

DS #: 4833

APN: 125-20-711-007

PROJECT: Centennial Hills Memory Care Facility

SUBMITTAL: 1st Submittal

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		October 24, 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:	
	Centennial Hills Memory Care Facility	
Cross Streets:	SWQ of Doe Brook Tr. & Deer Springs Way	COPIES TO:
File Number:	F:\Depot\DSMemos\DS4833A.doc	McCay Engineering
Parcel Number:	125-20-711-007	6630 Grand Montecito, LLC
Zoning Action:	SDR-67159	Bart Anderson, P.E., DevCo
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	10/11/2016	10/24/2016	See Comments Below	\$400.00	461334: \$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 (**SDR-67159**) 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 engineer proposed to connect a new onsite storm drain to an existing storm drain system which is already overburdened performing as a bubbler system. The engineer may consider to have the onsite drainage as surface flow and discharges at the southeast corner of the site. Review and revise accordingly.

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: T19S/R60E/20
AREA G-20



WELBROOK

Senior Living

October 7, 2016

Mr. Albert Sung
City of Las Vegas
Land Development Services
333 N. Rancho Drive
Las Vegas, NV 89106

**RE: CENTENNIAL HILLS MEMORY CARE FACILITY – FLOOD INDEMNIFICATION
APN 125-20-711-007**

Dear Mr. Sung:

It is noted that the interior courtyard of the memory care building has no overflow path for stormflow in the case the stormdrain system becomes blocked.

We hereby indemnify the City of Las Vegas of damages caused by flood waters to the Memory Care Facility in the event the courtyard stormdrain system fails.

Sincerely,

Ken Magargee, *MANAGING PARTNER*
Welbrook Senior Living, LLC

KEN MAGARGEE, MANAGING PARTNER 10.13.16

Printed Name & Title Date

ACKNOWLEDGMENT

STATE OF _____ SS

COUNTY OF _____

This instrument was acknowledged before me on _____, by _____

See Attached

Notary Public

My appointment expires the ____ Day of _____, _____

3960 Prospect Ave Suite L, Yorba Linda Ca 92886
O 801.922.0046 | M 714.743.8222
(855.935.2766) welbrook.com ken.magargee@welbrook.com

CALIFORNIA ALL-PURPOSE CERTIFICATE OF ACKNOWLEDGMENT

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California }

County of Orange }

On Oct. 13, 2016 before me, M. Stingl, notary public
(Here insert name and title of the officer)

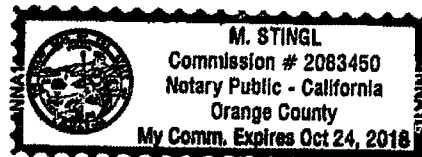
personally appeared Kenneth Magargale
who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

M. Stingl
Notary Public Signature

(Notary Public Seal)



ADDITIONAL OPTIONAL INFORMATION

DESCRIPTION OF THE ATTACHED DOCUMENT

(Title or description of attached document)

(Title or description of attached document continued)

Number of Pages _____ Document Date _____

CAPACITY CLAIMED BY THE SIGNER

- ☐ Individual (s)
☐ Corporate Officer

(Title)

- ☐ Partner(s)
☐ Attorney-in-Fact
☐ Trustee(s)
☐ Other _____

INSTRUCTIONS FOR COMPLETING THIS FORM

This form complies with current California statutes regarding notary wording and, if needed, should be completed and attached to the document. Acknowledgments from other states may be completed for documents being sent to that state so long as the wording does not require the California notary to violate California notary law.

- State and County information must be the State and County where the document signer(s) personally appeared before the notary public for acknowledgment.
- Date of notarization must be the date that the signer(s) personally appeared which must also be the same date the acknowledgment is completed.
- The notary public must print his or her name as it appears within his or her commission followed by a comma and then your title (notary public).
- Print the name(s) of document signer(s) who personally appear at the time of notarization.
- Indicate the correct singular or plural forms by crossing off incorrect forms (i.e. he/she/they, is /are) or circling the correct forms. Failure to correctly indicate this information may lead to rejection of document recording.
- The notary seal impression must be clear and photographically reproducible. Impression must not cover text or lines. If seal impression smudges, re-seal if a sufficient area permits, otherwise complete a different acknowledgment form.
- Signature of the notary public must match the signature on file with the office of the county clerk.
 - ♦ Additional information is not required but could help to ensure this acknowledgment is not misused or attached to a different document.
 - ♦ Indicate title or type of attached document, number of pages and date.
 - ♦ Indicate the capacity claimed by the signer. If the claimed capacity is a corporate officer, indicate the title (i.e. CEO, CFO, Secretary).
- Securely attach this document to the signed document with a staple.

Albert Sung

From: Jeremy McCay <jmccay@centurylink.net>
Sent: Monday, October 17, 2016 8:46 AM
To: Albert Sung
Subject: Centennial Hills Memory Care Facility
Attachments: SKMBT_55216101316290.pdf

Albert,

Please find a PDF of the Indemnification Letter concerning the acknowledgement of no overflow path for rainwater within the courtyard.

Best wishes,

Jeremy S. McCay
McCAY ENGINEERING
11700 W. Charleston
Suite 170-298
Las Vegas, NV 89135
(702) 860-3897

McCAY ENGINEERING

11700 W. CHARLESTON BLVD., SUITE 170-298
LAS VEGAS, NV 89135
702-860-3897

**TECHNICAL DRAINAGE STUDY
FOR
CENTENNIAL HILLS MEMORY CARE FACILITY
(UPDATE #4 TO THE TECHNICAL DRAINAGE STUDY FOR CENTENNIAL BUSINESS PARK)**

**CITY OF LAS VEGAS
OCTOBER 10, 2016**



**McCay
ENGINEERING**

PREPARED FOR:

**WELBROOK SENIOR LIVING, LLC
3960 PROSPECT AVE., SUITE L
YORBA LINDA, CA 92886**

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Centennial Hills Memory Care Facility Date: October 9, 2016
Location of Development: a) Descriptive (Cross Streets) North/South: Grand Montecito
East/West: Rome
b) Section: 20 Township: 19 S Range: 60 E
c) APN: 125-20-711-007

Name of Owner: 6630 Grand Montecito, LLC
Telephone No.: 801-922-0046 Facsimile No.: NA Email Address: kenmargaree@gmail.com
Address: 3960 Prospect Ave., Suite L Yorba Linda CA 92886
Contact Person Name: Jeremy S. McCay, P.E. Telephone No: (702) 860-3897
E-mail Address: jmccay@centurylink.net
Firm: McCay Engineering
Address: 11700 W. Charleston Blvd., Suite 170-298, Las Vegas, NV 89135

Type of Land Development/Land Disturbance Process:

☐
☐
☐

Rezoning
Parcel Map
Large Parcel Map

☐
☐
☒

Subdivision Map
Planned Unit Development
Building Permit

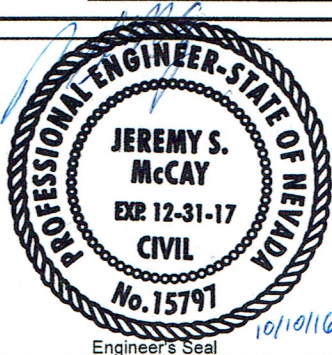
☐
☐

Clearing and Grading Only
Other (Please specify below)

1. Total Owned Land Area: At Site: 1.57 +/- ac Being Developed/Disturbed: 1.57 +/- ac
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? YES* ☐ NO ☐
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? YES* ☐ NO ☐
4. Proposed type of development (Residential, Commercial, Etc.)? Commercial
5. Approximate upstream land area which drains to the subject site? 1
6. Has the site drainage been evaluated in the past? YES ☐ NO ☐ If yes, please identify documentation:

Drainage study for Centennial Business Park (DS 3535B) w/ Updates

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site:
Existing wall opening at southeast corner of site.
8. Briefly describe your proposed schedule for the subject project: As soon as possible



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

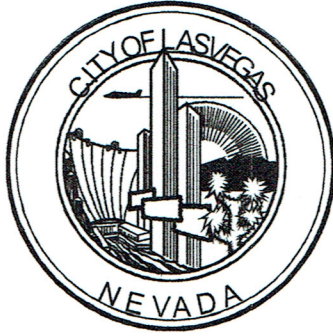
* Review and concurrence of the Clark County Regional Flood Control District is required.

Local Entity File No. _____

Revision	Date

Reference:

STANDARD FORM 1



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 (CCRFCDD) 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 CCRFCDD Hydrologic Criteria and Drainage Design Manual (Design Manual).

An appointment must be made to preview this checklist in conjunction with CCRFCDD 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	
NA		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.) <i>Adjacent Parcel is owned by same owner.</i>
✓		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> <i>AM</i> </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.
	✓	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.)
	✓	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.
✓		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.
	✓	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	
		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.
		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.



McCay ENGINEERING

11700 W. CHARLESTON BLVD.
SUITE #170-298
LAS VEGAS, NV 89135
JMCCAY@CENTURYLINK.NET
(702) 860-3897

Date: October 10, 2016

Albert Sung, P.E.
Flood Control
City of Las Vegas Public Works
731 S. Fourth Street
Las Vegas, Nevada 89101

**RE: TECHNICAL DRAINAGE STUDY FOR CENTENNIAL HILLS MEMORY CARE FACILITY
(UPDATE #4 TO THE TECHNICAL DRAINAGE STUDY FOR CENTENNIAL BUSINESS PARK)
Job No. 16191**

Dear Mr. Sung:

McCay Engineering is pleased to submit two copies of the Update to the Technical Drainage Study for your review and approval for the above-mentioned project. The site is recorded on the Clark County Assessor's maps as APN 125-20-711-007. See *Figure 1, Vicinity Map*, within Appendix A following this letter.

According to Figure F-13 of the 2008 CCRFCD'S *Master Plan Update*, no proposed or constructed regional facilities are located adjacent to the project site. Descriptions of nearby facilities are shown on the *Master Plan Update* on Figure 2, *Flood Control Facilities*, within Appendix A following this letter.

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Community Panel Number 32003C 1745E, Clark County, Nevada, effective September 27, 2002, the site lies within a FEMA designated Zone "X". A Zone "X" is described as an area determined to be outside the 500-year floodplain. See *Figure 3, FEMA Map*, within Appendix A following this letter.

This update is in regards to the further completion of the overall planned development. The lots, contains approximately 1.57 acres. A single Memory Care Facility will be placed on the parcel.

The original drainage study for the overall development was completed by TRC and was approved on June 28, 2004. The study is on file with the City of Las Vegas as DS3535. In addition, an Update #2 was completed by this office for the Skilled Nursing Facility located on APN 125-20-711-016 (formerly APN's 125-20-711-009 thru 012). The study is on file at the City of Las Vegas as DS4582B, approved on February 25, 2012. Copies of pertinent reference information from the original study and Update #2 have been included in Appendix B of this Update.

The street flow quantities within Doe Brook Trail have been referenced from the original drainage study. The reference 100-year street flow rate is 86 cfs. The referenced Flowmaster calculation indicates a street slope of 0.4%, having a corresponding depth of flow of 1.03 feet. It

is noted that the actual street slope of Doe Brook Trail at the projection of the northern end of the proposed building is actually 1.24%. A Flowmaster normal depth calculation was performed utilizing the same cross-section as in the original study. The corresponding depth of flow for 86 cfs and 1.24% is 0.85'. Twice the depth of flow is 1.70', or 1.20' above top of curb. The Finished Floor elevation has been set based on this calculation. The proposed finished floor elevation is being proposed at 2504.00 feet.

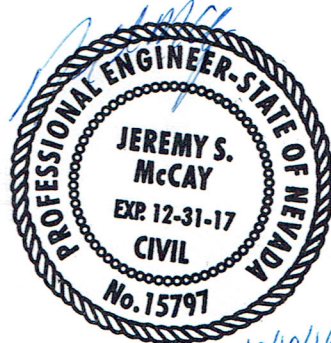
Site-generated storm flow will continue to discharge towards its previously designed locations at the southeast corner of the overall planned development. In addition, as the proposed building/site layout requires, an onsite stormdrain system to convey a portion of the roof drainage, landscape and entire courtyard flow was necessary. The proposed 8" C900 stormdrain pipe will discharge into an existing onsite 12" C900 stormdrain extending along the southern portion of the subject site. Ultimately, the stormdrain discharges into an existing public stormdrain system within Doe Brook Trail.

It is understood that the existing storm drain system in Doe Brook Trail is nearly at capacity during the 10-year event, therefore the system will be overburdened during the 100-year event. Given this, the hydraulic grade line will be above the rim elevations. There is an existing grated cover on the easternmost drain basin of the existing onsite stormdrain system. The grate will act as a bubbler for our system during the 100-year event. Flows exiting the onsite storm drain system will be discharged, along with surface flow, through the existing wall opening located at the southeast corner of the site.

It is noted that the interior courtyard of the building has no overflow path for stormflow in the case the stormdrain system becomes blocked. An indemnity letter to the City of Las Vegas of damages caused by flood waters to the Skilled Nursing Facility if the courtyard stormdrain system fails will be provided with the submittal of the improvement drawings for permitting.

If you have any questions or comments regarding this project, please do not hesitate to contact this office at (702) 860-3897.

Sincerely,
MCCAY ENGINEERING



Jeremy S. McCay, P.E.
Principal

Worksheet for Doe Brook Trail - 100 YR @ N. Portion of Site

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth		0.85	ft
Elevation Range	0.00 to 1.32 ft		
Flow Area		14.47	ft ²
Wetted Perimeter		35.68	ft
Hydraulic Radius		0.41	ft
Top Width		34.50	ft
Normal Depth		0.85	ft
Critical Depth		1.01	ft
Critical Slope		0.00431	ft/ft
Velocity		5.94	ft/s
Velocity Head		0.55	ft
Specific Energy		1.40	ft
Froude Number		1.62	
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	0.85	ft
Critical Depth	1.01	ft
Channel Slope	0.01240	ft/ft
Critical Slope	0.00431	ft/ft

Worksheet for Doe Brook Trail - 100 YR @ N. Portion of Site

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.01240 ft/ft
Discharge 86.00 ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	1.32
0+15	1.02
0+16	1.05
0+16	0.52
0+17	0.65
0+17	0.69
0+43	0.17
0+43	0.13
0+45	0.00
0+45	0.50
0+46	0.50
0+46	0.50
0+50	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 1.32)	(0+15, 1.02)	0.014
(0+15, 1.02)	(0+17, 0.65)	0.013
(0+17, 0.65)	(0+43, 0.13)	0.016
(0+43, 0.13)	(0+50, 0.60)	0.013

Options

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

Project Description

Manning Formula

Normal Depth

86.00 ft³/s



APPENDIX A

FIGURES



**McCay
ENGINEERING**

APPENDIX B

REFERENCES

DRAINAGE STUDY UPDATE

FOR

MONTECITO TOWN CENTER SOUTH (CENTENNIAL BUSINESS PARK)

Located on the northeast corner of
Rome Blvd. & Montecito Pkwy.

Sec. 20, T19S, R60E

APN 125-20-711-003

Las Vegas, Nevada

March 2004

Prepared by:

TRC

Customer-Focused Solutions

BV Engineering Nevada

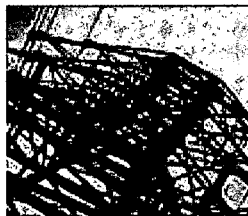
1050 E. Flamingo Road, Suite N136

Las Vegas, Nevada 89119

Phone (702) 650-0572, Fax (702) 650-0517



INFRASTRUCTURE



ENERGY



ENVIRONMENTAL



LAND DEVELOPMENT

Prepared for:

Royal Construction Company.

3320 North Buffalo Drive, Suite #208

Las Vegas, NV 89129

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

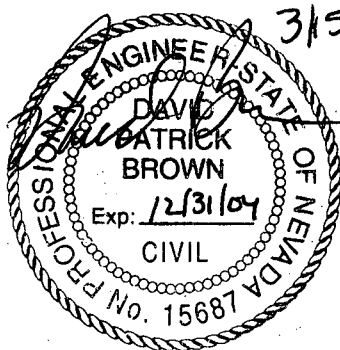
DRAINAGE STUDY INFORMATION FORM

Name of Development: Centennial Business ParkDate: March 12, 2004Location of Development: a) Descriptive (Cross Streets) NE corner Rome Blvd. & Montecito Pkwy.b) Sect. 20 Twn. 19S Rng. 60EName of Owner: Royal Construction/ Montecito Town Center LLCAssessors Parcel No. 125-20-711-003Telephone No: (702) 873-7773Facsimile No: (702) 395-7111Address: 3320 N. Buffalo Drive, Suite #208 Las Vegas NV 89129Contact Person-Name: David L. Yancy IITelephone No: (702) 650-0572Firm: BV Engineering NevadaAddress: 1050 E. Flamingo Rd., Suite N136 Las Vegas, Nevada 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: ± 4.62 Acres Being Developed/Disturbed: ± 4.62 Acres
2. Is a portion of all of the subject property located in a designated FEMA Flood Hazard Area? Yes ☐ No ☒
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? Yes ☐ No ☒
4. Proposed type of development (Residential, Commercial, Etc.)? Commercial
5. Approximate upstream land area which drains to the subject site? ± 1.25 acres
6. Has the site drainage been evaluated in the past? ☒ Yes ☐ No If yes, please identify documentation:
Montecito Town Center South
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site:
North on Doe Brook Trail.
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 subject property. This form may provide sufficient information to serve as the Conceptual Drainage Study.

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

Local Entity File No.

Revision	Date

REFERENCE:

STANDARD FORM 1

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		June 28, 2004
TO: Land Development Services Department of Public Works		FROM: <i>AT for</i> Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for:	
	Centennial Business Park	
Cross Streets:	NEC of Montecito Pkwy. & Rome Blvd.	
File Number:	F:\Depot\DSMemos\DS3535B.doc	
Parcel Number:	125-20-711-003	
Zoning Action:		
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X
COPIES TO:		
		BV Engineering
		Royal Construction
		Bart Anderson, P.E., DevCo
		Leni Skaar, Ward 6 Liaison Officer

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID G.R. No.
1 st Submittal	3/15/2004	3/29/2004	See Comments Below	\$400.00	121241: \$400
2 nd Submittal, Supplement	6/10/2004, 6/28/2004	6/24/2004, 6/28/2004	See Comments Below	\$400.00	6324: \$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.

- The project is adjacent to the Montecito Parkway improvements that will be constructed as part of a Special Improvement District. This project must continue to coordinate with Marv Stine, project manager of CLV Engineering Design Section for the Montecito Parkway improvements.
- The subject development is accepting offsite flow from the north and has provided a 10-foot wide public drainage easement to be privately maintained along the north property line to convey the flow. All drainage easements must be "Common Lots" and "Public Drainage Easement to be privately maintained" to be labeled in the grading plan. Public drainage easements must be recorded by separate document prior to the final acceptance of the improvement plans unless they are to be recorded by parcel or final map.
- 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.
- This drainage study assumes that the project will be constructed in one phase. If improvement plans are submitted to break the project into separate phases, a drainage study update will be required for each phase addressing the interim condition.

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.

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

END OF REMARKS
ays/ajj

T/R/S: T19S/R60E/20
AREA G-20

March 12, 2004

Albert Sung, P.E.
City of Las Vegas
Department of Public Works
731 S. Forth Street
Las Vegas, Nevada 89101

**Re: Update to Montecito Town Center South
(Centennial Business Park)**

This drainage update letter has been prepared to address the development of the Centennial Business Park, located in Montecito Town Center South. The Master Drainage Study was prepared by Primas and Associates and this letter is to serve as an update to that study.

The project site lies within a portion of sub-basin ST06 which is shown to drain to Durango Drive (Doe Brook Trail) on the Montecito Town Center South Master Plan. Sub-basin ST06 generates a developed .10-year flow of 14cfs and a developed 100-year flow of 23cfs. Centennial Academy borders the proposed development to the south and accounts for 50% of sub-basin ST06. The development of Centennial Business Park encompasses the remaining 50% and will therefore generate a flow of 7cfs and 11cfs for the 10-year and 100-year developed event respectively. In a similar manner, offsite flow impacting the site is approximately 10% of the total offsite flow in basin NP2 and will therefore generate a flow of 1cfs & 3cfs for the 10-year and 100-year respectively. Offsite basins impacting the site are delineated on **Figure 6 & 7**. The development will not change the drainage pattern of basin ST06 and all onsite flow will drain as shown on the Montecito Town Center South Master Plan and Centennial Business Park plans. In addition, the development will not increase flows depicted on the Montecito Town Center South Master Plan.

Onsite flow generated by the business park (7cfs/11cfs; 10year/100year) will outlet at the southeast corner of the site via a 3-foot concrete flume to Doe Brook Trail. Onsite flows conveyed to Doe Brook Trail do not deviate from the drainage pattern of the master drainage study. Offsite flow (1cfs/3cfs; 10year/100year) generated by the parcel bordering the project site to the north site are conveyed east to Doe Brook Trail via a 6-foot wide earthen V-ditch with 3:1 (H:V) side slopes. Offsite flow conveyance does not deviate from the drainage pattern of the master drainage study. The offsite and onsite basins are delineated on the drainage basin map (**Figure 7**) for Centennial Business Park.

Street flow calculations in the appendix show that flood protection for the site is minimal. The interim condition was used to model street flows due to the fact that they are more conservative than the ultimate condition street flows. Onsite street

flow calculations are provided so that adequate protection is afforded to all buildings. **Table 1** illustrates the 100-year interim street flows given by the Montecito Town Center South Master Plan interim condition basin map. The interior street section hydraulic analysis is included in Appendix B for reference.

TABLE 1 – Street Flow Data

Street Name	Frequency Storm	Q (cfs)	Depth (ft)	Velocity (fps)	* V x D
Montecito Parkway (Section A)	10-year	28	0.42	4.03	1.69
Montecito Parkway (Section A)	100-year	223	0.82	6.88	5.64
Doe Brook Trail (Section B)	10-year	7	0.51	1.96	1.0
Doe Brook Trail (Section B)	100-year	86	1.03	4.23	4.36

*Under current criteria, VxD should be less than 6 and less than 8 for the 10-year and 100-year frequency storms, respectively.

**Manning's Equation was used to calculate flow depths in the street. Appendix A includes supporting calculations.

The site is graded to convey on-site flows to Doe Brook Trail. Adequate protection will be provided by maintaining on-site finish floor elevations twice the depth of flow up to a maximum of 18-inches above the water surface elevation in the adjacent streets. If the above stated criteria cannot be met, stem walls shall be provided to protect finish floor elevations from inundation.

The finished floor elevation is calculated based on the above noted criteria and is summarized in **Table 2**. The resultant finished floor elevation is presented on the grading plan and summarized in **Table 3**.

**TABLE 2 – CALCULATION OF FINISHED FLOOR ELEVATION
BASED ON 100-YEAR FLOW DEPTH IN ADJACENT STREET**

Building Pad	Flowline Elevation	100-Year Flow Depth	Twice 100-Year Flow Depth	Minimum Finished Floor Elevation
1	13.54	0.83	1.66	15.04
2	16.60	0.83	1.66	18.10
3	Protected by 2-foot stem Wall			
4	Protected by 2-foot stem Wall			
5	4.67	0.23	0.46	5.13
6	5.62	0.23	0.46	6.08
7	3.50	0.26	0.52	4.02

Note: Buildings protected by stem walls did not meet the criteria set forth above and did not have a finish floor elevation at least 6-inches above the highest adjacent top of curve elevation.

Doe Brook Trail 100-year Interim Condition Worksheet for Irregular Channel

Project Description

Worksheet	Doe Brook Trail 100-year Interim Condition
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data

Channel Slope	0.004000 ft/ft
Discharge	86.00 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	0.015
Water Surface Elevation	1.03 ft
Elevation Range	0.00 to 6.60
Flow Area	20.3 ft²
Wetted Perimeter	36.58 ft
Top Width	35.05 ft
Actual Depth	1.03 ft
Critical Elevation	1.02 ft
Critical Slope	0.004170 ft/ft
Velocity	4.23 ft/s
Velocity Head	0.28 ft
Specific Energy	1.31 ft
Froude Number	0.98
Flow Type	Subcritical

Calculation Messages:
Flow is divided.

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+15	0.014
0+15	0+17	0.013
0+17	0+43	0.016
0+43	0+50	0.013

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	3.32
0+00	1.32
0+15	1.02
0+16	1.05
0+16	0.52
0+17	0.65
0+17	0.69

Doe Brook Trail 100-year Interim Condition Worksheet for Irregular Channel

Natural Channel Points

Station (ft)	Elevation (ft)
0+43	0.17
0+43	0.13
0+45	0.00
0+45	0.50
0+45	0.50
0+50	0.60
0+50	6.60

Doe Brook Trail 100-year Interim Condition Cross Section

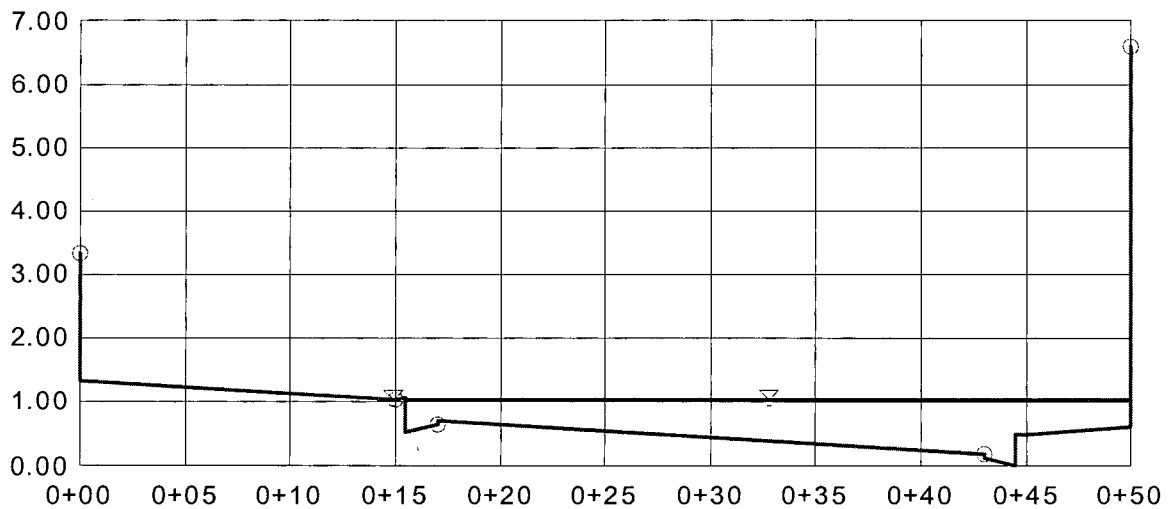
Cross Section for Irregular Channel

Project Description

Worksheet	Doe Brook Trail 100-year Ii
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data

Mannings Coefficient	0.015
Channel Slope	0.004000 ft/ft
Water Surface Elev.	1.03 ft
Elevation Range	.00 to 6.60
Discharge	86.00 cfs



V:3.03030303
H:1
NTS

ASSESSOR'S PARCELS - CLARK CO., NV.
Michele W. Shafe - Assessor

125-20-7

N 2 SE 4

20

T19S R60E

009 100
126 125
137 138

001 ROAD PARCEL NUMBER
002 AIR SPACE PCL
003 RIGHT OF WAY PCL
004 PARCEL SUB/SEQ NUMBER
005 SUB-SURFACE PCL
006 MATCH / LEADER LINE
007 HISTORIC LOT LINE
008 HISTORIC SUB BOUNDARY
009 HISTORIC PMLD BOUNDARY
010 SECTION LINE

001 ROAD PARCEL NUMBER
002 AIR SPACE PCL
003 RIGHT OF WAY PCL
004 PARCEL SUB/SEQ NUMBER
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125-20-7

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007 HISTORIC LOT LINE
008 HISTORIC SUB BOUNDARY
009 HISTORIC PMLD BOUNDARY
010 SECTION LINE

TAX DIST 200
FIGURE 1

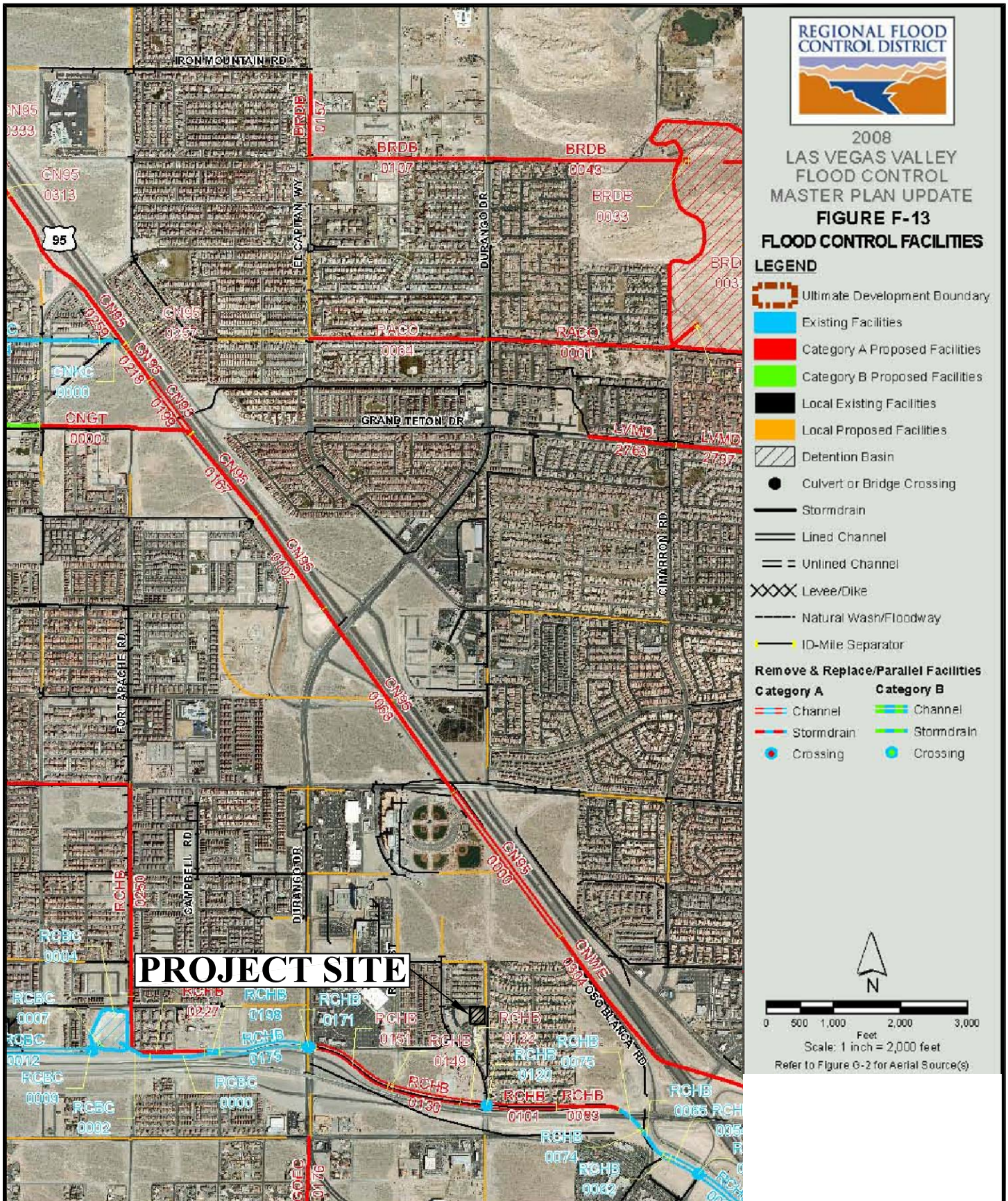


FIGURE 3
FEMA MAP



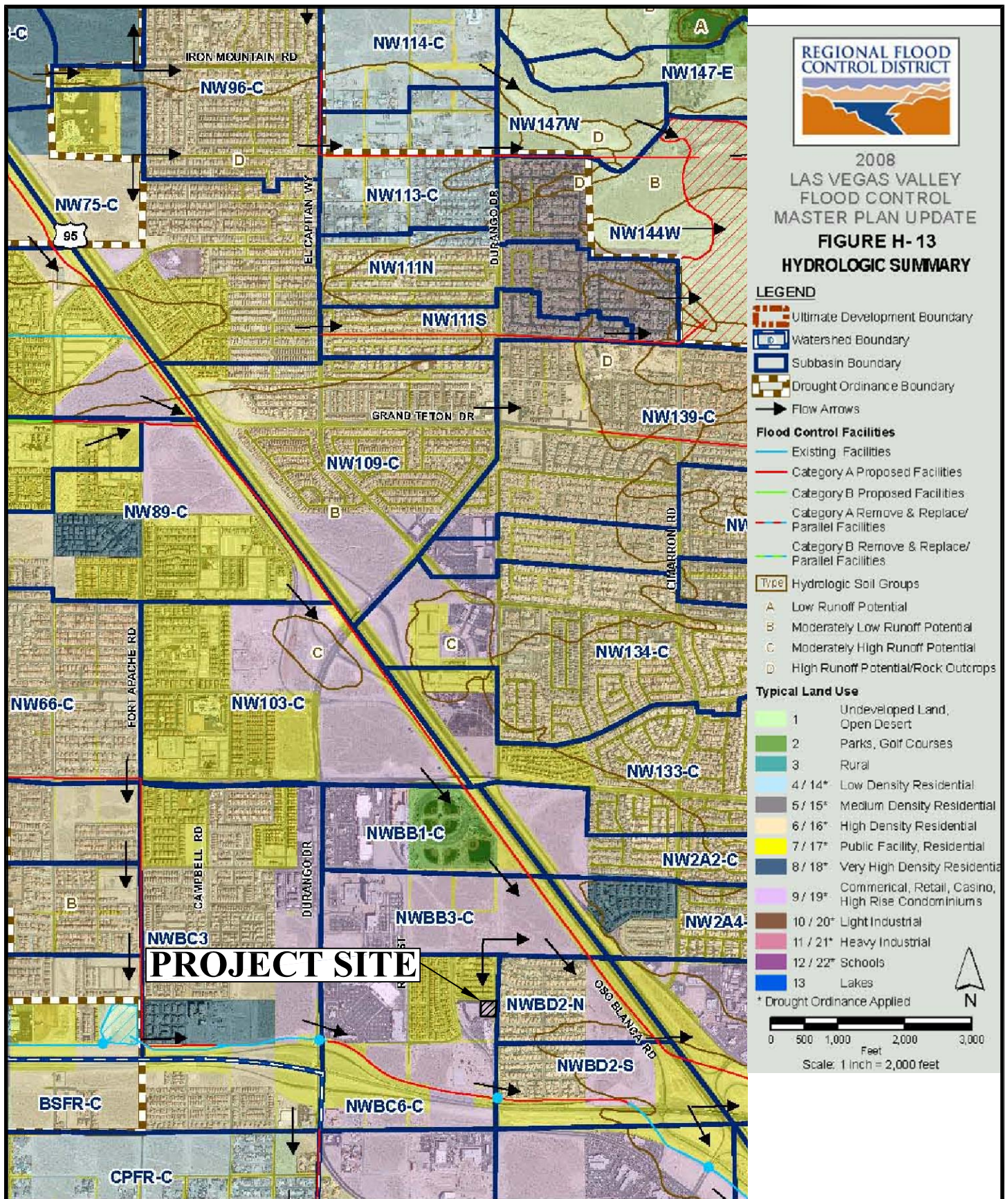


FIGURE 4
SOILS MAP



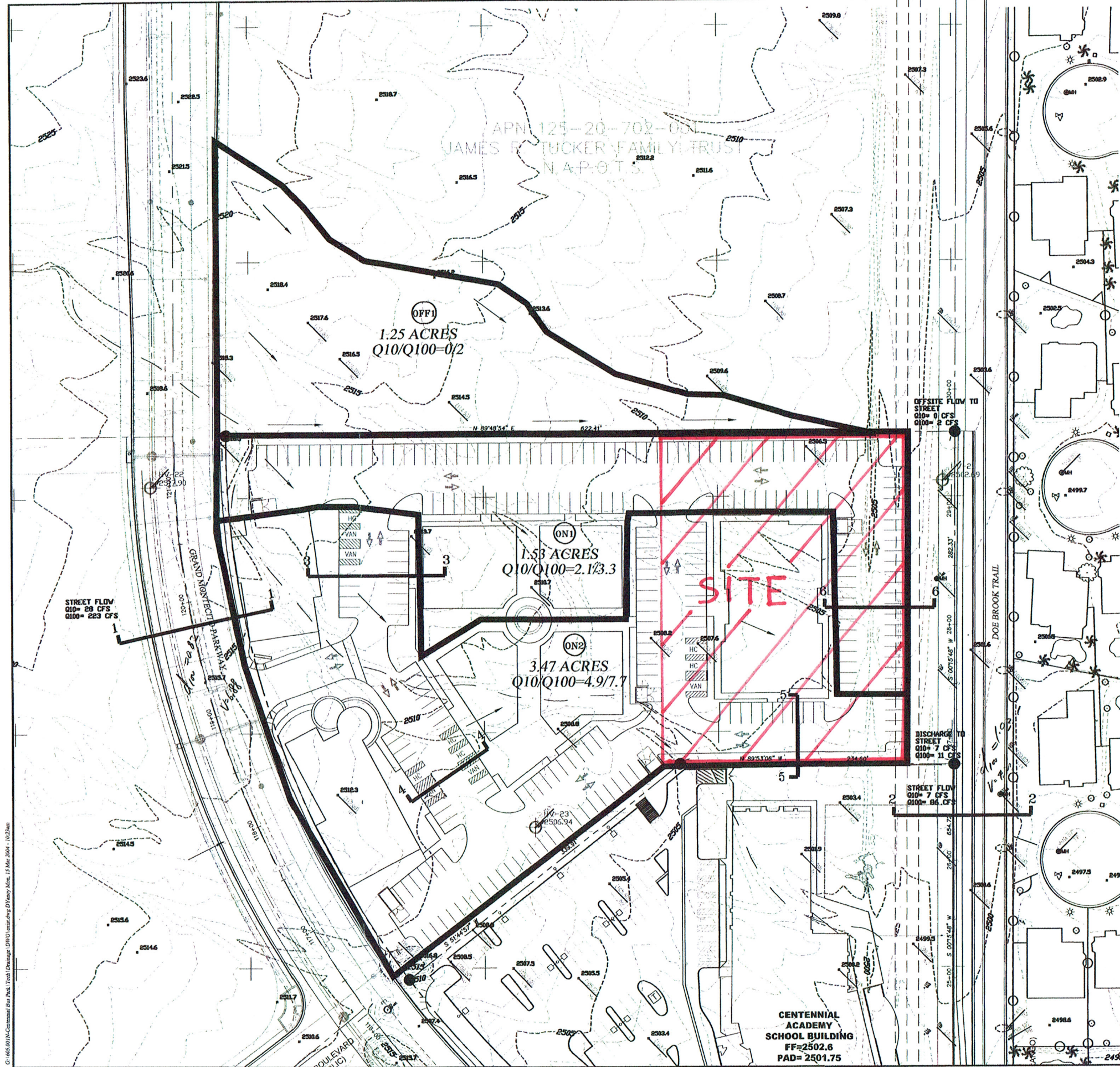
McCay Engineering

11700 W. CHARLESTON BLVD.
SUITE #170-298
LAS VEGAS, NEVADA 89135
P 702-860-3897

JOB NUMBER: 16191

DRAWN BY: JSM

DATED: 10/10/16



LEGEND

- BASIN BOUNDARY
- ON1 BASIN I.D.
- CS CONCENTRATION POINT
- FLOW DIRECTION
- (1/3) Q10/Q100 FLOW PER APPROVED STUDY (SEE REFERENCE IN APPENDIX)
- HYDRAULIC SECTION (SEE CALCULATIONS IN APPENDIX)

NORTH

1"=40'

40 0 40 80
SCALE FEET

EXISTING CONDITION FOR ON-SITE BASIN

HEC-1 STORM FLOW SUMMARY			
BASIN	AREA (AC.)	Q10 (CFS)	Q100 (CFS)
ON1	1.53	2.1	3.3
ON2	3.47	4.9	7.7
OFF1	1.25	0	2

* PLEASE REFER TO THE TEXT AND MONTECITO TOWN CENTER SOUTH INTERIM DRAINAGE CONDITION MAP FOR FLOW GENERATION. DEVELOPED BASIN SUBDIVIDED FOR PURPOSE OF ANALYZING STREET FLOWS.

HYDRAULIC SUMMARY									
CROSS SECTION	DESCRIPTION	SLOPE (%)	10-YEAR			100-YEAR			
			Q10 (CFS)	DEPTH (FT.)	V (FPS)	Q100 (CFS)	DEPTH (FT.)	V (FPS)	V/D
1 - 1	MONTECITO PKWY	1.56	28	0.42	4.03	1.7	223	0.82	6.88
2 - 2	DOE BROOK TRAIL	0.40	7	0.51	1.96	1.0	86	1.03	4.23
3 - 3	ONSITE SECTION#	3.33	X	X	X	X	7.7	0.30	4.05
4 - 4	ONSITE SECTION#	3.33	X	X	X	X	7.7	0.30	4.05
5 - 5	ONSITE SECTION#	0.50	X	X	X	X	7.7	0.23	1.58
6 - 6	ONSITE SECTION#	0.73	X	X	X	X	3.3	0.26	1.96

*ONLY THE 100-YR SCENARIO WAS ANALYZED ONSITE TO PROVIDE FLOOD MITIGATION MEASURES. DRY-LANE IS NOT REQUIRED.

This grading plan is a part of drainage study #3535 which was received on 3/15/04 and posted on 3/29/04. Page 4 Of 7.

PROJECT NO.	XXXXXXX
DESIGN	XXX
DATE	XX/XX/XX
SCALE	AS SHOWN
CADFILE	XXXXXX.dwg

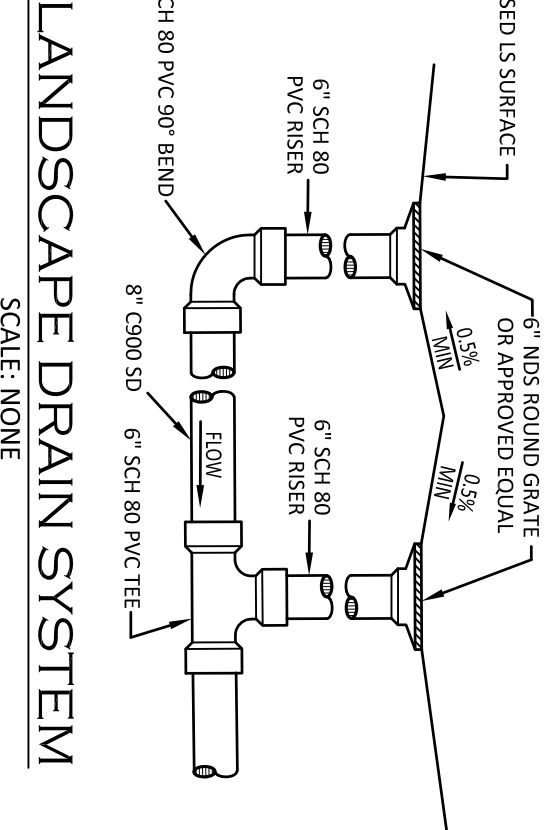
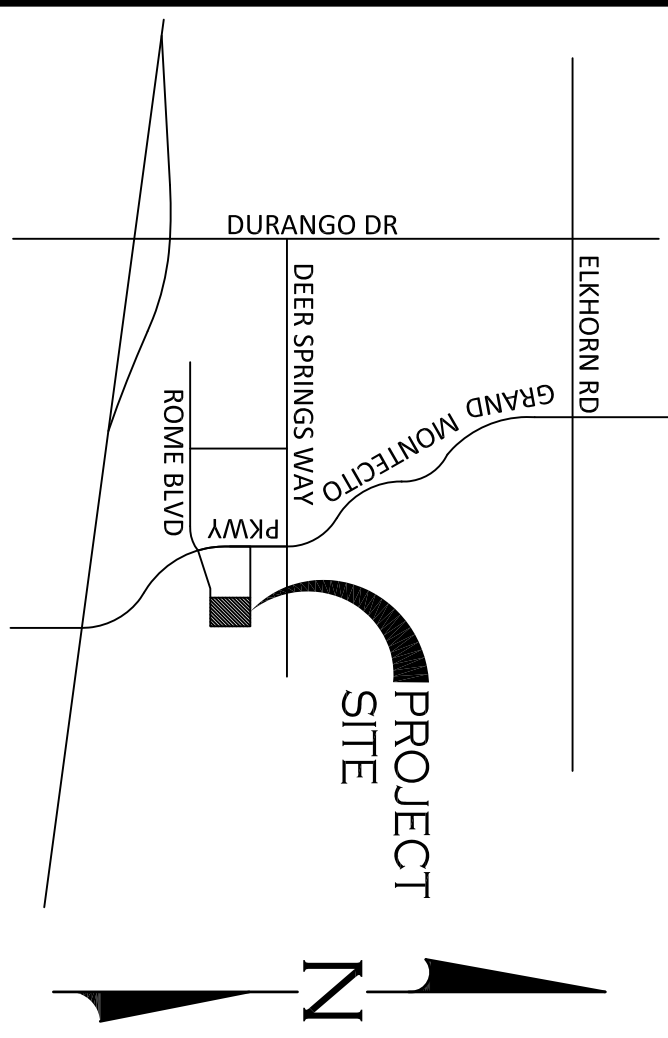
STAMP DATE
EXP. DATE

1050 E FLAMINGO ROAD
SUITE 1135
LAS VEGAS, NV 89119
Tel: 702-650-0572
Fax: 702-650-0517
Web: trcsolutions.com

TRC
Customer-Focused Solutions
BV Engineering Nevada

SPINNER
CENTENNIAL BUSINESS PARK
DEVELOPED CONDITION DRAINAGE MAP

SHEET
FIGURE 7
2 OF 2 SHTS
PROJECT ID



VICINITY MAP
SCALE: NTS

LEGEND

- RIGHT-OF-WAY
- PROPERTY LINE
- STREET CENTER LINE
- EXISTING BUILDING
- PROPOSED BUILDING
- EXISTING CURB & GUTTER
- PROPOSED CURB & GUTTER
- EXISTING EDGE OF AC
- PROPOSED ELEVATION
- EXISTING ELEVATION
- SCOPE & DIRECTION OF SLOPE
- GRADE BREAK
- PROPOSED CMU WALL
- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- CROSS SECTION

DEPRESSED CURB DETAIL
SCALE: NONE

0" CURB DETAIL
SCALE: NONE

ONSITE CURB RAMP
SCALE: NONE

SECTION A
SCALE: NONE

SECTION B
SCALE: NONE

SECTION D
SCALE: NONE

SECTION C
SCALE: NONE

FLOOD ZONE NOTE:

ACCORDING TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) COMMUNITY PANEL NUMBER 32003 C1745 E, CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, DATED SEPTEMBER 27, 2002, THE SITE LIES WITHIN A FEMA DESIGNATED ZONE: "X". A ZONE "X" IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD ZONE.

DISCLAIMER NOTE

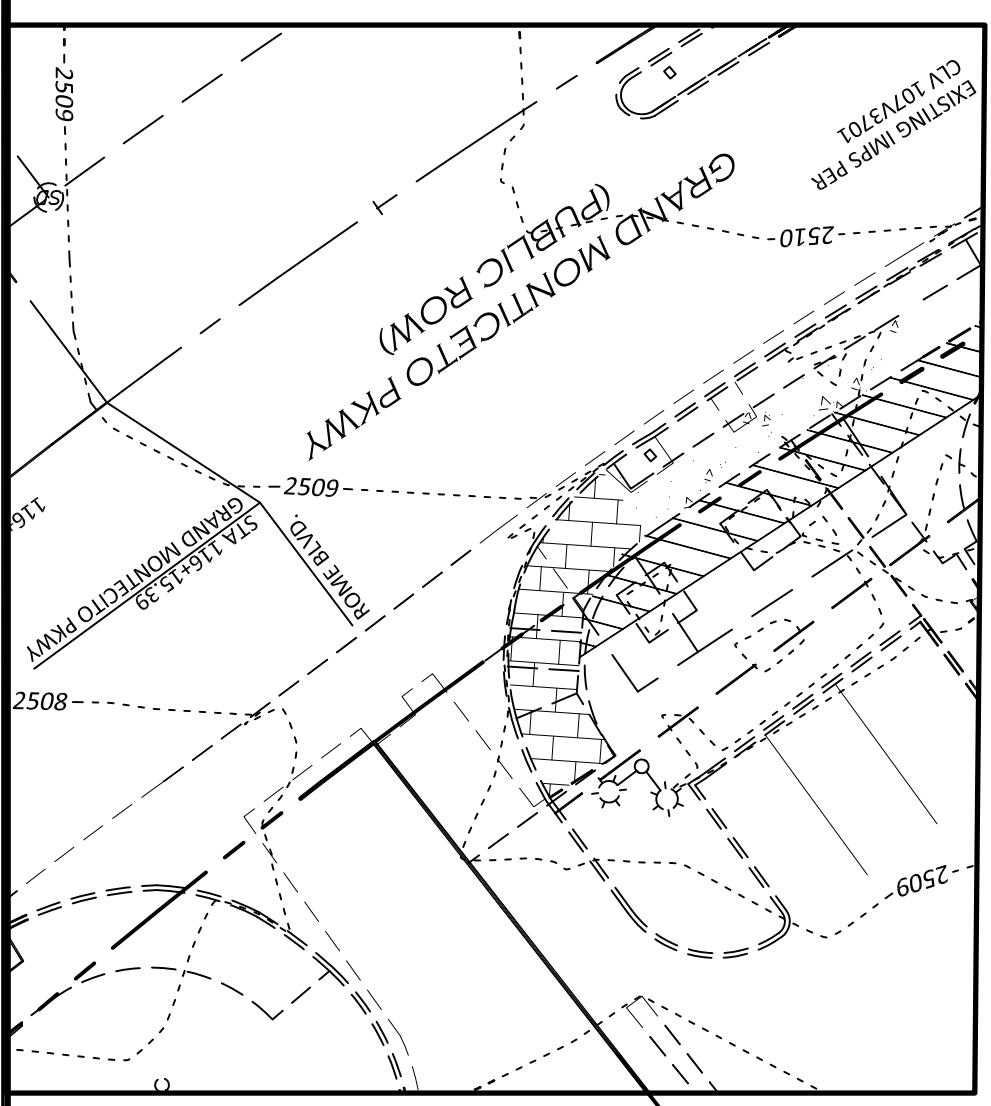
EXISTING UTILITY LOCATIONS SHOWN HEREIN ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN ON THIS PLAN. THE ENGINEER HAS CONDUCTED A VISUAL SURVEY OF THE SITE AND HAS NOT CONDUCTED A GROUND PENETRATING RADAR (GPR) SURVEY. ALL DISCREPANCIES MUST BE IMMEDIATELY REPORTED TO THE ENGINEER.

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

Call before you Dig
811
Call before you Dig
811
Call before you Dig
811

FAST
UnderGround
1-702-432-5300
1-800-227-2600

FAST
UnderGround
1-702-432-5300
1-800-227-2600



BASIS OF BEARING

NOTE:
ALL ON-SITE STORM DRAIN AND THE ASSOCIATED FACILITIES ARE PRIVATELY OWNED AND TO BE PRIVATELY MAINTAINED BY THE PROPERTY OWNER.

LEGAL DESCRIPTION

SITUATED IN A PORTION OF THE NORTH-EAST QUARTER (NE 1/4) OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 20, TOWNSHIP 19 SOUTH, RANGE 60 EAST 14 D.M.

BENCHMARK

NOTE:
THE BENCHMARK IS A 1/2" DIA. ALUMINUM PILE IN THE TOP CORNER OF CURB, ON THE SOUTHWEST CORNER OF RILEY STREET AND DEER SPRINGS WAY. CLASH: 31.902865 ELEVATION: 2747.343 (VERTICAL DATUM: NAVD83)

ONSITE "A" TYPE CURB DETAIL CONCRETE FLUME 2' OR 3' VALLEY GUTTER

CONSTRUCTION NOTES:

NOTE:
CONSTRUCT "A" TYPE CURB & GUTTER PER CAUSD #245.

NOTE:
CONSTRUCT "A" TYPE CURB & GUTTER PER CAUSD #245.

NOTE:
CONSTRUCT "A" TYPE CURB & GUTTER PER CAUSD #245.

NOTE:
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NOTE:
CONSTRUCT "A" TYPE CURB & GUTTER PER CAUSD #245.

ONSITE "A" TYPE CURB DETAIL CONCRETE FLUME 2' OR 3' VALLEY GUTTER

GRAPHIC SCALE
1 INCH = 20 FT.

GRAPHIC SCALE
1 INCH = 20 FT.

DRAINAGE STUDY COMPLIANCE

NOTE:
THE DRAINAGE STUDY WAS CONDUCTED BY THE CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, DATED SEPTEMBER 27, 2002.

NOTE:
THE DRAINAGE STUDY WAS CONDUCTED BY THE CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, DATED SEPTEMBER 27, 2002.

NOTE:
THE DRAINAGE STUDY WAS CONDUCTED BY THE CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, DATED SEPTEMBER 27, 2002.

REV	DATE	BY	REVISION

CIVIL

ENGINEERING

MCCAY

ENGINEERING

11700 W. CHARLESTON BLVD.

SUITE 100

LAS VEGAS, NEVADA 89135

P 702-860-3897

WELBROOK

SENIOR LIVING

3960 PROSPECT AVE, SUITE L

YORBA LINDA, CA 92886

TEL (801) 922-0046

CENTENNIAL HILLS

MEMORY CARE FACILITY

GRADING PLAN

DATE: 10/10/16

DRAWN BY: JSM

PROJECT MGR: JSM

PROJECT NO: 16191

SCALE: 1"=20'

10/10/16

SHEET

C401

5 OF 5 SHEETS

DRAWING NO.

JEREMY S. MCCAY

REGISTERED PROFESSIONAL ENGINEER

STATE OF NEVADA

EXP. 12/31/17

CIVIL