DS # 4521

DS INDEX:

APN: 138-29-212-003; -004 & -005

PROJECT: 901 TROPHY HILLS (TOURNAMENT HILLS UNIT 3)

SUBMITTAL 2ND

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: April 25, 2011
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: **901 Trophy Hills (Tournament Hills Unit 3)**			**COPIES TO:** Wright One Source
Cross Streets:	NWQ of Summerlin Pkwy. & Rampart Blvd.			Robert Paul G. Trust
File Number:	F:\Depot\DSMemos\DS4521B.doc			Bart Anderson, P.E., DevCo
Parcel Number:	138-29-212-003; -004 & -005			
Zoning Action:	FMP-40979			
FEMA Flood Zone	YES	NO	X	
Proposed Storm Drain	YES	NO	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1st Submittal	2/16/2011	3/2/2011	Not Approved	$400.00	162890: $400
2nd Submittal	4/14/2011	4/25/2011	See Comments Below	$400.00	166632: $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. *City of Las Vegas* does not allow HDPE pipe in public right-of-ways or public drainage easements. *City of Las Vegas* only allow the use of HDPE storm drain pipe for privately owned and privately maintained storm drain system, which serve and are located exclusively on private property. Any proposed HDPE storm drain pipe must also meet all design criteria established by the *Clark County Regional Flood Control District* and must be installed per *Clark County Regional Transportation Commission Uniform Standard Drawings and Specifications.*

In an effort to increase administrative efficiency, the City of Las Vegas Public Works will be requiring all soils report, drainage study and traffic impact analysis submittals to be accompanied by an electronic copy of the submittal. Electronic documents must be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output replicating your submittal to be used for archival or display purposes. This may be more than one file if necessary. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats, but provided it is a high quality digitized replication of the submittal, other formats may be acceptable. If figures are in color, they must be scanned in color and saved as a separate file. The new submittal requirements will become effective on July 1, 2011. If there are any questions regarding these new requirements, please contact Robert Welch in the Flood Section at (702) 229-2177 or Rick Schroder in Traffic Engineering at (702) 229-6327.

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

ays

T/R/S: T20S/R60E/29
AREA L-29

WRIGHT ENGINEERS

Rec'd: 4/14/11

ADDENDUM #1 TO THE UPDATE TO THE TECHNICAL DRAINAGE STUDY FOR TOURNAMENT HILLS – UNIT 3 A.K.A. 901 TROPHY HILLS

DS4521

L-29 $400-

CITY OF LAS VEGAS

April 14, 2011

WRIGHT engineers

PREPARED FOR:

INTERFACE OPERATIONS, LLC
3355 LAS VEGAS BLVD. S.
LAS VEGAS, NV 89109

7425 Peak Drive • Las Vegas, NV 89128 • Ph. (702) 933-7000 • Fax (702) 933-7001

WRIGHT
one source

April 14, 2011

Albert Sung, P.E.
Flood Control
City of Las Vegas Public Works
731 S. Fourth Street
Las Vegas, Nevada 89101

RE: UPDATE TO THE TECHNICAL DRAINAGE STUDY FOR TOURNAMENT HILLS – UNIT 3 – LOTS 3, 4, AND 5 A.K.A. 901 TROPHY HILLS
Job No. CN111029
DS4521

Dear Mr. Sung:

We have received the comment letter for the Technical Drainage Study for 901 Trophy Hills, dated March 2, 2011. The format for each response is as follows: the numbered comment from the City of Las Vegas is presented first in bold followed by Wright Engineers' response. A copy of the review comments is attached. Any required supporting calculations for each response are included in the *Appendix*.

1. **Provide a copy of the zoning/planning conditions associated with this site (FMP-40979) with the next submittal to verify compliance with conditions. *Flood Control* will not issue conditional 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 resubmitted.**

   RESPONSE: A copy of the FMP-40979 conditions of approval is provided in the Appendix.

2. **The project proposes to discharge concentrated flows through storm drain pipes at two distinct locations at the northwest property line to the adjacent golf course. Since this is concentrated flow which differs from the original sheet flow design. This may cause erosion and maintenance problem for the golf course owner/management. A notarized letter of acknowledgment or acceptance of the proposed design must be obtained from the adjacent golf course prior to the final approval of the drainage study. Also clarify whose responsibility is it for the maintenance of the storm drain pipes within the golf course.**

   RESPONSE: Unfortunately, the request for permission to discharge concentrated flow was denied by the golf course. The storm drain system has been revised to outlet to Trophy Hills Drive via a concrete flume with sidewalk underdrains. In the existing condition lot 4 drains to Trophy Hills Drive, while lots 3 and 5 drain to Players Club Drive. Due to the revision in the storm drain system a majority of the storm water from lots 3 and 5 will now drain to Trophy Hills Drive.

CIVIL
STRUCTURAL
MECHANICAL
ELECTRICAL
PLUMBING
SURVEYING
PLANNING
LEED

7425 Peak Drive
Las Vegas, NV 89128
(p) 702.933.7000
(f) 702.933.7001
800.933.7611
wrightengineers.com

Hydrologic calculations have been completed for the project site and demonstrate that the 100-year peak flow increase to Trophy Hills Drive is approximately 4cfs. This minor diversion of flow will not negatively impact the downstream properties. The total site, a combination of lots 3, 4 and 5, produces 7cfs in the 100-year storm. A hydraulic cross section of Trophy Hills Drive has been provided. This section demonstrates that Trophy Hills Drive can adequately convey the additional flow at a flow depth of 0.31-feet. All necessary calculations and figures have been provided in the Appendix.

The revised storm drain system has been adequately sized to handle the 100-year storm flow. Emergency overflow paths have also been provided while still protecting the finished floor.

3. **At the northeast corner of the property, there appears to be a storm drain line running from the northwest corner of the building and ends at the north property wall, but without any note for discharging. Please address in the next submittal.**

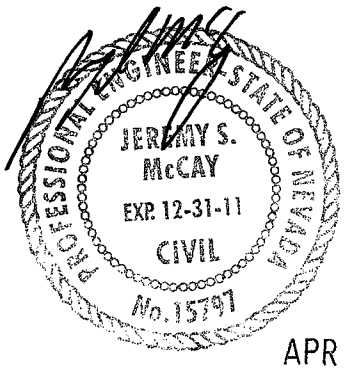
   RESPONSE: The storm drain system has been revised and the storm drain line in question now discharges to Trophy Hills Drive. Please see response to comment number 2 for additional information.

4. **Construction Note #12 calls for the installation of wall opening(s) but to nowhere be found on the grading plan. Clarify in the next submittal.**

   RESPONSE: Construction Note #12 was provided in error. There are no wall openings proposed with this project.

If you have any further questions or comments regarding this study, please do not hesitate to contact this office at (702) 933-7000.

Sincerely,
Wright Engineers,



APR 13 2011

Robert D. Hansen, E.I.
Hydrologic/Hydraulic Services

Jeremy S. McCay, P.E.
Principal

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: **901 Trophy Hills** Date: **April 13, 2011**

Location of Development: a) Descriptive (Cross Streets) North/South: **Trophy Hills Drive**
East/West: **Players Club Drive**

b) Section: **29** Township: **20 S** Range: **60 E**

c) APN: **138-29-212-003, 004, & 005**

Name of Owner: **Robert Paul G Trust**

Telephone No.: **702-374-3300** Facsimile No.: _____ Email Address: **jspurling@trailmarkinc.com**

Address: **3355 Las Vegas Blvd. S. Las Vegas NV 89109**

Contact Person Name: **Rob Hansen** Telephone No: **(702) 933-7000**

E-mail Address: **rhansen@wrightengineers.com**

Firm: **Wright Engineers**

Address: **7425 Peak Drive, Las Vegas, NV 89128**

Type of Land Development/Land Disturbance Process:

- [ ] Rezoning
- [ ] Parcel Map
- [ ] Large Parcel Map
- [ ] Subdivision Map
- [ ] Planned Unit Development
- [X] Building Permit
- [ ] Clearing and Grading Only
- [ ] Other (Please specify below)

1. Total Owned Land Area: At Site: **2.52 +/- ac** Being Developed/Disturbed: **2.52 +/- 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.)? **Residential**
5. Approximate upstream land area which drains to the subject site? **< 1 ac**
6. Has the site drainage been evaluated in the past? [YES] NO If yes, please identify documentation:

   TDS for Tournament Hills Unit III, G.C. Wallace, 1992, DS901
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site:

   The southern portion of the site will drain to Trophy Hills Drive. The remaining portion of the site will drain to the existing golf course.
8. Briefly describe your proposed schedule for the subject project: **As soon as possible**

PROFESSIONAL ENGINEER STATE OF NEVADA
JEREMY S. McCAY
EXP. 12-31-11
CIVIL
No. 15797

Engineer's Seal

APR 13 2011

Local Entity File No.

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.

Revision	Date

Reference: Wright Engineers, Inc. Job Number: CN111029

STANDARD FORM 1

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: March 2, 2011
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: 901 Trophy Hills (Tournament Hills Unit 3)		COPIES TO: Wright One Source
Cross Streets:	NWQ of Summerlin Pkwy. & Rampart Blvd.		Robert Paul G. Trust
File Number:	F:\Depot\DSMemos\DS4521A.doc		Bart Anderson, P.E., DevCo
Parcel Number:	138-29-212-003; -004 & -005		
Zoning Action:	FMP-40979		
FEMA Flood Zone	YES	NO X	
Proposed Storm Drain	YES	NO X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Transaction #
1st Submittal	2/16/2011	3/2/2011	See Comments Below	$400.00	162890: $400
			TOTAL FEES (LDDRS):	$400.00	—

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:
X	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.

1. Provide a copy of the zoning/planning conditions associated with this site (**FMP-40979**) with the next submittal to verify compliance with conditions. *Flood Control* will not issue conditional 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 resubmitted.

2. The project proposes to discharge concentrated flows through storm drain pipes at two distinct locations at the northwest property line to the adjacent golf course. Since this is concentrated flow which differs from the original sheet flow design. This may cause erosion and maintenance problem for the golf course owner/management. A notarized letter of acknowledgment or acceptance of the proposed design must be obtained from the adjacent golf course prior to the final approval of the drainage study. Also clarify whose responsibility is it for the maintenance of the storm drain pipes within the golf course.

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END OF REMARKS
ays

T/R/S: T20S/R60E/29
AREA L-29

Post-it® Fax Note 7671	Date 3/2/11	# of pages ▶ 2
To Rob Hansen	From Albert Sung	
Co./Dept. Wright Eng.	Co. CLV	
Phone #	Phone # 229-200	
Fax # 933-700	Fax #	

Memorandum

Department of Public Works
City Engineer Division
Survey Section
Phone (702) 229-6217
Fax (702) 804-8582
www.lasvegasnevada.gov

From: ALAN R RIEKKI, PLS - CITY SURVEYOR

To: STEVE GEBEKE - DEPARTMENT OF PLANNING
STEVE SWANTON - DEPARTMENT OF PLANNING
TRENT KEENAN, PLS
TROPHY HILLS RESIDENCE TRUST
PLAYERS CLUB REALTY TRUST
WRIGHT ENGINEERS
BAYIT 3 REALTY TRUST

Date: March 03, 2011

RE: **FINAL MAP 40979 - TOURNAMENT HILLS - UNIT 3 AMENDED**

Attached is a redlined drawing delineating comments for the above map. **THE REDLINED PRINT MUST BE RETURNED TO SURVEY ALONG WITH A CORRECTED DRAWING FOR APPROVAL.**

431494 CURRENT PL Status: Conditional Approval February 28, 2011

If you have any questions regarding the following Planning comments please call 229-6301

1. The Amended Final Map Mylar shall be in conformance with all applicable Conditions of Approval for the original Final Map of Tournament Hills - Unit 3 (FM-0073-92).

2. The Final Map shall be revised as required by the Department of Planning prior to the submittal of the original Mylar for signature by the City. These revisions include the following:
a. The file number "FMP-40979" shall be placed above the box at the lower right hand corner of the cover sheet.
b. The CERTIFICATE OF DIRECTOR OF PLANNING AND DEVELOPMENT shall be revised to read, "CERTIFICATE OF DIRECTOR OF PLANNING APPROVAL."
c. Within the Certificate of Director of Planning Approval, text shall be revised to replace "the Director of Planning and Development" with "the Director of Planning."
d. The signature block for the Director of Planning shall read as follows:

_____

Flinn Fagg, AICP Date
Acting Director of Planning
City of Las Vegas, Nevada

3. Provide an approval letter to the Department of Planning from the Master Developer (Summerlin) consenting to the amended map.

431495 DEVCO Status: Conditional Approval March 01, 2011

If you have any questions regarding the following Development Coordination comments please call 229-6578

COMMENTS:

We have no objection to this Amended Final Map request to Amend Residential Lots 3, 4, and 5 of

Block "A" as long as all previous conditions of approval for the Tournament Hills Unit 3 subdivision and all subsequent site-related actions are ultimately complied with.
CONDITIONS OF APPROVAL:

1. On the cover sheet, the signature block for the City Engineer should be "Acting City Engineer: David Bowers, P. E. #16736".

2. All three parcels shall have the same ownership designation and there shall be one Owner's Certificate prior to recordation of this Final Map. The last paragraph of the new Owner's Certificate shall not have a reference to public streets and should be replaced with the Owner's Certificate found on the original Final Map, Book 55, Page 26.

3. Site development to comply with all previous conditions of approval for the Tournament Hills Unit 3 Final Map and all other site related actions.

4. Prior to recordation, this Final Map must show all required easements and right-of-way dedications, must coincide with the approved drainage plan/study and construction plans, and the Owner's Certificate must make specific reference to all easements and rights-of-way noted/offered for public use as required by the Department of Public Works. Appropriate bonds must be in place, including bonding for survey monument placement and/or removal.

431496 SURVEY Status: Conditional Approval March 02, 2011

If you have any questions regarding the following Survey comments please call 229-6217

In addition to the above comments.

Minor typo in the Surveyors Certificate.

Please correct the City Surveyors license number to 12469.

Please check and revise the adjoiner information as shown on Sheet 3.

Please correct miscellaneous errors, typos, or omissions as shown on the redlines.

End of Comments.

March 23, 2011

Richard Luke
Richard Luke Architects
9061 W. Sahara Ave Suite 105
Las Vegas, NV 89117

Re: Architectural Review Submittal for Adelson Residence APN 138-29-212-003, -004, and -005. Plans as submitted to date.

Dear Mr Luke:

The Architectural Review Committee has considered your plans submitted to date for the above referenced project and has APPROVED the plans as submitted.

For the Architectural Review Committee
Tournament Hills Community Association

Moana Vineyard, CMCA ®
Community Manager
Terra West Property Management, Agent

RAINFALL METHODOLOGY AND SOILS INFORMATION

Hydrologic Methodology and Criteria

The U. S. Army Corps of Engineer's HEC-1 *Flood Hydrograph Package* was used to estimate the peak runoff values of the watershed for the 10-year and 100-year, 6-hour storm event. The HEC-1 model was designed for the simulation of flood events in watersheds and river basins. The HEC-1 computer model has the ability to simulate the surface runoff response of a drainage basin to precipitation by representing the basin as an interconnected system of hydrologic and hydraulic components. Each component models an aspect of the rainfall-runoff process within a portion of the whole basin. This basin portion is referred to as a sub-basin. The runoff hydrographs of each sub-basin are then combined and a final discharge hydrograph is obtained. Since the study watershed is ungaged, the analysis used to model the onsite runoff incorporated the Soil Conservation Service (SCS) unit hydrograph method to develop a hypothetical flood hydrograph.

Input parameters used for the HEC-1 hydrograph model were determined from the *HC&DDM*. Procedures and calculations related to these HEC-1 Parameters can be found in the following pages.

HEC-1 Parameters

Basin Area

The drainage basins were determined from the topographic maps at 1-foot and 5-foot contour intervals, aerial photographs, field investigation, and 30-scale onsite grading plans. The drainage basins are shown on the Drainage Plan located in Appendix E.

Rainfall Criteria

The drainage areas analyzed in this report lie outside of the McCarran Airport Rainfall Area. Depth-Duration-Frequency values determined from the NOAA atlas (Figures 503 and 506) were used as rainfall depths for the10-year and 100-year 6-hour storm event. The unadjusted storm water depth values are 1.3 inches and 2.00 inches respectively. The rainfall values were adjusted using the Precipitation Adjustment Ratios from Table 501. The adjusted storm water depth values are 1.61 inches and 2.86 inches respectively and were used as input values for the HEC-1 program.

Hydrologic Abstractions

Hydrologic abstractions include interception, infiltration, surface storage, evaporation, and evapo-transpiration. Infiltration is regarded as the primary rainfall loss component in hydrologic models.

The SCS curve number method was used to approximate the infiltration rates for the onsite watershed. Curve numbers are a function of the hydrologic soil group, vegetative cover and its hydrologic condition, land use, and the soil's antecedent soil moisture condition.

Curve numbers are referenced from the CCRFCD's *Hydrologic Criteria and Drainage Design Manual*, Table 602, 1 of 4, for a hydrologic soil group "D". Hydrologic soil group information was obtained from the National Resource Conservation Service; as shown on the 2008 MPU H-maps.

Lag Time

Lag time is a measure of the time elapsed between the occurrence of rainfall and the occurrence of runoff. It is a measure of the watershed's response time and is dependent upon basin length, slope and the basin's roughness characteristics.

Based on studies of many storm events for a range of watershed conditions, the following empirical relationship between lag time (T_{LAG}) and time of concentration (t_c) was derived:

$$T_{LAG} = 0.6t_c$$

Where t_c is the time of concentration. In order to calculate t_c the following equations are used:

$$t_c = t_i + t_t$$

Where t_i = Initial overland flow time in minutes:

$$t_i = 1.8\frac{(1.1-K)\sqrt{L_o}}{\sqrt[3]{S}}$$

Where:

K = Flow resistance factor, K = 0.0132 * CN - 0.39
CN = Curve Number.
L_o = Length of the overland flow element.
S = Average basin slope in percent.

And t_t = Travel time for flow within the channel or swale:

$$t_t = \frac{L}{V}(60)$$

Where:
L = Length of channel element in feet.
V = Flow velocity in feet per second.

Precipitation Calculations

Project:	**901 Trophy Hills**				
Designed By:	**Rob Hansen**	**Date:**	**4/13/2011**	**Job:**	**CN111029**
Checked By:	**Jeremy McCay**	**Date:**	**4/13/2011**		

Precipitation Calculations REFERENCE*

Site falls outside McCarran Airport area FIGURE 513

6-HOUR STORM

10 - YEAR	=	1.3	inches	FIGURE 503
100 - YEAR	=	2.00	inches	FIGURE 506

TOTAL AREA

3	acres	=	0.004	sq. miles
D.A.R.F.		=	1.00	TABLE 502

PRECIPITATION ADJUSTMENT RATIOS

10-YEAR	= 1.24	TABLE 501
100-YEAR	= 1.43	TABLE 501

ADJUSTED PRECIPITATION VALUES

P_{10} = 1.30 * 1.00 * 1.24 = **1.61** inches

P_{100} = 2.00 * 1.00 * 1.43 = **2.86** inches

HEC1 10-YEAR AND 100-YEAR STORM RATIOS

10 - YEAR = **0.5636**

100 - YEAR = **1.0000**

WRIGHT engineers

* Copy of reference material is included in the Appendix

CURVE NUMBER CALCULATIONS

Project Name: 901 Trophy Hills

Designed By: Rob Hansen **Date:** 4/13/2011 **Job Number:** CN111029

Curve Numbers for Soils and Landuse

Soil Type	Open Space (Poor Condition)	Impervious
A	68	98
B	79	98
C	86	98
D	**89**	**98**

Composite Curve Numbers for Basins

Basin	Soil Type	Percent Open Space	Percent Impervious	CN
OND1	D	25%	75%	95.8

WRIGHT engineers

TIME OF CONCENTRATION

STANDARD FORM 4

DEVELOPMENT: 901 Trophy Hills | CALCULATED BY: RDH | DATE: 4/13/2011

SUB-BASIN DATA				INITIAL / OVERLAND TIME (t_i)			TRAVEL TIME (t_t)					t_c CHECK (URBANIZED BASINS)		FINAL t_c	REMARKS	
DES.	K	AREA	AREA	LEN.	SLOPE	t_i	LEN	SLOPE	VEL (V_1)	VEL (V_2)	t_t	TOTAL LENGTH	t_c=(L/180) +10		CN	T_{LAG}
		Ac	Sq Mi	Ft	%	Min	Ft	%	fps	fps	Min	Ft	Min	Min		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10a)	(10b)	(11)	(12)	(13)	(14)	(15)	(16)
DEVELOPED ONSITE																
OND1	0.8746	2.24	0.0035	67	1.50	2.90	843	0.50	1.43	2.16	8.48	910	15.06	11.38	95.8	0.114

K = 0.0132*CN-0.39 $t_l = t_c*0.6$

$t_i = 1.8(1.1-K)L^{1/2}/S^{1/3}$

Velocity obtained from Manning's Equation

Travel Time Velocity Formulas*	
Existing	Developed
$V_1 = 14.8*(S/100)^{1/2}$	$V_1 = 20.2*(S/100)^{1/2}$
$V_2 = 29.4*(S/100)^{1/2}$	$V_2 = 30.6*(S/100)^{1/2}$

* - See CCRFCD HC&DDM Sec. 602.1

For the travel time (T_i) calculations:

V_1 applies to the first 500 feet of travel distance

V_2 applies to the remaining travel distance

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN  1998                *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   13APR11  TIME  14:23:51  *
*                                      *
****************************************
```

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

              *DIAGRAM
    1         ID    ********PROJECT NAME********
    2         ID
    3         ID    PREPARED FOR: CLIENT NAME
    4         ID
    5         ID
    6         ID    ULTIMATE 10-YEAR AND 100-YEAR STORM FLOW
    7         ID    @@@@@@@@@@@@@@@@@@@@
    8         ID
    9         ID    file name:  C:\HECEXE\TEMPLATE.DAT
   10         ID    Project Number: CN09XXXX
   11         ID
   12         ID    WRIGHT ENGINEERS
   13         ID    7425 PEAK DRIVE
   14         ID    Las Vegas, Nevada  89128
   15         ID
   16         ID
   17         ID    **********************
   18         ID    *    SDN 3  VALUES   *
   19         ID    **********************
   20         ID
   21         JR    PREC    .5636    1.000
   22         IT       5        0        0      300
   23         IO       5        0        0
   24         IN       5        0        0
              *
   25         KK    OND1
   26         BA   .0035
   27         PB    2.86
   28         PC    .000     .020     .057     .070     .087     .108     .124     .130     .130     .130
   29         PC    .130     .130     .130     .133     .140     .142     .148     .158     .172     .181
   30         PC    .190     .197     .199     .200     .201     .204     .214     .229     .241     .249
   31         PC    .251     .256     .270     .278     .281     .283     .295     .322     .352     .409
   32         PC    .499     .590     .710     .744     .781     .812     .819     .835     .851     .856
   33         PC    .860     .868     .876     .888     .910     .926     .937     .950     .970     .976
   34         PC    .982     .985     .987     .989     .990     .993     .993     .994     .995     .998
   35         PC    .998     .999    1.00
   36         LS       0    95.8
   37         UD    .114
              *
   38         ZZ
```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

    25       OND1

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```


```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN  1998                *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   13APR11  TIME  14:23:51  *
*                                      *
****************************************
```

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


********PROJECT NAME********

PREPARED FOR: CLIENT NAME

ULTIMATE 10-YEAR AND 100-YEAR STORM FLOW
@@@@@@@@@@@@@@@@@@@@

file name: C:\HECEXE\TEMPLATE.DAT
Project Number: CN09XXXX

WRIGHT ENGINEERS
7425 PEAK DRIVE
Las Vegas, Nevada 89128

****
* SDN 3 VALUES *
****

```
    23 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
                       .56      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  RATIO 2
                                                                .56      1.00

 HYDROGRAPH AT
+                   OND1       .00      1   FLOW              3.       7.
                                             TIME            3.50     3.50


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

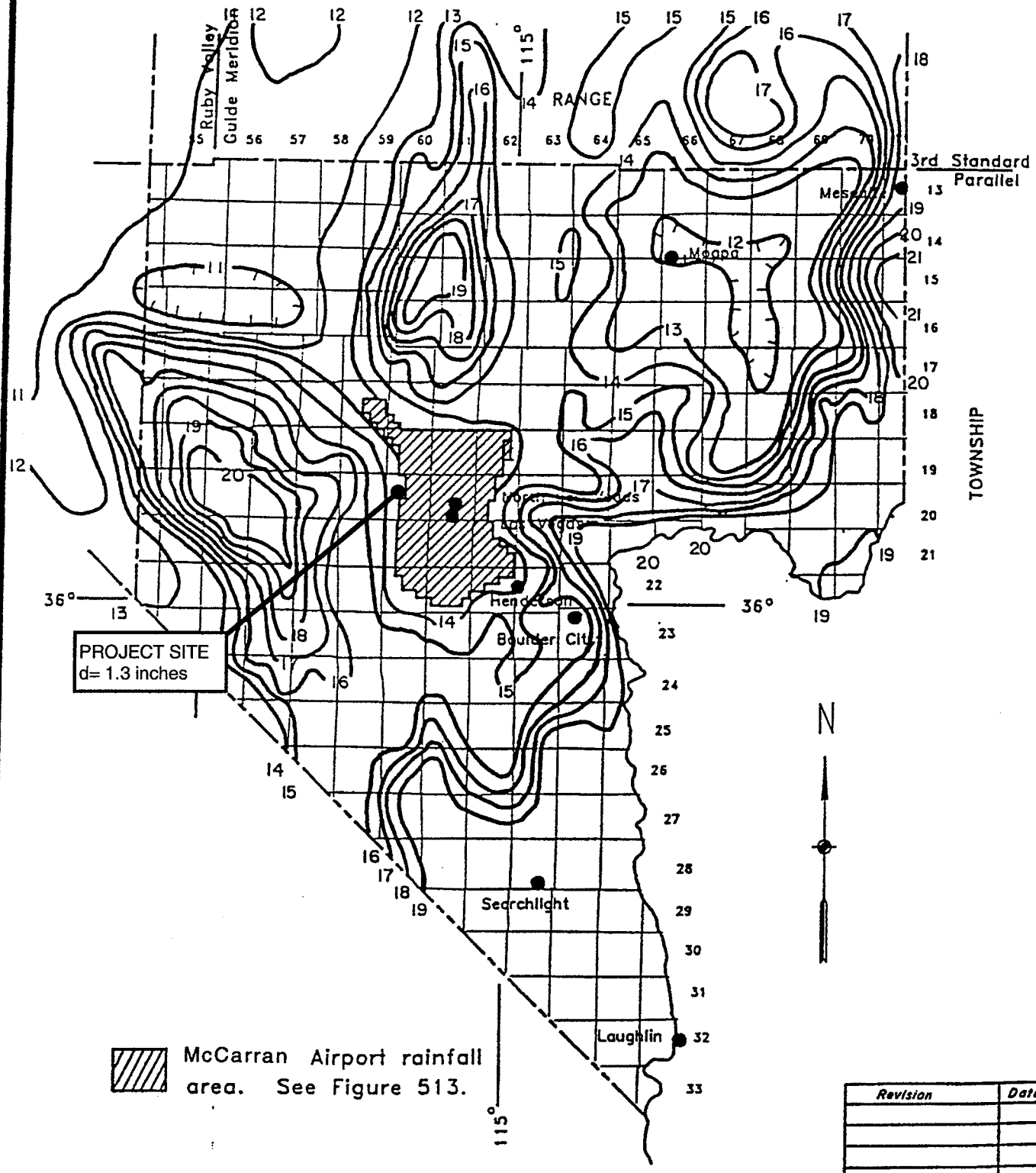
PRECIPITATION ADJUSTMENT RATIOS

Recurrence Interval	Ratio to NOAA Atlas 2
2-year	1.00
5-year	1.16
10-year	1.24
25-year	1.33
50-year	1.39
100-year	1.43

NOTE:
1. Multiply the values obtained from the NOAA Atlas 2 by the above ratios to obtain the adjusted precipitation values.
2. NOAA Atlas 2 values for use with TR-55 shall not be adjusted by the above ratios.
3. Tables 505 and 506 require no adjustments.

Revision	Date

RAINFALL DEPTH-DURATION-FREQUENCY
10-YEAR, 6-HOUR
(DEPTHS IN TENTHS OF INCHES)



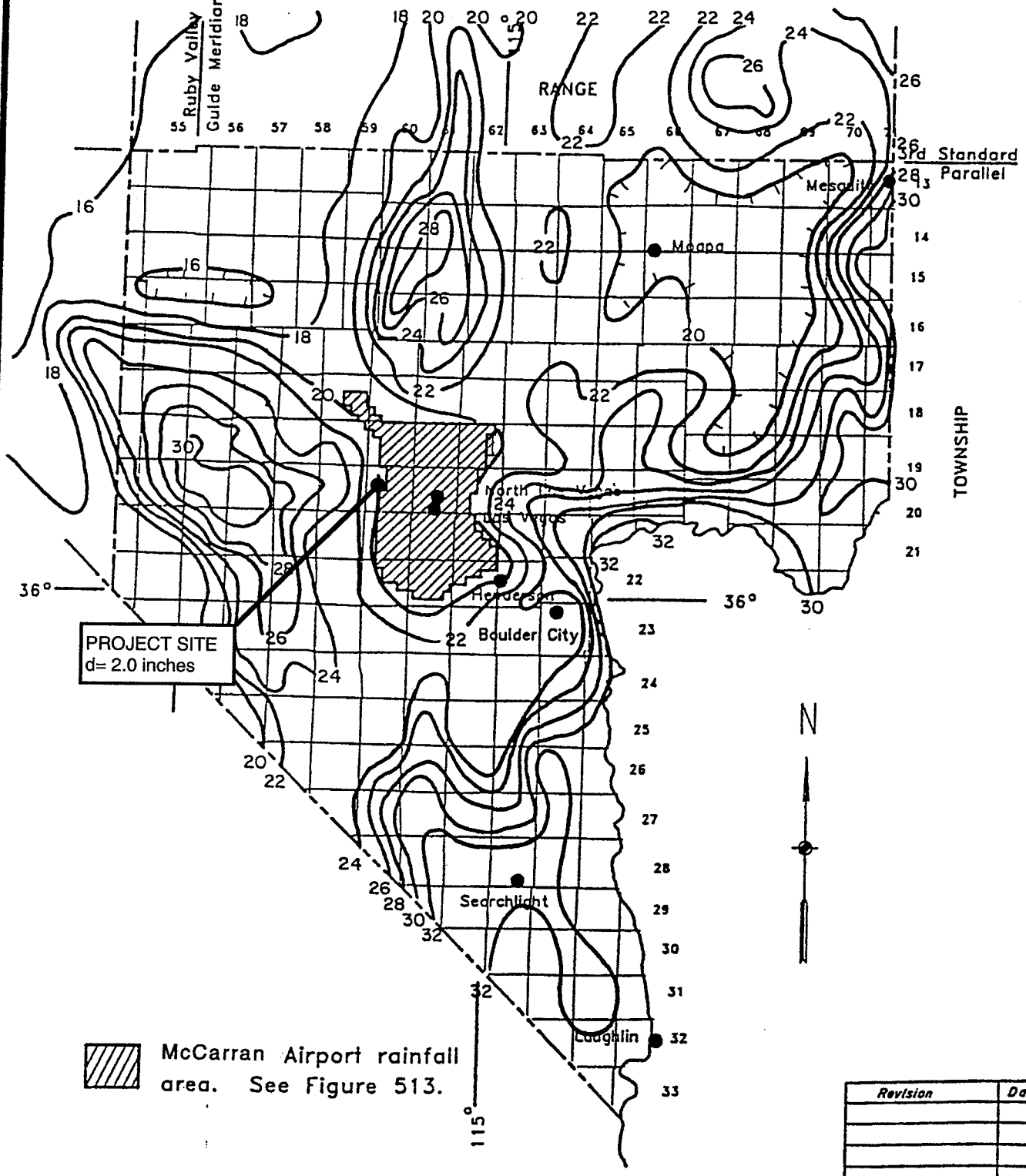
Revision	Date

WRC ENGINEERING

REFERENCE:
NOAA ATLAS 2, VOLUME VII NEVADA, 1973

FIGURE 503

RAINFALL DEPTH-DURATION-FREQUENCY
100-YEAR, 6-HOUR
(DEPTHS IN TENTHS OF INCHES)



Revision	Date

WRC ENGINEERING

REFERENCE:
NOAA ATLAS 2, VOLUME VII NEVADA, 1973

FIGURE 506

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

Worksheet for A_Trophy Hills

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.20000	%
Discharge	7.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	8.21
0+00.5	8.21
0+00.5	7.71
0+02.0	7.88
0+24.5	8.14
0+51.5	7.85
0+53.0	7.68
0+53.0	8.18
0+53.5	8.18

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 8.21)	(0+02.0, 7.88)	0.013
(0+02.0, 7.88)	(0+51.5, 7.85)	0.016
(0+51.5, 7.85)	(0+53.5, 8.18)	0.013

Results

Normal Depth		0.31	ft
Elevation Range	7.68 to 8.21 ft		
Flow Area		2.19	ft^2
Wetted Perimeter		27.04	ft
Top Width		26.42	ft
Normal Depth		0.31	ft
Critical Depth		0.37	ft

Worksheet for A_Trophy Hills

Results

Critical Slope		0.00772	ft/ft
Velocity		3.19	ft/s
Velocity Head		0.16	ft
Specific Energy		0.47	ft
Froude Number		1.96	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.31	ft
Critical Depth	0.37	ft
Channel Slope	0.03200	ft/ft
Critical Slope	0.00772	ft/ft

Cross Section for A_Trophy Hills

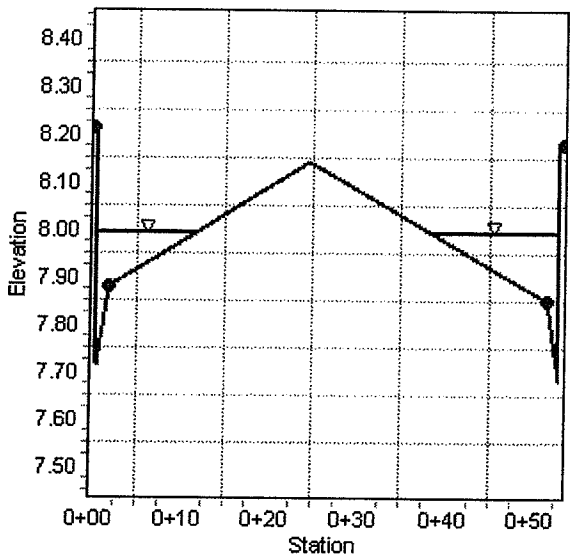
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	3.20000	%
Normal Depth	0.31	ft
Discharge	7.00	ft³/s

Cross Section Image



Worksheet for 4' Flume @ 0.5%

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.50000	%
Bottom Width	4.00	ft
Discharge	7.00	ft^3/s

Results

Normal Depth	0.43	ft
Flow Area	1.73	ft^2
Wetted Perimeter	4.86	ft
Top Width	4.00	ft
Critical Depth	0.46	ft
Critical Slope	0.00421	ft/ft
Velocity	4.05	ft/s
Velocity Head	0.26	ft
Specific Energy	0.69	ft
Froude Number	1.09	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.43	ft
Critical Depth	0.46	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00421	ft/ft

Cross Section for 4' Flume @ 0.5%

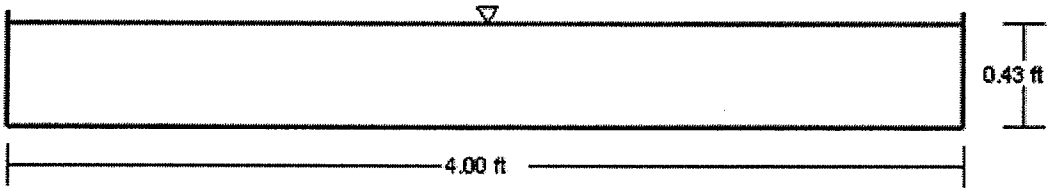
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.50000	%
Normal Depth	0.43	ft
Bottom Width	4.00	ft
Discharge	7.00	ft³/s

Cross Section Image



V: 1
H: 1

WRIGHT
engineers

TRANSMITTAL

CIVIL
STRUCTURAL
MECHANICAL
ELECTRICAL
PLUMBING
ENERGY MODELING
COMMISSIONING
LEED ADMINISTRATION

DATE: Apr 14, 2011

TO: City of Las Vegas – Flood Control
731 S. 4th Street
Las Vegas, NV 89101

ATTN: Albert Sung

PROJECT: Private Res @ 901 Trophy Hills
PROJECT No: CN111029-002
PROJECT MGR: Jeremy S. McCay

VIA: Hand Deliver
FOR: Approval
COPIES TO:

FROM: Jeremy S. McCay

ITEM	QTY	DESCRIPTION
CORRESPONDENCE	1	Addendum #1 to 901 Trophy Hills
CHECK	1	$400 check #476 to City of Las Vegas

REMARKS:

** Duplicate Receipt **

City of Las Vegas

Development Services Center

731 South Fourth Street

Las Vegas, NV 89101

04/14/2011 08:49 Trn 166632
Cashier 970040

PRJ Permit # DS4521	$400.00
Subtotal	$400.00
Tax	$0.00
Total	$400.00
Received CHECK	$400.00
Check # 476	
Change	$0.00

For questions related to this receipt call

702-229-6551

Las Vegas
7425 Peak Drive
Las Vegas, NV 89128
(p) 702.933.7000
(f) 702.933.7001
800.933.7611

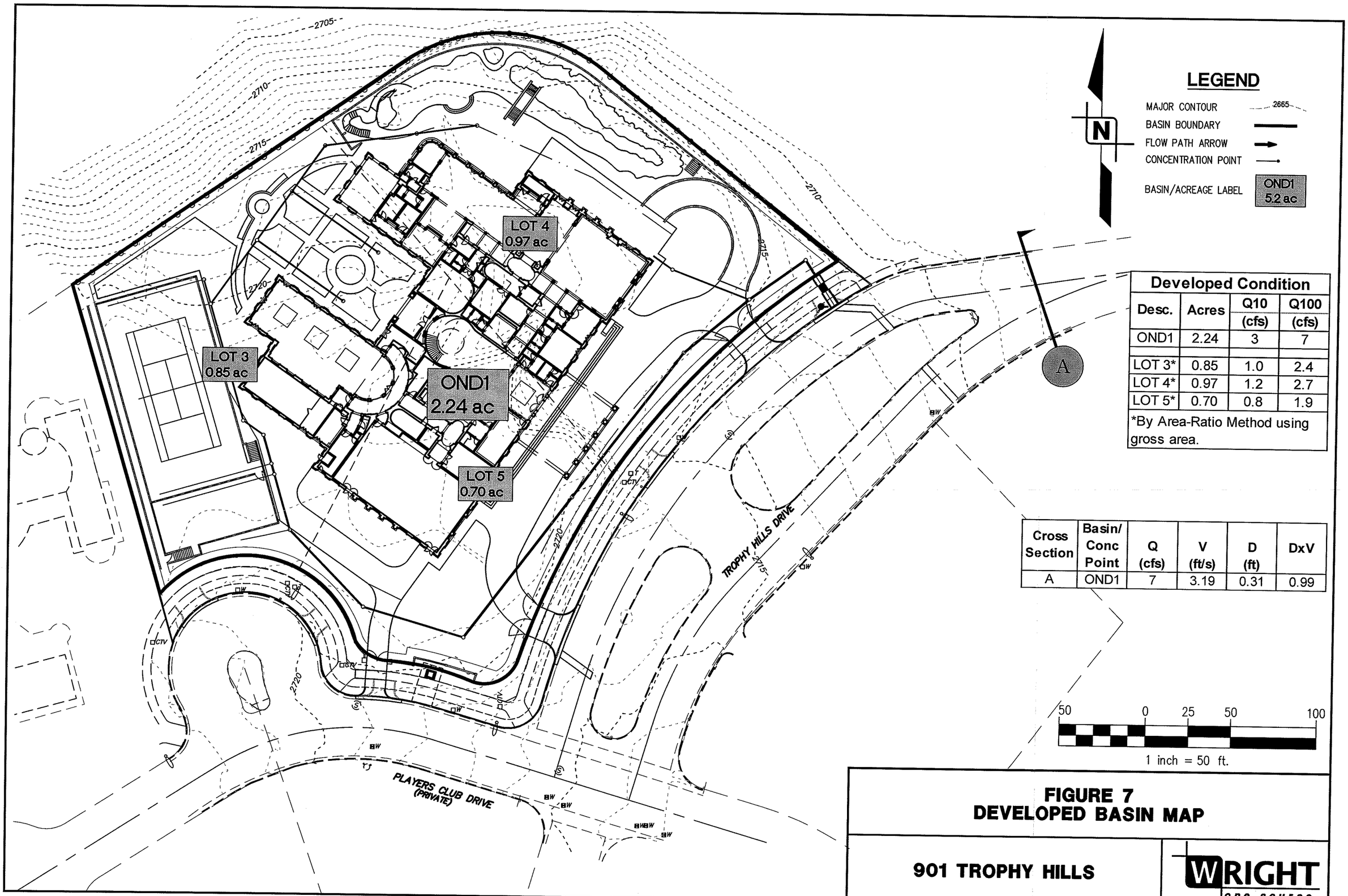
Irvine
2 Venture, Suite 200
Irvine, CA 92618
(p) 949.477.4001
(f) 949.477.4009

Phoenix
3115 S. Price Road
Chandler, AZ 85248
(p) 480.483.6111
(f) 480.483.6112

Salt Lake
9176 South 300 West
Suite 12
Sandy, UT 84070
(p) 801.352.2001
(f) 801.352.2006
wrightengineers.com
(p) 800.933.7611

COMPLETED BY: Rob Hansen
CALLED BY:
TIME:
DATE:

SIGNATURE:
PRINT NAME:
DATE:



Developed Condition

Desc.	Acres	Q10 (cfs)	Q100 (cfs)
OND1	2.24	3	7
LOT 3*	0.85	1.0	2.4
LOT 4*	0.97	1.2	2.7
LOT 5*	0.70	0.8	1.9

*By Area-Ratio Method using gross area.

Cross Section	Basin/ Conc Point	Q (cfs)	V (ft/s)	D (ft)	DxV
A	OND1	7	3.19	0.31	0.99

FIGURE 7
DEVELOPED BASIN MAP

901 TROPHY HILLS

WRIGHT one source