FLOOD INSURANCE STUDY

CLARK COUNTY UNINCORPORATED AREAS

NEVADA

Community Identification Number 32003A

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Flood Insurance Rate Map

FLOOD INSURANCE STUDY
CLARK COUNTY (UNINCORPORATED AREAS), NEVADA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the unincorporated areas of Clark County, Nevada, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert Clark County to the regular program of flood insurance by the Federal Insurance Administration (FIA). Local and regional planners will use it to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally-supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 24 CFR, 1910.1(d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements

1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Department of Agriculture (USDA), Soil Conservation Service (SCS), for the FIA, under Inter-Agency Agreement No. IAA-H-8-77. This study was completed in March 1979. Hydrologic and hydraulic analyses for the unincorporated metropolitan areas adjacent to the cities of Las Vegas and North Las Vegas were performed as a part of a Flood Hazard Analyses for Las Vegas Valley prepared by the USDA, SCS in cooperation with the Clark County Conservation District.

The Clark County Public Works Department assisted by obtaining copies of the Las Vegas Valley regional aerial mapping and by publishing the History of Flooding of Clark County. The maps and flood history report provided valuable information which helped expedite the study.

In addition to field surveys made by the SCS, field and aerial surveys were made by American Aerial Surveys, Inc. of Covina, California, under contract with the SCS.

1.3 Coordination

Areas requiring detailed study and approximate study were identified at meetings attended by representatives of the SCS and the FIA.

The first meeting was held in June 1975 by the SCS and local representatives of the county and cities in the Clark County area. A time and cost estimate was submitted in August 1975 by the SCS to the FIA. This proposal included study for incorporated areas of Las Vegas, North Las Vegas, Henderson and Boulder City. SCS personnel met in December 1975 with the Open Space Council of Clark County and other officials of the study areas to determine their assessment of problems. Other meetings were held in January 1976 to inform the public and local officials of the study. The time and cost estimate was revised in January and in April 1976. The April 1976 revision divided Clark County into five separate studies: Las Vegas, North Las Vegas, Boulder City, Henderson and the Unincorporated areas of Clark County. Public notification that a flood insurance study of these areas was to be conducted was issued in the Las Vegas Sun on January 30, 1976.

SCS personnel met in August 1976 with community representatives from the town of Bunkerville and Clark County to review the proposed study limits. Project order amendments were issued in October 1976 and in January 1977 to get additional funds for field surveying expenses.

Further references to study areas in Clark County, other than the unincorporated areas covered by this report, are provided by individual reports for each of the areas previously mentioned.

The Las Vegas metropolitan area hydrologic analyses were coordinated with the U.S. Bureau of Reclamation (BR), the U.S. Geological Survey (USGS), and the U.S. Army Corps of Engineers (CE) (Reference 1). Moapa Valley hydrologic and hydraulic analyses were coordinated with the CE, Los Angeles District. The hydrologic analyses for the Moapa Valley were coordinated with the USGS, BR and the Nevada Power Company. The hydrologic analysis of the Virgin River was coordinated with the USGS, CE, Los Angeles District, and the BR.

Preliminary study results for the unincorporated Las Vegas metropolitan area and seven other areas in Clark County were reviewed with representatives of FIA, the Clark County Planning Commission and Public Works Department on July 21, 1978.

The results of the study were reviewed again with the county at the Intermediate Coordination Meeting on April 6, 1979. The final meeting on _____ was attended by the Soil Conservation Service, FIA and county officials. The study was acceptable to the county.

2.0 AREA STUDIED

2.1 Scope of Study

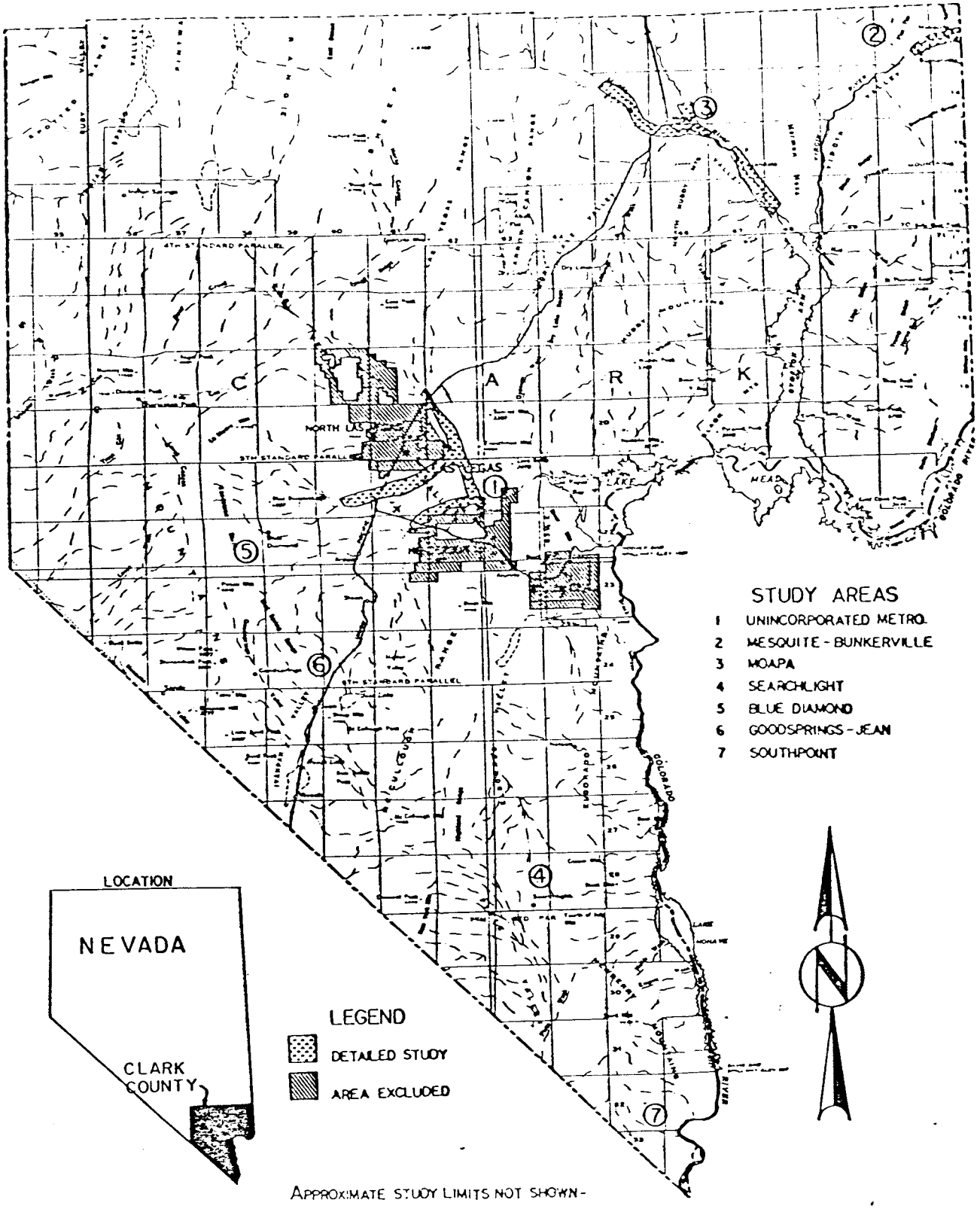
This Flood Insurance Study covers the unincorporated area of Clark County, Nevada. The area of study is shown on the Vicinity Map (Figure 1).

The limits of detailed and approximate studies in Clark County were determined by FIA with county and Soil Conservation Service consultation at the meetings previously described in Section 1.3 Coordination.

Eight areas in Clark County were identified for study. These areas are: 1) Las Vegas Unincorporated Metropolitan Area; 2) Mesquite-Bunkerville; 3) Moapa Valley (towns of Moapa, Glendale, Logandale and Overton); 4) Searchlight; 5) Blue Diamond; 6) Goodsprings; 7) Jean; and 8) South Point. The streams studied within these areas are described as follows:

Las Vegas Unincorporated Metropolitan Area

The major riverine areas (large washes) studied in detail are: Las Vegas Wash from Duck Creek confluence upstream 7 miles to Charleston Blvd.; Las Vegas Range Wash from Vegas Valley Drive upstream 10 miles to Craig Road; Duck Creek from Las Vegas Wash confluence 9 miles upstream to Union Pacific Railroad; Tropicana Wash from Flamingo Wash confluence


STUDY AREAS
1 UNINCORPORATED METRO.
2 MESQUITE - BUNKERVILLE
3 MOAPA
4 SEARCHLIGHT
5 BLUE DIAMOND
6 GOODSPRINGS - JEAN
7 SOUTHPOINT
LOCATION
NEVADA
CLARK COUNTY
LEGEND
DETAILED STUDY
AREA EXCLUDED
APPROXIMATE STUDY LIMITS NOT SHOWN - SEE FIR MAPS
N
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
APPROXIMATE SCALE 1:1,000,000
FIGURE 1
VICINITY MAP

ten miles upstream to Rainbow Road; and Flamingo Wash from Las Vegas Wash confluence upstream 14 miles to Rainbow Road.

Mesquite-Bunkerville

Major sources of flooding studied in detail were the Virgin River, Pulsipher Wash, Abbott Wash, Town Wash, and an unnamed wash at Bunkerville referred to in this report as Bunkerville Wash. Study of the Virgin River covers a six-mile reach from one-half mile upstream of Mesquite to a point one-half mile below Bunkerville. The four washes (named above) are tributary to the Virgin River. These washes were studied for a distance of about one and one-half miles, beginning at their confluence with the Virgin River and extending to Interstate 15 on Pulsiper, Abbott and Town Washes and to State Highway 170 on the Bunkerville Wash.

Moapa Valley

The Muddy River was studied in detail from a point two miles downstream from Arrow Canyon Dam to one mile downstream from Overton, a distance of approximately 28 miles. In addition, Meadow Valley Wash was studied in detail from the confluence with the Muddy River (near Glendale) upstream for a distance of approximately five miles. Logan and Overton Washes were studied by approximate methods where they flow near Logandale and Overton.

Searchlight

Two washes, which flow south, one on the east side and one on the west side of Searchlight were studied by approximate methods. The east wash was studied for a distance of about two miles beginning in the center of the airstrip and continuing upstream. The unnamed west wash was studied from State Route 164 downstream approximately one mile.

Blue Diamond

Blue Diamond Wash was studied in detail from about one-half mile above the Blue Diamond Road Junction for a distance of about four miles upstream. Two unnamed tributaries (Wash A and Wash B) of Blue Diamond Wash were studied by detailed methods.

Goodsprings

An unnamed wash flowing through Goodsprings Valley was studied in detail for a distance of approximately two miles, with the downstream limits just east of the cemetery on the east edge of the town. A small wash which flows from west to east through town was studied by approximate methods.

Jean

The unnamed wash was studied in detail from near the airstrip south of town and continued upstream a distance of four miles. A small wash on the east side of Jean near the state prison was studied by approximate methods.

South Point

Flooding on two large alluvial fans which cover approximately 30 square miles was studied by approximate methods.

The studies of the eight areas of Clark County mentioned above supercedes information presented on the Flood Hazard Boundary Maps (FHBM) (Ref. 36). The FHBM is still applicable in other unincorporated areas not mentioned above.

Development in the unincorporated areas of Clark County in other than these eight unincorporated towns and developed areas will be limited. The factors which will limit development are the desert and mountainous terrain, lack of available sewage treatment facilities, and limited water supply.

Approximate methods of analyses were used to study these areas having a low development potential or a minimal flood hazard and shallow flooding from sheet flows.

The areas studied by detailed methods were selected with priority given to all known flood hazard areas, and areas of projected development or proposed construction for the next five years, through 1984.

2.2 Community Description

Clark County is located in the southern part of Nevada. The 1970 population for Clark County was 273,288 (Reference 2). Clark County covers an area of 7874 square miles. The cities of Las Vegas, North Las Vegas, Boulder City, and Henderson are the major incorporated population centers.

Las Vegas Unincorporated Metropolitan Area

The Las Vegas unincorporated metropolitan area surrounding the cities of Las Vegas and North Las Vegas covers an area of about 120 square miles. The present population residing in this rapidly developing area is estimated at 63,613 and includes East Las Vegas, Sunrise Manor, Vegas Creek, Paradise, and Winchester.

Large casino-hotel facilities, including the Las Vegas "Strip", are located in this area. Tourism, conventions, and gaming are the major industries. Numerous related retail services support the main business. Entertainment and year-round recreation draws an average of 25,000 daily visitors. (Reference 4).

At the time this study was conducted, more than 380 housing developments were under construction in the greater Las Vegas area. Most of these developments were in the unincorporated metropolitan area.

Mesquite-Bunkerville

The Mesquite and Bunkerville areas are about 75 miles northeast of the city of Las Vegas. Both communities are in the Virgin Valley. Mesquite covers an area of about one square mile and currently has a population of about 700. Bunkerville covers an area of about one square mile and has a population of approximately 300.

Moapa Valley

The Moapa Valley is 50 miles northeast of Las Vegas. Meadow Valley Wash is a major tributary of the Muddy River. The Muddy River flows into Lake Mead southeast of the town of Overton.

In the Lower Moapa Valley, the irrigated land is intensively farmed and the prime crops are vegetables, other cash crops and forage crops which are fed to dairy cattle and horses. More recent irrigation development has occurred in the Upper Moapa Valley. The Moapa Indian Reservation covers a large portion of the presently irrigated land in this area. In the Meadow Valley Wash area there is minimal agricultural development but residential development has begun west of Glendale. The Lower Moapa Valley is a wide alluvial floodplain with relatively flat slopes. The Upper Moapa Valley floodplains are somewhat narrower than those in the lower valley. Several particularily narrow floodplains are found:

1) between Glendale and the Wells Siding Diversion Dam; 2) about one mile west of Glendale; 3) Whites Narrows near the Moapa Indian Reservation; and 4) Arrow Canyon just upstream of the study limit. The floodplain of Meadow Valley Wash (within the study area) is relatively wide and flat (Reference 5).

The nonirrigated areas have phreatophyte tree and shrub cover or grass and desert brush. The vegetation of the surrounding watershed is very sparse desert brush.

Population in the Moapa Valley area was 737 in 1930 and it has increased slowly in comparison to the remainder of Clark County. The 1960 census showed approximately 2,400 persons residing in the Moapa Valley and Meadow Valley Wash area near Glendale. The 1970 census showed a population of about 2100 (Reference 2). New residential development is occurring near the small towns of the valley. There are farmsteads located throughout the Moapa Valley.

Searchlight

The unincorporated area of Searchlight is 60 miles southeast of Las Vegas. The current population is about 425. The community covers an area of about one square mile. Very limited development is occurring at the time of this study.

Blue Diamond

Blue Diamond, population 220, is an area of one square mile about 20 miles west of Las Vegas. The community is a residential area near a gypsum mine and plant. Residential development is occurring due to the communities' proximity to Las Vegas.

Goodsprings

Goodsprings is 25 miles south of Las Vegas. The community of 314 covers approximately 0.5 square miles. Development was not occurring at the time this study was made.

Jean

The community of Jean is 25 miles south of Las Vegas and to the east of Goodsprings. It covers about one square mile and has a population of 90. A new state prison is being constructed and residential development is anticipated in the future.

South Point

South Point is located 70 miles south and slightly east of the city of Las Vegas. The development consists of a coal-fired power plant and a small casino-resort complex located on the west bank of the Colorado River.

The climate of Clark County has four well defined seasons. The summer ranges from June to September with daytime temperatures over 100°F. The spring and fall seasons are relatively short with temperatures in the 70's. Winters are generally snowless, with daytime temperatures in the 50's and 60's. Nights during January and February are near freezing. The average annual precipitation in Clark County ranges from 4-7 inches and the annual temperature is 66°F (Reference 6).

2.3 Principal Flood Problems

Flood problems in Clark County occur during both winter and summer. Winter frontal storms, which cover large areas, are of low rainfall intensity. Most of the rainfall during the summer results from thundershowers produced when warm, moist tropical air invades the area. About one third of the annual rainfall results from short, high intensity thunderstorms, which usually cover a relatively small area. The rainfall intensity is greatest during the first five or ten minutes. Resulting flash floods are common and the majority of floods have occurred in July and August on an average of once each year. Additional flood history is available in the History of Flooding, Clark County (Reference 7).

Most of the stream channels located on debris cones or alluvial fans are inadequate to pass even minor floods and flows rarely spread evenly over the surface of an alluvial fan. Typically, flow is concentrated in a temporary channel or confined to a portion of the fan surface. The flow paths are prone to lateral migration and sudden relocation to other areas of the fan during a single flood event. This erratic, unpredictable behavior subjects all portions of the fan to potential flood hazard.

Channel migration is considerably less on larger well defined washes, especially where channel stability measures have been constructed (i.e., reinforced concrete lining or rock riprap). On washes where protective measures have not been constructed, rapid alteration may occur in the channel banks due to the highly erosive materials that make up an alluvial fan. In undeveloped areas, flood flows on alluvial fans are essentially unmodified and processes such as fanhead trenching, braiding of distributary channels, and channel abandonment take place.

High velocities, rapid bank erosion, and sediment deposition are the major flood-related hazards to which urban development on the alluvial fans are subjected (Reference 8).

Other specific flood problems in the study areas are presented.

Las Vegas Metropolitan Unincorporated Areas

The main washes originate in the mountain ranges surrounding Las Vegas Valley. Alluvial aprons formed by numerous coalesced alluvial fans skirt the mountains and are located mostly in the western part of the metropolitan area.

The largest recorded flood on Las Vegas Wash occurred on July 3, 1975 when 12,010 cfs was measured at North Las Vegas. The next largest recorded events occurred on May 31, 1973 and September 25, 1967 when 1,640 cfs and 1,170 cfs were measured (Reference 9). These three floods have return periods of 111, 5 and 4 years, respectively.

Flamingo and Tropicana Washes experienced large flows on July 3, 1975 and September 13, 1969 when 2,750 cfs and 1,500 cfs were measured (Reference 10). The return periods are 53 and 17 years. The largest flow on Duck Creek was 3,570 cfs on August 30, 1961 (Reference 10). The return period is 83 years. Large flows have not been experienced on Las Vegas Range Wash.

In the past, flood events on Tropicana and Flamingo Washes have been aggravated when culvert entrances were blocked by automobiles washed from parking areas. This potential still exists and could be even greater since a large parking lot for school buses is located in the floodplain of Upper Flamingo Wash. Siltation of culverts occurs on all washes and culvert openings may become plugged from tumbleweeds, trash, and other objects located on the floodplains. Flamingo Wash channel below Boulder Highway and Duck Creek channel near the Boulder Highway are overgrown with grass,

reeds, and salt-cedar trees which obstruct the channels and retard flood flows. The bridges on Flamingo Wash at Swenson Road, Eastern Avenue, and Tropicana Avenue, Tropicana Wash at Las Vegas Boulevard, and Union Pacific Railroad have high head losses and restrict the passage of floodwaters.

The potential for sediment damage is high. Some of the soils in the drainage areas are highly erosive which results in turbid, sediment-laden flood flows. Channel banks of the washes are unstable and unprotected, allowing undermining of road culverts, roadways, cinder block fence foundations, and a few home foundations close to the washes.

Mesquite-Bunkerville

The Virgin River frequently causes flooding problems in this area. The largest recorded peak flow occurred on December 6, 1966 when 35,200 cfs were measured (Reference 10). This flood has a return interval of approximately 98 years. Flood damage included erosion of agricultural land, sediment and floodwater covering of crops, road washouts and bridge destruction. Natural obstructions to flood flow include brush, large trees, and other vegetation along the river. The Bunkerville bridge and two irrigation diversion dams are man-made obstructions. Brush on the floodplains can be carried downstream by flood flows to collect as obstructions,

causing a damming effect and a raised water surface. This effect can also cause bridge approaches to be washed out.

Pulsipher, Abbott, and Town Washes have some vegetation growing in them which impedes floods. Some of the culverts are clogged with silt. However, the channels appear to have sufficient capacity to carry large infrequent flows.

Moapa Valley

Floods within the Moapa Valley are of two types: (1) Major storms on the upstream watershed of the Muddy River and its tributary Meadow Valley Wash; and (2) Intense convective storms on the watershed of local side washes. (Flooding of both types has always been a problem in the developed and irrigated areas.)

The flood history of the Moapa Valley from newspaper accounts is summarized in the Flood History of Clark County (Reference 7). Descriptions of several floods follow:

The flood of January 8, 1910 was a large flood reported in the Las Vegas Age (January 8, 1910, #2, Vol VI). "In the Muddy Valley, the flood was the greatest known in recent years, but aside from the loss of fences and a

portion of the growing crops, it was thought that the loss was not great. Near Logan (Logandale), the river ran a turbulent stream nearly a mile and half in width..... The house of John Averett near Logandale, which had never before been reached by floodwaters, was surrounded by water 18 inches deep.....Railroads were practically obliterated down through the valley."

The estimated discharge of this flood was 7,000 cfs at the lower Moapa Valley which is a 15-year return period. Many floods were reported (Reference 7) where the railroad along Meadow Valley Wash was damaged.

"A storm during the latter part of the week ending August 4, damaged a large acreage of land on the Moapa Indian Reservation. The flood came down the Moapa River in great volume covering fields with silt and ruining a large portion of crops." Las Vegas Age, August 4, 1917, #31, Vol. XIII.

This flood on the upper Muddy River did not have an estimated discharge or recurrence interval.

On August 17, 1922, a large flood damaged much of the Moapa Valley. The flood came through Arrow Canyon into

the upper end of the valley and was augmented by flow from side washes emptying into the valley. Roads and bridges were washed out and the drug store and many houses were flooded in Overton. Las Vegas Age, August 19, 1922, #33, Vol. XVIII. The estimated discharge for the lower Moapa area was 8,110 cfs and had a recurrence interval of about 20 years.

A large flood hit Meadow Valley Wash and Lower Moapa Valley on March 3, 1938. The estimated discharge was 10,000 cfs and recurrence interval was 30 years. Some excerpts of the Las Vegas Review-Journal, March 4, 1938, #53, Vol. XXX follow:

"Scores of families in ranches near the river moved out furniture and personal belongings.....One residence at Logandale was worst damaged and was saved from being swept into the river by means of stout ropes anchored to trees. The water filled this home and was running through the windows at the height of the flood.....The,waters were running over the sidewalks of the Logandale School, through the Windsor home. The water was lapping at the floor of the highway bridge at Glendale at the crest....."

The news article contains more information on the flooding of specific properties in both Upper and Lower Moapa Valley.

On August 11, 1941 the largest flood recorded on the Lower Moapa Valley occurred. An intense short duration storm over the Lower Moapa Valley and California Wash produced estimated discharges of 10,000 cfs at California Wash and 12,000 cfs at Glendale. The latter is estimated to be a 36-year flood. The discharge on California Wash was estimated to be a 100-year flood.

Excerpts from Reference 7 follow:

"The flood severely damaged the town of Overton by floodwaters from Overton Creek and also damaged agricultural and railroad property."

The flood "swept away two railway bridges on a branch line, put one highway bridge out of commission and did an undetermined amount of damage to farms.....The railroad bridge between Moapa and Glendale....was washed out and carried downstream and lodged against the new highway bridge near Glendale. It was feared for a time that this bridge would go out, but it withstood the strain."

The most recent large flood to have occurred in the Moapa Valley happened in November of 1960. The estimated discharge near Glendale was 7,400 cfs with a return period of 16 years.

This brief section on flood history is included to indicate the magnitude and severity of floods in the Moapa Valley and to show that a variety of different storms centered in widely distant areas can produce flooding in the Moapa Valley.

Vegetation in channels of the Muddy River and Meadow Valley Wash obstruct flood flows. In many areas, trees and shrubs grow on the channel banks and bottom which increase roughness and decrease the effective flow area of the channel. There are several culverts and bridge crossings along the Muddy River. The culverts are often overtopped by floodwaters and erosion and washing occurs. In past floods, bridges have been washed out and carried downstream thus aggravating flood problems.

Searchlight, Blue Diamond, Goodsprings, Jean, and South Point

Flood problems of Searchlight, Blue Diamond, Goodsprings, Jean and South Point consist of two types: alluvial fan and wash flooding. The washes have large drainage areas which produce floodwaters with high velocities and erosive power. Most of the flood damage is to roads and bridges on the washes. Many residential and business establishments are subject to shallow surface flooding.

On August 19, 1967, a hail and rain storm hit an area north of Searchlight with close to one inch of precipitation in 22 minutes. This rainfall has a return period of about 10 years. The damage reported was boulders and sediment on U.S. Highway 95 (Reference 7).

Flood damage reported in Blue Diamond was mainly road closings and washouts. Low-lying residential areas and the schoolgrounds are subject to localized shallow flooding.

Flood damage in Goodsprings and Jean was primarily road damage (Reference 7).

South Point is subject to flash floods coming from the mountains located to the west of the area. There are few well-defined channels to concentrate the flood flows. Most of the damage consists of roads being covered with silt, boulders, and other debris making travel impossible at times.

2.4 Flood Protection Measures

Few major flood protection structures have been installed in Clark County, outside of the Moapa Valley. Railroad fills and highway embankments affect the smaller more frequent flows.

Significant flood protection measures are discussed below.

Las Vegas Unincorporated Metropolitan Area

Enlargement and shaping of channels have occurred on Las Vegas Wash, Flamingo Wash, and Duck Creek for distances of 11,900, 7,100 and 2,000 feet, respectively. About 1,500 feet of Flamingo Wash at Interstate 15 have been concrete lined. The Union Pacific Railroad acts as a dike which tends to collect and concentrate surface flows. Portions of Las Vegas Wash, Flamingo Wash, and Tropicana Wash have been zoned for golf courses.

Mesquite-Bunkerville

Two irrigation diversion structures are located in the Virgin River in the study area (Reference 11). However, these structures offer no flood protection from large flows. Interstate 15 above Mesquite acts as a dike which concentrates flows through large culverts and offers protection to areas located immediately below. Interstate 15 would not be overtopped by a 100-year flood.

Moapa Valley

There have been several flood control structures built on the Muddy River and Meadow Valley Wash.

In 1935 and 1936, the Wells Siding Diversion Dam and Bowman Reservoir were constructed by Civilian Conservation Corps (CCC) labor. These structues are located near the upper end of the Lower Moapa Valley. The Wells Siding Diversion Dam diverts Muddy River flows into the Lower Moapa Valley Canal System and into Bowman Reservoir. The feeder canal to Bowman Reservoir has a capacity of about 1000 cfs. Bowman Reservoir is about a mile east of Wells Siding Dam and is approximately 30' high and 780' long. Bowman Reservoir is used to store excess winter flows to supplement the normal Muddy River discharge during the heavy irrigation season. Runoff from a small side wash is collected in Bowman Reservoir (Reference 12) but this has a minor effect on reducing peak flows on the Muddy River.

The Muddy River channel was enlarged for two miles in the vicinity of Logandale also by the CCC.

Arrow Canyon Dam was built by the CCC and is approximately 2.5 miles upstream of the study limit on the Muddy River. This dam is approximately 30' high and constructed of rubble masonry. At the time of this study, the storage area of the dam is filled with sediment and no longer controls flood flows (Reference 5).

A channelization project completed in the early 1960s, between the Union Pacific Railroad and the upstream boundary of the Moapa Indian Reservation, affords some flood protection to the lands within this reach of the Muddy River.

Two Corps of Engineer's dams are located in the drainage area of Meadow Valley Wash above the town of Caliente. These are Pine Canyon and Mathews Canyon Dams (Reference 12). The SCS has constructed a watershed protection and flood prevention project in the headwaters of Meadow Valley Wash (Reference 13). Because of the distance from the study area, their effect on major floodflows in the study area is minimal.

Searchlight, Blue Diamond, Goodsprings, Jean, and South Point

Floodwater retention structures do not exist in the watersheds above Searchlight, Blue Diamond, Goodsprings, Jean and South Point. There are also no significant channel relocations or modifications in these areas. Flows in the Colorado River are regulated by Hoover Dam and Davis Dam near South Point. These structures offer flood protection from events larger than the 100-year flood on the Colorado River.

Land use regulations have been adopted to control building within areas that have a high risk of flooding.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10, 50, 100, or 500 year period (recurrence intervals), have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10, 50, 100, and 500 year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one percent chance of annual occurrence) in any 50 year period is about 40 percent (four in 10), and for any 90 year period, the risk increases to about 60 percent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the county at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail in the county.

Standard SCS procedures were used to estimate peak discharges for areas where stream gage data was not available. Input data for the SCS TR-20 (Reference 14) computer program was obtained from the following sources: soil types from the Clark County Soil Survey (References 15 and 16) and rainfall data from NOAA Atlas 2 for Nevada (Reference 17). Runoff curve numbers were based on existing land use and information from SCS publications (References 18 and 19). Drainage areas were delineated and measured from USGS $7\frac{1}{2}$ and 15 minute topographic quadrangles (References 20 and 21). The three-hour duration storm (typical of a summer thunderstorm) was used to determine the 10, 50 and 100-year frequency flood discharges. The 500-year discharge was estimated by extrapolating the curve on log probability paper.

Las Vegas Unincorporated Metropolitan Area

Data was obtained for stream gage stations located within the Las Vegas Valley (Reference 10). Records ranged from 8 to 20 years, including water year 1976. Statistical analyses were performed in accordance with Water Resources Council Bulletin 17A (Reference 22). A large thunderstorm which occurred on July 3, 1975 was modeled using the SCS TR-20 (Reference 14) rainfall-runoff procedure. This provided calibration for a TR-20 model. Rainfall amounts were then obtained from the National Weather Service NOAA Atlas 2, Volume VII (Reference 17) and were used in the TR-20 model. Peak discharges corresponding to the selected frequencies were then calculated for various locations on Las Vegas Wash and its tributaries within the metropolitan area.

A separate hydrology report for this area has been prepared (Reference 1).

Mesquite-Bunkerville

The stream gage on the Virgin River at Littlefield, Arizona has 47 years of record including water year 1976. A peak flow analysis was performed in accordance with WRC Bulletin 17A. The results were applied to the Mesquite-Bunkerville area.

Peak discharges for Pulsipher, Abbott, Town and Bunkerville Washes were calculated using the TR-20 program (Reference 14).

Moapa Valley

The study area is divided into five reaches or tributaries. The methods used for computing discharge-frequency and the results are described below.

A. Lower Muddy River (downstream of confluence with Meadow Valley Wash)

The data from the USGS stream gage Muddy River near Glendale (number 09-4190) (Reference 10) was analyzed according to the WRC Bulletin 17A, Appendix 6 (Reference 22). The data used included 15 historical floods between 1906 and 1946 and continuous record from 1951 to 1976. The results are summarized in Table 1.

These peak discharges and associated hydrographs were flood routed from the stream gage location downstream to a point downstream of Overton.

B. Meadow Valley Wash

Since the majority of floods recorded at the Muddy River stream gage originated on Meadow Valley Wash and there is very little data available on the lower reach of

Meadow Valley Wash, discharges of the Muddy River near Glendale are used for the lower reach of Meadow Valley Wash.

C. Overton Wash and Logan Wash

These two washes are studied by approximate methods and only the 100-year frequency discharge is estimated using the SCS computer program TR-20 (Reference 14). The drainage area of Overton Wash is approximately 21.8 square miles and the computed 100-year discharge is 2350 cfs. The drainage area of Logan Wash is approximately 4.6 square miles and the computed 100-year discharge is 550 cfs.

D. California Wash (Tributary to Muddy River)

California Wash drains into the Muddy River 2.2 miles upstream of the confluence with Meadow Valley Wash. The drainage area is approximately 288.5 square miles. This wash was also studied by approximate methods using the TR-20 computer program (Reference 14). The 100-year flood was computed to be 9150 cfs. The largest flood of recent years was in 1941 and the estimated discharge was 10,000 cfs.

E. Muddy River Above the Confluence with Meadow Valley Wash

The data from the USGS stream gage on the Muddy River near Moapa (number 09-4160) was analyzed according to WRC Bulletin 17A. The data used included 34 years of record between the years 1913 to 1976, most of which was between 1945 and 1976. The results of the gage analysis were:

500-year - 7,730 cfs
100-year - 3,820 cfs
50-year - 2,710 cfs
10-year - 1,040 cfs

This analysis does not represent the true discharge frequency relationship because during part of the record a large part of the drainage area was controlled by Arrow Canyon Dam. As of this time, the dam offers no control because the storage area is filled with sediment.

The dam is located about eight miles upstream of the gaging site and has an uncontrolled drainage area of approximately 979 square miles as compared with a drainage area of 1016 at the gage.

In lieu of the gage analysis, a discharge-drainage area relationship was developed using the Muddy River at Glendale gage and peak discharge data for California Wash. This relationship was used to

estimate the 100-year discharge at several locations on the Upper Muddy River. The discharge-frequency curve for each of these locations was derived from the 100-year discharge and the slope of the discharge-frequency curve of the Muddy River at Glendale gaging site.

Between the confluence of California Wash and the Union Pacific Railroad bridge near the town of Moapa, lower discharges are used because of the floodwater storage upstream of the railroad fill. The maximum fill height is about 28 feet. The storage at maximum stage for the 500-year flood is approximately 2360 acre-feet. The 10, 50, 100 and 500-year hydrographs were flood routed through the structure using the storage-indication method. The results are tabulated below.

PEAK DISCHARGES AT UNION PACIFIC RAILROAD BRIDGE NEAR MOAPA

Frequency	Upstream Discharge (cfs)	Downstream Discharge (cfs)	Reduction
500-year	29,400	22,900	6,500
100-year	13,900	11,300	2,600
50-year	9,650	8,150	1,500
10-year	3,440	3,100	340

Between the confluences of Muddy River with California Wash and Meadow Valley Wash, the reduction in peak flow caused by the railroad fill is subtracted from the peak discharges calculated from the discharge-drainage area relationship.

Searchlight, Blue Diamond, Goodsprings, Jean and South Point

The 10, 50, 100 and 500-year peak discharges were determined for these areas using the TR-20 program (Reference 14). Only the 100-year peak discharges were calculated for the Searchlight and South Point areas.

There are no stream gages in or near any of these areas. There is a daily recording rain gage at Searchlight but rain gages are not located in any of the other areas.

A summary of drainage area-peak discharge relationships for each stream studied in detail is shown in Table 1. The locations given in the table are referenced to the Flood Boundary and Floodway Maps.

TABLE 1 - SUMMARY OF DISCHARGES

Flooding Source and Location	Drainage Area (Sq. Mi.)	Peak Discharges (cfs) 10-Yr.	50-Yr.	100-Yr.	500-Yr.
LAS VEGAS UNINCORPORATED METROPOLITAN AREA					
Las Vegas Wash at Charleston Av.	858	3180	9,000	12,100	21,800
Las Vegas Wash at Duck Creek Confluence	1444	5350	14,500	19,300	35,000
Duck Creek at Boulder Highway	233	1200	3,040	3,770	6,440
Flamingo Wash at Boulder Highway	120	1110	2,610	3,430	5,810
Tropicana Wash at Interstate-15	11	630	1,210	1,520	2,340
Las Vegas Range Wash at Vegas Valley Drive	155	530	1,500	2,050	3,930
Las Vegas Range Wash at Las Vegas Blvd.	55	520	1,070	1,410	2,240
MESQUITE-BUNKERVILLE					
Virgin River at Bunkerville Bridge	5363	14,400	28,500	36,600	61,500
Pulsipher Wash at Interstate-15	4.9	540	1,130	1,400	2,140
Abbott Wash at Interstate-15	7.1	780	1,590	2,050	2,850
Town Wash at Interstate-15	20.7	1,810	3,110	3,960	5,470
Bunkerville Wash at State Highway 170	10.4	1,340	2,440	3,050	4,340

TABLE 1 - SUMMARY OF DISCHARGES (Continued)

Flooding Source and Location	Drainage Area (Sq. Mi.)	Peak Discharges (cfs) 10-Yr.	50-Yr.	100-Yr.	500-Yr.
MOAPA VALLEY					
Muddy River Downstream of Wells Siding Diversion Dam	3,951	4,250	13,700	20,200	44,000
Muddy River Downstream of Glendale	3,936	5,250	14,750	21,350	45,350
Meadow Valley Wash	2,555	5,250	14,750	21,350	45,350
Muddy River Above Meadow Valley Wash	1,360	3,450	9,000	12,500	25,200
Muddy River Above California Wash	1,065	3,100	8,150	11,300	22,900
Muddy River Above Union Pacific RR	1,060	3,440	9,650	13,900	29,400
Muddy River at Warm Springs Road	1,016	3,420	9,550	13,700	28,800
Muddy River at Upstream Study Limit	988	3,400	9,500	13,600	28,600
Lake Mead				20,000	
Sec 1 @ Overton Wash — downstream Overton Airport				20,000	

TABLE 1 - SUMMARY OF DISCHARGES (Continued)

Flooding Source and Location	Drainage Area (Sq. Mi.)	Peak Discharges (cfs) 10-Yr.	50-Yr.	100-Yr.	500-Yr.
BLUE DIAMOND					
Blue Diamond Wash Cross Section A	45.00	2,450	4,950	6,250	8,750
Cross Section B	27.11	1,350	2,700	3,400	4,800
Cross Section D	24.47	1,300	2,600	3,300	4,600
Wash A	16.89	1,200	2,400	3,000	4,200
Wash B	0.37	45	95	125	210
GOODSPRINGS					
Cross Section A	43.60	2,050	3,850	4,750	7,150
JEAN					
Cross Section A	84.29	3,200	6,250	7,800	12,000
Cross Section B	28.04	1,300	2,550	3,150	4,800
Cross Section C	11.93	550	1,100	1,350	2,050

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in detail in Clark County were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of the flood sources.

Water surface elevations of floods of the selected recurrence intervals were computed through use of the SCS WSP-2 step backwater computer program (Reference 23). Basic data for the hydraulic calculations included cross section data, reach lengths, roughness coefficients and peak discharges. All bridges, dams, and culverts were field checked to obtain elevation data and structural geometry. Some culvert data was obtained from the Nevada State Highway Department.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map. Roughness coefficients were estimated using an SCS publication entitled, Procedure for the Estimation of "N" Values (Reference 24) and engineering judgments based on field observations of the streams and floodplain areas.

All elevations are referenced from the National Geodetic Vertical Datum of 1929, (NGVD) formerly referred to as Sea Level Datum of 1929; elevation reference marks used in this study are shown on the Flood Boundary and Floodway Maps.

Las Vegas Unincorporated Metropolitan Areas

Cross section data was obtained from field surveys conducted by the SCS and from 5-foot contour interval maps (scale - 1:2400) which were the result of the Clark County regional aerial mapping project (Reference 25). The map photography is dated February and March 1974. Stream reach lengths and channel bottom profile data were obtained from the contour maps. Starting water surface elevations for the washes were based on normal channel slope. Roughness values used for the washes are:

Wash	Channel "N"	Overbank "N"
Lower Las Vegas Wash	.08 to .12	.04 to .15
Las Vegas Wash Above Vegas Valley Drive	.03 to .04	.04 to .05
Duck Creek	.025 to .125	.03 to .12
Flamingo Wash	.013 to .07	.025 to .11
Tropicana Wash	.02 to .05	.035 to .06
Las Vegas Range Wash	.02 to .05	.02 to .055

The Corps of Engineers, LA District, Floodplain Information Report for Lower Las Vegas Wash (Reference 26) show 100-year water surface profiles on Las Vegas Wash at Charleston Avenue which agree within one-half foot of the profiles given in this study report for the same location. Water surface profile data for the other washes is not available.

Mesquite-Bunkerville

Digitized cross sections from aerial photographs (Reference 27) and five-foot contour maps with scale 1:2400 (Reference 28) provided data for this area. Reach lengths and channel bottom profile data were obtained from the contour maps. Normal channel slopes were used to start the water surface profiles. Roughness values used for the streams are:

Stream	Channel "N"	Overbank "N"
Virgin River	.05	.065 to .10
Pulsipher Wash	.045	.065 to .10
Abbott Wash	.045	.065 to .10
Town Wash	.045	.065 to .10

Flows in Bunkerville were analyzed using the FIA alluvial fan procedure (Reference 8). Other water surface profile data for these streams is not available.

Moapa Valley

Cross section data for the Lower Moapa Valley, furnished by the Corps of Engineers, Los Angeles District, was also used in the Floodplain Information Report for the Muddy River (Reference 12). The source of this data was two-foot contour mapping of the valley (Reference 29). Cross section data for the Upper Muddy River and Meadow Valley Wash were obtained from two sources. Twelve cross sections were surveyed using aerial photogrammetry (Reference 27) and the remaining cross sections were located and tabulated from the two-foot contour mapping of the valley (Reference 29). All reach lengths were measured from the two-foot contour mapping (Reference 29) which has a scale of 1"= 400'.

Starting data for the water surface profile of the Lower Moapa Valley was taken from the Floodplain Information Report of the Muddy River (Reference 12). The water surface profile for the Upper Moapa Valley was begun with normal slope.

Roughness coefficients (Manning's "N" values) were estimated with the aid of three references (References 24, 30, 31). The range of values used for each stream are listed below.

Stream	Channel "N"	Overbank "N"
Muddy River in Vicinity of Overton & Logandale	0.065 to 0.070	0.055 to 0.07
Muddy River Upstream of & in Vicinity of Glendale	0.06 to 0.085	0.053 to 0.10
Meadow Valley Wash	0.048 to 0.072	0.053 to 0.064

A water surface profile of the Upper Muddy River was computed by G. C. Wallace Engineers (Reference 32) for the Nevada Power Company. The reach studied began at the Union Pacific Railroad bridge near Moapa and extended 4500 feet upstream. At the lower study limit the 100-year elevation was computed to be 1598.6 and for this FIS the 100-year elevation at the same location was computed to be 1598.4. At the upstream study limit of the Nevada Power Company study, the computed 100-year elevation was 1602.1 and for this FIS the 100-year elevation was 1603.2. .

Searchlight, Blue Diamond, Goodsprings, Jean

Cross section data was obtained from aerial photogrammetry (Reference 27). Cross section locations are plotted on the Flood Boundary and Floodway Map. Reach lengths were measured from USGS topographic quadrangles (References 20 and 21). The range of "N" values used is tabulated below:

Area	Channel "N"	Overbank "N"
Searchlight	0.04 to 0.06	0.06
Blue Diamond	0.04 to 0.05	0.05 to 0.07
Goodsprings	0.05 to 0.06	0.05 to 0.06
Jean	0.045 to 0.055	0.055 to 0.06

Starting data for water surface profiles was not available so profiles were started with normal slope.

In Searchlight, an approximate method was used to determine the depth of flooding. The 100-year peak discharge was divided by the number of waterways and the depth determined for an average waterway cross section (i.e. waterway depth and width).

South Point

Flood depths were estimated using the FIA alluvial fan procedure (Reference 8).

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and the 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps as described below.

Las Vegas Unincorporated Metropolitan Area

The five-foot contour interval (scale 1:2400) topographic maps were used to draw the flood boundaries (Reference 25). These boundaries were then transferred to the 1"=500' scale work maps. Aerial photographs provided by the Nevada State Highway Department of the July 3-4, 1975 storm were also used to delineate some of the flood boundaries.

Mesquite-Bunkerville

Flood boundaries were drawn on maps with five-foot contours at a scale of 1:2400 (Reference 28). The boundaries were transferred to the 1"= 1000' scale work maps.

Moapa

Flood boundaries were initially drawn on maps with a scale of 1"=400' with two-foot contours. Flood boundaries for the 100-year flood were then transferred to the 1"=1000' scale work map. Since the area between the 100-year and 500-year flood boundaries and the area subject to shallow flooding (Zone B) is not subdivided, these areas are mapped together. Thus, the 500-year flood boundary is not shown on the work map unless there is no area beyond that flood boundary subject to shallow flooding.

For streams studied by approximate methods, the boundary of the 100-year flood was developed from peak discharge data, channel measurements, Flood Hazard Boundary Maps, and aerial photography.

Searchlight, Blue Diamond, Goodsprings, Jean

In Searchlight flood boundaries, verified by aerial photography (Reference 27) and field observations, were drawn on 1"=2,000' enlargement of the Searchlight USGS

quadrangle (Reference 21). Since shallow flooding is the type of flooding analyzed in Searchlight, flood boundaries extended to the edge of the alluvial fan. Approximate flood boundaries in Blue Diamond, Goodsprings and Jean, in most cases, were also extended to the boundary of the alluvial fan.

Flood boundaries in Blue Diamond were drawn on 1"=750' aerial photographs (Reference 27) and transferred to 7½-minute USGS quadrangle maps (Reference 20).

Goodsprings and Jean flood boundaries were drawn on 1"=2000' enlarged USGS 15-minute quadrangle maps (Reference 21). Channel locations, physiographic features, and other data were obtained from aerial photography (Reference 27).

South Point

The shallow flooding limits were drawn on the 7½-minute quadrangle sheets (Reference 20) using peak discharge data, channel measurements, and the Flood Hazard Boundary Maps.

For the streams and areas studied by approximate methods, the boundary of the 100-year flood was developed from FIA Identification of Special Flood Hazard Areas on Alluvial Fans, SCS Tech. Note 6, Overland Flow Program (HP 9825-A),

and a parabolic channel procedure as described in Section 3.2, Hydraulics.

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Maps. Small areas within the flood boundaries may lie above the flood elevations, and therefore, may not be subject to flooding. Owing to limitations of the map scale and/or lack of detailed topographic data, such areas are not shown. Where the 100- and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed (Table 2).

As shown on the Flood Boundary and Floodway Maps, the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

The streams on which a floodway analysis was performed are:

Las Vegas Unincorporated Metropolitan Area

- Las Vegas Wash
- Duck Creek
- Flamingo Wash
- Tropicana Wash
- Las Vegas Range Wash

Mesquite-Bunkerville

Virgin River

Pulsipher Wash

Abbott Wash

Town Wash

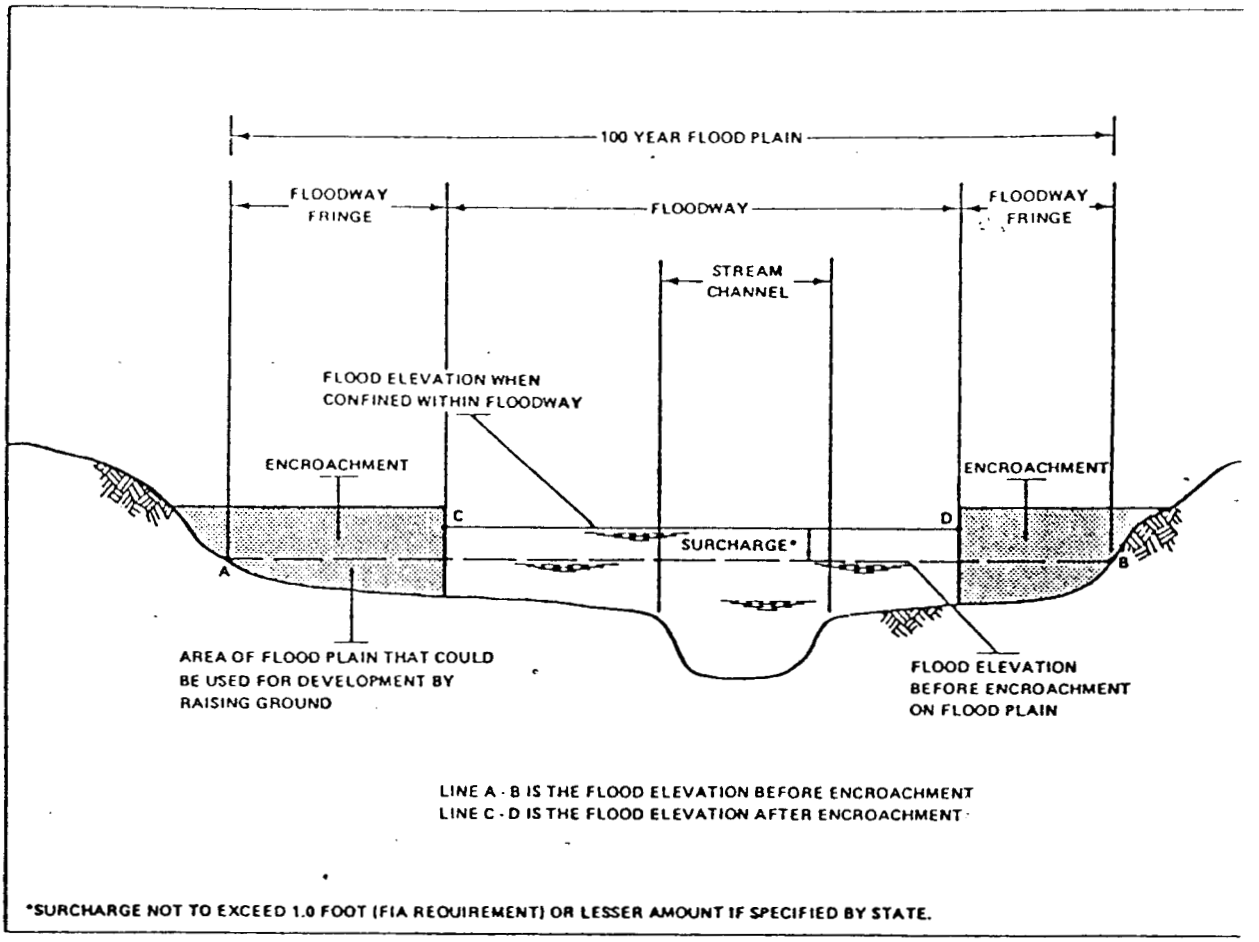
Moapa Valley

Muddy River

Meadow Valley Wash

Searchlight, Blue Diamond, Goodsprings, Jean and South Point

Floodways were not determined for Searchlight, Blue Diamond, Jean, or Goodsprings. Searchlight and South Point are subject to shallow flooding which is not consistent with the floodway concept of encroachment to raise the water surface. In Blue Diamor Jean, and Goodsprings, the 100-year floodplain is confined to bottom lands and is within the area subject to flooding in the past. Any filling or encroachment into these wash areas would be subject to high velocities and would experience severe erosion. Therefore, a floodway was not determined for these three areas.



FLOODWAY SCHEMATIC Figure 2

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE 1/	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Las Vegas Wash							
A	0	1292	8530	2.3	1569.0	1568.0	1.0
B	2,685	1536	7038	2.3	1579.0	1578.0	1.0
C	5,420	920	4495	3.5	1597.2	1596.2	1.0
D	7,910	1780	7813	2.0	1617.5	1616.5	1.0
E	9,765	1598	3350	4.7	1633.5	1632.5	1.0
F	11,940	838	3364	4.7	1649.7	1648.7	1.0
G	14,160	1980	6401	2.5	1664.1	1663.1	1.0
H	16,225	740	4010	4.0	1674.1	1673.1	1.0
I	18,120	1193	6754	2.4	1680.1	1679.1	1.0
J	20,585	873	3486	4.6	1688.5	1687.5	1.0
K	23,085	761	4452	3.6	1696.4	1695.4	1.0
L	24,870	760	2790	5.8	1697.8	1696.8	1.0
M	28,805	620	2886	5.2	1709.3	1708.3	1.0
N	29,755	430	4553	3.3	1711.6	1710.6	1.0

1/ FEET ABOVE DOWNSTREAM STUDY LIMITS

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE 1/	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
O	32,110	400	4509	2.7	1715.5	1714.5	1.0
P	34,220	1078	2167	5.6	1727.3	1726.3	1.0
Q	36,660	270	1518	8.0	1732.4	1731.4	1.0
S	36,960	175	1945	6.3	1736.2	1735.2	1.0
T	37,985	145	1696	7.2	1737.2	1736.2	1.0
AH	52,970	200	3394	3.6	1801.4	1800.4	1.0
AI	54,800	246	1446	8.4	1811.4	1810.4	1.0
AJ	56,655	150	1645	7.2	1821.4	1820.4	1.0

1/ FEET ABOVE DOWNSTREAM STUDY LIMITS

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE 1/	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Duck Creek							
A	3,200	496	1889	2.0	1594.0	1593.0	1.0
B	5,360	535	1455	2.6	1607.2	1606.2	1.0
G	10,087	284	1063	3.6	1643.7	1642.7	1.0
J	14,325	105	551	6.9	1665.0	1664.0	1.0
L	14,475	85	735	5.2	1667.3	1666.3	1.0
N	17,060	100	518	7.3	1688.4	1687.4	1.0
P	20,840	161	409	9.3	1758.4	1757.4	1.0
R	23,890	200	967	3.9	1831.2	1830.2	1.0
S	25,920	75	783	4.8	1860.4	1859.4	1.0
T	26,970	55	454	8.4	1881.0	1880.0	1.0

1/ FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE [1/]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
U	28,240	149	605	6.3	1909.3	1908.3	1.0
V	29,390	127	451	8.4	1923.4	1922.4	1.0
W	29,870	178	536	7.3	1928.9	1927.9	1.0
X	30,340	240	3128	1.3	1931.8	1930.8	1.0
Y	31,640	151	814	4.8	1941.1	1940.1	1.0
Z	32,740	442	1187	3.3	1950.4	1949.4	1.0
AA	34,080	728	1218	3.2	1962.2	1961.2	1.0
AC	35,995	636	1981	2.0	1977.0	1976.0	1.0
AD	38,220	47	293	13.3	2001.0	2000.0	1.0
AE	39,190	440	946	4.1	2015.9	2014.9	1.0
AF	40,180	55	363	10.7	2027.2	2026.2	1.0

[1] FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE [1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
AG	40,280	71	559	7.0	2027.9	2026.9	1.0
AH	40,410	95	578	6.7	2028.5	2027.5	1.0
Duck Creek Trib.							
A	230	53	191	4.7	1644.8	1643.8	1.0
B	3,300	55	154	5.8	1669.0	1668.0	1.0
C	5,140	90	312	2.9	1684.9	1683.9	1.0
D	6,370	180	288	3.1	1690.9	1689.9	1.0

[1] FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE 1/	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Flamingo Wash							
A	1,490	95	1810	2.5	1713.7	1712.7	1.0
B	4,140	73	476	9.7	1727.5	1726.5	1.0
E	4,550	315	3891	1.2	1730.5	1729.5	1.0
F	6,745	550	1418	3.2	1742.8	1741.8	1.0
G	9,385	70	455	10.1	1774.0	1773.0	1.0
J	11,755	163	775	5.9	1789.1	1788.1	1.0
K	13,605	69	409	8.3	1801.0	1800.0	1.0
M	13,955	55	327	10.4	1804.7	1803.7	1.0
N	14,165	46	303	11.2	1807.0	1806.0	1.0
O	16,195	80	504	6.8	1819.1	1818.1	1.0
P	18,350	58	296	11.5	1850.0	1849.0	1.0

1/ FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE [1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
S	19,490	70	407	8.4	1864.1	1863.1	1.0
U	19,790	68	401	8.5	1869.3	1868.3	1.0
V	21,985	101	578	5.9	1887.6	1886.6	1.0
W	24,505	175	805	4.2	1909.2	1908.2	1.0
Y	24,805	165	1568	2.2	1917.7	1916.7	1.0
Z	27,605	51	311	10.9	1940.7	1939.7	1.0
AB	27,885	85	629	5.4	1945.2	1944.2	1.0
AC	30,890	43	362	9.4	1971.1	1970.1	1.0
AF	31,285	133	1254	2.8	1989.3	1988.3	1.0
AG	32,510	110	616	5.7	1998.1	1997.1	1.0

[1] FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE 1/	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
AH	33,685	90	409	8.6	2016.8	2015.8	1.0
AJ	33,955	156	1282	2.7	2024.5	2023,5	1.0
AK	34,880	70	399	8.8	2034.2	2033.2	1.0
AN	36,560	755	4180	0.8	2049.6	2048.6	1.0
AO	39,200	230	713	4.6	2072.5	2071.5	1.0
AR	41,933	57	338	9.5	2102.6	2101.6	1.0
AT	42,250	108	709	4.5	2106.5	2105.5	1.0
AU	42,395	103	535	6.0	2106.5	2105.5	1.0
AV	43,570	73	260	12.3	2112.8	2111.8	1.0

1/ FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE 1/	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
AW	44,245	80	376	8.5	2114.6	2113.6	1.0
AY	44,770	65	425	7.5	2121.0	2120.0	1.0
BB	45,220	65	324	9.9	2129.8	2128.8	1.0
BD	45,755	101	414	7.7	2134.1	2133.1	1.0
BF	45,955	57	311	10.3	2139.3	2138.3	1.0
BG	48,165	165	528	6.1	2156.4	2155.4	1.0
BH	48,905	103	404	7.9	2164.1	2163.1	1.0
BI	51,395	200	455	7.0	2195.0	2194.0	1.0
BJ	52,335	110	484	6.6	2206.9	2205.9	1.0
BL	54,195	200	560	5.7	2235.3	2234.3	1.0

1/ FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE 1/	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
BM	55,940	416	1097	3.0	2246.3	2245.3	1.0
BN	57,040	93	336	9.8	2263.7	2262.7	1.0
BO	59,280	60	402	8.2	2279.2	2278.2	1.0
BP	59,935	200	571	5.8	2291.3	2290.3	1.0
BQ	62,215	65	292	11.3	2316.3	2315.3	1.0
BR	63,695	130	572	5.8	2331.5	2330.5	1.0
BS	64,418	46	317	10.4	2334.4	2333.4	1.0
BU	64,635	61	682	4.8	2340.7	2339.7	1.0
BV	64,712	34	276	11.9	2340.7	2339.7	1.0
BX	65,725	125	645	5.3	2348.1	2347.1	1.0
BY	67,740	340	884	3.9	2377.6	2376.6	1.0
BZ	71,695	133	447	7.6	2416.2	2415.2	1.0

1/ FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE [1/]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Tropicana Wash							
A	750	70	266	5.6	2016.3	2015.3	1.0
C	995	110	354	4.2	2022.7	2021.7	1.0
D	3,380	109	268	5.6	2038.2	2037.2	1.0
E	3,775	100	279	5.4	2043.6	2042.6	1.0
G	3,975	296	1083	1.4	2047.7	2046.7	1.0
H	4,315	113	400	3.8	2048.4	2047.4	1.0
I	6,010	65	280	5.4	2063.0	2062.0	1.0
K	6,340	112	665	2.3	2068.1	2067.1	1.0
O	8,430	46	268	5.6	2086.1	2085.1	1.0
P	10,780	58	212	7.1	2112.3	2111.3	1.0

[1] FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE [1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
R	11,670	75	411	3.6	2120.5	2119.5	1.0
X	14,105	114	634	2.4	2149.7	2148.7	1.0
Y	15,500	71	176	7.4	2169.3	2168.3	1.0
Z	16,535	70	301	4.3	2181.8	2180.8	1.0
AA	16,885	100	250	5.2	2186.8	2185.8	1.0
AB	17,515	40	148	8.8	2196.3	2195.3	1.0
AC	18,210	100	265	4.9	2205.6	2204.6	1.0
AE	18,570	370	3060	.4	2217.5	2216.5	1.0
AF	19,700	94	274	4.8	2222.6	2221.6	1.0
AG	21,655	150	614	2.1	2243.9	2242.9	1.0
AH	23,425	390	702	1.9	2262.3	2261.3	1.0

[1] FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE 1/	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
AI	24,385	50	256	5.1	2271.5	2270.5	1.0
AJ	26,590	125	251	5.2	2288.1	2287.1	1.0
AK	27,890	50	162	8.0	2302.5	2301.5	1.0
AL	30,800	100	211	6.2	2332.2	2331.2	1.0
AM	33,225	25	126	10.3	2359.8	2358.8	1.0
AN	33,865	56	177	7.3	2389.0	2388.0	1.0
AO	36,180	220	341	3.2	2416.8	2415.8	1.0
AP	38,735	38	115	9.6	2453.3	2452.3	1.0
Tropicana Tributary							
A	1,980	60	211	1.4	2168.1	2167.1	1.0
B	3,810	30	72	4.2	2194.9	2193.9	1.0
C	5,160	170	283	1.1	2211.1	2210.1	1.0
D	5,340	200	225	1.3	2213.9	2212.9	1.0
E	5,780	35	94	3.2	2217.2	2216.2	1.0
F	8,310	65	128	2.4	2246.9	2245.9	1.0

1/ FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE [1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
I	8,600	105	141	2.1	2249.1	2248.1	1.0
J	9,000	95	143	2.1	2257.7	2256.7	1.0
K	10,420	80	180	1.7	2273.0	2272.0	1.0
L	13,520	44	85	3.5	2315.7	2314.7	1.0

[1] FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE 1/	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Las Vegas Range Wash							
A	4,755	805	1283	1.6	1712.8	1711.8	1.0
B	6,805	255	625	3.2	1722.1	1721.1	1.0
C	9,465	670	1306	1.5	1729.8	1728.8	1.0
D	10,265	615	931	2.2	1731.3	1730.3	1.0
E	12,610	360	792	2.6	1738.8	1737.8	1.0
F	14,895	520	968	2.2	1745.8	1744.8	1.0
G	17,625	700	1034	2.0	1757.6	1756.6	1.0
H	19,080	1205	1838	1.1	1763.5	1762.5	1.0
I	20,920	1220	2180	1.0	1769.6	1768.6	1.0
J	24,840	131	455	4.6	1788.8	1787.8	1.0
K	27,990	125	406	3.4	1798.2	1797.2	1.0
L	32,275	80	320	4.4	1816.7	1815.7	1.0

1 FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE [1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
M	36,095	1000	2152	.7	1826.5	1825.5	1.0
N	42,215	440	1083	1.3	1852.7	1851.7	1.0
P	42,645	60	288	4.9	1854.7	1853.7	1.0
Q	46,545	430	817	1.7	1871.1	1870.1	1.0
R	49,275	65	175	3.4	1892.6	1891.6	1.0
S	51,995	51	103	5.8	1926.1	1925.1	1.0
T	53,795	60	120	5.0	1945.6	1944.6	1.0

[1] FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE 1/	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY, (NGVD)	DIFFERENCE (FT.)
Virgin River							
A	0	1389	9,441	3.9	1505.2	1504.2	1.0
B	1,960	851	6,626	5.5	1510.8	1509.8	1.0
C	4,145	1291	9,050	4.0	1518.0	1517.0	1.0
D	6,000	1352	10,332	3.5	1522.1	1521.1	1.0
E	7,830	1369	9,685	3.8	1525.6	1524.6	1.0
F	10,000	978	6,804	5.4	1531.0	1530.0	1.0
G	12,032	1503	9,063	4.0	1536.9	1535.9	1.0
H	13,590	764	5,865	6.2	1541.3	1540.3	1.0
I	16,280	761	6,118	6.0	1550.8	1549.8	1.0
J	17,430	677	6,251	5.9	1553.8	1552.8	1.0
L	17,580	596	5,449	6.7	1554.1	1553.1	1.0
M	20,000	740	7,357	5.0	1561.1	1560.1	1.0
N	22,000	924	8,003	4.6	1566.9	1565.9	1.0
O	23,563	1154	9,521	3.8	1570.9	1569.9	1.0

1/ FEET ABOVE DOWNSTREAM STUDY LIMITS

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

VIRGIN RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE [1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
P	24,671	844	7,838	4.7	1574.3	1573.3	1.0
Q	24,961	297	3,263	11.2	1574.9	1573.9	1.0
R	25,061	842	7,504	4.9	1576.8	1575.8	1.0
S	27,198	1237	9,632	3.8	1582.7	1581.7	1.0
T	29,025	1352	9,830	3.7	1587.8	1586.7	1.0
U	30,060	1986	11,952	3.1	1589.4	1588.4	1.0

[1] FEET ABOVE DOWNSTREAM STUDY LIMITS

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

VIRGIN RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE [1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Pulsipher Wash							
A	1,685	280	535	2.6	1552.4	1551.4	1.0
B	2,620	50	164	8.5	1574.0	1573.0	1.0
C	4,615	60	215	6.5	1592.7	1591.7	1.0
E	5,075	70	457	3.1	1598.6	1597.6	1.0

[1] FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

PULSIPHER WASH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE 1/	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Abbott Wash							
A	1,160	33	210	9.8	1564.0	1563.0	1.0
B	2,095	419	474	4.3	1573.8	1572.8	1.0
C	5,000	35	227	9.0	1599.2	1598.2	1.0
E	5,227	90	352	5.8	1601.5	1600.5	1.0
F	5,450	2080	3895	.5	1602.3	1601.3	1.0
G	7,080	25	214	9.6	1611.5	1610.5	1.0
I	7,530	481	3997	.5	1624.0	1623.0	1.0

1/ FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

ABBOTT WASH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE [1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Town Wash							
B	1,815	80	470	8.4	1582.7	1581.7	1.0
C	3,145	40	339	11.7	1595.4	1594.4	1.0
F	3,579	60	388	10.2	1597.5	1596.5	1.0
G	4,783	75	468	8.5	1606.6	1605.6	1.0
H	6,013	65	422	9.4	1618.2	1617.2	1.0
J	6,468	96	1057	3.8	1626.8	1625.8	1.0

[1] FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

TOWN WASH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
A	0	4850	13,015	1.55	1245.7	1244.7	1.0
B	500	3256	32,374	0.62	1245.8	1244.8	1.0
C	1,500	3079	24,184	0.84	1245.9	1244.9	1.0
D	2,500	2093	12,409	1.63	1246.4	1245.4	1.0
E	3,500	1735	8,192	2.47	1248.5	1247.5	1.0
F	4,700	1770	7,494	2.70	1252.7	1251.7	1.0
G	5,700	1325	5,850	3.45	1255.8	1254.8	1.0
H	6,700	1790	5,930	3.41	1259.5	1258.5	1.0
I	8,100	1675	7,303	2.77	1263.5	1262.5	1.0
J	9,300	2145	6,294	3.21	1267.2	1266.2	1.0
K	10,300	2241	4,371	4.62	1271.9	1270.9	1.0
L	11,050	2296	4,028	5.02	1275.7	1274.7	1.0
N	11,755	1850	4,840	4.17	1279.1	1278.1	1.0
O	12,755	2155	7,048	2.87	1284.2	1283.2	1.0
P	13,755	1763	5,119	3.95	1290.1	1289.1	1.0

[1] FEET ABOVE DOWNSTREAM STUDY LIMITS

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

MUDDY RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Q	14,755	1681	5,917	3.41	1295.0	1294.0	1.0
R	15,755	1814	6,210	3.25	1299.6	1298.6	1.0
S	16,755	2347	6,636	3.04	1304.2	1303.2	1.0
T	17,755	2057	6,519	3.10	1308.8	1307.8	1.0
U	18,755	2206	6,199	3.26	1312.5	1311.5	1.0
W	19,790	2476	5,951	3.39	1317.0	1316.0	1.0
X	20,790	250	2,240	9.02	1323.1	1322.1	1.0
Y	22,990	1271	4,494	4.49	1332.6	1331.6	1.0
Z	23,990	606	3,128	6.46	1338.1	1337.1	1.0
AA	25,840	1624	5,486	3.68	1346.0	1345.0	1.0
AB	26,840	1054	3,932	5.14	1351.4	1350.4	1.0
AC	27,840	786	3,746	5.39	1355.0	1354.0	1.0
AD	28,840	780	3,740	5.40	1360.4	1359.4	1.0
AF	29,800	140	2,250	8.98	1364.2	1363.2	1.0

' FEET ABOVE DOWNSTREAM STUDY LIMITS

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA

FLOODWAY DATA

MUDDY RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
AG	30,800	170	2,513	8.04	1368.8	1367.8	1.0
AH	31,800	130	2,358	8.57	1372.6	1371.6	1.0
AI	32,430	127	2,024	9.98	1375.8	1374.8	1.0
AJ	32,960	126	2,128	9.49	1378.7	1377.7	1.0
AK	33,010	128	2,405	8.40	1379.2	1378.2	1.0
AM	33,090	357	3,073	6.57	1381.4	1380.4	1.0
AN	33,740	123	2,123	9.52	1383.7	1382.7	1.0
AO	33,840	130	2,183	9.25	1384.1	1383.1	1.0
AP	34,840	317	2,760	7.32	1388.2	1387.2	1.0
AQ	35,840	200	3,020	6.69	1391.1	1390.1	1.0
AR	36,840	160	2,767	7.30	1393.7	1392.7	1.0
AS	38,240	850	3,235	6.24	1404.1	1403.1	1.0
AT	39,240	822	3,384	5.97	1411.2	1410.2	1.0
AU	40,240	533	3,212	6.29	1417.8	1416.8	1.0
AV	41,040	234	2,163	9.34	1425.6	1424.6	1.0

[1] FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

MUDDY RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE [1/]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (M.S.L.)	WITHOUT FLOODWAY (M.S.L.)	DIFFERENCE (FT.)
AW	630+50	841	5502	3.88	1497.2	1496.2	1.0
AX	658+10	615	4451	4.80	1505.0	1504.0	1.0
AY	682+80	394	3868	5.52	1512.2	1511.2	1.0
AZ	697+60	653	5787	3.69	1515.1	1514.1	1.0
BA	721+40	160	3993	5.35	1519.8	1518.8	1.0
BE	742+45	145	2668	4.68	1522.2	1521.2	1.0
BG	767+80	140	2154	5.80	1527.5	1526.5	1.0
BI	769+80	207	2864	4.36	1528.7	1527.7	1.0
BJ	788+30	131	2337	5.35	1531.1	1530.1	1.0
BK	818+70	79	1397	8.94	1542.0	1541.0	1.0
BL	841+20	177	2727	4.58	1545.9	1544.9	1.0
BM	870+00	978	5299	2.13	1549.5	1548.5	1.0
BN	886+30	930	4080	2.77	1553.5	1552.5	1.0

[1] FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

MUDDY RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1/]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
BP	903+70	929	4481	2.52	1558.3	1557.3	1.0
BQ	920+10	813	3330	3.39	1564.3	1563.3	1.0
BR	933+90	563	2873	3.93	1569.3	1568.3	1.0
BS	946+40	664	3649	3.10	1571.8	1570.8	1.0
BT	970+60	384	2053	5.50	1580.3	1579.3	1.0
BV	1008+90	1465	13,663	1.02	1599.7	1598.7	1.0
BW	1027+40	1316	8584	1.62	1601.2	1600.2	1.0
CD	1182+00	807	3911	3.50	1678.6	1677.6	1.0

1/ FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

MUDDY RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1/]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
CE	1205+50	2217	5745	2.38	1684.4	1683.4	1.0
CF	1224+75	1648	4572	3.00	1693.1	1692.1	1.0
CG	1251+25	1686	4602	2.98	1702.1	1701.1	1.0
CH	1267+35	2293	5422	2.53	1707.5	1706.5	1.0
CJ	1288+65	772	3476	3.94	1721.2	1720.2	1.0
CK	1313+65	708	3298	4.12	1729.7	1728.7	1.0
CL	1341+95	780	3755	3.62	1738.5	1737.5	1.0
CM	1377+45	471	2497	5.45	1761.0	1760.0	1.0
CN	1477+05	329	1959	6.94	1830.6	1829.6	1.0

1/ FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

MUDDY RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1/]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
MEADOW VALLEY WASH							
A	4+50	125	2481	8.61	1520.1	1519.1	1.0
B	33+50	3570	5275	4.05	1529.1	1528.1	1.0
C	59+20	207	2648	8.06	1535.6	1534.6	1.0
D	88+00	584	4629	4.61	1541.4	1540.4	1.0
E	107+50	686	4679	4.56	1545.3	1544.3	1.0
F	128+30	315	3104	6.88	1553.0	1552.0	1.0
G	159+50	581	3888	5.49	1558.8	1557.8	1.0
H	172+70	283	2740	7.79	1564.3	1563.3	1.0
I	191+70	350	3795	5.63	1568.4	1567.4	1.0
J	212+70	390	4009	5.33	1573.8	1572.8	1.0
K	235+40	344	3432	6.22	1580.8	1579.8	1.0
L	249+90	695	5885	3.63	1583.7	1582.7	1.0

1/ FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CLARK COUNTY UNINCORPORATED AREAS
(NEVADA)

FLOODWAY DATA

MEADOW VALLEY WASH

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each significant flooding source affecting Clark County.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot

Forty-six reaches meeting the above criteria were required for the flooding sources studied in Clark County. This includes 22 reaches in the Las Vegas Unincorporated Metropolitan Area, 4 in the Mesquite-Bunkerville Area,

15 in the Moapa Valley, 3 in Blue Diamond, 1 in Goodsprings, and 1 in Jean. Reach locations are shown on the Flood Profiles for the respective areas. Reaches and flood profiles were not determined for the Searchlight and South Point areas.

5.2 Flood Hazard Factors (FHFs)

The Flood Hazard Factor is used to correlate flood information with insurance rate tables. Correlations between property damages from floods and their assigned FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between the water surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water surface elevations is greater than 10.0 feet, the accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire unincorporated area of Clark County was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone AO: Special Flood Hazard Area inundated by types of 100-year shallow flooding where depths are between 1.0 and 3.0 feet; depths shown; but no Flood Hazard Factors are determined.

Zone A: Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods, no base flood elevations shown or FHFs determined.

Zones A1, A22: Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones assigned according to FHFs.

Zone B: Areas between the Special Flood Hazard Areas and the limits of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; or, areas subject to 100-year flooding from sources with drainage areas of less than one square mile. Zone B is not subdivided.

Zone C: Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the county.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE BETWEEN BASE FLOOD AND:[2]			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Las Vegas Wash							
Reach 1		-1.9	- .5	+1.2	020	A4	Varies
Reach 2		-4.0	- .8	+1.6	040	A8	Varies
Reach 3		-7.6	-3.1	+3.5	075	A15	Varies
Reach 4		-2.2	- .5	+1.0	020	A4	Varies
Duck Creek							
Reach 1		-1.4	- .4	+ .9	015	A3	Varies
Reach 2		-2.3	- .5	+1.5	025	A5	Varies
Reach 3		-1.4	- .3	+ .7	015	A3	Varies
Duck Creek Tributary							
Reach 1		- .9	- .3	+ .8	010	A2	Varies

[1] FLOOD INSURANCE RATE MAP PANEL
[2] WEIGHTED AVERAGE
[3] ROUNDED TO NEAREST FOOT

TABLE 3

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
Clark County Unincorporated Areas
(Nevada)

FLOOD INSURANCE ZONE DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE BETWEEN BASE FLOOD AND:[2]			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Flamingo Wash							
Reach 1		-1.3	-0.3	+0.8	015	A3	Varies
Reach 2		-2.4	-0.6	+1.3	025	A5	Varies
Reach 3		-3.6	-0.9	+1.3	035	A7	Varies
Reach 4		-1.3	-0.3	+0.7	015	A3	Varies
Reach 5		-2.1	-0.6	+1.2	020	A4	Varies
Reach 6		-1.4	-0.4	+0.8	015	A3	Varies
Reach 7		-2.8	-0.8	+1.1	030	A6	Varies
Reach 8		-0.9	-0.2	+0.6	010	A2	Varies

[1] FLOOD INSURANCE RATE MAP PANEL
[2] WEIGHTED AVERAGE
[3] ROUNDED TO NEAREST FOOT

TABLE 3

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
Clark County Unincorporated Areas
(Nevada)

FLOOD INSURANCE ZONE DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE BETWEEN BASE FLOOD AND:[2]			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Tropicana Wash							
Reach 1		-1.1	-0.3	+0.7	010	A2	Varies
Reach 2		-1.6	-0.5	+1.1	015	A3	Varies
Reach 3		-3.7	-1.4	+1.4	035	A7	Varies
Reach 4		-0.8	-0.3	+0.5	010	A2	Varies
Tropicana Tributary							
Reach 1		-0.9	-0.4	+0.5	010	A2	Varies
Las Vegas Range Wash							
Reach 1		-0.8	-0.2	+0.5	010	A2	Varies

[1] FLOOD INSURANCE RATE MAP PANEL
[2] WEIGHTED AVERAGE
[3] ROUNDED TO NEAREST FOOT

TABLE 3

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
Clark County Unincorporated Areas
(Nevada)

FLOOD INSURANCE ZONE DATA

LAS VEGAS WASH AND TRIBUTARIES

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE BETWEEN BASE FLOOD AND:[2]			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
VIRGIN RIVER							
Reach 1		-2.9	-.9	+2.1	030	A6	Varies
PULSIPHER WASH							
Reach 1		-1.6	-.2	+0.7	015	A3	Varies
ABBOTT WASH							
Reach 1		-2.3	-.5	+0.8	025	A5	Varies
TOWN WASH							
Reach 1		-1.9	-.7	+0.9	020	A4	Varies

[1] FLOOD INSURANCE RATE MAP PANEL
[2] WEIGHTED AVERAGE
[3] ROUNDED TO NEAREST FOOT

TABLE 3

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
Clark County Unincorporated Areas
(Nevada)

FLOOD INSURANCE ZONE DATA

VIRGIN RIVER, PULSIPHER, ABBOTT, TOWN WASHES

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE BETWEEN BASE FLOOD AND:[2]			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
MUDDY RIVER							
Reach 1		- 1.5	-0.5	+1.4	015	A3	Varies
Reach 2		- 2.5	-0.7	+1.7	025	A5	Varies
Reach 3		- 4.0	-0.9	+1.7	040	A8	Varies
Reach 4		- 1.8	-0.5	+1.2	020	A4	Varies
Reach 5		- 5.0	-0.8	+1.4	050	A10	Varies
Reach 6		- 7.6	-1.2	+1.9	075	A15	Varies
Reach 7		-12.1	-3.1	+3.1	120	A22	Varies
Reach 8		- 4.5	-1.1	+2.8	045	A9	Varies
Reach 9		- 8.4	-1.6	+3.0	085	A17	Varies
Reach 10		- 9.9	-2.8	+7.1	100	A20	Varies
Reach 11		- 2.5	-0.8	+2.5	025	A5	Varies
Reach 12		- 3.2	-0.8	+2.1	030	A6	Varies

[1] FLOOD INSURANCE RATE MAP PANEL
[2] WEIGHTED AVERAGE
[3] ROUNDED TO NEAREST FOOT

TABLE 3

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
Clark County Unincorporated Areas
(Nevada)

FLOOD INSURANCE ZONE DATA

MUDDY RIVER

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE BETWEEN BASE FLOOD AND:[2]			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Reach 1		- 9.8	-2.5	+6.7	100	A20	Varies
Reach 2		- 8.1	-1.6	+3.5	080	A16	Varies
Reach 3		- 4.9	-1.4	+2.7	050	A10	Varies

[1] FLOOD INSURANCE RATE MAP PANEL
[2] WEIGHTED AVERAGE
[3] ROUNDED TO NEAREST FOOT

TABLE 3

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
CLARK COUNTY UNINCORPORATED AREAS
(Nevada)

FLOOD INSURANCE ZONE DATA

MEADOW VALLEY WASH

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE BETWEEN BASE FLOOD AND:[2] 10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)	FHF	ZONE	BASE FLOOD ELEVATION[3]
Blue Diamond Wash		-1.3	-0.4	+0.6	015	A3	Varies
Wash "A"		-1.1	-0.3	+0.6	010	A2	Varies
Wash "B"		-1.0	-0.2	+0.5	010	A2	Varies

[1] FLOOD INSURANCE RATE MAP PANEL
[2] WEIGHTED AVERAGE
[3] ROUNDED TO NEAREST FOOT

TABLE 3

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
Clark County Unincorporated Areas
NEVADA

FLOOD INSURANCE ZONE DATA

Blue Diamond

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE BETWEEN BASE FLOOD AND:[2]			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Jean Wash		-0.7	-0.2	+0.6	005	A1	Varies
Goodsprings Valley Wash		-1.1	-0.3	+0.6	010	A2	Varies

[1] FLOOD INSURANCE RATE MAP PANEL
[2] WEIGHTED AVERAGE
[3] ROUNDED TO NEAREST FOOT

TABLE 3

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
Clark County Unincorporated Areas
Nevada

FLOOD INSURANCE ZONE DATA

Goodsprings - Jean

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Maps for unincorporated areas in Clark County are, for insurance purposes, the principal results of the Flood Insurance Study. These maps (published separately) contain the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water surface elevations of the base (100-year) flood. These maps are developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

The scale of the Flood Insurance Rate Map is 1"=1000' for the Las Vegas Metropolitan Unincorporated Area, Moapa Valley and the Mesquite-Bunkerville area. The map scale is 1"=2000' for Searchlight, Blue Diamond, Goodsprings, Jean and South Point areas.

6.0 OTHER STUDIES

Flood Insurance Studies were conducted for the cities of North Las Vegas, Las Vegas, Henderson and Boulder City by USDA, SCS. The results of the Clark County (Unincorporated Areas) study will match exactly the results in areas adjacent to these studies.

The Corps of Engineers prepared a report on a survey for flood control for Las Vegas Wash and tributaries, Las Vegas and Vicinity, Nevada in 1959 (Reference 33). The flood control measures proposed in this report were never installed due to the lack of support by the local sponsors and citizens. In 1967, the Corps of Engineers prepared a Floodplain Information Report for Lower Las Vegas Wash, Clark County, Nevada (Reference 26) which showed flood boundaries for a portion of Las Vegas Wash. These boundaries were in close agreement to those delineated in this study. The Corps of Engineers prepared a Floodplain Information Report for the Virgin River and Fort Pierce Wash in 1973 (Reference 34). This report covers an area which is about 40 miles upstream from the Mesquite-Bunkerville area. This report provided some accounts of flooding on the Virgin River and there was no conflict with the data that was used in this report.

Moapa

Four other studies were done in Moapa. The Moapa Valley Pumping Project Reconnaissance Report was prepared by the Bureau of Reclamation in 1962 (Reference 5). This report provided background information on soils, geology, agricultural economy and history of the area. Peak discharges and flood profiles were not computed for this study, but flood problems of the area were addressed and possible flood damages to the proposed pumping project considered. The major impact of this pumping project in the Moapa Valley would be the addition of 6,000 irrigated acres (and subsequent residences) many of which would be located in the flood plain of Meadow Valley Wash and the Muddy River.

The second study was done by G. C. Wallace Consulting Engineers for the Nevada Power Company and focuses on the area near the Union Pacific Railroad (UPRR) crossing of the Muddy River near the town of Moapa (Reference 32). The 100-year discharge was estimated at the UPRR crossing to be 16,200 cfs compared with 13,900 cfs computed for the FIS. Different methods were used for each study. The Nevada Power Company study was based on a 24-hour storm and the FIS was based on a three-hour storm. This may explain the difference in peak discharges. The three-hour thunderstorm was used for the Clark County FIS since it occurs frequently

and was determined to be the most likely cause of large floods in Clark County (Reference 1). The profile comparison between the G. C. Wallace study and the FIS is discussed in Section 3.2

The Corps of Engineers prepared a Flood Plain Information Report (FPI) for the Lower Moapa Valley (Reference 12). The 100-year and 1000-year flood profiles were computed from the lower study limit upstream to the Wells Siding Diversion Dam. A frequency analysis was completed for the Muddy River near Glendale stream gage which yielded the following:

Frequency	Corps of Engineers FPI	Clark Co. FIS
10	6,000 cfs	5,250 cfs
50	15,800 cfs	14,750 cfs
100	21,300 cfs	21,350 cfs
500	38,500 cfs	45,350 cfs

The FPI discharges are negatively skewed and the FIS discharges are positively skewed. The FIS discharges were computed using procedures from the Water Resources Council Bulletin 17A (Reference 22) and the FPI discharges were taken off a plot of historical discharges and frequency (plotting positions). The 100-year discharge values and the base flood of the Flood Insurance Program agree. The differences in discharges were coordinated between the SCS and the Corps of Engineers.

Flood profiles for the intermediate regional and standard project flood and flood mapping were completed by the Corps of Engineers for the lower Muddy River. The study limits were from the Wildlife Refuge south of Overton upstream to the Wells Siding Diversion Dam.

Coordination with this study was necessary due to differences in flood profiles and flood plain delineation.

Water surface profiles were prepared as a part of this flood Insurance Study for the Lower Moapa Valley with channel "n" values of 0.065 to 0.070 and flood plain "n" values of 0.055 to 0.070. The resulting increase in the 100-year elevation over the Intermediate Regional Flood as plotted in the Flood Plain Information Report was approximately 3.5 feet for the reach between River Mile 12.8 and 14.2. For the reaches from River Mile 7.0 to 12.8 and 14.2 to 14.87 the average increase due to changing the "n" value was 0.8 foot. Where the difference in elevation was near one foot, there was slightly more area included in the 100-year flood plain. However, for the 100-year flood plain in the reach from River Mile 12.8 to 14.2 (Logandale) there was a more significant difference. For most of this reach the FPI shows the Intermediate Regional Flood as being contained in the channel, whereas the flood insurance study shows some overbank flooding from a 100-year event.

The flood of 1938, with a peak discharge of 10,000 cfs and return period of approximately 30 years, was mapped by the SCS soon after the flood occured. The map indicates flooding in that vicinity, With no major channel reconstruction occurring since 1938 it is reasonable to show overbank flooding between River Miles 12.8 and 14.2. The result of the coordination was to utilize the additional information and increase flooding depths and flood plain areas.

The fourth study was done by the SCS in 1939 (Reference 35). Peak discharges and flood profiles were not computed for that study. Contained in the study is a flood map showing areas affected by the 1938 flood (approximately 30-year event) and description of the channel conditions existing at that time.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the office of the Federal Insurance Administration, Regional Director, Post Office Box 36003, San Francisco, CA 94102.

8.0 BIBLIOGRAPHY AND REFERENCES

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33. "Report on Survey for Flood Control, Las Vegas Wash and Tributaries, Las Vegas and Vicinity, Nevada," U.S. Department of Army, Corps of Engineers, September 30, 1959.

34. "Floodplain Information, Virgin River and Fort Pierce Wash, Vicinity of St. George, Washington County, Utah," U.S. Department of Army, Corps of Engineers, Los Angeles District, April 1973.

35. USDA, SCS, "Preliminary Report on Flood Control Channel, Groundwater Drainage and Supplementary Phases of Land Utilization, Lower Moapa Valley, Clark County, Nevada", October 1939.

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ELEVATION REFERENCE MARKS

Las Vegas Unincorporated Metropolitan Area

Reference Mark Number	Reference Mark	Elevation (NGVD)	Description
1	CC 499	2380.27	Hub at section corner 35|36 / 2|1 T 21S, T22S, R60E.
2	CC 498	2455.11	Brass disc in concrete which is the section corner 34|35 / 3|2 T21S, T22S, R60E.
3	CLN 021L	2398.63	BLM brass cap at Rainbow Blvd. and Russell Rd. which is section corner 27|26 / 34|35 T21S, R60E.
4	DODO 2	2278.6	USC & GS brass cap horizontal control marker approximately 1/4 mile west of Decatur Blvd. and 1/2 mile south of Flamingo Road.
5	BM #9	2302.42	3-inch brass cap BLM section corner 23|24 / 26|25 T21S, R60E in the intersection of West Tropicana Ave. and Jones Blvd.
6	CC 1129	2352.27	Brass cap which is the center of Section 26, T21S, R60E.
7	CC 1126	2295.09	USC & GS brass cap which is the center of Section 25, T21S, R60E.
8	CC 500	2326.86	GLO brass cap which is the section corner 36|31 / 1|6 T21S, T22S, R60E.
9	BM #14	2318.89	BLM brass cap which is the East 1/16 corner section 36, T21S, R60E.

ELEVATION REFERENCE MARKS

Las Vegas Unincorporated Metropolitan Area
(Continued)

Reference Mark Number	Reference Mark	Elevation (NGVD)	Description
10	CC 1056	2098.61	GLO brass cap 1/4 corner section 21 T21S, R61E at the intersection of 28 Tropicana Ave. and Koval.
11	BM #7	2091.13	Aluminum cap in intersection of Harmon and Koval-Suzanne marked VTN RLS 4046.
12	CLM 009H	2153.38	Brass cap located in the center median of I-15 about 6.3 miles south of the downtown interchange.
13	CLM 01C	2166.53	Brass cap located just south of Tropicana Ave. between the northbound lane of I-15 and the Tropicana off ramp.
14	CC C-170	2230.27	Brass disc in concrete which is the center of Section 30, T21S, R61E.
15	BM #13	2180.90	Brass cap in center of intersection of Tropicana Ave. and Valley View Dr. which is section corner 19|20 / 30|29 T21S, R61E.
16	CC 492	2353.84	RR spike in center of intersection of West Flamingo Rd. and Rainbow Blvd. and the section corner of 15|14 / 22|23 T21S, R60E.
17	BM #10	2377.06	3-inch brass cap BLM 1/4 corner section 27/26 T21S, R60E, which is 1/2 mile south of Tropicana in the center of Rainbow Rd.
18	BM #11	2446.67	Nail in center of West Flamingo Road in line with west edge of Buffalo Drive.
19	BM #12	2428.69	3-inch BLM brass cap at the intersection of Tropicana Ave. and Buffalo Dr. which is the section corner for 21|22 / 28|27 T21S, R60E.

ELEVATION REFERENCE MARKS

Las Vegas Unincorporated Metropolitan Area
(Continued)

Reference Mark Number	Reference Mark	Elevation (NGVD)	Description
20	CC 525	2154.29	RR spike center of intersection of Flamingo Rd. and Valley View Drive and is section corner 18|17 / 19|20 T21S, R61E.
21	BM #8	2217.40	USGS brass cap in center of intersection of Tropicana Ave. and Arville St. and is the 1/4 corner of section 19 / 30 T21S, R61E.
22	CC 523	2227.44	Nail at section corner 13|18 / 24|19 T21S, R60E, R61E.
23	CC 491	2303.99	3-inch brass cap BLM section corner 14|13 / 23|24 T21S, R60E in the intersection of West Flamingo Rd. and Jones Blvd.
24	CC 536	2002.21	2-inch brass cap in intersection of Flamingo Road and Maryland Parkway.
25	CC 529	2050.09	Brass cap in concrete near Flamingo Blvd. and Paradise Road which is the section corner of 16|15 / 21|22 T21S, R61E.
26	CC 531	2071.62	RR spike in Tropicana Ave. at section corner 21|22 / 28|27 T21S, R61E.
27	CLM 011	2147.3	2-inch brass cap located 11 feet west of I-15 southbound lane and 4.5 feet south of Flamingo Road.
28	CLM 056	1778.60	2-inch brass cap on north side of Sahara Ave. .2 mile west of Lamb Blvd.
29	CLN 065	1817.86	2-inch brass cap at the NE corner of Glen Ave. and Boulder Highway.

ELEVATION REFERENCE MARKS

Las Vegas Unincorporated Metropolitan Area
(Continued)

Reference Mark Number	Reference Mark	Elevation (NGVD)	Description
30	CLN 057	1816.13	2-inch brass cap on Boulder Highway in median, across southbound land from auto sales at 3780 Boulder Highway.
31	CC 515	1863.66	5/8 inch rebar in the intersection of Pecos Road and Desert Inn Road.
32	BM #5	1864.40	Center of spike with punch hole in center of intersection of Desert Inn Rd and Mojave Road.
33	CC 537	1948.36	2-inch brass cap in concrete in intersection of Flamingo Road and Eastern Ave. Also section corner 14|13 / 23|24 T21S, R61E.
34	BM #6	1923.41	2-inch brass cap marked "Clark County Enginee ing Dept. P.O.T." at intersection of Eastern Ave. and Emerson.
35	CLN 076	1946.65	2-inch brass cap on north side of Sunset Rd. .40 mile east of Sandhill Rd.
36	CLN 068	1934.91	RR spike at the junction of Sandhill Rd. and Sunset Rd. in the centerline of Sandhill and at the north edge of Sunset.
37	CC 510	1948.69	Brass disc in concrete at section corner 36|31 / 1 | 6 which is the SE corner of section 36, T21S, R61E.
38	CC 1005	2047.52	GLO brass cap at the junction of Danielson Dr. and Section line 12/7 T22S, R61E, R62E.
39	CLN 069	1948.5	RR spike at the NE corner of the junction of Sunset Rd. and Pecos Rd.
40	TBM #3	2031.65	Brass cap at 1/4 corner sections 2/1, T22S, R61E.

ELEVATION REFERENCE MARKS

Las Vegas Unincorporated Metropolitan Area

(Continued)

Reference Mark Number	Reference Mark	Elevation (NGVD)	Description
41	Whitney 2	1906.	USC & GS brass cap in concrete approximatel 800 feet west of section corner 29|28 32|33 T21S, R62E.
42	BM #1	1668.21	GLO brass cap at section corner 28|27 33|34 T21S, R62E.
43	BM #2.	1705.91	GLO brass cap at 1/4 corner section 28 33 T21S, R62E.
44	BM #4	1858.17	GLO brass cap at the intersection of Lamb Blvd. and Russell Rd. Also section corner 30|29 31|32 T21S, R62E.
45	CC 298	1597.48	GLO brass cap at section corner 26|25 35|26 T21S, R62E.
46	CC 297	1630.84	GLO brass cap at section corner 27|26 34|35 T21S, R62E.
47	CC 262	1678.24	Nail and tin in intersection of Monson Rd. and Stephanie.
48	CC 260	1702.44	Nail in intersection of Monson Rd. and Nellis Blvd.
49	CLN 066	1706.19	2-inch brass cap in traffic island at Nellis Blvd. and Boulder Highway on north side of Nellis.
50	CC 1017	1711.21	Nail and tin in Vegas Valley Drive 1/2 mile east of Nellis Blvd.
51	CC 1018	1694.88	Aluminum cap in Vegas Valley Drive 0.4 mile west of Hollywood Blvd.

ELEVATION REFERENCE MARKS

Las Vegas Unincorporated Metropolitan Area
(Continued)

Reference Mark Number	Reference Mark	Elevation (NGVD)	Description
52	CLN 054	1752.48	At the NW corner of Lamb Blvd. and Charleston Blvd.
53	CC 248	1728.61	Bolt in intersection of Sloan Lane and E. Charleston Blvd.
54	CC 329	1748.19	Railroad spike at the intersection of Stewart Street and Nellis Blvd. 1/4 corner of Sec. 32|33 T20S, R62E.
55	CC 1037	1771.87	Spike located in Marion Drive approximately 500 feet north of Washington Avenue.
56	CLN 052	1772.05	Railroad spike in the asphalt at the centerline of Lamb and centerline of Bonanza.
57	CC 1038	1762.19	Nail in Christy Lane approximately 500 feet north of Washington Avenue.
58	CC 329	1748.19	RR spike in the intersection of Stewart Ave. and Nellis Blvd.
59	CLN 086	1815.5	2-inch brass cap at the junction of Lamb and Carey in the centerline of Carey in line with the west edge of Lamb.
60	CLN 087	1803.74	2-inch brass cap at the junction of Lamb and Lake Mead Blvd. at the NW corner in line with the north edge of Lake Mead Blvd.
61	CLN 088	1790.10	2-inch brass cap at the junction of Lamb and Owens Avenue.
62	CC 204	1798.03	Brass disc in the intersection of Nellis Blvd and Carey Ave.

ELEVATION REFERENCE MARKS

Las Vegas Unincorporated Metropolitan Area
(Continued)

Reference Mark Number	Reference Mark	Elevation (NGVD)	Description
63	CC Q-368	1789.13	Brass disc in concrete in intersection of Lake Mead Blvd. and Sloan Lane.
64	CC 206	1796.73	Brass cap at section corner $\frac{16\|15}{21\|22}$ T20S, R62E.
65	CC 202	1815.41	Copper weld monument in the intersection of Carey Ave. and Lamb Blvd.
66	CC 1039	1810.51	Aluminum cap in the intersection of Alto Ave. and Christy Lane.
67	CLN 085	1865.45	2-inch brass cap .40 mile south of the junction of Las Vegas Blvd. and Lamb Blvd. on Lamb.
68	CLM 024	1937.50	Railroad spike in an island on the south side of Craig Road at the junction of I-15 northbound off-ramp and Craig Road.
69	CLN 039	1903.6	2-inch brass cap located 500 feet south on Lamb from junction with Craig Road and 60 feet west of Lamb on top of a small sandy hill.
70	View	1892.7	USC & GS brass cap in concrete station 1047 on Quad No. 361152 located approximately 1700 feet east of the intersection of Walnut Road and Gowan.
71	CC 241	1922.58	State highway brass disc at intersection of Lamb Blvd. and Lone Mountain Road.
72	CC 1048	1945.62	Brass cap at the section corner of $\frac{29\|28}{32\|33}$ T19S, R62E.
73	CC 1035	1961.94	Iron post with cap at north 1/4 corner section 32 T19S, R62E.
74	CC L-365	1970.69	Brass disc in concrete approximately 1000 feet north of the section corner of $\frac{30\|29}{31\|32}$ T19S, R62E.

ELEVATION REFERENCE MARKS

Las Vegas Unincorporated Metropolitan Area
(Continued)

Reference Mark Number	Reference Mark	Elevation (NGVD)	Description
75	CC 239	1926.88	Brass cap @ section corner 36|31 / 1 | 6 T19S, T20S; R61E, R62E.
76	CC 100-5	1854.89	Concrete mon. with RLS tag 3645 sec. corner 12|7 / 13|18 T20S, R61E. (intersection of Cheyenne Ave. and Pecos Road)
77	CC 201	1827.72	Alum. cap @ section corner 13|18 / 24|19 T20S, R61E (intersection of Carey Avenue and Pecos Road).
78	CC 328	1812.41	Brass cap at section corner 24|19 / 25|30 T20S, R61E (intersection of Owens Ave. and Pecos Road).
79	K-368	1811.24	Brass disc in concrete center of Section 19, T20S, R63E; at intersection of Lake Mead Blvd. and Walnut Road.
80	CC 1034	1792.81	Spike in curb at Washington Avenue and Walnut Road.
81	CC 839	1711.97	GLO brass cap at section corner 33|34 / 4 | 3 T21S, R62E.
82	CC 508	2021.93	Brass cap at section corner 35|36 / 2 | 1 T21S, R61E in the intersection of Sunset Rd. and Eastern Ave.
83	CLN 071	2022.4	RR spike at the junction of Sunset aand Eastern in the centerline of Sunset at the east edge of Eastern.

ELEVATION REFERENCE MARKS

Las Vegas Unincorporated Metropolitan Area

(Continued)

Reference Mark Number	Reference Mark	Elevation (NGVD)	Description
84	CC 327	1791.53	Nail and tin in intersection of Stewart Avenue and Pecos Road.
85	CLM 012	2153.8	2-inch brass cap located 2.9 feet west of the northbound lane of I-15 and north of the Union Pacific RR crossing.
86	CC 1133	2400.57	Brass cap which is the center of Section 27, T21S, R60E.
87	CC 1136	2452.16	Brass cap which is the center of Section 28, T21S, R60E.
88	CLN 041	2327.98	Nevada State Highway copper weld monument approximately 1.1 mile west of Industrial Road and .3 miles south of Sunset Road.
89	CC 247	1801.59	2 x 2 hub 1080 feet east of the NW corner of Section 2, T21S, R62E.
90	CC 207	1912.50	Spike at section corner $\frac{15\|14}{22\|23}$ T20S, R62E.
91	CC 244	1893.29	4 x 4 post approximately 300 feet north of the intersection of Highway 91-93 and D Street at the section corner of $\frac{33\|34}{4\|3}$ T19S, T20S, R62E.
92	CC 227	2021.47	Brass cap at section corner $\frac{19\|20}{30\|29}$ T19S, R62E.
93	CC 226	2019.19	Brass cap at section corner $\frac{20\|21}{29\|28}$ T19S, R62E.

ELEVATION REFERENCE MARKS

Mesquite-Bunkerville Area

Reference Mark Number	Reference Mark	Elevation (NGVD)	Description
1	VR-06-A	1560.15	T-Bar with cap located on south side of Highway 91 approximately $5\frac{1}{4}$ miles west of Mesquite.
2	VR-06-B	1506.45	T-Bar with cap located 1750 feet north of State Highway 170 $\frac{1}{2}$-mile west of Bunkerville.
3	M-51	1529.98	USC & GS monument on north side of State Highway 170 $\frac{1}{2}$-mile west of Bunkerville.
4	B-01-C	1512.73	T-Bar with cap 750 feet north of State Highway 170 approximately 2100 feet west of Bunkerville.
5	B-02-M	1543.81	Nail and tin in center of Highway 170 1200 feet west of Bunkerville.
6	B-01-A	1555.44	Nail and tin in center of Highway 170 approximately 4000 feet east of Bunkerville.
7	VR-05-B	1534.69	T-Bar with cap at NE corner of Bunkerville cemetery.
8	CC-2113	1576.47	Aluminum disc in concrete on south side of Highway 91 approximately 4 miles west of Mesquite.
9	VR-05-A	1571.58	T-Bar with cap on south side of Highway 91 approximately 3.75 miles west of Mesquite.
10	VR-04-A	1568.93	GLO brass cap which is the section corner $\frac{13 \mid 18}{24 \mid 19}$ T13S, R70 and 71E.
11	M-02-B	1571.88	T-Bar with cap located 1723 feet east of RM #10.
12	M-01-B	1559.72	T-Bar with cap located approximately 3500 feet west of the Bunkerville Bridge and 3000 feet south of Highway 91.

ELEVATION REFERENCE MARKS

Mesquite-Bunkerville Area
(Continued)

Reference Mark Number	Reference Mark	Elevation (NGVD)	Description
13	M-01-A	1567.64	T-Bar with cap located 1 mile west of the Bunkerville Bridge and 2400 feet south of Highway 91.
14	CC-2107	1611.24	Aluminum disc in concrete on south side of State Highway 170 approximately 1¼ miles east of Bunkerville.
15	B-02-A	1572.24	Nail and tin in Highway 170 located approximately 1-3/4 miles east of Bunkerville.
16	VR-03-B	1568.61	Nail and tin located 400 feet south of the Bunkerville Bridge in the center of the road.
17	VR-03-A	1561.07	T-Bar with cap on east side of State Highway 170 approximately 600 feet north of the Bunkerville Bridge.
18	T-160	1561.34	USC & GS monument located at the southwest corner of the Bunkerville Bridge.
19	M-03-A	1574.58	T-Bar with cap located 800 feet east of State Highway 170 in Hafen Lane.
20	M-03-B	1572.97	T-Bar with cap approximately 2170 feet east of State Highway 170 in line with Hafen Lane.
21	M-04-A	1595.30	Nail and tin in Highway 91 approximately 1-1/3 miles west of Mesquite.
22	M-04-C	1593.16	Nail and tin in Highway 91 approximately 1 mile west of Mesquite.
23	M-06-A	1589.90	Nail and tin in Highway 91 approximately 5/8-mile west of Mesquite.

ELEVATION REFERENCE MARKS

Mesquite-Bunkerville Area
(Continued)

Reference Mark Number	Reference Mark	Elevation (NGVD)	
24	M-06-E	1599.38	Nail and tin in Highway 91 one block west of 90° turn in Mesquite.
25	M-05-A	1585.18	T-Bar with cap 5/8 mile west of Mesquite and ¼ mile south of Highway 91.
26	M-05-B	1585.19	Aluminum cap ¼ mile west of Mesquite and 1200 feet south of Highway 91.
27	VR-02-A	1568.87	T-Bar with cap 5/8 mile west of Mesquite and 2000 feet south of Highway 91.
28	VR-02-B	1632.38	T-Bar with cap ½ mile west of Mesquite and 4000 feet south of Highway 91 on south bank of Virgin River.
29	CC-2110	1645.60	Aluminum monument in concrete ½ mile east of Mesquite on south bank of the Virgin River.
30	VR-01-B	1646.63	T-Bar with cap 600 feet east of RM #29 on south bank of the Virgin River.
31	VR-01-A	1592.81	Nail and tin in road ½ mile east of Mesquite and ¼ mile north of Highway 91 on north bank of the Virgin River.

ELEVATION REFERENCE MARKS

Moapa Area

Reference Mark Number	Reference Mark	Elevation (NGVD)	Description
1	W-50	1521.85	Near Glendale, 100 yards south-southeast of the airport entrance and 148 feet south of a service station and cafe. A standard disk (USC & GS) stamped "W-50 1934" set in the top of a concrete post projecting 0.4 feet above ground.
2	CC-3009	1443.61	Aluminum monument in concrete 0.6 miles west of Nevada State Road 12 and 3100 feet north of Amber RR marker.
3	T-165	1406.65	USC & GS vertical disk in concrete face of small diversion dam, 81 feet east of and across the track from milepole 9 of the Union Pacific Railroad.
4	MV-01-A	1447.58	T-Bar with cap on south bank of Muddy River 3600 feet west of State Road 12 and 330 feet south of the Union Pacific RR tracks.
5	MV-01-B	1455.85	T-Bar with cap on north bank of Muddy River 700 feet east of the Wells Siding Diversion Dam and 3000 feet west of State Road 12.
6	MV-02-B	1559.60	T-Bar with cap on NW bank of Muddy River approximately 1-1/4 miles southwest of Glendale.
7	T-50	1520.83	USC & GS bronze disk 3.9 miles east along the Union Pacific Railroad from the Moapa Station.
8	MV-03-A	1539.02	T-Bar with cap on south bank of Muddy River 800 feet west of I-15 and 400 feet south of the Union Pacific Railroad.
9	MV-03-C	1541.47	T-Bar with cap on the north bank of Muddy River 1800 feet west of I-15 and 2500 feet southwest of the Highway 93, Interstate 15 junction.

ELEVATION REFERENCE MARKS

Moapa Area
(Continued)

Reference Mark Number	Reference Mark	Elevation (NGVD)	Description
10	V-50	1538.04	USC & GS bronze disk 2 miles east along the Union Pacific railroad from the station at Moapa and 4400 feet northwest of Inter-State 15.
11	MV-04-A	1569.01	T-Bar with cap north of paved road by the Anderson Dairy on south bank of Muddy River one mile west of I-15.
12	MV-04-B	1575.13	T-Bar with cap on north bank of Muddy River 4600 feet south of Highway 93 and 6000 feet east of Moapa station along railroad tracks.
13	Z-165	1565.27	USC & GS bronze disk set in a concrete post one mile east along the Union Pacific railroad from the station at Moapa and 84.5 feet southeast of milepole 1.
14	SCS-1	1550.58	Top of concrete pipe on the west side of the road where the Muddy River crosses near the Anderson Dairy. The culvert is approximately 1-1/2 miles south of Moapa.
15	MV-05-A	1585.44	T-Bar with cap located 1300 feet east of the Union Pacific Railroad tracks and 1500 feet south of the railroad trestle over the Muddy River.
16	MV-05-C	1625.14	T-Bar with cap on north bank of Muddy River along a dirt road and 1500 feet west of the Union Pacific Railroad tracks.
17	MV-07-A	1669.60	T-Bar with cap on south side of the Muddy River at the White narrows two miles south of Highway 93 and 1-3/4 miles west of the Moapa Indian Reservation Community Center.
18	F-302	1615.18	USC & GS bronze disk located 1.5 miles southwest along the Union Pacific Railroad from the station at Moapa, at a steel and concrete bridge over Muddy River, in the top of the southeast end of the southwest abutment, 6.7 feet east of the east rail.

ELEVATION REFERENCE MARKS

Moapa Area
(Continued)

Reference Mark Number	Reference Mark	Elevation (NGVD)	Description
26	MUD	1566.28	Standard USC & GS disk set in a four inch black soil pipe projecting three inches located .15 mile northeast along U.S. Highway 91 from Glendale, north of the highway about 200 yards on a small hill.
27	MDV-01-B	1593.05	T-Bar with cap located one mile north of Glendale on east side of Meadow Valley Wash and 500 feet east of a dirt road on the side of a hill.
28	MDV-02-B	1595.40	T-Bar with cap located 3.1 miles north of Glendale on east side of Meadow Valley Wash and 700 feet east of a dirt road.
29	MDV-02-A	1593.18	T-Bar with cap located two miles north of Moapa and 1.1 miles east of the Union Pacific Railroad tracks on the west side of Meadow Valley Wash.
30	MDV-01-A	1577.87	T-Bar with cap located 1.3 miles along Highway 93 from Glendale and 1/2 mile north of Highway 93 on west side of Meadow Valley Wash.
31	A-165	1339.24	USC & GS bronze disk set in the top of a concrete post located 1.4 miles north of B Street in Overton at the north side of the Overton Cemetery.
32	H-315	1358.19	USC & GS bronze disk in the center of the west edge of the wind cone concrete foundation at the Overton Airport at the "Y" junction of the runways.
33	D-165	1265.41	USC & GS bronze disk set in the top of a concrete post located 0.4 miles north of B Street and 39.5 feet east of the center line of State Highway 12.
34	J-165	1281.45	USC & GS bronze disk set in the top of a concrete post located 0.6 mile northwest along the Union Pacific Railroad from the station sign at Overton and 46 feet northeast of the northeast rail.

ELEVATION REFERENCE MARKS

Moapa Area
(Continued)

Reference Mark Number	Reference Mark	Elevation (NGVD)	Description
19	MV-08-B	1725.74	T-Bar with cap 100 feet south of Highway 93 and 300 feet west of the east Warm Springs Road intersection.
20	J-301	1716.47	Standard USC & GS disk located about four miles NW along U.S. Highway 93 from the overpass over the Union Pacific Railroad from Moapa, about one mile east of the crossing of a road leading to the Doty Ranch, in the top of the east end of the south head wall, 15.0 feet south of the highway centerline.
21	K-301	1735.23	Standard USC & GS disk in a concrete post about 5 miles NW along Highway 93 from the overpass over the Union Pacific Railroad at Moapa, 48 feet south of the center line of the highway.
22	M-301	1815.27	Standard USC & GS disk in a concrete post about 7 miles NW along Highway 93 from the overpass over the Union Pacific Railroad at Moapa, about 230 feet west of the crossing of the road leading to the Vegas Stock Farm, 40 feet southwest of the centerline of the highway.
23	N-301	1832.07	About eight miles northwest along Highway 93 from the overpass over the Union Pacific Railroad from Moapa at a culvert in the top of the east wing wall of the north head wall, 16 feet north of the center line of the highway.
24	MV-09-B	1822.48	USC & GS bronze disk in a concrete post about six miles northwest along Highway 93 from the overpass over the Union Pacific Railroad from Moapa and 700 feet northeast of the highway on top of a small hill.
25	MV-09-A	1822.56	T-Bar with cap about 3/4 mile northwest of Warm Springs and 500 feet south of Warm Springs road on top of a small hill.

ELEVATION REFERENCE MARKS

Moapa Area
(Continued)

Reference Mark Number	Reference Mark	Elevation (NGVD)	Description
35	L-165	1308.86	USC & GS bronze disk set in the top of a concrete post locate 1.4 miles northwest along the Union Pacific Railroad from the station sign at Overton and 19 feet northeast of the northeast rail.
36	N-165	1316.60	USC & GS bronze disk set in the top of a concrete post located 2.1 miles northwest along the Union Pacific Railroad from the station sign at Overton and 47.5 feet northeast of the northeast rail.
37	N-50	1333.54	USC & GS bronze disk set in the top of a concrete post located 1.8 miles southeast along the Union Pacific Railroad from the station at Logandale and 14.8 feet northeast of the northeast rail.
38	Q-165	1352.62	USC & GS bronze disk set in the top of a concrete post located one mile along the Union Pacific Railroad from the station at Logandale, at the southeast end of a curve, 47.8 feet southwest of the southwest rail.
39	Q-50	1379.38	USC & GS bronze disk set in the top of a concrete post located at Logandale, 0.1 mile northwest along the Union Pacific Railroad from the station, 15.7 feet southwest of the southwest rail.
40	V-165	1448.17	Bronze disk 1.8 miles northwest along the Union Pacific Railroad from the station at Logandale in the top of a limestone outcrop, 36.4 feet south of the south rail about three feet higher than the track.

ELEVATION REFERENCE MARKS

Blue Diamond Area

Reference Mark Number	Reference Mark	Elevation (NGVD)	Description
1	BM-3128	3127.69	USGS Brass in concrete stamped 538-50 located on south edge of Blue Diamond Road approx. $1\frac{1}{4}$ miles east of the Pahrump intersection.
2	Blue-02-B	3225.92	Nail and tin in ℄ Blue Diamond Road approximately 3300 feet west of the Pahrump intersection.
3	Blue-01-A	3194.86	T-Bar with cap 1500 feet north of Blue Diamond Road and 2500 feet west of the Pahrump intersection.
4	Blue-02-A	3241.66	Nail and tin in ℄ of Blue Diamond Road approx. 1 mile west of the Pahrump intersection.
5	Blue-03-B	3283.85	T-Bar with cap 200 feet south of Blue Diamond Road and 1000 feet east of the sewage disposal ponds.
6	Blue-04-B	3324.44	T-Bar with cap approx. 100 feet north of Blue Diamond Road 2/3 mile east of Blue Diamond.
7	BM-157	3381.83	USGS brass disc stamped 3382 157GWM 1950 located 100 feet north of Blue Diamond Road and north of Blue Diamond.
8	Blue-05-A	3389.77	Nail and tin in the intersection of the most eastern street and the second east-west street in Blue Diamond.
9	Blue-06-C	3403.12	T-Bar with cap 350 feet north of Blue Diamond Road and in line with the most westerly north-south street in Blue Diamond.
10	Blue-07-B	3408.58	T-Bar with cap 100 feet north of Blue Diamond Road and approx. 2000 feet west of RM #9.

ELEVATION REFERENCE MARKS

Goodsprings-Jean Area

Reference Mark Number	Name	Elev. (NGVD)	Coordinates N	Coordinates E	Description
1	G-01-A	3614.85	392,884.40	546,688.99	T-Bar with cap, up 0.1 ft., SW quarter of section 25 of TWP 24S, R58E. Located approx. 350 ft. north of intersection of Goodsprings Rd. & road to Sandy. Approx 200 ft. east of cemetery.
2	G-01-B	3608.05	393,293.80	548,177.28	T-Bar with cap, up 0.1 ft., located near center of section 25, T24S, R58E, 1544 ft east-northeast of RM 1.
3	G-02-A	3703.81	395,908.39	544,660.05	T-Bar with cap, flush, NE quarter of section 26, T24S, R58E near edge of N-S gravel road near intersection with gravel road to the west.
4	G-02-B	3734.32	397,471.95	546,374.59	T-Bar with cap, flush, SW quarter of section 24, T24S, R58E, 2321 ft. NE of RM 3.
5	G-03-A	3755.75	394,561.61	542,948.16	T-Bar with cap, flush, NE quarter of section 26, T24S, R58E, located 350 ft. SW of gravel road leaving Goodsprings to the NW. Approx. 400 ft west of nearest residence.
6	G-03-B	3748.48	395,874.72	543,044.73	T-Bar with cap, flush, NE quarter of section 26, T24S, R58E, located 1317 ft north of RM 5, approx. 400 ft. NE of gravel road described in description of RM 5.

ELEVATION REFERENCE MARKS

Goodsprings-Jean Area
(Continued)

Reference Mark Number	Name	Elev. (NGVD)	Coordinates N	Coordinates E	Description
7	G-04-A	3778.94	392,863.05	543,555.33	T-Bar with cap, flush, SE quarter of section 26, T24S, R58E, approx. 600 ft. south of paved road leaving Goodsprings to the west from a point 400 ft. west of intersection.
8	G-04-B	3777.64	393,659.32	543,279.51	T-Bar with cap, flush, near center of section 26, T24S, R58E, 842 ft. N-NW of RM 8, approx. 250 ft. north of paved road leading west out of Goodsprings.
9	G-05-A	3762.31	393,305.21	545,108.58	T-Bar with cap, flush, SE quarter of section 26, T24S R58E, approx. 200 ft. west of section line, approx. 650 ft. south of Goodspring Road.
10	G-05-B	3726.88	394,999.52	545,204.78	T-Bar with cap, flush, NE quarter of section 26, T24S R58E, approx. 100 ft. west of section line. Approx. 1000 ft. north of Goodsprings Road.
11	J-01-A	2831.66	369,662.01	573,558.51	T-Bar with cap, flush, NW quarter of section 23, T25S R59E, from a point approx. 6000 ft. south of Jean on the old highway, RM is approx. 450 ft. west.
12	J-01-B	2835.22	368,016.39	577,395.52	T-Bar with cap, flush, NW quarter of section 24, T25S R59E, from a point 4300 ft. south of residences next to RR track, RM is approx. 650 ft. east.

ELEVATION REFERENCE MARKS

Goodsprings-Jean Area (Continued)

Reference Mark Number	Name	Elev. (NGVD)	Coordinates N	Coordinates E	Description
13	USC & GS E 150 1935	2869.48	373,570.45	579,099.02	USC & GS brass disc stamped E 150 1935 in NW corner of a concrete slab 20 ft. east of RR track. NW quarter of section 13, T25S, R59E.
14	State of Nevada 1	2822.067			State of Nevada, Dept. of Highways brass disc stamped No. 1, Elev = 2822.067 at north end of concrete headwall east side of old highway approx. 0.5 miles south of Jean, section 14, T25S, R59E.
15	J-02-A	2855.66	375,621.63	576,674.91	T-Bar with cap, flush, SE quarter of section 11, T25S, R59E, 850 ft. west & 600 ft. north from center of Jean.
16	J-02-B	2865.75	374,004.04	579,231.25	T-Bar with cap, flush, NW quarter of section 13, T25S, R59E, west side of RR track approx. 200 ft. north of gravel road crossing.
17	J-03-A	2897.25	379,550.21	578,816.77	T-Bar with cap, flush, NW quarter of section 12, T25S, R59E, north of Jean 5100 ft. along old highway & approx. 1050 ft. NW.
18	J-03-B	2901.70	378,034.64	581,310.28	T-Bar with cap, flush, NE quarter of section 12, T25S, R59E, east of RR track approx. 4800 ft. north along track from gravel road crossing.

ELEVATION REFERENCE MARKS

Goodsprings-Jean Area
(Continued)

Reference Mark Number	Name	Elev. (NGVD)	Coordinates N	Coordinates E	Description
19	J-04-B	2927.74	373,706.31	580,898.13	T-Bar with cap, flush, NE quarter of section 13, T25S, R59E, approx. 1700 ft. along gravel road to prison from RR crossing and approx. 200 ft. north of gravel road.

ELEVATION REFERENCE MARKS

Searchlight Area

Reference Mark Number	Name	Elev. (NGVD)	Coordinates N	Coordinates E	Description
1	USC & GS K-148	3471.83			Brass disc stamped K-148-1935. Located on abondoned old Nipton Rd., approx. 3200 feet west of intersection with Nipton Rd (State Highway 164).
2	SL-06-C	3493.20	262,822.94	691,865.38	Set nail & tin on Nipton Road over 5 ft. diam. cmp culvert, approx. 6200 ft. west of intersection with U.S. Highway 95.
3	SL-06-E	3498.12	262,010.79	694,037.69	Set nail & tin on Nipton Road over 36" cmp culvert, approx. 3900 ft. west of intersection with U.S. Highway 95.
4	SL-06-G	3501.95	261,641.24	695,072.36	Set nail & tin on Nipton Road over 36" cmp culvert, approx. 2800 ft. west of intersection with U.S. Highway 95.
5	USC & GS V-303	3498.25			USC & GS brass disc in large rock stamped V 303 1940. Located near abandoned old Nipton Rd. approx 500 ft. west of intersection with Nipton Road (State Highway 164).
6	USGS 3445-1909	3443.67			USGS brass cap set in concrete post with metal casing up .85 ft. stamped 3445-1909. Located at intersection of two gravel roads, 1600 ft. west of State Highway 164 along abandoned old Nipton Road ! 1800 ft. south along gravel road.

ELEVATION REFERENCE MARKS

Searchlight Area (Continued)

Reference Mark Number	Name	Elev. (NGVD)	Coordinates N	Coordinates E	Description
7	SL-05A	3440.15	259,465.75	692,885.02	Set "T" with cap, flush. From intersection of Highway 164 & abandoned old Nipton Rd, 1600 ft. west on abandoned old Nipton Rd., south 1800 ft. along gravel road then west approx. 600 600 ft. along gravel road.
8	SL-05-B	3454.16	258,950.97	694,879.69	"T" bar with cap, flush. Located 600 ft. west of intersection of Highway 164 and abandoned old Nipton Rd and 2550 ft. south along unnamed gravel road.
9	SL-04-A	3370.62	255,395.87	693,151.66	"T" bar with cap, flush. Located approx. 1600 ft. east of north-south power line from a point approx. 7400 ft. south of Highway 164 along power line.
10	ECC-06-1	3537.84	260,963.23	697,596.85	Nail & tin flush southwest of intersection of U.S. 95 & Nipton Rd. (Nevada 164).
11	ECC-03-01	3548.08	261,133.58	698,280.48	Nail & tin flush, northwest corner of intersection Main St. & Cottonwood Cove Rd.
12	ECC-03-2	3551.57	261,142.75	698,646.22	Nail & tin flush ±1 ft. west of sewer manhole at intersection of Main St. & Lincoln St.
13	SL-03-A	3535.95	260,226.31	699,498.39	T-Bar with cap up 0.1 ft., 970 ft. south of intersection of Cottonwood Cove Rd. & Montana Streets.

ELEVATION REFERENCE MARKS

Searchlight Area (Continued)

Reference Mark Number	Name	Elev. (NGVD)	Coordinates N	Coordinates E	Description
14	USC & GS K-315	3499.64			USC & GS brass disc in large rock, stamped K-315 1949. Rock is up 3.0 ft.±. Located on south side of gravel road approx. 1000 ft. east of intersection of Hopson & Montana Streets.
15	SL-02-A	3472.17	257,141.76	699,835.85	T-Bar with cap up 0.2 ft. Approx. 1500 ft. northwest of north end of runway & approx. 1000 ft. due east of U.S. Highway 95.
16	SL-01-B	3339.22	252,951.40	700,831.72	T-Bar with cap, flush. Located 2900 ft. south of north end of runway and 200 ft. west.