

**FINAL TECHNICAL DRAINAGE STUDY
FOR
WASHINGTON LAS VEGAS WASH
PARK**

865-012

July 2017

Prepared for:

**JW Zunino & Associates
3191 Jones Boulevard
Las Vegas, Nevada 89146
Phone: (702) 253-9390
Fax: (702) 253-1016**

GCV
ENGINEERS \ SURVEYORS

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Washington Las Vegas Wash Park Date: July 2017

Location of Development: a) Descriptive (Cross Streets) North/South: Lamb Blvd

East/West: Washington Ave

b) Section: 29 Township: 20S Range: 62E

c) APN : 140-29-212-010

Name of Owner: City of Las Vegas

Telephone No.: (702) 229-6272 Fax No.: (702) 382-3104 E-Mail Address: Not Available

Address: 333 North Rancho Drive, Las Vegas, NV 89106

Contact Person-Name: Steve Jones Telephone No.: (702) 804-2000

* E-Mail Address: sjones@gcwengineering.com Fax No.: (702) 804-2297

Firm: GCW, Inc.

Address: 1555 S Rainbow Blvd, Las Vegas, NV 89146

Type of Land Development/Land Disturbance Process:

☐	Rezoning	☐	Subdivision Map	☐	Clearing and Grading Only
☐	Parcel Map	☐	Planned Unit Development	☐	Other (Please specify below)
☐	Large Parcel Map	☐	Building Permit	☒	Park

1. Total Owned Land Area: At Site: +/- 7.0 AC Being Developed/Disturbed: +/- 7.0 AC

2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ Yes** ☒ No

3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☒ Yes** ☐ No

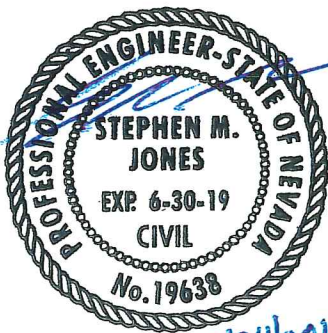
4. Proposed type of development (Residential, Commercial, Etc.): Park

5. Approximate upstream land area which drains to the subject site: 0

6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: Technical Drainage Study for Washington and Lamb, 1997 BBCE;

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: South in Storm Drain in Washington Avenue

8. Briefly describe your proposed schedule for the subject project: ASAP



Engineer's Seal

Submit this form as part of the required drainage study to the local entity which has jurisdiction over the subject property. This form may provide sufficient information to serve as the Conceptual Drainage Study.

*New Required Field

**Review and concurrence of the Clark County Regional Flood Control District is required.

Revision	Date

Local Entity File No. _____

REFERENCE:

STANDARD FORM 1

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Washington Las Vegas Wash Park		Map ID:
Firm Name: GCW, Inc.		Engineer: Steve Jones
Address: 1555 S. Rainbow Blvd		
City: Las Vegas	State: Nevada	Zip: 89146
Phone Number: 804-2000	Fax Number: 804-2297	
Property Owner: City of Las Vegas		
Address: 333 North Rancho Drive		
City: Las Vegas	State: Nevada	Zip: 89106
Reviewed By:	Date Received:	Date Accepted for Review:

The following checklist is intended as a guide for the engineer preparing a Technical Drainage Study to submit to the local entity and Clark County Regional Flood Control District (if necessary). The listed items are the minimum information required prior to the entity performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the Clark County Regional Flood Control District (CCRFCD) Hydrologic Criteria and Drainage Design Manual (MANUAL).

This document is intended as an aid in preparing Technical Drainage Studies. Each study submitted is reviewed for compliance with local and regional criteria. This form is not intended to be all inclusive and does not limit the extent of the information, calculations or exhibits which may be necessary to properly evaluate the intended land use.

If items are not applicable for the subject site, provide N/A.

I. GENERAL REQUIREMENT

Yes	No	
☒	☐	Design Manual Standard Form 1 with the engineer's seal and signature.
☒	☐	Design Manual Standard Form 4 .
☒	☐	2 copies of the 24" x 36" Drainage Plan.
☐	☐	<u>N/A</u> A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.

II. MAPS AND EXHIBITS

Yes	No	
☒	☐	A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated.
☒	☐	A copy of the current CCRFCD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental areas with the site delineated.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS (Continued)

Yes No

- ☒ ☐ Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.
- ☒ ☐ On-site drainage basin maps for existing and proposed conditions showing the existing topography, basin boundaries, concentration points, and on-site and off-site flows in cfs.
- ☒ ☐ Vicinity Map with local and major cross streets identified and a north arrow.

III. DRAINAGE PLAN

Yes No

- ☒ ☐ Sheet size: 24" x 36" sealed by a registered engineer in the State of Nevada.
- ☒ ☐ Minimum scale: 1" = 60'.
- ☒ ☐ Project name.
- ☒ ☐ Vicinity Map with local and major cross streets.
- ☒ ☐ Revision box.
- ☒ ☐ North arrow and bar scale.
- ☒ ☐ Engineer's/consultant's address and phone number.
- ☒ ☐ Elevation datum and benchmark.
- ☒ ☐ Legend for symbols and abbreviations.
- ☒ ☐ Cut/fill scarps, where applicable.
- ☒ ☐ Street names, grades, widths.
- ☒ ☐ Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street.
- ☒ ☐ Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.
- ☒ ☐ Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
- ☒ ☐ Proposed typical street sections.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes No

- | | | |
|-------------------------------------|--------------------------|---|
| ☐ | <u>NA</u> | Streets with off-set crowns. |
| ☒ | ☐ | Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes. |
| ☒ | ☐ | Property lines. |
| ☒ | ☐ | Right-of-way lines and widths, existing and proposed. |
| ☒ | ☐ | Existing improvements and their elevations. |
| ☒ | ☐ | Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points. |
| ☒ | ☐ | Concentration points and drainage flow direction with Q100 and V100 and D100 in streets. |
| ☒ | ☐ | Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows. |
| ☒ | ☐ | Location and cross-section of street capacity calculations. |
| ☒ | ☐ | Cross-sectional detail for channels, including cutoff wall locations. |
| ☒ | ☐ | Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations. |
| ☒ | ☐ | Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement. |
| ☐ | <u>NA</u> | Location and detail of existing, proposed, and future block wall openings. Minimum size is 16" x 48". Wrought iron gate is required for flows > 10 cfs. |
| ☒ | ☐ | Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc. |
| ☒ | ☐ | Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit. |
| ☐ | <u>N/a</u> | Building and/or lot numbers. |
| ☐ | <u>NA</u> | Alignment of all existing, proposed, or future Regional Facilities adjacent to the site. |
| ☐ | <u>NA</u> | Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information. |

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes No

- | | |
|----------------|--|
| <u>x</u> _____ | For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE. |
| <u>X</u> _____ | Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from the Q100 flows. |
| <u>X</u> _____ | Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent. |
| <u>x</u> _____ | Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required). |

IV. HYDROLOGIC ANALYSIS

Yes No

- | | |
|------------------|--|
| <u>X</u> _____ | Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated. |
| <u>X</u> _____ | Input and output information for existing conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models. |
| <u>X</u> _____ | Input and output information for future conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models. |
| <u>X</u> _____ | Use of correct precipitation values in and around the McCarran Airport rainfall area. |
| <u>X</u> _____ | A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations. |
| <u>X</u> _____ | A summary table of stormwater flows showing basin area, Q10 and Q100 for both individual basins and combined basin flows, where applicable. |
| <u>X</u> _____ | Copies of supporting technical information referenced from a previously approved study and a statement accepting these results. |
| <u>X</u> _____ | On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with current Nevada Drainage Law. |
| _____ <u>N/A</u> | Calculation for impervious area for parking lots and LIDs (if required). |

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
☐	<u>NA</u>	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
<u>X</u>	☐	Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q100 and Q10 flows representing the worst case for interior and all perimeter streets. Q100 d x v < 8. Q10 d x v < 6 and 12 foot dry lane for rights-of-way > 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
<u>X</u>	☐	A summary table of interior and exterior street capacity calculations showing the street name, Q100 flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
☐	<u>NA</u>	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
<u>X</u>	☐	Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
<u>X</u>	☐	Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q100 weir height or flow depth, whichever is greater.
☐	<u>N/A</u>	A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. • Field survey data. • Input and output information. • Plotted cross-sections based on survey with proper encroachments. • A map showing the location of the cross-sections. • Analysis of both sub and super-critical flow segments. • A summary table and a discussion of the results in the text of the report.
<u>X</u>	☐	Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
<u>X</u>	☐	Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
<u>X</u>	☐	The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.
<u>x</u>	☐	Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:

STANDARD FORM 2



CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 5/18/11)

The following checklist is intended as a supplemental guide for the engineer preparing a Technical Drainage Study submittal to the City of Las Vegas. This supplement focuses on requirements specific to the City of Las Vegas. The requirements presented are in addition to the Clark County Regional Flood Control District (CCRFCD) Manual Standard Form 2. The listed items are the minimum information required prior to the City performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the CCRFCD Hydrologic Criteria and Drainage Design Manual (Design Manual).

An appointment must be made to preview this checklist in conjunction with CCRFCD Standard Form 2 prior to the City accepting a new drainage study for review. The engineer must contact the Flood Control Section at (702) 229-6541 to schedule a submittal appointment.

If items are not applicable for the subject site, provide N/A.

I. GENERAL REQUIREMENT		
Yes	No	
	x	A notarized letter from the adjacent property owner(s) allowing off-site grading. (A copy of the letter must be received prior to final acceptance of the drainage study.)
	x	Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.
x		An electronic copy of the complete submittal is required to be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output device replicating your submittal. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats. If figures are in color, they must be scanned in color and saved as a separate file. by initial here, the engineer on record acknowledges that the electronic copy is an identical replicate of the original hard copy submitted to the City of Las Vegas.

II. GRADING PLAN INFORMATION		
Yes	No	
x		(1) 24" X 36" copy of the Grading Plan, (including all Detail Sheets) sealed by the engineer.
x		Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street. Note: Proposed top of curb elevations must be provided for both sides of roadways even if only half street construction is required.
x		Label existing topography at a minimum 5 foot elevation interval including adjacent developments, finished floor elevations of existing buildings and top of existing curbs extending 100 feet around the perimeter of the site. (*Measured from the centerline of the adjacent roadway.)

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

II. GRADING PLAN INFORMATION		
Yes	No	
x		Proposed on-site and off-site storm drains and other flood control facilities with plan and profile sheets for public storm drains showing the class of pipe, (Class III, IV, V, etc.), design hydraulic grade line, (HGL) and 100 year storm flow. A public drainage easement must be provided over on-site storm drains conveying off-site flows. An overflow path must be provided over all storm drains.
n/a		All existing and "to be constructed" walls with cross-sections showing wall type, (e.g. block wall, retaining wall, flood wall, etc.), with limits clearly defined, adjacent ground elevations. Wall heights must meet current ordinances and in no case exceed 14 feet above the adjacent property.
x		Street slopes for both interior and perimeter streets. Note: The minimum slope for a roadway is 0.4 percent, a minimum 18-inch storm drain must be provided where minimum slopes cannot be met.
n/a		Back of lot elevations and lot drainage pattern for all lots including common lots.
n/a		Sites with a grade difference two feet above or below existing ground are required to have approval from City of Las Vegas Current Planning. Current Planning approval is required prior to final approval of the drainage study.
x		On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners. (The project must pass flows through the site every 600 feet where the project is blocking flow paths.)
	x	This project uses a solid grouted stem wall (or approved alternate) at the back of sidewalk to provide erosion protection for landscaped areas where the depth of flow in the roadway exceeds the back of walk elevation. A corresponding cross-section detail is included.
n/a		Commercial and Common Lot Landscape areas are not allowed to drain over the sidewalk. The grading plans show flow lines with grades and sidewalk under drains for all landscape areas draining to the public ROW.

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
		Concrete valley gutters are required in parking lots with slopes less than 1 percent. Slopes through cul-de-sac must be at a 1 percent minimum where flow is drained through the cul-de-sac.
n/a		Ten-foot wide public drainage easements to be privately maintained are allowed for flow less than 20 cfs. The depth of flow entering the easement must be checked using the submerged weir calculation.
n/a		The limits of the flood zones and the base flood elevations (BFE) must be shown on all grading plans for all developments within a Special Flood Hazard Zone A, AO, AE, etc.
n/a		Minimum finish floor elevation is 6 inches above highest adjacent top of curb. Finish floor calculations must include allowances for super elevations on curves and velocity head for tee intersections.
n/a		Finished floor elevations for buildings adjacent to public drainage easements must be a minimum of 18 inches above the Q100 weir of submerged weir elevation, whichever is greater.

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
n/a		Lots with "B and C Type Drainage" that drain from one lot to another through a drainage easement shall be required to install an underground nuisance drainage system or a 2-foot valley gutter. 16" x 24" minimum block wall openings are required for both options.
n/a		Bubblers are required across 80 foot and greater ROW streets. When flows exceed 10 cfs, bubblers larger than 18 inches will be required up to a maximum of 36". Inlets must be sized to match the pipe size provided.

- Contact the Flood Control Section regarding the drainage study review fee. These fees are payable at the time of submittal.
- The Drainage Study must be conditionally approved prior to submitting improvement plans to the Civil and Planning Development of the Department of Building and Safety for review.

This document is intended as an aid in preparing Technical Drainage Studies for the City of Las Vegas. Each study submitted is reviewed for compliance with local and regional criteria. This form is not intended to be all-inclusive and does not limit the extent of the information, calculations or exhibits which may be necessary to properly evaluate the intended land use.

**FINAL TECHNICAL DRAINAGE STUDY
FOR
WASHINGTON LAS VEGAS WASH
PARK**

865-012

July 2017

Prepared for:

**JW Zunino & Associates
3191 Jones Boulevard
Las Vegas, Nevada 89146
Phone: (702) 253-9390
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Prepared by:

**GCW, Inc.
1555 S. Rainbow Blvd.
Las Vegas, NV 89146
Phone: (702) 804-2000
Fax: (702) 804-2299**

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I. INTRODUCTION

JW Zunino & Associates is proposing park improvements and grading within a 7-acre parcel (hereinafter referred to as the LV Wash Park), located north of Washington Avenue and east of Lamb Boulevard.

The *Technical Drainage Study for Washington and Lamb* (Reference 1, hereinafter referred to as the Washington Lamb Study) was conditionally approved by the City of Las Vegas (CLV) on May 2, 1997. Concurrence for the study was issued by the Clark County Regional Flood Control District (CCRFCD) on August 5, 1997. The Washington Lamb Study shows that the *CLV Central Neighborhood Flood Control Master Plan* (hereinafter referred to as the CLV CNFCMP) flow rate in Washington Avenue is conservative. Pertinent reference material has been included in Appendix C.

The *Preliminary Drainage Report for Washington Avenue Roadway Project* (Reference 2, hereinafter referred to as the Washington Roadway Study) was prepared by URS Consultants in August of 1992. Existing storm drain information has been referenced from the Washington Roadway Study. Pertinent reference material is included in Appendix C.

The project's parcel is located within the limits of the *CLV CNFCMP* (Reference 3), and it was used to determine the adjacent flow rate in Washington Avenue. Pertinent reference material is included in Appendix C.

The purpose of this report is to accompany the improvement plans, to provide detailed hydrologic and hydraulic analyses for the site, and to determine adequate protection for the project from offsite and onsite flows. The following tasks were performed in the preparation of this report:

- ◆ Identify previous drainage studies for the project site and surrounding areas.
- ◆ Determine the FEMA floodplain designation for the project site.
- ◆ Identify existing and proposed regional drainage facilities adjacent to the site.
- ◆ Identify existing, proposed, and future drainage areas and facilities that affect the site.
- ◆ Estimate peak runoff impacting the proposed grading and storm drain improvements during the 10-year and 100-year return period storms for existing and ultimate conditions.

- ♦ Provide hydraulic calculations for proposed drainage swales.
- ♦ Recommend drainage facilities to protect the project from storm runoff.

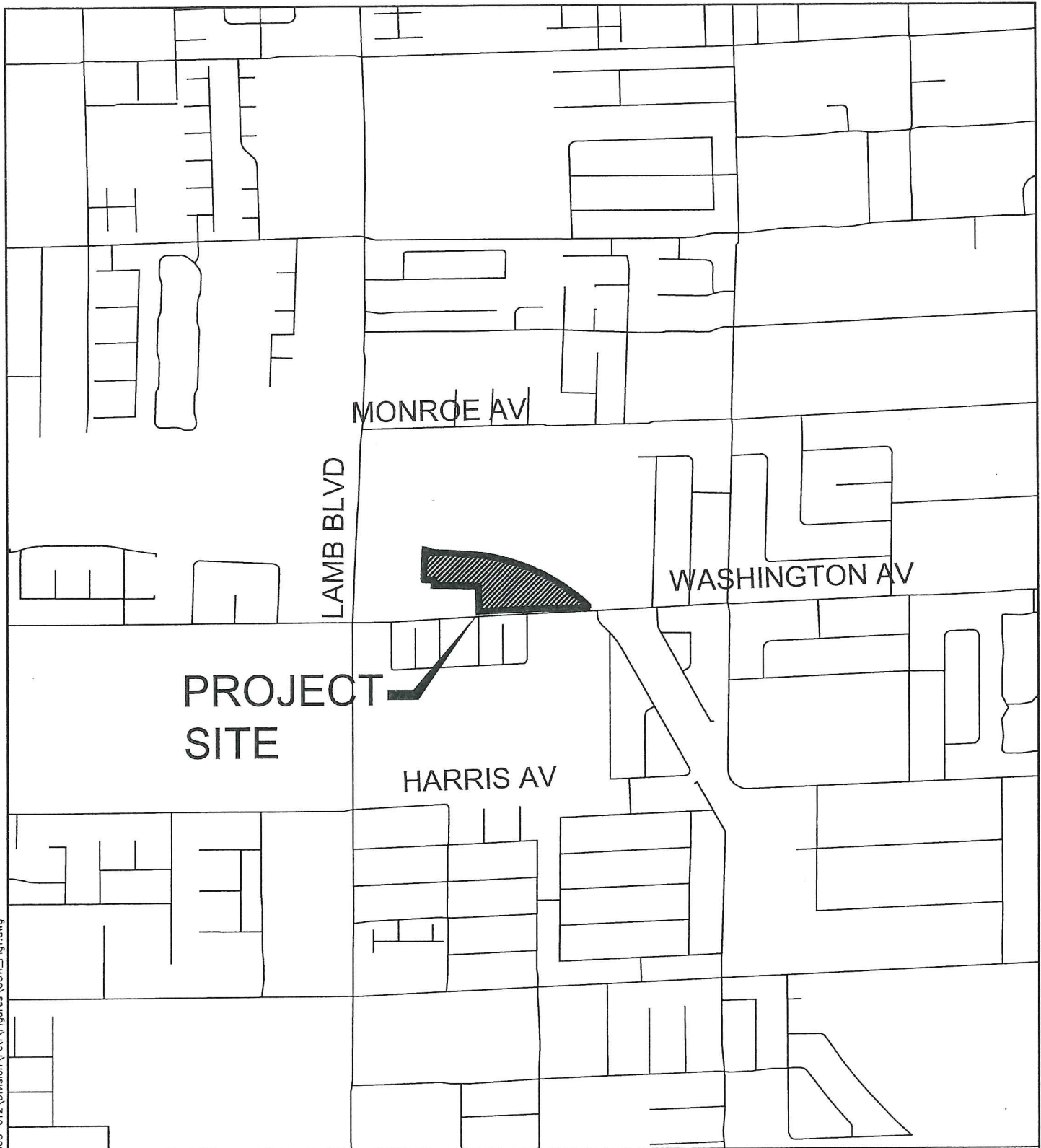
II. LOCATION AND DESCRIPTION

The proposed LV Wash Park is located within Section 29, Township 20 South, Range 62 East, M.D.M. in Clark County. The site is presently undeveloped with sparse vegetation. Additionally, the project is bordered by Las Vegas Wash – Middle Branch Flood Channel to the north and east, undeveloped land and a commercial lot to the west, and Washington Avenue to the south. Please refer to Figure 1 for the location and vicinity of the project.

III. FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD HAZARD ANALYSIS

Based on the FEMA Flood Insurance Rate Map (FIRM) Community Panel 32003C 2187F, dated November 16, 2011, the project site lies within a Shaded Zone X; therefore, this project is not currently located in a FEMA designated Special Flood Hazard Area (SFHA). Figure 2 shows the site denoted on a portion of the aforementioned FIRM.

The site is adjacent to a Special Flood Hazard Area (SFHA) Zone 'AE'. Base Flood Elevations (BFEs) are shown on the drainage exhibits. The Flood Zone is contained in the Las Vegas Wash adjacent to the site and the park improvements are 18-inches above the BFEs.



**PROJECT
SITE**

MONROE AV

LAMB BLVD

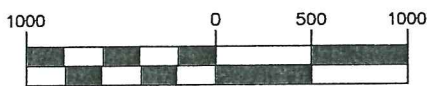
WASHINGTON AV

HARRIS AV

WASHINGTON LAS VEGAS WASH
PARK

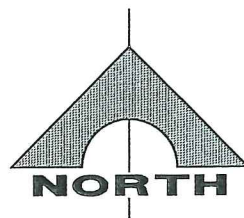
FIGURE 1
VICINITY MAP

GRAPHIC SCALE



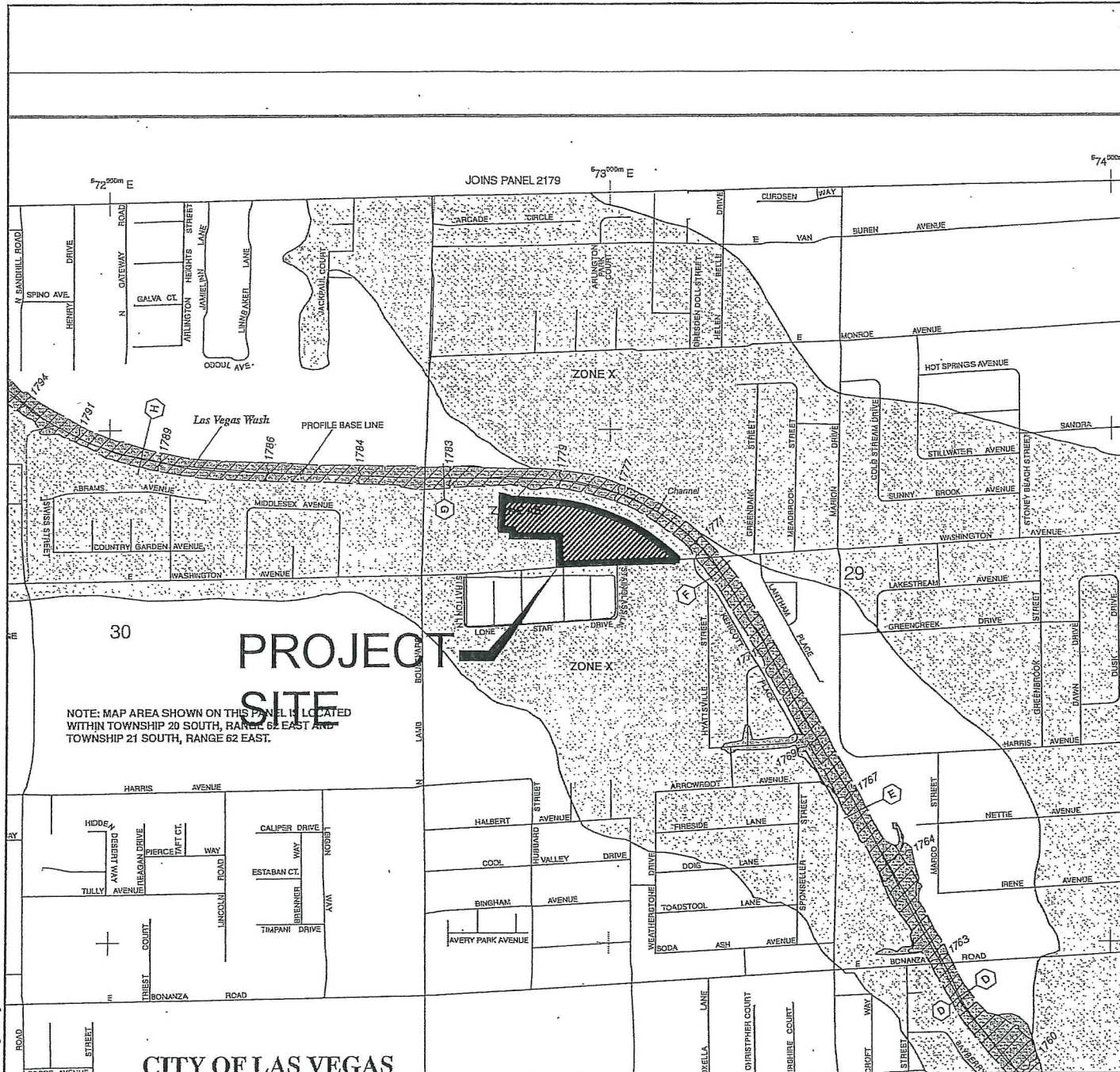
(IN FEET)

1 inch = 1000 ft.



GCV
ENGINEERS SURVEYORS

1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com



CITY OF LAS VEGAS

NATIONAL FLOOD INSURANCE PROGRAM

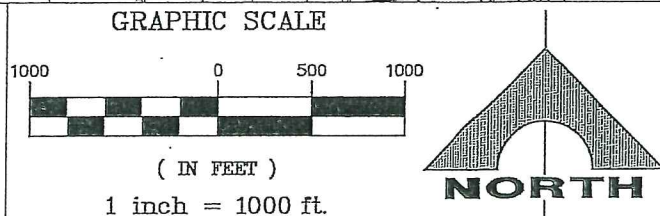
FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY,
NEVADA
AND INCORPORATED AREAS

PANEL 2187 OF 4090
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:	NUMBER	PANEL SUFFIX
CLARK COUNTY	20003	2187
LAS VEGAS CITY OF	20016	2187

MAP NUMBER
32003C2187F
MAP REVISED
NOVEMBER 16, 2011

Federal Emergency Management Agency



WASHINGTON LAS VEGAS WASH
PARK

FIGURE 2

F.I.R.M.

GCV
ENGINEERS SURVEYORS

1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcvengineering.com

IV. CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT (CCRFCD) FACILITIES

Figures 3 and 4 are a reproduction of Figure H-27 and F-27 of the CCRFCD 2013 Las Vegas Valley Master Plan Update (Reference 4, hereinafter referred to as the 2013 MPU).

As shown on the figure, the site is adjacent to existing CCRFCD facility LVMD 1232 and proposed CCRFCD facility LVMD 1233. These facilities serve as part of the Las Vegas Wash-Middle System.

The 2013 MPU describes LVMD 1232 as a Bank-Stabilized channel 48-feet wide, 8-feet deep with 2:1 side slopes.

The 2013 MPU describes LVMD 1233 as a concrete lined channel 90-feet wide, 8-feet deep with 0:1 side slopes (Replaces LVMD 1232). Note that the existing CCRFCD facility will be upgraded in the future; however, the current flood zone is contained in the existing CCRFCD facility. It is outside the scope of this project to construct regional stabilization improvements within the Las Vegas Wash.

V. HYDROLOGY

The methodology presented in this study is in compliance with the *CCRFCD Hydrologic Criteria and Drainage Design Manual* (Reference 5, hereinafter referred to as the Manual).

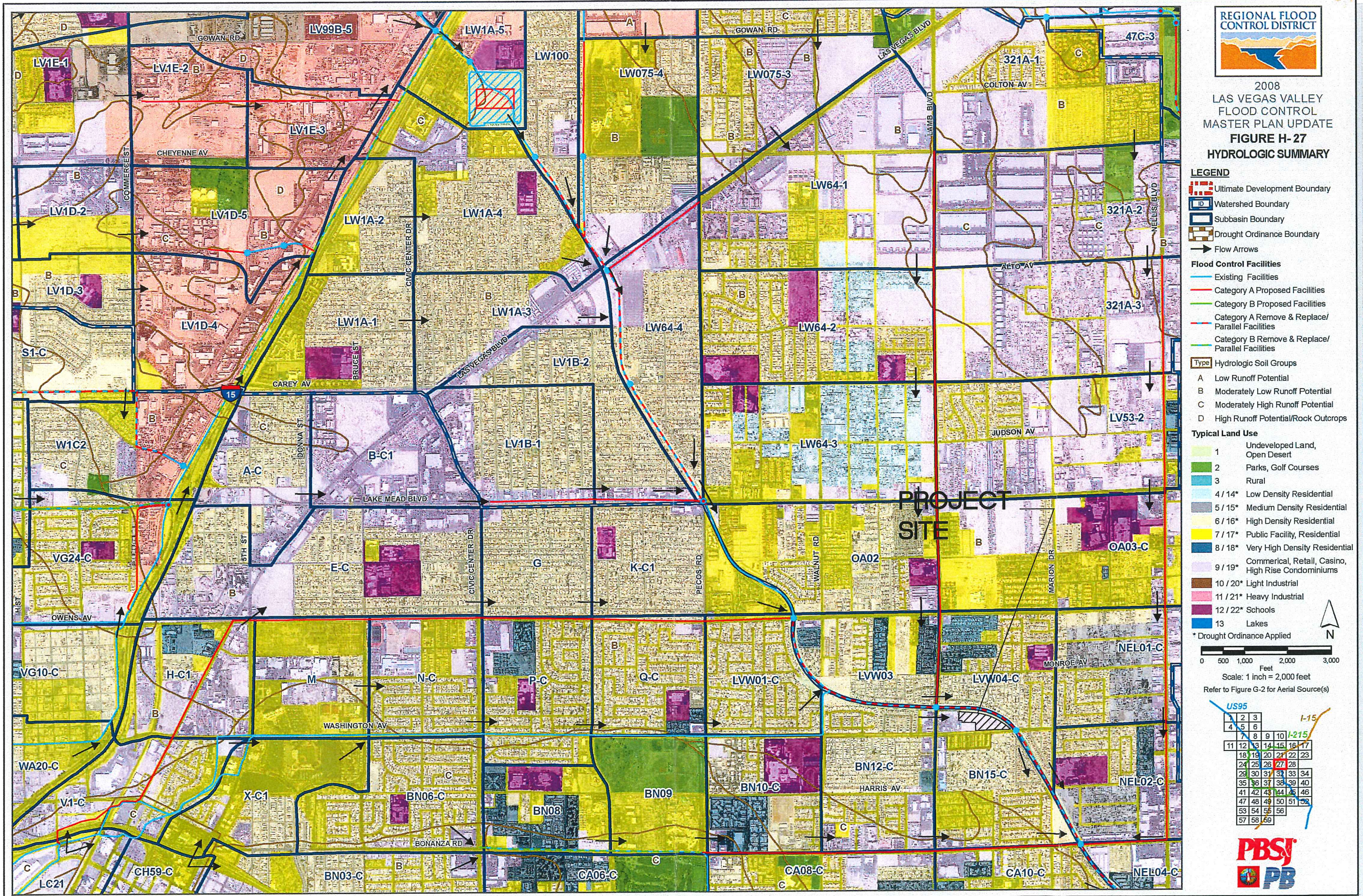
Model Description. The watersheds were modeled using the SCS Unit Hydrograph method within the Army Corps of Engineers *HEC-1 Flood Hydrograph Package* (Reference 6). Since the drainage area for the project is less than 8 square miles, an SDN 3 design storm was selected for use in the HEC-1 computer model.

Drainage Areas and Flow Patterns. The sub basins and flow patterns have been determined from 1-ft aerial topography for the project site. The proposed conditions drainage patterns are consistent with the referenced studies. Pertinent reference material has been included in Appendix C.

VI. EXISTING CONDITIONS

Under existing conditions, the site is undeveloped. Washington Avenue is fully improved including curb, gutter and storm drain. Figure 5 depicts the onsite existing drainage patterns. The unimproved park site surface flows into Washington Avenue and is

collected into storm drain via a series of drop inlets within the roadway. There are no offsite flows which impact the park site. An onsite existing conditions HEC-1 analysis is included in Appendix A. Pertinent reference material from CLV CNFCMP for the flow rate in Washington Avenue is included in Appendix C.



VII. PROPOSED CONDITIONS

Under proposed conditions, the site is developed. Figure 6 depicts the drainage patterns. An onsite proposed conditions HEC-1 Analysis is included in Appendix A. Onsite sub basins have been prorated to determine specific flow rates to be collected by proposed area drains. The prorated flows are based on the cfs per acre of tributary area. Area drain calculations contain a 50 percent clogging factor and are included in Appendix B.

Note that proposed condition is the same as the ultimate condition, because the majority of the offsite is developed and the CLV CNFCMP referenced flow rate excerpted for this study in Washington assumes full build-out of the upstream watershed.

The below table summarizes that the proposed condition runoff from the site has increased above the existing condition discharging into Washington.

Existing Condition vs. Proposed Condition Runoff to Washington	
Existing Condition Q_{100} (cfs)	Proposed Condition Q_{100} (cfs)
10	13

It is acknowledged that the proposed condition discharges additional flow into Washington above what occurs during the existing condition; however, the proposed improvements have directed the developed site runoff into the existing storm drain in Washington, thus removing it as surface flow and thereby resulting in an improvement of flood protection for existing adjacent development. Note that the existing storm drain was designed to handle the entirety of the site runoff through drop inlets as discussed in the existing condition, with further detail regarding storm drain design in Section IX of this report.

The restroom will meet CLV finished floor criteria, which is above twice the depth of flow as shown in Cross Section 6 which is a normal depth calculation for the swale adjacent to the restroom is included in Appendix B. Additionally positive drainage has been provided around the entire site and away from amenities, and any ponding that occurs on the site is mitigated by proposed area drains and storm drain.

In general, the proposed park, area drains and storm drain improvements are in conformance with drainage patterns. The Washington Lamb Study confirms the drainage

patterns of the CLV CNFCMP Study. Therefore, the proposed project will not adversely impact any downstream properties or facilities.

VIII. STREET HYDRAULICS

Street sections have been prepared for Washington Avenue and the parking lot areas. Based on the calculated street and parking lot flow characteristics, the Manual criteria for depth (D) and velocity times depth ($D \cdot V$) for the 100-year storm event will be met. All onsite 100-year flows meet 10-year flow criteria. Washington is fully improved with the developed site improving the street flow condition as discussed in Section VII; therefore, the hydraulic criteria in Washington is no worse than occurs during existing condition. The hydraulic sections are included in Appendix B and summarized on a table on Figure 6.

IX. STORM DRAIN & BMP/LID IMPROVEMENTS

The proposed area drains discharge into the existing storm drain in Washington, via proposed onsite storm drain. The entirety of the runoff produced from the site is designed to be collected and discharge into the existing storm drain in Washington. The onsite storm drain will be privately maintained. A WSPG model has been prepared to analyze the storm drain hydraulics. The starting HGLs for each of the proposed onsite storm drains analyzed in this study are referenced from the Washington Roadway Study for the hydraulic models and are included in Appendix C.

There are three BMP swales designed to treat and carry flows to the proposed area drains. A 1-foot deep swale with 4 to 1 side slopes, riprap, a minimum length of 30 feet, and longitudinal slope of 1 percent swale has been provided within the landscape to treat the entire parking lot. The swales meet the requirements as outlined in Section 1503.4.5 of the Manual. Normal depth calculations for the proposed swale have been included in Appendix B. The swales have been designed to contain the 100-year storm event and hence the 2-year storm event will be contained; therefore, a 2-year storm event analysis has not been prepared.

X. CONCLUSIONS AND RECOMMENDATIONS

1. Methodology used in this report is in compliance with the Clark County Regional Flood Control District (CCRFCD) criteria.
2. The proposed project lies within a Shaded Zone X and is adjacent to a SFHA Zone 'AE'. The project is not currently located in a FEMA-designated Special Flood Hazard Area. The SFHA Zone 'AE' is contained in the adjacent Las Vegas Wash, and the park improvements are 18-inches above the BFEs.
3. The project is adjacent to an existing CCRFCD Regional Facility, the Las Vegas Wash and is planned for future upgrade which is not assumed to impact the site.
4. The proposed onsite swales will discharge flows into proposed drop inlets. The entire site runoff will be in collected in storm drain.
5. The proposed development improves existing street flows downstream of the site and is in conformance with the existing storm drain design and CLV CNFCMP. Therefore, the runoff generated from, or conveyed by, the project will not adversely impact any downstream properties or facilities.

XI. REFERENCES

1. Brechler & Bell Consulting Engineers, Inc. *Technical Drainage Study for Washington and Lamb*. February 1997.
2. URS Consultants. *Preliminary Drainage Report for Washington Avenue Roadway Project*. August 1992.
3. PBS&J, Inc. *City of Las Vegas Central Neighborhood Flood Control Master Plan*.
4. *CCRFCD 2013 Las Vegas Valley Master Plan Update*. 2013.
5. Clark County Regional Flood Control District. *Hydrologic Criteria and Drainage Design Manual*. August 1999.
6. U.S. Army Corps of Engineers. *HEC-1 Flood Hydrograph Package*. Revised June 1998.

**TECHNICAL DRAINAGE STUDY FOR
WASHINGTON LAS VEGAS WASH PARK
APPENDIX LAYOUT**

Appendix A. Hydrologic Calculations and Information

1. Rainfall Information
2. Soils Information
3. Curve Number Calculations
4. Standard Form 4
5. Existing Condition HEC-1 Model
6. Proposed Condition HEC-1 Model

Appendix B. Hydraulic Calculations

1. Cross Section Normal Depth Calculations
2. Area Drain Calculations
3. WSPG Calculation

Appendix C. Reference Materials

1. Technical Drainage Study for Washington and Lamb
 - a) CLV Approval Letter
 - b) CCRFCD Concurrence Letter
 - c) Proposed Drainage Basin Map
 - d) Existing Drainage Basin Map
 - e) Offsite Drainage Basin Map
 - f) HEC-1 Models
2. Preliminary Drainage Report for Washington Avenue Roadway Project
 - a) Standard Form 6 Calculations
 - b) Plans
3. CLV Central Neighborhood Flood Control Master Plan

Appendix D. Response to Comments/Comment Letter

Appendix E. Improvement Plans

Back Cover CD

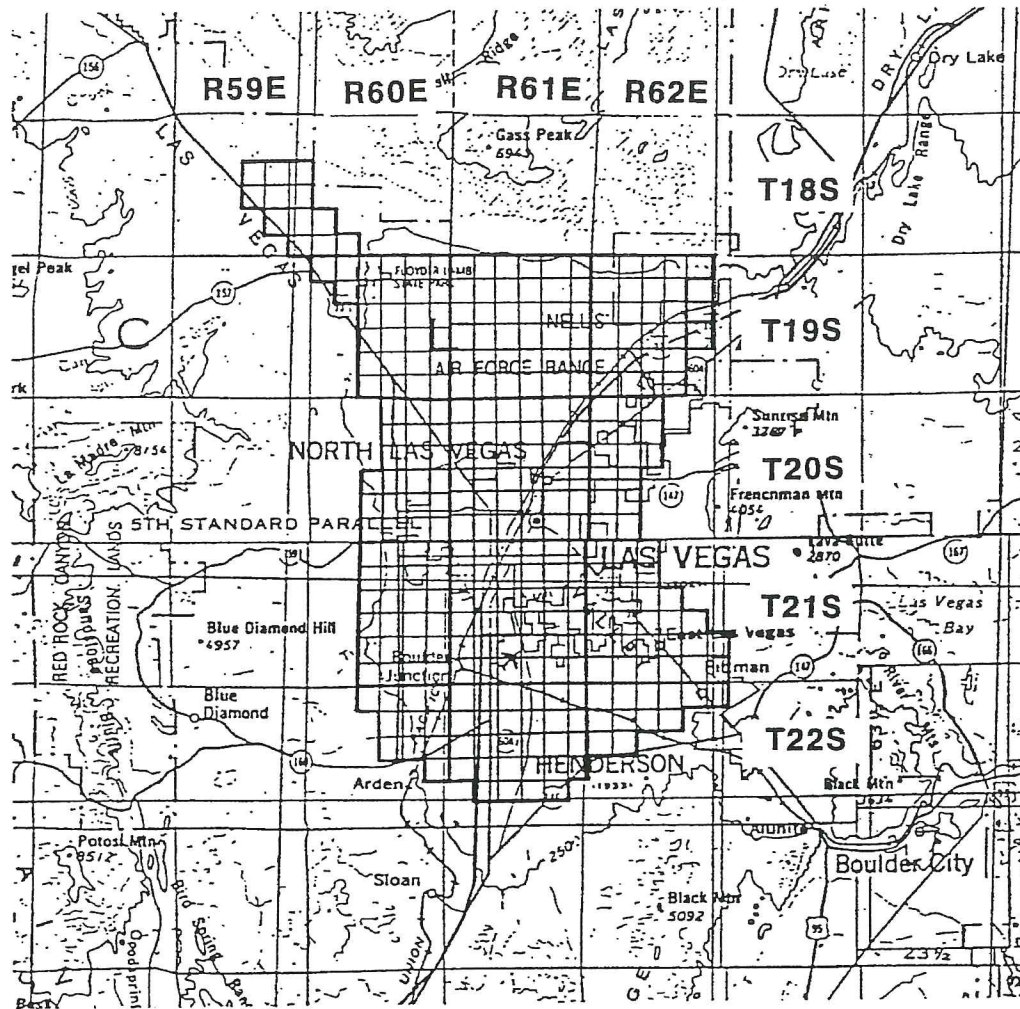
1. PDF of report
2. Electronic Files
 - a) HEC-1
 - b) WSPG Models

APPENDIX A

Hydrologic Calculations and Information

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

McCARRAN AIRPORT RAINFALL AREA



TOWNSHIP	RANGE	SECTIONS	TOWNSHIP	RANGE	SECTIONS
18 South	59 East	13-15,22-26,36	20 South	62 East	4-9,16-20,29-32
18 South	60 East	30-32	21 South	60 East	1-4,9-16,21-28,33-36
19 South	60 East	1-6,8-16,21-28,33-36	21 South	61 East	ALL SECTIONS
19 South	61 East	ALL SECTIONS	21 South	62 East	4-9,15-23, 25-36
19 South	62 East	2-11,14-23,27-34	22 South	60 East	1-4,10-15,24
20 South	60 East	1-3,10-15,21-28,33-36	22 South	61 East	1-24,26-29
20 South	61 East	ALL SECTIONS	22 South	62 East	1-10,17-18

Notes:

1. Refer to Table 505 and Figure 516 Depth-Duration-Frequency values in the McCarran Airport Rainfall Area.
2. Refer to Table 506 and Figure 517 for Time-Intensity-Frequency values on the McCarran Airport Rainfall Area.

Revision	Date

WRC
ENGINEERING

REFERENCE:

USACE, Los Angeles District, 1988

FIGURE 513



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Las Vegas Valley Area, Nevada, Part of Clark County



May 26, 2017

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

Custom Soil Resource Report

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



MAP LEGEND

	Area of Interest (AOI)		Soil Area
	Area of Interest (AOI)		Stony Spot
	Soils		Very Stony Spot
	Soil Map Unit Polygons		Wet Spot
	Soil Map Unit Lines		Other
	Soil Map Unit Points		Special Line Features
	Special Point Features		Water Features
	Blowout		Streams and Canals
	Borrow Pit		Transportation
	Clay Spot		Rails
	Closed Depression		Interstate Highways
	Gravel Pit		US Routes
	Gravelly Spot		Major Roads
	Landfill		Local Roads
	Lava Flow		Background
	Marsh or swamp		Aerial Photography
	Mine or Quarry		
	Miscellaneous Water		
	Perennial Water		
	Rock Outcrop		
	Saline Spot		
	Sandy Spot		
	Severely Eroded Spot		
	Sinkhole		
	Slide or Slip		
	Sodic Spot		

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County
Survey Area Data: Version 11, Sep 16, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 26, 2013—Feb 25, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

APPENDIX B

Hydraulic Calculations

TRAPEZOIDAL CHANNEL

1-1 BMP Swale

1-ft depth provided

Flow "Q" 1 cfs

Manning's "n" 0.033

Slope (%) 1.00

Bottom Width 0.0 ft

Side Slope (Lt) 4.0 H:1V

Side Slope (Rt) 4.0 H:1V

Radius 0.0 ft

OUTPUT:

Velocity 1.52 ft/sec

Depth 0.41 ft

Freeboard 0.54 ft

Total Depth 0.95 ft

Froude No. 0.59 ft

Superelevation 0.00 ft

Normal depth calculations using Manning's equation

$Fb = 1 + 0.025Vd^{(1/3)}$ Supercritical; $0.5 + V^2/2g$ Subcritical



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TRAPEZOIDAL CHANNEL

2-2 BMP Swale

1-ft depth provided.

Flow "Q"	3 cfs
Manning's "n"	0.033
Slope (%)	1.00
Bottom Width	0.0 ft
Side Slope (Lt)	4.0 H:1V
Side Slope (Rt)	4.0 H:1V
Radius	0.0 ft

OUTPUT:

Velocity	2.00 ft/sec
Depth	0.61 ft
Freeboard	0.56 ft
Total Depth	1.17 ft
Froude No.	0.64 ft
Superelevation	0.00 ft

Normal depth calculations using Manning's equation

$Fb = 1 + 0.025Vd^{(1/3)}$ Supercritical; $0.5 + V^2/2g$ Subcritical



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TRAPEZOIDAL CHANNEL

3-3 BMP Swale

1-ft depth provided.

Flow "Q"	2 cfs
Manning's "n"	0.033
Slope (%)	1.00
Bottom Width	0.0 ft
Side Slope (Lt)	4.0 H:1V
Side Slope (Rt)	4.0 H:1V
Radius	0.0 ft

OUTPUT:

Velocity	1.81 ft/sec
Depth	0.53 ft
Freeboard	0.55 ft
Total Depth	1.08 ft
Froude No.	0.62 ft
Superelevation	0.00 ft

Normal depth calculations using Manning's equation

$Fb = 1 + 0.025Vd^{(1/3)}$ Supercritical; $0.5 + V^2/2g$ Subcritical



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Project Description

Friction Method

Solve For	Normal Depth
-----------	--------------

Input Data

Channel Slope	0.47	%
---------------	------	---

Discharge	2.00	ft ³ /s
-----------	------	--------------------

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.500
0+00.5	0.500
0+00.5	0.000
0+02.0	0.130
0+02.0	0.170
0+44.0	0.590
0+44.0	1.010
0+44.5	1.010

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.500)	(0+44.5, 1.010)	0.016

Options

Current Roughness weighted Improved Lotter's Method

Open Channel Weighting Method Improved Lotter's Method

Closed Channel Weighting Method	Horton's Method
$Q_{\text{peak}} = 0.000078 \left(\frac{A}{\text{mi}^2} \right)^{0.78} \left(\frac{L}{\text{mi}} \right)^{1.49} \left(\frac{P}{\text{in}} \right)^{1.49}$	$Q_{\text{peak}} = 0.000078 \left(\frac{A}{\text{mi}^2} \right)^{0.78} \left(\frac{L}{\text{mi}} \right)^{1.49} \left(\frac{P}{\text{in}} \right)^{1.49}$

Results

Normal Depth 0.32 ft

Elevation Range 0.00 to 1.01 ft

Flow Area	1.56	ft²
-----------	------	-----

Wetted Perimeter	17.16	ft
------------------	-------	----

Hydraulic Radius	0.09	ft
------------------	------	----

Worksheet for 4-4

Results

Top Width	16.79	ft
Normal Depth	0.32	ft
Critical Depth	0.30	ft
Critical Slope	0.00881	ft/ft
Velocity	1.29	ft/s
Velocity Head	0.03	ft
Specific Energy	0.35	ft
Froude Number	0.74	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.32	ft
Critical Depth	0.30	ft
Channel Slope	0.47	%
Critical Slope	0.00881	ft/ft

Messages

Notes

P-1

Cross Section for 4-4

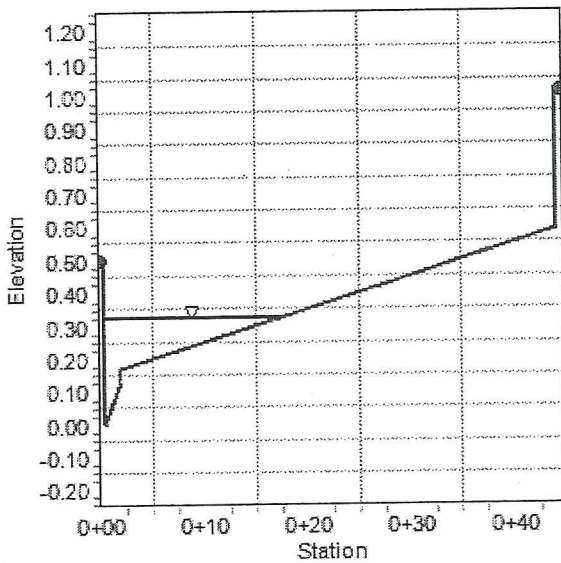
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope	0.47 %
Normal Depth	0.32 ft
Discharge	2.00 ft ³ /s

Cross Section Image



Worksheet for 5-5

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.67 %
Discharge 3.00 ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.500
0+00.5	0.500
0+00.5	0.000
0+02.0	0.130
0+02.0	0.170
0+44.0	0.800
0+44.0	1.220
0+44.5	1.220

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.500)	(0+44.5, 1.220)	0.016

Options

Current Roughness Weighted Method Improved Lotter's Method
Open Channel Weighting Method Improved Lotter's Method
Closed Channel Weighting Method Horton's Method

Results

Normal Depth 0.36 ft
Elevation Range 0.00 to 1.22 ft
Flow Area 1.68 ft²
Wetted Perimeter 14.74 ft
Hydraulic Radius 0.11 ft

Worksheet for 5-5

Results

Top Width	14.33	ft
Normal Depth	0.36	ft
Critical Depth	0.35	ft
Critical Slope	0.00800	ft/ft
Velocity	1.79	ft/s
Velocity Head	0.05	ft
Specific Energy	0.41	ft
Froude Number	0.92	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.36	ft
Critical Depth	0.35	ft
Channel Slope	0.67	%
Critical Slope	0.00800	ft/ft

Messages

Notes

P-1

Project Description

Manning Formula

Normal Depth

0.67 %

0.36 ft

3.00 ft³/s

Profile view graph showing Elevation (Y-axis, 0.00 to 1.40) versus Station (X-axis, 0+00 to 0+40). The graph displays a proposed profile (solid line) and an existing profile (dashed line). The vertical axis is Elevation (0.00 to 1.40) and the horizontal axis is Station (0+00 to 0+40). A vertical curve is shown between stations 0+00 and 0+10, with a grade change from -0.05 to 0.00. The existing profile is a straight line from (0+00, 0.40) to (0+40, 1.25). The proposed profile follows the existing profile until station 0+10, then rises to a peak of 1.25 at station 0+40.

Worksheet for 6-6

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.00 %
Discharge 0.50 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	84.410
0+04.0	80.950
0+09.0	81.390

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 84.410)	(0+09.0, 81.390)	0.025

Options

Current Roughness Weighted Method Improved Lotter's Method
Open Channel Weighting Method Improved Lotter's Method
Closed Channel Weighting Method Horton's Method

Results

Normal Depth 0.24 ft
Elevation Range 80.95 to 84.41 ft
Flow Area 0.36 ft²
Wetted Perimeter 3.08 ft
Hydraulic Radius 0.12 ft
Top Width 2.98 ft
Normal Depth 0.24 ft
Critical Depth 0.21 ft
Critical Slope 0.02021 ft/ft
Velocity 1.41 ft/s

Worksheet for 6-6

Results

Velocity Head	0.03	ft
Specific Energy	0.27	ft
Froude Number	0.72	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.24	ft
Critical Depth	0.21	ft
Channel Slope	1.00	%
Critical Slope	0.02021	ft/ft

Messages

Notes

P-1

Cross Section for 6-6

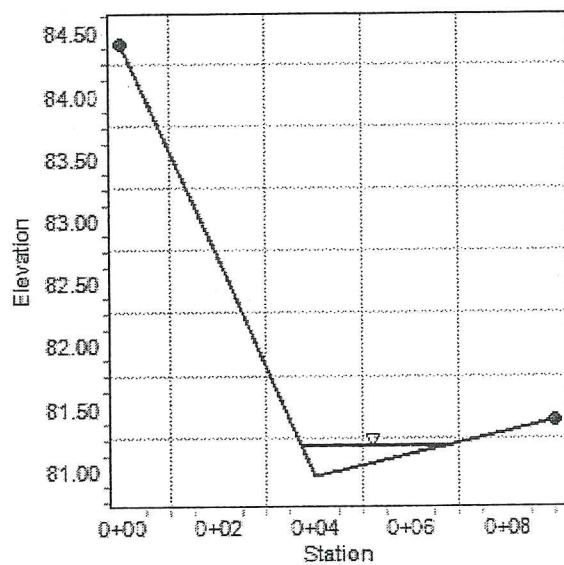
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.00 %
Normal Depth 0.24 ft
Discharge 0.50 ft³/s

Cross Section Image



Worksheet for 7-7 Washington Ave

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.40 %
Discharge 54.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.500
0+00.5	0.500
0+00.5	0.000
0+02.0	0.130
0+02.0	0.170
0+36.5	0.690
0+36.5	1.110
0+63.5	1.110
0+63.5	0.690
0+98.0	0.170
0+98.0	0.130
0+99.5	0.000
0+99.5	0.500
1+00.0	0.500

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.500)	(1+00.0, 0.500)	0.016

Options

Current Roughness Weighted Method Improved Lotter's Method
Open Channel Weighting Method Improved Lotter's Method
Closed Channel Weighting Method Horton's Method

Cross Section for 7-7 Washington Ave

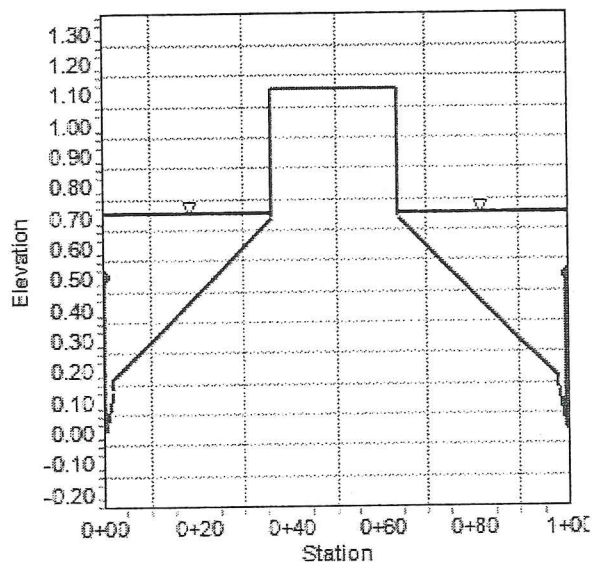
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.40 %
Normal Depth 0.71 ft
Discharge 54.00 ft³/s

Cross Section Image



Worksheet for 8-8

Results

Normal Depth	0.18	ft
Critical Depth	0.15	ft
Critical Slope	0.03117	ft/ft
Velocity	1.11	ft/s
Velocity Head	0.02	ft
Specific Energy	0.19	ft
Froude Number	0.66	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.18	ft
Critical Depth	0.15	ft
Channel Slope	1.30	%
Critical Slope	0.03117	ft/ft

Messages

Notes

P-1

Project Description

Manning Formula

Normal Depth

1.30 %

0.18 ft

4.00 ft³/s

Station	Elevation (ft)
0+00	84.00
0+25	81.00
0+50	80.80
0+75	80.60
1+00	80.80
1+25	81.30
1+50	81.50



ENGINEERS & SURVEYORS

Drop Inlet Sizing Calculation

Project Name: Washington Las Vegas Wash Park
By: Michelle Castell
Date: 5/30/2017

Grate Inlet Headwater Depth		
NDOT TYPE 2 FOR 15"SD		
Facility 1		
Known:		
Q=	Flow (cfs)	2
W=	Width of Grate (ft)	3.0
L=	Length of Grate (ft)	2.0
D=	Diameter of Circle (in)	
Cf=	Clogging Factor (%)	50
Weir Conditions:		
$H_w = (Q / (C_w * P))^{2/3}$		
Cw=	Weir Coefficient	3.0
P=	Perimeter of grate (ft)	10.0
Pc=	Perimeter (w/clogging) (ft)	5.0
Hw=	Headwater depth (ft)	0.26
Orifice Conditions:		
$H_w = (Q / (C_o * A_c))^2 / 2 * g$		
Co=	Orifice Coefficient	0.65
Ag=	Grate Area (ft ²)	6.0
Gf=	Grate Opening Factor	0.80
Ac=	Grate Open Area (w/ clogging) (ft ²)	2.4
Hw=	Headwater depth (ft)	0.03
Worst Case Scenario Occurs Under Weir Conditions		
Headwater Depth (ft) = 0.3		



ENGINEERS \ SURVEYORS

Drop Inlet Sizing Calculation

Project Name: Washington Las Vegas Wash Park
By: Michelle Castell
Date: 5/30/2017

Grate Inlet Headwater Depth		
NDOT TYPE 2 FOR 18"SD		
Facility 2		
Known:		
Q=	Flow (cfs)	4
W=	Width of Grate (ft)	3.0
L=	Length of Grate (ft)	2.0
D=	Diameter of Circle (in)	
Cf=	Clogging Factor (%)	50
Weir Conditions:		
$Hw=(Q/(Cw*P))^{2/3}$		
Cw=	Weir Coefficient	3.0
P=	Perimeter of grate (ft)	10.0
Pc=	Perimeter (w/clogging) (ft)	5.0
Hw=	Headwater depth (ft)	0.41
Orifice Conditions:		
$Hw=(Q/(Co*Ac))^2/2*g$		
Co=	Orifice Coefficient	0.65
Ag=	Grate Area (ft ²)	6.0
Gf=	Grate Opening Factor	0.80
Ac=	Grate Open Area (w/ clogging) (ft ²)	2.4
Hw=	Headwater depth (ft)	0.10
Worst Case Scenario Occurs Under Weir Conditions		
Headwater Depth (ft) = 0.4		



ENGINEERS & SURVEYORS

Drop Inlet Sizing Calculation

Project Name: Washington Las Vegas Wash Park
By: Michelle Castell
Date: 7/20/2017

Grate Inlet Headwater Depth		
NDOT TYPE 2 FOR 15"SD		
Facility 3		
Known:		
Q=	Flow (cfs)	0.5
W=	Width of Grate (ft)	3.0
L=	Length of Grate (ft)	2.0
D=	Diameter of Circle (in)	
Cf=	Clogging Factor (%)	50
Weir Conditions:		
$H_w = (Q / (C_w * P))^{2/3}$		
Cw=	Weir Coefficient	3.0
P=	Perimeter of grate (ft)	10.0
Pc=	Perimeter (w/clogging) (ft)	5.0
Hw=	Headwater depth (ft)	0.10
Orifice Conditions:		
$H_w = (Q / (C_o * A_c))^2 / 2 * g$		
Co=	Orifice Coefficient	0.65
Ag=	Grate Area (ft ²)	6.0
Gf=	Grate Opening Factor	0.80
Ac=	Grate Open Area (w/ clogging) (ft ²)	2.4
Hw=	Headwater depth (ft)	0.00
Worst Case Scenario Occurs Under Weir Conditions		
Headwater Depth (ft) = 0.1		



ENGINEERS \ SURVEYORS

Drop Inlet Sizing Calculation

Project Name: Washington Las Vegas Wash Park
 By: Michelle Castell
 Date: 5/30/2017

Grate Inlet Headwater Depth NDOT TYPE 2 FOR 18" SD Facility 4		
Known:		
Q=	Flow (cfs)	1
W=	Width of Grate (ft)	3.0
L=	Length of Grate (ft)	2.0
D=	Diameter of Circle (in)	
Cf=	Clogging Factor (%)	50
Weir Conditions:		
$Hw=(Q/(Cw*P))^{2/3}$		
Cw=	Weir Coefficient	3.0
P=	Perimeter of grate (ft)	10.0
Pc=	Perimeter (w/clogging) (ft)	5.0
Hw=	Headwater depth (ft)	0.16
Orifice Conditions:		
$Hw=(Q/(Co*Ac))^2/2*g$		
Co=	Orifice Coefficient	0.65
Ag=	Grate Area (ft ²)	6.0
Gf=	Grate Opening Factor	0.80
Ac=	Grate Open Area (w/ clogging) (ft ²)	2.4
Hw=	Headwater depth (ft)	0.01
Worst Case Scenario Occurs Under Weir Conditions		
Headwater Depth (ft) =		0.2



ENGINEERS & SURVEYORS

Drop Inlet Sizing Calculation

Project Name: _____ Washington Las Vegas Wash Park
By: _____ Michelle Castell
Date: _____ 5/30/2017

Grate Inlet Headwater Depth		
12" X 12" NDS SQUARE GRATE		
Facility 5		
Known:		
Q=	Flow (cfs)	1
W=	Width of Grate (ft)	1.0
L=	Length of Grate (ft)	1.0
D=	Diameter of Circle (in)	
Cf=	Clogging Factor (%)	50
Weir Conditions:		
$Hw = (Q / (Cw * P))^{2/3}$		
Cw=	Weir Coefficient	3.0
P=	Perimeter of grate (ft)	4.0
Pc=	Perimeter (w/clogging) (ft)	2.0
Hw=	Headwater depth (ft)	0.30
Orifice Conditions:		
$Hw = (Q / (Co * Ac))^2 / 2 * g$		
Co=	Orifice Coefficient	0.65
Ag=	Grate Area (ft ²)	1.0
Gf=	Grate Opening Factor	0.80
Ac=	Grate Open Area (w/ clogging) (ft ²)	0.4
Hw=	Headwater depth (ft)	0.23
Worst Case Scenario Occurs Under Weir Conditions		
Headwater Depth (ft) = 0.3		



ENGINEERS \ SURVEYORS

Drop Inlet Sizing Calculation

Project Name: Washington Las Vegas Wash Park
By: Michelle Castell
Date: 5/30/2017

Grate Inlet Headwater Depth		
NDOT TYPE 2 FOR 18" SD		
Facility 6		
Known:		
Q=	Flow (cfs)	3
W=	Width of Grate (ft)	3.0
L=	Length of Grate (ft)	2.0
D=	Diameter of Circle (in)	
Cf=	Clogging Factor (%)	50
Weir Conditions:		
$Hw=(Q/(Cw*P))^{2/3}$		
Cw=	Weir Coefficient	3.0
P=	Perimeter of grate (ft)	10.0
Pc=	Perimeter (w/clogging) (ft)	5.0
Hw=	Headwater depth (ft)	0.34
Orifice Conditions:		
$Hw=(Q/(Co*Ac))^2/2*g$		
Co=	Orifice Coefficient	0.65
Ag=	Grate Area (ft ²)	6.0
Gf=	Grate Opening Factor	0.80
Ac=	Grate Open Area (w/ clogging) (ft ²)	2.4
Hw=	Headwater depth (ft)	0.06
Worst Case Scenario Occurs Under Weir Conditions		
Headwater Depth (ft) = 0.3		



ENGINEERS & SURVEYORS

Drop Inlet Sizing Calculation

Project Name: Washington Las Vegas Wash Park
By: Michelle Castell
Date: 5/30/2017

Grate Inlet Headwater Depth		
NDOT TYPE 2 FOR 18" SD		
Facility 7		
Known:		
Q=	Flow (cfs)	2
W=	Width of Grate (ft)	3.0
L=	Length of Grate (ft)	2.0
D=	Diameter of Circle (in)	
Cf=	Clogging Factor (%)	50
Weir Conditions:		
$H_w = (Q / (C_w * P))^{2/3}$		
Cw=	Weir Coefficient	3.0
P=	Perimeter of grate (ft)	10.0
Pc=	Perimeter (w/clogging) (ft)	5.0
Hw=	Headwater depth (ft)	0.26
Orifice Conditions:		
$H_w = (Q / (C_o * A_c))^2 / 2 * g$		
Co=	Orifice Coefficient	0.65
Ag=	Grate Area (ft ²)	6.0
Gf=	Grate Opening Factor	0.80
Ac=	Grate Open Area (w/ clogging) (ft ²)	2.4
Hw=	Headwater depth (ft)	0.03
Worst Case Scenario Occurs Under Weir Conditions		
Headwater Depth (ft) = 0.3		

T1 WASHINGTON LAS VEGAS WASH PARK

T2 MAINLINE

T3 856-012

SO	1000.0001763.110	18			1773.460				
R	1064.2001763.510	18	.013			.000	66.000	1	
JX	1064.2001763.520	18	.013	4.000	1763.770	45.0			.000
R	1256.5001764.860	18	.013			.000	-68.000	1	
JX	1256.5001764.870	15	.013	1.000	1764.870	45.0			.000
R	1352.4001765.770	15	.013			.000	00.000	1	
JX	1352.4001765.780	15	.013	2.500	1765.780	45.0			.000
R	1406.9001772.760	15	.013			.000	00.000	1	
SH	1406.9001772.760	15							
CD	1 3 0	.000	4.000	8.000	.000	.000	.00		
CD	2 3 0	.000	5.000	6.000	.000	.000	.00		
CD	3 3 0	.000	5.000	8.000	.000	.000	.00		
CD	4 3 0	.000	5.000	9.000	.000	.000	.00		
CD	5 3 0	.000	5.000	10.000	.000	.000	.00		
CD	6 3 0	.000	5.000	12.000	.000	.000	.00		
CD	7 3 0	.000	5.000	14.000	.000	.000	.00		
CD	8 3 0	.000	5.000	16.000	.000	.000	.00		
CD	15 4		1.250						
CD	18 4		1.500						
CD	24 4		2.000						
CD	30 4		2.500						
CD	36 4		3.000						
CD	42 4		3.500						
CD	48 4		4.000						
CD	54 4		4.500						
CD	60 4		5.000						
CD	72 4		6.000						
Q		4.000	.0						

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	1763.110	10.350	1773.460	11.50	6.51	.66	1774.12	.00	1.29	.00	1.500	.000	.00	0 .0
64.200	.0062					.0120	.77	10.35	.00	1.50	.013	.00	.00	PIPE
1064.200	1763.510	10.896	1774.406	11.50	6.51	.66	1775.06	.00	1.29	.00	1.500	.000	.00	0 .0
JUNCT STR	.0000					.0085	.00	10.90	.00		.013	.00	.00	PIPE
1064.200	1763.520	11.641	1775.161	7.50	4.24	.28	1775.44	.00	1.06	.00	1.500	.000	.00	0 .0
192.300	.0070					.0051	.98	11.64	.00	1.07	.013	.00	.00	PIPE
1256.500	1764.860	11.358	1776.218	7.50	4.24	.28	1776.50	.00	1.06	.00	1.500	.000	.00	0 .0
JUNCT STR	.0000					.0076	.00	11.36	.00		.013	.00	.00	PIPE
1256.500	1764.870	11.295	1776.165	6.50	5.30	.44	1776.60	.00	1.03	.00	1.250	.000	.00	0 .0
95.900	.0094					.0101	.97	11.29	.00	1.07	.013	.00	.00	PIPE
1352.400	1765.770	11.387	1777.157	6.50	5.30	.44	1777.59	.00	1.03	.00	1.250	.000	.00	0 .0
JUNCT STR	.0000					.0070	.00	11.39	.00		.013	.00	.00	PIPE
1352.400	1765.780	11.919	1777.699	4.00	3.26	.16	1777.86	.00	.81	.00	1.250	.000	.00	0 .0
54.500	.1281					.0038	.21	11.92	.00	.35	.013	.00	.00	PIPE
1406.900	1772.760	5.156	1777.916	4.00	3.26	.16	1778.08	.00	.81	.00	1.250	.000	.00	0 .0

FILE: MAIN.WSW

MAIN.EDT
- EDIT LISTING - Version 14.10
Date: 7-14-2017 Time: 3:11:50
PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	WATER SURFACE HEIGHT 1 DIAMETER	W S P G W BASE WIDTH	PROFILE ZL	CHANNEL ZR	DEFINITION INV DROP	LISTING Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
00	1	3	0	.000	4.000	8.000	.000	.000	.00										
00	2	3	0	.000	5.000	6.000	.000	.000	.00										
00	3	3	0	.000	5.000	8.000	.000	.000	.00										
00	4	3	0	.000	5.000	9.000	.000	.000	.00										
00	5	3	0	.000	5.000	10.000	.000	.000	.00										
00	6	3	0	.000	5.000	12.000	.000	.000	.00										
00	7	3	0	.000	5.000	14.000	.000	.000	.00										
00	8	3	0	.000	5.000	16.000	.000	.000	.00										
00	15	4	0		1.250														
00	18	4	0		1.500														
00	24	4	0		2.000														
00	30	4	0		2.500														
00	36	4	0		3.000														
00	42	4	0		3.500														
00	48	4	0		4.000														
00	54	4	0		4.500														
00	60	4	0		5.000														
00	72	4	0		6.000														

W S P G W
WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
HEADING LINE NO 2 IS -
HEADING LINE NO 3 IS -

WASHINGTON LAS VEGAS WASH PARK
MAINLINE
856-012

PAGE NO 1

W S P G W
WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	1 IS A SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H
			1000.000	1763.110	18	1773.460				
ELEMENT NO 2	IS A REACH	U/S DATA	STATION	INVERT	SECT					
			1064.200	1763.510	18					
ELEMENT NO 3	IS A JUNCTION	U/S DATA	STATION	INVERT	SECT					
			1064.200	1763.520	18					
ELEMENT NO 4	IS A REACH	U/S DATA	STATION	INVERT	SECT					
			1256.500	1764.860	18					
ELEMENT NO 5	IS A JUNCTION	U/S DATA	STATION	INVERT	SECT					
			1256.500	1764.870	15					
ELEMENT NO 6	IS A REACH	U/S DATA	STATION	INVERT	SECT					
			1352.400	1765.770	15					
ELEMENT NO 7	IS A JUNCTION	U/S DATA	STATION	INVERT	SECT					
			1352.400	1765.780	15					
ELEMENT NO 8	IS A REACH	U/S DATA	STATION	INVERT	SECT					
			1406.900	1772.760	15					
ELEMENT NO 9	IS A SYSTEM HEADWORKS	U/S DATA	STATION	INVERT	SECT					
			1406.900	1772.760	15					

W S P G W
WATER SURFACE PROFILE - ELEMENT CARD LISTING

PAGE NO 2

PAGE NO 3

15WEST.WSW

0

T1 WASHINGTON LAS VEGAS WASH PARK

T2 MAINLINE

T3 856-012

SO	1000.0001765.780	15		1777.700				
R	1146.5001775.910	15	.013		.000	26.000	1	
R	1221.3001779.890	15	.013		.000	.000	1	
SH	1221.3001779.890	15						
CD	1 3 0	.000	4.000	8.000	.000	.000	.00	
CD	2 3 0	.000	5.000	6.000	.000	.000	.00	
CD	3 3 0	.000	5.000	8.000	.000	.000	.00	
CD	4 3 0	.000	5.000	9.000	.000	.000	.00	
CD	5 3 0	.000	5.000	10.000	.000	.000	.00	
CD	6 3 0	.000	5.000	12.000	.000	.000	.00	
CD	7 3 0	.000	5.000	14.000	.000	.000	.00	
CD	8 3 0	.000	5.000	16.000	.000	.000	.00	
CD	15 4		1.250					
CD	18 4		1.500					
CD	24 4		2.000					
CD	30 4		2.500					
CD	36 4		3.000					
CD	42 4		3.500					
CD	48 4		4.000					
CD	54 4		4.500					
CD	60 4		5.000					
CD	72 4		6.000					
Q		2.000	.0					

856-012														
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	1765.780	11.920	1777.700	2.00	1.63	.04	1777.74	.00	.56	.00	1.250	.000	.00	0 .0
146.500	.0691					.0010	.14	11.92	.00	.29	.013	.00	.00	PIPE
1146.500	1775.910	1.936	1777.846	2.00	1.63	.04	1777.89	.00	.56	.00	1.250	.000	.00	0 .0
13.135	.0532					.0009	.01	1.94	.00	.31	.013	.00	.00	PIPE
1159.635	1776.609	1.250	1777.859	2.00	1.63	.04	1777.90	.00	.56	.00	1.250	.000	.00	0 .0
2.117	.0532					.0009	.00	1.25	.00	.31	.013	.00	.00	PIPE
1161.752	1776.722	1.134	1777.856	2.00	1.71	.05	1777.90	.00	.56	.73	1.250	.000	.00	0 .0
1.213	.0532					.0009	.00	1.13	.24	.31	.013	.00	.00	PIPE
1162.965	1776.786	1.066	1777.852	2.00	1.79	.05	1777.90	.00	.56	.89	1.250	.000	.00	0 .0
.957	.0532					.0009	.00	1.07	.28	.31	.013	.00	.00	PIPE
1163.922	1776.837	1.011	1777.848	2.00	1.88	.05	1777.90	.00	.56	.98	1.250	.000	.00	0 .0
.834	.0532					.0010	.00	1.01	.32	.31	.013	.00	.00	PIPE
1164.756	1776.881	.962	1777.844	2.00	1.97	.06	1777.90	.00	.56	1.05	1.250	.000	.00	0 .0
.137	.0532					.0011	.00	.96	.35	.31	.013	.00	.00	PIPE
1164.893	1776.889	.918	1777.807	2.00	2.07	.07	1777.87	.00	.56	1.10	1.250	.000	.00	0 .0
HYDRAULIC JUMP														
1164.893	1776.889	.309	1777.198	2.00	8.46	1.11	1778.31	.00	.56	1.08	1.250	.000	.00	0 .0
11.139	.0532					.0526	.59	.31	3.18	.31	.013	.00	.00	PIPE
% FILE: 15WEST.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 2														

856-012															*****	
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip		
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch		
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****		
1176.032	1777.482	.310	1777.792	2.00	8.40	1.10	1778.89	.00	.56	1.08	1.250	.000	.00	0 .0		
20.206	.0532					.0488	.99	.31	3.15	.31	.013	.00	.00	PIPE		
1196.237	1778.557	.321	1778.878	2.00	8.01	1.00	1779.87	.00	.56	1.09	1.250	.000	.00	0 .0		
7.582	.0532					.0427	.32	.32	2.95	.31	.013	.00	.00	PIPE		
1203.819	1778.960	.332	1779.292	2.00	7.63	.91	1780.20	.00	.56	1.10	1.250	.000	.00	0 .0		
4.443	.0532					.0374	.17	.33	2.76	.31	.013	.00	.00	PIPE		
1208.263	1779.197	.344	1779.541	2.00	7.28	.82	1780.36	.00	.56	1.12	1.250	.000	.00	0 .0		
3.068	.0532					.0327	.10	.34	2.59	.31	.013	.00	.00	PIPE		
1211.331	1779.360	.356	1779.716	2.00	6.94	.75	1780.46	.00	.56	1.13	1.250	.000	.00	0 .0		
2.280	.0532					.0286	.07	.36	2.42	.31	.013	.00	.00	PIPE		
1213.611	1779.481	.368	1779.849	2.00	6.62	.68	1780.53	.00	.56	1.14	1.250	.000	.00	0 .0		
1.735	.0532					.0251	.04	.37	2.26	.31	.013	.00	.00	PIPE		
1215.346	1779.573	.381	1779.954	2.00	6.31	.62	1780.57	.00	.56	1.15	1.250	.000	.00	0 .0		
1.382	.0532					.0219	.03	.38	2.12	.31	.013	.00	.00	PIPE		
1216.728	1779.647	.394	1780.041	2.00	6.02	.56	1780.60	.00	.56	1.16	1.250	.000	.00	0 .0		
1.091	.0532					.0192	.02	.39	1.98	.31	.013	.00	.00	PIPE		
1217.819	1779.705	.408	1780.113	2.00	5.74	.51	1780.62	.00	.56	1.17	1.250	.000	.00	0 .0		
.865	.0532					.0168	.01	.41	1.85	.31	.013	.00	.00	PIPE		
U.S. B.G.W. - CIVIL DESIGN Version 14.08																
														PAGE		

856-012														
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
1218.684	1779.751	.423	1780.174	2.00	5.47	.46	1780.64	.00	.56	1.18	1.250	.000	.00	0 .0
.708	.0532				.0148	.01	.42	1.73	.31	.013	.00	.00	PIPE	

MAINLINE 856-012															*****	
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base wt or I.D.	ZL	No Wth Prs/Pip		
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch		

1000.000	1765.780	11.920	1777.700	2.00	1.63	.04	1777.74	.00	.56	.00	1.250	.000	.00	0 .0		
146.500	.0691					.0010	.14	11.92	.00	.29	.013	.00	.00	PIPE		
1146.500	1775.910	1.936	1777.846	2.00	1.63	.04	1777.89	.00	.56	.00	1.250	.000	.00	0 .0		
13.135	.0532					.0009	.01	1.94	.00	.31	.013	.00	.00	PIPE		
1159.635	1776.609	1.250	1777.859	2.00	1.63	.04	1777.90	.00	.56	.00	1.250	.000	.00	0 .0		
2.117	.0532					.0009	.00	1.25	.00	.31	.013	.00	.00	PIPE		
1161.752	1776.722	1.134	1777.856	2.00	1.71	.05	1777.90	.00	.56	.73	1.250	.000	.00	0 .0		
1.213	.0532					.0009	.00	1.13	.24	.31	.013	.00	.00	PIPE		
1162.965	1776.786	1.066	1777.852	2.00	1.79	.05	1777.90	.00	.56	.89	1.250	.000	.00	0 .0		
.957	.0532					.0009	.00	1.07	.28	.31	.013	.00	.00	PIPE		
1163.922	1776.837	1.011	1777.848	2.00	1.88	.05	1777.90	.00	.56	.98	1.250	.000	.00	0 .0		
.834	.0532					.0010	.00	1.01	.32	.31	.013	.00	.00	PIPE		
1164.756	1776.881	.962	1777.844	2.00	1.97	.06	1777.90	.00	.56	1.05	1.250	.000	.00	0 .0		
.137	.0532					.0011	.00	.96	.35	.31	.013	.00	.00	PIPE		
1164.893	1776.889	.918	1777.807	2.00	2.07	.07	1777.87	.00	.56	1.10	1.250	.000	.00	0 .0		
HYDRAULIC JUMP																
1164.893	1776.889	.309	1777.198	2.00	8.46	1.11	1778.31	.00	.56	1.08	1.250	.000	.00	0 .0		
11.139	.0532					.0526	.59	.31	3.18	.31	.013	.00	.00	PIPE		

§ FILE: 15WEST.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 2																

MAINLINE 856-012															*****	
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip		
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch		
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****		
1176.032	1777.482	.310	1777.792	2.00	8.40	1.10	1778.89	.00	.56	1.08	1.250	.000	.00	0 .0		
20.206	.0532					.0488	.99	.31	3.15	.31	.013	.00	.00	PIPE		
1196.237	1778.557	.321	1778.878	2.00	8.01	1.00	1779.87	.00	.56	1.09	1.250	.000	.00	0 .0		
7.582	.0532					.0427	.32	.32	2.95	.31	.013	.00	.00	PIPE		
1203.819	1778.960	.332	1779.292	2.00	7.63	.91	1780.20	.00	.56	1.10	1.250	.000	.00	0 .0		
4.443	.0532					.0374	.17	.33	2.76	.31	.013	.00	.00	PIPE		
1208.263	1779.197	.344	1779.541	2.00	7.28	.82	1780.36	.00	.56	1.12	1.250	.000	.00	0 .0		
3.068	.0532					.0327	.10	.34	2.59	.31	.013	.00	.00	PIPE		
1211.331	1779.360	.356	1779.716	2.00	6.94	.75	1780.46	.00	.56	1.13	1.250	.000	.00	0 .0		
2.280	.0532					.0286	.07	.36	2.42	.31	.013	.00	.00	PIPE		
1213.611	1779.481	.368	1779.849	2.00	6.62	.68	1780.53	.00	.56	1.14	1.250	.000	.00	0 .0		
1.735	.0532					.0251	.04	.37	2.26	.31	.013	.00	.00	PIPE		
1215.346	1779.573	.381	1779.954	2.00	6.31	.62	1780.57	.00	.56	1.15	1.250	.000	.00	0 .0		
1.382	.0532					.0219	.03	.38	2.12	.31	.013	.00	.00	PIPE		
1216.728	1779.647	.394	1780.041	2.00	6.02	.56	1780.60	.00	.56	1.16	1.250	.000	.00	0 .0		
1.091	.0532					.0192	.02	.39	1.98	.31	.013	.00	.00	PIPE		
1217.819	1779.705	.408	1780.113	2.00	5.74	.51	1780.62	.00	.56	1.17	1.250	.000	.00	0 .0		
.865	.0532					.0168	.01	.41	1.85	.31	.013	.00	.00	PIPE		
W S P G W - CIVILDESIGN Version 14.08																
														PAGE		

MAINLINE 856-012														
station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1218.684	1779.751	.423	1780.174	2.00	5.47	.46	1780.64	.00	.56	1.18	1.250	.000	.00	0 .0
.708	.0532					.0148	.01	.42	1.73	.31	.013	.00	.00	PIPE

15WEST.OUT														
1219.392	1779.789	.438	1780.227	2.00	5.21	.42	1780.65	.00	.56	1.19	1.250	.000	.00	0 .0
.581	.0532	-	-	-	-	.0129	.01	.44	1.62	.31	.013	.00	.00	PIPE
1219.973	1779.820	.453	1780.273	2.00	4.97	.38	1780.66	.00	.56	1.20	1.250	.000	.00	0 .0
.427	.0532	-	-	-	-	.0113	.00	.45	1.51	.31	.013	.00	.00	PIPE
1220.400	1779.842	.470	1780.312	2.00	4.74	.35	1780.66	.00	.56	1.21	1.250	.000	.00	0 .0
.364	.0532	-	-	-	-	.0099	.00	.47	1.42	.31	.013	.00	.00	PIPE
1220.764	1779.862	.486	1780.348	2.00	4.52	.32	1780.66	.00	.56	1.22	1.250	.000	.00	0 .0
.244	.0532	-	-	-	-	.0087	.00	.49	1.32	.31	.013	.00	.00	PIPE
1221.007	1779.875	.504	1780.379	2.00	4.31	.29	1780.67	.00	.56	1.23	1.250	.000	.00	0 .0
.158	.0532	-	-	-	-	.0077	.00	.50	1.23	.31	.013	.00	.00	PIPE
1221.166	1779.883	.523	1780.406	2.00	4.11	.26	1780.67	.00	.56	1.23	1.250	.000	.00	0 .0
.104	.0532	-	-	-	-	.0067	.00	.52	1.15	.31	.013	.00	.00	PIPE
1221.270	1779.888	.542	1780.431	2.00	3.92	.24	1780.67	.00	.56	1.24	1.250	.000	.00	0 .0
.030	.0532	-	-	-	-	.0059	.00	.54	1.08	.31	.013	.00	.00	PIPE
1221.300	1779.890	.563	1780.453	2.00	3.73	.22	1780.67	.00	.56	1.24	1.250	.000	.00	0 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

15EAST.WSW

T1 WASHINGTON LAS VEGAS WASH PARK

0

T2 MAINLINE

T3 856-012

SO 1000.0001763.770 15

1774.410

R 1141.1001769.410 15 .013

.000 .000 1

SH 1141.1001769.410 15

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CD	2	3	0	.000	5.000	6.000	.000	.000	.00
CD	3	3	0	.000	5.000	8.000	.000	.000	.00
CD	4	3	0	.000	5.000	9.000	.000	.000	.00
CD	5	3	0	.000	5.000	10.000	.000	.000	.00
CD	6	3	0	.000	5.000	12.000	.000	.000	.00
CD	7	3	0	.000	5.000	14.000	.000	.000	.00
CD	8	3	0	.000	5.000	16.000	.000	.000	.00
CD	15	4			1.250				
CD	18	4			1.500				
CD	24	4			2.000				
CD	30	4			2.500				
CD	36	4			3.000				
CD	42	4			3.500				
CD	48	4			4.000				
CD	54	4			4.500				
CD	60	4			5.000				
CD	72	4			6.000				
Q				1.000	.0				

FILE: 15EAST.WSW 15EAST.EDT
W S P G W - EDIT LISTING - Version 14.10 Date: 7-14-2017 Time: 4: 1: 4
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING
PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
00	1	3	0	.000	4.000	8.000	.000	.000	.00										
00	2	3	0	.000	5.000	6.000	.000	.000	.00										
00	3	3	0	.000	5.000	8.000	.000	.000	.00										
00	4	3	0	.000	5.000	9.000	.000	.000	.00										
00	5	3	0	.000	5.000	10.000	.000	.000	.00										
00	6	3	0	.000	5.000	12.000	.000	.000	.00										
00	7	3	0	.000	5.000	14.000	.000	.000	.00										
00	8	3	0	.000	5.000	16.000	.000	.000	.00										
00	15	4	0		1.250														
00	18	4	0		1.500														
00	24	4	0		2.000														
00	30	4	0		2.500														
00	36	4	0		3.000														
00	42	4	0		3.500														
00	48	4	0		4.000														
00	54	4	0		4.500														
00	60	4	0		5.000														
00	72	4	0		6.000														

W S P G W
WATER SURFACE PROFILE - TITLE CARD LISTING

PAGE NO 1

HEADING LINE NO 1 IS -

WASHINGTON LAS VEGAS WASH PARK

0

HEADING LINE NO 2 IS -

MAINLINE

HEADING LINE NO 3 IS -

856-012

W S P G W
WATER SURFACE PROFILE - ELEMENT CARD LISTING

PAGE NO 2

ELEMENT NO	1 IS A SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H
			1000.000	1763.770	15	1774.410				
ELEMENT NO	2 IS A REACH	U/S DATA	STATION	INVERT	SECT					
			1141.100	1769.410	15					
ELEMENT NO	3 IS A SYSTEM HEADWORKS	U/S DATA	STATION	INVERT	SECT	W S ELEV				
			1141.100	1769.410	15	.000				

FILE: 15EAST.WSW

15EAST.OUT
 W S P G W - CIVILDESIGN Version 14.08
 Program Package Serial Number: 3074
 WATER SURFACE PROFILE LISTING
 WASHINGTON LAS VEGAS WASH PARK
 MAINLINE
 856-012

PAGE 1
 Date: 7-14-2017 Time: 4: 1: 8

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	1763.770	10.640	1774.410	1.00	.81	.01	1774.42	.00	.39	.00	1.250	.000	.00	0 .0
141.100	.0400					.0002	.03	10.64	.00	.24	.013	.00	.00	PIPE
1141.100	1769.410	5.034	1774.444	1.00	.81	.01	1774.45	.00	.39	.00	1.250	.000	.00	0 .0

18EAST.WSW

0

T1 WASHINGTON LAS VEGAS WASH PARK

T2 18EAST.WSW

T3 856-012

S0 1000.0001768.230 18

1771.980

R 1025.6001770.790 18 .013

.000 .000 1

SH 1025.6001770.790 18

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CD	3	3	0	.000	5.000	8.000	.000	.000	.00
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CD	5	3	0	.000	5.000	10.000	.000	.000	.00
CD	6	3	0	.000	5.000	12.000	.000	.000	.00
CD	7	3	0	.000	5.000	14.000	.000	.000	.00
CD	8	3	0	.000	5.000	16.000	.000	.000	.00
CD	15	4			1.250				
CD	18	4			1.500				
CD	24	4			2.000				
CD	30	4			2.500				
CD	36	4			3.000				
CD	42	4			3.500				
CD	48	4			4.000				
CD	54	4			4.500				
CD	60	4			5.000				
CD	72	4			6.000				
Q				2.000	.0				

FILE: 18EAST.WSW 18EAST.EDT - EDIT LISTING - Version 14.10 Date: 5-31-2017 Time: 1:52:38
 WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING
 CARD SECT CHN NO OF AVE PIER HEIGHT 1 BASE ZL ZR INV Y(1) Y(2) Y(3) Y(4) Y(5) Y(6) Y(7) Y(8) Y(9) Y(10)
 CODE NO TYPE PIER/PIP WIDTH DIAMETER WIDTH DROP

00	1	3	0	.000	4.000	8.000	.000	.000	.00
00	2	3	0	.000	5.000	6.000	.000	.000	.00
00	3	3	0	.000	5.000	8.000	.000	.000	.00
00	4	3	0	.000	5.000	9.000	.000	.000	.00
00	5	3	0	.000	5.000	10.000	.000	.000	.00
00	6	3	0	.000	5.000	12.000	.000	.000	.00
00	7	3	0	.000	5.000	14.000	.000	.000	.00
00	8	3	0	.000	5.000	16.000	.000	.000	.00
00	15	4	0		1.250				
00	18	4	0		1.500				
00	24	4	0		2.000				
00	30	4	0		2.500				
00	36	4	0		3.000				
00	42	4	0		3.500				
00	48	4	0		4.000				
00	54	4	0		4.500				
00	60	4	0		5.000				
00	72	4	0		6.000				

PAGE NO 1

HEADING LINE NO 1 IS - WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 2 IS - WASHINGTON LAS VEGAS WASH PARK

HEADING LINE NO 3 IS - 18EAST.WSW

856-012

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	1 IS A	SYSTEM OUTLET	STATION	INVERT	SECT	W S ELEV	RADIUS	ANGLE	ANG PT	MAN H
	U/S DATA		1000.000	1768.230	18	1771.980				
ELEMENT NO	2 IS A	REACH	STATION	INVERT	SECT					
	U/S DATA		1025.600	1770.790	18					
ELEMENT NO	3 IS A	SYSTEM HEADWORKS	STATION	INVERT	SECT	W S ELEV				
	U/S DATA		1025.600	1770.790	18	.000				

FILE: 18EAST.WSW

18EAST.OUT
W S P G W - CIVILDESIGN Version 14.08
Program Package Serial Number: 3074
WATER SURFACE PROFILE LISTING

PAGE 1

Date: 5-31-2017 Time: 1:52:44

WASHINGTON LAS VEGAS WASH PARK
18EAST.WSW
856-012

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	1768.230	3.750	1771.980	2.00	1.13	.02	1772.00	.00	.53	.00	1.500	.000	.00	0 .0
22.590	.1000					.0004	.01	3.75	.00	.25	.013	.00	.00	PIPE
1022.590	1770.489	1.500	1771.989	2.00	1.13	.02	1772.01	.00	.53	.00	1.500	.000	.00	0 .0
1.374	.1000					.0003	.00	1.50	.00	.25	.013	.00	.00	PIPE
1023.964	1770.626	1.360	1771.986	2.00	1.19	.02	1772.01	.00	.53	.87	1.500	.000	.00	0 .0
.781	.1000					.0003	.00	1.36	.15	.25	.013	.00	.00	PIPE
1024.745	1770.704	1.280	1771.985	2.00	1.24	.02	1772.01	.00	.53	1.06	1.500	.000	.00	0 .0
.648	.1000					.0004	.00	1.28	.18	.25	.013	.00	.00	PIPE
1025.393	1770.769	1.213	1771.982	2.00	1.31	.03	1772.01	.00	.53	1.18	1.500	.000	.00	0 .0
.207	.1000					.0004	.00	1.21	.20	.25	.013	.00	.00	PIPE
1025.600	1770.790	1.192	1771.982	2.00	1.33	.03	1772.01	.00	.53	1.21	1.500	.000	.00	0 .0

APPENDIX C

Reference Materials

2016
N29
\$250

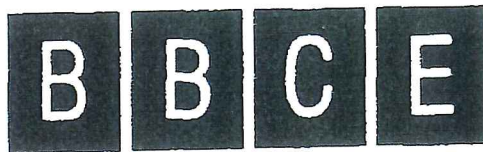
Diane Phomvannh
CORPUS
FEMA A ZONE
WID

FEBRUARY 1997

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CLV PUBLIC WORKS
FLOOD CONTROL



BRECHLER & BELL CONSULTING ENGINEERS, INC.
19 West Brooks Avenue, Suite C
North Las Vegas, Nevada 89030
(702) 642-5362

TECHNICAL DRAINAGE STUDY

FOR

WASHINGTON AND LAMB

FOR

PACESETTER/DASCO

JOB NO. 96852

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM TO: Diane Phomninh, P.E. Land Development Services Department of Public Works		DATE: August 5, 1997 FROM: Dennis W. Stransky, P.E. Flood Control Project Manager Department of Public Works
SUBJECT: Drainage Study for "Pacesetter" @ Washington and Lamb FILE NO. L:\DEPOT\DS\DS2016D.ZNA		COPIES TO: Brechler & Bell C. E., Inc. Pacesetter/Dasco John McNellis, P. E. CCRFCD
FEMA Flood Zone	YES X No	
Proposed Storm Drain	YES X No	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES
1st Submittal	02/18/97	03/03/97	Not Acceptable	\$250.00
2nd Submittal	03/27/97	04/01/97	Not Acceptable	\$250.00
3rd Submittal	04/23/97	05/02/97	Acceptable	\$250.00
CCRFCD	08/04/97	08/05/97	See Below Comments	N/C
TOTAL FEES:				\$750.00

REMARKS:

The Drainage Study for the subject project has been reviewed and:

X	is acceptable in concept subject to conformance to all City standards.
	must be resubmitted or supplemented including the following:
	must have Clark County Regional Flood Control District concurrence and the following conditions:

- The project is located in a FEMA Zone AE. Per CCRFCD and CLV criteria, the minimum finish floor elevation (FFE) for each building must be 18 inches over the highest adjacent Base Flood Elevation (BFE). BFEs along Washington Avenue appear acceptable for the whole site. FFEs for Lot-2 and Lot-3 must therefore be set, based on these BFEs, at **86.03** (84.53+1.50) and **83.15** (81.65+1.50) respectively.
- The FFE for Lot 4 must be **88.63** [(88.13+0.50) > (1.50+86.82)].
- The 20' overflow easement must be granted as 20-foot Public Drainage Easement to be Privately Maintained prior to receiving a grading permit for Lot 3.
- A technical update to this study will be required for each parcel as they develop.

NOTE: FEMA Elevation Certificates, showing as-built finish floor elevations, must be completed for each building in a FEMA Zone A. The certificate must be submitted to the City of Las Vegas Flood Control Section prior to scheduling a framing inspection. The Engineer is to provide an address for each building within this FEMA Zone A prior to obtaining a grading permit. This information is necessary to insure that the elevation certificates are provided for each address prior to completion of construction. The City recommends that the developer apply for a LOMR, using the approved drainage study as technical support, to remove the site or individual structures from the SFHA Zone A. Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Amendment

and accepted by the City of Las Vegas Flood Control Section. Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the City of Las Vegas reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction.

PLANS SENT TO LAND DEVELOPMENT yes (Initial)

END OF REMARKS

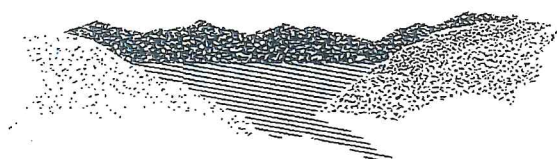
ssn

T/R/S: 20S/62E/29

AREA N-29

2016
W29
N/C

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT



RECEIVED

AUG 4 1997

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

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July 31, 1997

Mr. Randy Fultz
City of Las Vegas
Department of Public Works
400 East Stewart
Las Vegas, NV 89101

DISTRICT CONCURRENCE: PACESETTER / DASCO

Dear Mr. Fultz:

The District has reviewed the Technical Drainage Study dated February 17, 1997; Addendum No. 1 dated March 26, 1997; and Addendum No. 2 dated April 23, 1997, for the above captioned project as submitted by Brechler & Bell Consulting Engineers, Inc. In addition the District is in receipt of the Conditional Letter of Acceptance from the City of Las Vegas Department of Public Works dated May 6, 1997.

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

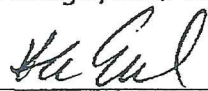
As noted in the study the site resides in a Special Flood Hazard Area (SFHA) designated as "Zone AE" per the effective Flood Insurance Rate Map (FIRM). Therefore the consultant shall be advised that this acceptance does not serve to amend the FIRM or remove the SFHA designation.

The District's review of this project was limited to issues of Regional Flood Control Significance as defined in the Uniform Regulations for the Control of Drainage.

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

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

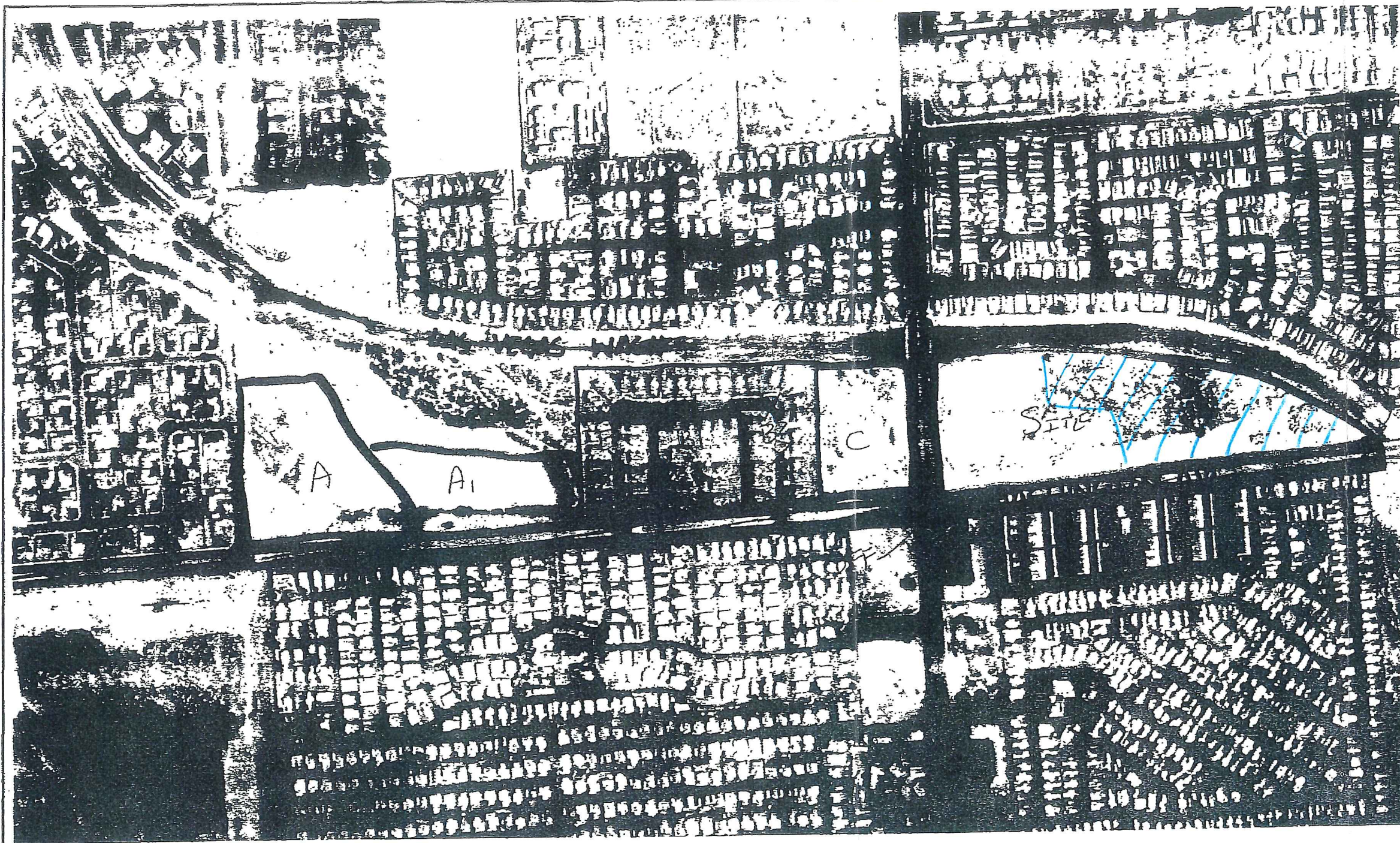
BY:


Kevin L. Eubanks, P.E.
Assistant General Manager

cc: Brechler & Bell Consulting Engineers, Inc.

KLE:JHH:mak

FILE: 20-62-29.BBC



DRAINAGE MAP SUPPORTS CLV CNFCMP FOR OBTAINING FLOW RATE IN WASHINGTON

BASIN	Q-10	Q-100
A	5	9
A1	4	7
B	2	4
B1	2	3
B2	1	2
C	4	7

BASIN	Q-10	Q-100
SITE	11	21
WASH	8	14
LAMB	1	2
WASH2	5	10

NODE	Q-10	Q-100
SUM1	5	11
SUM2	6	12
SUM3	8	15
SUM4	8	16
SUM5	17	25

NODE	Q-10	Q-100
WASH1	20	37
OFF	12	16
TOTAL	26	44

UTILIZE CLV CNFCMP
FLOW RATE FOR
CONSERVATIVE PURPOSES.

JOB TITLE: PACESETTER	BRECHLER & BELL CONSULTING ENGINEERS, INC. 19 WEST BROOKS AVENUE, SUITE C NORTH LAS VEGAS, NV 89030 (702) 642-5362	CIVIL ENGINEERING LAND SURVEYING	BBCE	REVISIONS
SHEET TITLE: PROPOSED DRAINAGE BASINS	DATE 3/14/97			
	DRAWN CPB			
	SCALE 1"=400'			
	JOB NO. 96852			
	SHEET A-36			

HWVersion: 6.20 Data File: prop.hcl

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*****
*                                     *
*      FLOOD HYDROGRAPH PACKAGE (HEC-1)      *
*      SEPTEMBER 1990                          *
*      VERSION 4.0                             *
*
* RUN DATE 04/07/1997  TIME  21:22:12
*
*****

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

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

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.....
::: Full Microcomputer Implementation :::
::: by :::
::: Naestad Methods, Inc. :::
.....

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37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HECIGS, HECIDB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RYTOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -ANXK- ON MH-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

1 ID PACKSETTER/DASCO
 2 ID OFFSITE FLOWS
 3 ID HECX PROJECT NO. 96852
 4 ID
 5 ID RATIO 1 IS THE 10 YEAR STORM, RATIO 2 IS THE 100-YEAR STORM
 6 ID FB IS 2.77 (100 YEAR STORM) ± 0.98 (.53 SQ MILE DRY)
 7 ID

8 IF 5 0 0 200 0 0 0 0

9 IO 4 0 0

10 IN 5 0 0

11 IR PREC 0.57 1.00

DIAGRAM

12 KK WASH
 13 BA .009
 14 PB 2.77
 15 PC 0 2 5.7 7 8.7 10.8 12.4 13 13 13
 16 PC 13 13 13 13.3 14 14.2 14.8 15.8 17.2 18.1
 17 PC 19 19.7 19.9 20 20.1 20.4 21.4 22.9 24.1 24.9
 18 PC 25.1 25.6 27 27.8 28.1 28.3 29.5 32.2 35.2 40.9
 19 PC 49.9 59 71 74.4 78.1 81.2 81.9 83.5 85.1 85.6
 20 PC 86 86.8 87.6 88.8 91 92.6 93.7 95 97 97.6
 21 PC 98.2 98.5 98.7 98.9 99 99.3 99.3 99.4 99.5 99.8
 22 PC 99.8 99.9 100
 23 LS 0 98 100
 24 UD 0.22

25 KK A
 26 BA 0.009
 27 LS 0 61 65
 28 UD 0.156

29 KK ROUTED ROUTED BASIN A THROUGH WASHINGTON
 30 KK 640 0.005 0.16 TRAP 100

31 KK A1
 32 BA 0.007
 33 LS 0 61 65
 34 UD 0.150

35 KK SUM1 SUM OF A, A1
 36 EC 2

37 KK ROUTED ROUTED SUM1
 38 KK 160 0.005 0.016 TRAP 100

39 KK B
 40 BA 0.004
 41 LS 0 61 49
 42 UD 0.120

LINE	ID	1	2	3	4	5	6	7	8	9	10
43	KK	SUM2									
44	HC	2									
45	KK	ROUTE2									
46	RK	300	0.005	0.016		TRAP	100				
47	KK	B1									
48	BA	0.003									
49	LS	0	61	49							
50	UD	0.120									
51	KK	SUM3									
52	HC	2									
53	KK	ROUTE3									
54	RK	300	0.005	0.016		TRAP	100	0			
55	KK	B2									
56	BA	0.002									
57	LS	0	61	49							
58	UD	0.160									
59	KK	SUM4									
60	HC	2									
61	KK	ROUTE4									
62	RK	530	0.005	0.016		TRAP	100				
63	KK	C									
64	BA	0.007									
65	LS	0	61	65							
66	UD	0.139									
67	KK	WASH1									
68	HC	3									
69	KK	wash1r									
70	DT	washd									
71	DI	0	20	37	50						
72	DQ	0	8.299	14.888	19.818						
73	KK	LAMB									
74	BA	0.001									
75	LS	0	98	100							
76	UD	0.10									
77	KK	lanbr									
78	DT	lanbd									
79	DI	0	1	2	5						
80	DQ	0	0.518	1.069	2.776						

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

81	KK	OFF								
82	EC	2								
83	KK	ROUTES								
84	KK	1750	.005	.016	TRAP	100				
85	KK	WBSZ								
86	BA	.006								
87	LS	0	98	100						
88	UD	0.22								
89	KK	SUM5								
90	EC	2								
91	KK	SITE								
92	BA	.022								
93	LS	0	61	49						
94	UD	.175								
95	KK	TOTAL								
96	EC	2								
97	ZZ									

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT
LINE (V) ROUTING (→) DIVERSION OR PUMP FLOW
NO. (.) CONNECTOR (←) RETURN OF DIVERTED OR PUMPED FLOW

```

12  WASH
25  .      A
    .      V
29  .      ROUTE0
31  .      .      A1
    .      .
35  .      SUM1.....
    .      V
37  .      ROUTE1
39  .      .      B
    .      .
43  .      SUM2.....
    .      V
45  .      ROUTE2
47  .      .      B1
    .      .
51  .      SUM3.....
    .      V
53  .      ROUTE3
55  .      .      B2
    .      .
59  .      SUM4.....
    .      V
61  .      ROUTE4
63  .      .      C
    .      .
67  WASH1.....
    .
70  .-----> washd
69  washlr
    .
73  .      LAMB
    .      .
78  .      .-----> lambd
77  .      lambr
    .
81  OFF.....
    V
83  ROUTE5
    .
85  .      WASH2
    .
89  SUM5.....
    .
91  .      SITE
    .
95  TOTAL.....
  
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

HEC1 S/N: HWversion: 6.20 Data File: papp.hcl

*
* FLOOD HYDROGRAPH PACKAGE (HRC-1) *
* SEPTEMBER 1990 *
* VERSION 4.0 *
*
* RUN DATE 04/07/1997 TIME 21:22:12 *
*

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

PACESITTER/DASCO
OFFSITE FLOWS
EBCE PROJECT NO. 96852

RATIO 1 IS THE 10 YEAR STORM, RATIO 2 IS THE 100-YEAR STORM
PB IS 2.77 (100 YEAR STORM) + 0.98 (.53 SQ MILE DRP)

9 IO OUTPUT CONTROL VARIABLES

IPRNT 4 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

MIN 5 MINUTES IN COMPUTATION INTERVAL
IDATE 1 0 STARTING DATE
ITIME 0000 STARTING TIME
NQ 200 NUMBER OF HYDROGRAPH ORDINATES
ENDATE 1 0 ENDING DATE
ENDTIME 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-FOOT
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION

NIPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION

RATIOS OF PRECIPITATION
.57 1.00

*** **

*
12 KK * WASH *
*

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

SUBBASIN RUNOFF DATA

13 BA SUBBASIN CHARACTERISTICS
TAREA .01 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 2.77 BASIN TOTAL PRECIPITATION

15 PT INCREMENTAL PRECIPITATION PATTERN

2.00	3.70	1.30	1.70	2.10	1.60	.60	.00	.00	.00
.00	.00	.30	.70	.20	.60	1.00	1.40	.90	.90
.70	.20	.10	.10	.30	1.00	1.50	1.20	.80	.20
.50	1.40	.80	.30	.20	1.20	2.70	3.00	5.70	9.00
9.10	12.00	3.40	3.70	3.10	.70	1.60	1.60	.50	.40
.80	.80	1.20	2.20	1.60	1.10	1.30	2.00	.60	.60
.30	.20	.20	.10	.30	.00	.10	.10	.30	.00
.10	.10								

23 LS SCS LOSS RATE
STRTL .04 INITIAL ABSTRACTION
CNUMBER 98.00 CURVE NUMBER
RTIMP 100.00 PERCENT IMPERVIOUS AREA

24 UD SCS DIMENSIONLESS UNITGRAPH
FLAG .22 LAG

UNIT HYDROGRAPH 15 END-OF-PERIOD ORDINATES

4.	12.	17.	15.	9.	5.	3.	2.	1.	1.
0.	0.	0.	0.	0.					

*** **

*
25 KK * A *
*

SUBBASIN RUNOFF DATA

26 BA

SUBBASIN CHARACTERISTICS

TAREA

.01 SUBBASIN AREA

PRECIPITATION DATA

14 PB

SUM

2.77 BASIN TOTAL PRECIPITATION

15 PI

INCREMENTAL PRECIPITATION PATTERN

2.00	3.70	1.30	1.70	2.10	1.60	.60	.00	.00	.00
.00	.00	.30	.70	.20	.60	1.00	1.40	.90	.90
.70	.20	.10	.10	.30	1.00	1.50	1.20	.80	.20
.50	1.40	.80	.30	.20	1.20	2.70	3.00	5.70	9.00
9.10	12.00	3.40	3.70	3.10	.70	1.60	1.60	.50	.40
.80	.80	1.20	2.20	1.60	1.30	1.30	2.80	.60	.60
.30	.20	.20	.10	.30	.00	.10	.10	.30	.00
.10	.10								

27 LS

SCS LOSS RATE

STPL

1.28 INITIAL ABSTRACTION

CN2BR

61.00 CURVE NUMBER

RTIMP

65.00 PERCENT IMPERVIOUS AREA

28 UD

SCS DIMENSIONLESS UNITGRAPH

TLAC

.16 LAG

UNIT HYDROGRAPH

11 END-OF-PERIOD ORDINATES

8.	21.	20.	11.	5.	3.	1.	1.	0.	0.
0.									

*** ***

29 KK

* *
* ROUTE *
* *

ROUTED BASIN A THROUGH WASHINGTON

HYDROGRAPH ROUTING DATA

30 KK

KINEMATIC WAVE STREAM ROUTING

L	640.	CHANNEL LENGTH
S	.0050	SLOPE
N	.160	CHANNEL ROUGHNESS COEFFICIENT
CA	.00	CONTRIBUTING AREA
SHAPE	TRAP	CHANNEL SHAPE
WD	100.00	BOTTOM WIDTH OR DIAMETER
Z	.00	SIDE SLOPE
NDXMIN	2	MINIMUM NUMBER OF DI INTERVALS

*** **

* *
31 KK * A1 *
* *

SUBBASIN RUNOFF DATA

32 BA SUBBASIN CHARACTERISTICS
TARZA .01 SUBBASIN AREA

PRECIPITATION DATA

14 FB STORM 2.77 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

2.00	3.70	1.30	1.70	2.10	1.60	.60	.00	.00	.00
.00	.00	.30	.70	.20	.60	1.00	1.40	.90	.90
.70	.20	.10	.10	.30	1.00	1.50	1.20	.80	.20
.50	1.40	.80	.30	.20	1.20	2.70	3.00	5.70	9.00
9.10	12.00	3.40	3.70	3.10	.70	1.60	1.60	.50	.40
.80	.80	1.20	2.20	1.60	1.10	1.30	2.00	.60	.60
.30	.20	.20	.10	.30	.00	.10	.10	.30	.00
.10	.10								

33 LS SCS LOSS RATE
STRTL 1.28 INITIAL ABSTRACTION
CRVMBR 61.00 CURVE NUMBER
RTIMP 65.00 PERCENT IMPERVIOUS AREA

34 UD SCS DIMENSIONLESS UNITGRAPH
TLAG .15 LAG

UNIT HYDROGRAPH
11 END-OF-PERIOD ORDINATES

7.	17.	15.	8.	4.	2.	1.	0.	0.	0.
0.									

*** **

* *
35 KK * SUM1 * SUM OF A, A1
* *

36 HC HYDROGRAPH COMBINATION
ICONP 2 NUMBER OF HYDROGRAPHS TO COMBINE

*** ***

 * *
 37 KK * ROUTE1 * ROUTED SURF
 * *

HYDROGRAPH ROUTING DATA

38 KK KINEMATIC WAVE STREAM ROUTING
 L 160. CHANNEL LENGTH
 S .0050 SLOPE
 N .016 CHANNEL ROUGHNESS COEFFICIENT
 CA .00 CONTRIBUTING AREA
 SHAPE TRAP CHANNEL SHAPE
 WD 100.00 BOTTOM WIDTH OR DIAMETER
 Z .00 SIDE SLOPE
 NDMIN 2 MINIMUM NUMBER OF DX INTERVALS

*** ***

 * *
 39 KK * B *
 * *

SUBBASIN RUNOFF DATA

40 BA SUBBASIN CHARACTERISTICS
 TAREA .00 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 2.77 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

2.00	3.70	1.30	1.70	2.10	1.60	.60	.00	.00	.00
.00	.00	.30	.70	.20	.60	1.00	1.40	.90	.90
.70	.20	.10	.10	.30	1.00	1.50	1.20	.80	.20
.50	1.40	.80	.30	.20	1.20	2.70	3.00	5.70	9.00
9.10	12.00	3.40	3.70	3.10	.70	1.60	1.60	.50	.40
.80	.80	1.20	2.20	1.60	1.10	1.30	2.00	.60	.60
.30	.20	.20	.10	.30	.00	.10	.10	.30	.00
.10	.10								

41 LS SCS LOSS RATE
 STRL 1.28 INITIAL ABSTRACTION
 CRVNR 61.00 CURVE NUMBER
 RTIMP 49.00 PERCENT IMPERVIOUS AREA

42 UD SCS DIMENSIONLESS UNITGRAPH

TLAG .12 LAG

UNIT HYDROGRAPH
9 END-OF-PERIOD ORDINATES

6. 12. 8. 3. 1. 1. 0. 0. 0.

*** ***

* *
43 KK * SUM2 * SUM OF A, A1, B
* *

44 KC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

*** ***

* *
45 KK * ROUTE2 * ROUTED SUM2
* *

HYDROGRAPH ROUTING DATA

46 KK KINEMATIC WAVE STREAM ROUTING
L 300. CHANNEL LENGTH
S .0050 SLOPE
N .016 CHANNEL ROUGHNESS COEFFICIENT
CA .00 CONTRIBUTING AREA
SHAPE TRAP CHANNEL SHAPE
WD 100.00 BOTTOM WIDTH OR DIAMETER
Z .00 SIDE SLOPE
NDXMIN 2 MINIMUM NUMBER OF DX INTERVALS

*** ***

* *
47 KK * B1 *
* *

SUBBASIN RUNOFF DATA

48 BA SUBBASIN CHARACTERISTICS
TAREA .00 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 2.77 BASIN TOTAL PRECIPITATION

15 PT INCREMENTAL PRECIPITATION PATTERN

2.00	3.70	1.30	1.70	2.10	1.60	.60	.00	.00	.00	.00
.66	.00	.30	.70	.20	.60	1.00	1.40	.96	.90	
.70	.20	.10	.10	.30	1.00	1.50	1.20	.80	.20	
.50	1.40	.80	.30	.20	1.20	2.70	3.00	5.70	9.00	
9.10	12.00	3.40	3.70	3.10	.70	1.60	1.60	.50	.40	
.80	.80	1.20	2.20	1.60	1.10	1.30	2.00	.60	.60	
.30	.20	.20	.10	.30	.00	.10	.10	.30	.00	
.10	.10									

49 LS SCS LOSS RATE
SRTL 1.28 INITIAL ABSTRACTION
CRNBR 61.00 CURVE NUMBER
RTIMP 49.00 PERCENT IMPERVIOUS AREA

50 UD SCS DIMENSIONLESS UNITGRAPH
TLAG .12 LAG

UNIT HYDROGRAPH 9 END-OF-PERIOD ORDINATES

5. 9. 6. 2. 1. 0. 0. 0. 0.

*** ***

* *
51 KK * SUM3 * SUM OF A, A1, B, B1
* *

52 EC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

*** ***

* *
53 KK * ROUTE3 * ROUTED SUM3
* *

HYDROGRAPH ROUTING DATA

54 RK	KINEMATIC WAVE STREAM ROUTING	
	L	300. CHANNEL LENGTH
	S	.0050 SLOPE
	N	.016 CHANNEL ROUGHNESS COEFFICIENT
	CA	.00 CONTRIBUTING AREA
	SHAPE	TRAP CHANNEL SHAPE
	WD	100.00 BOTTOM WIDTH OR DIAMETER
	Z	.60 SIDE SLOPE
	NDXMIN	2 MINIMUM NUMBER OF DX INTERVALS

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*** FPKRUT - NEWTON RAPSON FAILEDFIXED POINT ITERATION USED - ITERATION= 2

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[illegible]

* * * * *
55 KK * B2 *
* * * * *

SUBBASIN RUNOFF DATA

56 BA SUBBASIN CHARACTERISTICS
TAREA .00 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 2.77 BASIN TOTAL PRECIPITATION

15 PI	INCREMENTAL PRECIPITATION PATTERN									
	2.00	3.70	1.30	1.70	2.10	1.60	.60	.00	.00	.00
	.00	.00	.30	.70	.20	.60	1.00	1.40	.90	.90
	.70	.20	.10	.10	.30	1.00	1.50	1.20	.80	.20
	.50	1.40	.80	.30	.20	1.20	2.70	3.00	5.70	9.00
	9.10	12.00	3.40	3.70	3.10	.70	1.60	1.60	.50	.40
	.80	.80	1.20	2.20	1.60	1.10	1.30	2.00	.60	.60
	.30	.20	.20	.10	.30	.00	.10	.10	.30	.00
	.10	.10								

57 LS	SCS LOSS RATE	
	STRTL	1.28 INITIAL ABSTRACTION
	CRVNR	61.00 CURVE NUMBER
	RTIMP	49.00 PERCENT IMPERVIOUS AREA

58 UD SCS DIMENSIONLESS UNITGRAPH
TLAG .16 LAG

UNIT HYDROGRAPH

B-77c

12 END-OF-PERIOD COORDINATES

2. 5. 4. 2. 1. 1. 0. 0. 0. 0.

59 KK

SUBA

SUB 1, 11, 1, 11, 12

60 KC

HYDROGRAPH COMBINATION

ICOMP

2 NUMBER OF HYDROGRAPHS TO COMBINE

61 KK

ROUTER4

ROUTED SUB 4

HYDROGRAPH ROUTING DATA

62 KK

KINEMATIC WAVE STREAM ROUTING

L 530. CHANNEL LENGTH
S .0050 SLOPE
N .016 CHANNEL ROUGHNESS COEFFICIENT
CA .00 CONTRIBUTING AREA
SHAPE TRAP CHANNEL SHAPE
WD 100.00 BOTTOM WIDTH OR DIAMETER
Z .00 SIDE SLOPE
NDXMIN 2 MINIMUM NUMBER OF DX INTERVALS

63 KK

C

SUBBASIN RUNOFF DATA

64 BA

SUBBASIN CHARACTERISTICS

TAREA

.01 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 2.77 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

2.00	3.70	1.30	1.70	2.10	1.60	.60	.00	.00	.00
.00	.00	.30	.70	.20	.60	1.00	1.40	.90	.90
.70	.20	.10	.10	.30	1.00	1.50	1.20	.80	.20
.50	1.40	.80	.30	.20	1.20	2.70	3.00	5.70	9.00
9.10	12.00	3.40	3.70	3.10	.70	1.60	1.60	.50	.40
.80	.80	1.20	2.20	1.60	1.10	1.30	2.00	.60	.60
.30	.20	.20	.10	.30	.00	.10	.10	.30	.00
.10	.10								

65 LS SCS LOSS RATE

SYTTL	1.28	INITIAL ABSTRACTION
CRVNR	61.00	CURVE NUMBER
RTIMP	65.00	PERCENT IMPERVIOUS AREA

66 UD SCS DIMENSIONLESS UNITGRAPH

FLAG .14 LAG

UNIT HYDROGRAPH

10 END-OF-PERIOD ORDINATES

8. 19. 15. 7. 3. 2. 1. 0. 0. 0.

1

◆◆◆◆◆

67 KK

[illegible]

6B HC

HYDROGRAPH COMBINATION

ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE

[illegible]

壹 伍 貳 參 肆 伍 陸 柒 捌 玖 拾

69 KK

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 土 washir 土
 土 土
 土土土土土土土土土土土土土土土土

DT

DIVERSION

ISTAD washd DIVERSION HYDROGRAPE IDENTIFICATION

DI

INFLON

.00 20.00 37.00 50.00

DQ DIVERTED FLOW .00 8.30 14.89 19.82

*** ***

73 KK * LAMB *
* *

SUBBASIN RUNOFF DATA

74 BA SUBBASIN CHARACTERISTICS
TAREA .00 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 2.77 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

2.00	3.70	1.30	1.70	2.10	1.60	.60	.00	.00	.00
.00	.00	.30	.70	.20	.60	1.00	1.40	.90	.90
.70	.20	.10	.10	.30	1.00	1.50	1.20	.80	.20
.50	1.40	.80	.30	.20	1.20	2.70	3.00	5.70	9.00
9.10	12.00	3.40	3.70	3.10	.70	1.60	1.60	.50	.40
.80	.80	1.20	2.20	1.60	1.10	1.30	2.00	.60	.60
.30	.20	.20	.10	.30	.00	.10	.10	.30	.00
.10	.10								

75 LS SCS LOSS RATE
STPL .04 INITIAL ABSTRACTION
CRVR 98.00 CURVE NUMBER
RTNP 100.00 PERCENT IMPERVIOUS AREA

76 UD SCS DIMENSIONLESS UNITGRAPH
TLAG .10 LAG

UNIT HYDROGRAPH 8 END-OF-PERIOD ORDINATES

2. 3. 1. 1. 0. 0. 0. 0.

*** ***

77 KK * LAMB *
* *

DT	DIVERSION				
	ISTAD	lambd	DIVERSION HYDROGRAPH IDENTIFICATION		
DI	INFLOW	.00	1.00	2.00	5.00
DQ	DIVERTED FLOW	.00	.52	1.07	2.78

*** ***

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*****
*           *
81 KK      *   OFF   *
*           *
*****

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82 HC	HYDROGRAPH COMBINATION	
	ICOMP	2 NUMBER OF HYDROGRAPHS TO COMBINE

*** ***

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*****
*           *
83 KK      * ROUTES *
*           *
*****

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HYDROGRAPH ROUTING DATA

84 BK	KINEMATIC WAVE STREAM ROUTING	
	L	1750. CHANNEL LENGTH
	S	.0050 SLOPE
	N	.016 CHANNEL ROUGHNESS COEFFICIENT
	CA	.00 CONTRIBUTING AREA
	SHAPE	TRAP CHANNEL SHAPE
	WD	100.00 BOTTOM WIDTH OR DIAMETER
	Z	.00 SIDE SLOPE
	NDXMIN	2 MINIMUM NUMBER OF DX INTERVALS

*** ***

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*****
*           *
85 KK      * WASH2  *
*           *
*****

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SUPPLEMENTARY DATA

五五

SUBSTRATE CHARACTERISTICS

TABLA

.01 SUBRISTEN AREA

PRECIPITATION DATA

14 PB

STORM

2.77 BASIN TOTAL: PRECIPITATION

15 PE.

INTERMITTENT PRECIPITATION PATTERN

2.00	3.70	1.30	1.70	2.10	1.60	.60	.00	.00	.00
.00	.00	.30	.70	.20	.60	1.00	1.40	.90	.90
.70	.20	.10	.10	.30	1.00	1.50	1.20	.80	.20
.50	1.40	.80	.30	.20	1.20	2.70	3.00	5.70	9.00
9.10	12.00	3.40	3.70	3.10	.70	1.60	1.60	.50	.40
.80	.80	1.20	2.20	1.60	1.10	1.30	2.00	.60	.60
.30	.20	.20	.10	.30	.00	.10	.10	.30	.00
.10	.10								

87 LS

SCS LOSS RATE

STILL

.04 INITIAL ABSTRACTION

【答案】 C

98.00 CURVE NUMBER

RTING

100.00 PERCENT IMPERVIOUS AREA

88 10

SCS DIMENSIONLESS UNITGRAPH

FLAG

.22 LAG

◆◆◆

UNIT HYDROGRAPH

15 END-OF-PERIOD ORDINATES

2.	8.	11.	10.	6.	4.	2.	1.	1.	0.
0.	0.	0.	0.	0.					

[illegible]

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☞ ☞

89 KK

去 SIMS 去

2 5

—————

90 HC

HYDROGRAPH COMBINATION

ICOMP

2 NUMBER OF HYDROGRAPHS TO COMBINE

自來水

[illegible]

● ●

91 KK

* SITE *

♣ ♣

SUBBASIN RUNOFF DATA

92 BA SUBBASIN CHARACTERISTICS
TAREA .02 SUBBASIN AREA

PRECIPITATION DATA

14 PB STORM 2.77 BASIN TOTAL PRECIPITATION

15 PI INCREMENTAL PRECIPITATION PATTERN

2.00	3.70	1.30	1.70	2.10	1.60	.60	.00	.00	.00	.00
.00	.00	.30	.70	.20	.60	1.00	1.40	.90	.90	.90
.70	.20	.10	.10	.30	1.00	1.50	1.20	.80	.20	.20
.50	1.40	.80	.30	.20	1.20	2.70	3.00	5.70	9.00	9.00
9.10	12.00	3.40	3.70	3.10	.70	1.60	1.60	.50	.40	.40
.80	.80	1.20	2.20	1.60	1.10	1.30	2.00	.60	.60	.60
.30	.20	.20	.10	.30	.00	.10	.10	.30	.00	.00
.10	.10									

93 LS SCS LOSS RATE
STPL 1.28 INITIAL ABSTRACTION
CRVNR 61.00 CURVE NUMBER
RTIMP 49.00 PERCENT IMPERVIOUS AREA

94 UD SCS DIMENSIONLESS UNITGRAPH
TLAG .17 LAG

UNIT HYDROGRAPH
12 END-OF-PERIOD ORDINATES

14.	44.	47.	31.	16.	9.	5.	2.	1.	1.
0.	0.								

*** ***

95 KK * TOTAL *
* *

96 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1	RATIO 2
				.57	1.00
HYDROGRAPH AT	WASH	.01	1 FLOW TIME	8. 3.58	14. 3.58
HYDROGRAPH AT	A	.01	1 FLOW TIME	6. 3.58	11. 3.58
ROUTED TO	ROUTE0	.01	1 FLOW TIME	6. 3.92	11. 3.83
HYDROGRAPH AT	A1	.01	1 FLOW TIME	5. 3.58	9. 3.58
2 COMBINED AT	SUM1	.02	1 FLOW TIME	7. 3.92	15. 3.83
ROUTED TO	ROUTE1	.02	1 FLOW TIME	7. 3.92	15. 3.83
HYDROGRAPH AT	B	.00	1 FLOW TIME	2. 3.50	4. 3.58
2 COMBINED AT	SUM2	.02	1 FLOW TIME	8. 3.92	16. 3.83
ROUTED TO	ROUTE2	.02	1 FLOW TIME	7. 4.00	16. 3.83
HYDROGRAPH AT	B1	.00	1 FLOW TIME	2. 3.50	3. 3.58
2 COMBINED AT	SUM3	.02	1 FLOW TIME	9. 3.58	17. 3.83
ROUTED TO	ROUTE3	.02	1 FLOW TIME	8. 3.58	17. 3.83
HYDROGRAPH AT	B2	.00	1 FLOW TIME	1. 3.58	2. 3.58
2 COMBINED AT	SUM4	.03	1 FLOW TIME	10. 3.58	19. 3.67
ROUTED TO	ROUTE4	.03	1 FLOW TIME	9. 3.67	19. 3.67
HYDROGRAPH AT	C	.01	1 FLOW TIME	5. 3.58	9. 3.58
3 COMBINED AT	WASH1	.04	1 FLOW	22.	40.

				TIME	3.58	3.58
DIVERSION TO	washd	.04	1	FLOW	9.	16.
				TIME	3.58	3.58
HYDROGRAPH AT	washlr	.04	1	FLOW	13.	24.
				TIME	3.58	3.58
HYDROGRAPH AT	LAMB	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
DIVERSION TO	lambd	.00	1	FLOW	1.	1.
				TIME	3.50	3.50
HYDROGRAPH AT	lambx	.00	1	FLOW	1.	1.
				TIME	3.50	3.50
2 COMBINED AT	OFF	.04	1	FLOW	13.	25.
				TIME	3.58	3.58
ROUTED TO	ROUTE5	.04	1	FLOW	13.	25.
				TIME	3.75	3.75
HYDROGRAPH AT	WASH2	.01	1	FLOW	5.	10.
				TIME	3.58	3.58
2 COMBINED AT	SUM5	.05	1	FLOW	18.	33.
				TIME	3.75	3.67
HYDROGRAPH AT	SITE	.02	1	FLOW	11.	21.
				TIME	3.58	3.58
2 COMBINED AT	TOTAL	.07	1	FLOW	26.	52.
				TIME	3.67	3.67

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

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

FOR PLAN = 1 RATIO= .57

ROUTED NAME	5.05	6.35	235.76	1.10	5.00	5.79	235.00	1.10
-------------	------	------	--------	------	------	------	--------	------

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4949E+00 EXCESS= .0000E+00 OUTFLOW= .5263E+00 BASIN STORAGE= .1289E-02 PERCENT ERROR= -6.6

FOR PLAN = 1 RATIO= 1.00

ROUTED NAME	4.94	11.09	230.98	1.98	5.00	10.60	230.00	1.98
-------------	------	-------	--------	------	------	-------	--------	------

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9116E+00 EXCESS= .0000E+00 OUTFLOW= .9512E+00 BASIN STORAGE= .1426E-02 PERCENT ERROR= -4.5

FOR PLAN = 1 RATIO= .57

ROUTE1 NAME	.60	7.26	236.28	1.07	5.00	6.98	235.00	1.07
-------------	-----	------	--------	------	------	------	--------	------

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9107E+00 EXCESS= .0000E+00 OUTFLOW= .9107E+00 BASIN STORAGE= .1368E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= 1.00

ROUTE1 NAME	.43	14.78	230.55	1.95	5.00	14.64	230.00	1.95
-------------	-----	-------	--------	------	------	-------	--------	------

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1660E+01 EXCESS= .0000E+00 OUTFLOW= .1660E+01 BASIN STORAGE= .1422E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .57

ROUTE2 NAME	.95	7.44	237.65	1.01	5.00	7.23	240.00	1.01
-------------	-----	------	--------	------	------	------	--------	------

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1077E+01 EXCESS= .0000E+00 OUTFLOW= .1077E+01 BASIN STORAGE= .2777E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= 1.00

ROUTE2 NAME	.81	16.23	231.12	1.86	5.00	16.09	230.00	1.86
-------------	-----	-------	--------	------	------	-------	--------	------

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1982E+01 EXCESS= .0000E+00 OUTFLOW= .1982E+01 BASIN STORAGE= .2831E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .57

ROUTE3 NAME	.87	8.76	216.85	.98	5.00	8.48	215.00	.98
-------------	-----	------	--------	-----	------	------	--------	-----

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1202E+01 EXCESS= .0000E+00 OUTFLOW= .1202E+01 BASIN STORAGE= .3033E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= 1.00

ROUTE3 NAME	.73	17.31	231.01	1.81	5.00	17.24	230.00	1.81
-------------	-----	-------	--------	------	------	-------	--------	------

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2223E+01 EXCESS= .0000E+00 OUTFLOW= .2223E+01 BASIN STORAGE= .3099E-03 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .57

ROUTE4 NAME	1.62	9.42	217.96	.96	5.00	9.34	220.00	.97
-------------	------	------	--------	-----	------	------	--------	-----

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1284E+01 EXCESS= .0000E+00 OUTFLOW= .1286E+01 BASIN STORAGE= .5968E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= 1.00

ROUTE4 NAME	1.18	18.55	222.03	1.79	5.00	18.52	220.00	1.79
-------------	------	-------	--------	------	------	-------	--------	------

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2383E+01 EXCESS= .0000E+00 OUTFLOW= .2385E+01 BASIN STORAGE= .6231E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .57

ROUTE5 NAME	4.35	13.00	227.06	.66	5.00	12.94	225.00	.66
-------------	------	-------	--------	-----	------	-------	--------	-----

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1463E+01 EXCESS= .0000E+00 OUTFLOW= .1476E+01 BASIN STORAGE= .2023E-02 PERCENT ERROR= -1.1

FOR PLAN = 1 RATIO= 1.00

ROUTE5 NAME	3.43	24.92	223.68	1.20	5.00	24.73	225.00	1.20
-------------	------	-------	--------	------	------	-------	--------	------

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2678E+01 EXCESS= .0000E+00 OUTFLOW= .2694E+01 BASIN STORAGE= .2110E-02 PERCENT ERROR= -.7

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

NORMAL END OF HEC-1

ID# 938

Rec. 9/8/92

FILED
BT

WASHINGTON AVENUE ROADWAY PROJECT

PRELIMINARY DRAINAGE REPORT

Prepared For:



August 1992

Prepared By:

URS CONSULTANTS

STORM SEWER HYDRAULIC CALCULATIONS

CONDUIT DATA					FLOW DATA								ENERGY LOSS DATA							ENERGY AND HYDRAULIC DATA				COMMENTS			
STATION		SIZE / TYPE	INVERTS		LENGTH	A (FT ²)	I	Q (CFS)	V (FPS)	H _v = V ² /2g (FT)	S _f (FT/FT)	AVE. S _f (FT/FT)	TRANSITIONS						PIPE		TRANSITION		PRESS. FLOW?	OTHER			
FROM	TO		D/S ELEV.	U/S ELEV.									H ₁ (FT)	H ₂ (FT)	H ₃ (FT)	H ₄ (FT)	H ₅ (FT)	H ₆ (FT)	U/S EGL ELEV.	U/S HGL ELEV.	U/S EGL ELEV.	U/S HGL ELEV.					
CORRESPONDS CLOSELY w/ CINFMP													Enter Starting EGL and HGL Here → 66.84 64.61 ←														
4835.0	4700.0	36" Ø	61.61	61.95	125	7.07	.00492	63	8.91	1.23	.00687	.00687	1.20						2.00	67.04	65.81	69.04	67.81	YES	Loss from 2 laterals @ 47+00 = 2 x 1.00 = 2.00'		
4700.0	4200.0	36" Ø	61.95	63.20	500.0	7.07	.00492	54	7.64	0.91	.00653	.00770	3.85						1.48	72.89	71.98	74.37	73.46	YES	Loss from 2 laterals @ 41+00 = 2 x 0.74 = 1.48'		
4200.0	3700.0	36" Ø	63.20	64.00	500.0	7.07	.00492	47	6.65	0.69	.00498	.00576	2.88						1.12	77.25	76.56	78.37	77.68	YES	Loss from 2 laterals @ 37+00 = 2 x 0.56 = 1.12'		
3700.0	3200.0	36" Ø	64.00	74.51	500.0	7.07	.00492	40	5.68	0.50	.00361	.00430	2.15						0.01	80.52	80.02	80.53	80.03	YES	Loss from 5 straight thru M.H. = 0.01'		
3200.0	2920.0	36" Ø	74.51	77.60	280.0	7.07	.00492	40	5.66	0.50	.00361	.00361	1.01						0.84	81.54	81.04	82.38	81.88	YES	Loss from 2 laterals = 0.42 x 2 = 0.84'		
2920.0	2525.0	36" Ø	77.60	79.30	395.0	7.07	.00492	32	4.52	0.32	.00231	.00296	1.17						0.54	83.55	83.23	84.09	83.77	YES	Loss from 2 laterals = 2 x 0.27 = 0.54'		
2525.0	2215.0	36" Ø	79.30	80.54	310.0	7.07	.00492	25	3.53	0.19	.00140	.00186	0.58						0.15	84.67	84.48	84.82	84.63	YES	Expansion Loss = 0.05' One Lateral Only = 0.05'		
2215.0	1905.0	36" Ø	80.54	81.78	310.0	7.07	.00492	21.5	3.04	0.14	.00541	.00340	1.05						0.19	85.87	85.73	86.06	85.92	YES	Loss from 2 laterals @ 19+05 = 2 x 0.08 = 0.16'		
1905.0	1500.0	24" Ø	82.78	84.40	405.0	3.14	.00492	12.5	3.98	0.25	.00309	.00425	1.72						0.22	87.78	87.53	88.00	87.95	YES	One lateral Only		
1500.0	1000.0	24" Ø	84.40	86.40	500.0	3.14	.00492	8.0	2.55	0.10	.00124	.00217	1.08						0.10	89.08	88.98	89.18	89.08	YES			
																						</					

starting HGL mainline

starting HGL lateral

$$S_f = \frac{K H_v}{R^{1.33}}$$

$$K = \frac{2g(n^2)}{2.21}$$

Revision	Date

July 6, 1992

BY: JPS CHK'D: PRS/7/1/92

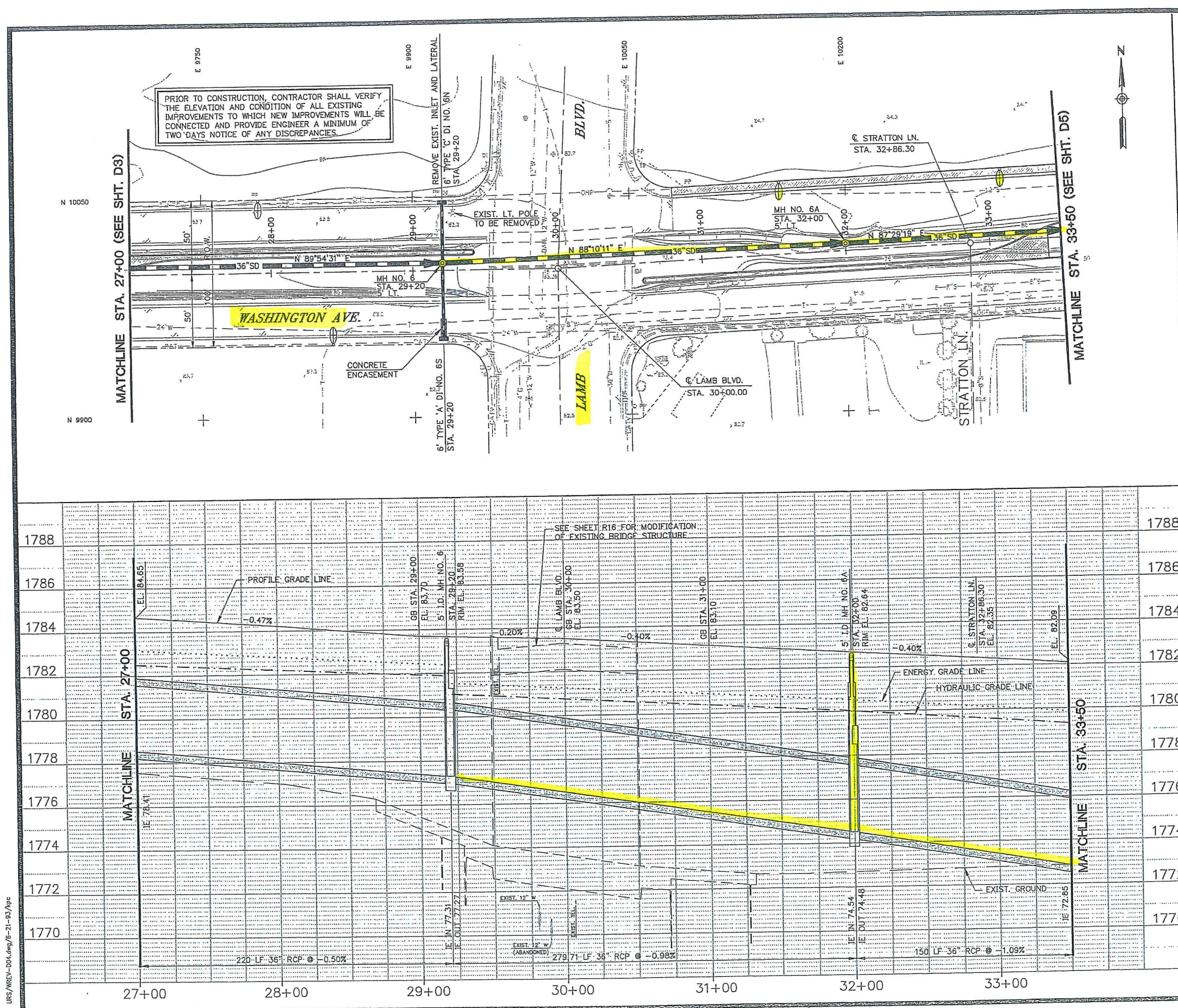
REFERENCE: Concrete Pipe Design Manual

CCRFCD Design Manual

WASHINGTON AVE. ROADWAY PROJECT

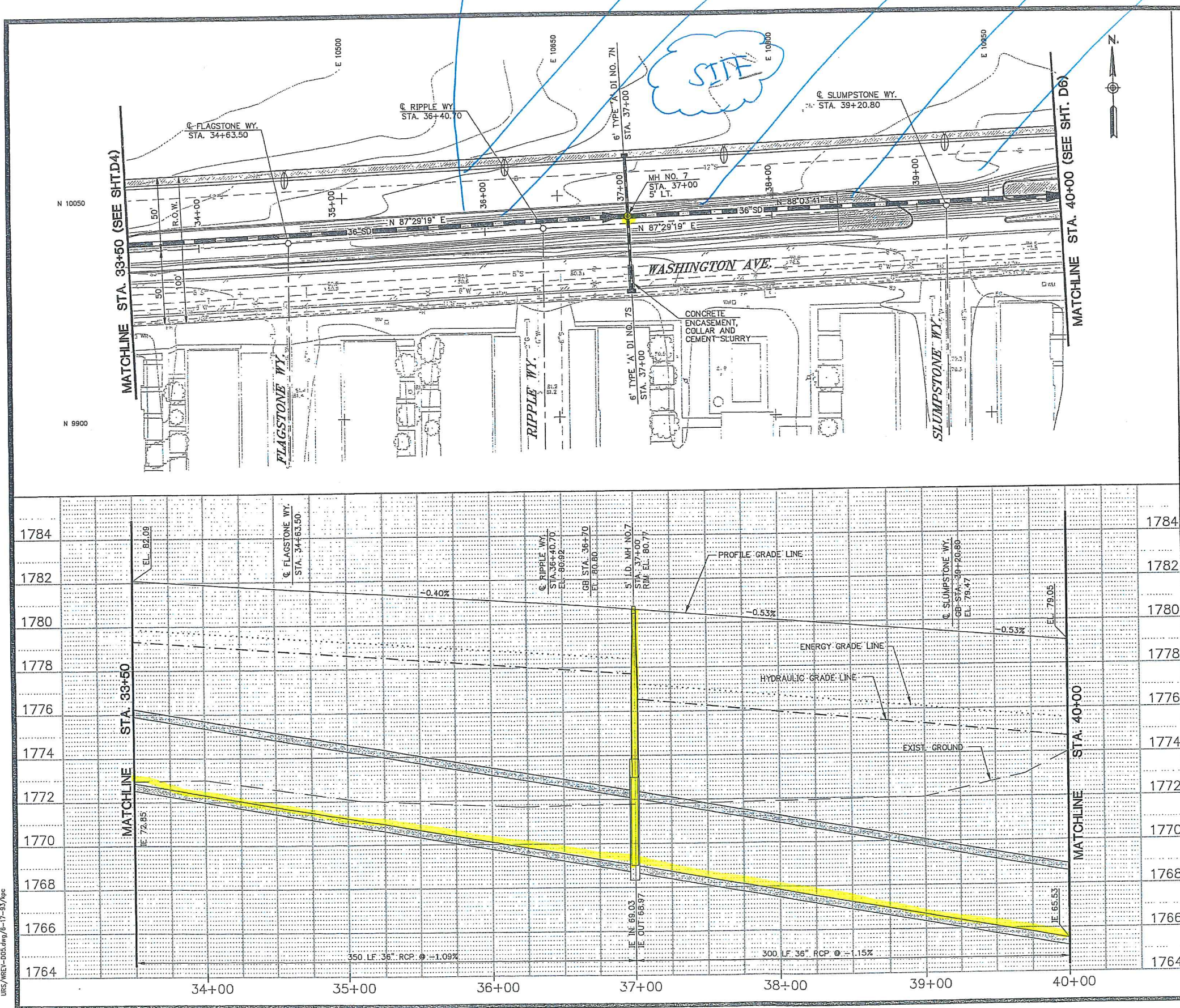
STORM SEWER HYDRAULIC CALC - WEST SIDE

STANDARD FORM 6



- 29.3-31 31/74

URS/ARC-DOE.dwg (6-17-93)/aps



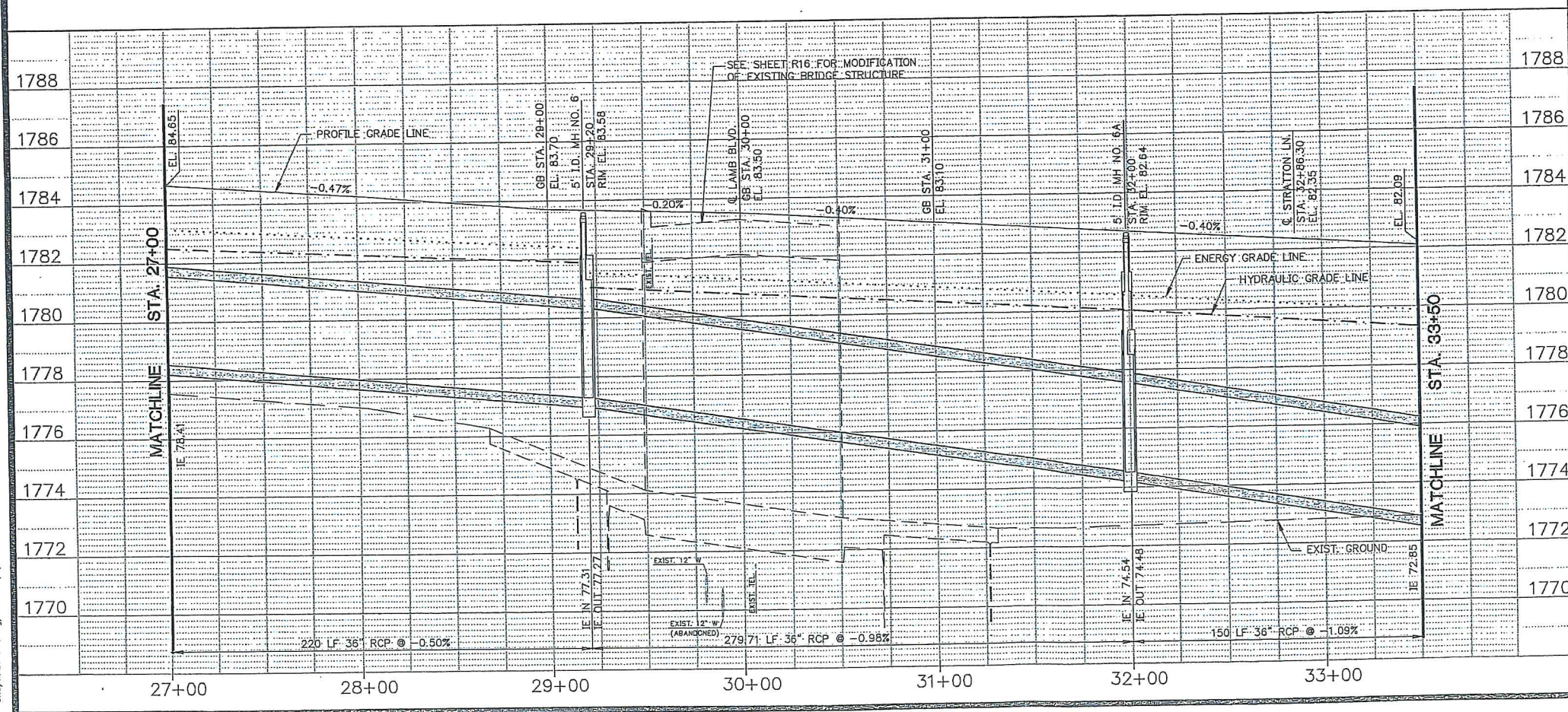
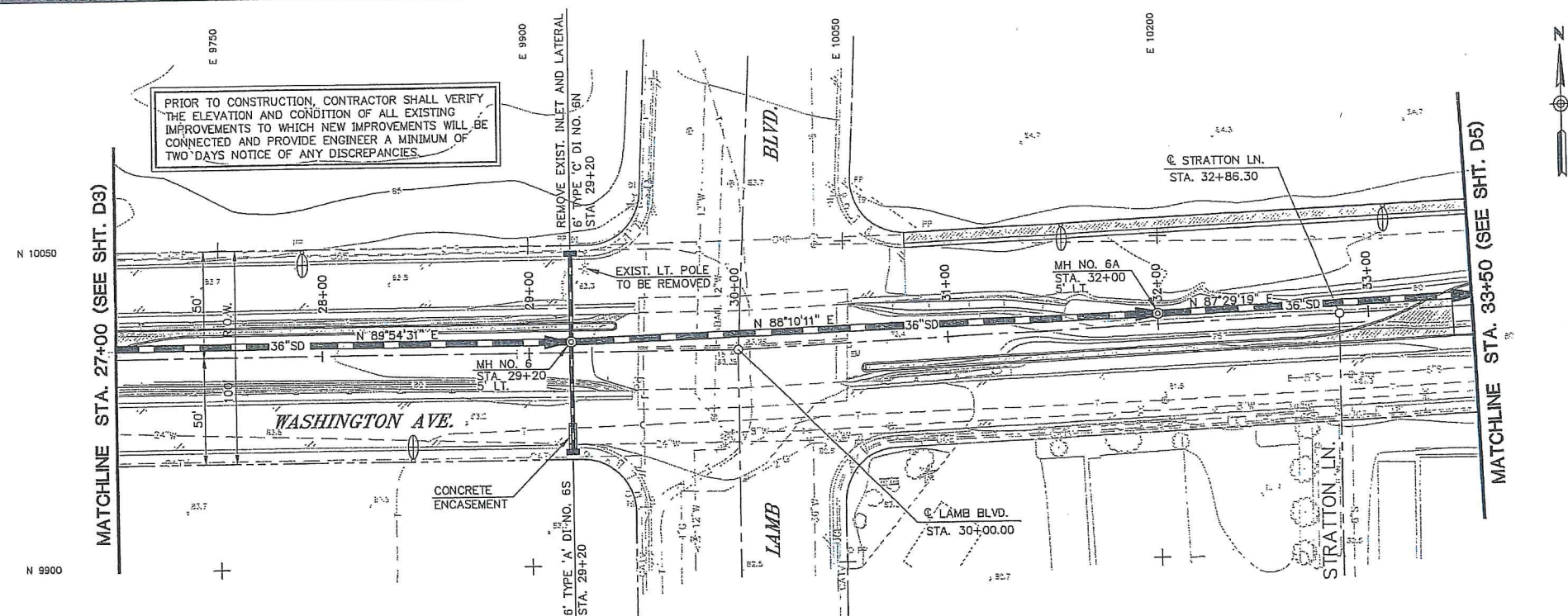
NOTES

1. SEE SHEET D12 & D13 FOR STORM DRAIN LATERALS.
2. STATIONS AND OFFSETS ARE TO BACK OF CURB AT CENTER OF INLET, AND TO CENTER OF MANHOLE.
3. STORM DRAIN MANHOLES ARE TYPE I MANHOLES PER U.S.D. NO. 405, UNLESS OTHERWISE NOTED.
4. STORM DRAIN PIPE IS CLASS III RCP, UNLESS OTHERWISE NOTED.
5. SEE SHEETS R1 THRU R23 FOR ROADWAY IMPROVEMENTS AND MEDIAN GEOMETRY.
6. SEE SHEET G2 FOR CONCRETE ENCASEMENT REQUIREMENTS FOR WATER-SEWER/STORM LINE CROSSING.

REVISIONS		DATE	
NO.	DESCRIPTION	DATE	BY

DESIGNED BY: PRS	SCALE: 1"=30'
APPROVED BY: JKS	HORIZ. 1"=2'
PROJECT NO. 43007	DATE: JUN. 25, 1993
URS CONSULTANTS, INC. Las Vegas, Nevada	

DEPARTMENT OF PUBLIC WORKS	PROJECT: WASHINGTON AVENUE ROADWAY PROJECT
SHEET: STORM DRAIN PLAN AND PROFILE STA. 33+50 TO STA. 40+00	DRAWING NO. 107-V1982
D 5	



NOTES

1. SEE SHEET D12 & D13 FOR STORM DRAIN LATERALS.
2. STATIONS AND OFFSETS ARE TO BACK OF CURB AT CENTER OF INLET, AND TO CENTER OF MANHOLE.
3. STORM DRAIN MANHOLES ARE TYPE I MANHOLES PER U.S.D. NO. 405, UNLESS OTHERWISE NOTED.
4. STORM DRAIN PIPE IS CLASS III RCP, UNLESS OTHERWISE NOTED.
5. SEE SHEETS R1 THRU R23 FOR ROADWAY IMPROVEMENTS AND MEDIAN GEOMETRY.
6. SEE SHEET G2 FOR CONCRETE ENCASEMENT REQUIREMENTS FOR WATER-SEWER/STORM LINE CROSSING.

[illegible]

DRAWN BY: GPR REVIEWED BY: JKS PROJECT NO. 43007	DESIGNED BY: PRS APPROVED BY: JKS DATE: JUN. 25, 1993	SCALE: 1"=30' HORIZ. 1"=2' VERT.
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1-21-20

PUBLIC WORKS

PROJECT:

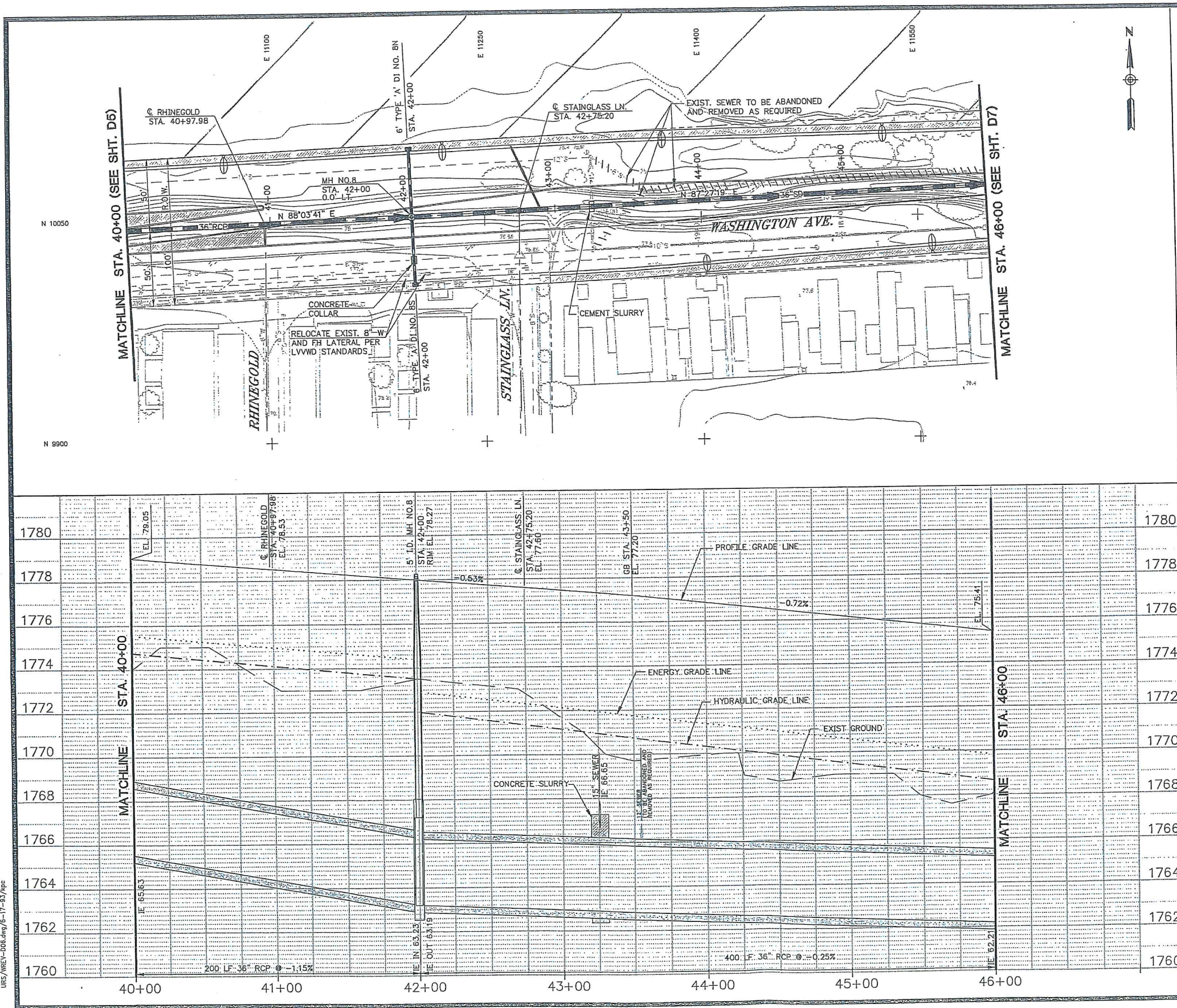
**WASHINGTON AVENUE
ROADWAY PROJECT**

DEPARTMENT OF
STORM DRAIN
PLAN AND PROFILE



DRAWING NO.
107-V1982

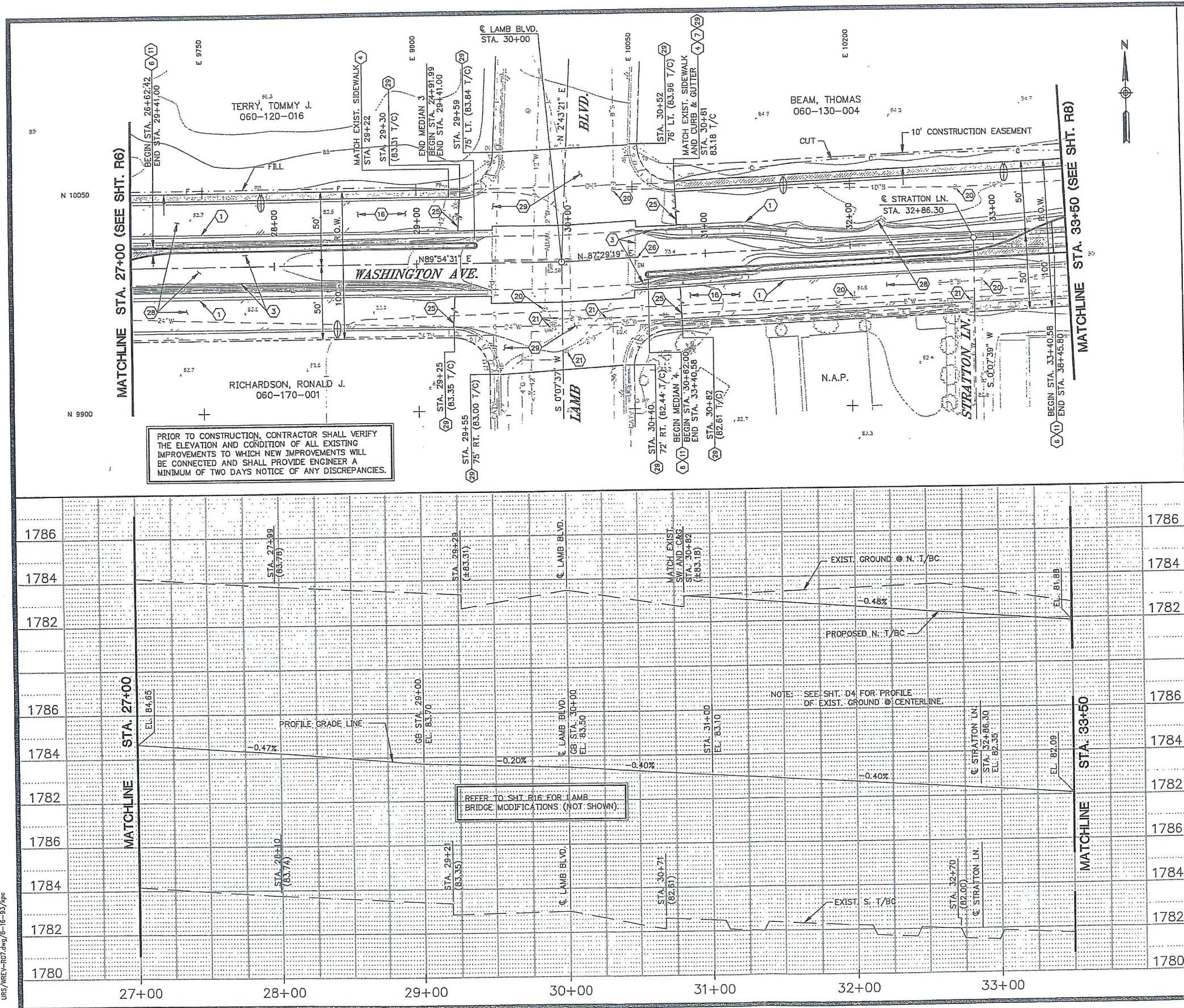
29-3-31 31/74



NOTES

- SEE SHEET D12 & D13 FOR STORM DRAIN LATERALS.
- STATIONS AND OFFSETS ARE TO BACK OF CURB AT CENTER OF INLET, AND TO CENTER OF MANHOLE.
- STORM DRAIN MANHOLES ARE TYPE I MANHOLES PER U.S.D. NO. 405, UNLESS OTHERWISE NOTED.
- STORM DRAIN PIPE IS CLASS III RCP, UNLESS OTHERWISE NOTED.
- SEE SHEETS R1 THRU R23 FOR ROADWAY IMPROVEMENTS AND MEDIAN GEOMETRY.
- SEE SHEETS S1 THRU S3 FOR SEWER PLAN AND PROFILES.
- SEE SHEET G2 FOR CONCRETE ENCASUREMENT REQUIREMENTS FOR WATER-SEWER/STORM LINE CROSSING.

DATE		SCALE		DESIGNED BY		APPROVED BY		PROJECT NO.		DATE	
REVISIONS		HORIZ. 1"=30'		VERT. 1"=2'		JMS		JMS		JUN. 25, 1993	
DRAWN BY		GPR		JMS		JMS		JMS		JMS	
PROJECT		WASHINGTON AVENUE ROADWAY PROJECT		SHEET		STORM DRAIN PLAN AND PROFILE		STA. 40+00 TO STA. 46+00		DRAWING NO. 107-V1982	
DEPARTMENT OF PUBLIC WORKS		PROJECT		STORM DRAIN PLAN AND PROFILE		STA. 40+00 TO STA. 46+00		DRAWING NO. 107-V1982		D 6	
URS CONSULTANTS, INC.		Las Vegas, Nevada		JMS		JMS		JMS		JMS	



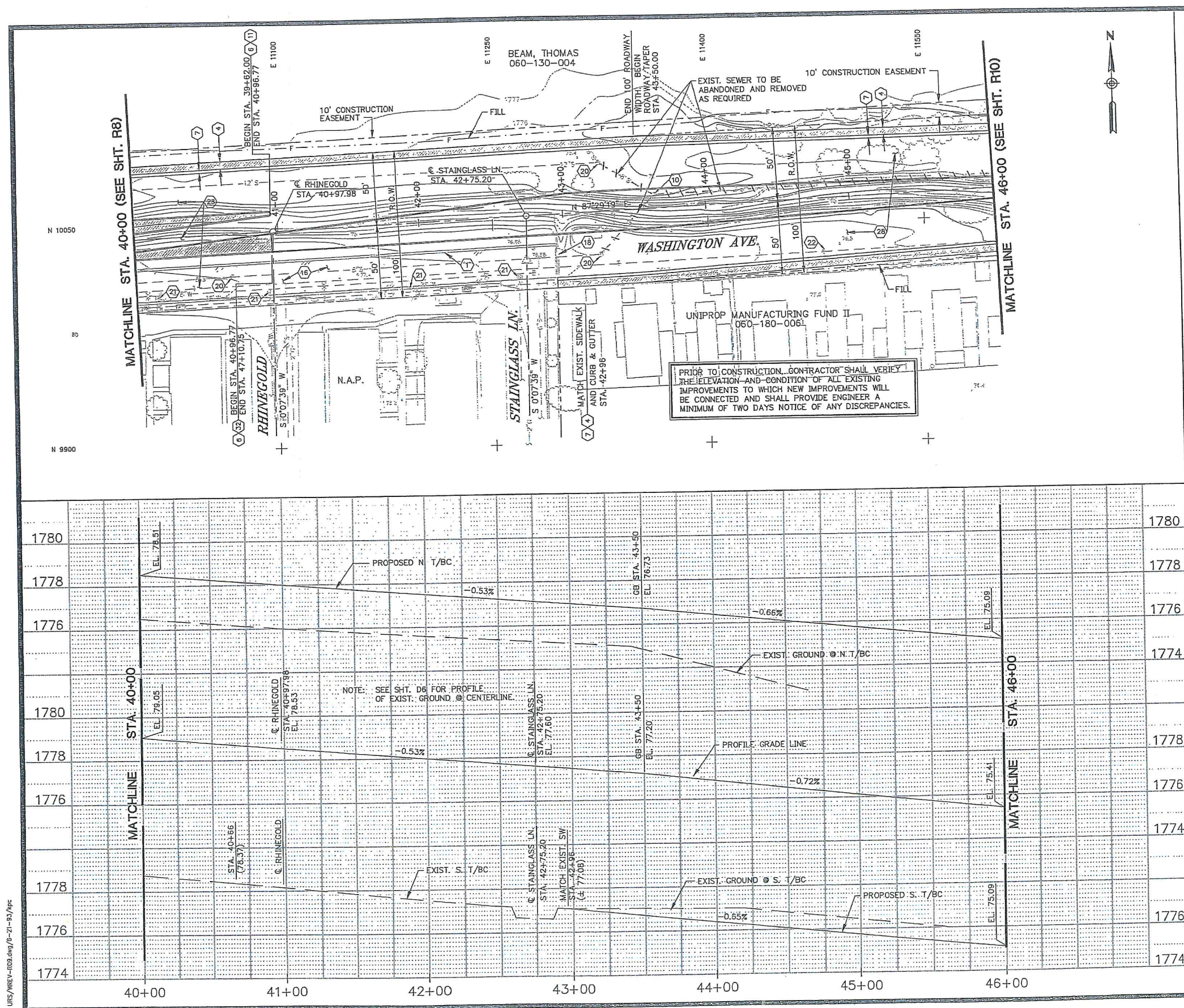
CONSTRUCTION NOTES

- ① REMOVE EXISTING CONCRETE CURB & GUTTER.
- ② REMOVE EXISTING CONCRETE SIDEWALK.
- ③ REMOVE THE TOP 3' OF THE CONC. LINING AND PLACE FILL IN EXISTING CHANNEL.
- ④ INSTALL CONCRETE SIDEWALK PER U.S.D. NO. 234.
- ⑤ INSTALL WHEELCHAIR RAMP PER U.S.D. NO. 235 (CASE 1).
- ⑥ INSTALL TYPE A TACK ON ISLAND CURB PER U.S.D. NO. 220-A.
- ⑦ INSTALL "L" TYPE CURB & GUTTER PER U.S.D. NO. 216.
- ⑧
- ⑨ REMOVE AND REPLACE EXISTING SIDEWALK AND CURB & GUTTER.
- ⑩ ABANDON SANITARY SEWER LINES AND MANHOLES PER C.L.V. STANDARDS.
- ⑪ INSTALL CONCRETE TACK ON ISLAND PER U.S.D. NO. 220-A.
- ⑫ INSTALL 15' RESIDENTIAL DRIVEWAY PER U.S.D. NO. 223.
- ⑬ INSTALL 18' RESIDENTIAL DRIVEWAY PER U.S.D. NO. 223.
- ⑭ INSTALL 23' COMMERCIAL DRIVEWAY PER U.S.D. NO. 224.
- ⑮ INSTALL 32' COMMERCIAL DRIVEWAY PER U.S.D. NO. 224.
- ⑯ REMOVE EXISTING AC PAVEMENT.
- ⑰ REMOVE EXISTING CROSS GUTTER.
- ⑱ REMOVE EXISTING CONCRETE BARRIER.
- ⑲ REMOVE AND RELOCATE EXISTING SIGNS AND MARKERS.
- ⑳ ADJUST MANHOLE RIM AND CONSTRUCT CONCRETE COLLAR PER U.S.D. NO. 408.
- ㉑ ADJUST VALVE BOX AND CONSTRUCT CONCRETE COLLAR PER U.S.D. NO. 517.
- ㉒ EXISTING TELEPHONE MANHOLE TO BE ADJUSTED TO FINISH GRADE.
- ㉓ INSTALL CROSS GUTTER PER MODIFIED U.S.D. NO. 228.
- ㉔ EXISTING POWER POLE TO BE RELOCATED BY NEVADA POWER COMPANY.
- ㉕ SAWCUT EXISTING AC PAVEMENT.
- ㉖ SALVAGE FLOW MONITORING DEVICE.
- ㉗ RELOCATE EXISTING LIGHT POLE.
- ㉘ NEW STRUCTURAL PAVEMENT SECTION SEE SHT. R1 FOR DETAIL.
- ㉙ ¾" ROTOMILL AND OPEN GRADE WITHIN CURB RETURN.
- ㉚ APPLY SEAL COAT.
- ㉛ ROTOMILL 2" OFF EXIST. PAVEMENT SEE SHT. R2 FOR SECTION AND DETAIL.
- ㉜
- ㉝ INSTALL 2" ROCK SURFACING.
- ㉞
- ㉟ INSTALL 20' COMMERCIAL DRIVEWAY PER U.S.D. NO. 225.
- ㊱
- ㊲ INSTALL A.C. PAVEMENT.

NOTES

1. FOR ROADWAY TYPICAL SECTION
SEE SHEETS R1 AND R2.
2. FOR MEDIAN ISLAND CURB GEOMETRY
SEE SHEETS R2D THRU R23.
3. FOR A.C. PAVEMENT PLAN SEE
SHEETS G4 AND G5.
4. FOR STREET LIGHT PLAN SEE
SHEETS E1 THRU E8.

	DRAWING NO. 107-V1982		SHEET: ROADWAY PLAN AND PROFILE STA. 97+00 TO STA. 33+50	PROJECT: WASHINGTON AVENUE ROADWAY PROJECT		DEPARTMENT OF PUBLIC WORKS		SCALE: HORIZ. 1"=30' VERT. 1"=2'		DESIGNED BY: PHS APPROVED BY: JKS DATE: JUN. 25, 1983		REVISIONS		DATE
						DRAWN BY: GPH/JPC CHECKED BY: JKS PROJECT NO. 43007		URS CONSULTANTS, INC. Las Vegas, Nevada						



- CONSTRUCTION NOTES

NOTES

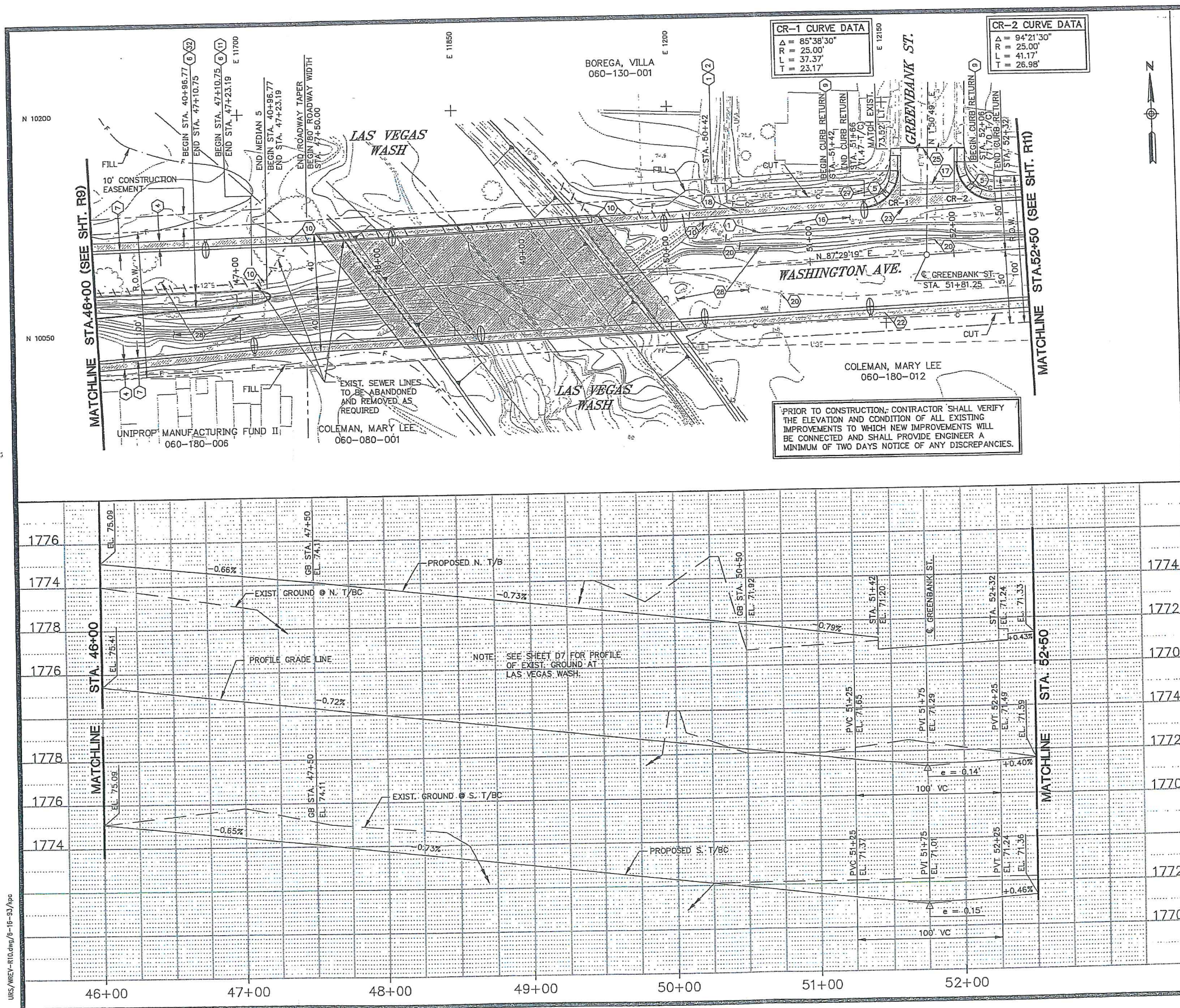
DEPARTMENT OF PUBLIC WORKS

DRAWING NO. 107-V1982	R / 9
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NO. 43007	DATE: JUN, 25, 1993
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URS CONSULTANTS, INC.
Las Vegas, Nevada

URS/MEV-R10.dwg/15-16-93/aps



DATE	
REVISIONS	
SCALE	DESIGNED BY
HORIZ. 1"=30'	PREP
VERT. 1"=2'	APPROVED BY
PROJECT NO.	DATE
43007	JUN. 25, 1993
URS CONSULTANTS, INC. Las Vegas, Nevada	
DEPARTMENT OF PUBLIC WORKS	
PROJECT: WASHINGTON AVENUE ROADWAY PROJECT	
SHEET: ROADWAY PLAN AND PROFILE STA. 46+00 TO STA. 52+50	
DRAWING NO. R 107-V1982	

16/74



City of Las Vegas

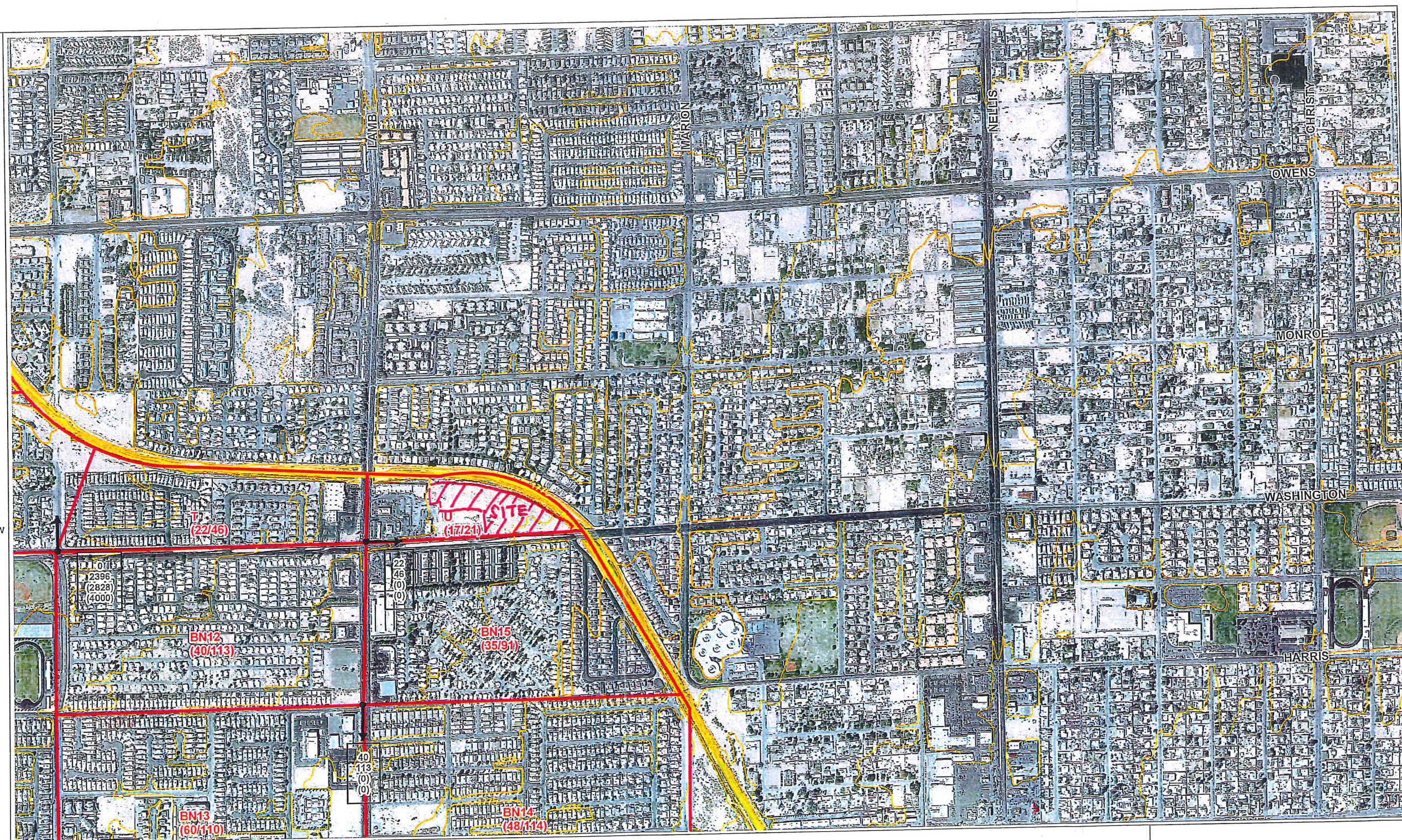
CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN

LEGEND

- Sub-basin Boundary
- LV12 Basin ID
- (10yr./100yr.) Contributing flow from the basin (cfs)
- Flow Arrow
- 250 10-Year Street Flow
- 500 100-Year Street Flow
- (300) 10-Year Facility Flow
- (800) 100-Year Facility Flow
- (Flows in CFS)
- Study Area Limit

PHOTO DATE: SPRING 2004

FIGURE E-6



EXISTING DRAINAGE CONDITIONS



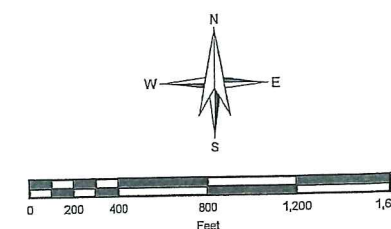
2270 Corporate Circle, Suite 100
Henderson, NV 89074
(702) 263-7275
Fax: (702) 263-7200

	Durango	Rainbow	Decatur	Tonopah	6th	Pecos	Nellis
Lake Mead				1	2		
Washington				3	4	5	6
Charleston	7	8	9	10		11	12
Sahara	13	14	15	16		17	
Desert Inn		18	19				

$Q_{100} = 46 + 21 = 67 \text{ cfs in WASHINGTON}$
 $Q_{10} = 22 + 17 = 39 \text{ cfs in WASHINGTON}$

NOTE:
Existing conditions are based on future
Curve Number values with only existing local and
regional facilities in place.

100-Year flows at locations where a 100-Year
subbasin concentration point does not exist in the
map were based on an area-weighted
ratio of the 100-Year flows from concentration points
upstream and downstream of the location. See
Volume I for a more detailed explanation.



SCALE: 1 inch = 800 feet



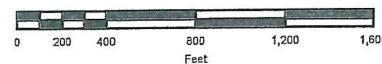
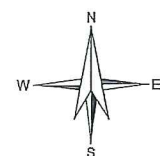
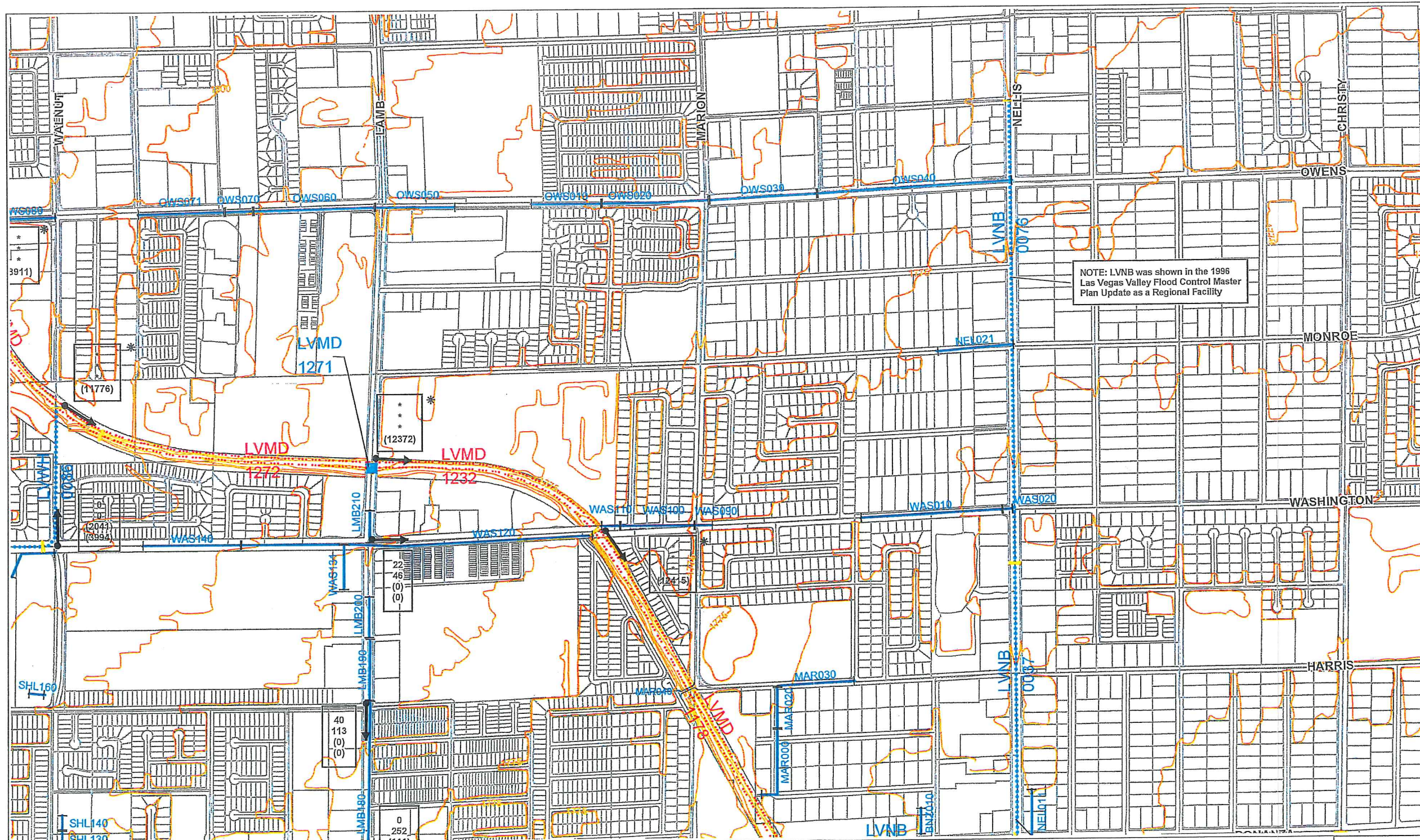
City of Las Vegas

CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN

LEGEND

- Existing Regional Facility
- Category A Proposed Regional Facility (2002 MPU)
- Category B Proposed Regional Facility (2002 MPU)
- Category A Proposed Regional Facility (2004 CNFCMP)
- Existing Local Facility
- Proposed Local Facility
- Regional Culvert
- Regional Bridge
- Regional Pipeline
- Regional Channel
- Regional Levee
- Regional Detention Basin
- Local Storm Drain
- Local Culvert
- Proposed Local Storm Drain
- Regional ID-Mile Separator
- Local Facility Separator

FIGURE F-6



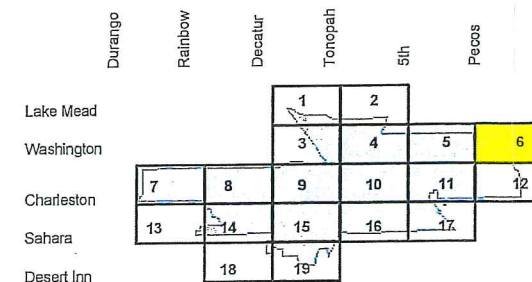
SCALE: 1 inch = 800 feet

- Flow Arrow
- | | |
|-------|------------------------|
| 250 | 10-Year Street Flow |
| 500 | 100-Year Street Flow |
| (300) | 10-Year Facility Flow |
| (800) | 100-Year Facility Flow |
- (Flows in CFS)

NOTE: Ultimate drainage conditions are based on future Curve Number values with all flood control facilities in place.

100-Year flows at locations where a 100-Year subbasin concentration point does not exist in the hydrology model were based on an area-weighted ratio of the 100-Year flows from concentration points upstream and downstream of the location. See Volume I for a more detailed explanation.

* Flow rate taken from 2002 Las Vegas Valley Flood Control Master Plan Update.



FUTURE DRAINAGE CONDITIONS



2270 Corporate Circle, Suite 100
Henderson, NV 89074
(702) 263-7275
Fax: (702) 263-7200

APPENDIX D

Response to Comments/Comment Letter

865-012

July 24, 2017

Peter Jackson, CFM
City of Las Vegas Public Works
Flood Control Section
333 N. Rancho Drive
Las Vegas, NV 89106-3797

**Re: Washington Las Vegas Wash Park
Hansen # 59811, WU9878**

Dear Mr. Jackson:

GCW, Inc., is in receipt of your comment memorandum dated June 29, 2017, regarding the subject project. The following are our responses to these comments:

Comment: "1. Flood Control takes no exception to the overall Drainage Study. Provide an updated Drainage Study that incorporates the following minor comments:
"A. Update Figure 6 in the Drainage Study to change the inlet at Location 3 to a NDOT Type 2 inlet. This inlet has two 15-inch storm drain pipes entering the inlet and the 12-inch inlet cannot accommodate the pipes. Review and revise the report and plans accordingly.
"B. The storm drain system Q and HGL is provided in the report, however the 90% improvement plans shall be revised to show the information.
"C. Provide a section and calculation showing that the water feature is sufficiently elevated to prevent offsite flows from impacting the water feature drain."

Response: A. An NDOT Type 2 inlet can accommodate the two 15-inch storm drain pipes entering the inlet at Location 3. The report, Figure 6 and the plans have been updated accordingly.
B. The plans have been revised to show the Q and HGL on the storm drain system.
C. A section and calculation has been provided adjacent to the water feature drain showing that it is sufficiently elevated to prevent offsite flows from impacting the water feature. See Section 8-8 on Figure 6 and the calculation in the report.

Comment: "2. The graded swale on Sheet C4.01 does not match the Landscape Plans that shows a meandering river rock swale. Review and revise accordingly"

Response: The Landscape Plans and drainage swale on Sheet C4.01 now coincide.

Comment: "3. Provide the Q and HGL on the storm drain profile sheets."



Response: The storm drain profile sheets have been revised to show the Q and HGL.

Comment: "4. Rip-Rap requires Type 2 base and geofabric. Review and revise the details accordingly."

Response: The details have been shown to incorporate Type 2 base and geo-fabric for riprap.

Comment: "5. The existing and proposed utility crossings of the storm drain must be shown on the sewer lateral profiles. Some of the utility crossings are shown with clearance less than 2-foot. Separations less than 2-feet will require protection of the sewer line. Specific details and approvals for separations less than 2-foot shall be provided with the 100% submittal."

Response: The utility crossings have been provided on the profile sheets with proper separation.

Comment: "6. Provide expanded details of the 12"x12" catch basin that accommodates the inlet depth shown. Provide detail sheets showing typical details needed for the construction, connection and any special transition structure details. Structural details, if required, must be submitted by the 100% submittal."

Response: Detail 4 on sheet C4.09 has been provided to show expanded details of the 12"x12" catch basin.

Comment: "7. The Final Drainage Study needs to include an electronic copy of the entire report with the input and output files for the hydraulics and hydrology."

Response: Noted. Electronic copy of the entire report with the input and output files for hydraulics and hydrology have been provided.

Comment: "8. Add a note for all storm drain drop inlets that references the newly adopted USDCCA Drawing No. 421 (Stormwater Quality Management Stamp and Sign Detail."

Response: Construction notes have been added. Additionally, a standard detail has been added to sheet C4.10.

Comment: "9. Provide a Construction Note for the access gates and details. Reference Sheets C3.01 & C3.05."

Response: Construction note 27 has been provided to refer to landscape plans.

Comment: "10. Sheet C3.01: Provide reference sections for matching into existing improvements."

Response: Notes have been added to the plans. See sheet section 5 on sheet C3.07.

Comment: "11. Sheet C4.02: Provide a cross section near the water feature to show that the water feature is sufficiently elevated to prevent offsite flows from impacting water feature drain."

Response: Section K on Sheet C4.02 and C4.10 is provided. The hydraulic calculation, Section 8 on Figure 6, shows that the water feature is sufficiently elevated to prevent offsite flows from impacting the water feature.

Comment: "12. Sheet C4.04: Verify inlet box size will accommodate the three storm drain lines. Revise the inlet northwest of the restroom/storage building to an NDOT Type 2 inlet with concrete apron. Provide Finish Floor elevation for restroom/storage building."

Response: Inlet box size can accommodate the three storm drain lines as mentioned in response to comment #1. Inlet located northwest of the restroom/storage building will not be revised to include a concrete line apron due to the grass-lined contributing area. Additional concrete in the play area may be considered a trip hazard. However, the NDOT Type 2 inlet next to restroom/storage building which is in desert landscaping will have a concrete apron. Finished floor elevations provided on restroom/storage building. The restroom meets CLV finished floor criteria, which is above twice the depth of flow as shown in Cross Section 6 which is a normal depth calculation for the swale adjacent to the restroom is included in Appendix B.

Comment: "13. Additional comments are included with the marked-up plans."

Response: Additional comments on marked-up plans have been addressed.

Additional Item:

Graphical changes in basin delineation of Prorated Sub basins B and F were made due to minor grading revisions to minimize nuisance ponding. Note that the changes in basin area equaled 0.2 acres, which is 0.2 acres at 1.91 cfs/acre = 0.4 cfs, which is considered insignificant. Therefore, no changes were made to hydrologic and hydraulic data and calculations in this study.

Please feel free to contact our office with any questions at (702) 804-2000.

Cordially,

GCW, INC



Michelle Castell
Hydraulic Designer
Flood Control Division



Steve Jones, PE
Flood Control Division Manager
Flood Control Division

Enclosures

MMC/vlr

Memorandum

City of Las Vegas
Department of Public Works
Engineering Planning

To: Patrick Batte', AIA
Architectural Project Manager

From: Peter Jackson, CFM
Flood Control Section

Date: June 29, 2017

Re: Washington Las Vegas Wash Park
90% Submittal Hansen # 59811, WU9878



We have reviewed the Washington Las Vegas Wash Park, 90% improvement submittal and the 90% Drainage Study for the proposed park improvements. This is the first submittal for the Drainage Study. The following comments are provided to assist in the overall design:

1. Flood Control takes no exception to the overall Drainage Study. Provide an updated Drainage Study that incorporates the following minor comments:
 - A. Update Figure 6 in the Drainage Study to change the inlet at Location 3 to a NDOT Type 2 inlet. This inlet has two 15-inch storm drain pipes entering the inlet and the 12-inch inlet cannot accommodate the pipes. Review and revise the report and plans accordingly.
 - B. The storm drain system Q and HGL is provided in the report, however the 90% improvement plans shall be revised to show the information.
 - C. Provide a section and calculation showing that the water feature is sufficiently elevated to prevent offsite flows from impacting the water feature drain.
2. The graded swale on Sheet C4.01 does not match the Landscape Plans that shows a meandering river rock swale. Review and revise accordingly.
3. Provide the Q and HGL on the storm drain profile sheets.
4. Rip-Rap requires Type 2 base and geofabric. Review and revise the details accordingly.
5. The existing and proposed utility crossings of the storm drain must be shown on the sewer lateral profiles. Some of the utility crossings are shown with clearance less than 2-foot. Separations less than 2-feet will require protection of the sewer line. Specific details and approvals for separations less than 2-foot shall be provided with the 100% submittal.
6. Provide expanded details of the 12"x12" catch basin that accommodates the inlet depth shown. Provide detail sheets showing typical details needed for the construction, connection and any special transition structure details. Structural details, if required, must be submitted by the 100% submittal.
7. The Final Drainage Study needs to include an electronic copy of the entire report with the input and output files for the hydraulics and hydrology.

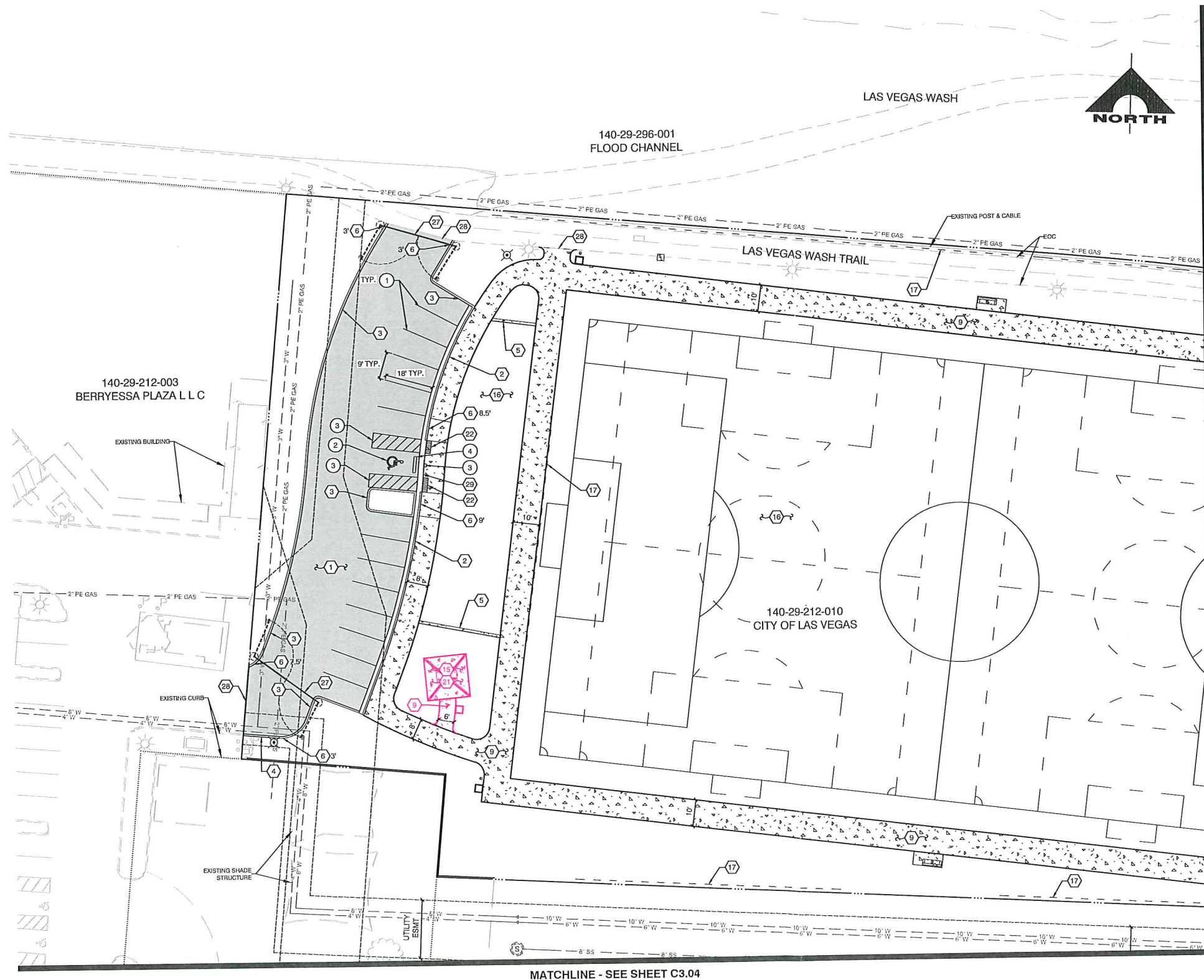
8. Add a note for all storm drain drop inlets that references the newly adopted USDCCA Drawing No. 421 (Stormwater Quality Management Stamp and Sign Detail).
9. Provide a Construction Note for the access gates and details. Reference Sheets C3.01 & C3.05.
10. Sheet C3.01: Provide reference sections for matching into existing improvements.
11. Sheet C4.02: Provide a cross section near the water feature to show that the water feature is sufficiently elevated to prevent offsite flows from impacting water feature drain.
12. Sheet C4.04: Verify inlet box size will accommodate the three storm drain lines. Revise the inlet northwest of the restroom/storage building to an NDOT Type 2 inlet with concrete apron. Provide Finish Floor elevation for restroom/storage building.
13. Additional comments are included with the marked-up plans.

CC: Oh-Sang Kwon, P.E. – CLV
Steve Jones, P.E. – GCW

F:\PW_Flood\CIP Projects\Washington Las Vegas WashPark\Comments\90% Washington Las Vegas Wash Park CLV Flood memo.docx

APPENDIX E

Improvement Plans



CONSTRUCTION NOTES

1. CONSTRUCT PLANT MIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE (SEE SECTION 4, SHEET C3.07)
2. CONSTRUCT CONCRETE 'L' TYPE CURB & GUTTER (USDOCA STD. DWG. NO. 216 SHEET C3.10)
3. CONSTRUCT CONCRETE 'A' TYPE CURB (USDOCA STD. DWG. NO. 219 SHEET C3.10)
4. CONSTRUCT CONCRETE 'ZERO' TYPE CURB (SEE DETAIL 1, SHEET C3.07)
5. CONSTRUCT CONCRETE 'LANDSCAPE' TYPE CURB (SEE DETAIL 2, SHEET C3.07)
6. CONSTRUCT CURB TRANSITION (SEE DETAIL 1, SHEET C3.08)
7. CONSTRUCT CONCRETE BUS TURN-OUT (USDOCA STD. DWG. NO. 234.1 SHEET C3.11)
8. CONSTRUCT CONCRETE MEDIAN ISLAND (USDOCA STD. DWG. NO. 216 SHEET C3.10)
9. CONSTRUCT CONCRETE SIDEWALK (WIDTH VARIES) (SEE SECTION 4, SHEET C3.07) (USDOCA STD. DWG. NO. 234 SHEET C3.11)
10. CONSTRUCT SIDEWALK RAMP - CASE I WITH TACTILE WARNING PANEL (USDOCA STD. DWG. NO. 235 SHEET C3.10)
11. CONSTRUCT SIDEWALK RAMP - CASE II WITH TACTILE WARNING PANEL (USDOCA STD. DWG. NO. 235 SHEET C3.10)
12. CONSTRUCT CONCRETE SLAB AND RESTROOM (SEE SECTION 4, SHEET C3.07 & ARCHITECTURE PLANS)
13. CONSTRUCT POST-TENSIONED CONCRETE SLAB (SEE SHEET S1.00)
14. CONSTRUCT TRASH ENCLOSURE (SEE SECTION 4, SHEET C3.07 & DETAIL 1, SHEET C3.12)
15. CONSTRUCT ON-GRADE SLAB (SEE SECTION 4, SHEET C3.07)
16. INSTALL SYNTHETIC TURF (SEE SHEET L1.10)
17. INSTALL 20' TALL SOCCER NET (SEE DETAILS B & C, SHEET L4.06)
18. INSTALL 8' TALL BASKETBALL SAFETY BARRIER NET (SEE DETAIL D, SHEET L4.06)
19. CONSTRUCT DG-PATH (SEE DETAIL A, SHEET L4.04)
20. INSTALL CANOPY (SEE SHEETS L4.01-L4.02)
21. INSTALL RAMADA (SEE SHEETS L5.01-L5.12)
22. INSTALL TACTILE WARNING PANEL (USDOCA STD. DWG. NO. 235 SHEET C3.10)
23. CONSTRUCT CONCRETE 'L' TYPE ISLAND CURB & GUTTER (USDOCA STD. DWG. NO. 219 SHEET C3.10)
24. CONSTRUCT SIDEWALK DRAIN (USDOCA STD. DWG. NO. 238 SHEET C3.11)
25. UTACS OVERLAY (1-INCH)
26. CONSTRUCT CONCRETE CROSS GUTTER (USDOCA STD. DWG. NO. 238 SHEET C3.11)
27. INSTALL GATE (SEE DETAIL J, SHEET L4.06)
28. PAVEMENT CONNECTION (SEE DETAIL S, SHEET C3.07)
29. CONSTRUCT CONCRETE VALLEY GUTTER (SEE DETAIL 3, SHEET C3.07)

NOTES:
1. SEE LANDSCAPING PLANS FOR CONCRETE FINISH AND/OR COLOR.

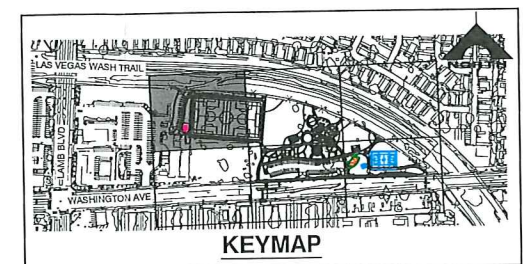
TRAFFIC NOTES

1. 4" SOLID WHITE (PAINT)
2. ACCESSIBLE DISABLED LEGEND (PAINT) (SEE DETAIL S, SHEET C3.09)
3. INSTALL ADA ACCESSIBLE STALL SIGNING AND STRIPING (PAINT) (SEE DETAILS 6 & 7, SHEET C3.08)
4. INSTALL PRECAST BUMPER BLOCKS (USDOCA STD. DWG. NO. 238 SHEET C3.11)
5. INSTALL SIGN(S) (GROUND MOUNTED)
6. INSTALL SIGN(S) (POLE MOUNTED)
7. 24" WHITE CROSSWALK (PMF-NDOT TYPE 2) (USDOCA STD. DWG. NO. 254 SHEET C3.11)
8. PEDESTRIAN FLASHER (SEE SHEET C6.01)
9. 24" WHITE YIELD LINE (PMF-NDOT TYPE 2)
- R. REMOVE EXISTING SIGN(S)
- E. EXISTING SIGN(S) TO REMAIN

NOTES:
1. SEE FLASHER PLAN (SHT C6.01) FOR POLE MOUNTED SIGNS
2. POSITION R1-5 SIGN TO AVOID BLOCKING VIEW OF W11-2 SIGN

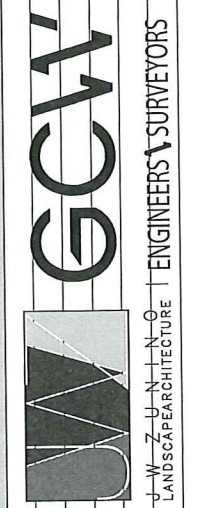
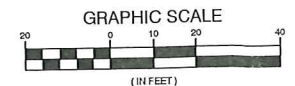
LEGEND

	ADDITIVE ALTERNATE 1
	ADDITIVE ALTERNATE 2
	ADDITIVE ALTERNATE 3
	ADDITIVE ALTERNATE 4
	CONSTRUCT PLANT MIX BITUMINOUS SURFACE (SEE TYPICAL SECTIONS FOR PAVEMENT SECTION)
	1-INCH UTACS OVERLAY
	CONSTRUCT CONCRETE
	CONSTRUCT DG PATH

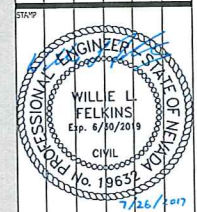


CALL BEFORE CONSTRUCTION

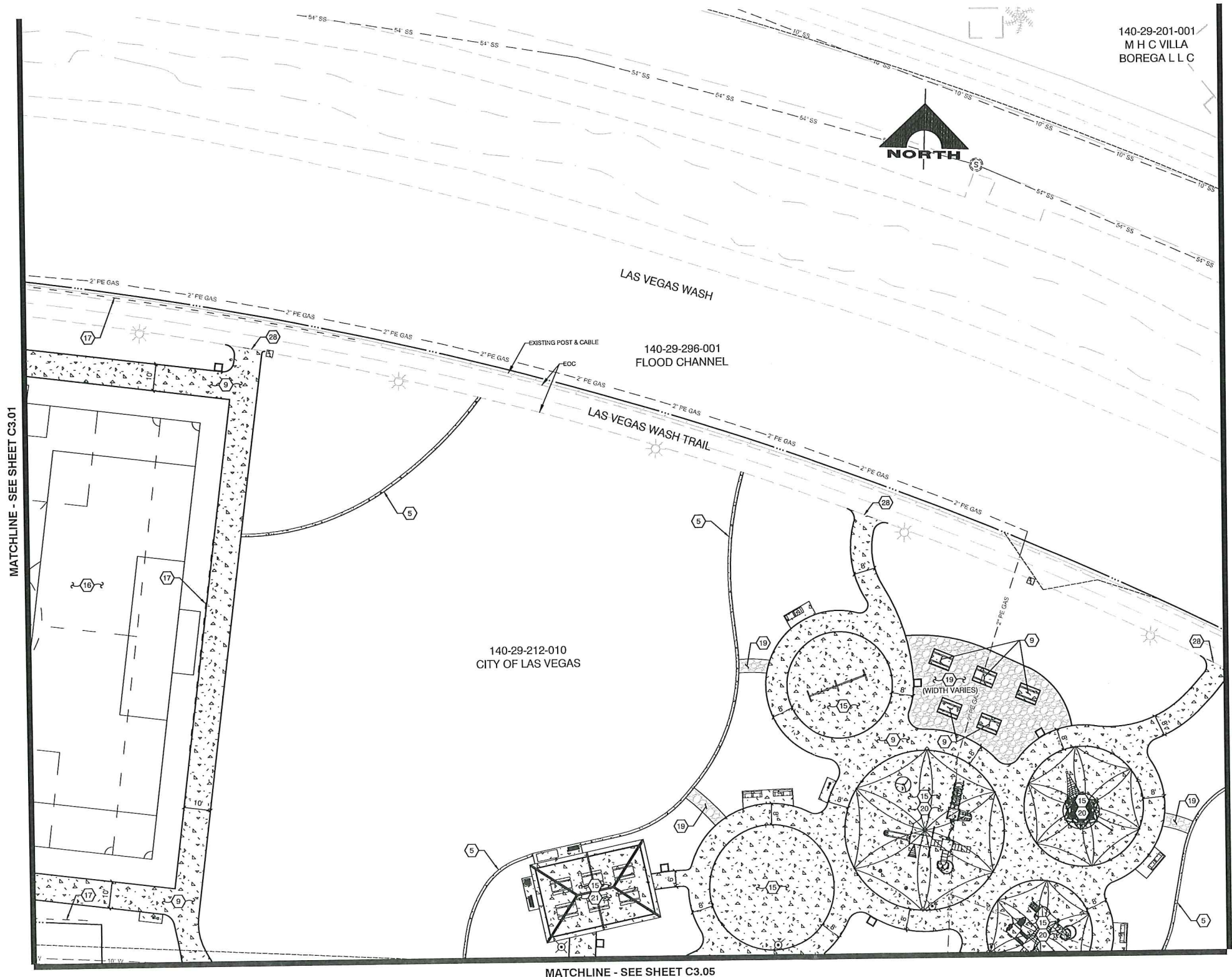
BEFORE YOU DIG	USA NORTH	811 OR 800-227-2000
BEFORE YOU UNDERGROUND	F.A.S.T.	702-432-5300
BEFORE YOU OVERHEAD	CLARK COUNTY TRAFFIC OPERATIONS	702-455-7511
	CITY OF LAS VEGAS T.E.F.O.	702-229-6611
	NV ENERGY	702-227-2929



WASHINGTON LAS VEGAS WASH PARK
CITY OF LAS VEGAS
100% CONSTRUCTION DOCUMENTS
CONSTRUCTION PLAN



OWNER: CITY OF LAS VEGAS
DEPARTMENT OF PUBLIC WORKS
400 EAST STEWART AVENUE
LAS VEGAS, NEVADA 89101
PHONE: (702) 229-6335
FAX: (702) 584-8846
TDD: (702) 584-3108
DESIGNER: FUG
FILE: AS SHOWN
DATE: 07/26/17
SCALE: AS SHOWN
SHEET NO: 1553811DC
CITY ENGINEER: 65015
CIVIL NO: 53811
SHEET NO: C3.01



CONSTRUCTION NOTES

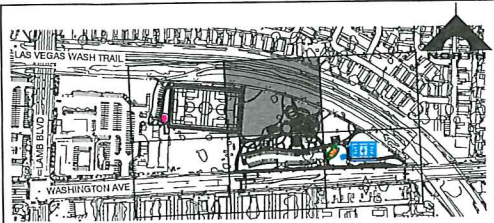
- 1. CONSTRUCT PLANT MIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE (SEE SECTION 4, SHEET C3.07)
- 2. CONSTRUCT CONCRETE "L" TYPE CURB & GUTTER (USDOCA STD. DWG. NO. 218 SHEET C3.10)
- 3. CONSTRUCT CONCRETE "A" TYPE CURB (USDOCA STD. DWG. NO. 219 SHEET C3.10)
- 4. CONSTRUCT CONCRETE "ZERO" TYPE CURB (SEE DETAIL 1, SHEET C3.07)
- 5. CONSTRUCT CONCRETE "LANDSCAPE" TYPE CURB (SEE DETAIL 2, SHEET C3.07)
- 6. CONSTRUCT CURB TRANSITION (SEE DETAIL 1, SHEET C3.08)
- 7. CONSTRUCT CONCRETE BUS TURN-OUT (USDOCA STD. DWG. NO. 234.1 SHEET C3.11)
- 8. CONSTRUCT CONCRETE MEDIAN ISLAND (USDOCA STD. DWG. NO. 218 SHEET C3.10)
- 9. CONSTRUCT CONCRETE SIDEWALK (WIDTH VARIES) (SEE SECTION 4, SHEET C3.07) (USDOCA STD. DWG. NO. 234 SHEET C3.11)
- 10. CONSTRUCT SIDEWALK RAMP - CASE I WITH TACTILE WARNING PANEL (USDOCA STD. DWG. NO. 235 SHEET C3.10)
- 11. CONSTRUCT SIDEWALK RAMP - CASE II WITH TACTILE WARNING PANEL (USDOCA STD. DWG. NO. 235 SHEET C3.10)
- 12. CONSTRUCT CONCRETE SLAB AND RESTROOM (SEE SECTION 4, SHEET C3.07 & ARCHITECTURE PLANS)
- 13. CONSTRUCT POST-TENSIONED CONCRETE SLAB (SEE SHEET S1.00)
- 14. CONSTRUCT TRASH ENCLOSURE (SEE SECTION 4, SHEET C3.07 & DETAIL 1, SHEET C3.12)
- 15. CONSTRUCT ON-GRADE SLAB (SEE SECTION 4, SHEET C3.07)
- 16. INSTALL SYNTHETIC TURF (SEE SHEET L1.10)
- 17. INSTALL 28" TALL SOCCER NET (SEE DETAILS B & C, SHEET L4.08)
- 18. INSTALL 8" TALL BASKETBALL SAFETY BARRIER NET (SEE DETAIL D, SHEET L4.08)
- 19. CONSTRUCT DG-PATH (SEE DETAIL A, SHEET L4.04)
- 20. INSTALL CANOPY (SEE SHEETS L8.01-L8.02)
- 21. INSTALL RAMADA (SEE SHEETS L8.01-L8.12)
- 22. INSTALL TACTILE WARNING PANEL (USDOCA STD. DWG. NO. 235 SHEET C3.10)
- 23. CONSTRUCT CONCRETE "L" TYPE ISLAND CURB & GUTTER (USDOCA STD. DWG. NO. 218 SHEET C3.10)
- 24. CONSTRUCT SIDEWALK DRAIN (USDOCA STD. DWG. NO. 238 SHEET C3.11)
- 25. UTACS OVERLAY (1-INCH)
- 26. CONSTRUCT CONCRETE CROSS GUTTER (USDOCA STD. DWG. NO. 238 SHEET C3.11)
- 27. INSTALL GATE (SEE DETAIL J, SHEET L4.08)
- 28. PAVEMENT CONNECTION (SEE DETAIL K, SHEET C3.07)
- 29. CONSTRUCT CONCRETE VALLEY GUTTER (SEE DETAIL L, SHEET C3.07)

NOTES:
1. SEE LANDSCAPING PLANS FOR CONCRETE FINISH AND/OR COLOR.
TRAFFIC NOTES

- 1. 4" SOLID WHITE (PAINT)
- 2. ACCESSIBLE DISABLED LEGEND (PAINT) (SEE DETAIL 6, SHEET C3.09)
- 3. INSTALL ADA ACCESSIBLE STALL SIGNING AND STRIPING (PAINT) (SEE DETAILS 6 & 7, SHEET C3.09)
- 4. INSTALL PRECAST BUMPER BLOCKS (USDOCA STD. DWG. NO. 238 SHEET C3.11)
- 5. INSTALL SIGN(S) (GROUND MOUNTED)
- 6. INSTALL SIGN(S) (POLE MOUNTED)
- 7. 24" WHITE CROSSWALK (PMF-NDOT TYPE 2) (USDOCA STD. DWG. NO. 234 SHEET C3.11)
- 8. PEDESTRIAN FLASHER (SEE SHEET C6.01)
- 9. 24" WHITE YIELD LINE (PMF-NDOT TYPE 2)
- R. REMOVE EXISTING SIGN(S)
- E. EXISTING SIGN(S) TO REMAIN

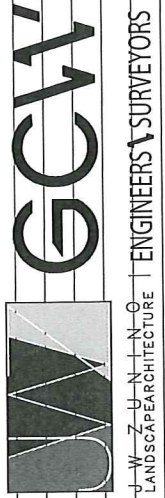
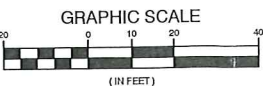
- NOTES:
1. SEE FLASHER PLAN (SHT C6.01) FOR POLE MOUNTED SIGNS
2. POSITION R1-5 SIGN TO AVOID BLOCKING VIEW OF W11-2 SIGN

LEGEND	
	ADDITIVE ALTERNATE 1
	ADDITIVE ALTERNATE 2
	ADDITIVE ALTERNATE 3
	ADDITIVE ALTERNATE 4
	CONSTRUCT PLANT MIX BITUMINOUS SURFACE (SEE TYPICAL SECTIONS FOR PAVEMENT SECTION)
	1-INCH UTACS OVERLAY
	CONSTRUCT CONCRETE
	CONSTRUCT DG PATH

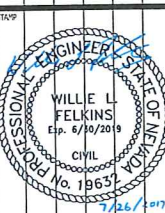


CALL BEFORE CONSTRUCTION

BEFORE YOU DIG	USA NORTH	811 OR 800-227-2600
BEFORE YOU UNDERGROUND	F.A.S.T.	702-432-5300
BEFORE YOU OVERHEAD	CLARK COUNTY TRAFFIC OPERATIONS	702-455-7511
	CITY OF LAS VEGAS T.E.F.O.	702-229-6611
	NV ENERGY	702-227-2920



WASHINGTON LAS VEGAS WASH PARK
CITY OF LAS VEGAS
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CONSTRUCTION PLAN



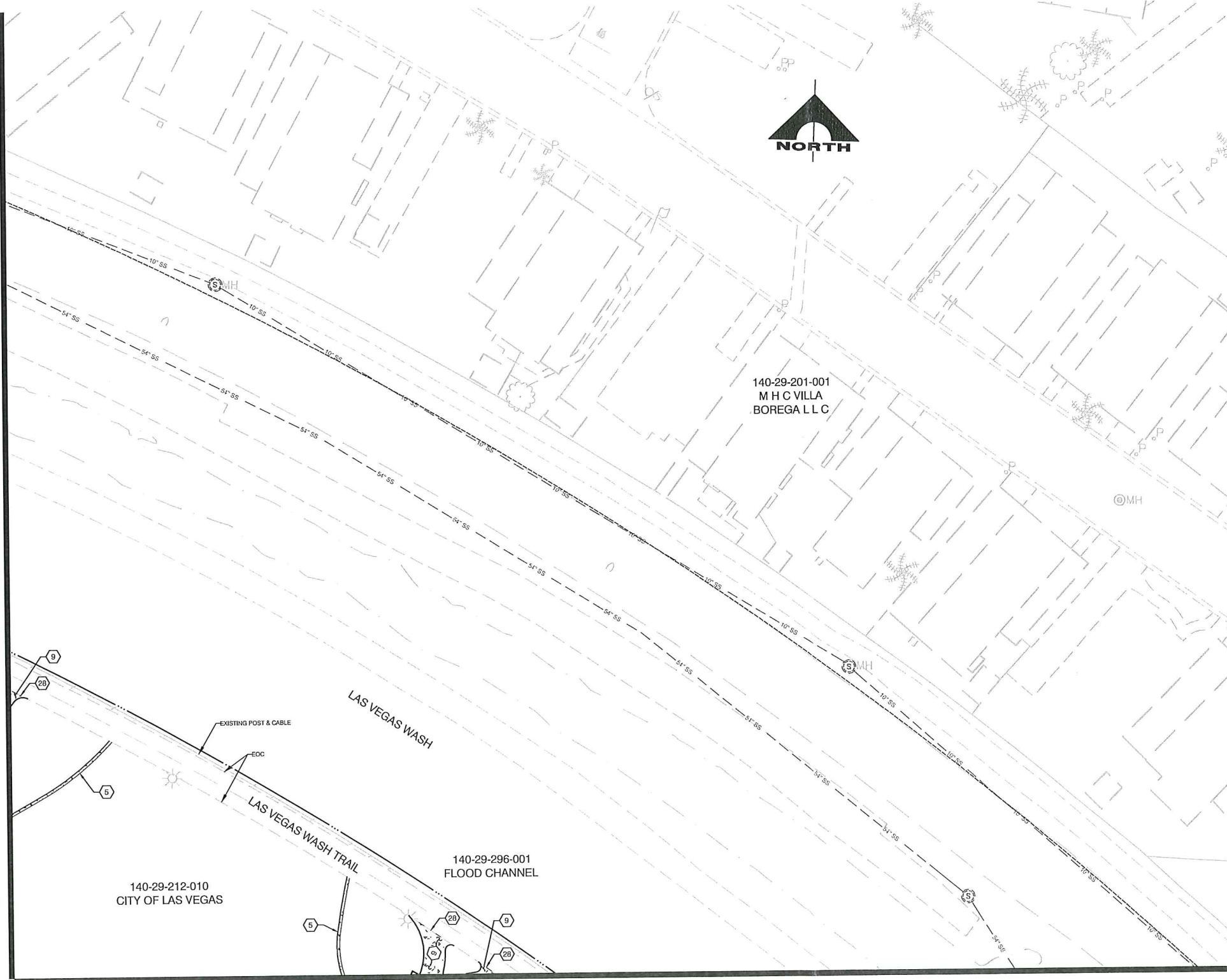
OWNER: CITY OF LAS VEGAS
DEPARTMENT OF PUBLIC WORKS

400 EAST STEWART AVENUE
LAS VEGAS, NEVADA 89101
PHONE: (702) 229-5535
FAX: (702) 386-1846
TDD: (702) 386-1108

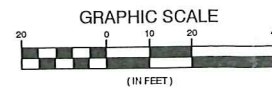
DATE	7/26/2017
FILE	AS SHOWN
DATE	07/26/17
SCALE	AS SHOWN
ED NO	155381.1DC
CLV DWG NO	65015
REVISED NO	53811
REVISED NO	

C3.02

MATCHLINE - SEE SHEET C3.02



MATCHLINE - SEE SHEET C3.06



CONSTRUCTION NOTES

1. CONSTRUCT PLANT MIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE (SEE SECTION 4, SHEET C3.07)
2. CONSTRUCT CONCRETE "L" TYPE CURB & GUTTER (USDOCA STD. DWG. NO. 234.1 SHEET C3.11)
3. CONSTRUCT CONCRETE "N" TYPE CURB (USDOCA STD. DWG. NO. 219 SHEET C3.10)
4. CONSTRUCT CONCRETE "ZERO" TYPE CURB (SEE DETAIL 1, SHEET C3.07)
5. CONSTRUCT CONCRETE "LANDSCAPE" TYPE CURB (SEE DETAIL 2, SHEET C3.07)
6. CONSTRUCT CURB TRANSITION (SEE DETAIL 1, SHEET C3.08)
7. CONSTRUCT CONCRETE BUS TURN-OUT (USDOCA STD. DWG. NO. 234.1 SHEET C3.11)
8. CONSTRUCT CONCRETE MEDIAN ISLAND (USDOCA STD. DWG. NO. 218 SHEET C3.10)
9. CONSTRUCT CONCRETE SIDEWALK (WIDTH VARIES) (SEE SECTION 4, SHEET C3.07) (USDOCA STD. DWG. NO. 234 SHEET C3.11)
10. CONSTRUCT SIDEWALK RAMP - CASE I WITH TACTILE WARNING PANEL (USDOCA STD. DWG. NO. 235 SHEET C3.10)
11. CONSTRUCT SIDEWALK RAMP - CASE II WITH TACTILE WARNING PANEL (USDOCA STD. DWG. NO. 235 SHEET C3.10)
12. CONSTRUCT CONCRETE SLAB AND RESTROOM (SEE SECTION 4, SHEET C3.07 & ARCHITECTURE PLANS)
13. CONSTRUCT POST-TENSIONED CONCRETE SLAB (SEE SHEET S1.00)
14. CONSTRUCT TRASH ENCLOSURE (SEE SECTION 4, SHEET C3.07 & DETAIL 1, SHEET C3.12)
15. CONSTRUCT ON-GRADE SLAB (SEE SECTION 4, SHEET C3.07)
16. INSTALL SYNTHETIC TURF (SEE SHEET L1.10)
17. INSTALL 28' TALL SOCCER NET (SEE DETAILS B & C, SHEET L4.00)
18. INSTALL 8' TALL BASKETBALL SAFETY BARRIER NET (SEE DETAIL D, SHEET L4.00)
19. CONSTRUCT DG PATH (SEE DETAIL A, SHEET L4.04)
20. INSTALL CANOPY (SEE SHEETS L8.01-L8.02)
21. INSTALL RAMADA (SEE SHEETS L5.01-L5.12)
22. INSTALL TACTILE WARNING PANEL (USDOCA STD. DWG. NO. 235 SHEET C3.10)
23. CONSTRUCT CONCRETE "L" TYPE ISLAND CURB & GUTTER (USDOCA STD. DWG. NO. 219 SHEET C3.10)
24. CONSTRUCT SIDEWALK DRAIN (USDOCA STD. DWG. NO. 238 SHEET C3.11)
25. UTACS OVERLAY (1 INCH)
26. CONSTRUCT CONCRETE CROSS GUTTER (USDOCA STD. DWG. NO. 238 SHEET C3.11)
27. INSTALL GATE (SEE DETAIL J, SHEET L4.00)
28. PAVEMENT CONNECTION (SEE DETAIL 6, SHEET C3.07)
29. CONSTRUCT CONCRETE VALLEY GUTTER (SEE DETAIL 3, SHEET C3.07)

NOTES:
1. SEE LANDSCAPING PLANS FOR CONCRETE FINISH AND/OR COLOR.

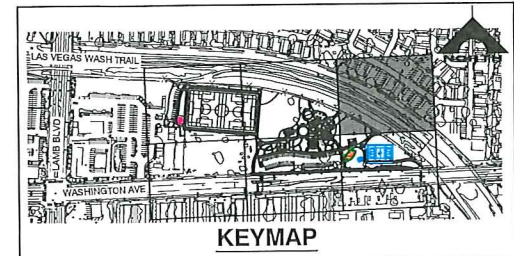
TRAFFIC NOTES

1. 4" SOLID WHITE (PAINT)
2. ACCESSIBLE DISABLED LEGEND (PAINT) (SEE DETAIL 5, SHEET C3.09)
3. INSTALL ADA ACCESSIBLE STALL SIGNING AND STRIPING (PAINT) (SEE DETAILS 6 & 7, SHEET C3.09)
4. INSTALL PRECAST BUMPER BLOCKS (USDOCA STD. DWG. NO. 238 SHEET C3.11)
5. INSTALL SIGN(S) (GROUND MOUNTED)
6. INSTALL SIGN(S) (POLE MOUNTED)
7. 24" WHITE CROSSWALK (PMF-NDOT TYPE 2) (USDOCA STD. DWG. NO. 254 SHEET C3.11)
8. PEDESTRIAN FLASHER (SEE SHEET C6.01)
9. 24" WHITE YIELD LINE (PMF-NDOT TYPE 2)
- R. REMOVE EXISTING SIGN(S)
- E. EXISTING SIGN(S) TO REMAIN

NOTES:
1. SEE FLASHER PLAN (SHT C6.01) FOR POLE MOUNTED SIGNS
2. POSITION R1-5 SIGN TO AVOID BLOCKING VIEW OF W11-2 SIGN

LEGEND

- ADDITIVE ALTERNATE 1
- ADDITIVE ALTERNATE 2
- ADDITIVE ALTERNATE 3
- ADDITIVE ALTERNATE 4
- CONSTRUCT PLANT MIX BITUMINOUS SURFACE (SEE TYPICAL SECTIONS FOR PAVEMENT SECTION)
- 1-INCH UTACS OVERLAY
- CONSTRUCT CONCRETE
- CONSTRUCT DG PATH

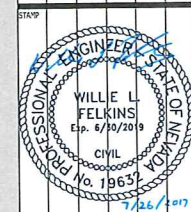


CALL BEFORE CONSTRUCTION

BEFORE YOU DIG	USA NORTH	811 OR 800-227-2600
BEFORE YOU UNDERGROUND	F.A.S.T.	702-432-5300
BEFORE YOU OVERHEAD	CLARK COUNTY TRAFFIC OPERATIONS	702-455-7511
	CITY OF LAS VEGAS T.E.F.O.	702-229-6611
	NV ENERGY	702-227-2929



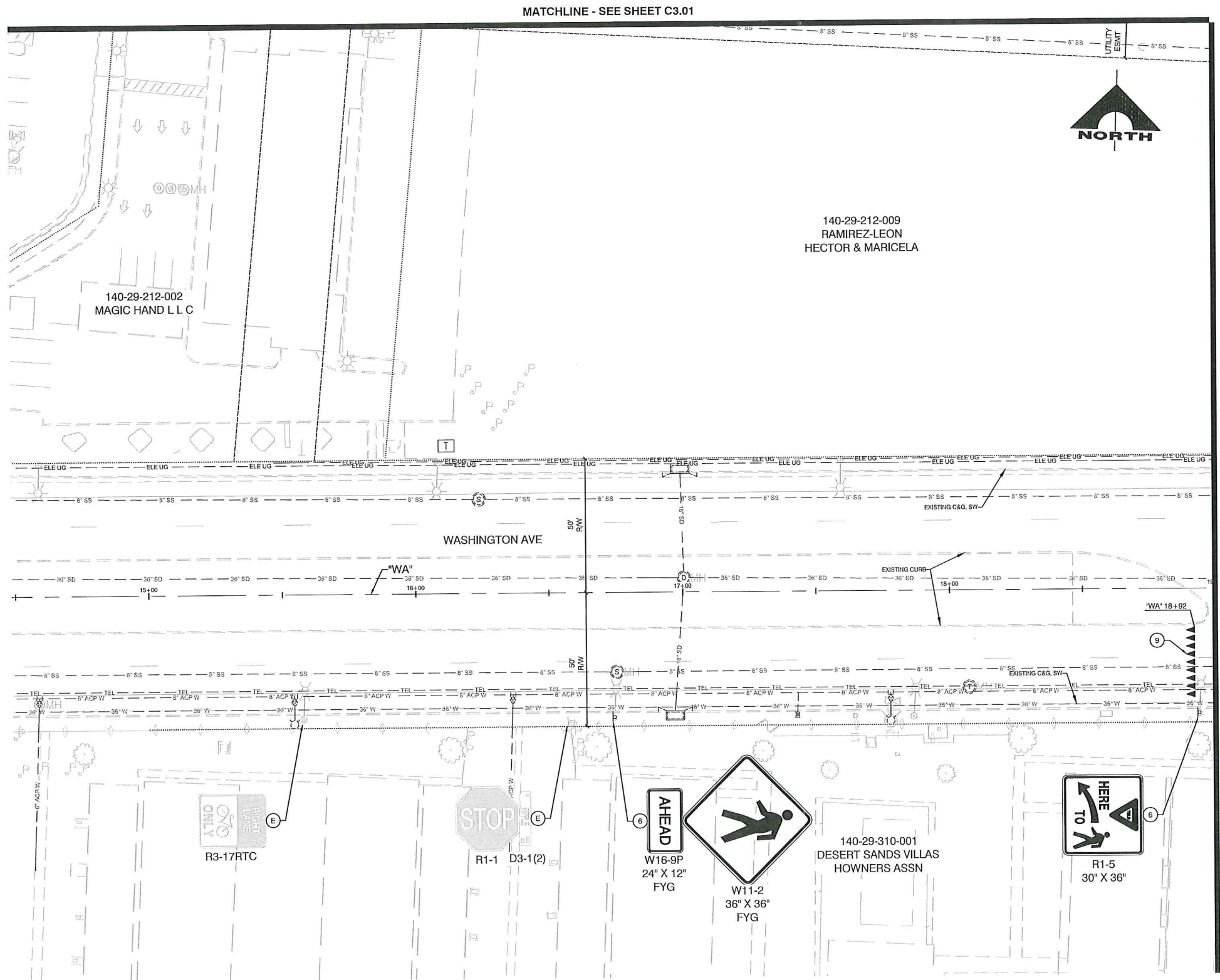
WASHINGTON LAS VEGAS WASH PARK
CITY OF LAS VEGAS
100% CONSTRUCTION DOCUMENTS
CONSTRUCTION PLAN



OWNER: CITY OF LAS VEGAS
DEPARTMENT OF PUBLIC WORKS

400 EAST STEWART AVENUE
LAS VEGAS, NEVADA 89101
PHONE: (702) 229-5535
FAX: (702) 229-5535
TDD: (702) 229-5535

DATE	01/26/11
SCALE	AS SHOWN
SD NO	1553811DC
OWNER NO	65015
VEGA NO	53811
SHEET NO	C3.03



CONSTRUCTION NOTES

1. CONSTRUCT PLANT MIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE (SEE SECTION 4, SHEET C3.07)
2. CONSTRUCT CONCRETE "L" TYPE CURB & GUTTER (USDCCA STD. DWG. NO. 218 SHEET C3.10)
3. CONSTRUCT CONCRETE "A" TYPE CURB (USDCCA STD. DWG. NO. 219 SHEET C3.10)
4. CONSTRUCT CONCRETE "ZERO" TYPE CURB (SEE DETAIL 1, SHEET C3.07)
5. CONSTRUCT CONCRETE "LANDSCAPE" TYPE CURB (SEE DETAIL 2, SHEET C3.07)
6. CONSTRUCT CURB TRANSITION (SEE DETAIL 1, SHEET C3.08)
7. CONSTRUCT CONCRETE BUS TURN-OUT (USDCCA STD. DWG. NO. 234.1 SHEET C3.11)
8. CONSTRUCT CONCRETE MEDIAN ISLAND (USDCCA STD. DWG. NO. 218 SHEET C3.10)
9. CONSTRUCT CONCRETE SIDEWALK (WIDTH VARIES) (SEE SECTION 4, SHEET C3.07) (USDCCA STD. DWG. NO. 234 SHEET C3.11)
10. CONSTRUCT SIDEWALK RAMP - CASE I WITH TACTILE WARNING PANEL (USDCCA STD. DWG. NO. 235 SHEET C3.10)
11. CONSTRUCT SIDEWALK RAMP - CASE II WITH TACTILE WARNING PANEL (USDCCA STD. DWG. NO. 235 SHEET C3.10)
12. CONSTRUCT CONCRETE SLAB AND RESTROOM (SEE SECTION 4, SHEET C3.07 & ARCHITECTURE PLANS)
13. CONSTRUCT POST-TENSIONED CONCRETE SLAB (SEE SHEET S1.00)
14. CONSTRUCT TRASH ENCLOSURE (SEE SECTION 4, SHEET C3.07 & DETAIL 1, SHEET C3.12)
15. CONSTRUCT ON-GRADE SLAB (SEE SECTION 4, SHEET C3.07)
16. INSTALL SYNTHETIC TURF (SEE SHEET L1.10)
17. INSTALL 28' TALL SOCCER NET (SEE DETAILS B & C, SHEET L4.08)
18. INSTALL 8' TALL BASKETBALL SAFETY BARRIER NET (SEE DETAIL D, SHEET L4.08)
19. CONSTRUCT DG-PATH (SEE DETAIL A, SHEET L4.04)
20. INSTALL CANOPY (SEE SHEETS L8.01-L8.02)
21. INSTALL RAMADA (SEE SHEETS L5.01-L5.12)
22. INSTALL TACTILE WARNING PANEL (USDCCA STD. DWG. NO. 235 SHEET C3.10)
23. CONSTRUCT CONCRETE "L" TYPE ISLAND CURB & GUTTER (USDCCA STD. DWG. NO. 219 SHEET C3.10)
24. CONSTRUCT SIDEWALK DRAIN (USDCCA STD. DWG. NO. 238 SHEET C3.11)
25. UTACS OVERLAY (1-INCH)
26. CONSTRUCT CONCRETE CROSS GUTTER (USDCCA STD. DWG. NO. 238 SHEET C3.11)
27. INSTALL GATE (SEE DETAIL J, SHEET L4.08)
28. PAVEMENT CONNECTION (SEE DETAIL 5, SHEET C3.07)
29. CONSTRUCT CONCRETE VALLEY GUTTER (SEE DETAIL 3, SHEET C3.07)

NOTES:
1. SEE LANDSCAPING PLANS FOR CONCRETE FINISH AND/OR COLOR.

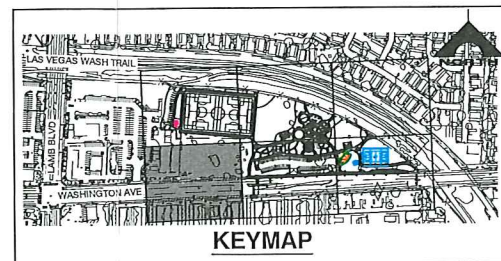
TRAFFIC NOTES

1. 4" SOLID WHITE (PAINT)
2. ACCESSIBLE DISABLED LEGEND (PAINT) (SEE DETAIL 5, SHEET C3.09)
3. INSTALL ADA ACCESSIBLE STALL SIGNING AND STRIPING (PAINT) (SEE DETAILS 6 & 7, SHEET C3.09)
4. INSTALL PRECAST BUMPER BLOCKS (USDCCA STD. DWG. NO. 238 SHEET C3.11)
5. INSTALL SIGN(S) (GROUND MOUNTED)
6. INSTALL SIGN(S) (POLE MOUNTED)
7. 24" WHITE CROSSWALK (P/W-NDOT TYPE 2) (USDCCA STD. DWG. NO. 254 SHEET C3.11)
8. PEDESTRIAN FLASHER (SEE SHEET C8.01)
9. 24" WHITE YIELD LINE (P/W-NDOT TYPE 2)
- R. REMOVE EXISTING SIGN(S)
- E. EXISTING SIGN(S) TO REMAIN

NOTES:
1. SEE FLASHER PLAN (SHT C8.01) FOR POLE MOUNTED SIGNS
2. POSITION R1-5 SIGN TO AVOID BLOCKING VIEW OF W11-2 SIGN

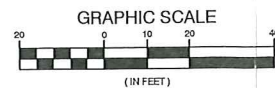
LEGEND

	ADDITIVE ALTERNATE 1
	ADDITIVE ALTERNATE 2
	ADDITIVE ALTERNATE 3
	ADDITIVE ALTERNATE 4
	CONSTRUCT PLANT MIX BITUMINOUS SURFACE (SEE TYPICAL SECTIONS FOR PAVEMENT SECTION)
	1-INCH UTACS OVERLAY
	CONSTRUCT CONCRETE
	CONSTRUCT DG PATH



CALL BEFORE CONSTRUCTION

BEFORE YOU DIG	USA NORTH	811 OR 606-227-2600
BEFORE YOU UNDERGROUND	F.A.S.T.	702-432-5300
	CLARK COUNTY TRAFFIC OPERATIONS	702-455-7511
	CITY OF LAS VEGAS T.E.F.O.	702-229-6611
BEFORE YOU OVERHEAD	NV ENERGY	702-227-2929



WASHINGTON LAS VEGAS WASH PARK
CITY OF LAS VEGAS
100% CONSTRUCTION DOCUMENTS
CONSTRUCTION PLAN

REVISIONS

NO.	DATE	DESCRIPTION
1	7/26/2017	ISSUED FOR PERMIT

CONSULTANT

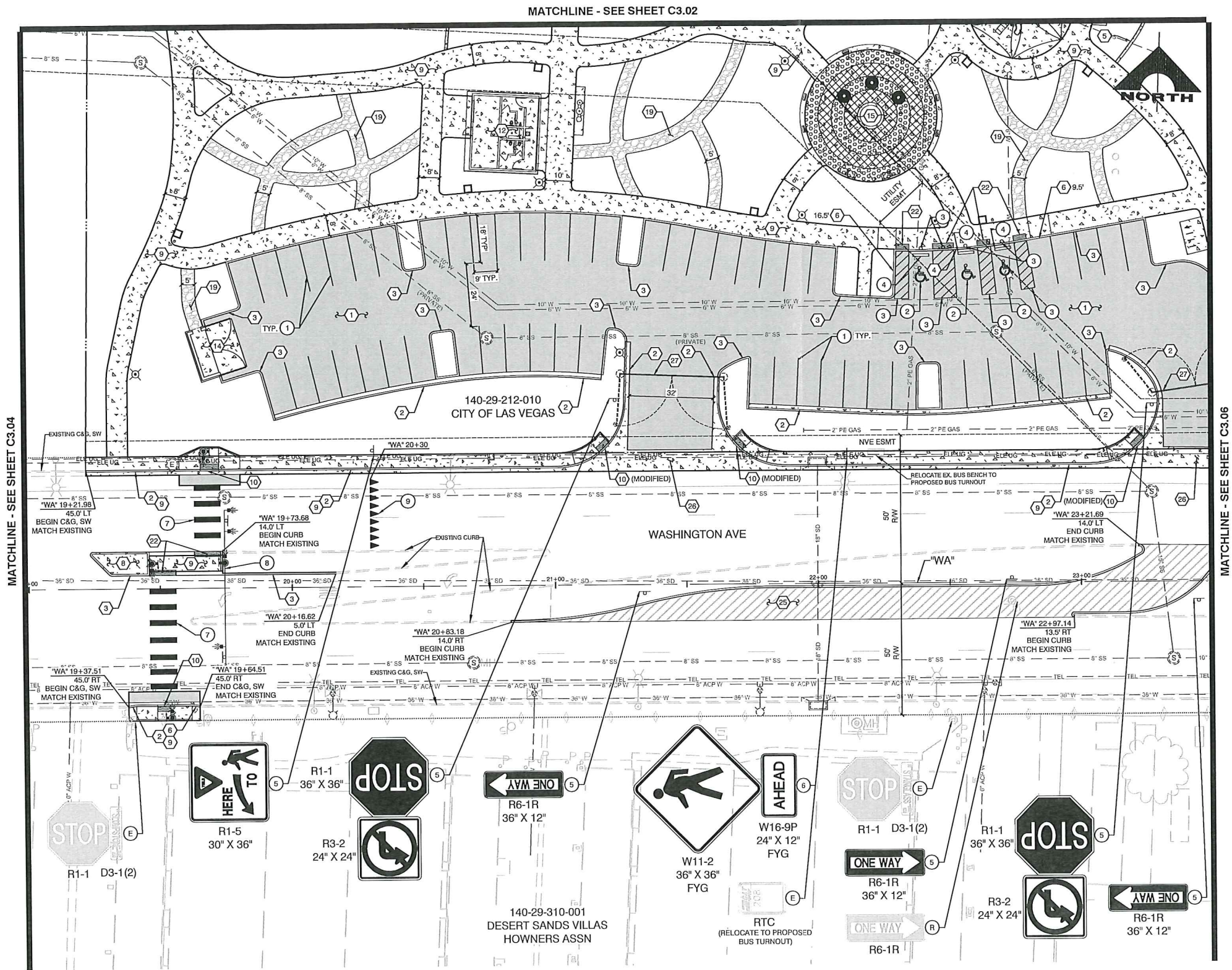
GCA
J.W. ZUNIGA
LANDSCAPE ARCHITECTURE
ENGINEERS & SURVEYORS

PROFESSIONAL ENGINEER - STATE OF NEVADA
WILLIE L. FELKINS
Exp. 6/10/2019
CIVIL
No. 19631

OWNER: CITY OF LAS VEGAS
DEPARTMENT OF PUBLIC WORKS

400 EAST STEWART AVENUE
LAS VEGAS, NEVADA 89101
PHONE: (702) 229-8535
FAX: (702) 384-8846
TDD: (702) 386-9108

DRAWN: FJG
FILE: AS SHOWN
DATE: 07/26/17
SCALE: AS SHOWN
SHEET NO: 15.598/11 DC
CLV DRG NO: 65215
9/15/2017
53811
SHEET NO: C3.04



CONSTRUCTION NOTES

1. CONSTRUCT PLANT MIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE (SEE SECTION 4, SHEET C3.07)
2. CONSTRUCT CONCRETE "L" TYPE CURB & GUTTER (USDOCA STD. DWG. NO. 218 SHEET C3.10)
3. CONSTRUCT CONCRETE "A" TYPE CURB (USDOCA STD. DWG. NO. 219 SHEET C3.10)
4. CONSTRUCT CONCRETE "ZERO" TYPE CURB (SEE DETAIL 1, SHEET C3.07)
5. CONSTRUCT CONCRETE "LANDSCAPE" TYPE CURB (SEE DETAIL 2, SHEET C3.07)
6. CONSTRUCT CURB TRANSITION (SEE DETAIL 1, SHEET C3.08)
7. CONSTRUCT CONCRETE BUS TURN-OUT (USDOCA STD. DWG. NO. 234.1 SHEET C3.11)
8. CONSTRUCT CONCRETE MEDIAN ISLAND (USDOCA STD. DWG. NO. 218 SHEET C3.10)
9. CONSTRUCT CONCRETE SIDEWALK (WIDTH VARIES) (SEE SECTION 4, SHEET C3.07) (USDOCA STD. DWG. NO. 234 SHEET C3.11)
10. CONSTRUCT SIDEWALK RAMP - CASE I WITH TACTILE WARNING PANEL (USDOCA STD. DWG. NO. 235 SHEET C3.10)
11. CONSTRUCT SIDEWALK RAMP - CASE II WITH TACTILE WARNING PANEL (USDOCA STD. DWG. NO. 235 SHEET C3.10)
12. CONSTRUCT CONCRETE SLAB AND RESTROOM (SEE SECTION 4, SHEET C3.07 & ARCHITECTURE PLANS)
13. CONSTRUCT POST-TENSIONED CONCRETE SLAB (SEE SHEET S1.00)
14. CONSTRUCT TRASH ENCLOSURE (SEE SECTION 4, SHEET C3.07 & DETAIL 1, SHEET C3.12)
15. CONSTRUCT ON-GRADE SLAB (SEE SECTION 4, SHEET C3.07)
16. INSTALL SYNTHETIC TURF (SEE SHEET L1.10)
17. INSTALL 28" TALL SOCCER NET (SEE DETAILS B & C, SHEET L4.00)
18. INSTALL 8" TALL BASKETBALL SAFETY BARRIER NET (SEE DETAIL D, SHEET L4.00)
19. CONSTRUCT DG-PATH (SEE DETAIL A, SHEET L4.04)
20. INSTALL CANOPY (SEE SHEETS L5.01 & L5.02)
21. INSTALL RAMADA (SEE SHEETS L5.01 & L5.12)
22. INSTALL TACTILE WARNING PANEL (USDOCA STD. DWG. NO. 235 SHEET C3.10)
23. CONSTRUCT CONCRETE "L" TYPE ISLAND CURB & GUTTER (USDOCA STD. DWG. NO. 219 SHEET C3.10)
24. CONSTRUCT SIDEWALK DRAIN (USDOCA STD. DWG. NO. 236 SHEET C3.11)
25. UTACS OVERLAY (1-INCH)
26. CONSTRUCT CONCRETE CROSS GUTTER (USDOCA STD. DWG. NO. 228 SHEET C3.11)
27. INSTALL GATE (SEE DETAIL J, SHEET L4.00)
28. PAVEMENT CONNECTION (SEE DETAIL 5, SHEET C3.07)
29. CONSTRUCT CONCRETE VALLEY GUTTER (SEE DETAIL 3, SHEET C3.07)

NOTES:
1. SEE LANDSCAPING PLANS FOR CONCRETE FINISH AND/OR COLOR.

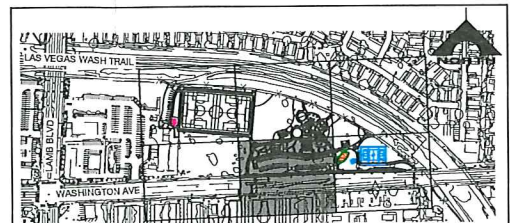
TRAFFIC NOTES

1. 4" SOLID WHITE (PAINT)
2. ACCESSIBLE DISABLED LEGEND (PAINT) (SEE DETAIL 5, SHEET C3.09)
3. INSTALL ADA ACCESSIBLE STALL SIGNING AND STRIPING (PAINT) (SEE DETAILS 6 & 7, SHEET C3.09)
4. INSTALL PRECAST BUMPER BLOCKS (USDOCA STD. DWG. NO. 238 SHEET C3.11)
5. INSTALL SIGN(S) (GROUND MOUNTED)
6. INSTALL SIGN(S) (POLE MOUNTED)
7. 24" WHITE CROSSWALK (P&M ADOT TYPE 2) (USDOCA STD. DWG. NO. 245 SHEET C3.11)
8. PEDESTRIAN FLASHER (SEE SHEET C6.01)
9. 24" WHITE YIELD LINE (P&M ADOT TYPE 2)
10. REMOVE EXISTING SIGN(S)
11. EXISTING SIGN(S) TO REMAIN

NOTES:
1. SEE FLASHER PLAN (SHT C6.01) FOR POLE MOUNTED SIGNS
2. POSITION R1-5 SIGN TO AVOID BLOCKING VIEW OF W11-2 SIGN

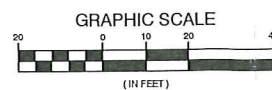
LEGEND

	ADDITIVE ALTERNATE 1
	ADDITIVE ALTERNATE 2
	ADDITIVE ALTERNATE 3
	ADDITIVE ALTERNATE 4
	CONSTRUCT PLANT MIX BITUMINOUS SURFACE (SEE TYPICAL SECTIONS FOR PAVEMENT SECTION)
	1-INCH UTACS OVERLAY
	CONSTRUCT CONCRETE
	CONSTRUCT DG PATH

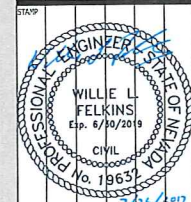


CALL BEFORE CONSTRUCTION

BEFORE YOU DIG	USA NORTH	811 OR 600-227-2600
	F.A.S.T.	702-432-5300
BEFORE YOU UNDERGROUND	CLARK COUNTY TRAFFIC OPERATIONS	702-455-7511
	CITY OF LAS VEGAS T.E.F.O.	702-229-6611
BEFORE YOU OVERHEAD	NV ENERGY	702-227-2929



WASHINGTON LAS VEGAS WASH PARK
CITY OF LAS VEGAS
100% CONSTRUCTION DOCUMENTS
CONSTRUCTION PLAN

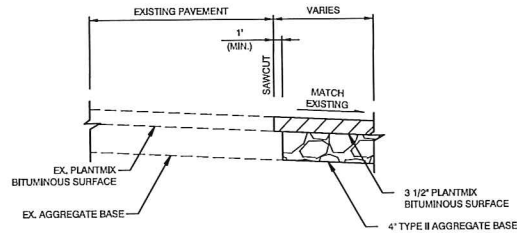


OWNER: CITY OF LAS VEGAS
DEPARTMENT OF PUBLIC WORKS

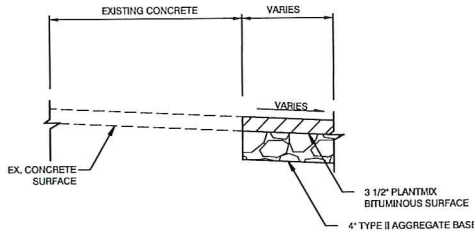
400 EAST STEWART AVENUE
LAS VEGAS, NEVADA 89101
PHONE: (702) 229-6535
FAX: (702) 384-8848
TDD: (702) 386-9108

DATE	AS SHOWN
DATE	01/06/11
SCALE	AS SHOWN
SD NO	155981.DOC
REV NO	05015
4100A NO	59811
SHEET NO	

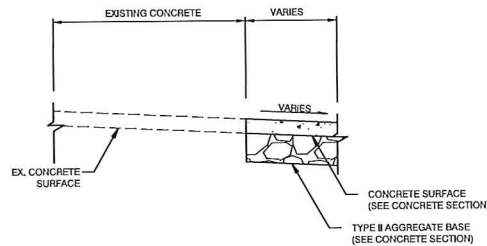
C3.05



PAVEMENT WIDENING



PAVEMENT TO CONCRETE



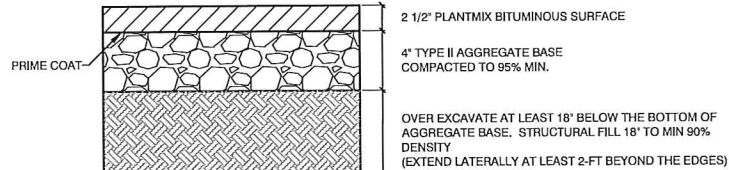
CONCRETE TO CONCRETE

PAVEMENT CONNECTIONS

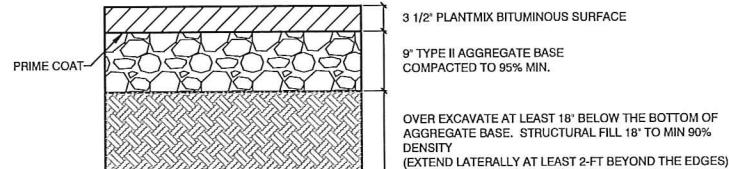
NOT TO SCALE

5

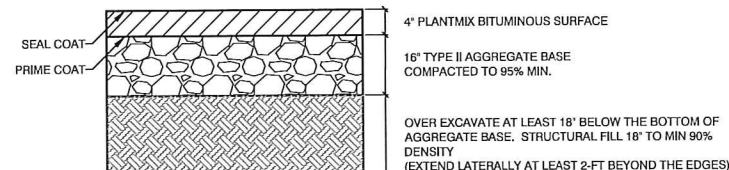
C3.07



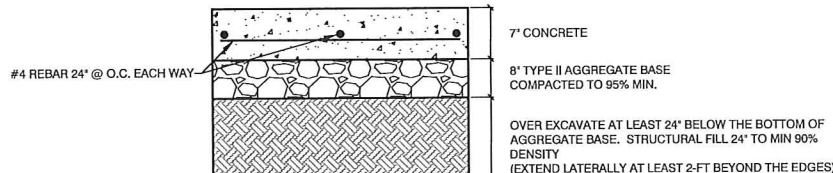
PARKING STALLS PLANTMIX BITUMINOUS SURFACE SECTION



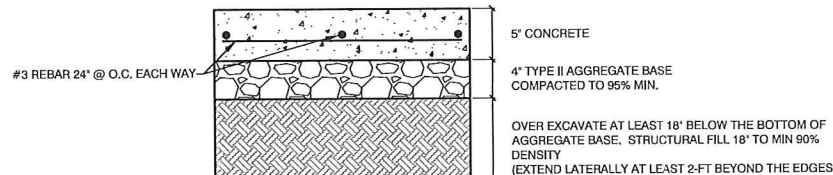
DRIVE ISLE BITUMINOUS SURFACE SECTION



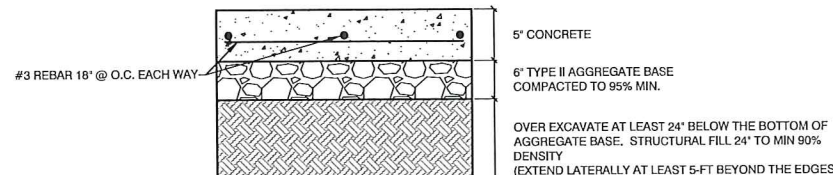
WASHINGTON AVE BITUMINOUS SURFACE SECTION



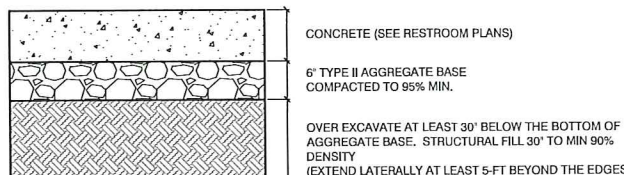
CONCRETE PAVEMENT SECTION FOR TRASH ENCLOSURE



CONCRETE PAVEMENT SECTION FOR SIDEWALKS & FLATWORK



CONCRETE PAVEMENT SECTION FOR ON-GRADE SLAB (UNDER CANOPIES, RAMADAS, TOT-LOT, SPLASH PAD, ETC.)



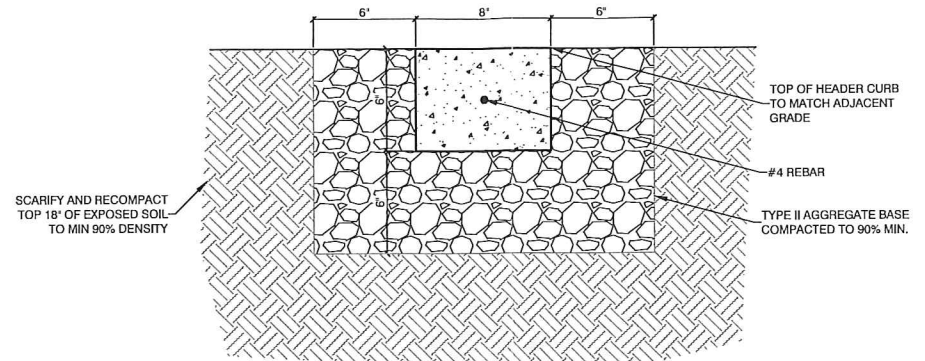
SUBGRADE PREPARATION FOR CONCRETE RESTROOM

TYPICAL PAVEMENT SECTION

NOT TO SCALE

4

C3.07

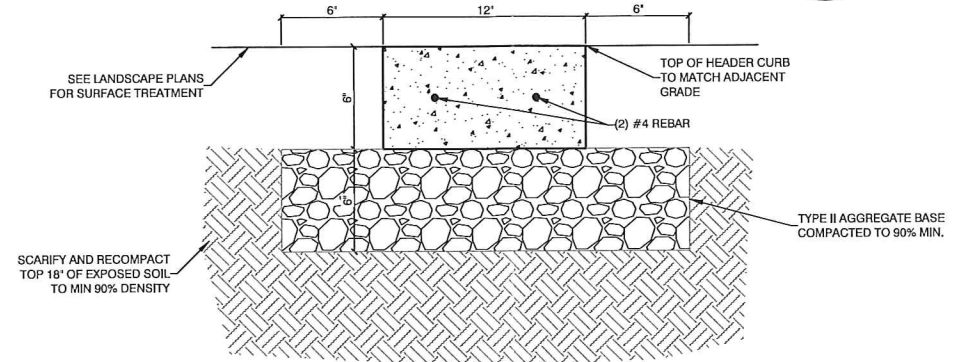


"ZERO" TYPE CURB

NOT TO SCALE

1

C3.07

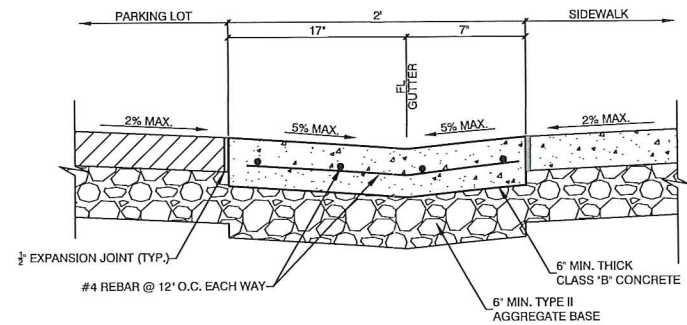


"LANDSCAPE" TYPE CURB

NOT TO SCALE

2

C3.07



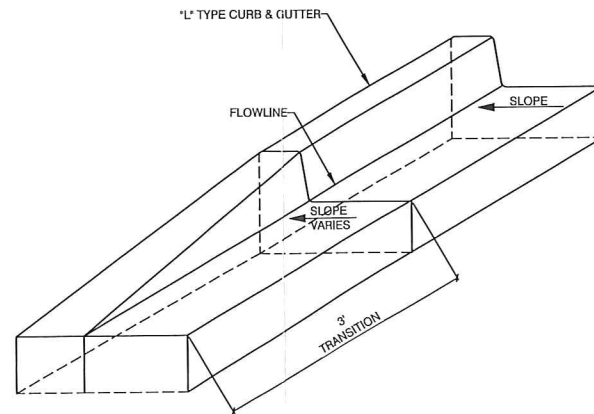
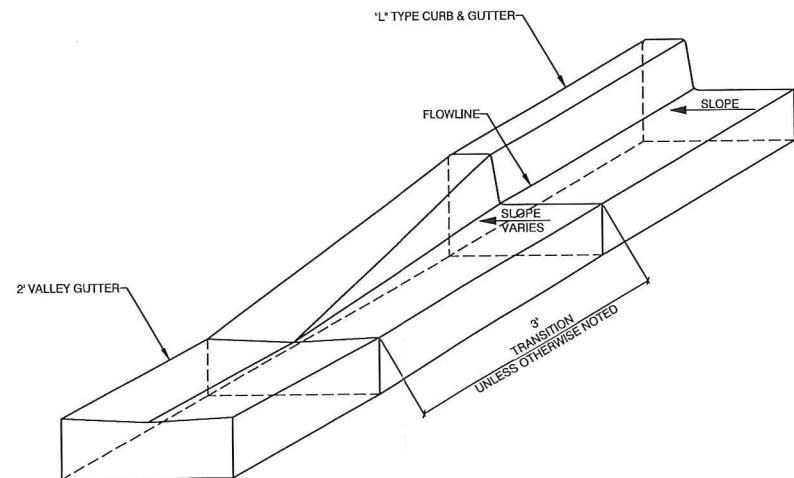
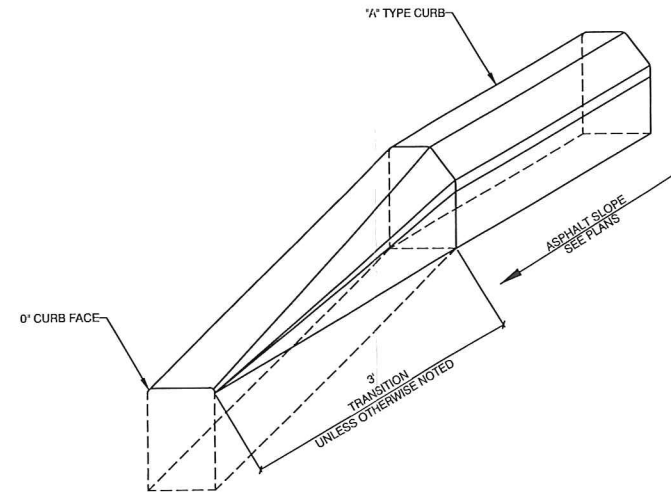
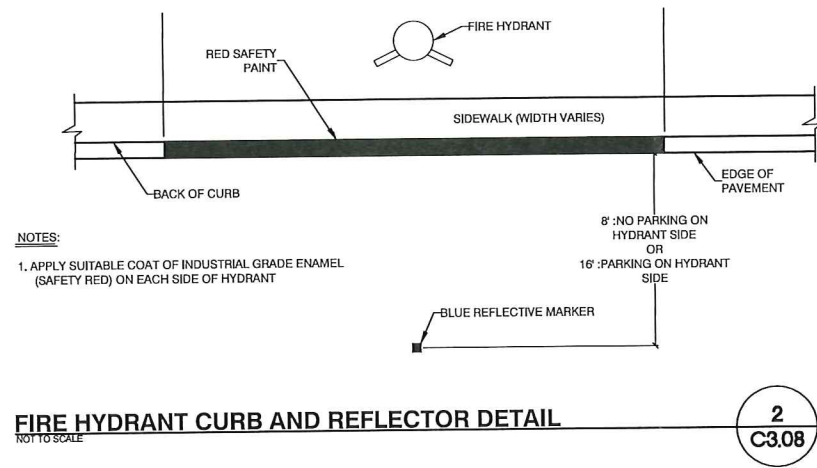
CONCRETE VALLEY GUTTER DETAIL

NOT TO SCALE

3

C3.07

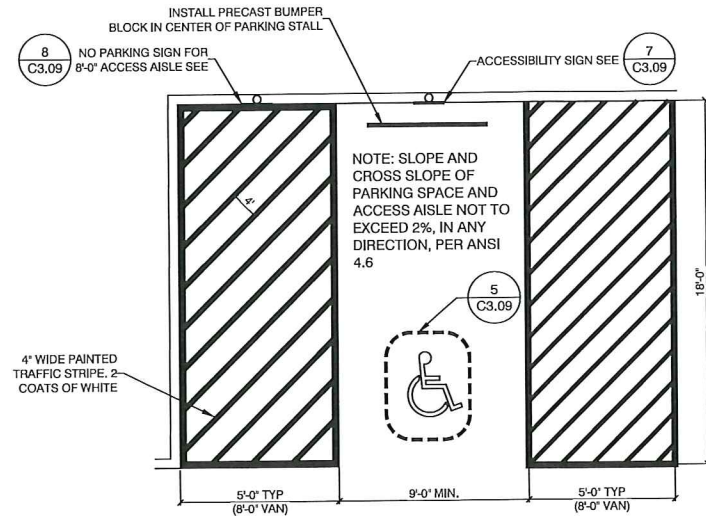
REVISIONS	
CONSULT	
GCA ENGINEERS & SURVEYORS	
J.W. ZUNINO LANDSCAPE ARCHITECTURE	
WASHINGTON LAS VEGAS WASH PARK CITY OF LAS VEGAS 100% CONSTRUCTION DOCUMENTS CONSTRUCTION DETAILS	
PROFESSIONAL ENGINEER'S SEAL OF THE STATE OF NEVADA WILLIE L. FELKINS Exp. 6/30/2019 CIVIL No. 19637 7/26/2017	
OWNER: CITY OF LAS VEGAS DEPARTMENT OF PUBLIC WORKS	
400 EAST STEWART AVENUE LAS VEGAS, NEVADA 89101 PHONE: (702) 229-8535 FAX: (702) 384-8846 TDD: (702) 386-9108	
DRAWN	FJG
FILE	AS SHOWN
DATE	07/26/17
SCALE	AS SHOWN
CD NO	15.598/11DC
CLY DRG NO	65015
W/ISSN NO	59811
S/IT NO	
C3.07	



CURB & GUTTER TRANSITIONS

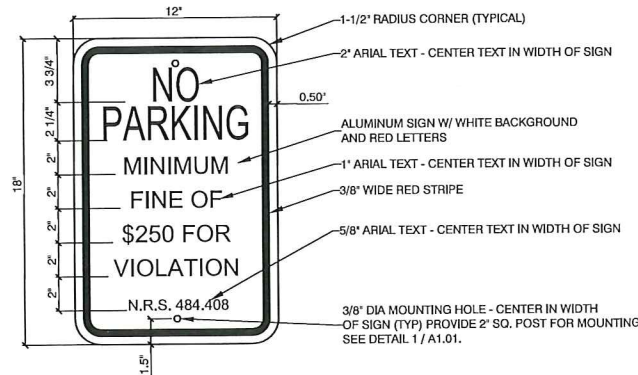
1
C3.08

WASHINGTON LAS VEGAS WASH PARK CITY OF LAS VEGAS 100% CONSTRUCTION DOCUMENTS CONSTRUCTION DETAILS		ENGINEERS & SURVEYORS LANDSCAPE ARCHITECTURE	
OWNER: CITY OF LAS VEGAS DEPARTMENT OF PUBLIC WORKS 400 EAST STEWART AVENUE LAS VEGAS, NEVADA 89101 PHONE: (702) 229-5525 FAX: (702) 386-1046 TDD: (702) 386-9108			
DESIGN: FVG FILE: AS SHOWN DATE: 07/26/17 SCALE: AS SHOWN ED NO: 1553811.DC CIV DIV NO: 65015 VISION NO: 59811			
1 C3.08			



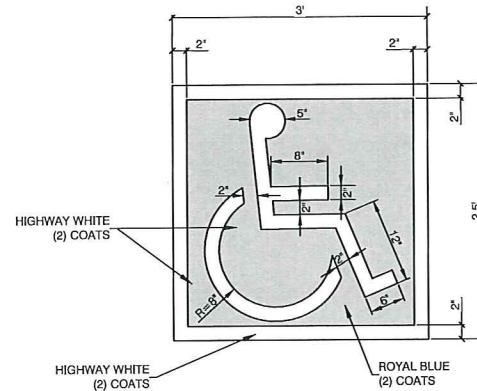
ACCESSIBLE PARKING STALL
NOT TO SCALE

6
C3.09



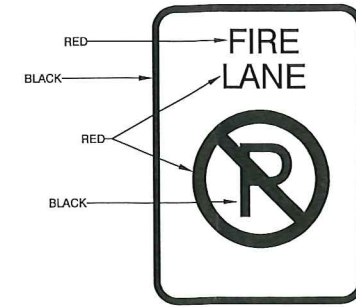
NO PARKING SIGN
NOT TO SCALE

8
C3.09



ACCESSIBLE LEGEND
NOT TO SCALE

5
C3.09

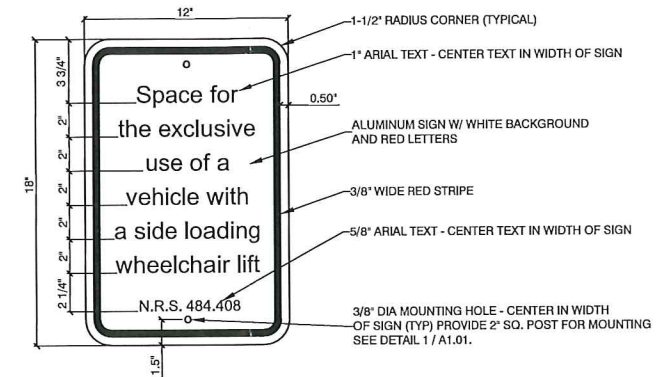


MINIMUM SPECIFICATIONS OF "NO PARKING FIRE LANE SIGNS"

SIZE: 1" WIDE X 1 1/2" LONG OR 2" WIDE X 2 1/2" LONG AS REQUIRED
COLOR: RED AND BLACK ON WHITE LUMINOUS BACKGROUND (SEE ABOVE EXAMPLE)
SYMBOL: INTERNATIONAL NO PARKING SYMBOL
HEIGHT: TO BE INSTALLED NOT LESS THAN SEVEN (7) FEET NOR MORE THAN TEN (10) FEET FROM GROUND LEVEL

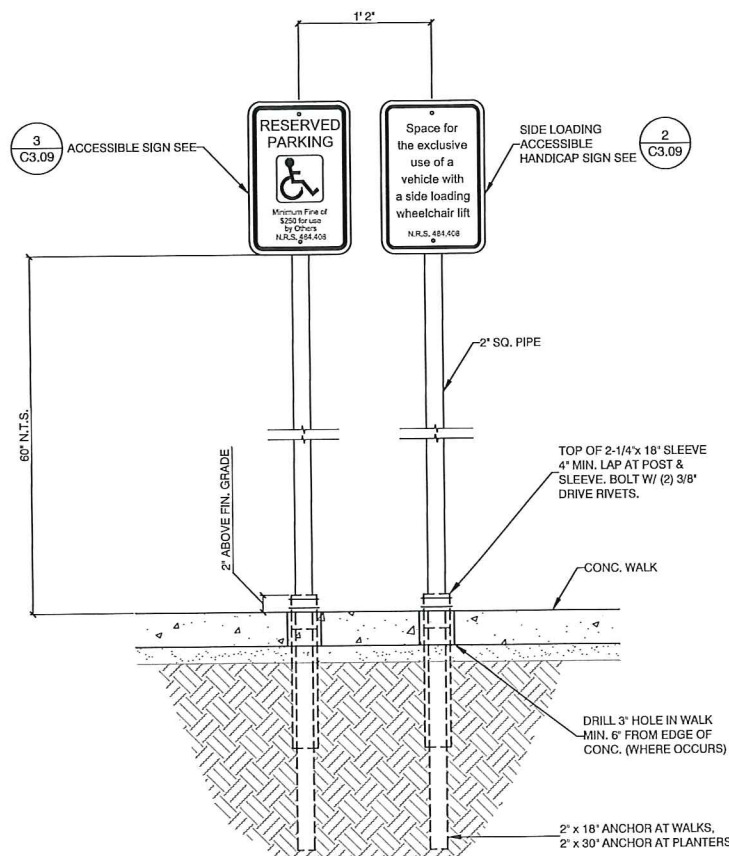
FIRE LANE SIGN
NOT TO SCALE

1
C3.09



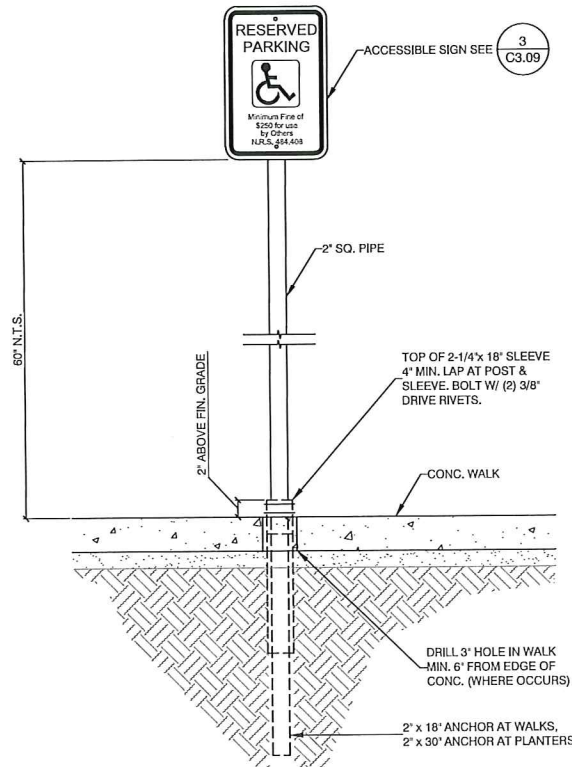
SIDE LOADING ACCESSIBLE HANDICAP SIGN
NOT TO SCALE

2
C3.09

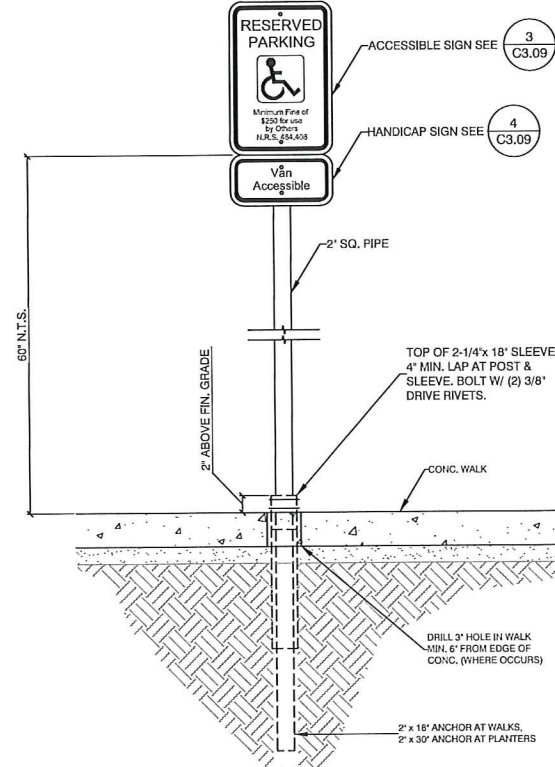


ALL COMPONENTS TO BE GALVANIZED SQUARE POST. ATTACH ANCHOR TO SLEEVE PRIOR TO DRIVING INTO GROUND.

METAL ACCESSIBILITY SIGN
NOT TO SCALE

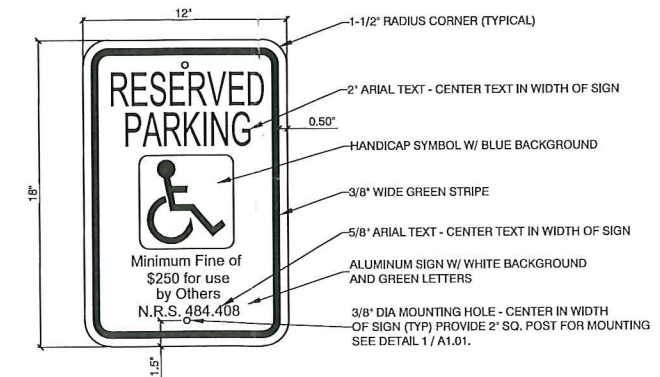


ALL COMPONENTS TO BE GALVANIZED SQUARE POST. ATTACH ANCHOR TO SLEEVE PRIOR TO DRIVING INTO GROUND.



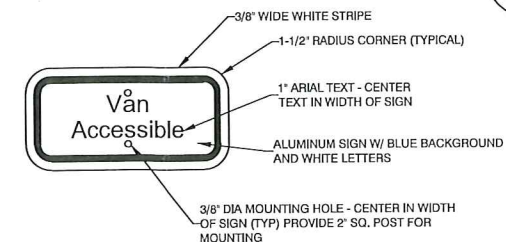
ALL COMPONENTS TO BE GALVANIZED SQUARE POST. ATTACH ANCHOR TO SLEEVE PRIOR TO DRIVING INTO GROUND.

7
C3.09



ACCESSIBLE SIGN
NOT TO SCALE

3
C3.09



VAN ACCESSIBLE SIGN
NOT TO SCALE

4
C3.09

WASHINGTON LAS VEGAS WASH PARK
CITY OF LAS VEGAS
100% CONSTRUCTION DOCUMENTS
CONSTRUCTION DETAILS

GCM ENGINEERS & SURVEYORS
J-W-Z-UNION-0
LANDSCAPE ARCHITECTURE

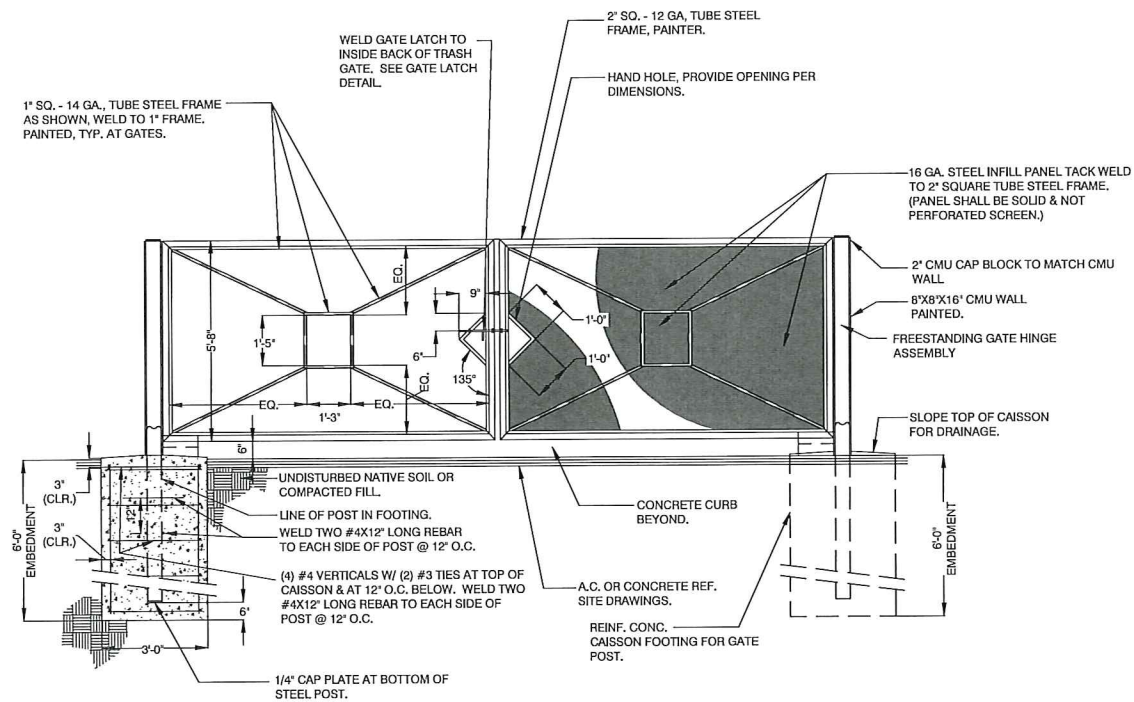
PROFESSIONAL ENGINEER STATE OF NEVADA
WILLIE L. FELKINS
Exp. 6/10/2019
CIVIL
No. 19653
7/26/2019

OWNER: CITY OF LAS VEGAS
DEPARTMENT OF PUBLIC WORKS

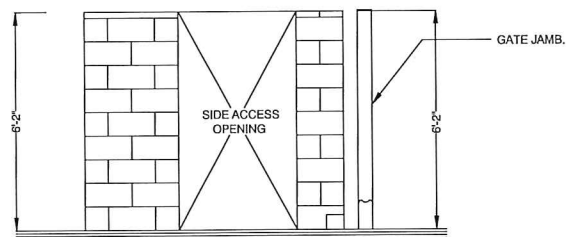
400 EAST STEWART AVENUE
LAS VEGAS, NEVADA 89101
PHONE: (702) 229-5535
FAX: (702) 386-1846
TDD: (702) 386-9108

DATE: 07/26/19
SCALE: AS SHOWN
SHEET NO: 155981.DC
CIVIL NO: 65015
NO. OF SHEETS: 59811

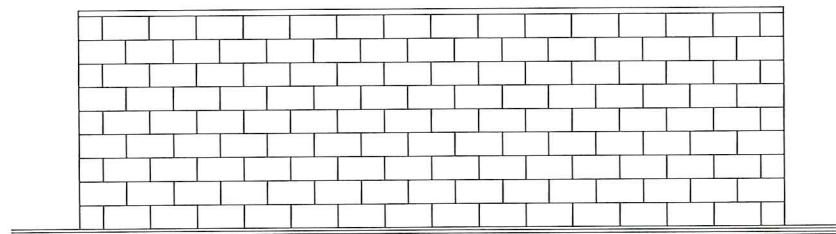
C3.09



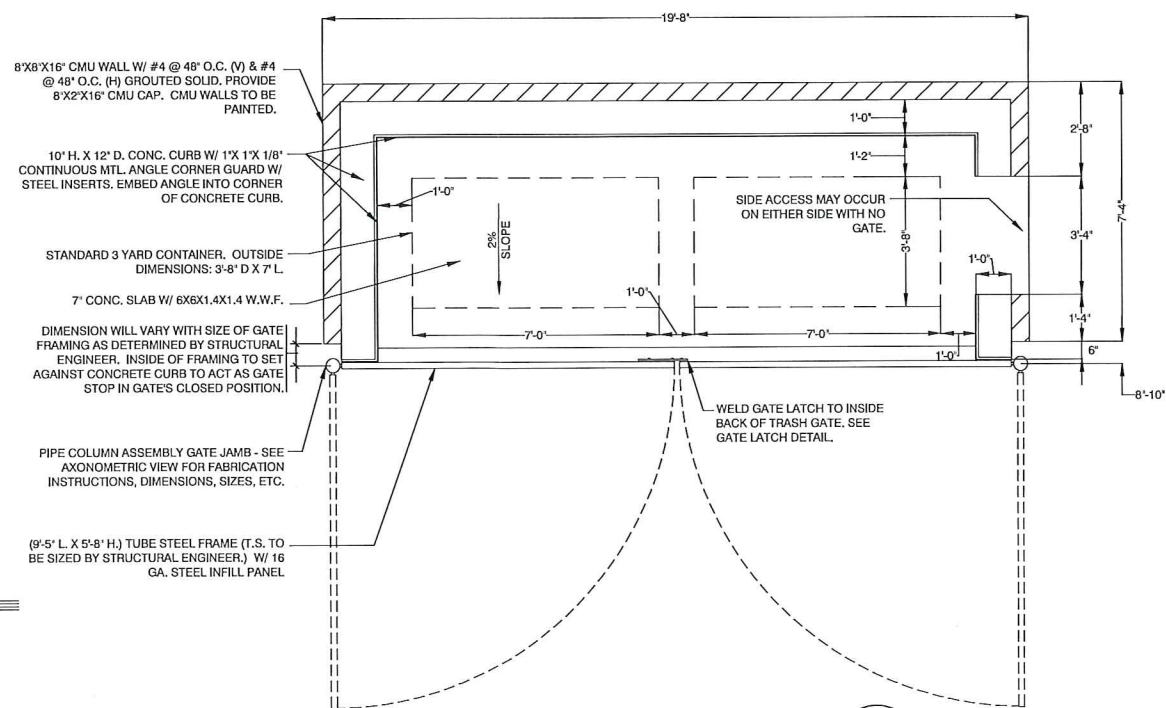
FRONT ELEVATION



SIDE ELEVATION



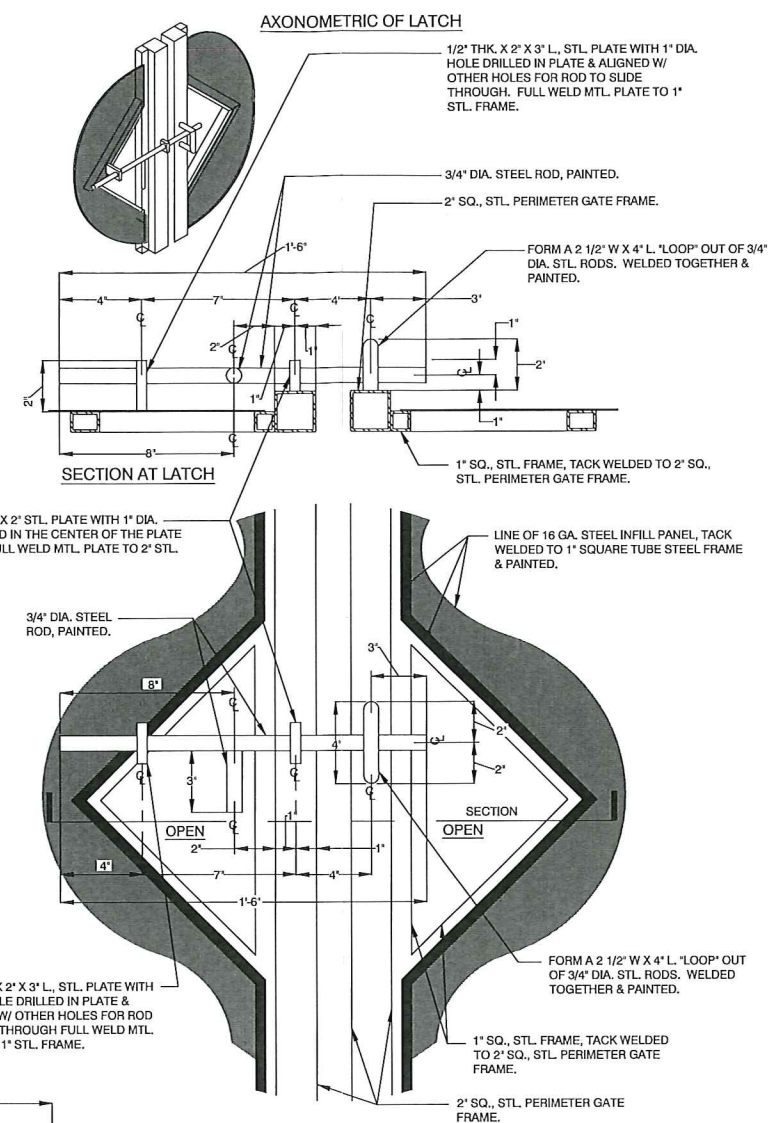
REAR ELEVATION



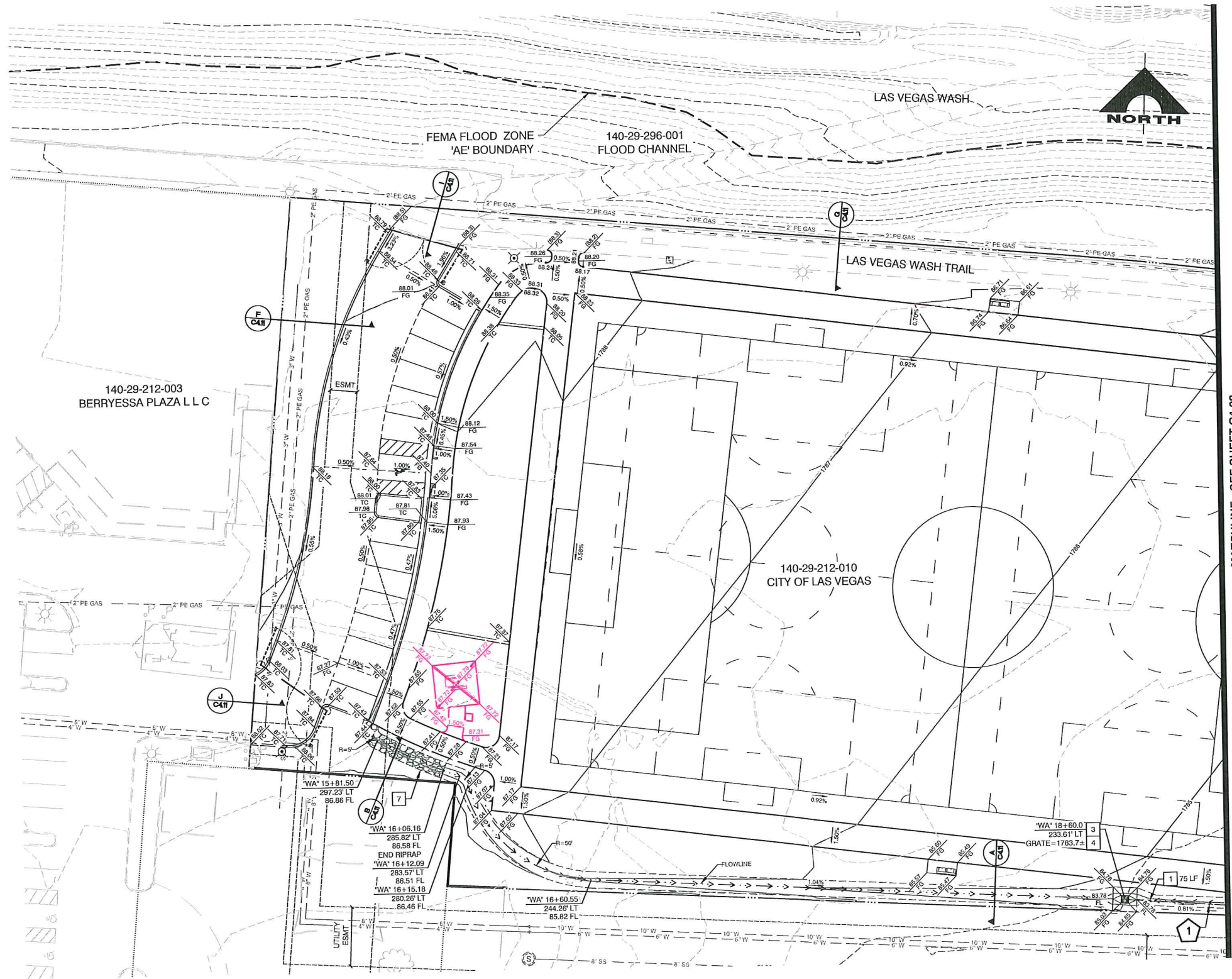
TRASH ENCLOSURE DETAIL

NOT TO SCALE

1
C3.12



REVISIONS	
CONSULTANT	
J. W. ZUNIGA ENGINEERS & SURVEYORS	
LANDSCAPE ARCHITECTURE	
WASHINGTON LAS VEGAS WASH PARK	
CITY OF LAS VEGAS	
100% CONSTRUCTION DOCUMENTS	
CONSTRUCTION DETAILS	
OWNER: CITY OF LAS VEGAS DEPARTMENT OF PUBLIC WORKS	
400 EAST STEWART AVENUE LAS VEGAS, NEVADA 89101 PHONE: (702) 229-5535 FAX: (702) 386-8866 TDD: (702) 386-1108	
DESIGN	FJG
FILE	AS SHOWN
DATE	01/26/11
SCALE	AS SHOWN
CD NO	1553811DC
CLY DRG NO	65015
PERSON NO	59311
SHT NO	
C3.12	



DRAINAGE NOTES

1. INSTALL 15-INCH PVC NUISANCE STORM DRAIN PIPE
2. INSTALL 12-INCH SQUARE BASIN KIT (NDS OR APPROVED EQUAL) WITH 8-INCH PVC DOWN PIPE & 15-INCH X 8-INCH TEE (SEE DETAIL 1 & 4, SHEET C4.09) (USDCCA STD. DWG. NO. 421 SHEET C4.10)
3. CONSTRUCT TYPE 2 DROP INLET (NDOT STD. PLAN R-4.2.1 SHEET C4.08) (USDCCA STD. DWG. NO. 421 SHEET C4.10)
4. CONSTRUCT DROP INLET CONCRETE APRON (NDOT STD. PLAN R-4.2.7 SHEET C4.08)
5. INSTALL 18-INCH RCP STORM DRAIN
6. CONSTRUCT STORM DRAIN MANHOLE (USDCCA STD. DWG. NO. 401, 403.1, & 408.1 SHEET C4.08 & C4.10)
7. INSTALL BMP SWALE WITH RIPRAP (D50 = 4-INCH, THICKNESS = 8-INCH) (COLOR = PALOMINO CORAL) (SEE DETAIL 2, SHEET C4.09)
8. CONNECT PIPE TO EXISTING DROP INLET (SEE DETAIL 3, SHEET C4.09)

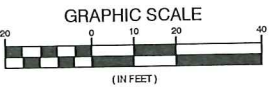
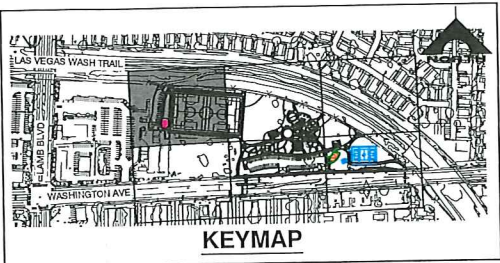
SD PROFILE INDEX		
SD RUN NO	SEE SHEET	
1	2	C4.06
3	4	C4.07

FLOOD ZONE NOTE

THE PROJECT IS WITHIN A FEMA DESIGNATED SHADED ZONE 'X' (WITHIN THE 500-YR FLOODPLAIN) PER FIRM PANEL 32003C2187F DATED NOVEMBER 16, 2011

LEGEND

- ADDITIVE ALTERNATE 1
- ADDITIVE ALTERNATE 2
- ADDITIVE ALTERNATE 3
- ADDITIVE ALTERNATE 4

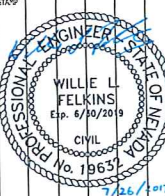


CALL BEFORE CONSTRUCTION

BEFORE YOU DIG	USA NORTH	811 OR 800-227-2500
BEFORE YOU UNDERGROUND	F.A.S.T.	702-432-5300
	CLARK COUNTY TRAFFIC OPERATIONS	702-455-7511
	CITY OF LAS VEGAS T.E.F.O.	702-229-6811
BEFORE YOU OVERHEAD	NV ENERGY	702-227-2928

GCA
LANDSCAPE ARCHITECTURE
ENGINEERS & SURVEYORS

WASHINGTON LAS VEGAS WASH PARK
CITY OF LAS VEGAS
100% CONSTRUCTION DOCUMENTS
STORM DRAIN & GRADING PLAN

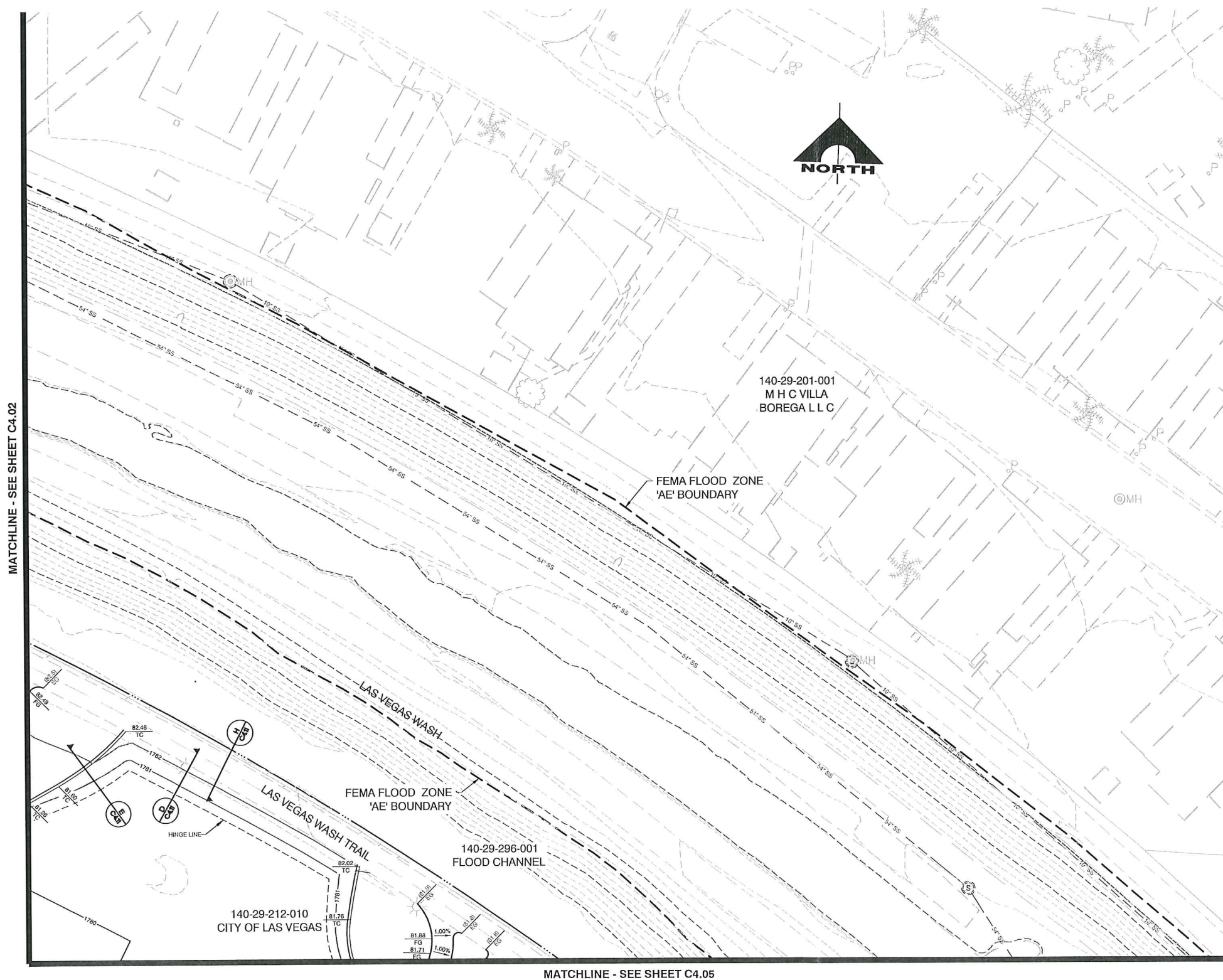


OWNER: CITY OF LAS VEGAS
DEPARTMENT OF PUBLIC WORKS

400 EAST STEWART AVENUE
LAS VEGAS, NEVADA 89101
PHONE: (702) 229-8535
FAX: (702) 384-8846
TDD: (702) 386-9108

DATE	AS SHOWN
DATE	07/26/17
SCALE	AS SHOWN
SD NO	155381/ND
CLY DRG NO	65015
VISION NO	53811
SHT NO	

C4.01



DRAINAGE NOTES

- | | |
|---|---|
| 1 | INSTALL 15-INCH PVC NUISANCE STORM DRAIN PIPE |
| 2 | CONSTRUCT 18-INCH SQUARE BASIN KUT (NDS OR APPROVED EQUIV) WITH 8-INCH PVC DOWN PIPE & 15-INCH X 4-INCH TIE (SEE DETAIL 1 & 4, SHEET C4-09) (USDOCA SHEET DWG. NO. 421 SHEET C4-10) |
| 3 | CONSTRUCT TYPE 2 DROP INLET (FOOT DET. PLAN R-4-27 SHEET C4-08) |
| 4 | CONSTRUCT DROP INLET CONCRETE APRON (FOOT DET. PLAN R-4-27 SHEET C4-08) |
| 5 | INSTALL 18-INCH RCP STORM DRAIN |
| 6 | CONSTRUCT STORM DRAIN MANHOLE (USDOCA SHEET DWG. NO. 400-1 SHEET C4-08 & C4-10) |
| 7 | INSTALL BMP SWALE WITH RPPAP (DOE 1/4-INCH THICKNESS = 8-INCH) (COLOR = PALMISTO KODAK) (SEE DETAIL 2, SHEET C4-09) |
| 8 | CONNECT PIPE TO EXISTING DROP INLET (SEE DETAIL 3, SHEET C4-09) |

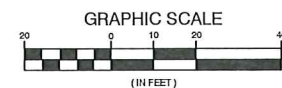
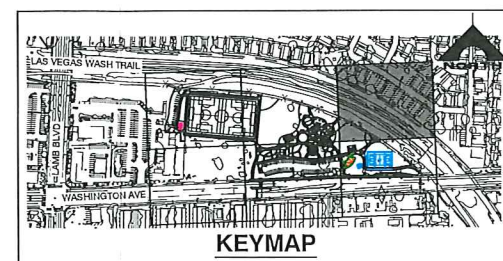
SD PROFILE INDEX		
SD RUN NO		SEE SHEET
		C4.06
		C4.07

FLOOD ZONE NOTE

THE PROJECT IS WITHIN A FEMA DESIGNATED SHADED
ZONE 'X' (WITHIN THE 500-YR FLOODPLAIN) PER FIRM
PANEL 32003C2187F DATED NOVEMBER 16, 2011

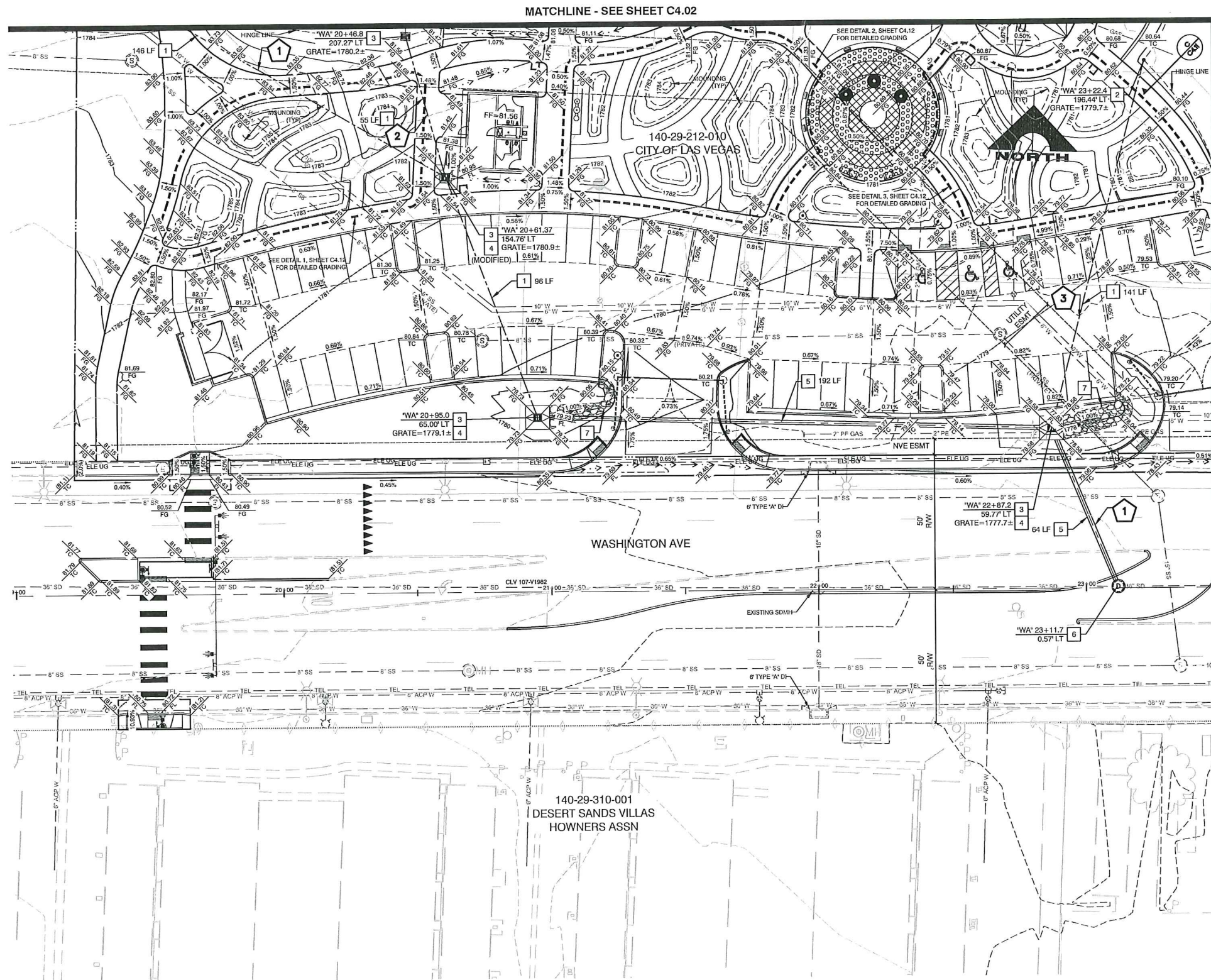
LEGEND

	ADDITIVE ALTERNATE 1
	ADDITIVE ALTERNATE 2
	ADDITIVE ALTERNATE 3
	ADDITIVE ALTERNATE 4



CALL BEFORE CONSTRUCTION

BEFORE YOU DIG	USA NORTH	811 OR 800-227-2600
BEFORE YOU UNDERGROUND	F.A.S.T.	702-432-5300
	CLARK COUNTY TRAFFIC OPERATIONS	702-455-7511
	CITY OF LAS VEGAS T.E.O.	702-229-6611
BEFORE YOU OVERHEAD	NV ENERGY	702-227-2029



DRAINAGE NOTES

1. INSTALL 15-INCH PVC NUISANCE STORM DRAIN PIPE
2. INSTALL 12-INCH SQUARE BASIN KIT (NDS OR APPROVED EQUAL) WITH 8-INCH PVC DOWN PIPE & 15-INCH X 8-INCH TEE (SEE DETAIL 1 & 4, SHEET C4.09) (USDOCA STD. DWG. NO. 421 SHEET C4.10)
3. CONSTRUCT TYPE 2 DROP INLET (NDS STD. PLAN R-4.2.1 SHEET C4.08) (USDOCA STD. DWG. NO. 421 SHEET C4.10)
4. CONSTRUCT DROP INLET CONCRETE APRON (NDS STD. PLAN R-4.2.7 SHEET C4.08)
5. INSTALL 18-INCH RCP STORM DRAIN (USDOCA STD. DWG. NO. 401, 403.1, & 408.1 SHEET C4.08 & C4.10)
6. CONSTRUCT STORM DRAIN MANHOLE (USDOCA STD. DWG. NO. 401, 403.1, & 408.1 SHEET C4.08 & C4.10)
7. INSTALL BMP SWALE WITH RPPAP (D50 = 4-INCH, THICKNESS = 8-INCH) (COLOR = PALOMINO CORAL) (SEE DETAIL 2, SHEET C4.09)
8. CONNECT PIPE TO EXISTING DROP INLET (SEE DETAIL 3, SHEET C4.09)

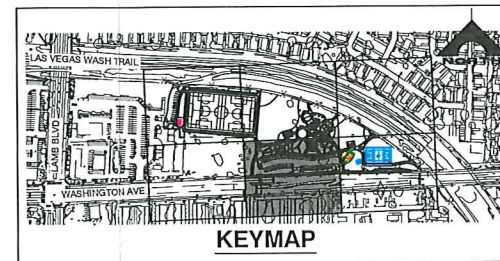
SD PROFILE INDEX		
SD RUN NO	SEE SHEET	
1	2	C4.06
3	4	C4.07

FLOOD ZONE NOTE

THE PROJECT IS WITHIN A FEMA DESIGNATED SHADED ZONE 'X' (WITHIN THE 500-YR FLOODPLAIN) PER FIRM PANEL 32003C2187F DATED NOVEMBER 16, 2011

LEGEND

	ADDITIVE ALTERNATE 1
	ADDITIVE ALTERNATE 2
	ADDITIVE ALTERNATE 3
	ADDITIVE ALTERNATE 4



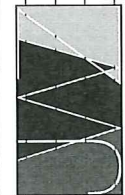
GRAPHIC SCALE



CALL BEFORE CONSTRUCTION

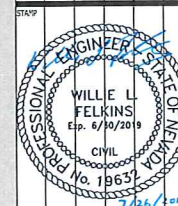
BEFORE YOU DIG	USA NORTH	811 OR 600-227-2600
BEFORE YOU UNDERGROUND	CLARK COUNTY TRAFFIC OPERATIONS	702-455-7511
BEFORE YOU OVERHEAD	CLARK COUNTY TRAFFIC OPERATIONS	702-455-7511
BEFORE YOU OVERHEAD	CLARK COUNTY TRAFFIC OPERATIONS	702-455-7511

GCTV



ENGINEERS & SURVEYORS

WASHINGTON LAS VEGAS WASH PARK
CITY OF LAS VEGAS
100% CONSTRUCTION DOCUMENTS
STORM DRAIN & GRADING PLAN

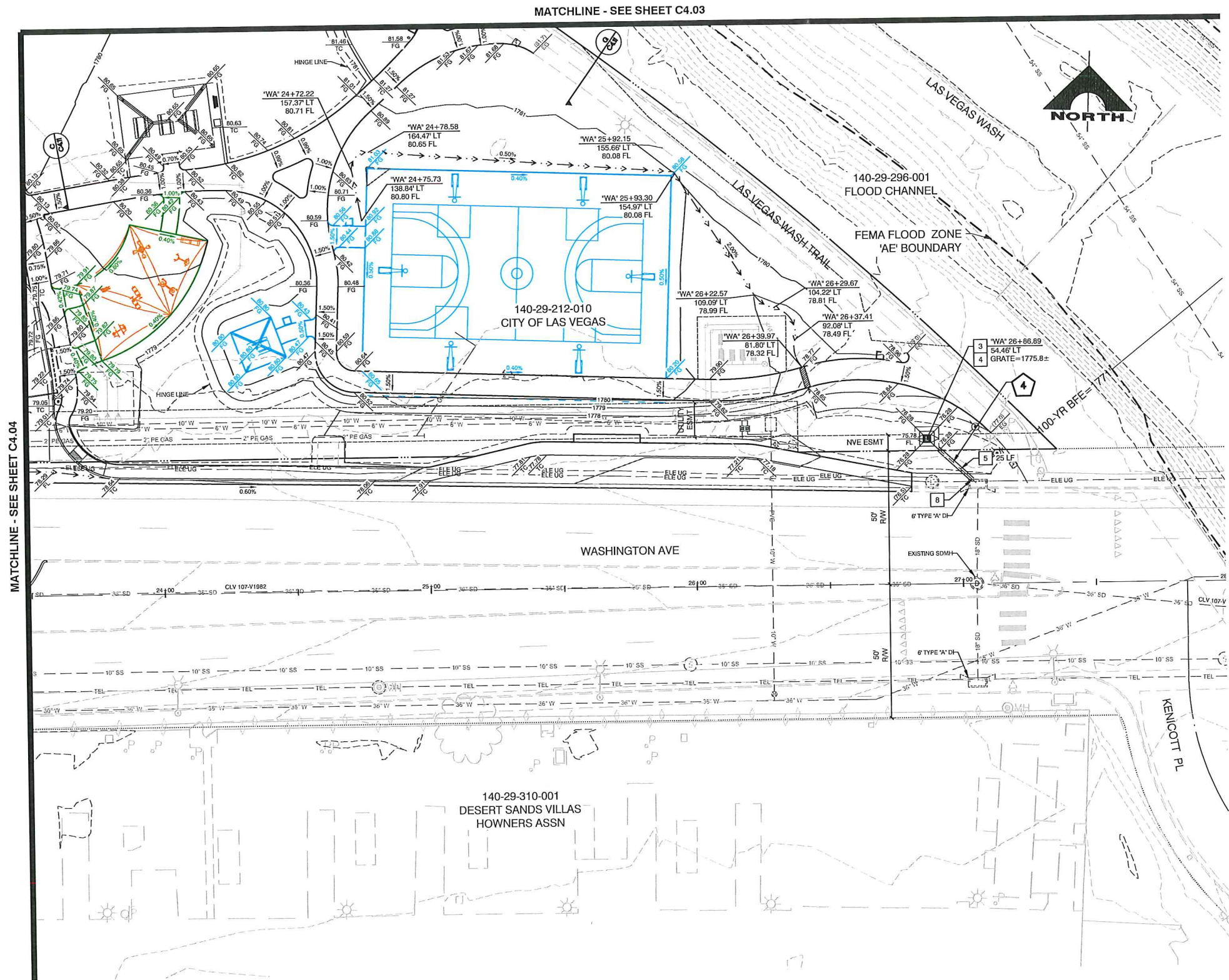


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DEPARTMENT OF PUBLIC WORKS

408 EAST STEWART AVENUE
LAS VEGAS, NEVADA 89101
PHONE: (702) 229-5535
FAX: (702) 384-1846
(702) 386-5108

DESIGN	FUG
FILE	AS SHOWN
DATE	01/06/11
SCALE	AS SHOWN
3D NO	153381.DIC
CLIP NO	65015
VERSION	59811
SHEET NO	

C4.04



DRAINAGE NOTES

1. INSTALL 15-INCH PVC NUISANCE STORM DRAIN PIPE
2. INSTALL 12-INCH SQUARE BASIN KIT (NDS OR APPROVED EQUAL) WITH 8-INCH PVC DOWN PIPE & 15-INCH X 8-INCH TEE (SEE DETAIL 1 & 4, SHEET C4.06) (USDOCA STD. DWG. NO. 421 SHEET C4.10)
3. CONSTRUCT TYPE 2 DROP INLET (NDS STD. PLAN R-4.2.1 SHEET C4.08) (USDOCA STD. DWG. NO. 421 SHEET C4.10)
4. CONSTRUCT DROP INLET CONCRETE APRON (NDS STD. PLAN R-4.2.7 SHEET C4.08)
5. INSTALL 18-INCH RCP STORM DRAIN
6. CONSTRUCT STORM DRAIN MANHOLE (USDOCA STD. DWG. NO. 401, 403.1, & 406.1 SHEET C4.06 & C4.10)
7. INSTALL BMP SWALE WITH RIPRAP (D50 = 4-INCH, THICKNESS = 8-INCH) (COLOR = PALOMINO CORAL) (SEE DETAIL 2, SHEET C4.06)
8. CONNECT PIPE TO EXISTING DROP INLET (SEE DETAIL 3, SHEET C4.06)

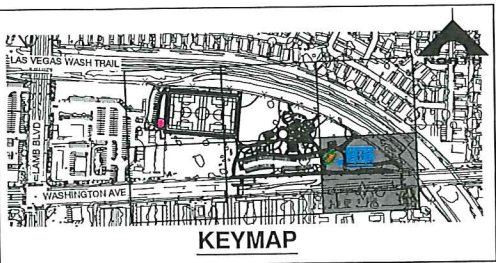
SD PROFILE INDEX		
SD RUN NO		SEE SHEET
1	2	C4.06
3	4	C4.07

FLOOD ZONE NOTE

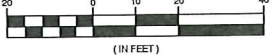
THE PROJECT IS WITHIN A FEMA DESIGNATED SHADED ZONE 'X' (WITHIN THE 500-YR FLOODPLAIN) PER FIRM PANEL 92003C2187F DATED NOVEMBER 16, 2011

LEGEND

- ADDITIVE ALTERNATE 1
- ADDITIVE ALTERNATE 2
- ADDITIVE ALTERNATE 3
- ADDITIVE ALTERNATE 4



GRAPHIC SCALE



CALL BEFORE CONSTRUCTION

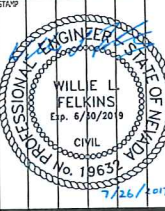
BEFORE YOU DIG	USA NORTH	811 OR 800-227-5500
BEFORE YOU UNDERGROUND	F.A.S.T.	702-432-5300
	CLARK COUNTY TRAFFIC OPERATIONS	702-455-7511
	CITY OF LAS VEGAS T.E.F.O.	702-229-6611
BEFORE YOU OVERHEAD	NV ENERGY	702-227-2929

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ENGINEERS & SURVEYORS

WASHINGTON LAS VEGAS WASH PARK
CITY OF LAS VEGAS
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STORM DRAIN & GRADING PLAN

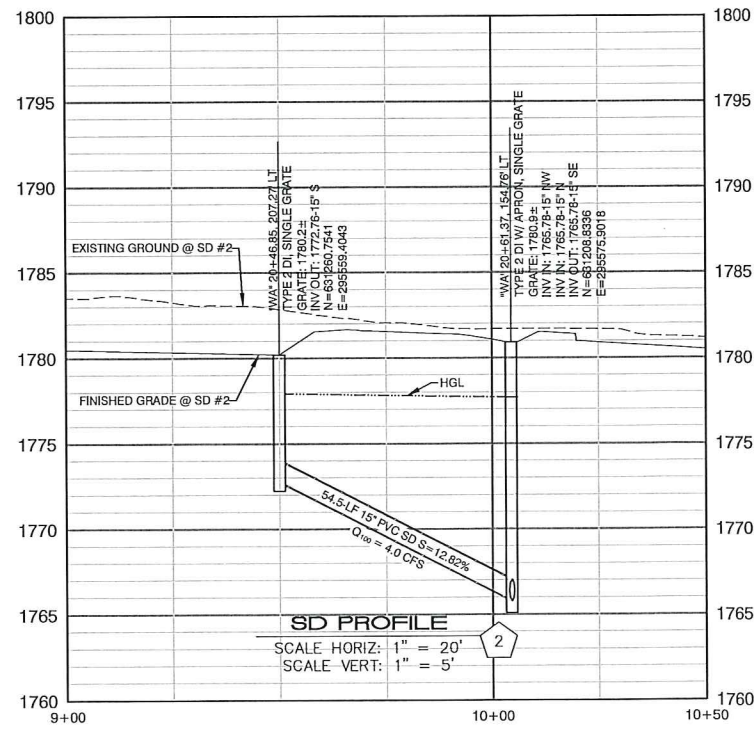
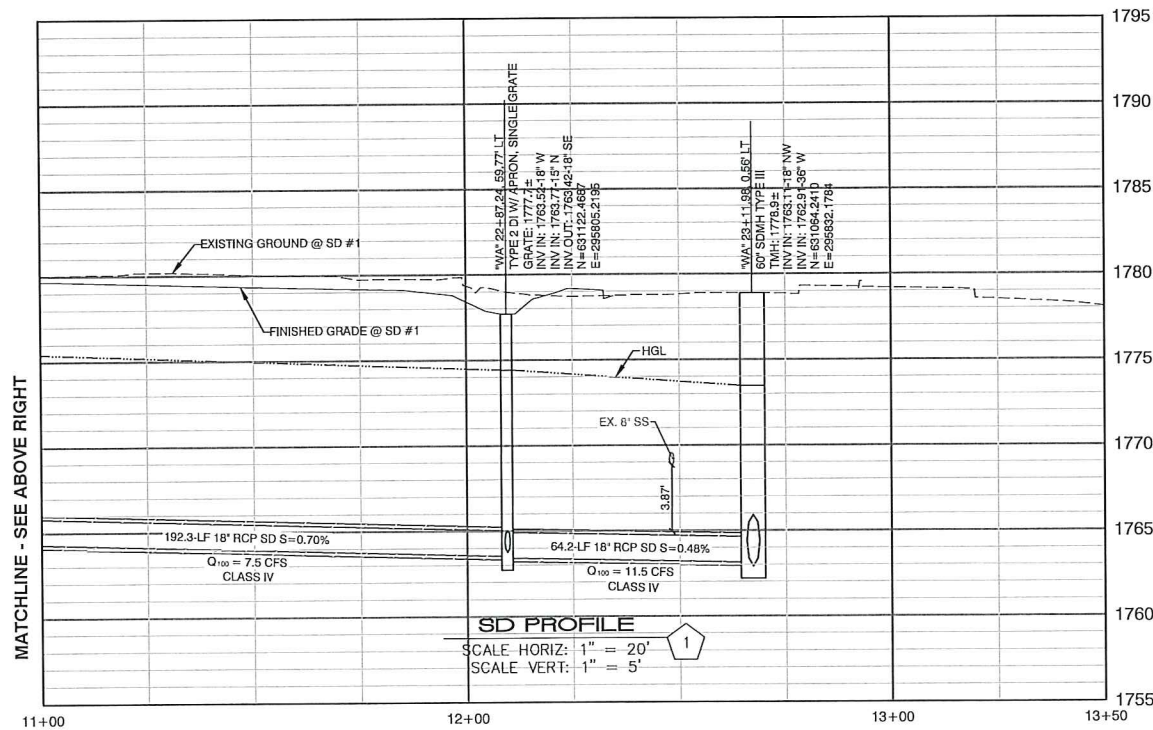
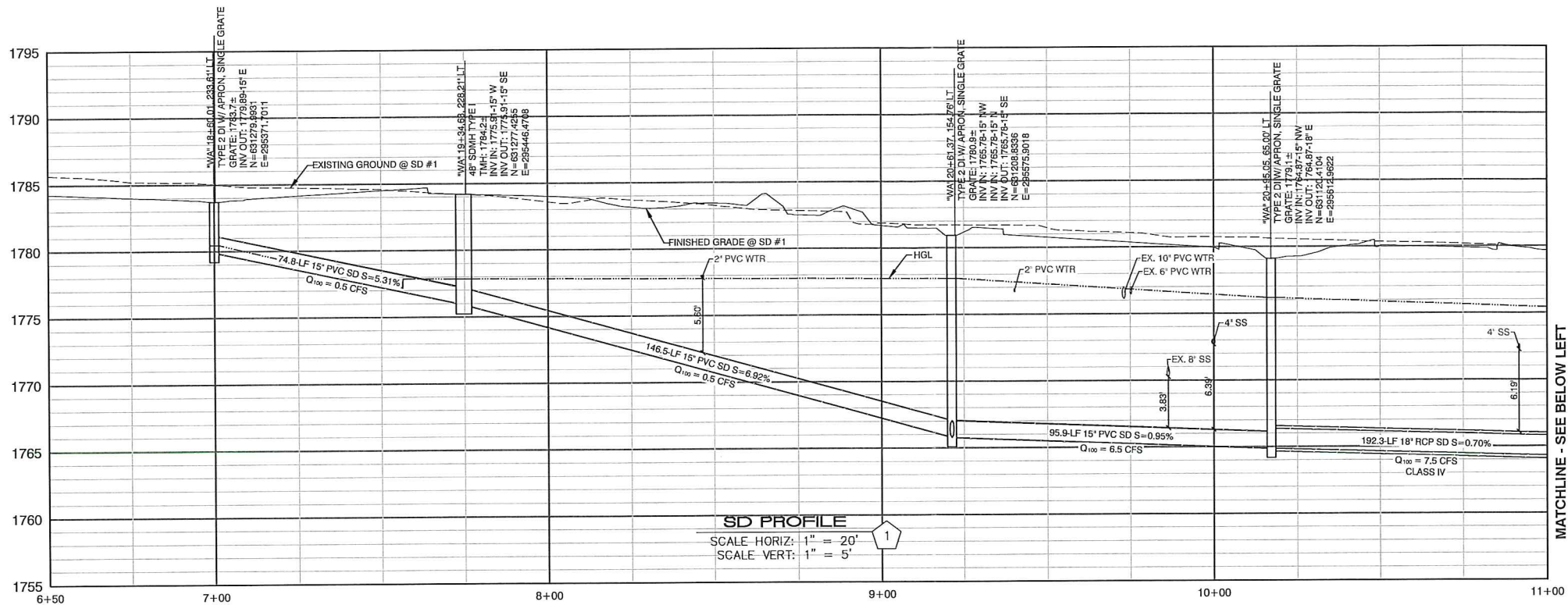


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DATE	AS SHOWN
DATE	07/26/17
SCALE	AS SHOWN
SD NO	1559811.DC
CLV DRG NO	65015
REVISED	53811
SIT NO	

C4.05



GCW
 J. W. Z. U. N. N. O.
 LANDSCAPE ARCHITECTURE | ENGINEERS & SURVEYORS

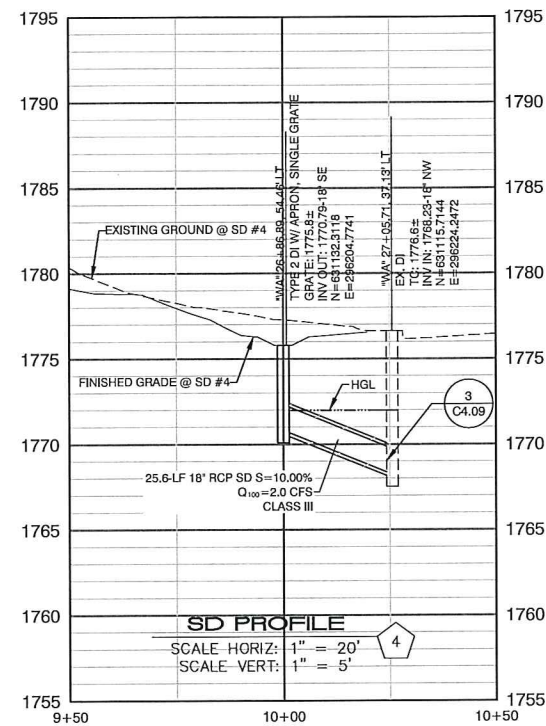
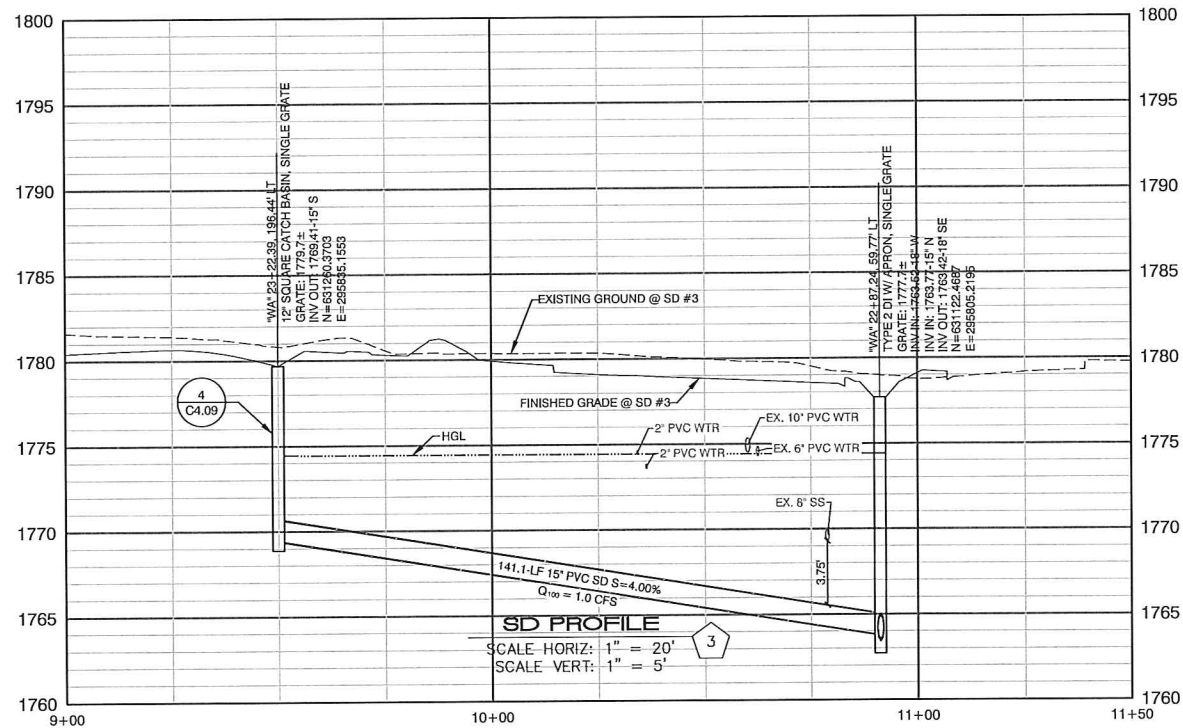
WASHINGTON LAS VEGAS WASH PARK
 CITY OF LAS VEGAS
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 STORM DRAIN PROFILES

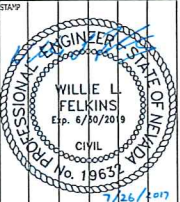
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 LAS VEGAS, NEVADA 89101
 PHONE: (702) 229-5535
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 TDD: (702) 388-9108

DATE: 07/26/11
 SCALE: AS SHOWN
 EDITION: 15.5981 IDC
 CIVIL NO: 65015
 DESIGN NO: 59811

C4.06



 ENGINEERS & SURVEYORS	
WASHINGTON LAS VEGAS WASH PARK CITY OF LAS VEGAS 100% CONSTRUCTION DOCUMENTS STORY DRAIN PROFILES	
	
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DRAWN: FJG	FILE: AS SHOWN
DATE: 01/26/11	SCALE: AS SHOWN
SD NO: 15.53811.DC	CIV ENG NO: 65015
SURVEY NO: 53811	SHT NO:
C4.07	

MANHOLE NOTES:

- MANHOLE MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE REQUIREMENTS OF SECTION 609, "CATCH BASINS, MANHOLES AND INLETS" OF THE STANDARD SPECIFICATIONS.
- REINFORCING STEEL SHALL BE AS SHOWN, WIRED TIGHTLY AT ALL INTERSECTIONS AND EMBEDDED AT LEAST ONE (1) INCH CLEAR UNLESS OTHERWISE NOTED.
- EXCAVATION SHALL BE AS NEARLY VERTICAL AS POSSIBLE (SHEET AND SHORE, IF SOIL CONDITIONS REQUIRE), IN EXISTING STREET SECTIONS, ALLEY SECTIONS AND COVERED AREAS SUCH AS LIMITED EASEMENTS OR ADJACENT TO STRUCTURES. NATURAL ANGLE OF REPOSE WILL ALLOW IN ALL OTHER AREAS.
- MANHOLE DESIGN FOR PIPE LARGER THAN SIXTY (60) INCHES SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
- MANHOLE DESIGN FOR DEPTHS EXCEEDING EIGHTEEN (18) FEET SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
- TYPE AND SIZE OF MANHOLE TO BE CONSTRUCTED IN A PARTICULAR LOCATION SHALL BE DETERMINED BY THE PIPE SIZE, ALIGNMENT AND GRADE AS FOLLOWS:

TYPE I

- ALL CASES FOR PIPE EIGHTEEN (18) INCHES AND SMALLER.
- TWENTY-FOUR (24) INCHES AND SMALLER PIPE ON TANGENT LINE AND GRADE.

SIXTY (60) INCH SIZE

- TWENTY-SEVEN (27) INCH THROUGH THIRTY-SIX (36) INCH PIPE ON TANGENT LINE AND GRADE.
- TWENTY-ONE (21) INCH THROUGH TWENTY-SEVEN (27) INCH PIPE AT ANGLE POINTS AND CHANGES IN GRADE OR PIPE SIZE.

TYPE I/A

USED IN PLACE OF TYPE I WHEN COVER ABOVE CONDUIT IS LIMITED, AND WHEN APPROVED BY THE ENGINEER.

TYPE II

- FORTY-EIGHT (48) INCH SIZE
- THIRTY (30) INCH THROUGH SIXTY (60) INCH PIPE ON TANGENT LINE WITH A CHANGE IN GRADE OR PIPE SIZE.

SPECIFICATION REFERENCE		AGENCY APPROVED						
		B	C	H	L	M	N	
501	CONCRETE							
609	CATCH BASINS, MANHOLES & INLETS							
		UNIFORM STANDARD DRAWINGS CLARK COUNTY AREA						
		STORM DRAIN MANHOLES GENERAL NOTES						
		DATE 2-9-06 DWG. NO. 401 SHEET 1 OF 2						

MANHOLE NOTES (CONTINUED):

TYPE III

TANGENT

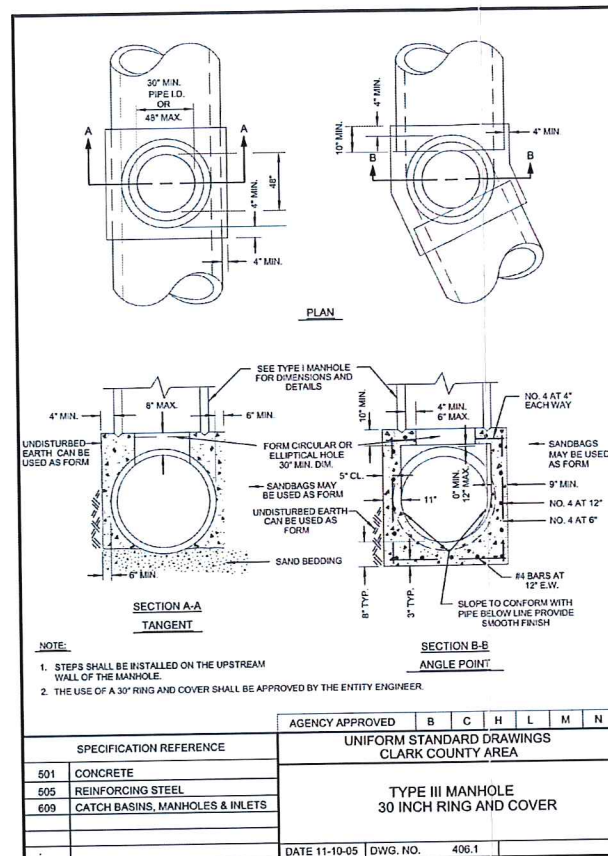
- SIXTY (60) INCH SIZE
- THIRTY-NINE (39) INCH THROUGH SIXTY (60) INCH PIPE ON TANGENT LINE AND GRADE WITH NO CHANGE IN PIPE SIZE.

ANGLE POINT

- SIXTY (60) INCH SIZE
- THIRTY (30) INCH THROUGH SIXTY (60) INCH PIPE AT THE ANGLE POINT IN LINE.

- PRECAST MANHOLE COMPONENTS SHALL CONFORM TO ASTM C-478.
- DISTANCE BETWEEN THE TOP OF MANHOLE AND FIRST STEP SHALL BE A MAXIMUM OF SIXTEEN (16) INCHES. MANHOLE STEPS SHALL BE GROUTED IN PLACE.
- (CLARK COUNTY ONLY) DISTANCE BETWEEN MANHOLES SHALL BE A MAXIMUM OF FOUR HUNDRED (400) FEET.
- MANHOLE SPACING SHALL BE REFERRED TO THE WASTE WATER COLLECTION STANDARDS.

SPECIFICATION REFERENCE		AGENCY APPROVED						
		B	C	H	L	M	N	
501	CONCRETE							
609	CATCH BASINS, MANHOLES & INLETS							
		UNIFORM STANDARD DRAWINGS CLARK COUNTY AREA						
		STORM DRAIN MANHOLES GENERAL NOTES						
		DATE 2-9-06 DWG. NO. 401 SHEET 2 OF 2						



BILL OF MATERIALS (RCP HDPE CMP)											
SINGLE (ONE GRATE)				DOUBLE (TWO GRATES)				TRIPLE (THREE GRATES)			
PIPE SIZE (INCH)	CONCRETE QUAN. (CY)	REINF. QUAN. (LB)	STR. STEEL QUAN. (CY)	CONCRETE QUAN. (CY)	REINF. QUAN. (LB)	STR. STEEL QUAN. (CY)	CONCRETE QUAN. (CY)	REINF. QUAN. (LB)	STR. STEEL QUAN. (CY)	CONCRETE QUAN. (CY)	REINF. QUAN. (LB)
15	0.71	0.19	36	1.06	0.28	50	1.31	0.36	77	1.56	0.50
18	0.89	0.20	40	1.31	0.36	80	1.56	0.50	105	1.81	0.63
24	1.06	0.22	48	1.56	0.40	96	1.81	0.54	129	2.06	0.71
30	1.23	0.24	56	1.81	0.44	112	2.06	0.58	153	2.31	0.79
36	1.40	0.26	64	2.06	0.48	128	2.31	0.62	177	2.56	0.87
42	1.57	0.28	72	2.31	0.52	144	2.56	0.66	201	2.81	0.95
48	1.74	0.30	80	2.56	0.56	160	2.81	0.70	225	3.06	1.03

*The Concrete And Reinforcing Quantities Are Based On The H Min. Shown. Increase The Concrete And Reinforcing Base Quantity By The Corresponding Add Rate (Per Foot Of Increased H) If The H Specified Is Larger Than H Min.

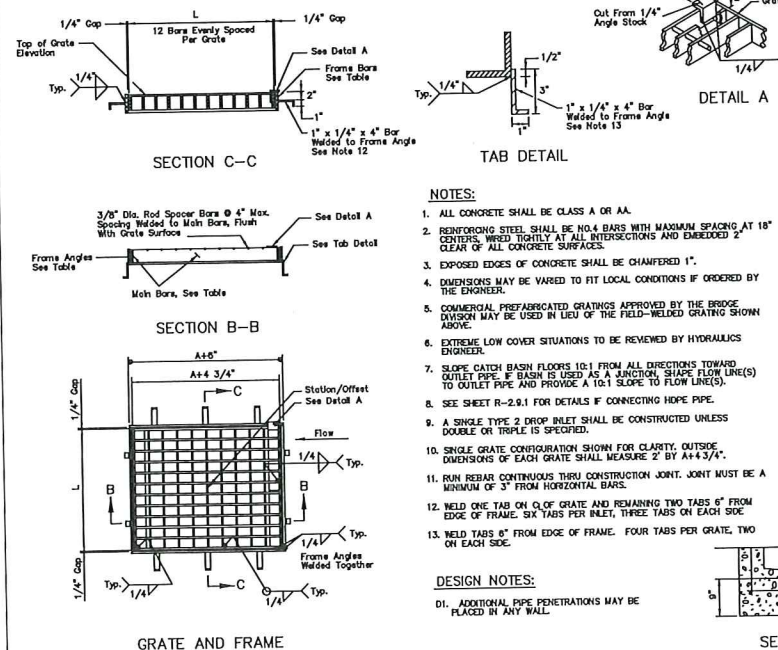
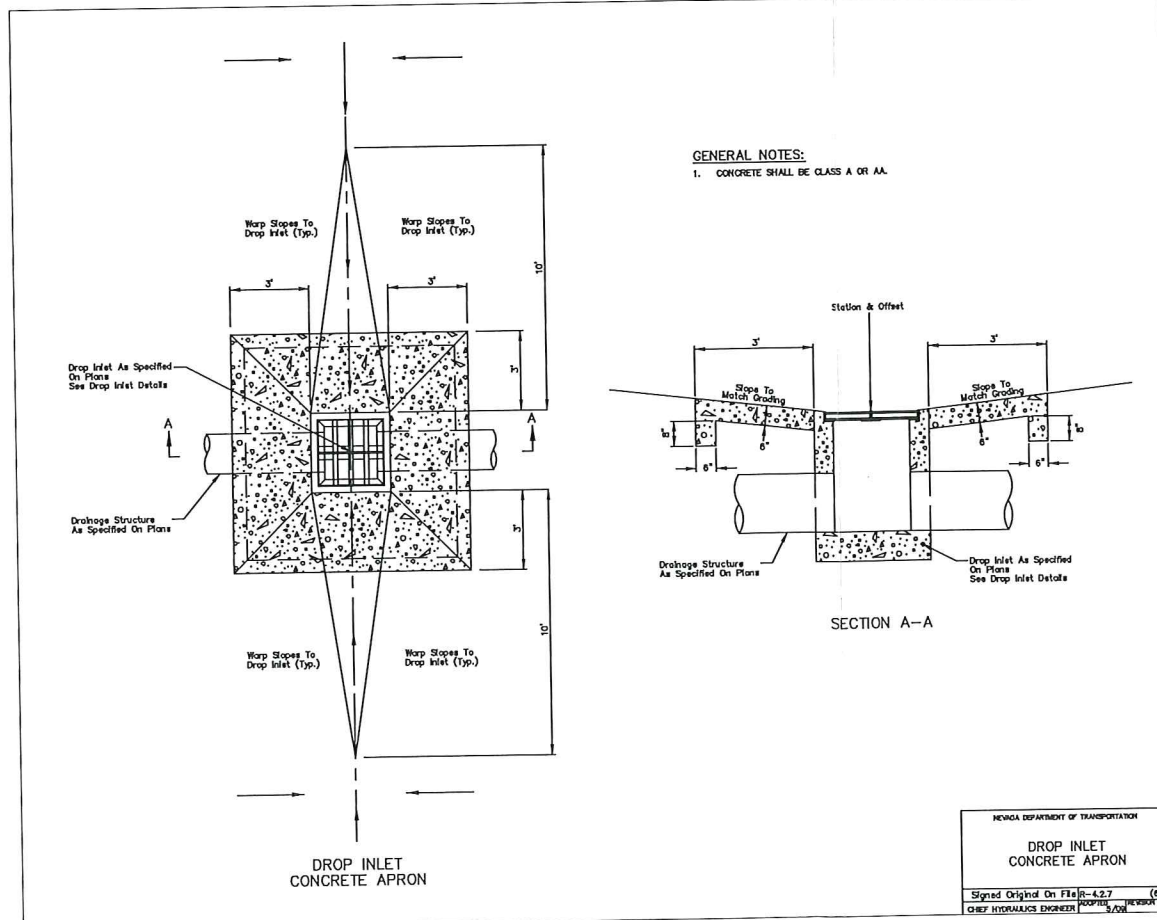


TABLE OF DIMENSIONS (RCP HDPE CMP)											
PIPE SIZE (INCH)	A (INCH)	H (INCH)	MAN BARS (INCH)	FRAME ANGLES (INCH)	FRAME BARS (INCH)	SINGLE GRATE	DOUBLE GRATE	TRIPLE GRATE	L (FT)		
15	2'	2.50	3/8 X 3/8	4 X 3 X 3/8	4 X 3/8	2	4	6	2	4	6
18	2'	3.00	1/2 X 3/8	5 X 3 X 3/8	5 X 3/8	2	4	6	2	4	6
24	3'	3.00	1/2 X 3/8	5 X 3 X 3/8	5 X 3/8	2	4	6	2	4	6
30	4'	4.00	1/2 X 3/8	5 X 3 X 3/8	5 X 3/8	2	4	6	2	4	6
36	4'	4.50	1/2 X 3/8	5 X 3 X 3/8	5 X 3/8	2	4	6	2	4	6
42	5'	5.00	1/2 X 3/8	5 X 3 X 3/8	5 X 3/8	2	4	6	2	4	6
48	5'	5.50	1/2 X 3/8	5 X 3 X 3/8	5 X 3/8	2	4	6	2	4	6



WASHINGTON LAS VEGAS WASH PARK
CITY OF LAS VEGAS
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STORM DRAIN DETAILS

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J-W-Z-U-N-N-G
LANDSCAPE ARCHITECTURE

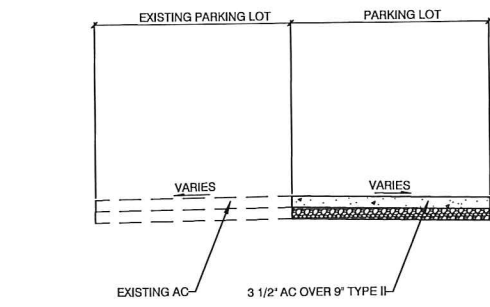
PROFESSIONAL ENGINEER
WILLE L. WELKINS
Exp. 5/30/2019
CIVIL
19632
7/26/2017

OWNER: CITY OF LAS VEGAS
DEPARTMENT OF PUBLIC WORKS

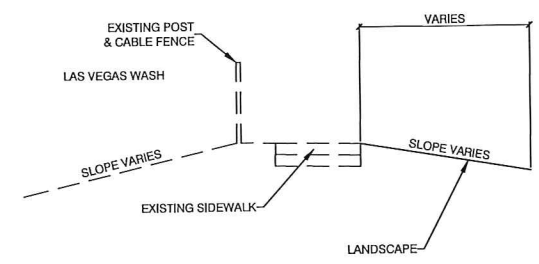
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LAS VEGAS, NEVADA 89101
PHONE: (702) 229-5535
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TDD: (702) 384-8108

DATE: 07/26/17
SCALE: AS SHOWN
SHEET NO: 53811
SHEET NO: 53811

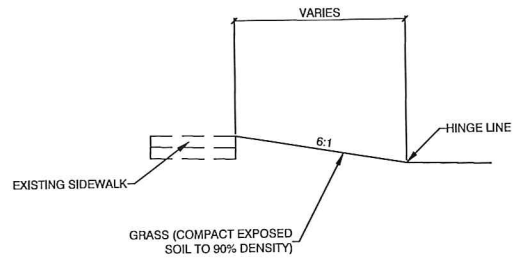
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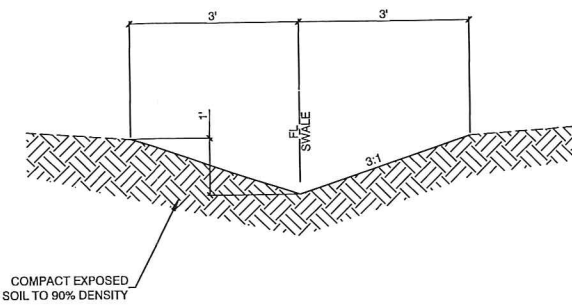
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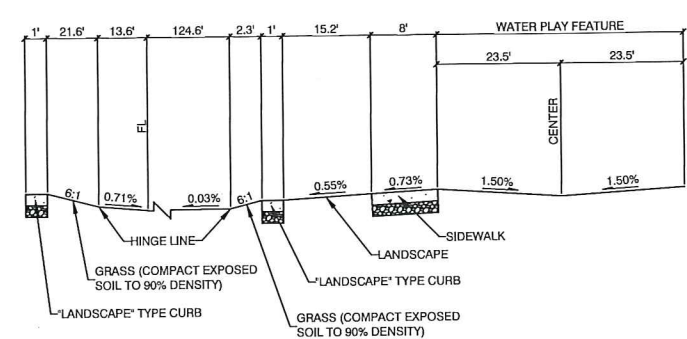
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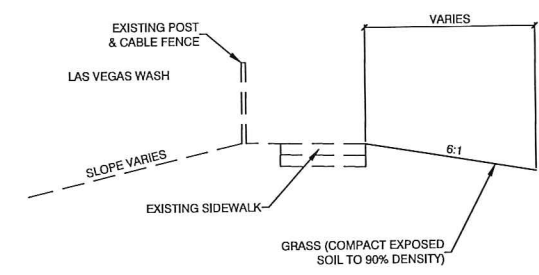
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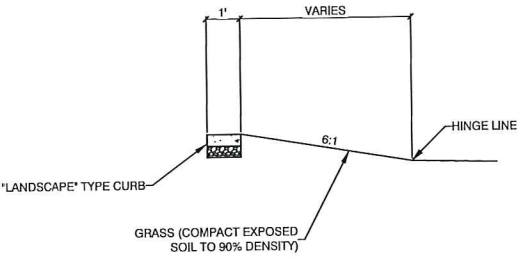
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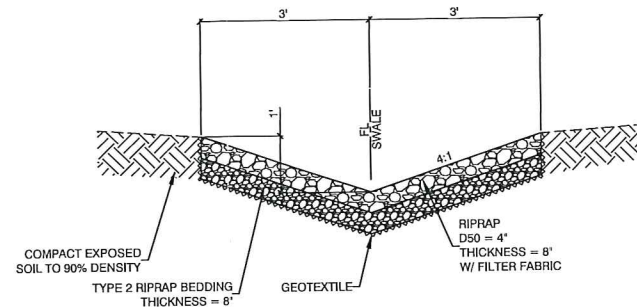
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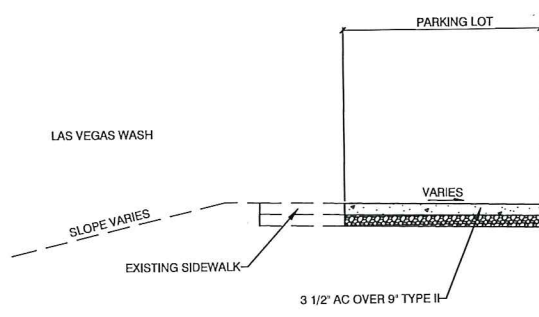
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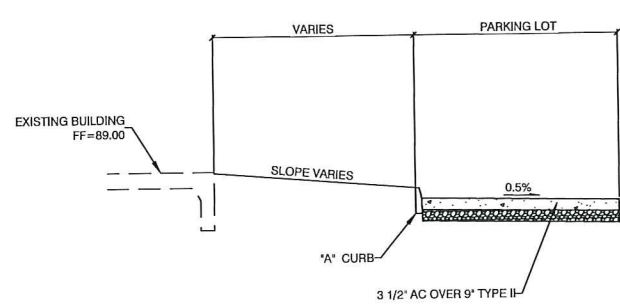
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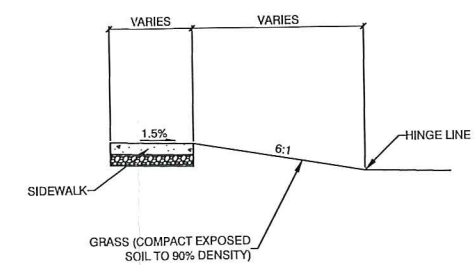
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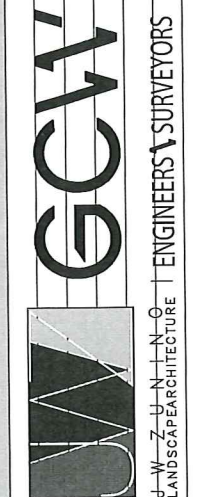
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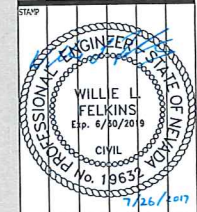
SECTION F
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C4.11



SECTION C
NOT TO SCALE
C4.11



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STORY DRAIN SECTIONS

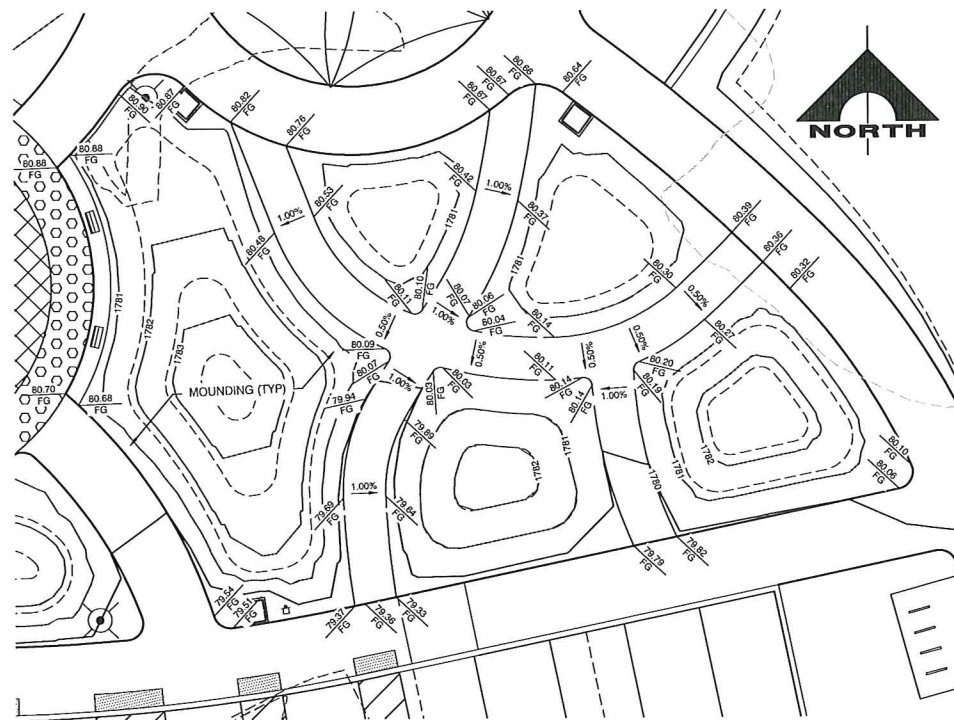


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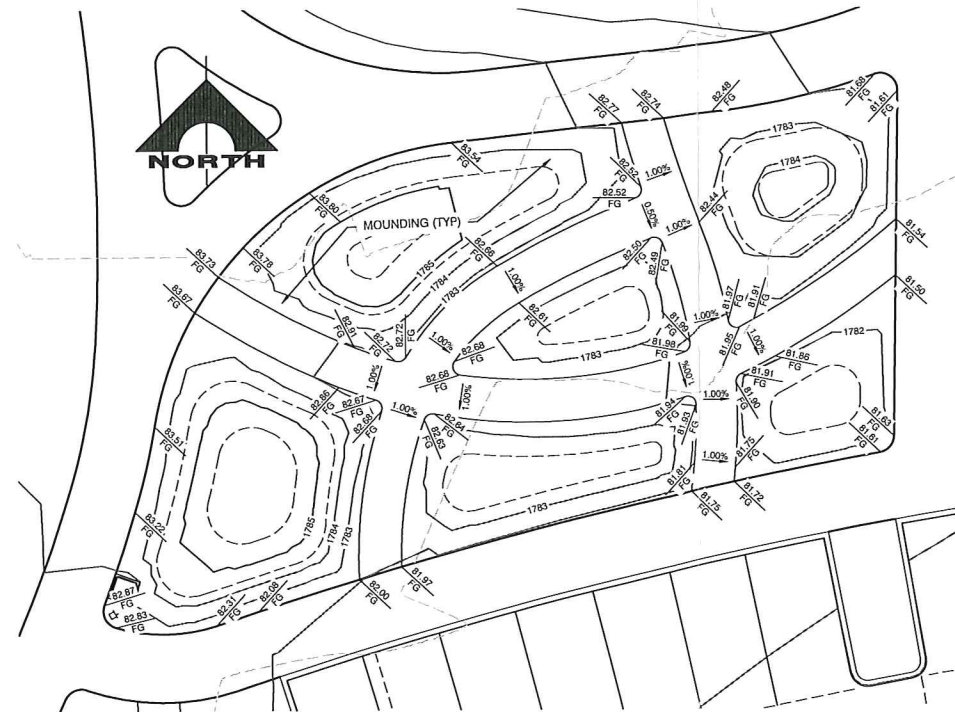
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C4.11



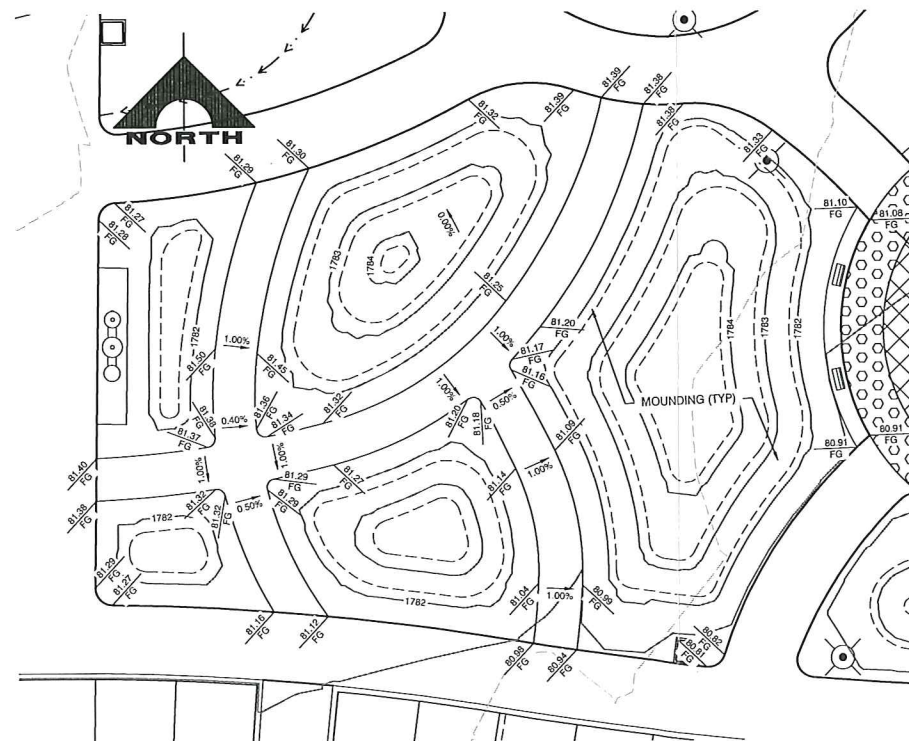
DG PATH GRADING DETAIL

3
C4.12



DG PATH GRADING DETAIL

1
C4.12



DG PATH GRADING DETAIL

2
C4.12

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DRAWN FILE DATE SCALE EDD NO ELEV NO 44'00" NO 5-17 NO	FJK AS SHOWN 01/26/11 AS SHOWN 15.53811DC 650.15 53811 C4.12