TECHNICAL DRAINAGE STUDY
ADDENDUM No. 1

Skye Canyon
Phase 3 Infrastructure

City of Las Vegas, Nevada

Job No.: OLY1602.000
Date: July 2016

Prepared By:
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Prepared For:
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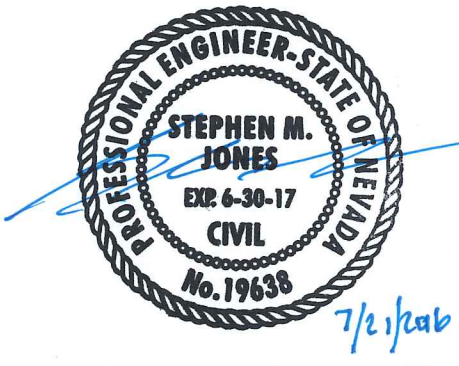


Steve Jones, P.E.
NV Professional Engineer No. 19638

Assisted by: Cameron Bencini, E.I.

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Skye Canyon - Phase 3 Infrastructure - Addendum #1 Date: July 2016

Location of Development: a) Descriptive (Cross Streets) North/South: Grand Canyon Drive

East/West: Skype Canyon Park Drive

b) Section: 7 Township: 19 South Range: 60 East

c) APN : 125-07-201-003, 125-07-201-001

Name of Owner: M F Land, LLC / Ninety-Five Management, LLC

Telephone No.: 702-220-6565 Fax No.: 702-220-6566 E-Mail Address: bwilliamson@olympiacompanies.com

Address: 11411 Southern Highlands Parkway, Suite 300; Las Vegas Nevada 89141

Contact Person-Name: Steve Jones, P.E. **Telephone No.:** 702-284-5300

* **E-Mail Address:** sjones@shg-inc.com **Fax No.:** 702-284-5399

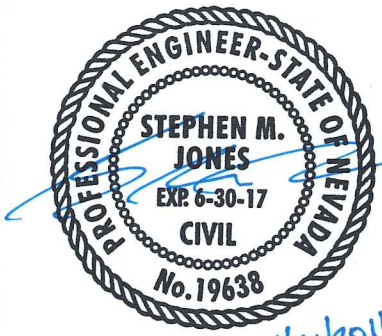
Firm: Slater Hanifan Group

Address: 5740 S. Arville Street #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	☒	Infrastructure Improvements

1. Total Owned Land Area: At Site: 37.5 acres Being Developed/Disturbed: 3.4 acres
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ **Yes**** ☒ **No**
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☐ **Yes**** ☒ **No**
4. Proposed type of development (Residential, Commercial, Etc.): Roadway
5. Approximate upstream land area which drains to the subject site: 1.0 Sq. Miles +/-
6. Has the site drainage been evaluated in the past? ☒ **YES** ☐ **NO** If yes, please identify documentation: Master Drainage Study for Kyle Canyon (SHG, DS4420)
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: East into ephemeral wash that crosses Grand Canyon approximately 700-ft north of Skye Canyon Park Drive
8. Briefly describe your proposed schedule for the subject project: Phase 3 is divided into 2 phases: Roadways - Infrastructure TDS; Commercial Subdivision - Onsite TDS



7/21/2016

Engineer's Seal

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

*New Required Field

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

Local Entity File No.

Revision	Date

REFERENCE:

STANDARD FORM 1

Updated 05/01/2008

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

OLY1602.000

July 21, 2016

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: Addendum No. 1 to the Technical Drainage Study for Skye Canyon Phase 3 (DS4796)

Dear Mr. Sung:

This letter is submitted in response to comments contained in the June 29, 2016 review memorandum regarding the above referenced project. A copy of the CLV drainage study comment letter is included in Appendix A. The comments have been individually addressed as follows.

1. **Comment:** *The **Phase 3 Infrastructure** drainage study addresses the included street improvements of Grand Canyon Drive, Skye Park Drive, Street "D", a local minor detention basin, culvert crossings and storm drain systems within the perimeter streets. A separate technical drainage study will be required for the future onsite commercial developments.*

   Response: Acknowledged. There is ongoing coordination between SHG and the onsite engineer.

2. **Comment:** *The development of the **Phase 3 Infrastructure** is predicated upon the existence of Detention Basin #1. The drainage study for Detention Basin #1 is approved, however the permits for construction have not been issued. Detention Basin #1 significantly reduces the flows impacting the Phase 3 infrastructure improvements and the future commercial development. Provide the interim flow impacts to Phase 3 that are needed to address the added flows from sub-basins WOFF5, WOFF6, and a portion of ON1. What are the increased drainage impacts to the proposed storm drain system in the interim condition to the future commercial development within Phase 3 until the basin is substantially complete. Review and revise the HEC-1 analysis and the system design to account for the larger interim flows.*

   Response: Upon review of project schedules, the building permits for this study's Phase 3 offsite improvements and the future onsite commercial subdivision are anticipated to be obtained prior to construction of both Detention Basin 1 and Phase 2 improvements. As a result, the hydrologic models for the existing, proposed and future conditions for this project have been revised to remove those improvements from the offsite watershed. As a result, flow rates at the pertinent design locations changed and all hydraulic calculations have been updated accordingly. Below is a brief synopsis of the change to the existing, proposed and future condition. Note the ultimate condition remains the same because it

assumes the offsite watershed is developed as described in the initial submittal, in accordance with the Master Drainage Study.

Existing Condition:

This study's existing condition hydrologic model has generally been performed in the same manner as completed in the Phase 1 developed condition, because this study assumes Phase 1 complete. However, this study's existing condition added the currently existing Skye Canyon Park – Phase 1 drainage area not incorporated in the referenced Phase 1 developed condition analysis, with subbasins referenced from the Park Study. Also, this study divided Subbasin 'EX-W5' into 'EX-W5N' and 'EX-W5S' to determine specific flow rates for design purposes. The below table shows the evolution of existing condition flow rates specific to the property discharge location (Concentration Point WC9) affected by this project's improvements.

Summary of Existing Condition Flow Rates @ Concentration Point WC9	
Scenario	**Q_{100} (cfs)**
Phase 1 Existing Condition (Historic)	756
Developed Phase 1 Condition	795
Phase 3 Existing Condition (Current)	816
Downstream Allowable	1,315

As referenced from the Phase 1 study, the slight increase in 100-year flow rate above historic drainage was considered acceptable because it was proven to be less than shown in the downstream drainage study and the routing is consistent with the master drainage patterns.

Proposed & Future Condition:

The definition of change in improvements from existing to proposed and future conditions remains the same as described in the initial submittal. The below table describes the transition of 100-year flow rates from existing to proposed to future condition at the property discharge location.

Summary of Flow Rates @ Concentration Point WC9	
Scenario	**Q_{100} (cfs)**
Phase 1 Existing Condition (Historic)	756
Phase 3 Existing Condition (Current)	816
Phase 3 Proposed Condition	694
Phase 3 Future Condition	695

As a result of hydrograph timing in the offsite watershed and enlarging the volume in the proposed temporary detention basin at Concentration Point 'CPN' (refer to

Response to Comment No. 4), the 100-year flow rate during the proposed and future conditions has been reduced below current and historic existing condition flow rates at the property discharge location. Therefore, the proposed improvements are considered acceptable.

Note that all hydraulic calculations have been adjusted to account for the new flow rates that comprise the above table. The Exhibit I – Drainage Facilities & Hydraulic Summary Exhibit has been updated to match into the flow rates. The flow rate through the south culvert at Concentration Point 'CPS' slightly increased but at the point of property discharge after combination with flows from Concentration Points 'DBN' and 'WC7', the flows total as summarized above.

3. **Comment:** *Provide interim debris/sediment basins at the upstream ends of the culvert systems near concentration points CPN and CPS. Provide detailed plans and sections for the facilities. These debris/sediment basins shall be privately owned and privately maintained by the master developer. The developer shall provide 12-foot minimum maintenance access to the facility and shall provide a public drainage easement to be privately maintained for the improvements. These facilities are considered to be temporary in nature and the City understands that the future development and the ultimate Regional Flood Control facilities will require that these facilities may be removed by the developer upon the City's approval of a Technical Drainage Study that addresses the impacts of those improvements. Provide a note on the improvement plans that identifies these facilities as Privately Maintained.*

   Response: Temporary sediment traps, intended to protect the pipe inlets from a first flush of debris generated by a small storm event, are now provided at the proposed culvert crossings at CPN and CPS. Sediment traps are provided by excavating 2-ft below the invert of the outlet pipe. Note that at CPN, a temporary minor detention basin is proposed and the sediment storage area is not accounted for within the HEC-1 model for card "DBN" because it is assumed it is filled during a design storm event. In addition, 12-ft maintenance access paths with concrete turn-around access are now provided to the upstream and downstream end of each culvert facility, inclusive of the required sediment traps.

   It is acknowledged that these sediment traps are temporary and are to be removed in the future upon permanent use of the culverts or upstream infrastructure completion. However, until such a time, a public drainage easement to be privately maintained has been reserved for the culverts, sediment traps and access paths. The limits of the proposed drainage easements and associated grading for the sediment traps and access paths are shown on Sheet GR-01 within the plans included in Appendix K.

4. **Comment:** *The proposed interim local detention basin near concentration point CPN shall be expanded to accommodate the addition of the debris/sediment basin. The interim basin shall be designed with 4: 1 side slopes. This proposed local detention basin is a minor and temporary facility which will be removed by the developer upon the construction of the ultimate upstream Regional Flood Control facilities. This detention basin is to be privately owned and privately maintained by the master developer. The developer shall provide maintenance access to the public storm drain outfall and shall provide a public drainage*

easement, to be privately maintained. Provide a note on the Improvement plans that identifies this detention basin as Privately Maintained.

Response: Acknowledged. The detention basin was revised to accommodate 4:1 side slopes. With the addition of the access path, a new stage-storage rating table has been populated in the HEC-1 model for 'DBN', resulting in new outflow from the detention basin. Therefore, an updated WSGPW model has been included in Appendix G for the revised outflow in the detention basin's outlet pipe. Labeling has been added to Sheet GR-01 in Appendix K to denote that the temporary detention basin is to be privately maintained by the master developer within a public drainage easement.

5. **Comment:** *The proposed culvert crossings at the concentration points "CPN", "CPS" and "WC9" are Oversized interim facilities that are not required in the ultimate condition. All drainage facilities proposed in this* ***Phase 3 Infrastructure Study*** *are considered interim facilities and must be maintained by the Master Developer until the upstream ultimate facilities are completed and accepted by the City of Las Vegas. The City of Las Vegas will not maintain the culverts during all interim conditions. Interim facilities will require an Encroachment Agreement for those facilities within public right-of-way.*

   Response: Acknowledged. The facilities have been labeled as privately maintained and future coordination regarding an Encroachment Agreement for developer maintenance in the public right-of-way will be on-going.

6. **Comment:** *In the proposed drainage condition, offsite flows will traverse and perpetuate through the subject site using the existing washes at two locations. Identify and dedicate as such two public drainage easements (privately maintained) through the site. Future development of the site will require storm drain extensions and the corresponding public drainage easements, to be privately maintained. Dedication shall be provided using the mapping process or by separate legal description and must be approved by Flood Control prior to recordation. The easements must be recorded prior to the final approval of the subject improvement plans.*

   Response: Noted. Public drainage easements to be privately maintained are now proposed to encompass the entire north and south wash located within the subject site. These drainage easements, as delineated on Sheet GR-01 in Appendix K will be dedicated by separate document. If the future commercial development changes the flow pattern or extends the subject storm drain facilities, these easements may be required to be vacated and/or re-dedicated, as necessary.

7. **Comment:** *Provide an overall grading plan that shows the limits of the drainage berms and the corresponding flow paths. It appears that the overflow path drains back into the future commercial development. Discuss the impact of this overflow.*

   Response: An overall grading plan, Sheet GR-01 in Appendix K is provided within the improvement plans to show the limits of any drainage berms and/or channels proposed by this project. In addition, an emergency overflow path exhibit (Exhibit I) is included in Appendix B. In general, overflow from the south culvert spills onto Skye Canyon Park Drive and drains east while overflow from the north culvert spills into a drainage swale and is conveyed east to Grand Canyon Drive which ultimately drains south to drop inlets. To

ensure adjacent finish floor elevations met drainage criteria, properties located within Skye Canyon Parcel 1.2 were verified against the anticipated emergency flow depth within Skye Canyon Park Drive. Future commercial developments will need to adequately flood protect against the emergency overflow conditions. The overflow path exhibit is provide in Appendix B, and supporting hydraulic computations and finish floor checks are provided in Appendix I.

8. **Comment:** *The provided Phase 3 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.*

   Response: Acknowledged.

9. **Comment:** *Provide numbering system for the manholes and inlets. It was noted in the response that the project may be divided into additional phases. The numbering system is still needed.*

   Response: The manholes and drop inlets are now appropriately numbered on the improvement plans. See revised improvement plan sheets provided in Appendix K.

10. **Comment:** *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.*

    Response: Noted. A copy of the design plans will be forwarded Streets & Sanitation Department.

11. **Comment:** *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.*

    Response: Noted.

12. **Comment:** *The project proposes to build temporary drainage facilities including; detention basins, debris/sediment basins, drainage berms/swales over the Phase 3 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.

Response: Noted.

13. **Comment:** *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.*

    Response: The aforementioned details were annotated to show the intent of pipe penetrations reflect a concrete collar with dowelled rebar connection. However, the structural plans to be submitted at a later date will propose the actual penetration detail. See revised improvement plans provided in Appendix K.

14. **Comment:** *Revise the Construction Notes to reflect that the storm drain is privately maintained.*

    Response: The labeling of the pipe as privately maintained has been reflected in each of the storm drain profiles in Appendix K.

15. **Comment:** ***Sheet SD-01:*** *Provide 12'-wide maintenance access paths to both ends of the culvert from Skye Park Drive.*

    Response: A 12-ft-wide access path now extends from Skye Park Drive to the ends of the proposed culvert. In addition concrete turn around access is provided at the inlet and outlets ends of the culverts. See revised Improvement plans provided in Appendix K for the access road detail.

16. **Comment:** ***Sheet SD-02 & Sheet SD-03:*** *Provide 12'-wide maintenance access paths to the local minor detention basin and the other end of the culvert from Street "D".*

    Response: A 12-ft-wide access path now provided to the temporary detention basin. In addition concrete turn around access is provided at the inlet and outlets ends of the culverts. See revised Improvement plans provided in Appendix K for the access road detail.

17. **Comment:** ***Sheet SD-03:*** *Verify that the downhill cul-de-sac has 1% minimum fall through the cul-de-sac bulb to the low point drain. It is not clear where this street will drain in the future. If the cul-de-sac is draining onto private property a drainage easement will be required from the street to the east, connecting to public right-of-way.*

    Response: Runoff from Street D drains to the east to a sidewalk underdrain located at the end of the cul-de-sac, which outlets to a drainage swale. The drainage swale is a minimum 1-ft deep v-ditch with 4:1 (H:V) side slopes. Flow in the drainage swale is conveyed east to Grand Canyon Drive within a public drainage easement to be privately maintained. The cul-de-sac is now annotated within the improvement plans to show a minimum 1% fall through the bulb. Hydraulic computations are provided in Appendix E and revised improvement plans are provided in Appendix K.

18. **Comment:** ***Sheet SD-04:*** *It appears that an existing drop inlet is in the way of a new proposed driveway apron and is being removed with a new pipe connection to the westerly inlet. Provide a manhole connection within the roadway. Explain why a new manhole is proposed behind the curb instead of within the roadway portion?*

    Response: The remaining drop inlet has been identified by this study as a nuisance flow drop inlet to protect the driveway to the future commercial subdivision. A manhole behind the curb is proposed for re-connection to the existing storm drain where the drop inlet was formerly, in order to avoid adding a new lateral connection and storm drain manhole to the trunk 42-inch storm drain in a roadway that has its final UTACS (Ultra-Thin Asphalt Concrete Surface) layer completed causing a larger asphalt replacement than typical. A collar has been proposed for connection of the proposed pipe to the existing pipe to cause minimal undermining of the existing curb and gutter rather than a larger repair job caused by a manhole structure.

    A public drainage easement has been provided in the area of the subject drop inlet, storm drain and manhole to ensure access to maintain the manhole behind the curb for the nuisance flow drop inlet.

19. **Comment:** ***Sheet SD-06:*** *The storm drain north of the culvert crossing is to slope to the north in the proposed and ultimate drainage conditions in the* ***Master Study.*** *However, the storm drain in the subject plans drains to the south. Address whether this storm drain is a throwaway pipe and will be replaced in the ultimate condition. Also address the timing of the installation of the ultimate facility in Grand Canyon Drive.*

    Provide 12'-wide maintenance access paths to both ends of the culvert from Grand Canyon Drive.

    Response: It is acknowledged that in the Master Drainage Study ultimate condition, the MLA Parcel 2.02 is anticipated to drain northeast toward Concentration Points WC4 and WC5, and not into the proposed 66-inch RCP that drains south to the proposed Grand Canyon RCB culvert crossing. It is anticipated that this 66-inch storm drain is temporary to route the proposed 'DBN' runoff back to its historic discharge location since this flow is not yet cut-off by the future regional storm drain facility in Skye Village Road. However, it will remain utilized in the ultimate condition to a much lesser extent because the anticipated commercial development utilizes the facility for its smaller onsite runoff, determined after coordination with the onsite engineer.

    Note that the Master Drainage Study does propose this 66-inch storm drain facility be utilized in a "proposed condition" where the regional storm drain facility connectivity is not present north of Iron Mountain in Skye Village Road. Inspection of Master Drainage Study Facility 23-1b shows the anticipated 100-year flow rate in the same 66-inch RCP proposed by this project as 250 cfs which is less than its design flow rate; therefore, its size is considered acceptable.

    Relevant reference material from the Master Drainage Study supporting the above discussion has been included in Appendix J.

A 12-ft wide maintenance access path is provided to the culvert opening on the west side of Grand Canyon Drive. However, due to grading constraints within the existing right-of-way width on the east half of Grand Canyon, the maintenance access path is provided as 10-ft in width in order to not require a permission to grade on the downstream adjacent property. Barrier rails are required for traffic safety and are proposed along the area of impact to the east edge of Grand Canyon pavement; however, the proposed 10-ft access path is considered drive-able and acceptable.

20. **Comment:** *Revise the callout of all proposed drop inlets to Type "CM" Drop Inlet per Uniform Standard Drawings USDCCA DWG. No. 422.*

    Response: All drop inlets have remained Type "CM2", per CCUSD 412.1. In order to protect the public interest for ability to access and maintain the "CM2" drop inlets behind the curb, the final map will be recorded with language that allows access for drainage rights 5-ft behind the curb since the right-of-way ends at back of curb.

21. **Comment:** *Add a note in all pertinent sheets for the construction of all storm drain drop inlets per USDCCA Drawing No. 421 (Stormwater Quality Management Stamp and Sign Detail).*

    Response: Noted.

Additional Revision:

Through coordination with the engineer proposing the onsite commercial improvements, other adjustments, beyond CLV comment, have been made to the storm drain facilities proposed by this study. Brief synopses of the changes are as follows:

Street D:

The storm drain crossing the roadway has been re-aligned to avoid conflict with commercial pads and to match the extension alignment through the commercial development.

Additionally, a high point has been graded into Street D to direct the ultimate condition flow rate at Concentration Point WC8 to Concentration Point WC6, continuing in Skye Park Drive without flow split into Street D. Refer to the revised Exhibit H included in Appendix B and ultimate condition HEC-1 model in Appendix D for the updated hydrology reflecting this routing change. The addition of the high point no longer necessitates the drop inlets previously proposed in Street D. As a result, the storm drain culvert crossing Street D no longer conveys flows from a public right-of-way allowing the storm drain extended by the onsite engineer to propose the pipe as privately maintained in perpetuity. The hydraulic Exhibit I, associated street flow sections and storm drain analyses in Street D and Skye Park have been updated accordingly.

Skye Park Drive:

Through coordination with the onsite engineer, the alignment of the storm drain culvert crossing Skye Park has shifted slightly to remain within the drive aisle through the commercial subdivision. This change is insignificant to the hydraulic calculations.

However, the hydraulic calculations in Skye Park have been adjusted to reflect the above change in Street D.

Grand Canyon Drive:

Through coordination with the onsite engineer, the stub provided to the onsite development has increased from a 66-inch RCP to a 72-inch RCP to match the drainage study by AWA.

Through coordination with Traffic, the driveway into the commercial development from Grand Canyon has been shifted further north. However, the drop inlets remain in the previously proposed location and only a cross gutter has been provided at the added driveway to route the flow accordingly.

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

Respectfully Submitted,

SLATER HANIFAN GROUP

Cameron Bencini, E.I.
Engineer Intern II – Flood Control Division

cc: Steve Jones, P.E. – SHG
Jerrod Ratcliffe – SHG
David Myhre, E.I. – SHG

APPENDIX

Appendix A – City of Las Vegas Correspondence
- Drainage Study Comment Letter

Appendix B – Drainage Exhibits
- Exhibit A – Location Map
- Exhibit E – Existing Condition Drainage Map
- Exhibit F – Proposed Condition Drainage Map
- Exhibit G – Future Condition Drainage Map
- Exhibit H – Ultimate Condition Drainage Map
- Exhibit I – Drainage Facilities & Hydraulics Summary Map
- Exhibit J – Emergency Overflow Path Map

Appendix C – Hydologic Data
- Curve Number
- Lag Time – Standard Form 4 Computations
- Referenced Drainage Study Material Skye Canyon – Phase 1 Infrastructure – Update #6 (DS4661K)
- Referenced Drainage Study Material Skye Canyon Park – Phase 1 (DS4707D)

Appendix D – HEC-1 Analyses
- Existing Condition (100-Yr)
- Proposed Condition (100-Yr &10-Yr)
- Future Condition (100-Yr)
- Ultimate Condition (100-Yr & 10-Yr)

Appendix E – Surface Flow Hydraulic Computations
- Street Flows
- Drop Inlets
- Drainage Swale
- Existing Wash

Appendix F – Skye Canyon Park Storm Drain Hydraulic Design
- Inlet Control Nomograph & Flowmaster Normal Depth
- WSPG for Street Storm Drain
- Culvert Crossing
- Emergency Overflow – Drop Inlet Clogging

Appendix G – Street "D" Storm Drain Hydraulic Design
- Detention Basin Outfall Stage-Discharge
- Emergency Overflow – Culvert Crossing & DB Spillway
- Emergency Overflow – Drop Inlet Clogging

Appendix H – Grand Canyon Storm Drain Hydraulic Design
- Inlet Control Nomograph
- Proposed WSPG for Culvert Crossing

- Future WSPG for Culvert Crossing
- WSPG for North Storm Drain
- WSPG for South Storm Drain
- Outlet Protection Computation

Appendix I – Response to Comment #7

- Flowmaster Calc. Skye Canyon Park – Emergency Overflow Path
- Referenced Improvement Plans – Skye Canyon – Parcel 1.2 (DS4679E)
- Reference Improvement Plans – Skye Canyon Phase 1

Appendix J – Response to Comment #19

- Reference Drainage Exhibits – Skye Canyon Master Drainage Study

Appendix K – Revised Improvement Plans

APPENDIX A

Comment Letter

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: June 29, 2016
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 3 Infrastructure**		**COPIES TO:** Slater Hanifan Group
Cross Streets:	NWC of Grand Canyon & Skye Canyon Park		MF Land / Ninety Five Management
File Number:	F:\Depot\DSMemos\DS4796A.doc		Bart Anderson, P.E., DevCo
Parcel Number:	125-07-201-003		
Zoning Action:	MOD-62679; SUP-63594; SUP-63597; SDR-63598; VAR-63963 & GPA-64013		
FEMA Flood Zone	YES	NO **X**	
Proposed Storm Drain	YES **X**	NO	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	4/28/2016	5/24/2016 & 6/28/2016	See Comments Below	$400.00	442241: $400
			TOTAL FEES (LDDRS):	**$400.00**	**----**

REMARKS: Infrastructure necessary for the 38 acre Commercial Development known as Phase 3.

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

	is approved subject to conformance to all City standards and the following conditions:
X	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is conditionally approved subject to Clark County Public Works Department concurrence.

1. The ***Phase 3 Infrastructure*** drainage study addresses the included street improvements of *Grand Canyon Drive*, *Skye Park Drive*, *Street "D"*, a local minor detention basin, culvert crossings and storm drain systems within the perimeter streets. A separate technical drainage study will be required for the future onsite commercial developments.

2. The development of the ***Phase 3 Infrastructure*** is predicated upon the existence of Detention Basin #1. The drainage study for Detention Basin #1 is approved, however the permits for construction have not been issued. Detention Basin #1 significantly reduces the flows impacting the Phase 3 infrastructure improvements and the future commercial development. Provide the interim flow impacts to Phase 3 that are needed to address the added flows from sub-basins WOFF5, WOFF6, and a portion of ON1. What are the increased drainage impacts to the proposed storm drain system in the interim condition to the future commercial development within Phase 3 until the basin is substantially complete. Review and revise the HEC-1 analysis and the system design to account for the larger interim flows.

3. Provide interim debris/sediment basins at the upstream ends of the culvert systems near concentration points *CPN* and *CPS.* Provide detailed plans and sections for the facilities. These

debris/sediment basins shall be privately owned and privately maintained by the master developer. The developer shall provide 12-foot minimum maintenance access to the facility and shall provide a public drainage easement to be privately maintained for the improvements. These facilities are considered to be temporary in nature and the City understands that the future development and the ultimate Regional Flood Control facilities will require that these facilities may be removed by the developer upon the City's approval of a Technical Drainage Study that addresses the impacts of those improvements. Provide a note on the improvement plans that identifies these facilities as Privately Maintained.

4. The proposed interim local detention basin near concentration point *CPN* shall be expanded to accommodate the addition of the debris/sediment basin. The interim basin shall be designed with 4:1 side slopes. This proposed local detention basin is a minor and temporary facility which will be removed by the developer upon the construction of the ultimate upstream Regional Flood Control facilities. This detention basin is to be privately owned and privately maintained by the master developer. The developer shall provide maintenance access to the public storm drain outfall and shall provide a public drainage easement, to be privately maintained. Provide a note on the improvement plans that identifies this detention basin as Privately Maintained.

5. The proposed culvert crossings at the concentration points "CPN", "CPS" and "WC9" are oversized interim facilities that are not required in the ultimate condition. All drainage facilities proposed in this ***Phase 3 Infrastructure Study*** are considered interim facilities and must be maintained by the Master Developer until the upstream ultimate facilities are completed and accepted by the *City of Las Vegas. The City of Las Vegas* will not maintain the culverts during all interim conditions. Interim facilities will require an Encroachment Agreement for those facilities within public right-of-way.

6. In the proposed drainage condition, offsite flows will traverse and perpetuate through the subject site using the existing washes at two locations. Identify and dedicate as such two public drainage easements (privately maintained) through the site. Future development of the site will require storm drain extensions and the corresponding public drainage easements, to be privately maintained. Dedication shall be provided using the mapping process or by separate legal description and must be approved by Flood Control prior to recordation. The easements must be recorded prior to the final approval of the subject improvement plans.

7. Provide an overall grading plan that shows the limits of the drainage berms and the corresponding flow paths. It appears that the overflow path drains back into the future commercial development. Discuss the impact of this overflow.

8. The provided Phase 3 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. Provide numbering system for the manholes and inlets. It was noted in the response that the project may be divided into additional phases. The numbering system is still needed.

10. 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.

11. 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.

12. The project proposes to build temporary drainage facilities including; detention basins, debris/sediment basins, drainage berms/swales over the *Phase 3* 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.

13. 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.

14. Revise the Construction Notes to reflect that the storm drain is privately maintained.

15. **Sheet SD-01**: Provide 12'-wide maintenance access paths to both ends of the culvert from *Skye Park Drive.*

16. **Sheet SD-02 & Sheet SD-03**: Provide 12'-wide maintenance access paths to the local minor detention basin and the other end of the culvert from *Street "D".*

17. **Sheet SD-03**: Verify that the downhill cul-de-sac has 1% minimum fall through the cul-de-sac bulb to the low point drain. It is not clear where this street will drain in the future. If the cul-de-sac is draining onto private property a drainage easement will be required from the street to the east, connecting to public right-of-way.

18. **Sheet SD-04**: It appears that an existing drop inlet is in the way of a new proposed driveway apron and is being removed with a new pipe connection to the westerly inlet. Provide a manhole connection within the roadway. Explain why a new manhole is proposed behind the curb instead of within the roadway portion?

19. **Sheet SD-06**: The storm drain north of the culvert crossing is to slope to the north in the proposed and ultimate drainage conditions in the ***Master Study***. However, the storm drain in the subject plans drains to the south. Address whether this storm drain is a throwaway pipe and will be replaced in the ultimate condition. Also address the timing of the installation of the ultimate facility in *Grand Canyon Drive*.

    Provide 12'-wide maintenance access paths to both ends of the culvert from *Grand Canyon Drive*.

20. Revise the callout of all proposed drop inlets to *Type "CM" Drop Inlet* per Uniform Standard Drawings USDCCA DWG. No. 422.

21. Add a note in all pertinent sheets for the construction of all storm drain drop inlets per USDCCA Drawing No. 421 (*Stormwater Quality Management Stamp and Sign Detail*).

NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the *Nevada Division of Environmental Protection* a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For

more information, including forms and applications see http://ndep.nv.gov/bwpc/storm01.htm or call (775) 687-9429.

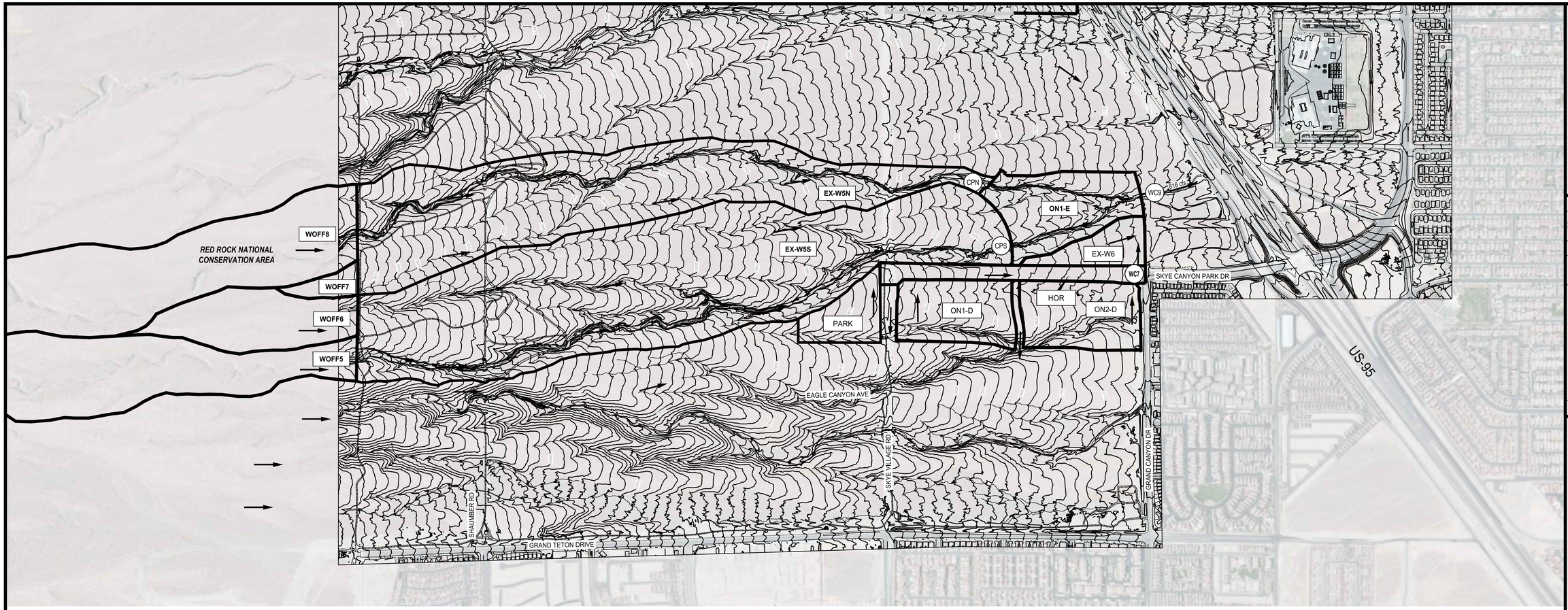
END OF REMARKS
ays

T/R/S: T19S/R60E/07
AREA G-07

APPENDIX B

Drainage Exhibits

Exhibit E – Existing Condition Drainage Map
Exhibit F – Proposed Condition Drainage Map
Exhibit G – Future Condition Drainage Map
Exhibit H – Ultimate Condition Drainage Map
Exhibit I – Drainage Facilities & Hydraulics Summary Map
Exhibit J – Emergency Overflow Path Map



NOTE:

EXISTING, PROPOSED, AND FUTURE CONDITION ASSUMES PHASE 1 UPSTREAM OF PHASE 3 DEVELOPMENT BOUNDARY IS CONSTRUCTED.

Basin Flow Rate Summary

Basin/Concentration Point ID	Area (ac)	Q_{100} (cfs)
WOFF5*	164.4	236
WOFF6*	25.5	59
WOFF7*	4.4	10
WOFF8*	137.0	230
PARK***	12.8	36
EX-W5S	151.3	237
EX-W5N	91.2	139
EX-W6	8.4	20
ON1-E	23.5	53
ON1-D**	17.8	47
ON2-D**	19.3	45
HOR**	10.4	30

*REFERENCED FROM THE SKYE CANYON MASTER DRAINAGE STUDY.
**REFERENCED FROM THE SKYE CANYON PHASE 1 INFRASTRUCTURE STUDY.
***REFERENCED FROM THE SKYE CANYON PARK - PHASE 1 SUBBASINS OFF3, IOFF4 & D2 COMPRISE "PARK" SHOWN ON DRAINAGE MAP.

Concentration Points Summary

Basin/Concentration Point ID	Area (mi^2)	Q_{100} (cfs)
CPS *(WOFF5* + WOFF6* + EX-W5S + PARK***)*	0.55	433
CPN *(WOFF7* + WOFF8* + EX-W5N)*	0.36	361
WC7 *(ON1-D** + ON2-D** + HOR**)*	0.07	121
WC9 *(CPS + CPN + WC7 + ON1-E)*	1.03	816

N

0 500 1000
SCALE – 1"=500' FEET

LEGEND

- BASIN BOUNDARY
- OFF1 — BASIN ID
- FLOW DIRECTION
- ID — CONCENTRATION POINT

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NINETY-FIVE MANAGEMENT, LLC

SKYE CANYON PHASE 3 INFRASTRUCTURE

EXISTING CONDITION DRAINAGE MAP

DATE: JULY 2016
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DESIGNER: CWB
CHECKED: SMJ
PROJECT NO.
OLY1602.000

EXHIBIT E
SHEET 1 OF 1

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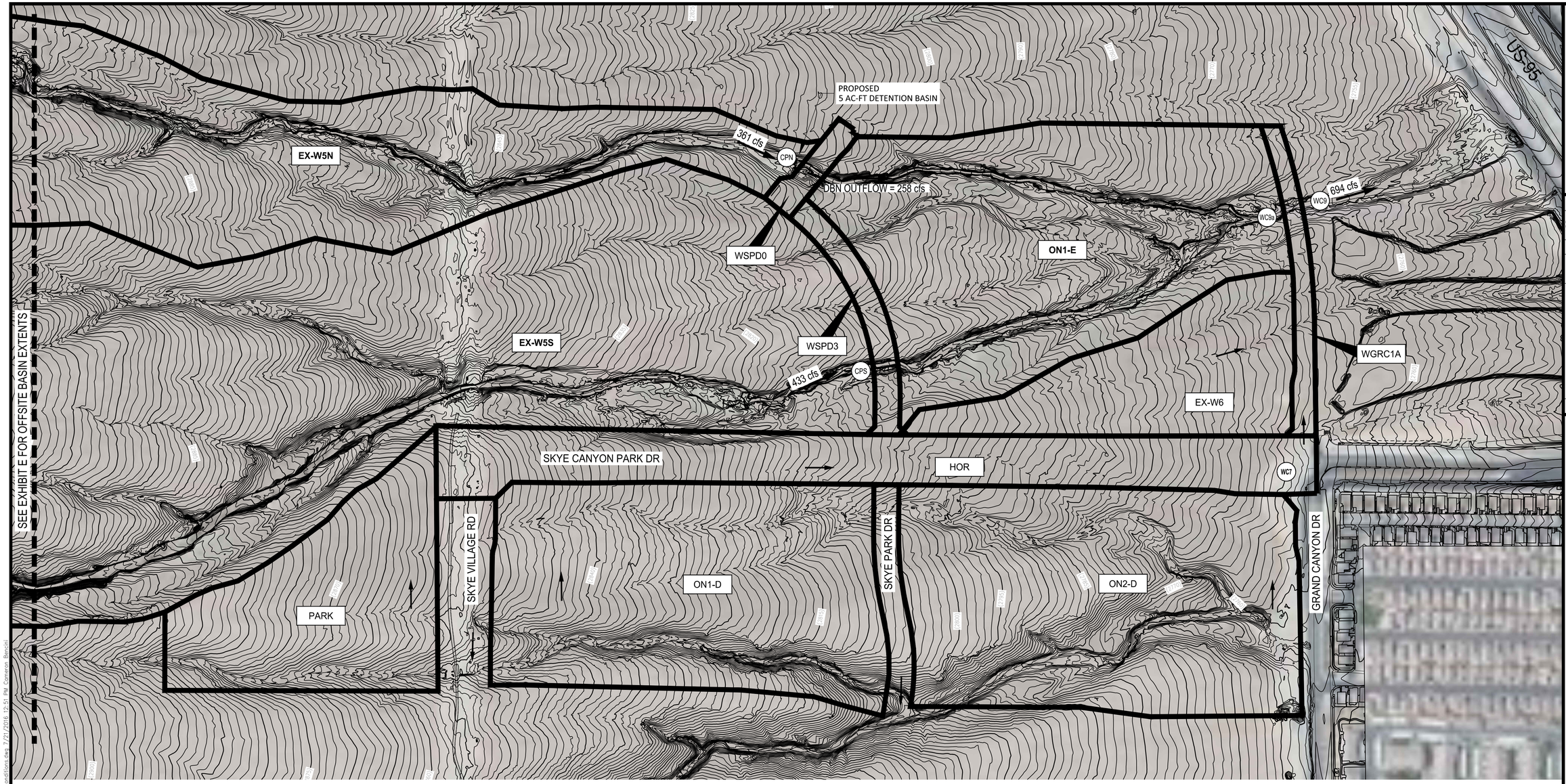

Basin Flow Rate Summary		
Basin/Concentration Point ID	Area (ac)	Q_{100} (cfs)
WOFF5*	164.4	236
WOFF6*	25.5	59
PARK***	12.8	36
EX-W5S	141.2	246
EX-W5N	91.2	135
WOFF7*	4.4	10
WOFF8*	137.0	230
ON1-D**	17.8	47
ON2-D**	19.3	45
HOR**	10.4	30
WSPD0	0.6	2
WSPD3	1.4	5
ON1-E	20.8	47
WGRC1A	1.4	4
EX-W6	7.7	18

*REFERENCED FROM THE SKYE CANYON MASTER DRAINAGE STUDY.
**REFERENCED FROM THE SKYE CANYON PHASE 1 INFRASTRUCTURE STUDY.
***REFERENCED FROM THE SKYE CANYON PARK - PHASE 1 SUBBASINS OFF3, OFF4 & D2 COMPRISE "PARK" SHOWN ON DRAINAGE MAP

NOTE:

EXISTING, PROPOSED, AND FUTURE CONDITION ASSUMES PHASE 1 UPSTREAM OF PHASE 3 DEVELOPMENT BOUNDARY IS CONSTRUCTED.

Concentration Points Summary		
Basin/Concentration Point ID	Area (mi^2)	Q_{100} (cfs)
CPS *(ROFF5* + WOFF6* + EX-W5S + PARK***)*	0.56	433
CPN *(WOFF7* + WOFF8* + EX-W5N)*	0.36	361
DBN *(Outflow from CPN)*	0.36	258
WC7 *(ON1-D** + ON2-D** + HOR**)*	0.07	121
WC9a *(CPS + DBN + WSPD3 + ON1-E)*	0.95	665
WC9 *(WC9a + WC7 + WGRC1A + WSPD0 + EX-W6)*	1.04	694

N

0 150 300
SCALE – 1"=150' FEET

LEGEND

- BASIN BOUNDARY
- OFF1 BASIN ID
- FLOW DIRECTION
- ID CONCENTRATION POINT

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SKYE CANYON PHASE 3 INFRASTRUCTURE

PROPOSED CONDITION DRAINAGE MAP

DATE: JULY 2016
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CHECKED: SMJ

PROJECT NO.
OLY1602.000

EXHIBIT F
SHEET 1 OF 1

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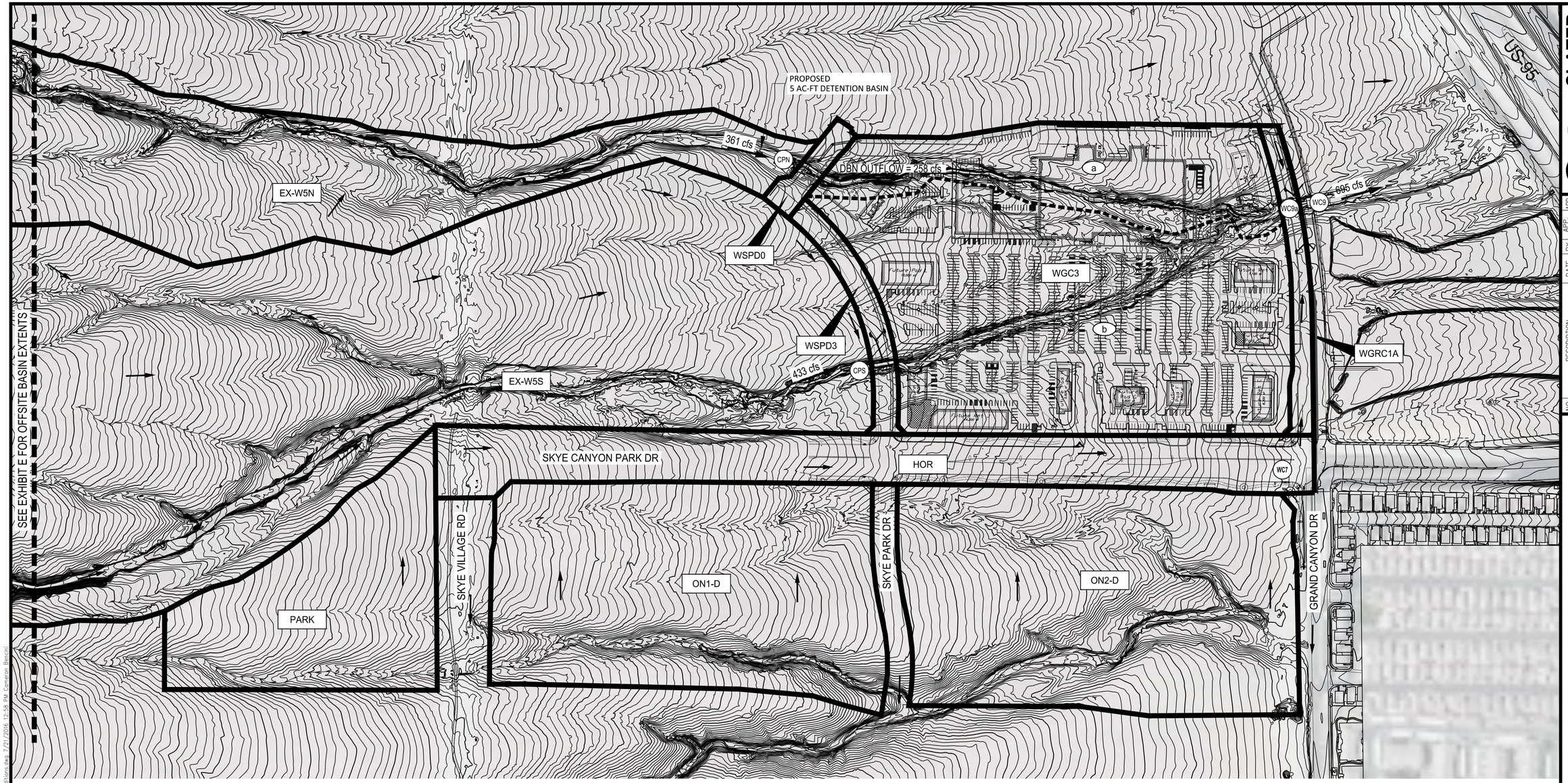

Basin Flow Rate Summary		
Basin/Concentration Point ID	Area (ac)	Q_{100} (cfs)
WOFF5*	164.4	236
WOFF6*	25.5	59
PARK***	12.8	36
EX-W5S	141.2	246
EX-W5N	91.2	139
WOFF7*	4.4	10
WOFF8*	137.0	230
ON1-D**	17.8	47
ON2-D**	19.3	45
HOR**	10.4	30
WSPD0	0.6	2
WSPD3	1.4	5
WGC3	28.4	89
WGRC1A	1.4	4

*REFERENCED FROM THE SKYE CANYON MASTER DRAINAGE STUDY.
**REFERENCED FROM THE SKYE CANYON PHASE 1 INFRASTRUCTURE STUDY.
***REFERENCED FROM THE SKYE CANYON PARK - PHASE 1 SUBBASINS OFF3, OFF4 & D2 COMPRISE "PARK" SHOWN ON DRAINAGE MAP

Concentration Points Summary		
Basin/Concentration Point ID	Area (mi^2)	Q_{100} (cfs)
CPS *(WOFF5* + WOFF6* + EX-W5S + PARK***)*	0.56	433
CPN *(WOFF7* + WOFF8* + EX-W5N)*	0.36	361
DBN *(Outflow from CPN)*	0.36	258
WC7 *(ON1-D** + ON2-D** + HOR**)*	0.07	121
WC9a *(CPS + DBN + WSPD3 + ON1-E)*	0.97	671
WC9 *(WC9a + WC7 + WGRC1A + WSPD0 + EX-W6)*	1.04	695

100-Yr Prorated Flow Summary			
Future Condition			
Basin	Q_{100} (cfs)	Area (acres)	Unit Flow (cfs/acre)
WGC3	89	28.4	3.1
Subbasin	Q_{100} (cfs)	Area (acres)	Unit Flow (cfs/acre)
a	28	9.0	3.1
b	61	19.4	3.1
TOTAL	*89*	*28.4*	*3.1*

NOTE:

EXISTING, PROPOSED, AND FUTURE CONDITION ASSUMES PHASE 1 UPSTREAM OF PHASE 3 DEVELOPMENT BOUNDARY IS CONSTRUCTED.

N

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SCALE – 1"=150' FEET

LEGEND

- BASIN BOUNDARY
- PRO-RATED SUBBASIN BOUNDARY
- OFF1 — BASIN ID
- FLOW DIRECTION
- ID — CONCENTRATION POINT
- ID — PRO-RATED SUBBASIN ID

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NINETY-FIVE MANAGEMENT, LLC

SKYE CANYON PHASE 3 INFRASTRUCTURE

FUTURE CONDITION DRAINAGE MAP

DATE: JULY 2016
DRAFTER: CWB
DESIGNER: CWB
CHECKED: SMJ

PROJECT NO.
OLY1602.000

EXHIBIT G
SHEET 1 OF 1

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SCALE – 1"=150' FEET

Basin Flow Rate Summary

Basin/Concentration Point ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
WML16*	22.2	64	32
WSPD3	1.4	5	2
ON1-D**	17.8	47	21
ON2-D**	19.4	45	18
HOR**	10.4	30	14
WGC3	28.4	89	43
WGRC1A	1.3	4	2
WML15B*	11.2	34	17
WSPD2*	2.1	3	2
OFF1	0.4	1	1

*REFERENCED FROM THE SKYE CANYON MASTER DRAINAGE STUDY.
**REFERENCED FROM THE SKYE CANYON PHASE 1 INFRASTRUCTURE STUDY.

Concentration Points Summary

Basin/Concentration Point ID	Area (mi^2)	Q_{100} (cfs)	Q_{10} (cfs)
WC6 *(WML16* + WSPD3* + WC8)*	0.06	107	52
WC7 *(ON1-D** + ON2-D** + HOR**)*	0.10	121	53
WC8 *(WML15B + WSPD2)*	0.02	37	19
WC9a *(WC6 + WGC3)*	0.10	195	96
WC9 *(WC9a + OFF1+ WC7 + WGRC1A)*	0.18	317	148

100-Yr Prorated Flow Summary
Ultimate Condition

Basin	Q_{100} (cfs)	Area (acres)	Unit Flow (cfs/acre)
WGC3	89	28.4	3.1
Subbasin	**Q_{100} (cfs)**	**Area (acres)**	**Unit Flow (cfs/acre)**
a	28	9.0	3.1
b	61	19.4	3.1
TOTAL	***89***	***28.4***	***3.1***

LEGEND

- BASIN BOUNDARY
- PRO-RATED SUBBASIN BOUNDARY
- OFF1 BASIN ID
- FLOW DIRECTION
- ID CONCENTRATION POINT
- ID PRO-RATED SUBBASIN ID

NOTE:
ULTIMATE CONDITION ASSUMES SKYE CANYON MASTER PLANNED COMMUNITY IS FULL BUILT-OUT AS SHOWN IN MASTER DRAINAGE STUDY'S ULTIMATE CONDITION.

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SKYE CANYON PHASE 3 INFRASTRUCTURE
ULTIMATE DRAINAGE CONDITION MAP

DATE: JULY 2016
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DESIGNER: CWB
CHECKED: SMJ
PROJECT NO.
OLY1602.000

EXHIBIT H
SHEET 1 OF 1

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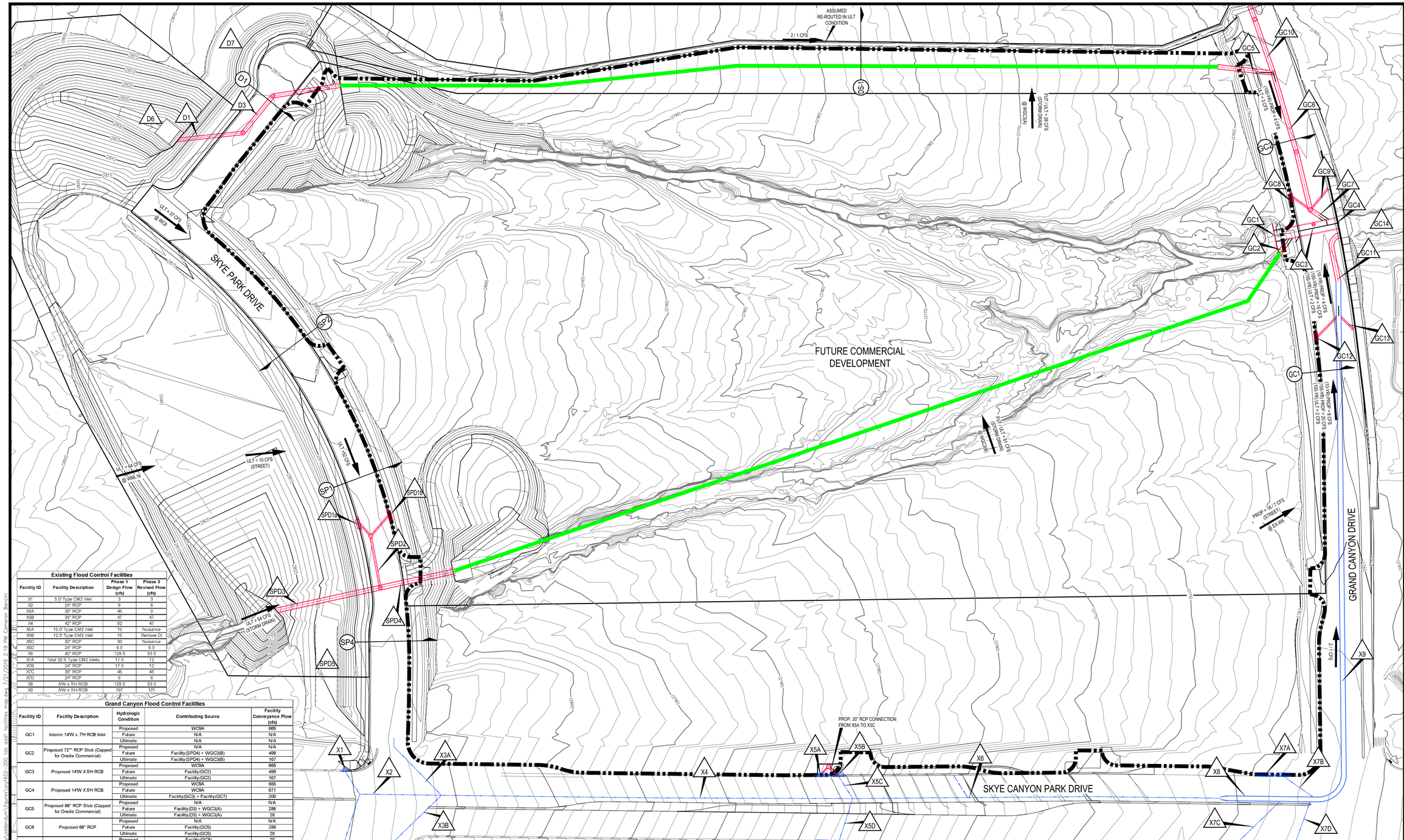

Existing Flood Control Facilities

Facility ID	Facility Description	Phase 1 Design Flow (cfs)	Phase 3 Revised Flow (cfs)
X1	5.0' Type CM2 Inlet	3	3
X2	24" RCP	6	6
X3A	36" RCP	45	0
X3B	36" RCP	47	47
X4	42" RCP	92	47
X5A	15.0' Type CM2 Inlet	15	Nuisance
X5B	12.5' Type CM2 Inlet	15	Remove DI
X5C	30" RCP	30	Nuisance
X5D	24" RCP	6.5	6.5
X6	42" RCP	128.5	53.5
X7A	Total 32.5' Type CM2 Inlets	17.5	12
X7B	24" RCP	17.5	12
X7C	30" RCP	45	45
X7D	24" RCP	6	6
X8	6'W x 5'H RCB	128.5	53.5
X9	6'W x 5'H RCB	197	121

Grand Canyon Flood Control Facilities

Facility ID	Facility Description	Hydrologic Condition	Contributing Source	Facility Conveyance Flow (cfs)
GC1	Interim 14'W x 7'H RCB Inlet	Proposed	WC9A	665
		Future	N/A	N/A
		Ultimate	N/A	N/A
GC2	Proposed 72"" RCP Stub (Capped for Onsite Commercial)	Proposed	N/A	N/A
		Future	Facility(SPD4) + WGC3(B)	499
		Ultimate	Facility(SPD4) + WGC3(B)	167
GC3	Proposed 14'W X 5'H RCB	Proposed	WC9A	665
		Future	Facility(GC2)	499
		Ultimate	Facility(GC2)	167
GC4	Proposed 14'W X 5'H RCB	Proposed	WC9A	665
		Future	WC9A	671
		Ultimate	Facility(GC3) + Facility(GC7)	200
GC5	Proposed 66" RCP Stub (Capped for Onsite Commercial)	Proposed	N/A	N/A
		Future	Facility(D3) + WGC3(A)	286
		Ultimate	Facility(D3) + WGC3(A)	28
GC6	Proposed 66" RCP	Proposed	N/A	N/A
		Future	Facility(GC5)	286
		Ultimate	Facility(GC5)	28
GC7	Proposed 66" RCP	Proposed	Facility(GC6)	20
		Future	Facility(GC6) + Facility(GC8)	292
		Ultimate	Facility(GC6) + Facility(GC8)	35
GC8	Proposed 10' Type CM2 SDDI & 24" RCP SD Lateral	Proposed	Bypass(Section GC-1) + WSPD0	20
		Future	WGRC1A + WSPD0	6
		Ultimate	WGRC1A + OFF1 + WSPD0	7
GC9	Proposed 24" RCP Stub (Capped for Others)	Proposed	N/A	N/A
		Future	N/A	N/A
		Ultimate	WGRC1A + OFF1 + WSPD0	7
GC10	Proposed 66" RCP Stub (Capped for Others)	Proposed	N/A	N/A
		Future	N/A	N/A
		Ultimate	N/A	N/A
GC11	Remove & Replace of Existing 6'W x 5'H RCB	Proposed	Facility(GC12) + Facility(X9)	125
		Future	Facility(X9)	121
		Ultimate	Facility(X9)	121
GC12	Proposed 7.5' Type CM2 SDDI & 24" RCP SD Lateral	Proposed	10-Yr [EX-W6 + (0.5)WGRC1A]	4
		Future	N/A	Nuisance
		Ultimate	N/A	Nuisance
GC13	Proposed 24" RCP Stub	Proposed	N/A	N/A
		Future	N/A	Nuisance
		Ultimate	N/A	Nuisance
GC14	Existing Wash	Proposed	WC9	694
		Future	WC9	695
		Ultimate	WC9	317

All Contributing Sources are based on 100-yr flowrates unless noted

Skye Park Drive Flood Control Facilities

Facility ID	Facility Description	Hydrologic Condition	Contributing Source	Facility Conveyance Flow (cfs)
SPD1a	Proposed 12.5' Type CM2 Inlet & 24" RCP Lateral	Proposed	(0.5)WSPD3	2.5
		Future	(0.5)WSPD3	2.5
		Ultimate	(0.5)Section(SP1)	26
SPD1b	Proposed 12.5' Type CM2 Inlet & 24" RCP Lateral	Proposed	(0.5) WSPD3	2.5
		Future	(0.5) WSPD3	2.5
		Ultimate	(0.5)Section(SP1)	26
SPD2	Proposed 30" RCP	Proposed	WSPD3	5
		Future	WSPD3	5
		Ultimate	SPD1a + SPD1b	52
SPD3	Proposed 72" RCP	Proposed	CPS	433
		Future	CPS	433
		Ultimate	WML16[54cfs]	54
SPD4	Proposed 72" RCP	Proposed	SPD2 + SPD3	438
		Future	SPD2 + SPD3	438
		Ultimate	SPD2 + SPD3	106
SPD5	Emergency Overflow 30' Wide Channel w/ 3' High Berm	Proposed	CPS	433
		Future	CPS	433
		Ultimate	N/A	106

Street D Flood Control Facilities

Facility ID	Facility Description	Hydrologic Condition	Contributing Source	Facility Conveyance Flow (cfs)
D1	Proposed 54" RCP	Proposed	DBN	258
		Future	DBN	258
		Ultimate	N/A	N/A
D3	Proposed 60" RCP	Proposed	DBN	258
		Future	DBN	258
		Ultimate	N/A	N/A
D6	5-acre-ft Detention Basin with a 54" Outlet	Proposed	CPN	361
		Future	CPN	361
		Ultimate	N/A	N/A
D7	Emergency Overflow 25' Wide Channel w/ 3' High Berm	Proposed	CPN	361
		Future	CPN	361
		Ultimate	N/A	N/A

Hydraulic Analyses Flow Summary

Cross Section	Section Type	Q (cfs)	Slope (%)	Depth (ft)	Velocity (fps)	DxV
D1 *Q = WSPD0*	Full Street	2	3.50	0.23	3.0	0.7
SP1 *Q = SP2 + WSPD3 + BASIN WML16[10CFS]*	Full Street	52	1.90	0.59	4.9	2.9
SP2 *Q = WC8*	Full Street	37	1.90	0.54	4.4	2.4
SP4 *Q = 0.5(WSPD0)*	Full Street	2.5	0.60	0.36	1.8	0.6
GC1 (10-Year) *Q = 0.5(WGRC1A) + WGC3a[9cfs]*	Half Street	4	0.50	0.41	2.1	0.8
GC1 (100-Year) *Q = 0.5(WGRC1A) + WGC3a[18cfs]*	Half Street	16	0.50	0.62	2.7	1.7
GC2 (10-Year) *Q = 0.5(WGRC1A) + DS-1*	Half Street	2	2.36	0.28	3.0	0.8
GC2 (100-Year) *Q = 0.5(WGRC1A) + DS-1*	Half Street	4	2.36	0.34	3.4	1.2
DS-1 *Q = WSPD0*	Swale	2	2.80	0.39	3.3	1.3
			4.50	0.36	3.9	1.4

Max. Capacity for Grand Canyon 10-Yr Dry Lane Criteria is 5-cfs.

LEGEND

- FUTURE COMMERCIAL SITE BOUNDARY
- EXISTING DRAINAGE FACILITY
- PROPOSED DRAINAGE FACILITY
- ESTIMATED FUTURE DRAINAGE FACILITY
- FLOW DIRECTION
- ID — FLOWMASTER SECTION
- ID — FACILITY ID

N

SCALE – 1"=60' FEET (0, 60, 120)

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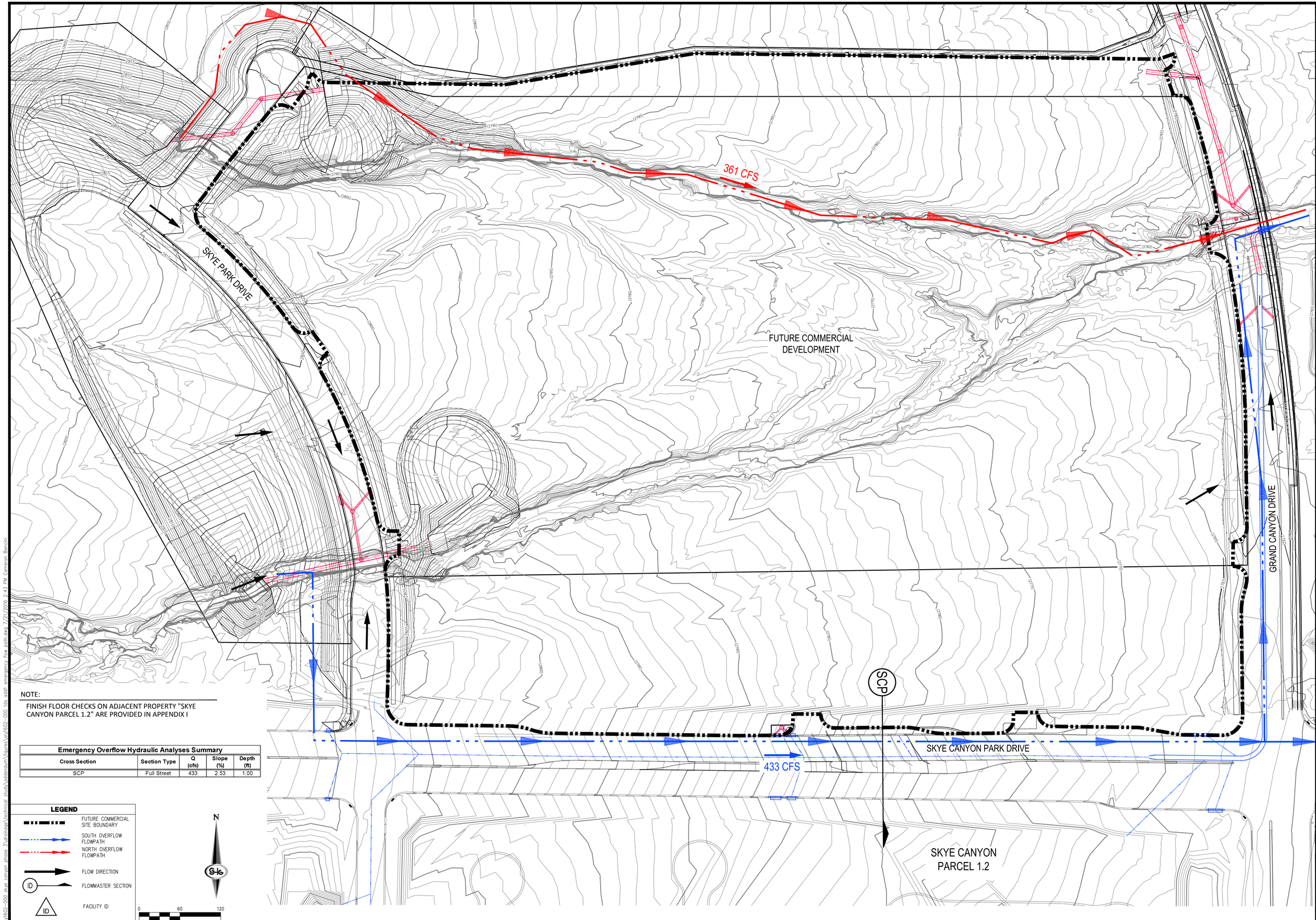
NINETY-FIVE MANAGEMENT, LLC
SKYE CANYON PHASE 3 INFRASTRUCTURE
DRAINAGE FACILITIES & HYDRAULIC SUMMARY MAP

DATE: JULY 2016
DRAFTER: CWB
DESIGNER: CWB
CHECKED: SMJ
PROJECT NO.
OLY1602.000

EXHIBIT I
SHEET 1 OF 1

\\oly1602-000 skye canyon phase 3\drainage\technical study\exhibits\Revised\oly1602-000 fac dsgn facilities map.dwg 7/21/2016 6:19 PM Cameron Brecht



NOTE:

FINISH FLOOR CHECKS ON ADJACENT PROPERTY "SKYE CANYON PARCEL 1.2" ARE PROVIDED IN APPENDIX I

Emergency Overflow Hydraulic Analyses Summary

Cross Section	Section Type	Q (cfs)	Slope (%)	Depth (ft)
SCP	Full Street	433	2.53	1.00

LEGEND

- FUTURE COMMERCIAL SITE BOUNDARY
- SOUTH OVERFLOW FLOWPATH
- NORTH OVERFLOW FLOWPATH
- FLOW DIRECTION
- ID FLOWMASTER SECTION
- ID FACILITY ID

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

NINETY-FIVE MANAGEMENT, LLC

SKYE CANYON PHASE 3 INFRASTRUCTURE

EMEGENCY OVERFLOW PATH MAP

DATE: JULY 2016
DRAFTER: CWB
DESIGNER: CWB
CHECKED: SMJ
PROJECT NO. OLY1602.000

EXHIBIT J

SHEET 1 OF 1

APPENDIX C

Hydrologic Data

Curve Number

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

Soil & Curve Number Computation

Project Name: OLY1602-000 Skye Canyon Phase 3
Date: 7/19/2016
File Name: OLY1602-000 Add1 CN Calc.xlsx
By: CWB

Data: **Reference:**

Soil Type & Description		A	B	C	D
155	Cave gravelly fine sandy loam, 4 to 15 percent slopes	5%	5%	0%	90%
191	Dalian very cobbly fine sandy loam, 2 to 8 percent slopes	5%	85%	0%	10%
400	Tencee very gravelly fine sandy loam, 2 to 8 percent slopes	0%	10%	0%	90%

Exhibit D
SCS Soil Data

Land Use	A	B	C	D
Desert Shrub (poor)	63	77	85	88
Roadway	98	98	98	98

EXISTING CONDITION

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CALCULATED CN
EX-W5N	155	87.5%	Desert Shrub (poor)	5%	5%	0%	90%	63	77	85	88	79.78	75.41
	400	12.5%	Desert Shrub (poor)	0%	10%	0%	90%	63	77	85	88	11.42	10.88
TOTAL PERCENT		100.0%									TOTAL AREA	91.20	**86.29**

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CALCULATED CN
EX-W5S	155	98.1%	Desert Shrub (poor)	5%	5%	0%	90%	63	77	85	88	148.37	84.54
	400	0.8%	Desert Shrub (poor)	0%	10%	0%	90%	63	77	85	88	1.27	0.73
	191	1.1%	Desert Shrub (poor)	5%	85%	0%	10%	63	77	85	88	1.65	0.84
TOTAL PERCENT		100.0%									TOTAL AREA	151.29	**85.27**

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CALCULATED CN
ON1-E	155	54.8%	Desert Shrub (poor)	5%	5%	0%	90%	63	77	85	88	12.85	47.24
	400	45.2%	Desert Shrub (poor)	0%	10%	0%	90%	63	77	85	88	10.60	39.28
TOTAL PERCENT		100.0%									TOTAL AREA	23.45	**86.52**

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CALCULATED CN
EX-W6	400	100.0%	Desert Shrub (poor)	0%	10%	0%	90%	63	77	85	88	8.43	86.90
TOTAL PERCENT		100.0%									TOTAL AREA	8.43	**86.90**

PROPOSED CONDITION

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CALCULATED CN
ON1-E	155	55.1%	Desert Shrub (poor)	5%	5%	0%	90%	63	77	85	88	11.44	47.50
	400	44.9%	Desert Shrub (poor)	0%	10%	0%	90%	63	77	85	88	9.32	39.01
TOTAL PERCENT		100.0%									TOTAL AREA	20.76	**86.51**

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CALCULATED CN
EX-W6	400	100.0%	Desert Shrub (poor)	0%	10%	0%	90%	63	77	85	88	7.65	86.90
TOTAL PERCENT		100.0%									TOTAL AREA	7.65	**86.90**

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA ACRES	CALCULATED CN
WSPD0	155	29.7%	Roadway	5%	5%	0%	90%	98	98	98	98	0.19	29.09
	400	29.7%	Roadway	0%	10%	0%	90%	98	98	98	98	0.19	29.09
	400	21.9%	Natural Desert Landscaping	0%	10%	0%	90%	63	77	85	88	0.14	19.01
	155	18.8%	Natural Desert Landscaping	5%	5%	0%	90%	63	77	85	88	0.12	16.16
TOTAL PERCENT		100.0%									TOTAL AREA	0.64	**93.36**

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP A	B	C	D	LAND USE CN A	B	C	D	SUBAREA 0.55	CALCULATED CN
WSPD3	155	38.7%	Roadway	5%	5%	0%	90%	98	98	98	98	0.55	37.96
	400	16.9%	Roadway	0%	10%	0%	90%	98	98	98	98	0.24	16.56
	400	9.9%	Natural Desert Landscaping	0%	10%	0%	90%	63	77	85	88	0.14	8.57
	155	34.5%	Natural Desert Landscaping	5%	5%	0%	90%	63	77	85	88	0.49	29.75
TOTAL PERCENT		100.0%									TOTAL AREA	1.42	**92.83**

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

Soil & Curve Number Computation

Project Name: OLY1602-000 Skye Canyon Phase 3
Date: 7/19/2016
File Name: OLY1602-000 Add1 CN Calc.xlsx
By: CWB

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA 0.55	CALCULATED CN
				A	B	C	D	A	B	C	D		
WGRC1A	400	57.1%	Roadway	0%	10%	0%	90%	98	98	98	98	0.80	56.00
	400	42.9%	Natural Desert Landscaping	0%	10%	0%	90%	63	77	85	88	0.60	37.24
TOTAL PERCENT		100.0%									TOTAL AREA	1.40	**93.24**

FUTURE CONDITION

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CALCULATED CN
				A	B	C	D	A	B	C	D		
WGC3	155	40.3%	Commercial	5%	5%	0%	90%	89	92	94	95	11.44	38.07
	400	59.7%	Commercial	0%	10%	0%	90%	89	92	94	95	16.97	56.57
TOTAL PERCENT		100.0%									TOTAL AREA	28.41	**94.64**

ULTIMATE CONDITION

BASIN ID	SOIL TYPE	SUBAREA PERCENT	LAND USE	HYDROLOGIC SOIL GROUP				LAND USE CN				SUBAREA ACRES	CALCULATED CN
				A	B	C	D	A	B	C	D		
OFF1	400	57.9%	Commercial	0%	10%	0%	90%	89	92	94	95	0.22	54.83
	400	42.1%	Commercial	0%	10%	0%	90%	89	92	94	95	0.16	39.87
TOTAL PERCENT		100.0%									TOTAL AREA	0.38	**94.70**

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Lag Time - Standard Form 4 Computations

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL
TIME OF CONCENTRATION

Project Name: **Skye Canyon**
Description: Phase 3 Overall Hydrologic Model
File Name: OLY1602-000 Add1 SF4.xls
By: SMJ
Date: 7/19/2016

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check Urbanized Basins		Tlag
DESIG:	DEV./EX. (D or E)	CN	K [1]	AREA Ac	AREA Mi^2 [2]	INITIAL LENGTH Feet	SLOPE %	Ti Min [3]	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY FPS [4]	V2 VELOCITY FPS [5]	Tt Min [6]	Tc Calc. [7]	Total Length Feet [8]	Tc Check [9]	Tlag Hours [10]
EXISTING CONDITION																	
EX-W5N	E	86.3	0.749	91.20	0.1425	500	4.8	8.38	7850	2.8	2.48	4.92	28.27	36.64			0.366
EX-W5S	E	85.3	0.736	151.29	0.2364	500	5.6	8.26	7360	3.5	2.77	5.50	23.80	32.06			0.321
ON1-E	E	86.5	0.752	23.45	0.0366	335	4.5	6.95	820	4.4	3.10	6.17	3.55	10.50			0.105
EX-W6	E	86.9	0.757	8.43	0.0132	335	3.9	7.18	660	5.0	3.31	6.57	2.92	10.10			0.101
PROPOSED CONDITION																	
ON1-E	E	86.5	0.752	20.76	0.0324	335	4.5	6.95	820	4.4	3.10	6.17	3.55	10.50			0.105
EX-W6	E	86.9	0.757	7.65	0.0120	335	3.9	7.18	660	5.0	3.31	6.57	2.92	10.10			0.101
WSPD0	D	93.4	0.842	0.64	0.0010	25	1.0	2.32	305	2.0	2.86	4.33	1.78	4.10	330	11.833	0.050
WSPD3	D	92.8	0.835	1.42	0.0022	25	1.0	2.38	560	1.9	2.78	4.22	3.23	5.61	585	13.250	0.056
WGRC1A	D	93.2	0.841	1.40	0.0022	25	1.0	2.33	675	0.5	1.43	2.16	7.18	9.52	700	13.889	0.095
FUTURE CONDITION																	
WGC3	D	94.6	0.859	28.41	0.0444	135	2.7	3.62	1525	2.7	3.32	5.03	5.91	9.52	1660	19.222	0.095
ULTIMATE CONDITION																	
OFF1	D	94.7	0.860	0.38	0.0006	30	1.0	2.37	275	1.5	2.47	3.75	1.85	4.22	305	11.694	0.050

[1] K = 0.0132 (CN) - 0.39
[2] A = Area/640
[3] Ti = (1.8 (1.1-K) L^0.5)/S^0.33
[4] For Existing Conditions: V1 = 14.8 * (S/100)^0.5
For Developed Conditions: V1 = 20.2 * (S/100)^0.5
[5] For Existing Conditions: V2 = 29.4 * (S/100)^0.5
For Developed Conditions: V2 = 30.6 * (S/100)^0.5
[6] Tt = L/(60*V)
[7] Tc = Ti + Tt
[8] Total L = Initial L + Travel L
[9] Tc = (L/180) + 10
[10] Tlag = (0.6*Tc)/60
[11] Min Tlag =0.05
Note: For Travel Time Calcs: V1 applies to first 500 feet and V2 applies to remaining distance.

REFERENCE :

STANDARD FORM 4

Referenced Drainage Study Material

Skye Canyon – Phase 1 Infrastructure – Update #6 (DS4661K)

CITY OF LAS VEGAS
INTER-OFFICE MEMORANDUM

DATE: July 11, 2016

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 1 Infrastructure - Update #6

COPIES TO:
Slater Hanifan Group
K A G Development South, LLC / Ninety-Five Management, LLC
Bart Anderson, P.E., DevCo
CCRFCD

Cross Streets:	NEC of Grand Teton Blvd. & Hualapai Way
File Number:	F:\Depot\DSMemos\DS4661K.doc
Parcel Number:	125-07-301-001 & 125-07-301-002; 125-07-401-001 & 125-07-401-002
Zoning Action:	TMP-53058

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

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	3/19/2014	4/17/2014	Not Approved	$400.00	351277: $400
2nd Submittal	5/14/2014	6/12/2014	Conditionally Approved	$400.00	356797: $400
Supplemental	8/25/2014	9/15/2014	Approved	----	----
3rd Submittal	11/25/2014	12/10/2014	See Comments Below	$100.00	377769: $100
4th Submittal	12/10/2014	1/7/2015	Approved	$100.00	379537: $100
5th Submittal	12/18/2014	1/8/2015	Approved	$100.00	380446: $100
6th Submittal	3/5/2015	3/9/2015	Approved	$100.00	388162: $100
7th Submittal	5/18/2015	6/2/2015	Approved	$100.00	397877: $100
8th Submittal	6/8/2015	6/22/2015	Approved	$100.00	400871: $100
9th Submittal	7/5/2016	7/11/2016	See Comments Below	$100.00	449985: $100
			TOTAL FEES (LDDRS):	**$1,500.00**	----

REMARKS:

9th Submittal: Update #6 for As-Built Final Location of Storm Drain System in Horse Drive

8th Submittal: Update #5 for Phasing a Stockpile Permit

7th Submittal: Update #4 for minor lateral profile revision in *Skye Canyon Parkway* at Sta. 95+28

6th Submittal: Update #3 for minor storm drain profile revision in *Skye Park Drive* at *Skye Canyon Drive* (aka Horse Drive)

5th Submittal: Update #2 for Stockpile Permit at additional locations

4th Submittal: Update for revision of storm drains alignment in *Grand Canyon Drive, Eagle Canyon Avenue, Mountain Landing Street* and *Hualapai Way*

3rd Submittal: Update for Stockpile Permit Only

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

X	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.

The following comments are repeated until they are complete:

1. The *Kyle Canyon Master Drainage Study* is proposing to revise the hydrology and facilities indentified in the *Clark County Regional Flood Control District's (CCRFCD) 2008 Las Vegas Valley Flood Control Master Plan Update*. A *Master Plan Amendment* (MPA) must be submitted to the *City of Las Vegas* for approval. The *City of Las Vegas* will coordinate the MPA submittal to CCRFCD for approval. The Master Developer will be responsible for preparing all submittals needed for CCRFCD along with any and all presentations. The MPU must be approved by the *City of Las Vegas City Council* prior to the final approval of the *Master Drainage Study.*
2. For all culvert entrances or exits located outside of the Public Right-of-Way or dedicated "Public Drainage Easement to be Privately Maintained" must be recorded by separate document prior to the final acceptance of the improvement plans unless they are to be recorded by parcel or final map. Also, show the easement on the grading plan.
3. In an overview perspective for the proposed *Phase 1 Infrastructures, Racel Street* with its regional storm drain act as the sole perpetuation pathway for offsite flows during a major storm event in the interim condition (reference Sheets GR-01 & GR-02).

   In a worst case scenario that the upstream culvert entrance is completely clogged, ie, the 100-year flow will be conveyed on the *Racel Street* surface. Provide a hydraulic calculation for the worst case 100-year water surface in *Racel Street.* The finish floor elevation of future houses in the PODs adjacent to *Racel* shall be above the corresponding water surface or flood wall for protection to that effect. This shall serve as a guideline in the future technical drainage studies for the PODs.
4. Provide a detail grading around the culvert entrance at Racel Street Storm Drain and make sure freeboard requirements are satisfied.
5. All drainage facilities proposed in this *Phase 1 Infrastructure Study* are considered interim facilities and must be maintained by the master developer until the facilities are formally accepted by the *City of Las Vegas.*
6. 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 *Flood Control* prior to final acceptance of the technical drainage study.
7. The project proposes to build a temporary drainage facility on the west side of *Hualapai Way*. Prior to final plan approval the developer must complete a ***Maintenance and Liability Agreement*** for the interim drainage improvements (off-site berms or channels) 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 constructing the facility and an exhibit that adequately shows the location and limits of the drainage facility to *Flood Control* for approval. Once the drainage study is conditionally approved, the engineer/developer should contact the *City's Land Development Section* (229-6371) to begin the agreement process.

   In order for the maintenance bond to be released in the future, a drainage update / letter will be required to justify that the offsite berms / channels are no longer necessary and can be removed.
8. **Sheet SD-09**: Review and revise an appeared low point "61.95TC" in *Grand Canyon Drive* at the intersection with *Grand Teton Drive.*
9. Technical drainage studies are required for each of the POD's. The technical drainage studies for the POD's may not be conditional approved until the final approval of the pertinent infrastructure drainage study is obtained.
10. Building permits for the homes within the individual POD's will not be issued until construction of the street and flood control infrastructure around the POD is substantially complete or interim protection is provided per the approved technical drainage study.

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.

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.

END OF REMARKS
ays

T/R/S: T19S/R60E/07
AREA G-07

TECHNICAL DRAINAGE STUDY

Skye Canyon

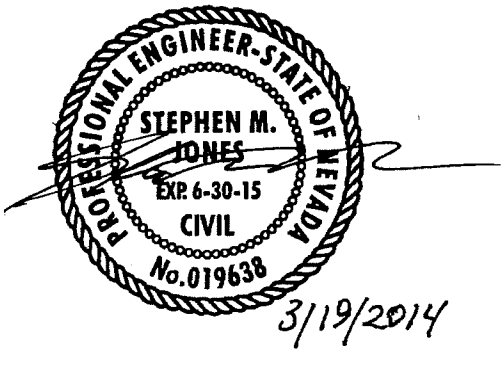
(Phase 1 Infrastructure)

City of Las Vegas, Nevada

Job No.: OLY1401.001
Date: March 2014

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



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

Assisted by: Andrew Howard, P.E.
Erick Mata, EI

Table 1 below summarizes the concentration point flow rates relevant to support the drainage patterns presented in the existing condition discussion in this study.

Table 1: Summary of Existing Condition Flow Rates (Concentration Points)

Concentration Point ID	Area (mi^2)	Q_{100} (cfs)	Q_{10} (cfs)
PT1	0.19	233	83
PT2A	0.30	319	102
PT3A	0.76	557	215
CP12	1.00	756	281
CP26	1.25	741	271

Note that although the contributing watershed to Concentration Point CP12 has been referenced from the GCW Master Study, the flow rates reported in this study at CP12 vary from what GCW Master Study established at CP12 as demonstrated in Table 2 below. Inspection of the GCW Master Study shows that the DARF utilized for CP12 is different than the DARF utilized in this study and identified in the CCRFCD Manual for the contributing drainage area. Therefore, CP12 flow reported in Table 1 is considered acceptable.

Table 2: Flow Rate Comparison at CP12: SHG vs. GCW

Concentration Point	SHG Q_{100} (cfs)	GCW Q_{100} (cfs)
CP12	756	733

HISTORIC EX. COND. FLOW @ PROPERTY DISCHARGE ≅ WC9 IN THIS PH.3 STUDY

4 DEVELOPED DRAINAGE CONDITION

4.1 Definition of Developed Condition

The developed condition considers the entire Phase 1 area developed, inclusive of both the proposed roadway infrastructure improvements and the future anticipated residential subdivisions bound by the proposed roadways. Included in this project are the proposed drainage facilities required to collect and convey storm runoff produced by the entire Phase 1 area and conform to master planned drainage patterns established in the SHG Master Study.

The offsite drainage areas shown in the existing condition are assumed to remain in their current state. In addition to routing Phase 1 onsite runoff, the proposed drainage infrastructure has also been provided for collection of offsite runoff as determined necessary.

4.2 Discussion of Developed Condition

Refer to Exhibit F, included in Appendix A, for a detailed illustration of the developed condition drainage patterns.

Table 4: Flow Rate Comparison at CP2 - Phase 1 Study vs. SHG Master Study			
Phase 1 Infrastructure Study		**SHG Master Study**	
Contributing Source	**Q_{100} (cfs)**	**Contributing Source**	**Q_{100} (cfs)**
PT2	121	WL2B + HORSE3 + GRAND2	131

Review of Table 4 shows that the flow routed to PT2 does not exceed what the SHG Master Study had anticipated; therefore, the Phase 1 development is considered in conformance with master planned drainage patterns.

Concentration Point CP3:

Similar to as described in the CP2 discussion above, this project proposes additional flow at CP3 than occurs during the existing condition. As demonstrated above, the additional flow routed toward CP3 from CP2 is in conformance with master planned drainage patterns which have been approved by NDOT in review of the SHG Master Study. Therefore, the impacts to downstream US-95 is considered minimal and temporary until future Skye Canyon infrastructure is installed.

However, in between US-95 and the Skye Canyon property, stockpiles are in the process of being placed on the private property located at the northeast corner of Horse and Grand Canyon. Table 5 below summarizes the flow rate utilized for design in the referenced Stockpile Study compared to the proposed flow rate to CP3.

Table 5: Flow Rate Comparison at CP3 - Phase 1 Study vs. Stockpile Study			
Phase 1 Infrastructure Study		**Stockpile Study**	
Contributing Source	**Q_{100} (cfs)**	**Contributing Source**	**Q_{100} (cfs)**
CP3	795	Section 4	1315

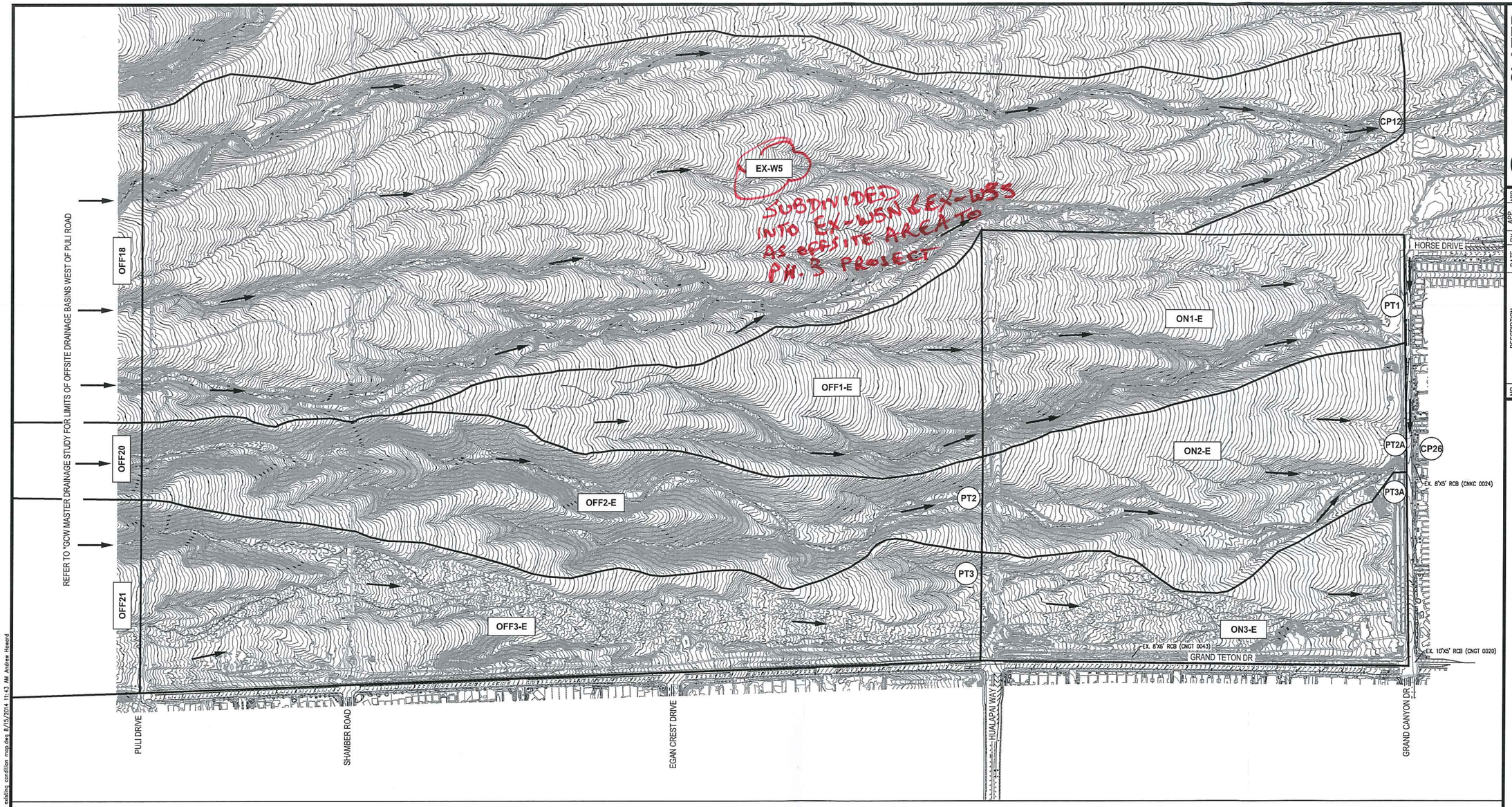
SLIGHT FURTHER INCREASE TO 821 cfs AFTER INCLUSION OF 'PARK'

Review of Table 5 shows that the flow routed to CP3 does not exceed what the downstream property had planned for in the Stockpile Study; therefore, the Phase 1 development does not result in adverse impacts to downstream property.

Concentration Point RA-HU:

The developed condition flow routed to RA-HU contributes to CP26 and further discussion will follow that the proposed discharge at CP26 is considered acceptable. However, the SHG Master Study had defined a flow rate contributing to RA-HU and its associated downstream storm drain that has been utilized in project planning. Table 6 below summarizes the flow rate reported at RA-HU in this study compared to the quantity of flow anticipated by the SHG Master Study to be routed to this location.

Table 6: Flow Rate Comparison at RA-HU - Phase 1 Study vs. SHG Master Study			
Phase 1 Infrastructure Study		**SHG Master Study**	
Contributing Source	**Q_{100} (cfs)**	**Contributing Source**	**Q_{100} (cfs)**
RA-HU	704	RA-HU	532



Basin Flow Rate Summary (Existing Condition)

Basin/Concentration Point ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
ON1-E	65.8	129	46
ON2-E	62.5	127	46
ON3-E	45.8	86	32
OFF1-E	58.7	114	43
OFF2-E	86.8	160	60
OFF3-E	101.2	146	48
*OFF18	351.4	480	182
*OFF20	42.0	85	33
*OFF21	337.9	461	179
*EX-W5	285.4	443	165

*REFERENCED FROM GC WALLACE KYLE CANYON MASTER DRAINAGE STUDY

Concentration Points Summary (Existing Condition)

Basin/Concentration Point ID	Area (sq-mi)	Q_{100} (cfs)	Q_{10} (cfs)
PT1 *(OFF1-E +ON1-E)*	0.19	233	83
PT2 *(*OFF20 + OFF2-E)*	0.20	232	83
PT3 *(*OFF21 + OFF3-E)*	0.69	540	202
PT2A *(PT2 + ON2-E)*	0.30	319	102
PT3A *(PT3 + ON3-E)*	0.76	557	215
CP26 *(PT1 + PT2A + PT3A)*	1.25	741	271
CP12 *(*OFF18 + *EX-W5)*	1.00	756	281

*REFERENCED FROM GC WALLACE KYLE CANYON MASTER DRAINAGE STUDY

HISTORIC Ex. CONDITION FLOW@ WC9 (THIS STUDY)

LEGEND
- BASIN BOUNDARY
- ID — BASIN ID
- FLOW DIRECTION
- ID — CONCENTRATION POINT

N

0 300 600
SCALE — 1"=300' FEET

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

NINETY-FIVE MANAGEMENT, LLC.

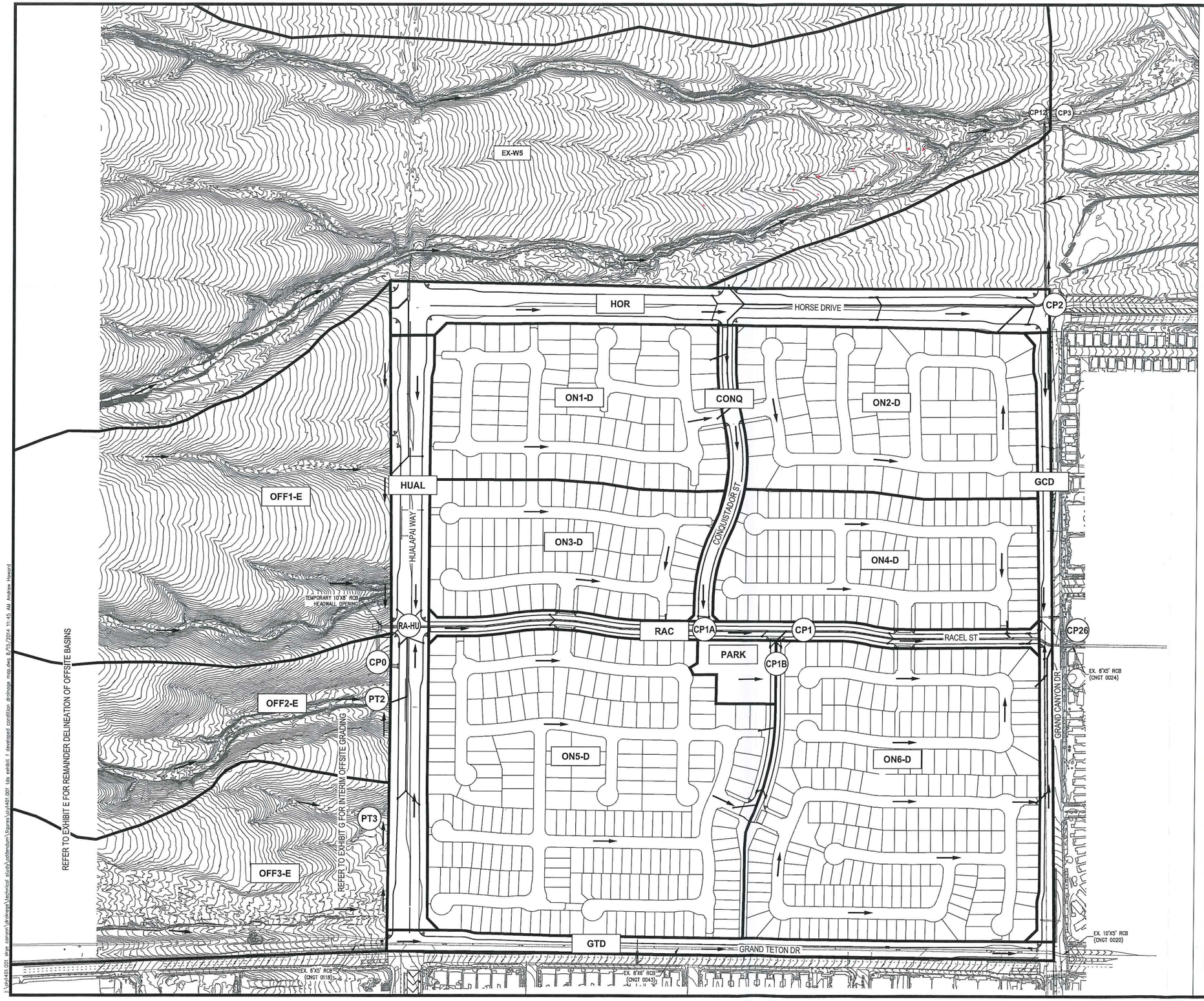
SKYE CANYON - PHASE 1 INFRASTRUCTURE

EXISTING CONDITION DRAINAGE MAP

DATE: MARCH 2014
DRAFTER: ETM/AJH
DESIGNER: ETM/AJH
CHECKED: SMJ
PROJECT NO. OLY1401.001

EXHIBIT E
SHEET 1 OF 1

J:\oly\1401.001 skye canyon\Drainage\Technical study\Addendum\Figures\oly1401.001 tds exhibit e existing condition mosp.dwg 8/15/2014 11:43 AM Andrew Howard



N

0 180 360
SCALE – 1"=180' FEET

LEGEND

- BASIN BOUNDARY
- ID — BASIN ID
- FLOW DIRECTION
- (ID) — CONCENTRATION POINT

Basin Flow Rate Summary (Developed Condition)

Basin/Concentration Point ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
ON1-D	17.8	47	21
ON2-D	19.3	45	18
ON3-D	14.8	39	17
ON4-D	16.1	49	24
ON5-D	37.3	107	52
ON6-D	32.3	93	46
CONQ	2.2	6	3
RAC	4.6	13	6
PARK	1.8	4	1
HOR	10.4	30	14
GCD	3.4	10	5
GTD	4.7	14	7
HUAL	9.2	26	11
OFF1-E	60.3	114	43
OFF2-E	86.8	160	60
OFF3-E	101.2	146	48
*OFF18	351.4	480	182
*OFF20	42.0	85	33
*OFF21	337.9	462	179
*EX-W5	285.4	443	165

*REFERENCED FROM GC WALLACE KYLE CANYON MASTER DRAINAGE STUDY

Concentration Points Summary (Developed Condition)

Basin/Concentration Point ID	Area (sq-mi)	Q_{100} (cfs)	Q_{10} (cfs)
PT2 (OFF20 + OFF2-E)	0.20	232	83
PT3 (OFF21 + OFF3-E)	0.69	540	202
RA-HU (CP0 + HUAL + OFF1-E)	0.99	704	255
CP0 (PT2 + PT3)	0.89	655	241
CP1 (CP1A + CP1B + RAC + CONQ)	1.09	728	262
CP2 (ON1-D + ON2-D + HOR)	0.07	121	53
CP3 (CP12 + CP2)	1.04	795	296
CP12 (OPFF18 + EX-W5)	1.00	756	281
CP1A (RA-HU + ON3-D)	1.02	700	251
CP1B (ON5-D + PARK)	0.06	110	53
CP26 (CP1 + ON4-D + ON6-D + GCD)	1.17	760	275

ALLOWABLE INCREASE TO EXI. COND. FLOW @ THIS STUDY'S WC9

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

NINETY-FIVE MANAGEMENT, LLC.

SKYE CANYON - PHASE 1 INFRASTRUCTURE

DEVELOPED CONDITION DRAINAGE MAP

DATE: MAY 2014
DRAFTER: AJH
DESIGNER: AJH
CHECKED: SMJ
PROJECT NO. OLY1401.001

EXHIBIT F
SHEET 1 OF 1

J:\Oly1401.001 skye canyon\drainage\technical study\addendum\figures\Oly1401.001 fds exhibit f developed condition drainage map.dwg, 8/15/2014 11:45 AM, Andrew Howard

Referenced Drainage Study Material
Skye Canyon Park – Phase 1 (DS4707D)

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: September 2, 2015
TO: **Land Development Services** Department of Building & Safety			FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: **Skye Canyon Park – Phase 1**		**COPIES TO:** Slater Hanifan Group
Cross Streets:	SWC Skye Canyon Park Bl & Skye Village Dr		Section 12, LLC / Ninety-Five Mgmt.
File Number:	F:\Depot\DSMemos\DS4707D.doc		Bart Anderson, P.E., DevCo
Parcel Number:	126-12-000-001		CCRFCD
Zoning Action:	*Skye Canyon Development Agreement*		
FEMA Flood Zone	YES	NO X	
Proposed Storm Drain	YES	NO X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	10/30/2014	12/10/2014	Not Approved	$400.00	375470: $400
2nd Submittal	2/3/2015	2/19/2015	Not Approved	$400.00	384502: $400
Revised Memo	3/3/2015	3/3/2015	Conditional Approval	N/C	N/C
Supplement	5/14/2015	6/1/2015	Approved	N/C	N/C
3rd Submittal & Supplement	8/19/2015 & 9/1/2015	9/2/2015	See Comments Below	$100.00	411589: $100
			TOTAL FEES (LDDRS):	**$900.00**	**----**

REMARKS:

3rd Submittal: Update #1 for Minor Site Layout Changes

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

X	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is conditionally approved until the *Skye Canyon Development Agreement* is approved by the *City of Las Vegas City Council*

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

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

END OF REMARKS

ays

T/R/S: T19S/R59E/07
AREA F-12

TECHNICAL DRAINAGE STUDY
ADDENDUM #1

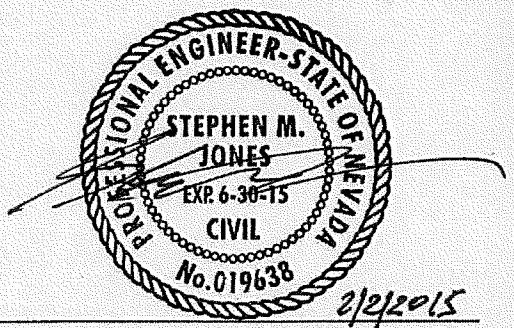
Skye Canyon Park – Phase 1

City of Las Vegas, Nevada

Job No.: OLY1401.002
Date: February 2015

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



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

Assisted by: Andrew Howard, P.E.

(REFER TO EXHIBIT E FOR OFFSITE DRAINAGE INFORMATION)

OFF1
OFF2
OFF3
IOFF4
IOFF5
EX1
D1
D2
SCP
CP1
CP2
CP3
CP4
CP5
A
B
C
D

CAPPED RCB
PROPOSED 60" RCP SD (MOHU 0085)
EX. 60" RCP SD
EX. 30" SD BLEEDER
EX. 8'X5' RCB SD (MOHU 0036)
(51 CFS)
(9 CFS)
(0 CFS)
SKYE CANYON PARK BLVD
PROPOSED 24" RCP SD
PROPOSED 17.5' TYPE CM2 SDDI
SKYE VILLAGE DRIVE
FUTURE SKYE CANYON PARCEL 1.1
PROPOSED SDDI
4 CFS
PROPOSED DRAINAGE SWALE
(6 CFS)
(14 CFS)
(42 CFS)
EX. 30" RCP SD
EX. 10.0' TYPE CM2 SDDI
EX. 5.0' TYPE CM2 SDDI
(36 CFS)
(38 CFS)
PROPOSED STORM DRAIN (TYP.)
EX. STORM DRAIN
PROPOSED INTERIM TRAP. DITCH
EX. DITCH PER PHASE 1 INFRASTRUCTURE STUDY

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NINETY-FIVE MANAGEMENT, LLC.

SKYE CANYON PARK - PHASE 1

DEVELOPED CONDITION DRAINAGE MAP

100-Year Interim Ditch Flow Hydraulic Summary

Cross Section ID	Slope (%)	Q_{100} (cfs)	Normal Depth (ft)	Velocity (fps)	Description
A	4.0	26	0.29	5	Earth Lined Trap. Channel; 17-ft Bottom, 3:1 SS, Min. 2.0-ft Depth
B	1.0	22	0.68	2.4	Grass Lined V-Ditch Swale, 20:1 SS, Min. 1.0-ft Depth

Prorated Flow Summary

Basin	Q_{100} (cfs)	Q_{10} (cfs)	Area (acres)	Unit Flow 100 (cfs/acre)	Unit Flow 10 (cfs/acre)
D2	24	9	9.8	2.4	0.9
Subbasin	Q_{100} (cfs)	Q_{10} (cfs)	Area (acres)	Unit Flow$_{100}$ (cfs/acre)	Unit Flow$_{100}$ (cfs/acre)
A	4	2	1.7	2.4	0.9
B	4	2	1.8	2.4	0.9
C	2	1	1.0	2.4	0.9
D	14	4	5.3	2.4	0.9
TOTAL	*24*	*9*	*9.8*		

Developed Condition Flow Rate Summary

Basin ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
EX1	1.4	3	1
EX2	1.8	2	1
D1	2.0	7	4
D2	9.6	24	9
OFF1	14.4	31	12
OFF2	277.6	328	125
OFF3	0.8	2	1
IOFF4	6.7	16	7
IOFF5	4.3	10	3
SCP	0.4	1	1
Concentration Point ID	**Area (sq-mi)**	**Q_{100} (cfs)**	**Q_{10} (cfs)**
CP1 *(OFF1 + OFF2 + EX1)*	0.46	338	128
CP2 *(SCP + D1)*	0.00	9	4
CP3 *(OFF3 + IOFF4 + D2)*	0.04	42	17
CP4 *(IOFF5)*	0.01	10	3
CP5 *(OFF3 + D2(A))*	N/A	6	3

'PARK' REFERENCED DRAINAGE AREA

NOTE: INTERIM OFFSITE DITCH IS PROPOSED FOR DEVELOPED CONDITION ONLY AND WILL NO LONGER BE NECESSARY AFTER THE ADJACENT RESIDENTIAL POD IS DEVELOPED.

LEGEND
- BASIN BOUNDARY
- PRO-RATED SUBBASIN BOUNDARY
- ID — BASIN ID
- (ID) — PRO-RATED SUBBASIN ID
- FLOW DIRECTION
- (ID) — CONCENTRATION POINT
- (ID) — FLOWMASTER SECTION

N

0 80 160
SCALE 1"=80' FEET

DATE: FEB. 2015
DRAFTER: AJH
DESIGNER: AJH
CHECKED: SMJ
PROJECT NO. OLY1401.003

EXHIBIT F
SHEET 1 OF 1

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TECHNICAL DRAINAGE STUDY

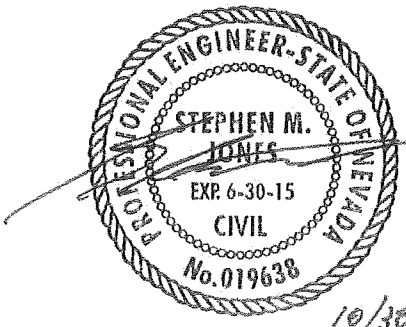
Skye Canyon Park – Phase 1

City of Las Vegas, Nevada

Job No.: OLY1401.003
Date: October 2014

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



10/30/2014

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

Assisted by: Andrew Howard, P.E.

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1*****************************************
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 *                                       *
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *                                       *
 *              JUN   1998               *
 *                                       *
 *            VERSION 4.1                *
 *                                       *
 *                                       *
 *                                       *
 *  RUN DATE   29OCT14  TIME  22:05:15   *
 *                                       *
 *                                       *
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U.S. ARMY CORPS OF ENGINEERS
HYDROLOGIC ENGINEERING CENTER
609 SECOND STREET
DAVIS, CALIFORNIA 95616
(916) 756-1104


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

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

1 HEC-1 INPUT PAGE 1

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

              *DIAGRAM
    1         ID     SLATER HANIFAN GROUP
    2         ID     OLYMPIA COMPANIES
    3         ID     SKYE CANYON PARK - PHASE 1
    4         ID     DEVELOPED CONDITION
    5         ID
    6         ID     RETURN PERIOD -------- 100-YEAR & 10-YEAR
    7         ID     DISTRIBUTION --------- 6-HOUR SDN3
    8         ID     PROJECT NO. ---------- OLY1401.003
    9         ID     FILENAME ------------- DEV.H1
   10         ID     DATE ----------------- 10/29/2014
   11         ID     MODELED BY ----------- AJH
   12         ID
   13         ID        PRECIPITATION STORM EVENT RATIOS
   14         ID        STORM EVENT                RATIO
   15         ID        100-YR                      1.00
   16         ID        10-YR                       0.56
   17         ID
   18         IT      5       0       0     300
   19         IO      5       0       0
   20         IN      5       0       0
   21         JR   PREC    1.00    0.56
              *
   22         KK    OFF1
   23         KM   NORTHERN-MOST OFFSITE BASIN
   24         PB    3.00
   25         PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
   26         PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
   27         PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
   28         PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   29         PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   30         PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
   31         PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
   32         PC   0.998   0.999       1
   33         BA   .0224
   34         LS       0    86.2
   35         UD   0.165
              *
   36         KK    OFF2
   37         KM   OFFSITE BASIN SOUTH OF OFF1 (MAIN WASH)
   38         BA   .4338
   39         LS       0    86.4
   40         UD   0.581
              *
   41         KK     EX1
   42         KM   ONSITE BASIN INCLUSIVE OF ARROYO, WEST OF BASIN D1
   43         BA   .0021
   44         LS       0    86.2
   45         UD   0.100
              *
```

1 HEC-1 INPUT PAGE 2

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

   46         KK     CP1
   47         KM   COMBINES OFF1, OFF2 & EX1
   48         HC       3
              *
   49         KK     SCP
   50         KM   SKYE CANYON PARK BLVD HALF-STREET BASIN ADJACENT TO D1
```

```
51          BA   .0006
52          LS      0     98.0
53          UD   0.087
            *

54          KK      D1
55          KM   DEVELOPED ONSITE BASIN ALONG SKYE CANYON PARK BLVD
56          BA   .0031
57          LS      0     94.6
58          UD   0.053
            *

59          KK     CP2
60          KM   COMBINES SCP & D1
61          HC       2
            *

62          KK    OFF3
63          KM   OFFSITE BASIN WEST OF BASIN D2
64          BA   .0012
65          LS      0     86.2
66          UD   0.100
            *

67          KK      D2
68          KM   MAIN ONSITE BASIN
69          BA   .0154
70          LS      0     86.0
71          UD   0.089
            *

72          KK     CP3
73          KM   COMBINES OFF3 & D2
74          HC       2
            *

75          KK   IOFF4
76          KM   OFFSITE BASIN WEST OF ONSITE SOCCER FIELD (INTERIM CONDITION)
77          BA   .0062
78          LS      0     86.2
79          UD   0.100
            *
```

REFERENCED HEC-1 DATA


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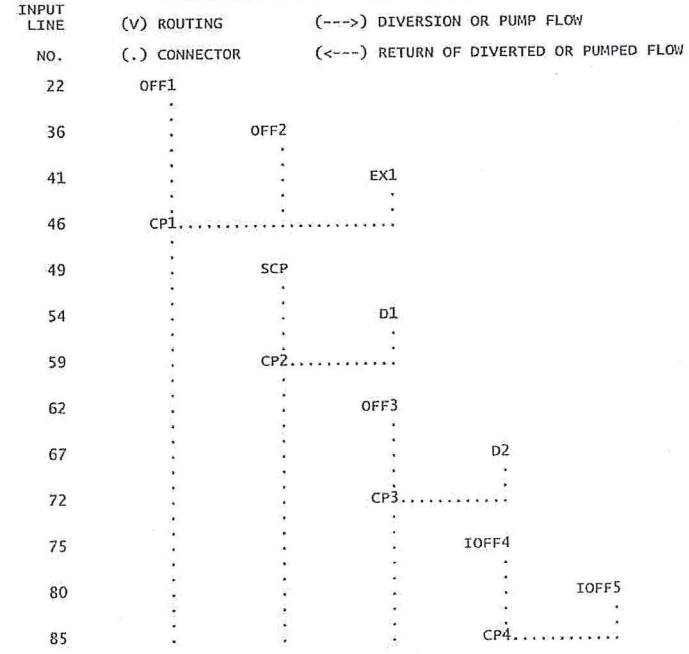
LINE        ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

80          KK   IOFF5
81          KM   OFFSITE BASIN SOUTH OF PROJECT SITE (INTERIM CONDITION)
82          BA   .0111
83          LS      0     86.2
84          UD   0.101
            *

85          KK     CP4
86          KM   COMBINES IOFF4 & IOFF5
87          HC       2
            *

88          ZZ
```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1**********

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* *

* *

* FLOOD HYDROGRAPH PACKAGE (HEC-1) *

* *

* JUN 1998 *

* *

* U.S. ARMY CORPS OF ENGINEERS *

* HYDROLOGIC ENGINEERING CENTER *

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*                                                                              *
*            VERSION 4.1                       *                             *          609 SECOND STREET
*                                              *                             *
*                                              *                             *       DAVIS, CALIFORNIA 95616
*                                              *                             *
*  RUN DATE   29OCT14  TIME  22:05:15          *                             *         (916) 756-1104
*                                              *                             *
*                                              *                             *
*********************************************
*********************************************
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SLATER HANIFAN GROUP
OLYMPIA COMPANIES
SKYE CANYON PARK - PHASE 1
DEVELOPED CONDITION

RETURN PERIOD ------- 100-YEAR & 10-YEAR
DISTRIBUTION -------- 6-HOUR SDN3
PROJECT NO. --------- OLY1401.003
FILENAME ------------ DEV.H1
DATE ---------------- 10/29/2014
MODELED BY ---------- AJH

PRECIPITATION STORM EVENT RATIOS

STORM EVENT	RATIO
100-YR	1.00
10-YR	0.56

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

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

                   COMPUTATION INTERVAL      .08 HOURS
                        TOTAL TIME BASE    24.92 HOURS

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

     JP           MULTI-PLAN OPTION
                      NPLAN          1  NUMBER OF PLANS

     JR           MULTI-RATIO OPTION
                     RATIOS OF PRECIPITATION
                   1.00       .56
1
                PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                              FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                          TIME TO PEAK IN HOURS
```

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .56
HYDROGRAPH AT						
+	OFF1	.02	1	FLOW	31.	12.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	OFF2	.43	1	FLOW	328.	125.
				TIME	4.00	4.08
HYDROGRAPH AT						
+	EX1	.00	1	FLOW	3.	1.
				TIME	3.50	3.50
3 COMBINED AT						
+	CP1	.46	1	FLOW	338.	128.
				TIME	4.00	4.08
HYDROGRAPH AT						
+	SCP	.00	1	FLOW	1.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	D1	.00	1	FLOW	7.	4.
				TIME	3.50	3.50
2 COMBINED AT						
+	CP2	.00	1	FLOW	9.	4.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	OFF3	.00	1	FLOW	2.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	D2	.02	1	FLOW	24.	9.
				TIME	3.50	3.50

+ 2 COMBINED AT	CP3	.02	1	FLOW TIME	26. 3.50	10. 3.50
+ HYDROGRAPH AT	IOFF4	.01	1	FLOW TIME	9. 3.50	4. 3.50
+ HYDROGRAPH AT	IOFF5	.01	1	FLOW TIME	17. 3.50	6. 3.58
+ 2 COMBINED AT	CP4	.02	1	FLOW TIME	26. 3.50	10. 3.50

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

APPENDIX D

HEC-1 Analyses

Existing Condition (100-Yr)

EX

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN  1998               *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   18JUL16  TIME  15:36:43  *
*                                      *
****************************************
```

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

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

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

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


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

                        *DIAGRAM
 *** FREE ***
              1         ID     SKYE CANYON
              2         ID     PHASE 3 INFRASTRUCTURE - EXISTING CONDITION
              3         ID     PRIOR TO DETENTION BASIN 1 & PHASE 2 BUILD-OUT
              4         ID
              5         ID     RETURN PERIOD ------- 100-YEAR
              6         ID     DISTRIBUTION -------- 6-HOUR SDN3
              7         ID     PROJECT NO. --------- OLY1602.000
              8         ID     FILENAME ------------ EX.H1
              9         ID     DATE ---------------- 7/20/2016
             10         ID     MODELED BY ---------- SMJ
             11         ID
             12         ID        SIX HOUR DEPTH-AREA REDUCTION FACTORS
             13         ID        DRAINAGE AREA (MI^2)    DARF
             14         ID        0.0-0.49                1.00
             15         ID        0.5-0.99                0.98
             16         ID        1.0-1.99                0.97
             17         ID
             18         IT       5       0       0     300
             19         IO       5       0       0
             20         IN       5       0       0
             21         JR    PREC    1.00    0.98    0.97
                        *

             22         KK   WOFF5
             23         KM   EXISTING OFFSITE DRAINAGE BASIN
             24         KM   REFERENCED FROM DB1 STUDY
             25         PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
             26         PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
             27         PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
             28         PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
             29         PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
             30         PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
             31         PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
             32         PC   0.998   0.999   1.000
             33         PB    3.00
             34         BA   .2569
             35         LS       0    86.5
             36         UD   0.419
                        *

             37         KK  RWOFF5
             38         KM   ROUTE TO CPS
             39         RD    7360   0.035   0.040       0    TRAP      15       1
                        *

             40         KK   WOFF6
             41         KM   EXISTING OFFSITE DRAINAGE BASIN
             42         KM   REFERENCED FROM DB1 STUDY
             43         PB    3.00
             44         BA   .0399
             45         LS       0    86.2
             46         UD   0.121
                        *
```



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

             47         KK  EX-W5S
             48         PB    3.00
             49         BA   .2364
             50         LS       0    85.3
             51         UD   0.321
                        *

             52         KK    OFF3
```

```
 53          KM   REFERENCED FROM SKYE PARK STUDY
 54          PB    3.00
 55          BA   .0012
 56          LS       0    86.2
 57          UD   0.100
             *

 58          KK      D2
 59          KM   REFERENCED FROM SKYE PARK STUDY
 60          PB    3.00
 61          BA   .0154
 62          LS       0    86.0
 63          UD   0.089
             *

 64          KK   IOFF4
 65          KM   REFERENCED FROM SKYE PARK STUDY
 66          PB    3.00
 67          BA   .0062
 68          LS       0    86.2
 69          UD   0.100
             *

 70          KK    PARK
 71          KM   COMBINES IOFF4, OFF3, D2
 72          HC       3
             *

 73          KK     CPS
 74          HC       4
             *

 75          KK   WOFF7
 76          KM   EXISTING OFFSITE DRAINAGE BASIN
 77          KM   REFERENCED FROM SKYE CANYON MASTER STUDY
 78          PB    3.00
 79          BA   .0068
 80          LS       0    86.2
 81          UD   0.100
             *
```



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

 82          KK   WOFF8
 83          KM   EXISTING OFFSITE DRAINAGE BASIN
 84          KM   REFERENCED FROM SKYE CANYON MASTER STUDY
 85          PB    3.00
 86          BA   .2141
 87          LS       0    86.3
 88          UD   0.302
             *

 89          KK  RWOFF8
 90          KM   ROUTE TO CPN
 91          RD    7850   0.028   0.040       0    TRAP      15       3
             *

 92          KK  EX-W5N
 93          PB    3.00
 94          BA   .1425
 95          LS       0    86.3
 96          UD   0.366
             *

 97          KK     CPN
 98          KM   COMBINATION POINT CPN
 99          HC       3
             *

100          KK   ON1-D
101          KM   PHASE 1, NORTHWEST QUAD ONSITE BASIN
102          KM   REFERENCED FROM PHASE 1 STUDY
103          BA   .0278
104          PB    2.93
105          LS       0    91.2
106          UD   0.114
             *

107          KK   ON2-D
108          KM   PHASE 1, NORTHEAST QUAD ONSITE BASIN
109          KM   REFERENCED FROM PHASE 1 STUDY
110          BA   .0301
111          PB    2.93
112          LS       0    88.8
113          UD   0.152
             *

114          KK     HOR
115          KM   PHASE 1, STREET BASIN SKYE CANYON PARK DRIVE
116          KM   REFERENCED FROM PHASE 1 STUDY
117          BA   .0163
118          PB    2.93
119          LS       0    93.3
120          UD   0.108
             *
```



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

121          KK     WC7
122          HC       3
             *
```

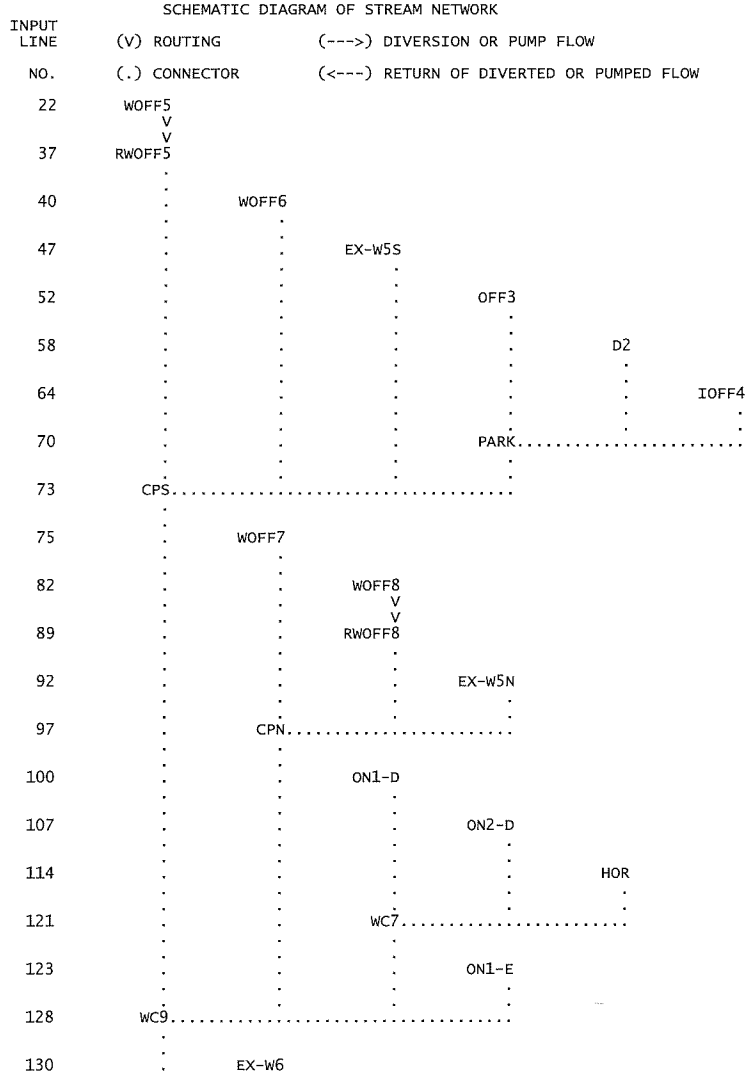
```
123           KK   ON1-E
124           PB    2.93
125           BA   .0366
126           LS      0    86.5
127           UD   0.105
              *

128           KK     WC9
129           HC       4
              *

130           KK   EX-W6
131           PB    2.93
132           BA   .0132
133           LS      0    86.9
134           UD   0.101
              *
135           ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1**********

```
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN   1998                *
*          VERSION 4.1                  *
*                                       *
*  RUN DATE   18JUL16  TIME  15:36:43   *
*                                       *
*****************************************
```

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

RETURN PERIOD ------- 100-YEAR
DISTRIBUTION -------- 6-HOUR SDN3
PROJECT NO. --------- OLY1602.000
FILENAME ------------ EX.HI
DATE ---------------- 7/20/2016
MODELED BY ---------- SMJ

SIX HOUR DEPTH-AREA REDUCTION FACTORS

DRAINAGE AREA (MI^2)	DARF
0.0-0.49	1.00
0.5-0.99	0.98
1.0-1.99	0.97

19 IO OUTPUT CONTROL VARIABLES

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

IT HYDROGRAPH TIME DATA

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

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

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

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
1.00 .98 .97

1

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .98	RATIO 3 .97
HYDROGRAPH AT							
+	WOFF5	.26	1	FLOW	236.	229.	226.
				TIME	3.83	3.83	3.83
ROUTED TO							
+	RWOFF5	.26	1	FLOW	237.	230.	227.
				TIME	4.00	4.00	4.00
HYDROGRAPH AT							
+	WOFF6	.04	1	FLOW	59.	57.	56.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	EX-W5S	.24	1	FLOW	237.	230.	227.
				TIME	3.75	3.75	3.75
HYDROGRAPH AT							
+	OFF3	.00	1	FLOW	2.	2.	2.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	D2	.02	1	FLOW	24.	24.	23.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	IOFF4	.01	1	FLOW	9.	9.	9.
				TIME	3.50	3.50	3.50
3 COMBINED AT							
+	PARK	.02	1	FLOW	36.	35.	34.
				TIME	3.50	3.50	3.50
4 COMBINED AT							
+	CPS	.56	1	FLOW	447.	433.	426.
				TIME	3.92	3.92	3.92
HYDROGRAPH AT							
+	WOFF7	.01	1	FLOW	10.	10.	10.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	WOFF8	.21	1	FLOW	230.	223.	220.
				TIME	3.75	3.75	3.75
ROUTED TO							
+	RWOFF8	.21	1	FLOW	230.	222.	220.
				TIME	3.92	4.00	4.00
HYDROGRAPH AT							

```
                                                                  EX
+                EX-W5N       .14     1   FLOW        139.     135.     133.
                                         TIME        3.83     3.83     3.83

  3 COMBINED AT
+                  CPN        .36     1   FLOW        361.     350.     345.
                                         TIME        3.92     3.92     3.92

 HYDROGRAPH AT
+                ON1-D        .03     1   FLOW         47.      46.      45.
                                         TIME        3.58     3.58     3.58

 HYDROGRAPH AT
+                ON2-D        .03     1   FLOW         45.      44.      44.
                                         TIME        3.58     3.58     3.58

 HYDROGRAPH AT
+                  HOR        .02     1   FLOW         30.      29.      29.
                                         TIME        3.50     3.50     3.50

  3 COMBINED AT
+                  WC7        .07     1   FLOW        121.     118.     116.
                                         TIME        3.58     3.58     3.58

 HYDROGRAPH AT
+                ON1-E        .04     1   FLOW         53.      52.      51.
                                         TIME        3.50     3.50     3.50

  4 COMBINED AT
+                  WC9       1.03     1   FLOW        856.     830.     816.
                                         TIME        3.92     3.92     3.92

 HYDROGRAPH AT
+                EX-W6        .01     1   FLOW         20.      19.      19.
                                         TIME        3.50     3.50     3.50
1
                                         SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                             (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                                  INTERPOLATED TO
                                                                                COMPUTATION INTERVAL
          ISTAQ    ELEMENT      DT       PEAK    TIME TO     VOLUME      DT       PEAK    TIME TO     VOLUME
                                                   PEAK                                     PEAK

                               (MIN)     (CFS)     (MIN)      (IN)     (MIN)     (CFS)     (MIN)       (IN)

        FOR PLAN = 1  RATIO=  .00
          RWOFF5  MANE          5.00    237.34    240.00      1.70      5.00    237.34    240.00       1.70

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2330E+02 EXCESS= .0000E+00 OUTFLOW= .2332E+02 BASIN STORAGE= .7632E-02 PERCENT ERROR=   -.1

        FOR PLAN = 1  RATIO=  .00
          RWOFF5  MANE          5.00    230.22    240.00      1.65      5.00    230.22    240.00       1.65

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2259E+02 EXCESS= .0000E+00 OUTFLOW= .2261E+02 BASIN STORAGE= .7531E-02 PERCENT ERROR=   -.1

        FOR PLAN = 1  RATIO=  .00
          RWOFF5  MANE          5.00    226.67    240.00      1.62      5.00    226.67    240.00       1.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2224E+02 EXCESS= .0000E+00 OUTFLOW= .2226E+02 BASIN STORAGE= .7480E-02 PERCENT ERROR=   -.1

        FOR PLAN = 1  RATIO=  .00
          RWOFF8  MANE          5.00    229.71    235.00      1.69      5.00    229.71    235.00       1.69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1924E+02 EXCESS= .0000E+00 OUTFLOW= .1928E+02 BASIN STORAGE= .6283E-02 PERCENT ERROR=   -.2

        FOR PLAN = 1  RATIO=  .00
          RWOFF8  MANE          5.00    222.50    240.00      1.64      5.00    222.50    240.00       1.64

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1865E+02 EXCESS= .0000E+00 OUTFLOW= .1869E+02 BASIN STORAGE= .6205E-02 PERCENT ERROR=   -.2

        FOR PLAN = 1  RATIO=  .00
          RWOFF8  MANE          5.00    219.78    240.00      1.61      5.00    219.78    240.00       1.61

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1836E+02 EXCESS= .0000E+00 OUTFLOW= .1840E+02 BASIN STORAGE= .7178E-02 PERCENT ERROR=   -.2


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

Proposed Condition (100-Yr & 10-Yr)

PRO

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN  1998                *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   19JUL16  TIME  16:29:56   *
*                                       *
*****************************************
```

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

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

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

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


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

                    *DIAGRAM
 *** FREE ***
               1    ID     SKYE CANYON
               2    ID     PHASE 3 INFRASTRUCTURE - PROPOSED CONDITION
               3    ID     PRIOR TO DETENTION BASIN 1 & PHASE 2 BUILD-OUT
               4    ID
               5    ID     RETURN PERIOD ------- 100-YEAR & 10-YEAR
               6    ID     DISTRIBUTION -------- 6-HOUR SDN3
               7    ID     PROJECT NO. --------- OLY1602.000
               8    ID     FILENAME ------------ EX.H1
               9    ID     DATE ---------------- 7/20/2016
              10    ID     MODELED BY ---------- SMJ
              11    ID
              12    ID        SIX HOUR DEPTH-AREA REDUCTION FACTORS
              13    ID        DRAINAGE AREA (MI^2)    DARF
              14    ID        0.0-0.49                1.00
              15    ID        0.5-0.99                0.98
              16    ID        1.0-1.99                0.97
              17    ID        10-YEAR                 0.55
              18    ID
              19    IT       5       0       0     300
              20    IO       5       0       0
              21    IN       5       0       0
              22    JR    PREC    1.00    0.98    0.97    0.55
                    *

              23    KK   WOFF5
              24    KM   EXISTING OFFSITE DRAINAGE BASIN
              25    KM   REFERENCED FROM DB1 STUDY
              26    PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
              27    PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
              28    PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
              29    PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
              30    PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
              31    PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
              32    PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
              33    PC   0.998   0.999   1.000
              34    PB    3.00
              35    BA   .2569
              36    LS       0    86.5
              37    UD   0.419
                    *

              38    KK  RWOFF5
              39    KM   ROUTE TO CPS
              40    RD    7360   0.035   0.040       0    TRAP      15       1
                    *

              41    KK   WOFF6
              42    KM   EXISTING OFFSITE DRAINAGE BASIN
              43    KM   REFERENCED FROM DB1 STUDY
              44    PB    3.00
              45    BA   .0399
              46    LS       0    86.2
              47    UD   0.121
                    *
```



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

              48    KK  EX-W5S
              49    PB    3.00
              50    BA   .2364
              51    LS       0    85.3
              52    UD   0.321
                    *
```

```
   53          KK    OFF3
   54          KM   REFERENCED FROM SKYE PARK STUDY
   55          PB    3.00
   56          BA   .0012
   57          LS       0    86.2
   58          UD   0.100
               *

   59          KK      D2
   60          KM   REFERENCED FROM SKYE PARK STUDY
   61          PB    3.00
   62          BA   .0154
   63          LS       0    86.0
   64          UD   0.089
               *

   65          KK   IOFF4
   66          KM   REFERENCED FROM SKYE PARK STUDY
   67          PB    3.00
   68          BA   .0062
   69          LS       0    86.2
   70          UD   0.100
               *

   71          KK    PARK
   72          KM   COMBINES IOFF4, OFF3, D2
   73          HC       3
               *

   74          KK     CPS
   75          HC       4
               *

   76          KK   WOFF7
   77          KM   EXISTING OFFSITE DRAINAGE BASIN
   78          KM   REFERENCED FROM SKYE CANYON MASTER STUDY
   79          PB    3.00
   80          BA   .0068
   81          LS       0    86.2
   82          UD   0.100
               *
```



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

   83          KK   WOFF8
   84          KM   EXISTING OFFSITE DRAINAGE BASIN
   85          KM   REFERENCED FROM SKYE CANYON MASTER STUDY
   86          PB    3.00
   87          BA   .2141
   88          LS       0    86.3
   89          UD   0.302
               *

   90          KK  RWOFF8
   91          KM   ROUTE TO CPN
   92          RD    7850   0.028   0.040       0    TRAP      15       3
               *

   93          KK  EX-W5N
   94          PB    3.00
   95          BA   .1425
   96          LS       0    86.3
   97          UD   0.366
               *

   98          KK     CPN
   99          KM   COMBINATION POINT CPN
  100          HC       3
               *

  101          KK     DBN
  102          KM   OUTLET = 54" ORIFICE @ INVERT ELEVATION = 2997.3-FT
  103          KO       1
  104          RS       1    ELEV  2797.3
  105          SA    0.00    0.09    0.12    0.15     .37    0.79    0.86
  106          SE  2797.3    2798    2799    2800    2805    2812    2813
  107          SQ    0.00      54     129     193     241     268
  108          SE  2797.3    2802    2804    2807    2810    2812
               *

  109          KK   WSPD3
  110          BA   .0022
  111          PB    2.93
  112          LS       0    92.8
  113          UD   0.056
               *

  114          KK   ON1-E
  115          PB    2.93
  116          BA   .0324
  117          LS       0    86.5
  118          UD   0.105
               *
```



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

  119          KK    WC9a
  120          HC       4
               *

  121          KK   ON1-D
  122          KM   PHASE 1, NORTHWEST QUAD ONSITE BASIN
```

```
 123           KM   REFERENCED FROM PHASE 1 STUDY
 124           BA   .0278
 125           PB    2.93
 126           LS      0    91.2
 127           UD   0.114
               *

 128           KK   ON2-D
 129           KM   PHASE 1, NORTHEAST QUAD ONSITE BASIN
 130           KM   REFERENCED FROM PHASE 1 STUDY
 131           BA   .0301
 132           PB    2.93
 133           LS      0    88.8
 134           UD   0.152
               *

 135           KK     HOR
 136           KM   PHASE 1, STREET BASIN SKYE CANYON PARK DRIVE
 137           KM   REFERENCED FROM PHASE 1 STUDY
 138           BA   .0163
 139           PB    2.93
 140           LS      0    93.3
 141           UD   0.108
               *

 142           KK     WC7
 143           HC       3
               *

 144           KK  WGRC1A
 145           BA   .0022
 146           PB    2.93
 147           LS      0    93.2
 148           UD   0.095
               *

 149           KK   EX-W6
 150           PB    2.93
 151           BA   .0120
 152           LS      0    86.9
 153           UD   0.101
               *
```



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

 154           KK   WSPD0
 155           BA   .0010
 156           PB    2.93
 157           LS      0    93.4
 158           UD   0.050
               *

 159           KK     WC9
 160           HC       5
               *
 161           ZZ
```

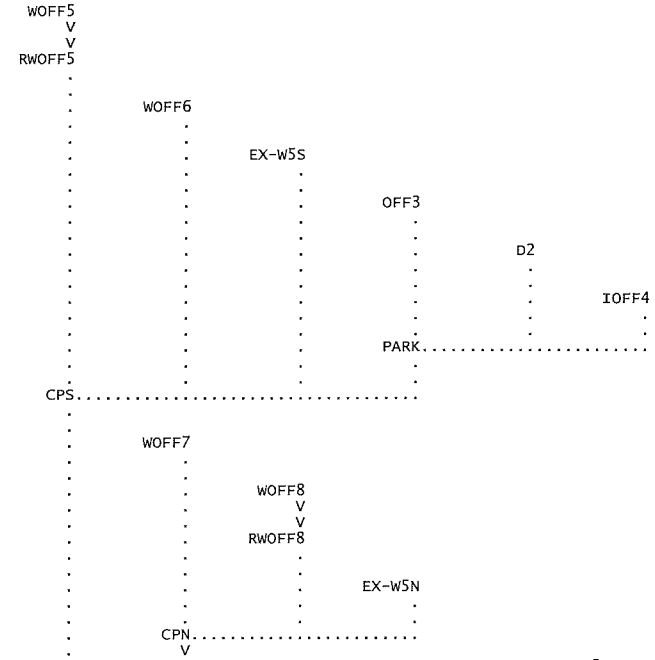
1

SCHEMATIC DIAGRAM OF STREAM NETWORK

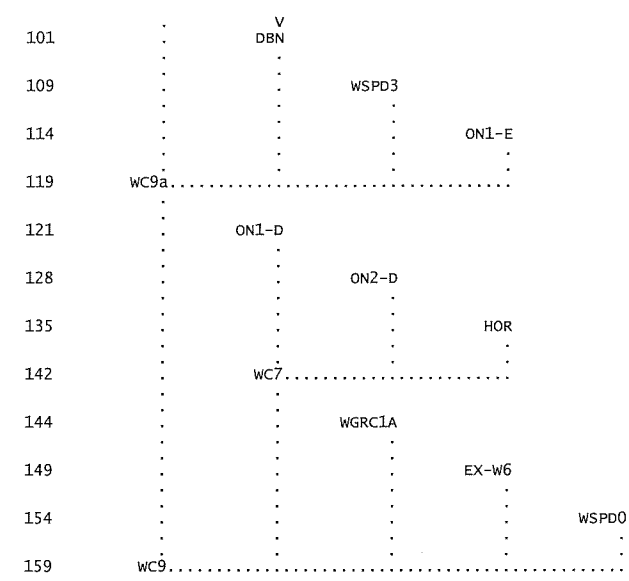
INPUT LINE NO.

(V) ROUTING (---->) DIVERSION OR PUMP FLOW

(.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW



```
                .          V
  101           .        DBN
                .          .
                .          .
  109           .          .      WSPD3
                .          .          .
                .          .          .
  114           .          .          .      ON1-E
                .          .          .          .
                .          .          .          .
  119       WC9a.....................................
                .
                .
  121           .      ON1-D
                .          .
                .          .
  128           .          .      ON2-D
                .          .          .
                .          .          .
  135           .          .          .        HOR
                .          .          .          .
                .          .          .          .
  142           .        WC7.......................
                .          .
                .          .
  144           .          .     WGRC1A
                .          .          .
                .          .          .
  149           .          .          .      EX-W6
                .          .          .          .
                .          .          .          .
  154           .          .          .          .      WSPD0
                .          .          .          .          .
                .          .          .          .          .
  159        WC9.............................................
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   19JUL16  TIME  16:29:56   *
*                                       *
*****************************************
```

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

SKYE CANYON
PHASE 3 INFRASTRUCTURE - PROPOSED CONDITION
PRIOR TO DETENTION BASIN 1 & PHASE 2 BUILD-OUT

RETURN PERIOD ------- 100-YEAR
DISTRIBUTION -------- 6-HOUR SDN3
PROJECT NO. --------- OLY1602.000
FILENAME ---------- EX.H1
DATE ---------- 7/20/2016
MODELED BY ---------- SMJ

SIX HOUR DEPTH-AREA REDUCTION FACTORS

DRAINAGE AREA (MI^2)	DARF
0.0-0.49	1.00
0.5-0.99	0.98
1.0-1.99	0.97
10-YEAR	0.55

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

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

                  COMPUTATION INTERVAL     .08 HOURS
                       TOTAL TIME BASE   24.92 HOURS

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

     JP          MULTI-PLAN OPTION
                      NPLAN           1  NUMBER OF PLANS

     JR          MULTI-RATIO OPTION
                     RATIOS OF PRECIPITATION
                    1.00       .98       .97       .55
```

*** ***

```
          **************
          *            *
101 KK    *       DBN  *
          *            *
          **************

103 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          1  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

              HYDROGRAPH ROUTING DATA

104 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       ELEV  TYPE OF INITIAL CONDITION
                     RSVRIC     2797.30  INITIAL CONDITION
                         X          .00 WORKING R AND D COEFFICIENT

105 SA              AREA          .0       .1       .1       .2       .4       .8       .9

106 SE          ELEVATION     2797.30  2798.00  2799.00  2800.00  2805.00  2812.00  2813.00

107 SQ          DISCHARGE          0.       54.      129.     193.     241.     268.

108 SE          ELEVATION     2797.30  2802.00  2804.00  2807.00  2810.00  2812.00
                                                      ***

                                        COMPUTED STORAGE-ELEVATION DATA

            STORAGE        .00      .02      .13      .26     1.52     5.49     6.31
          ELEVATION    2797.30  2798.00  2799.00  2800.00  2805.00  2812.00  2813.00

                                        COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE        .00      .02      .13      .26      .63     1.18     1.52     2.36     4.05     5.49
            OUTFLOW        .00     8.04    19.53    31.02    54.00   129.00   150.33   193.00   241.00   268.00
          ELEVATION    2797.30  2798.00  2799.00  2800.00  2802.00  2804.00  2805.00  2807.00  2810.00  2812.00

            STORAGE       6.31
            OUTFLOW     281.50
          ELEVATION    2813.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO        8.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)
```

HYDROGRAPH AT STATION DBN
PLAN 1, RATIO = 1.00

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	2797.3	1		0820	101	0.	.0	2797.3	1		1640	201	0.	.0	2797.3
1		0005	2	0.	.0	2797.3	1		0825	102	0.	.0	2797.3	1		1645	202	0.	.0	2797.3
1		0010	3	0.	.0	2797.3	1		0830	103	0.	.0	2797.3	1		1650	203	0.	.0	2797.3
1		0015	4	0.	.0	2797.3	1		0835	104	0.	.0	2797.3	1		1655	204	0.	.0	2797.3
1		0020	5	0.	.0	2797.3	1		0840	105	0.	.0	2797.3	1		1700	205	0.	.0	2797.3
1		0025	6	0.	.0	2797.3	1		0845	106	0.	.0	2797.3	1		1705	206	0.	.0	2797.3
1		0030	7	0.	.0	2797.3	1		0850	107	0.	.0	2797.3	1		1710	207	0.	.0	2797.3
1		0035	8	0.	.0	2797.3	1		0855	108	0.	.0	2797.3	1		1715	208	0.	.0	2797.3
1		0040	9	0.	.0	2797.3	1		0900	109	0.	.0	2797.3	1		1720	209	0.	.0	2797.3
1		0045	10	0.	.0	2797.3	1		0905	110	0.	.0	2797.3	1		1725	210	0.	.0	2797.3
1		0050	11	1.	.0	2797.3	1		0910	111	0.	.0	2797.3	1		1730	211	0.	.0	2797.3
1		0055	12	1.	.0	2797.3	1		0915	112	0.	.0	2797.3	1		1735	212	0.	.0	2797.3
1		0100	13	0.	.0	2797.3	1		0920	113	0.	.0	2797.3	1		1740	213	0.	.0	2797.3
1		0105	14	0.	.0	2797.3	1		0925	114	0.	.0	2797.3	1		1745	214	0.	.0	2797.3
1		0110	15	0.	.0	2797.3	1		0930	115	0.	.0	2797.3	1		1750	215	0.	.0	2797.3
1		0115	16	1.	.0	2797.4	1		0935	116	0.	.0	2797.3	1		1755	216	0.	.0	2797.3
1		0120	17	1.	.0	2797.4	1		0940	117	0.	.0	2797.3	1		1800	217	0.	.0	2797.3
1		0125	18	2.	.0	2797.4	1		0945	118	0.	.0	2797.3	1		1805	218	0.	.0	2797.3
1		0130	19	2.	.0	2797.5	1		0950	119	0.	.0	2797.3	1		1810	219	0.	.0	2797.3
1		0135	20	3.	.0	2797.5	1		0955	120	0.	.0	2797.3	1		1815	220	0.	.0	2797.3
1		0140	21	4.	.0	2797.6	1		1000	121	0.	.0	2797.3	1		1820	221	0.	.0	2797.3
1		0145	22	4.	.0	2797.7	1		1005	122	0.	.0	2797.3	1		1825	222	0.	.0	2797.3
1		0150	23	5.	.0	2797.8	1		1010	123	0.	.0	2797.3	1		1830	223	0.	.0	2797.3
1		0155	24	6.	.0	2797.8	1		1015	124	0.	.0	2797.3	1		1835	224	0.	.0	2797.3
1		0200	25	7.	.0	2797.9	1		1020	125	0.	.0	2797.3	1		1840	225	0.	.0	2797.3
1		0205	26	7.	.0	2797.9	1		1025	126	0.	.0	2797.3	1		1845	226	0.	.0	2797.3
1		0210	27	8.	.0	2798.0	1		1030	127	0.	.0	2797.3	1		1850	227	0.	.0	2797.3
1		0215	28	9.	.0	2798.1	1		1035	128	0.	.0	2797.3	1		1855	228	0.	.0	2797.3
1		0220	29	11.	.0	2798.2	1		1040	129	0.	.0	2797.3	1		1900	229	0.	.0	2797.3
1		0225	30	12.	.1	2798.4	1		1045	130	0.	.0	2797.3	1		1905	230	0.	.0	2797.3
1		0230	31	14.	.1	2798.5	1		1050	131	0.	.0	2797.3	1		1910	231	0.	.0	2797.3
1		0235	32	15.	.1	2798.6	1		1055	132	0.	.0	2797.3	1		1915	232	0.	.0	2797.3
1		0240	33	15.	.1	2798.6	1		1100	133	0.	.0	2797.3	1		1920	233	0.	.0	2797.3
1		0245	34	15.	.1	2798.6	1		1105	134	0.	.0	2797.3	1		1925	234	0.	.0	2797.3
1		0250	35	15.	.1	2798.6	1		1110	135	0.	.0	2797.3	1		1930	235	0.	.0	2797.3
1		0255	36	17.	.1	2798.8	1		1115	136	0.	.0	2797.3	1		1935	236	0.	.0	2797.3
1		0300	37	19.	.1	2799.0	1		1120	137	0.	.0	2797.3	1		1940	237	0.	.0	2797.3
1		0305	38	21.	.1	2799.1	1		1125	138	0.	.0	2797.3	1		1945	238	0.	.0	2797.3
1		0310	39	23.	.2	2799.3	1		1130	139	0.	.0	2797.3	1		1950	239	0.	.0	2797.3
1		0315	40	26.	.2	2799.6	1		1135	140	0.	.0	2797.3	1		1955	240	0.	.0	2797.3
1		0320	41	32.	.3	2800.1	1		1140	141	0.	.0	2797.3	1		2000	241	0.	.0	2797.3
1		0325	42	40.	.4	2800.8	1		1145	142	0.	.0	2797.3	1		2005	242	0.	.0	2797.3
1		0330	43	54.	.6	2802.0	1		1150	143	0.	.0	2797.3	1		2010	243	0.	.0	2797.3
1		0335	44	88.	.9	2802.9	1		1155	144	0.	.0	2797.3	1		2015	244	0.	.0	2797.3
1		0340	45	127.	1.2	2804.0	1		1200	145	0.	.0	2797.3	1		2020	245	0.	.0	2797.3
1		0345	46	159.	1.7	2805.4	1		1205	146	0.	.0	2797.3	1		2025	246	0.	.0	2797.3
1		0350	47	198.	2.5	2807.3	1		1210	147	0.	.0	2797.3	1		2030	247	0.	.0	2797.3

PRO

1	0355	48	225.	3.5	2809.0	*	1	1215	148	0.	.0	2797.3	*	1	2035	248	0.	.0	2797.3
1	0400	49	246.	4.3	2810.3	*	1	1220	149	0.	.0	2797.3	*	1	2040	249	0.	.0	2797.3
1	0405	50	255.	4.8	2811.1	*	1	1225	150	0.	.0	2797.3	*	1	2045	250	0.	.0	2797.3
1	0410	51	258.	5.0	2811.3	*	1	1230	151	0.	.0	2797.3	*	1	2050	251	0.	.0	2797.3
1	0415	52	256.	4.8	2811.1	*	1	1235	152	0.	.0	2797.3	*	1	2055	252	0.	.0	2797.3
1	0420	53	249.	4.5	2810.6	*	1	1240	153	0.	.0	2797.3	*	1	2100	253	0.	.0	2797.3
1	0425	54	238.	3.9	2809.8	*	1	1245	154	0.	.0	2797.3	*	1	2105	254	0.	.0	2797.3
1	0430	55	220.	3.3	2808.7	*	1	1250	155	0.	.0	2797.3	*	1	2110	255	0.	.0	2797.3
1	0435	56	203.	2.7	2807.6	*	1	1255	156	0.	.0	2797.3	*	1	2115	256	0.	.0	2797.3
1	0440	57	181.	2.1	2806.4	*	1	1300	157	0.	.0	2797.3	*	1	2120	257	0.	.0	2797.3
1	0445	58	156.	1.6	2805.2	*	1	1305	158	0.	.0	2797.3	*	1	2125	258	0.	.0	2797.3
1	0450	59	134.	1.3	2804.2	*	1	1310	159	0.	.0	2797.3	*	1	2130	259	0.	.0	2797.3
1	0455	60	109.	1.0	2803.5	*	1	1315	160	0.	.0	2797.3	*	1	2135	260	0.	.0	2797.3
1	0500	61	97.	.9	2803.2	*	1	1320	161	0.	.0	2797.3	*	1	2140	261	0.	.0	2797.3
1	0505	62	95.	.9	2803.1	*	1	1325	162	0.	.0	2797.3	*	1	2145	262	0.	.0	2797.3
1	0510	63	95.	.9	2803.1	*	1	1330	163	0.	.0	2797.3	*	1	2150	263	0.	.0	2797.3
1	0515	64	92.	.9	2803.0	*	1	1335	164	0.	.0	2797.3	*	1	2155	264	0.	.0	2797.3
1	0520	65	88.	.9	2802.9	*	1	1340	165	0.	.0	2797.3	*	1	2200	265	0.	.0	2797.3
1	0525	66	81.	.8	2802.7	*	1	1345	166	0.	.0	2797.3	*	1	2205	266	0.	.0	2797.3
1	0530	67	73.	.8	2802.5	*	1	1350	167	0.	.0	2797.3	*	1	2210	267	0.	.0	2797.3
1	0535	68	64.	.7	2802.3	*	1	1355	168	0.	.0	2797.3	*	1	2215	268	0.	.0	2797.3
1	0540	69	55.	.6	2802.0	*	1	1400	169	0.	.0	2797.3	*	1	2220	269	0.	.0	2797.3
1	0545	70	50.	.6	2801.6	*	1	1405	170	0.	.0	2797.3	*	1	2225	270	0.	.0	2797.3
1	0550	71	44.	.5	2801.1	*	1	1410	171	0.	.0	2797.3	*	1	2230	271	0.	.0	2797.3
1	0555	72	39.	.4	2800.7	*	1	1415	172	0.	.0	2797.3	*	1	2235	272	0.	.0	2797.3
1	0600	73	34.	.3	2800.2	*	1	1420	173	0.	.0	2797.3	*	1	2240	273	0.	.0	2797.3
1	0605	74	29.	.2	2799.8	*	1	1425	174	0.	.0	2797.3	*	1	2245	274	0.	.0	2797.3
1	0610	75	23.	.2	2799.3	*	1	1430	175	0.	.0	2797.3	*	1	2250	275	0.	.0	2797.3
1	0615	76	19.	.1	2799.0	*	1	1435	176	0.	.0	2797.3	*	1	2255	276	0.	.0	2797.3
1	0620	77	15.	.1	2798.6	*	1	1440	177	0.	.0	2797.3	*	1	2300	277	0.	.0	2797.3
1	0625	78	13.	.1	2798.4	*	1	1445	178	0.	.0	2797.3	*	1	2305	278	0.	.0	2797.3
1	0630	79	11.	.0	2798.2	*	1	1450	179	0.	.0	2797.3	*	1	2310	279	0.	.0	2797.3
1	0635	80	9.	.0	2798.1	*	1	1455	180	0.	.0	2797.3	*	1	2315	280	0.	.0	2797.3
1	0640	81	7.	.0	2797.9	*	1	1500	181	0.	.0	2797.3	*	1	2320	281	0.	.0	2797.3
1	0645	82	5.	.0	2797.8	*	1	1505	182	0.	.0	2797.3	*	1	2325	282	0.	.0	2797.3
1	0650	83	4.	.0	2797.7	*	1	1510	183	0.	.0	2797.3	*	1	2330	283	0.	.0	2797.3
1	0655	84	3.	.0	2797.6	*	1	1515	184	0.	.0	2797.3	*	1	2335	284	0.	.0	2797.3
1	0700	85	2.	.0	2797.5	*	1	1520	185	0.	.0	2797.3	*	1	2340	285	0.	.0	2797.3
1	0705	86	2.	.0	2797.5	*	1	1525	186	0.	.0	2797.3	*	1	2345	286	0.	.0	2797.3
1	0710	87	1.	.0	2797.4	*	1	1530	187	0.	.0	2797.3	*	1	2350	287	0.	.0	2797.3
1	0715	88	1.	.0	2797.4	*	1	1535	188	0.	.0	2797.3	*	1	2355	288	0.	.0	2797.3
1	0720	89	1.	.0	2797.4	*	1	1540	189	0.	.0	2797.3	*	2	0000	289	0.	.0	2797.3
1	0725	90	1.	.0	2797.3	*	1	1545	190	0.	.0	2797.3	*	2	0005	290	0.	.0	2797.3
1	0730	91	0.	.0	2797.3	*	1	1550	191	0.	.0	2797.3	*	2	0010	291	0.	.0	2797.3
1	0735	92	0.	.0	2797.3	*	1	1555	192	0.	.0	2797.3	*	2	0015	292	0.	.0	2797.3
1	0740	93	0.	.0	2797.3	*	1	1600	193	0.	.0	2797.3	*	2	0020	293	0.	.0	2797.3
1	0745	94	0.	.0	2797.3	*	1	1605	194	0.	.0	2797.3	*	2	0025	294	0.	.0	2797.3
1	0750	95	0.	.0	2797.3	*	1	1610	195	0.	.0	2797.3	*	2	0030	295	0.	.0	2797.3
1	0755	96	0.	.0	2797.3	*	1	1615	196	0.	.0	2797.3	*	2	0035	296	0.	.0	2797.3
1	0800	97	0.	.0	2797.3	*	1	1620	197	0.	.0	2797.3	*	2	0040	297	0.	.0	2797.3
1	0805	98	0.	.0	2797.3	*	1	1625	198	0.	.0	2797.3	*	2	0045	298	0.	.0	2797.3
1	0810	99	0.	.0	2797.3	*	1	1630	199	0.	.0	2797.3	*	2	0050	299	0.	.0	2797.3
1	0815	100	0.	.0	2797.3	*	1	1635	200	0.	.0	2797.3	*	2	0055	300	0.	.0	2797.3

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 258.	4.17		66.	16.	16.	16.
		(INCHES)	1.685	1.687	1.687	1.687
		(AC-FT)	33.	33.	33.	33.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
5.	4.17	1.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2811.29	4.17	2801.25	2798.30	2798.26	2798.26

CUMULATIVE AREA = .36 SQ MI

HYDROGRAPH AT STATION DBN
PLAN 1, RATIO = .98

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE		DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE		DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	2797.3	*	1		0820	101	0.	.0	2797.3	*	1		1640	201	0.	.0	2797.3
1		0005	2	0.	.0	2797.3	*	1		0825	102	0.	.0	2797.3	*	1		1645	202	0.	.0	2797.3
1		0010	3	0.	.0	2797.3	*	1		0830	103	0.	.0	2797.3	*	1		1650	203	0.	.0	2797.3
1		0015	4	0.	.0	2797.3	*	1		0835	104	0.	.0	2797.3	*	1		1655	204	0.	.0	2797.3
1		0020	5	0.	.0	2797.3	*	1		0840	105	0.	.0	2797.3	*	1		1700	205	0.	.0	2797.3
1		0025	6	0.	.0	2797.3	*	1		0845	106	0.	.0	2797.3	*	1		1705	206	0.	.0	2797.3
1		0030	7	0.	.0	2797.3	*	1		0850	107	0.	.0	2797.3	*	1		1710	207	0.	.0	2797.3
1		0035	8	0.	.0	2797.3	*	1		0855	108	0.	.0	2797.3	*	1		1715	208	0.	.0	2797.3
1		0040	9	0.	.0	2797.3	*	1		0900	109	0.	.0	2797.3	*	1		1720	209	0.	.0	2797.3
1		0045	10	0.	.0	2797.3	*	1		0905	110	0.	.0	2797.3	*	1		1725	210	0.	.0	2797.3
1		0050	11	0.	.0	2797.3	*	1		0910	111	0.	.0	2797.3	*	1		1730	211	0.	.0	2797.3
1		0055	12	0.	.0	2797.3	*	1		0915	112	0.	.0	2797.3	*	1		1735	212	0.	.0	2797.3
1		0100	13	0.	.0	2797.3	*	1		0920	113	0.	.0	2797.3	*	1		1740	213	0.	.0	2797.3
1		0105	14	0.	.0	2797.3	*	1		0925	114	0.	.0	2797.3	*	1		1745	214	0.	.0	2797.3
1		0110	15	0.	.0	2797.3	*	1		0930	115	0.	.0	2797.3	*	1		1750	215	0.	.0	2797.3
1		0115	16	1.	.0	2797.4	*	1		0935	116	0.	.0	2797.3	*	1		1755	216	0.	.0	2797.3
1		0120	17	1.	.0	2797.4	*	1		0940	117	0.	.0	2797.3	*	1		1800	217	0.	.0	2797.3
1		0125	18	1.	.0	2797.4	*	1		0945	118	0.	.0	2797.3	*	1		1805	218	0.	.0	2797.3
1		0130	19	2.	.0	2797.5	*	1		0950	119	0.	.0	2797.3	*	1		1810	219	0.	.0	2797.3
1		0135	20	2.	.0	2797.5	*	1		0955	120	0.	.0	2797.3	*	1		1815	220	0.	.0	2797.3

									PRO								
1	0140	21	3.	.0	2797.6	*	1	1000	121	0.	.0	2797.3	*	1	1820	221	0.	.0	2797.3
1	0145	22	4.	.0	2797.7	*	1	1005	122	0.	.0	2797.3	*	1	1825	222	0.	.0	2797.3
1	0150	23	5.	.0	2797.7	*	1	1010	123	0.	.0	2797.3	*	1	1830	223	0.	.0	2797.3
1	0155	24	6.	.0	2797.8	*	1	1015	124	0.	.0	2797.3	*	1	1835	224	0.	.0	2797.3
1	0200	25	6.	.0	2797.8	*	1	1020	125	0.	.0	2797.3	*	1	1840	225	0.	.0	2797.3
1	0205	26	7.	.0	2797.9	*	1	1025	126	0.	.0	2797.3	*	1	1845	226	0.	.0	2797.3
1	0210	27	8.	.0	2798.0	*	1	1030	127	0.	.0	2797.3	*	1	1850	227	0.	.0	2797.3
1	0215	28	9.	.0	2798.1	*	1	1035	128	0.	.0	2797.3	*	1	1855	228	0.	.0	2797.3
1	0220	29	10.	.0	2798.2	*	1	1040	129	0.	.0	2797.3	*	1	1900	229	0.	.0	2797.3
1	0225	30	12.	.1	2798.3	*	1	1045	130	0.	.0	2797.3	*	1	1905	230	0.	.0	2797.3
1	0230	31	13.	.1	2798.4	*	1	1050	131	0.	.0	2797.3	*	1	1910	231	0.	.0	2797.3
1	0235	32	14.	.1	2798.5	*	1	1055	132	0.	.0	2797.3	*	1	1915	232	0.	.0	2797.3
1	0240	33	14.	.1	2798.5	*	1	1100	133	0.	.0	2797.3	*	1	1920	233	0.	.0	2797.3
1	0245	34	14.	.1	2798.5	*	1	1105	134	0.	.0	2797.3	*	1	1925	234	0.	.0	2797.3
1	0250	35	15.	.1	2798.6	*	1	1110	135	0.	.0	2797.3	*	1	1930	235	0.	.0	2797.3
1	0255	36	16.	.1	2798.7	*	1	1115	136	0.	.0	2797.3	*	1	1935	236	0.	.0	2797.3
1	0300	37	18.	.1	2798.9	*	1	1120	137	0.	.0	2797.3	*	1	1940	237	0.	.0	2797.3
1	0305	38	20.	.1	2799.1	*	1	1125	138	0.	.0	2797.3	*	1	1945	238	0.	.0	2797.3
1	0310	39	22.	.2	2799.2	*	1	1130	139	0.	.0	2797.3	*	1	1950	239	0.	.0	2797.3
1	0315	40	25.	.2	2799.5	*	1	1135	140	0.	.0	2797.3	*	1	1955	240	0.	.0	2797.3
1	0320	41	31.	.3	2800.0	*	1	1140	141	0.	.0	2797.3	*	1	2000	241	0.	.0	2797.3
1	0325	42	39.	.4	2800.7	*	1	1145	142	0.	.0	2797.3	*	1	2005	242	0.	.0	2797.3
1	0330	43	52.	.6	2801.8	*	1	1150	143	0.	.0	2797.3	*	1	2010	243	0.	.0	2797.3
1	0335	44	84.	.8	2802.8	*	1	1155	144	0.	.0	2797.3	*	1	2015	244	0.	.0	2797.3
1	0340	45	122.	1.1	2803.8	*	1	1200	145	0.	.0	2797.3	*	1	2020	245	0.	.0	2797.3
1	0345	46	155.	1.6	2805.2	*	1	1205	146	0.	.0	2797.3	*	1	2025	246	0.	.0	2797.3
1	0350	47	194.	2.4	2807.1	*	1	1210	147	0.	.0	2797.3	*	1	2030	247	0.	.0	2797.3
1	0355	48	220.	3.3	2808.7	*	1	1215	148	0.	.0	2797.3	*	1	2035	248	0.	.0	2797.3
1	0400	49	242.	4.1	2810.0	*	1	1220	149	0.	.0	2797.3	*	1	2040	249	0.	.0	2797.3
1	0405	50	251.	4.6	2810.7	*	1	1225	150	0.	.0	2797.3	*	1	2045	250	0.	.0	2797.3
1	0410	51	253.	4.7	2810.9	*	1	1230	151	0.	.0	2797.3	*	1	2050	251	0.	.0	2797.3
1	0415	52	251.	4.6	2810.7	*	1	1235	152	0.	.0	2797.3	*	1	2055	252	0.	.0	2797.3
1	0420	53	244.	4.2	2810.2	*	1	1240	153	0.	.0	2797.3	*	1	2100	253	0.	.0	2797.3
1	0425	54	231.	3.7	2809.4	*	1	1245	154	0.	.0	2797.3	*	1	2105	254	0.	.0	2797.3
1	0430	55	214.	3.1	2808.3	*	1	1250	155	0.	.0	2797.3	*	1	2110	255	0.	.0	2797.3
1	0435	56	197.	2.5	2807.2	*	1	1255	156	0.	.0	2797.3	*	1	2115	256	0.	.0	2797.3
1	0440	57	172.	1.9	2806.0	*	1	1300	157	0.	.0	2797.3	*	1	2120	257	0.	.0	2797.3
1	0445	58	149.	1.5	2804.9	*	1	1305	158	0.	.0	2797.3	*	1	2125	258	0.	.0	2797.3
1	0450	59	127.	1.2	2803.9	*	1	1310	159	0.	.0	2797.3	*	1	2130	259	0.	.0	2797.3
1	0455	60	101.	1.0	2803.3	*	1	1315	160	0.	.0	2797.3	*	1	2135	260	0.	.0	2797.3
1	0500	61	93.	.9	2803.0	*	1	1320	161	0.	.0	2797.3	*	1	2140	261	0.	.0	2797.3
1	0505	62	92.	.9	2803.0	*	1	1325	162	0.	.0	2797.3	*	1	2145	262	0.	.0	2797.3
1	0510	63	92.	.9	2803.0	*	1	1330	163	0.	.0	2797.3	*	1	2150	263	0.	.0	2797.3
1	0515	64	90.	.9	2803.0	*	1	1335	164	0.	.0	2797.3	*	1	2155	264	0.	.0	2797.3
1	0520	65	86.	.9	2802.8	*	1	1340	165	0.	.0	2797.3	*	1	2200	265	0.	.0	2797.3
1	0525	66	79.	.8	2802.7	*	1	1345	166	0.	.0	2797.3	*	1	2205	266	0.	.0	2797.3
1	0530	67	71.	.8	2802.5	*	1	1350	167	0.	.0	2797.3	*	1	2210	267	0.	.0	2797.3
1	0535	68	62.	.7	2802.2	*	1	1355	168	0.	.0	2797.3	*	1	2215	268	0.	.0	2797.3
1	0540	69	54.	.6	2802.0	*	1	1400	169	0.	.0	2797.3	*	1	2220	269	0.	.0	2797.3
1	0545	70	49.	.6	2801.6	*	1	1405	170	0.	.0	2797.3	*	1	2225	270	0.	.0	2797.3
1	0550	71	44.	.5	2801.1	*	1	1410	171	0.	.0	2797.3	*	1	2230	271	0.	.0	2797.3
1	0555	72	38.	.4	2800.6	*	1	1415	172	0.	.0	2797.3	*	1	2235	272	0.	.0	2797.3
1	0600	73	33.	.3	2800.2	*	1	1420	173	0.	.0	2797.3	*	1	2240	273	0.	.0	2797.3
1	0605	74	28.	.2	2799.7	*	1	1425	174	0.	.0	2797.3	*	1	2245	274	0.	.0	2797.3
1	0610	75	23.	.2	2799.3	*	1	1430	175	0.	.0	2797.3	*	1	2250	275	0.	.0	2797.3
1	0615	76	19.	.1	2798.9	*	1	1435	176	0.	.0	2797.3	*	1	2255	276	0.	.0	2797.3
1	0620	77	15.	.1	2798.6	*	1	1440	177	0.	.0	2797.3	*	1	2300	277	0.	.0	2797.3
1	0625	78	12.	.1	2798.4	*	1	1445	178	0.	.0	2797.3	*	1	2305	278	0.	.0	2797.3
1	0630	79	10.	.0	2798.2	*	1	1450	179	0.	.0	2797.3	*	1	2310	279	0.	.0	2797.3
1	0635	80	9.	.0	2798.1	*	1	1455	180	0.	.0	2797.3	*	1	2315	280	0.	.0	2797.3
1	0640	81	7.	.0	2797.9	*	1	1500	181	0.	.0	2797.3	*	1	2320	281	0.	.0	2797.3
1	0645	82	5.	.0	2797.7	*	1	1505	182	0.	.0	2797.3	*	1	2325	282	0.	.0	2797.3
1	0650	83	4.	.0	2797.7	*	1	1510	183	0.	.0	2797.3	*	1	2330	283	0.	.0	2797.3
1	0655	84	3.	.0	2797.6	*	1	1515	184	0.	.0	2797.3	*	1	2335	284	0.	.0	2797.3
1	0700	85	2.	.0	2797.5	*	1	1520	185	0.	.0	2797.3	*	1	2340	285	0.	.0	2797.3
1	0705	86	2.	.0	2797.5	*	1	1525	186	0.	.0	2797.3	*	1	2345	286	0.	.0	2797.3
1	0710	87	1.	.0	2797.4	*	1	1530	187	0.	.0	2797.3	*	1	2350	287	0.	.0	2797.3
1	0715	88	1.	.0	2797.4	*	1	1535	188	0.	.0	2797.3	*	1	2355	288	0.	.0	2797.3
1	0720	89	1.	.0	2797.4	*	1	1540	189	0.	.0	2797.3	*	2	0000	289	0.	.0	2797.3
1	0725	90	1.	.0	2797.3	*	1	1545	190	0.	.0	2797.3	*	2	0005	290	0.	.0	2797.3
1	0730	91	0.	.0	2797.3	*	1	1550	191	0.	.0	2797.3	*	2	0010	291	0.	.0	2797.3
1	0735	92	0.	.0	2797.3	*	1	1555	192	0.	.0	2797.3	*	2	0015	292	0.	.0	2797.3
1	0740	93	0.	.0	2797.3	*	1	1600	193	0.	.0	2797.3	*	2	0020	293	0.	.0	2797.3
1	0745	94	0.	.0	2797.3	*	1	1605	194	0.	.0	2797.3	*	2	0025	294	0.	.0	2797.3
1	0750	95	0.	.0	2797.3	*	1	1610	195	0.	.0	2797.3	*	2	0030	295	0.	.0	2797.3
1	0755	96	0.	.0	2797.3	*	1	1615	196	0.	.0	2797.3	*	2	0035	296	0.	.0	2797.3
1	0800	97	0.	.0	2797.3	*	1	1620	197	0.	.0	2797.3	*	2	0040	297	0.	.0	2797.3
1	0805	98	0.	.0	2797.3	*	1	1625	198	0.	.0	2797.3	*	2	0045	298	0.	.0	2797.3
1	0810	99	0.	.0	2797.3	*	1	1630	199	0.	.0	2797.3	*	2	0050	299	0.	.0	2797.3
1	0815	100	0.	.0	2797.3	*	1	1635	200	0.	.0	2797.3	*	2	0055	300	0.	.0	2797.3
						*							*						

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 253.	4.17		64.	16.	15.	15.
		(INCHES)	1.633	1.635	1.635	1.635
		(AC-FT)	32.	32.	32.	32.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
5.	4.17		1.	0.	0.	0.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
2810.92	4.17		2801.14	2798.27	2798.23	2798.23

CUMULATIVE AREA = .36 SQ MI

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PRO
HYDROGRAPH AT STATION DBN
PLAN 1, RATIO = .97

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	2797.3	1		0820	101	0.	.0	2797.3	1		1640	201	0.	.0	2797.3
1		0005	2	0.	.0	2797.3	1		0825	102	0.	.0	2797.3	1		1645	202	0.	.0	2797.3
1		0010	3	0.	.0	2797.3	1		0830	103	0.	.0	2797.3	1		1650	203	0.	.0	2797.3
1		0015	4	0.	.0	2797.3	1		0835	104	0.	.0	2797.3	1		1655	204	0.	.0	2797.3
1		0020	5	0.	.0	2797.3	1		0840	105	0.	.0	2797.3	1		1700	205	0.	.0	2797.3
1		0025	6	0.	.0	2797.3	1		0845	106	0.	.0	2797.3	1		1705	206	0.	.0	2797.3
1		0030	7	0.	.0	2797.3	1		0850	107	0.	.0	2797.3	1		1710	207	0.	.0	2797.3
1		0035	8	0.	.0	2797.3	1		0855	108	0.	.0	2797.3	1		1715	208	0.	.0	2797.3
1		0040	9	0.	.0	2797.3	1		0900	109	0.	.0	2797.3	1		1720	209	0.	.0	2797.3
1		0045	10	0.	.0	2797.3	1		0905	110	0.	.0	2797.3	1		1725	210	0.	.0	2797.3
1		0050	11	0.	.0	2797.3	1		0910	111	0.	.0	2797.3	1		1730	211	0.	.0	2797.3
1		0055	12	0.	.0	2797.3	1		0915	112	0.	.0	2797.3	1		1735	212	0.	.0	2797.3
1		0100	13	0.	.0	2797.3	1		0920	113	0.	.0	2797.3	1		1740	213	0.	.0	2797.3
1		0105	14	0.	.0	2797.3	1		0925	114	0.	.0	2797.3	1		1745	214	0.	.0	2797.3
1		0110	15	0.	.0	2797.3	1		0930	115	0.	.0	2797.3	1		1750	215	0.	.0	2797.3
1		0115	16	0.	.0	2797.3	1		0935	116	0.	.0	2797.3	1		1755	216	0.	.0	2797.3
1		0120	17	1.	.0	2797.4	1		0940	117	0.	.0	2797.3	1		1800	217	0.	.0	2797.3
1		0125	18	1.	.0	2797.4	1		0945	118	0.	.0	2797.3	1		1805	218	0.	.0	2797.3
1		0130	19	2.	.0	2797.4	1		0950	119	0.	.0	2797.3	1		1810	219	0.	.0	2797.3
1		0135	20	2.	.0	2797.5	1		0955	120	0.	.0	2797.3	1		1815	220	0.	.0	2797.3
1		0140	21	3.	.0	2797.6	1		1000	121	0.	.0	2797.3	1		1820	221	0.	.0	2797.3
1		0145	22	4.	.0	2797.6	1		1005	122	0.	.0	2797.3	1		1825	222	0.	.0	2797.3
1		0150	23	5.	.0	2797.7	1		1010	123	0.	.0	2797.3	1		1830	223	0.	.0	2797.3
1		0155	24	5.	.0	2797.7	1		1015	124	0.	.0	2797.3	1		1835	224	0.	.0	2797.3
1		0200	25	5.	.0	2797.8	1		1020	125	0.	.0	2797.3	1		1840	225	0.	.0	2797.3
1		0205	26	6.	.0	2797.8	1		1025	126	0.	.0	2797.3	1		1845	226	0.	.0	2797.3
1		0210	27	6.	.0	2797.8	1		1030	127	0.	.0	2797.3	1		1850	227	0.	.0	2797.3
1		0215	28	8.	.0	2798.0	1		1035	128	0.	.0	2797.3	1		1855	228	0.	.0	2797.3
1		0220	29	9.	.0	2798.1	1		1040	129	0.	.0	2797.3	1		1900	229	0.	.0	2797.3
1		0225	30	11.	.0	2798.2	1		1045	130	0.	.0	2797.3	1		1905	230	0.	.0	2797.3
1		0230	31	12.	.1	2798.4	1		1050	131	0.	.0	2797.3	1		1910	231	0.	.0	2797.3
1		0235	32	14.	.1	2798.5	1		1055	132	0.	.0	2797.3	1		1915	232	0.	.0	2797.3
1		0240	33	14.	.1	2798.5	1		1100	133	0.	.0	2797.3	1		1920	233	0.	.0	2797.3
1		0245	34	14.	.1	2798.5	1		1105	134	0.	.0	2797.3	1		1925	234	0.	.0	2797.3
1		0250	35	14.	.1	2798.5	1		1110	135	0.	.0	2797.3	1		1930	235	0.	.0	2797.3
1		0255	36	15.	.1	2798.6	1		1115	136	0.	.0	2797.3	1		1935	236	0.	.0	2797.3
1		0300	37	16.	.1	2798.7	1		1120	137	0.	.0	2797.3	1		1940	237	0.	.0	2797.3
1		0305	38	19.	.1	2798.9	1		1125	138	0.	.0	2797.3	1		1945	238	0.	.0	2797.3
1		0310	39	21.	.1	2799.2	1		1130	139	0.	.0	2797.3	1		1950	239	0.	.0	2797.3
1		0315	40	24.	.2	2799.4	1		1135	140	0.	.0	2797.3	1		1955	240	0.	.0	2797.3
1		0320	41	30.	.2	2799.9	1		1140	141	0.	.0	2797.3	1		2000	241	0.	.0	2797.3
1		0325	42	38.	.4	2800.6	1		1145	142	0.	.0	2797.3	1		2005	242	0.	.0	2797.3
1		0330	43	51.	.6	2801.7	1		1150	143	0.	.0	2797.3	1		2010	243	0.	.0	2797.3
1		0335	44	82.	.8	2802.7	1		1155	144	0.	.0	2797.3	1		2015	244	0.	.0	2797.3
1		0340	45	119.	1.1	2803.7	1		1200	145	0.	.0	2797.3	1		2020	245	0.	.0	2797.3
1		0345	46	153.	1.6	2805.1	1		1205	146	0.	.0	2797.3	1		2025	246	0.	.0	2797.3
1		0350	47	192.	2.3	2806.9	1		1210	147	0.	.0	2797.3	1		2030	247	0.	.0	2797.3
1		0355	48	217.	3.2	2808.5	1		1215	148	0.	.0	2797.3	1		2035	248	0.	.0	2797.3
1		0400	49	239.	4.0	2809.9	1		1220	149	0.	.0	2797.3	1		2040	249	0.	.0	2797.3
1		0405	50	248.	4.4	2810.5	1		1225	150	0.	.0	2797.3	1		2045	250	0.	.0	2797.3
1		0410	51	251.	4.6	2810.7	1		1230	151	0.	.0	2797.3	1		2050	251	0.	.0	2797.3
1		0415	52	248.	4.4	2810.6	1		1235	152	0.	.0	2797.3	1		2055	252	0.	.0	2797.3
1		0420	53	242.	4.1	2810.0	1		1240	153	0.	.0	2797.3	1		2100	253	0.	.0	2797.3
1		0425	54	227.	3.6	2809.1	1		1245	154	0.	.0	2797.3	1		2105	254	0.	.0	2797.3
1		0430	55	211.	3.0	2808.1	1		1250	155	0.	.0	2797.3	1		2110	255	0.	.0	2797.3
1		0435	56	194.	2.4	2807.1	1		1255	156	0.	.0	2797.3	1		2115	256	0.	.0	2797.3
1		0440	57	168.	1.9	2805.8	1		1300	157	0.	.0	2797.3	1		2120	257	0.	.0	2797.3
1		0445	58	145.	1.4	2804.7	1		1305	158	0.	.0	2797.3	1		2125	258	0.	.0	2797.3
1		0450	59	121.	1.1	2803.8	1		1310	159	0.	.0	2797.3	1		2130	259	0.	.0	2797.3
1		0455	60	98.	1.0	2803.2	1		1315	160	0.	.0	2797.3	1		2135	260	0.	.0	2797.3
1		0500	61	91.	.9	2803.0	1		1320	161	0.	.0	2797.3	1		2140	261	0.	.0	2797.3
1		0505	62	90.	.9	2803.0	1		1325	162	0.	.0	2797.3	1		2145	262	0.	.0	2797.3
1		0510	63	91.	.9	2803.0	1		1330	163	0.	.0	2797.3	1		2150	263	0.	.0	2797.3
1		0515	64	89.	.9	2802.9	1		1335	164	0.	.0	2797.3	1		2155	264	0.	.0	2797.3
1		0520	65	84.	.9	2802.8	1		1340	165	0.	.0	2797.3	1		2200	265	0.	.0	2797.3
1		0525	66	78.	.8	2802.6	1		1345	166	0.	.0	2797.3	1		2205	266	0.	.0	2797.3
1		0530	67	71.	.8	2802.4	1		1350	167	0.	.0	2797.3	1		2210	267	0.	.0	2797.3
1		0535	68	62.	.7	2802.2	1		1355	168	0.	.0	2797.3	1		2215	268	0.	.0	2797.3
1		0540	69	53.	.6	2801.9	1		1400	169	0.	.0	2797.3	1		2220	269	0.	.0	2797.3
1		0545	70	49.	.5	2801.5	1		1405	170	0.	.0	2797.3	1		2225	270	0.	.0	2797.3
1		0550	71	43.	.5	2801.1	1		1410	171	0.	.0	2797.3	1		2230	271	0.	.0	2797.3
1		0555	72	38.	.4	2800.6	1		1415	172	0.	.0	2797.3	1		2235	272	0.	.0	2797.3
1		0600	73	33.	.3	2800.2	1		1420	173	0.	.0	2797.3	1		2240	273	0.	.0	2797.3
1		0605	74	28.	.2	2799.7	1		1425	174	0.	.0	2797.3	1		2245	274	0.	.0	2797.3
1		0610	75	23.	.2	2799.3	1		1430	175	0.	.0	2797.3	1		2250	275	0.	.0	2797.3
1		0615	76	19.	.1	2799.0	1		1435	176	0.	.0	2797.3	1		2255	276	0.	.0	2797.3
1		0620	77	15.	.1	2798.6	1		1440	177	0.	.0	2797.3	1		2300	277	0.	.0	2797.3
1		0625	78	13.	.1	2798.4	1		1445	178	0.	.0	2797.3	1		2305	278	0.	.0	2797.3
1		0630	79	11.	.0	2798.2	1		1450	179	0.	.0	2797.3	1		2310	279	0.	.0	2797.3
1		0635	80	9.	.0	2798.1	1		1455	180	0.	.0	2797.3	1		2315	280	0.	.0	2797.3
1		0640	81	8.	.0	2798.0	1		1500	181	0.	.0	2797.3	1		2320	281	0.	.0	2797.3
1		0645	82	6.	.0	2797.8	1		1505	182	0.	.0	2797.3	1		2325	282	0.	.0	2797.3
1		0650	83	5.	.0	2797.7	1		1510	183	0.	.0	2797.3	1		2330	283	0.	.0	2797.3
1		0655	84	4.	.0	2797.6	1		1515	184	0.	.0	2797.3	1		2335	284	0.	.0	2797.3
1		0700	85	3.	.0	2797.6	1		1520	185	0.	.0	2797.3	1		2340	285	0.	.0	2797.3
1		0705	86	2.	.0	2797.5	1		1525	186	0.	.0	2797.3	1		2345	286	0.	.0	2797.3
1		0710	87	2.	.0	2797.4	1		1530	187	0.	.0	2797.3	1		2350	287	0.	.0	2797.3
1		0715	88	1.	.0	2797.4	1		1535	188	0.	.0	2797.3	1		2355	288	0.	.0	2797.3
1		0720	89	1.	.0	2797.4	1		1540	189	0.	.0	2797.3	2		0000	289	0.	.0	2797.3
1		0725	90	1.	.0	2797.4	1		1545	190	0.	.0	2797.3	2		0005	290	0.	.0	2797.3
1		0730	91	1.	.0	2797.3	1		1550	191	0.	.0	2797.3	2		0010	291	0.	.0	2797.3
1		0735	92	0.	.0	2797.3	1		1555	192	0.	.0	2797.3	2		0015	292	0.	.0	2797.3
1		0740	93	0.	.0	2797.3	1		1600	193	0.	.0	2797.3	2		0020	293	0.	.0	2797.3
1		0745	94	0.	.0	2797.3	1		1605	194	0.	.0	2797.3	2		0025	294	0.	.0	2797.3
1		0750	95	0.	.0	2797.3	1		1610	195	0.	.0	2797.3	2		0030	295	0.	.0	2797.3
1		0755	96	0.	.0	2797.3	1		1615	196	0.	.0	2797.3	2		0035	296	0.	.0	2797.3
1		0800	97	0.	.0	2797.3	1		1620	197	0.	.0	2797.3	2		0040	297	0.	.0	2797.3
1		0805	98	0.	.0	2797.3	1		1625	198	0.	.0	2797.3	2		0045	298	0.	.0	2797.3
1		0810	99	0.	.0	2797.3	1		1630	199	0.	.0	2797.3	2		0050	299	0.	.0	2797.3

																				PRO			
1	0815	100	0.	.0	2797.3	*	1	1635	200	0.	.0	2797.3	*	2	0055	300	0.	.0	2797.3				
						*							*										

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 251.	4.17		63.	16.	15.	15.
		(INCHES)	1.607	1.610	1.610	1.610
		(AC-FT)	31.	31.	31.	31.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE		
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
5.	4.17	1.	0.	0.	0.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE		
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2810.75	4.17	2801.08	2798.26	2798.22	2798.22

CUMULATIVE AREA = .36 SQ MI

HYDROGRAPH AT STATION DBN
PLAN 1, RATIO = .55

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	2797.3	1		0820	101	0.	.0	2797.3	1		1640	201	0.	.0	2797.3
1		0005	2	0.	.0	2797.3	1		0825	102	0.	.0	2797.3	1		1645	202	0.	.0	2797.3
1		0010	3	0.	.0	2797.3	1		0830	103	0.	.0	2797.3	1		1650	203	0.	.0	2797.3
1		0015	4	0.	.0	2797.3	1		0835	104	0.	.0	2797.3	1		1655	204	0.	.0	2797.3
1		0020	5	0.	.0	2797.3	1		0840	105	0.	.0	2797.3	1		1700	205	0.	.0	2797.3
1		0025	6	0.	.0	2797.3	1		0845	106	0.	.0	2797.3	1		1705	206	0.	.0	2797.3
1		0030	7	0.	.0	2797.3	1		0850	107	0.	.0	2797.3	1		1710	207	0.	.0	2797.3
1		0035	8	0.	.0	2797.3	1		0855	108	0.	.0	2797.3	1		1715	208	0.	.0	2797.3
1		0040	9	0.	.0	2797.3	1		0900	109	0.	.0	2797.3	1		1720	209	0.	.0	2797.3
1		0045	10	0.	.0	2797.3	1		0905	110	0.	.0	2797.3	1		1725	210	0.	.0	2797.3
1		0050	11	0.	.0	2797.3	1		0910	111	0.	.0	2797.3	1		1730	211	0.	.0	2797.3
1		0055	12	0.	.0	2797.3	1		0915	112	0.	.0	2797.3	1		1735	212	0.	.0	2797.3
1		0100	13	0.	.0	2797.3	1		0920	113	0.	.0	2797.3	1		1740	213	0.	.0	2797.3
1		0105	14	0.	.0	2797.3	1		0925	114	0.	.0	2797.3	1		1745	214	0.	.0	2797.3
1		0110	15	0.	.0	2797.3	1		0930	115	0.	.0	2797.3	1		1750	215	0.	.0	2797.3
1		0115	16	0.	.0	2797.3	1		0935	116	0.	.0	2797.3	1		1755	216	0.	.0	2797.3
1		0120	17	0.	.0	2797.3	1		0940	117	0.	.0	2797.3	1		1800	217	0.	.0	2797.3
1		0125	18	0.	.0	2797.3	1		0945	118	0.	.0	2797.3	1		1805	218	0.	.0	2797.3
1		0130	19	0.	.0	2797.3	1		0950	119	0.	.0	2797.3	1		1810	219	0.	.0	2797.3
1		0135	20	0.	.0	2797.3	1		0955	120	0.	.0	2797.3	1		1815	220	0.	.0	2797.3
1		0140	21	0.	.0	2797.3	1		1000	121	0.	.0	2797.3	1		1820	221	0.	.0	2797.3
1		0145	22	0.	.0	2797.3	1		1005	122	0.	.0	2797.3	1		1825	222	0.	.0	2797.3
1		0150	23	0.	.0	2797.3	1		1010	123	0.	.0	2797.3	1		1830	223	0.	.0	2797.3
1		0155	24	0.	.0	2797.3	1		1015	124	0.	.0	2797.3	1		1835	224	0.	.0	2797.3
1		0200	25	0.	.0	2797.3	1		1020	125	0.	.0	2797.3	1		1840	225	0.	.0	2797.3
1		0205	26	0.	.0	2797.3	1		1025	126	0.	.0	2797.3	1		1845	226	0.	.0	2797.3
1		0210	27	0.	.0	2797.3	1		1030	127	0.	.0	2797.3	1		1850	227	0.	.0	2797.3
1		0215	28	0.	.0	2797.3	1		1035	128	0.	.0	2797.3	1		1855	228	0.	.0	2797.3
1		0220	29	0.	.0	2797.3	1		1040	129	0.	.0	2797.3	1		1900	229	0.	.0	2797.3
1		0225	30	0.	.0	2797.3	1		1045	130	0.	.0	2797.3	1		1905	230	0.	.0	2797.3
1		0230	31	1.	.0	2797.4	1		1050	131	0.	.0	2797.3	1		1910	231	0.	.0	2797.3
1		0235	32	1.	.0	2797.4	1		1055	132	0.	.0	2797.3	1		1915	232	0.	.0	2797.3
1		0240	33	1.	.0	2797.4	1		1100	133	0.	.0	2797.3	1		1920	233	0.	.0	2797.3
1		0245	34	1.	.0	2797.4	1		1105	134	0.	.0	2797.3	1		1925	234	0.	.0	2797.3
1		0250	35	1.	.0	2797.4	1		1110	135	0.	.0	2797.3	1		1930	235	0.	.0	2797.3
1		0255	36	1.	.0	2797.4	1		1115	136	0.	.0	2797.3	1		1935	236	0.	.0	2797.3
1		0300	37	2.	.0	2797.4	1		1120	137	0.	.0	2797.3	1		1940	237	0.	.0	2797.3
1		0305	38	2.	.0	2797.5	1		1125	138	0.	.0	2797.3	1		1945	238	0.	.0	2797.3
1		0310	39	3.	.0	2797.5	1		1130	139	0.	.0	2797.3	1		1950	239	0.	.0	2797.3
1		0315	40	4.	.0	2797.7	1		1135	140	0.	.0	2797.3	1		1955	240	0.	.0	2797.3
1		0320	41	8.	.0	2798.0	1		1140	141	0.	.0	2797.3	1		2000	241	0.	.0	2797.3
1		0325	42	11.	.0	2798.2	1		1145	142	0.	.0	2797.3	1		2005	242	0.	.0	2797.3
1		0330	43	16.	.1	2798.7	1		1150	143	0.	.0	2797.3	1		2010	243	0.	.0	2797.3
1		0335	44	24.	.2	2799.4	1		1155	144	0.	.0	2797.3	1		2015	244	0.	.0	2797.3
1		0340	45	32.	.3	2800.1	1		1200	145	0.	.0	2797.3	1		2020	245	0.	.0	2797.3
1		0345	46	39.	.4	2800.7	1		1205	146	0.	.0	2797.3	1		2025	246	0.	.0	2797.3
1		0350	47	45.	.5	2801.3	1		1210	147	0.	.0	2797.3	1		2030	247	0.	.0	2797.3
1		0355	48	65.	.7	2802.3	1		1215	148	0.	.0	2797.3	1		2035	248	0.	.0	2797.3
1		0400	49	101.	1.0	2803.3	1		1220	149	0.	.0	2797.3	1		2040	249	0.	.0	2797.3
1		0405	50	118.	1.1	2803.7	1		1225	150	0.	.0	2797.3	1		2045	250	0.	.0	2797.3
1		0410	51	117.	1.1	2803.7	1		1230	151	0.	.0	2797.3	1		2050	251	0.	.0	2797.3
1		0415	52	108.	1.0	2803.4	1		1235	152	0.	.0	2797.3	1		2055	252	0.	.0	2797.3
1		0420	53	95.	.9	2803.1	1		1240	153	0.	.0	2797.3	1		2100	253	0.	.0	2797.3
1		0425	54	82.	.8	2802.8	1		1245	154	0.	.0	2797.3	1		2105	254	0.	.0	2797.3
1		0430	55	71.	.8	2802.4	1		1250	155	0.	.0	2797.3	1		2110	255	0.	.0	2797.3
1		0435	56	61.	.7	2802.2	1		1255	156	0.	.0	2797.3	1		2115	256	0.	.0	2797.3
1		0440	57	54.	.6	2802.0	1		1300	157	0.	.0	2797.3	1		2120	257	0.	.0	2797.3
1		0445	58	51.	.6	2801.7	1		1305	158	0.	.0	2797.3	1		2125	258	0.	.0	2797.3
1		0450	59	48.	.5	2801.5	1		1310	159	0.	.0	2797.3	1		2130	259	0.	.0	2797.3
1		0455	60	45.	.5	2801.2	1		1315	160	0.	.0	2797.3	1		2135	260	0.	.0	2797.3
1		0500	61	43.	.5	2801.0	1		1320	161	0.	.0	2797.3	1		2140	261	0.	.0	2797.3
1		0505	62	41.	.4	2800.9	1		1325	162	0.	.0	2797.3	1		2145	262	0.	.0	2797.3
1		0510	63	40.	.4	2800.8	1		1330	163	0.	.0	2797.3	1		2150	263	0.	.0	2797.3
1		0515	64	40.	.4	2800.8	1		1335	164	0.	.0	2797.3	1		2155	264	0.	.0	2797.3
1		0520	65	39.	.4	2800.7	1		1340	165	0.	.0	2797.3	1		2200	265	0.	.0	2797.3
1		0525	66	38.	.4	2800.6	1		1345	166	0.	.0	2797.3	1		2205	266	0.	.0	2797.3
1		0530	67	36.	.3	2800.4	1		1350	167	0.	.0	2797.3	1		2210	267	0.	.0	2797.3
1		0535	68	34.	.3	2800.2	1		1355	168	0.	.0	2797.3	1		2215	268	0.	.0	2797.3
1		0540	69	31.	.3	2800.0	1		1400	169	0.	.0	2797.3	1		2220	269	0.	.0	2797.3
1		0545	70	27.	.2	2799.6	1		1405	170	0.	.0	2797.3	1		2225	270	0.	.0	2797.3
1		0550	71	23.	.2	2799.3	1		1410	171	0.	.0	2797.3	1		2230	271	0.	.0	2797.3
1		0555	72	20.	.1	2799.0	1		1415	172	0.	.0	2797.3	1		2235	272	0.	.0	2797.3

															PRO								
1	0600	73	16.	.1	2798.7	*	1	1420	173	0.	.0	2797.3	*	1	2240	273	0.	.0	2797.3
1	0605	74	14.	.1	2798.5	*	1	1425	174	0.	.0	2797.3	*	1	2245	274	0.	.0	2797.3
1	0610	75	11.	.1	2798.3	*	1	1430	175	0.	.0	2797.3	*	1	2250	275	0.	.0	2797.3
1	0615	76	10.	.0	2798.2	*	1	1435	176	0.	.0	2797.3	*	1	2255	276	0.	.0	2797.3
1	0620	77	8.	.0	2798.0	*	1	1440	177	0.	.0	2797.3	*	1	2300	277	0.	.0	2797.3
1	0625	78	6.	.0	2797.8	*	1	1445	178	0.	.0	2797.3	*	1	2305	278	0.	.0	2797.3
1	0630	79	5.	.0	2797.7	*	1	1450	179	0.	.0	2797.3	*	1	2310	279	0.	.0	2797.3
1	0635	80	4.	.0	2797.7	*	1	1455	180	0.	.0	2797.3	*	1	2315	280	0.	.0	2797.3
1	0640	81	4.	.0	2797.6	*	1	1500	181	0.	.0	2797.3	*	1	2320	281	0.	.0	2797.3
1	0645	82	3.	.0	2797.6	*	1	1505	182	0.	.0	2797.3	*	1	2325	282	0.	.0	2797.3
1	0650	83	3.	.0	2797.6	*	1	1510	183	0.	.0	2797.3	*	1	2330	283	0.	.0	2797.3
1	0655	84	3.	.0	2797.5	*	1	1515	184	0.	.0	2797.3	*	1	2335	284	0.	.0	2797.3
1	0700	85	2.	.0	2797.5	*	1	1520	185	0.	.0	2797.3	*	1	2340	285	0.	.0	2797.3
1	0705	86	2.	.0	2797.5	*	1	1525	186	0.	.0	2797.3	*	1	2345	286	0.	.0	2797.3
1	0710	87	1.	.0	2797.4	*	1	1530	187	0.	.0	2797.3	*	1	2350	287	0.	.0	2797.3
1	0715	88	1.	.0	2797.4	*	1	1535	188	0.	.0	2797.3	*	1	2355	288	0.	.0	2797.3
1	0720	89	1.	.0	2797.4	*	1	1540	189	0.	.0	2797.3	*	2	0000	289	0.	.0	2797.3
1	0725	90	1.	.0	2797.4	*	1	1545	190	0.	.0	2797.3	*	2	0005	290	0.	.0	2797.3
1	0730	91	0.	.0	2797.3	*	1	1550	191	0.	.0	2797.3	*	2	0010	291	0.	.0	2797.3
1	0735	92	0.	.0	2797.3	*	1	1555	192	0.	.0	2797.3	*	2	0015	292	0.	.0	2797.3
1	0740	93	0.	.0	2797.3	*	1	1600	193	0.	.0	2797.3	*	2	0020	293	0.	.0	2797.3
1	0745	94	0.	.0	2797.3	*	1	1605	194	0.	.0	2797.3	*	2	0025	294	0.	.0	2797.3
1	0750	95	0.	.0	2797.3	*	1	1610	195	0.	.0	2797.3	*	2	0030	295	0.	.0	2797.3
1	0755	96	0.	.0	2797.3	*	1	1615	196	0.	.0	2797.3	*	2	0035	296	0.	.0	2797.3
1	0800	97	0.	.0	2797.3	*	1	1620	197	0.	.0	2797.3	*	2	0040	297	0.	.0	2797.3
1	0805	98	0.	.0	2797.3	*	1	1625	198	0.	.0	2797.3	*	2	0045	298	0.	.0	2797.3
1	0810	99	0.	.0	2797.3	*	1	1630	199	0.	.0	2797.3	*	2	0050	299	0.	.0	2797.3
1	0815	100	0.	.0	2797.3	*	1	1635	200	0.	.0	2797.3	*	2	0055	300	0.	.0	2797.3
						*							*						

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 118.	4.08		24.	6.	6.	6.
		(INCHES)	.610	.610	.610	.610
		(AC-FT)	12.	12.	12.	12.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
1.	4.08	0.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2803.70	4.08	2799.10	2797.76	2797.74	2797.74

CUMULATIVE AREA = .36 SQ MI

1

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

					RATIOS APPLIED TO PRECIPITATION			
OPERATION	STATION	AREA	PLAN		RATIO 1 1.00	RATIO 2 .98	RATIO 3 .97	RATIO 4 .55
HYDROGRAPH AT								
+	WOFF5	.26	1	FLOW	236.	229.	226.	87.
				TIME	3.83	3.83	3.83	3.92
ROUTED TO								
+	RWOFF5	.26	1	FLOW	237.	230.	227.	88.
				TIME	4.00	4.00	4.00	4.08
HYDROGRAPH AT								
+	WOFF6	.04	1	FLOW	59.	57.	56.	22.
				TIME	3.58	3.58	3.58	3.58
HYDROGRAPH AT								
+	EX-W5S	.24	1	FLOW	237.	230.	227.	83.
				TIME	3.75	3.75	3.75	3.75
HYDROGRAPH AT								
+	OFF3	.00	1	FLOW	2.	2.	2.	1.
				TIME	3.50	3.50	3.50	3.50
HYDROGRAPH AT								
+	D2	.02	1	FLOW	24.	24.	23.	9.
				TIME	3.50	3.50	3.50	3.50
HYDROGRAPH AT								
+	IOFF4	.01	1	FLOW	9.	9.	9.	3.
				TIME	3.50	3.50	3.50	3.50
3 COMBINED AT								
+	PARK	.02	1	FLOW	36.	35.	34.	13.
				TIME	3.50	3.50	3.50	3.50
4 COMBINED AT								
+	CPS	.56	1	FLOW	447.	433.	426.	152.
				TIME	3.92	3.92	3.92	4.00
HYDROGRAPH AT								
+	WOFF7	.01	1	FLOW	10.	10.	10.	4.
				TIME	3.50	3.50	3.50	3.50
HYDROGRAPH AT								
+	WOFF8	.21	1	FLOW	230.	223.	220.	85.
				TIME	3.75	3.75	3.75	3.75

ROUTED TO								
+	RWOFF8	.21	1	FLOW	230.	222.	220.	88.
				TIME	3.92	4.00	4.00	4.00
HYDROGRAPH AT								
+	EX-W5N	.14	1	FLOW	139.	135.	133.	51.
				TIME	3.83	3.83	3.83	3.83
3 COMBINED AT								
+	CPN	.36	1	FLOW	361.	350.	345.	133.
				TIME	3.92	3.92	3.92	4.00
ROUTED TO								
+	DBN	.36	1	FLOW	258.	253.	251.	118.
				TIME	4.17	4.17	4.17	4.08
			** PEAK STAGES IN FEET **					
			1	STAGE	2811.29	2810.92	2810.75	2803.70
				TIME	4.17	4.17	4.17	4.08
HYDROGRAPH AT								
+	WSPD3	.00	1	FLOW	5.	5.	5.	2.
				TIME	3.50	3.50	3.50	3.50
HYDROGRAPH AT								
+	ON1-E	.03	1	FLOW	47.	46.	45.	18.
				TIME	3.50	3.50	3.50	3.58
4 COMBINED AT								
+	WC9a	.95	1	FLOW	684.	665.	656.	269.
				TIME	3.92	4.00	4.00	4.08
HYDROGRAPH AT								
+	ON1-D	.03	1	FLOW	47.	46.	45.	21.
				TIME	3.58	3.58	3.58	3.58
HYDROGRAPH AT								
+	ON2-D	.03	1	FLOW	45.	44.	44.	18.
				TIME	3.58	3.58	3.58	3.58
HYDROGRAPH AT								
+	HOR	.02	1	FLOW	30.	29.	29.	14.
				TIME	3.50	3.50	3.50	3.50
3 COMBINED AT								
+	WC7	.07	1	FLOW	121.	118.	116.	53.
				TIME	3.58	3.58	3.58	3.58
HYDROGRAPH AT								
+	WGRC1A	.00	1	FLOW	4.	4.	4.	2.
				TIME	3.50	3.50	3.50	3.50
HYDROGRAPH AT								
+	EX-W6	.01	1	FLOW	18.	18.	17.	7.
				TIME	3.50	3.50	3.50	3.50
HYDROGRAPH AT								
+	WSPD0	.00	1	FLOW	2.	2.	2.	1.
				TIME	3.50	3.50	3.50	3.50
5 COMBINED AT								
+	WC9	1.04	1	FLOW	724.	704.	694.	281.
				TIME	3.92	3.92	3.92	4.08

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .00									
RWOFF5	MANE	5.00	237.34	240.00	1.70	5.00	237.34	240.00	1.70

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2330E+02 EXCESS= .0000E+00 OUTFLOW= .2332E+02 BASIN STORAGE= .7632E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00									
RWOFF5	MANE	5.00	230.22	240.00	1.65	5.00	230.22	240.00	1.65

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2259E+02 EXCESS= .0000E+00 OUTFLOW= .2261E+02 BASIN STORAGE= .7531E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00									
RWOFF5	MANE	5.00	226.67	240.00	1.62	5.00	226.67	240.00	1.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2224E+02 EXCESS= .0000E+00 OUTFLOW= .2226E+02 BASIN STORAGE= .7480E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00									
RWOFF5	MANE	5.00	87.59	245.00	.62	5.00	87.59	245.00	.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8461E+01 EXCESS= .0000E+00 OUTFLOW= .8484E+01 BASIN STORAGE= .7208E-02 PERCENT ERROR= -.4

FOR PLAN = 1 RATIO= .00									
RWOFF8	MANE	5.00	229.71	235.00	1.69	5.00	229.71	235.00	1.69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1924E+02 EXCESS= .0000E+00 OUTFLOW= .1928E+02 BASIN STORAGE= .6283E-02 PERCENT ERROR= -.2

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          FOR PLAN = 1  RATIO=  .00
            RWOFF8  MANE          5.00    222.50    240.00      1.64      5.00    222.50    240.00        1.64

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1865E+02 EXCESS= .0000E+00 OUTFLOW= .1869E+02 BASIN STORAGE= .6205E-02 PERCENT ERROR=   -.2

          FOR PLAN = 1  RATIO=  .00
            RWOFF8  MANE          5.00    219.78    240.00      1.61      5.00    219.78    240.00        1.61

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1836E+02 EXCESS= .0000E+00 OUTFLOW= .1840E+02 BASIN STORAGE= .7178E-02 PERCENT ERROR=   -.2

          FOR PLAN = 1  RATIO=  .00
            RWOFF8  MANE          5.00     88.48    240.00       .61      5.00     88.48    240.00         .61

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6943E+01 EXCESS= .0000E+00 OUTFLOW= .6979E+01 BASIN STORAGE= .7050E-02 PERCENT ERROR=   -.6


*** NORMAL END OF HEC-1 ***
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Future Condition (100-Yr)

Fut

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1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN  1998                *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   19JUL16  TIME  07:24:46   *
*                                       *
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*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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


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          LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
                        *DIAGRAM
 *** FREE ***
             1          ID     SKYE CANYON
             2          ID     PHASE 3 INFRASTRUCTURE - FUTURE CONDITION
             3          ID     PRIOR TO DETENTION BASIN 1 & PHASE 2 BUILD-OUT
             4          ID
             5          ID     RETURN PERIOD ------- 100-YEAR
             6          ID     DISTRIBUTION -------- 6-HOUR SDN3
             7          ID     PROJECT NO. --------- OLY1602.000
             8          ID     FILENAME ------------ EX.H1
             9          ID     DATE ---------------- 7/20/2016
            10          ID     MODELED BY ---------- CWB
            11          ID
            12          ID        SIX HOUR DEPTH-AREA REDUCTION FACTORS
            13          ID        DRAINAGE AREA (MI^2)    DARF
            14          ID        0.0-0.49                1.00
            15          ID        0.5-0.99                0.98
            16          ID        1.0-1.99                0.97
            17          ID
            18          IT       5       0       0     300
            19          IO       5       0       0
            20          IN       5       0       0
            21          JR    PREC    1.00    0.98    0.97
                        *
            22          KK   WOFF5
            23          KM   EXISTING OFFSITE DRAINAGE BASIN
            24          KM   REFERENCED FROM DB1 STUDY
            25          PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
            26          PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
            27          PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
            28          PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
            29          PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
            30          PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
            31          PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
            32          PC   0.998   0.999   1.000
            33          PB    3.00
            34          BA   .2569
            35          LS       0    86.5
            36          UD   0.419
                        *
            37          KK  RWOFF5
            38          KM   ROUTE TO CPS
            39          RD    7360   0.035   0.040       0    TRAP      15       1
                        *
            40          KK   WOFF6
            41          KM   EXISTING OFFSITE DRAINAGE BASIN
            42          KM   REFERENCED FROM DB1 STUDY
            43          PB    3.00
            44          BA   .0399
            45          LS       0    86.2
            46          UD   0.121
                        *
```



```
          LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
            47          KK  EX-W5S
            48          PB    3.00
            49          BA   .2364
            50          LS       0    85.3
            51          UD   0.321
                        *
            52          KK    OFF3
```

```
 53          KM   REFERENCED FROM SKYE PARK STUDY
 54          PB    3.00
 55          BA   .0012
 56          LS       0    86.2
 57          UD   0.100
             *

 58          KK      D2
 59          KM   REFERENCED FROM SKYE PARK STUDY
 60          PB    3.00
 61          BA   .0154
 62          LS       0    86.0
 63          UD   0.089
             *

 64          KK   IOFF4
 65          KM   REFERENCED FROM SKYE PARK STUDY
 66          PB    3.00
 67          BA   .0062
 68          LS       0    86.2
 69          UD   0.100
             *

 70          KK    PARK
 71          KM   COMBINES IOFF4, OFF3, D2
 72          HC       3
             *

 73          KK     CPS
 74          HC       4
             *

 75          KK   WOFF7
 76          KM   EXISTING OFFSITE DRAINAGE BASIN
 77          KM   REFERENCED FROM SKYE CANYON MASTER STUDY
 78          PB    3.00
 79          BA   .0068
 80          LS       0    86.2
 81          UD   0.100
             *
```



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

 82          KK   WOFF8
 83          KM   EXISTING OFFSITE DRAINAGE BASIN
 84          KM   REFERENCED FROM SKYE CANYON MASTER STUDY
 85          PB    3.00
 86          BA   .2141
 87          LS       0    86.3
 88          UD   0.302
             *

 89          KK  RWOFF8
 90          KM   ROUTE TO CPN
 91          RD    7850   0.028   0.040       0    TRAP      15       3
             *

 92          KK  EX-W5N
 93          PB    3.00
 94          BA   .1425
 95          LS       0    86.3
 96          UD   0.366
             *

 97          KK     CPN
 98          KM   COMBINATION POINT CPN
 99          HC       3
             *

100          KK     DBN
101          KM   OUTLET = 54" ORIFICE @ INVERT ELEVATION = 2997.3-FT
102          KO       1
103          RS       1    ELEV  2797.3
104          SA    0.00    0.09    0.12    0.15     .37    0.79    0.86
105          SE  2797.3    2798    2799    2800    2805    2812    2813
106          SQ    0.00      54     129     193     241     268
107          SE  2797.3    2802    2804    2807    2810    2812
             *

108          KK   WSPD3
109          BA   .0022
110          PB    2.93
111          LS       0    92.8
112          UD   0.056
             *

113          KK    WGC3
114          BA   .0444
115          PB    2.93
116          LS       0    94.6
117          UD   0.095
             *
```



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

118          KK    WC9a
119          HC       4
             *

120          KK   ON1-D
121          KM   PHASE 1, NORTHWEST QUAD ONSITE BASIN
122          KM   REFERENCED FROM PHASE 1 STUDY
```

```
123           BA   .0278
124           PB    2.93
125           LS       0    91.2
126           UD   0.114
              *

127           KK   ON2-D
128           KM   PHASE 1, NORTHEAST QUAD ONSITE BASIN
129           KM   REFERENCED FROM PHASE 1 STUDY
130           BA   .0301
131           PB    2.93
132           LS       0    88.8
133           UD   0.152
              *

134           KK     HOR
135           KM   PHASE 1, STREET BASIN SKYE CANYON PARK DRIVE
136           KM   REFERENCED FROM PHASE 1 STUDY
137           BA   .0163
138           PB    2.93
139           LS       0    93.3
140           UD   0.108
              *

141           KK     WC7
142           HC       3
              *

143           KK  WGRC1A
144           BA   .0022
145           PB    2.93
146           LS       0    93.2
147           UD   0.095
              *

148           KK   WSPD0
149           BA   .0010
150           PB    2.93
151           LS       0    93.4
152           UD   0.050
              *
```

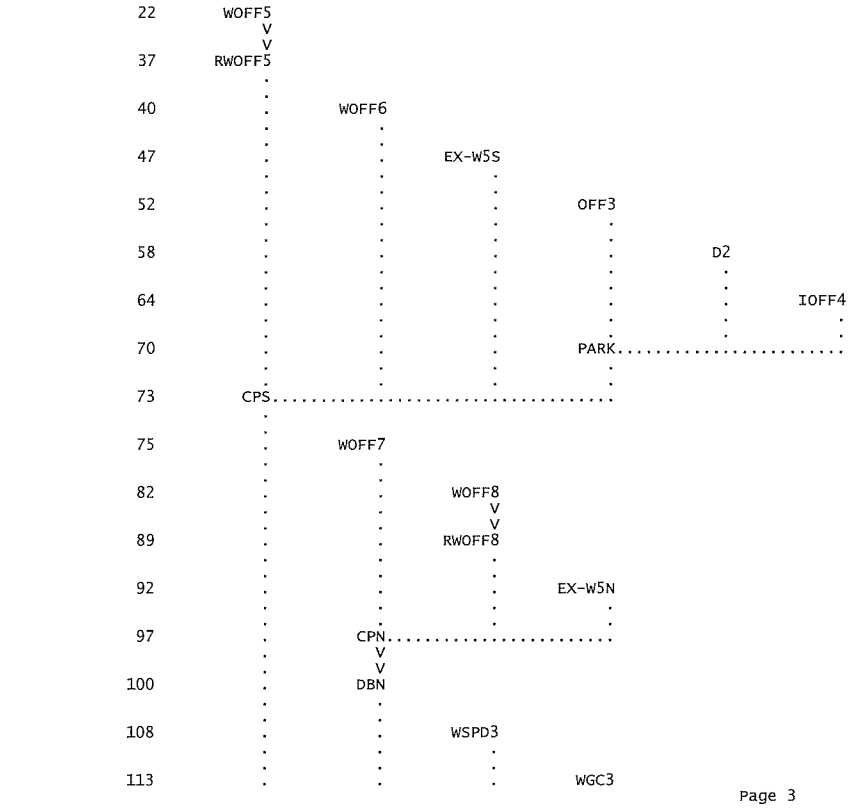
1 HEC-1 INPUT PAGE 5

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

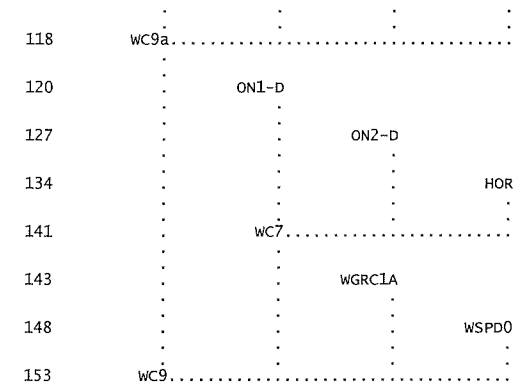
153           KK     WC9
154           HC       4
              *
155           ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK



```
                .          .          .          .
                .          .          .          .
  118        WC9a.....................................
                .
                .
  120           .       ON1-D
                .          .
                .          .
  127           .          .       ON2-D
                .          .          .
                .          .          .
  134           .          .          .         HOR
                .          .          .          .
                .          .          .          .
  141           .         WC7.......................
                .          .
                .          .
  143           .          .      WGRC1A
                .          .          .
                .          .          .
  148           .          .          .       WSPD0
                .          .          .          .
                .          .          .          .
  153         WC9.....................................
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   19JUL16  TIME  07:24:46   *
*                                       *
*****************************************
```

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

```
                         SKYE CANYON
                         PHASE 3 INFRASTRUCTURE - FUTURE CONDITION
                         PRIOR TO DETENTION BASIN 1 & PHASE 2 BUILD-OUT

                         RETURN PERIOD ------- 100-YEAR
                         DISTRIBUTION -------- 6-HOUR SDN3
                         PROJECT NO. --------- OLY1602.000
                         FILENAME ------------ EX.H1
                         DATE ---------------- 7/20/2016
                         MODELED BY ---------- CWB

                            SIX HOUR DEPTH-AREA REDUCTION FACTORS
                            DRAINAGE AREA (MI^2)     DARF
                            0.0-0.49                 1.00
                            0.5-0.99                 0.98
                            1.0-1.99                 0.97


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

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

                   COMPUTATION INTERVAL     .08 HOURS
                        TOTAL TIME BASE   24.92 HOURS

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

     JP          MULTI-PLAN OPTION
                       NPLAN           1  NUMBER OF PLANS

     JR          MULTI-RATIO OPTION
                     RATIOS OF PRECIPITATION
                    1.00       .98       .97


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 100 KK     *       DBN  *
            *            *
            **************

 102 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           1  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
```

HYDROGRAPH ROUTING DATA

```
103 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       ELEV  TYPE OF INITIAL CONDITION
                     RSVRIC    2797.30  INITIAL CONDITION
                         X         .00 WORKING R AND D COEFFICIENT

104 SA               AREA          .0       .1       .1       .2       .4       .8       .9

105 SE           ELEVATION     2797.30  2798.00  2799.00  2800.00  2805.00  2812.00  2813.00

106 SQ           DISCHARGE          0.       54.      129.     193.     241.     268.

107 SE           ELEVATION     2797.30  2802.00  2804.00  2807.00  2810.00  2812.00
```

***

COMPUTED STORAGE-ELEVATION DATA

STORAGE	.00	.02	.13	.26	1.52	5.49	6.31
ELEVATION	2797.30	2798.00	2799.00	2800.00	2805.00	2812.00	2813.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	.02	.13	.26	.63	1.18	1.52	2.36	4.05	5.49
OUTFLOW	.00	8.04	19.53	31.02	54.00	129.00	150.33	193.00	241.00	268.00
ELEVATION	2797.30	2798.00	2799.00	2800.00	2802.00	2804.00	2805.00	2807.00	2810.00	2812.00

STORAGE	6.31
OUTFLOW	281.50
ELEVATION	2813.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 0. TO 8.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

****

HYDROGRAPH AT STATION DBN
PLAN 1, RATIO = 1.00

****

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	2797.3	1		0820	101	0.	.0	2797.3	1		1640	201	0.	.0	2797.3
1		0005	2	0.	.0	2797.3	1		0825	102	0.	.0	2797.3	1		1645	202	0.	.0	2797.3
1		0010	3	0.	.0	2797.3	1		0830	103	0.	.0	2797.3	1		1650	203	0.	.0	2797.3
1		0015	4	0.	.0	2797.3	1		0835	104	0.	.0	2797.3	1		1655	204	0.	.0	2797.3
1		0020	5	0.	.0	2797.3	1		0840	105	0.	.0	2797.3	1		1700	205	0.	.0	2797.3
1		0025	6	0.	.0	2797.3	1		0845	106	0.	.0	2797.3	1		1705	206	0.	.0	2797.3
1		0030	7	0.	.0	2797.3	1		0850	107	0.	.0	2797.3	1		1710	207	0.	.0	2797.3
1		0035	8	0.	.0	2797.3	1		0855	108	0.	.0	2797.3	1		1715	208	0.	.0	2797.3
1		0040	9	0.	.0	2797.3	1		0900	109	0.	.0	2797.3	1		1720	209	0.	.0	2797.3
1		0045	10	0.	.0	2797.3	1		0905	110	0.	.0	2797.3	1		1725	210	0.	.0	2797.3
1		0050	11	1.	.0	2797.3	1		0910	111	0.	.0	2797.3	1		1730	211	0.	.0	2797.3
1		0055	12	1.	.0	2797.3	1		0915	112	0.	.0	2797.3	1		1735	212	0.	.0	2797.3
1		0100	13	0.	.0	2797.3	1		0920	113	0.	.0	2797.3	1		1740	213	0.	.0	2797.3
1		0105	14	0.	.0	2797.3	1		0925	114	0.	.0	2797.3	1		1745	214	0.	.0	2797.3
1		0110	15	0.	.0	2797.3	1		0930	115	0.	.0	2797.3	1		1750	215	0.	.0	2797.3
1		0115	16	1.	.0	2797.4	1		0935	116	0.	.0	2797.3	1		1755	216	0.	.0	2797.3
1		0120	17	1.	.0	2797.4	1		0940	117	0.	.0	2797.3	1		1800	217	0.	.0	2797.3
1		0125	18	2.	.0	2797.4	1		0945	118	0.	.0	2797.3	1		1805	218	0.	.0	2797.3
1		0130	19	2.	.0	2797.5	1		0950	119	0.	.0	2797.3	1		1810	219	0.	.0	2797.3
1		0135	20	3.	.0	2797.5	1		0955	120	0.	.0	2797.3	1		1815	220	0.	.0	2797.3
1		0140	21	4.	.0	2797.6	1		1000	121	0.	.0	2797.3	1		1820	221	0.	.0	2797.3
1		0145	22	4.	.0	2797.7	1		1005	122	0.	.0	2797.3	1		1825	222	0.	.0	2797.3
1		0150	23	5.	.0	2797.8	1		1010	123	0.	.0	2797.3	1		1830	223	0.	.0	2797.3
1		0155	24	6.	.0	2797.8	1		1015	124	0.	.0	2797.3	1		1835	224	0.	.0	2797.3
1		0200	25	7.	.0	2797.9	1		1020	125	0.	.0	2797.3	1		1840	225	0.	.0	2797.3
1		0205	26	7.	.0	2797.9	1		1025	126	0.	.0	2797.3	1		1845	226	0.	.0	2797.3
1		0210	27	8.	.0	2798.0	1		1030	127	0.	.0	2797.3	1		1850	227	0.	.0	2797.3
1		0215	28	9.	.0	2798.1	1		1035	128	0.	.0	2797.3	1		1855	228	0.	.0	2797.3
1		0220	29	11.	.0	2798.2	1		1040	129	0.	.0	2797.3	1		1900	229	0.	.0	2797.3
1		0225	30	12.	.1	2798.4	1		1045	130	0.	.0	2797.3	1		1905	230	0.	.0	2797.3
1		0230	31	14.	.1	2798.5	1		1050	131	0.	.0	2797.3	1		1910	231	0.	.0	2797.3
1		0235	32	15.	.1	2798.6	1		1055	132	0.	.0	2797.3	1		1915	232	0.	.0	2797.3
1		0240	33	15.	.1	2798.6	1		1100	133	0.	.0	2797.3	1		1920	233	0.	.0	2797.3
1		0245	34	15.	.1	2798.6	1		1105	134	0.	.0	2797.3	1		1925	234	0.	.0	2797.3
1		0250	35	15.	.1	2798.6	1		1110	135	0.	.0	2797.3	1		1930	235	0.	.0	2797.3
1		0255	36	17.	.1	2798.8	1		1115	136	0.	.0	2797.3	1		1935	236	0.	.0	2797.3
1		0300	37	19.	.1	2799.0	1		1120	137	0.	.0	2797.3	1		1940	237	0.	.0	2797.3
1		0305	38	21.	.1	2799.1	1		1125	138	0.	.0	2797.3	1		1945	238	0.	.0	2797.3
1		0310	39	23.	.2	2799.3	1		1130	139	0.	.0	2797.3	1		1950	239	0.	.0	2797.3
1		0315	40	26.	.2	2799.6	1		1135	140	0.	.0	2797.3	1		1955	240	0.	.0	2797.3
1		0320	41	32.	.3	2800.1	1		1140	141	0.	.0	2797.3	1		2000	241	0.	.0	2797.3
1		0325	42	40.	.4	2800.8	1		1145	142	0.	.0	2797.3	1		2005	242	0.	.0	2797.3
1		0330	43	54.	.6	2802.0	1		1150	143	0.	.0	2797.3	1		2010	243	0.	.0	2797.3
1		0335	44	88.	.9	2802.9	1		1155	144	0.	.0	2797.3	1		2015	244	0.	.0	2797.3
1		0340	45	127.	1.2	2804.0	1		1200	145	0.	.0	2797.3	1		2020	245	0.	.0	2797.3
1		0345	46	159.	1.7	2805.4	1		1205	146	0.	.0	2797.3	1		2025	246	0.	.0	2797.3
1		0350	47	198.	2.5	2807.3	1		1210	147	0.	.0	2797.3	1		2030	247	0.	.0	2797.3
1		0355	48	225.	3.5	2809.0	1		1215	148	0.	.0	2797.3	1		2035	248	0.	.0	2797.3
1		0400	49	246.	4.3	2810.3	1		1220	149	0.	.0	2797.3	1		2040	249	0.	.0	2797.3
1		0405	50	255.	4.8	2811.1	1		1225	150	0.	.0	2797.3	1		2045	250	0.	.0	2797.3
1		0410	51	258.	5.0	2811.3	1		1230	151	0.	.0	2797.3	1		2050	251	0.	.0	2797.3
1		0415	52	256.	4.8	2811.1	1		1235	152	0.	.0	2797.3	1		2055	252	0.	.0	2797.3
1		0420	53	249.	4.5	2810.6	1		1240	153	0.	.0	2797.3	1		2100	253	0.	.0	2797.3
1		0425	54	238.	3.9	2809.8	1		1245	154	0.	.0	2797.3	1		2105	254	0.	.0	2797.3
1		0430	55	220.	3.3	2808.7	1		1250	155	0.	.0	2797.3	1		2110	255	0.	.0	2797.3
1		0435	56	203.	2.7	2807.6	1		1255	156	0.	.0	2797.3	1		2115	256	0.	.0	2797.3
1		0440	57	181.	2.1	2806.4	1		1300	157	0.	.0	2797.3	1		2120	257	0.	.0	2797.3
1		0445	58	156.	1.6	2805.2	1		1305	158	0.	.0	2797.3	1		2125	258	0.	.0	2797.3
1		0450	59	134.	1.3	2804.2	1		1310	159	0.	.0	2797.3	1		2130	259	0.	.0	2797.3

												Fut											
1	0455	60	109.	1.0	2803.5	*	1	1315	160	0.	.0	2797.3	*	1	2135	260	0.	.0	2797.3
1	0500	61	97.	.9	2803.2	*	1	1320	161	0.	.0	2797.3	*	1	2140	261	0.	.0	2797.3
1	0505	62	95.	.9	2803.1	*	1	1325	162	0.	.0	2797.3	*	1	2145	262	0.	.0	2797.3
1	0510	63	95.	.9	2803.1	*	1	1330	163	0.	.0	2797.3	*	1	2150	263	0.	.0	2797.3
1	0515	64	92.	.9	2803.0	*	1	1335	164	0.	.0	2797.3	*	1	2155	264	0.	.0	2797.3
1	0520	65	88.	.9	2802.9	*	1	1340	165	0.	.0	2797.3	*	1	2200	265	0.	.0	2797.3
1	0525	66	81.	.8	2802.7	*	1	1345	166	0.	.0	2797.3	*	1	2205	266	0.	.0	2797.3
1	0530	67	73.	.8	2802.5	*	1	1350	167	0.	.0	2797.3	*	1	2210	267	0.	.0	2797.3
1	0535	68	64.	.7	2802.3	*	1	1355	168	0.	.0	2797.3	*	1	2215	268	0.	.0	2797.3
1	0540	69	55.	.6	2802.0	*	1	1400	169	0.	.0	2797.3	*	1	2220	269	0.	.0	2797.3
1	0545	70	50.	.6	2801.6	*	1	1405	170	0.	.0	2797.3	*	1	2225	270	0.	.0	2797.3
1	0550	71	44.	.5	2801.1	*	1	1410	171	0.	.0	2797.3	*	1	2230	271	0.	.0	2797.3
1	0555	72	39.	.4	2800.7	*	1	1415	172	0.	.0	2797.3	*	1	2235	272	0.	.0	2797.3
1	0600	73	34.	.3	2800.2	*	1	1420	173	0.	.0	2797.3	*	1	2240	273	0.	.0	2797.3
1	0605	74	29.	.2	2799.8	*	1	1425	174	0.	.0	2797.3	*	1	2245	274	0.	.0	2797.3
1	0610	75	23.	.2	2799.3	*	1	1430	175	0.	.0	2797.3	*	1	2250	275	0.	.0	2797.3
1	0615	76	19.	.1	2799.0	*	1	1435	176	0.	.0	2797.3	*	1	2255	276	0.	.0	2797.3
1	0620	77	15.	.1	2798.6	*	1	1440	177	0.	.0	2797.3	*	1	2300	277	0.	.0	2797.3
1	0625	78	13.	.1	2798.4	*	1	1445	178	0.	.0	2797.3	*	1	2305	278	0.	.0	2797.3
1	0630	79	11.	.0	2798.2	*	1	1450	179	0.	.0	2797.3	*	1	2310	279	0.	.0	2797.3
1	0635	80	9.	.0	2798.1	*	1	1455	180	0.	.0	2797.3	*	1	2315	280	0.	.0	2797.3
1	0640	81	7.	.0	2797.9	*	1	1500	181	0.	.0	2797.3	*	1	2320	281	0.	.0	2797.3
1	0645	82	5.	.0	2797.8	*	1	1505	182	0.	.0	2797.3	*	1	2325	282	0.	.0	2797.3
1	0650	83	4.	.0	2797.7	*	1	1510	183	0.	.0	2797.3	*	1	2330	283	0.	.0	2797.3
1	0655	84	3.	.0	2797.6	*	1	1515	184	0.	.0	2797.3	*	1	2335	284	0.	.0	2797.3
1	0700	85	2.	.0	2797.5	*	1	1520	185	0.	.0	2797.3	*	1	2340	285	0.	.0	2797.3
1	0705	86	2.	.0	2797.5	*	1	1525	186	0.	.0	2797.3	*	1	2345	286	0.	.0	2797.3
1	0710	87	1.	.0	2797.4	*	1	1530	187	0.	.0	2797.3	*	1	2350	287	0.	.0	2797.3
1	0715	88	1.	.0	2797.4	*	1	1535	188	0.	.0	2797.3	*	1	2355	288	0.	.0	2797.3
1	0720	89	1.	.0	2797.4	*	1	1540	189	0.	.0	2797.3	*	2	0000	289	0.	.0	2797.3
1	0725	90	1.	.0	2797.3	*	1	1545	190	0.	.0	2797.3	*	2	0005	290	0.	.0	2797.3
1	0730	91	0.	.0	2797.3	*	1	1550	191	0.	.0	2797.3	*	2	0010	291	0.	.0	2797.3
1	0735	92	0.	.0	2797.3	*	1	1555	192	0.	.0	2797.3	*	2	0015	292	0.	.0	2797.3
1	0740	93	0.	.0	2797.3	*	1	1600	193	0.	.0	2797.3	*	2	0020	293	0.	.0	2797.3
1	0745	94	0.	.0	2797.3	*	1	1605	194	0.	.0	2797.3	*	2	0025	294	0.	.0	2797.3
1	0750	95	0.	.0	2797.3	*	1	1610	195	0.	.0	2797.3	*	2	0030	295	0.	.0	2797.3
1	0755	96	0.	.0	2797.3	*	1	1615	196	0.	.0	2797.3	*	2	0035	296	0.	.0	2797.3
1	0800	97	0.	.0	2797.3	*	1	1620	197	0.	.0	2797.3	*	2	0040	297	0.	.0	2797.3
1	0805	98	0.	.0	2797.3	*	1	1625	198	0.	.0	2797.3	*	2	0045	298	0.	.0	2797.3
1	0810	99	0.	.0	2797.3	*	1	1630	199	0.	.0	2797.3	*	2	0050	299	0.	.0	2797.3
1	0815	100	0.	.0	2797.3	*	1	1635	200	0.	.0	2797.3	*	2	0055	300	0.	.0	2797.3
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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 258.	4.17		66.	16.	16.	16.
		(INCHES)	1.685	1.687	1.687	1.687
		(AC-FT)	33.	33.	33.	33.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
5.	4.17	1.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2811.29	4.17	2801.25	2798.30	2798.26	2798.26

CUMULATIVE AREA = .36 SQ MI

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HYDROGRAPH AT STATION DBN
PLAN 1, RATIO = .98

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE		DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE		DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	2797.3	*	1		0820	101	0.	.0	2797.3	*	1		1640	201	0.	.0	2797.3
1		0005	2	0.	.0	2797.3	*	1		0825	102	0.	.0	2797.3	*	1		1645	202	0.	.0	2797.3
1		0010	3	0.	.0	2797.3	*	1		0830	103	0.	.0	2797.3	*	1		1650	203	0.	.0	2797.3
1		0015	4	0.	.0	2797.3	*	1		0835	104	0.	.0	2797.3	*	1		1655	204	0.	.0	2797.3
1		0020	5	0.	.0	2797.3	*	1		0840	105	0.	.0	2797.3	*	1		1700	205	0.	.0	2797.3
1		0025	6	0.	.0	2797.3	*	1		0845	106	0.	.0	2797.3	*	1		1705	206	0.	.0	2797.3
1		0030	7	0.	.0	2797.3	*	1		0850	107	0.	.0	2797.3	*	1		1710	207	0.	.0	2797.3
1		0035	8	0.	.0	2797.3	*	1		0855	108	0.	.0	2797.3	*	1		1715	208	0.	.0	2797.3
1		0040	9	0.	.0	2797.3	*	1		0900	109	0.	.0	2797.3	*	1		1720	209	0.	.0	2797.3
1		0045	10	0.	.0	2797.3	*	1		0905	110	0.	.0	2797.3	*	1		1725	210	0.	.0	2797.3
1		0050	11	0.	.0	2797.3	*	1		0910	111	0.	.0	2797.3	*	1		1730	211	0.	.0	2797.3
1		0055	12	0.	.0	2797.3	*	1		0915	112	0.	.0	2797.3	*	1		1735	212	0.	.0	2797.3
1		0100	13	0.	.0	2797.3	*	1		0920	113	0.	.0	2797.3	*	1		1740	213	0.	.0	2797.3
1		0105	14	0.	.0	2797.3	*	1		0925	114	0.	.0	2797.3	*	1		1745	214	0.	.0	2797.3
1		0110	15	0.	.0	2797.3	*	1		0930	115	0.	.0	2797.3	*	1		1750	215	0.	.0	2797.3
1		0115	16	1.	.0	2797.4	*	1		0935	116	0.	.0	2797.3	*	1		1755	216	0.	.0	2797.3
1		0120	17	1.	.0	2797.4	*	1		0940	117	0.	.0	2797.3	*	1		1800	217	0.	.0	2797.3
1		0125	18	1.	.0	2797.4	*	1		0945	118	0.	.0	2797.3	*	1		1805	218	0.	.0	2797.3
1		0130	19	2.	.0	2797.5	*	1		0950	119	0.	.0	2797.3	*	1		1810	219	0.	.0	2797.3
1		0135	20	2.	.0	2797.5	*	1		0955	120	0.	.0	2797.3	*	1		1815	220	0.	.0	2797.3
1		0140	21	3.	.0	2797.6	*	1		1000	121	0.	.0	2797.3	*	1		1820	221	0.	.0	2797.3
1		0145	22	4.	.0	2797.7	*	1		1005	122	0.	.0	2797.3	*	1		1825	222	0.	.0	2797.3
1		0150	23	5.	.0	2797.7	*	1		1010	123	0.	.0	2797.3	*	1		1830	223	0.	.0	2797.3
1		0155	24	6.	.0	2797.8	*	1		1015	124	0.	.0	2797.3	*	1		1835	224	0.	.0	2797.3
1		0200	25	6.	.0	2797.8	*	1		1020	125	0.	.0	2797.3	*	1		1840	225	0.	.0	2797.3
1		0205	26	7.	.0	2797.9	*	1		1025	126	0.	.0	2797.3	*	1		1845	226	0.	.0	2797.3
1		0210	27	8.	.0	2798.0	*	1		1030	127	0.	.0	2797.3	*	1		1850	227	0.	.0	2797.3
1		0215	28	9.	.0	2798.1	*	1		1035	128	0.	.0	2797.3	*	1		1855	228	0.	.0	2797.3
1		0220	29	10.	.0	2798.2	*	1		1040	129	0.	.0	2797.3	*	1		1900	229	0.	.0	2797.3
1		0225	30	12.	.1	2798.3	*	1		1045	130	0.	.0	2797.3	*	1		1905	230	0.	.0	2797.3
1		0230	31	13.	.1	2798.4	*	1		1050	131	0.	.0	2797.3	*	1		1910	231	0.	.0	2797.3
1		0235	32	14.	.1	2798.5	*	1		1055	132	0.	.0	2797.3	*	1		1915	232	0.	.0	2797.3

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1	0240	33	14.	.1	2798.5	*	1	1100	133	0.	.0	2797.3	*	1	1920	233	0.	.0	2797.3
1	0245	34	14.	.1	2798.5	*	1	1105	134	0.	.0	2797.3	*	1	1925	234	0.	.0	2797.3
1	0250	35	15.	.1	2798.6	*	1	1110	135	0.	.0	2797.3	*	1	1930	235	0.	.0	2797.3
1	0255	36	16.	.1	2798.7	*	1	1115	136	0.	.0	2797.3	*	1	1935	236	0.	.0	2797.3
1	0300	37	18.	.1	2798.9	*	1	1120	137	0.	.0	2797.3	*	1	1940	237	0.	.0	2797.3
1	0305	38	20.	.1	2799.1	*	1	1125	138	0.	.0	2797.3	*	1	1945	238	0.	.0	2797.3
1	0310	39	22.	.2	2799.2	*	1	1130	139	0.	.0	2797.3	*	1	1950	239	0.	.0	2797.3
1	0315	40	25.	.2	2799.5	*	1	1135	140	0.	.0	2797.3	*	1	1955	240	0.	.0	2797.3
1	0320	41	31.	.3	2800.0	*	1	1140	141	0.	.0	2797.3	*	1	2000	241	0.	.0	2797.3
1	0325	42	39.	.4	2800.7	*	1	1145	142	0.	.0	2797.3	*	1	2005	242	0.	.0	2797.3
1	0330	43	52.	.6	2801.8	*	1	1150	143	0.	.0	2797.3	*	1	2010	243	0.	.0	2797.3
1	0335	44	84.	.8	2802.8	*	1	1155	144	0.	.0	2797.3	*	1	2015	244	0.	.0	2797.3
1	0340	45	122.	1.1	2803.8	*	1	1200	145	0.	.0	2797.3	*	1	2020	245	0.	.0	2797.3
1	0345	46	155.	1.6	2805.2	*	1	1205	146	0.	.0	2797.3	*	1	2025	246	0.	.0	2797.3
1	0350	47	194.	2.4	2807.1	*	1	1210	147	0.	.0	2797.3	*	1	2030	247	0.	.0	2797.3
1	0355	48	220.	3.3	2808.7	*	1	1215	148	0.	.0	2797.3	*	1	2035	248	0.	.0	2797.3
1	0400	49	242.	4.1	2810.0	*	1	1220	149	0.	.0	2797.3	*	1	2040	249	0.	.0	2797.3
1	0405	50	251.	4.6	2810.7	*	1	1225	150	0.	.0	2797.3	*	1	2045	250	0.	.0	2797.3
1	0410	51	253.	4.7	2810.9	*	1	1230	151	0.	.0	2797.3	*	1	2050	251	0.	.0	2797.3
1	0415	52	251.	4.6	2810.7	*	1	1235	152	0.	.0	2797.3	*	1	2055	252	0.	.0	2797.3
1	0420	53	244.	4.2	2810.2	*	1	1240	153	0.	.0	2797.3	*	1	2100	253	0.	.0	2797.3
1	0425	54	231.	3.7	2809.4	*	1	1245	154	0.	.0	2797.3	*	1	2105	254	0.	.0	2797.3
1	0430	55	214.	3.1	2808.3	*	1	1250	155	0.	.0	2797.3	*	1	2110	255	0.	.0	2797.3
1	0435	56	197.	2.5	2807.2	*	1	1255	156	0.	.0	2797.3	*	1	2115	256	0.	.0	2797.3
1	0440	57	172.	1.9	2806.0	*	1	1300	157	0.	.0	2797.3	*	1	2120	257	0.	.0	2797.3
1	0445	58	149.	1.5	2804.9	*	1	1305	158	0.	.0	2797.3	*	1	2125	258	0.	.0	2797.3
1	0450	59	127.	1.2	2803.9	*	1	1310	159	0.	.0	2797.3	*	1	2130	259	0.	.0	2797.3
1	0455	60	101.	1.0	2803.3	*	1	1315	160	0.	.0	2797.3	*	1	2135	260	0.	.0	2797.3
1	0500	61	93.	.9	2803.0	*	1	1320	161	0.	.0	2797.3	*	1	2140	261	0.	.0	2797.3
1	0505	62	92.	.9	2803.0	*	1	1325	162	0.	.0	2797.3	*	1	2145	262	0.	.0	2797.3
1	0510	63	92.	.9	2803.0	*	1	1330	163	0.	.0	2797.3	*	1	2150	263	0.	.0	2797.3
1	0515	64	90.	.9	2803.0	*	1	1335	164	0.	.0	2797.3	*	1	2155	264	0.	.0	2797.3
1	0520	65	86.	.9	2802.8	*	1	1340	165	0.	.0	2797.3	*	1	2200	265	0.	.0	2797.3
1	0525	66	79.	.8	2802.7	*	1	1345	166	0.	.0	2797.3	*	1	2205	266	0.	.0	2797.3
1	0530	67	71.	.8	2802.5	*	1	1350	167	0.	.0	2797.3	*	1	2210	267	0.	.0	2797.3
1	0535	68	62.	.7	2802.2	*	1	1355	168	0.	.0	2797.3	*	1	2215	268	0.	.0	2797.3
1	0540	69	54.	.6	2802.0	*	1	1400	169	0.	.0	2797.3	*	1	2220	269	0.	.0	2797.3
1	0545	70	49.	.6	2801.6	*	1	1405	170	0.	.0	2797.3	*	1	2225	270	0.	.0	2797.3
1	0550	71	44.	.5	2801.1	*	1	1410	171	0.	.0	2797.3	*	1	2230	271	0.	.0	2797.3
1	0555	72	38.	.4	2800.6	*	1	1415	172	0.	.0	2797.3	*	1	2235	272	0.	.0	2797.3
1	0600	73	33.	.3	2800.2	*	1	1420	173	0.	.0	2797.3	*	1	2240	273	0.	.0	2797.3
1	0605	74	28.	.2	2799.7	*	1	1425	174	0.	.0	2797.3	*	1	2245	274	0.	.0	2797.3
1	0610	75	23.	.2	2799.3	*	1	1430	175	0.	.0	2797.3	*	1	2250	275	0.	.0	2797.3
1	0615	76	19.	.1	2798.9	*	1	1435	176	0.	.0	2797.3	*	1	2255	276	0.	.0	2797.3
1	0620	77	15.	.1	2798.6	*	1	1440	177	0.	.0	2797.3	*	1	2300	277	0.	.0	2797.3
1	0625	78	12.	.1	2798.4	*	1	1445	178	0.	.0	2797.3	*	1	2305	278	0.	.0	2797.3
1	0630	79	10.	.0	2798.2	*	1	1450	179	0.	.0	2797.3	*	1	2310	279	0.	.0	2797.3
1	0635	80	9.	.0	2798.1	*	1	1455	180	0.	.0	2797.3	*	1	2315	280	0.	.0	2797.3
1	0640	81	7.	.0	2797.9	*	1	1500	181	0.	.0	2797.3	*	1	2320	281	0.	.0	2797.3
1	0645	82	5.	.0	2797.7	*	1	1505	182	0.	.0	2797.3	*	1	2325	282	0.	.0	2797.3
1	0650	83	4.	.0	2797.7	*	1	1510	183	0.	.0	2797.3	*	1	2330	283	0.	.0	2797.3
1	0655	84	3.	.0	2797.6	*	1	1515	184	0.	.0	2797.3	*	1	2335	284	0.	.0	2797.3
1	0700	85	2.	.0	2797.5	*	1	1520	185	0.	.0	2797.3	*	1	2340	285	0.	.0	2797.3
1	0705	86	2.	.0	2797.5	*	1	1525	186	0.	.0	2797.3	*	1	2345	286	0.	.0	2797.3
1	0710	87	1.	.0	2797.4	*	1	1530	187	0.	.0	2797.3	*	1	2350	287	0.	.0	2797.3
1	0715	88	1.	.0	2797.4	*	1	1535	188	0.	.0	2797.3	*	1	2355	288	0.	.0	2797.3
1	0720	89	1.	.0	2797.4	*	1	1540	189	0.	.0	2797.3	*	2	0000	289	0.	.0	2797.3
1	0725	90	1.	.0	2797.3	*	1	1545	190	0.	.0	2797.3	*	2	0005	290	0.	.0	2797.3
1	0730	91	0.	.0	2797.3	*	1	1550	191	0.	.0	2797.3	*	2	0010	291	0.	.0	2797.3
1	0735	92	0.	.0	2797.3	*	1	1555	192	0.	.0	2797.3	*	2	0015	292	0.	.0	2797.3
1	0740	93	0.	.0	2797.3	*	1	1600	193	0.	.0	2797.3	*	2	0020	293	0.	.0	2797.3
1	0745	94	0.	.0	2797.3	*	1	1605	194	0.	.0	2797.3	*	2	0025	294	0.	.0	2797.3
1	0750	95	0.	.0	2797.3	*	1	1610	195	0.	.0	2797.3	*	2	0030	295	0.	.0	2797.3
1	0755	96	0.	.0	2797.3	*	1	1615	196	0.	.0	2797.3	*	2	0035	296	0.	.0	2797.3
1	0800	97	0.	.0	2797.3	*	1	1620	197	0.	.0	2797.3	*	2	0040	297	0.	.0	2797.3
1	0805	98	0.	.0	2797.3	*	1	1625	198	0.	.0	2797.3	*	2	0045	298	0.	.0	2797.3
1	0810	99	0.	.0	2797.3	*	1	1630	199	0.	.0	2797.3	*	2	0050	299	0.	.0	2797.3
1	0815	100	0.	.0	2797.3	*	1	1635	200	0.	.0	2797.3	*	2	0055	300	0.	.0	2797.3
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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 253.	4.17		64.	16.	15.	15.
		(INCHES)	1.633	1.635	1.635	1.635
		(AC-FT)	32.	32.	32.	32.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
5.	4.17	1.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2810.92	4.17	2801.14	2798.27	2798.23	2798.23

CUMULATIVE AREA = .36 SQ MI

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HYDROGRAPH AT STATION DBN
PLAN 1, RATIO = .97

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
							*								*							
1		0000	1	0.	.0	2797.3	*	1		0820	101	0.	.0	2797.3	*	1		1640	201	0.	.0	2797.3
1		0005	2	0.	.0	2797.3	*	1		0825	102	0.	.0	2797.3	*	1		1645	202	0.	.0	2797.3
1		0010	3	0.	.0	2797.3	*	1		0830	103	0.	.0	2797.3	*	1		1650	203	0.	.0	2797.3
1		0015	4	0.	.0	2797.3	*	1		0835	104	0.	.0	2797.3	*	1		1655	204	0.	.0	2797.3
1		0020	5	0.	.0	2797.3	*	1		0840	105	0.	.0	2797.3	*	1		1700	205	0.	.0	2797.3

												Fut									
1	0025	6	0.	.0	2797.3	*	1	0845	106	0.	.0	2797.3	*	1	1705	206	0.	.0	2797.3
1	0030	7	0.	.0	2797.3	*	1	0850	107	0.	.0	2797.3	*	1	1710	207	0.	.0	2797.3
1	0035	8	0.	.0	2797.3	*	1	0855	108	0.	.0	2797.3	*	1	1715	208	0.	.0	2797.3
1	0040	9	0.	.0	2797.3	*	1	0900	109	0.	.0	2797.3	*	1	1720	209	0.	.0	2797.3
1	0045	10	0.	.0	2797.3	*	1	0905	110	0.	.0	2797.3	*	1	1725	210	0.	.0	2797.3
1	0050	11	0.	.0	2797.3	*	1	0910	111	0.	.0	2797.3	*	1	1730	211	0.	.0	2797.3
1	0055	12	0.	.0	2797.3	*	1	0915	112	0.	.0	2797.3	*	1	1735	212	0.	.0	2797.3
1	0100	13	0.	.0	2797.3	*	1	0920	113	0.	.0	2797.3	*	1	1740	213	0.	.0	2797.3
1	0105	14	0.	.0	2797.3	*	1	0925	114	0.	.0	2797.3	*	1	1745	214	0.	.0	2797.3
1	0110	15	0.	.0	2797.3	*	1	0930	115	0.	.0	2797.3	*	1	1750	215	0.	.0	2797.3
1	0115	16	0.	.0	2797.3	*	1	0935	116	0.	.0	2797.3	*	1	1755	216	0.	.0	2797.3
1	0120	17	1.	.0	2797.4	*	1	0940	117	0.	.0	2797.3	*	1	1800	217	0.	.0	2797.3
1	0125	18	1.	.0	2797.4	*	1	0945	118	0.	.0	2797.3	*	1	1805	218	0.	.0	2797.3
1	0130	19	2.	.0	2797.4	*	1	0950	119	0.	.0	2797.3	*	1	1810	219	0.	.0	2797.3
1	0135	20	2.	.0	2797.5	*	1	0955	120	0.	.0	2797.3	*	1	1815	220	0.	.0	2797.3
1	0140	21	3.	.0	2797.6	*	1	1000	121	0.	.0	2797.3	*	1	1820	221	0.	.0	2797.3
1	0145	22	4.	.0	2797.6	*	1	1005	122	0.	.0	2797.3	*	1	1825	222	0.	.0	2797.3
1	0150	23	5.	.0	2797.7	*	1	1010	123	0.	.0	2797.3	*	1	1830	223	0.	.0	2797.3
1	0155	24	5.	.0	2797.7	*	1	1015	124	0.	.0	2797.3	*	1	1835	224	0.	.0	2797.3
1	0200	25	5.	.0	2797.8	*	1	1020	125	0.	.0	2797.3	*	1	1840	225	0.	.0	2797.3
1	0205	26	6.	.0	2797.8	*	1	1025	126	0.	.0	2797.3	*	1	1845	226	0.	.0	2797.3
1	0210	27	6.	.0	2797.8	*	1	1030	127	0.	.0	2797.3	*	1	1850	227	0.	.0	2797.3
1	0215	28	8.	.0	2798.0	*	1	1035	128	0.	.0	2797.3	*	1	1855	228	0.	.0	2797.3
1	0220	29	9.	.0	2798.1	*	1	1040	129	0.	.0	2797.3	*	1	1900	229	0.	.0	2797.3
1	0225	30	11.	.0	2798.2	*	1	1045	130	0.	.0	2797.3	*	1	1905	230	0.	.0	2797.3
1	0230	31	12.	.1	2798.4	*	1	1050	131	0.	.0	2797.3	*	1	1910	231	0.	.0	2797.3
1	0235	32	14.	.1	2798.5	*	1	1055	132	0.	.0	2797.3	*	1	1915	232	0.	.0	2797.3
1	0240	33	14.	.1	2798.5	*	1	1100	133	0.	.0	2797.3	*	1	1920	233	0.	.0	2797.3
1	0245	34	14.	.1	2798.5	*	1	1105	134	0.	.0	2797.3	*	1	1925	234	0.	.0	2797.3
1	0250	35	14.	.1	2798.5	*	1	1110	135	0.	.0	2797.3	*	1	1930	235	0.	.0	2797.3
1	0255	36	15.	.1	2798.6	*	1	1115	136	0.	.0	2797.3	*	1	1935	236	0.	.0	2797.3
1	0300	37	16.	.1	2798.7	*	1	1120	137	0.	.0	2797.3	*	1	1940	237	0.	.0	2797.3
1	0305	38	19.	.1	2798.9	*	1	1125	138	0.	.0	2797.3	*	1	1945	238	0.	.0	2797.3
1	0310	39	21.	.1	2799.2	*	1	1130	139	0.	.0	2797.3	*	1	1950	239	0.	.0	2797.3
1	0315	40	24.	.2	2799.4	*	1	1135	140	0.	.0	2797.3	*	1	1955	240	0.	.0	2797.3
1	0320	41	30.	.2	2799.9	*	1	1140	141	0.	.0	2797.3	*	1	2000	241	0.	.0	2797.3
1	0325	42	38.	.4	2800.6	*	1	1145	142	0.	.0	2797.3	*	1	2005	242	0.	.0	2797.3
1	0330	43	51.	.6	2801.7	*	1	1150	143	0.	.0	2797.3	*	1	2010	243	0.	.0	2797.3
1	0335	44	82.	.8	2802.7	*	1	1155	144	0.	.0	2797.3	*	1	2015	244	0.	.0	2797.3
1	0340	45	119.	1.1	2803.7	*	1	1200	145	0.	.0	2797.3	*	1	2020	245	0.	.0	2797.3
1	0345	46	153.	1.6	2805.1	*	1	1205	146	0.	.0	2797.3	*	1	2025	246	0.	.0	2797.3
1	0350	47	192.	2.3	2806.9	*	1	1210	147	0.	.0	2797.3	*	1	2030	247	0.	.0	2797.3
1	0355	48	217.	3.2	2808.5	*	1	1215	148	0.	.0	2797.3	*	1	2035	248	0.	.0	2797.3
1	0400	49	239.	4.0	2809.9	*	1	1220	149	0.	.0	2797.3	*	1	2040	249	0.	.0	2797.3
1	0405	50	248.	4.4	2810.5	*	1	1225	150	0.	.0	2797.3	*	1	2045	250	0.	.0	2797.3
1	0410	51	251.	4.6	2810.7	*	1	1230	151	0.	.0	2797.3	*	1	2050	251	0.	.0	2797.3
1	0415	52	248.	4.4	2810.6	*	1	1235	152	0.	.0	2797.3	*	1	2055	252	0.	.0	2797.3
1	0420	53	242.	4.1	2810.0	*	1	1240	153	0.	.0	2797.3	*	1	2100	253	0.	.0	2797.3
1	0425	54	227.	3.6	2809.1	*	1	1245	154	0.	.0	2797.3	*	1	2105	254	0.	.0	2797.3
1	0430	55	211.	3.0	2808.1	*	1	1250	155	0.	.0	2797.3	*	1	2110	255	0.	.0	2797.3
1	0435	56	194.	2.4	2807.1	*	1	1255	156	0.	.0	2797.3	*	1	2115	256	0.	.0	2797.3
1	0440	57	168.	1.9	2805.8	*	1	1300	157	0.	.0	2797.3	*	1	2120	257	0.	.0	2797.3
1	0445	58	145.	1.4	2804.7	*	1	1305	158	0.	.0	2797.3	*	1	2125	258	0.	.0	2797.3
1	0450	59	121.	1.1	2803.8	*	1	1310	159	0.	.0	2797.3	*	1	2130	259	0.	.0	2797.3
1	0455	60	98.	1.0	2803.2	*	1	1315	160	0.	.0	2797.3	*	1	2135	260	0.	.0	2797.3
1	0500	61	91.	.9	2803.0	*	1	1320	161	0.	.0	2797.3	*	1	2140	261	0.	.0	2797.3
1	0505	62	90.	.9	2803.0	*	1	1325	162	0.	.0	2797.3	*	1	2145	262	0.	.0	2797.3
1	0510	63	91.	.9	2803.0	*	1	1330	163	0.	.0	2797.3	*	1	2150	263	0.	.0	2797.3
1	0515	64	89.	.9	2802.9	*	1	1335	164	0.	.0	2797.3	*	1	2155	264	0.	.0	2797.3
1	0520	65	84.	.9	2802.8	*	1	1340	165	0.	.0	2797.3	*	1	2200	265	0.	.0	2797.3
1	0525	66	78.	.8	2802.6	*	1	1345	166	0.	.0	2797.3	*	1	2205	266	0.	.0	2797.3
1	0530	67	71.	.8	2802.4	*	1	1350	167	0.	.0	2797.3	*	1	2210	267	0.	.0	2797.3
1	0535	68	62.	.7	2802.2	*	1	1355	168	0.	.0	2797.3	*	1	2215	268	0.	.0	2797.3
1	0540	69	53.	.6	2801.9	*	1	1400	169	0.	.0	2797.3	*	1	2220	269	0.	.0	2797.3
1	0545	70	49.	.5	2801.5	*	1	1405	170	0.	.0	2797.3	*	1	2225	270	0.	.0	2797.3
1	0550	71	43.	.5	2801.1	*	1	1410	171	0.	.0	2797.3	*	1	2230	271	0.	.0	2797.3
1	0555	72	38.	.4	2800.6	*	1	1415	172	0.	.0	2797.3	*	1	2235	272	0.	.0	2797.3
1	0600	73	33.	.3	2800.2	*	1	1420	173	0.	.0	2797.3	*	1	2240	273	0.	.0	2797.3
1	0605	74	28.	.2	2799.7	*	1	1425	174	0.	.0	2797.3	*	1	2245	274	0.	.0	2797.3
1	0610	75	23.	.2	2799.3	*	1	1430	175	0.	.0	2797.3	*	1	2250	275	0.	.0	2797.3
1	0615	76	19.	.1	2799.0	*	1	1435	176	0.	.0	2797.3	*	1	2255	276	0.	.0	2797.3
1	0620	77	15.	.1	2798.6	*	1	1440	177	0.	.0	2797.3	*	1	2300	277	0.	.0	2797.3
1	0625	78	13.	.1	2798.4	*	1	1445	178	0.	.0	2797.3	*	1	2305	278	0.	.0	2797.3
1	0630	79	11.	.0	2798.2	*	1	1450	179	0.	.0	2797.3	*	1	2310	279	0.	.0	2797.3
1	0635	80	9.	.0	2798.1	*	1	1455	180	0.	.0	2797.3	*	1	2315	280	0.	.0	2797.3
1	0640	81	8.	.0	2798.0	*	1	1500	181	0.	.0	2797.3	*	1	2320	281	0.	.0	2797.3
1	0645	82	6.	.0	2797.8	*	1	1505	182	0.	.0	2797.3	*	1	2325	282	0.	.0	2797.3
1	0650	83	5.	.0	2797.7	*	1	1510	183	0.	.0	2797.3	*	1	2330	283	0.	.0	2797.3
1	0655	84	4.	.0	2797.6	*	1	1515	184	0.	.0	2797.3	*	1	2335	284	0.	.0	2797.3
1	0700	85	3.	.0	2797.6	*	1	1520	185	0.	.0	2797.3	*	1	2340	285	0.	.0	2797.3
1	0705	86	2.	.0	2797.5	*	1	1525	186	0.	.0	2797.3	*	1	2345	286	0.	.0	2797.3
1	0710	87	2.	.0	2797.4	*	1	1530	187	0.	.0	2797.3	*	1	2350	287	0.	.0	2797.3
1	0715	88	1.	.0	2797.4	*	1	1535	188	0.	.0	2797.3	*	1	2355	288	0.	.0	2797.3
1	0720	89	1.	.0	2797.4	*	1	1540	189	0.	.0	2797.3	*	2	0000	289	0.	.0	2797.3
1	0725	90	1.	.0	2797.4	*	1	1545	190	0.	.0	2797.3	*	2	0005	290	0.	.0	2797.3
1	0730	91	1.	.0	2797.3	*	1	1550	191	0.	.0	2797.3	*	2	0010	291	0.	.0	2797.3
1	0735	92	0.	.0	2797.3	*	1	1555	192	0.	.0	2797.3	*	2	0015	292	0.	.0	2797.3
1	0740	93	0.	.0	2797.3	*	1	1600	193	0.	.0	2797.3	*	2	0020	293	0.	.0	2797.3
1	0745	94	0.	.0	2797.3	*	1	1605	194	0.	.0	2797.3	*	2	0025	294	0.	.0	2797.3
1	0750	95	0.	.0	2797.3	*	1	1610	195	0.	.0	2797.3	*	2	0030	295	0.	.0	2797.3
1	0755	96	0.	.0	2797.3	*	1	1615	196	0.	.0	2797.3	*	2	0035	296	0.	.0	2797.3
1	0800	97	0.	.0	2797.3	*	1	1620	197	0.	.0	2797.3	*	2	0040	297	0.	.0	2797.3
1	0805	98	0.	.0	2797.3	*	1	1625	198	0.	.0	2797.3	*	2	0045	298	0.	.0	2797.3
1	0810	99	0.	.0	2797.3	*	1	1630	199	0.	.0	2797.3	*	2	0050	299	0.	.0	2797.3
1	0815	100	0.	.0	2797.3	*	1	1635	200	0.	.0	2797.3	*	2	0055	300	0.	.0	2797.3
						*							*						

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	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	24.92-HR
+	(CFS)	(HR)					
			(CFS)				
+	251.	4.17		63.	16.	15.	15.
			(INCHES)	1.607	1.610	1.610	1.610
			(AC-FT)	31.	31.	31.	31.

Fut

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
5.	4.17	1.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
2810.75	4.17	2801.08	2798.26	2798.22	2798.22

CUMULATIVE AREA = .36 SQ MI

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1	RATIO 2	RATIO 3
					1.00	.98	.97
HYDROGRAPH AT							
+	WOFF5	.26	1	FLOW	236.	229.	226.
				TIME	3.83	3.83	3.83
ROUTED TO							
+	RWOFF5	.26	1	FLOW	237.	230.	227.
				TIME	4.00	4.00	4.00
HYDROGRAPH AT							
+	WOFF6	.04	1	FLOW	59.	57.	56.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	EX-W5S	.24	1	FLOW	237.	230.	227.
				TIME	3.75	3.75	3.75
HYDROGRAPH AT							
+	OFF3	.00	1	FLOW	2.	2.	2.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	D2	.02	1	FLOW	24.	24.	23.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	IOFF4	.01	1	FLOW	9.	9.	9.
				TIME	3.50	3.50	3.50
3 COMBINED AT							
+	PARK	.02	1	FLOW	36.	35.	34.
				TIME	3.50	3.50	3.50
4 COMBINED AT							
+	CPS	.56	1	FLOW	447.	433.	426.
				TIME	3.92	3.92	3.92
HYDROGRAPH AT							
+	WOFF7	.01	1	FLOW	10.	10.	10.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	WOFF8	.21	1	FLOW	230.	223.	220.
				TIME	3.75	3.75	3.75
ROUTED TO							
+	RWOFF8	.21	1	FLOW	230.	222.	220.
				TIME	3.92	4.00	4.00
HYDROGRAPH AT							
+	EX-W5N	.14	1	FLOW	139.	135.	133.
				TIME	3.83	3.83	3.83
3 COMBINED AT							
+	CPN	.36	1	FLOW	361.	350.	345.
				TIME	3.92	3.92	3.92
ROUTED TO							
+	DBN	.36	1	FLOW	258.	253.	251.
				TIME	4.17	4.17	4.17
			** PEAK STAGES IN FEET **				
			1	STAGE	2811.29	2810.92	2810.75
				TIME	4.17	4.17	4.17
HYDROGRAPH AT							
+	WSPD3	.00	1	FLOW	5.	5.	5.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	WGC3	.04	1	FLOW	89.	87.	86.
				TIME	3.50	3.50	3.50
4 COMBINED AT							
+	WC9a	.97	1	FLOW	690.	671.	662.
				TIME	3.92	4.00	4.00
HYDROGRAPH AT							
+	ON1-D	.03	1	FLOW	47.	46.	45.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	ON2-D	.03	1	FLOW	45.	44.	44.
				TIME	3.58	3.58	3.58

HYDROGRAPH AT							
+	HOR	.02	1	FLOW	30.	29.	29.
				TIME	3.50	3.50	3.50
3 COMBINED AT							
+	WC7	.07	1	FLOW	121.	118.	116.
				TIME	3.58	3.58	3.58
HYDROGRAPH AT							
+	WGRC1A	.00	1	FLOW	4.	4.	4.
				TIME	3.50	3.50	3.50
HYDROGRAPH AT							
+	WSPD0	.00	1	FLOW	2.	2.	2.
				TIME	3.50	3.50	3.50
4 COMBINED AT							
+	WC9	1.04	1	FLOW	725.	705.	695.
				TIME	3.92	3.92	3.92

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SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .00									
RWOFF5	MANE	5.00	237.34	240.00	1.70	5.00	237.34	240.00	1.70

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2330E+02 EXCESS= .0000E+00 OUTFLOW= .2332E+02 BASIN STORAGE= .7632E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00									
RWOFF5	MANE	5.00	230.22	240.00	1.65	5.00	230.22	240.00	1.65

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2259E+02 EXCESS= .0000E+00 OUTFLOW= .2261E+02 BASIN STORAGE= .7531E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00									
RWOFF5	MANE	5.00	226.67	240.00	1.62	5.00	226.67	240.00	1.62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2224E+02 EXCESS= .0000E+00 OUTFLOW= .2226E+02 BASIN STORAGE= .7480E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .00									
RWOFF8	MANE	5.00	229.71	235.00	1.69	5.00	229.71	235.00	1.69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1924E+02 EXCESS= .0000E+00 OUTFLOW= .1928E+02 BASIN STORAGE= .6283E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00									
RWOFF8	MANE	5.00	222.50	240.00	1.64	5.00	222.50	240.00	1.64

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1865E+02 EXCESS= .0000E+00 OUTFLOW= .1869E+02 BASIN STORAGE= .6205E-02 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .00									
RWOFF8	MANE	5.00	219.78	240.00	1.61	5.00	219.78	240.00	1.61

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1836E+02 EXCESS= .0000E+00 OUTFLOW= .1840E+02 BASIN STORAGE= .7178E-02 PERCENT ERROR= -.2

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

Ultimate Condition (100-Yr & 10-Yr)

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN  1998                *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   21JUL16  TIME  10:45:01   *
*                                       *
*****************************************
```

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

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

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

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


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

                        *DIAGRAM
 *** FREE ***
             1          ID     SKYE CANYON
             2          ID     PHASE 3 INFRASTRUCTURE - ULTIMATE CONDITION
             3          ID     SKY CANYON MASTER PLAN DEVELOPED
             4          ID
             5          ID
             6          ID     RETURN PERIOD ------- 100-YEAR & 10-YEAR
             7          ID     DISTRIBUTION -------- 6-HOUR SDN3
             8          ID     PROJECT NO. --------- OLY1602.001
             9          ID     FILENAME ------------ ULT.H1
            10          ID     DATE ---------------- 4/19/2016
            11          ID     MODELED BY ---------- SMJ/ALB
            12          ID
            13          ID        SIX HOUR DEPTH-AREA REDUCTION FACTORS
            14          ID        DRAINAGE AREA (MI^2)    DARF
            15          ID        0.0-0.50                1.00
            16          ID        10-Year                 0.55
            17          ID
            18          IT       5       0       0     300
            19          IO       5       0       0
            20          IN       5       0       0
            21          JR    PREC    1.00    0.55
                        *

            22          KK   WML16
            23          KM   WEST BASIN, WEST OF SKYE PARK DRIVE
            24          PB    2.93
            25          PC       0   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
            26          PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
            27          PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
            28          PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
            29          PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
            30          PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
            31          PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
            32          PC   0.998   0.999       1
            33          BA   .0346
            34          LS       0    95.0
            35          UD   0.118
                        *

            36          KK   WSPD3
            37          KM   WEST BASIN, SKYE PARK DRIVE
            38          BA   .0022
            39          PB    2.93
            40          LS       0    92.8
            41          UD   0.056
                        *

            42          KK  WML15B
            43          KM   WEST BASIN, WEST OF SKYE PARK DRIVE
            44          BA   .0175
            45          PB    2.93
            46          LS       0    95.0
            47          UD   0.102
                        *
```



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

            48          KK   WSPD2
            49          KM   WEST BASIN, SKYE PARK DRIVE
            50          BA   .0012
            51          PB    2.93
            52          LS       0    98.0
            53          UD   0.050
                        *
```

```
          54          KK     WC8
          55          KM   COMBINE  WML15B, WSPD2
          56          HC       2
                      *

          57          KK     WC6
          58          KM   N OF SKYE CANYON PARK/SKYE PARK INTERSECTION
          59          KM   COMBINE WML16, WSPD3 & WC8
          60          HC       3
                      *

          61          KK    WGC3
          62          KM   WEST BASIN, WEST OF GRAND CANYON DRIVE
          63          BA   .0444
          64          PB    2.93
          65          LS       0    94.6
          66          UD   0.095
                      *

          67          KK    WC9a
          68          KM   COMBINE WGC3 & WC6
          69          HC       2
                      *

          70          KK   ON1-D
          71          KM   PHASE 1, NORTHWEST QUAD ONSITE BASIN
          72          BA   .0278
          73          PB    2.93
          74          LS       0    91.2
          75          UD   0.114
                      *

          76          KK   ON2-D
          77          KM   PHASE 1, NORTHEAST QUAD ONSITE BASIN
          78          BA   .0301
          79          PB    2.93
          80          LS       0    88.8
          81          UD   0.152
                      *

          82          KK     HOR
          83          KM   PHASE 1, STREET BASIN SKYE CANYON PARK DRIVE
          84          BA   .0163
          85          PB    2.93
          86          LS       0    93.3
          87          UD   0.108
                      *
```



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

          88          KK     WC7
          89          KM   W OF SKYE CANYON PARK/GRAND CANYON INTERSECTION
          90          KM   COMBINE ON1-D, ON2-D, HOR
          91          HC       3
                      *

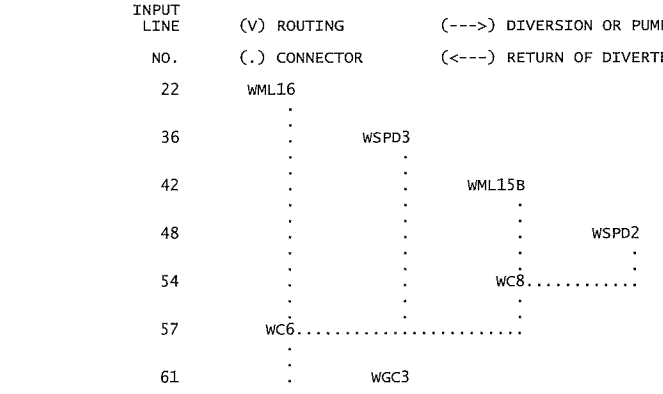
          92          KK  WGRC1A
          93          KM   WEST BASIN, GRAND CANYON DRIVE
          94          BA   .0022
          95          PB    2.93
          96          LS       0    93.2
          97          UD   0.095
                      *

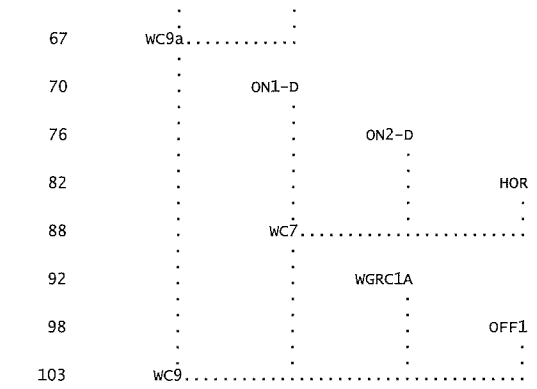
          98          KK    OFF1
          99          BA   .0006
         100          PB    2.93
         101          LS       0    94.7
         102          UD   0.050
                      *

         103          KK     WC9
         104          KM   FAR N OF SKYE CANYON PARK/GRAND CANYON INTERSECTION
         105          KM   COMBINE WC7, WC9a, WGRC1A
         106          HC       4
                      *
         107          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK





(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN  1998               *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   21JUL16  TIME  10:45:01   *
*                                       *
*****************************************
```

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

SKYE CANYON
PHASE 3 INFRASTRUCTURE - ULTIMATE CONDITION
SKY CANYON MASTER PLAN DEVELOPED

RETURN PERIOD ------- 100-YEAR
DISTRIBUTION -------- 6-HOUR SDN3
PROJECT NO. --------- OLY1602.001
FILENAME ------------ ULT.H1
DATE ---------------- 4/19/2016
MODELED BY ---------- SMJ/ALB

SIX HOUR DEPTH-AREA REDUCTION FACTORS

DRAINAGE AREA (MI^2)	DARF
0.0-0.50	1.00
10-Year	0.55

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

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

                    COMPUTATION INTERVAL      .08 HOURS
                       TOTAL TIME BASE   24.92 HOURS

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

      JP          MULTI-PLAN OPTION
                       NPLAN           1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                     RATIOS OF PRECIPITATION
                    1.00       .55
1
```

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .55
HYDROGRAPH AT						
+	WML16	.03	1	FLOW	64.	32.
				TIME	3.50	3.58
HYDROGRAPH AT						

						ULT
+	WSPD3	.00	1	FLOW	5.	2.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	WML15B	.02	1	FLOW	34.	17.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	WSPD2	.00	1	FLOW	3.	2.
				TIME	3.50	3.50
2 COMBINED AT						
+	WC8	.02	1	FLOW	37.	19.
				TIME	3.50	3.50
3 COMBINED AT						
+	WC6	.06	1	FLOW	107.	52.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	WGC3	.04	1	FLOW	89.	43.
				TIME	3.50	3.50
2 COMBINED AT						
+	WC9a	.10	1	FLOW	195.	96.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	ON1-D	.03	1	FLOW	47.	21.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	ON2-D	.03	1	FLOW	45.	18.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	HOR	.02	1	FLOW	30.	14.
				TIME	3.50	3.50
3 COMBINED AT						
+	WC7	.07	1	FLOW	121.	53.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	WGRC1A	.00	1	FLOW	4.	2.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	OFF1	.00	1	FLOW	1.	1.
				TIME	3.50	3.50
4 COMBINED AT						
+	WC9	.18	1	FLOW	317.	148.
				TIME	3.50	3.50

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

APPENDIX E

Surface Flow Hydraulic Computations

Street Flows

Section D1 - Flow in Street D
Worksheet for Irregular Channel

Project Description	
Worksheet	Section D1 - Flow in Street D
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	3.50	%
Discharge	2.00	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.016	
Water Surface Elevation	0.23	ft
Elevation Range	0.00 to 0.56	
Flow Area	0.7	ft²
Wetted Perimeter	9.71	ft
Top Width	9.24	ft
Actual Depth	0.23	ft
Critical Elevation	0.27	ft
Critical Slope	0.89	%
Velocity	2.95	ft/s
Velocity Head	0.13	ft
Specific Energy	0.36	ft
Froude Number	1.92	
Flow Type	Supercritical	

Calculation Messages:
Flow is divided.

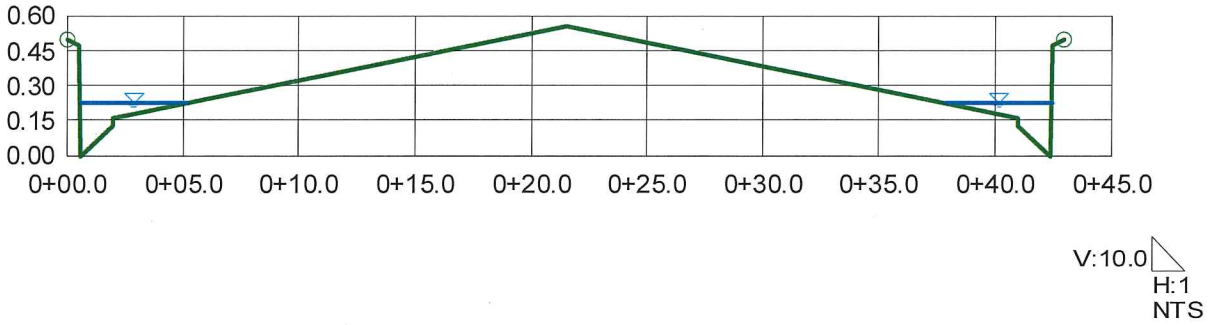
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+43.0	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.50
0+00.5	0.48
0+00.6	0.00
0+02.0	0.13
0+02.0	0.17
0+21.5	0.56
0+41.0	0.17
0+41.0	0.13
0+42.4	0.00
0+42.5	0.48
0+43.0	0.50

Section D1 - Flow in Street D
Cross Section for Irregular Channel

Project Description	
Worksheet	Section D1 - Flow in Street D
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.016	
Channel Slope	3.50	%
Water Surface Elevation	0.23	ft
Elevation Range	0.00 to 0.56	
Discharge	2.00	cfs



Section SP1 - Flow in Sky Park Drive
Worksheet for Irregular Channel

Project Description	
Worksheet	Section SP1 - Flow in Sky Park Drive
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	1.90	%
Discharge	52.00	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.016	
Water Surface Elevation	0.59	ft
Elevation Range	0.00 to 0.56	
Flow Area	10.5	ft²
Wetted Perimeter	44.08	ft
Top Width	43.00	ft
Actual Depth	0.59	ft
Critical Elevation	0.70	ft
Critical Slope	0.55	%
Velocity	4.93	ft/s
Velocity Head	0.38	ft
Specific Energy	0.97	ft
Froude Number	1.76	
Flow Type	Supercritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.88120047e-1 ft.

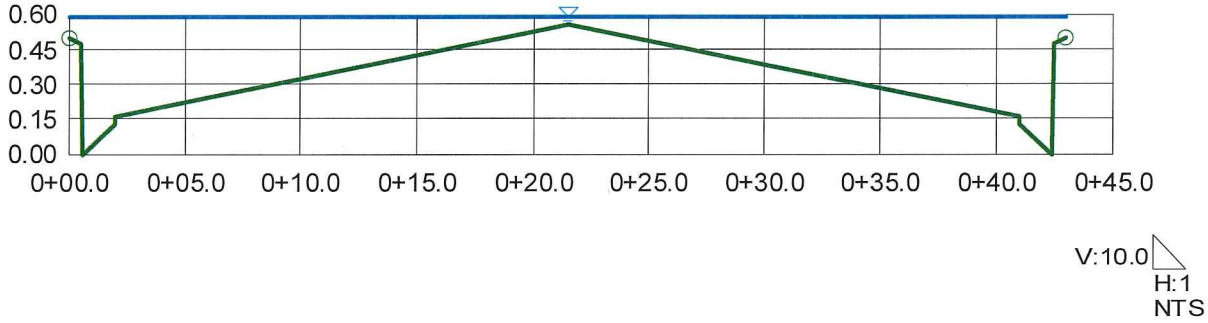
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+43.0	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.50
0+00.5	0.48
0+00.6	0.00
0+02.0	0.13
0+02.0	0.17
0+21.5	0.56
0+41.0	0.17
0+41.0	0.13
0+42.4	0.00
0+42.5	0.48
0+43.0	0.50

Section SP1 - Flow in Sky Park Drive
Cross Section for Irregular Channel

Project Description	
Worksheet	Section SP1 - Flow in Sky Park Drive
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.016	
Channel Slope	1.90	%
Water Surface Elevation	0.59	ft
Elevation Range	0.00 to 0.56	
Discharge	52.00	cfs



Section SP2 - Flow in Sky Park Drive
Worksheet for Irregular Channel

Project Description	
Worksheet	Section SP2 - Flow in Sky Park Drive
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	1.90	%
Discharge	37.00	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.016	
Water Surface Elevation	0.54	ft
Elevation Range	0.00 to 0.56	
Flow Area	8.5	ft²
Wetted Perimeter	42.44	ft
Top Width	41.45	ft
Actual Depth	0.54	ft
Critical Elevation	0.63	ft
Critical Slope	0.59	%
Velocity	4.37	ft/s
Velocity Head	0.30	ft
Specific Energy	0.84	ft
Froude Number	1.70	
Flow Type	Supercritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.39546149e-1 ft.
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+43.0	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.50
0+00.5	0.48
0+00.6	0.00
0+02.0	0.13
0+02.0	0.17
0+21.5	0.56
0+41.0	0.17
0+41.0	0.13
0+42.4	0.00
0+42.5	0.48

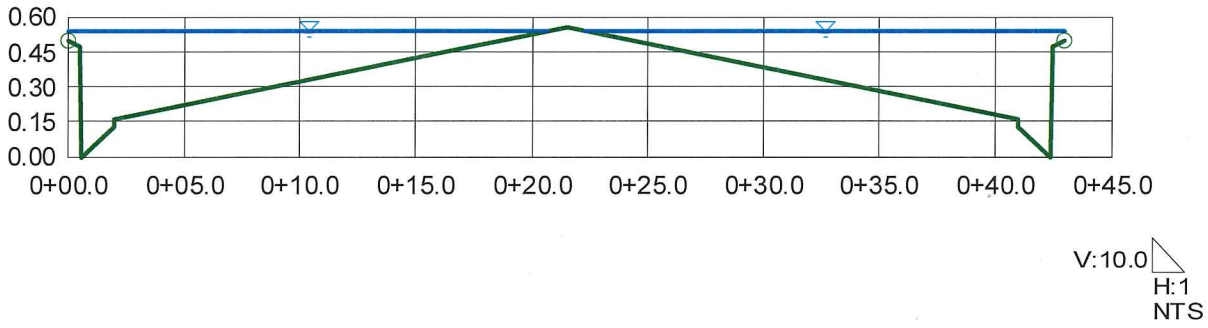
Section SP2 - Flow in Sky Park Drive
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+43.0	0.50

Section SP2 - Flow in Sky Park Drive
Cross Section for Irregular Channel

Project Description	
Worksheet	Section SP2 - Flow in Sky Park Drive
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.016	
Channel Slope	1.90	%
Water Surface Elevation	0.54	ft
Elevation Range	0.00 to 0.56	
Discharge	37.00	cfs



Section GC1 - (100-Year) Flow in Half Street Section Grand Canyon Drive
Worksheet for Irregular Channel

Project Description	
Worksheet	Section GC1 - (100-Year) Flow in Half Street Section Grand Canyon Drive
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	0.50	%
Discharge	20.00	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.66	ft
Elevation Range	0.00 to 1.08	
Flow Area	7.1	ft²
Wetted Perimeter	27.26	ft
Top Width	26.64	ft
Actual Depth	0.66	ft
Critical Elevation	0.65	ft
Critical Slope	0.54	%
Velocity	2.81	ft/s
Velocity Head	0.12	ft
Specific Energy	0.79	ft
Froude Number	0.96	
Flow Type	Subcritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.16276543 ft.

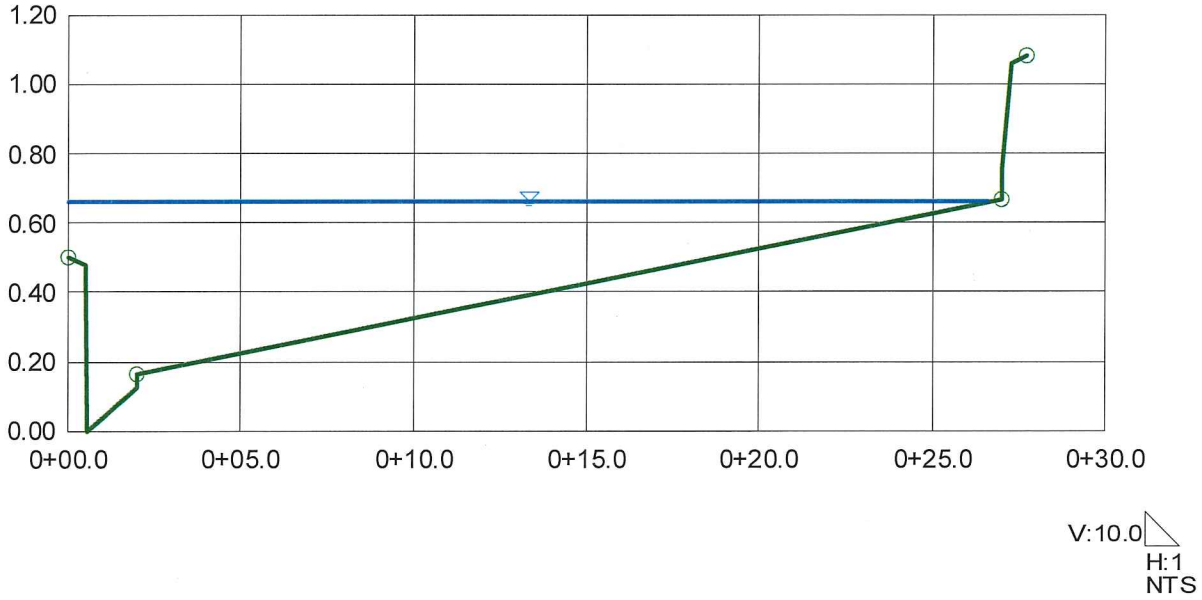
Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+02.0	0.013
0+02.0	0+27.0	0.016
0+27.0	0+27.7	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.50
0+00.5	0.48
0+00.6	0.00
0+02.0	0.13
0+02.0	0.17
0+27.0	0.67
0+27.0	0.75
0+27.3	1.06
0+27.7	1.08

Section GC1 - (100-Year) Flow in Half Street Section Grand Canyon Drive
Cross Section for Irregular Channel

Project Description	
Worksheet	Section GC1 - (100-Year) Flow in Half Street Section Grand Canyon Drive
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.015	
Channel Slope	0.50	%
Water Surface Elevation	0.66	ft
Elevation Range	0.00 to 1.08	
Discharge	20.00	cfs



Section GC2 - (100-Year) Flow in Half Street Section Grand Canyon Drive
Worksheet for Irregular Channel

Project Description	
Worksheet	Section GC2 - (100-Year) Flow in Half Street Section Grand Canyon Drive
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	2.36	%
Discharge	4.00	cfs

← Update for Additional flow from Northern Swale

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.016	
Water Surface Elevation	0.34	ft
Elevation Range	0.00 to 1.08	
Flow Area	1.2	ft²
Wetted Perimeter	10.67	ft
Top Width	10.34	ft
Actual Depth	0.34	ft
Critical Elevation	0.40	ft
Critical Slope	0.74	%
Velocity	3.33	ft/s
Velocity Head	0.17	ft
Specific Energy	0.52	ft
Froude Number	1.72	
Flow Type	Supercritical	

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+27.7	0.016

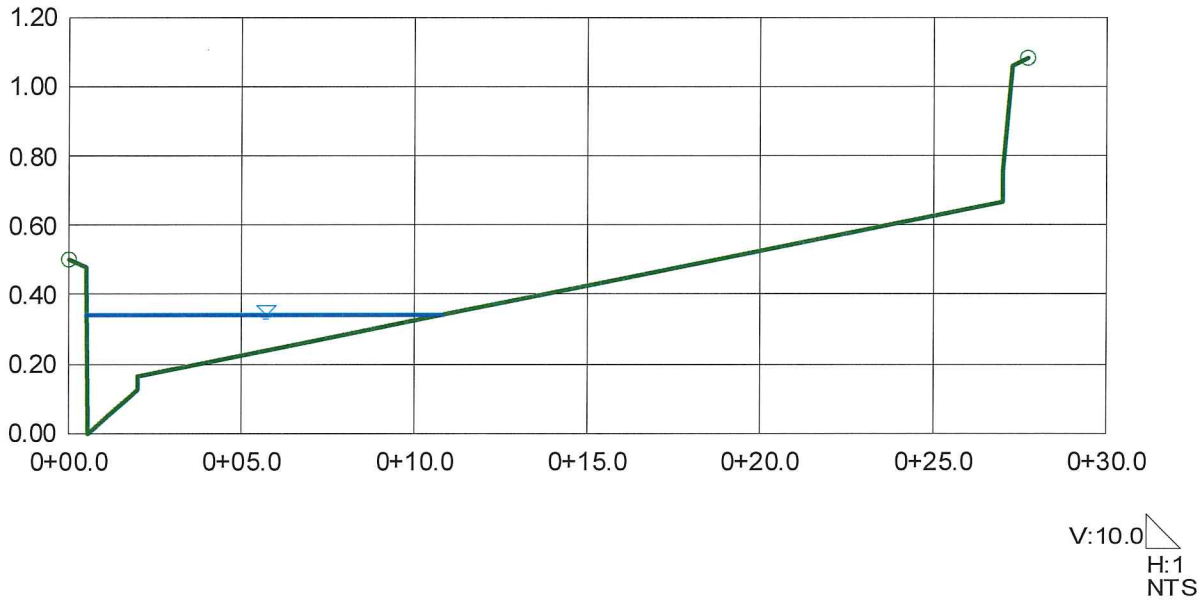
Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.50
0+00.5	0.48
0+00.6	0.00
0+02.0	0.13
0+02.0	0.17
0+27.0	0.67
0+27.0	0.75
0+27.3	1.06
0+27.7	1.08

Notes: Q = WSPD0 + 0.5(WGRC1A)
= 2 + 2
= 4 cfs

Section GC2 - (100-Year) Flow in Half Street Section Grand Canyon Drive
Cross Section for Irregular Channel

Project Description	
Worksheet	Section GC2 - (100-Year) Flow in Half Street Section Grand Canyon Drive
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.016	
Channel Slope	2.36	%
Water Surface Elevation	0.34	ft
Elevation Range	0.00 to 1.08	
Discharge	4.00	cfs



Section GC2 - (10-Year) Flow in Half Street Section Grand Canyon Drive
Worksheet for Irregular Channel

Project Description	
Worksheet	Section GC2 - (10-Year) Flow in Half Street Section Grand Canyon Drive
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	2.36	%
Discharge	2.00	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.016	
Water Surface Elevation	0.29	ft
Elevation Range	0.00 to 1.08	
Flow Area	0.7	ft²
Wetted Perimeter	7.85	ft
Top Width	7.56	ft
Actual Depth	0.29	ft
Critical Elevation	0.33	ft
Critical Slope	0.81	%
Velocity	2.85	ft/s
Velocity Head	0.13	ft
Specific Energy	0.41	ft
Froude Number	1.65	
Flow Type	Supercritical	

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.0	0+27.7	0.016

Natural Channel Points

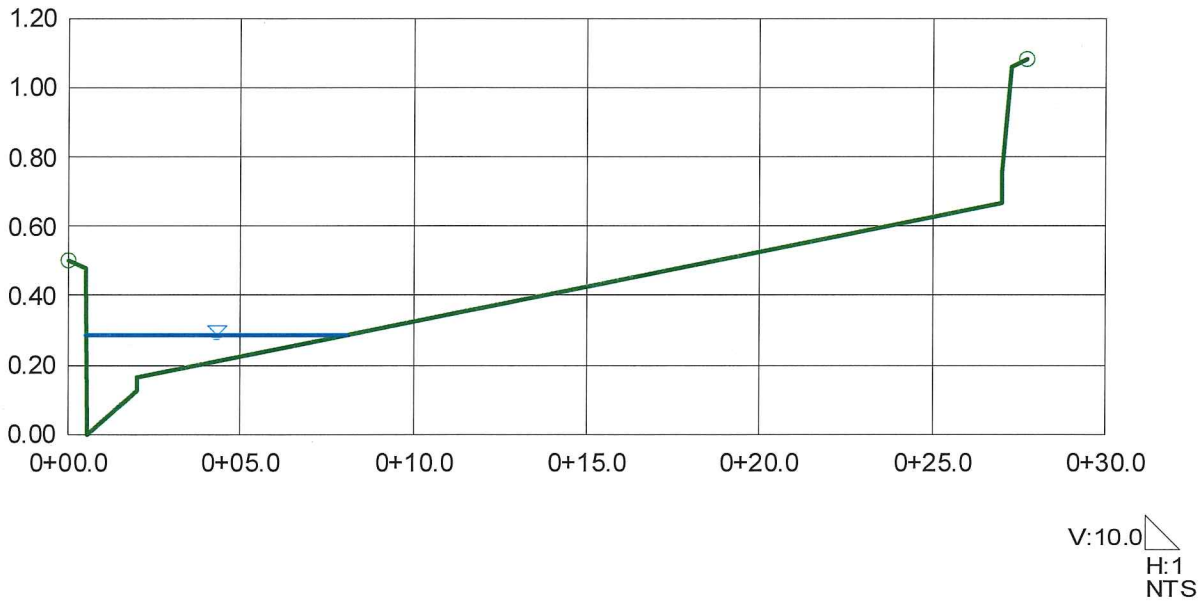
Station (ft)	Elevation (ft)
0+00.0	0.50
0+00.5	0.48
0+00.6	0.00
0+02.0	0.13
0+02.0	0.17
0+27.0	0.67
0+27.0	0.75
0+27.3	1.06
0+27.7	1.08

Notes: Q = WSPD0 + 0.5(WGRC1A)
= 1 + 1
= 2 cfs

Section GC2 - (10-Year) Flow in Half Street Section Grand Canyon Drive
Cross Section for Irregular Channel

Project Description	
Worksheet	Section GC2 - (10-Year) Flow in Half Street Section Grand Canyon Drive
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.016	
Channel Slope	2.36	%
Water Surface Elevation	0.29	ft
Elevation Range	0.00 to 1.08	
Discharge	2.00	cfs



Drop Inlets

Project Name:	**SKYE CANYON PHASE 3**	SLATER HANIFAN GROUP CONSULTING ENGINEERS & PLANNERS
By:	**CWB**	
Date:	**7/19/16**	

Notes:		
Facility ID:	GC8	
Drainage Condition	Proposed	
Design Flow (cfs)	20.0	
Inlet Type:	Type CM2 (Sump)	
Inlet Length:	10.-ft	
Number of Grates:	3	
Input:	**Variable:**	**Input:**
Depth at Inlet (ft)	D	0.83
Grate Width (ft)	W	1.50
Length of Grate (ft)	L_g	7.50
Length of Curb Opening (ft)	L_c	10.00
Height of Curb Opening (ft)	H	0.50
Weir Coef. - Curb Opening	W_c	2.3
Weir Coef. - Grate	W_g	3.0
Orifice Coef.	O_c	0.67
Grate Coef.	G_c	0.60
Clogging Factor - Grate (%)	CF_g	50
Clogging Factor - Curb (%)	CF_c	50
Output (Grate):	**Equation:**	**Output (Grate):**
Effective Weir Length (ft)	$2*W+L_g$	10.50
Adjusted Effective Weir Length (ft)	$2*(1-CF_g/100)*W+(1-CF_g/100)*L_g$	5.25
Grate Open Area (sf)	$W*L_g$	11.25
Adjusted Grate Open Area (sf)	Grate Open Area * $G_c*(1-CF_g/100)$	3.38
Controlling Flow Type (weir/orifice)	If D<1.792*(Adj. Grate Open Area/Adj. Eff. Length)	weir
	use weir, else orifice	
Intercepted Flow (cfs)	weir: $W_g*(\text{Adj. Eff. Weir Length})*D^{1.5}$	11.9
	orifice: $O_c*(\text{Adj. Grate Open Area})*(64.4*D)^{0.5}$	
Output (Curb):	**Equation:**	**Output (Curb):**
Effective Weir Length (ft)	L+1.8*W	12.70
Adjusted Effective Weir Length (ft)	$L+1.8(1-CF_c/100)*W$	11.41
Curb Open Area (sf)	L*H	5.00
Adjusted Curb Open Area (sf)	Curb Open Area * $(1-CF_c/100)$	2.50
Controlling Flow Type (weir/orifice)	If D<H, weir, else orifice	orifice
Intercepted Flow (cfs)	weir: $W_c*(\text{Adj. Eff. Weir Length})*D^{1.5}$	12.22
	orifice: $O_c*(\text{Adj. Curb Open Area})*(64.4*(D-H/2))^{0.5}$	
Output (Total):	**Equation:**	**Output (Total):**
Capacity Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	**24.1**

Actual Collected Flow = 20 cfs

Project Name:	**SKYE CANYON PHASE 3**	SLATER HANIFAN GROUP CONSULTING ENGINEERS & PLANNERS
By:	**AJH**	
Date:	**7/21/2016**	

Notes:		
Facility ID:	SPD1a & SPD1b	
Drainage Condition	Ultimate	
Design Flow (cfs)	52 / 2 = Approximately 26cfs to Each SDDI	
Inlet Type:	Type CM2 (Sump)	
Inlet Length:	12.5-ft	
Number of Grates:	4	
Input:	**Variable:**	**Input:**
Depth at Inlet (ft)	D	0.83
Grate Width (ft)	W	1.50
Length of Grate (ft)	L_g	10.00
Length of Curb Opening (ft)	L_c	12.50
Height of Curb Opening (ft)	H	0.50
Weir Coef. - Curb Opening	W_c	2.3
Weir Coef. - Grate	W_g	3.0
Orifice Coef.	O_c	0.67
Grate Coef.	G_c	0.60
Clogging Factor - Grate (%)	CF_g	50
Clogging Factor - Curb (%)	CF_c	50
Output (Grate):	**Equation:**	**Output (Grate):**
Effective Weir Length (ft)	$2*W+L_g$	13.00
Adjusted Effective Weir Length (ft)	$2*(1-CF_g/100)*W+(1-CF_g/100)*L_g$	6.50
Grate Open Area (sf)	$W*L_g$	15.00
Adjusted Grate Open Area (sf)	Grate Open Area * $G_c*(1-CF_g/100)$	4.50
Controlling Flow Type (weir/orifice)	If D<1.792*(Adj. Grate Open Area/Adj. Eff. Length)	weir
	use weir, else orifice	
Intercepted Flow (cfs)	weir: $W_g*(\text{Adj. Eff. Weir Length})*D^{1.5}$	14.7
	orifice: $O_c*(\text{Adj. Grate Open Area})*(64.4*D)^{0.5}$	
Output (Curb):	**Equation:**	**Output (Curb):**
Effective Weir Length (ft)	L+1.8*W	15.20
Adjusted Effective Weir Length (ft)	$L+1.8(1-CF_c/100)*W$	13.91
Curb Open Area (sf)	L*H	6.25
Adjusted Curb Open Area (sf)	Curb Open Area * $(1-CF_c/100)$	3.13
Controlling Flow Type (weir/orifice)	If D<H, weir, else orifice	orifice
Intercepted Flow (cfs)	weir: $W_c*(\text{Adj. Eff. Weir Length})*D^{1.5}$	15.27
	orifice: $O_c*(\text{Adj. Curb Open Area})*(64.4*(D-H/2))^{0.5}$	
Output (Total):	**Equation:**	**Output (Total):**
Capacity Intercepted Flow (cfs)	Intercepted (Grate) + Intercepted (Curb)	**30.0**
	***Actually collects 26 cfs per inlet**	

Drainage Swale

Section DS-1 - Drainage Swale (Max.)
Worksheet for Triangular Channel

Project Description	
Worksheet	Section DS-1 - Drainage Swale (Max.)
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Channel Slope	4.50	%
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Discharge	2.00	cfs

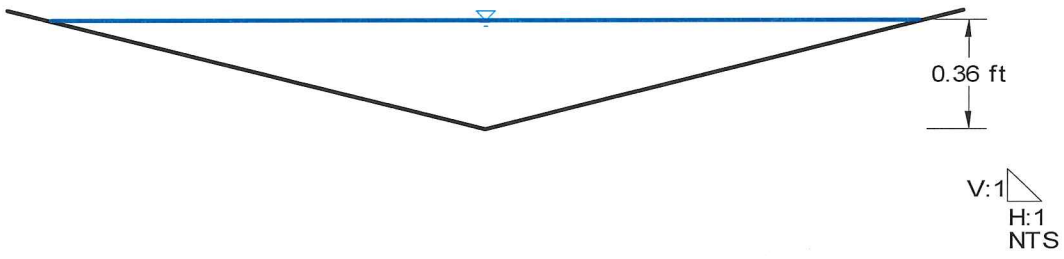
Results		
Depth	0.36	ft
Flow Area	0.5	ft²
Wetted Perimeter	2.94	ft
Top Width	2.86	ft
Critical Depth	0.43	ft
Critical Slope	1.58	%
Velocity	3.92	ft/s
Velocity Head	0.24	ft
Specific Energy	0.60	ft
Froude Number	1.64	
Flow Type	Supercritical	

→ 1' DEPTH MIN. CONTAINS 2x FLOW

Section DS-1 - Drainage Swale (Max.)
Cross Section for Triangular Channel

Project Description	
Worksheet	Section DS-1 - Drainage Swale (Max.)
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.025	
Channel Slope	4.50	%
Depth	0.36	ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Discharge	2.00	cfs



Section DS-1 - Drainage Swale (Min.)
Worksheet for Triangular Channel

Project Description	
Worksheet	Section DS-1 - Drainage Swale (Min.)
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Channel Slope	2.80	%
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Discharge	2.00	cfs

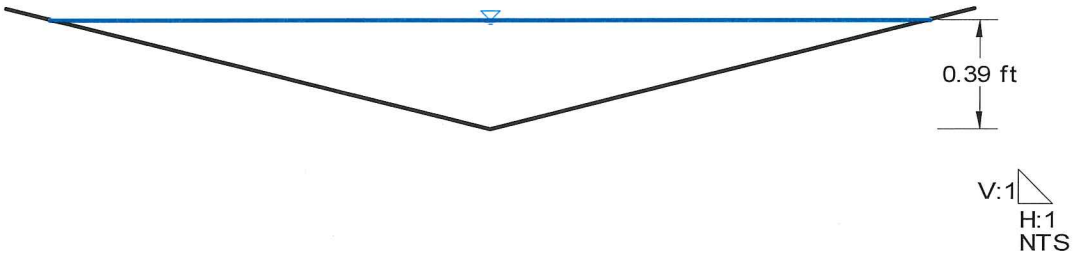
Results		
Depth	0.39	ft
Flow Area	0.6	ft²
Wetted Perimeter	3.22	ft
Top Width	3.12	ft
Critical Depth	0.43	ft
Critical Slope	1.57	%
Velocity	3.28	ft/s
Velocity Head	0.17	ft
Specific Energy	0.56	ft
Froude Number	1.31	
Flow Type	Supercritical	

→ 1' MIN. DEPTH SWALE CONTAINS 2X FLOW DEPTH

Section DS-1 - Drainage Swale (Min.)
Cross Section for Triangular Channel

Project Description	
Worksheet	Section DS-1 - Drainage Swale (Min.)
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.025	
Channel Slope	2.80	%
Depth	0.39	ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Discharge	2.00	cfs



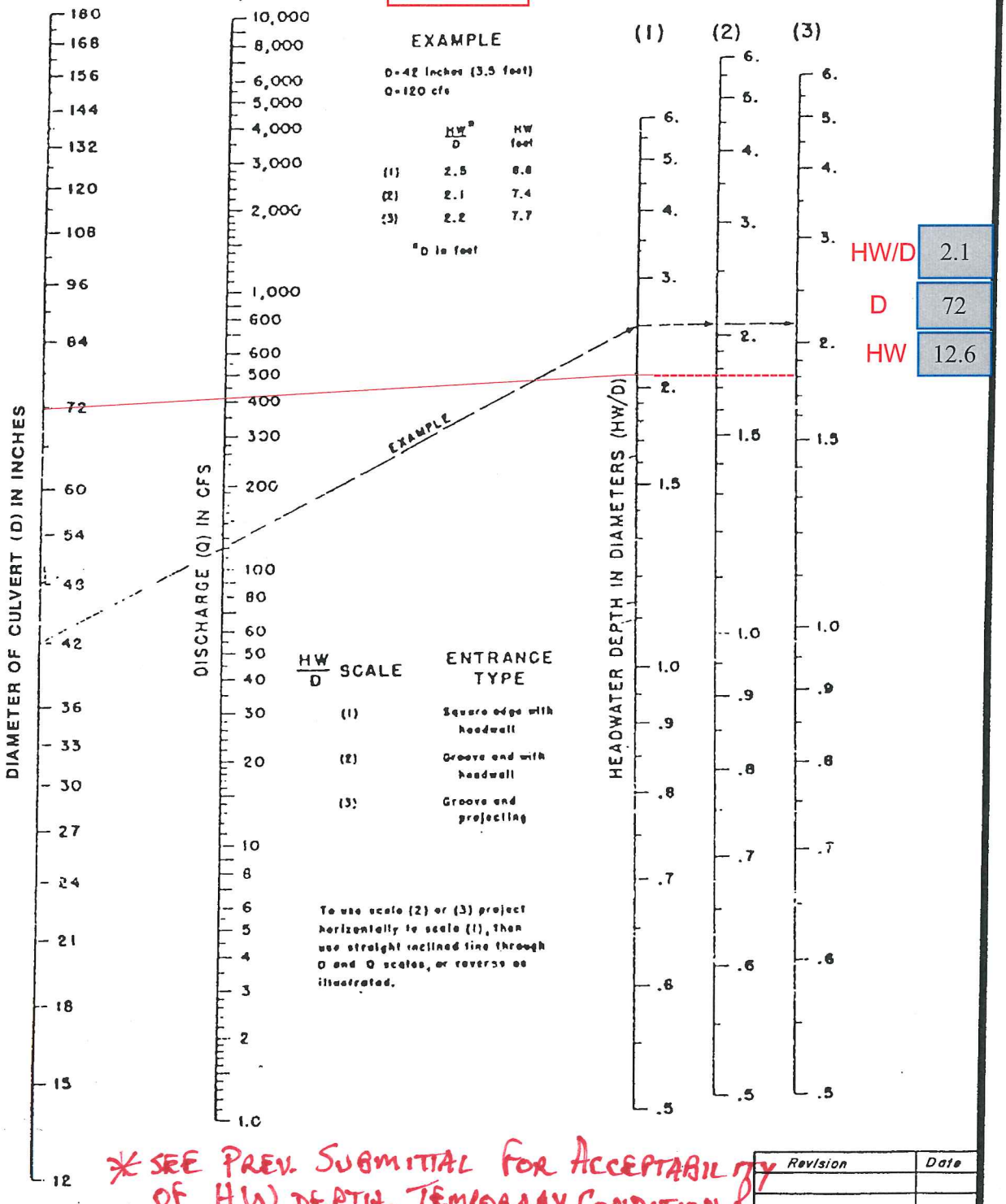
APPENDIX F

Skye Park Storm Drain Hydraulic Design

Inlet Control Nomograph & Flowmaster Normal Depth

NOMOGRAPH – INLET CONTROL RCP

Q=433 CFS



* SEE PREV. SUBMITTAL FOR ACCEPTABILITY OF HW DEPTH. TEMPORARY CONDITION & ≈5-FT FREEBOARD TO OVERFLOW SWALE

Revision	Date

WRC ENGINEERING

REFERENCE: USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

Culvert Crossing

CPN Culvert Crossing @ Street D
Worksheet for Circular Channel

Project Description	
Worksheet	CPN Culvert Crossing @ Street D
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

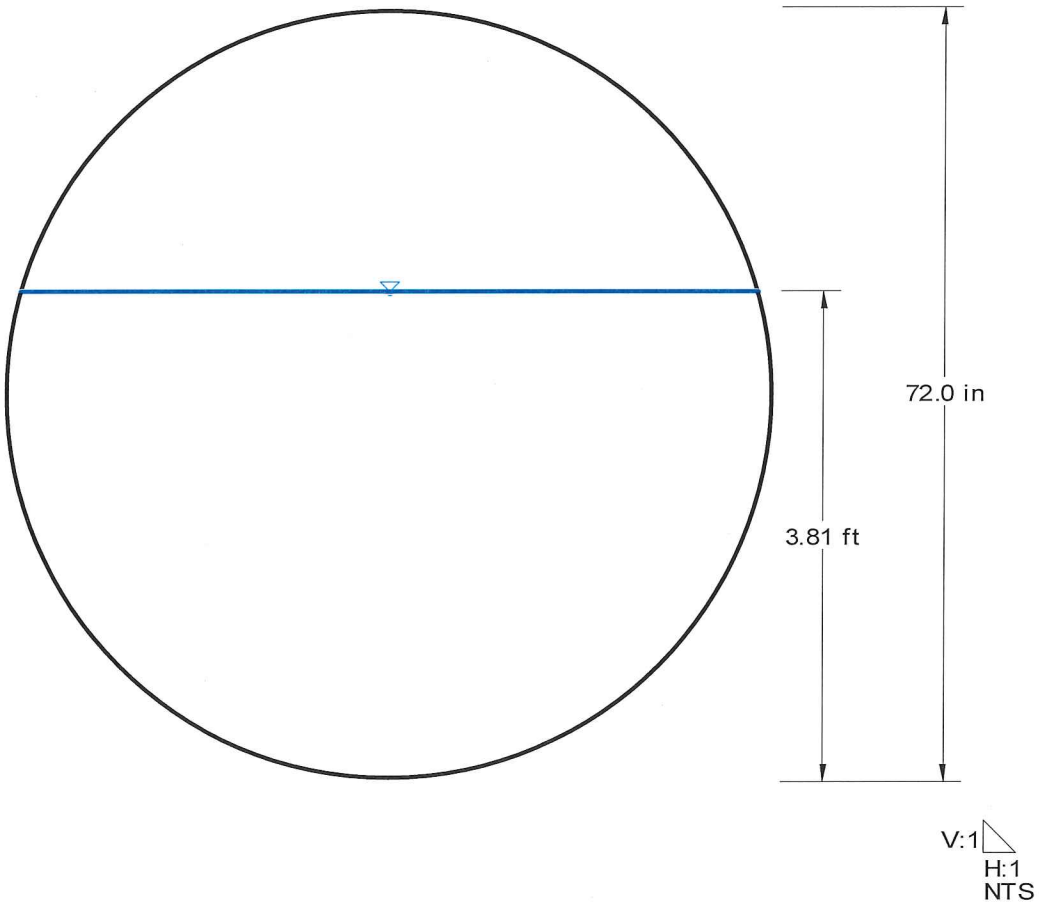
Input Data		
Mannings Coefficient	0.013	
Channel Slope	2.0	%
Diameter	72.0	in
Discharge	438.00	cfs

Results		
Depth	3.81	ft
Flow Area	18.9	ft^2
Wetted Perimeter	11.07	ft
Top Width	0.00	ft
Critical Depth	5.49	ft
Percent Full	63.5	%
Critical Slope	0.9	%
Velocity	23.13	ft/s
Velocity Head	8.31	ft
Specific Energy	12.12	ft
Froude Number	2.25	
Maximum Discharge	644.24	cfs
Discharge Full	598.90	cfs
Slope Full	1.1	%
Flow Type	Supercritical	

CPN Culvert Crossing @ Street D
Cross Section for Circular Channel

Project Description	
Worksheet	CPN Culvert Crossing @ Street D
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.013	
Channel Slope	2.0	%
Depth	3.81	ft
Diameter	72.0	in
Discharge	438.00	cfs



WSPG for Street Storm Drain

```
T1 SKYE CANYON PHASE 3
T2 STORM DRAIN SYSTEM AT SKYE PARK DRIVE LOW POINT
T3 24" - 30" RCP DISCHARGING INTO TO 72" RCP (ULTIMATE CONDITION)
SO   1000.00 2793.22  30                          2795.72                    60.0   1
R    1067.30 2793.97  30      .013
JX   1072.30 2794.47  24 24   .013   26.0           2794.47          90.0
R    1109.55 2798.20  24      .013
SH   1109.55 2798.20  24
CD  24  4   1    .000   2.000     .000  .000  .000   .00
CD  30  4   1    .000   2.500     .000  .000  .000   .00
CD  54  4   1    .000   4.500     .000  .000  .000   .00
CD  60  4   1    .000   5.000     .000  .000  .000   .00
CD  66  4   1    .000   5.500     .000  .000  .000   .00
CD  72  4   1    .000   6.000     .000  .000  .000   .00
CD  84  4   1    .000   7.000     .000  .000  .000   .00
Q           26.00   .0
```

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WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	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	24	4	1		2.000														
CD	30	4	1		2.500														
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	84	4	1		7.000														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SKYE CANYON PHASE 3

HEADING LINE NO 2 IS -

STORM DRAIN SYSTEM AT SKYE PARK DRIVE LOW POINT

HEADING LINE NO 3 IS -

24" - 30" RCP DISCHARGING INTO TO 72" RCP (ULTIMATE CONDITION)

W S P G W 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
	1000.000	2793.220	30	2795.720

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1067.300	2793.970	30	.013	.000	.000	60.000	1

ELEMENT NO 3 IS A JUNCTION * * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1072.300	2794.470	24	24	0	.013	26.000	.000	2794.470	.000	90.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1109.550	2798.200	24	.013	.000	.000	.000	0

ELEMENT NO 5 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1109.550	2798.200	24	.000

SKYE CANYON PHASE 3
STORM DRAIN SYSTEM AT SKYE PARK DRIVE LOW POINT
24" - 30" RCP DISCHARGING INTO TO 72" RCP (ULTIMATE CONDITION)

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
1000.000	2793.220	2.500	2795.720	52.00	10.59	1.74	2797.46	.00	2.32	.00	2.500	.000	.00	1 .0
67.300	.0111					.0161	1.08	2.50	.00	2.50	.013	.00	.00	PIPE
1067.300	2793.970	3.264	2797.234	52.00	10.59	1.74	2798.98	.00	2.32	.00	2.500	.000	.00	1 .0
JUNCT STR	.1000					.0146	.07	3.26	.00		.013	.00	.00	PIPE
1072.300	2794.470	5.427	2799.897	26.00	8.28	1.06	2800.96	.00	1.79	.00	2.000	.000	.00	1 .0
37.250	.1001					.0132	.49	5.43	.00	.83	.013	.00	.00	PIPE
1109.550	2798.200	2.189	2800.389	26.00	8.28	1.06	2801.45	.00	1.79	.00	2.000	.000	.00	1 .0

♀♀

SKYE CANYON PHASE 3

STORM DRAIN SYSTEM AT SKYE PARK DRIVE LOW POINT

24" - 30" RCP DISCHARGING INTO TO 72" RCP (ULTIMATE CONDITION)

1000.00 .I C H E . R
1002.24 . .
1004.47 . .
1006.71 . .
1008.94 . .
1011.18 . .
1013.41 . .
1015.65 . .
1017.89 . .
1020.12 . .
1022.36 . .
1024.59 . .
1026.83 . .
1029.06 . .
1031.30 . .
1033.54 . .
1035.77 . .
1038.01 . .
1040.24 . .
1042.48 . .
1044.71 . .
1046.95 . .

```
1049.19   .                                                                                                  .
1051.42   .                                                                                                  .
1053.66   .                                                                                                  .
1055.89   .                                                                                                  .
1058.13   .                                                                                                  .
1060.36   .                                                                                                  .
1062.60   .                                                                                                  .
1064.84   .                                                                                                  .
1067.07   .                                                                                                  .
1069.31   .        I                          C H       W                   E                                .   JX
1071.54   .                                                                                                  .
1073.78   .             I                     C  H                                       W           E       .   R
1076.01   .                                                                                                  .
1078.25   .                                                                                                  .
1080.49   .                                                                                                  .
1082.72   .                                                                                                  .
1084.96   .                                                                                                  .
1087.19   .                                                                                                  .
1089.43   .                                                                                                  .
1091.66   .                                                                                                  .
1093.90   .                                                                                                  .
1096.14   .                                                                                                  .
1098.37   .                                                                                                  .
1100.61   .                                                                                                  .
1102.84   .                                                                                                  .
1105.08   .                                                                                                  .
1107.31   .                                                                                                  .
1109.55   .                                                          I                   C H  W           E .   R

          2793.220  2794.043  2794.866  2795.690  2796.513  2797.336  2798.159  2798.983  2799.806  2800.629  2801.453
```

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

Emergency Overflow – Culvert Crossing

Skye Park Culvert Crossing - Emergency Overflow Weir Into Overflow Channel
Worksheet for Generic Weir

Project Description	
Worksheet	Skye Park Culvert - Emergency Overflow Weir
Type	Generic Weir
Solve For	Headwater Elevation

Input Data		
Discharge	433.00	cfs
Crest Elevation	0.00	ft
Discharge Coefficient	3.00	US
Crest Length	30.00	ft

Results		
Headwater Elevation	2.85	ft
Headwater Height Above Crest	2.85	ft
Flow Area	85.5	ft²
Velocity	5.06	ft/s
Wetted Perimeter	35.70	ft
Top Width	30.00	ft

→ FL OVERFLOW (2811') CONTAINED BY TOP OF BERM (2814')

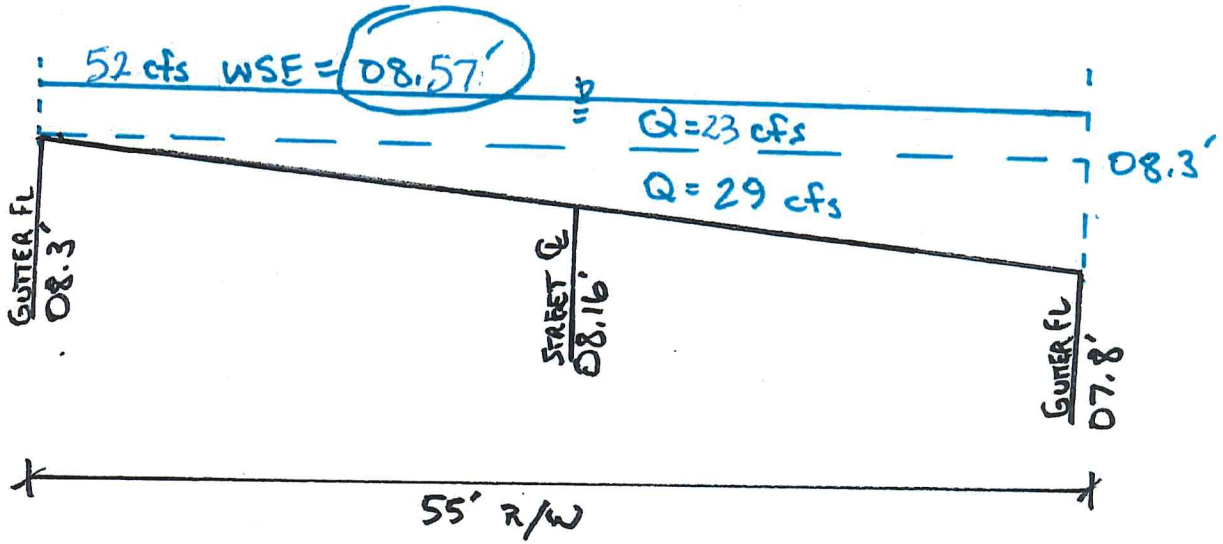
Emergency Overflow – Drop Inlet Clogging

SKYE PARK DRIVE - SAG DIs EMERGENCY OVERFLOW

Q @ LP DIs = 52 cfs (EXHIBIT I)

HP @ STA. 80+50 APPROX ⇒ WEIR CREST FOR EMERGENCY OVERFLOW

WEIR EQUATION: $Q=(3)LH^{3/2}$ (RECT.) ; $Q=\frac{1}{2}(3)LH^{3/2}$ (TRIANG.)



APPENDIX G

Street "D" Storm Drain Hydraulic Design

Detention Basin Outfall Stage-Discharge

Table
Rating Table for Circular Orifice

Project Description	
Worksheet	Orifice CPN - Street D
Type	Circular Orifice
Solve For	Discharge

Input Data		
Centroid Elevation	2,799.52	ft
Tailwater Elevation	2,801.57	ft
Discharge Coefficient	0.65	
Diameter	54.0	in

* See USPGV Model "Lat1" for tailwater depth in Appendix H

Attribute	Minimum	Maximum	Increment
Headwater Elevation (ft)	2,797.00	2,812.00	1.00

Headwater Elevation (ft)	Discharge (cfs)	Velocity (ft/s)
2,797.00	N/A	N/A
2,798.00	N/A	N/A
2,799.00	N/A	N/A
2,800.00	N/A	N/A
2,801.00	N/A	N/A
2,802.00	54.38	3.42
2,803.00	99.17	6.24
2,804.00	129.27	8.13
2,805.00	153.58	9.66
2,806.00	174.54	10.97
2,807.00	193.24	12.15
2,808.00	210.28	13.22
2,809.00	226.04	14.21
2,810.00	240.77	15.14
2,811.00	254.65	16.01
2,812.00	267.82	16.84

Emergency Overflow – Culvert Crossing & DB Spillway

Street D Culvert/DB - Emergency Overflow Weir Into Overflow Channel
Worksheet for Generic Weir

Project Description	
Worksheet	Street D Culvert - Emergency Overflow Weir
Type	Generic Weir
Solve For	Headwater Elevation

Input Data		
Discharge	361.00	cfs
Crest Elevation	0.00	ft
Discharge Coefficient	3.00	US
Crest Length	25.00	ft

Results		
Headwater Elevation	2.85	ft
Headwater Height Above Crest	2.85	ft
Flow Area	71.3	ft²
Velocity	5.07	ft/s
Wetted Perimeter	30.70	ft
Top Width	25.00	ft

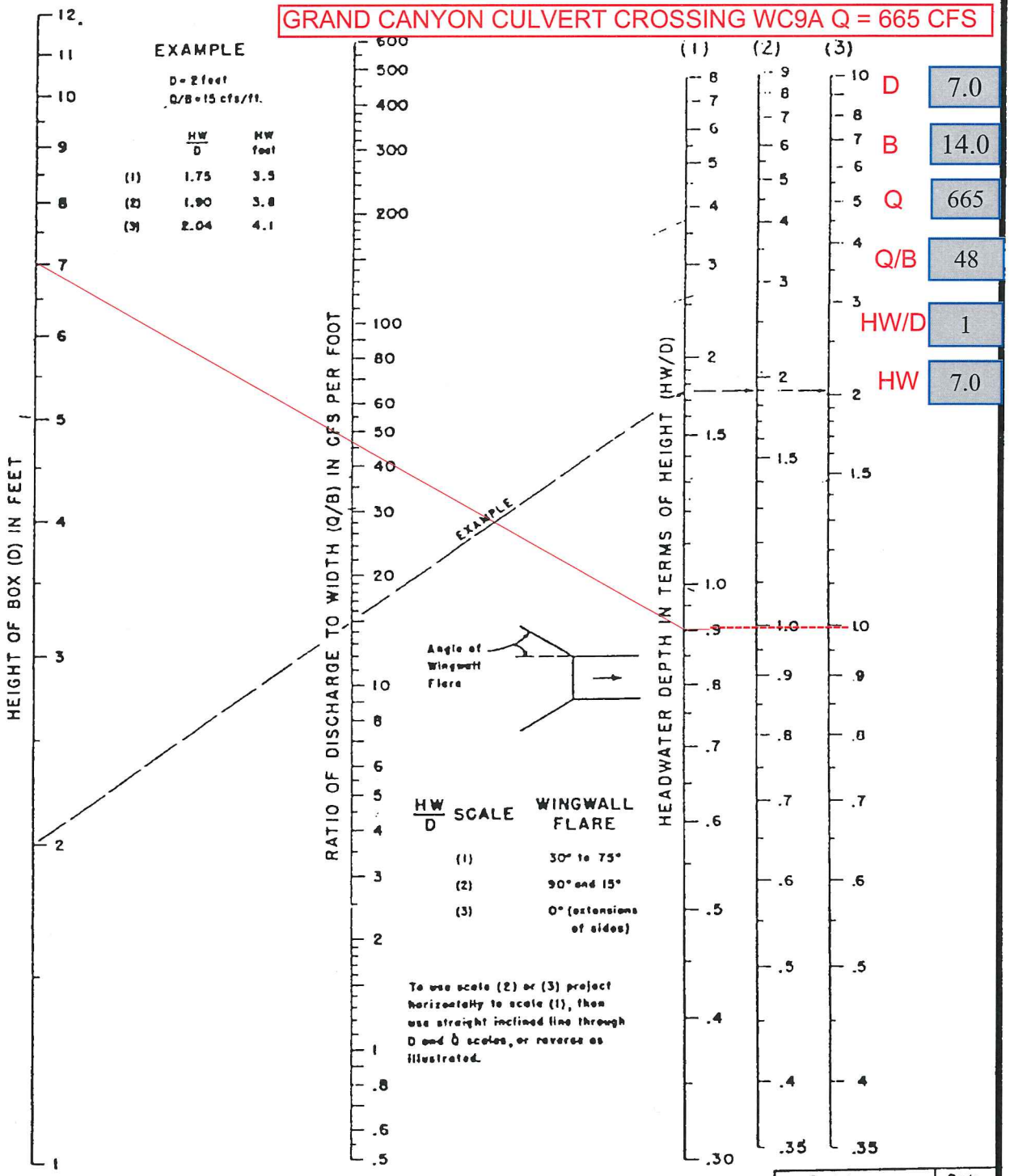
APPENDIX H

Grand Canyon Storm Drain Hydraulic Design

Inlet Control Nomograph

NOMOGRAPH – INLET CONTROL BOX CULVERT

GRAND CANYON CULVERT CROSSING WC9A Q = 665 CFS



D	7.0
B	14.0
Q	665
Q/B	48
HW/D	1
HW	7.0

Revision	Date

WRC ENGINEERING

REFERENCE:
USDOT, FHWA, HDS No.5, 1985

FIGURE 1004

Existing Wash

Existing Wash @ WC9 Discharge
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Existing Wash @ GC Discharge
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Channel Slope	2.4	%
Left Side Slope	1.00	H : V
Right Side Slope	1.00	H : V
Bottom Width	20.00	ft
Discharge	816.00	cfs

Results		
Depth	2.99	ft
Flow Area	68.9	ft²
Wetted Perimeter	28.47	ft
Top Width	25.99	ft
Critical Depth	3.50	ft
Critical Slope	1.4	%
Velocity	11.85	ft/s
Velocity Head	2.18	ft
Specific Energy	5.18	ft
Froude Number	1.28	
Flow Type	Supercritical	

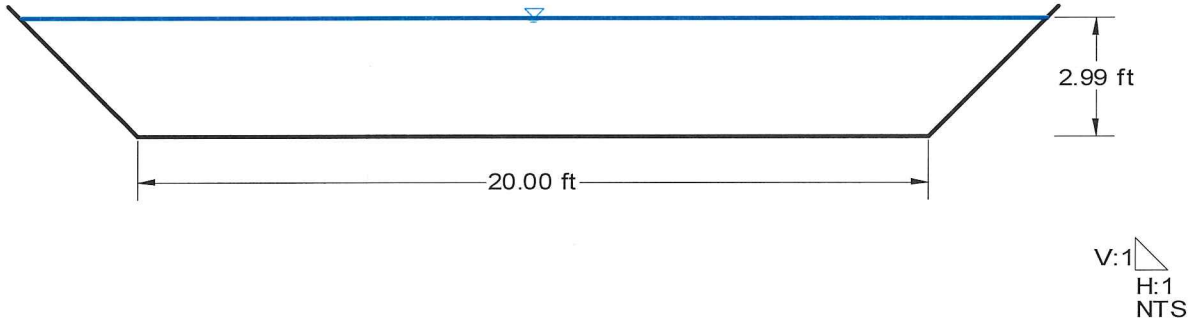
OUTFLOW DEPTH & VELOCITY FROM PROP. RCB SIMILAR TO EX. CONDITION W/ 121 cfs DECREASE IN PEAK FLOW RATE

 © Haestad Methods, Inc.

Existing Wash @ WC9 Discharge
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	Existing Wash @ GC Discharge
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.035	
Channel Slope	2.4	%
Depth	2.99	ft
Left Side Slope	1.00	H : V
Right Side Slope	1.00	H : V
Bottom Width	20.00	ft
Discharge	816.00	cfs



Proposed WSPG for Culvert Crossing

```
T1 SKYE CANYON PHASE 3
T2 STORM DRAIN SYSTEM AT GRAND CANYON LOW POINT (CULVERT CROSSING)
T3 14'W x 5'H RCB DISCHARGING TO NATURAL WASH (PROPOSED CONDITION)
SO     998.00 2748.98   1      .035                2751.97
R      999.00 2749.00   1      .042
TS    1007.00 2749.09   5      .013
JX    1017.00 2749.19   5  2   .013   29.0          2749.18            0.1
WX    1017.00 2749.19   3
R     1092.97 2749.44   3      .013
WX    1092.97 2749.44   6
R     1109.36 2751.70   6      .013
SH    1109.36 2751.70   6
CD    1  1   0    .000   4.000   20.000 1.000 1.000   .00
CD    2  3   0    .000   5.000    6.000  .000  .000   .00
CD    3  3   0    .000   5.000   14.000  .000  .000   .00
CD    4  1   0    .000   5.000   20.000 3.000 3.000   .00
CD    5  1   0    .000   5.000   30.50010.00010.000   .00
CD    6  3   0    .000   7.000   14.000  .000  .000   .00
CD   54  4   1    .000   4.500     .000  .000  .000   .00
CD   60  4   1    .000   5.000     .000  .000  .000   .00
CD   66  4   1    .000   5.500     .000  .000  .000   .00
CD   72  4   1    .000   6.000     .000  .000  .000   .00
Q           665.0     .0
```

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WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	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	1	1	0	.000	4.000	20.000	1.000	1.000	.00										
CD	2	3	0	.000	5.000	6.000	.000	.000	.00										
CD	3	3	0	.000	5.000	14.000	.000	.000	.00										
CD	4	1	0	.000	5.000	20.000	3.000	3.000	.00										
CD	5	1	0	.000	5.000	30.500	10.000	10.000	.00										
CD	6	3	0	.000	7.000	14.000	.000	.000	.00										
CD	54	4	1		4.500														
CD	60	4	1		5.000														
CD	66	4	1		5.500														
CD	72	4	1		6.000														

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SKYE CANYON PHASE 3

HEADING LINE NO 2 IS -

STORM DRAIN SYSTEM AT GRAND CANYON LOW POINT (CULVERT CROSSING)

HEADING LINE NO 3 IS -

14'W x 5'H RCB DISCHARGING TO NATURAL WASH (PROPOSED CONDITION)

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
	998.000	2748.980	1	2751.970

ELEMENT NO 2 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	999.000	2749.000	1	.042	.000	.000	.000	0

ELEMENT NO 3 IS A TRANSITION

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	1007.000	2749.090	5	.013	.000	.000

ELEMENT NO 4 IS A JUNCTION

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1017.000	2749.190	5	2	0	.013	29.000	.000	2749.180	.000	.000	.100

RADIUS	ANGLE
.000	.000

ELEMENT NO 5 IS A WALL EXIT

U/S DATA	STATION	INVERT	SECT
	1017.000	2749.190	3

ELEMENT NO 6 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1092.970	2749.440	3	.013	.000	.000	.000	0

ELEMENT NO 7 IS A WALL EXIT

U/S DATA	STATION	INVERT	SECT
	1092.970	2749.440	6

ELEMENT NO 8 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1109.360	2751.700	6	.013	.000	.000	.000	0

ELEMENT NO 9 IS A SYSTEM HEADWORKS

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1109.360	2751.700	6	.000

SKYE CANYON PHASE 3
STORM DRAIN SYSTEM AT GRAND CANYON LOW POINT (CULVERT CROSSING)
14'W x 5'H RCB DISCHARGING TO NATURAL WASH (PROPOSED CONDITION)

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
998.000	2748.980	3.164	2752.144	694.00	9.47	1.39	2753.54	.00	3.16	26.33	4.000	20.000	1.00	0 .0
1.000	.0200					.0204	.02	3.16	1.00	3.20	.042	.00	1.00	TRAP
999.000	2749.000	3.194	2752.194	694.00	9.37	1.36	2753.56	.00	3.16	26.39	4.000	20.000	1.00	0 .0
TRANS STR	.0113					.0010	.01	3.19	.99		.013	.00	1.00	TRAP
1007.000	2749.090	4.748	2753.838	694.00	1.87	.05	2753.89	.00	2.01	125.46	5.000	30.500	****	0 .0
JUNCT STR	.0100					.0001	.00	4.75	.19		.013	.00	****	TRAP
1017.000	2749.190	4.652	2753.842	665.00	1.86	.05	2753.90	.00	1.97	123.54	5.000	30.500	****	0 .0
HYDRAULIC JUMP														
1017.000	2749.190	2.642	2751.832	665.00	17.98	5.02	2756.85	.00	4.12	14.00	5.000	14.000	.00	0 .0
29.553	.0033					.0108	.32	2.64	1.95	3.92	.013	.00	.00	BOX
1046.553	2749.287	2.567	2751.854	665.00	18.50	5.32	2757.17	.00	4.12	14.00	5.000	14.000	.00	0 .0
46.417	.0033					.0122	.56	2.57	2.04	3.92	.013	.00	.00	BOX
1092.970	2749.440	2.447	2751.887	665.00	19.41	5.85	2757.74	.00	4.12	14.00	5.000	14.000	.00	0 .0
WALL EXIT														
1092.970	2749.440	2.446	2751.886	665.00	19.42	5.86	2757.74	.00	4.12	14.00	7.000	14.000	.00	0 .0
3.152	.1379					.0122	.04	2.45	2.19	1.14	.013	.00	.00	BOX
1096.122	2749.875	2.560	2752.434	665.00	18.56	5.35	2757.78	.00	4.12	14.00	7.000	14.000	.00	0 .0
2.839	.1379					.0107	.03	2.56	2.04	1.14	.013	.00	.00	BOX

SKYE CANYON PHASE 3
STORM DRAIN SYSTEM AT GRAND CANYON LOW POINT (CULVERT CROSSING)
14'W x 5'H RCB DISCHARGING TO NATURAL WASH (PROPOSED CONDITION)

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
1098.961	2750.266	2.685	2752.951	665.00	17.69	4.86	2757.81	.00	4.12	14.00	7.000	14.000	.00	0 .0
2.417	.1379					.0092	.02	2.68	1.90	1.14	.013	.00	.00	BOX
1101.378	2750.599	2.816	2753.415	665.00	16.87	4.42	2757.83	.00	4.12	14.00	7.000	14.000	.00	0 .0
2.036	.1379					.0080	.02	2.82	1.77	1.14	.013	.00	.00	BOX
1103.414	2750.880	2.953	2753.833	665.00	16.09	4.02	2757.85	.00	4.12	14.00	7.000	14.000	.00	0 .0
1.689	.1379					.0070	.01	2.95	1.65	1.14	.013	.00	.00	BOX
1105.103	2751.113	3.097	2754.210	665.00	15.34	3.65	2757.86	.00	4.12	14.00	7.000	14.000	.00	0 .0
1.372	.1379					.0061	.01	3.10	1.54	1.14	.013	.00	.00	BOX
1106.475	2751.302	3.248	2754.551	665.00	14.62	3.32	2757.87	.00	4.12	14.00	7.000	14.000	.00	0 .0
1.081	.1379					.0053	.01	3.25	1.43	1.14	.013	.00	.00	BOX
1107.555	2751.451	3.407	2754.858	665.00	13.94	3.02	2757.88	.00	4.12	14.00	7.000	14.000	.00	0 .0
.811	.1379					.0046	.00	3.41	1.33	1.14	.013	.00	.00	BOX
1108.367	2751.563	3.573	2755.136	665.00	13.29	2.74	2757.88	.00	4.12	14.00	7.000	14.000	.00	0 .0
.561	.1379					.0040	.00	3.57	1.24	1.14	.013	.00	.00	BOX
1108.927	2751.640	3.748	2755.388	665.00	12.67	2.49	2757.88	.00	4.12	14.00	7.000	14.000	.00	0 .0
.326	.1379					.0035	.00	3.75	1.15	1.14	.013	.00	.00	BOX
1109.254	2751.685	3.930	2755.616	665.00	12.09	2.27	2757.88	.00	4.12	14.00	7.000	14.000	.00	0 .0
.106	.1379					.0031	.00	3.93	1.07	1.14	.013	.00	.00	BOX

SKYE CANYON PHASE 3
STORM DRAIN SYSTEM AT GRAND CANYON LOW POINT (CULVERT CROSSING)
14'W x 5'H RCB DISCHARGING TO NATURAL WASH (PROPOSED CONDITION)

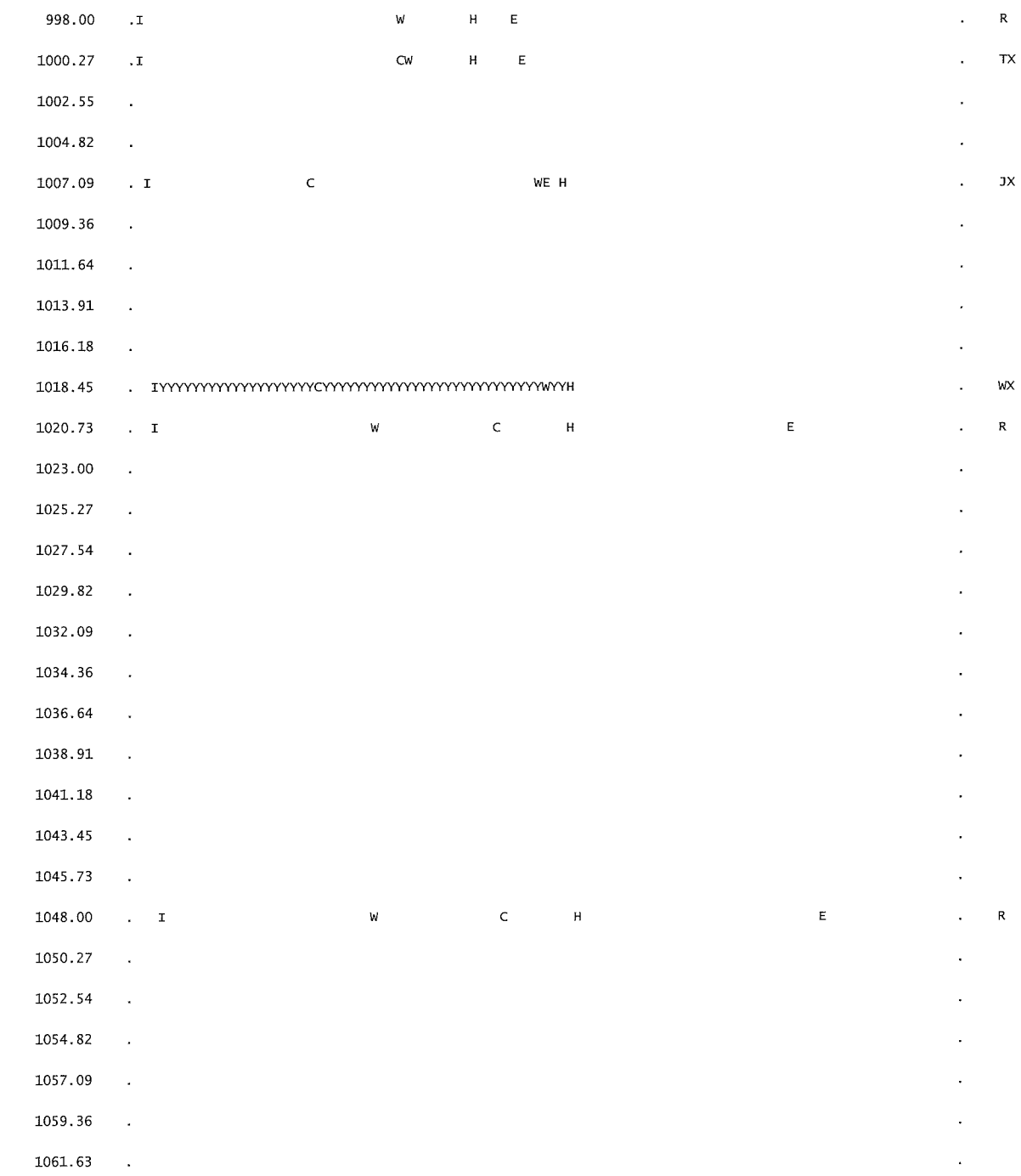
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip

L/Elem	Ch Slope				SF Ave	PRCB HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
1109.360	2751.700	4.123	2755.823	665.00	11.52	2.06	2757.88	.00	4.12	14.00	7.000	14.000	.00	0 .0

SKYE CANYON PHASE 3

STORM DRAIN SYSTEM AT GRAND CANYON LOW POINT (CULVERT CROSSING)

14'W x 5'H RCB DISCHARGING TO NATURAL WASH (PROPOSED CONDITION)



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1063.91   .                                                
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Future WSPG for Culvert Crossing

FUT

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T1 SKYE CANYON PHASE 3
T2 STORM DRAIN SYSTEM AT GRAND CANYON LOW POINT (CULVERT CROSSING)
T3 14'W x 5'H RCB DISCHARGING TO NATURAL WASH (FUTURE CONDITION)
SO    998.00 2748.98   1      .035                2751.97
R     999.00 2749.00   1      .042
TS   1007.00 2749.09   5      .013
JX   1017.00 2749.19   5  2   .013   24.0           2749.24            0.1
WX   1017.00 2749.19   3
R    1033.50 2749.24   3      .013
JX   1033.50 2749.24   3 66   .013  172.0           2749.23           45.0
R    1067.00 2749.37   3      .013                                    -45.0
TS   1074.00 2749.37  72      .013
R    1084.00 2749.89  72      .013                                      0.0
R    1120.00 2750.28  72      .013                                      0.0
R    1179.00 2752.05  72      .013                                    -37.0
R    2355.00 2787.32  72      .013                                      0.0
SH   2355.00 2787.32  72
CD    1  1   0    .000   4.000   20.000 1.000 1.000   .00
CD    2  3   0    .000   5.000    6.000  .000  .000   .00
CD    3  3   0    .000   5.000   14.000  .000  .000   .00
CD    4  1   0    .000   5.000   20.000 3.000 3.000   .00
CD    5  1   0    .000   5.000   30.50010.00010.000   .00
CD   54  4   1    .000   4.500     .000  .000  .000   .00
CD   60  4   1    .000   5.000     .000  .000  .000   .00
CD   66  4   1    .000   5.500     .000  .000  .000   .00
CD   72  4   1    .000   6.000     .000  .000  .000   .00
Q           499.0     .0
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WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	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	1	1	0	.000	4.000	20.000	1.000	1.000	.00										
CD	2	3	0	.000	5.000	6.000	.000	.000	.00										
CD	3	3	0	.000	5.000	14.000	.000	.000	.00										
CD	4	1	0	.000	5.000	20.000	3.000	3.000	.00										
CD	5	1	0	.000	5.000	30.500	10.000	10.000	.00										
CD	54	4	1		4.500														
CD	60	4	1		5.000														
CD	66	4	1		5.500														
CD	72	4	1		6.000														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SKYE CANYON PHASE 3

HEADING LINE NO 2 IS -

STORM DRAIN SYSTEM AT GRAND CANYON LOW POINT (CULVERT CROSSING)

HEADING LINE NO 3 IS -

14'W x 5'H RCB DISCHARGING TO NATURAL WASH (FUTURE CONDITION)

W S P G W 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
	998.000	2748.980	1	2751.970

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	999.000	2749.000	1	.042	.000	.000	.000	0

ELEMENT NO 3 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	1007.000	2749.090	5	.013	.000	.000

ELEMENT NO 4 IS A JUNCTION * * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1017.000	2749.190	5	2	0	.013	24.000	.000	2749.240	.000	.000	.100

RADIUS	ANGLE
.000	.000

ELEMENT NO 5 IS A WALL EXIT *

U/S DATA	STATION	INVERT	SECT
	1017.000	2749.190	3

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1033.500	2749.240	3	.013	.000	.000	.000	0

ELEMENT NO 7 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1033.500	2749.240	3	66	0	.013	172.000	.000	2749.230	.000	45.000	.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 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1067.000	2749.370	3	.013	.000	.000	-45.000	0

ELEMENT NO 9 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	1074.000	2749.370	72	.013	.000	.000

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

W S P G W PAGE NO 3

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 10 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1084.000	2749.890	72	.013	.000	.000	.000	0

ELEMENT NO 11 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1120.000	2750.280	72	.013	.000	.000	.000	0

ELEMENT NO 12 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1179.000	2752.050	72	.013	.000	.000	-37.000	0

ELEMENT NO 13 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2355.000	2787.320	72	.013	.000	.000	.000	0

ELEMENT NO 14 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	2355.000	2787.320	72	.000

SKYE CANYON PHASE 3
STORM DRAIN SYSTEM AT GRAND CANYON LOW POINT (CULVERT CROSSING)
14'W x 5'H RCB DISCHARGING TO NATURAL WASH (FUTURE CONDITION)

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
998.000	2748.980	1.633	2750.613	695.00	19.67	6.01	2756.62	.00	3.17	23.27	4.000	20.000	1.00	0 .0
1.000	.0200					.1960	.20	1.63	2.81	3.20	.042	.00	1.00	TRAP
999.000	2749.000	1.608	2750.608	695.00	20.00	6.21	2756.82	.00	3.17	23.22	4.000	20.000	1.00	0 .0
TRANS STR	.0113					.0469	.38	1.61	2.88		.013	.00	1.00	TRAP
1007.000	2749.090	.778	2749.868	695.00	23.32	8.45	2758.32	.00	2.01	46.07	5.000	30.500	****	0 .0
JUNCT STR	.0100					.0849	.85	.78	5.11		.013	.00	****	TRAP
1017.000	2749.190	.712	2749.902	671.00	25.04	9.73	2759.64	.00	1.98	44.75	5.000	30.500	****	0 .0
WALL	EXIT													
1017.000	2749.190	1.976	2751.166	671.00	24.25	9.13	2760.30	.00	4.15	14.00	5.000	14.000	.00	0 .0
16.500	.0030					.0262	.43	1.98	3.04	4.06	.013	.00	.00	BOX
1033.500	2749.240	1.932	2751.172	671.00	24.81	9.56	2760.73	.00	4.15	14.00	5.000	14.000	.00	0 .0
JUNCT STR	.0000					.0383	.00	1.93	3.15		.013	.00	.00	BOX
1033.500	2749.240	1.312	2750.552	499.00	27.17	11.46	2762.01	.00	3.40	14.00	5.000	14.000	.00	0 .0
12.286	.0039					.0516	.63	1.31	4.18	3.03	.013	.00	.00	BOX
1045.786	2749.288	1.278	2750.565	499.00	27.90	12.08	2762.65	.00	3.40	14.00	5.000	14.000	.00	0 .0
21.214	.0039					.0580	1.23	1.28	4.35	3.03	.013	.00	.00	BOX
1067.000	2749.370	1.218	2750.588	499.00	29.26	13.29	2763.88	.00	3.40	14.00	5.000	14.000	.00	0 .0
TRANS STR	.0000					.0454	.32	1.22	4.67		.013	.00	.00	BOX

SKYE CANYON PHASE 3
STORM DRAIN SYSTEM AT GRAND CANYON LOW POINT (CULVERT CROSSING)
14'W x 5'H RCB DISCHARGING TO NATURAL WASH (FUTURE CONDITION)

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
1074.000	2749.370	3.696	2753.066	499.00	27.30	11.58	2764.64	.00	5.67	5.84	6.000	.000	.00	1 .0
10.000	.0520					.0280	.28	3.70	2.72	3.06	.013	.00	.00	PIPE
1084.000	2749.890	3.734	2753.624	499.00	26.98	11.30	2764.93	.00	5.67	5.82	6.000	.000	.00	1 .0
36.000	.0108					.0287	1.03	3.73	2.67	6.00	.013	.00	.00	PIPE
1120.000	2750.280	3.635	2753.915	499.00	27.85	12.05	2765.96	.00	5.67	5.86	6.000	.000	.00	1 .0
59.000	.0300					.0299	1.76	3.63	2.81	3.63	.013	.00	.00	PIPE
1179.000	2752.050	3.635	2755.685	499.00	27.85	12.04	2767.73	.00	5.67	5.86	6.000	.000	.00	1 .0
331.528	.0300					.0297	9.83	3.64	2.81	3.63	.013	.00	.00	PIPE
1510.528	2761.993	3.651	2765.644	499.00	27.70	11.91	2777.56	.00	5.67	5.86	6.000	.000	.00	1 .0
421.307	.0300					.0278	11.70	3.65	2.78	3.63	.013	.00	.00	PIPE
1931.835	2774.628	3.802	2778.430	499.00	26.41	10.83	2789.26	.00	5.67	5.78	6.000	.000	.00	1 .0
153.967	.0300					.0246	3.79	3.80	2.57	3.63	.013	.00	.00	PIPE
2085.802	2779.246	3.963	2783.209	499.00	25.18	9.85	2793.06	.00	5.67	5.68	6.000	.000	.00	1 .0
89.426	.0300					.0219	1.96	3.96	2.38	3.63	.013	.00	.00	PIPE
2175.228	2781.928	4.135	2786.063	499.00	24.01	8.95	2795.01	.00	5.67	5.55	6.000	.000	.00	1 .0
60.059	.0300					.0195	1.17	4.14	2.19	3.63	.013	.00	.00	PIPE
2235.287	2783.729	4.320	2788.050	499.00	22.89	8.14	2796.19	.00	5.67	5.39	6.000	.000	.00	1 .0
42.914	.0300					.0175	.75	4.32	2.01	3.63	.013	.00	.00	PIPE

SKYE CANYON PHASE 3
STORM DRAIN SYSTEM AT GRAND CANYON LOW POINT (CULVERT CROSSING)
14'W x 5'H RCB DISCHARGING TO NATURAL WASH (FUTURE CONDITION)

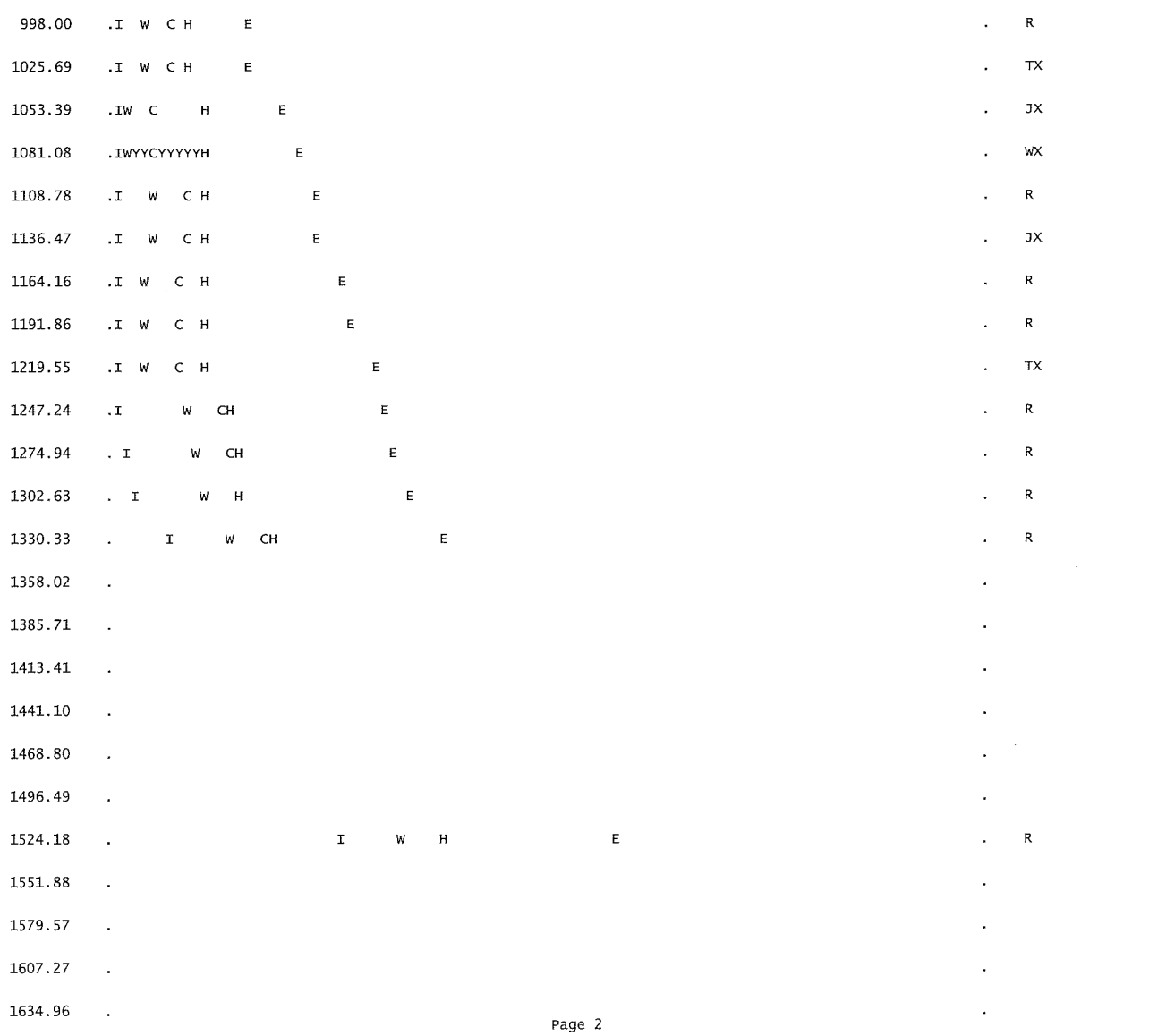
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip

L/Elem	Ch Slope					SF Ave	FUT HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2278.201	2785.017	4.522	2789.539	499.00	21.83	7.40	2796.94	.00	5.67	5.17	6.000	.000	.00	1 .0
31.502	.0300					.0157	.49	4.52	1.83	3.63	.013	.00	.00	PIPE
2309.703	2785.961	4.744	2790.706	499.00	20.81	6.73	2797.43	.00	5.67	4.88	6.000	.000	.00	1 .0
22.942	.0300					.0142	.33	4.74	1.65	3.63	.013	.00	.00	PIPE
2332.645	2786.649	4.993	2791.643	499.00	19.84	6.11	2797.76	.00	5.67	4.48	6.000	.000	.00	1 .0
15.521	.0300					.0130	.20	4.99	1.48	3.63	.013	.00	.00	PIPE
2348.166	2787.115	5.285	2792.400	499.00	18.92	5.56	2797.96	.00	5.67	3.89	6.000	.000	.00	1 .0
6.834	.0300					.0122	.08	5.29	1.28	3.63	.013	.00	.00	PIPE
2355.000	2787.320	5.670	2792.990	499.00	18.04	5.05	2798.04	.00	5.67	2.74	6.000	.000	.00	1 .0

SKYE CANYON PHASE 3

STORM DRAIN SYSTEM AT GRAND CANYON LOW POINT (CULVERT CROSSING)

14'W x 5'H RCB DISCHARGING TO NATURAL WASH (FUTURE CONDITION)



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1662.65   .                                                                                                                  .
1690.35   .                                                                                                                  .
1718.04   .                                                                                                                  .
1745.73   .                                                                                                                  .
1773.43   .                                                                                                                  .
1801.12   .                                                                                                                  .
1828.82   .                                                                                                                  .
1856.51   .                                                                                                                  .
1884.20   .                                                                                                                  .
1911.90   .                                                                                                                  .
1939.59   .                                                I       W  CH                E                                  .    R
1967.29   .                                                                                                                  .
1994.98   .                                                                                                                  .
2022.67   .                                                                                                                  .
2050.37   .                                                                                                                  .
2078.06   .                                                                                                                  .
2105.76   .                                                            I       W   H               E                      .    R
2133.45   .                                                                                                                  .
2161.14   .                                                                                                                  .
2188.84   .                                                                    I       W  CH             E                .    R
2216.53   .                                                                                                                  .
2244.22   .                                                                        I        W  CH            E           .    R
2271.92   .                                                                                                                  .
2299.61   .                                                                            I        W  H           E         .    R
2327.31   .                                                                                I         WCH          E       .    R
2355.00   .                                                                                I         W CH         E      .    R

          2748.980  2753.886  2758.792  2763.699  2768.605  2773.511  2778.417  2783.324  2788.230  2793.136  2798.042
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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

WSPG for North Storm Drain

LAT1

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T1 SKYE CANYON PHASE 3
T2 STORM DRAIN SYSTEM AT GRAND CANYON LOWPOINT (NORTH STORM DRAIN)
T3 66" RCP IN GRAND CANYON DISCHARGING INTO 14'X5' RCB (FUTURE CONDITION)
SO   1000.00 2749.24   3                          2751.17
TS   1010.00 2749.38  66      .013                                    -43.0   1
R    1027.00 2749.46  66      .013                                      .0   1
JX   1027.00 2749.46  66 24   .013    6.0           2752.96          -40.0
R    1109.00 2749.87  66      .013                                     -3.0   1
R    1223.00 2750.44  66      .013                                    -72.0   1
R    1300.00 2751.40  66      .013                                      0.0   1
R    1951.00 2771.19  66      .013                                    -10.0   1
JX   1951.00 2771.19  66 30   .013   28.0           2771.19          -45.0
R    2248.00 2779.81  66      .013                                     10.0   1
R    2506.93 2790.86  66      .013                                      0.0   1
TS   2511.93 2790.86  60      .013                                      0.0   1
R    2606.93 2793.27  60      .013                                    -45.0   1
R    2663.93 2794.96  60      .013                                     45.0   1
TS   2672.93 2795.46  54      .013                                     45.0   1
R    2762.93 2797.27  54      .013                                      0.0   1
SH   2762.93 2797.27  54
CD    1  1   0    .000   4.000   24.000 1.000 1.000   .00
CD    2  3   0    .000   5.000    7.000  .000  .000   .00
CD    3  3   0    .000   5.000   14.000  .000  .000   .00
CD    4  1   0    .000   5.000   14.000 3.000 0.000   .00
CD   18  4   1    .000   1.500     .000  .000  .000   .00
CD   24  4   1    .000   2.000     .000  .000  .000   .00
CD   30  4   1    .000   2.500     .000  .000  .000   .00
CD   54  4   1    .000   4.500     .000  .000  .000   .00
CD   60  4   1    .000   5.000     .000  .000  .000   .00
CD   66  4   1    .000   5.500     .000  .000  .000   .00
CD   72  4   1    .000   6.000     .000  .000  .000   .00
Q           258.0     .0
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CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	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	1	1	0	.000	4.000	24.000	1.000	1.000	.00										
CD	2	3	0	.000	5.000	7.000	.000	.000	.00										
CD	3	3	0	.000	5.000	14.000	.000	.000	.00										
CD	4	1	0	.000	5.000	14.000	3.000	.000	.00										
CD	18	4	1		1.500														
CD	24	4	1		2.000														
CD	30	4	1		2.500														
CD	54	4	1		4.500														
CD	60	4	1		5.000														
CD	66	4	1		5.500														
CD	72	4	1		6.000														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
SKYE CANYON PHASE 3

HEADING LINE NO 2 IS -
STORM DRAIN SYSTEM AT GRAND CANYON LOWPOINT (NORTH STORM DRAIN)

HEADING LINE NO 3 IS -
66" RCP IN GRAND CANYON DISCHARGING INTO 14'X5' RCB (FUTURE CONDITION)

W S P G W 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
	1000.000	2749.240	3	2751.170

ELEMENT NO 2 IS A TRANSITION

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	1010.000	2749.380	66	.013	.000	.000

ELEMENT NO 3 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1027.000	2749.460	66	.013	.000	.000	.000	1

ELEMENT NO 4 IS A JUNCTION

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1027.000	2749.460	66	24	0	.013	6.000	.000	2752.960	.000	-40.000	.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 5 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1109.000	2749.870	66	.013	.000	.000	-3.000	1

ELEMENT NO 6 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1223.000	2750.440	66	.013	.000	.000	-72.000	1

ELEMENT NO 7 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1300.000	2751.400	66	.013	.000	.000	.000	1

ELEMENT NO 8 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1951.000	2771.190	66	.013	.000	.000	-10.000	1

ELEMENT NO 9 IS A JUNCTION

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1951.000	2771.190	66	30	0	.013	28.000	.000	2771.190	.000	-45.000	.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

W S P G W PAGE NO 3

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 10 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2248.000	2779.810	66	.013	.000	.000	10.000	1

ELEMENT NO 11 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2506.930	2790.860	66	.013	.000	.000	.000	1

ELEMENT NO 12 IS A TRANSITION

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	2511.930	2790.860	60	.013	.000	.000

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

ELEMENT NO 13 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2606.930	2793.270	60	.013	.000	.000	-45.000	1

ELEMENT NO 14 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2663.930	2794.960	60	.013	.000	.000	45.000	1

ELEMENT NO 15 IS A TRANSITION

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	2672.930	2795.460	54	.013	.000	.000

ELEMENT NO 16 IS A REACH

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2762.930	2797.270	54	.013	.000	.000	.000	1

ELEMENT NO 17 IS A SYSTEM HEADWORKS

U/S DATA	STATION	INVERT	SECT	W S ELEV
	2762.930	2797.270	54	.000

SKYE CANYON PHASE 3
STORM DRAIN SYSTEM AT GRAND CANYON LOWPOINT (NORTH STORM DRAIN)
66" RCP IN GRAND CANYON DISCHARGING INTO 14'X5' RCB (FUTURE CONDITION)

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
1000.000	2749.240	1.014	2750.254	292.00	20.56	6.57	2756.82	.00	2.38	14.00	5.000	14.000	.00	0 .0
TRANS STR	.0140					.0249	.25	1.01	3.60		.013	.00	.00	BOX
1010.000	2749.380	3.734	2753.114	292.00	17.00	4.49	2757.60	.00	4.71	5.14	5.500	.000	.00	1 .0
17.000	.0047					.0120	.20	3.73	1.64	5.50	.013	.00	.00	PIPE
1027.000	2749.460	3.665	2753.125	292.00	17.37	4.68	2757.81	.00	4.71	5.19	5.500	.000	.00	1 .0
JUNCT STR	.0000					.0125	.00	3.66	1.70		.013	.00	.00	PIPE
1027.000	2749.460	3.565	2753.025	286.00	17.55	4.78	2757.81	.00	4.68	5.25	5.500	.000	.00	1 .0
5.422	.0050					.0129	.07	3.57	1.76	5.50	.013	.00	.00	PIPE
1032.422	2749.487	3.545	2753.032	286.00	17.66	4.85	2757.88	.00	4.68	5.27	5.500	.000	.00	1 .0
38.869	.0050					.0138	.54	3.55	1.78	5.50	.013	.00	.00	PIPE
1071.291	2749.681	3.403	2753.084	286.00	18.53	5.33	2758.41	.00	4.68	5.34	5.500	.000	.00	1 .0
37.709	.0050					.0156	.59	3.40	1.92	5.50	.013	.00	.00	PIPE
1109.000	2749.870	3.269	2753.139	286.00	19.43	5.86	2759.00	.00	4.68	5.40	5.500	.000	.00	1 .0
9.511	.0050					.0168	.16	3.27	2.07	5.50	.013	.00	.00	PIPE
1118.511	2749.918	3.236	2753.154	286.00	19.67	6.01	2759.16	.00	4.68	5.41	5.500	.000	.00	1 .0
36.085	.0050					.0182	.66	3.24	2.12	5.50	.013	.00	.00	PIPE
1154.595	2750.098	3.111	2753.209	286.00	20.63	6.61	2759.82	.00	4.68	5.45	5.500	.000	.00	1 .0
34.831	.0050					.0206	.72	3.11	2.28	5.50	.013	.00	.00	PIPE

SKYE CANYON PHASE 3
STORM DRAIN SYSTEM AT GRAND CANYON LOWPOINT (NORTH STORM DRAIN)
66" RCP IN GRAND CANYON DISCHARGING INTO 14'X5' RCB (FUTURE CONDITION)

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
1189.426	2750.272	2.993	2753.265	286.00	21.64	7.27	2760.54	.00	4.68	5.48	5.500	.000	.00	1 .0
33.574	.0050					.0233	.78	2.99	2.45	5.50	.013	.00	.00	PIPE
1223.000	2750.440	2.882	2753.322	286.00	22.69	8.00	2761.32	.00	4.68	5.49	5.500	.000	.00	1 .0
30.863	.0125					.0258	.80	2.88	2.64	3.60	.013	.00	.00	PIPE
1253.863	2750.825	2.816	2753.641	286.00	23.36	8.47	2762.11	.00	4.68	5.50	5.500	.000	.00	1 .0
46.137	.0125					.0286	1.32	2.82	2.76	3.60	.013	.00	.00	PIPE
1300.000	2751.400	2.713	2754.113	286.00	24.50	9.32	2763.43	.00	4.68	5.50	5.500	.000	.00	1 .0
28.018	.0304					.0304	.85	2.71	2.96	2.71	.013	.00	.00	PIPE
1328.018	2752.252	2.713	2754.964	286.00	24.50	9.32	2764.29	.00	4.68	5.50	5.500	.000	.00	1 .0
410.239	.0304					.0288	11.80	2.71	2.96	2.71	.013	.00	.00	PIPE
1738.258	2764.723	2.804	2767.527	286.00	23.48	8.56	2776.09	.00	4.68	5.50	5.500	.000	.00	1 .0
137.574	.0304					.0255	3.51	2.80	2.78	2.71	.013	.00	.00	PIPE
1875.832	2768.905	2.912	2771.817	286.00	22.39	7.78	2779.60	.00	4.68	5.49	5.500	.000	.00	1 .0
75.168	.0304					.0225	1.69	2.91	2.59	2.71	.013	.00	.00	PIPE
1951.000	2771.190	3.027	2774.217	286.00	21.35	7.08	2781.29	.00	4.68	5.47	5.500	.000	.00	1 .0
JUNCT STR	.0000					.0259	.00	3.03	2.40		.013	.00	.00	PIPE
1951.000	2771.190	2.549	2773.739	258.00	23.94	8.90	2782.64	.00	4.47	5.49	5.500	.000	.00	1 .0
163.226	.0290					.0319	5.21	2.55	3.01	2.59	.013	.00	.00	PIPE

SKYE CANYON PHASE 3
STORM DRAIN SYSTEM AT GRAND CANYON LOWPOINT (NORTH STORM DRAIN)
66" RCP IN GRAND CANYON DISCHARGING INTO 14'X5' RCB (FUTURE CONDITION)

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	Lat1 HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2114.227	2775.927	2.493	2778.421	258.00	24.64	9.43	2787.85	.00	4.47	5.48	5.500	.000	.00	1 .0
133.773	.0290					.0354	4.74	2.49	3.14	2.59	.013	.00	.00	PIPE
2248.000	2779.810	2.405	2782.215	258.00	25.84	10.37	2792.58	.00	4.47	5.46	5.500	.000	.00	1 .0
110.933	.0427					.0356	3.95	2.40	3.37	2.32	.013	.00	.00	PIPE
2358.932	2784.544	2.486	2787.031	258.00	24.73	9.50	2796.53	.00	4.47	5.47	5.500	.000	.00	1 .0
68.727	.0427					.0315	2.16	2.49	3.16	2.32	.013	.00	.00	PIPE
2427.659	2787.477	2.579	2790.056	258.00	23.58	8.64	2798.69	.00	4.47	5.49	5.500	.000	.00	1 .0
45.872	.0427					.0277	1.27	2.58	2.94	2.32	.013	.00	.00	PIPE
2473.531	2789.435	2.676	2792.111	258.00	22.49	7.85	2799.96	.00	4.47	5.50	5.500	.000	.00	1 .0
33.399	.0427					.0244	.81	2.68	2.74	2.32	.013	.00	.00	PIPE
2506.930	2790.860	2.778	2793.638	258.00	21.44	7.14	2800.78	.00	4.47	5.50	5.500	.000	.00	1 .0
TRANS STR	.0000					.0228	.11	2.78	2.55		.013	.00	.00	PIPE
2511.930	2790.860	2.954	2793.814	258.00	21.36	7.09	2800.90	.00	4.47	4.92	5.000	.000	.00	1 .0
95.000	.0254					.0220	2.09	2.95	2.40	2.86	.013	.00	.00	PIPE
2606.930	2793.270	3.026	2796.296	258.00	20.76	6.69	2802.99	.00	4.47	4.89	5.000	.000	.00	1 .0
10.042	.0296					.0210	.21	3.03	2.30	2.72	.013	.00	.00	PIPE
2616.971	2793.568	3.046	2796.614	258.00	20.60	6.59	2803.20	.00	4.47	4.88	5.000	.000	.00	1 .0
46.958	.0296					.0196	.92	3.05	2.27	2.72	.013	.00	.00	PIPE

Program Package Serial Number: 1704

WATER SURFACE PROFILE LISTING Date: 7-20-2016 Time: 9:12:55

SKYE CANYON PHASE 3
STORM DRAIN SYSTEM AT GRAND CANYON LOWPOINT (NORTH STORM DRAIN)
66" RCP IN GRAND CANYON DISCHARGING INTO 14'X5' RCB (FUTURE CONDITION)

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
2663.930	2794.960	3.172	2798.132	258.00	19.64	5.99	2804.12	.00	4.47	4.82	5.000	.000	.00	1 .0
TRANS STR	.0556					.0176	.16	3.17	2.10		.013	.00	.00	PIPE
2672.930	2795.460	3.750	2799.210	258.00	18.22	5.15	2804.36	.00	4.30	3.35	4.500	.000	.00	1 .0
8.481	.0201					.0167	.14	3.75	1.56	3.42	.013	.00	.00	PIPE
2681.411	2795.631	3.770	2799.401	258.00	18.13	5.11	2804.51	.00	4.30	3.32	4.500	.000	.00	1 .0
57.846	.0201					.0160	.92	3.77	1.54	3.42	.013	.00	.00	PIPE
2739.257	2796.794	3.994	2800.788	258.00	17.29	4.64	2805.43	.00	4.30	2.84	4.500	.000	.00	1 .0
23.673	.0201					.0151	.36	3.99	1.33	3.42	.013	.00	.00	PIPE
2762.930	2797.270	4.299	2801.569	258.00	16.48	4.22	2805.79	.00	4.30	1.86	4.500	.000	.00	1 .0

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SKYE CANYON PHASE 3

STORM DRAIN SYSTEM AT GRAND CANYON LOWPOINT (NORTH STORM DRAIN)

66" RCP IN GRAND CANYON DISCHARGING INTO 14'X5' RCB (FUTURE CONDITION)

1000.00	.IW C H E	.	TX
1027.98	.I W CH E	.	R
1055.97	.I W C H E	.	JX
1083.95	.I W C H E	.	R
1111.93	.I W C H E	.	R
1139.92	.I W CH E	.	R
1167.90	. I W CH E	.	R
1195.88	. I W CH E	.	R

```
1223.86   . I     W C H      E                                                                  .    R
1251.85   . I     W  CH       E                                                                 .    R
1279.83   .  I    W  CH         E                                                               .    R
1307.81   .  I    W   CH         E                                                              .    R
1335.80   .   I    W   CH           E                                                           .    R
1363.78   .     I    W  C H          E                                                          .    R
1391.76   .                                                                                     .
1419.75   .                                                                                     .
1447.73   .                                                                                     .
1475.71   .                                                                                     .
1503.69   .                                                                                     .
1531.68   .                                                                                     .
1559.66   .                                                                                     .
1587.64   .                                                                                     .
1615.63   .                                                                                     .
1643.61   .                                                                                     .
1671.59   .                                                                                     .
1699.58   .                                                                                     .
1727.56   .                                                                                     .
1755.54   .                          I    W  C H         E                                       .    R
1783.52   .                                                                                     .
1811.51   .                                                                                     .
1839.49   .                                                                                     .
1867.47   .                                                                                     .
1895.46   .                                I    W   CH        E                                  .    R
1923.44   .                                                                                     .
1951.42   .                                    I     W  CH       E                              .    JX
1979.41   .                                    I    W  C H          E                           .    R
2007.39   .                                                                                     .
2035.37   .                                                                                     .
2063.35   .                                                                                     .
2091.34   .                                                                                     .
2119.32   .                                            I   W   CH           E                    .    R
2147.30   .                                                                                     .
2175.29   .                                                                                     .
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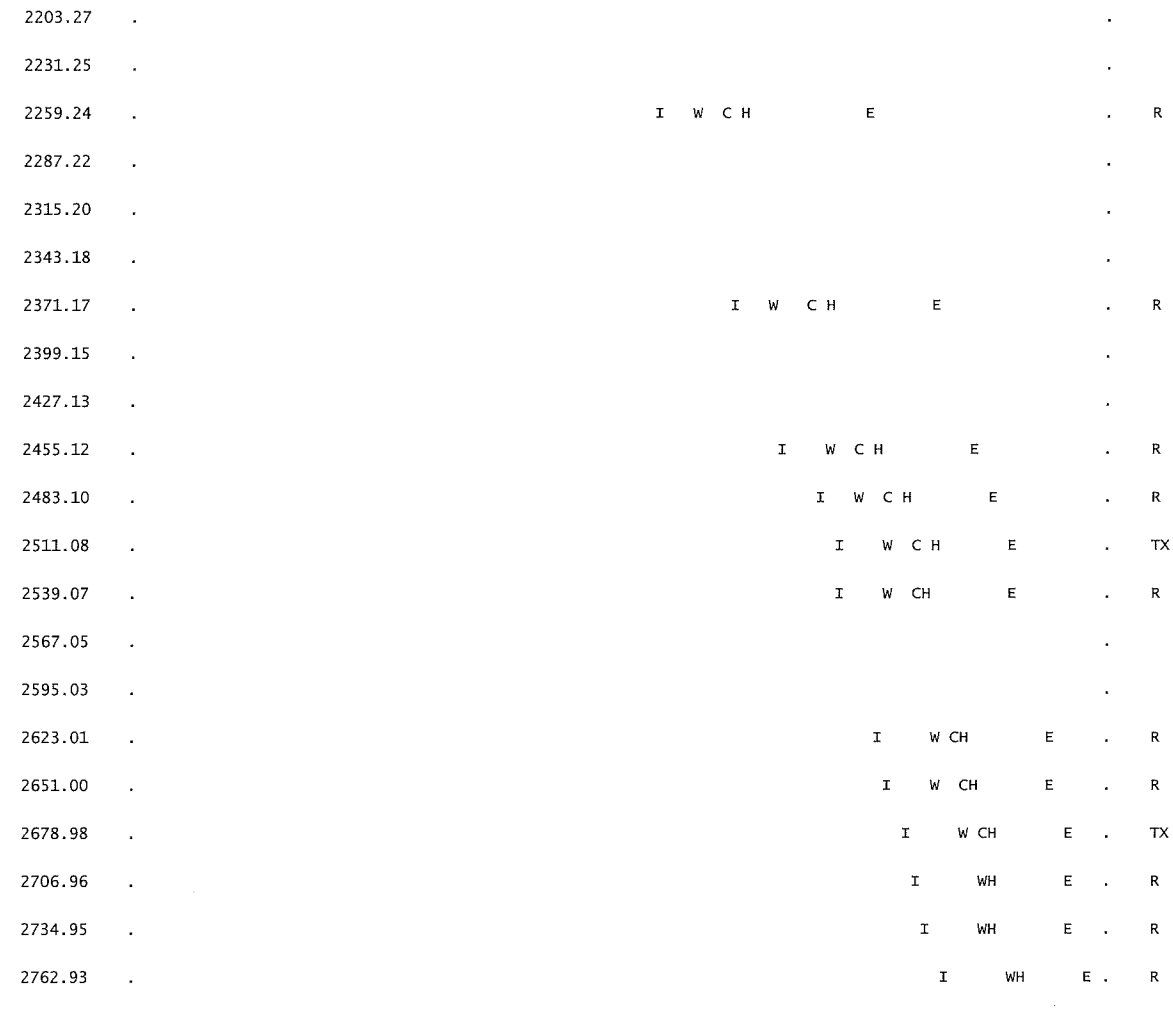
Lat1



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

WSPG for South Storm Drain

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                                                                    PROP
T1 SKYE CANYON PHASE 3
T2 STORM DRAIN SYSTEM AT GRAND CANYON LOW POINT (SOUTH STORM DRAIN)
T3 6'W x 5'H EX RCB DISCHARGING TO NATURAL WASH (PROP CONDITION)
SO   1017.00 2749.18   2                          2751.20
R    1017.00 2749.18   2      .013                                          0.0
R    1042.5002749.310  2      .013                                -97.403    .000 0
R    1089.50 2749.70   2      .013                                          0.0
R    1137.96 2749.94   2      .013                                          0.0
JX   1137.96 2749.94   2 18   .013    4.0          2749.94           45.0
R    1733.36 2752.92   2      .013                                          0.0
SH   1733.36 2752.92   2
CD   1  1   0    .000   4.000   20.000 1.000 1.000   .00
CD   2  3   0    .000   5.000    6.000  .000  .000   .00
CD   3  3   0    .000   5.000   14.000  .000  .000   .00
CD   4  1   0    .000   5.000   14.000 3.000 3.000   .00
CD  18  4   1    .000   1.500     .000  .000  .000   .00
CD  54  4   1    .000   4.500     .000  .000  .000   .00
CD  60  4   1    .000   5.000     .000  .000  .000   .00
CD  66  4   1    .000   5.500     .000  .000  .000   .00
CD  72  4   1    .000   6.000     .000  .000  .000   .00
Q          121.000   .0
```

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	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	1	1	0	.000	4.000	20.000	1.000	1.000	.00										
CD	2	3	0	.000	5.000	6.000	.000	.000	.00										
CD	3	3	0	.000	5.000	14.000	.000	.000	.00										
CD	4	1	0	.000	5.000	14.000	3.000	3.000	.00										
CD	18	4	1		1.500														
CD	54	4	1		4.500														
CD	60	4	1		5.000														
CD	66	4	1		5.500														
CD	72	4	1		6.000														

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SKYE CANYON PHASE 3

HEADING LINE NO 2 IS -

STORM DRAIN SYSTEM AT GRAND CANYON LOW POINT (SOUTH STORM DRAIN)

HEADING LINE NO 3 IS -

6'W x 5'H EX RCB DISCHARGING TO NATURAL WASH (PROP CONDITION)

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

	STATION	INVERT	SECT	W S ELEV
U/S DATA	1017.000	2749.180	2	2751.200

ELEMENT NO 2 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1017.000	2749.180	2	.013	.000	.000	.000	0

ELEMENT NO 3 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1042.500	2749.310	2	.013	15.000	-97.403	.000	0

ELEMENT NO 4 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1089.500	2749.700	2	.013	.000	.000	.000	0

ELEMENT NO 5 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1137.960	2749.940	2	.013	.000	.000	.000	0

ELEMENT NO 6 IS A JUNCTION * * * * * * * *

	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
U/S DATA	1137.960	2749.940	2	18	0	.013	4.000	.000	2749.940	.000	45.000	.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 7 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1733.360	2752.920	2	.013	.000	.000	.000	0

ELEMENT NO 8 IS A SYSTEM HEADWORKS * *

	STATION	INVERT	SECT	W S ELEV
U/S DATA	1733.360	2752.920	2	.000

SKYE CANYON PHASE 3
STORM DRAIN SYSTEM AT GRAND CANYON LOW POINT (SOUTH STORM DRAIN)
6'W x 5'H EX RCB DISCHARGING TO NATURAL WASH (PROP CONDITION)

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1017.000	2749.180	2.034	2751.214	125.00	10.24	1.63	2752.84	1.30	2.38	6.00	5.000	6.000	.00	0 .0
25.500	.0051					.0064	.16	3.34	1.27	2.18	.013	.00	.00	BOX
1042.500	2749.310	1.983	2751.293	125.00	10.51	1.71	2753.01	.00	2.38	6.00	5.000	6.000	.00	0 .0
14.975	.0083					.0065	.10	1.98	1.32	1.84	.013	.00	.00	BOX
1057.475	2749.434	2.022	2751.457	125.00	10.30	1.65	2753.10	.00	2.38	6.00	5.000	6.000	.00	0 .0
21.520	.0083					.0059	.13	2.02	1.28	1.84	.013	.00	.00	BOX
1078.995	2749.613	2.121	2751.734	125.00	9.82	1.50	2753.23	.00	2.38	6.00	5.000	6.000	.00	0 .0
10.505	.0083					.0052	.05	2.12	1.19	1.84	.013	.00	.00	BOX
1089.500	2749.700	2.225	2751.925	125.00	9.37	1.36	2753.29	.00	2.38	6.00	5.000	6.000	.00	0 .0
35.484	.0050					.0047	.17	2.22	1.11	2.21	.013	.00	.00	BOX
1124.984	2749.876	2.268	2752.144	125.00	9.18	1.31	2753.45	.00	2.38	6.00	5.000	6.000	.00	0 .0
12.975	.0050					.0043	.06	2.27	1.07	2.21	.013	.00	.00	BOX
1137.960	2749.940	2.380	2752.320	125.00	8.75	1.19	2753.51	.00	2.38	6.00	5.000	6.000	.00	0 .0
JUNCT STR	.0000					.0024	.00	2.38	1.00		.013	.00	.00	BOX
1137.960	2749.940	2.826	2752.766	121.00	7.14	.79	2753.56	.00	2.33	6.00	5.000	6.000	.00	0 .0
21.150	.0050					.0024	.05	2.83	.75	2.15	.013	.00	.00	BOX
1159.110	2750.046	2.695	2752.740	121.00	7.48	.87	2753.61	.00	2.33	6.00	5.000	6.000	.00	0 .0
18.015	.0050					.0027	.05	2.69	.80	2.15	.013	.00	.00	BOX

SKYE CANYON PHASE 3
STORM DRAIN SYSTEM AT GRAND CANYON LOW POINT (SOUTH STORM DRAIN)
6'W x 5'H EX RCB DISCHARGING TO NATURAL WASH (PROP CONDITION)

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1177.125	2750.136	2.569	2752.705	121.00	7.85	.96	2753.66	.00	2.33	6.00	5.000	6.000	.00	0 .0
6.653	.0050					.0031	.02	2.57	.86	2.15	.013	.00	.00	BOX
1183.778	2750.169	2.520	2752.689	121.00	8.00	.99	2753.68	.00	2.33	6.00	5.000	6.000	.00	0 .0
HYDRAULIC JUMP														
1183.778	2750.169	2.147	2752.316	121.00	9.39	1.37	2753.69	.00	2.33	6.00	5.000	6.000	.00	0 .0
467.752	.0050					.0050	2.34	2.15	1.13	2.15	.013	.00	.00	BOX
1651.530	2752.510	2.147	2754.657	121.00	9.39	1.37	2756.03	.00	2.33	6.00	5.000	6.000	.00	0 .0
70.470	.0050					.0048	.34	2.15	1.13	2.15	.013	.00	.00	BOX
1722.000	2752.863	2.220	2755.083	121.00	9.09	1.28	2756.36	.00	2.33	6.00	5.000	6.000	.00	0 .0
11.360	.0050					.0043	.05	2.22	1.07	2.15	.013	.00	.00	BOX
1733.360	2752.920	2.329	2755.249	121.00	8.66	1.16	2756.41	.00	2.33	6.00	5.000	6.000	.00	0 .0

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SKYE CANYON PHASE 3

STORM DRAIN SYSTEM AT GRAND CANYON LOW POINT (SOUTH STORM DRAIN)

6'W x 5'H EX RCB DISCHARGING TO NATURAL WASH (PROP CONDITION)

1017.00 .I W C S E H . R

1031.62 .

1046.24 . I W C E H . R

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1060.86   .  I                    W   C            E              H                          .   R
1075.48   .                                                                                  .
1090.10   .    I                    W  C            E              H                          .   R
1104.72   .     I                     W C           E              H                          .   R
1119.34   .                                                                                  .
1133.96   .       I                     W C           E              H                          .   R
1148.58   .        I                      W            E              H                          .   JX
1163.20   .        I                      C     W       E              H                          .   R
1177.82   .         I                      C   W        E              H                          .   R
1192.44   .          I                      C  W         E              H                          .   R
1207.05   .           I                     C  W         E              H                          .   R
1221.67   .           I                    W C            E              H                          .   R
1236.29   .                                                                                  .
1250.91   .                                                                                  .
1265.53   .                                                                                  .
1280.15   .                                                                                  .
1294.77   .                                                                                  .
1309.39   .                                                                                  .
1324.01   .                                                                                  .
1338.63   .                                                                                  .
1353.25   .                                                                                  .
1367.87   .                                                                                  .
1382.49   .                                                                                  .
1397.11   .                                                                                  .
1411.73   .                                                                                  .
1426.35   .                                                                                  .
1440.97   .                                                                                  .
1455.59   .                                                                                  .
1470.21   .                                                                                  .
1484.83   .                                                                                  .
1499.45   .                                                                                  .
1514.07   .                                                                                  .
1528.69   .                                                                                  .
1543.31   .                                                                                  .
1557.92   .                                                                                  .
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PROP

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1572.54   .                                                                                  .
1587.16   .                                                                                  .
1601.78   .                                                                                  .
1616.40   .                                                                                  .
1631.02   .                                                                                  .
1645.64   .                                                                                  .
1660.26   .                                I                    W C            E              H    .   R
1674.88   .                                                                                  .
1689.50   .                                                                                  .
1704.12   .                                                                                  .
1718.74   .                                                                                  .
1733.36   .                                    I                    WC            E              H .   R
          2749.180  2750.054  2750.928  2751.802  2752.676  2753.550  2754.424  2755.298  2756.172  2757.046  2757.920
```

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

Outlet Protection Computation

SLATER HANIFAN GROUP
CONSULTING ENGINEERS AND PLANNERS

RCB Outlet Protection Computation

FACILITY DESCRIPTION

Project Name:	Skye Canyon - Phase 3
Date:	7/21/2016
File Name:	OLY1602-000 TDS Outlet Protect Calc.xlsx
By:	CWB

Equations:

$(d_{50}/H)*(Y_t/H)/(Q/WH^{1.5}) = 0.0014$	(for $(Q/WH^{1.5})$ <4)	Equation 761a*
$(d_{50}/H)*(Y_t/H)^2/(Q/WH^{1.5})^{2.5} = 0.0019$	(for $(Q/WH^{1.5})$>=4)	Equation 761b*
$D_a = 1/2(D+Y_n)$ (used in place of D if Fr>1)		Equation 762*
$L = (1/(2 \tan q))(A_t/Y_t-W)$		Equation 764*
$A_t = Q/V$		Equation 765*

Known Information:

Q =	695	Flow (cfs)
H =	5	RCB Height
W =	14.0	RCB Width
q =	20	Expansion angle of the RCB flow (typ=20°)
V =	11.9	Allowable downstream velocity **(Referenced from Existing Wash Normal Depth)**
Fr =	3.04	Froude Number (0 if full)
Y_n =	4.06	Normal Depth of flow in RCB (ft)* **(Referenced from WSPGW Analysis)**
		* Not necessary if Fr<1 (Enter 0 if unknown)
Y_t =	3.0	Tailwater Depth (Enter 0.4H if unknown)

Riprap Erosion Protection Check (Figure 713):

Applicable only if $Q/WH^{1.5} \leq 8$

Ha = 0.5(H+Yn) = 4.53

$Q/WH^{1.5}$ = ***0.44*** ← ***See Figure 713 for Recommended Riprap Type***

$Q/WH^{0.5}$ = 22.20

Y_t/H 0.60

Solve For:

$Q/WH^{1.5}$ =	4.44	
D_{50} =	0.491	Average Size Riprap (ft) (for $(Q/WH^{1.5})$ <4)
D_{50} =	1.173	Average Size Riprap (ft) (for $(Q/WH^{1.5})$>=4)
D_{50} =	**1.2**	**Average Size Riprap (ft)**
D_{50} =	**14**	**Average Size Riprap (in)**
A_t =	58.4	Req'd Area of flow at allowable velocity (ft2)
Y_t =	3.01	Tailwater depth (ft)
H_a =	4.53	only used if Fr>=1
L =	**7.4**	**Length of Protection (ft)**
Min Length *L =	**18**	***For: Ha<3.5-ft, L_{min}=3Ha. For: Ha>=3.5-ft, L_{min}>= 4Ha. $L_{max(required)}$=10Ha**

D = Equivalent round pipe size

Notes:

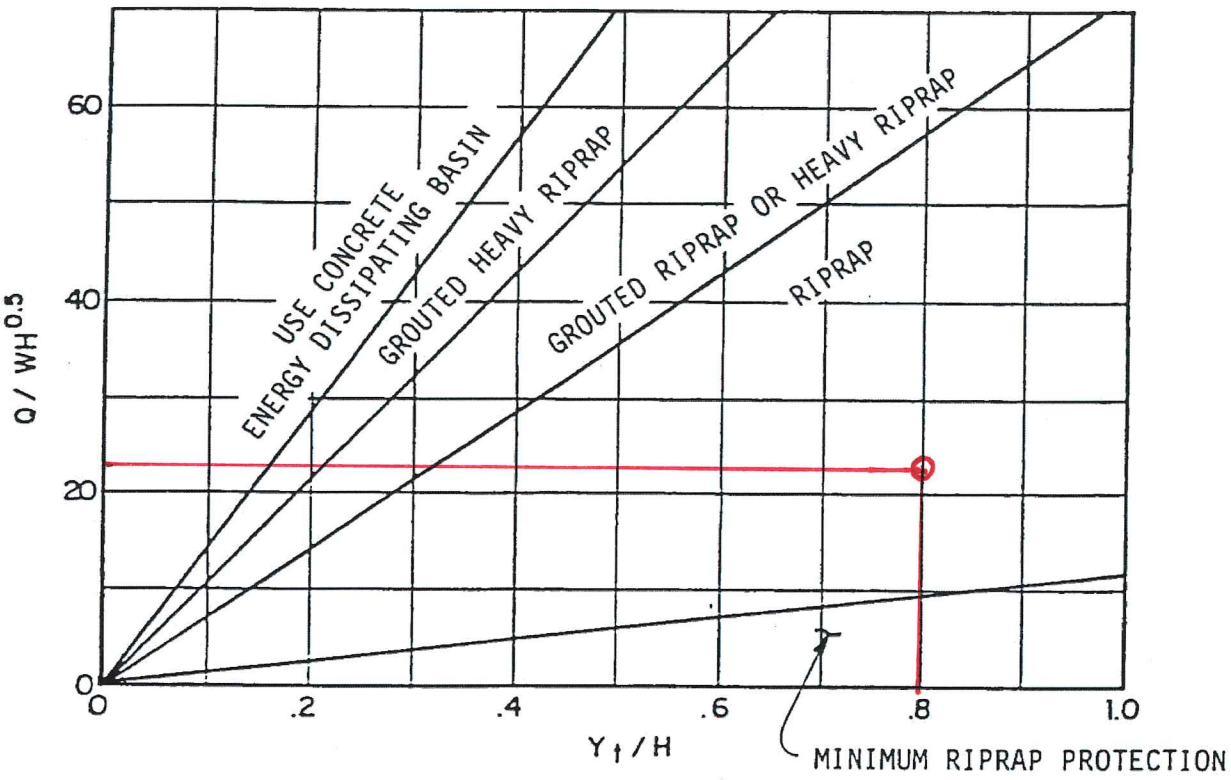
Provide D_{50} = 24-inch riprap for a length of 8-ft

*Concrete turnaround for maintenance extends 10-ft from the culvert outlet. Therefore total length of outlet protection is 18-ft (10-ft concrete + 8-ft rip-rap).

* Equations taken from the Clark County Regional Flood Control District - Hydrologic Criteria and Drainage Design Manual

5740 S. Arville St., Suite 216 - Las Vegas, NV 89118
Ph. 702-284-5300 - Fx. 702-284-5399

RIPRAP EROSION PROTECTION AT RECTANGULAR CONDUIT OUTLET



Notes:

1. Use H_a instead of H whenever culvert has supercritical flow in the barrel.
2. Minimum Riprap Protection: Use Riprap for a distance of 3H downstream for 18" to 36" equivalent round pipe size and 4D downstream for 42" and larger equivalent round pipe size.

*Outlet Protection shall be 10-ft Concrete + 7-ft Rip-Rap for a total length Min of 17-ft

Revision	Date

WRC ENGINEERING	REFERENCE: USDCM, DRCOG, March 1969 (with modifications)	FIGURE 713

APPENDIX I

Response to Comment #7

Flowmaster Calc. Skye Canyon Park – Emergency Overflow Path

Section SCP - Skye Canyon Park - Emergency Overflow
Worksheet for Irregular Channel

Project Description	
Worksheet	Section SCP - Skye Canyon Park - Emergency Overflow
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	2.53	%
Discharge	433.00	cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.016	
Water Surface Elevation	1.00	ft
Elevation Range	0.00 to 1.15	
Flow Area	43.9	ft²
Wetted Perimeter	80.57	ft
Top Width	78.35	ft
Actual Depth	1.00	ft
Critical Elevation	1.43	ft
Critical Slope	0.41	%
Velocity	9.86	ft/s
Velocity Head	1.51	ft
Specific Energy	2.51	ft
Froude Number	2.32	
Flow Type	Supercritical	

Calculation Messages:
Water elevation exceeds lowest end station by 0.50232964 ft.
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.0	0+91.0	0.016

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.0	0.50
0+00.5	0.48
0+00.6	0.00
0+02.0	0.13
0+02.0	0.17
0+39.0	0.74
0+39.0	0.82
0+39.3	1.13
0+39.7	1.15
0+51.3	1.15

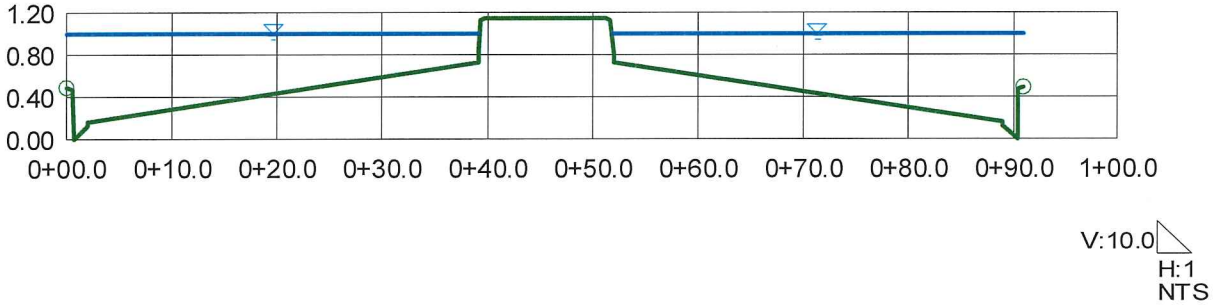
Section SCP - Skye Canyon Park - Emergency Overflow
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+51.7	1.13
0+52.0	0.82
0+52.0	0.74
0+89.0	0.17
0+89.0	0.13
0+90.4	0.00
0+90.5	0.48
0+91.0	0.50

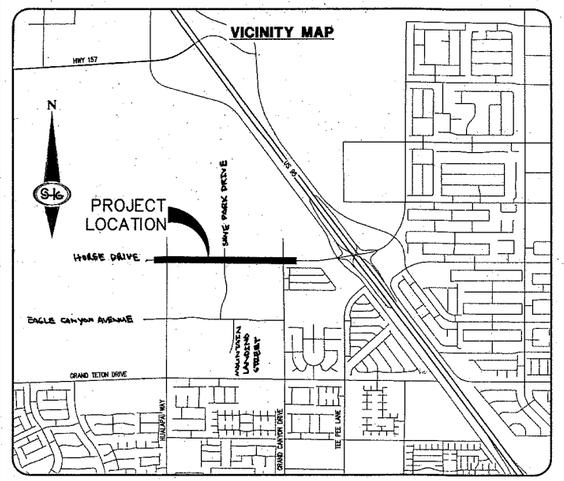
Section SCP - Skye Canyon Park - Emergency Overflow
Cross Section for Irregular Channel

Project Description	
Worksheet	Section SCP - Skye Canyon Park - Emergency Overflow
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.016	
Channel Slope	2.53	%
Water Surface Elevation	1.00	ft
Elevation Range	0.00 to 1.15	
Discharge	433.00	cfs



Reference Improvement Plans –
Skye Canyon Phase 1



IMPROVEMENT PLANS
FOR
SKYE CANYON PHASE 1
SKYE CANYON PARK BOULEVARD
A.K.A. HORSE DRIVE

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, 858.810 METERS
NAVD 88 DATUM

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

BASIS OF BEARING

SOUTH 00°22'12" WEST, BEING THE BEARING OF THE WEST LINE OF THE NORTHWEST QUARTER (NW1/4) 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.

OWNER

K A G DEVELOPMENT SOUTH LLC
% OLYMPIA COMPANIES LLC
11411 SOUTHERN HIGHLANDS
PARKWAY, SUITE 300
LAS VEGAS, NV 89141

DEVELOPER

NINETY–FIVE MANAGEMENT LLC
% OLYMPIA COMPANIES LLC
11411 SOUTHERN HIGHLANDS
PARKWAY, SUITE 300
LAS VEGAS, NV 89141
PH (702) 220–6565
FX (702) 220–6566

ENGINEER

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

SURVEY MONUMENTS PLACED FOR PUBLIC STREETS IN THIS PLAN SHALL BE PER BOOK 147 PAGE 71 OF SUBDIVISION PLATS

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

FAST. Call before you UnderGround. 1-702-432-5300

Call before you Dig. Avoid striking underground utility lines. It's costly. Call 811 or 1-800-227-2600

SUBMITTAL REVISION INDEX (CONTINUED)

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.
6	ADD SERVICE PEDESTAL, CONDUIT + PAVER ACCENTS	10-9-15	RM	11/9/15	SB
7	REVISE PRIVATE LANE STRIPING	10/29/15	JJS	11/2/15	

DRY UTILITY SUPPLEMENTAL INDEX

SOUTHWEST GAS

1	SKYE CANYON PARKWAY
2	SKYE CANYON PARKWAY
3	SKYE CANYON PARKWAY
4	SKYE CANYON PARKWAY
5	SKYE CANYON PARKWAY
6	SKYE CANYON PARKWAY
7	SKYE CANYON PARKWAY
8	SKYE CANYON PARKWAY
1	SKYE CANYON & GRAND CANYON
2	SKYE CANYON & GRAND CANYON
3	SKYE CANYON & GRAND CANYON

APPROVALS

CITY ENGINEER–DAVID BOWEN PE #16736 — DATE 11/6/14
ACTING AS CITY ENGINEER — DATE 11/7/14

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 FORM 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.

CHRIS KNIGHT — 11-6-14
DIRECTOR, BUILDING AND SAFETY — DATE

THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER — DATE 10/30/14
PROJECT NO. 122932
SHEETS: G-01, G-02, G-03, R-01, C-01 THRU C-04, SD-01, SD-02, SD-03, SD-05, AND UT-01 THRU UT-06
1ST APPD 10-30-14

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 — 9/12/14 — DATE

NV ENERGY — 7-30-14 — 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.

CENTURYLINK — 7/31/14 — DATE
MICHAEL SAMARA
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 STATUES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

SOUTHWEST GAS — EDWARD THURMAN — 8/1/14 — DATE

COX COMMUNICATIONS LAS VEGAS, INC. — DATE

INDEX OF DRAWINGS

SHT. NO.	DWG. NO.	DESCRIPTION
1	G–01	COVER SHEET
2	G–02	GENERAL NOTES
3	G–03	ABBREVIATIONS, LEGEND AND QUANTITIES
4	TY–01	ROADWAY SECTIONS
5	R–01	REMOVAL PLAN – "SCP" 94+00.00 TO "SCP" 103+50.00
6	C–02	CONSTRUCTION PLAN – "SCP" 73+50.00 TO "SCP" 79+50.00
7	C–03	CONSTRUCTION PLAN – "SCP" 79+50.00 TO "SCP" 89+00.00
8	C–04	CONSTRUCTION PLAN – "SCP" 89+00.00 TO "SCP" 98+50.00
9	C–05	CONSTRUCTION DETAILS
10	GR–01	GRADING PLAN – "SCP" 65+00.00 TO "SCP" 77+00.00
11	GR–02	GRADING PLAN – "SCP" 77+00.00 TO "SCP" 89+00.00
12	GR–03	GRADING PLAN – "SCP" 89+00.00 TO "SCP" 101+00.00
13	GR–04	GRADING DETAILS – SKYE CANYON PARKWAY & HUALAPAI WAY
14	GR–05	GRADING DETAILS – SKYE CANYON PARKWAY & GRAND CANYON DRIVE
15	SD–01	STORM DRAIN PLAN AND PROFILE – "SCP" 79+50.00 TO "SCP" 89+00.00
16	SD–02	STORM DRAIN PLAN AND PROFILE – "SCP" 89+00.00 TO "SCP" 98+50.00
17	SD–03	STORM DRAIN PLAN AND PROFILE – "GCD" 33+00.00 TO "GCD" 42+50.00
18	SD–04	STORM DRAIN PLAN AND PROFILE – "GCD" 42+50.00 TO "GCD" 45+50.00
19	SD–05	STORM DRAIN LATERAL PROFILES
20	SD–06	STORM DRAIN DETAILS
21	UT–01	UTILITY PLAN – "SCP" 64+00.00 TO "SCP" 73+50.00
22	UT–02	UTILITY PLAN – "SCP" 73+50.00 TO "SCP" 79+50.00
23	UT–03	UTILITY PLAN – "SCP" 79+50.00 TO "SCP" 89+00.00
24	UT–04	UTILITY PLAN – "SCP" 89+00.00 TO "SCP" 98+50.00
25	UT–05	UTILITY LATERAL PROFILES
26	LL–01	LIGHTING PLAN – "SCP" 64+00.00 TO "SCP" 79+50.00
27	LL–02	LIGHTING PLAN – "SCP" 79+50.00 TO "SCP" 98+50.00
28	ST–01	SIGNING AND STRIPING PLAN – "SCP" 64+00.00 TO "SCP" 79+50.00
29	ST–02	SIGNING AND STRIPING PLAN – "SCP" 79+50.00 TO "SCP" 98+50.00
30	ST–03	SIGNING AND STRIPING PLAN – "SCP" 98+50.00 TO "SCP" 101+00.00
31	TS–01	TRAFFIC SIGNAL INFRASTRUCTURE
32	S0.1	GENERAL STRUCTURAL NOTES
33	S0.2	TYPICAL DETAILS
34	S1.1	PLAN OF TRANSITION STRUCTURE HEAD WALL
35	S2.1	DETAILS OF TRANSITION STRUCTURE AND HEAD WALL
36		HORIZONTAL CONTROL PLAN I
37		HORIZONTAL CONTROL PLAN II
38		HORIZONTAL CONTROL PLAN III
39	CE–1	COMMON ELEMENT GRADING PLAN
40	CE–2	COMMON ELEMENT GRADING PLAN
41	CE–3	MONUMENT GRADING PLAN

#54681

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.
1	REVISED SEWER PROFILE	9/12/14	TMC	9/12/14	DB
2	ADD PR. SAN. SEWERS + CE GRD	3-9-15	TMC	3/9/15	DB
3	REVISED STORM DRAIN LAYOUT	04/15/15	DAS	4/15/15	DB
4	REVISED SKYE PARK NOTES	5-19-15	TMC	5/19/15	DB
5	ADD SEWER + STORM DRAIN, ADD SHEET 2	6/15/15	DAS	6/15/15	DB
6	REVISE SEWER + DRAIN LAYOUT	9/21/15	DAS	9/21/15	DB
7	REVISED SEWER + DRAIN LAYOUT	10/15/15	DAS	10/15/15	DB
8	REVISED SEWER + DRAIN LAYOUT	11/2/15	DAS	11/2/15	DB

NINETY-FIVE MANAGEMENT LLC

SKYE CANYON PHASE 1
SKYE CANYON PARK BOULEVARD
COVER SHEET

DATE: 6/16/14
DRAFTER: SPC
DESIGNER: DAM
CHECKED: JSR
PROJECT NO.
OLY1401-001

PROFESSIONAL ENGINEER — STATE OF NEVADA — JERRY A. SLATER — Reg. 08/30/2016 — CIVIL — No. 14167

G-01
SHEET 1 OF 35
DRAWING NO.
107V6296-SCP

HANSEN NO. 54681

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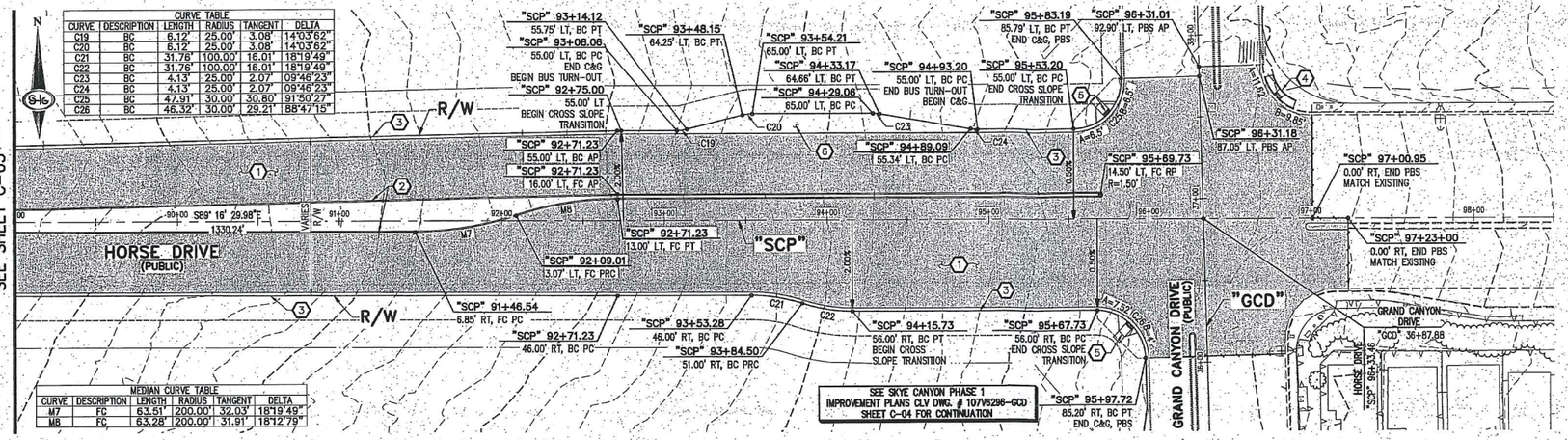


CONSTRUCTION NOTES

1. CONSTRUCT "I" UTACS OVER 5" PBS OVER 6" TYPE II AGGREGATE BASE (SEE TY-SHEETS).
2. CONSTRUCT "A" TYPE ISLAND CURB (USDCCA STD. DWG. NO. 219)
3. CONSTRUCT "L" TYPE CURB AND GUTTER (USDCCA STD. DWG. NO. 218)
4. CONSTRUCT SIDEWALK RAMP (CASE I) WITH TACTILE WARNING PANEL (USDCCA STD. DWG. NO. 235)
5. CONSTRUCT SIDEWALK RAMP (CASE II) WITH TACTILE WARNING PANEL (USDCCA STD. DWG. NO. 235 AND DETAIL 1, SHEET C-05)
6. CONSTRUCT BUS TURN-OUT (USDCCA STD. DWG. NO. 234.1)

NOTES

1. DIMENSIONS ARE TO BACK OF CURB, FACE OF CURB, OR FACE OF MEDIAN UNLESS OTHERWISE NOTED.
2. SEE TY-SHEETS FOR TYPICAL SECTIONS.
3. SEE R-SHEETS FOR REMOVAL PLANS.
4. SEE SD-SHEETS FOR STORM DRAIN PLAN AND PROFILES.
5. SEE UT-SHEETS FOR WATER AND SEWER PLAN AND PROFILES.
6. SEE GR-SHEETS FOR OFFSITE GRADING

LEGEND

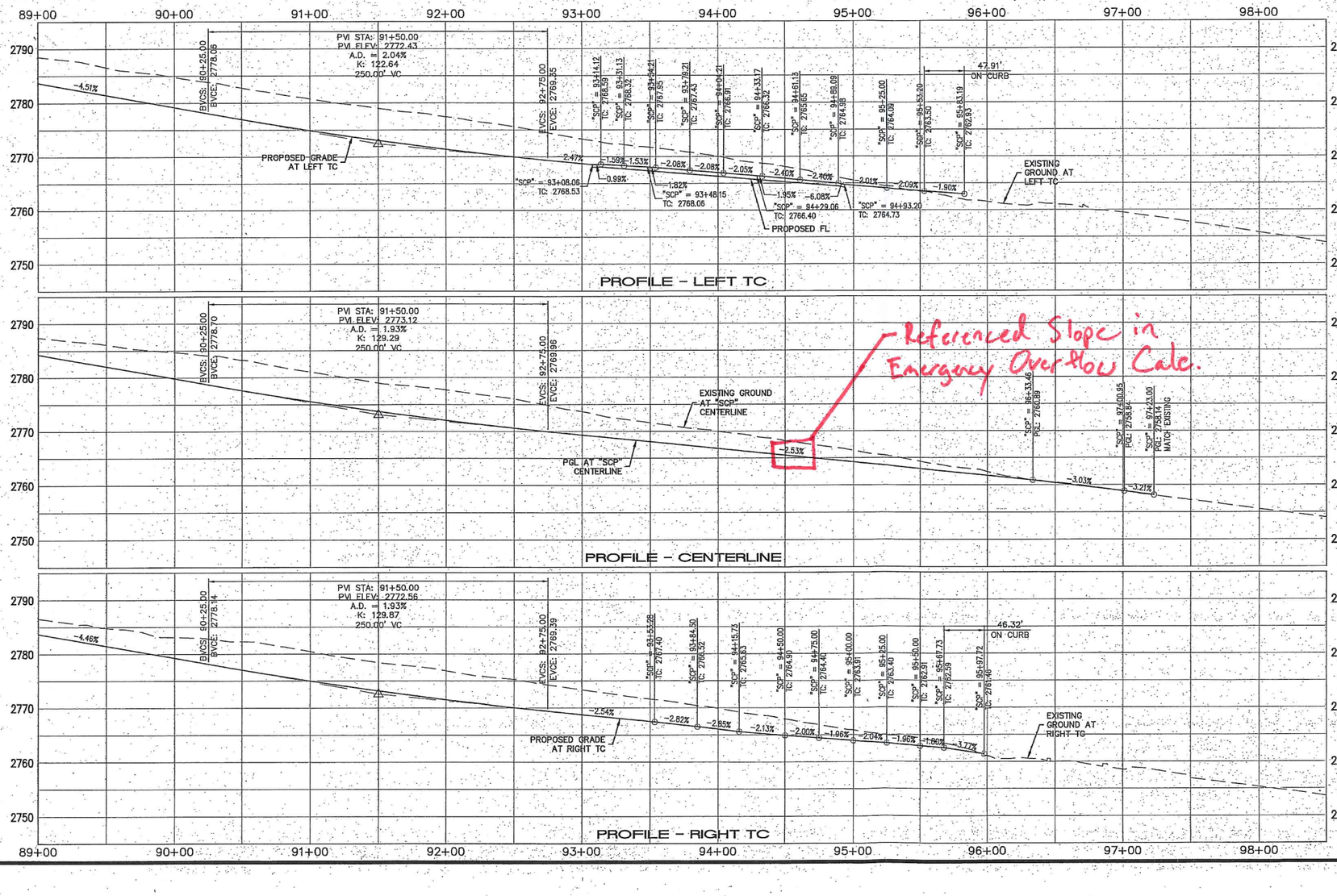
"I" UTACS OVER 5" PBS OVER 6" TYPE II AGGREGATE BASE.

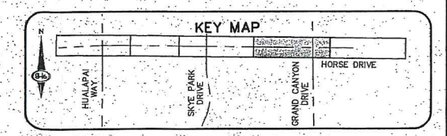
APPROVED FOR CONSTRUCTION

Y. DISHARI FOR J. SCHER 10/30/14

LVVWD ENGINEERING SERVICES MANAGER — DATE

PROJECT NO. 122932





SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

NINETY-FIVE MANAGEMENT LLC

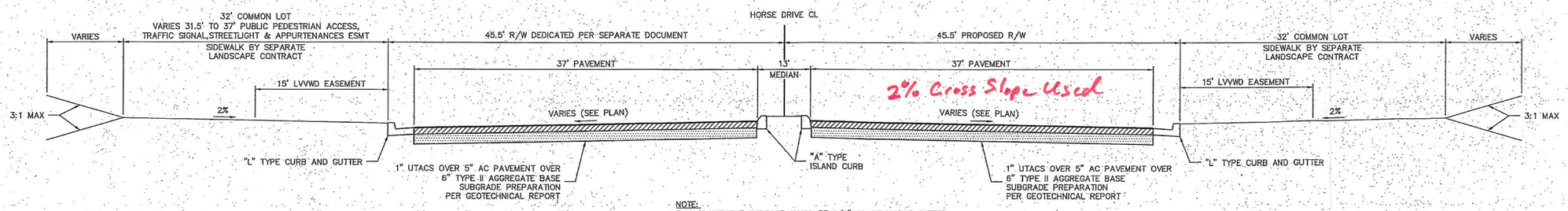
SKYE CANYON PHASE 1
SKYE CANYON PARK BOULEVARD
CONSTRUCTION PLAN - "SCP" 89+00.00 TO "SCP" 98+50.00

DATE: 9/17/14
DRAFTER: SPC
DESIGNER: DAM
CHECKED: JSR
PROJECT NO. OLY1401-001

PROFESSIONAL ENGINEER STATE OF NEVADA JERRY J. SCHER No. 14167 CIVIL 9.24.14

C-04
SHEET 9 OF 39
DWG NO. 107V6206-SCP
HANSEN NO: 54681

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DIG OVERHEAD 1-702-227-2929
FAST Call before you UnderGround. 1-702-432-5300
Call before you Dig Avoid hitting underground utility lines. Call 811 1-800-227-2600



NOTE:
FINAL PAVEMENT SURFACE SHALL BE 1/2" ABOVE LIP OF GUTTER.
PAVEMENT SHALL BE FLUSH WITH LIP OF GUTTER AT SIDEWALK RAMPS.

HORSE DRIVE I.E. Sky Canyon Park Dr. (A)

NOT TO SCALE

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NINETY-FIVE MANAGEMENT LLC

SKYE CANYON PHASE 1
SKYE CANYON PARKWAY
ROADWAY SECTIONS

DATE: 9/17/14
DRAFTER: SPC
DESIGNER: DAM
CHECKED: JSR
PROJECT NO.
OLY1401-001

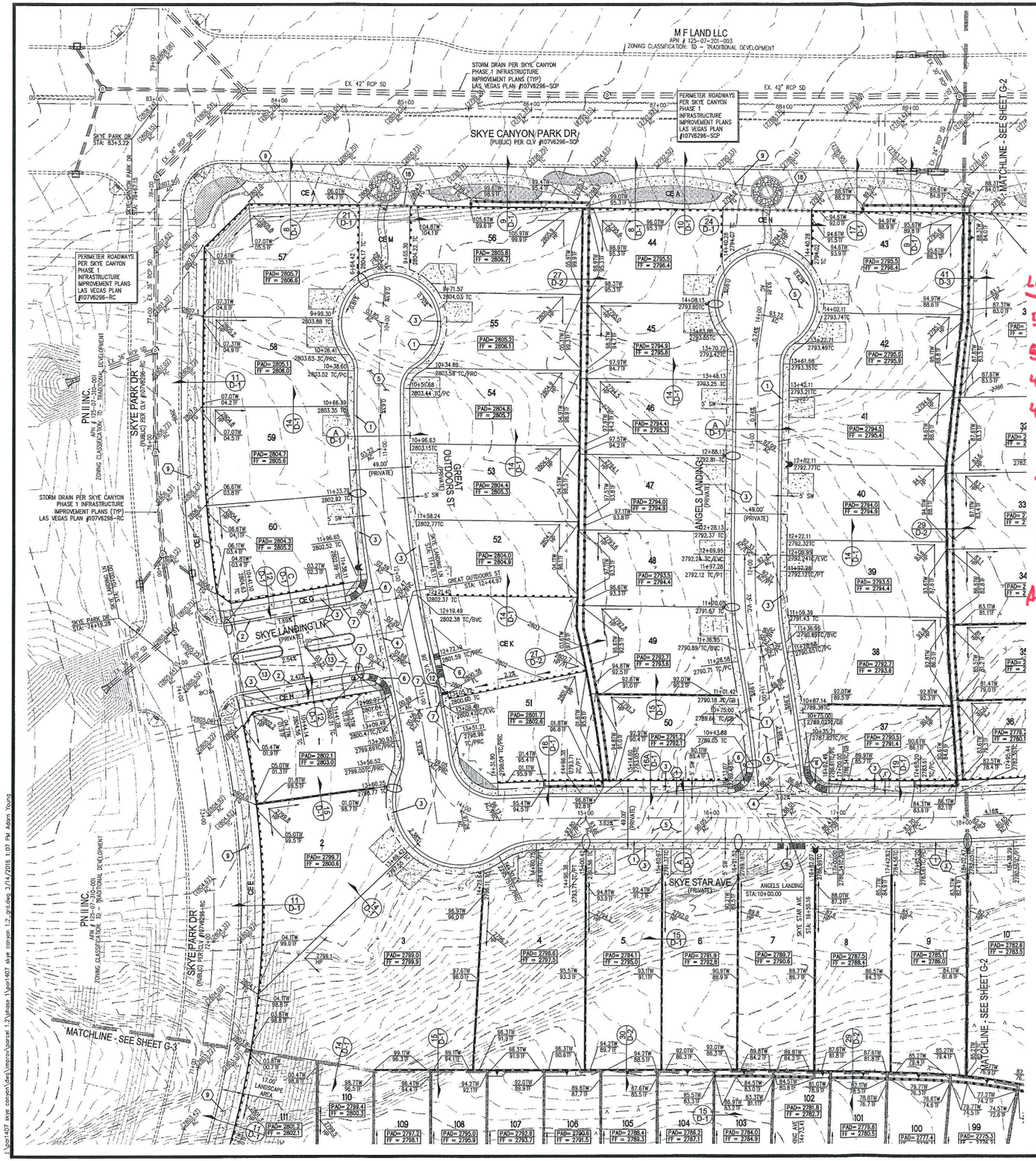
PROFESSIONAL ENGINEER - STATE OF NEVADA
JERRY SLATER
Exp. 06/30/2016
CIVIL
No. 14167

TY-01
SHEET 4 OF 34

DWG NO. 107V6296-SCP
HANSEN NO. 54681

J:\OLY\1401-001 Sky Canyon\Dwg\Improv\SCPKWY-All.dwg, TY-01, 6/20/2014 8:52:25 AM, ewolf

Referenced Improvement Plans –
Skye Canyon – Parcel 1.2 (DS4679E)



Lot	HighTc	FF	Δ
57	2.7	6.6	2.9
56	0.73	6.7	5
44	94.67	96.4	0.7
43	88.14	96.4	7.26

Δ = FF - [WSE + HighTc]

WSE = Lft
See Floodmaster Comp.

All Δ > 0 FFE are OK

QUANTITIES

DRAINAGE	PUBLIC		PRIVATE	
1. 60" TYPE I STORM DRAIN MANHOLE	EA	–	EA	1
2. 60" TYPE II STORM DRAIN MANHOLE	EA	–	EA	5
3. 10.0' TYPE "CM2" STORM DRAIN DROP INLET	EA	–	EA	2
4. 22.5' TYPE "CM2" STORM DRAIN DROP INLET	EA	–	EA	1
5. 24" RCP STORM DRAIN	LF	–	LF	271
6. 36" RCP STORM DRAIN	LF	–	LF	361
7. 42" RCP STORM DRAIN	LF	–	LF	–

N

SCALE – 1"=40' (0, 40, 80 FEET)

KEY MAP
NOT TO SCALE

GRADING NOTES

1. INSTALL 35" ROLL CURB PER CCAUSD NO. 217.S1 OVER 6" TYPE II AGGREGATE BASE
2. INSTALL "L" TYPE CURB AND GUTTER PER CCAUSD #216
3. INSTALL 5' WIDE CONCRETE SIDEWALK (5" THICK OVER 6" TYPE 2 AGGREGATE BASE) PER CCAUSD #234
4. INSTALL 9-FT CROSS GUTTER PER DETAIL 37 ON SHEET D-2
5. INSTALL 2" ASPHALT PAVEMENT OVER 4" TYPE II AGGREGATE BASE
6. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT CCAUSD NO. 235, CASE I & 235.1
7. CONSTRUCT 12' TRANSITION FROM "L" CURB TO ROLL CURB PER DETAIL 43 ON SHEET D-3
8. INSTALL 60" TYPE I STORM DRAIN MANHOLE PER CCAUSD #403
9. PERIMETER LANDSCAPE TO BE CONSTRUCTED BY MASTER DEVELOPER
10. INSTALL 60" TYPE III STORM DRAIN MANHOLE PER CCAUSD #406
11. INSTALL 10.0' TYPE "CM2" DROP INLET PER CCAUSD #412.1 AND #421
12. INSTALL SIDEWALK DRAIN PER CCAUSD #236
13. INSTALL "A" TYPE ISLAND CURB PER CCAUSD #219
14. SEE SHEET P-2 FOR STORM DRAIN PLAN AND PROFILE
15. SEE SHEET P-1 FOR STORM DRAIN PLAN AND PROFILE
16. INSTALL 22.5' TYPE "CM2" DROP INLET PER CCAUSD #412.1 AND #421
17. INSTALL WROUGHT IRON FENCE W/ PEDESTRIAN ACCESS GATE PER DETAIL 39 ON SHEET D-2
18. INSTALL WROUGHT IRON FENCE W/PEDESTRIAN ACCESS
19. INSTALL 5.0' TYPE "CM2" DROP INLET PER CCAUSD #412.1 AND #421
20. INSTALL ROLL-CURB TO DEPRESSED CURB TRANSITION PER DETAIL 43 ON SHEET D-3
21. INSTALL CONCRETE FLOWLINE PER DETAIL 42 ON SHEET D-3

SEE SHEET C-2 FOR ABBREVIATIONS AND QUANTITIES

STORMWATER RUNOFF MANAGEMENT

(REQUIRED FOR ALL SITES GREATER THAN 1 ACRE (43,560 SQ.FT.))

1. THE OWNER, SITE DEVELOPER, CONTRACTOR AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATE IN, THE PUBLIC RIGHTS OF WAYS OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN TITLE 24.40 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BEST MANAGEMENT PRACTICES MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY. REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BMPS WEEKLY AND WITHIN 24 HOURS AFTER ANY ACTUAL RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL IMPLEMENT OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMPS SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

LEGEND

- PLANTER RETAINING WALL
- RETAINING WALL WITH DECORATIVE BLOCK
- DECORATIVE SCREEN WALL
- RETAINING WALL WITH DECORATIVE 6' SCREEN WALL

WALLS ADJACENT TO COMMON LOTS

SCREEN WALLS ADJACENT TO COMMON LOTS SHALL END NO CLOSER THAN 20' TO BACK OF CURB. RETAINING WALLS SHALL END NO CLOSER THAN 5' TO BACK OF CURB.

FLOOD CERTIFICATION

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY # DS4672 ON FILE AT CITY OF LAS VEGAS FOR THE SUBJECT PROJECT.

KIRBY P. ADAMS, P.E. 15522 — 3/14/16 DATE

LEGAL DESCRIPTION

BEING A PORTION OF THE NORTHWEST QUARTER (NW 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 7, TOWNSHIP 19 SOUTH, RANGE 60 EAST M.D.M., CLARK COUNTY, NEVADA.

BASIS OF BEARING

NORTH 89°11'30" WEST, BEING THE BEARING OF THE SOUTH LINE OF THE SOUTHWEST QUARTER (SW ¼) OF SECTION 7, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., AS PER FILE 151, PAGE 14 OF SURVEYS, ON FILE IN THE COUNTY RECORDER'S OFFICE.

BENCHMARK

USDA BRASS CAP ON AN IRON PIPE, 140' SOUTHWEST OF TELEPHONE POLE #26994T, SOUTHWEST CORNER OF THE U.S. 95/KYLE CANYON TURNOFF.

ELEVATION = 2817.62 FEET, 858.813 METERS
N.A.V.D. 88 DATUM
PER THE CLARK COUNTY VERTICAL CONTROL LAST REVISED 2003

GENERAL NOTES

1. SEE PLAN AND PROFILE SHEETS FOR CENTERLINE AND BACK OF CURB CURVE DATA.
2. FINAL GRADES ADJACENT TO STRUCTURES SHALL BE IN CONFORMANCE WITH IBC 2012, SECTION 2304.11.2.2.
3. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND REPORT ALL DISCREPANCIES TO THE ENGINEER.
4. ALL IMPROVEMENTS TO BE PROTECTED FROM EROSION BY SWPPP.
5. MAXIMUM/MINIMUM SLOPES AND MINIMUM STREET SECTIONS NOT TO EXCEED THAT SHOWN ON GEOTECH REPORT.
6. SEE DETAIL SHEETS FOR STREET SECTIONS AND DETAILS.
7. ALL PUBLIC AND PRIVATE DRAINAGE IMPROVEMENTS TO BE BONDED FOR AND INSPECTED.
8. CONSTRUCTION OF BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL.
9. EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING UTILITY STRUCTURES AND FACILITIES AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. CONTRACTOR TO PROTECT IN PLACE DURING CONSTRUCTION. ENGINEER/OWNER SHALL BE NOTIFIED OF PRIOR DAMAGE TO EXISTING FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR REPAIR/REPLACING FACILITIES IF ENGINEER/OWNER IS NOT NOTIFIED OF EXISTING DAMAGE PRIOR TO CONSTRUCTION COMMENCING.
10. NO STRUCTURE, VEGETATION, OR OBJECTS OF ANY KIND IS PERMITTED OVER TWENTY-FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB IF CURB EXIST) WITHIN THE SIGHT VISIBILITY ZONES.
11. ALL ELEVATIONS SHOWN, WITH EXCEPTION TO PAD, FINISHED FLOOR, AND CONTOUR ELEVATIONS, ARE THE VALUE SHOWN PLUS 2800'.

PERIMETER SIDEWALKS

PERIMETER SIDEWALK DISPLAYED FOR CONCEPTUAL PURPOSES ONLY. MASTER DEVELOPER TO PROVIDE DESIGN AND CONNECTIONS FOR ONSITE PEDESTRIAN ACCESS

DRAINAGE EASEMENT NOTE

ALL DRAINAGE EASEMENTS AND COMMON LOTS ARE PUBLIC DRAINAGE EASEMENTS PRIVATELY MAINTAINED BY THE HOA

PRIVATE STREETS NOTE

ALL PRIVATE STREETS ARE P.U.E., PUBLIC SEWER EASEMENTS AND PUBLIC DRAINAGE EASEMENTS TO BE PRIVATELY MAINTAINED BY THE HOA

STORM DRAIN NOTE

ALL ONSITE STORM DRAIN AND THE ASSOCIATED FACILITIES ARE PRIVATELY OWNED AND TO BE PRIVATELY MAINTAINED BY THE HOMEOWNERS ASSOCIATION

FLOOD ZONE

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C2535F, DATED NOVEMBER 16, 2011. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD.

DISCLAIMER NOTE

EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXCEPT 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.

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP.	APP. DATE
1	UPDATE OWNER, LOTS, STREETS & UTILITY DESIGNS	03/14/16	AY		

CITY OF LAS VEGAS, NEVADA

Pardee Homes

SKYE CANYON PARCEL 1.2

GRADING PLAN I

ST T19S R60E

DATE: 3/14/16
DRAFTER: AJY
DESIGNER: AJY
CHECKED: KPA

PROJECT NO.
PAR1407

PROFESSIONAL ENGINEER — STATE OF NEVADA — KIRBY P. ADAMS — Exp. 12/31/2016 — CIVIL — No. 15522 — 3/14/16

G-1
SHEET 3 OF 42

H #58197
CLV #107Y5009-1.2

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Lot	HeadTS	FF	Δ
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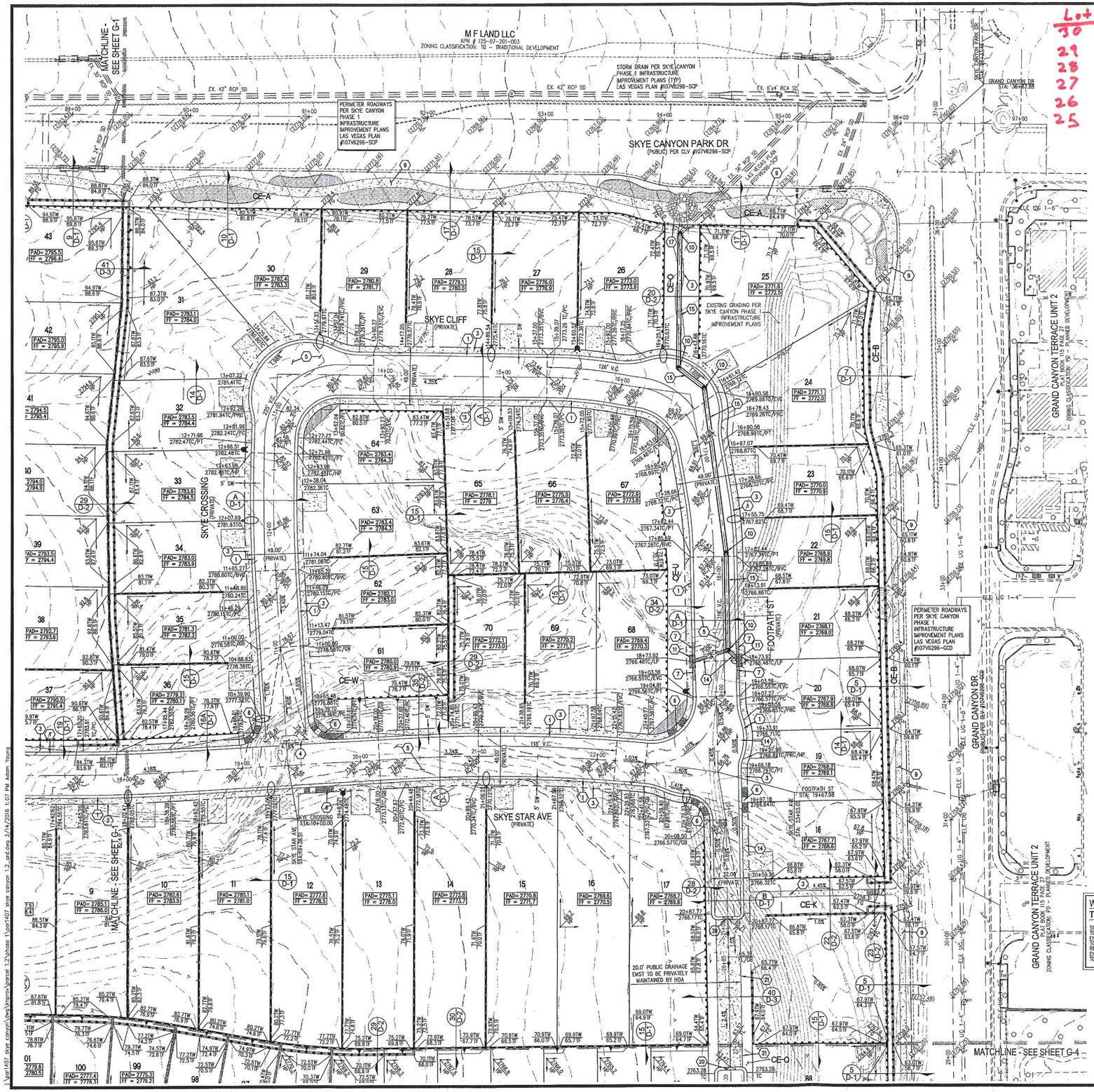
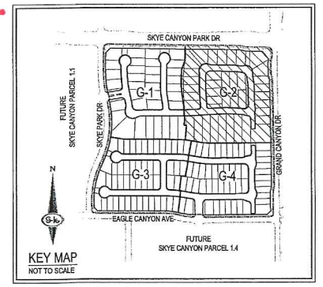
27	70.05	76.9	5.85
26	68.76	73.9	4.14
25	65.63	72.5	5.87





KEY MAP
NOT TO SCALE

GRADING NOTES

1. INSTALL 30" ROLL CURB PER CCAUSD NO. 217.S1 OVER 6" TYPE II AGGREGATE BASE
2. INSTALL "L" TYPE CURB AND GUTTER PER CCAUSD #216
3. INSTALL 5' WIDE CONCRETE SIDEWALK (5" THICK OVER 6" TYPE 2 AGGREGATE BASE) PER CCAUSD #234
4. INSTALL 8-FT CROSS GUTTER PER DETAIL J7 ON SHEET D-2
5. INSTALL 2" ASPHALT PAVEMENT OVER 4" TYPE II AGGREGATE BASE
6. CONSTRUCT SIDEWALK RAMPS USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT CCAUSD NO. 235, CASE I.E. 238.1
7. CONSTRUCT TO TRANSITION FROM "L" CURB TO ROLL CURB PER DETAIL A5 ON SHEET D-3
8. INSTALL 60" TYPE I STORM DRAIN MANHOLE PER CCAUSD #403
9. PERIMETER LANDSCAPE TO BE CONSTRUCTED BY MASTER DEVELOPER
10. INSTALL 60" TYPE III STORM DRAIN MANHOLE PER CCAUSD #406
11. INSTALL 10.0' TYPE "CM2" DROP INLET PER CCAUSD #412.1 AND #421
12. INSTALL SIDEWALK DRAIN PER CCAUSD #236
13. INSTALL "A" TYPE ISLAND CURB PER CCAUSD #219
14. SEE SHEET P-2 FOR STORM DRAIN PLAN AND PROFILE
15. SEE SHEET P-1 FOR STORM DRAIN PLAN AND PROFILE
16. INSTALL 22.5° TYPE "CM2" DROP INLET PER CCAUSD #412.1 AND #421
17. INSTALL WROUGHT IRON FENCE W/ PEDESTRIAN ACCESS GATE PER DETAIL 39 ON SHEET D-2
18. INSTALL WROUGHT IRON FENCE W/PEDESTRIAN ACCESS
19. INSTALL 5.0' TYPE "CM2" DROP INLET PER CCAUSD #412.1 AND #421
20. INSTALL ROLL-CURB TO DEPRESSED CURB TRANSITION PER DETAIL A3 ON SHEET D-3
21. INSTALL CONCRETE FLOWLINE PER DETAIL 42 ON SHEET D-3

SEE SHEET C-2 FOR ABBREVIATIONS AND QUANTITIES

STORMWATER RUNOFF MANAGEMENT

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FLOOD CERTIFICATION

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KIRBY P. ADAMS, P.E. 15522 — DATE 3/14/16

LEGAL DESCRIPTION

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BENCHMARK

USDA BRASS CAP ON AN IRON PIPE, 140' SOUTHWEST OF TELEPHONE POLE #269947, SOUTHWEST CORNER OF THE U.S. 95/KYLE CANYON TURNOFF.

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N.A.V.D. 88 DATUM
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5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.
1	PRIVATE OWNER, LOTS, STREETS & UTILITY DESIGNS	10/14/16	JAY		

CITY OF LAS VEGAS, NEVADA

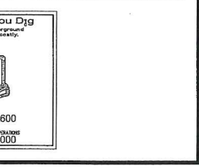
Pardee Homes

SKYE CANYON PARCEL 1.2
GRADING PLAN II

S17 T19S R60E

DATE: 3/14/16
DRAFTER: AJY
DESIGNER: AJY
CHECKED: KPA

PROJECT NO.
PAR1407



G-2
SHEET 4 OF 42

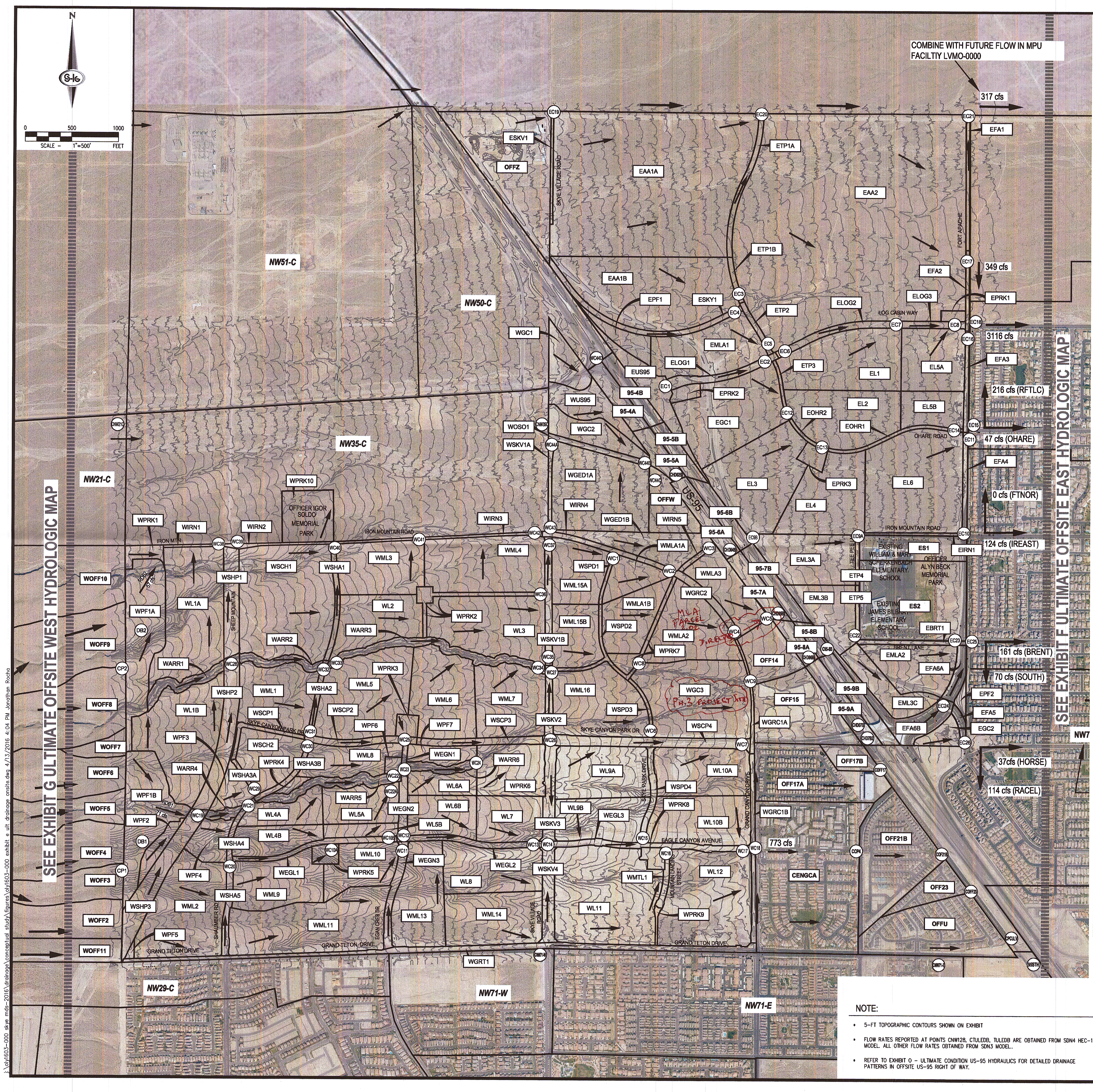
H #58197
CLV #107Y5009-1.2

J:\par1407 skye canyon\civil\Virginia\parcel 1.2\phase 1\par1407 skye canyon 1.2_grd.dwg 3/14/2016 1:07 PM Adam Young

APPENDIX J

Response to Comment #19

Reference Drainage Exhibits
Skye Canyon Master Drainage Study



j:\oly1603-000 skye mds-2016\drainage\conceptual study\figures\oly1603-000 exhibit e ult drainage onsite.dwg 4/13/2016 4:04 PM Jonathan Rocha

NOTE:

- 5-FT TOPOGRAPHIC CONTOURS SHOWN ON EXHIBIT
- FLOW RATES REPORTED AT POINTS CNW128, CTULEDB, TULEDB ARE OBTAINED FROM SDN4 HEC-1 MODEL. ALL OTHER FLOW RATES OBTAINED FROM SDN3 MODEL..
- REFER TO EXHIBIT O - ULTIMATE CONDITION US-95 HYDRAULICS FOR DETAILED DRAINAGE PATTERNS IN OFFSITE US-95 RIGHT OF WAY.

Ultimate Condition Flow Rate Summary
Skye Canyon West Basins

Basin/Concentration Point ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
WARR1	3.6	9	4
WARR2	2.8	7	3
WARR3	7.1	17	7
WARR4	1.3	3	1
WARR5	8.0	18	8
WARR6	2.4	6	2
WGC1	8.3	24	11
WGC2	8.3	23	10
WGC3	30.4	95	47
WGED1A	28.4	77	35
WGED1B	11.5	33	16
WL10A	17.1	46	21
WL10B	18.3	49	22
WL11	36.7	99	46
WL12	31.4	84	38
WL1A	29.8	81	38
WL1B	28.0	79	36
WL2	15.7	45	21
WL3	24.9	69	32
WL4A	8.0	23	10
WL4B	8.9	27	12
WL5A	10.9	32	15
WL5B	3.8	12	5
WL6A	6.2	19	9
WL6B	10.6	30	14
WL7	11.5	34	16
WL8	17.4	48	22
WL9A	18.2	49	22
WL9B	14.4	39	18
WML1	18.0	52	24
WML10	11.6	38	19
WML11	16.0	48	23
WML12	15.1	44	20
WML13	16.4	49	25
WML14	19.2	59	29
WML15A	12.3	40	20
WML15B	11.2	34	17
WML16	22.2	64	32
WML2	27.4	78	38
WML3	17.3	56	28
WML4	25.1	77	38
WML5	27.3	82	41
WML6	20.5	64	32
WML7	18.6	59	30
WML8	10.3	34	17
WML9	16.4	55	28
WMLA1A	6.5	20	10
WMLA1B	12.0	37	18
WMLA2	30.4	88	44
WMLA3	11.5	35	17
WPF1A	20.2	59	29
WPF1B	18.9	63	31
WPF2	3.1	10	5
WPF3	4.6	17	8
WPF4	5.7	19	9
WPF5	0.4	1	0
WPF6	1.0	4	2
WPF7	4.5	14	7
WPRK1	2.4	6	2
WPRK10	10.0	19	8
WPRK2	3.2	7	2
WPRK3	1.8	4	2
WPRK4	1.0	3	1
WPRK5	2.0	5	2
WPRK6	13.2	28	10
WPRK7	3.0	6	2
WPRK8	1.7	4	1
WPRK9	0.5	1	0
WSCH1	39.4	106	48
WSCH2	11.5	37	16
WEST ROADWAY BASINS			
WEGL1	3.4	12	6
WEGL2	3.3	12	7
WEGL3	4.8	16	9
WEGN1	0.5	2	1
WEGN2	2.1	2	1
WEGN3	3.3	10	6
WGRC1A	1.3	4	2
WGRC1B	3.2	10	5
WGRC2	2.7	9	5
WGRT1	11.7	30	16
WIRN1	0.6	2	1
WIRN2	2.2	7	4
WIRN3	1.3	5	3
WIRN4	2.7	9	5
WIRN5	0.7	3	2
WMTL1	1.3	5	2
WOSO1	2.2	8	4
WSCP1	1.5	6	3
WSCP2	3.0	11	6
WSCP3	3.5	13	7
WSCP4	7.8	25	14
WSHA1	2.3	6	2
WSHA2	1.5	5	2
WSHA3A	0.7	3	1
WSHA3B	1.6	6	3
WSHA4	1.4	6	3
WSHA5	2.4	8	5
WSHP1	6.4	19	9
WSHP2	9.3	27	13
WSHP3	10.4	31	15
WSKV1A	1.4	5	3
WSKV1B	3.5	11	6
WSKV2	2.0	19	8
WSKV3	4.2	14	7
WSKV4	4.5	15	8
WSPD1	0.7	3	1
WSPD2	2.1	3	2
WSPD3	0.9	3	2
WSPD4	2.3	8	4
WUS95	8.5	28	16

Ultimate Condition Flow Rate Summary
Skye Canyon West Concentration Points

Basin/Concentration Point ID	Area (sq. mi)	Q_{100} (cfs)	Q_{10} (cfs)
WC1 Q = WML15A + WSPD1	0.02	43	21
WC2 Q = WC1 + WIRN4 + WMLA1A	0.03	73	37
WC3 Q = WC2 + WGED1B + WIRN5	0.05	109	54
WC4 Q = WPRK7 + WMLA1B + WMLA2 + WGRC2	0.08	135	67
WC5 Q = WC4 + WMLA3	0.09	170	83
WC6 Q = WML16 + WSPD3	0.04	68	33
WC7 Q = WC6 + WL9A + WL10A + WSCP4	0.10	186	89
WC8 Q = WML15B + WSPD2	0.02	37	19
WC9 Q = WC7 + WGC3 + WGRC1A + WC8	0.17	322	155
WC10A Q = WML9 + WPRK5	0.03	60	30
WC10B Q = WC10A + WL4B + WEGL1	0.05	99	48
WC11 Q = WML10 + WEGN3	0.07	127	61
WC12 Q = WC10B + WC11	0.11	226	109
WC13 Q = WC12 + WL6B + WL7 + WML13 + WEGL2	0.17	352	170
WC14 Q = WC13 + WML14 + WL8 + WSKV3 + WSKV4	0.24	485	236
WC15 Q = WL9B + WSPD4	0.03	46	21
WC16 Q = WL11 + WPRK8 + WPRK9 + WMTL1	0.06	106	48
WC17 Q = WC14 + WC15 + WC16 + WEGL3 + WL10B	0.37	695	331
WC18 Q = WC17 + WL12 + WGRC1B	0.42	787	372
WC19 Q = RDB1 + WSHP3 + WPF2	0.90	94	70
WC20 Q = WPF5 + WML2 + WSHA5	0.05	86	42
WC21 Q = WC19 + WC20 + WARR4 + WPF4 + WSHA4	0.96	201	121
WC22A Q = WL4A + WL5A + WL5B	0.05	67	43
WC22 Q = WC21 + WC22A + WPRK4 + WARR5	1.01	282	169
WC23 Q = WC22 + WML8 + WPF6 + WEGN1 + WEGN2	1.03	322	189
WC24 Q = WC23 + WARR6 + WPF7 + WL6A	1.05	359	194
WC25 Q = WSCP2 + WPRK3	0.01	16	8
WC26 Q = WC24 + WC25 + WPRK6 WSCP3	1.09	412	217
WC27 Q = WC26 + WML7 + WSKV2	1.12	487	253
WC28 Q = WL1B + WARR1 + WSHP2	0.06	113	53
WC29 Q = WPF4 + WSHA3A	0.01	19	10
WC30 Q = WC29 + WSCH2 + WSHA3B	0.04	62	29
WC31 Q = WC30 + WSCP1	0.04	68	33
WC32 Q = WC31 + WML1 + WSHA2	0.07	124	58
WC33 Q = WC28 + WC32 + WARR2	0.14	244	113
WC34 Q = WC33 + WARR3 + WML5 + WML6	0.23	404	191
WC35 Q = WC27 + WC34	1.34	876	436
WC36 Q = WL2 + WPRK2	0.03	51	23
WC37 Q = WC35 + WC36 + WSKV1B + WL3	1.41	1000	492
WC38 Q = RDB2 + WPRK1 + WIRN1 + WL1A	0.62	111	46
WC39 Q = WC38 + WSHP1	0.63	129	55
WC40 Q = WSCH1 + WSHA1	0.07	112	50
WC41 Q = WC38 + WC39 + WIRN2 + WC40 + WML3	0.72	293	132
WC42 Q = WC41 + WIRN3 + WML4	0.77	370	171
WC43 Q = WL37 + WC42	2.18	1291	619
WC44A Q = WC43 + WSKV1A	2.19	1296	621
WC44B Q = CNW35C + WC44A + WGC2 + WOSO1 + WGED1A	4.95	2079	865
WC44C Q = NW50-C + WGC1	0.18	250	97

Ultimate Condition Flow Rate Summary
Skye Canyon East Concentration Points

Basin/Concentration Point ID	Area (sq. mi)	Q_{100} (cfs)	Q_{10} (cfs)
EC1 Q = WC44B + WC44C + +RETC1B + EUS95 + 95-4A + 95-4B	5.16	2355	978
EC2 Q = EC1 + ELOG1 + EPRK2	5.18	2364	964
EC3 Q = EAA1B + ETP1B	0.06	109	49
EC4 Q = ESKY1 + EPF1	0.01	19	9
EC5 Q = EC3 + EC4 + ETP2 + EMLA1	0.11	177	82
EC6 Q = EC2 + EC5	5.27	2521	1034
EC7 Q = EC6 + EL1 + ELOG2	5.33	2574	1055
EC8 Q = EC7 + EL5A + ELOG3 + EPRK1	5.36	2606	1068
EC9A Q = RETC2B + 95-5A + 95-5B + 95-6A + 95-6B	0.03	57	27
EC9B Q = EC9A + EML3A + ETP4	0.04	108	52
EC10 Q = EC9B + EIRN1 + ES1	0.08	140	68
EC11 Q = FTNOR + EL6 + EFA4	0.14	73	29
EC12 Q = EGC1 + ETP3	0.05	80	37
EC13 Q = EC12 + EL3 + EOHR2 + EPRK3	0.10	134	58
EC14 Q = EC13 + EL4 + EL2 + EOHR1	0.17	228	96
EC15 Q = EC11 + EC14	0.31	301	125
EC16 Q = FTLC + EFA3 + EL5B	0.32	276	88
EC17 Q = EFA2 + EAA2	0.28	349	161
EC18 Q = EC8 + EC16 + EC17	5.95	3116	1251
EC19 Q = OFFZ + ESKV1	0.05	72	29
EC20 Q = EAA1A + ETP1A	0.17	239	111
EC21 Q = EC19 + EC20 + EFA1	0.22	317	143
EC22 Q = C95-8B + EML3B + ETP5	0.04	85	43
EC23 Q = EC22 + EBRT1 + ES2	0.09	168	85
EC24 Q = EML3C + EFA6B + 95-9B	0.03	64	32
EC25 Q = EC23 + EMLA2 + EFA6A	0.12	231	116
EC26 Q = SOUTH + EC24 + EPF2 + EFA5 + EGC2	0.17	151	110

Ultimate Condition Flow Rate Summary
Skye Canyon East Basins

Basin/Concentration Point ID	Area (ac)	Q_{100} (cfs)	Q_{10} (cfs)
EAA1A	103.1	231	107
EAA1B	40.0	106	48
EAA2	177.6	347	160
EL1	25.0	51	20
EL2	21.7	46	18
EL3	26.4	51	20
EL4	21.4	44	18
EL5A	15.1	32	13
EL5B	8.5	18	7
EL6	36.3	68	28
EML3A	17.5	50	25
EML3B	11.5	34	17
EML3C	9.1	27	13
EMLA1	18.9	49	23
EMLA2	16.7	53	26
EGC1	26.4	65	30
EGC2	3.2	11	5
EPRK1	1.0	1	0
EPRK2	1.6	1	0
EPRK3	2.0	2	0
EPF1	4.3	9	3
EPF2	1.0	2	1
EAST ROADWAY BASINS			
EBRT1	1.8	7	4
EFA1	1.8	5	3
EFA2	1.1	3	2
EFA3	1.6	5	3
EFA4	1.9	6	3
EFA5	1.1	4	2
EFA6A	2.5	9	5
EFA6B	4.5	17	9
EIRN1	1.1	4	2
ELOG1	3.4	11	6
ELOG2	3.5	12	6
ELOG3	1.7	6	3
EOHR1	1.8	6	4
EOHR2	0.6	2	1
ESKV1	1.1	3	2
ESKY1	3.4	10	5
ETP1A	2.9	9	5
ETP1B	0.9	3	2
ETP2	1.2	4	2
ETP3	0.8	16	7
ETP4	0.8	3	2
ETP5	0.9	3	2
EUS95	8.9	31	17

Ultimate Condition Flow Rate Summary
Skye Canyon Offsite Basins

Basin/Concentration Point ID	Area (sq. mi)	Q_{100} (cfs)	Q_{10} (cfs)
WEST BASINS			
CENGCA	0.08	152	71
ES1	0.02	29	14
ES2	0.05	84	43
OFF4-1	0.30	397	128
OFF4-2	0.42	682	214
OFF5-1	0.30	375	115
OFF5-2	0.40	467	163
OFF14	0.01	26	13
OFF15	0.03	62	32
OFF17A	0.03	51	24
OFF17B	0.01	15	7
OFF21B	0.04	75	39
OFF23	0.01	17	9
OFFU	0.04	74	37
OFFW	0.01	22	10
OFFZ	0.05	69	27
WOFF1	0.41	403	153
WOFF10	0.25	292	110
WOFF11	0.03	55	29
WOFF2	0.04	48	17
WOFF3	0.03	38	15
WOFF4	0.06	84	32
WOFF5	0.26	236	89
WOFF6	0.04	59	23
WOFF7	0.01	10	4
WOFF8	0.17	198	74
WOFF9	0.12	144	55
US95 BASINS			
95-4A	0.01	14	7
95-4B	0.01	13	6
95-5A	0.01	12	6
95-5B	0.01	11	5
95-6A	0.01	19	9
95-6B	0.01	12	5
95-7A	0.01	14	7
95-7B	0.01	16	8
95-8A	0.01	11	6
95-8B	<0.01	7	4
95-9A	0.01	21	10
95-9B	0.01	22	10
EAST BASINS			
NW1-C	0.29	327	107
NW7-C	0.49	500	192
NW21-C	0.16	242	110
NW29-C	0.13	200	93
NW35-C	0.34	423	191
NW50-C	0.17	228	87
NW71-E	0.24	259	106
NW71-W	0.10	156	74
NW102-C	0.20	262	132
NW116-C	0.13	100	30
NW129-C	0.14	126	44
NW128	0.45	236	54
NW130-E	0.25	196	70
NW148-C	0.13	76	20
NW157	0.25	178	56

Ultimate Condition Flow Rate Summary
Skye Canyon Offsite Concentration Points

Basin/Concentration Point ID	Area (sq. mi)	Q_{100} (cfs)	Q_{10} (cfs)
WEST CONCENTRATION POINTS			
157DB Q = R2CNW1	2.19	1093	386
CP1 Q = WOFF1 + WOFF2 + WOFF3 + WOFF11	0.50	471	178
CP2 Q = WOFF7 + WOFF8	0.17	204	77
CCP4 Q = CENGCA + WC18	0.51	917	431
CNW1-C Q = ROFF52 + NW1-C	0.69	757	255
2CNW1C Q = RCOFF5 + CNW1-C	1.70	1895	582
CNW7 Q = R2CNW1 + NW7-C	2.19	2213	690
CNW21C Q = R2CNW7C + NW21-C	2.35	1139	347
CNW35C Q = R2CNW21 + NW35-C + WPRK10	2.71	1324	410
CNW71E Q = RCNW71 + NW71-E	0.24	610	106
CNW71W Q = RNW29C + NW71-W	0.24	354	167
COFF17 Q = OFF17B + OFF17A	0.04	66	31
COF21B Q = CCP4 + OFF21B	0.55	990	469
COFF23 Q = ROFF23 + OFF23	0.01	19	9
COFF42 Q = ROFF41 + OFF4-2	0.72	871	245
COFF51 Q = RCOFF4 + OFF5-1	1.02	1182	352
DB1 Q = CP1 + WOFF4 + WOFF5 + WOFF6 + WPF1B	0.88	793	313
RDB1 (FROM DB1)	0.88	71	57
DB2 Q = CP2 + WOFF9 + WOFF10 + WPF1A	0.57	667	254
RDB2 (FROM DB2)	0.57	57	28
EAST CONCENTRATION POINTS			
CNW128 Q = RTULE + RNW116 + NW128	6.87	391	131
CNW129 Q = DB-OFF + NW129-C	6.29	206	121
CNW148 Q = CNW128 + RNW130 + NW148-C	7.25	616	197
LOGDB Q = EC18 + NW102-C	6.15	3269	1348
CTULEDB Q = RCW148 + NW157	7.50	751	229
CBRDB Q = CNW144W + CNW111N	8.30	1499	N/A
DBRDB (FROM CNW129)	6.29	61	48
RTULE (FROM CNW129)	6.29	145	73
US95 CONCENTRATION POINTS			
CHD04B Q = DHD02B + WC3 + OFFW	0.08	130	64
CHD05B Q = CHD04B + WC5	0.17	301	147
CHD06B Q = CHD05B + WC9 + OFF14	0.36	648	315
CHD07B Q = CHD06B + 95-9A	0.37	669	325
CHD07B2 Q = CHD07B + OFF15	0.40	731	357
C95-8B Q = 95-7A + 95-7B + 95-8A + 95-8B	0.02	47	24
CPCULV Q = CHD07B2 + COFF17 + COF21B + COFF23 + OFFU	1.05	1836	877
95STH Q = CPCULV + CNW71E	1.53	2267	1070

Ultimate Condition Flow Rate Summary
Skye Canyon East Diversions

Diversion ID	Q_{100} (cfs)	Q_{10} (cfs)	Diverted From	Diverted To
DB-OFF	134	101	LOGDB	CTULEDB
TULEDB	64	56	CTULEDB	SILVERSTONE RANCH
RFTLC	216	59	EC15	FORT APACHE ROAD
OHARE	47	47	EC15	OHARE ROAD
FTNOR	0	0	EC10	FORT APACHE ROAD
IREAST	124	59	EC10	IRON MOUNTAIN EAST
BRENT	161	46	EC25	BRENT LANE
SOUTH	70	70	EC25	RACEL STREET
HORSE	37	0	EC26	HORSE DRIVE
RACEL	114	110	EC26	RACEL STREET

LEGEND

- BASIN BOUNDARY
- MATCHLINE SEE EXHIBIT FOR MAP EXTENSION
- ID — BASIN ID
- NW ID — MPA BASIN ID
- (ID) — CONCENTRATION POINT ID
- FLOW DIRECTION
- ID / ID — FLOW SPLIT

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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

OLYMPIA COMPANIES
SKYE CANYON - MASTER DRAINAGE STUDY
ULTIMATE CONDITION ONSITE HYDROLOGIC MAP

DATE: APRIL 2016
DRAFTER: JSR
DESIGNER: JSR
CHECKED: SMJ
PROJECT NO. **OLY1603.000**

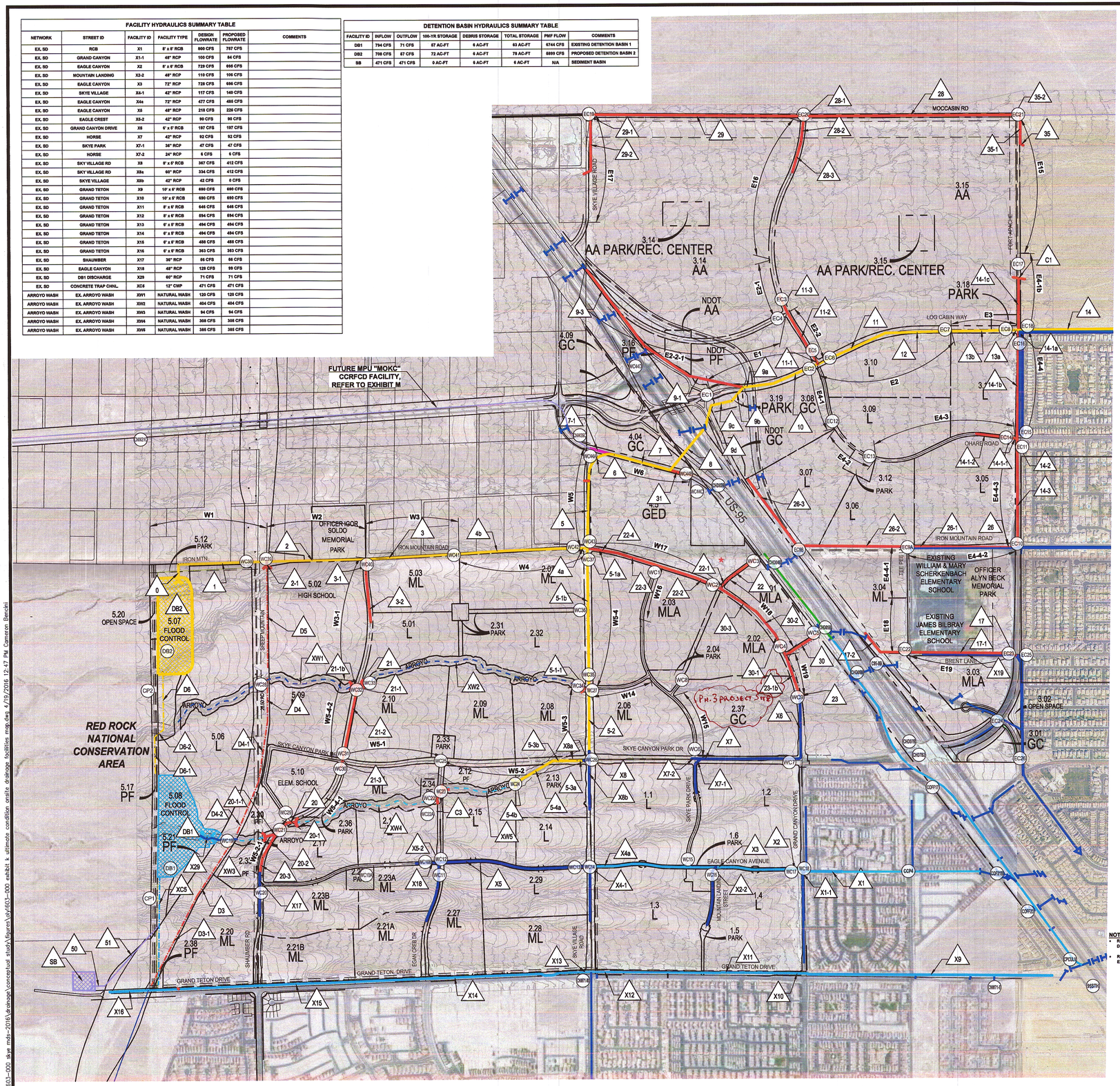
EXHIBIT E
SHEET 1 OF 1

FACILITY HYDRAULICS SUMMARY TABLE

NETWORK	STREET ID	FACILITY ID	FACILITY TYPE	DESIGN FLOWRATE	PROPOSED FLOWRATE	COMMENTS
EX. SD	RCB	X1	5' x 5' RCB	800 CFS	797 CFS	
EX. SD	GRAND CANYON	X1-1	48" RCP	100 CFS	84 CFS	
EX. SD	EAGLE CANYON	X2	5' x 5' RCB	728 CFS	698 CFS	
EX. SD	MOUNTAIN LANDING	X3-2	48" RCP	110 CFS	106 CFS	
EX. SD	EAGLE CANYON	X3	72" RCP	728 CFS	696 CFS	
EX. SD	SKYE VILLAGE	X4-1	42" RCP	117 CFS	140 CFS	
EX. SD	EAGLE CANYON	X4a	72" RCP	477 CFS	486 CFS	
EX. SD	EAGLE CANYON	X5	48" RCP	218 CFS	226 CFS	
EX. SD	EAGLE CREST	X5-2	42" RCP	90 CFS	90 CFS	
EX. SD	GRAND CANYON DRIVE	X6	6' x 6' RCB	197 CFS	197 CFS	
EX. SD	HORSE	X7	42" RCP	92 CFS	92 CFS	
EX. SD	SKYE PARK	X7-1	36" RCP	47 CFS	47 CFS	
EX. SD	HORSE	X7-2	24" RCP	6 CFS	6 CFS	
EX. SD	SKY VILLAGE RD	X8	5' x 5' RCB	387 CFS	412 CFS	
EX. SD	SKY VILLAGE RD	X8a	60" RCP	334 CFS	412 CFS	
EX. SD	SKYE VILLAGE	X8b	42" RCP	42 CFS	0 CFS	
EX. SD	GRAND TETON	X9	10' x 6' RCB	690 CFS	690 CFS	
EX. SD	GRAND TETON	X10	10' x 6' RCB	690 CFS	690 CFS	
EX. SD	GRAND TETON	X11	6' x 6' RCB	646 CFS	646 CFS	
EX. SD	GRAND TETON	X12	6' x 6' RCB	594 CFS	594 CFS	
EX. SD	GRAND TETON	X13	6' x 6' RCB	494 CFS	494 CFS	
EX. SD	GRAND TETON	X14	6' x 6' RCB	494 CFS	494 CFS	
EX. SD	GRAND TETON	X15	6' x 6' RCB	488 CFS	488 CFS	
EX. SD	GRAND TETON	X16	6' x 6' RCB	363 CFS	363 CFS	
EX. SD	SHAMMER	X17	36" RCP	66 CFS	66 CFS	
EX. SD	EAGLE CANYON	X18	48" RCP	128 CFS	99 CFS	
EX. SD	DB1 DISCHARGE	X29	60" RCP	71 CFS	71 CFS	
EX. SD	CONCRETE TRAP CHNL.	XC5	12" CMP	471 CFS	471 CFS	
ARROYO WASH	EX. ARROYO WASH	XW1	NATURAL WASH	120 CFS	120 CFS	
ARROYO WASH	EX. ARROYO WASH	XW2	NATURAL WASH	404 CFS	404 CFS	
ARROYO WASH	EX. ARROYO WASH	XW3	NATURAL WASH	94 CFS	94 CFS	
ARROYO WASH	EX. ARROYO WASH	XW4	NATURAL WASH	308 CFS	308 CFS	
ARROYO WASH	EX. ARROYO WASH	XW5	NATURAL WASH	386 CFS	386 CFS	

DETENTION BASIN HYDRAULICS SUMMARY TABLE

FACILITY ID	INFLOW	OUTFLOW	100-YR STORAGE	DEBRIS STORAGE	TOTAL STORAGE	PMF FLOW	COMMENTS
DB1	794 CFS	71 CFS	67 AC-FT	6 AC-FT	63 AC-FT	6744 CFS	EXISTING DETENTION BASIN 1
DB2	708 CFS	67 CFS	72 AC-FT	6 AC-FT	78 AC-FT	5899 CFS	PROPOSED DETENTION BASIN 2
SB	471 CFS	471 CFS	0 AC-FT	6 AC-FT	6 AC-FT	N/A	SEDIMENT BASIN



FACILITY HYDRAULICS SUMMARY TABLE

NETWORK	STREET ID	FACILITY ID	FACILITY TYPE	LENGTH	SLOPE	FLOW RATE	COMMENTS
WEST SD	DB2 OUTLET	0	30" RCP	214'	2.0%	67 CFS	
WEST SD	W1	1	30" RCP	1099'	2.9%	66 CFS	
WEST SD	W2	2	30" RCP	1236'	5.0%	90 CFS	
WEST SD	INFLOW FROM SHEEP MOUNTAIN CHNL	2-1	18" RCP	60'	4.4%	19 CFS	
WEST SD	W3	3	42" RCP	1161'	3.2%	227 CFS	
WEST SD	W3-1	3-1	30" RCP	191'	3.0%	112 CFS	
WEST SD	W3-1	3-2	30" RCP	699'	1.7%	46 CFS	
WEST SD	W4	4a	54" RCP	100'	4.8%	370 CFS	
WEST SD	W4	4b	48" RCP	1600'	4.8%	249 CFS	
WEST SD	W5	5	13' x 6' RCB	931'	1.0%	1256 CFS	
WEST SD	ARROYO WASH INFLOW	5-1-1	6' x 6' RCB	81'	14.8%	404 CFS	
WEST SD	W5-4	5-1a	6' x 6' RCB	100'	0.8%	1000 CFS	
WEST SD	W5-4	5-1b	6' x 6' RCB	1664'	0.9%	816 CFS	
WEST SD	W5-3	5-2	6' x 6' RCB	779'	1.0%	412 CFS	
WEST SD	W5-2	5-3a	60" RCP	79'	3.0%	412 CFS	
WEST SD	W5-2	5-3b	60" RCP	301'	3.0%	359 CFS	
WEST SD	CONVEYS FLOW TO SD 5-3a	5-4a	60" RCP	491'	3.0%	359 CFS	
WEST SD	INFLOW FROM ARROYO WASH	5-4b	6' x 6' RCB	60'	2.8%	359 CFS	
WEST SD	W6	6	13' x 6' RCB	440'	1.9%	1256 CFS	
WEST SD	W6	7	13' x 6' RCB	723'	2.0%	2079 CFS	
WEST SD	MPU FACILITY	7-1	7' x 6' RCB	309'	5.0%	1324 CFS	MOKC-0000 MPU FACILITY
WEST SD	DISCAHRGE TO ARROYO WASH	20	48" RCP	109'	2.0%	201 CFS	
WEST SD	W8-2-1	20-1	48" RCP	194'	2.0%	160 CFS	
WEST SD	INFLOW FROM DB1	20-1-1	48" RCP	136'	2.2%	84 CFS	
WEST SD	W8-2-1	20-2	36" RCP	340'	3.0%	84 CFS	
WEST SD	W8-2-1	20-3	36" RCP	193'	3.5%	84 CFS	
WEST SD	DISCHARGE TO ARROYO WASH	21	48" RCP	42'	4.0%	244 CFS	
WEST SD	W8-4-2	21-1	42" RCP	100'	2.5%	124 CFS	
WEST SD	INFLOW FROM ARROYO WASH	21-1b	48" RCP	68'	3.4%	120 CFS	
WEST SD	W8-4-2	21-2	36" RCP	863'	3.4%	62 CFS	
WEST SD	W8-4-1	21-3	36" RCP	106'	1.3%	62 CFS	
WEST SD	N/A	22	7' x 6' RCB	428'	2.5%	73 CFS	
WEST SD	N/A	22-1	7' x 6' RCB	146'	2.2%	73 CFS	
WEST SD	W17	22-2	6' x 6' RCB	339'	2.0%	73 CFS	
WEST SD	W17	22-3	6' x 6' RCB	1017'	2.0%	0 CFS	
WEST SD	W17	22-4	6' x 6' RCB	382'	2.6%	0 CFS	
WEST SD	W19 OUTLET TO WASH	23	36" RCP	69'	3.4%	288 CFS	
WEST SD	W19	23-1b	54" RCP	523'	1.7%	0 CFS	PROP. SD NOT INTENDED FOR PRIMARY USE BY ANY PARCEL OR ROADWAY IN MASTER STUDY ULT. COND.
WEST SD	N/A	30	42" RCP	476'	2.5%	170 CFS	
WEST SD	W18	30-1	72" RCP	397'	1.2%	135 CFS	
WEST SD	W18	30-2	54" RCP	364'	1.8%	0 CFS	
WEST SD	W18	30-3	54" RCP	527'	1.4%	0 CFS	
WEST SD	RCB	31	6' x 6' RCB	272'	2.0%	0 CFS	
WEST SD	DISCHARGE FROM SB	50	12' x 6' RCB	162'	1.5%	471 CFS	
WEST SD	DISCHARGE TO DB1	51	72" RCP	1916'	2.1%	471 CFS	
WEST SD	ARROYO WASH CULVERT	C3	6' x 6' RCB	164'	6.1%	306 CFS	
WEST SD	SHEEP MOUNTAIN CHNL	D3	EARTHEN TRAP CHNL	818'	3.6%	31 CFS	29' BOTTOM WIDTH; 5:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D3-1	EARTHEN TRAP CHNL	1239'	1.7%	31 CFS	9' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D4	EARTHEN TRAP CHNL	534'	4.5%	11 CFS	9' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D4-1	EARTHEN TRAP CHNL	757'	1.6%	11 CFS	9' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D4-2	EARTHEN TRAP CHNL	691'	1.0%	11 CFS	9' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D5	EARTHEN TRAP CHNL	1252'	1.2%	6 CFS	9' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	CHANNEL TO DB2	D6	CONCRETE TRAP CHNL	723'	3.0%	235 CFS	12' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	CHANNEL TO DB2	D6-1	EARTHEN TRAP CHNL	451'	0.9%	10 CFS	9' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	CHANNEL TO DB2	D6-2	EARTHEN TRAP CHNL	149'	1.4%	10 CFS	9' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP

FACILITY HYDRAULICS SUMMARY TABLE

NETWORK	STREET ID	FACILITY ID	FACILITY TYPE	LENGTH	SLOPE	FLOW RATE	COMMENTS
EAST SD	US-95 SD CROSSING	8	13' x 6' RCB	686'	2.3%	2079 CFS	
EAST SD	US-95	9-1	60" RCP	688'	4.0%	255 CFS	
EAST SD	US-95	9-2	60" RCP	665'	2.3%	255 CFS	
EAST SD	US-95	9-3	60" RCP	1191'	1.3%	255 CFS	
EAST SD	E1	9a	13' x 6' RCB	380'	2.6%	2356 CFS	
EAST SD	US-95 SD CROSSING	9b	13' x 6' RCB	220'	2.0%	2079 CFS	
EAST SD	US-95 SD CROSSING	9c	13' x 6' RCB	268'	2.3%	2079 CFS	
EAST SD	US-95 SD CROSSING	9d	13' x 6' RCB	282'	2.3%	2079 CFS	
EAST SD	E1	10	13' x 6' RCB	602'	2.6%	2356 CFS	
EAST SD	E2	11	13' x 6' RCB	928'	2.9%	2532 CFS	
EAST SD	E2-2	11-1	36" RCP	60'	3.0%	177 CFS	
EAST SD	E2-2	11-2	36" RCP	686'	1.2%	73 CFS	
EAST SD	E2-1	11-3	30" RCP	238'	1.7%	39 CFS	
EAST SD	E2	12	13' x 6' RCB	784'	2.9%	2532 CFS	
EAST SD	E3	13a	14' x 7' RCB	60'	1.6%	2606 CFS	
EAST SD	E3	13b	13' x 6' RCB	809'	2.9%	2532 CFS	
EAST SD	E4-3	14-1-1	42" RCP	50'	5.0%	181 CFS	
EAST SD	E4-3	14-1-2	42" RCP	461'	5.0%	36 CFS	
EAST SD	E4-4	14-1a	72" RCP	51'	1.4%	276 CFS	
EAST SD	E4-4	14-1b	72" RCP	1303'	0.7%	264 CFS	
EAST SD	E4-1b	14-1c	72" RCP	629'	2.0%	349 CFS	
EAST SD	E4-4-3	14-2	48" RCP	50'	6.8%	73 CFS	
EAST SD	E4-4-3	14-3	48" RCP	1259'	0.4%	0 CFS	
EAST SD	E19	17	36" RCP	66'	3.0%	70 CFS	
EAST SD	E19	17-1	6' x 6' RCB	1632'	3.0%	63 CFS	
EAST SD	Parcel 3.04	17-2	48" RCP	298'	2.3%	220 CFS	
EAST SD	E4-4-2	28	60" RCP	209'	2.6%	67 CFS	
EAST SD	E4-4-2	28-1	60" RCP	1199'	2.6%	67 CFS	
EAST SD	PARCEL 3.06	28-2	60" RCP	1356'	2.6%	23 CFS	
EAST SD	PARCEL 3.07	28-3	60" RCP	1019'	2.5%	23 CFS	
EAST SD	MPU FACILITY	28	N/A	N/A	N/A	N/A	LVMO-0144 MPU FACILITY, REPLACES PROP. CONDITION FACILITY D1
EAST SD	E16	28-1	48" RCP	50'	6.0%	199 CFS	
EAST SD	E16	28-2	42" RCP	269'	0.8%	81 CFS	
EAST SD	E16	28-3	24" RCP	391'	1.0%	81 CFS	LVMO-0194 MPU FACILITY, REPLACES PROP. CONDITION FACILITY D2
EAST SD	MPU FACILITY	29	N/A	2652'	3.1%	0 CFS	
EAST SD	E17	29-1	60" RCP	50'	4.0%	72 CFS	
EAST SD	E17	29-2	60" RCP	647'	0.6%	26 CFS	
OFFSITE SD	LOG CABIN WAY	14	14' x 7' RCB	1691'	2.2%	3137 CFS	SEE EXHIBIT M FOR CONTINUATION
PROPOSED SD	CROSSING FORT APACHE	35	60" RCP	46'	4.4%	0 CFS	NOT UTILIZED WITHIN THE ULTIMATE CONDITIONS
PROPOSED SD	E15	35-1	60" RCP	359'	0.8%	0 CFS	NOT UTILIZED WITHIN THE ULTIMATE CONDITIONS
PROPOSED SD	MOCCASIN CHNL INFLOW	35-2	60" RCP	120'	3.3%	0 CFS	NOT UTILIZED WITHIN THE ULTIMATE CONDITIONS
PROPOSED SD	E4-1b	C1	60" RCP	147'	2.0%	0 CFS	NOT UTILIZED WITHIN THE ULTIMATE CONDITIONS

NOTES:

- REFER TO EXHIBIT M - ULTIMATE CONDITION US-95 HYDRAULICS SUMMARY MAP FOR DETAILED FLOW THRU EXISTING US-95 CULVERTS & RCB FACILITIES
- REFER TO EXHIBIT K - ULTIMATE CONDITION OFFSITE EAST FACILITIES MAP FOR EXTENSION OF FACILITIES REQUIRED IN MPU ALIGNMENT EAST OF SKYE CANYON.

LEGEND

- PROPOSED LOCAL FACILITIES
- ONSITE CCRFCD REGIONAL FACILITIES
- FUTURE CCRFCD REGIONAL FACILITIES (BY OTHERS)
- FUTURE LOCAL FACILITIES
- EXISTING CCRFCD REGIONAL FACILITIES
- EXISTING LOCAL FACILITIES
- OPEN CHANNEL FACILITIES
- ID — STREET SEGMENT ID

N

0 600 1200

SCALE – 1"=600' FEET

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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.
1					

OLYMPIA COMPANIES

SKYE CANYON - MASTER DRAINAGE STUDY

ULTIMATE CONDITION ONSITE DRAINAGE FACILITIES MAP

DATE: APRIL 2016
DRAFTER: ###
DESIGNER: ###
CHECKED: SMJ

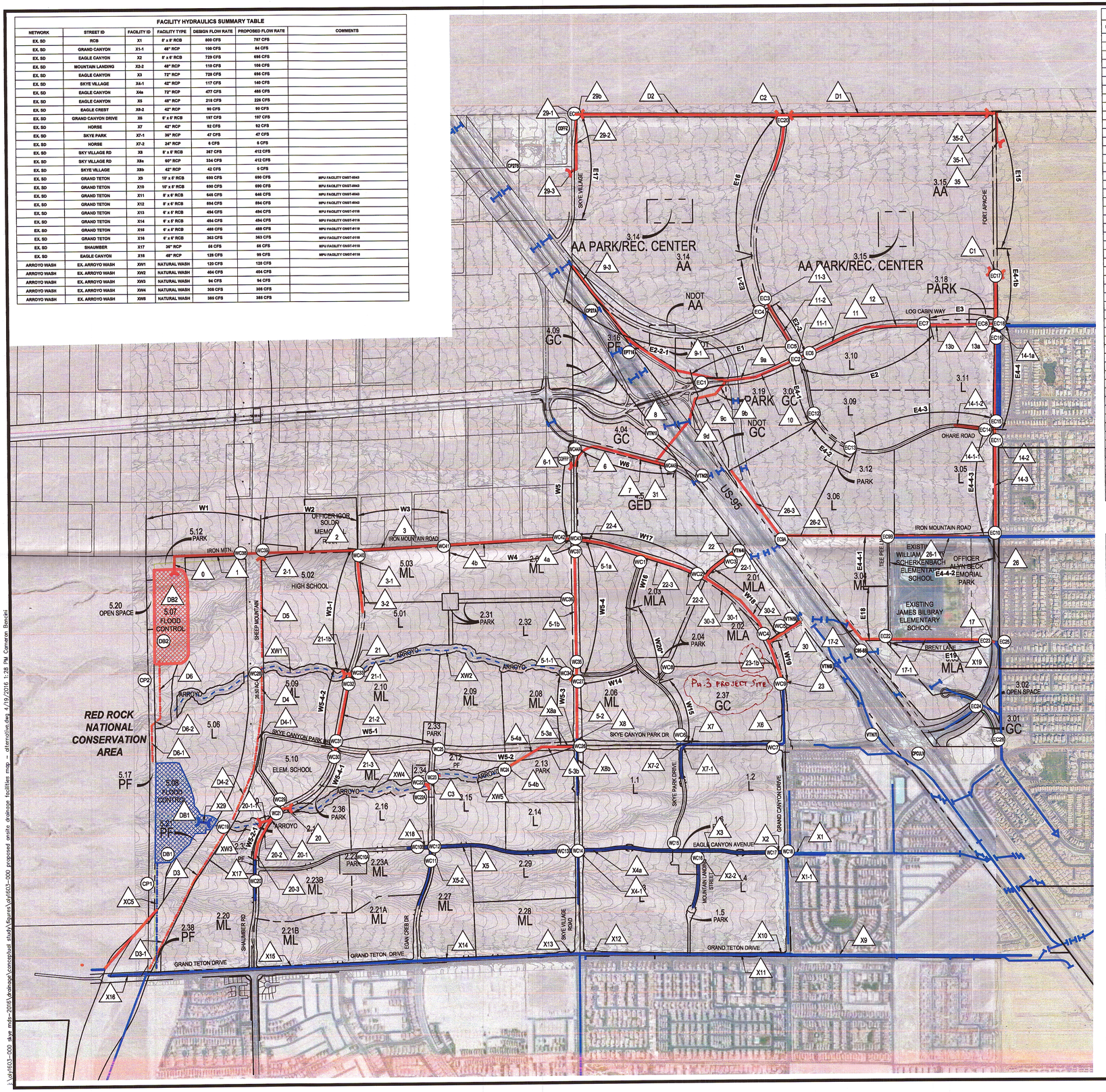
PROJECT NO.
OLY1603.000

EXHIBIT J
SHEET 1 OF 1

I:\oly1603-000 skye mda-2016\drainage\conceptual study\figures\oly1603-000 exhibit k ultimate condition onsite drainage facilities map.dwg 4/19/2016 12:47 PM Cameron Bender

FACILITY HYDRAULICS SUMMARY TABLE

NETWORK	STREET ID	FACILITY ID	FACILITY TYPE	DESIGN FLOW RATE	PROPOSED FLOW RATE	COMMENTS
EX. SD	RCB	X1	8' x 8' RCB	800 CFS	787 CFS	
EX. SD	GRAND CANYON	X1-1	48" RCP	106 CFS	84 CFS	
EX. SD	EAGLE CANYON	X2	8' x 6' RCB	729 CFS	696 CFS	
EX. SD	MOUNTAIN LANDING	X2-2	48" RCP	110 CFS	106 CFS	
EX. SD	EAGLE CANYON	X3	72" RCP	729 CFS	696 CFS	
EX. SD	SKYE VILLAGE	X4-1	42" RCP	117 CFS	140 CFS	
EX. SD	EAGLE CANYON	X4a	72" RCP	477 CFS	485 CFS	
EX. SD	EAGLE CANYON	X5	48" RCP	218 CFS	228 CFS	
EX. SD	EAGLE CREST	X5-2	42" RCP	90 CFS	90 CFS	
EX. SD	GRAND CANYON DRIVE	X6	6' x 6' RCB	197 CFS	197 CFS	
EX. SD	HORSE	X7	42" RCP	92 CFS	92 CFS	
EX. SD	SKYE PARK	X7-1	36" RCP	47 CFS	47 CFS	
EX. SD	HORSE	X7-2	24" RCP	6 CFS	6 CFS	
EX. SD	SKY VILLAGE RD	X8	8' x 6' RCB	367 CFS	412 CFS	
EX. SD	SKY VILLAGE RD	X8a	60" RCP	334 CFS	412 CFS	
EX. SD	SKYE VILLAGE	X8b	42" RCP	42 CFS	0 CFS	
EX. SD	GRAND TETON	X9	10' x 6' RCB	690 CFS	690 CFS	MPU FACILITY CN07-0043
EX. SD	GRAND TETON	X10	10' x 6' RCB	690 CFS	690 CFS	MPU FACILITY CN07-0043
EX. SD	GRAND TETON	X11	8' x 6' RCB	648 CFS	648 CFS	MPU FACILITY CN07-0043
EX. SD	GRAND TETON	X12	8' x 6' RCB	894 CFS	894 CFS	MPU FACILITY CN07-0043
EX. SD	GRAND TETON	X13	6' x 6' RCB	494 CFS	494 CFS	MPU FACILITY CN07-0118
EX. SD	GRAND TETON	X14	6' x 6' RCB	494 CFS	494 CFS	MPU FACILITY CN07-0118
EX. SD	GRAND TETON	X15	6' x 6' RCB	488 CFS	488 CFS	MPU FACILITY CN07-0118
EX. SD	GRAND TETON	X16	6' x 6' RCB	363 CFS	363 CFS	MPU FACILITY CN07-0118
EX. SD	SHAUMBER	X17	36" RCP	66 CFS	66 CFS	MPU FACILITY CN07-0118
EX. SD	EAGLE CANYON	X18	48" RCP	128 CFS	99 CFS	MPU FACILITY CN07-0118
ARROYO WASH	EX. ARROYO WASH	XW1	NATURAL WASH	120 CFS	120 CFS	
ARROYO WASH	EX. ARROYO WASH	XW2	NATURAL WASH	404 CFS	404 CFS	
ARROYO WASH	EX. ARROYO WASH	XW3	NATURAL WASH	94 CFS	94 CFS	
ARROYO WASH	EX. ARROYO WASH	XW4	NATURAL WASH	308 CFS	308 CFS	
ARROYO WASH	EX. ARROYO WASH	XW5	NATURAL WASH	388 CFS	388 CFS	



FACILITY HYDRAULICS SUMMARY TABLE

NETWORK	STREET ID	FACILITY ID	FACILITY TYPE	LENGTH	SLOPE	FLOW RATE	COMMENTS
WEST SD	DB2 OUTLET	0	30" RCP	214'	2.0%	76 CFS	
WEST SD	W1	1	30" RCP	1069'	2.9%	76 CFS	
WEST SD	W2	2	30" RCP	1234'	5.0%	91 CFS	
WEST SD	INFLOW FROM SHEEP MOUNTAIN CHNL	2-1	18" RCP	66'	4.4%	16 CFS	
WEST SD	W3	3	42" RCP	1161'	3.2%	222 CFS	
WEST SD	W3-1	3-1	36" RCP	191'	3.0%	112 CFS	
WEST SD	W3-1	3-2	30" RCP	699'	1.7%	40 CFS	
WEST SD	W4	4a	84" RCP	100'	4.6%	362 CFS	
WEST SD	W4	4b	48" RCP	1500'	4.6%	241 CFS	
WEST SD	ARROYO WASH INFLOW	5-1-1	6' x 6' RCB	61'	14.8%	398 CFS	
WEST SD	W6-4	5-1a	8' x 6' RCB	100'	0.8%	987 CFS	
WEST SD	W6-4	5-1b	8' x 6' RCB	1664'	0.9%	892 CFS	
WEST SD	W6-3	5-2	6' x 6' RCB	779'	1.0%	464 CFS	
WEST SD	W6-2	5-3a	60" RCP	79'	3.0%	464 CFS	
WEST SD	W6-2	5-3b	60" RCP	391'	3.0%	382 CFS	
WEST SD	CONVEYS FLOW TO SD 5-3a	5-4a	60" RCP	491'	3.0%	382 CFS	
WEST SD	INFLOW FROM ARROYO WASH	5-4b	6' x 6' RCB	80'	2.8%	382 CFS	
WEST SD	W6	6	9' x 6' RCB	448'	1.8%	1322 CFS	
WEST SD	W6	7	9' x 6' RCB	723'	2.0%	1333 CFS	
WEST SD	DISCAHRGE TO ARROYO WASH	20	48" RCP	109'	2.0%	193 CFS	
WEST SD	W6-2-1	20-1	48" RCP	194'	2.0%	199 CFS	
WEST SD	INFLOW FROM DB1	20-1-1	48" RCP	136'	2.2%	87 CFS	
WEST SD	W6-2-1	20-2	36" RCP	340'	3.0%	84 CFS	
WEST SD	W6-2-1	20-3	36" RCP	193'	3.8%	84 CFS	
WEST SD	DISCHARGE TO ARROYO WASH	21	48" RCP	42'	4.0%	239 CFS	
WEST SD	W6-4-2	21-1	42" RCP	100'	2.5%	154 CFS	
WEST SD	INFLOW FROM ARROYO WASH	21-1b	48" RCP	69'	3.4%	116 CFS	
WEST SD	W6-4-2	21-2	36" RCP	863'	3.4%	68 CFS	
WEST SD	W6-4-1	21-3	36" RCP	100'	1.3%	62 CFS	
WEST SD	N/A	22	7' x 6' RCB	428'	2.2%	1131 CFS	
WEST SD	N/A	22-1	7' x 6' RCB	140'	2.2%	1093 CFS	
WEST SD	W17	22-2	8' x 6' RCB	339'	2.0%	1343 CFS	
WEST SD	W17	22-3	8' x 6' RCB	1017'	2.0%	1276 CFS	
WEST SD	W17	22-4	8' x 6' RCB	382'	2.6%	1276 CFS	
WEST SD	W19 OUTLET TO WASH	23	36" RCP	69'	3.4%	538 CFS	
WEST SD	W19	23-1b	54" RCP	629'	1.7%	280 CFS	PROP. SD LARGER SIZE W/ HIGHER FLOW OK FOR MASTER STUDY PEAK FLOWS
WEST SD	N/A	30	42" RCP	479'	2.9%	136 CFS	
WEST SD	W18	30-1	72" RCP	297'	1.3%	366 CFS	
WEST SD	W18	30-2	54" RCP	364'	1.8%	280 CFS	280 CFS FLOW SPLIT STRUCTURE AT 30-1 / 23-1b
WEST SD	W18	30-3	54" RCP	627'	1.4%	280 CFS	229 CFS FLOW SPLIT STRUCTURE AT 23-2 / 30-3
WEST SD	RCB	31	8' x 6' RCB	272'	2.0%	1133 CFS	
WEST SD	DISCHARGE FROM SB	50	12' x 6' RCB	152'	1.9%	471 CFS	
WEST SD	DISCHARGE TO DB1	51	72" RCP	1016'	2.1%	471 CFS	
WEST SD	ARROYO WASH CULVERT	C3	6' x 6' RCB	164'	6.1%	308 CFS	
WEST SD	SHEEP MOUNTAIN CHNL	D3	EARTHEN TRAP CHNL	818'	3.9%	31 CFS	25' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D3-1	EARTHEN TRAP CHNL	1239'	1.7%	31 CFS	9' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D4	EARTHEN TRAP CHNL	934'	4.8%	11 CFS	6' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D4-1	EARTHEN TRAP CHNL	787'	1.8%	11 CFS	6' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D4-2	EARTHEN TRAP CHNL	691'	1.0%	11 CFS	6' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	SHEEP MOUNTAIN CHNL	D5	EARTHEN TRAP CHNL	1352'	1.2%	8 CFS	6' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	CHANNEL TO DB2	D6	CONCRETE TRAP CHNL	723'	3.0%	238 CFS	12' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	CHANNEL TO DB2	D6-1	EARTHEN TRAP CHNL	491'	0.9%	10 CFS	8' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	CHANNEL TO DB2	D6-2	EARTHEN TRAP CHNL	148'	1.4%	10 CFS	8' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3' DEEP
WEST SD	N/A	8-1	12' x 10' RCB	62'	16.0%	1310 CFS	

FACILITY HYDRAULICS SUMMARY TABLE

NETWORK	STREET ID	FACILITY ID	FACILITY TYPE	LENGTH	SLOPE	FLOW RATE	COMMENTS
EAST SD	US-95 SD CROSSING	8	60" RCP	688'	2.3%	200 CFS	
EAST SD	US-95	9-1	60" RCP	688'	4.0%	466 CFS	
EAST SD	US-95	9-3	60" RCP	1191'	1.3%	466 CFS	
EAST SD	E1	9a	72" RCP	380'	2.5%	639 CFS	
EAST SD	US-95 SD CROSSING	9b	60" RCP	220'	2.0%	639 CFS	
EAST SD	US-95 SD CROSSING	9c	60" RCP	266'	2.3%	639 CFS	
EAST SD	US-95 SD CROSSING	9d	60" RCP	282'	2.3%	200 CFS	
EAST SD	E1	10	72" RCP	602'	2.5%	639 CFS	
EAST SD	E2	11	60" RCP	928'	2.9%	666 CFS	
EAST SD	E2-2	11-1	36" RCP	80'	3.0%	226 CFS	
EAST SD	E2	12	72" RCP	794'	2.9%	666 CFS	
EAST SD	E3	13a	72" RCP	60'	1.6%	639 CFS	
EAST SD	E3	13b	72" RCP	809'	2.9%	666 CFS	
EAST SD	E4-3	14-1-1	42" RCP	50'	8.0%	181 CFS	
EAST SD	E4-3	14-1-2	42" RCP	461'	8.0%	36 CFS	
EAST SD	E4-4	14-1a	72" RCP	61'	1.4%	347 CFS	
EAST SD	E4-4-3	14-2	48" RCP	50'	6.8%	140 CFS	
EAST SD	E4-4-3	14-3	48" RCP	1299'	0.4%	111 CFS	
EAST SD	E19	17	36" RCP	50'	3.0%	70 CFS	REPLACES STORM DRAIN X19
EAST SD	E19	17-1	6' x 6' RCB	1632'	3.5%	1058 CFS	
EAST SD	Parcel 3.04	17-2	48" RCP	288'	2.3%	220 CFS	
EAST SD	E4-4-2	26	60" RCP	209'	2.6%	416 CFS	
EAST SD	E4-4-2	26-1	60" RCP	1150'	2.6%	374 CFS	
EAST SD	PARCEL 3.06	28-2	60" RCP	1356'	2.6%	374 CFS	
EAST SD	PARCEL 3.07	28-3	60" RCP	1018'	2.6%	374 CFS	
EAST SD	E17	29-1	60" RCP	89'	4.0%	308 CFS	
EAST SD	E17	29-2	60" RCP	647'	0.6%	304 CFS	
EAST SD	EX WASH INFLOW	29-3	60" RCP	90'	0.6%	173 CFS	
EAST SD	DISCHARGE TO MOCCASIN CHNL	29b	60" RCP	69'	1.2%	208 CFS	
EAST SD	CROSSING FORT APACHE	35	60" RCP	46'	4.4%	228 CFS	
EAST SD	E15	35-1	60" RCP	359'	0.8%	228 CFS	
EAST SD	MOCCASIN CHNL INFLOW	35-2	60" RCP	120'	3.3%	228 CFS	
EAST SD	E4-1b	C1	60" RCP	147'	2.0%	349 CFS	
EAST SD	E15 CULVERT	C2	60" RCP	169'	1.0%	208 CFS	
EAST SD	MOCCASIN CHNL	D1	RIP-RAP TRAP CHANNEL	2490'	2.6%	378 CFS	25' BOTTOM WIDTH; 3:1 SIDE SLOPES; 4' DEEP; 10-in RIP-RAP
EAST SD	MOCCASIN CHNL	D2	RIP-RAP TRAP CHANNEL	2504'	3.0%	208 CFS	25' BOTTOM WIDTH; 3:1 SIDE SLOPES; 3.5' DEEP; 8-in RIP-RAP

DETENTION BASIN HYDRAULICS SUMMARY TABLE

FACILITY ID	INFLOW	OUTFLOW	100-YR STORAGE	DEBRIS STORAGE	TOTAL STORAGE	PMF FLOW	COMMENTS
DB1	784 CFS	71 CFS	67 AC-FT	6 AC-FT	93 AC-FT	5744 CFS	EXISTING DETENTION BASIN 1
DB2	708 CFS	67 CFS	72 AC-FT	6 AC-FT	78 AC-FT	5899 CFS	PROPOSED DETENTION BASIN 2

N

0 600 1200
SCALE – 1"=600' FEET

NOTES:
- REFER TO EXHIBIT M - PROPOSED CONDITION US-95 HYDRAULICS SUMMARY MAP FOR DETAILED FLOW THRU EXISTING US-95 CULVERTS & RCB FACILITIES
- REFER TO EXHIBIT I - PROPOSED CONDITION OFFSITE EAST FACILITIES MAP FOR EXTENSION OF FACILITIES REQUIRED IN NPU ALIGNMENT EAST OF SKYE CANYON.

LEGEND
- PROPOSED FACILITIES
- EXISTING FACILITIES
- OPEN CHANNEL FACILITIES
- ID — STREET SEGMENT ID

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.
1					

OLYMPIA COMPANIES

SKYE CANYON - MASTER DRAINAGE STUDY

PROPOSED CONDITION ONSITE DRAINAGE FACILITIES MAP

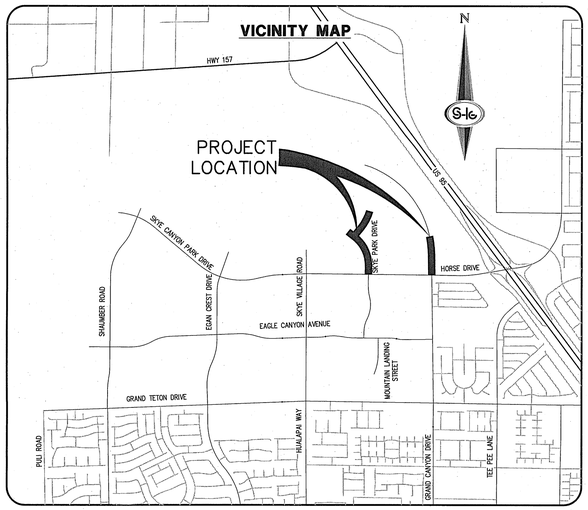
DATE: APRIL 2016
DRAFTER: ###
DESIGNER: ###
CHECKED: SMJ
PROJECT NO. OLY1603.000

EXHIBIT H
SHEET 1 OF 1

J:\olv\1603-000 skye mds-2016\drainage\conceptual study\figures\olv1603-000 proposed onsite drainage facilities map - alternative.dwg 4/19/2016 1:28 PM Cameron Blanchi

APPENDIX K

Revised Improvement Plans



IMPROVEMENT PLANS
FOR
SKYE CANYON PHASE 3

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, 858.810 METERS
NAVD 88 DATUM

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

BASIS OF BEARING

SOUTH 00°22'12" WEST, BEING THE BEARING OF THE WEST LINE OF THE NORTHWEST QUARTER (NW1/4) 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.

OWNER

M F LAND LLC
% OLYMPIA COMPANIES LLC
11411 SOUTHERN HIGHLANDS
PARKWAY, SUITE 300
LAS VEGAS, NV 89141

DEVELOPER

NINETY–FIVE MANAGEMENT LLC
% OLYMPIA COMPANIES LLC
11411 SOUTHERN HIGHLANDS
PARKWAY, SUITE 300
LAS VEGAS, NV 89141
PH (702) 220–6565
FX (702) 220–6566

ENGINEER

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

APPROVALS

CITY ENGINEER–DAVID BOWER PE, PTOE #16736 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 FORM 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.

CHRIS KNIGHT DATE
DIRECTOR, BUILDING AND SAFETY

THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. XXXXXX DATE:_____
SHEETS: X

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 STATUES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

SOUTHWEST GAS DATE

COX COMMUNICATIONS LAS VEGAS, INC. DATE

INDEX OF DRAWINGS

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1	G–01	COVER SHEET
2	G–02	GENERAL NOTES
3	G–03	ABBREVIATIONS, KEY MAP, LEGEND AND QUANTITIES
4	SD–01	SKYE PARK DRIVE STORM DRAIN PLAN AND PROFILE "SPD" 77+50.00 TO "GTD" 83+50.00
5	SD–02	SKYE PARK DRIVE STORM DRAIN PLAN AND PROFILE "SPD" 83+50.00 TO "SPD" 89+00.00
6	SD–03	STREET "D" STORM DRAIN PLAN AND PROFILE "SD" 10+00.00 TO "GTD" 15+00.00
7	SD–04	SKYE CANYON PARK DRIVE STORM DRAIN PLAN
8	SD–05	GRAND CANYON DRIVE STORM DRAIN PLAN AND PROFILE "GCD" 36+00.00 TO "GCD" 42+50.00
9	SD–06	GRAND CANYON DRIVE STORM DRAIN PLAN AND PROFILE "GCD" 42+50.00 TO "GCD" 48+50.00
10	SD–07	STORM DRAIN LATERAL PROFILES
11	SD–08	STORM DRAIN LATERAL PROFILES
12	SD–09	ROADWAY SECTIONS
13	SD–10	BERM SECTIONS
14	SD–11	STORM DRAIN DETAILS
15	GR–01	GRADING PLAN
	SO.1	
	SO.2	
	S1.1	

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

NINETY-FIVE MANAGEMENT LLC

SKYE CANYON PHASE 3

COVER SHEET

DATE: 4/28/16
DRAFTER: JAS
DESIGNER: DAM
CHECKED: JSR

PROJECT NO.
OLY1602-000

PROFESSIONAL ENGINEER – STATE OF NEVADA – STEPHEN M. JONES – Exp. 6/30/17 – CIVIL – No. 019638 – 7/21/2016

G-01
SHEET 1 OF 15

CITY OF LAS VEGAS SEWER NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.
2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS. ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.
3. CHISEL "S" OR "G" IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.
4. POLYVINYL (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACKFILL OF TYPE II AGGREGATE BASE.
5. ALL MANHOLES PAVED IN STREETS EIGHTY (80') FOOT R/W AND LARGER SHALL HAVE CONCRETE COLLARS. STREETS LESS THAN EIGHTY (80') FOOT R/W WILL REQUIRE RETROFIT IF PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.
6. TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12") DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE "Y" 'S SHALL BE USED ON LINES TWELVE INCHES (12") OR ABOVE.
7. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVVWD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.
8. ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.
9. THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH (0.1) OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO EXCEED THIS TOLERANCE WILL HAVE TO BE REPAIRED OR REMOVED OR REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.
10. INSTALLATION OF CURVED SEWER REQUIRES THE USE OF C-900 PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.

REVISED 04/15/10

STORMWATER MANAGEMENT NOTES

1. THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARD IN THE USDCCA AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER ANY RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR 100000, SECTION III.A.12.
5. THE DEVELOPER SHALL BE RESPONSIBLE TO PROVIDE AND INSTALL ALL PERMANENT SIGNS SHOWN ON THE PLANS. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CLARK COUNTY AREA STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH CLARK COUNTY AREA STANDARDS. ALL SIGNS SHALL USE TYPE III SHEETING.

LAS VEGAS VALLEY WATER DISTRICT (LVVWD) STANDARD NOTES

LVVWD PROJECT #XXXXXX

1. NO WORK SHALL BEGIN UNTIL THE WATER PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE LVVWD. FOLLOWING WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVVWD COMMUNICATION SUPPORT CENTER (258-7171) TWO (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION. FOR FUTURE INSPECTIONS, NOTICE MUST BE GIVEN BY 2:00 P.M. THE BUSINESS DAY PRIOR TO THE REQUESTED LVVWD INSPECTION. **WHEN REQUESTING INSPECTIONS, PLEASE REFER TO THE PROJECT # IDENTIFIED ABOVE.**
2. ALL WORK SHALL CONFORM TO LVVWD STANDARD PLATES, DRAWINGS, AND SPECIFICATIONS, AND TO THE **2010** EDITION OF THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS (UDACS). **THE LATEST EDITION OF UDACS SHALL SUPERSEDE ANY CONFLICTS CONTAINED IN THE APPROVED DRAWINGS AND/OR SPECIFICATIONS.**
3. ALL WORK, EXCEPT AS MODIFIED BY THESE PLANS OR BY NOTE 2 ABOVE, SHALL BE DONE IN ACCORDANCE WITH THE MOST RECENT DRAFT OR EDITION OF THE UNIFORM SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENT, CLARK COUNTY AREA.
4. A SINGLE PIPE MATERIAL SHALL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE LVVWD.
5. ALL SERVICE LATERALS TWO (2) INCHES IN DIAMETER AND SMALLER SHALL BE TYPE K COPPER TUBING WITH LVVWD APPROVED SERVICE SADDLES.
6. ALL WATER METER BOXES SHALL BE LOCATED OUTSIDE OF DRIVEWAY AREAS.
7. ALL VALVES SHALL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY AND CURB GUTTERS.
8. ALL WATER AND STORM DRAIN OR SANITARY SEWER CROSSINGS SHALL CONFORM TO SECTION 2.22 OF THE **2010** EDITION OF THE UDACS
9. ALL WATER FACILITIES SHALL BE FILLED, DISINFECTED, PRESSURE TESTED, FLUSHED, FILLED, AND AN ACCEPTABLE WATER SAMPLE OBTAINED, PRIOR TO CONNECTION TO THE LVVWD DISTRIBUTION SYSTEM.
10. THE CONTRACTOR MUST OBTAIN ALL METERS TWO (2) INCHES AND SMALLER FROM LVVWD CENTRAL STORES. TELEPHONE 258-3152 OR 258-3802, TWO (2) WORKING DAYS PRIOR TO METER PICKUP.
11. ANY INTERRUPTION OF SERVICE MUST BE PERFORMED IN ACCORDANCE WITH UDACS SECTION 3.14.01, AND APPROVED BY THE LVVWD INSPECTION DIVISION PRIOR TO SHUTDOWN. PROPER WRITTEN NOTIFICATION MUST BE GIVEN TO ALL AFFECTED CUSTOMERS.
12. ALL WATER FACILITY CONSTRUCTION MATERIALS USED MUST BE LISTED ON THE LVVWD PRE-APPROVED MATERIALS AND MANUFACTURER'S LISTING FOR NEW FACILITIES, LATEST REVISION, OR SPECIFICALLY APPROVED ON THESE PLANS.
13. TELEPHONE "CALL BEFORE YOU DIG" AT "811" OR 1-800-227-2600.
14. THE INSTALLATION OF LAS VEGAS VALLEY WATER DISTRICT (LVVWD) MUNICIPAL WATER FACILITIES WITHIN ALL STREETS IS ASSUMED TO BE IN COMPLIANCE WITH THE UNIFORM STANDARDS, INCLUDING THE PLACEMENT OF ASPHALT PAVING STREET SURFACES. ANY REPAIR WORK DONE BY THE LVVWD TO THE MUNICIPAL WATER FACILITIES WILL INCLUDE THE PLACEMENT OF AN APPROPRIATELY SIZED ASPHALT REPAIR PATCH ON THE STREET SURFACE. ANY DECORATIVE PAVING SURFACE WITHIN THE STREET IS THE RESPONSIBILITY OF THE OWNER'S ASSOCIATION, OR THE INDIVIDUAL PROPERTY OWNERS IF NO OWNER'S ASSOCIATION IS IN EXISTENCE, OR THE AGENCY HAVING JURISDICTION DECORATIVE SURFACE MATERIALS PLACED WITHIN THE TEN FOOT EASEMENT ABUTTING A PUBLIC OF PRIVATE STREET, IF DISTURBED BY THE LVVWD DURING THE REPAIR OR OPERATION OF ITS FACILITIES, WILL BE REPLACED BY LVVWD WITH AN APPROPRIATELY SIZED PLAIN FINISH CONCRETE PATCH. THE LVVWD WILL NOT RESTORE, AND WILL NOT BE RESPONSIBLE FOR THE RESTORATION OF ANY DECORATIVE PAVING SURFACE WITH THE STREET. THE LVVWD WILL NOT ATTEMPT TO MATCH COLOR OR FINISH OF ANY ADJACENT MATERIALS.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
DATE____________________ LVVWD PROJECT # XXXXXX

CITY OF LAS VEGAS GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST ISSUE; THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST REVISED EDITION; THE "SUMMERLIN IMPROVEMENT STANDARDS" FOR WORK IN THE SUMMERLIN AREA; AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY; THE UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".
2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CLV PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE PLANS. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCE WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER OR OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS; ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
5. TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGN TO BE APPROVED BY THE QUALITY CONTROL DIVISION, PRIOR TO THE USE ON THE PROJECT.
6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.
7. JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTRUDED-TYPE CURB.
8. AC PAVEMENT TO BE 1/2" ABOVE LIP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS.
9. CURB AND GUTTER WITH A GRADE OF LESS THAN FOUR-TENTHS OF ONE PERCENT SHALL BE WATER-TESTED AS SOON AS POSSIBLE AFTER CONSTRUCTION. ANY CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY SHALL BE REMOVED AND REPLACED PER USD 216.
10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER USD 235; CASE I. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY PROJECT REPRESENTATIVE.
11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF TRANSITIONS TO BE AS SHOWN ON PLANS, OR AS DESIGNATED IN THE FIELD BY CITY PROJECT REPRESENTATIVE.
12. EXACT LOCATION OF ALL SAWCUT LINES MAY BE DETERMINED IN THE FIELD BY A CITY PROJECT REPRESENTATIVE IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES RELOCATIONS.
13. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED, AND SHALL BE DONE ONLY BY A NEVADA PROFESSIONAL LAND SURVEYOR IN ACCORDANCE WITH THE UNIFORM STANDARD DRAWINGS – CLARK COUNTY AREA. A RECORD-OF-SURVEY FOR REPLACEMENT OF PERMANENT SURVEY MONUMENTS SHALL BE SUBMITTED TO THE CITY ENGINEER FOR APPROVAL PRIOR TO RECORDING. THE RECORD-OF-SURVEY SHALL BE PREPARED IN ACCORDANCE WITH NEVADA REVISED STATUTES 625.350.
14. UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APRONS, FLOWLINES, AND CROSS GUTTER UNLESS WRITTEN APPROVAL IS GRANTED BY THE AFFECTED UTILITY COMPANY AND THE CITY ENGINEER.
15. ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS; FLOOD CONTROL AND SIGHT DISTANCE AT INTERSECTIONS. NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE CLV BUILDING DEPARTMENT.
16. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHTS OF WAY.
17. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, SEWER CLEANOUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.
18. MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF NDOT AND CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.
19. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC, THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO THE ENGINEER CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.
20. SANITARY SEWER AND STORM DRAIN FINAL LOCATION INFORMATION SHALL BE PROVIDED TO THE ENGINEER PRIOR TO PROJECT ACCEPTANCE. THE INFORMATION SHALL INCLUDE THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, AND THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXITS THE PUBLIC RIGHT-OF-WAY. THE LOCATION SHALL BE DESCRIBED BY COORDINATES WHICH SHALL BE BASED ON THE OFFICIAL HORIZONTAL AND VERTICAL CONTROL NETWORKS OF THE CITY OF LAS VEGAS. FINAL LOCATION INFORMATION MUST BE SEALED AND CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTAINTIES OF ± 0.09 METERS (± 0.3 FEET) HORIZONTALLY AND VERTICALLY. A SEPARATE ELECTRONIC COMMA DELIMITED FILE FOR THE SANITARY SEWER AND STORM DRAIN COORDINATES SHALL ALSO ACCOMPANY THE SANITARY SEWER AND STORM DRAIN FINAL LOCATION INFORMATION.
21. CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST ADDITION.
22. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

REVISED JANUARY 23, 2014

CITY OF LAS VEGAS STREETLIGHT NOTES

1. ALL STREET LIGHTING INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE STREET LIGHTING PLANS, THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST REVISION, AND THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST REVISION, AND ANY ADOPTED SPECIAL AREA STANDARDS.
2. NO DEVIATION OF STREET LIGHT, PULL BOX, CONDUITS (ETC.) LOCATIONS SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF TRAFFIC ENGINEERING AND THE CITY ENGINEER.
3. ALL EXISTING STREET LIGHTING SHALL REMAIN OPERATIONAL DURING CONSTRUCTION.
4. ALL STREET LIGHTING CONDUITS STUB SHALL HAVE AT LEAST ONE GREEN #8 THW WIRE INSTALLED, AS TRACER WIRE. WHEN "EMPTY" CONDUIT IS COMPLETELY INSTALLED FROM PB TO PB, IT SHALL HAVE MINIMUM OF 2 #4 AND 1 #8 THW WIRE WITH THE ENDS TAPED OR "SAFE OFF" PRIOR TO FINAL INSPECTION.
5. ANY STRUCTURE SUCH AS BLOCK WALLS, CHAIN LINK FENCES, RETAINING WALLS, ETC., SHALL LEAVE A MINIMUM CLEARANCE IN ACCORDANCE WITH THE USD NO. 320A.
6. AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE TEFO PRIOR TO ANY PRE-FINAL INSPECTION. THE AS-BUILT DRAWING NEEDS TO BE STAMPED AS-BUILT AND SIGNED BY THE PREPARER.
7. SERVICE POINT SHALL BE COORDINATED WITH NV ENERGY COMPANY, AND WHEREVER POSSIBLE, BE LOCATED NEAR THE CENTER OF THE CIRCUIT. SERVICE POINTS SHALL BE SHOWN ON THE CIVIL PLANS.
8. IT SHALL BE ASSUMED THAT IN THE ABSENCE OF AN EXISTING, WORKABLE CIRCUIT TO ATTACH TO, ALL INSTALLATIONS SHALL REQUIRE A NEW SERVICE FOR OPERATION OF THE CIRCUIT.
9. WHEREVER THERE IS AN OVERHEAD UTILITY THAT MAY CONFLICT WITH THE INSTALLATION OF STREET LIGHTING CIRCUITS AND/OR POLES, THESE CONFLICTS MUST BE RESOLVED BETWEEN THE DEVELOPER AND THE UTILITIES INVOLVED, AT NO EXPENSE TO THE CITY OF LAS VEGAS, BEFORE STREETLIGHT BASES ARE INSTALLED.
10. THE CONTRACTOR SHALL FURNISH COMPLETE SERVICE TO TRANSFORMERS AND CONTROL SYSTEMS IF REQUIRED ON PLANS.
11. THE DEVELOPER/OWNER WILL BE REQUIRED TO SUPPLY POWER TO ALL NEW PUBLIC STREET LIGHTS INSTALLED UNDER THIS DESIGN PRIOR TO BOND RELEASE OR PROJECT COMPLETION. THE DEVELOPER/OWNER WILL BE RESPONSIBLE FOR ALL ITEMS ASSOCIATED WITH THE INSTALLATION, CONSTRUCTION, ENERGIZING, MAINTENANCE AND OPERATIONAL COST OF SAID STREET LIGHTS PRIOR TO PROJECT COMPLETION. REFER TO THE PLAN FOR ANY NEW SERVICE REQUIREMENTS. THE TRANSFER OF OWNERSHIP FROM THE DEVELOPER/OWNER TO THE CITY OF LAS VEGAS FOR ALL NEW PUBLIC STREET LIGHT/S AND/OR SERVICE/S INSTALLED UNDER THIS PLAN DESIGN WILL BE IN CONJUNCTION WITH THIS PROJECT COMPLETION. COORDINATE ALL MAINTENANCE AND OPERATIONAL TRANSFERS WITH THE CITY OF LAS VEGAS TRAFFIC ENGINEERING DEPARTMENT (TEFO) AT (702) 229-6331.

REVISED 04/15/10

LAS VEGAS FIRE AND RESCUE GENERAL NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE # 6325 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.
2. AUTHORIZED FIRE HYDRANTS ARE AS FOLLOWS:
   - KENNEDY -GUARDIAN MODELS K81A AND K81D
   - MUELLER -SUPER CENTURION 250, MODEL A-423
   - CLOW -MEDALLION MODEL F-2546LVD
   - U.S.PIPE -METROFLOW/M-03
3. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK. [IFC § 105.7.12]
4. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE MAINTAINED BEFORE COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDERAND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW. [IFC § 3310, § 3312]
5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF THE STREET ADJACENT TO THE FIRE HYDRANTS. [IFC § 507.5.7.3]
6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL. [IFC § 106.3]
7. ALL ON-SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L. LISTED, A.W.W.A APPROVED AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE. [IFC § 507.2.1, NFPA 24]
8. PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE, AND ALL OTHER WORK NECESSARYPER PLANS SHALL BE COMPLETED BEFORE APPROVAL BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION. [IFC § 507]
9. PRIVATE HYDRANTS SHALL BE PAINTED RED. [IFC § 507.5.7.1]
10. PRIOR TO THE FINAL OCCUPANCY, A FIRE FLOW TEST SHALL BE WITNESSED BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW. [IFC § 507]
11. FIRE HYDRANT SPACING SHALL BE AS FOLLOWS: [IFC § C102]
    - RESIDENTIAL -500 FT UNSPRINKLERED; 600 FT SPRINKLERED.
    - COMMERCIAL -300 FT UNSPRINKLERED; 400 FT SPRINKLERED.
12. WHERE THE WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM OF 1000 FT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 500 FT ON AN ALTERNATING BASIS. [IFC § C102.8]
13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF A CUL-DE-SAC OR WITHIN 20 FT OF THE PERIMETER OF THE RADIUS OF THE CUL-DE-SAC.
14. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FT OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION. [IFC § C102.12]
15. A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT, AS MEASURED BY AN APPROVED ROUTE. [IFC § C102.4]
16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FT, AS MEASURED BY AN APPROVED ROUTE. [IFC § C102.7]
17. THE MAXIMUM DISTANCE FROM A HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. [IFC § C102.6]
18. TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE IS 4 OR MORE FIRE HYDRANTS/SPRINKLER LEAD-INS ARE INSTALLED ON A SINGLE SYSTEM. SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS CAN BE OUT OF SERVICE DUE TO A BREAK IN A WATER MAIN. [IFC § C104]
19. ALL FIRE APPARATUS ACCESS ROADS SHALL BE PAVED TO PROVIDE ALL-WEATHER DRIVING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF THE FIRE APPARATUS. [IFC § 503.2.3]
20. THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12%. ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FT PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%. [IFC § 503.2.7, § 503.2.8]
21. THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FT OUTSIDE AND 28 FT INSIDE TURNING RADIUS. [IFC § 503.2.4]
22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13FT 6 INS. [IFC § 503.2.1]
23. FIRE DEPARTMENT ACCESS ROADS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 40 FT FLOW LINE TO FLOW LINE WITH PARALLEL PARKING PERMITTED ON BOTH SIDES. NOT LESS THAN 32 FT WIDE, FLOW-LINE TO FLOW-LINE, WHERE PARKING IS PERMITTED ONLY ON ONE SIDE OF THE FIRE APPARATUS ACCESS ROAD. NOT LESS THAN 24 FT WIDE, FLOW-LINE TO FLOW-LINE, WHERE NO PARKING IS PERMITTED ON EITHER SIDE. FIRE LANES THROUGH PARKING LOTS SHALL BE NOT LESS THAN 24 FT. [IFC § 503.2.1.1]
24. A FIRE APPARATUS ACCESS ROAD SHALL BE REQUIRED WHEN ANY PORTION OF AN EXTERIOR WALL OF THE FIRST STORY IS LOCATED MORE THAN 150 FT FROM A FIRE DEPARTMENT VEHICLE ACCESS. THIS DISTANCE COULD BE INCREASED TO 250 FT IF THE BUILDING IS SPRINKLERED. [IFC § 503.1.1]
25. APPROVED SECONDARY FIRE APPARATUS ACCESS SHALL BE PROVIDED FOR 100 OR MORE DWELLING UNITS, ROAD(S) WITH DEAD-ENDS OR WITH A SINGLE POINT OF ACCESS IN EXCESS OF 600 FT. COMMERCIAL AND INDUSTRIAL DEVELOPMENTS WHERE BUILDINGS EXCEED 2 STORIES OR 30 FEET IN HEIGHT, OR EXCEEDING 62,000 SQUARE FEET IN AREA. [IFC § 503.1.2]
26. ALL DEAD-END FIRE APPARATUS ROADS AND/OR FIRE LANES, PUBLIC OR PRIVATE, IN EXCESS OF 150 FT IN LENGTH SHALL BE PROVIDED WITH AN APPROVED TURN AROUND HAVING A MINIMUM DIAMETER OF 81 FT. [IFC § 503.2.5]
27. ALL FIRE APPARATUS ACCESS ROADS SHALL BE MARKED BY PLACING APPROVED SIGNS AT THE START OF THE DESIGNATED FIRE LANE, ONE SIGN AT THE END OF THE FIRE LANE AND WITH SIGNS AT INTERVALS OF 100 FT ALONG THE DESIGNATED FIRE LANES. SIGNS TO BE PLACED ON BOTH SIDES OF AN ACCESS ROADWAY IF NEEDED TO PREVENT PARKING ON EITHER SIDE. SIGNS TO BE INSTALLED NO HIGHER THAN 10 FT OR LESS THAN 6 FT FROM THE ROADWAY LEVEL. THE CURB ALONG OR ON THE PAVEMENT OR CEMENT (IF NO CURB IS PROVIDED) SHALL BE PAINTED WITH A RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. [IFC § 503.3]
28. ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER SYSTEM. SAID SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE IFC § 503.6 AND IFC APPENDIX M.

REVISED 7/1/14

UTILITY NOTES

NV ENERGY, CENTRAL TELEPHONE CO, DBA CENTURY LINK TELEPHONE, AND SOUTHWEST GAS SHOWN FOR INFORMATIONAL PURPOSES ONLY. REFERENCE NV ENERGY, CENTRAL TELEPHONE CO, DBA CENTURY LINK TELEPHONE, AND SOUTHWEST GAS DRAWINGS FOR CONSTRUCTION DETAILS. CONTRACTOR TO COORDINATE WITH UTILITIES FOR REMOVAL AND INSTALLATION OF FACILITIES.

ALL EXISTING UTILITY LOCATIONS SHOW HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION. THE DEPTH BELOW GRADE OF THE VARIOUS UTILITIES DEPICTED ON THE PLANS VARIES THROUGHOUT THE PROJECT AREA. THE CONTRACTOR SHALL EXERCISE EXTREME CARE WHERE EXCAVATING AND GRADING THE SUBBASE IN THE VICINITY OF UTILITIES TO AVOID DAMAGE TO THE LATTER.

ALL EXISTING UTILITIES SHALL BE PROTECTED IN PLACE UNLESS OTHERWISE NOTED.

CITY OF LAS VEGAS GRADING NOTES

1. IN THE EVENT THAT ANY UNFORESEEN CONDITIONS NOT COVERED BY THESE NOTES ARE ENCOUNTERED DURING GRADING OPERATIONS, THE OWNER/ENGINEER SHALL BE IMMEDIATELY NOTIFIED FOR DIRECTION.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM ALL NECESSARY CUTS AND FILLS WITHIN THE LIMITS OF THIS PROJECT AND THE RELATED OFF-SITE WORK, SO AS TO GENERATE THE DESIRED SUBGRADE, FINISH GRADES AND SLOPES SHOWN.
3. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL EXCAVATION. ADEQUATE SHORING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OR FACILITIES AND/OR CAVING OF THE EXCAVATION.
4. THE GRADING CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE OWNER TO PROVIDE FOR THE REQUIREMENTS OF THE PROJECT STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ASSOCIATED PERMIT.
5. CONTRACTOR SHALL GRADE TO THE LINES AND ELEVATIONS SHOWN ON THE PLANS WITHIN THE FOLLOWING HORIZONTAL AND VERTICAL TOLERANCES AND DEGREES OF COMPACTION, IN THE AREAS INDICATED:

		HORIZONTAL	VERTICAL
A.	PAVEMENT AREA SUBGRADE	0.1'±	+0.0' TO -0.1'
B.	ENGINEERED FILL	0.5'±	+0.1' TO -0.1'

   COMPACTION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE. COMPACTION SHALL COMPLY WITH THE REQUIREMENTS OF THE ENGINEER.
6. ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL HAS BEEN ESTABLISHED.
7. THE USE OF POTABLE WATER WITHOUT A SPECIAL PERMIT FOR BUILDING OR CONSTRUCTION PURPOSES INCLUDING CONSOLIDATION OF BACKFILL OR DUST CONTROL IS PROHIBITED. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION WATER.
8. THE CONTRACTOR SHALL MAINTAIN THE STREETS, SIDEWALKS AND ALL OTHER PUBLIC RIGHT-OF-WAY IN A CLEAN, SAFE AND USABLE CONDITION. ALL SPILLS OF SOIL, ROCK OR CONSTRUCTION DEBRIS SHALL BE PROMPTLY REMOVED FROM THE PUBLICLY OWNED PROPERTY DURING CONSTRUCTION AND UPON COMPLETION OF THE PROJECT. ALL ADJACENT PROPERTY, PRIVATE OR PUBLIC SHALL BE MAINTAINED IN A CLEAN, SAFE AND USABLE CONDITION.
9. IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED THAT IS NOT SHOWN ON THESE DRAWINGS, SUCH ITEM SHALL BE PROVIDED, AS DIRECTED BY THE CITY ENGINEER, AT NO EXPENSE TO THE CITY OF LAS VEGAS. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERMS, ROAD SIGNS AND BARRICADES, ETC.

REVISED JULY 2008

DEVIATION FROM STANDARDS

NONE

CITY OF LAS VEGAS TRAFFIC NOTES

1. ALL CONSTRUCTION SIGNING, BARRICADING, AND TRAFFIC DELINEATION SHALL CONFORM TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", LATEST EDITION.
2. THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE PLANNING DEPARTMENT PRIOR TO CONSTRUCTION.
3. BEFORE ANY WORK IS STARTED IN THE RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE CONSTRUCTION ZONE. THE CONTRACTOR SHALL INSTALL TEMPORARY STOP SIGNS AT ALL NEW STREET ENCROACHMENTS INTO EXISTING CITY STREETS WHERE WARRANTED IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.
4. WHEN A DESIGNATED "SUGGESTED ROUTE TO SCHOOL" IS ENCROACHED UPON BY A CONSTRUCTION WORK ZONE AND PUBLIC WORKS STAFF IDENTIFIES A NEED FOR STUDENTS TO BE ASSISTED IN THE SAFE CROSSING THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED "CROSSING GUARD". THE GUARD SHALL BE PRESENT FOR THE FULL DURATION OF TIME THAT CHILDREN ARE LIKELY TO BE PRESENT.
5. IF THE IMPROVEMENTS NECESSITATE THE OBLITERATION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LIKE MATERIALS TO THE SATISFACTION OF THE CITY TRAFFIC ENGINEER.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL PERMANENT SIGNS SHOWN ON THE PLANS. ALL NEW TRAFFIC SIGNS SHALL BE FABRICATED WITH DIAMOND GRADE VIP CLASS 6 REFLECTIVE SHEETING OR APPROVED EQUAL. ALL NEW TRAFFIC SIGNS, EXCEPT STREET NAME AND SCHOOL SPEED LIMIT SIGNS, SHALL HAVE 3M SERIES 1160 OR APPROVED EQUIVALENT ANTI-GRAFFITI PROTECTIVE OVERLAY FILM; SCHOOL ZONE SIGNS SHALL HAVE 3M SERIES 1150 ANTI-GRAFFITI PROTECTIVE OVERLAY FILM. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CURRENT CITY STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.
7. WHEN A PROPOSED STREET LIGHT STANDARD IS LOCATED WITHIN FIVE (5') FEET OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON A SIGNPOST, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGNPOST SHALL BE ELIMINATED.
8. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE PORTIONS OF THE ROAD(S) BEING IMPROVED HERE UNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.
9. STREET SIGNS AND STOP SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF STREET NAME SIGNS.
10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO INSURE THE SAFETY OF THE PUBLIC IN OR AROUND THE WORK AREA. THE CONTRACTOR SHALL HAVE A CERTIFIED ATSSA TRAFFIC CONTROL TECHNICIAN OR IMSA WORK ZONE SAFETY SPECIALIST SET UP, MAINTAIN AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHT OF WAY.
11. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXPEDITED TO COMPLETION SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO THE TRAVELING PUBLIC.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING CITIZENS AREA TRANSIT (C.A.T.) IF THE CONSTRUCTION INTERRUPTS OR RELOCATES A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE ON THAT STREET TO ARRANGE FOR TEMPORARY RELOCATION OF STOP.
13. GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL EVENTS UNIT (PHONE # 828-3442) WHO WILL PROVIDE OFFICERS PROPERLY TRAINED IN TRAFFIC CONTROL. FEES FOR THE USE OF THESE OFFICERS SHALL BE SET BY METRO AND WILL BE PAID BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.
14. ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.
15. THE CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECT'S OFFSITE INSPECTOR PRIOR TO INITIATING PAVING TO RECEIVE DIRECTION FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MATCH ADJACENT ROADWAY SEGMENTS. THE CONTRACTOR SHALL PROVIDE A DRAWING FOR APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPICTING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNAGE, WHICH MAY INCLUDE OMITTING, ADDING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SUCH THAT ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

REVISED 05/05/08

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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

NINETY-FIVE MANAGEMENT LLC

SKYE CANYON PHASE 3
GENERAL NOTES

DATE: 4/28/16
DRAFTER: JAS
DESIGNER: DAM
CHECKED: JSR

PROJECT NO.
OLY1602-000

PROFESSIONAL ENGINEER – STATE OF NEVADA
STEPHEN M. JONES
Exp: 6/30/17
CIVIL
No. 019638
7/21/2016

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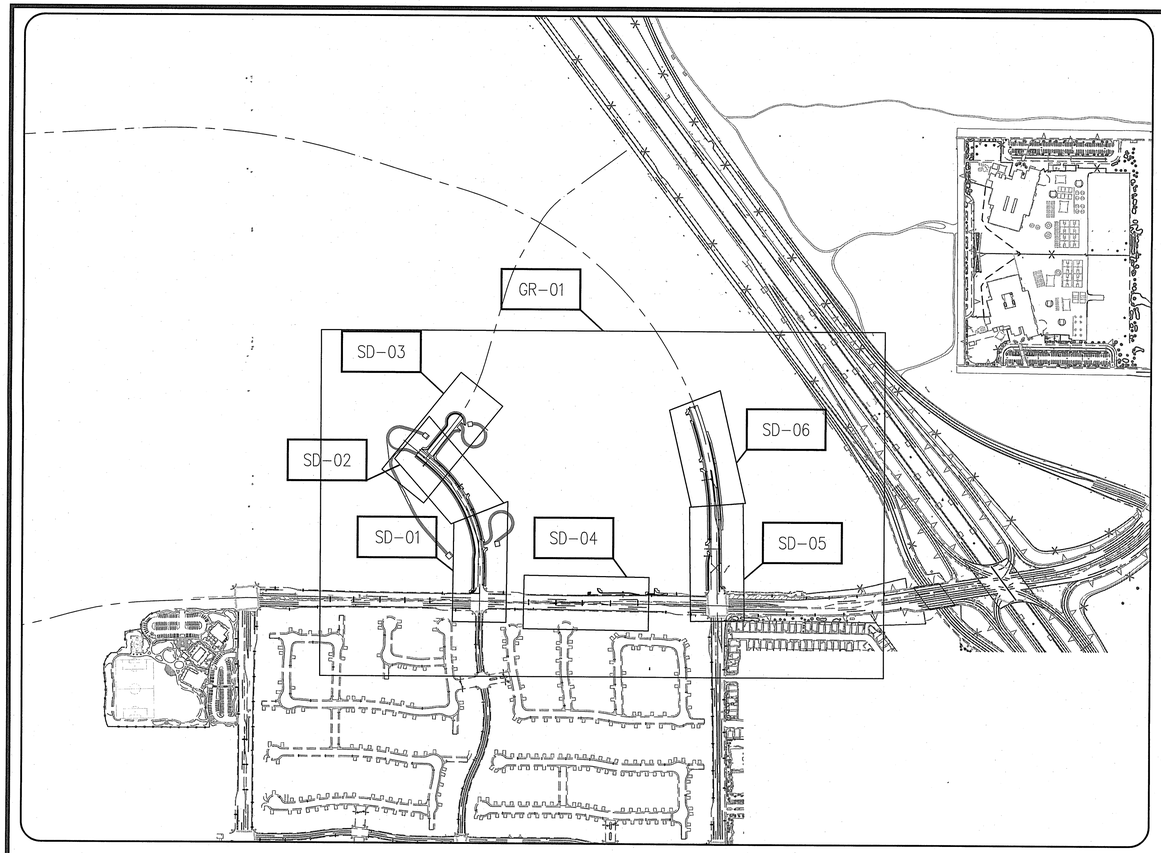
SHEET 2 OF 15



KEYMAP

LEGEND

- EXISTING CURB & GUTTER
- EXISTING RIGHT-OF-WAY LINE
- EXISTING PROPERTY LINE
- EXISTING CHAIN-LINK FENCE
- EXISTING MANHOLE OR VAULT
- EXISTING CONTOUR LINE (1875)
- EXISTING ELEVATION (12.3 TC)
- STREET CENTERLINE
- EASEMENT LINE
- FLOWLINE
- SAWCUT LINE
- CONTOUR LINE (1875)
- ELEVATION (12.3 TC)

QUANTITIES

DESCRIPTION	UNIT	TOTAL QUANTITY
DROP INLET 7.5' TYPE CM2	EA	1
DROP INLET 10' TYPE CM2	EA	1
DROP INLET 12.5' TYPE CM2	EA	2
60" TYPE III MANHOLE	EA	2
NDOT TYPE 4 MANHOLE	EA	5
RCB ACCESS MANHOLE	EA	1
STRUCTURAL MANHOLE	EA	2
18" RCP	LF	15
24" RCP	LF	225
30" RCP	LF	100
60" RCP	LF	165
66" RCP	LF	390
72" RCP	LF	275
PRECAST 6'X5' RCB	FT	73
PRECAST 14'X5' RCB	FT	77
PRECAST 14'X7' RCB	FT	15
STRUCTURAL HEADWALL	EA	5
NDOT TYPE II HEADWALL	EA	1
6" CONCRETE PAD	SF	3300
RIPRAP	CY	35

ABBREVIATIONS

ABUT	ABUTMENT
AC	ALUMINUM CAP/ASPHALTIC CONCRETE
AEP	AUTHORIZATION TO ENTER PROPERTY
AP	ANGLE POINT
APN	ASSESSORS PARCEL NUMBER
AVE	AVENUE
BC	BEGIN CURVE/BRASS CAP/BACK OF CURB
BCR	BEGIN CURB RETURN
BLVD	BOULEVARD
BM	BENCHMARK
BOT	BOTTOM
BRG	BEARING
BSW	BACK OF SIDEWALK
BVCE	BEGIN VERTICAL CURVE ELEVATION
BVCS	BEGIN VERTICAL CURVE STATION
CATV	UNDERGROUND CABLE TV
CG	CURB AND GUTTER
CCSD	DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS
CKT	CIRCUIT
CLR	CLEAR/CLEARANCE
CLBM	CITY OF LAS VEGAS BENCHMARK
CLV	CITY OF LAS VEGAS
CMU	CONCRETE MASONRY UNIT
CONC	CONCRETE
℄, C/L	CENTERLINE
COB	CENTER OF BOLLARD
COL	COLUMN
CONST	CONSTRUCT/CONSTRUCTION
COORD	COORDINATE
COR	CORNER
CY	CUBIC YARD(S)
Δ	DELTA
DB	DIRECT BURY
DBL	DOUBLE
DI	DROP INLET
DIA	DIAMETER
DIST	DISTANCE
DR	DRIVE
DW	DRIVEWAY
DWG	DRAWING
ECR	END CURB RETURN
E	EAST
EA	EACH
ESMT	EASEMENT
ECR	END CURB RETURN
ELEC	ELECTRICAL
ELEV/EL	ELEVATION
EP/EOP	EDGE OF PAVEMENT
EQ	EQUAL
EST	ESTIMATED
EVC	END VERTICAL CURVE
EX./EXIST	EXISTING
EXP	EXPANSION JOINT
EW	EACH WAY
FC	FACE OF CURB
FG	FINISH GRADE
FH	FIRE HYDRANT
FL	FLOW LINE
FO	FIBER OPTIC
FS	FINISH SURFACE
FT	FOOT/FEET
FTG	FOOTING
FW	FACE OF WALL
FYA	FLASHING YELLOW ARROW
G	GAS
GA	GAUGE
GB	GRADE BREAK
GND	GROUND
H	HEIGHT
HGL	HYDRAULIC GRADE LINE
HORIZ	HORIZONTAL
HWY	HIGHWAY
INV	INVERT
ITS	INTELLIGENT TRANSPORTATION SYSTEM
JT	JOINT
LF	LINEAR (LINEAL) FEET
LIP	LIP OF GUTTER
LT	LEFT
LUM	LUMINAIRE
LVVWD	LAS VEGAS VALLEY WATER DISTRICT
MAX	MAXIMUM
MH	MANHOLE
MIN	MINIMUM
MLCP	MULTI-LAYERED COMPOSITE PIPE
MOD	MODIFY/MODIFIED
MON	MONUMENT
MPH	MILES PER HOUR
N	NORTH
NDOT	NEVADA DEPARTMENT OF TRANSPORTATION
NO	NUMBER
NVE	NV ENERGY
NTS	NOT TO SCALE
OC	ON CENTER
OHP	OVERHEAD POWER LINE
PAT	PATENT
PB	PULL BOX
PBS	PLANTMIX BITUMINOUS SURFACE
PC	POINT OF CURVE, PHOTO CELL
PCC	POINT OF COMPOUND CURVE
PD	PONDING DEPTH
PE	PROJECT ENGINEER/POLYETHYLENE
PED	PEDESTRIAN
PG	PROFILE GRADE (FG ON CONTROL LINE)
PGL	PROFILE GRADE LINE
PH	POTHOLE
PI	POINT OF INTERSECTION
PKWY	PARKWAY
PL	PROPERTY LINE
PMF	PAVEMENT MARKING FILM
POB	POINT OF BEGINNING
POC	POINT ON CURVE
POE	POINT OF ENDING
POT	POINT ON TANGENT
PP	POWER POLE
PPCBR	PORTABLE PRECAST CONCRETE BARRIER RAIL
PPM	POLYUREA PAVEMENT MARKINGS
PR	PAIR
PROP	PROPOSED
PRC	POINT OF REVERSE CURVE
PRVC	POINT REVERSE VERTICAL CURVE
PSI	POUNDS PER SQUARE INCH
PT	POINT OF TANGENCY
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
R	RADIUS
RCB	REINFORCED CONCRETE BOX
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RDWY	ROADWAY
REC	RECTANGULAR
REINF	REINFORCED
REQD	REQUIRED
RND	ROUND
RP	RADIUS POINT
RPM	RAISED PAVEMENT MARKERS
R/W	RIGHT-OF-WAY
RT	RIGHT
S	SOUTH
SCH	SCHEDULE
SD	STORM DRAIN
SDMH	STORM DRAIN MANHOLE
SECT	SECTION
SF	SQUARE FOOT/FEET
SHLDR	SHOULDER
SHT	SHEET
SIM	SIMILAR
SP	SERVICE POINT
SPA	SPACING
SQ	SQUARE
SS	SANITARY SEWER
SSMH	SANITARY SEWER MANHOLE
STA	STATION
STD	STANDARD
ST	STREET
STL	STEEL
SL	STREET LIGHT
STRUCT	STRUCTURE
SW	SIDEWALK
SNBORS	SOUTHERN NEVADA BUILDING OFFICIALS REGIONAL STANDARDS
SWG	SOUTHWEST GAS
T	TELEPHONE/TOP
TAN	TANGENT
TC	TOP OF CURB
TEMP	TEMPORARY
TF	TOP OF FOOTING
TG	TOP OF GRATE
TMH	TOP OF MANHOLE
TRANS	TRANSITION STRUCTURE
THW	TOP OF HEADWALL
TRW	TOP OF RETAINING WALL
TW	TOP OF WALL
TS	TRAFFIC SIGNAL
TYP	TYPICAL
UDACS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS
USDCCA	UNIFORM STD. DRAWINGS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS CLARK COUNTY AREA, NEVADA
UT	UNDERGROUND TELEPHONE
VAR	VARIABLE/VARIES
VC	VERTICAL CURVE
VERT	VERTICAL
VG	VALLEY GUTTER
W	WEST
WY	WAY
WT	WEIGHT
XING	CROSSING

ALIGNMENT ABBREVIATIONS

"GCD"	GRAND CANYON DRIVE (SKYE CANYON PARK DRIVE TO SKYE PARK DRIVE)
"SCP"	SKYE CANYON PARK DRIVE (GRAND TETON DRIVE TO EAGLE CANYON AVENUE)
"SD"	STREET D (SKYE PARK DRIVE TO CUL-DE-SAC END)
"SPD"	SKYE PARK DRIVE (SKYE CANYON PARK DRIVE TO STREET D)

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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

NINETY-FIVE MANAGEMENT LLC

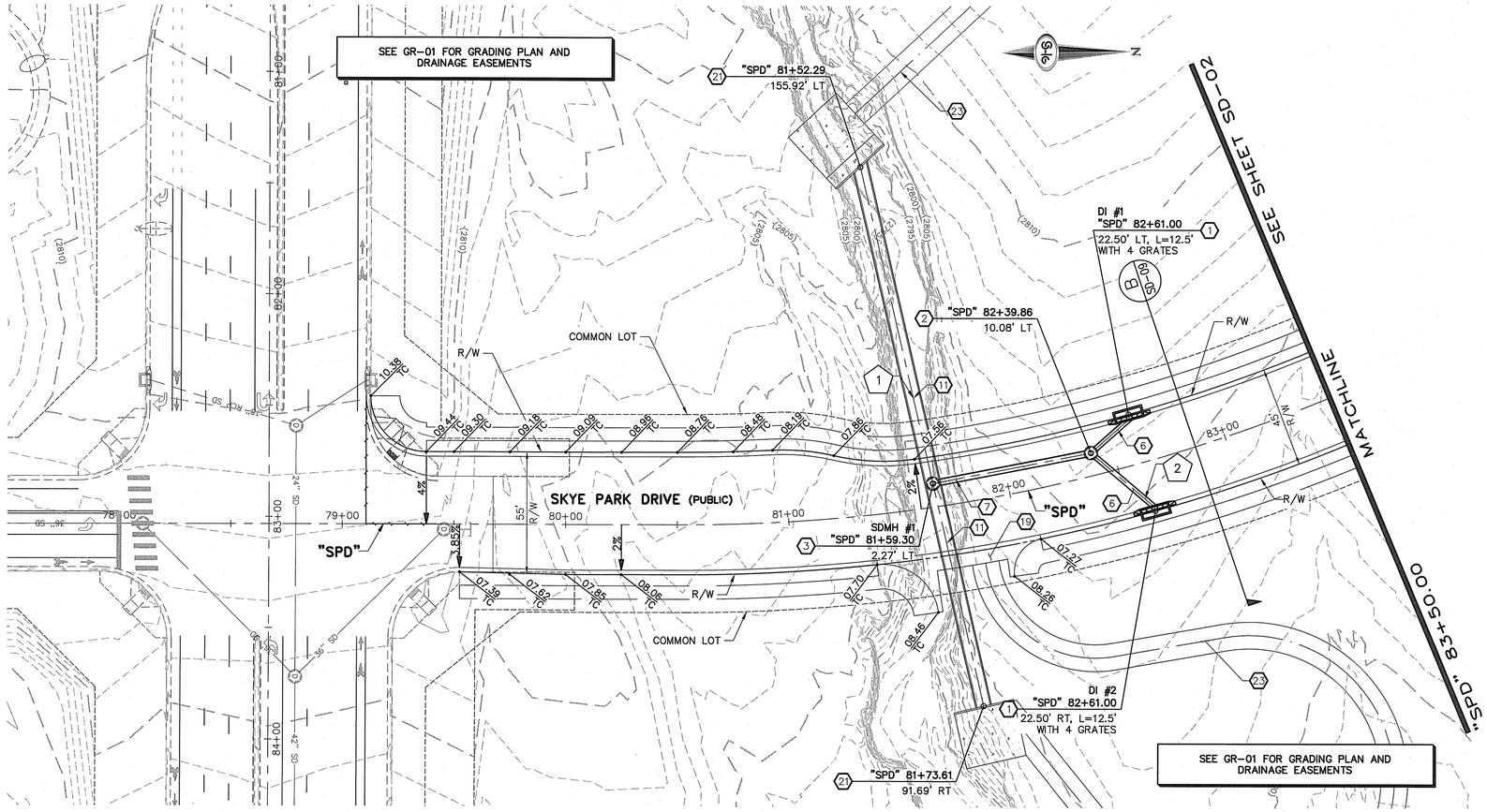
SKYE CANYON PHASE 3

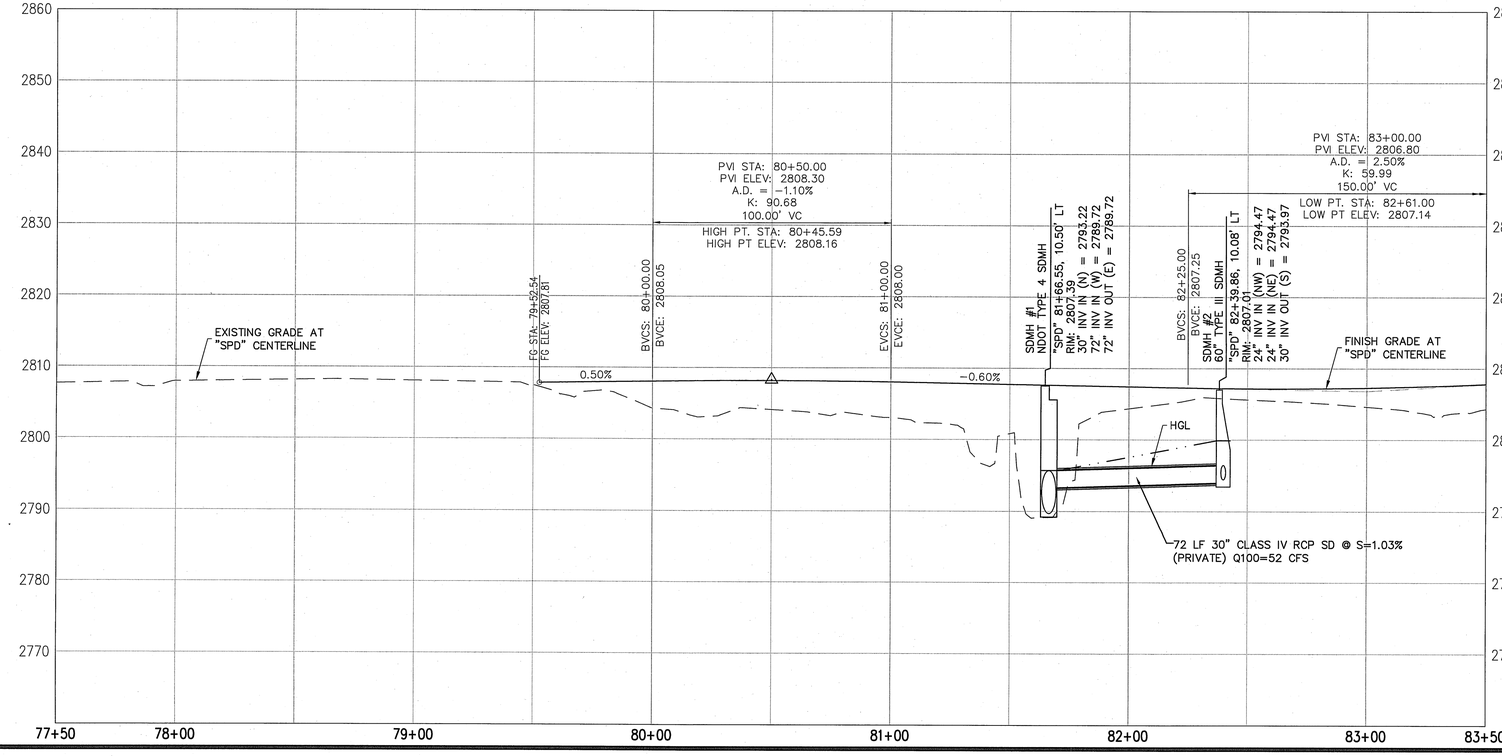
ABBREVIATIONS, KEYMAP, LEGEND AND QUANTITIES

DATE: 4/28/16
DRAFTER: JAS
DESIGNER: DAM
CHECKED: JSR
PROJECT NO.
OLY1602-000

PROFESSIONAL ENGINEER - STATE OF NEVADA - STEPHEN M. JONES - Exp. 6/30/17 - CIVIL - No. 019638 - 7/21/2016

G-03
SHEET 3 OF 15





STORM DRAIN NOTES

1. CONSTRUCT TYPE "CM2" DROP INLET (USDCCA STD. DWG. NO. 412.1 & 421)
2. CONSTRUCT 60" TYPE III MANHOLE (USDCCA STD. DWG. NO. 406.1)
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DROP INLET NOTE

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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

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JERRY SLATER, P.E. 14167 — DATE

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: 32003C1735E, DATED SEPTEMBER 27, 2002

NOTE:

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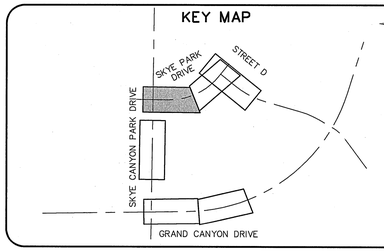
KEY MAP



30 0 30 60
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5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

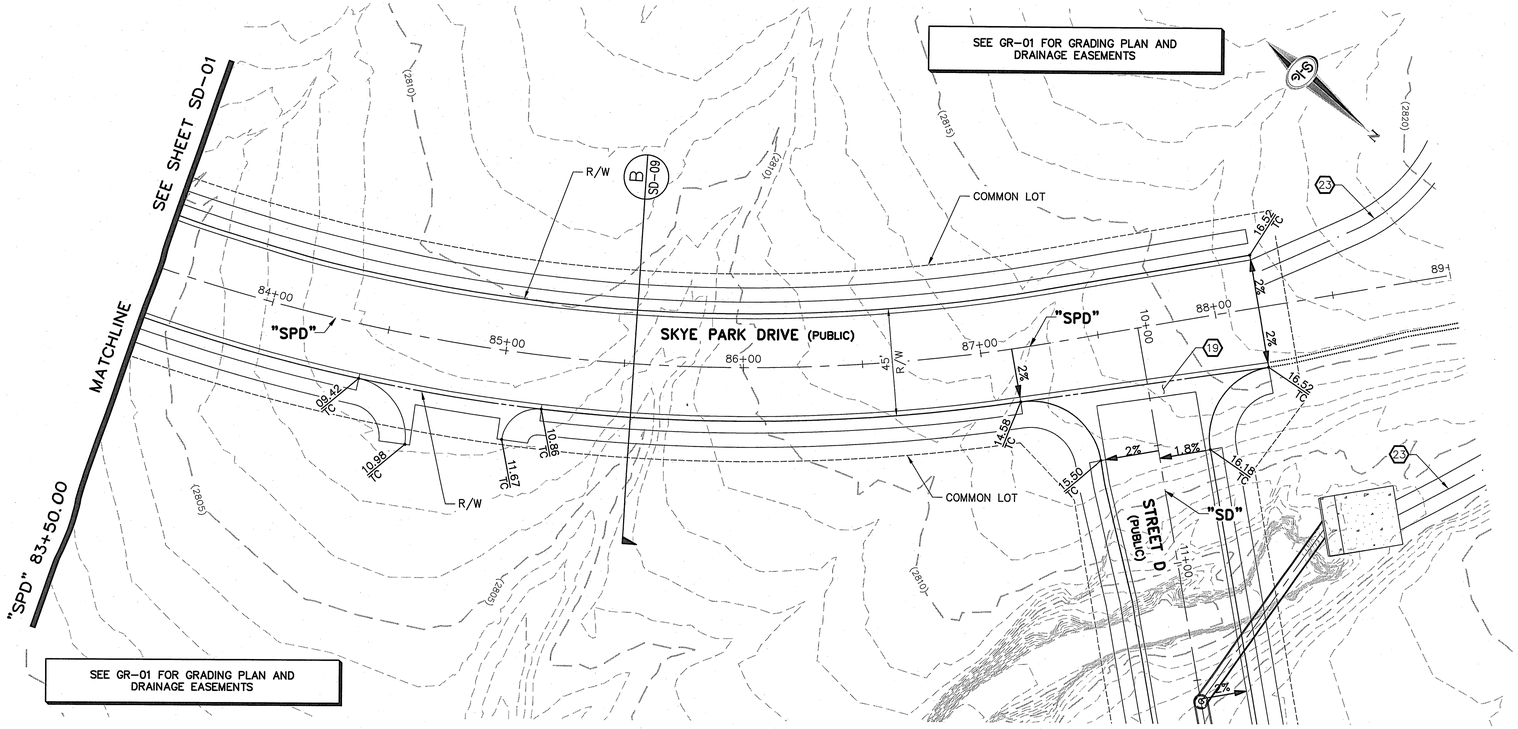
NINETY-FIVE MANAGEMENT LLC

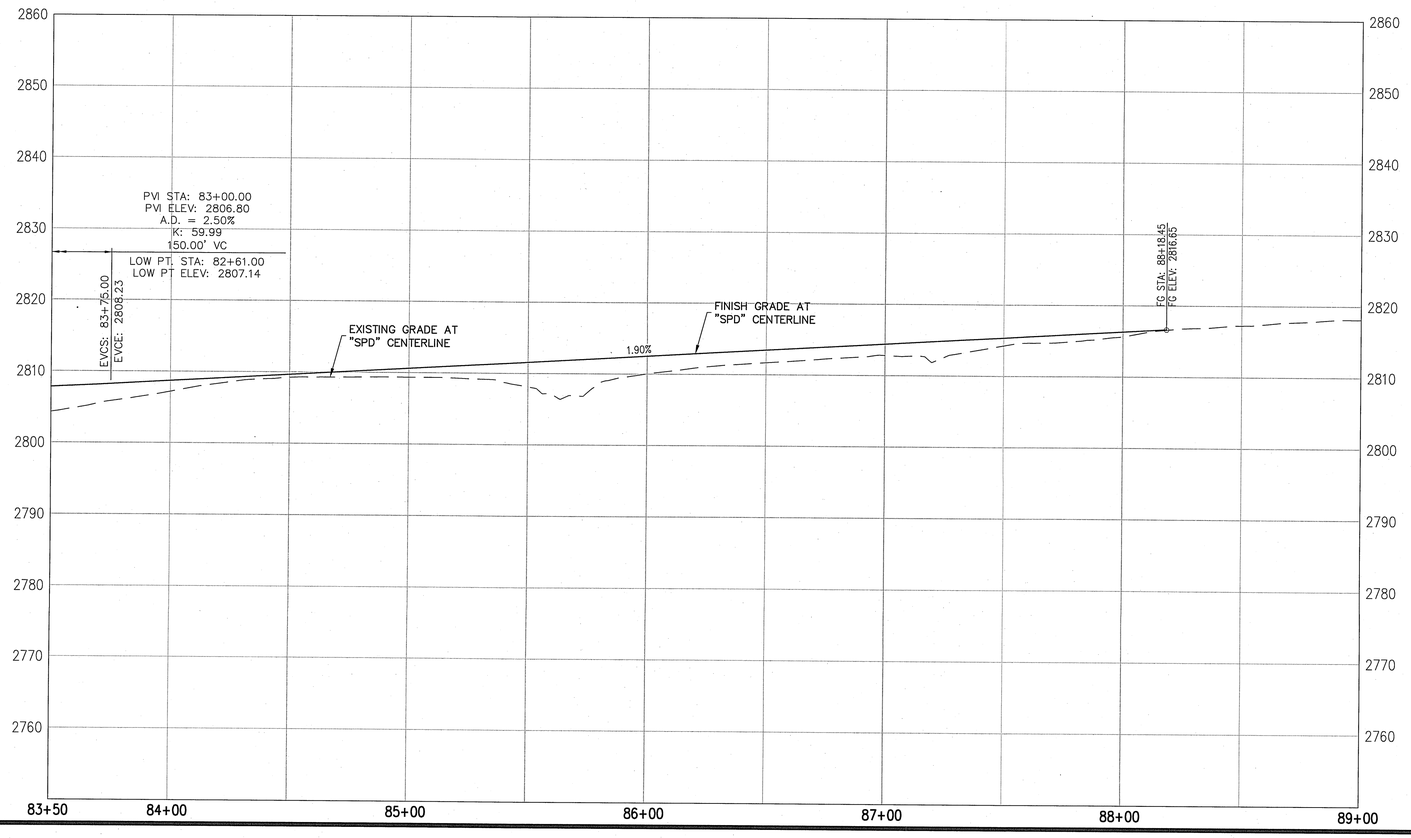
SKYE CANYON PHASE 3
SKYE PARK DRIVE STORM DRAIN PLAN AND PROFILE
"SPD" 77+50.00 TO "SPD" 83+50.00

DATE: 4/28/16
DRAFTER: DAM
DESIGNER: DAM
CHECKED: JSR
PROJECT NO.
OLY1602-000

NATIONAL ENGINEER - STATE OF NEVADA
STEPHEN M. JONES
Exp. 6/30/17
CIVIL
No. 019538
7/21/2016

SD-01
SHEET 4 OF 15





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LEGEND

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JERRY SLATER, P.E. 14167 DATE

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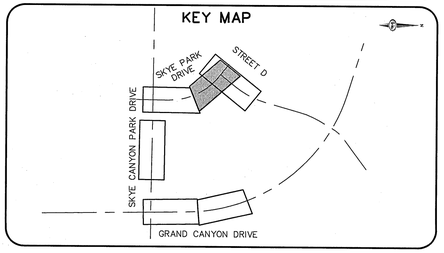

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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

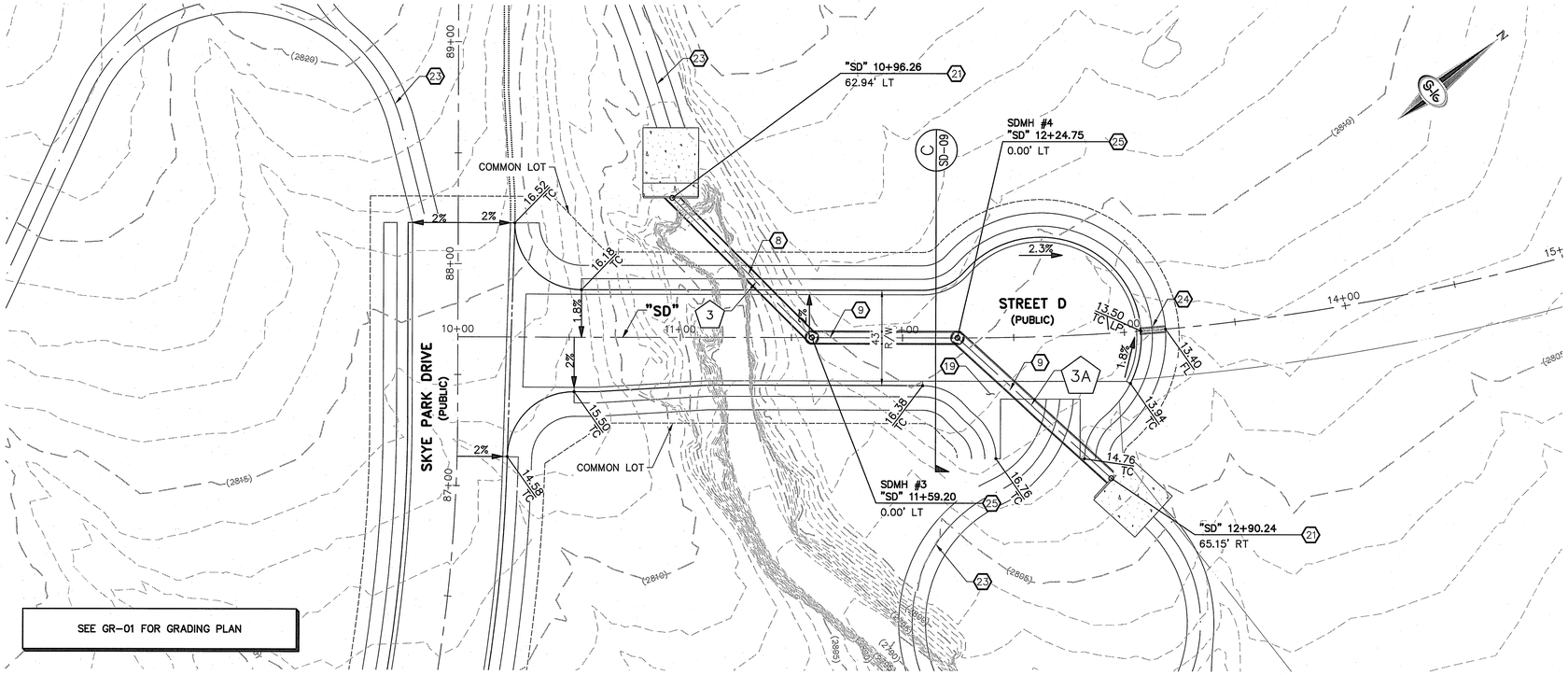
NINETY-FIVE MANAGEMENT LLC

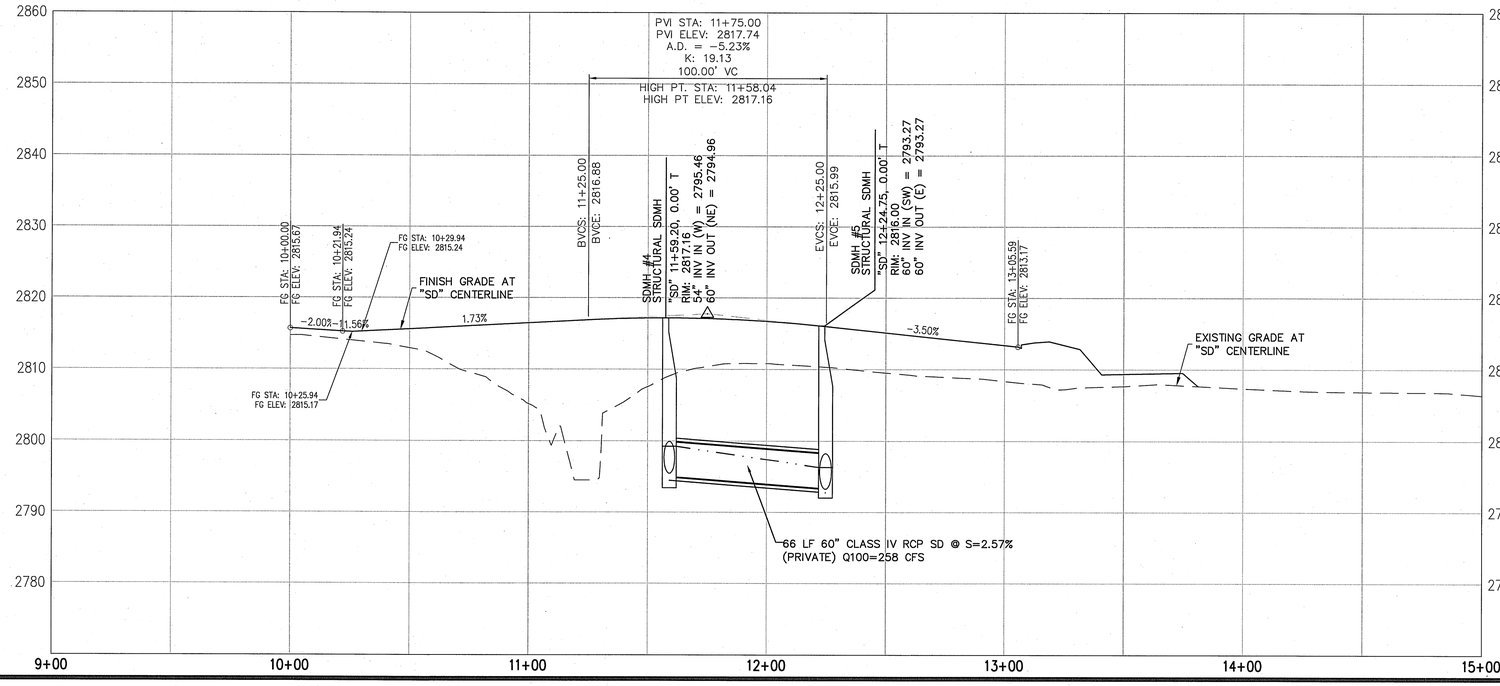
SKYE CANYON PHASE 3
SKYE PARK DRIVE STORM DRAIN PLAN AND PROFILE
"SPD" 83+50.00 TO "SPD" 89+00.00

DATE: 4/28/16
DRAFTER: DAM
DESIGNER: DAM
CHECKED: JSR
PROJECT NO.
OLY1602-000

STEPHEN M. JONES
EXP. 6/30/17
CIVIL
No. 019639
PROFESSIONAL ENGINEER - STATE OF NEVADA
7/21/2016

SD-02
SHEET 5 OF 15





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LEGEND

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JERRY SLATER, P.E. 14167 — DATE

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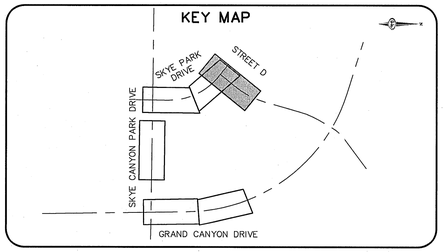

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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

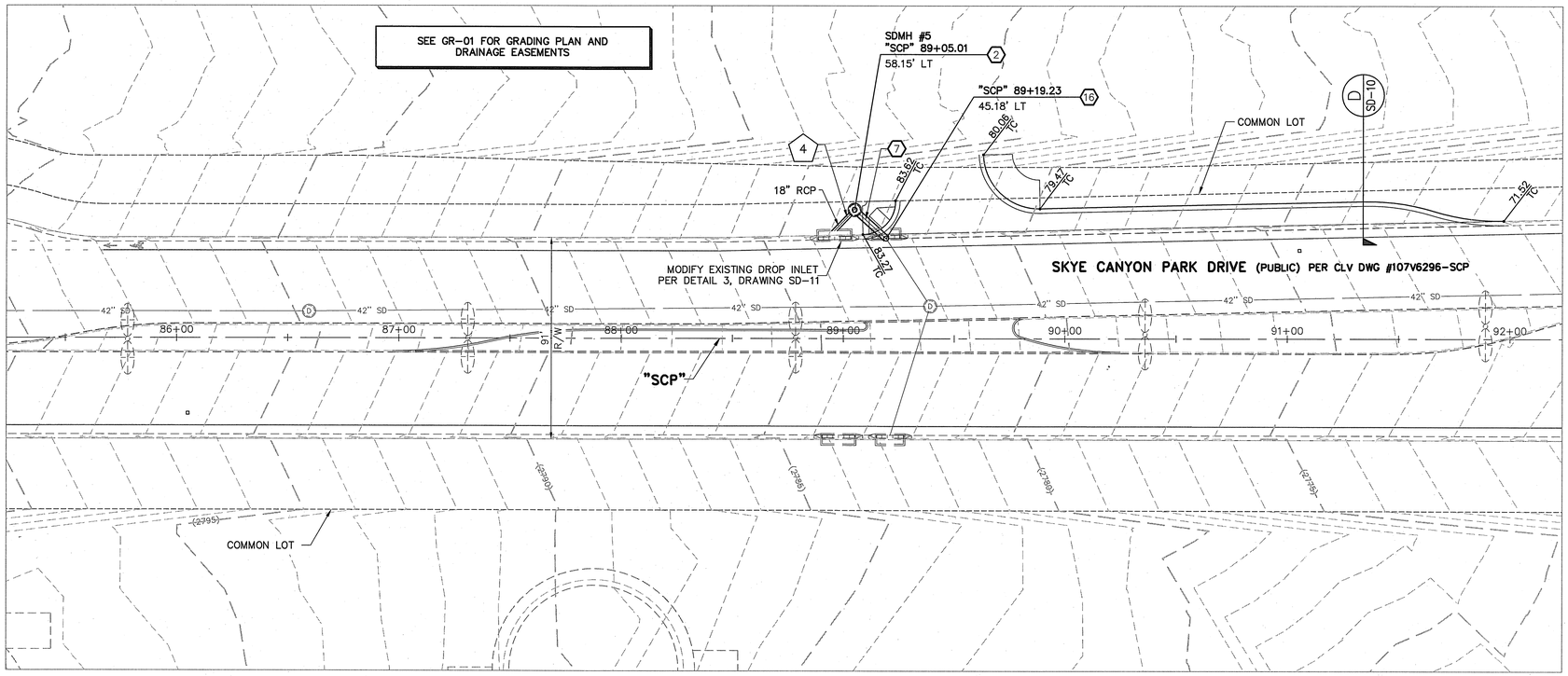
NINETY-FIVE MANAGEMENT LLC

SKYE CANYON PHASE 3
STREET D STORM DRAIN PLAN AND PROFILE
"SD" 10+00.00 TO "SD" 15+00.00

DATE: 4/28/16
DRAFTER: DAM
DESIGNER: DAM
CHECKED: JSR
PROJECT NO.
OLY1602-000

PROFESSIONAL ENGINEER - STATE OF NEVADA
STEPHEN M. JONES
Exp. 6/30/17
CIVIL
No. 019538
7/21/2015

SD-03
SHEET 6 OF 15



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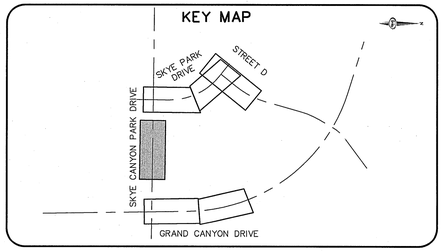

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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

NINETY-FIVE MANAGEMENT LLC

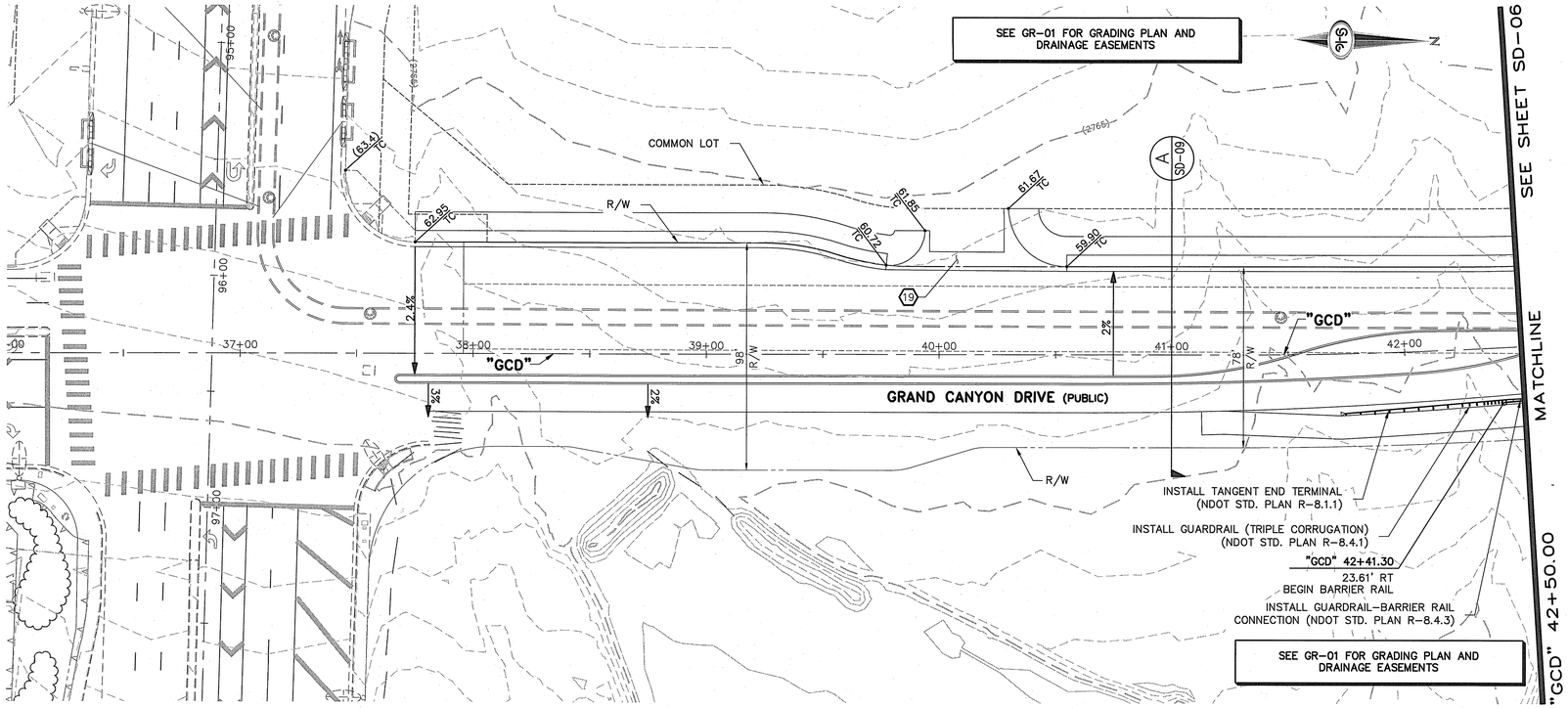
SKYE CANYON PHASE 3
SKYE CANYON PARK DRIVE
STORM DRAIN PLAN

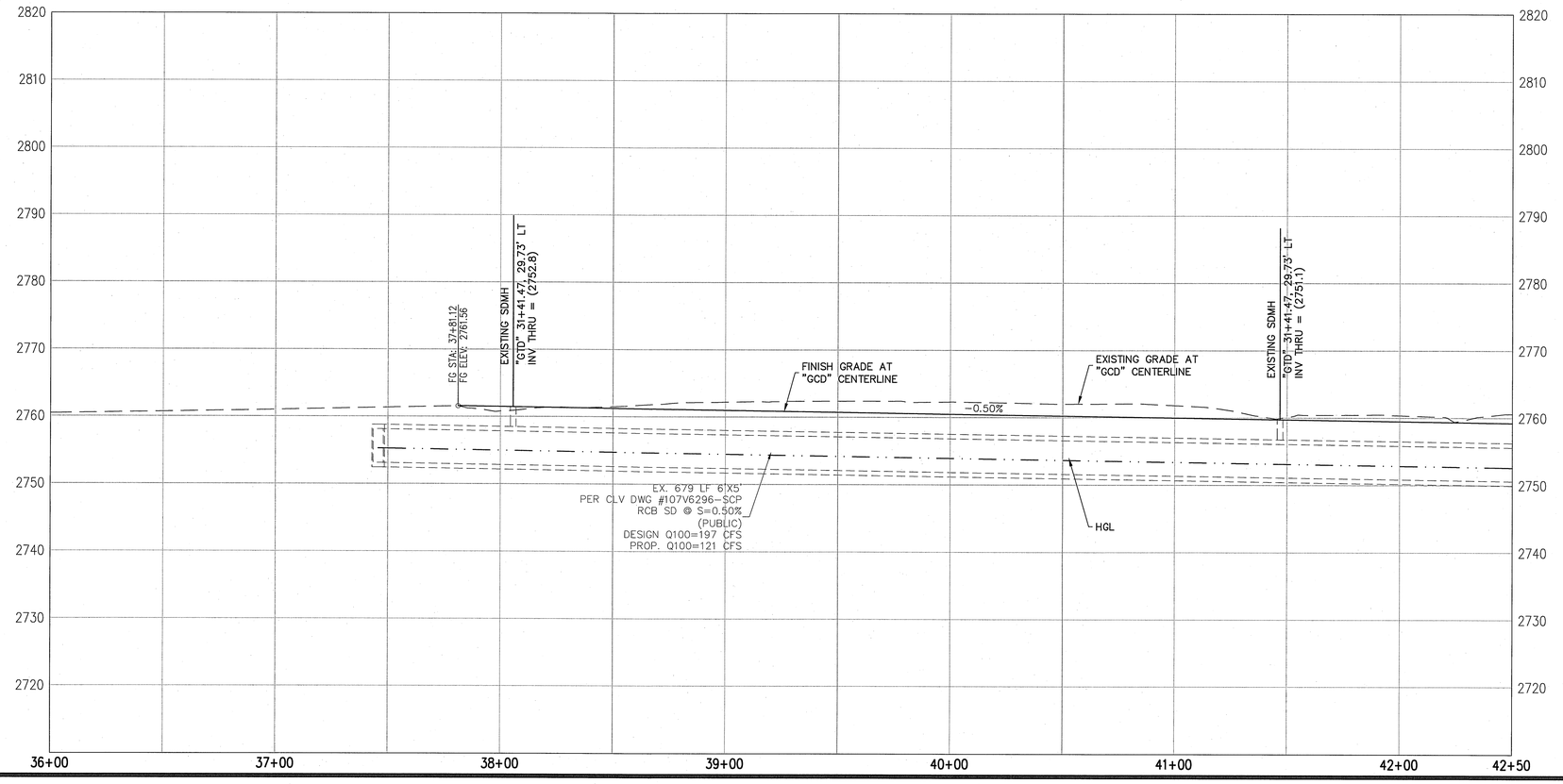
DATE: 4/28/16
DRAFTER: DAM
DESIGNER: DAM
CHECKED: JSR

PROJECT NO.
OLY1602-000

PROFESSIONAL ENGINEER - STATE OF NEVADA
STEPHEN M. JONES
Exp. 6/30/17
CIVIL
No. 019538
7/21/2016

SD-04
SHEET 7 OF 15





STORM DRAIN NOTES

1. CONSTRUCT TYPE "CM2" DROP INLET (USDCCA STD. DWG. NO. 412.1 & 421)
2. CONSTRUCT 60" TYPE III MANHOLE (USDCCA STD. DWG. NO. 406.1)
3. CONSTRUCT NDOT TYPE 4 MANHOLE (NDOT STD. PLAN R-4.3.2)
4. CONSTRUCT RCB ACCESS MANHOLE (TYPE 1 OR 1A MANHOLE ASSEMBLY PER USDCCA STD. DWG. NO. 403 OR 404. USE OF TYPE 1 OR 1A SHALL BE DETERMINED BASED ON FINAL COVER REQUIRED)
5. NOT USED
6. INSTALL 24" RCP OR WATER QUALITY C905 AS SHOWN ON PROFILES (USDCCA STD. DWG. NO. 503.2)
7. INSTALL 30" RCP (USDCCA STD. DWG. NO. 503.2)
8. INSTALL 54" RCP (USDCCA STD. DWG. NO. 503.2)
9. INSTALL 60" RCP (USDCCA STD. DWG. NO. 503.2)
10. INSTALL 66" RCP (USDCCA STD. DWG. NO. 503.2)
11. INSTALL 72" RCP (USDCCA STD. DWG. NO. 503.2)
12. CONSTRUCT PRECAST 6' X 5' RCB (NDOT STD. PLAN B-20.1.2)
13. CONSTRUCT PRECAST 14' X 5' RCB (NDOT STD. PLAN B-20.1.8)
14. CONSTRUCT PRECAST 14' X7' RCB (NDOT STD. PLAN B-20.1.8)
15. PIPE PENETRATION PER STRUCTURAL DETAIL
16. CONSTRUCT CONCRETE COLLAR (SEE DETAIL 2, DRAWING SD-11)
17. CONSTRUCT BRICK AND MORTAR PLUG (SEE DETAIL 1, DRAWING SD-11)
18. CONSTRUCT TRANSITION STRUCTURE (SEE STRUCTURAL DETAIL)
19. CONSTRUCT CONCRETE CROSS GUTTER (USDCCA STD. DWG. NO. 228)
20. CONSTRUCT TYPE "CM2" DROP INLET PER STRUCTURAL DETAIL & DWG NO. 421
21. CONSTRUCT HEADWALL PER STRUCTURAL DETAIL W/POST AND CABLE FENCE, SEE DETAIL 4, DRAWING SD-11
22. CONSTRUCT NDOT TYPE II HEADWALL (NDOT STD. PLAN B-20.1.5 & B-20.1.5.1) W/POST AND CABLE FENCE, SEE DETAIL 4, DRAWING SD-11
23. MAINTENANCE ACCESS PATH, SEE GR-01 FOR GRADING PLAN
24. CONSTRUCT SIDEWALK DRAIN (USDCCA STD. DWG. NO. 236)
25. CONSTRUCT MANHOLE PER STRUCTURAL DETAILS

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 USDCCA STD. DWG. NO. 421.
4. SEE STRUCTURAL PLANS FOR ADDITIONAL STRUCTURAL DETAILS AND CONNECTIONS.
5. ALL PIPES ARE PUBLICLY MAINTAINED.
6. ADD SPECIAL INSPECTION REQUIRED FOR PIPE SEGMENTS WITH SACRIFICIAL CONCRETE.

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

(1) STORM DRAIN LATERAL # (SEE SHEETS SD-07 THRU SD-08)

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY DS-4796 ON FILE AT THE CITY OF LAS VEGAS FOR THE SUBJECT PROJECT

JERRY SLATER, P.E. 14167 — DATE

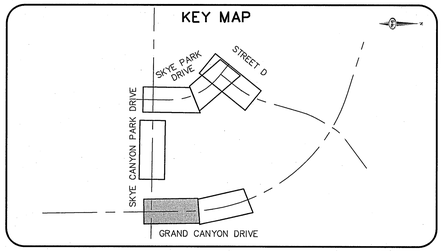
FLOOD ZONE

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-32003C1735E, 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.

KEY MAP



30 0 30 60
SCALE FEET

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

FAST
Call before you UnderGround.
1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig
Avoid hitting underground utility lines, it's costly.
Call 811
or
1-800-227-2600

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

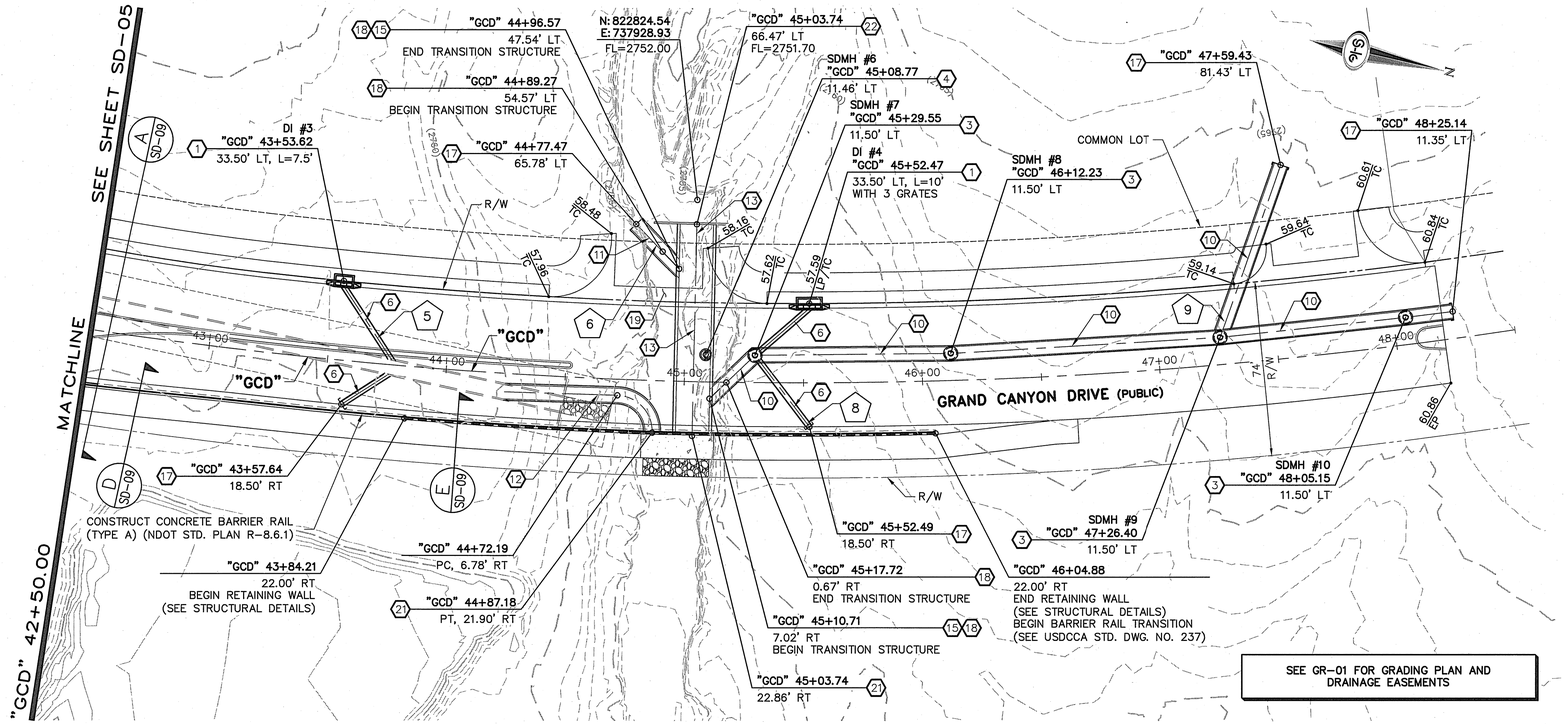
NINETY-FIVE MANAGEMENT LLC

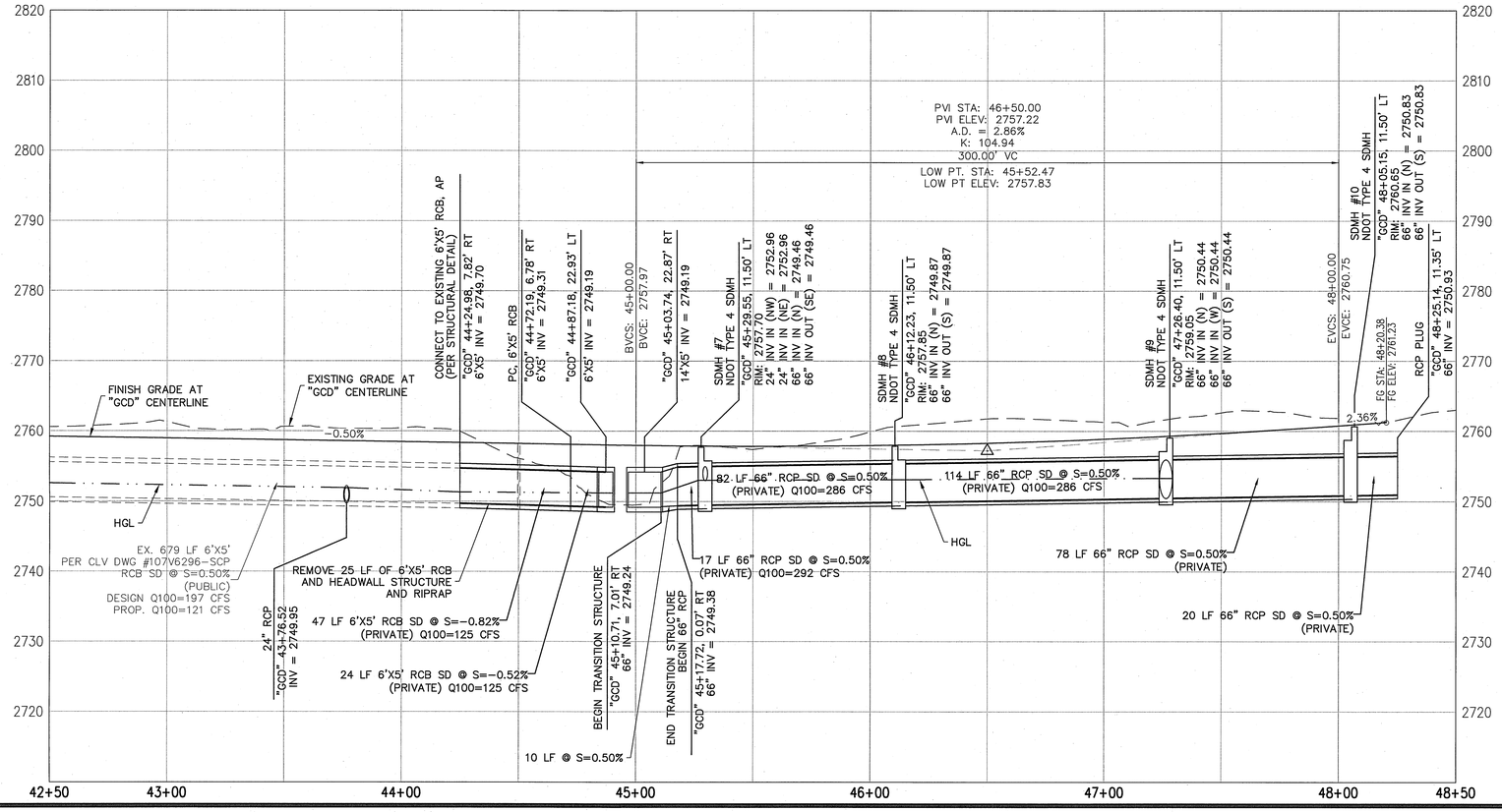
SKYE CANYON PHASE 3
GRAND CANYON DRIVE STROM DRAIN PLAN AND PROFILE
"GCD" 36+00.00 TO "GCD" 42+50.00

DATE: 4/28/16
DRAFTER: DAM
DESIGNER: DAM
CHECKED: JSR
PROJECT NO.
OLY1602-000

PROFESSIONAL ENGINEER — STATE OF NEVADA
STEPHEN M. JONES
Exp. 6/30/17
CIVIL
No. 019638
7/21/2016

SD-05
SHEET 8 OF 15





STORM DRAIN NOTES

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LEGEND

(1) STORM DRAIN LATERAL # (SEE SHEETS SD-07 THRU SD-08)

I CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED TECHNICAL DRAINAGE STUDY DS-4796 ON FILE AT THE CITY OF LAS VEGAS FOR THE SUBJECT PROJECT

JERRY SLATER, P.E. 14167 — DATE

FLOOD ZONE

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NOTE:

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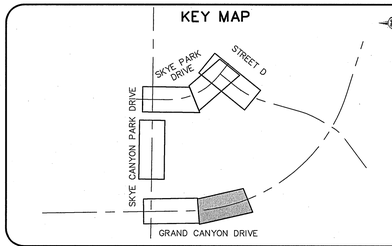
KEY MAP



SCALE 30 0 30 60 FEET

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

FAST Call before you UnderGround. 1-702-432-5300 REGIONAL AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig Avoid striking buried utility lines. It's easy. Call 811 or 1-800-227-2600

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

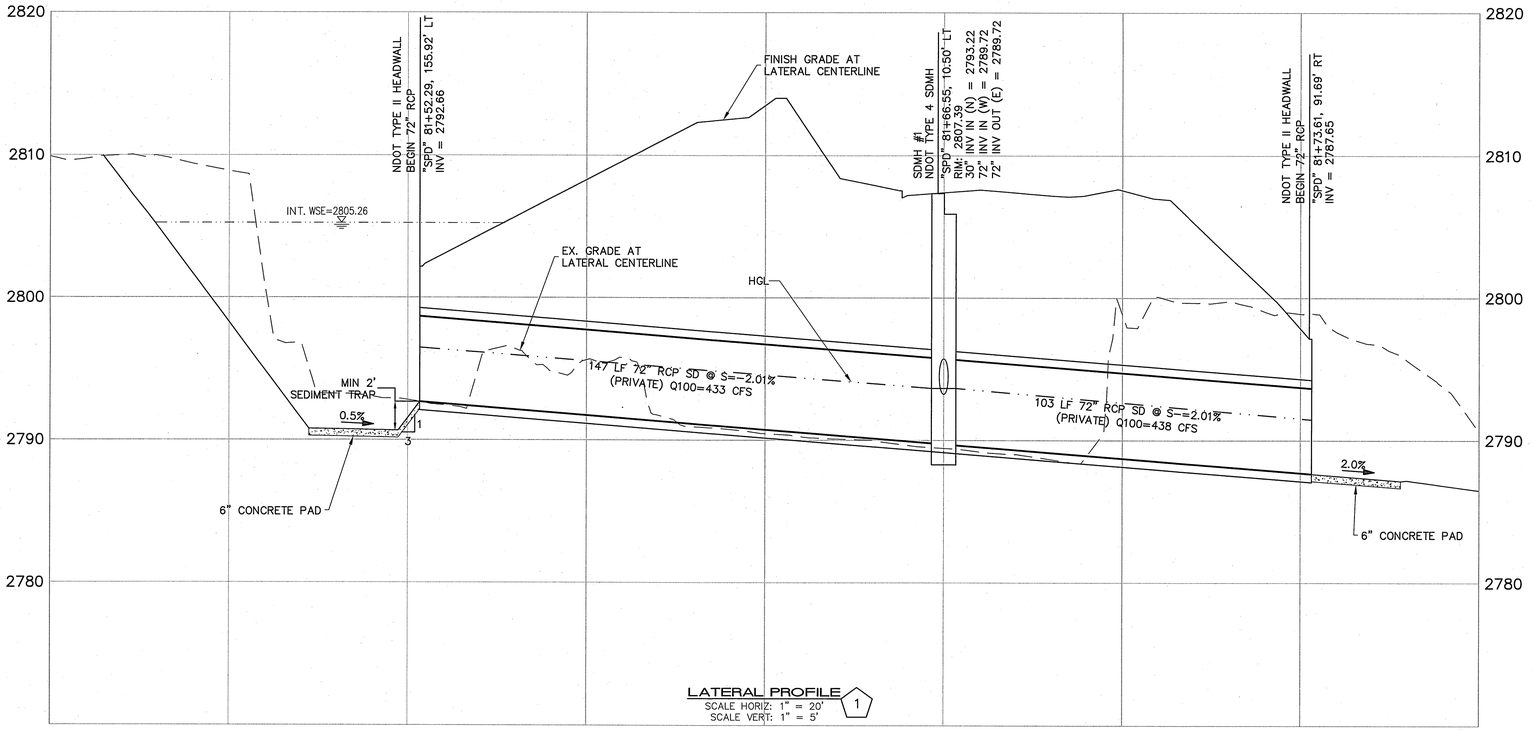
NINETY-FIVE MANAGEMENT LLC

SKYE CANYON PHASE 3
GRAND CANYON DRIVE STORM DRAIN PLAN AND PROFILE
"GCD" 42+50.00 TO "GCD" 48+50.00

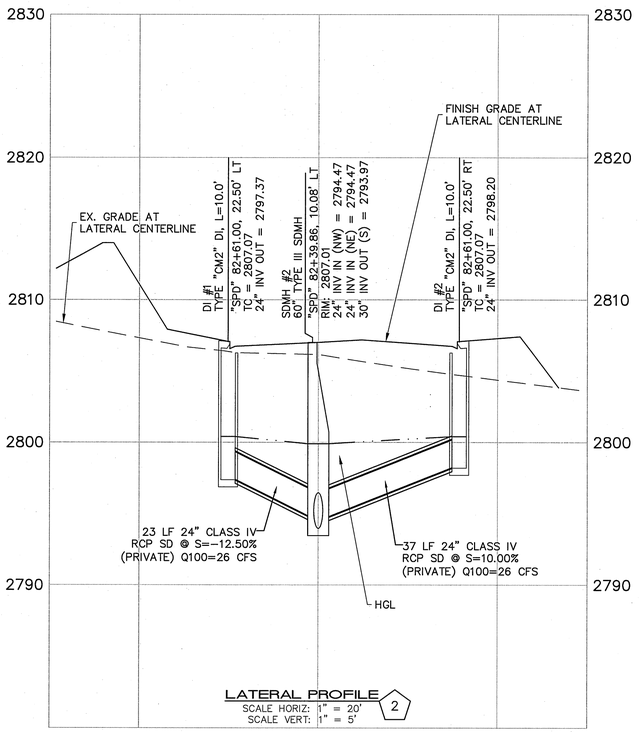
DATE: 4/28/16
DRAFTER: DAM
DESIGNER: DAM
CHECKED: JSR
PROJECT NO.
OLY1602-000

PROFESSIONAL ENGINEER — STATE OF NEVADA — STEPHEN M. JONES — Exp. 4/30/17 — CIVIL — No. 019632 — 7/21/2016

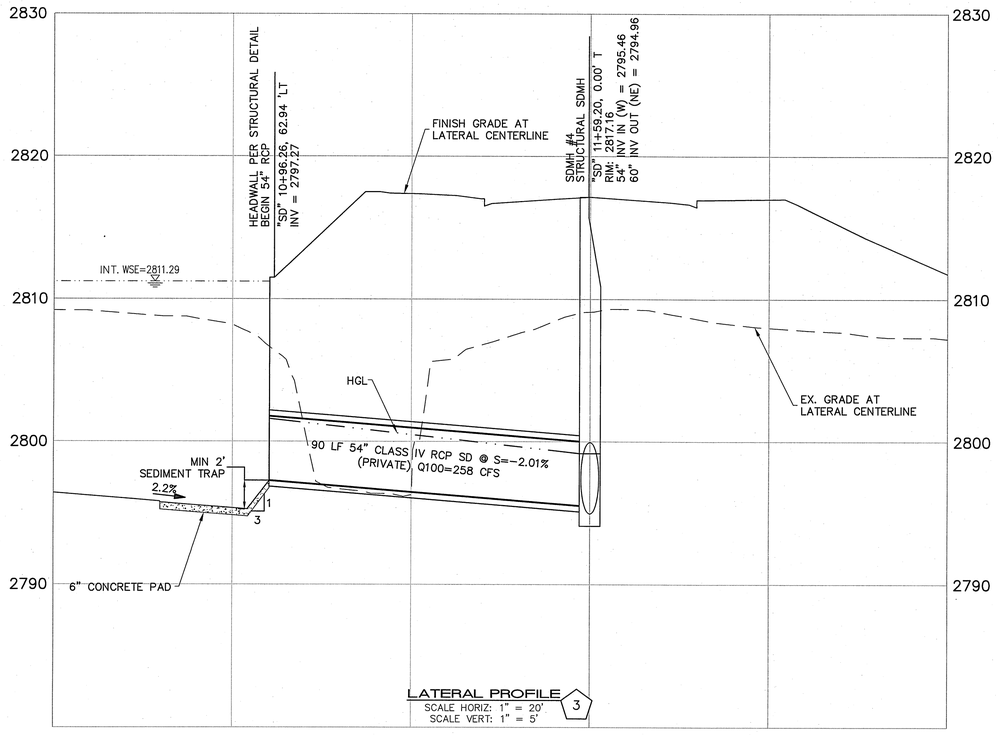
SD-06
SHEET 9 OF 15



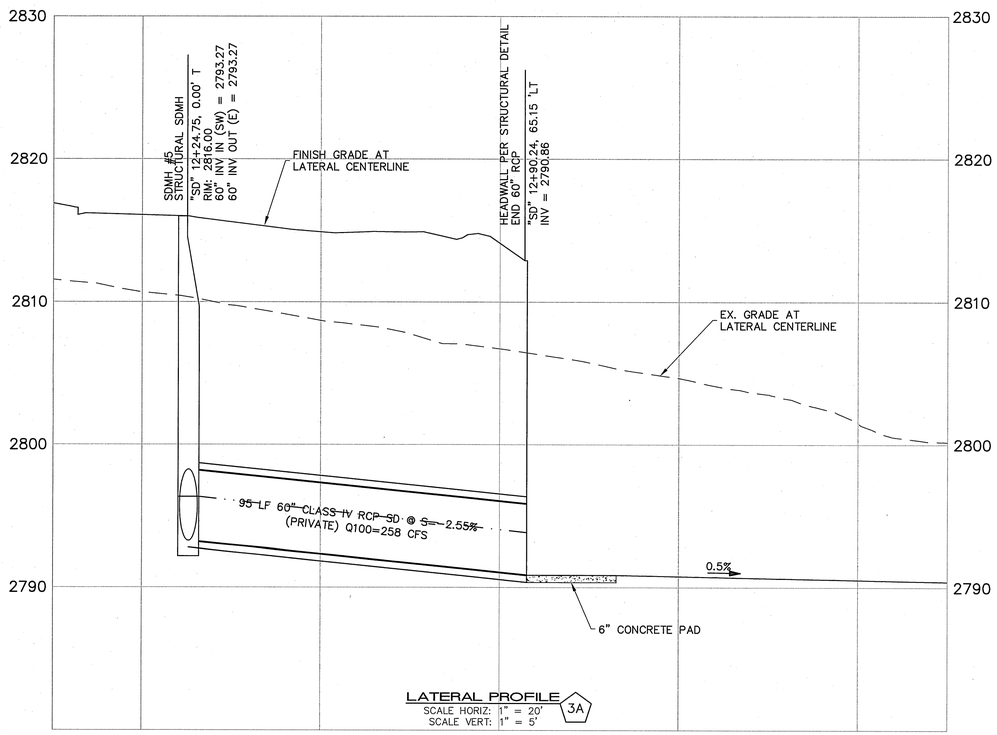
LATERAL PROFILE 1
SCALE HORIZ: 1" = 20'
SCALE VERT: 1" = 5'



LATERAL PROFILE 2
SCALE HORIZ: 1" = 20'
SCALE VERT: 1" = 5'



LATERAL PROFILE 3
SCALE HORIZ: 1" = 20'
SCALE VERT: 1" = 5'



LATERAL PROFILE 3A
SCALE HORIZ: 1" = 20'
SCALE VERT: 1" = 5'

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

NINETY-FIVE MANAGEMENT LLC

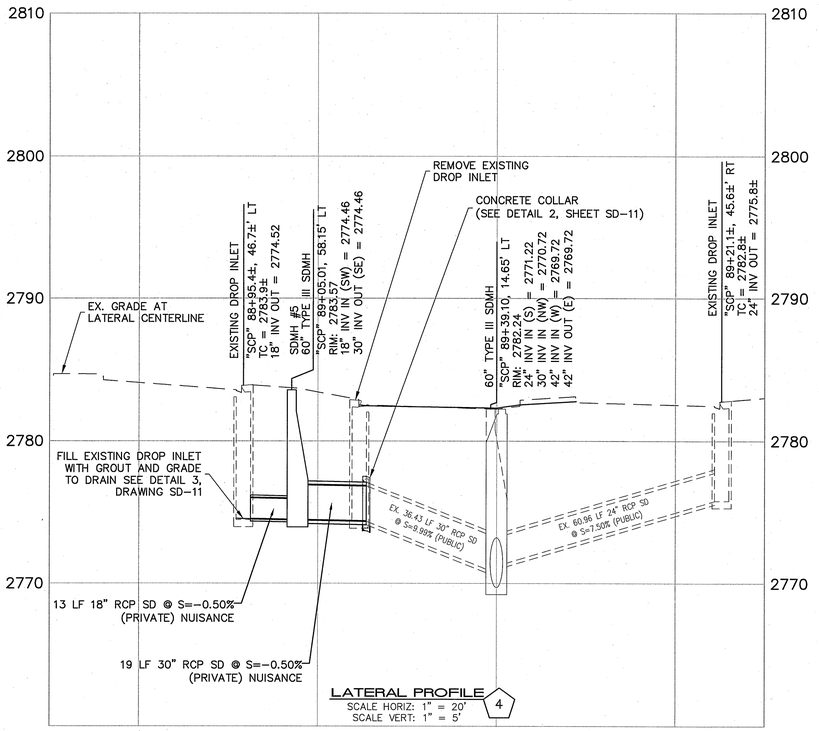
SKYE CANYON PHASE 3

STORM DRAIN LATERAL PROFILES

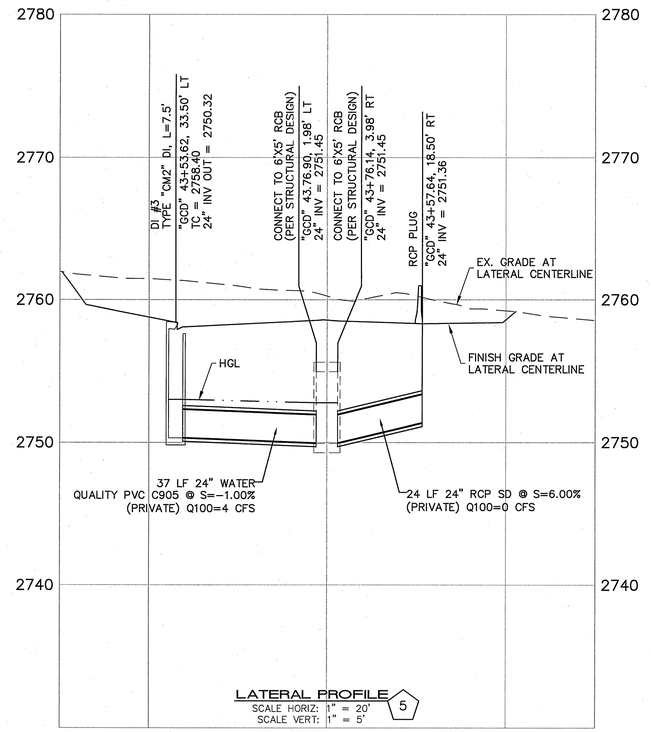
DATE: 4/28/16
DRAFTER: DAM
DESIGNER: DAM
CHECKED: JSR
PROJECT NO.
OLY1602-000

PROFESSIONAL ENGINEER - STATE OF NEVADA
STEPHEN M. JONES
Lic. 4/30/17
CIVIL
No. 019632
7/21/2016

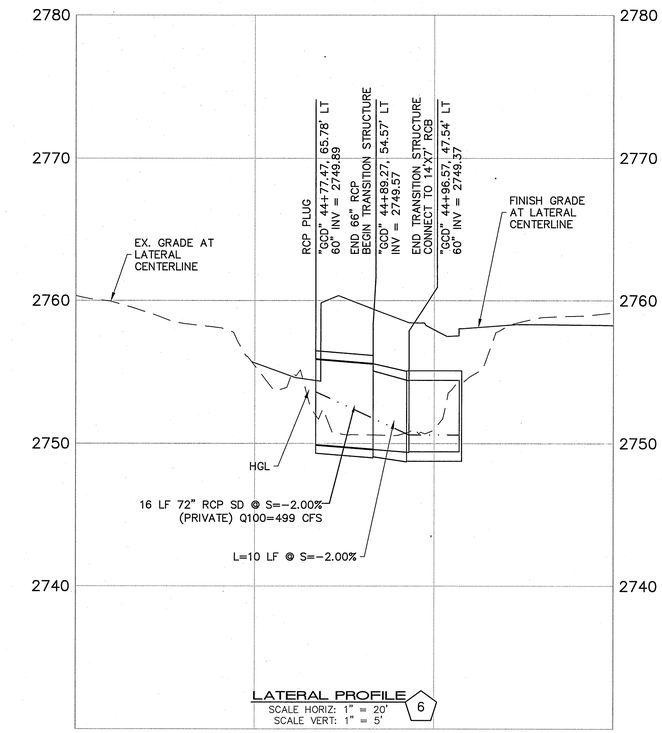
SD-07
SHEET 10 OF 15



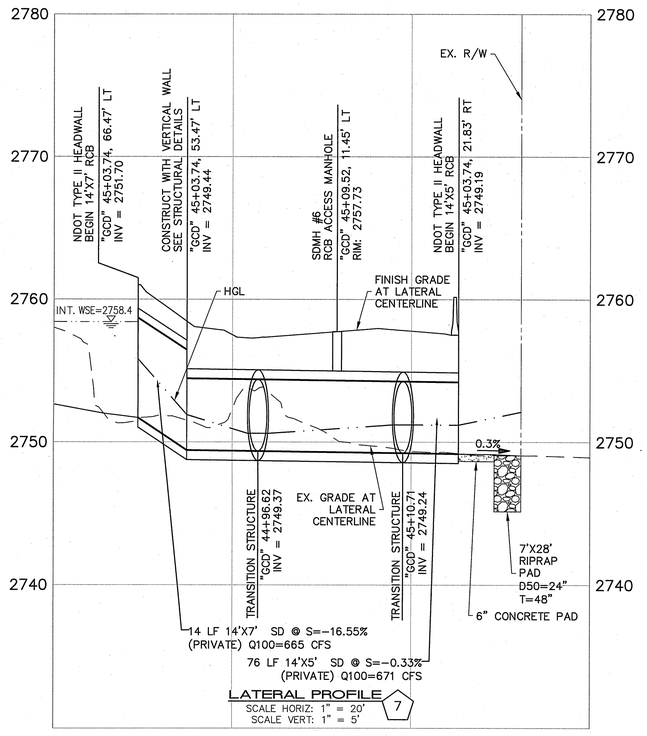
LATERAL PROFILE 4
SCALE HORIZ: 1" = 20'
SCALE VERT: 1" = 5'



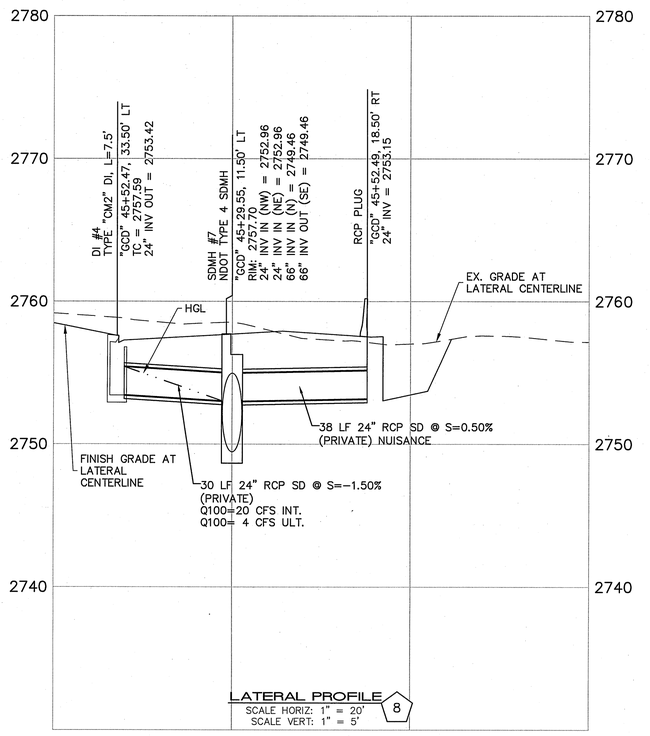
LATERAL PROFILE 5
SCALE HORIZ: 1" = 20'
SCALE VERT: 1" = 5'



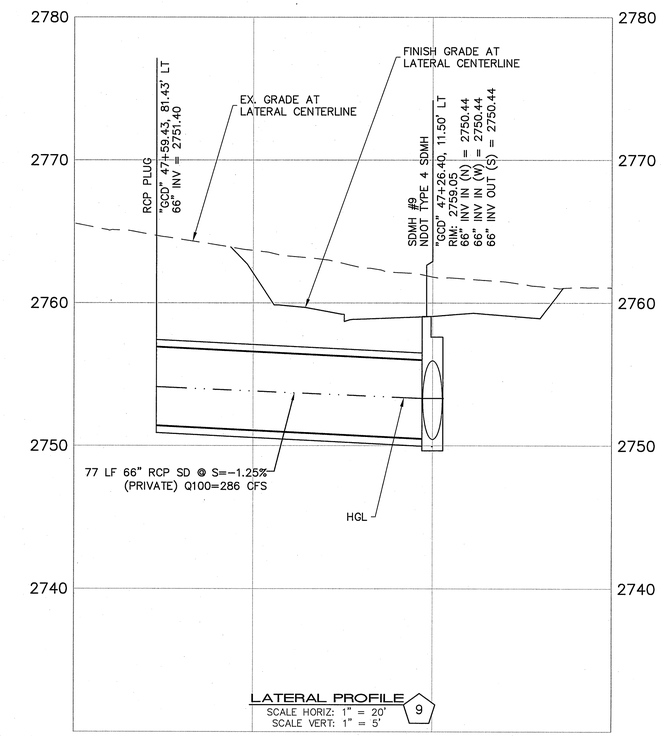
LATERAL PROFILE 6
SCALE HORIZ: 1" = 20'
SCALE VERT: 1" = 5'



LATERAL PROFILE 7
SCALE HORIZ: 1" = 20'
SCALE VERT: 1" = 5'



LATERAL PROFILE 8
SCALE HORIZ: 1" = 20'
SCALE VERT: 1" = 5'



LATERAL PROFILE 9
SCALE HORIZ: 1" = 20'
SCALE VERT: 1" = 5'

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

NINETY-FIVE MANAGEMENT LLC

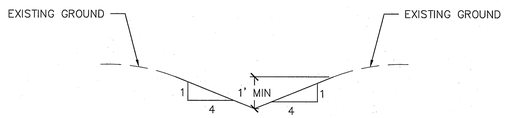
SKYE CANYON PHASE 3

STORM DRAIN LATERAL PROFILES

DATE: 4/28/16
DRAFTER: DAM
DESIGNER: DAM
CHECKED: JSR
PROJECT NO. OLY1602-000

PROFESSIONAL ENGINEER STATE OF NEVADA STEPHEN M. JONES Exp. 6/30/17 CIVIL No. 019632
7/2/2018

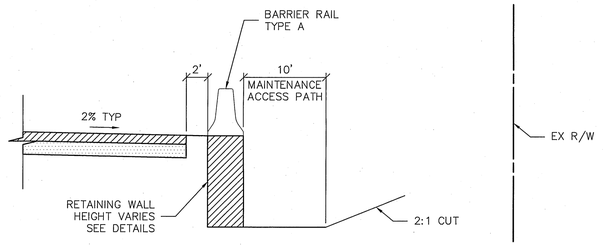
SD-08
SHEET 11 OF 15



EARTHEN DITCH

NOT TO SCALE

F



GRAND CANYON DRIVE

NOT TO SCALE

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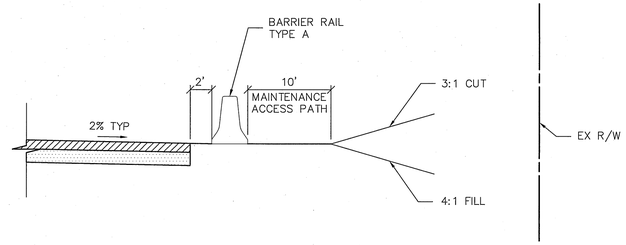
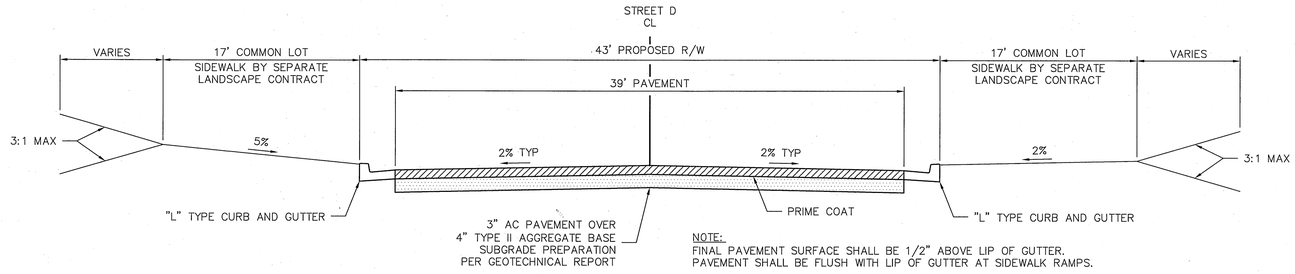


GRAND CANYON DRIVE

NOT TO SCALE

D



STREET D

NOT TO SCALE

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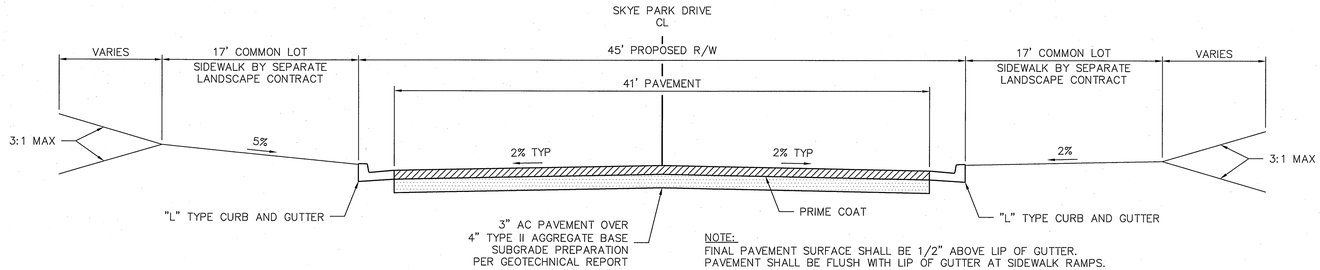
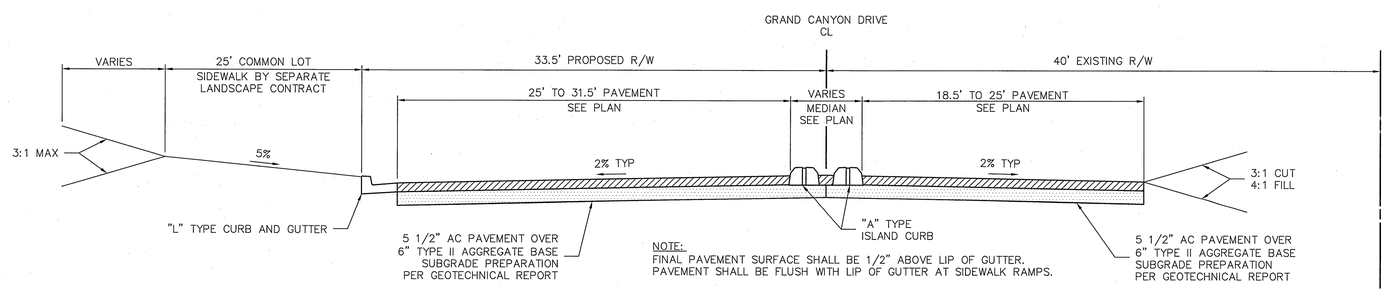


SKYE PARK DRIVE

NOT TO SCALE

B



GRAND CANYON DRIVE

NOT TO SCALE

A

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
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PHONE (702) 284-5300
FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

NINETY-FIVE MANAGEMENT LLC

SKYE CANYON PHASE 3

ROADWAY SECTIONS

DATE: 4/28/16

DRAFTER: JAS

DESIGNER: DAM

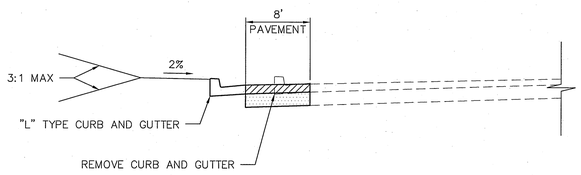
CHECKED: JSR

PROJECT NO.
OLY1602-000

PROFESSIONAL ENGINEER - STATE OF NEVADA
STEPHEN M. JONES
Exp. 6/30/17
CIVIL
No. 019638
7/21/2016

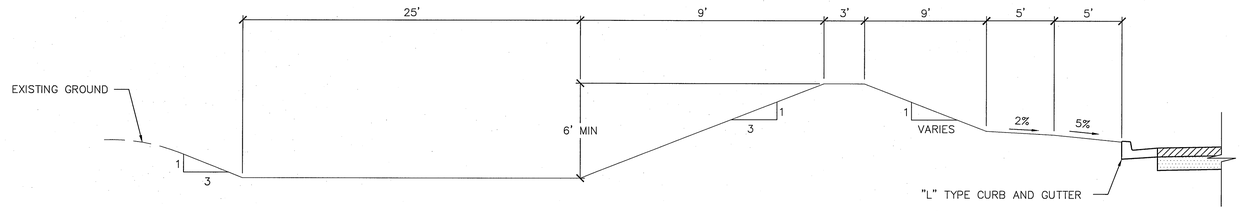
SD-09

SHEET 12 OF 15



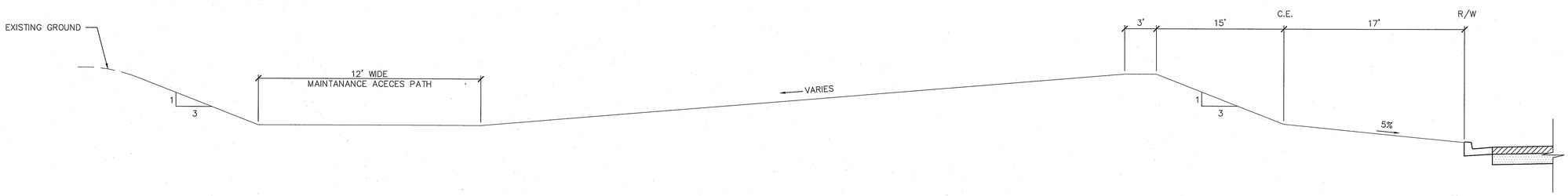
SKYE CANYON PARK DRIVE — D

NOT TO SCALE



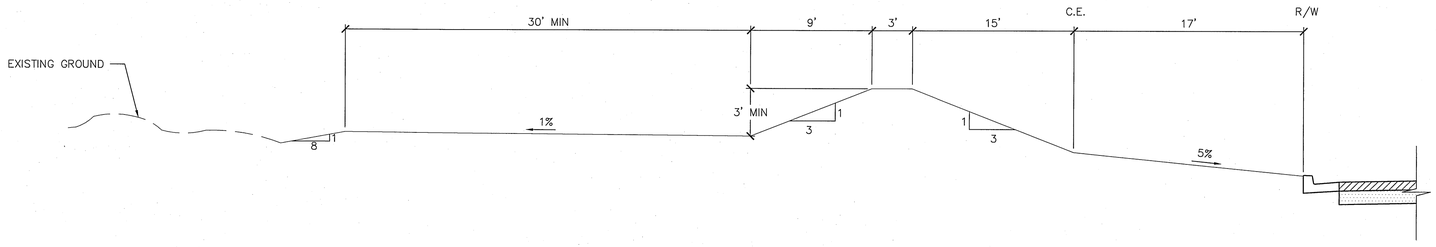
EMERGENCY OVERFLOW BERM SECTION ON STREET D — C

NOT TO SCALE



MAINTANANCE ACECES PATH SECTION ON SKYE PARK DRIVE — B

NOT TO SCALE



EMERGENCY OVERFLOW BERM SECTION ON SKYE PARK DRIVE — A

NOT TO SCALE

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
5740 S. ARVILLE STREET #216, LAS VEGAS, NV 89118
PHONE (702) 284-5300 FAX (702) 284-5399

NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

NINETY-FIVE MANAGEMENT LLC

SKYE CANYON PHASE 3

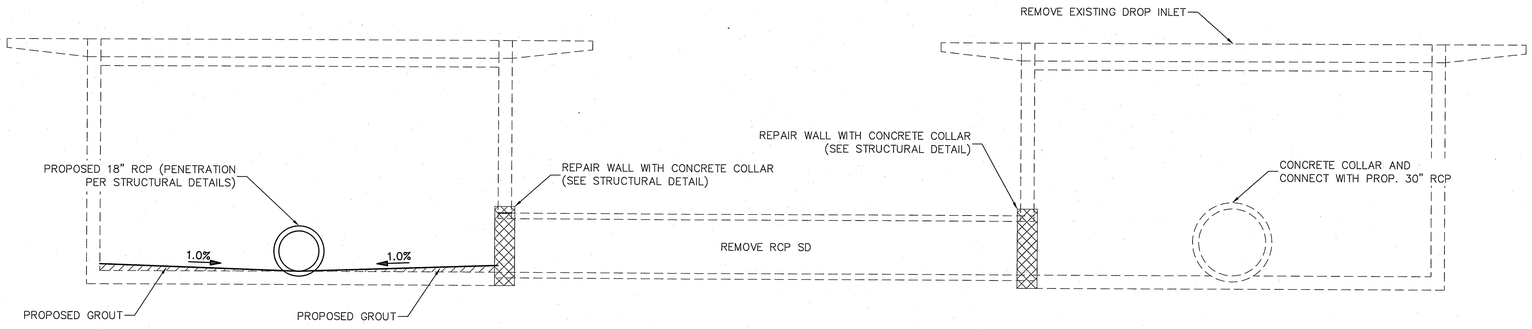
BERM SECTIONS

DATE: 4/28/16
DRAFTER: JAS
DESIGNER: DAM
CHECKED: JSR

PROJECT NO.
OLY1602-000

NATIONAL ENGINEER — STATE OF NEVADA
STEPHEN M. JONES
Exp. 6/30/17
CIVIL
No. 019635
7/21/2016

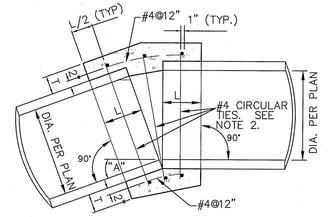
SD-10
SHEET 13 OF 15



EXISTING DROP INLET MODIFICATION

NOT TO SCALE

3 SD-11



PLAN

NOTES:

1. WHERE THE SLOPE OF THE UPSTREAM PIPE IS GREATER THAN THE SLOPE OF THE DOWNSTREAM PIPE, JOIN SOFFITS. WHERE THE SLOPE OF THE UPSTREAM PIPE IS LESS THAN THE SLOPE OF THE DOWNSTREAM PIPE, JOIN INVERTS.
2. WHERE THE SPACE BETWEEN THE PIPE EXTREMITIES EXCEEDS 2 1/2 INCHES, THE NUMBER OF CIRCULAR TIES SHALL BE INCREASED TO MAINTAIN A MAXIMUM SPACING OF 6 INCHES CENTER TO CENTER. CIRCULAR TIES SHALL HAVE A DIAMETER 5 INCHES GREATER THAN THE OUTSIDE DIAMETER OF THE LARGER PIPE.

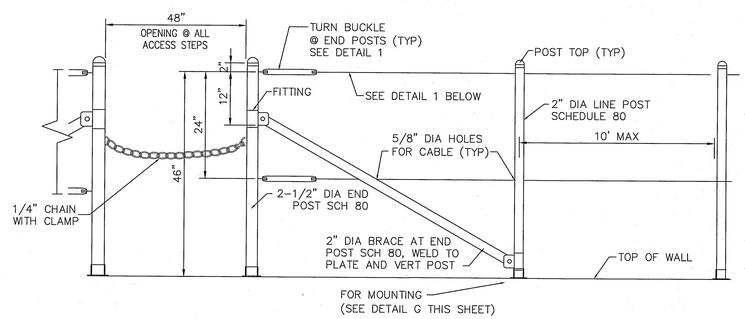
CIRCULAR TIES

PIPE DIAMETER	SPACE BETWEEN PIPE EXTREMITIES	NO. OF CIRCULAR TIES	L	T
18"	2 1/2"	3	12"	5"
24"	2 1/2"	3	12"	6"
30"	2 1/2"	3	12"	7"
36"	2 1/2" or less	4	18"	9"
60"	2 1/2" or less	5	21"	11"

CONCRETE COLLAR

NOT TO SCALE

2 SD-11

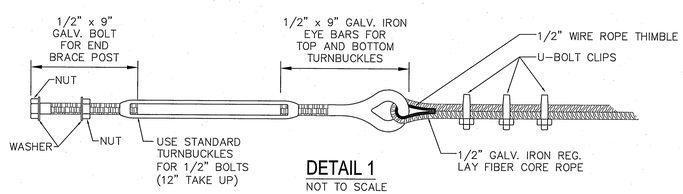


NOTES:

1. ALL POSTS SHALL BE SET PLUMB.
2. RAILING POSTS AND FITTINGS SHALL BE HOT OR DIPPED GALVANIZED MALLEABLE CAST IRON, PRESSED STEEL.
3. GALVANIZE COMPONENTS AFTER FABRICATION.
4. BRACE BANDS SIZED FOR 1500 LBS. (WORKING LOAD).

ELEVATION VIEW

NOT TO SCALE



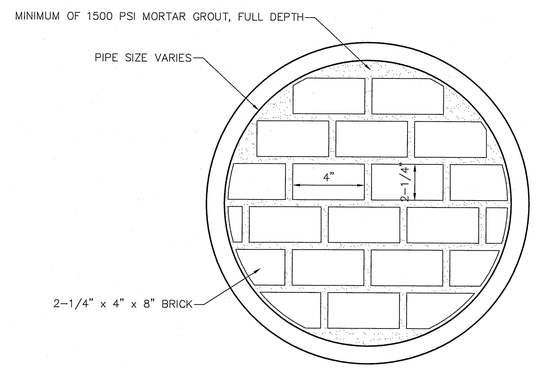
DETAIL 1

NOT TO SCALE

POST AND CABLE RAILING

NOT TO SCALE

4 SD-11



BRICK AND MORTAR PLUG

NOT TO SCALE

1 SD-11

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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

NINETY-FIVE MANAGEMENT LLC

SKYE CANYON PHASE 3

STORM DRAIN DETAILS

DATE: 4/28/16
DRAFTER: JAS
DESIGNER: DAM
CHECKED: JSR

PROJECT NO.
OLY1602-000

PROFESSIONAL ENGINEER — STATE OF NEVADA — STEPHEN M. JONES — Exp. 6/30/17 — CIVIL — No. 019638 — 7/21/2016

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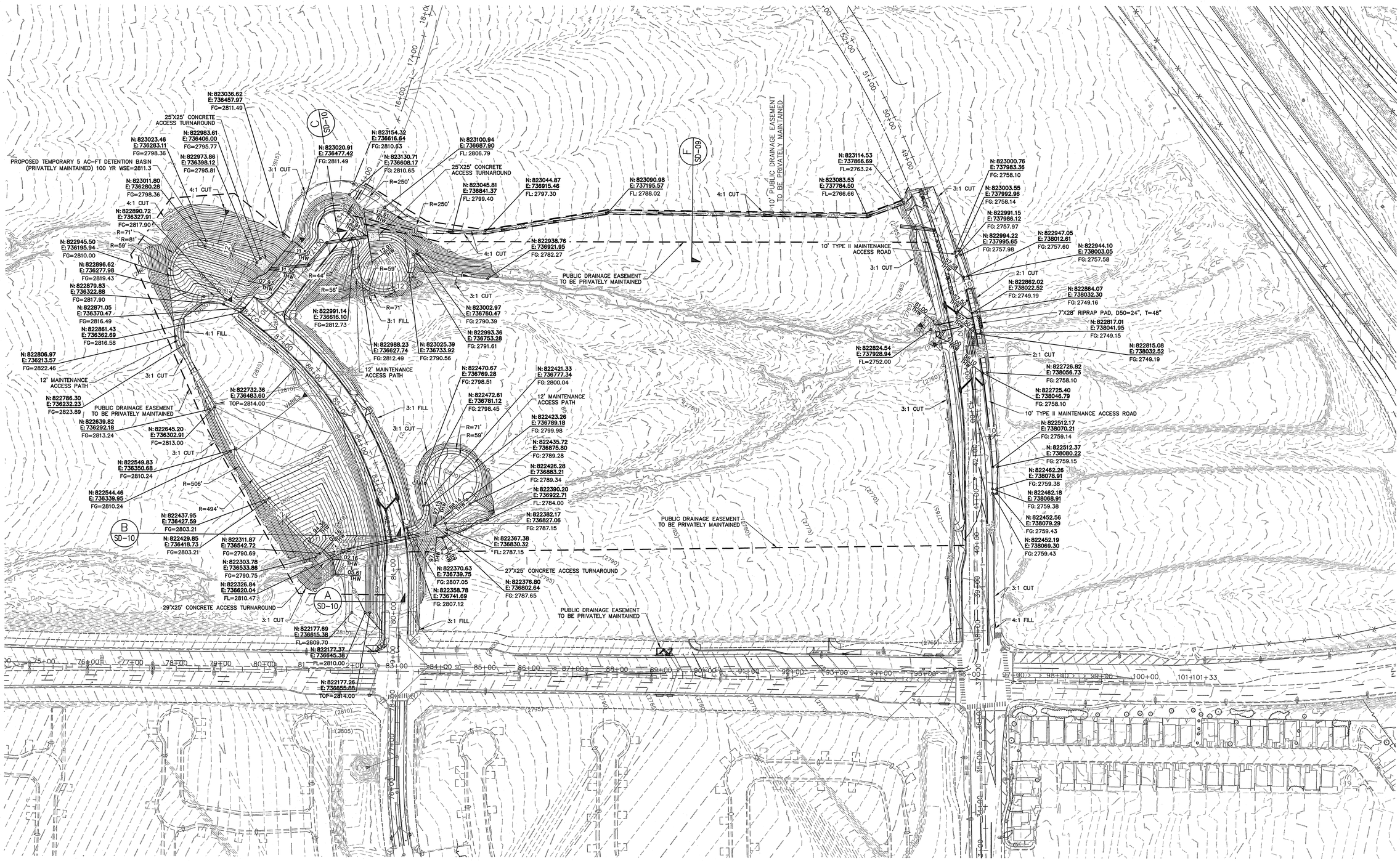

NOTE:

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.

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

FAST. Call before you UnderGround. 1-702-432-5300. FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig. Avoid cutting underground utility lines. It's easy. Call 811 or 1-800-227-2600

SLATER HANIFAN GROUP
CONSULTING ENGINEERS & PLANNERS
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NO.	DESCRIPTION	DATE	BY	APP. DATE	APP.

NINETY-FIVE MANAGEMENT LLC

SKYE CANYON PHASE 3
GRADING PLAN

DATE: 4/28/16
DRAFTER: JAS
DESIGNER: DAM
CHECKED: JSR
PROJECT NO. OLY1602-000

PROFESSIONAL ENGINEER - STATE OF NEVADA - STEPHEN M. JONES - Exp: 6/30/17 - CIVIL - No. 019638 - 7/21/2016

GR-01
SHEET 15 OF 15