DS #: 5379

APN: 139-21-510-001 thru 004

PROJECT: Good Cluck West

SUBMITTAL: 1st

SCANNED BY/DATE:

CHECKED BY/DATE:

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: November 16, 2020
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: **Good Cluck West**			**COPIES TO:** Baughman & Turner, Inc.
Cross Streets:	SEC of Martin L. King Blvd. & Carey Ave.			Good Cluck West – Rolando Leal
File Number:	F:\Depot\DSMemos\DS5379A.doc			Bart Anderson, P.E., DevCo
Parcel Number:	139-21-510-001 thru -004			CCRFCD
Zoning Action:	SDR-XXXXX			CNLV
FEMA Flood Zone	YES	NO	X	
Proposed Storm Drain	YES	NO	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	10/26/2020	11/16/2020	See Comments Below	$400.00	4044225: $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 City of North Las Vegas Public Works Department concurrence.

1. Provide a copy of the zoning/planning conditions associated with this site with the next submittal to verify compliance with conditions. *Flood Control* will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the *City Council*). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.

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

   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

3. The subject development is also adjacent to the jurisdiction of the *City of North Las Vegas* to the north of *Carey Avenue*. Obtain concurrence from the *City of North Las Vegas Public Works Department* prior to the final approval of the subject drainage study.

4. The subject development consists of four (4) parcels. Is there a reversionary map to consolidate the parcels into one? Provide evidence for the application of such an action in the next submittal.

5. The anticipated 100-year flow in *Carey Avenue* is above the top of curb and erosive. Provide erosion protection measures behind the sidewalk in *Carey Avenue*. Revise the pertinent cross sections such as C/C2.1, D/C2.1 and G/C2.1 accordingly.

6. The proposed BMP landscape swales (d_{50} =3") along *Carey Avenue* will not sustain the flow velocity during a 100-year flow event. Provide riprap sizing calculation in the next submittal to provide adequate BMP landscape swales.

7. *Detail Section F/C2.1*: Should there be a property wall at the property line to protect the adjacent residential lot? Review and revise accordingly.

In an effort to increase administrative efficiency, for all original and re-submittal packages including updates and the addenda, the City of Las Vegas Public Works Department requires both a hardcopy and a digital copy (PDF) on CD for the drainage study.

A letter sealed and signed by a Nevada registered civil engineer must be included in every submittal certifying documents on the electronic CD matches 100% of the hardcopy submittal. The new submittal requirement is effective on May 1, 2019. If there are any questions regarding these new requirements, please contact Albert Sung in the City Flood Control Section at (702) 229-6541.

Sample Letter to certify CD.pdf

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

END OF REMARKS
ays

T/R/S: T20S/R61E/21
AREA M-21

TECHNICAL DRAINAGE STUDY FOR
GOOD CLUCK
SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST
CITY OF LAS VEGAS, NEVADA

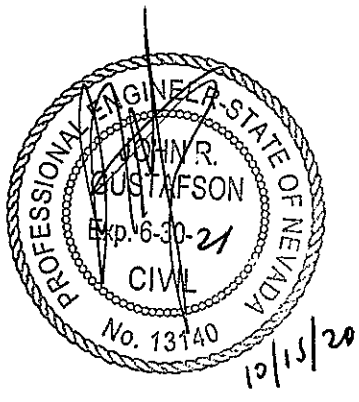
October 13, 2020

PREPARED FOR:

GOOD CLUCK, WEST
1770 NO. BUFFALO DR., #101
LAS VEGAS, NV 89128

PREPARED BY:

BAUGHMAN & TURNER, INC.
1210 HINSON STREET
LAS VEGAS, NEVADA 89102
TEL: (702) 870-8771/FAX: (702) 878-2695



10/15/20

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Good Cluck West - MLK Date: October 15, 2020

Location of Development: a) Descriptive (Cross Streets) North/South: Martin Luther King Road
East/West: Carey Avenue

b) Section: 21 Township: 20 S Range: 61 E

c) APN: 139-21-510-001 through 004

Name of Owner: Good Cluck West attn: Rolando Leal

Telephone No.: (214) 943-9090 Fax No.: E-Mail Address: rleal@lealrs.com

Address 2505 Buddy Owens Ave McAllen, TX 78504

Contact Person-Name: Pamela Pitcher **Telephone No.:** 702-870-8771

***E-Mail Address:** pamp@baughman-turner.com **Fax No.:** 702-878-2695

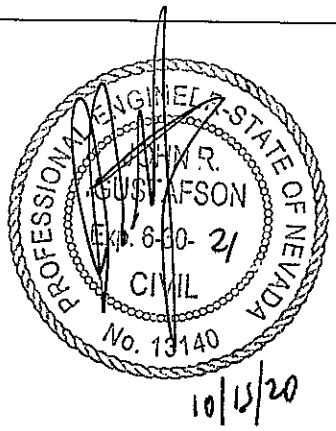
Firm: Baughman & Turner, Inc.

Address: 1210 Hinson Street Las Vegas, NV 89102

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: 1.77 acres Being Developed/Disturbed: 1.77 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.): commercial
5. Approximate upstream land area which drains to the subject site: -/+ 184 acres
6. Has the site drainage been evaluated in the past? ☐ **YES** ☒ **NO** If yes, please identify documentation:
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site:
8. Briefly describe your proposed schedule for the subject project: ASAP



10/15/20

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

Baughman & Turner, Inc.
Consulting Engineers & Land Surveyors

1210 Hinson Street Las Vegas, Nevada 89102-1604
Phone (702) 870-8771~Fax (702) 878-2695

October 15, 2020

City of Las Vegas Flood Control
Attn.: Mr. Albert Sung, PE
2200 N. Rancho Drive
Las Vegas, Nevada 89103

Re: Technical Drainage Study for Good Cluck West - MLK
SEC Martin L King and Carey

Dear Mr. Sung,

This letter certifies that all items provided on the Technical Drainage Study for Good Cluck West – MLK electronic submittal matches 100% the paper version bound into the study.

Respectfully submitted,
Baughman & Turner, Inc.

John Gustafson. PE

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I. INTRODUCTION

This study analyzes the development of the Good Cluck fast food restaurant and their local corporate offices. The development lies at the southeast corner of Carey Avenue and Martin Luther King Boulevard on 1.73 acres. Analysis presented herein was established after first consulting with the CCRFCD's 2018 Master Plan Update, of Las Vegas City Wide Study, FEMA regulations and policies, and the CCRFCD's Hydrologic Criteria and Drainage Design Manual (referred to hereafter as the HCDDM).

II. GENERAL DESCRIPTION

A. Location

The site consists of approximately 1.73 acres of undeveloped land, located at the southeast corner of the intersection of Carey Avenue and Martin Luther King Boulevard. The site is also located in the Northwest Quarter (NW¼) of the Northeast Quarter (NE¼) of Section 21, Township 20 South, Range 61 East, M.D. M., Clark County, Nevada. The property is more particularly described as Assessor Parcel Numbers 139-21-510-001-004, (see Figure 1, Vicinity Map and Figure 2, Assessor's Parcel Map).

B. Property Description

The property is about 1.73 acres of undeveloped land. The proposed site has undeveloped land to the south, the existing retail and a park to the west, a Clark County Community Resource Center to the north and a single family residence to the east. (See Figure 3 and 4, Aerial Map). The site is bordered by Martin L. King Blvd to the west, Carey Avenue to the north and Miller Street to the south. In the existing condition, the property slopes from the northwest to the southeast at about 0.68%.

C. Master Planning Information

The Clark County Regional Flood Control District's (CCRFCD) 2018 Master Plan Update, a comprehensive plan to facilitate construction of regionally significant flood control structures to alleviate flooding in the Las Vegas Valley, shows one existing and one proposed facility bordering the property.

A review of the 2018 CCRFCD's Master Plan Update, Figure F-24, (see Figure 5A and 5B, Flood Control Facilities), indicates that there is one existing and proposed regional facility adjacent to the site bordering the north property line. There is an existing 66" RCP with a design capacity of 340 cfs, identified as LVSR 0070 (Las Vegas Wash – Smoke Ranch). This facility is expected to be replaced in the future by a 10' x 8' RCB with a design capacity of 1086 cfs. This facility is identified as LVSR 0071 (Las Vegas Wash-Smoke Ranch). The proposed development is located at the upstream end of sub-basin LM20-C, as shown on Master Plan Figure W-5, Central Watershed (see Figure 6, Hydrologic Sub-basins).

The 1997 City of Las Vegas' City Wide Hydrology Study Update, Figure H-10, (See Figure

7) indicates that there is about 1025 cfs in the 100-yr storm and 607 cfs in the 10-yr, 6-hour storm event flowing east in Carey Avenue.

Figure F-10, from the same City Wide study indicates that there is an existing regional facility in Carey identified as LVSR 0070, a 66" RCP with a design flow of 441 cfs (See Figure 8.)

D. Floodplain Information

The Flood Insurance Rate Map, Clark County, Nevada, Community Panel No. 32003C 2160 F (effective date November 16, 2011, Revised by LOMR dated 7/30/19), published by the Federal Emergency Management Agency (FEMA), indicates that the site is located in a Zone X. A Zone X is determined to be an area outside the 0.2% annual chance floodplain (see Figure 9a and 9b, Flood Insurance Rate Map).

E. Previous Hydrology Studies

The following approved drainage studies were utilized in preparation of this study. Baughman & Turner, Inc. concurs with the engineering analyses presented in the studies, subject to the modifications discussed in the text of this report.

> Technical Drainage Study for MLK and Carey Avenue Park (Update to Early Childhood Facility), by Lochsa Engineering, dated June, 2007, approved August 9, 2007 (referred to hereafter as the *Park Study*). CLV #DS3614E.

This study was prepared for the park located on the SWC of Martin L King and Carey. The study is an update to two previous studies and discusses and quantifies the flows in Carey Avenue and Martin L King adjacent to the site. Flows from this study will be referenced and added to the HEC-1 analysis manually. See Appendix H for referenced material.

The following studies were reviewed but not specifically referenced:

> Technical Drainage Study Update to Early Childhood Facility for Pearson Park, by S&B Christ Consulting, LLC, dated November 18, 2014, approved March 25, 2015 (referred to hereafter as the *Pearson Park Study*). CLV #DS4711C.

This study was prepared for track and field renovations at the park located on the SWC of Martin L King and Carey. The study is an update to the Park Study and utilizes the previously quantified the flows in Carey Avenue and Martin L King adjacent to the site. See Appendix I.

> Technical Drainage Study Update to MLK and Carey Avenue Park, by Wood Rodgers, dated August 2019, approved September 11, 2019 (referred to hereafter as the *Splash Pad Study*). CLV #DS5180A-REV.

This study was prepared for the park splash pad located on the SWC of Martin L King and Carey. The study is an update to the two previously mentioned studies. See Appendix I.

III. HYDROLOGY

A. Existing Offsite Drainage Conditions

See Figures 10a and 10b, Existing Conditions Map (reference Figures DS-001 & -002) for the following discussion. Offsite flows arrive at the site from northwest of the intersection of Carey and Martin L King. The offsite basin generally extends north to Cheyenne Avenue and west to Simmons Street. This area is partially developed consisting of mostly residential homes on small lots and industrial/commercial parcels. The balance of the upstream area is undeveloped currently. This area, as identified by the 2018 Master Plan, is in sub-basins R2-C and S. Runoff associated with these basins are collected and directed east in Carey Avenue. As quantified by the CLV City Wide study (Figure 7 and 8) and discussed in the approved Park Study, approximately 1025 cfs is currently conveyed east in Carey Avenue at the intersection with Martin L King during a 100-yr, 6-hour storm event. However, there is an existing 66" RCP in Carey Avenue with a capacity of 441 cfs. Therefore, the existing 100-yr surface runoff in Carey Avenue is approximately 584 cfs (1025 – 441 = 584).

Additionally, as discussed in the Park Study, the quantity of flows in Martin L King adjacent to the site was estimated by analyzing the existing retail stores located at the southeast corner of the site, including the street right-of-way width as basin MLK (4/7). Runoff in Martin L King Blvd then combines with flows generated on the Park site "and the combined flow traverses east in Blankenship Avenue" at CMD3. Flows on the west side of Martin L King stay on the west side. Another offsite basin associated with the roadway, MLK, created on the east side of Martin L King adjacent to the site produces about 1 cfs and 2 cfs in the 10 and 100-yr storm event. Flows associated with basin MLK travel south then east in Miller Avenue.

Basin MILL is the full street width of Miller Avenue and runs the length of the proposed development. Basin MILL will generate about 1 and 2 cfs in the minor and major storm event. Runoff associated with MILL travel east in Miller Avenue along with those from Basin MLK for a total of 2 and 3 cfs in Miller Avenue at CP1a.

Table 1 below, and Figure 10, Existing Conditions Map, shows the summary of flows during the 10-year and 100-year storm events.

B. Existing Onsite Drainage Conditions

See Figure 11, Existing On-Site Drainage Basin Map, for existing flow patterns, basin delineation, and peak flow rates for existing onsite drainage conditions. In the existing condition, the site has been analyzed as one basin, EXON1. Basin EXON1 is about 1.73 acres and generates about less than 1 and 1 cfs in the 10- and 100-yr, 6-hour storm

event. Runoff associated with basin EXON1 travel southeast and discharge from the site along the south property line to Miller Avenue. On-site flows combine with those in Miller Avenue at CP1 for a total of 2 and 4 cfs in Miller at the southeast corner of the site.

The existing condition HEC-1 model has been included in Appendix E. Reference study can be found in Appendix I. Table 1 below summarizes the HEC-1 results for the existing conditions.

C. Interim Drainage Condition

In the interim condition, the offsite is the same as the existing condition and is as discussed in Section III.A above (See Figures 12a and 12b for offsite basins (reference Figures DS-003 and -004) and the site is developed. The proposed commercial site has been analyzed as four (4) developed basins, DON1 – DON4 (see Figure 13, Interim Drainage Basin Map). An onsite interim condition HEC-1 model has been included in Appendix F. Table 2 summarizes the HEC-1 results for the interim conditions.

Basins DON1 and DON2 are located along the Carey Avenue frontage and collectively discharge about 2 and 1 cfs in the 100 and 10-yr storm event to Carey Avenue. This runoff travels east in Carey Avenue. On-site flows do not combine with those off-site flows in Carey Avenue due to the time to peak not coinciding.

Basins DON3 and DON4 encompass the majority of the site and runoff associated with these basins travel southeast to exit to Miller Avenue. These basins collectively will generate approximately 3 and 1 cfs in the 100 and 10-yr storm events. Flows are then directed east in Miller and combine with off-site flows at CP1 for a total of 7 and 3 cfs.

D. Future Drainage Conditions

See Figures 14a and 14b, Future Conditions Map (reference Figures DS-005 and -006) for the following discussion. In the future condition, all off-site basin areas are as discussed in the Existing Condition but are now fully developed including the regional facilities. This area, as identified by the 2018 Master Plan, is in sub-basins R2-C and S1-C. Runoff associated with these basins are collected and directed east in Carey Avenue. As quantified by the CLV City Wide study (Figure 7 and 8) and discussed in the approved Park Study, approximately 1025 cfs is currently conveyed east in Carey Avenue at the intersection with Martin L King during a 100-yr, 6-hour storm event. However, the future 10′ x 8′ RCB in Carey Avenue will have a capacity of 1086 cfs. Therefore, the future 10 and 100-yr surface runoff in Carey Avenue is approximately 0 cfs. All other off-site flows are as identified in the Park Study.

E. Compliance with Regulations and Adopted Plans

All design criteria has been established after first consulting with the CCRFCD's 2018 Master Plan Update, City Wide Study, FEMA regulations and policies, and the CCRFCD's Hydrologic Criteria and Drainage Design Manual. City of Las Vegas will review this study

as it relates to development standards. CCRFCD will review this study as it relates to regional issues and facilities.

IV. HYDROLOGIC/HYDRAULIC CRITERIA

A. Soil Classification

The native soils associated with the onsite and offsite basins have been classified by the United States Department of Agriculture Soils Natural Resources Conservation Service (NRCS) in their soil survey of Las Vegas Valley Area. Soils have been identified as Soil Unit 325, McCarran, fine sandy loam. McCarran, fine sandy loam has a weighted hydrologic soils group of A. The curve number for the onsite existing and developed drainage areas were calculated using Table 602 and Table 602A of the HCDDM. The on and off-site associated curve numbers can be found in Appendix B along with the soils information. The offsite basin curve numbers can also be found in the approved referenced drainage studies.

B. Precipitation

The project and associated offsite basins are located within the McCarran Airport Rainfall area as shown on Figure 513 of the CCRFCD's Hydrologic Criteria and Drainage Design Manual, Section 500. 10 and 100-year rainfall depths, 1.58 and 2.77, were referenced from Table 505. No aerial depth reduction factor was used. The aforementioned HCDDM figures and tables are included in Appendix C.

In accordance with the CCRFCD's Hydrologic Criteria and Drainage Design Manual, the design storm selected was a 6-hour duration storm. Three different 6-hour storm distributions are allowed in the Clark County area, labeled SDN-3, SDN-4, and SDN-5 (see Table 503). For drainage areas less than 8 square miles, an SDN-3 is required. The drainage area associated with this site is less than 8 square miles; therefore, an SDN-3 was used.

C. Time of Concentration and Lag Time

The Criteria Manual's Standard Form 4 was completed to determine the time of concentration for each drainage basin.

For all basins, which comprise less than 1 square mile, the time of concentration was calculated as follows:

$$T_c = T_i + T_t$$

Where: T_c = Time of Concentration
T_i = Initial, inlet or overland flow time
T_t = Travel time in the ditch, gutter, etc.

The time of concentration is the sum of the initial flow time, T_i and the travel time, T_t.

The minimum T_c recommended for non-urban watersheds is 10 minutes and 5 minutes minimum for urban watersheds.

Initial flow time was calculated as follows:

$$T_i = 1.8(1.1 - K)\, Lo^{1/2}/S^{1/3}$$

Where: T_i = Initial overland flow time (in minutes)

K = 0.0132CN – 0.39 Lo = Length of overland flow (maximum 500 feet)

CN = Curve Number S = Average basin slope (in percent)

The lag time was calculated as follows:

T_{lag} = 0.6Tc (in hours) (See Appendix D for calculations)

D. Summary of Findings

Tables 1-3 list the 100-year and 10-year, 6-hour storm flows. The HEC-1 printouts can be found in Appendices E-F.

Table 1. Peak Flow Summary

Existing Condition			
Source	**Basin Area (ac)**	**100-year Flow (cfs)**	**10-year Flow (cfs)**
Carey*	--	584	166
MLK	0.44	2	1
MILL	0.54	2	1
CP1a	--	3	2
EXON1	1.73	1	<1
CP1	--	4	2

*Includes referenced flows from City Wide Study
**Includes referenced flows from Park Study

Table 2. Peak Flow Summary

Interim Condition			
Source	**Basin Area (ac)**	**100-year Flow (cfs)**	**10-year Flow (cfs)**
Carey*	--	584	166
MLK	0.44	2	1
MILL	0.54	2	1
DON3	0.88	2	1
CP1a	--	6	3
DON4	0.32	1	<1

CP1	--	7	3
DON1	0.26	1	<1
DON2	0.27	1	<1
CP2	--	584	166

*Includes referenced flows from City Wide Study
**Includes referenced flows from Park Study

Table 3. Peak Flow Summary

Future Condition			
Source	**Basin Area (ac)**	**100-year Flow (cfs)**	**10-year Flow (cfs)**
Carey	--	0	0
MLK	0.44	2	1
MILL	0.54	2	1
DON3	0.88	2	1
CP1a	--	6	3
DON4	0.32	1	<1
CP1	--	7	3
DON1	0.26	1	<1
DON2	0.27	1	<1
CP2	--	1	1

*Includes referenced flows from City Wide Study
**Includes referenced flows from Park Study

Analysis to determine peak flow rates were achieved using the SCS Unit Hydrograph Method. The input parameters discussed in Section IV, A – C were input into HEC-1, computer results are shown in the tables above. A summary of input parameters and the HEC-1 printouts can be found in Appendices E-F.

E. Facility Design Calculations

1. Street Capacity

Street capacity analyses were performed to determine the depth of flow in the surrounding streets. Table 4 summarizes the 100 and 10-year flow in the street.

Table 4.

Street Capacity Summary							
Section	**Location**	**Slope**	**Q (cfs)**	**D (ft)**	**V (fps)**	**V x D**	**Remarks**
10-Year Flow –Interim Conditions							
HS1	**Carey Ave**	0.4%	166	1.0	3.53	3.53	VxD <6 is met; D is 1 ft; dry lane is not met, existing condition
HS2	**Carey Ave**	0.67%	166	1.0	4.13	4.13	VxD <6 is met; D is 1 ft; dry lane is not met, existing condition
HS3	**Martin King (East ½)**	0.49%	1	0.3	1.02	0.31	VxD <6 is met; D less than 1; dry lane is met
HS4	**Miller**	0.5%	3	0.3	1.38	0.41	VxD <6 is met; D less than 1; dry lane is met
HS5	**Miller**	0.53%	3	0.3	1.38	0.41	VxD <6 is met; D less than 1; dry lane is met
100-Year Flow – Interim Conditions							
HS1	**Carey Ave**	0.4%	584	1.6	5.78	9.25	VxD <8 is not met; D less than 2
HS2	**Carey Ave**	0.67%	584	1.4	6.76	9.46	VxD <8 is not met; D less than 2
HS3	**Martin King (East ½)**	0.49%	2	0.3	1.19	0.36	VxD <8 is met; D less than 2
HS4	**Miller**	0.5%	6	0.4	1.60	0.64	VxD <8 is met; D less than 2
HS5	**Miller**	0.53%	7	0.4	1.66	0.66	VxD <8 is met; D less than 2
10-Year Flow – Future Conditions							
HS1	**Carey Ave**	0.4%	1	0.3	1.07	0.32	VxD <6 is met; D less than 1; dry lane is met
HS2	**Carey Ave**	0.62%	1	0.2	1.34	0.27	VxD <6 is met; D less than 1; dry lane is met
100-Year Flow – Future Conditions							
HS1	**Carey Ave**	0.67%	1	0.3	1.07	0.32	VxD <8 is met; D less than 2
HS2	**Carey Ave**	0.62%	1	0.2	1.34	0.27	VxD <8 is met; D less than 2

See Appendix G for street capacity calculations. As shown in the hydraulic criteria tables (tables 1-4), the *HCDDM* hydraulic criteria are met as follows:

- **Martin L King Boulevard and Miller Avenue**
  - 10-year DxV products are less than 6, with depths of flow less than 1 foot, and the dry lane criteria is met.
  -100-year DxV products are less than 8 with depths of flow less than 2 feet.

- **Carey Avenue**
  - 10-yr DxV products are less than 6, however depths are at 1 ft
  -The dry lane criteria is not met in the existing and interim conditions. There is an existing under sized regional facility in Carey Avenue and, in the future, it will be increased in size to accommodate all the flow in the street and provide the required dry lane criteria.
  -100-year DxV products are not less than 8, however depths of flow are less than 2 feet.

2. Finished Floor Calculations

Street capacity analyses were performed to determine the depth of flow in Craig Road and finished floor elevations were checked against this depth. Table 5 below summarizes the method to determine the lowest finished floor elevation.

Table 5. Minimum Finished Floor Elevation Determination

	Top of Curb Carey	Free-board	FF Based on TC in Carey	Flowline Elevation	Depth of Flow	Free-board	Finished Floor Based on Depth of Flow	Proposed Minimum Elevation
Bldg #1	58.13	0.5	58.63	57.63	1.74	1.50	60.87	**2060.90**
Bldg #2	57.20	0.5	57.70	56.70	1.74	1.50	59.94	**2059.94**

Finish Floor Elevation analysis for the building was determined according to the specifications outlined in the CCRFCD's *Hydrologic Criteria and Drainage Manual.* The finished floor must be set a minimum of twice the depth of flow, or 0.5 ft above the top of curb of the addressed street, taken at the high side of the building, whichever is highest. The proposed finished floor elevations have met these conditions based off of Carey Avenue (the addressing street). The onsite grading will direct flows away from the buildings.

3. Best Management Practices

The total parking area for the site will exceed 1 acre in size and shall conform to the Section 1500; Structural Best Management Practices as referenced within the Clark County Regional Flood Control District (CCRFCD) Hydrologic and Drainage Design Manual HCDDM).

The table below provides the calculations for the impervious area for parking lots and LID's.

Table 6. BMP Calculations

PARKING LOT AREA	**ACERAGE**
Property size (PS)	1.73
Building Area (BA)	0.12
Total Pervious Area (TPA)	0.35
Parking Lot Area (PLA) PLA = PS-BA-TPA	1.26
Min. PLA to be treated Min = PLA x 0.75	0.94

The total parking area has been broken into smaller drainage areas under 1 acre in size. The parking has been discharged into the landscaping areas through rip rap lined 'v' ditch

swales for a minimum of 40 ft per Section 1503.4.5.

4. Proposed Facilities

The drainage facilities required for this site consist of:

- Positive onsite grading
- Buildings set a minimum of twice the depth of flow above flows in street
- Sidewalk underdrains and curb openings

V. CONCLUSIONS

A. Compliance with Agency Regulations

City of Las Vegas will review the Hydrology Study as it relates to development standards and overall facility effectiveness. Below is a discussion of the effectiveness of the proposed drainage scheme. Clark County Regional Flood Control will review this study as it relates to regional drainage facilities and flows. This study complies with the standards as set forth in the CCRFCD's Hydrologic Criteria and Drainage Design Manual.

B. Overall Facility Effectiveness

Development of this site will not adversely affect surrounding property owners, since current drainage patterns have not been significantly changed. In the developed condition, there will be a small decrease in runoff generated by the developed site.

VI. REFERENCES

The following documents were used in the preparation of this hydrology study update:

1) DRAINAGE DESIGN MANUAL, 1999 - Hydrologic Criteria and Drainage Design Manual, Clark County Regional Flood Control District.

2) CCRFCD, 2018 - Flood Control Master Plan Update, Volume 1, Clark County Regional Flood Control District, James M. Montgomery Consulting Engineers, Inc., September, 2018.

3) NRCS, 2020 - Soil Survey of the Las Vegas Valley Area, Nevada, United States Department of Agriculture Soils, Natural Resources Conservation Service, Washington D.C., y 30, 2020.

4) FEMA, 2011 - Flood Insurance Rate Maps, Clark County, Nevada, U.S. Federal Emergency Management Agency, November 16, 2011.

5) HEC, 1998 - HEC1vm version 4.1 Flood Hydrograph Package, User's Manual, U.S. Army Corps of Engineers, the Hydrologic Engineering Center, Davis, California, 1998.

6) Technical Drainage Study for MLK and Carey Avenue Park (Update to Early Childhood Facility), by Lochsa Engineering, Inc., dated June 07, 2007, approved August 9, 2007 (CLV

No. DS3614E)

7) Technical Drainage Study Update to Early Childhood Facility for Pearson Park, by S&B Christ Consulting, LLC, dated November 18, 2014, approved March 25, 2015 (referred to hereafter as the *Pearson Park Study*). CLV #DS4711C.

8) Technical Drainage Study Update for MLK and Carey Avenue Park, by Wood Rodgers, dated August 2019, approved September 11, 2019 (referred to hereafter as the Splash Pad Study). CLV #DS5180A-REV.

VICINITY MAP

FIGURE 1

BAUGHMAN & TURNER, INC.
CIVIL ENGINEERS LAND PLANNERS
LAND SURVEYORS
1210 HINSON STREET LAS VEGAS, NEVADA
(702) 870-8771 89102

PREPARED FOR :

GOOD CLUCK

DATE: 2020
DESIGN: PJP
DRAWN: PJP
JOB: 2-20-61

VICINITY MAP

FIGURE 1

BAUGHMAN & TURNER, INC.
CIVIL ENGINEERS LAND PLANNERS
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1210 HINSON STREET LAS VEGAS, NEVADA
(702) 870-8771 89102

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NOTES

This map is for assessment use only and does NOT represent a survey.

No liability is assumed for the accuracy of the data deliniated herein. Information on roads and other non-assessed parcels may be obtained from the Road Document Listing in the Assessor's Office.

This map is compiled from official records, including surveys and deeds, but only contains the information required for assessment. See the recorded documents for more detailed legal information.

USE THIS SCALE(FEET) WHEN MAP REDUCED FROM 11X17 ORIGINAL

0 100 200 400 600 800

MAP LEGEND

PARCEL BOUNDARY
SUB BOUNDARY
PM/LD BOUNDARY
ROAD EASEMENT
MATCH / LEADER LINE
HISTORIC LOT LINE
HISTORIC SUB BOUNDARY
HISTORIC PM/LD BOUNDARY
SECTION LINE

CONDOMINIUM UNIT
AIR SPACE PCL
RIGHT OF WAY PCL
SUB-SURFACE PCL

001 ROAD PARCEL NUMBER
001 PARCEL NUMER
1.00 ACREAGE
202 PARCEL SUB/SEQ NUMBER
PB 24-45 PLAT RECORDING NUMBER
5 BLOCK NUMBER
5 LOT NUMBER
GL5 GOV. LOT NUMBER

ASSESSOR'S PARCELS - CLARK COUNTY, NV.

Briana Johnson - Assessor

BOOK T20S R61E

125	124	123
138	139	140
163	162	161

Scale: 1" = 200'

SEC. 21

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Rev: 1/14/2020

MAP N 2 NE 4

8	4	8	4
5	1	5	1
6	2	6	2
7	3	7	3
8	4	8	4
5	1	5	1

139-21-5

CLARK COUNTY NEVADA

CAREY AVE

MILLER AVE

BLANKENSHIP AVE

BARTLETT AVE

BALZAR AVE

MARTIN L KING BLVD

LEXINGTON ST

CONCORD ST

LASALLE ST

REVERE ST

VEGAS HEIGHTS TRACT UNIT NO 4

PB 1-77

PM 94-56

PM 113-43

PM 100-72

PM 111-85

PT 139-21-510-283

VAC 20030109:2437

VAC 20030730:3599

AC 20100921:1078

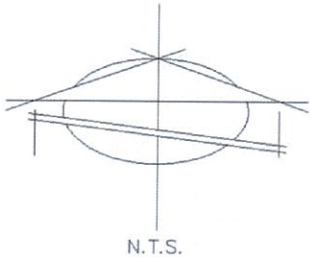
(SITE)

204 200

812 510 502 501 601

TAX DIST 204,200

FIGURE 2



GENERAL AERIAL VIEW

FIGURE 3

BAUGHMAN & TURNER, INC.
CIVIL ENGINEERS
LAND PLANNERS
LAND SURVEYORS
1210 HINSON STREET
LAS VEGAS, NEVADA
(702) 870-8771
89102

PREPARED FOR :

GOOD CLUCK

DATE: 2020
DESIGN: PJP
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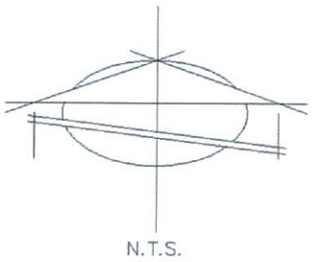
JOB: 2-20-61



GENERAL AERIAL VIEW

FIGURE 3

BAUGHMAN & TURNER, INC.
CIVIL ENGINEERS LAND PLANNERS
LAND SURVEYORS
1210 HINSON STREET LAS VEGAS, NEVADA
(702) 870-8771 89102

PREPARED FOR :

GOOD CLUCK

DATE: 2020
DESIGN: PJP
DRAWN: PJP
JOB: 2-20-61

N.T.S.

AERIAL VIEW

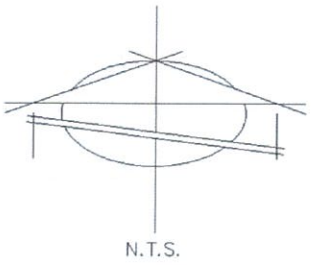
FIGURE 4

BAUGHMAN & TURNER, INC.
CIVIL ENGINEERS LAND PLANNERS
LAND SURVEYORS
1210 HINSON STREET LAS VEGAS, NEVADA
(702) 870-8771 89102

PREPARED FOR :

GOOD CLUCK

DATE: 2020
DESIGN: SW
DRAWN: SW
JOB: 4-20-61



AERIAL VIEW

FIGURE 4

BAUGHMAN & TURNER, INC.
CIVIL ENGINEERS LAND PLANNERS
LAND SURVEYORS
1210 HINSON STREET LAS VEGAS, NEVADA
(702) 870-8771 89102

PREPARED FOR :

GOOD CLUCK

DATE: 2020
DESIGN: SW
DRAWN: SW
JOB: 4-20-61

REGIONAL FLOOD CONTROL DISTRICT

2018
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F-24
FLOOD CONTROL FACILITIES

LEGEND

- Ultimate Development Boundary
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Local Existing Facilities
- Detention Basin
- Culvert or Bridge Crossing
- Stormdrain
- Lined Channel
- Unlined Channel
- Levee/Dike
- Natural Wash/Floodway
- ID-Mile Separator

Remove & Replace/Parallel Facilities

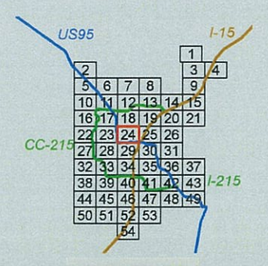
Category A	Category B
Channel	Channel
Stormdrain	Stormdrain
Crossing	Crossing

N

0 500 1,000 2,000 3,000
Feet

Scale: 1 inch = 2,000 feet

AerialSource:Esri World Imagery 2017



ATKINS
Member of the SNC-Lavalin Group

Louis Berger

FIGURE 5a

ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
GOOF		GOWAN OUTFALL FACILITIES						
0485	E	99" RCP	1080	630	DGOW2A	GOW3B	1.37	0.47
0486	E	8' X 5' RCB	3200	630	DGOW2A	GOW3B	1.37	0.69
0511	E	8' X 5' RCB	8390	740	CPT6B-C	GOW3B	1.08	0.50
LAAS		NORTH LAS VEGAS AIR TERMINAL - SIMMONS						
0000	E	14' X 6' RCB	580	728	CR2-CA	NW3	2.57	0.50
0014	E	9' X 6' RCB	1489	728	CR2-CA	NW3	2.57	1.44
0040	E	8' X 6' RCB	1111	728	CR2-CA	NW3	2.57	1.74
0060	E	10' X 6' RCB	864	728	CR2-CA	NW3	2.57	0.69
0080	E	66" RCP	157	294	R-C	NW3	0.27	0.50
0083	E	60" RCP	627	294	R-C	NW3	0.27	1.42
0095	E	54" RCP	373	294	R-C	NW3	0.27	1.44
0103	E	48" RCP	400	294	R-C	NW3	0.27	1.75
LAAT		NORTH LAS VEGAS AIR TERMINAL						
0000	E	3. 8' X 5' RCBC	650	1364	CB3-1	NW3	4.17	0.50
0006	E	CONC CHNL 20'W 5'D 1.5:1 SS	380	1364	CB3-1	NW3	4.17	0.50
0014	E	10' X 6' RCB	934	1364	CB3-1	NW3	4.17	1.84
0031	E	16' X 6' RCB	1618	1105	CB3-2	NW3	3.67	1.05
0062	E	12' X 8' RCB	511	1105	CB3-2	NW3	3.67	0.50
0070	E	12' X 6' RCB	376	1105	CB3-2	NW3	3.67	0.56
0078	E	10' X 6' RCB	1055	1105	CB3-2	NW3	3.67	0.58
0098	E	10' X 4' RCB	2207	696	CCA1-C	NW3	2.98	0.60
0140	E	CONC CHNL 6'W 4'D 1.5:1 SS	336	696	CCA1-C	NW3	2.98	0.64
0146	E	CONC CHNL 6'W 3'D 1.5:1 SS	1388	696	CCA1-C	NW3	2.98	0.68
0172	E	76" X 48" HERCP	536	494	CA1-C	NW3	2.77	0.75
0182	E	CONC CHNL 6'W 3'D 1.5:1 SS	997	494	CA1-C	NW3	2.77	0.63
0201	E	CONC CHNL 6'W 3'D 1.5:1 SS	184	494	CA1-C	NW3	2.77	0.37
0204	E	48" RCP	425	494	CA1-C	NW3	2.77	0.37
LANO		NORTH LAS VEGAS AIR TERMINAL NORTH						
0000	E	CONC CHNL 0'W 3'D 1.5:1 SS	470	494	CA1-C	NW3	2.77	0.30
0010	P	8' X 4' RCB	3375	211	DA1-C	NW3	2.46	1.13
LCCH		LAS VEGAS CREEK CHANNEL						
0013	E	2- 12' X 6' RCB	2035	3050	CLC20-C	MEADOWS4	9.60	0.62
0051	E	2- 14' X 7' RCB	3113	3050	CLC20-C	MEADOWS4	9.60	0.69
0110	E	TRANSITION STRUCTURE	220	3001	CCLC16-C	MEADOWS4	9.50	
0114	E	2- 14' X 7' RCB	670	2366	CRMEDET	MEADOWS4	8.19	0.50
0127	E	TRANSITION STRUCTURE	110	2366	CRMEDET	MEADOWS4	8.19	
0129	E	2- 14' X 7' RCB	1130	2366	CRMEDET	MEADOWS4	8.19	0.50
0150	E	2- 13' X 7' RCB	200	2366	CRMEDET	MEADOWS4	8.19	0.95
0154	E	TRANSITION STRUCTURE	190	2366	CRMEDET	MEADOWS4	8.19	
0167	E	2- 12' X 6' RCB	1650	1700	CCLC14-C	SW3	2.93	1.06
0188	E	2- 12' X 6' RCB	2225	1700	CCLC14-C	SW3	2.93	1.36
0230	E	12' X 6' RCB	2140	1450	CLC14-C	SW3	2.53	1.74
0270	E	12' X 6' RCB	1705	814	CCWA02-C	SW3	1.84	0.54
0302	E	8' X 6' RCB	3940	814	CCWA02-C	SW3	1.84	2.49
0377	E	10' X 7' RCB	1226	814	CCWA02-C	SW3	1.84	0.74
0400	E	TRANSITION STRUCTURE	110	458	CWA02-C	SW3	1.47	0.49
0402	E	8' X 6' RCB @ JONES	535	458	CWA02-C	SW3	1.47	0.49
0412	E	60" RCP	1370	458	CWA02-C	SW3	1.47	1.08
0436	E	60" RCP	1090	171	CLC01-C	SW3	1.20	1.66
0458	E	60" RCP	1060	171	CLC01-C	SW3	1.20	1.60
0478	E	60" RCP	1110	171	CLC01-C	SW3	1.20	0.55
0499	E	42" RCP OUTLET	660	87	RAINBWDB	SW3	1.11	1.68
0513	E	102 AC-FT RAINBOW DETENTION BASIN		1027	RAINBWIN	SW3	1.11	
LCDE		LAS VEGAS CREEK - DECATUR						
0000	E	6' X 5' RCB	1500	430	LC11-C	SW3	0.38	1.26
0034	E	72" RCP	700	430	LC11-C	SW3	0.38	0.50
LCJO		LAS VEGAS CREEK - JONES						
0000	E	6' X 6' RCB	380	381	AL01B-C	SW3	0.37	0.50
0007	E	6' X 5' RCB	675	381	AL01B-C	SW3	0.37	0.62
LCLO		LAS VEGAS CREEK - LORENZI						
0000	E	7' X 6' RCB	445	285	DAL00A	SW3	0.41	3.37

ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LCLO		LAS VEGAS CREEK - LORENZI						
0008	E	7' X 6' RCB	2953	285	DAL00A	SW3	0.41	0.40
LCLT		LAS VEGAS CREEK - LATERAL						
0000	E	6' X 6' RCB	620	250	WA16D	SW3	0.40	0.50
0006	E	CONC CHNL 10'W 4'D 0.1 SS	1230	125^	WA16D^	SW3	0.40	0.82
0007	E	23" x 14" HERCP	1230	125^	WA16D^	SW3	0.40	0.82
0033	E	10' X 4' RCBC @ WASHINGTON	96	372	WA16-C	SW3	0.40	0.50
0034	E	GRASS CHNL 12'W 5'D 1:1 SS	1750	372	WA16-C	SW3	0.40	0.20
LCME		LAS VEGAS CREEK - MEADOWS						
0000	E	14' X 8' RCB	595	1484	MEADOWDB	SW3SC	5.67	0.72
0016	E	STILLING BASIN	140	1484	MEADOWDB	SW3SC	5.67	0.21
0017	E	3,360 CFS SPILLWAY (REPLACE W/ LCME0018)		3300	MEADOWDB	SW3SC	5.67	
0018	P	MODIFY SPILLWAY, RAISE HEIGHT BY 1' (REPLACES LCME0017)		3300	MEADOWDB	SW3SC	5.67	
0019	E	1: 11' X 5' RCB AND 1: 11.5' X 5' RCB	110	1484	MEADOWDB	SW3SC	5.67	0.81
0020	E	213 AC-FT MEADOWS DETENTION BASIN		4909	MEADOWIN	SW3SC	7.55	
LCRA		LAS VEGAS CREEK - RANCHO						
0000	E	12' X 8' RCB	360	931	CLC16-C	SW3	1.71	0.60
0004	E	12' X 6' RCB	2367	931	CLC16-C	SW3	1.71	0.77
0050	E	8' X 8' RCB	356	604	WA13D	SW3	1.39	0.50
LMDE		LAKE MEAD BOULEVARD - DECATUR BRANCH						
0000	P	10' X 5' RCB	2640	673	DCVG04-C	NW3	1.25	0.90
LV15		FREEWAY CHANNEL						
0372	E	9' X 6' RCB	1970	1152	CWA20-C	NW3	4.52	0.66
0409	E	7' X 6' RCB	815	841	CVG07	NW3	4.09	0.91
0424	E	10' X 5' RCB	130	841	CVG07	NW3	4.09	0.40
0427	E	8' X 5' RCB	2411	841	CVG07	NW3	4.09	0.60
0460	E	6' X 5' RCB	1242	253	CCWA13-C	NW3	3.31	1.50
0472	E	60" RCP	713	410	WA15A-C	NW3	0.43	0.30
0474	E	5' X 5' RCB	1825	253	CCWA13-C	NW3	3.31	1.00
0528	P	8' X 8' RCB	4420	959	CWA13-C	SW3	1.39	1.19
0602	P	2- 66" RCP	5960	551	CWA09-C	SW3	0.83	1.59
LVLM		LAS VEGAS WASH - LAKE MEAD						
0058	E	72" RCP (REPLACE W/ LVLM0060)	5952	1159	CLM20-C	NW3SC	1.36	0.66
0060	P0	12' X 7' RCB (REPLACES LVLM0059)	5952	1159	CLM20-C	NW3SC	1.36	0.66
0170	E	78" RCP	2421	454	CLM16A-C	NW5	12.15	1.17
0221	P	48" RCP OUTLET	270	195	DR2	NW4	11.77	
0222	E	48" RCP OUTLET	500	368	DCAREY	NW4	11.77	
0224	E	36" RCP	2428					0.53
0225	E	90" RCP (REPLACE W/ LVLM0226)	641	2077	CLM10-C	NW3	3.01	1.35
0226	P0	2- 10' X 9' RCB (REPLACES LVLM0225)	641	2077	CLM10-C	NW3	3.01	0.50
0227	E	10,000 CFS PMF SPILLWAY		10000	CARYLMDB	NW4	11.77	
0228	E	607 AC-FT CAREY-LAKE MEAD DETENTION BASIN		5499	CARYLMIN	NW4	11.78	
0270	E	90" RCP (REPLACE W/ LVLM0271)	3473	2077	CLM10-C	NW3	3.01	1.35
0271	P0	12' X 8' RCB (REPLACES LVLM0270)	3473	2077	CLM10-C	NW3	3.01	1.35
0336	E	84" RCP (REPLACE W/ LVLM0337)	1050	1769	CLM06-C	NW3	2.60	1.16
0337	P0	12' X 8' RCB (REPLACES LVLM0336)	1050	1769	CLM06-C	NW3	2.60	1.16
0355	E	90" RCP (REPLACE W/ LVLM0356)	1840	1769	CLM06-C	NW3	2.60	0.40
0356	P0	12' X 11' RCB (REPLACES LVLM0355)	1840	1769	CLM06-C	NW3	2.60	0.40
0388	E	84" RCP	520	913	CLM05-C	NW3	1.00	1.40
0399	E	78" RCP	803	913	CLM05-C	NW3	1.00	1.07
0416	E	72" RCP	1320	913	CLM05-C	NW3	1.00	1.00
0442	E	60" RCP	725	591	CLM03-C	NW3	0.83	1.26
0453	E	54" RCP	589	591	CLM03-C	NW3	0.83	2.37
0460	E	54" RCP	1464	591	CLM03-C	NW3	0.83	2.05
0475	E	48" RCP	2632	242	LM02-C	NW3	0.29	1.24
0526	E	48" RCP	2600	585	CLM01-C	NW3	0.64	1.24
LVOW		OWENS AVENUE SYSTEM						
0003	E	90" RCP	7500	1219	CLM16B-C	NW3	2.43	0.70
0146	E	84" RCP	4800	570	DCVG20-C	NW3	2.04	0.90
0241	E	72" RCP	4832	416	CVG20-C	NW3	1.58	1.05
0327	E	7' X 5' RCB	350	416	CVG20-C	NW3	1.58	1.26
0351	E	72" RCP	2250	837	CVG04-C	NW3	1.25	1.44

ID / Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVOW		OWENS AVENUE SYSTEM						
0355	E	6' X 5' RCB	491	837	CVG04-C	NW3	1.25	0.40
0360	P	6' X 6' RCB	2300	837	CVG04-C	NW3	1.25	1.48
0460	P	7' X 6' RCB	2700	615	CVG03-C	NW3	0.95	1.48
0513	P	6' X 5' RCB	2815	463	CVG02-C	NW3	0.68	1.68
LVPK		PEAK DRIVE SYSTEM						
0000	E	CONC CHNL 15'W 6'D 0.1 SS	698	1081	CPD04B-C	NW3	1.59	1.22
0019	E	CONC CHNL 20'W 5.5'D 0.1 SS	2190	1081	CPD04B-C	NW3	1.59	0.57
0056	E	10' X 5' RCB	193	723	CCY04A-C	NW3	1.12	0.40
0058	E	9' X 6' RCB	2542	723	CCY04A-C	NW3	1.12	0.95
0104	E	10' X 6' RCB	75	723	CCY04A-C	NW3	1.12	1.26
0108	E	7' X 5' RCB	1235	723	CCY04A-C	NW3	1.12	0.61
0130	E	7' X 5' RCB	1435	383	CPD01-C	NW3	0.67	0.61
LVRA		LAS VEGAS WASH - RANCHO						
0000	E	12' X 8' RCB	512	1438	CCPD04BC	NW3	3.77	1.56
0012	E	12' X 8' RCB	2838	1438	CCPD04BC	NW3	3.77	0.78
0066	E	14' X 5' RCB	65	1438	CCPD04BC	NW3	3.77	1.22
LVSR		LAS VEGAS WASH - SMOKE RANCH						
0070	E	66" RCP (REPLACE W/ LVSR0071)	4118	1086	CS1-C	NW3SC	1.42	0.73
0071	P	10' X 8' RCB (REPLACES LVSR0070)	4118	1086	CS1-C	NW3SC	1.42	0.73
0148	E	54" RCP (REPLACE W/ LVSR0149)	2587	823	CS	NW3SC	0.95	0.58
0149	P	11' X 6' RCB (REPLACES LVSR0148)	2587	823	CS	NW3SC	0.95	0.58
0197	E	30" RCP (REPLACE W/ LVSR0198)	581	368	CR2-C	NW3SC	0.38	0.86
0198	P	8' X 4' RCB (REPLACES LVSR0197)	581	368	CR2-C	NW3SC	0.38	0.86
0208	E	54" RCP (REPLACE W/ LVSR0209)	2060	368	CR2-C	NW3SC	0.38	1.41
0209	P	7' X 4' RCB (REPLACES LVSR0208)	2060	368	CR2-C	NW3SC	0.38	1.41
0210	E	14' X 8' RCB	800	3092	CB1-C	NW3	6.34	1.73
0221	E	TRANSITION STRUCTURE	100	3092	CB1-C	NW3	6.34	7.08
0223	E	CONC CHNL 14'W 5'D 1.5:1 SS	2150	3092	CB1-C	NW3	6.34	0.96
0293	E	14' X 8' RCB	707	3092	CB1-C	NW3	6.34	0.63
0273	E	11' X 11' RCB	1140	3092	CB1-C	NW3	6.34	0.92
0295	E	11' X 11' RCB	510	2868	CCSR05B	NW3	6.06	2.85
0312	E	8' X 8' RCB	460	1652	CSR05B	NW3	2.30	1.63
0359	E	66" RCP (REPLACE W/ LVSR0360)	1690	1652	CSR05B	NW3	2.30	0.67
0360	P	10' X 10' RCB (REPLACES LVSR0359)	1690	1652	CSR05B	NW3	2.30	0.75
0396	E	60" RCP (REPLACE W/ LVSR0397)	2640	1483	CSR05D	NW3	1.94	1.14
0397	P	10' X 9' RCB (REPLACES LVSR0396)	2640	1483	CSR05D	NW3	1.94	0.87
0446	E	54" RCP (REPLACE W/ LVSR0447)	2530	1483	CSR05D	NW3	1.94	1.14
0447	P	10' X 8' RCB (REPLACES LVSR0446)	2530	1483	CSR05D	NW3	1.94	1.25
0498	P	10' X 7' RCB	2855	1245	CSR02E	NW3	1.64	1.27
0500	E	60" RCP	1290					1.97
0525	E	54" RCP	1340					0.30
0546	P	8' X 9' RCB	2640	781	CSR00A	NW3	1.01	0.57

*The HEC-1 node shown identifies the controlling concentration point for the associated facility and is located upstream of this facility due to decreasing peak flow with increasing tributary area caused by storm distribution transitions, depth area reduction factors, or attenuation of flow from routing.
**As-built or design slopes were used when available. All other slopes are based on existing topography. The user should verify the facility slope listed prior to performing any facility specific analysis.
^ For parallel facilities, the existing facility flow equals its normal depth capacity, and the proposed parallel facility flow equals the remaining flow (i.e. HEC-1 Node flow = existing facility normal depth capacity + proposed parallel facility flow).

REGIONAL FLOOD CONTROL DISTRICT

2018 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE

FACILITY INVENTORY FIGURE F-24

LEGEND

ID (Facility Identifier) AABB
- Parent Stream Name
- Stream Name

Mile 0000
- Distance Above Confluence with Parent Stream (Miles)
- Miles in Hundredths

Existing Facility..... E
Proposed or Modified Facility..... P
Contingency Level
- Category A..... P
- Category B..... P0

Bottom Width..... W
Depth..... D
Side Slope, H:V..... SS

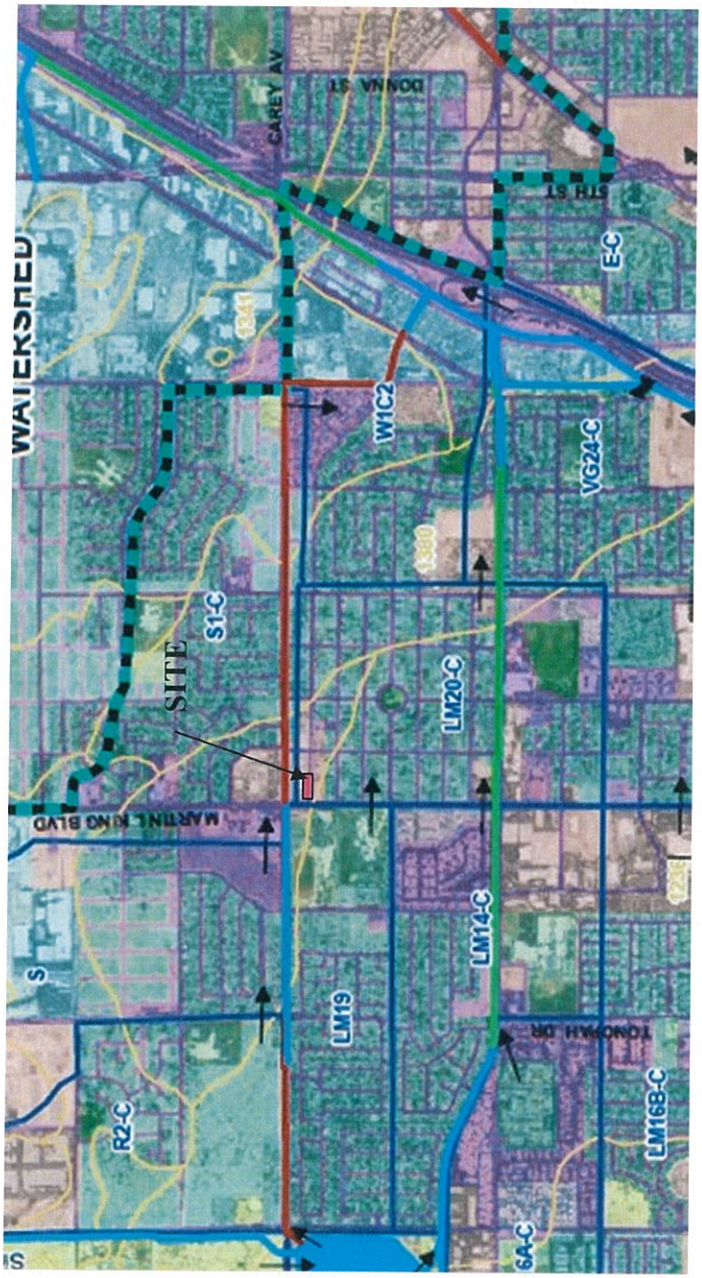
Construction Features

Cast in Place Concrete Pipe	CIPCP	Reinforced Concrete Arch Culvert	RCAC
Corrugated Metal Arch Pipe Culvert	CMAP	Reinforced Concrete Box	RCB
Corrugated Metal Pipe Culvert	CMPC	Reinforced Concrete Box Culvert	RCBC
High Density Polyethylene	HDPE	Reinforced Concrete Pipe	RCP
Horizontal Elliptical Reinforced Concrete Pipe	HERCP	Reinforced Concrete Pipe Culvert	RCPC
Reinforced Concrete Arch Pipe	RCAP	Storm Sewer Pipe	SSP

ATKINS
Member of the SNC Lavalin Group
Louis Berger

FIGURE 56

N.T.S.



REGIONAL FLOOD CONTROL DISTRICT

2018 Las Vegas Valley Master Plan Update

Figure W-5
Central Watershed

Legend

- Flow Arrows
- Concentration Points
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Ultimate Development Boundary
- Watershed
- Subbasins
- Soils
- 1: Undeveloped Land, Open desert
- 2: Parks, Golf Courses
- 3: Rural, 0.5-1 units per acre (uses 1 unit/acre)
- 4: Low-Density Residential, 1-2 units per acre (uses 2 units/acre)
- 5: Medium-Density Residential, 2-4 units per acre (uses 3 units/acre)
- 6: High-Density Residential, 4-8 units per acre (uses 6 units/acre)
- 7: Public Facility and Residential, 8-12 units/acre
- 8: Very High-Density Residential, 12 units/acre or more
- 9: Commercial, Retail, Casino, High Rise Condominiums
- 10: Light Industrial
- 11: Heavy Industrial
- 12: Schools
- 13: Lakes

CENTRAL WATERSHED – W5

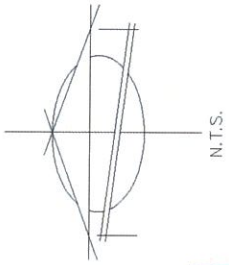
FIGURE 6

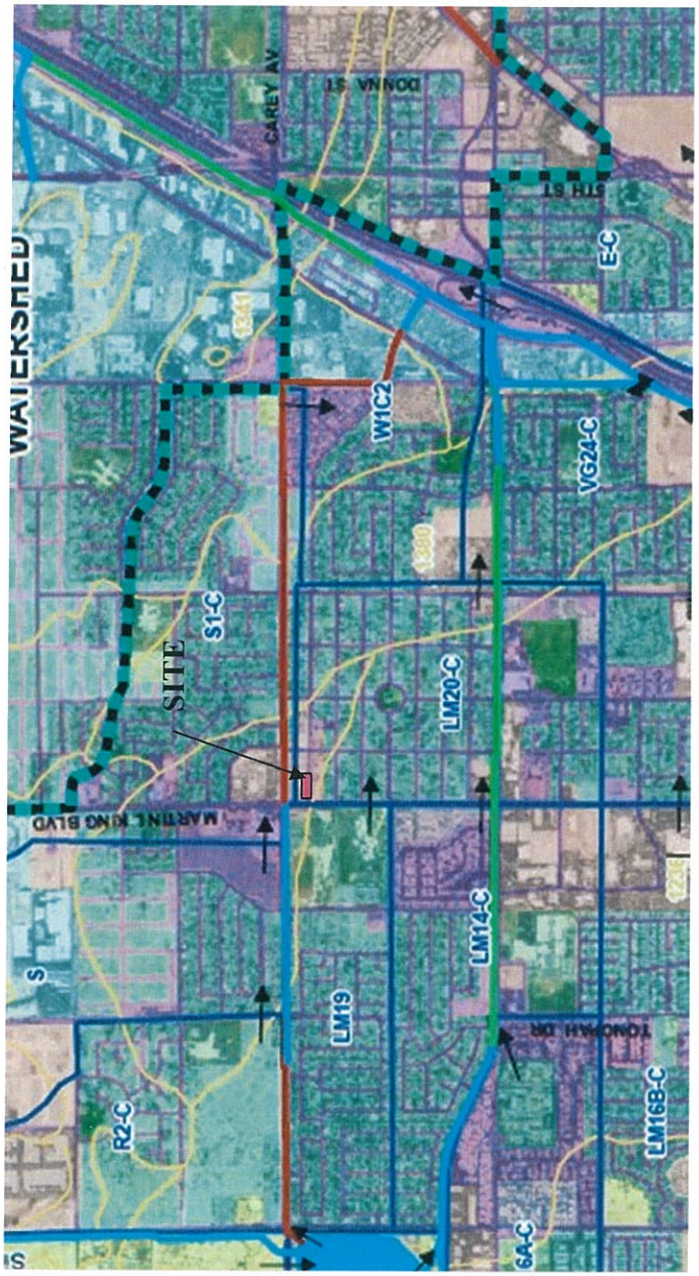
BAUGHMAN & TURNER, INC.
CIVIL ENGINEERS LAND PLANNERS
LAND SURVEYORS
1210 HINSON STREET LAS VEGAS, NEVADA
(702) 870-8771 89102

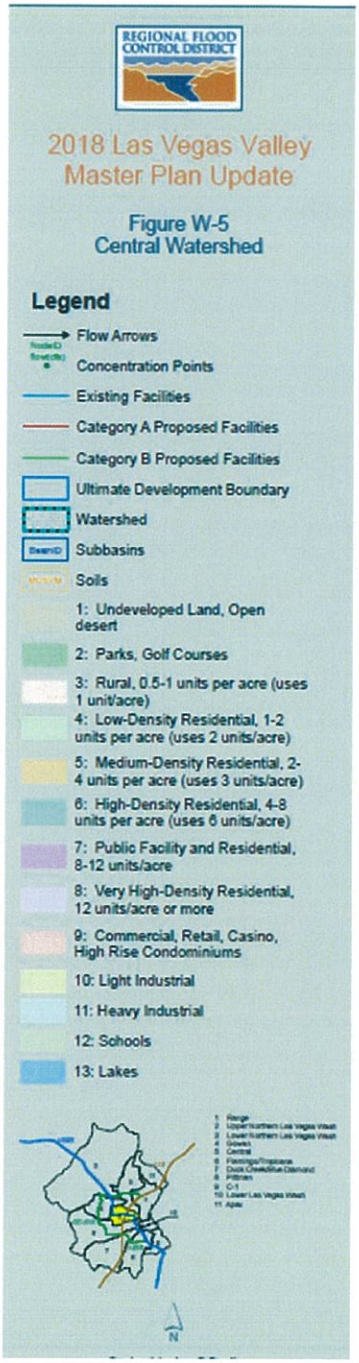
PREPARED FOR :

GOOD CLUCK

DATE: 2020
DESIGN: PJP
DRAWN: PJP
JOB: 2-20-61







CENTRAL WATERSHED – W5

FIGURE 6

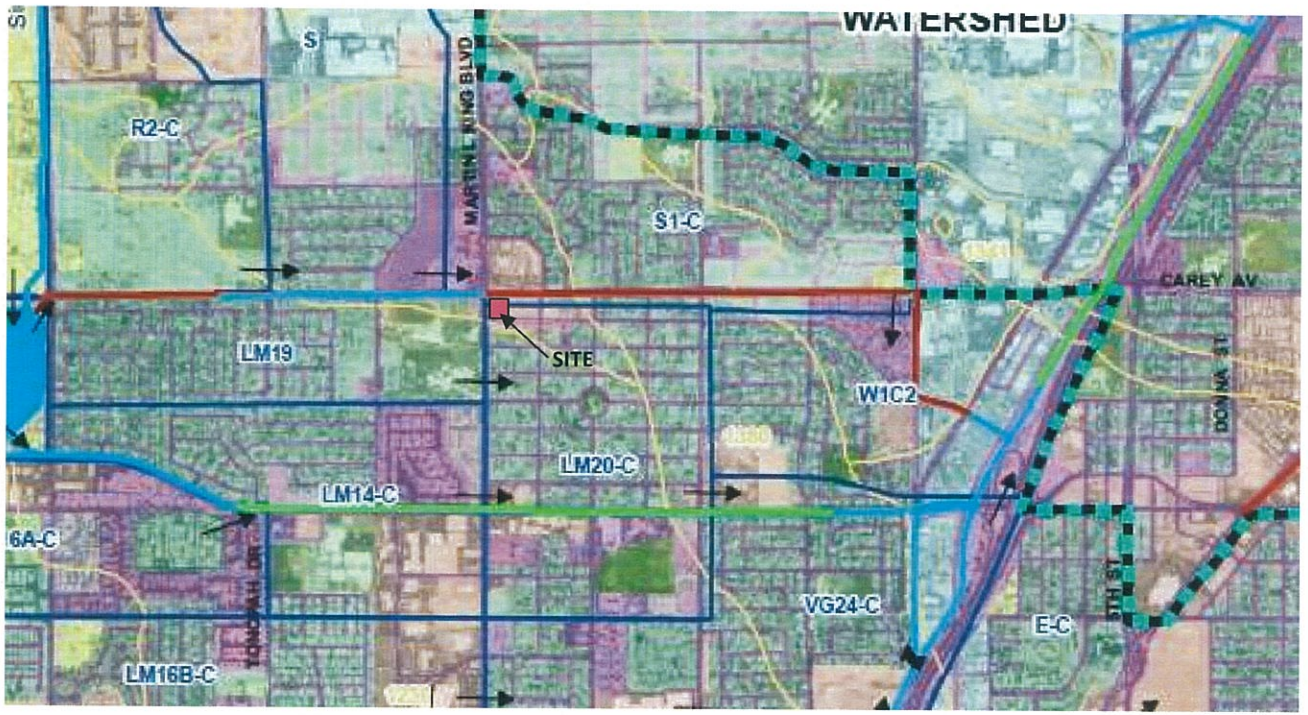
BAUGHMAN & TURNER, INC.
CIVIL ENGINEERS LAND PLANNERS
LAND SURVEYORS
1210 HINSON STREET LAS VEGAS, NEVADA
(702) 870-8771 89102

PREPARED FOR :

GOOD CLUCK

DATE: 2020
DESIGN: PJP
DRAWN: PJP
JOB: 2-20-61

N.T.S.



REGIONAL FLOOD CONTROL DISTRICT

2018 Las Vegas Valley Master Plan Update

Figure W-5
Central Watershed

Legend

- Flow Arrows
- Concentration Points
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Ultimate Development Boundary
- Watershed
- Subbasins
- Soils
- 1: Undeveloped Land, Open desert
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- 6: High-Density Residential, 4-8 units per acre (uses 6 units/acre)
- 7: Public Facility and Residential, 8-12 units/acre
- 8: Very High-Density Residential, 12 units/acre or more
- 9: Commercial, Retail, Casino, High Rise Condominiums
- 10: Light Industrial
- 11: Heavy Industrial
- 12: Schools
- 13: Lakes

Scale: 1 inch = 0.5 mile

0 0.25 0.5 1

Miles

CENTRAL WATERSHED – W5

BAUGHMAN & TURNER, INC.
CIVIL ENGINEERS LAND PLANNERS
LAND SURVEYORS
1210 HINSON STREET LAS VEGAS, NEVADA
(702) 870-8771 89102

PREPARED FOR :

GOOD CLUCK
MLK & CAREY

DATE: 2020
DESIGN: PJP
DRAWN: PJP
JOB: 07-20-62

FIGURE 6

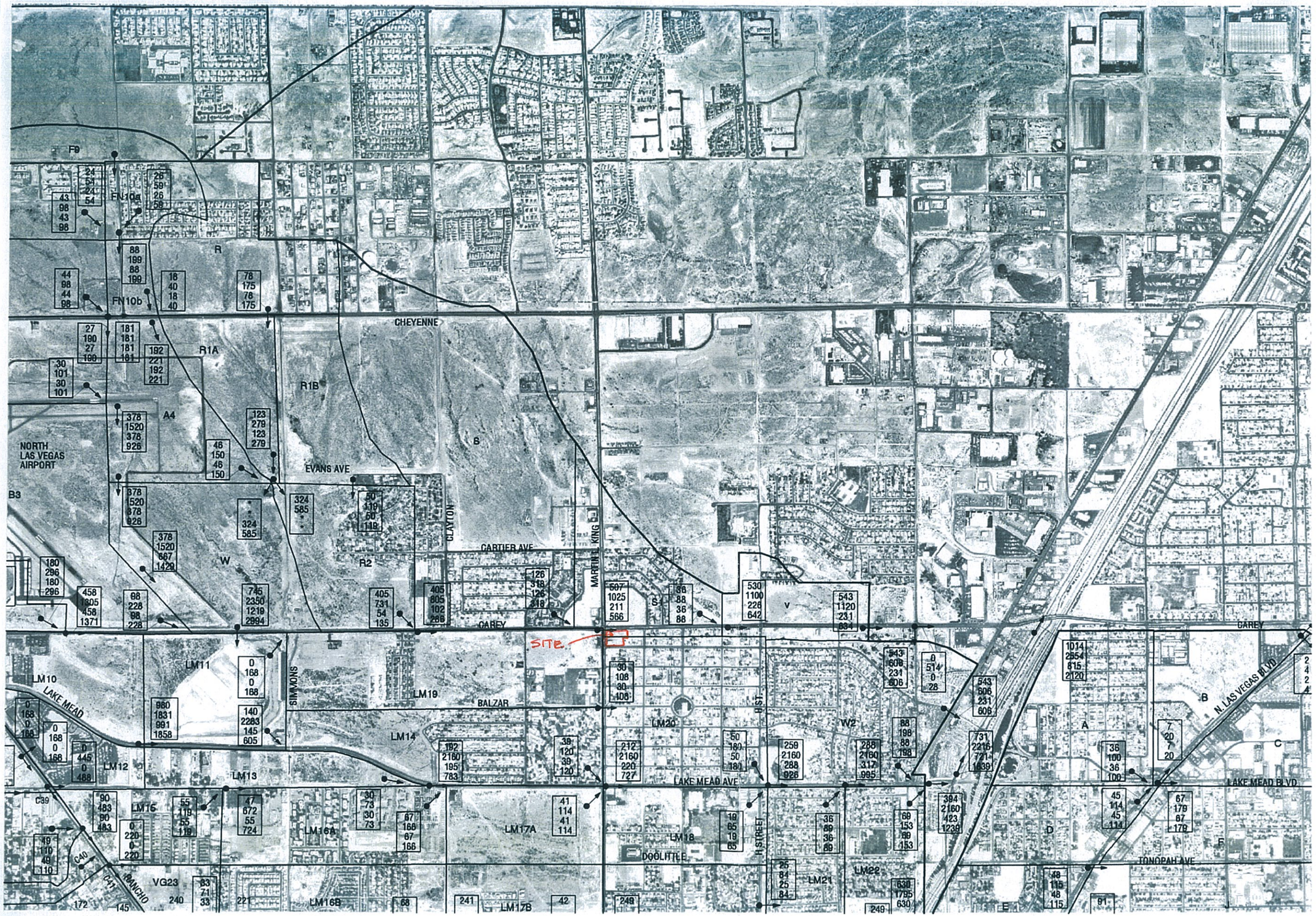


PHOTO DATE: APRIL 1996

CITY OF LAS VEGAS NEVADA

CITY WIDE HYDROLOGY STUDY UPDATE - 1997

LEGEND

- SUB-BASIN BOUNDARY
- FLOW ARROW

250	10-YEAR EXISTING FLOW
500	100-YEAR EXISTING FLOW
300	10-YEAR ULTIMATE FLOW
800	100-YEAR ULTIMATE FLOW

(FLOWS IN CFS)

NOTE:
Facility flows must be subtracted from flows shown to determine surface flows. (See "F" sheets for facility flows)

N
W E
S

1 INCH = 1600 FEET

FIGURE H-10

1	2			
3	4			
5	6			
7	8	9	10	
11	12	13	14	15
	16	17	18	19

PBSJ POST, BUCKLEY, SCHUH & JERNIGAN, INC.

FIGURE 7

FLOOD CONTROL FACILITY INVENTORY UPDATE

LEGEND

REGIONAL STREAM NAME DESIGNATOR	AABB
PARENT STREAM NAME	
STREAM NAME	
REGIONAL ID / RIVER MILE	0000
DISTANCE ABOVE CONFLUENCE WITH PARENT STREAM	
MILES	
TENTHS OF A MILE	
LOCAL STREAM NAME DESIGNATOR	AAB
LOCAL ID NUMBER	000
EXISTING FACILITY	E
PROPOSED OR MODIFIED FACILITY	P
CONTINGENCY LEVEL:	
MASTER PLAN	P1
FACILITY PLAN	P2
PRELIMINARY DESIGN	P3
DESIGN	P4
BOTTOM WIDTH	W
DEPTH	D
SIDE SLOPE, H:V	SS
CORRUGATED METAL PIPE CULVERT	CMP
CORRUGATED METAL ARCH PIPE CULVERT	CMAP
REINFORCED CONCRETE BOX	RCB
RCB CULVERT	RCBC
REINFORCED CONCRETE PIPE	RCP
RCP CULVERT	RCPC
REINFORCED CONCRETE ARCH PIPE CULVERT	RCACP
GENERAL COMMENT	G1
FACILITY SPECIFIC COMMENT	S1
PUBLIC DRAINAGE EASEMENT	PDE

NOTES:
FLOW = 100 YEAR DESIGN FLOW (REGIONAL FACILITIES)
FLOW = FACILITY CAPACITY (LOCAL FACILITIES)

FLOOD CONTROL FACILITIES INVENTORY

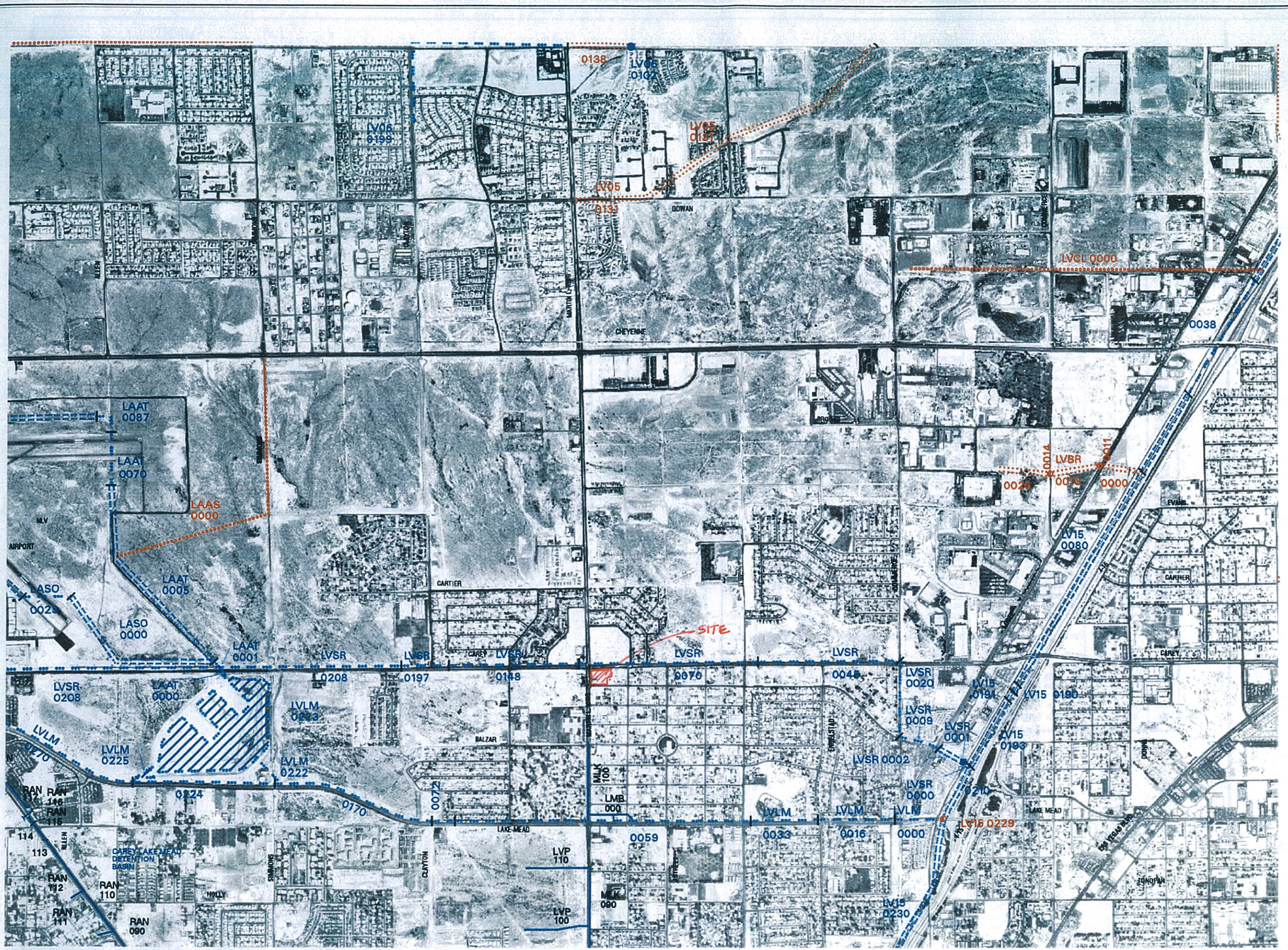
SHEET F-10

PBS&J, INC

ID	ID No.	Eff	From - To	Facility Description	Length	Flow (cfs)	Plan Page
				LOCAL FACILITIES			
LMB	000	E	327-V183 / 107-V1607	21" RCP (Ties into LVLM)	700		15
LVP	110	E	630-V2	18" RCP	1,078	0.40	6
LVP	120	E	107-4378-3	24" PDE			
MLK	000	E	107-V666A	18" RCP	1,780		4
MLK	100	E	327-V183	21" RCP	1,315		6
RAN	110	E	107-V1668, HWY BK T-2	42" RCP	660		142
RAN	112	E	HWY BK T-2	36" RCP	434		72
RAN	113	E	HWY BK T-2	30" RCP	665		50
RAN	114	E	HWY BK T-2	24" CMP	216		31
RAN	115	E	HWY BK T-2	6' x 3' RCBC	106		126
RAN	116	E	HWY BK T-2	24" CMP	112		
RAN	117	E	Field Verified	48" RCP			
TNP	000	E	327Y-4413-1	18" RCP	90	2.40	16

ID	ID No.	Eff	From - To	Facility Description	Length	Flow (cfs)	Plan Page
				REGIONAL FACILITIES			
LAAS	LAAS 0000	P1	1996 Master Plan Update	NORTH LAS VEGAS AIR TERMINAL - SIMMONS 60" RCP	5,500	0.70	315
LAAT	LAAT 0000	E	731-51	NORTH LAS VEGAS AIR TERMINAL 3: 8' x 5' RCB	832		
LAAT	0051	E	731-51	Conc Chnl 20'W 7'D 1.5:1 SS	400		
LAAT	0005	E	731-51	Unlined Chnl 12'W 6'D 1.5:1 SS	3,696		
LAAT	0070	E	1996 Master Plan Update	10' x 6' RCB Culvert	898		721
LAAT	0087	E	1996 Master Plan Update	10' x 4' RCB Culvert	195		721
LASO	LASO 0000	E	731-51	NORTH LAS VEGAS AIR TERMINAL SOUTH Earth Chnl 14'W 3'D 3:1SS	1,518	1.10	460
LASO	0023	E	1996 Master Plan Update	54" RCP	700	0.40	450
LV05	LV05 0131	E	1996 Master Plan Update	TRIBUTARY TO WESTERN TRIB @ ALEXANDER RD Earth Chnl 3'D 8'W 2:1 SS	6,100	0.70	520
LV05	0131	P1	1996 Master Plan Update	Conc Chnl 3'D 8'W 2:1 SS	6,100	0.70	520
LV05	LV05 0199	E	1996 Master Plan Update	TRIBUTARY TO WESTERN TRIB @ CRAIG RD 30" - 72" RCP	4,000	2.00	610
LV15	LV15 0038	E	1996 Master Plan Update	FREEWAY CHANNEL 2: 15' x 12' RCBC	2,200		3,200
LV15	0080	E	1996 Master Plan Update	Conc Chnl 20'W 10'D 1:1SS	5,700	0.18	2,500
LV15	0190	E	1996 Master Plan Update	Drop Structure 20'W 1'D 1:1SS			1,700
LV15	0190	E	1996 Master Plan Update	Conc Chnl 20'W 10'D 1:1SS	100		1,700
LV15	0191	E	1996 Master Plan Update	Drop Structure 20'W 1'D 1:1SS			1,700
LV15	0191	E	1996 Master Plan Update	Conc Chnl 20'W 10'D 1:1SS	100		1,700
LV15	0193	E	1996 Master Plan Update	Drop Structure 20'W 1'D 1:1SS			1,700
LV15	0193	E	1996 Master Plan Update	Conc Chnl 20'W 10'D 1:1SS	900		1,700
LV15	0210	E	1996 Master Plan Update	Conc. Chnl 8'W 8'D 1:1SS	1,000	0.18	1,153
LV15	0229	E	1996 Master Plan Update	2: 7.5' x 3' RCBC	80		977
LV15	0229	P1	1996 Master Plan Update	2: 8' x 6' RCBC	80		977
LV15	0230	E	1996 Master Plan Update	Conc Chnl 8'W 8'D 1:1SS	2,900	0.18	977
LVBR	LVBR 0000	P1	1996 Master Plan Update	LAS VEGAS - BROOK Conc Chnl 5'D 8'W 2:1 SS	700	2.00	610
LVBR	0011	P1	1996 Master Plan Update	6' x 6' RCBC @ N 5th St	100		610
LVBR	0013	P1	1996 Master Plan Update	Conc Chnl 5'D 8'W 2:1 SS	850	2.00	610
LVBR	0014	P1	1996 Master Plan Update	6' x 6' RCBC @ Lease	100		610
LVBR	0026	P1	1996 Master Plan Update	Conc Chnl 5'D 8'W 2:1 SS	850	2.00	610
LVCL	LVCL 0000	P1	1996 Master Plan Update	LAS VEGAS WASH - COLTON 84" RCP	6,000	0.67	480
LVLM	LVLM 0000	E	107-V1607	LAS VEGAS WASH - LAKE MEAD 84" RCP	978	4.46	762
LVLM	0016	E	107-V1607	42" x 68" HERCP	772		383
LVLM	0033	E	107-V1607	60" RCP	1,186	1.26	536
LVLM	0069	E	107-V1607	72" RCP	5,952	1.07	340
LVLM	0072	E	107-V1607-2	72" RCP	197	0.65	340
LVLM	0179	E	107-V1607-2	78" RCP	2,819	1.17	302
LVLM	0222	E	731-51 / 107-V1607-2	48" RCP	518		
LVLM	0223	E	731-51	Carey Ave/Lake Mead Det. Basin (515 ac-ft)			3185 / 302
LVLM	0223	E	731-51	10,000 cfs spillway			10,000
LVLM	0224	E	107-V1607-2	36" RCP	2,081	0.53	60
LVLM	0225	E	731-51 / 107-V1607-2	90" RCP	591		
LVLM	0270	E	107-V1607-2	90" RCP	3,300	1.44	1,491
LVSR	LVSR 0000	E	1996 Master Plan Update	LAS VEGAS WASH - SMOKE RANCH Conc Chnl 22'W 8'D	50	1.67	608
LVSR	0001	E	1996 Master Plan Update	Free Span Bridge 22'W 10'D	100		608
LVSR	0002	E	1996 Master Plan Update	Conc Chnl 22'W 8'D	370	1.67	608
LVSR	0009	E	1996 Master Plan Update	72" RCP	561		608
LVSR	0020	E	1996 Master Plan Update	60" RCP	1,320		608
LVSR	0045	E	1996 Master Plan Update	54" RCP	1,320		608
LVSR	0070	E	1996 Master Plan Update	90" RCP	4,118		441
LVSR	0148	E	1996 Master Plan Update	54" RCP	2,547		340
LVSR	0197	E	1996 Master Plan Update	30" RCP	561		302
LVSR	0206	E	1996 Master Plan Update	54" RCP	8,000		302

FIGURE 8a



City of Las Vegas

CITY - WIDE HYDROLOGY ANALYSIS

LEGEND

- EXISTING REGIONAL DETENTION BASINS
- PROPOSED REGIONAL DETENTION BASINS
- EXISTING LOCAL DETENTION BASINS
- EXISTING REGIONAL BRIDGES
- PROPOSED REGIONAL BRIDGES
- EXISTING LOCAL BRIDGES
- EXISTING REGIONAL CULVERT
- PROPOSED REGIONAL CULVERT
- EXISTING LOCAL CULVERT
- EXISTING REGIONAL PIPELINE
- PROPOSED REGIONAL PIPELINE
- EXISTING LOCAL PIPELINE
- EXISTING REGIONAL CHANNEL
- PROPOSED REGIONAL CHANNEL
- EXISTING LOCAL CHANNEL
- EXISTING REGIONAL DIKE/LEVEE
- PROPOSED REGIONAL DIKE/LEVEE
- EXISTING LOCAL DIKE/LEVEE
- EXISTING STORM WATER PUMPING STATION
- PROPOSED BELTWAY ALIGNMENT

FIGURE F-10

	1	2		
	3	4		
	5	6		
7	8	9	10	
11	12	13	14	15
	16	17	18	19

N W E S

Scale: 1 inch = 1600 feet

FLOOD CONTROL FACILITIES

PBS&J POST, BUCKLEY, SCHUH & JERNIGAN

FIGURE 8

National Flood Hazard Layer FIRMette

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

- SPECIAL FLOOD HAZARD AREAS
  - Without Base Flood Elevation (BFE) *Zone A, V, A99*
  - With BFE or Depth *Zone AE, AO, AH, VE, AR*
  - Regulatory Floodway
- OTHER AREAS OF FLOOD HAZARD
  - 0.2% Annual Chance Flood Hazard, Area of 1% annual chance flood with average depth less than one foot or with drainag areas of less than one square mile *Zone X*
  - Future Conditions 1% Annual Chance Flood Hazard *Zone X*
  - Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
  - Area with Flood Risk due to Levee *Zone D*
- OTHER AREAS
  - NO SCREEN Area of Minimal Flood Hazard *Zone X*
  - Effective LOMRs
  - Area of Undetermined Flood Hazard *Zone*
- GENERAL STRUCTURES
  - Channel, Culvert, or Storm Sewer
  - Levee, Dike, or Floodwall
- OTHER FEATURES
  - 20.2 Cross Sections with 1% Annual Chance
  - 17.5 Water Surface Elevation
  - Coastal Transect
  - 513 Base Flood Elevation Line (BFE)
  - Limit of Study
  - Jurisdiction Boundary
  - Coastal Transect Baseline
  - Profile Baseline
  - Hydrographic Feature
- MAP PANELS
  - Digital Data Available
  - No Digital Data Available
  - Unmapped

N

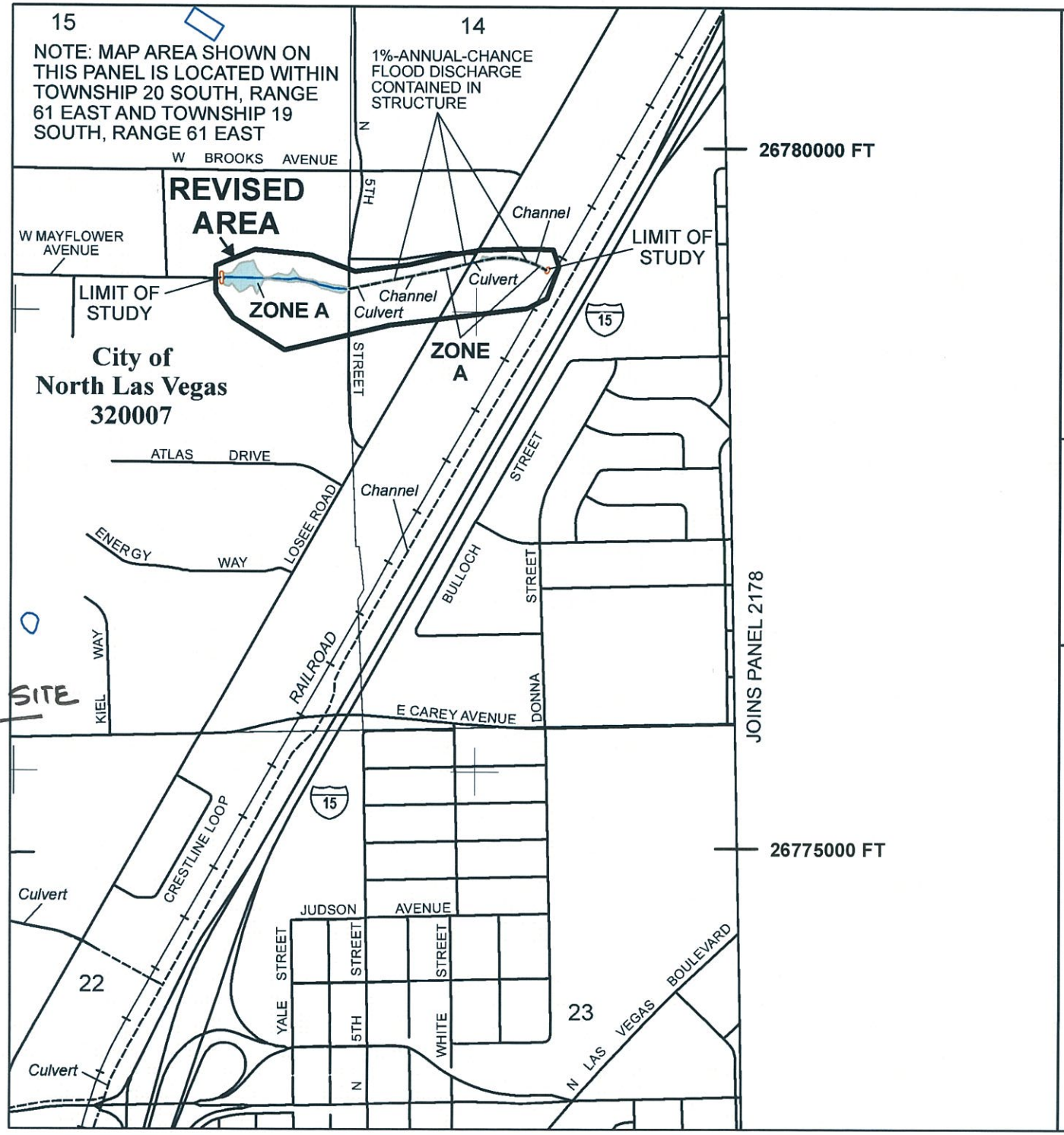
The pin displayed on the map is an approximate point selected by the user and does not represe an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 7/30/2020 at 6:27 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

FIGURE 9a



SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes. *Zone X*

SCALE

Map Projection:
NAD 1983 UTM Zone 11N;
Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet 1:12,000

0 500 1,000 2,000 Feet

0 150 300 600 Meters

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA
and Incorporated Areas

PANEL 2160 OF 4090

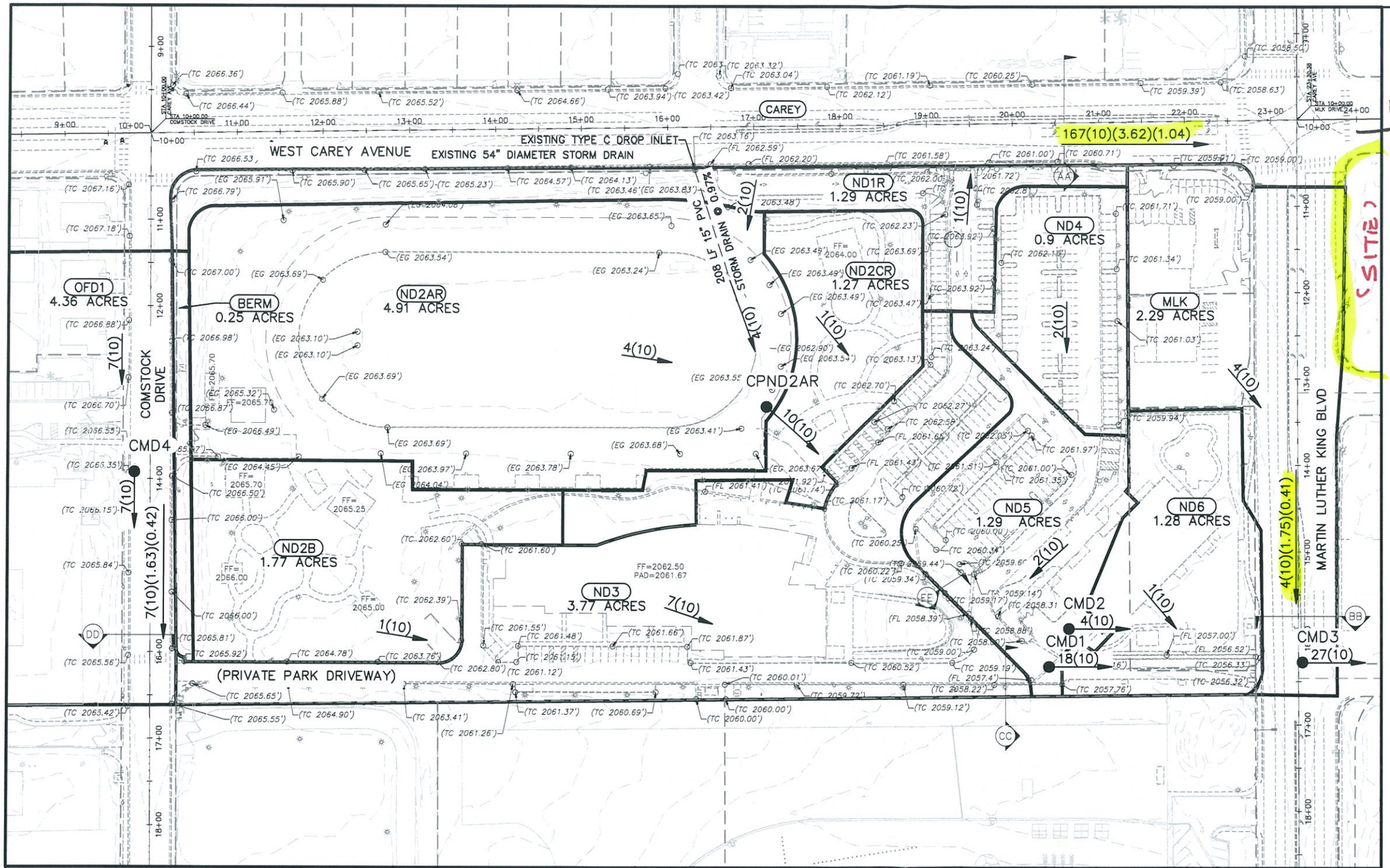
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY	320003	2160	F
LAS VEGAS, CITY OF	325276	2160	F
NORTH LAS VEGAS, CITY OF	320007	2160	F

REVISED TO REFLECT LOMR EFFECTIVE: July 30, 2019

VERSION NUMBER
2.1.3.0
MAP NUMBER
32003C2160F
MAP REVISED
NOVEMBER 16, 2011

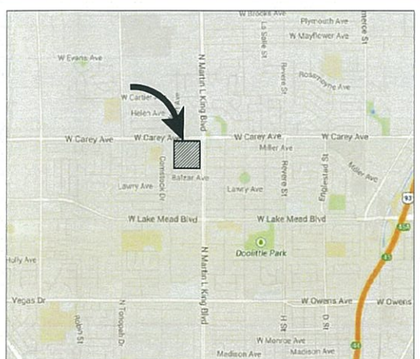
FIGURE 96



HEC-1 ID	AREA (ACRES)	10-YR FLOW (CFS)	DATA SOURCE
ND1R	1.29	1	SBCC
ND2AR	4.91	4	SBCC
CAREY-SD	–	4	SBCC
CAREY-BERM	–	2	SBCC
CPND2AR	–	10	SBCC
ND2B	1.77	1	LOCHSA
ND2CR	1.27	1	SBCC
ND3	3.77	7	LOCHSA
CMD1	–	18	SBCC
ND4	0.9	2	LOCHSA
ND5	1.29	2	LOCHSA
CMD2	–	4	LOCHSA
ND6	1.28	1	LOCHSA
MLK	2.29	4	LOCHSA
CMD3	–	27	SBCC
OFD1	4.36	7	LOCHSA
BERM	0.25	< 1	LOCHSA
CMD4	–	7	LOCHSA

DRAINAGE LEGEND

ND1	DRAINAGE BASIN
●	CONCENTRATION POINT
CMD1	COMBINATION POINT (LOCHSA)
CP1	COMBINATION POINT (SBCC)
10(10)(10)(1.2)	Q(10 OR 10)(V10 OR V100)(D10 OR D100)
2(10)	FLOW IN CFS (10 OR 100 YR)
	FLOW DIRECTION
AA	HYDRAULIC CROSS SECTION



BASIS OF BEARINGS

NORTH 89°15'24" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHEAST QUARTER (NE1/4) OF THE NORTHWEST QUARTER (NW1/4) OF SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 110, PAGE 33 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

BENCHMARK

BENCHMARK NUMBER: SLV012INNW6 – RIVET AND PLATE IN TOP OF CURB AT SW CORNER OF CAREY AND COMSTOCK.
ELEVATION = 2067.15 FEET, 630.069 METERS
N.A.V.D. 88 DATUM
PER THE CITY OF LAS VEGAS BENCHMARK BOOK 2008 ADJUSTMENT (UPDATED 05/24/2010)

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL SYSTEMS AND STREET LIGHT SYSTEM CONDUITS. IT'S COSTLY.
Call before you do UnderGround 1-702-455-7511 CLARK COUNTY TRAFFIC OPERATIONS AND 1-702-432-5300 FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811 or 1-800-227-2600 AND CLARK COUNTY TRAFFIC OPERATIONS 1-702-455-7544

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CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

ALWAYS THINK SAFETY

CLARK COUNTY NEVADA

Project Title: PEARSON PARK TRACK & FIELD RENOVATION
1625 W. Carey Ave., Las Vegas, NV 89032

CLARK COUNTY REAL PROPERTY MANAGEMENT
500 S. Grand Central Pkwy 4th Floor, Las Vegas, NV 89155 702-455-4616

Sheet Title: 10 YEAR STORM (EXISTING CONDITION)

Civil Engineer: S&B CIVIL CONSULTING, LLC

Consultant:

Revisions:

No.	Description	Date

PROFESSIONAL ENGINEER - STATE OF NEVADA
JONATHAN D. TULL
Exp. 06/30/2016
CIVIL
No. 14881

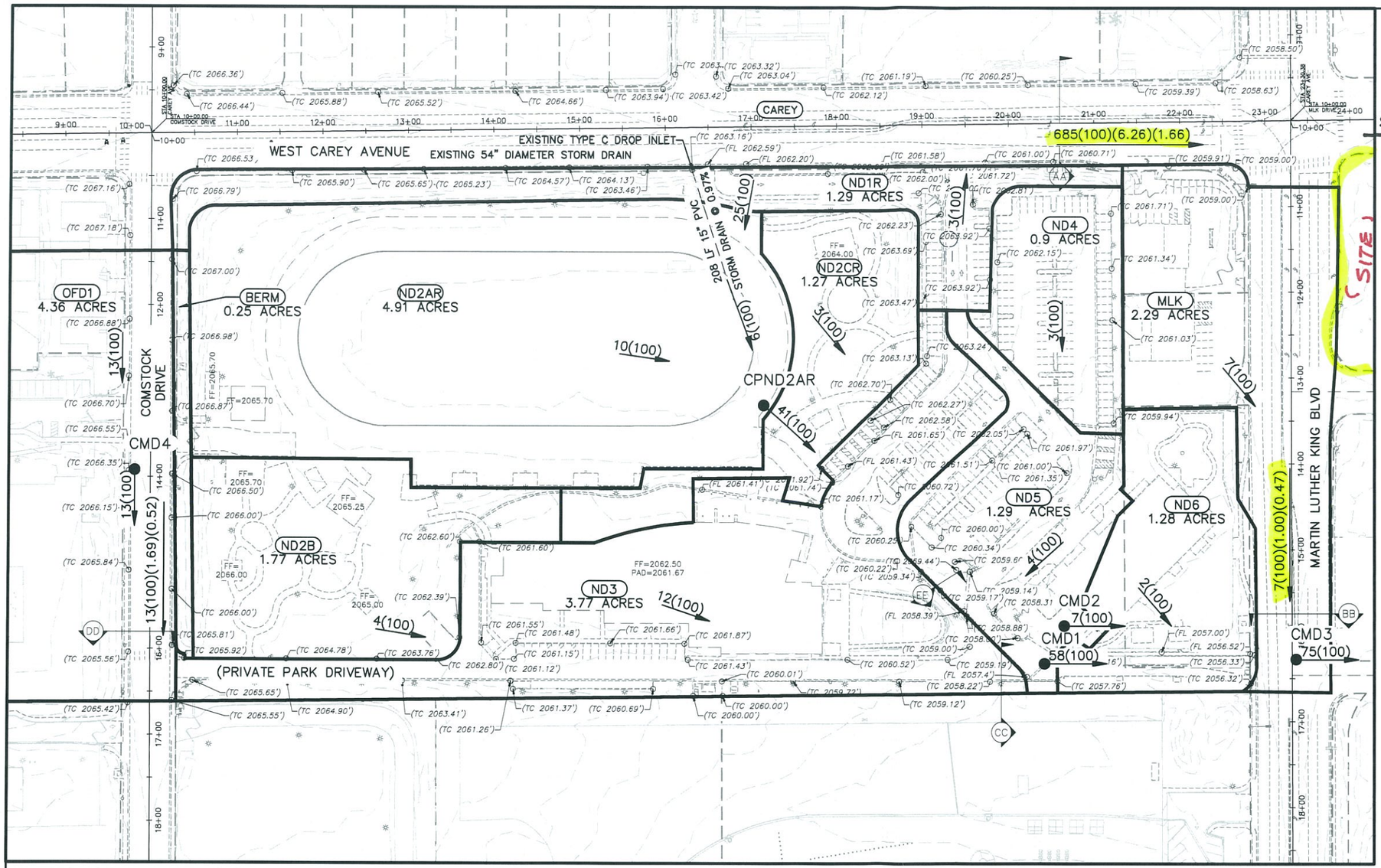
Contract #	603295-14
Designed by:	D. Duranleau
Drawn by:	D. Duranleau
Checked by:	J. Tull
Reviewed by:	B. Christ
Approved by:	J. Tull
Date:	2014 AUG 28

DS-001

Sheet 1 of 6

PEARSON PARK TRACK & FIELD RENOVATIONS

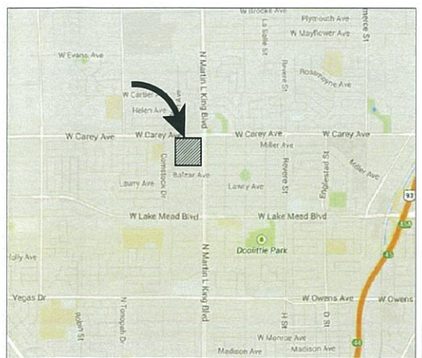
FIGURE 10a



HEC-1 ID	AREA (ACRES)	100-YR FLOW (CFS)	DATA SOURCE
ND1R	1.29	3	SBCC
ND2AR	4.91	10	SBCC
CAREY-SD	–	6	SBCC
CAREY-BERM	–	25	SBCC
CPND2AR	–	41	SBCC
ND2B	1.77	4	LOCHSA
ND2CR	1.27	3	SBCC
ND3	3.77	12	LOCHSA
CMD1	–	58	SBCC
ND4	0.9	3	LOCHSA
ND5	1.29	4	LOCHSA
CMD2	–	7	LOCHSA
ND6	1.28	2	LOCHSA
MLK	2.29	7	LOCHSA
CMD3	–	75	SBCC
OFD1	4.36	13	LOCHSA
BERM	0.25	1	LOCHSA
CMD4	–	13	LOCHSA

DRAINAGE LEGEND

ND1	DRAINAGE BASIN
●	CONCENTRATION POINT
CMD1	COMBINATION POINT (LOCHSA)
CP1	COMBINATION POINT (SBCC)
10(10)(10)(1.2)	Q(10 OR 10)(V10 OR V100)(D10 OR D100)
2(10)	FLOW IN CFS (10 OR 100 YR)
	FLOW DIRECTION
AA	HYDRAULIC CROSS SECTION



LOCATION MAP NTS

BASIS OF BEARINGS

NORTH 89°15'24" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHEAST QUARTER (NE1/4) OF THE NORTHWEST QUARTER (NW1/4) OF SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 110, PAGE 33 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

BENCHMARK

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ELEVATION = 2067.15 FEET, 630.069 METERS
N.A.V.D. 88 DATUM.
PER THE CITY OF LAS VEGAS BENCHMARK BOOK 2008 ADJUSTMENT (UPDATED 05/24/2010)

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Call before you do UnderGround 1-702-455-7511 CLARK COUNTY TRAFFIC OPERATIONS AND 1-702-432-5300 FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

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AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929
ALWAYS THINK SAFETY

CLARK COUNTY NEVADA

Project Title: PEARSON PARK TRACK & FIELD RENOVATION
1625 W. Carey Ave., Las Vegas, NV 89032

CLARK COUNTY REAL PROPERTY MANAGEMENT
500 S. Grand Central Pkwy 4th Floor, Las Vegas, NV 89155 702-455-4616

Sheet Title: 100 YEAR STORM (EXISTING CONDITION)

Civil Engineer: B&B CHRIST CONSULTING, LLC

Consultant:

Revisions:

Description	Date

PROFESSIONAL ENGINEER STATE OF NEVADA JONATHAN D. TULL Exp. 05/31/2016 CIVIL No. 14581

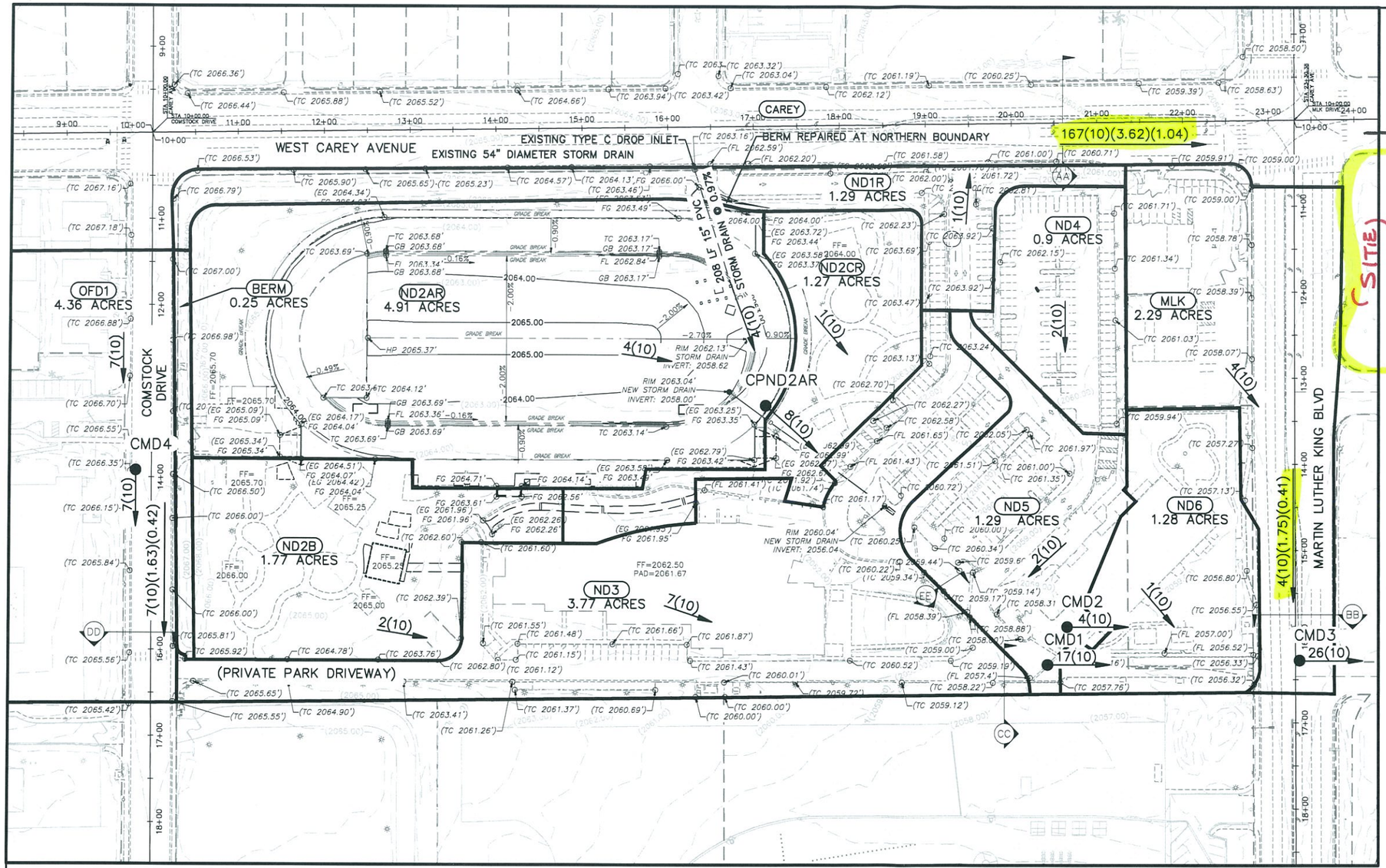
Contract #	603295-14
Designed by:	D. Duranleau
Drawn by:	D. Duranleau
Checked by:	J. Tull
Reviewed by:	B. Christ
Approved by:	J. Tull
Date:	2014 AUG 28

DS-002

Sheet 2 of 6

PEARSON PARK TRACK & FIELD RENOVATIONS

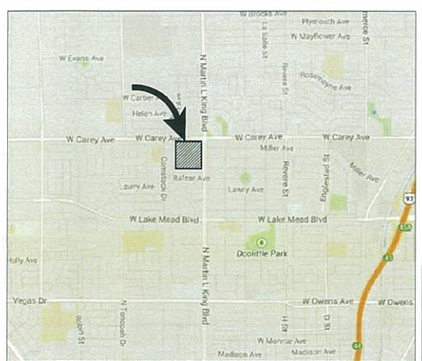
FIGURE 10b



HEC-1 ID	AREA (ACRES)	10-YR FLOW (CFS)	DATA SOURCE
ND1R	1.29	1	SBCC
ND2AR	4.91	4	SBCC
CAREY-SD	–	4	SBCC
CAREY-BERM	–	0	SBCC
CPND2AR	–	8	SBCC
ND2B	1.77	2	SBCC
ND2CR	1.27	1	SBCC
ND3	3.77	7	LOCHSA
CMD1	–	17	SBCC
ND4	0.9	2	LOCHSA
ND5	1.29	2	LOCHSA
CMD2	–	4	LOCHSA
ND6	1.28	1	LOCHSA
MLK	2.29	4	LOCHSA
CMD3	–	26	SBCC
OFD1	4.36	7	LOCHSA
BERM	0.25	< 1	LOCHSA
CMD4	–	7	LOCHSA

DRAINAGE LEGEND

ND1	DRAINAGE BASIN
●	CONCENTRATION POINT
CMD1	COMBINATION POINT (LOCHSA)
CP1	COMBINATION POINT (SBCC)
10(10)(10)(1.2)	Q(10 OR 10)(V10 OR V100)(D10 OR D100)
2(10)	FLOW IN CFS (10 OR 100 YR)
→	FLOW DIRECTION
AA	HYDRAULIC CROSS SECTION



BASIS OF BEARINGS

NORTH 89°15'24" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHEAST QUARTER (NE1/4) OF THE NORTHWEST QUARTER (NW1/4) OF SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 110, PAGE 33 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

BENCHMARK

BENCHMARK NUMBER: SLVD121NW6 – RIVET AND PLATE IN TOP OF CURB AT SW CORNER OF CAREY AND COMSTOCK.
ELEVATION = 2067.15 FEET, 630.069 METERS
N.A.V.D. 88 DATUM
PER THE CITY OF LAS VEGAS BENCHMARK BOOK 2008 ADJUSTMENT (UPDATED 05/24/2010)

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL SYSTEM AND STREET LIGHT SYSTEM CONDUITS. IT'S COSTLY.
Call before you do UnderGround 1-702-455-7511
CLARK COUNTY TRAFFIC OPERATIONS
AND
1-702-492-5000
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811
OR
1-800-227-2600
AND
CLARK COUNTY TRAFFIC OPERATIONS
1-702-455-7544

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CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

ALWAYS THINK SAFETY

CLARK COUNTY NEVADA

Project Title: PEARSON PARK TRACK & FIELD RENOVATION
1625 W. Carey Ave., Las Vegas, NV 89032

CLARK COUNTY REAL PROPERTY MANAGEMENT
500 S. Grand Central Pkwy 4th Floor, Las Vegas, NV 89155 702-455-4616

Sheet Title: 10 YEAR STORM (INTERM CONDITION)

Civil Engineer: B&A CIVIL CONSULTING, LLC

Consultant:

Revisions:

No.	Description	Date

PROFESSIONAL ENGINEER – STATE OF NEVADA
JONATHAN D. TULL
Exp. 05/31/2016
CIVIL
No. 14581

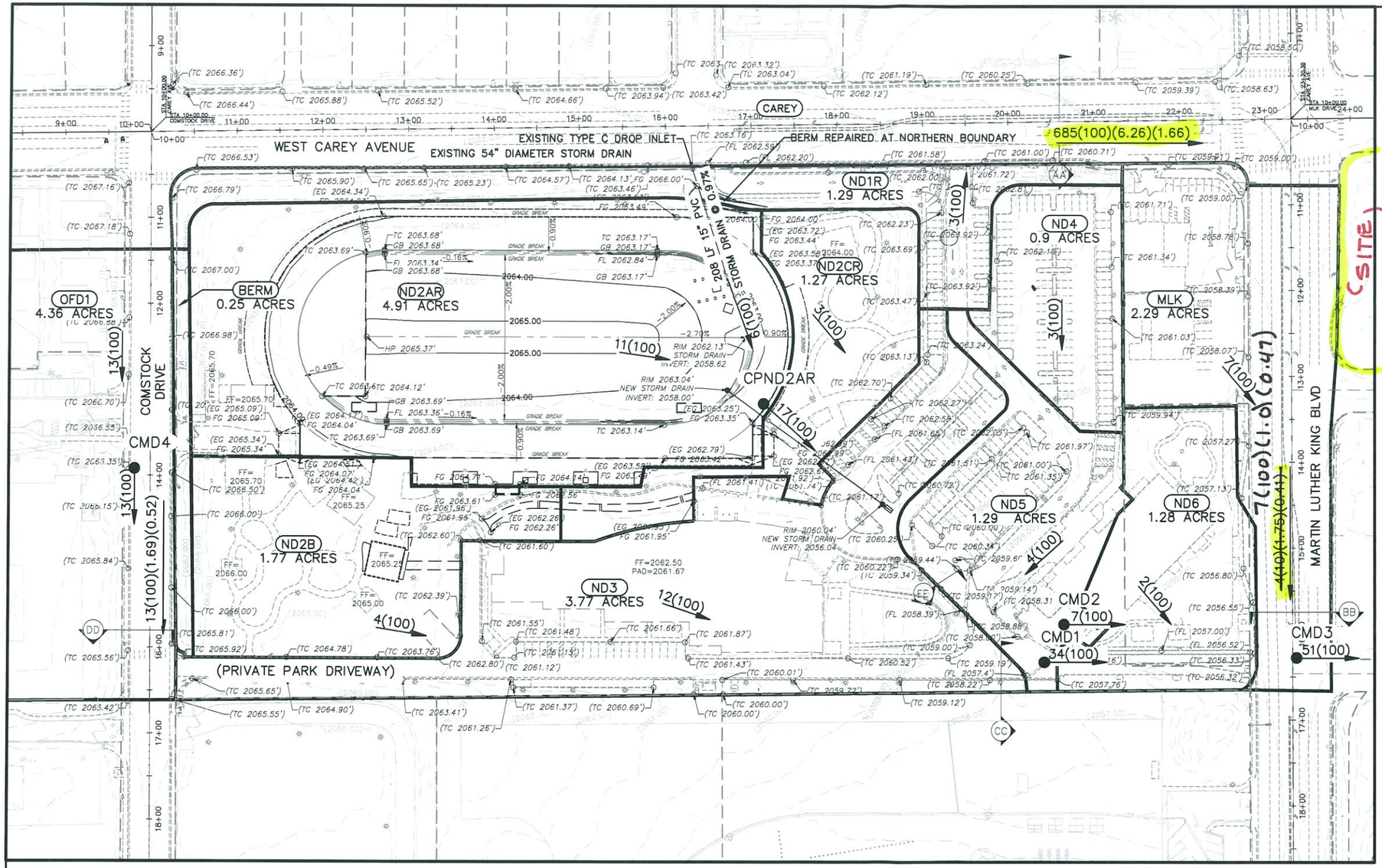
Contract #	603295-14
Designed by:	D. Duranleau
Drawn by:	D. Duranleau
Checked by:	J. Tull
Reviewed by:	B. Christ
Approved by:	J. Tull
Date:	2014 AUG 28

DS-003

Sheet 3 of 6

PEARSON PARK TRACK & FIELD RENOVATIONS

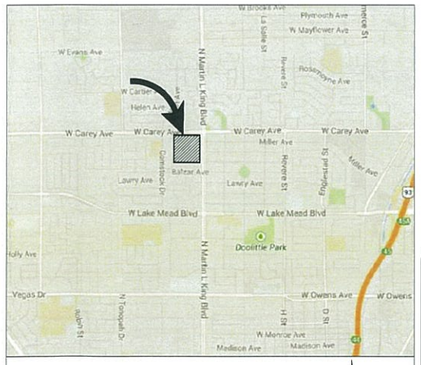
FIGURE 12a



HEC-1 ID	AREA (ACRES)	100-YR FLOW (CFS)	DATA SOURCE
ND1R	1.29	3	SBCC
ND2AR	4.91	11	SBCC
CAREY-SD	–	6	SBCC
CAREY-BERM	–	0	SBCC
CPND2AR	–	17	SBCC
ND2B	1.77	4	SBCC
ND2CR	1.27	3	SBCC
ND3	3.77	12	LOCHSA
CMD1	–	34	SBCC
ND4	0.9	3	LOCHSA
ND5	1.29	4	LOCHSA
CMD2	–	7	LOCHSA
ND6	1.28	2	LOCHSA
MLK	2.29	7	LOCHSA
CMD3	–	51	SBCC
OFD1	4.36	13	LOCHSA
BERM	0.25	1	LOCHSA
CMD4	–	13	LOCHSA

DRAINAGE LEGEND

ND1	DRAINAGE BASIN
●	CONCENTRATION POINT
CMD1	COMBINATION POINT (LOCHSA)
CP1	COMBINATION POINT (SBCC)
10(10)(10)(1.2)	Q(10 OR 10)(V10 OR V100)(D10 OR D100)
2(10)	FLOW IN CFS (10 OR 100 YR)
	FLOW DIRECTION
AA	HYDRAULIC CROSS SECTION



BASIS OF BEARINGS

NORTH 89°15'24" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHEAST QUARTER (NE1/4) OF THE NORTHWEST QUARTER (NW1/4) OF SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 110, PAGE 33 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

BENCHMARK

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ELEVATION = 2067.15 FEET, 630.069 METERS
N.A.V.D. 88 DATUM
PER THE CITY OF LAS VEGAS BENCHMARK BOOK 2008 ADJUSTMENT (UPDATED 05/24/2010)

Call before you do UnderGround 1-702-455-7511 CLARK COUNTY TRAFFIC OPERATIONS AND 1-702-432-5900 FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig Avoid cutting underground utility lines. It's costly. Call 811 OR 1-800-227-2600 AND CLARK COUNTY TRAFFIC OPERATIONS 1-702-455-7544

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

ALWAYS THINK SAFETY

Project Title: PEARSON PARK TRACK & FIELD RENOVATION
1625 W. Carey Ave., Las Vegas, NV 89032

CLARK COUNTY REAL PROPERTY MANAGEMENT
500 S. Grand Central Pkwy 4th Floor, Las Vegas, NV 89155 702-455-4616

Sheet Title: 100 YEAR STORM (INTERIM CONDITION)

Civil Engineer: S&B CIVIL CONSULTING, LLC

Consultant:

Revisions:

Date	Description

JONATHAN D. TULL — No. 14581 — CIVIL — Exp. 03/31/2016 — PROFESSIONAL ENGINEER — STATE OF NEVADA

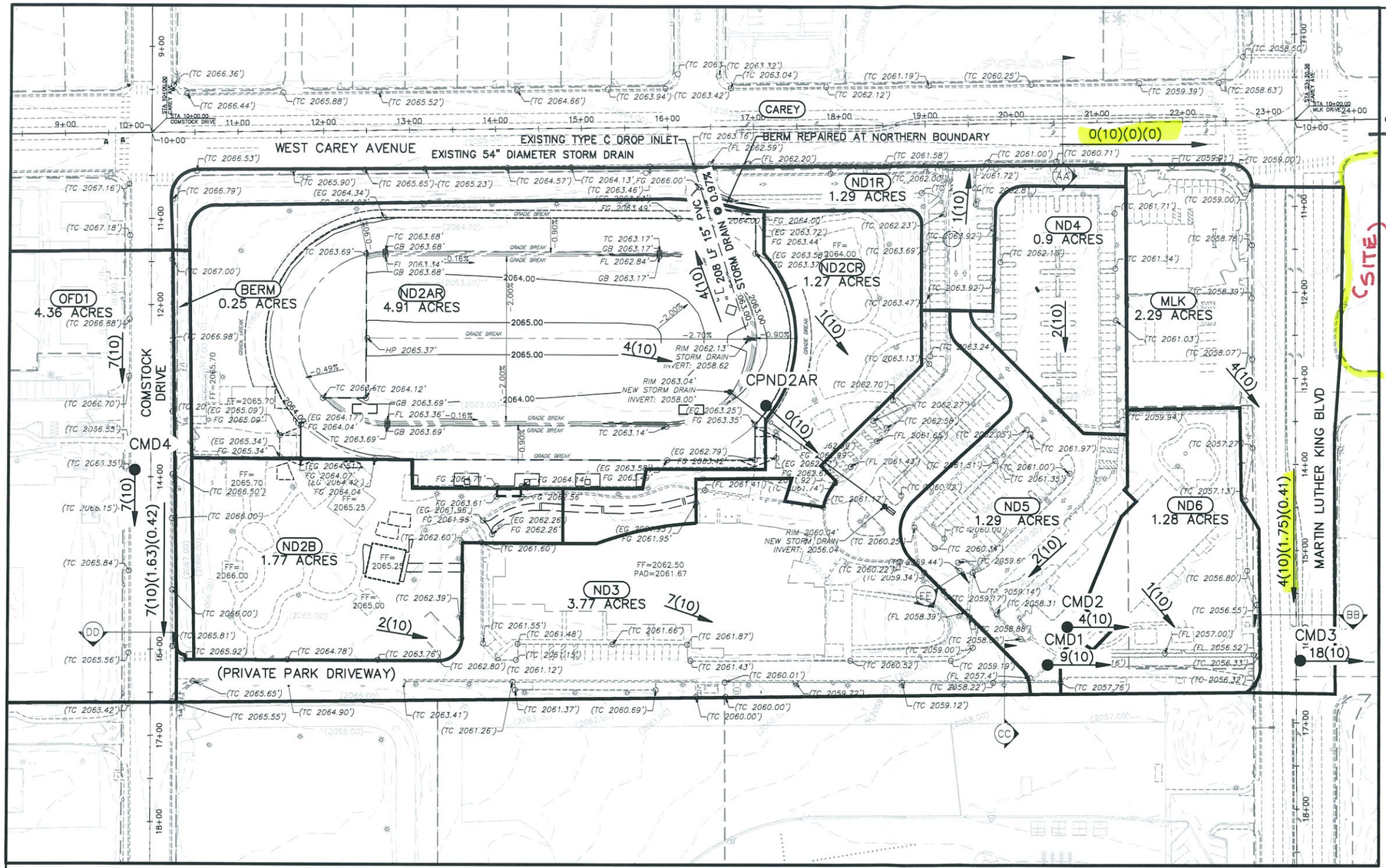
Contract #	603295-14
Designed by:	D. Duranleau
Drawn by:	D. Duranleau
Checked by:	J. Tull
Reviewed by:	B. Christ
Approved by:	J. Tull
Date:	2014 AUG 28

DS-004

Sheet 4 of 6

PEARSON PARK TRACK & FIELD RENOVATIONS

FIGURE 12b



HEC-1 ID	AREA (ACRES)	10-YR FLOW (CFS)	DATA SOURCE
ND1R	1.29	1	SBCC
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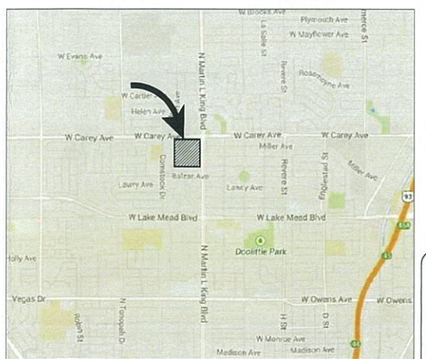
CAREY-SD	–	-4	SBCC
CAREY-BERM	–	0	SBCC
CPND2AR	–	0	SBCC
ND2B	1.77	2	SBCC
ND2CR	1.27	1	SBCC
ND3	3.77	7	LOCHSA
CMD1	–	9	SBCC
ND4	0.9	2	LOCHSA
ND5	1.29	2	LOCHSA
CMD2	–	4	LOCHSA
ND6	1.28	1	LOCHSA
MLK	2.29	4	LOCHSA
CMD3	–	18	LOCHSA
OFD1	4.36	7	LOCHSA
BERM	0.25	< 1	LOCHSA
CMD4	–	7	LOCHSA

DRAINAGE LEGEND

ND1	DRAINAGE BASIN
●	CONCENTRATION POINT
CMD1	COMBINATION POINT (LOCHSA)
CP1	COMBINATION POINT (SBCC)
10(10)(10)(1.2)	Q(10 OR 10)(V10 OR V100)(D10 OR D100)
2(10)	FLOW IN CFS (10 OR 100 YR)
→	FLOW DIRECTION
AA	HYDRAULIC CROSS SECTION



LOCATION MAP — NTS

BASIS OF BEARINGS

NORTH 89°15'24" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHEAST QUARTER (NE1/4) OF THE NORTHWEST QUARTER (NW1/4) OF SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 110, PAGE 33 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

BENCHMARK

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ELEVATION = 2067.15 FEET, 630.069 METERS
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PER THE CITY OF LAS VEGAS BENCHMARK BOOK 2008 ADJUSTMENT (UPDATED 05/24/2010)

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Call before you do UnderGround 1-702-455-7511 CLARK COUNTY TRAFFIC OPERATIONS AND 1-702-492-5900 FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

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Avoid cutting underground utility lines. It's costly.
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OR 1-800-227-2600
AND CLARK COUNTY TRAFFIC OPERATIONS 1-702-455-7544

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CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

ALWAYS THINK SAFETY

CLARK COUNTY NEVADA

Project Title: PEARSON PARK TRACK & FIELD RENOVATION
1625 W. Carey Ave., Las Vegas, NV 89032

CLARK COUNTY REAL PROPERTY MANAGEMENT
500 S. Grand Central Pkwy 4th Floor, Las Vegas, NV 89155 702-455-4616

Sheet Title: 10 YEAR STORM (FUTURE CONDITION)

Civil Engineer: S&B CIVIL CONSULTING, LLC

Consultant:

Revisions:

Date	Description

PROFESSIONAL ENGINEER – STATE OF NEVADA
JONATHAN D. TULL
Exp. 03/31/2016
CIVIL
No. 14581

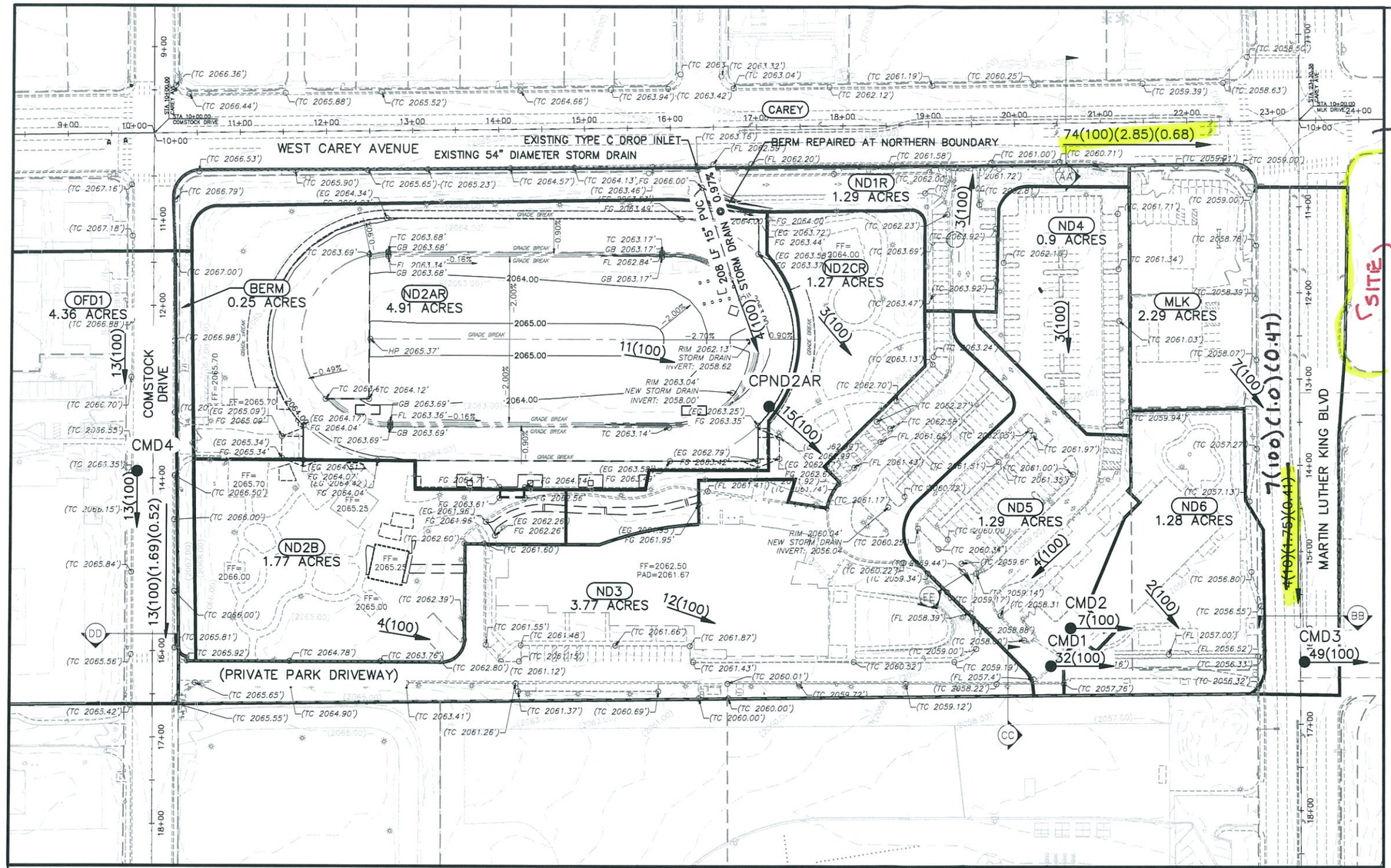
Contract #	603295-14
Designed by:	D. Duranleau
Drawn by:	D. Duranleau
Checked by:	J. Tull
Reviewed by:	B. Christ
Approved by:	J. Tull
Date:	2014 AUG 28

DS-005

Sheet 5 of 6

PEARSON PARK TRACK & FIELD RENOVATIONS

FIGURE 14a

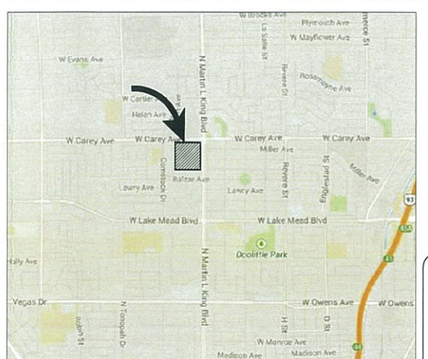


HEC–1 ID	AREA (ACRES)	100–YR FLOW (CFS)	DATA SOURCE
ND1R	1.29	3	SBCC
ND2AR	4.91	11	SBCC
CAREY–SD	–	4	SBCC
CAREY–BERM	–	0	SBCC
CPND2AR	–	15	SBCC
ND2B	1.77	4	SBCC
ND2CR	1.27	3	SBCC
ND3	3.77	12	LOCHSA
CMD1	–	32	SBCC
ND4	0.9	3	LOCHSA
ND5	1.29	4	LOCHSA
CMD2	–	7	LOCHSA
ND6	1.28	2	LOCHSA
MLK	2.29	7	LOCHSA
CMD3	–	49	SBCC
OFD1	4.36	13	LOCHSA
BERM	0.25	1	LOCHSA
CMD4	–	13	LOCHSA

60' 30' 0 60' 120'
1"=60'

DRAINAGE LEGEND

ND1	DRAINAGE BASIN
●	CONCENTRATION POINT
CMD1	COMBINATION POINT (LOCHSA)
CP1	COMBINATION POINT (SBCC)
10(10)(10)(1.2)	Q(10 OR 10)(V10 OR V100)(D10 OR D100)
2(10)	FLOW IN CFS (10 OR 100 YR)
	FLOW DIRECTION
AA	HYDRAULIC CROSS SECTION



LOCATION MAP — NTS

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL SYSTEM AND STREET LIGHT SYSTEM CONDUITS. IT'S COSTLY. Call before you do UnderGround 1-702-455-7511 CLARK COUNTY TRAFFIC OPERATIONS AND 1-702-492-5900 FREEWAY AND INTERNAL SYSTEM OF TRANSPORTATION

Call before you Dig. Avoid cutting underground utility lines. It's costly. Call 811 or 1-800-227-2600 AND CLARK COUNTY TRAFFIC OPERATIONS 1-702-455-7544

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

ALWAYS THINK SAFETY

BASIS OF BEARINGS

NORTH 89°15'24" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHEAST QUARTER (NE1/4) OF THE NORTHWEST QUARTER (NW1/4) OF SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 110, PAGE 33 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

BENCHMARK

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ELEVATION = 2067.15 FEET, 630.069 METERS
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CLARK COUNTY NEVADA

Project Title: PEARSON PARK TRACK & FIELD RENOVATION
1625 W. Carey Ave., Las Vegas, NV 89032

CLARK COUNTY REAL PROPERTY MANAGEMENT
500 S. Grand Central Pkwy 4th Floor, Las Vegas, NV 89155 (702-455-4616)

Sheet Title: 100 YEAR STORM (INTERIM CONDITION)
Civil Engineer: S&B CIVIL CONSULTING, LLC
Consultant: FUTURE

Revisions:

Description	Date
A	

PROFESSIONAL ENGINEER – STATE OF NEVADA – JONATHAN D. TULL – Exp. 06/30/2016 – CIVIL – No. 14581

Contract #	603295-14
Designed by:	D. Duranleau
Drawn by:	D. Duranleau
Checked by:	J. Tull
Reviewed by:	B. Christ
Approved by:	J. Tull
Date:	2014 AUG 28

DS-006
Sheet 6 of 6
PEARSON PARK TRACK & FIELD RENOVATIONS

FIGURE 146

United States Department of Agriculture

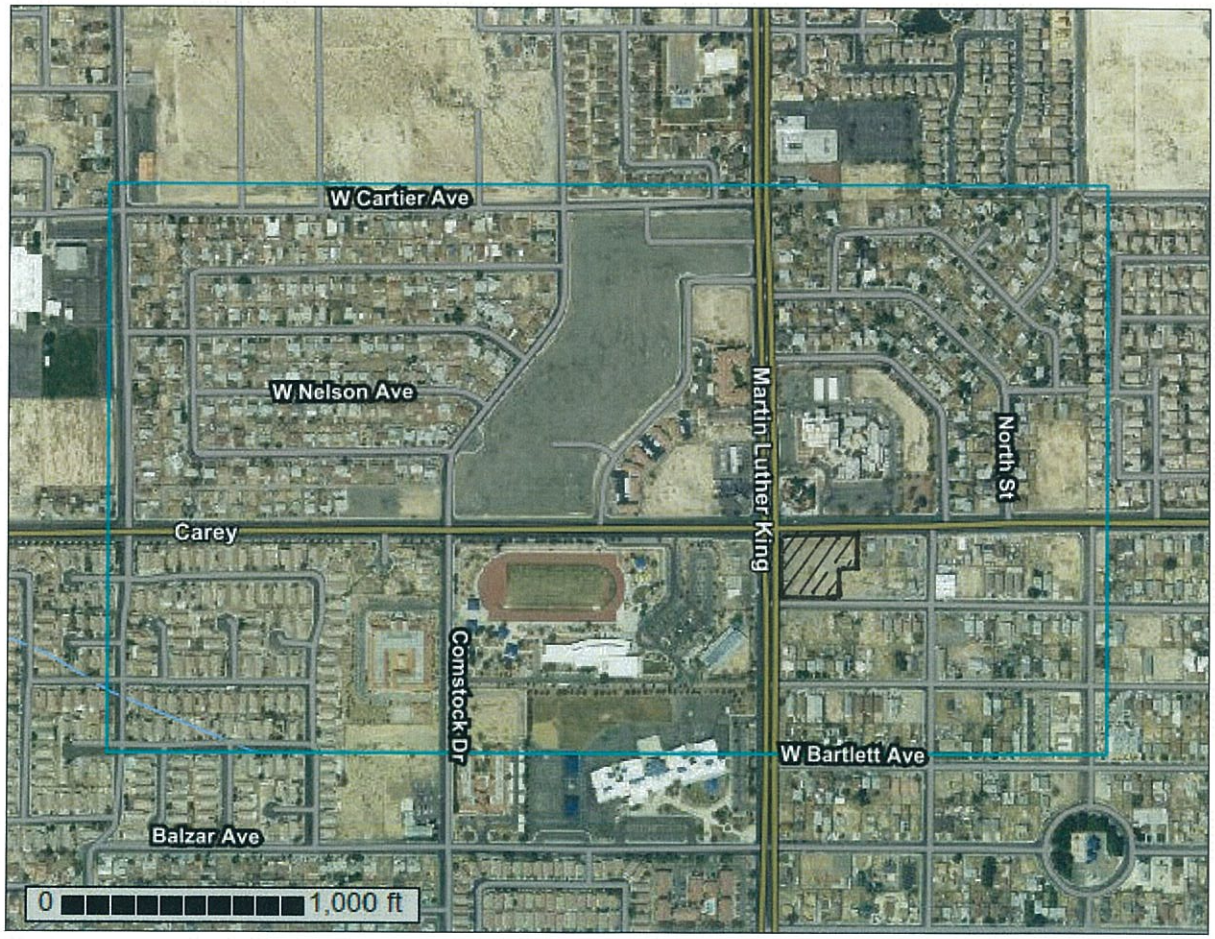
NRCS

Natural Resources Conservation Service

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

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

Good Cluck



July 30, 2020

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County
Survey Area Data: Version 15, Jun 11, 2020

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

Date(s) aerial images were photographed: Apr 3, 2019—May 14, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
236	Glencarb very fine sandy loam, saline	59.1	26.4%
325	McCarran fine sandy loam, 0 to 4 percent slopes	145.0	64.8%
380	Skyhaven very fine sandy loam, 0 to 4 percent slopes	19.5	8.7%
Totals for Area of Interest		**223.7**	**100.0%**

Map Unit Descriptions

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

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

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

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

325—McCarran fine sandy loam, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: hrbv
Elevation: 1,600 to 2,400 feet
Mean annual precipitation: 4 to 6 inches
Mean annual air temperature: 63 to 66 degrees F
Frost-free period: 235 to 260 days
Farmland classification: Not prime farmland

Map Unit Composition

Mccarran and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mccarran

Setting

Landform: Alluvial flats
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from limestone

Typical profile

H1 - 0 to 9 inches: fine sandy loam
H2 - 9 to 48 inches: gypsiferous material
H3 - 48 to 62 inches: gypsiferous material

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 70 percent
Gypsum, maximum content: 40 percent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 12.0
Available water capacity: Very low (about 1.3 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Other vegetative classification: SHALLOW LIMY 5-8 P.Z. (030XB031NV_2)
Hydric soil rating: No

RUNOFF CURVE NUMBERS
(SEMIARID RANGELANDS[1])

Cover description		Curve numbers for hydrologic soil group—			
Cover type	Hydrologic condition[2]	A[3]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

[1]Average runoff condition, and $I_a = 0.2S$.

[2]*Poor:* <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: >70% ground cover.

[3]Curve numbers for group A have been developed only for desert shrub.

Revision	Date

RUNOFF CURVE NUMBERS
(URBAN AREAS[1])

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)[3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only)[4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					

See Table 602A

Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)[5]		77	86	91	94

1 Average runoff condition, and $I_a = 0.2S$.

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system. Impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using Figure 603.

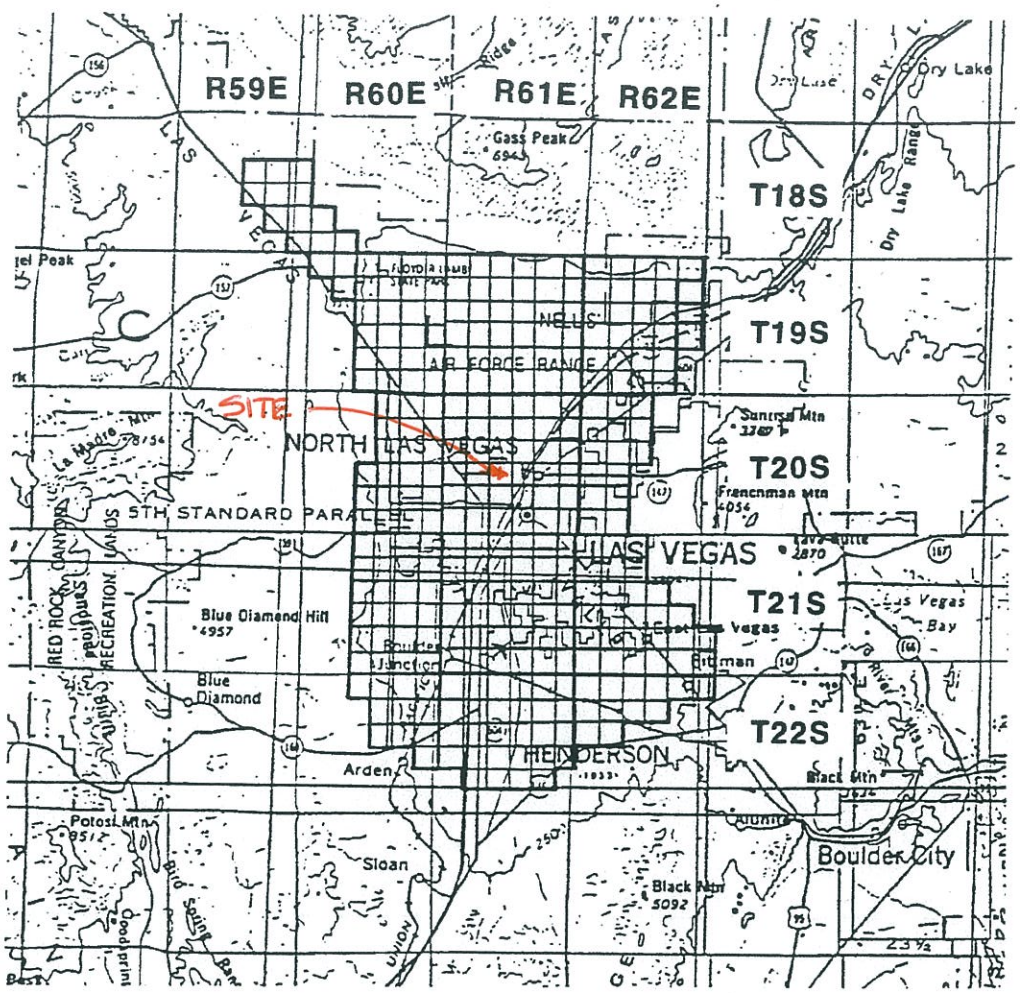
3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4 Composite CN's for natural desert landscaping should be computed using Figure 603 based on the impervious area percentage (CN #98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using Figure 603 based on the degree of development impervious area percentage) and the CN's for the newly graded pervious areas.

Revision	Date

McCARRAN AIRPORT RAINFALL AREA



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

TOWNSHIP	RANGE	SECTIONS
20 South	62 East	4-9,16-20,29-32
21 South	60 East	1-4,9-16,21-28,33-36
21 South	61 East	ALL SECTIONS
21 South	62 East	4-9,15-23, 25-36
22 South	60 East	1-4,10-15,24
22 South	61 East	1-24,26-29
22 South	62 East	1-10,17-18

Notes:
1. Refer to Table 505 and Figure 516 Depth-Duration- Frequency values in the McCarran Airport Rainfall Area.
2. Refer to Table 506 and Figure 517 for Time-Intensity-Frequency values on the McCarran Airport Rainfall Area.

Revision	Date

WRC ENGINEERING

REFERENCE:
USACE, Los Angeles District, 1988

FIGURE 513

SIX-HOUR STORM DISTRIBUTIONS

Storm Time (In Minutes)	Percent of Total Storm Depth SDN3	SDN4	SDN5
0	0.0	0.0	0.0
5	2.0	2.0	2.0
10	5.7	5.8	5.9
15	7.0	7.5	8.0
20	8.7	9.9	11.0
25	10.8	12.6	14.4
30	12.4	13.7	15.0
35	13.0	14.5	16.0
40	13.0	14.9	16.8
45	13.0	15.1	17.1
50	13.0	15.5	18.0
55	13.0	15.6	18.2
60	13.0	15.9	18.7
65	13.3	16.2	19.0
70	14.0	16.9	19.7
75	14.2	17.2	20.2
80	14.8	17.9	21.0
85	15.8	18.9	22.0
90	17.2	20.1	23.0
95	18.1	21.1	24.1
100	19.0	22.0	25.0
105	19.7	22.8	25.9
110	19.9	23.2	26.5
115	20.0	24.0	28.0
120	20.1	24.6	29.0
125	20.4	25.2	30.0
130	21.4	26.0	30.5
135	22.9	26.9	30.9
140	24.1	27.6	31.0
145	24.9	28.3	31.7
150	25.1	28.6	32.1
155	25.6	29.2	32.7
160	27.0	30.2	33.3
165	27.8	31.2	34.6
170	28.1	32.1	36.1
175	28.3	33.2	38.1
180	29.5	35.2	40.8
185	32.2	37.6	43.0
190	35.2	41.5	47.7
195	40.9	46.2	51.4
200	49.9	53.0	56.1
205	59.0	61.0	63.0
210	71.0	71.0	71.0
215	74.4	73.2	72.0
220	78.1	75.6	73.1
225	81.2	78.2	75.2
230	81.9	79.9	77.9
235	83.5	81.3	79.0
240	85.1	82.3	79.5
245	85.6	83.0	80.4
250	86.0	83.5	81.0
255	86.8	84.4	82.0
260	87.6	85.1	82.6
265	88.8	86.4	84.0
270	91.0	88.5	85.9
275	92.6	90.8	88.9
280	93.7	92.4	91.0
285	95.0	94.4	93.8
290	97.0	96.8	96.6
295	97.6	97.3	97.0
300	98.2	97.8	97.4
305	98.5	98.2	97.9
310	98.7	98.4	98.1
315	98.9	98.6	98.3
320	99.0	98.8	98.5
325	99.3	99.1	98.9
330	99.3	99.2	99.0
335	99.4	99.3	99.2
340	99.5	99.4	99.3
345	99.8	99.7	99.6
350	99.8	99.8	99.7
355	99.9	99.9	99.9
360	100.0	100.0	100.0

Notes:
1. For drainage areas less than 8 square miles in size, use SDN 3.
2. For drainage areas greater than or equal to 8 square miles and less than 12 square miles in size, use SDN 4.
3. For drainage areas greater than or equal to 12 square miles, use SDN 5.
4. A graphical representation of these values is presented on **Figure 515.**

Revision	Date

REFERENCE:

TABLE 503

DEPTH-DURATION-FREQUENCY VALUES FOR McCARRAN AIRPORT RAINFALL AREA

(IN INCHES)

	RECURRENCE INTERVAL					
TIME	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
5 min.	0.15	0.27	0.35	0.46	0.54	0.63
10 min.	0.25	0.44	0.57	0.74	0.89	1.02
15 min.	0.33	0.57	0.74	0.97	1.15	1.32
30 min.	0.44	0.78	1.01	1.31	1.55	1.79
1 hour	0.52	0.89	1.15	1.50	1.78	2.06
2 hour	0.59	1.01	1.30	1.70	2.01	2.30
3 hour	0.64	1.08	1.39	1.82	2.15	2.48
6 hour	0.72	1.22	1.58	2.05	2.41	2.77
24 hour (TR-55)	1.20	1.60	1.80	2.40	2.70	2.96

NOTE: 1. Refer to Figure 513 for a description and drawing of the area included in the McCarran Airport Rainfall Area.

2. The 24 hour values presented above are for use with TR-55 only.

3. Table 501 adjustments not required.

Revision	Date

WRC ENGINEERING	REFERENCE: USACE, Los Angeles District, 1988	TABLE 505

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

BAUGHMAN & TURNER, INC.
CONSULTING ENGINEERS

PROJECT NO. : **DEVELOPMENT : Good Cluck MLK & Carey**

FILE : Existing & Developed Condition **CALCULATED BY: pp** **DATE : 10/13/20**

Sub-Basin Data					Initial/Overland Time (T_i)			Travel Time (T_t)					T_c	T_c Check (Urbanized Basins)		Final T_c	T_{lag}	Remarks
DESIG	CN	K	AREA (acres)	AREA (mi^2)	LENGTH (ft)	SLOPE (%)	T_i (min)	LENGTH (ft)	SLOPE (%)	V_1 (fps)	V_2 (fps)	T_t (min)	$T_c=T_i+T_t$ (min)	TOTAL (ft)	T_c (min)	T_c (min)	T_{lag} (hrs)	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
Interim/Developed Condition																		
DON1	89	0.78	0.26	0.0004	15	2.00	1.7	135	1.810	2.72	N/A	0.8	2.6	150.0	10.8	2.6	0.050	Dev.
DON2	89	0.78	0.27	0.0004	50	0.50	5.1	180	1.00	2.02	N/A	1.5	6.5	230.0	11.3	6.5	0.065	Dev.
DON3	89	0.78	0.88	0.0014	120	1.63	5.3	185	1.41	2.40	N/A	1.3	6.6	305.0	11.7	6.6	0.066	Dev.
DON4	89	0.78	0.32	0.0005	50	1.76	3.3	210	1.69	2.63	N/A	1.3	4.7	260.0	11.4	4.7	0.050	Dev.
Existing																		
EXON1	63	0.44	1.73	0.0027	180	0.56	19.3	360	0.68	1.22	N/A	4.9	24.2	N/A	N/A	24.2	0.242	Undev.
MLK	98	0.9	0.44	0.0007	55	2.00	2.1	306	0.510	1.44	N/A	3.5	5.6	361.0	12.0	5.6	0.056	Dev.
MILLER	98	0.9	0.54	0.0008	23	2.00	1.3	295	0.520	1.46	N/A	3.4	4.7	318.0	11.8	4.7	0.050	Dev.

$T_i=(1.8(1.1-K)L^{(1/2)})/(S^{1/3})$

$T_c=T_i+T_t$

$K=0.0132(CN)-.39$

$T_{lag} = 0.6T_c$

For the travel time (T_t) calculations,
V_1 applies to the first 500 feet of travel distance;
V_2 applies to the remaining travel distance.

Travel Time Velocity Formulas

Existing	Developed
$V_1 = 14.8*(S/100)^{1/2}$	$V_1 = 20.2*(S/100)^{1/2}$
$V_2 = 29.4*(S/100)^{1/2}$	$V_2 = 30.6*(S/100)^{1/2}$

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

REFERENCE:

STANDARD FORM 4

```
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*              JUN  1998               *
*            VERSION 4.1               *
*                                      *
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*                                      *
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****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


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

              *DIAGRAM
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    2         ID   Good Cluck MLK & Carey
    3         ID
    4         ID   Existing Condition
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    8         ID
    9         IT       5                    300
   10         IO       5
   11         IN       5
   12         JR    PREC    0.57     1.0
              * **********************
              * Existing Conditions  *
              * **********************

   13         KK     MLK
   14         BA  0.0007
   15         PB    2.77
   16         PC    0.00       2     5.7       7     8.7    10.8    12.4      13      13      13
   17         PC      13      13      13    13.3      14    14.2    14.8    15.8    17.2    18.1
   18         PC      19    19.7    19.7    20.1    20.1    20.4    21.4    22.9    24.1    24.9
   19         PC    25.1    25.6      27    27.8    28.1    28.3    29.5    32.2    35.2    40.9
   20         PC    49.9      59      71    74.4    78.1    81.2    81.9    83.5    85.1    85.6
   21         PC      86    86.8    87.6    88.8      91    92.6    93.7      95      97    97.6
   22         PC    98.2    98.5    98.7    98.9      99    99.3    99.3    99.4    99.5    99.8
   23         PC    99.8    99.9     100
   24         LS              98
   25         UD   0.056

   26         KK  MILLER
   27         BA  0.0008
   28         LS              98
   29         UD    0.05

   30         KK    CP1A
   31         HC       2

   32         KK   EXON1
   33         BA  0.0027
   34         LS              63
   35         UD   0.242

   36         KK     CP1
   37         HC       2
   38         ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

    13        MLK
                .
                .
    26          .      MILLER
                .          .
                .          .
    30        CP1A.........
                .
```

```
                .
    32          .       EXON1
                .         .
                .         .
    36        CP1.........
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *               JUN  1998               *
 *            VERSION 4.1                *
 *                                       *
 *  RUN DATE   12OCT20  TIME  09:37:36   *
 *                                       *
 *****************************************
```

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

Good Cluck MLK & Carey

Existing Condition

File N:\Good Cluck West MLK Carey\DOCS\HYDROLOGY\HEC1\goodex.DAT

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                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

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

                    COMPUTATION INTERVAL      .08 HOURS
                         TOTAL TIME BASE    24.92 HOURS

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

      JP            MULTI-PLAN OPTION
                         NPLAN           1  NUMBER OF PLANS

      JR            MULTI-RATIO OPTION
                        RATIOS OF PRECIPITATION
                        .57      1.00
1
```

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1	RATIO 2
					.57	1.00
HYDROGRAPH AT						
+	MLK	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	MILLER	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
2 COMBINED AT						
+	CP1A	.00	1	FLOW	2.	3.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	EXON1	.00	1	FLOW	0.	1.
				TIME	4.92	3.75
2 COMBINED AT						
+	CP1	.00	1	FLOW	2.	4.
				TIME	3.50	3.50

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

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN  1998               *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   12OCT20  TIME  13:47:40  *
*                                      *
****************************************
```

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

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


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

              *DIAGRAM
    1         ID
    2         ID   Good Cluck MLK & Carey
    3         ID
    4         ID   Developed Condition
    5         ID
    6         ID    File  N:\Good Cluck West MLK Carey\DOCS\HYDROLOGY\HEC1\gooddv.DAT
    7         ID
    8         ID
    9         IT       5                    300
   10         IO       5
   11         IN       5
   12         JR    PREC    0.57     1.0
              * **********************
              * Developed Conditions *
              * **********************

   13         KK     MLK
   14         BA  0.0007
   15         PB    2.77
   16         PC    0.00       2     5.7       7     8.7    10.8    12.4      13      13      13
   17         PC      13      13      13    13.3      14    14.2    14.8    15.8    17.2    18.1
   18         PC      19    19.7    19.7    20.1    20.1    20.4    21.4    22.9    24.1    24.9
   19         PC    25.1    25.6      27    27.8    28.1    28.3    29.5    32.2    35.2    40.9
   20         PC    49.9      59      71    74.4    78.1    81.2    81.9    83.5    85.1    85.6
   21         PC      86    86.8    87.6    88.8      91    92.6    93.7      95      97    97.6
   22         PC    98.2    98.5    98.7    98.9      99    99.3    99.3    99.4    99.5    99.8
   23         PC    99.8    99.9     100
   24         LS              98
   25         UD   0.056

   26         KK  MILLER
   27         BA  0.0008
   28         LS              98
   29         UD    0.05

   30         KK    DON3
   31         BA  0.0014
   32         LS              89
   33         UD   0.066

   34         KK    CP1A
   35         HC       3

   36         KK    DON4
   37         BA  0.0005
   38         LS              89
   39         UD   0.050

   40         KK     CP1
   41         HC       2
```



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

   42         KK    DON1
   43         BA  0.0004
   44         LS              89
   45         UD   0.050

   46         KK    DON2
```

```
            47          BA  0.0004
            48          LS              89
            49          UD   0.065

            50          KK     CP2
            51          HC       2
            52          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    13        MLK
              .
              .
    26        .      MILLER
              .          .
              .          .
    30        .          .        DON3
              .          .          .
              .          .          .
    34       CP1A.....................
              .
              .
    36        .        DON4
              .          .
              .          .
    40       CP1.............
              .
              .
    42        .        DON1
              .          .
              .          .
    46        .          .        DON2
              .          .          .
              .          .          .
    50        .         CP2.............

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                  ****************************************
*                                      *                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                  *    U.S. ARMY CORPS OF ENGINEERS      *
*               JUN  1998              *                  *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1               *                  *         609 SECOND STREET            *
*                                      *                  *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   12OCT20  TIME  13:47:40  *                  *           (916) 756-1104             *
*                                      *                  *                                      *
****************************************                  ****************************************
```

Good Cluck MLK & Carey

Developed Condition

File N:\Good Cluck West MLK Carey\DOCS\HYDROLOGY\HEC1\gooddv.DAT

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

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

                    COMPUTATION INTERVAL      .08 HOURS
                         TOTAL TIME BASE   24.92 HOURS

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

     JP          MULTI-PLAN OPTION
                      NPLAN           1  NUMBER OF PLANS

     JR          MULTI-RATIO OPTION
                     RATIOS OF PRECIPITATION
                     .57      1.00
1

                PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                                  FLOWS IN CUBIC FEET PER SECOND   AREA IN SQUARE MILES
```

TIME TO PEAK IN HOURS

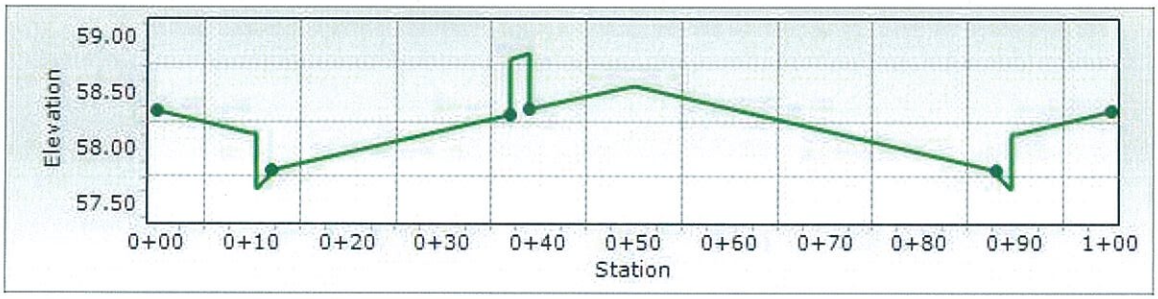
OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1	RATIO 2
					.57	1.00
HYDROGRAPH AT						
+	MLK	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	MILLER	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	DON3	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
3 COMBINED AT						
+	CP1A	.00	1	FLOW	3.	6.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	DON4	.00	1	FLOW	0.	1.
				TIME	3.50	3.50
2 COMBINED AT						
+	CP1	.00	1	FLOW	3.	7.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	DON1	.00	1	FLOW	0.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	DON2	.00	1	FLOW	0.	1.
				TIME	3.50	3.50
2 COMBINED AT						
+	CP2	.00	1	FLOW	1.	1.
				TIME	3.50	3.50

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

Cross Section for HS1 Carey Ave Q100

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.004 ft/ft
Normal Depth	1.6 ft
Discharge	584.00 cfs



Worksheet for HS1 Carey Ave Q100

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.004 ft/ft
Discharge	584.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	58.34
0+10.00	58.14
0+10.50	58.14
0+10.50	57.64
0+12.00	57.77
0+12.00	57.81
0+37.00	58.31
0+37.00	58.81
0+39.00	58.85
0+39.00	58.35
0+50.00	58.57
0+88.00	57.81
0+88.00	57.77
0+89.50	57.64
0+89.50	58.14
0+90.00	58.14
1+00.00	58.34

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 58.34)	(0+12.00, 57.81)	0.013
(0+12.00, 57.81)	(0+37.00, 58.31)	0.017
(0+37.00, 58.31)	(0+39.00, 58.35)	0.013
(0+39.00, 58.35)	(0+88.00, 57.81)	0.017
(0+88.00, 57.81)	(1+00.00, 58.34)	0.013

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

Results	
Normal Depth	1.6 ft

Worksheet for HS1 Carey Ave Q100

Results	
Roughness Coefficient	0.016
Elevation	59.20 ft
Elevation Range	57.64 to 58.85 ft
Flow Area	101.0 ft²
Wetted Perimeter	103.84 ft
Hydraulic Radius	1.0 ft
Top Width	100.00 ft
Normal Depth	1.6 ft
Critical Depth	1.6 ft
Critical Slope	0.004 ft/ft
Velocity	5.78 ft/s
Velocity Head	0.52 ft
Specific Energy	2.08 ft
Froude Number	1.014
Flow Type	Supercritical

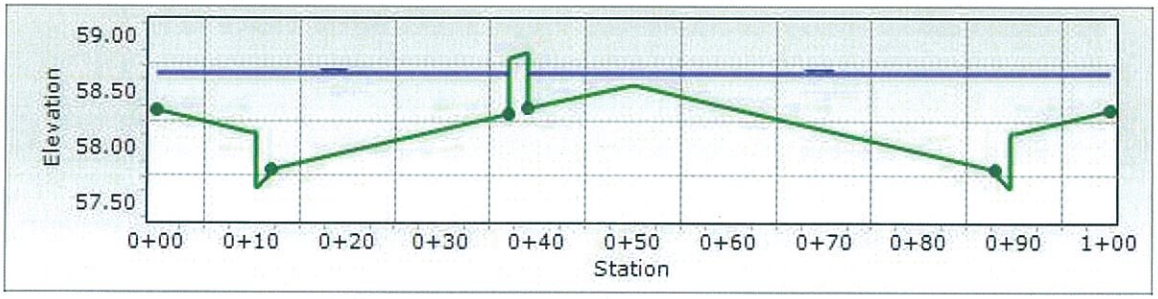
GVF Input Data	
Downstream Depth	0.0 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.6 ft
Critical Depth	1.6 ft
Channel Slope	0.004 ft/ft
Critical Slope	0.004 ft/ft

HS1 Carey Ave Q10

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.0040 ft/ft
Normal Depth	1.0 ft
Discharge	166.00 cfs



*Dry Lane not met

Worksheet for HS1 Carey Ave Q10

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.0040 ft/ft
Discharge	166.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	58.34
0+10.00	58.14
0+10.50	58.14
0+10.50	57.64
0+12.00	57.77
0+12.00	57.81
0+37.00	58.31
0+37.00	58.81
0+39.00	58.85
0+39.00	58.35
0+50.00	58.57
0+88.00	57.81
0+88.00	57.77
0+89.50	57.64
0+89.50	58.14
0+90.00	58.14
1+00.00	58.34

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 58.34)	(0+12.00, 57.81)	0.013
(0+12.00, 57.81)	(0+37.00, 58.31)	0.017
(0+37.00, 58.31)	(0+39.00, 58.35)	0.013
(0+39.00, 58.35)	(0+88.00, 57.81)	0.017
(0+88.00, 57.81)	(1+00.00, 58.34)	0.013

Options

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

Results

Normal Depth	1.0 ft

Worksheet for HS1 Carey Ave Q10

Results	
Roughness Coefficient	0.016
Elevation	58.66 ft
Elevation Range	57.64 to 58.85 ft
Flow Area	47.0 ft²
Wetted Perimeter	100.42 ft
Hydraulic Radius	0.5 ft
Top Width	98.00 ft
Normal Depth	1.0 ft
Critical Depth	1.0 ft
Critical Slope	0.0051 ft/ft
Velocity	3.53 ft/s
Velocity Head	0.19 ft
Specific Energy	1.22 ft
Froude Number	0.899
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.0 ft
Critical Depth	1.0 ft
Channel Slope	0.0040 ft/ft
Critical Slope	0.0051 ft/ft

Worksheet for HS1 Carey Ave Q10

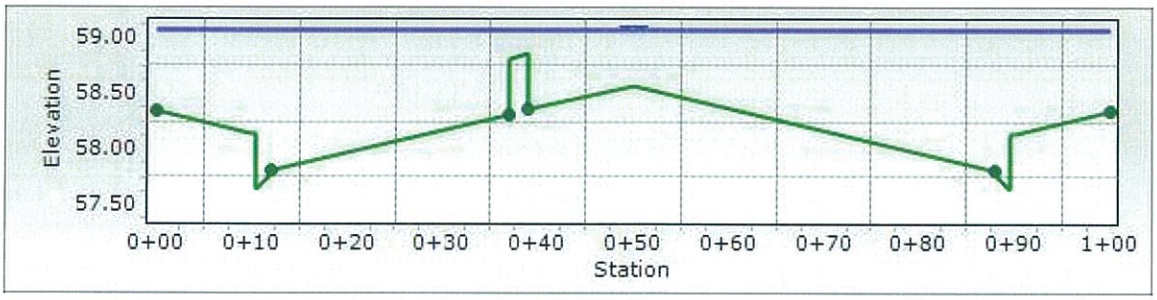
Messages:

Water Surface Elevation exceeds lowest end station by 0.321771038450734ft. Flow is divided.

HS2 Carey Ave Q100

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.0067 ft/ft
Normal Depth	1.4 ft
Discharge	584.00 cfs



Worksheet for HS2 Carey Ave Q100

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.0067 ft/ft
Discharge	584.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	58.34
0+10.00	58.14
0+10.50	58.14
0+10.50	57.64
0+12.00	57.77
0+12.00	57.81
0+37.00	58.31
0+37.00	58.81
0+39.00	58.85
0+39.00	58.35
0+50.00	58.57
0+88.00	57.81
0+88.00	57.77
0+89.50	57.64
0+89.50	58.14
0+90.00	58.14
1+00.00	58.34

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 58.34)	(0+12.00, 57.81)	0.013
(0+12.00, 57.81)	(0+37.00, 58.31)	0.017
(0+37.00, 58.31)	(0+39.00, 58.35)	0.013
(0+39.00, 58.35)	(0+88.00, 57.81)	0.017
(0+88.00, 57.81)	(1+00.00, 58.34)	0.013

Options

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

Results

Normal Depth	1.4 ft

Worksheet for HS2 Carey Ave Q100

Results	
Roughness Coefficient	0.016
Elevation	59.06 ft
Elevation Range	57.64 to 58.85 ft
Flow Area	86.4 ft²
Wetted Perimeter	103.55 ft
Hydraulic Radius	0.8 ft
Top Width	100.00 ft
Normal Depth	1.4 ft
Critical Depth	1.6 ft
Critical Slope	0.0039 ft/ft
Velocity	6.76 ft/s
Velocity Head	0.71 ft
Specific Energy	2.13 ft
Froude Number	1.281
Flow Type	Supercritical

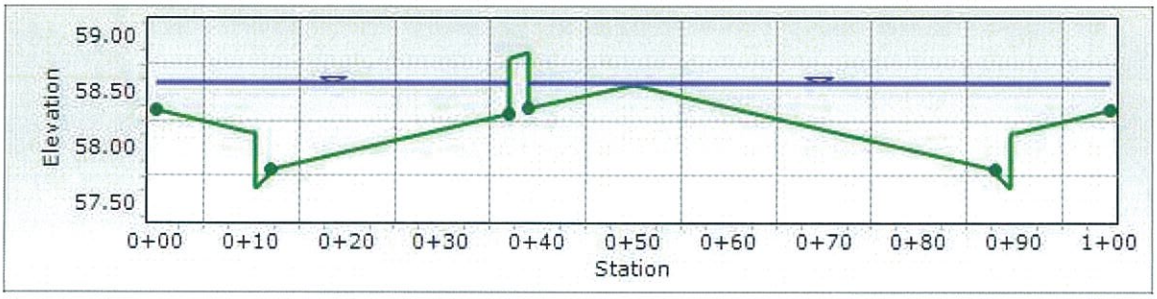
GVF Input Data	
Downstream Depth	0.0 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.4 ft
Critical Depth	1.6 ft
Channel Slope	0.0067 ft/ft
Critical Slope	0.0039 ft/ft

HS2 Carey Ave Q10

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.0067 ft/ft
Normal Depth	1.0 ft
Discharge	166.00 cfs



* Dry Lane Not met

Worksheet for HS2 Carey Ave Q10

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.0067 ft/ft
Discharge	166.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	58.34
0+10.00	58.14
0+10.50	58.14
0+10.50	57.64
0+12.00	57.77
0+12.00	57.81
0+37.00	58.31
0+37.00	58.81
0+39.00	58.85
0+39.00	58.35
0+50.00	58.57
0+88.00	57.81
0+88.00	57.77
0+89.50	57.64
0+89.50	58.14
0+90.00	58.14
1+00.00	58.34

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 58.34)	(0+12.00, 57.81)	0.013
(0+12.00, 57.81)	(0+37.00, 58.31)	0.017
(0+37.00, 58.31)	(0+39.00, 58.35)	0.013
(0+39.00, 58.35)	(0+88.00, 57.81)	0.017
(0+88.00, 57.81)	(1+00.00, 58.34)	0.013

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

Results	
Normal Depth	1.0 ft

Worksheet for HS2 Carey Ave Q10

Results	
Roughness Coefficient	0.016
Elevation	58.59 ft
Elevation Range	57.64 to 58.85 ft
Flow Area	40.2 ft²
Wetted Perimeter	100.14 ft
Hydraulic Radius	0.4 ft
Top Width	98.00 ft
Normal Depth	1.0 ft
Critical Depth	1.0 ft
Critical Slope	0.0051 ft/ft
Velocity	4.13 ft/s
Velocity Head	0.26 ft
Specific Energy	1.22 ft
Froude Number	1.135
Flow Type	Supercritical

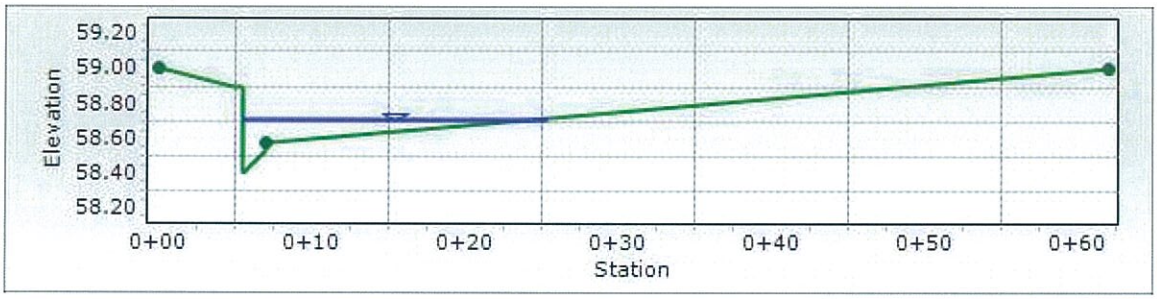
GVF Input Data	
Downstream Depth	0.0 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.0 ft
Critical Depth	1.0 ft
Channel Slope	0.0067 ft/ft
Critical Slope	0.0051 ft/ft

HS3 Martin L King Q100 (1/2)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.0049 ft/ft
Normal Depth	0.3 ft
Discharge	2.00 cfs



Worksheet for HS3 Martin L King Q100 (1/2)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.0049 ft/ft
Discharge	2.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	59.00
0+05.00	58.90
0+05.50	58.90
0+05.50	58.40
0+07.00	58.53
0+07.00	58.57
0+62.00	59.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 59.00)	(0+07.00, 58.57)	0.013
(0+07.00, 58.57)	(0+62.00, 59.00)	0.017

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

Results	
Normal Depth	0.3 ft
Roughness Coefficient	0.017
Elevation	58.71 ft
Elevation Range	58.40 to 59.00 ft
Flow Area	1.7 ft²
Wetted Perimeter	20.18 ft
Hydraulic Radius	0.1 ft
Top Width	19.82 ft
Normal Depth	0.3 ft
Critical Depth	0.3 ft
Critical Slope	0.0098 ft/ft
Velocity	1.19 ft/s
Velocity Head	0.02 ft

Worksheet for HS3 Martin L King Q100 (1/2)

Results	
Specific Energy	0.34 ft
Froude Number	0.718
Flow Type	Subcritical

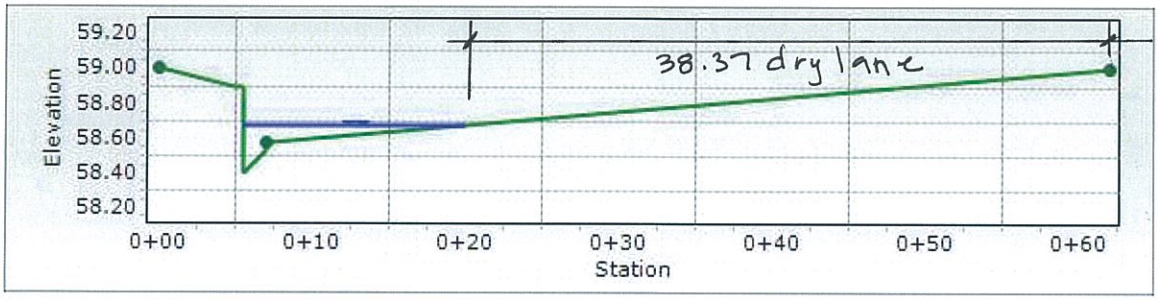
GVF Input Data	
Downstream Depth	0.0 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.3 ft
Critical Depth	0.3 ft
Channel Slope	0.0049 ft/ft
Critical Slope	0.0098 ft/ft

HS3 Martin L King Q10 (1/2)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.0049 ft/ft
Normal Depth	0.3 ft
Discharge	1.00 cfs



$\frac{59 - (58.40 + 0.3)}{0.0078} = 38.37$ dry lane

Worksheet for HS3 Martin L King Q10 (1/2)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.0049 ft/ft
Discharge	1.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	59.00
0+05.00	58.90
0+05.50	58.90
0+05.50	58.40
0+07.00	58.53
0+07.00	58.57
0+62.00	59.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 59.00)	(0+07.00, 58.57)	0.013
(0+07.00, 58.57)	(0+62.00, 59.00)	0.017

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

Results	
Normal Depth	0.3 ft
Roughness Coefficient	0.017
Elevation	58.67 ft
Elevation Range	58.40 to 59.00 ft
Flow Area	1.0 ft²
Wetted Perimeter	14.87 ft
Hydraulic Radius	0.1 ft
Top Width	14.55 ft
Normal Depth	0.3 ft
Critical Depth	0.3 ft
Critical Slope	0.0106 ft/ft
Velocity	1.02 ft/s
Velocity Head	0.02 ft

Worksheet for HS3 Martin L King Q10 (1/2)

Results	
Specific Energy	0.29 ft
Froude Number	0.697
Flow Type	Subcritical

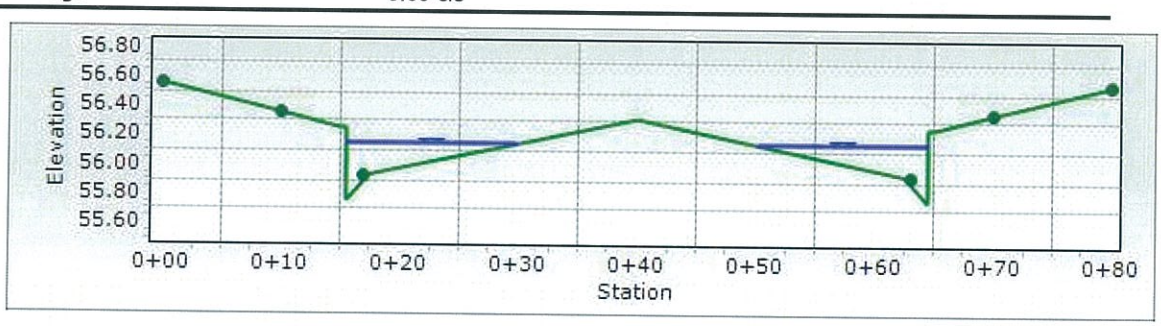
GVF Input Data	
Downstream Depth	0.0 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.3 ft
Critical Depth	0.3 ft
Channel Slope	0.0049 ft/ft
Critical Slope	0.0106 ft/ft

HS4 Miller Ave Q100

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.0050 ft/ft
Normal Depth	0.4 ft
Discharge	6.00 cfs



Worksheet for HS4 Miller Ave Q100

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.0050 ft/ft
Discharge	6.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	56.56
0+10.00	56.36
0+15.00	56.26
0+15.50	56.26
0+15.50	55.76
0+17.00	55.89
0+17.00	55.93
0+40.00	56.32
0+63.00	55.93
0+63.00	55.89
0+64.50	55.76
0+64.50	56.26
0+65.00	56.26
0+70.00	56.36
0+80.00	56.56

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 56.56)	(0+10.00, 56.36)	0.025
(0+10.00, 56.36)	(0+17.00, 55.93)	0.013
(0+17.00, 55.93)	(0+63.00, 55.93)	0.017
(0+63.00, 55.93)	(0+70.00, 56.36)	0.013
(0+70.00, 56.36)	(0+80.00, 56.56)	0.025

Options

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

Results

Normal Depth	0.4 ft
Roughness Coefficient	0.017
Elevation	56.15 ft

Worksheet for HS4 Miller Ave Q100

Results	
Elevation Range	55.76 to 56.56 ft
Flow Area	3.7 ft²
Wetted Perimeter	29.47 ft
Hydraulic Radius	0.1 ft
Top Width	28.60 ft
Normal Depth	0.4 ft
Critical Depth	0.4 ft
Critical Slope	0.0084 ft/ft
Velocity	1.60 ft/s
Velocity Head	0.04 ft
Specific Energy	0.43 ft
Froude Number	0.781
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.4 ft
Critical Depth	0.4 ft
Channel Slope	0.0050 ft/ft
Critical Slope	0.0084 ft/ft

Worksheet for HS4 Miller Ave Q100

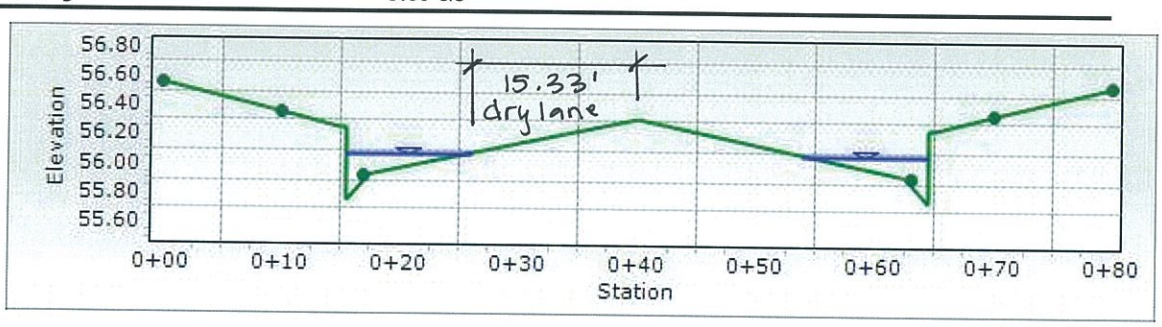
Messages:

Flow is divided.

HS4 Miller Ave Q10

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.0050 ft/ft
Normal Depth	0.3 ft
Discharge	3.00 cfs



$$\frac{56.32-(55.76+0.3)}{0.017} = 15.33 \text{ drylane}^{*}$$

*Although 80 ft of R/W, street is built @ 60ft

Worksheet for HS4 Miller Ave Q10

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.0050 ft/ft
Discharge	3.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	56.56
0+10.00	56.36
0+15.00	56.26
0+15.50	56.26
0+15.50	55.76
0+17.00	55.89
0+17.00	55.93
0+40.00	56.32
0+63.00	55.93
0+63.00	55.89
0+64.50	55.76
0+64.50	56.26
0+65.00	56.26
0+70.00	56.36
0+80.00	56.56

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 56.56)	(0+10.00, 56.36)	0.025
(0+10.00, 56.36)	(0+17.00, 55.93)	0.013
(0+17.00, 55.93)	(0+63.00, 55.93)	0.017
(0+63.00, 55.93)	(0+70.00, 56.36)	0.013
(0+70.00, 56.36)	(0+80.00, 56.56)	0.025

Options

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

Results

Normal Depth	0.3 ft
Roughness Coefficient	0.016
Elevation	56.08 ft

Worksheet for HS4 Miller Ave Q10

Results	
Elevation Range	55.76 to 56.56 ft
Flow Area	2.2 ft²
Wetted Perimeter	21.91 ft
Hydraulic Radius	0.1 ft
Top Width	21.17 ft
Normal Depth	0.3 ft
Critical Depth	0.3 ft
Critical Slope	0.0091 ft/ft
Velocity	1.38 ft/s
Velocity Head	0.03 ft
Specific Energy	0.35 ft
Froude Number	0.758
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.3 ft
Critical Depth	0.3 ft
Channel Slope	0.0050 ft/ft
Critical Slope	0.0091 ft/ft

Worksheet for HS4 Miller Ave Q10

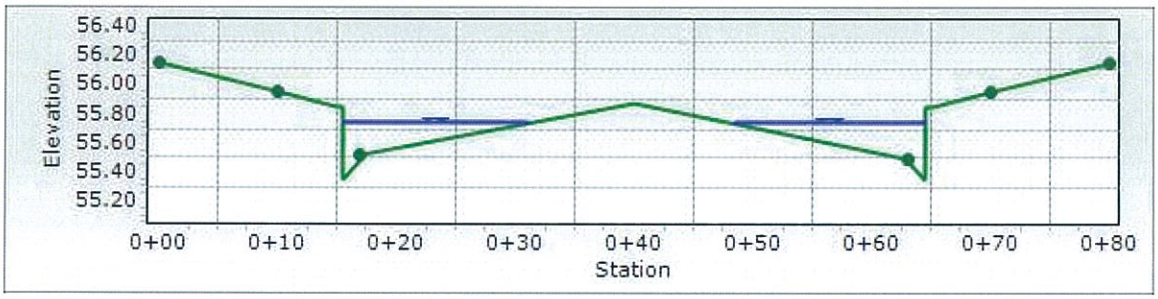
Messages:

Flow is divided.

HS5 Miller Ave Q100

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.0053 ft/ft
Normal Depth	0.4 ft
Discharge	7.00 cfs



Worksheet for HS5 Miller Ave Q100

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.0053 ft/ft
Discharge	7.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	56.15
0+10.00	55.95
0+15.00	55.85
0+15.50	55.85
0+15.50	55.35
0+17.00	55.48
0+17.00	55.52
0+40.00	55.87
0+63.00	55.50
0+63.00	55.48
0+64.50	55.35
0+64.50	55.85
0+65.00	55.85
0+70.00	55.95
0+80.00	56.15

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 56.15)	(0+10.00, 55.95)	0.025
(0+10.00, 55.95)	(0+17.00, 55.52)	0.013
(0+17.00, 55.52)	(0+63.00, 55.50)	0.017
(0+63.00, 55.50)	(0+70.00, 55.95)	0.013
(0+70.00, 55.95)	(0+80.00, 56.15)	0.025

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

Results	
Normal Depth	0.4 ft
Roughness Coefficient	0.017
Elevation	55.74 ft

Worksheet for HS5 Miller Ave Q100

Results	
Elevation Range	55.35 to 56.15 ft
Flow Area	4.2 ft²
Wetted Perimeter	32.63 ft
Hydraulic Radius	0.1 ft
Top Width	31.78 ft
Normal Depth	0.4 ft
Critical Depth	0.4 ft
Critical Slope	0.0084 ft/ft
Velocity	1.66 ft/s
Velocity Head	0.04 ft
Specific Energy	0.43 ft
Froude Number	0.806
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.4 ft
Critical Depth	0.4 ft
Channel Slope	0.0053 ft/ft
Critical Slope	0.0084 ft/ft

Worksheet for HS5 Miller Ave Q100

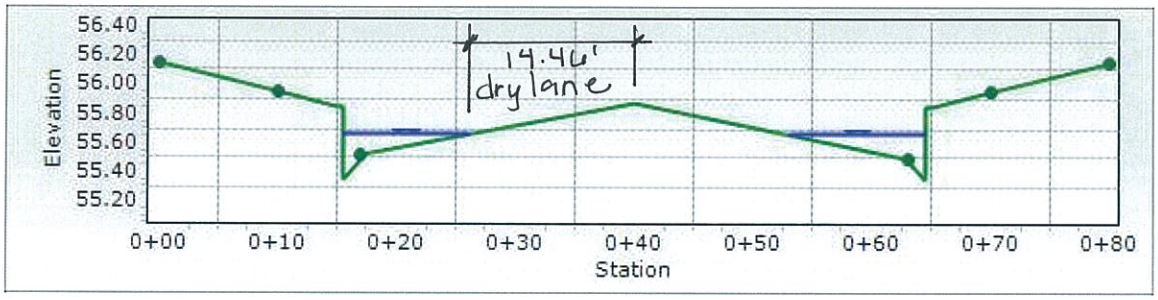
Messages:

Flow is divided.

HS5 Miller Ave Q10

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.0053 ft/ft
Normal Depth	0.3 ft
Discharge	3.00 cfs



$\frac{55.87 - (55.35 + 0.3)}{0.0152} = 14.46$ ft dry lane

*Although 80ft of R/W, street is built @ 60ft

Worksheet for HS5 Miller Ave Q10

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.0053 ft/ft
Discharge	3.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	56.15
0+10.00	55.95
0+15.00	55.85
0+15.50	55.85
0+15.50	55.35
0+17.00	55.48
0+17.00	55.52
0+40.00	55.87
0+63.00	55.50
0+63.00	55.48
0+64.50	55.35
0+64.50	55.85
0+65.00	55.85
0+70.00	55.95
0+80.00	56.15

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 56.15)	(0+10.00, 55.95)	0.025
(0+10.00, 55.95)	(0+17.00, 55.52)	0.013
(0+17.00, 55.52)	(0+63.00, 55.50)	0.017
(0+63.00, 55.50)	(0+70.00, 55.95)	0.013
(0+70.00, 55.95)	(0+80.00, 56.15)	0.025

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

Results	
Normal Depth	0.3 ft
Roughness Coefficient	0.016
Elevation	55.66 ft

Worksheet for HS5 Miller Ave Q10

Results	
Elevation Range	55.35 to 56.15 ft
Flow Area	2.2 ft²
Wetted Perimeter	22.87 ft
Hydraulic Radius	0.1 ft
Top Width	22.18 ft
Normal Depth	0.3 ft
Critical Depth	0.3 ft
Critical Slope	0.0092 ft/ft
Velocity	1.38 ft/s
Velocity Head	0.03 ft
Specific Energy	0.34 ft
Froude Number	0.774
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.3 ft
Critical Depth	0.3 ft
Channel Slope	0.0053 ft/ft
Critical Slope	0.0092 ft/ft

Worksheet for HS5 Miller Ave Q10

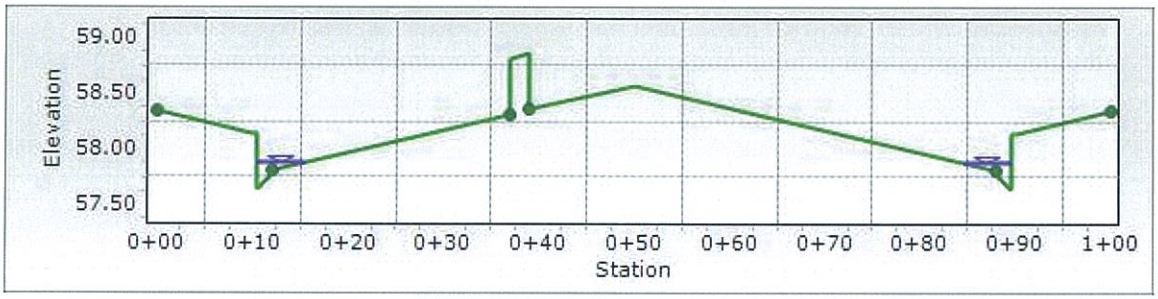
Messages:

Flow is divided.

HS2 Carey Ave Q100 & Q10 Future

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.0067 ft/ft
Normal Depth	0.2 ft
Discharge	1.00 cfs



Worksheet for HS2 Carey Ave Q100 & Q10 Future

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.0067 ft/ft
Discharge	1.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	58.34
0+10.00	58.14
0+10.50	58.14
0+10.50	57.64
0+12.00	57.77
0+12.00	57.81
0+37.00	58.31
0+37.00	58.81
0+39.00	58.85
0+39.00	58.35
0+50.00	58.57
0+88.00	57.81
0+88.00	57.77
0+89.50	57.64
0+89.50	58.14
0+90.00	58.14
1+00.00	58.34

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 58.34)	(0+12.00, 57.81)	0.013
(0+12.00, 57.81)	(0+37.00, 58.31)	0.017
(0+37.00, 58.31)	(0+39.00, 58.35)	0.013
(0+39.00, 58.35)	(0+88.00, 57.81)	0.017
(0+88.00, 57.81)	(1+00.00, 58.34)	0.013

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

Results	
Normal Depth	0.2 ft

Worksheet for HS2 Carey Ave Q100 & Q10 Future

Results	
Roughness Coefficient	0.016
Elevation	57.88 ft
Elevation Range	57.64 to 58.85 ft
Flow Area	0.7 ft²
Wetted Perimeter	10.32 ft
Hydraulic Radius	0.1 ft
Top Width	9.75 ft
Normal Depth	0.2 ft
Critical Depth	0.2 ft
Critical Slope	0.0093 ft/ft
Velocity	1.34 ft/s
Velocity Head	0.03 ft
Specific Energy	0.27 ft
Froude Number	0.856
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.2 ft
Critical Depth	0.2 ft
Channel Slope	0.0067 ft/ft
Critical Slope	0.0093 ft/ft

Worksheet for HS2 Carey Ave Q100 & Q10 Future

Messages:

Flow is divided.

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: August 9, 2007
TO: **Land Development Services** Department of Public Works				FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Technical Drainage Study for: **MLK and Carey Avenue Park** **(Update to Early Childhood Facility)**			COPIES TO: Lochsa Engineering
Cross Streets:	SWC Martin Luther King Blvd. & Carey Ave.			Clark County Park & Commercial
File Number:	F:\Depot\DSMEMOS\DS3614E.doc			Bart Anderson, P.E., DevCo
Parcel Number:	139-21-102-011, 139-21-102-012			CCRFCD
Zoning Action:	ZON-4526; SDR-4527			CNLV
FEMA Flood Zone	YES	NO	X	
Proposed Storm Drain	YES	NO	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Trn. No.
1st Submittal	7/23/2004	8/5/2004	Not Approved	$400.00	7029: $400
2nd Submittal	9/24/2004	10/12/2004	Conditionally Approved	$400.00	9997: $400
CCRFCD	12/27/2004	1/7/2005	Concurrence	N/C	N/C
3rd Submittal	6/27/2007	7/20/2007	Not Approved	$100.00	72061: $100
4th Submittal	7/27/2007	8/9/2007	See Comments Below	N/C	N/C
			TOTAL FEES (LDDRS):	**$900.00**	----

REMARKS:

3rd & 4th Submittals: Update & Addendum to construct a Park within the Early Childhood Facility

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.
X	is conditionally approved subject to City of North Las Vegas concurrence.

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

2. The site is also adjacent to the jurisdiction of City of North Las Vegas (CNLV) to the north and the west. The engineer must coordinate with *City of North Las Vegas* and incorporate any concerns for boundary conditions along the north and west borders. CNLV concurrence is required prior to final acceptance of the study.

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
B&H/rac/ays

T/R/S: T20S/R61E/21
AREA M-21

update to

DS 3614-1
6/26/07
M-21
$100

Technical Drainage Study

for

MLK and Carey Avenue Park

JOB# 061015

June 2007

Prepared for:

Dekker Perich Sabatini Inc.,
1 Holmes Sabatini Way,
Henderson, Nevada 89014
(702) 436-1006

Prepared By:
LOCHSA ENGINEERING
6345 South Jones Boulevard
Suite 100
Las Vegas, Nevada 89118
(702) 365-9312

1. GENERAL LOCATION AND DEVELOPMENT DESCRIPTION

1.1 Purpose

Dekker Perich Sabatini Architects, has retained the services of Lochsa Engineering to provide a Technical Drainage Study for the proposed MLK and Carey Avenue Park located at the southwest corner of Carey Avenue and Martin Luther King Boulevard. The site is currently partially being developed. The portion of the site adjacent to Martin Luther King Boulevard, has already been developed for the Early Childhood Facility, while the adjacent southern portion of the site has been designed for the proposed Pearson Community Center currently under construction. The construction of the improvements for the Pearson Community Center is currently at the final stage. The purpose of this study is to provide an updated hydrologic analysis of the site, and to substantiate onsite hydraulic design for the park. The existing hydrology of the site and the offsite basins impacting the site has already been presented in the previously approved "*Technical Drainage Study for Early Childhood Facility*" and the "*Technical Drainage Study for Pearson Community Center*". The hydrologic analyses from the approved studies will be utilized and/or adopted for reference in the subject study. The Clark County Regional Flood Control District (CCRFCD) Hydrologic Criteria and Drainage Design Manual and the CCRFCD 2002 Las Vegas Valley Flood Control Master Plan Update have been compiled and are also utilized. This report presents the hydrologic and hydraulic analyses, methodology, and results of the study.

1.2 Location of Property

The site is located at the southwest corner of the intersection of Carey Avenue and Martin Luther King Boulevard, extending west to Comstock Drive. The site is located within a portion of the northern half (N 1/2) of the northwest quarter (NW 1/4) of Section 21, Township 20 South, Range 61 East, of the M.D.M., in the City of Las Vegas, Nevada. The site is also identified to be

a portion of Assessors Parcel Number APN: 139-21-102-013.

The existing City of Las Vegas Community Resource Center is located adjacent to the site at the northeast corner of Martin Luther King Boulevard and Carey Avenue intersection. The existing Booker Elementary School located directly south of the site is currently under renovation, while directly north of the site across Carey Avenue are existing Convenience Store and Apartment Complex. On the immediate east of the site across Martin Luther King Boulevard are existing residential homes. The centerline of Martin Luther King Boulevard and Comstock Drive form the boundary line between the City of North Las Vegas and the City of Las Vegas jurisdictions.

1.3 Description of Property

The entire site consists of approximately 17 acres of partially developed desert land. However, the undeveloped portion for the proposed MLK and Carey Avenue Park consists of approximately 8.50 acres. The existing site generally slopes to the southeast at approximately 0.90 percent. A review of the 2002 Flood Control Master Plan Update (Reference 3), Figure H-12, indicates that the site and its immediate offsite watersheds are located within the hydrologic soil group B. Soil group B is defined as soils with "Moderate Infiltration Rate, and Moderately Low Runoff Potential". The Curve Numbers (CN) for the existing and developed conditions analyses have been determined from Table 602 of the CCRFCD Hydrologic Criteria and Drainage Design Manual.

2 DRAINAGE DESCRIPTION

In the 2002 Las Vegas Valley Flood Control Master Plan Update, the valley was hydrologically divided into nine watersheds and each watershed was further subdivided into subareas. The onsite and offsite basins of the subject project area fall within the Central Watershed. The site is located within sub-basin LM19, while the offsite watersheds impacting the site in Carey Avenue are located within sub-basins S and R2-C. The existing Lake Mead Detention Basin is located upstream of the site at the intersection of Carey Avenue and Simmons Street (approximately 4,000 feet west of the site) and intercepts all offsite flows generated by the basins located west and northwest of Simmons Street.

2.1 Existing Drainage Conditions

A. Offsite and Onsite Drainage

Generally, offsite flows are conveyed to the southeast through the study area. The offsite basins impacting the subject site consist of the areas west of Martin Luther King Boulevard, extending north to Cheyenne Avenue and further west to Simmons Street. These areas are partially developed and consist mainly of residential homes with average lots of less than six thousand square foot (6000 square feet), and few commercial developments. The remainder portions of the watershed are still bare without any improvements. These offsite areas were studied in the "*2002 Las Vegas Valley Flood Control Master Plan Update*", dated September 2002, as prepared by Post Buckley Schuh and Jernigan, Inc. (PBS&J), in association with G. C. Wallace Inc., and Louis Berger Group, for the Clark County Regional Flood Control District (CCRFCD) (Reference 3). The offsite areas have also been studied in the "*City of Las Vegas Flood Control Facilities Inventory and City Wide Hydrology Analysis Volume II*" (Reference 5). The approved "*Technical Drainage Study for Early Childhood Facility*" (Reference 6) previously addressed the onsite and offsite flows impacting the entire site. The resulting flow rates estimated in Reference 6 were also adopted for the design of

improvements addressed in the "*Technical Drainage Study for Pearson Community Center*" (Reference 7). As addressed in Reference 6, approximately 1025 cfs is currently conveyed in Carey Avenue adjacent to the site, during a 100-year, 6-hour storm event. Furthermore, a future 100-year flow of approximately 566 cfs in anticipated in Carey Avenue adjacent to the site. These flow rates were adopted from the City Wide as shown on figure H-10 (Reference 5). However, there is an existing 54-inch RCP in Carey Avenue, which has a capacity of 340 cfs (please refer to Figure F-10 attached in the appendix). Therefore, the existing 100-year surface runoff in Carey Avenue is approximately 685 cfs (ie. 1025 - 340 = 685 cfs). This runoff will be completely intercepted in the future condition by the proposed CCRFCD facility (11'x8' RCB) to be installed in Carey Avenue. Onsite improvement and interim flood protection designs as addressed in Reference 6, were based on a the existing condition 100-year surface flow of 685 cfs, since this represents the worst case condition and will result in the most conservative design for the site. Additionally, as previously addressed in Reference 6, the quantity of flows in Martin Luther King Boulevard adjacent to the site was estimated by analyzing the existing retail stores located at the north east corner of the site, including the street right-of-way width as basin MLK (4/7 cfs). Runoff in Martin Luther King Boulevard then combines with other flows generated onsite (CMX2) and the combined flow traverses east in Blankenship Avenue. The proposed improvements for the Early Childhood Facility and those of Pearson Community Center are currently constructed. Thus, the existing condition flows impacting the site have been adopted from Reference 6, and has not been re-analyzed in the subject study. Furthermore, the area that impacts Comstock Drive adjacent to the site was also analyzed as basin OFX1 (1/4 cfs) in Reference 6. Runoff from basin OFX1 is conveyed south in Comstock Drive and eventually east in Balzar Street. These offsite flows in Comstock Drive have also been adopted from Reference 6 and the analysis have been incorporated into those of the subject site. Please refer to the referenced Offsite Basin Map-Existing Condition (Sheet OF1) provided in

the appendix for the location and delineation of offsite basin OFX1 described above.

The interim condition onsite analyses presented in Reference 6 and Reference 7 have been adopted as existing for the subject study, since construction of the improvements for the Early Childhood Facility and the Pearson Community Center have been generally completed. Therefore, the existing onsite flows and the flows in Martin Luther King Boulevard will not be reevaluated. The site as addressed in Reference 6, was analyzed as six drainage basins labeled ND1 through ND6. Basin ND1 (1/2 cfs) is a portion of the site including part of the proposed riprap berm that sheet flows into Carey Avenue. Basins ND2 (2/6 cfs) and ND3 (1/5 cfs) incorporate the upstream portion of the site that was designed to be rough graded with the Early Childhood Facility project, and a portion of which now consists of the area for the proposed Pearson Community Center. The analysis presented in the Pearson Community Center further subdivided the rough graded upstream portion of the site as basins ND2A (4/11 cfs) and ND2B (2/6 cfs), which is now the area being improved as the subject MLK and Carey Avenue Park. As analyzed in Reference 7, runoff from ND2A and ND2B combine with other developed flows from the remainder of the site traversing east across Martin Luther King Boulevard. Please refer to sheet DR1 in the appendix for the referenced onsite drainage basin delineations.

2.2 Interim Drainage Condition

A. Offsite and Onsite Drainage

For the interim condition, the quantity of flow in Carey Avenue will remain the same as in the existing condition (Q_{100} = 1025 cfs) with existing 54-inch RCP intercepting 340 cfs and a remainder surface flow of approximately 685 cfs in Carey Avenue. Offsite runoff in Martin Luther King Boulevard adjacent to the site will also remain same as in the existing condition, and will maintain the existing drainage pattern established. Furthermore, the area that impacts Comstock Drive adjacent to the site was also analyzed as basin OFX1 (1/4 cfs) in Reference 6, while the

western portion of the perimeter berm that discharges into Comstock Drive is analyzed as basin BERM (<1/1 cfs). Flows from basin OFX1 combines with BERM at CMD4 (1/5 cfs) and the combined runoff is conveyed south in Comstock Drive and eventually east in Balzar Street.

The onsite analysis has been modified to reflect the proposed improvements for the subject MLK and Carey Avenue Park. The area for the subject park has been re-analyzed as three drainage basins labeled ND2A, ND2B and ND2C. Basin ND2A (2/7 cfs) is the majority of the proposed park mainly consisting of the area for track and field events with the service yard and the equipment storage buildings. Runoff from ND2A will be captured by a proposed 24"x24" Jensen Precast Inlet Structure and a Trench Drain to be installed continuously around the toe of the tracks and field area. The flows captured by the 24"x24" Jensen Precast Inlet Structure will be conveyed by a 15" PVC pipe to an existing 4' Type 'C' drop inlet in Carey Avenue adjacent to the site. Runoff captured by the Type 'C' drop inlet currently discharges into the 54" RCP storm drain in Carey Avenue. The existing 4' Type 'C' inlet will be removed and replaced with a new inlet of similar size and type. Basins ND2B (1/4 cfs) and ND2C (1/3 cfs) are the southwestern and northeastern portions of the proposed park respectively, consisting of restroom buildings, picnic canopies and surrounding sidewalks with decorative landscaping. Runoff from ND2B and ND2C will combine with other onsite flows from the Pearson Community Center and the Early Childhood Facility to impact Martin Luther King Boulevard. The combined onsite and offsite flows traversing east across Martin Luther King Boulevard is estimated at concentration point CMD3 (18/35 cfs). The combined runoff impacting Martin Luther King Boulevard has not increased over those previously estimated in Reference 6. Hence, the proposed park improvements will not contribute any negative impact to the adjacent and/or downstream properties. Please refer to sheet DR2 in the appendix for the onsite basin delineations in the interim condition. The concentration point location in Martin Luther King Boulevard is beyond the limit of improvements fro the subject site and thus, has not been identified

on the drainage basin map.

2.3 Future Drainage Condition

A. Offsite and Onsite Drainage

For the future condition, both the site and the offsite basins are assumed to be fully developed. The offsite basins impacting the site in Carey Avenue have already been analyzed by the City Wide. However, the future CCRFCD facility (11'x8' RCB) to be installed in Carey Avenue will completely intercept all flows in the street adjacent to the site. Therefore, no future condition flow depth calculations for Carey Avenue was provided in either Reference 6 or Reference 7. Offsite flows in Martin Luther King Boulevard adjacent to the site will remain the same as estimated in the existing condition since the street and retail stores as previously analyzed have already been developed and consist of asphalt pave parking lots and roofs of the existing stores. However, the area that impacts Comstock Drive adjacent to the site was analyzed as basin OFD1 (7/13 cfs) in Reference 7 for the ultimate developed condition. The subject future condition analysis from Reference 7 have also been adopted and incorporated into the analysis for the subject site. The ultimate developed condition flows in Comstock Drive will be conveyed south and eventually east in Balzar Street as in the existing and interim conditions.

The onsite analysis presented in the interim condition represents the ultimate improvement of the site. Therefore, a re-analysis of the onsite basins will not be necessary and have not been provided. The Future Condition Offsite Drainage Map (Sheet DR3) from Reference 7 has also been provided in the appendix to indicate the location of offsite basin OFD1 in relation to the site, and to depict the flows in Comstock Drive adjacent to the site. The Future Condition Onsite Drainage Map (Sheet DR3) is also provided to indicate the combined flows and hydraulic street section in Comstock Drive adjacent to the site.

2.4 Master Planning Information

The "*2002 Las Vegas Valley Flood Control Master Plan Update*", dated September 2002, as prepared by Post Buckley Schuh and Jernigan, Inc. (PBS&J), in association with G. C. Wallace Inc., and Louis Berger Group, for the Clark County Regional Flood Control District (CCRFCD) (Reference 3) illustrates the proposed regional master planned facilities in the area as shown on Figure F-12.

Review of the Master Plan Update (Reference 3), indicates both existing and proposed CCRFCD facilities in Carey Avenue adjacent to the site. Both the existing and proposed facilities were identified in Reference 3 as LVSR 0148: Las Vegas Wash-Smoke Ranch. The existing facility is a 54" RCP identified to convey 340 cfs by the City Wide (Reference 5). However, this facility will be replaced by the proposed 11'x8' RCB in the future condition. The 11'x8' RCB will be approximately 2587-feet long with a capacity to convey 1,125 cfs. The RCB is proposed to be constructed at a bed slope of 1.12%.

2.5 Flood Plain Information

The project site is covered by Flood Insurance Rate Map (FIRM) for the Clark County, Nevada, and incorporated areas, Community Parcel Number: 32003C 2160 E, Effective Date: September 27, 2002 and revised to reflect LOMR dated December 11, 2003 (Reference 4).

Review of panel 3200C 2160 E, indicates that the site is located entirely within FEMA Flood Zone "X" (unshaded). Zone "X" (unshaded) is described by the Federal Emergency Management Agency (FEMA) as:

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

Figure 2 in the Appendix illustrates the location of the site on a portion of the above referenced Flood Insurance Rate Map.

2.6 Previous Drainage Studies

The overall area is covered within the CCRFCD "*2002 Las Vegas Valley Flood Control*

3. PROPOSED DRAINAGE FACILITIES

3.1 General Description

Runoff has been designed to flow away from proposed building pads through L-curbs, valley gutters and local swales. The runoff impacting the site in Carey Avenue was adopted from the City of Las Vegas Flood Control Facilities Inventory and City Wide Hydrology Analysis. The flows generated onsite will generally be conveyed to Martin Luther King Boulevard as addressed in the approved drainage studies for Early Childhood Facility and Pearson Community Center. Flood protection for the entire site was also designed and specified in the approved Early Childhood Facility study (Reference 6). The improvements addressed by the subject study are generally onsite but will include offsite half street construction of Comstock Drive adjacent to the site. The temporary perimeter berm as specified in Reference 5 and adopted in Reference 6, has already been constructed along Carey Avenue and Comstock Drive to protect the site from offsite flows. Hydraulic capacity calculations have been provided for the proposed 24"x24" Jensen Precast Inlet Structure and the 15" PVC storm drain. The inlet capacity calculation indicates that the major flows from onsite basin ND2A (2/7 cfs) will be captured at a ponding depth of approximately 0.50-feet. Likewise, a Standard Form 6 (SF6) calculation provided for the 15" PVC storm drain indicates the flows from ND2A will be safely conveyed to the 4.0-foot Type 'C' inlet in Carey Avenue while maintaining the HGLs at more than 1.0-foot below finished grade elevations. Both the inlet capacity and the storm drain (SF6) hydraulic calculations have been provided in the appendix.

3.2 Compliance with Regulations and Adopted Plans

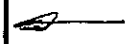
The hydrologic analysis and drainage design of this development is in compliance with local requirements, including the Clark County Regional Flood Control District (CCRFCD) "*Hydrologic Criteria and Drainage Design Manual*" (HCDDM) (Reference 1), and the CCRFCD "*Flood Control Master Plan Update*" (Reference 2). The design of this development is also in compliance with the

3.4 Facility Design Calculations

All drainage facilities within this project area have been designed in accordance with the HCDDM (Reference 1). Drainage facilities and street flow capacities were calculated based on Manning's equation. The proposed onsite drainage plan has been designed to closely resemble historic drainage patterns. Street capacity calculations for Martin Luther King Boulevard, Carey Avenue and Comstock Drive adjacent to the site were previously addressed in the drainage study for Early Childhood Facility and the Technical Drainage Study for Pearson Community Center. Copies of the calculations are provided in the appendix for references. The referenced street capacity calculations for Comstock Drive have also been provided to estimate Velocity x Depth (V*D) Products and to ensure that adequate hump is provided at the proposed driveway access through Comstock Drive. The calculations for Comstock Drive indicate that the V*D criteria is met in both the major and minor storm events. Please refer to the referenced street flow summary table provided in the appendix. As addressed in Reference 6, the existing and interim condition street capacity calculation for Carey Avenue indicate no minor storm dry lane, and the V*D criteria for the major storm event is not met. However, this is an existing condition and has not been negatively impacted as a result of the proposed improvements to the site. This condition will be improved by the future CCRFCD facility (11'x8' RCB) to be installed in Carey Avenue, since the facility will have the capacity to intercept all flows impacting Carey Avenue adjacent to the site.

Peak Flow Summary
Interim Condition

HEC-1 I.D.	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)
ND1	1.13	1	2
ND2A	5.64	2	7
ND2B	2.80	1	4
ND3	3.77	7	12
ND2C	1.52	1	3
CMD1	-	9	18
ND4	0.90	2	3
ND5	1.29	2	4
CMD2	-	4	7
ND6	1.28	1	2
MLK	2.29	4	7
CMD3	-	18	35
OFX1	4.36	1	4
BERM	0.25	<1	1
CMD4	-	1	5



Peak Flow Summary
Future Condition

HEC-1 I.D.	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)
ND1	1.13	1	2
ND2A	5.64	2	7
ND2B	2.80	1	4
ND3	3.77	7	12
ND2C	1.52	1	3
CMD1	-	9	18
ND4	0.90	2	3
ND5	1.29	2	4
CMD2	-	4	7
ND6	1.28	1	2
MLK	2.29	4	7
CMD3	-	18	35
OFD1	4.36	7	13
BERM	0.25	<1	1
CMD4	-	7	13

Street Flow Summary
(Proposed Condition)

10-year, 6-hour Storm

Street	Right of Way Width (ft)	Section	10-Year Flow [Q10] (cfs)	10-year Velocity [v] (fps)	10-year Flow Depth [d] (ft)	10-year Velocity x Depth Product (v x d)	Dry Lane Width (ft) (Within 1/2 ROW)
Comstock Drive	60	DD	1	0.99	0.28	0.26	N/A

Street Flow Summary
(Proposed Condition)

100-year, 6-hour Storm

Street	Right of Way Width (ft)	Section	100-Year Flow [Q100] (cfs)	100-year Velocity [v] (fps)	100-year Flow Depth [d] (ft)	100-year Velocity x Depth Product (v x d)
Comstock Drive	60	DD	5	1.54	0.38	0.59

Street Flow Summary
(Future Condition)

10-year, 6-hour Storm

Street	Right of Way Width (ft)	Section	10-Year Flow [Q10] (cfs)	10-year Velocity [v] (fps)	10-year Flow Depth [d] (ft)	10-year Velocity x Depth Product (v x d)	Dry Lane Width (ft) (Within 1/2 ROW)
Comstock Drive	60	DD	7	1.63	0.42	0.68	N/A

Street Flow Summary
(Future Condition)

100-year, 6-hour Storm

Street	Right of Way Width (ft)	Section	100-Year Flow [Q100] (cfs)	100-year Velocity [v] (fps)	100-year Flow Depth [d] (ft)	100-year Velocity x Depth Product (v x d)
Comstock Drive	60	DD	13	1.69	0.52	0.88

DEVELOPMENT: MLK and Carey Avenue Park
CALCULATED BY: SOA
PROJECT NUMBER: 61015

DATE: June 2007

SUB-BASIN DATA			INITIAL/OVERLAND TIME (ti)				TRAVEL TIME (tt)				tc CHECK (URBANIZED BASINS)		FINAL tc	REMARKS			
DESIGN (1)	K (2)	AREA Ac (3)	AREA Sq. mile (4)	LENGTH Ft (5)	SLOPE % (6)	ti Min (7)	LENGTH Ft (8)	SLOPE % (9)	VELOCITY FPS (10)	tt Min (11)	TOTAL LENGTH Ft (12)	tc =(L/180)+10 Min (13)	Min (14)	CN (15)	tL Hrs (16)	Urbanized? (18)	Soil Type (19)
ND2A	0.6653	4.94	0.00772	128	0.5	11.2	524	0.25	0.61	14.7	652	13.6	13.6	80.0	0.136	YES	B
ND2B	0.7531	1.77	0.00277	109	0.5	8.2	256	0.5	0.7	6.3	365	12.0	12.0	86.6	0.120	YES	B
ND2C	0.7782	1.52	0.00238	123	0.5	8.1	258	0.5	0.7	6.3	381	12.1	12.1	88.5	0.121	YES	B
BERM	0.7452	0.25	0.00039	30	33.0	1.1	484	0.3	1.1	7.3	514	12.9	8.4	86.0	0.084	YES	B

ti = 1.8 (1.1 - K) L^(0.5) / S^(1/3)

K = 0.0132 CN - 0.39

tt = L / (60 V)

tc = ti + tt

tL = tLAG = 0.6 tc

LOCATION: Onsite
HYDROLOGIC CONDITION: Developed
TRIAL: Final Iteration

MLK and Carey Avenue Park

10-Year and 100-Year
6-Hour Storm:
Future Condition

FILE: 61015F.DAT

FLOOD HYDROGRAPH PACKAGE (HEC-1)
JUN 1998
VERSION 4.1

RUN DATE 18JUN07 TIME 11:45:47

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

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X     X  XXXXXXX   XXXXX          X
X     X  X         X     X       XX
X     X  X         X             X
XXXXXXX  XXXX      X       XXXXX X
X     X  X         X             X
X     X  X         X     X       X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

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

    1     ID    MLK AND CAREY AVENUE PARK
    2     ID    FUTURE CONDITION - ONSITE AND OFFSITE
    3     ID    USING SCS METHODS AND KINEMATIC WAVE ROUTING
    4     ID    MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION
    5     ID
    6     ID     FILE:  61015F.DAT
    7     ID
    8     ID    ****************************************
    9     ID         McCARRAN AIRPORT RAINFALL AREA
   10     ID         10 & 100 YEAR - 6 HOUR STORM EVENT
   11     ID
   12     ID    ****************************************
          *DIAGRAM
   13     IT     5                    300
   14     IO     5      0
   15     IN     5
   16     JR   PREC   .5704    1.0

   17     KK    ND1
   18     PB   2.77
   19     PC    0.0    .02    .057    .07    .087   .108   .124   .13    .13    .13
   20     PC    .13    .13    .13    .133    .14    .142   .148   .158   .172   .181
   21     PC    .19    .197   .199    .2     .201   .204   .214   .229   .241   .249
   22     PC   .251    .256   .27    .278    .281   .283   .295   .322   .352   .409
   23     PC   .499     .59   .71    .744    .781   .812   .819   .835   .851   .856
   24     PC    .86    .868   .876   .888    .91    .926   .937   .95    .97    .976
   25     PC   .982    .985   .987   .989    .99    .993   .993   .994   .995   .998
   26     PC   .998    .999   1.0
   27     KM   ONSITE BASIN ND1, A PORTION OF THE PROPOSED BERM AND DRIVEWAY IMPACTING
   28     KM   CAREY AVENUE AS PREVIOUSLY ANALYZED IN EARLY CHILDHOOD STUDY
   29     BA  .00176
   30     LS     0    87.4
   31     UD   .161

   32     KK   ND2A
   33     KM   ONSITE BASIN  ND2A, A PORTION OF THE PROPOSED PARK CONSISTING OF THE RUNNING
   34     KM   TRACKS AND FIELD, PLAY AREA WITH SURROUNDING SIDEWALKS AND STORAGE BUILDINGS
   35     BA  .00772
   36     LS     0    80.0
   37     UD   .136

   38     KK   ND2B
   39     KM   ONSITE BASIN  ND2A, THE SOUTHWEST PORTION OF THE PROPOSED PARK CONSISTING
   40     KM   OF RESTROOMS AND PICNIC CANOPIES WITH SURROUNDING SIDEWALKS AND LANDSCAPING
   41     BA  .00277
   42     LS     0    86.6
   43     UD   .120

   44     KK    ND3
   45     KM   ONSITE BASIN  ND3, THE PROPOSED PEARSON COMMUNITY CENTER BUILDING
   46     KM   PARKING LOTS, DRIVE ISLE AND OTHER IMPROVEMENTS
   47     BA  .00589
   48     LS     0    98.0
   49     UD   .093
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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  50      KK  ND2C
  51      KM  ONSITE BASIN  ND2C, THE NORTHWEST PORTION OF THE PROPOSED PARK ALSO
  52      KM  CONSISTING OF PICNIC CANOPY WITH SURROUNDING SIDEWALKS AND LANDSCAPING
  53      BA  .00238
  54      LS        0    88.5
  55      UD    .121

  56      KK   CMD1
  57      KM  COMBINE ND2C WITH ND2B AND ND3 IMPACTING THE EXISTING ALLEY/SERVICE ROAD
  58      HC        3

  59      KK    ND4
  60      KM  ONSITE BASIN  ND4, FORMERLY ROUGH GRADED WITH THE EARLY CHILDHOOD FACILITY
  61      KM  IMPROVEMENTS BUT WILL NOW BE CONSIST OF TO A PARKING LOT
  62      BA  .00141
  63      LS        0    98.0
  64      UD    .068

  65      KK    ND5
  66      KM  ONSITE BASIN  ND3, MAJORITY OF THE PROPOSED IMPROVEMENTS WITH
  67      KM  THE EARLY CHILDHOOD FACILITY STUDY
  68      BA  .00201
  69      LS        0    98.0
  70      UD    .082

  71      KK   CMD2
  72      KM  COMBINE ND4 AND ND5 AT THE SOUTHERN DRIVEWAY
  73      HC        2

  74      KK    ND6
  75      KM  ONSITE BASIN  ND6, AS PROPOSED WITH THE EARLY CHILDHOOD FACILITY STUDY
  76      KM  DISCHARGES INTO MARTIN LUTHER KING BLVD THRU A WALL OPENING
  77      BA  .00201
  78      LS        0    82.6
  79      UD    .121

  80      KK    MLK
  81      KM  EXISTING RETAIL SHOPS AND PORTION OF MARTIN LUTHER KING BOULEVARD CONVEYED
  82      KM  ADJACENT TO THE SITE
  83      BA  .00358
  84      LS        0    98.0
  85      UD    .098

  86      KK   CMD3
  87      KM  COMBINE ALL ONSITE AND OFFSITE RUNOFF IN MARTING LUTHER KING BOULEVARD
  88      KM  DOWNSTREAM OF THE SITE
  89      HC        4

  90      KK   OFD1
  91      KM  FUTURE DEVELOPED PARCELS CONVEYED SOUTH IN COMSTOCK DRIVE
  92      KM  ADJACENT TO THE SITE
  93      BA  .00682
  94      LS        0    98.0
  95      UD    .125
```

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

   96     KK   BERM
   97     KM   GRADED PORTION OF THE EARTHEN BERM ADJACENT TO COMSTOCK DRIVE
   98     BA  .00039
   99     LS       0    86.0
  100     UD    .084

  101     KK   CMD4
  102     KM   COMBINE FLOWS IN COMSTOCK DRIVE CONVEYED SOUTH DOWNSTREAM OF THE SITE
  103     HC       2
  104     ZZ
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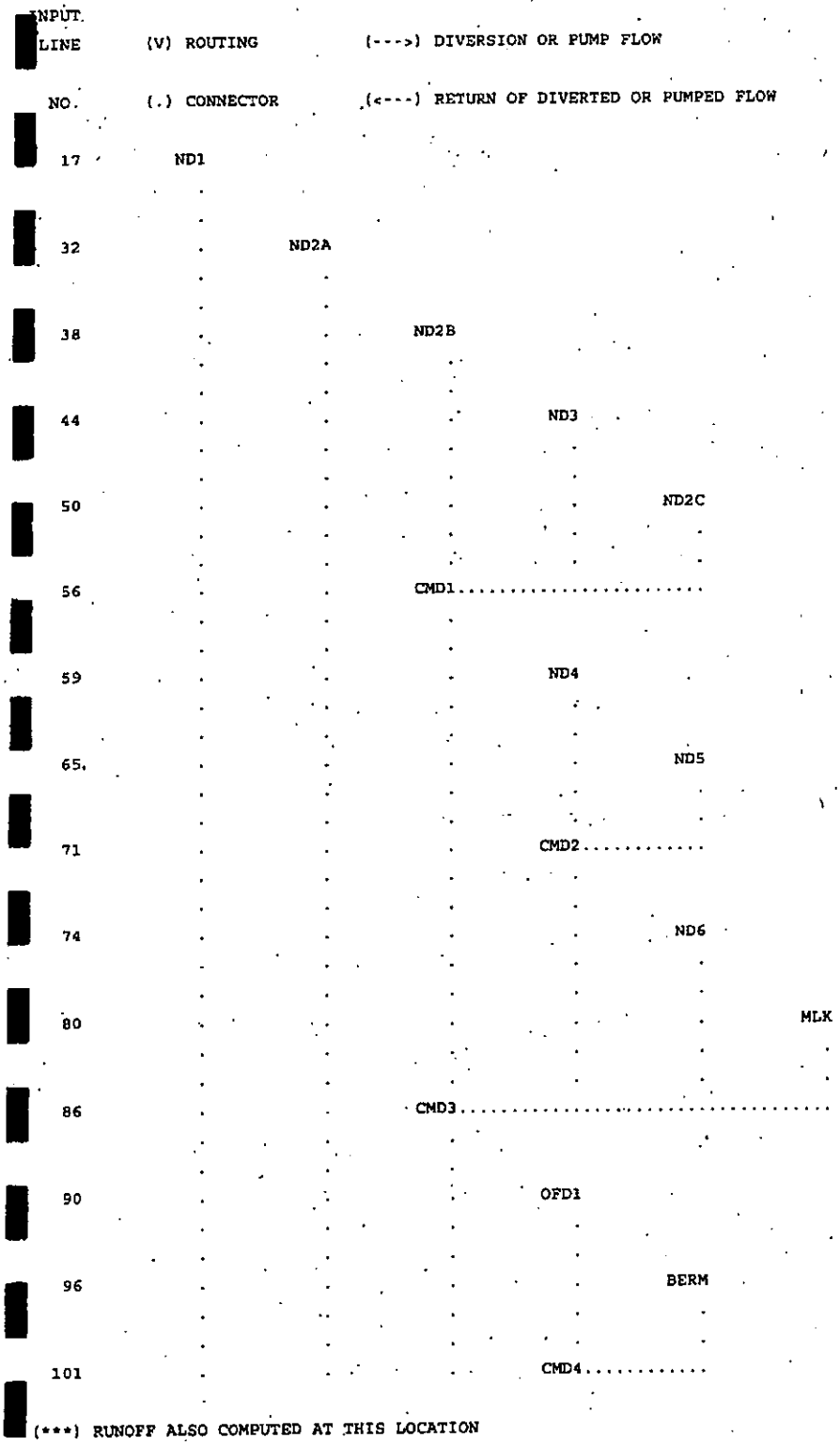
SCHEMATIC DIAGRAM OF STREAM NETWORK



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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**************************************
*                                    *
*  FLOOD HYDROGRAPH PACKAGE (HEC-1)  *
*            JUN 1998                *
*         VERSION 4.1                *
*                                    *
*  RUN DATE  18JUN07  TIME  11:45:47 *
*                                    *
**************************************
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**************************************
*                                    *
*  U.S. ARMY CORPS OF ENGINEERS      *
*  HYDROLOGIC ENGINEERING CENTER     *
*       609 SECOND STREET            *
*    DAVIS, CALIFORNIA 95616         *
*         (916) 756-1104             *
*                                    *
**************************************
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MLK AND CAREY AVENUE PARK
FUTURE CONDITION - ONSITE AND OFFSITE
USING SCS METHODS AND KINEMATIC WAVE ROUTING
MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION

FILE: 61015F.DAT

****
McCARRAN AIRPORT RAINFALL AREA
10 & 100 YEAR - 6 HOUR STORM EVENT
****

14 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

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

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

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

JP MULTI-PLAN OPTION

NPLAN	1	NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
.57 1.00

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS

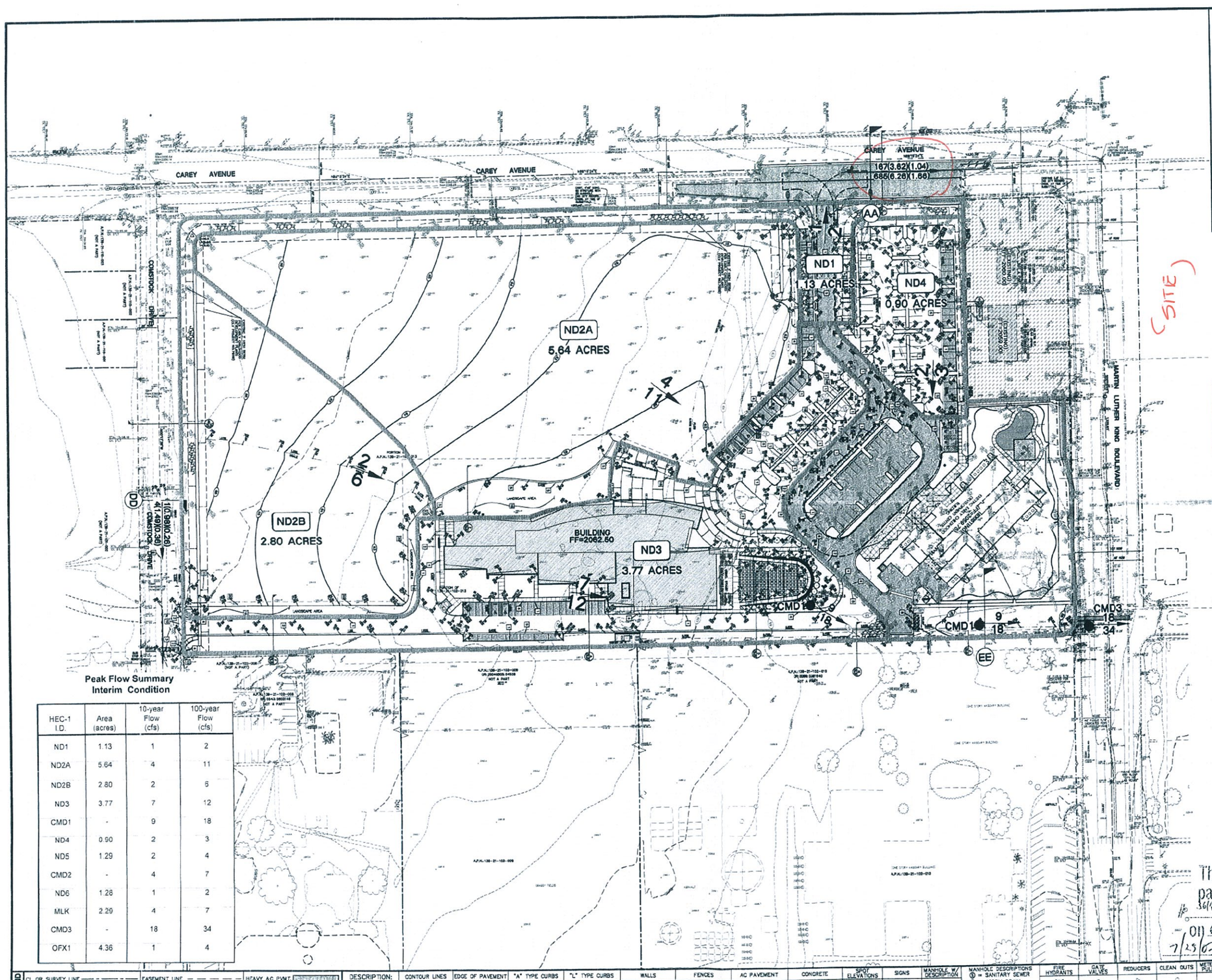
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES

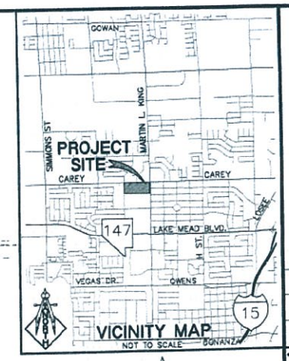
TIME TO PEAK IN HOURS

					RATIOS APPLIED TO PRECIPITATION	
OPERATION	STATION	AREA	PLAN		RATIO 1	RATIO 2
					.57	1.00
HYDROGRAPH AT	ND1	.00	1	FLOW	1.	2.
				TIME	3.58	3.58
HYDROGRAPH AT	ND2A	.01	1	FLOW	2.	7.
				TIME	3.58	3.58
YDROGRAPH AT	ND2B	.00	1	FLOW	1.	4.
				TIME	3.58	3.58
YDROGRAPH AT	ND3	.01	1	FLOW	7.	12.
				TIME	3.50	3.50
YDROGRAPH AT	ND2C	.00	1	FLOW	1.	3.
				TIME	3.58	3.58
3 COMBINED AT	CMD1	.01	1	FLOW	9.	19.
				TIME	3.50	3.50
HYDROGRAPH AT	ND4	.00	1	FLOW	2.	3.
				TIME	3.50	3.50
HYDROGRAPH AT	ND5	.00	1	FLOW	2.	4.
				TIME	3.50	3.50
2 COMBINED AT	CMD2	.00	1	FLOW	4.	7.
				TIME	3.50	3.50
HYDROGRAPH AT	ND6	.00	1	FLOW	1.	2.
				TIME	3.58	3.58
HYDROGRAPH AT	MLK	.00	1	FLOW	4.	7.
				TIME	3.50	3.50
4 COMBINED AT	CMD3	.02	1	FLOW	18.	35.
				TIME	3.50	3.50
HYDROGRAPH AT	OFD1	.01	1	FLOW	7.	13.
				TIME	3.58	3.58
HYDROGRAPH AT	BERM	.00	1	FLOW	0.	1.
				TIME	3.50	3.50
2 COMBINED AT	CMD4	.01	1	FLOW	7.	13.
				TIME	3.58	3.58

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

REFERENCED MATERIAL FROM THE APPROVED
'TECHNICAL DRAINAGE STUDY FOR PEARSON COMMUNITY CENTER'
CLV DS #3889





NORTH

GRAPHIC SCALE

60 0 30 60 120

(IN FEET)
1 inch = 60 ft.

DRAINAGE LEGEND

ND1	DRAINAGE BASIN LABEL
CMD1	CONCENTRATION POINT
SUMP-1	COMBINATION POINT
1 (1.0)(1.2)	BASIN BOUNDARY LINE
1 (1.0)(1.2)	STORAGE POINT
2	Q10 (V10)(D10)
3	Q100 (V100)(D100)
1D	Q10 FLOW IN CFS (10 YR.)
	Q100 FLOW IN CFS (100 YR.)
	FLOW DIRECTION
	HYDRAULIC CROSS-SECTION

HEC-RAS

	HEC-RAS CONTROL LINE
	LIMITS OF FEMA ZONE "A"
100	HEC-RAS CROSS-SECTION AND STATION NUMBER
	100 YR. WATER SURFACE ELEV.

Peak Flow Summary
Interim Condition

HEC-1 I.D.	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)
ND1	1.13	1	2
ND2A	5.64	4	11
ND2B	2.80	2	6
ND3	3.77	7	12
CMD1	-	9	18
ND4	0.90	2	3
ND5	1.29	2	4
CMD2	-	4	7
ND6	1.28	1	2
MLK	2.29	4	7
CMD3	-	18	34
OFX1	4.36	1	4

A.P.N.:
139-21-102-011
139-21-102-012

BASIS OF BEARINGS:
THE BASIS OF BEARINGS FOR THIS SURVEY IS THE NORTH LINE OF THE NORTHEAST QUARTER (NE 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF NORTH LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY THAT MAP ON FILE IN FILE 95 OF PARCEL MAPS, PAGE 94 IN THE CLARK COUNTY RECORDER'S OFFICE, CLARK COUNTY, NEVADA.

SAID LINE BEARS NORTH 89°13'24" EAST.

BENCHMARK:
CLV BM NO. 2LV0121N4
BEING A RIVET AND PLATE IN THE TOP OF CURB AT THE SOUTHEAST CORNER OF CAREY AND MARTIN LUTHER KING
ELEVATION: 2058.60 FEET / 627.4635 METERS
(NAVD '88 DATUM)

NOTE:
LOCHSA ENGINEERING ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS AND ELEVATIONS. THE UTILITIES SHOWN ON THIS DRAWING ARE FROM THE BEST AVAILABLE INFORMATION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION AND ELEVATION OF ALL UTILITIES, INCLUDING BUT NOT LIMITED TO, THE WATER, FIRE, SANITARY SEWER, STORM SEWER, TELEPHONE, POWER, GAS, AND IRRIGATION LINES PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. IF CONFLICT EXISTS IN THE FIELD, THE CONTRACTOR IS TO NOTIFY THE PROJECT ARCHITECT, OWNER'S REPRESENTATIVE, AND PROJECT ENGINEER IMMEDIATELY.

Avoid cutting underground utility lines. Call before you dig. 1-800-227-2600 or 811

This grading plan is a part of drainage SAFETY ALERT #3614-1 which was reviewed on 6/26/07 by Call before You Dig Overhead 1-702/593-6111

Reference 7

LEGEND				DESCRIPTION:	CONTOUR LINES	EDGE OF PAVEMENT	"A" TYPE CURBS	"L" TYPE CURBS	WALLS	FENCES	AC PAVEMENT	CONCRETE	SPOT ELEVATIONS	SIGNS	MANHOLE W/ DESCRIPTION
CL OR SURVEY LINE	EASEMENT LINE	HEAVY AC PVMT.		EXISTING:	(2210)								(12.34)		①
PROPERTY LINE	SAWCUT LINE	LIGHT AC PVMT.		PROPOSED:	2210								12.34		
ROW LINE	SCARP LINE	CONCRETE PVMT.											BC		

MANHOLE DESCRIPTIONS	FIRE HYDRANTS	GATE VALVES	REDUCERS	CLEAN OUTS	METERS AND PULLBOXES	100w HPS STREETLIGHTS	150w HPS STREETLIGHTS	200w HPS STREETLIGHTS	250w HPS STREETLIGHTS
① = SANITARY SEWER									
② = STORM DRAIN									
③ = ELECTRICAL									
④ = TELEPHONE									

architecture interiors planning engineering
Dekker Perich Holmes Sabatini
1 Holmes Satellite Way Henderson, Nevada 89014
702.434.1004 fax 434.1050
dphs@dphsnet.com

LOCHSA ENGINEERING
6345 SOUTH JONES BOULEVARD SUITE 100
LAS VEGAS, NV 89118
PHONE: (702) 365-9312, FAX: (702) 365-9317

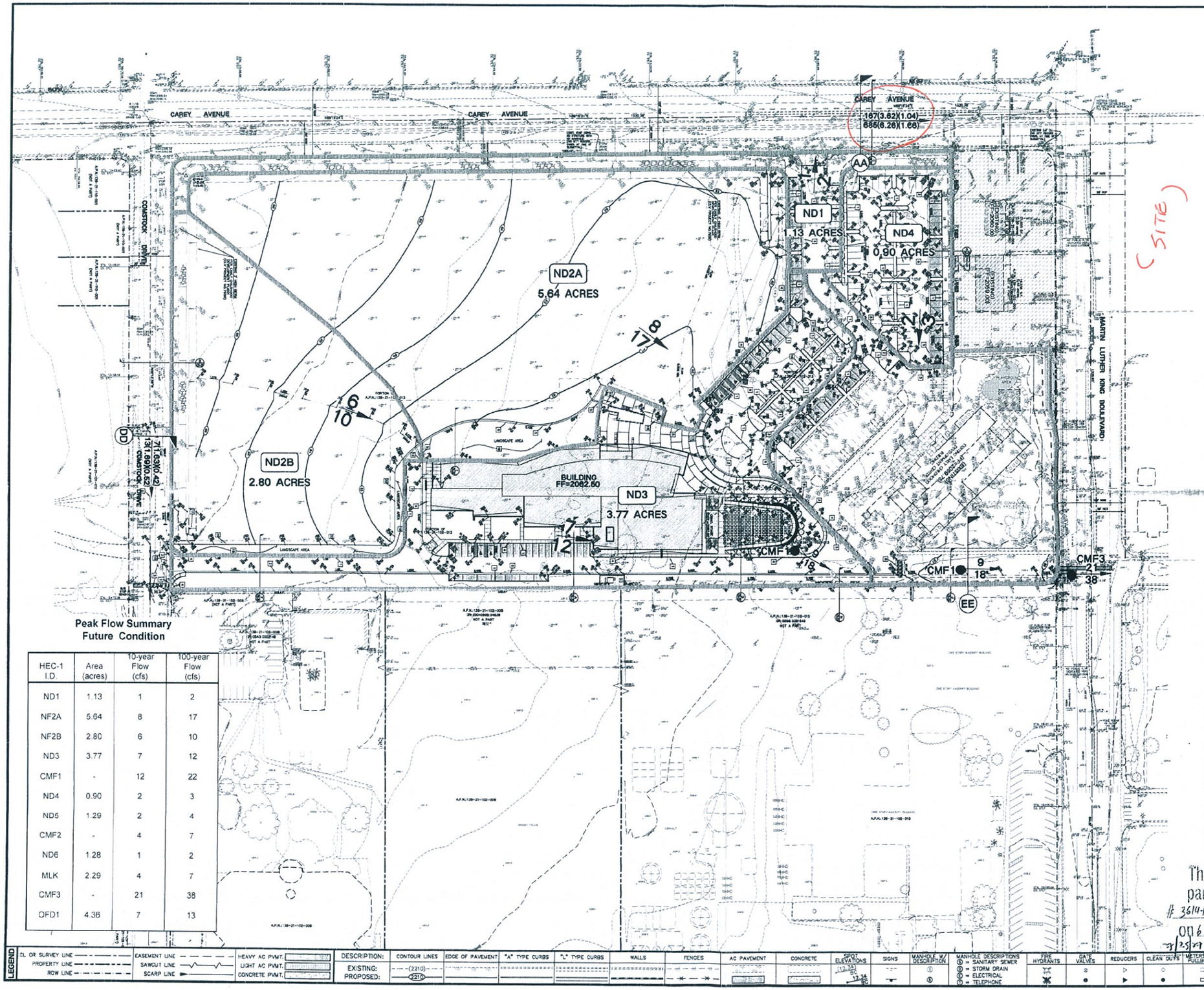
REV.	DATE	BY	DESCRIPTION

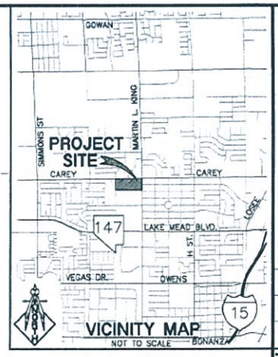
DRAWN BY: JMD DATE: 08-06-05
DESIGNED BY: SOA DATE: 08-06-05
CHECKED BY: HMN DATE: 08-06-05
PROJECT No.: 051031 SCALE: 1"=60'

SEAL

SHEET: ONSITE BASIN MAP (INTERIM CONDITION)
TITLE: PEARSON COMMUNITY CENTER

SHEET No.
DR2
SHEET 2 OF 3
DRAWING No.





NORTH

GRAPHIC SCALE

60 0 30 60 120

(IN FEET)
1 inch = 60 ft.

DRAINAGE LEGEND

ND1	DRAINAGE BASIN LABEL
• CMD1	CONCENTRATION POINT
	COMBINATION POINT
	BASIN BOUNDARY LINE
SUMP-1	STORAGE POINT
1 (1.0)(1.2) / 1 (1.0)(1.2)	Q10 (V10)(D10) / Q100 (V100)(D100)
2 / 3	Q10 FLOW IN CFS (10 YR.) / Q100 FLOW IN CFS (100 YR.)
	FLOW DIRECTION
(1D)	HYDRAULIC CROSS-SECTION

HEC-RAS

	HEC-RAS CONTROL LINE
	LIMITS OF FEMA ZONE "A"
100	HEC-RAS CROSS-SECTION AND STATION NUMBER
	100 YR. WATER SURFACE ELEV.

Peak Flow Summary
Future Condition

HEC-1 I.D.	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)
ND1	1.13	1	2
NF2A	5.64	8	17
NF2B	2.80	6	10
ND3	3.77	7	12
CMF1	-	12	22
ND4	0.90	2	3
ND5	1.29	2	4
CMF2	-	4	7
ND6	1.28	1	2
MLK	2.29	4	7
CMF3	-	21	38
OFD1	4.36	7	13

A.P.N.:
139-21-102-011
139-21-102-012

BASIS OF BEARINGS:
THE BASIS OF BEARINGS FOR THIS SURVEY IS THE NORTH LINE OF THE NORTHEAST QUARTER (NE 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF NORTH LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY THAT MAP ON FILE IN FILE 05 OF PARCEL MAPS, PAGE 94 IN THE CLARK COUNTY RECORDER'S OFFICE, CLARK COUNTY, NEVADA.

SAID LINE BEARS NORTH 89°13'24" EAST.

BENCHMARK:
CLV BM NO. 2LV0121N4
BEING A RIVET AND PLATE IN THE TOP OF CURB AT THE SOUTHEAST CORNER OF CAREY AND MARTIN LUTHER KING
ELEVATION: 2058.60 FEET / 627.4635 METERS
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Notify Nevada Underground Utility Users, It's the Law!
SAFETY ALERT
Call Before You Dig 1-800-227-2600
Call Before You Overhead 1-702-593-6111

This drawing shall is a part of drawing set # 3614-1 before you ... was regarding ... on 6/26/07 ... 1-25-07 ... 13 of 13

LEGEND

CL OR SURVEY LINE	EASEMENT LINE	HEAVY AC PVMT.	
PROPERTY LINE	SAWCUT LINE	LIGHT AC PVMT.	
ROW LINE	SCARP LINE	CONCRETE PVMT.	

DESCRIPTION: CONTOUR LINES (-(210)-) EDGE OF PAVEMENT "A" TYPE CURBS "L" TYPE CURBS WALLS FENCES AC PAVEMENT CONCRETE SPOT ELEVATIONS SIGNS MANHOLE W/ DESCRIPTION

EXISTING: (210)
PROPOSED: 210

MANHOLE DESCRIPTIONS
① = SANITARY SEWER
② = STORM DRAIN
③ = ELECTRICAL
④ = TELEPHONE

FIRE HYDRANTS GATE VALVES REDUCERS CLEAN OUTS METERS AND PULLBOXES 100W HPS STREETLIGHTS 150W HPS STREETLIGHTS 200W HPS STREETLIGHTS 250W HPS STREETLIGHTS

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interiors
planning
engineering
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Henderson, Nevada 89014
702.436.1005
fax 436.1050
dphsln@dphsln.com

LOCHSA ENGINEERING
6345 SOUTH JONES BOULEVARD SUITE 100
LAS VEGAS, NEVADA 89118
PHONE: (702) 365-9312, FAX: (702) 365-9317

REV.	DATE:	BY:	DESCRIPTION:

DRAWN BY: JMD
DESIGNED BY: SDA
CHECKED BY: HMN
PROJECT No.: 051031
DATE: 09-06-05
DATE: 09-06-05
SCALE: 1"=60'

SHEET: ONSITE BASIN MAP (FUTURE CONDITION)
TITLE: PEARSON COMMUNITY CENTER

SEAL

REFERENCE 7

SHEET No. DR3
SHEET 3 OF 3
DRAWING No.

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM	DATE: February 23, 2006
TO: **Land Development Services** Department of Public Works	FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT: Technical Drainage Study for: **Pearson Community Center**	**COPIES TO:** Lochsa Engineering
Cross Streets: SWC Martin Luther King Blvd. & Carey Ave.	Dekker Perich Holmes Sabatini Inc.
File Number: F:\Depot\DSMEMOS\DS3889D.doc	Bart Anderson, P.E., DevCo
Parcel Number: 139-21-102-011	CCRFCD
Zoning Action: ZON-9105, SDR-7683	CNLV

FEMA Flood Zone	YES		NO	X
Proposed Storm Drain	YES		NO	X

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Trn. No.
1st Submittal	9/6/2005	9/20/2005	Not Approved	$400.00	29108: $400
2nd Submittal	11/24/2005	12/8/2005	Not Approved	$400.00	33896: $400
Supplement	12/15/2005	12/29/2005	Conditional Approval	N/C	N/C
CNLV & CCRFCD	2/21/2006	2/23/2006	Concurrence	N/C	N/C
			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.
	is conditionally approved subject to City of North Las Vegas concurrence.

1. The drainage study for "Pearson Community Center" is based on condition that the improvements proposed in the "Early Childhood Facility" are complete. The proposed berms along Carey Avenue and Cumstock Drive must be completed prior to the issuance of any building permits.

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.

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

B&H/ays

T/R/S: T20S/R61E/21

AREA M-21

REGIONAL FLOOD CONTROL DISTRICT

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

BOARD OF DIRECTORS

Larry Brown
Chairman
City of Las Vegas

Chip Maxfield
Vice-Chairman
Clark County

Robert L. Eliason
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City of Mesquite

Roger Tobler
City of Boulder City

Bruce L. Woodbury
Clark County

February 13, 2006

Mr. Randy Fultz, P.E.
City of Las Vegas Public Works
731 S. Fourth St
Las Vegas, NV 89101

DISTRICT CONCURRENCE: PEARSON COMMUNITY CENTER (DS3889) (RFCD NO. 05-6587)

Dear Mr. Fultz:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated September 6, 2005, Addendum No. 1 dated November 24, 2005 and Supplement No. 1 dated December 15, 2005, for the above-mentioned project as submitted by Lochsa Engineering. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas Public Works dated December 29, 2005.

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

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

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

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

BY: _____
Abigail Mayrena, P.E.
Associate Engineer

_____
Andrew R. Trelease, P.E., CFM
Principal Civil Engineer

AM:ART:css

c: Guy M. Morris, P.E., Lochsa Engineering

File: 20-61-21.LOC

600 S. Grand Central Parkway, Suite 300 • Las Vegas, Nevada 89106-4511
(702) 455-3139 • FAX (702) 455-3870
Website: *http://www.regionalflood.org*

LOCHSA ENGINEERING

JESS. S HALDEMAN, S.E.
MARK L. HEDGE, P.E.
KENNETH W. (BILL) KARREN, JR., S.E.
DAVID S. PETERSON, S.E.
TED T. EGERTON, P.E.

KENDARD F. MIZE, P.E.
JOHN R. ZIELINSKI, S.E.

November 18, 2005

Mr. Albert Sung, P.E.
Flood Control Project Engineer
Department of Public Works
731 S. 4th Street
Las Vegas, NV 89101

Subject: **Addendum to the Technical Drainage Study for Pearson Community Center**
CLV File #DS3889A
Lochsa Job #051031

Dear Mr. Sung:

Listed below are your review comments and our respective responses, in regard to the above Technical Drainage Study:

Comment #1: The site 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.

Response #1: **Noted. A copy of the drainage study and any pertinent addendum will be submitted to Clark County Regional Flood Control District (CCRFCD), upon receipt of a conditional approval from the City of Las Vegas Flood Control Division.**

Comment #2: The development is adjacent to the jurisdiction of City of North Las Vegas to the north and to the west. Concurrence from City of North Las Vegas must be obtained prior to the final approval of the drainage study.

Response #2: **Noted. A copy of the drainage study and any pertinent addendum will be submitted to the City of North Las Vegas for concurrence, upon receipt of a conditional approval from the City of Las Vegas Flood Control Division.**

Comment #3: Provide a copy of the zoning/planning conditions associated with this site (Site specific: **ZON-9105 & SDR- 7683)** with the next submittal to verify compliance with conditions. Flood control will not issue final approval of the drainage study without the associated zoning/planning conditions. Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and submitted.

Response #3: **Please refer to the appendix for the zoning/planning conditions (ZON-9105 and SDR-7683) associated with the subject site.**

Comment #4: The drainage study for "Pearson Community Center" is based on condition that the improvements proposed in the "Early Childhood Facility" are complete. The perimeter streets and all associated flood control facilities must be completed prior to the issuance of any building permits.

Response #4: **The "Early Childhood Facility" is not proposing any perimeter street improvements. However, the perimeter earthen berm along Carey Avenue and Comstock Drive will provide flood protection to the site. Therefore, the issuance of permits for the proposed "Pearson Community Center" will only be conditioned by the construction of the aforementioned earthen berm.**

Comment #5: The finish floors of the existing buildings along Martin Luther King Boulevard are lower than the elevation at the adjacent proposed parking area. Provide either flood walls or swale for protection.

Response #5: **A 6.0-foot screen wall with 2.0-foot (max) retaining has been proposed along the property line adjacent to the subject buildings. Therefore, any flows from the landscape area along this boundary of the site will be conveyed onsite in the proposed valley gutter, and will not impact the finished floors of the existing buildings.**

Comment #6: Sheet C3.01: The north flow line in Carey Avenue in the driveway entrance shows 61.02FL, however, in referencing the "Early Childhood Facility" plan, 60.57FL is shown at the same location. Both plans used the same bench mark, explain or correct the discrepancy.

Response #6: **The north flow line elevation (61.02'FL) in question is correct per the "Early Childhood Facility" Plans. It is not certain where the elevation of 60.57' was shown. Therefore, no revision has been made.**

Comment #7: The subject development drains to the adjacent site to the south. Either prove there is a public drainage easement in the adjacent property or obtain a notarized letter from the adjacent owner to accept the flow prior to final approval of the drainage study.

Response #7: **The grading plans have been revised to drain onsite flows within the boundaries of the site. Runoff will be conveyed to Martin Luther King Boulevard, through the landscape area along the southeast corner of the site. Runoff from the site will discharge into the subject landscape area through a 22-foot wide curb opening. A normal depth calculation across the landscape area has been provided to ensure that the 100-year flows are contained within the boundaries of the site.**

Please refer to the calculations at hydraulic section EE for the interim and future conditions.

Comment #8: Sheet C5.01: Section A shows drainage across the south property line. Revise to contain the drainage within a swale. Show the construction of the swale with flow line elevations on the plans accordingly.

Response #8: **A review of the existing grades along the southern property line in the vicinity of Section A indicates that the flows from the site will not cross drain to the adjacent property. In addition, the adjacent parcel to the south is the existing Kermit Booker Elementary School, currently being redesigned by Lochsa Engineering. The proposed grades along the southern property line per the Kermit Booker Elementary School improvements, have been shown on the revised grading plans. Section A on Sheet C5.01 has been revised to match the plans.**

Comment #9: Revise the direction of the arrow on sheet DR2 Onsite Basin Map (Interim Condition).

Response #9: **The direction of the north arrow has been corrected. The revised Sheets DR2 and DR3 have been resubmitted with this addendum to indicate the location of hydraulic Section EE.**

Comment #10: In all grading plans, the topographic information tags are too small and overlap each other, ie. illegible. Resolve in the next submittal.

Response #10: **The grading plan has been revised to eliminate all overlapping and illegible topographic information.**

Comment #11: Provide topography or existing grade 100' beyond the perimeter of the site. Also include the existing finish floor elevation of all buildings within 100' proximity.

Response #11: **Topographic information has been provided for at least a 100-feet beyond the perimeters of the site. Please refer to the revised plans attached.**

Comment #12: Show the slopes for the parking lots and the ramps at the handicapped parking area on all the grading plans. On Sheet C3.02, at the north corner of the handicap parking space, a proposed 62.48TC is at low point. Revise accordingly.

Response #12: **The slopes for the parking lots and the handicapped ramps have been shown on the revised grading plans. The grades on Sheet C3.02 have been revised to eliminate the low point. Please refer to the revised grading plans attached.**

Comment #13: Revise the improvement plan(s) and detail sheet(s) as follows:

a. Provide City of Las Vegas approval block on the Cover Sheet.

Response #13a: **The City of Las Vegas Approval Block has been provided on the Cover Sheet. Please see the revised plans attached.**

b. Provide slope and flow lines for all the valley gutters on Sheet 3.01

Response #13b: **Slopes and flow line elevations have been provided. Please see the revised Sheet C3.01.**

c. Provide the standard drainage study note on the grading plan. I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT (DS3889).

Response #13c: **The standard Drainage Study note has been provided on the grading plans. Please see the revised grading plans attached.**

d. Sheet C3.01: Label the City of Las Vegas recorded plan number for the existing 54" storm drain pipe in Carey Avenue.

Response #13d: **Our recent research through the City of Las Vegas Plans Library indicates no record available for the subject 54" storm drain in Carey Avenue. The CLV plan number has not been labeled.**

No Record drawings available for the 54" SD in Carey Avenue

e. Provide sufficient grading information for the manhole and drop inlet at the northeast corner of the site on Sheet C3.01.

Response #13e: **All the topographic (grading) information available for the drop inlet has been shown on the grading plan. As previously stated, the as built plans for the storm drain could not be obtained from the CLV Plans Library. Therefore, the storm drain laterals from the subject drop inlet could not be identified. However, the inlet size as determined by recent site investigation has been called out on the plans. Please see the revised grading plan provided.**

f. Provide sufficient grading information at the southeast quarter of the site northeast of the building on Sheet C3.02.

Response #13f: **Additional grades have been provided as requested. Please note that the area in question is a proposed amphitheater with a concrete stage. The theater might be provided with a covered roof.**

g. Sheet C3.02: Show a swale north of the building for positive drainage away from the building and provide a cross-section to show the swale and the building.

Response #13g: **A 2.0' wide concrete valley gutter has been provided along the northern portion of the building for positive drainage. Please refer to the revised grading plan Sheet C3.02 and Detail Section E on Sheet C5.01.**

h. Sheet C3.03: Show clearly how the berm along Comstock Drive tie in with the driveway at the southwest corner of the site or provide a hump minimum 6" above street flow water surface elevation.

Response #13h: **Additional grading information has been provided to clarify the berm and driveway design on Comstock Drive. It will be noted that the driveway elevations as previously designed, provided a hump of approximately 6" above the water surface elevation in Comstock Drive. Please compare the future condition flow depth of 0.52' to the TC elevations of 65.95' and 65.85' at the driveway.**

i. Call out the City of Las Vegas plan number for the existing berm along Carey Avenue per Early Childhood Facility in Sheet C3.02 & C3.03 and provide the height of the berm in Detail Section-C in Sheet C5.01.

Response #13i: **The CLV approved plan number for the subject berm has been called out. Additionally, Detail Section-B on Sheet C5.01 has been modified to call out the height of the berm.**

j. Sheet C3.03: The proposed contour between the elevation of the finished floor (62.50 feet) at the upper-right corner of the sheet is flat, review and revise with minimum finish floor according to the code.

Response #13j: **The grading plan has been revised to eliminate the flat area and provide positive drainage away from the building.**

k. Clarify whether any sidewalk and L-curb along Comstock Drive on Sheet C3.03 and Detail Section-B on Sheet C5.01.

Response #13k: **No sidewalk and L-curb are proposed along Comstock Drive with this phase of the development.**

l. Differentiate the existing and proposed facilities such as the three existing structures with finish floors along Martin Luther King Boulevard. A general practice is to put existing items in light grey and proposed items in black.

Response #13l: **The plans have been clarified to differentiate between the existing and proposed facilities. Please refer to the revised grading plans provided.**

m. Sheet C3.01: The proposed high point for the entrance of Carey Avenue is at 180 + feet into the site. That means the parking area will be

substantially inundated during a 100-year storm which is. Either move the hump closer to the entrance or obtain a notarized letter from the owner acknowledging the inundation. Furthermore, the south side of that inundated parking space cannot stop the Q100 storm water going further south and impact the proposed building. Resolve and provide protection in the next submittal.

Response #13m: **The grading plan (Sheet C3.01) has been revised to reduce the area of inundation onto the site while maintaining safe entrance slopes at the driveway. Additionally, the earthen berm will be continued along the western side of the driveway to the proposed high point, to protect the site from the 100-year flows. Please refer to the revised grading plan.**

n. The swales shown on Sheet C3.02 need to have minimum 4:1 side slope and 1% longitudinal slope, otherwise, 3' valley gutter is required. Take the drainage thru (not over) the curb with sidewalk drains.

Response #13n: **The earthen swale northeast of the proposed building (adjacent to the parking lots) has been redesigned to maintain positive drainage at a longitudinal slope of approximately 0.50%. However, the swale is only proposed to direct sheet flows from the rough graded portion of the site. This portion of the site is very flat and will be impossible to achieve a 4:1 side slope without unnecessary fill to the site. Additionally, the rough grading is only an interim design, as a future park is currently being planned for this portion of the site. A 2.0-foot wide concrete valley gutter will be installed in place of the previous swale adjacent to the proposed building as described in the response to Comment #13g above. Furthermore, a sidewalk drain is proposed to drain the flows through the sidewalk into the L-curb in the drive isle northeast of the building.**

o. Sheet C3.01: Clarify some existing curb and gutter lines in the proposed parking area.

Response #13o: **Sheet C3.01 has been clarified. The existing curb and gutter lines shown in the subject parking areas are from the plans for the Early Childhood Facility and have been removed. A demolition plan will be provided for the improvements to be removed.**

If you have any further comments please contact our office at your co

Sincerely,
LOCHSA ENGINEERING

Stanley Okey Anadi
Civil Designer

PROFESSIONAL ENGINEER-STATE OF NEVADA
GUY M. MORRIS
EXP. 12-31-05
CIVIL
No. 14526

LOCHSA ENGINEERING • CIVIL AND STRUCTURAL ENGINEERING
6345 South Jones Boulevard • Suite 100 • Las Vegas, NV 89118 • Phone (702) 365-9312 • Fax (702) 365-9317

Peak Flow Summary
Interim Condition

HEC-1 I.D.	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)
ND1	1.13	1	2
ND2A	5.64	4	11
ND2B	2.80	2	6
ND3	3.77	7	12
CMD1	-	9	18
ND4	0.90	2	3
ND5	1.29	2	4
CMD2	-	4	7
ND6	1.28	1	2
MLK	2.29	4	7
CMD3	-	18	34
OFX1	4.36	1	4

Peak Flow Summary
Future Condition

HEC-1 I.D.	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)
ND1	1.13	1	2
NF2A	5.64	8	17
NF2B	2.80	6	10
ND3	3.77	7	12
CMF1	-	12	22
ND4	0.90	2	3
ND5	1.29	2	4
CMF2	-	4	7
ND6	1.28	1	2
MLK	2.29	4	7
CMF3	-	21	38
OFD1	4.36	7	13

DEVELOPMENT: Pearson Community Center
CALCULATED BY: SOA
PROJECT NUMBER: 51031

DATE: September 2005

SUB-BASIN DATA			INITIAL/OVERLAND TIME (ti)				TRAVEL TIME (tt)				tc CHECK (URBANIZED BASINS)		FINAL tc	REMARKS			
DESIGN (1)	K (2)	AREA Ac (3)	AREA Sq. mile (4)	LENGTH Ft (5)	SLOPE % (6)	ti Min (7)	LENGTH Ft (8)	SLOPE % (9)	VELOCITY FPS (10)	tt Min (11)	TOTAL LENGTH Ft (12)	tc =(L/180)+10 Min (13)	Min (14)	CN (15)	tL Hrs (16)	Urbanized? (18)	Soil Type (19)
ND2A	0.7452	5.64	0.00881	188	0.5	11.0	528	0.9	1.3	7.0	716	14.0	14.0	86.0	0.140	YES	B
ND2B	0.7452	2.80	0.00438	115	1.1	6.7	244	1.3	1.2	3.3	359	12.0	10.0	86.0	0.100	YES	B
ND3	0.9036	3.77	0.00589	200	1.0	5.0	767	0.5	3.0	4.3	967	15.4	9.3	98.0	0.093	YES	B
ND4	0.9036	0.90	0.00141	100	1.4	3.2	246	0.5	1.1	3.6	346	11.9	6.8	98.0	0.068	YES	B
NF2A	0.9036	5.64	0.00881	188	0.5	6.1	528	0.9	2.0	4.3	716	14.0	10.4	98.0	0.104	YES	B
NF2B	0.9036	2.80	0.00438	115	1.1	3.7	244	1.3	2.1	2.0	359	12.0	5.7	98.0	0.057	YES	B
OFX1	0.6264	4.36	0.00682	230	0.9	13.5	430	0.3	0.6	12.8	-	-	26.3	77.0	0.263	NO	B
OFD1	0.9036	4.36	0.00682	230	0.9	5.6	430	0.3	1.0	6.8	660	13.7	12.5	98.0	0.125	YES	B

ti = 1.8 (1.1 - K) L^(0.5) / S^(1/3)

K = 0.0132 CN - 0.39

tt = L / (60 V)

tc = ti + tt

tL= tLAG = 0.6 tc

LOCATION: Offsite/ Onsite

HYDROLOGIC CONDITION: Existing/ Developed

TRIAL: Final Iteration

Pearson Community Center

10-Year & 100-Year
6-Hour Storm:
Interim Condition

FILE: 51031P.DAT

FLOOD HYDROGRAPH PACKAGE (HEC-1)
JUN 1998
VERSION 4.1

RUN DATE 06SEP05 TIME 08:40:22

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

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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX  XXXXX           XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

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

    1     ID   PEARSON COMMUNITY CENTER
    2     ID   INTERIM CONDITION - ONSITE AND OFFSITE
    3     ID   USING SCS METHODS AND KINEMATIC WAVE ROUTING
    4     ID   MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION
    5     ID
    6     ID   FILE:  51031P.DAT
    7     ID
    8     ID   ****************************************
    9     ID       McCARRAN AIRPORT RAINFALL AREA
   10     ID       10 & 100 YEAR - 6 HOUR STORM EVENT
   11     ID
   12     ID   ****************************************
          *DIAGRAM
   13     IT    5                  300
   14     IO    5    0
   15     IN    5
   16     JR   PREC   .5704    1.0

   17     KK    ND1
   18     PB   2.77
   19     PC    0.0    .02    .057    .07    .087    .108    .124    .13    .13    .13
   20     PC    .13    .13    .13    .133    .14    .142    .148    .158    .172    .181
   21     PC    .19    .197    .199    .2    .201    .204    .214    .229    .241    .249
   22     PC    .251    .256    .27    .278    .281    .283    .295    .322    .352    .409
   23     PC    .499    .59    .71    .744    .781    .812    .819    .835    .851    .856
   24     PC    .86    .868    .876    .888    .91    .926    .937    .95    .97    .976
   25     PC    .982    .985    .987    .989    .99    .993    .993    .994    .995    .998
   26     PC    .998    .999    1.0
   27     KM   ONSITE BASIN ND1, A PORTION OF THE PROPOSED BERM AND DRIVEWAY IMPACTING
   28     KM   CAREY AVENUE AS PREVIOUSLY ANALYZED IN EARLY CHILDHOOD STUDY
   29     BA  .00176
   30     LS       0    87.4
   31     UD    .161

   32     KK    ND2A
   33     KM   ONSITE BASIN  ND2A, A PORTION OF THE SITE TO BE ROUGH GRADED
   34     KM   PREVIOUSLY ANALYZED IN EARLY CHILDHOOD STUDY AS ND2
   35     BA  .00681
   36     LS       0    86.0
   37     UD    .140

   38     KK    ND2B
   39     KM   ONSITE BASIN  ND2A, THE REMAINDER ROUGH GRADED PORTION OF THE SITE
   40     KM   TO BE CONVEYED WITHIN THE DRIVE ISLE OF THE PEARSON COMMUNITY CENTER
   41     BA  .00438
   42     LS       0    86.0
   43     UD    .100

   44     KK    ND3
   45     KM   ONSITE BASIN  ND3, THE PROPOSED PEARSON COMMUNITY CENTER BUILDING
   46     KM   PARKING LOTS, DRIVE ISLE AND OTHER IMPROVEMENTS
   47     BA  .00589
   48     LS       0    98.0
   49     UD    .093
```

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

  50      KK   CMD1
  51      KM   COMBINE ND2A, ND2B AND ND3 IMPACTING THE EXISTING ALLEY/SERVICE ROAD
  52      HC     2

  53      KK   ND4
  54      KM   ONSITE BASIN  ND4, FORMERLY ROUGH GRADED WITH THE EARLY CHILDHOOD FACILITY
  55      KM   IMPROVEMENTS BUT WILL NOW BE CONSIST OF TO A PARKING LOT
  56      BA  .00141
  57      LS     0    98.0
  58      UD    .068

  59      KK   ND5
  60      KM   ONSITE BASIN  ND3, MAJORITY OF THE PROPOSED IMPROVEMENTS WITH
  61      KM   THE EARLY CHILDHOOD FACILITY STUDY
  62      BA  .00201
  63      LS     0    98.0
  64      UD    .082

  65      KK   CMD2
  66      KM   COMBINE ND4 AND ND5 AT THE SOUTHERN DRIVEWAY
  67      HC     2

  68      KK   ND6
  69      KM   ONSITE BASIN  ND6; AS PROPOSED WITH THE EARLY CHILDHOOD FACILITY STUDY
  70      KM   DISCHARGES INTO MARTIN LUTHER KING BLVD THRU A WALL OPENING
  71      BA  .00201
  72      LS     0    82.6
  73      UD    .121

  74      KK   MLK
  75      KM   EXISTING RETAIL SHOPS AND PORTION OF MARTIN LUTHER KING BOULEVARD CONVEYED
  76      KM   ADJACENT TO THE SITE
  77      BA  .00358
  78      LS     0    98.0
  79      UD    .098

  80      KK   CMD3
  81      KM   COMBINE ALL ONSITE AND OFFSITE RUNOFF IN MARTING LUTHER KING BOULEVARD
  82      KM   DOWNSTREAM OF THE SITE
  83      HC     4

  84      KK   OFX1
  85      KM   EXISTING UNDEVELOPED PARCELS CONVEYED SOUTH IN COMSTOCK DRIVE
  86      KM   ADJACENT TO THE SITE
  87      BA  .00682
  88      LS     0    77.0
  89      UD    .263
  90      ZZ
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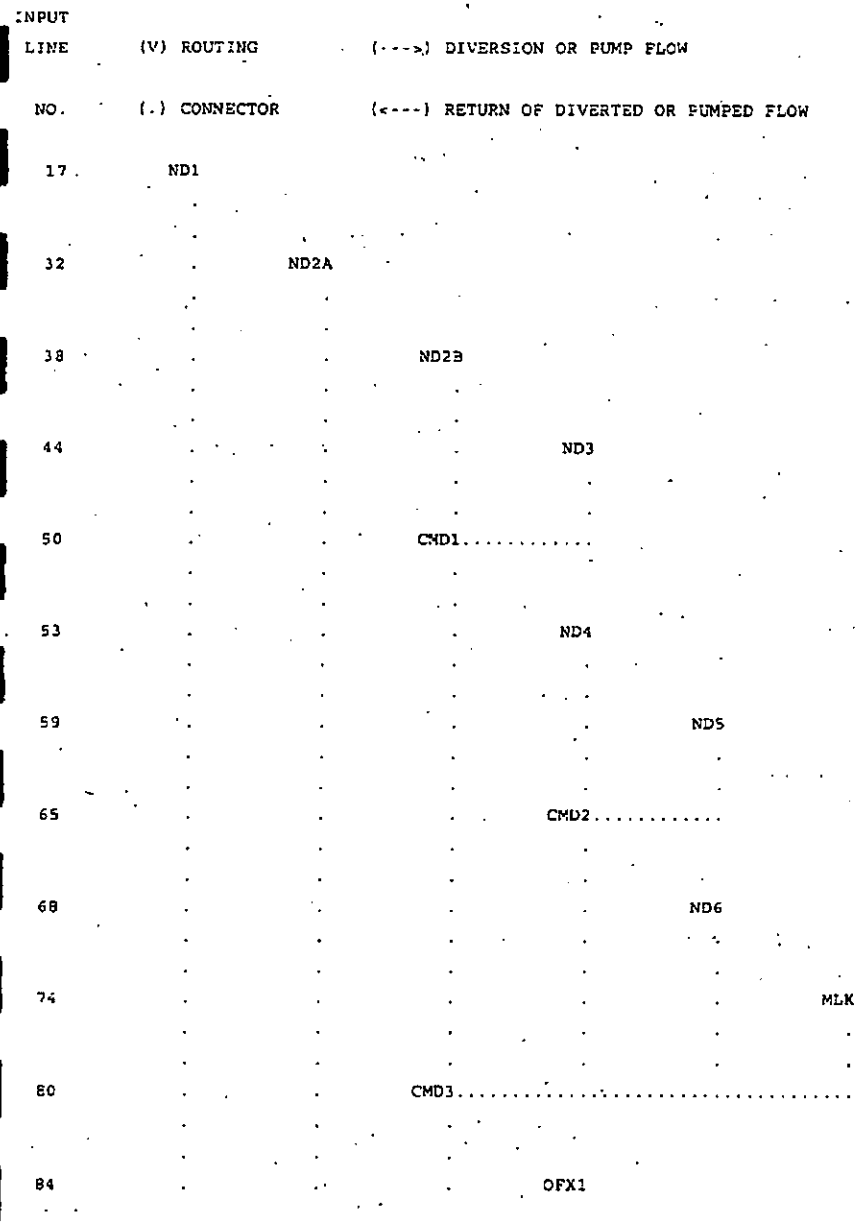
SCHEMATIC DIAGRAM OF STREAM NETWORK



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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*  FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*        JUN  1998                  *
*      VERSION 4.1                  *
*                                   *
*  RUN DATE  06SEP05  TIME 08:40:22 *
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*                                   *
*  U.S. ARMY CORPS OF ENGINEERS     *
*  HYDROLOGIC ENGINEERING CENTER    *
*       609 SECOND STREET           *
*    DAVIS, CALIFORNIA 95616        *
*       (916) 756-1104              *
*                                   *
*************************************
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PEARSON COMMUNITY CENTER
INTERIM CONDITION - ONSITE AND OFFSITE
USING SCS METHODS AND KINEMATIC WAVE ROUTING
MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION

FILE: 51031P.DAT

****
McCARRAN AIRPORT RAINFALL AREA
10 & 100 YEAR - 6 HOUR STORM EVENT
****

14 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

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

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

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

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
.57 1.00

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

					RATIOS APPLIED TO PRECIPITATION	
OPERATION	STATION	AREA	PLAN		RATIO 1	RATIO 2
					.57	1.00
HYDROGRAPH AT	ND1	.00	1	FLOW	1.	2.
				TIME	3.58	3.58
HYDROGRAPH AT	ND2A	.01	1	FLOW	4.	11.
				TIME	3.58	3.58
HYDROGRAPH AT	ND2B	.00	1	FLOW	2.	6.
				TIME	3.58	3.50
HYDROGRAPH AT	ND3	.01	1	FLOW	7.	12.
				TIME	3.50	3.50
2 COMBINED AT	CMD1	.01	1	FLOW	9.	18.
				TIME	3.50	3.50
HYDROGRAPH AT	ND4	.00	1	FLOW	2.	3.
				TIME	3.50	3.50
HYDROGRAPH AT	ND5	.00	1	FLOW	2.	4.
				TIME	3.50	3.50
2 COMBINED AT	CMD2	.00	1	FLOW	4.	7.
				TIME	3.50	3.50
HYDROGRAPH AT	ND6	.00	1	FLOW	1.	2.
				TIME	3.58	3.58
HYDROGRAPH AT	MLK	.00	1	FLOW	4.	7.
				TIME	3.50	3.50
4 COMBINED AT	CMD3	.02	1	FLOW	18.	34.
				TIME	3.50	3.50
HYDROGRAPH AT	OFX1	.01	1	FLOW	1.	4.
				TIME	3.75	3.75

AREA FOR THE SUBJECT SITES PREVIOUSLY ANALYZED IN REFERENCES 6

OTHER BASINS HAVE BEEN ADOPTED AND INCORPORATED INTO THE HYDROLOGIC ANALYSIS FOR THE SUBJECT SITE.

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

Pearson Community Center

10-Year & 100-Year
6-Hour Storm:
Future Condition

FILE: 51031F.DAT

FLOOD HYDROGRAPH PACKAGE (HEC-1)
JUN 1998
VERSION 4.1

RUN DATE 06SEP05 TIME 08:41:02

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

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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX  XXXXX          XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
    1     ID    PEARSON COMMUNITY CENTER
    2     ID    FUTURE CONDITION - ONSITE AND OFFSITE
    3     ID    USING SCS METHODS AND KINEMATIC WAVE ROUTING
    4     ID    MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION
    5     ID
    6     ID    FILE:  51031F.DAT
    7     ID
    8     ID    ****************************************
    9     ID         McCARRAN AIRPORT RAINFALL AREA
   10     ID         10 & 100 YEAR - 6 HOUR STORM EVENT
   11     ID
   12     ID    ****************************************
          *DIAGRAM
   13     IT     5                  300
   14     IO     5       0
   15     IN     5
   16     JR   PREC   .5704     1.0

   17     KK    ND1
   18     PB   2.77
   19     PC     0.0     .02    .057     .07    .087    .108    .124     .13     .13     .13
   20     PC     .13     .13     .13    .133     .14    .142    .148    .158    .172    .181
   21     PC     .19    .197    .199      .2    .201    .204    .214    .229    .241    .249
   22     PC    .261    .256     .27    .278    .281    .283    .295    .322    .352    .409
   23     PC    .499     .59     .71    .744    .781    .812    .819    .835    .851    .856
   24     PC     .86    .868    .876    .888     .91    .926    .937     .95     .97    .976
   25     PC    .982    .985    .987    .989     .99    .993    .993    .994    .995    .998
   26     PC    .998    .999     1.0
   27     KM   ONSITE BASIN ND1, A PORTION OF THE PROPOSED BERM AND DRIVEWAY IMPACTING
   28     KM   CAREY AVENUE AS PREVIOUSLY ANALYZED IN EARLY CHILDHOOD STUDY
   29     BA  .00176
   30     LS       0    87.4
   31     UD    .161

   32     KK    NF2A
   33     KM   ONSITE BASIN  NF2A, TO BE DEVELOPED IN THE FUTURE
   34     BA  .00881
   35     LS       0    98.0
   36     UD    .104

   37     KK    NF2B
   38     KM   ONSITE BASIN  NF2A, TO BE DEVELOPED IN THE FUTURE
   39     BA  .00436
   40     LS       0    98.0
   41     UD    .057

   42     KK     ND3
   43     KM   ONSITE BASIN  ND3, THE PROPOSED PEARSON COMMUNITY CENTER BUILDING
   44     KM   PARKING LOTS, DRIVE ISLE AND OTHER IMPROVEMENTS
   45     BA  .00589
   46     LS       0    98.0
   47     UD    .093
```

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

  48          KK   CMF1
  49          KM   COMBINE ND2A, ND2B AND ND3 IMPACTING THE EXISTING ALLEY/SERVICE ROAD
  50          HC     2

  51          KK    ND4
  52          KM   ONSITE BASIN  ND4, FORMERLY ROUGH GRADED WITH THE EARLY CHILDHOOD FACILITY
  53          KM   IMPROVEMENTS BUT WILL NOW BE CONSIST OF TO A PARKING LOT
  54          BA  .00141
  55          LS      0    98.0
  56          UD   .068

  57          KK    ND5
  58          KM   ONSITE BASIN_ ND3, MAJORITY OF THE PROPOSED IMPROVEMENTS WITH
  59          KM   THE EARLY CHILDHOOD FACILITY STUDY
  60          BA  .00201
  61          LS      0    98.0
  62          UD   .082

  63          KK   CMF2
  64          KM   COMBINE ND4 AND ND5 AT THE SOUTHERN DRIVEWAY
  65          HC      2

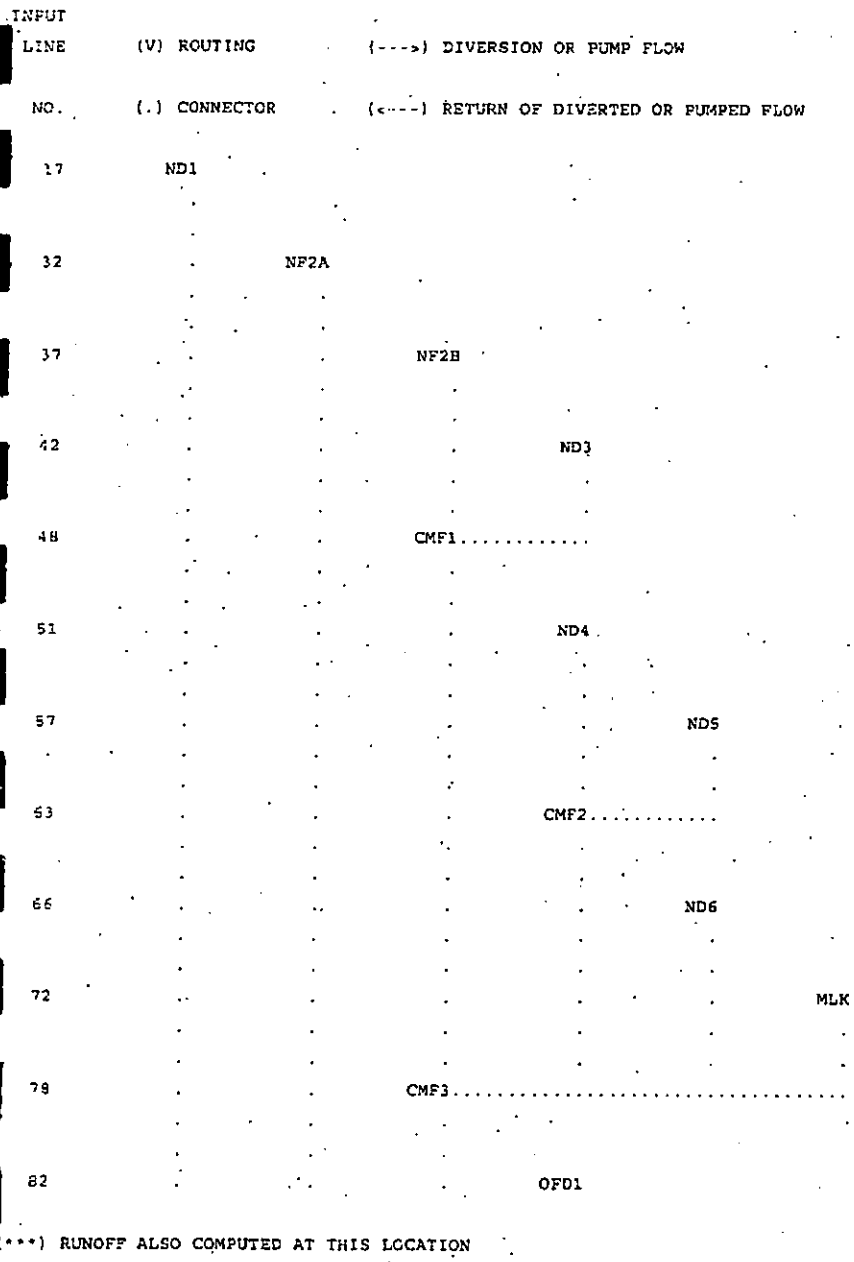
  66          KK    ND6
  67          KM   ONSITE BASIN  ND6, AS PROPOSED WITH THE EARLY CHILDHOOD FACILITY STUDY
  68          KM   DISCHARGES INTO MARTIN LUTHER KING BLVD THRU A WALL OPENING
  69          BA  .00201
  70          LS      0    82.6
  71          UD   .121

  72          KK    MLK
  73          KM   EXISTING RETAIL SHOPS AND PORTION OF MARTIN LUTHER KING BOULEVARD CONVEYED
  74          KM   ADJACENT TO THE SITE
  75          BA  .00358
  76          LS     0    98.0
  77          UD   .098

  78          KK   CMF3
  79          KM   COMBINE ALL ONSITE AND OFFSITE RUNOFF IN MARTING LUTHER KING BOULEVARD
  80          KM   DOWNSTREAM OF THE SITE
  81          HC      4

  82          KK   OFD1
  83          KM   FUTURE DEVELOPED PARCELS CONVEYED SOUTH IN COMSTOCK DRIVE
  84          KM   ADJACENT TO THE SITE
  85          BA  .00682
  86          LS     0    98.0
  87          UD   .125
  88          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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*  FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*            JUN  1998              *
*         VERSION 4.1               *
*                                   *
*  RUN DATE  05SEP05  TIME 08:41:02 *
*                                   *
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*************************************
*                                   *
*  U.S. ARMY CORPS OF ENGINEERS     *
*  HYDROLOGIC ENGINEERING CENTER    *
*       609 SECOND STREET           *
*    DAVIS, CALIFORNIA 95616        *
*       (916) 756-1104              *
*                                   *
*************************************
```


PEARSON COMMUNITY CENTER
FUTURE CONDITION - ONSITE AND OFFSITE
USING SCS METHODS AND KINEMATIC WAVE ROUTING
MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION

FILE: 51031F.DAT

McCARRAN AIRPORT RAINFALL AREA
10 & 100 YEAR - 6 HOUR STORM EVENT

14 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

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

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

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

JP MULTI-PLAN OPTION

NPLAN	1	NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
.57 1.00

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

					RATIOS APPLIED TO PRECIPITATION	
OPERATION	STATION	AREA	PLAN		RATIO 1	RATIO 2
					.57	1.00
HYDROGRAPH AT	ND1	.00	1	FLOW	1.	2.
				TIME	3.58	3.58
HYDROGRAPH AT	NF2A	.01	1	FLOW	10.	17.
				TIME	3.50	3.50
HYDROGRAPH AT	NF2B	.00	1	FLOW	6.	10.
				TIME	3.50	3.50
HYDROGRAPH AT	ND3	.01	1	FLOW	7.	12.
				TIME	3.50	3.50
2 COMBINED AT	CMF1	.01	1	FLOW	12.	22.
				TIME	3.50	3.50
HYDROGRAPH AT	ND4	.00	1	FLOW	2.	3.
				TIME	3.50	3.50
HYDROGRAPH AT	ND5	.00	1	FLOW	2.	4.
				TIME	3.50	3.50
2 COMBINED AT	CMF2	.00	1	FLOW	4.	7.
				TIME	3.50	3.50
HYDROGRAPH AT	ND6	.00	1	FLOW	1.	2.
				TIME	3.58	3.58
HYDROGRAPH AT	MLK	.00	1	FLOW	4.	7.
				TIME	3.50	3.50
4 COMBINED AT	CMF3	.02	1	FLOW	21.	38.
				TIME	3.50	3.50
HYDROGRAPH AT	OFD1	.01	1	FLOW	7.	13.
				TIME	3.58	3.58

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

KNOCK FOR THIS SUBJECT SITE PREVIOUSLY ANALYZED IN REFERENCE 6

OTHER BASINS HAVE BEEN ADOPTED AND INCORPORATED INTO THE HYDROLOGIC ANALYSIS FOR THIS SUBJECT SITE

REFERENCED MATERIAL FROM THE APPROVED
'TECHNICAL DRAINAGE STUDY FOR EARLY CHILDHOOD FACILITY'
CLV DS #3614

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: January 7, 2005
TO: **Land Development Services** Department of Public Works				**FROM:** Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Technical Drainage Study for: **Early Childhood Facility**			**COPIES TO:** Lochsa Engineering
Cross Streets:	SWC Martin Luther King Blvd. & Carey Ave.			Robert A. Fielden, Inc.
File Number:	F:\Depot\DSMEMOS\DS3614C.doc			Bart Anderson, P.E., DevCo
Parcel Number:	139-21-102-011, 139-21-102-012			CCRFCD
Zoning Action:	ZON-4526; SDR-4527			
FEMA Flood Zone	YES	NO	X	
Proposed Storm Drain	YES	NO	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Trn. No.
1st Submittal	7/23/2004	8/5/2004	Not Approved	$400.00	7029: $400
2nd Submittal	9/24/2004	10/12/2004	Conditionally Approved	$400.00	9997: $400
CCRFCD	12/27/2004	1/7/2005	Concurrence	N/C	N/C
			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 following comments are repeated until they are complete:

1. *Coordinate the improvements along Martin Luther King (MLK) Boulevard with the ongoing MLK widening project. Contact Joe Christensen with City of Las Vegas Engineering Design at 229-2212 to coordinate MLK issues.*

2. *The document provided (i.e., Combination Request Form) does not confirm that the two parcels have merged. Coordinate with the City of Las Vegas Surveyor (Alan Riekki @ 229-6217) for assistance with merging these parcels together. A copy of the recorded document is required prior to final approval of the improvement plans.*

3. *On Sheet C3.01, verify that the invert elevation (56.24) and/or the finished grade elevation (58.00) are correct at the outlet of the onsite 8" PVC storm drain.*

4. *Additional grade elevations are required within the landscape area south of the 4-foot concrete channel to demonstrate how this area drains.*

5. *On Sheet C5.01, revise Section-C to depict the proposed playground area (i.e., sidewalk, wall, etc.).*

6. *A Drainage Study Update will be required upon future development of the remaining portion of this site.*

Post-it® Fax Note 7671	Date	# of pages ▶
To Guy Morris	From Albert Sung	
Co./Dept. Lochsa	Co. CLV	
Phone #	Phone #	
Fax # 365-9317	Fax #	

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.

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) 687-8429.

END OF REMARKS
B&H/rac

T/R/S: T20S/R61E/21
AREA M-21

REGIONAL FLOOD CONTROL DISTRICT

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

BOARD OF DIRECTORS

Larry Brown
Chairman
City of Las Vegas

Chip Maxfield
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City of Mesquite

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City of Boulder City

Bruce L. Woodbury
Clark County

December 8, 2004

Mr. Randy Fultz, P.E.
City of Las Vegas Public Works
731 S. Fourth St
Las Vegas, NV 89101

DISTRICT CONCURRENCE: EARLY CHILDHOOD FACILITY (DS3614) (RFCD NO. 04-6015)

Dear Mr. Fultz:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated July 23, 1004 and Addendum No. 1 dated September 23, 2004, for the above-mentioned project as submitted by Lochsa Engineering. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas Public Works dated October 12, 2004.

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

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

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

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

BY: _____
Andrew R. Trelease, P.E.
Senior Civil Engineer

ART:css

c: Guy M. Morris, P.E., Lochsa Engineering

File: 20-61-21.LOC

600 S. Grand Central Parkway, Suite 300 • Las Vegas, Nevada 89106-4511
(702) 455-3139 • FAX: (702) 455-3870
Website: http://www.ccrfcd.org

Technical Drainage Study

for

Early Childhood Facility

JOB# 6741

July 2004

Prepared for:

Robert A. Fielden Inc.,
2480 East Tompkins,
Suite 103
Las Vegas, Nevada 89121
(702) 435-6501

Prepared By:
LOCHSA ENGINEERING
5828 Spring Mountain Road
Suite 308
Las Vegas, Nevada 89146-8896
(702) 365-9312

is an existing 54-inch RCP with a capacity of 340 cfs in Carey Avenue (please refer to Figure F-10 attached in the appendix). Therefore, the surface 100-year storm runoff in Carey Avenue is approximately 685 cfs (ie. 1025 - 340 = 685 cfs). This runoff will be completely intercepted in the future condition by the proposed CCRFCD facility (11'x8' RCB) to be installed in Carey Avenue. Onsite improvement designs have been based on a the existing condition flows of 685 cfs, since this represents the worst case condition and will result in a conservative design for the site. In order to estimate the quantity of flow in Martin Luther King Boulevard adjacent to the site, the existing retail stores located at the north east corner of the site and the street right-of-way width is analyzed as basin MLK (4/7 cfs). Runoff in Martin Luther King Boulevard combines with other flows generated onsite (CMX2) and the combined flow traverses east to Blankenship Avenue.

The existing site is analyzed as three basins labeled NX1 through NX3. Basin NX1 (1/5 cfs) consists of the northwestern one-third of the site majority of the site and combines with offsite flows in the wash traversing the site. Basins NX2 (1/2 cfs) and NX3 (1/3 cfs) consist of the southeast and northeast corners of the site, and combine with flows from OFX3 at CMX3 (3/8 cfs) to impact the adjacent northeast parcel. Please refer to sheet DR1 for the existing condition onsite drainage basin map.

2.2 Interim Drainage Condition

A. Offsite and Onsite Drainage

For the interim condition, the quantity of flow in Carey Avenue is assumed to remain the same as in the existing condition (Q_{100} = 1025 cfs) with existing 54-inch RCP intercepting 340 cfs and a remainder surface flow of approximately 685 cfs in Carey Avenue. Runoff in Martin Luther King Boulevard adjacent to the site will also remain the same as in the existing condition, and will maintain the existing drainage pattern. However, the onsite analysis has been revised to reflect the

proposed improvements. The site is analyzed as six drainage basins labeled ND1 through ND6. Basin ND1 (1/2 cfs) is a portion of the site including part of the proposed berm that sheet flows into Carey Avenue. Basins ND2 (2/6 cfs) and ND3 (1/5 cfs) consist of the upstream portion of the site not intended for development with this phase of the project. No improvements are proposed on this portion of the site at this time (basins ND2 and ND3), therefore the interim condition analysis provided is the same as in the existing condition. An earthen swale will be constructed around the proposed drive isle to route flows from ND2 and ND3 to the existing service road south of the site as in the existing condition. Runoff from ND2 and ND3 will combine at CMD1 (3/11 cfs), and the combined runoff is routed east in the existing service road to impact Martin Luther King Boulevard. Basin ND4 (1/2 cfs) is the northeast portion of the site, and will be rough graded to sheet flow into the proposed drive isle through a 2-foot curb opening, while ND5 (2/4 cfs) consist of the proposed paved parking lots, drive isles and a portion of the proposed building. Runoff from ND4 and ND5 will combine at CMD2 (3/6 cfs), and the combined runoff will be conveyed to Martin Luther King Boulevard through a proposed 4-foot U-gutter. Basin ND6 (1/2 cfs) is the southeast portion of the site which consists of the remainder of the proposed building and the play area behind the building. Runoff from ND6 will also discharge southeast to Martin Luther King Boulevard through a proposed wall opening. The combined onsite runoff discharging into Martin Luther King Boulevard through the service road, U-gutter and wall opening is approximately 16 cfs {see CMD3 (5/16 cfs)}. Please refer to sheet DR2 in the appendix for the onsite basin delineations in the interim condition.

2.3 Future Drainage Condition

A. Offsite and Onsite Drainage

For the future condition, both the site and the offsite basins are assumed to be fully developed. The offsite basins impacting the site in Carey Avenue have already been analyzed by

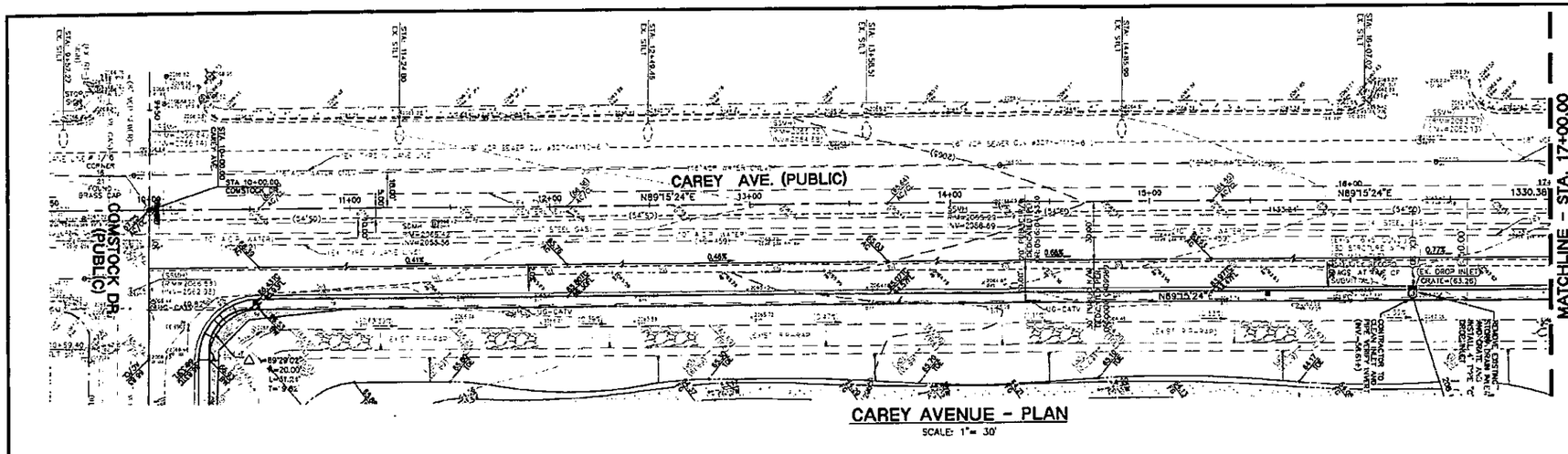
the City Wide, however, the future CCRFCD facility (11'x8' RCB) to be installed in Carey Avenue will completely intercept all flows in the street adjacent to the site. Therefore, no future condition flow depth calculations for Carey Avenue has been provided. Flows in Martin Luther King Boulevard adjacent to the site will remain the same as estimated in the existing condition since the street and retail stores have already been developed and consist of asphalt pavement and roofs.

The upstream onsite basins (ND2 and ND3) are also assumed to be developed and are therefore correspondingly analyzed as basins NF2 (8/17 cfs) and NF3 (6/13 cfs). The future condition analysis of these basins were based on the intended future land use (commercial, retail and casino) as identified on Figure H-13 of the Master Plan Update (Reference 3). The runoff from basins NF2 and NF3 are combined at CMF1 (14/30 cfs) and will be conveyed to Martin Luther King Boulevard through the existing service road. Other onsite basins which were already analyzed as developed in the interim condition will remain the same in the future condition. The combined future condition onsite flows impacting Martin Luther King Boulevard is approximately 37 cfs, during a 100-year, 6-hour storm event {see combination point CMF3 (17/37 cfs).

2.4 Master Planning Information

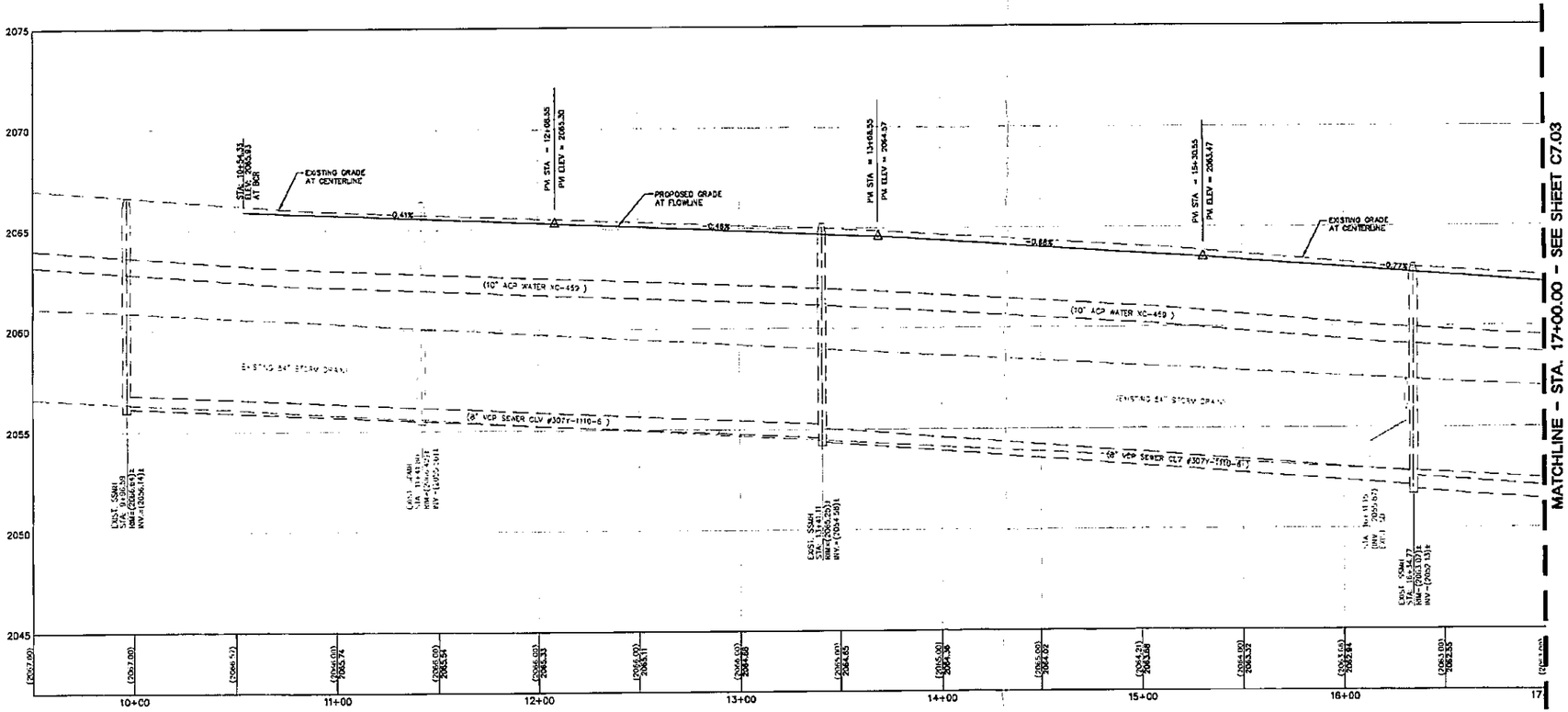
The "*2002 Las Vegas Valley Flood Control Master Plan Update*", dated September 2002, as prepared by Post Buckley Schuh and Jernigan, Inc. (PBS&J), in association with G. C. Wallace Inc., and Louis Berger Group, for the Clark County Regional Flood Control District (CCRFCD) (Reference 3) illustrates the proposed regional master planned facilities in the area as shown on Figure F-20.

Review of the Master Plan Update (Reference 3), indicates both an existing and a proposed CCRFCD facilities in Carey Avenue adjacent to the site. Both facilities are identified in Reference 3 as LVSR 0148: Las Vegas Wash-Smoke Ranch. The existing facility is a 54" RCP identified to



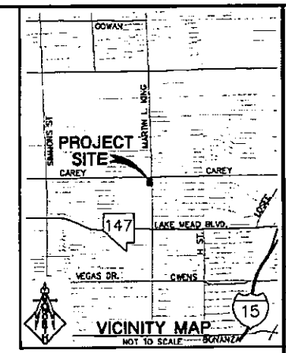
CAREY AVENUE - PLAN

SCALE: 1"= 30'



CAREY AVENUE - PROFILE

HORIZ. SCALE: 1"= 30'
VERT. SCALE: 1"= 3'



GRAPHIC SCALE

30 0 15 30 60

(IN FEET)
1 inch = 30 ft.

NOTE:
FOR GRADING CONSTRUCTION NOTES SEE UTILITY PLANS SHEET C3.01 AND C3.02

NOTE:
FOR UTILITY CONSTRUCTION NOTES SEE UTILITY PLANS SHEET C4.01 AND C4.02

This grading plan is a part of drainage study #3614-1 which was received on 7/6/07 and Conditionally approved on 8/6/07 Page 6 of 7.

A.P.N.:
139-21-102-013

BASIS OF BEARINGS:

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE NORTH LINE OF THE NORTHEAST QUARTER (NE 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF NORTH LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY THAT MAP ON FILE IN FILE 00 OF PARCEL MAPS, PAGE 84 IN THE CLARK COUNTY RECORDER'S OFFICE, CLARK COUNTY, NEVADA.

SAID LINE BEARS NORTH 89°13'24" EAST.

BENCHMARK:

CLV BM NO. 21/0121N4
BEING A RIVET AND PLATE IN THE TOP OF CURB AT THE SOUTHEAST CORNER OF CAREY AND MARTIN LUTHER KING
ELEVATION: 2056.80 FEET / 627.4835 METERS
(NAVD '88 DATUM)

NOTE:

LOCHSA ENGINEERING ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS AND ELEVATIONS. THE UTILITIES SHOWN ON THIS DRAWING ARE FROM THE BEST AVAILABLE INFORMATION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION AND ELEVATION OF ALL UTILITIES, INCLUDING BUT NOT LIMITED TO, THE WATER, FIRE, SANITARY SEWER, STORM SEWER, TELEPHONE, POWER, GAS, AND IRRIGATION LINES PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. IF CONFLICT EXISTS IN THE FIELD, THE CONTRACTOR IS TO NOTIFY THE PROJECT ARCHITECT, OWNER'S REPRESENTATIVE, AND THE PROJECT ENGINEER IMMEDIATELY.

CITY OF LAS VEGAS FIRE DEPARTMENT APPROVAL

BY: _____ DATE: _____

APPROVAL OF THESE PLANS SHALL NOT BE CONSTRUED TO BE A PERMIT FOR, OR AN APPROVAL OF, ANY VIOLATION OF ANY OF THE PROVISIONS OF THE STATE OR COUNTY LAWS. FIRE FLOW 1,500 GPM AT 20 P.S.I. RESIDUAL.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT DATE:
PROJECT #113982

Avoid cutting underground utility lines. It's costly.
Call before you Dig
1-800-227-2600

SAFETY ALERT
Call Before You Overhead
1-702-593-8111

LEGEND				DESCRIPTION:	CONTOUR LINES	EDGE OF PAVEMENT	"A" TYPE CURBS	"L" TYPE CURBS	WALLS	FENCES	AC PAVEMENT	CONCRETE	SPOT ELEVATIONS	SIGNS	MANHOLE W/ DESCRIPTION	MANHOLE DESCRIPTIONS	FIRE HYDRANTS	GATE VALVES	REDUCERS	CLEAN OUTS	METERS AND PULLBOXES	100w HPS STREETLIGHTS	150w HPS STREETLIGHTS	200w HPS STREETLIGHTS	250w HPS STREETLIGHTS
CL OR SURVEY LINE	EASEMENT LINE	HEAVY AC PVMT.		EXISTING:	(2210)											S = SANITARY SEWER								
PROPERTY LINE	SAWCUT LINE	LIGHT AC PVMT.		PROPOSED:	2210											SD = STORM DRAIN								
ROW LINE	SCARP LINE	CONCRETE PVMT.														E = ELECTRICAL								
																T = TELEPHONE								

engineering
planning
surveying
Dekker Perich Sabatini
7251 Amigo Street, Suite 120
Las Vegas, Nevada 89119
(702) 362-1006
(702) 362-1060 fax
dpslasvegas.com

REV	DATE	BY	DESCRIPTION

LOCHSA ENGINEERING
6345 SOUTH JONES BOULEVARD SUITE 100
LAS VEGAS, NV 89118
PHONE: (702) 365-9312, FAX: (702) 365-9317

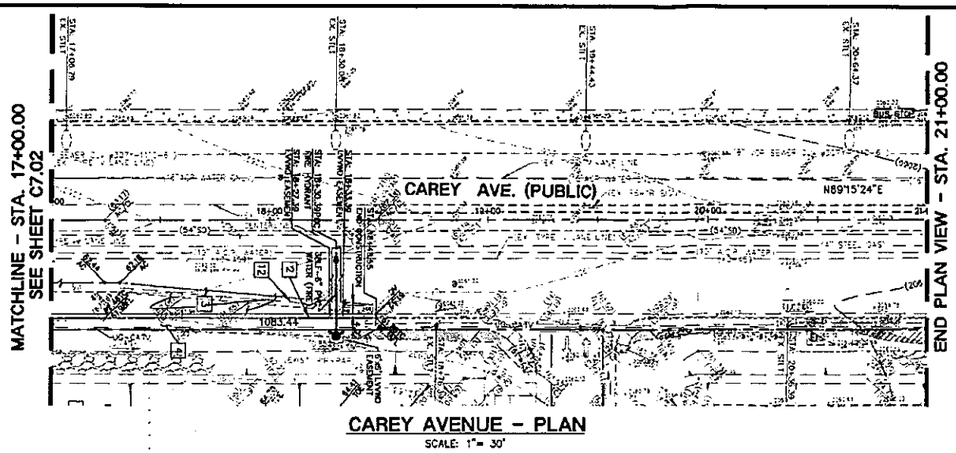
CAREY AVENUE PLAN AND PROFILE

M.L.K. AND CAREY AVE. PARK
CITY OF LAS VEGAS

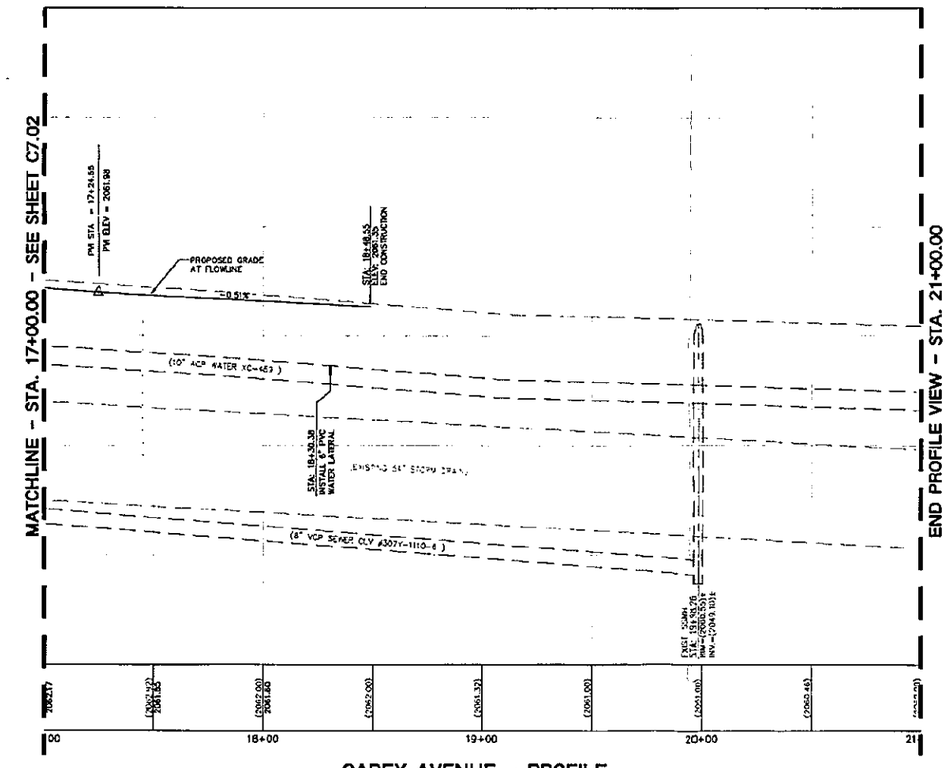
DRAWN BY:	CHECKED BY:	SHEET:	DATE:	SCALE:
CRW	CRW		07-11-07	1"=30'
DESIGNED BY:	QA/QC BY:	TITLE:	DATE:	
CRW	CMM		07-11-07	
		PROJECT NO.:	061015	

CLIFFORD W. MORRIS
EXP 12-31-07
CIVIL
No. 14578
STATE OF NEVADA
7/27/07

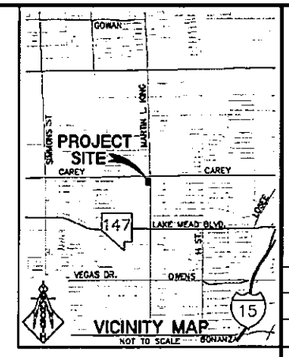
SHEET No.
C7.02
SHEET 13 OF 14
DRAWING No.
CLV #21045



CAREY AVENUE – PLAN
SCALE: 1"= 30'



CAREY AVENUE – PROFILE
HORIZ. SCALE: 1"= 30'
VERT. SCALE: 1"= 3'



NORTH

GRAPHIC SCALE
(IN FEET)
1 inch = 30 ft.

NOTE:
FOR GRADING CONSTRUCTION NOTES SEE UTILITY PLANS SHEET C3.01 AND C3.02

NOTE:
FOR UTILITY CONSTRUCTION NOTES SEE UTILITY PLANS SHEET C4.01 AND C4.02

This grading plan is a part of drainage study #3614-1 which was received on 7/27/07 and approved on 8/7/07. Page 7 of 7

A.P.N.:
139-21-102-013

BASIS OF BEARINGS:
THE BASIS OF BEARINGS FOR THIS SURVEY IS THE NORTH LINE OF THE NORTHEAST QUARTER (NE 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF NORTH LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY THAT MAP ON FILE IN FILE 05 OF PARCEL MAPS, PAGE 94 IN THE CLARK COUNTY RECORDER'S OFFICE, CLARK COUNTY, NEVADA.

SAID LINE BEARS NORTH 89°13'24" EAST.

BENCHMARK:
CLV BM NO. 35.VD12114
BEING A RIVET AND PLATE IN THE TOP OF CURB AT THE SOUTHEAST CORNER OF CAREY AND MARTIN LUTHER KING
ELEVATION: 2058.60 FEET / 627.4655 METERS
(NAVD '88 DATUM)

NOTE:
LOCHSA ENGINEERING ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS AND ELEVATIONS. THE UTILITIES SHOWN ON THIS DRAWING ARE FROM THE BEST AVAILABLE INFORMATION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION AND ELEVATION OF ALL UTILITIES, INCLUDING BUT NOT LIMITED TO, THE WATER, FIRE, SANITARY SEWER, STORM SEWER, TELEPHONE, POWER, GAS, AND IRRIGATION LINES PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. IF CONFLICT EXISTS IN THE FIELD, THE CONTRACTOR IS TO NOTIFY THE PROJECT ARCHITECT, OWNER'S REPRESENTATIVE, AND THE PROJECT ENGINEER IMMEDIATELY.

Avoid cutting underground utility lines. It's costly.
Call before you Dig
1-800-227-2600

SAFETY ALERT
Call Before You Overhead
1-702-593-8111

CITY OF LAS VEGAS FIRE DEPARTMENT APPROVAL
BY: _____ DATE: _____
APPROVAL OF THESE PLANS SHALL NOT BE CONSTRUED TO BE A PERMIT FOR, OR AN APPROVAL OF, ANY VIOLATION OF ANY OF THE PROVISIONS OF THE STATE OR COUNTY LAWS. FIRE FLOW 1,500 GPM AT 20 P.S.I. RESIDUAL.

APPROVED FOR CONSTRUCTION
LAS VEGAS VALLEY WATER DISTRICT DATE:
PROJECT #113082

LEGEND

| | | |

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: March 25, 2015
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: **Pearson Park: Track & Field Renovation** **(Clark County Park in the City of Las Vegas)**			**COPIES TO:** S&B Christ Consulting LLC
Cross Streets:	SWC of Carey Avenue & Martin L. King Blvd.			Clark County Real Property Mgmt.
File Number:	F:\Depot\DSMemos\DS4711C.doc			Bart Anderson, P.E., DevCo
Parcel Number:	139-21-102-013			CCRFCD
Zoning Action:	SDR-55804			CNLV
FEMA Flood Zone	YES	NO	X	
Proposed Storm Drain	YES	NO	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	11/18/2014	12/3/2014	Not Approved	$400.00	377167: $400
2nd Submittal	2/4/2015	2/19/2015	Conditional Approval	$400.00	384607: $400
CCRFCD	3/11/2015	3/25/2015	Concurrence Recv'd	N/C	N/C
			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:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
X	is conditionally approved subject to City of North Las Vegas Public Works Department concurrence.

1. The site is adjacent to the jurisdiction of *City of North Las Vegas* (CNLV) to the north and west. The engineer must coordinate with *City of North Las Vegas Department of Public Works* and incorporate any concerns for boundary conditions along the jurisdictional border. CNLV concurrence is required prior to the final approval of the study.

2. Label an existing 54"-RCP regional storm drain in *Carey Avenue* with recorded drawing number on all pertinent plans. Identify two existing drop inlets and the associated laterals in *Carey Avenue*. Label with type of inlets and length information on the plans.

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

END OF REMARKS

ays

T/R/S: T20S/R61E/21
AREA M-21

REGIONAL FLOOD CONTROL DISTRICT

Rec'd: 3/11/15

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

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March 10, 2015

Mr. Oh Sang Kwon, P.E.
City of Las Vegas
333 North Rancho Drive
Las Vegas, NV 89106

DISTRICT CONCURRENCE: **PEARSON PARK TRACK & FIELD RENOVATION (DS4711B) (RFCD No. 15-9466)**

Dear Mr. Kwon:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated November 18, 2014 and Addendum No. 1 dated January 5, 2015 for above-mentioned project as submitted by S & B CHRIST CONSULTING, LLC. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas dated February 19, 2015.

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

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

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

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

BY: _____
Abigail Mayrena, P.E., CFM
Senior Engineer

AM:eb

c: Jonathan Tull, P.E., S & B Christ Consulting, LLC

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Website: *http://www.regionalflood.org*

PEARSON PARK: TRACK & FIELD RENOVATION

TECHNICAL DRAINAGE STUDY
UPDATE TO THE EARLY CHILDHOOD FACILITY
#DS3614

CCRPM Project No. RP.D0914078
CLV Project No. 55389
SBCC Project No. 304-14-002

Prepared for:
Clark County Real Property Management
500 South Grand Central Parkway, 4th Floor
Las Vegas, Nevada 89106
Attn: Roland Wisdom

PROFESSIONAL ENGINEER-STATE OF NEVADA
JONATHAN D. TULL
Exp: 6/30/16
CIVIL
No 14581

11-18-14

November 18, 2014

S&B CHRIST CONSULTING, LLC.
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Las Vegas, NV 89148
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S&B Christ Consulting, LLC
Ops Research & Civil/Env Engineering
8(a), Woman, Service Disabled Veteran Owned Small Business

2. General Location and Development Description

a) Purpose

Clark County Real Property Management (CCRPM) has retained the services of S&B Christ Consulting, LLC. (SBCC) to provide renovations for the existing recreation facility and amenities at the Dr. William U. Pearson Park and Community Center (Pearson Park), located within the jurisdictional boundary of the City of Las Vegas, at the southwest corner of Carey Avenue and Marin Luther King Boulevard. The developed site currently consists of an Early Childhood facility, Community Center facility, separate restroom facility and storage facility, running track, field event venues, picnic pavilions, playground area, and associated concrete pavement/sidewalks, landscaping, and parking and drive areas.

The purpose of this drainage study amendment is to provide an updated hydrologic analysis of the site, and to substantiate onsite hydraulic design for proposed recreation facility renovations and additions. The existing hydrology of the site and the offsite basins impacting the site were originally evaluated during the design of the Early Childhood and Community Center facilities and associated site amenities in the reports entitled *"Technical Drainage Study for Early Childhood Facility"*, *"Technical Drainage Study for Pearson Community Center" (by reference only)*, and *"Technical Drainage Study for MLK and Carey Avenue Park (Update to Early Childhood Facility)", #DS3641*, with associated addenda. These reports were previously prepared by Lochsa Engineering between 2004 and 2007, and were reviewed and approved by the authorities having jurisdiction (AHJs). SBCC staff have obtained and reviewed the referenced prior reports, addenda, and AHJ approvals associated with City of Las Vegas Drainage Study #DS3641, and stands in substantial agreement with the methodology, approach, conclusions, and recommendations contained therein, with specific *exceptions* identified and addressed in this report. As such, SBCC will utilize and rely upon these prior reports, which will constitute the basis of our current study.

The reviewed prior reports had analyzed for two specific development conditions: "Existing" and "Future". SBCC's review of prior reports and current site conditions indicated that a third site development condition, identified as "Interim", was necessary to fully describe site storm water flow conditions. The following table summarizes these identified development conditions, and these conditions are referenced throughout the remainder of this technical drainage study (TDS) update report (particularly in Section 3 below):

SUMMARY OF IDENTIFIED SITE CONDITIONS

IDENTIFIED SITE CONDITION	DESCRIPTION
Existing	Current site as of November 18, 2014, with the existing 54-inch reinforced concrete pipe (RCP) facility (LVSR 0148) in Carey Avenue to the north, and associated conditions, development features and grades based on the "future" site conditions identified in prior drainage study reports and improvement plans, as well as current SBCC examination of existing site features and configurations.

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Interim	A future site condition that occurs following construction and implementation of proposed on-site improvements identified in this TDS Update and associated improvement plans, but **prior to construction** of the regionally significant storm drain facility upgrade in Carey Avenue that will replace the existing 54-inch RCP facility (LVSR 0148) with a larger reinforced concrete box (RCB) facility (LVSR 0149).
Future	The ultimate future site condition that occurs following construction and implementation of the proposed on-site improvements identified in this TDS Update and associated improvement plans and **also following construction** of the regionally significant storm drain facility upgrade in Carey Avenue that replaces the existing 54-inch RCP (LVSR 0148) with a larger RCB facility (LVSR 0149).

The Clark County Regional Flood Control District (CCRFCD) *Hydrologic Criteria and Drainage Design Manual* (**Reference 1**) was utilized for reference in the preparation of this update. During our review, SBCC noted that the previously approved reports had referenced the CCRFCD *2002 Las Vegas Valley Flood Control Master Plan Update* (**References 2 and 3**). The CCRFCD *2008 Las Vegas Valley Flood Control Master Plan Update* (**References 4 and 5**) has been compiled and is currently utilized by the AHJs for planning purposes. This update reviewed both the 2002 and 2008 *Las Vegas Valley Flood Control Master Plan Update*s and presents changes noted between the studies. In addition, SBCC noted that the FEMA FIRM for the site had been updated since generation of the prior reports. SBCC reviewed the FIRMs for differences, which could impact the project and immediate vicinity.

This report presents the hydrologic and hydraulic analyses, methodology, and results of SBCC's drainage study update efforts.

b) Location of Property

The site is a recreational facility owned and managed by Clark County, and is located at the southwest corner of the intersection of Carey Avenue and Martin Luther King Boulevard, extending west to Comstock Drive. The site is located within a portion of the north half (N ½) of the northwest quarter (NW ¼) of Section 21, Township 20 South, Range 61 East of the M.D.M., in the City of Las Vegas, Nevada. The site is identified as Assessor's Parcel Number APN: 139-21-102-013 (**Appendix A**). It should be noted that the existing Early Childhood facility extends onto adjacent Assessor's Parcel Number APN: 139-21-102-014 to the east, also owned by Clark County. Due to the history of development on the site, this adjacent improved parcel has been included as part of Pearson Park for purposes of on-site hydrologic basin analysis; however, it is not subject to the renovations proposed at the facility at this time, and as such is not specifically reflected in the proposed Pearson Park improvement drawings.

Based on review of the *2008 Las Vegas Valley Flood Control Master Plan Update* (**References 4 and 5**), the on-site and off-site basins are located within the Central Watershed, and the site is located within sub-basin LM19. Off-site watersheds impacting the site in Carey Avenue (i.e. to the north of Carey Avenue) are sub-basins S and R2-C (**Appendix A**).

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The Lake Mead Detention Basin is located approximately 4,000 feet west (up grade) of the site at the intersection of Carey Avenue and Simmons Street, and manages off-site flows generated by the sub-basins located to the west and northwest of Simmons Street.

The Existing Condition includes a 54-inch RCP in the Carey Avenue alignment located just to the north of the site (**Reference 13**). The identified Interim Condition includes the proposed on-site improvements and retains the existing 54-inch RCP in Carey Avenue. The Future Condition will include replacement of the existing 54-inch RCP with an 11'x7' RCB in Carey Avenue (**Reference 5**).

The existing Clark County Community Resource Center and North Las Vegas Justice Court facilities are located adjacent to Pearson Park (the Site) at the northeast corner of the Martin Luther King Boulevard and Carey Avenue intersection. Two abandoned commercial buildings on dedicated parcels are located at the southwest corner of the Martin Luther King Boulevard and Carey Avenue intersection, and are immediately adjacent to the Site. East of the Site, across Martin Luther King Boulevard, are vacant properties and existing residential homes. South of the Site is the Kermit R. Booker Sr. Elementary School. West of the Site, across Comstock Drive, are residential homes and the 100 Academy of Excellence. The northwest corner of Comstock Drive and Carey Avenue is vacant, while North across Carey Avenue is an open lot, which is under consideration for the construction of new apartment buildings. The northwest corner of the Martin Luther King Boulevard and Carey Avenue intersection is occupied by a convenience store. The centerlines of Martin Luther King Boulevard and Comstock Drive form the boundary line between the City of North Las Vegas and the City of Las Vegas jurisdictions placing the site within the jurisdiction of the City of Las Vegas.

c) Description of Property

The entire Pearson Park site consists of approximately 17 acres of developed recreational land. However, the portion of the site subject to the proposed improvements examined in this update encompasses approximately 6 acres. The existing site generally slopes to the southeast at approximately 0.90 percent. The majority of the storm water from the site is conveyed via surface flow to Martin Luther King Boulevard east of the site. A smaller portion is captured in an on-site storm drain consisting of a 24"x24" drop inlet and associated 15" PVC pipe connected to the storm drain system in Carey Avenue north of the site.

A review of the *2008 Las Vegas Valley Flood Control Master Plan Update*, Figure H-26 (**Appendix A**), indicates that the site and its immediate offsite watersheds are located within the hydrologic soil group B. Soil group B is defined as soils with "Moderate Infiltration Rate, and Moderately Low Runoff Potential". The Curve Numbers (CN) for the existing and developed condition analyses were previously determined by others and are referenced as a basis of this document, being based on Table 602 of the *CCRFCD Hydrologic Criteria and Drainage Design Manual* (**Appendix A**)

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3. Drainage Description

a) Existing Drainage Conditions

i. Offsite Drainage

Generally, offsite flows are conveyed from the northwest to the southeast through Pearson Park. The offsite basins impacting the subject site consist of those in the area north of Carey Avenue, west of Martin Luther King Boulevard, south of Cheyenne Avenue and east of Simmons Street. These basins are partially developed and the southern portion of the identified area consists of mainly single-family residential housing developments with average lots of less than six thousand square feet, as well as limited commercial development. The northern portion of the identified basins consists mainly of commercial development. Large portions of the identified watershed area are undeveloped, vacant land.

These offsite areas were studied in the *2002 Las Vegas Valley Flood Control Master Plan Update*, dated September 2002 (**References 2 and 3**), as well as in the *2008 Las Vegas Valley Flood Control Master Plan Update*, dated September 2008 (**References 4 and 5**). The offsite areas were also studied in the *City of Las Vegas Flood Control Facilities Inventory and City Wide Hydrology Analysis Volume II* (**Reference 7**). The approved *Technical Drainage Study for the Early Childhood Facility* (**Reference 8**) previously addressed the onsite and offsite flows impacting the entire site, as did the approved *Technical Drainage Study for MLK and Carey Avenue Park* (**Reference 13**). The flow rates estimated in Reference 8 were also adopted for the design of improvements addressed in the *Technical Drainage Study for Pearson Community Center* (**Reference 11**).

As indicated in Reference 7, approximately 1,025 cubic feet per second (CFS) is currently conveyed in Carey Avenue during a 100-year, 6-hour storm event. An ultimate 100-year flow of 566 CFS had also been anticipated in Carey Avenue adjacent to the site in the *City of Las Vegas Flood Control Facilities Inventory and City Wide Hydrology Analysis Volume II* (**Reference 7**). The current conveyance numbers were utilized by Lochsa (**Reference 8**) and adopted by SBCC since they represent the worse case storm water flows adjacent to the site.

A 54-inch RCP currently exists in Carey Avenue, which has an indicated capacity of 340 CFS (refer to Figure F-10). Therefore, the 100-year surface runoff in Carey Avenue had been previously modeled (**References 8 through 15**) as approximately 685 CFS (i.e. 1025 – 340 = 685 CFS).

The future condition as previously identified by Lochsa included a planned 11'x8' RCB in Cary Avenue, which was identified in the *2002 Las Vegas Valley Flood Control Master Plan Update*, dated September 2002 (**References 2 and 3**). This RCB had the capacity to convey the full anticipated 1,025 CFS; however the revised *2008 Las Vegas Valley Flood Control Master Plan Update*, dated September 2008 (**References 4 and 5**) modified the size of this facility to an 11'x7' RCB, resulting in surface flows in Carey Avenue during the future 100-year flow conditions.

Previous drainage studies prepared for onsite improvements (**References 8 through 15**) were based on the existing condition (54-inch RCP), which represents the worst-case condition, and results in the following drainage scenarios:

1. 10-year 6-hour surface flow of 167 CFS in Carey Avenue.
2. 100-year 6-hour surface flow of 685 CFS in Carey Avenue.

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Based on this information, the *Technical Drainage Study for Early Childhood Facility* (**Reference 8**) had predicted that during a 10-Year storm event, Carey Avenue would experience a flow depth of 1.04 feet over the existing flow line (167 CFS), and 1.66 feet over the flow line during a 100-Year storm event (685 CFS).

However, as previously stated, the *2008 Las Vegas Valley Flood Control Master Plan Update* (**References 4 and 5**) modified the future 11' x 8' RCB to a 11' x 7' RCB changing the RCB capacity from 1,025 CFS to 951 CFS (**Reference 5**). This results in additional surface flow of 74 CFS in Carey Avenue adjacent to the site (1025 – 951 = 74 CFS) during the future condition 100-year storm event. This is much less than the flows identified during the Existing and Interim Conditions worse case scenarios, but more than the Future Condition surface flows that were previously identified in site reports.

Additionally, the flows in Martin Luther King Boulevard adjacent to the site were previously estimated by analyzing the existing retail stores located at the northeast corner of the site, including the street right-of-way as basin MLK (4/7 CFS) (**Reference 8**). Runoff in Martin Luther King Boulevard combines with flows generated within the Pearson Park site and proceeds east in Blankenship Avenue. The existing condition flows impacting the site have been adopted from Reference 8, and have not been re-analyzed as part of this study.

The area that impacts Comstock Drive adjacent to the site was analyzed as basin OFD1 (7/13 CFS) for the ultimate developed condition (**Reference 11**). The identified Future Condition analyses from Reference 11 were also adopted and incorporated into this analysis for the subject site. The developed condition flows in Comstock Drive are conveyed south and eventually east in Balzar Street. The flows impacting Comstock Drive have been adopted from Reference 11, and have not been re-analyzed as part of this study. Refer to the "Peak Flow Summary, Existing Condition" table in **Appendix B**, and Figures DS-001 and DS-002, **Appendix D** for additional information.

ii. Onsite Drainage

The site was previously analyzed as eight drainage basins labeled ND1, ND2A, ND2B, ND2C, ND3, ND4, ND5 and ND6 (**Reference 15**). Basin ND1 (1/2 CFS) includes part of the proposed riprap berm that sheet flows into Carey Avenue. Basins ND2A (2/7 CFS), ND2B (1/4 CFS), ND2C (1/3 CFS) and ND3 (7/12 CFS) incorporate the portions most directly effected by the proposed Pearson Park Track & Field Renovations, which are the subject of this study. Basins ND5 (2/4 CFS) and ND6 (1/2 CFS) were previously analyzed in **Reference 8**, but are not effected by the currently proposed Pearson Park Track & Field Renovations, and have been adopted as identified in **Reference 8**.

Comparison of Existing site conditions to the Interim and Future Conditions (Sheets DR2 and DR3, **Reference 15**) indicates the presence of an access drive along the northern boundary of the site adjacent to, and parallel with, Carey Avenue. This drive extends approximately 300 feet to the west of the single in/out drive reflected in basin ND1 in Sheets DR2 and DR3 (**Reference 15**) and impacts the boundaries of existing basins ND1, ND2A, and ND2C. Please Refer to Curve Number Calculations – Revised Existing Basin Conditions, as well as the Standard Form 4, provided in **Appendix A**, and Sheets DS-001 and DS-002 in **Appendix D**, for the revised onsite drainage basin delineations (ND1-R, ND2A-R, and ND2C-R), which reflect the current Existing site conditions. The changes documented in the analyzed basins were minor in most cases, with the exception of basin ND2A. The associated flows generated in these basins were re-analyzed using HEC-1 (**Appendix A**), and the revised flows were adopted and utilized for subsequent analysis in this report.

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The interim condition onsite analyses presented in the prior drainage studies (**References 8 through 15**) have been adopted as the existing condition for this study, since construction of the improvements for the Early Childhood Facility, Pearson Community Center, and MLK and Carey Avenue Park have been completed. Therefore, the existing onsite flows and offsite flows were not reevaluated, unless directly impacted by observed changes to existing site conditions, master plan conditions, or proposed improvements related to the Track & Field Renovations. The following specific *exceptions* to existing conditions were identified during our review of sit conditions indicated in the previous reports:

1.) *Exception 1:* Previous reports identified that in the Interim Condition during the 100-year, 6-hour storm event, flows in Carey Avenue would exceed the carrying capacity of the existing 54-inch storm drain facility and result in above-grade flows predicted to reach a rate of 685 CFS in Carey Avenue, resulting in above-grade flows anticipated to reach a depth of 1.66 feet above the existing flow line in Carey Avenue (**Reference 8**). This condition would result in an estimated water surface elevation of 64.35 feet (62.69 feet + 1.66 feet = 64.35 feet) at the existing drop inlet in Carey Avenue, which is higher than the existing grate elevation for the drop inlet located within the field area of the Pearson Park track (62.13 feet), and also higher than the as-constructed edge of the Pearson Park track (approximately 63.41 feet at the lowest point). These relative elevations indicate that any surface water flows in Carey Avenue that exceed the conveyance capacity of the storm drain system, and are greater than 0.20 feet in depth (62.89 – 62.69) at the Carey Avenue storm drain drop inlet (flow line), will result in a reverse-flow scenario in which storm water is conveyed onto the site through the existing 15-inch storm drain pipe. This condition indicates that during a 100-year storm event the predicted head of water in Carey Avenue would drive storm water flow in the reverse of the normal direction and onto the site through the installed 15-inch PVC storm drain line. The size of this line would limit flow migration onto the site due to the water surface differential of 0.94 feet (64.35 – 63.41), to approximately 6 CFS (Hazen-Williams Pressure Flow Calculation, **Appendix B**). An analysis of the existing track and field facility indicates that this localized basin could hold approximately 300 cubic yards (8,100 cubic feet) of volume before over-topping. Based on a linear rainfall curve analysis utilizing the 6 CFS added to the generated basin volume of 7 CFS (**References 14 and 15**) for a total 100-year flow of 13 CFS, applied over a six-hour storm event, the estimated total volume of storm water contributing to the existing track and field facility is 140,400 (60 seconds x 60 minutes x 6 hours x 13 CFS x ½) cubic feet, which is significantly greater than the 8,100 cubic feet able to be impounded. Thus, the offsite flows from Carey Avenue, combined with generated onsite storm water flow, would overtop the track perimeter and flow through adjacent site basins in an easterly direction.

Similarly, previous reports identified that in the Interim Condition during the 10-year, 6-hour storm event, flows in Carey Avenue would exceed the carrying capacity of the existing 54-inch storm drain facility and result in above-grade flows predicted to reach a depth of 1.04 feet above the existing flow line in Carey Avenue (**Reference 8**). This condition would result in an estimated water surface elevation of 63.73 feet (62.69 feet + 1.04 feet = 63.73 feet) at the existing drop inlet in Carey Avenue, which is higher than the existing grate elevation for the drop inlet located within the field area of the Pearson Park track (62.13 feet), and also higher than the constructed edge of the Pearson Park track (approximately 63.41 feet at the lowest point). This condition indicates that during a 10-year storm event the predicted head of water in Carey Avenue would drive storm water flow in the reverse of the normal direction and onto the site through the installed

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15-inch PVC storm drain line. The size of this line would limit flow migration onto the site due to the water surface differential of 0.32 feet (63.73 – 63.41), to approximately 4 CFS (Hazen-Williams Pressure Flow Calculation, **Appendix B**). An analysis of the existing track and field facility indicates that this localized basin could hold approximately 300 cubic yards (8,100 cubic feet) of volume before over-topping. Based on a linear rainfall curve analysis utilizing the 4 CFS added to the generated basin volume of 2 CFS (**References 14 and 15**) for a total 10-year flow of 6 CFS, applied over a six-hour storm event, the estimated total volume of storm water contributing to the existing track and field facility is 64,800 (60 seconds x 60 minutes x 6 hours x 6 CFS x ½) cubic feet, which is significantly greater than the 8,100 cubic feet able to be impounded. Thus, the offsite flows from Carey Avenue, combined with generated onsite storm water flow, would overtop the track perimeter and flow through adjacent site basins in an easterly direction.

2.) *Exception 2:* Previous reports did not indicate the presence of an access road along the northern site boundary. This road is in an area previously occupied by a diversion berm designed to protect the site from the predicted surface flows in Carey Avenue. The presence of this access road will need to be accounted for and incorporated into existing site conditions. In addition, prior reports identified the impervious area within drainage sub basin ND2A as 0.25 acres. Review of the existing conditions in this basin, which includes the track and field facilities, walkways, bleachers, etc., indicate the presence of approximately 1.69 acres of impervious surface. Previous reports had also indicated discrepancies between acreages including prior HEC-1 analyses versus sub basin areas reflected in exhibits (for instance, sub basin ND2B was reflected in exhibits as being 2.80 acres, but in hydrologic tables and HEC-1 analyses is summarized as 1.77 acres). In general the prior hydrologic tables and HEC-1 analyses were closer to SBCC's analysis results of 1.77 acres for ND2B, and SBCC utilized this information to re-analyze the site where applicable.

Existing drainage basin boundaries have been re-configured (Sheets DS-001 and DS-002, **Appendix D**) and the revised basins have been re-summarized (Curve Number Calculations, Standard Form 4, and HEC-1 Analysis Results, **Appendix A**). SBCC's review of the revised basins and differences result in changes that are numerically significant compared with the 10-year and 100-year flows, particularly with respect to sub basin ND2A, now revised as sub basin ND2A-R (**References 8 through 15**). Basin ND1 was revised from 1.13 to 1.29 acres. However, this basin discharges north to Carey Avenue via surface flow, and the total 100-year storm contribution of 3 CFS from this basin is negligible in comparison to the 685 CFS worse case surface flows predicted for this area. The other onsite basins become smaller in area (ND2A starts at 4.94 acres and reduces to 4.91 acres; ND2C starts at 1.52 acres and reduces to 1.27 acres). The revised acreages were used to re-analyze the onsite flows using HEC-1.

3.) *Exception 3:* Previous reports indicate the presence of a storm water diversion berm along the northern site boundary to protect the site from storm water conveyed in Carey Avenue. Toward the west end of the access road indicated previously in *Exception 2*, a discontinuity in the berm was noted in the recent topographic information for the site and observed by SBCC staff during a recent site visit. Prior reports identified that surface water elevations in Carey Avenue of 1.04 feet above the flow line (1.04 – 0.89 = 0.15) for the 10-year 6-hour storm event, and 1.66 feet above the flow line (1.66 – 0.89 = 0.77) for the 100-year 6-hour storm event were predicted. The discontinuous portion

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of the berm exhibits a low point elevation of 63.48 feet, which is approximately 0.89 feet above the adjacent flow line elevation of 62.59 in Carey Avenue. Since this elevation is less than 1.04 feet above the flow line (1.04 – 0.89 = 0.15) for the 10-year storm event, and 1.66 feet above the flow line (1.66 – 0.89 = 0.77) predicted for the 100-year storm event in previous reports, this berm discontinuity would result in weir flows of approximately 2 CFS (10 year) and 25 CFS (100 year) (Weir Analysis, **Appendix B**) to migrate south onto the site from Carey Avenue. These additional flow contributions have been accounted for in the analysis of existing site conditions within this report.

Based on these listed exceptions, the existing drainage condition was re-compiled utilizing previous technical drainage study information (**References 8 through 15**) modified to incorporate the identified changes (**Appendix A**), and the updated existing site flow conditions are presented in Sheets DS-001 and DS-002 (**Appendix D**). It should be noted that the additional off-site flow contributions due to the berm break and back-flow thorough the existing 15-inch storm drain were added to the on-site flows generated through updated HEC-1 analyses included in Appendix A, and summarized in the provided flow total charts (**Appendix B**)

b) Interim Drainage Conditions

i. Offsite Drainage

For the Interim Drainage Condition, the site and the offsite basins are assumed fully developed per the current renovation plans, but the 11x7 RCB regional facility is not yet constructed. This assumes the berm discontinuity at the west end of the site access drive has been addressed, and storm water no longer migrates onto the site from this location. Preliminary improvement plans documenting the proposed interim site conditions are included in **Appendix C** to this document.

The offsite basin impacting the site in Carey Avenue has already been analyzed in the *City of Las Vegas Flood Control Facilities Inventory and City Wide Hydrology Analysis Volume II* (**Reference 7**). However, for the defined "Interim" condition, the planned CCRFCD facility (11'x7' RCB) installed in Carey Avenue remains unconstructed, and the existing worse case offsite flows, particularly the surface flows in Carey Avenue, remain unchanged from the existing condition (with the exception of the berm break flows as described above). Also, storm water continues to migrate onto the site through the existing 15-inch storm drain during the 10-year and 100-year flood conditions, when the storm drain in Carey Avenue is at full capacity.

Offsite flows in Martin Luther King Boulevard adjacent to the site remain the same as estimated in previous analysis (**References 14 and 15**) since the street and retail stores remain unchanged with these proposed improvements. The area that impacts Comstock Drive adjacent to the site will also remain the same for the interim developed condition.

ii. Onsite Drainage

The onsite analysis presented in the Interim Condition represents the currently planned renovations for the site. The onsite basin changes, modifications to impervious areas, and analysis of existing storm water flows previously identified in *Exceptions 1.) and 2.)* above, results in changes to the onsite basins, as does construction of the proposed Concession/Storage building within on-site Basin ND2B. Refer to Curve Number Calculations – Revised Existing Basin Conditions, as well as the Standard Form 4 for basins modified for the interim conditions. HEC-1 analyses for the interim condition, provided in **Appendix A**, and Sheets DS-003 and DS-004 in **Appendix D**, are also provided for the revised onsite drainage basin delineations, which reflect completion of planned improvements for the interim site condition as defined above.

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The proposed improvements to the Pearson Park track and field (**Appendix C**) call for a second storm drain system to route flows from within the track infield to the parking/drive area southeast of the track. This will ensure that the renovated track and field will drain in a controlled manner to the existing site access drive area, as opposed to over-topping the track and flowing to the east in an uncontrolled weir manner. Due to routing conflicts with existing utilities at the site, this second storm drain is proposed as an inverted siphon, or "bubbler". This configuration includes 215 linear feet of 20-inch PVC with 48"x48" Jensen precast drop inlets installed at each end.

This system will convey the calculated 17 CFS at a head of 0.4 feet above the grate assuming 50% clogging (48-inch x 48-inch Grate Capacity, **Appendix B**). The pipe will be sloped 0.90% invert to invert, but flows will be controlled by the hydraulic grade differential between the respective rims of the drop inlets, which are proposed at elevations of 2062.80 feet for the track drop inlet, and 2060.04 feet for the outlet rim resulting in a 1.3% hydraulic slope. Using Hazen-Williams equation for a full pipe under pressure, the proposed 20-inch PVC is capable of conveying over 21 CFS, which is greater than the 17 CFS maximum flows estimated for the worse case infield flows scenario (Summary Calculations – 20-inch Proposed Strom Drain Flow, **Appendix B**).

The outlet for the "bubbler" is proposed to be located southeast of the identified emergency/fire lane within the drive area for the site. This location would ensure accessibility is maintained in this drive corridor during flood events up to the 100-year, 6-hour storm event. The bubbler will be outfitted with an appropriate subsurface soil infiltration gallery to drain this facility once a storm event passes and the facility is no longer performing as an inverted siphon to convey storm flows.

The additional flow contributions to the access drive at the site (projected Interim Drainage Condition flows of 21 CFS (CMD-1 flows of 17 CFS plus CMD-2 flows of 4 CFS) during the 10-year, 6-hour storm event, and 41 CFS (CMD-1 flows of 34 CFS plus CMD-2 flows of 7 CFS) during the 100-year, 6-hour storm event have been summarized and analyzed (Access Road Cross Sections, **Appendix B**). During the 10-year and 100-year storm events, depths of 0.25 feet and 0.37 feet, respectively, would be anticipated in the site access road (Section E-E, Figures DS-003 and DS-004, **Appendix D**).

c) Future Drainage Conditions

i. Offsite Drainage

For the future drainage condition, the site and the offsite basins are assumed fully developed and the 11x7 RCB in Carey Avenue is constructed. The offsite basin impacting the site in Carey Avenue has already been analyzed by the in the *City of Las Vegas Flood Control Facilities Inventory and City Wide Hydrology Analysis Volume II* (**Reference 7**). The 100-year, 6-hour storm event will result in surface flows of approximately 74 CFS. Because previous reports, were based on a 11'x8' RCB, which completely intercepted all flows in Carey Avenue, no future condition flow depth calculations for Carey Avenue had been provided in References 8 through 15. However, based on the identified changes in the *2008 Las Vegas Valley Flood Control Master Plan Update* (**References 4 and 5**), combined with the condition previously identified as *Exception 1.)* above, the Future Condition flow depth in Carey Avenue during the 100-year storm event is estimated at 0.68 feet above the flow line and existing drop inlet (Carey Avenue – 100 Year Storm Future Condition – 74 CFS Surface Flow, **Appendix B**).

This condition would result in an estimated water surface elevation of 63.67 feet (62.69 feet + 0.68 feet = 63.67 feet) at the existing drop inlet in Carey Avenue. This elevation is higher than

the drop inlet grate elevation within the field area of the Pearson Park track (62.13 feet), and higher than the proposed edge of the renovated Pearson Park track (approximately 63.35 feet at the lowest point). This indicates that during a 100-year, 6-hour storm event the predicted head of water in Carey Avenue would drive storm water flow in the reverse of the normal direction and onto the site through the installed 15-inch PVC storm drain line. The size of this line would limit flow migration onto the site to approximately 4 CFS (Hazen-Williams Pressure Flow Calculation, **Appendix B**). An analysis of the proposed track and field facility indicates that this localized basin could hold approximately 285 cubic yards (7,695 cubic feet) of volume storm water before over-topping. Based on a simple rational method analysis utilizing the 4 CFS added to the 10 CFS generated on site (Curve Number Calculations, Standard Form 4, and HEC-1 Analysis Results, **Appendix A**), a total 100-year flow of 14 CFS is expected. When applied over a six-hour storm event, the estimated volume of storm water impacting the track and field facility is 151,200 (60 seconds x 60 minutes x 6 hours x 14 CFS x ½) cubic feet, which is significantly greater than the 7,695 cubic feet capacity.

Offsite flows in Martin Luther King Boulevard adjacent to the site will remain the same as estimated in the existing condition since the street and retail stores remain unchanged. The area that impacts Comstock Drive adjacent to the site will also remain the same for the developed condition.

ii. Onsite Drainage

The Offsite Drainage Conditions and Onsite Drainage Conditions identified above for the Interim Condition are greater than the Offsite and Onsite flows estimated for the Future Condition, and the construction of the 11'x7' RCB in Carey Avenue will generally serve to decrease the maximum flow rates anticipated onsite. Therefore, the infrastructure planned based on the Interim Condition will be sufficient to manage the anticipated onsite flows in the identified Future Condition. Refer to calculations in Appendix A, and Sheets DS-005 and DS-006 in Appendix C, for the revised onsite drainage basin delineations, which reflect completion of planned improvements for the future site condition as defined above.

Once the planned CCRFCD facility (11'x7' RCB) is installed in Carey Avenue, 10-year storm flows will no longer result in inundation of the Carey Avenue storm drain, and associated reverse flows through the existing 15-inch storm drain. However, the 100-year storm will still result in surface water and reverse flow conditions, although at a lower flow rate of 4 CFS. This is less than flows anticipated for the Interim Condition; therefore, the onsite improvements proposed and sized to manage the Interim Drainage Conditions will be suitable for management of the Future Conditions.

As described above under Interim Drainage Conditions, the proposed improvements to the Pearson Park Track and Field facility (**Appendix C**) call for a second storm drain system to route flows internal to the site from the track infield to the parking/drive area southeast of the track. This second "bubbler" storm drain is capable of conveying the 17 CFS flow anticipated for the Interim Condition, which is greater than the 15 CFS anticipated in the Future Condition, and therefore will be suitable for conveying the anticipated flows to the access drive area as described in Section b) ii "Onsite Drainage" above. The Future Condition is reflected in Figures DS-005 and DS-006 in **Appendix D**.

d) Master Planning Information

The *2002 Las Vegas Valley Flood Control Master Plan Update* (**References 2 and 3**) had illustrated the proposed regional master planned facilities in the Pearson Park area as shown on Figure F-12. This master plan document was referenced by the previous Technical Drainage

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4. Proposed Drainage Facilities

a) General Description

Originally, site runoff was designed to flow away from proposed building pads through L-curbs, valley gutters and local swales. The runoff impacting the site in Carey Avenue was adopted from the *City of Las Vegas Flood Control Facilities Inventory and City Wide Hydrology Analysis* (**Reference 7**). The flows generated onsite will generally be conveyed to Martin Luther King Boulevard as addressed in the approved drainage studies for the Early Childhood Facility, Pearson Community Center, and MLK and Carey Park (**References 8 through 15**).

Flood protection for the entire site was designed and specified in the approved *Technical Drainage Study for Early Childhood Facility* (**References 8 through 10**). The improvements addressed by this study are located onsite, but SBCC's analysis of the prior site improvements and existing conditions revealed the presence of two existing drainage conditions that will potentially result in offsite flows from Carey Avenue migrating onto the site.

The first condition is an observed break in the flood protection berm that occurs along Carey Avenue, which would allow surface flow from Carey Avenue to migrate onto and across the site. The proposed improvements (**Appendix C**) currently call for the restoration of the flood protection berm in this area in accordance with prior studies and improvements.

The second condition will allow offsite flows from Carey Avenue to migrate onto the site through an existing 15-inch drainage facility provided with a 24"x24" Jensen Precast Inlet Structure. Migration onto the site will potentially occur during the 10-year and 100-year storm events during the identified Interim Condition, when proposed site improvements are completed, but prior to construction of the planned CCRFCD facility (11'x7' RCB) in Carey Avenue as identified in the *2008 Las Vegas Valley Flood Control Master Plan Update* (**References 4 and 5**), as well as during the 100-year storm event in the identified Future Condition, following construction of the planned CCRFCD facility (11'x7' RCB) in Carey Avenue. In order to mitigate this second identified condition and convey flows through the site in an effective manner, a second storm drain from the track infield area to the drive area southeast of the track and northeast of the Community Center is planned. This second storm water conveyance is proposed to be configured in a "bubbler" or inverted siphon configuration, consisting of two (2) 48"x48" Jensen Precast Inlet Structures and 215 feet of 20-inch PVC drainage pipe. This proposed structure ensures that storm water flows generated onsite, and migrating onto the site from Carey Avenue to the north, are conveyed and directed to appropriate curbed roadway channels on site in a controlled manner as opposed to potential uncontrolled weir overtopping of the proposed track rim. The bubbler will be outfitted with an appropriate subsurface soil infiltration gallery to drain this facility once a storm event passes and the facility is no longer performing as an inverted siphon to convey storm flows.

Analysis of existing and proposed conditions reveals that in the absence of the proposed secondary storm water conveyance, a potential for storm water migration from the track and field area toward the southeast through an uncontrolled weir over the track outer edge exists. This would occur at an approximate weir invert elevation of 63.41 in the Existing Condition and 63.35 in the Interim and Future Condition, which are both higher than the finish floor of the existing Community Center finish floor. The proposed secondary storm water conveyance would outlet water at an elevation of approximately 60.04, which would maintain the proposed conveyance HGL at more than 1.0-foot below the existing Community Center finished floor elevation.

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addressed in the drainage study for the *Technical Drainage Study for Early Childhood Facility* (**References 8 through 10**), the *Technical Drainage Study for Pearson Community Center* (References 11 and 12), and the *Technical Drainage Study for MLK and Carey Avenue Park* (**References 13 through 15**).

Copies of the calculations are provided in **Appendix B** for reference. The referenced street capacity calculations for the Future Condition in Carey Avenue have also been provided to estimate Velocity x Depth (V*D) for analysis of the surface flow potential due to the down-sizing of the future CCRFCD facility (from an 11'x8' RCB to a 11'x7' RCB). This is necessary for analysis of the identified potential for reverse flows through the existing 15-inch storm drain during the 100-year storm event. Refer to the referenced street flow summary table provided in Appendix B.

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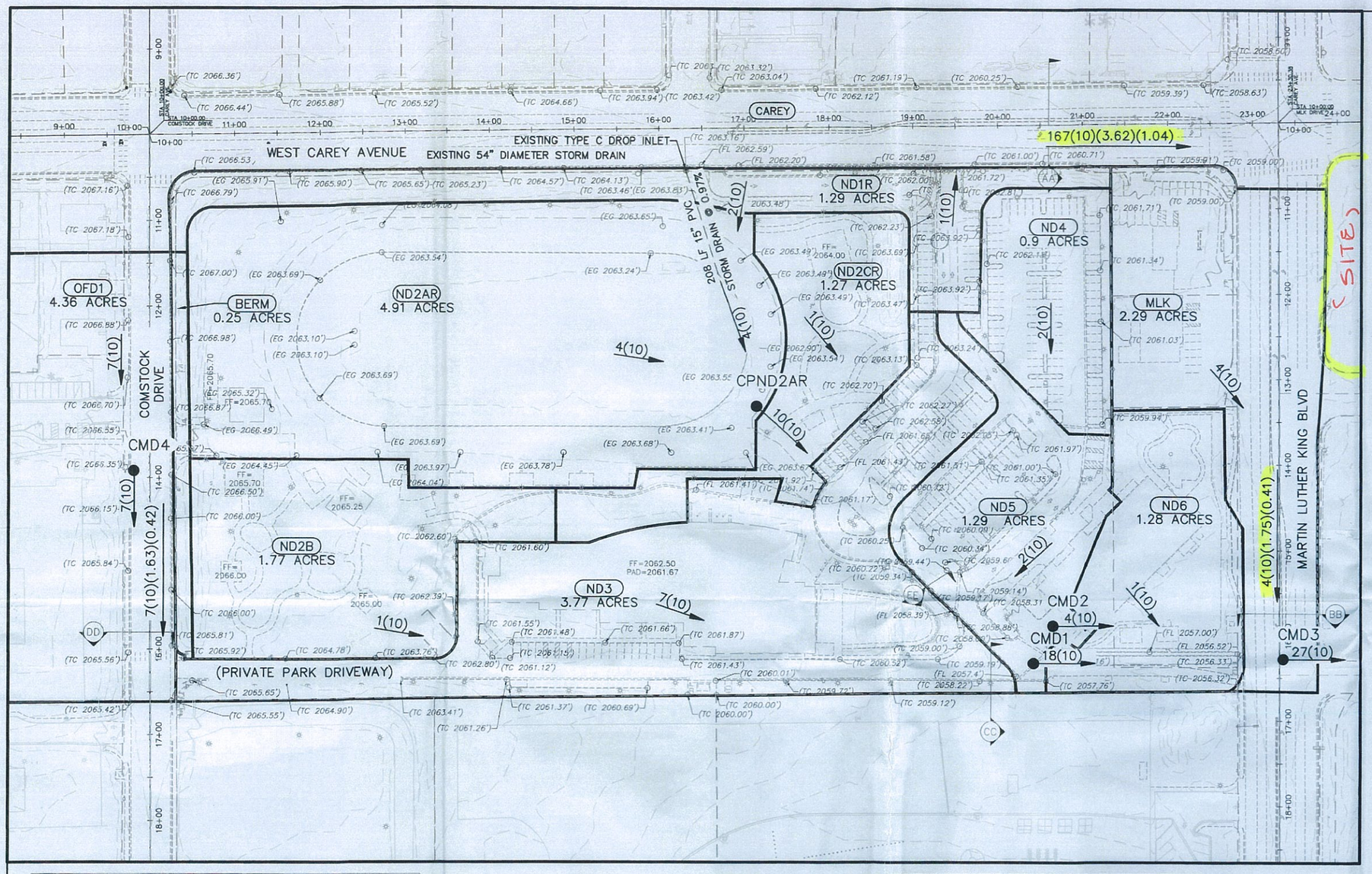
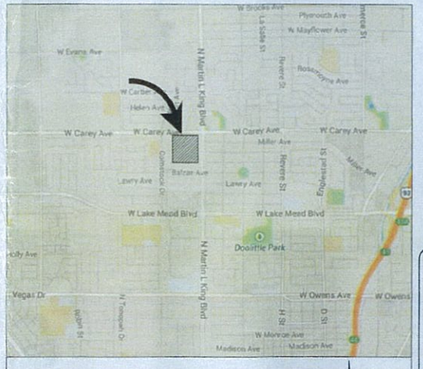


HEC-1 ID	AREA (ACRES)	10-YR FLOW (CFS)	DATA SOURCE
ND1R	1.29	1	SBCC
ND2AR	4.91	4	SBCC
CAREY-SD	–	4	SBCC
CAREY-BERM	–	2	SBCC
CPND2AR	–	10	SBCC
ND2B	1.77	1	LOCHSA
ND2CR	1.27	1	SBCC
ND3	3.77	7	LOCHSA
CMD1	–	18	SBCC
ND4	0.9	2	LOCHSA
ND5	1.29	2	LOCHSA
CMD2	–	4	LOCHSA
ND6	1.28	1	LOCHSA
MLK	2.29	4	LOCHSA
CMD3	–	27	SBCC
OFD1	4.36	7	LOCHSA
BERM	0.25	< 1	LOCHSA
CMD4	–	7	LOCHSA

DRAINAGE LEGEND

ND1	DRAINAGE BASIN
●	CONCENTRATION POINT
CMD1	COMBINATION POINT (LOCHSA)
CP1	COMBINATION POINT (SBCC)
10(10)(10)(1.2)	Q(10 OR 10)(V10 OR V100)(D10 OR D100)
2(10)	FLOW IN CFS (10 OR 100 YR)
	FLOW DIRECTION
AA	HYDRAULIC CROSS SECTION



LOCATION MAP NTS

BASIS OF BEARINGS
NORTH 89°15'24" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHEAST QUARTER (NE1/4) OF THE NORTHWEST QUARTER (NW1/4) OF SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 116, PAGE 33 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

BENCHMARK
BENCHMARK NUMBER: SLV012INNWS – RIVET AND PLATE IN TOP OF CURB AT SW CORNER OF CAREY AND COMSTOCK.
ELEVATION = 2057.15 FEET, 630.069 METERS
N.A.V.D. 88 DATUM
PER THE CITY OF LAS VEGAS BENCHMARK BOOK 2008 ADJUSTMENT (UPDATED 05/24/2010)

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Project Title: PEARSON PARK TRACK & FIELD RENOVATION
1625 W. Carey Ave., Las Vegas, NV 89032

CLARK COUNTY REAL PROPERTY MANAGEMENT
500 S. Grand Central Pkwy 4th Floor, Las Vegas, NV 89155 702-455-4616

Sheet Title: 10 YEAR STORM (EXISTING CONDITION)

Civil Engineer: S&B CHRIST CONSULTING, LLC

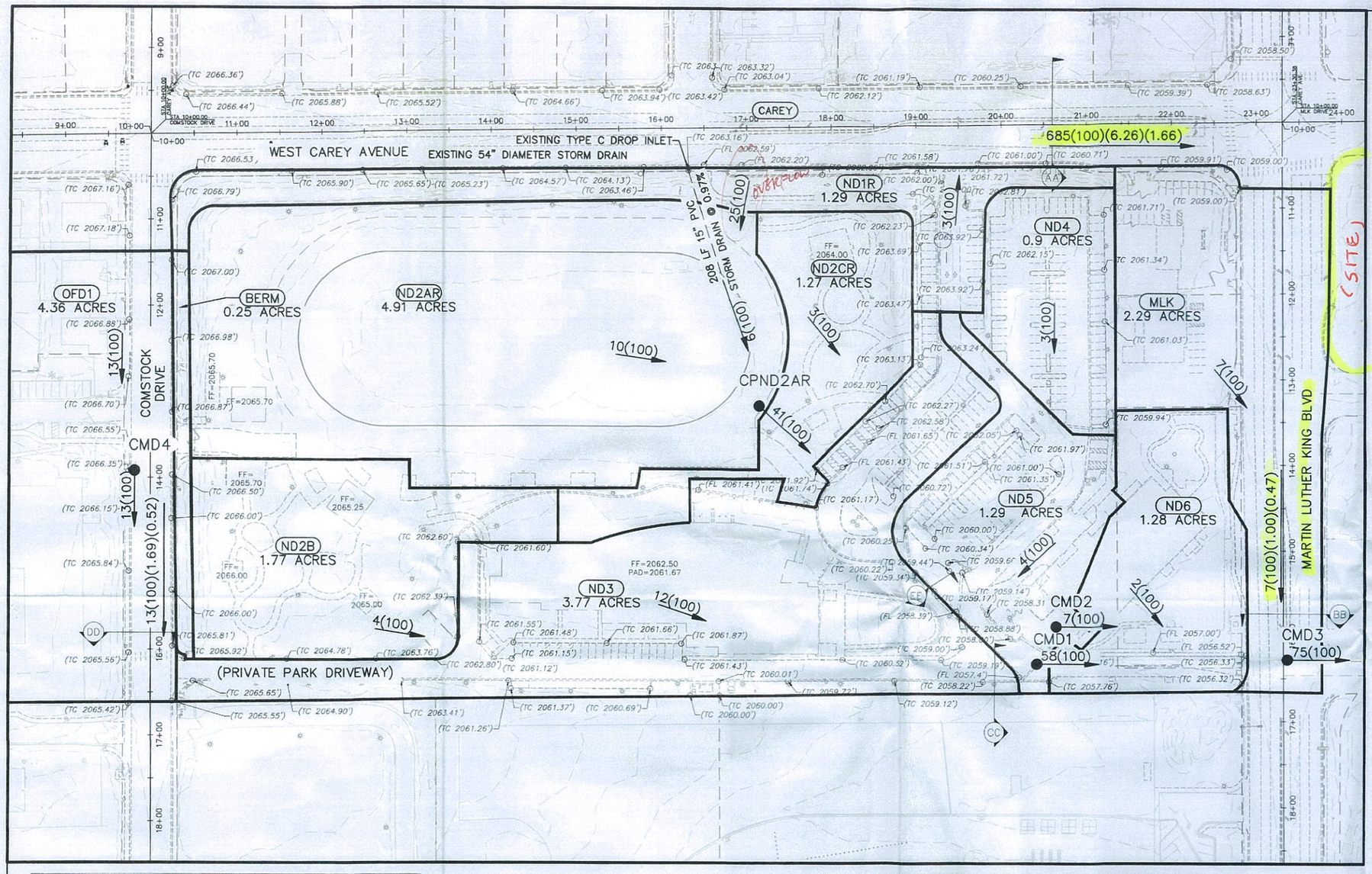
Consultant:

Revisions: # Description Date

PROFESSIONAL ENGINEER – STATE OF NEVADA – JONATHAN D. TULL – Exp. 03/31/2015 – CIVIL – No. 14581 – 11-17-14

Contract #	603295-14
Designed by:	D. Duranleau
Drawn by:	D. Duranleau
Checked by:	J. Tull
Reviewed by:	B. Christ
Approved by:	J. Tull
Date:	2014 AUG 28

DS-001
Sheet 1 of 6
PEARSON PARK TRACK & FIELD RENOVATIONS



60' 30' 0 60' 120'
1"=60'

HEC-1 ID	AREA (ACRES)	100-YR FLOW (CFS)	DATA SOURCE
ND1R	1.29	3	SBCC
ND2AR	4.91	10	SBCC
CAREY-SD	–	6	SBCC
CAREY-BERM	–	25	SBCC
CPND2AR	–	41	SBCC
ND2B	1.77	4	LOCHSA
ND2CR	1.27	3	SBCC
ND3	3.77	12	LOCHSA
CMD1	–	58	SBCC
ND4	0.9	3	LOCHSA
ND5	1.29	4	LOCHSA
CMD2	–	7	LOCHSA
ND6	1.28	2	LOCHSA
MLK	2.29	7	LOCHSA
CMD3	–	75	SBCC
OFD1	4.36	13	LOCHSA
BERM	0.25	1	LOCHSA
CMD4	–	13	LOCHSA

DRAINAGE LEGEND

ND1	DRAINAGE BASIN
●	CONCENTRATION POINT
CMD1	COMBINATION POINT (LOCHSA)
CP1	COMBINATION POINT (SBCC)
10(10)(10)(1.2) →	Q(10 OR 10)(V10 OR V100)(D10 OR D100)
2(10) →	FLOW IN CFS (10 OR 100 YR)
→	FLOW DIRECTION
AA	HYDRAULIC CROSS SECTION

LOCATION MAP NTS

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BASIS OF BEARINGS

NORTH 89°15'24" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHEAST QUARTER (NE1/4) OF THE NORTHWEST QUARTER (NW1/4) OF SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 110, PAGE 33 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

BENCHMARK

BENCHMARK NUMBER: 5LV012NNWR – RIVET AND PLATE IN TOP OF CURB AT SW CORNER OF CAREY AND COMSTOCK.
ELEVATION = 2067.15 FEET, 630.069 METERS
N.A.V.D. 88 DATUM
PER THE CITY OF LAS VEGAS BENCHMARK BOOK 2008 ADJUSTMENT (UPDATED 05/24/2010)

This grading plan is part of drainage study #4711 which was reviewed on 11/18/14 and revised 12/3/14. Page 20 of 24

CLARK COUNTY
CLARK COUNTY REAL PROPERTY MANAGEMENT
500 S. Grand Central Pkwy 4th Floor, Las Vegas, NV 89155 702-455-4616

Project Title: PEARSON PARK TRACK & FIELD RENOVATION
1625 W. Carey Ave., Las Vegas, NV 89032

Sheet Title: 100 YEAR STORM (EXISTING CONDITION)

Civil Engineer: S&B CHRIST CONSULTING, LLC

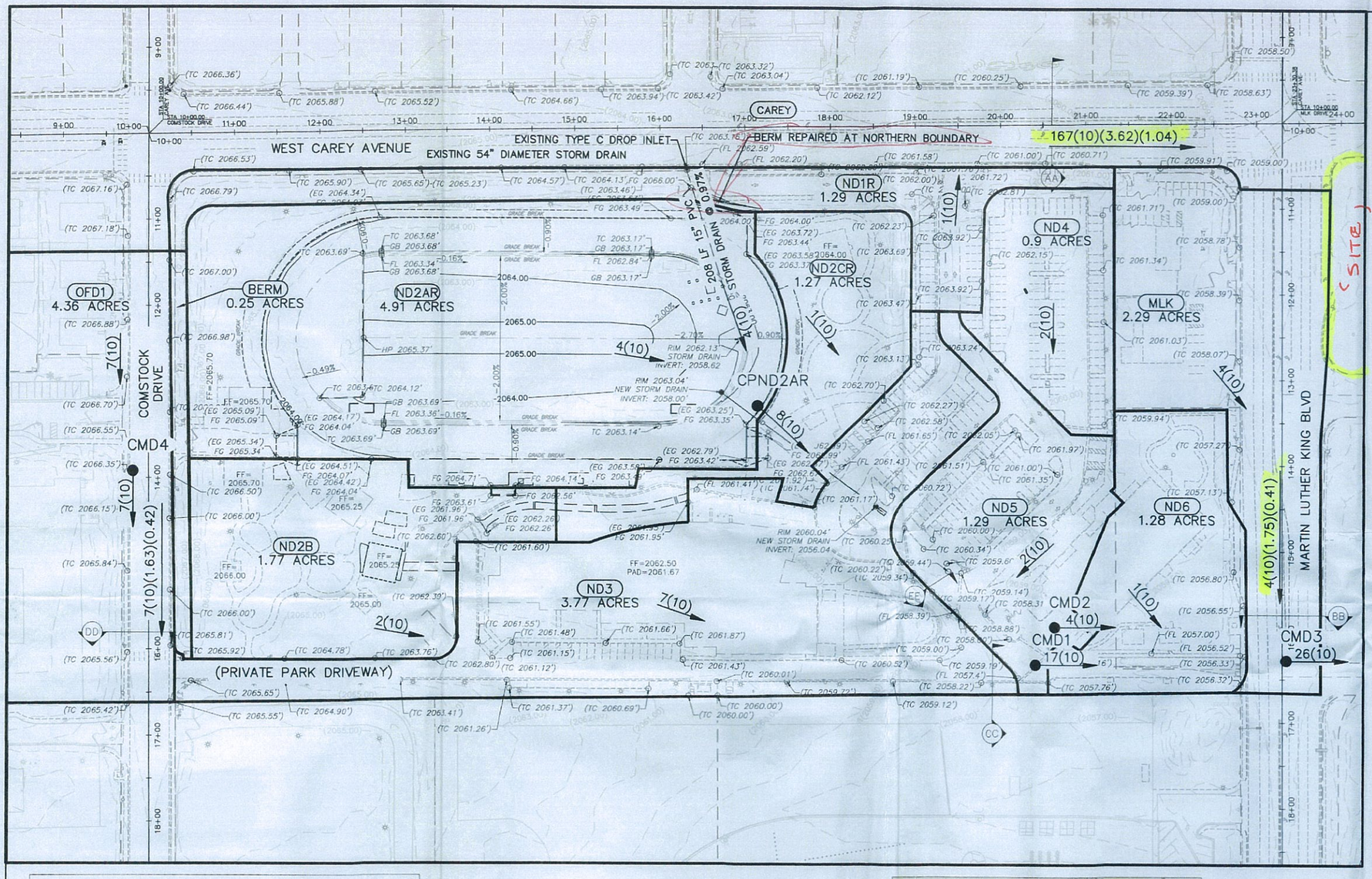
Consultant:

Revisions: # Description Date

PROFESSIONAL ENGINEER – STATE OF NEVADA
JONATHAN D. TULL
Exp. 06/30/2016
CIVIL
No. 14881
11-17-14

Contract #	603295-14
Designed by:	D. Duranleau
Drawn by:	D. Duranleau
Checked by:	J. Tull
Reviewed by:	B. Christ
Approved by:	J. Tull
Date:	2014 AUG 28

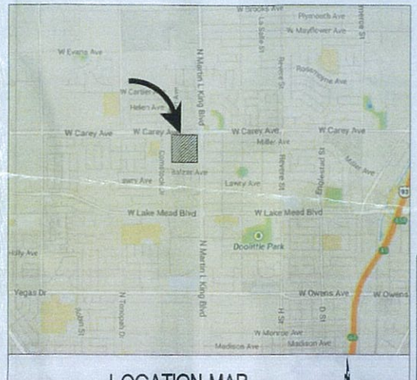
DS-002
Sheet 2 of 6
PEARSON PARK TRACK & FIELD RENOVATIONS



HEC-1 ID	AREA (ACRES)	10-YR FLOW (CFS)	DATA SOURCE
ND1R	1.29	1	SBCC
ND2AR	4.91	4	SBCC
CAREY-SD	–	4	SBCC
CAREY-BERM	–	0	SBCC
CPND2AR	–	8	SBCC
ND2B	1.77	2	SBCC
ND2CR	1.27	1	SBCC
ND3	3.77	7	LOCHSA
CMD1	–	17	SBCC
ND4	0.9	2	LOCHSA
ND5	1.29	2	LOCHSA
CMD2	–	4	LOCHSA
ND6	1.28	1	LOCHSA
MLK	2.29	4	LOCHSA
CMD3	–	26	SBCC
OFD1	4.36	7	LOCHSA
BERM	0.25	< 1	LOCHSA
CMD4	–	7	LOCHSA

DRAINAGE LEGEND

ND1	DRAINAGE BASIN
●	CONCENTRATION POINT
CMD1	COMBINATION POINT (LOCHSA)
CP1	COMBINATION POINT (SBCC)
10(10)(10)(1.2)	Q(10 OR 10)(V10 OR V100)(D10 OR D100)
2(10)	FLOW IN CFS (10 OR 100 YR)
	FLOW DIRECTION
AA	HYDRAULIC CROSS SECTION



LOCATION MAP NTS

BASIS OF BEARINGS

NORTH 89°15'24" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHEAST QUARTER (NE1/4) OF THE NORTHWEST QUARTER (NW1/4) OF SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 110, PAGE 33 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

BENCHMARK

BENCHMARK NUMBER: SLVG121NNWG – RIVET AND PLATE IN TOP OF CURB AT SW CORNER OF CAREY AND COMSTOCK.
ELEVATION = 2067.15 FEET, 630.069 METERS
N.A.V.D. 88 DATUM
PER THE CITY OF LAS VEGAS BENCHMARK BOOK 2008 ADJUSTMENT (UPDATED 05/24/2010)

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DS-003

Sheet 3 of 6

PEARSON PARK TRACK &

Project Title: PEARSON PARK TRACK & FIELD RENOVATION
1625 W. Carey Ave., Las Vegas, NV 89032

CLARK COUNTY REAL PROPERTY MANAGEMENT
500 S. Grand Central Pkwy 4th Floor, Las Vegas, NV 89155 702-455-4616

Sheet Title: 10 YEAR STORM (INTERIM CONDITION)

Civil Engineer: S&B CHRIST CONSULTING, LLC

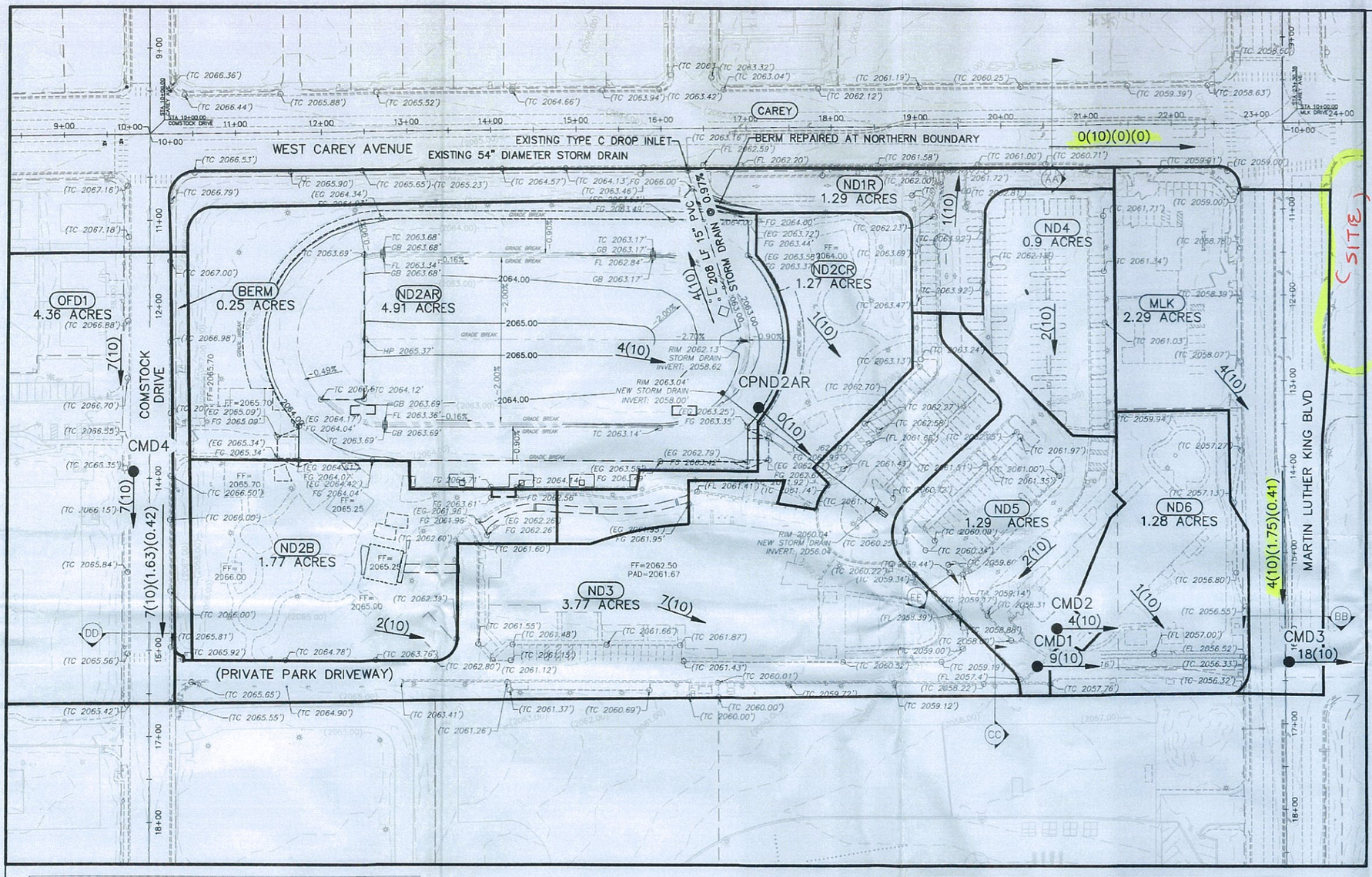
Consultant:

Revisions:

#	Description	Date

PROFESSIONAL ENGINEER – STATE OF NEVADA – JONATHAN D. TULL – Exp. 06/30/2015 CIVIL – No. 14561 – 11-17-14

Contract #	603295-14
Designed by:	D. Duranleau
Drawn by:	D. Duranleau
Checked by:	J. Tull
Reviewed by:	B. Christ
Approved by:	J. Tull
Date:	2014 AUG 28



HEC-1 ID	AREA (ACRES)	10-YR FLOW (CFS)	DATA SOURCE
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CAREY-SD	–	-4	SBCC
CAREY-BERM	–	0	SBCC
CPND2AR	–	0	SBCC
ND2B	1.77	2	SBCC
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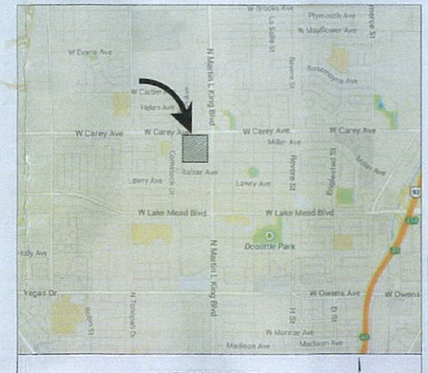
ND3	3.77	7	LOCHSA
CMD1	–	9	SBCC
ND4	0.9	2	LOCHSA
ND5	1.29	2	LOCHSA
CMD2	–	4	LOCHSA
ND6	1.28	1	LOCHSA
MLK	2.29	4	LOCHSA
CMD3	–	18	LOCHSA
OFD1	4.36	7	LOCHSA
BERM	0.25	< 1	LOCHSA
CMD4	–	7	LOCHSA

DRAINAGE LEGEND

ND1	DRAINAGE BASIN
●	CONCENTRATION POINT
CMD1	COMBINATION POINT (LOCHSA)
CP1	COMBINATION POINT (SBCC)
10(10)(10)(1.2)	Q(10 OR 10)(V10 OR V100)(D10 OR D100)
2(10)	FLOW IN CFS (10 OR 100 YR)
→	FLOW DIRECTION
AA	HYDRAULIC CROSS SECTION



LOCATION MAP NTS

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BASIS OF BEARINGS

NORTH 89°15'24" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHEAST QUARTER (NE1/4) OF THE NORTHWEST QUARTER (NW1/4) OF SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 110, PAGE 33 OF PARCEL MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

BENCHMARK

BENCHMARK NUMBER: SLV012INNNS – RIVET AND PLATE IN TOP OF CURB AT SW CORNER OF CAREY AND COMSTOCK
ELEVATION = 2067.15 FEET, 630.069 METERS
N.A.V.D. 88 DATUM
PER THE CITY OF LAS VEGAS BENCHMARK BOOK 2008 ADJUSTMENT (UPDATED 05/24/2010)

This grading plan is part of drainage study # 4711 which was received on 11/18/14 and Rev'd on 12/3/14. Page 23 of 24

DS-005

Sheet 5 of 6

PEARSON PARK TRACK & FIELD RENOVATIONS

CLARK COUNTY NEVADA

Project Title: PEARSON PARK TRACK & FIELD RENOVATION
1625 W. Carey Ave., Las Vegas, NV 89032

CLARK COUNTY REAL PROPERTY MANAGEMENT
500 S. Grand Central Pkwy 4th Floor, Las Vegas, NV 89155 702-455-4416

Sheet Title: 10 YEAR STORM (FUTURE CONDITION)

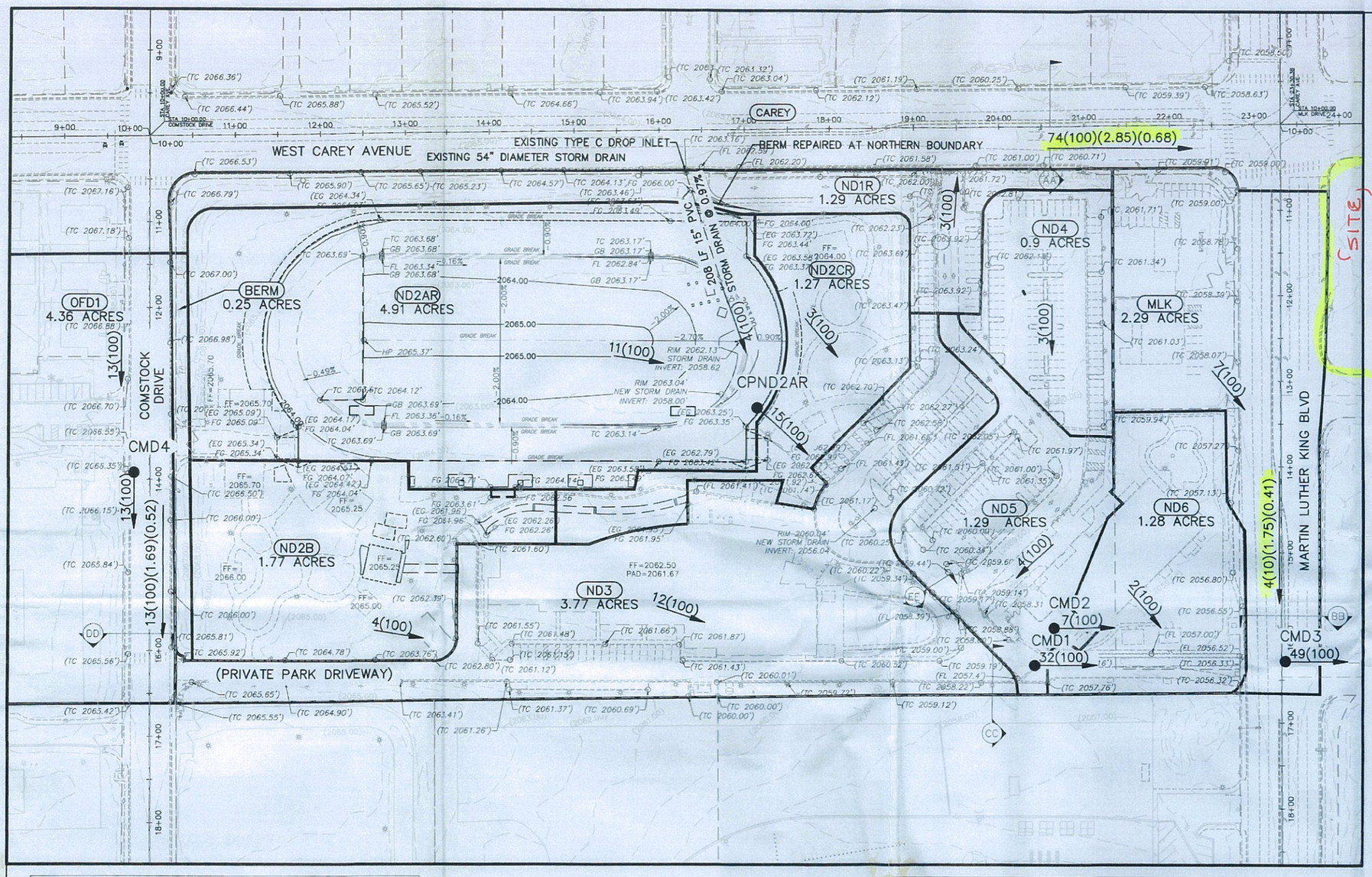
Civil Engineer: S&B CHRIST CONSULTING LLC

Consultant:

Revisions: # Description Date

JONATHAN D. TULL No. 14581 CIVIL STATE OF NEVADA PROFESSIONAL ENGINEER 11-17-14

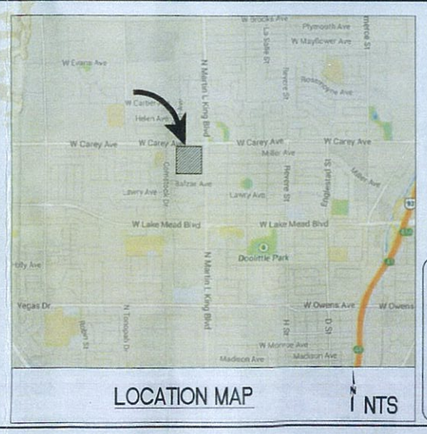
Contract #	603295-14
Designed by:	D. Duranleau
Drawn by:	D. Duranleau
Checked by:	J. Tull
Reviewed by:	B. Christ
Approved by:	J. Tull
Date:	2014 AUG 28



HEC-1 ID	AREA (ACRES)	100-YR FLOW (CFS)	DATA SOURCE
ND1R	1.29	3	SBCC
ND2AR	4.91	11	SBCC
CAREY-SD	–	4	SBCC
CAREY-BERM	–	0	SBCC
CPND2AR	–	15	SBCC
ND2B	1.77	4	SBCC
ND2CR	1.27	3	SBCC
ND3	3.77	12	LOCHSA
CMD1	–	32	SBCC
ND4	0.9	3	LOCHSA
ND5	1.29	4	LOCHSA
CMD2	–	7	LOCHSA
ND6	1.28	2	LOCHSA
MLK	2.29	7	LOCHSA
CMD3	–	49	SBCC
OFD1	4.36	13	LOCHSA
BERM	0.25	1	LOCHSA
CMD4	–	13	LOCHSA

DRAINAGE LEGEND

ND1	DRAINAGE BASIN
●	CONCENTRATION POINT
CMD1	COMBINATION POINT (LOCHSA)
CP1	COMBINATION POINT (SBCC)
10(10)(10)(1.2) →	Q(10 OR 10)(V10 OR V100)(D10 OR D100)
2(10)	FLOW IN CFS (10 OR 100 YR)
→	FLOW DIRECTION
AA	HYDRAULIC CROSS SECTION



BASIS OF BEARINGS

NORTH 89°15'24" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHEAST QUARTER (NE1/4) OF THE NORTHWEST QUARTER (NW1/4) OF SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 119, PAGE 33 OF PARCEL MAPS, IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

BENCHMARK

BENCHMARK NUMBER: SLVD12NNW6 – RIVET AND PLATE IN TOP OF CURB AT SW CORNER OF CAREY AND COMSTOCK.
ELEVATION = 2067.15 FEET, 630.089 METERS
N.A.V.D. 88 DATUM
PER THE CITY OF LAS VEGAS BENCHMARK BOOK 2008 ADJUSTMENT (UPDATED 05/24/2010)

Call before you Dig — Avoid cutting underground utility lines. It's costly. Call 811 or 1-800-227-2600 and CLARK COUNTY TRAFFIC OPERATIONS 1-702-455-7544

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

ALWAYS THINK SAFETY

This grading plan is part of drainage study # 4711 which was reviewed on 11/14/14 and Rights on 12/3/14. Page 29 of 29.

CLARK COUNTY NEVADA

Project Title: PEARSON PARK TRACK & FIELD RENOVATION
1625 W. Carey Ave., Las Vegas, NV 89032

CLARK COUNTY REAL PROPERTY MANAGEMENT
500 S. Grand Central Pkwy 4th Floor, Las Vegas, NV 89155 702-455-4616

Sheet Title: 100 YEAR STORM (INTERIM CONDITION)

Civil Engineer: C&K CHRIST CONSULTING, LLC

Consultant:

Revisions: # Description Date

PROFESSIONAL ENGINEER STATE OF NEVADA — JONATHAN D. TULL — Exp. 06/30/2016 — CIVIL — No. 14581 — 11-17-14

Contract #	603295-14
Designed by:	D. Duranleau
Drawn by:	D. Duranleau
Checked by:	J. Tull
Reviewed by:	B. Christ
Approved by:	J. Tull
Date:	2014 AUG 28

DS-006

Sheet 6 of 6

PEARSON PARK TRACK & FIELD RENOVATIONS

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: Revision September 11, 2019
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: **Clark County Pearson Park Splash Pad & Site Improvements**			**COPIES TO:** Wood Rodgers
Cross Streets:	SWC of Martin L. King Blvd. & Carey Avenue			Clark County Parks & Comm.
File Number:	F:\Depot\DSMemos\DS5180A-REV.doc			Bart Anderson, P.E., DevCo
Parcel Number:	139-21-102-013			
Zoning Action:	Not Required			
FEMA Flood Zone	YES	NO	X	
Proposed Storm Drain	YES	NO	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	8/22/2019	9/9/2019	Not Approved	$400.00	3539810: $400
Revision of Memo	9/11/2019	9/11/2019	See Comments Below	N/C	N/C
			TOTAL FEES (LDDRS):	**$400.00**	----

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.
	is conditionally approved subject to Clark County Public Works Department concurrence.

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

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

END OF REMARKS

ays

T/R/S: T20S/R61E/21
AREA M-21

Technical Drainage Study Update

for

Clark County Pearson Park Splash Pad & Site Improvements

(Update to the Technical Drainage Study for MLK and Carey Avenue Park, DS 3614)

Prepared For

kme ARCHITECTS

Prepared By

WOOD RODGERS

BUILDING RELATIONSHIPS ONE PROJECT AT A TIME

August 2019

The inlet capacity calculations for the proposed 2'x2' area drain, capacity calculations for the proposed 18-inch storm drain and existing 20-inch storm drain, and bubbler calcuations for the existing 4'x4' bubbler in the existing parking lot are included in **Appendix C** (attached).

Updated Hydrology

The Previous Study considered a composite curve number (CN) of 88.5 for basin ND2C. This was derived by assuming 50% of the basin was impervious area and 50% was landscaped. The weighted CN calculations and developed condition HEC-1 analysis from the Previous Study are included in Appendix A for reference.

The CN for basin ND2C and the developed condition HEC-1 analysis from the Previous Study were updated to assess the impact that changing the 0.09-acre area from turf to an impervious splash pad surface would have on the overall estimated runoff from basin ND2C. This is a somewhat conservative assumption since the Splash Pad will have surface drains in the center of the splash pad that are designed to collect splash-toy water (approximately 200 gpm), which could potentially decrease runoff from the splad pad area during rainfall events. The updated CN number calculations are shown in **Table 1** below, and the updated HEC-1 analysis is included in **Appendix B** (attached). Due to the relatively small area of disturbance (approximately 0.09-acres), the lag time for basin ND2C in the Previous Study was not updated with this Study.

TABLE 1 – Updated Weighted Composite CN Calculation

Land Use / Cover Type	Area (Acres)	Percentage	Curve Number	Composite CN
Open Space: Poor Condition	0.67	44.0%	79	34.76
Paved Areas	0.85	56.0%	98	54.88
			Weighted Composite CN	**89.64**

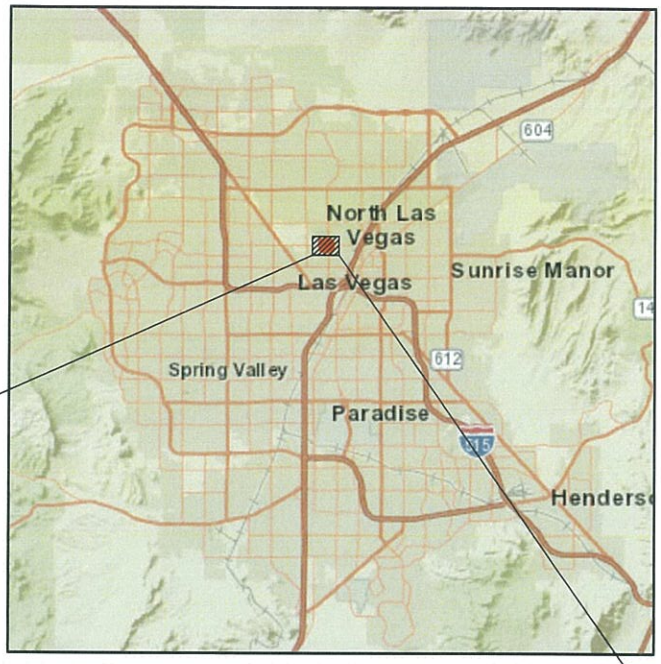
The results of updating the CN number of basin ND2C from 88.5 to 89.64 increased the estimated runoff of basin ND2C from 1 cfs and 3 cfs to 2 cfs and 4 cfs for the 10-year and 100-year storm events, respectively. Due to the relatively small increase in CN, this 1 cfs increase is attributed primarily to rounding error within the HEC-1 program.

The Previous Study combined runoff from basin ND2C with flow from basins ND2B and ND3 at combination point CMD1. Therefore, this Study modeled the flow from these basins and at the combination point to determine if the flow at CMD1 would be increased due to the addition of the splash pad. As shown in **Table 2** (below), the estimated runoff for the 10-year and 100-year storm events match those shown in the Previous Study. ***Therefore, this analysis demonstrates that the proposed Project will not alter the overall previously approved runoff flow rates or patterns.***

TABLE 2 – Developed Condition HEC-1 Result Comparison

HEC-1 ID	Previously Approved Study		This Update		Remarks
	10-year runoff (cfs)	100-year runoff (cfs)	10-year runoff (cfs)	100-year runoff (cfs)	
ND2C	1	3	2	4	Increase of 1 cfs is attributed primarily to rounding error in HEC-1
ND2B	1	4	1	4	
ND3	7	12	7	12	
CMD1	**9**	**19***	**9**	**19**	**Runoff at CMD1 is the same as the Prevously Approved Study.**

*NOTE: The Developed and Future condition HEC-1 analysis in the Previous Study reported 9 cfs and 19 cfs at CMD1, but the tables and basin maps in the Previous Study incorrectly reported the flow at CMD1 as 9 cfs and 18 cfs.



(SITE)

CLARK COUNTY PEARSON PARK
SPLASH PAD & SITE
IMPROVEMENTS

PROJECT LOCATION AND VICINITY MAP
AUGUST 2019

NORTH

0 100 200

Feet

WOOD RODGERS

FIGURE 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 (CCRFCD) Manual Standard Form 2. The listed items are the minimum information required prior to the City performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the CCRFCD Hydrologic Criteria and Drainage Design Manual (Design Manual).

An appointment must be made to preview this checklist in conjunction with CCRFCD Standard Form 2 prior to the City accepting a new drainage study for review. The engineer must contact the Flood Control Section at (702) 229-6541 to schedule a submittal appointment.

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

I. GENERAL REQUIREMENT		
Yes	No	
N/A		A notarized letter from the adjacent property owner(s) allowing off-site grading. (A copy of the letter must be received prior to final acceptance of the drainage study.)
		Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.
		An electronic copy of the complete submittal is required to be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output device replicating your submittal. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats. If figures are in color, they must be scanned in color and saved as a separate file. _____ 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.)

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.
N/A		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.
N/A		Ten-foot wide public drainage easements to be privately maintained are allowed for flow less than 20 cfs. The depth of flow entering the easement must be checked using the submerged weir calculation.
N/A		The limits of the flood zones and the base flood elevations (BFE) must be shown on all grading plans for all developments within a Special Flood Hazard Zone A, AO, AE, etc.
✓		Minimum finish floor elevation is 6 inches above highest adjacent top of curb. Finish floor calculations must include allowances for super elevations on curves and velocity head for tee intersections.
N/A		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.

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

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

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

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
N/A	____	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
✓	____	Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q_{100} and Q_{10} flows representing the worst case for interior and all perimeter streets. Q_{100} d x v ≤ 8. Q_{10} d x v ≤ 6 and 12 foot dry lane for rights-of-way ≥ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
✓	____	A summary table of interior and exterior street capacity calculations showing the street name, Q_{100} flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
N/A	____	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
N/A	____	Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
✓	____	Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, whichever is greater.
N/A	____	A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. • Field survey data. • Input and output information. • Plotted cross-sections based on survey with proper encroachments. • A map showing the location of the cross-sections. • Analysis of both sub and super-critical flow segments. • A summary table and a discussion of the results in the text of the report.
N/A	____	Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
N/A	____	Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
✓	____	The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.
✓	____	Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE: | **STANDARD FORM 2**

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Good Cluck-West ML	Map ID:
Firm Name: Baughman & Turner, Inc	Engineer: John Gustafson
Address: 1210 Hinson St	
City: Las Vegas State: NV	Zip: 89102
Phone Number: 702-870-8771	Fax Number: 702-878-2695
Property Owner: Good Cluck West	
Address: 2505 Buddy Owens Ave	
City: McAllen State: TX	Zip: 78504

Reviewed By:	Date Received:	Date Accepted for Review:

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

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

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

I. GENERAL REQUIREMENT

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

II. MAPS AND EXHIBITS

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

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS (Continued)

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

III. DRAINAGE PLAN

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

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

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

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

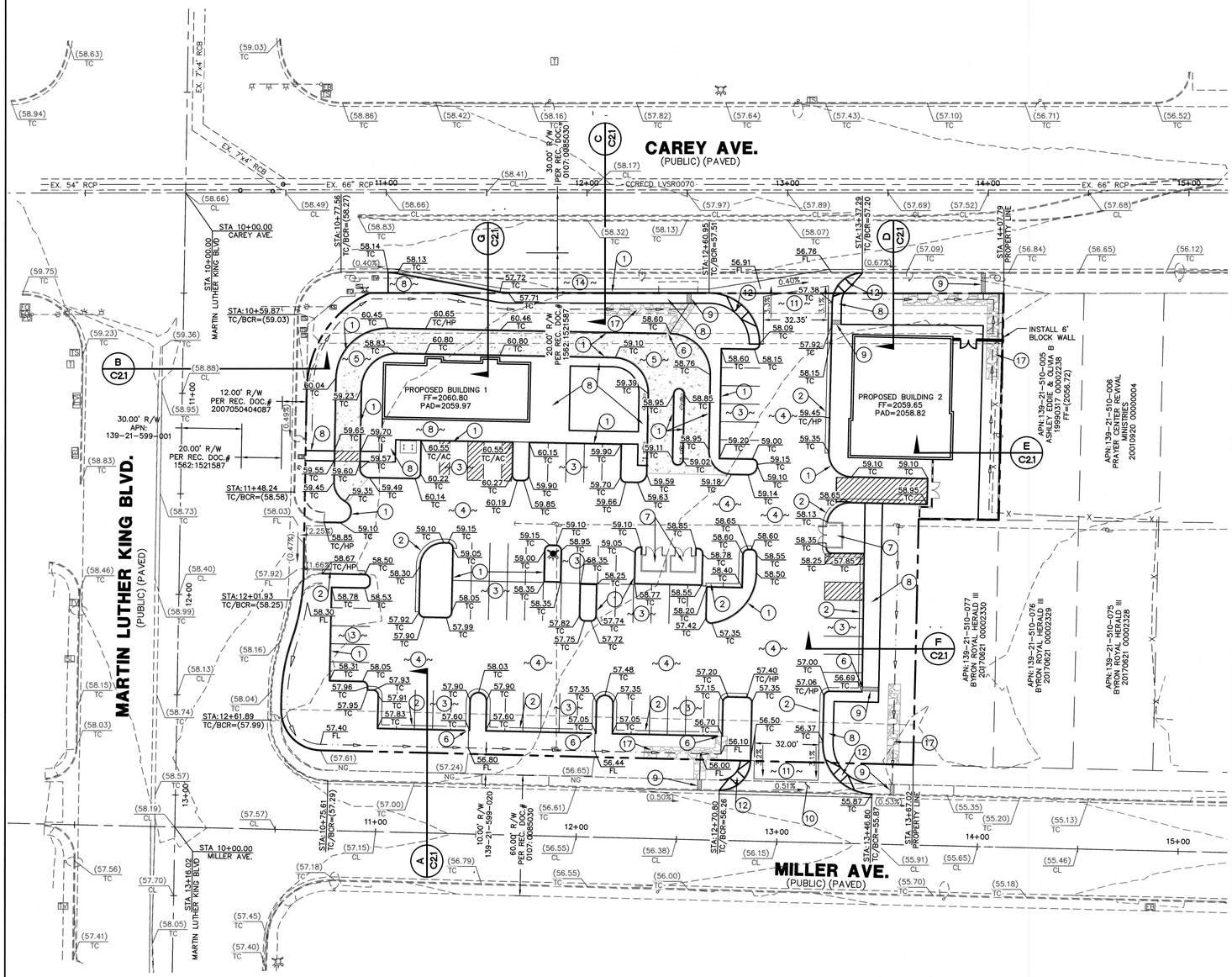
III. DRAINAGE PLAN (Continued)

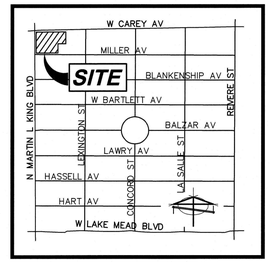
Yes	No	
N/A	____	For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE.
✓	____	Appropriately elevated "humps" 6 inches above the 100 year water surface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

IV. HYDROLOGIC ANALYSIS

Yes	No	
✓	____	Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated.
✓	____	Input and output information for existing conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
✓	____	Input and output information for future conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
✓	____	Use of correct precipitation values in and around the McCarran Airport rainfall area.
✓	____	A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations.
✓	____	A summary table of stormwater flows showing basin area, Q_{10} and Q_{100} for both individual basins and combined basin flows, where applicable.
✓	____	Copies of supporting technical information referenced from a previously approved study and a statement accepting these results.
✓	____	On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with current Nevada Drainage Law.
✓	____	Calculation for impervious area for parking lots and LIDs (if required).

REFERENCE:	STANDARD FORM 2





VICINITY MAP
NO SCALE

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

BENCHMARK

RIVET AND SQUARE ALUMINUM PLATE, STAMPED CITY OF LAS VEGAS BM NO. 5LV0121NNW6, SET IN THE TOP OF CURB, LOCATED APPROXIMATELY 1.0 FEET SOUTH OF THE SOUTHWEST SOUTH BCR AT THE INTERSECTION OF CAREY AVENUE AND COMSTOCK DRIVE.

630.063 METERS 2067.13 FEET
NAVD 88 DATUM

BASIS OF BEARING

SOUTH 89°59'51" EAST – BEING THE CENTERLINE OF CAREY AVENUE BETWEEN MARTIN LUTHER KING BOULEVARD AND LEXINGTON AVENUE AS SHOWN IN FILE 97, PAGE 54 OF SURVEYS, CLARK COUNTY RECORDER'S OFFICE, CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

FLOOD ZONE INFORMATION

THE SUBJECT PROPERTY LIES WITHIN FLOOD ZONE "X", BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA), ON FLOOD INSURANCE RATE MAP NO. 32003C2160F WITH A DATE OF IDENTIFICATION OF NOVEMBER 16, 2011, IN CLARK COUNTY, STATE OF NEVADA, WHICH IS THE CURRENT FLOOD INSURANCE RATE MAP FOR THE COMMUNITY IN WHICH SAID PROPERTY IS SITUATED.

CONSTRUCTION NOTES

#	ITEM	UNIT	QUANTITY PUBLIC	QUANTITY PRIVATE
1	INSTALL "A" TYPE CURB PER CCAUSD #219.	LF	–	1728
2	INSTALL 24" "L" TYPE C & G PER CCAUSD #216.	LF	–	679
3	INSTALL 2" AC OVER 4" TYPE II AGGREGATE BASE.	SY	–	1331
4	INSTALL 3" AC OVER 4" TYPE II AGGREGATE BASE.	SY	–	2521
5	INSTALL 6" CONCRETE OVER 4.5" TYPE II A.B.	SY	–	494
6	INSTALL 2 FT. CURB OPENING PER DETAIL #1 ON SHEET C2.6	EA	–	4
7	INSTALL TRASH ENCLOSURE SEE ARCHITECTURAL PLANS	EA	–	3
8	INSTALL 4" THICK CONCRETE SIDEWALK PER CCAUSD #234.	LF	–	7428
9	INSTALL SIDE WALK DRAIN PER CCAUSD #236.	EA	–	5
10	INSTALL 8' CROSS GUTTER PER CCAUSD #228	SF	1417	–
11	CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD #224	SF	–	1058
12	INSTALL HANDICAP RAMP PER CCAUSD #235 CASE I	EA	4	–
13	SAW CUT, TRENCH BACKFILL AND PAVEMENT RESTORATION PER CCAUSD #500.5 AND #503	SY	–	–
14	INSTALL BUS TURNOUT PER CCAUSD #234.1	SF	1525	–
15	CONSTRUCT BUS SHELTER PAD PER CCAUSD #234.5	SF	114	–
16	CONSTRUCT 2' GROUTED WALL.	LF	–	71
17	INSTALL RIP-RAP D50=3" T=6".	CY	–	26

LEGEND

	PROPERTY LINE
	STREET CENTERLINE
	LOT LINE
	BUILDING SETBACK LINE
	PROPOSED ROLL CURB
	EXISTING "L" CURB & GUTTER
XXXX	EXISTING CONTOUR LINES
	PROPOSED FLOW LINE
	SAW CUT LINE
	PROPOSED EDGE OF PAVEMENT
	EXIST. EDGE OF PAVEMENT
	PROPOSED BLOCK WALL
	PROPOSED SCARP
	EXIST. BLOCK WALL
	SAW CUT AREA
	MATCHLINE
00.00 LOC (00.00) LOC 0.00%	PROPOSED ELEVATION & LOCATION
	EXISTING ELEVATION & LOCATION
	PROPOSED GRADE
	CONSTRUCTION NOTE
	PROPOSED HYDRANT
	SIGHT VISIBILITY ZONE*
	ROADWAY EASEMENT

AC	ASPHALTIC CONCRETE
CL	CENTERLINE
TC	TOP OF CURB
EP	EDGE OF PAVEMENT
FG	FINISHED GRADE
TF	TOP OF FOOTING
TRW	TOP OF RETAINING WALL
TFW	TOP OF FLOOD WALL
TSW	TOP OF STEM WALL
BSW	BACK OF SIDEWALK
GB	GRADE BREAK
BVC	BEGIN VERTICAL CURVE
EVC	END VERTICAL CURVE
FF	FINISHED FLOOR
FL	FLOW LINE
HP	HIGH POINT
INV	INVERT
LF	LINEAR FEET
LP	LOW POINT
LS	LANDSCAPE
SWG	SOUTHWEST GAS
P.U.E.	PUBLIC UTILITY EASEMENT
P.D.E.	PRIVATE DRAINAGE EASEMENT
P.S.E.	PRIVATE SEWER EASEMENT
P.L.E.	PRIVATE LANDSCAPE EASEMENT
MIN	MINIMUM
MAX	MAXIMUM
TCS	TOP OF CONCRETE SLAB
EX	EXISTING
EXIST	EXISTING
PL	PROPERTY LINE
NG	NATURAL GRADE
EP	EDGE OF PAVMENT
APN	ASSESSORS PARCEL NUMBER
NTS	NOT TO SCALE
SS	SANITARY SEWER
DIA	DIAMETER
RCP	REINFORCED CONCRETE PIPE
R/W	RIGHT-OF-WAY

*NOTE: NOTHING OVER 24" IN HEIGHT ALLOWED IN SIGHT VISIBILITY ZONE EXCEPT TRAFFIC CONTROL DEVICES.

STORMWATER MANAGEMENT NOTES

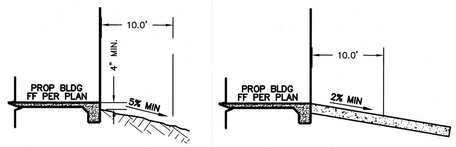
1. THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.

2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN CLARK COUNTY TITLE 24.40 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.

3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5

4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER ANY RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTION TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO NEVADA GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.

5. ACCUMULATED SEDIMENT IN BMPS SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.



LANDSCAPE AREAS HARDSCAPE AREAS
TYPICAL SLOPES FROM BUILDING FOUNDATION

SLOPE REQUIREMENT DETAIL

ENGINEERS CERTIFICATE

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS, NEVADA.

JOHN R. GUSTAFSON, P.E. 13140 DATE

DISCLAIMER NOTE

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DEVELOPER
WEST OF CLUCK LLC
2505 BUDDY OWENS AVE
McALLEN, TX 78504
(214)943-9090
RLEAL@LEALRS.COM

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Avoid cutting underground utility lines. It's costly.
Call 811 OR 1-800-227-2600

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1-702-227-2929

FAST Call before you UnderGround
1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

PROFESSIONAL ENGINEER-STATE OF NEVADA
JOHN R. GUSTAFSON
Exp. 6-30-21
CIVIL
NO. 13140
10/14/20

DATE	REV NO.	REVISIONS	APP'D INITIALS	DATE APPROVED

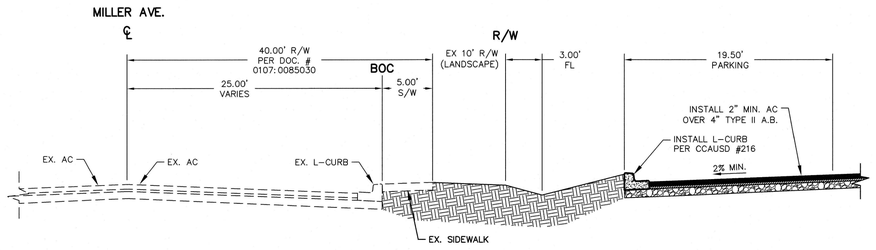
PREPARED FOR :
WEST OF CLUCK LLC
2505 BUDDY OWENS AVE
McALLEN, TX 78504
(214)943-9090

DATE	11/14/2018	
DESIGN	MJ	
DRAWN	EC	
CHECK	JRG	
SCALE		

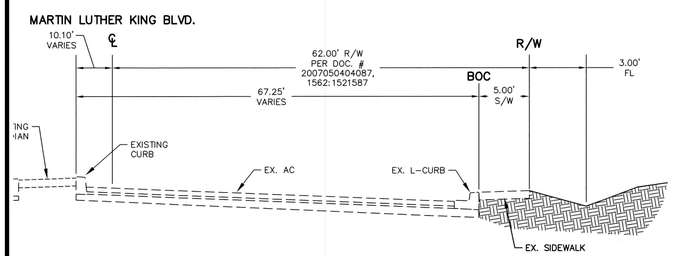
BAUGHMAN & TURNER, INC
CIVIL ENGINEERS LAND SURVEYORS
LAND PLANNERS
LAS VEGAS, NEVADA 89102
1210 HINSON STREET
PHONE:(702) 870-8771 FAX:(702) 878-2695

GOOD CLUCK WEST-MLK
GRADING PLAN
SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.B.& M.
CITY OF LAS VEGAS NEVADA
APN 139-21-510-001 & 004

SHEET
C2.0
3 OF 4
PROJ. NO.
6154



SECTION N.T.S. **A**



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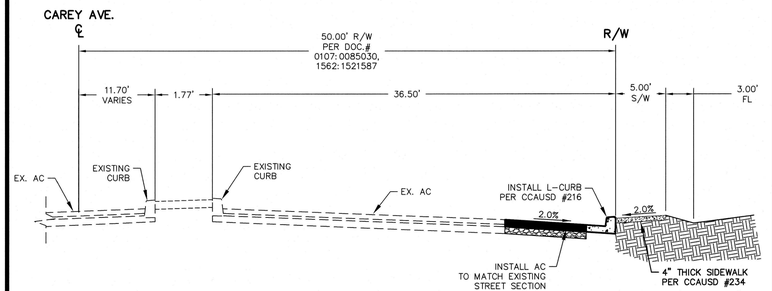

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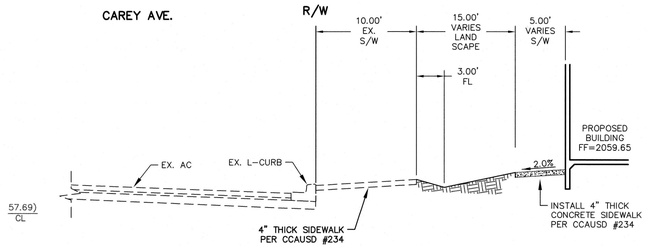

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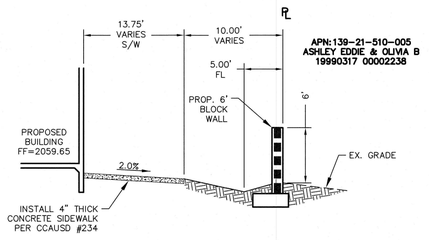

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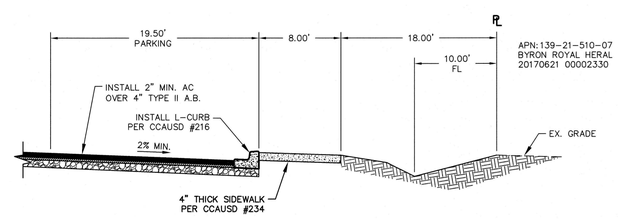

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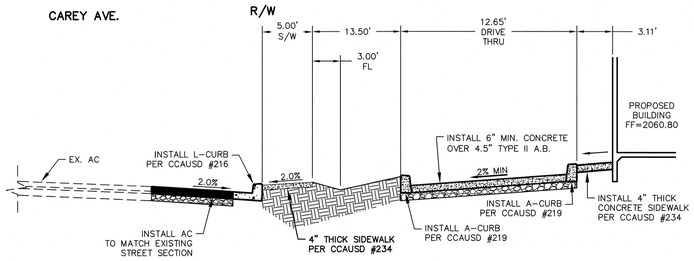
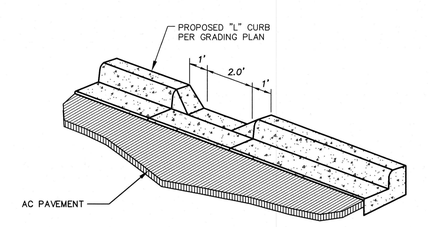


SECTION. N.T.S. **G**



2' CURB OPENING N.T.S. **1**

SECTION. N.T.S. **2**

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PROFESSIONAL ENGINEER - STATE OF NEVADA
JOHN R. GUSTAFSON
Exp. 6-30-21
CIVIL
No. 13140
10/19/21

REV NO.	DATE (CREATED)	REVISIONS	APP'D INITIALS	DATE APPROVED

PREPARED FOR :
WEST OF CLUCK LLC
2505 BUDDY OWENS AVE
MESQUITE, NEVADA 89034
(214)943-9090

DATE	11/14/2018
DESIGN	MJ
DRAWN	EC
CHECK	JRG
SCALE	

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SHEET
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4 OF 4
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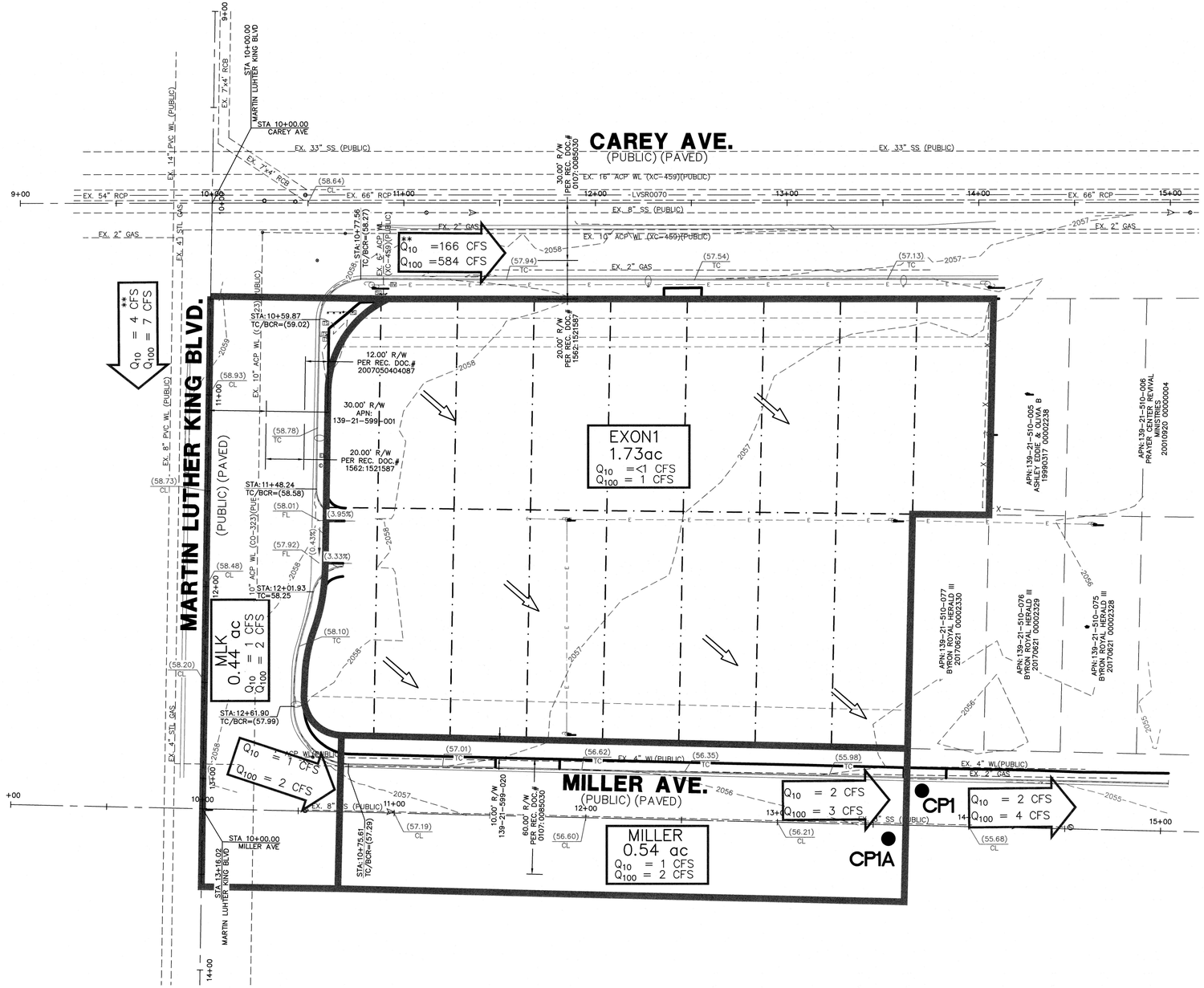

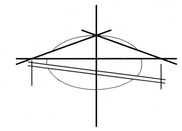

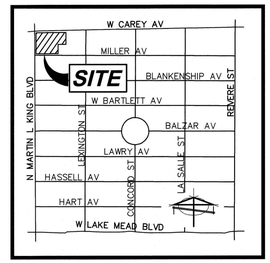

VICINITY MAP
NO SCALE

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

DRAINAGE LEGEND

- PROPERTY LINE
- LOT LINE
- STREET CENTERLINE
- PROPOSED WALL
- EXISTING WALL
- RETAINING FLOOD WALL
- PROPOSED "L" CURB & GUTTER
- EXISTING "L" CURB & GUTTER
- XXXX — EXISTING CONTOUR LINES
- XXXX — PROPOSED CONTOUR LINES
- EXISTING EDGE OF PAVEMENT
- 00.00 LOC — PROP. ELEVATION & LOCATION
- (00.00) LOC — EX. ELEVATION & LOCATION
- 0.00% — PROPOSED GRADE
- EXISTING DRAINAGE FLOW
- CL — CENTERLINE
- TC — TOP OF CURB
- EP — EDGE OF PAVEMENT
- FG — FINISHED GRADE
- GB — GRADE BREAK
- F.F. — FINISHED FLOOR
- HP — HIGHPOINT
- AC — ASPHALTIC CONCRETE
- THK — BLANKET THICKNESS
- OHE — OVERHEAD ELECTRIC LINES
- DRAINAGE BASIN BOUNDARY
- CP1 — COMBINATION POINT
- NAME, Q10 = -- CFS, Q100 = -- CFS — BASIN NAME & FLOW DATA
- Q10 = -- CFS, Q100 = -- CFS — DIRECTION OF FLOWS
- HS4 — HYDRAULIC SECTION (STREET CAPACITY)

Peak Flow Summary

Existing Condition			
Source	Basin Area (ac)	100-year Flow (cfs)	10-year Flow (cfs)
Carey*	--	584	166
MLK	0.44	2	1
MILL	0.54	2	1
CP1a	--	3	2
EXON1	1.73	1	<1
CP1	--	4	2

*Includes referenced flows from City Wide Study
**Includes referenced flows from Park Study

BENCHMARK

RIVET AND SQUARE ALUMINUM PLATE, STAMPED CITY OF LAS VEGAS BM NO. 5LV0121NNW6, SET IN THE TOP OF CURB, LOCATED APPROXIMATELY 1.0 FEET SOUTH OF THE SOUTHWEST SOUTH BCR AT THE INTERSECTION OF CAREY AVENUE AND COMSTOCK DRIVE.

630.063 METERS 2067.13 FEET
NAVD 88 DATUM

BASIS OF BEARING

SOUTH 89°59'51" EAST – BEING THE CENTERLINE OF CAREY AVENUE BETWEEN MARTIN LUTHER KING BOULEVARD AND LEXINGTON AVENUE AS SHOWN IN FILE 97, PAGE 54 OF SURVEYS, CLARK COUNTY RECORDER'S OFFICE, CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

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FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

	DATE	REV	REVISIONS	APP'D	DATE
		CREATED		INITIALS	APPROVED

PREPARED FOR :
WEST OF CLUCK LLC
3295 BEE CAVES #177
AUSTIN, TX 78704
(214)943-9090

DATE	10/9/2020	
DESIGN	PP	
DRAWN	EC	
CHECK	PP	
SCALE		

BAUGHMAN & TURNER, INC.
CIVIL ENGINEERS LAND PLANNERS LAND SURVEYORS
1210 HINSON STREET LAS VEGAS, NEVADA 89102
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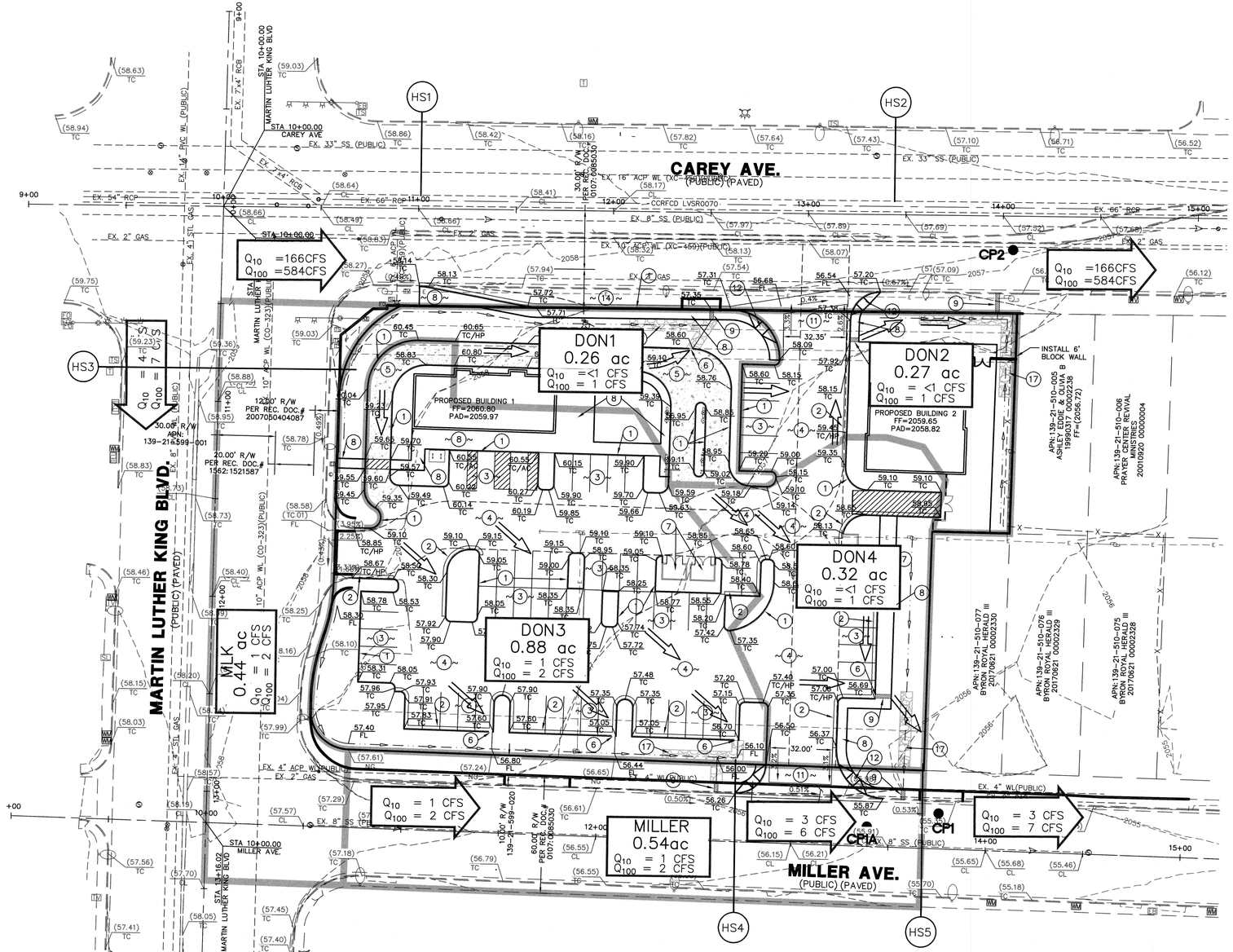
GOOD CLUCK WEST-MLK
EXISTING CONDITION BASIN MAP
SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.B.& M.
CITY OF LAS VEGAS NEVADA
APN 139-21-510-001 & 004

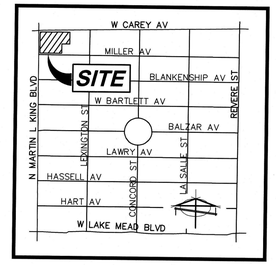
SHEET
FIG11
--- OF ---
PROJ. NO.
G154



GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.



VICINITY MAP
NO SCALE

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- LOT LINE
- STREET CENTERLINE
- PROPOSED WALL
- EXISTING WALL
- RETAINING FLOOD WALL
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- Q10 = – CFS, Q100 = – CFS — DIRECTION OF FLOWS
- HS4 — HYDRAULIC SECTION (STREET CAPACITY)

Peak Flow Summary
Interim Condition

Source	Basin Area (ac)	100-year Flow (cfs)	10-year Flow (cfs)
Carey*	--	584	166
MLK	0.44	2	1
MILL	0.54	2	1
DON3	0.88	2	1
CP1a	--	6	3
DON4	0.32	1	<1
CP1	--	7	3
DON1	0.26	1	<1
DON2	0.27	1	<1
CP2	--	584	166

*Includes referenced flows from City Wide Study
**Includes referenced flows from Park Study

Street Capacity Summary

Section	Location	Slope	Q (cfs)	D (ft)	V (fps)	V x D	Remarks
10-Year Flow –Interim Conditions							
HS1	Carey Ave	0.40%	166	1	3.53	3.53	VxD <6 is met; D is 1 ft; dry lane is not met, existing condition
HS2	Carey Ave	0.67%	166	1	4.13	4.13	VxD <6 is met; D is 1 ft; dry lane is not met, existing condition
HS3	Martin King (East ½)	0.49%	1	0.3	1.02	0.31	VxD <6 is met; D less than 1; dry lane is met
HS4	Miller	0.50%	3	0.3	1.38	0.41	VxD <6 is met; D less than 1; dry lane is met
HS5	Miller	0.53%	3	0.3	1.38	0.41	VxD <6 is met; D less than 1; dry lane is met
100-Year Flow – Interim Conditions							
HS1	Carey Ave	0.40%	584	1.6	5.78	9.25	VxD <8 is not met; D less than 2
HS2	Carey Ave	0.67%	584	1.4	6.76	9.46	VxD <8 is not met; D less than 2
HS3	Martin King (East ½)	0.49%	2	0.3	1.19	0.36	VxD <8 is met; D less than 2
HS4	Miller	0.50%	6	0.4	1.6	0.64	VxD <8 is met; D less than 2
HS5	Miller	0.53%	7	0.4	1.66	0.66	VxD <8 is met; D less than 2
10-Year Flow – Future Conditions							
HS1	Carey Ave	0.40%	1	0.3	1.07	0.32	VxD <6 is met; D less than 1; dry lane is met
HS2	Carey Ave	0.62%	1	0.2	1.34	0.27	VxD <6 is met; D less than 1; dry lane is met
100-Year Flow – Future Conditions							
HS1	Carey Ave	0.67%	1	0.3	1.07	0.32	VxD <8 is met; D less than 2
HS2	Carey Ave	0.62%	1	0.2	1.34	0.27	VxD <8 is met; D less than 2

BENCHMARK

RIVET AND SQUARE ALUMINUM PLATE, STAMPED CITY OF LAS VEGAS BM NO. 5LV0121NNW6, SET IN THE TOP OF CURB, LOCATED APPROXIMATELY 1.0 FEET SOUTH OF THE SOUTHWEST SOUTH BCR AT THE INTERSECTION OF CAREY AVENUE AND COMSTOCK DRIVE.

630.063 METERS 2067.13 FEET
NAVD 88 DATUM

FLOOD ZONE INFORMATION

THE SUBJECT PROPERTY LIES WITHIN FLOOD ZONE "x", BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA), ON FLOOD INSURANCE RATE MAP NO. 32003C2160F WITH A DATE OF IDENTIFICATION OF NOVEMBER 16, 2011, IN CLARK COUNTY, STATE OF NEVADA, WHICH IS THE CURRENT FLOOD INSURANCE RATE MAP FOR THE COMMUNITY IN WHICH SAID PROPERTY IS SITUATED.

DISCLAIMER NOTE

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UNDERGROUND AND OVERHEAD UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811 OR 1-800-227-2600

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
CALL BEFORE YOU DO OVER-HEAD
1-702-227-2929

FAST Call before you UnderGround
1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

DATE APPROVED	APP'D INITIALS	REVISIONS	REV NO.	DATE CREATED

PREPARED FOR :
WEST OF CLUCK LLC
2500 BUS. CENTER AVE
McALLEN, TX 78504
(214)943-9090

DATE	10/9/2020
DESIGN	PP
DRAWN	EC
CHECK	PP
SCALE	

BAUGHMAN & TURNER, INC.
CIVIL ENGINEERS LAND SURVEYORS LAND PLANNERS
1210 HINSON STREET LAS VEGAS, NEVADA 89102
PHONE:(702) 870-8771 FAX:(702) 878-2695

GOOD CLUCK WEST-MLK
INTERIM CONDITIONS
SECTION 21, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.B.& M.
CITY OF LAS VEGAS NEVADA
APN 139-21-510-001 & 004

SHEET
FIG13
--- OF ---
PROJ. NO.
G154