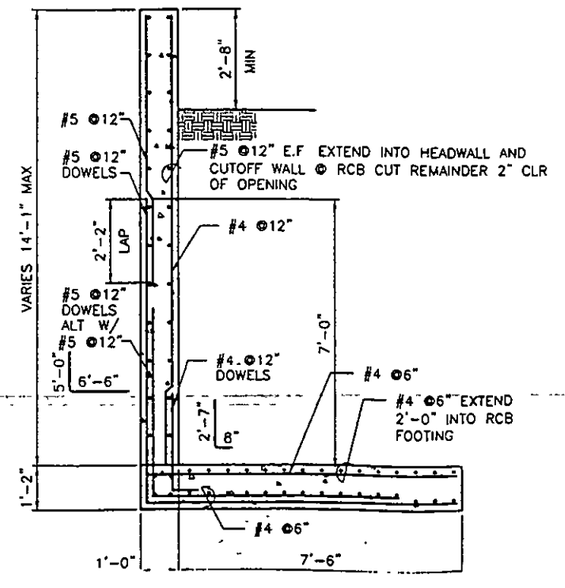
SHEET NO.

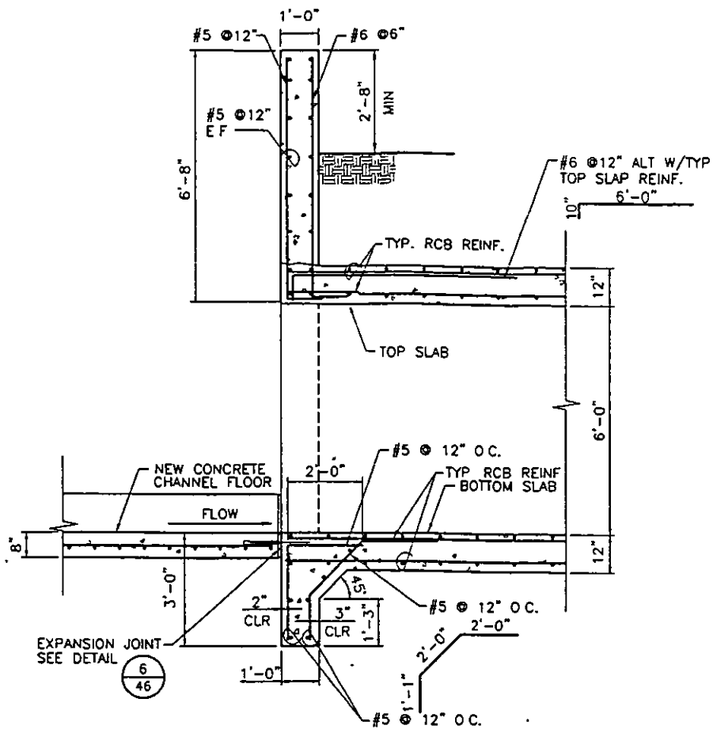


PLAN
1/2" = 1'-0"
1
53

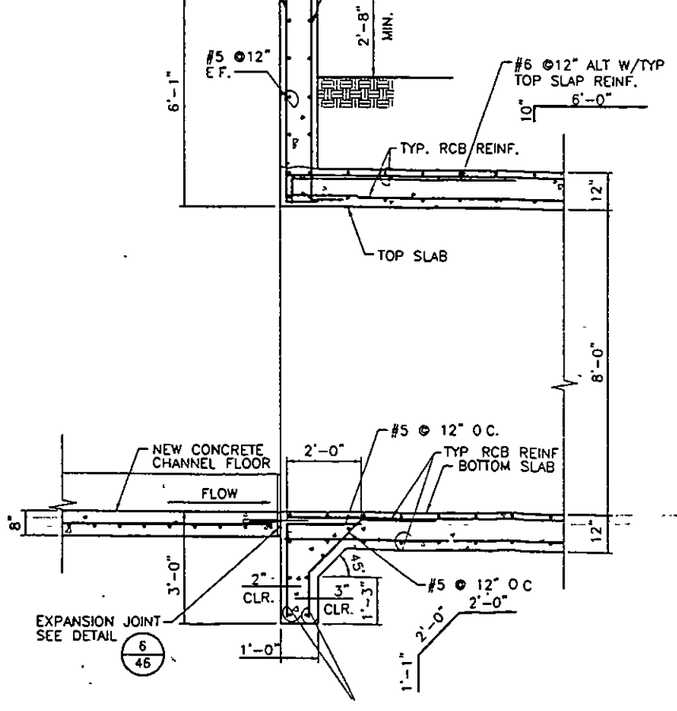


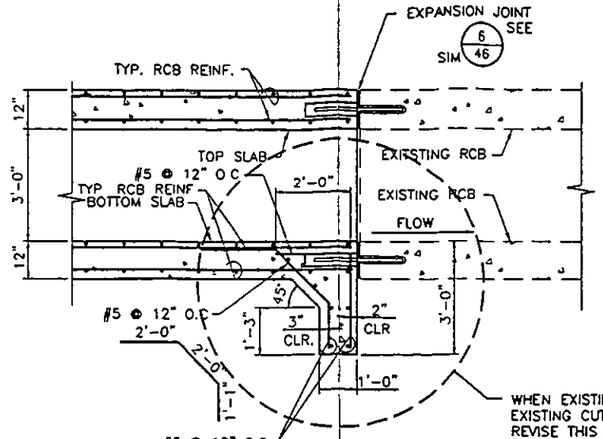
SECTION
1/2" = 1'-0"
G
53



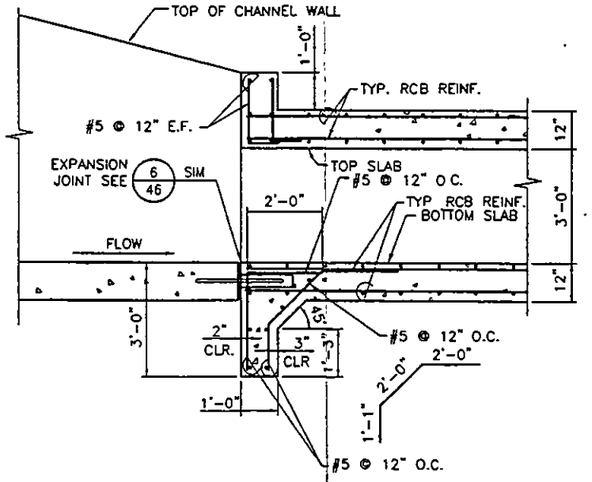


6'-0" RCB HEADWALL
1/2" = 1'-0"
E
53

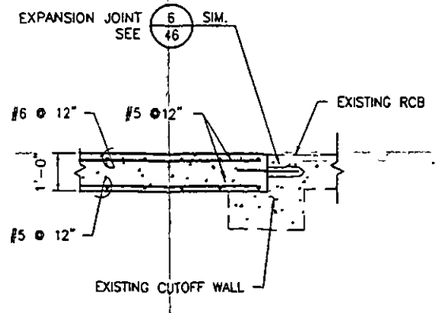




CONNECTION TO EXISTING RCB
1/2" = 1'-0"
C
53



OPEN CHANNEL TO RCB
1/2" = 1'-0"
B
53



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

NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			

SCALE: AS NOTED
DESIGN: DAA
DRAWN: ALA
CHECKED: D DAVIS
APPROVED: T. BRADY
DATE: July 19, 1999

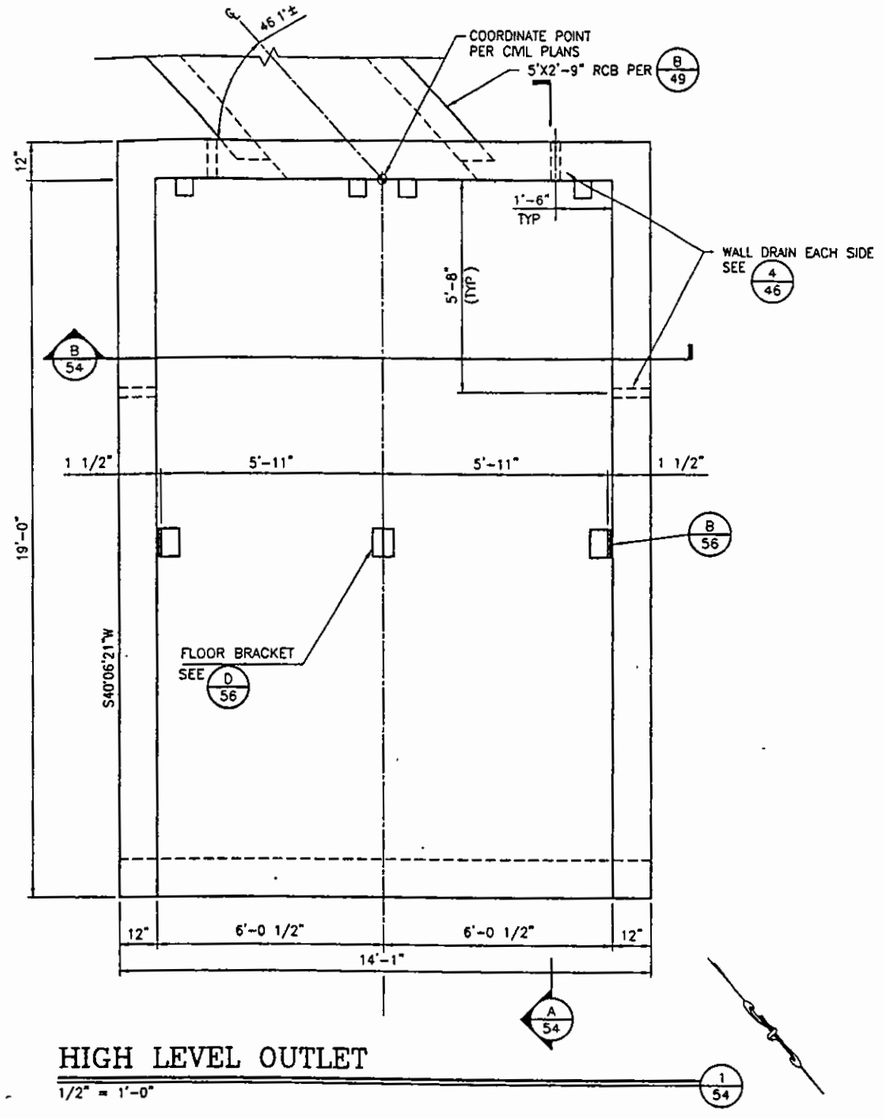
DANA A AMES — No. 10717 — NEVADA — PROFESSIONAL ENGINEER

MISCELLANEOUS STRUCTURAL DETAILS

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

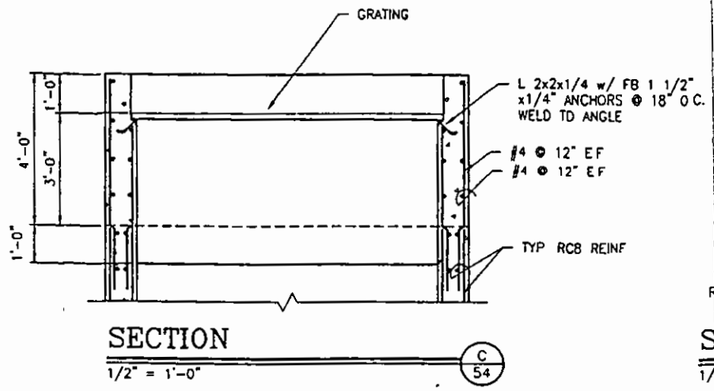
DRAWING TITLE
PROJECT TITLE

SHEET NO.



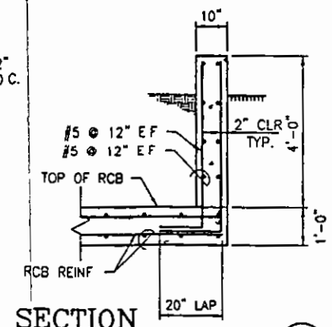
HIGH LEVEL OUTLET

1/2" = 1'-0" 1/54



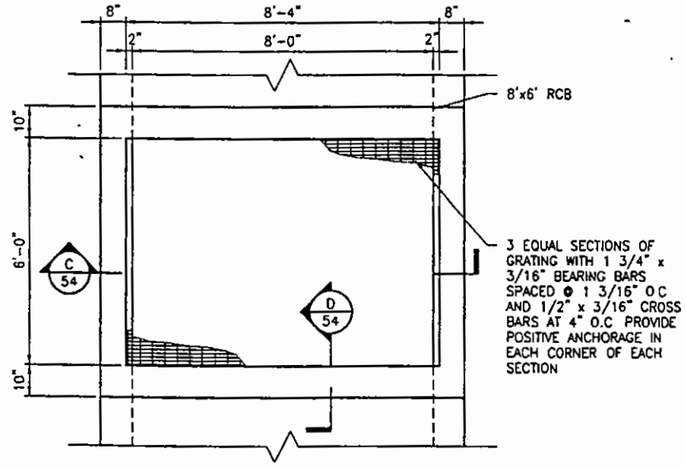
SECTION

1/2" = 1'-0" C/54



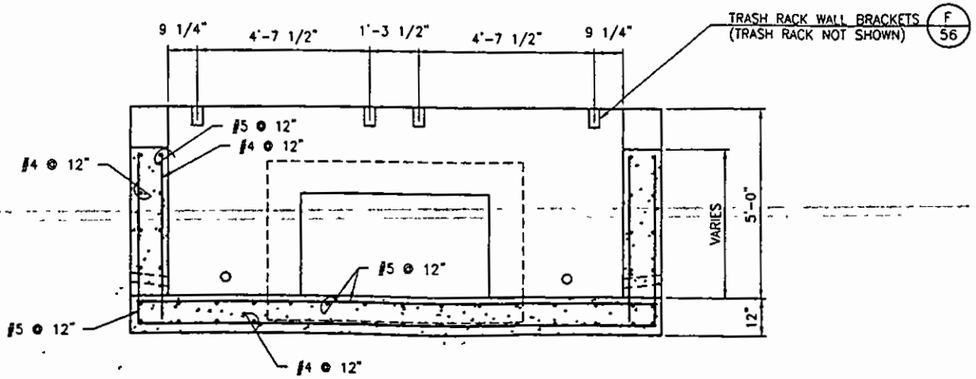
SECTION

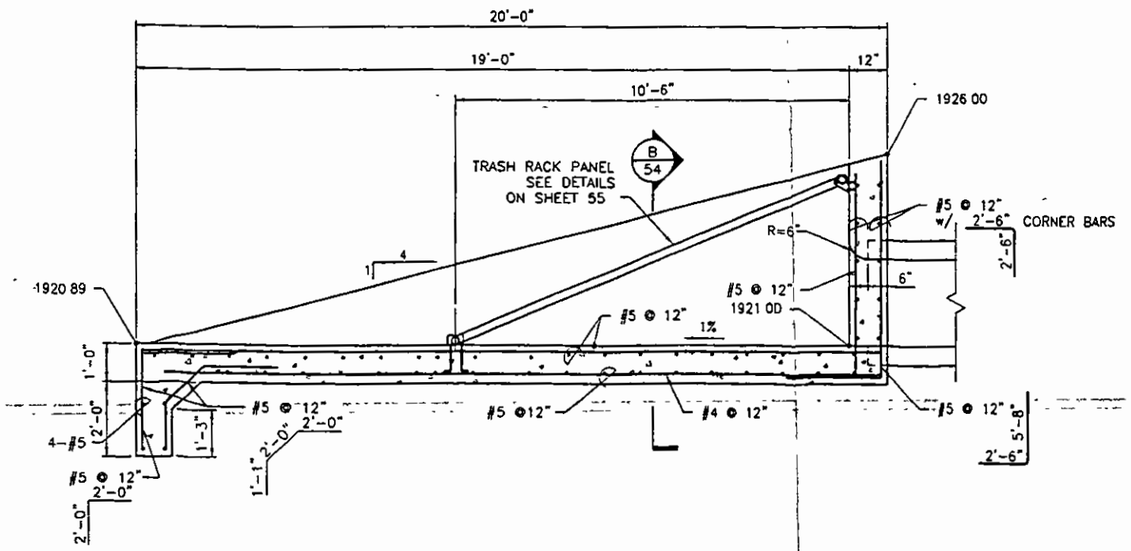
1/2" = 1'-0" D/54



RCB VENT DETAIL

1/2" = 1'-0" 2/54





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

NO	DESCRIPTION	DATE	BY
	REVISIONS		

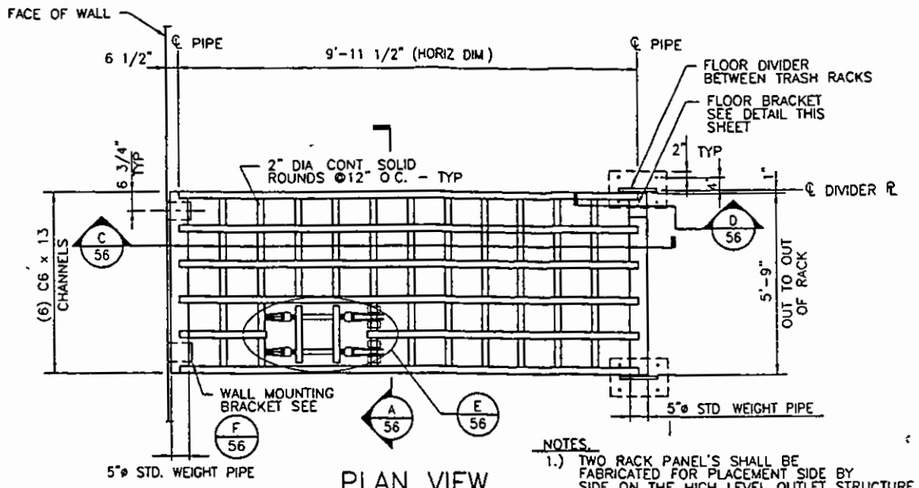
SCALE: AS NOTED
DESIGN: DAA
DRAWN: ALA
CHECKED: D. DAVIS
APPROVED: T. BRADY
DATE: July 19, 1999

DANA A. AMES, P.E. No. 10712 DYS. STRUCTURAL 7-1999

HIGH LEVEL OUTLET AND RCB VENT DETAILS

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

SHEET NO.



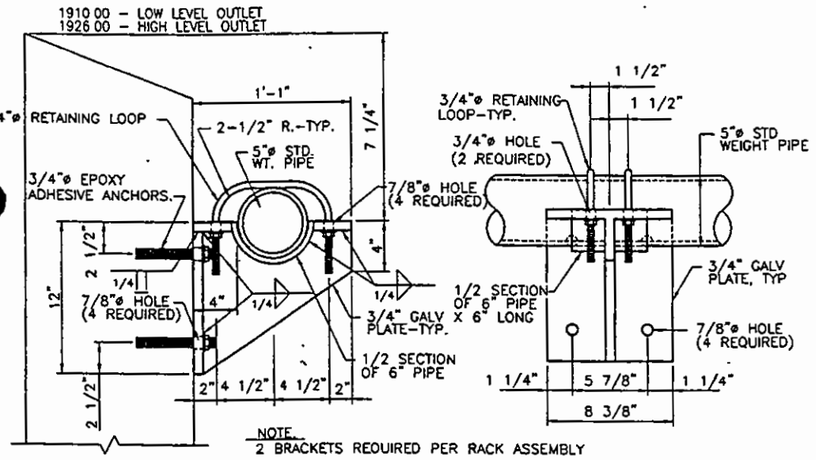
PLAN VIEW

TRASH RACK PANEL

SCALE N T S

1 56

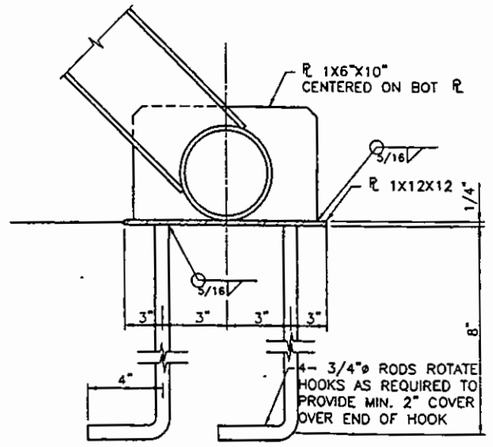
NOTES.
1.) TWO RACK PANEL'S SHALL BE FABRICATED FOR PLACEMENT SIDE BY SIDE ON THE HIGH LEVEL OUTLET STRUCTURE ONLY ONE PANEL SHALL HAVE ACCESS DOOR
2) HOT DIP GALVANIZE EACH ENTIRE ASSEMBLY AFTER FABRICATION.



TRASH RACK WALL BRACKET

SCALE .N.T.S

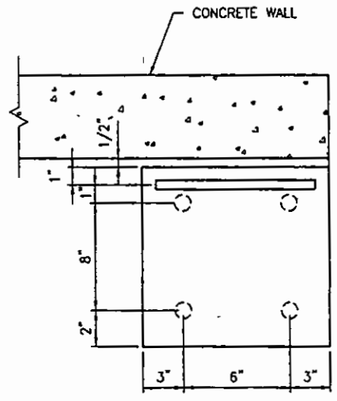
F 56



TRASH RACK FLOOR BRACKET SECTION

SCALE N.T.S

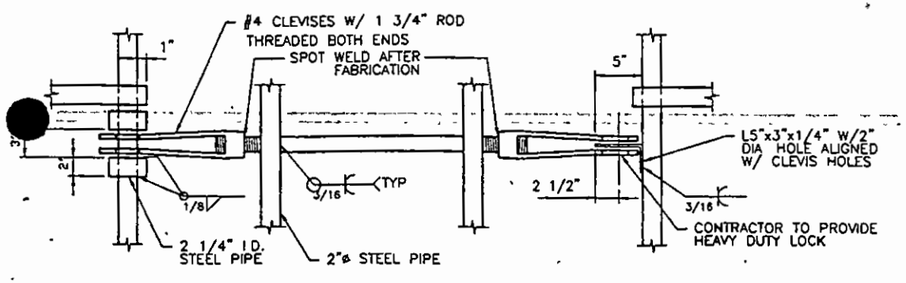
D 56

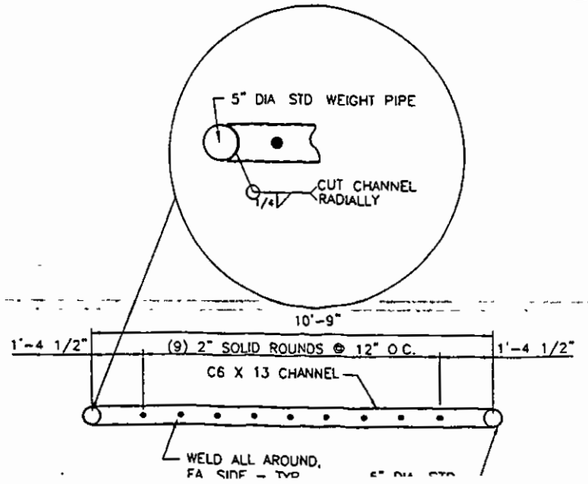


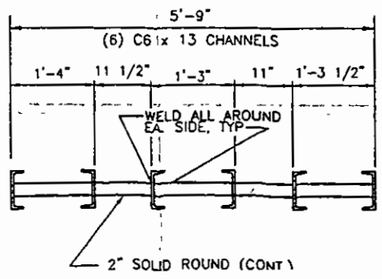
PLAN VIEW FLOOR BRACKET AT WALL

SCALE N T S.

B 56







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

NO	DESCRIPTION	DATE	BY
Δ			
Δ			
Δ			
Δ			

REVISIONS

SCALE: AS NOTED
DESIGN: DAA
DRAWN: ALA
CHECKED: D. DAVIS
APPROVED T BRADY
DATE 11-10-1998

DANA A. AMES, CIVIL, No. 10712, PROFESSIONAL ENGINEER, STATE OF NEVADA

TRASH RACK DETAILS

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

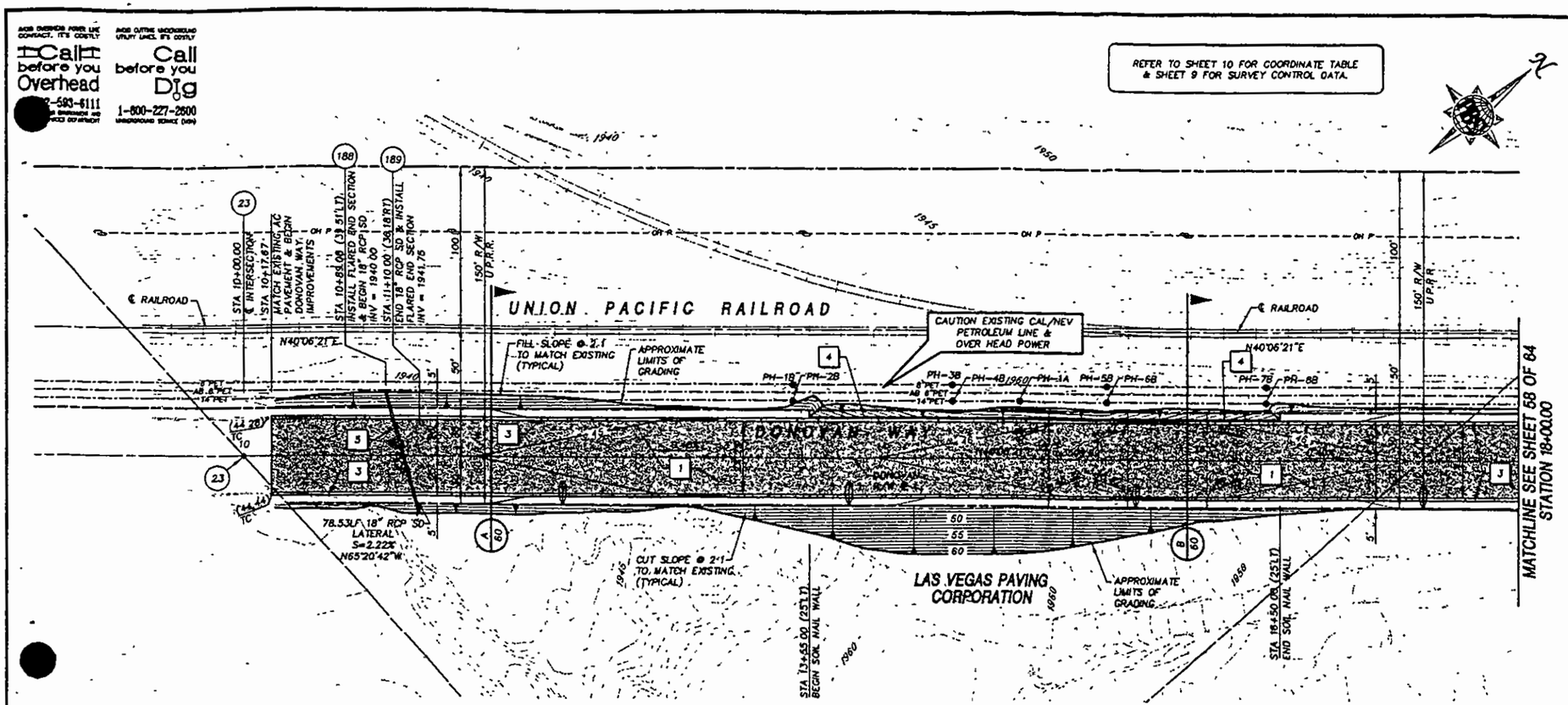
DRAWING TITLE

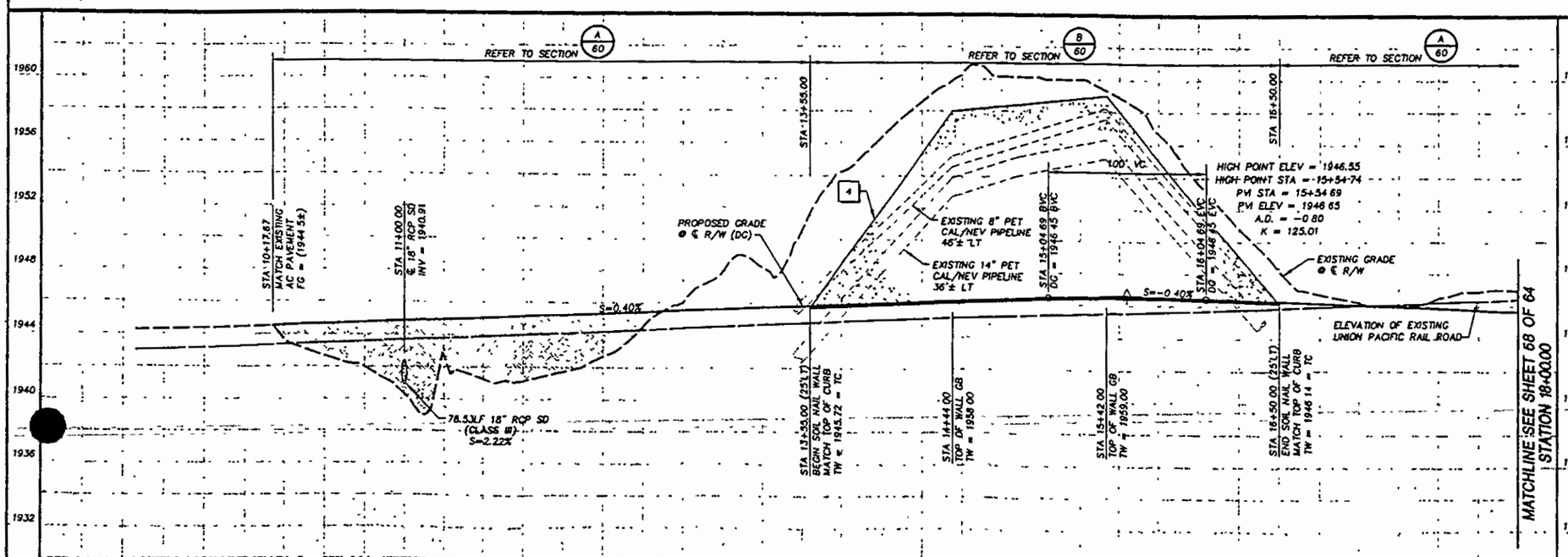
PROJECT TITLE

SHEET NO.

Call before you Overhead
Call before you Dig
1-800-227-2600

REFER TO SHEET 10 FOR COORDINATE TABLE & SHEET 9 FOR SURVEY CONTROL DATA.





KEY NOTES

1. DONOVAN WAY – 5" AC PAVING ALSO REFER TO SHEET 60
2. DONOVAN WAY (28' WIDE) – 6" TYPE II AGGREGATE BASE
3. INSTALL "L" TYPE CURB & GUTTER PER USD #216
4. CONSTRUCT SOIL NAIL WALL PER SHEETS 62 THRU 64
5. INSTALL 18" RCP SD PER TRENCH SECTION 1 SHEET 34
6. INSTALL 150W HPS STREETLIGHT (29' RT) PER USD #316 & # 320
7. 2" PVC STREETLIGHT CONDUIT WITH 2–#4, 1–#8 THW (TYP)
8. INSTALL TYPE 1 CENTERLINE PER USD #244
9. INSTALL W8–3 SIGN "PAVEMENT ENDS" (30"x30")
10. RELOCATE EXISTING SIGN AS INDICATED ON THE PLAN
11. REMOVE EXISTING SIGN "ROAD CLOSED"
12. REMOVE CONCRETE BARRIER RAIL W/ RED OBJECT MARKERS

STREETLIGHT NOTES

1. NEW STREETLIGHTS ON THE EAST SIDE OF DONOVAN WAY TO BE INSTALLED IN LINE WITH EXISTING STREETLIGHT POLES.
2. ALL STREETLIGHT CONDUIT TO BE 2" PVC WITH 2–#4, 1–#8 THW (TYP)

LEGEND

STREETLIGHT CONDUIT

150W HPS STREETLIGHT

GRAPHIC SCALE

(IN FEET)
HORZ. 1 inch = 40 ft.
VERT 1 inch = 4 ft.

PBS&J
901 North Green Valley Pkwy
Suite 100
Henderson, Nevada 89014
Telephone 702/263-7275
Fax 702/263-7200
ENGINEERING • PLANNING • SURVEYING • CONSTRUCTION SERVICES

BASIS OF BEARING

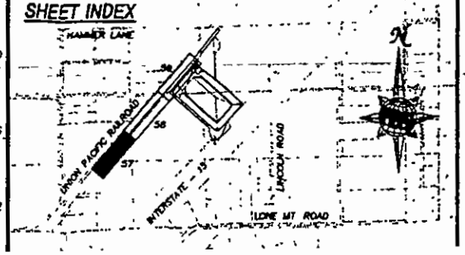
THE PROJECT BASIS OF BEARING IS BETWEEN THE SOUTH QUARTER CORNER AND THE SOUTHEAST CORNER OF SECTION 31, TOWNSHIP 19 SOUTH, RANGE 62 EAST, MDM, CITY OF NORTH LAS VEGAS, CLARK COUNTY NEVADA. THIS BEARING N89°33'14"E IS BASED UPON PLAT MAP BOOK 10 PAGE 76, ON RECORD IN THE CLARK COUNTY RECORDERS OFFICE.

BENCHMARK

THE PROJECT BENCHMARK IS NAVD 88 BENCHMARK NO. J0627 ELEVATION OF 584.412 METERS (1917.358 FT), BEING 16" DIAMETER CONCRETE MONUMENT 6.5 FT BACK OF CURB IN THE CENTER RETURN ON THE SOUTHWEST CORNER OF VANDENBERG DRIVE AND LONE MOUNTAIN ROAD

CAUTION
EXISTING UTILITIES ARE LOCATED ON THE PLANS FROM A SEARCH OF AVAILABLE RECORDS. CONTRACTOR TO VERIFY LOCATIONS AND DEPTHS PRIOR TO CONSTRUCTION.

SHEET INDEX



NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			

REVISIONS

SCALE: 1" = 40'
DESIGN: A. SPATA
DRAWN: J. BOLDEN
CHECKED: D. DAVIS
APPROVED: T. BRADY
DATE: JULY 19 1999

PROFESSIONAL ENGINEER – STATE OF NEVADA – DONALD V. DAVIS – CIVIL – No. 8087

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

DONOVAN WAY – PLAN AND PROFILE STA 9+00.00 TO STA 18+00.00

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

DRAWING NO.
PROJECT NO.
LOCATION

SHEET NO.

AVOID OVERHEAD POWER LINE CONTACT. IT'S COSTLY
Call before you Overhead
1-702-593-6111
CCS DEPARTMENT

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

REFER TO SHEET 10 FOR COORDINATE TABLE & SHEET 9 FOR SURVEY CONTROL DATA

MATCHLINE SEE SHEET 57 OF 64 STATION 18+00.00

MATCHLINE SEE SHEET 59 OF 64 STATION 27+00.00

UNION PACIFIC RAILROAD

℄ RAILROAD

150' R/W UPRR

100'

CAUTION EXISTING CAL/NEV PETROLEUM LINE & OVER HEAD POWER

CUT SLOPE @ 2:1 TO MATCH EXISTING (TYPICAL)

APPROXIMATE LIMITS OF GRADING

N40°06'21"E

PH-2A

8"PET
AB 6"PET
14"PET

DONOVAN WAY

FILL SLOPE @ 2:1 TO MATCH EXISTING (TYPICAL)

APPROXIMATE LIMITS OF GRADING

CENTER SECTION LINE SECTION 31

STA 26+29.93 (22'LT) BEGIN ROAD SIDE SWALE FL = 1941.34 INV = 1940.00

LAS VEGAS PAVING CORPORATION

ADDITIVE ALTERNATE #2 - DONOVAN WAY FULL STREET IMPROVEMENTS

REFER TO SECTION A/60

REFER TO SECTION C/60

ELEVATION OF EXISTING UNION PACIFIC RAIL ROAD

PROPOSED GRADE ℄ R/W (DG)

S=-0.40%

EXISTING 14" PET CAL/NEV PIPELINE 36± LT

EXISTING GRADE ℄ R/W

EXISTING GRADE / PROPOSED GRADE

KEY NOTES

1. DONOVAN WAY - 5" AC PAVING ALSO REFER TO SHEET 60
2. DONOVAN WAY (28' WIDE) - 6" TYPE II AGGREGATE BASE
3. INSTALL "L" TYPE CURB & GUTTER PER USD #216
4. CONSTRUCT SOIL NAIL WALL PER SHEETS 62 THRU 64
5. INSTALL 18" RCP SD PER TRENCH SECTION 1 SHEET 34
6. INSTALL 150W HPS STREETLIGHT (29' RT) PER USD #316 & # 320
7. 2" PVC STREETLIGHT CONDUIT WITH 2-#4, 1-#8 THW (TYP)
8. INSTALL TYPE 1 CENTERLINE PER USD #244
9. INSTALL W8-3 SIGN "PAVEMENT ENDS" (30"x30")
10. RELOCATE EXISTING SIGN AS INDICATED ON THE PLAN
11. REMOVE EXISTING SIGN "ROAD CLOSED"
12. REMOVE CONCRETE BARRIER RAIL W/ RED OBJECT MARKERS

STREETLIGHT NOTES

1. NEW STREETLIGHTS ON THE EAST SIDE OF DONOVAN WAY TO BE INSTALLED IN LINE WITH EXISTING STREETLIGHT POLES.
2. ALL STREETLIGHT CONDUIT TO BE 2" PVC WITH 2-#4, 1-#8 THW (TYP)

LEGEND

STREETLIGHT CONDUIT

150W HPS STREETLIGHT

GRAPHIC SCALE

(IN FEET)
HORZ. 1 inch = 40 ft.
VERT 1 inch = 4 ft.

PBSJ
901 North Green Valley Pkwy
Suite 100
Henderson, Nevada 89014
Telephone: 702/263-7275
Fax: 702/263-7200
ENGINEERING • PLANNING • SURVEYING • CONSTRUCTION SERVICES

BASIS OF BEARING

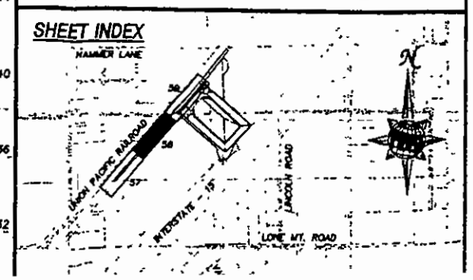
THE PROJECT BASIS OF BEARING IS BETWEEN THE SOUTH QUARTER CORNER AND THE SOUTHEAST CORNER OF SECTION 31 TOWNSHIP 19 SOUTH RANGE 62 EAST, MDM CITY OF NORTH LAS VEGAS, CLARK COUNTY NEVADA. THIS BEARING N89°21'14"E IS BASED UPON PLAT MAP BOOK 10 PAGE 76, ON RECORD IN THE CLARK COUNTY RECORDERS OFFICE.

BENCHMARK

THE PROJECT BENCHMARK IS NAVD 88 BENCHMARK NO 30837 ELEVATION OF 584.413 METERS (1917.358 FT), BEING 1.6" DIAMETER CONCRETE MONUMENT 8.5 FT BACK OF CURB IN THE CENTER RETURN ON THE SOUTHWEST CORNER OF VANDENBERG DRIVE AND LONE MOUNTAIN ROAD.

CAUTION
EXISTING UTILITIES ARE LOCATED ON THE PLANS FROM A SEARCH OF AVAILABLE RECORDS. CONTRACTOR TO VERIFY LOCATIONS AND DEPTHS PRIOR TO CONSTRUCTION.

SHEET INDEX



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

NO	DESCRIPTION	DATE	BY
△			
△			
△			
△			

REVISIONS

SCALE: 1" = 40'
DESIGN A SPATA
DRAWN J BOLDEN
CHECKED: D DAVIS
APPROVED: T BRADY
DATE: JULY 19, 1999

PROFESSIONAL ENGINEER - STATE OF NEVADA - RONALD W. DAVIS - CIVIL - No. 6987

DRAWING TITLE: DONOVAN WAY - PLAN AND PROFILE STA 18+00.00 TO STA 27+00.00

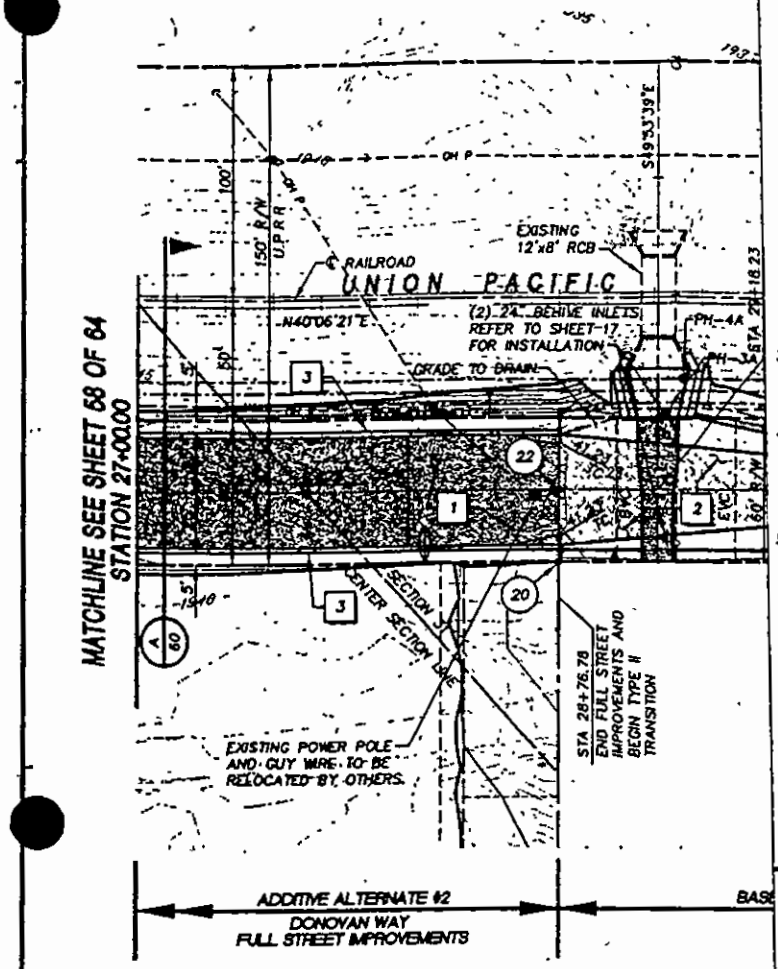
PROJECT TITLE: VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

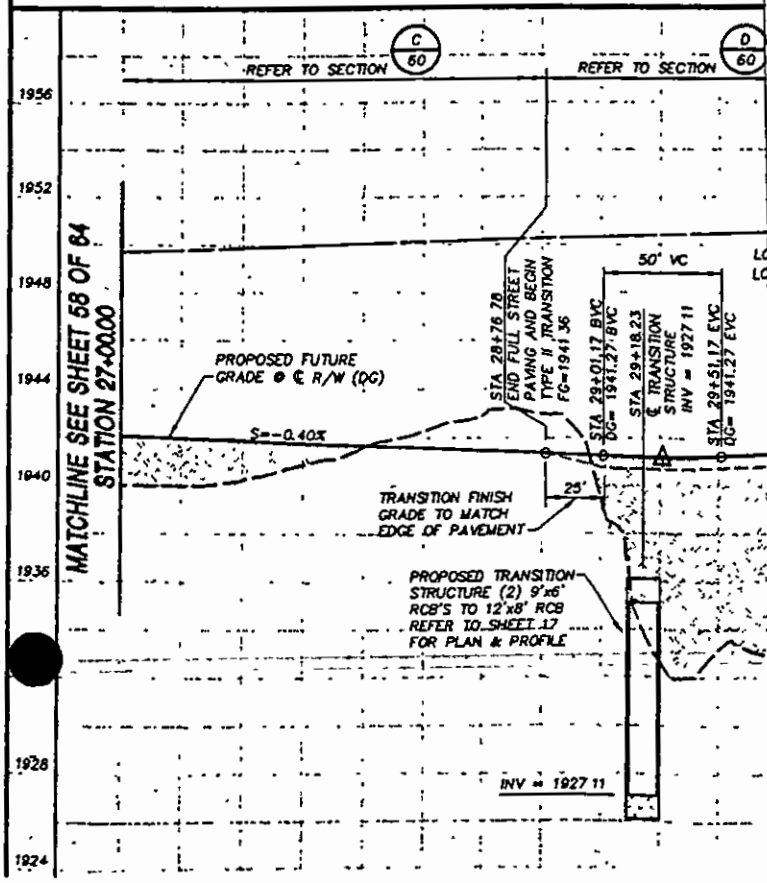
LOCATION

SHEET NO.

AVOID OVERHEAD POWER LINE CONTACT. IT'S COSTLY
Call before you Overhead
1-702-595-6111
NEVADA POWER DISTRIBUTION AND SAFETY SERVICES DEPARTMENT

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





KEY NOTES

1. DONOVAN WAY – 5" AC PAVING ALSO REFER TO SHEET 60
2. DONOVAN WAY (28' WIDE) – 6" TYPE II AGGREGATE BASE
3. INSTALL "L" TYPE CURB & GUTTER PER USD #216
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LEGEND

STREETLIGHT CONDUIT

150W HPS STREETLIGHT

GRAPHIC SCALE

(IN FEET)
HORZ. 1 inch = 40 ft.
VERT 1 inch = 4 ft.

PBSJ
901 North Green Valley Pkwy
Suite 100
Henderson, Nevada 89014
Telephone 702/263-7275
Fax 702/263-7300
ENGINEERING • PLANNING • SURVEYING • CONSTRUCTION SERVICES

BASIS OF BEARING

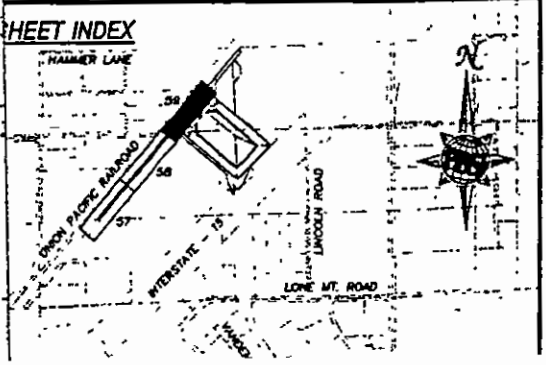
THE PROJECT BASIS OF BEARING IS BETWEEN THE SOUTH QUARTER CORNER AND THE SOUTHEAST CORNER OF SECTION 31 TOWNSHIP 19 SOUTH, RANGE 62 EAST, MDM, CITY OF NORTH LAS VEGAS, CLARK COUNTY NEVADA. THIS BEARING N89°33'14"E IS BASED ON PLAT MAP BOOK 10 PAGE 76, ON RECORD IN THE CLARK COUNTY RECORDERS OFFICE.

BENCHMARK

THE PROJECT BENCHMARK IS NAVD 88 BENCHMARK NO. J0627 ELEVATION OF 584.412 METERS (1917.358 FT), BEING 1'8" DIAMETER CONCRETE MONUMENT 0.5 FT BACK OF CURB AT THE CENTER RETURN ON THE SOUTHWEST CORNER OF VANDENBERG DRIVE AND LONE MOUNTAIN ROAD

CAUTION
EXISTING UTILITIES ARE LOCATED ON THE PLANS FROM A SEARCH OF AVAILABLE RECORDS. CONTRACTOR TO VERIFY LOCATIONS AND DEPTHS PRIOR TO CONSTRUCTION

SHEET INDEX



NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			

REVISIONS/

SCALE: 1" = 40'
DESIGN: A. SPATA
DRAWN: J. BOLDEN
CHECKED: D. DAVIS
APPROVED T. BRADY

PROFESSIONAL ENGINEER – CIVIL
DONALD V. DAVIS
CIVIL
No. 8867

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

DONOVAN WAY – PLAN AND PROFILE STA 27+00.00 TO STA 36+00.00

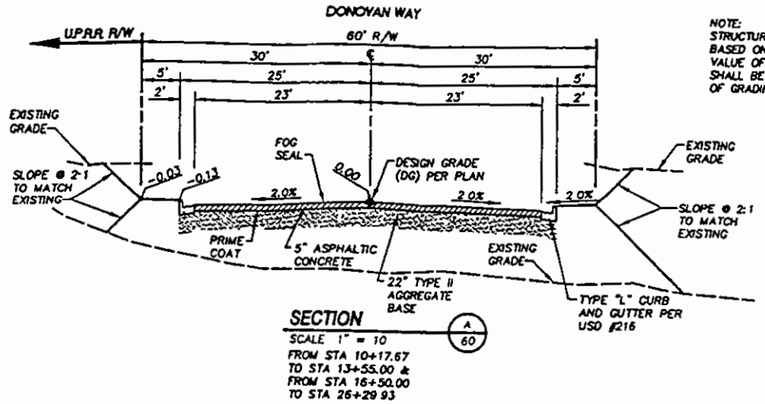
VANDENBERG DETENTION BASIN

INTERSTATE 15 AT VANDENBERG DRIVE

(DRAWING TITLE)

(PROJECT TITLE)

SHEET NO.



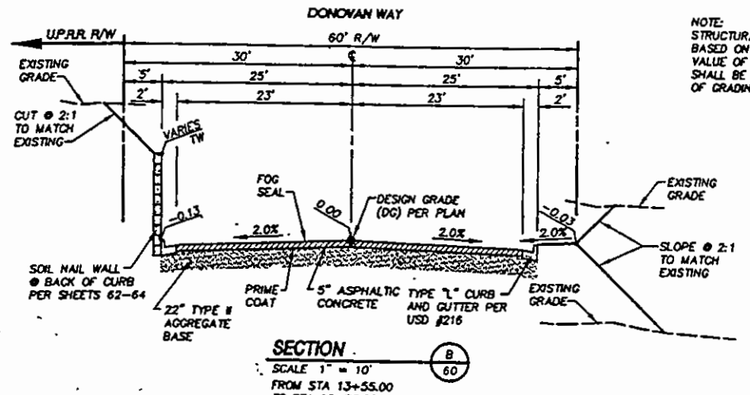
NOTE:
STRUCTURAL SECTION SHOWN IS BASED ON A SUBGRADE "R" VALUE OF 12 "R" VALUES SHALL BE VERIFIED AT TIME OF GRADING.

FOR OVEREXCAVATION SECTION REFER TO (1/60)

SECTION (A/60)

SCALE 1" = 10

FROM STA 10+17.67
TO STA 13+55.00 &
FROM STA 16+50.00
TO STA 26+29.93



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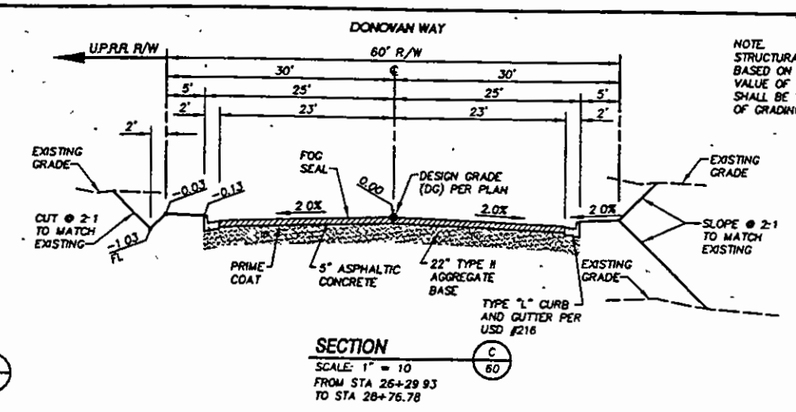
FOR OVEREXCAVATION SECTION REFER TO (1/60)

SECTION (B/60)

SCALE 1" = 10'

FROM STA 13+55.00
TO STA 16+50.00



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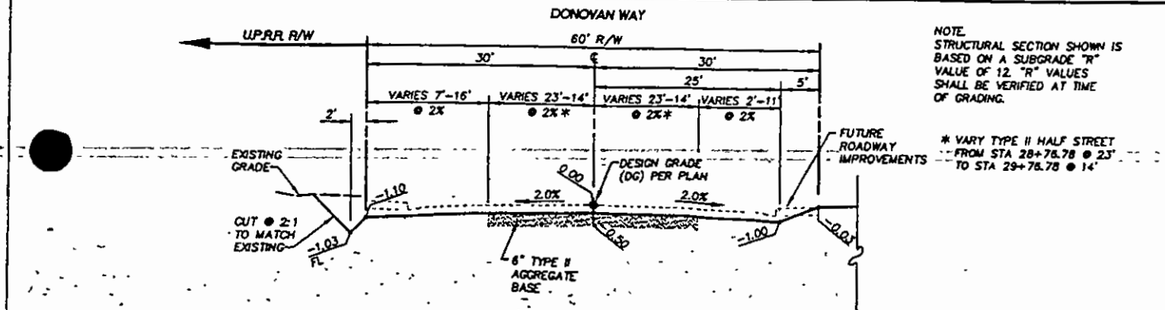
FOR OVEREXCAVATION SECTION REFER TO (1/60)

SECTION (C/60)

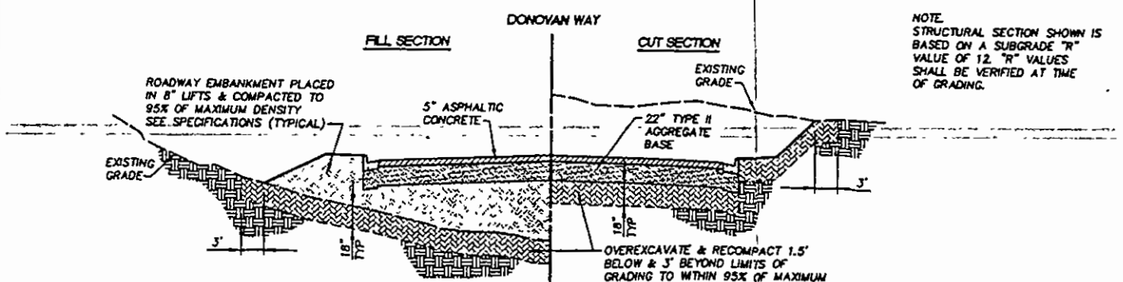
SCALE: 1" = 10

FROM STA 26+29.93
TO STA 28+76.78



NOTE.
STRUCTURAL SECTION SHOWN IS BASED ON A SUBGRADE "R" VALUE OF 12. "R" VALUES SHALL BE VERIFIED AT TIME OF GRADING.

* VARY TYPE II HALF STREET
FROM STA 28+76.78 @ 23'
TO STA 29+76.78 @ 14'



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PBS&J
ENGINEERING · PLANNING · SURVEYING · CONSTRUCTION SERVICES
301 North Green Valley Pkwy
Suite 100
Henderson, Nevada 89014
Telephone: 702/263-7275
Fax: 702/263-7200

Call before you Overhead 1-702-593-6111
Call before you Dig 1-800-227-2600

REVISIONS

NO	DESCRIPTION	DATE	BY
1			
2			
3			
4			

SCALE: 1" = 10'
DESIGN: A. SPATA
DRAWN: J. BOLDEN
CHECKED: D. DAWS
APPROVED: T. BRADY
DATE: JULY 19 1999

PROFESSIONAL ENGINEER STATE OF NEVADA RONALD V. MAYS CIVIL No. 8907

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

TYPICAL SECTIONS & MISCELLANEOUS DETAILS

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

(DRAWING TITLE)
(PROJECT TITLE)
SHEET NO.
(DRAWING NO.)

Call before you Overhead 1-702-593-6111 POWER EMERGENCY NO. SERVICES DEPARTMENT

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

KEY NOTES

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LEGEND

STREETLIGHT CONDUIT

150W HPS STREETLIGHT

GRAPHIC SCALE

(IN FEET)
HORZ. 1 Inch = 40 ft.
VERT. 1 Inch = 4 ft.

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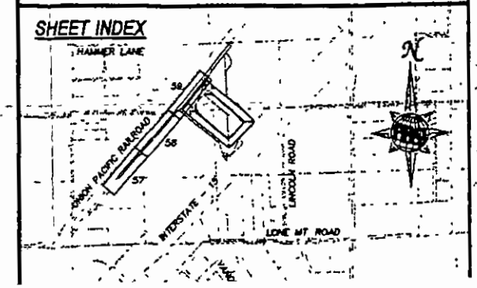
BENCHMARK

THE PROJECT BENCHMARK IS NAVD 88 BENCHMARK NO 30627 ELEVATION OF 584.412 METERS (1917.358 FT) BEING 16" DIAMETER CONCRETE MONUMENT 8.9 FT BACK OF CURB IN THE CENTER RETURN ON THE SOUTHWEST CORNER OF VANDENBERG DRIVE AND LONE MOUNTAIN ROAD

CAUTION
EXISTING UTILITIES ARE LOCATED ON THE PLANS FROM A SEARCH OF AVAILABLE RECORDS CONTRACTOR TO VERIFY LOCATIONS AND DEPTHS PRIOR TO CONSTRUCTION

SHEET INDEX



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

NO	DESCRIPTION	DATE	BY
	REVISIONS		

SCALE: 1" = 40'
DESIGN: A. SPATA
DRAWN: J. BOLDEN
CHECKED: D. DAVIS
APPROVED: T. BRADY

PROFESSIONAL ENGINEER – STATE OF NEVADA – JOHN V. MYERS – No. 9887 – CIVIL

DONOVAN WAY – SIGNAGE, STRIPING & STREETLIGHTING PLAN

VANDENBERG DETENTION BASIN

INTERSTATE 15 AT VANDENBERG DRIVE

(DRAWING TITLE)

(PROJECT TITLE)

SHEET NO.

GENERAL NOTES AND SOIL NAIL WALL DESIGN PARAMETERS

1. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE STATE OF NEVADA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, DATED 1996.
2. THE SOIL NAIL WALL STRUCTURES HAVE BEEN DESIGNED USING CALTRANS COMPUTER PROGRAM S NAIL, VERSION 2.11 AND IN ACCORDANCE WITH THE PROCEDURES CONTAINED IN THE FHWA "MANUAL FOR DESIGN AND CONSTRUCTION MONITORING OF SOIL NAIL WALLS." REPORT No. FHWA-SA-96-069 STRUCTURAL DESIGN OF ANY INDIVIDUAL WALL ELEMENTS NOT COVERED IN THE FHWA MANUAL HAVE BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE 1998 AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES AND LATEST INTERIM SPECIFICATIONS INCLUDING THE GUIDE SPECIFICATIONS FOR SEISMIC DESIGN OF HIGHWAY BRIDGES. A PSEUDOSTATIC SEISMIC ACCELERATION OF 0.2g WAS USED IN THE DESIGN.
3. REINFORCED CONCRETE AND SHOTCRETE. f_y = 60 ksi
   f'_c = 4,000 psi
   NAIL GROUT f'_c = 3,000 psi
4. STRUCTURAL STEEL. AASHTO M183/ASTM A36
5. UNLESS OTHERWISE NOTED ON THE PLANS, MINIMUM CONCRETE/SHOTCRETE COVER MEASURED FROM THE FACE OF CONCRETE/SHOTCRETE TO THE FACE OF ANY REINFORCING BAR SHALL BE AS FOLLOWS:
   FRONT SIDE OF PERMANENT FACINGS EXPOSED TO WEATHER: 2"
   PERMANENT SHOTCRETE FACINGS EXPOSED TO SOIL: 3"
   PERMANENT CIP FACINGS CAST AGAINST TEMPORARY SHOTCRETE: 1.5"
6. UNLESS OTHERWISE SHOWN ON PLANS, ALL EXTERIOR CORNERS AND EDGES SHALL HAVE A 3/4" CHAMFER AND ALL INTERIOR CORNERS SHALL HAVE A 3/4" FILLET
7. DESIGN SOIL PARAMETERS:

SOIL/ROCK TYPE	ULTIMATE FRICTION ANGLE (DEGREES)	ULTIMATE COHESION (psf)	UNIT WEIGHT (pcf)	ALLOWABLE PULLOUT RESISTANCE (psi)
SANDY CLAY WITH GRAVEL	30	50	110	6.7

8. ALL NAIL DRILLED LENGTHS (L) AND BAR SIZES SHALL BE IN ACCORDANCE WITH NAIL WALL ELEVATION SHEETS.
9. THE CONTRACTOR IS RESPONSIBLE FOR FIELD LOCATING ALL UTILITIES.
10. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING AND MAINTAINING STABLE SLOPES ABOVE AND BELOW THE SOIL NAIL WALLS.
11. NO GENERAL EXCAVATION OPEN CUTS STEEPER THAN 1H:1V SHALL BE MADE WITHIN 15 FEET IN FRONT OF THE SOIL NAIL WALLS WITHOUT APPROVAL OF THE ENGINEER.
12. AT THE CONTRACTORS OPTION, NAILS MAY BE DRILLED AND INSTALLED THROUGH A TEMPORARY STABILIZING BERM. SEE SHEET 64.
13. EXCAVATION IN THE VICINITY OF THE WALL FACE REQUIRES SPECIAL CARE AND EFFORT COMPARED TO GENERAL ROADWAY EXCAVATION. SEE GEOTECHNICAL REPORT AND NOTES THIS SHEET
14. A GEOTECHNICAL REPORT FOR THIS PROJECT WAS PREPARED BY TERRACON, REPORT No. 84995138, DATED 6/15/99

TYPICAL CONSTRUCTION SEQUENCE

1. WALLS SHALL BE BUILT FROM THE TOP DOWN IN ACCORDANCE WITH THE STAGED EXCAVATION LIFTS SHOWN ON SHEET 64 AND THE SPECIFICATION PROVIDED IN THE GEOTECHNICAL REPORT
2. THE FOLLOWING WALL CONSTRUCTION SEQUENCE FOR EACH EXCAVATION LIFT SHALL BE COMPLETE PRIOR TO INITIATING WORK ON THE NEXT EXCAVATION LIFT UNLESS OTHERWISE APPROVED BY THE ENGINEER
   2.1 INSTALL PRE-PRODUCTION VERIFICATION TEST NAILS. SEE TABLE BELOW
   2.2 EXCAVATE TO STAGE 1 ROUGH GRADE.
   2.3 TRIM TO FINAL WALL FACE EXCAVATION LINE OR TO STABALIZING BERM (IF USED)
   2.4 DRILL, INSTALL AND GROUT NAILS. TRIM STABALIZATION BERM (IF USED) TO FINAL WALL FACE EXCAVATION LINE.
   2.5 PLACE REINFORCING AND APPLY SHOTCRETE. NO EXCAVATION WHICH HAS EXPOSED WALL FACE SHALL BE LEFT UNSTABALIZED BY SHOTCRETE AT THE END OF THE WORK DAY UNLESS ENGINEER APPROVES OTHERWISE
   2.6 PERFORM NAIL PULLOUT TESTS PER SPECIFICATIONS AFTER SHOTCRETE AND NAIL GROUT HAVE ATTAINED THEIR SPECIFIED STRENGTHS.
3. INSTALL CIP FINAL FACING.

VERIFICATION TEST NAIL LOCATIONS

NAIL NUMBER	WALL STATION (ft.)	WALL ELEVATION (ft.)
V1	14+44.00	1948.60
V2	15+42.00	1953.00

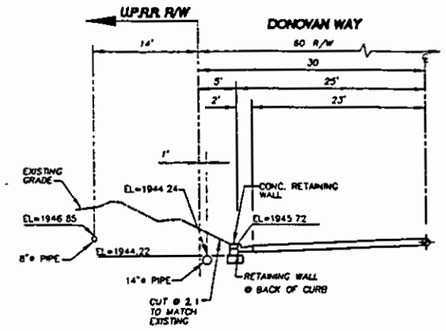
SEE SPECIFICATIONS FOR TESTING REQUIREMENTS.

NOTE:
SET BONDED LENGTH COMPLETELY INTO ONE SOIL OR ROCK UNIT FOR VERIFICATION TEST NAILS.

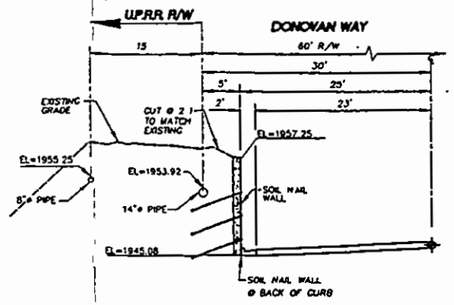
PROOF NAIL LOCATIONS

NAIL #	STATION	NAIL ROW #
P1	14+18.82	1
P2	14+86.82	1
P3	15+57.87	1
P4	14+58.39	2
P5	15+02.39	2
P6	14+33.45	3
P7	15+17.45	3
P8	15+61.45	3

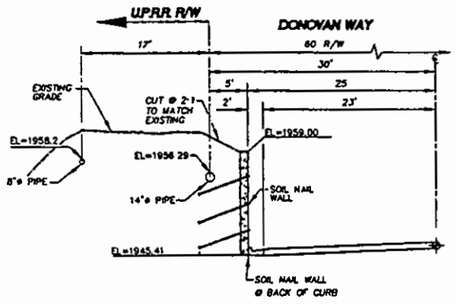
NOTE:
THE PROOF NAIL TEST LOCATIONS SHOWN IN THE TABLE ARE A GUIDE. ACTUAL LOCATIONS WILL BE AS DIRECTED BY THE ENGINEER.



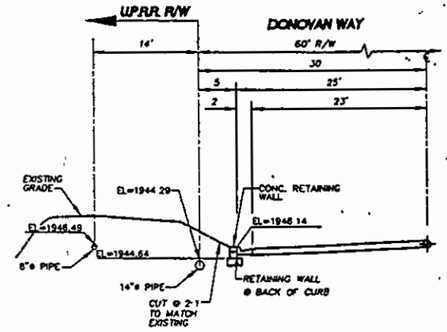
STA 13+55.00 (A / 62)
BEGIN WALL
(LOOKING AHEAD STATION-DONOVAN WAY)
SCALE 1" = 10'



STA 14+44.00 (B / 62)
(LOOKING AHEAD STATION-DONOVAN WAY)
SCALE 1" = 10'

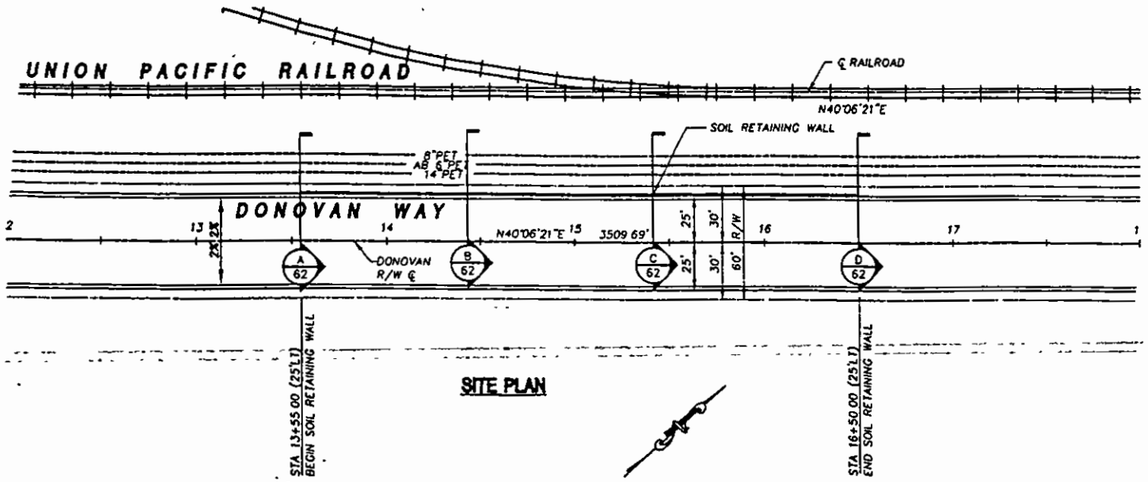


STA 15+42.00 (C / 62)
(LOOKING AHEAD STATION-DONOVAH WAY)
SCALE 1" = 10'



STA 16+50.00 (D / 62)
END WALL
(LOOKING AHEAD STATION-DONOVAN WAY)
SCALE: 1" = 10'

NOTES:
1. UTILITIES ELEVATIONS AND LOCATIONS SHOWN ARE APPROXIMATE. CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL EXISTING UTILITIES (SHOWN OR OTHERWISE) IN WORK AREA AND PROVIDING PROTECTION FOR SAME PRIOR TO PROCEEDING WITH THE WORK
2. ABANDONED 6" PIPE UTILITY NOT SHOWN.
3. MAINTAIN A 2'-0" MINIMUM CLEAR FROM EXISTING UTILITIES TO SOIL NAILS.
4. SEE CIVIL PLANS FOR INFORMATION NOT SHOWN



SITE PLAN

DEPT. OF PUBLIC WORKS - ENGINEERING DIVISION
CITY OF NORTH LAS VEGAS

NO	REVISIONS DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			

SCALE: 1" = 40'
DESIGN: A. SPATA
DRAWN: A. SPATA
CHECKED: D. DAVIS
APPROVED: T. BRADY
DATE: July 19, 1999

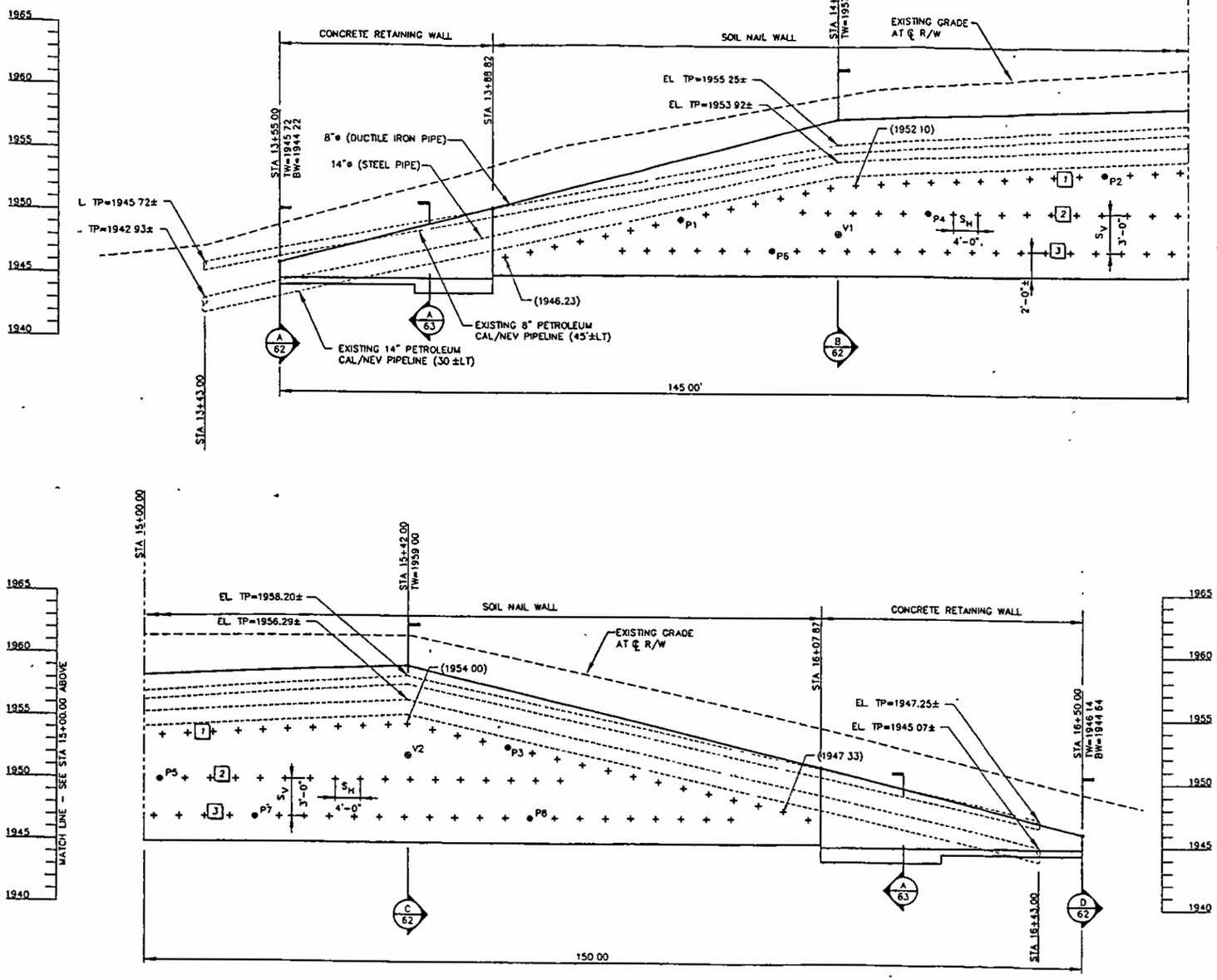
PROFESSIONAL ENGINEER — STATE OF NEVADA — No. 10712 — CIVIL & STRUCTURAL

20.9

SOIL NAIL, GENERAL NOTES AND SITE PLAN

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

DRAWING TITLE
PROJECT TITLE



ELEVATION – FRONT FACE

SOIL NAIL WALL

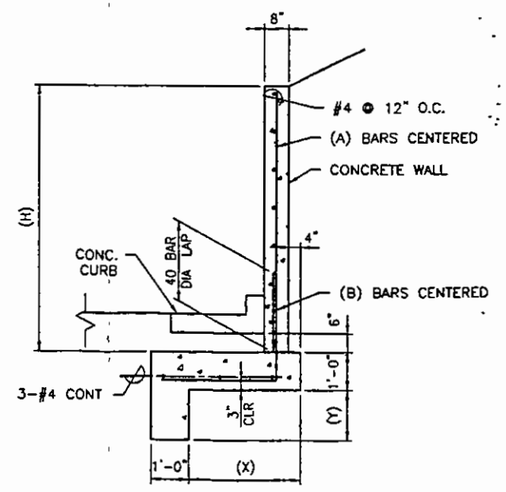
ROW	L	NAIL #	Qd
1	16	1"	20
2	16	1"	20
3	16	1"	20

LEGEND

+	NAIL	L	DRILLED LENGTH OF NAIL (FEET)
⊕	VERIFICATION TEST NAIL (V1 – V2)	BAR	STEEL BAR SIZE
		Q_d	ALLOWABLE PULLOUT RESISTANCE (KIP/FT)
(1000.00)	NAIL ELEVATION	S_H	HORIZONTAL NAIL SPACING (FEET)
CIP	CAST-IN-PLACE	S_V	VERTICAL NAIL SPACING (FEET)
TW	TOP OF WALL	●	PROOF NAIL (P1 – P8)
BW	BOTTOM OF WALL		
1	ROW NUMBER		

NOTES.

1. UTILITY ELEVATIONS AND LOCATIONS SHOWN ARE APPROXIMATE. CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL EXISTING UTILITIES (SHOWN OR OTHERWISE) IN WORK AREA AND PROVIDING PROTECTION FOR SAME PRIOR TO PROCEEDING WITH THE WORK
2. ABANDONED 6" PIPE UTILITY NOT SHOWN
3. SEE CIVIL PLANS FOR INFORMATION NOT SHOWN



WALL HEIGHT (H)	REINFORCEMENT (A) BARS	(B) BARS	FOOTING DIMENSIONS (X)	(Y)
7'–0"	#5@12"	#5@12"	3'–0"	1'–4"
6'–0"	#4@12"	#4@12"	3'–0"	1'–4"
4'–0"	#4@18"	#4@18"	3'–0"	NOT REQD.
3'–0"	#4@18"	#4@18"	2'–0"	NOT REQD.
2'–0"	#4@18"	#4@18"	1'–0"	NOT REQD.

SECTION (A/63)
1/2" = 1'–0"

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

REVISIONS

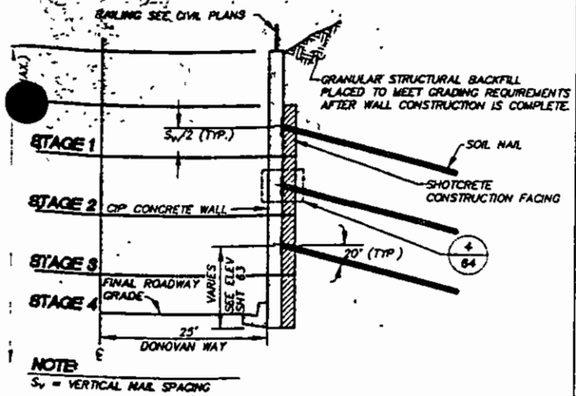
NO	DESCRIPTION	DATE	BY
Δ			
Δ			
Δ			
Δ			

SCALE 1" = 40'
DESIGN A. SPATA
DRAWN: A. SPATA
CHECKED: D. DAVIS
APPROVED: T. BRADY

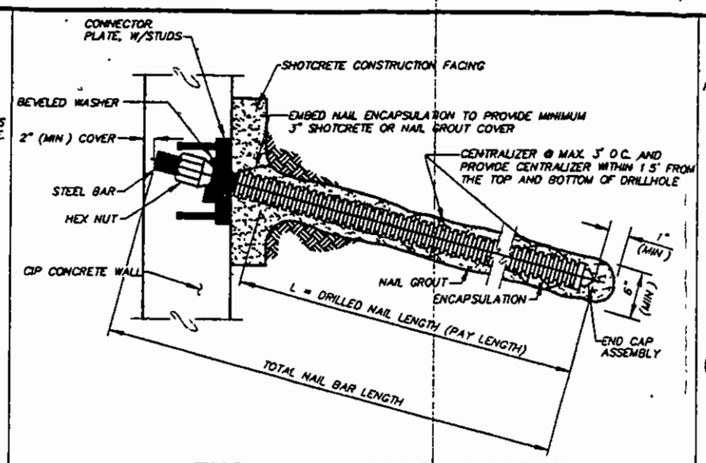
PROFESSIONAL ENGINEER – DANA A. AMES – No. 10712 – STATE OF NEVADA

SOIL NAIL WALL ELEVATIONS
VANDENBERG DETENTION BASIN

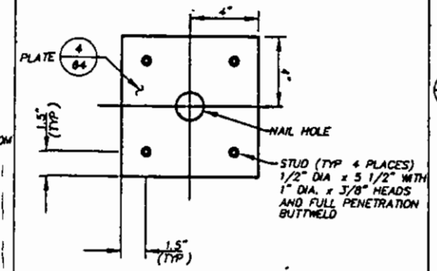
SHEET NO



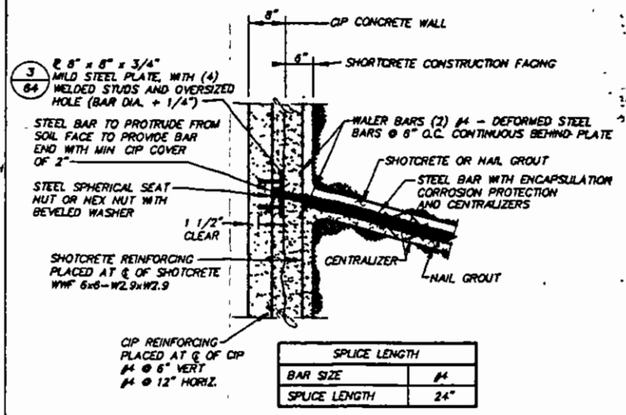
1/64 **TYPICAL SECTION**
N.T.S.



2/64 **ENCAPSULATED PRODUCTION SOIL NAIL**
N.T.S.

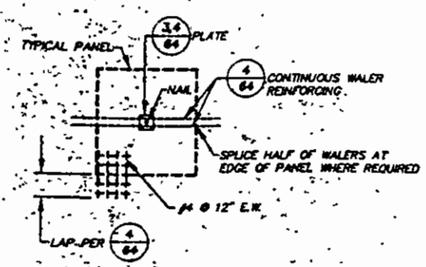


3/64 **CONNECTOR PLATE WITH STUD DETAIL**
N.T.S.

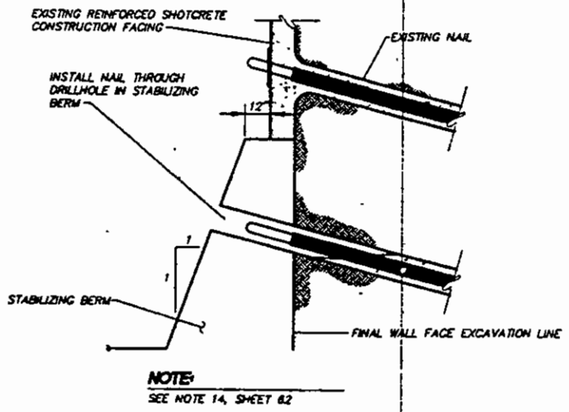


SPLICE LENGTH	
BAR SIZE	#4
SPLICE LENGTH	24"

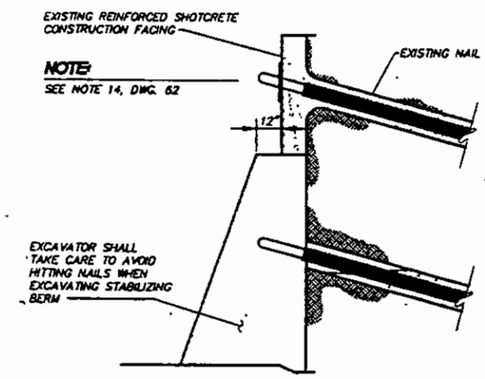
4/64 **FINISHED WALL SECTION**
N.T.S.



5/64 **TYPICAL SHOTCRETE PANEL STEEL**
N.T.S.



6/65 **NAIL INSTALLATION THROUGH TEMPORARY STABILIZING BERM (CONTRACTOR OPTION)**
N.T.S.



7/65 **EXCAVATION OF TEMPORARY STABILIZING BERM FOR SHOTCRETE PLACEMENT (CONTRACTOR OPTION)**
N.T.S.

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

NO.	DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			
6			

SCALE: 1" = 40'
DESIGN: A. SPATA
DRAWN: A. SPATA
CHECKED: B. DAVIS
APPROVED: T. BRADY
DATE: July 19, 1996

DETAILS

VANDENBERG DETENTION BASIN
INTERSTATE 15 AT VANDENBERG DRIVE

SHEET NO.