

# Supplemental Information to the Technical Drainage Study for

## Summerlin West Grand Park Detention Basin *Las Vegas, Nevada*

*7809-GPDB*

*Prepared for:*

**Howard Hughes Company, LLC**  
10845 Griffith Peak Dr. Suite 160  
Las Vegas, Nevada 89135  
702-791-4201

*Submitted to:*

**City of Las Vegas Public Works**  
333 N Rancho Dr  
Las Vegas, Nevada 89106  
702-229-6251



HYDROLOGIC CRITERIA AND DRAINAGE MANUAL  
**DRAINAGE STUDY INFORMATION FORM**

Name of Development: Grand Park Detention Basin Date: March 2, 2021

Location of Development: a) Descriptive (Cross Streets) North/South: I215

East/West: Summerlin Parkway

b) Section: 22 Township: 20 Range: 59

c) APN : 137-22-301-006

Name of Owner: The Howard Hughes Corporation

Telephone No.: (702) 791-4201 Fax No.: (702) 791-4453 E-Mail Address: April.Chapman@howardhughes.com

Address: 10845 W. Griffith Peak Dr. STE 160, LV, NV, 89135

Contact Person-Name: Brian Ruiz Telephone No.: (702)-873-7550

\* E-Mail Address: brianr@vtnnv.com Fax No.: (702)-362-2597

Firm: VTN Nevada

Address: 2727 S. Rainbow Blvd, LV, NV, 89146

Type of Land Development/Land Disturbance Process:

<input type="checkbox"/>	Rezoning	<input type="checkbox"/>	Subdivision Map	<input type="checkbox"/>	Clearing and Grading Only
<input type="checkbox"/>	Parcel Map	<input type="checkbox"/>	Planned Unit Development	<input checked="" type="checkbox"/>	Other (Please specify below)
<input type="checkbox"/>	Large Parcel Map	<input type="checkbox"/>	Building Permit		Detention basin and outflow facilities

1. Total Owned Land Area: At Site: 5100+/- Acres Being Developed/Disturbed: +/-5100 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.): Detention basin, inlet & outlet facilities

5. Approximate upstream land area which drains to the subject site: +/- 1.28 sq.mi.

6. Has the site drainage been evaluated in the past?  **YES**  **NO** If yes, please identify documentation: DS4926 - Summerlin West Master Plan Update, DS5089 - Conceptual Drainage Study for Grand Park Detention Basin

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Detention basin outlet into the storm drain within Summerlin Parkway eastbound.

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



03/02/2021

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



March 2, 2021  
W.O. #7809-GPDB

City of Las Vegas  
Land Development Services  
Department of Building Safety  
495 S. Main Street  
Las Vegas, NV 89101

Attention: Peter Jackson, CFM  
Senior Engineering Associate

**Subject: Supplemental Information for the Technical Drainage Study for Summerlin West Grand Park Detention Basin.**

Mr. Jackson:

This letter serves as a supplement to respond to the comments provided on the approval letter dated February 17, 2021. The plans included with this supplement include the final design approved through NDWR for the Dam Safety permit and addresses Comments 4 and Comments 13-20 within the letter. Below are responses to the letter comments:

***Comment 4:***

***Provide a Drainage Easement Exhibit with accompanying legal description for Flood Control approval prior to final approval of the Improvement Plans for all facilities located outside of existing right-of-way. Coordinate easement with on-going site mapping that may include the dedication of the park parcel.***

**RESPONSE:**

A drainage easement exhibit and legal description has been provided with this supplement.

***Comment 13:***

***Revise the Inlet Structure Details 1/S1 with B/S2. The wall height needs to be expanded to accommodate support plate and have adequate clearance from wall extension to the tie connection into the RCB. This will also affect the trash gate details. Revise plans accordingly.***

**RESPONSE:**

Sections 1/S1 and B/S2 have been revised to account for additional RCB thickness due to revision to cast-in-place RCB from pre-cast (See additional information section at end of letter). However, the 16" headwall height shown on the details has been reviewed and we believe that the wall

height is adequate for connection of the trash rack. As shown on section B/S2, the trash rack mounting bracket has 2” clear to the top of headwall and 2” clear to the top of the box culvert. This should be sufficient clearance for proper connection and functioning of the trash rack. No revision has been made to the design.

**Comment 14:**

***Detail H/DT1 needs to be revised at the downstream section adjacent to the roadway. Add a Construction Note that the concrete taper shall be extended to the curb with the Future Roadway Improvements to prevent roadway being undermined.***

**RESPONSE:**

Detail H/DT1 has been revised to provide the concrete taper and requested note.

**Comment 15:**

***Provide structural details for the removable Steel Stop Logs that include support details within the concrete walls. The structural details can be covered in the Specs based upon the proprietary usage of the Manufacturer. The Specs shall require stamped shop drawings with calculations that must be structurally approved by the City (Building Dept & Flood Control) prior to construction. The provided Specs need to be updated.***

**RESPONSE:**

Specifications section 609.03.05 STOP LOG contains submittal requirements (including shop drawings and calculations) and design guidance for stop log requirements including frames, seals, lifters, installation, and testing. In addition, Appendix A has been added to the specification with stop log information from a manufacture detailing the support connections of the stop log frame to the concrete walls. The specifications state that a stop log can be used from other manufactures as long as the product meets the minimum standards within the specifications.

**Comment 16:**

***Revise the Articulated Concrete Block (ACB) details on Sheets DT1 and DT3 to show the 4,500-psi concrete at terminations and angle mat connections. Remove “grout, or other” from the ACB Details and Sections.***

**RESPONSE:**

ACB details have been revised as requested.

**Comment 17:**

***The Concept RCB Details on Sheet DT5 (V and W) show the required sacrificial concrete and specify the 6,000-psi concrete. Detail V, includes 3" sacrificial with grooves and corrugated sidewalls. Verify that this information is shown on the Structural Details.***

**RESPONSE:**

This information has been added to the RCB details on S4. In addition, a corrugated wall detail has been added to sheet DT5 showing the dimensions and spacing of the wall corrugations. This detail matches the design of the Village 26 detention basin inlet culvert which the hydraulic modeling was based on in the approved drainage study. These details are for the proposed cast-in-place RCB used where the manufacture of pre-cast RCB is prohibited as discussed in the additional Information part of this letter.

**Comment 18:**

***For segments of the Main Line RCBs with velocities between 25 and 35 feet per second, 6,000-psi concrete with 2-inch additional (sacrificial) thickness is required. For segments of pipe with velocities in excess of 35 feet per second, added mitigation to reduce long term impacts is required. A Construction Note has been added to each of the Grading Plans and the Plan and Profile Sheets that calls out the special construction requirement for the minimum 6,000 psi concrete with the additional sacrificial concrete based upon the velocity.***

**RESPONSE:**

Acknowledged. The plans specify details V and W on sheet DT5 which are for each velocity conditions stated in the comment. Note that the corrugation of the side walls shown on detail W has prohibited the use of pre-cast for manufacturing reasons. A cast-in-place details have been added to sheet S4 for these boxes. This is discussed in the additional information section of this letter.

**Comment 19:**

***Provide details and sections for the RCBs to clearly show the velocity mitigation (6,000 psi concrete, additional sacrificial concrete, and grooves) measures. Provide a note for Pre-Case RCBs that require Shop Drawings that detail the minimum 6,000 psi concrete, dimension the additional sacrificial concrete, and grooves.***

**RESPONSE:**

Details V and W of sheet DT5 provide the information requested. A corrugated wall face detail has also been added to sheet DT5 showing the sidewall corrugation dimensions. This is consistent with the corrugation used on the inlet RCB of the Village 26 detention basin in Summerlin.

**Comment 20:**

***Revise the XS-Sheets and the GR-Sheets to reflect the correct 10-, 25-, and 100-year WSEs. Verify that the elevations are correctly referenced to match the approved elevations (see comment #13).***

**RESPONSE:**

All sheets have been revised to show the correct water surface elevations.

***Additional Information:***

The original intent of the design was to utilize pre-cast box culverts for all RCBs proposed for this project. Rinker-Hydro Conduit has informed VTN that the corrugated sidewalls provided to increase roughness coefficient on detail V on sheet DT5 cannot be manufactured due to restriction of the forms and manufacturing techniques. To provide for the design approved in the drainage study two cast-in-place RCB details have been added to sheet S4. The single 7'x7' RCB structural detail corresponds to detail V on sheet DT5 for the high velocity limits which required the corrugated walls. A detail to prepare the required corrugated wall surface for detail V has been added to DT5. The double culvert is for when the two culverts come together at the detention basin inlet from stations 42+50.00 to 43+51.64. This culvert does not require the corrugated walls due to high velocities, but the structural detail is provided for this section to simplify construction where the boxes come together.

Respectfully submitted,



Brian T. Ruiz, P.E., CFM

**DRAINAGE EASEMENT EXHIBIT  
WITH  
LEGAL DESCRIPTIONS**



2727 SOUTH RAINBOW BOULEVARD \*  
LAS VEGAS, NEVADA 89146-5148 PHONE 702-873-7550 \* FAX 702-362-2597

W.O.7809  
February 25, 2021  
BY: BT  
P.R. BY: TZ  
APN: 137-22-301-006  
PAGE 1 OF 15



**EXPLANATION:**

THIS LEGAL DESCRIBES A PARCEL OF LAND GENERALLY LOCATED SOUTHWESTERLY OF LAKE MEAD BOULEVARD AND KETTLE RIDGE DRIVE FOR DETENTION BASIN DRAINAGE EASEMENT PURPOSES.

**LEGAL DESCRIPTION  
DRAINAGE EASEMENT**

BEING A PORTION OF LOT 1 OF THAT CERTAIN PARCEL MAP ON FILE IN THE OFFICE OF THE COUNTY RECORDER, CLARK COUNTY, NEVADA IN FILE 125, PAGE 15, LOCATED WITHIN THE EAST HALF (E 1/2) AND THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 22, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

**COMMENCING** AT THE SOUTHEAST CORNER OF SAID SECTION 22; THENCE NORTH 00°22'56" WEST ALONG THE EAST LINE OF SAID SECTION 22, A DISTANCE OF 2241.45 FEET; THENCE SOUTH 89°37'04" WEST DEPARTING SAID EAST LINE, 1116.18 FEET TO THE POINT OF BEGINNING;

THENCE SOUTH 38°21'46" WEST, 152.42 FEET; THENCE SOUTH 48°24'57" WEST, 101.06 FEET; THENCE SOUTH 71°58'35" WEST, 68.28 FEET; THENCE NORTH 88°06'20" WEST, 129.39 FEET; THENCE NORTH 73°41'04" WEST, 278.90 FEET; THENCE SOUTH 29°46'48" WEST, 184.06 FEET; THENCE SOUTH 16°01'00" WEST, 275.40 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE NORTHEASTERLY HAVING A RADIUS OF 94.00 FEET, A RADIAL LINE TO SAID BEGINNING BEARS SOUTH 24°40'59" WEST; THENCE SOUTHEASTERLY, 22.06 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 13°26'54" TO WHICH A RADIAL LINE BEARS SOUTH 11°14'06" WEST;

THENCE SOUTH 16°01'00" WEST, 107.40 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 675.50 FEET, A RADIAL LINE TO SAID BEGINNING BEARS NORTH 35°08'36" EAST; THENCE NORTHWESTERLY, 57.20 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 04°51'05" TO WHICH A RADIAL LINE BEARS NORTH 30°17'31" EAST, SAME BEING THE BEGINNING OF A NON-TANGENT CURVE CONCAVE NORTHEASTERLY HAVING A RADIUS OF 123.26 FEET, A RADIAL LINE TO SAID BEGINNING BEARS SOUTH 79°11'20" WEST; THENCE NORTHWESTERLY, 53.69 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 24°57'18" TO WHICH A RADIAL LINE BEARS NORTH 75°51'23" WEST, SAME BEING THE BEGINNING OF A NON-TANGENT CURVE CONCAVE NORTHEASTERLY HAVING A RADIUS OF 146.00 FEET, A RADIAL LINE TO SAID BEGINNING BEARS SOUTH 40°20'20" WEST; THENCE NORTHWESTERLY, 46.32 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 18°10'42" TO THE BEGINNING OF A REVERSE CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 152.00 FEET, A RADIAL LINE TO SAID BEGINNING BEARS NORTH 58°31'03" EAST; THENCE NORTHWESTERLY, 63.11 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 23°47'23" TO WHICH A RADIAL LINE BEARS NORTH 34°43'40" EAST, SAME BEING THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHEASTERLY HAVING A RADIUS OF 454.00 FEET, A RADIAL LINE TO SAID BEGINNING BEARS NORTH 44°30'32" WEST; THENCE SOUTHWESTERLY, 12.89 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 01°37'38" TO THE BEGINNING OF A REVERSE CURVE CONCAVE NORTHWESTERLY HAVING A RADIUS OF 161.00 FEET, A RADIAL LINE TO SAID BEGINNING BEARS SOUTH 46°08'10" EAST; THENCE SOUTHWESTERLY, 97.77 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 34°47'34" TO WHICH A RADIAL LINE BEARS SOUTH 11°20'36" EAST; THENCE NORTH 65°46'47" WEST, 22.17 FEET; THENCE NORTH 24°13'13" EAST, 150.18 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE NORTHEASTERLY HAVING A RADIUS OF 131.43 FEET, A RADIAL LINE TO SAID BEGINNING BEARS SOUTH 15°02'06" WEST; THENCE NORTHWESTERLY, 78.31 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 34°08'18" TO WHICH A RADIAL LINE BEARS SOUTH 49°10'24" WEST; THENCE NORTH 36°28'16" WEST, 111.78 FEET; THENCE NORTH 50°42'22" WEST, 265.58 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE NORTHEASTERLY HAVING A RADIUS OF 41.09 FEET, A RADIAL LINE TO SAID BEGINNING BEARS SOUTH 39°24'23" WEST; THENCE NORTHWESTERLY, 64.37 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 89°45'17" TO WHICH A RADIAL LINE BEARS NORTH 50°50'20" WEST; THENCE NORTH 39°17'02" EAST, 637.07 FEET; THENCE SOUTH 57°14'02" WEST, 848.52 FEET; THENCE SOUTH 01°31'36" WEST, 117.87 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 820.50 FEET, A RADIAL LINE TO SAID BEGINNING BEARS NORTH 36°24'00" EAST; THENCE NORTHWESTERLY, 50.94 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 03°33'25" TO WHICH A RADIAL LINE BEARS NORTH 32°50'35" EAST;

THENCE NORTH 01°31'36" EAST, 62.26 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE NORTHWESTERLY HAVING A RADIUS OF 195.05 FEET, A RADIAL LINE TO SAID BEGINNING BEARS SOUTH 31°14'03" EAST; THENCE SOUTHWESTERLY, 70.49 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 20°42'24" TO WHICH A RADIAL LINE BEARS SOUTH 10°31'38" EAST, SAME BEING THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 820.50 FEET, A RADIAL LINE TO SAID BEGINNING BEARS NORTH 27°40'46" EAST; THENCE NORTHWESTERLY, 101.18 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 07°03'57" TO WHICH A RADIAL LINE BEARS NORTH 20°36'50" EAST; THENCE NORTH 20°38'02" EAST, 15.00 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE NORTHWESTERLY HAVING A RADIUS OF 145.71 FEET, A RADIAL LINE TO SAID BEGINNING BEARS SOUTH 20°38'02" WEST; THENCE NORTHEASTERLY, 135.86 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 53°25'14" TO WHICH A RADIAL LINE BEARS SOUTH 32°47'12" EAST; THENCE NORTH 57°14'02" EAST, 70.20 FEET; THENCE NORTH 77°45'58" WEST, 62.60 FEET; THENCE NORTH 12°14'02" EAST, 36.25 FEET; THENCE SOUTH 77°45'58" EAST, 98.85 FEET; THENCE NORTH 57°14'02" EAST, 610.25 FEET; THENCE NORTH 77°45'58" WEST, 64.31 FEET; THENCE NORTH 12°14'02" EAST, 32.83 FEET; THENCE SOUTH 77°45'58" EAST, 97.15 FEET; THENCE NORTH 57°14'02" EAST, 126.66 FEET TO THE BEGINNING OF A CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 210.18 FEET; THENCE SOUTHEASTERLY, 314.76 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 85°48'20" TO WHICH A RADIAL LINE BEARS NORTH 53°02'21" EAST, SAME BEING THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHEASTERLY HAVING A RADIUS OF 60.00 FEET, A RADIAL LINE TO SAID BEGINNING BEARS NORTH 37°24'22" WEST; THENCE NORTHEASTERLY, 72.72 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 69°26'34" TO THE BEGINNING OF A COMPOUND CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 108.00 FEET, A RADIAL LINE TO SAID BEGINNING BEARS NORTH 32°02'12" EAST; THENCE SOUTHEASTERLY, 23.74 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 12°35'38" TO WHICH A RADIAL LINE BEARS NORTH 44°37'50" EAST; THENCE NORTH 29°15'16" EAST, 339.92 FEET; THENCE SOUTH 40°52'32" EAST, 56.46 FEET TO THE BEGINNING OF A CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 1158.00 FEET; THENCE SOUTHEASTERLY, 1.31 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 00°03'53" TO WHICH A RADIAL LINE BEARS NORTH 49°11'21" EAST; THENCE SOUTH 29°15'16" WEST, 354.70 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE NORTHEASTERLY HAVING A RADIUS OF 24.00 FEET, A RADIAL LINE TO SAID BEGINNING BEARS SOUTH 68°03'31" WEST; THENCE SOUTHEASTERLY, 54.64 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 130°26'45" TO WHICH A RADIAL LINE BEARS SOUTH 62°23'13" EAST, SAME BEING THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHEASTERLY HAVING A RADIUS OF 155.27 FEET, A RADIAL LINE TO SAID BEGINNING BEARS NORTH 62°24'18" WEST;

THENCE NORTHEASTERLY, 39.16 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 14°27'01" TO WHICH A RADIAL LINE BEARS NORTH 47°57'17" WEST, SAME BEING THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHEASTERLY HAVING A RADIUS OF 156.08 FEET, A RADIAL LINE TO SAID BEGINNING BEARS NORTH 48°00'22" WEST; THENCE NORTHEASTERLY, 69.20 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 25°24'13" TO WHICH A RADIAL LINE BEARS NORTH 22°36'08" WEST, SAME BEING THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHEASTERLY HAVING A RADIUS OF 150.34 FEET, A RADIAL LINE TO SAID BEGINNING BEARS NORTH 33°29'13" WEST; THENCE NORTHEASTERLY, 10.29 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 03°55'11" TO THE BEGINNING OF A COMPOUND CURVE CONCAVE SOUTHEASTERLY HAVING A RADIUS OF 150.34 FEET, A RADIAL LINE TO SAID BEGINNING BEARS NORTH 29°34'02" WEST; THENCE NORTHEASTERLY, 52.93 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 20°10'13" TO WHICH A RADIAL LINE BEARS NORTH 09°23'49" WEST, SAME BEING THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 166.33 FEET, A RADIAL LINE TO SAID BEGINNING BEARS NORTH 01°01'30" WEST; THENCE SOUTHEASTERLY, 30.70 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 10°34'34" TO WHICH A RADIAL LINE BEARS NORTH 09°33'04" EAST, SAME BEING THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 681.09 FEET, A RADIAL LINE TO SAID BEGINNING BEARS NORTH 85°57'21" EAST; THENCE NORTHWESTERLY, 46.37 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 03°54'02" TO WHICH A RADIAL LINE BEARS NORTH 82°03'18" EAST, SAME BEING THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 732.30 FEET, A RADIAL LINE TO SAID BEGINNING BEARS NORTH 68°11'44" EAST; THENCE NORTHWESTERLY, 32.52 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 02°32'40" TO WHICH A RADIAL LINE BEARS NORTH 65°39'04" EAST, SAME BEING THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 307.12 FEET, A RADIAL LINE TO SAID BEGINNING BEARS NORTH 67°01'17" EAST; THENCE NORTHWESTERLY, 20.49 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 03°49'20" TO WHICH A RADIAL LINE BEARS NORTH 63°11'57" EAST, SAME BEING THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHEASTERLY HAVING A RADIUS OF 59.75 FEET, A RADIAL LINE TO SAID BEGINNING BEARS SOUTH 63°01'26" WEST; THENCE NORTHEASTERLY, 76.00 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 72°52'50" TO WHICH A RADIAL LINE BEARS NORTH 44°05'44" WEST; THENCE NORTH 52°51'59" EAST, 16.94 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 1158.00 FEET, A RADIAL LINE TO SAID BEGINNING BEARS NORTH 52°01'53" EAST; THENCE SOUTHEASTERLY, 274.26 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 13°34'12"; THENCE SOUTH 24°23'55" EAST, 389.97 FEET TO THE BEGINNING OF A CURVE CONCAVE NORTHEASTERLY HAVING A RADIUS OF 594.00 FEET;

LEGAL DESCRIPTION CONTINUED – DETENTION BASIN DRAINAGE EASEMENT  
February 25, 2021  
APN: 137-22-301-006  
PAGE 5 OF 15

THENCE SOUTHEASTERLY, 57.51 FEET ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 05°32'51" TO WHICH A RADIAL LINE BEARS SOUTH 60°03'14" WEST, SAME BEING THE POINT OF BEGINNING, AS SHOWN ON THE "EXHIBIT TO ACCOMPANY LEGAL DESCRIPTION" ATTACHED HERETO AND BY REFERENCE MADE A PART HEREOF.

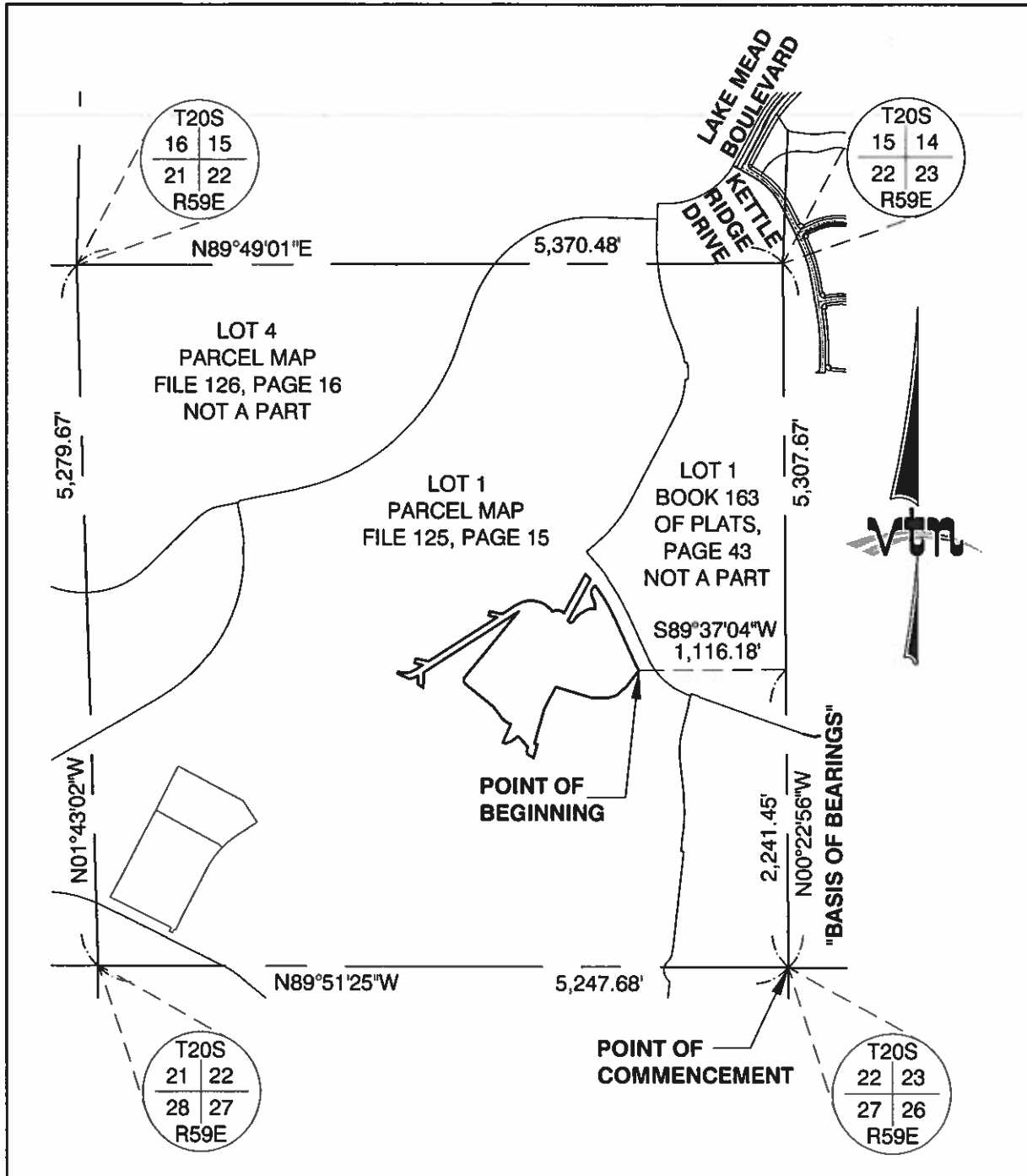
CONTAINING 20.53 ACRES, MORE OR LESS, AS DETERMINED BY COMPUTER METHODS.

**BASIS OF BEARINGS**

NORTH 00°22'56" WEST - BEING THE BEARING OF THE EAST LINE OF SECTION 22, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS SHOWN ON THAT CERTAIN PARCEL MAP ON FILE IN THE OFFICE OF THE COUNTY RECORDER, CLARK COUNTY, NEVADA, IN FILE 125 OF PARCEL MAPS, AT PAGE 15.


END OF DESCRIPTION.

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DETENTION BASIN.DOC  
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DETENTION BASIN.dwg (DET BSN01)



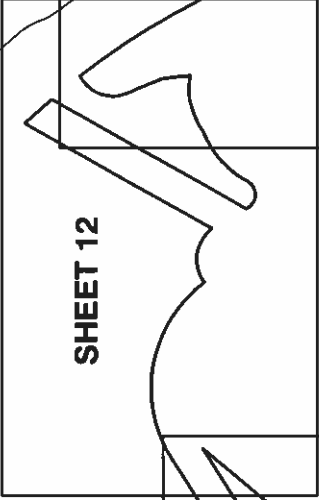
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 2727 SOUTH RAINBOW BOULEVARD LAS VEGAS, NV 89146-5148	<b>EXHIBIT TO ACCOMPANY          LEGAL DESCRIPTION</b>	SCALE	HORZ. 1"=1200'
			VERT.
		W.O. NO.	7809
		DRAWN BY:	TJ
		DATE:	02/2021
	<b>DETENTION BASIN          DRAINAGE EASEMENT</b>		SHEET <b>6</b> OF 15

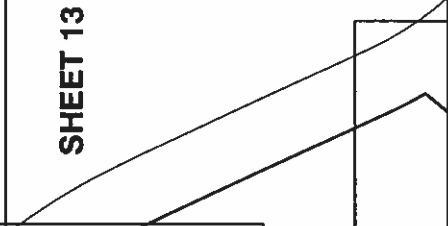


LOT 1  
PARCEL MAP  
FILE 125, PAGE 15



SHEET 12

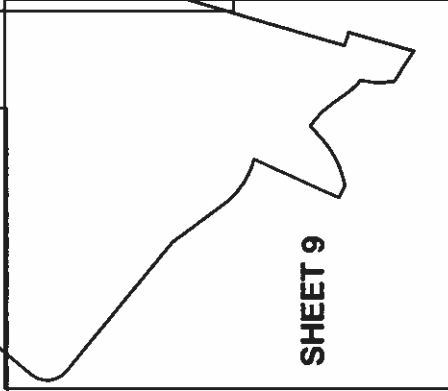
SHEET 10



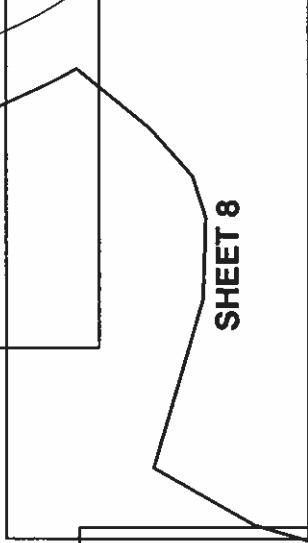
SHEET 13



SHEET 11



SHEET 9



SHEET 8

LOT 1  
PARCEL MAP  
FILE 125, PAGE 15

LOT 1  
PARCEL MAP  
FILE 125, PAGE 15

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**EXHIBIT TO ACCOMPANY LEGAL DESCRIPTION  
DETENTION BASIN DRAINAGE EASEMENT**

W.O. #: 7809

DATE: 02/2021

BY: TJ

SCALE: 1" = 300'

SHEET 7 OF 15

FOR CONTINUATION SEE SHEET 13

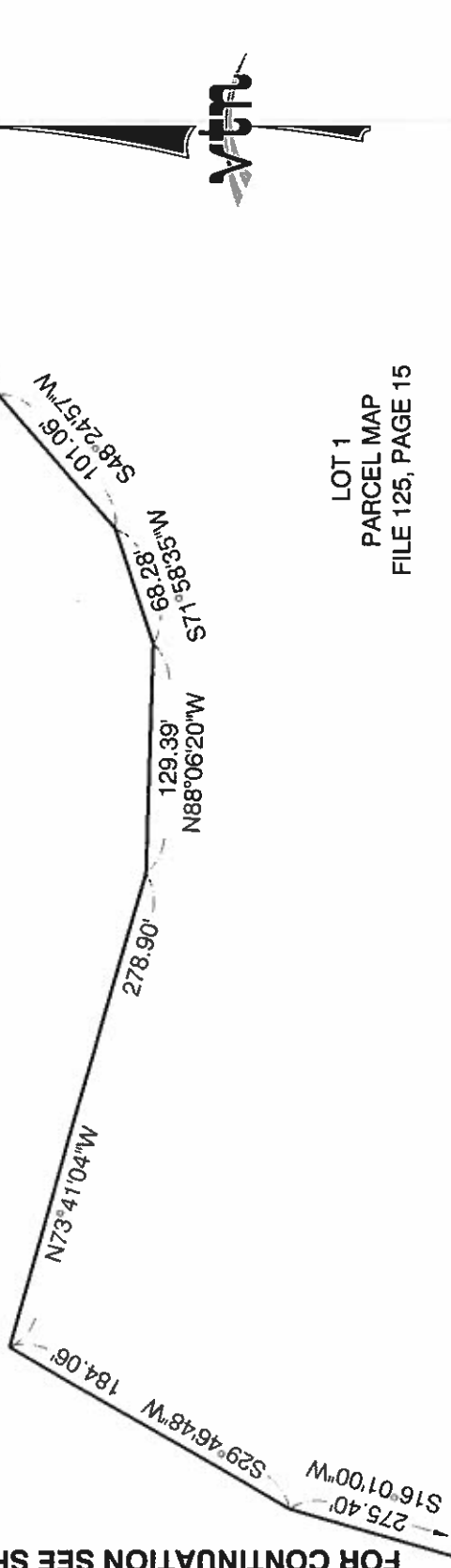
POINT OF BEGINNING

LOT 1  
PARCEL MAP  
FILE 125, PAGE 15

FOR CONTINUATION SEE SHEET 9



LOT 1  
PARCEL MAP  
FILE 125, PAGE 15



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W.O.#: 7809

DATE: 02/2021

BY: TJ

SCALE: 1" = 100'

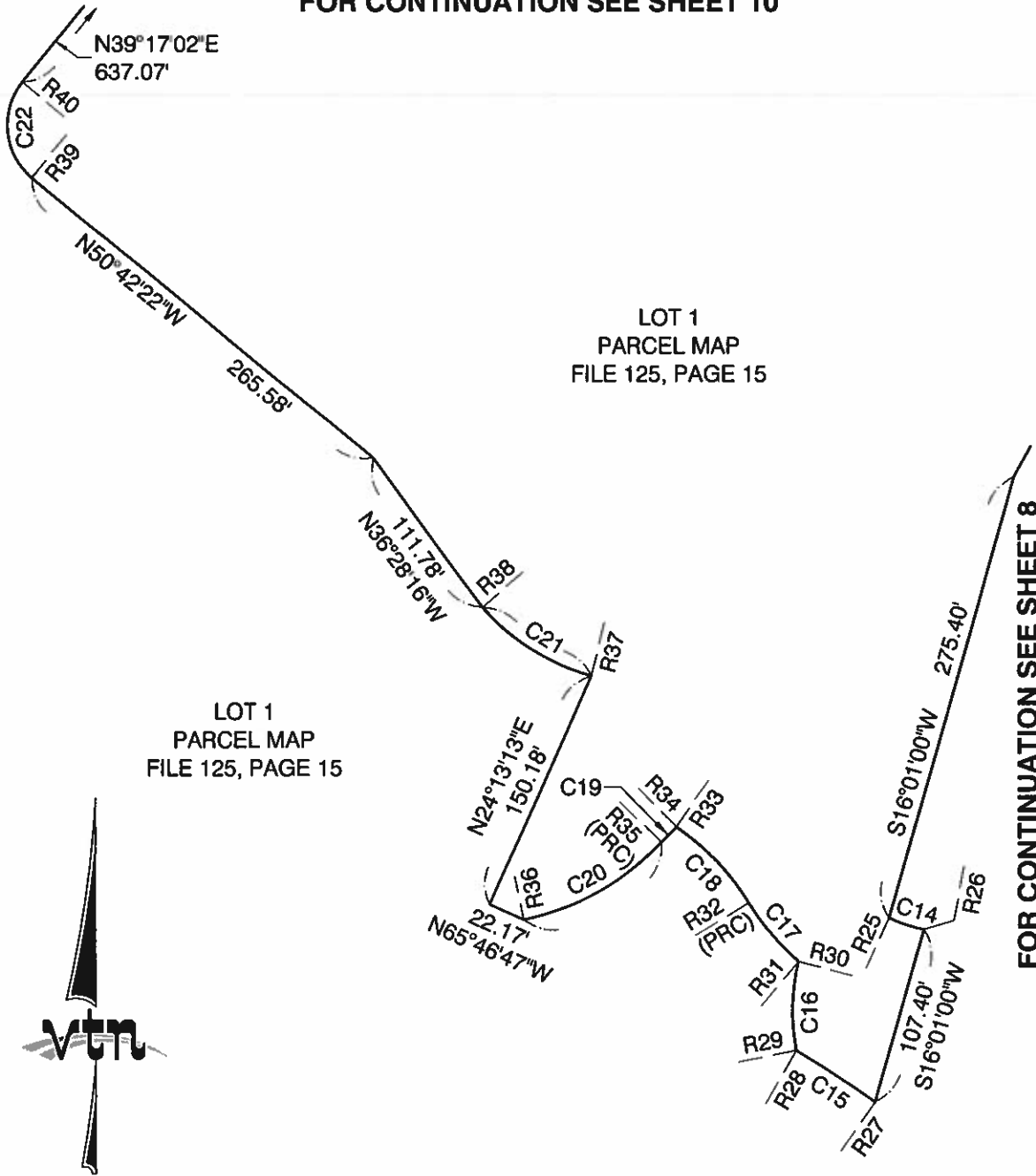
SHEET 8 OF 15

EXHIBIT TO ACCOMPANY LEGAL DESCRIPTION  
DETENTION BASIN DRAINAGE EASEMENT



2727 SOUTH RAINBOW BOULEVARD  
LAS VEGAS, NV 89146-5148

FOR CONTINUATION SEE SHEET 10



LOT 1  
PARCEL MAP  
FILE 125, PAGE 15

LOT 1  
PARCEL MAP  
FILE 125, PAGE 15



FOR CONTINUATION SEE SHEET 8

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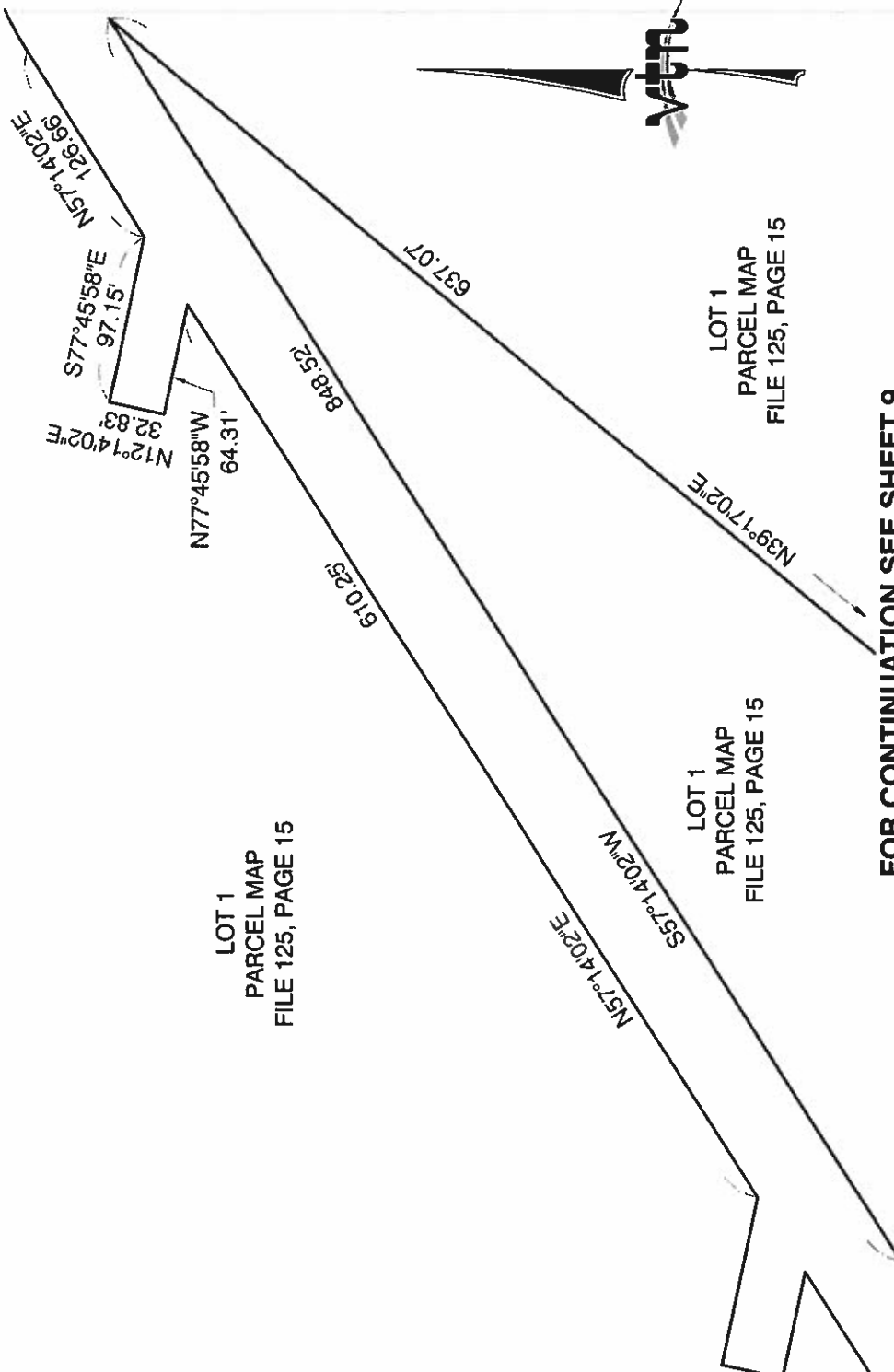


EXHIBIT TO ACCOMPANY  
LEGAL DESCRIPTION

DETENTION BASIN  
DRAINAGE EASEMENT

SCALE	HORZ.	1"= 100'
	VERT.	
W.O. NO.	7809	
DRAWN BY:	TJ	
DATE:	02/2021	
SHEET	9	OF 15

FOR CONTINUATION SEE SHEET 12



FOR CONTINUATION SEE SHEET 11

FOR CONTINUATION SEE SHEET 9

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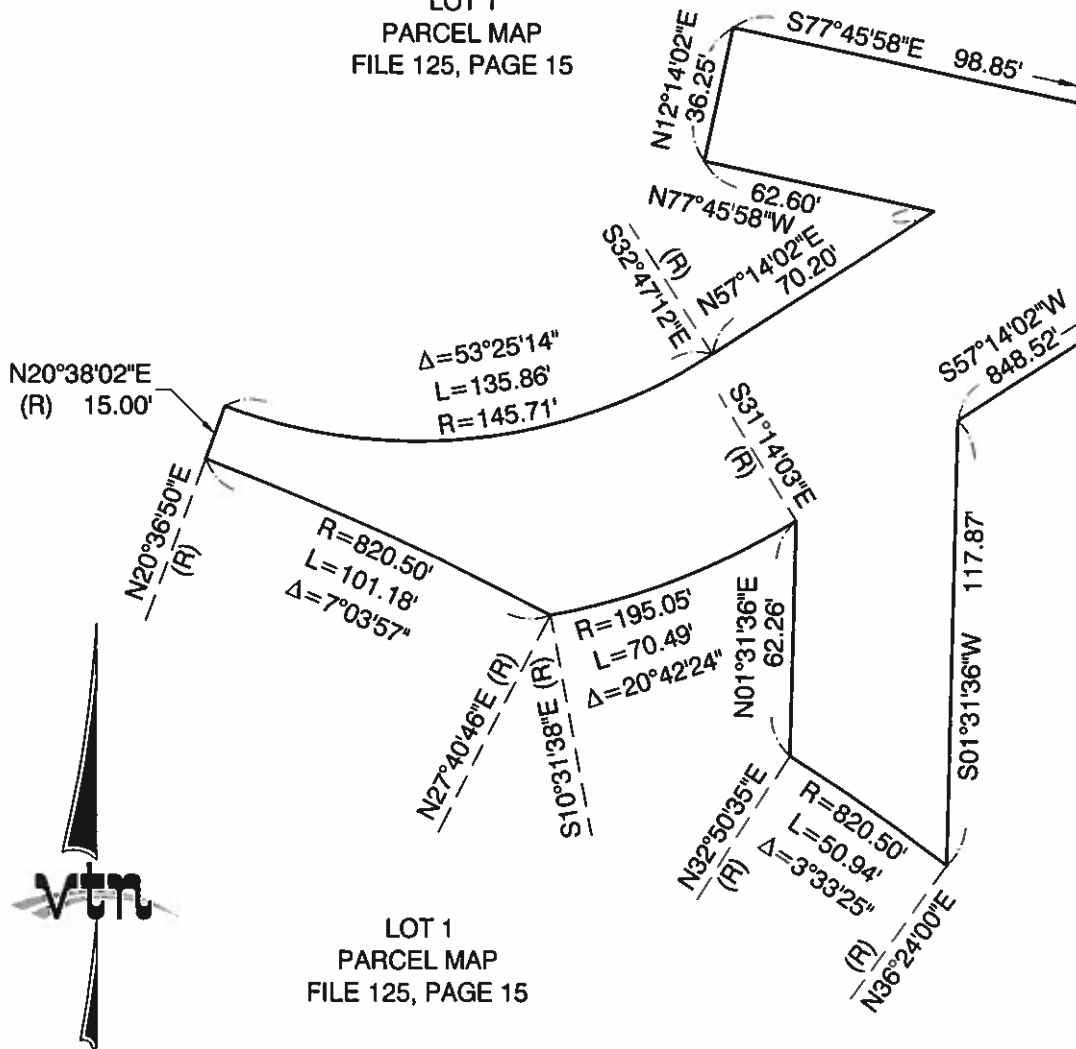
W.O.#:	7809
DATE:	02/2021
BY:	TJ
SCALE:	1"= 100'
SHEET	10 OF 15

EXHIBIT TO ACCOMPANY LEGAL DESCRIPTION  
DETENTION BASIN DRAINAGE EASEMENT



2727 SOUTH RAINBOW BOULEVARD  
LAS VEGAS, NV 89146-5148


LOT 1  
PARCEL MAP  
FILE 125, PAGE 15



FOR CONTINUATION SEE SHEET 10

LOT 1  
PARCEL MAP  
FILE 125, PAGE 15

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 2727 SOUTH RAINBOW BOULEVARD LAS VEGAS, NV 89146-5148	<b>EXHIBIT TO ACCOMPANY LEGAL DESCRIPTION</b>	SCALE	HORZ. 1" = 50'
			VERT.
		W.O. NO.	7809
		DRAWN BY:	TJ
		DATE:	02/2021
<b>DETENTION BASIN DRAINAGE EASEMENT</b>	SHEET <b>11</b> OF 15		



FOR CONTINUATION SEE SHEET 12

FOR CONTINUATION SEE SHEET 12

LOT 1  
BOOK 163 OF PLATS,  
PAGE 43  
NOT A PART

LOT 1  
PARCEL MAP  
FILE 125, PAGE 15



$\Delta = 13^{\circ}34'12''$   
 $L = 274.26'$   
 $R = 1158.00'$

$S24^{\circ}23'55''E$

389.97'

$R = 594.00'$   
 $L = 57.51'$   
 $\Delta = 5^{\circ}32'51''$   
 $S60^{\circ}03'14''W$   
(R)

FOR CONTINUATION SEE SHEET 8

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EXHIBIT TO ACCOMPANY  
LEGAL DESCRIPTION

DETENTION BASIN  
DRAINAGE EASEMENT

SCALE    HORZ. 1" = 100'  
          VERT.

W.O. NO.            7809

DRAWN BY:        TJ

DATE:              02/2021

SHEET **13** OF 15

CURVE TABLE				
CURVE	RADIUS	DELTA	LENGTH	TANGENT
C1	60.00'	69°26'34"	72.72'	41.58'
C2	108.00'	12°35'38"	23.74'	11.92'
C3	1158.00'	0°03'53"	1.31'	0.65'
C4	24.00'	130°26'45"	54.64'	52.00'
C5	155.27'	14°27'01"	39.16'	19.68'
C6	156.08'	25°24'13"	69.20'	35.18'
C7	150.34'	3°55'11"	10.29'	5.14'
C8	150.34'	20°10'13"	52.93'	26.74'
C9	166.33'	10°34'34"	30.70'	15.40'
C10	681.09'	3°54'02"	46.37'	23.19'
C11	732.30'	2°32'40"	32.52'	16.26'

CURVE TABLE				
CURVE	RADIUS	DELTA	LENGTH	TANGENT
C12	307.12'	3°49'20"	20.49'	10.25'
C13	59.75'	72°52'50"	76.00'	44.12'
C14	94.00'	13°26'54"	22.06'	11.08'
C15	675.50'	4°51'05"	57.20'	28.62'
C16	123.26'	24°57'18"	53.69'	27.28'
C17	146.00'	18°10'42"	46.32'	23.36'
C18	152.00'	23°47'23"	63.11'	32.02'
C19	454.00'	1°37'38"	12.89'	6.45'
C20	161.00'	34°47'34"	97.77'	50.44'
C21	131.43'	34°08'18"	78.31'	40.35'
C22	41.09'	89°45'17"	64.37'	40.91'

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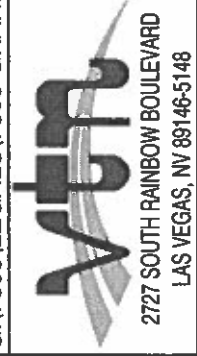


EXHIBIT TO ACCOMPANY LEGAL DESCRIPTION  
DETENTION BASIN DRAINAGE EASEMENT

W.O.#: 7809

DATE: 02/2021

BY: TJ

SCALE: NTS

SHEET 14 OF 15

### RADIAL LINE TABLE

NO.	BEARING
R1	N49°11'21"E
R2	S68°03'31"W
R3	S62°23'13"E
R4	N62°24'18"W
R5	N47°57'17"W
R6	N48°00'22"W
R7	N22°36'08"W
R8	N33°29'13"W
R9	N29°34'02"W
R10	N9°23'49"W
R11	N1°01'30"W
R12	N9°33'04"E
R13	N85°57'21"E
R14	N82°03'18"E
R15	N68°11'44"E
R16	N65°39'04"E
R17	N67°01'17"E
R18	N63°11'57"E
R19	S63°01'26"W
R20	N44°05'44"W

### RADIAL LINE TABLE

NO.	BEARING
R21	N52°01'53"E
R22	N44°37'50"E
R23	N32°02'12"E
R24	N37°24'22"W
R25	S24°40'59"W
R26	S11°14'06"W
R27	N35°08'36"E
R28	N30°17'31"E
R29	S79°11'20"W
R30	N75°51'23"W
R31	S40°20'20"W
R32	N58°31'03"E
R33	N34°43'40"E
R34	N44°30'32"W
R35	S46°08'10"E
R36	S11°20'36"E
R37	S15°02'06"W
R38	S49°10'24"W
R39	S39°24'23"W
R40	N50°50'20"W

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**EXHIBIT TO ACCOMPANY  
LEGAL DESCRIPTION**

**DETENTION BASIN  
DRAINAGE EASEMENT**

SCALE	HORZ. NTS
	VERT.
W.O. NO.	7809
DRAWN BY:	TJ
DATE:	02/2021
SHEET <b>15</b> OF 15	

# Parcel Map Check Report

**Client:****Prepared by:**

VTN

2727 S. Rainbow Blvd.

Las Vegas, Nv. 89146

Date: 2/23/2021 1:21:14 PM

Parcel Name: DET BASIN01 - :1

Description:

Process segment order counterclockwise: False

Enable mapcheck across chord: False

North: 1,292,511.8781'

East: 869,274.8410'

Segment# 1: Line

Course: S38°21'46"W

Length: 152.42'

North: 1,292,392.3660'

East: 869,180.2433'

Segment# 2: Line

Course: S48°24'57"W

Length: 101.06'

North: 1,292,325.2905'

East: 869,104.6523'

Segment# 3: Line

Course: S71°58'35"W

Length: 68.28'

North: 1,292,304.1641'

East: 869,039.7228'

Segment# 4: Line

Course: N88°06'20"W

Length: 129.39'

North: 1,292,308.4415'

East: 868,910.4035'

Segment# 5: Line

Course: N73°41'04"W

Length: 278.90'

North: 1,292,386.7921'

East: 868,642.7351'

Segment# 6: Line

Course: S29°46'48"W

Length: 184.06'

North: 1,292,227.0393'

East: 868,551.3178'

Segment# 7: Line

Course: S16°01'00"W

Length: 275.40'

North: 1,291,962.3299'

East: 868,475.3303'

Segment# 8: Curve

Length: 22.06'

Radius: 94.00'

Delta: 13°26'54"  
 Chord: 22.01'  
 Course In: N24°40'59"E  
 RP North: 1,292,047.7413'  
 End North: 1,291,955.5427'

Tangent: 11.08'  
 Course: S72°02'27"E  
 Course Out: S11°14'06"W  
 East: 868,514.5846'  
 East: 868,496.2702'

## Segment# 9: Line

Course: S16°01'00"W  
 North: 1,291,852.3118'

Length: 107.40'  
 East: 868,466.6367'

## Segment# 10: Curve

Length: 57.20'  
 Delta: 4°51'05"  
 Chord: 57.18'  
 Course In: S35°08'36"W  
 RP North: 1,291,299.9456'  
 End North: 1,291,883.2172'

Radius: 675.50'  
 Tangent: 28.62'  
 Course: N57°16'56"W  
 Course Out: N30°17'31"E  
 East: 868,077.8028'  
 East: 868,418.5292'

## Segment# 11: Curve

Length: 53.69'  
 Delta: 24°57'18"  
 Chord: 53.26'  
 Course In: N79°11'20"E  
 RP North: 1,291,906.3373'  
 End North: 1,291,936.4563'

Radius: 123.26'  
 Tangent: 27.28'  
 Course: N1°39'58"E  
 Course Out: N75°51'23"W  
 East: 868,539.6015'  
 East: 868,420.0779'

## Segment# 12: Curve

Length: 46.32'  
 Delta: 18°10'42"  
 Chord: 46.13'  
 Course In: N40°20'20"E  
 RP North: 1,292,047.7417'  
 End North: 1,291,971.4950'

Radius: 146.00'  
 Tangent: 23.36'  
 Course: N40°34'19"W  
 Course Out: S58°31'03"W  
 East: 868,514.5848'  
 East: 868,390.0760'

## Segment# 13: Curve

Length: 63.11'  
 Delta: 23°47'23"  
 Chord: 62.66'  
 Course In: S58°31'03"W  
 RP North: 1,291,892.1148'  
 End North: 1,292,017.0387'

Radius: 152.00'  
 Tangent: 32.02'  
 Course: N43°22'39"W  
 Course Out: N34°43'40"E  
 East: 868,260.4505'  
 East: 868,347.0415'

## Segment# 14: Curve

Length: 12.89'

Radius: 454.00'

Delta: 1°37'38"  
 Chord: 12.89'  
 Course In: S44°30'32"E  
 RP North: 1,291,693.2724'  
 End North: 1,292,007.8705'

Tangent: 6.45'  
 Course: S44°40'39"W  
 Course Out: N46°08'10"W  
 East: 868,665.3046'  
 East: 868,337.9760'

## Segment# 15: Curve

Length: 97.77'  
 Delta: 34°47'34"  
 Chord: 96.27'  
 Course In: N46°08'10"W  
 RP North: 1,292,119.4351'  
 End North: 1,291,961.5801'

Radius: 161.00'  
 Tangent: 50.44'  
 Course: S61°15'37"W  
 Course Out: S11°20'36"E  
 East: 868,221.8970'  
 East: 868,253.5637'

## Segment# 16: Line

Course: N65°46'47"W  
 North: 1,291,970.6752'

Length: 22.17'  
 East: 868,233.3452'

## Segment# 17: Line

Course: N24°13'13"E  
 North: 1,292,107.6356'

Length: 150.18'  
 East: 868,294.9559'

## Segment# 18: Curve

Length: 78.31'  
 Delta: 34°08'18"  
 Chord: 77.15'  
 Course In: N15°02'06"E  
 RP North: 1,292,234.5664'  
 End North: 1,292,148.6411'

Radius: 131.43'  
 Tangent: 40.35'  
 Course: N57°53'45"W  
 Course Out: S49°10'24"W  
 East: 868,329.0500'  
 East: 868,229.5982'

## Segment# 19: Line

Course: N36°28'16"W  
 North: 1,292,238.5297'

Length: 111.78'  
 East: 868,163.1542'

## Segment# 20: Line

Course: N50°42'22"W  
 North: 1,292,406.7211'

Length: 265.58'  
 East: 867,957.6198'

## Segment# 21: Curve

Length: 64.37'  
 Delta: 89°45'17"  
 Chord: 57.98'  
 Course In: N39°24'23"E  
 RP North: 1,292,438.4698'

Radius: 41.09'  
 Tangent: 40.91'  
 Course: N5°42'58"W  
 Course Out: N50°50'20"W  
 East: 867,983.7044'

End North: 1,292,464.4182'

East: 867,951.8443'

## Segment# 22: Line

Course: N39°17'02"E

Length: 637.07'

North: 1,292,957.5221'

East: 868,355.2136'

## Segment# 23: Line

Course: S57°14'02"W

Length: 848.52'

North: 1,292,498.2938'

East: 867,641.7043'

## Segment# 24: Line

Course: S1°31'36"W

Length: 117.87'

North: 1,292,380.4656'

East: 867,638.5640'

## Segment# 25: Curve

Length: 50.94'

Radius: 820.50'

Delta: 3°33'25"

Tangent: 25.48'

Chord: 50.93'

Course: N55°22'43"W

Course In: S36°24'00"W

Course Out: N32°50'35"E

RP North: 1,291,720.0502'

East: 867,151.6638'

End North: 1,292,409.4009'

East: 867,596.6535'

## Segment# 26: Line

Course: N1°31'36"E

Length: 62.26'

North: 1,292,471.6388'

East: 867,598.3123'

## Segment# 27: Curve

Length: 70.49'

Radius: 195.05'

Delta: 20°42'24"

Tangent: 35.63'

Chord: 70.11'

Course: S69°07'09"W

Course In: N31°14'03"W

Course Out: S10°31'38"E

RP North: 1,292,638.4174'

East: 867,497.1716'

End North: 1,292,446.6504'

East: 867,532.8078'

## Segment# 28: Curve

Length: 101.18'

Radius: 820.50'

Delta: 7°03'57"

Tangent: 50.66'

Chord: 101.12'

Course: N65°51'12"W

Course In: S27°40'46"W

Course Out: N20°36'50"E

RP North: 1,291,720.0481'

East: 867,151.6655'

End North: 1,292,488.0150'

East: 867,440.5378'

## Segment# 29: Line

Course: N20°38'02"E

Length: 15.00'

North: 1,292,502.0528'

East: 867,445.8237'

## Segment# 30: Curve

Length: 135.86'

Radius: 145.71'

Delta: 53°25'14"

Tangent: 73.32'

Chord: 130.99'

Course: N83°55'25"E

Course In: N20°38'02"E

Course Out: S32°47'12"E

RP North: 1,292,638.4156'

East: 867,497.1712'

End North: 1,292,515.9183'

East: 867,576.0750'

## Segment# 31: Line

Course: N57°14'02"E

Length: 70.20'

North: 1,292,553.9113'

East: 867,635.1053'

## Segment# 32: Line

Course: N77°45'58"W

Length: 62.60'

North: 1,292,567.1765'

East: 867,573.9269'

## Segment# 33: Line

Course: N12°14'02"E

Length: 36.25'

North: 1,292,602.6032'

East: 867,581.6083'

## Segment# 34: Line

Course: S77°45'58"E

Length: 98.85'

North: 1,292,581.6566'

East: 867,678.2135'

## Segment# 35: Line

Course: N57°14'02"E

Length: 610.25'

North: 1,292,911.9306'

East: 868,191.3647'

## Segment# 36: Line

Course: N77°45'58"W

Length: 64.31'

North: 1,292,925.5581'

East: 868,128.5152'

## Segment# 37: Line

Course: N12°14'02"E

Length: 32.83'

North: 1,292,957.6425'

East: 868,135.4719'

## Segment# 38: Line

Course: S77°45'58"E

Length: 97.15'

North: 1,292,937.0562'

East: 868,230.4157'

## Segment# 39: Line

Course: N57°14'02"E

Length: 126.66'

North: 1,293,005.6060'

East: 868,336.9225'

## Segment# 40: Curve

Length: 314.76'

Radius: 210.18'

Delta: 85°48'20"

Tangent: 195.33'

Chord: 286.16'

Course: S79°51'49"E

Course In: S32°45'58"E

Course Out: N53°02'21"E

RP North: 1,292,828.8684'

East: 868,450.6742'

End North: 1,292,955.2431'

East: 868,618.6178'

## Segment# 41: Curve

Length: 72.72'

Radius: 60.00'

Delta: 69°26'34"

Tangent: 41.58'

Chord: 68.35'

Course: N87°18'55"E

Course In: S37°24'22"E

Course Out: N32°02'12"E

RP North: 1,292,907.5821'

East: 868,655.0655'

End North: 1,292,958.4446'

East: 868,686.8932'

## Segment# 42: Curve

Length: 23.74'

Radius: 108.00'

Delta: 12°35'38"

Tangent: 11.92'

Chord: 23.69'

Course: S51°39'59"E

Course In: S32°02'12"W

Course Out: N44°37'50"E

RP North: 1,292,866.8921'

East: 868,629.6033'

End North: 1,292,943.7504'

East: 868,705.4768'

## Segment# 43: Line

Course: N29°15'16"E

Length: 339.92'

North: 1,293,240.3164'

East: 868,871.5919'

## Segment# 44: Line

Course: S40°52'32"E

Length: 56.46'

North: 1,293,197.6251'

East: 868,908.5404'

## Segment# 45: Curve

Length: 1.31'

Radius: 1,158.00'

Delta: 0°03'53"

Tangent: 0.65'

Chord: 1.31'

Course: S40°50'35"E

Course In: S49°07'28"W

Course Out: N49°11'21"E

RP North: 1,292,439.8088'

East: 868,032.9387'

End North: 1,293,196.6355'

East: 868,909.3959'

## Segment# 46: Line

Course: S29°15'16"W

Length: 354.70'

North: 1,292,887.1747'

East: 868,736.0579'

## Segment# 47: Curve

Length: 54.64'

Radius: 24.00'

Delta: 130°26'45"

Tangent: 52.00'

Chord: 43.58'

Course: S87°09'51"E

Course In: N68°03'31"E

Course Out: S62°23'13"E

RP North: 1,292,896.1424'

East: 868,758.3195'

End North: 1,292,885.0185'

East: 868,779.5859'

## Segment# 48: Curve

Length: 39.16'

Radius: 155.27'

Delta: 14°27'01"

Tangent: 19.68'

Chord: 39.06'

Course: N34°49'13"E

Course In: S62°24'18"E

Course Out: N47°57'17"W

RP North: 1,292,813.0945'

East: 868,917.1930'

End North: 1,292,917.0816'

East: 868,801.8870'

## Segment# 49: Curve

Length: 69.20'

Radius: 156.08'

Delta: 25°24'13"

Tangent: 35.18'

Chord: 68.64'

Course: N54°41'45"E

Course In: S48°00'22"E

Course Out: N22°36'08"W

RP North: 1,292,812.6561'

East: 868,917.8882'

End North: 1,292,956.7484'

East: 868,857.9018'

## Segment# 50: Curve

Length: 10.29'

Radius: 150.34'

Delta: 3°55'11"

Tangent: 5.14'

Chord: 10.28'

Course: N58°28'23"E

Course In: S33°29'13"E

Course Out: N29°34'02"W

RP North: 1,292,831.3631'

East: 868,940.8514'

End North: 1,292,962.1254'

East: 868,866.6670'

## Segment# 51: Curve

Length: 52.93'

Radius: 150.34'

Delta: 20°10'13"

Tangent: 26.74'

Chord: 52.65'

Course: N70°31'05"E

Course In: S29°34'02"E

Course Out: N9°23'49"W

RP North: 1,292,831.3631'

East: 868,940.8514'

End North: 1,292,979.6856'

East: 868,916.3049'

## Segment# 52: Curve

Length: 30.70'

Radius: 166.33'

Delta: 10°34'34"  
 Chord: 30.66'  
 Course In: S1°01'30"E  
 RP North: 1,292,813.3823'  
 End North: 1,292,977.4066'

Tangent: 15.40'  
 Course: S85°44'13"E  
 Course Out: N9°33'04"E  
 East: 868,919.2804'  
 East: 868,946.8790'

## Segment# 53: Curve

Length: 46.37'  
 Delta: 3°54'02"  
 Chord: 46.36'  
 Course In: S85°57'21"W  
 RP North: 1,292,929.3724'  
 End North: 1,293,023.5144'

Radius: 681.09'  
 Tangent: 23.19'  
 Course: N5°59'40"W  
 Course Out: N82°03'18"E  
 East: 868,267.4850'  
 East: 868,942.0373'

## Segment# 54: Curve

Length: 32.52'  
 Delta: 2°32'40"  
 Chord: 32.52'  
 Course In: S68°11'44"W  
 RP North: 1,292,751.5089'  
 End North: 1,293,053.4303'

Radius: 732.30'  
 Tangent: 16.26'  
 Course: N23°04'36"W  
 Course Out: N65°39'04"E  
 East: 868,262.1283'  
 East: 868,929.2915'

## Segment# 55: Curve

Length: 20.49'  
 Delta: 3°49'20"  
 Chord: 20.48'  
 Course In: S67°01'17"W  
 RP North: 1,292,933.5345'  
 End North: 1,293,072.0120'

Radius: 307.12'  
 Tangent: 10.25'  
 Course: N24°53'23"W  
 Course Out: N63°11'57"E  
 East: 868,646.5413'  
 East: 868,920.6702'

## Segment# 56: Curve

Length: 76.00'  
 Delta: 72°52'50"  
 Chord: 70.98'  
 Course In: N63°01'26"E  
 RP North: 1,293,099.1157'  
 End North: 1,293,142.0270'

Radius: 59.75'  
 Tangent: 44.12'  
 Course: N9°27'51"E  
 Course Out: N44°05'44"W  
 East: 868,973.9192'  
 East: 868,932.3417'

## Segment# 57: Line

Course: N52°51'59"E  
 North: 1,293,152.2533'

Length: 16.94'  
 East: 868,945.8468'

## Segment# 58: Curve

Length: 274.26'

Radius: 1,158.00'

Delta: 13°34'12"  
Chord: 273.62'  
Course In: S52°01'53"W  
RP North: 1,292,439.8173'  
End North: 1,292,918.1667'

Tangent: 137.77'  
Course: S31°11'01"E  
Course Out: N65°36'05"E  
East: 868,032.9399'  
East: 869,087.5232'

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**Segment# 59: Line**

Course: S24°23'55"E  
North: 1,292,563.0235'

Length: 389.97'  
East: 869,248.6129'

**Segment# 60: Curve**

Length: 57.51'  
Delta: 5°32'51"  
Chord: 57.49'  
Course In: N65°36'05"E  
RP North: 1,292,808.3944'  
End North: 1,292,511.8783'

Radius: 594.00'  
Tangent: 28.78'  
Course: S27°10'21"E  
Course Out: S60°03'14"W  
East: 869,789.5649'  
East: 869,274.8667'

Perimeter: 7,915.22'  
Error Closure: 0.0257  
Error North : 0.00025

Area: 894,408.10Sq.Ft.  
Course: N89°26'07"E  
East: 0.02573

Precision 1: 307,985.21

# **APPROVAL LETTER**

<b>CITY OF LAS VEGAS</b>		<b>DATE:</b>
<b>INTER-OFFICE MEMORANDUM</b>		February 17, 2021
<b>TO:</b> Land Development Services Department of Building & Safety		<b>FROM:</b> Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
<b>SUBJECT:</b>	Drainage Study for:	<b>COPIES TO:</b>
	<b>Summerlin West Grand Park Detention Basin</b>	VTN Nevada
<b>Cross Streets:</b>	I-215 and Summerlin Parkway	The Howard Hughes Corporation
<b>File Number:</b>	F:\Depot\DSMemos\DS5163F.doc	Bart Anderson, P.E., DevCo
<b>Parcel Number:</b>	137-22-301-001	CCRFCFCD
<b>Zoning Action:</b>		
<b>FEMA Flood Zone</b>	YES NO <b>X</b>	
<b>Proposed Storm Drain</b>	YES <b>X</b> NO	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 <sup>st</sup> Submittal	7/25/2019 & 7/31/2019	11/21/2019	Not Approved	\$400.00	3502046: \$400
2 <sup>nd</sup> Submittal & Supplemental	02/11/2020 & 3/23/2020	03/11/2020 & 3/26/2020	Not Approved	\$400.00	3741271: \$400
3 <sup>rd</sup> Submittal	6/8/2020	6/23/2020	Conditional Approval	\$400.00	3876719: \$400
CCRFCFCD	7/16/2020 & 8/12/2020	8/12/2020	Concurrence Recv'd	N/C	N/C
4 <sup>th</sup> Submittal	8/26/2020	9/3/2020	Conditionally Approved	\$100.00	3969487: \$100
CCRFCFCD & State Dam	1/25/2021	2/17/2021	See Comments Below	N/C	N/C
<b>TOTAL FEES (LDDRS):</b>				<b>\$1,300.00</b>	<b>----</b>

**REMARKS:**

**4<sup>th</sup> Submittal addressed State Dam Safety Comments. Minor changes to PMF Spillway flow and configuration.**

**3<sup>rd</sup> Submittal addressed CCRFCFCD Comments and minor Detention Basin changes.** Flood Control previously gave Conditional Approval of the rough grade excavation of the detention basin as a part of overall Mass Grading.

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

<b>X</b>	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is conditionally approved subject to Clark County Public Works Department concurrence.
	is conditionally approved subject to State of Nevada, Division of Water Resources, Dam Safety concurrence.

The following comments are repeated until they are complete:

1. The *Grand Park Detention Basin* plans include interim improvements. These interim improvements are to reduce interim flow impacts while the associated Village Infrastructure improvements are completed. The detention basin facilities shall be maintained by the Master Developer until such time as the Ultimate Detention Basin facility is complete and accepted by the City for maintenance purposes.
2. Flood Control supports the Mass Grading concept with the understanding that these are interim improvements and are the responsibility of the Master Developer. Mass Grading shall not place any fill material in the proposed embankment area of the detention basin. State Dam Safety Permit approval is required prior to any other detention basin work.
3. Flood Control understands that the Grand Park Detention Basin will ultimately be part of a dedicated Public Park. In the interim the Detention Basin shall be dedicated as a Public Drainage Easement. Maintenance requirements of the detention basin facility are based upon basin functionality and shall not include the associated park/aesthetic improvements including proposed vegetation.
4. Provide a Drainage Easement Exhibit with accompanying legal description for Flood Control approval prior to final approval of the Improvement Plans for all facilities located outside of existing right-of-way. Coordinate easement with on-going site mapping that may include the dedication of the park parcel.
5. The proposed Grand Park Detention Basin has been approved by the *State of Nevada, Division of Water Resources Dam Safety (DWR)* with Permit Approval NV10952, J-776.
6. This detention basin serves as a Multi-Use facility and the Park improvements shall comply with Section 304.8 of the CCRFCD Design Manual.
7. A Technical Drainage Study shall be required for the Park Improvements and needs to address the proposed park improvements and any park storm drain improvements
8. Verify and update quantity estimate of all drainage improvements within Public Drainage Easements. All proposed improvements associated with the project shall be bonded and inspected. This project, as an MPU facility, shall require that the inspection personnel be approved by the City. The project shall also require Special Inspection. Coordinate the requirements of and the Agreements needed for Special Inspection with the Building Department.
9. The project proposes to build a temporary drainage facility as a part of the interim drainage facilities for the *Grand Park Detention Basin*. Prior to final plan approval, the developer must complete a maintenance and liability agreement for the interim drainage improvements and post a minimum maintenance bond of \$100,000 or 50-percent of the construction cost for the improvements, whichever is greater. The engineer must submit an estimate of quantities for constructing the facility and an 8.5-inch by 11-inch exhibit that adequately shows the location and limits of the drainage facility to Flood Control for approval. Once the drainage study is conditionally approved, the engineer should contact the City's Land Development Section (229-6371) to begin the agreement process. In order for the maintenance bond to be released in the future, a drainage update/letter will be required to justify that the interim facility is no longer necessary and can be removed once the Ultimate Drainage Facilities are completed.
10. The Detention Basin is designed with 4:1 max slopes.
11. The Detention Basin performance curve tables have been included with the Improvement plans.
12. The approved Detention Basin Water Surface Elevations (WSE) are as follows:
  - 10-Year WSE = 3520.36
  - 25-Year WSE = 3523.38
  - 100-Year WSE = 3530.95
  - Spillway Elevation = 3532.0
  - Embankment Crest Elevation of 3535.0

The following are comments pertaining to the subject site specific drainage study and grading plans:

13. Revise the Inlet Structure Details 1/S1 with B/S2. The wall height needs to be expanded to accommodate support plate and have adequate clearance from wall extension to the tie connection into the RCB. This will also affect the trash gate details. Revise plans accordingly.
14. Detail H/DT1 needs to be revised at the downstream section adjacent to the roadway. Add a Construction Note that the concrete taper shall be extended to the curb with the Future Roadway Improvements to prevent roadway being undermined.
15. Provide structural details for the removable Steel Stop Logs that include support details within the concrete walls. The structural details can be covered in the Specs based upon the propriety usage of the Manufacturer. The Specs shall require stamped shop drawings with calculations that must be structurally approved by the City (Building Dept. & Flood Control) prior to construction. The provided Specs need to be updated.
16. Revise the Articulated Concrete Block (ACB) details on Sheets DT1 and DT3 to show the 4,500 psi concrete at terminations and angle mat connections. Remove "grout, or other" from the ACB Details and Sections.
17. The Concept RCB Details on Sheet DT5 (V and W) show the required sacrificial concrete and specify the 6,000 psi concrete. Detail V, includes 3" sacrificial with grooves and corrugated sidewalls. Verify that this information is shown on the Structural Details.
18. For segments of the Main Line RCB's with velocities between 25 and 35 feet per second, 6000-psi concrete with 2-inch additional (sacrificial) thickness is required. For segments of pipe with velocities in excess of 35 feet per second, added mitigation to reduce long term impacts is required. A Construction Note has been added to each of the Grading Plans and the Plan and Profile Sheets that calls out the special construction requirement for the minimum 6,000 psi concrete with the additional sacrificial concrete based upon the velocity.
19. Provide details and sections for the RCB's to clearly show the velocity mitigation (6,000 psi concrete, additional sacrificial concrete, and grooves) measures. Provide a note for Pre-Cast RCB's that require Shop Drawings that detail the minimum 6,000 psi concrete, dimension the additional sacrificial concrete, and grooves.
20. Revise the XS-Sheets and the GR-Sheets to reflect the correct 10, 25, and 100 year WSE's. Verify that the elevations are correctly referenced to match the approved elevations (see comment #13).

**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/PBJ

T/R/S: T20S/R59E/S22  
AREA K-22