DS #: 4837

APN: 125-27-222-015

PROJECT: Azure Tavern

SUBMITTAL: 2nd Submittal

SCANNED BY/DATE:

CHECKED BY/DATE:

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: December 27, 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: **Azure Tavern**			**COPIES TO:** Lochsa Engineering
Cross Streets:	SWQ of Azure Drive & Tenaya Way			Azure Capital Management, LLC
File Number:	F:\Depot\DSMemos\DS4837B.doc			Bart Anderson, P.E., DevCo
Parcel Number:	125-27-222-015			
Zoning Action:	SDR-64354; SUP-64352 & SUP-64353			
FEMA Flood Zone	YES	NO	**X**	
Proposed Storm Drain	YES	NO	**X**	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	10/26/2016	11/1/2016	Not Approved	$400.00	463281: $400
2nd Submittal	12/12/2016	12/27/2016	See Comments Below	$400.00	468465: $400
			TOTAL FEES (LDDRS):	**$800.00**	**----**

REMARKS:

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

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

1. A proposed "*30'-Multi-Use Non Equestrian Trail Easement*" must be dedicated and recorded prior to the final acceptance of the improvement plans.

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/R60E/27

AREA G-27

****
*** FAX TX REPORT ***
****

TRANSMISSION OK

JOB NO.	2740
DESTINATION ADDRESS	7023659317
PSWD/SUBADDRESS	
DESTINATION ID	
ST. TIME	12/27 15:05
USAGE T	00'30
PGS.	1
RESULT	OK

CITY OF LAS VEGAS
INTER-OFFICE MEMORANDUM

DATE: December 27, 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:
Azure Tavern

COPIES TO:
Lochsa Engineering
Azure Capital Management, LLC
Bart Anderson, P.E., DevCo

Cross Streets:	SWQ of Azure Drive & Tenaya Way		
File Number:	F:\Depot\DSMemos\DS4837B.doc		
Parcel Number:	125-27-222-015		
Zoning Action:	SDR-64354; SUP-64352 & SUP-64353		
FEMA Flood Zone	YES	NO **X**	
Proposed Storm Drain	YES	NO **X**	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	10/26/2016	11/1/2016	Not Approved	$400.00	463281: $400
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			TOTAL FEES (LDDRS):	**$800.00**	**----**

REMARKS:

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

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

1. A proposed "*30'-Multi-Use Non Equestrian Trail Easement*" must be dedicated and recorded prior to the final acceptance of the improvement plans.

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

Technical Drainage Study for the Azure Tavern

October 2016

Prepared for:

Azure Capital Management, LLC
Joseph A. Kennedy
7155 S. Rainbow Blvd., Suite 200
Las Vegas, Nevada 89118
(702) 304-8383

Prepared by:

Lochsa Engineering
6345 South Jones Boulevard, Suite 100
Las Vegas, Nevada 89118
(702) 365-9312

Lochsa Job No. 161079

Correspondence

(Final Zoning Actions / Permission to Grade Letter)

Final Zoning

LAS VEGAS
CITY COUNCIL

CAROLYN G. GOODMAN
MAYOR

STAVROS S. ANTHONY
MAYOR PRO TEM

LOIS TARKANIAN
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RICKI Y. BARLOW
BOB COFFIN
BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

October 16, 2014

Swecker & Lipp Tenaya Azure LLC
2451 S. Buffalo Drive, Ste 140
Las Vegas, Nevada 89117

RE: MOD-55204 [PRJ-54831] - MAJOR MODIFICATION RELATED TO VAR-55205, SUP-55202, SUP-55203 AND SDR-55201
CITY COUNCIL MEETING OF OCTOBER 15, 2014

Dear Applicant:

The City Council at a regular meeting held October 15, 2014 APPROVED the request for a Major Modification to the Town Center Development Standards Land Use Map FROM: SUBURBAN MIXED USE (SX-TC) TO: GENERAL COMMERCIAL (GC-TC) on 2.33 acres on the south side of Azure Drive, approximately 330 feet west of Tenaya Way (APN 125-27-222-013), T-C (Town Center) Zone. The Notice of Final Action was filed with the Las Vegas City Clerk on October 16, 2014.

Sincerely,

Deputy City Clerk for
Beverly K. Bridges, MMC, City Clerk

cc: Mr. Christopher Kaempfer
8345 W. Sunset Road, Ste 250
Las Vegas, Nevada 89113

CITY OF LAS VEGAS
495 S. MAIN STREET
LAS VEGAS, NEVADA 89101

VOICE 702.229.6011
TTY 702.386.9108
www.lasvegasnevada.gov

LAS VEGAS
CITY COUNCIL

CAROLYN G. GOODMAN
MAYOR

STAVROS S. ANTHONY
MAYOR PRO TEM

LOIS TARKANIAN
STEVEN D. ROSS
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BOB COFFIN
BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

October 16, 2014

Swecker & Lipp Tenaya Azure LLC
2451 S. Buffalo Drive, Ste 140
Las Vegas, Nevada 89117

RE: SDR-55201 [PRJ-54831] - SITE DEVELOPMENT PLAN REVIEW RELATED TO MOD-55204, VAR-55205, SUP-55202 AND SUP-55203
CITY COUNCIL MEETING OF OCTOBER 15, 2014

Dear Applicant:

The City Council at a regular meeting held October 15, 2014 APPROVED the request for a Site Development Plan Review FOR A 6,500 SQUARE-FOOT LIQUOR ESTABLISHMENT (TAVERN) on 2.33 acres on the south side of Azure Drive, approximately 330 feet west of Tenaya Way (APN 125-27-222-013), T-C (Town Center) Zone. The Notice of Final Action was filed with the Las Vegas City Clerk on October 16, 2014. This approval is subject to:

Planning

1. Conformance to the Conditions of Approval for Variance (VAR-55205) shall be required.

2. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.

3. All development shall be in conformance with the site plan, landscape plan, and building elevations, date stamped 08/13/14 and the colored site plan and landscaping plan date stamped 08/14/14, except as amended by conditions herein.

4. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.

5. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.

6. A fully operational fire protection system, including fire apparatus roads, fire hydrants and water supply, shall be installed and shall be functioning prior to construction of any combustible structures.

CITY OF LAS VEGAS
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7. A technical landscape plan, signed and sealed by a Registered Architect, Landscape Architect, Residential Designer or Civil Engineer, must be submitted prior to or at the same time application is made for a building permit. A permanent underground sprinkler system is required, and shall be permanently maintained in a satisfactory manner; the landscape plan shall include irrigation specifications. Installed landscaping shall not impede visibility of any traffic control device.

8. Prior to the submittal of a building permit application, the applicant shall meet with Department of Planning staff to develop a comprehensive address plan for the subject site. A copy of the approved address plan shall be submitted with any future building permit applications related to the site.

9. All City Code requirements and design standards of all City Departments must be satisfied, except as modified herein.

Public Works

10. Grant a Multi-Use Non-Equestrian Trail Easement for the existing multi-use trail along the south side off this site prior to issuance of permits. Additionally, grant Public Pedestrian Access Easements for public sidewalks, if any, that are outside the public right-of-way prior to issuance of permits.

11. In accordance with code requirements of Title 13.56, remove all substandard offsite improvements, if any, and replace with new improvements meeting Current City Standards concurrent with development of this site. All existing paving damaged or removed by this development shall be restored at its original location and to its original width concurrent with development of this site.

12. In accordance with the intent of a Commercial Subdivision, all sites within this subdivision shall have perpetual common access to all driveways connecting this site to the abutting streets unless incompatible uses can be demonstrated to the satisfaction of the City Engineer and a note to this effect shall appear on the Final Map for this site. No barriers (e.g. curbs, wall, etc.) shall be erected within the boundaries of the overall commercial subdivision map site which would prohibit any vehicle on this site from utilizing any driveway connecting this commercial development site to the abutting public streets.

13. A Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works prior to the issuance of any building or grading permits or submittal of any construction drawings, whichever may occur first. Provide and improve all drainageways recommended in the approved drainage plan/study. The developer of this site shall be responsible to construct such neighborhood or local drainage facility improvements as are recommended by the City of Las Vegas Neighborhood Drainage Studies and approved Drainage Plan/Study concurrent with development of this site.

14. Site development to comply with all applicable conditions of approval for TMP-0014-01 and all other applicable site-related actions.

Sincerely,

Debra A. Duttenhaver

Deputy City Clerk for
Beverly K. Bridges, MMC, City Clerk

cc: Mr. Christopher Kaempfer
8345 W. Sunset Road, Ste 250
Las Vegas, Nevada 89113

LAS VEGAS
CITY COUNCIL

CAROLYN G. GOODMAN
MAYOR

STAVROS S. ANTHONY
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BOB COFFIN
BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

October 16, 2014

Swecker & Lipp Tenaya Azure LLC
2451 S. Buffalo Drive, Ste 140
Las Vegas, Nevada 89117

RE: SDR-55201 [PRJ-54831] - SITE DEVELOPMENT PLAN REVIEW RELATED TO MOD-55204, VAR-55205, SUP-55202 AND SUP-55203
CITY COUNCIL MEETING OF OCTOBER 15, 2014

Dear Applicant:

The City Council at a regular meeting held October 15, 2014 APPROVED the request for a Site Development Plan Review FOR A 6,500 SQUARE-FOOT LIQUOR ESTABLISHMENT (TAVERN) on 2.33 acres on the south side of Azure Drive, approximately 330 feet west of Tenaya Way (APN 125-27-222-013), T-C (Town Center) Zone. The Notice of Final Action was filed with the Las Vegas City Clerk on October 16, 2014. This approval is subject to:

Planning

1. Conformance to the Conditions of Approval for Variance (VAR-55205) shall be required.

2. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.

3. All development shall be in conformance with the site plan, landscape plan, and building elevations, date stamped 08/13/14 and the colored site plan and landscaping plan date stamped 08/14/14, except as amended by conditions herein.

4. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.

5. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.

6. A fully operational fire protection system, including fire apparatus roads, fire hydrants and water supply, shall be installed and shall be functioning prior to construction of any combustible structures.

CITY OF LAS VEGAS
495 S. MAIN STREET
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7. A technical landscape plan, signed and sealed by a Registered Architect, Landscape Architect, Residential Designer or Civil Engineer, must be submitted prior to or at the same time application is made for a building permit. A permanent underground sprinkler system is required, and shall be permanently maintained in a satisfactory manner; the landscape plan shall include irrigation specifications. Installed landscaping shall not impede visibility of any traffic control device.

8. Prior to the submittal of a building permit application, the applicant shall meet with Department of Planning staff to develop a comprehensive address plan for the subject site. A copy of the approved address plan shall be submitted with any future building permit applications related to the site.

9. All City Code requirements and design standards of all City Departments must be satisfied, except as modified herein.

Public Works

10. Grant a Multi-Use Non-Equestrian Trail Easement for the existing multi-use trail along the south side off this site prior to issuance of permits. Additionally, grant Public Pedestrian Access Easements for public sidewalks, if any, that are outside the public right-of-way prior to issuance of permits.

11. In accordance with code requirements of Title 13.56, remove all substandard offsite improvements, if any, and replace with new improvements meeting Current City Standards concurrent with development of this site. All existing paving damaged or removed by this development shall be restored at its original location and to its original width concurrent with development of this site.

12. In accordance with the intent of a Commercial Subdivision, all sites within this subdivision shall have perpetual common access to all driveways connecting this site to the abutting streets unless incompatible uses can be demonstrated to the satisfaction of the City Engineer and a note to this effect shall appear on the Final Map for this site. No barriers (e.g. curbs, wall, etc.) shall be erected within the boundaries of the overall commercial subdivision map site which would prohibit any vehicle on this site from utilizing any driveway connecting this commercial development site to the abutting public streets.

13. A Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works prior to the issuance of any building or grading permits or submittal of any construction drawings, whichever may occur first. Provide and improve all drainageways recommended in the approved drainage plan/study. The developer of this site shall be responsible to construct such neighborhood or local drainage facility improvements as are recommended by the City of Las Vegas Neighborhood Drainage Studies and approved Drainage Plan/Study concurrent with development of this site.

14. Site development to comply with all applicable conditions of approval for TMP-0014-01 and all other applicable site-related actions.

Sincerely,

Debra A. Duttard

Deputy City Clerk for
Beverly K. Bridges, MMC, City Clerk

cc: Mr. Christopher Kaempfer
8345 W. Sunset Road, Ste 250
Las Vegas, Nevada 89113

LAS VEGAS
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BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

October 16, 2014

Swecker & Lipp Tenaya Azure LLC
2451 S. Buffalo Drive, Ste 140
Las Vegas, Nevada 89117

RE: SUP-55202 [PRJ-54831] - SPECIAL USE PERMIT - RELATED TO MOD-55204, VAR-55205, SUP-55202, SUP-55203 AND SDR-55201
CITY COUNCIL MEETING OF OCTOBER 15, 2014

Dear Applicant:

The City Council at a regular meeting held October 15, 2014 APPROVED the request for a Special Use Permit FOR A 6,500 SQUARE-FOOT LIQUOR ESTABLISHMENT (TAVERN) WITH A WAIVER TO ALLOW A ZERO-FOOT DISTANCE SEPERATION FROM AN EXISTING SCHOOL WHERE 400 FEET IS REQUIRED on 2.33 acres on the south side of Azure Drive, approximately 330 feet west of Tenaya Way (APN 125-27-222-013), T-C (Town Center) Zone. The Notice of Final Action was filed with the Las Vegas City Clerk on October 16, 2014. This approval is subject to:

Planning

1. Conformance to all Minimum Requirements under LVMC Title 19.12 for a Liquor Establishment (Tavern) use.

2. Approval of and conformance to the Conditions of Approval for Site Development Plan Review (SDR-55201) and Variance (VAR-55205) shall be required.

3. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.

4. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.

5. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit, as well as submitted as part of any business license application.

CITY OF LAS VEGAS
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6. Minors shall only be permitted in such areas wherein spirituous, malt or fermented liquors or wines are served only in conjunction with regular meals and where dining tables or booths are provided separate from the bar in conformance with Title 6.50.

7. Approval of this Special Use Permit does not constitute approval of a liquor license.

8. This business shall operate in conformance to Chapter 6.50 of the City of Las Vegas Municipal Code.

9. All City Code requirements and design standards of all City departments must be satisfied, except as modified herein.

Sincerely,

Deputy City Clerk for
Beverly K. Bridges, MMC, City Clerk

cc: Mr. Christopher Kaempfer
8345 W. Sunset Road, Ste 250
Las Vegas, Nevada 89113

LAS VEGAS
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BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

October 16, 2014

Swecker & Lipp Tenaya Azure LLC
2451 S. Buffalo Drive, Ste 140
Las Vegas, Nevada 89117

RE: SUP-55203 [PRJ-54831] - SPECIAL USE PERMIT REALTED TO MOD-55204, VAR-55205, SUP-55202 AND SDR-55201
CITY COUNCIL MEETING OF OCTOBER 15, 2014

Dear Applicant:

The City Council at a regular meeting held October 15, 2014 APPROVED the request for a Special Use Permit FOR A 6,500 SQUARE-FOOT GAMING ESTABLISHMENT, RESTRICTED USE WITH A WAIVER TO ALLOW A ZERO-FOOT DISTANCE SEPERATION FROM A SINGLE-FAMILY DETACHED DWELLING WHERE 330 FEET IS REQUIRED on 2.33 acres on the south side of Azure Drive, approximately 330 feet west of Tenaya Way (APN 125-27-222-013), T-C (Town Center) Zone. The Notice of Final Action was filed with the Las Vegas City Clerk on October 16, 2014. This approval is subject to:

Planning

1. Conformance to all Minimum Requirements under LVMC Title 19.12 for a Gaming Establishment, Restricted use.

2. Approval of and conformance to the Conditions of Approval for Site Development Plan Review (SDR-55201) and Variance (VAR-55205) shall be required.

3. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.

4. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.

5. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit, as well as submitted as part of any business license application.

CITY OF LAS VEGAS
495 S. MAIN STREET
LAS VEGAS, NEVADA 89101

VOICE 702.229.6011
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6. This business shall operate in conformance to Chapter 6.50 of the City of Las Vegas Municipal Code.

7. All City Code requirements and design standards of all City departments must be satisfied, except as modified herein.

Sincerely,

Deputy City Clerk for
Beverly K. Bridges, MMC, City Clerk

cc: Mr. Christopher Kaempfer
8345 W. Sunset Road, Ste 250
Las Vegas, Nevada 89113

LAS VEGAS
CITY COUNCIL

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BOB COFFIN
BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

CITY OF LAS VEGAS
DEPARTMENT OF PLANNING

VELOPMENT SERVICES CENTER
333 NORTH RANCHO DRIVE
3RD FLOOR
LAS VEGAS, NEVADA 89106

VOICE 702.229.6301
FAX 702.474.0352
TTY 7-1-1
www.lasvegasnevada.gov

/city of las vegas

May 17, 2016

Swecker & Lipp Tenaya Azure LLC
2451 S. Buffalo Drive, Ste. 140
Las Vegas, Nevada 89117

RE: **SUP-64352 [PRJ-63605] – *ADMINISTRATIVE SPECIAL USE PERMIT ADMINISTRATIVE CYCLE – MAY 2016***

Dear Applicant:

Your request for a Minor Amendment to an approved Special Use Permit (SUP-55202) FOR A 1,000 SQUARE-FOOT REDUCTION TO A PROPOSED 6,500 SQUARE-FOOT LIQUOR ESTABLISHMENT (TAVERN) on 2.33 acres on the south side of Azure Drive, approximately 330 feet west of Tenaya Way (APN 125-27-222-015), T-C (Town Center) Zone [GC-TC (General Commercial - Town Center) Special Land Use Designation], Ward 6 (Ross) [PRJ-63605], has been considered administratively by the Department of Planning staff.

The Department of Planning has administratively ***APPROVED*** your request subject to the following:

Planning

1. Approval of and conformance to the Conditions of Approval for Site Development Plan Review (SDR-64354) shall be required.

2. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.

3. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.

4. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.

5. All City Code requirements and design standards of all City departments must be satisfied, except as modified herein.

This action by the Department of Planning staff on May 17, 2016 is final unless a written appeal is filed with the Director of the Department of Planning within ten days of the date of this letter.

Sincerely,

Steve Gebeke, AICP
Planning Supervisor

SG:nl

cc:

Mr. Matthew Nelson
Azure Capital Management, LLC
7155 South Rainbow Blvd.
Las Vegas, Nevada 89117

Mr. Chris Kaempfer
Kaempfer Crowell
1980 Festival Plaza Drive
Las Vegas, Nevada 89135

LAS VEGAS
CITY COUNCIL

CAROLYN G. GOODMAN
MAYOR

STEVEN D. ROSS
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CITY MANAGER

CITY OF LAS VEGAS
DEPARTMENT OF PLANNING

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/city of las vegas

May 17, 2016

Swecker & Lipp Tenaya Azure LLC
2451 S. Buffalo Drive, Ste. 140
Las Vegas, Nevada 89117

RE: **SUP-64353 [PRJ-63605] – *ADMINISTRATIVE SPECIAL USE PERMIT ADMINISTRATIVE CYCLE – MAY 2016***

Dear Applicant:

Your request for a Minor Amendment to an approved Special Use Permit (SUP-55203) FOR A 1,000 SQUARE-FOOT REDUCTION TO A PROPOSED 6,500 SQUARE-FOOT GAMING ESTABLISHMENT, RESTRICTED USE on 2.33 acres on the south side of Azure Drive, approximately 330 feet west of Tenaya Way (APN 125-27-222-015), T T-C (Town Center) Zone [GC-TC (General Commercial - Town Center) Special Land Use Designation], Ward 6 (Ross) [PRJ-63605], has been considered administratively by the Department of Planning staff.

The Department of Planning has administratively ***APPROVED*** your request subject to the following:

Planning

1. Approval of and conformance to the Conditions of Approval for Site Development Plan Review (SDR-64354) shall be required.

2. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.

3. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.

4. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.

5. All City Code requirements and design standards of all City departments must be satisfied, except as modified herein.

This action by the Department of Planning staff on May 17, 2016 is final unless a written appeal is filed with the Director of the Department of Planning within ten days of the date of this letter.

Sincerely,

Steve Gebeke, AICP
Planning Supervisor

SG:nl

cc:

Mr. Matthew Nelson
Azure Capital Management, LLC
7155 South Rainbow Blvd.
Las Vegas, Nevada 89117

Mr. Chris Kaempfer
Kaempfer Crowell
1980 Festival Plaza Drive
Las Vegas, Nevada 89135

LAS VEGAS
CITY COUNCIL

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CITY OF LAS VEGAS
DEPARTMENT OF PLANNING

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/city of las vegas

May 17, 2016

Swecker & Lipp Tenaya Azure LLC
2451 S. Buffalo Drive, Ste. 140
Las Vegas, Nevada 89117

RE:* SDR-64354 [PRJ-63605] – *ADMINISTRATIVE SITE DEVELOPMENT PLAN REVIEW
ADMINISTRATIVE CYCLE – MAY 2016

Dear Applicant:

Your request for a Minor Amendment to an approved Site Development Plan Review (SDR-55201) FOR A 1,000 SQUARE-FOOT REDUCTION TO A 6,500 SQUARE-FOOT LIQUOR ESTABLISHMENT (TAVERN) on 2.33 acres on the south side of Azure Drive, approximately 330 feet west of Tenaya Way (APN 125-27-222-015), T-C (Town Center) Zone [GC-TC (General Commercial - Town Center) Special Land Use Designation], Ward 6 (Ross) [PRJ-63605], has been considered administratively by the Department of Planning staff.

The Department of Planning has administratively ***APPROVED*** your request subject to the following:

Planning

1. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.

2. All development shall be in conformance with the building elevations, date stamped 04/21/16, site plan, date stamped 05/10/16 and landscape plan, date stamped 05/11/16, except as amended by conditions herein.

3. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.

4. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.

5. A technical landscape plan, signed and sealed by a Registered Architect, Landscape Architect, Residential Designer or Civil Engineer, must be submitted prior to or at the same time application is made for a building permit. A permanent underground sprinkler system is required, and shall be permanently maintained in a satisfactory manner; the landscape plan shall include irrigation specifications. Installed landscaping shall not impede visibility of any traffic control device.

6. A fully operational fire protection system, including fire apparatus roads, fire hydrants and water supply, shall be installed and shall be functioning prior to construction of any combustible structures.

7. All City Code requirements and design standards of all City Departments must be satisfied, except as modified herein.

Public Works

8. Site development to comply with all applicable conditions of approval for SDR-55201 and all other applicable site-related actions.

This action by the Department of Planning staff on May 17, 2016 is final unless a written appeal is filed with the Director of the Department of Planning within ten days of the date of this letter.

Sincerely,

Steve Gebeke, AICP
Planning Supervisor

SG:nl

cc:

Mr. Matthew Nelson
Azure Capital Management, LLC
7155 South Rainbow Blvd.
Las Vegas, Nevada 89117

Mr. Chris Kaempfer
Kaempfer Crowell
1980 Festival Plaza Drive
Las Vegas, Nevada 89135

LAS VEGAS
CITY COUNCIL

CAROLYN G. GOODMAN
MAYOR

STAVROS S. ANTHONY
MAYOR PRO TEM

LOIS TARKANIAN
STEVEN D. ROSS
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BOB COFFIN
BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

October 16, 2014

Swecker & Lipp Tenaya Azure LLC
2451 S. Buffalo Drive, Ste 140
Las Vegas, Nevada 89117

RE: VAR-55205 [PRJ-54831] - VARIANCE RELATED TO MOD-55204, SUP-55202, SUP-55203 AND SDR-55201
CITY COUNCIL MEETING OF OCTOBER 15, 2014

Dear Applicant:

The City Council at a regular meeting held October 15, 2014 APPROVED the request for a Variance TO ALLOW 74 PARKING SPACES WHERE 82 PARKING SPACES ARE REQUIRED on 2.33 acres on the south side of Azure Drive, approximately 330 feet west of Tenaya Way (APN 125-27-222-013), T-C (Town Center) Zone. The Notice of Final Action was filed with the Las Vegas City Clerk on October 16, 2014. This approval is subject to:

Planning

1. Approval of and conformance to the Conditions of Approval for Modification (MOD-55204) and Site Development Plan Review (SDR-55201) shall be required, if approved.

2. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.

3. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.

4. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.

CITY OF LAS VEGAS
495 S. MAIN STREET
LAS VEGAS, NEVADA 89101

VOICE 702.229.6011
TTY 702.386.9108
www.lasvegasnevada.gov

J

Permission to Grade Letter

AZURE CAPITAL MANAGEMENT, LLC
7155 S. Rainbow Blvd., Suite 200, Las Vegas, Nevada 89118
(702) 304-8383 (O) / (702) 304-1622 (F)

August 18, 2016

Via Hand Delivery
Monterrey Plaza LLC
Attn: Arthur Pastel
8061 Castle Pines Avenue
Las Vegas, Nevada 89113

Subject: Permission to Grade Request – APN 125-27-222-011
Azure Capital Management, LLC – Grading on Undeveloped Site

Dear Sirs,

Azure Capital Management, LLC is proposing to develop a Tavern and Parking Lot on the parcel identified as having Assessor's Parcel Number 125-27-222-015 located between W. Azure Drive and N. Tenaya Way in Clark County, Nevada. This site is immediately adjacent to the existing undeveloped site on Assessor's Parcel Number 125-27-222-011. The City of Las Vegas is requiring that we obtain permission to grade adjacent to the existing undeveloped site Assessor's Parcel Number 125-27-222-011.

To achieve the construction of the Tavern and Parking Lot, Azure Capital Management, LLC needs to perform the grading and paving as indicated on the enclosed Lochsa Engineering drawings. To perform this grading and paving construction, we need your permission to grade, pave and construct improvements. We respectfully request your permission to allow these construction activities and the development of our site to continue. Please sign where indicated below and return. Thank you again for your cooperation and support of our development. Should you have any questions, please do not hesitate to contact me at 702-304-8383 or my general contractor, Mark Maffey at J.A. Tiberti Construction at 702-248-4000 or mmaffey@tiberti.com.

Sincerely,

Joseph A. Kennedy, Manager

By my signature below, I hereby grant authorization to AZURE CAPITAL MANAGEMENT, LLC to access / grade / pave and construct improvements on Assessor's Parcel Number 125-27-222-011, as necessary to support the development of the site improvements as shown by the Lochsa Engineering plans.

Monterrey Plaza LLC, a Nevada limited liability company

By: _____
Arthur Pastel, Manager
Date: 9/8/16

Technical Drainage Study
For
Azure Tavern

TABLE OF CONTENTS

1. GENERAL LOCATION AND DEVELOPMENT DESCRIPTION 1
    1.1 Purpose 1
    1.2 Location of Property 2
    1.3 Description of Property 2
2.DRAINAGE DESCRIPTION 3
    2.1 Existing Drainage Condition 3
    2.2 Interim Drainage Condition 6
    2.3 Future Drainage Condition 9
    2.4 Master Planning Information 10
    2.5 Floodplain Information 10
    2.6 Previous Drainage Studies 11
    2.7 Compliance with CCRFCD Best Management Practices (BMP) 12
3. PROPOSED DRAINAGE FACILITIES 12
    3.1 General Description 12
    3.2 Compliance with Regulations and Adopted Plans 12
    3.3 Hydrologic Criteria 13
    3.4 Facility Design Calculations 14
4.CONCLUSIONS AND RECOMMENDATIONS 15
5.REFERENCES 16

APPENDICES

A Hydrologic Analysis
B Hydraulic Calculations
C Figures
D References
E Drainage Maps

1. GENERAL LOCATION AND DEVELOPMENT DESCRIPTION

1.1 Purpose

Lochsa Engineering has been retained by Azure Capital Management, LLC to provide a Technical Drainage Study for the proposed Azure Tavern located 450 feet west of the southwest corner of Azure Drive and Tenaya Way. The proposed improvements are limited to the proposed tavern building (1), the associated surface parking lot improvements, and a driveway entrance from Azure Drive. The proposed improvements are located within an existing newly graded desert area. The proposed improvements are located approximately 450 feet west of the southwest corner of Azure Drive and Tenaya Way intersection.

The purpose of this study is to provide a detailed hydrologic analysis of the site and watershed impacting it, and to substantiate the flood control design for the proposed improvements. The Clark County Regional Flood Control District (CCRFCD) Hydrologic Criteria and Drainage Design Manual (HCDDM) and the 2008 Las Vegas Valley Flood Control Master Plan Update (2008 MPU) have been compiled and utilized to prepare this study. This report presents summary of the hydrologic and hydraulic analyses, methodology, and results of the study.

1.2 Location of Property

The property is located approximately 450 feet west of the southwest corner of Azure Drive and Tenaya Way intersection. The project site is bordered to the north by Azure Drive, east by a vacant lot with a newly graded desert area (APN 125-27-222-011), west by a vacant lot with newly graded area (APN 125-27-222-014) and to the south by a vacant lot with newly graded area (APN 125-27-202-004) and a residential lot (30,000 SF Lot - APN 125-27-202-003). There is one (1) proposed building on the site. The project site occupies a parcel identified by the Assessor's Parcel Number (APN) 125-27-222-015. The site occupies a portion of the Southern Half (S1/2) of the Northwest Quarter (NW 1/4) of Section 27, Township 19 South, Range 60 East, of the M.D.M., in Clark County, Nevada. Please refer to the copy of the Assessor's Parcel Map provided in the appendix. Figure 1 in Appendix C also provides the location of the subject site in relation to the surrounding major streets.

1.3 Description of Property

The project site occupies approximately 0.90 acres. The project area is entirely existing newly graded dirt area. The site generally slopes to the northeast at approximately 1.40%. A review of the 2008 MPU's Figure H-19 indicates that the site is located within the hydrologic soil group D, defined as soils with "low infiltration rate, and high runoff potential." Review of the Natural Resources Conservation Service (NRCS) Web Soil Survey 2.0 (Reference 3) indicates that the site is located within soil type 305. As shown in the attached referenced information, soil type 305 is determined to be mostly soil type 'D'.

2. DRAINAGE DESCRIPTION

In the CCRFCD's 2008 MPU (Reference 2), the valley was hydrologically divided into ten watersheds and each watershed was further subdivided into sub-basins. The onsite and offsite basins impacting the subject project area fall within the Upper Northern Las Vegas Wash watershed. As shown in Figure H-19 of the 2008 MPU, the project site is all located within sub-basin NW2A1-C.

2.1 Existing Drainage Condition

The offsite drainage areas tributary to the site have been generally addressed in different drainage studies prepared by others. The most relevant study to the subject site includes the "*Technical Drainage Study for Tenaya Commercial*", by Wood Rogers, Inc., approved on February 27, 2007 (DS# 4104 – Reference 5). Reference 5 makes up our project site (0.90 acres) and an extra 1.44 acres to the west of our site. The main purpose of Reference 5 for our analysis is to utilize the approved flows (65/181cfs) in Azure Drive (fully improved) and 55cfs in the existing 36" storm drain that runs along the south half of Azure Drive at the frontage of our project site.

For a good portion of the offsite flow discharged to Azure Drive (fully improved) at the northeast corner of our project site, Reference 5 concurred with the approved "TDS for Tropical Parkway" which utilized an offsite basin area (west of our project site) comprised of the Shea Commercial, Tenaya Village and Honda studies. This area consists of approximately 90 acres of tributary area which ultimately discharges to Azure Drive. Reference Figures 5 (Existing

Conditions) and 6 (Ultimate Conditions) have been included for the offsite analysis and the street flow (65cfs/181cfs – 10/100yr) in Azure Drive adjacent to our site. Please note 55cfs is in the existing 36" storm drain that runs along Azure Drive.

For the purposes of our Study in existing conditions, we are utilizing and adopting the approved developed condition flow rates in Azure Drive for their project site (their entire site was never constructed). Thus, the developed condition hydrologic analysis provided in the reference study has been adopted to represent the existing condition for the street flow in Azure Drive just north of our project site.

In the existing conditions, the offsite basins impacting our site from the west are identified as FX1 and FX2. Basin FX1 (undeveloped – newly graded) is approximately 0.43 acres and runoff (1/1cfs) from this basin travels south to northeast to Azure Drive at the northwest corner of our site.

Basin FX2 (undeveloped – newly graded) is approximately 0.27 acres and runoff (<1/1cfs) from this basin travels east to our site near the southwest corner. The flow from this basin combines with an onsite basin NX2 (<1/1cfs) at combination point CPX1 (1/2cfs) for the 10 and 100 year storm events.

For the flows in Azure Drive, we have referenced the developed condition flow (65/181cfs) which is located just north of our site at the northeast corner. This flow is all surface flow. We have referenced the storm drain flow of 55cfs in the existing 36" RCP. Please refer to Figure DR1

(Existing Drainage Plan) for the delineation of each offsite basin west of our site. Utilizing the Developed conditions for Ref. 5 for our offsite flows in conjunction with this study was determined to be the worst case scenario to flood protect our site.

The onsite basins have been divided into two sub-basins and are identified as NX1 and NX2. Refer to Figure DR1, *Existing Condition Basin Map,* for basin boundaries and flow paths. Basin NX1 (0.57ac. – 1/2cfs) is currently newly graded and the runoff generated from this basin runs southwest to northeast sheet flowing across the site toward Azure Drive. Basin NX2 (0.33ac. – <1/1cfs) is currently newly graded and the runoff discharges southwest to northeast sheet flowing across the site to the adjacent vacant lot to the east. We have obtained a permission-to-grade letter from the adjacent owner to the east to help tie into the existing grades. Onsite basin NX2 (<1/1cfs) combines with offsite basin FX2 (<1/1cfs) at combination point CPX1 (1/2cfs). The flow ultimately discharges north into Azure Drive.

The hydrologic analysis of the above mentioned offsite basins tributary to the site, as analyzed in Reference 5, have been incorporated into the site specific analyses provided with the subject study. Additionally, the offsite basins are located within the McCarran Airport Rainfall Area, hence the point precipitation values for the 10-year and 100-year 6-hour storms are 1.58" and 2.77" respectively.

The HEC-1 Flood Hydrograph Package was utilized to determine the relevant onsite runoff flows. Utilizing the 1-ft topographic map for the project site, the site was delineated into onsite basins and offsite basins. The delineation of the onsite basins as well as offsite basins are depicted on Exhibit DR1, labeled as the 'Existing Drainage Plan'. Referenced flows are also labeled on the plan. Excerpts of the basin maps and hydrologic analysis from the referenced studies have been included in the appendix.

2.2 Interim Drainage Condition

For the interim condition, the analysis of the offsite basins will remain the same as in the existing condition, while the site will be developed to consist of the proposed Tavern building with surrounding parking lot. Therefore, the estimated flow rates from the offsite basins will remain the same as analyzed in the existing condition. See Figure DR2 (Interim Drainage Plan) for the flows and referenced flows for the site.

The developed site is analyzed as three (3) drainage basins labeled ND1, ND2 and ND3. Basin ND1 (1/1cfs) is 0.31ac. of commercial and parking lot development. These flows from basin ND1 discharge north through a drive aisle to Azure Drive. The flows (65/181cfs) for the 10 and 100 year storm events referenced in Azure Dr. have taken into account that our site was developed.

Basin ND2 (0.56ac. – 1/2cfs) is located south of onsite basin ND1 and runoff from this basin

travels east through the parking lot and then north through an onsite swale (d50 = 3-inches) before ultimately discharging to Azure Drive through a proposed sidewalk underdrain. Any overtopping in the onsite swale will discharge east and then north to Azure Drive and continue to travel in its original drainage pattern.

Offsite Basin FX1 (undeveloped – newly graded) is approximately 0.43 acres and runoff (1/1cfs) from this basin travels south to northeast to Azure Drive at the northwest corner of our site. Basin FX2 (undeveloped – newly graded) is approximately 0.27 acres and runoff (<1/1cfs) from this basin travels east to our site near the southwest corner. The flow from this basin combines with an onsite basin ND2 at combination point CPI1 (2/3cfs) in the 10 and 100 year storm events respectively. Refer to Figure DR2 (Interim Drainage Plan) for the drainage patterns and basin delineations.

The HEC-1 Flood Hydrograph Package is utilized to determine the relevant onsite runoff flows. Utilizing the 1-ft topographic map for the project site, the site is delineated into onsite basins and offsite basins. The delineation of the onsite basins as well as offsite basins are depicted on Exhibit DR2, labeled as the 'Interim Drainage Plan'. Referenced flows are labeled on Figure DR2. Excerpts of the basin maps and hydrologic analysis from the referenced studies have been included in the appendix.

There is one onsite swale (D50= 3") for flow from offsite basin FX2 and onsite basin ND2. Please note, since our site is less than 1 acre, we are not required to satisfy the water quality Best Management Practice (BMP) requirement in Section 1500 of the CCRFCD Drainage Design Manual. The swale provided onsite is still designed to settle out sediment and pollutant for the water quality design flows prior to exiting the project site. Even though it is not required, the site is treating nearly 62% (.56ac/.90ac) of the parking lot area through the proposed water quality-lined swale. A normal depth calculation has been provided for the swale to illustrate its sufficient capacity to convey the entire 10 year flows from CPI1 (interim) and CPD1 (future). Please note that 100-year flows may overtop the swales and sheet flow to the adjacent vacant lot, following their historical drainage patterns.

Normal depth calculations are being provided for Azure Drive (section 1). As shown in the attached FlowMaster output, flows within Azure Drive are well below the maximum allowable velocity x depth (v x d) values of 6.0 and 8.0 during 10- and 100-year storm events, respectively. Flows within Azure Drive also do not meet the minimum 12-ft dry lane requirement during the 10-year storm events. Please note that it is an existing condition also. The flows used are referenced utilizing the worse-case scenario for all drainage conditions (existing/interim/.developed).

As shown in the attached grading plan and exhibits, the finished floor (FF) elevations for the proposed buildings are more than 18"above Azure Drive centerline elevation. Normal depth calculations are also provided at three (2) locations within the project site, to illustrate the acceptable onsite flows through the project site.

2.3 Future Drainage Condition

For the future condition, both the site and all the local offsite basins are assumed to be fully developed. One of the changes from the interim analysis is that the offsite flow west of our site has increased due to the assumption of basins FX1 (now FD1) and FX2 (now FD2) are now developed. Since the offsite basins we analyzed are almost fully improved in the developed condition, we only did a re-analysis for basin FX1 to be FD1 for the future conditions and basin FX2 to be FD2 for future conditions. Please note that we are assuming both FD1 and FD2 flow will be discharging in the future by curbs and gutters. The drainage patterns remain the same as in existing conditions.

The difference is a small flow increase (0/1cfs) in FD1 flow that flows north to Azure Drive. Please note that we utilized the worse-case flow for Azure Drive and the basins west of our site have all been assumed to be developed and is taken into account for the Azure Drive flows adjacent to our site. These changes are shown in Exhibit DR3 (Developed Drainage Plan). All the flow patterns remain the same as interim condition. Please note the reference flows have been adopted for all conditions.

The building has been flood protected to twice the depth of flow onsite. As shown in the attached grading plan and exhibits, the finished floor (FF) elevation for the proposed building is more than 18"above Azure Drive centerline elevation.

2.4 Master Planning Information

The "*2008 Las Vegas Valley Flood Control Master Plan Update*" (2008 MPU, Reference 2), dated September 2008, as prepared by Post Buckley Schuh and Jernigan, Inc. (PBS&J), in association with Louis Berger Group and Parsons Brinckerhoff, illustrates the existing and proposed regional master planned facilities. The CCRFCD facility exhibits and inventory tables were updated in 2013. Review of Figure F-19 of the 2013 MPU indicates that proposed improvements are not adjacent to a regional facility.

2.5 Floodplain Information

The project site is covered by Flood Insurance Rate Map (FIRM) for the Clark County, Nevada, and incorporated areas, Community Panel Number: 32003C1745E, Effective Date: September 27, 2002. The Site is entirely within FEMA Flood Zone "X" (un-shaded), defined as: "*Areas determined to be outside the 0.2% annual chance floodplain*". Please refer to the attached Figure 2 for the location of the site on a portion of the FIRM Map Index.

2.6 Previous Drainage Studies

The overall area is covered within the CCRFCD "*2008 Las Vegas Valley Flood Control Master Plan Update, Volume I and II*" (Reference 2) and the Natural Resources Conservation Service (NRCS), "*1985 Soil Survey of the Las Vegas Valley*", Issued in July 1985, in conjunction with the Web Soil Survey (Reference 3). The site is also covered in the FIRM for the Clark County, Nevada and incorporated areas, Community Panel Number: 32003C1745E, Effective Date: September 27, 2002.

The most relevant study to the subject site includes the "*Technical Drainage Study for Tenaya Commercial*", by Wood Rogers, Inc., approved on February 27, 2007 (DS# 4104 – Reference 5). Reference 5 makes up our project site (0.90 acres) and an extra 1.44 acres to the west of our site. The main purpose of Reference 5 for our analysis is to utilize the approved flows (65/181cfs) in Azure Drive which discharge toward our site.

Lochsa Engineering generally concurs with all the pertinent referenced analyses and results utilized in this study.

2.7 Compliance with CCRFCD Best Management Practices (BMP)

Since our site is 0.90acres (less than 1 acre), we are not required to satisfy the water quality BMP requirement in Section 1500 of the CCRFCD Drainage Design Manual. As shown in the grading plan, riprap-lined swales are not being proposed throughout the project site. We have provided typical landscaped swales to direct the flow off the site.

As shown in the attached excerpts from Section 1500 of the HCDDM, since the parking lot area of the project site (0.90 acres) is less than 1 acre, the parking lot is categorized as 'Small' parking. There are no specific BMP requirements for small parking lots.

3. PROPOSED DRAINAGE FACILITIES

3.1 General Description

The proposed improvements are limited to the proposed building (1), the associated surface parking, and a driveway entrance from Azure Drive. The majority of the proposed improvements are located within an existing newly graded area.

3.2 Compliance with Regulations and Adopted Plans

The hydrologic analysis and drainage design of this development is in compliance with local requirements, including the CCRFCD "*Hydrologic Criteria and Drainage Design Manual*" (HCDDM) (Reference 1), and the CCRFCD "*2008 Las Vegas Valley Flood Control Master Plan Update*" (Reference 2). The site design is also in compliance with the Natural Resources Conservation Service (NRCS) Web Soil Survey and the 1995 SCS Soil Survey of Las Vegas Area

(Reference 3), as well as FEMA's FIRM with panel number 23003C1745E (Reference 4).

3.3 Hydrologic Criteria

The onsite basins of the subject project area all fall within the Upper Northern Las Vegas Wash watershed. The hydrologic and hydraulic analyses presented in this report are carried out in accordance with the CCRFCD's HCDDM (Reference 1). The rainfall values used for the hydrologic analysis of the site represent the 10-year and 100-year storm recurrence events, each with six-hour duration. The site is within the boundary for using the McCarran Airport Rainfall Data. Therefore, the rainfall values for the 6-hour, 10-year and 100-year storm events are determined from Table 505 as 1.58 and 2.77 inches, respectively.

The rainfall losses due to infiltration, interception, etc. are represented using the SCS curve number (CN) method recommended in the CCRFCD HCDDM (Reference 1). The SCS method divides the soils into four hydrologic groups as A, B, C and D. Review of the 2008 MPU's Figure H-19 indicates that the site is located within the hydrologic soil group 'D', defined as soils with low infiltration rate and high runoff potential. Review of the Natural Resources Conservation Service (NRCS) Web Soil Survey 2.0 (Reference 3) indicates that the site is located within soil type 305. As shown in the attached referenced information, soil type 305 (soil type 'D') covers 100% of the site. The CN values for the different land use were determined from Table 602 (page 1) of the CCRFCD HCDDM. The runoff hydrograph is determined from the design precipitation for each sub-basin using the Soil Conservation Service (SCS) unit hydrograph method. Calculations used in the hydrologic analysis for the onsite basins for existing and proposed conditions are attached in

Appendix A.

3.4 Facility Design Calculations

All drainage facilities within this project have been designed in accordance with the CCRFCD "*Hydrologic Criteria and Drainage Design Manual*" (Reference 1). The onsite drainage plan has been developed to closely resemble existing drainage patterns, and to minimize any impact to the adjacent properties.

4. CONCLUSIONS AND RECOMMENDATIONS

1. This project is in compliance with the applicable drainage laws as recognized by the State of Nevada.
2. This project is in compliance with the CCRFCD "2008 Las Vegas Valley Flood Control Master Plan", as well as the CCRFCD "*Hydrologic Criteria and Drainage Design Manual*".
3. The site and the proposed improvements are located entirely within areas designated by FEMA as Zone "X" (unshaded), described by FEMA "*Areas determined to be outside the 0.2% annual chance floodplain.*"
4. The drainage facilities for this project have been designed to convey runoff from the 100-year storm safely through the site. In addition, they have been designed based on generally accepted engineering practices.
5. No adverse effects are expected either upstream or downstream of the subject site.

5. REFERENCES

1. Clark County Regional Flood Control District, "*Hydrologic Criteria and Drainage Design Manual*", August 1999.

2. Post Buckley, Schuh & Jernigan (PBS&J), Inc., in association with, G. C. Wallace Inc, and Louis Berger Group, "*2008 Las Vegas Valley Flood Control Master Plan Update, Volume 1 and II*", September 2008.

3. Natural Resources Conservation Service (NRCS), "*1985 Soil Survey of the Las Vegas Valley*", Issued July 1985, in conjunction with the Web Soil Survey.

4. Federal Emergency Management Agency, "*Flood Insurance Rate Maps; Community Panel Numbers 32003C1745E; Clark County, Nevada and Incorporated Areas,*" Dated September 2, 2002.

5. Wood Rogers, Inc., "*Technical Drainage Study for Tenaya Commercial*" (DS#4104); Approved by CLV on February 7, 2007.

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Azure Tavern Date: October 25, 2016

Location of Development: a) Descriptive (Cross Streets) North/South: Tenaya Way

East/West: Azure Drive

b) Section: 27 Township: 19 South Range: 60 East

c) APN : 125-27-222-015

Name of Owner: Azure Capital Management, LLC - Joseph A. Kennedy

Telephone No.: 702-304-8383 Fax No.: E-Mail Address:

Address: 7155 S. Rainbow Blvd. Suite 200, Las Vegas, Nevada 89118

Contact Person-Name: Chris Blake, EI **Telephone No.:** (702) 365-9312

* **E-Mail Address:** chris.blake@lochsa.com **Fax No.:** (702) 365-9317

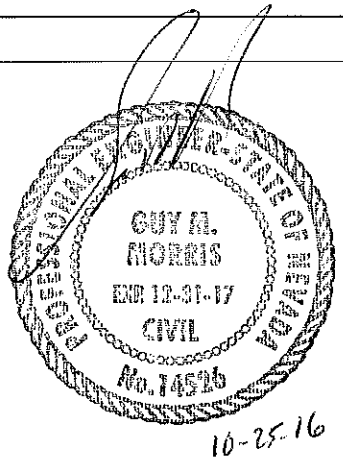
Firm: Lochsa Engineering

Address: 6345 South Jones Boulevard, Suite 100, Las Vegas, Nevada 89118

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At Site: 0.90 +/- Acres Being Developed/Disturbed: 0.90 +/- Acres
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ **Yes**** ☒ **No**
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☐ **Yes**** ☒ **No**
4. Proposed type of development (Residential, Commercial, Etc.): Commercial (Tavern)
5. Approximate upstream land area which drains to the subject site: 95 +/- Acres
6. Has the site drainage been evaluated in the past? ☒ **YES** ☐ **NO** If yes, please identify documentation: TDS for Tropical Parkway (DS 2525)
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Northeasterly to Azure Drive
8. Briefly describe your proposed schedule for the subject project: ASAP



10-25-16

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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name:	Azure Tavern	Map ID:	
Firm Name:	Lochsa Engineering	Engineer:	Guy Morris, PE
Address:	6345 South Jones Boulevard Suite 100		
City:	Las Vegas	State: Nevada	Zip: 89118
Phone Number:	(702) 365-9312	Fax Number:	(702) 365-9317
Property Owner:	Azure Capital Management, LLC - Joseph Kennedy		
Address:	7155 S. Rainbow Blvd., Suite 200		
City:	Las Vegas	State: NV	Zip: 89118

Reviewed By:	Date Received:	Date Accepted for Review:

The following checklist is intended as a guide for the engineer preparing a Technical Drainage Study to submit to the local entity and Clark County Regional Flood Control District (if necessary). The listed items are the minimum information required prior to the entity performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the Clark County Regional Flood Control District (CCRFCD) Hydrologic Criteria and Drainage Design Manual (MANUAL).

This document is intended as an aid in preparing Technical Drainage Studies. Each study is reviewed for compliance with local and regional criteria. This form is not intended to be all inclusive and does not limit the extent of the information, calculations or exhibits which may be necessary to properly evaluate the intended land use.

If items are not applicable for the subject site, provide N/A.

I. GENERAL REQUIREMENT

Yes	No	
✓		Design Manual **Standard Form 1** with the engineer's seal and signature.
✓		Design Manual **Standard Form 4.**
✓		2 copies of the 24" x 36" Drainage Plan
✓		A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.

REFERENCE:	**STANDARD FORM 2**

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS

Yes	No	
✓	____	A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated.
✓	____	A copy of the current CCRFCD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental areas with the site delineated.
✓	____	Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.
✓	____	On-site drainage basin maps for existing and proposed conditions showing the existing topography, basin boundaries, concentration points, and on-site and off-site flows in cfs.
✓	____	Vicinity Map with local and major cross streets identified and a north arrow.

III. DRAINAGE PLAN

Yes	No	
✓	____	Sheet size: 24" x 36" sealed by a registered engineer in the State of Nevada.
✓	____	Minimum scale: 1" = 60'.
✓	____	Project name.
✓	____	Vicinity Map with local and major cross streets.
✓	____	Revision box.
✓	____	North arrow and bar scale.
✓	____	Engineer's/consultant's address and phone number.
✓	____	Elevation datum and benchmark.
✓	____	Legend for symbols and abbreviations.
✓	____	Cut/fill scarps, where applicable.
✓	____	Street names, grades, widths.
✓	____	Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street.

REFERENCE:	STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
✓		Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.
✓		Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
	N/A	Proposed typical street sections.
	N/A	Streets with off-set crowns.
✓		Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
✓		Property lines.
✓		Right-of-way lines with widths, existing and proposed.
✓		Existing improvements and their elevations.
✓		Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.
✓		Concentration points and drainage flow directions with Q_{100} and V_{100} and D_{100} in streets.
✓		Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
✓		Location and cross-section of street capacity calculations.
	N/A	Cross-sectional detail for channels, including cutoff wall locations.
✓		Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations.
✓		Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
	N/A	Location and detail of existing, proposed, and future block wall openings. Minimum size is 16" x 48". Wrought iron gate is required for flows > 10 cfs.
	N/A	Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
____	N/A	Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit.
✓	____	Building and/or lot numbers.
____	N/A	Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
____	N/A	Limits of existing floodplain based on current FIRM of best available information; limits of proposed floodplains based on best available information.
____	N/A	For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table.
✓	____	Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from the Q_{100} flows.
✓	____	Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.

IV. HYDROLOGIC ANALYSIS

Yes	No	
✓	____	Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated.
✓	____	Input and output information for existing conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
✓	____	Input and output information for future conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
✓	____	Use of correct precipitation values in and around the McCarran Airport rainfall area.
✓	____	A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations.
✓	____	A summary table of stormwater flows showing basin area, Q_{10} and Q_{100} for both individual basins and combined basin flows, where applicable.
✓	____	Copies of supporting technical information referenced from a previously approved study and a statement accepting these results.
✓	____	On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with current Nevada Drainage Law.

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
____	N/A	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
✓	____	Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q_{100} and Q_{10} flows representing the worst case for interior and all perimeter streets. Q_{100} d x v $\leq$ 8. Q_{10} d x v $\leq$ 6 and 12 foot dry lane for rights-of-way $\geq$ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
✓	____	A summary table of interior and exterior street capacity calculations showing the street name, Q_{100} flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
____	N/A	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged).
✓	____	Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
✓	____	Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow of depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height of flow depth, which ever is greater.
____	N/A	A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. • Field survey data • Input and output information • Plotted cross-sections based on survey with proper encroachments. • A map showing the locations of the cross-sections. • Analysis of both sub and super-critical flow segments. • A summary table and a discussion of the results in the text of the report. Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
____	N/A	Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
✓	____	The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.

CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA
STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 5/18/11)

The following checklist is intended as a supplemental guide for the engineer preparing a Technical Drainage Study submittal to the City of Las Vegas. This supplement focuses on requirements specific to the City of Las Vegas. The requirements presented are in addition to the Clark County Regional Flood Control District (CCRFCD) Manual Standard Form 2. The listed items are the minimum information required prior to the City performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the CCRFCD Hydrologic Criteria and Drainage Design Manual (Design Manual).

An appointment must be made to preview this checklist in conjunction with CCRFCD Standard Form 2 prior to the City accepting a new drainage study for review. The engineer must contact the Flood Control Section at (702) 229-6541 to schedule a submittal appointment.

If items are not applicable for the subject site, provide N/A.

I. GENERAL REQUIREMENT		
Yes	No	
✓		A notarized letter from the adjacent property owner(s) allowing off-site grading. (A copy of the letter must be received prior to final acceptance of the drainage study.)
✓		Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.
✓		An electronic copy of the complete submittal is required to be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output device replicating your submittal. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats. If figures are in color, they must be scanned in color and saved as a separate file. _____ by initial here, the engineer on record acknowledges that the electronic copy is an identical replicate of the original hard copy submitted to the City of Las Vegas.

II. GRADING PLAN INFORMATION		
Yes	No	
✓		(1) 24" X 36" copy of the Grading Plan, (including all Detail Sheets) sealed by the engineer.
✓		Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street. Note: Proposed top of curb elevations must be provided for both sides of roadways even if only half street construction is required.
✓		Label existing topography at a minimum 5 foot elevation interval including adjacent developments, finished floor elevations of existing buildings and top of existing curbs extending 100 feet* around the perimeter of the site. (*Measured from the centerline of the adjacent roadway.)

II. GRADING PLAN INFORMATION		
Yes	No	
	✓	Proposed on-site and off-site storm drains and other flood control facilities with plan and profile sheets for public storm drains showing the class of pipe, (Class III, IV, V, etc.), design hydraulic grade line, (HGL) and 100 year storm flow. A public drainage easement must be provided over on-site storm drains conveying off-site flows. An overflow path must be provided over all storm drains.
	✓	All existing and "to be constructed" walls with cross-sections showing wall type, (e.g. block wall, retaining wall, flood wall, etc.), with limits clearly defined, adjacent ground elevations. Wall heights must meet current ordinances and in no case exceed 14 feet above the adjacent property.
✓		Street slopes for both interior and perimeter streets. Note: The minimum slope for a roadway is 0.4 percent, a minimum 18-inch storm drain must be provided where minimum slopes cannot be met.
✓		Back of lot elevations and lot drainage pattern for all lots including common lots.
	✓	Sites with a grade difference two feet above or below existing ground are required to have approval from City of Las Vegas Current Planning. Current Planning approval is required prior to final approval of the drainage study.
	✓	On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners. (The project must pass flows through the site every 600 feet where the project is blocking flow paths.)
	✓	This project uses a solid grouted stem wall (or approved alternate) at the back of sidewalk to provide erosion protection for landscaped areas where the depth of flow in the roadway exceeds the back of walk elevation. A corresponding cross-section detail is included.
	✓	Commercial and Common Lot Landscape areas are not allowed to drain over the sidewalk. The grading plans show flow lines with grades and sidewalk under drains for all landscape areas draining to the public ROW.

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
✓		Concrete valley gutters are required in parking lots with slopes less than 1 percent. Slopes through cul-de-sac must be at a 1 percent minimum where flow is drained through the cul-de-sac.
	✓	Ten-foot wide public drainage easements to be privately maintained are allowed for flow less than 20 cfs. The depth of flow entering the easement must be checked using the submerged weir calculation.
	✓	The limits of the flood zones and the base flood elevations (BFE) must be shown on all grading plans for all developments within a Special Flood Hazard Zone A, AO, AE, etc.
✓		Minimum finish floor elevation is 6 inches above highest adjacent top of curb. Finish floor calculations must include allowances for super elevations on curves and velocity head for tee intersections.
✓		Finished floor elevations for buildings adjacent to public drainage easements must be a minimum of 18 inches above the Q100 weir of submerged weir elevation, whichever is greater.

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
	✓	Lots with "B and C Type Drainage" that drain from one lot to another through a drainage easement shall be required to install an underground nuisance drainage system or a 2-foot valley gutter. 16" x 24" minimum block wall openings are required for both options.
	✓	Bubblers are required across 80 foot and greater ROW streets. When flows exceed 10 cfs, bubblers larger than 18 inches will be required up to a maximum of 36". Inlets must be sized to match the pipe size provided.

- Contact the Flood Control Section regarding the drainage study review fee. These fees are payable at the time of submittal.
- The Drainage Study must be conditionally approved prior to submitting improvement plans to the Civil and Planning Development of the Department of Building and Safety for review.

This document is intended as an **aid** in preparing Technical Drainage Studies for the City of Las Vegas. Each study submitted is reviewed for compliance with local and regional criteria. This form is not intended to be all-inclusive and does not limit the extent of the information, calculations or exhibits which may be necessary to properly evaluate the intended land use.

Peak Flow Summary
Existing Condition

HEC-1 I.D.	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)	
FX2	0.27	<1	1	
NX2	0.33	<1	1	
CPX1	-	1	2	(FX2+NX2)
FX1	0.43	1	1	
NX1	0.57	1	2	

Peak Flow Summary
Interim Condition

HEC-1 I.D.	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)	
FX2	0.27	<1	1	
ND2	0.59	1	2	
CPI1	-	2	3	(FX2+ND2)
FX1	0.43	1	1	
ND1	0.31	1	1	
ND3	0.03	<1	<1	

Peak Flow Summary
Developed Condition

HEC-1 I.D.	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)	
FD2	0.27	1	1	
ND2	0.59	1	2	
CPD1	-	2	3	(FX2+ND2)
FD1	0.43	1	2	
ND1	0.31	1	1	
ND3	0.03	<1	<1	

APPENDIX A

HYDROLOGIC ANALYSIS

DEVELOPMENT: Azure Tavern
CALCULATED BY: CB
PROJECT NUMBER: 161079

DATE: October 21, 2016

SUB-BASIN DATA				INITIAL/OVERLAND TIME (ti)			TRAVEL TIME (tt)				tc CHECK (URBANIZED BASINS)		FINAL tc	REMARKS			
DESIGN (1)	K (2)	AREA Ac (3)	AREA Sq. Mile (4)	LENGTH Ft (5)	SLOPE % (6)	ti Min (7)	LENGTH Ft (8)	SLOPE % (9)	VELOCITY FPS (10)	tt Min (11)	TOTAL LENGTH Ft (12)	tc =(L/180)+10 Min (13)	Min (14)	CN (15)	tL Hrs (16)	Urbanized? (17)	Soil Type (18)
NX1	0.8508	0.57	0.00089	50	0.5	4.0	181	0.5	0.6	4.7	-	-	8.7	94.0	0.100	NO	D
NX2	0.8508	0.33	0.00052	50	1.6	2.7	100	1.2	0.7	2.3	-	-	5.0	94.0	0.100	NO	D
FX1	0.8508	0.43	0.00067	50	0.5	4.0	113	3.1	1.0	1.9	-	-	5.9	94.0	0.100	NO	D
FX2	0.8508	0.27	0.00042	63	1.5	3.1	150	0.5	0.5	4.7	-	-	7.8	94.0	0.100	NO	D
ND1	0.9036	0.31	0.00048	40	3.0	1.6	129	1.4	1.2	1.8	169	10.9	3.3	98.0	0.050	YES	D
ND2	0.9036	0.59	0.00092	50	1.6	2.1	298	1.1	1.8	2.8	348	11.9	4.9	98.0	0.050	YES	D
ND3	0.8772	0.03	0.00005	20	0.5	2.3	42	2.0	1.1	0.6	62	10.3	2.9	96.0	0.050	YES	D
FD1	0.9036	0.43	0.00067	50	0.5	3.1	113	3.1	2.6	0.7	163	10.9	3.9	98.0	0.050	YES	D
FD2	0.9036	0.27	0.00042	60	1.5	2.4	150	0.5	1.1	2.2	210	11.2	4.6	98.0	0.050	YES	D

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

K = 0.0132 CN - 0.39

tt = L / (60 V)

tc = ti + tt

tL= tLAG = 0.6 tc

LOCATION: Onsite
HYDROLOGIC CONDITION: Existing and Developed

TRIAL: Final Iteration

Curve Number Calculations
Azure Tavern

Sub-Basin: **NX1**
Total Area: 0.57 Acres

Land Use/Cover type	Area [A] (acres)	Soil Type	Percentage, P [P]	Curve Number [CN]	Product {CN x P}
Newly graded area (pervious area only, no vegetation)	0.57	D	100%	94	94.0
Total:	0.57	-	100%	-	94.0

Curve Number Calculations
Azure Tavern

Sub-Basin: **NX2**
Total Area: 0.33 Acres

Land Use/Cover type	Area [A] (acres)	Soil Type	Percentage, P [P]	Curve Number [CN]	Product {CN x P}
Newly graded area (pervious area only, no vegetation)	0.33	D	100%	94	94.0
Total:	0.33	-	100%	-	94.0

Curve Number Calculations
Azure Tavern

Sub-Basin: **FX1**
Total Area: 0.43 Acres

Land Use/Cover type	Area [A] (acres)	Soil Type	Percentage, P [P]	Curve Number [CN]	Product {CN x P}
Newly graded area (pervious area only, no vegetation)	0.43	D	100%	94	94.0
Total:	0.43	-	100%	-	94.0

Curve Number Calculations
Azure Tavern

Sub-Basin: **FX2**
Total Area: 0.27 Acres

Land Use/Cover type	Area [A] (acres)	Soil Type	Percentage, P [P]	Curve Number [CN]	Product {CN x P}
Newly graded area (pervious area only, no vegetation)	0.27	D	100%	94	94.0
Total:	0.27	-	100%	-	94.0

Curve Number Calculations
Azure Tavern

Sub-Basin: **ND1**
Total Area: 0.31 Acres

Land Use/Cover type	Area [A] (acres)	Soil Type	Percentage, P [P]	Curve Number [CN]	Product {CN x P}
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	0.31	D	100%	98	98.0
Total:	0.31	-	100%	-	98.0

Curve Number Calculations
Azure Tavern

Sub-Basin: **ND2**
Total Area: 0.59 Acres

Land Use/Cover type	Area [A] (acres)	Soil Type	Percentage, P [P]	Curve Number [CN]	Product {CN x P}
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	0.59	D	100%	98	98.0
Total:	0.59	-	100%	-	98.0

Curve Number Calculations
Azure Tavern

Sub-Basin: **ND3**
Total Area: 0.03 Acres

Land Use/Cover type	Area [A] (acres)	Soil Type	Percentage, P [P]	Curve Number [CN]	Product {CN x P}
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	0.02	D	50%	98	49.0
Newly graded area (pervious area only, no vegetation)	0.02	D	50%	94	47.0
Total:	0.03	-	100%	-	96.0

AVERAGE VELOCITY

Basin NX1	Basin NX2		Basin FX1	Basin FX2		Basin ND1	Basin ND2	Basin ND3		Basin FD1	Basin FD2				
10.0	10.0		10.0	10.0		2.0	2.0	2.0		2.0	2.0				
100	100		100	100		100	0	100		0	0				
100	100		100	100		100	50	100		50	50				
0.025	0.025		0.025	0.025		0.015	0.015	0.020		0.015	0.015				
0.005	0.012	0.000	0.031	0.005	0.000	0.014	0.011	0.020	0.000	0.031	0.005	0.000	0.000	0.000	0.000
1	0.5		0.5	0.5		0.5	1	0.5		1	0.5				

Output Variables

0.09	0.05		0.04	0.06		0.06	0.11	0.06		0.09	0.10				
1.57	0.70		0.50	0.94		0.42	0.56	0.45		0.38	0.45				
0.64	0.72		1.00	0.53		1.20	1.79	1.10		2.62	1.12				
27.00	19.48		17.32	21.79		13.07	7.85	13.63		6.58	7.09				
0.06	0.04		0.03	0.04		0.03	0.07	0.03		0.06	0.06				
27.00	19.48		17.31	21.79		13.07	7.73	13.63		6.49	6.99				
0.04	0.02		0.02	0.03		0.02	0.05	0.02		0.04	0.04				

ʀ STORM RUNOFF FLOWS IS USED TO DETERMINE THE BASIN TRAVEL VELOCITY REQUIRED FOR THE LAG TIME CALCULATIONS

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

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

July 14, 2016

[Soil "305" FOR ONSITES & OFFSITES]

PROJECT SITE

Custom Soil Resource Report
Soil Map

ONSITE

Map Unit Legend

Las Vegas Valley Area, Nevada, Part of Clark County (NV788)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
192	Dalian-McCullough complex, 0 to 4 percent slopes	0.4	3.3%
305	Las Vegas-DeStazo complex, 0 to 2 percent slopes	12.2	96.7%
Totals for Area of Interest		12.6	100.0%

ONSITE & OFFSITE "305" ONLY

Map Unit Descriptions

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

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

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

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If

Typical profile

H1 - 0 to 5 inches: very gravelly very fine sandy loam
H2 - 5 to 30 inches: stratified sandy loam to loam
H3 - 30 to 40 inches: stratified coarse sand to loamy fine sand
H4 - 40 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Gypsum, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: LIMY 3-5" P.Z. (030XB019NV_3)

Minor Components

Las vegas

Percent of map unit: 5 percent
Landform: Basin-floor remnants
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)

Tencee

Percent of map unit: 5 percent
Landform: Fan remnants
Down-slope shape: Linear
Across-slope shape: Convex

SITE & OFFSITES

305—Las Vegas-DeStazo complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hrbs
Elevation: 1,400 to 5,200 feet
Mean annual precipitation: 3 to 10 inches

Mean annual air temperature: 55 to 70 degrees F
Frost-free period: 180 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Las vegas and similar soils: 60 percent
Destazo and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Las Vegas

Setting

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

Typical profile

H1 - 0 to 2 inches: gravelly fine sandy loam
H2 - 2 to 8 inches: fine sandy loam
H3 - 8 to 12 inches: gravelly sandy clay loam
H4 - 12 to 16 inches: indurated

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 3 to 14 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 85 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D 60% 'D' SOIL
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)

Description of Destazo

Setting

Landform: Alluvial flats
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 11 inches: fine sandy loam
H2 - 11 to 51 inches: very gravelly sandy clay loam
H3 - 51 to 62 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Other vegetative classification: LIMY 3-5" P.Z. (030XB019NV_3)

25% - 'C' soil

Minor Components

Skyhaven

Percent of map unit: 5 percent
Landform: Alluvial flats
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: SHALLOW LIMESTONE SLOPE 5-8 P.Z. (030XB030NV_2)

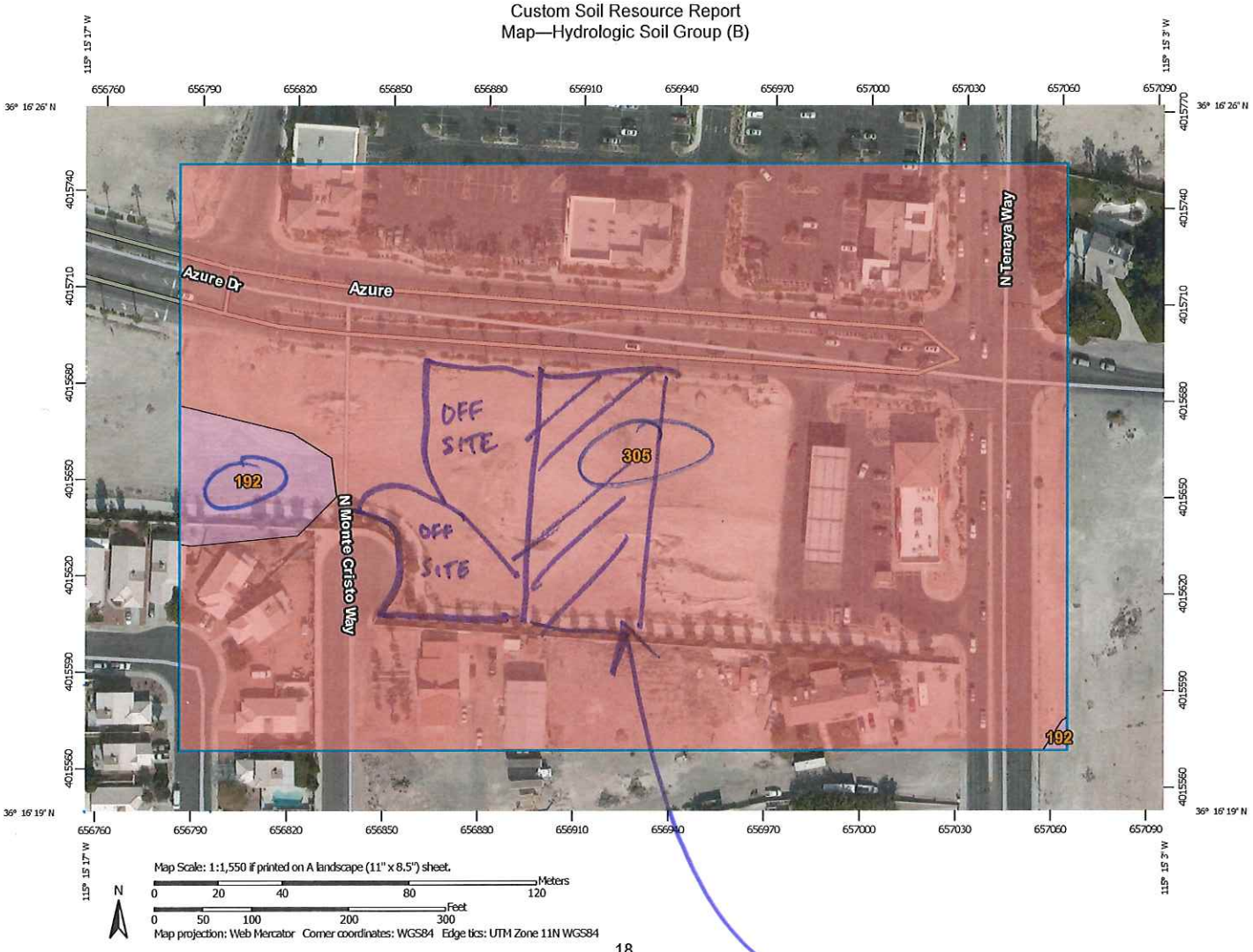
Glencarb

Percent of map unit: 5 percent
Landform: Alluvial flats
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: LOAMY BOTTOM (030XB020NV)

Bluepoint

Percent of map unit: 5 percent
Landform: Sand sheets, fan piedmonts
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Other vegetative classification: LIMY SAND 5-7" P.Z. (030XB037NV_2)

Custom Soil Resource Report
Map—Hydrologic Soil Group (B)



SITE

Table—Hydrologic Soil Group (B)

Hydrologic Soil Group— Summary by Map Unit — Las Vegas Valley Area, Nevada, Part of Clark County (NV788)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
	Dalian-McCullough complex, 0 to 4 percent slopes	A	0.4	3.3%
305	Las Vegas-DeStazo complex, 0 to 2 percent slopes	D	12.2	96.7%
Totals for Area of Interest			**12.6**	**100.0%**

Rating Options—Hydrologic Soil Group (B)

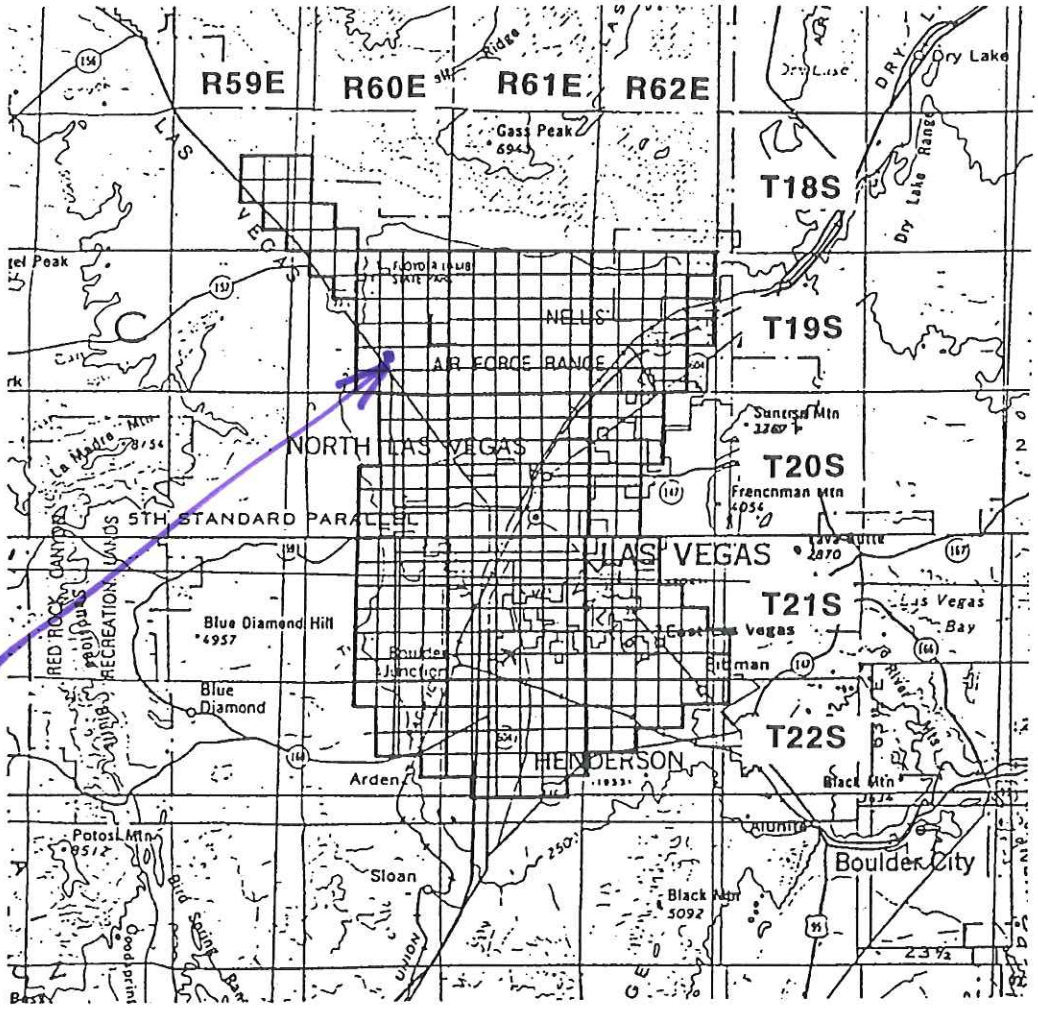
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

SITE & OFFSITES

McCARRAN AIRPORT RAINFALL AREA



TOWNSHIP	RANGE	SECTIONS	TOWNSHIP	RANGE	SECTIONS
18 South	59 East	13-15,22-26,36	20 South	62 East	4-9,16-20,29-32
18 South	60 East	30-32	21 South	60 East	1-4,9-16,21-28,33-36
19 South	60 East	1-6,8-16,21-28,33-36	21 South	61 East	ALL SECTIONS
19 South	61 East	ALL SECTIONS	21 South	62 East	4-9,15-23, 25-36
19 South	62 East	2-11,14-23,27-34	22 South	60 East	1-4,10-15,24
20 South	60 East	1-3,10-15,21-28,33-36	22 South	61 East	1-24,26-29
20 South	61 East	ALL SECTIONS	22 South	62 East	1-10,17-18

Section 27

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

Revision	Date

WRC ENGINEERING

REFERENCE:
USACE, Los Angeles District, 1988

FIGURE 513

DEPTH-DURATION-FREQUENCY VALUES FOR McCARRAN AIRPORT RAINFALL AREA

(IN INCHES)

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

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

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

3. Table 501 adjustments not required.

Revision	Date

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

SIX-HOUR STORM DISTRIBUTIONS

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

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

Revision	Date

REFERENCE:

TABLE 503

RUNOFF CURVE NUMBERS
(URBAN AREAS[1])

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)[3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only)[4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
See Table 602A					
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)[5]		77	86	91	94

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

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

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

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

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

Revision	Date

HEC-1 MODEL OUTPUT

(EXISTING CONDITION)

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *             JUN  1998                 *
 *           VERSION 4.1                 *
 *                                       *
 *  RUN DATE   24OCT16  TIME  06:43:42   *
 *                                       *
 *****************************************
```

X

```
*****************************************
*                                       *
*    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

    1         ID        AZURE TAVERN
    2         ID        ********** TECHNICAL DRAINAGE STUDY *****************
    3         ID        EXISTING CONDITION - ONSITE AND OFFSITE
    4         ID        USING SCS METHODS AND KINEMATIC WAVE ROUTING
    5         ID        MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION
    6         ID
    7         ID        LOCHSA JOB # 161079
    8         ID
    9         ID
   10         ID        INPUT FILE NAME:  X.DAT
   11         ID
   12         ID        OCTOBER 2016
   13         ID
   14         ID        ************************************************************************
   15         ID        ************************************************************************
   16         ID             MCCARRAN AIRPORT RAINFALL AREA
   17         ID             10 & 100 YEAR - 6 HOUR STORM EVENT
   18         ID             PRECIPITATION:
   19         ID                 10-YEAR          : 1.58 INCHES
   20         ID                 100-YEAR         : 2.77 INCHES
   21         ID                 10-YEAR/100-YEAR : 1.58/2.77= 0.5700
   22         ID        ************************************************************************
   23         ID        ************************************************************************
              *DIAGRAM
   24         IT       5                    200
   25         IO       5       0
   26         IN       5
   27         JR    PREC   .5700     1.0

   28         KK     FX2
   29         KM   OFFSITE BASIN WEST OF THE SOUTH PORTION OF PROJECT SITE
   30         PB   2.770
   31         PC     0.0     .02     .057     .07     .087     .108     .124     .13     .13     .13
   32         PC     .13     .13      .13     .133     .14     .142     .148     .158     .172     .181
   33         PC     .19     .197     .199     .2     .201     .204     .214     .229     .241     .249
   34         PC     .251     .256     .27     .278     .281     .283     .295     .322     .352     .409
   35         PC     .499     .59     .71     .744     .781     .812     .819     .835     .851     .856
   36         PC     .86     .868     .876     .888     .91     .926     .937     .95     .97     .976
   37         PC     .982     .985     .987     .989     .99     .993     .993     .994     .995     .998
   38         PC     .998     .999     1.0
   39         BA   .00042
   40         LS       0     94.0
   41         UD     .100
              *

   42         KK     NX2
   43         KM   ONSITE BASIN DISCHARGING EAST TO ADJACENT VACANT LOT
   44         BA   .00052
   45         LS       0     94.0
   46         UD    0.100
              *
```



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

   47         KK     CPX1
   48         KM   COMBINE FX2 AND NX2
   49         HC       2
              *

   50         KK     FX1
   51         KM   OFFSITE BASIN WEST OF THE NORTH PORTION OF THE PROJECT SITE
   52         BA   .00067
   53         LS       0     94.0
   54         UD    0.100
              *
```

```
                                                                      X
            55          KK     NX1
            56          KM   ONSITE BASIN DISCHARGING NORTHEAST TO AZURE DRIVE
            57          BA  .00089
            58          LS       0    94.0
            59          UD   0.100
                        *
            60          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

    28          FX2
                 .
                 .
    42           .          NX2
                 .            .
                 .            .
    47          CPX1.............
                 .
                 .
    50           .          FX1
                 .            .
                 .            .
    55           .            .         NX1

  (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                 ****************************************
 *                                       *                 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                 *    U.S. ARMY CORPS OF ENGINEERS      *
 *             JUN   1998                *                 *    HYDROLOGIC ENGINEERING CENTER     *
 *          VERSION 4.1                  *                 *         609 SECOND STREET            *
 *                                       *                 *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   24OCT16  TIME  06:43:42   *                 *         (916) 756-1104               *
 *                                       *                 *                                      *
 *****************************************                 ****************************************

                                AZURE TAVERN
                                ************ TECHNICAL DRAINAGE STUDY ******************
                                EXISTING CONDITION - ONSITE AND OFFSITE
                                USING SCS METHODS AND KINEMATIC WAVE ROUTING
                                MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION

                                LOCHSA JOB # 161079


                                INPUT FILE NAME:  X.DAT

                                OCTOBER 2016

                                ********************************************************************************
                                ********************************************************************************
                                     McCARRAN AIRPORT RAINFALL AREA
                                     10 & 100 YEAR - 6 HOUR STORM EVENT
                                     PRECIPITATION:
                                         10-YEAR          : 1.58 INCHES
                                         100-YEAR         : 2.77 INCHES
                                         10-YEAR/100-YEAR : 1.58/2.77= 0.5700
                                ********************************************************************************
                                ********************************************************************************

  25 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         200  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      1    0  ENDING DATE
                     NDTIME        1635  ENDING TIME
                      ICENT          19  CENTURY MARK

                    COMPUTATION INTERVAL      .08 HOURS
                        TOTAL TIME BASE    16.58 HOURS

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

     JP          MULTI-PLAN OPTION
                       NPLAN          1  NUMBER OF PLANS

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

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1	 RATIO 2
					.57	1.00
HYDROGRAPH AT						
+	FX2	.00	1	FLOW	0.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	NX2	.00	1	FLOW	0.	1.
				TIME	3.50	3.50
2 COMBINED AT						
+	CPX1	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	FX1	.00	1	FLOW	1.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	NX1	.00	1	FLOW	1.	2.
				TIME	3.50	3.50

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

HEC-1 MODEL OUTPUT

(INTERIM CONDITION)

```
1****************************************
*                                      *
*    FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *
*              JUN  1998               *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   24OCT16  TIME  06:54:38    *
*                                      *
****************************************
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I

```
****************************************
*                                      *
*    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

   1          ID        AZURE TAVERN
   2          ID        ********** TECHNICAL DRAINAGE STUDY *****************
   3          ID        INTERIM CONDITION - ONSITE AND OFFSITE
   4          ID        USING SCS METHODS AND KINEMATIC WAVE ROUTING
   5          ID        MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION
   6          ID
   7          ID        LOCHSA JOB # 161079
   8          ID
   9          ID
  10          ID        INPUT FILE NAME:  I.DAT
  11          ID
  12          ID        OCTOBER 2016
  13          ID
  14          ID        ************************************************************************
  15          ID        ************************************************************************
  16          ID             McCARRAN AIRPORT RAINFALL AREA
  17          ID             10 & 100 YEAR - 6 HOUR STORM EVENT
  18          ID             PRECIPITATION:
  19          ID                 10-YEAR          : 1.58 INCHES
  20          ID                 100-YEAR         : 2.77 INCHES
  21          ID                 10-YEAR/100-YEAR : 1.58/2.77= 0.5700
  22          ID        ************************************************************************
  23          ID        ************************************************************************
              *DIAGRAM
  24          IT       5                    200
  25          IO       5       0
  26          IN       5
  27          JR    PREC   .5700     1.0

  28          KK     FX2
  29          KM   OFFSITE BASIN WEST OF THE SOUTH PORTION OF PROJECT SITE
  30          PB   2.770
  31          PC     0.0      .02     .057      .07     .087     .108     .124      .13      .13      .13
  32          PC     .13      .13      .13     .133      .14     .142     .148     .158     .172     .181
  33          PC     .19     .197     .199       .2     .201     .204     .214     .229     .241     .249
  34          PC    .251     .256      .27     .278     .281     .283     .295     .322     .352     .409
  35          PC    .499      .59      .71     .744     .781     .812     .819     .835     .851     .856
  36          PC     .86     .868     .876     .888      .91     .926     .937      .95      .97     .976
  37          PC    .982     .985     .987     .989      .99     .993     .993     .994     .995     .998
  38          PC    .998     .999      1.0
  39          BA  .00042
  40          LS       0     94.0
  41          UD    .100
              *

  42          KK     ND2
  43          KM   ONSITE BASIN DISCHARGING EAST TO ADJACENT VACANT LOT
  44          BA  .00092
  45          LS       0     98.0
  46          UD   0.050
              *
```



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

  47          KK    CPI1
  48          KM   COMBINE FX2 AND ND2
  49          HC       2
              *

  50          KK     FX1
  51          KM   OFFSITE BASIN WEST OF THE NORTH PORTION OF THE PROJECT SITE
  52          BA  .00067
  53          LS       0     94.0
  54          UD   0.100
              *
```

```
                                                                      I
            55          KK     ND1
            56          KM   ONSITE BASIN DISCHARGING NORTHEAST TO AZURE DRIVE
            57          BA  .00048
            58          LS       0    98.0
            59          UD   0.050
                        *

            60          KK     ND3
            61          KM   ONSITE BASIN AT SEC OF SITE DISCHARGING EAST
            62          BA  .00005
            63          LS       0    96.0
            64          UD   0.050
                        *
            65          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

    28          FX2
                  .
                  .
    42            .          ND2
                  .            .
                  .            .
    47          CPI1...........
                  .
                  .
    50            .          FX1
                  .            .
                  .            .
    55            .            .         ND1
                  .            .           .
                  .            .           .
    60            .            .           .         ND3

  (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
 *                                       *
 *    FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN  1998                *
 *           VERSION 4.1                 *
 *                                       *
 *  RUN DATE   24OCT16  TIME  06:54:38   *
 *                                       *
 *****************************************

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

                                AZURE TAVERN
                                ************ TECHNICAL DRAINAGE STUDY *****************
                                INTERIM CONDITION - ONSITE AND OFFSITE
                                USING SCS METHODS AND KINEMATIC WAVE ROUTING
                                MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION

                                LOCHSA JOB # 161079


                                INPUT FILE NAME:  I.DAT

                                OCTOBER 2016

                                ********************************************************************************
                                ********************************************************************************
                                     McCARRAN AIRPORT RAINFALL AREA
                                     10 & 100 YEAR - 6 HOUR STORM EVENT
                                     PRECIPITATION:
                                         10-YEAR          : 1.58 INCHES
                                         100-YEAR         : 2.77 INCHES
                                         10-YEAR/100-YEAR : 1.58/2.77= 0.5700
                                ********************************************************************************
                                ********************************************************************************

  25 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         200  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      1   0  ENDING DATE
                      NDTIME       1635  ENDING TIME
                       ICENT         19  CENTURY MARK

                    COMPUTATION INTERVAL     .08 HOURS
                        TOTAL TIME BASE   16.58 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
```

I

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

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .57	RATIO 2 1.00
HYDROGRAPH AT						
+	FX2	.00	1	FLOW	0.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	ND2	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
2 COMBINED AT						
+	CPI1	.00	1	FLOW	2.	3.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	FX1	.00	1	FLOW	1.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	ND1	.00	1	FLOW	1.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	ND3	.00	1	FLOW	0.	0.
				TIME	3.50	3.50

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

HEC-1 MODEL OUTPUT

(DEVELOPED CONDITION)

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN   1998                *
*          VERSION 4.1                  *
*                                       *
*  RUN DATE   24OCT16  TIME  06:54:23   *
*                                       *
*****************************************
```

D

```
*****************************************
*                                       *
*    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

   1          ID        AZURE TAVERN
   2          ID        ********** TECHNICAL DRAINAGE STUDY *****************
   3          ID        DEVELOPED CONDITION - ONSITE AND OFFSITE
   4          ID        USING SCS METHODS AND KINEMATIC WAVE ROUTING
   5          ID        MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION
   6          ID
   7          ID        LOCHSA JOB # 161079
   8          ID
   9          ID
  10          ID        INPUT FILE NAME:  D.DAT
  11          ID
  12          ID        OCTOBER 2016
  13          ID
  14          ID        ************************************************************************
  15          ID        ************************************************************************
  16          ID             McCARRAN AIRPORT RAINFALL AREA
  17          ID             10 & 100 YEAR - 6 HOUR STORM EVENT
  18          ID             PRECIPITATION:
  19          ID                 10-YEAR          : 1.58 INCHES
  20          ID                 100-YEAR         : 2.77 INCHES
  21          ID                 10-YEAR/100-YEAR : 1.58/2.77= 0.5700
  22          ID        ************************************************************************
  23          ID        ************************************************************************
              *DIAGRAM
  24          IT       5                    200
  25          IO       5       0
  26          IN       5
  27          JR    PREC   .5700     1.0

  28          KK     FD2
  29          KM   OFFSITE BASIN WEST OF THE SOUTH PORTION OF PROJECT SITE
  30          PB   2.770
  31          PC     0.0     .02     .057     .07     .087     .108     .124     .13     .13     .13
  32          PC     .13     .13      .13     .133     .14     .142     .148     .158     .172     .181
  33          PC     .19     .197     .199     .2     .201     .204     .214     .229     .241     .249
  34          PC    .251     .256     .27     .278     .281     .283     .295     .322     .352     .409
  35          PC    .499     .59      .71     .744     .781     .812     .819     .835     .851     .856
  36          PC     .86     .868     .876     .888     .91     .926     .937     .95     .97     .976
  37          PC    .982     .985     .987     .989     .99     .993     .993     .994     .995     .998
  38          PC    .998     .999     1.0
  39          BA  .00042
  40          LS       0     98.0
  41          UD    .050
              *

  42          KK     ND2
  43          KM   ONSITE BASIN DISCHARGING EAST TO ADJACENT VACANT LOT
  44          BA  .00092
  45          LS       0     98.0
  46          UD   0.050
              *
```



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

  47          KK     CPD1
  48          KM   COMBINE FD2 AND ND2
  49          HC       2
              *

  50          KK     FD1
  51          KM   OFFSITE BASIN WEST OF THE NORTH PORTION OF THE PROJECT SITE
  52          BA  .00067
  53          LS       0     98.0
  54          UD   0.050
              *
```

```
            55          KK     ND1
            56          KM   ONSITE BASIN DISCHARGING NORTHEAST TO AZURE DRIVE
            57          BA  .00048
            58          LS      0    98.0
            59          UD   0.050
                        *

            60          KK     ND3
            61          KM   ONSITE BASIN AT SEC OF SITE DISCHARGING EAST
            62          BA  .00005
            63          LS      0    96.0
            64          UD   0.050
                        *
            65          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

    28          FD2
                 .
                 .
    42           .          ND2
                 .            .
                 .            .
    47         CPD1...........
                 .
                 .
    50           .          FD1
                 .            .
                 .            .
    55           .            .         ND1
                 .            .           .
                 .            .           .
    60           .            .           .         ND3

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN  1998                *
*          VERSION 4.1                 *
*                                      *
*  RUN DATE   24OCT16  TIME  06:54:23  *
*                                      *
****************************************

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

                        AZURE TAVERN
                        ************ TECHNICAL DRAINAGE STUDY ******************
                        DEVELOPED CONDITION - ONSITE AND OFFSITE
                        USING SCS METHODS AND KINEMATIC WAVE ROUTING
                        MASTER PLAN ADJUSTED 6-HOUR RAINFALL AND STORM DISTRIBUTION

                        LOCHSA JOB # 161079


                        INPUT FILE NAME:  D.DAT

                        OCTOBER 2016

                        ********************************************************************************
                        ********************************************************************************
                             McCARRAN AIRPORT RAINFALL AREA
                             10 & 100 YEAR - 6 HOUR STORM EVENT
                             PRECIPITATION:
                                 10-YEAR          : 1.58 INCHES
                                 100-YEAR         : 2.77 INCHES
                                 10-YEAR/100-YEAR : 1.58/2.77= 0.5700
                        ********************************************************************************
                        ********************************************************************************

  25 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         200  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      1    0  ENDING DATE
                     NDTIME        1635  ENDING TIME
                      ICENT          19  CENTURY MARK

                    COMPUTATION INTERVAL      .08 HOURS
                        TOTAL TIME BASE   16.58 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
```

D

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
.57 1.00

1

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .57	RATIO 2 1.00
HYDROGRAPH AT						
+	FD2	.00	1	FLOW	1.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	ND2	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
2 COMBINED AT						
+	CPD1	.00	1	FLOW	2.	3.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	FD1	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	ND1	.00	1	FLOW	1.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	ND3	.00	1	FLOW	0.	0.
				TIME	3.50	3.50

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

APPENDIX B

HYDRAULIC ANALYSIS

Azure Dr. (10yr) - Section 1
Worksheet for Irregular Channel

(EXISTING / INTERIM / DEVELOPED)

Project Description	
Worksheet	Azure Dr. (10yr) - Sectic
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	008000	ft/ft
Discharg	65.00	cfs

← REF. FLOW

Options	
Current Roughness Metho	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.015	
Water Surface Elev	52.95	ft
Elevation Range	.30 to 53.66	
Flow Area	18.6	ft²
Wetted Perimeter	73.39	ft
Top Width	72.16	ft
Actual Depth	0.65	ft
Critical Elevation	52.99	ft
Critical Slope	0.005284	ft/ft
Velocity	3.49	ft/s
Velocity Head	0.19	ft
Specific Energy	53.14	ft
Froude Number	1.21	
Flow Type	Supercritical	

← d_{10}

← V_{10}

$d \times V = .65 \times 3.49 = 2.27 < 6$ OK ✓

Calculation Messages:
Water elevation exceeds lowest end station by 0.4959382e-1 ft.
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+07.00	0.013
0+07.00	0+28.00	0.016
0+28.00	0+32.00	0.013
0+32.00	0+83.00	0.016
0+83.00	0+90.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	53.06
0+05.00	52.96
0+05.50	52.96
0+05.50	52.46
0+07.00	52.59

Azure Dr. (10yr) - Section 1
Worksheet for Irregular Channel

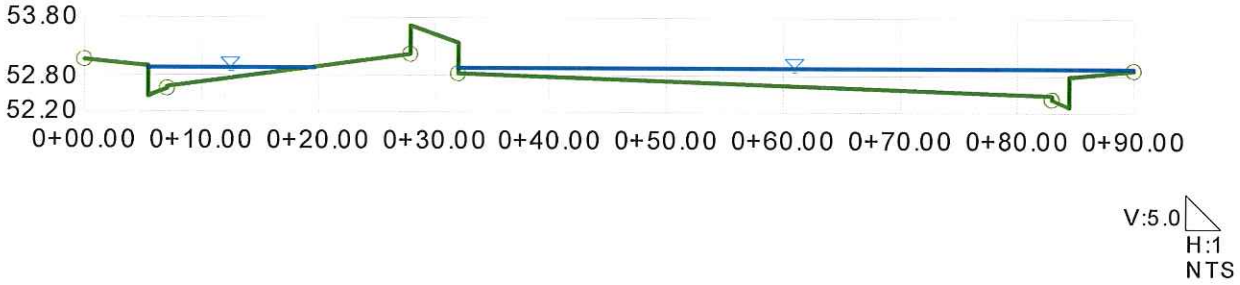
Natural Channel Points	
Station (ft)	Elevation (ft)
0+07.00	52.63
0+28.00	53.16
0+28.00	53.66
0+32.00	53.36
0+32.00	52.86
0+83.00	52.47
0+83.00	52.43
0+84.50	52.30
0+84.50	52.80
0+85.00	52.80
0+90.00	52.90

Azure Dr. (10yr) - Section 1
Cross Section for Irregular Channel

Project Description	
Worksheet	Azure Dr. (10yr) - Sectic
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficier	0.015	
Slope	0.008000	ft/ft
Water Surface Elev	52.95	ft
Elevation Range	!.30 to 53.66	
Discharge	65.00	cfs

No Dry Lane



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Lochsa Engineering
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666
Project Engineer: Hani Noshi

Azure Dr. (100yr) - Section 1
Worksheet for Irregular Channel

(EXISTING / INTERIM / DEVELOPED)

Project Description	
Worksheet	Azure Dr. (100yr) - Secti
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	.008000	ft/ft
Discharg	181.00	cfs

← REF. FLOW

Options	
Current Roughness Meth	ved Lotter's Method
Open Channel Weighting	ved Lotter's Method
Closed Channel Weightin	Horton's Method

Results		
Mannings Coefficie	0.015	
Water Surface Elev	53.18	ft
Elevation Range	.30 to 53.66	
Flow Area	37.2	ft²
Wetted Perimeter	87.84	ft
Top Width	86.00	ft
Actual Depth	0.88	ft ← d_{100}
Critical Elevation	53.26	ft
Critical Slope	0.004472	ft/ft
Velocity	4.86	ft/s ← V_{100}
Velocity Head	0.37	ft
Specific Energy	53.55	ft
Froude Number	1.30	
Flow Type	Supercritical	

$d \times V = .88 \times 4.86 = 4.28 < 8$ OKV

Calculation Messages:
Water elevation exceeds lowest end station by 0.27982068 ft.
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+07.00	0.013
0+07.00	0+28.00	0.016
0+28.00	0+32.00	0.013
0+32.00	0+83.00	0.016
0+83.00	0+90.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	53.06
0+05.00	52.96
0+05.50	52.96
0+05.50	52.46
0+07.00	52.59

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Lochsa Engineering
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

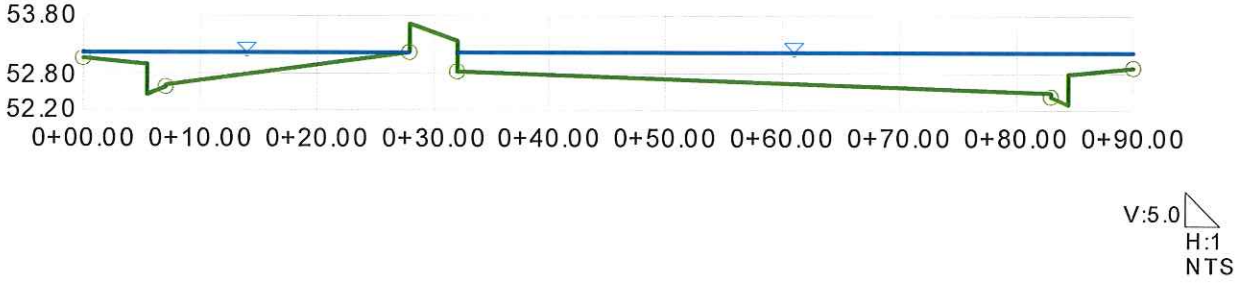
Azure Dr. (100yr) - Section 1
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
0+07.00	52.63
0+28.00	53.16
0+28.00	53.66
0+32.00	53.36
0+32.00	52.86
0+83.00	52.47
0+83.00	52.43
0+84.50	52.30
0+84.50	52.80
0+85.00	52.80
0+90.00	52.90

Azure Dr. (100yr) - Section 1
Cross Section for Irregular Channel

Project Description	
Worksheet	Azure Dr. (100yr) - Secti
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.015	
Slope	0.008000	ft/ft
Water Surface Elev	53.18	ft
Elevation Range	!.30 to 53.66	
Discharge	181.00	cfs



© Haestad Methods, Inc.

Onsite (100yr) - Section 3
Worksheet for Irregular Channel

(INTERIM & DEVELOPED)

Project Description	
Worksheet	Onsite (100yr) - Section 3
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	.004000	ft/ft
Discharge	1.00	cfs

← Q_{100} from ND1

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

Results		
Mannings Coefficient	0.015	
Water Surface Elev	54.72	ft
Elevation Range	1.57 to 55.50	
Flow Area	1.0	ft²
Wetted Perimeter	13.75	ft
Top Width	13.75	ft
Actual Depth	0.15	ft
Critical Elevation	54.70	ft
Critical Slope	0.008599	ft/ft
Velocity	1.04	ft/s
Velocity Head	0.02	ft
Specific Energy	54.73	ft
Froude Number	0.70	
Flow Type	Subcritical	

FF = [redacted]0 2355.58, which means onsite we are 0.78 ft. above the 100yr W.S. Elev.

← 54.72 ft

← d_{100}

← V_{100}

$d \times v = .15 \times 1.04 = 0.16 < 6$ OK ✓

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+09.00	0.016
0+09.00	0+12.00	0.013
0+12.00	0+29.00	0.016
0+29.00	0+34.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	55.00
0+09.00	54.61
0+10.50	54.57
0+12.00	54.61
0+29.00	54.83
0+34.00	54.88
0+34.00	55.50

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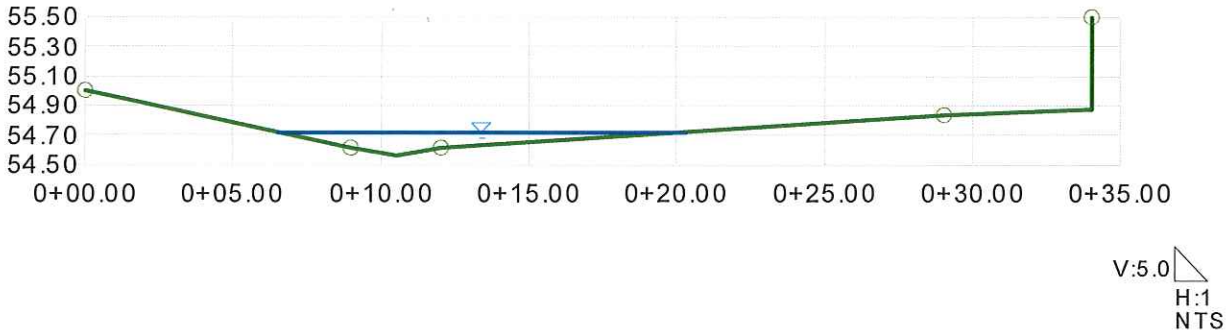
Lochsa Engineering
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

Onsite (100yr) - Section 3
Cross Section for Irregular Channel

Project Description	
Worksheet	Onsite (100yr) - Sectic
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.015	
Slope	0.004000	ft/ft
Water Surface Elev	54.72	ft
Elevation Range	.57 to 55.50	
Discharge	1.00	cfs



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Lochsa Engineering
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666
Project Engineer: Hani Noshi

Onsite Swale (100yr) - Section 2
Worksheet for Irregular Channel

(INTERIM / DEVELOPED)

Project Description	
Worksheet	Onsite Swale (100yr) - Sect. 2
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	.010000	ft/ft
Discharge	3.00	cfs

← Q100 from CPD1

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

d_{50} = 3" riprap

FF = 2555.50

Results		
Mannings Coefficient	0.031	
Water Surface Elev	2,553.85	ft
Elevation Range	53.29 to 2,555.00	
Flow Area	1.5	ft²
Wetted Perimeter	5.46	ft
Top Width	5.35	ft
Actual Depth	0.56	ft
Critical Elevation	2,553.77	ft
Critical Slope	0.023258	ft/ft
Velocity	2.01	ft/s
Velocity Head	0.06	ft
Specific Energy	2,553.91	ft
Froude Number	0.67	
Flow Type	Subcritical	

← d_{100}

← NON-EROSIVE

Bldg. is protected a minimum 6" above Water Surface Elev.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00.00	0+11.50	0.031

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00.00	2,555.00
0+08.00	2,553.29
0+11.50	2,554.00

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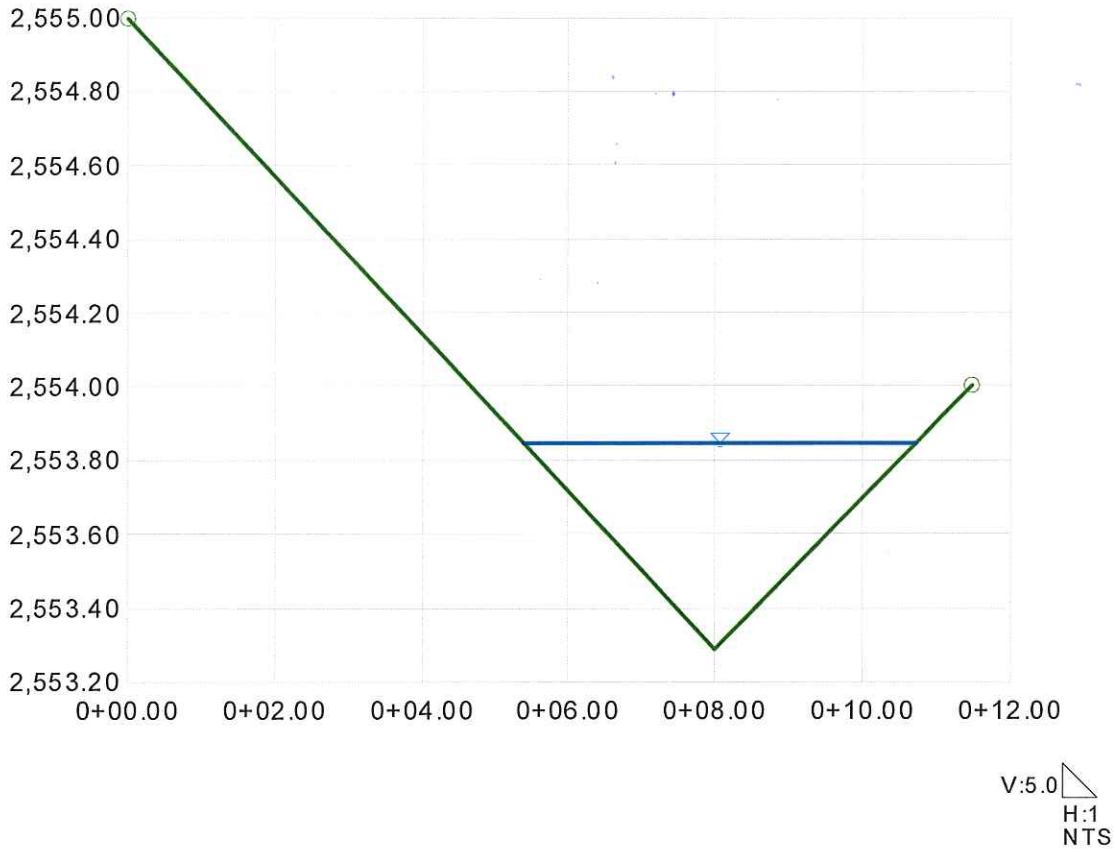
Lochsa Engineering
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666
Project Engineer: Hani Noshi

Onsite Swale (100yr) - Section 2
Cross Section for Irregular Channel

Project Description	
Worksheet	Onsite Swale (100yr) - Sec
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficie	0.031	
Slope	0.010000	ft/ft
Water Surface Elev	2,553.85	ft
Elevation Range	53.29 to 2,555.00	
Discharge	3.00	cfs



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37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666
Project Engineer: Hani Noshi

Relevant Information from Section 1500 of the CCRFCD Drainage Design Manual for the Best Management Practices

Section 1500
Structural Best Management Practices

1501 INTRODUCTION

This document presents design criteria for structural Best Management Practices (BMPs) for control of surface water quality in Las Vegas Valley. These BMPs have been identified as having potential effectiveness in Las Vegas Valley based on the types of water quality conditions expected in this area, and on documented BMP performance in other areas. Criteria for the following BMPs are presented:

Parking Lot Low Impact Development (LID)
General Low Impact Development (LID)
- Disconnected Impervious Areas
- Landscape Swale
- Depressed Medians
- Depressed Landscaping
- Buffer Strip
- Pervious Overflow Parking
- Sand / Media Filters
- Oil / Water Separators
- Oil / Grit Separators
- On-Site Water Quality Basin
- Infiltration Trench

There are currently no federal, state or local regulations which require the installation of specific facilities in most new or existing developments in Las Vegas Valley. The exception is new parking lots larger than 1.0 acre, for which low impact development (LID) measures are required by the local entities. *Thus this water quality BMP design information should be viewed as guidance, not as a requirement, for developers desiring to mitigate the impacts of urban development on surface water resources in Las Vegas Valley.*

There are three general categories of conditions for which urban stormwater quality management practices may be applied: (1) existing urban development; (2) new urban development; and (3) construction activity. The BMPs in this section are primarily applicable to areas of new urban development, where land is available to devote to installations of this type and where design flexibility exists. In certain cases, these structural BMPs may be effective in retrofitting existing developed areas to control water quality problems. However, it is generally more cost-effective to rely on nonstructural BMPs (e.g., source controls, housekeeping practices, public education, and employee training) in these applications. BMPs related to construction activity are primarily directed toward erosion control. This issue is covered separately in the Las Vegas Valley Construction Site Best Management Practices Guidance Manual.

1502 Parking Lot LID Measures

1502.1 Description

Low impact development (LID) measures can be used for managing runoff from areas of new development and significant redevelopment (NDSR). LID measures must be applied to all new commercial and industrial site parking lots of 1 acre and larger in the Las Vegas Valley. BMPs are not required for multi-family residential sites (i.e. apartments, condominiums). For the purpose of LID measures, a parking lot is defined as all impervious area outside the building footprint. Parking lot LID policies and design criteria are discussed in more detail in *Proposed Parking Lot Low Impact Development Program for Las Vegas Valley*, Las Vegas Valley Stormwater Quality Management Committee, February 2013.

1502.2 Design Criteria

Parking lot designs must be submitted to local entities with the technical drainage study required by Municipal code. A list of accepted parking lot BMPs that can be used in the Las Vegas Valley is provided in **Table 1501**.

BMP requirements shall adhere to this manual. A stepped approach to determine whether a parking lot is categorized as small, medium or large for the purpose of determining required BMPs is shown below. Any project site that is less than 1 acre in size is categorized as small; parking lot size is not a factor in determining required BMPs for small sites. For project sites that are greater than or equal to 1 acre, the parking lot size is used to determine if the category is medium or large. Sites having parking lots that are less than or equal to 1 acre are categorized as medium. Sites with parking lots greater than 1 acre are categorized as large.

SITE IS 0.90 ACRES

Total Site Size	Parking Lot Size	Parking Lot Category
< 1 acre	Not Applicable	Small
≥ 1 acre	≤ 1 acre	Medium
≥ 1 acre	> 1 acre	Large

NO SWALE REQ'D

Once the parking lot category is determined, the BMP requirements for the parking lot design can be determined as shown in **Table 1502**. BMP requirements are more stringent as the parking lot size increases.

The Developer may choose how to meet the parking lot BMP design requirements, depending on specific site characteristics. In order to maximize the water quality benefit of the parking lot BMPs, the Developer is encourage to locate BMPs to capture runoff from portions of the site with the highest potential to generate pollutants.

There are no specific BMP requirements for small parking lots; however, the developer has the option to install any of the BMPs that are listed for parking lots in the medium or large categories.

For the Medium parking lot category, the design requirements consist of disconnecting impervious areas for at least 75 percent of the combined parking lot and contributing building area. This may be accomplished by directing runoff to pervious areas such as landscaping, depressed medians, parking strips, or stormwater retention basins. The design criteria are based on meeting the accepted minimum standards for the BMPs selected. The developer may choose to install a treatment BMP listed in the Large parking lot category.

For the Large parking lot category, treatment BMPs are required to treat stormwater runoff from at least 75 percent of the parking lot. Because of typical site drainage layouts, treatment BMPs will need to be sized to accommodate runoff from the contributing building area as well. BMPs are to be sized for the 85th percentile storm, and hydrologic and hydraulic calculations are required to be submitted for the BMP design.

The requirement to treat 75 percent of the parking lot area, either through disconnecting impervious areas or installing treatment devices, recognizes that grading and other site conditions will prevent directing all site runoff to some type of BMP. However, Developers are encouraged to exceed the minimum standard when this can be done cost effectively in order to maximize the potential water quality benefits of the BMP system.

LID measures that are incorporated in the parking lot design should be planned during the site design process. Certain LID measures, including depressed medians, islands, and rock-lined swales, help to disconnect impervious areas and remove suspended particles in the stormwater runoff, prior to connection to the MS4. Parking Lot BMPs can be integrated into perimeter landscaped areas (e.g., buffers) and interior landscaped areas (e.g., medians) required by local development standards whenever possible. When incorporated into landscaping features, tributary areas to individual BMPs should be kept to less than 0.5 acres whenever possible, and should never exceed 1.0 acre.

Figure 1501 through **Figure 1503**, provide ideas on how parking lots can be designed to comply with the water quality regulations. The Developer is required to comply with the planning code for the municipality in which the site is located. The conceptual layouts incorporate general planning requirements, however, specific planning requirements such as for landscape buffers are determined based in part on the adjacent property. The conceptual layouts are designed to represent a commercial property that is approximately 5 acres in size, with the total parking lot area of approximately 3.3 acres.

Manning's Calculation

AZURE TAVERN Date: October, 2016

Lochsa Job No. 161079

Calculated By: Chris Blake

From Section 705.4.4 of Hydrologic Criteria and Drainage Design Manual (HCDDM)
Equation 732:

n = 0.0395(D50)^1/6

n = Manning's coefficient
D50 = Mean stone size in ft, rock size for which 50% (by weight) of the riprap is smaller

Solve for n: D50= 3.0 inches

n = 0.0395(D50)^1/6

D50= 0.250 ft

n = **0.031** <<<< Manning's n-value for 3-inch Loose Riprap

APPENDIX C

FIGURES

PROJECT SITE

NOTES

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

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

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

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

0 100 200 400 600 800

MAP LEGEND

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

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

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

ASSESSOR'S PARCELS - CLARK CO., NV.
Michele W. Shafe - Assessor

BOOK T19S R60E | SEC. 27 | MAP S 2 NW 4 | 125-27-2

126	125	124
137	138	139

Scale: 1" = 200' | Rev: 6/25/2015

CLARK COUNTY ASSESSOR NEVADA

TAX DIST 125,200

APN:125-27-222-015

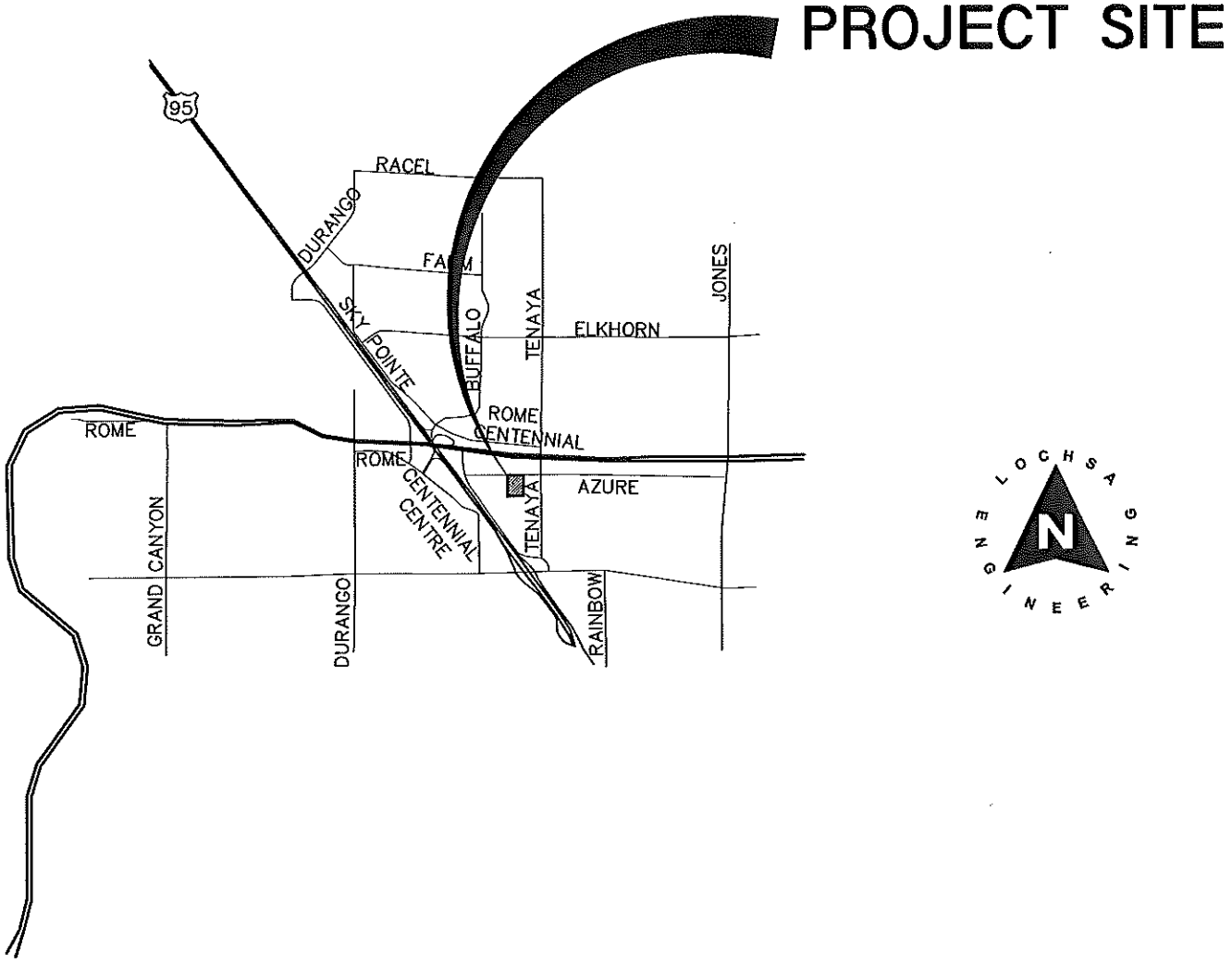


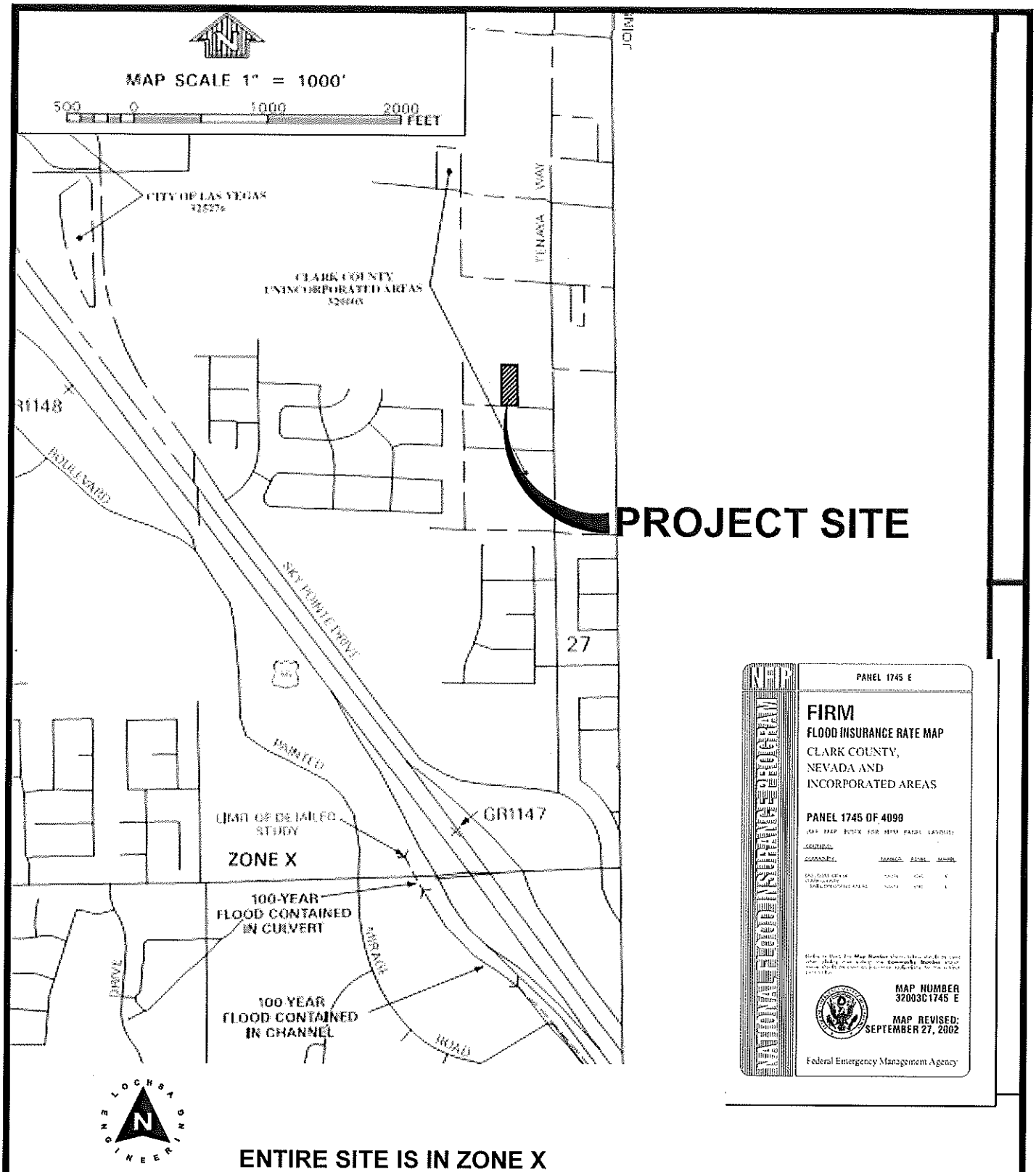
FIGURE 1
VICINITY MAP

AZURE TAVERN

PROJECT No.: 161079

SHEET No. FIG1

SHEET 1 OF 1

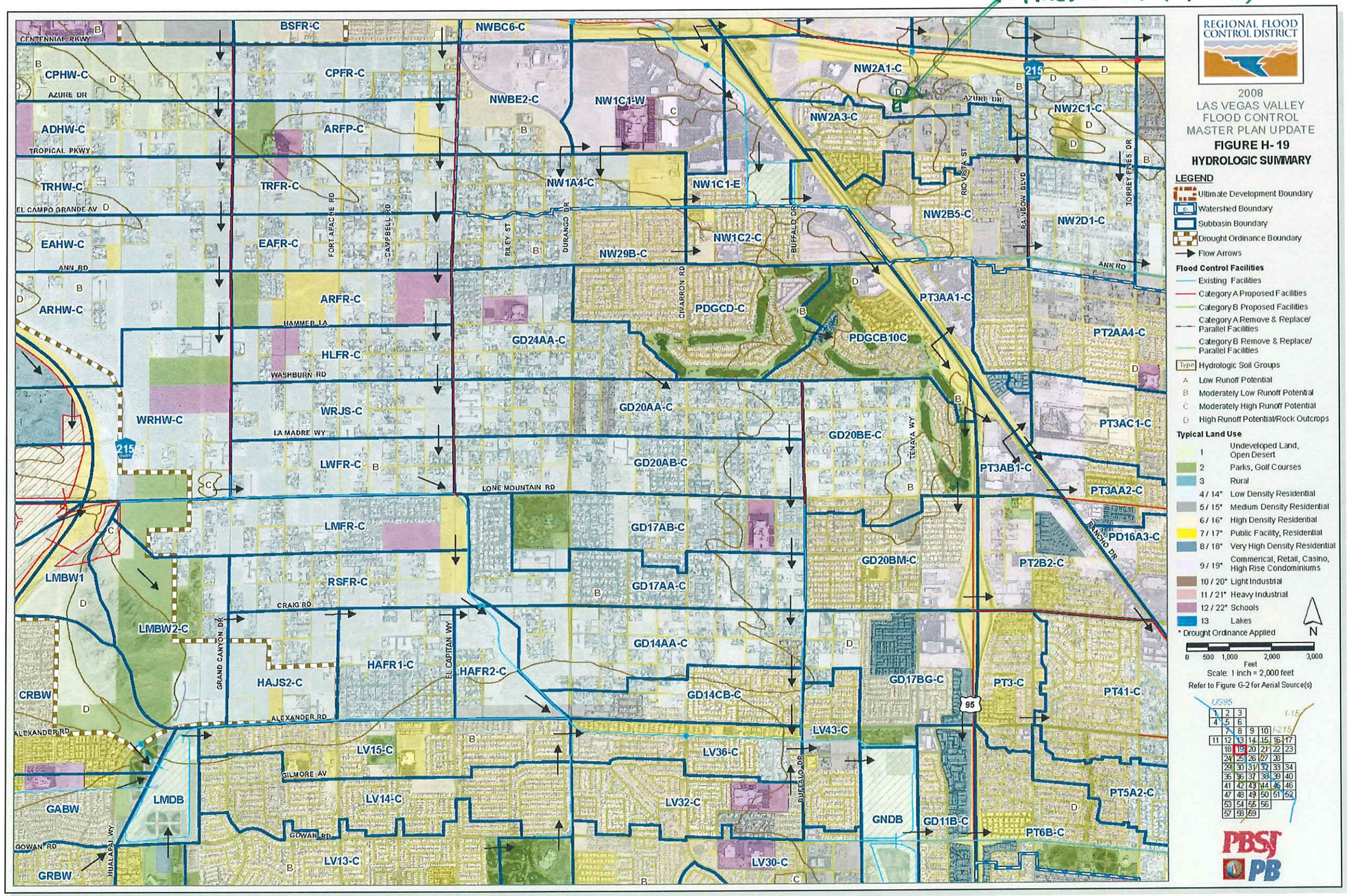


ENTIRE SITE IS IN ZONE X

DRAWN BY: CB	SCALE: 1" = 1000'	**FLOOD INSURANCE RATE MAP (FIGURE 2)**	PROJECT No.: 161079
CHECKED BY: CB	DATE: 06-05-16		SHEET No. **2**
		AZURE TAVERN	SHEET 1 OF 1

Lochsa engineering
6345 South Jones Blvd. Suite 100
Las Vegas, NV 89118
Phone (702) 365-9312 - Fax (702) 365-9317

PROJECT SITE ('D' SOIL)



PROJECT SITE (No Facilities)

REGIONAL FLOOD CONTROL DISTRICT

2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 19
FLOOD CONTROL FACILITIES

LEGEND

- Ultimate Development Boundary
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Local Existing Facilities
- Local Proposed Facilities
- Detention Basin

- Stormdrain
- Lined Channel
- Unlined Channel
- Levee/Dike
- Natural Wash/Floodway
- ID-Mile Separator

Remove & Replace/Parallel Facilities

Category A	Category B
Channel	Channel
Stormdrain	Stormdrain

N

0 500 1,000 2,000 3,000
Feet
Scale: 1 inch = 2,000 feet
Refer to Figure G-2 for Aerial Source(s)

US95 I-15 I-215

1	2	3					A1	A2				
4	5	6					A3	A4				
	7	8	9	10	A5	A6						
11	12	13	14	15	16	17						
	18	19	20	21	22	23						
	24	25	26	27	28							
	29	30	31	32	33	34						
	35	36	37	38	39	40						
	41	42	43	44	45	46						
	47	48	49	50	51	52						
	53	54	55	56								
	57	58	59									

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
ANRB		ANN ROAD CHANNEL WEST - RAINBOW						
0000	E	10' X 7' RCB	1320	721	CNW2B5-C	WEST3	0.99	0.40
ANWE		ANN ROAD CHANNEL WEST						
0245	E	10' X 9' RCB	1721	993	CNW2D1-C	WEST3	6.84	0.80
0279	E	10' X 9' RCB	553	743	2CNW2B5C	WEST3	6.37	0.80
0290	E	8' X 8' RCB	2050	743	2CNW2B5C	WEST3	6.37	0.70
0327	E	6' X 6' RCB	2360	161	RCHODB	WEST3	5.38	0.87
0371	E	6' X 6' RCB	760	161	RCHODB	WEST3	5.38	0.34
0385	E	54" RCP	1950	161	RCHODB	WEST3	5.38	1.17
CNWE		CENTENNIAL PKWY CHANNEL WEST						
0150	E	Conc Chnl 40'W 9.5'D 0:1 SS	2279	4233	CNW3B3-C	WEST3	5.64	0.42
0173	E	3: 18' X 8' RCBC @ Torrey Pines	200	4233	CNW3B3-C	WEST3	5.64	0.42
0176	E	Conc Chnl 40'W 9'D 0:1 SS	150	4233	CNW3B3-C	WEST3	5.64	0.41
0189	E	Conc Chnl 36'W 10'D 0:1 SS	1200	4067	CNW2D4-C	WEST3	5.15	0.42
0200	E	Conc Chnl 36'W 9'D 0:1 SS	2470	4067	CNW2D4-C	WEST3	5.15	1.00
0226	E	2: 18' X 8.5' RCBC @ Rio Vista	100	4067	CNW2D4-C	WEST3	5.15	0.51
0241	E	Conc Chnl 36'W 9.5'D 0:1 SS	405	3951	CNW2D3-C	WEST3	4.65	0.51
0251	E	Conc Chnl 36'W 9'D 0:1 SS	575	3951	CNW2D3-C	WEST3	4.65	0.51
0271	E	Conc Chnl 32'W 10'D 0:1 SS	229	3951	CNW2D3-C	WEST3	4.65	0.51
0274	E	32' X 10' RCBC @ Tenaya	142	3951	CNW2D3-C	WEST3	4.65	0.51
0277	E	Conc Chnl 32'W 9'D 0:1 SS	579	3951	CNW2D3-C	WEST3	4.65	0.64
0287	E	Conc Chnl 13'W 10'D 2:1 SS	605	3593	CNW2B2-C	WEST3	3.84	1.19
0301	P2	Conc Chnl 32'W 10'D 0:1 SS	235	3593	CNW2B2-C	WEST3	3.84	1.19
0304	P2	32' X 10' RCB	3259	3593	CNW2B2-C	WEST3	3.84	1.79
GO95		GOWAN OUTFALL - U.S. 95 CHANNEL						
0000	P1	Conc Chnl 12'W 4'D 2:1 SS	2640	299	GD17BG-C	ALLGOW3	0.36	0.30
0050	P1	Conc Chnl 12'W 4'D 2:1 SS	2450	299	GD17BG-C	ALLGOW3	0.36	0.30
GOA2		GOWAN OUTFALL - ALEXANDER BRANCH						
0000	P1	8' X 5' RCB	2281	523	CPT41-C	ALLGOW3	0.61	0.90
GOAL		GOWAN OUTFALL - ALEXANDER ROAD FACILITIES						
0111	P1	10' X 8' RCB	3000	880	CPT2B2	ALLGOW3	2.28	0.83
0168	P1	10' X 8' RCB	4200	880	CPT2B2	ALLGOW3	2.28	0.50
0247	P1	Conc Chnl 12'W 5.5'D 2:1 SS	2640	757	CGD20BMC	ALLGOW3	1.98	0.30
GOBU		GOWAN NORTH - BUFFALO BRANCH						
0000	E	2: 12' X 6' RCB	1705	961	CGD14CBC	ALLGOW3	2.53	0.20
0032	E	2: 12' X 5' RCB	1248	850	CGD14AAC	ALLGOW3	2.30	0.25
0058	E	2: 11' X 4' RCB	1398	745	CGD17AAC	ALLGOW3	1.90	0.25
0085	E	11' X 5' RCB	1266	614	CGD17ABC	ALLGOW3	1.52	0.25
0112	P1	8' X 6' RCB	1535	484	CGD20ABC	ALLGOW3	1.15	0.54
0136	P1	7' X 6' RCB	1400	344	CGD20AAC	ALLGOW3	0.76	0.36
GOBW		GOWAN BELTWAY WEST						
0000	E	48" RCP	2527	116	LMBWDB	ALLGOW4	10.68	4.37
0048	E	72" RCP	131	116	LMBWDB	ALLGOW4	10.68	2.21
0051	P1	72" RCP Outlet	1508	116	LMBWDB	ALLGOW4	10.68	0.30
0052	P1	589 ac-ft Lone Mountain-Beltway Detention Basin		5140	CLMBW1	GW3SC	3.50	
0082	P1	51,400 cfs PMF Spillway		51400	CLMBW1	GW3SC	3.50	
0096	P1	8' X 8' RCB Connector Pipe Under Beltway	839	5140	CLMBW1	GW3SC	3.50	0.30
0097	P1	54" RCP	394	525	UVB1-2	ALLGOW3	0.34	8.09
0100	P1	Energy Dissipator	143	525	UVB1-2	ALLGOW3	0.34	50.00
0106	P1	8' X 8' RCB Connector Pipe Under Lone Mountain	697	5140	CLMBW1	GW3SC	3.50	0.30
0128	P1	Conc Chnl 20'W 10'D 0:1 SS	190	3429	CWRBW1	ALLGOW3	6.06	25.00
0132	P1	Conc Chnl 14'W 10'D 0:1 SS	1286	2869	CHLBW1-C	GW3SC	1.84	5.00
0156	P1	Conc Chnl 16'W 10'D 0:1 SS	221	2869	CHLBW1-C	GW3SC	1.84	1.05
0160	P1	16' X 8' RCB	1230	2869	CHLBW1-C	GW3SC	1.84	1.05
GOBX		GOWAN BOX CANYON						
0000	P1	66" RCP	794	753	LWBW1	ALLGOW3	0.48	9.45
GODU		GOWAN NORTH - DURANGO BRANCH						
0000	E	12' X 6' RCB	2629	1150	CLV14-C	ALLGOW3	1.40	0.91
0050	E	9' X 6' RCB	865	835	CLV20-C	ALLGOW3	0.97	1.50

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
GOEC		GOWAN NORTH - EL CAPITAN BRANCH						
0000	P1	10' X 7' RCB	1445	1233	CLWFR-C	ALLGOW3	2.20	1.36
0026	P1	10' X 8' RCB	1320	1162	CWRJS-C	ALLGOW3	1.95	0.91
0051	P1	10' X 7' RCB	1320	1027	CHLFR-C	ALLGOW3	1.69	1.06
0076	P1	10' X 6' RCB	1320	894	CARFR-C	ALLGOW3	1.45	1.06
0100	P1	10' X 6' RCB	1320	745	CEAFR-C	ALLGOW3	1.21	0.76
0126	P1	10' X 7' RCB	1320	635	CTRFR-C	ALLGOW3	0.96	0.38
0152	P1	7' X 6' RCB	1320	485	CARFP-C	ALLGOW3	0.70	0.77
0176	P1	78" RCP	1320	363	CCPFR-C	ALLGOW3	0.46	1.15
GOL2		GOWAN LONE MOUNTAIN SYSTEM-BRANCH 2						
0000	E	5' X 4' RCB	150	461	CRBW	ALLGOW3	0.44	14.60
0003	E	66" RCP	607	461	CRBW	ALLGOW3	0.44	1.97
0014	E	84" RCPC @ Alexander	125	461	CRBW	ALLGOW3	0.44	4.00
GOLM		GOWAN LONE MOUNTAIN SYSTEM						
0000	E	78" RCP	2590	345	CLV15-C	ALLGOW4	11.88	1.80
0049	E	6' X 5' RCB	585	345	CLV15-C	ALLGOW4	11.88	1.87
0060	E	66" RCP	817	345	CLV15-C	ALLGOW4	11.88	2.40
0075	E	60" RCP	1385	345	CLV15-C	ALLGOW4	11.88	2.55
0101	E	54" RCP	701	190	LMTNDB	ALLGOW4	11.52	1.74
0115	E	48" RCP	1799	190	LMTNDB	ALLGOW4	11.52	3.08
0140	E	42" RCP	439	190	LMTNDB	ALLGOW4	11.52	1.60
0142	E	48" RCP	348	190	LMTNDB	ALLGOW4	11.52	2.14
0144	E	66" RCP	196	190	LMTNDB	ALLGOW4	11.52	5.44
0145	E	66" RCP Outlet	378	190	LMTNDB	ALLGOW4	11.52	0.90
0146	E	888 ac-ft Lone Mountain Detention Basin		7252	LMTNIN	GW3SC	6.13	
0147	E	36,000 cfs PMF Spillway		36000	LMTNIN	GW3SC	6.13	
0150	E	Drop Structure	481	6323	CGABW	GW3SC	5.12	
0162	E	26' X 8' RCBC @ Hualapai	625	6323	CGABW	GW3SC	5.12	1.86
0174	E	Conc Chnl 28'W 8'D 0:1 SS	2715	6173	CCLMT5	GW3SC	4.92	3.20
GOLO		GOWAN OUTFALL - LONE MTN. ROAD BRANCH						
0275	E	8' X 6' RCB	3000	590	CPT3AA2	ALLGOW3	1.16	0.77
GONO		GOWAN NORTH SYSTEM						
0000	E	8' X 8' RCB Outlet	184	558	GWNNDB	ALLGOW5	68.49	0.51
0001	E	8' X 8' RCB Outlet	156	558	GWNNDB	ALLGOW5	68.49	0.63
0006	E	30,780 cfs PMF Spillway		30780	GWNNDB	ALLGOW5	68.49	
0008	E	921 ac-ft Gowan North Detention Basin		4937	CCLV43-C*	GW4SC	11.93	
0009	E	3: 13' X 8' RCB	1662	4563	CLV43-C	GW4SC	11.24	0.62
0012	E	Conc Chnl 30'W 8'-9.5'D 0:1 SS	2665	4117	CCLV36-C	GW4SC	8.54	1.18
0062	E	Bridge 30'W 8.5'D @ Cimarron	80	3844	CCLV15-C	GW4SC	8.03	0.30
0063	E	Conc Chnl 30'W 8.5'-10'D 0:1 SS	2302	3844	CCLV15-C	GW4SC	8.03	1.00
0110	E	2: 12' X 8' RCAC @ Alexander	547	3352	CCRSFR-C*	GW3SC	6.10	1.00
0117	E	2: 12' X 8' RCAP	424	3352	CCRSFR-C*	GW3SC	6.10	1.10
0124	E	Conc Chnl 24'W 9'D 0:1 SS	887	3352	CCRSFR-C*	GW3SC	6.10	1.36
0141	E	Conc Chnl 24'W 9'-10.5'D 0:1 SS	2064	3352	CCRSFR-C	GW3SC	6.10	0.59
0181	E	Bridge 30'W 7'D @ Craig	142	2846	CRSFR-C	GW3SC	5.20	0.65
0183	E	Conc Chnl 22'W 8'-10.6'D 0:1 SS	2193	2846	CRSFR-C	GW3SC	5.20	0.72
0225	E	Conc Chnl Width Varies Depth Varies 0:1 SS	508	2605	CCLWFR-C	GW3SC	4.54	1.05
0230	E	13' X 5' RCB	256	1486	CCWRHW-C	GW3SC	2.34	2.78
0234	E	12' X 6' RCB	2010	1486	CCWRHW-C	GW3SC	2.34	1.67
0272	E	10' X 6' RCB	2797	1486	CCWRHW-C	GW3SC	2.34	3.15
0325	E	15' X 7' RCB	291	1486	CCWRHW-C	GW3SC	2.34	1.79
0335	E	15' X 7' RCB	529	1486	CWRHW-C	ALLGOW3	2.34	1.79
0350	P1	10' X 9' RCB	3473	1486	CWRHW-C	ALLGOW3	2.34	0.88
0411	P1	10' X 9' RCB	1320	1404	CARHW-C	ALLGOW3	1.89	0.76
0436	P1	10' X 7' RCB	1320	1173	CEAHW-C	ALLGOW3	1.53	1.14
0461	P1	10' X 9' RCB	1320	959	CTRHW-C	ALLGOW3	1.22	0.38
0486	P1	8' X 7' RCB	1320	747	CADHW-C	ALLGOW3	0.90	0.76
0511	P1	7' X 6' RCB	1320	546	CCPHW-C	ALLGOW3	0.60	1.14

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
GOOF		GOWAN OUTFALL FACILITIES						
0511	E	8' X 5' RCB	8390	699	CPT6B-C	GW3SC	1.08	0.50
0531	E	8' X 5' RCB	1300	558	GWNNDB	ALLGOW5	68.49	0.50
0551	E	72" RCP	524	558	GWNNDB	ALLGOW5	68.49	0.62
0773	E	60" RCP	803	286	LV30-C	ALLGOW3	0.42	1.40
0775	E	60" RCP	1300	286	LV30-C	ALLGOW3	0.42	1.00
RCHB		RANCHO ROAD SYSTEM - BELTWAY						
0000	E	2: 12' X 8.5' RCAP	1700	2631	CNW1C-W	WEST3	4.68	0.63
0034	E	Conc Chnl 21'W 8'D 0:1 SS	1000	2631	CNW1C-W	WEST3	4.68	1.19
0053	E	2: 12' X 8' RCBC @ South Ramp Connector	85	2304	CDW1C1	WEST3	4.31	1.40
0054	E	Conc Chnl 21'W 8'D 0:1 SS	432	2304	CDW1C1	WEST3	4.31	1.51
0062	E	Transition Structure	130	2304	CDW1C1	WEST3	4.31	1.51
0065	E	24' X 7' RCB	480	2304	CDW1C1	WEST3	4.31	0.30
0074	E	24' X 6' RCB	50	2226	CNWBC6-C	WEST3	4.17	0.30
0075	E	20' X 6' RCBC @ Beltway	428	2226	CNWBC6-C	WEST3	4.17	2.81
0083	P1	20' X 6' RCB	950	2226	CNWBC6-C	WEST3	4.17	2.49
0101	P1	Conc Chnl 20'W 7'D 0:1 SS	980	2226	CNWBC6-C	WEST3	4.17	2.38
0120	E	20' X 6' RCBC @ Grand Montecito	120	2226	CNWBC6-C	WEST3	4.17	1.00
0122	P1	Conc Chnl 16'-20'W 6'D 0:1 SS	350	2226	CNWBC6-C	WEST3	4.17	1.84
0130	P1	Conc Chnl 16'W 6'D 0:1 SS	1012	2226	CNWBC6-C	WEST3	4.17	2.67
RCHO		RANCHO ROAD SYSTEM						
0000	E	60" RCP with 36" Orifice Plate	1183	161	RCHODB	WEST3	5.38	0.74
0025	E	321 ac-ft Rancho Road Detention Basin		3115	RCHOIN	WEST3	5.38	
0027	E	18,000 cfs PMF Spillway		18000	RCHOIN	WEST3	5.38	
0050	E	Energy Dissipator	65	402	CNW1A4-C	WEST3	0.51	
0052	E	Conc Chnl 10'W 10'D 0:1 SS	115	402	CNW1A4-C	WEST3	0.51	11.73
0054	E	10' X 5' RCB	115	402	CNW1A4-C	WEST3	0.51	0.50
0056	E	10' X 5' RCB	835	402	CNW1A4-C	WEST3	0.51	0.47
0071	E	72" RCP	3126	402	CNW1A4-C	WEST3	0.51	1.80

No Adjacent Facilities

** The HEC-1 node shown identifies the controlling concentration point for the associated facility and is located upstream of this facility due to decreasing peak flow with increasing tributary area caused by storm distribution transitions, depth area reduction factors, or attenuation of flow from routing.*

*** As-built or design slopes were used when available. All other slopes are based on existing topography. The user should verify the facility slope listed prior to performing any facility specific analysis.*

^ For parallel facilities, the existing facility flow equals its normal depth capacity, and the proposed parallel facility flow equals the remaining flow (i.e., HEC-1 Node flow = existing facility normal depth capacity + proposed parallel facility flow).

REGIONAL FLOOD CONTROL DISTRICT

2013 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE

FACILITY INVENTORY FIGURE F - 19

LEGEND

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

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

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

Bottom Width..... W

Depth..... D

Side Slope, H:V..... SS

Construction Features

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

APPENDIX D

REFERENCES

REFERENCE 5

"*Technical Drainage Study for Tenaya Commercial*" (DS #4104)

LTR

HTE: 07-4410

CITY OF LAS VEGAS
INTER-OFFICE MEMORANDUM

DATE: February 27, 2007

TO:
Land Development Services
Department of Public Works

FROM:
Albert Sung, P.E.
Flood Control Project Engineer
Department of Public Works

SUBJECT:	Drainage Study for: **Tenaya Commercial**		
Cross Streets:	SWC of Tenaya Way & Azure Drive		
File Number:	F:\Depot\DSMemos\DS4104B.doc		
Parcel Number:	125-27-222-013		
Zoning Action:	SDR-18372		
FEMA Flood Zone	YES	NO X	
Proposed Storm Drain	YES	NO X	

COPIES TO:
Wood Rodgers, Inc.
O'Connell Commercial, LLC
Bart Anderson, P.E., DevCo
CCDDS

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1st Submittal	12/1/2006	12/15/2006	Not Approved	$400.00	58670: $400
2nd Submittal	2/12/2007	2/26/2007	See Comments Below	$400.00	62859: $400
			TOTAL FEES (LDDRS):	$800.00	---

REMARKS:

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

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

1. The site is adjacent to the jurisdiction of Clark County to the south. The engineer must coordinate with *Clark County Department of Development Services* (CCDDS) and incorporate any concerns for boundary conditions along the south border. CCDDS concurrence is required prior to final acceptance of the study.

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

END OF REMARKS
ays

T/R/S: T19S/R60E/27
AREA G-27

Department of Development Services
Civil Engineering Division

500 S Grand Central Pky 1st Fl • Box 551799 • Las Vegas NV 89155-1799
(702) 455-4600 • Fax (702) 388-2550

Phil Rosenquist, Director

LTR 07-4410

March 28, 2007

Development Resource Consultant Inc.
7180 Industrial Road, Suite 800
Las Vegas, NV 89118

LTR 07-4410

CLARK COUNTY Concurrence for Tenaya Commercial
Study Dated: December 1, 2006
Addendum # 1 Dated: February 9, 2007
Location: Southwest corner of Tenaya Way and Azure Drive
SEC27, T19S, R60E
H.T.E. # 07-4410 Concurrence with CLV# DS 4104B

The above-referenced project is located in the City of Las Vegas adjacent to Clark County south of Azure Drive and west of Tenaya Way. The drainage study was submitted to the County for concurrence on March 13, 2007. The County has reviewed the Study and addenda. In addition, the County has received a copy of the acceptance letter from the City of Las Vegas, dated February 27, 2007. The County concurs with the acceptance of this drainage study by the City of Las Vegas. Please note that the County's review of this development is limited to drainage issues significant to Clark County unincorporated areas.

The County's review is solely based on the information submitted by the Engineer of Record. The County's review is strictly limited to compliance with minimum County Codes and Standards. The Engineer of Record is responsible for researching and addressing situations that may require designs above and beyond the minimum codes for issues of public safety and impacts to upstream, downstream and adjacent properties. The County assumes no liability for information data, designs or conclusions of the Engineer of Record.

DEPARTMENT OF DEVELOPMENT SERVICES

By Glenn S. Hale

Glenn S. Hale, P. E.
Senior Civil Engineer
Civil Engineering Division

GSH/rmm
cc: O'Connell Commercial LLC
Albert Sung P.E., City of Las Vegas Department of Public Works
Development File

BOARD OF COUNTY COMMISSIONERS
RORY REID, Chairman • CHIP MAXFIELD, Vice-Chairman
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VIRGINIA VALENTINE, P.E., County Manager

TDS 07-4410
03-13-07
COMC

TECHNICAL DRAINAGE STUDY
FOR
TENAYA COMMERCIAL

Prepared for:

O'Connell Commercial, LLC
1504 Eureka Road, Suite 230
Roseville, CA 95661
Phone: (916) 772-7500
Fax: (916) 772-7505

December 2006

Project 1943.001

Wood Rodgers, Inc.
9900 Covington Cross Dr., Ste. #102 * Las Vegas, NV 89144
Tel: 702.434.2953 * Fax: 702.434.2957
www.woodrodgers.com

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Tenaya Commercial Date: February 2007

Location of Development: a) Descriptive (Cross Streets): North/South: Azure/Tropical East/West: Tenaya/Sky Pointe

b) Sect. 27 Twn. 19 S Rng. 60 E

Name of Owner: O' Connell Commercial, LLC Assessors Parcel No: 125-27-222-013

Telephone: (916)-772-7500 Facsimile No: (916) 772-7505

Address: 1504 Eureka Road Suite #230 Roseville, CA 95661

Contact Person - Name Chris Zrinyi, P.E. (czrinyi@woodrodgers.com) Telephone No: (702) 233-4807

Firm: Wood Rodgers

Address: 9900 Covington Cross Drive Suite #102 Las Vegas, Nevada 89144

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	X	Building Permit		

1. Total Owned Land Area: At Site: 2.34 Acre ± Being Developed / Disturbed: 2.04 Acre ±
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? Yes* No
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? Yes* No
4. Proposed type of development: (Residential, Commercial, etc.)? Commercial
5. Approximate upstream land area which drains to the subject site? 0.15 sq. mile
6. Has the site drainage been evaluated in the past? YES NO If yes, please identify documentation:
   Technical Drainage Study for Tropical Parkway, Primas And Associates Consulting Engineers, July 28th, 1999
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site:
   North to Azure Drive and East to Parcel 125-27-222-011
8. Briefly describe your proposed schedule for the subject project: ASAP

2/9/07

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.

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

Local Entity File No.

Revision	Date

REFERENCE:

STANDARD FORM 1

I. INTRODUCTION

O'Connell Commercial, LLC is proposing to develop Tenaya Commercial as a commercial/retail parcel. The purpose of this report is to accompany the grading plans, to provide detailed hydrological and hydraulic analyses for the site, and to determine adequate protection for the project from offsite and onsite flows. The following tasks were performed in the preparation of this report:

- Identify previous drainage studies for the project site and surrounding areas.
- Identify the FEMA floodplain designation for the project site.
- Identify existing and proposed regional drainage facilities adjacent to the site.
- Estimate runoff generated for the peak offsite and onsite 10-year and 100-year return period storms for existing and ultimate conditions.
- Recommend drainage facilities to protect the project from storm runoff.

II. LOCATION AND DESCRIPTION

The Project is located in Section 27, Township 19 South, Range 60 East, M.D.M., in Las Vegas, Nevada. The site is approximately 350 feet west of Tenaya Avenue and is bordered by Azure Drive on the north, future commercial development on the west, and Ranch House Estates on the south. Please refer to Figures 1 and 2 for the vicinity and location of the project site.

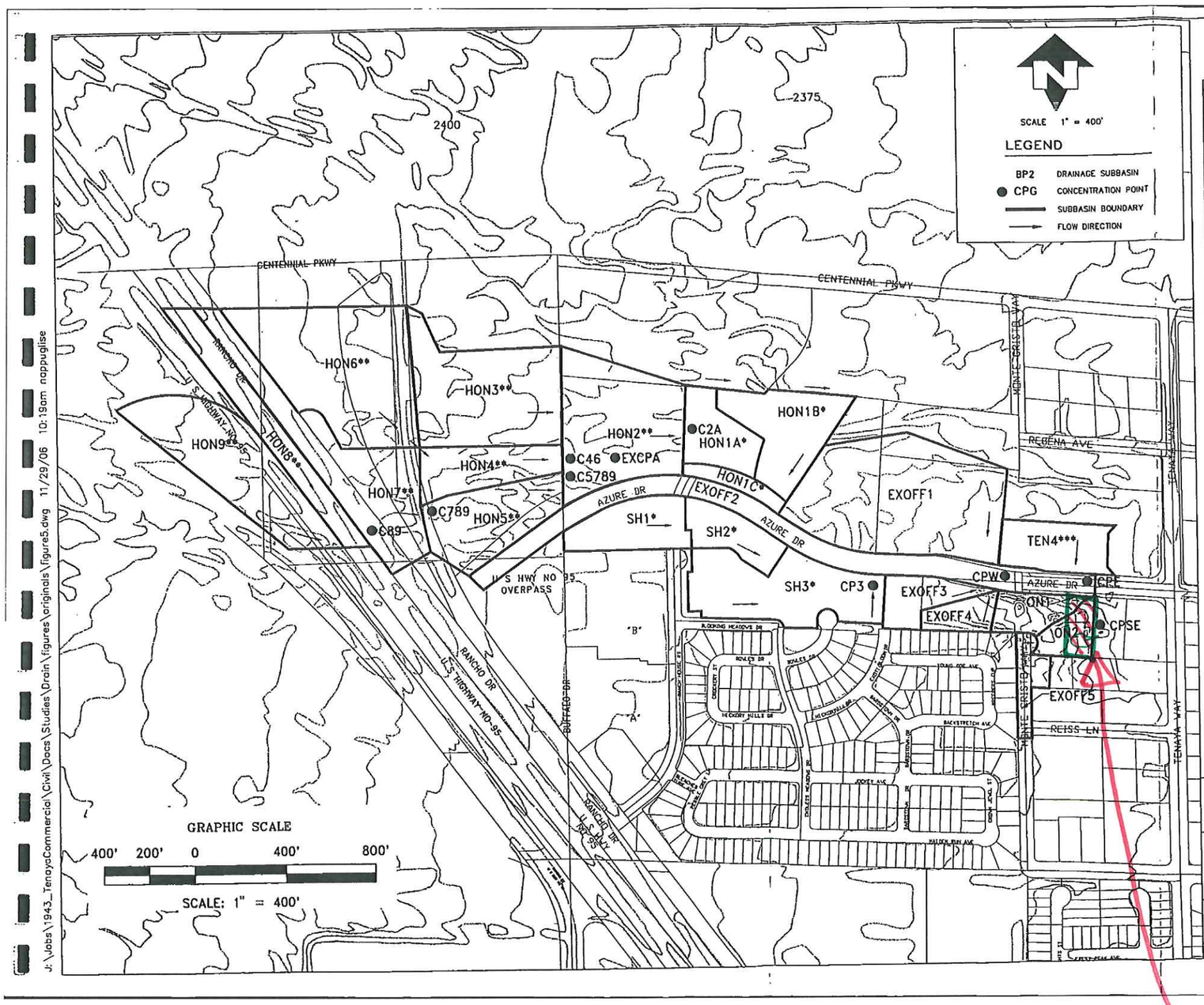
The majority of the 2.34± acre site is presently undeveloped with sparse vegetation. Currently, the southern 0.30± acres of the site consist of landscaping and a 10-foot wide meandering sidewalk path. Existing Azure Drive along the northern border of the site has been fully improved with the Montecito East infrastructure improvements. The proposed development with consist of two commercial buildings with approximately 109 parking spaces.

Lag Time - The lag time (TLAG) is described as the time between the center of mass of rainfall and the time of peak discharge from a basin. Lag time can be related to time of concentration (Tc) by the following relationship: TLAG = 0.6 (Tc). The time of concentration (Tc) is defined as the time required for runoff to flow from the most remote part of the basin area to the outlet of the basin or a design point under consideration. The procedure for calculating Tc is outlined in Section 602 of the Manual. Lag time calculations for the drainage subbasins have been included in Appendix A on Standard Form 4.

VI. EXISTING CONDITIONS

The project site lies within the area known as Montecito East. A technical drainage study was approved in January 2000 for this master planned commercial subdivision entitled Tropical Parkway (AKA Montecito East) by Primas & Associates (Reference 7, hereinafter referred to as the Montecito East study). Since that time, several developments have been constructed that changed the assumptions as presented in the Montecito East study. Therefore, the flow rates in Azure Drive adjacent to the site were reanalyzed in this study based on the hydrology presented in the Shea Commercial, Tenaya Village, and Honda studies. The existing condition HEC-1 model includes KM cards noting that the subbasin input was referenced and what study it was referenced from. Figure 5 depicts the subbasins and drainage patterns used in the existing conditions hydrological analysis.

The Findlay-Shack Honda site located northwest of the proposed Project will be constructed in two phases. Phase 1 (Subbasins HON1A, HON1B & HON1C) is currently under construction and will be considered as being developed under existing conditions. Phase 2 (Subbasin HON2) is not under construction and will be considered as desert shrub. Phase 2 drains into Phase 1, then flows south to Azure Drive and continues east toward Tenaya Way. The CN calculations sheet in Appendix A shows a correlation from the Honda Study subbasins to subbasins used in this study. The developed Phase 1 subbasin is referenced as an existing commercial site, while the Phase 2 subbasin will be undeveloped desert shrub (poor condition) for the existing conditions model. Offsite Subbasins HON3 through HON9 input parameters and boundaries were referenced from the existing conditions HEC-1 model from the Honda Study. These subbasins have been denoted with the HON designation as shown on Figure 5. Pertinent excerpts from the referenced materials have been included in Appendix C.



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SUMMARY OF FLOWS

BASIN OR LOCATION	Q100 (CFS)	Q10 (CFS)
HON1A**	9	5
HON1B**	12	7
HON1C**	1	1
HON2**	13	5
HON3**	15	6
HON4**	5	2
HON6**	21	8
C46**	26	10
HON7**	16	6
HON8**	8	3
HON9**	14	5
C89**	21	8
C789**	37	14
HON5**	8	3
C5789**	44	16
EXCPA**	85	31
C2A**	97	35
SH1*	7	3
SH2*	6	3
SH3*	13	6
CP3***	26	12
EXOFF1	14	4
EXOFF3	3	1
EXOFF2	18	10
CPW	169	70
EXOFF4	1	0
ON1	2	1
TEN4***	6	3
CPE	179	74
ON2	2	1
EXOFF5	3	1
CPSE	5	2

*OFFSITE SUBBASIN
REFERENCED FROM SHEA COMMERCIAL-TENAYA
**OFFSITE SUBBASIN
REFERENCED FROM FINDLAY-SHACK HONDA
***OFFSITE SUBBASIN
REFERENCED FROM TENAYA VILLAGE PHASE 1

O'CONNELL COMMERCIAL
TENAYA COMMERCIAL

FIGURE 5
EXISTING CONDITIONS

WOOD RODGERS
ENGINEERING • MAPPING • PLANNING • SURVEYING
9900 COVINGTON CROSS DRIVE SUITE 102 /LAS VEGAS, NEVADA 89144

REF.

OUR SITE

The Shea Commercial site (Subbasins SH1, SH2 & SH3) located west of the site is currently under construction and will be considered fully developed in the existing conditions model for this study. Subbasin input parameters and boundaries were referenced from the developed conditions HEC-1 model from the Shea Commercial Study. These subbasins have been denoted with the SH designation as shown on Figure 5. The CN calculations sheet in Appendix A shows a correlation from the Shea Commercial Study subbasins to subbasins used in this study. Pertinent excerpts from the referenced materials have been included in Appendix C.

The Tenaya Village site located north of Azure Avenue has been completed and will be considered fully developed. Subbasin TEN4 (DEON4) from the Tenaya Village future conditions HEC-1 model was the only subbasin used for this study since the other subbasins flow directly to Tenaya Way to the east, thus not affecting the Project. Subbasin input parameters and boundaries were referenced from the future conditions HEC-1 model from that study.

In addition to the subbasins referenced from the Shea Commercial, Tenaya Village, and Honda studies, five (5) additional offsite subbasins are tributary to Azure Drive and the Project. Subbasin EXOFF1 is undeveloped land located between the Honda and Tenaya Village sites. The northern boundary of this site was established based on 5 foot contours which show the subbasin drains southeast toward Azure Drive. Subbasin EXOFF2 consists of Azure Drive roadway improvements which flow east past the site to Tenaya Way. Subbasin EXOFF3 is partly developed commercial and partly undeveloped desert shrub located east of Shea Commercial. This subbasin flows northeast into Azure Drive. Subbasin EXOFF4 is undeveloped land which also drains directly into Azure Drive. The existing Ranch House Estates development drains to the south away from these subbasins. Subbasin EXOFF5 is located south of the project site and consists of Monte Cristo Way right of way and a ½ acre lot (20,000 square feet) that includes a house but the driveway and landscaping have not been completed. The southern boundary of this subbasin coincides with an existing high point in Monte Cristo Way. This subbasin flows onto the project site through an existing block wall opening along the eastern wall of the cul-de-sac on the north end of Monte Cristo Way. Copies of the improvement plans for Monte Cristo Way showing the high point and wall opening have been included in Appendix C.

The results of the HEC-1 model have been summarized below in Table 1. The project

site consists of two onsite subbasins, ON1 (2 cfs) and ON2 (2 cfs). The site will generate a total of 4 cfs under existing conditions during a 100-year storm event. Of the total flow 2 cfs will be drain north to Azure Drive and 2 cfs will drain east.

TABLE 1
EXISTING CONDITIONS
HEC-1 MODEL SUMMARY

SUBBASIN OR CP*	100 YR (CFS)	10 YR (CFS)
HON1A	9	5
HON1B	12	7
HON1C	1	1
HON2	13	5
HON3	15	6
HON4	5	2
HON6	21	8
C46	26	10
HON7	16	6
HON8	8	3
HON9	14	5
C89	21	8
C789	37	14
HON5	8	3
C5789	44	16
EXCPA	85	31
C2A	97	35
SH1	7	3
SH2	6	3
SH3	13	6
CP3	26	12
EXOFF1	14	4
EXOFF3	3	1
EXOFF2	18	10
CPW	169	70
EXOFF4	1	0
ON1	2	1
TEN4	6	3
CPE	179	74
ON2	2	1
EXOFF5	3	1
CPSE	5	2

*See Figure 5

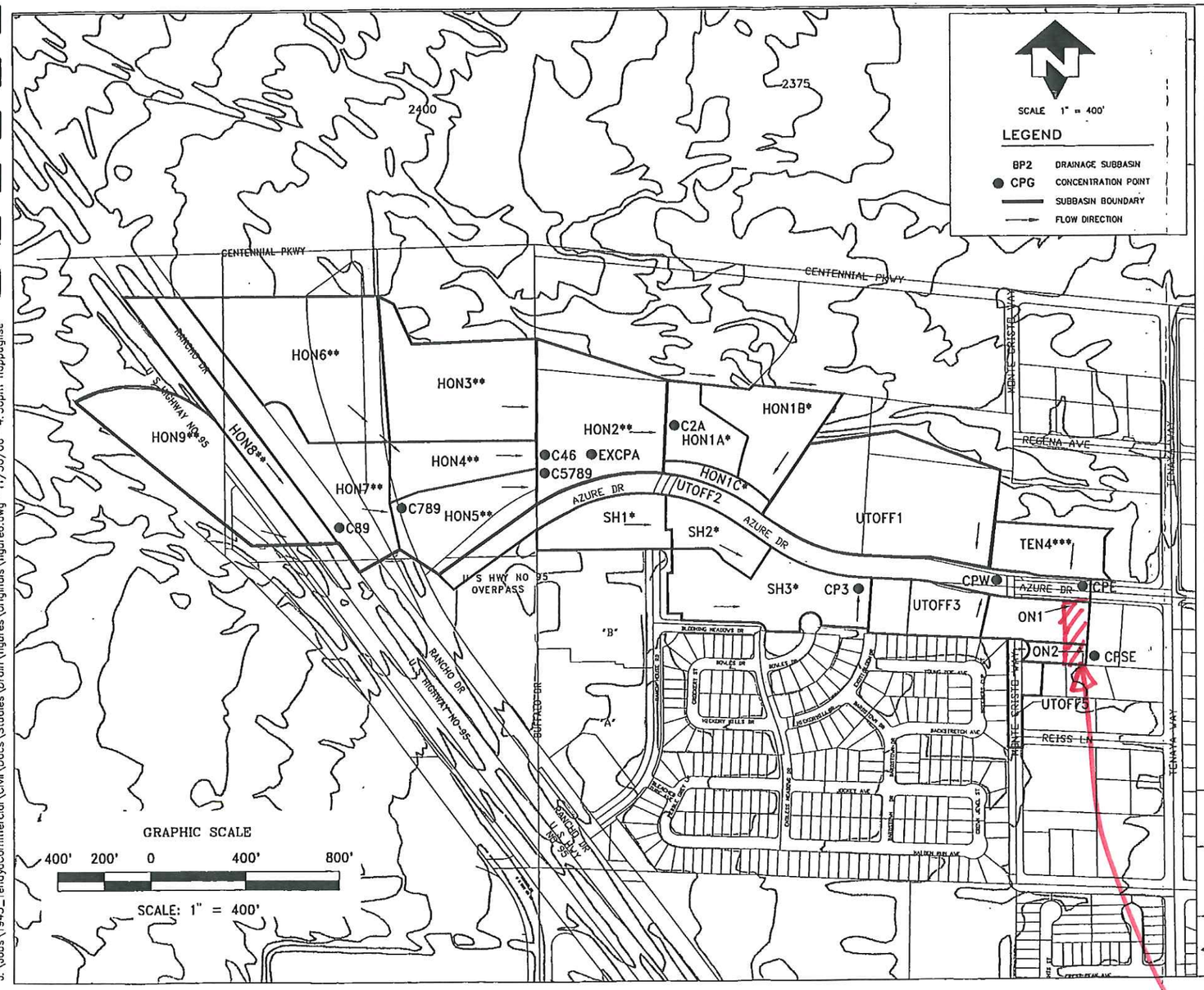
VII. ULTIMATE CONDITIONS

Under ultimate conditions all offsite areas as well as the Project will be fully developed. Figure 6 depicts the subbasins and drainage patterns used in the ultimate conditions hydrological analysis. An ultimate condition HEC-1 model has been included in Appendix A. The results of the HEC-1 model are summarized below in Table 2. For referenced subbasins, the HEC-1 model includes KM cards noting that the subbasin input parameters were referenced and what study they were referenced from.

TABLE 2
ULTIMATE CONDITIONS HEC-1 MODEL SUMMARY

SB OR CP*	100 YR (CFS)	10 YR (CFS)
HON1A	9	5
HON1B	12	7
HON1C	1	1
HON2	22	12
HON3	25	14
HON4	8	5
HON6	31	17
C46	37	21
HON7	23	13
HON8	8	3
HON9	14	5
C89	21	8
C789	45	21
HON5	12	7
C5789	54	26
EXCPA	112	58
C2A	127	66
SH1	7	3
SH2	6	3
SH3	13	6
CP3	26	12
UTOFF1	26	13
UTOFF3	7	3
UTOFF2	18	10
CPW	224	114
ON1	6	3
TEN4	6	3
CPE	236	120
ON2	2	1
UTOFF5	3	1
CPSE	4	2

*See Figure 6.



SUMMARY OF FLOWS

BASIN OR LOCATION	Q100 (CFS)	Q10 (CFS)
HON1A**	9	5
HON1B**	12	7
HON1C**	1	1
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HON4**	8	5
HON6**	31	17
C46**	37	21
HON7**	23	13
HON8**	8	3
HON9**	14	5
C89**	21	8
C789**	45	21
HON5**	12	7
C5789**	54	26
EXCPA**	112	58
C2A**	127	66
SH1*	7	3
SH2*	6	3
SH3*	13	6
CP3***	26	12
UTOFF1	26	13
UTOFF3	7	3
UTOFF2	18	10
CPW	224	114
ON1	6	3
TEN4***	6	3
CPE	236	120
ON2	2	1
UTOFF5	3	1
CPSE	4	2

*OFFSITE SUBBASIN
REFERENCED FROM SHEA COMMERCIAL-TENAYA
**OFFSITE SUBBASIN
REFERENCED FROM FINDLAY-SHACK HONDA
***OFFSITE SUBBASIN
REFERENCED FROM TENAYA VILLAGE PHASE 1

O'CONNELL COMMERCIAL
TENAYA COMMERCIAL

FIGURE 6
ULTIMATE

WOOD RODGERS
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9900 COVINGTON CROSS DRIVE, SUITE 102 / LAS VEGAS, NEVADA 89144

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The subbasins boundaries used in the ultimate condition HEC-1 model are generally the same as those used in the existing condition model. Subbasins HON1A, HON1B, HON1C, SH1, SH2, SH3, and TEN4 were all considered developed in the existing conditions model, therefore these subbasins were not revised. The input parameters for Subbasins HON2 through HON9 were previously referenced from the existing conditions HEC-1 model from the Honda Study. Under ultimate conditions these subbasins are developed and have been referenced from the developed conditions HEC-1 model from the Honda Study. Existing Subbasins EXOFF3 and EXOFF4 have been combined to form Subbasin UTOFF3 which is now considered developed as a commercial property. Subbasins EXOFF2, EXOFF1, and EXOFF5 have been revised to developed subbasins and renamed UTOFF2, UTOFF1, and UTOFF5 respectively.

Onsite Subbasins ON1 and ON2 make up the Project and reflect the improvements shown on the proposed grading plan. Subbasin ON1 comprises the north half of the site which drains to Azure Drive through a concrete slot gutter located at the north east corner of the site. During a 100-year storm event Subbasin ON1 will produce 6 cfs of runoff. This is higher than the existing condition flow of 2 cfs. However, the Montecito East Study and all existing storm drain facilities have already been approved based on this site being developed as a commercial property. Therefore, the increase in flow between existing and ultimate conditions has already been accounted for. Runoff from Subbasin ON2 combines with offsite runoff from UTOFF5 at CPSE and drains east onto the adjacent parcel which will direct the flow north into Azure Drive. The total 100-year flow of 4 cfs at CPSE is lower than the existing condition flow of 5 cfs.

— Esmt?

Azure Drive includes an existing 36-inch HDPE storm drain that connects into the Tenaya Way storm drain. Adjacent to the Project this storm drain was designed to convey 55 CFS per the referenced plan and profile sheet included in Appendix C. In general, the proposed development of Tenaya Commercial is in conformance with the existing drainage patterns for the site and the overall Montecito East commercial subdivision. Therefore, the proposed project will not result in any adverse impacts on downstream facilities or properties.

VIII. INTERIM CONDITIONS

Under interim conditions the Project will be developed and the offsite subbasins will remain the same as the existing conditions model. The storm drain in Azure Drive is existing and additional offsite storm drains to reduce flow rates or revise subbasin boundaries are not programmed. Therefore, interim conditions flow rates will be lower than or the same as ultimate conditions. Since, ultimate conditions provide for the worst case design flow rates an interim condition analysis and HEC-1 model was not prepared for the site.

The Montecito East commercial subdivision did not include access driveways for each Lot within the commercial subdivision. However, Notes 3 and 4 of the commercial subdivision map (See Appendix C) read as follows:

3. All properties within the site shall have perpetual, unobstructed access to all parking and all driveways servicing this site.
4. All subdivided parcels comprising this commercial subdivision shall provide perpetual intersite common drainage rights across all existing and future parcel limits.

Since, the properties east and west of this site are not developed an interim condition temporary 24 foot access roadway will be placed along the west side of the site. Once the parcels to the east and west of the project site are developed permanent access will be provided through their parking lots.

IX. STREET HYDRAULICS

The site is located within the City of Las Vegas Northwest Neighborhood Study Phase 1. Figures E-5 and F-5 from that study have been included in Appendix B with the site shown thereon. The existing and ultimate condition HEC-1 models and analysis included with this study supercede the flow rates shown in the Northwest Neighborhood Study. However, the flow rates in Azure were checked for a worst case condition. Under ultimate conditions this study calculated a 100-year flow rate of 236 cfs within Azure Drive. The ultimate condition 100-year flow rate in Azure Drive was shown to be 209 cfs per the Northwest Neighborhood Study. Therefore, the flow rates per this study were higher and were used for calculating street characteristics.

The resulting street and parking lot flow data based on the flows established from the ultimate conditions HEC-1 model is presented below in Table 3. Figure 7 shows the locations of the cross sections corresponding to the calculations included in Table 3. Hydraulic calculations have been included in Appendix B.

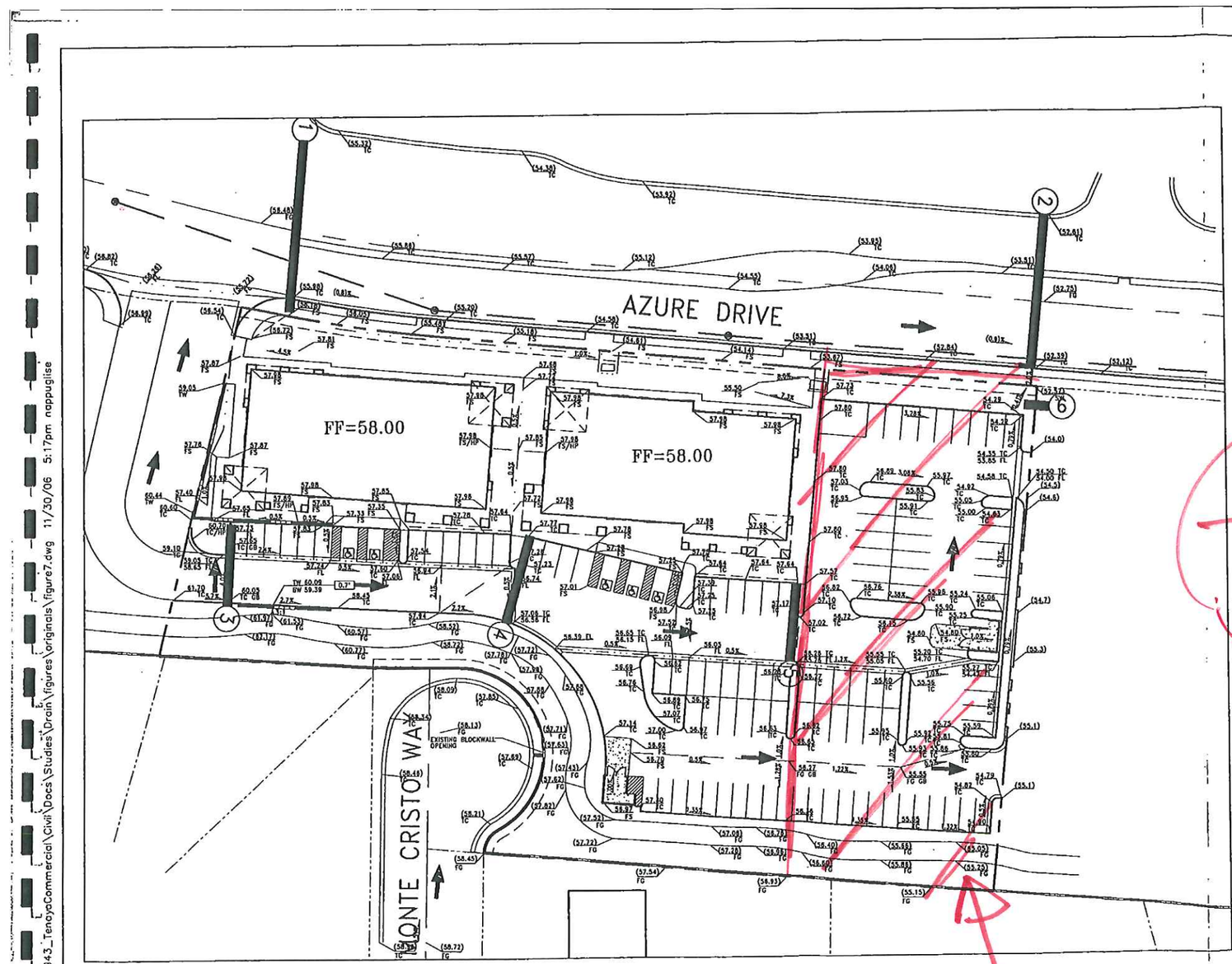
TABLE 3
100-YEAR HYDRAULIC CHARACTERISTICS
ULTIMATE CONDITIONS

Location*	Slope (%)	Q_{100} (cfs)	D_{100} (ft)	V_{100} (ft/sec)	$D*V_{100}$
Section 1	0.8	224-55=169	0.93	4.7	4.4
Section 2	0.9	236-55=181	0.94	5.0	4.7
Section 3	0.5	6	0.30	2.3	0.7
Section 4	0.5	6	0.20	1.6	0.3
Section 5	0.5	6	0.17	3.5	0.6
Section 6	10.4	6	0.24	12.4	N/A

*See Figure 7

Nuisance flows will be directed north into Azure Drive which includes an existing storm drain system. Nuisance flows on the south half of the site would be generated from the existing trail and landscaping. These nuisance flows will be continued east in their historical flow path.

The flow rates for Cross Sections 1 and 2 have been reduced by 55 cfs to account for the flows conveyed by the Azure Drive storm drain. Based on the calculated street flow characteristics, the Manual criteria for depth (D) and velocity times depth (V*D) during the 100-year storm event will be met.



SCALE 1" = 50'

LEGEND

8 — STREET FLOW CALCULATION

1.00% → STREET SLOPE

SUMMARY OF STREET FLOWS

SECTION	Q100 (CFS)	Q10 (CFS)
1*	169	59
2**	181	65
3	6	3
4	6	3
5	6	3
6	6	3

*CPW FLOWS-55 CFS IN AZURE SD
**CPE FLOWS-55 CFS IN AZURE SD

UTILIZED

GRAPHIC SCALE

50' 25' 0 50' 100'

SCALE: 1" = 50'

O'CONNELL COMMERCIAL
TENAYA COMMERCIAL

FIGURE 7
STREET SECTIONS

WOOD RODGERS
ENGINEERING • MAPPING • PLANNING • SURVEYING
9900 COVINGTON CROSS DRIVE SUITE 102 /LAS VEGAS, NEVADA 89144

OUR SITE

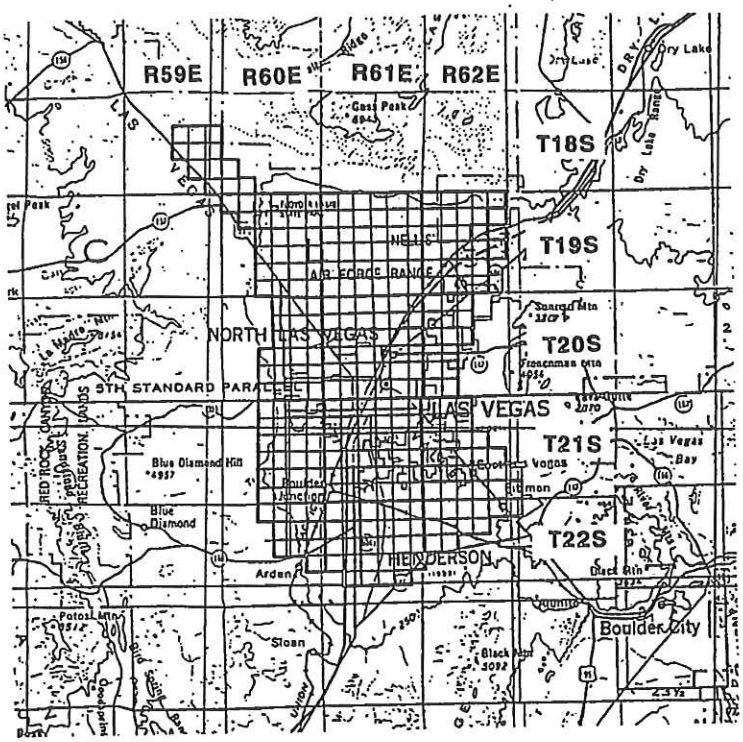
J:\Jobs\1943_TenayaCommercial\Civil\Docs\Studies\Drain\figures\originals\figure7.dwg 11/30/06 5:17pm nappuglise

The Azure Drive storm drain was designed to convey the 10-year flow per the Montecito East Study. However, approved studies for Shea Commercial, Tenaya Village, and Honda have shown an increase in the Azure Drive flows. Most notably the Honda Study revised on site CN values from a 92 to a 98 to more accurately reflect their site and added additional subbasins (HON 6 to HON9) that were not included with the Montecito East analysis (See Appendix C). Ultimate condition dry lane criteria calculations for Azure Drive have been included for Cross Sections 1 and 2 in Appendix B. Cross Section 1 is at the west edge of the site prior to flows from the site entering Azure Drive. Under ultimate conditions with all off-sites built, dry lane criteria will not be met based on the street depth of 0.69 feet. Cross Section 2 is at the east end of the site and includes the flows generated by the site. The depth at Cross Section two will be increased by 0.01 feet.

Dry lane criteria will not be met prior to site development and the flow depth will not be significantly increased (0.01 feet) after site development. Additionally, this 2.34 acre site only increases the 10-year flow by 2 cfs and it is part of a master planned area that already included storm drain facilities to meet dry lane criteria. Under interim conditions with the off-sites per the existing condition HEC-1 model and the site developed the 10-year flow in Azure Drive would be 20 cfs (74 cfs + 1 cfs more with ON1 developed – 55 cfs in the storm drain). Therefore, Azure Drive would meet dry lane criteria under interim conditions. For the reasons stated above WR believes this deviation is not a site specific problem and should be acceptable.

The proposed site will meet the City of Las Vegas criteria for finished floor elevations for the flow in Azure Drive. The City criteria requires that finished floor elevations are set at a vertical distance above the gutter flow line of at least twice the depth of flow or a minimum of 6-inches above highest adjacent top of curb. Building 1 meets these criteria for Azure Drive but not for the onsite parking lot. The parking lot includes a highpoint in the curb at elevation 60.7 at the south west corner of the building. However, the building includes parking spaces sloped away from the building with a 3-wide valley gutter. Section 3 has been conservatively modeled with 6 cfs generated by the entire onsite. Even with this conservative flow rate the depth of flow would be 0.3 feet in the valley gutter. The FF of Building 1 will be elevated as a minimum to twice this depth of flow.

McCARRAN AIRPORT RAINFALL AREA



TOWNSHIP	RANGE	SECTIONS	TOWNSHIP	RANGE	SECTIONS
18 South	59 East	13-15,22-26,36	20 South	62 East	4-9,16-20,29-32
18 South	60 East	30-32	21 South	60 East	1-4,9-16,21-28,33-36
19 South	60 East	1-6,8-16,21-28,33-36	21 South	61 East	ALL SECTIONS
19 South	61 East	ALL SECTIONS	21 South	62 East	4-9,15-23, 25-36
19 South	62 East	2-11,14-23,27-34	22 South	60 East	1-4,10-15,24
20 South	60 East	1-3,10-15,21-28,33-36	22 South	61 East	1-24,26-29
20 South	61 East	ALL SECTIONS	22 South	62 East	1-10,17-18

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

Revision	Date

WRC ENGINEERING

REFERENCE:
USACE, Los Angeles District, 1988

FIGURE 513

DEPTH-DURATION-FREQUENCY VALUES FOR McCARRAN AIRPORT RAINFALL AREA

(IN INCHES)

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

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

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

3. Table 501 adjustments not required.

Revision	Date

WRC ENGINEERING

REFERENCE: USACE, Los Angeles District, 1988

TABLE 505

SIX-HOUR STORM DISTRIBUTIONS

Storm Time (In Minutes)	Percent of Total Storm Depth		
	SDN3	SDN4	SDN5
0	0.0	0.0	0.0
5	2.0	2.0	2.0
10	5.7	5.8	5.9
15	7.0	7.5	8.0
20	8.7	9.9	11.0
25	10.8	12.6	14.4
30	12.4	13.7	15.0
35	13.0	14.5	16.0
40	13.0	14.9	16.8
45	13.0	15.1	17.1
50	13.0	15.5	18.0
55	13.0	15.6	18.2
60	13.0	15.9	18.7
65	13.3	16.2	19.0
70	14.0	16.9	19.7
75	14.2	17.2	20.2
80	14.8	17.9	21.0
85	15.8	18.9	22.0
90	17.2	20.1	23.0
95	18.1	21.1	24.1
100	19.0	22.0	25.0
105	19.7	22.8	25.9
110	19.9	23.2	26.5
115	20.0	24.0	28.0
120	20.1	24.6	29.0
125	20.4	25.2	30.0
130	21.4	26.0	30.5
135	22.9	26.9	30.9
140	24.1	27.6	31.0
145	24.9	28.3	31.7
150	25.1	28.6	32.1
155	25.6	29.2	32.7
160	27.0	30.2	33.3
165	27.8	31.2	34.6
170	28.1	32.1	36.1
175	28.3	33.2	38.1
180	29.5	35.2	40.8

Storm Time (In Minutes)	Percent of Total Storm Depth		
	SDN3	SDN4	SDN5
185	32.2	37.6	43.0
190	35.2	41.5	47.7
195	40.9	46.2	51.4
200	49.9	53.0	56.1
205	59.0	61.0	63.0
210	71.0	71.0	71.0
215	74.4	73.2	72.0
220	78.1	75.6	73.1
225	81.2	78.2	75.2
230	81.9	79.9	77.9
235	83.5	81.3	79.0
240	85.1	82.3	79.5
245	85.6	83.0	80.4
250	86.0	83.5	81.0
255	86.8	84.4	82.0
260	87.6	85.1	82.6
265	88.8	86.4	84.0
270	91.0	88.5	85.9
275	92.6	90.8	88.9
280	93.7	92.4	91.0
285	95.0	94.4	93.8
290	97.0	96.8	96.6
295	97.6	97.3	97.0
300	98.2	97.8	97.4
305	98.5	98.2	97.9
310	98.7	98.4	98.1
315	98.9	98.6	98.3
320	99.0	98.8	98.5
325	99.3	99.1	98.9
330	99.3	99.2	99.0
335	99.4	99.3	99.2
340	99.5	99.4	99.3
345	99.8	99.7	99.6
350	99.8	99.8	99.7
355	99.9	99.9	99.9
360	100.0	100.0	100.0

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

Revision	Date

REFERENCE:

TABLE 503

RUNOFF CURVE NUMBERS
(URBAN AREAS[1])

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)[3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only)[4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
See Table 602A					
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)[5]		77	86	91	94

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

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

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

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

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

Revision	Date

RUNOFF CURVE NUMBERS
(SEMIARID RANGELANDS[1])

Existing Conditions

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

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

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

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

Revision	Date

WRC ENGINEERING

REFERENCE: SCS TR-55, USDA, June 1986.

TABLE 602
4 of 4

RUNOFF CURVE NUMBERS - RESIDENTIAL DISTRICTS

Average Lot Size or Usage[1]	Percent Impervious[2]	Curve Number for Hydrologic Soil Groups			
		A	B	C	D
Apartments/Condos	72	81	88	91	93
Townhouses/6,000 sq ft lots or less[3]	69	80	87	90	92
7,000 sq ft lots	63	76	84	89	91
8,000 sq ft lots	58	73	82	88	90
10,000 sq ft lots	38	61	75	83	87
14,000 sq ft lots	30	57	72	81	86
20,000 sq ft lots	25	54	70	80 *	85
40,000 sq ft lots	20	51	68	79	84
80,000 sq ft lots	12	46	65	77	82

1 Lot size should represent the size of the average lot and not the gross acreage divided by the number of lots.
2 Actual percent impervious value should be compared to selected land use type.
3 In cases where average residential lots are smaller than 6,000 sq ft, commercial/business/industrial land use should be used.

* Subbasin UTOFF5 Residential Portion

Revision	Date

REFERENCE:

TABLE 602A

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

WoodRodgers

TENAYA COMMERCIAL
O'CONNELL COMMERCIAL LLC
Existing Conditions

BY: NA
DATE: 11/29/06

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check	Tlag	REMARKS
DESIG: (1)	DEV./EX. (D or E)	CN	K (2)	AREA Ac (3)	AREA MI^2	INITIAL LENGTH Feet (4)	SLOPE % (5)	Ti Min (6)	TRAVEL LENGTH Feet (7)	SLOPE % (8)	V1 VELOCITY FPS (9a)	V2 VELOCITY FPS (9b)	Tt Min (10)	Min (13)	Min (14)	Tlag= 0.6Tc/60 Hours	RAINFALL Q100/Q10 Inches
ON1	E	83.6	0.7135	1.31	0.0020	184	3.8	6.0	420	1.0	1.5	2.9	4.7	10.8	N/A	0.108	
ON2	E	85.0	0.7320	1.03	0.0016	132	1.5	6.6	233	2.0	2.1	4.2	1.9	8.5	N/A	0.085	Tc=10min.
EXOFF1	E	81.1	0.6805	9.79	0.0153	500	1.5	14.7	550	2.8	2.5	4.9	3.5	18.3	N/A	0.183	
EXOFF2	D	98.0	0.9036	6.36	0.0099	40	2.0	1.8	2900	1.3	2.3	3.5	15.0	16.8	28.9	0.168	
EXOFF3	E	88.0	0.7716	1.52	0.0024	110	2.0	4.9	667	1.7	1.9	3.8	5.9	10.0	N/A	0.100	
EXOFF4	E	78.4	0.6449	0.89	0.0015	300	2.0	11.3	102	2.0	2.1	4.2	0.8	12.1	N/A	0.121	
EXOFF5	D	94.3	0.8548	0.96	0.0015	30	2.0	1.8	574	0.5	1.4	2.2	6.9	8.8	13.4	0.088	

Tc = Ti + Tt Tlag = 0.6 Tc
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3
K = 0.0132 (CN) - 0.39

For the travel time (Tt) calculations,
V1 applies to the first 500 feet of travel distance;
V2 applies to the remaining travel distance.

Existing V1 = 14.8*(S/100)^1/2 Developed V1 = 20.2*(S/100)^1/2
Existing V2 = 29.4*(S/100)^1/2 Developed V2 = 30.6*(S/100)^1/2

Tc Check (Developed) = L/180+10

Minimum Tc (EX) = 10 Min per Section 602 Minimum Tc (DEV) = 5 Min per Section 602.1

REFERENCE :

STANDARD FORM 4

```
1*************************************
*                                   *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)*
*           JUN  1998               *
*         VERSION 4.1               *
*                                   *
*  RUN DATE  28NOV06  TIME  08:11:26*
*                                   *
*************************************
```


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

1 HEC-1 INPUT PAGE 1

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
   1      ID
          'DIAGRAM
   2      ID     $EHAYA/A2URE
   3      ID     EXISTING CONDITIONS
   4      ID     DESIGN STORM = 100-YEAR 6-HOUR STORM
   5      ID     STORM DISTRIBUTION = SCS3
   6      ID     JR CARDS BASED ON THE FOLLOWING VALUES
   7      ID
   8      ID   1.00       =100 YEAR
   9      ID   0.57       = 10 YEAR
  10      ID
  11      IT      5       0       0     300
  12      IO      5       0       0
  13      IN      5       0       0
  14      JR   PREC    1.00    0.57
          *
  15      KK   HON1A
  16      KM   THIS BASIN REFERENCED FROM WESTERLY PART OF PHASE 1: HONDA SITE DEVELOPMENT
  17      KM   BASIN ON1-DEVELOPED HEC-1 MODEL
  18      BA   .0041
  19      PB    2.77
  20      PC   0.000   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
  21      PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
  22      PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
  23      PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
  24      PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
  25      PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
  26      PC   0.982   0.985   0.987   0.989   0.990   0.991   0.993   0.994   0.995   0.998
  27      PC   0.998   0.999   1.000
  28      LS      0      98
  29      UD   0.083
          *
  30      KK   HON1B
  31      KM   THIS BASIN REFERENCED FROM EASTERLY PART OF PHASE 1: HONDA SITE DEVELOPMENT
  32      KM   BASIN ON2-DEVELOPED HEC-1 MODEL
  33      BA   .0056
  34      LS      0      98
  35      UD   0.075
          *
  36      KK   HON1C
  37      KM   THIS BASIN REFERENCED FROM SOUTHERLY PART OF PHASE1: HONDA SITE DEVELOPMENT
  38      KM   BASIN ON3-DEVELOPED HEC-1 MODEL
  39      BA   .0006
  40      LS      0      98
  41      UD   0.118
          *
```

1 HEC-1 INPUT PAGE 2

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
  42      KK  DVS1TE
  43      KM   COMBINE ON SITE FLOW FOR DEVELOPED PHASE 1 AT HONDA SITE
  44      KM   REFERENCED FROM TOTAL DISCHARGE FROM PHASE 1: HONDA SITE DEVELOPMENT
```

```
                    45          NC      3
                                *
                    46          KK   HON2
                    47          KM   THIS BASIN REFERENCED FROM HONDA SITE DEVELOPMENT AS EXOFF2
                    48          KM   EXISTING CONDITION HEC-1 MODEL
                    49          BA   0.010
                    50          LS      0       85
                    51          UD   0.100
                                *
                    52          KK   HON3
                    53          KM   THIS BASIN REFERENCED FROM HONDA SITE DEVELOPMENT AS EXOFF3
                    54          KM   EXISTING CONDITION HEC-1 MODEL
                    55          BA   .0120
                    56          LS      0       85
                    57          UD   0.100
                                *
                    58          KK   HON4
                    59          KM   THIS BASIN REFERENCED FROM HONDA SITE DEVELOPMENT AS EXOFF4
                    60          KM   EXISTING CONDITION HEC-1 MODEL
                    61          BA   .0041
                    62          LS      0       85
                    63          UD   0.100
                                *
                    64          KK   HON6
                    65          KM   THIS BASIN REFERENCED FROM HONDA SITE DEVELOPMENT EXOFF6
                    66          KM   EXISTING CONDITION HEC-1 MODEL
                    67          BA   .0167
                    68          LS      0       85
                    69          UD   .105
                                *
                    70          KK   RHON6
                    71          KM   ROUTE HON6 THROUGH HON4
                    72          KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS "ROUTE OFF6 THROUGH OFF4"
                    73          RK     680    .017    .035            TRAP       3       3
                                *
                    74          KK    C46
                    75          KM   COMBINE HON4 AND HON6
                    76          KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS "COMBINE OFF4 AND OFF6"
                    77          HC      2
                                *
1                                                       HEC-1 INPUT                                                     PAGE  3

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

                    78          KK   HON7
                    79          KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS EXOFF7
                    80          KM   EXISTING CONDITION HEC-1 MODEL
                    81          BA   .0128
                    82          LS      0       85
                    83          UD   0.115
                                *
                    84          KK   HON8
                    85          KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS EXOFF8
                    86          KM   EXISTING CONDITION HEC-1 MODEL
                    87          BA   .0086
                    88          LS      0       85
                    89          UD   .130
                                *
                    90          KK   HON9
                    91          KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS OFF9
                    92          KM   EXISTING CONDITION HEC-1 MODEL
                    93          BA   .0108
                    94          LS      0       85
                    95          UD   0.102
                                *
                    96          KK    C89
                    97          KM   COMBINE HON8 AND HON9
                    98          KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS "COMBINE OFF8 AND OFF9"
                    99          HC      2
                                *
                   100          KK    R89
                   101          KM   ROUTE C89 THROUGH HON7
                   102          KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS "ROUTE C89 THROUGH OFF7"
                   103          RK     160    .013    .035            TRAP       3       3
                                *
                   104          KK    C789
                   105          KM   COMBINE C89 AND HON7
                   106          KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS "COMBINE C89 AND OFF7"
                   107          HC      2
                                *
                   108          KK    R789
                   109          KM   ROUTE C789 THROUGH HON5
```

```
110          KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS "ROUTE C789 THROUGH OFF5"
111          RK     560    .020    .035            TRAP       3       3
             *
             *
112          KK    HON5
113          KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS EXOFF5
114          KM   EXISTING CONDITION HEC-1 MODEL
115          BA   .0059
116          LS      0      85
117          UD   0.100
             *
1                                        HEC-1 INPUT                                                    PAGE  4

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

118          KK   C5789
119          KM   COMBINE C789 AND HON5
120          KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS "COMBINE C789 AND OFF5"
121          HC      2
             *
122          KK   EXCPA
123          KM   COMBINE C5789, C46 AND HON3 AND ROUTE THROUGH HON2
124          KM   REFERENCED FROM HONDA SITE DEVELOPMENT
125          HC      3
             *
126          KK    RCPA
127          KM   ROUTE CONCENTRATION POINT "A" THROUGH HON2
128          KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS "A THROUGH OFF2"
129          RK     520    .017    .035            TRAP       3       3
             *
130          KK    C2A
131          KM   COMBINE CPA AND HON2
132          KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS"COMBINE CPA AND OFF2"
133          HC      2
             *
134          KK    SH1
135          KM   REFERENCED FROM SHEA COMMERCIAL-TENAYA AS OH1D
136          KM   FUTURE CONDITION MODEL
137          BA   .0031
138          LS      0      92
139          UD   0.064
             *
140          KK    SH2
141          KM   REFERENCED FROM SHEA COMMERCIAL-TENAYA AS OH2D
142          KM   FUTURE CONDITION MODEL
143          BA   .0031
144          LS      0      90
145          UD    .050
             *
146          KK    SH3
147          KM   REFERENCED FROM SHEA COMMERCIAL-TENAYA AS OH3D
148          KM   FUTURE CONDITION MODEL
149          KM   BASE FLOW NOT USED-HONDA BASINS WERE INCORPORATED INSTEAD OF BASE FLOW
150          BA   .0077
151          LS      0      92
152          UD    .110
             *
1                                        HEC-1 INPUT                                                    PAGE  5

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

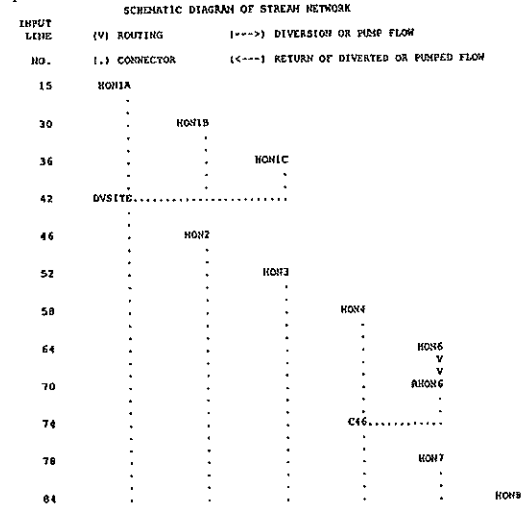
153          KK    CP3
154          KM   REFERENCED FROM SHEA COMMERCIAL-TENAYA-COMBINES SH1, SH2, & SH3
155          HC      3
             *
156          KK  EXOFF1
157          BA   .0153
158          LS      0    91.1
159          UD    .183
             *
160          KK  EXOFF3
161          KM   BASIN PART OF DISCOUNT TIRE
162          BA   .0024
163          LS      0      98
164          UD    .100
             *
165          KK  EXOFF2
166          KM   AZURE DRIVE
167          BA   .0099
168          LS      0      98
169          UD    .168
             *
170          KK     CPH
```

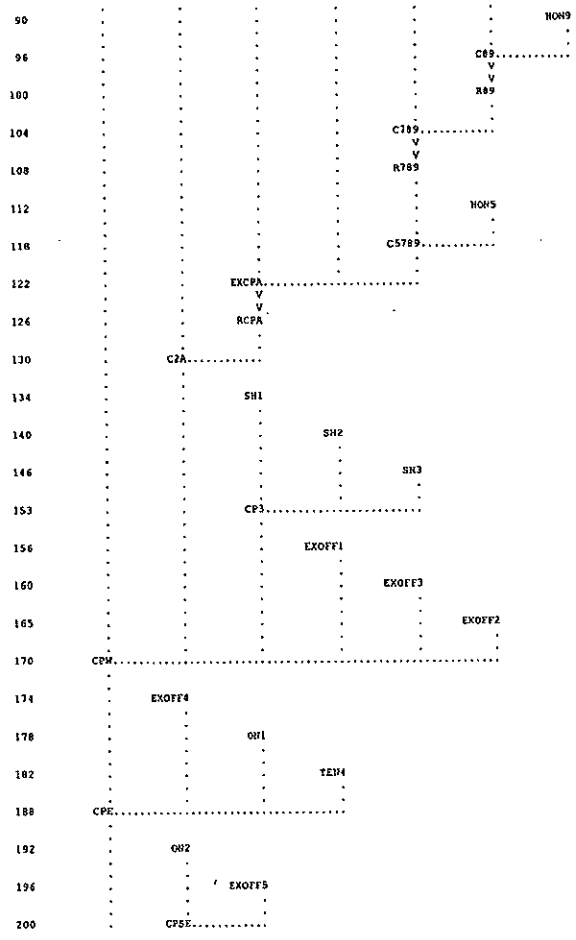
```
171          KK  COMBINATION OF SHEA, (CP3), EXOFF1, EXOFF3, EXOFF2, & HONDA BASINS
172          KM  FLOW IN AZURE @ WEST SIDE OF SITE
173          HC      6
             *
174          KK  EXOFF4
175          BA   .0015
176          LS      0    78.4
177          UD   .121
             *
178          KK    ON1
179          BA  .0020
180          LS      0    83.6
181          UD   .108
             *
182          KK    TEN4
183          KM  REFERENCED FROM YENAYA VILLAGE PHASE 1 MINI STORAGE AS DEON4
184          KM  FUTURE HEC-1 MODEL
185          BA   .004
186          LS      0      92
187          UD   .124
             *
```



```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
188          KK    CPE
189          KM  COMBINATION OF TEN4, ON1, EXOFF4, & CP4
190          KM  FLOW IN AZURE @ EAST SIDE OF SITE
191          HC      4
             *
192          KK    ON2
193          BA   .0016
194          LS      0      85
195          UD   .180
             *
196          KK  EXOFF5
197          BA   .0015
198          LS      0    94.1
199          UD   .093
             *
200          KK    CP5E
201          KM  COMBINE ON2 & EXOFF5
202          KM  FLOW TO PARCEL EAST OF SITE
203          HC      2
             *
204          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK





(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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

RUN DATE 28NOV06 TIME 08:11:26

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

TENAYA/AZURE
EXISTING CONDITIONS
DESIGN STORM = 100-YEAR 6-HOUR STORM
STORM DISTRIBUTION = SCS

JR CARDS BASED ON THE FOLLOWING VALUES

1.00 = 100 YEAR
0.57 = 10 YEAR

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

   IT          HYDROGRAPH TIME DATA
                    MAIN           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      .57
```

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 .57
HYDROGRAPH AT						
+	HON1A	.00	1	FLOW	9.	5.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	HON1B	.01	1	FLOW	12.	7.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	HON1C	.00	1	FLOW	1.	1.
				TIME	3.50	3.50
3 COMBINED AT						
+	DVSITE	.01	1	FLOW	22.	12.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	HON2	.01	1	FLOW	13.	5.
				TIME	3.50	3.58
HYDROGRAPH AT						
+	HON3	.01	1	FLOW	15.	6.
				TIME	3.50	3.58
HYDROGRAPH AT						
+	HON4	.00	1	FLOW	5.	2.
				TIME	3.50	3.58
HYDROGRAPH AT						
+	HON6	.02	1	FLOW	21.	8.
				TIME	3.50	3.58
ROUTED TO						
+	RHON6	.02	1	FLOW	21.	8.
				TIME	3.58	3.58
2 COMBINED AT						
+	C46	.02	1	FLOW	26.	10.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	HON7	.01	1	FLOW	16.	6.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	HON8	.01	1	FLOW	8.	3.

				TIME	3.58	3.58
HYDROGRAPH AT						
+	HON9	.01	1	FLOW	14.	5.
				TIME	3.50	3.58
2 COMBINED AT						
+	C89	.02	1	FLOW	21.	8.
				TIME	3.58	3.58
ROUTED TO						
+	R89	.02	1	FLOW	21.	8.
				TIME	3.58	3.58
2 COMBINED AT						
+	C789	.03	1	FLOW	37.	14.
				TIME	3.58	3.58
ROUTED TO						
+	R789	.03	1	FLOW	37.	14.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	HON5	.01	1	FLOW	8.	3.
				TIME	3.50	3.58
2 COMBINED AT						
+	C5789	.04	1	FLOW	44.	16.
				TIME	3.58	3.58
3 COMBINED AT						
+	EXCPA	.07	1	FLOW	85.	31.
				TIME	3.58	3.58
ROUTED TO						
+	RCPA	.07	1	FLOW	84.	31.
				TIME	3.58	3.58
2 COMBINED AT						
+	C2A	.08	1	FLOW	97.	35.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	SH1	.00	1	FLOW	7.	3.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	SH2	.00	1	FLOW	6.	3.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	SH3	.01	1	FLOW	13.	6.
				TIME	3.50	3.58
3 COMBINED AT						
+	CP3	.01	1	FLOW	26.	12.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	EXOFF1	.02	1	FLOW	14.	4.
				TIME	3.58	3.67
HYDROGRAPH AT						
+	EXOFF3	.00	1	FLOW	3.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	EXOFF2	.01	1	FLOW	18.	10.
				TIME	3.58	3.58
6 COMBINED AT						
+	CPW	.13	1	FLOW	169.	70.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	EXOFF4	.00	1	FLOW	1.	0.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	ON1	.00	1	FLOW	2.	1.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	TEN4	.00	1	FLOW	6.	3.
				TIME	3.58	3.58
4 COMBINED AT						
+	CPE	.14	1	FLOW	179.	74.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	ON2	.00	1	FLOW	2.	1.
				TIME	3.50	3.58
HYDROGRAPH AT						

```
                EXOFF5        .00     1   FLOW          3.      1.
                                          TIME          3.50    3.50

 2 COMBINED AT
                CPSE          .00     1   FLOW          5.      2.
                                          TIME          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 PEAK     VOLUME        DT        PEAK     TIME TO PEAK     VOLUME
                                  (MIN)      (CFS)      (MIN)          (IN)        (MIN)      (CFS)      (MIN)          (IN)

        FOR PLAN = 1  RATIO= 1.00
           RHON6  MANE            .88      20.85      212.08         1.40         5.00      20.72      215.00         1.40

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1244E+01 EXCESS= .0000E+00 OUTFLOW= .1245E+01 BASIN STORAGE= .2203E-08 PERCENT ERROR=   -.1

        FOR PLAN = 1  RATIO=  .57
           RHON6  MANE           1.09       7.69      216.60          .50         5.00       7.65      215.00          .50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4476E+00 EXCESS= .0000E+00 OUTFLOW= .4481E+00 BASIN STORAGE= .2075E-08 PERCENT ERROR=   -.1

        FOR PLAN = 1  RATIO= 1.00
           R89  MANE              .31      21.42      214.97         1.40         5.00      21.41      215.00         1.40

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1296E+01 EXCESS= .0000E+00 OUTFLOW= .1296E+01 BASIN STORAGE= .1336E-10 PERCENT ERROR=    .0

        FOR PLAN = 1  RATIO=  .57
           R89  MANE              .28       8.00      215.41          .50         5.00       7.98      215.00          .50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4664E+00 EXCESS= .0000E+00 OUTFLOW= .4664E+00 BASIN STORAGE= .9913E-11 PERCENT ERROR=    .0

        FOR PLAN = 1  RATIO= 1.00
           R789  MANE             .61      37.12      215.32         1.40         5.00      37.05      215.00         1.40

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2252E+01 EXCESS= .0000E+00 OUTFLOW= .2252E+01 BASIN STORAGE= .7730E-09 PERCENT ERROR=    .0

        FOR PLAN = 1  RATIO=  .57
           R789  MANE             .78      13.76      215.73          .50         5.00      13.60      215.00          .50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8101E+00 EXCESS= .0000E+00 OUTFLOW= .8107E+00 BASIN STORAGE= .8196E-09 PERCENT ERROR=   -.1

        FOR PLAN = 1  RATIO= 1.00
           RCPA  MANE             .46      84.41      215.27         1.40         5.00      84.25      215.00         1.40

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5141E+01 EXCESS= .0000E+00 OUTFLOW= .5142E+01 BASIN STORAGE= .6957E-08 PERCENT ERROR=    .0

        FOR PLAN = 1  RATIO=  .57
           RCPA  MANE             .55      31.29      216.14          .50         5.00      30.78      215.00          .50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1849E+01 EXCESS= .0000E+00 OUTFLOW= .1850E+01 BASIN STORAGE= .5712E-08 PERCENT ERROR=   -.1


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

CN CALCULATIONS - ULTIMATE CONDITIONS

Basin	SOIL TYPE	% SOIL TYPE	HYDRO	CN-COMMERCIAL / BUSINESS	CN-20,000 SF LOTS	CN-STREETS/ ROADS: PAVED CURBS	WEIGHTED CN
ON1	192	18	B	92			16.6
	305	82	C	94			77.1
							93.6
ON2	305	100	C	94			94.0
UTOFF1	192	49	B	92			45.1
	305	51	C	94			47.9
							93.0
UTOFF2	192	64	B			98	62.7
	305	36	C			98	35.3
							98.0
UTOFF3	192	73.8	B	92			67.9
	305	26.2	C	94			24.6
							92.5
UTOFF5	305	100	C		80	98	
PERCENT					28.2%	71.8%	92.9

*NOTE: Soil types were referenced from CCRFCD GIS data.

REFERENCED STUDY	MODEL	THIS STUDY
Findlay-Shack Honda		
ON1	Developed	HON1A
ON2	Developed	HON1B
ON3	Developed	HON1C
DVOFF2	Developed	HON2
DVOFF3	Developed	HON3
DVOFF4	Developed	HON4
DVOFF5	Developed	HON5
DVOFF6	Developed	HON6
DVOFF7	Developed	HON7
DVOFF8	Developed	HON8
DVOFF9	Developed	HON9
Shea Commercial		
ON1D	Future	SH1
ON2D	Future	SH2
ON3D	Future	SH3
Tenaya Village Phase 1 Mini Storage		
Deon4	Future	TEN4

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

WoodRodgers

TENAYA COMMERCIAL
O'CONNELL COMMERCIAL LLC
Ultimate Conditions

BY: NA
DATE: 11/30/06

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check	Tlag	REMARKS
DESIG: (1)	DEV./EX. (D or E)	CN	K (2)	AREA Ac (3)	AREA Mi^2	INITIAL LENGTH Feet (4)	SLOPE % (5)	TI Min (6)	TRAVEL LENGTH Feet (7)	SLOPE % (8)	V1 VELOCITY FPS (9a)	V2 VELOCITY FPS (9b)	Tt Min (10)	Min (13)	Min (14)	Tlag= 0.6Tc/60 Hours	RAINFALL Q100/Q10 Inches
ON1	D	93.6	0.8455	1.86	0.0029	60	5.2	2.0	634	1.1	2.1	3.2	4.7	6.7	13.0	0.067	
ON2	D	94.0	0.8508	0.48	0.0008	85	1.0	4.1	207	1.3	2.3	3.5	1.5	5.6	13.0	0.056	
UTOFF1	D	93.0	0.8376	9.79	0.0153	100	1.0	4.7	1074	1.5	2.5	3.7	5.9	10.6	16.5	0.106	
UTOFF2	D	98.0	0.9036	6.36	0.0099	40	2.0	1.8	2900	1.3	2.3	3.5	15.0	16.8	26.3	0.168	
UTOFF3	D	92.5	0.8310	2.51	0.0039	110	2.0	4.0	667	1.7	2.7	4.0	3.8	7.8	14.3	0.078	
UTOFF5	D	92.9	0.8363	0.98	0.0015	30	2.0	2.1	574	0.5	1.4	2.2	6.4	8.5	13.4	0.085	

Tc = Ti + Tt Tlag = 0.6 Tc
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3
K = 0.0132 (CN) - 0.39

For the travel time (Tt) calculations,
V1 applies to the first 500 feet of travel distance;
V2 applies to the remaining travel distance.

Existing V1 = 14.8*(S/100)^1/2 Developed V1 = 20.2*(S/100)^1/2
Existing V2 = 29.4*(S/100)^1/2 Developed V2 = 30.6*(S/100)^1/2

Tc Check (Developed) = L/180+10

Minimum Tc (EX) = 10 Min per Section 602

Minimum Tc (DEV) = 5 Min per Section 602.1

REFERENCE :

STANDARD FORM 4

```
*****************************************
*                                       *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *
*            JUN  1998                  *
*         VERSION 4.1                   *
*                                       *
*  RUN DATE  29NOV06  TIME  14:29:22    *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*  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

1 HEC-1 INPUT PAGE 1

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
   1      ID
   2      *DIAGRAM
   3      ID     TENAYA/AZURE
   4      ID     ULTIMATE CONDITIONS
   5      ID     DESIGN STORM = 100-YEAR 6-HOUR STORM
   6      ID     STORM DISTRIBUTION = SCS3
   7      ID     JR CARDS BASED ON THE FOLLOWING VALUES
   8      ID
   9      ID   1.00       =100 YEAR
  10      ID   0.57       = 10 YEAR
  11      ID
  12      IT      5       0       0     300
  13      IO      5       0       0
  14      IN      5       0       0
  15      JR    PREC    1.00    0.57
  16      *
  17      KK   HONLA
  18      KM   THIS BASIN REFERENCED FROM WESTERLY PART OF PHASE 1: HONDA SITE DEVELOPMENT
  19      KM   BASIN ON1-DEVELOPED HEC-1 MODEL
  20      BA   .0041
  21      PB   2.77
  22      PC   0.000   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
  23      PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
  24      PC   0.190   0.197   0.198   0.200   0.201   0.204   0.214   0.229   0.241   0.249
  25      PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
  26      PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
  27      PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
  28      PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
  29      PC   0.998   0.999   1.000
  30      LS      0      98
  31      UD   0.083
  32      *
  33      KK   HONLB
  34      KM   THIS BASIN REFERENCED FROM EASTERLY PART OF PHASE 1: HONDA SITE DEVELOPMENT
  35      KM   BASIN ON2-DEVELOPED HEC-1 MODEL
  36      BA   .0056
  37      LS      0      98
  38      UD   0.075
  39      *
  40      KK   HONLC
  41      KM   THIS BASIN REFERENCED FROM SOUTHERLY PART OF PHASE1: HONDA SITE DEVELOPMENT
  42      KM   BASIN ON3-DEVELOPED HEC-1 MODEL
  43      BA   .0006
  44      LS      0      98
  45      UD   0.116
  46      *
```

1 HEC-1 INPUT PAGE 2

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
  47      KK   DVSITE
  48      KM   REFERENCED FROM TOTAL DISCHARGE FROM PHASE 1: HONDA SITE DEVELOPMENT
  49      HC      3
```

```
                *
45              KK   HON2
46              KM  THIS BASIN REFERENCED FROM HONDA SITE DEVELOPMENT AS DVOFF2
47              KM  DEVELOPED CONDITION HEC-1 MODEL
48              BA  0.010
49              LS     0      98
50              UD  0.071
                *
51              KK   HON3
52              KM  THIS BASIN REFERENCED FROM HONDA SITE DEVELOPMENT AS DVOFF3
53              KM  DEVELOPED CONDITION HEC-1 MODEL
54              BA  .0120
55              LS     0      98
56              UD  0.079
                *
57              KK   HON4
58              KM  THIS BASIN REFERENCED FROM HONDA SITE DEVELOPMENT AS DVOFF4
59              KM  DEVELOPED CONDITION HEC-1 MODEL
60              BA  .0041
61              LS     0      98
62              UD  0.097
                *
63              KK   HON6
64              KM  THIS BASIN REFERENCED FROM HONDA SITE DEVELOPMENT DVOFF6
65              KM  DEVELOPED CONDITION HEC-1 MODEL
66              BA  .0167
67              LS     0      98
68              UD  .138
                *
69              KK  RHON6
70              KM  ROUTE HON6 THROUGH HON4
71              KM  REFERENCED FROM HONDA SITE DEVELOPMENT AS "ROUTE OFF6 THROUGH OFF4"
72              RK    680    .095    .017            TRAP       3     100
                *
73              KK    C46
74              KM  COMBINE HON4 AND HON6
75              KM  REFERENCED FROM HONDA SITE DEVELOPMENT AS "COMBINE OFF4 AND OFF6"
76              HC     2
                *
1                                          HEC-1 INPUT                                                    PAGE  3

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

77              KK   HON7
78              KM  REFERENCED FROM HONDA SITE DEVELOPMENT AS DVOFF7
79              KM  DEVELOPED CONDITION HEC-1 MODEL
80              BA  .0128
81              LS     0      98
82              UD  0.153
                *
83              KK   HON8
84              KM  REFERENCED FROM HONDA SITE DEVELOPMENT AS DVOFF8
85              KM  DEVELOPED CONDITION HEC-1 MODEL
86              BA  .0066
87              LS     0      85
88              UD  .130
                *
89              KK   HON9
90              KM  REFERENCED FROM HONDA SITE DEVELOPMENT AS DVOFF9
91              KM  DEVELOPED CONDITION HEC-1 MODEL
92              BA  .0108
93              LS     0      85
94              UD  0.102
                *
95              KK    C89
96              KM  COMBINE HON8 AND HON9
97              KM  REFERENCED FROM HONDA SITE DEVELOPMENT AS "COMBINE OFF8 AND OFF9"
98              HC     2
                *
99              KK    889
100             KM  ROUTE C89 THROUGH HON7
101             KM  REFERENCED FROM HONDA SITE DEVELOPMENT AS "ROUTE C89 THROUGH OFF7"
102             RK    160    .015    .017            TRAP       3     100
                *
103             KK   C789
104             KM  COMBINE C89 AND HON7
105             KM  REFERENCED FROM HONDA SITE DEVELOPMENT AS "COMBINE C89 AND OFF7"
106             HC     2
                *
107             KK   R789
108             KM  ROUTE C789 THROUGH HON5
109             KM  REFERENCED FROM HONDA SITE DEVELOPMENT AS "ROUTE C789 THROUGH OFF5"
```

```
                110         RK     560    .020    .017            TRAP       3     100
                            *
                111         KK    HON5
                112         KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS DVOFF5
                113         BA   .0059
                114         LS       0      98
                115         UD   0.090
                            *
1                                                        HEC-1 INPUT                                                    PAGE  4

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

                116         KK   C5789
                117         KM   COMBINE C789 AND HON5
                118         KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS "COMBINE C789 AND OFF5"
                119         HC       2
                            *
                120         KK   EXCPA
                121         KM   COMBINE C5789, C46 AND HON3 AND ROUTE THROUGH HON2
                122         KM   REFERENCED FROM HONDA SITE DEVELOPMENT
                123         HC       3
                            *
                124         KK    RCPA
                125         KM   ROUTE CONCENTRATION POINT "A" THROUGH HON2
                126         KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS "A THROUGH OFF2"
                127         RK     520    .017    .017             TRAP       3     100
                            *
                128         KK     C2A
                129         KM   COMBINE CPA AND HON2
                130         KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS"COMBINE CPA AND OFF2"
                131         HC       2
                            *
                132         KK     SH1
                133         KM   REFERENCED FROM SHEA COMMERCIAL-TENAYA AS ON1D
                134         KM   FUTURE CONDITION MODEL
                135         BA   .0037
                136         LS       0      92
                137         UD   0.064
                            *
                138         KK     SH2
                139         KM   REFERENCED FROM SHEA COMMERCIAL-TENAYA AS ON2D
                140         KM   FUTURE CONDITION MODEL
                141         BA   .0031
                142         LS       0      90
                143         UD    .050
                            *
                144         KK     SH3
                145         KM   REFERENCED FROM SHEA COMMERCIAL-TENAYA AS ON3D
                146         KM   FUTURE CONDITION MODEL
                147         KM   BASE FLOW NOT USED-HONDA BASINS WERE INCORPORATED INSTEAD OF BASE FLOW
                148         BA   .0077
                149         LS       0      92
                150         UD    .110
                            *
1                                                        HEC-1 INPUT                                                    PAGE  5

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

                151         KK     CP3
                152         KM   REFERENCED FROM SHEA COMMERCIAL-TENAYA-COMBINES SH1, SH2, & SH3
                153         HC       3
                            *
                154         KK  UTOFF1
                155         KM    FUTURE COMMERCIAL
                156         BA   .0153
                157         LS       0    93.0
                158         UD    .106
                            *
                159         KK  UTOFF3
                160         KM    FUTURE COMMERCIAL INCLUDING DISCOUNT TIRE
                161         BA   .0039
                162         LS       0    92.5
                163         UD    .078
                            *
                164         KK  UTOFF2
                165         KM    AZURE DRIVE
                166         BA   .0099
                167         LS       0    98.0
                168         UD    .168
                            *
                169         KK     CPW
                170         KM   COMBINATION OF SHEA (CP3), UTOFF1, UTOFF3, UTOFF2, & HONDA BASINS
```

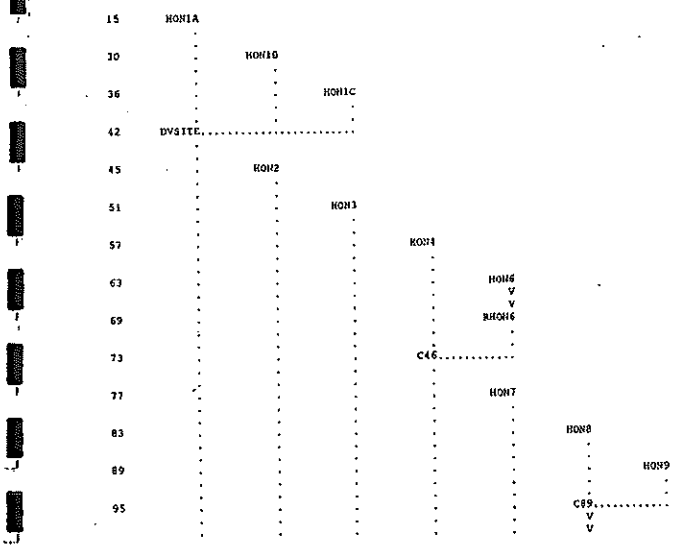
```
171          KK   FLOW IN AZURE @ WEST SIDE OF SITE
172          KC       6
             *
173          KK    ON1
174          KM   ONSITE COMMERCIAL TRIBUTARY TO AZURE
175          BA   .0029
176          LS      0    93.6
177          UD    .067
             *
178          KK    TEN4
179          KM   REFERENCED FROM TENAYA VILLAGE PHASE 1 MINI STORAGE AS DEON4
180          KM   FUTURE HEC-1 MODEL
181          BA    .004
182          LS      0      92
183          UD    .124
             *
184          KK    CPE
185          KM   COMBINATION OF TEN4, ON1, & CPW
186          KC       3
             *
```

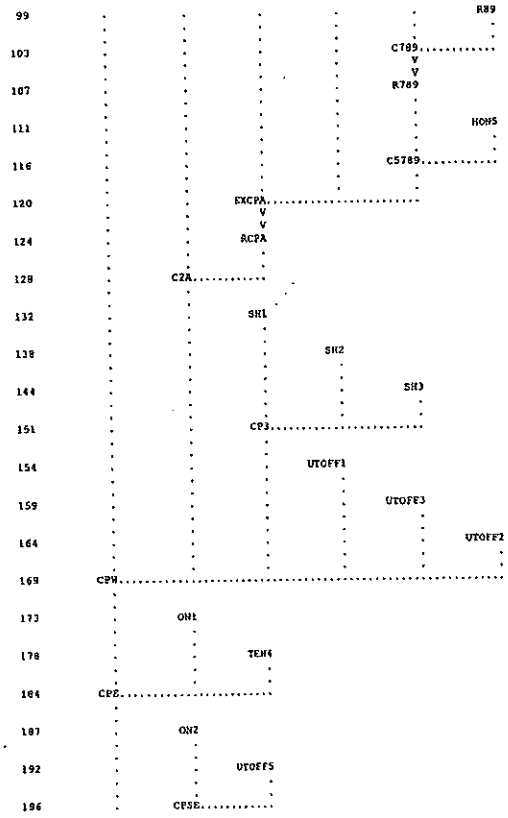


```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
187          KK    ON2
188          KM   ONSITE COMMERCIAL TRIBUTARY TO SITE TO THE EAST
189          BA   .0008
190          LS      0      94
191          UD    .056
             *
192          KK  UTOFF5
193          BA   .0015
194          LS      0    92.9
195          UD    .085
             *
196          KK    CPSE
197          KM   COMBINE ON2 & UTOFF5
198          KM   FLOW TO PARCEL EAST OF SITE
199          KC       2
200          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE — (V) ROUTING (---->) DIVERSION OR PUMP FLOW; (.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW





(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*          VERSION 4.1                  *
*                                       *
*  RUN DATE   29NOV06  TIME  14:29:22   *
*                                       *
*****************************************
```

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

TEMAYA/AZURE
ULTIMATE CONDITIONS
DESIGN STORM = 100-YEAR 6-HOUR STORM
STORM DISTRIBUTION = SDN3
JR CARDS BASED ON THE FOLLOWING VALUES

1.00 =100 YEAR
0.57 = 10 YEAR

12 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       .57
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  RATIO 2
                                                     1.00      .57

HYDROGRAPH AT
+               HON1A       .00     1   FLOW          9.       5.
                                        TIME       3.50     3.50

HYDROGRAPH AT
+               HON1B       .01     1   FLOW         12.       7.
                                        TIME       3.50     3.50

HYDROGRAPH AT
+               HON1C       .00     1   FLOW          1.       1.
                                        TIME       3.50     3.50

 3 COMBINED AT
+               DVSITE      .01     1   FLOW         22.      12.
                                        TIME       3.50     3.50

HYDROGRAPH AT
+               HON2        .01     1   FLOW         22.      12.
                                        TIME       3.50     3.50

HYDROGRAPH AT
+               HON3        .01     1   FLOW         25.      14.
                                        TIME       3.50     3.50

HYDROGRAPH AT
+               HON4        .00     1   FLOW          8.       5.
                                        TIME       3.50     3.50

HYDROGRAPH AT
+               HON6        .02     1   FLOW         31.      17.
                                        TIME       3.58     3.58

ROUTED TO
+               RHON6       .02     1   FLOW         30.      17.
                                        TIME       3.58     3.58

 2 COMBINED AT
+               C46         .02     1   FLOW         37.      21.
                                        TIME       3.58     3.58

HYDROGRAPH AT
+               HON7        .01     1   FLOW         23.      13.
                                        TIME       3.58     3.58

HYDROGRAPH AT
+               HON8        .01     1   FLOW          8.       3.
                                        TIME       3.58     3.58

HYDROGRAPH AT
+               HON9        .01     1   FLOW         14.       5.
                                        TIME       3.50     3.58

 2 COMBINED AT
+               C89         .02     1   FLOW         21.       8.
                                        TIME       3.58     3.59
```

ROUTED TO	R89	.02	1	FLOW	21.	8.
				TIME	3.58	3.58
2 COMBINED AT	C789	.03	1	FLOW	45.	21.
				TIME	3.58	3.58
ROUTED TO	R789	.03	1	FLOW	44.	20.
				TIME	3.58	3.58
HYDROGRAPH AT	HON5	.01	1	FLOW	12.	7.
				TIME	3.50	3.50
2 COMBINED AT	C5789	.04	1	FLOW	54.	26.
				TIME	3.58	3.58
3 COMBINED AT	EXCPA	.07	1	FLOW	112.	58.
				TIME	3.58	3.58
ROUTED TO	RCPA	.07	1	FLOW	111.	58.
				TIME	3.58	3.58
2 COMBINED AT	C2A	.08	1	FLOW	127.	66.
				TIME	3.58	3.58
HYDROGRAPH AT	SH1	.00	1	FLOW	7.	3.
				TIME	3.50	3.50
HYDROGRAPH AT	SH2	.00	1	FLOW	6.	3.
				TIME	3.50	3.50
HYDROGRAPH AT	SH3	.01	1	FLOW	13.	6.
				TIME	3.50	3.58
3 COMBINED AT	CP3	.01	1	FLOW	26.	12.
				TIME	3.50	3.50
HYDROGRAPH AT	UTOFF1	.02	1	FLOW	26.	13.
				TIME	3.50	3.50
HYDROGRAPH AT	UTOFF3	.00	1	FLOW	7.	3.
				TIME	3.50	3.50
HYDROGRAPH AT	UTOFF2	.01	1	FLOW	18.	10.
				TIME	3.58	3.58
6 COMBINED AT	CPW	.13	1	FLOW	224.	114.
				TIME	3.50	3.50
HYDROGRAPH AT	ON1	.00	1	FLOW	6.	3.
				TIME	3.50	3.50
HYDROGRAPH AT	TEN4	.00	1	FLOW	6.	3.
				TIME	3.50	3.58
3 COMBINED AT	CPE	.14	1	FLOW	236.	120.
				TIME	3.50	3.50
HYDROGRAPH AT	ON2	.00	1	FLOW	2.	1.
				TIME	3.50	3.50
HYDROGRAPH AT	UTOFF5	.00	1	FLOW	3.	1.
				TIME	3.50	3.50
2 COMBINED AT	CPSE	.00	1	FLOW	4.	2.
				TIME	3.50	3.50

1

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

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	INTERPOLATED TO COMPUTATION INTERVAL PEAK	TIME TO PEAK	VOLUME

DOESNT INCLUDE THE 55 cfs in SD...

$Q_{100} = 236 - 55 = 181$

$Q_{10} = 120 - 55 = 65$

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

          FOR PLAN = 1  RATIO= 1.00
             RHON6  MANE          1.38      30.49     216.69      2.55      5.00      29.99     215.00       2.55

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2262E+01 EXCESS= .0000E+00 OUTFLOW= .2264E+01 BASIN STORAGE= .1410E-07 PERCENT ERROR=   -.3

          FOR PLAN = 1  RATIO=  .57
             RHON6  MANE          1.68      16.98     217.95      1.36      5.00      16.55     215.00       1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1209E+01 EXCESS= .0000E+00 OUTFLOW= .1212E+01 BASIN STORAGE= .1136E-07 PERCENT ERROR=   -.2

          FOR PLAN = 1  RATIO= 1.00
                R89  MANE           .29      21.42     215.12      1.40      5.00      21.41     215.00       1.40

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1296E+01 EXCESS= .0000E+00 OUTFLOW= .1297E+01 BASIN STORAGE= .1212E-10 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .57
                R89  MANE           .44       7.98     215.28       .50      5.00       7.96     215.00        .50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4664E+00 EXCESS= .0000E+00 OUTFLOW= .4664E+00 BASIN STORAGE= .1140E-10 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO= 1.00
               R789  MANE           .71      44.35     216.07      1.88      5.00      43.99     215.00       1.89

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3032E+01 EXCESS= .0000E+00 OUTFLOW= .3034E+01 BASIN STORAGE= .1026E-08 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .57
               R789  MANE           .85      20.69     216.75       .87      5.00      20.32     215.00        .87

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1394E+01 EXCESS= .0000E+00 OUTFLOW= .1395E+01 BASIN STORAGE= .1025E-08 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO= 1.00
               RCPA  MANE           .61     111.42     215.00      2.26      5.00     111.42     215.00       2.26

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9283E+01 EXCESS= .0000E+00 OUTFLOW= .9286E+01 BASIN STORAGE= .1857E-07 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .57
               RCPA  MANE           .67      57.69     215.56      1.14      5.00      57.57     215.00       1.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4200E+01 EXCESS= .0000E+00 OUTFLOW= .4202E+01 BASIN STORAGE= .2013E-07 PERCENT ERROR=    .0


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

APPENDIX B – HYDRAULIC CALCS

Northwest Neighborhood Study Exhibits

Cross Section Calculations 100-Year

Dry Lane Calculations

SITE

CITY OF LAS VEGAS NEVADA

NORTHWEST NEIGHBORHOOD STUDY

LEGEND

—— SUB-BASIN BOUNDARY

←→ FLOW ARROW

250	10-YEAR STREET FLOW
500	100-YEAR STREET FLOW
300	10-YEAR FACILITY FLOW
800	100-YEAR FACILITY FLOW

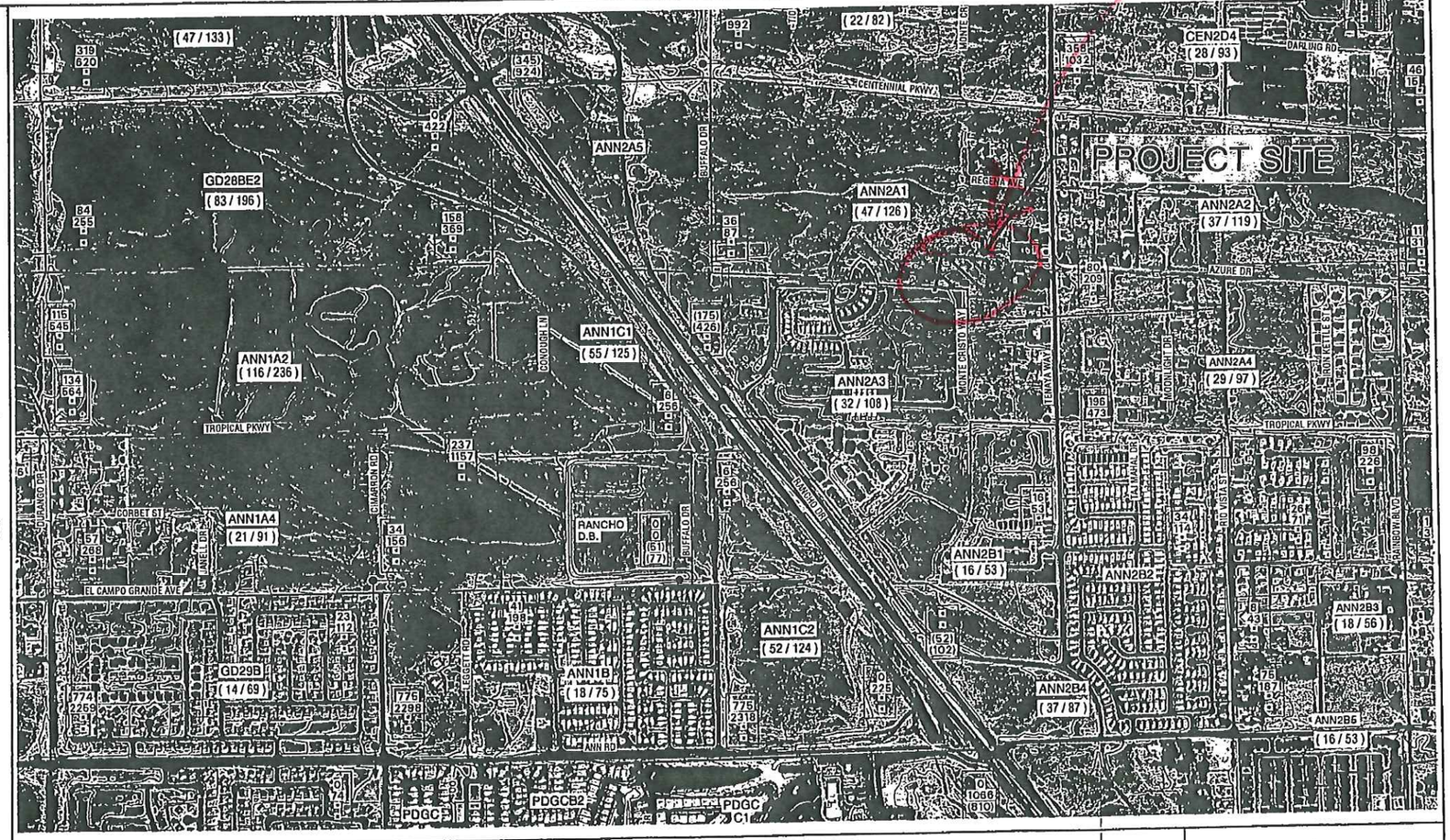
(FLOWS IN CFS)

BWJS ←→ Basin-ID

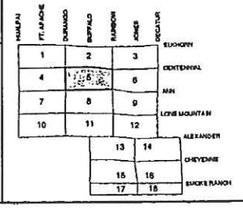
(13 / 59) ←→ Contributing flow (10-Year / 100-Year) from the basin (cfs)

PHOTO DATE: APRIL 1998

FIGURE E-5



EXISTING DRAINAGE CONDITIONS



PBS&J POST, BUCKLEY, SCHUH & JERNIGAN, INC.

ENGINEERING PLANNING SURVEYING GIS

601, N. Green Valley Pkwy, Ste 100, Henderson NV 89014
Phone: (702) 263-7276 Fax: (702) 263-7200

REVISED SEPTEMBER 1999

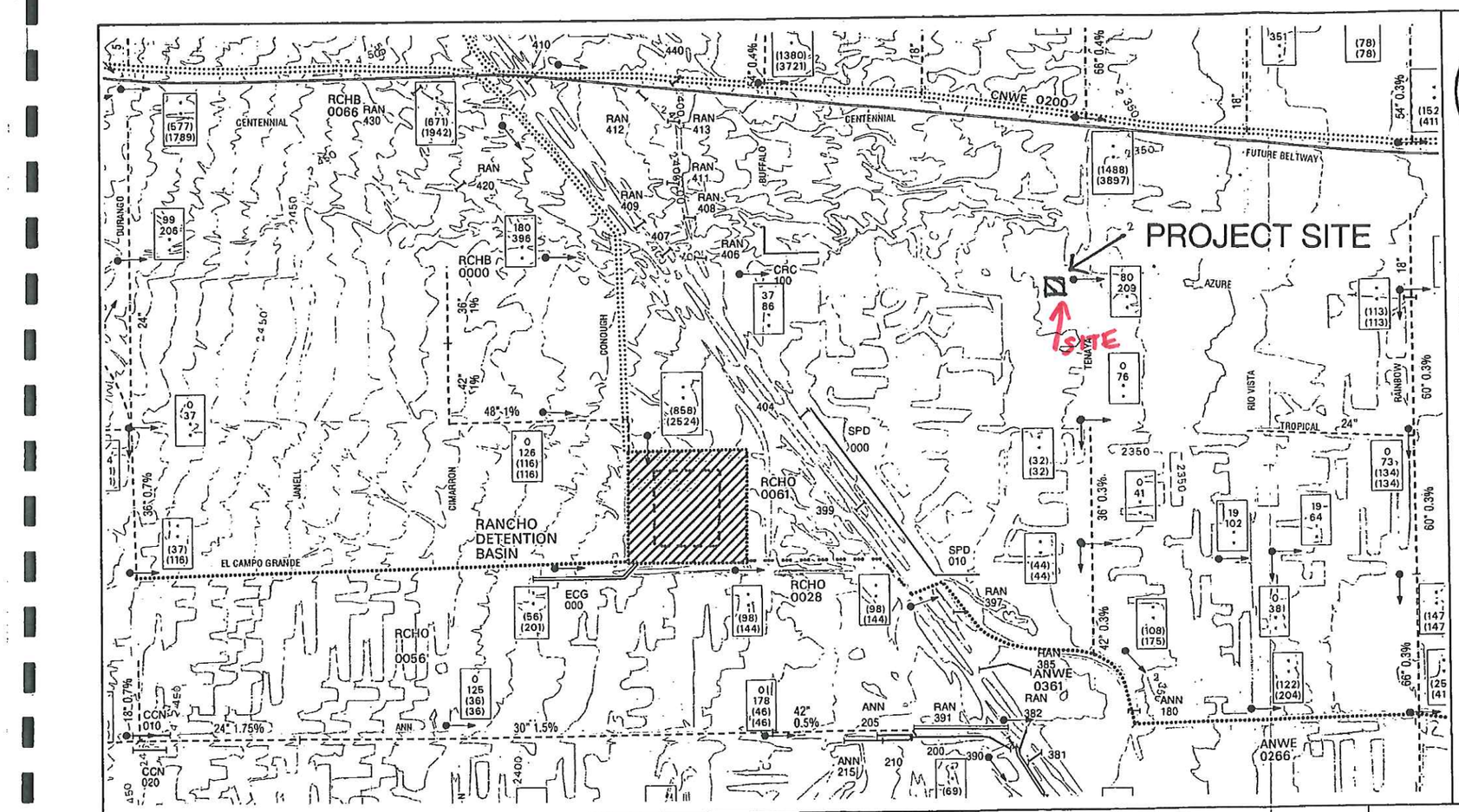
NOTE:
Existing conditions are based on future CN values with only existinig local and CCRFCD facilities in place

N W E S

800 600 400 200 0 400 800

(IN FEET)

SCALE: 1 INCH = 800 FEET


PROJECT SITE
SITE
RANCHO DETENTION BASIN
RCHB 0066
RCHB 0000
RCHO 0061
RCHO 0056
RCHO 0028
CRC 100
ECG 000
ANWE 0361
ANWE 0266
CNWE 0200
CENTENNIAL
FUTURE BELTWAY
DURANGO
BUFFALO
CONDUIT
CIMARRON
JANELL
EL CAMPO GRANDE
AZURE
TENAYA
RIO VISTA
RAINBOW
TROPICAL
SPD 000
SPD 010
RAN 430
RAN 420
RAN 412
RAN 413
RAN 411
RAN 409
RAN 408
RAN 407
RAN 406
RAN 397
RAN 391
RAN 385
RAN 382
ANN 205
ANN 215
ANN 180
CCN 010
CCN 020
CITY OF LAS VEGAS NEVADA
NORTHWEST NEIGHBORHOOD STUDY
LEGEND
EXISTING REGIONAL DETENTION BASINS
PROPOSED REGIONAL DETENTION BASINS
EXISTING LOCAL DETENTION BASINS
EXISTING REGIONAL BRIDGES
PROPOSED REGIONAL BRIDGES
EXISTING LOCAL BRIDGES
EXISTING REGIONAL CULVERT
PROPOSED REGIONAL CULVERT
EXISTING LOCAL CULVERT
EXISTING REGIONAL PIPELINE
PROPOSED REGIONAL PIPELINE
EXISTING LOCAL PIPELINE
PROPOSED LOCAL PIPLINE
EXISTING REGIONAL CHANNEL
PROPOSED REGIONAL CHANNEL
EXISTING LOCAL CHANNEL
PROPOSED REGIONAL PIPELINE (Not Included in 1998 MPU)
PROPOSED REGIONAL CHANNEL (Not Included in 1998 MPU)
EXISTING REGIONAL DIKE/LEVEE
PROPOSED REGIONAL DIKE/LEVEE
EXISTING LOCAL DIKE/LEVEE
EXISTING STORM WATER PUMPING STATION
PROPOSED BELTWAY ALIGNMENT
FIGURE F-5
FLOW ARROW
250 10-YEAR STREET FLOW
600 100-YEAR STREET FLOW
(300) 10-YEAR FACILITY FLOW
[800] 100-YEAR FACILITY FLOW
(FLOWS IN CFS)
NOTE:
Ultimate drainage conditions are based on future CN values with all flood control facilities in place
See the "September 1999 City of Las Vegas Northwest Neighborhood Study Phase 2" for proposed facilities in and north of Elkhorn.
800 600 400 200 0 400 800
(IN FEET)
SCALE: 1 INCH = 800 FEET
REVISED SEPTEMBER 1999
HUALAPAI
FT. APACHE
DURANGO
BUFFALO
RAINBOW
JONES
DECATUR
ELKHORN
CENTENNIAL
ANN
LONE MOUNTAIN
ALEXANDER
CHEYENNE
EDICH RANCH
FUTURE DRAINAGE CONDITIONS
PBS&J
801 North Green Valley Parkway, Suite 100
Henderson, Nevada 89014-6139
Phone: 702/263-7276
Fax: 702/263-7200

SECT 1 10 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	SECT 1 AZURE DRIVE 10 Y
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	0.8000	%
Discharge	59.00	cfs

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

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.69	ft
Elevation Range	0.00 to 2.00	
Flow Area	17.0	ft²
Wetted Perimeter	67.18	ft
Top Width	65.93	ft
Actual Depth	0.69	ft
Critical Elevation	0.73	ft
Critical Slope	0.5339	%
Velocity	3.47	ft/s
Velocity Head	0.19	ft
Specific Energy	0.88	ft
Froude Number	1.21	
Flow Type	Supercritical	

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
1+00.00	1+07.00	0.013
1+07.00	1+93.00	0.016
1+93.00	2+00.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
1+00.00	2.00
1+00.00	0.60
1+05.00	0.50
1+05.50	0.48
1+05.50	0.00
1+07.00	0.13
1+07.00	0.17
1+50.00	1.03

DRY LANE = 12' + 7' Curb = 19' TOTAL

19' @ 0.02 = 0.38

C_L = 1.03

DISTANCE = 1.03 CL
- 0.38 DRY

0.65 MAX Height

0.69 > 0.65 DRY LANE IS NOT MET by .04' vertical 2' HORIZONTAL

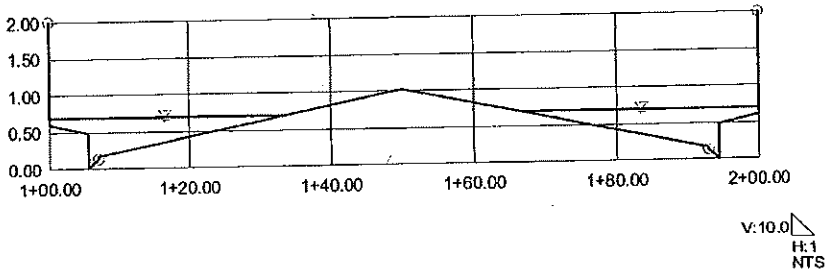
SECT 1 10 YEAR
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
1+93.00	0.17
1+93.00	0.13
1+94.50	0.00
1+94.50	0.48
1+95.00	0.50
2+00.00	0.60
2+00.00	2.00

X-Section 1: Q10
Cross Section for Irregular Channel

Project Description	
Worksheet	SECT 1 AZURE DRIVE 10 Y
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.015
Channel Slope	0.8000 %
Water Surface Elevation	0.69 ft
Elevation Range	0.00 to 2.00
Discharge	59.00 cfs



SECT 1 100 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	SECT 1 AZURE DRIVE 100 Y
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	0.8000	%
Discharge	169.00	cfs

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

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.93	ft
Elevation Range	0.00 to 2.00	
Flow Area	36.2	ft²
Wetted Perimeter	92.13	ft
Top Width	90.39	ft
Actual Depth	0.93	ft
Critical Elevation	1.02	ft
Critical Slope	0.4540	%
Velocity	4.67	ft/s
Velocity Head	0.34	ft
Specific Energy	1.27	ft
Froude Number	1.30	
Flow Type	Supercritical	

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
1+00.00	1+07.00	0.013
1+07.00	1+93.00	0.016
1+93.00	2+00.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
1+00.00	2.00
1+00.00	0.60
1+05.00	0.50
1+05.50	0.48
1+05.50	0.00
1+07.00	0.13
1+07.00	0.17
1+50.00	1.03

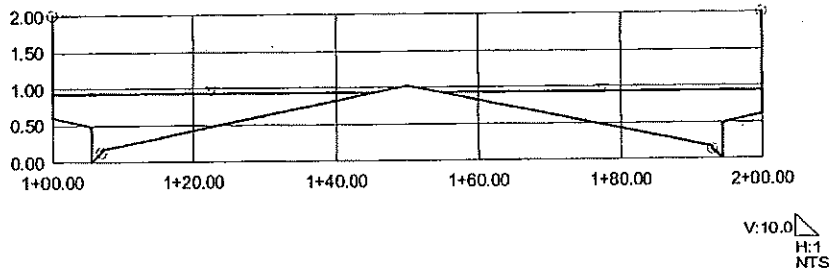
SECT 1 100 YEAR
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
1+93.00	0.17
1+93.00	0.13
1+94.50	0.00
1+94.50	0.48
1+95.00	0.50
2+00.00	0.60
2+00.00	2.00

X-Section 1: Q100
Cross Section for Irregular Channel

Project Description	
Worksheet	SECT 1 AZURE DRIVE 100 Y
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.015
Channel Slope	0.8000 %
Water Surface Elevation	0.93 ft
Elevation Range	0.00 to 2.00
Discharge	169.00 cfs



SECT 2 10 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	SECT 2 AZURE DRIVE 10 Y
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	0.9000	%
Discharge	65.00	cfs

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

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.70	ft
Elevation Range	0.00 to 2.00	
Flow Area	17.5	ft²
Wetted Perimeter	67.89	ft
Top Width	66.63	ft
Actual Depth	0.70	ft ←
Critical Elevation	0.75	ft
Critical Slope	0.5264	%
Velocity	3.72	ft/s
Velocity Head	0.22	ft
Specific Energy	0.91	ft
Froude Number	1.28	
Flow Type	Supercritical	

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
1+00.00	1+07.00	0.013
1+07.00	1+93.00	0.016
1+93.00	2+00.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
1+00.00	2.00
1+00.00	0.60
1+05.00	0.50
1+05.50	0.48
1+05.50	0.00
1+07.00	0.13
1+07.00	0.17
1+50.00	1.03

Dry Lane = 12' + 7' center = 19' Total

19' @ 0.02 = 0.38

C_L = 1.03

Distance = 1.03 C_L

$-\ 0.38$ Dry

0.65 Max Height

0.70 > 0.65 Dry Lane is not met by 0.05' vertical 2.5' horizontal

SECT 2 10 YEAR
Worksheet for Irregular Channel

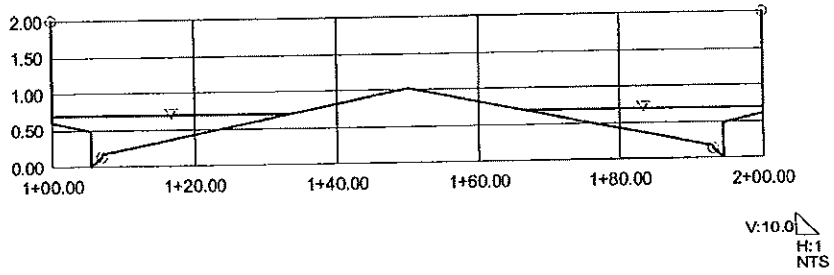
Natural Channel Points	
Station (ft)	Elevation (ft)
1+93.00	0.17
1+93.00	0.13
1+94.50	0.00
1+94.50	0.48
1+95.00	0.50
2+00.00	0.60
2+00.00	2.00

© Haestad Methods, Inc.
Wood Rodgers Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

X-Section 2: Q10
Cross Section for Irregular Channel

Project Description	
Worksheet	SECT 2 AZURE DRIVE 10 Y
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.015	
Channel Slope	0.9000	%
Water Surface Elevation	0.70	ft
Elevation Range	0.00 to 2.00	
Discharge	65.00	cfs



SECT 2 100 YEAR
Worksheet for Irregular Channel

Project Description	
Worksheet	SECT 2 AZURE DRIVE 100 Y
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Channel Slope	0.9000	%
Discharge	161.00	cfs

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

Results		
Mannings Coefficient	0.015	
Water Surface Elevation	0.94	ft
Elevation Range	0.00 to 2.00	
Flow Area	36.4	ft²
Wetted Perimeter	92.41	ft
Top Width	90.67	ft
Actual Depth	0.94	ft
Critical Elevation	1.04	ft
Critical Slope	0.4480	%
Velocity	4.97	ft/s
Velocity Head	0.38	ft
Specific Energy	1.32	ft
Froude Number	1.38	
Flow Type	Supercritical	

Calculation Messages:
Flow is divided.

Roughness Segments		
Start Station	End Station	Mannings Coefficient
1+00.00	1+07.00	0.013
1+07.00	1+93.00	0.016
1+93.00	2+00.00	0.013

Natural Channel Points	
Station (ft)	Elevation (ft)
1+00.00	2.00
1+00.00	0.60
1+05.00	0.50
1+05.50	0.48
1+05.50	0.00
1+07.00	0.13
1+07.00	0.17
1+50.00	1.03

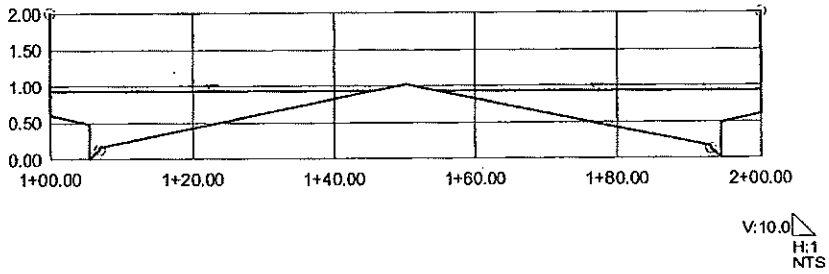
SECT 2 100 YEAR
Worksheet for Irregular Channel

Natural Channel Points	
Station (ft)	Elevation (ft)
1+93.00	0.17
1+93.00	0.13
1+94.50	0.00
1+94.50	0.48
1+95.00	0.50
2+00.00	0.60
2+00.00	2.00

X-Section 2: Q100
Cross Section for Irregular Channel

Project Description	
Worksheet	SECT 2 AZURE DRIVE 100 Y
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.015
Channel Slope	0.9000 %
Water Surface Elevation	0.94 ft
Elevation Range	0.00 to 2.00
Discharge	181.00 cfs



APPENDIX C – REFERENCE MATERIALS

Property Conditions

Commercial Subdivision Map

Findlay-Shack Honda

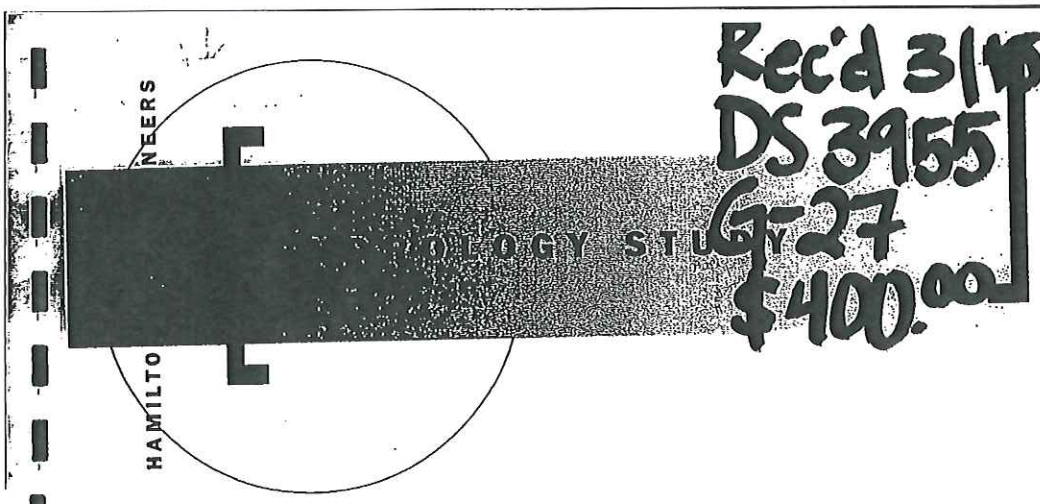
Shea Commercial-Tenaya

Tenaya Village Phase 1 Mini Storage

Montecito East L.L.C.

Ranch House Estates

Rec'd 3/15/06
DS 3955
GF-27
$400.00



Findlay-Shack Honda

APN 125-27-101-036

March 15, 2006
ADDENDUM #1 (CLV #DS-3955)

HAMILTON ENGINEERS

3945 Pebble Creek Avenue • Las Vegas • Nevada • 89147
Ph: (702) 580-3658 • Fax: (702) 247-4507 • Email: John@HamiltonCivilEngineers.com

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM					DATE: March 29, 2006
TO: **Land Development Services** Department of Public Works					FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Hydrology Study: **Findlay - Shack Honda**				COPIES TO: Hamilton Civil Engineers
Cross Streets:	North of Azure Dr. between US95 & Tenaya				Findlay Cliff & Donna Family Trust
File Number:	F:\Depot\DSMEMOS\DS3955B.doc				Bart Anderson, P.E., DevCo
Parcel Number:	125-27-101-036				CCPW
Zoning Action:	SUP-9966 & SDR-9641				
FEMA Flood Zone	YES		NO	X	
Proposed Storm Drain	YES		NO	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Trn. No.
1st Submittal	2/13/2006	2/27/2006	Not Approved	$400.00	38584: $400
2nd Submittal	3/15/2006	3/29/2006	See Comments Below	$400.00	40731: $400
			TOTAL FEES (LDDRS):	**$800.00**	---

REMARKS:

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

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

1. The improvement plans submitted shows the project separated into two phases. A drainage study update will be required for each phase addressing the interim condition.

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

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

END OF REMARKS
B&H/ays

T/R/S: T19S/R60E/27
AREA G-27

HAMILTON CIVIL ENGINEERS

APPENDIX – B

HYDROLOGY-EXISTING CONDITION
Standard Form 4 and HEC-1 Analysis

elevation of the drainage swale at Section QD is 2378.29 ft and the resulting water surface elevation at Section QD is 2378.93 ft, which is 1.77 ft lower than the proposed finish floor elevation of 2380.70 ft for the proposed building. Further, the proposed building elevation of 2380.70 ft is more than 1.5 ft above centerline asphalt grade of Azure Drive.

Street Flow:

At the southeasterly boundary of the site within Azure Drive, the anticipated Q10 and Q100 surface flow is on the magnitude of 73 and 149 cfs respectively. The following table provides the Street Flow Characteristics for the half-street section of Azure Drive being on the north side.

Table 3 - DEVELOPED CONDITION
AZURE DRIVE – 90 FT R/W

Description	Slope (%)	10 YEAR EVENT Q (cfs)	D (ft)	V (fps)	V*D	100 YEAR EVENT Q (cfs)	D (ft)	V (fps)	V*D
Azure Drive (Half-Street)	1.8%	73	0.75	6.31	4.7	149	0.97	8.34	8.0

Azure Drive is a fully improved right-of-way and is equipped with a storm drain system approximately 80 ft downstream of the site that was constructed as a part of the City of Las Vegas Tenaya Way / Azure Drive Roadway Improvements.

At the southeasterly corner of the site, the 12 ft dry lane criteria is not met and the velocity times depth product exceeds 6 for the Q_{10} storm event, which does not conform to the **Section 300** of the regional guidelines at that specific location, however, the City of Las Vegas storm drain system provided by the City of Las Vegas as a part of the Tenaya Way/Azure Drive Roadway Improvements commences approximately 80 ft downstream of the site and will serve to intercept these flows providing the required mitigation conforming to **Section 300** of the Clark County regional guidelines. **Section 300** requirements as it pertains to the Q_{100} storm event do satisfy regional requirements. It should be specifically noted that this hydrology study incorporates an increased RCN value of 98 as opposed to 92 as approved within the Tenaya Way / Azure Drive Roadway Improvements as well as incorporates certain tributary drainage basin areas identified as OFF6 (10.7 Acres), OFF7 (8.2 Acres), and OFF8 (4.2 Acres) for a total of 23.1 Acres. These additional basin areas and increased RCN value were incorporated to ensure adequate flood protection of the site.

HAMILTON CIVIL ENGINEER

STANDARD FORM 4

HCE 05-500-005 : Findlay-Shack Honda

Basin	RCN	K	Total AREA (Ac)	Total AREA (Sq.Mi.)	Length (ft)	Slope (%)	T_i (min)	Length (ft)	Slope (%)	Vel (ft/s)	T_t (min)	Total Length (ft)	$T_c=T_i+T_t$ (min)	$T_c=(L/180)+10$ (min)	Final T_c (min)	T_{LAG} [hrs]	Comments
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
																$T_{LAG}=0.6T_c$	
							$K=0.0132 * RCN - 0.39$				$T_t=1.8\,(1.1-K)\,L^{1/2} / S^{1/3}$						
DRAINGE BASINS - EXISTING CONDITION																	
EX-SITE	85.0	0.732	6.70	0.0105	50	1.0	4.68	600	1.25	3.20	3.13	650	7.81	13.61	7.81	0.078	Use 0.100 hr (Tc=10 minutes) per Section 602 (CCRFCD Manual)
OFF-1	85.0	0.732	8.00	0.0125	50	1.0	4.68	2000	2.50	4.37	7.64	2050	12.32	21.39	12.32	0.123	
OFF-2	85.0	0.732	6.40	0.0100	50	1.0	4.68	520	1.70	3.59	2.42	570	7.10	13.17	7.10	0.071	Use 0.100 hr (Tc=10 minutes) per Section 602 (CCRFCD Manual)
OFF-3	85.0	0.732	7.70	0.0120	50	1.0	4.68	640	2.50	4.30	2.48	690	7.17	13.83	7.17	0.072	Use 0.100 hr (Tc=10 minutes) per Section 602 (CCRFCD Manual)
OFF-4	85.0	0.732	2.60	0.0041	50	1.0	4.68	640	2.50	3.26	3.27	690	7.95	13.83	7.95	0.080	Use 0.100 hr (Tc=10 minutes) per Section 602 (CCRFCD Manual)
OFF-5	85.0	0.732	3.80	0.0059	50	1.0	4.68	640	2.00	3.38	3.16	690	7.84	13.83	7.84	0.078	Use 0.100 hr (Tc=10 minutes) per Section 602 (CCRFCD Manual)
OFF-6	85.0	0.732	10.70	0.0167	50	1.0	4.68	1400	1.70	4.04	5.77	1450	10.46	18.06	10.46	0.105	
OFF-7	85.0	0.732	8.20	0.0128	50	1.0	4.68	1480	1.50	3.60	6.84	1530	11.53	18.50	11.53	0.115	
OFF-8	85.0	0.732	4.20	0.0066	50	1.0	4.68	1520	1.50	3.03	8.36	1570	13.04	18.72	13.04	0.130	
OFF-9	85.0	0.732	6.90	0.0108	50	1.0	4.68	1160	1.50	3.49	5.55	1210	10.23	16.72	10.23	0.102	
OFF-10	85.0	0.732	4.10	0.0064	50	1.0	4.68	640	1.50	3.03	3.52	690	8.20	13.83	8.20	0.082	Use 0.100 hr (Tc=10 minutes) per Section 602 (CCRFCD Manual)
OFF-11	85.0	0.732	2.70	0.0042	50	1.0	4.68	595	1.50	2.69	3.68	645	8.36	13.58	8.36	0.084	Use 0.100 hr (Tc=10 minutes) per Section 602 (CCRFCD Manual)

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

RUN DATE  08FEB05 TIME  08:57:15
```


```
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
XXXXXX  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 -ANSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 20 SEP 91. 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

EXISTING CONDITION
EXISTING CONDITION
EXISTING CONDITION
EXISTING CONDITION
EXISTING CONDITION
EXISTING CONDITION
EXISTING CONDITION
EXISTING CONDITION
EXISTING CONDITION
EXISTING CONDITION

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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
    1     ID
          *DIAGRAM
    2     ID
    3     ID  **********************
    4     ID  **********************
    5     ID  EXISTING CONDITION
    6     ID  **********************
    7     ID  **********************
    8     ID
    9     ID
   10     ID  ***** FINDLAY-SHACK HONDA
   11     ID  ***** APN 125-27-101-036
   12     ID  ***** HCE PROJECT NO. 05-500-005
   13     ID
   14     ID        ANALYSIS BY:    JOHN R. HAMILTON, P.E.
   15     ID                        HAMILTON CIVIL ENGINEERS
   16     ID                        3945 PEBBLE CREEK AVENUE
   17     ID                        LAS VEGAS, NEVADA 89147
   18     ID                        PHONE: (702) 580-3658
   19     ID                        FAX: (702) 247-4507
   20     ID
   21     ID
   22     ID  100-YR STORM EVENT RATIO FOR (JR) CARD: 1.0000
   23     ID   10-YR STORM EVENT RATIO FOR (JR) CARD: 0.5704
   24     ID
   25     ID  THE PROJECT SITE IS LOCATED WITHIN THE
   26     ID  NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4)
   27     ID  OF SECTION 27, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M.,
   28     ID  CLARK COUNTY, NEVADA.
   29     ID  WHICH IS PART OF THE McCARREN AIRPORT RAINFALL AREA.
   30     ID  BY THE CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT, THE FOLLOWING
   31     ID  PRECIPITATION VALUES WERE DETERMINED.
   32     ID
   33     ID              100-YEAR, 6-HOUR : 2.77 INCHES
   34     ID               10-YEAR, 6-HOUR : 1.59 INCHES
   35     ID          10 YR / 100 YR RATIO : 0.5704  (REFER TO JR CARD)
   36     ID
   37     IT      5       0       0     300
   38     IO      5       0       0
   39     IN      5       0       0
   40     JR   PREC   1.000   0.5704

   41     KK  EXSITE
   42     BA   .0105
   43     PB   2.77
   44     PC   0.000   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
   45     PC   0.130   0.130   0.130   0.131   0.140   0.142   0.148   0.158   0.172   0.181
   46     PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
   47     PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   48     PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   49     PC   0.860   0.868   0.876   0.888   0.910   0.925   0.937   0.950   0.970   0.976
   50     PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
   51     PC   0.998   0.999   1.000
   52     LS      0      85
   53     UD    .100
```

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

  54      KK  EXOFF1
  55      BA   .0125
  56      LS      0       85
  57      UD   0.123

  58      KK  EXOFF2
  59      BA   .0100
  60      LS      0       85
  61      UD   0.100

  62      KK  EXOFF3
  63      BA   .0120
  64      LS      0       85
  65      UD   0.100

  66      KK  EXOFF4
  67      BA   .0041
  68      LS      0       85
  69      UD   0.100

  70      KK  EXOFF6
  71      BA   .0167
  72      LS      0       85
  73      UD   0.105

  74      KK   ROFF6
  75      KM   ROUTE OFF6 THROUGH OFF4
  76      RK     680    .017    .035            TRAP      3       1

  77      KK     C46
  78      KM   COMBINE OFF4 AND OFF6
  79      HC       2

  80      KK  EXOFF7
  81      BA   .0120
  82      LS      0       85
  83      UD   0.115

  84      KK  EXOFF8
  85      BA   .0065
  86      LS      0       85
  87      UD   0.130

  88      KK  EXOFF9
  89      BA   .0108
  90      LS      0       85
  91      UD   0.102

  92      KK     C89
  93      KM   COMBINE OFF8 AND OFF9
  94      HC       2
```

HEC-1 INPUT

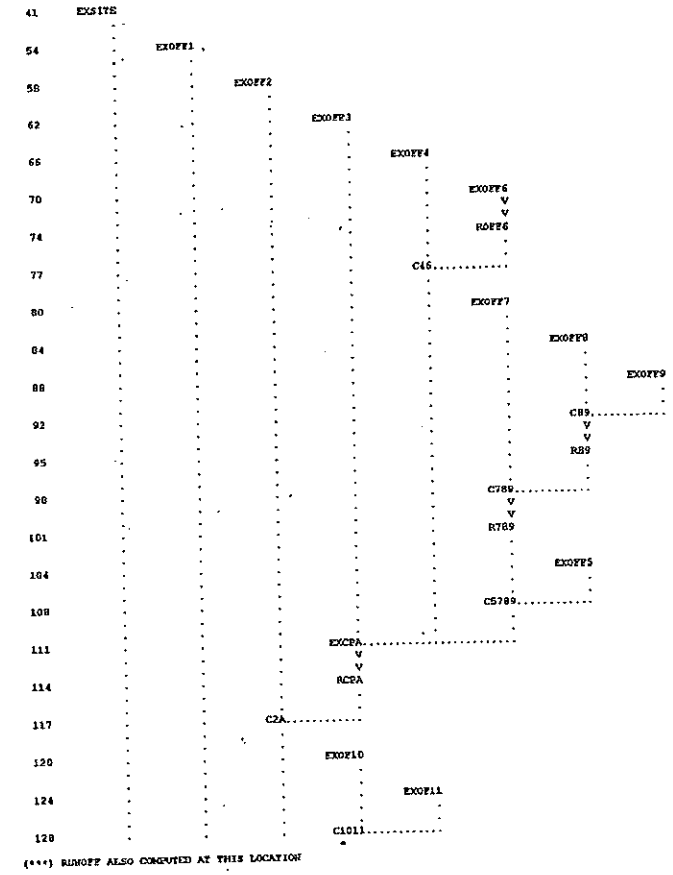
```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   95     KK    R89
   96     KM    ROUTE C89 THROUGH OFF7
   97     RK     160    .015    .035             TRAP       3       3

   98     KK    C789
   99     KM    COMBINE C89 AND OFF7
  100     HC      2

  101     KK    R789
  102     KM    ROUTE C789 THROUGH OFF5
  103     RK     560    .020    .035             TRAP       3       3

  104     KK  EXOFF5
  105     BA  .0059
  106     LS      0       85
  107     UD  0.100

  108     KK    C5789
  109     KM    COMBINE C789 AND OFF5
  110     HC      2

  111     KK    EXCPA
  112     KM    COMBINE C5789, C46 AND OFF3 AND ROUTE THROUGH OFF2
  113     HC      3

  114     KK    RCPA
  115     KM    ROUTE CONCENTRATION POINT "A" THROUGH OFF2
  116     RK     520    .017    .035             TRAP       3       3

  117     KK    C2A
  118     KM    COMBINE CPA AND OFF2
  119     HC      2

  120     KK  EXOF10
  121     BA  .0054
  122     LS      0       85
  123     UD  0.100

  124     KK  EXOF11
  125     BA  .0042
  126     LS      0       85
  127     UD  0.100

  128     KK    C1011
  129     KM    COMBINE OFF10 AND OFF11
  130     HC      2
  131     ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.

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

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



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*************************************
*                                   *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)*
*            JUN  1998              *
*         VERSION 4.1               *
*                                   *
* RUN DATE  08FEB06  TIME 09:57:15  *
*                                   *
*************************************
```

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

****
****
EXISTING CONDITION
****
****

***** FINDLAY-SHACK HONDA
***** APN 125-27-101-036
***** HCE PROJECT NO. 05-500-005

ANALYSIS BY: JOHN R. HAMILTON, P.E.
HAMILTON CIVIL ENGINEERS
3945 REDHILL CREEK AVENUE
LAS VEGAS, NEVADA 89147
PHONE: (702) 580-3658
FAX: (702) 247-4507

100-YR STORM EVENT RATIO FOR (JR) CARD: 1.0000
10-YR STORM EVENT RATIO FOR (JR) CARD: 0.5704

THE PROJECT SITE IS LOCATED WITHIN THE
NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4)
OF SECTION 27, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M.,
CLARK COUNTY, NEVADA.
WHICH IS PART OF THE McCARREN AIRPORT RAINFALL AREA.
BY THE CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT, THE FOLLOWING
PRECIPITATION VALUES WERE DETERMINED.

100-YEAR, 6-HOUR : 2.77 INCHES
10-YEAR, 6-HOUR : 1.58 INCHES
10 YR / 100 YR RATIO : 0.5704 (REFER TO JR CARD)

```
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
                NDATE    2   0  ENDING DATE
                NTIME        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       .57
```

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 .57
HYDROGRAPH AT	EXSITE	.01	1	FLOW	13.	5.
+				TIME	3.50	3.58
HYDROGRAPH AT	EXOFF1	.01	1	FLOW	16.	6.
+				TIME	3.58	3.58
HYDROGRAPH AT	EXOFF2	.01	1	FLOW	13.	5.
+				TIME	3.50	3.58
HYDROGRAPH AT	EXOFF3	.01	1	FLOW	15.	6.
+				TIME	3.50	3.58
HYDROGRAPH AT	EXOFF4	.00	1	FLOW	5.	2.
+				TIME	3.50	3.58
HYDROGRAPH AT	EXOFF6	.02	1	FLOW	21.	8.
+				TIME	3.50	3.58
ROUTED TO	ROFF6	.02	1	FLOW	21.	8.
+				TIME	3.58	3.58
2 COMBINED AT	C46	.02	1	FLOW	26.	10.
+				TIME	3.58	3.58
HYDROGRAPH AT	EXOFF7	.01	1	FLOW	16.	6.
+				TIME	3.58	3.58
HYDROGRAPH AT	EXOFF8	.01	1	FLOW	0.	3.
+				TIME	3.58	3.58
HYDROGRAPH AT	EXOFF9	.01	1	FLOW	14.	5.
+				TIME	3.50	3.58
2 COMBINED AT	C89	.02	1	FLOW	21.	8.
+				TIME	3.58	3.58
ROUTED TO	R89	.02	1	FLOW	21.	8.
+				TIME	3.58	3.58
2 COMBINED AT	C789	.03	1	FLOW	37.	14.
+				TIME	3.58	3.58
ROUTED TO	R789	.03	1	FLOW	37.	14.
+				TIME	3.58	3.58
HYDROGRAPH AT	EXOFF5	.01	1	FLOW	8.	3.
+				TIME	3.50	3.58
2 COMBINED AT	C5789	.04	1	FLOW	44.	16.
+				TIME	3.58	3.58
3 COMBINED AT	EXCPA	.07	1	FLOW	85.	32.
+				TIME	3.58	3.58
ROUTED TO	RCPA	.07	1	FLOW	84.	31.
+				TIME	3.58	3.58
2 COMBINED AT	C2A	.08	1	FLOW	97.	35.
+				TIME	3.58	3.58
HYDROGRAPH AT	EXOF10	.01	1	FLOW	8.	3.
+				TIME	3.50	3.58
HYDROGRAPH AT	EXOF11	.00	1	FLOW	5.	2.
+				TIME	3.50	3.58
2 COMBINED AT	C1011	.01	1	FLOW	14.	5.
+				TIME	3.50	3.58

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

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	DT (MIN)	INTERPOLATED TO COMPUTATION INTERVAL PEAK (CFS)	INTERPOLATED TO COMPUTATION INTERVAL TIME TO PEAK (MIN)	VOLUME (IN)
FOR PLAN = 1 RATIO= 1.00									
	ROFF6 MANE	.88	20.85	212.08	1.40	5.00	20.72	215.00	1.40
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1244E+01 EXCESS= .0000E+00 OUTFLOW= .1245E+01 BASIN STORAGE= .2203E-08 PERCENT ERROR= -.1									
FOR PLAN = 1 RATIO= .57									
	ROFF6 MANE	.98	7.76	216.81	.50	5.00	7.67	215.00	.50
CONTINUITY SUMMARY (AC-FT) - INFLOW= .4483E+00 EXCESS= .0000E+00 OUTFLOW= .4490E+00 BASIN STORAGE= .1792E-08 PERCENT ERROR= -.2									
FOR PLAN = 1 RATIO= 1.00									
	RB9 MANE	.31	21.42	214.97	1.40	5.00	21.41	215.00	1.40
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1296E+01 EXCESS= .0000E+00 OUTFLOW= .1296E+01 BASIN STORAGE= .1136E-10 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .57									
	RB9 MANE	.28	8.01	215.39	.50	5.00	7.99	215.00	.50
CONTINUITY SUMMARY (AC-FT) - INFLOW= .4670E+00 EXCESS= .0000E+00 OUTFLOW= .4671E+00 BASIN STORAGE= .1062E-10 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= 1.00									
	R789 MANE	.63	37.12	215.32	1.40	5.00	37.05	215.00	1.40
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2252E+01 EXCESS= .0000E+00 OUTFLOW= .2252E+01 BASIN STORAGE= .7710E-09 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .57									
	R789 MANE	.78	13.79	215.76	.50	5.00	13.62	215.00	.50
CONTINUITY SUMMARY (AC-FT) - INFLOW= .8119E+00 EXCESS= .0000E+00 OUTFLOW= .8119E+00 BASIN STORAGE= .9539E-09 PERCENT ERROR= -.1									
FOR PLAN = 1 RATIO= 1.00									
	RCRA MANE	.45	84.41	215.27	1.40	5.00	84.25	215.00	1.40
CONTINUITY SUMMARY (AC-FT) - INFLOW= .5141E+01 EXCESS= .0000E+00 OUTFLOW= .5142E+01 BASIN STORAGE= .6957E-08 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .57									
	RCRA MANE	.53	31.43	216.05	.50	5.00	30.83	215.00	.51
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1853E+01 EXCESS= .0000E+00 OUTFLOW= .1853E+01 BASIN STORAGE= .6582E-08 PERCENT ERROR= .0									

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

HAMILTON CIVIL ENGINEERS

APPENDIX – B

HYDROLOGY-DEVELOPED CONDITION
Standard Form 4 and HEC-1 Analysis

STANDARD FORM 4

HCE 05-500-005 ; Findlay-Shack Honda

Basin	RCN	K	Total AREA (Ac)	Total AREA (Sq.Mi.)	Length (ft)	Slope (%)	T_i (min)	Length (ft)	Slope (%)	Vel (ft/s)	T_t (min)	Total Length (ft)	$T_c=T_i+T_t$ (min)	$T_c=(L/180)+10$ (min)	Final T_c (min)	T_{LAG} (hrs)	Comments
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
																	$T_{LAG}=0.6T_c$
							$K=0.0132 * RCN - 0.39$					$T_i=1.8\ (1.1-K)\ L^{1/2} / S^{1/3}$					
DRAINGE BASINS - DEVELOPED CONDITION																	
ON-1	98.0	0.904	2.60	0.0041	50	1.0	2.50	530	0.5	1.52	5.81	580	8.31	13.22	8.31	0.083	
ON-2	98.0	0.904	3.60	0.0056	50	1.0	2.50	490	0.5	1.63	5.00	540	7.50	13.00	7.50	0.075	
ON-3	98.0	0.904	0.40	0.0006	50	1.0	2.50	490	0.5	0.88	9.30	540	11.80	13.00	11.80	0.118	
OFF-1	85.0	0.732	8.00	0.0125	50	1.0	4.68	2000	2.50	4.37	7.64	2050	12.32	21.39	12.32	0.123	
OFF-2	98.0	0.904	6.40	0.0100	50	1.0	2.50	520	0.50	1.90	4.56	570	7.06	13.17	7.06	0.071	
OFF-3	98.0	0.904	7.70	0.0120	50	1.0	2.50	640	0.50	1.96	5.43	690	7.93	13.83	7.93	0.079	
OFF-4	98.0	0.904	2.60	0.0041	50	1.0	2.50	640	0.50	1.48	7.22	690	9.72	13.83	9.72	0.097	
OFF-5	98.0	0.904	3.80	0.0059	50	1.0	2.50	640	0.50	1.63	6.53	690	9.02	13.83	9.02	0.090	
OFF-6	98.0	0.904	10.70	0.0167	50	1.0	2.50	1400	0.50	2.07	11.26	1450	13.76	18.06	13.76	0.138	
OFF-7	98.0	0.904	8.20	0.0128	50	1.0	2.50	1480	0.50	1.92	12.82	1530	15.32	18.50	15.32	0.153	
OFF-8	85.0	0.732	4.20	0.0066	50	1.0	4.68	1520	1.50	3.03	8.36	1570	13.04	18.72	13.04	0.130	
OFF-9	85.0	0.732	6.90	0.0108	50	1.0	4.68	1160	1.50	3.49	5.55	1210	10.23	16.72	10.23	0.102	
OFF-10	98.0	0.904	4.10	0.0064	50	1.0	2.50	640	0.50	1.67	6.40	690	8.90	13.83	8.90	0.089	
OFF-11	85.0	0.732	2.70	0.0042	50	1.0	4.68	595	1.50	2.82	3.52	645	8.20	13.58	8.20	0.082	

```
*****************************************
*                                       *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *
*            JUN  1998                  *
*          VERSION 4.1                  *
*                                       *
*  RUN DATE  08FEB05  TIME  09:03:46    *
*                                       *
*****************************************
```


```
*****************************************
*                                       *
*  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 -ANSTK- ON KM-CARD WAS CHANGED WITH REVISIONS DATED 20 SEP 01. 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

```
DEVELOPED CONDITION
DEVELOPED CONDITION
DEVELOPED CONDITION
DEVELOPED CONDITION
DEVELOPED CONDITION
DEVELOPED CONDITION
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DEVELOPED CONDITION
DEVELOPED CONDITION
DEVELOPED CONDITION
DEVELOPED CONDITION
DEVELOPED CONDITION
```

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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
   1      ID
          *DIAGRAM
          ID   **********************
   2      ID   **********************
   3      ID   DEVELOPED CONDITION
   4      ID   **********************
   5      ID   **********************
   6      ID
   7      ID   ***** FINDLAY-SHACK HONDA
   8      ID   ***** APN 125-27-101-035
   9      ID   ***** HCE PROJECT NO. 05-500-005
  10      ID
  11      ID
  12      ID        ANALYSIS BY:    JOHN R. HAMILTON, P.E.
  13      ID                        HAMILTON CIVIL ENGINEERS
  14      ID                        3945 PEBBLE CREEK AVENUE
  15      ID                        LAS VEGAS, NEVADA 89147
  16      ID                        PHONE: (702) 580-3650
  17      ID                        FAX: (702) 247-4507
  18      ID
  19      ID
  20      ID   100-YR STORM EVENT RATIO FOR (JR) CARD: 1.0000
  21      ID    10-YR STORM EVENT RATIO FOR (JR) CARD: 0.5704
  22      ID
  23      ID   THE PROJECT SITE IS LOCATED WITHIN THE
  24      ID   NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4)
  25      ID   OF SECTION 27, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M.,
  26      ID   CLARK COUNTY, NEVADA.
  27      ID   WHICH IS PART OF THE McCARREN AIRPORT RAINFALL AREA.
  28      ID   BY THE CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT, THE FOLLOWING
  29      ID   PRECIPITATION VALUES WERE DETERMINED.
  30      ID
  31      ID              100-YEAR, 6-HOUR : 2.77 INCHES
  32      ID               10-YEAR, 6-HOUR : 1.58 INCHES
  33      ID          10 YR / 100 YR RATIO : 0.5704  (REFER TO JR CARD)
  34      ID
  35      IT       5       0       0     300
  36      IO       5       0       0
  37      IN       5       0       0
  38      JR    PREC   1.000  0.5704

  39      KK    ON1
  40      KM   WESTERLY PART OF PHASE 1: HONDA SITE DEVELOPMENT
  41      BA   .0041
  42      PB    2.77
  43      PC  0.000   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
  44      PC  0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.191
  45      PC  0.198   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
  46      PC  0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
  47      PC  0.499   0.598   0.710   0.744   0.781   0.812   0.919   0.935   0.951   0.956
  48      PC  0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
  49      PC  0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
  50      PC  0.998   0.999   1.000
  51      LS    0      98
  52      UD  0.083
```

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

   53     KK    ON2
   54     KM   EASTERLY PART OF PHASE 1: HONDA SITE DEVELOPMENT
   55     BA   .0056
   56     LS      0      98
   57     UD   0.035

   58     KK    ON3
   59     KM   SOUTHERLY PART OF PHASE 1: HONDA SITE DEVELOPMENT
   60     BA   .0005
   61     LS      0      85
   62     UD   0.118

   63     KK  DVSITE
   64     KM   TOTAL DISCHARGE FROM PHASE 1: HONDA SITE DEVELOPMENT
   65     HC      3

   66     KK  DVOFF1
   67     BA   .0125
   68     LS      0      85
   69     UD   0.123

   70     KK  DVOFF2
   71     BA   .0100
   72     LS      0      98
   73     UD   0.071

   74     KK  DVOFF3
   75     BA   .0120
   76     LS      0      98
   77     UD   0.079

   78     KK  DVOFF4
   79     BA   .0041
   80     LS      0      98
   81     UD   0.097

   82     KK  DVOFF6
   83     BA   .0167
   84     LS      0      98
   85     UD   0.138

   86     KK   ROFF6
   87     KM   ROUTE OFF6 THROUGH OFF4
   88     RK     600    .005    .017          TRAP      3     100

   89     KK    C46
   90     KM   COMBINE OFF4 AND OFF6
   91     HC      2
```

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

   92     KK  DVOFF7
   93     BA   .0120
   94     LS      0       98
   95     UD   0.353

   96     KK  DVOFF8
   97     BA   .0066
   98     LS      0       85
   99     UD   0.130

  100     KK  DVOFF9
  101     BA   .0108
  102     LS      0       85
  103     UD   0.102

  104     KK    C89
  105     KM   COMBINE OFF8 AND OFF9
  106     HC      2

  107     KK    R89
  108     KM   ROUTE C89 THROUGH OFF7
  109     RK    160    .015    .017            TRAP      3     100

  110     KK    C789
  111     KM   COMBINE C89 AND OFF7
  112     HC      2

  113     KK    R789
  114     KM   ROUTE C789 THROUGH OFF5
  115     RK    560    .020    .017            TRAP      3     100

  116     KK  DVOFF5
  117     BA   .0059
  118     LS      0       98
  119     UD   0.090

  120     KK    C5789
  121     KM   COMBINE C789 AND OFF5
  122     HC      2

  123     KK    EXCPA
  124     KM   COMBINE C5789, C46 AND OFF3 AND ROUTE THROUGH OFF2
  125     HC      3

  126     KK    RCPA
  127     KM   ROUTE CONCENTRATION POINT "A" THROUGH OFF2
  128     RK    520    .017    .017            TRAP      3     100

  129     KK    C2A
  130     KM   COMBINE CPA AND OFF2
  131     HC      2
```

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

  132     KK  DVOF10
  133     BA    .0084
  134     LS       0       98
  135     UD   0.089

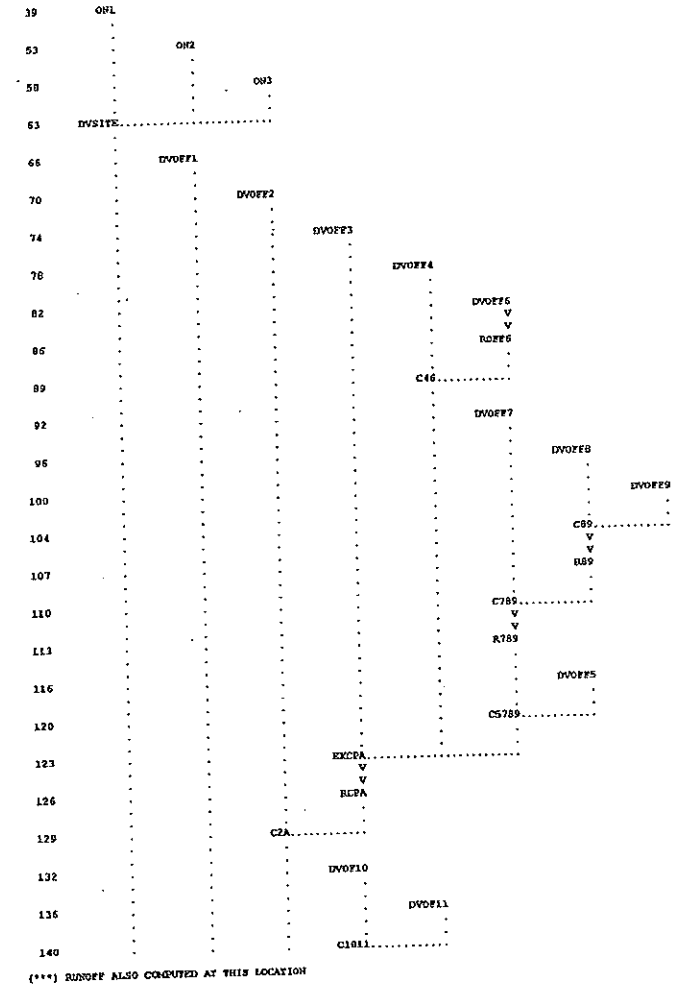
  136     KK  DVOF11
  137     BA    .0042
  138     LS       0       85
  139     UD   0.092

  140     KK  C10i1
  141     KM  COMBINE OFF10 AND OFF11
  142     HC       2
  143     KK
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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*                                   *
*  FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*            JUN  1998              *
*         VERSION 4.1               *
*                                   *
* RUN DATE  08FEB98  TIME 09:03:46  *
*                                   *
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*************************************
*                                   *
*  U.S. ARMY CORPS OF ENGINEERS     *
*  HYDROLOGIC ENGINEERING CENTER    *
*       609 SECOND STREET           *
*     DAVIS, CALIFORNIA 95616       *
*        (916) 756-1104             *
*                                   *
*************************************
```


****
****
DEVELOPED CONDITION
****
****

***** FINDLAY-SHACK HONDA
***** APN 125-27-101-036
***** HCE PROJECT NO. 05-500-005

ANALYSIS BY: JOHN R. HAMILTON, P.E.
HAMILTON CIVIL ENGINEERS
3945 PEBBLE CREEK AVENUE
LAS VEGAS, NEVADA 89147
PHONE: (702) 580-3658
FAX: (702) 247-4507

100-YR STORM EVENT RATIO FOR (JR) CARD: 1.0000
10-YR STORM EVENT RATIO FOR (JR) CARD: 0.5704

THE PROJECT SITE IS LOCATED WITHIN THE
NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4)
OF SECTION 27, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M.,
CLARK COUNTY, NEVADA.
WHICH IS PART OF THE McCARREN AIRPORT RAINFALL AREA.
BY THE CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT, THE FOLLOWING
PRECIPITATION VALUES WERE DETERMINED.

100-YEAR, 6-HOUR : 2.77 INCHES
10-YEAR, 6-HOUR : 1.58 INCHES
10 YR / 100 YR RATIO : 0.5704 (REFER TO JR CARD)

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

IT          HYDROGRAPH TIME DATA
              IMIN         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      .57

    *** SUBRUT - NEWTON RAPHSON FAILED;FIXED POINT ITERATION USED - ITERATION=  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 .57
HYDROGRAPH AT +	ON1	.00	1	FLOW	9.	5.
				TIME	3.50	3.50
HYDROGRAPH AT +	ON2	.01	1	FLOW	12.	7.
				TIME	3.50	3.50
HYDROGRAPH AT +	ON3	.00	1	FLOW	1.	0.
				TIME	3.50	3.50
3 COMBINED AT +	DVSITE	.01	1	FLOW	21.	12.
				TIME	3.50	3.50
HYDROGRAPH AT +	DVOFF1	.01	1	FLOW	16.	6.
				TIME	3.50	3.50
HYDROGRAPH AT +	DVOFF2	.01	1	FLOW	22.	12.
				TIME	3.50	3.50
HYDROGRAPH AT +	DVOFF3	.01	1	FLOW	25.	14.
				TIME	3.50	3.50
HYDROGRAPH AT +	DVOFF4	.00	1	FLOW	8.	5.
				TIME	3.50	3.50
HYDROGRAPH AT +	DVOFF5	.02	1	FLOW	31.	17.
				TIME	3.50	3.50
ROUTED TO +	RDFF5	.02	1	FLOW	30.	17.
				TIME	3.50	3.50
2 COMBINED AT +	C46	.02	1	FLOW	37.	21.
				TIME	3.50	3.50
HYDROGRAPH AT +	DVOFF7	.01	1	FLOW	23.	13.
				TIME	3.50	3.50
HYDROGRAPH AT +	DVOFF8	.01	1	FLOW	8.	3.
				TIME	3.50	3.50
HYDROGRAPH AT +	DVOFF9	.01	1	FLOW	14.	5.
				TIME	3.50	3.50
2 COMBINED AT +	C89	.02	1	FLOW	21.	8.
				TIME	3.50	3.50
ROUTED TO +	R89	.02	1	FLOW	21.	8.
				TIME	3.50	3.50
2 COMBINED AT +	C789	.03	1	FLOW	45.	21.
				TIME	3.50	3.50
ROUTED TO +	R789	.03	1	FLOW	44.	20.
				TIME	3.50	3.50
HYDROGRAPH AT +	DVOFF5	.01	1	FLOW	12.	7.
				TIME	3.50	3.50
2 COMBINED AT +	C5789	.04	1	FLOW	54.	26.
				TIME	3.50	3.50
3 COMBINED AT +	EXCRA	.07	1	FLOW	112.	58.
				TIME	3.50	3.50
ROUTED TO +	RCRA	.07	1	FLOW	111.	58.
				TIME	3.50	3.50
2 COMBINED AT +	C2A	.09	1	FLOW	127.	66.
				TIME	3.50	3.50

HYDROGRAPH AT +	DVDF10	.01	1	FLOW TIME	12. 3.50	7. 3.50
HYDROGRAPH AT +	DVDF11	.00	1	FLOW TIME	6. 3.50	2. 3.50
2 COMBINED AT +	C1011	.01	1	FLOW TIME	19. 3.50	9. 3.50

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

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	INTERPOLATED TO COMPUTATION INTERVAL PEAK	INTERPOLATED TO COMPUTATION INTERVAL TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= 1.00									
	ROPP6 MANE	1.10	30.49	216.68	2.55	5.00	29.99	215.00	2.55
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2262E+01 EXCESS= .0000E+00 OUTFLOW= .2260E+01 BASIN STORAGE= .1410E-07 PERCENT ERROR= -.3									
FOR PLAN = 1 RATIO= .57									
	ROPP6 MANE	1.69	16.99	217.93	1.36	5.00	16.56	215.00	1.36
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1210E+01 EXCESS= .0000E+00 OUTFLOW= .1213E+01 BASIN STORAGE= .1152E-07 PERCENT ERROR= -.2									
FOR PLAN = 1 RATIO= 1.00									
	RB9 MANE	.29	21.42	215.12	1.40	5.00	21.41	215.00	1.40
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1295E+01 EXCESS= .0000E+00 OUTFLOW= .1297E+01 BASIN STORAGE= .1212E-10 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .57									
	RB9 MANE	.44	7.99	215.26	.50	5.00	7.97	215.00	.50
CONTINUITY SUMMARY (AC-FT) - INFLOW= .4670E+00 EXCESS= .0000E+00 OUTFLOW= .4671E+00 BASIN STORAGE= .1135E-10 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= 1.00									
	R789 MANE	.71	44.35	216.07	1.88	5.00	43.99	215.00	1.89
CONTINUITY SUMMARY (AC-FT) - INFLOW= .3032E+01 EXCESS= .0000E+00 OUTFLOW= .3034E+01 BASIN STORAGE= .1026E-08 PERCENT ERROR= -.1									
FOR PLAN = 1 RATIO= .57									
	R789 MANE	.90	20.66	216.24	.87	5.00	20.33	215.00	.87
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1396E+01 EXCESS= .0000E+00 OUTFLOW= .1397E+01 BASIN STORAGE= .1035E-08 PERCENT ERROR= -.1									
FOR PLAN = 1 RATIO= 1.00									
	RCPA MANE	.61	111.42	215.00	2.26	5.00	111.42	215.00	2.26
CONTINUITY SUMMARY (AC-FT) - INFLOW= .8283E+01 EXCESS= .0000E+00 OUTFLOW= .8286E+01 BASIN STORAGE= .1857E-07 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .57									
	RCPA MANE	.62	57.77	215.50	1.14	5.00	57.62	215.00	1.15
CONTINUITY SUMMARY (AC-FT) - INFLOW= .4204E+01 EXCESS= .0000E+00 OUTFLOW= .4206E+01 BASIN STORAGE= .1764E-07 PERCENT ERROR= -.1									

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

Addendum #1 to the
Technical Drainage Study

06/17/05
DS3798
627
pd $400

Shea Commercial-Tenaya

Prepared for:
Shea Commercial Development

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092 508 003

Kimley-Horn
and Associates, Inc.

CITY OF LAS VEGAS
INTER-OFFICE MEMORANDUM

TO: Land Development Services Department of Public Works	**DATE:** June 27, 2005
	FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT: Technical Drainage Study for: **Shea Commercial Tenaya**	**COPIES TO:** Kimley-Horn & Associates
Cross Streets: SWC of Tenaya Way & Azure Road	Shea Commercial Development
File Number: F:\Depot\DSMEMO\DS3798B.doc	Bart Anderson, P.E., DevCo
Parcel Number: 125-27-222-007, 125-27-113-003	
Zoning Action: SDR-6109	
FEMA Flood Zone YES NO X	
Proposed Storm Drain YES NO X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Trn. No.
1st Submittal	5/4/2005	5/18/2005	Not Approved	$400.00	21210: $400
2nd Submittal	6/17/2005	6/27/2005	See Comments Below	$400.00	24048: $400
			TOTAL FEES (LDDRS):	**$800.00**	—

REMARKS:

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

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

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

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

END OF REMARKS

B&H/ays

T/R/S: T19S/R60E/27
AREA G-27

Rec'd: 5/4/05
DS 3798
G-27
$40
B44
SDR-6109

Technical Drainage Study

Shea Commercial-Tenaya

Prepared for:
Shea Commercial Development

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092.508.003

Kimley-Horn
and Associates, Inc.

2. Below is a summary of flow in the interim condition along with perimeter street calcs for Azure Avenue.

Table 1: Interim Runoff

Basin ID	Area	Q10 year	Q100 year	Description
ON1D	2.4 ac	3	7	Onsite Basin
ON2D	2 ac	3	6	Onsite Basin
ON3D	4.9 ac	6	13	Onsite Basin
OFF1E	18.6 ac	5	20	Undeveloped land north of Azure.
CP2	n/a	12	26	Onsite Combination Point
CP3	n/a	14	38	Combine CP2 and OFF1E

3.2 Streets and Driveways

Interim Perimeter Street Flow Calcs (Azure Ave)

Section	Slope	Flow (cfs)		Depth (ft)		Velocity (ft/s)		V*D	
		Q10	Q100	D10	D100	V10	V100	10 YR	100 YR
Azure	1.8	14	38	0.4	0.55	3.85	4.24	1.54	2.33

3.3 Proposed Storm Facilities

A 3-ft valley gutter has been incorporated into the onsite design to rout flow east within the parking lot. These flows will ultimately be discharged onto Azure Avenue.

4 ULTIMATE DRAINAGE CONDITIONS

4.1 Ultimate Condition Drainage Description

In this Ultimate condition, the project site will be developed with all off-site basins in their developed condition. The developed off-site flows are referenced from *Update #2 for Tropical Parkway a.k.a. Montecito East*, by Tetra Tech. Flow from referenced basin FUT1, FUT 2A and FUT2B were combined with onsite flows at combination point CP3. Note; the flow from the referenced offsite basins were added as a base flow to basin ON3D. Please see *Ultimate Condition Basin Map* located in Appendix 2. This condition yielded the greatest amount of flow so was considered the worst case scenario. All facilities and hump heights were based of flows from the Ultimate Condition. Please see table 1 below for Ultimate condition flow values.

Replace Base Flow with basins referenced from Shack Findley HONDA STUDY

Table 1: Interim Runoff

Basin	Area	10-year	100-year	Description
ON1D	2.4 ac	3	7	Onsite Basin
ON2D	2 ac	3	6	Onsite Basin
ON3D*	4.9 ac	6	13	Onsite Basin
FUT1	n/a	4	9	Referenced Montecito Basin
FUT2A	n/a	9	19	Referenced Montecito Basin
FUT2B	n/a	16	34	Referenced Montecito Basin
CP2	n/a	6	13	Onsite Combination Point
CP3	n/a	41	87	Combine CP2 and Referenced flows

* Incorporates Referenced flow values of (29,61 cfs)

4.2 Streets and Driveways

Perimeter Street Flow Calculations (Azure Ave)

Section	Slope	Flow (cfs)		Depth (ft)		Velocity (ft/s)		V*D	
		Q10	Q100	D10	D100	V10	V100	10-YR	100-YR
Azure (FM1)	1.8	41	87	0.57	0.69	4.29	5.08	2.45	3.51

Interior Street Flow Calculations

Section	Slope	Flow (cfs)		Depth (ft)		Velocity (ft/s)		V*D	
		Q10	Q100	D10	D100	V10	V100	10-YR	100-YR
FM2	1.8	5	20	0.3	0.44	3.0	4.09	0.92	1.80
FM3	2	6	13	0.2	0.27	2.9	3.48	0.57	0.94
FM4	0.5	12	26	0.3	0.45	2.0	2.6	0.69	1.17

4.3 Finished Floor

The proposed finished floors have been set to 18-inches or twice the depth of flow (whichever is greater) above the adjacent depth of flow. This is in compliance with the City of Las Vegas finish floor regulations.

5 CONCLUSION

5.1 COMPLIANCE WITH REGULATIONS

This study has been prepared in conformance with Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual and City of Las Vegas regulations.

The Shea Commercial-Tenaya project site is in compliance with the Clark County Regional Flood Control District Master Plan Update.

STANDARD FORM 4

DEVELOPMENT SHEA COMMERCIAL-TENAYA

W.O. # 92508003 CALCULATED BY: DF

V1 applies to the first 500 feet of travel distance
V2 applies to the remaining travel distance

Existing:		Developed	
$V1 = 1.48 * S^{1/2}$	$V2 = 2.91 * S^{1/2}$	$V1 = 2.02 * S^{1/2}$	$V2 = 3.06 * S^{1/2}$

$$T_i = \frac{1.8(1.1-k)L^{1/2}}{S^{1/3}} \qquad T_t = \frac{L}{60V}$$

$$k = 0.0132C_n - 0.39 \qquad T_c = T_i + T_t$$

SUB-BASIN DATA					INITIAL/OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc CHECK (URBANIZED BASINS)		FINAL Tc	LAG TIME	REMARKS
DESIG. (1)	Cn	K (2)	AREA AC (3)	AREA MI^2	LENGTH FT (4)	SLOPE % (5)	Ti Min. (6)	LENGTH FT (7)	SLOPE % (8)	V1 FPS (8A)	V2 FPS (8B)	Tt Min. (10)	TOTAL LENGTH (11)	Tc Min. (12)	Min.	TLAG Hr.	
ON1E	79.0	0.653	9.3	0.0145	180	0.5	13.61	1400	1.5	1.8	3.6	6.26			22.57	0.226	
ON1D	92.0	0.824	2.4	0.0037	60	1.0	3.84	500	1.2	3.2	3.4	2.45	560	13.11	6.43	0.064	
ON2D	90.0	0.798	2.0	0.0031	40	1.0	3.44	150	4.7	6.4	6.6	0.39	190	11.06	3.83	0.038	TLAG = .05
ON3D	92.0	0.824	4.9	0.0077	120	1.0	5.43	1100	1.2	3.2	3.3	5.61	1220	16.78	11.05	0.110	
OFF1E	78.0	0.640	18.6	0.0291	120	0.5	11.44	2523	1.8	2.0	4.0	12.60			24.10	0.241	

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

 RUN DATE  28APR05  TIME  16:57:55
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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
XXXXXX 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

HEC-1 INPUT

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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
    1         ID
    2         ID
    3         ID   SHEA COMMERCIAL-TENAYA
    4         ID   JOB #092 508 003
    5         ID
    6         ID   FUTURE CONDITION 100YR
    7         ID   TENAYAULT10.DAT
    8         ID
              *DIAGRAM
    9         ID
   10         IT       5                300
   11         IO       5        0
   12         IN       5
   13         JR    PREC    1.000

   14         KK    ON1D
   15         KM   ONSITE DEVELOPED BASIN W/OFFSITE FLOW
   16         BA   .0037
   17         PB    2.77
   18         PC    0.00    0.02    0.057   0.070   0.087   0.108   0.124   0.130   0.136   0.139
   19         PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
   20         PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
   21         PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   22         PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   23         PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
   24         PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
   25         PC   0.998   0.999   1.000
   26         LS              92
   27         UD   0.064
              *

   28         KK    ON2D
   29         KM   ONSITE DEVELOPED BASIN, TLAG .05 DEFAULT
   30         BA   .0031
   31         LS              90
   32         UD    .050
              *

   33         KK    CP2
   34         KM   COMBINE ON1D, FUT1, FUT2A AND ON2D
   35         HC       3
              *

   36         KK    ON3D
   37         KM   ONSITE DEVELOPED BASIN
   38         KM   BASE FLOW TAKEN FROM FUTURE BASIN MAP FOR MONTECITO EAST
   39         BA   .0077
```

```
         40          BF    61.0
         41          LS                92
         42          UD     .110
                     *
                                                 HEC-1 INPUT                                                PAGE  2

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

         43          KK    CP3
         44          KM    COMBINE ON1D, ON2D, ON3D, FUT1, FUT2A AND FUT2B
         45          KC       2
                     *
         46          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT
 LINE      (V) ROUTING             (---->) DIVERSION OR PUMP FLOW
  NO.      (.) CONNECTOR           (<----) RETURN OF DIVERTED OR PUMPED FLOW

   14        ON1D
             .
             .
   26        .         ON2D
             .           .
             .           .
   33        CP2.............
             .
             .
   36        .         ON3D
             .           .
             .           .
   43        CP3.............

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1**************************************
*                                    *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1) *
*            JUN  1998               *
*          VERSION 4.1               *
*                                    *
*  RUN DATE  28APR05  TIME  16:57:55 *
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*                                    *
*  U.S. ARMY CORPS OF ENGINEERS      *
*  HYDROLOGIC ENGINEERING CENTER     *
*    609 SECOND STREET               *
*  DAVIS, CALIFORNIA 95616           *
*    (916) 756-1104                  *
*                                    *
**************************************

                    SHEA COMMERCIAL-TENAYA
                    JOB #092 508 003

                    FUTURE CONDITION 100YR
                    TENAYAULT10.DAT


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

   1T          HYDROGRAPH TIME DATA
                      NMIN          5  MINUTES IN COMPUTATION INTERVAL
                      IDATE     1   0  STARTING DATE
                      ITIME      0300  STARTING TIME
                        NQ        101  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE    1   0  ENDING DATE
                      NDTIME     1120  ENDING TIME
                      ICENT        19  CENTURY MARK

                   COMPUTATION INTERVAL     0.08 HOURS
                     TOTAL TIME BASE        8.33 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
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

  HYDROGRAPH AT
+                 ON1D        0.00       1     FLOW                    7.
                                               TIME                 3.50

  HYDROGRAPH AT
+                 ON2D        0.00       1     FLOW                    6.
                                               TIME                 3.50

    2 COMBINED AT
+                 CP2         0.01       1     FLOW                   13.
                                               TIME                 3.50

  HYDROGRAPH AT
+                 ON3D        0.01       1     FLOW                   74.
                                               TIME                 3.50

    2 COMBINED AT
+                 CP3         0.01       1     FLOW                   87.
                                               TIME                 3.50


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

Recd 12/10/03
DS 3449
G-27
$400

ADDENDUM #1 TO THE UPDATE TO THE TECHNICAL DRAINAGE STUDY FOR ~~TROPICAL PARKWAY a.k.a. MONTECITO EAST~~ TENAYA VILLAGE PHASE 1 - MIX STORAGE

CITY OF LAS VEGAS

TT # P09072-0002

W.O. 4020

Prepared for:

MONTECITO COMPANIES

6600 W. Charleston Blvd., Suite 124

Las Vegas, NV 89146

Prepared by:

TETRA TECH, INC.

401 N. Buffalo Drive, Suite 100

Las Vegas, Nevada 89145

(702) 242-4200

FAX (702) 242-2100

December 2003

Recd 11/12/03
DS 3449
G-27
$400.00
CCPW

Tenaya Village Phase 1
Mini Storage

UPDATE TO THE TECHNICAL DRAINAGE STUDY FOR ~~TROPICAL PARKWAY a.k.a. MONTECITO EAST~~

CITY OF LAS VEGAS

TT # P09072-0002

W.O. 4020

Prepared for:

MONTECITO COMPANIES

6600 W. Charleston Blvd., Suite 124

Las Vegas, NV

Prepared by:

TETRA TECH, INC.

401 N. Buffalo Drive, Suite 100

Las Vegas, Nevada 89145

(702) 242-4200

FAX (702) 242-2100

November 2003

CITY OF LAS VEGAS
INTER-OFFICE MEMORANDUM

DATE: December 22, 2003

TO:
Land Development Services
Department of Public Works

FROM:
Albert J. Jankowiak, P.E.
Flood Control Civil Engineer
Department of Public Works

SUBJECT: Drainage Study for:
Tenaya Village Phase 1 Mini Storage – Update to Montecito East

COPIES TO:
Tetra Tech, Inc.
Montecito Companies
Bart Anderson, P.E., DevCo

Cross Streets:	NWC of Azure Drive & Tenaya Way
File Number:	F:\Depot\DSMemos\DS3449B.doc
Parcel Number:	125-27-113-001
Zoning Action:	

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

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID G.R. No.
1st Submittal	11/12/2003	11/26/2003	See Comments Below	$400.00	114258: $400
2nd Submittal	12/10/2003	12/22/2003	See Comments Below	$400.00	115885: $400
			TOTAL FEES (LDDRS):	**$800.00**	---

REMARKS:

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

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

1. This drainage study assumes that the project will be constructed in one phase. If improvement plans are submitted to break the project into separate phases, a drainage study update will be required for each phase addressing the interim condition.

NOTE: All land surface area disturbances over 1 acre require a stormwater discharge permit issued by the Nevada Division of Environmental Protection (NDEP). 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. A stormwater discharge permit application and associated information may be downloaded from the web site:

http://www.state.nv.us/ndep/bwpc/storm01.htm

Projects that disturb more than one acre of land must submit to NDEP a "Notice of Intent" for inclusion under Stormwater Permit No. NVR100000 along with the appropriate filling fee.

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

END OF REMARKS

T/R/S: T19S/R60E/27
AREA G-27

ays/ajj

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

Tetra Tech, Inc.
Project No. : P0S072-0001

DEVELOPMENT : FUTURE BASINS
Tenaya Village
CALCULATED BY : ARA

DATE: November 2003

SUB-BASIN DATA					INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc CHECK URBANIZED BASINS		FINAL Tc	Tlag	REMARKS
DESIG:	CN	K	AREA	AREA	LENGTH	SLOPE	Ti	LENGTH	SLOPE	LAND COVER	VELOCITY*	Tt	Tc = Ti + Tt	TOTAL LENGTH	Tc = (L/180)+10		Tlag= 0.6Tc/60	
			(acres)	(mi^2)	(ft)	(%)	(min)	(ft)	(%)	k	(fps)	(min)	(min)	(ft)	(min)	(min)	(hrs)	
(1)		(2)	(3)		(4)	(5)	(6)	(7)	(8)		(9)	(10)	(11)	(12)	(13)	(14)		
DEON1	92	0.8244	1.55	0.0024	35	1.00	2.93	670	0.72	DEV	2.61	4.3	7.2	705.0	13.9	7.21	0.0721	
DEON2	92	0.8244	1.68	0.0026	30	2.00	2.15	650	1.06	DEV	3.17	3.4	5.6	680.0	13.8	5.57	0.0557	
DEON3	92	0.8244	1.48	0.0023	50	0.50	4.42	724	1.15	DEV	3.39	3.7	8.1	774.0	14.3	8.07	0.0807	
DEON4	92	0.8244	2.50	0.0039	344	0.50	11.59	244	2.91	DEV	5.25	0.8	12.4	588.0	13.3	12.36	0.1236	
DEON5	92	0.8244	1.14	0.0018	110	2.82	3.64	189	1.23	DEV	3.42	0.9	4.6	299.0	11.7	4.56	0.0500	
DEON6	92	0.8244	0.54	0.0008	25	2.50	1.80	427	1.97	DEV	4.32	1.6	3.5	452.0	12.5	3.47	0.0500	
DEOF1	92	0.8244	2.09	0.0033	119	0.74	5.98	750	1.67	DEV	4.21	3.0	9.0	869.0	14.828	8.95	0.0895	
DEOF2	92	0.8244	3.06	0.0048	267	0.74	8.96	800	1.67	DEV	4.21	3.2	12.1	1067.0	15.928	12.13	0.1213	
			14.06															

Ti = 1.8 (1.1 - K) L^1/2 / S^1/3
Tc = Ti + Tt
K = 0.0132 (CN) - 0.39 Tlag = 0.6Tc

* The velocity in column 9 was computed using the equation V = CS^.5
where C = 30.6 and S = travel slope, as outlined in section 502.1 of the CCRFCD Manual.

REFERENCE :

STANDARD FORM 4

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE (HEC-1)    *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   07NOV03  TIME  14:14:30   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*   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 -ANSKK- ON KM-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

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

    1     ID
    2     ID   PREPARED FOR:
    3     ID            MONTECITO COMPANIES
    4     ID
    5     ID
    6     ID
    7     ID   @@@@@@@@@@@@@@@@@@
    8     ID
    9     ID            TECHNICAL HYDROLOGY STUDY FOR TENAYA VILLAGE- FUTURE 100 YR CONDIT
   10     ID   file name:  FUT100.TXT
   11     ID   Project Number: F09072-0001-00
   12     ID   WOF
   13     ID
   14     ID   TETRA TECH, INC.
   15     ID   401 N. Buffalo Drive, Suite 100
   16     ID   Las Vegas, Nevada  89145
   17     ID
   18     ID   ********************
   19     ID   *    SON )  VALUES  *
   20     ID   ********************
   21     ID
   22     ID
   23     ID
   24     ID
   25     ID
          *DIAGRAM
   26     IT       5       0       0     300
   27     IN       5       0       0
   28     IO       5       0       0
   29     JR    PREC     1.0
          *
   30     KK   DEON1
   31     KM   DEVELOPED ONSITE BASIN 1
   32     BA    .002
   33     BF       0
   34     PB    2.77
   35     PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
   36     PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
   37     PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
   38     PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
   39     PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
   40     PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
   41     PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
   42     PC    .998    .999   1.00
   43     LS       0      92
   44     UD    .072
          *
   45     KK   DEON2
   46     KM   DEVELOPED ONSITE BASIN 2
   47     BA    .003
   48     BF       0
   49     LS       0      92
   50     UD    .055
          *
```

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

  51          KK   DEOF1
  52          KM   DEVELOPED OFFSITE BASIN 1
  53          BA    .001
  54          BF      0
  55          LS      0      92
  56          UD    .089
              *

  57          KK     PT1
  58          KM  CONCENTRATION POINT 1- COMBINE DEON1, DEON2 AND DEOF1
  59          HC      3
              *

  60          KK   DEON1
  61          KM   DEVELOPED ONSITE BASIN 1
  62          BA    .002
  63          BF      0
  64          LS      0      92
  65          UD    .081
              *

  66          KK     PT2
  67          KM  CONCENTRATION POINT 2- COMBINE DEON3 AND PT1
  68          HC      2
              *

  69          KK   DEON6
  70          KM   DEVELOPED ONSITE BASIN 6
  71          BA    .001
  72          BF      0
  73          LS      0      92
  74          UD    .050
              *

  75          KK   DEOF2
  76          KM   DEVELOPED OFFSITE BASIN 2
  77          BA    .005
  78          BF      0
  79          LS      0      92
  80          UD    .121
              *

  81          KK     PT5
  82          KM  CONCENTRATION POINT 2- COMBINE DEON6 AND DEOF2
  83          HC      2
              *

  84          KK   DEON4
  85          KM   DEVELOPED ONSITE BASIN 4
  86          BA    .004
  87          BF      0
  88          LS      0      92
  89          UD    .124
              *
```



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

  90          KK     PT3
  91          KM  CONCENTRATION POINT 3- COMBINE PT5 AND DEON4
  92          HC      2
              *

  93          KK   DEON5
  94          KM   DEVELOPED ONSITE BASIN 5
  95          BA    .002
  96          BF      0
  97          LS      0      92
  98          UD    .050
              *

  99          KK     PT4
 100          KM  CONCENTRATION POINT 4- COMBINE PT3, PT2 AND DEON5
 101          HC      3
              *

 102          ZZ
```

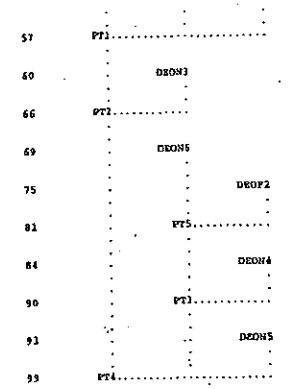
1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

  30       DEON1
             .
             .
  45         .        DEON2
             .          .
             .          .
  51         .          .        DEOF1
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*          VERSION 4.1                  *
*                                       *
* RUN DATE   07NOV03  TIME  14:14:30    *
*                                       *
*****************************************
```

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

PREPARED FOR:
HONTECITO COMPANIES

0000000000000000

TECHNICAL HYDROLOGY STUDY FOR TEHAYA VILLAGE- FUTURE 100 YR CONDIT
file name: FUT100.TXT
Project Number: 909072-0001-00
WDS

TETRA TECH, INC.
401 N. Buffalo Drive, Suite 100
Las Vegas, Nevada 89145

```
**********************
*    SUM 3  VALUES   *
**********************
```

```
28 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             100  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

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 RATIO 1 1.00
OPERATION	STATION	AREA	PLAN		
HYDROGRAPH AT	DEON1	.00	1	FLOW	4.
+				TIME	3.50
HYDROGRAPH AT	DEON2	.00	1	FLOW	6.
+				TIME	3.50
HYDROGRAPH AT	DEOF1	.00	1	FLOW	5.
+				TIME	3.50
3 COMBINED AT	PT1	.01	1	FLOW	15.
+				TIME	3.50
HYDROGRAPH AT	DEON3	.00	1	FLOW	4.
+				TIME	3.50
2 COMBINED AT	PT2	.01	1	FLOW	19.
+				TIME	3.50
HYDROGRAPH AT	DEON6	.00	1	FLOW	2.
+				TIME	3.50
HYDROGRAPH AT	DEOF2	.00	1	FLOW	8.
+				TIME	3.58
2 COMBINED AT	PT5	.01	1	FLOW	10.
+				TIME	3.50
HYDROGRAPH AT	DEON4	.00	1	FLOW	6.
+				TIME	3.58
2 COMBINED AT	PT3	.01	1	FLOW	16.
+				TIME	3.50
HYDROGRAPH AT	DEON5	.00	1	FLOW	4.
+				TIME	3.50
3 COMBINED AT	PT4	.02	1	FLOW	39.
+				TIME	3.50

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

cc cp/jk proj file

CITY OF LAS VEGAS
INTER-OFFICE MEMORANDUM

DATE: February 5, 2003

TO: Land Development Services, Department of Public Works

FROM: Albert Sung, P.E., Flood Control Project Engineer, Department of Public Works

SUBJECT: Drainage Study for: Tropical Parkway (AKA Montecito East)

COPIES TO: Montecito East, L.L.C.; Primas & Associates; Bart Anderson, P.E., DEVCO; CCPW

Cross Streets:	Azure Drive from Tenaya Way to 2800' west		
FILE NO.	F:\Depot\DSMEMOS\DS2525F.doc		
Parcel Number:	Not submitted		
Zoning Action:			
FEMA Flood Zone	YES	No	X
Proposed Storm Drain	YES X	No	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID GR#
1st Submittal	8/5/99	8/17/99	Not Accepted	$250.00	97401
2nd Submittal	10/12/99	10/27/99	Not Accepted	$250.00	97401
3rd Submittal	1/7/00	1/21/00	Not Accepted	N/A	
4th Submittal	1/25/00	1/31/00	Accepted	N/A	
5th Submittal	4/12/02 & 4/18/02	4/24/02	Accepted	$250.00	97401
6th Submittal	1/13/03	2/5/03	See Comments Below	$250.00	97401
			TOTAL FEES	$1000.00	Paid in Full

REMARKS: Update for off sites adjacent to site.

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

X	is acceptable in concept subject to conformance to all City standards and the following conditions.
	Must be resubmitted or supplemented including the following:
	Must have Clark County Regional Flood Control District concurrence
	Must have Clark County Public Works Department concurrence.

1. The existing drainage berm constructed with the Mass Grading/Stockpile Plan must be shown on Sheet 3.
2. The engineer must add a note to the plans that states *"I certify that the plan is in conformance with the approved drainage study on file at the City of Las Vegas for this project."*
3. The typical street section shown on Sheet 3 does not reflect the proposed street sections for Ranch House Road and Blooming Meadows Drive. Provide a revised street section for these streets. The revised section needs to also show the existing drainage berm.
4. A drainage study update must be submitted for any further development of this site.

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

END OF REMARKS

pbj

T/R/S: 19S/60E/27
AREA G-27

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: February 1, 2000
TO: Land Development Services Department of Public Works				FROM: Randy Fultz, P.E. Flood Control Project Manager Department of Public Works
SUBJECT:	Drainage Study for Tropical Parkway			COPIES TO: Montecito East, L.L.C. Primas & Associates Cheri Edelman, DEVCO Theresa Hanrahan - CLV CCPW
Cross Streets:	Azure Drive from Tenaya Way to 2800' west			
FILE NO.	F:\Depot\DSMEMOS\DS2525D.doc			
Parcel Number:	Not submitted			
Zoning Action:				
FEMA Flood Zone	YES	No	X	
Proposed Storm Drain	YES	No	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES
1st Submittal	8/5/99	8/17/99	See Comments Below	$250.00
2nd Submittal	10/12/99	10/27/99	See Comments Below	$250.00
3rd Submittal	1/7/00	1/21/00	See Comments Below	N/A
4th Submittal	1/25/00	1/31/00	See Comments Below	N/A
			TOTAL FEES	$500.00

REMARKS: Tropical Parkway - US 95 to Tenaya Way.

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

X	is acceptable in concept subject to conformance to all City standards and the following conditions.
	Must be resubmitted or supplemented including the following:
	Must have Clark County Regional Flood Control District concurrence
	Must have Clark County Public Works Department concurrence

Note: Acceptance of this drainage study is for Parcel Map and Vacation purposes only.

Following a meeting with the Primas and Associates Consulting Engineers on January 25, 2000, it is understood that their are mitigation measures needed prior to the development of the Tropical Parkway roadway plans. The measures necessary for development include the following:

1. **A storm drain system is needed to alleviate flows being conveyed within the proposed realignment of Tropical Parkway. The Tenaya Way roadway project is currently designing a 10-year storm drain system, which can accommodate the Tropical Parkway flows.**
2. **The design of the future storm drain system for Tropical Parkway will be added to the scope of the Tenaya Way project as an amendment to the Tenaya Way contract with the City (this is anticipated to go to City Council in mid February).**
3. **The drainage study for improvements in Tropical Parkway from US 95 to Tenaya Way will be completed with the Tenaya Way Project as part of an SID. Therefore, the drainage improvements in Tropical Parkway will be addressed in a separate drainage study.**

Additionally, the following comments must be addressed within the Tenaya Way roadway project or prior to any Tropical Parkway roadway development:

1. The currently approved flows for the Tropical Parkway/Azure and Tenaya Way intersection as per the Tenaya Way Road Project is 86 cfs for the 10-year event and 186 cfs for the 100-year event. The flows presented with this Tropical Parkway Project herein are 71 cfs and 151 cfs for the 10-year/100-year flows respectively. The City believes the maximum flow meeting the 12-foot dry lane criteria in the lower reach of Tropical Parkway (S=0.61%) was 12 cfs. Therefore, a storm system conveying 59 cfs (71 cfs - 12 cfs) will be needed as a minimum from CP2 to Tenaya Way, as shown on Figure 9 (of the Tropical Parkway drainage study). At CP1 the flow is 23 cfs and the allowable 12-foot dry lane flow is 17 cfs. Therefore, an 18-inch minimum storm drain is required from CP1 to CP2. At CP2 the flow is 44 cfs and the allowable street flow is 20 cfs. Therefore, a 24-inch minimum storm drain pipe will be needed from CP2 to Tenaya Way where the entire 71 cfs would need to be collected. (Please note: this assumes the Tropical Parkway flows are 71 cfs. This may be subject to revision based on the review by the Engineer as part of flow assessment at Tenaya Way as described above.)
2. The site is adjacent to Clark County boundaries. Clark County Public Works Department (CCPW) concurrence must be obtained prior to final acceptance of the study.
3. A drainage study update must be submitted for any future commercial developments along Tropical Parkway adjacent to this roadway project.

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 addreseed in a Drainage Study Amendment and accepted by the City of Las Vegas Flood Contrd 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.

PLANS SENT TO LAND DEVELOPMENT ___no___ (initial)

END OF REMARKS
pbj

T/R/S: 19S/60E/27
AREA G-27

PRIMAS AND ASSOCIATES
CONSULTING ENGINEERS

January 25, 2000

City of Las Vegas
Department of Public Works
Flood Control Division
731 S. Fourth Street
Las Vegas, Nevada 89101

Attn: Mr. Randy Fultz, P.E.

RE: Drainage Study for Tropical Parkway – Tenaya Way to Tropical Overpass

Dear Mr. Fultz,

Submitted for your review and approval is a copy of the *Summary Drainage Improvement Letter* for the above-mentioned project.

If there are any questions in regards to this technical drainage study, please contact our office at (702) 228-8183

Sincerely,
Primas & Associates

Manny Belen, E.I.

1091 S. Cimarron Road • Suite A-3 • Las Vegas, NV 89145 • Tel (702) 228-8183 • Fax (702) 228-8194
15615 North 71st Street • Suite 202 • Scottsdale, AZ 85254 • Tel (480) 596-5110 • Fax (480) 596-5118

SUMMARY DRAINAGE IMPROVEMENT LETTER

Re: Drainage Study for Tropical Parkway – Tenaya Way to Tropical Overpass
PACE Project No. 9711.24

This letter has been prepared to provide the Department of Public Works Flood Control Division with a response to the comment, dated January 21, 2000 concerning the Technical Drainage Study for Tropical Parkway. The intent of this letter is to explain, clarify, and resolve any drainage issues that maybe of concern to both the City of Las Vegas (CLV) and Primas and Associates Consulting Engineers (PACE).

Initially, Tropical Parkway realignment was a developer-funded project that ran across the proposed Montecito East development. In order for the Tropical Parkway rights-of-way to be dedicated to the CLV by way of Parcel Map, a drainage study was needed. At the time of the initial drainage submittal for Tropical Parkway was submitted to CLV, no roadway drainage improvements were proposed for Tenaya Way. Many options were considered on how to convey flows to minimize impact, however none were feasible. Consequently, no storm drain system was incorporated in Tropical Parkway. Subsequent to the initial design of Tropical Parkway, the Tenaya Way roadway redesign (an S.I.D. improvement project) established a storm drain system along Tenaya Way from Sky Point to Azure Drive (a.k.a. Tropical Parkway). It is now feasible to install a storm drain system in Tropical Parkway.

A feasible connection is now an alternative and since Tropical Parkway roadway design is being incorporated into the Tenaya Way City of Las Vegas Contract the storm drain design will be further refined to include the flows being conveyed through Tropical Parkway. On 1/25/2000 a meeting was held at City of Las Vegas, to discuss how the Tropical Parkway and Tenaya Way drainage issues is to be resolved. Both CLV and PACE acknowledge that a storm system will be beneficial along Tropical Parkway to alleviate flows conveying within the proposed realignment now that a feasible system exists to convey the flow. Furthermore, PACE is still pursuing to obtain approval for the Vacation and Parcel Maps to dedicate Tropical Parkway.

As agreed by Randy Fultz on 1/25/2000, CLV will provide a drainage approval letter for the Montecito East Vacation and Parcel Maps with the understanding that the design of the future storm drain system will proceed as soon as the amendment to the Tenaya Way contract is approved on the anticipated date of February 8, 2000. This will allow the Vacation and Parcel Maps to move forward.

In summary, PACE agrees with the comments that the City of Las Vegas provided Primas and Associates on January 21, 2000. Also, PACE understands that a drainage study update must be submitted for any future commercial development along Tropical Parkway adjacent to the roadway project.

SUMMARY DRAINAGE IMPROVEMENT LETTER

Re: Drainage Study for Tropical Parkway – Tenaya Way to Tropical Overpass
PACE Project No. 9711.24

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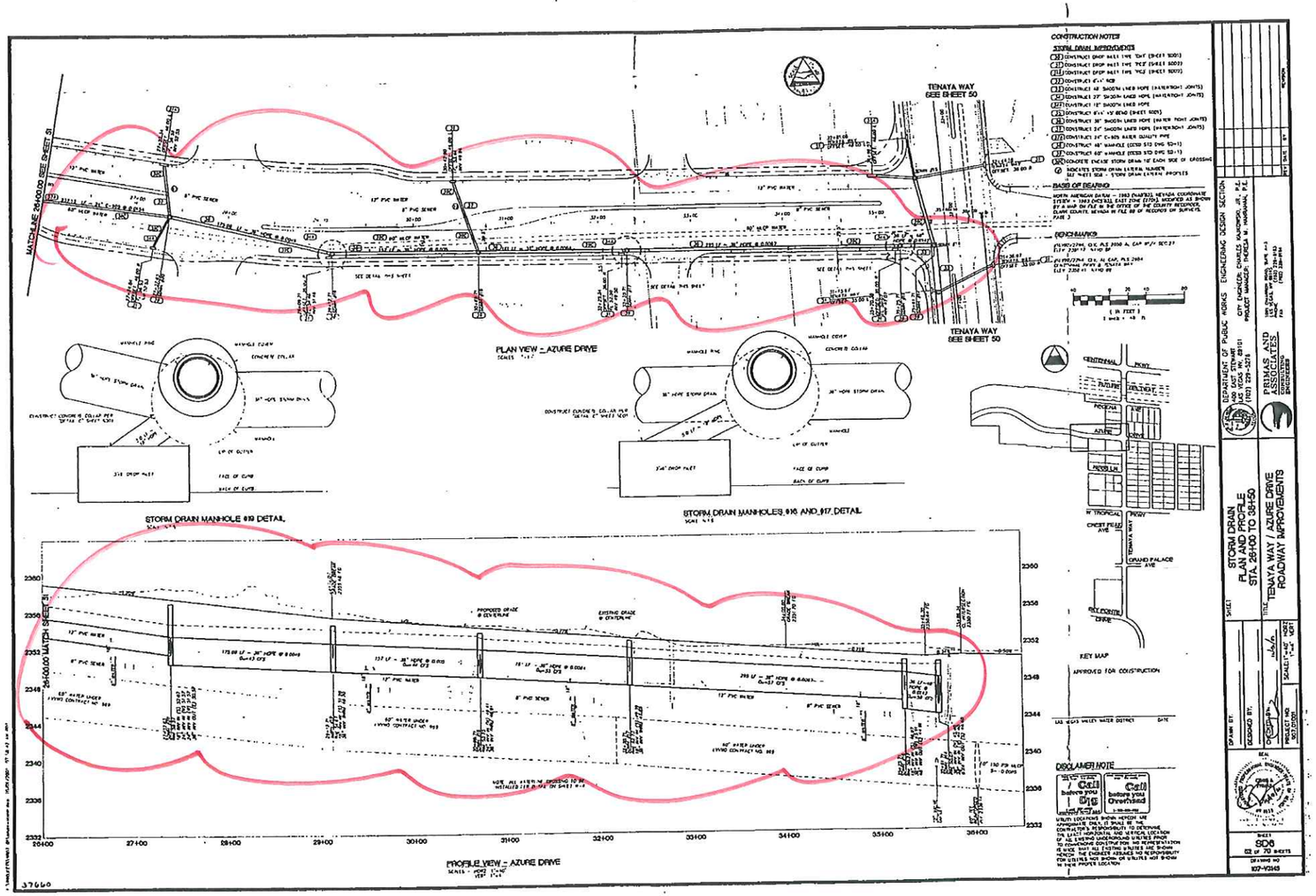
In summary, PACE agrees with the comments that the City of Las Vegas provided Primas and Associates on January 21, 2000. Also, PACE understands that a drainage study update must be submitted for any future commercial development along Tropical Parkway adjacent to the roadway project.

* THIS storm drain is in Azure Dr. that fronts our Site



ADD1
07-4410

ADDENDUM #1 TO THE TECHNICAL DRAINAGE STUDY FOR TENAYA COMMERCIAL

Prepared for:

O'Connell Commercial, LLC
1504 Eureka Road, Suite 230
Roseville, CA 95661
Phone: (916) 772-7500
Fax: (916) 772-7505

February 2007

Project 1943.001

Wood Rodgers, Inc.
9900 Covington Cross Dr., Ste. #102 * Las Vegas, NV 89144
Tel: 702.434.2953 * Fax: 702.434.2957
www.woodrodgers.com

WOOD RODGERS

1943.001

February 9, 2007

Albert Sung, P.E.
Flood Control Project Engineer
Department of Public Works
731 South Fourth Street
Las Vegas, NV 89101

Subject: **Addendum #1 to the Technical Drainage Study for Tenaya Commercial (CLV DS#4104A)**

Dear Mr. Sung:

The purpose of this letter is to address the comments from the City of Las Vegas Inter-office Memorandum dated December 19, 2006.

The comments are individually addressed as follows:

Comment: "1) The site is adjacent to the jurisdiction of Clark County to the south. The engineer must coordinate with Clark County Department of Development Services (CCDDS) and incorporate any concerns for boundary conditions along the south border. CCDDS concurrence is required prior to final acceptance of the study.

Response: The study and all addenda will be submitted to CCDDS for concurrence upon conditional approval by the City of Las Vegas.

Comment: "2) Provide a copy of the zoning/planning conditions associated with this site (VAR-18371 & SDR-18372) with the next submittal to verify compliance with conditions. Flood Control will not issue final approval of the drainage study without the associated zoning/planning conditions (issued by the City Council). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and submitted.

Response: The SDR was approved on January 12, 2007. A copy of the conditions of approval has been included in the Appendix. VAR-18371 was removed by the owner and is therefore no longer applicable to the site.

Comment: "3) Sections B/D-1 and C/D-1 show an onsite swale along Azure Drive. This swale must also be shown on the plan and designed with flow line elevations at regular intervals. Address how this swale goes through a handicap ramp at the northeast corner of Building 2.

Corporate Office: 3301 C Street, Bldg. 100-B • Sacramento, CA 95816 • 916.341.7760 • Fax 916.341.7767
Las Vegas Office: 9900 Covington Cross Drive, Suite #102 • Las Vegas, NV 89144 • 702.434.2953 • Fax 702.434.2957
www.woodrodgers.com

Response: The grading plan (Sheet G-1) has been updated to include flow line elevations for the swale at regular intervals. The alignment of the handicap ramp has been revised to allow for a sidewalk drain to connect into the swale. Construction Note #4 callouts out the sidewalk drain.

Comment: "4) Relocate a proposed sidewalk drain at the east end of the Azure frontage and tie it to the back of an existing drop inlet."

Response: The hood of the drop inlet is precast and an existing 25-foot high palm tree prevents the sidewalk drain from tying directly into the back of the drop inlet. A photo of the existing tree has been included in the Appendix. However, the onsite flume and sidewalk drain have been relocated approximately 5-feet upstream of the drop inlet to convey flows to the existing inlet.

Comment: "5) It appears that some offsite grading is required at the east boundary in order to match the existing adjacent grades properly. Provide the design in the next submittal and obtain a notarized letter of permission for such grading activities from the adjacent property owner prior to the final approval of the drainage study.

Response: The grading along the eastern boundary has been revised to match existing conditions. Since the grading has been revised a permission letter would not be required. Additionally, per a January 12, 2007 phone conversation between Richard Senecal (WR) and Albert Sung, a cross-access easement for the commercial subdivision will be acceptable in lieu of a permission to grade letter if one was required. Copied excerpts from the commercial subdivision CC&R's showing that access easements have been granted are included in the Appendix.

Comment: "6) The parking stalls along the southern boundary east of Monte Cristo Way appear to be draining to the south against a proposed "A"-curb. Revise the curb to an "L"-curb because it's receiving water. Revise all pertinent details and construction note accordingly.

Response: The "A"-curb has been revised to an "L"-curb and all pertinent details and construction notes have been updated.

Comment: "7) Provide a proposed onsite drainage basin plan.

Response: Figure 7 has been revised to Figure 7R to include the onsite drainage basins. Revisions to the grading plan have necessitated moving the boundary line between Subbasin ON1 and ON2. A revised HEC-1 model has been included in the Appendix. This model shows that the minor revision to the boundary line has not changed the HEC-1 output for the site. All other HEC-1 input parameters have not been revised from the previously submitted model.

1943.001

Comment: "8) Label the existing storm drain in Azure Drive with City of Las Vegas recorded plan number. Identify all existing drop inlets with type and size on the grading plan.

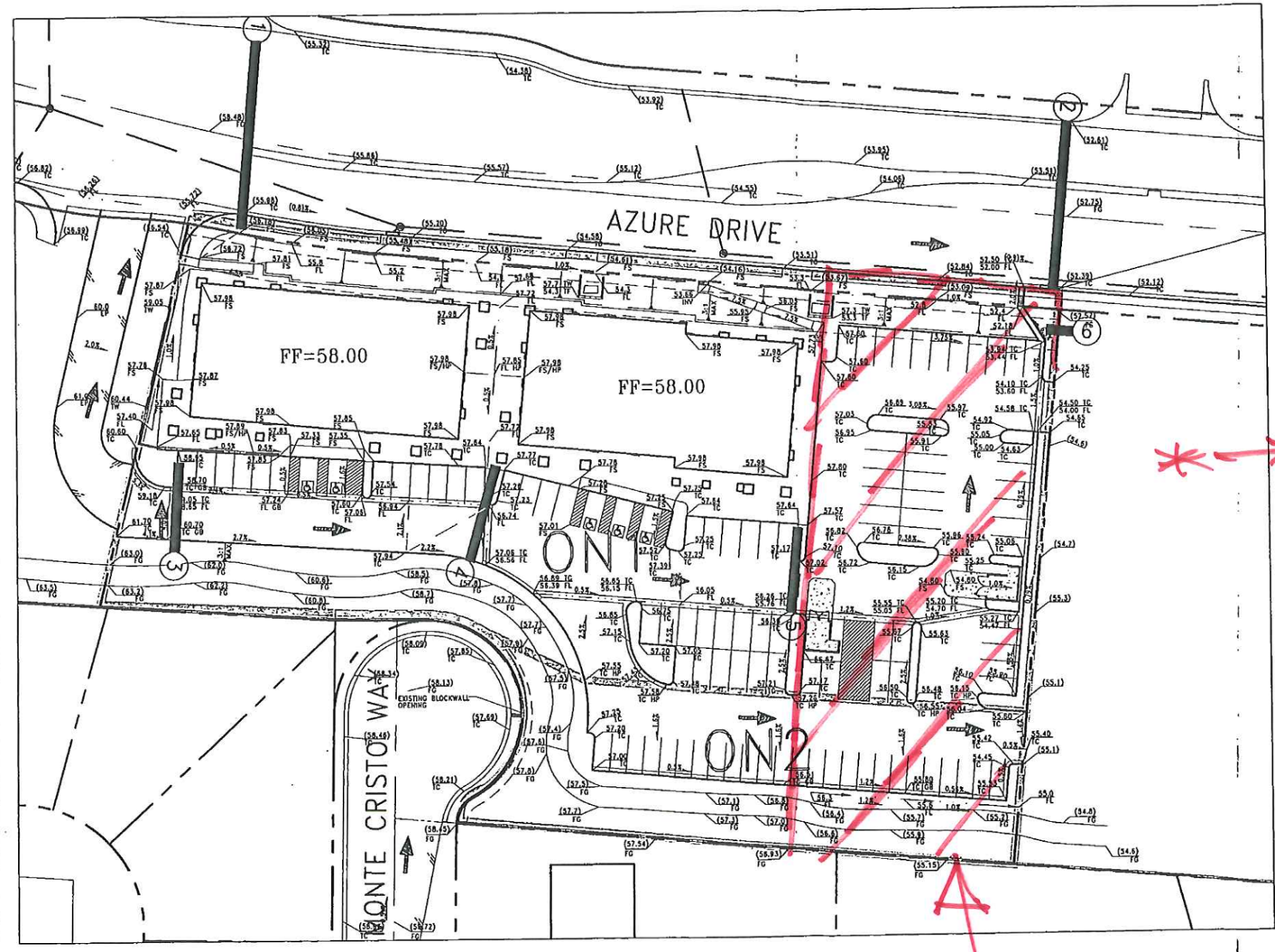
Response: The existing storm drain has been labeled with the City of Las Vegas recorded plan number. All existing drop inlets with type and size have been identified on the grading plan.

If you have any questions or require additional information, please contact Wood Rodgers, Inc. at 434-2953.

Thank You,

WOOD RODGERS, INC.

Chris Zrinyi, P.E.
Associate
Flood Control Division



SCALE 1" = 50'

LEGEND

(8) STREET FLOW CALCULATION

1.00% STREET SLOPE

SUMMARY OF STREET FLOWS

SECTION	Q100 (CFS)	Q10 (CFS)
1*	169	59
2**	181	65
3	6	3
4	6	3
5	6	3
6	6	3

*CPW FLOWS-55 CFS IN AZURE SD
**CPE FLOWS-55 CFS IN AZURE SD

NOTE: SEE FIGURE 6 FOR OFFSITE SBUBASINS AND FLOW RATES

GRAPHIC SCALE

50' 25' 0 50' 100'

SCALE: 1" = 50'

O'CONNELL COMMERCIAL
TENAYA COMMERCIAL

FIGURE 7R
STREET SECTIONS

WOOD RODGERS
ENGINEERING • MAPPING • PLANNING • SURVEYING
9900 COVINGTON CROSS DRIVE SUITE 102 /LAS VEGAS, NEVADA 89144

SITE

J:\Jobs\1943_TenayaCommercial\Civil\Docs\Studies\Drain\figures\dd#1\figure7R.dwg 2/09/07 1:05pm czinyi

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

WoodRodgers

TENAYA COMMERCIAL
O'CONNELL COMMERCIAL LLC
Ultimate Conditions

BY: NA
DATE: 2/9/07

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check	Tlag	REMARKS
DESIG: (1)	DEV./EX. (D or E)	CN	K (2)	AREA Ac (3)	AREA MI^2	INITIAL LENGTH Feet (4)	SLOPE % (5)	TI Min (6)	TRAVEL LENGTH Feet (7)	SLOPE % (8)	V1 VELOCITY FPS (9a)	V2 VELOCITY FPS (9b)	Tt Min (10)	Min (13)	Min (14)	Tlag= 0.6Tc/60 Hours	RAINFALL Q100/Q10 Inches
ON1	D	93.6	0.8455	1.92	0.0030	60	5.2	2.0	634	1.1	2.1	3.2	4.7	6.7	13.9	0.067	
ON2	D	94.0	0.8508	0.42	0.0007	70	2.0	3.0	220	0.7	1.7	2.6	2.2	5.1	11.6	0.051	
UTOFF1	D	93.0	0.8376	9.79	0.0153	100	1.0	4.7	1074	1.5	2.5	3.7	5.9	10.6	16.5	0.106	
UTOFF2	D	98.0	0.9036	6.36	0.0099	40	2.0	1.8	2900	1.3	2.3	3.5	15.0	16.8	26.3	0.168	
UTOFF3	D	92.5	0.8310	2.51	0.0039	110	2.0	4.0	667	1.7	2.7	4.0	3.8	7.8	14.3	0.078	
UTOFF5	D	92.9	0.8363	0.96	0.0015	30	2.0	2.1	574	0.5	1.4	2.2	6.4	8.5	13.4	0.085	

Tc = Ti + Tt Tlag = 0.6 Tc
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3
K = 0.0132 (CN) - 0.39

For the travel time (Tt) calculations,
V1 applies to the first 500 feet of travel distance;
V2 applies to the remaining travel distance.

Existing V1 = 14.8*(S/100)^1/2 Developed V1 = 20.2*(S/100)^1/2
Existing V2 = 29.4*(S/100)^1/2 Developed V2 = 30.6*(S/100)^1/2

Tc Check (Developed) = L/180+10

Minimum Tc (EX) = 10 Min per Section 602 Minimum Tc (DEV) = 5 Min per Section 602.1

REFERENCE :

STANDARD FORM 4

```
1*************************************
*                                   *
*   FLOOD HYDROGRAPH PACKAGE (HEC-1)*
*             JUN  1998             *
*          VERSION 4.1              *
*                                   *
* RUN DATE  05FEB07  TIME  11:58:02 *
*                                   *
*************************************
```

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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
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1EW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSRE- 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
   1      ID
          *DIAGRAM
   2      ID     TEMAYA/AZURE
   3      ID     ULTIMATE CONDITIONS
   4      ID     DESIGN STORM = 100-YEAR 6-HOUR STORM
   5      ID     STORM DISTRIBUTION = SCS3
   6      ID     JR CARDS BASED ON THE FOLLOWING VALUES
   7      ID
   8      ID  1.00       =100 YEAR
   9      ID  0.57       = 10 YEAR
  10      ID
  11      IT     5       0       0     300
  12      ID     5       0       0
  13      IN     5       0       0
  14      JR   PREC    1.00    0.57
          *
  15      KK   HONDA
  16      KM   THIS BASIN REFERENCED FROM WESTERLY PART OF PHASE 1: HONDA SITE DEVELOPMENT
  17      KM   BASIN OM1-DEVELOPED HEC-1 MODEL
  18      BA   .0041
  19      PB    2.77
  20      PC  0.000  0.020  0.057  0.070  0.087  0.108  0.124  0.130  0.130  0.130
  21      PC  0.130  0.130  0.130  0.132  0.140  0.142  0.146  0.158  0.172  0.181
  22      PC  0.190  0.197  0.199  0.200  0.201  0.204  0.214  0.239  0.241  0.249
  23      PC  0.251  0.256  0.270  0.272  0.281  0.283  0.295  0.322  0.352  0.409
  24      PC  0.499  0.590  0.710  0.744  0.781  0.812  0.819  0.835  0.851  0.856
  25      PC  0.860  0.868  0.876  0.888  0.910  0.926  0.937  0.956  0.970  0.976
  26      PC  0.982  0.985  0.987  0.989  0.990  0.991  0.993  0.994  0.995  0.998
  27      PC  0.998  0.999  1.000
  28      LS     0      98
  29      UD  0.083
          *
  30      KK   HONDB
  31      KM   THIS BASIN REFERENCED FROM EASTERLY PART OF PHASE 1: HONDA SITE DEVELOPMENT
  32      KM   BASIN OM2-DEVELOPED HEC-1 MODEL
  33      BA   .0056
  34      LS     0      98
  35      UD  0.075
          *
  36      KK   HONDC
  37      KM   THIS BASIN REFERENCED FROM SOUTHERLY PART OF PHASE1: HONDA SITE DEVELOPMENT
  38      KM   BASIN OM3-DEVELOPED HEC-1 MODEL
  39      BA   .0006
  40      LS     0      98
  41      UD  0.118
          *
```

1 HEC-1 INPUT PAGE 2

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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
  42      KK  DVSITE
  43      KM   REFERENCED FROM TOTAL DISCHARGE FROM PHASE 1: HONDA SITE DEVELOPMENT
  44      HC     3
```

```
                *
45              KK    HON2
46              KM   THIS BASIN REFERENCED FROM HONDA SITE DEVELOPMENT AS DVOFF2
47              KM   DEVELOPED CONDITION HEC-1 MODEL
48              BA   0.010
49              LS      0       98
50              UD   0.071
                *
51              KK    HON3
52              KM   THIS BASIN REFERENCED FROM HONDA SITE DEVELOPMENT AS DVOFF3
53              KM   DEVELOPED CONDITION HEC-1 MODEL
54              BA   .0120
55              LS      0       98
56              UD   0.079
                *
57              KK    HON4
58              KM   THIS BASIN REFERENCED FROM HONDA SITE DEVELOPMENT AS DVOFF4
59              KM   DEVELOPED CONDITION HEC-1 MODEL
60              BA   .0041
61              LS      0       98
62              UD   0.097
                *
63              KK    HON5
64              KM   THIS BASIN REFERENCED FROM HONDA SITE DEVELOPMENT DVOFF5
65              KM   DEVELOPED CONDITION HEC-1 MODEL
66              BA   .0167
67              LS      0       98
68              UD    .138
                *
69              KK   RHON5
70              KM   ROUTE HON5 THROUGH HON4
71              KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS "ROUTE OFF5 THROUGH OFF4"
72              RK     680    .005    .017             TRAP       3     100
                *
73              KK     C46
74              KM   COMBINE HON4 AND HON5
75              KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS "COMBINE OFF4 AND OFF5"
76              HC       2
                *                                                                                    PAGE  3
1                                                HEC-1 INPUT

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

77              KK    HON7
78              KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS DVOFF7
79              KM   DEVELOPED CONDITION HEC-1 MODEL
80              BA   .0128
81              LS      0       98
82              UD   0.153
                *
83              KK    HON8
84              KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS DVOFF8
85              KM   DEVELOPED CONDITION HEC-1 MODEL
86              BA   .0066
87              LS      0       85
88              UD    .130
                *
89              KK    HON9
90              KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS DVOFF9
91              KM   DEVELOPED CONDITION HEC-1 MODEL
92              BA   .0106
93              LS      0       85
94              UD   0.102
                *
95              KK     C89
96              KM   COMBINE HON8 AND HON9
97              KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS "COMBINE OFF8 AND OFF9"
98              HC       2
                *
99              KK     R89
100             KM   ROUTE C89 THROUGH HON7
101             KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS "ROUTE C89 THROUGH OFF7"
102             RK     160    .015    .017             TRAP       3     200
                *
103             KK    C789
104             KM   COMBINE C89 AND HON7
105             KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS "COMBINE C89 AND OFF7"
106             HC       2
                *
107             KK    R789
108             KM   ROUTE C789 THROUGH HON5
109             KM   REFERENCED FROM HONDA SITE DEVELOPMENT AS "ROUTE C789 THROUGH OFF5"
```

```
110         RK     560    .030    .017            TRAP       3     100
            *

111         KK    HON5
112         KM    REFERENCED FROM HONDA SITE DEVELOPMENT AS DVOFF5
113         BA    .0059
114         LS       0       98
115         UD    0.090
            *
1                                          HEC-1 INPUT                                                    PAGE  4

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

116         KK    C5789
117         KM    COMBINE C789 AND HON5
118         KM    REFERENCED FROM HONDA SITE DEVELOPMENT AS "COMBINE C789 AND OFF5"
119         HC       2
            *

120         KK    RKCPA
121         KM    COMBINE C5789, C46 AND HON3 AND ROUTE THROUGH HON2
122         KM    REFERENCED FROM HONDA SITE DEVELOPMENT
123         HC       3
            *

124         KK     RCPA
125         KM    ROUTE CONCENTRATION POINT "A" THROUGH HON2
126         KM    REFERENCED FROM HONDA SITE DEVELOPMENT AS "A THROUGH OFF2"
127         RK     520    .017    .017            TRAP       3     100
            *

128         KK     C2A
129         KM    COMBINE CPA AND HON2
130         KM    REFERENCED FROM HONDA SITE DEVELOPMENT AS"COMBINE CPA AND OFF2"
131         HC       2
            *

132         KK     SH1
133         KM    REFERENCED FROM SHEA COMMERCIAL-TENAYA AS OH1D
134         KM    FUTURE CONDITION MODEL
135         BA    .0037
136         LS       0       92
137         UD    0.054
            *

138         KK     SH2
139         KM    REFERENCED FROM SHEA COMMERCIAL-TENAYA AS OH2D
140         KM    FUTURE CONDITION MODEL
141         BA    .0031
142         LS       0       90
143         UD     .050
            *

144         KK     SH3
145         KM    REFERENCED FROM SHEA COMMERCIAL-TENAYA AS OH3D
146         KM    FUTURE CONDITION MODEL
147         KM    BASE FLOW NOT USED-HONDA BASINS WERE INCORPORATED INSTEAD OF BASE FLOW
148         BA    .0077
149         LS       0       92
150         UD     .110
            *
1                                          HEC-1 INPUT                                                    PAGE  5

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

151         KK     CP3
152         KM    REFERENCED FROM SHEA COMMERCIAL-TENAYA-COMBINES SH1, SH2, & SH3
153         HC       3
            *

154         KK   UTOFF1
155         KM    FUTURE COMMERCIAL
156         BA    .0153
157         LS       0    93.0
158         UD     .106
            *

159         KK   UTOFF3
160         KM    FUTURE COMMERCIAL INCLUDING DISCOUNT TIRE
161         BA    .0039
162         LS       0    92.5
163         UD     .078
            *

164         KK   UTOFF2
165         KM    AZURN DRIVE
166         BA    .0099
167         LS       0    98.0
168         UD     .168
            *

169         KK     CPW
170         KM    COMBINATION OF SHEA (CP3), UTOFF1, UTOFF3, UTOFF2, & HONDA BASINS
```

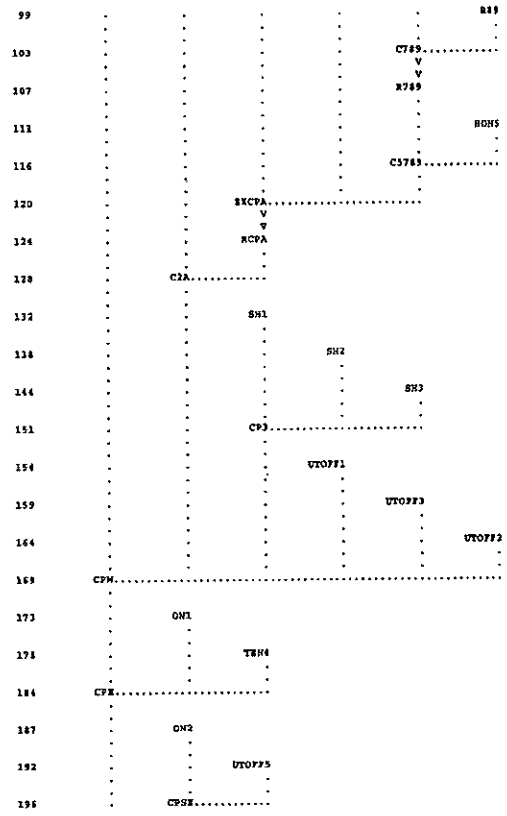
```
171          KM   FLOW IN AZURE @ WEST SIDE OF SITE
172          RC       6
             *
173          KK     ON1
174          KM   ONSITE COMMERCIAL TRIBUTARY TO AZURE
175          BA     .003
176          LS       0     93.6
177          UD     .047
             *
178          KK     TEN8
179          KM   REFERENCED FROM TENAYA VILLAGE PHASE 1 MINI STORAGE AS HON4
180          KM   FUTURE HEC-1 MODEL
181          BA     .004
182          LS       0       92
183          UD     .124
             *
184          KK     CPX
185          KM   COMBINATION OF TEN8, ON1, & CPM
186          RC       3
             *
1                                        HEC-1 INPUT                                    PAGE  6

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

187          KK     ON2
188          KM   ONSITE COMMERCIAL TRIBUTARY TO SITE TO THE EAST
189          BA   .0007
190          LS       0       94
191          UD     .051
             *
192          KK   UTOFF5
193          BA   .0013
194          LS       0     92.9
195          UD     .085
             *
196          KK     CPXX
197          KM   COMBINE ON2 & UTOFF5
198          KM   FLOW TO PARCEL EAST OF SITE
199          RC       2
200          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK

 INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW
  NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   15     HON1A
            .
            .
   20       .        HON1B
            .          .
            .          .
   26       .          .        HON1C
            .          .          .
            .          .          .
   62     DVSITE.....................
            .
            .
   45       .        HON2
            .          .
            .          .
   51       .          .        HON3
            .          .          .
            .          .          .
   57       .          .          .        HON4
            .          .          .          .
            .          .          .          .
   63       .          .          .          .        HON5
            .          .          .          .          V
            .          .          .          .          V
   69       .          .          .          .        RHON6
            .          .          .          .          .
            .          .          .          .          .
   73       .          .          .        C46.....     .
            .          .          .          .          .
            .          .          .          .        HON7
   77       .          .          .          .          .
            .          .          .          .          .          HON8
   83       .          .          .          .          .            .
            .          .          .          .          .            .          HON9
   89       .          .          .          .          .            .            .
            .          .          .          .          .            .            .
   95       .          .          .          .          .          C49.............
            .          .          .          .          .            V
            .          .          .          .          .            V
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*                                       *
*  RUN DATE   05FEB07  TIME  11:58:02   *
*                                       *
*****************************************
```

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

TEHAYA/AZURE
ULTIMATE CONDITIONS
DESIGN STORM = 100-YEAR 6-HOUR STORM
STORM DISTRIBUTION = SDN3
JR CARDS BASED ON THE FOLLOWING VALUES

1.00 -100 YEAR
0.57 - 10 YEAR

12 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       .57
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  RATIO 2
                                                             1.00     .57

 HYDROGRAPH AT
 +                HON1A        .00      1   FLOW             9.       5.
                                               TIME          3.50     3.50

 HYDROGRAPH AT
 +                HON1B        .01      1   FLOW            12.       7.
                                               TIME          3.50     3.50

 HYDROGRAPH AT
 +                HON1C        .00      1   FLOW             1.       1.
                                               TIME          3.50     3.50

   3 COMBINED AT
 +                DV81TH       .01      1   FLOW            22.      12.
                                               TIME          3.50     3.50

 HYDROGRAPH AT
 +                HON2         .01      1   FLOW            22.      13.
                                               TIME          3.50     3.50

 HYDROGRAPH AT
 +                HON3         .01      1   FLOW            25.      14.
                                               TIME          3.50     3.50

 HYDROGRAPH AT
 +                HON4         .00      1   FLOW             8.       5.
                                               TIME          3.50     3.50

 HYDROGRAPH AT
 +                HON6         .02      1   FLOW            31.      17.
                                               TIME          3.58     3.58

 ROUTED TO
 +                RHON6        .02      1   FLOW            30.      17.
                                               TIME          3.58     3.58

   2 COMBINED AT
 +                C46          .02      1   FLOW            37.      21.
                                               TIME          3.58     3.58

 HYDROGRAPH AT
 +                HON7         .01      1   FLOW            23.      13.
                                               TIME          3.58     3.58

 HYDROGRAPH AT
 +                HON8         .01      1   FLOW             8.       3.
                                               TIME          3.58     3.58

 HYDROGRAPH AT
 +                HON9         .01      1   FLOW            14.       5.
                                               TIME          3.50     3.58

   2 COMBINED AT
 +                C89          .02      1   FLOW            21.       8.
                                               TIME          3.58     3.58
```

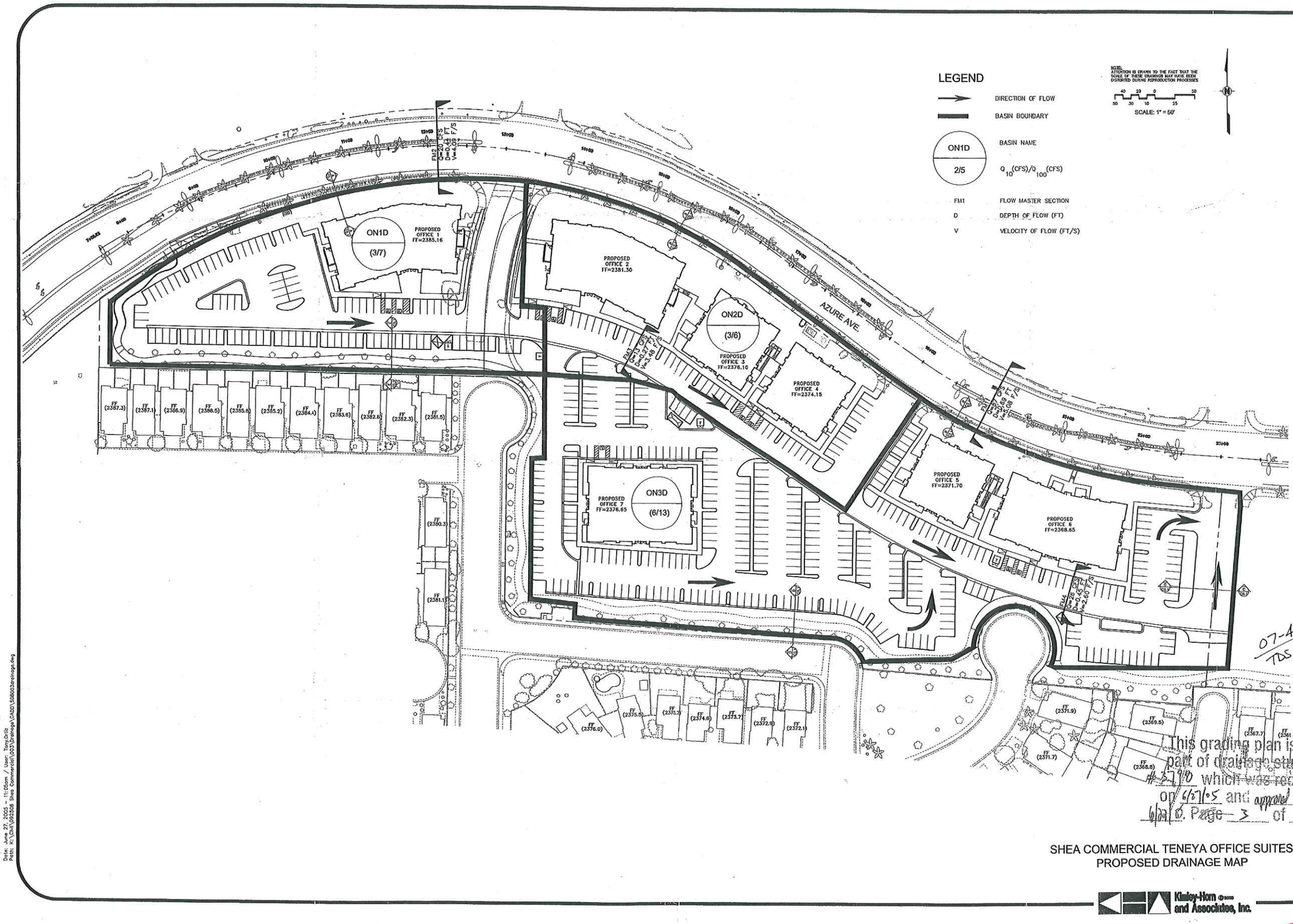
ROUTED TO	R89	.02	1	FLOW	21.	8.
				TIME	3.58	3.58
2 COMBINED AT	C789	.03	1	FLOW	45.	21.
				TIME	3.58	3.58
ROUTED TO	R789	.03	1	FLOW	44.	20.
				TIME	3.58	3.58
HYDROGRAPH AT	HON5	.01	1	FLOW	13.	7.
				TIME	3.50	3.50
2 COMBINED AT	C5789	.04	1	FLOW	56.	26.
				TIME	3.58	3.58
3 COMBINED AT	E1CPA	.07	1	FLOW	112.	58.
				TIME	3.58	3.58
ROUTED TO	RCPA	.07	1	FLOW	111.	58.
				TIME	3.58	3.58
2 COMBINED AT	C2A	.08	1	FLOW	127.	66.
				TIME	3.58	3.58
HYDROGRAPH AT	SH1	.00	1	FLOW	7.	3.
				TIME	3.50	3.50
HYDROGRAPH AT	SH2	.00	1	FLOW	6.	3.
				TIME	3.50	3.50
HYDROGRAPH AT	SH3	.01	1	FLOW	13.	6.
				TIME	3.50	3.58
3 COMBINED AT	CP3	.01	1	FLOW	26.	12.
				TIME	3.50	3.50
HYDROGRAPH AT	UTOFF1	.02	1	FLOW	26.	13.
				TIME	3.50	3.50
HYDROGRAPH AT	UTOFF3	.00	1	FLOW	7.	3.
				TIME	3.50	3.50
HYDROGRAPH AT	UTOFF2	.01	1	FLOW	18.	10.
				TIME	3.58	3.58
6 COMBINED AT	CPW	.13	1	FLOW	224.	114.
				TIME	3.50	3.50
HYDROGRAPH AT	ON1	.00	1	FLOW	6.	3.
				TIME	3.50	3.50
HYDROGRAPH AT	TEN4	.00	1	FLOW	6.	3.
				TIME	3.58	3.58
3 COMBINED AT	CPE	.14	1	FLOW	236.	120.
				TIME	3.50	3.50
HYDROGRAPH AT	ON2	.00	1	FLOW	2.	1.
				TIME	3.50	3.50
HYDROGRAPH AT	UTOFF5	.00	1	FLOW	3.	1.
				TIME	3.50	3.50
2 COMBINED AT	CPSE	.00	1	FLOW	4.	2.
				TIME	3.50	3.50

← AT OUR SITE (NEC)

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



07-4410
TDS MAP

This grading plan is a part of drainage study #07-410 which was received on 6/27/05 and approved on 6/30/05. Page 3 of 3

SHEA COMMERCIAL TENEYA OFFICE SUITES
PROPOSED DRAINAGE MAP

Kimley-Horn and Associates, Inc.

TDS MAP

REF.

Date: June 27, 2005 - 11:05am / User: TonyOrtiz
Path: K:\Civil\092508 Shea Commercial\003\Drainage\CADD\508003drainage.dwg

BENCHMARK
CITY OF LAS VEGAS RIVET AND ROUND PLATE IN TOP OF CURB, FAR WEST END OF DURHAM AVE., MARKED BLVD0 27NW06 727.175M, 2385.74', NAVD88

BASIS OF BEARING
N 0-55-40 E BEING THE WEST LINE OF THE NORTHWEST ONE-QUARTER (NW-1/4) OF SECTION 27, TOWNSHIP 19 SOUTH, RANGE 60 EAST, MOUNT DIABLO MERIDIAN, SHOWN ON MERGER AND RESUBDIVISION MAP, FILE 101, PAGE 91 OF PARCEL MAPS, CLARK COUNTY RECORDERS OFFICE.

FLOOD ZONE
FIRM PANEL NO. 32003C1745 E, ZONE "X", EFFECTIVE SEPTEMBER 27, 2002

LEGAL DESCRIPTION
PARCEL 2 OF THAT CERTAIN PARCEL MAP ON FILE IN THE CLARK COUNTY RECORDER'S OFFICE AT FILE 101, PAGE 91 OF PARCEL MAPS SITUATED WITHIN THE NORTH HALF (N 1/2) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 27, THOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

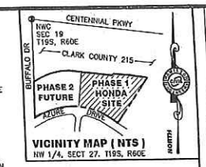
LEGEND

BASIN BOUNDARY LINE

FLOW PATTERNS

CONCENTRATION POINTS FOR EXISTING AND DEVELOPED Q10/Q100 BASIN FLOWS

EXISTING AND DEVELOPED CONDITION Q10/Q100 FLOW FOR BASIN



REV	DATE	BY	DESCRIPTION

CLIENT CONTACT:
STEVE VANMEETEREN
9880 SOUTH CAMERON
LAS VEGAS, NV 89118
PH: (702) 876-5900
FAX: (702) 251-0534
steve@oddmjt.com

PRINTED: 02-05-2006

HAMILTON CIVIL ENGINEERS
Ph: (702) 560-3658
Fax: (702) 247-4507
9845 Pebble Creek Avenue
Las Vegas, Nevada 89147 - John@HamiltonCivilEngineers.com

EXISTING BASIN RUNOFF

BASIN ID	Q10	Q100
OFF-1	6	16
OFF-2	5	13
OFF-3	6	15
OFF-4	2	5
OFF-5	3	8
OFF-6	8	21
OFF-7	6	16
OFF-8	3	8
OFF-9	5	14
OFF-10	3	8
OFF-11	2	5
EXSITE	5	13

RUNOFF SUMMARY-EXISTING CONDITION AT CONCENTRATION POINTS

DRAINAGE ID	Q10	Q100	COMMENTS
C2A	36	97	COMBINE OFF2 AND EXCPA
CPA	32	85	COMBINE OFF-3, 4, 5, 6, 7 AND CP89
CP89	8	21	COMBINE OFF8 AND OFF9
CP1011	5	14	COMBINE OFF10 AND OFF11
C46	10	28	COMBINE OFF4 AND OFF6
C5789	16	44	COMBINE OFF5, OFF7, OFF8, AND OFF9

DEVELOPED BASIN RUNOFF

BASIN ID	Q10	Q100
OFF-1	6	16
OFF-2	12	22
OFF-3	14	25
OFF-4	5	8
OFF-5	7	12
OFF-6	17	31
OFF-7	13	23
OFF-8	3	8
OFF-9	5	14
OFF-10	7	13
OFF-11	2	5

DEVELOPED SITE RUNOFF

BASIN ID	Q10	Q100
ON-1	5	9
ON-2	7	12
ON-3	0	1

RUNOFF SUMMARY-DEVELOPED CONDITION AT CONCENTRATION POINTS

DRAINAGE ID	Q10	Q100	COMMENTS
C2A	66	172	COMBINE OFF2 AND EXCPA
CPA	58	152	COMBINE OFF-3, 4, 5, 6, 7 AND CP89
CP89	9	19	COMBINE OFF8 AND OFF9
CP1011	9	24	COMBINE OFF10 AND OFF11
C46	21	37	COMBINE OFF4 AND OFF6
C5789	28	74	COMBINE OFF5, OFF7, OFF8, AND OFF9

This grading plan is a
which was received
on
Original

DRAINAGE BASIN MAP
NAME OF PROJECT:
FINDLAY-SHACK HONDA
APN 125-27-101-036
GOVERNING ENTITY:
CITY OF LAS VEGAS, NEVADA
ASSESSOR PARCEL NUMBER:
APN 125-27-101-036

1"=120'

HAMILTON CIVIL ENGINEERS:
HCE 05-500-005

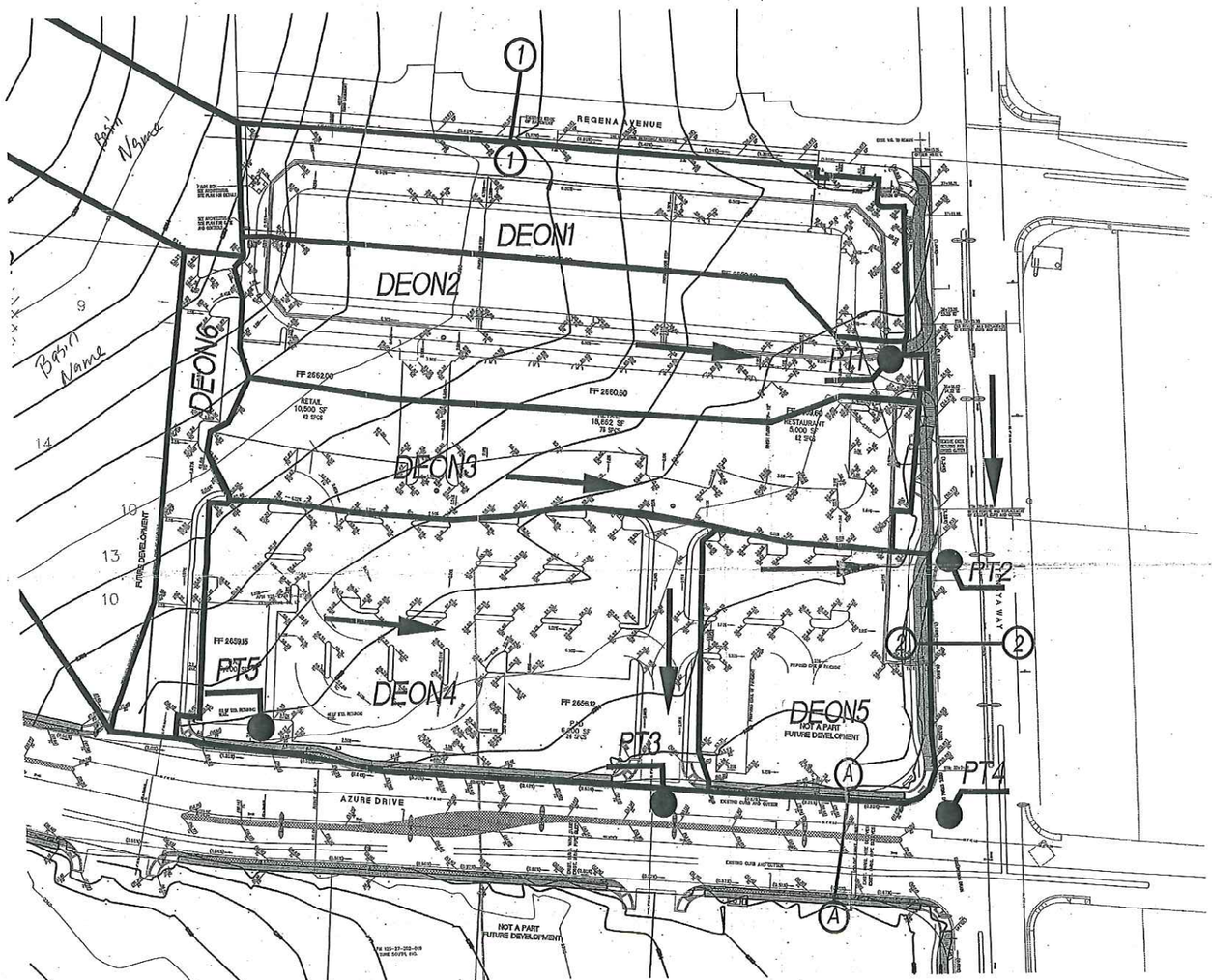
ENGINEER'S SEAL

SHEET ID
B-1

1 OF 1 SHEETS
GOVERNING ENTITY REF NO.:

TDS MAP

REF.



NORTH

W E S

LEGEND

DEON1	BASIN NAME
	BASIN BOUNDARY
	FLOW ARROW
PT1	CONCENTRATION POINT
1 1	STREET SECTION

BASIN / CONC. PT.	Q10 CFS	Q100 CFS
DEON1	2	4
DEON2	3	6
DEON3	2	4
DEON4	3	6
DEON5	2	4
DEON6	1	2
DEOF1	2	5
DEOF2	4	8
PT1	7	15
PT2	9	19
PT3	7	16
PT4	16	39
PT5	5	10

STREET SECTION	Q10 / Q100 CFS	D10/D100 FT	V10 / V100 FT/S
RICOTTA AVE. (SEC 1-1)*	5/23	.65/1.28	3.49/4.32
TENAYA WAY (SEC 2-2)	9/19	.52/.84	3.24/3.85
AZURE DRIV. (SEC A-A)**	—/151	—/.91	—/4.42

*FLOWS BASED ON INTERIM CONDITIONS

** AZURE DRIVE FLOWS OBTAINED FROM ADDENDUM #1 TO THE TECHNICAL DRAINAGE STUDY FOR TROPICAL PARKWAY

This grading plan is a part of drainage study # 3449 which was received on 11/4/07 and ____ on ____. Page 4 Of 5.

MONTECITO COMPANIES
8600 W. CHARLESTON BLVD., SUITE 124
LAS VEGAS, NEVADA
(702) 259-1277

TETRA TECH, INC.
INFRASTRUCTURE SERVICES GROUP
10 RAMADA DR. Suite 100, Las Vegas, Nevada 89145 (702) 242-6200

REV.	DATE	BY	REVISION

FIGURE 4
FUTURE ON-SITE DRAINAGE BASINS

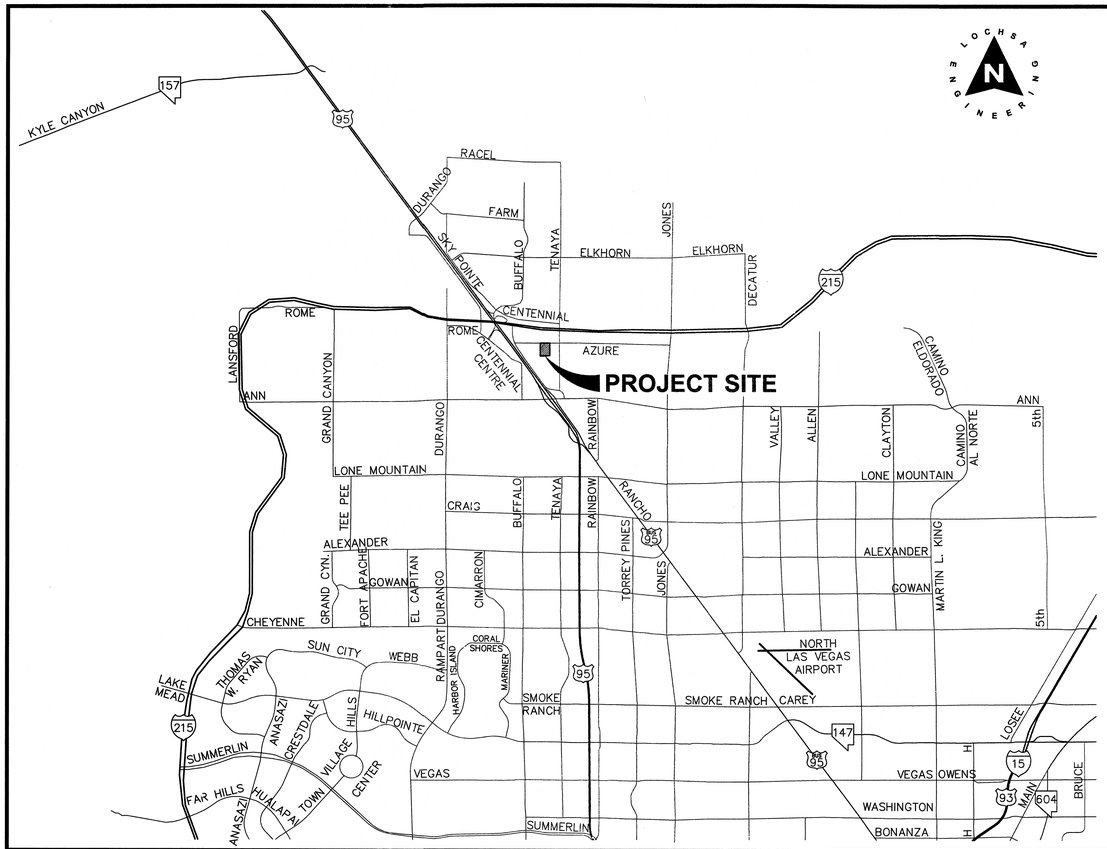
TENAYA VILLAGE
CITY OF LAS VEGAS

DRAWN BY:
DESIGNED BY:
CHECKED BY:
QUALITY CONTROL BY:
QUALITY CONTROL BY:
SCALE:
PROJECT NO. P09072-0002
SEAL

SHEET 1
1 OF 1
DRAWING NO.

TDS MAP

REF.



IMPROVEMENT PLANS FOR
AZURE TAVERN
CITY OF LAS VEGAS
LAS VEGAS, NEVADA

A PORTION OF THE NORTHEAST QUARTER (NE 1/4) OF THE SOUTHEAST QUARTER (SE1/4) OF THE NORTHWEST QUARTER (NW1/4) OF SECTION 27, TOWNSHIP 19S, RANGE 60E
A.P.N.: 125-27-222-015

*** CONTRACTOR TO REMOVE AND REPLACE ANY SUBSTANDARD PUBLIC IMPROVEMENTS.**

ABBREVIATIONS

ABAN	ABANDON	INV	INVERT
AIP	ABANDON IN PLACE	ISL	ISLAND
AGG	AGGREGATE	JB	JUNCTION BOX
ALT	ALTERNATE	LOC	LENGTH OF CURB
A	ANODE, GAS	LT	LEFT
ACP	ASBESTOS CEMENT PIPE	LF	LINEAR FEET
ACP	ASPHALTIC CONCRETE	LVVWD	LAS VEGAS VALLEY WATER DISTRICT
AVE	AVENUE	MH	MANHOLE
BC	BACK OF CURB	MAX	MAXIMUM
BCR	BACK OF CURB RADIUS	MIN	MINIMUM
BVC	BEGINNING OF VERTICAL CURVE	MON	MONOLITHIC
BM	BENCHMARK	N/O	NORTH OF
BDRY LINE	BOUNDARY LINE	NTS	NOT TO SCALE
CATV	CABLE TELEVISION	OC	ON CENTER
C-C	CENTER TO CENTER	OG	OPEN-GRADED PAVEMENT, ORIGINAL GROUND
CL	CENTERLINE	PVMT	PAVEMENT
CBC	CITY OF BOULDER CITY	PI	POINT OF INTERSECITON
CLV	CITY OF LAS VEGAS	PRC	POINT OF REVERSE CURVE
COH	CITY OF HENDERSON	PC	POINT OF CURVE
CM	CITY OF MESQUITE	PT	POINT OF TANGENCY
CNLV	CITY OF NORTH LAS VEGAS	PCC	POINT OF COMPOUND CURVE
CC	CLARK COUNTY	PCC, CONC	PORTLAND CEMENT CONCRETE
CCWRD	CLARK COUNTY WATER RECLAMATION DISTRICT	PP	POWER POLE
CO	CLEAN OUT, SEWER	P	POWER
COMM	COMMERCIAL	PL	PROPERTY LINE
CONC, PCC	CONCRETE	PROP	PROPOSED
CONST	CONSTRUCTION OR CONSTRUCT	PB	PULL BOX
COR	CORNER	RP	RADIUS POINT
CMP	CORRUGATED METAL PIPE	R	RADIUS
CSAP	CORRUGATED STEEL ARCH PIPE	RR	RAILROAD
CSP	CORRUGATED STEEL PIPE	REINF	REINFORCED
C&G	CURB & GUTTER	RC	REINFORCED CONCRETE
CIP	CAST IRON PIPE	RCB	REINFORCED CONCRETE BOX
COL	COLUMN	RCP	REINFORCED CONCRETE PIPE
CU YD, CY	CUBIC YARD	RELOC	RELOCATE
CU FT, CF	CUBIC FOOT	RT	RIGHT
CULV	CULVERT	R/W	RIGHT-OF-WAY
CF	CURB FACE	RD	ROAD
DEPT	DEPARTMENT	SS	SANITARY SEWER
DIA	DIAMETER	SHT	SHEET
DWY	DRIVEWAY	S/O	SOUTH OF
DI	DROP INLET	SW	SIDEWALK
ESMT	EASEMENT	SQ FT, SF	SQUARE FOOT
E/O	EAST OF	SQ YD,SY	SQUARE YARD
EP	EDGE OF PAVEMENT	STA	STATION
EO	EDGE OF OIL	SHP	STEEL HIGHPRESSURE PIPE
E	ELECTRIC	SD	STORM DRAIN
EM	ELECTRIC METER	STD	STANDARD
ELEV	ELEVATION	STRUCT	STRUCTURAL OR STRUCTURE
EMBK	EMBANKMENT	SURV	SURVEY
EOR	END OF CURB RETURN	SLT	STREETLIGHT
EC	END OF CURVE	TL	TELEPHONE
EBS	CATHODE PROTECTION BOND STATION	TEMP	TEMPORARY
ETS	CATHODE PROTECTION TEST STATION	TBA	TO BE ADJUSTED
EVC	END OF VERTICAL CURVE	TBR	TO BE REMOVED
EXIST	EXISTING	TC	TOP OF CURB
FT	FEET/FOOT	TP	TOP OF PIPE
FG	FINISH GRADE	TS	TRAFFIC SIGNAL
FA	FIRE ALARM	TSI	TRAFFIC SIGNAL INTERCONNECT
FH	FIRE HYDRANT	TRANS	TRANSITION
FL	FLOW LINE	TYP	TYPICAL
GALV	GLAVANIZED	UG	UNDERGROUND
GM	GAS METER	VAR	VARIABLE
GR	GAS PRESSURE REGULATOR	VERT	VERTICAL
PL-G	PLASTIC GAS	VC	VERTICAL CURVE
SG	STEEL GAS	VG	VALLEY GUTTER
GB	GRADE BREAK	VCP	VITRIFIED CLAY PIPE
GUT	GUTTER	W	WATER
HDWL	HEADWALL	WM	WATER METER
IN	INCH	W/O	WEST OF
INT	INTERSECTION	YD	YARD

DEVELOPER

AZURE CAPITAL MANAGEMENT, L.L.C.
7155 S. RAINBOW BLVD., STE. 200
LAS VEGAS, NV 89118
CONTACT: JOSEPH A. KENNEDY, MANAGER
PHONE: (702) 304-8383

OWNER

AZURE CAPITAL MANAGEMENT, L.L.C.
7155 S. RAINBOW BLVD., STE. 200
LAS VEGAS, NV 89118
CONTACT: JOSEPH A. KENNEDY, MANAGER
PHONE: (702) 304-8383

UTILITY PROVIDERS

WATER: . . . . . LAS VEGAS VALLEY WATER DISTRICT
SEWER: . . . . . CITY OF LAS VEGAS
GAS: . . . . . SOUTHWEST GAS CORPORATION
ELECTRIC: . . . . . NV ENERGY
TELEPHONE: . . . . . CENTURYLINK
CABLE TV: . . . . . COX COMMUNICATIONS LAS VEGAS, INC.
TRASH: . . . . . REPUBLIC SILVER STATE DISPOSAL SERVICE

APPROVALS

ALLEN PAVELKA, P.E., #9029 — DATE
CITY ENGINEER

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

CHRIS KNIGHT, DIRECTOR – BUILDING AND SAFETY — DATE

NOTE:
THIS PLAN CONFORMS TO THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT.

LAS VEGAS FIRE AND RESCUE — DATE

LAS VEGAS VALLEY WATER DISTRICT
APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER — DATE
PROJECT NO. XXXX SHEETS: XXXXX
LVVWD APPROVED FIRE FLOW = XXXX GPM AT 20 PSI RESIDUAL

SOUTHWEST GAS CORPORATION — 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.

COX COMMUNICATIONS LAS VEGAS, INC. — DATE

CENTRAL TELEPHONE COMPANY D.B.A. CENTURYLINK — DATE

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

SHEET INDEX

Sheet List Table

Sheet Number	Sheet Title
C1.01	COVER SHEET
C1.02	NOTE SHEET
C2.01	HORIZONTAL CONTROL PLAN
C3.01	GRADING PLAN
C4.01	UTILITY PLAN
C5.01	DETAIL SHEET

GENERAL SITE INFORMATION

A.P.N.:
125-27-222-015

BASIS OF BEARINGS:
THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CENTERLINE OF AZURE DRIVE AS SHOWN ON FILE 97 OF PARCEL MAPS, PAGE 42, LOCATED IN THE OFFICE OF THE RECORDER, CLARK COUNTY, NEVADA.
SAID LINE BEARS: NORTH 84°35'59" WEST

BENCHMARK:
CLARK COUNTY BENCHMARK NO. 6LV90 27N6
RIVET AND PLATE IN TOP OF CURB, NORTHWEST CORNER OF TENAYA WAY AND AZURE DRIVE.
ELVEVATION: 2350.88 FEET / 716.550 METERS
(NAVD '88 DATUM

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

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CALL 811 OR 1-800-227-2800

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1-702-432-6300
FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION

Avoid hitting overhead power lines. It's costly.
CALL BEFORE YOU DIG — OVERHEAD
1-702-227-2929

LEGEND

CL OR SURVEY LINE	EASEMENT LINE	DESCRIPTION:	CONTOUR LINES, EDGE OF PAVEMENT, "A" TYPE CURBS, "L" TYPE CURBS, WALLS, FENCES, AC PAVEMENT, CONCRETE, SPOT ELEVATIONS, SIGNS, MANHOLE W/ DESCRIPTION
PROPERTY LINE	SAWCUT LINE	EXISTING:	(2210)
ROW LINE	SCARP LINE	PROPOSED:	2122

MANHOLE DESCRIPTIONS: (S) = SANITARY SEWER; (D) = STORM DRAIN; (E) = ELECTRICAL; (T) = TELEPHONE

FIRE HYDRANTS, GATE VALVES, REDUCERS, CLEAN OUTS, UTILITY BOX OR VAULT, BACKWATER VALVES, 100w HPS STREETLIGHTS, 150w HPS STREETLIGHTS, 200w HPS STREETLIGHTS, 250w HPS STREETLIGHTS

Lochsa engineering
6345 South Jones Blvd.
Suite 100
Las Vegas, NV 89118
Phone (702) 385-8312
Fax (702) 385-8317
www.lochsa.com

REV.:	DATE:	BY:	DESCRIPTION:

GENERAL COVER SHEET
AZURE TAVERN
CITY OF LAS VEGAS
LAS VEGAS, NEVADA
SHEET / TITLE

PROJECT No.: 161079
DATE: 10-26-16
SCALE: N/A
DRAWN BY: JWN
DESIGNED BY: JWN
CHECKED BY: GMM

SEAL: PROFESSIONAL ENGINEER — STATE OF NEVADA — GUY M. MORRIS — EXP. 12-31-17 — CIVIL — No. 14526

10-26-16
SHEET No. C1.01
SHEET 1 OF 7

10/26/2016 8:34 AM
J:\CAD\161079\Drawings\Plot Drawings\PDF_161079-C1.01-CV.dwg

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', 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 ASBUILT 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

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 CONTRACTOR IS WARNED THAT AN EARTHWORK BALANCE WAS NOT NECESSARILY THE INTENT OF THIS PROJECT. ANY ADDITIONAL MATERIAL REQUIRED OR LEFTOVER MATERIAL FOLLOWING EARTHWORK OPERATIONS BECOMES THE RESPONSIBILITY OF THE CONTRACTOR.

5. 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.

6. 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	COMPACTION
A. PAVEMENT AREA SUBGRADE	0.1'+	+0.0' TO -0.1'	SEE SOILS REPORT
B. ENGINEERED FILL	0.5'+	+0.1' TO -0.1'	SEE SOILS REPORT
COMPACTION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE.			

7. ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL HAS BEEN ESTABLISHED.

8. 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.

9. 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.

10. IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED THAT IS NOT SHOWN ON THESE DRAWINGS, THE OWNER AGREES TO PROVIDE AND INSTALL SUCH ITEM AT HIS OWN EXPENSE AND AT THE DIRECTION OF THE CITY ENGINEER. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERMS, ROAD SIGNS AND BARRICADES, ETC.

REVISED 04/15/10

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

CITY OF LAS VEGAS FIRE DEPARTMENT NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE & RESCUE ADOPTED FIRE CODE ORDINANCE #6325 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.

2. ONLY FIRE HYDRANTS THAT ARE ON THE LAS VEGAS VALLEY WATER DISTRICT'S – APPROVED PRODUCTS LIST ARE ALLOWED TO BE INSTALLED.

3. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE & 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 ORDER AND 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 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 NECESSARY PER 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 FEET UNSPRINKLERED; 600 FEET SPRINKLERED.
COMMERCIAL – 300 FEET UNSPRINKLERED; 400 FEET SPRINKLERED.

12. WHERE THE WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF 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 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 13 FT 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 NOT BE LESS THAN 24 FT. [IFC § 503.2.1.1]

24. 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 FT IN HEIGHT, OR EXCEEDING 62,000 SQ FT 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 PLACES ON BOTH SIDES OF AN ACCESS ROADWAY IF NEEDED TO PREVENT PARKING ON EITHER SIDE. SIGNS TO BE INSTALLED NO HIGHER THAN 10FT 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 RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. [IFC § 503.3]

28. ELECTRONICALLY 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.

EFFECTIVE DATE 03-01-2016

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 PLANS. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCE'S 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 AND 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 DESIGNS TO BE APPROVED BY THE CITY, 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. EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTRUDED-TYPE CURB.

8. AC PAVEMENT TO BE ONE-HALF INCH (½") ABOVE LIP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.

9. CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.

10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.

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 THE TRANSITIONS TO BE AS SHOWN ON PLANS.

12. ALL GRADING WORK SHALL CONFORM TO THE SOILS REPORT AS PREPARED BY THE (COMPANY , _ REPORT #, DATE) APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.

13. EXACT LOCATION OF ALL SAWCUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES RELOCATIONS.

14. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH N.R.S. STATUTE NO. 625.380 & CITY OF LAS VEGAS TITLE 18, APPENDIX D.

15. UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APRONS, FLOWLINES, AND CROSS GUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE UTILITY COMPANY AND THE CITY ENGINEER.

WALL NOTES:
16. 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 BUILDING DEPARTMENT.

17. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHT OF WAY.

18. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.

19. MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF NDOT OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.

20. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC. THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO OFFSITE INSPECTION AND TESTING CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.

21. SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S) SHALL BE PROVIDED TO THE OFFSITE INSPECTION AND TESTING SECTION PRIOR TO PROJECT ACCEPTANCE. THE MAP(S) 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 STATE PLANE COORDINATES WHICH SHALL BE BASED ON THE NEVADA COORDINATE SYSTEM OF 1983, EAST ZONE' AS DEFINED BY THE NEVADA REVISED STATUTES CHAPTER 327, AND TIED TO THE CITY OF LAS VEGAS VERTICAL CONTROL BENCHMARK NETWORK. COORDINATES MUST BE CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTAINTIES OF +/- 0.1 METER (+/- 0.3 FEET). 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 MAP(S).

OR

SANITARY SEWER AND STORM DRAIN FACILITIES SHOWN ON THESE PLANS SHALL BE USED TO MEET THE REQUIREMENTS OF NRS 455 AND SHALL SHOW AT A MINIMUM THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF THE 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 EXIT THE PUBLIC RIGHT-OF-WAY. ANY DEVIATIONS FROM THE INFORMATION SHOWN SHALL BE NOTED AND SUBMITTED AS A REVISION TO THE PLANS AND APPROVED PRIOR TO ACCEPTANCE OF FACILITY VIDEO INSPECTION.

22. 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 EDITION.

23. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

REVISED 02/03/15

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 "SAFE 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.

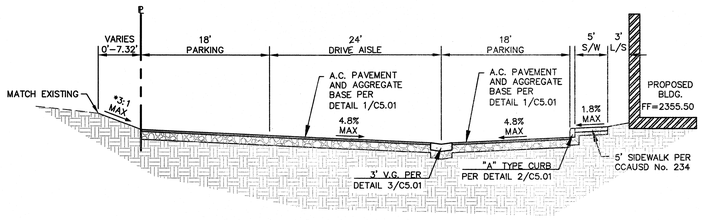
5. IF THE IMPROVEMENT NECESSITATE THE OBLITERATION, TEMPORARY OBSTRUCTION, TEMPORARY UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.

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 STREETNAME 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.

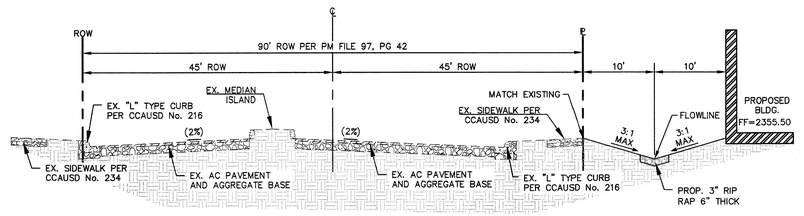
9. STREET SIGNS AND STOPS SIGNS SHALL BE INSTALLED PER CITY STANDARD SP



*NOTE: PERMISSION TO GRADE REQUIRED.

A WEST PROPERTY LINE SECTION

NOT TO SCALE



B NORTH PROPERTY LINE SECTION

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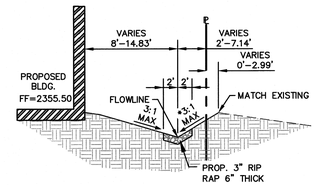

*NOTE: PERMISSION TO GRADE REQUIRED.

C EAST PROPERTY LINE SECTION

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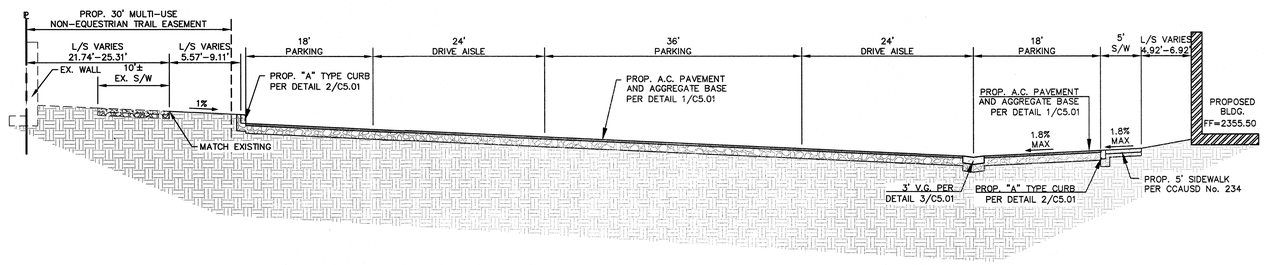
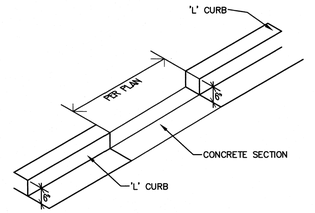


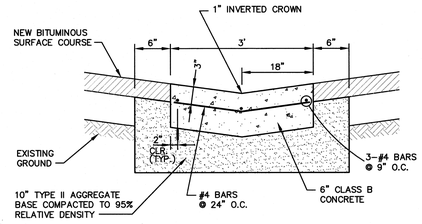
D SOUTH PROPERTY LINE SECTION

NOT TO SCALE



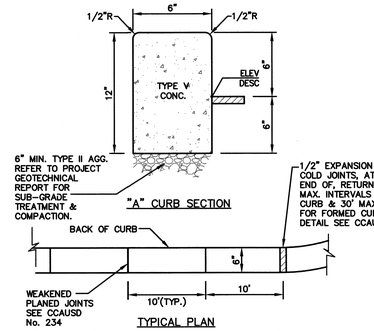
4 CURB OPENING

NOT TO SCALE



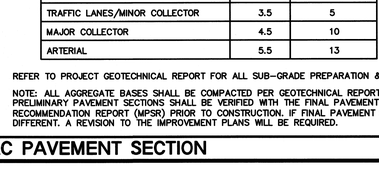
3 3' VALLEY GUTTER

NOT TO SCALE



2 "A" TYPE CURB

NOT TO SCALE



PAVEMENT SECTION AS PROPOSED IN GEOTECHNICAL REPORT PREPARED BY: WRIGHT ENGINEERS PROJ. NO.: 161158 DATED: 7/25/2016

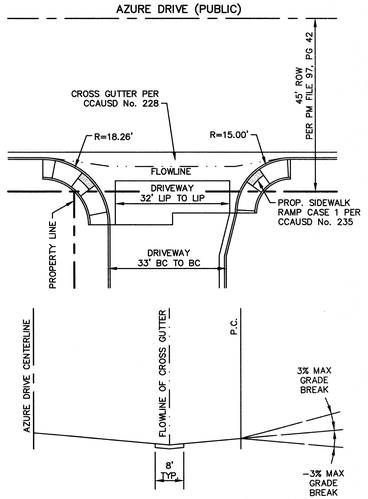
TYPE OF TRAFFIC	ASPHALT (inches)	TYPE II BASE COURSE (inches)
AUTOMOBILE PARKING	2.5	4.5
TRAFFIC LANES/MINOR COLLECTOR	3.5	5
MAJOR COLLECTOR	4.5	10
ARTERIAL	5.5	13

REFER TO PROJECT GEOTECHNICAL REPORT FOR ALL SUB-GRADE PREPARATION & COMPACTION.

NOTE: ALL AGGREGATE BASES SHALL BE COMPACTED PER GEOTECHNICAL REPORT PRELIMINARY PAVEMENT SECTIONS SHALL BE VERIFIED WITH THE FINAL PAVEMENT SECTION RECOMMENDATION REPORT (MPSR) PRIOR TO CONSTRUCTION. IF FINAL PAVEMENT SECTIONS ARE DIFFERENT, A REVISION TO THE IMPROVEMENT PLANS WILL BE REQUIRED.

1 AC PAVEMENT SECTION

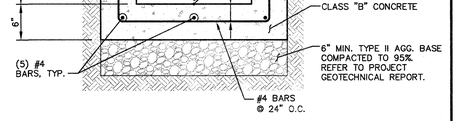
NOT TO SCALE



NOTES:
1. SEPARATION OF PEDESTRIAN AND VEHICLE TRAFFIC MUST BE MAINTAINED ON SITE.
2. FOR GRADE CHANGES GREATER THAN 3%, VERTICAL CURVES OF AT LEAST 10 FEET MUST BE USED.
3. WHEELCHAIR RAMPS SHALL BE CONSTRUCTED IN THE CURB RETURN IN ACCORDANCE WITH STANDARD DRAWING No. 235.

12 COMMERCIAL DRIVEWAY

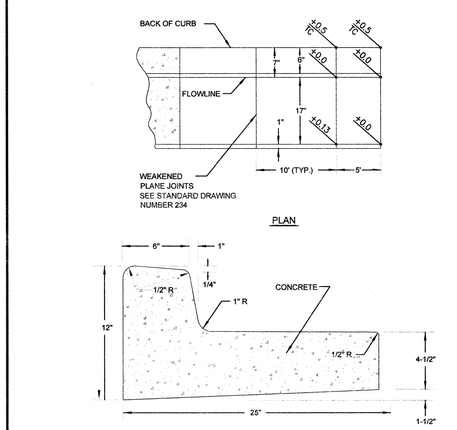
NOT TO SCALE



NOTES:
1. EXPANSION JOINTS REQUIRED AT ALL LOCATIONS WHERE CHANNEL MEETS CURB.
2. WEAKENED PLANE JOINTS REQUIRED AT 10' MAX. SPACING.
3. REFER TO PROJECT GEOTECHNICAL REPORT FOR TYPE II AGGREGATE OR SELECTED MATERIAL DEPTH AND COMPACTION, SUB-GRADE PREPARATION, MEMBRANES AND OTHER PLACEMENT RECOMMENDATIONS.

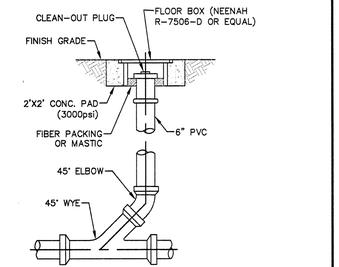
11 2' "U" CHANNEL

NOT TO SCALE



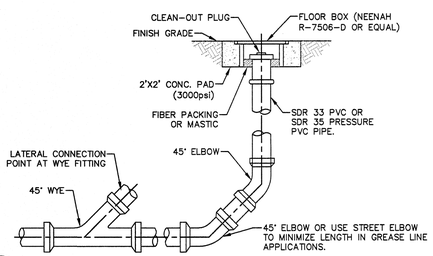
10 "L" CURB TRANSITION TO LAYING GUTTER FLAT

NOT TO SCALE



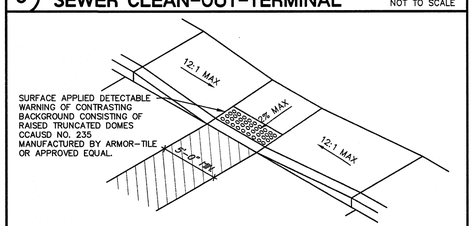
7 SEWER CLEAN-OUT-INLINE

NOT TO SCALE



9 SEWER CLEAN-OUT-TERMINAL

NOT TO SCALE

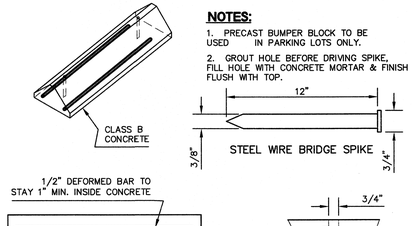


SURFACE APPLIED DETECTABLE WARNING OF CONTRASTING BACKGROUND CONSISTING OF RAISED TRUNCATED DOMES CCAUSD NO. 235 MANUFACTURED BY ARMOR-TILE OR APPROVED EQUAL.

RAMP NOTES: (FOR ALL ACCESSIBLE ROUTE SLOPES GREATER THAN 1:20)
1. RAMP LENGTHS SHALL BE 6'-0" (72") MIN. FOR EACH 6" RISE
2. RAMP LANDINGS SHALL BE FLAT FOR A MINIMUM DISTANCE OF 5'-0"
3. RAMP CROSS SLOPES SHALL NOT TO EXCEED 1:48
4. RAMP SLOPES SHALL NOT TO EXCEED 1:12
5. HEIGHT OF CURBS (OR EDGES) SHALL NOT TO EXCEED 6".
6. RAMP CLEAR WIDTHS TO BE 3'-0" MINIMUM.
7. RAMP HEIGHTS ARE NOT INTENDED TO EXCEED 6" IN HT. PER EA. RUN.
8. RAMP SHALL HAVE A BROOM FINISH.

8 ON-SITE RAMP

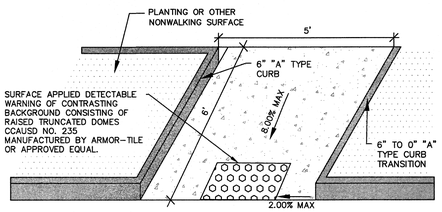
NOT TO SCALE



6 BUMPER BLOCK

NOT TO SCALE

NOTES:
1. PRECAST BUMPER BLOCK TO BE USED IN PARKING LOTS ONLY.
2. GROUT HOLE BEFORE DRIVING SPIKE, FILL HOLE WITH CONCRETE MORTAR & FINISH FLUSH WITH TOP.



RAMP NOTES: (FOR ALL ACCESSIBLE ROUTE SLOPES GREATER THAN 1:20)
1. RAMP LENGTHS SHALL BE 6'-0" (72") MAXIMUM FOR EACH 6" RISE
2. RAMP LANDINGS SHALL BE FLAT FOR A MINIMUM DISTANCE OF 5'-0"
3. RAMP CROSS SLOPES SHALL NOT TO EXCEED 1:48
4. RAMP SLOPES SHALL NOT TO EXCEED 1:12
5. HEIGHT OF CURBS (OR EDGES) SHALL NOT TO EXCEED 6".
6. RAMP CLEAR WIDTHS TO BE 4'-0" MINIMUM.
7. RAMP HEIGHTS ARE NOT INTENDED TO EXCEED 6" IN HT. PER EA. RUN.

5 ON-SITE RAMP

NOT TO SCALE

REV.:	DATE:	BY:	DESCRIPTION:

Lochsa engineering
6534 South Jones Blvd
Suite 100
Las Vegas, NV 89118
Phone (702) 430-3372
Fax (702) 430-3373
www.lochsa.com

DETAIL SHEETS
SHEET 1 OF 1

AZURE TAVERN
CITY OF LAS VEGAS
LAS VEGAS, NEVADA

SHEET

TITLE

PROJECT No.: 161079

DATE: 10-26-16

SCALE: N/A

DRAWN BY: JWN

DESIGNED BY: JWN

CHECKED BY: GMM

SEAL

PROFESSIONAL ENGINEER-STATE OF NEVADA
GUY M. MORRIS
EXP. 12-31-17
CIVIL
No. 14526

10-26-16

SHEET No.
C6.01

SHEET 7 OF 7

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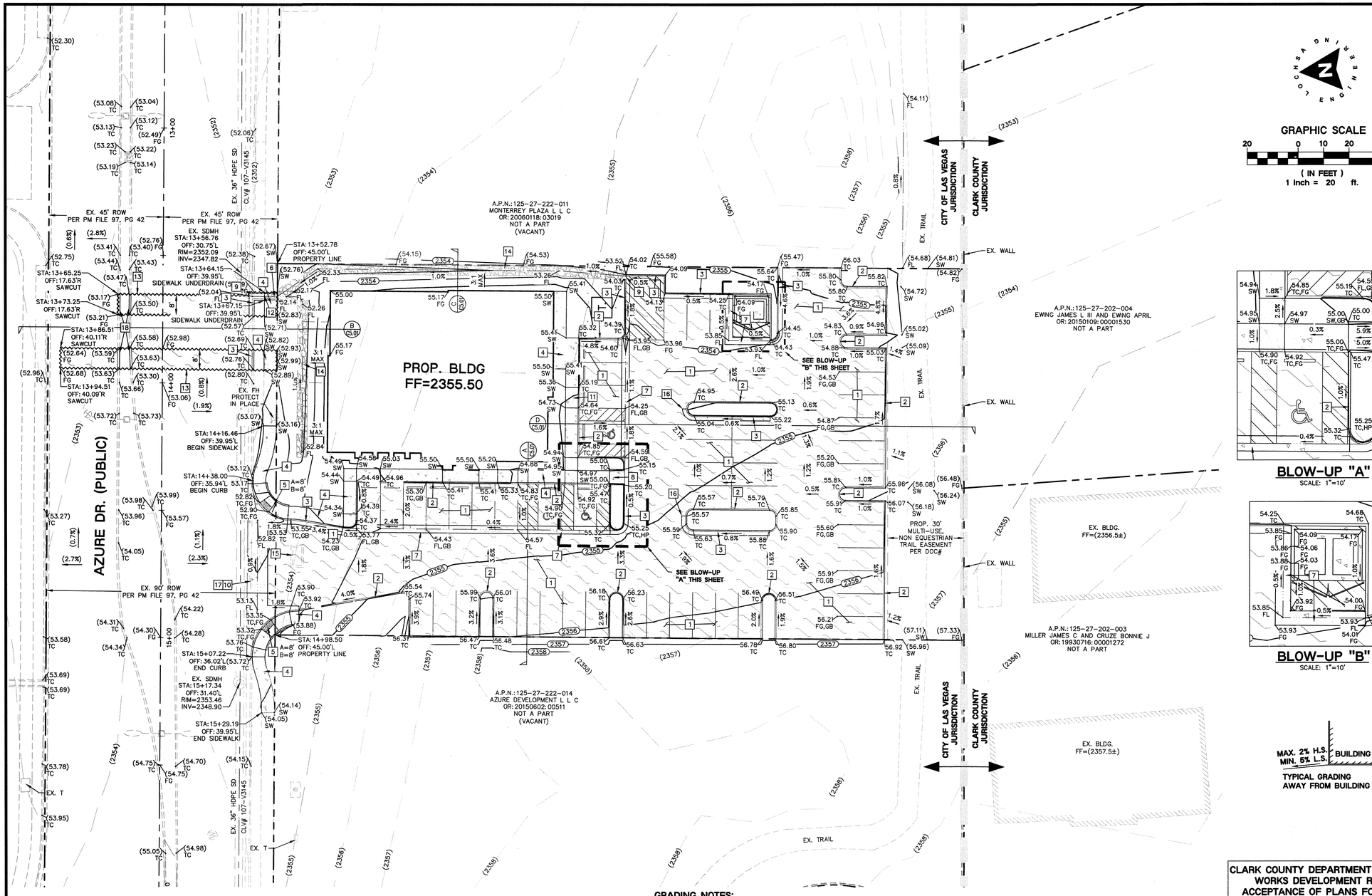

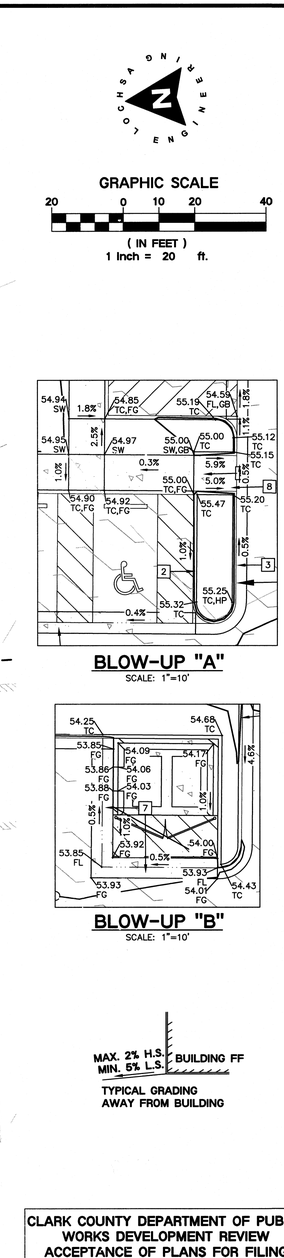

VICINITY MAP
NOT TO SCALE

BLOW-UP "A"
SCALE: 1"=10'

BLOW-UP "B"
SCALE: 1"=10'

TYPICAL GRADING AWAY FROM BUILDING

CONSTRUCTION NOTES:
– ALL CONSTRUCTION TO BE DONE IN ACCORDANCE WITH "CLARK COUNTY AREA UNIFORM STANDARD DRAWINGS (C.C.A.U.S.D.)" LATEST EDITION AND/OR REGULATING ENTITY HAVING JURISDICTION.
– NOT ALL NOTES USED ON THIS SHEET –

1. CONSTRUCT AC PAVEMENT PER DETAIL 1 ON C6.01.
2. CONSTRUCT "A" TYPE CURB PER DETAIL 2 ON C6.01.
3. CONSTRUCT "L" TYPE CURB PER CCAUSD No. 216.
4. CONSTRUCT CONC. SIDEWALK PER CCAUSD No. 234.
5. CONSTRUCT SIDEWALK RAMP CCAUSD No. 235 CASE I.
6. CONSTRUCT SIDEWALK DRAIN PER CCAUSD. No. 236.
7. CONSTRUCT 3' VALLEY GUTTER PER DETAIL 3 ON C6.01.
8. CONSTRUCT ONSITE SIDEWALK RAMP PER DETAIL 5 ON C6.01.
9. CONSTRUCT 2' CURB OPENING PER DETAIL 4 ON C6.01.
10. CONSTRUCT VALLEY GUTTER PER CCAUSD No 228.
11. CONSTRUCT ONSITE SIDEWALK RAMP PER DETAIL 8 ON C6.01.
12. INSTALL U–CHANNEL PER DETAIL 11 ON C6.01.
13. SAWCUT, TRENCH, AND MATCH EX. PER CCAUSD Nos. 503 & 500.5
14. INSTALL RIP RAP,. D_{50}=3", THICKNESS=6"
15. RELOCATE OR INSTALL WITH TRAFFIC RATED LID (ADJUST TO GRADE) TO BE COORDINATED WITH NV ENERGY.
16. LAY GUTTER FLAT TO DRAIN PER DETAIL 10/C6.01
17. CONSTRUCT COMMERCIAL DRIVEWAY PER DETAIL 12 ON C6.01
18. CONSTRUCT "A" TYPE MEDIAN ISLAND CURB PER CCAUSD No. 219.

EARTHWORK QUANTITIES

CUT	1039.30 CU. YD.
FILL	188.24 CU.YD.
NET	851.06 CU. YD. CUT

FLOOD ZONE NOTE:
THE PROJECT SITE IS COVERED BY THE FLOOD INSURANCE RATE MAP (FIRM) FOR THE CLARK COUNTY AND INCORPORATED AREAS, NEVADA, COMMUNITY PANEL NUMBER:32003C1745E, EFFECTIVE DATE:SEPTEMBER 27, 2002. THE SITE FALLS WITHIN ZONE "X" DESCRIBED BY FEMA AS: "AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN".

EXISTING UTILITY NOTE:
CONTRACTOR TO ADJUST ALL EXISTING UTILITIES TO MATCH PROPOSED FINISH GRADE ELEVATIONS.

GRADING PLAN CERTIFICATION

NAME: GUY M. MORRIS PE # 14526 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

NOTE:
ADD 2300 TO ALL ELEVATION TAGS SHOWN.

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

LAS VEGAS VALLEY CONSTRUCTION SITE BEST MANAGEMENT PRACTICES GUIDANCE MANUAL SECTION 3.5.1 STANDARD NOTES 1–5

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 RIGHT–OF–WAY OF THE CITY OF LAS VEGAS AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIAL 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 THE CITY OF LAS VEGAS 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 OR 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 LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMP'S 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.

GRADING NOTES:
1. SLOPES 4:1 OR STEEPER AND FINE–GRAINED MATERIALS THAT HAVE BEEN DISTURBED (SANDY AND SILTY MATERIALS) SHOULD BE PROTECTED WITH BURLAP OR OTHER EROSION CONTROL FABRIC/MATERIAL, UNLESS OTHERWISE SPECIFIED BY LANDSCAPE DRAWINGS AND SPECIFICATIONS OR THE SOILS REPORT.
2. CONTRACTOR SHALL DETERMINE HIS OWN FOOTING OR BASEMENT EXCAVATION QUANTITIES, EVEN THOUGH SHOWN ON ROUGH GRADING PLANS. ADDITIONALLY, STRUCTURE BACKFILL COSTS SHOULD BE INCLUDED IN THE COST OF THE STRUCTURE UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.
3. CONTRACTOR SHALL NOTIFY LOCHSA ENGINEERING WITHIN 24 HOURS OF OMISSIONS AND ERRORS DISCOVERED ON PLANS. LOCHSA ENGINEERING WILL NOT BE RESPONSIBLE FOR ANY "CORRECTIVE" WORK DONE BY OTHERS.
4. CONTRACTOR TO ENSURE POSITIVE DRAINAGE. NO PONDING ALLOWED. CONTRACTOR TO FOLLOW RECOMMENDATIONS AS OUTLINED IN THE PROJECT GEOTECHNICAL REPORT, INCLUDING BUT NOT LIMITED TO EXCAVATION, GRADING AND COMPACTION. REFER TO THE REPORT PREPARED BY: WRIGHT ENGINEERS, PROJECT No. 161158, DATED: JULY 25, 2016.
5. SEE ARCHTECTURAL/LANDSCAPE PLANS FOR TRASH ENCLOSURE DETAILS.

CLARK COUNTY DEPARTMENT OF PUBLIC WORKS DEVELOPMENT REVIEW ACCEPTANCE OF PLANS FOR FILING

BY: _____

ACCEPTANCE OF THESE PLANS FOR FILING SHALL NOT BE CONSTRUED TO BE A PERMIT FOR OR AN APPROVAL OF ANY VIOLATION OF ANY OF THE PROVISIONS OF THE STATE OR COUNTY LAWS AND/OR SPECIFICATIONS. CLARK COUNTY SHALL BE HELD FREE FROM DAMAGES WHICH MAY RESULT FROM THE CONSTRUCTION OF THE IMPROVEMENTS FROM THE ENGINEERING DESIGN DEPICTED HERE.

NOTE: POWER POLES AND/OR OTHER EXISTING FACILITIES NOT IN PROPER LOCATION BASED ON PROPOSED IMPROVEMENTS SHOWN HEREON WILL BE RELOCATED AT NO EXPENSE TO CLARK COUNTY.

A.P.N.:
125–27–222–015

BASIS OF BEARINGS:
THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CENTERLINE OF AZURE DRIVE AS SHOWN ON FILE 97 OF PARCEL MAPS, PAGE 42, LOCATED IN THE OFFICE OF THE RECORDER, CLARK COUNTY, NEVADA.
SAID LINE BEARS: NORTH 84°35'59" WEST

BENCHMARK:
CLARK COUNTY BENCHMARK NO. 6LV90 27N6
RIVET AND PLATE IN TOP OF CURB, NORTHWEST CORNER OF TENAYA WAY AND AZURE DRIVE.
ELEVATION: 2350.88 FEET / 716.550 METERS
(NAVD '88 DATUM

Call before you Dig
Avoid cutting underground utility lines. It's costly.
CALL 811 OR 1-800-227-2800

FAST before you Underground
1-702-432-5300
FREEING A NATIONAL SYSTEM OF TRANSPORTATION

Avoid hitting overhead power lines. It's costly.
CALL BEFORE YOU DIG OVERHEAD
1-702-227-2929

LEGEND

CL OR SURVEY LINE	EASEMENT LINE	DESCRIPTION:	CONTOUR LINES	EDGE OF PAVEMENT	"A" TYPE CURBS	"L" TYPE CURBS	WALLS	FENCES	AC PAVEMENT	CONCRETE	SPOT ELEVATIONS	SIGNS	MANHOLE W/ DESCRIPTION	MANHOLE DESCRIPTIONS	FIRE HYDRANTS	GATE VALVES	REDUCERS	CLEAN OUTS	UTILITY BOX OR VAULT	BACKWATER VALVES	100w HPS STREETLIGHTS	150w HPS STREETLIGHTS	200w HPS STREETLIGHTS	250w HPS STREETLIGHTS
PROPERTY LINE	SAWCUT LINE	EXISTING:	(2210)								(12.34) BC			Ⓢ = SANITARY SEWER						BWV				
ROW LINE	SCARP LINE	PROPOSED:	2122								12.34 BC		Ⓢ	Ⓓ = STORM DRAIN Ⓔ = ELECTRICAL Ⓣ = TELEPHONE						BWV				

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6345 South Jones Blvd.
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Las Vegas, NV 89118
Phone:(702)365-9312
Fax:(702)365-9317
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REV.:	DATE:	BY:	DESCRIPTION:

SHEET: GRADING PLANS SHEET 1 OF 1
TITLE: AZURE TAVERN CITY OF LAS VEGAS LAS VEGAS, NEVADA

PROJECT No.: 161079
DATE: 10–26–16
SCALE: 1"=20'
DRAWN BY: JWN
DESIGNED BY: JWN
CHECKED BY: GMM

SEAL: PROFESSIONAL ENGINEER–STATE OF NEVADA – GUY M. MORRIS – EXP. 12–31–17 – CIVIL – No. 14526
10–26–16

SHEET No.
C4.01
SHEET 5 OF 7

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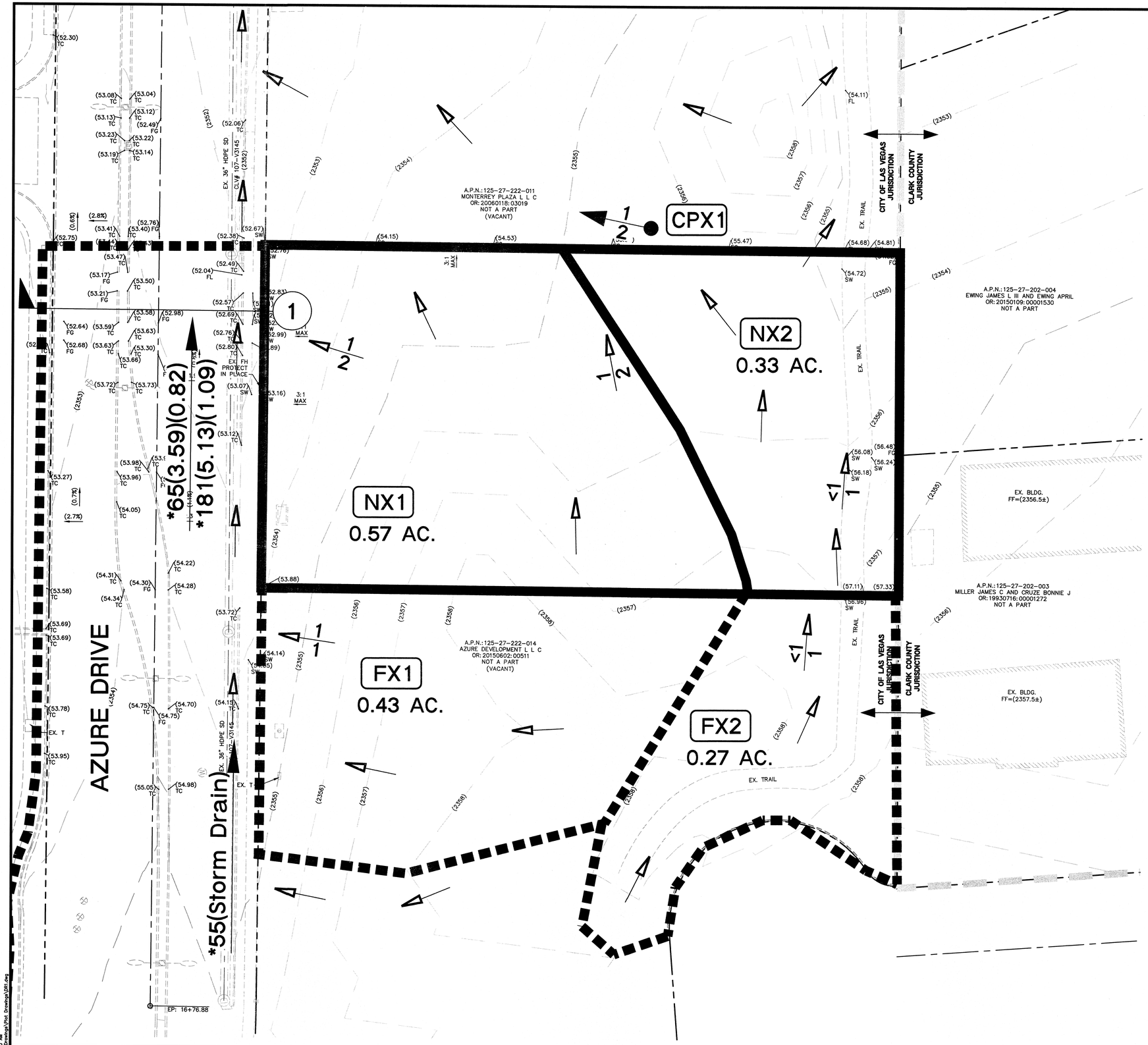

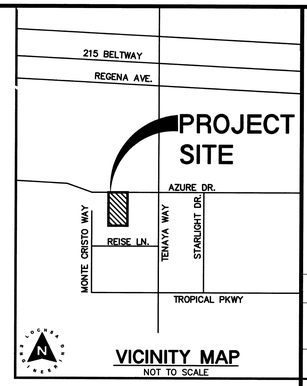

GRAPHIC SCALE

30 0 15 30 60

(IN FEET)
1 inch = 30 ft.

DRAINAGE LEGEND

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

Peak Flow Summary
Existing Condition

HEC-1 I.D.	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)	
FX2	0.27	<1	1	
NX2	0.33	<1	1	
CPX1	-	1	2	(FX2+NX2)
FX1	0.43	1	1	
NX1	0.57	1	2	

LEGEND

CL OR SURVEY LINE	EASEMENT LINE	DESCRIPTION:	CONTOUR LINES	EDGE OF PAVEMENT	"A" TYPE CURBS	"L" TYPE CURBS	WALLS	FENCES	AC PAVEMENT	CONCRETE	SPOT ELEVATIONS	SIGNS	MANHOLE W/ DESCRIPTION	MANHOLE DESCRIPTIONS	FIRE HYDRANTS	GATE VALVES	REDUCERS	CLEAN OUTS	UTILITY BOX OR VAULT	BACKWATER VALVES	100w HPS STREETLIGHTS	150w HPS STREETLIGHTS	200w HPS STREETLIGHTS	250w HPS STREETLIGHTS
PROPERTY LINE	SAWCUT LINE	EXISTING:	(2210)								(12.34) BC		(S)	(S) = SANITARY SEWER						BWV				
ROW LINE	SCARP LINE	PROPOSED:	2122								12.34 BC		(S)	(D) = STORM DRAIN (E) = ELECTRICAL (T) = TELEPHONE						BWV				

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REV.:	DATE:	BY:	DESCRIPTION:

EXISTING DRAINAGE PLAN

AZURE TAVERN
CITY OF LAS VEGAS
LAS VEGAS, NEVADA

SHEET

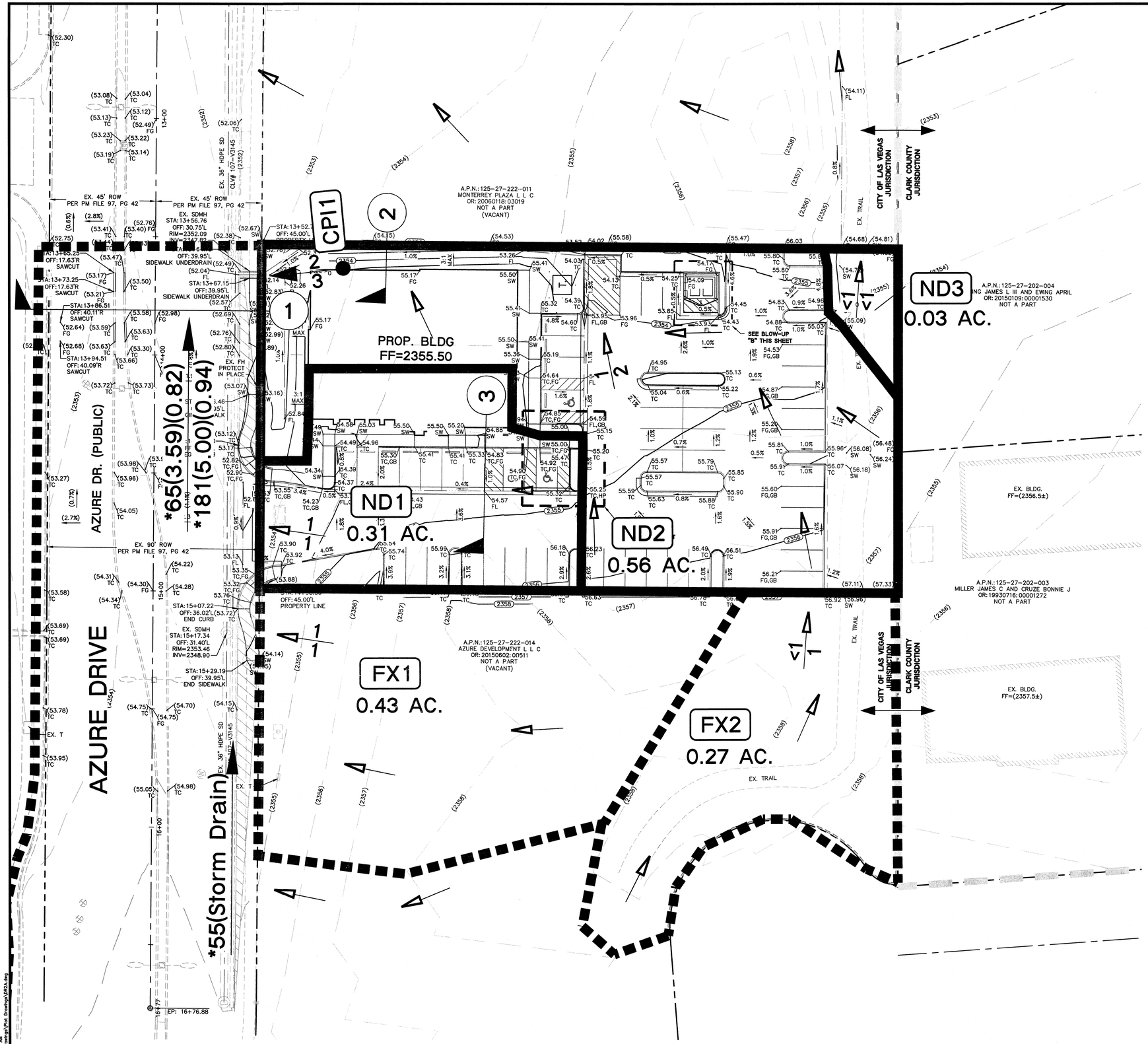
TITLE

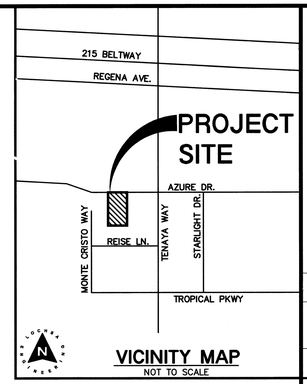
PROJECT No.: 161079
DATE: 10-21-16
SCALE: 1"=20'
DRAWN BY: CB
DESIGNED BY: CB
CHECKED BY: HMN

SEAL

PROFESSIONAL ENGINEER-STATE OF NEVADA
GUY M. MORRIS
EXP. 12-31-17
CIVIL
No. 14526

SHEET No.
DR1
SHEET 1 OF 1





VICINITY MAP
NOT TO SCALE

GRAPHIC SCALE
30 0 15 30 60
(IN FEET)
1 inch = 30 ft.

DRAINAGE LEGEND

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

Peak Flow Summary
Interim Condition

HEC-1 I.D.	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)	
FX2	0.27	<1	1	
ND2	0.56	1	2	
CPI1	-	2	3	(FX2+ND2)
FX1	0.43	1	1	
ND1	0.31	1	1	
ND3	0.03	<1	<1	

Peak Flow Summary
Developed Condition

SECTION I.D.	100-year Flow (cfs)	100-year Depth (ft)	100-year Velocity (fps)	D x V
2	3.00	0.56	2.01	N/A
3	1.00	0.15	1.04	0.156

LEGEND

CL OR SURVEY LINE / PROPERTY LINE / ROW LINE	EASEMENT LINE / SAWCUT LINE / SCARP LINE	DESCRIPTION: / EXISTING: / PROPOSED:	CONTOUR LINES (2210) 2122	EDGE OF PAVEMENT	"A" TYPE CURBS	"L" TYPE CURBS	WALLS	FENCES	AC PAVEMENT	CONCRETE	SPOT ELEVATIONS (12.34) BC / 12.34 BC	SIGNS	MANHOLE W/ DESCRIPTION (S)	MANHOLE DESCRIPTIONS (S) = SANITARY SEWER (D) = STORM DRAIN (E) = ELECTRICAL (T) = TELEPHONE	FIRE HYDRANTS	GATE VALVES	REDUCERS	CLEAN OUTS	UTILITY BOX OR VAULT	BACKWATER VALVES BWV	100w HPS STREETLIGHTS	150w HPS STREETLIGHTS	200w HPS STREETLIGHTS	250w HPS STREETLIGHTS

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Fax (702) 365-9317
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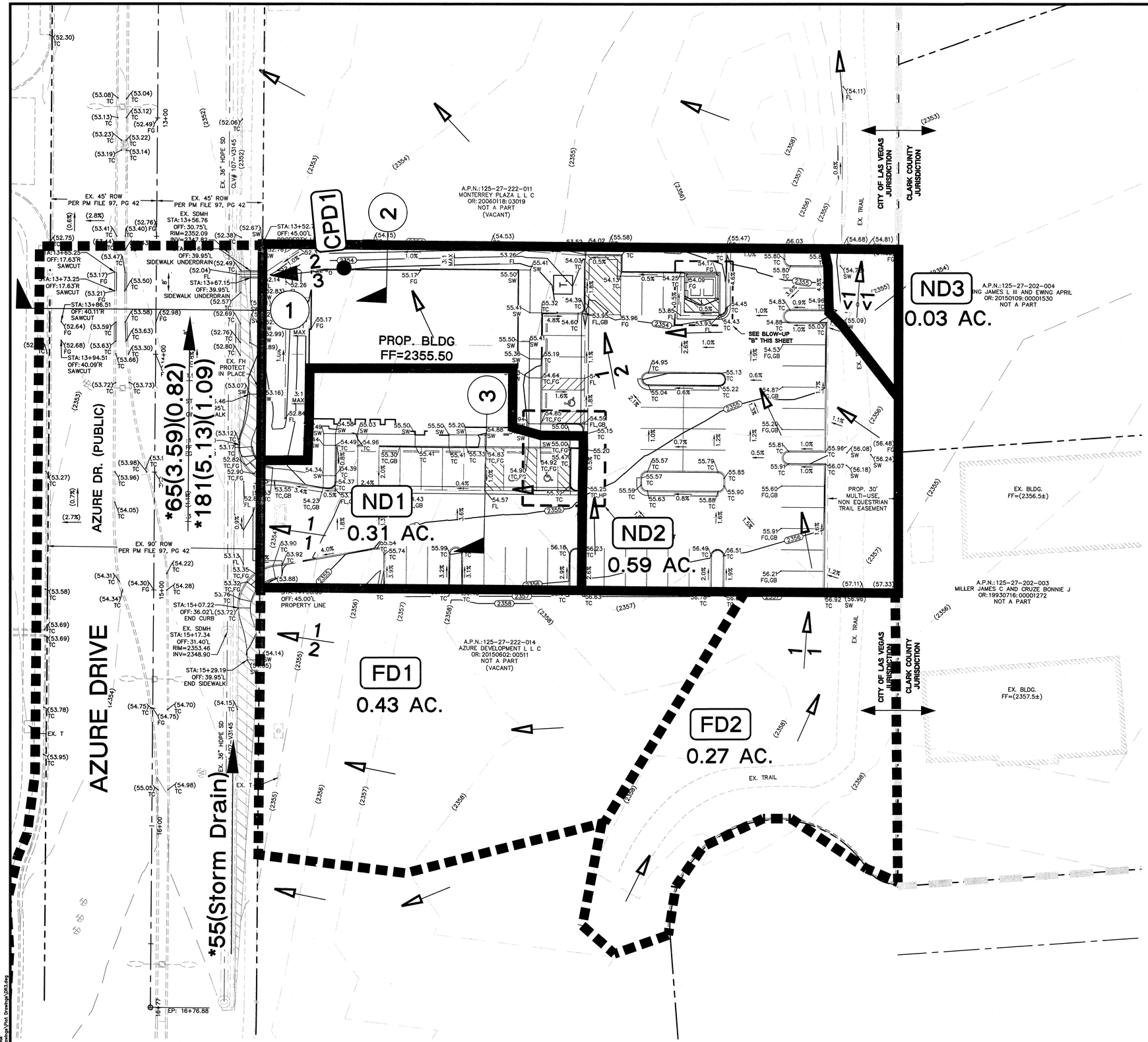
INTERIM DRAINAGE PLAN
AZURE TAVERN
CITY OF LAS VEGAS
LAS VEGAS, NEVADA

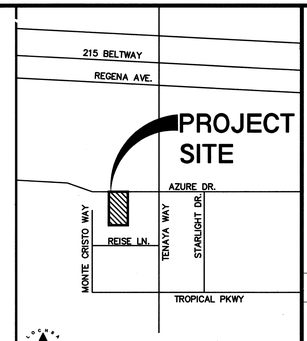
SHEET / TITLE

PROJECT No.: 161079
DATE: 10-21-16
SCALE: 1"=20'
DRAWN BY: CB
DESIGNED BY: CB
CHECKED BY: HMN

SEAL
PROFESSIONAL ENGINEER - STATE OF NEVADA
GUY M. MORRIS
EXP. 12-31-17
CIVIL
No. 14526

SHEET No.
DR2
SHEET 1 OF 1





VICINITY MAP
NOT TO SCALE

GRAPHIC SCALE
30 0 15 30 60
(IN FEET)
1 inch = 30 ft.

DRAINAGE LEGEND

ND1	DRAINAGE BASIN LABEL
CMD1	CONCENTRATION POINT
	COMBINATION POINT
	ONSITE BASIN BOUNDARY
	OFFSITE BASIN BOUNDARY
2 / 3	Q10 COMBINED FLOW IN CFS (10 YR.) / Q100 COMBINED FLOW IN CFS (100 YR.)
2 / 3	Q10 BASIN FLOW IN CFS (10 YR.) / Q100 BASIN FLOW IN CFS (100 YR.)
1 (1.0)(1.2) / 1 (1.0)(1.2)	Q10 (V10)(D10) / Q100 (V100)(D100)
1	HYDRAULIC CROSS-SECTION

Peak Flow Summary
Developed Condition

HEC-1 I.D.	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)	
FD2	0.27	1	1	
ND2	0.56	1	2	
CPD1	-	2	3	(FD2+ND2)
FD1	0.43	1	2	
ND1	0.31	1	1	
ND3	0.03	<1	<1	

Peak Flow Summary
Developed Condition

SECTION I.D.	100-year Flow (cfs)	100-year Depth (ft)	100-year Velocity (fps)	D x V
2	3.00	0.56	2.01	N/A
3	1.00	0.15	1.04	0.156

LEGEND

CL OR SURVEY LINE	EASEMENT LINE	DESCRIPTION:	CONTOUR LINES	EDGE OF PAVEMENT	"A" TYPE CURBS	"L" TYPE CURBS	WALLS	FENCES	AC PAVEMENT	CONCRETE	SPOT ELEVATIONS	SIGNS	MANHOLE W/ DESCRIPTION	MANHOLE DESCRIPTIONS (S) = SANITARY SEWER (D) = STORM DRAIN (E) = ELECTRICAL (T) = TELEPHONE	FIRE HYDRANTS	GATE VALVES	REDUCERS	CLEAN OUTS	UTILITY BOX OR VAULT	BACKWATER VALVES	100w HPS STREETLIGHTS	150w HPS STREETLIGHTS	200w HPS STREETLIGHTS	250w HPS STREETLIGHTS
PROPERTY LINE	SAWCUT LINE	EXISTING:	(2210)								(12.34) BC		S							BWV					
ROW LINE	SCARP LINE	PROPOSED:	2122								12.34 BC		S							BWV					

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REV.:	DATE:	BY:	DESCRIPTION:

SHEET: DEVELOPED DRAINAGE PLAN
TITLE: AZURE TAVERN CITY OF LAS VEGAS LAS VEGAS, NEVADA

PROJECT No.: 161079
DATE: 10-21-16
SCALE: 1"=20'
DRAWN BY: CB
DESIGNED BY: CB
CHECKED BY: HMN

SEAL
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GUY M. MORRIS
EXP. 12-31-17
CIVIL
No. 14576

SHEET No.
DR3
SHEET 1 OF 1