



TECHNICAL DRAINAGE STUDY UPDATE NO.2

Sunstone Phase 1 Infrastructure

JULY 2021

PREPARED FOR:
Eastland Company, LLC
Las Vegas, NV

PREPARED BY:
Westwood

Sunstone Phase 1 Infrastructure

Technical Drainage Study Update No. 2

City of Las Vegas, Nevada

Prepared For:

Eastland Company, LLC
9275 Russell Road, Suite 400
Las Vegas, NV 89148
Phone: 702-736-9100 Fax: 702-736-9200

Prepared By:

Westwood Professional Services
5725 W. Badura Avenue, Suite 100
Las Vegas, NV 89118
Phone: (702) 284-5300
Fax: (702) 284-5339



Project Number: EST1905.000
Date: July 2021

Lant Leavitt, P.E.
NV Professional Engineer No. 18287
Assisted by: Caitlyn Alcantara, E.I.

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Sunstone Phase 1 Infrastructure Update No. 2 Date: 7/15/2021
Location of Development: a) Descriptive (Cross Streets): North/South: Kyle Canyon Road
East/West: US 95
b) Section: 6 & 7 Township: 19 S. Range: 60 E.
c) APN: 125-06-501-001, 125-06-701-001 & 125-07-501-005

Name of Owner: Eastland Company, LLC
Telephone No.: (702) 736-9100 Fax No.: (702) 736-9200 E-mail Address: Efrain.Balisan@Lennar.com
Address: 9275 W. Russell Road, Suite 400 Las Vegas, NV 89148

Contact Person – Name: Lant Leavitt Telephone No.: (702) 284-5300
*E-mail Address: Lant.Leavitt@westwoodps.com Fax No.: (702) 284-5399
Firm: Westwood Professional Services
Address: 5740 S. Arville #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	☐

1. Total Owned Land Area: At Site: approx 600 acres Being Developed/Disturbed: approx 10 acres
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.): Master planned community infrastructure improvements
5. Approximate upstream land area which drains to the subject site: approximately 7.8 square miles
6. Has the site drainage been evaluated in the past? ☒ Yes** ☐ No If yes, please identify documentation: Skyy Canyon Master Drainage Study Update #5 (Sunstone MDS), CLV# DS5081

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Moccasin Regional Storm Drain Facility,
Iron Mountain Road, Brent Lane

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



Engineer's Seal

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

*Newly Required Field

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

Local Entity File No.	Revision	Date

REFERENCE:

STANDARD FORM 1

Updated 05/01/2008

EST1905.000

July 15, 2021

City of Las Vegas
495 S. Main Street
1st Floor
Las Vegas, Nevada 89101

Subject: Technical Drainage Study Update No. 2 for Sunstone Phase 1 Infrastructure

Mr. Sung:

This letter certifies that all items provided on electronic submittal CD matches 100% of the *Technical Drainage Study Update No. 2 for Sunstone Phase 1 Infrastructure* bound paper version.

Respectfully Submitted,
WESTWOOD PROFESSIONAL SERVICES



Caitlyn Alcantara, E.I.
Graduate Engineer – Water Resources Department

EST1905.000

July 15, 2021

City of Las Vegas
495 S. Main Street
1st Floor
Las Vegas, Nevada 89101

**Subject: Technical Drainage Study Update No. 2 for
Sunstone Phase 1 Infrastructure (DS5135)**

Mr. Sung:

Submitted for your review is this Technical Drainage Study Update No. 2 for Sunstone Phase 1 Infrastructure (hereinafter referred to as the Update 2 Study). The original Technical Drainage Study for Sunstone Phase 1 Infrastructure (hereinafter referred to as the Original Study) prepared by Slater Hanifan Group (SHG) was conditionally approved by the City of Las Vegas (City) on September 9, 2019. The Original Study addressed the development of roadway and infrastructure improvements intended to support the development of the Phase 1 area in the Sunstone master planned development. An update (hereinafter referred to as the Update Study) prepared by Westwood was conditionally approved by the City of Las Vegas on May 15, 2020. The update addressed further coordination with the submittal of the improvement plans which revealed a conflict with the proposed sewer line in Log Cabin Way at Skye Canyon Park Drive and the profile of the proposed storm drain. The Update Study provided revised storm drain computations to accommodate for the utility conflict. The approval letters for the Original Study and the Update Study are provided in Appendix A.

Purpose: The purpose of this Update 2 Study is to provide hydraulic analysis of revisions due to conflicts in design for two areas: storm drain within Moccasin Road and a lateral within Sky Pointe Drive.

Storm Drain Alignment in Moccasin Road

Upon construction of the regional storm drain within Moccasin Road, the existing point of connection to the Moccasin facility west of the intersection of Skye Canyon Park Drive and Moccasin Road was located several feet southwest of the anticipated location. The proposed storm drain within Moccasin Road therefore has been revised to match the existing point of connection. This change affects two lengths of pipe and two manhole inverts (SDMH#19 & #20) within the Moccasin storm drain alignment.

Lateral in Sky Pointe Drive

Due to a conflict with an existing NV Energy utility, the invert to SDDI#5 been raised to allow for a 12" clearance. Note that the downstream invert, flow, and length of the pipe has not been revised.

Hydraulics: The WSPGW model (NRC3.WSW) for the storm drain revision and the lateral loss computation for SDDI#5 has been revised and is included in Appendix B. Markups of the original approved drainage plans are provided in Appendix A to illustrate the changes proposed with this Update 2 Study. Note that within the Moccasin Road storm drain revision the flow in the storm drain system has not changed and the hydraulic grade line and velocity only changed for the two pipes and the revised connection stub. The proposed storm drain hydraulic changes are relatively minimal and still meet original requirements for the storm drain including maintaining the HGL at least 1-ft below finished grade and not increasing the amount of sacrificial concrete already proposed.

Conclusion: This Update 2 Study provides hydraulic analysis of changes to the conditionally approved storm drain facilities in Moccasin Road and Sky Pointe Drive. Required storm drain hydraulic criteria are still met with the profile changes, and the proposed facilities conform to the requirements of the Original Study. In addition, this Update 2 Study and the proposed improvements are in conformance with the following:

- This project is in compliance with all the applicable drainage laws as recognized by the state of Nevada as well as all the applicable design standards stipulated in the CCRFCD “Hydrologic Criteria and Drainage Design Manual”.
- This project is in compliance with the 2018 CCRFCD “Master Plan Update.”
- The entire project site is located outside of the FEMA designated Special Flood Hazard Area (SFHA). The site and the proposed improvements are located within a FEMA flood Zone “X” (unshaded). Therefore, notification and/or coordination with FEMA are not required for this project.

The revised improvement plans are included with this submittal to support the conclusions detailed in this study. If you have any questions or require additional information, please contact us at (702) 284-5300.

Respectfully Submitted,
WESTWOOD PROFESSIONAL SERVICES



Caitlyn Alcantara, E.I.
Water Resources Department

Pc: Lant Leavitt, P.E.
Mark Failla, P.E., CFM
Joshua Johnson, P.E.

List of Appendices

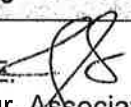
- Appendix A Reference Material**
Technical Drainage Study & Update Sunstone Phase 1 Infrastructure
(DS5135)
- Approval Letters
 - Referenced Hydraulic Analyses
 - Referenced Improvement Plans (with clouded revisions)
- Appendix B WSPGW Hydraulic Analyses**
- Appendix C Improvement Plans & CD of Electronic Files (PDF)**

APPENDIX A

Reference Material

Technical Drainage Study & Update Sunstone Phase 1 Infrastructure
(DS5135)

Approval Letters

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM		DATE: September 9, 2019
TO: Land Development Services Department of Public Works		FROM: Jennifer Shinn, P.E.  Flood Control, Engr. Associate Department of Public Works
SUBJECT:	Drainage Study for:	
SUNSTONE - Phase 1 Infrastructure		COPIES TO:
Cross Streets:	Fort Apache Road & Moccasin Road	Slater Hanifan Group
File Number:	F:\PW_Flood\DSMEMOS\DS5135B.docx	Eastland Co., LLC
Parcel Number:	125-06-501-001	Bart Anderson, P.E., DevCo
Zoning Action:	Eastland Development Agreement	CCRFC
FEMA Flood Zone	YES NO X	CCPW
Proposed Storm Drain	YES X NO	NDOT
		NV Energy

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1 st Submittal	5/6/2019	6/24/2019	See Comments Below	\$400.00	3122585: \$400
2 nd Submittal	8/8/2019	9/5/2019	See Comments Below	\$400.00	3524616: \$400
TOTAL FEES (LDDRS):				\$800.00	----

REMARKS: SUNSTONE – Phase 1 Infrastructure Improvements as well as the Master Study (DS5081) are predicated upon the completion of the ultimate condition offsite drainage facilities impacting the SUNSTONE development being in place prior to issuance of certificates of occupancy. Permits for development within Designated Builder Parcels shall not be issued if the associated Master Plan facilities are not under construction.

*****The Conditional Approval of this Drainage Study is to allow the engineer/developer to submit the Improvement Plans to Land Development only.**

*****Do not submit the Drainage Study to Clark County Regional Flood Control District (CCRFC) prior to the Structural Design and Calculations being approved by the City Building & Safety Department.**

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:
X	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
X	is conditionally approved subject to Nevada Department of Transportation concurrence.

The SUNSTONE – Phase 1 Infrastructure includes storm drain facilities that are sized based upon the design parameter of US-95 being a flow cut-off. **This Study assumes ultimate condition offsite drainage facilities impacting the SUNSTONE development will be in place prior to issuance of certificates of occupancy.** The ultimate condition infrastructure drainage facilities that are assumed to be in place include:

- The Moccasin Master Plan Regional Facility – Upper Las Vegas Wash to west of US-95. This includes the Interim Collection Facility west of US-95.
- Skye Canyon Detention Basin #2.
- Skye Canyon Phase 3A regional Facility – Skye Canyon Park Dr. to Iron Mountain Rd.
- The US-95 Local Facility – Brent Lane to Kyle Canyon Interchange. This connects into the existing MPU Facility along US-95.

The construction of these Ultimate Facilities will make the west side of US 95 a 100-yr cutoff through the reach south of the Moccasin Master Plan Regional Facility crossing, thereby meeting the full intent of the CCRFCD Master Plan.

Changes and timing of the corresponding infrastructure improvements that protect the SUNSTONE Development shall require Updating the Master Drainage Study Phasing.

1. The SUNSTONE - Phase 1 Infrastructure Improvements include the following roadways:
 - Sky Point Drive (Edgestone Dr.) – Log Cabin to Hualapai
 - Log Cabin Way (Sunstone Parkway) – US-95 to Skye Canyon Park Dr.
 - North Connector (Sunbridge Point Dr.) – Log Cabin to Moccasin
 - Skye Canyon Park Drive (Sun Park Dr.) – Iron Mountain to Log Cabin
 - O'Hare Road – Log Cabin to Skye Canyon Park Dr.
 - South Park – (Entry Roads 1 & 2) adjacent to the South Park
2. **This drainage study is acceptable in concept;** however, *City of Las Vegas* will not formally accept the study until the *Clark County Regional Flood Control District (CCRFCD)* has issued a letter of concurrence. The engineer should contact the CCRFCD to confirm that they have begun their review.
3. The Storm Drain System design includes lateral stubs at most Designated Builder Parcels that will convey the 100-year Ultimate flows from each parcel. Technical Drainage Studies are required for each of the Designated Builder Parcels and shall provide on-site collection for the 100-year facilities
4. 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 Phase 1 Infrastructure Drainage Study.
5. Structural plans for the storm drain improvements including special junction structures and deep manholes must be submitted for review. Provide a soils report, structural calculations and specifications, two wet stamped structural sets, and a grading plan to the Building Department for processing. The engineer must provide a copy of Building Department approval of the structures to *Flood Control* prior to final acceptance of the drainage study.
6. The engineer must provide a table on the Grading Plans that show a quantity estimate of all drainage improvements within Public Drainage Easements and Public Right-of-Way. All drainage improvements within Public Drainage Easements and Right-of-Way must be bonded and inspected.
7. Final approval of the Master Drainage Study shall be obtained prior to final approval of the subject infrastructure drainage study.
8. Technical drainage studies are required for each of the Designated Builder Parcels. The technical drainage studies for the Designated Builder Parcels shall not be submitted until the conditional approval of the pertinent infrastructure drainage study is obtained. Final approval for the infrastructure drainage study shall be obtained prior to conditional approval of the impacted Builder Parcels drainage studies.
9. Building permits for the homes within the individual Designated Builder Parcels shall not be issued until construction of the street and flood control infrastructure around the Designated Builder Parcels is substantially complete or interim protection is provided per the approved technical drainage study.

10. The interim channels adjacent to the infrastructure roadways are the Maintenance responsibility of the Master Developer.
11. Provide a legal description of the proposed drainage facilities located outside of dedicated public right-of-way prior to recordation of the parent final map.
12. The project proposes to build temporary drainage facilities including drainage berms/swales over the *Phase 1 Infrastructure* site. Interim drainage facilities are normally shown on the Improvement Plans, bonded for construction, and bonded under a separate Maintenance Agreement. As an alternative to including interim drainage improvements that are privately maintained as a part of the *Phase 1 Infrastructure*, and prior to the final plan approval for each set of improvement plans that will be bonded separately, the Improvement Plans shall show concrete pads and rip-rap berms at the culvert stubs for interim flows, and the developer must complete a ***Maintenance and Liability Agreement*** and bond for 100% of the costs. The Maintenance Bond shall include exhibits showing the interim drainage improvements at each culvert and the associated costs to complete the improvements. This shall be in the form of a 50% cash bond and a 50% standard bond for Maintenance. The cash bond gives the City the ability to perform work and draw down funds as needed in the interim condition. The engineer must submit an estimate of the quantities for the construction of the facilities and an exhibit that adequately shows the location and limits of the drainage facilities to *City Flood Control* for approval. Once the drainage study is conditionally approved, the engineer/developer should contact the *City's Land Development Section (702-229-6371)* to begin the agreement process.

In order for the maintenance bond to be released in the future, a drainage update/letter will be required to justify that the berms/swales are no longer necessary and can be removed.

A. Skye Point Drive Improvement Plans:

General: Provide references to Storm Drain Note call outs on all SD Sheets. Review and revise Storm Drain Notes and call outs for all lateral end sections and connections to existing storm drain systems.

SD-5: Provide pothole information all Lateral Profiles (e.g. Depth = Unknown). Identify and label utilities on Lateral Profile Sheets. Lateral Profile 4: The proposed 24" storm drain has velocities above 25 fps. Clearly identify where the velocity is above 25 fps. Detail mitigation measure for the velocity impact and note such on the profile Sheets.

B. Skye Canyon Park Drive Improvement Plans:

General: Complete the Flood Zone Block (Cover Sheet) and Flood Certification Block on PP and SD Sheets.

SD-4 and SD-5: Revise the plans to reflect removal of the existing 36" storm drain within Public Right-of-Way.

C. Log Cabin Way Improvement Plans:

General: Complete the Flood Zone Block (Cover Sheet) and Flood Certification Block on PP and SD Sheets.

SD-1: Provide pothole information all Lateral Profiles (e.g. Depth = Unknown).

SD-2: Provide call out for inlet type within Roundabout and call out reference to mainline connection detail.

SD-4 and SD-5: Call out Public Drainage Easements where the proposed storm drain crosses the common lot.

SD-9: Identify and label utilities shown on Lateral Profiles 12 and 18. Provide drop inlet information on Lateral Profile 18.

G-1 and G-2: Provide lengths of End Sections #2 and #5.

D. North Collector Road Improvement Plans:

General: Complete the Flood Zone and Flood Certification Blocks on PP and SD Sheets.

Sheet SD-5: Label the invert at the entrance of the 6' x 6' RCB on the profile. Call out storm drain manhole at Junction Structure. Revise Q100 labels to match WSPG model.

Sheet SD-6 through SD-9: The proposed 60" storm drain has velocities above 25 fps. Clearly identify where the velocity is above 25 fps. Detail mitigation measure for the velocity impact and note such on the profile Sheets.

Sheet SD-10: Label utilities shown on Lateral Profiles. Revise HGL shown below the invert of the pipe in Lateral Profile 4.

E. O'Hare Road Improvement Plans:

General: Review and revise Storm Drain Notes and call outs for all lateral end sections and connections to existing storm drain systems.

SD-3 and SD-4: Revise the storm drain size call outs to match between Plan and Profile. Review and revise the Storm Drain Note call outs for the drop inlets and storm drain manholes.

SD-5: The proposed 30" storm drain has velocities above 25 fps. Clearly identify where the velocity is above 25 fps. Detail mitigation measure for the velocity impact and note such on the profile Sheets.

F. Private Entry 1 and 2 Improvement Plans:

General: Complete the Flood Zone and Flood Certification Blocks on PP and SD Sheets.

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
PBJ

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

REGIONAL FLOOD CONTROL DISTRICT



Steven C. Parrish, P.E.
General Manager/Chief
Engineer

BOARD OF DIRECTORS

Lawrence L. Brown, III
Chair
Clark County

Mayor Debra March
Vice-Chair
City of Henderson

George Gault
City of Mesquite

James B. Gibson
Clark County

Mayor Carolyn Goodman
City of Las Vegas

Stavros Anthony
City of Las Vegas

Isaac Barron
City of North Las Vegas

Mayor Kiernan McManus
City of Boulder City

March 26, 2020

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

**DISTRICT CONCURRENCE: SUNSTONE - PHASE I
INFRASTRUCTURE
(DS5135B) (RFCD No. 20-12445)**

Dear Mr. Kwon:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated May 6, 2019, Addendum No. 1 dated August 8, 2019, and Addendum No. 2 dated March 18, 2020 for above-mentioned project as submitted by SLATER HANIFAN GROUP. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas Department of Public Works dated March 24, 2020.

District concurs with acceptance of this Technical Drainage Study by City of Las Vegas Department of Public Works with the following condition(s):

Note that per District's Policies and Procedures Manual, Section VIII.D.13 Uniform Regulations for the Control of Drainage, the Lead Entity shall provide As-Built plans or record drawings to the District after completion and final inspection of such privately installed flood control facilities that have a regional flood control significance.

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*.



Mr. Oh Sang Kwon, P.E.
March 26, 2020
Page 2

Please be aware that as additional information becomes available and/or restudies of Flood Insurance Studies are performed, information submitted by SLATER HANIFAN GROUP 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.

STEVEN C. PARRISH, P.E.
General Manager/Chief Engineer

BY:


Ching C. Wang, P.E.
Senior Civil Engineer

CCW:jb

c: Lant K. Leavitt, P.E., Slater Hanifan Group

P:\Letters and Memos\Local Drainage\Land Development & Drainage\2020\L-20-12445as_built.doc



STEVE SISOLAK
Governor

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
1263 S. Stewart Street
Carson City, Nevada 89712

KRISTINA L. SWALLOW, P.E., *Director*

In Reply, Refer to:

October 22, 2019

Lant K. Leavitt, P.E.
5740 S. Arville St., Suite 216
Las Vegas, NV 89118

TECHNICAL DRAINAGE STUDY
Sunstone Drainage Study Ph 1 Infrastructure
Clark County

Dear Mr. Leavitt:

The Nevada Department of Transportation (NDOT) Hydraulics Section has received and reviewed the following document(s) for the above-referenced project.

Document:	Dated:
Transmittal Letter from Lant K. Leavitt, P.E., SHG	May 6, 2019
City of Las Vegas Inter-Office Memorandum	Sept. 9, 2019
Technical Drainage Study Sunstone Phase 1 Infrastructure, stamped by Lant K. Leavitt, P.E.	May 6, 2019
Technical Drainage Study Addendum Sunstone Phase 1 Infrastructure, stamped by Lant K. Leavitt, P.E.	Aug. 8, 2019
Improvement Plans for Log Cabin, Skye Pointe Drive, Skye Canyon Park, OHare, Entry Roads, IM and TP and North Connector, all stamped by Joshua L. Johnson on May 5, 2019.	May 5, 2019

The drainage design information presented in the reviewed document(s):

X	is acceptable in concept. Final Hydraulic Section approval will be based on review of final design documents submitted with the NDOT Right-Of-Way Occupancy Permit application that must be submitted for this project.
	is acceptable in concept. Final Hydraulic Section approval will be based on review of final design documents submitted with the NDOT Right-Of-Way Occupancy Permit application that must be submitted for this project. The following comments should be addressed with the permit application:
	must be supplemented or modified to satisfy the following comment(s) before preliminary Hydraulic Section approval can be granted:

All submittals regarding this project must be forwarded through (or copied to) the local NDOT District permitting office. All pertinent drainage design documents (including those previously submitted for preliminary review) must be submitted to the local NDOT District permitting office with the Right-Of-Way Occupancy Permit Application. All plans and reports must be signed and stamped by a Nevada registered civil engineer.

No liability is assumed by the Department in performing this review. Verification and acceptance of all background information, design data and conclusions is the responsibility of the consulting engineer.

Please call me at (775) 888-7621 should you have any questions.

Sincerely,

A handwritten signature in dark ink, appearing to read "Brian A. Matthews". The signature is fluid and cursive, with the first name "Brian" and last name "Matthews" clearly distinguishable.

Brian A. Matthews, P.E.
Professional Engineering Specialist

c: Charles Molisee, District I Permits
Mike Alameda, Associate Engineer Right of Way Carson City
Linda Olguin, District I Permits
Mario Gomez, District 1 Assistant Engineer
Michael Yates, District 1 Assistant Engineer
Dave Facemyer, LV Permits

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: May 15, 2020
TO: Land Development Services Department of Public Works			FROM: Jennifer Shinn, P.E. Flood Control, Engr. Associate Department of Public Works
SUBJECT:	Drainage Study for:		COPIES TO:
SUNSTONE - Phase 1 Infrastructure Update #1			Slater Hanifan Group
Cross Streets:	Fort Apache Road & Moccasin Road		Eastland Co., LLC
File Number:	F:\PW_Flood\DSMEMOS\DS5135C.docx		Bart Anderson, P.E., DevCo
Parcel Number:	125-06-501-001		CCRFC
Zoning Action:	Eastland Development Agreement		CCPW
FEMA Flood Zone	YES	NO X	NDOT
Proposed Storm Drain	YES X	NO	NVEnergy

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1 st Submittal	5/6/2019	6/24/2019	See Comments Below	\$400.00	3122585: \$400
2 nd Submittal	8/8/2019	9/5/2019	See Comments Below	\$400.00	3524616: \$400
3 rd Submittal	2/4/2020 & 4/15/2020	3/3/2020 & 5/15/2020	Conditionally Approved	\$100.00	3732002: \$100
TOTAL FEES (LDDRS):				\$900.00	----

REMARKS:

3rd Submittal: Update #1 to revise storm drain to avoid conflict with future sewer.

SUNSTONE – Phase 1 Infrastructure Improvements as well as the Master Study (DS5081) are predicated upon the completion of the ultimate condition offsite drainage facilities impacting the SUNSTONE development being in place prior to issuance of certificates of occupancy. Permits for development within Designated Builder Parcels shall not be issued if the associated Master Plan facilities are not under construction.

*****The Conditional Approval of this Drainage Study is to allow the engineer/developer to submit the Improvement Plans to Land Development only.**

*****Do not submit the Drainage Study to Clark County Regional Flood Control District (CCRFC) prior to the Structural Design and Calculations being approved by the City Building & Safety Department.**

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:
X	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is conditionally approved subject to Nevada Department of Transportation concurrence.

The comments below pertain to the original study Conditionally Approved by the City of Las Vegas and will remain until fully addressed and concurrence letters are provided.

The SUNSTONE – Phase 1 Infrastructure includes storm drain facilities that are sized based upon the design parameter of US-95 being a flow cut-off. **This Study assumes ultimate condition offsite drainage facilities impacting the SUNSTONE development will be in place prior to issuance of certificates of occupancy.** The ultimate condition infrastructure drainage facilities that are assumed to be in place include:

- The Moccasin Master Plan Regional Facility – Upper Las Vegas Wash to west of US-95. This includes the Interim Collection Facility west of US-95.
- Skye Canyon Detention Basin #2.
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The construction of these Ultimate Facilities will make the west side of US 95 a 100-yr cutoff through the reach south of the Moccasin Master Plan Regional Facility crossing, thereby meeting the full intent of the CCRFCD Master Plan.

Changes and timing of the corresponding infrastructure improvements that protect the SUNSTONE Development shall require Updating the Master Drainage Study Phasing.

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 - Skye Canyon Park Drive (Sun Park Dr.) – Iron Mountain to Log Cabin
 - O'Hare Road – Log Cabin to Skye Canyon Park Dr.
 - South Park – (Entry Roads 1 & 2) adjacent to the South Park
2. **This drainage study is acceptable in concept;** however, *City of Las Vegas* will not formally accept the study until the *Clark County Regional Flood Control District (CCRFCD)* has issued a letter of concurrence. The engineer should contact the CCRFCD to confirm that they have begun their review.
3. The Storm Drain System design includes lateral stubs at most Designated Builder Parcels that will convey the 100-year Ultimate flows from each parcel. Technical Drainage Studies are required for each of the Designated Builder Parcels and shall provide on-site collection for the 100-year facilities
4. 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 Phase 1 Infrastructure Drainage Study.
5. Structural plans for the storm drain improvements including special junction structures and deep manholes must be submitted for review. Provide a soils report, structural calculations and specifications, two wet stamped structural sets, and a grading plan to the Building Department for processing. The engineer must provide a copy of Building Department approval of the structures to *Flood Control* prior to final acceptance of the drainage study.
6. The engineer must provide a table on the Grading Plans that show a quantity estimate of all drainage improvements within Public Drainage Easements and Public Right-of-Way. All drainage improvements within Public Drainage Easements and Right-of-Way must be bonded and inspected.

7. Final approval of the Master Drainage Study shall be obtained prior to final approval of the subject infrastructure drainage study.
8. Technical drainage studies are required for each of the Designated Builder Parcels. The technical drainage studies for the Designated Builder Parcels shall not be submitted until the conditional approval of the pertinent infrastructure drainage study is obtained. Final approval for the infrastructure drainage study shall be obtained prior to conditional approval of the impacted Builder Parcels drainage studies.
9. Building permits for the homes within the individual Designated Builder Parcels shall not be issued until construction of the street and flood control infrastructure around the Designated Builder Parcels is substantially complete or interim protection is provided per the approved technical drainage study.
10. The interim channels adjacent to the infrastructure roadways are the Maintenance responsibility of the Master Developer.
11. Provide a legal description of the proposed drainage facilities located outside of dedicated public right-of-way prior to recordation of the parent final map.
12. The project proposes to build temporary drainage facilities including drainage berms/swales over the *Phase 1 Infrastructure* site. Interim drainage facilities are normally shown on the Improvement Plans, bonded for construction, and bonded under a separate Maintenance Agreement. As an alternative to including interim drainage improvements that are privately maintained as a part of the *Phase 1 Infrastructure*, and prior to the final plan approval for each set of improvement plans that will be bonded separately, the Improvement Plans shall show concrete pads and rip-rap berms at the culvert stubs for interim flows, and the developer must complete a ***Maintenance and Liability Agreement*** and bond for 100% of the costs. The Maintenance Bond shall include exhibits showing the interim drainage improvements at each culvert and the associated costs to complete the improvements. This shall be in the form of a 50% cash bond and a 50% standard bond for Maintenance. The cash bond gives the City the ability to perform work and draw down funds as needed in the interim condition. The engineer must submit an estimate of the quantities for the construction of the facilities and an exhibit that adequately shows the location and limits of the drainage facilities to *City Flood Control* for approval. Once the drainage study is conditionally approved, the engineer/developer should contact the *City's Land Development Section* (702-229-6371) to begin the agreement process.

In order for the maintenance bond to be released in the future, a drainage update/letter will be required to justify that the berms/swales are no longer necessary and can be removed.

A. Skye Canyon Park Drive Improvement Plans:

SD-Sheets: Label the proposed sewer and water lines on the profiles (typ)

SD-3: Label water crossing at approximate Station 29+85. With clearance of 0.7', verify if storm drain must be C900.

B. O'Hare Road Improvement Plans:

SD-Sheets: Label the proposed sewer and water lines on the profiles (typ)

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
PBJ/JKS

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

Caitlyn Alcantara

From: Lant Leavitt
Sent: Friday, March 27, 2020 10:13 AM
To: Efraim Balizan
Subject: FW: SUNSTONE - PHASE I INFRASTRUCTURE
Attachments: 20-12445.pdf

Lant Leavitt

Project Manager II

lant.leavitt@westwoodps.com

direct (702) 284-5360
main (702) 284-5300

Westwood

5740 S. Arville Street, Suite 216
Las Vegas, NV 89118

westwoodps.com
(888) 937-5150

From: Lant Leavitt
Sent: Thursday, March 26, 2020 2:16 PM
To: Mark Failla <Mark.Failla@westwoodps.com>; Josh Johnson <Josh.Johnson@westwoodps.com>; Rhonda Miller <Rhonda.Miller@westwoodps.com>; Chelsea Jensen <Chelsea.Jensen@westwoodps.com>; Thomas Dyson <Thomas.Dyson@westwoodps.com>
Subject: FW: SUNSTONE - PHASE I INFRASTRUCTURE

Regional concurrence received for Sunstone Phase I Infrastructure TDS.

Thanks,

Lant Leavitt

Project Manager II

lant.leavitt@westwoodps.com

direct (702) 284-5360
main (702) 284-5300

Westwood

5740 S. Arville Street, Suite 216
Las Vegas, NV 89118

westwoodps.com
(888) 937-5150

From: Jessica Butte <JButte@regionalflood.org>
Sent: Thursday, March 26, 2020 2:05 PM
To: okwon@lasvegasnevada.gov; YSung@LasVegasNevada.GOV
Cc: Lant Leavitt <Lant.Leavitt@westwoodps.com>; Ching Wang <CWang@regionalflood.org>
Subject: SUNSTONE - PHASE I INFRASTRUCTURE

To: Mr. Oh Sang Kwon, P.E. (okwon@lasvegasnevada.gov; YSung@LasVegasNevada.GOV)
LANT K. LEAVITT, P.E. (LLEAVITT@SHG-INC.COM)
Subject: SUNSTONE - PHASE I INFRASTRUCTURE
Entity #: DS5135B
RFCD #: 20-12445

The District has completed our technical review and considered your request for Regional concurrence. Please find the attached letter for your reference. A hard copy will *NOT* be mailed to the Entity or to the Engineer.

PLEASE RESPOND DIRECTLY TO THIS E-MAIL TO VERIFY THAT THE LETTER HAS BEEN RECEIVED.

Regional Flood Control District
600 S Grand Central Pkwy, Suite 300

Phone: 702-685-0000
Fax: 702-685-0001

Referenced Hydraulic Analyses

Ultimate Condition WSPG Summary											
Storm Drain Through Basin EMR2 South of Moccasin Road (NCR3.WSW)											
WSPG Station	Plan Set Project No. *	Equivalent Roadway Station	Improvement Plan Sheet	Storm Drain Dimension	Invert Elevation (ft)	Q ₁₀₀ (cfs)	WSE (ft)	Velocity (ft/s)	FG Elevation	Facility Description	HGL Check ¹
1000.00	NCR: EST1912	38+85.42	SD-9	60" RCP	2626.96	385.00	2630.06	30.12	2659.28		OK
1024.00		38+16.17		60" RCP	2627.44	385.00	2630.48	30.83	2659.28		OK
1093.25		36+54.72		60" RCP	2631.59	385.00	2634.74	29.54	2660.75		OK
1254.71		32+66.46		60" RCP	2641.28	385.00	2645.16	23.55	2663.17		OK
1254.71		32+66.46		60" RCP	2641.28	365.00	2644.71	25.45	2663.17		OK
1607.19		N/A		60" RCP	2651.73	365.00	2655.16	25.44	2669.89		OK
2007.19		30+41.56	SD-8	60" RCP	2663.58	365.00	2667.01	25.44	2680.01		OK
2407.19		28+62.79	SD-7	60" RCP	2675.43	365.00	2678.86	25.42	2688.17		OK
2807.19		26+84.03	SD-6	60" RCP	2687.29	365.00	2690.76	25.10	2702.00		OK
3207.19		25+05.27		60" RCP	2699.14	365.00	2702.88	23.19	2711.59		OK
3607.19		23+26.51		60" RCP	2709.34	365.00	2714.18	18.77	2725.00		OK
3643.19		21+47.74	SD-5	6' x 6' RCB	2710.26	365.00	2718.84	10.14	2725.00		OK
3723.44		19+68.98		6' x 6' RCB	2712.30	365.00	2719.28	10.14	2725.00		OK
3723.44		17+90.22		6' x 6' RCB	2712.30	246.00	2720.40	6.83	2725.00		OK
3731.19		16+11.45		6' x 6' RCB	2712.51	246.00	2720.42	6.83	2724.00		OK
3864.19		14+32.69		6' x 6' RCB	2713.17	246.00	2720.69	6.83	2724.00		OK
3864.19		12+53.93		6' x 6' RCB	2713.17	246.00	2720.69	6.83	2724.00		OK

Portion of storm drain revised with Update 2 Study

Note that WSE, Q, and Velocity have not changed from revised model beyond the revised portions of SD

T1 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE ADD
T2 MOCCASIN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR3)
T3 FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2

Portion of storm drain
revised with Update 2 Study

FILE: NCR3.WSW W S P G W - EDIT LISTING - Version 14.10 Date: 8- 6-2019 Time:10:48:28
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1
CARD SECT CHN NO OF AVE PIER HEIGHT 1 BASE ZL ZR INV Y(1) Y(2) Y(3) Y(4) Y(5) Y(6) Y(7) Y(8) Y(9) Y(10)
CODE NO TYPE PIER/PIR WIDTH DIAMETER WIDTH DROP

CD	5	3	0	.000	11.000	10.000	.000	.000	.00									
CD	18	4	1		1.500													
CD	24	4	1		2.000													
CD	30	4	1		2.500													
CD	36	4	1		3.000													
CD	42	4	1		3.500													
CD	48	4	1		4.000													
CD	54	4	1		4.500													
CD	60	4	1		5.000													
CD	66	4	1		5.500													
CD	72	4	1		6.000													
CD	8	3	0	.000	6.000	6.000	.000	.000	.00									

W S P G W
WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS - EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE ADD
HEADING LINE NO 2 IS - MOCCASIN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR3)
HEADING LINE NO 3 IS - FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2

W S P G W
WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO 1 IS A SYSTEM OUTLET
U/S DATA STATION INVERT SECT W S ELEV
1000.000 2626.960 60 2631.960

ELEMENT NO 2 IS A REACH
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
1024.000 2627.440 60 .013 .000 .000 .000 1

ELEMENT NO 3 IS A REACH
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
1093.250 2631.590 60 .013 .000 .000 45.000 1

ELEMENT NO 4 IS A REACH
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
1254.710 2641.280 60 .013 .000 .000 45.000 1

ELEMENT NO 5 IS A JUNCTION
U/S DATA STATION INVERT SECT LAT-1 LAT-2 N Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4
1254.710 2641.280 60 24 0 .013 20.000 .000 2644.280 .000 90.000 .000
RADIUS ANGLE
.000 .000

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

ELEMENT NO 6 IS A REACH
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
1607.190 2651.730 60 .013 .000 .000 .000 1

ELEMENT NO 7 IS A REACH
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
2007.190 2663.580 60 .013 .000 .000 .000 1

ELEMENT NO 8 IS A REACH
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
2407.190 2675.430 60 .013 .000 .000 .000 1

ELEMENT NO 9 IS A REACH
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
2807.190 2687.290 60 .013 .000 .000 .000 1

ELEMENT NO 10 IS A REACH
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
3207.190 2699.140 60 .013 .000 .000 .000 1

ELEMENT NO 11 IS A REACH
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
3607.190 2709.340 60 .013 .000 .000 .000 0

W S P G W
WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO 12 IS A TRANSITION
U/S DATA STATION INVERT SECT N RADIUS ANGLE
3643.190 2710.258 8 .013 .000 .000

ELEMENT NO 13 IS A REACH
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
3723.430 2712.300 8 .013 .000 .000 .000 1

ELEMENT NO 14 IS A JUNCTION
U/S DATA STATION INVERT SECT LAT-1 LAT-2 N Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4
3723.430 2712.300 8 48 0 .013 119.000 .000 2713.300 .000 50.000 .000
RADIUS ANGLE
.000 .000

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

ELEMENT NO 15 IS A REACH
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
3731.190 2712.502 8 .013 .000 .000 .000 0

ELEMENT NO 16 IS A REACH
U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
3864.190 2713.170 8 .013 .000 .000 .000 0

ELEMENT NO 17 IS A SYSTEM HEADWORKS
U/S DATA STATION INVERT SECT W S ELEV
3864.190 2713.167 8 .000

FILE: NCR3.WSW

W S P G W - CIVILDESIGN Version 14.08
Program Package Serial Number: 7189

PAGE 1

WATER SURFACE PROFILE LISTING
EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE ADD
MOCCASIN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR3)
FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2

Date: 8- 6-2019 Time:10:48:31

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT or I.D.	Base Wt	No Wth	
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	2626.960	3.099	2630.059	385.00	30.12	14.09	2644.15	.00	4.87	4.85	5.000	.000	.00	1 .0
24.000	.0200					.0452	1.09	3.10	3.27	4.34	.013	.00	.00	PIPE
1024.000	2627.440	3.039	2630.479	385.00	30.83	14.76	2645.23	.00	4.87	4.88	5.000	.000	.00	1 .0
69.250	.0599					.0442	3.06	3.04	3.40	2.80	.013	.00	.00	PIPE
1093.250	2631.590	3.150	2634.740	385.00	29.54	13.55	2648.29	.00	4.87	4.83	5.000	.000	.00	1 .0
42.507	.0600					.0400	1.70	3.15	3.17	2.80	.013	.00	.00	PIPE
1135.757	2634.141	3.250	2637.391	385.00	28.49	12.61	2650.00	.00	4.87	4.77	5.000	.000	.00	1 .0
42.027	.0600					.0361	1.52	3.25	2.98	2.80	.013	.00	.00	PIPE
1177.785	2636.663	3.390	2640.053	385.00	27.17	11.46	2651.51	.00	4.87	4.67	5.000	.000	.00	1 .0
31.962	.0600					.0321	1.03	3.39	2.75	2.80	.013	.00	.00	PIPE
1209.747	2638.582	3.540	2642.121	385.00	25.90	10.42	2652.54	.00	4.87	4.55	5.000	.000	.00	1 .0
25.042	.0600					.0287	.72	3.54	2.52	2.80	.013	.00	.00	PIPE
1234.789	2640.084	3.702	2643.787	385.00	24.70	9.47	2653.26	.00	4.87	4.38	5.000	.000	.00	1 .0
19.921	.0600					.0257	.51	3.70	2.31	2.80	.013	.00	.00	PIPE
1254.710	2641.280	3.880	2645.160	385.00	23.55	8.61	2653.77	.00	4.87	4.17	5.000	.000	.00	1 .0
JUNCT STR	.0000					.0270	.00	3.88	2.10		.013	.00	.00	PIPE
1254.710	2641.280	3.426	2644.706	365.00	25.45	10.06	2654.77	.00	4.84	4.64	5.000	.000	.00	1 .0
352.400	.0296					.0296	10.45	3.43	2.55	3.43	.013	.00	.00	PIPE

FILE: NCR3.WSW

W S P G W - CIVILDESIGN Version 14.08
Program Package Serial Number: 7189

PAGE 2

WATER SURFACE PROFILE LISTING
EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE ADD
MOCCASIN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR3)
FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2

Date: 8- 6-2019 Time:10:48:31

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT or I.D.	Base Wt	No Wth	
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1607.190	2651.730	3.427	2655.157	365.00	25.44	10.05	2665.21	.00	4.84	4.64	5.000	.000	.00	1 .0
400.000	.0296					.0296	11.85	3.43	2.55	3.43	.013	.00	.00	PIPE
2007.190	2663.580	3.428	2667.008	365.00	25.44	10.05	2677.06	.00	4.84	4.64	5.000	.000	.00	1 .0
400.000	.0296					.0296	11.84	3.43	2.55	3.43	.013	.00	.00	PIPE
2407.190	2675.430	3.430	2678.860	365.00	25.42	10.03	2688.89	.00	4.84	4.64	5.000	.000	.00	1 .0
400.000	.0297					.0291	11.64	3.43	2.55	3.43	.013	.00	.00	PIPE
2807.190	2687.290	3.470	2690.760	365.00	25.10	9.78	2700.54	.00	4.84	4.61	5.000	.000	.00	1 .0
248.933	.0296					.0276	6.88	3.47	2.49	3.43	.013	.00	.00	PIPE
3056.123	2694.665	3.572	2698.237	365.00	24.32	9.18	2707.42	.00	4.84	4.52	5.000	.000	.00	1 .0
151.067	.0296					.0252	3.81	3.57	2.35	3.43	.013	.00	.00	PIPE
3207.190	2699.140	3.738	2702.877	365.00	23.19	8.35	2711.23	.00	4.84	4.34	5.000	.000	.00	1 .0
115.522	.0255					.0233	2.69	3.74	2.15	3.63	.013	.00	.00	PIPE
3322.712	2702.086	3.813	2705.898	365.00	22.72	8.01	2713.91	.00	4.84	4.26	5.000	.000	.00	1 .0
139.418	.0255					.0216	3.02	3.81	2.06	3.63	.013	.00	.00	PIPE

NCR3.OUT

3462.129	2705.641	4.003	2709.644	365.00	21.66	7.29	2716.93	.00	4.84	4.00	5.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
76.071	.0255					.0196	1.49	4.00	1.86	3.63	.013	.00	.00	PIPE	
3538.200	2707.581	4.218	2711.799	365.00	20.65	6.62	2718.42	.00	4.84	3.63	5.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
46.377	.0255					.0180	.84	4.22	1.65	3.63	.013	.00	.00	PIPE	

FILE: NCR3.WSW W S P G W - CIVILDESIGN Version 14.08
 Program Package Serial Number: 7189 Date: 8- 6-2019 Time:10:48:31
 WATER SURFACE PROFILE LISTING
 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE ADD
 MOCCASIN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR3)
 FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3584.577	2708.763	4.474	2713.238	365.00	19.69	6.02	2719.26	.00	4.84	3.07	5.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
22.613	.0255					.0173	.39	4.47	1.41	3.63	.013	.00	.00	PIPE
3607.190	2709.340	4.837	2714.177	365.00	18.77	5.47	2719.65	.00	4.84	1.77	5.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
TRANS STR	.0255					.0046	.16	4.84	1.00		.013	.00	.00	PIPE
3643.190	2710.258	8.577	2718.835	365.00	10.14	1.60	2720.43	.00	4.86	6.00	6.000	6.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
80.240	.0254					.0046	.37	8.58	.73	2.66	.013	.00	.00	BOX
3723.430	2712.300	6.982	2719.282	365.00	10.14	1.60	2720.88	.00	4.86	6.00	6.000	6.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JUNCT STR	.0000					.0021	.00	6.98	.73		.013	.00	.00	BOX
3723.430	2712.300	8.100	2720.400	246.00	6.83	.73	2721.13	.00	3.74	6.00	6.000	6.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
7.760	.0260					.0021	.02	8.10	.49	1.98	.013	.00	.00	BOX
3731.190	2712.502	7.914	2720.416	246.00	6.83	.73	2721.14	.00	3.74	6.00	6.000	6.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
133.000	.0050					.0021	.28	7.91	.49	3.63	.013	.00	.00	BOX
3864.190	2713.170	7.523	2720.693	246.00	6.83	.73	2721.42	.00	3.74	6.00	6.000	6.000	.00	0 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE ADD

MOCCASIN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR3)

FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2

1000.00	I	W	H	E		R
1058.45	I	W	H	E		R
1116.91	I	W	H	E		R
1175.36	I	W	H	E		R
1233.81	I	W	H	E		R
1292.26	I	W	H	E		R
1350.72	I	W	H	E		R
1409.17	I	W	H	E		JX
1467.62	I	W	H	E		R
1526.08						

NCR3.OUT

[illegible]

3279.66

I WH E . R

 Springer

175

I WH E R

I WH E R

I H E R

I H E TX

I CH WE R

I CHW E JX

I C H W E R R

NOTES

I = INVERT ELEVATION
C = CRITICAL DEPTH
W = WATER SURFACE ELEVATION
S = SUPER-ELEVATION
H = HEIGHT OF CHANNEL
E = ENERGY GRADE LINE
X = CURVES CROSSING OVER
B = BRIDGE ENTRANCE OR EXIT
Y = WALL ENTRANCE OR EXIT

Page 4

Referenced Improvement Plans

The seal of the City of Las Vegas, Nevada, is a circular emblem. The outer ring contains the text "CITY OF LAS VEGAS" at the top and "NEVADA" at the bottom, separated by small dots. The inner circle features a stylized illustration of the city's skyline. A prominent, tall, pointed tower stands in the center. To its left is a bridge with multiple arches. To its right are palm trees and a sunburst. The entire seal is rendered in black and white.

CITY ENGINEER-ALLEN E. PAVELKA PE #0029 DATE _____

APPROVAL OF THESE PLANS BY THE CITY ENGINEER IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED OR RIGHT-OF-WAY, AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS EXCEPT THOSE SPECIALLY LISTED UNDER DEVIATIONS FROM STANDARDS. THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARDS IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS, CLARK COUNTY AREA, NEVADA.

CITY OF LAS VEGAS PLANNING DEPARTMENT

DATE

THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
PROJECT NO. XXXXXX FIRST APPROVED DATE: _____
SHEETS: _____
LVWD APPROVED FIRE FLOW XXXX GPM AT 20 PSI RESIDUAL

APPROVAL BY THE FIRE DEPARTMENT HAVING JURISDICTION IS REQUIRED PRIOR TO OBTAINING FINAL APPROVAL FROM THE LAS VEGAS VALLEY WATER DISTRICT

LAS VEGAS FIRE AND RESCUE _____ DATE _____

NV ENERGY _____ DATE _____

NV ENERGY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NV ENERGY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.

CENTRAL TELEPHONE CO. DBA CENTURYLINK DATE

THE AFFIXED CENTRAL TELEPHONE CO. DBA CENTURYLINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUTES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

SOUTHWEST GAS CORPORATION DATE

COX COMMUNICATIONS LAS VEGAS, INC. DATE

SHEET NUMBER	SHEET DESCRIPTION	SHEET TITLE
1	C-1	COVER SHEET
2	C-2	GENERAL NOTES
3	C-3	ABBREVIATIONS, KEY MAP, LEGEND AND QUANTITIES
4	P-1	PLAN AND PROFILE - "NCR" 12+00.00 TO "NCR" 20+50
5	P-2	PLAN AND PROFILE - "NCR" 20+50.00 TO "NCR" 28+50
6	P-3	PLAN AND PROFILE - "NCR" 28+50.00 TO "NCR" 36+50
7	P-4	PLAN AND PROFILE - "NCR" 36+50.00 TO "NCR" 46+00
8	P-5	STORM DRAIN LATERAL DETAILS
9	D-1	DETAIL SHEET 1
10	G-1	GRADING PLAN 1
11	G-2	GRADING PLAN 2
12	G-3	GRADING PLAN 3
13	G-4	GRADING PLAN 4

PROJECT LOCATION

LOCUST CABIN WAY

OAK RIDGE ROAD

HICKORY MOUNTAIN ROAD

0 1/4 MILE

0 1/4 MILE

MONUMENT ID: USDA (1934) 19

U.S. DEPARTMENT OF AGRICULTURE BRASS DISC AT SOUTHWEST
CORNER OF U.S. 95 AND KYLE CANYON ROAD

ELEVATION = 2817.61 FEET, 858.810 METERS
NAVD 88 DATUM

PER THE CITY OF LAS VEGAS BENCHMARK BOOK -
2008 ADJUSTMENT (UPDATED 05/24/2010)

NORTH 00°15'50" WEST, BEING THE BEARING OF THE EAST LINE OF THE NORTHEAST QUARTER (NE1/4) OF SECTION 6, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 151, PAGE 14 OF SURVEYS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA

EASTLAND COMPANY, LLC
9275 RUSSELL ROAD SUITE
400 LAS VEGAS, NV 89148
PH (702) 821-4808

SLATER HANIFAN GROUP
a WESTWOOD TEAM
5740 S. ARVILLE STREET #216
LAS VEGAS, NV 89118
(702) 284-5300



NOTE: PROJECT PLAN APPROVAL CONTINGENT ON

```
SUNSTONE PHASE 1 XXXXX #XXXXX
SUNSTONE PHASE 1 XXXXX #XXXXX
SUNSTONE PHASE 1 XXXXX #XXXXX
```

PLAN APPROVAL

S-I-G
SLATER
HANFAN
GROUP
a Westwood team
5750 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300
FAX (702) 284-5309

[illegible]

CITY OF LAS VEGAS

EASTLAND COMPANY, LLC

**SUNSTONE PHASE 1
NORTH COLLECTOR ROAD
COVER SHEET**

DATE: 05/01/19

DRAFTER: SB/JR

DESIGNER: BC

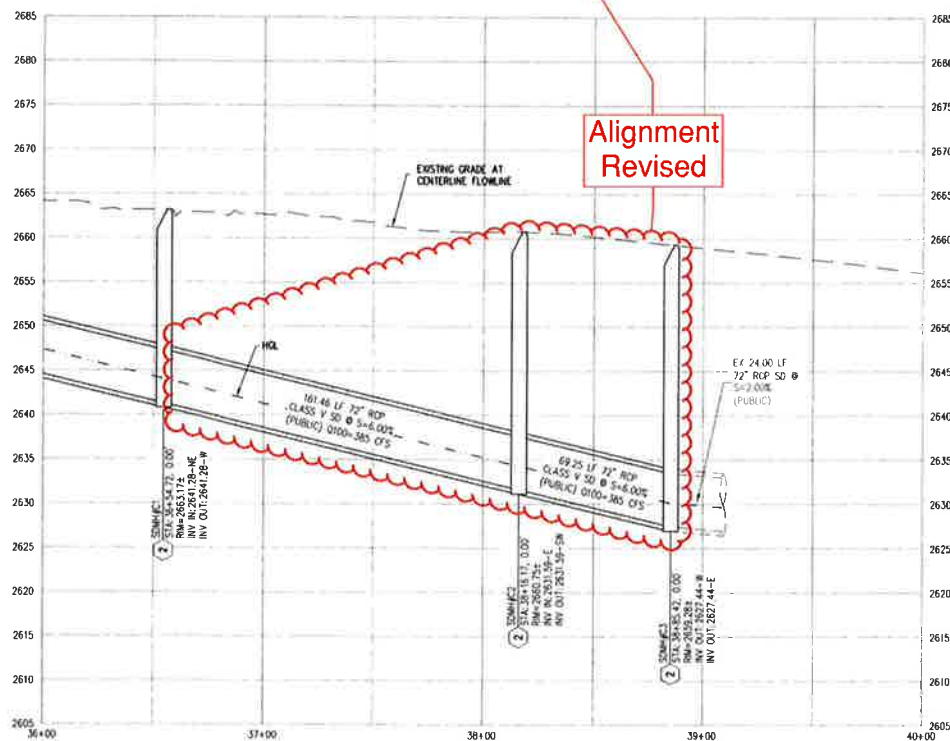
CHECKED: JJ

PROJECT NO.
EST1912-000



C-1

SHEET 1 OF 12



- ## STORM DRAIN NOTES
- 1 CONSTRUCT TYPE "CM2" DROP INLET (USDOCCA STD DWG NO 412.1 & 421)
 - 2 CONSTRUCT 60" TYPE III MANHOLE (USDOCCA STD DWG NO. 406.1)
 - 3 INSTALL 18" RCP (USDOCCA STD DWG NO. 503.2)
 - 4 INSTALL 48" RCP (USDOCCA STD. DWG. NO. 503.2)
 - 5 INSTALL 42" RCP (USDOCCA STD. DWG. NO. 503.2)
 - 6 INSTALL 60" RCP (USDOCCA STD. DWG. NO. 503.2)
 - 7 INSTALL 72" RCP (USDOCCA STD DWG. NO. 503.2)
 - 8 INSTALL RCP END SECTION (NDOT STD. PLAN R-2.3.1)
 - 9 CONNECT TO STORM DRAIN
 - 10 INSTALL HEADWALL PER STRUCTURAL DETAIL
 - 11 INSTALL 18" C900 STORM DRAIN
 - 12 INSTALL 42" C900 STORM DRAIN
 - 13 INSTALL 48" C900 STORM DRAIN

EASEMENTS

- E1 AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED JUNE 8, 2015 IN BOOK 20150606 AS INSTRUMENT NO 00946 OF OFFICIAL RECORDS
- E2 COVENANTS, CONDITIONS, EASEMENTS AND RESTRICTIONS IN A FINAL ORDER OF CONDEMNATION RECORDED OCTOBER 2, 2015, IN BOOK 20151002 AS INSTRUMENT NO 03296 OF OFFICIAL RECORDS
- E3 RIGHT-OF-WAY GRANTED BY DECISION, DATED AUGUST 18, 2004, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER 8-425926 TO NEVADA POWER COMPANY FOR RIGHT TO CONSTRUCT, OPERATE, MAINTAIN, AND TERMINATE AN UNDERGROUND 15KV DISTRIBUTION LINE WITH RIGHT-OF-WAY GRANT FILE IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF THE LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON SEPTEMBER 24, 2004 IN BOOK 20040924, AS INSTRUMENT NO 03289 OF OFFICIAL RECORDS
- E4 RIGHT-OF-WAY GRANTED BY DECISION, DATED JUNE 06, 2002, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER 8-75025 TO NEVADA POWER COMPANY FOR TRANSMISSION LINE. RIGHT-OF-WAY GRANT FILE IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON OCTOBER 09, 2003 IN BOOK 20031009, AS INSTRUMENT NO 01807 OF OFFICIAL RECORDS
- E5 RIGHT-OF-WAY GRANTED BY DECISION, DATED JUNE 06, 2002, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER 8-75060 TO NEVADA POWER COMPANY FOR FIRE OPTIC LINE. RIGHT-OF-WAY GRANT FILE IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON DECEMBER 22, 2003 IN BOOK 20031222, AS INSTRUMENT NO 02836 OF OFFICIAL RECORDS
- E6 RIGHT-OF-WAY GRANTED BY DECISION, DATED NOVEMBER 30, 2004, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER 8-18433 TO NEVADA POWER COMPANY FOR RIGHT TO CONSTRUCT, OPERATE, MAINTAIN, AND TERMINATE AN OVERHEAD FIRE OPTIC LINE (CONTAINING 12 FIBERS) WITH RELATED APPURTENANCES ON PUBLIC LANDS UNDER RIGHT-OF-WAY GRANT FILE IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF THE LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON FEBRUARY 09, 2005 IN BOOK 20050209, AS INSTRUMENT NO 00009 OF OFFICIAL RECORDS
- E7 RIGHT-OF-WAY GRANTED BY DECISION, DATED MAY 28, 2003, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER 8-75757 TO CITY OF LAS VEGAS FOR ROADWAY, SANITARY SEWER AND DRAINAGE PURPOSES AND RELATED PURPOSES UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON JUNE 30, 2003 IN BOOK 20030630, AS INSTRUMENT NO 00811 OF OFFICIAL RECORDS
- E8 RIGHT-OF-WAY GRANTED BY DECISION, DATED JUNE 9, 2004, BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER 8-75757A TO CITY OF LAS VEGAS FOR ROADWAY, SANITARY SEWER AND DRAINAGE PURPOSES UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON JUNE 30, 2004 IN BOOK 20040630, AS INSTRUMENT NO 01781 OF OFFICIAL RECORDS

NOTES

1. ALL RCP SHALL BE CLASS III UNLESS OTHERWISE SHOWN
2. ALL PIPE LENGTHS ARE MEASURED ALONG PIPE CENTERLINE TO CENTER OF MANHOLE OR INSIDE EDGE OF DI OR RCB/RCA
3. ALL DROP INLETS SHALL INCLUDE STORM WATER MANAGEMENT STAMP AND DETAIL PER USDOCA STD DWG NO. 421
4. SEE STRUCTURAL PLANS FOR ADDITIONAL STRUCTURAL DETAILS AND CONNECTIONS
5. ALL PIPES IN PUBLIC ROW ARE PUBLICLY MAINTAINED
6. ADD SPECIAL INSPECTION REQUIRED FOR PIPE SEGMENTS WITH SACRIFICIAL CONCRETE
7. SEE UTILITY PLAN AND PROFILE SHEETS FOR UTILITY ADJUSTMENTS AND RELOCATIONS
8. ALL INTERIM DRAINAGE FACILITIES TO BE PRIVATELY MAINTAINED

DROP INLET NOTE

WHERE 10 FEET PARALLEL SEPARATION IS NOT PRACTICABLE,
CAST-IN-PLACE MONOLITHIC POUR WITH WATERSTOP BETWEEN SLAB AND WALLS
BASE, WALLS AND TOP TO BE CONSTRUCTED WITH WATERSTOPS, CENTER BULB,
OR FLAT STRIP (VINYLEX, GREENSTREAK PLASTIC PRODUCTS OR APPROVED EQUAL)

LEGEND

 STORM DRAIN LATERAL # (SEE SHEETS P-5)

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY _____ ON FILE AT THE CITY OF LAS VEGAS FOR THE SUBJECT PROJECT

FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE 'X' (OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN) ON THE FLOOD INSURANCE RATE MAP (FIRM) PANELS: 32003C1735E AND 32003C1750E BOTH DATED SEPTEMBER 27, 2002

NOTE

PROPERTY OWNER IS RESPONSIBLE TO MAINTAIN THE BEST MANAGEMENT PRACTICES, SUCH AS BUT NOT LIMITED TO, THE REMOVAL OF ACCUMULATED SEDIMENT AND DEBRIS AND CARE OF VEGETATION.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
PROJECT NO. XXXXXX FIRST APPROVED DATE:



S-I-E
SLATER
HANIFAN
GROUP
a Westwood team

5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300
FAX (702) 284-5399

[illegible]

**EASTLAND COMPANY, LLC
SUNSTONE PHASE 1
NORTH COLLECTOR ROAD
GRADING PLAN 4**

DATE: 05/01/19

DRAFTER: SB/JR

DESIGNER: BC

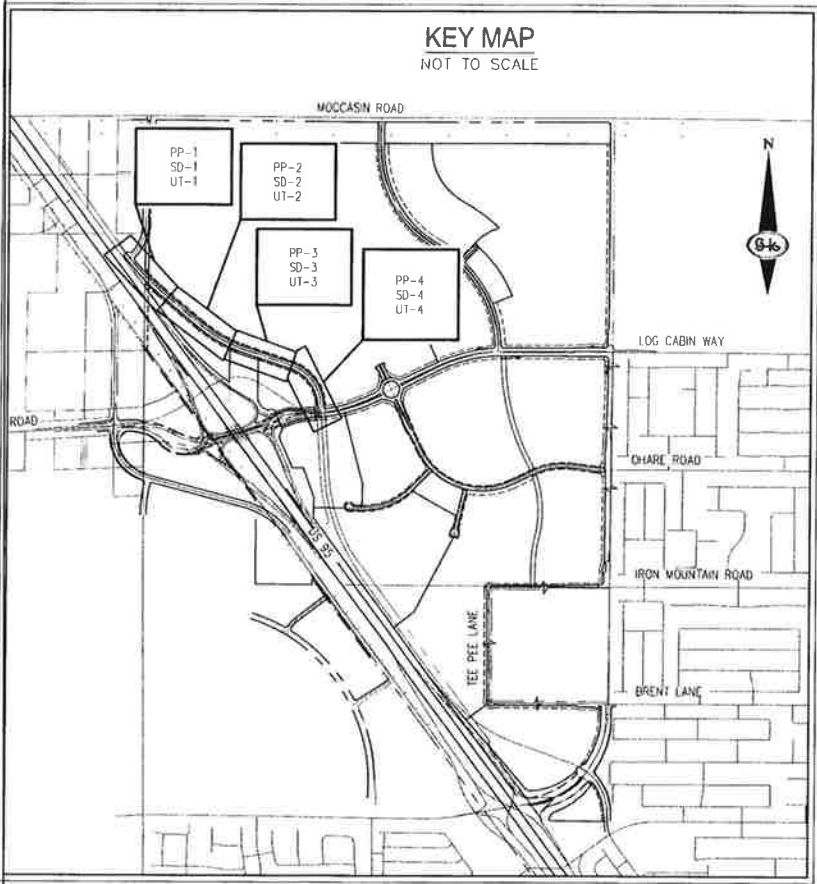
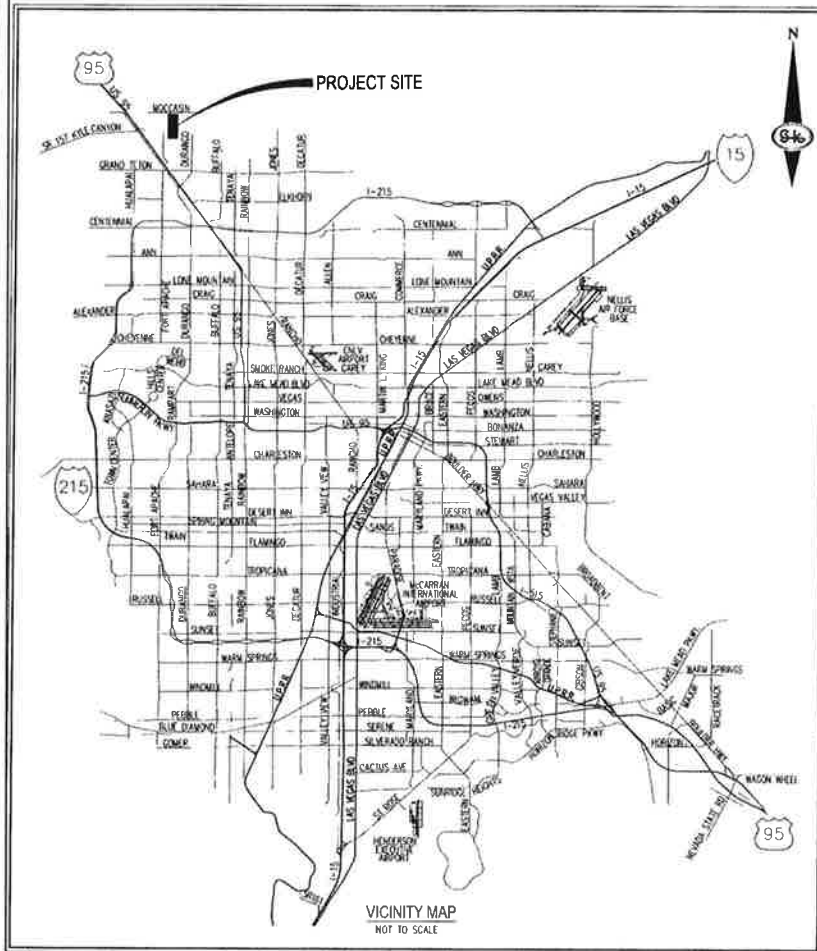
CHECKED: JJ

PROJECT NO.

EST1912-000



G-4
SHEET 13 OF 12



IMPROVEMENT PLANS FOR SUNSTONE PHASE 1 SKYE POINTE DRIVE CITY OF LAS VEGAS, NEVADA



SHEET INDEX		
NO.	SHEET	TITLE
1	CS-1	COVER SHEET
2	CS-2	GENERAL NOTES
3	CS-3	ABBREVIATIONS, KEY MAP, LEGEND AND QUANTITIES
4	PP-1	PLAN AND PROFILE I - "SPD" 8+00.00 TO "SPD" 17+50.00
5	PP-2	PLAN AND PROFILE II - "SPD" 17+50.00 TO "SPD" 26+50.00
6	PP-3	PLAN AND PROFILE III - "SPD" 26+50.00 TO "SPD" 34+00.00
7	PP-4	PLAN AND PROFILE IV - "SPD" 34+00.00 TO "SPD" 41+00.00
8	SD-1	STORM DRAIN I - "SPD" 8+00.00 TO "SPD" 17+50.00
9	SD-2	STORM DRAIN II - "SPD" 17+50.00 TO "SPD" 26+50.00
10	SD-3	STORM DRAIN III - "SPD" 26+50.00 TO "SPD" 34+00.00
11	SD-4	STORM DRAIN IV - "SPD" 34+00.00 TO "SPD" 41+00.00
12	SD-5	STORM DRAIN LATERAL I
13	UT-1	UTILITY PLAN I - "SPD" 8+00.00 TO "SPD" 17+50.00
14	UT-2	UTILITY PLAN II - "SPD" 17+50.00 TO "SPD" 26+50.00
15	UT-3	UTILITY PLAN III - "SPD" 26+50.00 TO "SPD" 34+00.00
16	UT-4	UTILITY PLAN IV - "SPD" 34+00.00 TO "SPD" 41+00.00
17	UT-5	UTILITY PLAN LATERAL 1
18	UT-6	UTILITY PLAN LATERAL 2
19	DT-1	DETAIL SHEET 1

APPROVALS

CITY ENGINEER-ALLEN PAVELKA PE, #9029	DATE
APPROVAL OF THESE PLANS BY THE CITY ENGINEER IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED OF RIGHT-OF-WAY, AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS EXCEPT THOSE SPECIALLY LISTED UNDER DEVIATIONS FROM STANDARDS. THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARDS IN FAVOR OF THE UNIFORM STANDARD DRAINAGE AND SPECIFICATIONS, CLARK COUNTY AREA, NEVADA.	
LAS VEGAS FIRE AND RESCUE	DATE
CITY OF LAS VEGAS - PLANNING DEPARTMENT	
THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT.	
CENTRAL TELEPHONE CO. DBA CENTURYLINK	DATE
THE AFFIRED CENTURYLINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUTES AND / OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.	
APPROVED FOR CONSTRUCTION	
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES	
PROJECT NO. 111111	FIRST APPROVED DATE
LYND APPROVED FLOW: 1.500	CPM AT 20 PS RESIDUAL
MAXIMUM AVAILABLE FIRE SPRINKLER FLOW	20
CPM	
SHEETS: ADD FIELD	
LYND APPROVAL IS VALID FOR ONE (1) YEAR FROM SIGNATURE DATE. IF CONSTRUCTION IS NOT STARTED, PLANS MUST BE RESUBMITTED FOR REVIEW AND APPROVAL.	
NV ENERGY	DATE
NV ENERGY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NV ENERGY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.	
SOUTHWEST GAS CORPORATION	DATE
CDX COMMUNICATIONS LAS VEGAS, INC.	DATE

OWNER/DEVELOPER	ENGINEER
EASTLAND COMPANY, LLC 9375 RUSSELL RD SUITE 400 LAS VEGAS, NV 89148 PH: 702-821-4808	SLATER HANFAN GROUP, INC. 6 WESTWOOD TRAIL 5740 S. ARVILLE STREET, SUITE 216 LAS VEGAS, NV 89118 PH: (702) 284-5300 CONTACT: JESSY JOHNSON

BENCHMARK

MONUMENT ID: USDA (1934) 19

U.S. DEPARTMENT OF AGRICULTURE BRASS DISC AT SOUTHWEST CORNER OF U.S. 95 AND KYLE CANYON ROAD

ELEVATION = 2817.61 FEET, 858.610 METERS

HAND-BB DATUM

PER THE CITY OF LAS VEGAS BENCHMARK BOOK - 2008 ADJUSTMENT (UPDATED 05/24/2010)

BASIS OF BEARINGS

NORTH 00°01'50" WEST, BEING THE BEARING OF THE EAST LINE OF THE NORTHEAST QUARTER (NE 1/4) OF SECTION 6, TOWNSHIP 19 SOUTH, RANGE 60 EAST, N.M.S., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 151, PAGE 14 OF SURVEYS IN THE CLARK COUNTY RECORDER'S OFFICE, NEVADA.

FEMA FLOOD ZONE INFORMATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE "X" (OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN) ON THE FLOOD INSURANCE RATE MAP (FIRM) PANELS: 30000C173K AND 30000C173K BOTH DATED SEPTEMBER 27, 2002

PROJECT PLAN APPROVAL CONTINGENT ON

SUNSTONE PHASE 1 XXXXX XXXXX
SUNSTONE PHASE 1 XXXXX XXXXX
SUNSTONE PHASE 1 XXXXX XXXXX

PLAN APPROVAL

SWPPP NOTE

NOTE: ALL LAND SURFACE AREA DISTURBANCES OVER 1 ACRE REQUIRE A STORMWATER DISCHARGE PERMIT ISSUED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDPEP). A PHASED CONSTRUCTION UNIT IN A CONTIGUOUS SUBDIVISION IS CONSIDERED UNDER CONSTRUCTION UNTIL ALL SLOPED SURFACE AREAS HAVE BEEN COVERED BY PAVING, BUILDING CONSTRUCTION OR PLANTING. A STORMWATER DISCHARGE PERMIT APPLICATION AND ASSOCIATED INFORMATION MAY BE DOWNLOADED FROM THE WEB SITE: <http://www.state.nv.us/dnep/stormwater.htm>. PROJECTS THAT DISURB MORE THAN ONE ACRE OF LAND MUST SUBMIT TO NDPEP A "NOTICE OF INTENT" FOR INCLUSION UNDER STORMWATER PERMIT NO. NV1000000 ALONG WITH THE APPROPRIATE FILING FEE.

DEVIATIONS FROM STANDARDS

NONE

GEOTECHNICAL ENGINEER

PREPARED BY: EBM
ADDRESS: ADDRESS
PHONE: PHONE #
PROJECT NO. PROJECT NUMBER
DATED: DATE

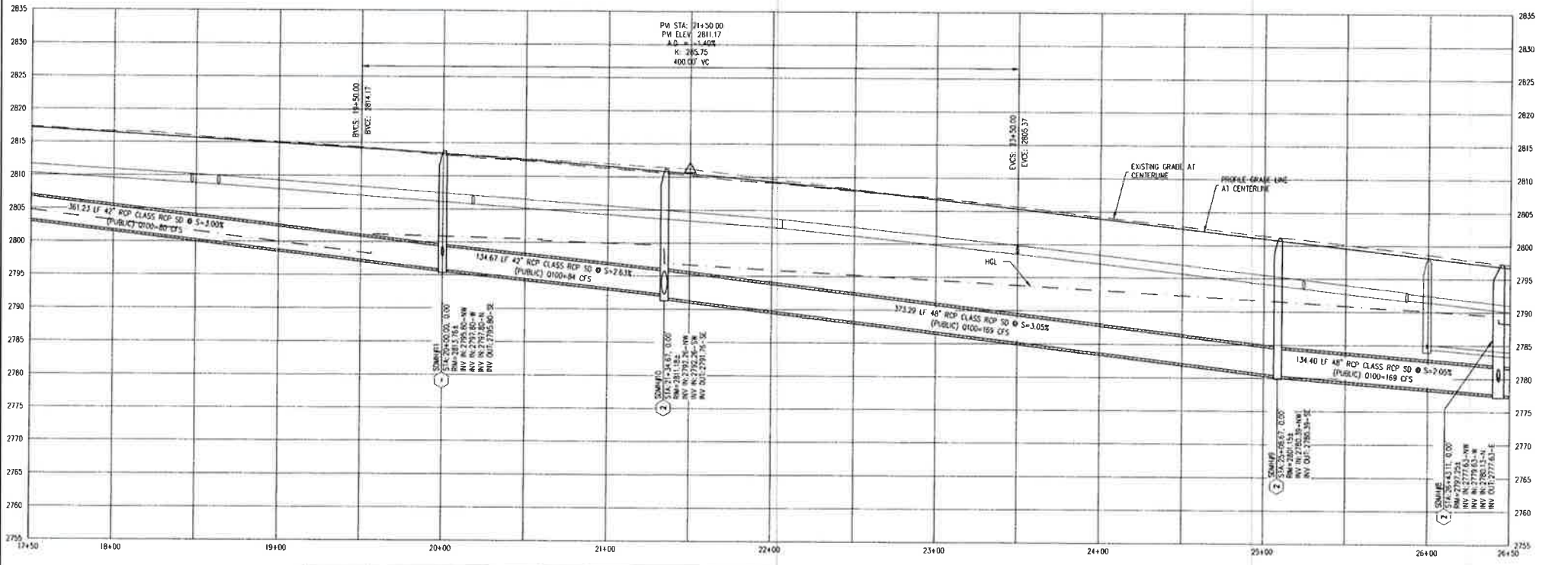
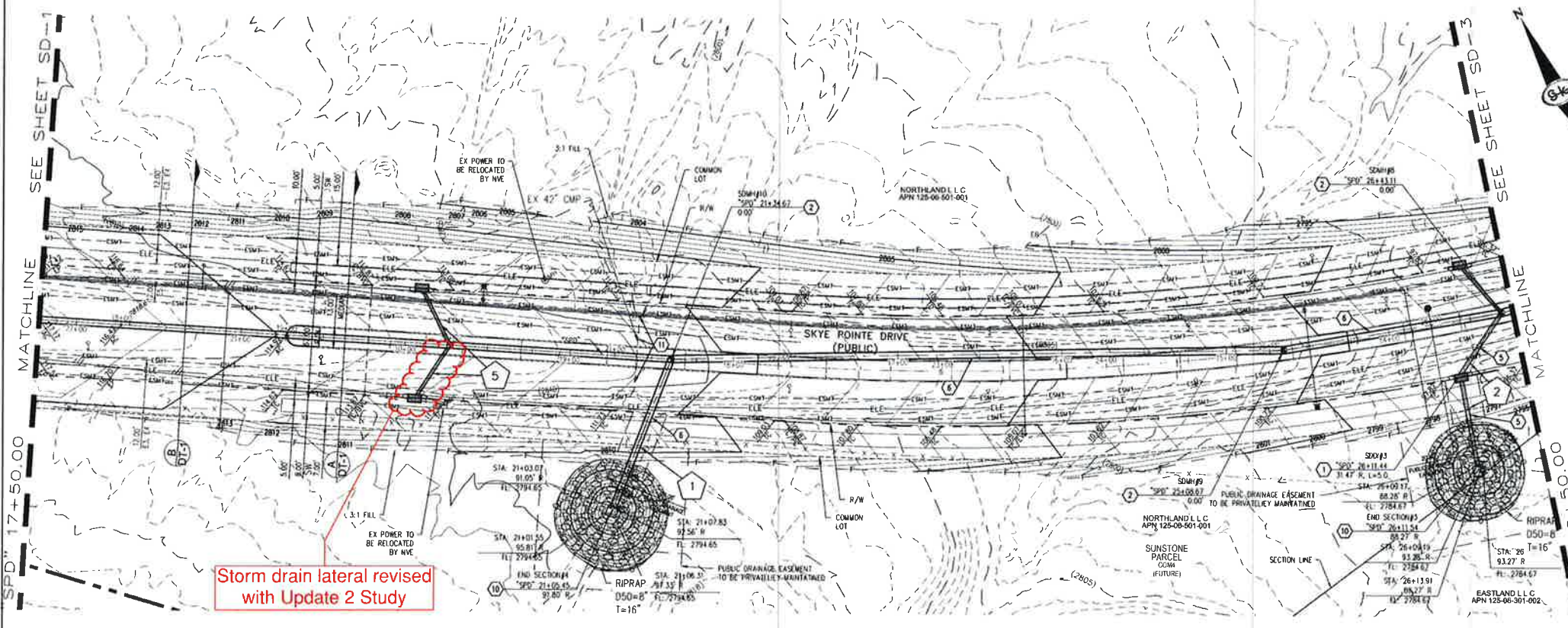


SLATER HANFAN GROUP
a Westwood team
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

SC EAST LANDCO, LLC
SUNSTONE PHASE 1
COVER SHEET

DATE: 08/07/19
DRAFTER: SB/JR
DESIGNER: BC
CHECKED: JJ
PROJECT NO. **EST1907-000**

CS-1
SHEET 1 OF 19



- ### NOTES
1. ALL RCP SHALL BE CLASS III UNLESS OTHERWISE SHOWN.
 2. ALL PIPE LENGTHS ARE MEASURED ALONG PIPE CENTERLINE TO CENTER OF MANHOLE OR INSIDE EDGE OF DI OR RCB/RCA.
 3. ALL DROP INLETS SHALL INCLUDE STORM WATER MANAGEMENT STAMP AND DETAIL PER USDOCCA STD DWG NO 421.
 4. SEE STRUCTURAL PLANS FOR ADDITIONAL STRUCTURAL DETAILS AND CONNECTIONS.
 5. ALL PIPES IN PUBLIC ROW ARE PUBLICLY MAINTAINED.
 6. ADD SPECIAL INSPECTION REQUIRED FOR PIPE SEGMENTS WITH SACRIFICIAL CONCRETE.
 7. SEE UTILITY PLAN AND PROFILE SHEETS FOR UTILITY ADJUSTMENTS AND RELOCATIONS.
 8. ALL INTERIOR DRAINAGE FACILITIES TO BE PRIVATELY MAINTAINED.
 9. PROPERTY OWNER IS RESPONSIBLE TO MAINTAIN THE BEST MANAGEMENT PRACTICES, SUCH AS BUT NOT LIMITED TO, THE REMOVAL OF ACCUMULATED SEDIMENT AND DEBRIS AND CARE OF VEGETATION.
 10. MINIMUM 10 FEET PARALLEL SEPARATION IS NOT PRACTICABLE.
- CAST-IN-PLACE MONOLITHIC POUR WITH WATERSTOP BETWEEN SLAB AND WALLS, BASE, WALLS AND TOP TO BE CONSTRUCTED WITH WATERSTOPS, CENTER BULB, OR FLAT STRIP (WYTHEX, GREENSTREAK PLASTIC PRODUCTS OR APPROVED EQUIV).

DISCLAIMER NOTE

1) EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND 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 IN THEIR PROPER LOCATION.

2) FOR ROADWAY WIDENING AND HALF STREET IMPROVEMENTS THE CONTRACTOR SHALL VERIFY CROSS SLOPES FROM EXISTING PAVEMENT SAWCUT LINE TO PROPOSED EDGE OF PAVEMENT OR PROPOSED LIP OF CURB PRIOR TO SUBGRADE PREPARATION AND CONSTRUCTION OF PROPOSED CURB LINE. IF MINIMUM CROSS SLOPES DO NOT MEET AGENCY STANDARDS THE CONTRACTOR SHALL NOTIFY THE ENGINEER.

FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE 'X' (OUTSIDE THE 500-YEAR FLOOD PLAIN) ON THE FLOOD INSURANCE RATE MAP (FIRM) PANEL: 32003C1735L, DATED SEPTEMBER 27, 2002.

CALL SOUTHWEST GAS AT 702-651-2111 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES.

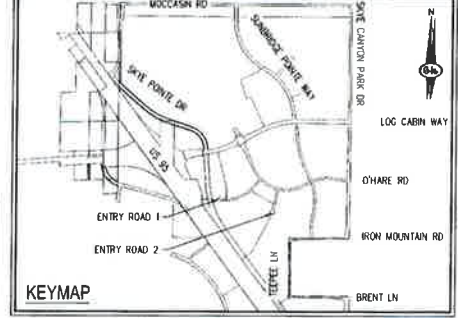
SURVEY NOTE

OWNER RESPONSIBLE TO PROVIDE SURVEY MONUMENTATION AS SHOWN AND TO REPLACE ALL SURVEY MONUMENTATION DAMAGED, DISTURBED, DESTROYED, OR OBLISCURED DURING CONSTRUCTION.

ELEVATION NOTE

ADD 2800 TO ALL SPOT GRADES WHERE THE HUNDREDS AND THOUSANDS PLACES ARE OMITTED FOR ACTUAL ELEVATION (I.E. 01.00 REPRESENTS 1001.00).

- ### EXISTING EASEMENTS
- 1) RIGHT-OF-WAY GRANTED BY DECISION, DATED JANUARY 16, 2003 BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-75502 TO LAS VEGAS VALLEY WATER DISTRICT FOR WATER PIPELINE UNDER RIGHT-OF-WAY GRANT FILED IN THE OFFICE OF THE BUREAU OF LAND MANAGEMENT OVER A PORTION OF SAID LAND, AS RECORDED IN THE OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA ON FEBRUARY 10, 2003 IN BOOK 20030210, AS INSTRUMENT NO. 00558 OF OFFICIAL RECORDS.
 - 2) RIGHT-OF-WAY GRANTED BY DECISION, DATED JANUARY 16, 2003 BY THE BUREAU OF LAND MANAGEMENT UNDER SERIAL NUMBER N-75502 TO LAS VEGAS VALLEY WATER DISTRICT FOR TEMPORARY WORK AREAS FOR A 42\"/>



- ### STORM DRAIN NOTES
- 1) CONSTRUCT TYPE "CM2" DROP INLET (USDOCCA STD. DWG. NO. 412.1 & 421).
 - 2) CONSTRUCT 60\"/>
 - 3) CONSTRUCT NDOT TYPE 4 MANHOLE (NDOT STD. PLAN R-4.3.2).
 - 4) INSTALL 18\"/>
 - 5) INSTALL 24\"/>
 - 6) INSTALL 42\"/>
 - 7) INSTALL 48\"/>
 - 8) INSTALL 66\"/>
 - 9) CONSTRUCT 6\" x 6\" RCB (NDOT STD. PLAN B-20.1.2).
 - 10) CONSTRUCT 7\" x 7\" RCB (NDOT STD. PLAN B-20.1.2).
 - 11) CONSTRUCT 8\" x 7\" RCA (SEE DETAIL 1, SHEET S4.10).
 - 12) CONSTRUCT 10\" x 9\" RCA (SEE DETAIL 2, SHEET S4.10).
 - 13) INSTALL 30\" RCP END SECTION (NDOT STD. PLAN R-2.3.1).
 - 14) INSTALL 42\" RCP END SECTION (NDOT STD. PLAN R-2.3.1).
 - 15) CONSTRUCT INTERIM PLUG (SEE DETAIL 4, SHEET S3.10).
 - 16) CONSTRUCT INTERIM PLUG (SEE DETAIL 4, SHEET S3.10).
 - 17) CONSTRUCT CULVERT HEADWALL (NDOT STD. PLAN R-2.5.2 & R-2.5.2.1).
 - 18) CONSTRUCT CONCRETE COLLAR (SEE DETAIL 1, DRAWING D-12).
 - 19) CONSTRUCT DROP INLET (SEE DETAIL 10, SHEET S1.10).
 - 20) 12\"/>
 - 21) CONSTRUCT HEADWALL (SEE SHEET S2.10).
 - 22) CONSTRUCT CONCRETE PAD WITH 3\"/>
 - 23) CONSTRUCT 3\"/>
 - 24) INSTALL 18\"/>
 - 25) INSTALL 30\"/>
 - 26) CONSTRUCT TYPE II PEDESTRIAN RAIL PER NDOT STD. PLAN B-25.1.5.

LEGEND

1/ STORM DRAIN LATERAL (SEE SHEET SD-5)

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
PROJECT NO. 1907-000
FIRST APPROVED DATE: 08/07/19
LIVING APPROVED FIRE FLOW: TOTAL 1,300 GPM / ON SITE 20 GPM

FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY 222222 ON FILE AT CITY OF LAS VEGAS AND CORP HTE #11-77777 FOR THE SUBJECT PROJECT.

JOSH JOHNSON, P.E. 15789 DATE: 8/7/19

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.

CALL BEFORE YOU DIG
OVERHEAD

1-702-227-2929

FAST

Call before you dig
UnderGround
1-702-432-5300
FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (F.A.S.T.)

Call before you dig
AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.

Call
811
OR
1-800-227-2600

SLATER HANIFAN GROUP

a Westwood team

5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

DATE: 08/07/19
DRAFTER: SB/JR
DESIGNER: BC
CHECKED: JJ
PROJECT NO. EST1907-000

SD-2
SHEET 9 OF 19

APPENDIX B

WSPGW Hydraulic Models

Storm Drain Through Basin EMR2 South of Moccasin Road (NCR3.WSW)

Ultimate Condition WSPG Summary

WSPG Station	Plan Set Project No. *	Equivalent Roadway Station	Improvement Plan Sheet	Storm Drain Dimension	Invert Elevation (ft)	Q ₁₀₀ (cfs)	WSE (ft)	Velocity (ft/s)	FG Elevation	Facility Description	HGL Check ¹
1000.00	NCR: EST1912	38+85.42	SD-9	60" RCP	2626.96	385.00	2630.03	30.51	2659.28		OK
1024.00		38+16.17		60" RCP	2627.37	385.00	2630.37	31.33	2659.54		OK
1087.71		36+54.72		60" RCP	2631.86	385.00	2635.02	29.44	2660.78		OK
1244.79		32+66.46		60" RCP	2641.28	385.00	2645.16	23.55	2663.17		OK
1244.79		32+66.46		60" RCP	2641.28	365.00	2644.71	25.45	2663.17		OK
1597.27		N/A	SD-8	60" RCP	2651.73	365.00	2655.16	25.44	2669.89		OK
1997.27		30+41.56	SD-7	60" RCP	2663.58	365.00	2667.01	25.44	2680.01		OK
2397.27		28+62.79		60" RCP	2675.43	365.00	2678.86	25.42	2688.17		OK
2797.27		26+84.03	SD-6	60" RCP	2687.29	365.00	2690.76	25.10	2702.00		OK
3197.27		25+05.27		60" RCP	2699.14	365.00	2702.88	23.19	2711.59		OK
3597.27		23+26.51		60" RCP	2709.34	365.00	2714.18	18.77	2725.00		OK
3633.27		21+47.74	SD-5	6' x 6' RCB	2710.26	365.00	2718.84	10.14	2725.00		OK
3713.51		19+68.98		6' x 6' RCB	2712.30	365.00	2719.28	10.14	2725.00		OK
3713.51		17+90.22		6' x 6' RCB	2712.30	246.00	2720.40	6.83	2725.00		OK
3721.27		16+11.45		6' x 6' RCB	2712.50	246.00	2720.42	6.83	2724.00		OK
3854.27		14+32.69		6' x 6' RCB	2713.17	246.00	2720.69	6.83	2724.00		OK
3854.27		12+53.93		6' x 6' RCB	2713.17	246.00	2720.69	6.83	2724.00		OK

NCR3.WSW

T1 EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE UP2

T2 MOCCASIN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR3)

T3 FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2

50	1000.0002626.960 60	2631.960
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[illegible]

Case	Year	Age	Sex	Occupation	Education	Marital Status	Religion	Political Party	Income	Assets	Liabilities	Net Worth	Assets	Liabilities	Net Worth
1	1987	45	M	Teacher	High School	Married	Catholic	Democrat	\$10,000	\$50,000	\$10,000	\$40,000	\$10,000	\$50,000	\$40,000
2	1987	45	F	Homemaker	High School	Married	Catholic	Democrat	\$10,000	\$50,000	\$10,000	\$40,000	\$10,000	\$50,000	\$40,000
3	1987	45	M	Teacher	High School	Married	Catholic	Democrat	\$10,000	\$50,000	\$10,000	\$40,000	\$10,000	\$50,000	\$40,000
4	1987	45	F	Homemaker	High School	Married	Catholic	Democrat	\$10,000	\$50,000	\$10,000	\$40,000	\$10,000	\$50,000	\$40,000
5	1987	45	M	Teacher	High School	Married	Catholic	Democrat	\$10,000	\$50,000	\$10,000	\$40,000	\$10,000	\$50,000	\$40,000
6	1987	45	F	Homemaker	High School	Married	Catholic	Democrat	\$10,000	\$50,000	\$10,000	\$40,000	\$10,000	\$50,000	\$40,000
7	1987	45	M	Teacher	High School	Married	Catholic	Democrat	\$10,000	\$50,000	\$10,000	\$40,000	\$10,000	\$50,000	\$40,000
8	1987	45	F	Homemaker	High School	Married	Catholic	Democrat	\$10,000	\$50,000	\$10,000	\$40,000	\$10,000	\$50,000	\$40,000
9	1987	45	M	Teacher	High School	Married	Catholic	Democrat	\$10,000	\$50,000	\$10,000	\$40,000	\$10,000	\$50,000	\$40,000
10	1987	45	F	Homemaker	High School	Married	Catholic	Democrat	\$10,000	\$50,000	\$10,000	\$40,000	\$10,000	\$50,000	\$40,000

Run	Time (min)	Conc. (mg/L)	Flow (L/min)	Temp. (°C)
1	10.0	1.0	1.0	25.0
2	10.0	1.0	1.0	25.0
3	10.0	1.0	1.0	25.0
4	10.0	1.0	1.0	25.0
5	10.0	1.0	1.0	25.0
6	10.0	1.0	1.0	25.0
7	10.0	1.0	1.0	25.0
8	10.0	1.0	1.0	25.0
9	10.0	1.0	1.0	25.0
10	10.0	1.0	1.0	25.0
11	10.0	1.0	1.0	25.0
12	10.0	1.0	1.0	25.0
13	10.0	1.0	1.0	25.0
14	10.0	1.0	1.0	25.0
15	10.0	1.0	1.0	25.0
16	10.0	1.0	1.0	25.0
17	10.0	1.0	1.0	25.0
18	10.0	1.0	1.0	25.0
19	10.0	1.0	1.0	25.0
20	10.0	1.0	1.0	25.0
21	10.0	1.0	1.0	25.0
22	10.0	1.0	1.0	25.0
23	10.0	1.0	1.0	25.0
24	10.0	1.0	1.0	25.0
25	10.0	1.0	1.0	25.0
26	10.0	1.0	1.0	25.0
27	10.0	1.0	1.0	25.0
28	10.0	1.0	1.0	25.0
29	10.0	1.0	1.0	25.0
30	10.0	1.0	1.0	25.0
31	10.0	1.0	1.0	25.0
32	10.0	1.0	1.0	25.0
33	10.0	1.0	1.0	25.0
34	10.0	1.0	1.0	25.0
35	10.0	1.0	1.0	25.0
36	10.0	1.0	1.0	25.0
37	10.0	1.0	1.0	25.0
38	10.0	1.0	1.0	25.0
39	10.0	1.0	1.0	25.0
40	10.0	1.0	1.0	25.0
41	10.0	1.0	1.0	25.0
42	10.0	1.0	1.0	25.0
43	10.0	1.0	1.0	25.0
44	10.0	1.0	1.0	25.0
45	10.0	1.0	1.0	25.0
46	10.0	1.0	1.0	25.0
47	10.0	1.0	1.0	25.0
48	10.0	1.0	1.0	25.0
49	10.0	1.0	1.0	25.0
50	10.0	1.0	1.0	25.0
51	10.0	1.0	1.0	25.0
52	10.0	1.0	1.0	25.0
53	10.0	1.0	1.0	25.0
54	10.0	1.0	1.0	25.0
55	10.0	1.0	1.0	25.0
56	10.0	1.0	1.0	25.0
57	10.0	1.0	1.0	25.0
58	10.0	1.0	1.0	25.0
59	10.0	1.0	1.0	25.0
60	10.0	1.0	1.0	25.0
61	10.0	1.0	1.0	25.0
62	10.0	1.0	1.0	25.0
63	10.0	1.0	1.0	25.0
64	10.0	1.0	1.0	25.0
65	10.0	1.0	1.0	25.0
66	10.0	1.0	1.0	25.0
67	10.0	1.0	1.0	25.0
68	10.0	1.0	1.0	25.0
69	10.0	1.0	1.0	25.0
70	10.0	1.0	1.0	25.0
71	10.0	1.0	1.0	25.0
72	10.0	1.0	1.0	25.0
73	10.0	1.0	1.0	25.0
74	10.0	1.0	1.0	25.0
75	10.0	1.0	1.0	25.0
76	10.0	1.0	1.0	25.0

	1244	7902641	280 60 24	.013	20 0	2644 280	90 0	45.0	1
K	1244	7902641	280 60	.013					
JX	1244	7902641	280 60 24	.013	20 0	2644 280	90 0	45.0	1

JA	1244.7502041	1.280	00	24	.013	20.0	2044.280	90.0
R	1597	2702651	730	60	013			0 0 1

K	1357.2702851	730 60	.013	0.0	1
R	1997 2702663	580 60	013	0.0	1

K	1997.2702065	.380	60	.013
R	2397	2702675	130	60
				.013

K	2397.2702675.430	00	.013
P	2797	2702687	200
			60
			013

K	2751.2702687.290 60	.013
R	3197 2702699 140 60	.013

R	3197.2702699.140 60	.013
P	3507 7702700 340 60	012

R	3597.2702709.340	60	.013
TS	3522.2702710.250	0	.012

IS	3633.2702710.258	8	.013
D	2712	5103712	200
			0
			012

[illegible]

JX	3/13.5102/12.300	8 48	.013	119.0	2713.300	50.0
D	3731	3703712	503	0	012	

R	3/21.2702712.502	8	.013
D	3054	3703712	170
D			013

R	3854.2702713.170	8	.013
CU	3854.2702713.157	0	

SH 3854.2702713.167 8

CD	5	3	0	0.000	11.000	10.000	0.000	0.0000.00	0.00
CD	5	3	0	0.000	11.000	10.000	0.000	0.0000.00	0.00

[illegible]

CD	24	4	1	0,000	2,000	0,000	0,000	0,000	0,000
CD	24	4	1	0,000	2,000	0,000	0,000	0,000	0,000

CD	30	4	1	0.000	2.500	0.000	0.000	0.000.00	0.00
CD	30	4	1	0.000	2.500	0.000	0.000	0.0000.00	0.00

CD	36	4	1	0.000	3.000	0.000	0.000	0.000.00	0.00
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CD	42	4	1	0.000	3.500	0.000	0.000	0.000	0.000	0.000
CD	42	4	1	0.000	3.500	0.000	0.000	0.000	0.000	0.000

CD	48	4	1	0.000	4.000	0.000	0.000	0.000.00	0.00
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CD	54	4	1	0.000	4.500	0.000	0.000	0.000.00	0.00
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CD	60	4	1	0.000	5.000	0.000	0.000	0.000	0.000
CD	60	4	1	0.000	5.000	0.000	0.000	0.000	0.000

CD	66	4	1	0.000	5.500	0.000	0.000	0.000.00	0.00
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CD	72	4	1	0.000	6.000	0.000 0.000 0.000 0.000 0.000
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CD	8	3	0	0.01
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00
31	0.00	0.00	0.00	0.00
32	0.00	0.00	0.00	0.00
33	0.00	0.00	0.00	0.00
34	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00
36	0.00	0.00	0.00	0.00
37	0.00	0.00	0.00	0.00
38	0.00	0.00	0.00	0.00
39	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00
41	0.00	0.00	0.00	0.00
42	0.00	0.00	0.00	0.00
43	0.00	0.00	0.00	0.00
44	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00
46	0.00	0.00	0.00	0.00
47	0.00	0.00	0.00	0.00
48	0.00	0.00	0.00	0.00
49	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00
51	0.00	0.00	0.00	0.00
52	0.00	0.00	0.00	0.00
53	0.00	0.00	0.00	0.00
54	0.00	0.00	0.00	0.00
55	0.00	0.00	0.00	0.00
56	0.00	0.00	0.00	0.00
57	0.00	0.00	0.00	0.00
58	0.00	0.00	0.00	0.00
59	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00
61	0.00	0.00	0.00	0.00
62	0.00	0.00	0.00	0.00
63	0.00	0.00	0.00	0.00
64	0.00	0.00	0.00	0.00
65	0.00	0.00	0.00	0.00
66	0.00	0.00	0.00	0.00
67	0.00	0.00	0.00	0.00
68	0.00	0.00	0.00	0.00
69	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00
71	0.00	0.00	0.00	0.00
72	0.00	0.00	0.00	0.00
73	0.00	0.00	0.00	0.00
74	0.00	0.00		

CD	5	3	0	.000	11.000	10.000	.000	.000	.00
CD	18	4	1		1.500				
CD	24	4	1		2.000				
CD	30	4	1		2.500				
CD	36	4	1		3.000				
CD	42	4	1		3.500				
CD	48	4	1		4.000				
CD	54	4	1		4.500				
CD	60	4	1		5.000				
CD	66	4	1		5.500				
CD	72	4	1		6.000				
CD	8	3	0	.000	6.000	6.000	.000	.000	.00

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE UP2

HEADING LINE NO 2 IS -

MOCCASIN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR3)

HEADING LINE NO 3 IS -

FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2

PAGE NO 2

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

W S ELEV
2631.960

ELEMENT NO	1 IS A SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H
ELEMENT NO	2 IS A REACH	U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H
ELEMENT NO	3 IS A REACH	U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H
ELEMENT NO	4 IS A REACH	U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H
ELEMENT NO	5 IS A JUNCTION	U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H
			1000.000	2626.960	60	.000	.000	.000	1
			1024.000	2627.370	60	.000	.000	.000	1
			1087.710	2631.860	60	.000	.000	45.000	1
			1244.790	2641.280	60	.000	.000	45.000	1
			1244.790	2641.280	60	.000	.000	90.000	.000

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

ELEMENT NO	6 IS A REACH	U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H
ELEMENT NO	7 IS A REACH	U/S DATA	STATION	INVERT	SECT	RADIUS	ANGLE	ANG PT	MAN H
			1597.270	2651.730	60	.000	.000	.000	1

ELEMENT NO	8 IS A REACH	1997.270	2663.580	60	*	NCR3.EDT	.013	.000	.000	1
	U/S DATA	STATION	INVERT	SECT					ANGLE	ANG PT MAN H
ELEMENT NO 9	IS A REACH	2397.270	2675.430	60	*		.013	.000	.000	1
	U/S DATA	STATION	INVERT	SECT					ANGLE	ANG PT MAN H
ELEMENT NO 10	IS A REACH	2797.270	2687.290	60	*		.013	.000	.000	1
	U/S DATA	STATION	INVERT	SECT					ANGLE	ANG PT MAN H
ELEMENT NO 11	IS A REACH	3197.270	2699.140	60	*		.013	.000	.000	1
	U/S DATA	STATION	INVERT	SECT					ANGLE	ANG PT MAN H
		3597.270	2709.340	60	*		.013	.000	.000	0
										PAGE NO 3
WATER SURFACE PROFILE - ELEMENT CARD LISTING										
ELEMENT NO 12	IS A TRANSITION	3633.270	2710.258	8	*		.013	.000	.000	
	U/S DATA	STATION	INVERT	SECT					ANGLE	
ELEMENT NO 13	IS A REACH	3713.510	2712.300	8	*		.013	.000	.000	1
	U/S DATA	STATION	INVERT	SECT					ANGLE	ANG PT MAN H
ELEMENT NO 14	IS A JUNCTION	3713.510	2712.300	8	*		.013	.000	.000	1
	U/S DATA	STATION	INVERT	SECT					ANGLE	ANG PT MAN H
		3713.510	2712.300	8	*		.013	.000	.000	0
										PAGE NO 3
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING										
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING										
ELEMENT NO 15	IS A REACH	3721.270	2712.502	8	*		.013	.000	.000	0
	U/S DATA	STATION	INVERT	SECT					ANGLE	ANG PT MAN H
ELEMENT NO 16	IS A REACH	3854.270	2713.170	8	*		.013	.000	.000	0
	U/S DATA	STATION	INVERT	SECT					ANGLE	ANG PT MAN H
ELEMENT NO 17	IS A SYSTEM HEADWORKS	3854.270	2713.167	8	*		.013	.000	.000	0
	U/S DATA	STATION	INVERT	SECT					ANGLE	ANG PT MAN H
										PAGE NO 3

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EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE UP2
MOCCASIN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR3)
FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top Dia.-ft	Height/ft or I.D.	Base Wt	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall		ZR	Type Ch
1000.000	2626.960	3.065	2630.025	385.00	30.51	14.45	2644.48	.00	4.87	4.87	5.000	.000	.00	.00	1 .0
24.000	.0171					.0469	1.13	3.07	3.34	5.00	.013	.00	.00	.00	PIPE
1024.000	2627.370	2.998	2630.368	385.00	31.33	15.24	2645.61	.00	4.87	4.90	5.000	.000	.00	.00	1 .0
17.443	.0705					.0476	.83	3.00	3.49	2.67	.013	.00	.00	.00	PIPE
1041.443	2628.599	3.034	2631.634	385.00	30.88	14.80	2646.44	.00	4.87	4.88	5.000	.000	.00	.00	1 .0
46.267	.0705					.0441	2.04	3.03	3.41	2.67	.013	.00	.00	.00	PIPE
1087.710	2631.860	3.160	2635.020	385.00	29.44	13.46	2648.48	.00	4.87	4.82	5.000	.000	.00	.00	1 .0
37.932	.0600					.0398	1.51	3.16	3.15	2.80	.013	.00	.00	.00	PIPE
1125.642	2634.135	3.250	2637.385	385.00	28.49	12.61	2649.99	.00	4.87	4.77	5.000	.000	.00	.00	1 .0
42.108	.0600					.0361	1.52	3.25	2.98	2.80	.013	.00	.00	.00	PIPE
1167.749	2636.660	3.390	2640.050	385.00	27.17	11.46	2651.51	.00	4.87	4.67	5.000	.000	.00	.00	1 .0
32.015	.0600					.0321	1.03	3.39	2.75	2.80	.013	.00	.00	.00	PIPE
1199.764	2638.580	3.540	2642.120	385.00	25.90	10.42	2652.54	.00	4.87	4.55	5.000	.000	.00	.00	1 .0
25.078	.0600					.0287	.72	3.54	2.52	2.80	.013	.00	.00	.00	PIPE
1224.842	2640.084	3.702	2643.786	385.00	24.70	9.47	2653.26	.00	4.87	4.38	5.000	.000	.00	.00	1 .0
19.948	.0600					.0257	.51	3.70	2.31	2.80	.013	.00	.00	.00	PIPE
1244.790	2641.280	3.880	2645.160	385.00	23.55	8.61	2653.77	.00	4.87	4.17	5.000	.000	.00	.00	1 .0
JUNCT STR .0000						.0270	.00	3.88	2.10		.013	.00	.00	.00	PIPE

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EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE UP2
MOCCASIN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR3)
FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2

NCR3.OUT

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top Width	Height/Dia.-FT or I.D.	Base Wt or I.D.	ZL	No Wth Prs/pip
L/Elem	Ch Slope														
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1244.790	2641.280	3.426	2644.706	365.00	25.45	10.06	2654.77	.00	4.84	4.64	5.000	.000	.00	1	.0
352.480	.0296	-	-	-	-	.0296	10.45	3.43	2.55	3.43	.013	.00	.00	PIPE	
1597.270	2651.730	3.427	2655.157	365.00	25.44	10.05	2665.21	.00	4.84	4.64	5.000	.000	.00	1	.0
400.000	.0296	-	-	-	-	.0296	11.85	3.43	2.55	3.43	.013	.00	.00	PIPE	
1997.270	2663.580	3.428	2667.008	365.00	25.44	10.05	2677.06	.00	4.84	4.64	5.000	.000	.00	1	.0
400.000	.0296	-	-	-	-	.0296	11.84	3.43	2.55	3.43	.013	.00	.00	PIPE	
2397.270	2675.430	3.430	2678.860	365.00	25.42	10.03	2688.89	.00	4.84	4.64	5.000	.000	.00	1	.0
400.000	.0297	-	-	-	-	.0291	11.64	3.43	2.55	3.43	.013	.00	.00	PIPE	
2797.270	2687.290	3.470	2690.760	365.00	25.10	9.78	2700.54	.00	4.84	4.61	5.000	.000	.00	1	.0
248.933	.0296	-	-	-	-	.0276	6.88	3.47	2.49	3.43	.013	.00	.00	PIPE	
3046.203	2694.665	3.572	2698.237	365.00	24.32	9.18	2707.42	.00	4.84	4.52	5.000	.000	.00	1	.0
151.067	.0296	-	-	-	-	.0252	3.81	3.57	2.35	3.43	.013	.00	.00	PIPE	
3197.270	2699.140	3.738	2702.877	365.00	23.19	8.35	2711.23	.00	4.84	4.34	5.000	.000	.00	1	.0
115.522	.0255	-	-	-	-	.0233	2.69	3.74	2.15	3.63	.013	.00	.00	PIPE	
3312.792	2702.086	3.813	2705.898	365.00	22.72	8.01	2713.91	.00	4.84	4.26	5.000	.000	.00	1	.0
139.418	.0255	-	-	-	-	.0216	3.02	3.81	2.06	3.63	.013	.00	.00	PIPE	
3452.209	2705.641	4.003	2709.644	365.00	21.66	7.29	2716.93	.00	4.84	4.00	5.000	.000	.00	1	.0
76.071	.0255	-	-	-	-	.0196	1.49	4.00	1.86	3.63	.013	.00	.00	PIPE	
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EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE UP2
MOCCASIN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR3)
FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2

WATER SURFACE PROFILE LISTING

NCR3.OUT

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top Dia.-FT	Height/ or I.D.	Base Wt	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall		ZR	Type Ch
3528.280	2707.581	4.218	2711.799	365.00	20.65	6.62	2718.42	.00	4.84	3.63	5.000	.000	.00	1	.0
46.377	.0255					.0180	.84	4.22	1.65	3.63	.013	.00	.00	PIPE	
3574.657	2708.763	4.474	2713.238	365.00	19.69	6.02	2719.26	.00	4.84	3.07	5.000	.000	.00	1	.0
22.613	.0255					.0173	.39	4.47	1.41	3.63	.013	.00	.00	PIPE	
3597.270	2709.340	4.837	2714.177	365.00	18.77	5.47	2719.65	.00	4.84	1.77	5.000	.000	.00	1	.0
TRANS STR	.0255					.0046	.16	4.84	1.00		.013	.00	.00	PIPE	
3633.270	2710.258	8.577	2718.835	365.00	10.14	1.60	2720.43	.00	4.86	6.00	6.000	6.000	.00	0	.0
80.240	.0254					.0046	.37	8.58	.73	2.66	.013	.00	.00	BOX	
3713.510	2712.300	6.982	2719.282	365.00	10.14	1.60	2720.88	.00	4.86	6.00	6.000	6.000	.00	0	.0
JUNCT STR	.0000					.0021	.00	6.98	.73		.013	.00	.00	BOX	
3713.510	2712.300	8.100	2720.400	246.00	6.83	.73	2721.13	.00	3.74	6.00	6.000	6.000	.00	0	.0
7.760	.0260					.0021	.02	8.10	.49	1.98	.013	.00	.00	BOX	
3721.270	2712.502	7.914	2720.416	246.00	6.83	.73	2721.14	.00	3.74	6.00	6.000	6.000	.00	0	.0
133.000	.0050					.0021	.28	7.91	.49	3.63	.013	.00	.00	BOX	
3854.270	2713.170	7.523	2720.693	246.00	6.83	.73	2721.42	.00	3.74	6.00	6.000	6.000	.00	0	.0

EST1905: SUNSTONE PHASE 1 INFRASTRUCTURE UP2

MOCCASIN NORTH COLLECTOR ROAD STORM DRAIN SYSTEM (NCR3)

FROM PROPOSED BASIN EAA1 TO PROPOSED BASIN EMR2

1000.00	.I W H E	R
1055.97	.I W H E	R
1111.93	. I W CH E	R
1167.90	. I W H E	R
1223.86	. I WH E	R
1279.83	. I W H E	R
1335.80	. I WH E	R
1391.76	. I W H E	R
1447.73	. I WH E	JX
1503.69	. I W H E	R
1559.66	.	*
1615.63	. I W H E	R
1671.59	.	*
1727.56	.	*
1783.53	.	*
1839.49	.	*
1895.46	.	*

NCR3.OUT

1951.42	*					*
2007.39	*	I	WCH	E		R
2063.36	*					*
2119.32	*					*
2175.29	*					*
2231.25	*					*
2287.22	*					*
2343.19	*					*
2399.15	*	I	W H	E		R
2455.12	*					*
2511.08	*					*
2567.05	*					*
2623.02	*					*
2678.98	*					*
2734.95	*					*
2790.91	*					*
2846.88	*	I	WCH	E		R

NCR3.OUT

3854.27 . I C H WE . R
2626.960 2636.406 2645.852 2655.297 2664.743 2674.189 2683.635 2693.081 2702.526 2711.972 2721.418

N O T E S

1. GLOSSARY

- I = INVERT ELEVATION
- C = CRITICAL DEPTH
- W = WATER SURFACE ELEVATION
- S = SUPER-ELEVATION
- H = HEIGHT OF CHANNEL
- E = ENERGY GRADE LINE
- X = CURVES CROSSING OVER
- B = BRIDGE ENTRANCE OR EXIT
- Y = WALL ENTRANCE OR EXIT

2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

APPENDIX C

Improvement Plans & CD of Electronic Files (PDF)