

EXHIBIT B

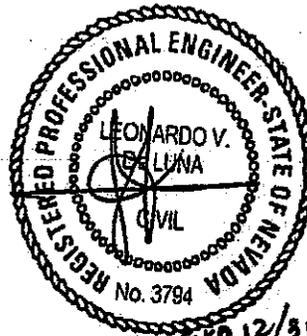
Drainage Study and Grading Plan for APN 191-05-801-012

DRAINAGE STUDY

for

BLUEHAWK TAVERN

DATE: MARCH 07, 2005



BY:

LEONARDO V. DeLUNA, P.E.
NEVADA CERTIFICATE NO. 3794



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EXHIBIT B - Drainage Study and Grading Plan for APN 191-05-801-012

Clark County, Nevada Drainage Study Submittal Checklist

This checklist itemizes all of the information that must be included as part of your drainage study submittal package. Most of these items are required with the initial submittal so that the County's drainage study review staff can conduct the review. Some of the other items are highly encouraged to be included with the initial submittal but will not hold up the review. These items, however, must be submitted to the Civil Engineering Division before the County can approve the drainage study.

At the end of this checklist is an enumeration of the most commonly noted drainage study issue omissions that cause delays in the review and approval process. Please ensure that your submittal package is complete and addresses all of the necessary issues to avoid any unnecessary delays in the process.

APPLICATION FEE		
Pay Applicable Fees		
Sec Attached Form	July 1, 2003	
GENERAL REQUIREMENT		
Standard Form 1 from CCRFCD Hydrologic Criteria and Drainage Design Manual with the engineer's seal and signature.	Must be included with initial submittal	✓
Standard Form 4 from CCRCCD Hydrologic Criteria and Drainage Design Manual	Must be included with initial submittal	✓
2 copies of the 24" x 36" Drainage Plan	Must be included with initial submittal	✓
A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.	Should be included with initial submittal; must be submitted prior to approval	N/A
MAPS AND EXHIBITS		
A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated	Must be included with initial submittal	✓
Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs	Must be included with initial submittal	✓
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	Must be included with initial submittal	✓
A copy of the current CCRFCD Master Plan Update Figure (F-x), for Flood Control Facilities and Environmental areas with the site delineated	Should be included with initial submittal; must be submitted prior to approval	✓
Vicinity Map with local and major cross streets identified and a north arrow	Should be included with initial submittal; must be submitted prior to approval	✓
DRAINAGE PLAN		
Sheet size: 24" x 36" sealed by a registered engineer in the State of Nevada.	Must be included with initial submittal	✓

EXHIBIT B - Drainage Study and Grading Plan for APN 191-05-801-012

Clark County, Nevada
Drainage Study Submittal Checklist

Minimum scale: 1" = 60'	Must be included with initial submittal	✓
North arrow and bar scale	Must be included with initial submittal	✓
Engineer's/consultant's address and phone number	Must be included with initial submittal	✓
Elevation datum and benchmark	Must be included with initial submittal	✓
Street names, grades and widths	Must be included with initial submittal	✓
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	Must be included with initial submittal	✓
Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate	Must be included with initial submittal	✓
Minimum finish floor elevations with top-of-curb elevations at upstream end of lot	Must be included with initial submittal	✓
Streets with off-set crowns	Must be included with initial submittal	N/A
Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patters and slopes	Must be included with initial submittal	✓
Property lines	Must be included with initial submittal	✓
Right-of-way lines and widths, existing and proposed	Must be included with initial submittal	✓
Existing improvements and their elevations	Must be included with initial submittal	✓
Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points	Must be included with initial submittal	✓
Concentration points and drainage flow direction with Q ₁₀₀ and V ₁₀₀ and D ₁₀₀ in streets	Must be included with initial submittal	✓
Cumulative flows, velocity, and direction of flow upstream and downstream ends of site for the 10-year and 100-year flows	Must be included with initial submittal	✓
Location and cross-section of street capacity calculations	Must be included with initial submittal	✓
Existing and proposed drainage facilities, appurtenances and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.)	Must be included with initial submittal	✓
Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement	Must be included with initial submittal	N/A
Location and detail of existing, proposed, and future block openings. Minimum size is 16" x 48". Wrought iron gate is required for flows > 10 cfs	Must be included with initial submittal	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	Must be included with initial submittal	N/A

EXHIBIT B - Drainage Study and Grading Plan for APN 191-05-801-012

Clark County, Nevada
Drainage Study Submittal Checklist

Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information	Must be included with initial submittal	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. Finish floor elevations must be a minimum of 18 inches above BFE	Must be included with initial submittal	N/A
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	Must be included with initial submittal	✓
Street slopes for perimeter and interior streets; minimum slope is 0.4 percent	Must be included with initial submittal	✓
Project name	Should be included with initial submittal; must be submitted prior to approval	✓
Vicinity Map with local and major cross streets	Should be included with initial submittal; must be submitted prior to approval	✓
Revision box	Should be included with initial submittal; must be submitted prior to approval	✓
Legend for symbols and abbreviation	Should be included with initial submittal; must be submitted prior to approval	✓
Cut/fill scarps, where applicable	Should be included with initial submittal; must be submitted prior to approval	✓
Proposed typical street sections	Should be included with initial submittal; must be submitted prior to approval	✓
Cross-sectional detail for channels, including cutoff wall locations	Should be included with initial submittal; must be submitted prior to approval	N/A
Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.	Should be included with initial submittal; must be submitted prior to approval	N/A
Building and/or lot numbers	Should be included with initial submittal; must be submitted prior to approval	✓

EXHIBIT B - Drainage Study and Grading Plan for APN 191-05-801-012

Clark County, Nevada
Drainage Study Submittal Checklist

Alignment of all existing, proposed, or future <u>Regional Flood Control facilities</u> adjacent to the site	Should be included with initial submittal; must be submitted prior to approval	N/A
HYDROLOGIC ANALYSIS		
Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated	Must be included with initial submittal	✓
Input and output information for existing conditions from computer models (HEC-1 or TR-5); the flow routing diagram must be provided with HEC-1 models	Must be included with initial submittal	✓
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	Must be included with initial submittal	✓
Use of correct precipitation values in and around the McCarran Airport rainfall area	Must be included with initial submittal	✓
A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs supporting assumptions, and calculations	Must be included with initial submittal	✓
A summary table of stormwater flows showing basin area, Q ₁₀ and Q ₁₀₀ for both individual basins and combined basin flows, where applicable	Must be included with initial submittal	✓
On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with <u>brief discussion located within the CCRFCD Hydrologic Criteria and Drainage Design Manual</u>	Must be included with initial submittal	✓
Copies of supporting technical information referenced from a previously approved study and a statement accepting these results	Should be included with initial submittal; must be submitted prior to approval	✓
HYDRAULIC ANALYSIS		
Flow split calculations and supporting documentation or reference for the method of flow split calculations used	Must be included with initial submittal	N/A
Normal depth street flow chart 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 \geq 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	Must be included with initial submittal	✓
Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor (Assume the lower half of the opening is plugged.)	Must be included with initial submittal	N/A
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	Must be included with initial submittal	✓

EXHIBIT B - Drainage Study and Grading Plan for APN 191-05-801-012

Clark County, Nevada
Drainage Study Submittal Checklist

Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or 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 or flow depth, whichever is greater	Must be included with initial submittal	✓
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 location 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	Must be included with initial submittal	✓
Provide a 50 percent clogging factor in the capacity calculation for drop inlets	Must be included with initial submittal	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	Must be included with initial submittal	N/A
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 need to meet 12 foot dry lane criteria.	Should be included with initial submittal; must be submitted prior to approval	✓
The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.	Should be included with initial submittal; must be submitted prior to approval	✓

Before you submit your drainage study for review it is critical that you comply with the above-listed checklist and review your package to avoid having an incorrect or incomplete submittal package – thus delaying the review process:

✓ Make sure that all tables, plans and calculations match what is listed in the text of the study; make sure all referenced exhibits, plans and appendices are included; make sure that current FIRM panels are used and make sure that there are no word processing errors that might cause confusion for the reviewer.

✓ Make sure that plans submitted with the study reflect the information and/or improvements proposed in the study.

N/A Make sure that geotechnical and/or structural information to support the designs is submitted and is correct for the design.

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Clark County, Nevada
Drainage Study Submittal Checklist

✓ Make sure to compare existing to propose site conditions and to propose mitigation to address any increased flows. Make sure to analyze the impact of the development of the site on the adjacent properties.

✓ Make sure that overall discussion and methodology is included in the text of the study. Also, explain the relevance of any included reference material. Make sure that your study includes a discussion about the local, state and federal requirements for the development and how the details and basis of design assumptions in the drainage plan address each requirement.

✓ Make sure to include all the relevant information when referencing other studies. Include approval letters, details, plans, etc. that are required to support the study. Make sure to include an explanation about the relevance of each item to the study.

✓ Make sure to include good quality drainage basin maps which include all of the basic data, such as topographic information, soils information, flows direction arrows, concentration points, flow summary, etc.

✓ Include supporting documentation for the beginning HGL for the study. In addition, include the interpretation of the results with the existing and proposed hydraulic model.

✓ Make sure to research approved studies in the neighborhood and include discussion in the study regarding the conclusions in these approved studies and if they differ, include an explanation as to why this is the case.

✓ Make sure to coordinate with the project's landscape architect to ensure that there are not conflicts between the drainage plans and landscape plans.

In reviewing your submittal package the County will be checking for compliance with various codes and regulations. In particular, County staff will be reviewing your plans to avoid potential liability or litigation issues, which include

Design information from the study that is not reflected on the approved plans; i.e., floodwalls, channel details, etc.

Diversions of flow that impact neighbors.

Structure failure.

Design choice was incorrect for the situation; i.e., box culvert vs. pipe.

Debris greater than anticipated.

If you comply with this checklist and the design complies with requirements, it will help us achieve our goal of approving studies within two reviews.

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: BLIEHAWK TAVERN Date: MAR 1 2005

Location of Development: a) Descriptive LAS VEGAS BLVD @ JONATHAN ST
 b) Sect.: 05 Twn.: 23 S. Rng.: 61 E.

Name of Owner: TZORTZIS VASSILIOS Assessors Parcel No.: 191-05-801-012

Contact Person Name: LEONARDO V. DeLUNA Telephone No.: 255-6242

Firm: DeLUNA, INC.

Address: 4511 W. CHEYENNE AVE., SUITE 101
NORTH LAS VEGAS, NV 89032

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
- DR-2214-04

1. Total Owned Land Area: At Site 5.0 AC. +/- Being Developed/Disturbed 5.0 AC. +/-

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

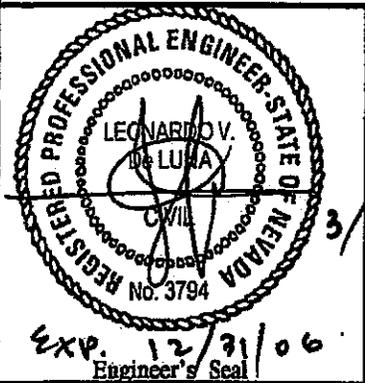
4. Proposed type of development (Residential, Commercial, Etc.)? COMMERCIAL

5. Approximate upstream land area which drains to the subject site? 28.2 AC. +/-

6. Has the site drainage been evaluated in the past? YES NO If yes, please identify documentation:

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site:
At the northwesterly and northeasterly corners of the Project Site.

8. Briefly describe your proposed schedule for the subject project: A. S. A. P.



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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL																	
DRAINAGE SUBMITTAL CHECKLIST																	
Project Name: BLUEHAWK TAVERN	Map ID:																
Firm Name: DeLUNA, INC.	Engineer: LEONARDO V. DeLUNA																
Address: 4511 W. CHEYENNE AVE., #101																	
City: NORTH LAS VEGAS	State: NV	Zip: 89032															
Phone Number: 255-6242	Fax Number: 255-7247																
Property Owner: TZORTZIS VASSILIOS																	
Address:																	
City:	State:	Zip:															
Reviewed By:	Date Received:	Date Accepted for Review:															
<p>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).</p> <p>This document is intended as an aid in preparing Technical Drainage Studies. 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.</p> <p>If items are not applicable for the subject site, provide N/A.</p> <p>I. GENERAL REQUIREMENTS</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 10%; text-align: center;">Yes</td> <td style="width: 10%; text-align: center;">No</td> <td style="width: 80%;"></td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Design Manual Standard Form 1 with the engineer's seal and signature.</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>Design Manual Standard Form 4.</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>2 copies of the 24" x 36" Drainage Plan</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td>A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.</td> </tr> </table>			Yes	No		<input checked="" type="checkbox"/>	<input type="checkbox"/>	Design Manual Standard Form 1 with the engineer's seal and signature.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Design Manual Standard Form 4.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2 copies of the 24" x 36" Drainage Plan	<input checked="" type="checkbox"/>	<input type="checkbox"/>	A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.
Yes	No																
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Design Manual Standard Form 1 with the engineer's seal and signature.															
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Design Manual Standard Form 4.															
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2 copies of the 24" x 36" Drainage Plan															
<input checked="" type="checkbox"/>	<input type="checkbox"/>	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	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Proposed typical street sections.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Streets with off-set crowns.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Property lines.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Right-of-way lines and widths, existing and proposed.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Existing improvements and their elevations.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Concentration points and drainage flow direction with Q_{100} and V_{100} and D_{100} in streets.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Location and cross-section of street capacity calculations.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Cross-sectional detail for channels, including cutoff wall locations.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	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.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	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.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

- | Yes | No | |
|-------------------------------------|-------------------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 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. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Building and/or lot numbers. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Alignment of all existing, proposed, or future Regional Facilities adjacent to the site. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | For areas in Zone A, AE, AH, and AD, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 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. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent. |

IV. HYDROLOGIC ANALYSIS

- | Yes | No | |
|-------------------------------------|--------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 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 checked="" type="checkbox"/> | <input type="checkbox"/> | 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. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Use of correct precipitation values in and around the McCarran Airport rainfall area. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | A summary table of stormwater flows showing basin area, Q_{10} and Q_{100} for both individual basins and combined basin flows, where applicable. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Copies of supporting technical information referenced from a previously approved study and a statement accepting these results. |
| <input type="checkbox"/> | <input type="checkbox"/> | On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with current Nevada Drainage Law. |

REFERENCE:

STANDARD FORM 2

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. $Q_{100} d \times v \leq 8$, $Q_{10} d \times v \leq 6$ and 12 foot dry lane for rights-of-way ≥ 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, super-elevation 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 or 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 or flow depth, which ever is greater.

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 location 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.

N/A 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.

REFERENCE:

STANDARD FORM 2

**DRAINAGE STUDY
FOR
BLUEHAWK TAVERN**

INTRODUCTION:

The subject area is approximately 5.0 acre parcel of land at the vicinity of South Las Vegas Blvd. and Bruners Avenue. It is being the South Half (S 1/2), of the Northeast Quarter (NE 1/4), of the Southeast Quarter (SE 1/4), of the Southeast Quarter (SE 1/4), of Section 5, Township 23 South, Range 61 East, M.D.M., Clark County, Nevada. Figure No. 1 delineates the location of the site..

EXISTING CONDITION:

The parcel is a vacant land along westerly side of Las Vegas Blvd. south, approximately one half (1/2) mile from St. Rose Parkway. Las Vegas Blvd. is bisecting the property in such a way that only about 3.7 acres can be used for development. The natural drainage across the property is by sheet flow and natural washes flowing in a northerly direction. A significant natural wash is located at the westerly side of the proposed project site. Previous drainage studies of the watershed south of this parcel, as shown on the reference materials, have come to the conclusion that a diversion flow is occurring at the existing box culverts at St. Rose Parkway just west of Las Vegas Blvd. according to the latest "Duck Creek/Blue Diamond Washes FIS Restudy", done by G.C. Wallace, Inc., this diversion flow is approximately 3160 cfs. We are in agreement with this flow rate, and this is the basis of our interim condition analysis.

PROPOSED CONDITION:

It is proposed that the site be developed into a Commercial Development. Because of the projected diversion flow of approximately 3160 cfs from St. Rose Parkway, the proposed development is limited to one (1) building (5000 s.f.) to be used as a Tavern. The proposed grading will be in such a way that it follows the existing flow pattern. The natural wash at the westerly portion of the site will still function as the drainage conveyance for the projected diversion flow from St. Rose Parkway. As shown on the detail "C", of the Grading Plan, the finish floor elevation of the proposed building will be at elevation 2436.60 feet which is approximately 2.10 feet higher than the projected Water Surface Elevation. The anticipated runoff from Offsite Basin OFF2, will enter the project site at point "A" (see figure 3), and will be intercepted by the proposed protective berm which then will convey the runoff towards Las Vegas Blvd. This scenario can still be replicated somewhat, should Onsite Basin "2B" be the next phase of development. The total build out of the subject site can only be economically feasible at the time when the proposed Pittman Wash Detention Basin and the corresponding outlet conveyance facilities are built, thus considerably reducing if not completely eliminating the diversion flow from St. Rose Parkway. At that time, Gabriel Street which is at the westerly boundary line of the site, can be built. Not only that this street will serve as an access to the subject site, but also, it will act as the drainage conveyance for Offsite Basin OFF1.

FLOOD HAZARD CONDITION:

Based on the Flood Insurance Rate Map (F.I.R.M.), Clark County, Nevada, dated Sept. 27, 2002, map number 32003C2910E, the subject property is within Flood Hazard Zone "X", whereas it is an area determined to be outside the 0.2% Annual Chance Flood Plain. See Figure No. 4.

HYDROLOGY:

Storm runoff for this study is estimated using the SCS Unit Hydrograph method within the HEC-1 Flood Hydrograph Package, May 1991, version 4.0.1E. The proposed project site is outside of the McCarran Rainfall Area. Precipitation depths were obtained from NOAA Atlas 2, Precipitation Frequency Atlas of the Western United States, Volume V11-Nevada, 1973. The depth - duration - frequency values were determined using Figure 503 & 506 and Table 501. The required Clark County Correction Factors were applied according to the Hydrologic Criteria and Drainage Design Manual to obtain the model precipitation. For the 100-yr. storm the depth is equal to 2.0 multiplied by the factor of 1.43 with a result of 2.86 inches. Likewise, the resulting depth for the 10-yr. storm is 1.74 inches.

The soils information for the project watershed was obtained from the SCS Soil Survey of Las Vegas Valley Area (See Figure No. 5). This survey delineates families of soil types and the Hydrologic Soil Group (HSG) of each family.

The included exhibit shows that the Offsite drainage basins as well as the project area, consist of soils which belong to the Hydrologic Soil Group D. Curve numbers were determined from Table 602 of the Manual.

EXHIBIT B - Drainage Study and Grading Plan for APN 191-05-801-012

Peak runoff rates were computed for the 10-year, and the 100-year storms. Offsite and Onsite runoffs were evaluated at point "C", the outlet point at the westerly portion of the site and at point "D", the outlet point at the easterly side of the project. The actual calculations were done using the methods as detailed in the aforementioned references. These calculations are contained in the appendix. The results of the analysis are tabulated below.

TABLE I
6 HR. STORM RUNOFF, CFS

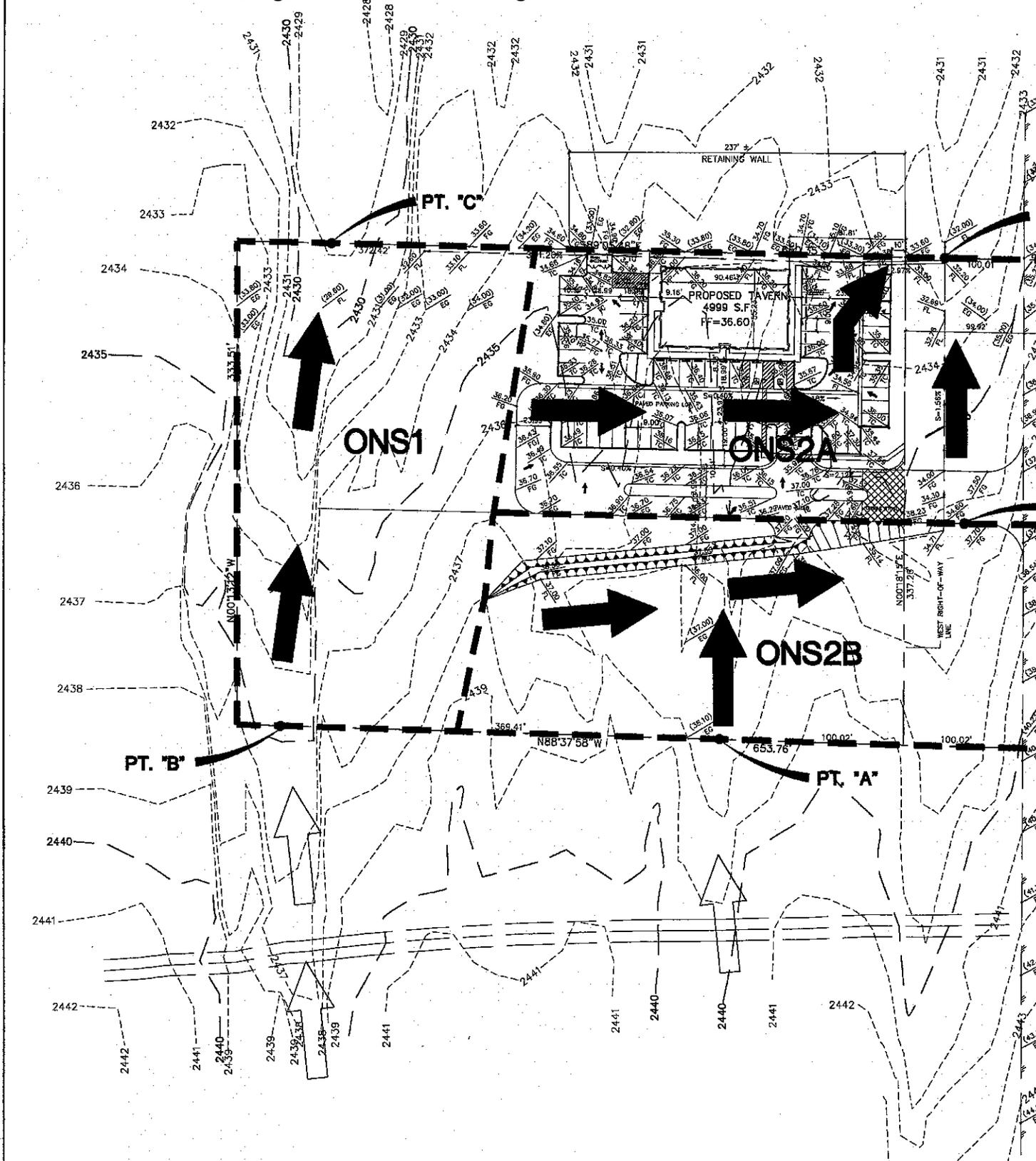
BASIN	AREA	EXISTING CONDITION		INTERIM CONDITION		DEVELOPED CONDITION	
		Q10	Q100	Q10	Q100	Q10	Q100
ONS1	1.43	2	4	2	4	3	5
ONS	3.71	3	7	-	-	-	-
ONS2A	2.00	-	-	4	7	4	7
ONS2B	1.71	-	-	2	4	3	6
ATPOINT "C"	-	24	60	1800	3160	44	83
ATPOINT "D"	-	12	31	11	28	23	44

CONCLUSION AND RECOMMENDATION:

As shown in Figure 6, the proposed project is not located adjacent to a proposed Clark County Regional Flood Control District storm drain facilities.

As demonstrated on the water surface elevation calculations, the finish floor elevation of the proposed building is set well above the 100-yr. flood elevation. Since the size of the proposed project is not that significant, it is our conclusion that the downstream properties will not be negatively affected by the development of this project.

EXHIBIT B - Drainage Study and Grading Plan for APN 191-05-801-012



RUNOFF TABULATION

BASIN	AREA AC.	EXISTING CONDITION		INTERIM CONDITION		DEVELOPED CONDITION	
		Q10	Q100	Q10	Q100	Q10	Q100
ONS1	1.43	2	4	2	4	3	5
ONS2	3.71	3	7	-	-	-	-
ONS2A	2.00	-	-	4	7	4	7
ONS2B	1.71	-	-	2	4	3	6
AT POINT "C"	-	24	60	1800	3160	44	83
AT POINT "D"	-	12	31	11	28	23	44

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