

DS #: 4420

APN: 125-06-001-001

PROJECT: KYLE CANYON MASTER DRAINAGE STUDY
(AKA. SKYE CANYON MASTER DRAINAGE)

SUBMITTAL: 5TH

SCANNED BY/DATE:

CHECKED BY/DATE:





CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: September 19, 2012
TO: Land Development Services Department of Public Works			FROM: Oh Sang Kwon, P.E. Flood Control Section Department of Public Works
SUBJECT:	Drainage Study for:		COPIES TO:
	Kyle Canyon Master Drainage Study		Slater Hanifan Group
Cross Streets:	Fort Apache Road & Moccasin Road		Wachovia Bank / Carwin Advisors
File Number:	F:\Depot\DSMemos\DS4420F.doc		Bart Anderson, P.E., DevCo
Parcel Number:	125-06-001-001		Randy Fultz
Zoning Action:			CCPW, CCRFCD
FEMA Flood Zone	YES	NO X	NDOT; NV Energy
Proposed Storm Drain	YES X	NO	PB America, Inc.

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1 st Submittal	6/22/2010	7/13/2010	Not Approved	\$1,000.00	147216: \$1000
2 nd Submittal	9/17/2010	10/4/2010	Not Approved	\$400.00	153788: \$400
3 rd Submittal	10/15/2011	11/14/2011	Not Approved	\$400.00	153788: \$400
4 th Submittal	2/13/2012	3/1/2012	Conditional Approval	\$400.00	274196: \$400
CCRFCD	5/23/2012	5/24/2012	Concurrence Recv'd	N/C	N/C
5 th Submittal NDOT Comments	9/10/2012	9/19/2012	See Comments Below	N/C	N/C
			TOTAL FEES (LDDRS):	\$2,200.00	----

REMARKS:

5th Submittal: Responses to NDOT Comments

Update to original Kyle Canyon Master Drainage Study (DS4091). Site layout has been changed.

The Master 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 Clark County Department of Public Works concurrence.
X	is conditionally approved subject to Nevada Department of Transportation concurrence.
X	is conditionally approved subject to BLM concurrence/approval.

The following comments are repeated until they are complete:

1. Please note that the traffic study must be approved prior to final approval of the Master Drainage Study. If the street layout does not match the Master Drainage study, an update to the Master Drainage Study must be submitted to address the changes.

2. The Kyle Canyon Master Drainage Study is proposing to revise the hydrology and facilities identified in the *Clark County Regional Flood Control District's (CCRFCD) 2008 Las Vegas Valley Flood Control Master Plan Update*. A Master Plan Amendment (MPA) must be submitted to the City of Las Vegas for approval. The City of Las Vegas will coordinate the MPA submittal to CCRFCD for approval. The Master Developer will be responsible for preparing all submittals needed for CCRFCD along with any and all presentations. The MPU must be approved by CCRFCD prior to the final approval of the Master Drainage Study.
3. Per a meeting held in August 18, 2011 between the developer and the *City of Las Vegas*, it was agreed that NV Energy's approval of any proposed drainage facilities within their access easements (such as the proposed detention basins) must be obtained prior to the final approval of the Master Drainage Study. Please provide documentation for such approval or acknowledgment.
4. Please note that any future technical drainage study submittals that differ from the Master Drainage Study (ie. Changes in pods, infrastructure, flows etc.) will require an update to the Master Drainage Study and this update must be approved by the *City of Las Vegas Flood Control Section* prior to final approval of technical drainage study.
5. The proposed detention basins will require coordination with the State of Nevada, Division of Water Resources Dam Safety and will require the State's approval prior to permitting.
6. Please obtain necessary 404 permits from Army Corps of Engineers and provide a copy of the permit to Flood Control prior to issuance of the grading permit. The contact information for Army Corps of Engineers is listed below:

Patricia L. McQueary
Chief, USACE S. George Regulatory Office
US Army Corps of Engineers
321 North Mall Drive
Suite L-101
St. George, UT 84790

(435) 986-3979 (Office)

(435) 986-3981 (FAX)

Patricia.L.McQueary@usace.army.mil

7. Please note that the proposed 100-year flood protection facilities identified on Exhibit F must be constructed by the Master Developer as a part of the master planned infrastructure. Technical drainage studies are required for each phase of the master planned infrastructure improvements. The technical drainage studies for the infrastructure improvements may be submitted with conditional approval of this Master Drainage Study. However, final approval for the Master Drainage Study must be obtained prior to conditional approval of the infrastructure drainage studies.
8. Technical drainage studies are required for each of the POD's. The technical drainage studies for the POD's may not be submitted until the conditional approval of the pertinent infrastructure drainage study is obtained. Final approval for the infrastructure drainage study must be obtained prior to conditional approval of the impacted POD drainage studies.
9. Building permits for the homes within the individual POD's will not be issued until construction of the street and flood control infrastructure around the POD is substantially complete or interim protection is provided per the approved technical drainage study.
10. The site is adjacent to Clark County jurisdictional boundaries. The engineer must coordinate the Master Drainage Study with *Clark County Public Works Department (CCPW)* and incorporate any concerns for boundary conditions. CCPW concurrence is required prior to final acceptance of the Master Drainage Study.

11. The project proposed to construct facilities and/or increase flows within *Nevada Department of Transportation* (NDOT) right-of-way. Therefore, NDOT concurrence is required prior to final approval of the Master Drainage Study.
12. The project proposed to discharge flows onto and proposed facilities within U.S. Bureau of Land Management (BLM) property. Therefore, BLM concurrence is required prior to final approval of the Master Drainage Study.
13. The proposed berm/levee along Moccasin Road will require approval from *Federal Emergency Management Agency* (FEMA) in the future. The proposed berm/levee must be designed to meet the minimum requirements set by FEMA and CCRFCD by a future technical drainage study.
14. The design of debris basins at all major culvert entrances to limit the amount of sediment and debris entering the storm drain facilities will be required in a future infrastructure study.
15. Please note that all detention basins must be designed per CCRFCD criteria including a low flow facility around the detention basin. Also, include new water quality feature per Storm Water Management Plan.
16. Please note that all proposed interim facilities must be maintained by the master developer.
17. Provide a legal description of the proposed detention basins prior to recordation of the parent final map.
18. Coordinate the proposed drainage facilities with *Sheep Mountain Parkway* project. Please contact Greg McDermott, P.E., at 702-229-2143 to coordinate the proposed drainage facilities.

NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved master 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.

In an effort to increase administrative efficiency, the City of Las Vegas Public Works Department requires all soil reports, drainage studies and traffic impact analysis submittals to be accompanied by an electronic copy of the submittal. Electronic documents must be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output replicating your submittal to be used for archival or display purposes. This may be more than one file if necessary. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats, but provided it is a high quality digitized replication of the submittal, other formats may be acceptable. If figures are in color, they must be scanned in color and saved as a separate file. The new submittal requirement is effective on **July 1, 2011**. If there are any questions regarding these new requirements, please contact Oh Sang Kwon in the Flood Section at (702) 229-2177 or Rick Schroder in Traffic Engineering at (702) 229-6327.

END OF REMARKS

osk

T/R/S: T19S/R60E/6 & 7
AREA G-6, 7, & F-12



Department of Public Works

500 S Grand Central Pky • Box 554000 • Las Vegas NV 89155-4000
(702) 455-6000 • Fax (702) 455-6040

Denis Cederburg, P.E., Director • E-Mail: dlc@ClarkCountyNV.gov

Concurrence Letter

Date: July 19, 2012
Firm: SHG
Engineer: Steve Jones, P.E.
Address: 5740 S. Arville Street, Suite 216, Las Vegas, NV 89118
Phone: (702) 284-5300
Fax: (702) 284-5399
E-mail: sjones@shg-inc.com

Subject: Conceptual Drainage Study for Kyle Canyon Conceptual Master Study
Location: NWC of Grand Teton Drive and Grand Canyon Drive
APN: 126-12-000-001; et al.
Sec, Township, Range: S12, S06, S07, T19S, R59E, R60E
Flood Zone & Panel: Zone X, 1750, 1745, 1735, Dated November 16, 2011
Application Tracking #: 12-25985



Submittals	Date Received	Date Returned	Reviewer	Miscellaneous
Concurrence	07/02/2012	07/19/2012	WG	
Addendum #1	07/02/2012	07/19/2012	WG	
Addendum #2	07/02/2012	07/19/2012	WG	
Addendum #3	07/02/2012	07/19/2012	WG	
Supplement	07/02/2012	07/19/2012	WG	

The above-referenced project is located within the **City of Las Vegas** adjacent to Clark County unincorporated areas. The drainage study was submitted to the County for concurrence on July 2, 2012. In addition, the County has received the City of Las Vegas acceptance letter dated May 24, 2012 for the Conceptual Drainage Study.

The County concurs with the acceptance of this Drainage Study by the City of Las Vegas. Please note that the County's review of this development is limited to drainage issues significant to Clark County unincorporated areas.

BOARD OF COUNTY COMMISSIONERS
SUSAN BRAGER, Chair • STEVE SISOLAK, Vice-Chair
LARRY BROWN • TOM COLLINS • CHRIS GIUNCHIGLIANI • MARY BETH SCOW • LAWRENCE WEEKLY
DONALD G. BURNETTE, County Manager

TRANSMITTAL

To: Oh-Sang Kwon, P.E. **Date:** September 10, 2012
City of Las Vegas Dept. of Public Works
Flood Control Section **Project No.:** WCR0902.004
333 N. Rancho Drive
Las Vegas, NV 89106

From: Steve Jones, P.E.

Subject: Master Drainage Study for Kyle Canyon

CC: Todd Steadham **CC:** Jerry Slater
CC: Mark Failla **CC:** Mike Ross
CC: Chelsea Peltier **CC:** _____

Transmitting Via:

- ☐ Mail
☒ Messenger / MDS
☐ Federal Express
☐ Pickup

For:

- ☒ Review & Comment
☐ Per your Request
☐ Information/File

Acknowledgement of Receipt:

- ☐ Not Required
☒ Acknowledgement Required

Received By: _____
Date: _____ Time: _____

Copies	Description
<u>1</u>	<u>Response to NDOT Comments on the Subject Study</u>
<u>1</u>	<u>Stamped and Signed Standard Form 1</u>
<u>1</u>	<u>Electronic Copy of Submittal on CD</u>

Comments:

Included for review is the *Response to NDOT Comments on the Master Drainage Study for Kyle Canyon*. This study addresses comments received from NDOT dated August 24, 2012. The study is being forwarded for your review and approval prior to transmittal to NDOT.

Please contact us if there are any questions at 702-284-5300. Thanks.

Signed: _____

Steve Jones, P.E.
Assistant Project Manager – Flood Control Division

Please, notify us at (702) 284-5300 if there are any problems receiving this transmission.

 *** FAX TX REPORT ***

TRANSMISSION OK

JOB NO. 4782
 DESTINATION ADDRESS 2845399
 PSWD/SUBADDRESS
 DESTINATION ID
 ST. TIME 09/19 15:28
 USAGE T 01' 25
 PGS. 3
 RESULT OK

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: September 19, 2012
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File Number:	F:\Depot\DSMemos\DS4420F.doc		Wachovia Bank / Carwin Advisors
Parcel Number:	125-06-001-001		Bart Anderson, P.E., DevCo
Zoning Action:			Randy Fultz
FEMA Flood Zone	YES	NO X	CCPW, CCRFCD
Proposed Storm Drain	YES X	NO	NDOT; NV Energy
			PB America, Inc.

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X	is conditionally approved subject to Clark County Department of Public Works concurrence.
X	is conditionally approved subject to Nevada Department of Transportation concurrence.



DRAINAGE INFORMATION FORM

Applicant: _____ Date of Application: _____
Name of Development: _____ Firm: _____
Encroachment Location: _____ Contact Person: _____
US95: 91 to 93 Address: _____
Milepost: SR157: 20 to 21 Route: _____
City: _____ County: _____ Telephone: _____
Type of Development: _____
Describe nature of encroachment into Department right-of-way: _____
Approximate upstream land area which drains to the subject site: _____
Approximate development land area which drains into Department right-of-way: _____

Is a portion or all of the proposed encroachment/development located in a designated FEMA Flood Hazard area?

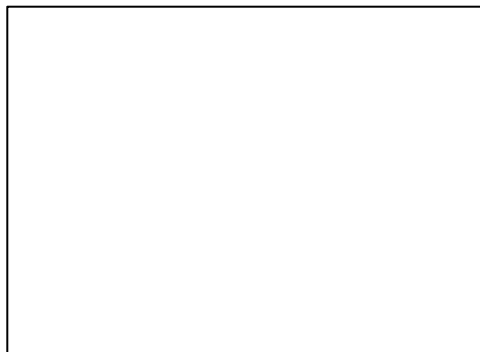
? Yes ? No

As a result of the encroachment/development:

Will peak flows up to the 100-year event entering Department right-of-way be increased over pre-development conditions?	? Yes	? No
Will any flows be diverted into or away from Department right-of-way?	? Yes	? No
Will flows entering or leaving Department right-of-way be obstructed (e.g., berms, property walls, etc.)?	? Yes	? No
Will established drainage conditions (velocities, depths, flow paths, etc.) be altered within Department right-of-way?	? Yes	? No
Will curb, gutter, sidewalk, medians or any other obstruction to roadway surface flows be constructed within Department right-of-way?	? Yes	? No
Will drainage facilities be constructed in Department right-of-way?	? Yes	? No
From a drainage standpoint, does the proposed encroachment in any way adversely affect Department right-of-way or any of the upstream or downstream property owners?	? Yes	? No

A drainage report, as described in Section II. 6.1 of the Department's Terms and Conditions Relating to Right-of-Way Occupancy Permits, is required if the answer to any of the above questions is yes unless waived by the District Engineer.

Unless completion of this form is waived by the Department's District Engineer, the form shall be completed and sealed by a licensed Civil Engineer.



Engineer's Seal

OR $\Rightarrow$ Waived By:

District Engineer

MASTER DRAINAGE STUDY
RESPONSE TO NDOT COMMENTS

Kyle Canyon

City of Las Vegas, Nevada

Job No.: WCP0902.004

Date: September 2012



CONSULTING ENGINEERS & PLANNERS

5740 S. ARVILLE STREET, SUITE 216

LAS VEGAS, NEVADA 89118

PHONE: 702-284-5300 • FAX: 702-284-5399

MASTER DRAINAGE STUDY
RESPONSE TO NDOT COMMENTS

Kyle Canyon

City of Las Vegas, Nevada

Job No.: WCP0902.004

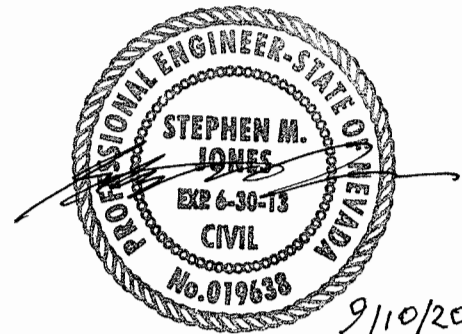
Date: September 2012

Prepared By:

Slater Hanifan Group, Inc.
5740 S. Arville Street, Suite 216
Las Vegas, Nevada 89118
Phone: 702-284-5300 • Fax: 702-284-5399

Prepared For:

Carwin Advisors
8379 W. Sunset Road, Suite 150
Las Vegas, NV 89113
Phone: 702-269-0043



Steve Jones, P.E.
NV Professional Engineer No. 19638



DRAINAGE INFORMATION FORM

Applicant: Carwin Advisors Date of Application: _____
Firm: Slater Hanifan Group
Name of Development: Kyle Canyon Contact Person: Steve Jones, P.E.
Encroachment Location: Kyle Canyon Road Address: 5740 S. Arville Street, Suite 216
US95: 91 to 93
Milepost: SR157: 20 to 21 Route: US-95 & SR-157 Las Vegas, NV 89118
City: Las Vegas County: Clark Telephone: 702-284-5300
Type of Development: Master Planned Community (residential, commercial, mixed use, school, recreation, etc.)
Describe nature of encroachment into Department right-of-way: Construction of new storm drain within SR-157 and a crossing of
US-95 @ SR-157. Additionally, the extension of Horse Drive Interchange storm drain north approx. 800-ft.
Approximate upstream land area which drains to the subject site: .61 square miles +/-
Approximate development land area which drains into Department right-of-way: 1.7 square miles +/-

Is a portion or all of the proposed encroachment/development located in a designated
FEMA Flood Hazard area?

☐ Yes

☒ No

As a result of the encroachment/development:

Will peak flows up to the 100-year event entering Department right-of-way be
increased over pre-development conditions?

☒ Yes

☐ No

Will any flows be diverted into or away from Department right-of-way?

☒ Yes

☐ No

Will flows entering or leaving Department right-of-way be obstructed (e.g., berms,
property walls, etc.)?

☐ Yes

☒ No

Will established drainage conditions (velocities, depths, flow paths, etc.) be altered
within Department right-of-way?

☒ Yes

☐ No

Will curb, gutter, sidewalk, medians or any other obstruction to roadway surface
flows be constructed within Department right-of-way?

☐ Yes

☒ No

Will drainage facilities be constructed in Department right-of-way?

☒ Yes

☐ No

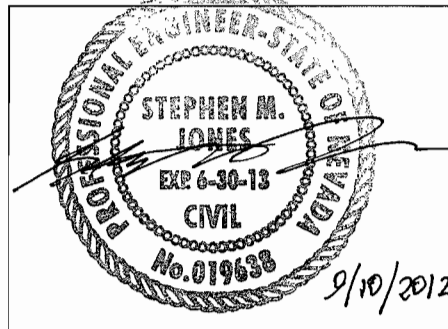
From a drainage standpoint, does the proposed encroachment in any way adversely
affect Department right-of-way or any of the upstream or downstream property owners?

☐ Yes

☒ No

A drainage report, as described in Section II. 6.1 of the Department's Terms and Conditions Relating to Right-of-Way
Occupancy Permits, is required if the answer to any of the above questions is yes unless waived by the District
Engineer.

Unless completion of this form
is waived by the Department's
District Engineer, the form
shall be completed and sealed
by a licensed Civil Engineer.



Engineer's Seal

OR ☐ Waived By:

District Engineer

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Kyle Canyon Master Drainage Study – NDOT RTC Date: September 2012
 Location of Development: a) Descriptive (Cross Streets): North/South: Hualapai Way
East/West: Iron Mountain Road
 b) Section: 12 Township: 19 South Range: 59 East
 Section: 6, 7 Township: 19 South Range: 60 East
 c) APN: 125-06-101-001; 125-06-401-001; 125-06-501-001; 125-06-701-001; 125-07-101-005, 006;
125-07-201-001, 002; 125-07-301-001, 002; 125-07-401-001, 002; 125-07-501-005;
125-07-602-001, 003, 004, 005; 126-12-000-001

Name of Owner/Developer: Wachovia Bank / Carwin Advisors
 Telephone No.: 702-269-0043 Fax No.: _____ E-mail Address: Michael.Ross@carwinadvisors.com
 Address: 8379 W. Sunset Road, Suite 150; Las Vegas, NV 89113

Contact Person – Name: Steve Jones, P.E. Telephone No.: 702-284-5300
 *E-mail Address: sjones@shg-inc.com Fax No.: 702-284-5399
 Firm: Slater Hanifan Group
 Address: 5740 S. Arville Street, Suite 216; Las Vegas, NV 89118

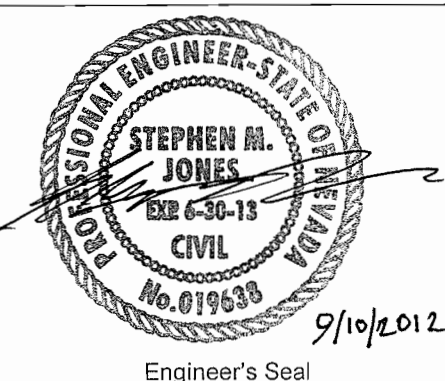
Type of Land Development/Land Disturbance Process:

☐ Rezoning	☐ Subdivision Map	☐ Clearing and grading Only
☐ Parcel Map	☐ Planned Unit Development	☒ Other (Please specify below)
☐ Large Parcel Map	☐ Building Permit	☐ Master Drainage Study

1. Total Owned Land Area: At Site: 1,662 +/- Acres Being Developed/Disturbed: All
 2. Is a portion or all of the subject property located in a FEMA Flood Hazard Area? ☐ Yes** ☒ No
 3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☒ Yes** ☐ No
 4. Proposed type of development (Residential, Commercial, Etc.): Residential, Commercial, Schools, Parks, Roadways, Gaming, etc.
 5. Approximate upstream land area which drains to the subject site: 6.1 Square Miles +/-
 6. Has the site drainage been evaluated in the past? ☒ Yes** ☐ No If yes, please identify documentation: Kyle Canyon Master Drainage Study and Updates, GCW (CLV DS4091);

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site:
Intersections of Moccasin, Log Cabin, O'Hare, Iron Mountain, Brent and Horse along Fort Apache Road,
Future Sheep Mountain Parkway alignment north of Moccasin,
U.S. Highway 95 right-of-way

8. Briefly describe your proposed schedule for the subject project: ASAP



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

*Newly 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

WCP0902.004

September 10, 2012

Brian A. Matthews, P.E.
Nevada Department of Transportation
Division C019 Hydraulics
123 E. Washington Avenue
Las Vegas, Nevada 89101

Subject: Response to NDOT Comments on the Master Drainage Study for Kyle Canyon (CLV DS4420, NDOT Advance Drainage Study No. 246)

Dear Mr. Matthews:

This letter is submitted in response to comments contained in the August 24, 2012 faxed memorandum, regarding the review of the above referenced project. A copy of the Nevada Department of Transportation (NDOT) faxed memo has been provided in the appendix of this submittal. The comments have been individually addressed as follows:

- Comment:** *In checking the Comparison of Allowable Flows vs. Proposed Flows vs. Ultimate Flows, as seen on Page 6 of Addendum #3, I discovered that the listed flows were not always the exact same value as predicted in the model. The values are usually close, so the flow value is not as much the issue, but you may wish to double check your numbers for the sake of accuracy against the latest model (the biggest offenders are US95 Culverts 6, 6A and 11);*

Response: Upon inspection of the approved HEC-1 hydrologic models included in Addendum #3, the ultimate condition flow rates in the summary table have been verified; however, the proposed condition flow rates identified in the summary table in the US-95 culverts were not updated to match the approved hydrologic model (Addendum #3). The subject summary table has been re-provided below with the updated flow rates from the approved hydrologic model included in Addendum #3.

Comparison of Allowable Flows vs. Proposed Condition Flows vs. Ultimate Condition Flows					
Location	ALLOWABLE		SHG		
	Q₁₀₀ (cfs)	Reference Material	Q_{PROPOSED} (cfs)	Q_{ULTIMATE} (cfs)	HEC-1 Node
Box Culvert approx. 1,300-ft north of Grand Canyon Drive / Grand Teton Drive	802	Centennial Point RCB Plans	777	777	CP26
Iron Mountain Road D/S of Fort Apache	235	CLV NWNS	118	118	IREAST
O'Hare Road D/S of Fort Apache	47	CLV NWNS	47	47	OHARE
Log Cabin Way D/S of Fort Apache	187	CLV NWNS	187	187	LOGCAB

Comparison of Allowable Flows vs. Proposed Condition Flows vs. Ultimate Condition Flows					
Location	ALLOWABLE		SHG		
	Q ₁₀₀ (cfs)	Reference Material	Q _{PROPOSED} (cfs)	Q _{ULTIMATE} (cfs)	HEC-1 Node
Interim Levee @ Fort Apache Road / Moccasin Road	2,666	Previous Master Study Interim 1 Condition	2,618	N/A	CP43
Brent Lane D/S of Fort Apache	79	CLV NWNS	373	178	BRENT
Horse Drive D/S of Fort Apache	37	CLV NWNS	37	37	HORSE
Fort Apache Road D/S of Horse Drive	101	CLV NWNS	101	101	RACEL
U.S. Highway 95 Culvert 1	54	Previous Master Study Interim 1 Condition	45	N/A	DCHD1B
U.S. Highway 95 Culvert 1A	54	Previous Master Study Interim 1 Condition	45	N/A	DCHD1C
U.S. Highway 95 Culvert 2	75	Horse Drive Culvert Analysis	91	N/A	DCHD2B
U.S. Highway 95 Culvert 2A	100	Horse Drive Culvert Analysis	59	N/A	DCHD2C
U.S. Highway 95 Culvert 4	1,141	Horse Drive Culvert Analysis	61	N/A	DCHD4B
U.S. Highway 95 Culvert 4A	872	Horse Drive Culvert Analysis	84	N/A	DCHD4C
U.S. Highway 95 Culvert 5	330	Previous Master Study Interim 2 Condition	244	N/A	CHD05B
U.S. Highway 95 Culvert 5A	153	Horse Drive Culvert Analysis	8	N/A	DCHD5C
U.S. Highway 95 Culvert 6	403	Horse Drive Culvert Analysis	215	N/A	DCHD6B
U.S. Highway 95 Culvert 6A	403	Horse Drive Culvert Analysis	216	N/A	DCHD6C
U.S. Highway 95 Culvert 8	66	Horse Drive Culvert Analysis	66	N/A	DVCUL8
U.S. Highway 95 Culvert 8A	66	Horse Drive Culvert Analysis	66	N/A	DIV8A
U.S. Highway 95 Culvert 9	1,008	Horse Drive Culvert Analysis	966	N/A	DVCUL9
U.S. Highway 95 Culvert 9A	256	Horse Drive Culvert Analysis	253	N/A	DIV9A
U.S. Highway 95 Culvert 10	18	Horse Drive Culvert Analysis	19	N/A	DCUL10
U.S. Highway 95 Culvert 10A	369	Previous Master Study Interim 1 Condition	366	N/A	DIV10A
U.S. Highway 95 Culvert 11	642	Previous Master Study Interim 1 Condition	285	N/A	DCUL11

Comparison of Allowable Flows vs. Proposed Condition Flows vs. Ultimate Condition Flows					
Location	ALLOWABLE		SHG		
	Q ₁₀₀ (cfs)	Reference Material	Q _{PROPOSED} (cfs)	Q _{ULTIMATE} (cfs)	HEC-1 Node
U.S. Highway 95 Culvert 11A	1,160	Horse Drive Culvert Analysis	1,034	N/A	DIV11A
CCRFCF Facility LVMO 0000	12,709	2008 MPU	N/A	10,844	CP43
CCRFCF Facility CN95 0167	2,160	2008 MPU	N/A	2,332	95STH

Although the proposed condition flow rates conveyed in the US-95 culverts have changed, the above table still shows that allowable flows were not exceeded by the development of Kyle Canyon. Also although the flow rates in the above summary table were not correct on Page 6 of Addendum #3, the facilities exhibits in Addendum #3 did show the correct flows from the approved hydrologic model; therefore, no revisions beyond the above corrected summary table are necessary for this submittal.

2. **Comment:** *Before you read this comment, I do want to say that I recognize that CCRFCF has already given their approval on the Technical Drainage Study. In comparing the 2008 CCRFCF Master Plan Update (MPU), there are some differences between the proposed layout and the MPU. The main concern rests upon the more than doubling of flow at the future interchange with Kyle Canyon (from 1066 cfs to a proposed 3324 cfs), while at the same time shrinking the proposed facility to about half (from double 13-ft by 7-ft RCB to a proposed single 14-ft by 8-ft RCB);*

Response: In regards to the difference in flow rates between the 2008 MPU and the current SHG Master Drainage Study, the proposed flow rate at the Kyle Canyon interchange is different because of site plan differences. It was previously assumed that CLV Sheep Mountain Parkway would be aligned along the western boundary of the site, future Sheep Mountain Parkway would convey flow in the future Kyle Canyon regional facility MOKC 0222 (2,192 cfs), and cross US-95 further north than Kyle Canyon Road. The current site plan provided in the SHG Master Drainage Study assumes Sheep Mountain Parkway bisects the property and intersects with the US-95/Kyle Canyon interchange. Therefore, the flow in regional facility MOKC 0222 combines in the proposed Kyle Canyon crossing of US-95. Arithmetic addition of regional facilities MOKY 0096 (1,066 cfs) and MOKC 0222 (2,192 cfs) results in a flow similar to the design flow (3,324cfs) utilized in conceptually sizing the proposed facility crossing US-95 at the Kyle Canyon interchange.

In regards to the size discrepancy of the storm drain facility shown crossing US-95 at the Kyle Canyon interchange, based on the CCRFCF MPU legend, MOKY 0096 has been conceptually assumed as a culvert crossing; whereas, the size of the proposed SHG facility assumes connectivity of the storm drain crossing US-95 and that it will not function as a culvert crossing. By assuming the facility at the interchange is a culvert crossing, the 2008 MPU artificially increases the size of the facility based on bridge criteria outlined in the MPU and the CCRFCF Manual.

Referenced facilities figures from the 2008 MPU have been included in the appendix for further support of the above discussions. It is noted that the proposed facility crossing US-95 is only conceptually designed with this study and a detailed technical analysis is required in order to construct the facility (including verification of longitudinal slopes and further hydraulic analysis).

3. **Comment:** *Please coordinate with Nick Johnson, NDOT Project Manager at (775) 888-7319, related to the crossing of US95. NDOT is in the planning stage for US95 Phase 5 widening improvements, which include an interchange at the intersection of US95 and Kyle Canyon;*

Response: Coordination has been performed with Nick Johnson, by way of a September 6, 2012 phone call and follow-up email included in the appendix of this submittal. After conversation with Nick, it seems that the planning for future interchange and widening improvements to US-95 at the Kyle Canyon interchange is preliminary and not considered to be constructed any time in the near future. It was noted to Nick that it is anticipated that the Kyle Canyon facilities in US-95, including the major 14-ft by 8-ft RCB crossing at the interchange, are also expected to not be constructed in the near future. It was discussed between Nick and myself that these facilities (when constructed) are intended as permanent facilities designed for ultimate development flow rates, which adhere to NDOT "no-cut" policy for the highway. Coordination will continue in the future between the Kyle Canyon property and NDOT as both projects become more tangible beyond the planning and conceptual levels.

If you have any questions or require additional information, please do not hesitate to contact us at 284-5300.

Respectfully Submitted,

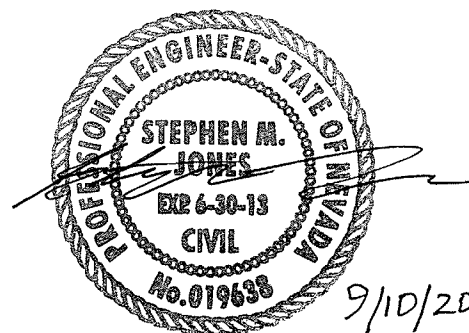
SLATER HANIFAN GROUP

Steve Jones, P.E.

Assistant Project Manager - Flood Control Division

cc: Mark Failla, P.E., CFM – SHG

Todd Steadham, P.E., LEED-AP – SHG



APPENDIX

1. Drainage Study NDOT Comment Letter
2. Coordination Summary with Nick Johnson
3. Relevant 2008 CCRFCD MPU Facilities Figures

Faxed NDOT Comment Letter

NDOT FAX/TRANSMITTAL

Date: 8/24/2012

TO

Slater Hanifan

Steve Jones
284-5300/fax 284-5399

FROM

Las Vegas Permits Ofc.
Rudye Lucero

Telephone # 671-6610

Reference: Advance Drainage Study No. .246
Kyle Canyon

Remarks or Special Instructions:

Attached are Comments by NDOT Review Committee

Advance Drainage Study No. .246

1) In checking the Comprision of Allowable Flows vs Proposed Flows vs Ultimate Condition Flows, as seen on Page 6 of Addendum 3, I discovered that the listed flows were not always the exact same value as predicted in the model. The values are usually close, so the flow value is not as much the issue, but you may wish to double check your numbers for the sake of accuracy against the latest model. (the biggest offenders are US 95 Culvert 6, 6A, and 11).

2) Before you read this comment, I do want to say that I recognize that C.C.R.F.C.D. has already given their approval on the Technical Drainage Study. In comparing the 2008 C.C.R.F.C.D. Master Plan Update (MPU), there are some differences between the proposed layout and the MPU. The main concern rests upon the more than doubling of flow at the future interchange with Kyle Canyon (from 1066 cfs to a proposed 3324 cfs), while at the same time shrinking the proposed facility to about half (from double 13'x 7' RCB to a proposed single 14'x8' RCB).

3) Please coordinate with Nick Johnson, NDOT Project Manager at (775) 888-7319, related to the crossing of US 95. NDOT is in the planning stage for US 95 Phase 5 widening improvements, which include an interchange at the intersection of US 95 and Kyle Canyon.

Coordination Summary Email with Nick Johnson

Steve Jones

From: Johnson, Nicholas J <NJohnson@dot.state.nv.us>
Sent: Monday, September 10, 2012 10:40 AM
To: Steve Jones
Subject: RE: Kyle Canyon Master Plan & US-95 Coordination
Attachments: FTP Site.doc

Hi Steve

Thanks for placing that map on our FTP site. For your information, I placed our Environmental Document on the FTP site. A link is provided below; the file is named "US 95 EA 100807.PDF".

ftp://ftp.dot.state.nv.us/ProjectMgmt/US_95_Northwest/

As we discussed, The US 95 NW phase 2 widening project is at approximately 90% design and the plans are being shelved until funding becomes available. Phase 5, the Kyle Canyon Interchange, is at preliminary design stage and it is not anticipated to begin final design for at least 5 years. If the status of either of these projects change, I will contact you so that we may be able to coordinate the proposed drainage improvements shown in your master plan with the US 95 improvements. Please let me know if you have any questions or concerns. Thanks Steve!

Nick Johnson, P.E., CPM

Senior Project Manager
Nevada Department of Transportation
1263 S. Stewart Street
Carson City, NV 89712
Phone: (775) 888- 7319
cell: (775) 843 3820
Fax: (775) 888-7322
njohnson@dot.state.nv.us

From: Steve Jones [<mailto:sjones@shg-inc.com>]
Sent: Friday, September 07, 2012 9:16 AM
To: Johnson, Nicholas J
Subject: RE: Kyle Canyon Master Plan & US-95 Coordination

I have placed our Facilities Map on your FTP site, titled "Kyle Canyon Facilities Map"

Let me know if you would like me to supply you with any other information regarding our project. Thanks,

Steve Jones, P.E.
Assistant Project Manager

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PHOENIX, ARIZONA 85028
PHONE: (602) 687-9664
FAX: (602) 687-9693

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From: Steve Jones
Sent: Thursday, September 06, 2012 9:53 AM
To: 'njohnson@dot.state.nv.us'
Cc: Todd Steadham (tsteadham@shg-inc.com)
Subject: Kyle Canyon Master Plan & US-95 Coordination

Nick,

As we discussed over the phone, attached is the current site plan for our Kyle Canyon master planned community. The .pdf file of our storm drain facilities exhibit is too large for attachment to this email, so could you please forward me the link to your FTP site in which I can forward you the exhibit.

Upon receipt of our storm drain facilities exhibit, it will include the infrastructure proposed at the Kyle Canyon interchange with US-95 (See Facilities P69W, P69AW, P70W and P70AW). These facilities are to be considered permanent and will be designed for ultimate condition storm flows. At this point, it is considered conceptual in nature and although no schedule has been produced for timeline on when we might need to construct these facilities, but based on that the bank still controls the property I wouldn't anticipate that this facility would be installed in the near future as we discussed. Also note that the property will also be required to construct some connecting storm drain facilities to the recently built Horse Interchange RCB storm drain (Facilities P66W and P71W) to adhere to ultimate condition drainage patterns on downstream property.

Thanks for taking the time to inform me of your expectations and any schedule for your future widening improvements in the Kyle Canyon interchange area.

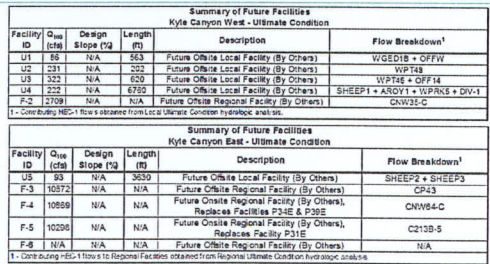
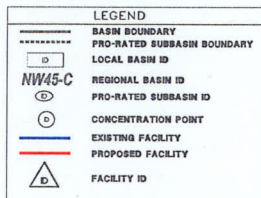
Steve Jones, P.E.
Assistant Project Manager

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Summary of Existing US-95 Culverts-Ultimate Condition							
Facility ID	Q _{max} (cfs)	Q _{design} (cfs)	Proposed CFS	Ultimate CFS	HEC-1 Node ¹	Description	Comments
E-1	22 ¹	N/A	24	N/A	N/A	6'-6" by 5'-4 RCB	N/A
E-2	31 ¹	N/A	34	N/A	N/A	6'-6" by 5'-4 RCB	N/A
E-3	44 ¹	N/A	47	N/A	N/A	6'-6" by 5'-4 RCB	N/A
E-4	44 ¹	N/A	47	N/A	N/A	42-inch CMP	N/A
E-5	223 ²	N/A	235	N/A	N/A	42-inch CMP	N/A
E-6	233 ²	N/A	244	N/A	N/A	8'-6" by 3'-4 RCB	N/A
E-7	19 ¹	24 ¹	25	N/A	N/A	(1) 5'-4 by 3'-4 RCB	V/N Outlet 1
E-8	14 ¹	18 ¹	19	N/A	N/A	(1) 36-inch RCB	V/N Outlet 1
E-9	30 ¹	34 ¹	45	51	DO-01B	6'-6" by 3'-4 RCB	V/N Outlet 1
E-10	36 ¹	37 ¹	45	51	DO-01B	6'-6" by 3'-4 RCB	V/N Outlet 1
E-11	362 ¹	75 ¹	61	71	DO-01B	(1) 5'-4 by 3'-4 RCB	V/N Outlet 2
E-12	547 ¹	120 ¹	59	50	DO-02B	(1) 5'-4 by 3'-4 RCB	V/N Outlet 2
E-13	1208 ¹	1141 ¹	61	61	N/A	(1) 10'-4 by 4'-4 RCB	V/N Outlet 4
E-14	65 ¹	82 ¹	84	33	85-4 + OFFB	(1) 42-inch CMP	V/N Outlet 4
E-15	68 ¹	330 ¹	215	215	OFFB	6'-6" by 3'-4 RCB	V/N Outlet 5
E-16	34 ¹	133 ¹	8	30	95-7-4 + OFFB	6'-6" by 3'-4 RCB	V/N Outlet 5
E-17	643 ¹	303 ¹	215	331	DO-01B	(1) 10'-4 by 4'-4 RCB	V/N Outlet 6
E-18	783 ¹	303 ¹	216	18	85-4 + 85-9	(1) 10'-4 by 4'-4 RCB	V/N Outlet 6
E-19	783 ¹	80 ¹	66	N/A	N/A	6'-6" by 3'-4 RCB	V/N Outlet 8
E-19A	767 ¹	66 ¹	66	N/A	N/A	6'-6" by 4'-4 RCB	V/N Outlet 8
E-20	773 ¹	1008 ¹	986	N/A	N/A	(1) 42-inch CMP	V/N Outlet 9
E-21	259 ¹	326 ¹	215	N/A	N/A	(1) 42-inch CMP	V/N Outlet 9
E-22	16 ¹	15 ¹	19	N/A	N/A	(1) 4'-4 by 4'-4 RCB	V/N Outlet 10
E-24	362 ¹	369 ¹	368	N/A	N/A	10'-4 by 4'-4 RCB	V/N Outlet 10
E-17	362 ¹	843 ¹	385	N/A	N/A	10'-4 by 10'-4 RCB	V/N Outlet 11
E-25	174 ¹	1167 ¹	1014	N/A	N/A	10'-4 by 10'-4 RCB	V/N Outlet 11
1-r.e. V/N Outlets See Flow							
2-r.e. V/N Outlets See Flow or check Culvert Schedule							
3-r.e. CFS is Unreliable estimate for flow. It is computed and the region is shown							
4-Combining HEC-1 flow is expanded from the Ultimate Condition to design analysis							
5-Referenced on the CULVERT Log No. 2 for the National Wetland Database Study							
6-Referenced from V/N Note D-1 on the US-95 Interchange Area							
Facility ID	Summary of US-95 V/N Facility - Ultimate Condition				Comments		
Facility ID	Description				Comments		
E-18	5'-4 by 5'-4 RCB				Existing CORP CDF V/N Facility ID = CN35 0353 Capacity = 122 cfs @ Regional Ultimate Condition Basin NW-2-5		
E-19	10'-4 by 8'-4 RCB						
E-20	10'-4 by 8'-4 RCB						
E-21	10'-4 by 8'-4 RCB						
E-22	15'-4 by 8'-4 RCB						
E-23	15'-4 by 8'-4 RCB				Existing CORP CDF V/N Facility ID = CN35 0168 Capacity = 1,822 cfs @ Regional Ultimate Condition Concentration Point (85TH - CNW1-5)		
E-24	6'-4 by 6'-4 RCB				Shores Headed out Facility E-13		
E-25	36-inch RCB						
E-26	36-inch RCB						
E-27	6'-4 by 3'-4 RCB				Shrubbed and Capped		
E-28	15'-4 by 4'-4 RCB				Shrubbed and Capped		
E-29	10'-4 by 4'-4 RCB				Shrubbed and Capped		
F-1	(1) 10'-4 by 4'-4 RCBs				Future CORP CDF V/N Facility ID = CN35 0167, Capacity = 2,125 cfs @ Regional Ultimate Condition Concentration Point 85TH		

(Note that the US-95 is planned as a hydrologic cut-off for all flow generated by Kiyu Canyon west of the highway.)

Summary of Existing Partnered Facilities					
Facility ID	Owner (city)	Description	Comments	Referenced Improvement Plans	
E-33	353	64 by 5-4 RCB	CONCORD UPU Facility CNO1 0119	2008 CONCORD UPU	
E-31	231	64 by 4-4 RCB		Hudson improvements	
E-32	N/A	18-inch RCP		Grand Teton Village / Grand View Apartments	
E-33	761	104 by 5-4 RCB	Parallel 18-inch RCP on south half of road to be abandoned and flow is collected by 104 by 5-4 RCB	Grand Teton Drive Storm Drain	
E-35	761	104 by 5-4 RCB	Outlets to US-55 Channel	Grand Teton Drive Storm Drain	
E-36	N/A	18-inch RCP	Flow from Grand Canyon Drive	Grand Canyon Apartments / Grand Canyon Park	
E-37	82	18-inch 24-slope Channel	West half of Grand Canyon Drive	Box Culvert for Centennial Point and Grand Canyon Apartments	
E-38	82	54 by 6-4 RCB	Concrete Headwall	Box Culvert for Centennial Point and Grand Canyon Apartments	
E-39	851	64 by 5-4 RCB	CONCORD UPU Facility CNO2 0024	Grand Canyon Apartments	
E-40	N/A	18-inch RCP		2008 CONCORD UPU	
E-41	999	104 by 5-4 RCB	CONCORD UPU Facility CNO3 0009	2008 CONCORD UPU	
E-42	999	104 by 4-4 RCB	CONCORD UPU Facility CNO4 0000	2008 CONCORD UPU	
E-43	9	24-inch RCP	Collects roadway flow via drop inlets	Horse Drive / US-25 interchange	
E-44	314	62-inch by 43-inch H-RCF	Discharges as surface flow into Horse Drive	Spring Mountain Tunnel	
E-45	101	48-inch H-RCF		Spring Mountain Ranch Unit 30	
E-46	131	24-inch RCP	Collects roadway flow via drop inlets	Horse Drive / US-25 interchange	
E-47	2	24-inch RCP	Collects roadway flow via drop inlets	Horse Drive / US-25 interchange	
E-48	161	48-inch RCP	Subsides to collect flow between US-85 and Sky Pointe Drive	Horse Drive / US-25 interchange	
E-49	291	38-inch to 60-inch H-RCF		Horse Drive / US-25 interchange	
E-50	101	48-inch RCP	18-24-inch RCP for west half of road	Spring Mountain Ranch Unit 40 Jackson Road	
E-51	N/A	18-inch by 35-inch H-RCF	Flow from school	James Ellery Elementary School	
E-52	N/A	18-inch RCP	Drop inlets of 18-inch RCP	James Ellery Elementary School	
E-53	60	30-inch H-PE	18-inch RCP for south half of road	James Ellery Elementary School	
E-54	88	36-inch RCP		Iron Mountain Estates West Units 1 and 2	
E-55	31	24-inch RCP	18-inch RCP SSS for west half of road	Spring Mountain Ranch Unit 60 Phase 1	
E-56	N/A	18-inch RCP	Shutted and capped	Spring Mountain Ranch Unit 60 Phase 1	
E-57	73	36-inch RCP	18-inch RCP SSS for north half of road	Spring Mountain Ranch Unit 60 Phase 1	
E-58	1160 ¹	18-inch Channel	Outlet for Facility E-57	Site Visit	
E-59	1160 ²	RCA Outlet	Outlet for Facility E-17	Site Visit	

1 - See Facility E-17

2 - Referenced from Horse Drive US-25 interchange draw.

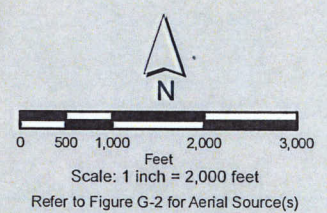
Relevant 2008 CCRFCD MPU Facilities Figures



2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE
FIGURE F- 8
FLOOD CONTROL FACILITIES

LEGEND

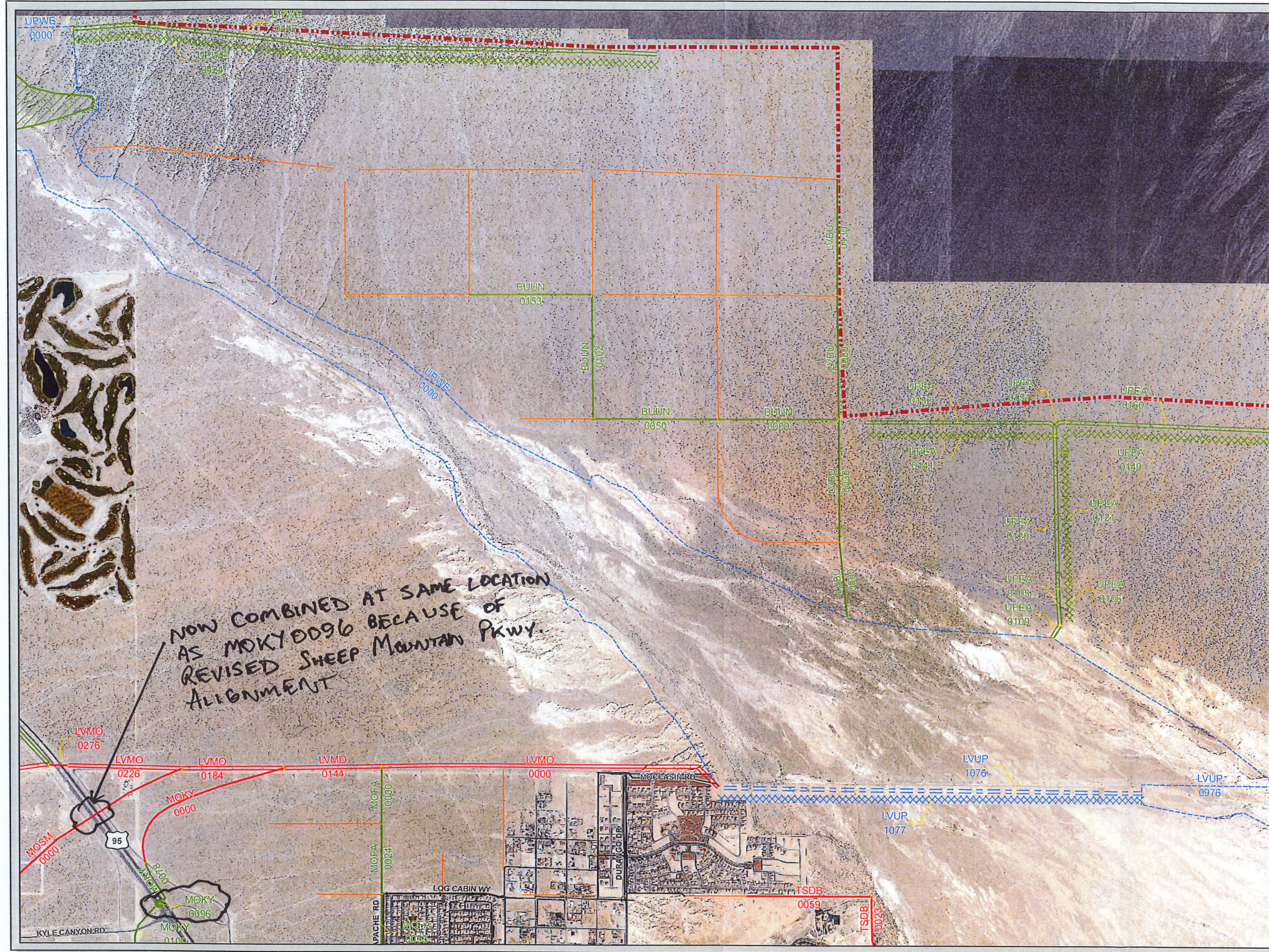
- Ultimate Development Boundary
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Local Existing Facilities
- Local Proposed Facilities
- Detention Basin
- Culvert or Bridge Crossing
- Stormdrain
- Lined Channel
- Unlined Channel
- Levee/Dike
- Natural Wash/Floodway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



US95			I-15		
2	3		8	9	10
4	5	6	7	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31	32	33	34	35	36
37	38	39	40	41	42
43	44	45	46	47	48
49	50	51	52	53	54
55	56	57	58	59	



NOW COMBINED AT SAME LOCATION
AS MOKY 0096 BECAUSE OF
REVISED SHEEP MOUNTAIN PKWY.
ALIGNMENT



ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
BUUN		BUFFALO AND UNKNOWN						
0000	P0	3: 9' X 8' RCB	2620	2239	C125A-11	LOWER3	1.80	0.38
0050	P0	3: 9' X 8' RCB	2735	1949	C125A-10	LOWER3	1.55	0.36
0102	P0	2: 6' X 6' RCB	2685	1626	C125A-9	LOWER3	1.28	2.97
0153	P0	2: 9' X 8' RCB	2675	1314	C125A-7	LOWER3	1.02	0.38
LVBV		UPPER LAS VEGAS WASH - BUFFALO BRANCH						
0000	P0	3: 9' X 9' RCB	1640	4363	C125A-13	LOWER3	4.68	1.21
0030	P0	3: 9' X 8' RCB	2660	4363	C125A-13	LOWER3	4.68	1.95
0080	P0	2: 7' X 6' RCB	2680	2066	C125B-4	LOWER3	2.64	3.54
0130	P0	7' X 7' RCB	2530	1454	C125B-2	LOWER3	2.14	4.15
LVMO		LAS VEGAS WASH - MOCCASIN						
0000	P1	Conc Chnl 30"W 13"D 0:1 SS	7530	12709	CNW130-W	LOWER5	77.80	2.10
0144	P1	Conc Chnl 27"W 13"D 0:1 SS	2125	12637	2CNW64-C	LOWER5	76.54	3.10
0184	P1	Conc Chnl 27"W 12.5"D 0:1 SS	2230	12439	CNW64-C	LOWER5	75.49	3.10
0226	P1	Conc Chnl 27"W 12.5"D 0:1 SS	2500	11853	CNW51-C	LOWER5	71.25	3.10
0276	P1	Bridge 30"W 10"D	400	11837	2C213B-5	LOWER5	70.94	3.10
0280	P1	Conc Chnl 16"W 8"D 0:1 SS	3500	3095	CNW23-C	LOWER3	5.71	2.86
LVUP		UPPER LAS VEGAS WASH						
0976	E	Floodway	7000	14661	ULWIN	LOWER5	110.99	0.71
1076	E	Unlined Chnl 300"W 8.5"D 3:1 SS	9200	13643	3CA-15	LOWER5	91.52	0.80
1077	E	Soil Cement Levee 8.5' with 300"W Chnl	9200	13643	3CA-15	LOWER5	91.52	0.82
MOFA		MOCCASIN - FORT APACHE						
0000	P0	19' X 6' RCB	1250	936	CNW64-E	LOWER3	0.90	0.25
0024	P0	12' X 6' RCB	1520	394	DNW100-W	LOWER3	0.46	0.25
0053	P0	10' X 6' RCB	1345	258	DNW78-C	LOWER3	0.24	0.25
MOKY		MOCCASIN - KYLE CANYON BRANCH						
0000	P1	2: 13' X 5' RCB	4120	1205	CNW50-E	LOWER3	1.06	0.40
0078	P0	2: 13' X 7' RCB	965	1205	CNW50-E	LOWER3	1.06	0.40
0095	P0	2: 13' X 7' RCBC @ US 95	210	1066	CNW35-C	LOWER3	0.89	1.70
0100	P0	2: 13' X 7' RCB	1515	1066	CNW35-C	LOWER3	0.89	0.40
MORC		RANCHO/MOCCASIN						
0000	P0	Conc Chnl 34"W 13"D 0:1 SS	3700	11711	C213B-5	LOWER5	65.23	1.00
MOSM		MOCCASIN AND SHEEP MOUNTAIN PARKWAY						
0000	P1	12' X 9' RCB	6530	3751	CNW50-W	LOWER3	4.10	3.06
TSDB		TULE SPRINGS DRAINAGE SYSTEM						
0023	P1	84" RCP	1320	376	CNW148-C	WEST3	0.52	0.80
0059	P1	78" RCP	2640	376	CNW148-C	WEST3	0.52	1.03
UPEA		UPPER LAS VEGAS WASH - EAST						
0100	P0	Transition Structure	315	4132	2C125B-5	LOWER4	10.83	0.25
0105	P0	Conc Chnl 60"W 6.5"D 4:1 SS	787	4132	2C125B-5	LOWER4	10.83	0.25
0106	P0	Unlined Levee 6.5'	787	4132	2C125B-5	LOWER4	10.83	2.47
0120	P0	Conc Chnl 60"W 5"D 4:1 SS	3318	4132	2C125B-5	LOWER4	10.83	3.61
0121	P0	Unlined Levee 6'	2831	4132	2C125B-5	LOWER4	10.83	3.36
0140	P0	Unlined Levee 8'	6050	1925	C117	LOWER3	3.87	2.39
0141	P0	Unlined Levee 8'	4100	3284	C125B-5	LOWER3	6.97	0.90
0151	P0	Conc Chnl 50'-60"W 5"D 4:1 SS	469	1925	C117	LOWER3	3.87	2.64
0152	P0	Conc Chnl 50"W 5"D 4:1 SS	4330	3284	C125B-5	LOWER3	6.97	0.90
0160	P0	Conc Chnl 50"W 5"D 4:1 SS	5614	1925	C117	LOWER3	3.87	2.24
UPWE		UPPER LAS VEGAS WASH - WEST						
0000	E	Floodway	30000	14272	2C116-7	LOWER5	105.83	1.30
0424	P0	Riprap Levee 11.5'	12725	5837	C126B-2	SHEEP5	30.77	1.30
0436	P0	3,385 ac-ft Northwest Detention Basin	16866		NWDBIN	NWDB5	199.98	
0447	P0	Riprap Chnl 200"W 5"D 3:1 SS	12740	5837	C126B-2	SHEEP5	30.77	1.00

* 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.
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^ 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).



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FACILITY INVENTORY
FIGURE F - 8

LEGEND	ID (Facility Identifier)	AABB	Existing Facility..... E	Construction Features			
	Parent Stream Name		Proposed or Modified Facility..... P	Bottom Width..... W	Cast in Place Concrete Pipe..... CIPCP	Reinforced Concrete Arch Culvert..... RCAC	
	Stream Name		Contingency Level		Corrugated Metal Arch Pipe Culvert..... CMAP	Reinforced Concrete Box..... RCB	
	River Mile	0000	Category B..... P0	Depth..... D	Corrugated Metal Pipe Culvert..... CMPC	Reinforced Concrete Box Culvert..... RCBC	
	Distance Above Confluence with Parent Stream (Miles)		Master Plan..... P1		High Density Polyethylene..... HDPE	Reinforced Concrete Pipe..... RCP	
	Miles in Hundredths		Preliminary Design..... P2	Side Slope, H:V..... SS	Horizontal Elliptical Reinforced Concrete Pipe..... HERCP	Reinforced Concrete Pipe Culvert..... RCPC	
			Design..... P3		Reinforced Concrete Arch Pipe..... RCAP	Storm Sewer Pipe..... SSP	



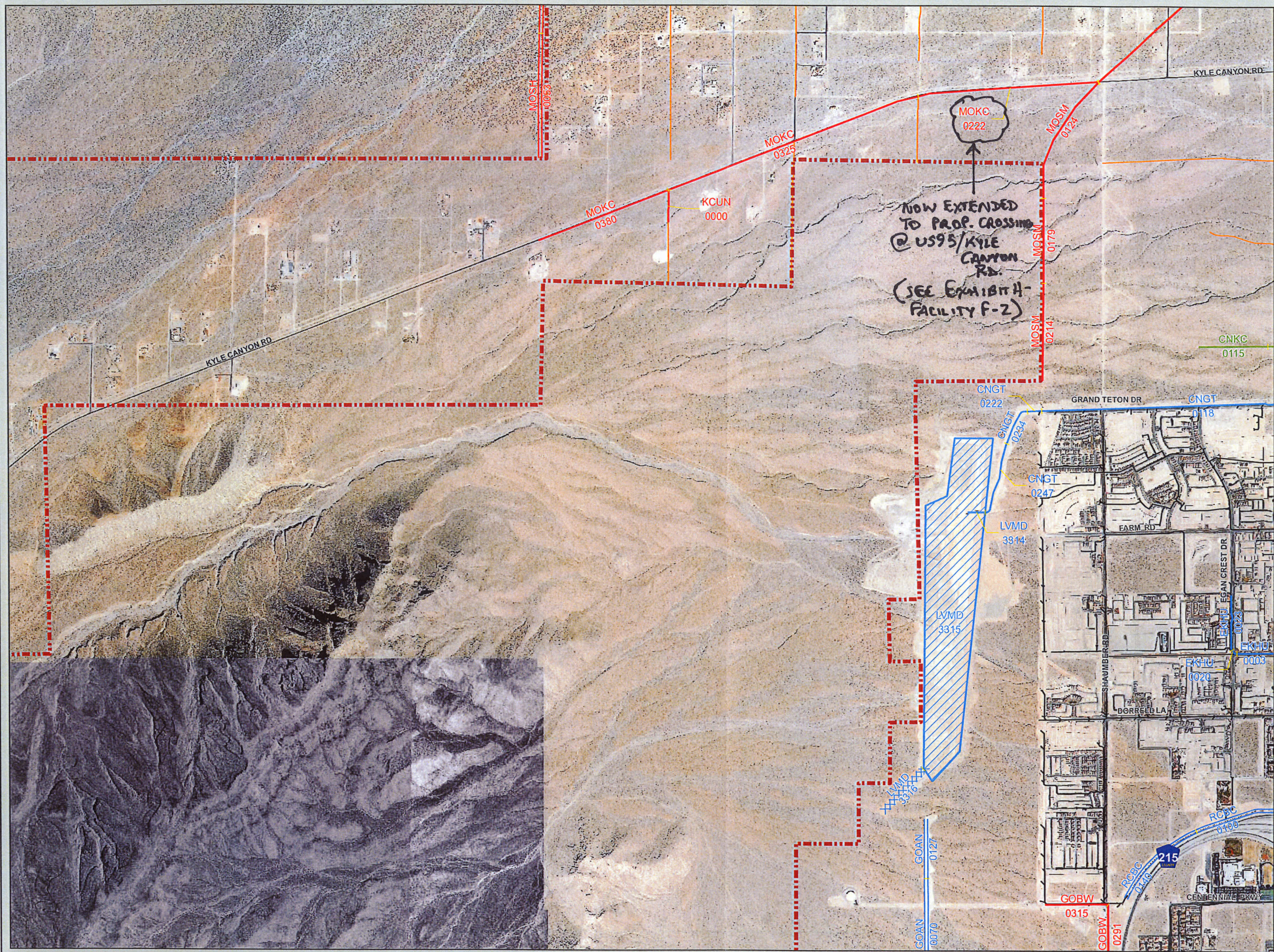
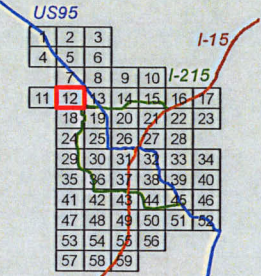
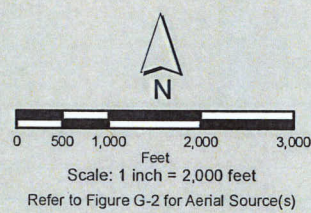


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FIGURE F-12
FLOOD CONTROL FACILITIES

LEGEND

- Ultimate Development Boundary
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Local Existing Facilities
- Local Proposed 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 |



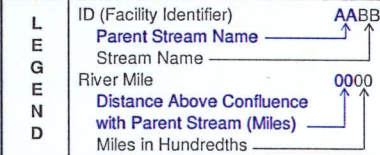
ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
CNGT 0118	E	CENTENNIAL PKWY CHANNEL WEST / GRAND TETON BRANCH	5472	363	KYLEDET*	KYLED8	57.73	3.72
0222	E	6' X 5' RCAP	305	363	KYLEDET	KYLED8	57.73	1.16
0234	E	6' X 6' RCAP	885	363	KYLEDET	KYLED8	57.73	4.50
0247	E	6' X 5' RCAP	1600	363	KYLEDET	KYLED8	57.73	1.63
CNKC 0115	P0	CENTENNIAL PKWY CHANNEL WEST / KYLE CANYON BRANCH	1513	452	NW45-S	WEST3	0.27	3.00
EKHU 0003	E	ELKHORN AND HUALAPAI	980	638	CNW26-C	WEST3	0.51	3.61
0020	E	6' X 4' RCAP	150	638	CNW26-C	WEST3	0.51	3.61
0023	E	6' X 5' RCAP	1200	638	CNW26-C	WEST3	0.51	0.90
GOAN 0070	E	GOWAN ANN ROAD DETENTION BASIN FACILITIES	3125	1045	CCAMDK3	ALLGOW3	0.65	3.00
0127	E	Soil Cement Chnl 10'W 4'-7'D 4:1 SS	1292	531	CAMDK3	ALLGOW3	0.32	1.73
GOBW 0291	P2	GOWAN BELTWAY WEST	1255	795	CMNA2	ALLGOW3	0.49	1.70
0315	P1	6' X 6' RCB	1360	591	CDMNA3	ALLGOW3	0.35	4.00
KCUN 0000	P1	KYLE CANYON AND UNKNOWN	685	751	CNW1-C	LOWER3	0.69	2.20
LVMD 3313	E	LAS VEGAS WASH - MIDDLE		120000	KYLED8	KYLED8	57.73	
3314	E	120,000 cfs PMF Spillway	385	363	KYLEDET	KYLED8	57.73	
3315	E	78" RCP Outlet		13554	KYLED8	KYLED8	57.73	
3316	E	3,200 ac-ft Kyle Canyon Detention Basin	1250	13554	KYLED8	KYLED8	57.73	3.00
3316	E	Riprap Levee (South) 5'						
MOKC 0222	P1	MOCCASIN AND KYLE CANYON	3900	2192	CNW-7	LOWER3	2.19	3.46
0325	P1	9' X 8' RCB	5700	2192	CNW-7	LOWER3	2.19	3.65
0380	P1	90" RCP	3000	1146	COFF5-1	LOWER3	1.02	3.73
MOSH 0000	P1	MOCCASIN AND SHEEP MOUNTAIN	2640	1963	COFF1A-6	LOWER3	3.70	2.71
0053	P1	Conc Chnl 12'W 7.5'D 0:1 SS	2640	1758	COFF2B	LOWER3	3.23	1.39
MOSM 0000	P1	MOCCASIN AND SHEEP MOUNTAIN PARKWAY	6530	3751	CNW50-W	LOWER3	4.10	3.06
0124	P1	12' X 9' RCB	2890	1587	CNW21-C	LOWER3	1.69	2.40
0179	P1	12' X 6' RCB	1820	1096	COFF8	LOWER3	1.18	2.12
0214	P1	9' X 6' RCB	2088	646	COFF9	LOWER3	0.88	2.21
RCBC 0100	E	RANCHO ROAD SYSTEM - BELTWAY CHANNEL	2085	598	CDMNA1	WEST3	0.48	2.88
0140	E	Conc Chnl 12'W 5.5'D 0:1 SS	2155	598	CDMNA1	WEST3	0.48	1.65
	E	Conc Chnl 10'W 5'D 0:1 SS						

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FACILITY INVENTORY
FIGURE F - 12



Existing Facility.....	E
Proposed or Modified Facility.....	P
Contingency Level	
Category B.....	P0
Master Plan.....	P1
Preliminary Design.....	P2
Design.....	P3

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

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



