DS #: 4943-1

APN: 138.15-810.012

PROJECT: UH6 Facilities: Additional Parking - Update 1

SUBMITTAL: 1st

SCANNED BY/DATE:

CHECKED BY/DATE:

CITY OF LAS VEGAS NEVADA

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: January 23, 2018
TO: **Land Development Services** Department of Building & Safety				FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: **UHG Facilities – Additional Parking**			**COPIES TO:** Collins Engineers
Cross Streets:	Box Canyon Drive & Tenaya Way			Sierra Health Services Inc.
File Number:	F:\Depot\DSMemos\DS4943A.doc			Bart Anderson, P.E., DevCo
Parcel Number:	138-15-810-012			
Zoning Action:	SDR-72190			
FEMA Flood Zone	YES	NO	X	
Proposed Storm Drain	YES	NO	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	12/21/2017 & 1/23/2018	1/23/2018	See Comments Below	$400.00	492298: $400
			TOTAL FEES (LDDRS):	**$400.00**	----

REMARKS:

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

X	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is conditionally approved subject to Clark County Public Works Department concurrence.

NOTE: 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 Update 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 of a project.

NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the *Nevada Division of Environmental Protection* a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see http://ndep.nv.gov/bwpc/storm01.htm or call (775) 687-9429.

END OF REMARKS

ays

T/R/S: T20S/R60E/15

AREA L-15

LAS VEGAS
CITY COUNCIL

CAROLYN G. GOODMAN
Mayor

LOIS TARKANIAN
Mayor Pro Tem

RICKI Y. BARLOW
STAVROS S. ANTHONY
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STEVEN G. SEROKA
MICHELE FIORE

SCOTT D. ADAMS
City Manager

DEVELOPMENT SERVICES CENTER
DEPARTMENT OF PLANNING
333 N. RANCHO DRIVE
3RD FLOOR
LAS VEGAS, NV 89106
702.229.6301 | VOICE
702.474.7463 | FAX
711 | TTY

cityoflasvegas
lasvegasnevada.gov

RECEIVED
JAN 14 2018
COLLINS ENGINEERS

January 10, 2018

Ms. Susan Vogel
Health Plan of Nevada Inc.
2720 N. Tenaya Way
Las Vegas, Nevada 89128

RE: SDR-72190 [PRJ-71870] - SITE DEVELOPMENT PLAN REVIEW PLANNING COMMISSION MEETING OF JANUARY 9, 2018

Dear Applicant:

Your request for a Site Development Plan Review FOR A PROPOSED PARKING LOT on a portion of 18.57 acres on the east side of Box Canyon Drive, north of Cathedral Rock Drive (APNs 138-15-710-023 and 138-15-810-012), C-PB (Planned Business Park) Zone, Ward 1 (Tarkanian) [PRJ-71870], was considered by the Planning Commission on January 9, 2018.

The Planning Commission voted to ***APPROVE*** your request, subject to the following:

Planning

1. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.

2. All development shall be in conformance with the site plan, landscape plan, and building elevations, date stamped 11/27/17, except as amended by conditions herein.

3. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.

4. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.

5. A technical landscape plan, signed and sealed by a Registered Architect, Landscape Architect, Residential Designer or Civil Engineer, must be submitted prior to or at the same time application is made for a building permit. A permanent underground sprinkler system is required, and shall be permanently maintained in a satisfactory manner; the landscape plan shall include irrigation specifications. Installed landscaping shall not impede visibility of any traffic control device.

6. A fully operational fire protection system, including fire apparatus roads, fire hydrants and water supply, shall be installed and shall be functioning prior to construction of any combustible structures.

7. All City Code requirements and design standards of all City Departments must be satisfied, except as modified herein.

Public Works

8. Correct all Americans with Disabilities Act (ADA) deficiencies on sidewalks along Box Canyon Drive adjacent to this site. All existing paving damaged or removed by this development shall be restored at its original location and to its original width concurrent with development of this site.

9. All private improvements and landscaping installed with this project shall be situated and maintained so as to not create sight visibility obstructions for vehicular traffic at all development access drives and abutting street intersections.

10. Concurrent with development of this site, post a "No Left Turn" sign at the driveway facing the exiting traffic.

11. Submit a License Agreement for landscaping and private improvements in the Box Canyon Drive public rights-of-way, if any, prior to the issuance of permits for these improvements. The applicant must carry an insurance policy for the term of the License Agreement and add the City of Las Vegas as an additionally insured entity on this insurance policy. If requested by the City, the applicant shall remove property within the public right-of-way at the applicant's expense pursuant to the terms of the City's License Agreement. The installation and maintenance of all private improvements in the public right of way shall be the responsibility of the applicant and any successors in interest to the property and assigns pursuant to the terms of the License Agreement. Coordinate all requirements for the License Agreement with the Land Development Section of the Department of Building and Safety (702-229-4836).

12. A Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works prior to the issuance of any building or grading permits or submittal of any construction drawings, whichever may occur first. Provide and improve all drainageways recommended in the approved drainage plan/study. The developer of this site shall be responsible to construct such neighborhood or local drainage facility improvements as are recommended by the City of Las Vegas Neighborhood Drainage Studies and approved Drainage Plan/Study concurrent with development of this site.

This action by the Planning Commission on **January 9, 2018** is final unless a written appeal is filed with the City Clerk within ten days of the date of the Planning Commission's decision as allowed by code or there is a review action filed by the City Council within the same time period. For additional information on appeals or review requests submitted please access http://www.lasvegasnevada.gov/CheckStatus/DevelopmentApp.htm, or contact the Department of Planning and Development at 702.229.6301 after ***January 22, 2018***. No building permits or business licenses related to these items shall be issued prior to the expiration of the required ten day waiting period, or until any filed appeal is resolved pursuant to LVMC Title 19.18.

Sincerely,

Steve Gebeke, AICP
Planning Supervisor
Case Planning Division

SG:nl

cc:

Mr. Tom Miller
Collins Engineers, Inc.
3130 S. Durango Dr., Ste. 404
Las Vegas, Nevada 89117









Technical Drainage Study
For
Additional Parking for UHG Facilities

APN 138-15-810-012

December 2017

Prepared for:

RSP Architects
1220 Marschall St, NE
Minneopolis , MN, 55414-1036
Contact: Sonmore Becky
Phone: (612) 677-7100

Prepared by:

COLLINS ENGINEERS INC.

3130 S. Durango Drive, Suite 404
Las Vegas, Nevada 89117
702.248.8000 • www.collinsengr.com

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COLLINS ENGINEERS INC.

December 19, 2017

Albert Sung, P.E., CFM
City of Las Vegas Department of Public Works
Flood Control
333 North Rancho Drive
Las Vegas, Nevada 89106

SUBJECT: **Technical Drainage Study for Additional Parking for UHG Facilities**
Collins Engineers Project No. 10470

Dear Mr. Sung:

Enclosed please find one copy of the Technical Drainage Study and the CD (electronic copy of the study) for Additional Parking for UHG Facilities for your review, comment and approval.

The proposed development is located on the northeastern portion of the property (APN: 138-15-801-012). The current phase of the development is on the ± 2.5 acres of the property as additional parking for UHG Facilities. The site is located on the northwest of Smoke Ranch and US 95, Las Vegas, Nevada.

The following study shows the proposed development is in compliance with the Clark County Regional Flood Control criteria.

If you have any questions or additional information is needed, please feel free to contact our office.

Respectfully,

Said A. Mohammed, P.E., CFM, Ph.D.
Sr. Project Engineer
Collins Engineers, Inc.

Thomas Miller, P.E.
Sr. Transportation Manager
Collins Engineers, Inc.

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: **Additional Parking for UHG Facilities** Date: 12/20/2017

Location of Development: a) Descriptive (Cross Streets) North/South: US 95

East/West: Smoke Ranch

b) Section: **15** Township: **20 South** Range: **60 East**

C) APN: **138-15-810-012**

Name of Owner : Sierra Health Services Inc., and Health Plan Nevada Inc.

Telephone Number: **612-677-7100** Fax No: **Email Address:**

Address: P.O.Box 15645 , Las Vegas , NV, 89114-5645

Contact Person Name: **Said A. Mohammed** **Telephone Number: (702) 248-8000**

*** Email Address** smohammed@collinsengr.com **Fax Number: (702) 248-8070**

Firm: Collins Engineers, Inc.

Address: 3130 South Durango Dr., Suite 404, Las Vegas, Nevada 89117

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	X	**Building Permit**		

1. Total Owned Land Area: At Site: **±9 Ac** Being Developed: **± 2.5 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.)? **Parking (Commercial)**
5. Approximate upstream land area which drains to the subject site? **0 ± Ac**
6. Has the site drainage been evaluated in the past? Yes ☐ No ☒

   IF Yes, Please identify documentation:
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site:

   The site area drains towards the east properties (APN: 138-15-799-003 & 899-003). Then, the south portion drains via existing 30" RCP, and the north portion drains towards the existing 24" RCP. All pipes discharge east of the US 95
8. Briefly describe your proposed schedule for the subject project: **As Soon As Possible**

PROFESSIONAL ENGINEER-STATE OF NEVADA
SAID ALI MOHAMMED
EXP. 12-31-19
CIVIL
No. 9273

12/19/17

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.**

Local Entity File No.

Revision	*Date*

REFERENCE: Collins Engineers Project No.10470

STANDARD FORM 1

updated 05/01/2008

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Additional Parking for UHG Facilities	Map ID:	
Firm Name: Collins Engineers	Engineer: Said A. Mohammed, P.E.	
Address: 3130 South Durango Drive, Suite 404		
City: Las Vegas	State: NV	Zip: 89117
Phone Number: (702) 248-8000	Fax Number: (702) 248-8070	
Property Owner; Sierra Health Services Inc., and Health Plan Nevada Inc.		
Address: P.O. Box 15645, Las Vegas, NV, 89114-5645	Contact: (612)677-7100	
City: Las Vegas	State: NV	Zip: 89114-5645

Revised 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 (HC&DDM).

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 REQUIREMENTS

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

REFERENCE:	**STANDARD FORM 2**

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS

YES	NO	
X		A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated.
X		A copy of the current CCRFCD Master Plan Update Figure, for Flood Control Facilities and Environmental areas with the site delineated.
X		Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.
X		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.
X		Vicinity Map with local and major cross streets identified and a north arrow.

III. DRAINAGE PLAN

YES	NO	
X		Sheet size: 24" x 36" sealed by a registered engineer in the State of Nevada
X		Minimum scale: 1"=60'
X		Project Name.
X		Vicinity Map with local and major cross streets.
X		Revision box.
X		North arrow and bar scale.
X		Engineer's /consultants address and phone number.
X		Elevation datum and benchmark.
X		Legend for symbols and abbreviations.
X		Cut/fill scarps, where applicable.
X		Street names, grades, widths.
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.
X		Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

YES	NO	
X		Minimum finished floor elevations with top-of-curb elevations at upstream end of lot.
X		Proposed typical street sections.
	N/A	Streets with offset crowns.
X		Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
X		Property lines.
X		Right-of-way lines and widths, existing and proposed.
X		Existing improvements and their elevations.
X		Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.
X		Concentration points and drainage flow direction with Q_{100} and V_{100} and D_{100} in streets.
X		Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
X		Location and cross-section of street capacity calculations.
X		Cross-sectional detail for channels, including cutoff wall locations.
X		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.
	N/A	Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
	N/A	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.
	N/A	Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.
X		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.
	N/A	Building and/or lot numbers.

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

YES	NO	
	N/A	Alignment of all existing, proposed, or future Regional Facilities adjacent to the site. Facilities are not listed as Regional.
	N/A	Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information.
	N/A	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. N/A
X		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 Q_{100} flows.
	N/A	Street slopes for perimeters and interior streets. The minimum slope is 0.4 percent.
X		Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required).

IV. Hydrologic Analysis

X	Appropriate soil information for existing and future conditions.
X	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.
X	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.
X	Use of correct precipitation values in and around the McCarran Airport rainfall area.
X	A discussion in the text of the hydrologic analysis justifying sub-basin boundaries and cutoffs, supporting assumptions, and calculations.
X	A summary table of stormwater flows showing basin area, Q10 and Q100 for both individual basins and combined basin flows, where applicable.
X	Copies of supporting technical information referenced from a previously approved study and a statement accepting these results.
X	On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent owners in accordance with current Nevada Drainage Law.
X	Calculations for impervious area for parking lots and LIDs (if required)

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

YES	NO	
	N/A	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
X		Normal depth street flow calculations and cross section diagrams for all interior and perimeter street. Provide "d x v" products for the Q_{100} and Q_{10} flows representing the worst case for interior and all perimeter streets. Q_{100} d x v $\leq$8. Q_{10} d x v $\leq$ 6 and 12 foot dry lane for rights-of –way $\geq$ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
X		A summary table of interior and exterior street capacity calculations showing the street name, Q_{100} flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
	N/A	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
	N/A	Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, super elevation and tee intersection losses, where appropriate.
	N/A	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 Q_{100} weir height or flow depth, which ever is greater.
	N/A	A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. N/A - 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 this report.
	N/A	Provide a 50 percent clogging factor in the capacity calculations for drop inlets.
	N/A	Hydraulic calculations for culverts and storm drains. D-load calculations must be provided for storm drain pipes in public right-of-way, including headwater pool inundation.
X		The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.
X		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	
	N/A	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. SAM 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.)

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.
X		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.)
	N/A	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	
	N/A	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?

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.

City of Las Vegas Development Services

Application: 72190 - SITE DEVELOPMENT PLAN REVIEW (SDR)

Project Name: HPN COVERED PARKING LOT

Review Info						
Review Type	**Review #**	**Plan Submittal Date to City**	**City Review Start Date**	**City Review Completion Date**	**City Plans Reviewer**	**Review Result**
TRAFFIC	1	11/27/2017	11/28/2017	11/30/2017	SCHRODER	Cond. Approval
Comments Post "No left turn" or similar at driveway facing exiting traffic.						
TRAFFIC	1	11/27/2017	11/28/2017	11/30/2017	SCHRODER	Cond. Approval
Comments Post "No left turn" or similar at driveway facing exiting traffic.						
TEFO	1	11/27/2017	12/05/2017	12/05/2017	WHITLOCK	Approved
TEFO	1	11/27/2017	12/05/2017	12/05/2017	WHITLOCK	Approved
SURVEY	1	11/27/2017	11/29/2017	11/29/2017	VON TOBEL	Approved
SURVEY	1	11/27/2017	11/29/2017	11/29/2017	VON TOBEL	Approved
SID	1	11/27/2017	11/29/2017	11/29/2017	PETRIE	Approved
SID	1	11/27/2017	11/29/2017	11/29/2017	PETRIE	Approved
SEWER	1	11/27/2017				Awaiting Review
SEWER	1	11/27/2017				Awaiting Review
ROW	1	11/27/2017	12/06/2017	12/06/2017	HELLER	Approved
Comments 12/6/17 No comment. RH						
ROW	1	11/27/2017	12/06/2017	12/06/2017	HELLER	Approved
Comments 12/6/17 No comment. RH						
NEIGH P&S	1	11/27/2017				Awaiting Review
NEIGH P&S	1	11/27/2017				Awaiting Review
LAND DEV	1	11/27/2017				Awaiting Review
LAND DEV	1	11/27/2017				Awaiting Review
FLOOD	1	11/27/2017	12/04/2017	12/04/2017	SUNG	Cond. Approval
Comments Technical drainage study required.						
FLOOD	1	11/27/2017	12/04/2017	12/04/2017	SUNG	Cond. Approval
Comments Technical drainage study required.						
FIRE ENG	1	11/27/2017	12/05/2017	12/05/2017	MILLER	Approved
FIRE ENG	1	11/27/2017	12/05/2017	12/05/2017	MILLER	Approved
ENGDESIGN	1	11/27/2017	12/06/2017	12/06/2017		Approved

Disclaimer: This information is prepared as an informational service only and should not be relied upon as an official record. For official records and actions, please contact the city of Las Vegas Department of Planning at (702) 229-6301.

City of Las Vegas Development Services

Application: 72190 - SITE DEVELOPMENT PLAN REVIEW (SDR)

Project Name: HPN COVERED PARKING LOT

Review Type	Review #	Plan Submittal Date to City	City Review Start Date	City Review Completion Date	City Plans Reviewer	Review Result
ENGDESIGN	1	11/27/2017	12/06/2017	12/06/2017		Approved
DEVCO	1	11/27/2017				Awaiting Review
DEVCO	1	11/27/2017				Awaiting Review
B&S PLAN	1	11/27/2017				Awaiting Review
B&S PLAN	1	11/27/2017				Awaiting Review

Disclaimer: This information is prepared as an informational service only and should not be relied upon as an official record. For official records and actions, please contact the city of Las Vegas Department of Planning at (702) 229-6301.

I. GENERAL DESCRIPTION

A. Study Overview And Purpose

This study has been prepared as the Technical Drainage Study for Additional Parking for UHG Facilities on the northwestern portion of the 9-acre property (APN 138-15-810-012). The current phase development consists of ±2.5 acres additional surface covered parking and driveways from Box Canyon Drive and from the north adjacent property's private driveway.

This study was conducted in accordance with the criteria set forth by Clark County Regional Flood Control District (CCRFCD) Hydrologic Criteria and Drainage Design Manual (Criteria Manual), adopted August 1999, by WRC Engineering (updated by Montgomery Watson) and revised September 12, 2013.

The following tasks were performed in the preparation of this report:

- Review of the Approved Technical Drainage Study in the vicinity of the site.
- Identification of the Federal Emergency Management Agency (FEMA) Flood Plain designation for the project site,
- Identification of known, existing or planned Clark County Regional Flood Control District (CCRFCD) or local drainage facilities that affect or are affected by the site, and
- Estimation of runoff generated within and around the project site for the 10 and 100-year storm events to design the required driveway surface elevation, and a storm drain facilities if necessary.

The purpose of this analysis is to obtain an approved drainage study to allow development of the site.

B. Site Description and Location

The proposed additional parking for UHG Facilities development is located northwest of Smoke Ranch Road and US 95, Las Vegas, Nevada. The site is bordered: on the west, by fully developed Box Canyon Drive; on the south, by fully developed commercial property (APN: 138-15-810-004); on the east, by fully developed US 95 Highway; and on the north, by fully developed commercial property (APN: 138-15-710-023). Currently, the site property is undeveloped land. For more information see Assessor's Map (Figure 1), and Vicinity Map (Figure 2) in Appendix A.

C. Master Planning Information

Figures 3 and 4 are the reproductions of the Clark County Regional Flood Control District 2013 Las Vegas Valley Flood Control Master Plan Update F-25. Per these figures, there is no existing, or proposed CCRFCD Facility in the vicinity of the site. However, Figure 7 and 8, the copy of the Northwest Neighborhood Study (Figure E-15 & F-15), show that there are local facilities (OKG262, 264 & 270) east of the site property across US 95.

These pipes carry flow from properties west of US 95 (including the site property) to the east (under US 95). The south portion of site drains towards 30" RCP (OKG264). The north portion drain north towards 24" RCP (OKG270.Figure 3, 4, 7, 8 and 8.1 (The 1999 City of Las Vegas Flood Control Facility Invertor Update) are included in Appendix A.

D. FEMA Floodplain Information

Figure 5 is a reproduction of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map for Clark County, Nevada, Community Panel Number 32003C2155F effective November 16, 2011. Figure 5 shows that part of the proposed site is located within Unshaded Flood Zone "X". Unshaded Flood Zone "X" is defined by FEMA as an area outside the 500-year floodplain. Figure 5 is included in Appendix A.

E. Previous Drainage Study

The following approved drainage study was reviewed in the preparation of this technical drainage study.

- Technical Drainage Study for Box Canyon Professional Park Phase II, (DS # 3806), by Wright Engineers, June 10, 2005 and approved by City of Las Vegas on July 21, 2005.
- Technical Drainage Study for Box Canyon Office Park, (DS#2971), by Poggemeyer Design Group Inc., May 15, 2002, and approved by City of Las Vegas on May 28, 2002.
- Improvement Plan for US 95, Project No. NH -095-2(051)

Collins Engineers has reviewed the Wright Engineers and the Poggemeyer Design Group studies and concurs with, and accepts, the analyses as presented in this approved drainage study (except the depth of flow in Box Canyon drive). Refer to specific cited and highlighted sections of these studies in Appendix D.

II. HYDROLOGIC PARAMETERS

The SCS Unit Hydrograph Methodology in conjunction with the HEC-1 Flood Hydrograph Package, from the US Army Corps of Engineers, was used to determine the peak runoff generated by the 10-year and 100-year, 6-hour storm events. Parameters used in the HEC analyses are described in the following paragraphs (refer to HEC-1 output data in Appendix B.)

A. Precipitation

Figure 513 of the Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual (The Manual) shows that the property is located within the McCarran Airport Rainfall Area. The 6-Hour, 10-year and 100-year storm event rainfall depths were obtained from Table 505 of the Manual. The values referenced are 1.58 inches and 2.77 inches for 10 and 100-Year Storm events respectively. The six-hour depth-area reduction factor of 1.00 is accepted based on the site area which is less than 0.5 square miles. The 10-year/100-year precipitation depth ratio, for the HEC-1 analysis, is calculated and accepted as 0.57 (see Precipitation Depth Calculation, Appendix B). To incorporate the 10 and 100-year diverted flows into the HEC-1 model separately this ratio was not used in the calculation. The existing and developed HEC-1 models are calculated separately for 10 and 100-Year storm events. See Appendix B for all models.

The Rainfall Calculation Table for the final precipitation values and referenced materials are included in Appendix B.

B. Soil Classification

The soil information for the study area was determined from the 2008 Las Vegas Valley Flood Control Master Plan Update (Hydrologic Sub-Areas, Land Use & Soils) H-25 included in Appendix A). Using the map, the north portion of the site is located on soil Group "A" and the south portion is located on soil Group "B".

Per Web Soil Survey map, the north portion of the site soil represents by Map Symbol 264, and the south portion by Map Symbol 502. Map Symbol 264-Jean Very gravelly loamy fine sand, 2 to 4 percent slopes, and Map Symbol 502-Canutio-Cave gravelly fine sandy loams, 2 to 8 present. Soil Map Symbol 264 is classified as a hydrologic Soil Group "A". However, Map Symbol 502 consists 55% hydrologic Soil Group "A" and 40% hydrologic Soil Group "D'.

Per the Soil Survey of Las Vegas Area, Table 15, Soil Type "264" and "502" are classified as hydrologic Soil Group "A" and "B" correspondingly.

For this analysis, the site Hydrologic Soil Groups are taken from 2008 MPU Figure 6 and Table 15, the north portion as Soil Group "A" and the south portion as Soil Group "B". Figure 6, the copy of H-25 of the 2008 MPU is included in Appendix A, whereas the Web Soil Survey Map and Table 15 are included in Appendix B.

Per the Manual (Table 602, sheet 4 of 4), for existing condition HEC-1 calculation, a curve number 63 and 77 are used for Soil Group "A" and Soil Group "B" respectably . For developed condition HEC-1 calculation (for commercial/Business cover) Per the Manual (Table 602, sheet 1 of 4) a curve number 89 and 92 are used for Soil Group "A" and "B" respectively.

Based on the area, composite curve numbers are calculated, and the curve number summary table is included in Appendix B.

C. Time of Concentration and Lag Time

Time of Concentration calculations were performed per section 602 of the HCDDM for basins less than one square mile. The methodology was developed by the Federal Aviation Administration (FAA1970) and is outlined as follows:

$$t_c = t_i + t_t$$

TLAG = 0.60* t_c / 60 (hr.) – Lag time used in HEC1 model

In which t_c = Time of Concentration (min)
t_i = Initial, Inlet, or Overland Flow Time (min)
t_t = Travel Time in the Ditch, Gutter, Storm Sewer, etc. (min)

The initial overland flow time is calculated as follows:

$$t_i = 1.8(1.1\text{-}K)L_o^{1/2}/S^{1/3}$$

Where K = flow resistance factor
L_o = overland flow length
L = length of channel (etc.)
S = average slope of basin (%)

For SCS & TR55 unit hydrographic Methods

$$K = 0.0132(CN) - 0.39$$

Where: CN = SCS runoff curve number
$t_t = L/60V$ (min)
V = average channel velocity (ft. /sec)

Velocity determination for time of concentration

At the upstream end of a drainage area, the initial overland flows begin to collect and gradually increase from small, shallow flows to larger, deeper flows with greater velocities. To estimate the average velocity for flow condition that constantly varies throughout the length of drainage area, two generalized relationships can be used. Velocity V_1 applies to the small shallow flows in the first 500 feet or less of travel distance and velocity V_2 applies to the remainder of the travel distance where the velocity is greater. Manning's equation was used to derive formulas for estimating the two travel time velocities. The equations are as follows:

$V = CS^{1/2}$ $C = 1.49/n\ R^{2/3}$ $R = A/P$

Where: V = Average Velocity (fps)
S = Average Slope (ft./ft.)
N = Manning's Roughness Coefficient
R = Hydraulic Radius (ft.)
P = Wetted Perimeter (ft.)
A = Area of Flow (sq. ft.)

Two sets of coefficients were determined, one for developed conditions and the other for undeveloped conditions. For the first developed-conditions velocity (V1), the appropriate coefficient (C=20.2) represents street flow with n = 0.016 and a depth of flow in the gutter of 0.3 feet. For the second developed-conditions velocity (V2), the appropriate coefficient (C=30.6) represents curb height street flow. As may be noted, V2 is approximately equal to 1.5 times V1. Typically, drainage areas are delineated such that the channelized flow considered in the calculations of travel times is within streets and other minor watercourses and does not include significant lengths of major improvement floodway and channels in the travel distance for the time of concentration. For the first undeveloped conditions velocity (V1), the appropriate coefficient (C = 14.8) represents wide channel flow with D = 0.25' and n = 0.04. For the second undeveloped conditions velocity (V2), the appropriate coefficient (C = 29.4) represents wide channel flow with a depth of 0.7 feet and n = 0.04.

For urbanized basins, the time of concentration should not exceed the time of concentration calculated by the following equation.

$$t_c = L/\ 180 + 10$$

Where: L = Watershed Length (ft.)

Additionally, the minimum t_c for urbanized areas is 5 minutes.

These methods are consistent with the methods outlined in Technical Release 55, SCS (TR55) for calculating the time of concentration and should provide times of concentration and lag times that are consistent with one another and with the degree of accuracy of typical hydrologic modeling.

The Standard Form 4 for Existing and Developed conditions are included in Appendix B.

III. HYDROLOGY

A. Hydrologic Methodology and Criteria

The U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package was used to determine the peak runoff values generated by the 10 and 100-Year, 6-hour storm events. The HEC-1 input and output values for the existing and developed condition are included in Appendix B.

B. Existing Drainage Condition

The following description refers to Figure 7, Existing Condition Drainage Basin Map which is included in Appendix A.

The existing onsite drainage basins were determined from the available aerial topography, GISMO, and field investigation. Based on the topography and surrounding property conditions, the site property does not accept any off-site flow. The onsite area is divided into 2 sub-basins. The north portion of the site (ONX1) with 3.19 acres generates <1/1 cfs in 10 and 100-year storm events respectively. It drains east towards the existing ditch west of the US -95. This flow drains towards the existing 24" RCP which is located under the US 95. This pipe discharges its flow on the east side of US-95, into the existing storm drain facility.

The South portion of the site (ONX2) with 5.68 acres of an area generates <1/4 cfs. It drains towards the existing 30" RCP which conveys flow from west to east under US-95 and discharges into the existing multifamily property APN 138-15-211-000.

A minor off-site area (basin OFX1) with 0.45 acres generates <1/1 cfs. This basin drains east, but does not affect the site in existing condition. This basin was created to analyze the developed condition driveway hump and to facilitate flow across the east driveway. The basin areas and flow rates during the 10-year and 100-year storm events are included in Table 1.

C. Developed Drainage Condition

The following description refers to Figure 8, Developed Condition Drainage Basin Map which is included in Appendix A.

In the proposed condition, off-site area remain the same as in existing condition. Onsite area divided into two sub-basins (OND1, OND2). The northwest portion of the on-site basin is developed as a surface parking lot, whereas the east and south portions remain undeveloped. This basin (OND1) with 3.29 acres generates 1/4 cfs and drains towards the same location as in existing condition.

In developed condition, the south on-site basin (OND2 with 5.60 acres generates 1/5 cfs. It drains the same as in existing basin towards the existing 30" RCP storm drain which cross under US-95. Basin OND2 and STD1 at their concentration point (CP1) generates a total of 3/9 cfs and drains towards the existing 30" RCP which has the capacity 36 cfs (see Figure 8.1).

Off-site basin OFD1with 0.45 acres generates <1/1 cfs and drains across the proposed drive way. The basin areas and flow rates during the 10-year and 100-year storm events are included in Table 1.

D. Future Drainage Condition

As shown in the future condition basin map (Figure 11), the future condition basins were analyzed as the site area fully developed as a commercial property. The site flow patterns remain the same as in developed condition. The south portion of the site (Basin ONF2) and the off-site basin (STF1) at their concentration point (CP1) generate a total of 8/18 cfs. This flow is carried by the exiting 30" RCP under US 95. Per the 1999 City of Las Vega Master Plan Update Facility Inventory Figure 8.1 which is included in Appendix A, the existing 30" RCP has the capacity of 36 cfs and can convey flow without affecting the NDOT Property.

IV. HYDRAULIC ANALYSIS

A. Peak Flows

The following Table 1 shows a summary of the runoff generated by each basin determined from the HEC-1 model. The HEC-1 analyses in the existing and developed conditions are included in Appendix B.

Table 1
Peak Flow Summary

Basin	Area (ac)	10-year Flow (cfs)	100-year Flow (cfs)
Existing Condition			
ONX1	3.19	<1	1
ONX2	5.68	<1	4
STX1	1.27	2	4
OFX1	0.45	<1	1
CP1	ONX2+STX1	2	7
Developed Condition			
OND1	3.29	1	4
OND2	5.60	1	5
STD1	1.27	2	4
OFD1	0.45	<1	1
CP1	OND2+STD1	3	9
Future Condition			
ONF1	3.29	3	7
ONF2	5.60	6	14
STF1	1.27	2	4
OFF1	0.45	<1	1
CP1	ONFF2+STF1	8	18

B. Flow Depth Analysis

The Flow Master V8i computer program was utilized to determine the maximum velocity and depth for the study. Table 2 summarizes the flow depth analysis for the 10-year and 100-year storm events (see Figure 10 and 11 for the location of the FlowMaster section). Copies of the flow depth calculations are included in Appendix C.

Table 2
Flow Depth Analysis

Hydraulic Section	Street Width (ft.)	Slope %	Q_{100} (Cfs.)	D_{100} (ft.)	V_{100} (Fps.)	VD_{100}	Q_{10} (Cfs.)	D_{10} (ft.)	V_{10} (fps	VD_{10}
FM1	N/A	1.2	1	0.24	1.54	0.37	<1	0.24	1.54	0.37
FM2	60	0.44	83	0.81	3.45	2.79	40	0.66	2.58	1.70

The 100-year flow creates 0.24' depth of flow at the north entrance (FM1). The referenced depth of flow in Box Canyon was calculated with mistyped slope; per revised FlowMaster Section (FM2) the 100-year flow (83 cfs) cerates 0.81' depth of flow. Both entrances are humped 6" above the 100-year water surface elevation and satisfy the Manual required elevation.

C. Storm Drain Capacity Analysis

The proposed surface for the additional parking development surface drains toward east as in the existing condition. No storm drain facility is required for the site.

D. Onsite Parking Lot Storm Water Treatment

The current phase development is ± 2.5 acres parking lot development for the existing facilities on the north and the future building on the east and south portion of the property. Per the Manual, it is considered as a large parking lot category. The site is proposed 3 BMP locations (landscaping swale with riprap d_{50}=3") to treat all storm water from the parking area.

BMP #1 treats the north portion of the parking area. BMP #2 (a 40' length riprap ditch) is proposed to treat the middle portion of the current development. The south portion will be treated by BMP #3. For the rest (currently undeveloped) area, the future development plan will propose an additional BMP locations or will modify as required by the Manual based on the future building location.

V. SUMMARY

A. Conclusion

As detailed in this study, the Additional Parking for UHG Facilities development is in compliance with the CCRFCD HC&DDM.

- Runoff from the project site will continue to flow in accordance with the natural historical drainage patterns to the east and north along the west side of US-95 property just west of the retain wall as plan by the road drainage plan. This flow will be captured by the existing 30" RCP (OKG264) and 24" RCP (OKG270).
- The existing 30" RCP which conveys the south portion of the site (ONX/D/F2) and the west portion of the US-95 (STD1) has 36 cfs capacity which is less than the future conditon flow at CP1.
- Box Canyon Drive is fully developed. Per the latest referenced study DS # 3806 the road conveys 40/83 cfs. The west and north entrances are humped 6" above the 100-year water surface elevation (for depth see FM1 and FM2).
- The site SDR is included in the report.

B. References

1. Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual, Adopted August 1999, WRC Engineering (updated by Montgomery Watson).Revised September 12, 2013

2. Clark County Regional Flood Control District Website, http://www.ccrfcd.org

3. 2013 and 2008 Clark County Regional Flood Control District Flood Control Master Plan Update, PBS&J, G.C. Wallace and Louis Berger Group.

4. HEC-1 Flood Hydrograph Package Version 4.1, June 1998, U.S. Army Corps of Engineers.

5. Flood Insurance Rate Map Number 32003C2155F, map revised November 16, 2011, Federal Emergency Management Agency.

6. Federal Emergency Management Agency Website, https://msc.fema.gov/webapp/wcs/stores/servlet/info?storeId=10001&catalogId=10001&langId=-1&content=firmetteHelp_A&title=FIRMettes

7. Web soil survey web site, http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

8. FlowMaster Version V8i, 2009, Bentley Systems, Inc.

9. Soil Survey of Las Vegas Area, Nevada part of Clark County, by US Department of Agriculture Soil conservation Service, July 1985.

10. Technical Drainage Study for Box Canyon Professional Park Phase II, (DS # 3806), by Wright Engineers, June 10, 2005 and approved by City of Las Vegas on July 21, 2005.

11. Technical Drainage Study for Box Canyon Office Park, (DS#2971), by poggemeyer Design Group Inc., May 15, 2002, and approved by City of Las Vegas on May 28, 2002.

12. Improvement Plan for US 95, Project No. NH -095-2(051)

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- Figure 7 – E-15 Northwest Neighborhood Study MPU
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- Technical Drainage Study for Box Canyon Professional Park Phase II, (DS # 3806), by Wright Engineers, June 10, 2005 and approved by City of Las Vegas on July 21, 2005.
- Technical Drainage Study for Box Canyon Office Park, (DS#2971), by poggemeyer Design Group Inc., May 15, 2002, and approved by City of Las Vegas on May 28, 2002.
- Improvement Plan for US 95, Project No. NH -095-2(051)

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APPENDIX A
(Figures)

- Figure 1– Assessor's Parcel MAP
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NOTES

This map is for assessment use only and does NOT represent a survey.

No liability is assumed for the accuracy of the data deliniated herein. Information on roads and other non-assessed parcels may be obtained from the Road Document Listing in the Assessor's Office.

This map is compiled from official records, including surveys and deeds, but only contains the information required for assessment. See the recorded documents for more detailed legal information.

USE THIS SCALE(FEET) WHEN MAP REDUCED FROM 11X17 ORIGINAL

0 100 200 400 600 800

MAP LEGEND

- PARCEL BOUNDARY
- SUB BOUNDARY
- PM/LD BOUNDARY
- ROAD EASEMENT
- MATCH / LEADER LINE
- HISTORIC LOT LINE
- HISTORIC SUB BOUNDARY
- HISTORIC PM/LD BOUNDARY
- SECTION LINE
- CONDOMINIUM UNIT
- AIR SPACE PCL
- RIGHT OF WAY PCL
- SUB-SURFACE PCL

ASSESSOR'S PARCELS - CLARK CO., NV.

Michele W. Shafe - Assessor

001 ROAD PARCEL NUMBER
001 PARCEL NUMER
1.00 ACREAGE
202 PARCEL SUB/SEQ NUMBER
PB 24-45 PLAT RECORDING NUMBER
5 BLOCK NUMBER
5 LOT NUMBER
GL5 GOV. LOT NUMBER

BOOK T20S R60E

SEC. 15

126	125	124
137	138	139
164	163	162

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

MAP S 2 SE 4

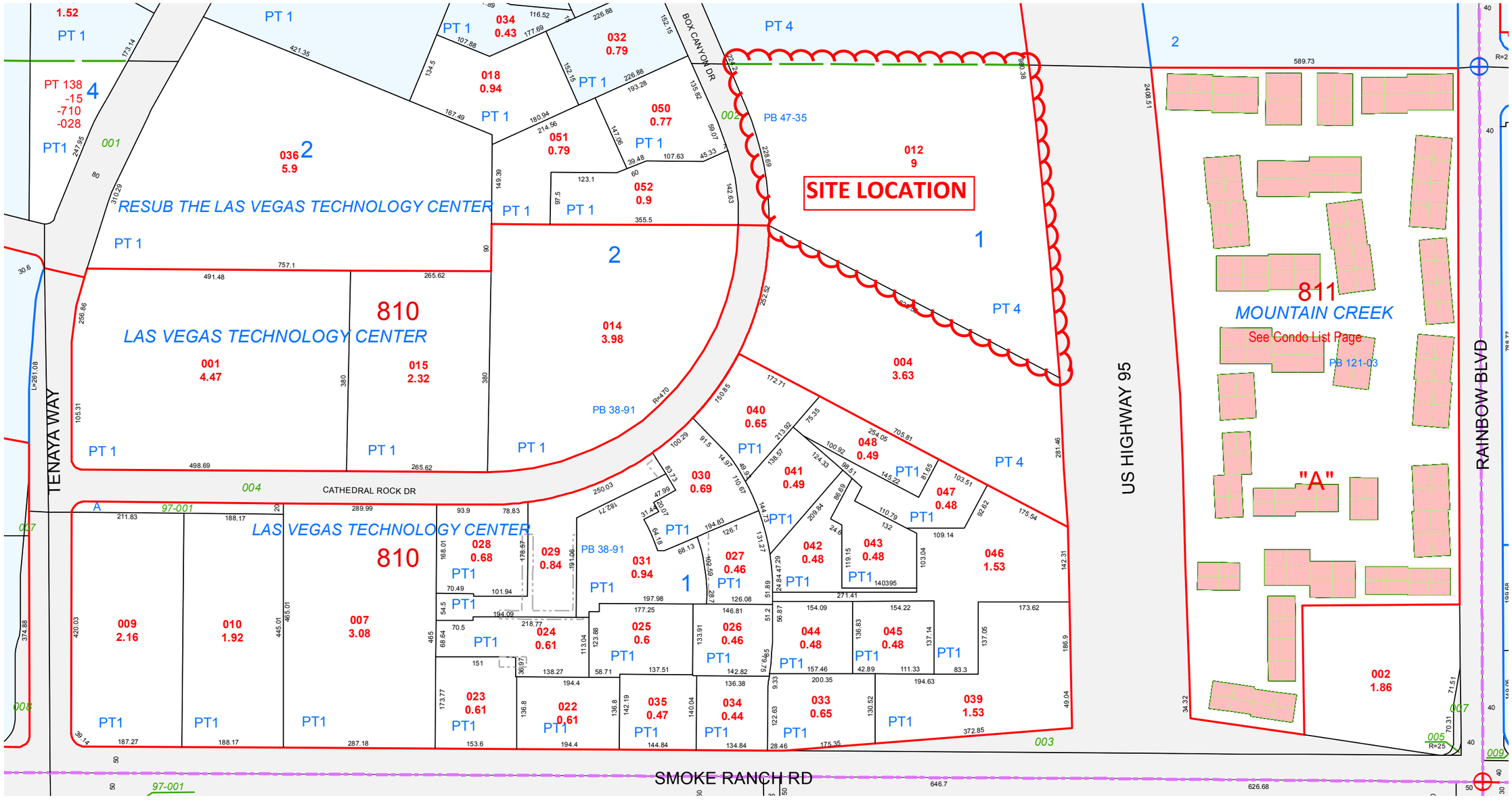
8	4	8	4
5	1	5	1
6	2	6	2
7	3	7	3
8	4	8	4
5	1	5	1

138-15-8

CLARK COUNTY ASSESSOR MAPPING DIVISION NEVADA

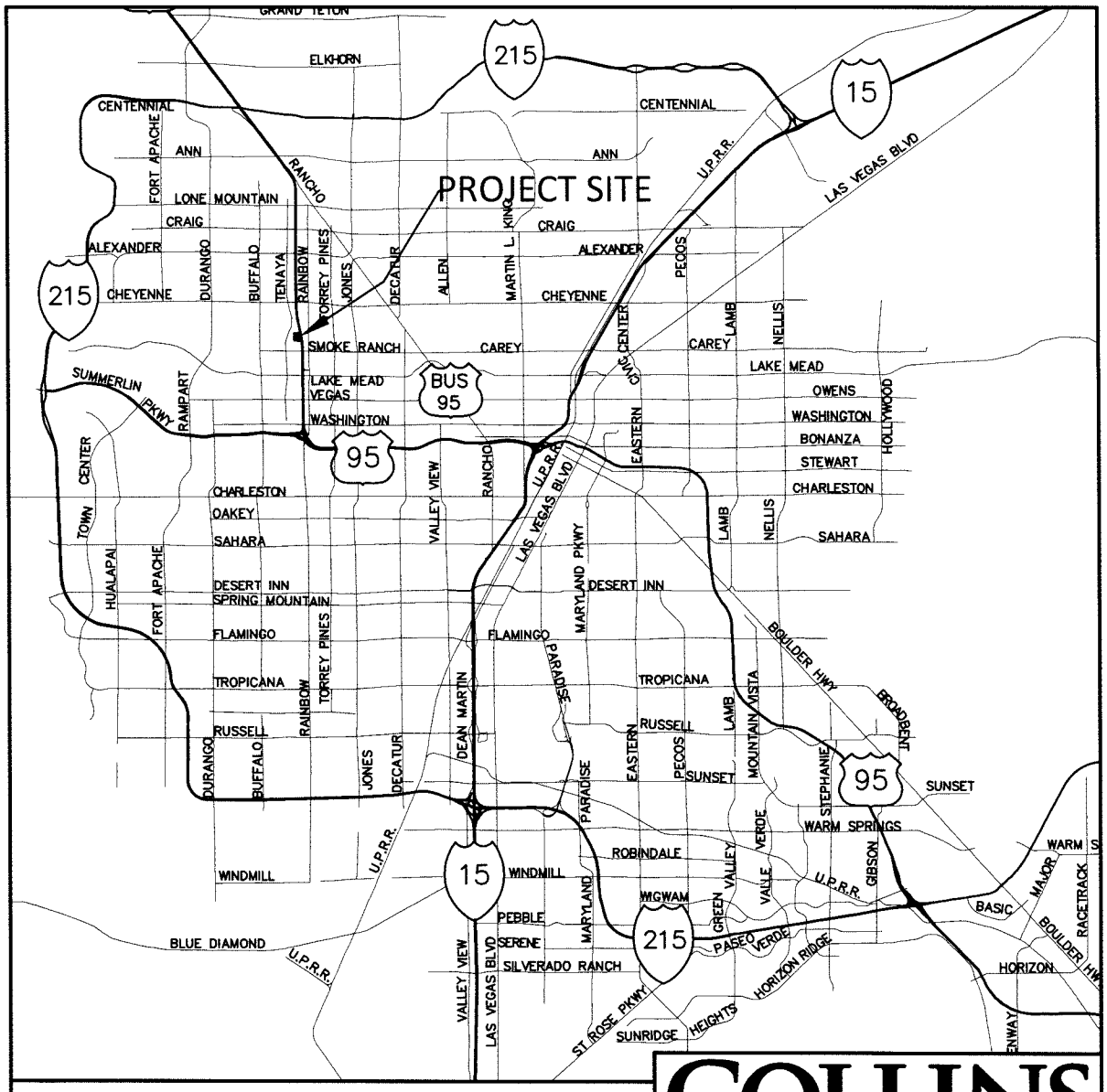
Scale: 1" = 200'

Rev: 9/18/2013



TAX DIST 200

FIGURE 1



COLLINS ENGINEERS INC.

3130 S. DURANGO DR., SUITE 404
LAS VEGAS, NV 89117
PHONE: (702) 248-8000
FAX: (702) 248-8070
www.collinsengr.com

VICINITY MAP

12/2/2016
MAP NTS

FIG 2

REGIONAL FLOOD CONTROL DISTRICT

2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 25
FLOOD CONTROL FACILITIES

LEGEND

- Ultimate Development Boundary
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Local Existing Facilities
- Local Proposed Facilities
- Detention Basin

- Stormdrain
- Lined Channel
- Unlined Channel
- Levee/Dike
- Natural Wash/Floodway
- ID-Mile Separator

Remove & Replace/Parallel Facilities

Category A	Category B
Channel	Channel
Stormdrain	Stormdrain

N

0 500 1,000 2,000 3,000
Feet
Scale: 1 inch = 2,000 feet
Refer to Figure G-2 for Aerial Source(s)

US95 I-15 I-215

1	2	3			A1	A2
4	5	6			A3	A4
	7	8	9	10	A5	A6
11	12	13	14	15	16	17
	18	19	20	21	22	23
	24	25	26	27	28	
	29	30	31	32	33	34
	35	36	37	38	39	40
	41	42	43	44	45	46
	47	48	49	50	51	52
	53	54	55	56		
	57	58	59			

FIGURE-3

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
APMD		**ANGEL PARK - MIDDLE BRANCH**						
0000	E	Natural Wash	940	6048	C11A-3*	ALLGOW4	11.31	2.90
0027	E	1: 12' X 10' and 2: 12' X 2' RCBC @ Canyon Run	170	6048	C11A-3*	ALLGOW4	11.31	3.00
0030	E	Natural Wash	7000	6048	C11A-3*	ALLGOW4	11.31	3.00
0132	E	2: 12'x10' RCBC @ Hualapai	120	6048	C11A-3*	ALLGOW4	11.31	1.00
APNO		**ANGEL PARK NORTH**						
0001	E	1,512 ac-ft Angel Park Detention Basin		9199	ANGLPKIN	ALLGOW5	21.99	
0002	E	2: 33" & 1: 42" RCP Emergency Outlet	190	406	ANGLPKDB	ALLGOW5	21.99	
0004	E	14' X 12' RCB Connector Pipe under Summerlin Pkwy	380	9199	ANGLPKIN	ALLGOW5	21.99	1.00
0005	E	Natural Wash	1559	7988	CC3B-2B*	GW3SC	7.68	2.00
0012	E	3: 12' X 10' RCBC @ Rampart	232	7988	CC3B-2B*	GW3SC	7.68	1.00
0013	E	Natural Wash	1283	7988	CC3B-2B	GW3SC	7.68	1.40
0015	E	Two Span Bridge 28' W 14'D @ Summerlin Pkwy	236	7988	CC3B-2B	GW3SC	7.68	1.00
APOF		**ANGEL PARK OUTFALL**						
0000	E	66" RCP	1297	728	CGD34AC	GW3SC	0.65	1.90
0015	E	60" RCP	5472	454	CGD34AB	ALLGOW5	22.25	2.20
0124	E	54" RCP Outlet	810	406	ANGLPKDB	ALLGOW5	21.99	2.50
APSP		**ANGEL PARK - SUMMERLIN PARKWAY**						
0000	E	Concrete Chute Drop	103	7988	CC3B-2B	GW3SC	7.68	3.00
0001	E	Unlined Chnl with Gabion Drops 20'W Depth Varies 2:1 SS	3924	2746	C3B-2B	ALLGOW3	2.67	3.00
0002	E	Unlined Chnl with Gabion Drops 50'W 3:1 SS	1424	2746	C3B-2B	ALLGOW3	2.67	3.50
0066	E	5: 8' X 4' RCBC @ Town Center Dr.	200	1697	C8B-2	ALLGOW3	1.56	2.40
0069	E	Conc Chnl 10'W 6'D 2:1 SS	3195	1697	C8B-2	ALLGOW3	1.56	2.40
0133	E	3: 9'X4' RCBC @ Crestdale	180	1173	C8B-1	ALLGOW3	1.14	2.33
0135	E	Conc Chnl 10'W 6'D 2:1 SS	2030	1173	C8B-1	ALLGOW3	1.14	2.40
GO02		**GOWAN SOUTH FACILITIES (CHEYENNE CHANNEL)**						
0000	E	Free Span Bridge 34'W 9.25'D @ Ronemus	100	4978	C16-C	ALLGOW3	7.09	0.50
0010	E	Conc Chnl 30'W 9'D 0:1 SS	600	4978	C16-C	ALLGOW3	7.09	0.50
0015	E	Free Span Bridge 31'W 7.25'D @ Buffalo	102	4978	C16-C	ALLGOW3	7.09	1.40
0018	E	Conc Chnl 30'W 9'D 0:1 SS	250	4978	C16-C	ALLGOW3	7.09	1.50
0020	E	Conc Chnl 10'W 7.25'D 1.5:1 SS	1000	4978	C16-C	ALLGOW3	7.09	1.50
0028	E	Free Span Bridge 35'W 7'D @ Soft Breezes	72	4800	CC7-C	ALLGOW3	6.78	2.20
0029	E	Conc Chnl 10'W 7.25'D 1.5:1 SS	2700	4800	CC7-C	ALLGOW3	6.78	1.50
0084	E	Free Span Bridge 35'W 7'D @ Soaring Gulls	95	4657	CCB-C	ALLGOW3	6.07	1.30
0085	E	Conc Chnl 10'W 7.25'D 1.5:1 SS	1240	4657	CCB-C	ALLGOW3	6.07	1.50
0111	E	Free Span Bridge 35'W 7'D @ Rampart	127	4657	CCB-C	ALLGOW3	6.07	2.90
0112	E	Conc Chnl 10'W 7'D 1.5:1 SS	7640	4225	CC-C	ALLGOW3	5.42	2.30
0257	E	Conc Chnl 10'W 6.75'D 1.5:1 SS	4293	2577	CCJ-C	ALLGOW3	2.97	4.10
GO95		**GOWAN OUTFALL - U.S. 95 CHANNEL**						
0000	P1	Conc Chnl 12'W 4'D 2:1 SS	2640	299	GD17BG-C	ALLGOW3	0.36	0.30
GODU		**GOWAN NORTH - DURANGO BRANCH**						
0000	E	12' X 6' RCB	2629	1150	CLV14-C	ALLGOW3	1.40	0.91
0050	E	9' X 6' RCB	865	835	CLV20-C	ALLGOW3	0.97	1.50
GOLB		**GOWAN LAKE MEAD-BUFFALO**						
0000	E	12' X 6' RCB	1294	1071	CCVILL23	ALLGOW3	1.46	1.50
0025	E	10' X 7' RCB	145	1071	CCVILL23	ALLGOW3	1.46	0.50
0030	E	2: 8' X 4' RCB	408	1071	CCVILL23	ALLGOW3	1.46	0.85
GOLM		**GOWAN LONE MOUNTAIN SYSTEM**						
0146	E	888 ac-ft Lone Mountain Detention Basin		7252	LMTNIN	GW3SC	6.13	
GONO		**GOWAN NORTH SYSTEM**						
0000	E	8' X 8' RCB Outlet	184	558	GWNNDB	ALLGOW5	68.49	0.51
0001	E	8' X 8' RCB Outlet	156	558	GWNNDB	ALLGOW5	68.49	0.63
0006	E	30,780 cfs PMF Spillway		30780	GWNNDB	ALLGOW5	68.49	
0008	E	921 ac-ft Gowan North Detention Basin		4937	CCLV43-C*	GW4SC	11.93	
GOOF		**GOWAN OUTFALL FACILITIES**						
0511	E	8' X 5' RCB	8390	699	CPT6B-C	GW3SC	1.08	0.50
0531	E	8' X 5' RCB	1300	558	GWNNDB	ALLGOW5	68.49	0.50
0551	E	72" RCP	524	558	GWNNDB	ALLGOW5	68.49	0.62
0773	E	60" RCP	803	286	LV30-C	ALLGOW3	0.42	1.40
0775	E	60" RCP	1300	286	LV30-C	ALLGOW3	0.42	1.00

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
GOSO		**GOWAN SOUTH FACILITIES**						
0000	E	72" RCP Outlet	2303	454	GWNSDB	GW5SC	12.13	0.53
0050	E	39,030 cfs PMF Spillway		39030	GWNSIN	GW5SC	12.13	
0051	E	624 ac-ft Gowan South Detention Basin		5625	GWNSIN	GW5SC	12.13	
0052	P1	Upgrade to 686 ac-ft Gowan South Detention Basin		5625	GWNSIN	GW5SC	12.13	
0068	E	Conc Chnl 15'W 7'D 2:1 SS	380	3796	CBUF01-C	GW3SC	4.88	0.40
0076	E	2: 10' X 7' RCBC @ Peak Dr	80	2119^	CBUF01-C^	GW3SC	4.88	0.56
0077	P0	Add 2: 14' X 7' RCBC @ Peak Dr	80	1677^	CBUF01-C^	GW3SC	4.88	0.56
0078	E	Conc Chnl 22'W 10'D 0:1 SS	60	3796	CBUF01-C	GW3SC	4.88	0.56
0080	E	Conc Chnl 12'W 7'D 2:1 SS	2078	3796	CBUF01-C	GW3SC	4.88	0.56
0119	E	Conc Chnl 22'W 10'D 0:1 SS	180	3587	CCCVIL23	GW3SC	4.52	0.95
0123	E	2: 10' X 7' RCBC @ Smoke Ranch	100	2229^	CCCVIL23^	GW3SC	4.52	0.62
0124	P0	Add 2: 10' X 7' RCBC @ Smoke Ranch	100	1358^	CCCVIL23^	GW3SC	4.52	0.62
0125	E	Conc Chnl 22'W 9'D 0:1 SS	50	3587	CCCVIL23	GW3SC	4.52	0.62
0126	E	Conc Chnl 12'W 7'D 2:1 SS	2155	3587	CCCVIL23	GW3SC	4.52	0.62
0170	E	Conc Chnl 12'W 7'D 2:1 SS	220	2657	CCGD34AC	GW3SC	3.06	0.62
0173	E	Conc Chnl 22'W 7'D 0:1 SS	158	2657	CCGD34AC	GW3SC	3.06	0.62
0176	E	2: 10' X 7' RCBC @ Lake Mead	100	2657	CCGD34AC	GW3SC	3.06	0.62
0178	E	Conc Chnl 22'W 7'D 0:1 SS	150	2657	CCGD34AC	GW3SC	3.06	1.00
0181	E	Conc Chnl 12'W 7'D 2:1 SS	2429	2657	CCGD34AC	GW3SC	3.06	0.58
0227	E	2 : 10' X 7' RCBC @ Vegas Drive	100	2065	CGD34AA	ALLGOW3	2.41	1.36
0229	E	Conc Chnl 12'W 7'D 1:1 SS	2649	2065	CGD34AA	ALLGOW3	2.41	1.36
0279	E	12' X 7' RCB	80	2065	CGD34AA	ALLGOW3	2.41	1.36
0280	E	12' X 8' RCB	875	2065	CGD34AA	ALLGOW3	2.41	0.34
0297	E	12' X 7' RCB	2124	1825	CW1BB-C	ALLGOW3	2.14	1.60
0336	E	12' X 7' RCB	602	1593	C1-WESTC	ALLGOW3	1.84	3.40
0352	E	2: 8' X 5' RCB	2740	1374	C1-DUCHC	ALLGOW3	1.60	0.73
GOTE		**GOWAN -TENAYA BRANCH**						
0000	E	60" RCP	1954	272	LV29-C	ALLGOW3	0.28	1.30
GOWC		**GOWAN SOUTH FACILITIES - WEST CLIFF**						
0000	E	24" RCP	5400	257	1-WEST-C	ALLGOW3	0.24	1.67
LCCH		**LAS VEGAS CREEK CHANNEL**						
0438	E	60" RCP	1090	162	CLC01-C	SW3	1.20	1.60
0458	E	60" RCP	1060	162	CLC01-C	SW3	1.20	1.60
0478	E	60" RCP	1110	162	CLC01-C	SW3	1.20	0.55
0499	E	42" RCP Outlet	660	85	RAINBWDB	SW3	1.11	1.88
0513	E	102 ac-ft Rainbow Detention Basin		970	RAINBWIN	SW3	1.11	
0518	E	60" RCP Connector Pipe Under Rainbow Blvd	670	970	RAINBWIN	SW3	1.11	1.85
0534	E	60" RCP	460	279	AL00A-C	SW3	0.23	5.38
0543	E	Conc Chnl 10'W 4'D 0:1 SS	700	279	AL00A-C	SW3	0.23	1.88
LCLO		**LAS VEGAS CREEK - LORENZI**						
0000	P3	7' X 6' RCB	445	265	DAL00A	SW3	0.41	3.37
0008	P3	7' X 6' RCB	2415	265	DAL00A	SW3	0.41	0.40
LVLM		**LAS VEGAS WASH - LAKE MEAD**						
0475	E	48" RCP	2632	235	LM02-C	NW3	0.29	1.24
0525	E	48" RCP	2600	542	CLM01-C	NW3	0.64	1.24
LVOW		**OWENS AVENUE SYSTEM**						
0460	P1	7' X 6' RCB	2700	616	CVG03-C	NW3	0.95	1.48
LVPK		**PEAK DRIVE SYSTEM**						
0130	E	7' X 5' RCB	1435	400	CPD01-C	NW3	0.67	0.61
LVSR		**LAS VEGAS WASH - SMOKE RANCH**						
0496	P1	10' X 7' RCB	2855	1245	CSR02E	NW3	1.64	1.27
0546	P1	8' X 8' RCB	2640	758	CSR00A	NW3	1.01	0.57

** The HEC-1 node shown identifies the controlling concentration point for the associated facility and is located upstream of this facility due to decreasing peak flow with increasing tributary area caused by storm distribution transitions, depth area reduction factors, or attenuation of flow from routing.*

*** As-built or design slopes were used when available. All other slopes are based on existing topography. The user should verify the facility slope listed prior to performing any facility specific analysis.*

^ For parallel facilities, the existing facility flow equals its normal depth capacity, and the proposed parallel facility flow equals the remaining flow (i.e., HEC-1 Node flow = existing facility normal depth capacity + proposed parallel facility flow).

REGIONAL FLOOD CONTROL DISTRICT

2013 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE

FACILITY INVENTORY FIGURE F - 25

LEGEND

ID (Facility Identifier) AABB
- Parent Stream Name
- Stream Name

River Mile 0000
- Distance Above Confluence with Parent Stream (Miles)
- Miles in Hundredths

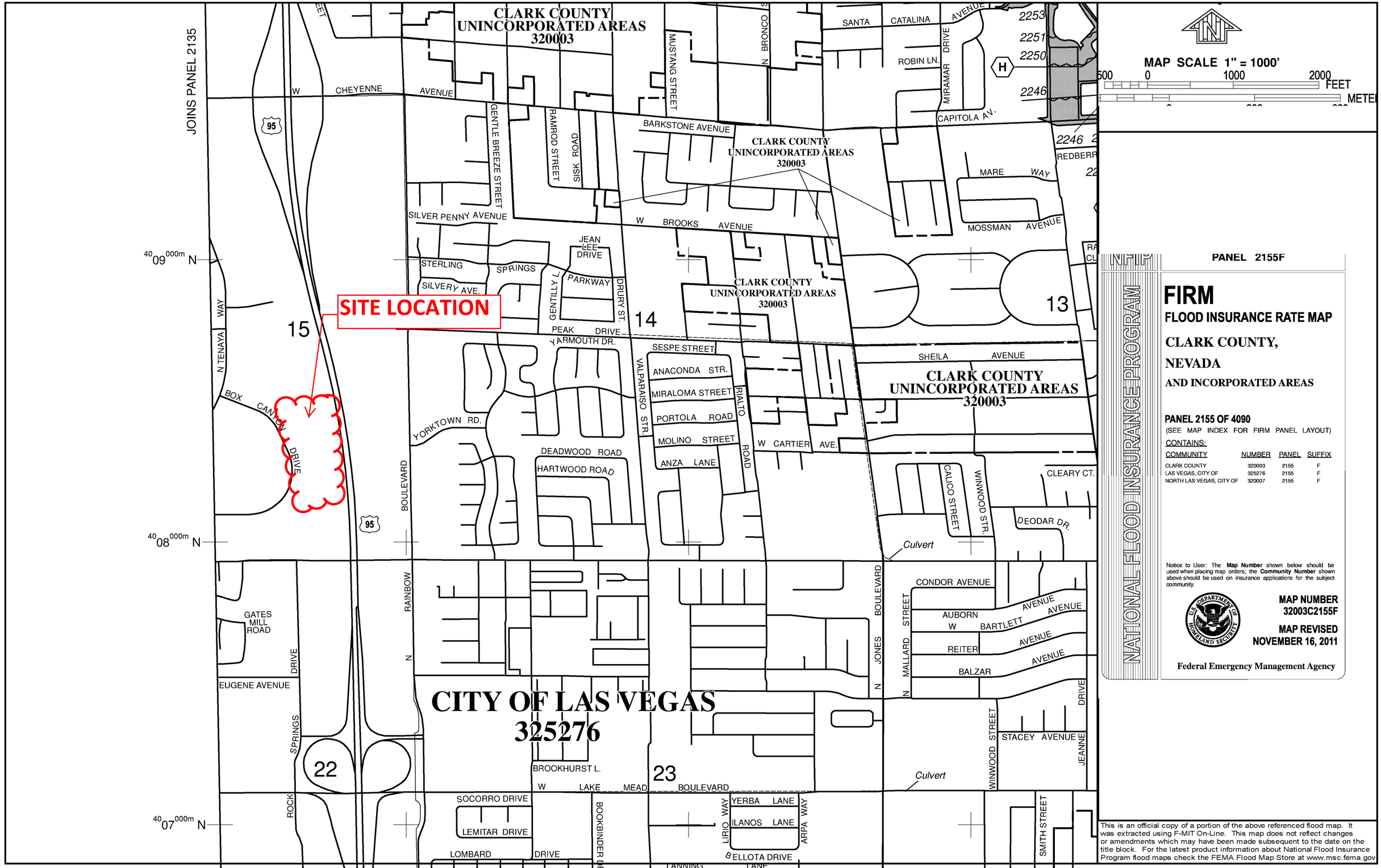
Existing Facility..... E
Proposed or Modified Facility..... P
Contingency Level
- Category B..... P0
- Master Plan..... P1
- Preliminary Design..... P2
- Design..... P3

Bottom Width..... W
Depth..... D
Side Slope, H:V..... SS

Construction Features

Cast in Place Concrete Pipe..... CIPCP
Corrugated Metal Arch Pipe Culvert..... CMAP
Corrugated Metal Pipe Culvert..... CMPC
High Density Polyethylene..... HDPE
Horizontal Elliptical Reinforced Concrete Pipe..... HERCP
Reinforced Concrete Arch Pipe..... RCAP
Reinforced Concrete Arch Culvert..... RCAC
Reinforced Concrete Box..... RCB
Reinforced Concrete Box Culvert..... RCBC
Reinforced Concrete Pipe..... RCP
Reinforced Concrete Pipe Culvert..... RCPC
Storm Sewer Pipe..... SSP

FIGURE-4



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2155F

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA

AND INCORPORATED AREAS

PANEL 2155 OF 4090

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY	320003	2155	F
LAS VEGAS, CITY OF	325276	2155	F
NORTH LAS VEGAS, CITY OF	320007	2155	F

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

MAP NUMBER
32003C2155F

MAP REVISED
NOVEMBER 16, 2011

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

FIGURE-5

REGIONAL FLOOD CONTROL DISTRICT

2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE H- 25

HYDROLOGIC SUMMARY

LEGEND

- Ultimate Development Boundary
- Watershed Boundary
- Subbasin Boundary
- Drought Ordinance Boundary
- Flow Arrows

Flood Control Facilities

- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Category A Remove & Replace/ Parallel Facilities
- Category B Remove & Replace/ Parallel Facilities

Type Hydrologic Soil Groups

- A Low Runoff Potential
- B Moderately Low Runoff Potential
- C Moderately High Runoff Potential
- D High Runoff Potential/Rock Outcrops

Typical Land Use

	1	Undeveloped Land, Open Desert
	2	Parks, Golf Courses
	3	Rural
	4 / 14*	Low Density Residential
	5 / 15*	Medium Density Residential
	6 / 16*	High Density Residential
	7 / 17*	Public Facility, Residential
	8 / 18*	Very High Density Residential
	9 / 19*	Commerical, Retail, Casino, High Rise Condominiums
	10 / 20*	Light Industrial
	11 / 21*	Heavy Industrial
	12 / 22*	Schools
	13	Lakes

* Drought Ordinance Applied

N

0 500 1,000 2,000 3,000
Feet

Scale: 1 inch = 2,000 feet

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

US95 I-15 I-215

1	2	3								
4	5	6								
	7	8	9	10						
11	12	13	14	15	16	17				
	18	19	20	21	22	23				
	24	25	26	27	28					
	29	30	31	32	33	34				
	35	36	37	38	39	40				
	41	42	43	44	45	46				
	47	48	49	50	51	52				
	53	54	55	56						
	57	58	59							

PBS&J PB

FIGURE-6

CITY OF LAS VEGAS NEVADA

NORTHWEST NEIGHBORHOOD STUDY

LEGEND

SUB-BASIN BOUNDARY

FLOW ARROW

250	10-YEAR STREET FLOW
500	100-YEAR STREET FLOW
300	10-YEAR FACILITY FLOW
800	100-YEAR FACILITY FLOW

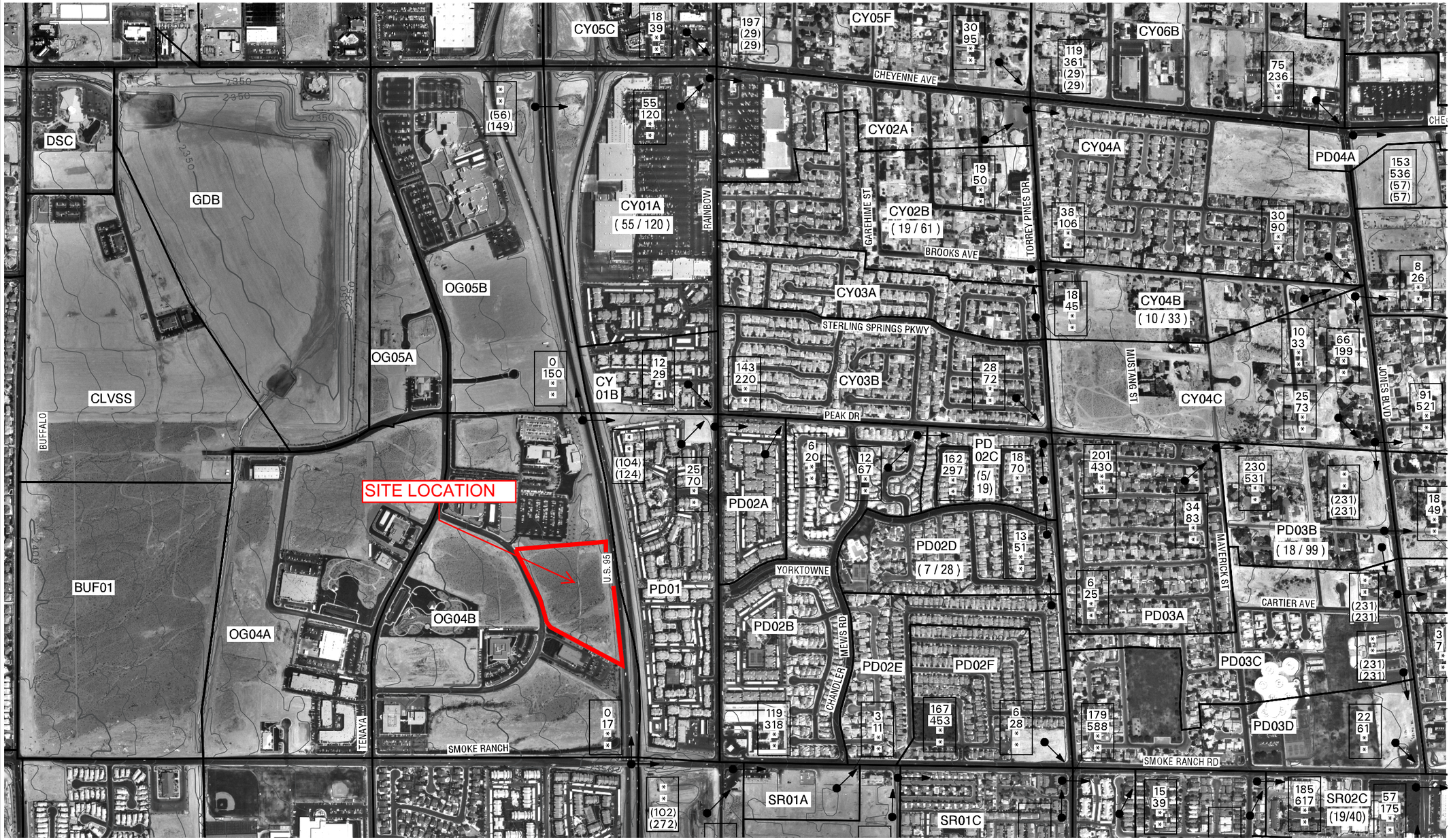
(FLOWS IN CFS)

BWJS Basin-ID

(13 / 59) Contributing flow (10-Year / 100-Year) from the basin (cfs)

PHOTO DATE: APRIL 1996

FIGURE E-15

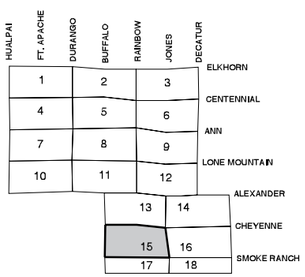


EXISTING DRAINAGE CONDITIONS

POST, BUCKLEY, SCHUH & JERNIGAN, INC.

ENGINEERING PLANNING SURVEYING GIS

901, N. Green Valley Pkwy, Ste 100, Henderson NV 89014
Phone: (702) 263-7275 Fax: (702) 263-7200



NOTE:

Existing conditions are based on future CN values with only existinig local and CCRFCD facilities in place

N W E S

800 600 400 200 0 400 800

(IN FEET)

SCALE: 1 INCH = 800 FEET

FIGURE-7

GOWAN SOUTH DETENTION BASIN

GOO2 0010

GOO2 0000

GOSO 0051

GOSO 0068

GOSO 0080

GOSO 0119

0123

0078

0076

SITE LOCATION

CHEYENNE

RAINBOW

TORREY PINES

BROOKS

PEAK

JONES

CARTIER

RIALTO

TENAYA

SMOKE RANCH

BUFFALO

LVSR 0552

LVSR 0525

54" 0.9%

60" 0.6%

48" 0.3%

48" 1.35%

54" 1.4%

54" 0.8%

54" 1.5%

18" 0.5%

30" 0.5%

0.4%

CITY OF LAS VEGAS NEVADA

NORTHWEST NEIGHBORHOOD STUDY

LEGEND

- EXISTING REGIONAL DETENTION BASINS
- PROPOSED REGIONAL DETENTION BASINS
- EXISTING LOCAL DETENTION BASINS
- EXISTING REGIONAL BRIDGES
- PROPOSED REGIONAL BRIDGES
- EXISTING LOCAL BRIDGES
- EXISTING REGIONAL CULVERT
- PROPOSED REGIONAL CULVERT
- EXISTING LOCAL CULVERT
- EXISTING REGIONAL PIPELINE
- PROPOSED REGIONAL PIPELINE
- EXISTING LOCAL PIPELINE
- PROPOSED LOCAL PIPLINE
- EXISTING REGIONAL CHANNEL
- PROPOSED REGIONAL CHANNEL
- EXISTING LOCAL CHANNEL
- PROPOSED REGIONAL PIPELINE (Not Included In 1996 MPU)
- PROPOSED REGIONAL CHANNEL (Not Included In 1996 MPU)
- EXISTING REGIONAL DIKE/LEVEE
- PROPOSED REGIONAL DIKE/LEVEE
- EXISTING LOCAL DIKE/LEVEE
- EXISTING STORM WATER PUMPING STATION
- PROPOSED BELTWAY ALIGNMENT

FIGURE F-15

N W E S

800 600 400 200 0 400 800

(IN FEET)

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 CN values with all flood control facilities in place

* See Chapter 7 of Volume I for additional proposed facilities in this area.

HUALPAI	FT. APACHE	DURANGO	BUFFALO	RAINBOW	JONES	DECATUR	
1		2		3			ELKHORN
4		5		6			CENTENNIAL
7		8		9			ANN
10		11		12			LONE MOUNTAIN
		13		14			ALEXANDER
		15		16			CHEYENNE
		17		18			SMOKE RANCH

FUTURE DRAINAGE CONDITIONS

POST, BUCKLEY, SCHUH & JERNIGAN, INC.

ENGINEERING PLANNING SURVEYING GIS

901, N. Green Valley Pkwy, Ste 100, Henderson NV 89014

Phone: (702) 263-7275 Fax: (702) 263-7200

FIGURE-8

1999 CITY OF LAS VEGAS
FLOOD CONTROL FACILITY
INVENTORY UPDATE

LEGEND

REGIONAL STREAM NAME DESIGNATOR — AABB
PARENT STREAM NAME
STREAM NAME

REGIONAL ID / RIVER MILE — 0000
DISTANCE ABOVE
CONFLUENCE WITH PARENT STREAM
MILES
TENTHS OF A MILE

LOCAL STREAM NAME DESIGNATOR	AAB
LOCAL ID NUMBER	000
EXISTING FACILITY	E
PROPOSED OR MODIFIED FACILITY	P
CONTINGENCY LEVEL:	
MASTER PLAN	P1
FACILITY PLAN	P2
PRELIMINARY DESIGN	P3
DESIGN	P4
BOTTOM WIDTH	W
DEPTH	D
SIDE SLOPE, H:V	SS
CORRUGATED METAL PIPE CULVERT	CMP
CORRUGATED METAL ARCH PIPE CULVERT	CMAP
REINFORCED CONCRETE BOX	RCB
RCB CULVERT	RCBC
REINFORCED CONCRETE PIPE	RCP
RCP CULVERT	RCPC
REINFORCED CONCRETE ARCH PIPE CULVERT	RCACP
GENERAL COMMENT	G1
FACILITY SPECIFIC COMMENT	S1
PUBLIC DRAINAGE EASEMENT	PDE

NOTES:
FLOW = 100 YEAR DESIGN FLOW (REGIONAL FACILITIES)
FLOW = FACILITY CAPACITY (LOCAL FACILITIES)

FLOOD CONTROL FACILITIES INVENTORY

SHEET F-9

PBS&J, INC

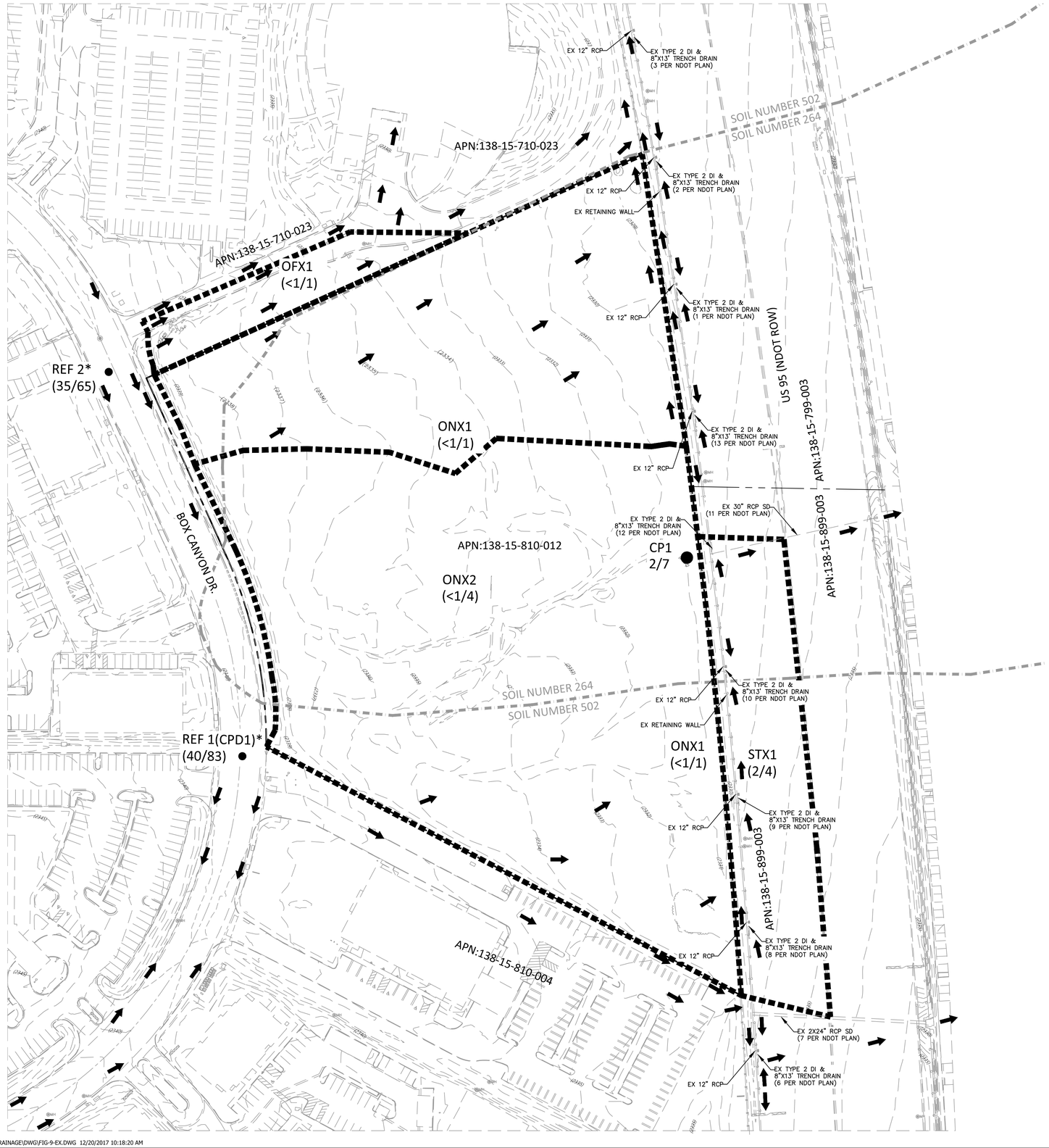
ID	ID No.	E/P	Plan No.	Facility Description	Fac Length	Slope (%)	Flow (cfs)
				LOCAL FACILITIES			
ALX	003	E	107-V2366	Unlined Chnl 75'W 3.5'D 3:1SS	2,545	0.25	3,676
BFO	060	E	731-58	54" RCP	102		210
BFO	061	E	731-58	48" RCP	84		154
BFO	062	E	731-58	36" RCP	129		68
BFO	063	E	731-58	42" RCP	103		172
BFO	064	E	731-58	24" RCP	129	0.38	13
BFO	070	E	107-V1877	42" RCP	308		101
BFO	071	E	107Y-4182	42" RCP	531		160
BFO	150	E	107-V2314	24" RCP	1,302		
BFO	160	E	107-V2314	30" RCP	1,710		
BFO	170	E	107-V2314	42" RCP	1,032		
BFO	180	E	107-V2314	36" RCP	123		
BFO	190	E	107-V2314	24" x 38" HE RCP	65		
BFO	210	E	107-V2314	36" RCP	202		
BFO	220	E	107-V2314	24" RCP	1,118	0.88	82
BFO	230	E	107-V2314	42" RCP	542		
BFO	310	E	107-V2713	24" RCP	354	2.00	32
BFO	440	E	Buffalo Drive 79% Plans	18" RCP	288	0.25	5
BFO	450	E	Buffalo Drive 75% Plans	24" RCP	91	0.25	10
BFO	460	E	Buffalo Drive 75% Plans	42" RCP	439	0.25	66
CHY	001	E	107-Y1157	24" RCP	170		18
CHY	005	E	107-V2686	24" RCP	72	2.63	37
CHY	010	E	107-V1776	42" RCP	1,498		71
CHY	020	E	107-V1776	36" RCP	1,865		57
CHY	030	E	107-V1776	30" RCP	4,513		29
CHY	035	E	107-V1776	24" RCP	140		23
CHY	040	E	107-V1776	24" RCP	525		23
CHY	050	E	107-V1776	18" RCP	360		11
CHY	052	E	107-V2315	8' x 2' RCBC	537	0.10	60
CHY	053	E	107-V2315	36" RCP	280	0.32	33
DCR	200	E	107-V2207	24" RCP	265		
DCR	210	E	107-V2207	36" RCP	117		68
DCR	220	E	107-V2207	30" RCP	755		25
DCR	230	E	107-V2207	24" RCP	145		
DCR	300	E	107-V2207	18" RCP	380		
DCR	310	E	107-V2207	24" RCP	150		
GIL	100	P	107Y-4281	30" RCP	112	1.50	50
GIL	110	P	107Y-4281	42" RCP	554	1.25	111
GWN	100	E	107Y-4519	18" RCP	32		
GWN	110	E	107Y-4519	36" RCP	70	2.94	114
JNS	100	E	107-V948A	12" RCP	2,656		2
JNS	111	E	107-V948C	48" RCP	70		144
JNS	112	E	107-V948C	24" RCP	5,130		10
JNS	113	E	107-V948C	24" RCP	1,100		
JNS	150	E	107-V4516	24" RCP	53	1.18	25
JNS	160	E	107-V2672	12" PVC	29	9.72	12
LMD	025	E	107-V2221	18" RCP	326	1.00	9
LMD	026	E	107-V2221	18" RCP	638	0.40	6
LMD	035	E	HWY BK E-9	18" RCP	184		11
LMD	037	E	HWY BK E-9	60" RCP	450		144
LMD	040	E	HWY BK E-9	60" RCP	188		260
LMD	043	E	107-V2200	42" RCP	150	0.01	9
LMD	044	E	107-V2200	35" x 55" HE RCP	71	0.40	62
LMD	045	E	107-V2096	35" x 80" HE RCP	32	1.66	169
LMD	046	E	107-V2096	40" x 65" HE RCP	118	0.20	71
LMD	047	E	107-V2096	36" RCP	360	1.61	73
LMD	048	E	107-V2096	42" RCP	777	0.89	82
LMD	049	E	107-V2096	36" RCP	108	0.50	41
LMD	050	E	327-V232	48" RCP	569		144
LMD	060	E	107-V2096	36" RCP	24		
LMD	061	E	107-V2096	29" x 45" HE RCP	103		
LMD	062	E	107-V2096	36" RCP	212		
LMD	063	E	107-V2096	10' x 7' RCB	55	0.50	1,001
LMD	064	E	107-V2585	12' x 6' RCB	1,274	1.40	1,538
LMD	065	E	107Y-4497	36" RCP	85	5.44	155
LMD	066	E	107Y-4497	36" RCP	129	4.50	141
LMD	067	E	107Y-4497	36" RCP	144	4.26	138
LMD	068	E	107Y-4497	36" RCP	148	4.28	138
LMD	069	E	107Y-4497	36" RCP	158	4.14	136
LMD	071	E	107Y-4497	36" RCP	172	5.05	24
LMD	072	E	107Y-4497	24" RCP	26	4.00	45
LMD	073	E	107Y-4497	24" RCP	46	1.87	29
LMD	074	E	107Y-4497	24" RCP	10	16.60	92
LMD	080	E	327-V232	36" RCP	142		62
LVW	010	E	585-304	15" PVC TO BACK OF DI	418	1.37	8
LVW	020	E	585-304	12" PVC TO BACK OF DI	96	5.90	9
LVW	030	E	585-304	12" PVC TO BACK OF DI	62	5.00	9
LVW	050	E	585-304	12" PVC LVVWD DISCHARGE TO DI	539		
OKG	210	E	HWY BK E-9	2: 10' x 4' RCBC	183		860
OKG	211	E	HWY BK E-9	24" RCP	475		

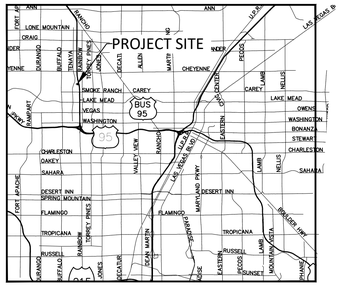
ID	ID No.	E/P	Plan No.	Facility Description	Fac Length	Slope (%)	Flow (cfs)
				LOCAL FACILITIES			
OKG	220	E	HWY BK E-9	24" RCP	183		30
OKG	225	E	HWY BK E-9	5' Flat Bottom Chnl Conc 5.5'D 2:1 SS	135		547
OKG	230	E	HWY BK E-9	48" RCP	200		144
OKG	231	E	HWY BK E-9	24" RCP	152		
OKG	240	E	HWY BK E-8	6' x 4' RCBC	183		192
OKG	250	E	HWY BK E-8	36" RCP	182		80
OKG	251	E	HWY BK E-9	36" RCP	200		82
OKG	252	E	HWY BK E-9	Grouted Rip Rap V-Ditch 10' W	256		114
OKG	260	E	107-V2046	18" RCP	600		11
OKG	262	E	Field Verified	2: 24" RCP			48
OKG	264	E	HWY BK E-8	30" RCP	176		36
OKG	270	E	HWY BK R-5	24" RCP	172		24
OKG	280	E	HWY BK R-5	24" RCP	186		24
OKG	290	E	107-V1669	30" RCP	1,003		41
PEK	025	E	107-V2819	Conc Chnl 20' W to 10' W	180	2.00	1,024
PEK	027	E	107-V2819	Grass Chnl 58' W	900	0.30	1,024
PEK	030	E	Rancho Peak Apartments	Conc Chnl 20'W 0:1 SS	700		328
PEK	040	E	107Y-4307	Conc Chnl 20'W 0:1 SS	611	0.325	786
RAN	112	E	HWY BK T-2	36" RCP	434		72
RAN	113	E	HWY BK T-2	30" RCP	992		50
RAN	114	E	HWY BK T-2	24" CMP	216		31
RAN	115	E	Field Verified	18" CMP			
RAN	116	E	HWY BK T-2	24" CMP	112		
RAN	117	E	Field Verified	48" RCP			
RAN	118	E	HWY BK T-2	6' x 3' RCBC	120		188
RAN	119	E	HWY BK T-2	6' x 3' RCBC	120		188
RAN	125	E	HWY BK T-2 / 107-V570	6' x 3' RCBC	106		126
RAN	127	E	107-V570	18" x 29" CMAP	194	0.45	8
RAN	130	E	HWY BK T-2	36" CMP	108		61
RAN	135	E	HWY BK T-2	36" CMP	108		35
RAN	140	E	107-V1844	36" RCP	277		58
RAN	145	E	107-V1844	19" x 30" RCP	178		18
RAN	150	E	Field Verified	19" x 30" RCP			
RAN	155	E		18" x 24" CMAP			
RAN	160	E	HWY BK T-2	27" x 43" CMAP	115		25
RAN	170	E	HWY BK T-2/107-V1776	6' x 3' RCBC	105		210
RAN	171	E	107-V1776	42" RCP	1,967		122
RAN	190	E	HWY BK T-2	2: 6' x 2' RCBC	100		72
RAN	200	E	HWY BK T-2	24" CMP (Median Drain)	48		30
RAN	205	E	107Y-4342	Conc Chnl 20'W 4'D 0:1 SS	570	0.25	426
RAN	206	E	731-63A	Conc Chnl 40' W	440	0.12	834
RAN	207	E	731-63	Conc Chnl 25.33'W 4'D 0:1 SS	327	0.26	426
RAN	208	E	107-V2595	18" CMP	136	0.50	8
RAN	209	E	107-V2848	25" PDE	180		
RAN	210	E	731-53/107-V2649	2: 4' x 4' RCBC	120		420
RAN	211	E	107-V2115 & 1885	2: 48" CMP	400	0.025	420
RAN	220	E	HWY BK T-2	30" CMP	108		45
RAN	230	E	HWY BK T-2	30" CMP	110		30
RAN	240	E	HWY BK T-2	6' x 2' RCBC	107		97
RAN	251	E	107-V948C	18" RCP	161	0.55	7
RON	000	E	522-V53	60" RCP	505	0.60	202
RON	010	E	522-V53	48" RCP	603	0.60	111
RON	020	E	522-V53	27" RCP	63	3.00	54
SMR	010	E	307Y-4452-2	18" RCP	80	0.35	5
SMR	030	E	307Y-4452-2	29" x 45" RCP	345	0.40	36
SMR	040	E	307Y-4452-2	24" RCP	67	0.40	12
SMR	050	E	307Y-4452-2	24" RCP	124	0.40	12
SWI	100	E	107Y-4281	10' PDE	90	1.48	
SWI	110	E	107Y-4281	10' PDE	95	1.46	
SWI	120	E	107Y-4281	10' PDE	95	1.99	
TNA	000	E	107-V1671	18" RCP	1,557		11
TNA	010	E	107-V1671	18" RCP	125		13
TNA	015	E	107-V1671	18" RCP	1,050		7
TNA	050	E	107-V2665	24" RCP	285	0.50	16
TNY	000	E	650.29-7	18" PVC	209	0.45	8

ID	ID No.	E/P	Plan No.	Facility Description	Fac Length	Slope (%)	Flow (cfs)
				REGIONAL FACILITIES			
TNY	100	E	650.29-7	18" PVC	1,590	0.40	7
VGS	010	E	327-V154	18" RCP	282		11
VGS	015	E	327-V154	12" RCP	118		4
	GOO2			**GOWAN SOUTH FACILITIES (CHEYENNE CHNL)**			
GOO2	0000	E	731-58	Free Span Bridge 34'W 9.25'D @ Ronemus	60		4,000
GOO2	0010	E	731-58	Conc Chnl 30'W 9'D	1,423		4,000
GOO2	0015	E	731-58	Free Span Bridge 31'W 7.25'D @ Buffalo	102		4,000
	GONO			**GOWAN NORTH SYSTEM**			
GONO	0000	E	731-53A	1: 8' x 8' RCB Culvert	440		580
GONO	0004	E	731-53A	36" RCP	634		67
GONO	0008	E	731-53A	258 ac-ft Lower Gowan-North Detention Basin			5200 / 510
GONO	0008	E	731-53A	704 ac-ft Upper Gowan-North Detention Basin			5200 / 510
GONO	0008	E	731-53A	1170' Spillway			
GONO	0009	E	731-65	3: 13' x 8' RCB Drain	1,699		5,327
	GOOF			**GOWAN OUTFALL FACILITIES**			
GOOF	0427	E	731-53C	96" RCP	2,700		575
GOOF	0485	E	731-53,107-V2649	90" RCP Drain	100		575
GOOF	0511	E	731-53,107-V2649	8' x 5' RCB Drain	12,795		630
GOOF	0551	E	731-53A	72" RCP	443		
GOOF	0773	E	731-53A	60" RCP	815		
GOOF	0775	E	Buffalo Drive 70% Plans	60" RCP	1,358	1.60	257
	GOSO			**GOWAN SOUTH FACILITIES**			
GOSO	0000	E	731-53A	72" RCP	2,690		580
GOSO	0051	E	731-53A	400 ac-ft Gowan-South Detention Basin			2880 / 400
GOSO	0051	P1	731-53A	Upgrade to 560 ac-ft Gowan-South			4395 / 580
GOSO	0051	E	731-53A	1240' Spillway			
GOSO	0068	E	731-49	Conc Chnl 15'W 7'D 2:1SS	400	0.40	3,140
GOSO	0076	E	731-49	2: 10' x 7' RCBC	80		3,140
GOSO	0078	E	731-49	Conc Chnl 22'W 10'D	30		3,060
GOSO	0080	E	731-49	Conc Chnl 12'W 7'D 2:1SS	2,218	0.58	3,060
GOSO	0119	E	731-49	Conc Chnl 22'W 10'D	155	0.95	3,060
GOSO	0123	E	731-49	2: 10' x 7' RCBC @ Smoke Ranch	100		3,060
GOSO	0126	E	731-49	Conc Chnl 12'W 7'D 2:1SS	2,482	0.62	3,000
GOSO	0173	E	731-49	Conc Chnl 22'W 7'D	283	0.62	3,000
GOSO	0176	E	731-49	2: 10' x 7' RCBC @ Lake Mead	100		2,400
GOSO	0178	E	731-49	Conc Chnl 22'W 7'D	186	1.00	2,400
GOSO	0181	E	731-49	Conc Chnl 12'W 7'D 2:1SS	2,585	0.58	2,400
	GOTE			**GOWAN - TENAYA BRANCH**			
GOTE	0000	E	Buffalo Drive 70% Plans	60" RCP	1,720	1.40	300
GOTE	0032	E	Buffalo Drive 70% Plans	48" x 76" HERCP	134	0.50	300
	LAAT			**NORTH LAS VEGAS AIR TERMINAL**			
LAAT	0091	E	1998 Master Plan Update	Conc Chnl 6'W 4'D 1.5:1SS	2,800	0.84	845
LAAT	0156	E	1998 Master Plan Update	60" RCP/C	528	0.75	341
LAAT	0186	E	1998 Master Plan Update	Conc Chnl 6'W 3'D 1.5:1SS	1,214	0.83	341
LAAT	0189	E	1998 Master Plan Update	60" RCP/C	475	0.37	95
	LANO			**NORTH LAS VEGAS AIR TERMINAL NORTH**			
LANO	0000	E	1998 Master Plan Update	Conc Chnl 0'W 3'D 1.5:1SS	475	0.30	95
	LASO			**NORTH LAS VEGAS AIR TERMINAL SOUTH**			
LASO	0023	E	1998 Master Plan Update	54" RCP	700	0.40	450
LASO	0040	E	1998 Master Plan Update	Conc Chnl 0'W 3'D 1.5:1SS	3,700	0.80	120
	LVLM			**LAS VEGAS WASH - LAKE MEAD**			
LVLM	0270	E	107-V1607-2	90" RCP	3,300	1.44	940
LVLM	0336	E	107-V1608	84" RCP	1,003	1.18	680
LVLM	0355	E	107-V1608	90" RCP	1,742	0.40	680
LVLM	0388	E	107-V1608	84" RCP	703	1.40	680
LVLM	0399	E	107-V1608	78" RCP	803	1.07	537
LVLM	0416	E	107-V1608	72" RCP	1,320	1.00	475
LVLM	0442	E	107-V1608	60" RCP	674	1.28	292
LVLM	0453	E	107-V1608	54" RCP	538	2.37	292
LVLM	0460	E	107-V1608	54" RCP	1,464		241
LVLM	0475	E	107-V1609	48" RCP	5,232		165
	LVRA			**LAS VEGAS WASH - RANCHO**			
LVRA	0000	P1	1998 Master Plan Update	Conc Chnl 8'W 5'D 2:1 SS	1,000	1.00	670
LVRA	0025	P1	1998 Master Plan Update	72" RCP	800	1.00	355
LVRA	0038	P1	1998 Master Plan Update	72" RCP	1,000	1.00	355
LVRA	0057	P1	1998 Master Plan Update	72" RCP	1,000	1.00	320
LVRA	0081	P1	1998 Master Plan Update	60" RCP	500	1.00	300
LVRA	0091	P1	1998 Master Plan Update	60" RCP	500	1.00	200
	LVSR			**LAS VEGAS WASH - SMOKE RANCH**			
LVSR	0208	E	1998 Master Plan Update	54" RCP	8,000		278
LVSR	0213	E	327-V227	60" RCP	390		231
LVSR	0360	E	327-V227	60" RCP	1,878		231
LVSR	0397	E	327-V227	60" RCP	2,460		231
LVSR	0447	E	327-V227	54" RCP	2,871		231
LVSR	0500	E	327-V227	60" RCP	1,247		231
LVSR	0525	E	107-V948C	54" RCP	834		231
LVSR	0552	P1	1998 Master Plan Update	60" RCP	3,000		231

Facility	Size	Material	Capacity
OKG262	2:24"	RCP	48 CFS
OKG264	30"	RCP	36 CFS
OKG270	24"	RCP	24 CFS

FIGURE 8.1





VICINITY MAP
NTS

DRAINAGE AREA SUMMARY TABLE			
BASIN ID	AREA (ACRES)	Q_{10} (CFS)	Q_{100} (CFS)
ONX1	3.19	<1	1
ONX2	5.68	<1	4
STX1	1.27	2	4
OFX1	0.45	<1	1

GRAPHIC SCALE

60 0 30 60

SCALE: 1"=60'

FLOOD ZONE NOTE:

THE PROJECT SITE LIES WITHIN UN-SHADED FLOOD ZONE "X". PER FIRM PANEL 32003C2155F REVISED NOVEMBER 16, 2011. PER FEMA, UN-SHADED FLOOD ZONE "X" IS AN AREAS OF OUTSIDE THE 500-YEAR FLOODPLAIN.

DRAINAGE LEGEND

($Q_{10/100}$)	PEAK 10 YR FLOW / PEAK 100 YR FLOW
	DRAINAGE AREA BOUNDARY
	SOIL BOUNDARY
	DRAINAGE AREA FLOW DIRECTION
ONX1	AREA DESIGNATION
CP1 ●	CONCENTRATION FLOW POINT
FM1	LOCATION OF HYDRAULIC CROSS SECTION

REF1 REPRESENTS THE BOX CANYON PROFESSIONAL PARK PHASE II STUDY (DS # 3806)
REF2 REPRESENTS THE BOX CANYON OFFICE PARK STUDY (DS # 2971)
REF1* AT CPD1
REF2* AT LOCATION B (SOUTH SIDE)

COLLINS ENGINEERS INC
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NO. | DESCRIPTION OF REVISIONS | DATE | APPROVAL

ADDITIONAL PARKING FOR UHG FACILITIES

APN: 138-15-810-012

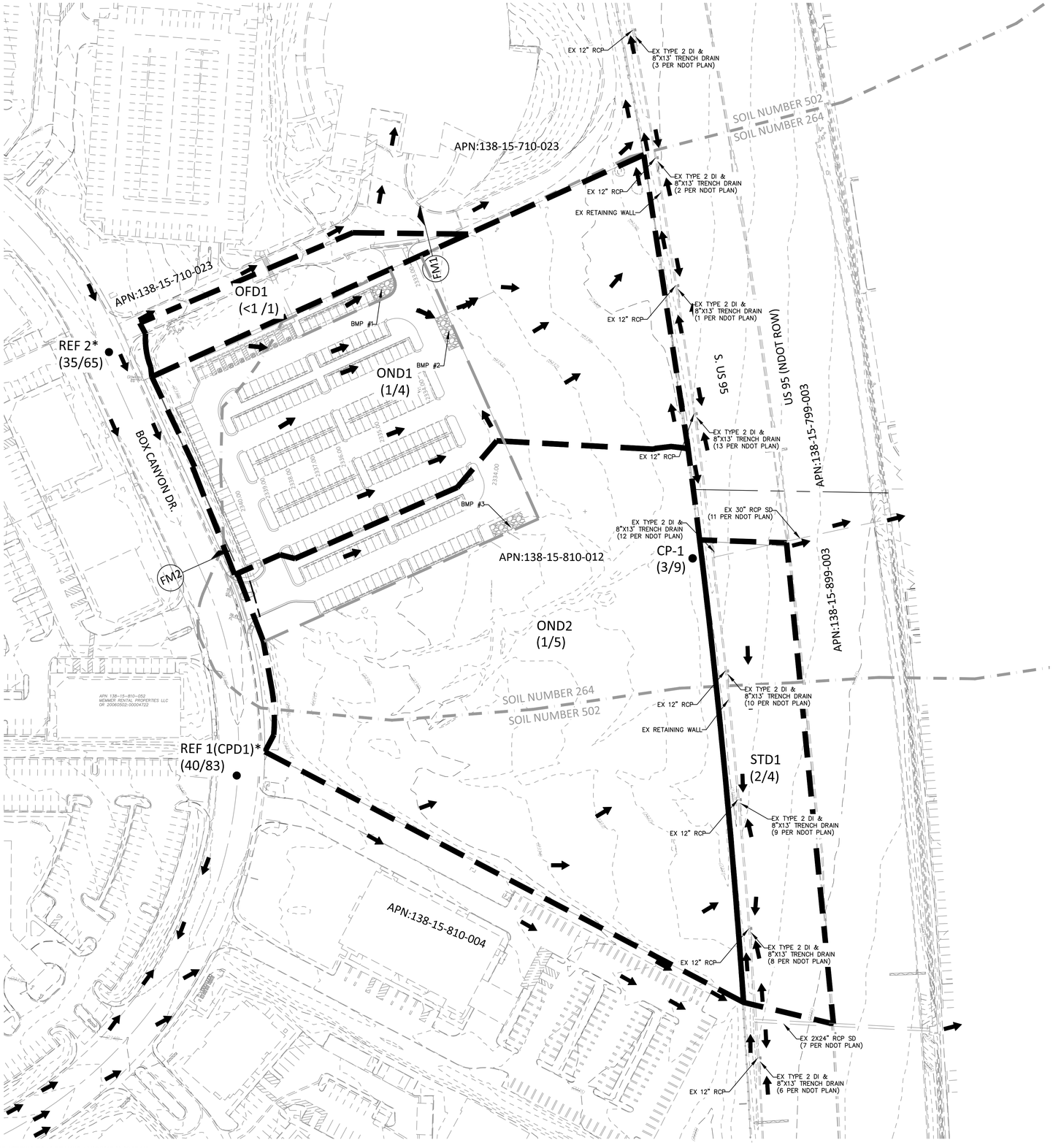
EXISTING CONDITION DRAINAGE BASIN MAP

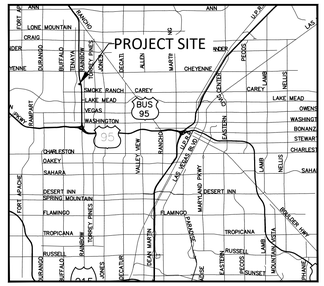
DATE:	12/13/17
JOB NUMBER:	10470
DESIGNED:	ASNI
DRAWN:	ASNI
CHECKED:	S. MOHAMMED P.E

SHEET NUMBER

FIG. 9

H:\CAD\LAND\10470\ADMIN\DRAINAGE\DWG\FIG-9-EX.DWG 12/20/2017 10:18:20 AM





VICINITY MAP
NTS

DRAINAGE AREA SUMMARY TABLE			
BASIN ID	AREA (ACRES)	Q_{10} (CFS)	Q_{100} (CFS)
~~OND1~~	~~1.29~~	~~1~~	~~5~~
OND2	5..60	1	5
STD1	1.27	2	4
OFD1	0.45	<1	1
CP1	OND2+STD1	3	9

GRAPHIC SCALE

60 0 30 60

SCALE: 1"=60'

FLOOD ZONE NOTE:

THE PROJECT SITE LIES WITHIN UN-SHADED FLOOD ZONE "X". PER FIRM PANEL 32003C2155F REVISED NOVEMBER 16, 2011. PER FEMA, UN-SHADED FLOOD ZONE "X" IS AN AREAS OF OUTSIDE THE 500-YEAR FLOODPLAIN.

DRAINAGE LEGEND

($Q_{10/100}$)	PEAK 10 YR FLOW / PEAK 100 YR FLOW
	DRAINAGE AREA BOUNDARY
	PRORATED/SUB-DRAINAGE AREA BOUNDARY
	SOIL BOUNDARY
	DRAINAGE AREA FLOW DIRECTION
OND1	AREA DESIGNATION
CP1 ●	CONCENTRATION FLOW POINT
FM1	LOCATION OF HYDRAULIC CROSS SECTION

FLOW DEPTH ANALYSIS SUMMARY										
SECTION	ST. WIDTH (FT)	SLOPE (%)	Q_{100} (CFS)	D_{100} (ft)	V_{100} (ft/sec)	$D_{100} \times V_{100}$	Q_{10}	D_{10} (ft)	V_{10} (ft/sec)	$D_{10} \times V_{10}$
FM1	N/A	1.20	1	0.24	1.54	0.37	1	0.24	1.54	0.37
FM2	60	0.44	83	0.81	3.45	2.79	40	0.66	2.58	1.70

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NO.	DESCRIPTION OF REVISIONS	DATE	APPROVAL

ADDITIONAL PARKING FOR UHG FACILITIES

APN: 138-15-810-012

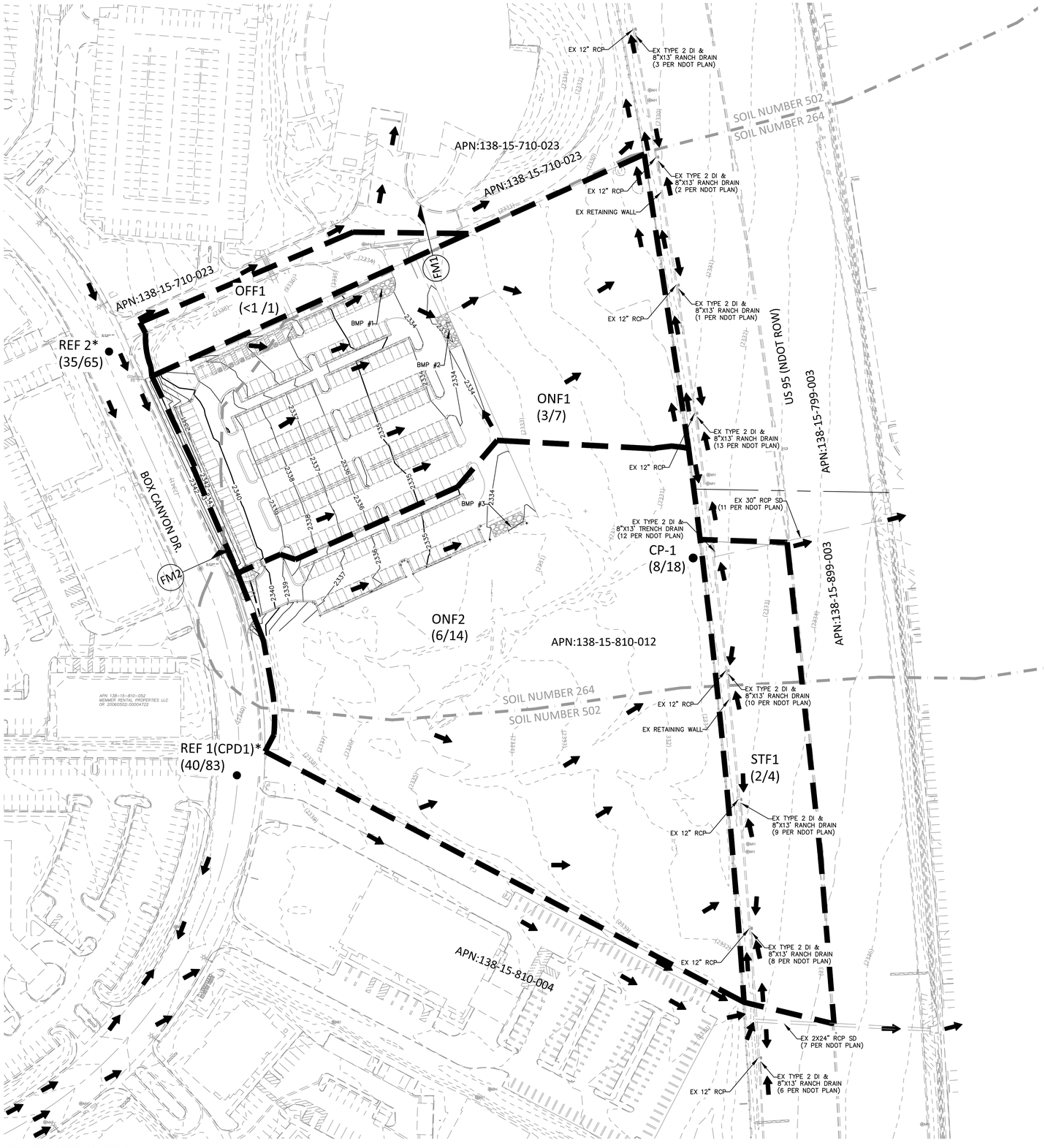
PROPOSED CONDITION DRAINAGE BASIN MAP

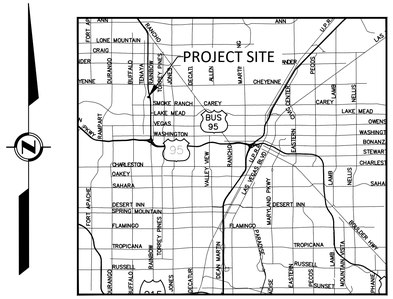
DATE:	12/20/17
JOB NUMBER:	10470
DESIGNED:	ASNI
DRAWN:	ASNI
CHECKED:	S. MOHAMMED P.E

SHEET NUMBER

FIG. 10

H:\CAD\LAND\10470\ADMIN\DRAINAGE\DWG\FIG-10-DEV.DWG 12/20/2017 09:29:27 AM





VICINITY MAP
NTS

DRAINAGE AREA SUMMARY TABLE			
BASIN ID	AREA (ACRES)	Q_{10} (CFS)	Q_{100} (CFS)
ONF1	3.29	3	7
ONF2	5.60	6	14
STF1	1.27	2	4
OFF1	0.45	<1	1
CP1	ONF2+STF1	8	18

GRAPHIC SCALE

60 0 30 60

SCALE: 1"=60'

FLOOD ZONE NOTE:

THE PROJECT SITE LIES WITHIN UN-SHADED FLOOD ZONE "X". PER FIRM PANEL 32003C2155F REVISED NOVEMBER 16, 2011. PER FEMA, UN-SHADED FLOOD ZONE "X" IS AN AREAS OF OUTSIDE THE 500-YEAR FLOODPLAIN.

DRAINAGE LEGEND

$(Q_{10/100})$	PEAK 10 YR FLOW / PEAK 100 YR FLOW
	DRAINAGE AREA BOUNDARY
	PRORATED/SUB-DRAINAGE AREA BOUNDARY
	SOIL BOUNDARY
	DRAINAGE AREA FLOW DIRECTION
OND1	AREA DESIGNATION
CP1 ●	CONCENTRATION FLOW POINT
FM1	LOCATION OF HYDRAULIC CROSS SECTION

FLOW DEPTH ANALYSIS SUMMARY										
SECTION	ST. WIDTH (FT)	SLOPE (%)	Q_{100} (CFS)	D_{100} (ft)	V_{100} (ft/sec)	$D_{100} \times V_{100}$	Q_{10}	D_{10} (ft)	V_{10} (ft/sec)	$D_{10} \times V_{10}$
FM1	N/A	1.20	1	0.24	1.54	0.37	1	0.24	1.54	0.37
FM2	60	0.44	83	0.81	3.45	2.79	40	0.66	2.58	1.70

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NO.	DESCRIPTION OF REVISIONS	DATE	APPROVAL

ADDITIONAL PARKING FOR UHG FACILITIES

APN: 138-15-810-012

FUTURE CONDITION DRAINAGE BASIN MAP

DATE:	12/20/17
JOB NUMBER:	10470
DESIGNED:	ASNI
DRAWN:	ASNI
CHECKED:	S. MOHAMMED P.E

SHEET NUMBER

FIG. 11

H:\CAD\LAND\10470\ADMIN\DRAINAGE\DWG\FIG-11-FUT.DWG 12/20/2017 09:30:16 AM

APPENDIX B
(Hydrologic Parameters)

- Rainfall Depth Calculation
- McCarran Airport Rainfall Area (Figure 513)
- Depth-Duration-Frequency Values for McCarran Airport Rainfall Area (Table 505)
- Six-Hour Depth Area Reduction Factors (Table 502)
- Six-Hour Storm Distributions (Table 503)
- Soil Map and Soil Group Info
- Soil Survey of Las Vegas Valley Area, Clark County (Table 15)
- Runoff Curve Numbers – Urban Area (Table 602 Sheet 1 of 4)
- Runoff Curve Numbers – Semiarid Rangelands (Table 602 Sheet 4 of 4)
- Curve Number Summary Tables
- Standard Form 4 and HEC-1 Analysis (Existing Condition)
- Standard Form 4 and HEC-1 Analysis (Developed Condition)
- Standard Form 4 and HEC-1 Analysis (Future Condition)

Additional Parking for UHG Facilities
Job No 10470
SHEET 1 OF 2
Rainfall Depth Calculation

Per Figure 513 of the Hydrologic Criteria and Design Manual the subject site *is within the McCarran Airport Rainfall Area*

Per Table 505, 502 and 503 of the *Hydrologic Criteria and Drainage Design Manual:*

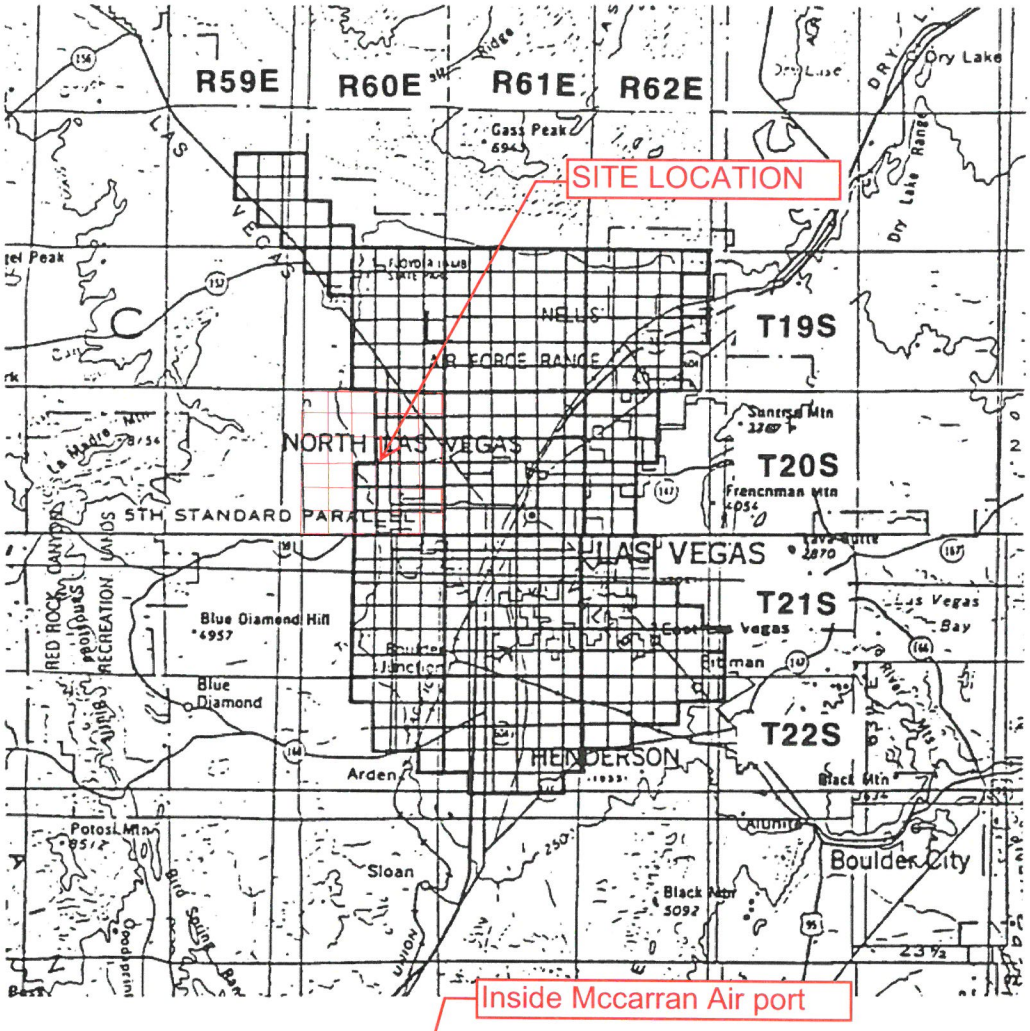
STORM EVENT	RAINFALL DEPTH (IN)	PRECIPITATION ADJUSTMENT RATIOS	SIX-HOUR DEPTH AREA REDUCTION FACTORS	DESIGN RAINFALL DEPTH (IN)
10-YEAR	1.58	1.00	1.00	1.58
100-YEAR	2.77	1.00	1.00	2.77

10YEAR/100-YEAR DESIGN RAINFALL DEPTH PB CARD RATIO: 0.57

NOTE:

1. Rainfall Depth are taken from Table 505 of the Drainage Design Manual.
2. Six-Hour Depth Area Reduction Factors is taken from Table 502.

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

DEPTH-DURATION-FREQUENCY VALUES FOR McCARRAN AIRPORT RAINFALL AREA

(IN INCHES)

TIME	RECURRENCE INTERVAL 2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
5 min.	0.15	0.27	0.35	0.46	0.54	0.63
10 min.	0.25	0.44	0.57	0.74	0.89	1.02
15 min.	0.33	0.57	0.74	0.97	1.15	1.32
30 min.	0.44	0.78	1.01	1.31	1.55	1.79
1 hour	0.52	0.89	1.15	1.50	1.78	2.06
2 hour	0.59	1.01	1.30	1.70	2.01	2.30
3 hour	0.64	1.08	1.39	1.82	2.15	2.48
6 hour	0.72	1.22	1.58	2.05	2.41	2.77
24 hour (TR-55)	1.20	1.60	1.80	2.40	2.70	2.96

NOTE: 1. Refer to Figure 513 for a description and drawing of the area included in the McCarran Airport Rainfall Area.

2. The 24 hour values presented above are for use with TR-55 only.

3. Table 501 adjustments not required.

Revision	Date

SIX HOUR DEPTH-AREA REDUCTION FACTORS

Drainage Area (Square Miles)	Six-Hour Depth-Area Reduction Factor
0.0	1.00
0.5	0.98
1.0	0.97
2.0	0.93
4.0	0.91
6.0	0.90
8.0	0.88
10.0	0.86
20.0	0.79
30.0	0.74
50.0	0.68
100.0	0.60
150.0	0.55
200.0	0.51
300.0	0.46
400.0	0.42
500.0	0.39

NOTES:
1. A graphical representation of these factors is presented in Figure 514.
2. Consult with the local entity and/or the CCRFCD for guidance in using the Depth-Area Reduction Factors for drainage areas greater than 200 square miles.

Revision	Date

SIX-HOUR STORM DISTRIBUTIONS

Storm Time (In Minutes)	Percent of Total Storm Depth SDN3	SDN4	SDN5	Storm Time (In Minutes)	Percent of Total Storm Depth SDN3	SDN4	SDN5
0	0.0	0.0	0.0	185	32.2	37.6	43.0
5	2.0	2.0	2.0	190	35.2	41.5	47.7
10	5.7	5.8	5.9	195	40.9	46.2	51.4
15	7.0	7.5	8.0	200	49.9	53.0	56.1
20	8.7	9.9	11.0	205	59.0	61.0	63.0
25	10.8	12.6	14.4	210	71.0	71.0	71.0
30	12.4	13.7	15.0	215	74.4	73.2	72.0
35	13.0	14.5	16.0	220	78.1	75.6	73.1
40	13.0	14.9	16.8	225	81.2	78.2	75.2
45	13.0	15.1	17.1	230	81.9	79.9	77.9
50	13.0	15.5	18.0	235	83.5	81.3	79.0
55	13.0	15.6	18.2	240	85.1	82.3	79.5
60	13.0	15.9	18.7	245	85.6	83.0	80.4
65	13.3	16.2	19.0	250	86.0	83.5	81.0
70	14.0	16.9	19.7	255	86.8	84.4	82.0
75	14.2	17.2	20.2	260	87.6	85.1	82.6
80	14.8	17.9	21.0	265	88.8	86.4	84.0
85	15.8	18.9	22.0	270	91.0	88.5	85.9
90	17.2	20.1	23.0	275	92.6	90.8	88.9
95	18.1	21.1	24.1	280	93.7	92.4	91.0
100	19.0	22.0	25.0	285	95.0	94.4	93.8
105	19.7	22.8	25.9	290	97.0	96.8	96.6
110	19.9	23.2	26.5	295	97.6	97.3	97.0
115	20.0	24.0	28.0	300	98.2	97.8	97.4
120	20.1	24.6	29.0	305	98.5	98.2	97.9
125	20.4	25.2	30.0	310	98.7	98.4	98.1
130	21.4	26.0	30.5	315	98.9	98.6	98.3
135	22.9	26.9	30.9	320	99.0	98.8	98.5
140	24.1	27.6	31.0	325	99.3	99.1	98.9
145	24.9	28.3	31.7	330	99.3	99.2	99.0
150	25.1	28.6	32.1	335	99.4	99.3	99.2
155	25.6	29.2	32.7	340	99.5	99.4	99.3
160	27.0	30.2	33.3	345	99.8	99.7	99.6
165	27.8	31.2	34.6	350	99.8	99.8	99.7
170	28.1	32.1	36.1	355	99.9	99.9	99.9
175	28.3	33.2	38.1	360	100.0	100.0	100.0
180	29.5	35.2	40.8				

Notes:
1. For drainage areas less than 8 square miles in size, use SDN 3.
2. For drainage areas greater than or equal to 8 square miles and less than 12 square miles in size, use SDN 4.
3. For drainage areas greater than or equal to 12 square miles, use SDN 5.
4. A graphical representation of these values is presented on **Figure 515**.

Revision	Date

REFERENCE:

TABLE 503

Soil Map—Las Vegas Valley Area, Nevada, Part of Clark County



Map Scale: 1:5,120 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

Map Unit Legend

Las Vegas Valley Area, Nevada, Part of Clark County (NV788)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
264	Jean very gravelly loamy fine sand, 2 to 4 percent slopes	19.1	20.2%
502	Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes	75.7	79.8%
Totals for Area of Interest		**94.8**	**100.0%**

Hydrologic Soil Group and Surface Runoff

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

Report—Hydrologic Soil Group and Surface Runoff

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

Hydrologic Soil Group and Surface Runoff–Las Vegas Valley Area, Nevada, Part of Clark County			
Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**
264—Jean very gravelly loamy fine sand, 2 to 4 percent slopes			
Jean	100	Very low	A

Hydrologic Soil Group and Surface Runoff–Las Vegas Valley Area, Nevada, Part of Clark County			
Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**
502—Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes			
Canutio	55	Low	A
Cave	40	Very high	D

Data Source Information

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

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding		High water table		Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Months	Depth	Months	Depth	Thickness	Depth	Hardness	Uncoated steel	Concrete
				Ft		In		In			
182*:											
Caliza	B	None	---	>6.0	---	>60	---	---	---	High	Low.
Pittman	C	None	---	>6.0	---	>60	---	20-30	Thick	High	Low.
Arizo	A	Occasional	Mar-Sep	>6.0	---	>60	---	---	---	High	Low.
183: Caliza	B	None	---	>6.0	---	>60	---	---	---	High	Low.
184: Caliza	B	Rare	---	>6.0	---	>60	---	---	---	High	Low.
187: Caliza	B	None	---	>6.0	---	>60	---	---	---	High	Low.
190: Dalian	B	None	---	>6.0	---	>60	---	---	---	High	Low.
191: Dalian	B	Rare	---	>6.0	---	>60	---	---	---	High	Low.
192*:											
Dalian	B	Rare	---	>6.0	---	>60	---	---	---	High	Low.
McCullough	B	Rare	---	>6.0	---	>60	---	---	---	High	Low.
200: Glencarb	B	Rare	---	>6.0	---	>60	---	---	---	High	Moderate.
206: Glencarb	C	Occasional	Jul-Sep	3.0-5.0	Jul-Jun	>60	---	---	---	High	High.
222: Glencarb	C	Rare	---	3.0-5.0	Jul-Jun	>60	---	---	---	High	High.
236: Glencarb	B	Rare	---	>6.0	---	>60	---	---	---	High	High.
237: Glencarb	B	Rare	---	>6.0	---	>60	---	40-60	Thick	High	Low.
240: Goodsprings	D	None	---	>6.0	---	>60	---	9-20	Thick	High	Low.
252, 255: Grapevine	B	Rare	---	>6.0	---	>60	---	---	---	High	High.
260: Jean	A	Rare	---	>6.0	---	>60	---	---	---	High	Low.
262*:											
Jean	A	Rare	---	>6.0	---	>60	---	---	---	High	Low.
Jean	A	Occasional	Jun-Sep	>6.0	---	>60	---	---	---	High	Low.
Goodsprings	D	Rare	---	>6.0	---	>60	---	9-20	Thick	High	Low.
263*:											
Jean	A	Rare	---	>6.0	---	>60	---	---	---	High	Low.
Jean	A	Occasional	Jun-Sep	>6.0	---	>60	---	---	---	High	Low.
264: Jean	A	Rare	---	>6.0	---	>60	---	---	---	High	Low.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding		High water table		Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Months	Depth	Months	Depth	Thickness	Depth	Hardness	Uncoated steel	Concrete
				Ft		In		In			
419*:											
Aztec	B	None	---	>6.0	---	>60	---	---	---	High	High.
Bracken	B	None	---	>6.0	---	40-60	Soft	---	---	High	High.
430 Knob Hill	B	None	---	>6.0	---	>60	---	---	---	High	Low.
440 Nickel	B	None	---	>6.0	---	40-60	Hard	---	---	High	Low.
450 Cave Variant	D	None	---	>6.0	---	>60	---	5-18	Thick	High	High.
481, 484 Hobog	D	None	---	>6.0	---	8-20	Hard	---	---	High	Low.
500*											
Canutio	B	None	---	>6.0	---	40-60	Hard	---	---	High	Low.
Akela	D	None	---	>6.0	---	10-20	Hard	---	---	High	Low.
501 Canutio	B	None	---	>6.0	---	>60	---	---	---	High	Low.
502*:											
Canutio	B	None	---	>6.0	---	>60	---	---	---	High	Low.
Cave	D	None	---	>6.0	---	>60	---	4-20	Thick	High	Low.
505*											
Canutio	B	None	---	>6.0	---	40-60	Hard	---	---	High	Low.
Akela	D	None	---	>6.0	---	10-20	Hard	---	---	High	Low.
510*:											
Akela	D	None	---	>6.0	---	10-20	Hard	---	---	High	Low.
Rock outcrop.											
540 Weiser	B	None	---	>6.0	---	>60	---	---	---	High	Low.
542*:											
Weiser	B	None	---	>6.0	---	>60	---	---	---	High	Low.
Aztec	B	None	---	>6.0	---	>60	---	---	---	High	High.
545*:											
Weiser	B	None	---	>6.0	---	>60	---	---	---	High	Low.
Goodsprings	D	None	---	>6.0	---	>60	---	9-20	Thick	High	Low.
600*. Silckens											
605*. Dumps											
610*. Pits											
615*. Urban land											
630*. Badlands											
635*, 640*. Rock outcrop											
645*. Pits											

PER 2008 MPU

* See description of the map unit for composition and behavior characteristics of the map unit.

RUNOFF CURVE NUMBERS
(URBAN AREAS[1])

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)[3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved: curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only)[4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					

See Table 602A

Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)[5]		77	86	91	94

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

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system. Impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using Figure 603.

3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4 Composite CN's for natural desert landscaping should be computed using Figure 603 based on the impervious area percentage (CN #98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using Figure 603 based on the degree of development impervious area percentage) and the CN's for the newly graded pervious areas.

Revision	Date

RUNOFF CURVE NUMBERS
(SEMIARID RANGELANDS[1])

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

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

[2]*Poor:* <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: >70% ground cover.

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

Revision	Date

WRC ENGINEERING

REFERENCE: SCS TR-55, USDA, June 1986.

TABLE 602
4 of 4

Additional Parking for UHG Facilities
Job No. 10470
Sheet 1 OF 2

Curve Number Table

Per Table 602 Sheet 1 of 4 and Table 602 Sheet 4 of 4 in the *Hydrologic Criteria and Drainage Design Manual and the National Cooperative Soil Survey*

Soil #264-Jean Very gravelly loamy fine sand, 2 to 4 percent slopes.						
Soil #502-Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes.						
SOIL	**%**	**HYDRO-LOGIC GROUP**	**Existing Condition** *SEE NOTE #1*	**Natural D/LS** *SEE NOTE #2*	**Paved** *SEE NOTE #2*	**Commercial** *SEE NOTE #2*
264	100	A	63	63	98	89
502	100	B	77	77	98	92

CN = CURVE NUMBER

NOTE:

1 Existing curve numbers are accepted per Table sheet 4 of 4.

2 Developed curve numbers are accepted per Table sheet 1 of 4.

Additional Parking for UHG Facilities

Job No. 10470

Sheet 2 OF 2

Curve Number Summary

Per Table 602 Sheet 1 of 4 and Table 602 Sheet 4 of 4 in the *Hydrologic Criteria and Drainage Design Manual and the National Cooperative Soil Survey*

EXISTING CONDITION						
BASIN	**TYPE OF DEVELOPMENT**	**SOIL A/264 EXISTNG (63)**	**SOIL B/502 EXISTNG (77)**	**SOIL B/502 D/LS(77)**	**SOIL264/502 PAVED(98)**	**CURVE NUMBER**
ONX1	EX	93.20%	7%	0%	0%	64
ONX2	EX.	59.70%	40%	0%	0%	69
STX1	DEV.	0	0%	0%	100%	98
OFX1	DEV.	0	0%	67%	33%	84

DEVELOPED CONDITION								
BASIN	**TYPE OF DEVELOPMENT**	**SOIL A/ 264 EX (63)**	**SOIL B/502 EX(77)**	**SOIL502-B DES. L/S(77)**	**SOIL A/ 264 Com(89)**	**SOIL B/502 Com(92)**	**502 PAVED(98)**	**CURVE NUMBER**
OND1	PAR. D	48.00%	0%	0%	44.00%	8%	0%	77
OND2	EX	43%	42%	0%	15%	0%	0%	73
STD1	DEV	0	0%	0%	0	0%	100%	98
OFD1	DEV	0	0%	67%	0	0%	33%	84

FUTURE CONDITION								
BASIN	**TYPE OF DEVELOPMENT**	**SOIL A/ 264 EX (63)**	**SOIL B/502 EX(77)**	**SOIL502-B DES. L/S(77)**	**SOIL A/ 264 Com(89)**	**SOIL B/502 Com(92)**	**PAVED(98)**	**CURVE NUMBER**
OND1	DEV	0%	0%	0%	92.00%	8%	0%	89
OND2	DEV	0%	0%	0%	58%	42%	0%	90
STD1	DEV	0%	0%	0%	0	0%	100%	98
OFD1	DEV	0%	0%	67%	0	0%	33%	84

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

Collins Engineers				**Technical Drainage Study**															
File: Standardform4.xls				**For Additional Parking for UHG Facilities**											**BY:**		**SM**		
Project No.10470				**Existing Condition**											**DATE:**		**12/13/17**		
SUB-BASIN						**INITIAL / OVERLAND**			**TRAVEL TIME**					**Tc**		**Tlag**	**REMARKS**		
DATA						**TIME (Ti)**			**(Tt)**										
						INITIAL			**TRAVEL**		**V1**	**V2**				**Tlag=**	**RAINFALL**		
DESIG:	**DEV./EX.**	**CN**	**K**	**AREA**	**AREA**	**LENGTH**	**SLOPE**	**Ti**	**LENGTH**	**SLOPE**	**VELOCITY**	**VELOCITY**	**Tt**	**Tc**	**Tc**	**0.6Tc/60**	**Inches**		
	(D or E)			**Ac**	**Mi^2**	**Feet**	**%**	**Min**	**Feet**	**%**	**FPS**	**FPS**	**Min**	**Calc.**	**Check**	**Hours**			
(1)			**(2)**	**(3)**		**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9a)**	**(9b)**	**(10)**	**(13)**		**Per Tc Calc**	**100-Yr**		
EXISTING CONDITION																			
ONX1	E	64	0.4548	3.19	0.00498	255	0.80	20.0	553	1.60	1.9	3.7	4.7	24.7	14.5	**0.247**	2.77		
ONX2	E	69	0.5208	5.68	0.00888	132	1.50	10.5	603	1.00	1.5	2.9	6.2	16.7	14.1	**0.167**	2.77		
STX1	D	98	0.9036	1.27	0.00198	79	2.50	2.3	569	0.40	1.3	1.9	7.1	9.4	13.6	**0.094**	2.77		
OFX1	D	84	0.7188	0.45	0.00070	21	2.00	2.5	362	2.60	3.3	4.9	1.9	4.3	12.1	**0.043**	2.77		
Tc = Ti + Tt Tt = L/V Tlag = 0.6 Tc					For the travel time (Tt) calculations,					Existing	V1 = 14.8*(S/100)^1/2			Developed		V1 = 20.2*(S/100)^1/2			
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3					V1 applies to the first 500 feet of travel distance;														
K = 0.0132 (CN) - 0.39					V2 applies to the remaining travel distance.					Existing	V2 = 29.4*(S/100)^1/2			Developed		V2 = 30.6*(S/100)^1/2			
REFERENCE :														**STANDARD FORM 4**					

Note: Per sec-602.1 of Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual, the minimum TC are recommended 10 minutes(Tlag-0.10) for undeveloped area and TC=5 (TLAG=0.05) fpr developed area.

Basin	TC used (MIN.)	TLAG (HR.)
OFX1	5	0.05

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN   1998                *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   13DEC17  TIME  11:59:39   *
*                                       *
*****************************************
```

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

```
X     X  XXXXXXX   XXXXX            X
X     X  X        X     X         XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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

    1         ID    TECHNICAL DRAINAGE STUDY FOR ADDITIONAL PARKING FOR UHG FACILITES LS
    2         ID                    LAS VEGAS, NEVADA
    3         ID
    4         ID
    5         ID        PREPARED BY:
    6         ID                     COLLINS ENGINEERS
    7         ID                     3130 S. DURANGO DRIVE SUITE 404
    8         ID                     LAVEGAS, NV  89117
    9         ID
   10         ID
   11         ID    EXISTING CONDITIONS 10-YEAR AND 100-YEAR
   12         ID    FILENAME:EX.DAT
   13         ID    JOB#10470
   14         ID
   15         ID    JR RATIOS
   16         ID    1.00 100-YEAR NO DARF
   17         ID    0.57 10-YEAR NO DARF
   18         ID
              *DIAGRAM
   19         IT       5       0       0     300
   20         IO       5
   21         IN       5
   22         JR    PREC    0.57     1.00
              *

   23         KK    ONX1
   24         KM   EXISTING ON-SITE BASIN
   25         BA  .00498
   26         PB    2.77
   27         PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
   28         PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
   29         PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
   30         PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
   31         PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
   32         PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
   33         PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
   34         PC    .998    .999   1.00
   35         LS       0      64
   36         UD    .247
              *

   37         KK    ONX2
   38         KM   EXISTING ON-SITE BASIN
   39         BA  .00888
   40         LS       0      69
   41         UD    .167
              *

   42         KK    STX1
   43         KM   WEST HALF US 95
   44         BA  .00198
   45         LS       0      98
   46         UD    .094
              *
```

1 HEC-1 INPUT PAGE 2

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

   47         KK     CP1
   48         KM   COMBNATION OF ONX2 AND STX1 AT 30" RCP
   49         KM   THE CAPACITY OF THE 30" RCP IS 36 CFS
   50         HC       2
              *

   51         KK    OFX1
   52         KM   OFF-SITE BASIN (NORTH ADJECENT PROPERTY)
   53         BA  .00070
   54         LS       0      84
   55         UD     .05
```

```
                    *
          56        ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    23        ONX1
                .
                .
    37          .        ONX2
                .          .
                .          .
    42          .          .        STX1
                .          .          .
                .          .          .
    47          .         CP1.........
                .          .
                .          .
    51          .          .        OFX1

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN   1998              *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   13DEC17  TIME  11:59:39   *
*                                       *
*****************************************

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

TECHNICAL DRAINAGE STUDY FOR ADDITIONAL PARKING FOR UHG FACILITES LS
LAS VEGAS, NEVADA

PREPARED BY:
COLLINS ENGINEERS
3130 S. DURANGO DRIVE SUITE 404
LAVEGAS, NV 89117

EXISTING CONDITIONS 10-YEAR AND 100-YEAR
FILENAME:EX.DAT
JOB#10470

JR RATIOS
1.00 100-YEAR NO DARF
0.57 10-YEAR NO DARF

```
   20 IO          OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

      IT           HYDROGRAPH TIME DATA
                        NMIN           5  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1    0  STARTING DATE
                       ITIME         0000  STARTING TIME
                          NQ          300  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      2    0  ENDING DATE
                      NDTIME         0055  ENDING TIME
                      ICENT           19  CENTURY MARK

                    COMPUTATION INTERVAL      .08 HOURS
                         TOTAL TIME BASE   24.92 HOURS

            ENGLISH UNITS
                 DRAINAGE AREA          SQUARE MILES
                 PRECIPITATION DEPTH    INCHES
                 LENGTH, ELEVATION      FEET
                 FLOW                   CUBIC FEET PER SECOND
                 STORAGE VOLUME         ACRE-FEET
                 SURFACE AREA           ACRES
                 TEMPERATURE            DEGREES FAHRENHEIT

      JP           MULTI-PLAN OPTION
                        NPLAN           1  NUMBER OF PLANS

      JR           MULTI-RATIO OPTION
                       RATIOS OF PRECIPITATION
                        .57      1.00
1

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

                                                                 RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION      AREA     PLAN                 RATIO 1  RATIO 2
                                                               .57      1.00

 HYDROGRAPH AT
+                   ONX1        .00      1   FLOW              0.       1.
                                             TIME            4.92     3.75

 HYDROGRAPH AT
+                   ONX2        .01      1   FLOW              0.       4.
                                             TIME            3.75     3.67
```

```
 HYDROGRAPH AT
+                    STX1        .00     1    FLOW            2.        4.
                                              TIME          3.50      3.50

   2 COMBINED AT
+                     CP1        .01     1    FLOW            2.        7.
                                              TIME          3.50      3.58

 HYDROGRAPH AT
+                    OFX1        .00     1    FLOW            0.        1.
                                              TIME          3.50      3.50


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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

Collins Engineers				Technical Drainage Study															
File: Standardform4.xls				For Additional Parking for UHG Facilities											BY:		SM		
Project No.10470				Developed Condition											DATE:		12/13/17		
SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)						Tc		Tlag	REMARKS	
						INITIAL			TRAVEL		V1	V2				Tlag=	RAINFALL		
DESIG:	DEV./EX.	CN	K	AREA	AREA	LENGTH	SLOPE	Ti	LENGTH	SLOPE	VELOCITY	VELOCITY	Tt	Tc	Tc	0.6Tc/60	Inches		
	(D or E)			Ac	Mi^2	Feet	%	Min	Feet	%	FPS	FPS	Min	Calc.	Check	Hours			
(1)			(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(10)	(13)		Per Tc Calc	100-Yr		
EXISTING CONDITION																			
OND1	D	77	0.6264	3.29	0.00514	255	0.80	14.7	553	1.60	2.6	3.9	3.5	18.2	14.5	**0.145**	2.77		
OND2	E	73	0.5736	5.60	0.00875	132	1.50	9.5	603	1.00	1.5	2.9	6.2	15.7	14.1	**0.157**	2.77		
STD1	D	98	0.9036	1.27	0.00198	79	2.50	2.3	569	0.40	1.3	1.9	7.1	9.4	13.6	**0.094**	2.77		
OFD1	D	84	0.7188	0.45	0.00070	21	2.00	2.5	362	2.60	3.3	4.9	1.9	4.3	12.1	**0.043**	2.77		
Tc = Ti + Tt Tt = L/V Tlag = 0.6 Tc					For the travel time (Tt) calculations,					Existing	V1 = 14.8*(S/100)^1/2			Developed		V1 = 20.2*(S/100)^1/2			
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3					V1 applies to the first 500 feet of travel distance;														
K = 0.0132 (CN) - 0.39					V2 applies to the remaining travel distance.					Existing	V2 = 29.4*(S/100)^1/2			Developed		V2 = 30.6*(S/100)^1/2			
REFERENCE :														STANDARD FORM 4					

Note: Per sec-602.1 of Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual, the minimum TC are recommended 10 minutes(Tlag-0.10) for undeveloped area and TC=5 (TLAG=0.05) fpr developed area.

Basin	C used (MIN	TLAG (HR.)
OFD1	5	0.05

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN   1998                *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   13DEC17  TIME  11:59:50   *
*                                       *
*****************************************
```

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

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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

   1          ID    TECHNICAL DRAINAGE STUDY FOR ADDITIONAL PARKING FOR UHG FACILITES LS
   2          ID                      LAS VEGAS, NEVADA
   3          ID
   4          ID
   5          ID        PREPARED BY:
   6          ID                       COLLINS ENGINEERS
   7          ID                       3130 S. DURANGO DRIVE SUITE 404
   8          ID                       LAVEGAS, NV  89117
   9          ID
  10          ID
  11          ID    DEVELOPED CONDITIONS 10-YEAR AND 100-YEAR
  12          ID    FILENAME:DEV.DAT
  13          ID    JOB#10470
  14          ID
  15          ID    JR RATIOS
  16          ID    1.00 100-YEAR NO DARF
  17          ID    0.57 10-YEAR NO DARF
  18          ID
              *DIAGRAM
  19          IT       5       0       0     300
  20          IO       5
  21          IN       5
  22          JR    PREC    0.57     1.00
              *

  23          KK    OND1
  24          KM   PARTIALY DEVELOPED ON-SITE BASIN
  25          BA  .00514
  26          PB    2.77
  27          PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
  28          PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
  29          PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
  30          PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
  31          PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
  32          PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
  33          PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
  34          PC    .998    .999   1.00
  35          LS       0      77
  36          UD    .145
              *

  37          KK    OND2
  38          KM   UNDEVELOVED ONSITE BASIN
  39          BA  .00875
  40          LS       0      73
  41          UD    .157
              *

  42          KK    STD1
  43          KM   WEST HALF US 95
  44          BA  .00198
  45          LS       0      98
  46          UD    .094
              *
```

1 HEC-1 INPUT PAGE 2

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

```
            47          KK     CP1
            48          KM   COMBNATION OF OND2 AND STD1 AT 30" RCP
            49          KM   THE CAPACITY OF THE 30" RCP IS 36 CFS
            50          HC       2
                        *

            51          KK    OFD1
            52          KM   DEVELOVED OFF-SITE BASIN
            53          BA  .00070
            54          LS       0      84
            55          UD     .05
                        *
            56          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING           (--->) DIVERSION OR PUMP FLOW

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

    23        OND1
                .
                .
    37          .        OND2
                .           .
                .           .
    42          .           .        STD1
                .           .           .
                .           .           .
    47          .         CP1.............
                .           .
                .           .
    51          .           .        OFD1

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *               JUN   1998              *
 *            VERSION 4.1                *
 *                                       *
 *  RUN DATE   13DEC17  TIME  11:59:50   *
 *                                       *
 *****************************************

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

TECHNICAL DRAINAGE STUDY FOR ADDITIONAL PARKING FOR UHG FACILITES LS
LAS VEGAS, NEVADA

PREPARED BY:

COLLINS ENGINEERS
3130 S. DURANGO DRIVE SUITE 404
LAVEGAS, NV 89117

DEVELOPED CONDITIONS 10-YEAR AND 100-YEAR
FILENAME:DEV.DAT
JOB#10470

JR RATIOS
1.00 100-YEAR NO DARF
0.57 10-YEAR NO DARF

```
  20 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT           HYDROGRAPH TIME DATA
                      NMIN           5  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1   0  STARTING DATE
                      ITIME        0000  STARTING TIME
                        NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      2   0  ENDING DATE
                     NDTIME        0055  ENDING TIME
                     ICENT           19  CENTURY MARK

                  COMPUTATION INTERVAL     .08 HOURS
                      TOTAL TIME BASE   24.92 HOURS

          ENGLISH UNITS
               DRAINAGE AREA         SQUARE MILES
               PRECIPITATION DEPTH   INCHES
               LENGTH, ELEVATION     FEET
               FLOW                  CUBIC FEET PER SECOND
               STORAGE VOLUME        ACRE-FEET
               SURFACE AREA          ACRES
               TEMPERATURE           DEGREES FAHRENHEIT
```

```
      JP          MULTI-PLAN OPTION
                       NPLAN           1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                      RATIOS OF PRECIPITATION
                       .57      1.00
1
```

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .57	RATIO 2 1.00
HYDROGRAPH AT						
+	OND1	.01	1	FLOW	1.	4.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	OND2	.01	1	FLOW	1.	5.
				TIME	3.67	3.58
HYDROGRAPH AT						
+	STD1	.00	1	FLOW	2.	4.
				TIME	3.50	3.50
2 COMBINED AT						
+	CP1	.01	1	FLOW	3.	9.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	OFD1	.00	1	FLOW	0.	1.
				TIME	3.50	3.50

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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

Collins Engineers				**Technical Drainage Study**														
File: Standardform4.xls				**For Additional Parking for UHG Facilities**										**BY:**		**SM**		
Project No.10470				**Future Condition**										**DATE:**		**12/13/17**		
SUB-BASIN						**INITIAL / OVERLAND**			**TRAVEL TIME**					**Tc**		**Tlag**	**REMARKS**	
DATA						**TIME (Ti)**			**(Tt)**									
						INITIAL			**TRAVEL**		**V1**	**V2**				**Tlag=**	**RAINFALL**	
DESIG:	**DEV./EX.**	**CN**	**K**	**AREA**	**AREA**	**LENGTH**	**SLOPE**	**Ti**	**LENGTH**	**SLOPE**	**VELOCITY**	**VELOCITY**	**Tt**	**Tc**	**Tc**	**0.6Tc/60**	**Inches**	
	(D or E)			**Ac**	**Mi^2**	**Feet**	**%**	**Min**	**Feet**	**%**	**FPS**	**FPS**	**Min**	**Calc.**	**Check**	**Hours**		
(1)			**(2)**	**(3)**		**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9a)**	**(9b)**	**(10)**	**(13)**		**Per Tc Calc**	**100-Yr**	
EXISTING CONDITION																		
ONF1	D	89	0.7848	3.29	0.00514	255	0.80	9.8	553	1.60	2.6	3.9	3.5	13.2	14.5	**0.132**	2.77	
ONF2	D	90	0.7980	5.60	0.00875	132	1.50	5.5	603	1.00	2.0	3.1	4.7	10.1	14.1	**0.101**	2.77	
STF1	D	98	0.9036	1.27	0.00198	79	2.50	2.3	569	0.40	1.3	1.9	7.1	9.4	13.6	**0.094**	2.77	
OFF1	D	84	0.7188	0.45	0.00070	21	2.00	2.5	362	2.60	3.3	4.9	1.9	4.3	12.1	**0.043**	2.77	
Tc = Ti + Tt Tt = L/V Tlag = 0.6 Tc					For the travel time (Tt) calculations,					Existing	V1 = 14.8*(S/100)^1/2			Developed		V1 = 20.2*(S/100)^1/2		
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3					V1 applies to the first 500 feet of travel distance;													
K = 0.0132 (CN) - 0.39					V2 applies to the remaining travel distance.					Existing	V2 = 29.4*(S/100)^1/2			Developed		V2 = 30.6*(S/100)^1/2		
REFERENCE :														**STANDARD FORM 4**				

Note: Per sec-602.1 of Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual, the minimum TC are recommended 10 minutes(Tlag-0.10) for undeveloped area and TC=5 (TLAG=0.05) fpr developed area.

Basin	TC used (MIN	TLAG (HR.)
OFF1	5	0.05

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN  1998                *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   13DEC17  TIME  12:00:02   *
*                                       *
*****************************************
```

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

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX           XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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

   1          ID    TECHNICAL DRAINAGE STUDY FOR ADDITIONAL PARKING FOR UHG FACILITES LS
   2          ID                      LAS VEGAS, NEVADA
   3          ID
   4          ID
   5          ID        PREPARED BY:
   6          ID                       COLLINS ENGINEERS
   7          ID                       3130 S. DURANGO DRIVE SUITE 404
   8          ID                       LAVEGAS, NV  89117
   9          ID
  10          ID
  11          ID    FUTURE CONDITIONS 10-YEAR AND 100-YEAR
  12          ID    FILENAME:FUT.DAT
  13          ID    JOB#10470
  14          ID
  15          ID    JR RATIOS
  16          ID    1.00 100-YEAR NO DARF
  17          ID    0.57 10-YEAR NO DARF
  18          ID
              *DIAGRAM
  19          IT       5       0       0     300
  20          IO       5
  21          IN       5
  22          JR    PREC    0.57     1.00
              *

  23          KK    ONF1
  24          KM   FULLY DEVELOVED ONSITE BASIN AS PAVED PARK
  25          BA  .00514
  26          PB    2.77
  27          PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
  28          PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
  29          PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
  30          PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
  31          PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
  32          PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
  33          PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
  34          PC    .998    .999   1.00
  35          LS       0      89
  36          UD    .132
              *

  37          KK    ONF2
  38          KM   FUTURE DEVELOVED ONSITE BASIN (COMMERCIAL)
  39          BA  .00875
  40          LS       0      90
  41          UD    .101
              *

  42          KK    STF1
  43          KM   WEST HALF US 95
  44          BA  .00198
  45          LS       0      98
  46          UD    .094
              *
              *
```

1 HEC-1 INPUT PAGE 2

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

            47          KK     CP1
            48          KM   COMBNATION OF ONF2 AND STF1 AT 30" RCP
            49          KM   THE CAPACITY OF THE 30" RCP IS 36 CFS
            50          HC       2
                        *

            51          KK    OFF1
            52          KM   DEVELOVED OFF-SITE BASIN
            53          BA  .00070
            54          LS       0      84
            55          UD     .05
                        *
            56          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    23        ONF1
                .
                .
    37          .        ONF2
                .          .
                .          .
    42          .          .        STF1
                .          .          .
                .          .          .
    47          .         CP1.........
                .          .
                .          .
    51          .          .        OFF1

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN  1998               *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   13DEC17  TIME  12:00:02  *
*                                      *
****************************************

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

TECHNICAL DRAINAGE STUDY FOR ADDITIONAL PARKING FOR UHG FACILITES LS
LAS VEGAS, NEVADA

PREPARED BY:
COLLINS ENGINEERS
3130 S. DURANGO DRIVE SUITE 404
LAVEGAS, NV 89117

FUTURE CONDITIONS 10-YEAR AND 100-YEAR
FILENAME:FUT.DAT
JOB#10470

JR RATIOS
1.00 100-YEAR NO DARF
0.57 10-YEAR NO DARF

```
  20 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT           HYDROGRAPH TIME DATA
                       NMIN          5  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1   0  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      2   0  ENDING DATE
                     NDTIME       0055  ENDING TIME
                     ICENT         19  CENTURY MARK

                  COMPUTATION INTERVAL     .08 HOURS
                      TOTAL TIME BASE   24.92 HOURS

          ENGLISH UNITS
               DRAINAGE AREA         SQUARE MILES
               PRECIPITATION DEPTH   INCHES
               LENGTH, ELEVATION     FEET
               FLOW                  CUBIC FEET PER SECOND
               STORAGE VOLUME        ACRE-FEET
               SURFACE AREA          ACRES
```

TEMPERATURE DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
.57 1.00
1

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .57	RATIO 2 1.00
HYDROGRAPH AT						
+	ONF1	.01	1	FLOW	3.	7.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	ONF2	.01	1	FLOW	6.	14.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	STF1	.00	1	FLOW	2.	4.
				TIME	3.50	3.50
2 COMBINED AT						
+	CP1	.01	1	FLOW	8.	18.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	OFF1	.00	1	FLOW	0.	1.
				TIME	3.50	3.50

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

APPENDIX C
(Hydraulic Analysis)

- Flow Depth Analysis

Cross Section for FM1

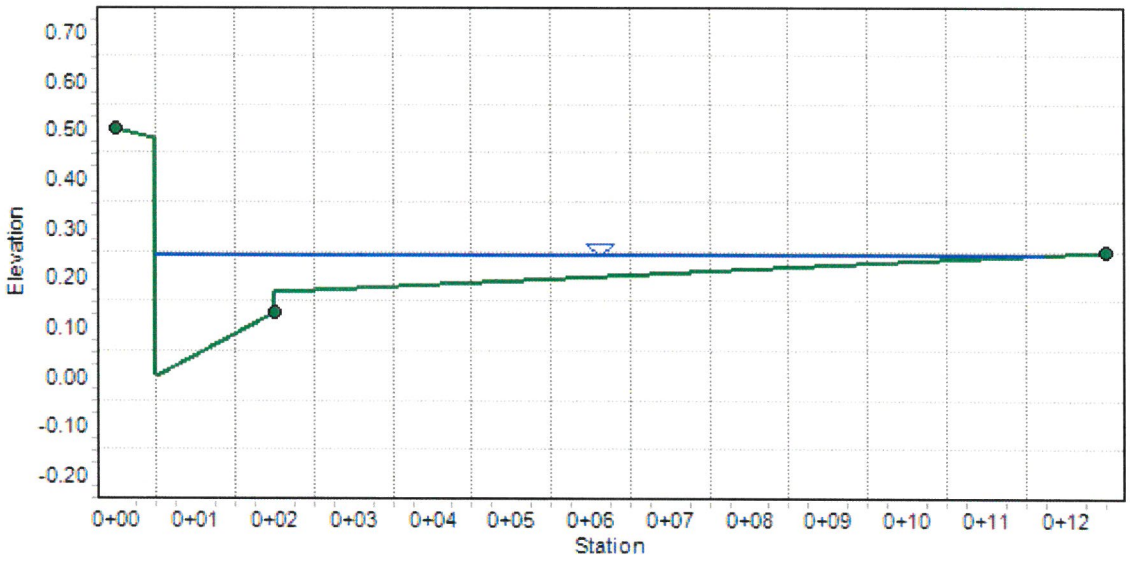
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01200	ft/ft
Normal Depth	0.24	ft
Discharge	1.00	ft³/s

Cross Section Image



Worksheet for FM1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01200	ft/ft
Discharge	1.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.48
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+12.50	0.25

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+02.00, 0.13)	0.013
(0+02.00, 0.13)	(0+12.50, 0.25)	0.016

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.24	ft
Elevation Range	0.00 to 0.50 ft	
Flow Area	0.65	ft²
Wetted Perimeter	11.54	ft
Hydraulic Radius	0.06	ft
Top Width	11.25	ft

Worksheet for FM1

Results

Normal Depth		0.24	ft
Critical Depth		0.25	ft
Critical Slope		0.00933	ft/ft
Velocity		1.54	ft/s
Velocity Head		0.04	ft
Specific Energy		0.28	ft
Froude Number		1.13	
Flow Type	Supercritical		

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		0.25	ft
Channel Slope		0.01200	ft/ft
Critical Slope		0.00933	ft/ft

Cross Section for FM2-100

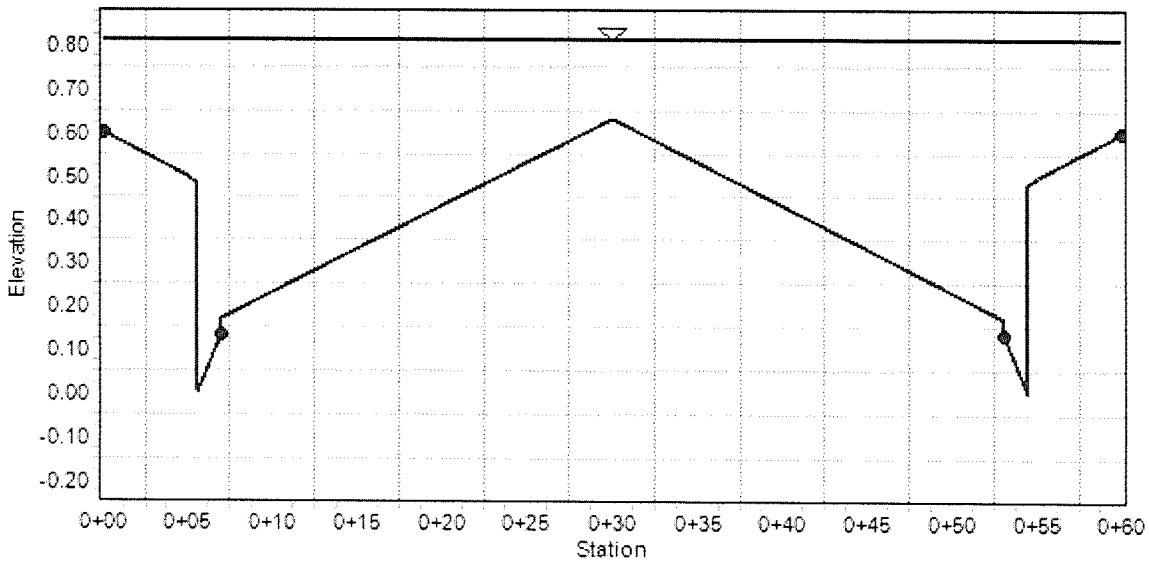
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00440	ft/ft
Normal Depth	0.81	ft
Discharge	83.00	ft³/s

Cross Section Image



Worksheet for FM2-100

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00440	ft/ft
Discharge	83.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.48
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17
0+53.00	0.13
0+54.50	0.00
0+54.50	0.48
0+55.00	0.50
0+60.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.13)	0.013
(0+07.00, 0.13)	(0+53.00, 0.13)	0.016
(0+53.00, 0.13)	(0+60.00, 0.60)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Worksheet for FM2-100

Results

Normal Depth		0.81	ft
Elevation Range	0.00 to 0.63 ft		
Flow Area		24.07	ft²
Wetted Perimeter		61.48	ft
Hydraulic Radius		0.39	ft
Top Width		60.00	ft
Normal Depth		0.81	ft
Critical Depth		0.80	ft
Critical Slope		0.00482	ft/ft
Velocity		3.45	ft/s
Velocity Head		0.18	ft
Specific Energy		0.99	ft
Froude Number		0.96	
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	0.81	ft
Critical Depth	0.80	ft
Channel Slope	0.00440	ft/ft
Critical Slope	0.00482	ft/ft

Cross Section for FM2-10

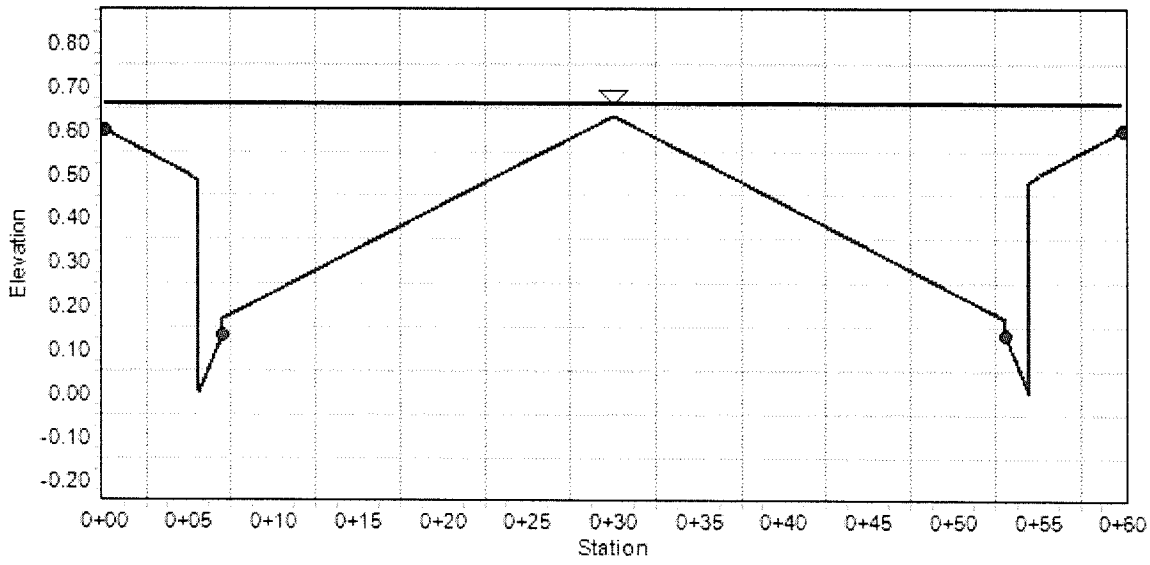
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00440	ft/ft
Normal Depth	0.66	ft
Discharge	40.00	ft^3/s

Cross Section Image



Worksheet for FM2-10

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00440	ft/ft
Discharge	40.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.48
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17
0+53.00	0.13
0+54.50	0.00
0+54.50	0.48
0+55.00	0.50
0+60.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+07.00, 0.13)	0.013
(0+07.00, 0.13)	(0+53.00, 0.13)	0.016
(0+53.00, 0.13)	(0+60.00, 0.60)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Worksheet for FM2-10

Results

Normal Depth		0.66	ft
Elevation Range	0.00 to 0.63 ft		
Flow Area		15.51	ft²
Wetted Perimeter		61.19	ft
Hydraulic Radius		0.25	ft
Top Width		60.00	ft
Normal Depth		0.66	ft
Critical Depth		0.65	ft
Critical Slope		0.00564	ft/ft
Velocity		2.58	ft/s
Velocity Head		0.10	ft
Specific Energy		0.77	ft
Froude Number		0.89	
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	0.66	ft
Critical Depth	0.65	ft
Channel Slope	0.00440	ft/ft
Critical Slope	0.00564	ft/ft

APPENDIX D
(Reference Studyies)

Technical Drainage Study for Box Canyon Professional Park Phase II, (DS # 3806), by Wright Engineers, June 10, 2005 and approved by City of Las Vegas on July 21, 2005.

The study material is used to support off-site flow quantity in Box Canyon Drive.

DS # 3806

DS INDEX:

APN: 138-15-810-037

PROJECT: Box Canyon professional Park, Phase II

SUBMITTAL 1st Submittal

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Box Canyon Professional Park Phase II Date: 5/9/2005

Location of Development: a) Descriptive (Cross Streets) North/South Box Canyon East/West Cathedral Rock
b) Sect. 15 Twn. 20 S Rng. 60 E

Name of Owner: Box Canyon Prof Park Phase II, LLC Assessors Parcel No: 138-15-810-037

Telephone No.: (702) 633-4994 Facsimile No.: (702) 254-8547

Address: 2001 Homeview CT

Las Vegas NV 89117

Contact Person Name: Quentin Allen Telephone No: (702) 933-7000

Firm: Wright Engineers

Address: 7425 Peak Drive

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	[XX]	Building Permit		

1. Total Owned Land Area: At Site: 2.46 +/- ac Being Developed/Disturbed: 2.46 +/- 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]

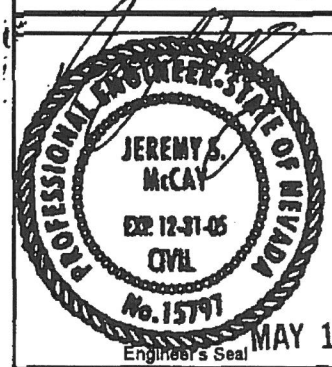
4. Proposed type of development (Residential, Commercial, Etc.)? Commercial

5. Approximate upstream land area which drains to the subject site? 5 +/- ac

6. Has the site drainage been evaluated in the past? YES [NO] If yes, please identify documentation:

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site:
The majority of the runoff will discharge through the south east corner of the site into Box Canyon Drive.

8. Briefly describe your proposed schedule for the subject project: As soon as possible



Engineer's Seal

MAY 11 2005

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.

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

Local Entity File No.

Revision	Date

Reference: Wright Engineers, Inc. Job Number: CN2511601

STANDARD FORM 1

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: July 19, 2001
TO: Land Development Services Department of Public Works				FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: Westside Surgery Center - Update			COPIES TO: Martin and Martin
Cross Streets:	Cathedral Rock Drive East of Tenaya Way			Westrock L.L.C.
File Number:	F:\Depot\DSMemos\DS2656C.doc			Cheri Edelman, DEVCO
Parcel Number:	138-15-810-006			
Zoning Action:	C-PB			
FEMA Flood Zone	YES	NO	X	
Proposed Storm Drain	YES	NO	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES
1st Submittal	3/16/2000	3/24/2000	Not Acceptable	$250.00
2nd Submittal	4/20/2000	4/27/2000	Acceptable	$250.00
3rd Submittal	7/19/2001	7/19/2001	See Comments Below	$250.00
			TOTAL FEES (LDDRS):	$750.00

REMARKS:

3rd Submittal (Update)

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

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

1. A revised grading plan is submitted for this update. The finished floor is maintained at the previous approved elevation. Minor grading revision is observed and two additional sidewalk underdrains are proposed to connect the roof drains at the east and west side of the building. The proposed revisions are minor and are acceptable.

NOTE: 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 of a project.

END OF REMARKS
Ssn/ays

T/R/S: T20S/R60E/15
AREA L-15

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: July 21, 2005
TO: **Land Development Services** Department of Public Works				FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Technical Drainage Study for: **Box Canyon Professional Park, Phase II**			**COPIES TO:** Wright Engineers
Cross Streets:	Box Canyon & Cathedral Rock			Box Canyon Professional Park Phase II, LLC
File Number:	F:\Depot\DSMEMOS\DS3806B.doc			Bart Anderson, P.E., DevCo
Parcel Number:	138-15-810-037			
Zoning Actions:	SDR-6211			
FEMA Flood Zone	YES	NO	X	
Proposed Storm Drain	YES	NO	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Tm. No.
1st Submittal	5/11/2005	5/25/2005	Not Approved	$400.00	21649: $400
2nd Submittal	6/10/2005 & 7/20/2005	7/21/2005	See Comments Below	$400.00	23664: $400
			TOTAL FEES (LDDRS):	**$800.00**	----

REMARKS:

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

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

1. This site accepts offsite flows and conveys them through the site. An existing 20' wide easement is shown on the Grading Plan along with a call out for a "15' Public Drainage Easement to be Privately Maintained". The 20' drainage easement must be vacated because Buildings 7 & 8 cannot be placed within that easement. Public drainage easements must be recorded by separate document prior to the final acceptance of the improvement plans. The vacation of the existing 20' easement must be recorded prior to the final approval of the improvement plans.

NOTE: 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 of a project.

NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the Nevada Division of Environmental Protection a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see http://ndep.nv.gov/bwpc/storm01.htm or call (775) 687-9429.

END OF REMARKS

B&H/ays

T/R/S: T20S/R60E/15

AREA L-15

EX. BUILDING 2
10,316 SF
FF=(46.07)

EX. BUILDING 5
6,585 SF
FF=(44.49)

EX. BUILDING 4
7,750 SF
FF=(46.64)

BUILDING 6
9,200 SF
FF=2343.35

BUILDING 7
9,200 SF
FF=2346.75

BUILDING 8
9,200 SF
FF=2342.78

EX. BUILDING
FF=(2345.60)

OFFD1
0.29 ac

OFFD2
0.49 ac

OND1
1.51 ac

OND2
0.95 ac

*REFD1
Q_{100} = 3 cfs
Q_{10} = 1 cfs

*REFD2
Q_{100} = 66 cfs
Q_{10} = 35 cfs

*REFD3
Q_{100} = 3 cfs
Q_{10} = 1 cfs

Q100=66
Q10=35

Q100=83
Q10=40

Q_{100} = 83 cfs
Q_{10} = 40 cfs

CPD1

SITE PROPERTY

BOX CANYON DRIVE
(60' PUBLIC ROW)

EX. 20' DRAINAGE & SEWER EASEMENT PER BOOK 900904 00742

EX. 20' DRAINAGE & SEWER EASEMENT PER BOOK 900904 00742

15' PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED

15' PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED

EX. 20' DRAINAGE & SEWER EASEMENT PER BOOK 900904 00742

GRAPHIC SCALE
(IN FEET)
1 inch = 30 ft

VICINITY MAP
SCALE: NTS
PEAK
TENAYA
BOX CANYON
CATHEDRAL ROCK
PROJECT SITE
SMOKE RANCH
US 95

LEGEND

- RIGHT OF WAY
- PROPERTY LINE
- STREET CENTER LINE
- EXISTING BUILDING
- PROPOSED BUILDING
- EXISTING CURB & GUTTER
- PROPOSED CURB & GUTTER
- EXISTING EDGE OF A.C. PAVEMENT
- 59 EXISTING CONTOUR LINE
- 64 PROPOSED 1' CONTOUR
- 65 PROPOSED 5' CONTOUR
- GB GRADE BREAK
- (X) CONSTRUCTION NOTE
- 4.80% SLOPE & DIRECTION OF SLOPE
- 57.62 TC PROPOSED ELEVATION
- (57.62) TC EXISTING ELEVATION
- [57.62] TC FUTURE ELEVATION
- ASPHALT PAVEMENT
- CONCRETE
- OFFSITE SAWCUT AREA & REPAVE
- BASIN BOUNDARY
- SECTION INDICATOR
- FLOW PATH ARROW
- CONCENTRATION POINT
- OND1 0.00 ac BASIN/ACREAGE LABEL

BASIS OF BEARING

S 00°00'59" W
BEING THE CENTERLINE OF BRADLEY ROAD AS SHOWN UPON THAT CERTAIN RECORD OF SURVEY RECORDED AS FILE 52, PAGE 70 CLARK COUNTY OFFICIAL RECORDS.

LEGAL DESCRIPTION

BEING LOT 2 OF THAT CERTAIN PARCEL MAP RECORDED AS FILE 66, PAGE 7 CLARK COUNTY OFFICIAL RECORDS.

LOCATED WITHIN THE NORTHEAST QUARTER (NE 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 25, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, NEVADA.

BENCHMARK

BENCHMARK NO.: 5LV90
2556

CITY OF LAS VEGAS RIVET AND ROUND PLATE IN TOP OF CURB, SOUTHWEST CORNER OF BRADLEY RD. AND EL CAMPO GRANDE AVE. NEAR THE PY BRADLEY RD

ELEVATION = 698.772 METERS
(2292.55 U.S. SURVEY FEET) NAVD88 DATUM

METERS x $\left(\frac{3937}{1200}\right)$ = U.S. SURVEY FEET

1. THE ELEVATIONS SHOWN HEREON ARE BASED ON FEET.

BASIN DATA

BASIN	100-YEAR FLOW (cfs)	10-YEAR FLOW (cfs)
OND1	5	1
OND2	3	1
OFFD1	1	0
OFFD2	2	1
CPD1	83	40

CROSS SECTION DATA

CROSS SECTION	100-YEAR FLOW (cfs)	10-YEAR FLOW (cfs)	100-YEAR VELOCITY (ft/s)	100-YEAR DEPTH (ft)	100-YR VD PRODUCT (ft²/s)
A	3	1	2.72	0.34	0.92
B	9	3	6.06	0.37	2.24
C	9	3	3.60	0.58	2.09
D	5	2	1.93	0.30	0.58
E	83	40	16.78	0.47	7.89

* FLOWS HAVE BEEN REFERENCED FROM THE APPROVED DRAINAGE STUDY FOR BOX CANYON PARK PHASE I BY POGGEMEYER DESIGN GROUP CLV# DS29710

** FLOWS HAVE BEEN REFERENCED FROM THE APPROVED DRAINAGE STUDY FOR WESTSIDE SURGERY CENTER BY MARTIN & MARTIN CIVIL ENGINEERS CLV# DS2664

This grading plan is a part of the drainage study dated 11/28/07 and was received on 12/10/07 and Rejected on 12/10/07. Page 1 of 3

BOX CANYON PROF PARK,LLC
2001 HOMEVIEW CT
LAS VEGAS, NEVADA 89117
TEL (702) 433-4994 FAX (702) 254-8547

WRIGHT ENGINEERS
7420 PEAK DRIVE
LAS VEGAS, NEVADA 89128
TEL (702) 933-7000 FAX (702) 933-7001
CIVIL STRUCTURAL MEP SURVEYING

REV	DATE	BY	REVISION

WRIGHT ENGINEERS

BOX CANYON PROFESSIONAL PARK PHASE II, LLC

BOX CANYON PROFESSIONAL PARK PHASE II

DRAINAGE PLAN

DRAWN BY: CBA — DATE: 05/09/2006
DESIGNED BY: CBA — DATE: 05/09/2006
CHECKED BY: MSB — DATE: 05/09/2006
PROJECT NO: 04PS01901 — SCALE: 1"=30'

PROFESSIONAL ENGINEER — JEREMY S. McCAY — No. 15791 — Exp. 12/31/08 — CIVIL — STATE OF NEVADA
4/01/05

SHEET
DP1
1 OF 1 SHEETS
DRAWING NO.

TIME OF CONCENTRATION

STANDARD FORM 4

DEVELOPMENT: Box Canyon Professional Park Phase II CALCULATED BY: QBA DATE: 5/9/2005

SUB-BASIN DATA				INITIAL / OVERLAND TIME (t_i)			TRAVEL TIME (t_t)					t_c CHECK (URBANIZED BASINS)		FINAL t_c	REMARKS	
DES.	K	AREA	AREA	LEN.	SLOPE	t_i	LEN	SLOPE	VEL (V_1)	VEL (V_2)	t_t	TOTAL LENGTH	t_c=(L/180) +10		CN	T_{LAG}
		Ac	Sq Mi	Ft	%	Min	Ft	%	fps	fps	Min	Ft	Min	Min		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10a)	(10b)	(11)	(12)	(13)	(14)	(15)	(16)
EXISTING ONSITE																
ONX1	0.7848	2.46	0.0038	200	1.25	7.45	310	1.30	1.69	N/A	3.06			10.51	89.0	0.105
DEVELOPED ONSITE																
OND1	0.8640	1.51	0.0024	250	1.30	6.15	300	0.95	1.97	N/A	2.54	550	13.06	8.69	95.0	0.087
OND2	0.8640	0.95	0.0015	120	1.30	4.26	325	1.45	2.43	N/A	2.23	445	12.47	6.49	95.0	0.065
ULTIMATE OFFSITE																
OFFD1	0.8640	0.29	0.0005	50	1.00	3.00	275	1.30	2.30	N/A	1.99	325	11.81	5.00	95.0	0.050
OFFD2	0.9036	0.49	0.0008	25	2.00	1.40	360	0.50	1.43	N/A	4.20	385	12.14	5.60	98.0	0.056

$K = 0.0132*CN-0.39$ $t_t = t_c*0.6$

$t_t = 1.8(1.1-K)L^{1/2}/S^{1/3}$

Velocity obtained from Manning's Equation

Travel Time Velocity Formulas*	
Existing	Developed
$V_1 = 14.8*(S/100)^{1/2}$	$V_1 = 20.2*(S/100)^{1/2}$
$V_2 = 29.4*(S/100)^{1/2}$	$V_2 = 30.6*(S/100)^{1/2}$

* - See CCRFCD HC&DDM Sec. 602.1

For the travel time (T_t) calculations:

V_1 applies to the first 500 feet of travel distance

V_2 applies to the remaining travel distance

Note:

Composite CN:

N/A Soil Type: D

	EXISTING	
	Q_{100}	Q_{10}
ONX1	6	1
OFFD2	2	1
REFD1	3	1
REFD2	66	35
REFD3	3	1
CPX1	80	38

	ULTIMATE	
	Q_{100}	Q_{10}
OND1	5	1
OND2	3	1
OFFD1	1	0
OFFD2	2	1
REFD1	3	1
REFD2	66	35
REFD3	3	1
CPD1	83	40

```
1**************************************
*                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)*
*             JUN  1998              *
*           VERSION 4.1              *
*                                    *
*  RUN DATE   06MAY05  TIME  10:06:46*
*                                    *
**************************************
```


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


```
X     X  XXXXXXX  XXXXX          X
X     X  X       X     X        XX
X     X  X       X              X
XXXXXXX  XXXX    X        XXXXX X
X     X  X       X              X
X     X  X       X     X        X
X     X  XXXXXXX  XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
              *DIAGRAM
    1         ID    ********BOX CANYON PROFESSIONAL PARK PHASE II*********
    2         ID
    3         ID    PREPARED FOR:  BOX CANYON PROFESSIONAL PARK, LLC
    4         ID
    5         ID    ULTIMATE 100-YEAR STORM FLOW
    6         ID    @@@@@@@@@@@@@@@@@@@@
    7         ID
    8         ID    file name:  C:\HECEXE\1005116U.DAT
    9         ID    Project Number: CN2511601
   10         ID
   11         ID    WRIGHT ENGINEERS
   12         ID    7425 PEAK DRIVE                    *100-YEAR CONDITION*
   13         ID    Las Vegas, Nevada  89128
   14         ID
   15         ID
   16         ID    **********************
   17         ID    *    SDN 3  VALUES   *
   18         ID    **********************
   19         ID
   20         JR    PREC   1.000
   21         IT       5        0        0      300
   22         IO       5        0        0
   23         IN       5        0        0

   24         KK   OFFD1
   25         BA   .0005
   26         PB   2.77
   27         PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
   28         PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
   29         PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
   30         PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
   31         PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
   32         PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
   33         PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
   34         PC    .998    .999   1.00
   35         LS       0      95
   36         UD    .050

   37         KK   OFFD2
   38         KM   BASE FLOW FROM REFERENCED FLOW IN BOX CANYON DRIVE (REFD2) = 66 CFS
   39         BA   .0008
   40         BF      66
   41         LS       0      98
   42         UD    .056

   43         KK    OND1
   44         BA   .0024
   45         BF       0
   46         LS       0      95
   47         UD    .087
```

1 HEC-1 INPUT PAGE 2

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

   48         KK    OND2
   49         KM   FLOW FROM TECHNOLOGY CENTER PARK SITES (REFD1) = 3 CFS
   50         KM   FLOW FROM WESTSIDE SURGERY CENTER (REFD3) = 3 CFS
   51         KM   BASE FLOW = REFD1 + REFD3 = 6 CFS
   52         BA   .0015
   53         BF       6
   54         LS       0      95
   55         UD    .065

   56         KK    CPD1
   57         KM   COLLECTION POINT FOR OFFD1, OFFD2, OND1, OND2
   58         HC       4
```

```
         59          ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK

 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW
   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    24       OFFD1
                .
    37          .       OFFD2
                .          .
    43          .          .        OND1
                .          .          .
    48          .          .          .        OND2
                .          .          .          .
    56        CPD1.....................................

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   06MAY05  TIME  10:06:46   *
*                                       *
*****************************************
```

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

```
                        ********BOX CANYON PROFESSIONAL PARK PHASE II*********

                        PREPARED FOR:  BOX CANYON PROFESSIONAL PARK, LLC

                        ULTIMATE 100-YEAR STORM FLOW
                        @@@@@@@@@@@@@@@@@@@@

                        file name:  C:\HECEXE\1005116U.DAT
                        Project Number: CN2511601

                        WRIGHT ENGINEERS
                        7425 PEAK DRIVE                    *100-YEAR CONDITION*
                        Las Vegas, Nevada  89128


                        **********************
                        *    SDN 3  VALUES   *
                        **********************

   22 IO          OUTPUT CONTROL VARIABLES
                        IPRNT          5  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                        NMIN           5  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1    0  STARTING DATE
                       ITIME        0000  STARTING TIME
                          NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      2    0  ENDING DATE
                      NDTIME       0055  ENDING TIME
                       ICENT          19  CENTURY MARK

                     COMPUTATION INTERVAL      .08 HOURS
                       TOTAL TIME BASE   24.92 HOURS

           ENGLISH UNITS
                DRAINAGE AREA          SQUARE MILES
                PRECIPITATION DEPTH    INCHES
                LENGTH, ELEVATION      FEET
                FLOW                   CUBIC FEET PER SECOND
                STORAGE VOLUME         ACRE-FEET
                SURFACE AREA           ACRES
                TEMPERATURE            DEGREES FAHRENHEIT

      JP          MULTI-PLAN OPTION
                       NPLAN          1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                     RATIOS OF PRECIPITATION
                    1.00
1

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

                                                                  RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION     AREA    PLAN                 RATIO 1
                                                            1.00

 HYDROGRAPH AT
+                OFFD1        .00     1   FLOW              1.
                                          TIME            3.50

 HYDROGRAPH AT
+                OFFD2        .00     1   FLOW             68.
```

				TIME	3.50
HYDROGRAPH AT					
+	OND1	.00	1	FLOW	5.
				TIME	3.50
HYDROGRAPH AT					
+	OND2	.00	1	FLOW	9.
				TIME	3.50
4 COMBINED AT					
+	CPD1	.01	1	FLOW	83.
				TIME	3.50

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

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE  06MAY05  TIME  10:20:34    *
*                                       *
*****************************************
```


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


```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X      .  XX
X     X  X        X                X
XXXXXXX  XXXX     X          XXXXX  X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
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NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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

              *DIAGRAM
    1         ID    ********BOX CANYON PROFESSIONAL PARK*********
    2         ID
    3         ID    PREPARED FOR:  BOX CANYON PROFESSIONAL PARK PHASE II, LLC
    4         ID
    5         ID    ULTIMATE 10-YEAR STORM FLOW
    6         ID    @@@@@@@@@@@@@@@@@@@@
    7         ID
    8         ID    file name:  C:\HECEXE\105116U.DAT
    9         ID    Project Number: CN2511601
   10         ID
   11         ID    WRIGHT ENGINEERS
   12         ID    7425 PEAK DRIVE                    *10-YEAR CONDITION*
   13         ID    Las Vegas, Nevada  89128
   14         ID
   15         ID
   16         ID    **********************
   17         ID    *    SDN 3  VALUES   *
   18         ID    **********************
   19         ID
   20         JR    PREC   .5704
   21         IT       5        0        0     300
   22         IO       5        0        0
   23         IN       5        0        0

   24         KK    OFFD1
   25         BA    .0005
   26         PB    1.58
   27         PC     .000     .020     .057     .070     .087     .108     .124     .130     .130     .130
   28         PC     .130     .130     .130     .133     .140     .142     .148     .158     .172     .181
   29         PC     .190     .197     .199     .200     .201     .204     .214     .229     .241     .249
   30         PC     .251     .256     .270     .278     .281     .283     .295     .322     .352     .409
   31         PC     .499     .590     .710     .744     .781     .812     .819     .835     .851     .856
   32         PC     .860     .868     .876     .888     .910     .926     .937     .950     .970     .976
   33         PC     .982     .985     .987     .989     .990     .993     .993     .994     .995     .998
   34         PC     .998     .999    1.00
   35         LS        0       95
   36         UD     .050

   37         KK    OFFD2
   38         KM    BASE FLOW FROM REFERENCED FLOW IN BOX CANYON DRIVE (REFD2) = 35 CFS
   39         BA    .0008
   40         BF       35
   41         LS        0       98
   42         UD     .056

   43         KK     OND1
   44         BA    .0024
   45         BF        0
   46         LS        0       95
   47         UD     .087
```

1 HEC-1 INPUT PAGE 2

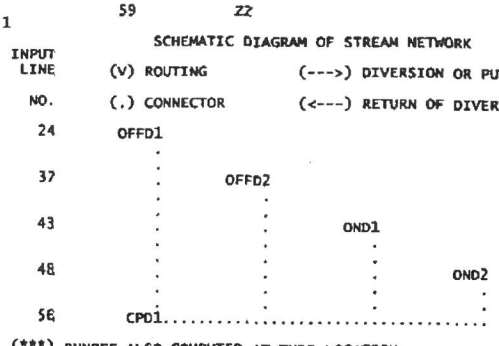
```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   48         KK     OND2
   49         KM    FLOW FROM TECHNOLOGY CENTER PARK SITES (REFD1) = 1 CFS
   50         KM    FLOW FROM WESTSIDE SURGERY CENTER (REFD3) = 1 CFS
   51         KM    BASE FLOW = REFD1 + REFD3 = 2 CFS
   52         BA    .0015
   53         BF        2
   54         LS        0       95
   55         UD     .065

   56         KK     CPD1
   57         KM    COLLECTION POINT FOR OFFD1, OFFD2, OND1, AND OND2
   58         HC        4
```

```
1          59          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK




```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   06MAY05  TIME  10:20:34   *
*                                       *
*****************************************
```

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

```
********BOX CANYON PROFESSIONAL PARK*********

PREPARED FOR:  BOX CANYON PROFESSIONAL PARK PHASE II, LLC

ULTIMATE 10-YEAR STORM FLOW
@@@@@@@@@@@@@@@@@@@@@

file name:  C:\HECEXE\105116U.DAT
Project Number: CN2511601

WRIGHT ENGINEERS
7425 PEAK DRIVE                    *10-YEAR CONDITION*
Las Vegas, Nevada  89128


**********************
*    SDN 3  VALUES   *
**********************

  22 ID          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                       NMIN          5  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1   0  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      2   0  ENDING DATE
                     NDTIME       0055  ENDING TIME
                     ICENT         19  CENTURY MARK

                  COMPUTATION INTERVAL      .08 HOURS
                    TOTAL TIME BASE    24.92 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT

     JP          MULTI-PLAN OPTION
                      NPLAN          1  NUMBER OF PLANS

     JR          MULTI-RATIO OPTION
                     RATIOS OF PRECIPITATION
                     .57
1
```

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .57
HYDROGRAPH AT					
+	OFFD1	.00	1	FLOW	0.
				TIME	3.50
HYDROGRAPH AT					
+	*OFFD2*	*.00*	1	FLOW	*36.*

				TIME	3.50
HYDROGRAPH AT					
+	OND1	.00	1	FLOW	1.
				TIME	3.50
HYDROGRAPH AT					
+	OND2	.00	1	FLOW	3.
				TIME	3.50
4 COMBINED AT					
+	CPD1	.01	1	FLOW	40.
				TIME	3.50

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

Hydraulic Section D, Q100
Worksheet for Irregular Channel

Project Description	
Worksheet	Hydraulic Section D, Q100
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.400000	ft/ft
Discharge	83.00	cfs

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

Results		
Mannings Coefficient	0.014	
Water Surface Elevation	39.86	ft
Elevation Range	39.39 to 40.10	
Flow Area	4.9	ft²
Wetted Perimeter	40.72	ft
Top Width	39.97	ft
Actual Depth	0.47	ft
Critical Elevation	40.19	ft
Critical Slope	0.003906	ft/ft
Velocity	16.78	ft/s
Velocity Head	4.38	ft
Specific Energy	44.24	ft
Froude Number	8.41	
Flow Type	Supercritical	

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+07.50	0.013
0+07.50	0+55.05	0.016
0+55.05	0+62.05	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	39.89
0+05.00	39.89
0+05.50	39.89
0+05.50	39.39
0+07.50	39.56
0+31.81	39.91
0+55.05	39.77
0+56.55	39.60

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Wright Engineers
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

Hydraulic Section D, Q100
Worksheet for Irregular Channel

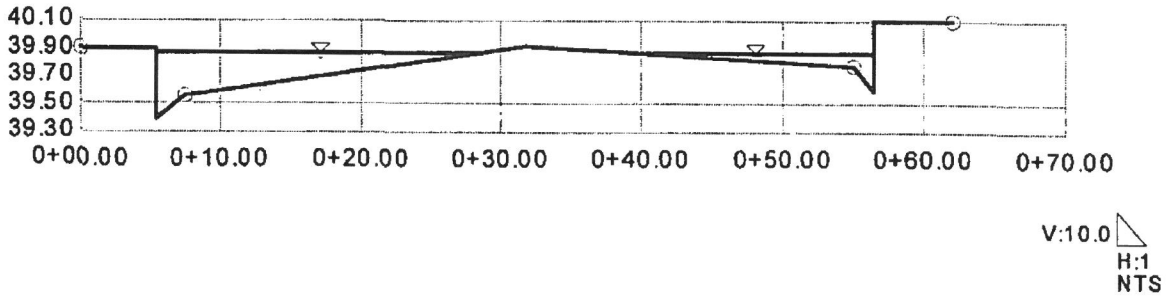
Natural Channel Points	
Station (ft)	Elevation (ft)
0+56.55	40.10
0+57.05	40.10
0+62.05	40.10

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Hydraulic Section D, Q100
Cross Section for Irregular Channel

Project Description	
Worksheet	Hydraulic Section D, Q100
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.014
Slope	0.400000 ft/ft
Water Surface Elevation	39.86 ft
Elevation Range	39.39 to 40.10
Discharge	83.00 cfs



Hydraulic Section D, Q10
Worksheet for Irregular Channel

Project Description	
Worksheet	Hydraulic Section D, Q10
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.400000	ft/ft
Discharge	40.00	cfs

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

Results		
Mannings Coefficient	0.013	
Water Surface Elevation	39.78	ft
Elevation Range	39.39 to 40.10	
Flow Area	2.4	ft²
Wetted Perimeter	20.14	ft
Top Width	19.56	ft
Actual Depth	0.39	ft
Critical Elevation	40.03	ft
Critical Slope	0.004227	ft/ft
Velocity	16.90	ft/s
Velocity Head	4.44	ft
Specific Energy	44.21	ft
Froude Number	8.56	
Flow Type	Supercritical	

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+07.50	0.013
0+07.50	0+55.05	0.016
0+55.05	0+62.05	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	39.89
0+05.00	39.89
0+05.50	39.89
0+05.50	39.39
0+07.50	39.56
0+31.81	39.91
0+55.05	39.77
0+56.55	39.60

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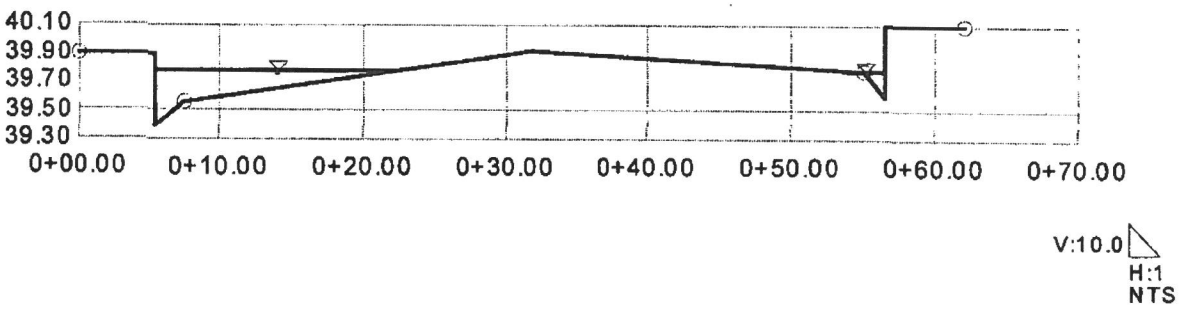
Hydraulic Section D, Q10
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+56.55	40.10
0+57.05	40.10
0+62.05	40.10

Hydraulic Section D, Q10
Cross Section for Irregular Channel

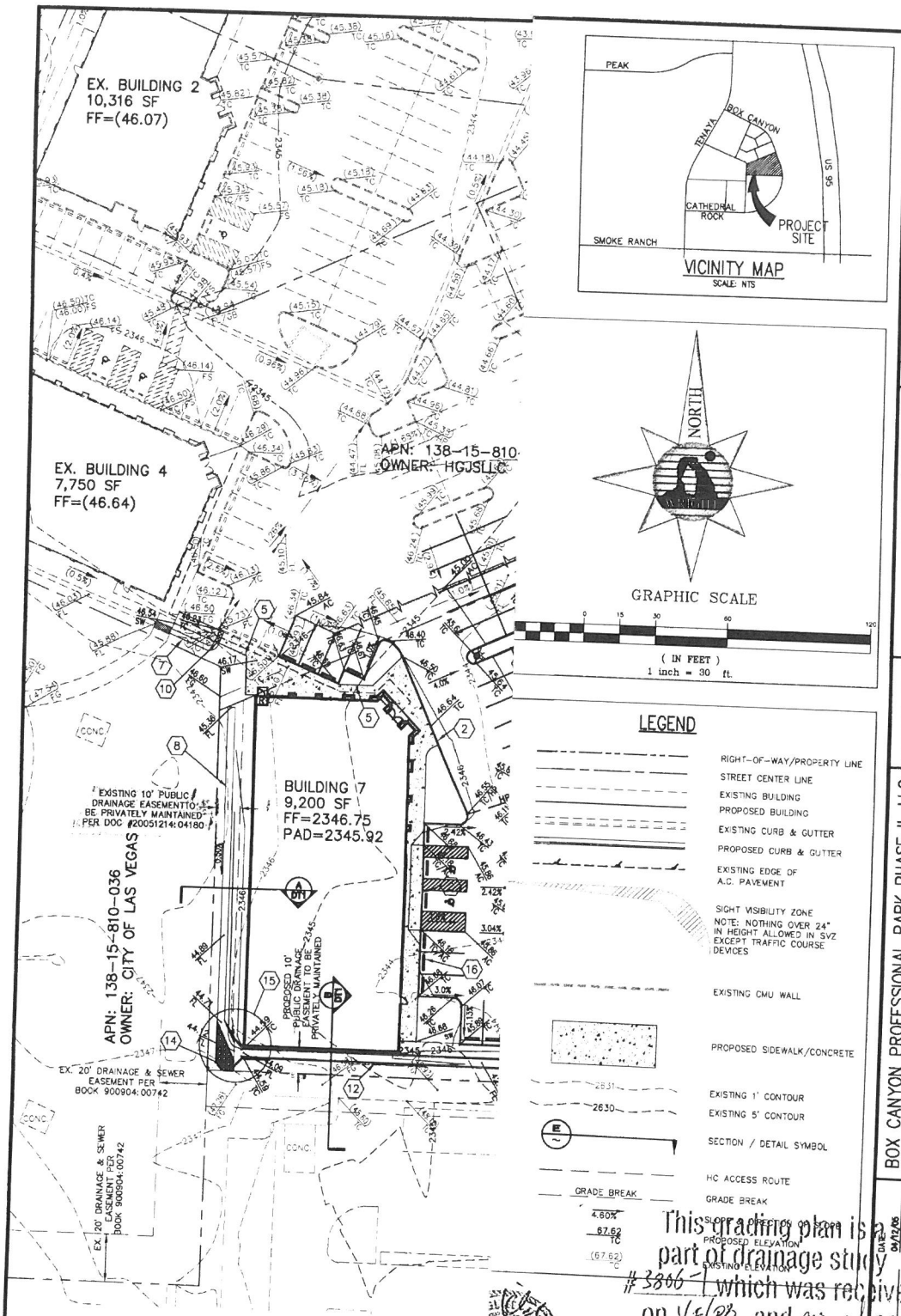
Project Description	
Worksheet	Hydraulic Section D, Q10
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.013	
Slope	0.400000	ft/ft
Water Surface Elevation	39.78	ft
Elevation Range	39.39 to 40.10	
Discharge	40.00	cfs



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Wright Engineers
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666



VICINITY MAP
SCALE: NTS

LEGEND

- RIGHT-OF-WAY/PROPERTY LINE
- STREET CENTER LINE
- EXISTING BUILDING
- PROPOSED BUILDING
- EXISTING CURB & GUTTER
- PROPOSED CURB & GUTTER
- EXISTING EDGE OF A.C. PAVEMENT
- SIGHT VISIBILITY ZONE NOTE: NOTHING OVER 24" IN HEIGHT ALLOWED IN SVZ EXCEPT TRAFFIC COURSE DEVICES
- EXISTING CMU WALL
- PROPOSED SIDEWALK/CONCRETE
- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- SECTION / DETAIL SYMBOL
- HC ACCESS ROUTE
- GRADE BREAK
- SLOPE DIRECTION & SLOPE
- PROPOSED ELEVATION
- EXISTING ELEVATION

This grading plan is a part of drainage study #3806-1 which was received on 1/15/08 and approved on 1/15/2008. Page 1 of 2

BASIS OF BEARING

N 28°52'06" E
BEING THE CENTERLINE OF TENAYA WAY, AS SHOWN ON THAT CERTAIN PLAT MAP RECORDED AS BOOK 47, PAGE 35, CLARK COUNTY OFFICIAL RECORDS.

LEGAL DESCRIPTION

SITUATED WITHIN THE NORTHWEST QUARTER (NW 1/4) OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 15, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK NUMBER OLV00 1554 (5) BEING A RIVET AND PLATE IN TOP OF CURB, NORTHEAST RETURN OF SMOKE RANCH ROAD AND TENAYA WAY.

ELEVATION (NAVD88) = 721.3739 METERS = 2366.707 FEET

Call before you DigGround

REV	DATE	BY	REVISION

WRIGHT ENGINEERS
7425 PEAK DRIVE
LAS VEGAS, NEVADA 89128
TEL (702) 933-7000
FAX (702) 933-7001
CIVIL STRUCTURAL MEP SURVEYING

WRIGHT ENGINEERS

BOX CANYON PROFESSIONAL PARK PHASE II, LLC

BOX CANYON PROFESSIONAL PARK PHASE II

GRADING PLAN

DRAWN BY:	DESIGNED BY:	CHECKED BY:	PROJECT NO:	SCALE:
BSL	ALK	ASH	CN25116	1"=30'
DATE: 04/12/05	DATE: 04/12/05	DATE: 04/12/05		

PROFESSIONAL ENGINEER-STATE OF NEVADA
No. 15797
JEREMY S. McCAY
Exp. 12/31/05
CIVIL

SHEET
GP1
5 OF 7 SHEETS
DRAWING NO.

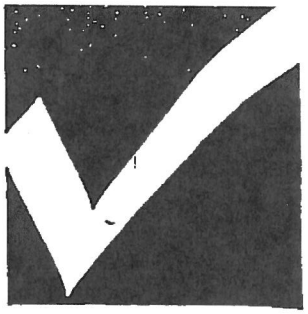
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APPENDIX D

Technical Drainage Study for Box Canyon Office Park, (DS#2971), by poggemeyer Design Group Inc., May 15, 2002, and approved by City of Las Vegas on May 28, 2002.

The study material is used to support off-site flow quantity in Box Canyon Drive.





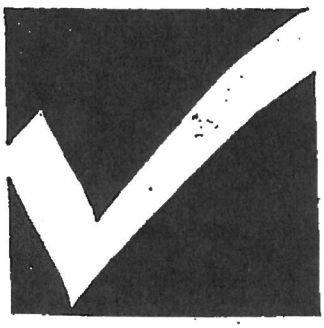
DS# 2971

DS INDEX

APN 138-15-810-013

PROJECT Box Canyon office park

SUBMITTAL 1st





scanning.doc

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Box Canyon Office Park Date: August 24, 2001

Location of Development: a) Descriptive (Cross Streets) North/South: Tenaya Way East/West: Box Canyon Drive

b) Sect. 15 Twn. 20 S Rng. 60 E

Name of Owner: Hy-Ray LLC Assessor's Parcel No.: 138-15-810-013

Telephone No.: (702) 633-4994 Facsimile No.: (702) 362-1833

Address: 4310 Losee Road #1A
North Las Vegas, NV 89030

Contact Person-Name: KRISTINA L. SWALLOW, P.E. Telephone No.: (702) 255-8100

Firm: POGGEMEYER DESIGN GROUP, INC.

Address: 2801 N. TENAYA WAY; LAS VEGAS, NV 89128

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	X	Building Permit		

1. Total Owned Land Area: At Site: 6.16 Acres Being Developed/Disturbed: 6.16 Acres
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.)? Commercial
5. Approximate upstream land area which drains to the subject site? 5.4 Acres
6. Has the site drainage been evaluated in the past? YES (NO) If yes, please identify documentation:
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site:
   The site will discharge into Box Canyon Drive.
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.

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

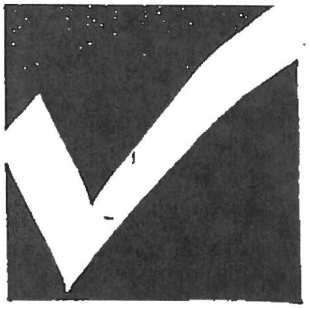
Local Entity File No.

Revision	Date

REFERENCE:

STANDARD FORM 1





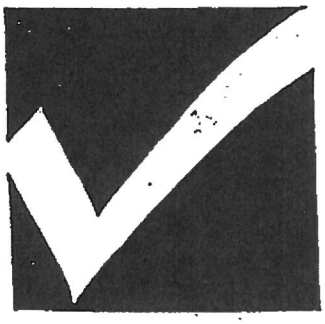
DS# 2971

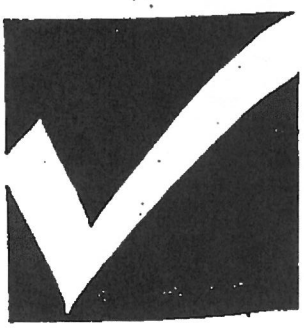
DS INDEX

APN 138-15-810-013

PROJECT Box Canyon Office Park

SUBMITTAL 4th





scanning.doc

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: May 28, 2002
TO: **Land Development Services** Department of Public Works				FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Technical Drainage Study for: **Box Canyon Office Park**			**COPIES TO:** Hy-Ray LLC
Cross Streets:	Tenaya Way & Box Canyon Drive			Poggemeyer Design Group
File Number:	F:\Depot\DSMEMOS\DS2971D.doc			Cheri Edelman, P.E., CLV DEVCO
Parcel Number:	138-15-810-013			
Zoning Action:				
FEMA Flood Zone	YES	NO	X	
Proposed Storm Drain	YES	NO	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES
1st Submittal	9/4/2001	9/17/2001	Not Acceptable	$250.00
2nd Submittal	10/1/2001	10/15/2001	Filed	N/C
3rd Submittal	11/1/2001	11/1/2001	Accepted	$250.00
4th Submittal	5/15/2002	5/28/2002	See Comments Below	$250.00
			TOTAL FEES (LDDRS):	**$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 and the following conditions.
	must be resubmitted or supplemented including the following:
	must have Clark County Regional Flood Control District concurrence

The 4th submittal was for a substantially revised site plan.

1. Revise section 5/C5.01 to add a swale to prevent cross lot drainage. Drain the swale along the southern property line to Box Canyon Drive.
2. Add a section through building 4 and the adjacent drainage easement.
3. Add a section through building 2 through the northern property line. Show the proposed drainage swale in the section.
4. Sections 3 and 7 are shown on the detail sheet, but not labeled on the grading plan. Label all sections on the grading plan.

NOTE: 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 CLV 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 of a project.

END OF REMARKS
Ssn/ays

T/R/S: **T20S/R60E/15**
AREA L-15

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: UPDATE FOR BOX CANYON OFFICE PARK Date: May 13, 2002

Location of Development: a) Descriptive (Cross Streets) North/South: TENAYA WAY East/West: BOX CANYON DRIVE

b) Sect. 15 Twn. 20 S Rng. 60 E

Name of Owner: HY-RAY, LLC Assessor's Parcel No.: 138-15-810-013

Telephone No.: (702) 633-4994 Facsimile No.: (702) 362-1833

Address: 4310 LOSEE ROAD, #1A
NORTH LAS VEGAS, NV 89030

Contact Person-Name: JASON M. CALHOUN Telephone No.: (702) 255-8100

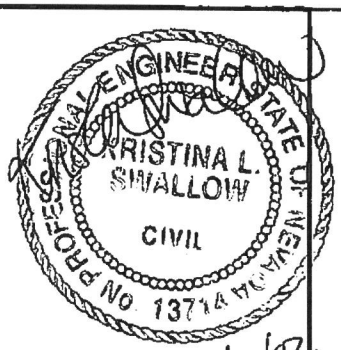
Firm: POGGEMEYER DESIGN GROUP, INC.

Address: 2601 N. TENAYA WAY; LAS VEGAS, NV 89128

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	X	Building Permit		

1. Total Owned Land Area: At Site: 3.69 Acres Being Developed/Disturbed: 3.69 Acres
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.)? COMMERCIAL
5. Approximate upstream land area which drains to the subject site? ~~5.4 Acres~~ 3.3 AC
6. Has the site drainage been evaluated in the past? YES (NO) If yes, please identify documentation:
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: THE SITE WILL DISCHARGE INTO BOX CANYON DRIVE.
8. Briefly describe your proposed schedule for the subject project: ASAP



Engineer's Seal 5/14/02

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.

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

Local Entity File No.

Revision	Date

REFERENCE:

STANDARD FORM 1

for the site, and some slight grading changes that were necessary due to the changes in the plot size and plan.

PROPOSED CONDITIONS			
BASIN	Acres	10-Year	100-Year
PRON-1	3.10	5 CFS	9 CFS
PRON-2	0.59	1 CFS	2 CFS
EXOFF-2	4.50	7 CFS	15 CFS
EAST-EX	5.4±	1 CFS	3 CFS
Total @ C-2	13.59±	14 CFS	29 CFS

XI. STREET FLOW CALCULATIONS

Street flows within Box Canyon Drive were determined by referencing the approved Technical Drainage Study Update for Summerlin Clinic Sierra Health Services Phase II, prepared by Martin & Martin dated November 19, 1993. Although other studies determined flows in Tenaya Way and Box Canyon Drive, this was the most conservative estimate. The study determined that 36.8 CFS from Tenaya Way is diverted onto Box Canyon Way; these flows combine with off-site Basin EXOFF-2 for a total of 52 CFS at Location A. Flows from Location A combine with Basins PRON-1, PRON-2, and EAST-EX for a total of 69 CFS at Location B. A summary table is provided below.

STREET CALCULATIONS

PROPOSED CONDITIONS						
Street	Flow (CFS)	Depth (feet)	Vel. (feet/sec)	V * D	R.O.W.	Dry Lane
Box Canyon Drive (10-year) Location A	29 CFS	0.60	2.44	1.46	60 feet	N/A
Box Canyon Drive (100-year) Location A	53 CFS	0.69	3.04	2.10	60 feet	N/A
Box Canyon Drive (10-year) Location B	35 CFS	0.66	2.32	1.53	60 feet	N/A
Box Canyon Drive (100-year) Location B	65 CFS	0.77	2.97	2.29	60 feet	N/A

Time of Concentration

REFERENCE:

STANDARD FORM 4

BOX CANYON SERVICE PARK

CALCULATED: 04/25/02

POGGEMEYER DESIGN GROUP #01120-D

SUB-BASIN DATA				INITIAL/OVERLAND TIME (Ti)			TRAVEL TIME (Tt)				tc CHECK (URBANIZED BASINS)		FINAL tc	Lag Time (hr)	
DESIG (1)	K (2)	AREA Ac (3)	AREA mi² (3)	LENGTH Ft (4)	SLOPE % (5)	Ti Min (6)	LENGTH Fl (7)	SLOPE % (8)	VEL fps (9)	Tt Min (10)	TOTAL LENGTH Ft (11)	Tc =(l/180)+10 Min (12)	Min (13)		Ti CN
EXISTING CONDITIONS															
EXON-1	0.73	3.69	0.0058	128.79	2.33	5.7	381	1.31	1.4	4.5	509.79	N/A	10.1	0.101	85
EXOFF-2	0.85	4.50	0.0070	110	3.64	3.1	760	1.54	4.6	2.7	870	N/A	5.8	0.058	94
PROPOSED CONDITIONS															
PRON-1	0.85	3.10	0.0048	173.83	0.72	6.6	331.29	0.83	2.7	2.1	505.12	12.8	8.7	0.087	94
PRON-2	0.85	0.59	0.0009	80	1.50	3.5	100	1.80	2.5	0.7	180	11.0	4.2	0.042*	94
															94

* revised to 5 min. Minimum in the Hec-1 analysis

t(i) = 1.8 (1.1 - K) L^(1/2) / S^(1/3)

t(c) = t(i) + t(t)

MINIMUM t(c) = 5 MIN

HEC1 S/N: 1333000222 HMVersion: 6.40 Data File: 1120PR.HC1

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*         SEPTEMBER 1990                *
*          VERSION 4.0                  *
*                                       *
*  RUN DATE  05/02/2002  TIME  13:08:10 *
*                                       *
*****************************************
```


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


```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

```
::::::::::::::::::::::::::::::::::::::::::::
::::::::::::::::::::::::::::::::::::::::::::
:::                                      :::
:::  Full Microcomputer Implementation   :::
:::                 by                   :::
:::        Haestad Methods, Inc.         :::
:::                                      :::
::::::::::::::::::::::::::::::::::::::::::::
::::::::::::::::::::::::::::::::::::::::::::
```

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

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

HEC-1 INPUT PAGE 1

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

   1          ID            BOX CANYON OFFICE PARK 1120-D
   2          ID            HEC-1 PROPOSED CONDITIONS
   3          ID            USING SCS METHODS AND KINEMATIC WAVE ROUTING
   4          ID            6-HOUR RAINFALL AND STORM DISTRIBUTION
   5          ID            INPUT FILE: 1120PR.HC1          OUTPUT FILE: 1120PR.OUT
   6          ID            PROPOSED CONDITIONS
   7          ID            ************************************************
   8          ID
   9          ID            10 & 100 YEAR - 6 HOUR STORM EVENT
  10          ID
  11          ID            ************************************************
  12          ID
              *DIAGRAM
  13          IT       5       0       0     300
  14          IO       5       0       0
  15          IN       5       0       0
  16          JR    PREC     .57       1

  17          KK  EXOFF2 EXISTING OFFSITE BASIN 2
  18          PB    2.77
  19          PC     0.0     .02    .057     .07    .087    .108    .124     .13     .13     .13
  20          PC     .13     .13     .13    .133     .14    .142    .148    .158    .172    .181
  21          PC     .19    .197    .199      .2    .201    .204    .214    .229    .241    .249
  22          PC    .251    .256     .27    .278    .281    .283    .295    .322    .352    .409
  23          PC    .499     .59     .71    .744    .781    .812    .819    .835    .851    .856
  24          PC     .86    .868    .876    .888     .91    .926    .937     .95     .97    .976
  25          PC    .982    .985    .987    .989     .99    .993    .993    .994    .995    .998
  26          PC    .998    .999     1.0
  27          BA   0.007
  28          LS       0      94
  29          UD   0.058

  30          KK    RTE1
  31          KM  ROUTE TO BASIN 2
  32          RK     150  0.0057   0.016       0    TRAP       0      50
```

```
          33          KK   PRON2 ONSITE PROPOSED BASIN 2
          34          BA  0.0009
          35          LS       0      94
          36          UD   0.050

          37          KK    CB-1
          38          HC       2

          39          KK   PRON1 ONSITE PROPOSED BASIN 1
          40          BA  0.0048
          41          LS       0      94
          42          UD   0.087

          43          KK    CB-2
          44          HC       2
          45          ZZ
□□
                SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE      (V) ROUTING           (--->) DIVERSION OR PUMP FLOW

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

   17      EXOFF2
               V
               V
   30       RTE1
              .
              .
   33         .        PRON2
              .          .
              .          .
   37       CB-1.............
              .
              .
   39         .        PRON1
              .          .
              .          .
   43       CB-2.............

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
□□ □HEC1 S/N: 1333000222        HMVersion: 6.40    Data File: 1120PR.HC1
```

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*         SEPTEMBER 1990               *
*          VERSION 4.0                 *
*                                      *
*  RUN DATE  05/02/2002  TIME  13:08:10 *
*                                      *
****************************************
```

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

```
BOX CANYON OFFICE PARK 1120-D
HEC-1 PROPOSED CONDITIONS
USING SCS METHODS AND KINEMATIC WAVE ROUTING
6-HOUR RAINFALL AND STORM DISTRIBUTION
INPUT FILE: 1120PR.HC1          OUTPUT FILE: 1120PR.OUT
PROPOSED CONDITIONS
**************************************************

10 & 100 YEAR - 6 HOUR STORM EVENT

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

 14 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                      NMIN          5  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1   0  STARTING DATE
                     ITIME       0000  STARTING TIME
                        NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      2   0  ENDING DATE
                     NDTIME       0055  ENDING TIME
                     ICENT         19  CENTURY MARK

                  COMPUTATION INTERVAL      .08 HOURS
                      TOTAL TIME BASE    24.92 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
```

SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
.57 1.00

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 .57	RATIO 2 1.00
HYDROGRAPH AT	EXOFF2	.01	1	FLOW	7.	15.
				TIME	3.50	3.50
ROUTED TO	RTE1	.01	1	FLOW	7.	14.
				TIME	3.50	3.50
HYDROGRAPH AT	PRON2	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
2 COMBINED AT	CB-1	.01	1	FLOW	8.	16.
				TIME	3.50	3.50
HYDROGRAPH AT	PRON1	.00	1	FLOW	5.	9.
				TIME	3.50	3.50
2 COMBINED AT	CB-2	.01	1	FLOW	13.	25.
				TIME	3.50	3.50

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

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .57									
RTE1	MANE	.47	7.26	210.35	1.01	5.00	7.15	210.00	1.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3763E+00 EXCESS= .0000E+00 OUTFLOW= .3764E+00 BASIN STORAGE= .1188E-10 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= 1.00									
RTE1	MANE	.33	14.56	210.63	2.13	5.00	14.32	210.00	2.13

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7945E+00 EXCESS= .0000E+00 OUTFLOW= .7948E+00 BASIN STORAGE= .8850E-11 PERCENT ERROR= .0

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

Box Canyon Drive 10-yr Location B
Worksheet for Irregular Channel

Project Description	
Project File	j:\01120-d\velcalcs.fm2
Worksheet	Box Canyon Drive
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data	
Channel Slope	0.40 %
Elevation range:	0.00 ft to 5.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	5.00	0.00	7.00	0.013
0.00	0.60	7.00	53.00	0.017
5.00	0.50	53.00	60.00	0.013
5.00	0.00			
7.00	0.17			
30.00	0.63			
53.00	0.17			
55.00	0.00			
55.00	0.50			
60.00	0.60			
60.00	5.00			

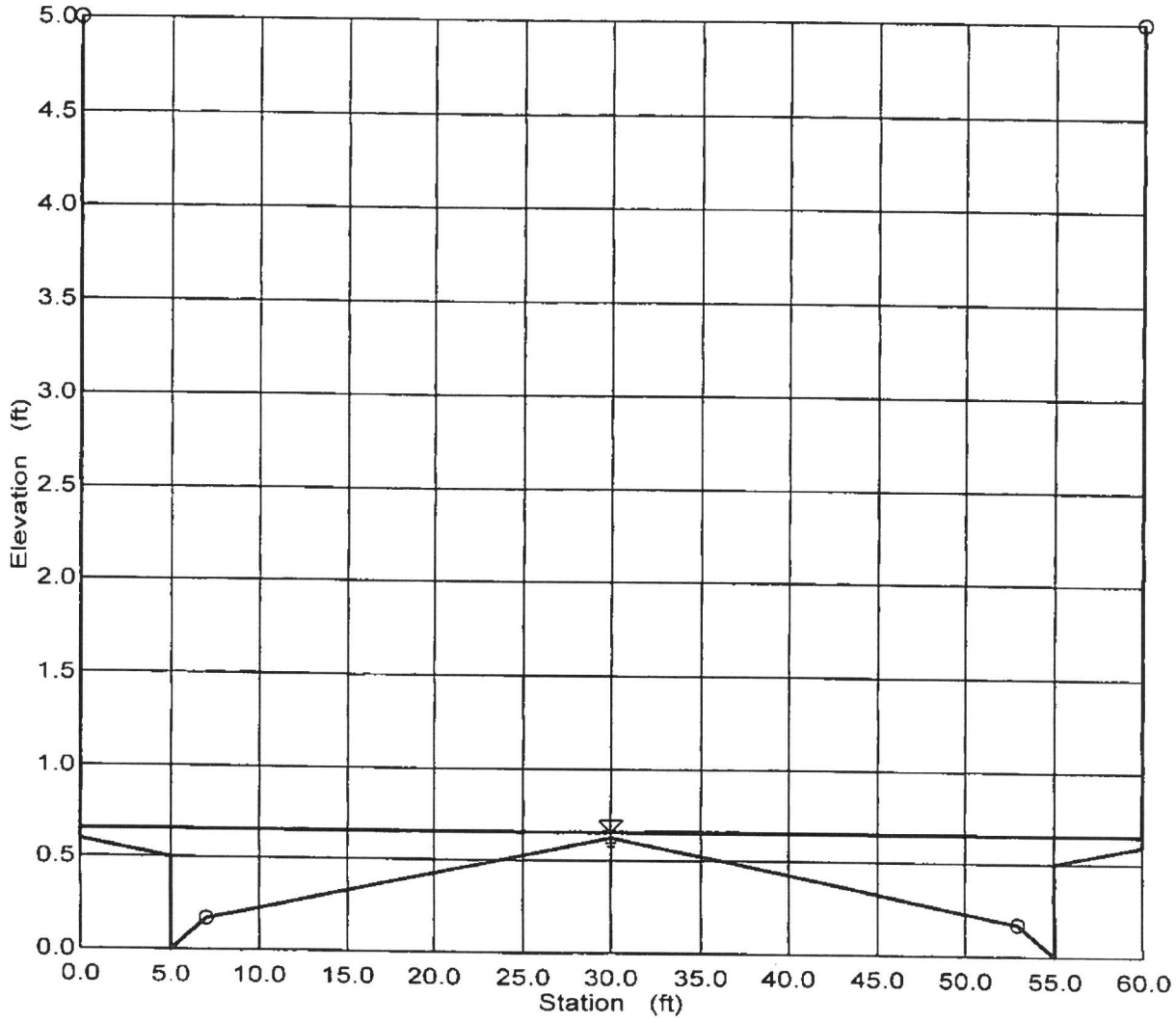
Discharge	35.00 ft³/s

Results		
Wtd. Mannings Coefficient	0.016	
Water Surface Elevation	0.66	ft
Flow Area	15.10	ft²
Wetted Perimeter	61.14	ft
Top Width	60.00	ft
Depth	0.66	ft
Critical Water Elev.	0.62	ft
Critical Slope	0.006290	ft/ft
Velocity	2.32	ft/s
Velocity Head	0.08	ft
Specific Energy	0.74	ft
Froude Number	0.81	
Full Flow Capacity	4132.98	ft³/s
Flow is subcritical.		

Box Canyon Drive 10-yr Location B
Cross Section for Irregular Channel

Project Description	
Project File	j:\01120-d\velcalcs.fm2
Worksheet	Box Canyon Drive
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.016	
Channel Slope	0.40	%
Water Surface Elevation	0.66	ft
Discharge	35.00	ft³/s



Box Canyon Drive 100-yr Location B
Worksheet for Irregular Channel

Project Description	
Project File	j:\01120-d\velcalcs.fm2
Worksheet	Box Canyon Drive
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data	
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Elevation range: 0.00 ft to 5.00 ft.	

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	5.00	0.00	7.00	0.013
0.00	0.60	7.00	53.00	0.017
5.00	0.50	53.00	60.00	0.013
5.00	0.00			
7.00	0.17			
30.00	0.63			
53.00	0.17			
55.00	0.00			
55.00	0.50			
60.00	0.60			
60.00	5.00			

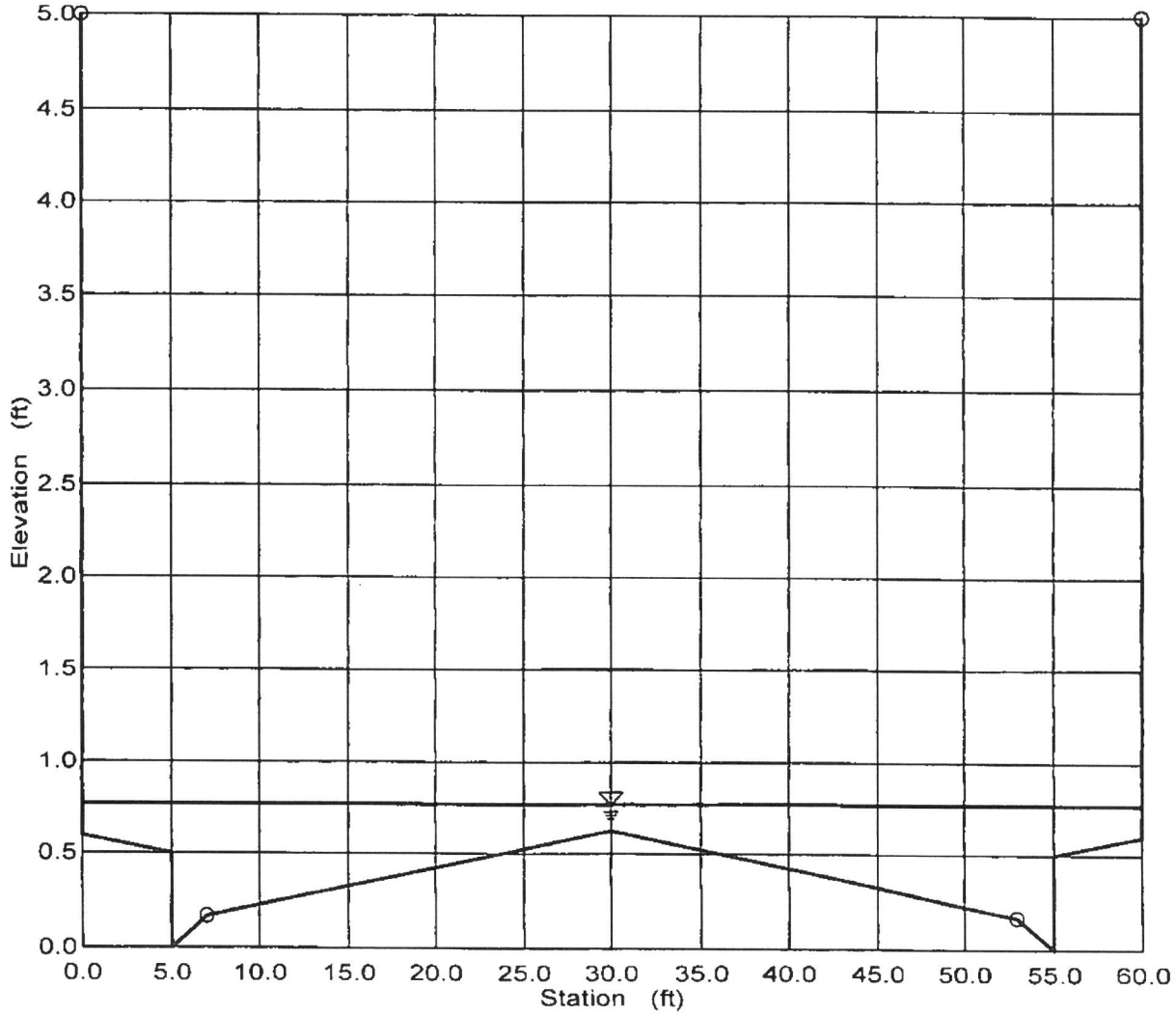
Discharge	65.00 ft³/s

Results		
Wtd. Mannings Coefficient	0.016	
Water Surface Elevation	0.77	ft
Flow Area	21.91	ft²
Wetted Perimeter	61.36	ft
Top Width	60.00	ft
Depth	0.77	ft
Critical Water Elev.	0.74	ft
Critical Slope	0.005507	ft/ft
Velocity	2.97	ft/s
Velocity Head	0.14	ft
Specific Energy	0.91	ft
Froude Number	0.87	
Full Flow Capacity	4132.98	ft³/s
Flow is subcritical.		

Box Canyon Drive 100-yr Location B
Cross Section for Irregular Channel

Project Description	
Project File	j:\01120-d\velcalcs.fm2
Worksheet	Box Canyon Drive
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.016	
Channel Slope	0.40	%
Water Surface Elevation	0.77	ft
Discharge	65.00	ft^3/s



for the site, and some slight grading changes that were necessary due to the changes in the plot size and plan.

PROPOSED CONDITIONS			
BASIN	Acres	10-Year	100-Year
PRON-1	3.10	5 CFS	9 CFS
PRON-2	0.59	1 CFS	2 CFS
EXOFF-2	4.50	7 CFS	15 CFS
EAST-EX	5.4±	1 CFS	3 CFS
Total @ C-2	13.59±	14 CFS	29 CFS

XI. STREET FLOW CALCULATIONS

Street flows within Box Canyon Drive were determined by referencing the approved Technical Drainage Study Update for Summerlin Clinic Sierra Health Services Phase II, prepared by Martin & Martin dated November 19, 1993. Although other studies determined flows in Tenaya Way and Box Canyon Drive, this was the most conservative estimate. The study determined that 36.8 CFS from Tenaya Way is diverted onto Box Canyon Way; these flows combine with off-site Basin EXOFF-2 for a total of 52 CFS at Location A. Flows from Location A combine with Basins PRON-1, PRON-2, and EAST-EX for a total of 69 CFS at Location B. A summary table is provided below.

STREET CALCULATIONS

PROPOSED CONDITIONS						
Street	Flow (CFS)	Depth (feet)	Vel. (feet/sec)	V * D	R.O.W.	Dry Lane
Box Canyon Drive (10-year) Location A	29 CFS	0.60	2.44	1.46	60 feet	N/A
Box Canyon Drive (100-year) Location A	53 CFS	0.69	3.04	2.10	60 feet	N/A
Box Canyon Drive (10-year) Location B	35 CFS	0.66	2.32	1.53	60 feet	N/A
Box Canyon Drive (100-year) Location B	65 CFS	0.77	2.97	2.29	60 feet	N/A

Box Canyon Drive 100-yr Location B
Worksheet for Irregular Channel

Project Description	
Project File	j:\01120-d\velcalcs.fm2
Worksheet	Box Canyon Drive
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data	
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0.00	5.00	0.00	7.00	0.013
0.00	0.60	7.00	53.00	0.017
5.00	0.50	53.00	60.00	0.013
5.00	0.00			
7.00	0.17			
30.00	0.63			
53.00	0.17			
55.00	0.00			
55.00	0.50			
60.00	0.60			
60.00	5.00			

Discharge	65.00 ft³/s

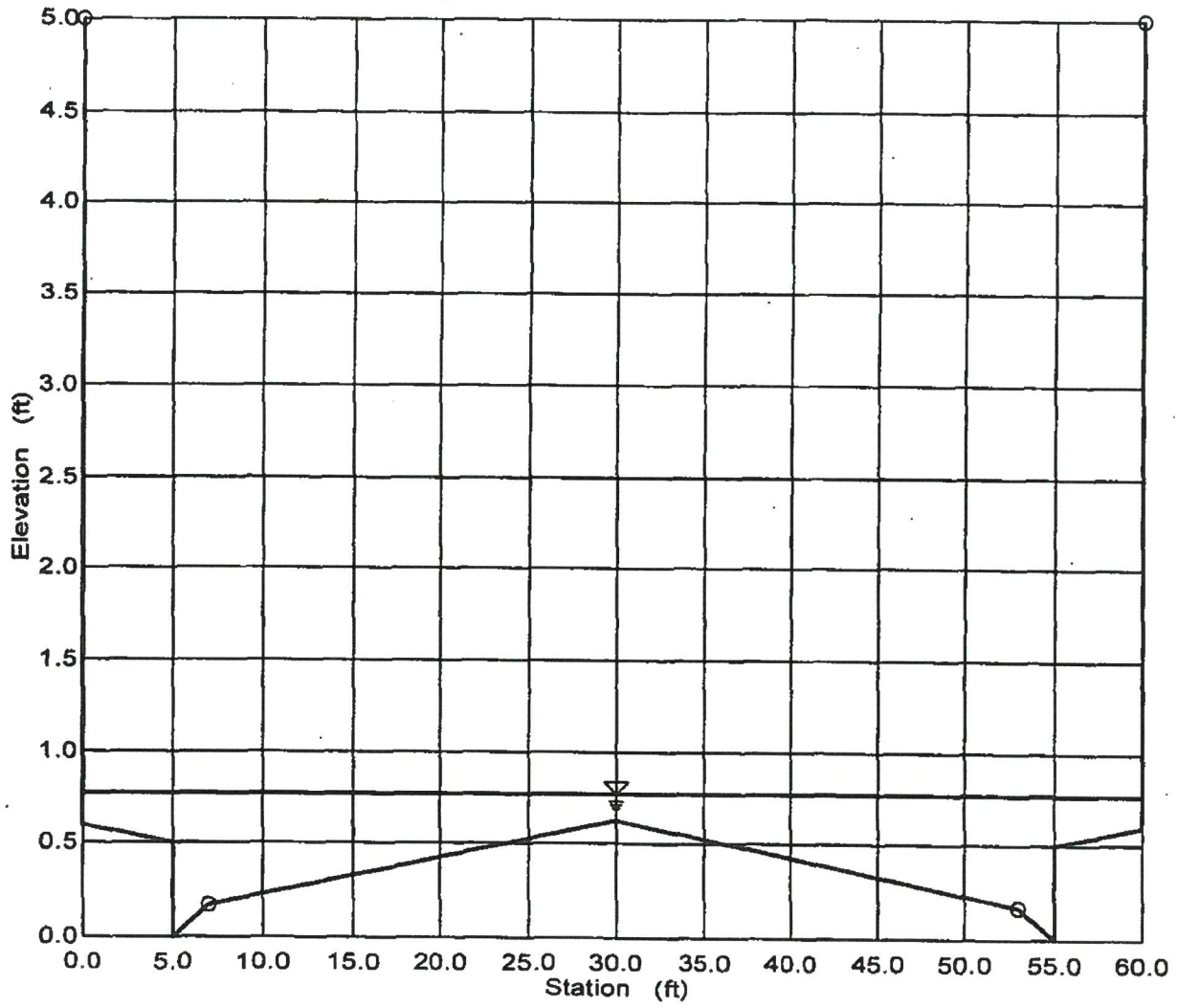
Results		
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Water Surface Elevation	0.77	ft
Flow Area	21.91	ft²
Wetted Perimeter	61.36	ft
Top Width	60.00	ft
Depth	0.77	ft
Critical Water Elev.	0.74	ft
Critical Slope	0.005507	ft/ft
Velocity	2.97	ft/s
Velocity Head	0.14	ft
Specific Energy	0.91	ft
Froude Number	0.87	
Full Flow Capacity	4132.98	ft³/s

Flow is subcritical.

Box Canyon Drive 100-yr Location B
Cross Section for Irregular Channel

Project Description	
Project File	j:\01120-d\velcalcs.fm2
Worksheet	Box Canyon Drive
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.016	
Channel Slope	0.40	%
Water Surface Elevation	0.77	ft
Discharge	65.00	ft^3/s



Box Canyon Drive 10-yr Location B
Worksheet for Irregular Channel

Project Description	
Project File	j:\01120-d\velcalcs.fm2
Worksheet	Box Canyon Drive
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data	
Channel Slope	0.40 %

Elevation range: 0.00 ft to 5.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	5.00	0.00	7.00	0.013
0.00	0.60	7.00	53.00	0.017
5.00	0.50	53.00	60.00	0.013
5.00	0.00			
7.00	0.17			
30.00	0.63			
53.00	0.17			
55.00	0.00			
55.00	0.50			
60.00	0.60			
60.00	5.00			

Discharge 35.00 ft³/s



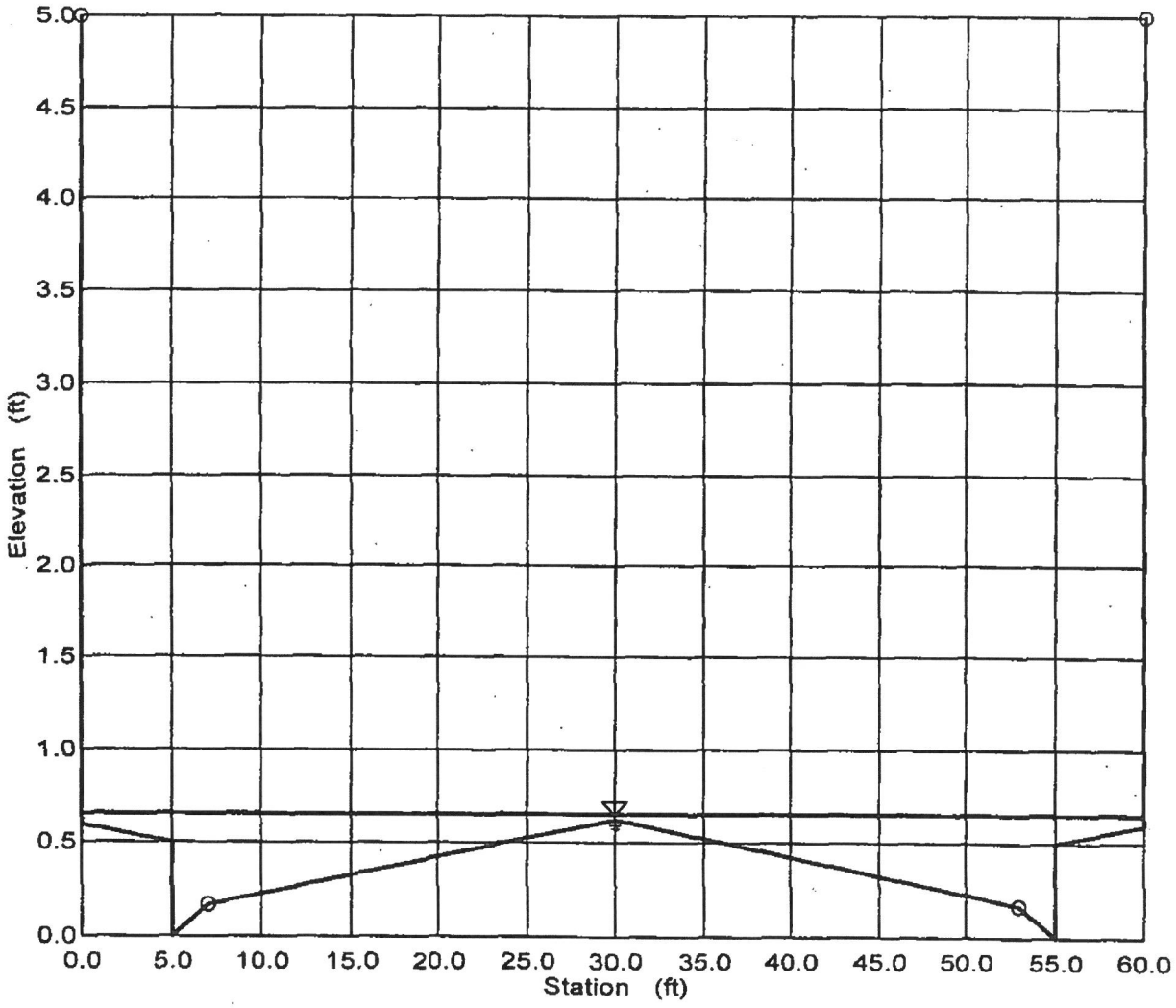
Results		
Wtd. Mannings Coefficient	0.016	
Water Surface Elevation	0.66	ft
Flow Area	15.10	ft²
Wetted Perimeter	61.14	ft
Top Width	60.00	ft
Depth	0.66	ft
Critical Water Elev.	0.62	ft
Critical Slope	0.006290	ft/ft
Velocity	2.32	ft/s
Velocity Head	0.08	ft
Specific Energy	0.74	ft
Froude Number	0.81	
Full Flow Capacity	4132.98	ft³/s

Flow is subcritical.

Box Canyon Drive 10-yr Location B
Cross Section for Irregular Channel

Project Description	
Project File	j:\01120-d\velcalcs.fm2
Worksheet	Box Canyon Drive
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data	
Wtd. Mannings Coefficient	0.016
Channel Slope	0.40 %
Water Surface Elevation	0.66 ft
Discharge	35.00 ft^3/s



OFFICE 4
7,750 SF
FF=2346.64

OFFICE 2
10,316 SF
FF=2346.07

FF=2345.20
OFFICE 1
5,507 SF

OFFICE 10
4,168 SF
FF=2344.70

OFFICE 5
6,585 SF
FF=2344.49

10' PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED

26' PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED

26' PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED

HAND-RAIL

BOX CANYON DRIVE (PUBLIC)

STA 14+07.13
BEGIN PROJECT CONSTR
TC=(43.61)

STA 14+56.56
PC
TC=(43.31)

STA 15+64.43
BEGIN BCR (MATCH EXIST)
& VALLEY GUTTER
TC=(42.97)

STA 15+93.05
ECR
TC=(43.32)

STA 16+52.16
BEGIN BCR (MATCH EXIST)
TC=42.83

STA 16+58.93
ECR (MATCH EXIST)
& VALLEY GUTTER
TC=(42.48)

STA 17+06.39
TC=(42.26)

STA 18+50.83
END CONSTRUCTION
TC=(41.35)

SITE LOCATION

2344
2343
2342
2341

BENCHMARK

CITY OF LAS VEGAS BENCHMARK NUMBER OLV00 1554 (5) BEING A RIVET AND PLATE IN TOP OF CURB, NORTHEAST RETURN OF SMOKE RANCH ROAD AND TENAYA WAY.

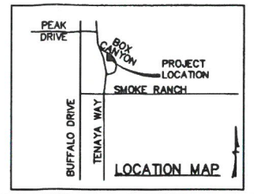
ELEVATION (NAVD88) = 721.3739 METERS = 2366.707 FEET

BASIS OF BEARING

BEING THE SOUTH LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 15, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., BEING THE CENTERLINE OF SMOKE RANCH ROAD, BEARS SOUTH 89°39'29" EAST AS SHOWN ON THE PLAT OF LAS VEGAS TECHNOLOGY CENTER, BOOK 38 PAGE 91 OF PLATS, OFFICIAL RECORDS OF CLARK COUNTY, NEVADA.

GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.



LEGEND

- DETAIL/SECTION IDENTIFICATION LETTER OR NUMBER
- SHEET DETAIL IS SHOWN
- EXISTING MANHOLE
- EXISTING WATER VALVE
- EXISTING FIRE HYDRANT
- EXISTING SIGN
- EXISTING POWER POLE
- W — EXISTING WATER LINE
- G — EXISTING GAS LINE
- E — EXISTING ELECTRICAL LINE
- SS — EXISTING SANITARY SEWER LINE
- SD — EXISTING STORM DRAIN LINE
- T — EXISTING TELEPHONE LINE
- XX — EXISTING CONTOUR
- X — X — EXISTING CHAIN-LINK FENCE
- EXISTING ELEVATION
- EXISTING EDGE OF PAVEMENT
- EXISTING STREET LIGHT
- PROPOSED MANHOLE
- PROPOSED FIRE HYDRANT
- PROPOSED SIGN
- PROPOSED STREET LIGHT
- W — PROPOSED WATER LINE
- SS — PROPOSED SANITARY SEWER LINE
- SD — PROPOSED STORM DRAIN LINE
- 45.67 TC — NEW ELEVATION
- R/W — RIGHT OF WAY LINE
- CENTERLINE
- PROPERTY LINE
- FLOW LINE
- STLT — PROPOSED STREET LIGHT CONDUIT
- PROPOSED WALL
- GB — GRADE BREAK
- SIGHT VISIBILITY RESTRICTION ZONE
- PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED

CONTRUCTION NOTES

1. CONSTRUCT "L" TYPE CURB AND GUTTER
2. CONSTRUCT "A" TYPE CURB.
3. CONSTRUCT 2' V.G. PER. DETAIL 2 ON SHEET C5.01
4. CONSTRUCT 8' V.G. PER STD. DWG. No. 228
5. CONSTRUCT SIDEWALK PER STD. DWG. No. 234
6. CONSTRUCT HANDICAP RAMP PER STD. DWG. No. 235 CASE I
7. CONSTRUCT 4' SIDEWALK UNDERDRAIN PER DETAIL 1 ON SHEET C5.01
8. CONSTRUCT 12" PVC CULVERT & SIDEWALK SEE DETAIL 6 SHEET C5.01
9. CONSTRUCT TRASH ENCLOSURE PER ARCHITECTURAL PLANS
10. REFER TO ARCHITECTURAL PLANS FOR SIDEWALK LOCATION
11. SIGHT VISIBILITY RESTRICTION EASEMENT
12. CONSTRUCT 5' U-CHANNEL PER DETAIL 10 ON SHEET C5.01
13. CONSTRUCT 2' VALLEY GUTTER PER DETAIL 3 ON SHEET C5.01
14. CONSTRUCT 2' SIDEWALK UNDERDRAIN PER STD. DWG. No. 236

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE WITH THE CITY OF LAS VEGAS FOR THIS PROJECT.

KRISTINA L. SWALLOW NO. 13714 — DATE 10/16/02

KRISTINA L SWALLOW — No 13714 — CIVIL — Exp 6-30-04 — 10/16/02

Call before you Dig. 1-800-227-2600

1-702-593-8111 WHEN POWER IS INTERRUPT...A SAFETY SERVICES DEPARTMENT

REV	DATE	BY	REVISION

HY-RAY LLC
4310 LOSEE ROAD #1A
LAS VEGAS, NEVADA 89030
(702) 633-4994

POGGEMEYER DESIGN GROUP
ENGINEERS PLANNERS SURVEYORS
LANDSCAPE ARCHITECTS
2901 NORTH TENAYA WAY LAS VEGAS, NEVADA 89128 (702) 255-8100

SHEET: GRADING PLAN
TITLE: BOX CANYON PROFESSIONAL PARK

DRAWN BY:	BCF, SMK — 06.25.02
DESIGNED BY:	CDK — 06.25.02
CHECKED BY:	KLS — 06.25.02
PROJECT NO.	01120
SCALE:	

SEAL: REGISTERED PROFESSIONAL ENGINEER OF NEVADA — KRISTINA L SWALLOW — No 13714 — CIVIL — 10/16/02

SHEET C3.01
5 OF 7 SHEETS
DRAWING NO. 107-V3635

45774

EX. BUILDING 2
10,316 SF
FF=(46.07)

EX. BUILDING 5
6,585 SF
FF=(44.49)

TC=41.40

APN: 138-15-710-032
OWNER: PHASE ONE PROPERTIES LLC

APN: 138-15-810-018
OWNER: HGJSLLC

EX. BUILDING 4
7,750 SF
FF=(46.64)

BUILDING 6
9,200 SF
FF=2343.35
PAD=2342.52

BOX CANYON DRIVE (60' PUBLIC ROW)

APN: 138-15-810-012
OWNER: SIERRA HEALTH SERVICES INC

SITE PROPERTY

BUILDING 7
9,200 SF
FF=2346.75
PAD=2345.92

10' PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED

doc?

TC=40.25

BUILDING 8
9,200 SF
FF=2342.78
PAD=2341.95

APN: 138-15-810-036
OWNER: CITY OF LAS VEGAS

(2340)

STA 23+08.01
END OF PROJECT

EX. UTILITY ADJUST TO FINISH GRADE

EX. 20' DRAINAGE & SEWER EASEMENT PER BOOK 900904 00742

15' PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED

APN: 138-15-810-014
OWNER: CATHEDRAL ROCK MEDICAL CTR LLC

Show the proposed location of the building

EX. BUILDING
FF=(2345.60)

Checked with Tim P.
There is no sewer line running in the existing easement.

CONSTRUCTION NOTES:

1. CONSTRUCT "G" TYPE CURB & GUTTER PER CCAUSD #218
2. CONSTRUCT ONSITE "A" CURB PER DETAIL ON SHEET DTI
3. INSTALL 3" AC PAVEMENT OVER 4" TYPE II AGG. BASE
4. INSTALL 2" AC PAVEMENT OVER 4" TYPE II AGG. BASE
5. INSTALL CONCRETE SIDEWALK PER CCAUSD #234
6. INSTALL COMMERCIAL DRIVEWAY AND CROSS GUTTER PER CCAUSD #222A & 228
7. INSTALL 2' CONCRETE VALLEY GUTTER PER DETAIL ON SHEET DTI
8. INSTALL 3' CONCRETE VALLEY GUTTER PER DETAIL ON SHEET DTI
9. CONSTRUCT SIDEWALK RAMP USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER CCAUSD DWG 235, CASE 1
10. INSTALL 2' UNDER SIDEWALK DRAIN PER CCAUSD #236
11. INSTALL 3' WIDE FLUME PER DETAIL ON SHEET DTI
12. INSTALL 4' WIDE FLUME PER DETAIL ON SHEET DTI
13. INSTALL TRASH ENCLOSURE PER ARCHITECTURAL PLANS
14. INSTALL RIP-RAP PAD, D50=6" THK=12"
15. SEE DETAIL ON SHEET DTI FOR MORE INFORMATION
16. INSTALL CONCRETE BUMPER BLOCKS PER CCAUSD #238
17. CONSTRUCT 4' SIDEWALK PER CCAUSD #234

DRAINAGE STUDY COMPLIANCE

I, JEREMY S. MCCAY, HEREBY CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY ON FILE WITH THE CITY OF LAS VEGAS.
DS3806

JEREMY S. MCCAY
NEVADA PE NO. 15797

11/19/05
DATE

GEOTECHNICAL:

GEOTECHNICAL EVALUATION PREPARED BY TERRACON DATED AUGUST 27, 2002, WORK ORDER UPDATE No. E4015139.

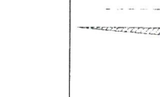
NOTE:
ALL HANDICAP ACCESS ROUTES ARE AT A MAXIMUM OF 5% DOWNSLOPE AND 2% CROSS SLOPE & 2% IN DIRECTION CHANGE.

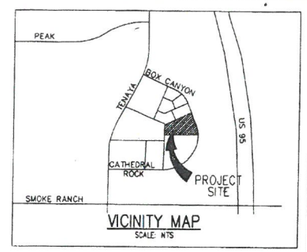
DISCLAIMER NOTE

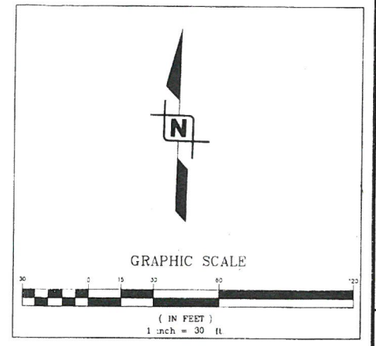
EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDER- GROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION. ALL DISCREPANCIES MUST BE IMMEDIATELY REPORTED TO THE ENGINEER.
CALL BEFORE YOU DIG: 1-800-227-2600

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

AVOID DAMAGED POWER LINE CONTACTS. IT'S COSTLY.
Call before you OVERHEAD
1-702-593-6111
NEVADA POWER COMPANY AND SIERRA PACIFIC POWER COMPANY







LEGEND

- RIGHT-OF-WAY/PROPERTY LINE
- STREET CENTER LINE
- EXISTING BUILDING
- PROPOSED BUILDING
- EXISTING CURB & GUTTER
- PROPOSED CURB & GUTTER
- EXISTING EDGE OF A.C. PAVEMENT
- SIGHT VISIBILITY ZONE NOTE: NOTHING OVER 24" IN HEIGHT ALLOWED IN SVZ EXCEPT TRAFFIC COURSE DEVICES
- EXISTING CMU WALL
- PROPOSED SIDEWALK/CONCRETE
- 2631 EXISTING 1' CONTOUR
- 2630 EXISTING 5' CONTOUR
- SECTION / DETAIL SYMBOL
- HC ACCESS ROUTE
- GRADE BREAK
- 4.60% SLOPE & DIRECTION OF SLOPE
- 67.62 PROPOSED ELEVATION
- (67.62) EXISTING ELEVATION

JEREMY S McCAY
EXP 12-31-07
CIVIL
No. 15797
PROFESSIONAL ENGINEER, STATE OF NEVADA
7/6/06

BASIS OF BEARING

N 28°32'00" E
BEING THE CENTERLINE OF TENAYA WAY, AS SHOWN ON THAT CERTAIN PLAT MAP RECORDED AS BOOK 47, PAGE 25, CLARK COUNTY OFFICIAL RECORDS

LEGAL DESCRIPTION

SITUATED WITHIN THE NORTHWEST QUARTER (NW 1/4) OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 15, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M.

Call 11/27/07 any Deviation

BENCHMARK

LAS VEGAS BENCHMARK ALMER OLYDD..1556 (S), BEING A RIVET AND PLATE IN TOP OF CURB, NORTHEAST RETURN OF SMOKE RANCH ROAD AND TENAYA WAY.

ELEVATION (NAVD88) = 721.3739 METERS = 2366.707 FEET

Page 3

WRIGHT ENGINEERS
7425 PEAK DRIVE
LAS VEGAS, NEVADA 89128
TEL (702) 933-7000
FAX (702) 933-7001
CIVIL STRUCTURAL MEP SURVEYING

REV	DATE	BY	REVISION

BOX CANYON PROFESSIONAL PARK PHASE II, LLC

BOX CANYON PROFESSIONAL PARK PHASE II

GRADING PLAN

DRAWN BY: BSL — DATE: 04/12/05
DESIGNED BY: ALK — DATE: 04/12/05
CHECKED BY: JSM — DATE: 04/12/05
SCALE: 1"=30'
PROJECT NO. CP25116

PROFESSIONAL ENGINEER, STATE OF NEVADA
JEREMY S McCAY
Exp 12/31/05
No. 15797
CIVIL

SHEET
GP1
5 OF 7 SHEETS
DRAWING NO.
107V3635-2

APPENDIX D

Improvement Plan for US 95, Project No. NH -095-2(051)

The improvement plan is used to support the location and the size of existing storm drain facilities in US 95 to set the boundary of basin ST1.

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NH-095-2(051)	CLARK	D8

NOTE: DEPICTED UTILITY LOCATIONS ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.

① "PF" 694+53 to "PF" 721+00 *REGRADE ROADSIDE DITCH ADJACENT TO NEW RETAINING WALL, LT (SEE SHEET DD10).

② "PF" 694+60 CONSTRUCT TYPE 2 DROP INLET, 85.5' LT (GRATE ELEV. = 2336.34', H = 1.92', A = 1.63'), WITH 8" X 14' TRENCH DRAIN BACK ON LINE (H1 = 4", H2 = 8"). INSTALL 12" X 2' RCP (UIE = 2334.42', LIE = 2334.41') THROUGH WALL (SEE SHEET DD2, DD9).

③ "PF" 696+25 CONSTRUCT TYPE 2 DROP INLET, 85.5' LT (GRATE ELEV. = 2335.45', H = 1.92', A = 1.63'), WITH 8" X 14' TRENCH DRAIN BACK ON LINE (H1 = 4", H2 = 8"). INSTALL 12" X 2' RCP (UIE = 2333.53', LIE = 2333.52') THROUGH WALL. CONSTRUCT 3' X 3' CLASS 150 RIPRAP PAD WITH BEDDING AT OUTLET (SEE SHEET DD2, DD9).

④ "PF" 697+75 CONSTRUCT TYPE 2 DROP INLET, 85.5' LT (GRATE ELEV. = 2334.67', H = 1.92', A = 1.63'), WITH 8" X 13' TRENCH DRAIN BACK ON LINE (H1 = 4", H2 = 8"). INSTALL 12" X 2' RCP (UIE = 2332.75', LIE = 2332.74') THROUGH WALL. CONSTRUCT 3' X 3' CLASS 150 RIPRAP PAD WITH BEDDING AT OUTLET (SEE SHEET DD2, DD9).

⑤ "PF" 699+25 CONSTRUCT TYPE 2 DROP INLET, 85.5' LT (GRATE ELEV. = 2334.28', H = 1.92', A = 1.63'), WITH 8" X 13' TRENCH DRAIN BACK ON LINE (H1 = 4", H2 = 8"). INSTALL 12" X 2' RCP (UIE = 2332.36', LIE = 2332.35') THROUGH WALL. CONSTRUCT 3' X 3' CLASS 150 RIPRAP PAD WITH BEDDING AT OUTLET (SEE SHEET DD2, DD9).

⑥ "PF" 700+75 CONSTRUCT TYPE 2 DROP INLET, 85.5' LT (GRATE ELEV. = 2333.64', H = 1.92', A = 1.63'), WITH 8" X 13' TRENCH DRAIN BACK ON LINE (H1 = 4", H2 = 8"). INSTALL 12" X 2' RCP (UIE = 2331.72', LIE = 2331.71') THROUGH WALL. ~~CONSTRUCT 3' X 3' CLASS 150 RIPRAP PAD WITH BEDDING AT OUTLET~~ (SEE SHEET DD2, DD9). ~~RIP RAP PAD~~

⑦ "PF" 701+01 EXISTING DOUBLE 24" X 195' RCP. REMOVE END SECTIONS LT. EXTEND 3.0' LT WITH 30" X 19" OVAL RCP (HE) THROUGH WALL. CONSTRUCT SUMP WITH CONCRETE APRON AT INLET. "PF" 701+06, 89.0' LT (SEE SHEET DD5, DD7).

⑧ "PF" 702+25 CONSTRUCT TYPE 2 DROP INLET, 85.5' LT (GRATE ELEV. = 2333.09', H = 1.92', A = 1.63'), WITH 8" X 13' TRENCH DRAIN BACK ON LINE (H1 = 4", H2 = 8"). INSTALL 12" X 2' RCP (UIE = 2331.17', LIE = 2331.16') THROUGH WALL. CONSTRUCT 3' X 3' CLASS 150 RIPRAP PAD WITH BEDDING AT OUTLET (SEE SHEET DD2, DD9).

⑨ "PF" 703+75 CONSTRUCT TYPE 2 DROP INLET, 85.5' LT (GRATE ELEV. = 2332.62', H = 1.92', A = 1.63'), WITH 8" X 13' TRENCH DRAIN BACK ON LINE (H1 = 4", H2 = 8"). INSTALL 12" X 2' RCP (UIE = 2330.70', LIE = 2330.69') THROUGH WALL. ~~CONSTRUCT 3' X 3' CLASS 150 RIPRAP PAD WITH BEDDING AT OUTLET~~ (SEE SHEET DD2, DD9). ~~RIP RAP PAD~~

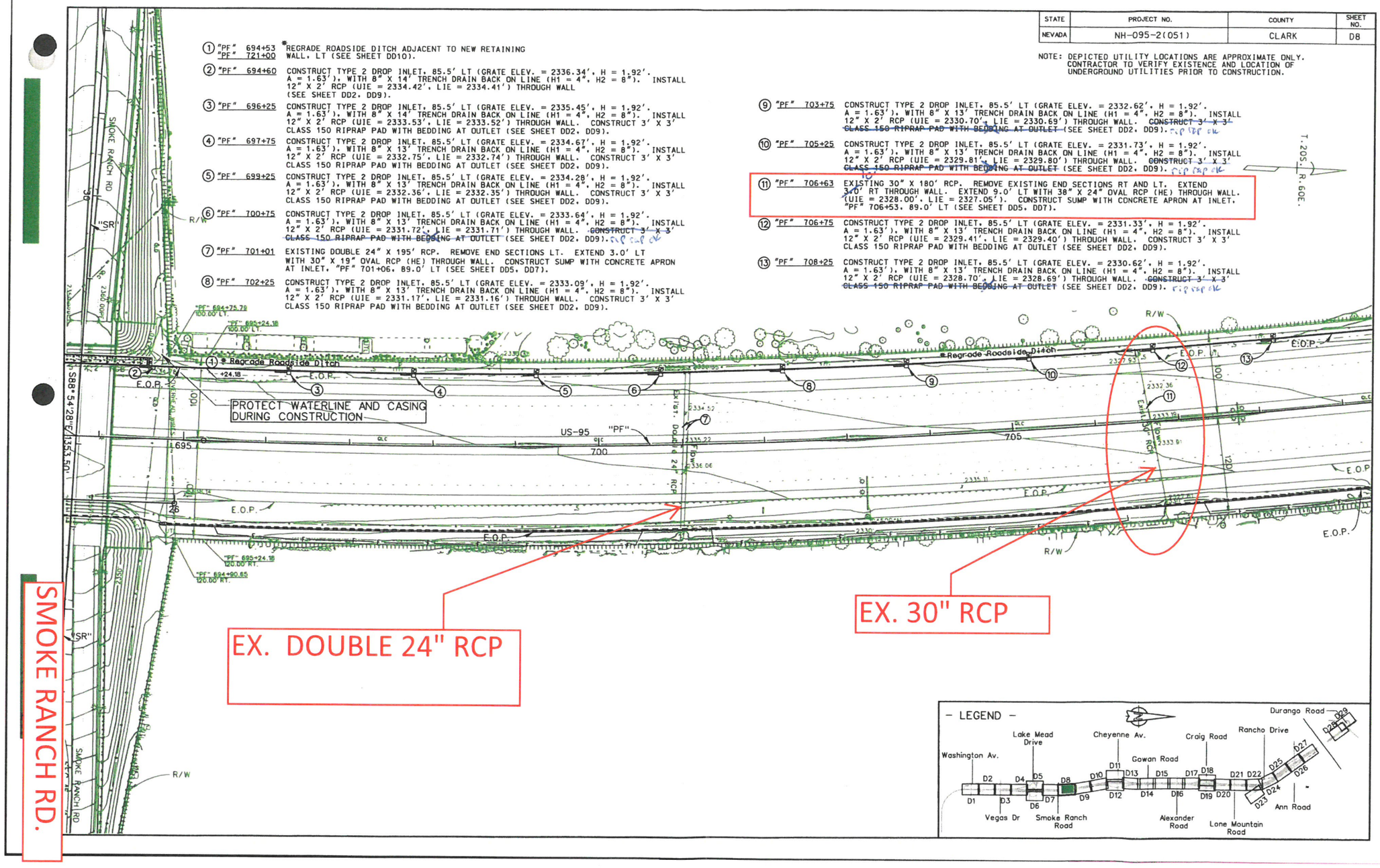
⑩ "PF" 705+25 CONSTRUCT TYPE 2 DROP INLET, 85.5' LT (GRATE ELEV. = 2331.73', H = 1.92', A = 1.63'), WITH 8" X 13' TRENCH DRAIN BACK ON LINE (H1 = 4", H2 = 8"). INSTALL 12" X 2' RCP (UIE = 2329.81', LIE = 2329.80') THROUGH WALL. ~~CONSTRUCT 3' X 3' CLASS 150 RIPRAP PAD WITH BEDDING AT OUTLET~~ (SEE SHEET DD2, DD9). ~~RIP RAP PAD~~

⑪ "PF" 706+63 EXISTING 30" X 180' RCP. REMOVE EXISTING END SECTIONS RT AND LT. EXTEND 3.0' RT THROUGH WALL. EXTEND 9.0' LT WITH 38" X 24" OVAL RCP (HE) THROUGH WALL. (UIE = 2328.00', LIE = 2327.05'). CONSTRUCT SUMP WITH CONCRETE APRON AT INLET. "PF" 706+53, 89.0' LT (SEE SHEET DD5, DD7).

⑫ "PF" 706+75 CONSTRUCT TYPE 2 DROP INLET, 85.5' LT (GRATE ELEV. = 2331.33', H = 1.92', A = 1.63'), WITH 8" X 13' TRENCH DRAIN BACK ON LINE (H1 = 4", H2 = 8"). INSTALL 12" X 2' RCP (UIE = 2329.41', LIE = 2329.40') THROUGH WALL. CONSTRUCT 3' X 3' CLASS 150 RIPRAP PAD WITH BEDDING AT OUTLET (SEE SHEET DD2, DD9).

⑬ "PF" 708+25 CONSTRUCT TYPE 2 DROP INLET, 85.5' LT (GRATE ELEV. = 2330.62', H = 1.92', A = 1.63'), WITH 8" X 13' TRENCH DRAIN BACK ON LINE (H1 = 4", H2 = 8"). INSTALL 12" X 2' RCP (UIE = 2328.70', LIE = 2328.69') THROUGH WALL. ~~CONSTRUCT 3' X 3' CLASS 150 RIPRAP PAD WITH BEDDING AT OUTLET~~ (SEE SHEET DD2, DD9). ~~RIP RAP PAD~~

T.20S., R.60E.



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STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NH-095-2(051)	CLARK	D9

NOTE: DEPICTED UTILITY LOCATIONS ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.

① "PF" 709+75 CONSTRUCT TYPE 2 DROP INLET, 85.5' LT (GRATE ELEV. = 2330.04', H = 1.92', A = 1.63'), WITH 8" X 13' TRENCH DRAIN BACK ON LINE (H1 = 4", H2 = 8"). INSTALL 12" X 2' RCP (UIE = 2328.12', LIE = 2328.11') THROUGH WALL. ~~CONSTRUCT 3' X 3'~~ CLASS 150 RIPRAP PAD ~~WITH BEDDING~~ AT OUTLET (SEE SHEET DD2, DD9).

② "PF" 711+25 CONSTRUCT TYPE 2 DROP INLET, 85.5' LT (GRATE ELEV. = 2329.69', H = 1.92', A = 1.63'), WITH 8" X 13' TRENCH DRAIN BACK ON LINE (H1 = 4", H2 = 8"). INSTALL 12" X 2' RCP (UIE = 2327.77', LIE = 2327.76') THROUGH WALL. ~~CONSTRUCT 3' X 3'~~ CLASS 150 RIPRAP PAD ~~WITH BEDDING~~ AT OUTLET (SEE SHEET DD2, DD9).

③ "PF" 712+75 CONSTRUCT TYPE 2 DROP INLET, 85.5' LT (GRATE ELEV. = 2329.25', H = 1.92', A = 1.63'), WITH 8" X 13' TRENCH DRAIN BACK ON LINE (H1 = 4", H2 = 8"). INSTALL 12" X 2' RCP (UIE = 2327.33', LIE = 2327.32') THROUGH WALL. CONSTRUCT 3' X 3' CLASS 150 RIPRAP PAD ~~WITH BEDDING~~ AT OUTLET (SEE SHEET DD2, DD9).

④ "PF" 714+25 CONSTRUCT TYPE 2 DROP INLET, 85.5' LT (GRATE ELEV. = 2329.08', H = 1.92', A = 1.63'), WITH 8" X 13' TRENCH DRAIN BACK ON LINE (H1 = 4", H2 = 8"). INSTALL 12" X 2' RCP (UIE = 2327.16', LIE = 2327.15') THROUGH WALL. CONSTRUCT 3' X 3' CLASS 150 RIPRAP PAD ~~WITH BEDDING~~ AT OUTLET (SEE SHEET DD2, DD9).

⑤ "PF" 715+75 CONSTRUCT TYPE 2 DROP INLET, 85.5' LT (GRATE ELEV. = 2328.50', H = 1.92', A = 1.63'), WITH 8" X 13' TRENCH DRAIN BACK ON LINE (H1 = 4", H2 = 8"). INSTALL 12" X 2' RCP (UIE = 2326.58', LIE = 2326.57') THROUGH WALL. CONSTRUCT 3' X 3' CLASS 150 RIPRAP PAD ~~WITH BEDDING~~ AT OUTLET (SEE SHEET DD2, DD9).

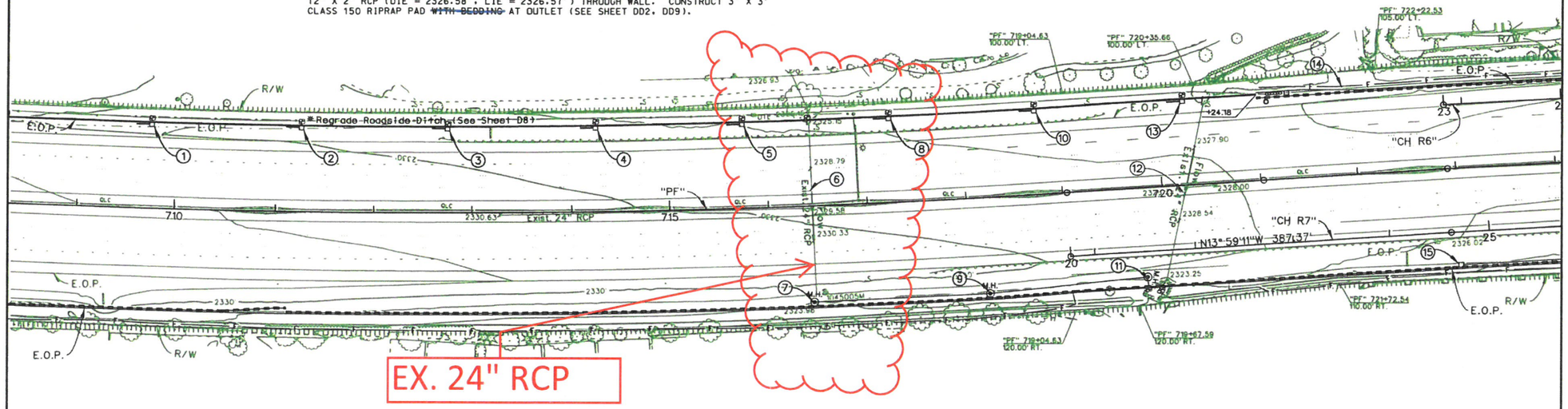
⑥ "PF" 716+43 EXISTING 24" X 184' RCP. REMOVE EXISTING END SECTIONS RT AND LT. REMOVE 4.0' OF EXISTING RCP, RT. CONNECT TO TYPE 1 MANHOLE, "PF" 716+44, 98.5' RT. EXTEND 5.0' LT WITH 30" X 19" OVAL RCP (HE) THROUGH WALL (UIE = 2324.39', LIE = 2323.53'). CONSTRUCT SUMP WITH CONCRETE APRON AT INLET, "PF" 716+42, 89.0' LT (SEE SHEET DP8, DD5, DD7).

⑦ "PF" 716+44 CONSTRUCT TYPE 1 ECCENTRIC MANHOLE, 98.5' RT (COVER ELEV. = 2331.83', H = 8.36'). INSTALL 24" X 178' RCP (UIE = 2323.47', LIE = 2323.11'). CONNECT TO TYPE 1 MANHOLE, "PF" 718+20, 98.5' RT (SEE SHEET DP8).

⑧ "PF" 717+25 CONSTRUCT TYPE 2 DROP INLET, 85.5' LT (GRATE ELEV. = 2327.74', H = 1.92', A = 1.63'), WITH 8" X 13' TRENCH DRAIN BACK ON LINE (H1 = 4", H2 = 8"). INSTALL 12" X 2' RCP (UIE = 2325.82', LIE = 2325.81') THROUGH WALL. CONSTRUCT 3' X 3' CLASS 150 RIPRAP PAD ~~WITH BEDDING~~ AT OUTLET (SEE SHEET DD2, DD9).

⑨ "PF" 718+20 CONSTRUCT TYPE 1 ECCENTRIC MANHOLE, 98.5' RT (COVER ELEV. = 2331.24', H = 8.14'). INSTALL 24" X 160' RCP (UIE = 2323.10', LIE = 2322.78'). CONNECT TO TYPE 1 MANHOLE, "PF" 719+80, 92.0' RT (SEE SHEET DP8).

T. 20S., R. 60E., SEC. 15



⑩ "PF" 718+75 CONSTRUCT TYPE 2 DROP INLET, 85.5' LT (GRATE ELEV. = 2327.35', H = 1.92', A = 1.63'), WITH 8" X 13' TRENCH DRAIN BACK ON LINE (H1 = 4", H2 = 8"). INSTALL 12" X 2' RCP (UIE = 2325.43', LIE = 2325.42') THROUGH WALL. CONSTRUCT 3' X 3' CLASS 150 RIPRAP PAD ~~WITH BEDDING~~ AT OUTLET (SEE SHEET DD2, DD9).

⑪ "PF" 719+80 CONSTRUCT TYPE 1 ECCENTRIC MANHOLE, 92.0' RT (COVER ELEV. = 2329.52', H = 6.75'). INSTALL 24" X 9' RCP (UIE = 2322.77', LIE = 2322.72'). THROUGH WALL. CONSTRUCT 3' X 3' CLASS 150 RIPRAP APRON AT OUTLET (SEE SHEET DP8).

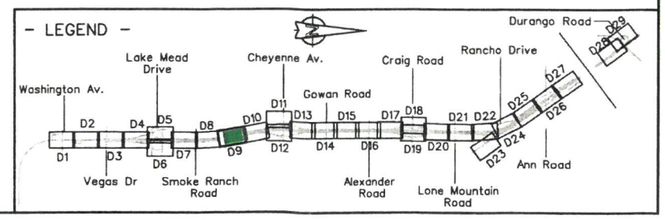
⑫ "PF" 720+22 EXISTING 24" X 186' RCP. REMOVE EXISTING END SECTIONS RT AND LT. EXTEND 5.0' RT THROUGH WALL AND 7.0' LT WITH 30" X 19" OVAL RCP (HE) THROUGH WALL (UIE = 2324.28', LIE = 2322.81'). CONSTRUCT CLASS 150 RIPRAP APRON AT OUTLET, RT (SEE SHEET DD5).

⑬ "PF" 720+25 CONSTRUCT TYPE 2 DROP INLET, 85.5' LT (GRATE ELEV. = 2327.34', H = 1.92', A = 1.63'), WITH 8" X 13' TRENCH DRAIN BACK ON LINE (H1 = 4", H2 = 8"). INSTALL 12" X 2' RCP (UIE = 2325.42', LIE = 2325.41') THROUGH WALL. CONSTRUCT 3' X 3' CLASS 150 RIPRAP PAD ~~WITH BEDDING~~ AT OUTLET (SEE SHEET DD2, DD9).

⑭ "PF" 721+00 "PF" 731+00 PLACE TYPE C DECORATIVE ROCK ON SLOPES, LT (SEE SHEET DD23).

⑮ "PF" 723+00 CONSTRUCT TYPE 2 DROP INLET, 98.8' RT (GRATE ELEV. = 2325.66', H = 3.21', A = 1.92'). INSTALL 18" X 198' RCP (UIE = 2322.45', LIE = 2321.80'). CONNECT TO DROP INLET, "PF" 725+00, 98.8' RT (SEE SHEET DP8).

- LEGEND -



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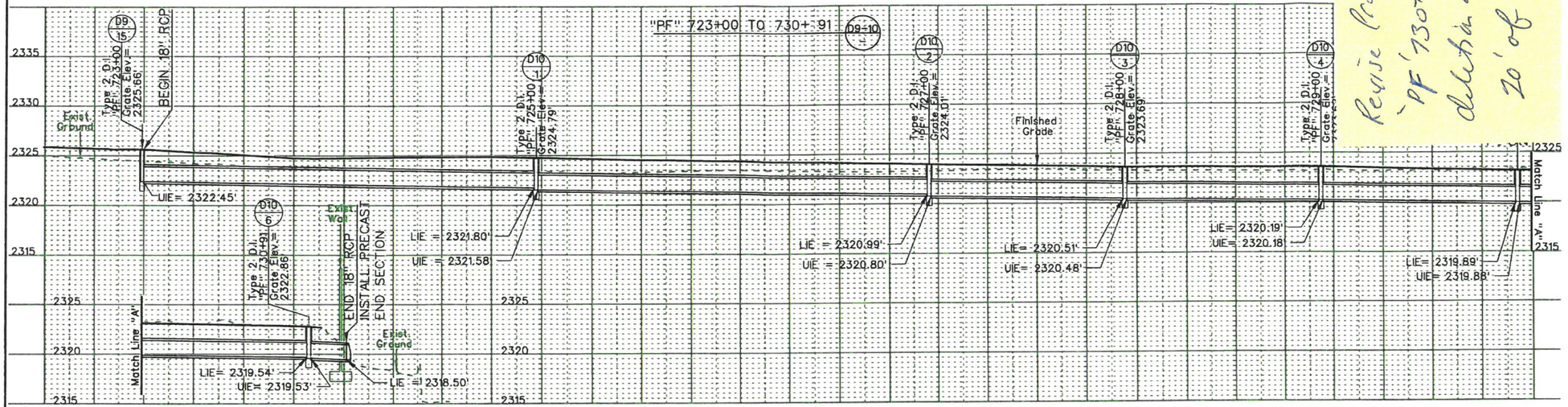
VERTICAL TO HORIZONTAL 5:1

*CONTRACTOR TO FIELD VERIFY EXISTING CULVERT LOCATION AND INVERT ELEVATION.

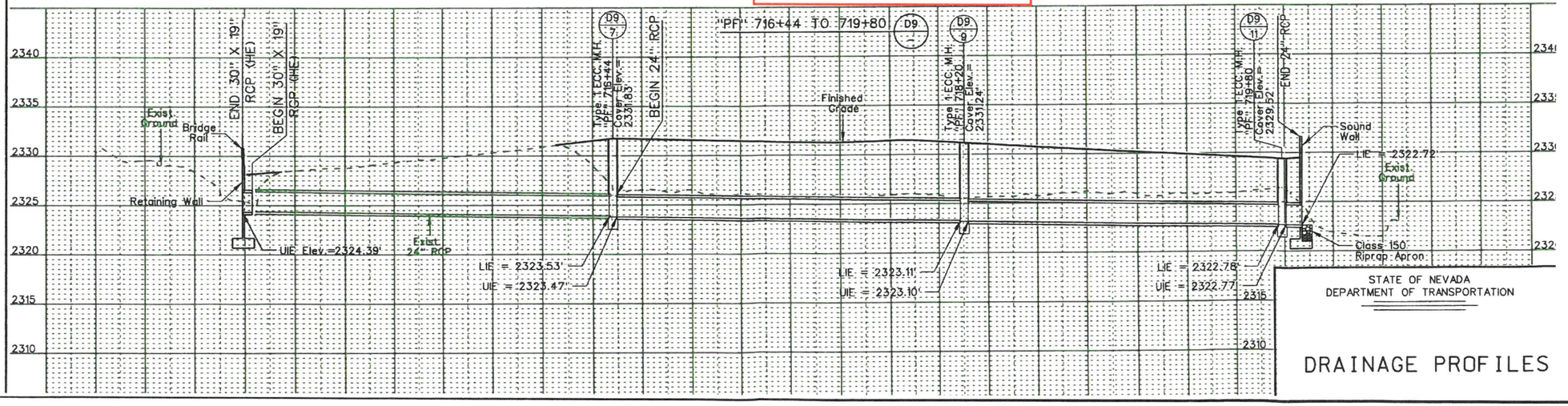
STATE	PROJECT NO.
NEVADA	NH-095-2(05

NOTE: DEPICTED UTILITY LOCATIONS
CONTRACTER TO VERIFY EX
UNDERGROUND UTILITIES PRI

Revise Profile for
-PF 730+91
delete 18" RCP
20' of 18" RCP
Down



24" RCP (NORTH)

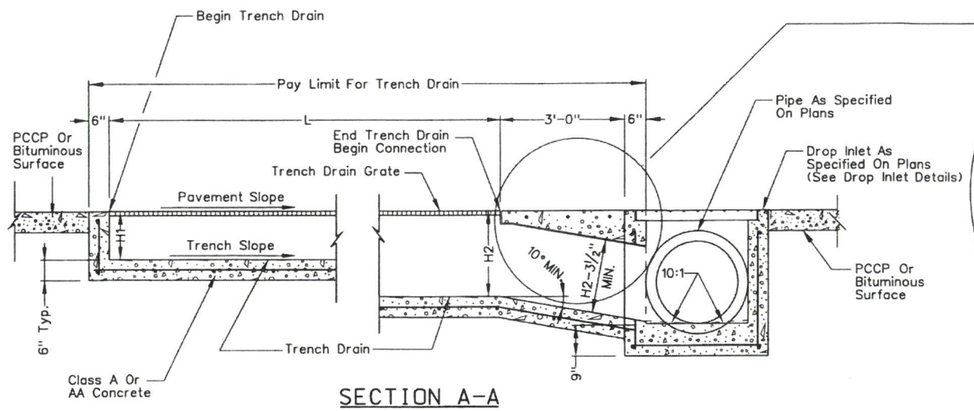


STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

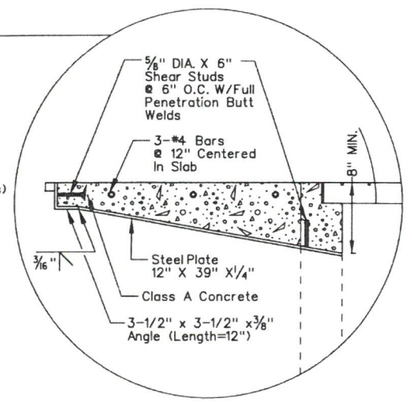
DRAINAGE PROFILES

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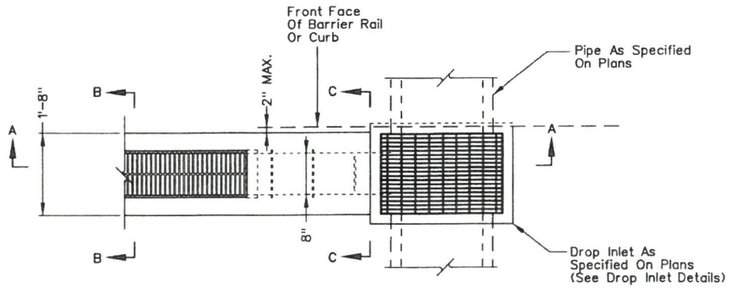
STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NH-095-2(051)	CLARK	DD9



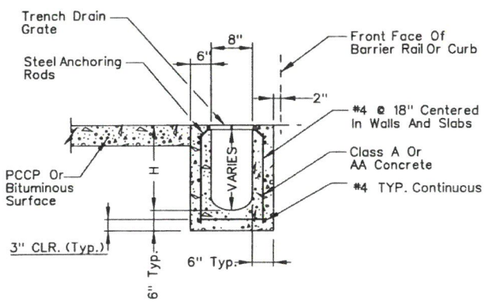
SECTION A-A



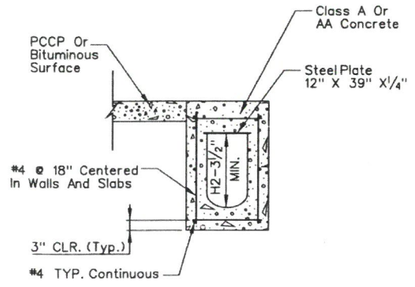
ENLARGED VIEW



PLAN VIEW



SECTION B-B



SECTION C-C

GENERAL NOTES:

1. DIMENSIONS AND DEPTHS ARE MINIMUM ACCEPTABLE. ANY INCREASED DEPTHS MUST MAINTAIN OR INCREASE TRENCH SLOPE AND PROVIDE POSITIVE DRAINAGE TO INLET. REVISIONS SHALL BE APPROVED BY THE ENGINEER IN WRITING PRIOR TO CONSTRUCTION.
2. CONSTRUCTION OF THE TRENCH DRAIN MUST FOLLOW THE MANUFACTURERS RECOMMENDATIONS.
3. MATCH TRENCH DRAIN GRATE TO PAVEMENT SURFACE.
4. L,H1, AND H2 AS SPECIFIED ON PLANS.

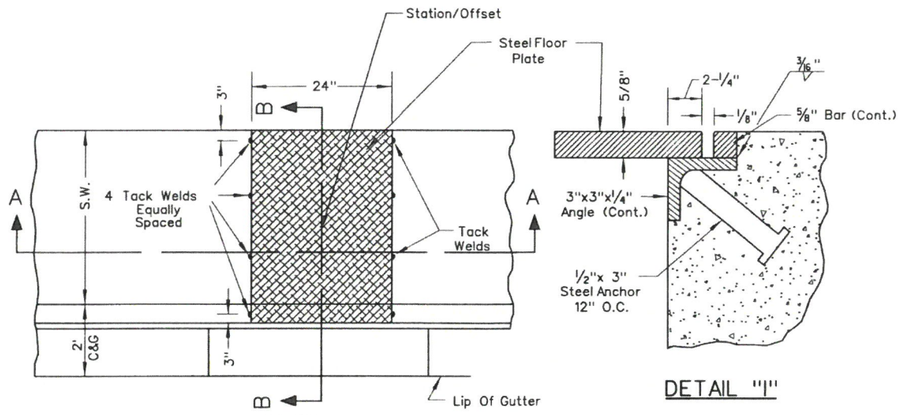
NOT TO SCALE

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

TRENCH DRAIN AND DROP INLET CONNECTION

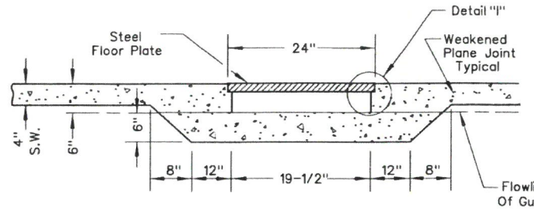
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STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NH-095-2(051)	CLARK	DD7

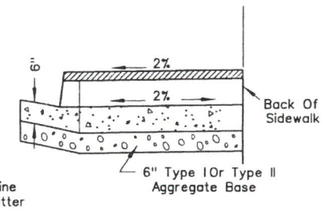


PLAN
SIDEWALK DRAIN
"R5" 25+16, 24.9' LT

DETAIL "I"



SECTION A-A

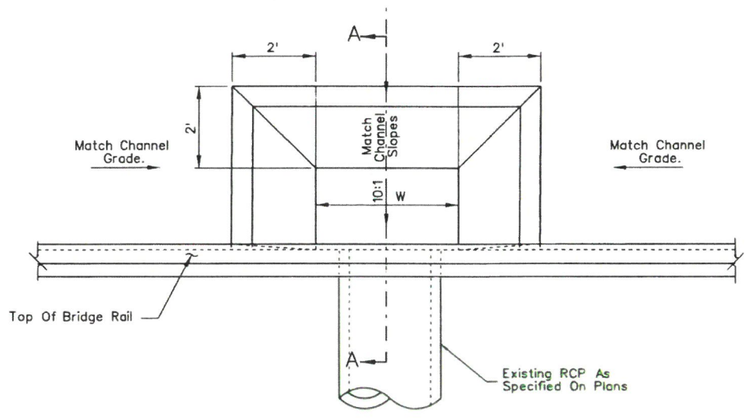


SECTION B-B

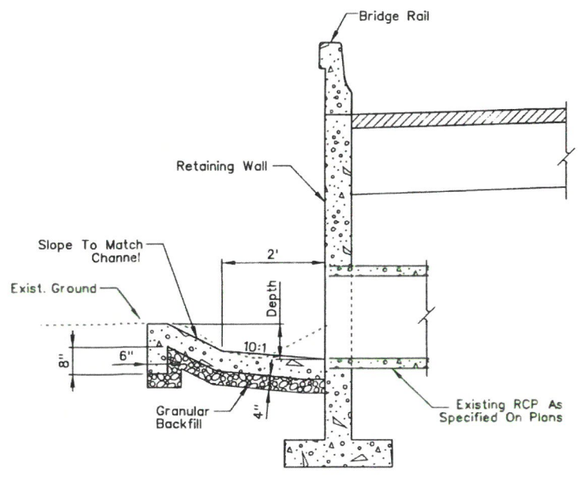
NOTES:

1. CONCRETE SHALL BE CLASS A OR AA.
2. IF WIDTH OF PLATE IS GREATER THAN 24", A SPECIAL DESIGN IS REQUIRED.
3. ALL EXPOSED METAL PARTS SHALL BE GALVANIZED AND ALL GALVANIZING DAMAGED BY FABRICATION OR INSTALLATION SHALL RECEIVE TWO COATS OF ALUMINUM PAINT (GALVONOX OR EQUAL).
4. STATION/OFFSET DISTANCE LISTED IN THE PLANS IS MEASURED TO CENTER OF GRATE.

NOT TO SCALE



PLAN
CONCRETE SUMP



SECTION A-A

STATION	W (ft)	DEPTH (ft)
"PF" 701+06	8.0	0.36 TO 0.78
"PF" 706+53	2.5	0.27
"PF" 716+42	2.0	0.91

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

DRAINAGE DETAIL

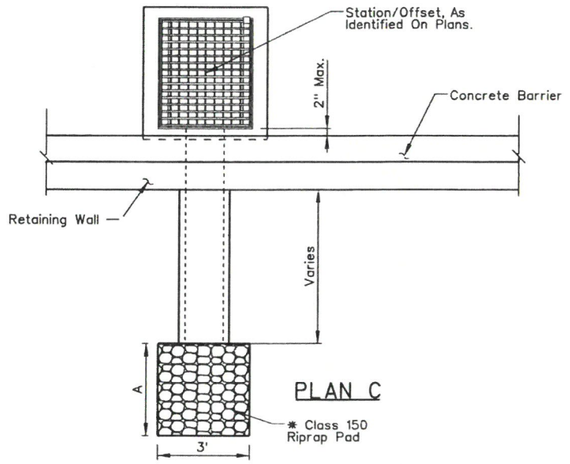
NOT TO SCALE

This is a digital copy from AppXtender by h1031mxc; Marc Cutler

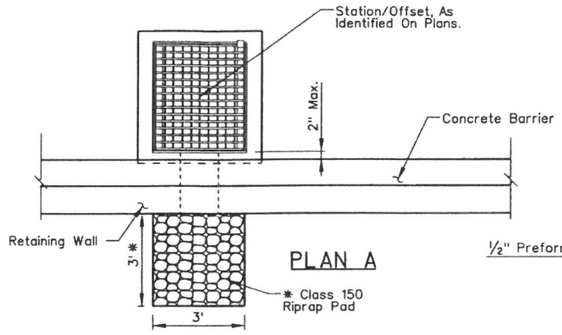
STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA	NH-095-2(051)	CLARK	DD2

NOTES:

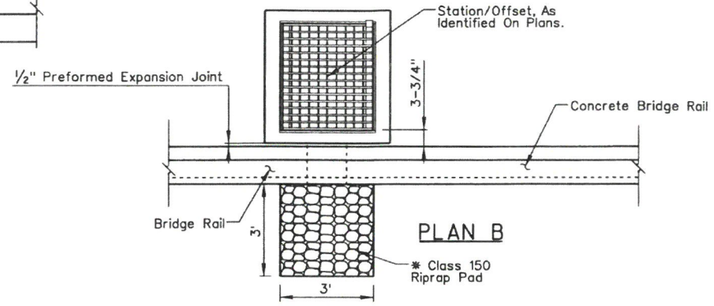
1. REFER TO STANDARD PLANS R-4.2.1 OF TYPE 2 DROP INLETS FOR CONSTRUCTION SPECIFICATIONS NOT SHOWN.
2. IN ADDITION TO STANDARD REINFORCING, PLACE #6 BAR AT MIDPOINT OF D FOR FULL WIDTH OF D.I. WHEN H IS LESS THAN 2.94'.
3. CONSTRUCT DROP INLET WALL ADJACENT TO RETAINING WALL BATTER IN PROFILE B AT SAME ANGLE AS BATTER.



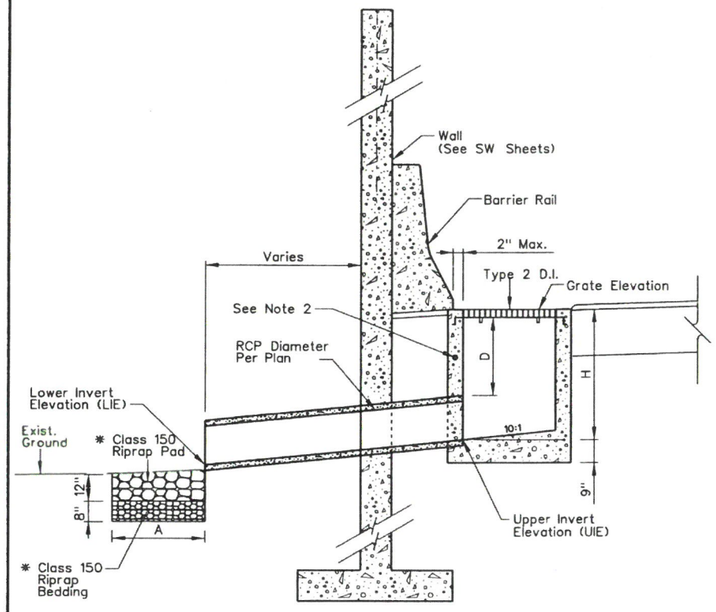
PLAN C



PLAN A

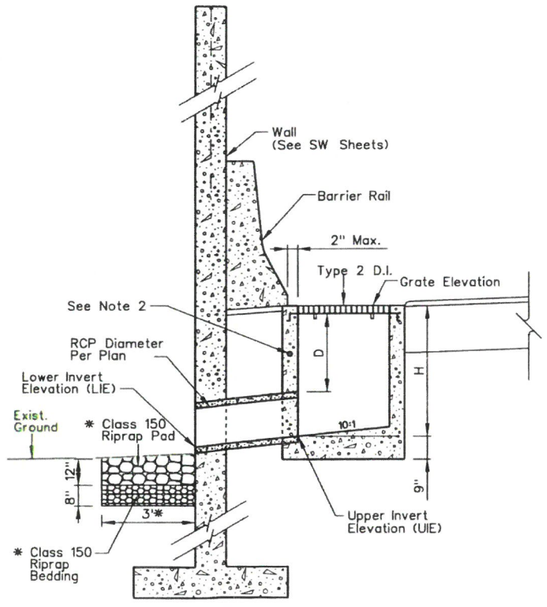


PLAN B



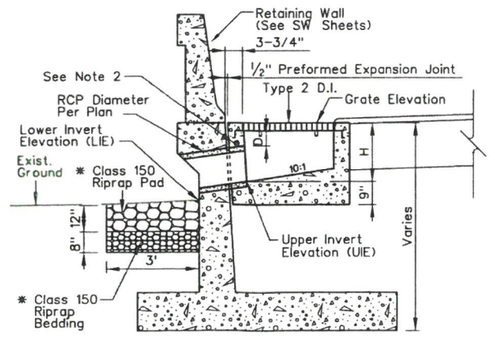
PROFILE C

* UNLESS STATED OTHERWISE ON PLANS OR PAVING EXISTS AT OUTLET



PROFILE A

* UNLESS STATED OTHERWISE ON PLANS OR PAVING EXISTS AT OUTLET



PROFILE B

* UNLESS STATED OTHERWISE ON PLANS OR PAVING EXISTS AT OUTLET.

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

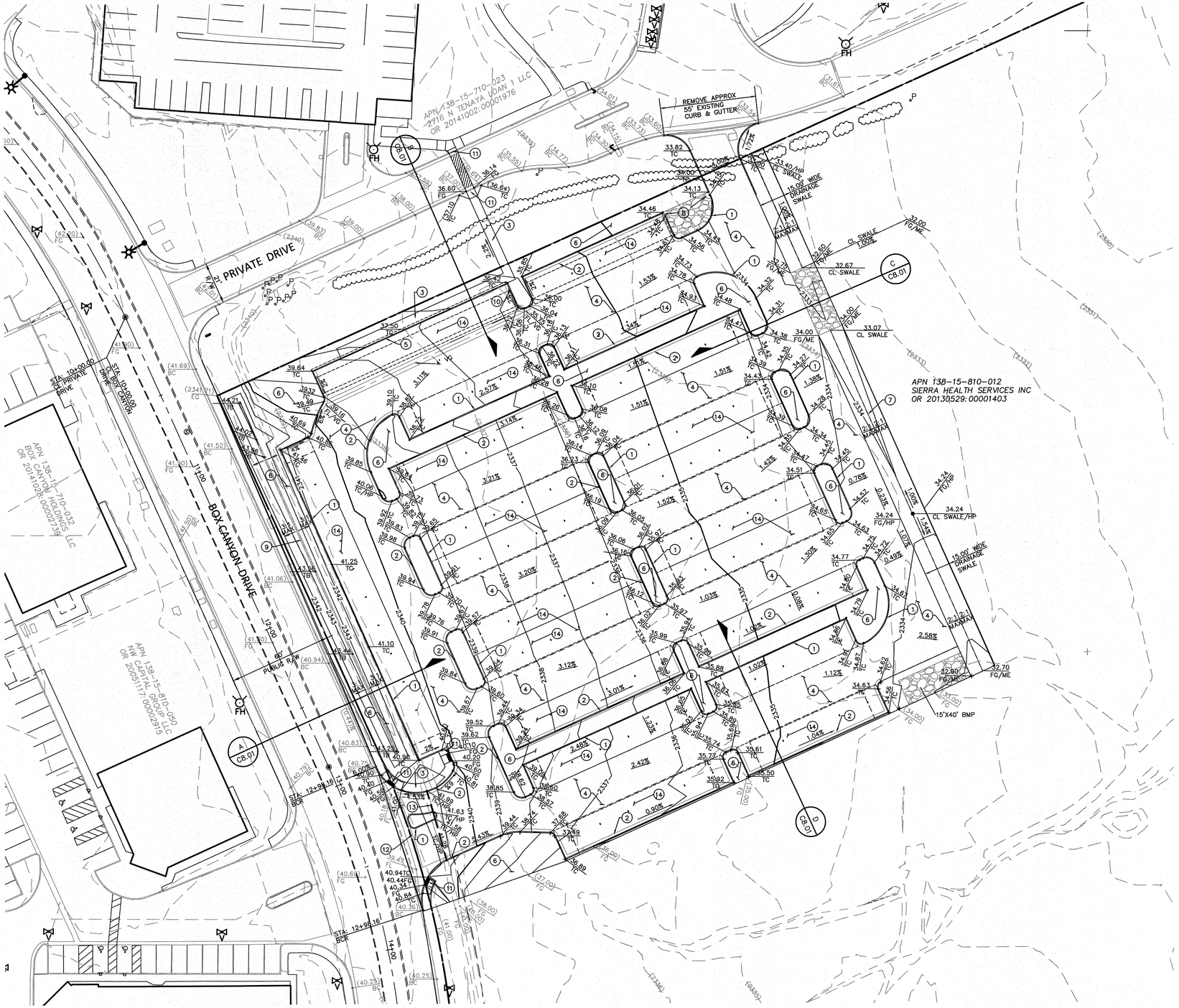
DRAINAGE DETAIL

NOT TO SCALE

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APPENDIX E
(Plans)

- Grading Plan
- Detail Sheet



30 0 15 30

SCALE: 1"=30'

BASIS OF BEARING

NORTH 24°14'59" WEST, BEING THE BEARING OF THE CENTERLINE OF BOX CANYON DRIVE AS SHOWN IN BOOK 47 OF PLATS, AT PAGE 35, OFFICIAL RECORDS OF CLARK COUNTY, NEVADA.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK "7LV0022N4", BEING A RIVET AND PLATE IN THE TOP OF CURB SW CORNER TENAYA WAY & SMOKE RANCH ROAD.
ELEVATION: 2,367.25(US SURVEY FEET)

BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
721.54 (METERS)

CONSTRUCTION NOTES

NO.	ITEM USDCCA: UNIFORM STANDARD DRAWINGS CLARK COUNTY AREA
(1)	CONSTRUCT TYPE 'A' CURB PER DETAIL 'E' SHEET C8.01.
(2)	CONSTRUCT TYPE 'L' CURB PER USDCCA NO. 219.
(3)	CONSTRUCT SIDEWALK PER USDCCA NO. 234.
(4)	CONSTRUCT 2" AC PAVEMENT OVER 6" TYPE II AGGREGATE BASE (CAR).
(5)	CONSTRUCT 0" TALL TYPE 'A' CURB PER DETAIL 'F' SHEET C8.01.
(6)	LANDSCAPE AREA. SEE LANDSCAPE PLANS FOR DETAILS.
(7)	DRAINAGE SWALE
(8)	CONSTRUCT 2.0' CURB OPENING (SIZE PER PLAN) PER DETAIL 'G' SHEET C8.01.
(9)	LANDSCAPE BERM PER LANDSCAPE PLANS
(10)	CONSTRUCT CURB TRANSITION FROM 6" TALL CURB TO 0" TALL CURB.
(11)	INSTALL ADA COMPLIANT RAMP AND TACTILE SENSORS PER USDCCA NO. 235
(12)	CONSTRUCT COMMERCIAL DRIVEWAY PER NDOT STANDARD R-5.3.3 WITH 8' WIDE VALLEY GUTTER.
(13)	GRADE BREAK AT ENTRANCE
(14)	COVERED PARKING

FLOOD ZONE NOTE:

THE PROJECT SITE LIES WITHIN UN-SHADED FLOOD ZONE "X", PER FIRM PANEL 32003C2155F REVISED NOVEMBER 16, 2011. PER FEMA, UN-SHADED FLOOD ZONE "X" IS AN AREAS OF OUTSIDE THE 500-YEAR FLOODPLAIN.

ALL GRADING WORK SHALL BE IN STRICT ACCORDANCE WITH THE SOILS REPORT FOR THE SITE ENTITLED "ADDITIONAL PARKING FOR UHG FACILITIES".

PROJECT NO.: 384181001 DATED SEPTEMBER 22, 2017

PREPARED BY: NINYO & MOORE
GEOTECHNICAL & ENVIRONMENTAL SCIENCES CONSULTANTS
6700 PARADISE ROAD, SUITE E
LAS VEGAS, NEVADA 89119
PHONE NO. (702) 433-0330
WWW.NINYOANDMOORE.COM

ALL WORK SHALL BE PERFORMED UNDER THE DIRECTION OF A REGISTERED PROFESSIONAL SOILS ENGINEER.

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO DRAINAGE STUDY NO. XXXXXX

THOMAS D. MILLER – 15776 DATE

CALL BEFORE YOU DIG
AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY
Call 811 or 1-800-227-2600

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL AND STREET LIGHT SYSTEMS. IT'S COSTLY.
CALL BEFORE YOU DO UNDERGROUND WORK
CALL 1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
CALL BEFORE YOU DO OVERHEAD WORK
1-702-227-2929

COLLINS ENGINEERS ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS AND ELEVATIONS. THE UTILITIES SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM THE BEST AVAILABLE INFORMATION. IT IS, HOWEVER, THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION AND ELEVATION OF ALL UTILITIES PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION. CONTRACTOR TO FIELD VERIFY ALL EXISTING SITE CONDITIONS PRIOR TO CONSTRUCTION. IF A CONFLICT EXISTS BETWEEN WHAT IS SHOWN ON THESE DRAWINGS AND WHAT EXISTS IN THE FIELD, THE CONTRACTOR IS TO NOTIFY THE ARCHITECT OR ENGINEER IMMEDIATELY.

LEGEND

EXISTING	PROPOSED	
(0.00%)	0.00%	SLOPE
(0.00) XX	0.00 XX	ELEVATION TAG
		STORM MANHOLE
		DROP INLET
-00-	-00-	CONTOUR
		RETAINING WALL
		SCREEN WALL
		AC PAVEMENT
		6" TYPE "A" CURB
		24" TYPE "L" CURB & GUTTER
		30" ROLL CURB
		PL-RIGHT-OF-WAY
		PL-ADJACENT
		CENTERLINE
		EASEMENT LINE
		FLOW LINE
		SAWCUT LINE

COLLINS ENGINEERS
3130 S. DURANGO DR., SUITE 404
LAS VEGAS, NV 89117
PHONE: (702) 248-8000
FAX: (702) 248-8070
www.collinsengr.com

PROFESSIONAL ENGINEER – STATE OF NEVADA
THOMAS D. MILLER
EXP. 12-31-19
CIVIL
NO. 15776
12-26-17

IMPROVEMENT PLANS FOR ADDITIONAL PARKING FOR UHG FACILITIES APN:138-15-810-012

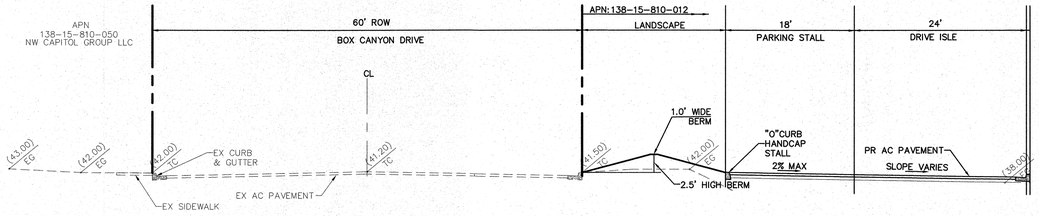
GRADING PLAN

BOX CANYON DRIVE

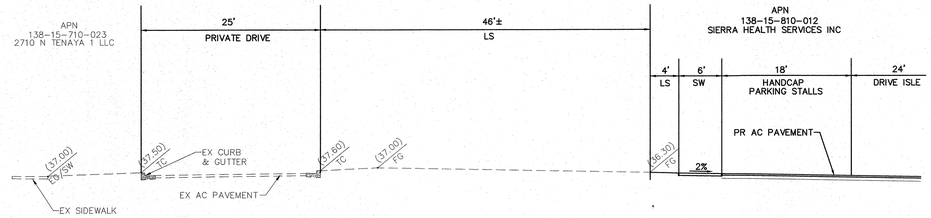
NO.	DATE	DESIGN BY	DESCRIPTION

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DESIGN BY:	JDMSR
DRAWN BY:	JDMSR
CHECKED BY:	TDM
DATE:	01-02-2018
SCALE:	1"=30'
SHEET NUMBER	C4.01
	SHEET 4 OF 6

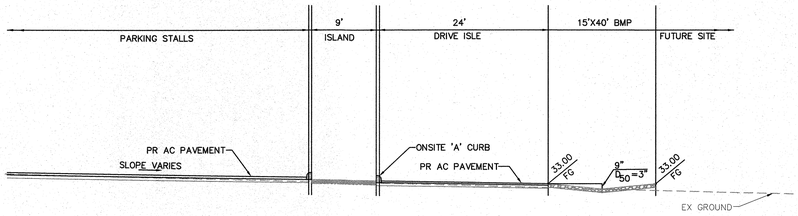
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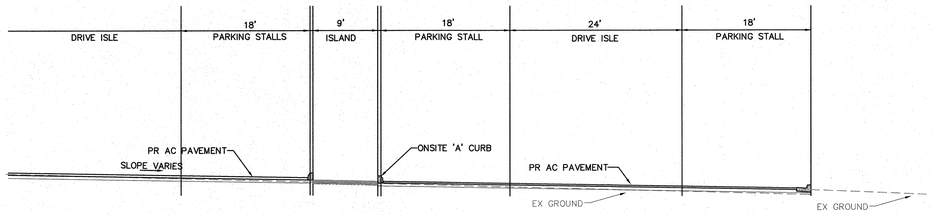
A C8.01 BOX CANYON DRIVE
NTS



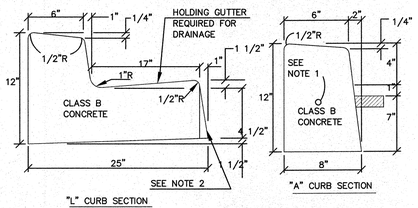
B C8.01 PRIVATE DRIVE
NTS

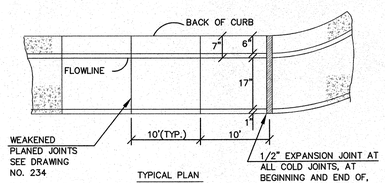


C C8.01 PRIVATE DRIVE
NTS



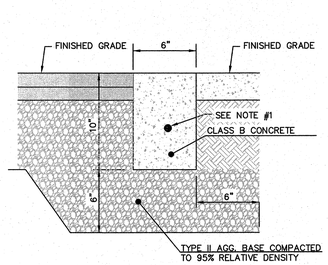
D C8.01 PRIVATE DRIVE
NTS



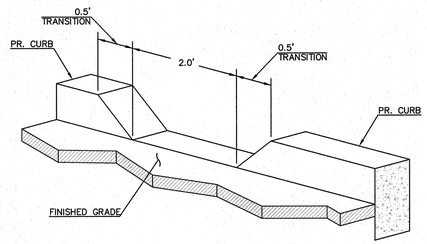


NOTES:
1. CONTINUOUS NO. 4 BAR REQUIRED IN NOSE OF MEDIAN ONLY.
2. 1" BATTER ON GUTTER FACE.

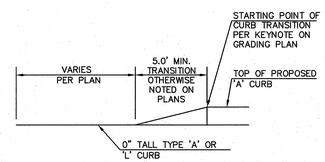
E C8.01 TYPE "L" & 'A' CURB (ONSITE)
NTS



F C8.01 0" TALL TYPE 'A' CURB (ONSITE)
NTS



G C8.01 VARIES 1.5' MIN. CURB OPENING
NTS



H C8.01 ONSITE CURB TRANSITION
NTS

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IMPROVEMENT PLANS FOR ADDITIONAL PARKING FOR UHG FACILITIES APN:138-15-810-012

DETAIL SHEET
BOX CANYON DRIVE

NO.	DATE	DESIGN BY	DESCRIPTION

CEI PROJECT:	10470
DESIGN BY:	JDMSR
DRAWN BY:	JDMSR
CHECKED BY:	TDM
DATE:	01-02-2018
SCALE:	AS SHOWN
SHEET NUMBER	C8.01
	SHEET 6 OF 6

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