

DS #: 4987

APN: 139-32.413-003 & 139-32.413-004

PROJECT: 750 & 800 Weaver Court - Update to Hastings & Campbell

SUBMITTAL: 1st Submittal

SCANNED BY/DATE: _____

CHECKED BY/DATE: _____



CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		December 13, 2017
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:	
	750 & 800 Wexler Court – Update to Hastings & Campbell	
Cross Streets:	NEC of Campbell Drive & Wexler Court	
File Number:	F:\Depot\DSMemos\DS4937A.doc	
Parcel Number:	139-32-413-003 & 139-32-413-004	
Zoning Action:	FMP-66129	
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X
COPIES TO:		
		Byron Anderson, P.E.
		Midtown Modern, LLC
		Bart Anderson, P.E., DevCo

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	11/21/2017	12/13/2017	See Comments Below	\$400.00	491591: \$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.

- Per the original approved drainage study, the 20'-wide public drainage easement (privately maintained) between **Lot 3** and **Lot 4** is also a common element and must be concrete lined for the whole width. Note that this easement serves multi-purposes such as drainage and sanitary sewer and for vehicular access for future maintenance. Install screen walls on both sides of the easement. Provide a cross section of the 20'-wide easement in the next submittal.
- Private onsite storm drains are provided to drain the courtyard areas in both **Lot 3** and **Lot 4**. In case the onsite storm drain systems are clogged or broken in the future, address whether an emergency overflow path is provided for safe passage of flood water, ie, will the proposed residences still be flood protected?
- Riprap pads are proposed at the end of several onsite storm drain systems. No dimensions of the riprap pad such as length, width and depth are shown in the grading plans. What's the purpose of the riprap pads, do they function as dry wells? Address and clarify in the next submittal.
- 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 owners".

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/R61E/32
AREA M-32

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

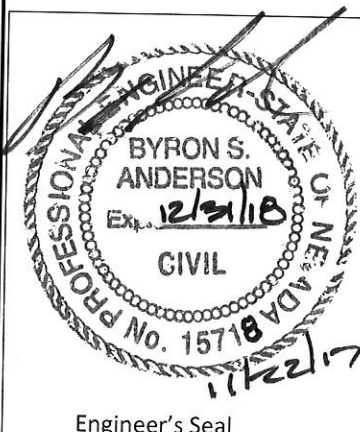
Name of Development: UPDATE TO TDS FOR HASTINGS & CAMPBELL Date: 11/22/17
 Location of Development: a) Descriptive (Cross Streets) North/South: CAMPBELL
 East/West: WEXLER
 b) Section: 32 Township: 20 Range: 61
 c) APN: 139-32-413-003
139-32-413-004
 Name of Owner: MID-TOWN MODERN, LLC
 Telephone No.: 702 250 8800 Fax No.: 702 886 062 E-Mail Address: TWOLAK@BLUEHERON.COM
 Address: 4675 W. TELL AVE #250

Contact Person-Name: BYRON ANDERSON Telephone No.: 702 807 6239
 * E-Mail Address: SANDERSON1018@COX.NET Fax No.:
 Firm: BYRON ANDERSON, PE
 Address: 2141 COPPER CREEK, HENDERSON, NV 89014

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	

- Total Owned Land Area: At Site: 0.95 ACRES Being Developed/Disturbed: 0.85 ACRES
- Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ Yes** ☒ No
- Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☐ Yes** ☒ No
- Proposed type of development (Residential, Commercial, Etc.): RESIDENTIAL
- Approximate upstream land area which drains to the subject site: 2.2 ACRES
- Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: DS 4800
- If known, please briefly identify the proposed discharge point(s) of runoff from the site: 10' WIDE CONCRETE VALLEY WATER (EXIST.) ON EAST BOUNDARY
- Briefly describe your proposed schedule for the subject project: START CONSTRUCTION OF HOMES EARLY 2018



Engineer's Seal

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

*New Required Field

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

Revision	Date

Local Entity File No.

REFERENCE:

STANDARD FORM 1

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: UPGRADE TO TDS
HASTINGS & CAMPBELL Map ID: 139-32-413-003 & 004

Firm Name: Brian Anderson PE Engineer: Brian Anderson

Address: 2441 COPPER COVE

City: HENDERSON State: NV Zip: 89014

Phone Number: 702 607 6239 Fax Number:

Property Owner: MIDTOWN PROPERTIES, LLC

Address: 4015 W. TELL AVE

City: LAS VEGAS State: NV Zip: 89

Reviewed By: Date Received: Date Accepted for Review:

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

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

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

I. GENERAL REQUIREMENT

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

II. MAPS AND EXHIBITS

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

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS (Continued)

- | Yes | No | |
|-------------------------------------|-------------------------------------|--|
| ☐ | ☒ | Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs. |
| ☒ | ☐ | On-site drainage basin maps for existing and proposed conditions showing the existing topography, basin boundaries, concentration points, and on-site and off-site flows in cfs. |
| ☒ | ☐ | Vicinity Map with local and major cross streets identified and a north arrow. |

III. DRAINAGE PLAN

- | Yes | No | |
|-------------------------------------|--------------------------|---|
| ☒ | ☐ | Sheet size: 24" x 36" sealed by a registered engineer in the State of Nevada. |
| ☒ | ☐ | Minimum scale: 1" = 60'. |
| ☒ | ☐ | Project name. |
| ☒ | ☐ | Vicinity Map with local and major cross streets. |
| ☒ | ☐ | Revision box. |
| ☒ | ☐ | North arrow and bar scale. |
| ☒ | ☐ | Engineer's/consultant's address and phone number. |
| ☒ | ☐ | Elevation datum and benchmark. |
| ☒ | ☐ | Legend for symbols and abbreviations. |
| ☒ | ☐ | Cut/fill scarps, where applicable. |
| ☒ | ☐ | Street names, grades, widths. |
| ☒ | ☐ | Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street. |
| ☒ | ☐ | Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate. |
| ☒ | ☐ | Minimum finish floor elevations with top-of-curb elevations at upstream end of lot. |
| ☒ | ☐ | Proposed typical street sections. |

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
☐	☒	Streets with off-set crowns.
☒	☐	Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
☒	☐	Property lines.
☒	☐	Right-of-way lines and widths, existing and proposed.
☒	☐	Existing improvements and their elevations.
☒	☐	Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.
☐	☒	Concentration points and drainage flow direction with Q_{100} and V_{100} and D_{100} in streets.
☐	☒	Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
☐	☒	Location and cross-section of street capacity calculations.
☒	☐	Cross-sectional detail for channels, including cutoff wall locations.
☒	☐	Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations.
☒	☐	Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
☐	☒	Location and detail of existing, proposed, and future block wall openings. Minimum size is 16" x 48". Wrought iron gate is required for flows > 10 cfs.
☐	☒	Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.
☐	☒	Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit.
☒	☐	Building and/or lot numbers.
☐	☒	Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
☐	☒	Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
☐	☒	For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE.
☒	☐	Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from the Q_{100} flows.
☒	☐	Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.
☒	☐	Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required).

IV. HYDROLOGIC ANALYSIS

Yes	No	
☐	☒	Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated.
☐	☒	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.
☐	☒	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.
☐	☒	Use of correct precipitation values in and around the McCarran Airport rainfall area.
☒	☐	A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations.
☒	☐	A summary table of stormwater flows showing basin area, Q_{10} and Q_{100} for both individual basins and combined basin flows, where applicable.
☒	☐	Copies of supporting technical information referenced from a previously approved study and a statement accepting these results.
☐	☒	On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with current Nevada Drainage Law.
☐	☒	Calculation for impervious area for parking lots and LIDs (if required).

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
☐	☒	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
☐	☒	Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q_{100} and Q_{10} flows representing the worst case for interior and all perimeter streets. $Q_{100} d \times v \leq 8$. $Q_{10} d \times v \leq 6$ and 12 foot dry lane for rights-of-way ≥ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
☒	☐	A summary table of interior and exterior street capacity calculations showing the street name, Q_{100} flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
☐	☒	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
☒	☐	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.
☒	☐	Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, whichever is greater.
☐	☒	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.
☐	☒	Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
☐	☒	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.
☐	☒	The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.
☐	☒	Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:

STANDARD FORM 2

UPDATE
TO
TECHNICAL DRAINAGE STUDY
FOR
HASTINGS & CAMPBELL

RESIDENTIAL DEVELOPMENT

November 20, 2017

CUSTOM RESIDENCES
750 AND 800 WEXLER COURT
LAS VEGAS, NV 89107

Prepared By:

BYRON ANDERSON, PE

2641 Copper Cove
Henderson, Nv. 89074
702-807-6239

Prepared For:

MIDTOWN MODERN, LLC
4675 W. TECO AVE #250
LAS VEGAS, NV. 89118

CITY OF LAS VEGAS
PUBLIC WORKS DEPARTMENT
Development Services Center
333 N. Rancho Drive, Ste. 700
Las Vegas, NV 89106

**Re: Update to Hydrology Study for
 Hastings & Campbell, Residential Development
 Custom Residences, 750 and 800 Wexler Court**

Mr. Sung,

The purpose of this technical drainage study update is to lower the finish floors on lot 3 (750 Wexler Ct.) and lot 4 (800 Wexler Ct.) from the set finish floor elevations as shown on the approved improvement plans titled 805 Campbell, A Residential Subdivision. This subdivision has an approved drainage study prepared by Taney Engineering titled *Technical Drainage Study for Hastings and Campbell, Residential Development* (DS 4800). The proposed finished floors will still meet RFC and CLV criteria by being set greater than twice the depth of flow in the adjacent roadway. Furthermore, a cutoff swale will be installed to provide additional flood control protection.

PROJECT BACKGROUND

The subject properties lie within Developed Basin DON3 of the approved study. Both lot 3 and lot 4 front Wexler Court. Wexler Court has a 100-year storm flow of 4 CFS (Section A of the Developed Condition Basin Map of the approved study). These storm flows are contained within the private street section with a normal depth of 0.35' (see Exhibit 'A' this Update).

Developed Basin DON1 and DON2 drain into a 20' wide drainage easement that lies between Lots 3 and 4. This 20' wide drainage easement has an existing 2' wide concrete valley gutter. The 100 year storm flows within this drainage easement are 9 CFS (Section B of the Developed Condition Basin Map of the approved study). The normal depth for this storm flow is 0.27' (see Exhibit 'B' this Update). The velocity of these storm flows is non-erosive and the existing 2' wide valley gutter with earthen slopes will provide adequate protection to the proposed residences.

At the back of lots 3 and 4 is an existing 10' wide concrete valley gutter that contains offsite storm flows as well as the storm flows from the Hastings & Campbell residential development (Section C and D of the Developed Condition Basin Map of the approved study).

PROPOSED REVISIONS

Lot 3, 750 Wexler Court

The existing finish floor elevation per the approved improvement plans for lot 3 is 2098.37. The proposed finish floor elevation per this Update for lot 3 is 2097.47. This proposed finish floor

elevation is 0.72' above the high side top of curb elevation on Wexler Court in front of this lot. A cut-off swale will be constructed between Wexler Court and the proposed residence that will provide additional flood protection (see attached grading plan for 750 Wexler Court). The proposed finish floor elevation of 2097.47 on lot 3 sits 0.87' above the water surface elevation in Wexler Court. The proposed finish floor sits 1.60' above the water surface elevation in the 20' wide drainage easement (existing 2' valley gutter) between lots 3 and 4. The proposed finish floor sits 2.41' above the water surface elevation in the existing 10' wide concrete valley gutter at the back of the lot. This proposed residence is protected against a 100-year storm event.

Lot 4, 800 Wexler Court

The existing finish floor elevation per the approved improvement plans for lot 4 is 2098.97. The proposed finish floor elevation for lot 4 is 2097.97. This proposed finish floor elevation is 0.77' above the high side top of curb elevation on Wexler Court in front of this lot. A cut-off swale will be constructed between Wexler Court and the proposed residence that will provide additional flood protection (see attached grading plan for 800 Wexler Court). The proposed finish floor elevation of 2097.97 on lot 4 sits 0.92' above the water surface elevation in Wexler Court. The proposed finish floor sits 2.10' above the water surface elevation in the 20' wide drainage easement (existing 2' valley gutter) between lots 3 and 4. The proposed finish floor sits 2.43' above the water surface elevation in the existing 10' wide concrete valley gutter at the back of the lot. This proposed residence is protected against a 100-year storm event.

20' Drainage Easement between Lots 3 and 4

The existing 2' wide concrete valley gutter and graded earthen slopes will provide adequate flood protection to the adjacent lots. The proposed retaining walls on each side of the easement as shown on the approved improvement plans are not needed for flood protection.

I look forward to your approval of this Update.

Sincerely,



Byron Anderson, PE

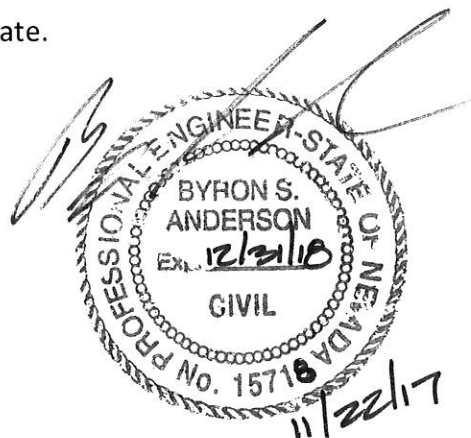


Exhibit A

Horizontal Scale: Ratio: 1:12 (1 in=1 ft)
Vertical Scale: Ratio: 1:60 (1 in=5 ft)

0+00
0+05
0+10
0+15
0+20
0+25

0+00.50
0+10.77
0+16.35
0+26.8

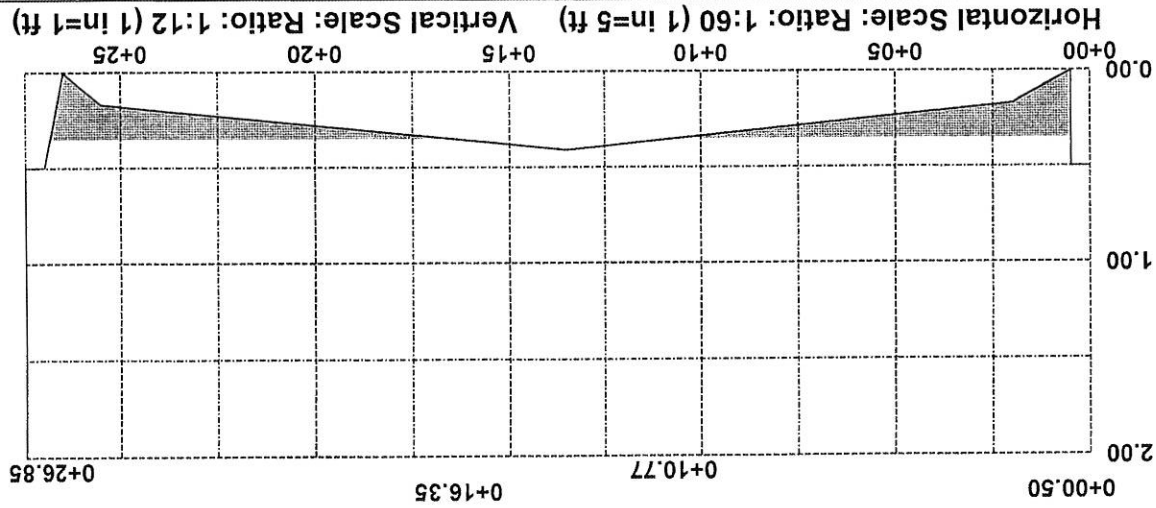
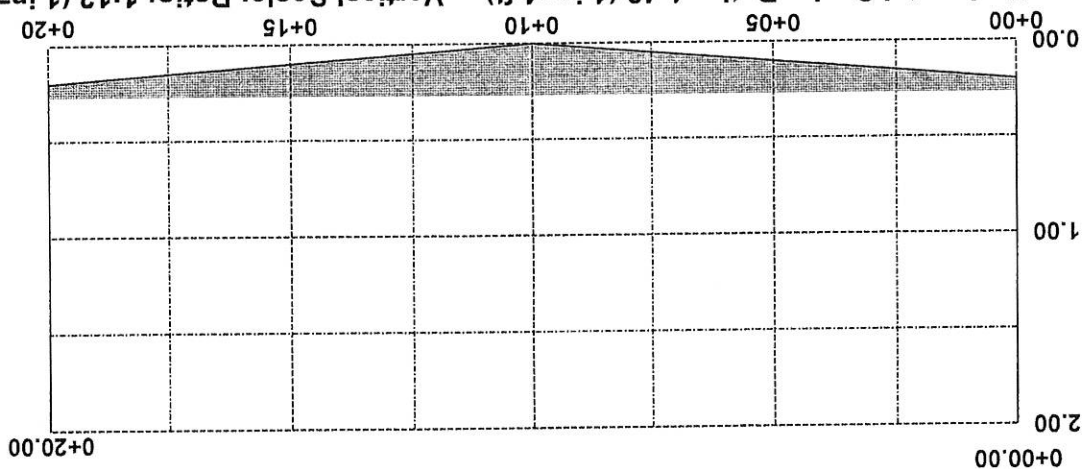


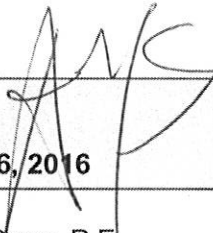
Exhibit 'B' New Irregular Channel

Input Parameters		Channel Section	
Manning N Value	0.0165	Manning N Method	Pavlovskii
Channel Slope	0.90000 %	Normal Depth	0.27 ft
Discharge	9.00 cfs	Solve For	Normal Depth
Station		Elevation (ft)	Start N-Value
0+00.00	2.00	0.0200	
0+00.00	0.20	0.0200	
0+09.00	0.02	0.0130	
0+10.00	0.00	0.0130	
0+11.00	0.02	0.0130	
0+20.00	0.20	0.0200	
0+20.00	2.00	0.0200	

Channel Depth	2.00 ft
Channel Width	20.00 ft
Water Surface Elevation	0.27 ft
Flow Area	3.44 sq.ft.
Wetted Perimeter	20.15 ft
Top Width	20.00 ft
Hydraulic Depth	0.172 ft
Hydraulic Radius	0.171 ft
Critical Depth	0.28 ft
Critical Slope	0.70932 %
Velocity	2.62 ft/s
Velocity Head	0.11 ft
Specific Energy	0.38 ft
Froude Number	1.114
Velocity Depth Product	0.71 sq.ft./s
Flow Type	Super-Critical



REFERENCE MATERIAL

CITY OF LAS VEGAS		DATE: 
INTER-OFFICE MEMORANDUM		June 16, 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:	
	Hastings & Campbell	
Cross Streets:	NEQ of Charleston Blvd. & Campbell Ave.	
File Number:	F:\Depot\DSMemos\DS4800B.doc	
Parcel Number:	139-32-405-027	
Zoning Action:	TMP-62358; WVR-62353; WVR-62356; VAC-62357 & VAR-62407	
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	5/4/2016	5/18/2016	Not Approved	\$400.00	442793: \$400
2 nd Submittal & Supplement	5/26/2016 & 6/15/2016	6/16/2016	See Comments Below	\$400.00	445645: \$400
TOTAL FEES (LDDRS):				\$800.00	----

REMARKS:

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

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

- Private streets must be public drainage easements. Provide a note on the grading plans: Note: All private streets are P.U.E., Public Sewer Easements and Public Drainage Easements to be privately maintained by the HOA.
- All drainage easements must be public drainage easements to be privately maintained and common lots to be labeled on the grading plans and to be dedicated as such in the final map or by separate document.
- The engineer must provide a table on the grading plans that shows a quantity estimate of all drainage improvements within Public Drainage Easements. All drainage improvements within Public Drainage Easements must be bonded and inspected.

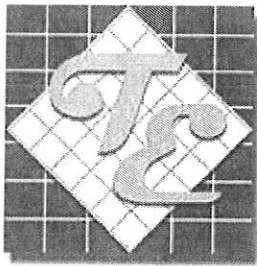
NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Update and accepted by the *City of Las Vegas Flood Control Section*. Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the *City of Las Vegas* reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

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

END OF REMARKS

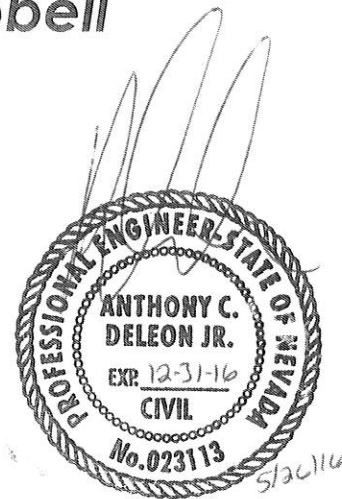
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T/R/S: T20S/R61E/32
AREA M-32



TANEY ENGINEERING

ADDENDUM #1
TO THE
TECHNICAL DRAINAGE STUDY
FOR
Hastings & Campbell
Residential Development



CITY OF LAS VEGAS NEVADA

May 2016

Prepared by:
Taney Engineering
6030 S. Jones
Las Vegas, Nevada 89118
Telephone: (702) 362-8844
Fax: (702) 362-5233

Prepared for:
Blue Heron
4675 W Teco Ave, Ste 250
Las Vegas, NV 89118
Telephone: (702) 256-8866
Fax: (702) 256-8862

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Hastings & Campbell Date: May 26, 2016

Location of Development: a) Descriptive (Cross Streets) North/South: Campbell Drive

East/West: Hastings Avenue

b) Section: 32 Township: 20S Range: 61E

c) APN : 139-32-405-027

Name of Owner: Blue Heron

Telephone No.: (702) 256-8866 Fax No.: (702) 256-8862 E-Mail Address: _____

Address: 4675 W Teco Ave STE 250 Las Vegas, NV 89118

Contact Person-Name: Anthony Deleon Jr., PE, CFM Telephone No.: (702) 362-8844

* E-Mail Address: AnthonyD@taneycorp.com Fax No.: (702) 362-5233

Firm: Taney Engineering

Address: 6030 S. Jones Blvd, Las Vegas NV 89118

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: 2.49+/- acres Being Developed/Disturbed: 2.49+/- acres

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

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

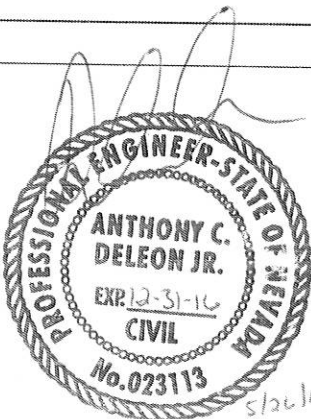
4. Proposed type of development (Residential, Commercial, Etc.): Residential

5. Approximate upstream land area which drains to the subject site: 7.55+/- acres

6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: Storm Drain Report for Busch Residence(DS#4430)

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: To the northeast corner of the site through the existing 20-foot wide Drainage Easement.

8. Briefly describe your proposed schedule for the subject project: A.S.A.P



Engineer's Seal

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

*New Required Field

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

	Revision	Date

Local Entity File No. _____

REFERENCE:

STANDARD FORM 1



5 HYDRAULIC ANALYSIS

5.1 Street Hydraulics

Hydraulic calculations have been provided for all streets in the developed conditions. See Table 2 for a summary of results; calculations can be found in Appendix C. The location of the hydraulic cross sections can be found on Figures 7 and 8. All street sections meet VxD and depth requirements for the 10-year and 100-year storm events. The interior street is being designed as a 30' crowned private street. The cul-de-sac slopes from west to east at 1.7%.

5.2 Drainage Easements

The project includes two public 20' sewer and drainage easements and one existing 10' private drainage easement running north-south along the eastern boundary. This easement starts as 10' at south end and extends to 20' at the connection to the proposed 20' public drainage easement running west-east. This easement conveys the flow from the cul-de-sac towards the first drainage easement discharging the runoff through wall opening. Cross section B provides worst case hydraulic calculations for the west-east easement and cross section C provides worst case hydraulic calculations for the north-south easement. The north-south easement includes a 10' channel and 3:1 slope on the west side. The west-east easement consists of a 2' valley gutter down the middle for low flows with pavers covering the remainder of the easement.

Weir calculations have also been provided. The adjacent screen walls have been solid grouted to a minimum of 18" above the 100-year weir elevation. Both the public drainage easements are to be publicly maintained and are lined with reinforced concrete.

5.3 Finished Floor Elevations

The proposed finished floor elevations have been set at a minimum vertical distance above the gutter flowline of at least twice the depth of flow in the gutter flowline up to a maximum of 18 inches above the water surface elevation in the street.

The proposed finished floor elevations have also been protected to a minimum of 18" above the water surface elevation and weir elevation where adjacent to drainage easements.



6 SUMMARY TABLES

Table 1: Basin Summary

Existing Condition				Ultimate Condition			
Basin	Area (acres)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)	Basin	Area (acres)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
XON1	0.36	1	1	DON1	0.36	1	1
XON2	2.13	3	6	DON2	1.06	1	3
REF1*	N/A	1	3	DON3	1.07	1	2
REF2*	N/A	10	20	REF1*	N/A	1	3
XCP	N/A	15	30	REF2*	N/A	10	20
				DCP	N/A	14	29

* FLOW REFERENCED FROM DRAINAGE STUDY DS 4430.

Table 2: Cross Section Summary

Cross Section	Description	Q (cfs)	Slope (%)	Depth (ft)	Velocity (ft/s)	DxV
A - 30 FT PRIVATE DR 100YR-DV	REF1 + DON1	4	1.29	0.32	2.30	0.74
A - 30 FT PRIVATE DR 10YR-DV	REF1 + DON2	2	1.29	0.27	1.99	0.54
B - 20 FT PRIVATE DRAINAGE EASEMENT 100YR-DV	REF1+DON1+DON2+DON3	9	0.87	0.25	3.00	0.75
C - 10 FT VALLEY GUTTER 100YR-DV	DCP	29	0.37	1.12	4.64	5.20
D - 10 FT VALLEY GUTTER 100YR-DV	REF2*	20	0.23	1.06	3.54	3.75

7 CONCLUSIONS AND RECOMMENDATIONS

As detailed in this study, the Hastings and Campbell Residential Development is in compliance with the HC&DDM. No adverse effects are expected either upstream or downstream of the subject site. Street and drainage easement criteria will be met. Proposed finished floor elevations are adequately protected and are set a minimum of 18" above the adjacent top of curb elevation.



8 REFERENCES

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

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

FlowMaster Version V8i, Haestad Methods, Inc.

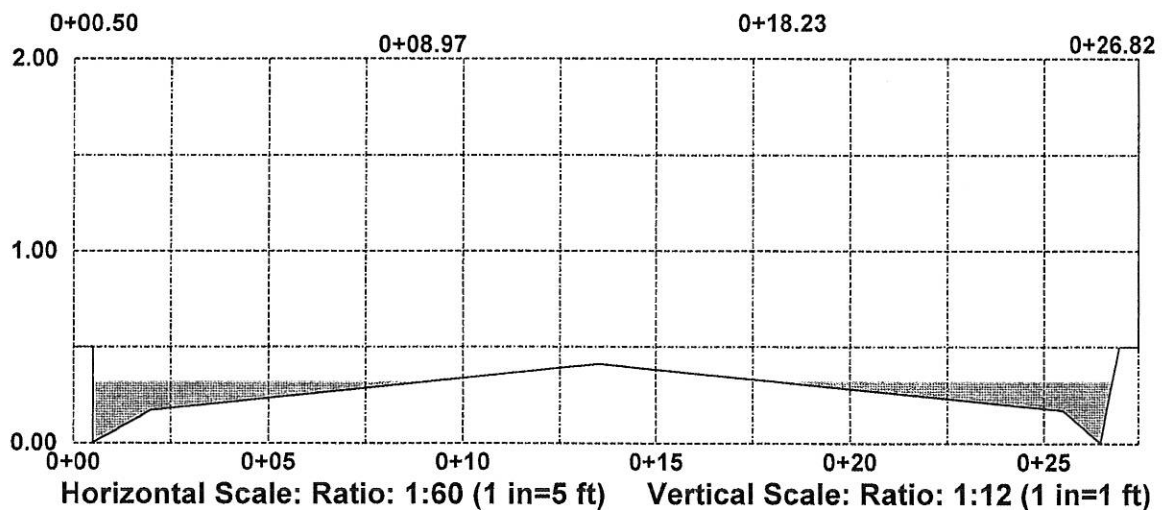
Flood Insurance Rate Map Number 32003C2170F, dated November 16, 2011, Federal Emergency Management Agency.

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

Technical Drainage Study for Busch Residence, Lochsa Engineering, DS-4430, 2010

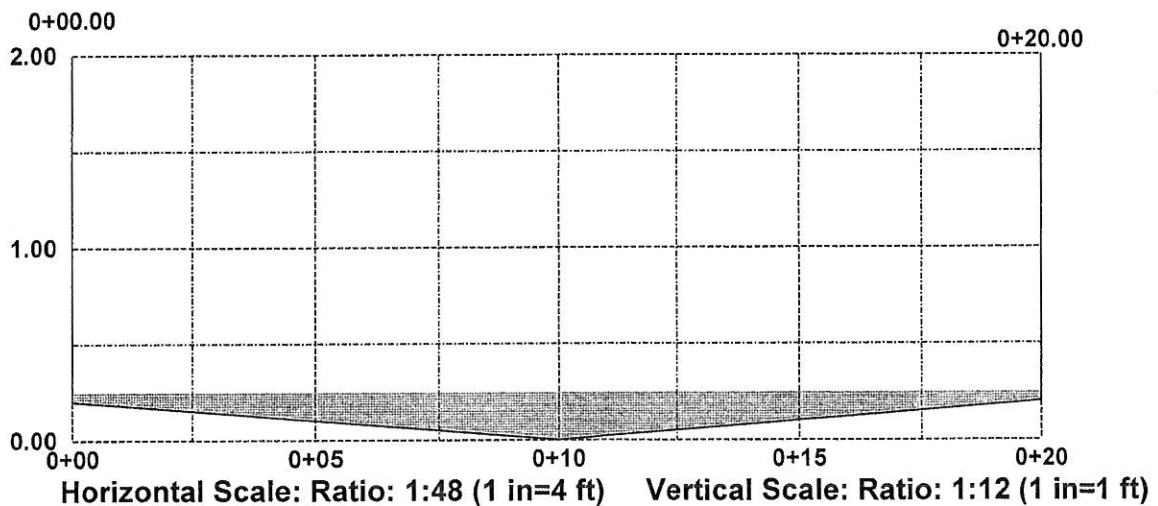
New Irregular Channel

Input Parameters			Output Parameters	
Manning N Value	0.0146		Channel Depth	0.50 ft
Manning N Method	Pavlovskii		Channel Width	27.50 ft
Channel Slope	1.29000 %		Water Surface Elevation	0.32 ft
Normal Depth	0.32 ft		Flow Area	1.66 sq.ft.
Discharge	4.00 cfs		Wetted Perimeter	17.53 ft
Solve For	Normal Depth		Top Width	17.06 ft
Channel Section			Hydraulic Depth	0.097 ft
Station (ft)	Elevation (ft)	Start N-Value	Hydraulic Radius	0.095 ft
0+00.00	0.50	0.0130	Critical Depth	0.34 ft
0+00.50	0.50	0.0130	Critical Slope	0.67098 %
0+00.50	0.00	0.0130	Velocity	2.41 ft/s
0+02.00	0.17	0.0130	Velocity Head	0.09 ft
0+13.50	0.41	0.0160	Specific Energy	0.41 ft
0+25.50	0.17	0.0160	Froude Number	1.360
0+26.50	0.00	0.0160	Velocity Depth Product	0.76 sq.ft./s
0+27.00	0.50	0.0160	Flow Type	Super-Critical
0+27.50	0.50	0.0160		
0+27.50	2.00	0.0160		



New Irregular Channel

Input Parameters			Output Parameters	
Manning N Value	0.0130		Channel Depth	2.00 ft
Manning N Method	Pavlovskii		Channel Width	20.00 ft
Channel Slope	0.90000 %		Water Surface Elevation	0.25 ft
Normal Depth	0.25 ft		Flow Area	2.97 sq.ft.
Discharge	9.00 cfs		Wetted Perimeter	20.10 ft
Solve For	Normal Depth		Top Width	20.00 ft
Channel Section			Hydraulic Depth	0.148 ft
Station (ft)	Elevation (ft)	Start N-Value	Hydraulic Radius	0.148 ft
0+00.00	2.00	0.0130	Critical Depth	0.28 ft
0+00.00	0.20	0.0130	Critical Slope	0.43749 %
0+10.00	0.00	0.0130	Velocity	3.03 ft/s
0+20.00	0.20	0.0130	Velocity Head	0.14 ft
0+20.00	2.00	0.0130	Specific Energy	0.39 ft
			Froude Number	1.386
			Velocity Depth Product	0.75 sq.ft./s
			Flow Type	Super-Critical



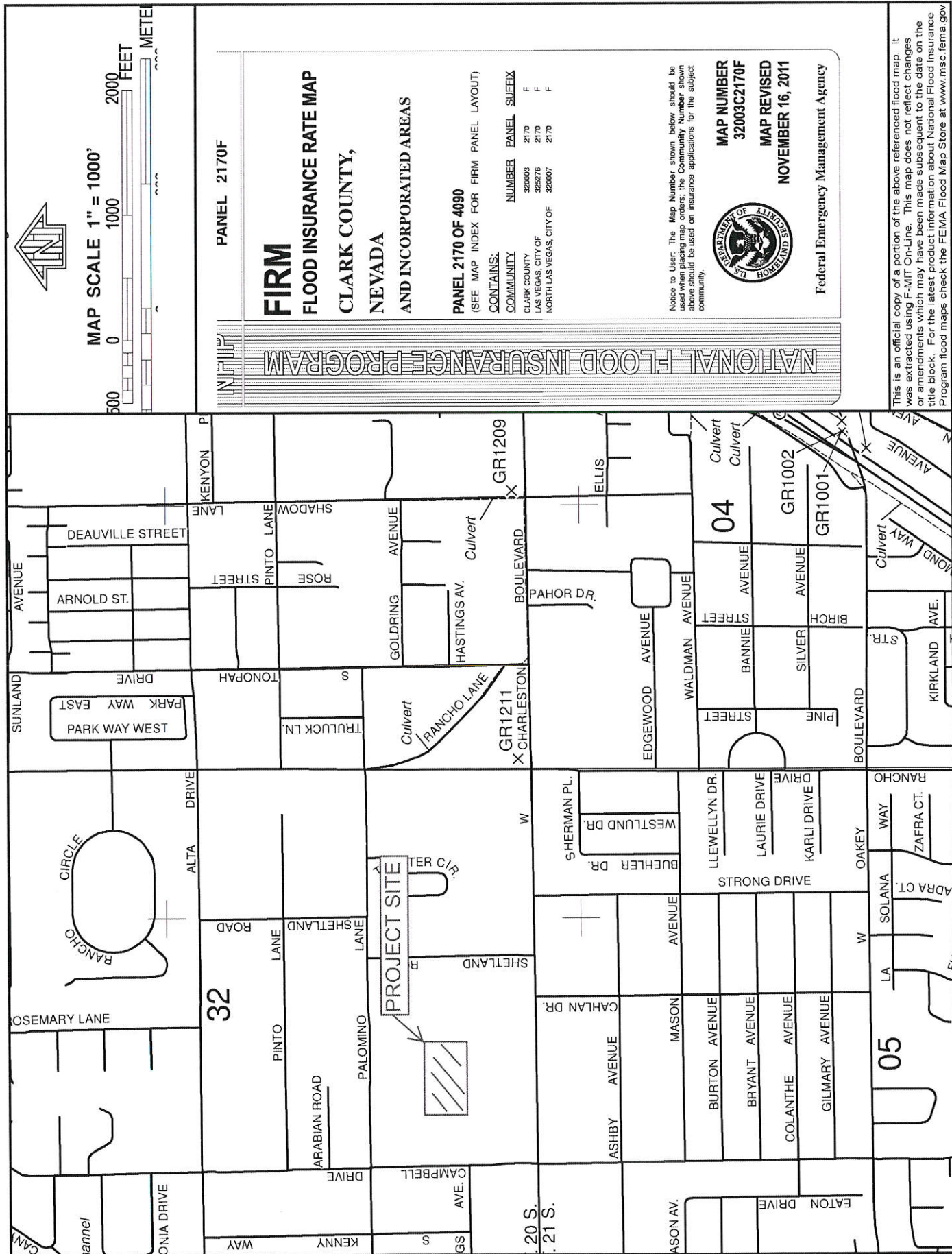


FIGURE 3 FIRM MAP

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL - STANDARD FORM 4



Taney Engineering
6030 S. Jones, Suite #100
Las Vegas, NV 89118

PROJECT NO.: DXC-16-058
FILE: STD_FRM4

PROJECT: Hastings & Campbell
CALCULATED BY: NID

DATE: 05/02/16

Sub-Basin Data				Initial/Overland Time (T _i)				Travel Time (T _t)					T _c	T _c Check (Urbanized Basins)		Final T _c	T _{lag}	Remarks	
DESIG	CN	K	AREA (acres)	AREA (mi^2)	LENGTH (ft)	SLOPE (%)	T _i (min)	LENGTH (ft)	SLOPE (%)	V ₁ (fps)	V ₂ (fps)	T _t (min)	T _c =T _i +T _t (min)	TOTAL (ft)	T _c (min)	T _c (min)	T _{lag} (hrs)	Remarks	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	
EXISTING CONDITION																			
XON1	94.0	0.851	0.36	0.0006	20	1.0	2.0	360	1.0	1.48	N/A	4.1	6.1	N/A	N/A	6.06	0.100		
XON2	94.0	0.851	2.13	0.0033	50	1.0	3.2	366	0.9	1.40	N/A	4.3	7.5	N/A	N/A	7.52	0.100		
DEVELOPED CONDITION																			
DON1	91.0	0.811	0.36	0.0006	20	1.0	2.3	360	1.0	2.02	N/A	3.0	5.3	380.0	12.1	5.3	0.053		
DON2	85.0	0.732	1.06	0.0017	20	1.0	3.0	240	1.1	2.15	N/A	1.9	4.8	260.0	11.4	4.8	0.050		
DON3	84.0	0.719	1.07	0.0017	20	1.0	3.0	290	0.4	1.23	N/A	3.9	7.0	310.0	11.7	7.0	0.070		
										Travel Time Velocity Formulas					All basins over one square mile are calculated by the equation T _{lag} =20Kn(L* _i /S^0.5)^0.33 and denoted by shaded gray (See Worksheet).				
For the travel time (T _i) calculations, V ₁ applies to the first 500 feet of travel distance; V ₂ applies to the remaining travel distance.										Existing					Developed				
										V ₁ = 14.8*(S/100)^1/2					V ₁ = 20.2*(S/100)^1/2				
										V ₂ = 29.4*(S/100)^1/2					V ₂ = 30.6*(S/100)^1/2				

$T_i = (1.8(1-K)(L^{1/2}))(S^{1/3})$
 For the travel time (T_i) calculations,
 V₁ applies to the first 500 feet of travel distance;
 V₂ applies to the remaining travel distance.
 $T_c = T_i + T_t$
 $K = 0.0132(CN)^{-0.39}$
 $T_{lag} = 0.6T_c$

CCRFCD HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

STANDARD FORM 4

REFERENCE:

All basins over one square mile
 are calculated by the equation
 $T_{lag} = 20Kn(L^{1/2}/S^{0.5})^{0.33}$
 and denoted by shaded gray
 (See Worksheet).

Travel Time Velocity Formulas

Existing
 $V_1 = 14.8(S/100)^{1/2}$
 $V_2 = 29.4(S/100)^{1/2}$

Developed
 $V_1 = 20.2(S/100)^{1/2}$
 $V_2 = 30.6(S/100)^{1/2}$

Worksheet for A - 30 FT PRIVATE DR 10YR-DV

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.29000 %
Discharge 2.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.50
0+00.5	0.50
0+00.5	0.00
0+02.0	0.17
0+13.5	0.41
0+25.5	0.17
0+26.5	0.00
0+27.0	0.50
0+27.5	0.50
0+27.5	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.50)	(0+02.0, 0.17)	0.013
(0+02.0, 0.17)	(0+25.5, 0.17)	0.016
(0+25.5, 0.17)	(0+27.5, 2.00)	0.013

Options

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

Results

Normal Depth 0.27 ft

Worksheet for A - 30 FT PRIVATE DR 10YR-DV

Results

Elevation Range	0.00 to 2.00 ft	
Flow Area	1.01	ft²
Wetted Perimeter	13.12	ft
Hydraulic Radius	0.08	ft
Top Width	12.71	ft
Normal Depth	0.27	ft
Critical Depth	0.29	ft
Critical Slope	0.00810	ft/ft
Velocity	1.99	ft/s
Velocity Head	0.06	ft
Specific Energy	0.33	ft
Froude Number	1.24	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.27	ft
Critical Depth	0.29	ft
Channel Slope	1.29000	%
Critical Slope	0.00810	ft/ft

Worksheet for A - 30 FT PRIVATE DR 100YR-DV

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 1.29000 %
Discharge 4.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.50
0+00.5	0.50
0+00.5	0.00
0+02.0	0.17
0+13.5	0.41
0+25.5	0.17
0+26.5	0.00
0+27.0	0.50
0+27.5	0.50
0+27.5	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.50)	(0+02.0, 0.17)	0.013
(0+02.0, 0.17)	(0+25.5, 0.17)	0.016
(0+25.5, 0.17)	(0+27.5, 2.00)	0.013

Options

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

Results

Normal Depth 0.32 ft

Worksheet for A - 30 FT PRIVATE DR 100YR-DV

Results

Elevation Range	0.00 to 2.00 ft	
Flow Area	1.74	ft²
Wetted Perimeter	18.00	ft
Hydraulic Radius	0.10	ft
Top Width	17.52	ft
Normal Depth	0.32	ft
Critical Depth	0.34	ft
Critical Slope	0.00758	ft/ft
Velocity	2.30	ft/s
Velocity Head	0.08	ft
Specific Energy	0.40	ft
Froude Number	1.28	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.32	ft
Critical Depth	0.34	ft
Channel Slope	1.29000	%
Critical Slope	0.00758	ft/ft

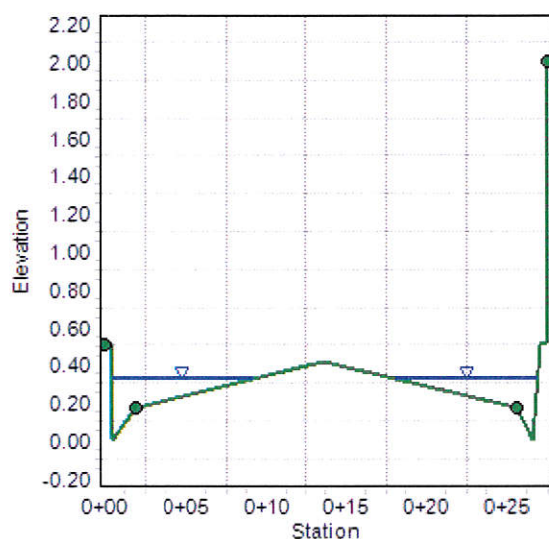
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.29000	%
Normal Depth	0.32	ft
Discharge	4.00	ft ³ /s

Cross Section Image



Project Description

Input Data

Station (ft)	Elevation (ft)
0+00.0	2.00
0+00.0	0.20
0+10.0	0.00
0+20.0	0.20
0+20.0	2.00

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 2.00)	(0+20.0, 2.00)	0.013

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

Normal Depth		0.25	ft
Elevation Range	0.00 to 2.00 ft		
Flow Area		3.00	ft²
Wetted Perimeter		20.10	ft
Hydraulic Radius		0.15	ft
Top Width		20.00	ft
Normal Depth		0.25	ft
Critical Depth		0.28	ft

Worksheet for B - 20 FT PRIVATE DRAINAGE EASEMENT 100YR-DV

Results

Critical Slope	0.00438	ft/ft
Velocity	3.00	ft/s
Velocity Head	0.14	ft
Specific Energy	0.39	ft
Froude Number	1.37	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.25	ft
Critical Depth	0.28	ft
Channel Slope	0.87000	%
Critical Slope	0.00438	ft/ft

Cross Section for B - 20 FT PRIVATE DRAINAGE EASEMENT 100YR-DV

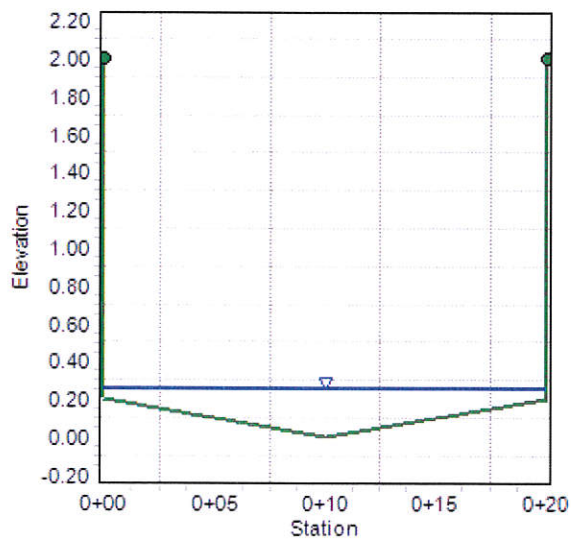
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.87000 %
Normal Depth 0.25 ft
Discharge 9.00 ft³/s

Cross Section Image



Worksheet for C - 10 FT VALLEY GUTTER 100YR-DV

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.37000 %
Discharge 29.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	4.33
0+10.0	1.00
0+15.0	0.00
0+20.0	1.00
0+20.0	3.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 4.33)	(0+10.0, 1.00)	0.025
(0+10.0, 1.00)	(0+20.0, 3.00)	0.013

Options

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

Results

Normal Depth 1.12 ft
Elevation Range 0.00 to 4.33 ft
Flow Area 6.26 ft²
Wetted Perimeter 10.71 ft
Hydraulic Radius 0.58 ft
Top Width 10.37 ft
Normal Depth 1.12 ft

Worksheet for C - 10 FT VALLEY GUTTER 100YR-DV

Results

Critical Depth	1.15	ft
Critical Slope	0.00332	ft/ft
Velocity	4.64	ft/s
Velocity Head	0.33	ft
Specific Energy	1.46	ft
Froude Number	1.05	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

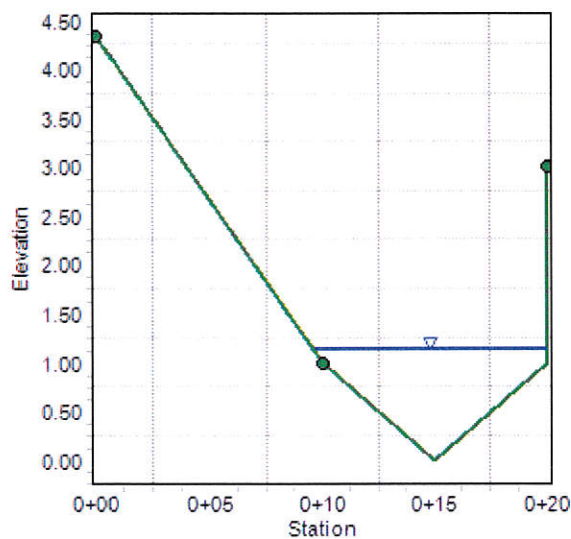
GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.12	ft
Critical Depth	1.15	ft
Channel Slope	0.37000	%
Critical Slope	0.00332	ft/ft

Project Description

Input Data

Cross Section Image



Worksheet for D - 10 FT VALLEY GUTTER 100YR-DV

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.23000 %
Discharge 20.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	4.33
0+10.0	1.00
0+15.0	0.00
0+20.0	1.00
0+20.0	3.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 4.33)	(0+10.0, 1.00)	0.025
(0+10.0, 1.00)	(0+20.0, 3.00)	0.013

Options

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

Results

Normal Depth 1.06 ft
Elevation Range 0.00 to 4.33 ft
Flow Area 5.65 ft²
Wetted Perimeter 10.46 ft
Hydraulic Radius 0.54 ft
Top Width 10.19 ft
Normal Depth 1.06 ft

Worksheet for D - 10 FT VALLEY GUTTER 100YR-DV

Results

Critical Depth	1.00	ft
Critical Slope	0.00335	ft/ft
Velocity	3.54	ft/s
Velocity Head	0.19	ft
Specific Energy	1.26	ft
Froude Number	0.84	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.06	ft
Critical Depth	1.00	ft
Channel Slope	0.23000	%
Critical Slope	0.00335	ft/ft

Cross Section for D - 10 FT VALLEY GUTTER 100YR-DV

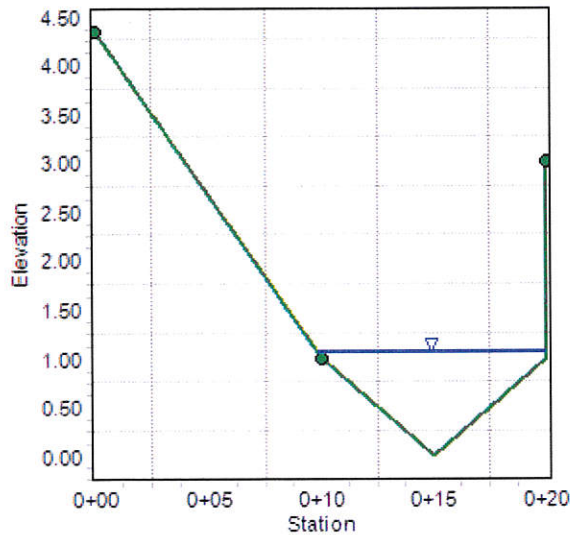
Project Description

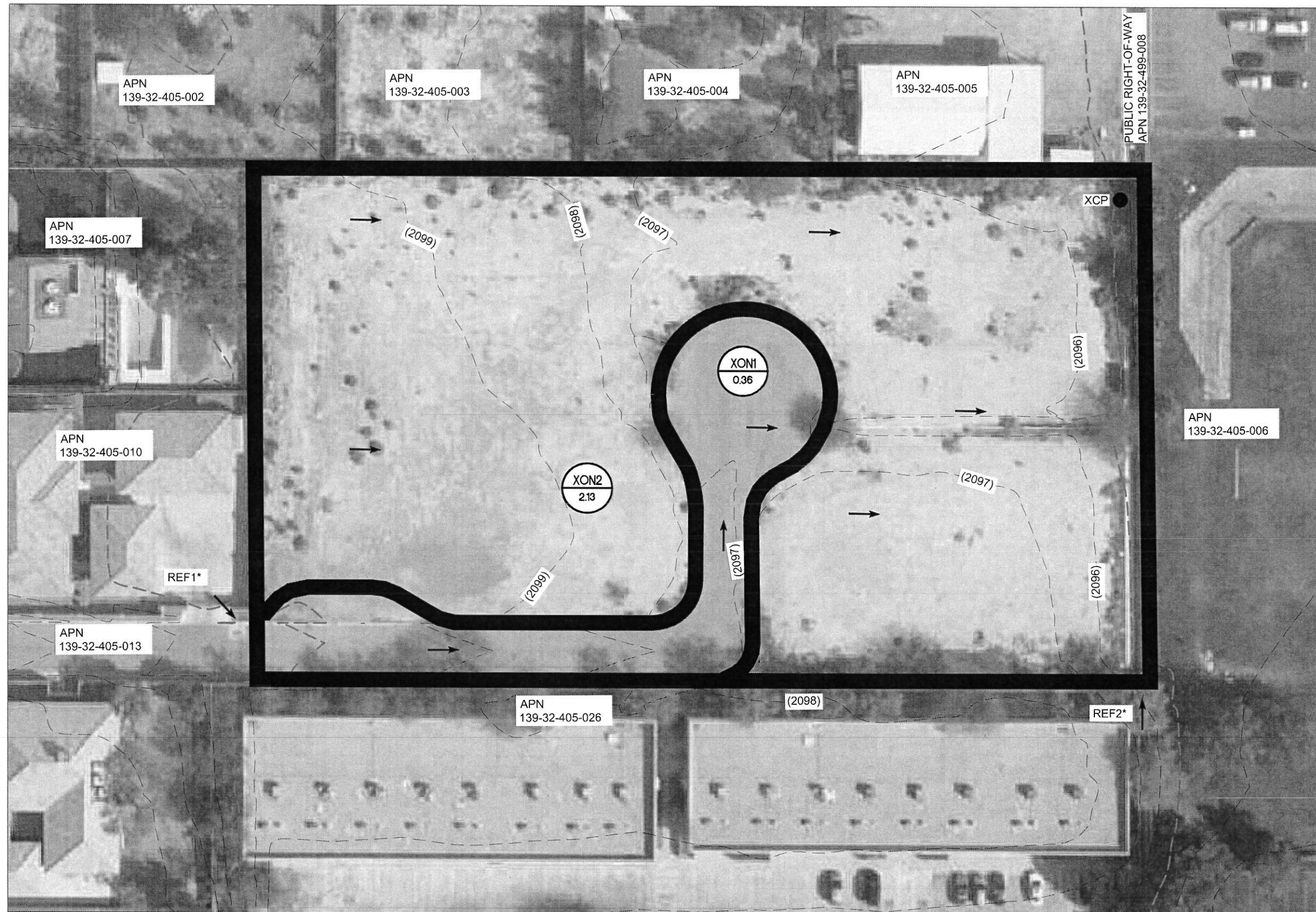
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

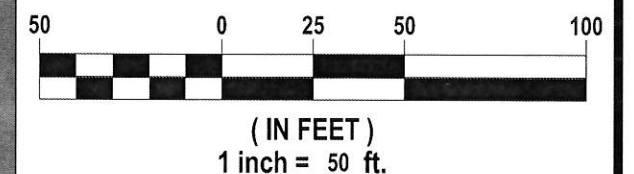
Channel Slope	0.23000	%
Normal Depth	1.06	ft
Discharge	20.00	ft ³ /s

Cross Section Image



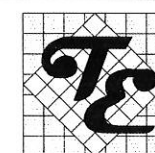


Existing Condition			
Basin	Area (acres)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
XON1	0.36	1	1
XON2	2.13	3	6
REF1*	N/A	1	3
REF2*	N/A	10	20
XCP	N/A	15	30



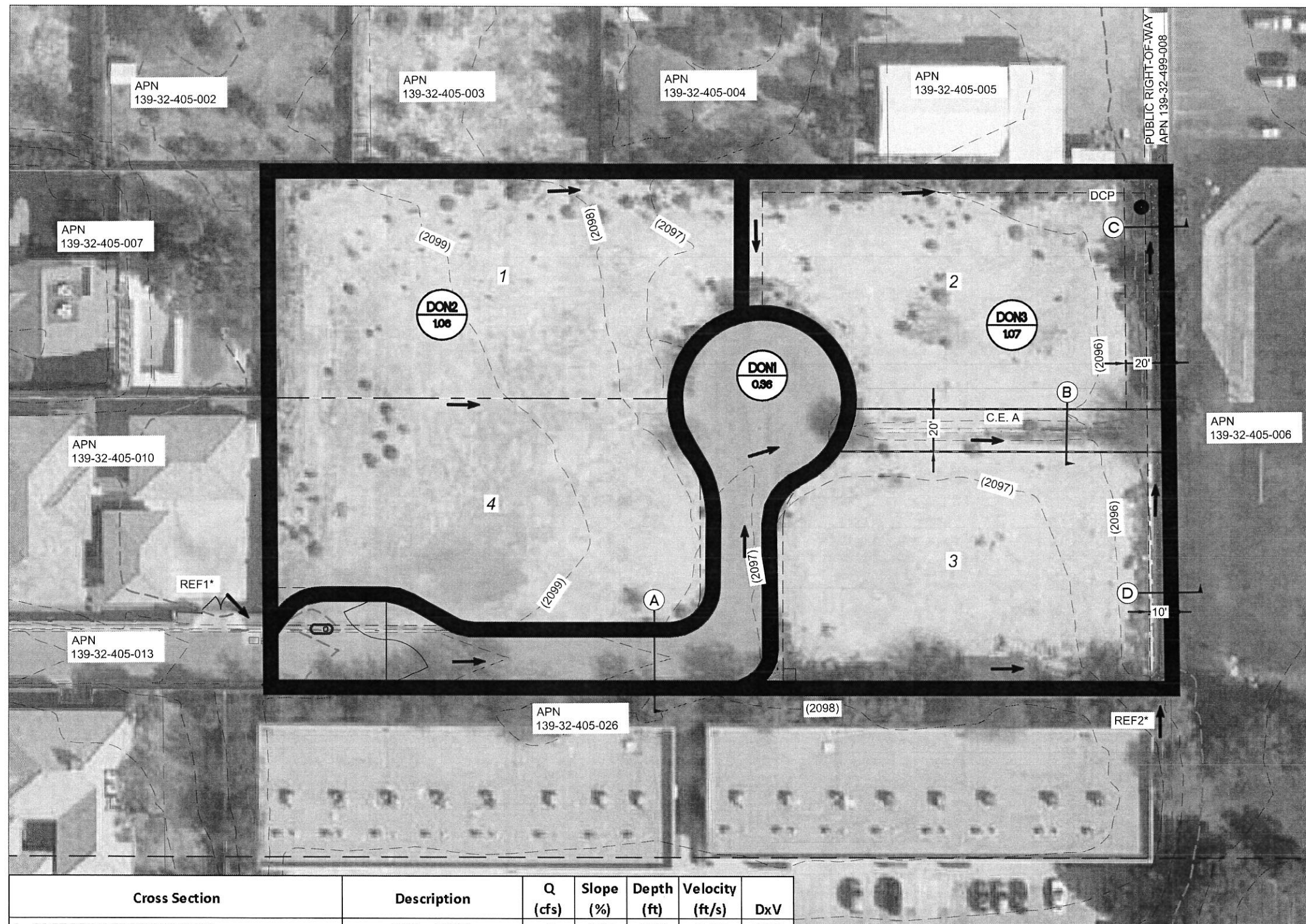
DRAINAGE LEGEND	
	BASIN IDENTIFICATION
	BASIN AREA (ACRES)
	BASIN BOUNDARY
	SUB-BASIN BOUNDARY
	CONCENTRATION POINT
	FLOW PATH
	CROSS SECTION
	10-YR/100-YR FLOW (CFS)
	REFERENCE FLOW (CFS)

REF1* AND REF2* ARE FLOWS REFERENCED FROM DRAINAGE STUDY DS 4430



TANEY ENGINEERING
6030 S. JONES BLVD STE#100
LAS VEGAS, NV 89118
(702) 362-8844 FAX: (702) 362-5233

FIGURE 8
EXISTING CONDITION BASIN MAP
HASTINGS & CAMPBELL



Ultimate Condition			
Basin	Area (acres)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
DON1	0.36	1	1
DON2	1.06	1	3
DON3	1.07	1	2
REF1*	N/A	1	3
REF2*	N/A	10	20
DCP	N/A	14	29

REF1* AND REF2* ARE FLOWS REFERENCED FROM DRAINAGE STUDY DS 4430

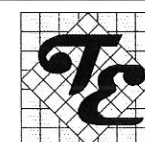


(IN FEET)
1 inch = 50 ft.

DRAINAGE LEGEND

	BASIN IDENTIFICATION
	BASIN AREA (ACRES)
	BASIN BOUNDARY
	SUB-BASIN BOUNDARY
	CONCENTRATION POINT
	FLOW PATH
	CROSS SECTION
	10-YR/100-YR FLOW (CFS)
	REFERENCE FLOW (CFS)

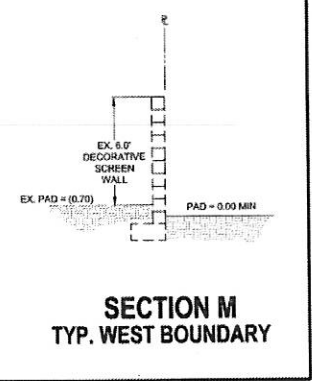
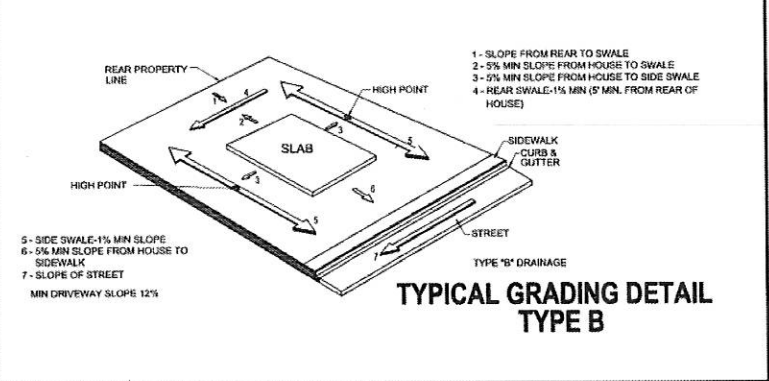
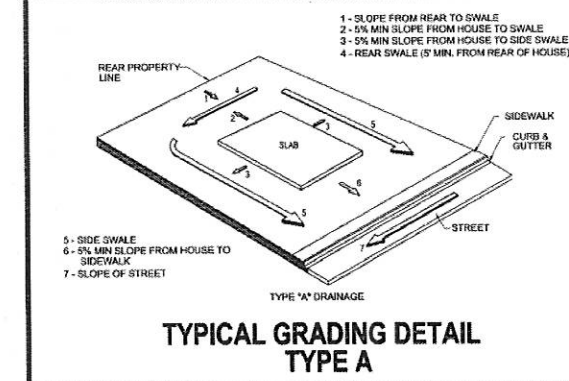
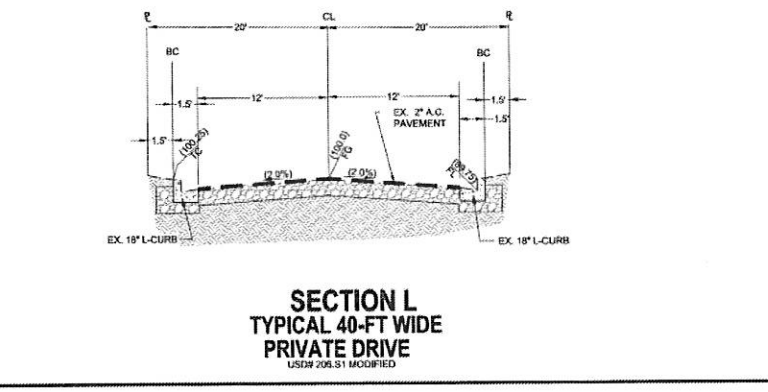
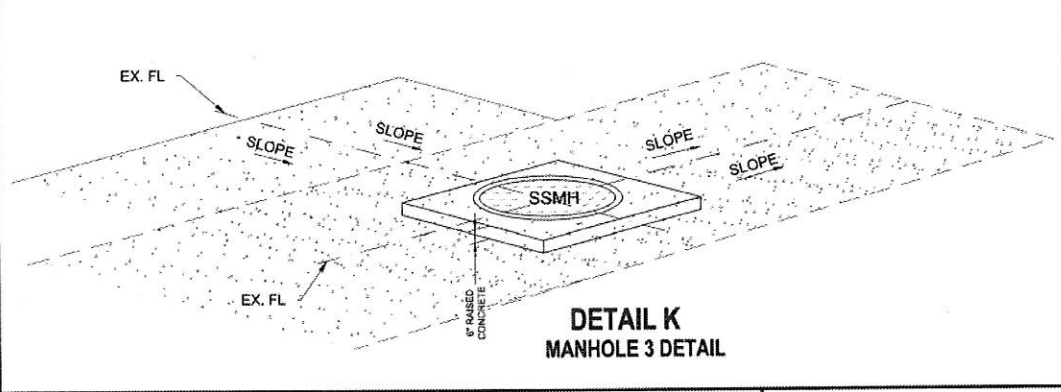
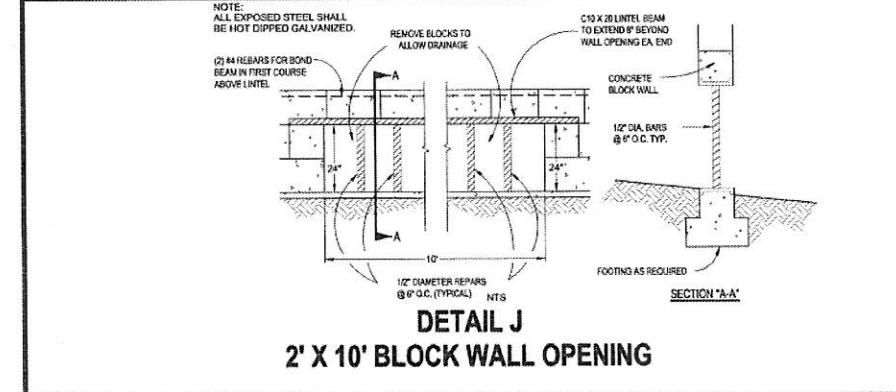
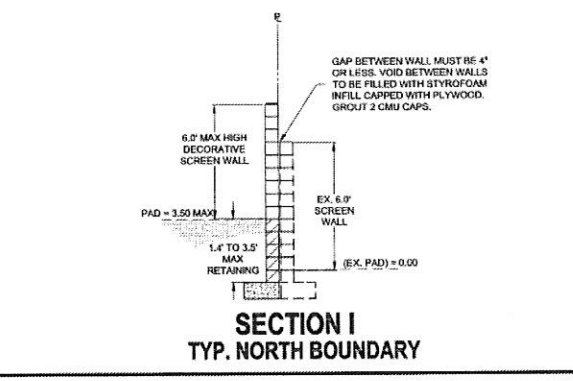
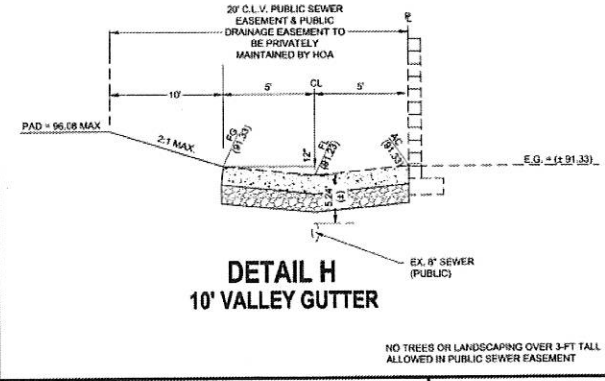
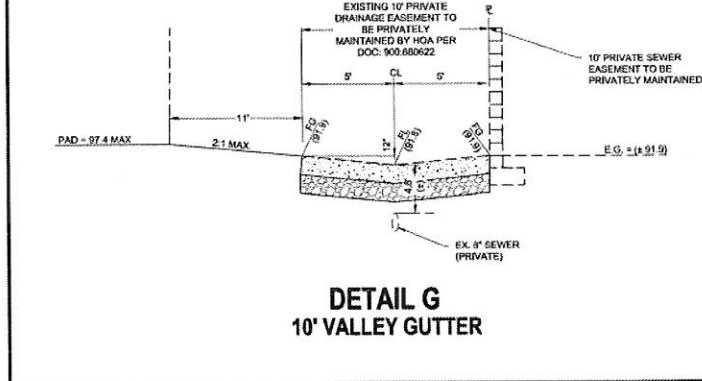
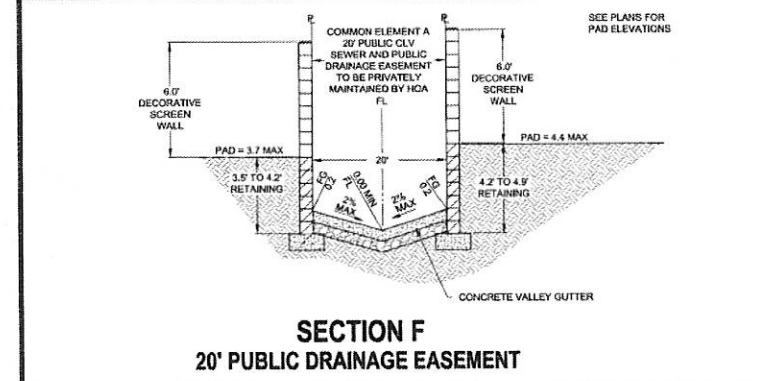
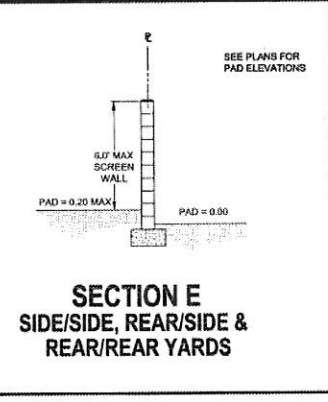
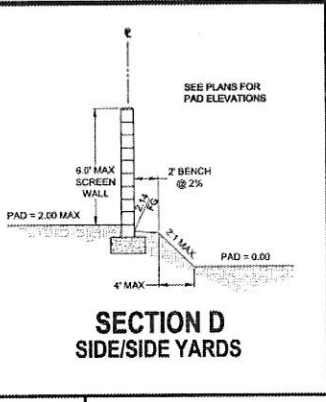
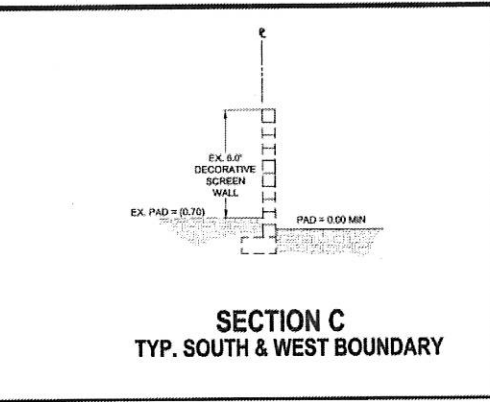
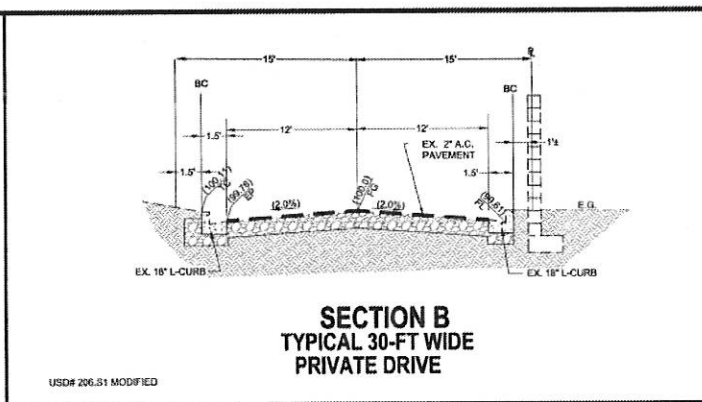
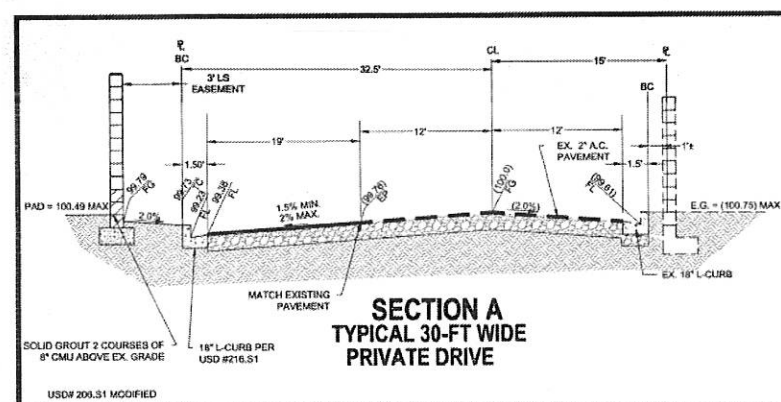
Cross Section	Description	Q (cfs)	Slope (%)	Depth (ft)	Velocity (ft/s)	DxV
A - 30 FT PRIVATE DR 100YR-DV	REF1 + DON1	4	1.29	0.32	2.30	0.74
A - 30 FT PRIVATE DR 10YR-DV	REF1 + DON2	2	1.29	0.27	1.99	0.54
B - 20 FT PRIVATE DRAINAGE EASEMENT 100YR-DV	REF1+DON1+DON2+DON3	9	0.87	0.25	3.00	0.75
C - 10 FT VALLEY GUTTER 100YR-DV	DCP	29	0.37	1.12	4.64	5.20
D - 10 FT VALLEY GUTTER 100YR-DV	REF2*	20	0.23	1.06	3.54	3.75



TANEY ENGINEERING
6030 S. JONES BLVD STE#100
LAS VEGAS, NV 89118
(702) 362-8844 FAX: (702) 362-5233

FIGURE 9
DEVELOPED CONDITION BASIN MAP
HASTINGS & CAMPBELL

**REFERENCE MATERIAL
FROM APPROVED
IMPROVEMENT PLANS**



BLUE HERON 4473 W. TICO AVE #250 LAS VEGAS, NV 89118 (702) 256-4866 FAX: (702) 256-4862		TANEY ENGINEERING 6030 S. JONES BOULEVARD LAS VEGAS, NV 89118 (702) 362-8844 FAX: (702) 362-8233
805 CAMPBELL A RESIDENTIAL SUBDIVISION		GRADING DETAILS & CROSS SECTIONS
S. JUSTIN THORNE Exp. 06-30-18 CIVIL		DATE: 11/15/2016 SCALE: NTS JOB NO: DXC-16-058 DESIGNED BY: MPB CHECKED BY: SJT SHEET NAME: GD1 SHEET NUMBER: 4 OF 9 CLV: 65480 107Y5047

