

DS #:

4821

APN:

138-19.419-006

PROJECT:

Crossing Car Campus

SUBMITTAL:

1st

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		August 31, 2016
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:	
	Crossing Care Campus	
Cross Streets:	NWC Center Crossing Rd & Desert Crossing Ct	COPIES TO:
File Number:	F:\Depot\DSMemos\DS4821A.doc	DRC Surveying Nevada, Inc.
Parcel Number:	138-19-419-006	Crossing Business Center 8, LLC
Zoning Action:	CRG-65728	Bart Anderson, P.E., DevCo
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X
		CCRFCD

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	8/16/2016	8/30/2016	See Comments Below	\$400.00	455008: \$400
			TOTAL FEES (LDDRS):	\$400.00	----

REMARKS:

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

	is approved subject to conformance to all City standards and the following conditions:
X	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.

1. Provide a copy of the zoning/planning conditions associated with this site (**CRG-65728**) with the next submittal to verify compliance with conditions. *Flood Control* will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the *City Council*). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.
2. The site is adjacent to or crosses an existing or proposed *Clark County Regional Flood Control District* (CCRFCD) master planned facility. Therefore, CCRFCD concurrence is required prior to final approval of the drainage study.
3. Sites with a grade difference of 2 feet above or below existing are required to have approval from the *City Planning and Development Department*. The engineer must submit copies of the grading plans and detail sheet with a letter justifying the grade difference to the *City Planning Department* (229-6301). The engineer must provide Planning approval with the next submittal.
4. The subject development accepts offsite flow through the site. Provide and delineate a public drainage easement(s) (privately maintained) through the site in the next submittal. The public drainage easement must be dedicated and recorded prior to the final approval of the improvement plans.

5. The engineer/developer proposed offsite grading in the adjacent parcel to the southwest. Obtain a notarized letter of permission for the proposed grading from the adjacent parcel owner prior to the final approval of the subject drainage study.
6. Provide grading and drainage design in the "Courtyard" areas on the pertinent grading plans in the next submittal.
7. Revise the construction of all proposed drop inlets to either **Type "C-D" Modified Drop Inlet** (RTC Std. Dwg. 412.1) or **Type "CM" Drop Inlet** (RTC Std. Dwg. 422). Revise all pertinent plans and construction notes accordingly.
8. The engineer/developer proposed to discharge the subject development to a regional flood control channel to the north at three locations with concrete flume. Provide structural connection detail from concrete to concrete in the next submittal.
9. The re-construction of an existing 21'-drop inlet to D.I. #2 is not clear. Provide structural and construction detail in the next submittal.
10. Provide detail of sand/oil separators in the two proposed onsite drop inlets (DI #1 and DI #5) in the next submittal.
11. Label an existing storm drain in the main entrance of the development with *City of Las Vegas* recorded drawing number on the pertinent grading plan.
12. Provide a note on the grading plans: "All onsite storm drains and the associated facilities are Privately Owned and to be Privately Maintained by the Property Owner".
13. Add a note in all pertinent sheets for the construction of all storm drain drop inlets per a newly adopted USDCCA Drawing No. 421 (*Stormwater Quality Management Stamp and Sign Detail*).

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/19

AREA L-19



Civil Engineering · Land Surveying · Planning

DRC Surveying Nevada, Inc.

7080 La Cienega Street, Ste. 200

Las Vegas, NV 89119

Tel 702-270-6119 · Fax 702-932-6129

LETTER OF TRANSMITTAL

To: City of Las Vegas

Attn: Albert Sung, P.E.

333 N. Rancho Drive

Las Vegas, NV 89103

Date: 8/16/16

Project No: SN15-823

**RE: Crossings Care Campus
Technical Drainage Study**

ITEM	DESCRIPTION
1	Technical Drainage Study – wet stamped
2	Grading/Detail Plans – wet stamped
3	CD with TDS and Plans
4	Check #3121

REMARKS:

SENDER:

Andrew E. Whittaker, PE

RECEIVED BY: _____ **DATE** _____

TECHNICAL DRAINAGE STUDY FOR CROSSING CARE CAMPUS

DRC Job# SN 15-823
City of Las Vegas No. _____

Prepared for:
The Calida Group
10777 W. Twain Avenue, Suite 115
Las Vegas, Nevada 89135
Ph: (702) 990-3906
Fx: (702) 925-5506

Prepared by:
DRC Surveying Nevada, Inc.
7080 La Cienega Street, Ste. 200
Las Vegas, Nevada 89119
Ph: (702) 270-6119
Fax: (702) 932-6129

Submitted to:
City of Las Vegas
Department of Development Services
333 N. Rancho Drive
Las Vegas, NV 89103

AUGUST 2016

DRC Surveying Nevada

Civil Engineering • Land Surveying • Planning
7080 La Cienega Street, Suite 200, Las Vegas, NV 89119 (Ph. 270-6119 Fax 270-4899)

August 5, 2016

Albert Sung, P.E.
City of Las Vegas
Land Development Services
333 N. Rancho Drive
Las Vegas, NV 89103

**Subject: Technical Drainage Study for Crossing Care Campus
DRC # SN 15-823**

Dear Mr. Sung:

Transmitted herewith for your review and approval is one (1) copy of the above-referenced Technical Drainage Study. The subject site will include the development of two commercial buildings, parking areas, drive aisles, and a driveway entrance/exit on Center Crossing Road. The project is located east of Crestline Way and south of Summerlin Parkway, more specifically, northwest of Center Crossing Road and Desert Crossing Court.

If there are any questions concerning this study or additional information is needed, please contact me at (702) 270-6119.

Sincerely,

DRC Surveying Nevada, Inc.



Andrew E. Whittaker, PE

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Crossing Care Campus Date: August 5, 2016

Location of Development: a) Descriptive (Cross Streets): North/South Desert Crossing Ct East/West Center Crossing Rd
b) Sect. 19 Twn. 20S Rng. 60E

Name of Owner: Crossing Business Center 8, LLC

Assessor's Parcel Number: 138-19-419-006

Telephone Number: _____

Facsimile Number: _____

Address: 444 S. Flower St. #2100, Los Angeles, CA 90071

Contact Person - Name: Dennis Wertzler, P.E.

Telephone Number: (702) 270-6119

* Email Address: dwertzler@drc-lasvegas.com

Firm: DRC Surveying Nevada, Inc.

Address: 7080 La Cienega Street, Ste. #200, Las Vegas, NV 89119

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At site: 11.01 acres +/- Being Developed/Disturbed: 11.01 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 Master Plan Facility? : YES** NO

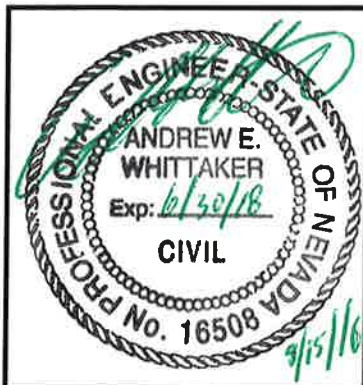
4. Proposed type of development (Residential, Commercial, Etc.): Commercial

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

6. Has the site been evaluated in the past? YES NO If yes, please identify documentation:
The Crossings Business Park Phase VII

7. If known, please identify the proposed point(s) of runoff from the site: _____

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



Submit this form as part of the required drainage study to the local entity which has jurisdiction over the 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.

Revisions	Date

Local Entity File Number _____

Engineer's Seal

REFERENCE:

STANDARD FORM 1

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Crossing Care Campus		Map ID:	
Firm Name: DRC Surveying Nevada, Inc.		Engineer: Andrew E. Whittaker, P.E.	
Address: 7080 La Cienega Street, Suite 200			
City: Las Vegas		State: NV	Zip: 89119
Phone Number: (702) 270-6119		Fax Number: (702) 270-4899	
Property Owner: Crossings Business Center 8, LLC			
Address: 444 S. Flower Street, #2100			
City: Los Angeles		State: CA	Zip 90071
Reviewed By:		Date Received:	Date Accepted for Review:

The following checklist is intended as a guide for the engineer preparing a Technical Drainage Study to submit to the local entity and Clark County Regional Flood Control District (if necessary). The list 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 (CCRFCDD) Hydrologic Criteria and Drainage Design Manual (MANUAL).

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

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

I. GENERAL REQUIREMENT

Yes	No	
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.
N/A		A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.

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 CCRFCDD Master Plan Update Figure (F-x), 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 on-site and off-site flows in cfs.
X		On-site drainage basin maps for existing and proposed conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.
X		Vicinity Map with local and major cross streets identified and a north arrow.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN		
Yes	No	
X		Sheet size: 24"x36" 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.
X		Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
X		Proposed typical street sections.
N/A		Streets with off-set 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 Q100 and V100 and D100 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 (e.i., 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.
X		Existing and proposed drainage easements and widths shown with sufficient detail. A cross-sectional detail must be provided that shows appropriate lining and reinforcement.
X		Location and detail of existing, proposed, and future blockwall openings. Minimum size is 16"x48". Wrought iron gate is required for flows > 10 cfs.
X		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.
X		Building and/or lot numbers.
X		Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
X		Limits of existing floodplain based on current FIRM of best available information; limits of proposed floodplains based on best available information.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Yes	No	
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, in a table. Finish floor elevations must be a minimum of 18 inches above BFE.
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 Q100 flows.
X		Street slopes for perimeter 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

Yes	No	
X		Appropriate soil information and Soil Map for existing and future conditions with subbasins and property delineated.
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 subbasin 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 property owners in accordance with current Nevada Drainage Law.
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 streets. Provide "d x v" products for Q100 and Q10 flows representing the worst case for interior and all perimeter streets. $Q100\ d \times v \leq 8$. $Q10\ d \times v \leq 6$ and 12 foot dry lane for rights-of-way ≥ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
X		A summary table of interior and exterior street capacity calculations showing the street name, Q100 flow, slope, depth of flow, velocity, and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
X		Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
X		Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
X		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 easement must always be provided with 18 inches of freeboard above the Q100 weir height or flow depth, whichever is greater.
X		Calculation for impervious area for parking lots and LIDs (if required)

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Yes	No	
N/A		A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. ◆ Field survey data. ◆ Input and output information. ◆ Plotted cross-sections based on survey with proper encroachments. ◆ A map showing the location of the cross-sections. ◆ Analysis of both sub and super-critical flow segments. ◆ A summary table and a discussion of the results in the text of the report.
N/A		Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
X		Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
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).

Before you submit your drainage study for review it is critical that you comply with the above-listed checklist and review your package to avoid having an incorrect or incomplete submittal package – thus delaying the review process:

 X Make sure that all tables, plans and calculations match what is listed in the text of the study; make sure all referenced exhibits, plans and appendices are included; make sure that current FIRM panels are used and make sure that there are no word processing errors that might cause confusion for the reviewer.

 X Make sure that plans submitted with the study reflect the information and/or improvements proposed in the study.

 X Make sure that geotechnical and/or structural information to support the designs is submitted and is correct for the design.

 X Make sure to compare existing to proposed site conditions and to propose mitigation to address any increased flows. Make sure to analyze the impact of the development of the site on the adjacent properties.

 X Make sure that overall discussion and methodology is included in the text of the study. Also, explain the relevance of any included reference material. Make sure that your study includes a discussion about the local, state and federal requirements for the development and how the details and basis of design assumptions in the drainage plan address each requirement.

 X Make sure to include all the relevant information when referencing other studies. Include all approval letters, details, plans, etc. that are required to support the study. Make sure to include an explanation about the relevance of each item to the study.

 X Make sure to include good quality drainage basin maps which include all of the basic data, such as topographic information, soils information, flows direction arrows, concentration points, flow summary, etc.

 X Include supporting documentation for the beginning HGL for the study. In addition, include the interpretation of the results with the existing and proposed hydraulic model.

 X Make sure to research approved studies in the neighborhood and include a discussion in the study regarding the conclusions in these approved studies, and if they differ, include an explanation as to why this is the case.

 X Make sure to coordinate with the project's landscape architect to ensure that there are not conflicts between the drainage plans and landscape plans.



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	
☒	☐	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.)
☒	☐	Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.
☒	☐	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. <u>AW</u> 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	
☒	☐	(1) 24" X 36" copy of the Grading Plan, (including all Detail Sheets) sealed by the engineer.
☒	☐	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.
☒	☐	Label existing topography at a minimum 5 foot elevation interval including adjacent developments, finished floor elevations of existing buildings and top of existing curbs extending 100 feet around the perimeter of the site. (*Measured from the centerline of the adjacent roadway.)

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

II. GRADING PLAN INFORMATION		
Yes	No	
✓		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.
✓		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.
✓		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.
✓		Back of lot elevations and lot drainage pattern for all lots including common lots.
Pending		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.
✓		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.
✓		Commercial and Common Lot Landscape areas are not allowed to drain over the sidewalk. The grading plans show flow lines with grades and sidewalk under drains for all landscape areas draining to the public ROW.

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

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

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

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

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

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1.0 GENERAL LOCATION AND DEVELOPMENT DESCRIPTION

1.1 Scope

The purpose of this study is to provide detailed hydrologic and hydraulic analyses for this commercial development called Summerlin Senior Center located south of Summerlin Parkway and east of Crestdale Lane. This study will address the existing and proposed conditions that effect the onsite and offsite drainage. The criteria set forth in the Clark County Regional Flood Control District (CCRFCD) "Hydrologic Criteria and Drainage Design Manual," hereafter referred to as the "Drainage Criteria Manual," (Reference 5) has been used as the technical basis for this study.

1.2 Location

The Summerlin Senior Center project is located within the City of Las Vegas, Nevada. The project site lies south of Summerlin Parkway and east of Crestdale Lane; more specifically, north of Center Crossing Road and Desert Crossing Court, (see Figure 1, *Vicinity Map* and Figure 2, *Location Map* in Appendix A). The proposed project is within a portion of the south half of the southwest quarter of Section 19, Township 20 South, Range 60 East.

1.3 Description of Project

The project is for two commercial buildings and parking lot on 10-acres of land. Offsite include a commercial driveway, three (3) drop inlets and the removal of 1 drop inlet. Onsite improvements include curb & gutter, drive aisles, parking lots, sidewalk, buildings, U-channels, a drop inlet and storm drain.

2.0 EXISTING DRAINAGE BASIN DESCRIPTION

2.1 Drainage Description

The site is bordered by commercial property to the west and south, vacant land to the east and a regional storm drain facility that parallels Summerlin Parkway to the north.

There is an existing Regional Drainage Facility north of the subject site. The Regional Facility is a portion of the Angel Park – Summerlin Parkway Facility and is designated as APSP 0069 from the Master Plan Update dated September, 2013. The existing facility is an existing concrete trapezoidal channel 10' wide 6' deep with 2:1 side slopes. Runoff from the subject site drains to this facility.

Offsite and Onsite Basins and Concentration Points

There are three developed offsite basins drain toward the subject site and two onsite basins that drains into the regional drainage facility north of the subject site.

Basin DOF1 drains to Desert Crossing Court into an existing drop inlet adjacent to the subject site.

Basin DOF2 drains onto the site and combines with runoff from onsite basin XON1 at concentration point CP1. Basin DOF3 drains onsite through basin XON2. Runoff from basins DOF3 XON2 and combination point CP1 combine at concentration point CP2 near the northeast corner of the subject site.

The flow rates are provided on Table 1 below and Figure 3 in Appendix A.

TABLE 1
EXISTING CONDITION
PEAK FLOW RATE SUMMARY

BASIN / CONC. POINT	AREA (AC.)	Q10 (CFS)	Q100 (CFS)
DOF1	2.97	4	8
DOF2	2.86	4	8
XON1	1.63	1	2
CP1	-	4	10
DOF3	3.69	6	12
XON2	8.16	2	10
CP2	-	12	30

See Figure 3, Existing Condition Drainage Map

2.2 FEMA Flood Hazard Zone

The Special Flood Hazard Areas for Clark County, Nevada are outlined in the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map dated November 16, 2011 and September 27, 2002. A majority of the subject site lies within the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Community Panel Number 32003C2150E which was last revised September 27, 2007. A portion of the subject site also lies within FEMA FIRM Community Panel Number 32003C2135F and 32003C2145F. The project site is located within "Zone X". "Zone X" describes areas outside of the 0.2% annual flood. (See Figure 4, *Flood Insurance Rate Map* in Appendix A.)

2.3 Regional Flood Control Master Plan Update

The project site has been delineated on Figures 5 (F-25) and 6 (H-25), which are referenced from the CCRFCD 2013 Las Vegas Valley Flood Control Master Plan

Update. The project site is adjacent to a regional facility called Angel Park-Summerlin Parkway (APSP 0069) facility. The facility is an existing trapezoidal concrete channel 10' wide at the bottom, 6' deep with 2:1 side slopes. According to the Master Plan Update, the channel conveys 1697 cfs during the 100-year storm event. The site lies within a portion of subarea basin 8B-2 as shown on Figure 6 (H-25).

2.4 Previous Drainage Studies

Technical Drainage Study for "The Crossing Business Park, Phase VII", Approved November 16, 2004 (DS 2750)

This drainage study was performed for a portion of the subject site and other parcels east and south of the subject site as a commercial development built in several phases. Several Updates were made to this drainage study as buildings were added. Reference material pertaining to this study is provided in Appendix D. The engineer has accepted information from this study.

BMP Compliance

The subject site was designed to make better use of "Best Management Practices" (MBPs) as described in the Drainage Control Manual revised on September 11, 2014. The total area of land that will be developed with this site is about 10 acres. The impervious area consists of rooftops and parking lots that total 7.2 acres. About 4.0 acres of the development consist of rooftops that drain to landscape swales around building. The impervious area within the parking lot is about 3.2 acres. About 1.8 acres of the parking lot drains to the two onsite drop inlets with land/oil separators and about 1.2 acres of the parking lot drains to landscape swales within the proposed U-channels between the Trash Enclosure near the northeast corner of the site and the U-channels along the north property line. About 0.2 acres of parking lot drains directly into the existing channel without any BMPs. According to Section 1500 of the Drainage Design Manual, 75% of the parking lot must drain through some type of BMP. The subject development is designed such that about 93% of the parking area and 100% of rooftops drain to some type of BMP.

The area of land that will not be developed at this time, near the west side of the site, consists of about 1 acre. The developer of that land will need to provide best management practices for that area when designed.

3.0 PROPOSED DRAINAGE FACILITIES

3.1 General Description

The project consists of the development of a commercial building, drive aisles, and parking areas. Onsite flows will be conveyed via onsite L-curb, valley gutters landscape swales, U-channels, storm drain and riprap swales. The subject site is

being developed as an commercial site.

One developed condition drainage scenario is provided with this study since the offsite basins upstream of the site are fully developed.

During the Developed Condition, the storm water runoff flow rates and patterns from offsite basins are the same as the Existing Condition and the onsite basins are developed as a commercial site.

Runoff from offsite basin DOF1 drains into Desert Crossing Court where it is collected in a series of proposed storm drain inlets near Center Crossing Road. Runoff from offsite basin DOF2 drains onsite and combines with onsite basin DON1 at concentration point CP1 at a proposed drop inlet. Runoff from offsite basin DOF3 drains onsite and combines with runoff from onsite basin DON2 at concentration point CP2. Runoff at concentration point CP2 drains offsite through a proposed U-channel into the existing Regional Facility. Runoff from onsite basin DON3 drains to a proposed inlet that connects to RCP storm drain that ties into a proposed U-channel where it drains into the existing Regional Facility. Runoff from onsite basin DON4 drains into a proposed U channel that connects to the existing Regional Facility.

Table 2 is a summary of the peak flow rate for the interim condition. See Figure 7, *Developed Condition Drainage Map* in Appendix A.

TABLE 2
DEVELOPED CONDITION
PEAK FLOW RATE SUMMARY

BASIN / CONC. POINT	AREA (AC.)	Q10 (CFS)	Q100 (CFS)
DOF1	2.97	4	8
DOF2	2.86	4	8
DON1	2.09	3	6
CP1	-	7	13
DOF3	3.69	6	12
DON2	2.84	4	8
CP2	-	10	20
DON3	2.89	2	4
DON4	1.98	1	2

See Figure 7, *Developed Condition Drainage Map* in Appendix A

3.2 Compliance with Regulations and Adopted Plans

This study has been prepared in accordance with the CCRFCD's *Hydrologic Criteria and Drainage Design Manual* (Reference 5) and Clark County's *Uniform*

Regulations for the Control of Drainage. The study is in compliance with all Master Planned Flood Control Facilities, FEMA flood plain regulations and all proposed modifications to or verifications of the FEMA regulated floodplain through the subject site, and Uniform Regulations.

3.3 Hydrologic Criteria

The watershed was modeled using the generalized storm network computation capabilities of the U.S. Army Corps of Engineer's HEC-1 Flood Hydrograph computer model (Reference 3). The HEC-1 computer program has a wide range of capabilities in modeling gauged and ungauged watersheds, with most of the latest techniques for simulating precipitation, evaporation, surface impoundment, flood routing, flow diversions and splits. Since the study watershed is ungauged, the analysis used to model runoff incorporated the Soil Conservation Service (SCS) unit hydrograph method to develop a hypothetical flood hydrograph (Reference 2).

The Drainage Criteria Manual was used to establish the point precipitation values, rainfall distribution (SDN 3). A review of Figure 513 indicated that the project site is outside the McCarran Airport Rainfall Area. The point precipitation values taken from Figures 503 and 506 are shown in Table 3 for the six-hour duration design storm events. A DARF adjustment value was not used in this study.

TABLE 3
POINT PRECIPITATION VALUE

<u>PARAMETER</u>	INCHES (6-HOUR DURATION)	
	10-Year	100-Year
Precipitation Values (outside McCarran Airport Rainfall Area)	1.80	3.00

The drainage basins were determined with the use of the onsite grading plan. Computer methods were used to determine the basin areas. The existing, and developed drainage basins are shown on Figures 3, and 7, respectively.

The curve numbers were developed based on vegetation, soils group information, land use, and antecedent moisture conditions (AMC II) in accordance with the standard methods of the National Resources Conservation Service (NRCS) Soil Classification System (SCS). The soils information obtained from the NRCS website is provided in Appendix B of this report. The subject site lies within Soil Group 502--Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes which contains 55% Canutio and 40% Cave and 5% Arizo. The curve numbers are provided on Curve Number Calculations Table in Appendix D.

The time between a brief heavy rain and the maximum runoff rate is called lag time. Lag can be estimated from historical hydrographs or it can be estimated from specific watershed characteristics such as watershed length, slope and flow retardance. Based on studies of many storm events for a range of watershed conditions, the following empirical relationship between lag (L) and time of concentration (Tc) was derived:

$$L = 0.6T_c$$

$$T_c = \frac{L_{ws}}{60V} + T_i$$

where: L_{ws} = Hydraulic length, V = Average Velocity

T_i = Initial flow time

Average velocities for estimating travel time (T_t) for surface flow were used to develop a time of concentration (Reference 5). The Travel Time Velocity Formulas were used in the Standard Form 4 to determine the overland flow velocities of the drainage basins. For the existing formulas: $V_1 = 14.8 \cdot (S/100)^{1/2}$ and $V_2 = 29.4 \cdot (S/100)^{1/2}$. For the developed formulas: $V_1 = 20.2 \cdot (S/100)^{1.2}$ and $V_2 = 30.6 \cdot (S/100)^{1/2}$. In the travel time calculations, V_1 applies to the first 500 feet of travel distance and V_2 applies to the remaining travel distance. To determine initial flow times, the equation $T_i = 1.8(1.1-K)L^{1/2}/S^{1/3}$ was used as outlined in the Criteria Manual.

3.4 Facility Design Calculations

Normal Depth Calculations

Parking areas, drive aisles, drainage swales, concrete valley gutters, and U-Channels, provide for the storm water conveyance for this site. Hydraulic calculations for the flow sections are based on Manning's Equation and were performed utilizing a typical street or flow section and the area runoff for each section. The depths of flow for the interior flow sections range from 0.26-ft to 0.63-ft with a depth-velocity product of less than 8 in the 100-year storm event.

All hydraulic calculations have been included in the appendix of this drainage study. Table 5 summarizes the capacity calculations for the interior flow sections, and adjacent streets. Figure 7, *Developed Conditions Basin Map*, shows the flow sections locations and summary table. See Appendix D for the normal depth calculations for each section.

TABLE 5
STREET/FLOW SECTION SUMMARY
DEVELOPED CONDITIONS

STREET/FLOW SECTION	S (%)	Q10/Q100 (CFS)	D10/D100 (FT)	V10/V100 (FPS)	D*V
1 Desert Crossing	3.57	4/8	-/0.38	-/5.13	-/1.95

2 Onsite Drive Aisle	0.51	7/13	-/0.48	-/2.11	-/1.01
3 Onsite Drive Aisle	0.40	6/12	-/0.63	-/2.40	-/1.51
4 Onsite Drive Aisle	0.50	10/20	-/0.57	-/2.34	-/1.33
5 Onsite Drive Aisle	5.63	2/4	-/0.26-/	-/4.93	-/1.28
6 Onsite Drive Aisle	0.50	1/2	-/0.35	-/1.83	-/0.64
7 U Channel	37.8	4/8	-/0.11	-/15.23	N/A
8 U Channel	10.0	2/4	-/0.14	-/19.32	N/A
9 Trap. Channel	4.2	6/12	-/0.34	-/3.99	N/A
10 U-Channel	25.0	6/12	-/0.15	-/15.73	N/A
11 Riprap Channel	15.0	6/12	-/0.36	-/6.66	N/A
12 U-Channel	3.0	10/20	-/0.30	-/8.41	N/A
13 U-Channel	38.2	1/2	-/0.06	-/10.77	N/A
14 U-Channel	37.8	4/8	-/0.11	-/15.23	N/A
15 Regional Channel	2.4	-/1697	-/3.94	-/31.00	N/A

See Figure 7, Developed Conditions Basin Map

The finished floor elevations have been checked with the adjacent flow depths calculated. The finished floor elevations have been designed to be at least twice the depth of flow or 18-inches above the water surface elevations within the adjacent flood control facilities, streets and drive aisles. See calculations in Appendix C.

Storm Drain Calculations

There are two storm drains systems proposed with this project.

The Storm Drain near the main entrance to the site consists of an existing 32" RCP, and proposed 18" RCP with two (2) manholes and two (2) junctions. This storm drain is designed to convey runoff from at concentration point CP1 (Q100=13 cfs) and a portion of basin DOF1 (5.4 cfs). A portion of the existing storm drain is removed and new storm drain and inlets are added. WSPG was used to analyze the storm drain, (see SUMMER.WSW model in Appendix C). The Hydraulic Grade Line (HGL) is above the top of pipe at the system headworks (upstream end); however, the HGL is more than one (1) foot below the proposed inlet.

The main storm drain system has two (2) laterals that tie into the proposed Storm Drain. The Standard Form 6 from the CCRFCD Manual was used to analyze the laterals. See Standard Form 6 in Appendix C.

The Storm Drain System near the north end of the site consists of a proposed 18"

RCP. Runoff from the 18" RCP drains into a proposed concrete flume that ties into the existing Regional Facility. This storm drain is designed to convey runoff from onsite basin DON3 (Q100=4 cfs).

Inlet Calculations

There are two (2) drop inlets proposed onsite to collect storm water runoff from the onsite parking area. There are three (3) drop inlets proposed to collect storm water runoff in Desert Crossing Court and Center Crossing.

The two inlets onsite are labeled as DI #1 and DI#5. The inlets in a sump condition and intercept the 100-year storm event. DI #1 collects runoff from onsite basin DON3. DI#5 collects runoff from concentration point CP1. Both inlets are sized to account for 50% clogging.

The three (3) inlets offsite replace the existing inlet that is within the proposed drive aisle of the subject site. The two (2) upstream inlets are "on-grade". DI#4 collects about 3.1 cfs and about 4.9 cfs is bypassed to DI#3. DI#3 collects about 2.3 cfs and about 2.6 cfs is bypassed to DI#2. DI#2 collects about 1.8 cfs and about 0.8 cfs may bypass the inlet and drain down Center Crossing Road. All three inlets are sized to account for 50% clogging during the 100-year storm event.

4.0 CONCLUSIONS AND RECOMMENDATIONS

1. Hydrology was based on the HEC-1 computer model and on generally accepted engineering practices in accordance with the Drainage Criteria Manual.
2. The development of this site is in compliance with the Clark County Regional Flood Control District Flood Control Master Plan Update.
3. The onsite flows can be safely conveyed through the site via drive aisles, valley gutters, U-channels, landscape swales, riprap swales and storm drain.
4. Finished floor elevations have been set at least twice the depth of flow of the adjacent the drive aisles.
5. Best Management Practices (BMPs) are provided with the use of Sand/Oil Separators and landscape drainage swales.

6. The site is outside of the Special Hazard Flood Zone.
7. The development of the proposed site is anticipated to have no significant impact to downstream or upstream developments.
8. The subject site is adjacent to an existing Regional Facility. CCRFCD concurrence may be required upon the approval by CLV.

5.0 REFERENCES

1. Department of Public Works, Clark County, Nevada, "Improvement Standards," Revised July 2011
2. U.S. Department of Agriculture, Soils Conservation Services, Technical Release 55, "Urban Hydrology for Small Watersheds," Washington, D.C. January 1975, Revised June 1986
3. U.S. Army Corps of Engineers, "HEC-1 Flood Hydrograph Package," September 1981, Revised January 1985
4. PBS&J and G.C. Wallace, "Flood Control Master Plan Update of the Las Vegas Valley," September 2013
5. Clark County Regional Flood Control District, "Hydrologic Criteria and Drainage Design Manual," September 2013
6. G.C. Wallace, Inc., "Technical Drainage Study for Crossings Business Center Phase II (DS 2950)", Approved September, 2001



**LAS VEGAS
CITY COUNCIL**

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/city of las vegas

June 15, 2016

Crossing Business Center 8, LLC
444 South Flower Street, Ste. 2100
Los Angeles, California 90071

**RE: SCD-64471 [PRJ-64230] - MAJOR DEVIATION - SUMMERLIN
DEVELOPMENT STANDARDS
PLANNING COMMISSION MEETING OF JUNE 14, 2016**

Dear Applicant:

Your request for a Major Deviation of the Summerlin Development Standards TO ALLOW 218 PARKING SPACES WHERE 261 PARKING SPACES ARE REQUIRED FOR A PROPOSED SPECIAL CARE FACILITY AND ASSISTED LIVING APARTMENTS on 11.01 acres at the north corner of Desert Crossing Court and Center Crossing Road (APNs 138-19-419-006 and a portion of 138-30-113-011), P-C (Planned Community) Zone [EC (Employment Center) Summerlin North Special Land Use Designation], Ward 2 (Beers) [PRJ-64230], was considered by the Planning Commission on June 14, 2016.

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

Planning

1. Approval of and conformance to a future City Referral Group application for this site.
2. This approval shall be void one year from the date of final approval, unless a building permit has been issued for the principal building on the site. An Extension of Time may be filed for consideration by the City of Las Vegas.

This action by the Planning Commission on **June 14, 2016** 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 **June 27, 2016**. 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

SCD-64471 [PRJ-64230] - Page Two
June 15, 2016

SG:nj

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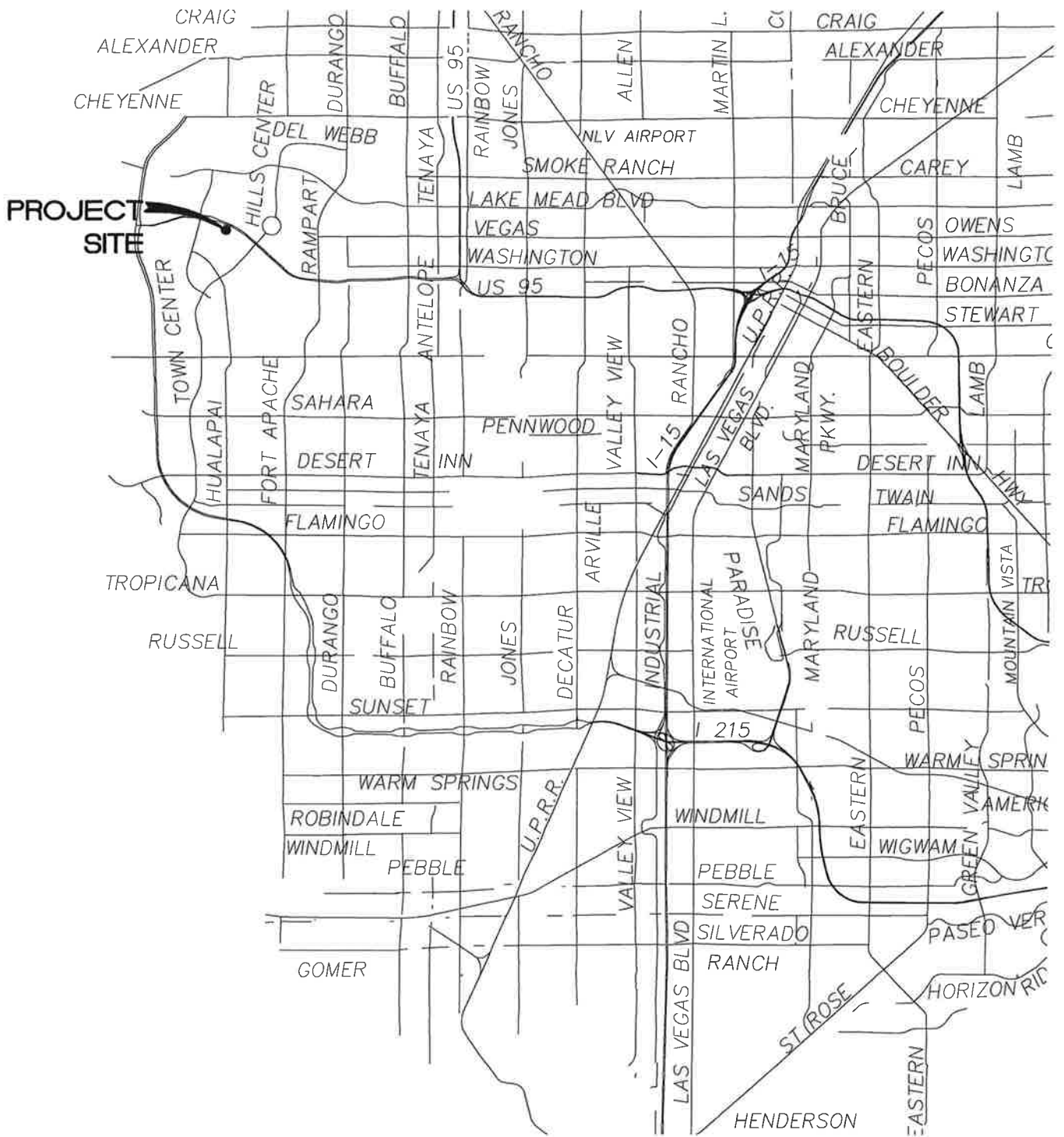
Mr. Thomas Jurbala
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10777 West Twain Avenue, Ste. 115
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Howard Hughes Properties, L.P.
10801 West Charleston Blvd., 3rd Floor
Las Vegas, Nevada 89135

Mr. Bob Gronauer
Kaempfer Crowell
1980 Festival Plaza Drive, Ste. 650
Las Vegas, Nevada 89135

APPENDIX A FIGURES

- **Figure 1 – Vicinity Map**
- **Figure 2 – Location Map**
- **Figure 3 – Existing Basin Map**
- **Figure 4 – FEMA FIRM Map**
- **Figure 5A– CCRFCD MPU Facilities Map**
- **Figure 5B – CCRFCD MPU Facility Inventory Map**
- **Figure 6 – CCRFCD MPU Hydrologic Summary Map**
- **Figure 7 – Developed Condition Basin Map**
- **Figure 8 – FlowMaster Section Map**



N.T.S.

VICINITY MAP

FIGURE 1

CROSSING CARE CAMPUS



DRC Surveying, Inc.
 Civil Engineering • Land Surveying • Land Planning
 7080 LA CIENEGA STREET, STE. 200
 LAS VEGAS, NV 89119 (702) 270-6119



N.T.S.

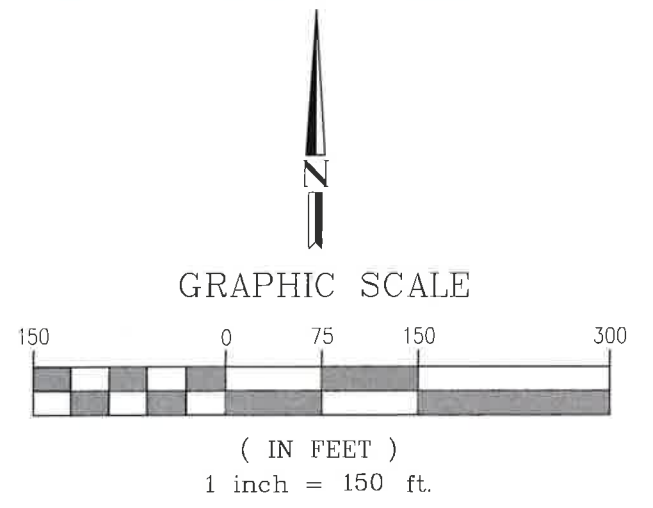
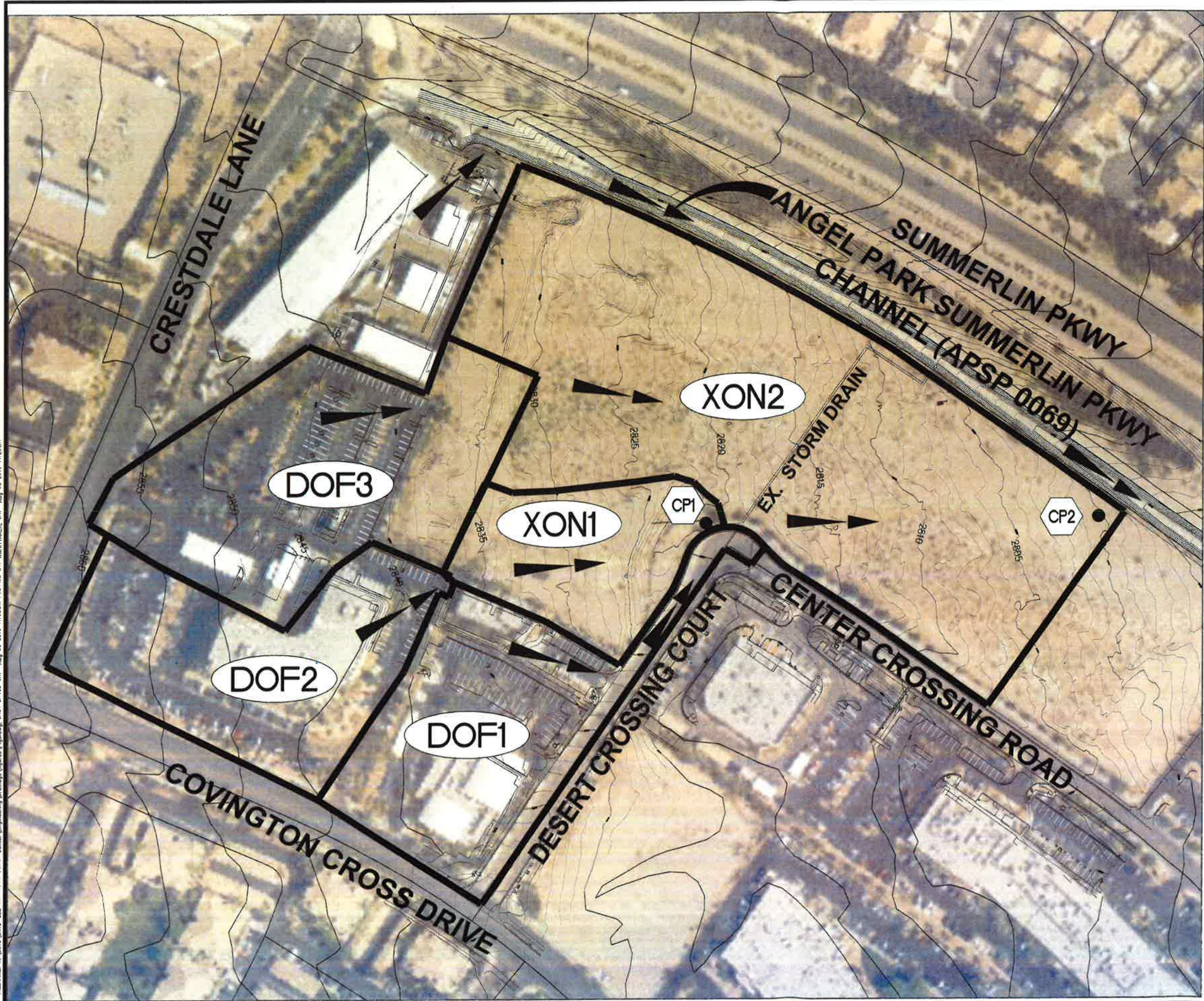
LOCATION MAP

FIGURE 2

CROSSING CARE CAMPUS

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 LAS VEGAS, NV 89119 (702) 270-6119

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PEAK FLOW SUMMARY			
EXISTING CONDITION			
BASIN NAME/ CONC. PT	AREA (ACRES)	10-YR FLOW (CFS)	100-YR FLOW (CFS)
DOF1	2.97	4	8
DOF2	2.86	4	8
XON1	1.63	1	2
CP1	-	4	10
DOF3	3.69	6	12
XON2	8.16	2	10
CP2	-	12	30

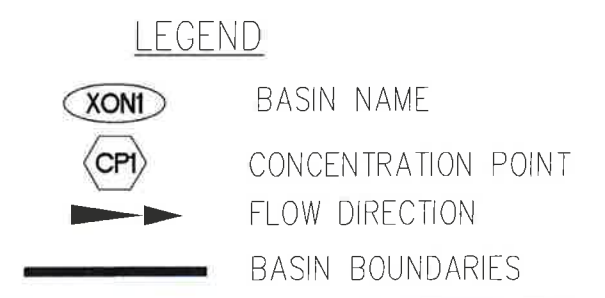


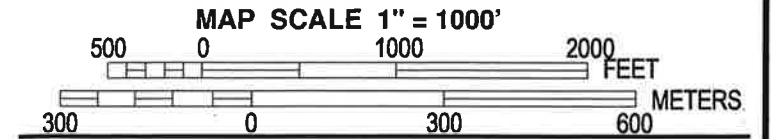
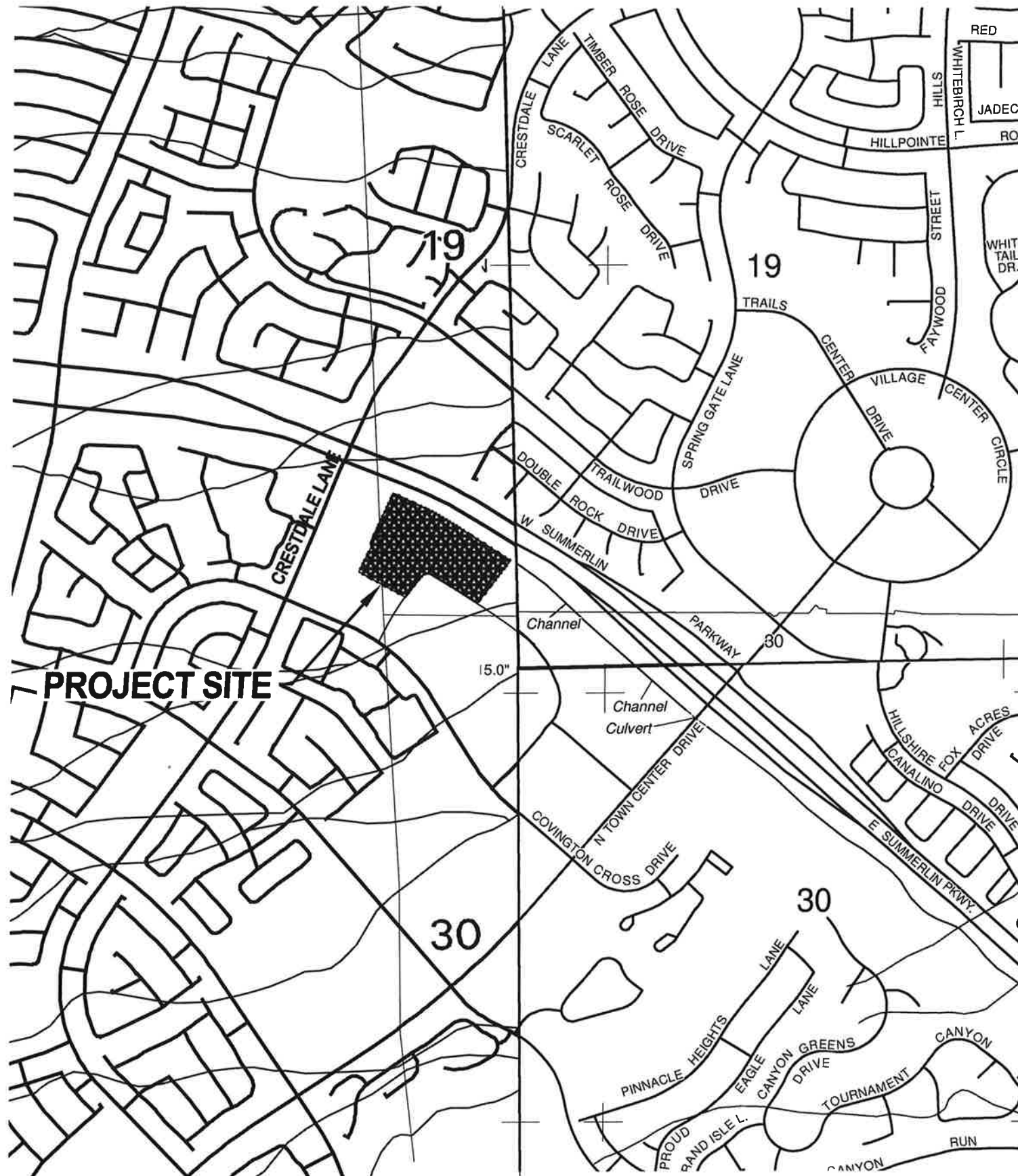
FIGURE 3

**CROSSING CARE CAMPUS
EXISTING CONDITION DRAINAGE MAP**



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ZONE X

OTHER AREAS

Areas determined to be outside the 0.2% annual chance floodplain.

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2150 E

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

PANEL 2150 OF 4090
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LAS VEGAS, CITY OF	325378	2150	E
CLARK COUNTY, UNINCORPORATED AREAS	325383	2150	E

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

MAP NUMBER 32003C2150 E
MAP REVISED: SEPTEMBER 27, 2002

 Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2145F

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

PANEL 2145 OF 4090
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY	320003	2145	F
LAS VEGAS, CITY OF	325276	2145	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 32003C2145F**
MAP REVISED: NOVEMBER 16, 2011

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2135F

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

PANEL 2135 OF 4090
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY	320003	2135	F
LAS VEGAS, CITY OF	325276	2135	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.

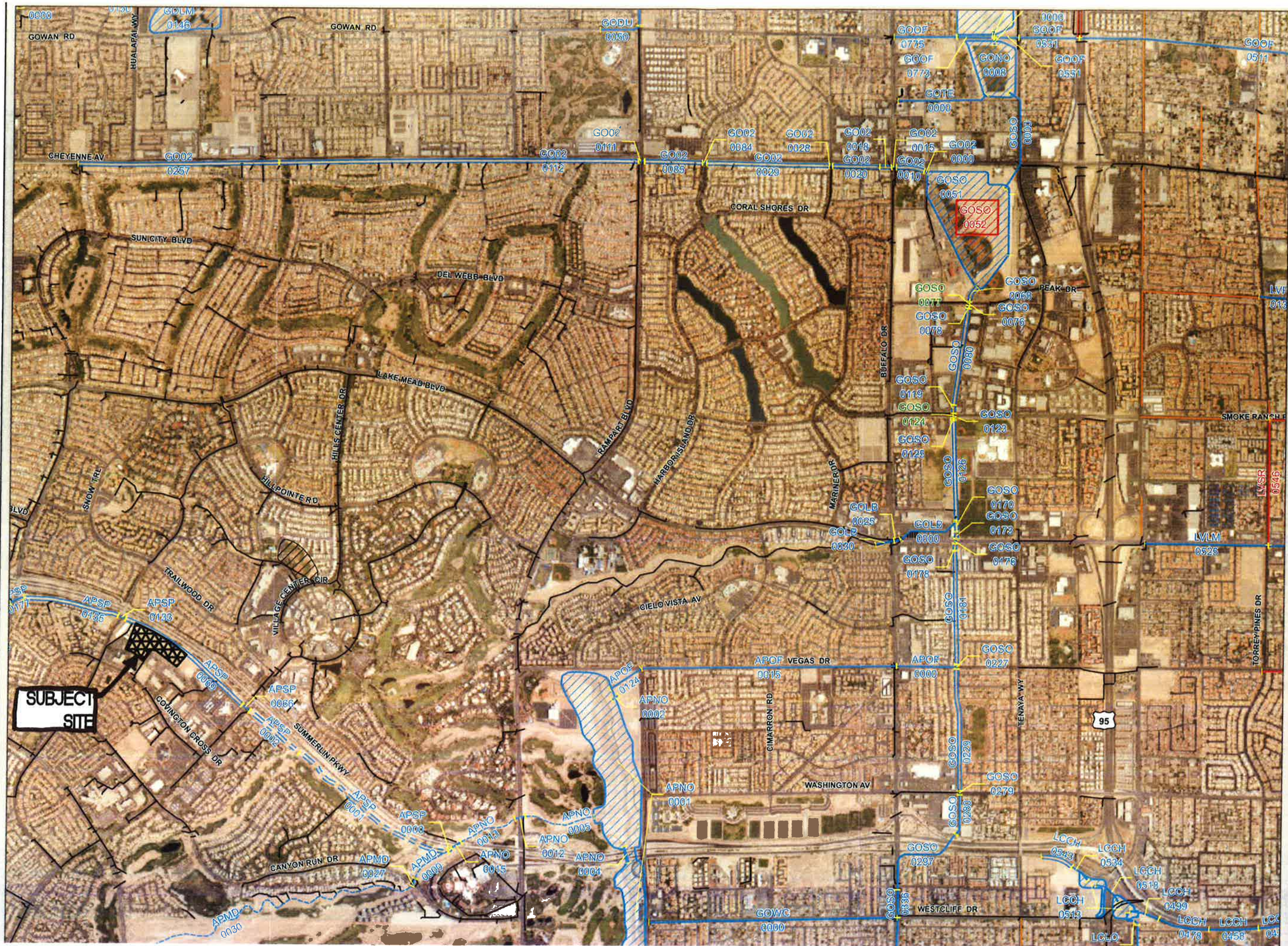
 **MAP NUMBER 32003C2135F**
MAP REVISED: NOVEMBER 16, 2011

Federal Emergency Management Agency

FIGURE 4

CROSSING CARE CAMPUS
FEMA FIRM MAP

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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
 - Channel
 - Stormdrain
 - Category B
 - Channel
 - Stormdrain

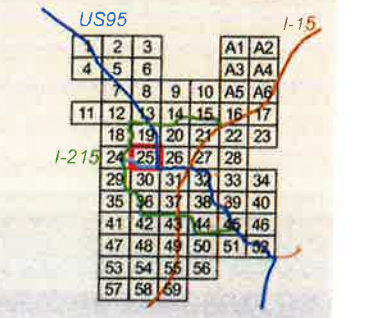
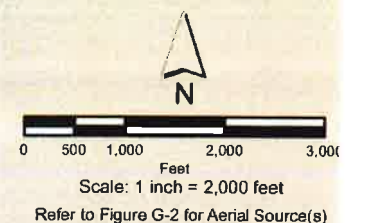


FIG5A

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
ANGEL PARK - MIDDLE BRANCH								
APMD 0000	E	Natural Wash	940	6048	C11A-3*	ALLGOW4	11.31	2.80
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
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
ANGEL PARK OUTFALL								
APOF 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
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
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
GOWAN OUTFALL - U.S. 95 CHANNEL								
GO95 0000	P1	Conc Chnl 12'W 4'D 2:1 SS	2640	299	GD17BG-C	ALLGOW3	0.36	0.30
GOWAN NORTH - DURANGO BRANCH								
GODU 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
GOWAN LAKE MEAD-BUFFALO								
GOLB 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
GOWAN LONE MOUNTAIN SYSTEM								
GOLM 0146	E	888 ac-ft Lone Mountain Detention Basin		7252	LMTNIN	GW3SC	6.13	
GOWAN NORTH SYSTEM								
GONO 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	
GOWAN OUTFALL FACILITIES								
GOOF 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 (%) **
GOWAN SOUTH FACILITIES								
GOSO 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	CCCIVL23	GW3SC	4.52	0.95
0123	E	2: 10' X 7' RCBC @ Smoke Ranch	100	2229^	CCCIVL23^	GW3SC	4.52	0.62
0124	P0	Add 2: 10' X 7' RCBC @ Smoke Ranch	100	1358^	CCCIVL23^	GW3SC	4.52	0.62
0125	E	Conc Chnl 22'W 9'D 0:1 SS	50	3587	CCCIVL23	GW3SC	4.52	0.62
0126	E	Conc Chnl 12'W 7'D 2:1 SS	2155	3587	CCCIVL23	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
GOWAN -TENAYA BRANCH								
GOTE 0000	E	60" RCP	1954	272	LV29-C	ALLGOW3	0.28	1.30
GOWAN SOUTH FACILITIES - WEST CLIFF								
GOWC 0000	E	24" RCP	5400	257	1-WEST-C	ALLGOW3	0.24	1.67
LAS VEGAS CREEK CHANNEL								
LCCH 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
LAS VEGAS CREEK - LORENZI								
LCLO 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
LAS VEGAS WASH - LAKE MEAD								
LVLN 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
OWENS AVENUE SYSTEM								
LVOW 0460	P1	7' X 6' RCB	2700	616	CVG03-C	NW3	0.95	1.48
PEAK DRIVE SYSTEM								
LVPK 0130	E	7' X 5' RCB	1435	400	CPD01-C	NW3	0.67	0.61
LAS VEGAS WASH - SMOKE RANCH								
LVSF 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.

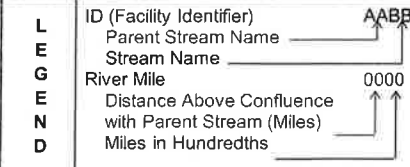
** As-built or design slopes were used when available. All other slopes are based on existing topography. The user should verify the facility slope listed prior to performing any facility specific analysis.

^ 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).



2013 LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FACILITY INVENTORY
FIGURE F - 25



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
Reinforced Concrete Box 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..... RCP
Storm Sewer Pipe..... SSP

FIGURE 5B

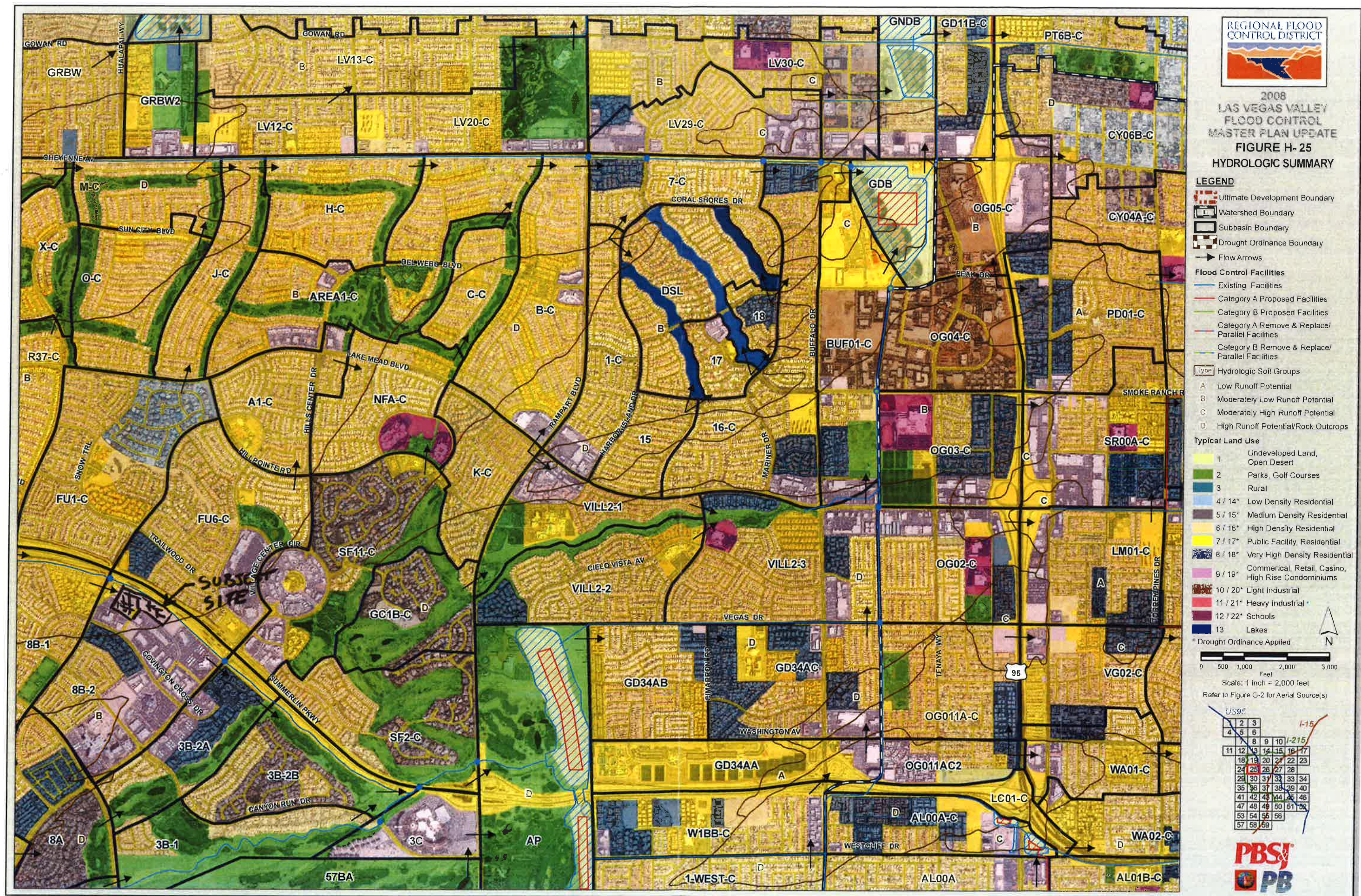
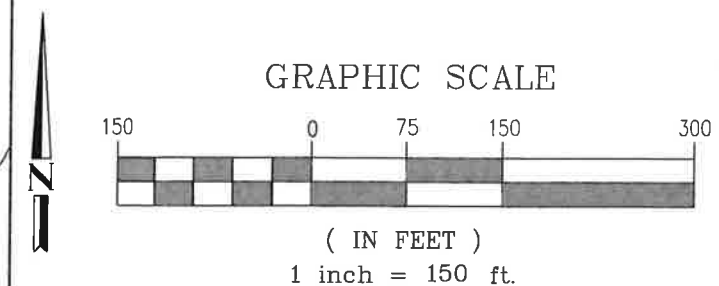
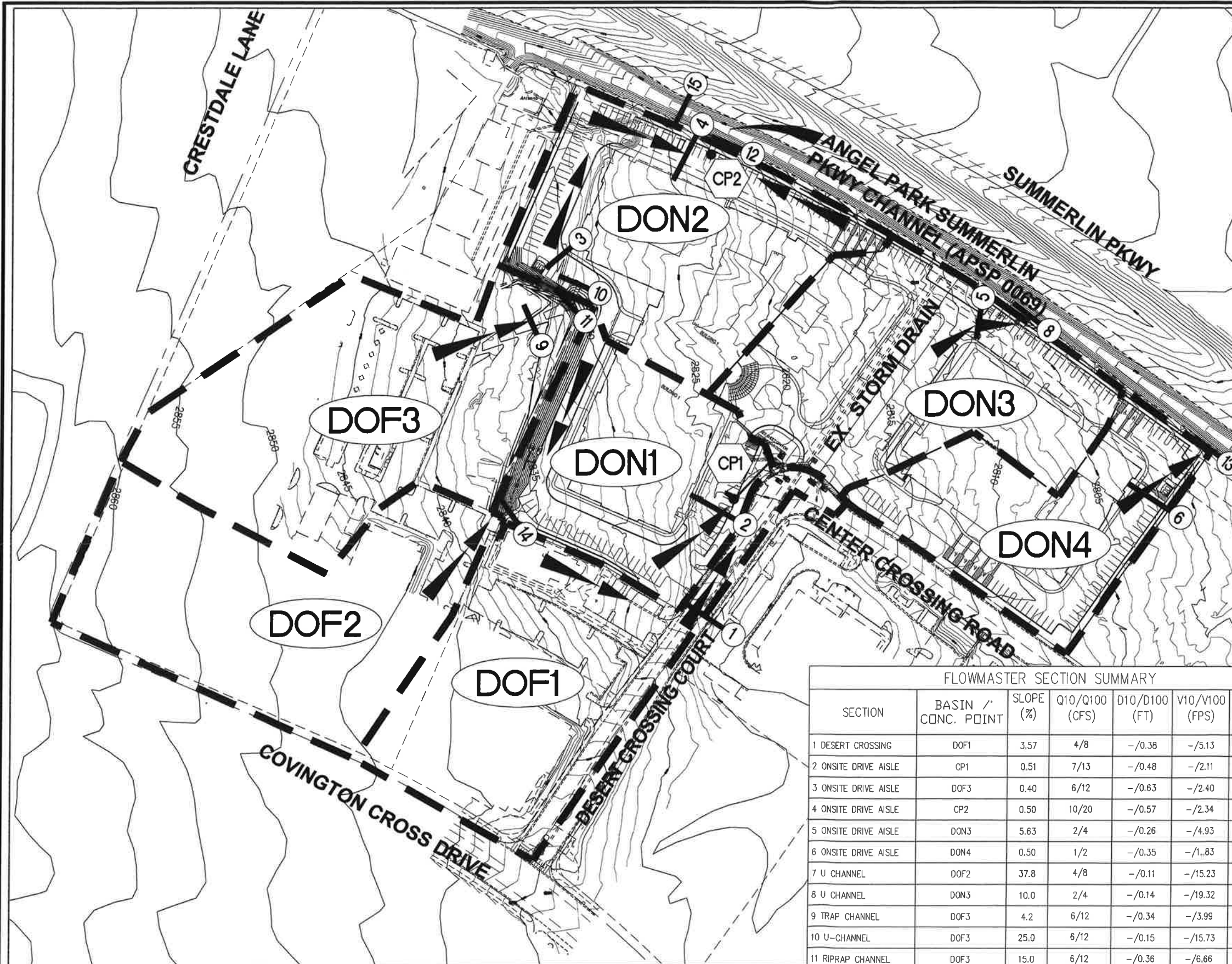


FIG 6

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- LEGEND**
- BASIN NAME
 - CONCENTRATION POINT
 - FLOW DIRECTION
 - BASIN BOUNDARIES

PEAK FLOW SUMMARY			
DEVELOPED CONDITION			
BASIN NAME/ CONC. PT	AREA (ACRES)	10-YR FLOW (CFS)	100-YR FLOW (CFS)
DOF1	2.97	4	8
DOF2	2.86	4	8
DON1	2.09	3	6
CP1	—	7	13
DOF3	3.69	6	12
DON2	2.84	4	8
CP2	—	10	20
DON3	2.89	2	4
DON4	1.98	1	2

FLOWMASTER SECTION SUMMARY						
SECTION	BASIN / CONC. POINT	SLOPE (%)	Q10/Q100 (CFS)	D10/D100 (FT)	V10/V100 (FPS)	DxV10/ DxV100
1 DESERT CROSSING	DOF1	3.57	4/8	-/0.38	-/5.13	-/1.95
2 ONSITE DRIVE AISLE	CP1	0.51	7/13	-/0.48	-/2.11	-/1.01
3 ONSITE DRIVE AISLE	DOF3	0.40	6/12	-/0.63	-/2.40	-/1.51
4 ONSITE DRIVE AISLE	CP2	0.50	10/20	-/0.57	-/2.34	-/1.33
5 ONSITE DRIVE AISLE	DON3	5.63	2/4	-/0.26	-/4.93	-/1.28
6 ONSITE DRIVE AISLE	DON4	0.50	1/2	-/0.35	-/1.83	-/0.64
7 U CHANNEL	DOF2	37.8	4/8	-/0.11	-/15.23	N/A
8 U CHANNEL	DON3	10.0	2/4	-/0.14	-/19.32	N/A
9 TRAP CHANNEL	DOF3	4.2	6/12	-/0.34	-/3.99	N/A
10 U-CHANNEL	DOF3	25.0	6/12	-/0.15	-/15.73	N/A
11 RIPRAP CHANNEL	DOF3	15.0	6/12	-/0.36	-/6.66	N/A
12 U-CHANNEL	CP2	3.0	10/20	-/0.30	-/8.41	N/A
13 U-CHANNEL	DON4	38.2	1/2	-/0.06	-/10.77	N/A
14 U-CHANNEL	DOF2	37.8	4/8	-/0.11	-/15.23	N/A
15 REGIONAL CHANNEL	MPU FLOW	2.4	-/1697	-/3.94	-/31.00	N/A

FIGURE 7

**CROSSING CARE CAMPUS
DEVELOPED CONDITION DRAINAGE MAP**

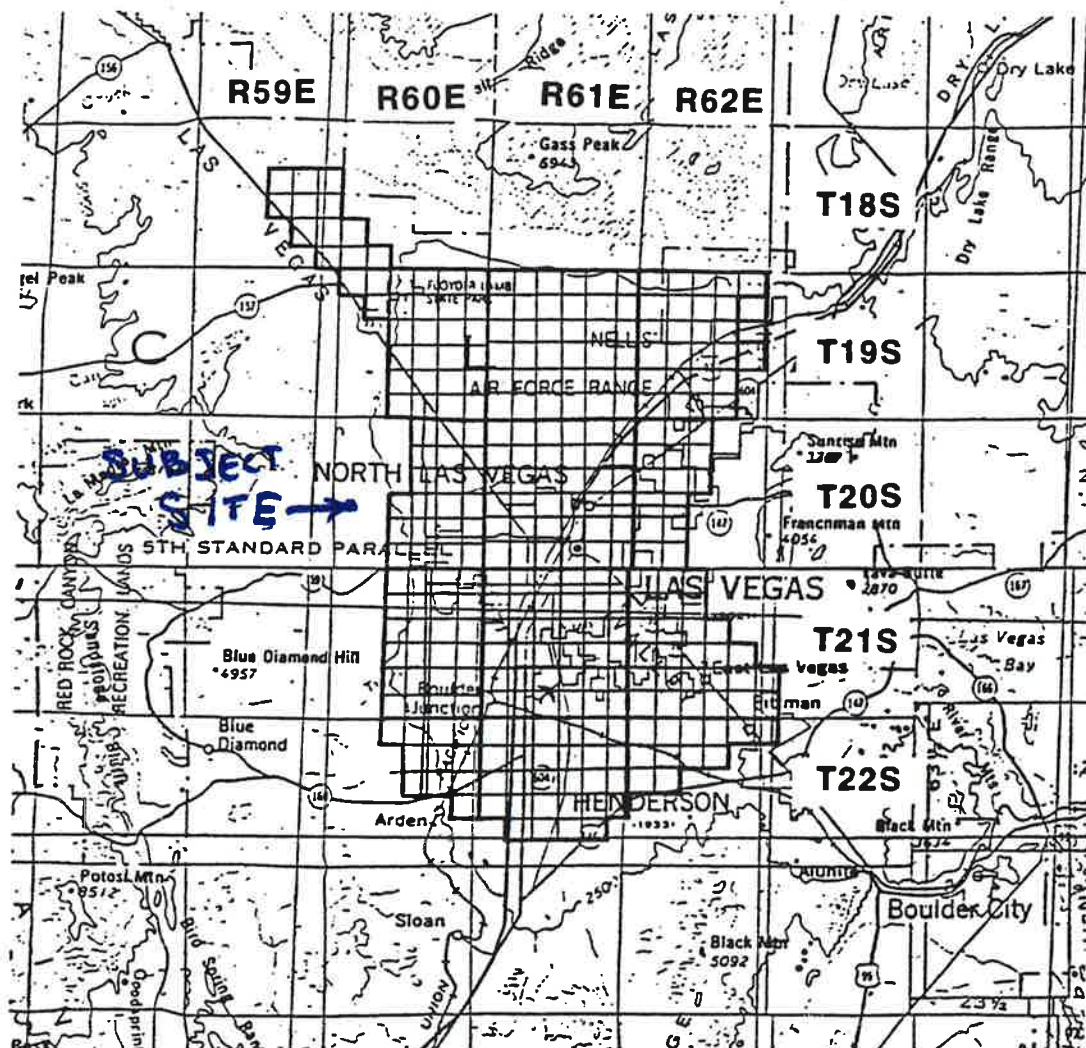
DRC **DRC SURVEYING NEVADA, Inc.**
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APPENDIX B

HYDROLOGY

- **CCRFC Manual Reference Material**
- **NRCS Soils Report**
- **CN Value Calculations Table**
- **Standard Form 4**
- **Existing Conditions HEC-1**
- **Developed Conditions HEC-1**

McCARRAN AIRPORT RAINFALL AREA



TOWNSHIP RANGE SECTIONS

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

TOWNSHIP RANGE SECTIONS

20 South	62 East	4-9,16-20,29-32
21 South	60 East	1-4,9-16,21-28,33-36
21 South	61 East	ALL SECTIONS
21 South	62 East	4-9,15-23, 25-36
22 South	60 East	1-4,10-15,24
22 South	61 East	1-24,26-29
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.

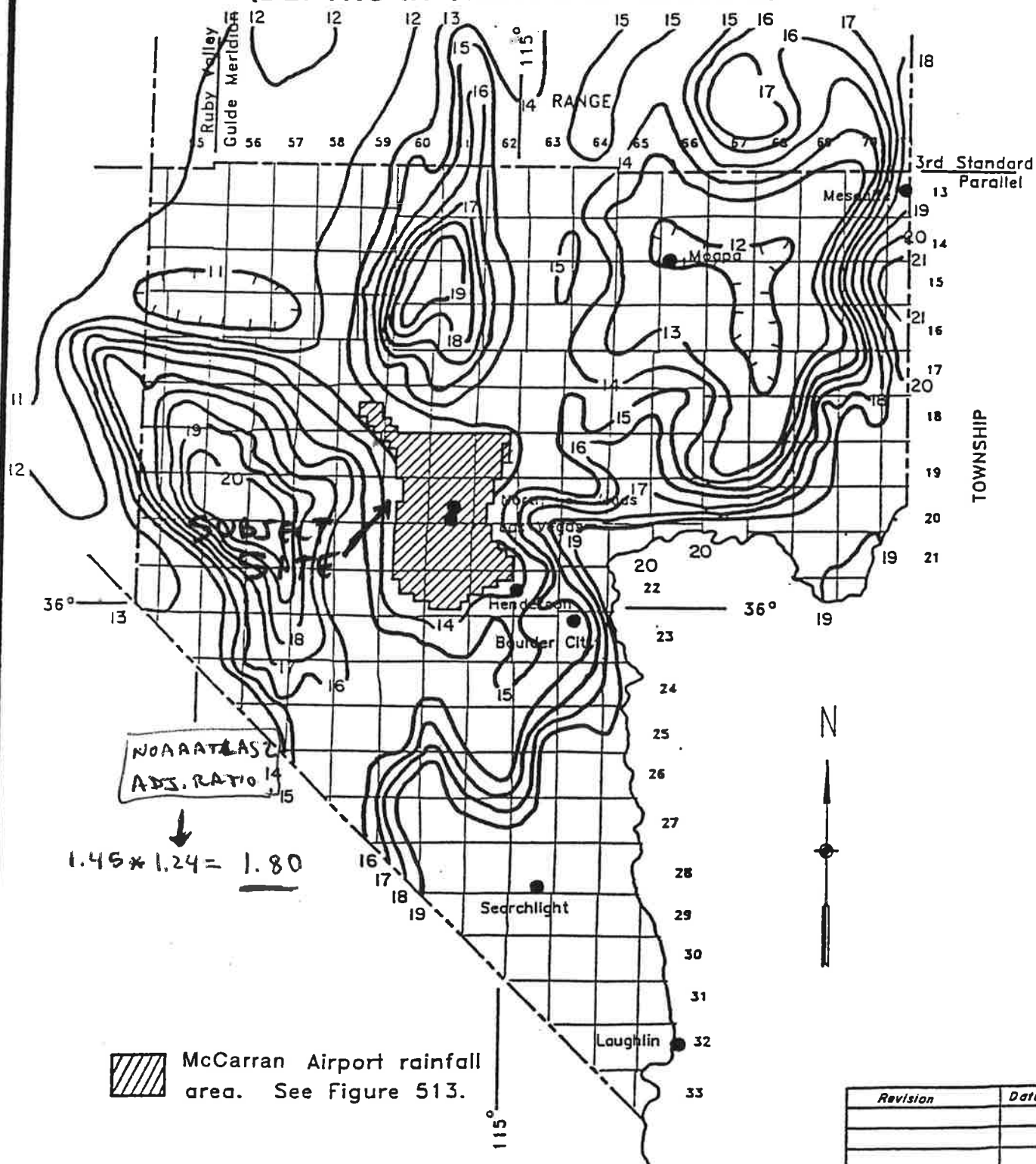
Revision

Date

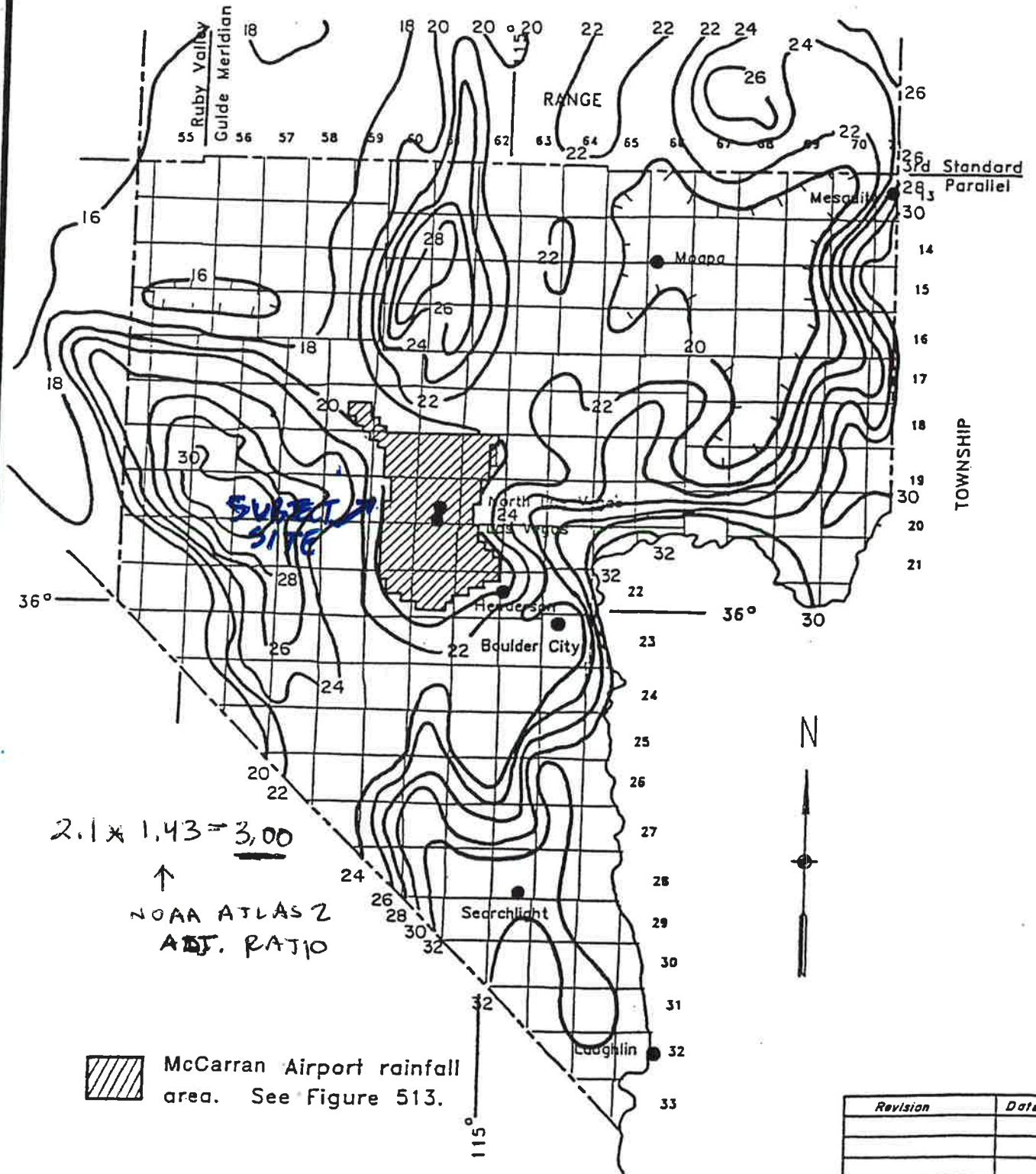
REFERENCE:

USACE, Los Angeles District, 1988

RAINFALL DEPTH-DURATION-FREQUENCY 10-YEAR, 6-HOUR (DEPTHS IN TENTHS OF INCHES)



RAINFALL DEPTH-DURATION-FREQUENCY 100-YEAR, 6-HOUR (DEPTHS IN TENTHS OF INCHES)



PRECIPITATION ADJUSTMENT RATIOS

<u>Recurrence Interval</u>	<u>Ratio to NOAA Atlas 2</u>
2-year	1.00
5-year	1.16
10-year	1.24
25-year	1.33
50-year	1.39
100-year	1.43

- NOTE:
1. Multiply the values obtained from the NOAA Atlas 2 by the above ratios to obtain the adjusted precipitation values.
 2. NOAA Atlas 2 values for use with TR-55 shall not be adjusted by the above ratios.
 3. Tables 505 and 506 require no adjustments.

<i>Revision</i>	<i>Date</i>



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

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

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



July 13, 2016

Custom Soil Resource Report Soil Map



Map Scale: 1:5,950 if printed on A landscape (11" x 8.5") sheet.

0 50 100 200 300 Meters

0 250 500 1000 1500 Feet

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

MAP LEGEND

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

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County
Survey Area Data: Version 10, Aug 22, 2014

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

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

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

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
152	Cave gravelly fine sandy loam, 0 to 4 percent slopes	29.1	18.1%
502	Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes	131.5	81.9%
Totals for Area of Interest		160.6	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If

502—Canutio-Cave gravelly fine sandy loams, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: hrcf
Elevation: 1,700 to 4,800 feet
Mean annual precipitation: 4 to 12 inches
Mean annual air temperature: 57 to 70 degrees F
Frost-free period: 180 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

→ *Canutio and similar soils:* 55 percent
→ *Cave and similar soils:* 40 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canutio

Setting

Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 9 inches: gravelly fine sandy loam
H2 - 9 to 60 inches: stratified extremely gravelly loamy coarse sand to gravelly loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7c
→ *Hydrologic Soil Group:* A
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)

Description of Cave

Setting

Landform: Fan remnants
Down-slope shape: Linear

Custom Soil Resource Report

Across-slope shape: Convex

Parent material: Mixed alluvium

Typical profile

H1 - 0 to 16 inches: gravelly fine sandy loam

H2 - 16 to 30 inches: indurated

H3 - 30 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 2 to 8 percent

Depth to restrictive feature: 4 to 20 inches to petrocalcic

Natural drainage class: Well drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 40 percent

Gypsum, maximum in profile: 5 percent

Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 12.0

Available water storage in profile: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

→ *Hydrologic Soil Group:* D

Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)

Minor Components

Arizo

Percent of map unit: 5 percent

Landform: Channels

Down-slope shape: Linear

Across-slope shape: Concave

Ecological site: VALLEY WASH (R030XB028NV)

Custom Soil Resource Report

Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A
Ecological site: VALLEY WASH (R030XB028NV)



113—Arizo very gravelly fine sandy loam, gypsiferous substratum, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: hr9f
Elevation: 2,000 to 2,800 feet
Mean annual precipitation: 3 to 5 inches
Mean annual air temperature: 57 to 70 degrees F
Frost-free period: 240 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Arizo, gypsiferous substratum, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.



Description of Arizo, Gypsiferous Substratum

Setting

Landform: Inset fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 2 inches: very gravelly fine sandy loam
H3 - 2 to 40 inches: stratified very gravelly coarse sand to extremely gravelly loamy sand
H3 - 40 to 60 inches: gypsiferous material

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Custom Soil Resource Report

Calcium carbonate, maximum in profile: 10 percent
Gypsum, maximum in profile: 60 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
→ *Hydrologic Soil Group:* A
Ecological site: LIMY 3-5 P.Z. (R030XB019NV)
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)

Minor Components

Arizo

Percent of map unit: 5 percent
Landform: Drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: VALLEY WASH (R030XB028NV)

115—Whitebasin-Upperline-Harbasin association

Map Unit Setting

National map unit symbol: 1tf5t
Elevation: 2,030 to 3,280 feet
Mean annual precipitation: 3 to 7 inches
Mean annual air temperature: 57 to 69 degrees F
Frost-free period: 180 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Whitebasin and similar soils: 35 percent
Upperline and similar soils: 30 percent
Harbasin and similar soils: 20 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Whitebasin

Setting

Landform: Pediments
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium and/or residuum weathered from gypsum

Typical profile

H1 - 0 to 1 inches: very fine sandy loam
H2 - 1 to 11 inches: gypsiferous material

CURVE NUMBER CALCULATIONS

PROJECT NO. : SN#15-823

DEVELOPMENT : SUMMERLIN SENIOR CENTER

FILE : SN15-823-CN-VALUES.XLS

CALCULATED BY: AEW

DATE : 08/02/16

HYDROLOGIC SOIL GROUP

Soil Class	Natural Desert	Apartments	Streets / Impervious Areas	Commercial	Desert Landscape
"A"	63	81	98	89	63
"B"	77	88	98	92	77
"C"	85	91	98	94	85
"D"	88	93	98	95	88

BASIN NAME	SOIL DESCRIPTION	DEVELOPMENT TYPE	SOIL GROUP	%	CN VALUE	SOIL DESCRIPTION	DEVELOPMENT TYPE	GROUP	%	CN VALUE	WEIGHTED CN VALUE
ONX1	CANUTIO & ARIZO	NATURAL DESERT	A	60	63	CAVE	NATURAL DESERT	D	40	88	73
ONX2	CANUTIO & ARIZO	NATURAL DESERT	A	60	63	CAVE	NATURAL DESERT	D	40	88	73
ONX3	CANUTIO & ARIZO	NATURAL DESERT	A	60	63	CAVE	NATURAL DESERT	D	40	88	73
OND1	CANUTIO & ARIZO	COMMERCIAL	A	60	89	CAVE	COMMERCIAL	D	40	95	91
OND2	CANUTIO & ARIZO	COMMERCIAL	A	60	89	CAVE	COMMERCIAL	D	40	95	91
OND3	CANUTIO & ARIZO	COMMERCIAL	A	60	89	CAVE	COMMERCIAL	D	40	95	91
OND4	CANUTIO & ARIZO	COMMERCIAL	A	60	89	CAVE	COMMERCIAL	D	40	95	91
DOF1	CANUTIO & ARIZO	COMMERCIAL	A	60	89	CAVE	COMMERCIAL	D	40	95	91
DOF2	CANUTIO & ARIZO	COMMERCIAL	A	60	89	CAVE	COMMERCIAL	D	40	95	91
DOF3	CANUTIO & ARIZO	COMMERCIAL	A	60	89	CAVE	COMMERCIAL	D	40	95	91

HEC-1 ANALYSIS
EXISTING CONDITIONS

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 04AUG16 TIME 08:43:28 *
*****

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

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X X XXXXXXX XXXXX X
X X X X X XX
X X X X X
XXXXXX XXXX X XXXXX X
X X X X X
X X X X X
X X XXXXXXX XXXXX XXX

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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
2 ID TECHNICAL DRAINAGE STUDY
3 ID SUMMERLIN SENIOR CENTER
4 ID 6-HOUR STORM
5 ID RATIO 1=10 YEAR STORM
6 ID RATIO 1=100 YEAR STORM
7 ID EXISTING CONDITIONS
8 ID DATA FILE = SN15-823-EX.DAT
9 ID DRC Surveying Nevada, INC.
10 ID
11 IT 5 0 0 300
12 IO 5 0 0
13 IN 5 0 0
14 JR PREC 0.60 1.00
*
15 KK DOF1
16 KM OFFSITE BASIN DEVELOPED COMMERCIAL
17 BA 0.0046
18 PB 3.00
19 PC 0.0000 0.0200 0.0570 0.0700 0.0870 0.1080 0.1240 0.1300 0.1300 0.1300
20 PC 0.1300 0.1300 0.1300 0.1330 0.1400 0.1420 0.1480 0.1580 0.1720 0.1810
21 PC 0.1900 0.1970 0.1990 0.2000 0.2010 0.2040 0.2140 0.2290 0.2410 0.2490
22 PC 0.2510 0.2560 0.2700 0.2780 0.2810 0.2830 0.2950 0.3220 0.3520 0.4090
23 PC 0.4990 0.5900 0.7100 0.7440 0.7810 0.8120 0.8190 0.8350 0.8510 0.8560
24 PC 0.8600 0.8680 0.8760 0.8880 0.9100 0.9260 0.9370 0.9500 0.9700 0.9760
25 PC 0.9820 0.9850 0.9870 0.9890 0.9900 0.9930 0.9930* 0.9940 0.9950 0.9980
26 PC 0.9980 0.9990 1.0000
27 LS 0 91
28 UD 0.100
*
29 KK DOF2
30 KM OFFSITE BASIN DEVELOPED COMMERCIAL
31 BA 0.0045
32 LS 0 91
33 UD 0.119
*
34 KK XON1
35 KM ONSITE BASIN UNDEVELOPED DESERT
36 BA 0.0025
37 LS 0 73
38 UD 0.093
*
39 KK CP1
40 KM COMBINE BASINS DOF2 AND XON1
41 HC 2
*

```

1 HEC-1 INPUT PAGE 2

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

42 KK DOF3

43	KM	OFFSITE BASIN DEVELOPED COMMERCIAL
44	BA	0.0058
45	LS	0 91
46	UD	0.073
	*	
47	KK	XON2
48	KM	ONSITE BASIN UNDEVELOPED DESERT
49	BA	0.0128
50	LS	0 73
51	UD	0.124
	*	
52	KK	CP2
53	KM	COMBINE CP1 WITH BASINS DOF3 AND XON2
54	HC	3
	*	
55	ZZ	

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

```

15 DOF1
   *
   *
29 DOF2
   *
   *
34 XON1
   *
   *
39 CP1.....
   *
   *
42 DOF3
   *
   *
47 XON2
   *
   *
52 CP2.....
   *
  
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 04AUG16 TIME 08:43:28 *
*****
  
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*****
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*****
  
```

TECHNICAL DRAINAGE STUDY
SUMMERLIN SENIOR CENTER
6-HOUR STORM
RATIO 1=10 YEAR STORM
RATIO 1=100 YEAR STORM
EXISTING CONDITIONS
DATA FILE = SN15-823-EX.DAT
DRC Surveying Nevada, INC.

12 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLT	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
NDDTIME	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
 .60 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 .60	RATIO 2 1.00
HYDROGRAPH AT +	DOF1	.00	1 FLOW TIME	4. 3.50	8. 3.50
HYDROGRAPH AT +	DOF2	.00	1 FLOW TIME	4. 3.58	8. 3.58
HYDROGRAPH AT +	XON1	.00	1 FLOW TIME	1. 3.58	2. 3.50
2 COMBINED AT +	CP1	.01	1 FLOW TIME	4. 3.58	10. 3.58
HYDROGRAPH AT +	DOF3	.01	1 FLOW TIME	6. 3.50	12. 3.50
HYDROGRAPH AT +	XON2	.01	1 FLOW TIME	2. 3.58	10. 3.58
3 COMBINED AT +	CP2	.03	1 FLOW TIME	12. 3.50	30. 3.50

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

HEC-1 ANALYSIS
DEVELOPED CONDITIONS


```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 02AUG16 TIME 15:35:51
*
*****

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* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
*****

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X X XXXXXXX XXXX X
X X X X X XX
X X X X X X
XXXXXX XXXX X XXXX X
X X X X X X
X X X X X X
X X XXXXXXX XXXX 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 -AMSK- 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
2      ID  TECHNICAL DRAINAGE STUDY
3      ID  SUMMERLIN SENIOR CENTER
4      ID  6-HOUR STORM
5      ID  RATIO 1=10 YEAR STORM
6      ID  RATIO 1=100 YEAR STORM
7      ID  DEVELOPED CONDITIONS
8      ID  DATA FILE = SN15-023-DEV.DAT
9      ID  DRC Surveying Nevada, INC.
10     ID
11     IT      5      0      0      300
12     IO      5      0      0
13     IN      5      0      0
14     JR  PREC      0.60      1.00
*
15     KK  DOF1
16     KM  OFFSITE BASIN DEVELOPED COMMERCIAL
17     BA  0.0046
18     PB      3.00
19     PC  0.0000  0.0200  0.0570  0.0700  0.0870  0.1080  0.1240  0.1300  0.1300  0.1300
20     PC  0.1300  0.1300  0.1300  0.1330  0.1400  0.1420  0.1480  0.1580  0.1720  0.1810
21     PC  0.1900  0.1970  0.1990  0.2000  0.2010  0.2040  0.2140  0.2290  0.2410  0.2490
22     PC  0.2510  0.2560  0.2700  0.2780  0.2810  0.2830  0.2950  0.3220  0.3520  0.4090
23     PC  0.4990  0.5900  0.7100  0.7440  0.7810  0.8120  0.8190  0.8350  0.8510  0.8560
24     PC  0.8600  0.8680  0.8760  0.8880  0.9100  0.9260  0.9370  0.9500  0.9700  0.9760
25     PC  0.9820  0.9850  0.9870  0.9890  0.9900  0.9930  0.9930  0.9940  0.9950  0.9980
26     PC  0.9980  0.9990  1.0000
27     LS      0      91
28     UD      0.100
*
29     KK  DOF2
30     KM  OFFSITE BASIN DEVELOPED COMMERCIAL
31     BA  0.0045
32     LS      0      91
33     UD      0.119
*
34     KK  DON1
35     KM  ONSITE BASIN DEVELOPED COMMERCIAL
36     BA  0.0033
37     LS      0      91
38     UD      0.107
*
39     KK  CP1
40     KM  COMBINE BASINS DOF2 AND DON1
41     HC      2
*

```

1

HEC-1 INPUT

PAGE 2

```

LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
42     KK  DOF3

```

```

43      KM  OFFSITE BASIN DEVELOPED COMMERCIAL
44      BA  0.0058
45      LS      0      91
46      UD  0.073
      *

47      KK  DON2
48      KM  ONSITE BASIN DEVELOPED COMMERCIAL
49      BA  0.0044
50      LS      0      91
51      UD  0.094
      *

52      KK  CP2
53      KM  COMBINE DOF3 AND DON2
54      HC      2
      *

55      KK  DON3
56      KM  ONSITE BASIN DEVELOPED COMMERCIAL
57      BA  0.0045
58      LS      0      91
59      UD  0.66
      *

60      KK  DON4
61      KM  ONSITE BASIN DEVELOPED COMMERCIAL
62      BA  0.0031
63      LS      0      91
64      UD  0.81
      *
65      ZZ

```

SCHEMATIC DIAGRAM OF STREAM NETWORK

```

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

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

15      DOF1
      *
29      *      DOF2
      *      *
34      *      *      DON1
      *      *      *
39      *      *      CP1.....
      *      *      *
42      *      *      DOF3
      *      *      *
47      *      *      *      DON2
      *      *      *      *
52      *      *      *      CP2.....
      *      *      *      *
55      *      *      *      DON3
      *      *      *      *
60      *      *      *      *      DON4

```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 02AUG16 TIME 15:35:51 *
*****

```

```

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

```

TECHNICAL DRAINAGE STUDY
 SUMMERLIN SENIOR CENTER
 6-HOUR STORM
 RATIO 1=10 YEAR STORM
 RATIO 1=100 YEAR STORM
 DEVELOPED CONDITIONS
 DATA FILE = SN15-823-DEV.DAT
 DRC Surveying Nevada, INC.

```

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

```

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

COMPUTATION INTERVAL .08 HOURS
 TOTAL TIME BASE 24.92 HOURS

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

JP MULTI-PLAN OPTION
 NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
 RATIOS OF PRECIPITATION
 .60 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 .60	RATIO 2 1.00
HYDROGRAPH AT +	DOF1	.00	1 FLOW TIME	4. 3.50	8. 3.50
HYDROGRAPH AT +	DOF2	.00	1 FLOW TIME	4. 3.58	8. 3.58
HYDROGRAPH AT +	DON1	.00	1 FLOW TIME	3. 3.50	6. 3.50
2 COMBINED AT +	CP1	.01	1 FLOW TIME	7. 3.58	13. 3.50
HYDROGRAPH AT +	DOF3	.01	1 FLOW TIME	6. 3.50	12. 3.50
HYDROGRAPH AT +	DON2	.00	1 FLOW TIME	4. 3.50	8. 3.50
2 COMBINED AT +	CP2	.01	1 FLOW TIME	10. 3.50	20. 3.50
HYDROGRAPH AT +	DON3	.00	1 FLOW TIME	2. 4.08	4. 4.08
HYDROGRAPH AT +	DON4	.00	1 FLOW TIME	1. 4.25	2. 4.25

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

APPENDIX C

HYDRAULICS

STREET/FLOW SECTION
CALCULATIONS

1 DESERT COURT (Q100)

Worksheet for Irregular Channel

Project Description	
Worksheet	1 DESERT COURT (Q100)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	3.57 %
Discharge	8.00 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	0.38 ft
Elevation Range	0.00 to 0.63
Flow Area	1.6 ft ²
Wetted Perimeter	12.36 ft
Top Width	11.93 ft
Actual Depth	0.38 ft
Critical Elevation	0.49 ft
Critical Slope	0.50 %
Velocity	5.13 ft/s
Velocity Head	0.41 ft
Specific Energy	0.79 ft
Froude Number	2.50
Flow Type	Supercritical

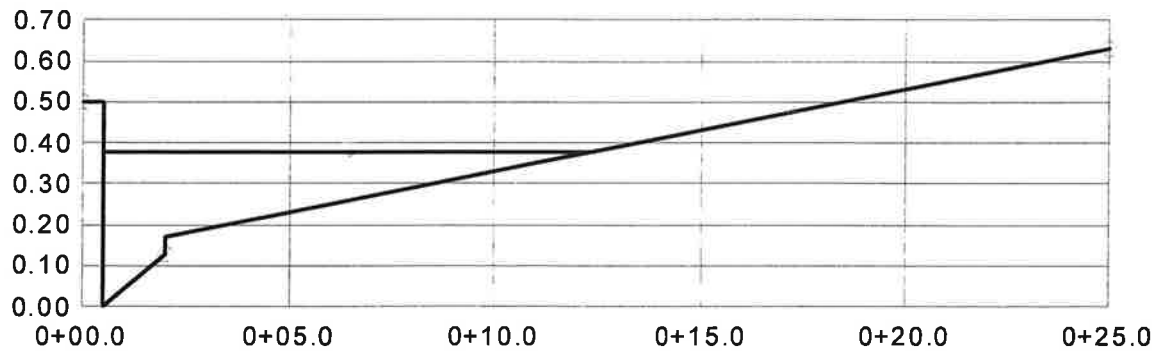
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+02.0	0.013
0+02.0	0+25.0	0.017

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.50
0+00.5	0.50
0+00.5	0.00
0+02.0	0.13
0+02.0	0.17
0+25.0	0.63

1 DESERT COURT (Q100)
Cross Section for Irregular Channel

Project Description	
Worksheet	1 DESERT COURT (Q100)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.014
Channel Slope	3.57 %
Water Surface Elevation	0.38 ft
Elevation Range	0.00 to 0.63
Discharge	8.00 cfs



V: 10.0
H: 1
NTS

2 ONSITE DRIVE AISLE (Q100)

Worksheet for Irregular Channel

Project Description	
Worksheet	2 ONSITE DRIVE AISLE (Q100)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.51 %
Discharge	13.00 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	0.016
Water Surface Elevation	21.38 ft
Elevation Range	20.90 to 22.10
Flow Area	6.2 ft²
Wetted Perimeter	33.25 ft
Top Width	32.73 ft
Actual Depth	0.48 ft
Critical Elevation	20.90 ft
Critical Slope	0.00 %
Velocity	2.11 ft/s
Velocity Head	0.07 ft
Specific Energy	21.45 ft
Froude Number	0.86
Flow Type	Subcritical

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+51.0	0.017
0+51.0	0+52.0	0.013

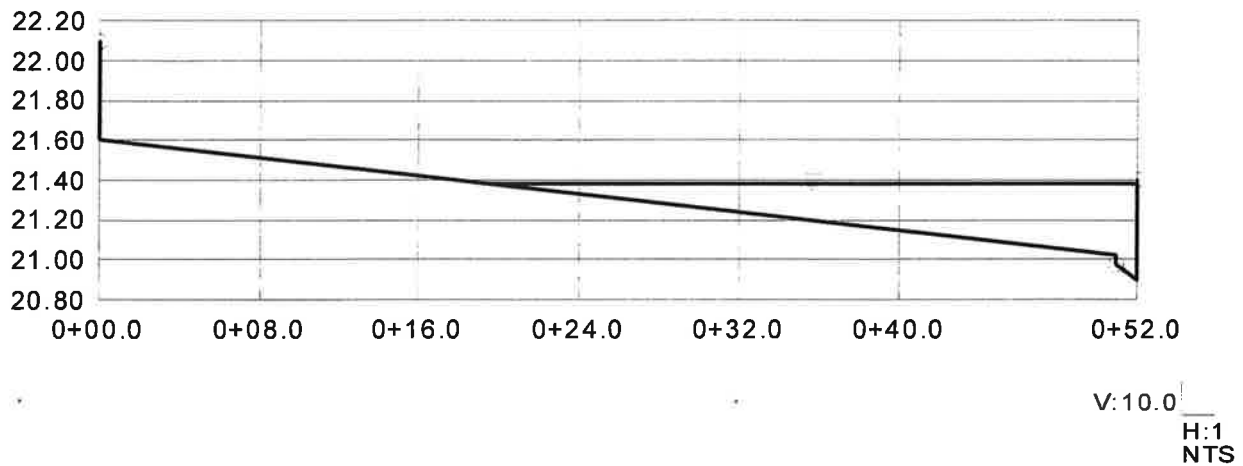
Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	22.10
0+00.0	21.60
0+51.0	21.02
0+51.0	20.98
0+52.0	20.90
0+52.0	21.40

2 ONSITE DRIVE AISLE (Q100)

Cross Section for Irregular Channel

Project Description	
Worksheet	2 ONSITE DRIVE AISLE (Q100)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.016
Channel Slope	0.51 %
Water Surface Elevation	21.38 ft
Elevation Range	20.90 to 22.10
Discharge	13.00 cfs



3 ONSITE DRIVE AISLE (Q100)

Worksheet for Irregular Channel

Project Description		
Worksheet	3 ONSITE DRIVE AISLE (Q100)	
Flow Element	Irregular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	

Input Data		
Channel Slope	0.40	%
Discharge	12.00	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	0.016	
Water Surface Elevation	23.63	ft
Elevation Range	23.00 to 24.40	
Flow Area	5.0	ft²
Wetted Perimeter	18.81	ft
Top Width	18.13	ft
Actual Depth	0.63	ft
Critical Elevation	23.59	ft
Critical Slope	0.63	%
Velocity	2.40	ft/s
Velocity Head	0.09	ft
Specific Energy	23.72	ft
Froude Number	0.81	
Flow Type	Subcritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.13390092 ft.

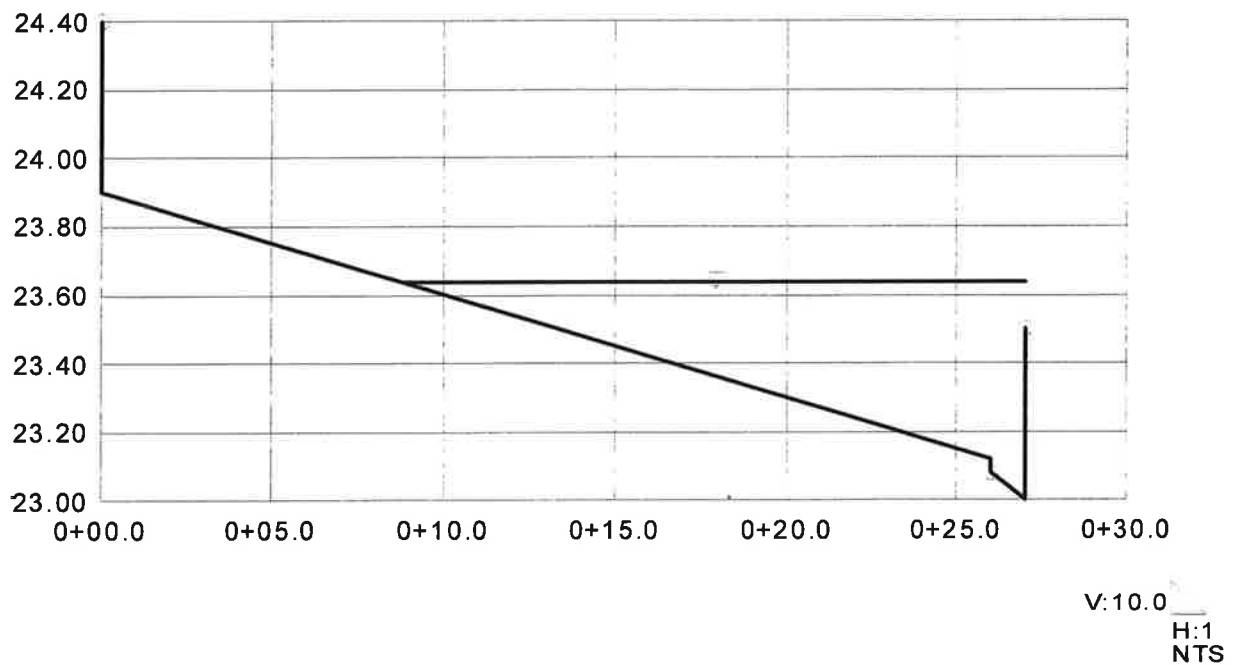
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+26.0	0.017
0+26.0	0+27.0	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	24.40
0+00.0	23.90
0+26.0	23.12
0+26.0	23.08
0+27.0	23.00
0+27.0	23.50

3 ONSITE DRIVE AISLE (Q100) Cross Section for Irregular Channel

Project Description	
Worksheet	3 ONSITE DRIVE AISLE (Q100)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.016
Channel Slope	0.40 %
Water Surface Elevation	23.63 ft
Elevation Range	23.00 to 24.40
Discharge	12.00 cfs



4 ONSITE DRIVE AISLE (Q100)

Worksheet for Irregular Channel

Project Description	
Worksheet	4 ONSITE DRIVE AISLE (Q100)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.50 %
Discharge	20.00 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	0.017
Water Surface Elevation	21.72 ft
Elevation Range	21.15 to 22.30
Flow Area	8.6 ft²
Wetted Perimeter	38.50 ft
Top Width	37.89 ft
Actual Depth	0.57 ft
Critical Elevation	21.15 ft
Critical Slope	0.00 %
Velocity	2.34 ft/s
Velocity Head	0.08 ft
Specific Energy	21.80 ft
Froude Number	0.87
Flow Type	Subcritical

Calculation Messages:

Water elevation exceeds lowest end station by 0.06591740 ft.

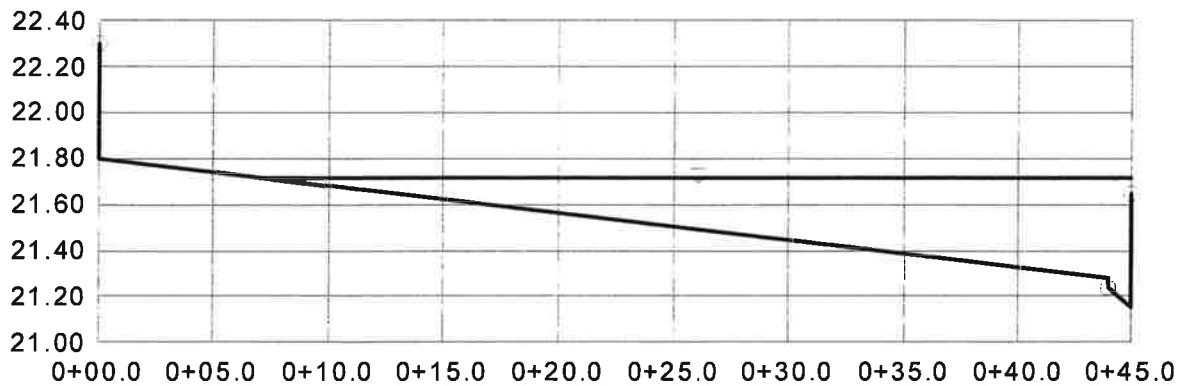
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+44.0	0.017
0+44.0	0+45.0	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	22.30
0+00.0	21.80
0+44.0	21.28
0+44.0	21.24
0+45.0	21.15
0+45.0	21.65

4 ONSITE DRIVE AISLE (Q100) **Cross Section for Irregular Channel**

Project Description	
Worksheet	4 ONSITE DRIVE AISLE (Q100)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.017
Channel Slope	0.50 %
Water Surface Elevation	21.72 ft
Elevation Range	21.15 to 22.30
Discharge	20.00 cfs



V: 10.0
H: 1
NTS

5 ONSITE DRIVE AISLE (Q100)

Worksheet for Irregular Channel

Project Description	
Worksheet	5 ONSITE DRIVE AISLE (Q100)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	5.63 %
Discharge	4.00 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	13.66 ft
Elevation Range	13.40 to 14.40
Flow Area	0.8 ft ²
Wetted Perimeter	9.42 ft
Top Width	9.11 ft
Actual Depth	0.26 ft
Critical Elevation	13.76 ft
Critical Slope	0.58 %
Velocity	4.93 ft/s
Velocity Head	0.38 ft
Specific Energy	14.04 ft
Froude Number	2.91
Flow Type	Supercritical

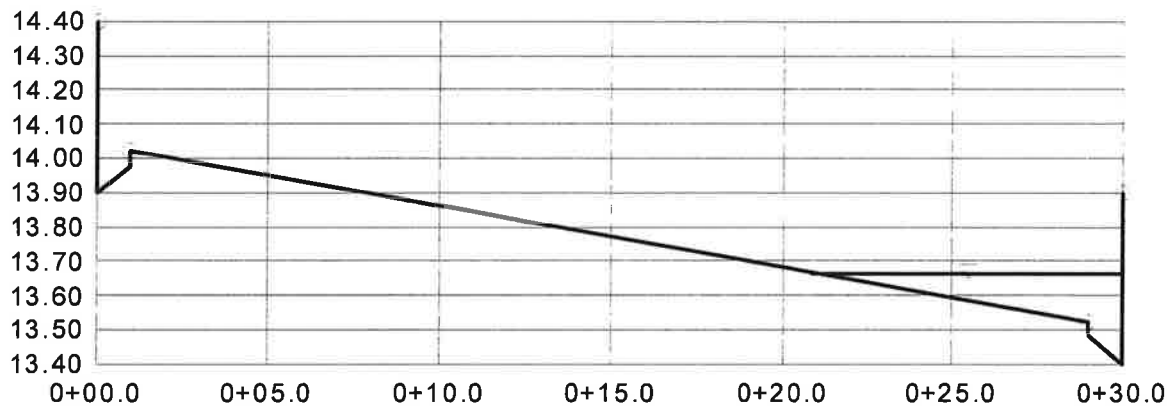
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+01.0	0.013
0+01.0	0+29.0	0.017
0+29.0	0+30.0	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	14.40
0+00.0	13.90
0+01.0	13.98
0+01.0	14.02
0+29.0	13.52
0+29.0	13.48
0+30.0	13.40
0+30.0	13.90

5 ONSITE DRIVE AISLE (Q100) **Cross Section for Irregular Channel**

Project Description	
Worksheet	5 ONSITE DRIVE AISLE (Q100)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.014
Channel Slope	5.63 %
Water Surface Elevation	13.66 ft
Elevation Range	13.40 to 14.40
Discharge	4.00 cfs



V:10.0
H:1
NTS

6 ONSITE DRIVE AISLE (Q100)

Worksheet for Irregular Channel

Project Description	
Worksheet	6 ONSITE DRIVE AISLE (Q100)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Channel Slope	0.50 %
Discharge	2.00 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	10.02 ft
Elevation Range	9.67 to 11.60
Flow Area	1.1 ft ²
Wetted Perimeter	8.71 ft
Top Width	8.32 ft
Actual Depth	0.35 ft
Critical Elevation	9.67 ft
Critical Slope	0.00 %
Velocity	1.83 ft/s
Velocity Head	0.05 ft
Specific Energy	10.07 ft
Froude Number	0.89
Flow Type	Subcritical

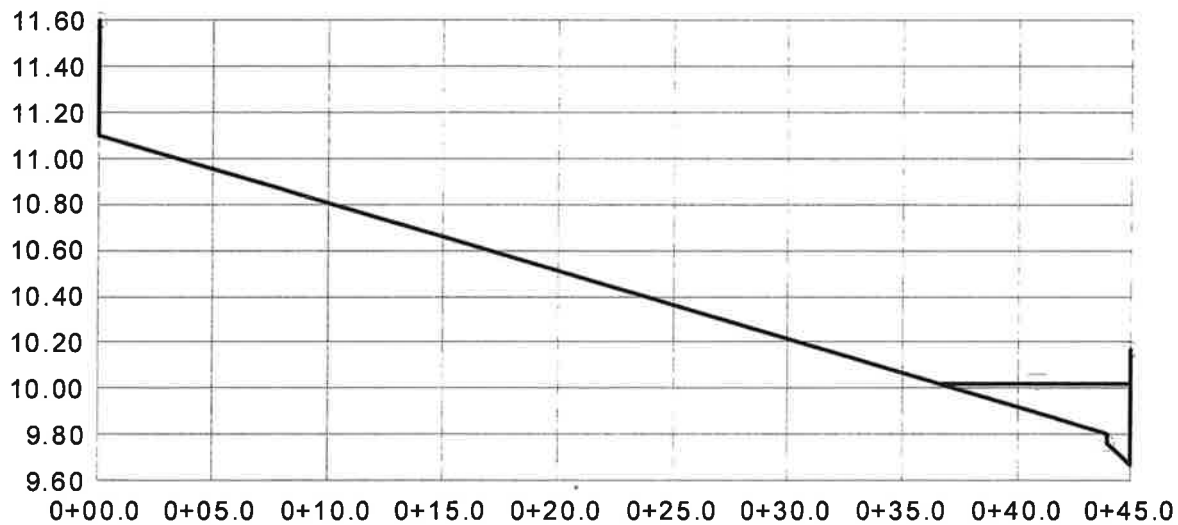
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+44.0	0.017
0+44.0	0+45.0	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	11.60
0+00.0	11.10
0+44.0	9.80
0+44.0	9.76
0+45.0	9.67
0+45.0	10.17

6 ONSITE DRIVE AISLE (Q100)
Cross Section for Irregular Channel

Project Description	
Worksheet	6 ONSITE DRIVE AISLE (Q100)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.014
Channel Slope	0.50 %
Water Surface Elevation	10.02 ft
Elevation Range	9.67 to 11.60
Discharge	2.00 cfs



V: 10.0
H: 1
NTS

7 U CHANNEL (Q100)
Worksheet for Rectangular Channel

Project Description	
Worksheet	7 U-CHANNEL (Q100)
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

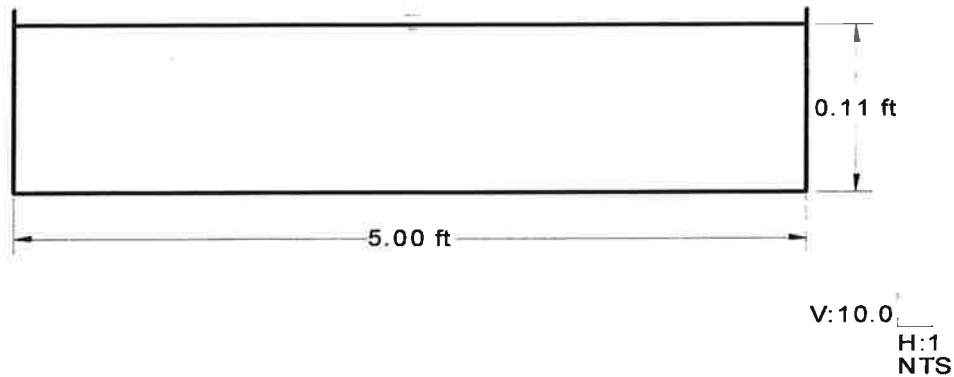
Input Data	
Mannings Coefficient	0.013
Channel Slope	37.80 %
Bottom Width	5.00 ft
Discharge	8.00 cfs

Results	
Depth	0.11 ft
Flow Area	0.5 ft ²
Wetted Perimeter	5.21 ft
Top Width	5.00 ft
Critical Depth	0.43 ft
Critical Slope	0.40 %
Velocity	15.23 ft/s
Velocity Head	3.60 ft
Specific Energy	3.71 ft
Froude Number	8.28
Flow Type	Supercritical

7 U CHANNEL (Q100)
Cross Section for Rectangular Channel

Project Description	
Worksheet	7 U-CHANNEL (Q100)
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.013
Channel Slope	37.80 %
Depth	0.11 ft
Bottom Width	5.00 ft
Discharge	8.00 cfs



8 U-CHANNEL (Q100)
Worksheet for Rectangular Channel

Project Description	
Worksheet	8 U-CHANNEL (Q100)
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

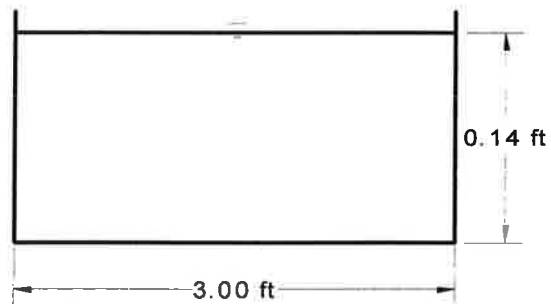
Input Data	
Mannings Coefficient	0.013
Channel Slope	10.00 %
Bottom Width	3.00 ft
Discharge	4.00 cfs

Results	
Depth	0.14 ft
Flow Area	0.4 ft ²
Wetted Perimeter	3.29 ft
Top Width	3.00 ft
Critical Depth	0.38 ft
Critical Slope	0.46 %
Velocity	9.32 ft/s
Velocity Head	1.35 ft
Specific Energy	1.49 ft
Froude Number	4.34
Flow Type	Supercritical

8 U-CHANNEL (Q100)
Cross Section for Rectangular Channel

Project Description	
Worksheet	8 U-CHANNEL (Q100)
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.013
Channel Slope	10.00 %
Depth	0.14 ft
Bottom Width	3.00 ft
Discharge	4.00 cfs



V: 10.0
H: 1
NTS

9 TRAP CHANNEL (Q100)

Worksheet for Trapezoidal Channel

Project Description	
Worksheet	9 TRAP CHANNEL (Q100)
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

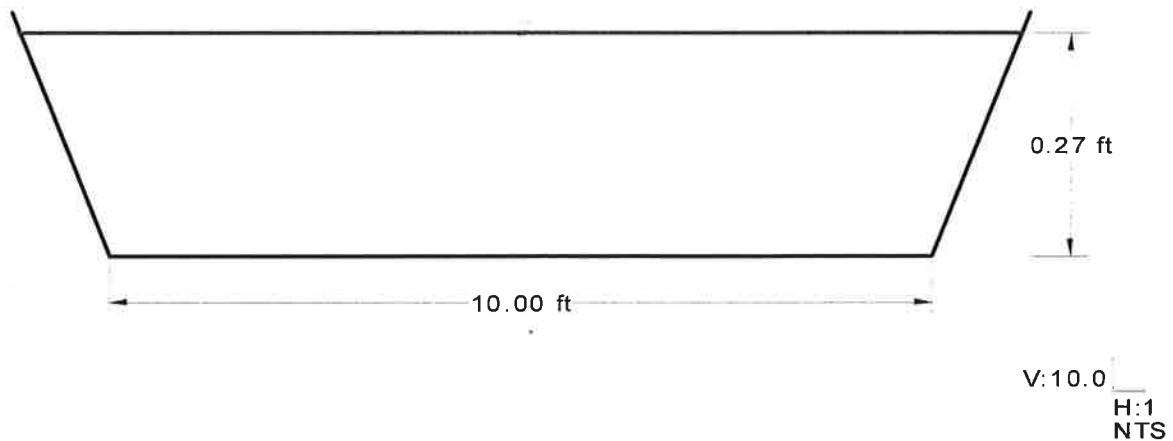
Input Data	
Mannings Coefficient	0.030
Channel Slope	4.20 %
Left Side Slope	4.00 H : V
Right Side Slope	4.00 H : V
Bottom Width	10.00 ft
Discharge	12.00 cfs

Results	
Depth	0.27 ft
Flow Area	3.0 ft ²
Wetted Perimeter	12.24 ft
Top Width	12.17 ft
Critical Depth	0.34 ft
Critical Slope	1.97 %
Velocity	3.99 ft/s
Velocity Head	0.25 ft
Specific Energy	0.52 ft
Froude Number	1.41
Flow Type	Supercritical

9 TRAP CHANNEL (Q100)
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	9 TRAP CHANNEL (Q100)
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.030
Channel Slope	4.20 %
Depth	0.27 ft
Left Side Slope	4.00 H : V
Right Side Slope	4.00 H : V
Bottom Width	10.00 ft
Discharge	12.00 cfs



10 U-CHANNEL (Q100)
Worksheet for Rectangular Channel

Project Description	
Worksheet	10 U-CHANNEL (Q100)
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

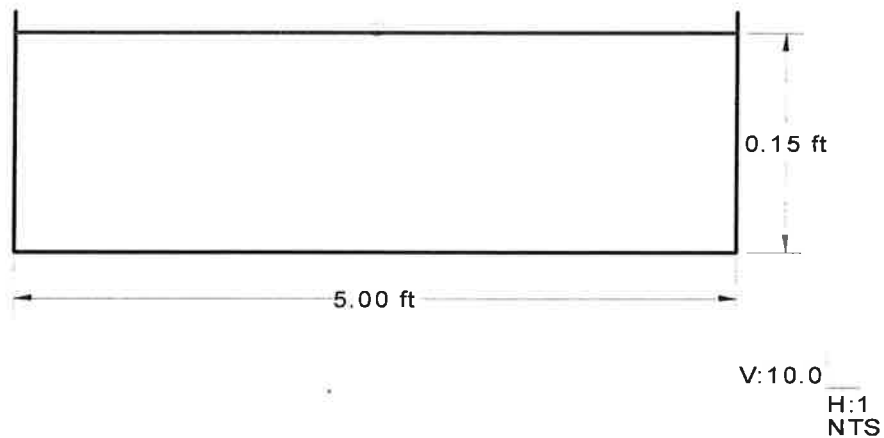
Input Data	
Mannings Coefficient	0.013
Channel Slope	25.00 %
Bottom Width	5.00 ft
Discharge	12.00 cfs

Results	
Depth	0.15 ft
Flow Area	0.8 ft ²
Wetted Perimeter	5.31 ft
Top Width	5.00 ft
Critical Depth	0.56 ft
Critical Slope	0.39 %
Velocity	15.73 ft/s
Velocity Head	3.84 ft
Specific Energy	4.00 ft
Froude Number	7.10
Flow Type	Supercritical

10 U-CHANNEL (Q100)
Cross Section for Rectangular Channel

Project Description	
Worksheet	10 U-CHANNEL (Q100)
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.013
Channel Slope	25.00 %
Depth	0.15 ft
Bottom Width	5.00 ft
Discharge	12.00 cfs



11 RIPRAP U-CHANNEL (Q100)

Worksheet for Rectangular Channel

Project Description	
Worksheet	11 RIPRAP U-CHANNEL (Q100)
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

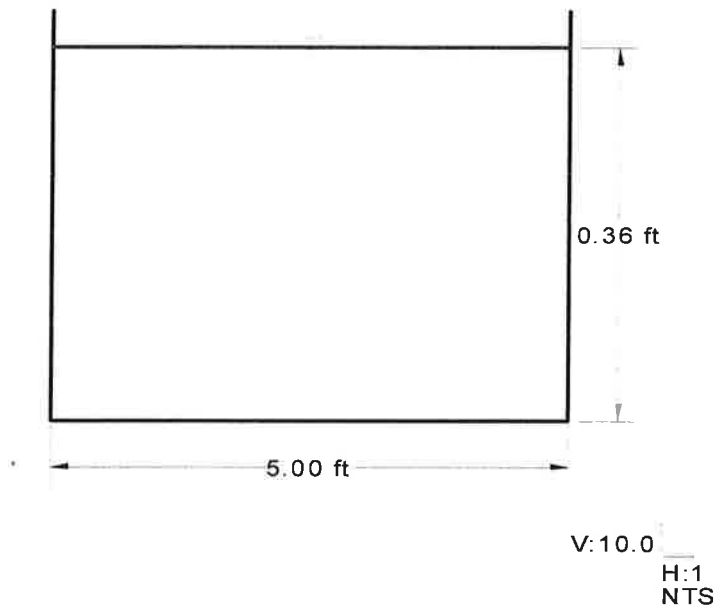
Input Data	
Mannings Coefficient	0.040
Channel Slope	15.00 %
Bottom Width	5.00 ft
Discharge	12.00 cfs

Results	
Depth	0.36 ft
Flow Area	1.8 ft ²
Wetted Perimeter	5.72 ft
Top Width	5.00 ft
Critical Depth	0.56 ft
Critical Slope	3.70 %
Velocity	6.66 ft/s
Velocity Head	0.69 ft
Specific Energy	1.05 ft
Froude Number	1.96
Flow Type	Supercritical

11 RIPRAP U-CHANNEL (Q100)
Cross Section for Rectangular Channel

Project Description	
Worksheet	11 RIPRAP U-CHANNEL (Q100)
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.040
Channel Slope	15.00 %
Depth	0.36 ft
Bottom Width	5.00 ft
Discharge	12.00 cfs



Rip Rap Calculations

Project: SUMMERLIN SENIOR CENTER

Eqn. 732

$$n = 0.0395(d_{50})^{1/6}$$

Assume $d_{50} =$ 1 ft

$$n = \mathbf{0.040}$$

For Channel Lining

From CCRFCD, Sec. 705.4.6: $V = 3(d_{50}^{0.5})(S_s - 1)/S^{0.17}$ Eqn. 734

Solve for d_{50}

V = Velocity (ft/s)

S_s = Specific gravity of rock (minimum $S_s = 2.50$)

S = Longitudinal channel slope (ft/ft)

d_{50} = Rock size for which 50% of the riprap by weight is smaller (ft)

CROSS SECTION 23

$$V \text{ (ft/s)} = 6.66$$

$$S \text{ (ft/ft)} = 0.1500$$

$$S_s = 2.50 \quad (\text{Minimum } 2.50)$$

$$d_{50} = \mathbf{1.15 \text{ feet}}$$

$$d_{50} = \mathbf{13.79 \text{ inches}}$$

12 U-CHANNEL (Q100)
Worksheet for Rectangular Channel

Project Description	
Worksheet	12 U-CHANNEL (Q100)
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

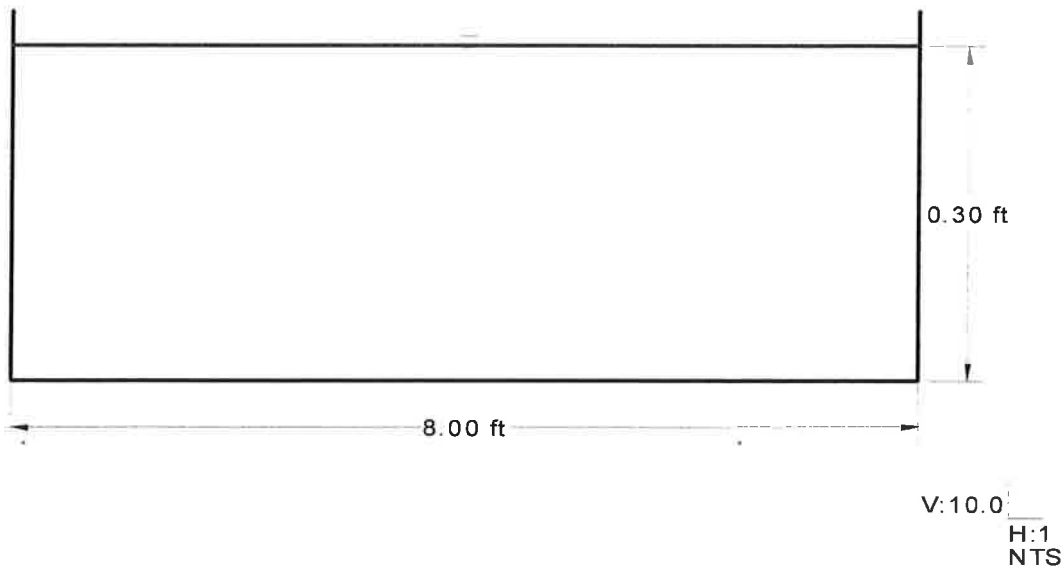
Input Data	
Mannings Coefficient	0.013
Channel Slope	3.00 %
Bottom Width	8.00 ft
Discharge	20.00 cfs

Results	
Depth	0.30 ft
Flow Area	2.4 ft ²
Wetted Perimeter	8.59 ft
Top Width	8.00 ft
Critical Depth	0.58 ft
Critical Slope	0.35 %
Velocity	8.41 ft/s
Velocity Head	1.10 ft
Specific Energy	1.40 ft
Froude Number	2.72
Flow Type	Supercritical

12 U-CHANNEL (Q100)
Cross Section for Rectangular Channel

Project Description	
Worksheet	12 U-CHANNEL (Q100)
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.013
Channel Slope	3.00 %
Depth	0.30 ft
Bottom Width	8.00 ft
Discharge	20.00 cfs



13 U-CHANNEL (Q100)

Worksheet for Rectangular Channel

Project Description	
Worksheet	13 U-CHANNEL (Q100)
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

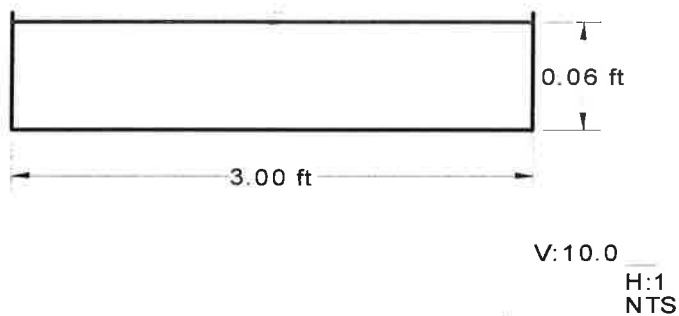
Input Data	
Mannings Coefficient	0.013
Channel Slope	38.20 %
Bottom Width	3.00 ft
Discharge	2.00 cfs

Results	
Depth	0.06 ft
Flow Area	0.2 ft ²
Wetted Perimeter	3.12 ft
Top Width	3.00 ft
Critical Depth	0.24 ft
Critical Slope	0.48 %
Velocity	10.77 ft/s
Velocity Head	1.80 ft
Specific Energy	1.86 ft
Froude Number	7.63
Flow Type	Supercritical

13 U-CHANNEL (Q100)
Cross Section for Rectangular Channel

Project Description	
Worksheet	13 U-CHANNEL (Q100)
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.013
Channel Slope	38.20 %
Depth	0.06 ft
Bottom Width	3.00 ft
Discharge	2.00 cfs



14 U-CHANNEL (Q100) **Worksheet for Rectangular Channel**

Project Description	
Worksheet	14 U-CHANNEL (Q100)
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

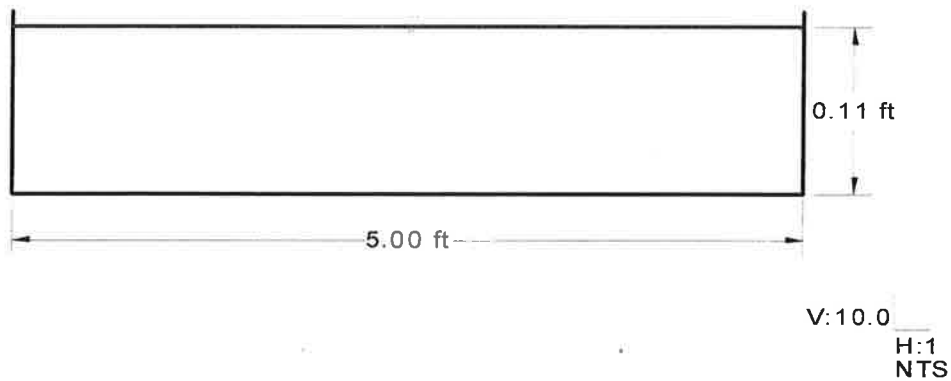
Input Data	
Mannings Coefficient	0.013
Channel Slope	37.80 %
Bottom Width	5.00 ft
Discharge	8.00 cfs

Results	
Depth	0.11 ft
Flow Area	0.5 ft ²
Wetted Perimeter	5.21 ft
Top Width	5.00 ft
Critical Depth	0.43 ft
Critical Slope	0.40 %
Velocity	15.23 ft/s
Velocity Head	3.60 ft
Specific Energy	3.71 ft
Froude Number	8.28
Flow Type	Supercritical

14 U-CHANNEL (Q100)
Cross Section for Rectangular Channel

Project Description	
Worksheet	14 U-CHANNEL (Q100)
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.013
Channel Slope	37.80 %
Depth	0.11 ft
Bottom Width	5.00 ft
Discharge	8.00 cfs



15 EXISTING REGIONAL CHANNEL (Q100)

Worksheet for Trapezoidal Channel

Project Description	
Worksheet	15 EXISTING REGIONAL CHANNEL Q100)
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

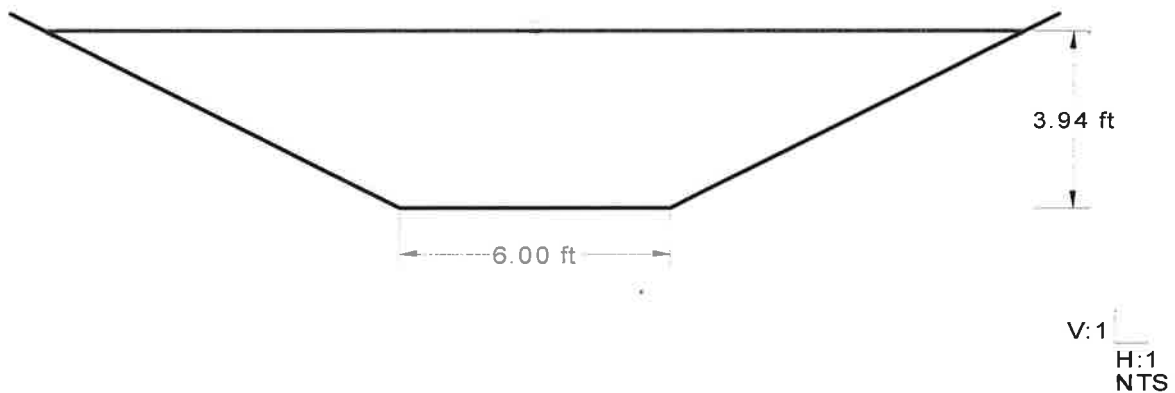
Input Data	
Mannings Coefficient	0.013
Channel Slope	2.40 %
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Bottom Width	6.00 ft
Discharge	1,697.00 cfs

Results	
Depth	3.94 ft
Flow Area	54.7 ft ²
Wetted Perimeter	23.63 ft
Top Width	21.77 ft
Critical Depth	7.17 ft
Critical Slope	0.17 %
Velocity	31.00 ft/s
Velocity Head	14.94 ft
Specific Energy	18.88 ft
Froude Number	3.45
Flow Type	Supercritical

15 EXISTING REGIONAL CHANNEL (Q100)
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	15 EXISTING REGIONAL CHANNEL Q100)
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.013
Channel Slope	2.40 %
Depth	3.94 ft
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Bottom Width	6.00 ft
Discharge	1,697.00 cfs



STORM DRAIN **CALCULATIONS**

0

Page 1

SN15-823

SUMMERLIN SENIOR CENTER

ONSITE STORM DRAIN

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top Height/Dia.-FT	Base Wt I.D.	No Wth Prs/Pip
L/Elem	Ch Slope												
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
.000	9.480	3.000	12.480	18.40	3.75	.22	12.70	.00	1.45	.00	2.500	.000	1 .0
30.195	.0121	-	-	-	-	.0020	.06	3.00	.00	1.11	.013	.00	PIPE
30.195	9.845	2.705	12.550	18.40	3.75	.22	12.77	.00	1.45	.00	2.500	.000	1 .0
HYDRAULIC JUMP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.195	9.845	.722	10.566	18.40	15.67	3.81	14.38	.00	1.45	2.27	2.500	.000	1 .0
4.585	.0121	-	-	-	-	.0635	.29	.72	3.84	1.11	.013	.00	PIPE
34.780	9.900	.707	10.607	18.40	16.13	4.04	14.65	.00	1.45	2.25	2.500	.000	1 .0
JUNCT STR 19.9958	-	-	-	-	-	.0779	.00	.71	3.99	-	.013	.00	PIPE
34.790	10.100	.760	10.860	16.10	17.92	4.98	15.84	.00	1.43	1.50	1.500	.000	1 .0
2.640	.2144	-	-	-	-	.0855	.23	.76	4.08	.59	.013	.00	PIPE
37.430	10.666	.783	11.449	16.10	17.25	4.62	16.07	.00	1.43	1.50	1.500	.000	1 .0
2.826	.2144	-	-	-	-	.0764	.22	.78	3.85	.59	.013	.00	PIPE
40.256	11.272	.813	12.085	16.10	16.45	4.20	16.28	.00	1.43	1.49	1.500	.000	1 .0
2.379	.2144	-	-	-	-	.0674	.16	.81	3.58	.59	.013	.00	PIPE
42.635	11.782	.845	12.627	16.10	15.68	3.82	16.45	.00	1.43	1.49	1.500	.000	1 .0
2.021	.2144	-	-	-	-	.0595	.12	.85	3.33	.59	.013	.00	PIPE
44.657	12.215	.879	13.095	16.10	14.95	3.47	16.57	.00	1.43	1.48	1.500	.000	1 .0
1.728	.2144	-	-	-	-	.0526	.09	.88	3.09	.59	.013	.00	PIPE

WATER SURFACE PROFILE LISTING

Date: 8- 4-2016 Time: 2:48:21

SN15-823

SUMMERLIN SENIOR CENTER

ONSITE STORM DRAIN

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top Height/Dia.-FT or I.D.	Base Wt ZL	No Wth Pxs/Pip
L/Elem	Ch Slope					SE Dpth	HF		"N"	X-Fall	ZR	Type Ch	
46.385	12.586	.915	13.501	16.10	14.25	3.16	16.66	.00	1.43	1.46	1.500	.00	1 .0
1.483	.2144					.0466	.07	.92	2.86	.59	.013	.00	PIPE
47.868	12.904	.953	13.857	16.10	13.59	2.87	16.73	.00	1.43	1.44	1.500	.00	1 .0
1.276	.2144					.0414	.05	.95	2.64	.59	.013	.00	PIPE
49.144	13.178	.993	14.171	16.10	12.96	2.61	16.78	.00	1.43	1.42	1.500	.00	1 .0
1.092	.2144					.0368	.04	.99	2.44	.59	.013	.00	PIPE
50.237	13.412	1.036	14.448	16.10	12.36	2.37	16.82	.00	1.43	1.39	1.500	.00	1 .0
.928	.2144					.0328	.03	1.04	2.25	.59	.013	.00	PIPE
51.164	13.611	1.083	14.694	16.10	11.78	2.16	16.85	.00	1.43	1.34	1.500	.00	1 .0
.783	.2144					.0293	.02	1.08	2.06	.59	.013	.00	PIPE
51.947	13.779	1.134	14.913	16.10	11.23	1.96	16.87	.00	1.43	1.29	1.500	.00	1 .0
.655	.2144					.0264	.02	1.13	1.88	.59	.013	.00	PIPE
52.602	13.919	1.189	15.108	16.10	10.71	1.78	16.89	.00	1.43	1.22	1.500	.00	1 .0
.519	.2144					.0239	.01	1.19	1.70	.59	.013	.00	PIPE
53.121	14.030	1.252	15.282	16.10	10.21	1.62	16.90	.00	1.43	1.11	1.500	.00	1 .0
.380	.2144					.0219	.01	1.25	1.51	.59	.013	.00	PIPE
53.501	14.112	1.326	15.438	16.10	9.74	1.47	16.91	.00	1.43	.96	1.500	.00	1 .0
.179	.2144					.0207	.00	1.33	1.31	.59	.013	.00	PIPE

SN15-823

SUMMERLIN SENIOR CENTER

ONSITE STORM DRAIN

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top Height Dia.-Ft	Base Wt or I.D.	ZL	No Wth Pts/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
53.680	14.150	1.426	15.576	16.10	9.28	1.34	16.91	.00	1.43	.65	1.500	.000	.00	1 .0
JUNCT STR 20.0034														
53.690	14.350	2.180	16.530	13.00	7.36	.84	17.37	.00	1.43	1.00	.013	.00	.00	PIPE
65.190	.0100													
118.880	15.000	2.529	17.529	13.00	7.36	.84	18.37	.00	1.35	.00	1.500	.000	.00	1 .0

Page: 1 of 1

Date: 8/04/16

$$S_f = \psi \cdot H_v / R^{1.33} \quad \psi = (2g(n^2))/2.21 \quad H_m = K_m \cdot H_v \quad n = 0.013$$

INLET
CALCULATIONS

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 08/04/2016

Project No. :
Project Name.:
Computed by : D I P I

Inlets on Sag: Sweeper Combination Inlet

Roadway and Discharge Data

	Cross Slope	Composite
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0830
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	1.50
a	Gutter Depression (inch)	0.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening	
L	Curb-Opening Length (ft)	2.00	— 4 ft for 50% clogging
H	Curb-Opening Height (in)	6.00	
	Inlet Type *Sag*	Parallel Bar P-1-7/8	
T	Width of Spread (ft)	23.64	
WGR	Grate Width (ft)	1.50	
L	Grate Length (ft)	1.25	— 2.5 ft for 50% clogging
	Inlet Type *Sag*	Sweeper Combination	
d_ave	Depth of Flow (ft)	0.505	
d_curb	Depth at Curb (ft)	0.567	
Qi	Intercepted Flow (cfs)	4.000	

Note: The curb opening length in the input screen is the total of the curb opening including its length along the grate.

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 08/04/2016

Project No. :
Project Name.:
Computed by :

D1 #5

Inlets on Sag: Sweeper Combination Inlet

Roadway and Discharge Data

	Cross Slope	Composite
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0830
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	1.50
a	Gutter Depression (inch)	0.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening	
L	Curb-Opening Length (ft)	3.00	- 6' For 50% CLOGGING
H	Curb-Opening Height (in)	6.00	
	Inlet Type *Sag*	Parallel Bar P-1-7/8	
T	Width of Spread (ft)	28.87	
WGR	Grate Width (ft)	1.50	
L	Grate Length (ft)	2.50	- 5' For 50% CLOGGING
	Inlet Type *Sag*	Sweeper Combination	
d_ave	Depth of Flow (ft)	0.610	
d_curb	Depth at Curb (ft)	0.672	
Qi	Intercepted Flow (cfs)	13.000	

Note: The curb opening length in the input screen is the total of the curb opening including its length along the grate.

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/04/2016

Project No. :
Project Name.:
Computed by :

D1 #4

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0117
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0830
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	1.50
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	8.000
T	Width of Spread (ft)	14.86

Gutter Flow

Eo	Gutter Flow Ratio	0.299
d	Depth of Flow (ft)	0.39
V	Average Velocity (ft/sec)	3.51

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	31.75	3.00	0.03	0.225	7.775
Parallel Bar P-1-7/8	1.50	2.50	0.38	2.917	4.857
Combination			0.39	3.143	4.857

Note: The curb opening length in the input screen is the total length of the curb opening including its length along the grate.

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/04/2016

Project No. :
Project Name.: D1 # 3
Computed by :

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0117
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0830
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	1.50
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	4.900
T	Width of Spread (ft)	12.21

Gutter Flow

Eo	Gutter Flow Ratio	0.366
d	Depth of Flow (ft)	0.34
V	Average Velocity (ft/sec)	3.14

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	24.30	3.00	0.04	0.180	4.720
Parallel Bar P-1-7/8	1.50	2.50	0.45	2.122	2.598
Combination			0.47	2.302	2.598

Note: The curb opening length in the input screen is the total length of the curb opening including its length along the grate.

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade

Date: 08/04/2016

Project No. :

Project Name.:

Computed by :

D1 #2

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite
S	Longitudinal Slope (ft/ft)	0.0010
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0830
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	1.50
a	Gutter Depression (inch)	0.00
Q	Discharge (cfs)	2.600
T	Width of Spread (ft)	15.49

Gutter Flow

Eo	Gutter Flow Ratio	0.287
d	Depth of Flow (ft)	0.40
V	Average Velocity (ft/sec)	1.05

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	9.59	3.00	0.09	0.239	2.361
Parallel Bar P-1-7/8	1.50	2.50	0.66	1.550	0.811
Combination			0.69	1.789	0.811

Note: The curb opening length in the input screen is the total length of the curb opening including its length along the grate.

APPENDIX D REFERENCES

- **TDS for The Crossings Business Center (DS2950)**

TDS FOR THE CROSSINGS BUSINESS
CENTER PHASE VII

**RESPONSE TO COMMENTS FOR
THE TECHNICAL DRAINAGE STUDY
FOR
THE CROSSINGS BUSINESS CENTER
PHASE VII**

620.1011

August 2001

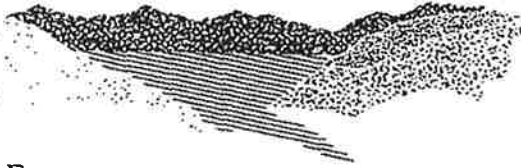
Prepared for:

**The Howard Hughes Corporation
10000 West Charleston Boulevard; Suite 200
Las Vegas, NV 89135
Phone: (702) 791-4300
Fax: (702) 791-4450**



G. C. WALLACE, INC.
Engineers/Planners/Surveyors

C L A R K C O U N T Y
REGIONAL FLOOD CONTROL DISTRICT



October 18, 2001

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

BOARD OF DIRECTORS

Larry Brown
Chairman
City of Las Vegas

Presnet Hardy
Vice-Chairman
City of Mesquite

Shari Buck
City of North Las Vegas

Mayor James Gibson
City of Henderson

Michael Mack
City of Las Vegas

Chip Maxfield
Clark County

Bryan A. Nix
City of Boulder City

Bruce L. Woodbury
Clark County

Mr. Randy Fultz, P.E.
City of Las Vegas Public Works
731 4th Street
Las Vegas, NV 89101

**DISTRICT CONCURRENCE: THE CROSSINGS BUSINESS CENTER
PHASE VII (DS2950)**

Dear Mr. Fultz:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated August 2, 2001, and Addendum No. 1 dated August 28, 2001, for above-mentioned project as submitted by G. C. Wallace, Inc. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas Public Works dated September 12, 2001.

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

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

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

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

BY:


Jill A. Reilly, P.E.
Senior Civil Engineer

JAR:css

c: William Meyer, E.I., G. C. Wallace, Inc.

File: 20-60-19.GCW

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		September 12, 2001
TO: Land Development Services Department of Public Works		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	COPIES TO:	
Drainage Study for The Crossings Business Center Phase VII	The Howard Hughes Corporation	
Cross Streets:	Covington Cross and Town Center Drive	G.C. Wallace, Inc.
File Number:	F:\Depot\DSMEMOS\DS2950B.doc	Cheri Edleman, P.E. DEVCO
Parcel Number:	138-30-113-014	CCRFC
Zoning Action:		
FEMA Flood Zone	YES	No X
Proposed Storm Drain	YES X	No

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES
1 st Submittal	8/6/2001	8/17/2001	Not Acceptable	\$260.00
2 nd Submittal	8/29/2001	9/12/2001	See Comments Below	\$250.00
TOTAL FEES (LDDRS):				\$500.00

REMARKS:

2nd Submittal (Response to 1st submittal)

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

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

1. This drainage study is acceptable in concept, however, the City of Las Vegas will not formally accept the study until the Clark County Regional Flood Control District (CCRFC) has issued a letter of concurrence. The Engineer should contact the CCRFC to confirm that they have begun their review.
2. Center Crossing Road must be granted as "Private Street, Public Drainage Easements to be privately maintained" on the Final Map or separate document and clearly labeled on the grading plans.
3. Both the 20-foot and 50-foot wide drainage easements must each be labeled on the grading plans as "Public drainage easement to be privately maintained" and recorded prior to final approval of improvement plans.
4. A note, indicating all onsite storm drain systems to be privately owned and maintained, must also be shown on the plan.
5. The type, size and slope for the existing storm drains, along the west side of the site, must be labeled on the plans. Revise the line type to show existing.
6. The southern end of the proposed 2'-flood wall at the west side of Building 4 must extend easterly for 55'± for better protection.
7. Label flow line elevation 91.80FL at the beginning of the swale between Building 3 and Building 4.
8. A technical drainage update will be required upon Phase 2 improvements.

END OF REMARKS

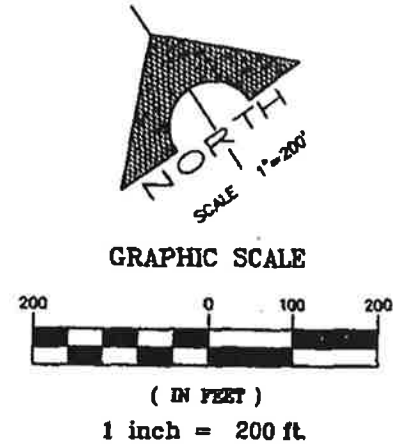
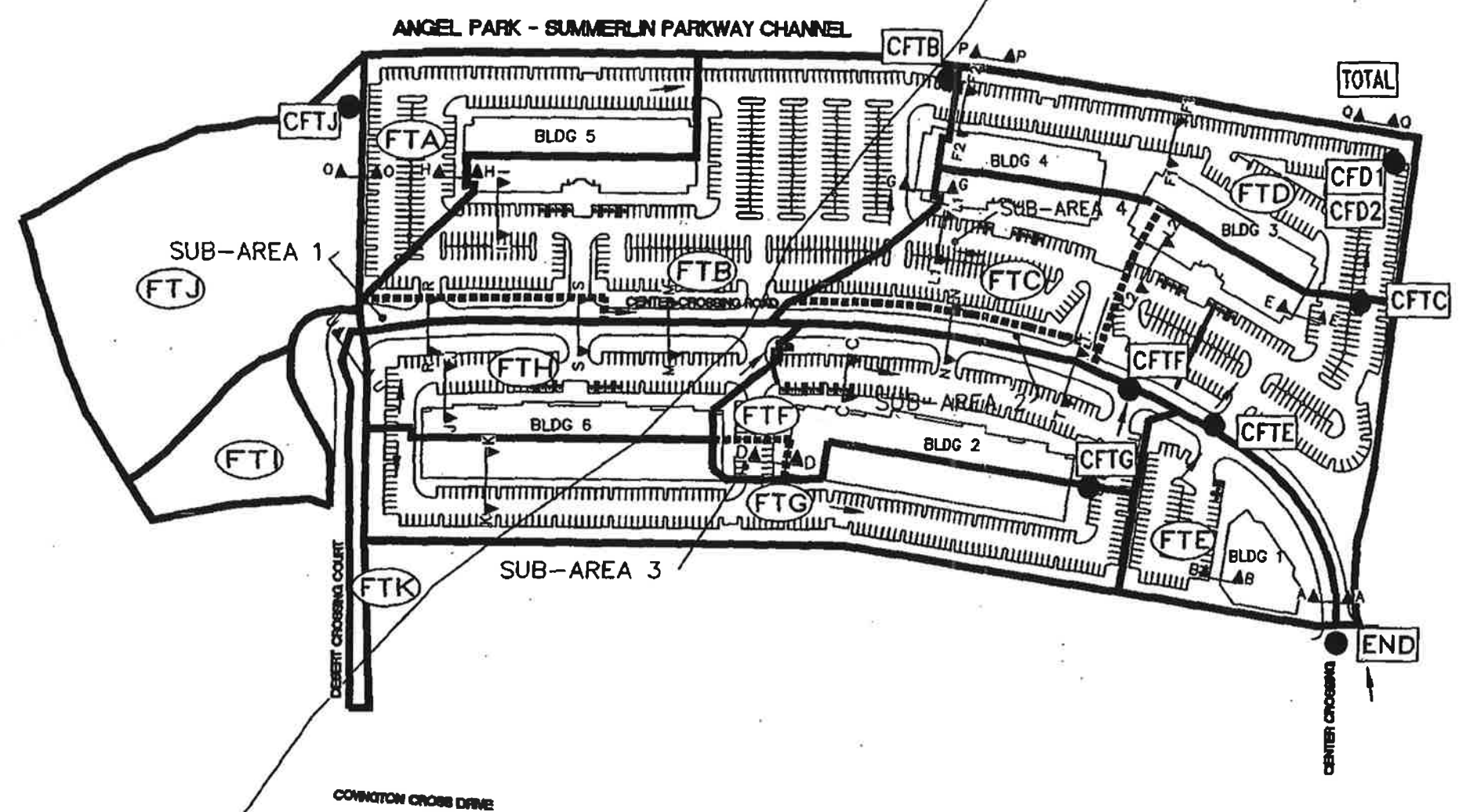
Ssn/ays

Post-It Fax Note

7671

Date 9/12/01 # of pages 30

To: William Meyer	From: Albert Sung
Co/Dept: G.C. Wallace	Co: CLV
Phone #	Phone # 229-2001
Fax # 229-2242	Fax #



SUMMARY OF HEC-1 MODEL

BASIN OR LOCATION	Q10 (CFS)	Q100 (CFS)
FTA	4	8
FTB	8	16
FTC	9	17
FTD	6	11
FTE	3	6
FTF	5	9
FTG	6	11
FTH	4	7
FTI	1	3
FTJ	4	10
FTK	1	1
CFTB	12	24
CFTC	9	17
CFTD1	16	33
CFTD2	25	49
CFTE	24	47
CFTF	8	16
CFTG	14	27
CFTJ	5	13
END	7	14
TOTAL	55	110

- LEGEND
- (FTE) DRAINAGE SUBBASIN
 - CFTB CONCENTRATION POINT
 - 1 FACILITY DESIGNATION
 - SUBBASIN BOUNDARY
 - FLOW DIRECTION
 - L2 L2 CROSS SECTION

THE CROSSINGS BUSSINESS PARK
AT SUMMERLIN

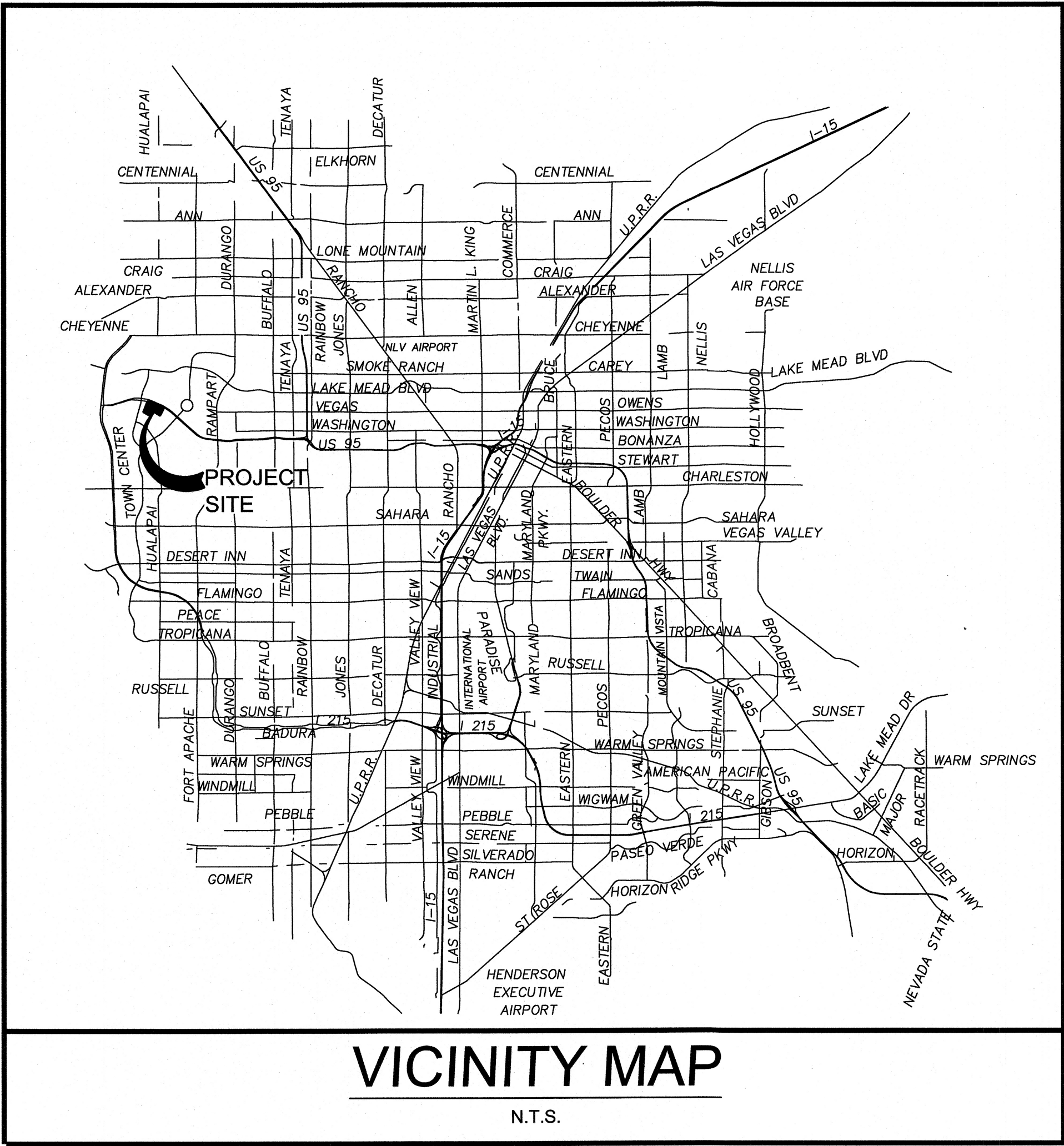
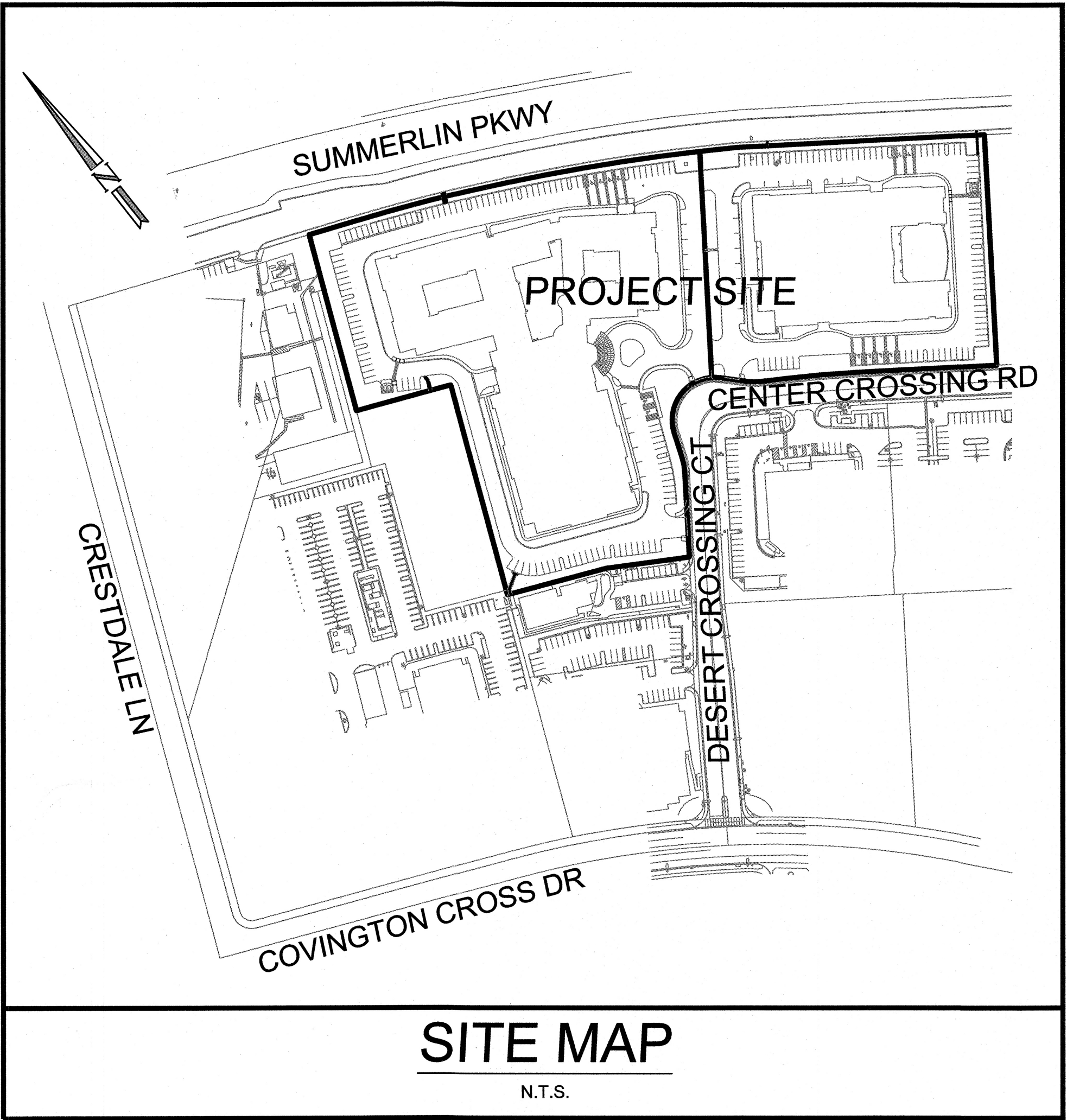
FIGURE 5
PROPOSED (ULTIMATE) DRAINAGE MAP

 **G.C. WALLACE, INC.**
Engineers/Planners/Surveyors

APPENDIX E
GRADING PLANS

IMPROVEMENT PLANS FOR
CROSSINGS CARE CAMPUS

CITY OF LAS VEGAS
STATE OF NEVADA
APN # 138-19-419-006
11.01 ACRES



SHEET INDEX		
SHEET NUMBER	SHEET TITLE	SHEET DESCRIPTION
1	CV	COVER SHEET
2	NT	GENERAL NOTES
3	GP1	GRADING PLAN 1
4	GP2	GRADING PLAN 2
5	GP3	GRADING PLAN 3
6	GP4	GRADING PLAN 4
7	DT1	DETAIL SHEET 1
8	DT2	DETAIL SHEET 2
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		

APPROVALS

SOUTHWEST GAS CORPORATION

COX COMMUNICATIONS LAS VEGAS, INC

CENTRAL TELEPHONE COMPANY, d/b/a CENTURYLINK
THE AFFIXED CENTRAL TELEPHONE COMPANY, d/b/a CENTURYLINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUTES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

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

SOUTHERN NEVADA WATER AUTHORITY
DPR # 2016-7777

SNWA APPROVAL IS VALID ONE (1) YEAR FROM THE SIGNATURE DATE. IF CONSTRUCTION WITHIN THE EASEMENT OR RESTRICTED PIPE SAFETY ZONE IS NOT COMPLETE, PLANS MUST BE RESUBMITTED TO SNWA FOR APPROVAL.

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
DATE: _____
PROJECT: XXXX
LVVWD APPROVED FIRE FLOW: XXXX, GPM AT 20 PSI RESIDUAL SHEETS:

CITY OF LAS VEGAS FIRE DEPARTMENT
APPROVAL BY THE FIRE DEPARTMENT HAVING JURISDICTION IS REQUIRED PRIOR TO OBTAINING FINAL APPROVAL FROM THE LAS VEGAS VALLEY WATER DISTRICT

CHRIS KNIGHT
DIRECTOR, BUILDING AND SAFETY
THIS PLAN MEETS THE APPLICABLE STANDARDS OF PLANNING

DAVID BOWER, PE, PTOE # 16736
CITY OF LAS VEGAS ENGINEER
APPROVAL OF THESE PLANS IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHTS-OF-WAY AND/OR DEDICATED EASEMENTS. THE APPROVAL DOES NOT AUTHORIZE THE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS EXCEPT THOSE SPECIFICALLY LISTED UNDER "DEVIATIONS FROM STANDARDS". THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN "DEVIATIONS FROM STANDARDS" IN FAVOR OF THE UNIFORM STANDARDS DRAWINGS AND SPECIFICATIONS CLARK COUNTY AREA NEVADA.

SUMMERLIN NON-RESIDENTIAL DESIGN REVIEW COMMITTEE
THIS SIGNATURE IS LIMITED TO APPROVAL OF THESE DOCUMENTS FOR CONFORMANCE TO THE DESIGN INTENT OF THE APPLICABLE SUMMERLIN DESIGN CRITERIA. NEITHER SUMMERLIN NOR THE SUMMERLIN NON-RESIDENTIAL DESIGN REVIEW COMMITTEE ASSUMES RESPONSIBILITY FOR PLAN CONFORMANCE WITH APPLICABLE LAWS, ORDINANCES AND CODES.

APPROVED	BY	DATE	REVISION	REV

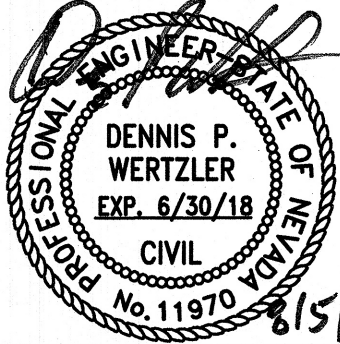
THE CALIDA GROUP
10777 W TWAIN AVE., SUITE 115, LAS VEGAS NV, 89135
TEL: (702) 990-3906 FAX: (702) 925-5506

DRC
DRC Surveying Nevada, Inc.
7080 LA CIENEGA ST., STE #200
LAS VEGAS, NEVADA 89119
(702) 270-6119

CROSSINGS CARE CAMPUS

COVER SHEET

DRAWN BY: DPW
DESIGNED BY: DPW
CHECKED BY: DPW
PROJECT NO: SN15-823



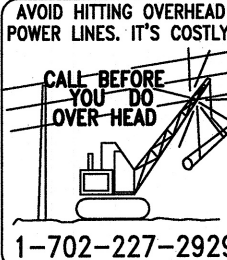
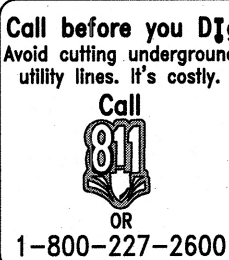
SHEET
CV
1 OF 8 SHEETS
DRAWING #
XXXX

OWNER / DEVELOPER
DEVELOPER: THE CALIDA GROUP
10777 W TWAIN AVE., SUITE 115
LAS VEGAS, NEVADA 89135
PHONE: (702) 990-3906
FAX: (702) 925-5506

ENGINEER
DRC SURVEYING NEVADA, INC.
7080 LA CIENEGA ST., SUITE 200
LAS VEGAS, NEVADA 89110
PHONE: (702) 270-6119
FAX: (702) 932-6129

DISCLAIMER NOTE:

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UNDERGROUND OR OVERHEAD 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. CONTRACTOR TO NOTIFY ENGINEER OF ANY CHANGES OR DISCREPANCIES.



GEOTECHNICAL EXPLORATION REPORT
ORIGINAL PREPARED BY:
COMPANY NAME: NOVA GEOTECHNICAL
ADDRESS: 4480 HACIENDA AVE., STE 104
LAS VEGAS, NV 89118
TEL: (702) 873-3478
PROJECT NO.: E-15-223
DATED: JANUARY 6, 2016

LEGAL DESCRIPTION
LOTS 1-3 AS SHOWN IN FILE 199, PAGE 92 OF SURVEYS, OFFICIAL RECORDS, LYING WITHIN THE NORTHWEST QUARTER (NW 1/4) OF SECTION 30, TOWNSHIP 21 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY NEVADA.

BASIS OF BEARINGS
NORTH 48°00'00" WEST, BEING THE BEARING OF THE CENTERLINE OF COVINGTON CROSS DRIVE AS SHOWN IN BOOK 70, PAGE 61 OF PLATS IN THE RECORDERS OFFICE OF CLARK COUNTY, NEVADA.

BENCHMARK
CITY OF LAS VEGAS BENCHMARK NO. 0LV0030NW6
RIVET & PLATE IN THE TOP OF CURB NORTHWEST CORNER OF TOWN CENTER DRIVE AND COVINGTON CROSS DRIVE.
ELEVATION = 856.034 METERS (PUBLISHED NAVD 88 DATUM)
ELEVATION = 2808.51 US SURVEY FEET (CALCULATED)

CITY OF LAS VEGAS GENERAL NOTES

- ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST EDITION. THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST REVISED EDITION, THE "SUMMER IN IMPROVEMENT STANDARDS" FOR WORK IN THE SUMMER, AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY, THE CITY OF LAS VEGAS, AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".
- THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CLIP PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE PLANS. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCES WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
- THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE. FROM DAMAGE, AND SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
- ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS, ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
- TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGNS TO BE APPROVED BY THE CITY, PRIOR TO THE USE ON THE PROJECT.
- PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.
- EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTRUDED-TYPE CURB.
- AC PAVEMENT TO BE ONE-HALF INCH (1/2") ABOVE LIP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.
- CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.
- SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.
- CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING CONSTRUCTION TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF THE TRANSITIONS TO BE AS SHOWN ON PLANS.
- ALL GRADING WORK SHALL CONFORM TO THE SOILS REPORT AS PREPARED BY THE NOVA GEOTECHNICAL PROJECT NO. E-15-223, DATED JANUARY 8, 2016, APPROVED BY THE CITY ENGINEER AND AS SHOWN ON THESE PLANS.
- EXACT LOCATION OF ALL SAWCUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER. LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES RELOCATIONS.
- THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH N.R.S. STATUTE NO. 625.380 & CITY OF LAS VEGAS TITLE 18, APPENDIX D.
- UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APRONS, FLOWLINES, AND CROSS GUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE UTILITY COMPANY AND THE CITY ENGINEER.

WALL NOTES:

- ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS; FLOOD CONTROL AND SIGHT DISTANCE AT INTERSECTIONS. NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE BUILDING DEPARTMENT.
- ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHT-OF-WAY.
- CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC., TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.
- MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF MDT OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.
- WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC., THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO OFFSITE INSPECTION AND TESTING CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.
- SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S) SHALL BE PROVIDED TO THE CITY AND APPROVED PRIOR TO ACCEPTANCE OF FACILITY VIDEO INSPECTION. THE MAP(S) SHALL INCLUDE THE HORIZONTAL AND VERTICAL LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES AND TRANSITION STRUCTURES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, AND THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXITS THE PUBLIC RIGHT-OF-WAY, AND STORMDRAIN MAIN ALIGNMENT. INCLUDES DEFLECTION POINTS. THE LOCATION SHALL BE DESCRIBED BY COORDINATES WHICH SHALL BE BASED ON THE OPTICAL HORIZONTAL AND VERTICAL CONTROL NETWORKS OF THE CITY OF LAS VEGAS. FINAL LOCATION MAPS MUST BE SEALED AND CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTAINTY OF NOT LESS THAN (0.3 FEET) HORIZONTALLY AND VERTICALLY. A SEPARATE ELECTRONIC COMPANY DELIMITED FILE FOR THE SANITARY SEWER AND STORM DRAIN COORDINATES SHALL ALSO ACCOMPANY THE SANITARY SEWER AND STORMDRAIN FINAL LOCATION MAP(S).
- CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST EDITION.
- A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

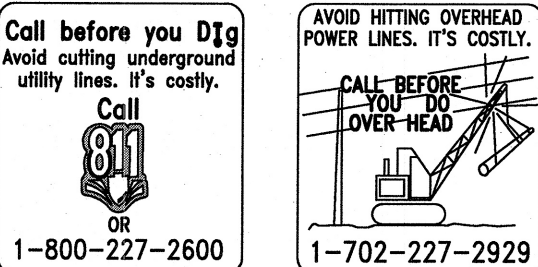
REVISED 02/15

STORMWATER MANAGEMENT NOTES

- THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF THE CITY OF LAS VEGAS AS A RESULT OF CONSTRUCTION ACTIVITY AND THIS SITE DEVELOPER'S OBLIGATION TO CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM DRAIN SYSTEM.
- ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN THE TITLE 24.40 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
- TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICAL AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS BEEN COMPLETED. SOME EXCEPTIONS BASED ON CERTAIN CONDITIONS MAY BE GRANTED BY THE STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
- AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER ANY RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE AND MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS ANY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
- ACCUMULATED SEDIMENT IN BMPs SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

DISCLAIMER NOTE:

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UNDERGROUND OR OVERHEAD 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. CONTRACTOR TO NOTIFY ENGINEER OF ANY CHANGES OR DISCREPANCIES.



CITY OF LAS VEGAS FIRE AND RESCUE GENERAL NOTES

- ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE, ORDINANCE # 6325 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.
- AUTHORIZED FIRE HYDRANTS ARE AS FOLLOWS:
KENNEDY - GUARDIAN MODELS K81A AND K91D
MUELLER - SUPER CENTURION 250, MODEL A-423
CLOW - MEDALLION MODEL F-2546LVD
U.S. PIPE - METROFLOWMAG
- A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK. (IPC 507.6.1.9)
- ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE MAINTAINED BEFORE COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FLOW RATES. (IPC 507.6.3.1, IPC 507.6.3.2)
- TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF THE STREET ADJACENT TO THE FIRE HYDRANTS. (IPC 507.6.1.9)
- ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL. (IPC 106.3)
- ALL ON-SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L. LISTED, A.W.W.A APPROVED AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE. (IPC 507.2.1, NFPA 24)
- PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE, AND ALL OTHER WORKS ON FIRE LINES SHALL BE COMPLETED BEFORE APPROVAL BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION. (IPC 507)
- PRIVATE HYDRANTS SHALL BE PAINTED RED. (IPC 507.5.7.1)
- PRIOR TO FINAL OCCUPANCY, A FIRE FLOW TEST SHALL BE WITNESSED BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW. (IPC 507)
- FIRE HYDRANT SPACING SHALL BE AS FOLLOWS: (IPC C102)
RESIDENTIAL - 500 FT UNSPRINKLERED; 600 FT SPRINKLERED
COMMERCIAL - 300 FT UNSPRINKLERED; 400 FT SPRINKLERED.
- WHERE THE WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AS SHOWN ON THE PLANS TO PROVIDE FOR TRANSPORTATION OF FIRE DEPARTMENT VEHICLES. STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 300 FT ON AN ALTERNATING BASIS. (IPC C102.8)
- NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF A CUL-DE-SAC OR WITHIN 20 FT OF THE PERIMETER OF THE RADIUS OF THE CUL-DE-SAC.
- NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FT OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION. (IPC C102.12)
- A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT, AS MEASURED BY AN APPROVED ROUTE. (IPC C102.4)
- THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FT, AS MEASURED BY AN APPROVED ROUTE. (IPC C102.7)
- THE MAXIMUM DISTANCE FROM A HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. (IPC C102.9)
- TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE IS 4 OR MORE FIRE HYDRANTS/SPRINKLER LEAD-INS ARE INSTALLED ON A SINGLE SYSTEM. SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS CAN BE OUT OF SERVICE DUE TO A BREAK IN A WATER MAIN. (IPC C104)
- ALL FIRE APPARATUS ACCESS ROADS SHALL BE PAVED TO PROVIDE ALL-WEATHER DRIVING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF THE FIRE APPARATUS. (IPC 503.2.3)
- THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12% ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FT PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%. (IPC 503.2.7, 503.2.8)
- THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 32 FT OUTSIDE AND 28 FT INSIDE TURNING RADIUS. (IPC 503.2.4)
- VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13 FT 6 INS. (IPC 503.2.1)
- FIRE DEPARTMENT ACCESS ROADS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS 40 FT WITH PARALLEL PARKING PERMITTED ON BOTH SIDES, NOT LESS THAN 32 FT WIDE, FLOW-LINE TO FLOW-LINE, WHERE PARKING IS PERMITTED ONLY ON ONE SIDE OF THE FIRE DEPARTMENT VEHICLE ACCESS ROAD, NOT LESS THAN 24 FT WIDE, FLOW-LINE TO FLOW-LINE, WHERE NO PARKING IS PERMITTED ON EITHER SIDE. FIRE LANES THROUGH PARKING LOTS SHALL BE NOT LESS THAN 24 FT. (IPC 503.2.1.1)
- A FIRE APPARATUS ACCESS ROAD SHALL BE REQUIRED WHEN ANY PORTION OF AN EXTERIOR WALL OF THE FIRST STORY IS 150 FT FROM A FIRE DEPARTMENT VEHICLE ACCESS. THIS DISTANCE MUST BE INCREASED TO 250 FT IF THE BUILDING IS SPRINKLERED. (IPC 503.1.4)
- APPROVED SECONDARY FIRE APPARATUS ACCESS SHALL BE PROVIDED FOR 100 OR MORE DWELLING UNITS, ROADS(S) WITH DEAD-ENDS OR WITH A SINGLE POINT OF ACCESS IN EXCESS OF 600 FT, COMMERCIAL AND HEIGHTS WHERE BUILDINGS EXCEED 2 STORY OR 30 FT IN HEIGHT, OR EXCEEDING 60,000 SQUARE FEET IN AREA. (IPC 503.1.2)
- ALL DEAD-END FIRE APPARATUS ROADS AND/OR FIRE LANES, PUBLIC OR PRIVATE, IN EXCESS OF 150 FT IN LENGTH SHALL BE PROVIDED WITH AN APPROVED TURN AROUND HAVING A MINIMUM DIAMETER OF 81 FT. (IPC 503.2.5)
- ALL FIRE APPARATUS ACCESS ROADS SHALL BE MARKED BY PLACING APPROVED SIGNS AT THE START OF THE DESIGNATED FIRE LANE AND WITH SIGNS AT 100 FT INTERVALS. SIGNS SHALL BE PLACED AT 100 FT ALONG THE DESIGNATED FIRE LANES. SIGNS TO BE PLACED ON BOTH SIDES OF AN ACCESS ROADWAY IF NEEDED TO PREVENT PARKING ON EITHER SIDE. SIGNS TO BE INSTALLED NO HIGHER THAN 10 FT OR LESS THAN 6 FT FROM THE ROADWAY LEVEL. THE CURB ALONG OR ON THE PAVEMENT OR CEMENT (IF NO CURB IS PROVIDED) SHALL BE PAINTED WITH A RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. (IPC 503.3)
- ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER SYSTEM. SAID SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH IPC 503.6 AND IPC APPENDIX M.

REVISED 7/1/2014

CITY OF LAS VEGAS TRAFFIC NOTES

- ALL CONSTRUCTION SIGNING, BARRICADE, AND TRAFFIC DELINEATION SHALL CONFORM TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", LATEST EDITION.
- THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE PLANNING DEPARTMENT PRIOR TO CONSTRUCTION.
- BEFORE ANY WORK IS STARTED IN THE RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE CONSTRUCTION ZONE. THE CONTRACTOR SHALL INSTALL TEMPORARY STOP SIGNS AT ALL NEW STREET EXISTING CITY STREETS WHERE WARRANTED IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.
- WHEN A DESIGNATED "SAFE ROUTE TO SCHOOL" IS ENCLOSED UPON BY A CONSTRUCTION WORK ZONE AND PARENTS ARE REQUIRED TO BE ASSISTED IN THE SAFE CROSSING OF THE ROAD(S) BEING IMPROVED THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED "CROSSING GUARD". THE GUARD SHALL BE PRESENT FOR THE FULL DURATION OF TIME THAT CHILDREN ARE LIKELY TO BE PRESENT.
- IF THE IMPROVEMENTS NECESSITATE THE OBLITERATION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LIKE MATERIALS TO THE SATISFACTION OF THE CITY TRAFFIC ENGINEER.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL PERMANENT SIGNS SHOWN ON THE PLANS. ALL NEW TRAFFIC SIGNS SHALL BE FABRICATED WITH DIAMOND GRADE V.P. CLASS 6 REFLECTIVE SHEETING OR APPROVED EQUAL. ALL NEW TRAFFIC SIGNS, EXCEPT STREETNAME AND SCHOOL SPEED LIMIT SIGNS, SHALL HAVE 3M SERIES 1160 OR APPROVED EQUIVALENT ANTI-GRAFFITI PROTECTIVE OVERLAY FILM. SCHOOL ZONE SIGNS SHALL HAVE 3M SERIES 1150 ANTI-GRAFFITI PROTECTIVE OVERLAY FILM. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CURRENT CITY STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.
- WHEN A PROPOSED STREET LIGHT STANDARD IS LOCATED WITHIN FIVE (5) FEET OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON A SIGNPOST, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGNPOST SHALL BE ELIMINATED.
- ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE ROAD(S) BEING IMPROVED HERE UNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.
- STREET SIGNS AND STOP SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF STREET NAME SIGNS.
- THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO INSURE THE SAFETY OF THE PUBLIC IN OR AROUND THE WORK AREA. THE CONTRACTOR SHALL HAVE A CERTIFIED ATSSA TRAFFIC CONTROL SPECIALIST SET UP, MAINTAIN AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHT OF WAY.
- WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXPEDITED TO COMPLETION SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO THE TRAVELING PUBLIC.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING CITIZENS AREA TRANSIT (C.A.T.) IF THE CONSTRUCTION OR EXCAVATION INTERRUPTS A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE ON THAT STREET TO ARRANGE FOR TEMPORARY RELOCATION OF STOP.
- GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL EVENTS UNIT (PHONE # 828-3442) WHO WILL PROVIDE OFFICERS PROPERLY TRAINED IN TRAFFIC CONTROL FEES FOR THE USE OF THESE OFFICERS SHALL BE SET BY METRO AND WILL BE PAID BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.
- ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS OTHERWISE DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.
- THE CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECTS OFFSITE INSPECTOR PRIOR TO INITIATING PAVING TO RECEIVE DIRECTION FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKING AND SIGNING THAT ARE REQUIRED TO MAINTAIN CENTERLINE ROADWAY SEGMENTS. THE CONTRACTOR SHALL PROVIDE A DRAWING FOR APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPICTING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNAGE, WHICH MAY INCLUDE OMITTING, ADJOINING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SUCH THAT ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

REVISED 04/15/10

CITY OF LAS VEGAS SEWER NOTES

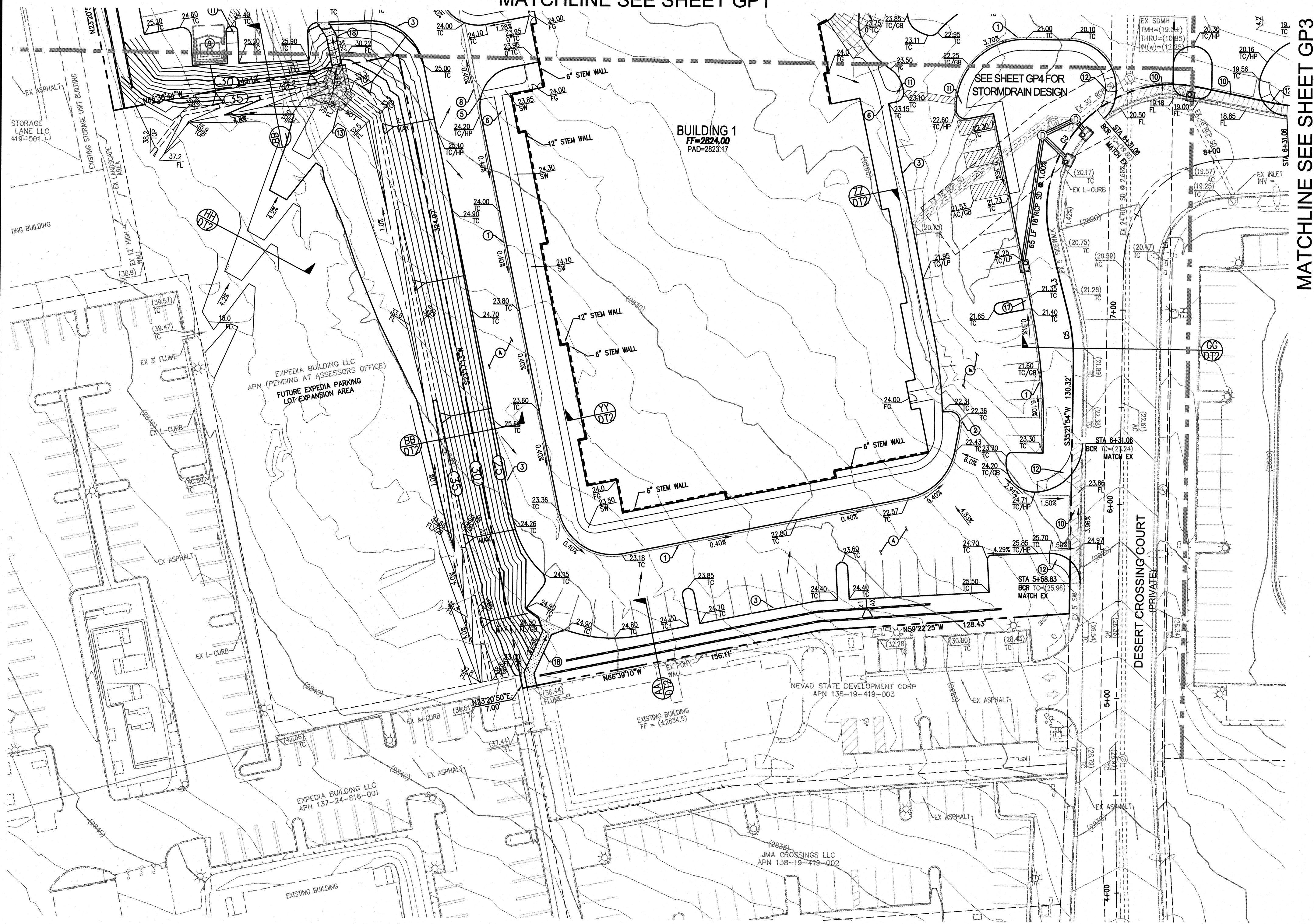
- ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.
- IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS. ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.
- CHISEL "S" OR "G" IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.
- POLYVINYL (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACKFILL OF TYPE I AGGREGATE BASE.
- ALL MANHOLES PAVED IN STREETS EIGHTY (80) FOOT RW AND LARGER SHALL HAVE CONCRETE COLLARS. STREETS LESS THAN EIGHTY (80) FOOT RW WILL REQUIRE RETROFIT IF PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.
- TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12") DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE "Y" "S" SHALL BE USED ON LINES TWELVE INCHES (12") OR ABOVE.
- WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVWD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.
- ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.
- THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH (0.1) OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO BE NONCONFORMING PER PLANS SHALL BE REMOVED OR REPAIRED OR REMOVED OR REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.
- INSTALLATION OF CURVED SEWER REQUIRES THE USE OF C-900 PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.

REVISED 04/15/10

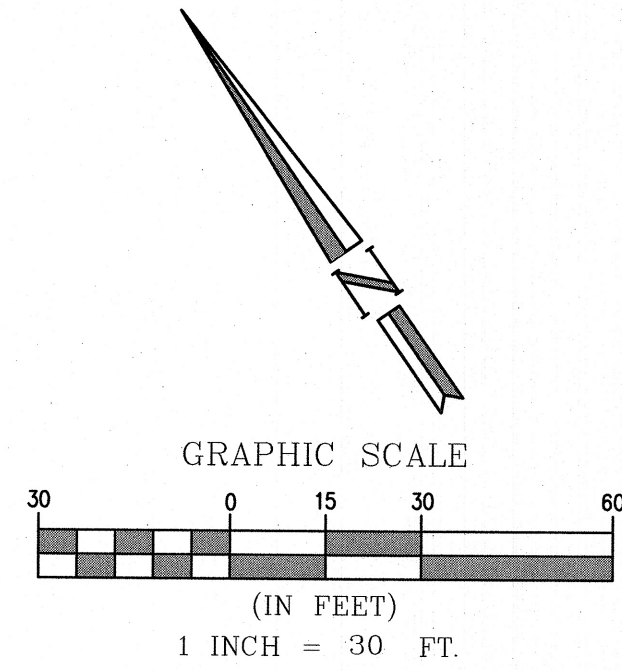
CITY OF LAS VEGAS GRADING NOTES

- IN THE EVENT THAT ANY UNFORESEEN CONDITIONS NOT COVERED BY THESE NOTES ARE ENCOUNTERED DURING GRADING OPERATIONS, THE OWNER/ ENGINEER SHALL BE IMMEDIATELY NOTIFIED FOR DIRECTION.
- IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM ALL NECESSARY CUTS AND FILLS WITHIN THE LIMITS OF THIS PROJECT AND THE RELATED OFF-SITE WORK, SO AS TO GENERATE THE DESIRED SUBGRADE, FINISH GRADES AND SLOPES SHOWN.
- CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL EXCAVATION, ADEQUATE SHORING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OR FACILITIES AND / OR CAVING OF THE EXCAVATION.
- THE CONTRACTOR IS WARNED THAT AN EARTHWORK BALANCE WAS NOT NECESSARILY THE INTENT OF THIS PROJECT. ANY ADDITIONAL MATERIAL REQUIRED OR LEFT-OVER MATERIAL FOLLOWING OPERATIONS BECOME THE RESPONSIBILITY OF THE CONTRACTOR.
- THE GRADING CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE OWNER TO PROVIDE FOR THE REQUIREMENTS OF THE PROJECT STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ASSOCIATED PERMIT.
- CONTRACTOR SHALL GRADE TO THE LINES AND ELEVATIONS SHOWN ON THE PLANS WITHIN THE FOLLOWING HORIZONTAL AND VERTICAL TOLERANCES AND DEGREES OF COMPACTION, IN THE AREAS INDICATED:
A. PAVEMENT AREA SUBGRADE HORIZONTAL VERTICAL COMPACTION
0.1+ 0.1+ 0.1+ 0.1+
B. ENGINEERED FILL 0.1+ 0.1+ 0.1+
C. EXISTING FILL 0.1+ 0.1+ 0.1+
D. EXISTING FILL 0.1+ 0.1+ 0.1+
E. EXISTING FILL 0.1+ 0.1+ 0.1+
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G. EXISTING FILL 0.1+ 0.1+ 0.1+
H. EXISTING FILL 0.1+ 0.1+ 0.1+
I. EXISTING FILL 0.1+ 0.1+ 0.1+
J. EXISTING FILL 0.1+ 0.1+ 0.1+
K. EXISTING FILL 0.1+ 0.1+ 0.1+
L. EXISTING FILL 0.1+ 0.1+ 0.1+
M. EXISTING FILL 0.1+ 0.1+ 0.1+
N. EXISTING FILL 0.1+ 0.1+ 0.1+
O. EXISTING FILL 0.1+ 0.1+ 0.1+
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AL. EXISTING FILL 0.1+ 0.1+ 0.1+
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MATCHLINE SEE SHEET GP1



MATCHLINE SEE SHEET GP3

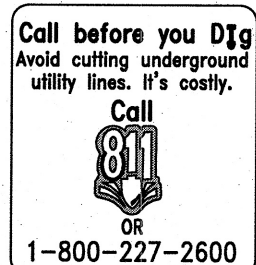


CONSTRUCTION NOTES

- 1) CONSTRUCT 18" L" CURB PER USD NO. 219 (ON-SITE ONLY)
- 2) CONSTRUCT SPILL CURB WITH 6" ASPHALT UP PER DETAIL 10 ON SHEET DTI
- 3) CONSTRUCT "A" TYPE 6" CURB PER USD NO. 219
- 4) CONSTRUCT AC PAVEMENT PER DETAIL 4 ON SHEET DTI
- 5) CONSTRUCT 0' CURB FACE PER DETAIL 9 ON SHEET DTI
- 6) CONSTRUCT SIDEWALK (4-INCH THICK) PER USD NO. 234
- 7) CONSTRUCT SIDEWALK DRAIN PER USD NO. 236
- 8) CONSTRUCT 2' VALLEY GUTTER PER DETAIL 5 ON SHEET DTI
- 9) CONSTRUCT TRASH ENCLOSURE PER ARCHITECTURAL PLANS
- 10) CONSTRUCT COMMERCIAL DRIVEWAY PER STD DWG. NO. 228
DIMENSIONS OF USD NO. 222.1 AND 226.
- 11) CONSTRUCT PRIVATE SIDEWALK RAMP'S PER ADA STANDARDS
- 12) CONSTRUCT SIDEWALK RAMPS PER USD NO. 235. (CASE 1)
- 13) INSTALL RIP RAP 150 = 12" (4" THICK)
- 14) CONSTRUCT RIP RAP U-CHANNEL PER DETAIL 10 ON SHEET DTI
- 15) CONSTRUCT 2' U CHANNEL PER DETAIL 6 ON SHEET DTI
- 16) CONSTRUCT 3' U CHANNEL PER DETAIL 6 ON SHEET DTI
- 17) CONSTRUCT 4' U CHANNEL PER DETAIL 6 ON SHEET DTI
- 18) CONSTRUCT 5' U CHANNEL PER DETAIL 6 ON SHEET DTI
- 19) CONSTRUCT 8' U CHANNEL PER DETAIL 6 ON SHEET DTI
- 20) CONSTRUCT 1-FIT CURB OPENING PER DETAIL 8 ON SHEET DTI
- 21) NOT USED
- 22) NOT USED

DISCLAIMER NOTE:

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UNDERGROUND OR OVERHEAD 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. CONTRACTOR TO NOTIFY ENGINEER OF ANY CHANGES OR DISCREPANCIES.



No.	GRADE (%) "B" TO "A"	"A"(FT) MIN.	"B"(FT) MIN.
1	-6 TO -5.01	4.5'	21.5'
2	-5 TO -4.01	4.5'	15.0'
3	-4 TO -3.01	4.5'	12.0'
4	-3 TO -2.01	4.5'	9.5'
5	-2 TO 2	8.0'	8.0'
6	2.01 TO 3	9.5'	4.5'
7	3.01 TO 4	12.0'	4.5'
8	4.01 TO 5	15.0'	4.5'
9	5.01 TO 6	21.5'	4.5'

RAMP IN CURB RETURN

NOTE:
 B TO A = NEGATIVE (-)
 A TO B = POSITIVE (+)

SIDEWALK RAMP

PER STD. DWG. NO. 235 - CASE 1

SIDEWALK RAMP

PER STD. DWG. No. 235 - CASE 1

NOTE
NO WALL

ANY OTHER OBJECT, OTHER THAN TRAFFIC CONTROL DEVICES, FIRE HYDRANTS, TREES, AND STREET LIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT, MEASURED FROM TOP OF CURB, OR WHERE NO CURB EXISTS, A HEIGHT OF 27 INCHES MEASURED FROM THE TOP OF ADJACENT ASPHALT, GRAVEL OR PAVEMENT STREET SURFACE. THIS RESTRICTION EXTENDS ALONG THE SIGHT VISIBILITY LINE THROUGH LANDSCAPED MEDIANS.

LEGEND

EXISTING TEXT
PROPOSED TEXT
FINISH FLOOR ELEVATION
PAD ELEVATION
PROPERTY LINE
RETAINING WALL
CUT FILL TRANSITION
LINE
EXISTING CONTOUR
EDGE OF PAVEMENT
SAWCUT LINE
AC REMOVAL
CONCRETE REMOVAL
SIGHT VISIBILITY ZONE

ABBREVIATIONS

ABBREVIATIONS

ADI	AREA DRAIN INLET
EXT	EXTENDED
FG	FINISH GRADE
FL	FLOW LINE
FTG	FOOTING
GB	GRADE BREAK
GF	GARAGE FLOOR
HP	HIGH POINT
LSA	LANDSCAPE AREA
SD	STORM DRAIN
SW	SIDEWALK
TC	TOP OF CURB
TF	TOP OF FOOTING
TW	TOP RETAINING WALL
VG	VALLEY GUTTER

NOTE

ADD 2800 FEET TO ALL TAGS

BENCHMARK

CITY OF LAS VEGAS BENCHMARK NO. 0LV0030NW6
 NIVET & PLATE IN THE TOP OF CURB NORTHWEST CORNER OF TOWN
 CENTER DRIVE AND COVINGTON CROSS DRIVE.
 ELEVATION = 856.034 METERS (PUBLISHED NAVD 88 DATUM)
 ELEVATION = 2808.51 US SURVEY FEET (CALCULATED)

GENERAL NOTES

1. SEE SHEET NT FOR ADDITIONAL NOTES, LEGEND AND QUANTITY ESTIMATE.
2. SEE SHEET UP1 FOR UTILITY LOCATIONS.
3. SEE SHEETS DT1 FOR CONSTRUCTION DETAILS.
4. THE CONTRACTOR SHALL VERIFY THE VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UTILITIES AND SURFACE FEATURES PERTINENT TO THIS PROJECT PRIOR TO CONSTRUCTION. THE CONTRACTOR MUST NOTIFY THE DESIGN ENGINEER IF ANY DISCREPANCIES ARE ENCOUNTERED.
5. CONSTRUCTION SHALL COMPLY WITH SOILS REPORT PROJECT NUMBER: 15-15-223
PREPARED BY: NOVA GEOTECHNICAL
DATED: 01-08-2016
UPDATED: N/A

DRAINAGE STUDY NOTE:

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



8/16/16
DENNIS P WERTZLER PE NO. 11970 DATE

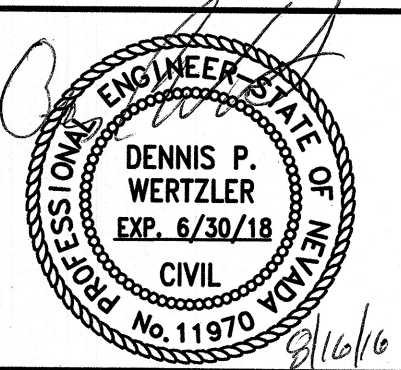
THE CALIDA GROUP

'TWIN AVE., SUITE 115, LAS VEGAS NV, 89135
 TEL: (702) 990-3906 FAX: (702) 925-5506

CROSSINGS CARE CAMPUS

GRADINING PLAN 2

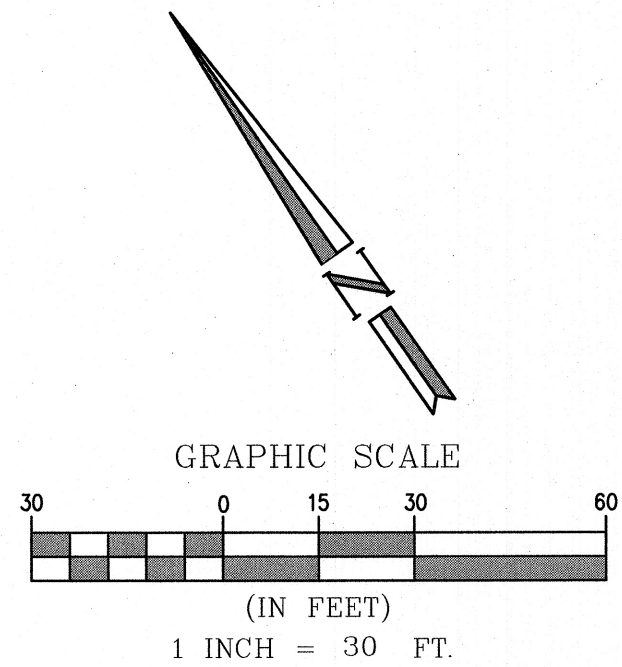
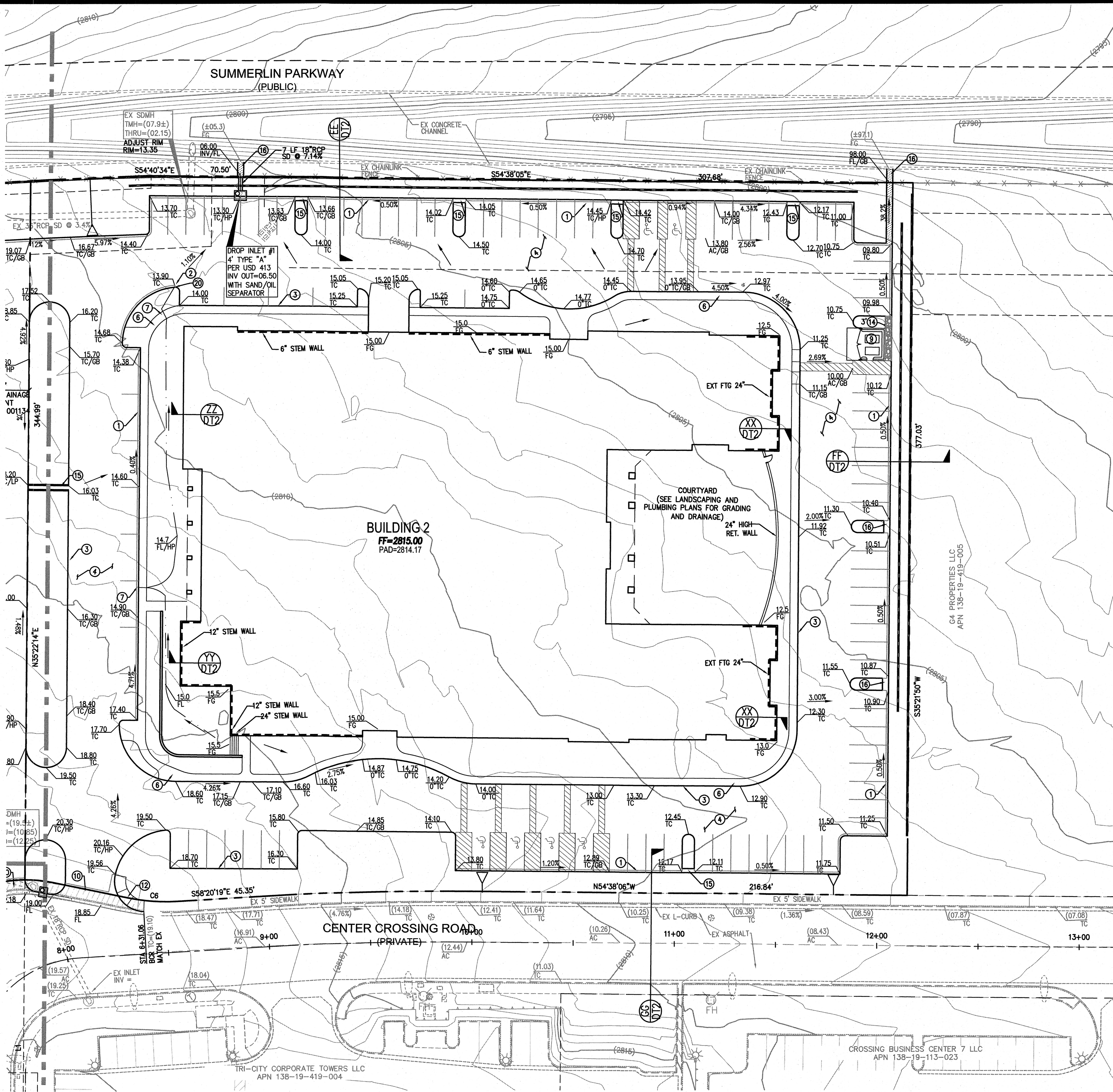
DRAWN BY: DPW
DESIGNED BY: DPW
CHECKED BY: DPW
PROJECT NO: SN15-823



SHEET
GP2
4 OF 8 SHEETS
DRAWING #
XXXX

FILENAME: C:\CADD\15-0000\15-0000.dwg, LAST SAVED ON: Aug 16 2016 8:13am PLOTTED BY: DPARTEN, ON: Aug 16 2016 8:20am

MATCHLINE SEE SHEET GP1



- CONSTRUCTION NOTES**
1. CONSTRUCT 18" "L" CURB PER USD NO. 219 (ON-SITE ONLY)
 2. CONSTRUCT SPILL CURB WITH 0" ASPHALT LIP PER DETAIL 10 ON SHEET DT1
 3. CONSTRUCT "A" TYPE 6" CURB PER USD NO. 219
 4. CONSTRUCT AC PAVEMENT PER DETAIL 4 ON SHEET DT1
 5. CONSTRUCT 0" CURB FACE PER DETAIL 9 ON SHEET DT1
 6. CONSTRUCT SIDEWALK (4-INCH THICK) PER USD NO. 234
 7. CONSTRUCT SIDEWALK DRAIN PER USD NO. 236
 8. CONSTRUCT 2" VALLEY GUTTER PER DETAIL 5 ON SHEET DT1
 9. CONSTRUCT TRASH ENCLOSURE PER ARCHITECTURAL PLANS
 10. CONSTRUCT COMMERCIAL DRIVEWAY PER STD DWG. NO. 228 WITH GEOMETRICS OF USD NO. 222.1 AND 225.
 11. CONSTRUCT PRIVATE SIDEWALK RAMPS PER ADA STANDARDS
 12. CONSTRUCT SIDEWALK RAMPS PER USD NO. 235. (CASE 1)
 13. INSTALL RP RAP D50 = 12" (24" THICK)
 14. CONSTRUCT RP RAP U-CURB PER DETAIL 10 ON SHEET DT1
 15. CONSTRUCT 2" U-CURB PER DETAIL 6 ON SHEET DT1
 16. CONSTRUCT 3" U-CURB PER DETAIL 6 ON SHEET DT1
 17. CONSTRUCT 4" U-CURB PER DETAIL 6 ON SHEET DT1
 18. CONSTRUCT 5" U-CURB PER DETAIL 6 ON SHEET DT1
 19. CONSTRUCT 8" U-CURB PER DETAIL 6 ON SHEET DT1
 20. CONSTRUCT 1-FIT CURB OPENING PER DETAIL 8 ON SHEET DT1
 21. NOT USED
 22. NOT USED

THE CALIDA GROUP

10777 W TWAIN AVE., SUITE 115, LAS VEGAS NV, 89135
TEL: (702) 990-3906 FAX: (702) 925-5506

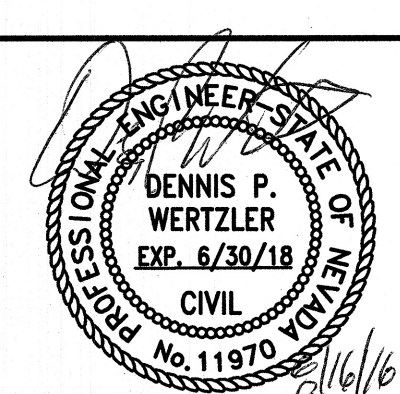


DRC Surveying Nevada, Inc.
7080 LA CIENEGA ST., STE #200
LAS VEGAS, NEVADA 89119
(702) 270-0119

CROSSINGS CARE CAMPUS

GRADING PLAN 3

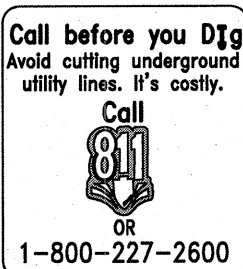
DRAWN BY: DPW
DESIGNED BY: DPW
CHECKED BY: DPW
PROJECT NO: SN15-823



SHEET
GP3
5 OF 8 SHEETS
DRAWING #
XXXX

DISCLAIMER NOTE:

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No.	GRADE (%)	"A" (FT)	"B" (FT)
1	-6 TO -5.01	4.5'	21.5'
2	-5 TO -4.01	4.5'	15.0'
3	-4 TO -3.01	4.5'	12.0'
4	-3 TO -2.01	4.5'	9.5'
5	-2 TO -1.01	4.5'	8.0'
6	-1 TO 0.01	4.5'	8.0'
7	0.01 TO 1.01	4.5'	8.0'
8	1.01 TO 2.01	4.5'	8.0'
9	2.01 TO 3.01	4.5'	8.0'
10	3.01 TO 4.01	4.5'	8.0'
11	4.01 TO 5.01	4.5'	8.0'
12	5.01 TO 6.01	4.5'	8.0'

NOTE:
A TO B = NEGATIVE (-)
B TO A = POSITIVE (+)

SIDEWALK RAMP
PER STD. DWG. NO. 235 - CASE 1

NOTE
NO WALLS, FENCES, SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAN TRAFFIC CONTROL DEVICES, FIRE HYDRANTS, TREES, AND STREET LIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT, MEASURED FROM TOP OF CURB, OR WHERE NO CURB EXISTS, A HEIGHT OF 27 INCHES MEASURED FROM THE TOP OF ADJACENT ASPHALT, GRAVEL, OR PAVEMENT STREET SURFACE. THIS RESTRICTION EXTENDS ALONG THE SIGHT VISIBILITY LINE THROUGH LANDSCAPED MEDIANS.

LEGEND

EXISTING TEXT
PROPOSED TEXT
FINISH FLOOR ELEVATION
PAD ELEVATION
PROPERTY LINE
RETAINING WALL
CUT FILL TRANSITION LINE
EXISTING CONTOUR
SAWCUT LINE
AC REMOVAL
CONCRETE REMOVAL
SIGHT VISIBILITY ZONE

ABBREVIATIONS

ADI AREA DRAIN INLET
EXT EXTENDED
FG FINISH GRADE
FL FLOW LINE
FTG FOOTING
GB GRADE BREAK
GF GARAGE FLOOR
HP HIGH POINT
LSA LANDSCAPE AREA
SD STORM DRAIN
SW SIDEWALK
TC TOP OF CURB
TF TOP OF FOOTING
TW TOP RETAINING WALL
VG VALLEY GUTTER

NOTE

ADD 2800 FEET TO ALL TAGS

BENCHMARK

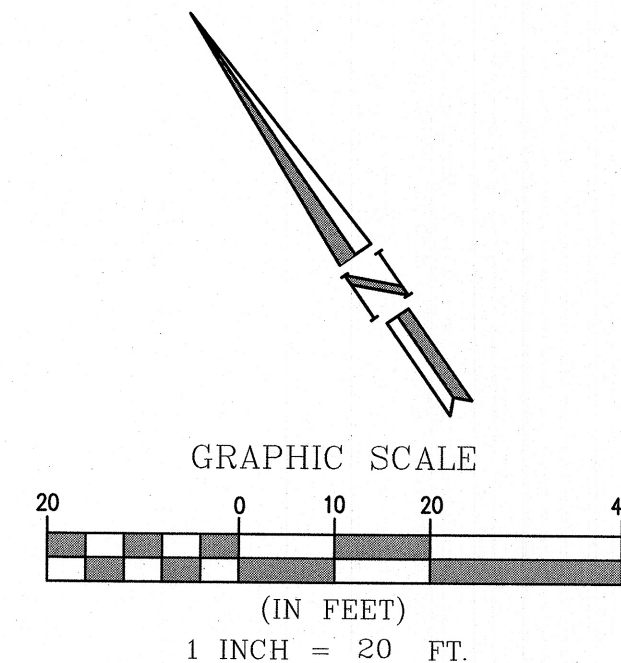
CITY OF LAS VEGAS BENCHMARK NO. 0LV0030NW6
RIVET & PLATE IN THE TOP OF CURB NORTHWEST CORNER OF TOWN CENTER DRIVE AND COVINGTON CROSS DRIVE.
ELEVATION = 856.034 METERS (PUBLISHED NAVD 88 DATUM)
ELEVATION = 2808.51 US SURVEY FEET (CALCULATED)

GENERAL NOTES

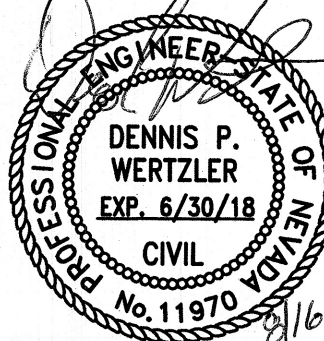
1. SEE SHEET NT FOR ADDITIONAL NOTES, LEGEND AND QUANTITY ESTIMATE.
2. SEE SHEET UP1 FOR UTILITY LOCATIONS.
3. SEE SHEETS DT1 FOR CONSTRUCTION DETAILS.
4. THE CONTRACTOR SHALL VERIFY THE VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UTILITIES AND SURFACE FEATURES PERTINENT TO THIS PROJECT PRIOR TO CONSTRUCTION. THE CONTRACTOR MUST NOTIFY THE DESIGN ENGINEER IF ANY DISCREPANCIES ARE ENCOUNTERED.
5. CONSTRUCTION SHALL COMPLY WITH SOILS REPORT PROJECT NUMBER: E-15-223 PREPARED BY: NOVA GEOTECHNICAL DATED: 01-08-2016 UPDATED: N/A

DRAINAGE STUDY NOTE:

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT CITY OF LAS VEGAS FOR THIS PROJECT.
(7777)
Dennis P. Wertzler PE No. 11970 DATE 8/16/16



DRAWN BY:	DPW
DESIGNED BY:	DPW
CHECKED BY:	DPW
PROJECT NO:	SN15-823



SHEET

GP4

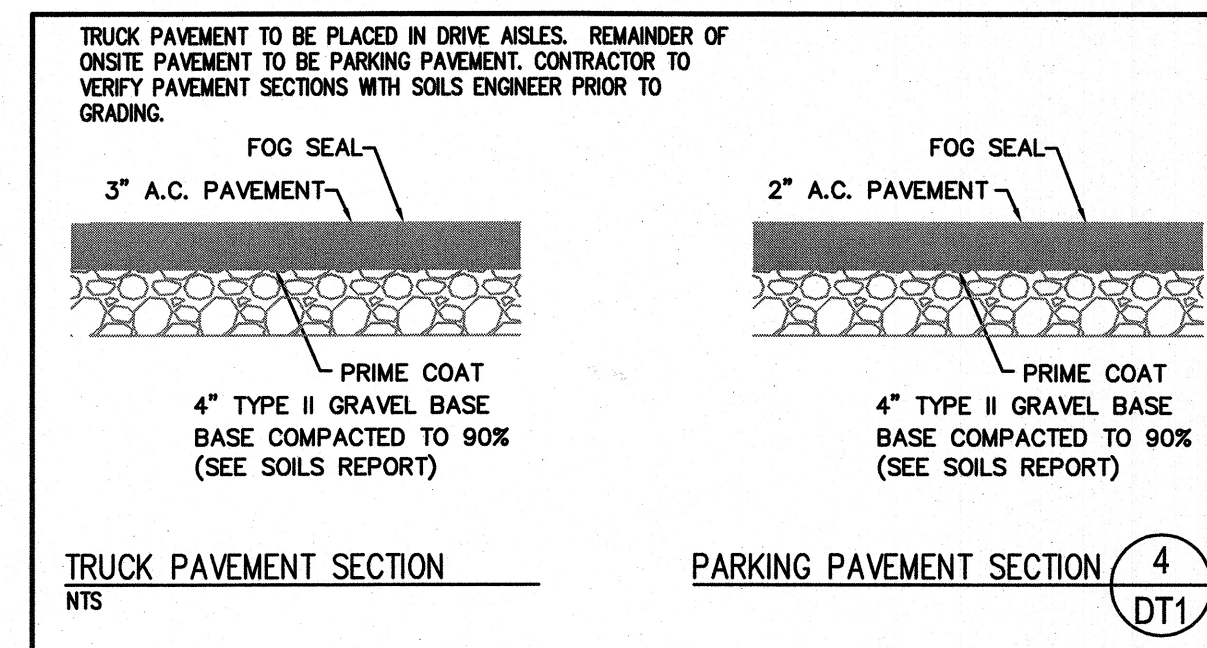
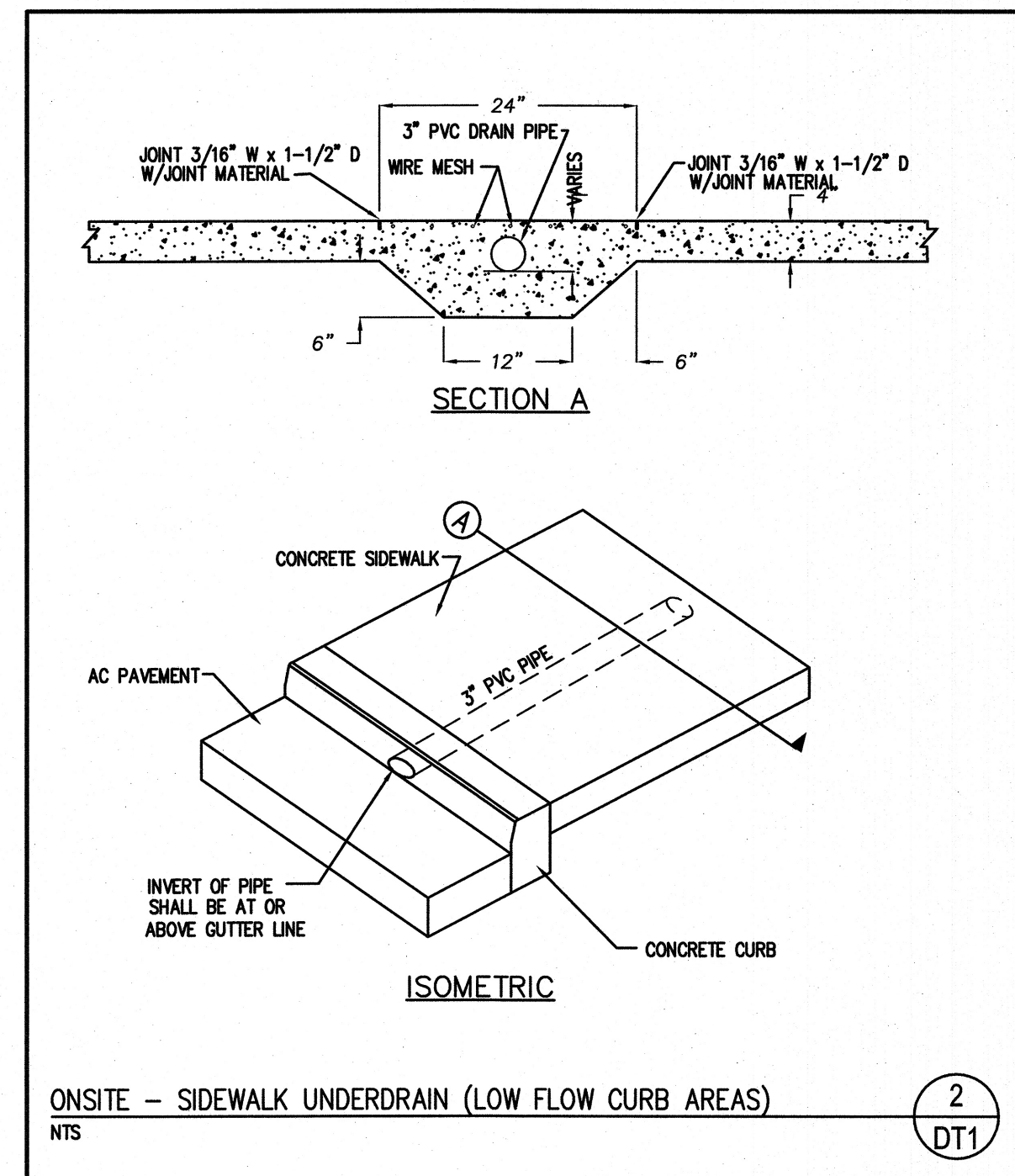
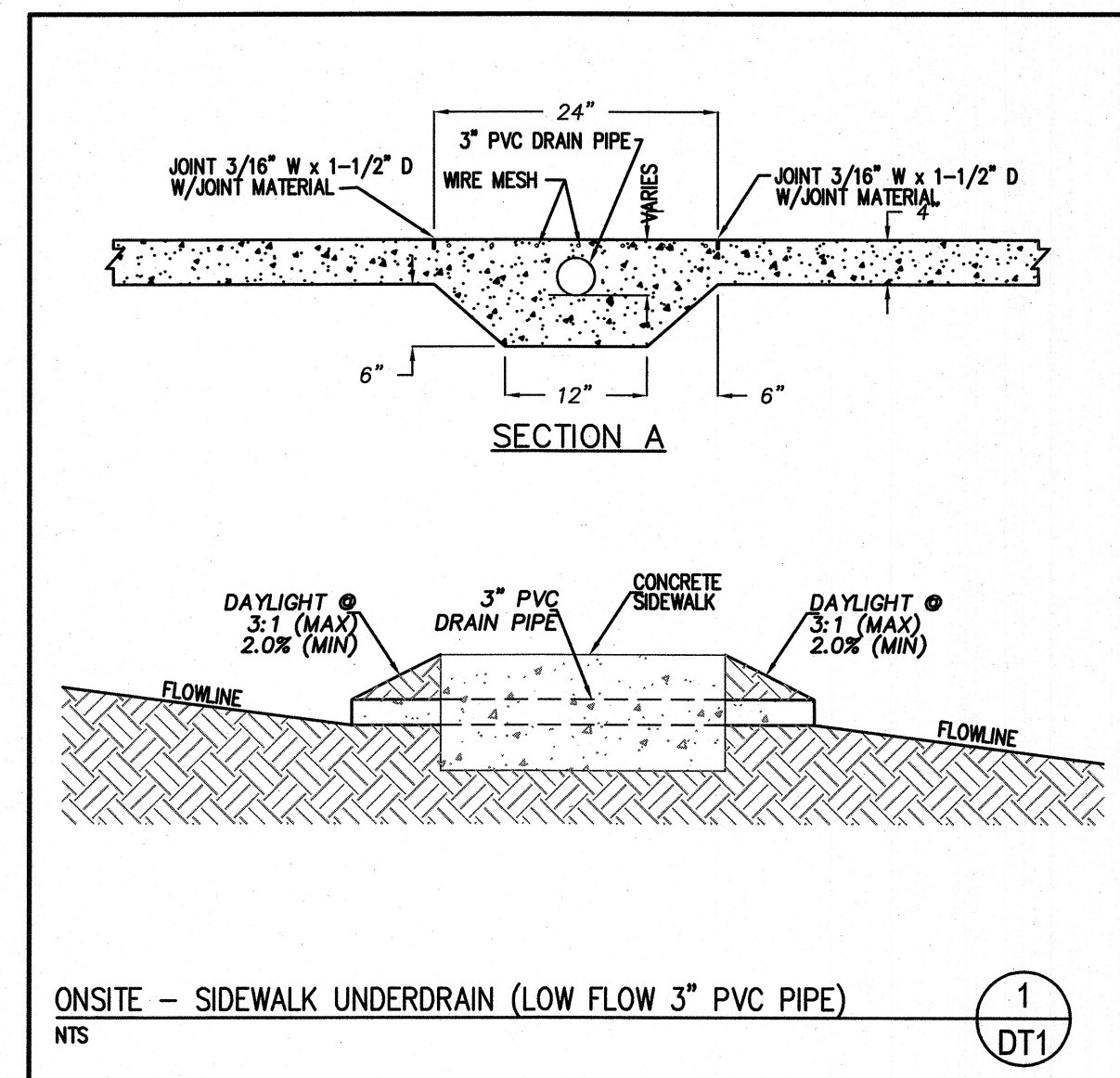
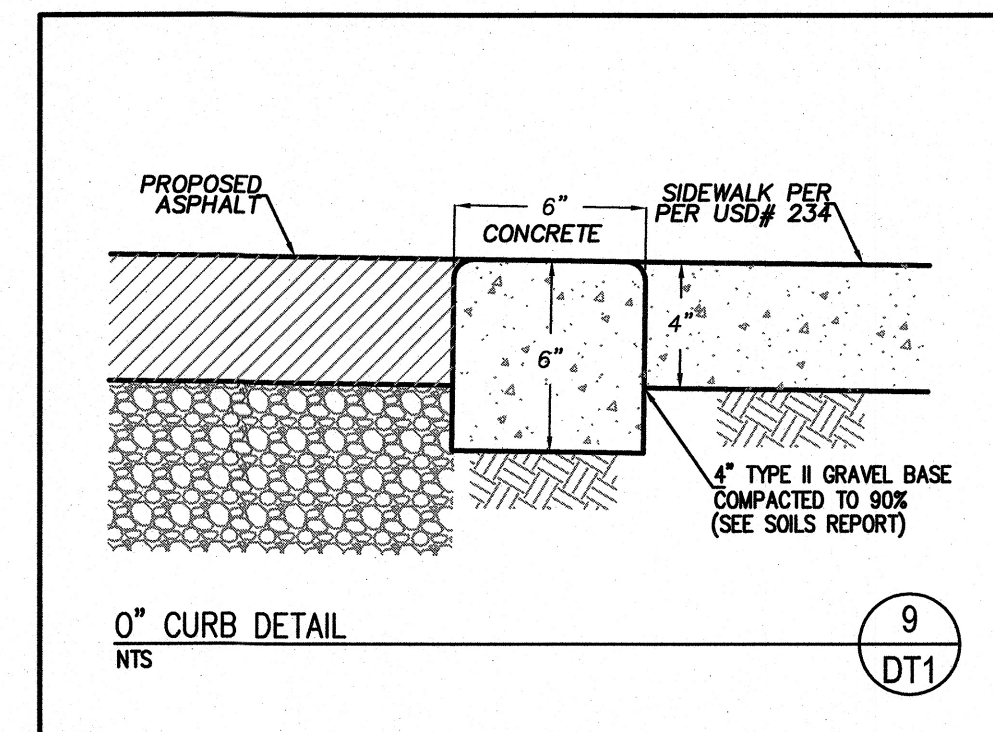
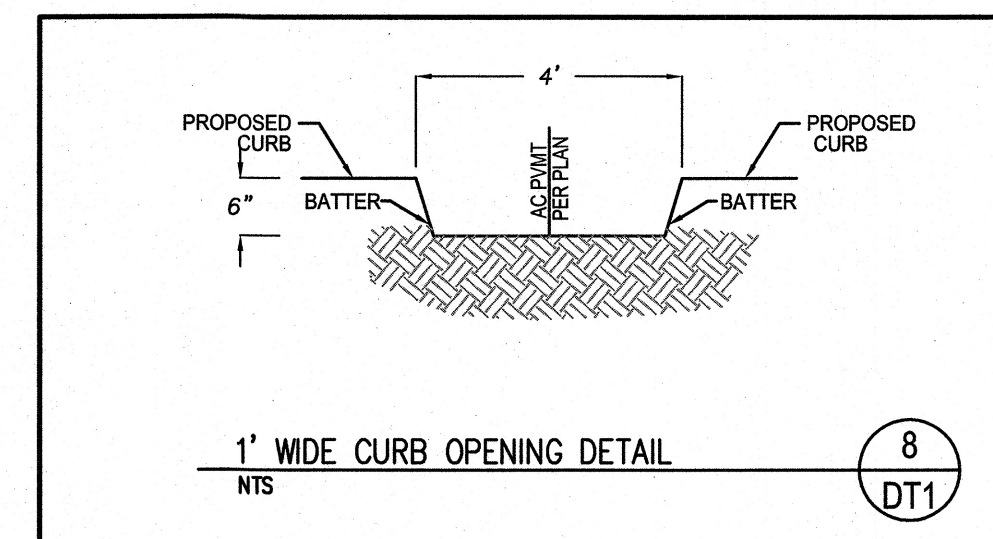
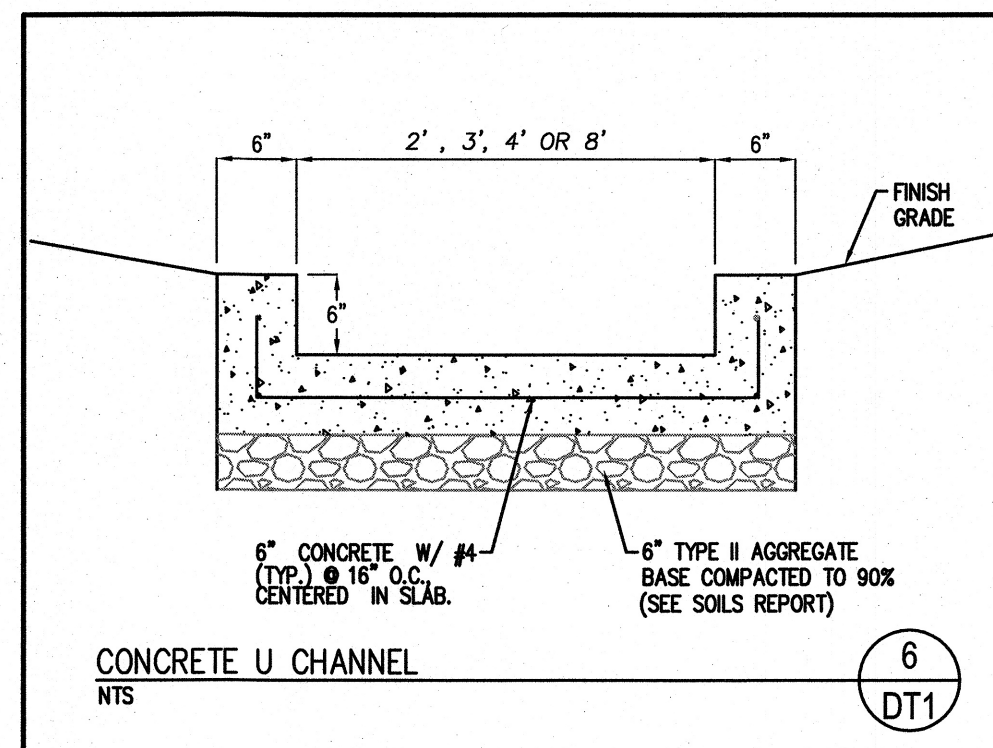
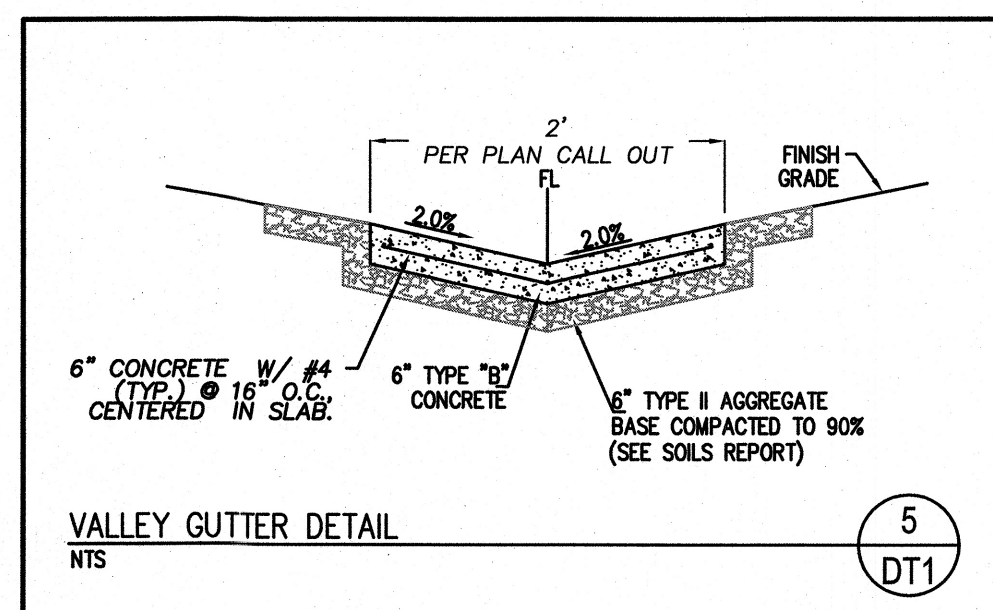
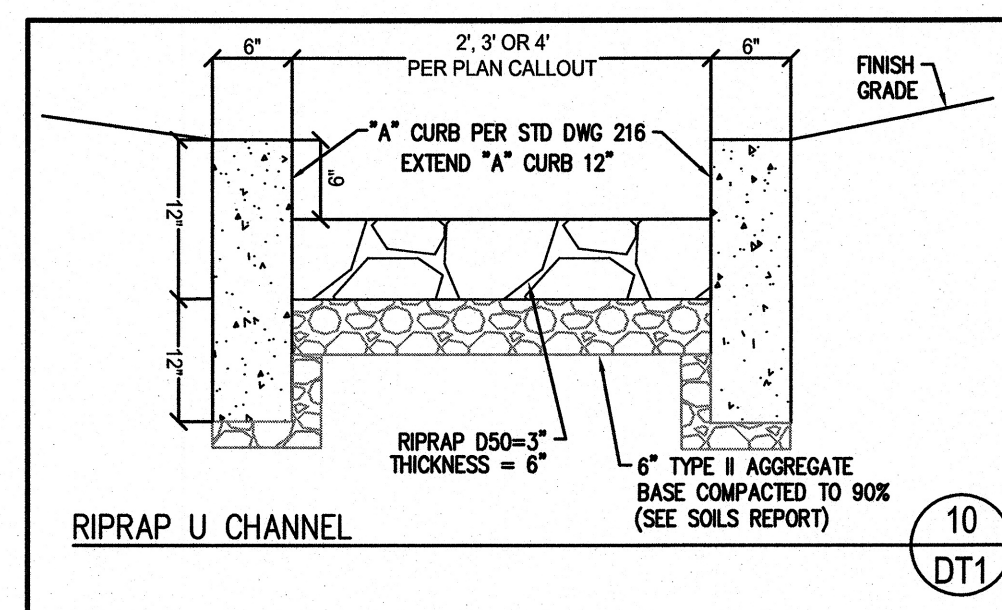
6 OF 8 SHEETS

DRAWING #

XXXX

1. SEE SHEET NT FOR ADDITIONAL NOTES, LEGEND AND QUANTITY ESTIMATE.
2. SEE SHEET UP1 FOR UTILITY LOCATIONS.
3. SEE SHEETS DT1 FOR CONSTRUCTION DETAILS.
4. THE CONTRACTOR SHALL VERIFY THE VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UTILITIES AND SURFACE FEATURES PERTINENT TO THIS PROJECT PRIOR TO CONSTRUCTION. THE CONTRACTOR MUST NOTIFY THE DESIGN ENGINEER IF ANY DISCREPANCIES ARE ENCOUNTERED.
5. CONSTRUCTION SHALL COMPLY WITH SOILS REPORT PROJECT NUMBER: E-15-223
 PREPARED BY: NOVA GEOTECHNICAL
 DATED: 01-08-2016
 UPDATED: N/A

DENNIS P WERTZLER PE NO. 11970

[illegible]

