



TECHNICAL DRAINAGE STUDY UPDATE NO.6

Skye Canyon Ph-2 Infrastructure

JUNE 2020

PREPARED FOR:

Ninety-Five Management, LLC
Las Vegas, Nevada

PREPARED BY:

Westwood

Westwood

Skye Canyon Ph-2 Infrastructure

Technical Drainage Study Update No.6

City of Las Vegas, Nevada

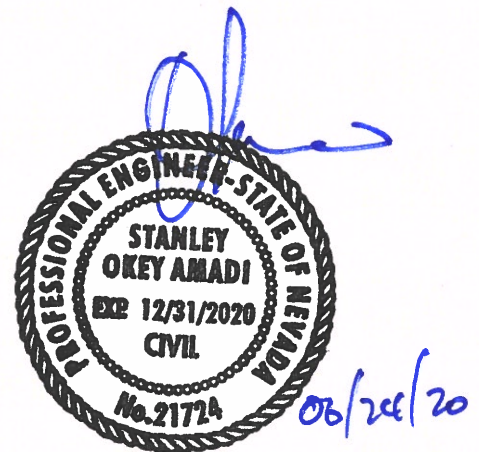
Prepared For:

Ninety-Five Management, LLC
11411 Southern Highlands Parkway, Suite 2
Las Vegas, NV 89141
Phone: 702-220-6565
Fax: 702-220-6566

Prepared By:

Westwood Professional Services
5740 S. Arville Street, Suite 216
Las Vegas, NV 89118
Phone: (702) 284-5300
Fax: (702) 284-5339

Project Number: OLY1501.001
Date: June 2020



Stanley Okey Amadi, P.E., CFM
NV Professional Engineer No. 21724
Assisted by: Abhusan Achhami

OLY1501.001

June 24, 2020

Jennifer Shinn, P.E.
City of Las Vegas
333 Rancho Drive (7th Floor)
Las Vegas, NV 89101

Subject: Technical Drainage Study Update No.6 for Skye Canyon Ph-2 Infrastructure

Ms. Shinn:

This letter certifies that all items provided on electronic submittal CD for the *Technical Drainage Study Update No.6 for Skye Canyon Ph-2 Infrastructure* matches the bound paper version.

Respectfully Submitted,
WESTWOOD PROFESSIONAL SERVICES



Stanley Okey Amadi, P.E., CFM
Project Manager – Flood Control Division

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: Skye Canyon – Phase 2 Infrastructure - Update No.6 Date: June 2020
Location of Development: a) Descriptive (Cross Streets): North/South: Skye Village Road
East/West: Grand Teton Drive
b) Section: 12 Township: 19 South Range: 59 East
c) APN: 126-12-799-001

Name of Owner/Developer: Public Right-of-Way / Ninety-Five Management, LLC
Telephone No.: 702-220-6565 Fax No.: 702-220-6566 E-mail Address: mbolduc@olympiacompanies.com
Address: 11411 Southern Highlands Parkway, Suite 300; Las Vegas, NV 89141

Contact Person – Name: Stanley Okey Amadi, P.E., CFM Telephone No.: 702-284-5300
*E-mail Address: Stanley.amadi@westwoodps.com Fax No.: 702-284-5399
Firm: Westwood PS
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	☒ Roadway & Storm Drain Infrastructure

1. Total Owned Land Area: At Site: 2.56 Acres +/- Being Developed/Disturbed: 2.56 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.): Roadway & Storm Drain Infrastructure

5. Approximate upstream land area which drains to the subject site: 48 acres +/-

6. Has the site drainage been evaluated in the past? ☒ Yes** ☐ No If yes, please identify documentation: Technical Drainage Study for Skye Canyon Phase 2 Infrastructure (SHG, DS4739) & TDS Updates 1 thru 5

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Eagle Canyon Avenue Storm Drain

8. Briefly describe your proposed schedule for the subject project: ASAP – As-built Update Study



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

Revision	Date

Local Entity File No. _____

REFERENCE: **Westwood Job No. OLY1501.001**

STANDARD FORM 1

Updated 05/01/2008

OLY1501-001

June 24, 2020

Ms. Jennifer Shinn, P.E.
Flood Control Engineering Associate - City of Las Vegas Public Works
333 N. Ranch Drive
Las Vegas, Nevada 89106

Subject: Technical Drainage Study Update No.6 for Skye Canyon Ph-2 Infrastructure (DS4739)

Dear Ms. Shinn:

This letter is intended to serve as the *Technical Drainage Study Update No. 6 for Skye Canyon Ph-2 Infrastructure* (hereinafter referred to as the Update 6 Study). The proposed improvements for the site have been fully installed. However, some drop inlets (SDDI 27, 28, 33 & 34) along Eagle Canyon Avenue were installed slightly off horizontally from the designed locations. Hence CLV staff has requested that an update to the approved study with revised plans be provided to reflect the as-built condition.

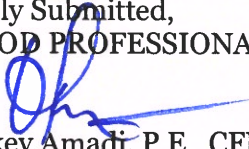
Revisions and Lateral Storm Drain Hydraulics

The inlets as constructed deviated slightly to the east. SDDI 27 shifted 7.2-ft, SDDI 29 shifted 2.5-ft while SDDI 33 & SDDI 34 shifted 2.2-ft and 1.7-ft respectively. As a result, the inlet laterals became slightly shorter than proposed. Note that the lateral for SDDI 27 was connected at a 90-degree angle to the mainline as opposed to the 60-degrees angle proposed. However, any additional loss that might result from the change in in angle is considered negligible. Thus, the mainline hydraulic model has not been updated. It should also be noted that although, the inlet lateral storm drains are now slightly shorter than proposed, the anticipated loss due to friction will also be reduced accordingly. Nonetheless, the Standard Form 6 lateral loss calculation has been provided for all the inlet laterals. The calculations indicate that the storm drain laterals still have adequate capacity for the design flows and will still maintain the HGLs at more than 1.0-ft below the inlet grate elevations. Thus, the storm drain laterals and as built still satisfies criteria.

Conclusions

Based on the revised lateral loss computations, the installed storm drain facilities are still in compliance with the CCRFCD Manual and will function as intended. The as-built plans including the storm drain plan and profiles sheets have been included in Appendix B to support the hydraulic computations and conclusions detailed in this update study. If you have any questions or require additional information, please do not hesitate to contact us at (702) 284-5300.

Respectfully Submitted,
WESTWOOD PROFESSIONAL SERVICES



Stanley Okey Amadi, P.E., CFM
Project Manager – Flood Control Division
pc: Mark Failla, P.E., CFM – Westwood PS
Jerry Slater, P.E. – Westwood PS

APPENDIX

Appendix A – CLV Email Coordination Thread

Appendix B – Revised Standard Form 6 lateral Loss Computations

Appendix C – Reference Materials

Technical Drainage Study Update No.4 for Skye Canyon Phase 2 Infrastructure

- Approval Letters
- Report Excerpts
- Mainline WSPG Model
- Drainage Facilities Exhibit

Appendix D – CD of Electronic Files & Revised Improvement Plans

APPENDIX A

CLV Email Coordination Thread

Stanley Amadi

From: Lant Leavitt
Sent: Monday, June 15, 2020 9:58 AM
To: Ben Morris; Bobby Williamson
Cc: Stanley Amadi; Mark Failla; Jerry Slater; Josh Johnson
Subject: FW: H63875 SD
Attachments: SKYE CANYON2-PHASE2-SD-PNTS-NCRS.TXT

Follow Up Flag: Follow up
Flag Status: Flagged

Ben/Bobby,

See email below. CLV is requiring a TDS Update for Skye Canyon Phase 2 Infrastructure to address deviations to locations of constructed facilities.

Lant Leavitt, P.E.
PROJECT MANAGER II
lant.leavitt@westwoodps.com

Direct (702) 284-5360
Main (702) 284-5300

Westwood
Multi-Disciplined Surveying & Engineering
5740 S. Arville Street, Suite 216 | Las Vegas, NV 89118

westwoodps.com
(888) 937-5150

From: Jennifer Shinn <jshinn@LasVegasNevada.GOV>
Sent: Monday, June 15, 2020 9:44 AM
To: Lant Leavitt <Lant.Leavitt@westwoodps.com>
Cc: Albert Sung <YSung@LasVegasNevada.GOV>
Subject: FW: H63875 SD

Good morning Lant,

Flood Control received a Final Location Map notification that several SD facilities deviated from the plan (see email thread below). These facilities were a part of the Skye Canyon Phase 2 Infrastructure (DS4739). A hold has been placed on the bond release until the drainage study update and IP revision(s) to address the deviations are approved.

Thank you,

Jennifer Shinn
Engineering Associate
Department of Public Works | City Engineering Division
Phone: (702) 229-6131
333 N. Rancho, floor | Las Vegas, NV 89106



lasvegasnevada.gov



Your opinion is important! Click [here](#) to take a short survey.

From: Albert Sung <YSung@LasVegasNevada.GOV>

Sent: Monday, June 15, 2020 9:21 AM

To: Jennifer Shinn <jshinn@LasVegasNevada.GOV>

Subject: FW: H63875 SD

Jen,

Can you find out what study the following deviation is related to? After we know what study it is, we can email the engineer to require a DS Update.

Thanks.

Albert Y. Sung

Project Engineer

Public Works Dept. / Flood Control

(702) 229-6541

333 N. Rancho Dr. 7th Floor

Las Vegas, NV 89106



lasvegasnevada.gov



Your opinion is important! Click [here](#) to take a short survey.

From: Oh-Sang Kwon <okwon@LasVegasNevada.GOV>

Sent: Monday, June 15, 2020 9:09 AM

To: Luis Morales <lmorales@LasVegasNevada.GOV>; Albert Sung <YSung@LasVegasNevada.GOV>

Cc: Michael Cunningham <mcunningham@LasVegasNevada.GOV>; Mark Dwillis <mdwillis@LasVegasNevada.GOV>

Subject: FW: H63875 SD

Luis,

Please place a hold on offsite bond release until revision and updated drainage study is approved.

Albert,

Please ask for drainage study update and revision to approved plan for these deviations.

Thank you,

Oh Sang Kwon

Engineering Project Manager

Public Works | City Engineering

702-229-1815 | 702-379-9491

333 N. Rancho Drive, 7th Floor | Las Vegas, NV 89106



lasvegasnevada.gov



Your opinion is important! Click [here](#) to take a short survey.

From: Mark Dwillis <mdwillis@LasVegasNevada.GOV>

Sent: Monday, June 15, 2020 8:54 AM

To: Oh-Sang Kwon <okwon@LasVegasNevada.GOV>

Subject: RE: H63875 SD

Sorry, I meant to put that in the text. Yes it is. I have also attached the point file since I forgot to do that previously.

Mark

From: Oh-Sang Kwon <okwon@LasVegasNevada.GOV>

Sent: Monday, June 15, 2020 7:57 AM

To: Mark Dwillis <mdwillis@LasVegasNevada.GOV>

Subject: FW: H63875 SD

Is this Mass Grading for Skye Canyon Phase 2?

Thank you,

Oh Sang Kwon

Engineering Project Manager

Public Works | City Engineering

702-229-1815 | 702-379-9491

333 N. Rancho Drive, 7th Floor | Las Vegas, NV 89106



lasvegasnevada.gov



Your opinion is important! Click [here](#) to take a short survey.

From: Mark Dwillis <mdwillis@LasVegasNevada.GOV>

Sent: Monday, June 15, 2020 7:47 AM

To: Oh-Sang Kwon <okwon@LasVegasNevada.GOV>

Subject: H63875 SD

Good morning,

H63875 SD UFLS is completed and approved with the following deviations found.

Structure	Horizontal	Vertical	Remarks
SDDI 27	±7.2'		
SDDI 29	±2.5'		
SDDI 33	±2.2		
SDDI 34	±1.7		

Mark Dwillis

Sr. Engineering Associate

Department of Public Works | Survey

702-229-4865

Development Services Center (DSC) 8th Floor

333 N. Rancho Dr., Las Vegas, Nevada 89106



lasvegasnevada.gov



Your opinion is important! Click [here](#) to take a short survey.

APPENDIX B

Revised Standard Form 6 Lateral Loss Computations

APPENDIX C

Reference Material – Technical Drainage Study Update No.4 for
Skye Canyon Phase Infrastructure, By SHG

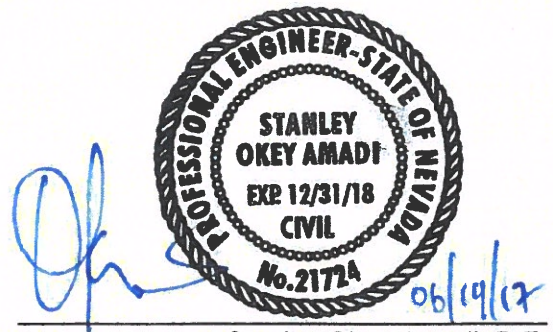
TECHNICAL DRAINAGE STUDY UPDATE No.4

**Skye Canyon
(Phase 2 Infrastructure)**
City of Las Vegas, Nevada

Job No.: OLY1501.001
Date: June 2017

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:
Ninety-Five Management, LLC
11411 Southern Highlands Parkway, Suite 300
Las Vegas, NV 89141
Phone: 702-220-6565 • Fax: 702-220-6566



Stanley Okey Amadi, P.E.
NV Professional Engineer No. 21724

Assisted by: Erick Mata, E.I

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		August 17, 2017
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for:	
	Skye Canyon – Phase 2 Infrastructure Update #4	
Cross Streets:	NWC of Grand Teton Blvd. & Hualapai Way	Section 12, LLC / Ninety Five Mgmt.
File Number:	F:\Depot\DSMemos\DS4739H.doc	Bart Anderson, P.E., DevCo
Parcel Number:	Portion of 126-12-000-001	CCRFC
Zoning Action:	TMP-58560	
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES X	NO

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal & Supplemental	6/18/2015, 8/4/2015	8/26/2015	Not Approved	\$400.00	402578: \$400
2 nd Submittal	10/19/2015	11/02/2015	Not Approved	\$400.00	419048: \$400
3 rd Submittal	11/19/2015 & Supplemental	1/7/2016	Conditional Approval	\$400.00	423549: \$400
4 th Submittal	4/4/2016	4/13/2016	Conditional Approval	\$100.00	438958: \$100
5 th Submittal & CCRFC	5/12/2016 & 5/16/2016	6/8/2016 & 6/21/2016	Conditional Approval	\$100.00	443735: \$100
6 th Submittal	12/15/2016 & 1/17/2017	1/19/2017	Conditional Approval	\$100.00	469104: \$100
7 th Submittal	6/19/2017	7/10/2017	Not Approved	\$100.00	488195: \$100
8 th Submittal	8/2/2017	8/17/2017	See Comments Below	\$400.00	489157: \$400
TOTAL FEES (LDDRS):				\$2,000.00	----

REMARKS:

7th & 8th Submittals: Update #4 & Addendum for minor relocations of drop inlets and the discharge stub of Parcel 2.27

6th Submittal: Update #3 Revise storm drain system capture and collection points based upon Parcel development.

5th Submittal: Update #2 and CCRFC concurrence received. Revised Memo on 6/21/2016, Approved "At Risk".

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

X	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is approved "At Risk" subject to the final approval of the Revised Master Drainage Study.

The following conditions are repeated until they are complete:

A Flood Control Master Plan Amendment (MPA) shall be updated to reflect the latest Master Plan for the Skye Canyon Development and approved by the City prior to submitting residential development plans outside of the shadow of protection from Detention Basin #1 and outside of the limits of the Phase 2 pods.

Detention Basin #1 and the Phase 2 Infrastructure are required to be substantially complete prior to the final inspection of the first Unit in Phase 2. No Certificate of Occupancy on the houses will be issued until after the detention basin has been accepted for Substantial Completion by the City.

1. Note that the **Skye Canyon Master Drainage Study** has not been approved in the current stage. The subject **Skye Canyon Infrastructure Phase 2** drainage study is approved **"At Risk"** until the final approval of the Master Drainage Study. Any changes required by the Master Drainage Study to the Phase 2 area shall require a drainage study update to the **Phase 2 Infrastructure Study** and any required facility changes to the Phase 2 Infrastructure shall be provided at the developers' cost.
2. The **Skye Canyon Phase 2 Development** is based on the sole protection of a planned **Skye Canyon Detention Basin #1** from major storm flood events. The Detention Basin #1 drainage study has been approved.
3. Building Permits for onsite developments within Phase 2 will be issued subject to the construction and substantial completion of the **Skye Canyon Detention Basin #1**. The notice of Substantial Completion from the City of Las Vegas, Department of Public Works is required for the release of Occupancy Permits for any development within Phase 2.
4. The site is adjacent to or crosses an existing or proposed **Clark County Regional Flood Control District (CCRFCD)** master planned facility. CCRFCD concurrence has been provided for the Phase 2 Infrastructure.
5. The impacts to existing downstream neighborhoods of the long term discharge from the detention basin(s) and the Phase 2 developments without the associated regional outfall facilities is a major concern of both the City and the Clark County Regional Flood Control District. Flood Control understands that these interim impacts are addressed with Skye Canyon Detention Basin #1. The proposed interim impact solution was included as a part of the Skye Canyon Detention Basin #1 improvements until the overall Skye Canyon MPU facilities are completed.
6. The drainage study for Phase 2 Infrastructure assumes that the project will be constructed in one phase. It was noted within this Addendum response that the developer desires to phase the construction of the improvements. If improvement plans are submitted to break the Phase 2 Infrastructure into separate phases, a drainage study update will be required for each phase addressing the interim condition.
7. The development of Parcel 2.23B, identified as Parcel WML9 on Exhibit E2, drains through the future park and onto Eagle Canyon (WC10A) near Station 41+00 on Sheet C-03. The roadway plans shall incorporate the proposed drainage facilities as the 60 cfs will impact the 17-foot sidewalk & amenity zone. Provide concrete low flow channel connection through the 17-foot sidewalk & amenity zone.
8. The provided Phase 2 Infrastructure plans only show the proposed drainage facilities. The complete improvement plans will require additional review for impacts with other needed infrastructure; i.e. sanitary sewer, water, gas, etc. Any changes to the proposed storm drain system shall require a drainage study update.
9. The Storm Drain Plans have been revised to accommodate the proposed cross fall street sections and include added nuisance inlets at low points within the intersections.

10. The plans show preliminary mass grading with collection facilities within the parcels to intercept the flows prior to entering the infrastructure roadway improvements. It was noted that the inlet collection system needs to incorporate stormwater quality (SWQ) features and Best Management Practices (BMP's) at these interim collection points. This information will be provided and shown on the SWPPP, a copy of which shall be provided to Flood Control prior to permits. Additionally, the mass grading plan (Sheet GR-03) shows sheet flow from Basin ON2-IB discharging directly onto Hualapai Way without any interim collection. Revise to incorporate interim collection.
11. All drainage facilities proposed in this **Phase 2 Infrastructure Study** are considered interim facilities and must be maintained by the Master Developer until the facilities are dedicated to and formally accepted by the *City of Las Vegas*.
12. Since the streets network and the associated storm drain facilities will eventually be accepted by the City, the engineer must coordinate with *City of Las Vegas Streets & Sanitation Department* for their review and approval prior to the final approval of the subject drainage study.
13. The provided WSPG Model shows that the storm drain in *Eagle Canyon Avenue* exceeds the maximum allowed velocity (25 fps) per the *CCRFCD Hydrologic & Hydraulic Design Manual*. A *Special Construction Note* has been added to the plan & profile sheets that call out the special construction requirement and the required special inspection for the additional sacrificial concrete.
14. Structural plans for the storm drain improvements must be submitted for review. Provide a soil report, structural calculations and specifications, wet stamped structural sets and a grading plan to the *City of Las Vegas Building Department* for processing (call *Building Department* to confirm their submittal requirements). The engineer must provide a copy of *Building Department* approval of the structures to *City Flood Control Section* prior to the final acceptance of the technical drainage study.
15. The project proposes to build temporary drainage berms/swales over the *Phase 2* site. Prior to final plan approval the developer must complete a **Maintenance and Liability Agreement** for the interim drainage improvements and post a minimum maintenance bond of \$50,000 or 50-percent of the construction cost for the improvements, whichever is greater. The engineer must submit an estimate of the quantities for construction the facility and an exhibit that adequately shows the location and limits of the drainage facility 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.
16. Technical drainage studies are required for each of the future PODs. Final approval for the infrastructure study must be obtained prior to final approval of the impacted POD drainage studies.
17. A note on the Grading Plans has been provided that "*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 the vegetation.*"
18. A numbering system for the manholes and inlets has been provided. It was noted in the response that the project may be divided into additional phases.
19. Show the size of all the proposed riprap areas. The rip-rap pads are shown on the GR-Sheets and some of the SD-Sheets include the pad size. Add the pad size to the grading plans and revise all pertinent plans and callouts accordingly.
20. Revise the pipe penetration detail to include a concrete collar with dowelled rebar connections. The detail has not been provided at this time and was noted that it will be a part of the Structural Details.
21. Provide details for the transition structure modifications to accommodate the 66"-RCP connection and the removal of the existing facilities to allow construction of the proposed improvements. The detail has not been provided at this time and was noted that it will be a part of the Structural Details.

NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Update and accepted by the *City of Las Vegas Flood Control Section*. Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the *City of Las Vegas* reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

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

END OF REMARKS
AYS/PBJ

T/R/S: T19S/R59E/12
AREA F-12

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		October 19, 2017
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for:	COPIES TO:
	Skye Canyon – Phase 2 Infrastructure Update #5	Slater Hanifan Group, Inc.
Cross Streets:	NWC of Grand Teton Blvd. & Hualapai Way	Section 12, LLC / Ninety Five Mgmt.
File Number:	F:\Depot\DSMemos\DS4739J.doc	Bart Anderson, P.E., DevCo
Parcel Number:	Portion of 126-12-000-001	CCRFCD
Zoning Action:	TMP-58560	
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES X	NO

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8 th Submittal	8/2/2017	8/17/2017	Approved	\$400.00	489157: \$400
9 th Submittal	9/28/2017	10/19/2017	See Comments Below	\$100.00	490355: \$100
TOTAL FEES (LDDRS):				\$2,100.00	----

REMARKS:

9th Submittal: Update #5 for minor revision of storm drain connection at the intersection of Grand Teton Boulevard and Egan Crest Drive.

7th & 8th Submittals: Update #4 & Addendum for minor relocations of drop inlets and the discharge stub of Parcel 2.27

6th Submittal: Update #3 Revise storm drain system capture and collection points based upon Parcel development.

5th Submittal: Update #2 and CCRFCD concurrence received. Revised Memo on 6/21/2016, Approved "At Risk".

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

X	is approved subject to conformance to all City standards and the following conditions:
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The following conditions are repeated until they are complete:

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Detention Basin #1 and the Phase 2 Infrastructure are required to be substantially complete prior to the final inspection of the first Unit in Phase 2. No Certificate of Occupancy on the houses will be issued until after the detention basin has been accepted for Substantial Completion by the City.

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7. The development of Parcel 2.23B, identified as Parcel WML9 on Exhibit E2, drains through the future park and onto Eagle Canyon (WC10A) near Station 41+00 on Sheet C-03. The roadway plans shall incorporate the proposed drainage facilities as the 60 cfs will impact the 17-foot sidewalk & amenity zone. Provide concrete low flow channel connection through the 17-foot sidewalk & amenity zone.

8. The provided Phase 2 Infrastructure plans only show the proposed drainage facilities. The complete improvement plans will require additional review for impacts with other needed infrastructure; i.e. sanitary sewer, water, gas, etc. Any changes to the proposed storm drain system shall require a drainage study update.
9. The Storm Drain Plans have been revised to accommodate the proposed cross fall street sections and include added nuisance inlets at low points within the intersections.
10. The plans show preliminary mass grading with collection facilities within the parcels to intercept the flows prior to entering the infrastructure roadway improvements. It was noted that the inlet collection system needs to incorporate stormwater quality (SWQ) features and Best Management Practices (BMP's) at these interim collection points. This information will be provided and shown on the SWPPP, a copy of which shall be provided to Flood Control prior to permits. Additionally, the mass grading plan (Sheet GR-03) shows sheet flow from Basin ON2-IB discharging directly onto Hualapai Way without any interim collection. Revise to incorporate interim collection.
11. All drainage facilities proposed in this **Phase 2 Infrastructure Study** are considered interim facilities and must be maintained by the Master Developer until the facilities are dedicated to and formally accepted by the *City of Las Vegas*.
12. Since the streets network and the associated storm drain facilities will eventually be accepted by the City, the engineer must coordinate with *City of Las Vegas Streets & Sanitation Department* for their review and approval prior to the final approval of the subject drainage study.
13. The provided WSPG Model shows that the storm drain in *Eagle Canyon Avenue* exceeds the maximum allowed velocity (25 fps) per the *CCRFCD Hydrologic & Hydraulic Design Manual*. A *Special Construction Note* has been added to the plan & profile sheets that call out the special construction requirement and the required special inspection for the additional sacrificial concrete.
14. Structural plans for the storm drain improvements must be submitted for review. Provide a soil report, structural calculations and specifications, wet stamped structural sets and a grading plan to the *City of Las Vegas Building Department* for processing (call *Building Department* to confirm their submittal requirements). The engineer must provide a copy of *Building Department* approval of the structures to *City Flood Control Section* prior to the final acceptance of the technical drainage study.
15. The project proposes to build temporary drainage berms/swales over the *Phase 2* site. Prior to final plan approval the developer must complete a **Maintenance and Liability Agreement** for the interim drainage improvements and post a minimum maintenance bond of \$50,000 or 50-percent of the construction cost for the improvements, whichever is greater. The engineer must submit an estimate of the quantities for construction the facility and an exhibit that adequately shows the location and limits of the drainage facility 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.
16. Technical drainage studies are required for each of the future PODs. Final approval for the infrastructure study must be obtained prior to final approval of the impacted POD drainage studies.
17. A note on the Grading Plans has been provided that "*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 the vegetation.*"
18. A numbering system for the manholes and inlets has been provided. It was noted in the response that the project may be divided into additional phases.
19. Show the size of all the proposed riprap areas. The rip-rap pads are shown on the GR-Sheets and some of the SD-Sheets include the pad size. Add the pad size to the grading plans and revise all pertinent plans and callouts accordingly.

20. Revise the pipe penetration detail to include a concrete collar with dowelled rebar connections. The detail has not been provided at this time and was noted that it will be a part of the Structural Details.
21. Provide details for the transition structure modifications to accommodate the 66"-RCP connection and the removal of the existing facilities to allow construction of the proposed improvements. The detail has not been provided at this time and was noted that it will be a part of the Structural Details.

NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Update and accepted by the *City of Las Vegas Flood Control Section*. Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the *City of Las Vegas* reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

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

END OF REMARKS
AYS/PBJ

T/R/S: T19S/R59E/12
AREA F-12



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

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City of Las Vegas

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City of Boulder City

May 6, 2016

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

**DISTRICT CONCURRENCE: UPDATE FOR SKYE CANYON - PHASE 2
INFRASTRUCTURE
(DS #4739D) (RFCD No. 16-9671)**

Dear Mr. Kwon:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated April 4, 2016 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 April 13, 2016.

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

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

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


Abigail Mayrena, P.E., CFM
Principal Civil Engineer

AM:sa

c: Stanley Okey Amadi, P.E., Slater Hanifan Group

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REGIONAL FLOOD CONTROL DISTRICT



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

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City of Las Vegas

Mayor Rodney Woodbury
City of Boulder City

March 3, 2016

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

**DISTRICT CONCURRENCE: SKYE CANYON - PHASE 2 INFRASTRUCTURE
(DS 4739C) (RFCD No. 16-9633)**

Dear Mr. Kwon:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated August 4, 2015, Addendum No. 1 dated October 14, 2015, and Addendum No. 2 dated November 19, 2015 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 dated January 11, 2016.

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

District's review of this project was limited to issues of Regional Flood Control Significance as defined in *Uniform Regulations for the Control of Drainage*. As noted in study, site resides in a Special Flood Hazard Area (SFHA) designated as "Zone A" per the effective Flood Insurance Rate Map (FIRM). Therefore, consultant should be advised that this acceptance does not serve to amend the FIRM or remove the SFHA.

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:


Abigail Mayrena, P.E., CFM
Principal Civil Engineer

AM:fv

c: Stanley Amadi, P.E., Slater Hanifan Group

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CONSULTING ENGINEERS & PLANNERS

OLY1501.001

June 14, 2017

Albert Sung, P.E.
Flood Control Project Engineer
City of Las Vegas Department of Public Works
333 N. Rancho Drive
Las Vegas, Nevada 89106

Subject: Technical Drainage Study Update No.4 for Skye Canyon Ph.2 Infrastructure

Dear Mr. Sung:

Submitted for your review is this *Technical Drainage Study Update No.4 for Skye Canyon Phase 2 Infrastructure* (hereinafter referred to as the Update No.4 Study). The site had been previously analyzed and designed as addressed in the Technical Drainage Study for Skye Canyon Phase 2 Infrastructure (CLV DS4739), prepared by Slater Hanifan Group (SHG). The Phase 2 Infrastructure Study was approved on January 11, 2016 and addressed the mass grading and development of roadway and infrastructure improvements intended to support the approximately 202 acres portion of the Skye Canyon master planned community, identified hereinafter as the *Phase 2 Study*. Three previous updates (CLV DS4739D, DS4739E & DS4739F; hereinafter referred to as the Update No.1, the Update No.2 and Update No.3 correspondingly) had been approved for the site addressing additional bike lane widths, a land plan change per the Master Study and Parcel 2.16 stub relocations respectively. The relevant approval letter(s) have been included in pertinent reference appendices of this submittal.

Overview & Purpose

Majority of the parcels within the Phase 2 area of Skye Canyon Master Plan development are currently in planning with some technical drainage studies already approved and others currently under review by the City of Las Vegas. However, with the proposed site plans for the individual parcels, some of the storm drain stubs originally proposed for the drainage of the parcels do not align correctly with the interior streets conveying the flows to the stubs. The purpose of this update study is to address some of the proposed stub and/or inlet relocations as well as any other minor changes anticipated as a result of the development of the parcels. This update will specifically address the following:

- Revision to the inlet type and relocation of the previously proposed Type CM nuisance drop inlets along Grand Teton Drive due to the additional west bound lane proposed per the CLV traffic department request.
- Relocation of the nuisance drop inlets at the curb returns of Shaumber Road near Eagle Canyon Avenue and Shaumber Road near Grand Teton Drive due to dedication of right turn lanes at the respective intersections.
- Reanalysis of the Eagle Canyon Avenue corridor and mainline storm drain system as well as Hualapai Way mainline storm drain. This provides updated hydraulic analyses

that incorporates the redistribution and minor change in ultimate condition peak flows impacting the street and storm drain systems resulting from the proposed improvements of Parcels 2.15, 2.23a, 2.27, 2.28 and 2.29.

- Revision and relocation of a 5-ft Type CM2 drop inlet and the 30" RCP lateral storm drain stub (identified in the Phase 2 Study as Facilities P4 & L6) located on Eagle Canyon Avenue at approximate station 55+08.18 for the drainage of Parcel 2.27. This update study will also address a discrepancy in the drainage area for basin WML13 (Parcel 2.27) as analyzed in the Master Drainage Study Update #3 for Skye Canyon.

The following provides detailed discussions of the above listed revisions and their respective updated hydraulic calculations where pertinent. Note that the hydraulic calculations are not necessary and have not been provided for the relocated nuisance inlets.

Grand Teton Drive Nuisance Inlets

The CLV traffic department requested that another west bound lane be added along Grand Teton Drive to accommodate a future right turn lane at interchange with Puli Road. Thus, the curb line along the northern half of Grand Teton Drive shifted to the north. Consequently, the previously proposed 5-ft Type CM nuisance inlets will now be revised to 5-ft Type CM2 inlets. The inlets were previously proposed as Type CMs due to lack of room between the curb line and the existing 6'x5' RCB mainline in the street. However, with the extension of the curb line and widening of the street improvement, the Type CM2 inlets can now be constructed in place without conflict. Note that one of the inlets proposed at the curb return of Grand Teton Drive south of Shaumber Road intersection will no longer be constructed due to conflict with the future bus turn out lane. However, the inlet will not be necessary as the low point of the intersection is now designed to the curb return of Shaumber Road where another nuisance drop inlet is provided.

Shaumber Road Curb Return Inlets

Right turn lanes have now been proposed on Shaumber Road at the intersections with Grand Teton Drive and Eagle Canyon Avenue. The two drop inlets located at the curb returns of Shaumber Road just north and south of the intersections of Grand Teton Drive and Eagle Canyon Avenue respectively will be relocated to align with the curb and gutter of the proposed right turn lanes. The inlet located south of Eagle Canyon Avenue (Facility P1) was designed to intercept approximately 2 cfs from the eastern half of Shaumber Road during the 100-year storm event. Relocation of the inlet will not have any impact on the capacity as the street design grade and cross slope remains the same as previously approved. Therefore, revision to the inlet computation will not be necessary and has not been provided. Likewise, the storm drain lateral WSPG hydraulic computation has not been revised as the pipe extension is very minimal and maintains the same slope previously approved.

Parcel 2.27 Stub & Eagle Canyon Avenue Corridor Analysis

The existing 30" RCP storm drain stub provided for the drainage of Parcel 2.27 conflicts with the proposed site plan for the parcel. Thus, the storm drain stub is proposed to be relocated as a part of the revisions addressed by this Update Study. The relocated stub will connect to the downstream manhole in Eagle Canyon Avenue at approximate station 56+68.73. The stub will

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T1 SKYE CANYON INFRASTRUCTURE - PHASE 2 (UPDATE NO.4)

T2 BY OLYMPIA COMPANIES

T3 EAGLE CANYON - TRUNK STORM DRAIN

SO	0613.002823.35	72			2829.26				
R	0900.002830.52	72		.013					1
JX	0900.002830.52	72	48	.013	88.5	2832.52	45.00		
R	0950.002831.58	72		.013					1
WE	0950.002831.58	72		.013					
TS	1000.002835.61	66		.013					1
WX	1000.002835.61	66		.013					
R	1093.002837.13	66		.013					1
JX	1093.002838.13	54	42	42.013	54.5	37.52839.13	2839.13	45.00	45.00
R	1389.502839.63	54		.013					1
JX	1394.502840.13	48	18	18.013	5.0	5.02842.63	2842.63	45.00	45.00
R	1632.002854.48	48		.013				5.	1
R	1762.002862.62	48		.013				5.	1
R	1883.002868.57	48		.013				5.	1
R	1992.002873.94	48		.013				5.	1
JX	1992.002873.94	48	18	24.013	4.0	16.02876.44	2875.94	75.00	75.00
R	2072.002877.87	48		.013				5.	1
R	2167.002882.51	48		.013				5.	1
R	2262.002885.16	48		.013				5.	1
JX	2262.002885.16	48	36	.013	56.0	2886.16	38.00		
R	2422.002888.80	48		.013					1
JX	2422.002888.80	48	18	.013	3.0	2891.30	45.00		
R	2820.002903.13	48		.013					1
JX	2820.002903.13	48	42	.013	86.0	2903.63	45.00		
R	3004.002908.81	48		.013				60.	1
JX	3004.002908.81	48	36	18.013	52.0	18.02909.81	2911.31	60.00	45.00
R	3024.002910.72	48		.013					1
JX	3024.002910.72	48	48	.013	18.0	2912.12	90.00		
R	3060.002912.43	48		.013					1
SH	3060.002912.43	48							
CD	18	4							1.5
CD	24	4							2.
CD	30	4							2.5
CD	36	4							3.
CD	42	4							3.5
CD	48	4							4.
CD	54	4							4.5
CD	60	4							5.
CD	66	4							5.5
CD	72	4							6.
CD	78	4							6.5

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DATE: 6/15/2017
TIME: 16: 5

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WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	18	4			1.50														
CD	24	4			2.00														
CD	30	4			2.50														
CD	36	4			3.00														
CD	42	4			3.50														
CD	48	4			4.00														
CD	54	4			4.50														
CD	60	4			5.00														
CD	66	4			5.50														
CD	72	4			6.00														
CD	78	4			6.50														

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PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SKYE CANYON INFRASTRUCTURE - PHASE 2 (UPDATE NO.4)

HEADING LINE NO 2 IS -

BY OLYMPIA COMPANIES

HEADING LINE NO 3 IS -

EAGLE CANYON - TRUNK STORM DRAIN

F 0 5 1 5 P

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	1 IS A SYSTEM OUTLET	U/S DATA	STATION	INVERT	SECT	W S ELEV
			613.00	2823.35	72	2829.26
ELEMENT NO 2	IS A REACH	U/S DATA	STATION	INVERT	SECT	
			900.00	2830.52	72	
						N 0.013
						RADIUS 0.00
						ANGLE 0.00
						ANG PT 0.00
						MAN H 1
ELEMENT NO 3	IS A JUNCTION	U/S DATA	STATION	INVERT	SECT	
			900.00	2830.52	72	
						N 0.013
						Q3 88.5
						Q4 0.0
						INVERT-3 2832.52
						INVERT-4 0.00
						PHI 3 45.00
						PHI 4 0.00
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 4	IS A REACH	U/S DATA	STATION	INVERT	SECT	
			950.00	2831.58	72	
						N 0.013
						RADIUS 0.00
						ANGLE 0.00
						ANG PT 0.00
						MAN H 1
ELEMENT NO 5	IS A WALL ENTRANCE	U/S DATA	STATION	INVERT	SECT	
			950.00	2831.58	72	
						FP 0.013
ELEMENT NO 6	IS A TRANSITION	U/S DATA	STATION	INVERT	SECT	
			1000.00	2835.61	66	
						N 0.013
ELEMENT NO 7	IS A WALL EXIT	U/S DATA	STATION	INVERT	SECT	
			1000.00	2835.61	66	
ELEMENT NO 8	IS A REACH	U/S DATA	STATION	INVERT	SECT	
			1093.00	2837.13	66	
						N 0.013
						RADIUS 0.00
						ANGLE 0.00
						ANG PT 0.00
						MAN H 1
ELEMENT NO 9	IS A JUNCTION	U/S DATA	STATION	INVERT	SECT	
			1093.00	2838.13	54	
						N 0.013
						Q3 54.5
						Q4 37.5
						INVERT-3 2839.13
						INVERT-4 2839.13
						PHI 3 45.00
						PHI 4 45.00
ELEMENT NO 10	IS A REACH	U/S DATA	STATION	INVERT	SECT	
			1389.50	2839.63	54	
						N 0.013
						RADIUS 0.00
						ANGLE 0.00
						ANG PT 0.00
						MAN H 1
ELEMENT NO 11	IS A JUNCTION	U/S DATA	STATION	INVERT	SECT	
			1394.50	2840.13	48	
						N 0.013
						Q3 5.0
						Q4 5.0
						INVERT-3 2842.63
						INVERT-4 2842.63
						PHI 3 45.00
						PHI 4 45.00
F 0 5 1 5 P						
PAGE NO 3						

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO	12 IS A REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
			1632.00	2854.48	48					
						N 0.013				
							0.00	0.00	5.00	1
ELEMENT NO 13	IS A REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
			1762.00	2862.62	48					
						N 0.013				
							0.00	0.00	5.00	1
ELEMENT NO 14	IS A REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
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						N 0.013				
							0.00	0.00	5.00	1
ELEMENT NO 15	IS A REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
			1992.00	2873.94	48					
						N 0.013				
							0.00	0.00	5.00	1
ELEMENT NO 16	IS A JUNCTION	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
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						N 0.013				
							4.0	16.0	2876.44	2875.94
									PHI 3 75.00	PHI 4 75.00
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THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING										
ELEMENT NO 17	IS A REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
			2072.00	2877.87	48					
						N 0.013				
							0.00	0.00	5.00	1
ELEMENT NO 18	IS A REACH	U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
			2167.00	2882.51	48					
						N 0.013				
							0.00	0.00	5.00	1

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ELEMENT NO 19 IS A REACH
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ELEMENT NO 20 IS A JUNCTION
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2262.00 2885.16 48 36 0 0.013 56.0 0.0 2886.16 0.00 38.00 0.00
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ELEMENT NO 21 IS A REACH
U/S DATA STATION 2422.00 INVERT 2888.80 SECT 48 N 0.013 RADIUS 0.00 ANGLE 0.00 ANG PT 0.00 MAN H 1

ELEMENT NO 22 IS A JUNCTION
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2422.00 2888.80 48 18 0 0.013 3.0 0.0 2891.30 0.00 45.00 0.00
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THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
F 0 5 1 5 P PAGE NO 4

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 23 IS A REACH
U/S DATA STATION 2820.00 INVERT 2903.13 SECT 48 N 0.013 RADIUS 0.00 ANGLE 0.00 ANG PT 0.00 MAN H 1

ELEMENT NO 24 IS A JUNCTION
U/S DATA STATION 2820.00 INVERT 2903.13 SECT 48 LAT-1 LAT-2 N Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4
2820.00 2903.13 48 42 0 0.013 86.0 0.0 2903.63 0.00 45.00 0.00
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THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

ELEMENT NO 25 IS A REACH
U/S DATA STATION 3004.00 INVERT 2908.81 SECT 48 N 0.013 RADIUS 0.00 ANGLE 0.00 ANG PT 60.00 MAN H 1

ELEMENT NO 26 IS A JUNCTION
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3004.00 2908.81 48 36 18 0.013 52.0 18.0 2909.81 2911.31 60.00 45.00
THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING
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ELEMENT NO 27 IS A REACH
U/S DATA STATION 3024.00 INVERT 2910.72 SECT 48 N 0.013 RADIUS 0.00 ANGLE 0.00 ANG PT 0.00 MAN H 1

ELEMENT NO 28 IS A JUNCTION
U/S DATA STATION 3024.00 INVERT 2910.72 SECT 48 LAT-1 LAT-2 N Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4
3024.00 2910.72 48 48 0 0.013 18.0 0.0 2912.12 0.00 90.00 0.00
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 29 IS A REACH
U/S DATA STATION 3060.00 INVERT 2912.43 SECT 48 N 0.013 RADIUS 0.00 ANGLE 0.00 ANG PT 0.00 MAN H 1

ELEMENT NO 30 IS A SYSTEM HEADWORKS
U/S DATA STATION 3060.00 INVERT 2912.43 SECT 48 W S ELEV 0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
LICENSEE: SLATER HANIFAN GROUP F0515P PAGE 1

WATER SURFACE PROFILE LISTING

SKYE CANYON INFRASTRUCTURE - PHASE 2 (UPDATE NO.4)
BY OLYMPIA COMPANIES
EAGLE CANYON - TRUNK STORM DRAIN

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/DIA	BASE/ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF		NORM DEPTH			ZR		
613.00	2823.35	4.010	2827.360	479.5	23.88	8.853	2836.213	0.00	5.621	6.00	0.00	0.00	0	0.00
70.92	0.02498					.020090	1.42		3.757			0.00		
683.92	2825.12	4.102	2829.224	479.5	23.28	8.414	2837.638	0.00	5.621	6.00	0.00	0.00	0	0.00
88.77	0.02498					.018416	1.63		3.757			0.00		
772.69	2827.34	4.284	2831.623	479.5	22.19	7.649	2839.272	0.00	5.621	6.00	0.00	0.00	0	0.00
58.23	0.02498					.016459	0.96		3.757			0.00		
830.92	2828.79	4.483	2833.277	479.5	21.16	6.954	2840.231	0.00	5.621	6.00	0.00	0.00	0	0.00
40.67	0.02498					.014774	0.60		3.757			0.00		
871.59	2829.81	4.700	2834.510	479.5	20.18	6.321	2840.831	0.00	5.621	6.00	0.00	0.00	0	0.00
28.41	0.02498					.013347	0.38		3.757			0.00		
900.00	2830.52	4.944	2835.464	479.5	19.24	5.747	2841.211	0.00	5.621	6.00	0.00	0.00	0	0.00
JUNCT STR	0.00000					.018387	0.00					0.00		
900.00	2830.52	3.332	2833.852	391.0	24.25	9.128	2842.980	0.00	5.292	6.00	0.00	0.00	0	0.00
50.00	0.02120					.024400	1.22		3.468			0.00		
950.00	2831.58	3.305	2834.885	391.0	24.49	9.314	2844.199	0.00	5.292	6.00	0.00	0.00	0	0.00
TRANS STR	0.08060					.019055	0.95					0.00		
1000.00	2835.61	4.540	2840.150	391.0	18.64	5.395	2845.545	0.00	5.168	5.50	0.00	0.00	0	0.00
WALL EXIT												0.00		
1000.00	2835.61	4.539	2840.149	391.0	18.65	5.398	2845.547	0.00	5.168	5.50	0.00	0.00	0	0.00
8.18	0.01634					.013339	0.11		4.120			0.00		
1008.18	2835.74	4.560	2840.304	391.0	18.56	5.351	2845.655	0.00	5.168	5.50	0.00	0.00	0	0.00
61.83	0.01634					.012762	0.79		4.120			0.00		

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U-ECA.OUT
WATER SURFACE PROFILE LISTING
SKYE CANYON INFRASTRUCTURE - PHASE 2 (UPDATE NO.4)
BY OLYMPIA COMPANIES
EAGLE CANYON - TRUNK STORM DRAIN

Ref starting HGL for DI #33 & 34 Lateral SF6

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF		NORM DEPTH			ZR		
1070.01	2836.75	4.825	2841.579	391.0	17.70	4.865	2846.444	0.00	5.168	5.50	0.00	0.00	0	0.00
22.99	0.01634					.011978	0.28		4.120			0.00		
1093.00	2837.13	5.168	2842.298	391.0	16.87	4.422	2846.720	0.00	5.168	5.50	0.00	0.00	0	0.00
JUNCT STR	0.00000					.017417	0.00					0.00		
1093.00	2838.13	5.209	2843.339	299.0	18.80	5.488	2848.827	0.00	4.385	4.50	0.00	0.00	0	0.00
296.50	0.00506					.023118	6.85		4.500			0.00		
1389.50	2839.63	10.836	2850.468	299.0	18.80	5.488	2855.956	0.00	4.385	4.50	0.00	0.00	0	0.00
JUNCT STR	0.10000											0.00		
1394.50	2840.13	2.787	2842.917	289.0	30.92	14.841	2857.758	0.00	3.963	4.00	0.00	0.00	0	0.00
237.50	0.06042					.055460	13.17		2.752			0.00		
1632.00	2854.48	2.908	2857.388	289.0	29.54	13.545	2870.933	0.00	3.963	4.00	0.00	0.00	0	0.00
70.99	0.06262					.050304	3.57		2.716			0.00		
1702.99	2858.93	3.014	2861.939	289.0	28.45	12.566	2874.505	0.00	3.963	4.00	0.00	0.00	0	0.00
59.01	0.06262					.045764	2.70		2.716			0.00		
1762.00	2862.62	3.162	2865.782	289.0	27.12	11.424	2877.206	0.00	3.963	4.00	0.00	0.00	0	0.00
15.82	0.04917					.043162	0.68		2.986			0.00		
1777.82	2863.40	3.178	2866.576	289.0	26.99	11.311	2877.887	0.00	3.963	4.00	0.00	0.00	0	0.00
105.18	0.04917					.041003	4.31		2.986			0.00		
1883.00	2868.57	3.347	2871.917	289.0	25.73	10.284	2882.201	0.00	3.963	4.00	0.00	0.00	0	0.00
7.31	0.04927					.038901	0.28		2.984			0.00		
1890.31	2868.93	3.364	2872.294	289.0	25.62	10.189	2882.483	0.00	3.963	4.00	0.00	0.00	0	0.00
60.57	0.04927					.037325	2.26		2.984			0.00		

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WATER SURFACE PROFILE LISTING
SKYE CANYON INFRASTRUCTURE - PHASE 2 (UPDATE NO.4)
BY OLYMPIA COMPANIES
EAGLE CANYON - TRUNK STORM DRAIN

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF		NORM DEPTH			ZR		
1950.88	2871.91	3.567	2875.481	289.0	24.42	9.262	2884.743	0.00	3.963	4.00	0.00	0.00	0	0.00
41.12	0.04927					.035621	1.46		2.984			0.00		
1992.00	2873.94	3.848	2877.788	289.0	23.29	8.421	2886.209	0.00	3.963	4.00	0.00	0.00	0	0.00
JUNCT STR	0.00000					.037623	0.00					0.00		
1992.00	2873.94	3.074	2877.014	269.0	25.96	10.465	2887.479	0.00	3.951	4.00	0.00	0.00	0	0.00
13.53	0.04913					.039592	0.54		2.820			0.00		
2005.53	2874.61	3.096	2877.701	269.0	25.77	10.311	2888.012	0.00	3.951	4.00	0.00	0.00	0	0.00
66.47	0.04913					.037405	2.49		2.820			0.00		
2072.00	2877.87	3.254	2881.124	269.0	24.57	9.373	2890.497	0.00	3.951	4.00	0.00	0.00	0	0.00
39.34	0.04884					.034253	1.35		2.826			0.00		
2111.34	2879.79	3.404	2883.196	269.0	23.60	8.650	2891.846	0.00	3.951	4.00	0.00	0.00	0	0.00
33.77	0.04884					.031859	1.08		2.826			0.00		
2145.11	2881.44	3.617	2885.058	269.0	22.50	7.864	2892.922	0.00	3.951	4.00	0.00	0.00	0	0.00
21.89	0.04884					.031405	0.69		2.826			0.00		
2167.00	2882.51	3.951	2886.461	269.0	21.45	7.148	2893.609	0.00	3.951	4.00	0.00	0.00	0	0.00
2.99	0.02789					.033326	0.10		4.000			0.00		
2169.99	2882.59	4.000	2886.594	269.0	21.41	7.116	2893.710	0.00	3.951	4.00	0.00	0.00	0	0.00
92.01	0.02789					.034835	3.21		4.000			0.00		
2262.00	2885.16	5.005	2890.165	269.0	21.41	7.116	2897.281	0.00	3.951	4.00	0.00	0.00	0	0.00
JUNCT STR	0.00000					.028529	0.00					0.00		
2262.00	2885.16	9.449	2894.609	213.0	16.95	4.461	2899.070	0.00	3.879	4.00	0.00	0.00	0	0.00
160.00	0.02275					.021988	3.52		3.220			0.00		

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WATER SURFACE PROFILE LISTING
SKYE CANYON INFRASTRUCTURE - PHASE 2 (UPDATE NO.4)
BY OLYMPIA COMPANIES
EAGLE CANYON - TRUNK STORM DRAIN

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
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Ref starting HGL for DI #29 Lateral SF6

L/ELEM	SO	SF AVE	HF	U-ECA.OUT	NORM DEPTH	ZR
2422.00	2888.80	9.590 2898.350	213.0	16.95	4.461 2902.811	0.00 3.879
JUNCT STR	0.00000	.021680	0.00			4.00 0.00 0.00 0 0.00
2422.00	2888.80	9.791 2898.591	210.0	16.71	4.337 2902.928	0.00 3.872
398.00	0.03601	.021373	8.51			2.633 0.00 0.00 0 0.00
2820.00	2903.13	4.184 2907.314	210.0	16.71	4.337 2911.651	0.00 3.872
JUNCT STR	0.00000	.014412	0.00			4.00 0.00 0.00 0 0.00
2820.00	2903.13	8.490 2911.620	124.0	9.87	1.512 2913.132	0.00 3.345
184.00	0.03087	.007452	1.37			1.980 0.00 0.00 0 0.00
3004.00	2908.81	4.556 2913.366	124.0	9.87	1.512 2914.878	0.00 3.345
JUNCT STR	0.00000	.004432	0.00			4.00 0.00 0.00 0 0.00
3004.00	2908.81	6.215 2915.023	54.0	4.30	0.287 2915.310	0.00 2.209
20.00	0.09550	.001413	0.03			0.941 0.00 0.00 0 0.00
3024.00	2910.72	4.346 2915.066	54.0	4.30	0.287 2915.353	0.00 2.209
JUNCT STR	0.00000	.001020	0.00			4.00 0.00 0.00 0 0.00
3024.00	2910.72	4.665 2915.385	36.0	2.86	0.127 2915.512	0.00 1.787
14.23	0.04750	.000624	0.01			0.915 0.00 0.00 0 0.00
3038.23	2911.40	4.000 2915.396	36.0	2.86	0.127 2915.523	0.00 1.787
7.61	0.04750	.000585	0.00			0.915 0.00 0.00 0 0.00
3045.84	2911.76	3.629 2915.387	36.0	3.00	0.140 2915.527	0.00 1.787
4.31	0.04750	.000569	0.00			0.915 0.00 0.00 0 0.00
3050.15	2911.96	3.413 2915.375	36.0	3.15	0.154 2915.529	0.00 1.787
3.44	0.04750	.000615	0.00			0.915 0.00 0.00 0 0.00

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WATER SURFACE PROFILE LISTING

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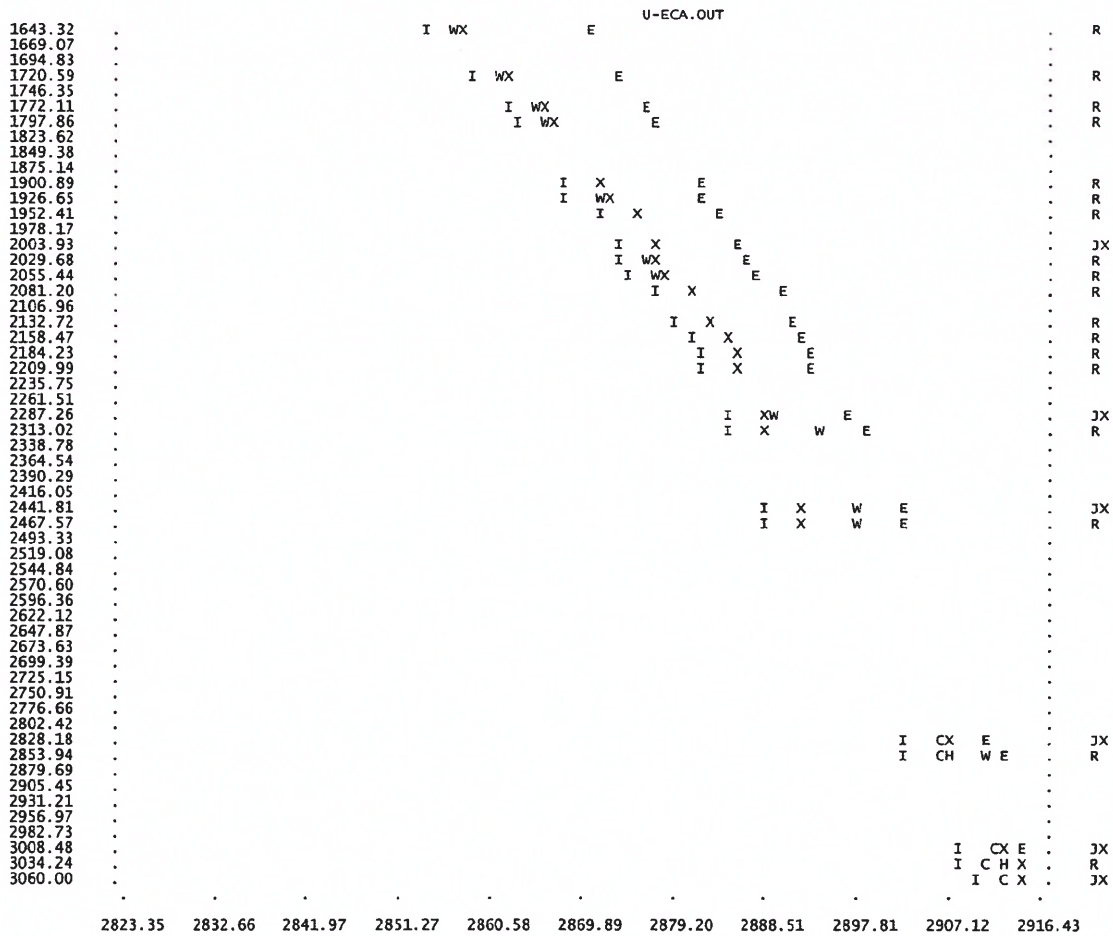
SKYE CANYON INFRASTRUCTURE - PHASE 2 (UPDATE NO.4)
BY OLYMPIA COMPANIES
EAGLE CANYON - TRUNK STORM DRAIN

Ref starting HGL for DI #27 Lateral SF6

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD. EL.	SUPER ELEV	CRITICAL DEPTH	HGT/DIA	BASE/ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF		NORM DEPTH		ZR			
3053.59	2912.13	3.236	2915.362	36.0	3.31	0.170	2915.532	0.00	1.787	4.00	0.00	0.00	0	0.00
2.97	0.04750					.000677	0.00		0.915			0.00		
3056.56	2912.27	3.080	2915.347	36.0	3.47	0.187	2915.534	0.00	1.787	4.00	0.00	0.00	0	0.00
2.60	0.04750					.000751	0.00		0.915			0.00		
3059.16	2912.39	2.940	2915.330	36.0	3.64	0.205	2915.535	0.00	1.787	4.00	0.00	0.00	0	0.00
0.84	0.04750					.000808	0.00		0.915			0.00		
3060.00	2912.43	2.894	2915.324	36.0	3.70	0.212	2915.536	0.00	1.787	4.00	0.00	0.00	0	0.00

SKYE CANYON INFRASTRUCTURE - PHASE 2 (UPDATE NO.4)
BY OLYMPIA COMPANIES
EAGLE CANYON - TRUNK STORM DRAIN

613.00	.I	W	X	E										R
638.76	.													
664.52	.													
690.27	.I	W	CH	E										R
716.03	.													
741.79	.													
767.55	.													
793.31	.	I	W	X	E									R
819.06	.													
844.82	.	I	W	CH	E									R
870.58	.													
896.34	.	I	W	CH	E									R
922.09	.	I	X	H	E									JX
947.85	.	I	W	CH	E									R
973.61	.	I	W	CH	E									TX
999.37	.													
1025.13	.		I	Y	X	H	E							WX
1050.88	.		I	X	H	E								R
1076.64	.		I	X	H	E								R
1102.40	.		I	X	H	E								R
1128.16	.		I	X	H	E								JX
1153.92	.		I	X	W	E								R
1179.67	.													
1205.43	.													
1231.19	.													
1256.95	.													
1282.71	.													
1308.46	.													
1334.22	.													
1359.98	.													
1385.74	.													
1411.49	.		I	X	W	E								JX
1437.25	.		I	W	X	E								R
1463.01	.													
1488.77	.													
1514.53	.													
1540.28	.													
1566.04	.													
1591.80	.													
1617.56	.													

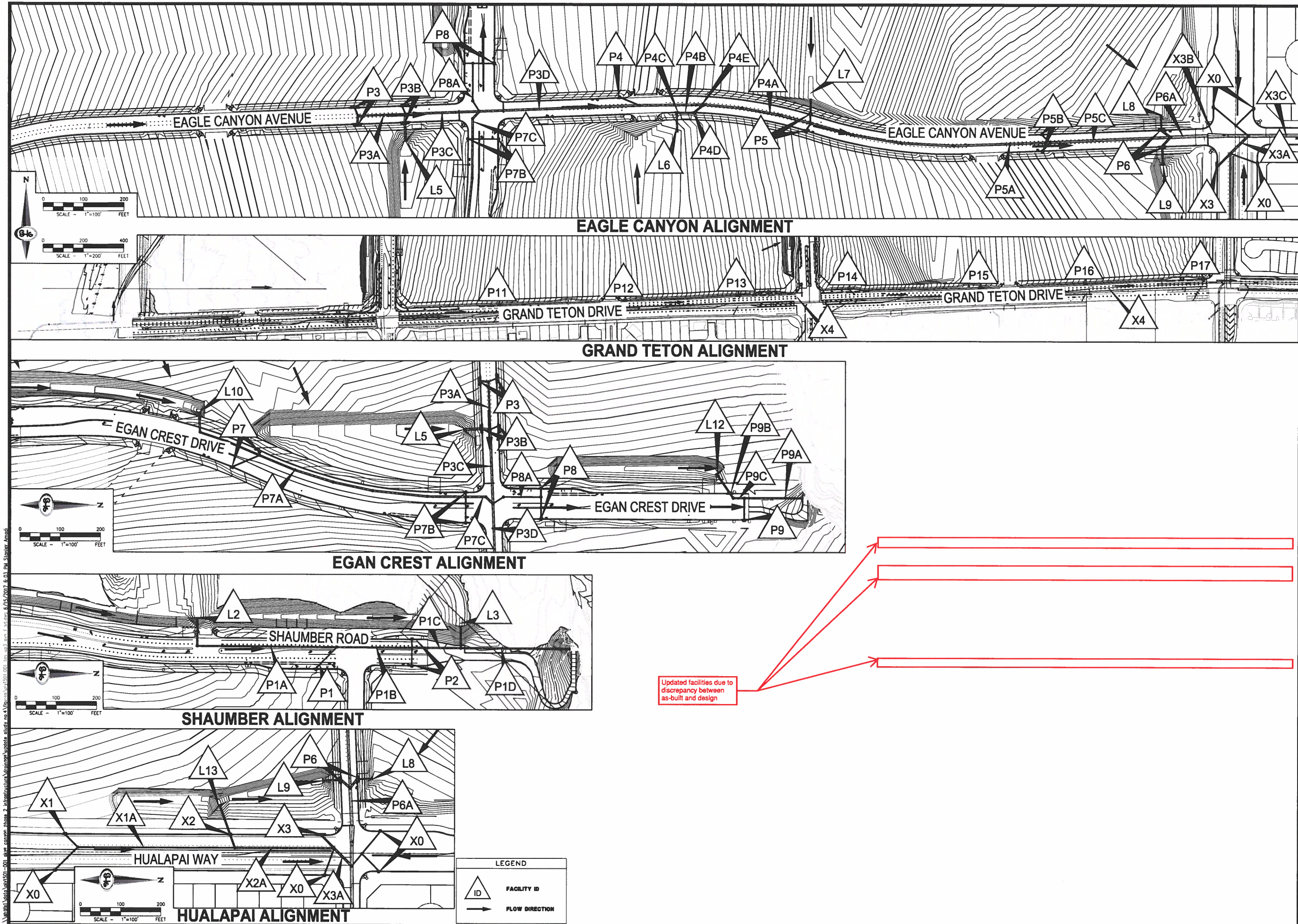


NOTES

1. GLOSSARY

- I = INVERT ELEVATION
- C = CRITICAL DEPTH
- W = WATER SURFACE 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



SLATER HANIFAN GROUP CONSULTING ENGINEERS & PLANNERS 5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118 PHONE (702) 284-5300 FAX (702) 284-5389		NO.		DESCRIPTION	DATE	BY	APP. DATE	APP.	
NINETY-FIVE MANAGEMENT, LLC.									
SKYE CANYON - PHASE 2 INFRASTRUCTURE UPDATE NO.4									
STORM DRAIN SCHEMATIC MAP									
DATE: JUNE 2017									
DRAFTER: E.T.M.									
DESIGNER: E.T.M.									
CHECKED: SOA									
PROJECT NO. OLY1501.001									
EXHIBIT F									
SHEET 1 OF 1									

APPENDIX D

CD of Electronic Files & Revised Improvement Plans