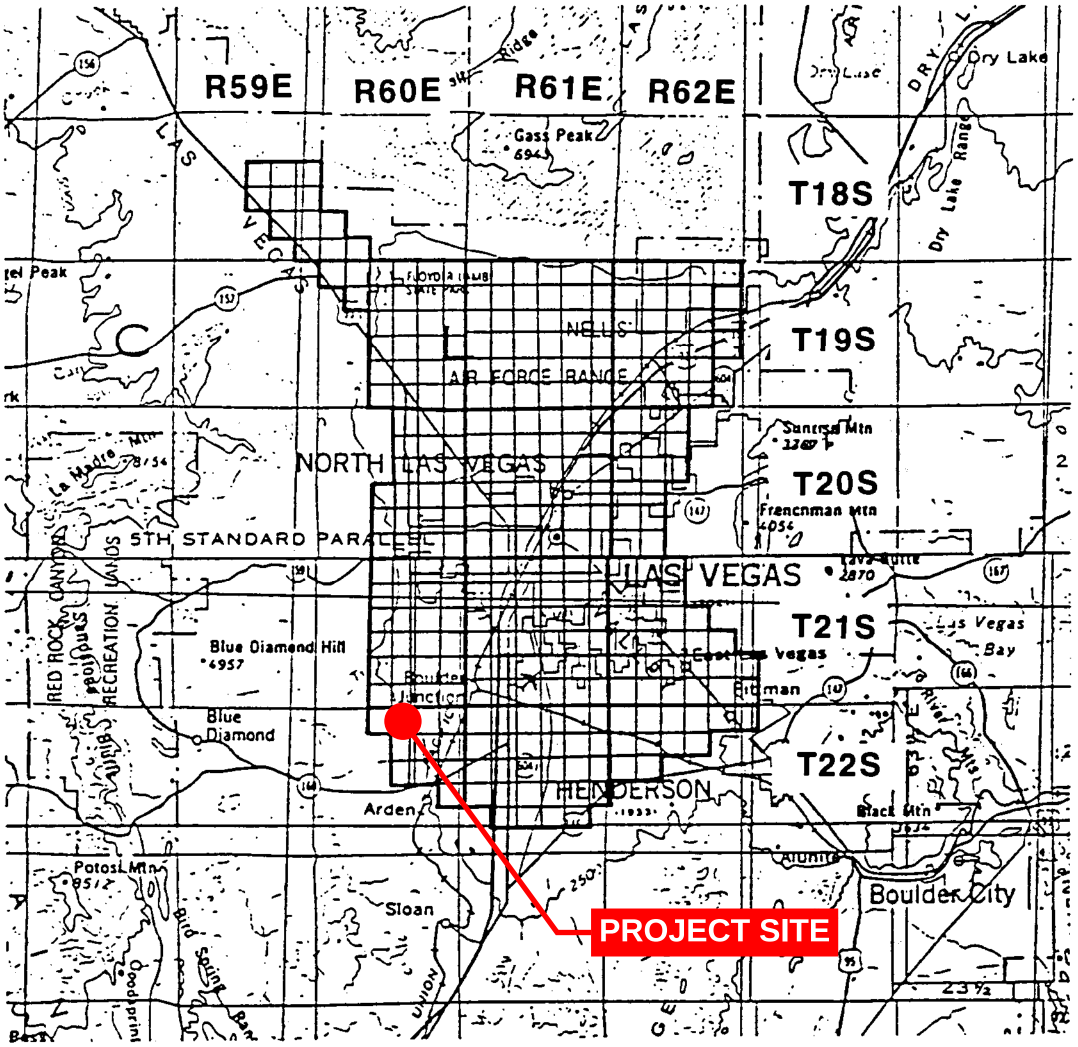
Appendix B – Hydrologic Calculations

- Figure 513 McCarran Airport Rainfall Area
- Table 503 Six-hour Storm Distributions
- Table 505 Depth-Duration-Frequency Values
- USDA NRCS Custom Soils Resource Report for Las Vegas Valley
- Curve Number Calculations
- Existing Condition Standard Form 4
- Existing Condition HEC-1 Output
- Proposed Condition Standard Form 4
- Proposed Condition HEC-1 Output

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

SIX-HOUR STORM DISTRIBUTIONS

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

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

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

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

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

RUNOFF CURVE NUMBERS
(SEMIARID RANGELANDS[1])

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

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

December 9, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:2,740 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 40, 80, 160, 240

Feet: 0, 100, 200, 400, 600

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Las Vegas Valley Area, Nevada, Part of Clark County
Survey Area Data: Version 21, Sep 18, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 1, 2023—Sep 1, 2023

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND	MAP INFORMATION
	imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
200	Glencarb silt loam	32.8	100.0%
Totals for Area of Interest		**32.8**	**100.0%**

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 intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Las Vegas Valley Area, Nevada, Part of Clark County

200—Glencarb silt loam

Map Unit Setting

National map unit symbol: hrb6
Elevation: 1,500 to 2,400 feet
Mean annual precipitation: 4 to 6 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 180 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Glencarb and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Glencarb

Setting

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

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 60 inches: stratified very fine sandy loam to silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
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 content: 60 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 12.0
Available water supply, 0 to 60 inches: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C
Ecological site: R030XY040NV - SODIC TERRACE
Other vegetative classification: LOAMY BOTTOM (030XB020NV)
Hydric soil rating: No

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Soil Physical Properties

This folder contains a collection of tabular reports that present soil physical properties. The reports (tables) include all selected map units and components for each map unit. Soil physical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Percentage of rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties–Las Vegas Valley Area, Nevada, Part of Clark County														
Map unit symbol and soil name	**Pct. of map unit**	**Hydrologic group**	**Depth**	**USDA texture**	**Classification**		**Pct Fragments**		**Percentage passing sieve number—**				**Liquid limit**	**Plasticity index**
					Unified	**AASHTO**	**>10 inches**	**3-10 inches**	**4**	**10**	**40**	**200**		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
200—Glencarb silt loam														
Glencarb	100	C	0-6	Silt loam	CL-ML, ML	A-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	90-95-100	70-80-90	20-25-30	NP-5-10
			6-60	Stratified very fine sandy loam to silty clay loam	CL-ML, CL	A-4, A-6	0- 0- 0	0- 0- 0	100-100-100	100-100-100	95-98-100	75-80-85	25-30-35	5-10-15

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

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United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Whataburger Nellis and Walnut

SOILS DESCRIPTION TABLES

DATE: 1/6/2025
FILE: CNTABLE.xls
BY: SS

Hydrologic Soil Group	Desert Shrub (Poor Condition)	Commercial
A	63	89
B	77	92
C	85	94
D	88	95
ROCK	92	95

SOIL 200 Glencarb (silt loam)				
Description	Type	%	Desert Shrub (Poor Condition)	Commercial
Glencarb	C	100%	85	94
Composite CN		100%	85.0	94.0

Whataburger Nellis and Walnut						
WEIGHTED CURVE NUMBERS AND PRECIPITATION VALUES						
EXISTING CONDITIONS						
Basin	Soil	Percent	CN	LandUse	WCN	PREC
EON1	200	100.0%	85.0	Desert Shrub (Poor Condition)	**85.0**	2.77

Whataburger Nellis and Walnut						
WEIGHTED CURVE NUMBERS AND PRECIPITATION VALUES						
PROPOSED CONDITIONS						
Basin	Soil	Percent	CN	LandUse	WCN	PREC
DON1	200	100.0%	94.0	Commercial	**94.0**	2.77

TIME OF CONCENTRATION / LAG TIME DETERMINATION - less than 1 mi2

Kimley»Horn

CIRCLE K Sahara & Nellis
ONSITE HYDROLOGY
EXISTING CONDITIONS

Project No: 192331009
Date: 1/10/25
Calculated by: DM/MS

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)							T_{lag}	REMARKS
Basin ID	DEV./UNDEV. (D or U)	CN	K	AREA Ac	AREA Mi^2	INITIAL LENGTH Feet	SLOPE %	Ti Min	TRAVEL LENGTH Feet	SLOPE %	V_1 VELOCITY FPS	V_2 VELOCITY FPS	Tt Min	Tc Min	Tc Check Min	T_{lag} 0.6Tc/60 Hours	RAINFALL INCHES
(1)	(2)	(3)	(4)	(5a)	(5b)	(6)	(7)	(8)	(9)	(10)	(10a)	(10b)	(11)	(12)	(13)	(14)	(15)
EON1	U	85.00	0.7320	2.08	0.0033	107	0.30	10.2	236	0.90	1.4	2.8	2.8	13.0	N/A	**0.130**	2.77

NOTE:

(1) Subbasin Name
(2) Developed or Undeveloped Subbasin
(3) Curve Number (See Subbasin CN Calculations)
(4) K = 0.0132 (CN) - 0.39
(5a) & (5b) Area
(6) Initial Length
(7) Initial Slope
(8) Ti = 1.8 (1.1 - K) L^1/2 / S^1/3
(9) Travel Length
(10) Slope
(10a) Slope V_1 applies to the first 500 feet of travel distance;
Developed V_1 = 20.2*(S/100)^1/2
(10b) V_2 applies to the remaining travel distance;
Developed V_2 = 30.6*(S/100)^1/2
(11) Tt = 500/(V1*60)+(Travel Length-500)/(V2*60)
(12) Tc = Ti + Tt
(13) Tc Check = L/180+10 (select smaller Tc)
(14) Tlag = 0.6 Tc/60
(15) Rainfall in inches

REFERENCE: Calculations based on the Clark County Regional Flood Control District HCDDM

STANDARD FORM 4

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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   30DEC24  TIME  16:45:09   *                                                             *          (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
 *** FREE ***
             1          ID   **********************************************
             2          ID   *                                            *
             3          ID   *    Whataburger Nellis & Walnut             *
             4          ID   *    EXISTING CONDITIONS                     *
             5          ID   *                                            *
             6          ID   *    PROJECT No:_ _ _ 192496002              *
             7          ID   *    FILE: _ _ _ _ _ _EX.H1                  *
             8          ID   *    DATE MODELED:_ _ 12/30/24               *
             9          ID   *    MODELED BY:_ _ _ DM/MS                  *
            10          ID   *                                            *
            11          ID   **********************************************
            12          ID
            13          ID   **********************************************
            14          ID   *    RETURN PERIOD:_ _100-, 10- YEAR         *
            15          ID   *    DISTRIBUTION:_ _ 6-HOUR SDN3            *
            16          ID   **********************************************
            17          ID
            18          ID    JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
            19          ID
            20          ID
            21          IT       5       0       0     300
            22          IO       5       0       0
            23          IN       5       0       0
            24          JR    PREC       1    0.57
                        *

            25          KK      ON
            26          KM  ONSITE BASIN 1
            27          PB    2.77
            28          BA   .0033
            29          PC   0.000   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
            30          PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
            31          PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
            32          PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
            33          PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
            34          PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
            35          PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
            36          PC   0.998   0.999   1.000
            37          LS       0      85
            38          UD     .13
                        *
            39          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

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

    25          ON
```

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 (***) 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   30DEC24  TIME  16:45:09   *                                               *          (916) 756-1104             *
 *                                       *                                               *                                     *
 ****************************************                                               ***************************************



                          *********************************************
                          *                                           *
                          *    Whataburger Nellis & Walnut            *
                          *    EXISTING CONDITIONS                    *
                          *                                           *
                          *    PROJECT No:_ _ _ 192496002             *
                          *    FILE: _ _ _ _ _ _EX.H1                 *
                          *    DATE MODELED:_ _ 12/30/24              *
                          *    MODELED BY:_ _ _ DM/MS                 *
                          *                                           *
                          *********************************************

                          *********************************************
                          *    RETURN PERIOD:_ _100-, 10- YEAR        *
                          *    DISTRIBUTION:_ _ 6-HOUR SDN3           *
                          *********************************************

                           JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:


   22 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
+                    ON       .00     1  FLOW           4.       2.
                                         TIME         3.58     3.58


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

TIME OF CONCENTRATION / LAG TIME DETERMINATION - less than 1 mi2

Kimley»Horn

CIRCLE K Sahara & Nellis
OFFSITE & ONSITE HYDROLOGY
PROPOSED CONDITIONS

Project No: 192331009
Date: 1/10/25
Calculated by: DM/MS

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)							T_{lag}	REMARKS
	DEV./UNDEV.			AREA	AREA	INITIAL LENGTH	SLOPE	Ti	TRAVEL LENGTH	SLOPE	V_1 VELOCITY	V_2 VELOCITY	Tt	Tc	Tc Check	T_{lag} 0.6Tc/60	RAINFALL
Basin ID	(D or U)	CN	K	Ac	Mi^2	Feet	%	Min	Feet	%	FPS	FPS	Min	Min	Min	Hours	INCHES
(1)	(2)	(3)	(4)	(5a)	(5b)	(6)	(7)	(8)	(9)	(10)	(10a)	(10b)	(11)	(12)	(13)	(14)	(15)
DON1	D	94.00	0.8508	2.08	0.0033	34	4.40	1.6	276	0.70	1.7	2.6	2.7	4.3	11.7	**0.050**	2.77

NOTE:

(1) Subbasin Name
(2) Developed or Undeveloped Subbasin
(3) Curve Number (See Subbasin CN Calculations)
(4) K = 0.0132 (CN) - 0.39
(5a) & (5b) Area
(6) Initial Length
(7) Initial Slope
(8) Ti = 1.8 (1.1 - K) L^1/2 / S^1/3
(9) Travel Length
(10) Slope
(10a) Slope V_1 applies to the first 500 feet of travel distance;
Developed V_1 = 20.2*(S/100)^1/2
(10b) V_2 applies to the remaining travel distance;
Developed V_2 = 30.6*(S/100)^1/2
(11) Tt = 500/(V1*60)+(Travel Length-500)/(V2*60)
(12) Tc = Ti + Tt
(13) Tc Check = L/180+10 (select smaller Tc)
(14) Tlag = 0.6 Tc/60
(15) Rainfall in inches

REFERENCE: Calculations based on the Clark County Regional Flood Control District HCDDM

STANDARD FORM 4

```
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   30DEC24  TIME  16:46:32   *                                                      *         (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
 *** FREE ***
             1          ID   **********************************************
             2          ID   *                                            *
             3          ID   *    Whataburger Nellis & Walnut             *
             4          ID   *    PROPOSED CONDITIONS                     *
             5          ID   *                                            *
             6          ID   *    PROJECT No:_ _ _ 192496002              *
             7          ID   *    FILE: _ _ _ _ _ _PRO.H1                 *
             8          ID   *    DATE MODELED:_ _ 12/30/24               *
             9          ID   *    MODELED BY:_ _ _ DM/MS                  *
            10          ID   *                                            *
            11          ID   **********************************************
            12          ID
            13          ID   **********************************************
            14          ID   *    RETURN PERIOD:_ _100-, 10- YEAR         *
            15          ID   *    DISTRIBUTION:_ _ 6-HOUR SDN3            *
            16          ID   **********************************************
            17          ID
            18          ID    JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
            19          ID
            20          ID
            21          IT       5       0       0     300
            22          IO       5       0       0
            23          IN       5       0       0
            24          JR    PREC       1    0.57
                        *

            25          KK      ON
            26          KM  ONSITE BASIN 1
            27          PB    2.77
            28          BA   .0033
            29          PC   0.000   0.020   0.057   0.070   0.087   0.108   0.124   0.130   0.130   0.130
            30          PC   0.130   0.130   0.130   0.133   0.140   0.142   0.148   0.158   0.172   0.181
            31          PC   0.190   0.197   0.199   0.200   0.201   0.204   0.214   0.229   0.241   0.249
            32          PC   0.251   0.256   0.270   0.278   0.281   0.283   0.295   0.322   0.352   0.409
            33          PC   0.499   0.590   0.710   0.744   0.781   0.812   0.819   0.835   0.851   0.856
            34          PC   0.860   0.868   0.876   0.888   0.910   0.926   0.937   0.950   0.970   0.976
            35          PC   0.982   0.985   0.987   0.989   0.990   0.993   0.993   0.994   0.995   0.998
            36          PC   0.998   0.999   1.000
            37          LS       0      94
            38          UD     .05
                        *
            39          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    25          ON
```

```
 (***) 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   30DEC24  TIME  16:46:32   *                                        *          (916) 756-1104             *
 *                                       *                                        *                                     *
 *****************************************                                        ***************************************


                          **********************************************
                          *                                            *
                          *    Whataburger Nellis & Walnut             *
                          *    PROPOSED CONDITIONS                     *
                          *                                            *
                          *    PROJECT No:_ _ _ 192496002              *
                          *    FILE: _ _ _ _ _ _PRO.H1                 *
                          *    DATE MODELED:_ _ 12/30/24               *
                          *    MODELED BY:_ _ _ DM/MS                  *
                          *                                            *
                          **********************************************

                          **********************************************
                          *    RETURN PERIOD:_ _100-, 10- YEAR         *
                          *    DISTRIBUTION:_ _ 6-HOUR SDN3            *
                          **********************************************

                           JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:


   22 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
+                     ON       .00     1   FLOW           7.       4.
                                           TIME         3.50     3.50


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