

**US Army Corps
of Engineers**
Los Angeles District

STANDING INSTRUCTIONS TO THE PROJECT OPERATOR FOR WATER CONTROL

**RED ROCK DETENTION BASIN
RED ROCK WASH
CLARK COUNTY, NEVADA**



JULY 1999

**Red Rock Detention Basin
Las Vegas Wash and Tributaries
(Tropicana and Flamingo Washes)
Nevada**

Pertinent Data

Completion Date	December 1996
Stream System	Red Rock Wash
Drainage Area55.2 mi ²
Dam	
Embankment (earthfill)	
Crest elevation	3225 ft ¹
Crest length	4000 ft
Crest width	25 ft
Maximum height above streambed	60 ft
Main Spillway	
Type -- side channel with concrete ogee crest	
Crest elevation	3212.5 ft
Crest length	600 ft
Probable Maximum Flood (PMF) peak discharge	72,000 ft ³ /s
Auxiliary Spillway	
Type -- rectangular with concrete ogee crest and downstream chute	
Crest elevation	3212.5 ft
Crest length	450 ft
Probable Maximum Flood peak discharge	38,000 ft ³ /s
Outlet Works	
Type -- reinforced concrete box culvert with constrictor plate at entrance	
Culvert dimensions	6.25 ft by 6.25 ft
Length of box culvert	567 ft
Outlet sill elevation	3161 ft
Constrictor plate dimensions	2.25 ft by 2.25 ft
Detention Basin	
Area at dam spillway crest	66.4 acres
Gross capacity at dam spillway crest	2,007 ac-ft
Storage allocation below dam spillway crest	
Flood control	2,007 ac-ft
Sedimentation	0 ac-ft
100-year flood (reservoir design flood)	
Inflow volume	2,090 ac-ft
Peak inflow	12,800 ft ³ /s
Peak outflow	182 ft ³ /s
Peak elevation	3212.4 ft
Drawdown time	10.4 days
Probable Maximum Flood (spillway design flood)	
Inflow volume (24-hour)	25,600 ac-ft
Peak inflow	110,000 ft ³ /s
Peak outflow	110,000 ft ³ /s
Peak elevation	3221.96 ft
Spillway flow duration	10.75 hours

1. All elevations based on NGVD datum of 1929.

STANDING INSTRUCTIONS TO THE PROJECT OPERATOR

FOR WATER CONTROL

RED ROCK DETENTION BASIN

Red Rock Wash
Tropicana and Flamingo Wash System
Clark County, Nevada

Los Angeles District

U.S. Army Corps of Engineers

July 1999



Red Rock Detention Basin - 13 April 1997

Standing Instructions to the Project Operator
for Water Control
Red Rock Detention Basin

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Standing Instructions to the Project Operator
for Water Control
Red Rock Detention Basin

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- Photo 2. Red Rock Detention Basin. Upstream end of outlet works, showing intake structure constrictor plate.
- Photo 3. Red Rock Detention Basin. Outlet works trashrack.
- Photo 4. Red Rock Detention Basin. Instrumentation vault and precipitation gage.

STANDING INSTRUCTIONS TO THE PROJECT OPERATOR
FOR WATER CONTROL
RED ROCK DETENTION BASIN

I. BACKGROUND AND RESPONSIBILITIES

A. General Information

1. Purpose of Document. This document is prepared in compliance with Paragraph 9-2 of EM 1110-2-3600 (Management of Water Control Systems) and ER 1110-2-240 (Water Control Management). A copy of these Standing Instructions to the Project Operator is to be kept at the headquarters of the Clark County Regional Flood Control District. Any deviation from the authorized purpose of Red Rock Detention Basin will require approval of the Commander, South Pacific Division, Corps of Engineers (Corps).

2. Project Purpose and Authorization. Red Rock Wash is part of the Las Vegas Wash and Tributaries (Tropicana and Flamingo Washes) drainage system. In October 1982, a feasibility study to analyze and recommend solutions to the Las Vegas Wash flood problems was authorized by a Senate Resolution. Further authorization was provided with the Water Resources Development Act of 1986, Title IV, Section 401(c). The Project Feasibility Report concluded that an existing Red Rock Wash detention basin should be modified to increase storage and reduce outflow in order to function with other elements of a proposed flood control system. In addition, while meeting state and local design criteria, the original detention basin did not meet Corps criteria for spillway capacity. Corps regulations require spillways for flood control basins to pass the Probable Maximum Flood (PMF) and to have at least three feet of freeboard between the PMF maximum water surface elevation and the top of the dam embankment. Therefore, to be incorporated into the Las Vegas Wash Project, the original Red Rock Detention Basin required considerable modification. The original Red Rock Detention Basin was constructed by the Clark County Regional Flood control district to control flood runoff from the upstream Red Rock Wash drainage basin. The original project was completed in 1987. Both the original and modified Red Rock Detention Basins are described in Section I(4). The Las Vegas Wash (Tropicana-Flamingo) Project was formally authorized by the Water Resources Development Act of 1992. The project is in compliance with all environmental requirements and regulations, as determined by the Final Supplemental Environmental Assessment (EA), dated November 1993, and the signed Finding of No Significant Impact (FONSI), dated

January 1994. The EA and FONSI are based on the operation of the project, as designed.

3. Chain of Command in Flood Emergencies. The Chain of Command for LAD, along with respective telephone numbers, is shown in table 1-1. The Chain of Command for Clark County Regional Flood Control District (hereinafter referred to as the "Project Operator") is shown on table 1-2.

4. Project Location and Description. Red Rock Detention Basin is located on Red Rock Wash approximately 12 miles west of downtown Las Vegas, Nevada (reference plate 1). Red Rock Wash is a principal tributary to the Flamingo Wash.

The main features of the original detention basin consisted of a 4,000-foot-long compacted earthfill embankment, a 600-foot-wide ogee crest spillway, a rock-lined side channel running adjacent to the spillway, and a 6.25 by 6.25-foot reinforced concrete box culvert outlet conduit running through the embankment. The crest elevation of the earthfill embankment was 3222 feet, NGVD. The crest elevation of the spillway is 3212.5 feet, NGVD.

The following are the modifications made to the original detention basin in order to comply with the requirements of the Las Vegas Wash project and with Corps design criteria. (1) The dam embankment was raised three feet to elevation 3225 feet, NGVD. The 3-foot increase was required in order to provide at least the minimum 3-foot freeboard between the PMF maximum water surface elevation and the dam crest. (2) An auxiliary spillway was constructed, which together with the original spillway, would pass the 110,000 cfs PMF peak flow (72,000 cfs over the original spillway; 38,000 cfs over the auxiliary spillway). The auxiliary spillway is a rectangular channel, with a short approach channel, a 323-foot wide ogee crest section (crest elevation 3212.5 feet, NGVD), and a downstream chute. The downstream chute tapers from 323 feet in width at the crest to 278 feet in width at the downstream end. The spillway centerline is parallel to and 30 feet north of the outlet conduit centerline (photo 1). The foregoing features are depicted on plate 2. (3) A constrictor plate (flow restrictor), with a 2.25 by 2.25-foot orifice was installed at the entrance to the 6.25 by 6.25-foot outlet conduit (reference plate 3). The constrictor plate (photo 2) was necessary in order to reduce the 100-year (reservoir design) flood maximum outflow from 1,420 cfs to the Corps' planned maximum discharge of 180 cfs. (4) The existing trashrack, which had openings of 6 feet by 2 feet, was modified to have openings of 1.5 feet by 1.5 feet (photo 3). The 1.5 by 1.5-foot opening is two-thirds the opening of the constrictor plate, as required by Corps regulations. (5) A total of 434 acre-feet of material was excavated from the detention basin, increasing the basin storage

to 2,000 acre-feet. The increased storage volume was necessary in order to keep the 100-year flood maximum water surface elevation at spillway crest level with the reduced outflows from the modified outlet works. The detention basin storage allocations and elevation-storage capacity are shown in plates 4 and 5, respectively. The elevation-storage capacity is also listed in table 1-3.

5. Project Operating Constraints. Since the dam's outlet works and spillways are ungated facilities, there are no operating constraints at Red Rock Detention Basin. The elevation-discharge capacities of the outlet works and the spillways are shown on plates 6 and 7, respectively. The outlet and spillway elevation-discharge relationships are presented on tables 1-4 and 1-5. The project's routings of the Probable Maximum Flood and Reservoir Design Flood are shown on plates 8 and 9, respectively.

6. Project Operation and Maintenance. Operation and maintenance (O&M) activities for Red Rock Detention Basin are to be conducted by the Project Operator. Those sections in the Code of Federal Regulations, Title 33, Part 208.10 applicable to operation and maintenance of the project are in effect upon completion of project construction and transfer to the Project Operator for O&M. Applicable paragraphs from these sections include, but are not limited to, the following:

"The State, political subdivision thereof, or other responsible local agency, which furnished assurance that it will maintain and operate flood control works in accordance with regulations prescribed by the Secretary of the Army, as required by law, shall appoint a permanent committee consisting of or headed by an official hereinafter called the 'Superintendent,' who shall be responsible for the development and maintenance of, and directly in charge of an organization responsible for the efficient operation and maintenance of all of the structures and facilities during flood periods and for continuous inspection and maintenance of the project works during periods of low water, all without cost to the United States."

"Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods."

"The District Engineer or his authorized representatives shall have access at all times to all portions of the protective works."

"It shall be the duty of the Superintendent to submit a semiannual report to the district Engineer covering inspection, maintenance, and operation of the protective works." (The reports are to be submitted to the U.S. Army Corps of Engineers, Los Angeles District, Hydrology and Hydraulics Branch, Reservoir Regulation Section)

In addition to those items specified therein, the Project Operator is responsible for the periodic removal of excess sediment accumulation after each major sediment-producing storm and on an annual basis. Since no additional storage volume is allocated for sediment, removal of sediment accumulations is essential in order to maintain the required flood control volume in the basin.

B. Role of the Project Operator

1. Normal Conditions. The Project Operator is responsible for operation and maintenance during normal hydrometeorological conditions, when little or no runoff occurs, without daily instruction. However, LAD should be contacted any time conditions are such that consultation or instructions regarding operation and maintenance is needed. Since Red Rock Detention Basin is an ungated facility, the Project Operator is not normally on site during normal conditions. Whenever the National Weather Service or the Clark County Regional Flood Control District predicts a major storm event with a large volume of storm runoff, an emergency condition exists and Clark County Public Works shall post a site monitor at the project.

2. Emergency Conditions. During flood conditions, the Project Operator shall keep the LAD Reservoir Operations Center informed, as required, of the project status. Project status information includes the following: (1) current basin water surface elevation, outflow (both outlet works and spillway), and inflow; (2) incremental and cumulative watershed precipitation; (3) any unusual or critical conditions, such as, but not limited to, debris clogging the outlet works intake structure, boils near the downstream toe, or embankment sloughing.

3. Initial Filling of Detention Basin. During the first significant flood event, the Project Operator shall monitor and/or report on the condition of seepage, if any, in the toe drains; wave run-up on the embankment; hydrostatic boils near the

downstream toe; and any embankment sloughing. Each of the above activities are described in the following paragraphs herein.

(1) Seepage in the toe drains is normally expected to occur if significant impoundments remain in the detention basin for 10 or more hours and, as such, does not indicate an adverse condition with the embankment. Monitoring these conditions should consist of observing for a cloudy condition in the seepage water, indicating possible internal embankment erosion. If seepage commences within a shorter duration after initial impoundment and the seepage is cloudy in nature, internal erosion might be occurring. Should this be the case, the seepage should be reduced or eliminated by covering the seepage ingress and egress points with filter blankets, gravel, and/or rock. This situation should be reported to the Clark County Department of Public Works Emergency Management Coordinator.

(2) Wave run-up on the embankment resulting from waves 2 feet or greater in height, should be monitored closely for embankment surface erosion or sloughing. If either of these two conditions is apparent, they should be reported to the Clark County Department of Public Works Emergency Management Coordinator.

(3) Any hydrostatic boils that occur near the downstream toe indicate an internal erosion condition that may or may not be associated with the embankment drainage system. The water emitting from the boil should be observed as to condition (either clear or cloudy). In addition, sandbags should be placed around the boil to reduce or eliminate the seepage flow. The condition should be reported to the Clark County Department of Public Works Emergency Management Coordinator.

(4) Any embankment sloughing, caused by either wave run-up (reference paragraph (2) above) or by the receding basin water surface elevation after the peak of the flood event, should be reported as to the Clark County Department of Public Works Emergency Management Coordinator. In addition, gravel and/or rock should be placed in the sloughed area to stabilize the area.

II. DATA COLLECTION AND REPORTING

The project operator has one precipitation gage (photo 4) within the Red Rock Wash watershed, plus additional precipitation gages in the surrounding vicinity. There is a water level (basin water surface elevation) gage within the detention basin, plus a stage (water level) gage in the channel immediately downstream from the outlet works. Both precipitation and water level gages record in real time. The precipitation and water level gage network is shown on plate 10. The Project Operator obtains data from the National Weather Service regarding hydrometeorological conditions that may/will affect the structure.

At the end of each water year (September 30), the Project Operator shall provide LAD with the year's record of detention basin water surface elevation, inflow and outflow data. This data will be used by LAD to determine the flood benefits of the project for each year and is used in other reports that LAD prepares annually. The data can be provided at the same time as the December submission of the semi-annual operation and maintenance report, described in the Las Vegas Wash and Tributaries Operation, Maintenance Repair, Replacement, and Rehabilitation Manual. The December submission is due on or before 1 December. The submission can be made using Corps of Engineers forms SPL 403, SPL 403A, SPL 403B, a narrative report, or a reporting agency form.

III. WATER CONTROL ACTION AND REPORTING

A. Normal Conditions.

The Red Rock Detention Basin outlet works are ungated and the project is, therefore, a self-regulating facility. There are no additional water control actions required for the Project Operator to undertake.

B. Emergency Conditions.

During emergency conditions, such as debris clogging the outlet works, embankment piping or downstream toe boils, the Project Operator shall keep the LAD appraised, as appropriate.

C. Inquiries.

All significant inquiries received by the Project Operator from citizens, constituents or interest groups regarding the status of a project in an emergency situation must be answered with the best available information. The Project Operator should consult with LAD if sensitive information is requested, especially during emergency situations.

D. Water Control Problems.

The LAD must be contacted immediately by the most rapid means available in the event that an operational malfunction, erosion, or other incident occurs that could impact project integrity in general or water control capability in particular.

E. Communication Outages.

Should communication outages occur during an emergency situation, the Project Operator shall continue to monitor the situation and make every effort to contact the District Engineer at the earliest possible opportunity, and report the situation as described in Section III (B) above. The Project Operator is to document all attempts to contact the District Engineer. If the structure is in danger of failing due to overtopping, internal erosion, or other cause, the Project Operator shall leave the site for his/her safety.

IV. REFERENCES

Listed herein are reference documents to these Standing Instructions. Copies of these documents should be kept on file by the Project Operator, as appropriate.

Design Memorandum, Red Rock Detention Basin, Department of the Army, Los Angeles District, Corps of Engineers, Los Angeles, California, November 1993.

Operation, Maintenance, Repair, Replacement, and Rehabilitation Manual, Las Vegas Wash & Tributaries (Tropicana and Flamingo Washes), Las Vegas, Nevada U.S. Army Corps of Engineers, Los Angeles District, March 1997.

Emergency Action Plan for Red Rock Detention Basin, U.S. Army Corps of Engineers, Los Angeles District, July 1998.

Management of Water Control Systems (EM 1110-2-3600), U.S. Army Corps of Engineers, 30 November 1987.

V. UPDATING

Clark County Regional Flood District is responsible for updating table 1-2, as necessary. The table is to be updated at least annually, in October-November. Other parts of the Standing Instructions shall be updated by the Corps of Engineers in response to any project modifications or changes in the project operating plan.

Table I-1
Chain of Command for Reservoir Operations
Decisions at Redrock Detention Basin
Revised June 1999

District Engineer
Phone (213)452-3961
Pager (213)391-2087

Chief, Engineering Division
Phone (213)452-3629

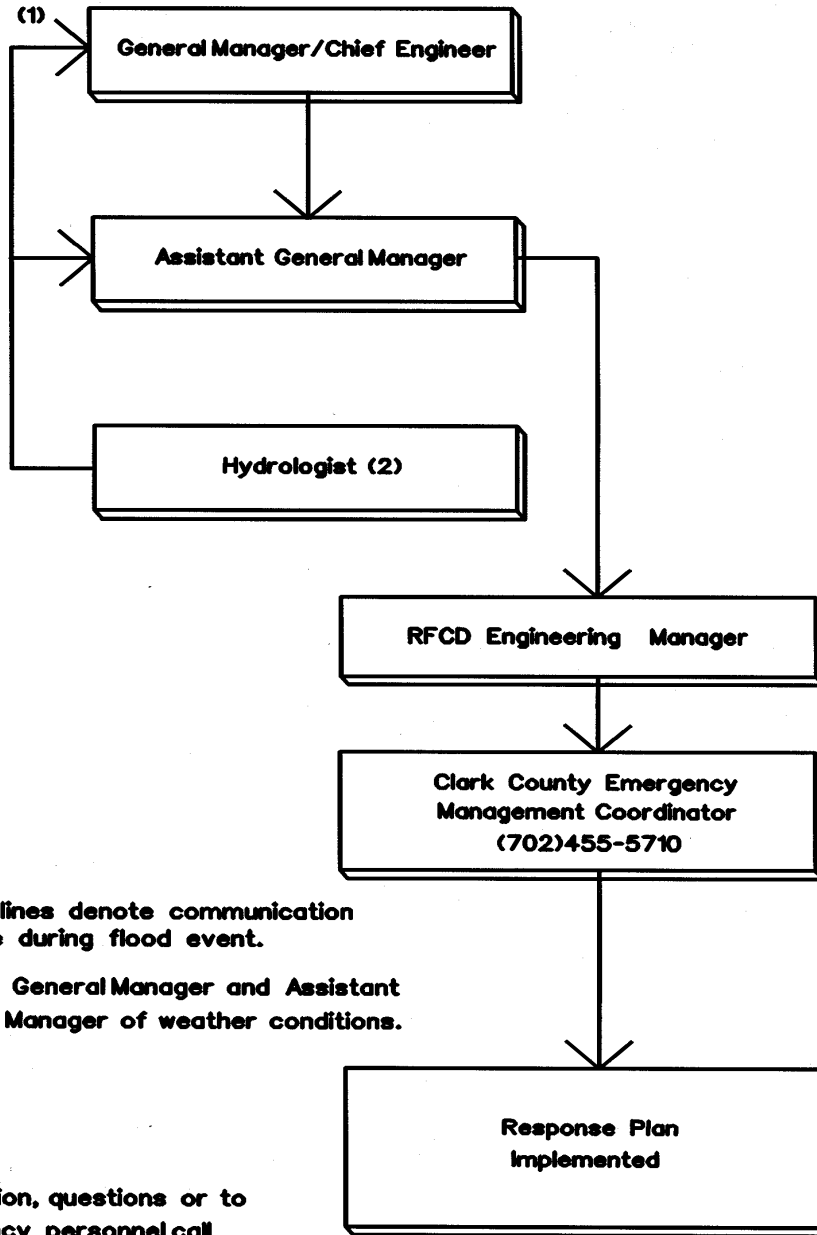
Chief, Hydrology and Hydraulics Branch
Phone (213)452-3525
Pager (213)508-9494

Chief, Reservoir Regulation Section
Phone (213)452-3527
Pager (213)508-9472

South Pacific Division
Phone (415)977-8112
Pager (800)759-7243 / Plus Seven Digit
ID Code Number #2372911

Chief, Reservoir Regulation Unit
Phone (213)452-3530
Pager (213)508-9266

Table I-2
Chain of Command for Response Plan
Implementation at Red Rock Detention Basin
Revised June 1999



Note:

- (1) Arrowed lines denote communication sequence during flood event.**
- (2) Apprises General Manager and Assistant General Manager of weather conditions.**

For information, questions or to contact agency personnel call
Phone No. (702) 455-3139

Table I-3
Red Rock Detention Basin Storage Table¹

Elevation (Feet)	Storage (Acre-Feet)	Elevation (Feet)	Storage (Acre-Feet)	Elevation (Feet)	Storage (Acre-Feet)
3161	0	3183	564.2	3205	1545.8
3162	9	3184	599.4	3206	1602.4
3163	28.6	3185	634.6	3207	1659.0
3164	48.2	3186	669.8	3208	1722.0
3165	67.8	3187	705.0	3209	1785.0
3166	87.4	3188	744.6	3210	1848.0
3167	107.0	3189	784.2	3211	1911.0
3168	131.8	3190	823.8	3212	1974.0
3169	156.6	3191	863.4	3212.5	2007.0
3170	181.4	3192	903.0	3213	2043.0
3171	206.2	3193	947.4	3214	2115.0
3172	231.0	3194	991.8	3215	2187.0
3173	259.2	3195	1036.2	3216	2259.0
3174	287.4	3196	1080.6	3217	2331.0
3175	315.6	3197	1125.0	3218	2402.8
3176	343.8	3198	1175.2	3219	2474.6
3177	372.0	3199	1225.4	3220	2546.4
3178	403.4	3200	1275.6	3221	2618.2
3179	434.8	3201	1325.8	3222	2690.0
3180	466.2	3202	1376.0	3223	2771.0
3181	497.6	3203	1432.6	3224	2852.0
3182	529.0	3204	1489.2	3225	2933.0

1. Based on storage table contained in November 1993 Design Memorandum -- Red Rock Detention Basin. One-foot storage values linearly interpolated from 5-foot values in storage table, starting with elevation 3162 feet.

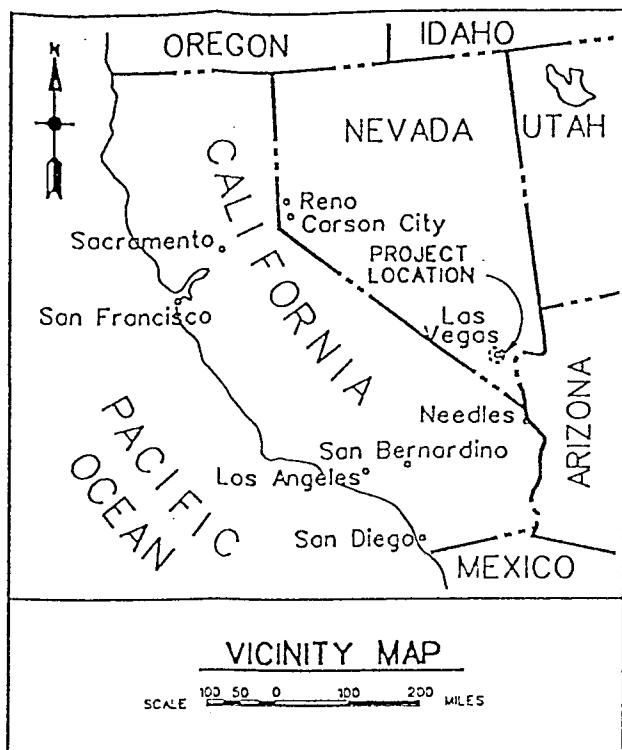
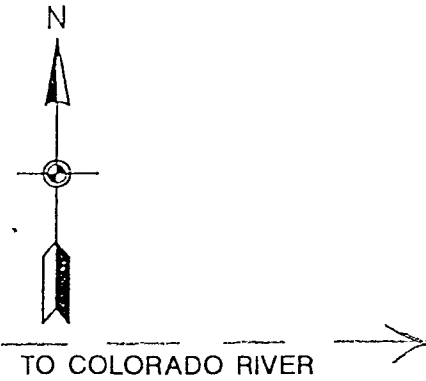
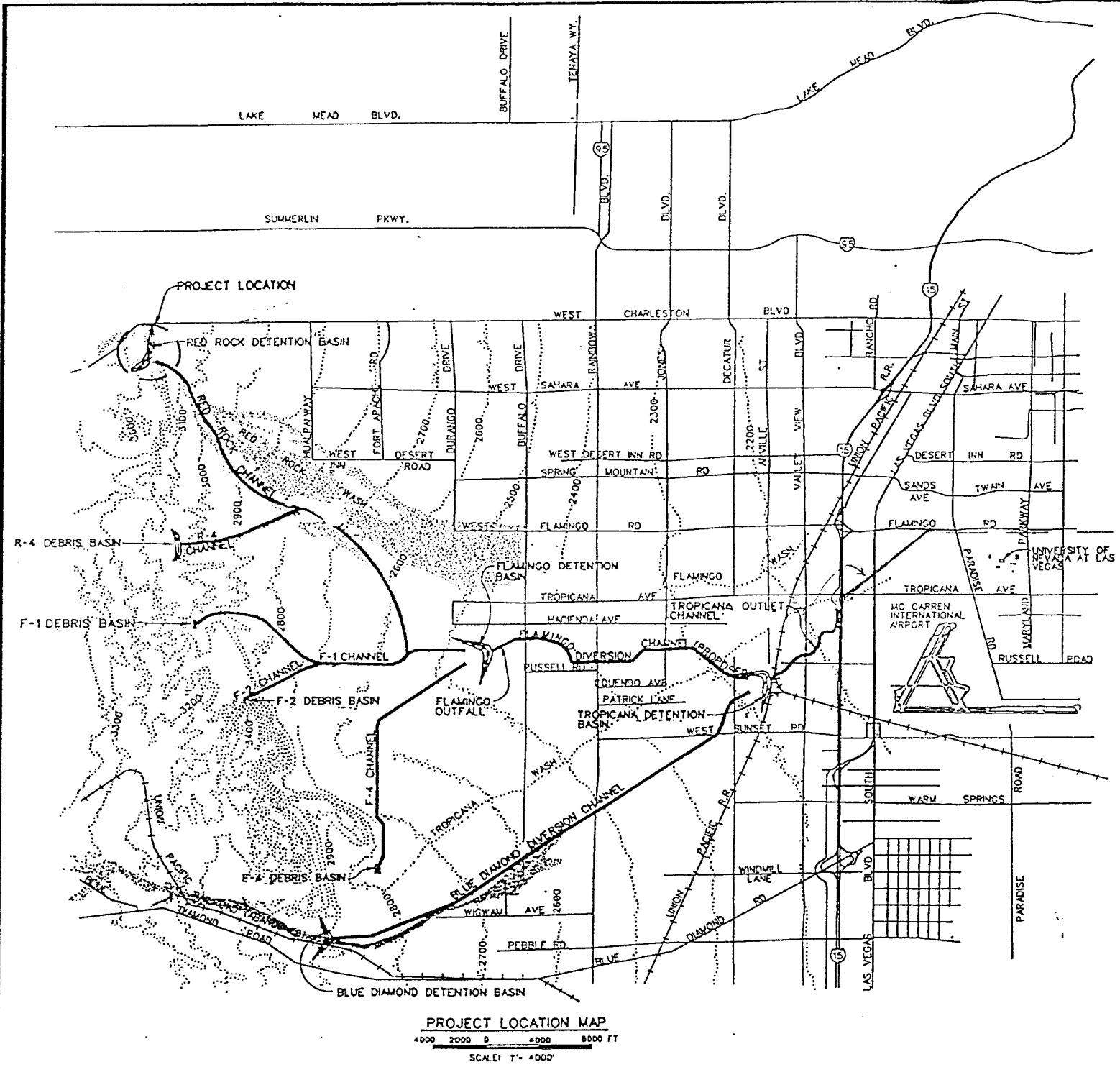
Table I-4
 Red Rock Detention Basin
 Outlet Works Discharge Table

Elevation (feet, NGVD)	Discharge (cfs)	Elevation (feet, NGVD)	Discharge (cfs)	Elevation (feet, NGVD)	Discharge (cfs)
3161	0	3183	117	3206	170
3162	5	3184	120	3207	171
3163	15	3185	122	3208	173
3164	28	3186	125	3209	175
3165	43	3187	128	3210	177
3166	50	3188	130	3211	179
3167	57	3189	133	3212	181
3168	62	3190	135	3212.5	182
3169	67	3191	138	3213*	183
3170	72	3192	140	3214*	184
3171	76	3193	142	3215*	186
3172	80	3194	145	3216*	188
3173	84	3195	147	3217*	190
3174	88	3196	149	3218*	191
3175	92	3197	151	3219*	193
3176	95	3198	153	3220*	195
3177	99	3299	155	3221*	196
3178	102	3200	158	3222*	198
3179	105	3201	160	3223*	200
3180	108	3202	162	3224*	201
3181	111	3203	164	3225*	203
3182	114	3204	166		

*Refer to table I-5 for total outflow from the basin.

Table I-5
 Red Rock Detention Basin
 Outlet Works & Spillway Discharge Table

Elevation (feet, NGVD)	Outlet Discharge (cfs)	Main Spillway Discharge (cfs)	Auxiliary Spillway Discharge (cfs)	Total Discharge (cfs)
3212.5	182	0	0	182
3213	183	1,384	348	1,915
3214	184	6,500	1,970	8,654
3215	186	11,771	4,505	16,463
3216	188	18,416	7,695	26,299
3217	190	23,100	11,780	33,270
3218	191	33,596	15,796	49,583
3219	193	41,956	20,605	62,754
3220	195	50,752	25,874	76,820
3221	196	59,946	31,575	91,717
3222	198	72,448	38,272	110,918
3223	200	79,400	44,193	123,793
3224	201	89,614	51,075	140,890
3225	203	106,497	56,777	163,477



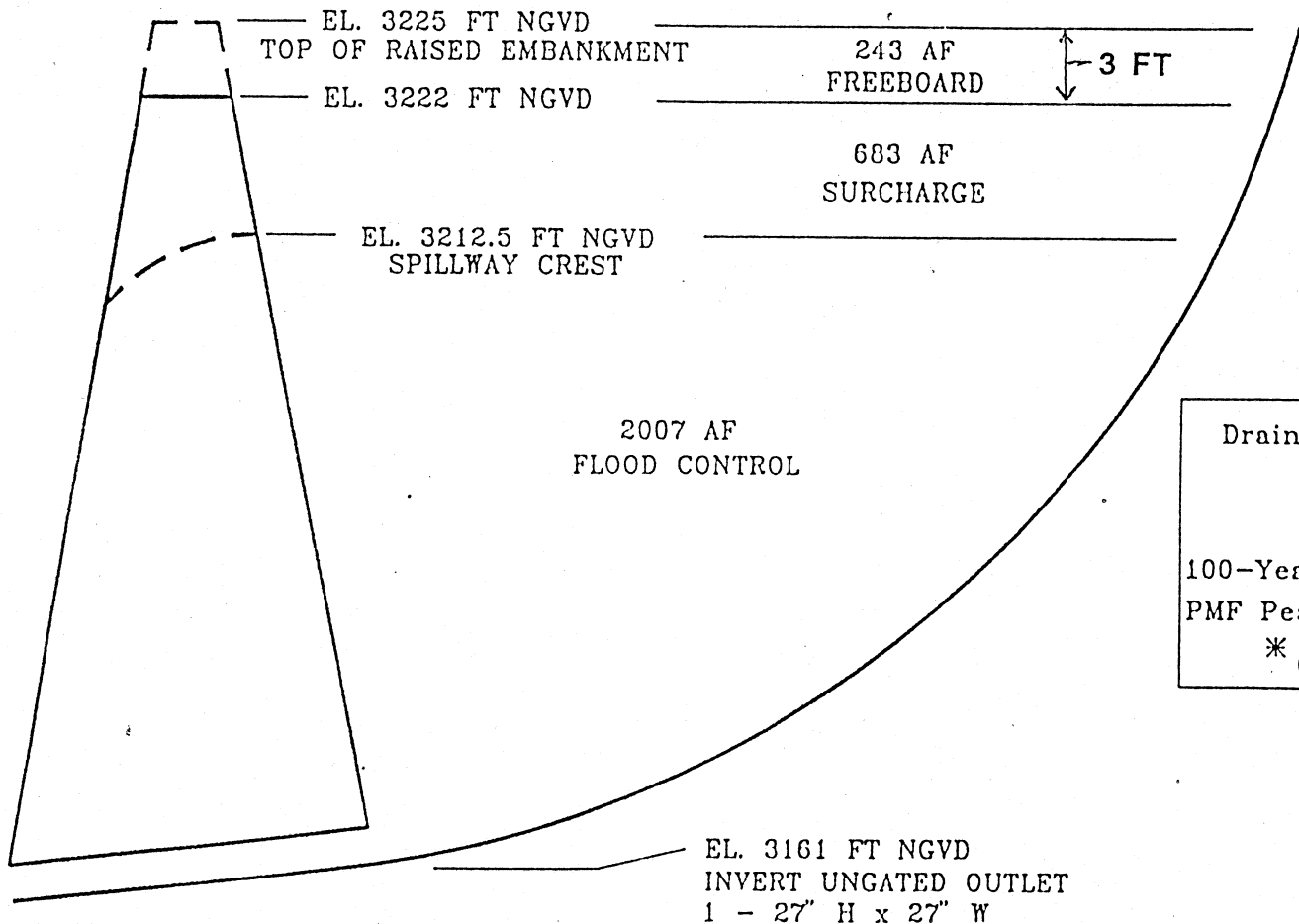
RED ROCK DETENTION BASIN
 LAS VEGAS NEVADA

PROJECT LOCATION
 AND VICINITY MAPS

U.S. ARMY CORPS OF ENGINEERS
 LOS ANGELES DISTRICT

Plates 2-3 are not currently available.

For additional information, please contact the Los Angeles District Public Affairs Office at (213) 452-3908.



Drainage Area = 55.2 mi²

INFLOW

100-Year Peak = 12,800 ft³/s*

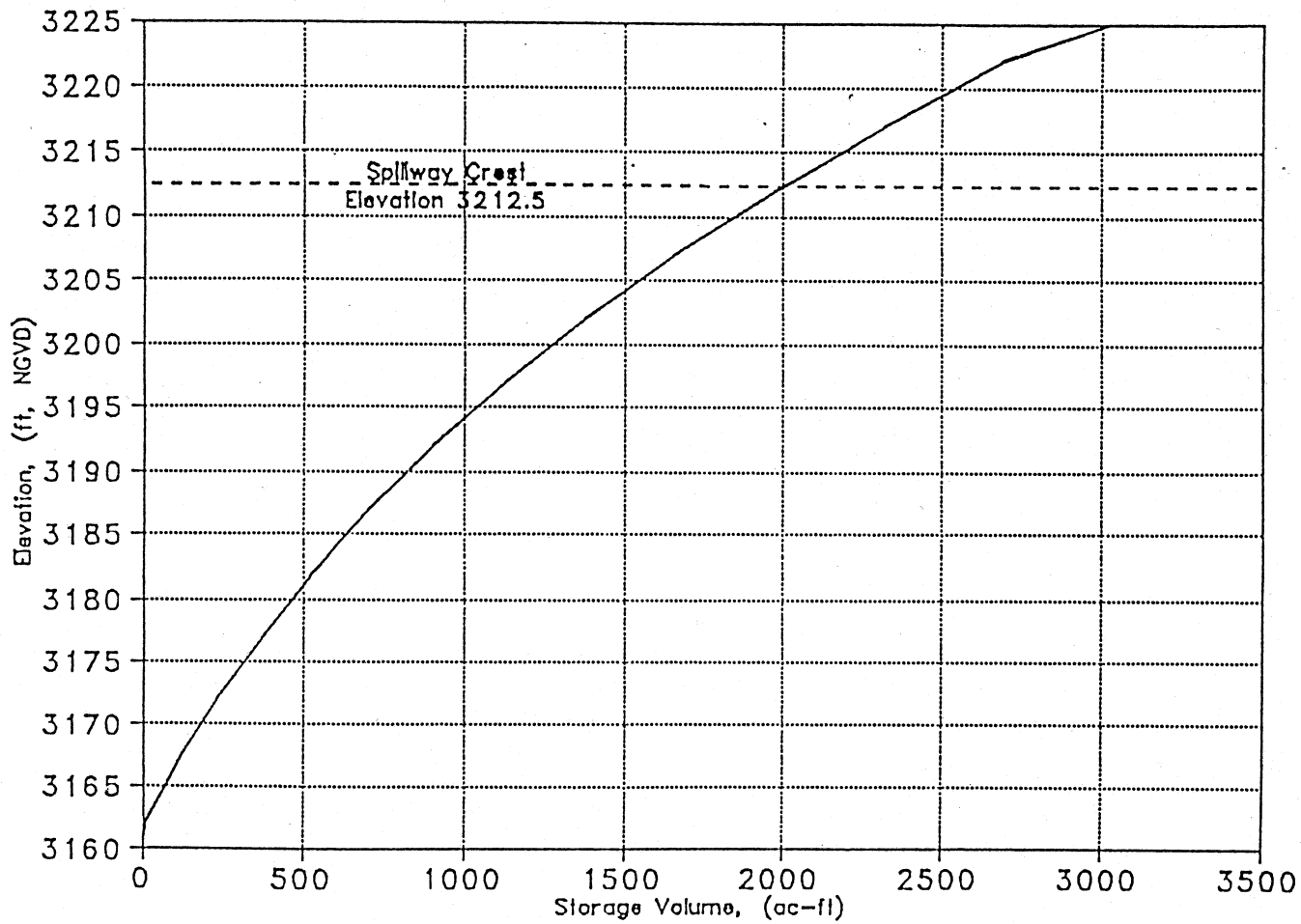
PMF Peak = 110,000 ft³/s

* Computed Probability

RED ROCK DETENTION BASIN
LAS VEGAS, NEVADA

RESERVOIR STORAGE
ALLOCATION DIAGRAM

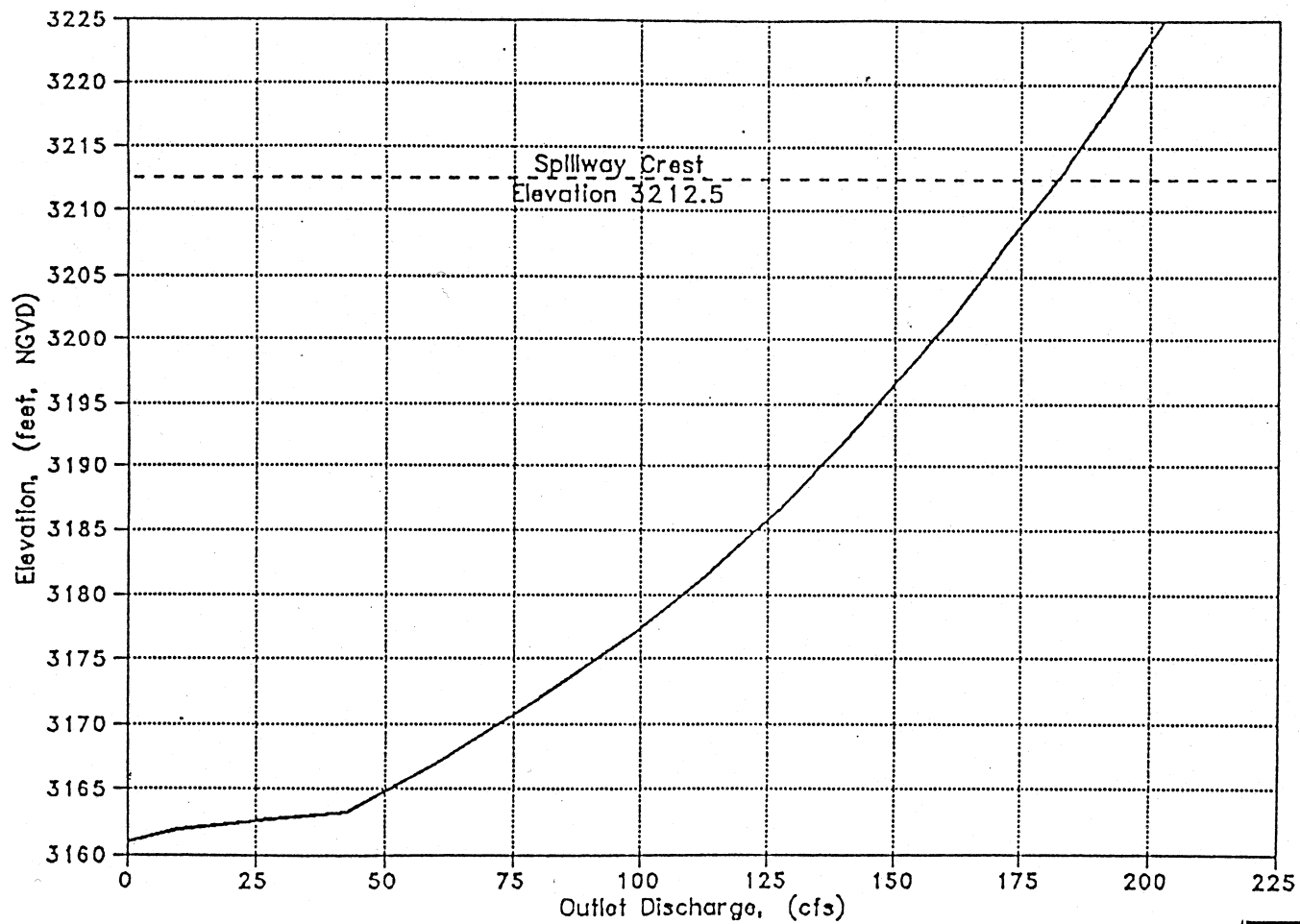
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LOS ANGELES DISTRICT



RED ROCK DETENTION BASIN
LAS VEGAS, NEVADA

RED ROCK DETENTION BASIN
STORAGE ELEVATION CURVE

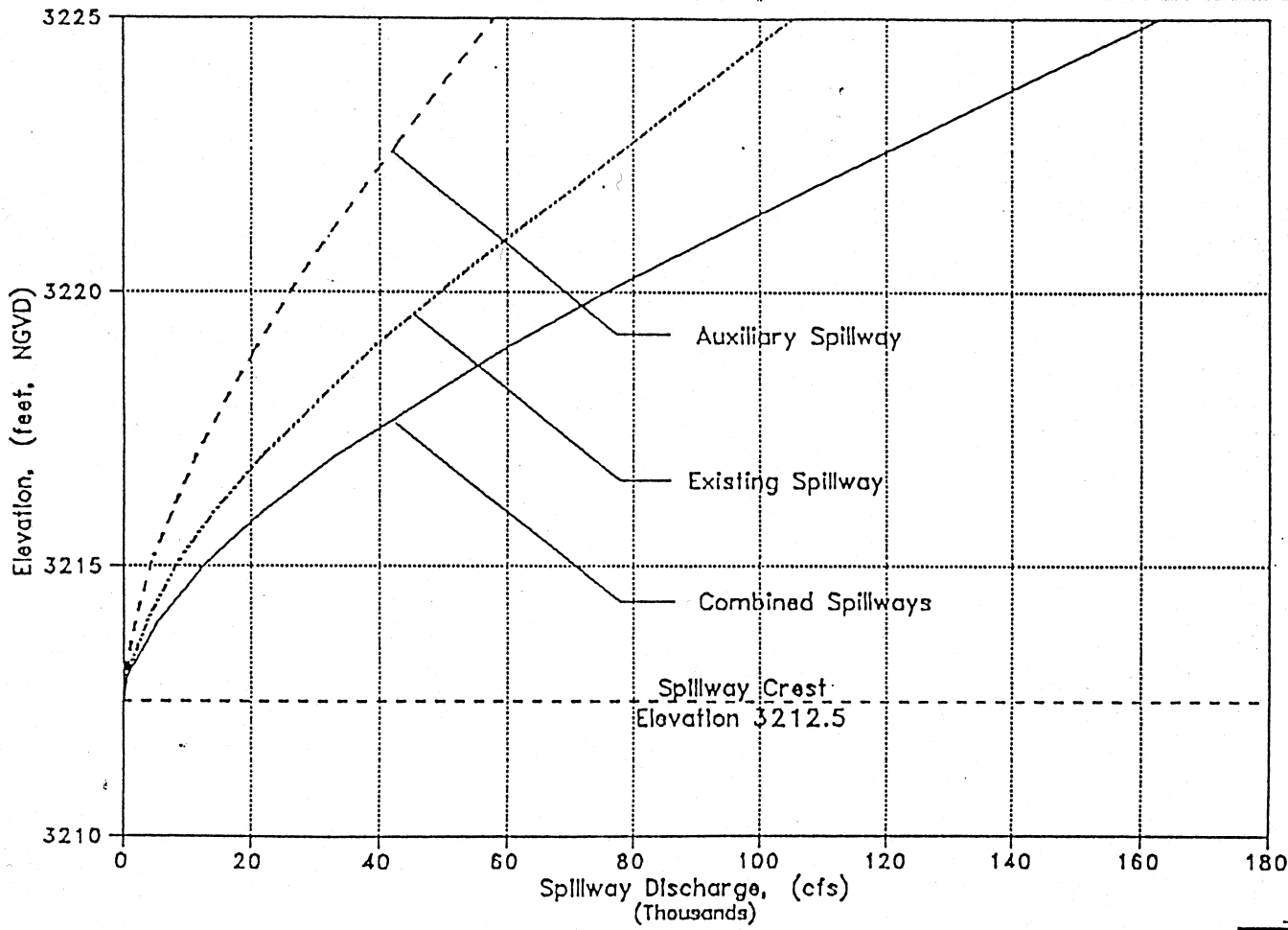
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RED ROCK DETENTION BASIN
LAS VEGAS, NEVADA

RED ROCK DETENTION BASIN
OUTLET DISCHARGE CURVE

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

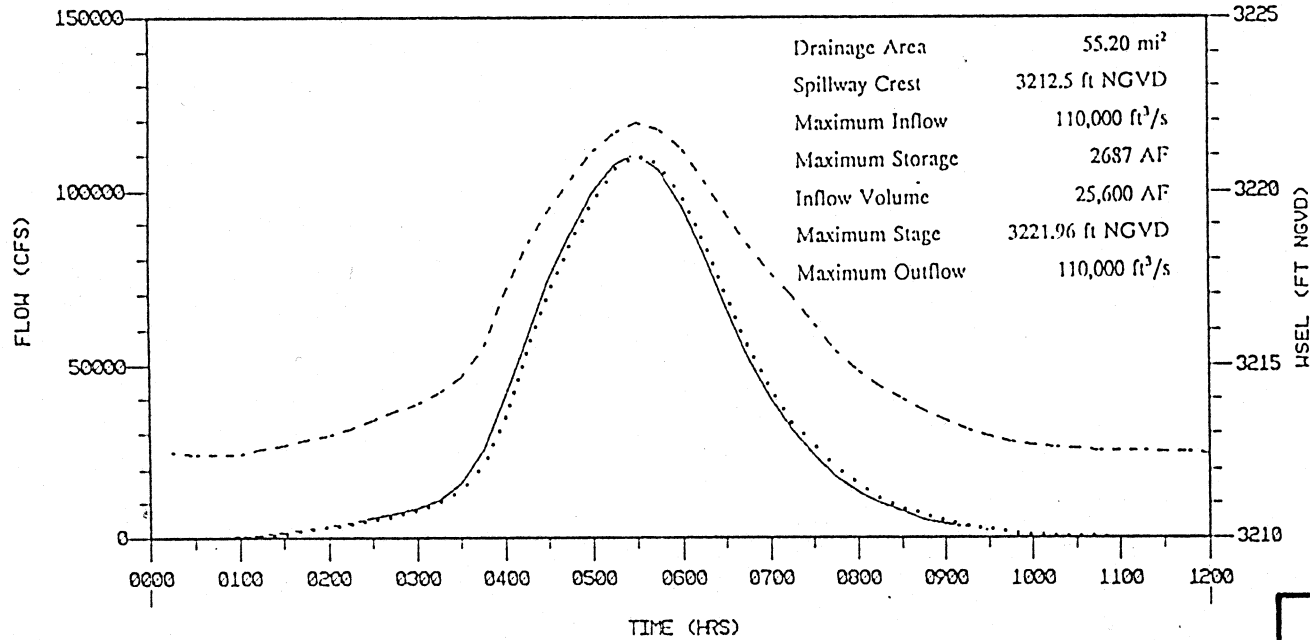
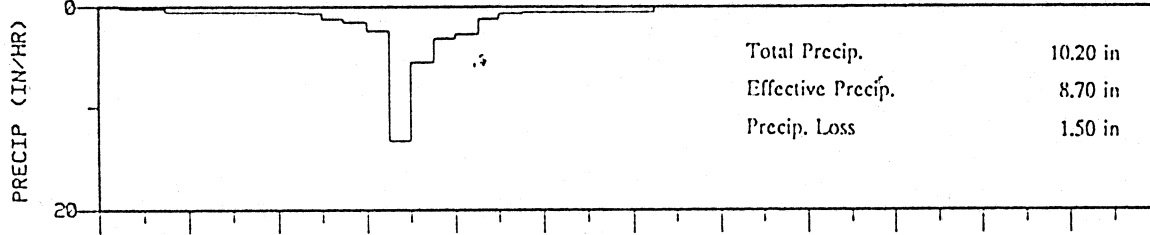


RED ROCK DETENTION BASIN
LAS VEGAS, NEVADA

RED ROCK DETENTION BASIN
SPILLWAY RATING CURVES

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

RED ROCK DETENTION BASIN - PROBABLE MAXIMUM FLOOD



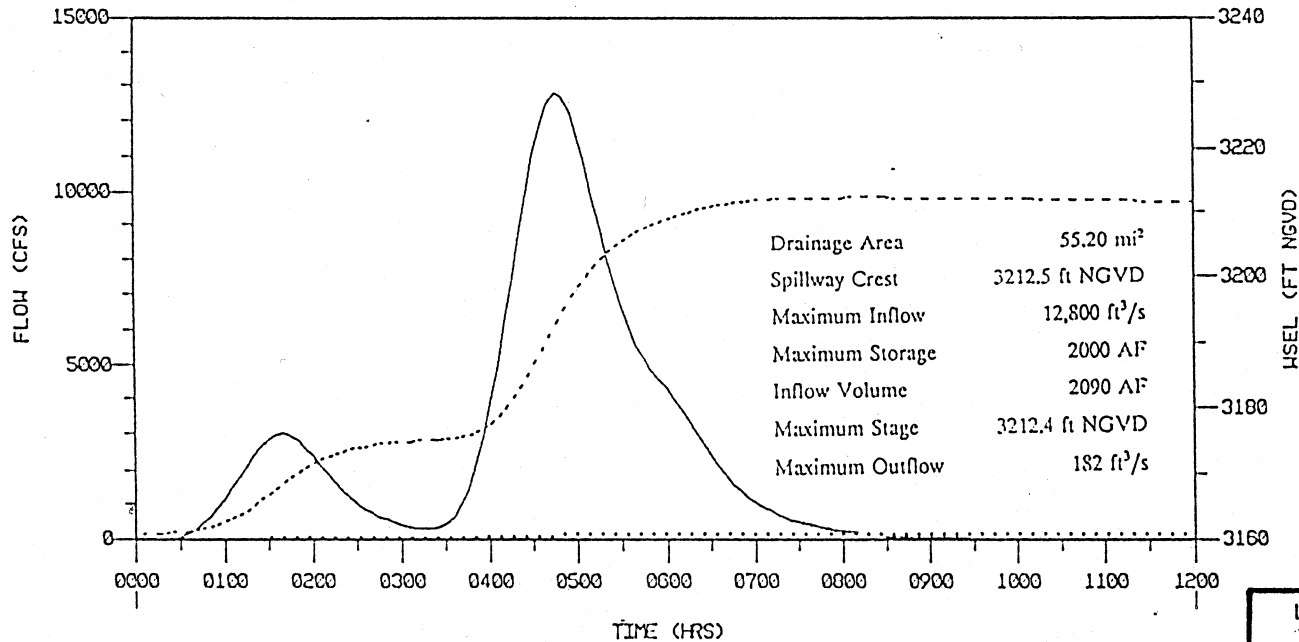
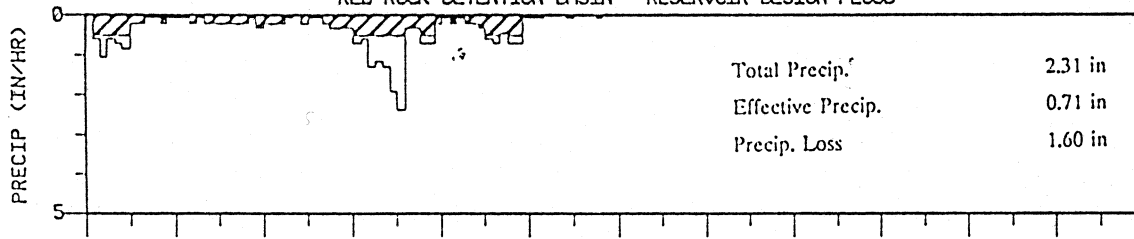
_____ INFLOW
 OUTFLOW
 - - - - - WATER SURFACE ELEVATION

LAS VEGAS WASH AND TRIBUTARIES
 (TROPICANA & FLAMINGO WASHES)
 DESIGN MEMORANDUM

RED ROCK DETENTION BASIN
 PROBABLE MAXIMUM FLOOD
 INFLOW
 HYDROGRAPH

U.S. ARMY CORPS OF ENGINEERS
 LOS ANGELES DISTRICT

RED ROCK DETENTION BASIN - RESERVOIR DESIGN FLOOD

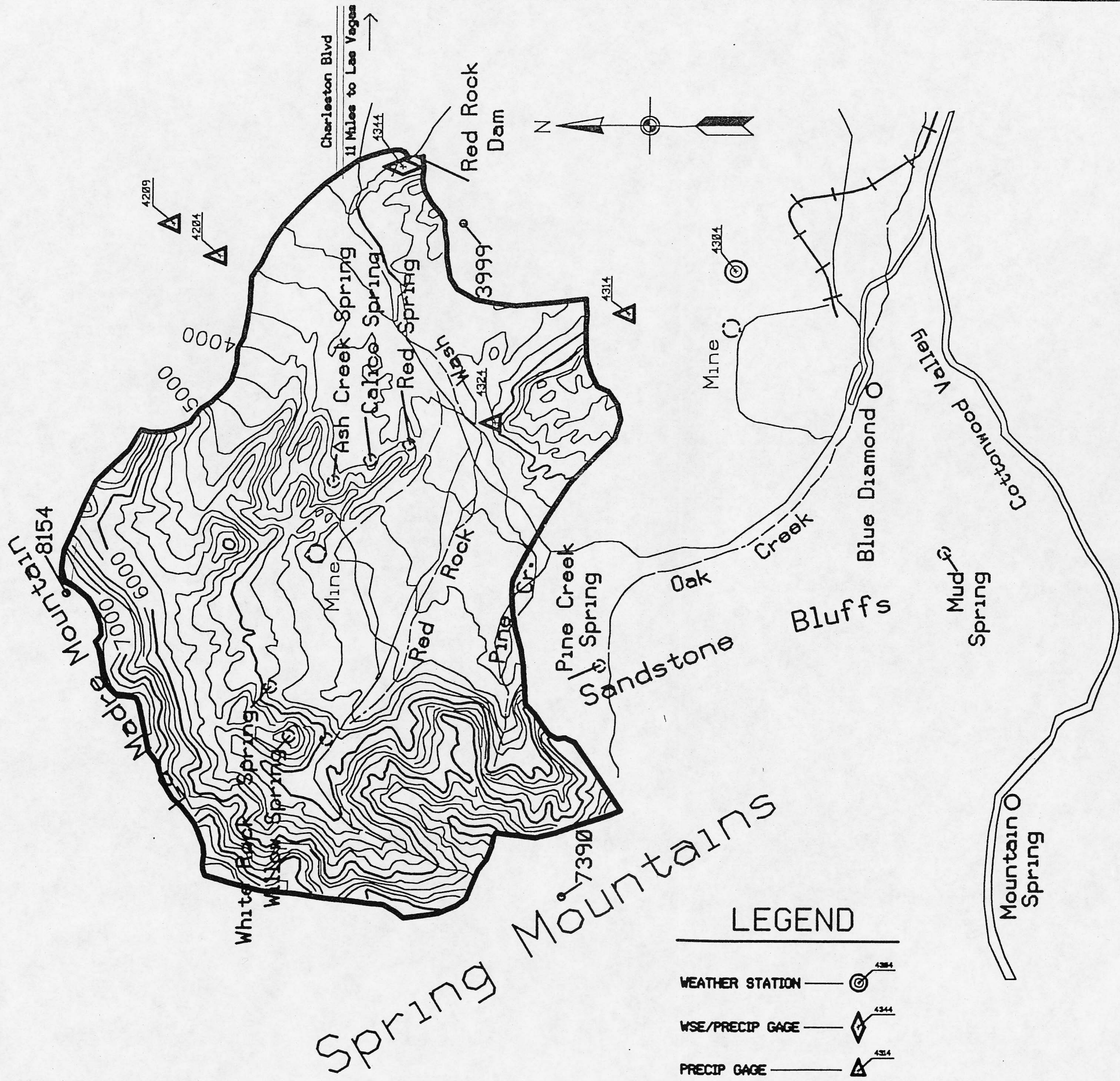


_____ INFLOW
 OUTFLOW
 - - - - - WATER SURFACE ELEVATION


LAS VEGAS WASH AND TRIBUTARIES
 (TROPICANA & FLAMINGO WASHES)
 DESIGN MEMORANDUM


RED ROCK DETENTION BASIN
 RESERVOIR DESIGN FLOOD
 INFLOW, OUTFLOW & STAGE
 HYDROGRAPHS


U.S. ARMY CORPS OF ENGINEERS
 LOS ANGELES DISTRICT



LEGEND

WEATHER STATION —  4304

WSE/PRECIP GAGE —  4344

PRECIP GAGE —  4314

RED ROCK DETENTION BASIN LAS VEGAS, NEVADA
DRAINAGE AREA MAP SHOWING LOCATIONS OF COUNTY GAGES AND RED ROCK DETENTION BASIN
U.S. ARMY CORPS OF ENGINEERS LOS ANGELES DISTRICT



Photo 1. Red Rock Detention Basin. Downstream end of outlet works and auxiliary spillway.



Photo 2. Red Rock Detention Basin. Upstream end of outlet works, showing intake structure constrictor plate.



Photo 3. Red Rock Detention Basin. Outlet works trashrack.



Photo 4. Red Rock Detention Basin. Instrumentation vault and precipitation gage (cylindrical structure).