

DS #: 5399

APN: 163-01-510-001 ? 163-01-510-004

PROJECT: Charleston & Westwind Retail Center

SUBMITTAL: 2nd

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM		DATE: February 8, 2021
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:	COPIES TO:
Charleston & Westwind Retail Center		McCay Engineering
Cross Streets:	SEC Charleston Blvd. & Westwind Road	LDR Partners
File Number:	F:\Depot\DSMemos\DS5399B.doc	Bart Anderson, P.E., DevCo
Parcel Number:	163-01-510-001 & 163-01-510-004	CCRFCD
Zoning Action:	20-0023-VAR1; SDR-78460; VAR-78455; VAR-78456 & ZON-78454	
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	12/23/2020	1/13/2021	Not Approved	\$400.00	4110866: \$400
2 nd Submittal	1/25/2021	2/8/2021	See Comments Below	\$400.00	4138310: \$400
TOTAL FEES (LDDRS):				\$800.00	----

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

- This drainage study is acceptable in concept;** however, City of Las Vegas will not formally accept the study until the *Clark County Regional Flood Control District (CCRFCD)* has issued a letter of concurrence. The engineer should contact the CCRFCD to confirm that they have begun their review.

Please note that effective March 15, 2019, the CCRFCD adopted new requirements for drainage study concurrence submittal. Follow the link below for specific guidance.

<http://gustfront.ccrfcd.org/LandDev/LandDev.aspx>

Please note that effective April 6, 2020, only electronic submittals to the CCRFCD will be accepted for regional concurrence. Contact cwang@regionalflood.org for direction.

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
HDR/AYS

T/R/S: T21S/R60E/01
AREA Q-01

MCCAY ENGINEERING

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

ADDENDUM #1 TO THE TECHNICAL DRAINAGE STUDY FOR CHARLESTON & WESTWIND RETAIL CENTER

CITY OF LAS VEGAS

January 20, 2021



MCCAY ENGINEERING

PREPARED FOR:

LDR PARTNERS, LLC
985 WHITE DRIVE, SUITE #100
LAS VEGAS, NV 89119
(702) 733-3622

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Charleston & Westwind Retail Center Date: January 16, 2021
 Location of Development: a) Descriptive (Cross Streets) North/South: Westwind Rd.
 East/West: Charleston Blvd.
 b) Section: 1 Township: 21 South Range: 60 East
 c) APN: 163-01-510-001/004

Name of Owner: LDR Partners
 Telephone No.: (702)733-3622 Fax No.: _____ E-Mail Address: N/A
 Address: 985 White Drive, Suite #100 Las Vegas, NV 89119

Contact Person-Name: Jeremy McCay Telephone No.: (702) 860-3897
 * E-Mail Address: jmccay@centurylink.net Fax No.: N/A
 Firm: McCay ENGINEERING
 Address: 11700 W. CHARLESTON BLVD., SUITE 170-298 LAS VEGAS NV 89135

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: 2.58 ACRES (+/-) Being Developed/Disturbed: 1.71 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.): Commercial buildings with parking addition
- Approximate upstream land area which drains to the subject site: 300 ACRES (+/-)
- Has the site drainage been evaluated in the past? ☐ YES ☒ NO If yes, please identify documentation: _____
- If known, please briefly identify the proposed discharge point(s) of runoff from the site: North to Charleston Boulevard
- Briefly describe your proposed schedule for the subject project: ASAP



Engineer's Seal

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

***New Required Field**

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

Revision	Date

Local Entity File No. _____

REFERENCE:

STANDARD FORM 1



McCay ENGINEERING

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

Date: January 20, 2021

Albert Sung, P.E.
City of Las Vegas
Public Works Department – Flood Control
495 S. Main St.
Las Vegas, Nevada 89101

RE: TECHNICAL DRAINAGE STUDY FOR CHARLESTON & WESTWIND RETAIL CENTER
Job No. 20347

Dear Mr. Sung:

This letter is provided to certify that all items on the CD match 100% of the hard copy version provided.

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

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		January 13, 2021
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:	COPIES TO:
	Charleston & Westwind Retail Center	McCay Engineering
Cross Streets:	SEC Charleston Blvd. & Westwind Road	LDR Partners
File Number:	F:\Depot\DSMemos\DS5399A.doc	Bart Anderson, P.E., DevCo
Parcel Number:	163-01-510-001 & 163-01-510-004	CCRFCD
Zoning Action:	20-0023-VAR1; SDR-78460; VAR-78455; VAR-78456 & ZON-78454	
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	12/23/2020	1/13/2021	See Comments Below	\$400.00	\$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. The site is adjacent to or crosses an existing or proposed *Clark County Regional Flood Control District* (CCRFCD) master planned facility. Therefore, CCRFCD concurrence is required prior to final approval of the drainage study.

Please note that effective March 15, 2019, the CCRFCD adopted new requirements for drainage study concurrence submittal. Follow the link below for specific guidance.

<http://gustfront.ccrfcd.org/LandDev/LandDev.aspx>

Please note that effective April 6, 2020, only electronic submittals to the CCRFCD will be accepted for regional concurrence. Contact cwang@regionalflood.org for direction.

2. The subject development consists of two parcels. A reversionary map must be recorded prior to the final improvement plans approval. Provide proof of a reversionary map has been applied to the **City** in the next submittal.
3. There are existing buildings in the subject site. Provide a *Demolition Plan* to clearly identify what buildings are to be demolished and what buildings or features need to remain in the next submittal.

4. Provide street names on the grading plan and all drainage basin plans.
5. There is a discrepancy of what it's being proposed in "Chapter 1.1 Scope" and the *Description of Property*. The grading plan does not seem to have a *Gasoline Station*. Revise accordingly.
6. Provide a section at the *Future Pad* in *Charleston Boulevard*. Provide erosion protection measures behind the sidewalk in *Charleston Boulevard*.
7. Provide erosion protection measures behind the sidewalk in *Cross Section A*.
8. On the east side of the driveway entrance in *Charleston Boulevard*, explain why a local low point "68.34TC/LP" is created at the throat of the entrance which doesn't make sense. Address and revise accordingly.
9. Construction Note #18 on *Sheet C4.01* should provide "Install 3 course solid grouted flood wall."

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
HDR/AYS

T/R/S: T21S/R60E/01
AREA Q-01



McCay ENGINEERING

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

Date: January 20, 2021

Albert Sung, P.E.
City of Las Vegas Public Works Department
Flood Control Division
495 S. Main Street
Las Vegas, NV 89101

Subject: **ADDENDUM #1 TO TECHNICAL DRAINAGE STUDY FOR CHARLESTON & WESTWIND
RETAIL CENTER**

APN: 163-01-510-001 & 163-01-510-004
Application Tracking DS 5399A

Dear Mr. Sung,

We are in receipt of your comment letter for the above referenced project. In response to your comments, the following responses are being offered:

Comment 1: The site is adjacent to or crosses an existing or proposed *Clark County Regional Flood Control District (CCRFC)* master planned facility. Therefore, CCRFC concurrence is required prior to final approval of the drainage study.

Response 1: Noted.

Comment 2: The subject development consists of two parcels. A reversionary map must be recorded prior to the final improvement plans approval. Provide proof of a reversionary map has been applied to the **City** in the next submittal.

Response 2: Noted. We are performing a commercial subdivision. Our Tentative Map has been submitted under 20-0381-TMP1.

Comment 3: There are existing buildings in the subject site. Provide a *Demolition Plan* to clearly identify what buildings are to be demolished and what buildings or features need to remain in the next submittal.

Response 3: Noted. We have provided a Demolition Plan along with the set of revised Plans.

Comment 4: Provide street names on the grading plan and all drainage basin plans.

Response 4: Noted. Street names have been provided on the Grading plan and Drainage Plans. See revised Plans with this submittal.

Comment 5: There is a discrepancy of what it's being proposed in "Chapter 1.1 Scope" and the *Description of Property*. The grading plan does not seem to have a *Gasoline Station*. Revise accordingly.

Response 5: Noted. The report has been revised. The revised 'report page' has been included in the submittal.

Comment 6: Provide a section at the *Future Pad* in *Charleston Boulevard*. Provide erosion protection measures behind the sidewalk in *Charleston Blvd*.

Response 6: We have provided a hydraulic section for Charleston Blvd. using the 1.30% slope along the Future Pad location. Utilizing the 100yr velocity, we have provided a riprap calculation that shows approximately 12-inch riprap is needed for erosion control behind the sidewalk and along the embankment of the proposed berm. See calculations.

Comment 7: Provide erosion protection measures behind the sidewalk in *Cross Section A*.

Response 7: We have provided a hydraulic section for Charleston Blvd. using the 1.46% slope at Section 'A'. Utilizing the 100yr velocity, we have provided a riprap calculation that shows approximately 13-inch riprap is needed for erosion control behind the sidewalk. See revised plans and calculations within the submittal.

Comment 8: On the east side of the driveway entrance in *Charleston Blvd.*, explain why a local low point "68.34TC/LP" is created at the throat of the entrance which doesn't make sense. Address and revise accordingly.

Response 8: Noted. This low point is to allow the onsite storm flow to be conveyed east through the required BMP swale, where it will then ultimately discharge north into Charleston Blvd. Please note that there is a curb depression (see Construction Note 13) there to allow the flow through.

Comment 9: Construction Note #18 on Sheet C4.01 should provide "Install 3 course solid grouted flood wall."

Response 9: Noted. The Construction Note #18 has been updated. See revised Plans.

If you have any questions or further comments, please contact our office at your convenience.

Sincerely,
MCCAY ENGINEERING

Jeremy McCay
Principal

COMMENT #5

(REVISED REPORT)

1 GENERAL LOCATION AND DEVELOPMENT DESCRIPTION

1.1 Scope

The purpose of this technical report is to provide a hydrologic and hydraulic analysis in order to establish overall drainage patterns and constraints for the proposed Retail Store and parking lot. This report provides recommendations for any proposed drainage facilities, and addresses onsite and offsite drainage patterns and flow rates for both the existing and interim conditions. The study was analyzed and compiled in accordance to the criteria set forth by the Clark County Regional Flood Control District's (CCRFC) *Hydrologic Criteria and Drainage Design Manual (HC&DDM)*.

1.2 Location

The project site is located in a portion of the Northern Half (N 1/2) of the Northwest Quarter (NW 1/4) of Section 1, Township 21 South, Range 60 East, unincorporated areas Clark County, Nevada. The site is recorded on the Clark County Assessor's maps as APN's 163-01-103-001/004. The site is bound by Westwind Rd. to the West, Charleston Blvd. to the north, an existing residential lot to the south and an existing commercial building lot and undeveloped parcel to the east. See Figure 1, *Vicinity Map*, and *Assessor's Parcel Map* in Appendix C.

1.3 Description of Property

The parcels total approximately 2.58 acres in area, with the northeast and southern areas (1.98 acres) of the entire site being developed at this time. The site will comprise of a Retail Store and a parking lot. The existing site is developed but the existing buildings along the south and southeast corner of the site will be demolished. The site generally slopes in a northeasterly direction at an average slope of approximately 1.00 percent.

2 GENERAL DRAINAGE DESCRIPTION

2.1 Master Planning Information

In the *2018 Las Vegas Valley Flood Control Master Plan Update – Volume I* (2018 MPU) (Reference 2), dated September 2018, as prepared by ATKINS. The valley was divided into ten watersheds and each watershed was further subdivided into sub-basins. The on-site basins fall within the Central Watershed. As shown in Figure W-5 of the 2018 MPU, the subject site is located within sub-basin CHO9-C.

Refer to the annotated Figure W-5 in Appendix A.

Existing and future CCRFC flood control facilities are shown in the *2018 Las Vegas Valley Flood Control Master Plan Update – Volume II* (2018 MPU) (Reference 3), dated September 2018, as prepared by CCRFC. The figures and inventory tables from Volume II of the 2018 MPU were updated by CCRFC in 2018. Per Figure F-29, the subject parcel is adjacent to a Category 'A' Proposed MPU facility (Facility ID MECN 0123). The proposed facility is an 8ft x 6ft RCB (854cfs). Please note this facility will be connected with a future upstream facility (year 2023/2024) to eliminate all of the surface flow in Charleston Blvd.

Annotated Figure F-29 and its inventory table are provided in Appendix C.

2.2 Floodplain Information

COMMENT #6

(added Charleston Blvd. hydraulic section
for rip-rap size calculation for erosion control)

Charleston Blvd. (100yr Existing & Developed) Worksheet for Irregular Channel

Project Description	
Worksheet	Charleston Blvd. (100yr Existing & Dev.)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Slope	.013000 ft/ft
Discharge	910.00 cfs

slope in street at Future Pcd
CLV MAPU Flow

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

Results	
Mannings Coefficient	0.015
Water Surface Elev.	70.16 ft
Elevation Range	69.77 to 70.06
Flow Area	89.2 ft ²
Wetted Perimeter	103.68 ft
Top Width	100.00 ft
Actual Depth	1.39 ft
Critical Elevation	70.64 ft
Critical Slope	0.003141 ft/ft
Velocity	10.21 ft/s
Velocity Head	1.62 ft
Specific Energy	71.78 ft
Froude Number	1.91
Flow Type	Supercritical

draw

V₁₀₀

(V₁₀₀ is used for riprap calcs.)

Calculation Messages:
Water elevation exceeds lowest end station by 0.79121079 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+07.00	0.013
0+07.00	0+51.70	0.016
0+51.70	0+56.90	0.013
0+56.90	0+92.80	0.016
0+92.80	1+00.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	69.37
0+05.00	69.27
0+05.50	69.27
0+05.50	68.77
0+07.00	68.90
0+07.00	68.94

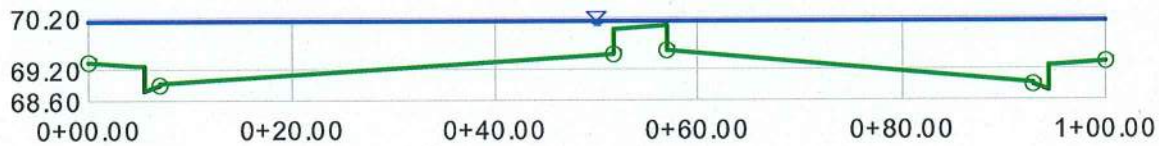
Charleston Blvd. (100yr Existing & Developed)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+51.70	69.49
0+51.70	69.99
0+56.90	70.06
0+56.90	69.56
0+92.80	68.94
0+92.80	68.90
0+94.30	68.77
0+94.30	69.27
0+94.80	69.27
1+00.00	69.37

Charleston Blvd. (100yr Existing & Developed) **Cross Section for Irregular Channel**

Project Description	
Worksheet	Charleston Blvd. (100yr Existing & De
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.015
Slope	0.013000 ft/ft
Water Surface Elev.	70.16 ft
Elevation Range	1.77 to 70.06
Discharge	910.00 cfs



V:5.0
H:1
NTS

Riprap sizing for Berm

SWC Charleston & Westwind Retail Center

Date: January, 2021

Calculated By: CB

Equation 734, Section 405.4.6 of the 1999 Hydrologic Criteria and Drainage Design Manual

$$V = 3(d_{50}^{0.5})(S_s - 1)/(S^{0.17})$$

V = Mean channel velocity in fps;

S = Longitudinal channel slope in feet per foot

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

d₅₀ = Mean stone size in ft, rock size in for which 50% (by weight) of the riprap is smaller

Solve for d₅₀:

$$d_{50} = [V(S^{0.17}) / (3(S_s - 1))]^2$$

V = 10.21 fps <<<< From Flow Master Street Section for Charleston Blvd.

S = 0.0130 ft/ft

S_s = 2.65

d₅₀ = 0.97 ft

11.66 inches

* d₅₀ = 12-inch Riprap is being proposed

COMMENT #7

(added Charleston Blvd. hydraulic section
for rip-rap size calculation for erosion control at Section 'A')

Charleston Blvd. (100yr Existing & Developed) Worksheet for Irregular Channel

Project Description	
Worksheet	Charleston Blvd. (100yr Existing & Dev.)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Slope	0.014600 ft/ft
Discharge	910.00 cfs

slope in street along wall
CLV MPH Flow

Options	
Current Roughness Method	Selected
Open Channel Weighting Method	Selected
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.015
Water Surface Elev.	70.13 ft
Elevation Range	69.77 to 70.06
Flow Area	86.0 ft ²
Wetted Perimeter	103.62 ft
Top Width	100.00 ft
Actual Depth	1.36 ft
Critical Elevation	70.64 ft
Critical Slope	0.003128 ft/ft
Velocity	10.58 ft/s
Velocity Head	1.74 ft
Specific Energy	71.87 ft
Froude Number	2.01
Flow Type	Supercritical

d100

V100

(V100 is used for riprap calcs.)

Calculation Messages:
Water elevation exceeds lowest end station by 0.75944846 ft.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+07.00	0.013
0+07.00	0+51.70	0.016
0+51.70	0+56.90	0.013
0+56.90	0+92.80	0.016
0+92.80	1+00.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	69.37
0+05.00	69.27
0+05.50	69.27
0+05.50	68.77
0+07.00	68.90
0+07.00	68.94

Charleston Blvd. (100yr Existing & Developed)
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+51.70	69.49
0+51.70	69.99
0+56.90	70.06
0+56.90	69.56
0+92.80	68.94
0+92.80	68.90
0+94.30	68.77
0+94.30	69.27
0+94.80	69.27
1+00.00	69.37

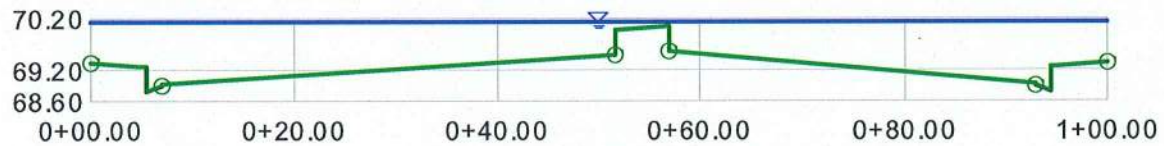
Charleston Blvd. (100yr Existing & Developed) **Cross Section for Irregular Channel**

Project Description

Worksheet	Charleston Blvd. (100yr Existing & Developed)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data

Mannings Coefficient	0.015
Slope	0.014600 ft/ft
Water Surface Elev.	70.13 ft
Elevation Range	68.77 to 70.06
Discharge	910.00 cfs



V:5.0
H:1
NTS

Riprap sizing for Berm

SWC Charleston & Westwind Retail Center

Date: January, 2021

Calculated By: CB

Equation 734, Section 405.4.6 of the 1999 Hydrologic Criteria and Drainage Design Manual

$$V=3(d50^{0.5})(Ss-1)/(S^{0.17})$$

V=Mean channel velocity in fps;

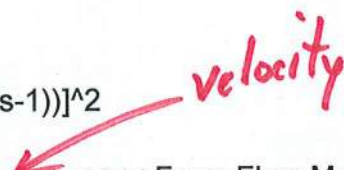
S=Longitudinal channel slope in feet per foot

Ss=Specific gravity of rock (minimum Ss=2.50)

d50 = Mean stone size in ft, rock size in for which 50% (by weight) of the riprap is smaller

Solve for d50:

$$d50=[V(S^{0.17})/(3(Ss-1))]^2$$

V= 10.58 fps  <<<< From Flow Master Street Section for Charleston Blvd.

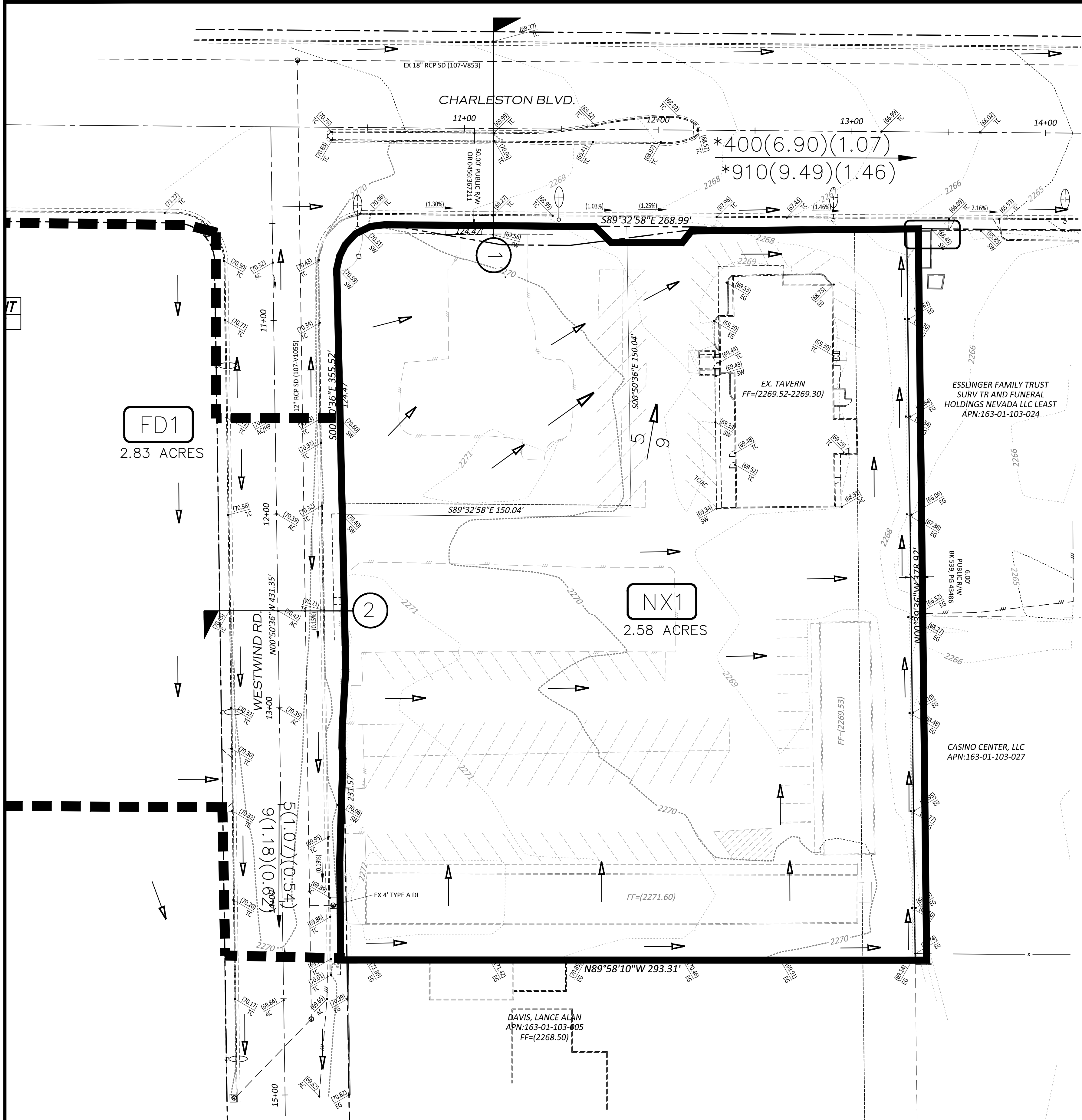
S= 0.0146 ft/ft  slope in street

Ss= 2.65

d50= 1.09 ft

13.03 inches 

* d50=13-inch Riprap is being proposed



*CLV CENTRAL NEIGHBORHOOD MPU (Figure E-9)

ND1

CMD1

2

3

1 (1.0)(1.2)

1 (1.0)(1.2)

1

DRAINAGE BASIN LABEL

CONCENTRATION POINT

COMBINATION POINT

ONSITE BASIN BOUNDARY

Q10 FLOW IN CFS (10 YR.)

Q100 FLOW IN CFS (100 YR.)

Q10 (V10)(D10)

Q100 (V100)(D100)

BASIN FLOW DIRECTION

COMBINED FLOW DIRECTION

HYDRAULIC CROSS-SECTION

SITE

CHARLESTON

DEL RAY

UNDELL

VICINITY MAP

SCALE: NTS

GRAPHIC SCALE

30 0 15 30 60

(IN FEET)

1 INCH = 30 FT.

Peak Flow Summary			
Existing Condition			
HEC-1 ID	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)
FD1	2.83	5	9
NX1	2.58	5	9

Street Flow Summary (Existing / Developed Condition)							
10-year, 6-hour Storm							
Street	Right of Way Width (ft)	Hydraulic Cross-Section Identifier	10-Year Flow [Q10] (cfs)	10-Year Velocity [v] (fps)	10-Year Flow Depth [d] (ft)	10-Year Velocity x Depth [v x d]	Dry Lane Width (within 1/2 ROW) (ft)
Westwind	60	2	5	1.07	0.54	0.58	N/A
Charleston	100	1	400	6.90	1.07	7.38	0.0
Street Flow Summary (Existing / Developed Condition)							
100-year, 6-hour Storm							
Street	Right of Way Width (ft)	Hydraulic Cross-Section Identifier	100-Year Flow [Q100] (cfs)	100-Year Velocity [v] (fps)	100-Year Flow Depth [d] (ft)	100-Year Velocity x Depth [v x d]	
Westwind	60	2	9	1.18	0.62	0.73	
Charleston	100	1	910	9.49	1.46	13.86	

REV

DATE

BY

REVISION

MCCAY ENGINEERING

CIVIL ENGINEERING

11700 W. CHARLESTON BLVD.
SUITE 100
LAS VEGAS, NV 89135
P 702-860-3897

985 WHITE DRIVE
LAS VEGAS, NV 89119
P 702-733-6622

EXISTING DRAINAGE PLAN

CHARLESTON & WESTWIND
RETAIL CENTER

DATE: 12/22/2020

DRAWN BY: JSM

PROJECT MGR: JSM

PROJECT NO: 20347

SCALE: 1"=30'

PROFESSIONAL ENGINEER'S SEAL OF THE STATE OF NEVADA

JEREMY S. MCCAY

Exp: 12/31/21

CIVIL

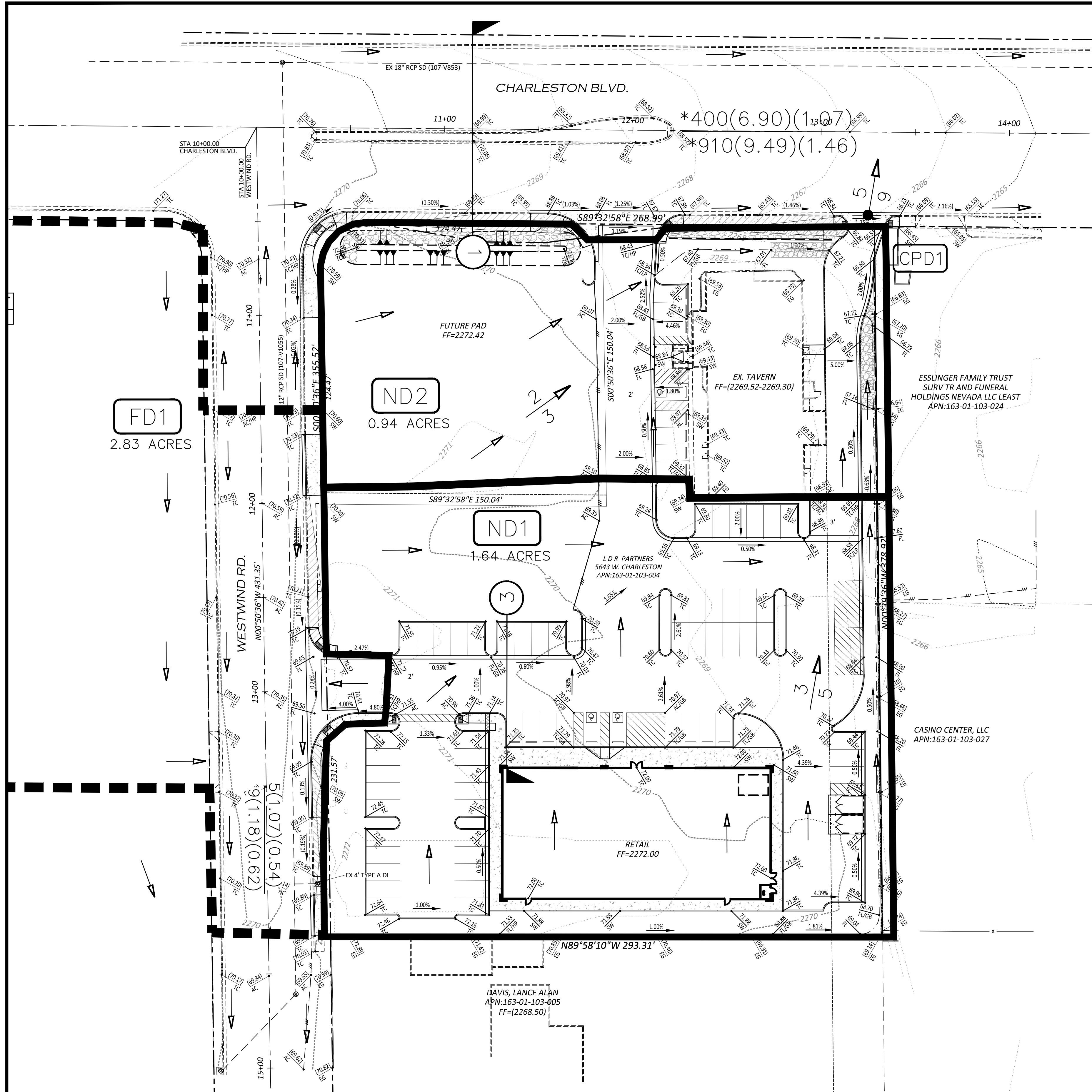
12/22/2020

SHEET

DR1

OF 5 SHEETS

DRAWING NO.



*CLV CENTRAL NEIGHBORHOOD MPU (Figure E-9)

ND1

CMD1

2

3

1

(1.0)(1.2)

1

(1.0)(1.2)

1

DRAINAGE BASIN LABEL

CONCENTRATION POINT

COMBINATION POINT

ONSITE BASIN BOUNDARY

Q10 FLOW IN CFS (10 YR.)

Q100 FLOW IN CFS (100 YR.)

Q10 (V10)(D10)

Q100 (V100)(D100)

BASIN FLOW DIRECTION

COMBINED FLOW DIRECTION

HYDRAULIC CROSS-SECTION

SITE

CHARLESTON

DEL RAY

UNDELL

WESTWIND

VICINITY MAP

SCALE: NTS

30

0

15

30

60

GRAPHIC SCALE

(IN FEET)

1 INCH = 30 FT.

Peak Flow Summary			
Developed Condition			
HEC-1 ID	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)
FD1	2.83	5	9
ND1	1.64	3	5
ND2	0.94	2	3
CPD1	-	5	9
(ND1+ND2)			

Street Flow Summary (Existing / Developed Condition)							
10-year, 6-hour Storm							
Street	Right of Way Width (ft)	Hydraulic Cross-Section Identifier	10-Year Flow [Q10] (cfs)	10-Year Velocity [v] (fps)	10-Year Flow Depth [d] (ft)	10-Year Velocity x Depth [v x d]	Dry Lane Width (within 1/2 ROW) (ft)
Westwind Charleston	60	2	5	1.07	0.54	0.58	N/A
	100	1	400	6.90	1.07	7.38	0.0
Street Flow Summary (Existing / Developed Condition)							
100-year, 6-hour Storm							
Street	Right of Way Width (ft)	Hydraulic Cross-Section Identifier	100-Year Flow [Q100] (cfs)	100-Year Velocity [v] (fps)	100-Year Flow Depth [d] (ft)	100-Year Velocity x Depth [v x d]	
Westwind Charleston	60	2	9	1.18	0.62	0.73	
	100	1	910	9.49	1.46	13.86	

On-site Sections (Interim / Developed Conditions)				
Hydraulic Cross-Section Identifier	100-Year Flow [Q100] (cfs)	100-Year Velocity [v] (fps)	100-Year Flow Depth [d] (ft)	2x 100-Year 2 x [d]
3	5	1.66	0.24	0.48

REV

DATE

BY

REVISION

MCCAY

ENGINEERING

CIVIL ENGINEERING

LDR PARTNERS

985 WHITE DRIVE

LAS VEGAS, NV 89119

P 702-860-3897

DEVELOPED DRAINAGE PLAN

CHARLESTON & WESTWIND

RETAIL CENTER

DATE: 01/20/2021

DRAWN BY: JSM

PROJECT MGR: JSM

PROJECT NO: 20347

SCALE: 1"=30'

PROFESSIONAL ENGINEER - STATE OF NEVADA

JEREMY S. MCCAY

Exp: 12/31/21

CIVIL

01/20/2021

SHEET

DR2

OF 5 SHEETS

DRAWING NO.

L#

