

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

---

# **STANDING INSTRUCTIONS TO THE PROJECT OPERATOR FOR WATER CONTROL**

**TROPICANA DETENTION BASIN  
LAS VEGAS WASH AND TRIBUTARIES  
CLARK COUNTY, NEVADA**



**MAY 2000**

STANDING INSTRUCTIONS TO THE PROJECT OPERATOR

FOR WATER CONTROL

TROPICANA DETENTION BASIN

Las Vegas Wash and Tributaries  
Clark County, Nevada

Los Angeles District

U.S. Army Corps of Engineers

May 2000

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

**Pertinent Data<sup>1</sup>**

Completion Date . . . . .	June 1998
Stream System . . . . .	Blue Diamond Wash
Drainage Area . . . . .	172.12 mi <sup>2</sup>
<b>Dam</b>	
Embankment (earthfill)	
Crest elevation <sup>2</sup> . . . . .	2,290.03 ft
Crest length . . . . .	2,779.92 ft
Crest width . . . . .	19.69 ft
Maximum height above streambed . . . . .	38.66 ft
Maximum height above downstream fill . . . . .	9.84 ft
Spillway (over entire dam embankment)	
Crest elevation . . . . .	2,290.03 ft
Crest length . . . . .	2,779.92 ft
Maximum height above downstream fill . . . . .	9.84 ft
Elevation of maximum water surface . . . . .	2,291.29 ft
Design discharge . . . . .	12,996 ft <sup>3</sup> /s
Outlet Works	
Width of conduit . . . . .	9.84 ft
Height of box culvert (range) . . . . .	8.69 to 6.89 ft
Length of box culvert . . . . .	1001.80 ft
Bulkhead constrictor plate width . . . . .	4.20 ft
Bulkhead constrictor plate height . . . . .	3.94 ft
Height of open conduit (range) . . . . .	7.22 to 6.00 ft
Length of open conduit . . . . .	245.99 ft
Intake elevation . . . . .	2,251.60 ft
<b>Dike (auxiliary dam)</b>	
Embankment (earthfill)	
Crest elevation (excluding spillway) . . . . .	2,282.64 ft
Crest length . . . . .	1,472.77 ft
Crest width . . . . .	19.69 ft
Maximum height above streambed . . . . .	28.97 ft
Spillway (over entire dike embankment)	
Crest elevation . . . . .	2,280.18 ft
Crest length . . . . .	705.38 ft
Design discharge . . . . .	6,203 ft <sup>3</sup> /s
Outlet works (ungated)	
Diameter of (two) outlet conduits . . . . .	3.94 ft
Length of each conduit . . . . .	146.42 ft
Intake elevation . . . . .	2,254.19 ft
<b>Reservoir (both bays combined)</b>	
Area at dam spillway crest . . . . .	52.74 acres
Gross capacity at dam spillway crest . . . . .	824.48 ac-ft
<b>Storage allocation below dam spillway crest</b>	
Flood control . . . . .	824.48 ac-ft
Sedimentation . . . . .	0 ac-ft
<b>100-year flood (reservoir design flood)</b>	
Inflow volume (24-hour) . . . . .	1,669.0 ac-ft
Peak inflow . . . . .	6,700 ft <sup>3</sup> /s
Peak outflow . . . . .	497 ft <sup>3</sup> /s
Peak elevation . . . . .	2,289.67 ft
Drawdown time . . . . .	4.5 days
<b>Probable maximum flood (spillway design flood)</b>	
Inflow volume (24-hour) . . . . .	1,732.0 ac-ft
Peak inflow . . . . .	13,985 ft <sup>3</sup> /s
Peak outflow . . . . .	12,986 ft <sup>3</sup> /s
Peak elevation . . . . .	2,291.34 ft
Spillway flow duration . . . . .	6 hours

1. All SI-to-English conversions based on Federal Standard 376B.
2. All elevations based on NAVD88 datum.

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

**Pertinent Data  
(Metric Units)**

Completion Date . . . . .	June 1998
Stream System . . . . .	Blue Diamond Wash
Drainage Area . . . . .	445.8km <sup>2</sup>
<b>Dam</b>	
Embankment (earthfill)	
Crest elevation . . . . .	698.000 m
Crest length . . . . .	847.321 m
Crest width . . . . .	6.000 m
Maximum height above streambed . . . . .	11.785 m
Maximum height above downstream fill . . . . .	3.000 m
Spillway (over entire dam embankment)	
Crest elevation . . . . .	698.000 m
Crest length . . . . .	847.321 m
Maximum height above downstream fill . . . . .	3.000 m
Elevation of maximum water surface . . . . .	698.385 m
Design discharge . . . . .	368 m <sup>3</sup> /s
Outlet Works	
Width of conduit . . . . .	3.000 m
Height of box culvert (range) . . . . .	2.650 to 2.100 m
Length of box culvert . . . . .	305.349 m
Bulkhead constrictor plate width . . . . .	1.28 m
Bulkhead constrictor plate height . . . . .	1.20 m
Height of open conduit (range) . . . . .	2.200 to 1.830 m
Length of open conduit . . . . .	74.978 m
Intake elevation . . . . .	686.287 m
<b>Dike (auxiliary dam)</b>	
Embankment (earthfill)	
Crest elevation (excluding spillway) . . . . .	695.750 m
Crest length . . . . .	448.900 m
Crest width . . . . .	6.000 m
Maximum height above streambed . . . . .	8.829 m
Spillway (over entire dike embankment)	
Crest elevation . . . . .	695.000 m
Crest length . . . . .	215.000 m
Design discharge . . . . .	175.65 m <sup>3</sup> /s
Outlet works (ungated)	
Diameter of (two) outlet conduits . . . . .	1.200 m
Length of each conduit . . . . .	44.63 m
Intake elevation . . . . .	687.077 m
<b>Reservoir (both bays combined)</b>	
Area at dam spillway crest . . . . .	213,440 m <sup>2</sup>
Gross capacity at dam spillway crest . . . . .	1,017,000 m <sup>3</sup>
<b>Storage allocation below dam spillway crest</b>	
Flood control . . . . .	1,017,000 m <sup>3</sup>
Sedimentation . . . . .	0 m <sup>3</sup>
<b>100-year flood (reservoir design flood)</b>	
Inflow volume (24-hour) . . . . .	2,058,695 m <sup>3</sup>
Peak inflow . . . . .	189.72 m <sup>3</sup> /s
Peak outflow . . . . .	14.07 m <sup>3</sup> /s
Peak elevation . . . . .	697.89 m
Drawdown time . . . . .	4.5 days
<b>Probable maximum flood (spillway design flood)</b>	
Inflow volume (24-hour) . . . . .	2,136,405 m <sup>3</sup>
Peak inflow . . . . .	396 m <sup>3</sup> /s
Peak outflow . . . . .	368 m <sup>3</sup> /s
Peak elevation . . . . .	698.40 m
Spillway flow duration . . . . .	6 hours

1. All elevations based on NAVD88 datum.



Metric to English Conversion Constants  
(Based on Federal Standard 376B -- Revised 27 January 1993)

From	Divide By	To Obtain
meters (m)	0.3048	feet (ft)
kilometers	1.609	miles (mi)
square meters (m <sup>2</sup> )	4046.9	acres (ac)
square kilometers (km <sup>2</sup> )	2.589988	square miles (mi <sup>2</sup> )
cubic meters (m <sup>3</sup> )	1233.5	acre-feet (ac-ft)
cubic meters per second (m <sup>3</sup> /s)	0.028317	cubic feet per second (ft <sup>3</sup> /s)



**Tropicana Detention Basin - 15 May 1998**

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for Water Control  
Tropicana Detention Basin

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STANDING INSTRUCTIONS TO THE PROJECT OPERATOR  
FOR WATER CONTROL  
TROPICANA 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 Tropicana Detention Basin will require approval of the Commander, South Pacific Division, Corps of Engineers.

2. Project Purpose and Authorization. Tropicana Wash, along with Flamingo Wash, is part of the Las Vegas Wash and Tributaries drainage system. The system is designed to provide for 100-year computed probability flood event protection, under future conditions, to the central and southwest areas of the Las Vegas community. The design discharge, however, is approximately equivalent to a 70-year expected probability event. 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 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 June 1996. The EA and FONSI are based on the operation of the project, as designed.

3. Project Location and Description. Tropicana Detention Basin is located on Tropicana Wash approximately 2.5 miles (4 kilometers) southwest of downtown Las Vegas, Nevada (reference plate 1). The detention basin outlet works conduit and the Tropicana Outlet Channel extend approximately 1.9 miles (3 kilometers) northeasterly from the detention basin to join Tropicana Wash just upstream from the Interstate Highway 15 crossing near downtown (reference plate 2). The 172.12 square-mile (445.8 square-kilometer) drainage area of the detention

basin and upstream diversion channels extends westerly from the basin across an alluvial cone into rugged terrain, including mountains.

The main feature of the project is a 2,779.92 foot (847.321 meter) long earthfill embankment revetted with soil cement and roller compacted concrete. The embankment crest is at elevation 2290.03 feet, NAVD88 (698 meters). The crest is 38.66 feet (11.785 meters) above the streambed and is 9.84 feet (3 meters) above the downstream fill. An emergency spillway is provided over the entire length of the embankment. The detention basin storage capacity is 824.48 acre-feet (1,017,000 m<sup>3</sup>). Other pertinent information is presented in the "Pertinent Data" sheet at the beginning of this document. Plates 3 through 16 show in detail the various features of the project.

The detention basin, itself, is divided into two bays (north and south) separated by a dike (photo 1). The dike is 1,472.77 feet (448.900 meters) long and has a crest elevation of 2,282.64 feet (695.75 meters), NAVD88. The dike ranges from 0 to a maximum height of 28.97 feet (8.829 meters) above the streambed. The dike has a crest width of 19.69 feet (6.000 meters). The west 705.38 feet (215.000 meters) of the dike functions as a spillway; the entire dike functions as a maintenance road. The elevation of the dike in the spillway crest segment is 2,280.18 feet (695.000 meters), NAVD88.

The purpose of dividing the basin is to provide small storage areas in which water depth will rise rapidly from inflow, thereby resulting in rapid attainment of near maximum outflow. Inflow enters the north bay and, if a sufficiently large flood were to occur, inflow will also overtop the dike spillway and enter the south bay. The accumulated inflow into the south bay subsequently returns to the north bay through a 4.92-foot (1.500-meter) diameter conduit in the dike (photo 2). The conduit is 146.42 feet (44.630 meters) long, with a flap gate that prevent a north-to-south bay flow through the conduit. The maximum capacity of the conduit is 561 cfs (15.89 cms), which occurs when the south bay pool elevation is at spillway crest and there is no tailwater in the north bay. However, under flood conditions, the north bay will fill first, causing a tailwater to be present throughout the flood event. During the flood recession the average difference between the north and south pool elevations is 0.50 feet (0.152 meters), resulting in a south-to-north pool discharge of 77 cfs (2.19 cms) through the conduit. Except for spillway flow, the entire basin outflow is through the outlet works, that are located in the north bay portion of the basin (photo 3). The outlet works intake is protected by a trashrack, consisting of steel members and pipes. The trashrack will prevent large size debris from entering the intake structure and clogging the outlet conduit.



4. Project Operating Constraints. Since the dam's outlet works and emergency spillway are ungated facilities, there are no operating constraints at Tropicana Detention Basin, and there is no on-site dam tender. The entire basin is allocated exclusively to flood control, as shown on plate 17. The detention basin's elevation-area and elevation-storage capacity curves are shown on plates 18 and 19, respectively. The elevation-area and elevation-capacity relationships are presented in tabular format in tables I-3 and I-4, respectively. The elevation-discharge capacity curves of the outlet works and the emergency spillway are shown on plates 20 and 21, respectively. The elevation-discharge capacity relationships for the outlet works and emergency spillway are presented in tabular format in tables I-5 and I-6, respectively. The project is designed to reduce the 100-year peak inflow of 6,700 cfs to 497 cfs (189.72 m<sup>3</sup>/s to 14.07 m<sup>3</sup>/s). The project's routing of the reservoir design flood, which is the 100-year flood event, is shown on plate 22. The probable maximum flood routing is shown on plate 23.

5. Project Operation and Maintenance. Operation and maintenance (O&M) activities for Tropicana 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."

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 to maintain the required flood control volume in the basin. In addition, particular care should be taken to remove sediment from around the interior dike flap gate to ensure the gate's operation during subsequent flood events.

#### 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. The Los Angeles District, Corps of Engineers (Los Angeles District) should be contacted any time conditions are not normal and consultation or instructions regarding operation and maintenance is needed. Since Tropicana 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 emergency flood conditions, the Project Operator shall keep the Los Angeles District Reservoir Operations Center informed 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; and (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. In addition, the Clark County Department of Public Works is to have a person on site to monitor for any of these conditions.

3. Initial Filling of Detention Basin. During the first significant flood event, the Project Operator shall monitor and/or report on the condition of any seepage 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:

(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 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 as described in the Emergency Action Plan for Tropicana Detention Basin, Clark County, Nevada, U.S. Army Corps of Engineers, Los Angeles District.

(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 as described in the Emergency Action Plan for Tropicana Detention Basin, Clark County, Nevada.

(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 the type of 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 as described in Section 4 of the Emergency Action Plan for Tropicana Detention Basin, Clark County, Nevada.

(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 described in Section 4 of the Emergency Action Plan for Tropicana Detention Basin, Clark County, Nevada. In addition, gravel and/or rock should be placed in the sloughed area to stabilize the area.

#### C. Chain of Command for Reservoir Operations.

The chains of command for reservoir operations, along with respective telephone numbers, are shown in tables I-1 and I-2. Table I-1, which is the Army Corps of Engineers chain of command

is used for reference primarily during emergency operating conditions. Table I-2, which is the Clark County Chain of command, is used for reference for both normal and emergency operating conditions.

## II. DATA COLLECTION AND REPORTING

The Project Operator has one precipitation gage located at the detention basin (photo 4) and additional precipitation gages in the surrounding vicinity. There are water level (basin water surface elevation) gages within the two bays of the detention basin and a stage (water level) gage in the channel immediately downstream from the outlet works. Both precipitation and water level gages record in real time. Within the basin are staff gages and supplemental range lines for measuring sediment deposition. The location of all gages is shown on plate 24. The Project Operator shall obtain data from the National Weather Service on regional hydrometeorological conditions.

At the end of each water year (September 30), the Project Operator shall provide Los Angeles District with the year's reservoir water surface elevation, inflow and outflow data. This data will be used by Los Angeles District to determine the flood benefits of the project for each year and is used in other reports that Los Angeles District 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 Operation, Maintenance, and Repair Manual, Las Vegas Wash & Tributaries (Tropicana and Flamingo Washes), Las Vegas, Nevada. 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. The time interval of the data can range from 15 minutes, for intense storm events, to annual maximum/minimum values, for years of negligible storm activity. Data whose time interval is daily or more frequent should be transmitted in electronic format as well as using the afore-mentioned forms.

The Project Operator is responsible for maintaining the official record of all project data mentioned herein.

### III. WATER CONTROL ACTION AND REPORTING

#### A. Normal Conditions.

The Tropicana 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, the Project operator shall keep the Los Angeles District 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 Los Angeles District if sensitive information is requested, especially during emergency situations.

#### D. Water Control Problems.

The Los Angeles District must be contacted immediately in the event that an operational malfunction, erosion, or other incidents that could impact the project integrity or water control capability.

#### 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

The following reference documents apply to the Standing Instructions. Copies of these documents are to be kept on file by the Project Operator.

Design Memorandum, Tropicana Detention Basin and Outlet Channel, Department of the Army, Los Angeles District, Corps of Engineers, Los Angeles, California, July 1996

Operation, Maintenance, and Repair 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 Tropicana Detention Basin, U.S. Army Corps of Engineers, Los Angeles District, February 1999.

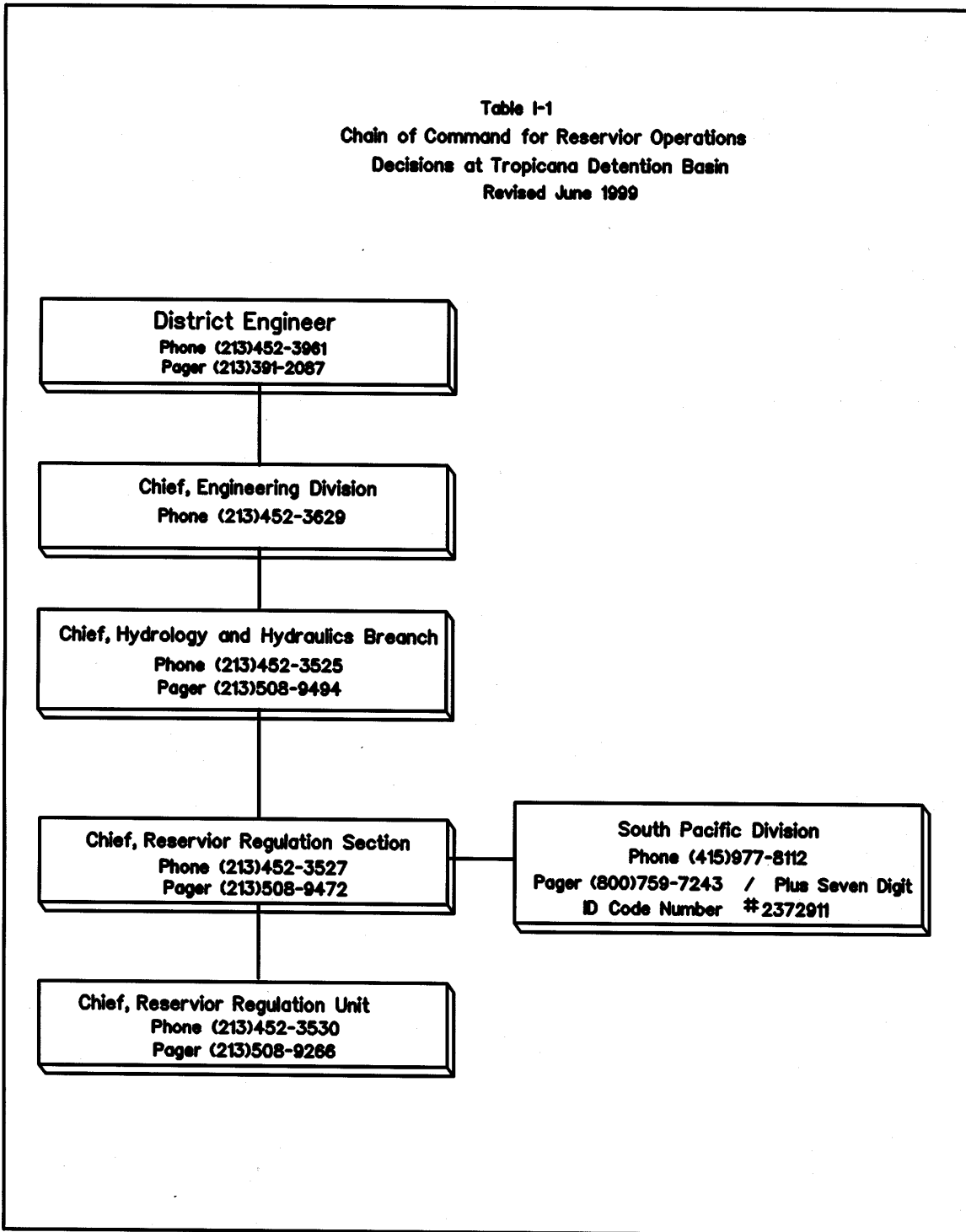
Management of Water Control Systems (EM 1110-2-3600), U.S. Army Corps of Engineers, 30 November 1987.



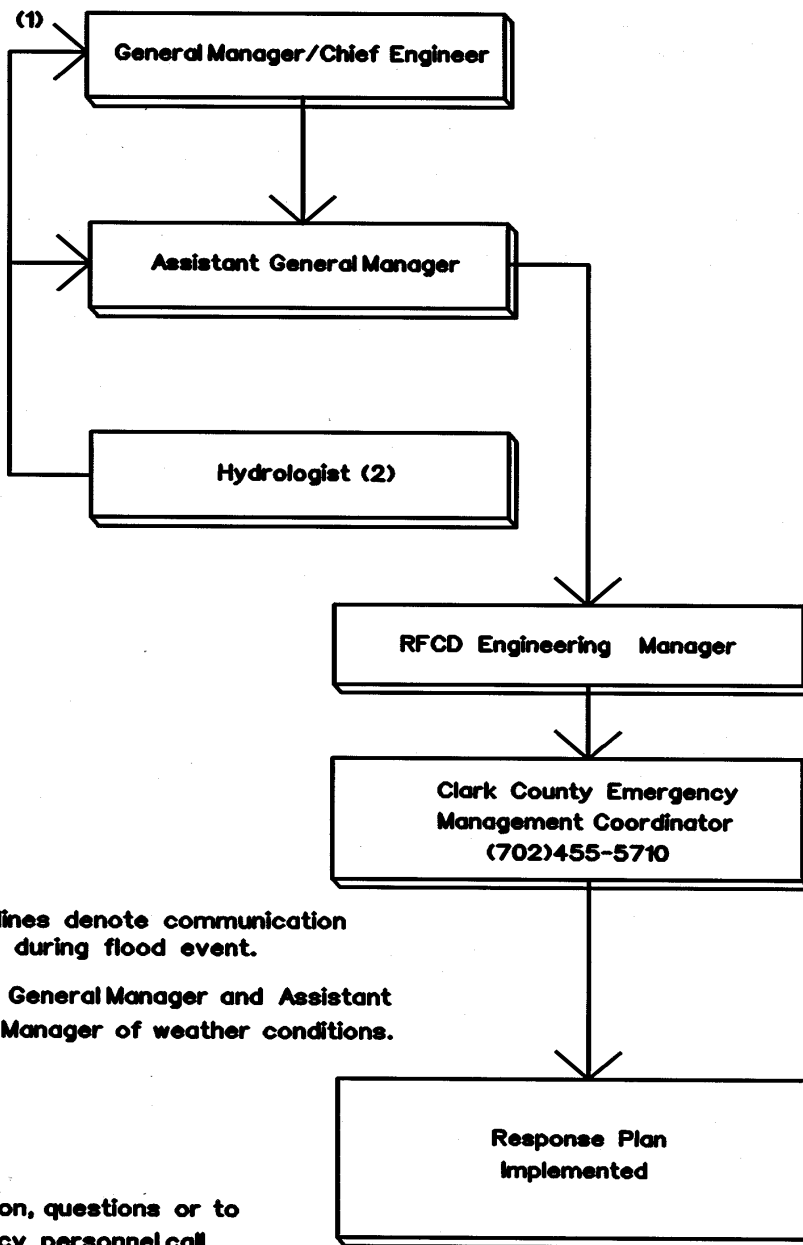
## V. UPDATING

Clark County Regional Flood Control District is responsible for updating table I-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 Tropicana Detention Basin**  
**Revised June 1999**



**Table I-2**  
**Chain of Command for Response Plan**  
**Implementation at Tropicana 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  
Tropicana Detention Basin Area Table<sup>1</sup>

Elevation (Feet, NAVD88)	Area - North Bay (Acres)	Area - South Bay (Acres)	Total Storage (Acres)
2251.60	0	0	0
2252	0.1	0.2	0.3
2253	0.2	0.5	0.7
2254	0.3	0.9	1.2
2255	0.5	1.3	1.8
2256	0.7	1.7	2.4
2257	0.9	2.2	3.1
2258	1.1	2.6	3.7
2259	1.4	3.1	4.5
2260	1.6	3.5	5.1
2261	1.9	4.2	6.1
2262	2.2	4.8	7.0
2263	2.6	5.5	8.1
2264	2.9	6.2	9.1
2265	3.2	6.8	10.0
2266	3.7	7.7	11.4
2267	4.2	8.6	12.8
2268	4.7	9.5	14.2
2269	5.2	10.5	15.7
2270	5.7	11.4	17.1
2271	6.4	12.4	18.8
2272	7.0	13.5	20.5
2273	7.7	14.6	22.3
2274	8.4	15.7	24.1
2275	9.0	16.8	25.8
2276	9.8	18.0	27.8
2277	10.6	19.3	29.9
2278	11.4	20.6	32.0
2279	12.2	21.9	34.1
2280	13.0	23.2	36.2
2281	----*	----*	37.9
2282	----*	----*	39.4
2283	----*	----*	41.0
2284	----*	----*	42.6
2285	----*	----*	44.2
2286	----*	----*	45.9
2287	----*	----*	47.5
2288	----*	----*	49.3
2289	----*	----*	51.0
2290	----*	----*	52.7
2291	----*	----*	54.0
2292	----*	----*	55.7
2293	----*	----*	57.8
2293.04	----*	----*	57.9

\*At elevation 2281 feet and above, the North and South bays are combined into a single pool.

1. Based on area table contained in Design Memorandum -- Tropicana Detention Basin and Outlet Channel -- July 1996. One-foot incremental area values linearly interpolated from irregular incremental metric area values.

Table I-3a  
Tropicana Detention Basin Area Table<sup>1</sup>  
(Metric Unit Version)

Elevation (Meters)	Area - North Bay (Square meters)	Area - South Bay (Square Meters)	Total Area Square meters
<b>686.29</b>	<b>0</b>	<b>0</b>	<b>0</b>
686.50	380	1040	1420
687.00	1283	3516	4799
<b>687.33</b>	<b>1880</b>	<b>5150</b>	<b>7030</b>
687.50	2382	6151	8533
688.00	3859	9096	12955
688.50	5336	12040	17376
<b>688.86</b>	<b>6400</b>	<b>14160</b>	<b>20560</b>
689.00	7012	15402	22413
689.50	9196	19836	29032
690.00	11380	24270	35650
<b>690.38</b>	<b>13040</b>	<b>27640</b>	<b>40680</b>
690.50	13833	29082	42915
691.00	17139	35088	52228
691.50	20445	41095	61540
692.00	23974	47338	71312
692.50	28392	54527	82919
693.00	32810	61717	94527
<b>693.43</b>	<b>36610</b>	<b>67900</b>	<b>104510</b>
693.50	37354	69086	106440
694.00	42669	77557	120227
694.50	47985	86029	134013
695.00	53300	94500	147800
695.50	----*	----*	158259
696.00	----*	----*	168719
<b>696.48</b>	----*	----*	<b>178760</b>
696.50	----*	----*	179216
697.00	----*	----*	190624
697.50	----*	----*	202032
698.00	----*	----*	213440
<b>698.31</b>	----*	----*	<b>218570</b>
698.50	----*	----*	222927
<b>698.61</b>	----*	----*	<b>225450</b>
<b>698.92</b>	----*	----*	<b>234190</b>

\*Above elevation 695.00 meters, the North and South bays are combined into a single pool.

1. Based on area table contained in Design Memorandum -- Tropicana Detention Basin and Outlet Channel -- July 1996. One-half meter incremental area values linearly interpolated from irregular incremental area values.

2. Bold numbers are actual elevations and areas obtained from Design Memorandum -- Tropicana Detention Basin and Outlet Channel -- July 1996.

Table I-4  
Tropicana Detention Basin Storage Table<sup>1</sup>

Elevation (Feet, NAVD88)	Storage - North Bay (Acre-Feet)	Storage - South Bay (Acre-Feet)	Total Storage (Acre-Feet)
2251.60	0	0	0
2252	0.1	0.2	0.3
2253	0.5	0.7	1.2
2254	0.8	1.1	1.9
2255	1.2	1.6	2.8
2256	2.2	4.0	6.2
2257	3.2	6.4	9.6
2258	4.2	8.7	12.9
2259	5.2	11.1	16.3
2260	6.3	13.5	19.8
2261	7.8	18.6	26.4
2262	9.4	23.8	33.2
2263	11.0	29.0	40.0
2264	12.6	34.2	46.8
2265	14.2	39.3	53.5
2266	18.7	48.5	67.2
2267	23.1	57.6	80.7
2268	27.6	66.7	94.3
2269	32.1	75.8	107.9
2270	36.6	85.0	121.6
2271	44.0	99.0	143.0
2272	51.3	113.0	164.3
2273	58.7	127.0	185.7
2274	66.0	141.0	207.0
2275	73.4	155.0	228.4
2276	85.1	174.9	260.0
2277	96.8	194.8	291.6
2278	108.5	214.7	323.2
2279	120.2	234.6	354.8
2280	131.9	254.5	386.4
2281	----*	----*	423.7
2282	----*	----*	462.0
2283	----*	----*	501.1
2284	----*	----*	541.6
2285	----*	----*	582.0
2286	----*	----*	630.5
2287	----*	----*	679.0
2288	----*	----*	727.5
2289	----*	----*	776.0
2290	----*	----*	824.5
2291	----*	----*	875.6
2292	----*	----*	930.7
2293	----*	----*	986.5
2293.04	----*	----*	987.4

\*At elevation 2281 feet and above, the North and South bays are combined into a single pool.

1. Based on storage table contained in Design Memorandum -- Tropicana Detention Basin and Outlet Channel -- July 1996. One-foot increment storage values linearly interpolated from irregular metric storage values.

Table I-4a  
Tropicana Detention Basin Storage Table<sup>1</sup>  
(Metric Unit Version)

Elevation (Meters, NAVD88)	Storage - North Bay (Cubic meters)	Storage - South Bay (Cubic Meters)	Total Storage (Cubic Meters)
<b>686.29</b>	<b>0</b>	<b>0</b>	<b>0</b>
686.50	289	396	685
686.60	427	585	1011
687.00	977	1339	2316
<b>687.33</b>	<b>1431</b>	<b>1961</b>	<b>3392</b>
687.50	2133	3596	5729
688.00	4196	8407	12603
688.50	6260	13217	19477
<b>688.86</b>	<b>7746</b>	<b>16680</b>	<b>24426</b>
689.00	8644	19614	28258
689.50	11853	30091	41943
690.00	15062	40568	55629
<b>690.38</b>	<b>17500</b>	<b>48530</b>	<b>66030</b>
690.50	19674	52957	72631
691.00	28733	71401	100134
691.50	37793	89845	127637
692.00	48013	110267	158280
692.50	62879	138600	201479
693.00	77745	166933	244679
<b>693.43</b>	<b>90530</b>	<b>191300</b>	<b>281830</b>
693.50	93850	196936	290786
694.00	117567	237190	354757
694.50	141283	277445	418729
695.00	165000	317700	482700
695.50	----*	----*	560233
<b>695.75</b>	----*	----*	<b>599000</b>
696.00	----*	----*	639925
<b>696.48</b>	----*	----*	<b>718500</b>
696.50	----*	----*	722428
697.00	----*	----*	820618
697.50	----*	----*	918809
698.00	----*	----*	1017000
<b>698.31</b>	----*	----*	<b>1081000</b>
<b>698.61</b>	----*	----*	<b>1148000</b>
<b>698.92</b>	----*	----*	<b>1218000</b>

\*Above elevation 695.00 meters, the North and South bays are combined into a single pool.

1. Based on storage table contained in Design Memorandum -- Tropicana Detention Basin and Outlet Channel -- July 1996. One-half meter incremental storage values linearly interpolated from irregular incremental storage values.

2. Bold numbers are actual elevations and storages obtained from Design Memorandum -- Tropicana Detention Basin and Outlet Channel -- July 1996.



Table I-5  
Tropicana Detention Basin  
Outlet Works Discharge Table

Elevation (Feet, NAVD88)	Discharge (cfs)	Elevation (Feet, NAVD88)	Discharge (cfs)	Elevation (Feet, NAVD88)	Discharge (cfs)
2251.6	0	2267	308	2283	450
2252	1	2268	315	2284	457
2253	5	2269	326	2285	465
2254	11	2270	336	2286	472
2255	19	2271	346	2287	479
2256	28	2272	356	2288	487
2257	153	2273	365	2289	494
2258	174	2274	375	2290*	500
2259	193	2275	384	2291*	507
2260	210	2276	393	2292*	514
2261	226	2277	401	2293*	521
2262	241	2278	410		
2263	255	2279	418		
2264	268	2280	426		
2265	280	2281	434		
2266	292	2282	442		

\*Refer to table I-6 for total discharge.

Table I-6  
Tropicana Detention Basin  
Outlet Works and Emergency Spillway Discharge Table

Elevation (Feet, NAVD88)	Outlet Works Discharge (cfs)	Spillway Discharge (cfs)	Total Discharge (cfs)
2290	500	0	500
2291	507	7768	8275
2292	514	22726	23240
2293	521	43149	43670

Table I-5a  
Tropicana Detention Basin  
Outlet Works Discharge Table  
(Metric Unit Version)

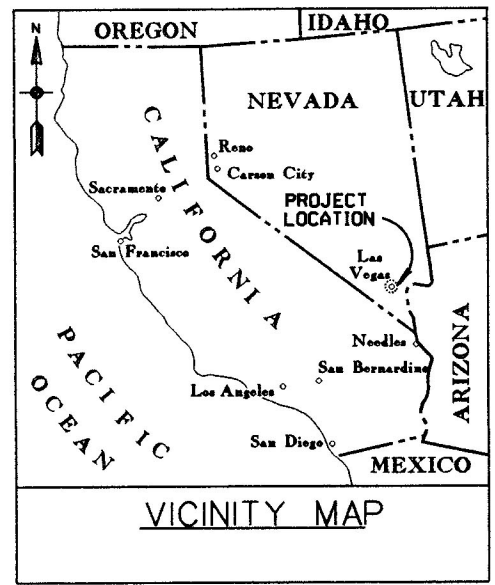
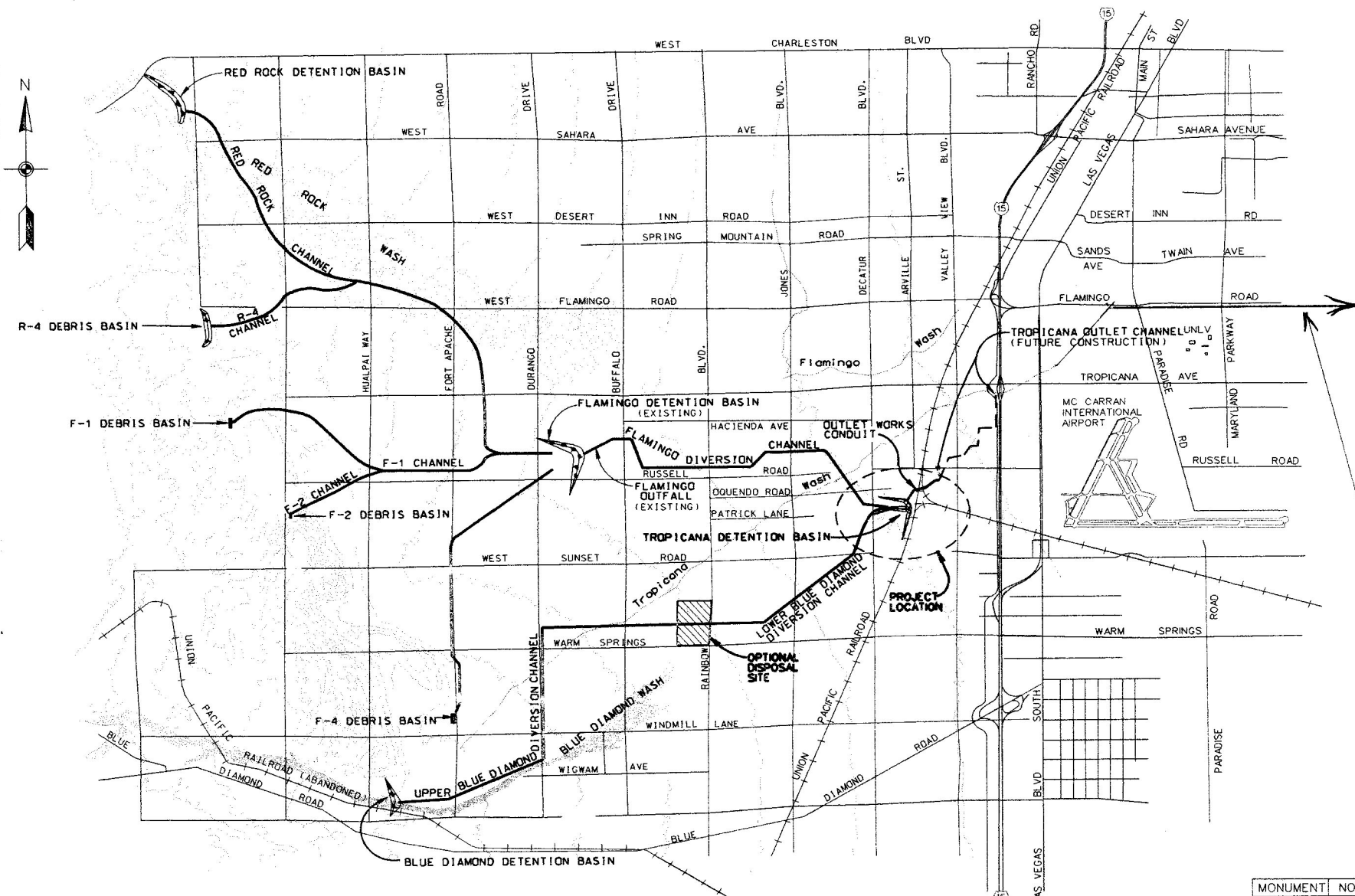
Elevation (Meters, NAVD88)	Discharge (cms)	Elevation (Meters, NAVD88)	Discharge (cms)	Elevation (Meters, NAVD88)	Discharge (cms)
686.30	0.00	690.50	8.07	<b>695.75</b>	<b>12.62</b>
686.50	0.03	691.00	8.61	696.00	12.83
687.00	0.24	691.50	9.12	<b>696.47</b>	<b>13.16</b>
<b>687.33</b>	<b>0.47</b>	<b>691.90</b>	<b>9.52</b>	696.50	13.18
687.50	0.62	692.00	9.60	697.00	13.51
687.60	0.72	692.50	10.07	697.50	13.84
688.00	1.20	693.00	10.50	<b>698.00*</b>	<b>14.17</b>
688.50	5.38	<b>693.42</b>	<b>10.87</b>	698.30*	14.36
<b>688.85</b>	<b>5.96</b>	693.50	10.92	698.50*	14.48
689.00	6.16	694.00	11.33	<b>698.60*</b>	<b>14.55</b>
689.50	6.86	694.50	11.72	<b>698.91*</b>	<b>14.74</b>
690.00	7.49	<b>695.00</b>	<b>12.11</b>	699.00*	14.79
<b>690.37</b>	<b>7.94</b>	695.50	12.47		

\*Refer to table I-6a for total discharge.

Table I-6a  
Tropicana Detention Basin  
Outlet Works and Emergency Spillway Discharge Table  
(Metric Unit Version)

Elevation (Meters, NAVD88)	Outlet Works Discharge (cms)	Spillway Discharge (cms)	Total Discharge (cms)
698.00	14.17	0.000	14.17
<b>698.30</b>	<b>14.36</b>	<b>220.000</b>	<b>234.36</b>
698.50	14.48	481.982	496.47
<b>698.60</b>	<b>14.55</b>	<b>643.600</b>	<b>658.15</b>
<b>698.91</b>	<b>14.74</b>	<b>1222.000</b>	<b>1236.74</b>
699.00	14.79	1261.000	1275.79

Bold numbers in the above tables are actual elevations and discharges obtained from Design Memorandum -- Tropicana Detention Basin and Outlet Channel -- July 1996.



TO COLORADO RIVER

NOTE:  
ALL ROADS SHOWN ON THIS DRAWING MAY NOT BE EXISTING.  
THE ROUTE FOR SITE ACCESS AND DISPOSAL OF MATERIAL  
SHALL BE VERIFIED BY THE CONTRACTOR.

PROJECT LOCATION MAP

SCALE: 1000 500 0 1000 2000 METER

ABBREVIATIONS AND SYMBOLS

ABT.	ABOUT	GALV.	GALVANIZED	RT.	RIGHT
A.B.C.	AGGREGATE BASE COURSE	G.B.	GRADE BREAK	R/W	RIGHT-OF-WAY
A.C.	ASPHALTIC CONCRETE	HORIZ./H	HORIZONTAL	S-	SLOPE EQUALS
APPROX.	APPROXIMATELY	HT/H	HEIGHT	S.	SOUTH
AVE.	AVENUE	INV.	INVERT	S.C.	SPIRAL TO CURVE
B.C.	BEGINNING-OF-CURVE	L	LENGTH-OF-CURVE	SE	SOUTHEAST
BLVD.	BOULEVARD	L	LENGTH-OF-CURVE	SEC.	SECTION
BOT.	BOTTOM	LT.	LEFT	SHT.	SHEET
CEMT.	CEMENT	MAT'L	MATERIAL	ST.	STREET
CL	CENTERLINE/CONTROL LINE	MAX.	MAXIMUM	ST.	SPIRAL TO TARGET
CL/CLR.	CLEARANCE	MIN.	MINIMUM	STA.	STATION
COMP.	COMPACTED	MISC.	MISCELLANEOUS	STD.	STANDARD
CONC.	CONCRETE	MSL	MEAN SEA LEVEL	STL.	STEEL
CONSTR. JT./C.J.	CONSTRUCTION JOINT	N.	NORTH	SW	SOUTHWEST
COR.	CORNER	NE	NORTHEAST	SYMM.	SYMMETRICAL
C.S.	CURVE TO SPIRAL	N.I.C.	NOT IN CONTRACT	T.C.E.	TEMPORARY CONSTRUCTION EASEMENT
Δ	DEFLECTION ANGLE	NO.	NUMBER	T.H.	TEST HOLE
Δ	SPIRAL DEFLECTION ANGLE	N.T.S.	NOT TO SCALE	T.S.	TANGENT TO SPIRAL
DIA.	DIAMETER	NW	NORTHWEST	TYP.	TYPICAL
DR.	DRIVE	Ø	DIAMETER	V	VERTICAL
E.	EAST	O.C.	ON CENTER	W.	WEST
E.C.	END-OF-CURVE	P.I.	POINT-OF-INTERSECTION		
E.F.	EACH FACE	R	PROPERTY LINE		
EL./ELEV.	ELEVATION	PLS	PROFESSIONAL LAND SURVEYOR		
E.W.	EACH WAY	R	RADIUS		
EXIST.	EXISTING	RD.	ROAD		
F.G.	FINISHED GRADE	R.C.C.	ROLLER COMPACTED CONCRETE		

LEGEND

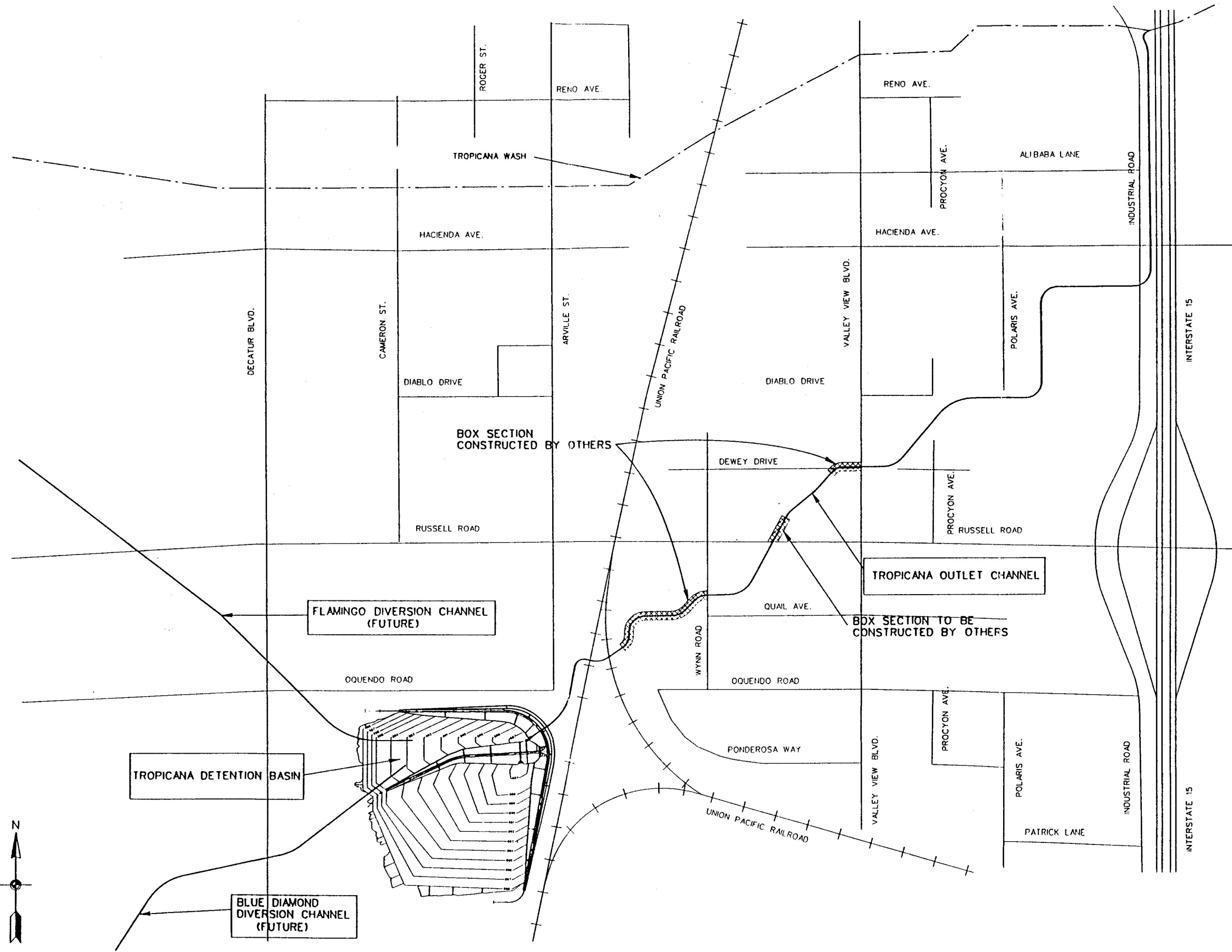
SYMBOL	DESCRIPTION
x 635.300	EXISTING ELEVATION
* 633.500	FINISHED GRADE ELEVATION
---	CENTERLINE/CONTROL LINE
---	RIGHT-OF-WAY
---	CONSTRUCTION EASEMENT
----	FENCE
----	RAILROAD
---	TOP OF SLOPE
---	TOE OF SLOPE

SURVEY CONTROL MONUMENTS

MONUMENT	NORTHING	EASTING	ELEVATION	DESCRIPTION
SEC. COR. 25   30 36   31	8 148 315.927	233 810.237	697.191	0.076 BLM BRASS DISK LOCATED AT DECATUR BLVD. AND RUSSELL RD., 19.812 SE OF A POWER POLE AND 15.24 N. AND W. OF A STORM DRAIN AND 25.908 W. OF END A.C. PAVEMENT.
N 1/16 COR. 36   31	8 147 910.821	233 812.294	700.200	ALUMINUM CAP PLS 9041 LOCATED AT DECATUR BLVD. AND OQUENDO RD., 9.144 NE OF A WATER VALVE AND 30.480 NW OF A 0.600X1.220 POST.
1/4 COR. 36   31	8 147 505.688	233 814.297	703.013	0.050 BRASS CAP IN CONCRETE, PLS 6015, LOCATED AT DECATUR BLVD AND PATRICK LANE.
NW 1/16 COR. SEC. 31	8 147 911.673	234 178.040	698.127	ROD AND CAP, PLS 9047, LOCATED AT CAMERON ST. AND OQUENDO RD.
W 1/16 COR. SEC. 31	8 147 507.030	234 179.809	697.486	ROD AND CAP, PLS 9047, LOCATED AT CAMERON ST. AND PATRICK LANE.
SW 1/16 COR. SEC. 31	8 147 102.430	234 181.527	703.301	0.040 ALUMINUM CAP PLS 9047, LOCATED AT CAMERON ST. AND OQUENDO RD., 0.076 EAST OF DIRT ROAD EDGE AND 0.120 BELOW GROUND LEVEL.
1/4 COR. 30   31	8 148 316.737	234 595.948	686.157	0.050 BRASS CAP MON. PLS 7004, LOCATED AT ARVILLE ST. AND RUSSELL RD., 26.520 SW OF A LIGHT POLE, 26.520 SE OF A POWER POLE AND 25.910 NW OF A LIGHT POLE.
N 1/16 COR. SEC. 31	8 147 912.634	234 596.369	693.746	REBAR WITH PLASTIC CAP, PLS 4046, LOCATED AT ARVILLE ST. AND OQUENDO RD., 67.06 WEST OF RAILROAD.
CEN 1/4 COR. SEC. 31	8 147 508.520	234 596.804	697.310	0.076 BLM CAP LOCATED AT ARVILLE ST. AND PATRICK LANE ON AN EARTHEN MOUND 10.670 WEST OF RAILROAD.

AS BUILT

DESIGNED BY: J. SERRANO	U.S. ARMY ENGINEER DISTRICT	ROBERT L. HALL, P.E.
DRAWN BY: J. SERRANO	LOS ANGELES	
CHECKED BY: G. DAVIS	CORPS OF ENGINEERS	
CADD FILE NAME: TROP-2.DGN		
SHEET 2 OF 44		
DISTRICT FILE NO: 186/161		
SYMBOL	DESCRIPTIONS	REVISIONS
DATE		
APPROVAL		



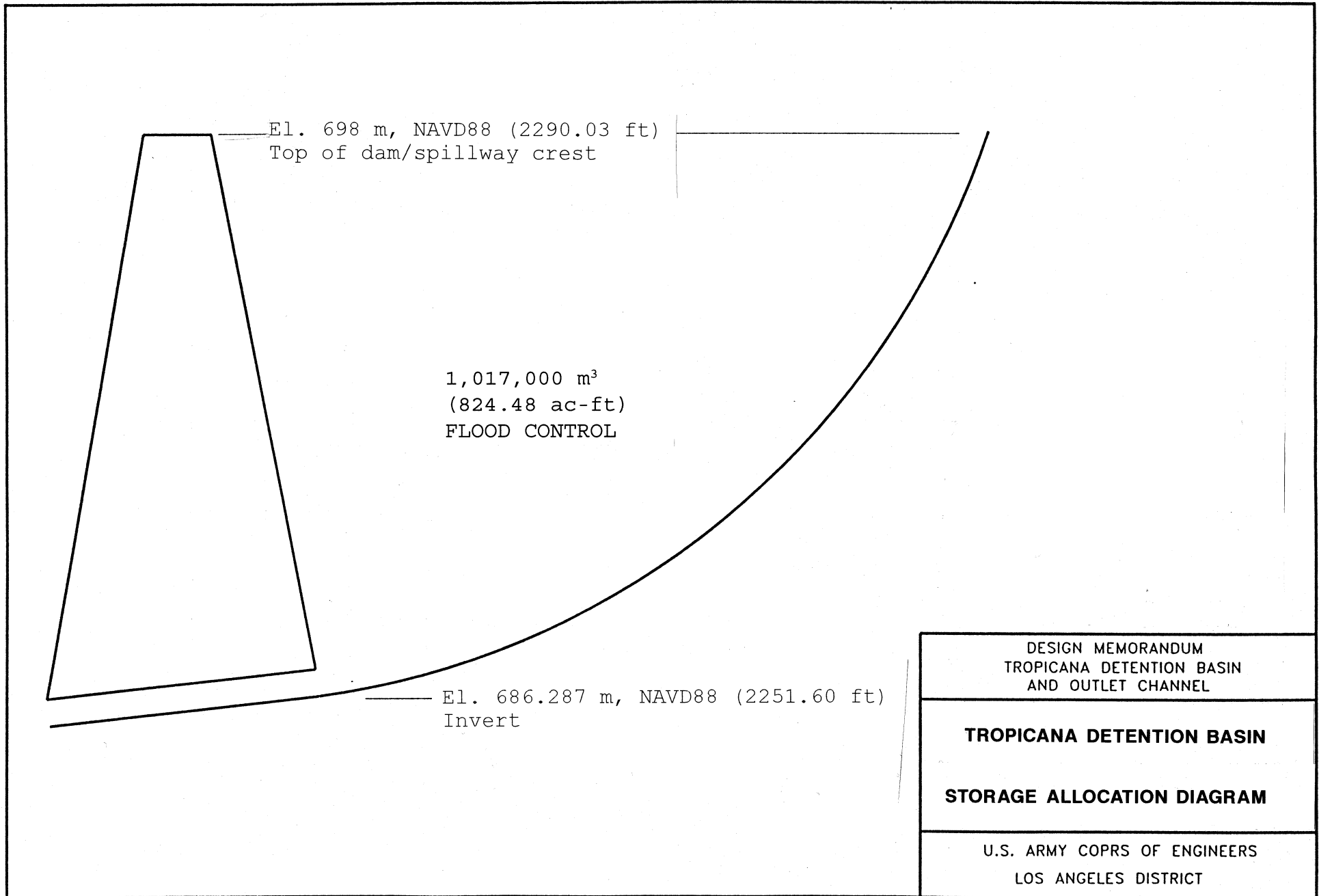
SYMBOL	DESCRIPTIONS	DATE	APPROVAL

**PROJECT LOCATION**  
 LAS VEGAS WASH AND TRIBUTARIES  
 (TROPICANA AND FLAMINGO WASHES), NEVADA  
**TROPICANA DETENTION BASIN  
 AND OUTLET CHANNEL**

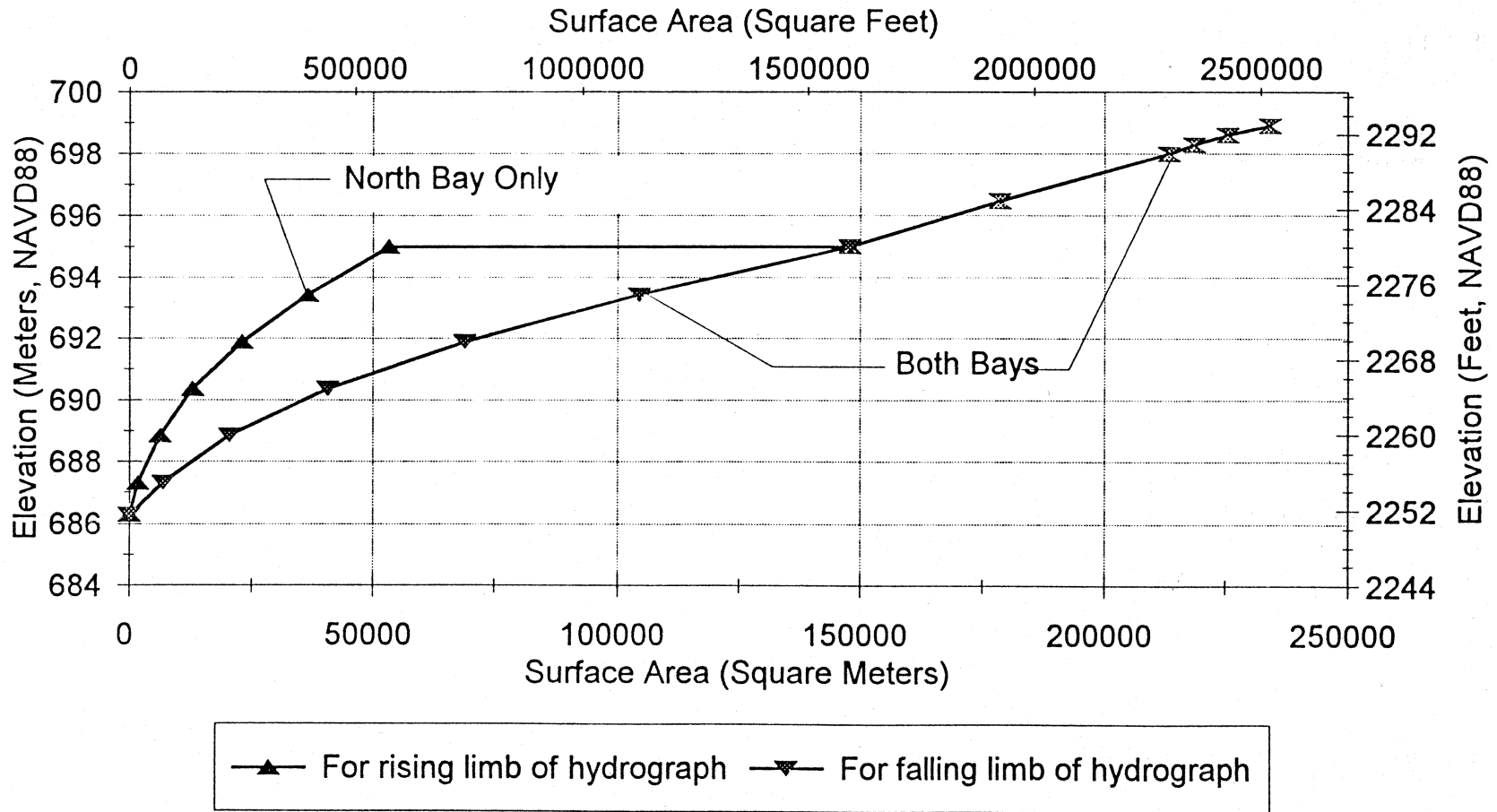
DESIGNED BY: T. CARSON	DISTRICT FILE NO.	U.S. ARMY ENGINEER DISTRICT LOS ANGELES CORPS OF ENGINEERS	CADD FILE NAME: #108502.DGN
DRAWN BY: J. SEPANO	SCALE: 1"=100'	SUBMITTED BY: <b>ROBERT L. HALL, P.E.</b> CHIEF DESIGN BRANCH	SHEET 7 OF 9 SHEETS
CHECKED BY: C. DAVIS	DATE		

**Plates 3a-16 are not currently available.**

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

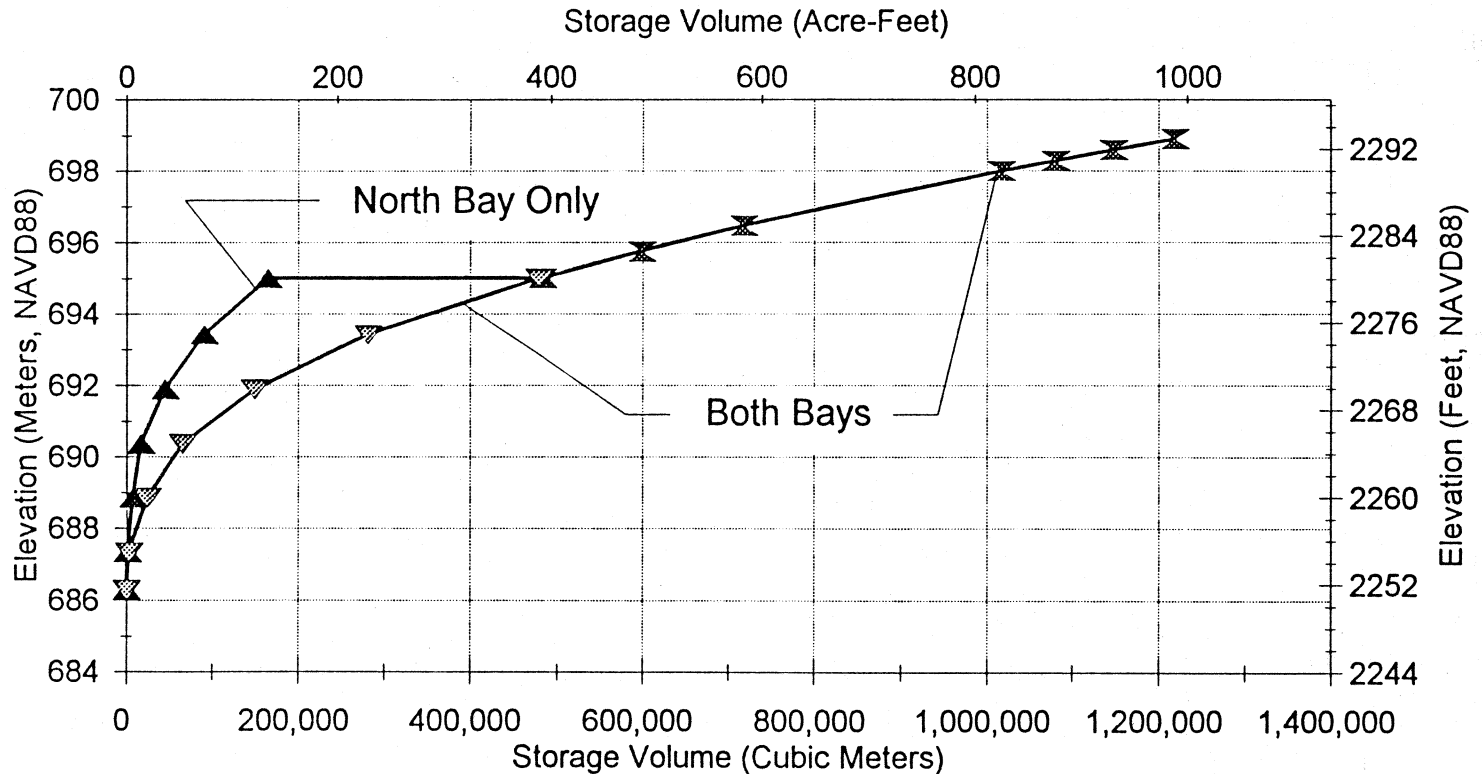


TROPICANA DETENTION BASIN  
 SURFACE AREA VS. ELEVATION CURVES



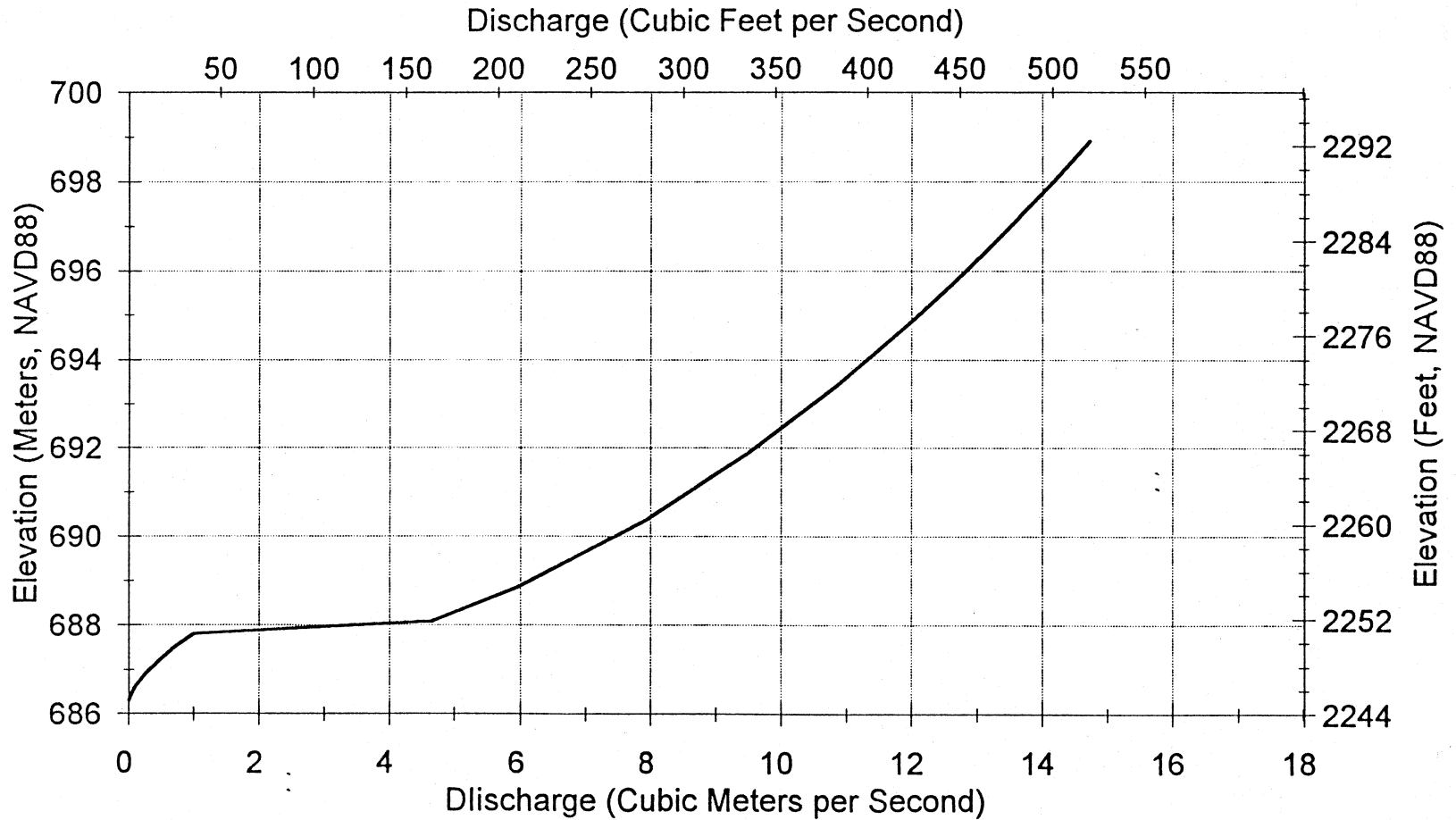


### TROPICANA DETENTION BASIN STORAGE VOLUME VS. ELEVATION CURVES



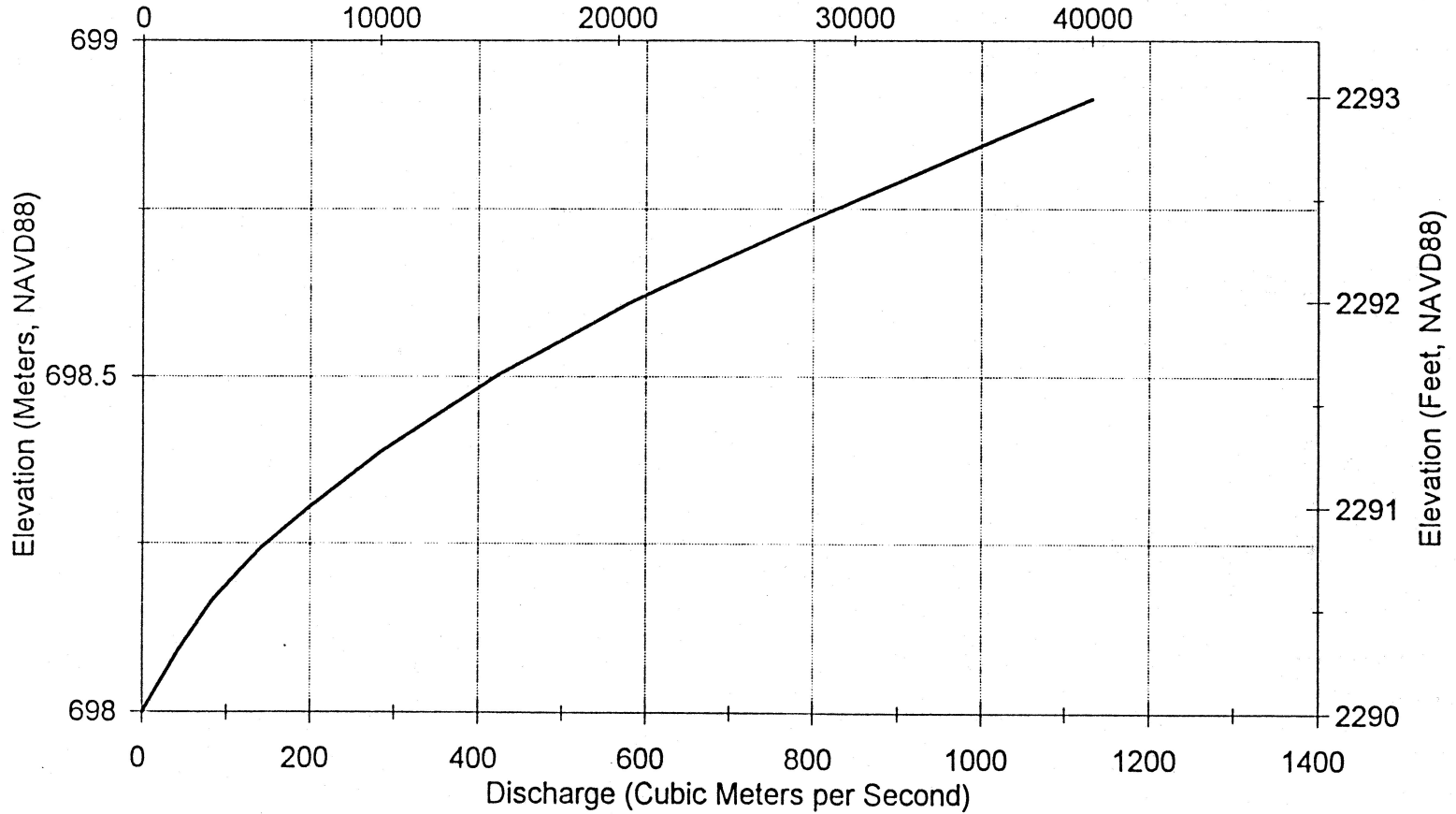
For rising limb of hydrograph
 
 For falling limb of hydrograph

TROPICANA DETENTION BASIN  
OUTLET DISCHARGE CURVE

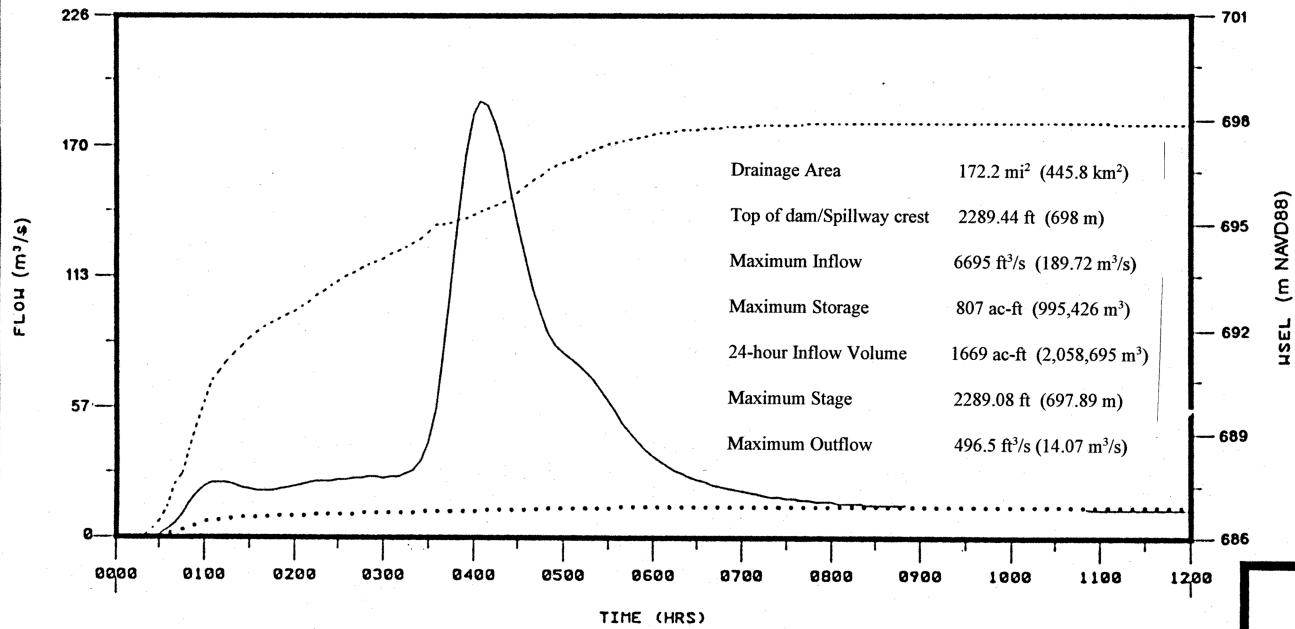
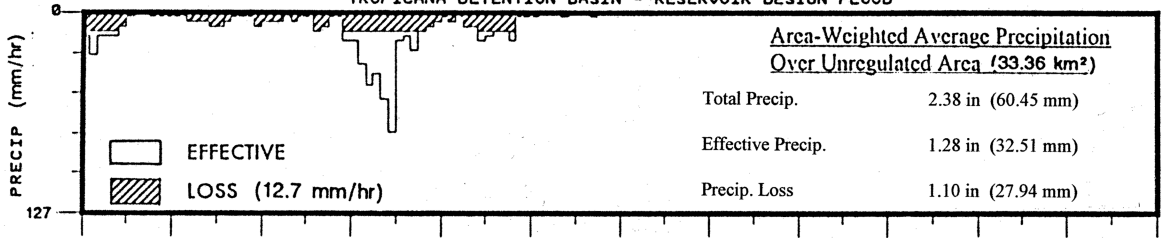


### TROPICANA DETENTION BASIN SPILLWAY RATING CURVE

Discharge (Cubic Feet per Second)



TROPICANA DETENTION BASIN - RESERVOIR DESIGN FLOOD



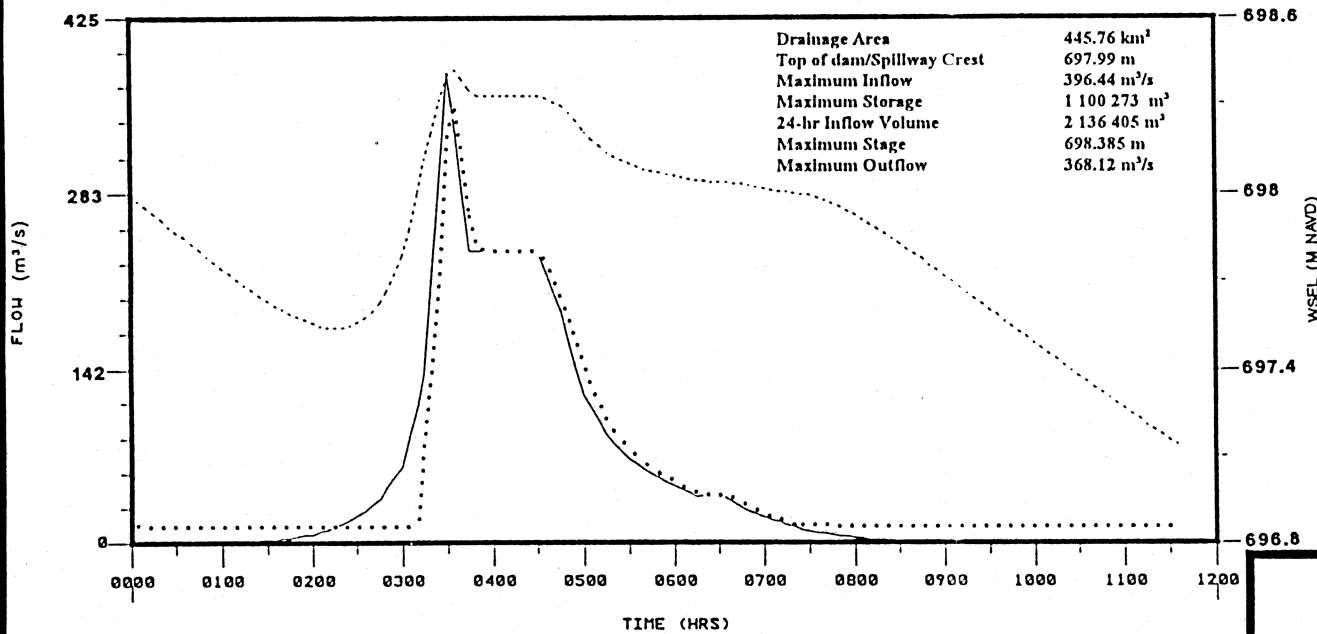
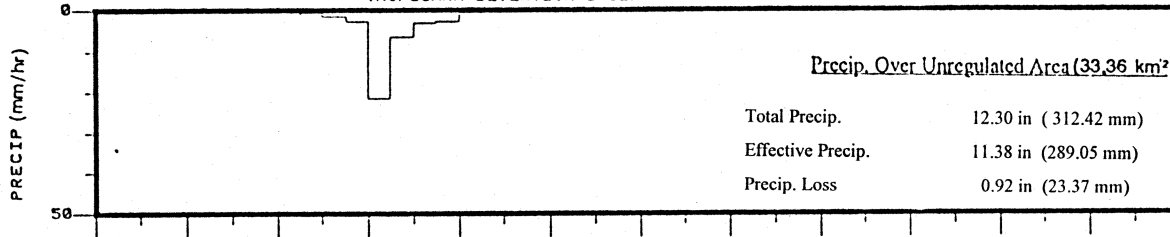
— INFLOW  
 ..... OUTFLOW  
 - - - - - WATER SURFACE ELEVATION  
 VERTICAL SCALE ROUNDED

DESIGN MEMORANDUM  
 TROPICANA DETENTION BASIN  
 AND OUTLET CHANNEL

RESERVOIR DESIGN FLOOD  
 BASIN HYETOGRAPH &  
 INFLOW, OUTFLOW, AND STAGE  
 HYDROGRAPHS

U.S. ARMY CORPS OF ENGINEERS  
 LOS ANGELES DISTRICT

TROPICANA DETENTION BASIN - PROBABLE MAXIMUM FLOOD



Drainage Area	445.76 km <sup>2</sup>
Top of dam/Spillway Crest	697.99 m
Maximum Inflow	396.44 m <sup>3</sup> /s
Maximum Storage	1 100 273 m <sup>3</sup>
24-hr Inflow Volume	2 136 405 m <sup>3</sup>
Maximum Stage	698.385 m
Maximum Outflow	368.12 m <sup>3</sup> /s

Drainage Area	172.2 mi <sup>2</sup> (445.8 km <sup>2</sup> )
Top of dam/Spillway crest	2289.44 ft (698 m)
Maximum Inflow	13,973.9 ft <sup>3</sup> /s (396 m <sup>3</sup> /s)
Maximum Storage	892 ac-ft (1,100,273 m <sup>3</sup> )
24-hour Inflow Volume	1731.99 ac-ft (2,136,405 m <sup>3</sup> )
Maximum Stage	2290.75 ft (698.40 m)
Maximum Outflow	12,985.8 ft <sup>3</sup> /s (368 m <sup>3</sup> /s)

——— INFLOW  
 ..... OUTFLOW  
 - - - - - WATER SURFACE ELEVATION

DESIGN MEMORANDUM  
 TROPICANA DETENTION BASIN  
 AND OUTLET CHANNEL  
  
**PROBABLE MAXIMUM FLOOD**  
**BASIN HYETOGRAPH &**  
**INFLOW, OUTFLOW, AND STAGE**  
**HYDROGRAPHS**  
  
 U.S. ARMY CORPS OF ENGINEERS  
 LOS ANGELES DISTRICT

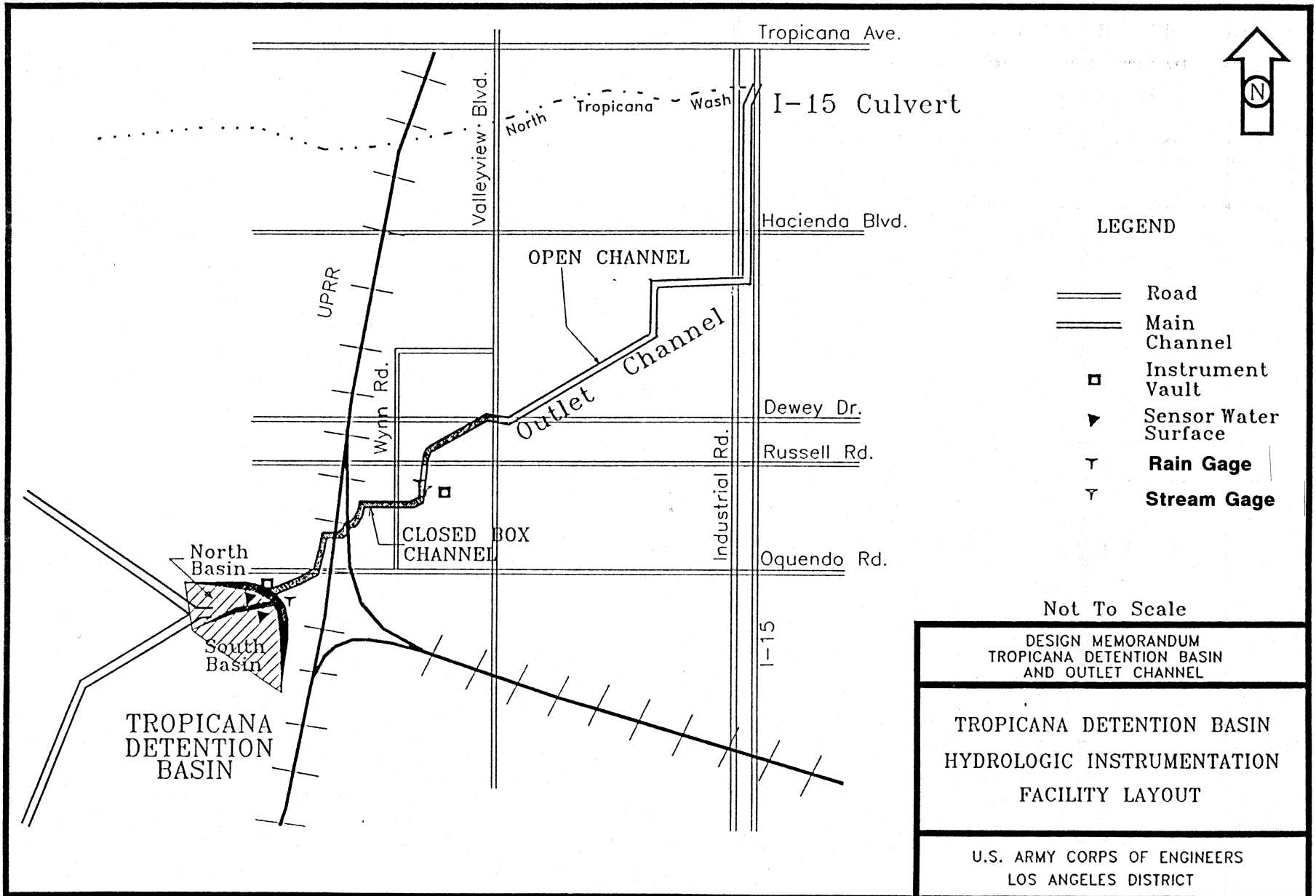




Photo 1. Tropicana Detention Basin. Dike (with individuals atop) separating north and south bays. Outlet works intake structure (with enclosing fence) is at right of photo.





Photo 2. Tropicana Detention Basin. North bay showing downstream end of south-to-north bay conduit.





Photo 3. Tropicana Detention Basin. Outlet works intake structure.

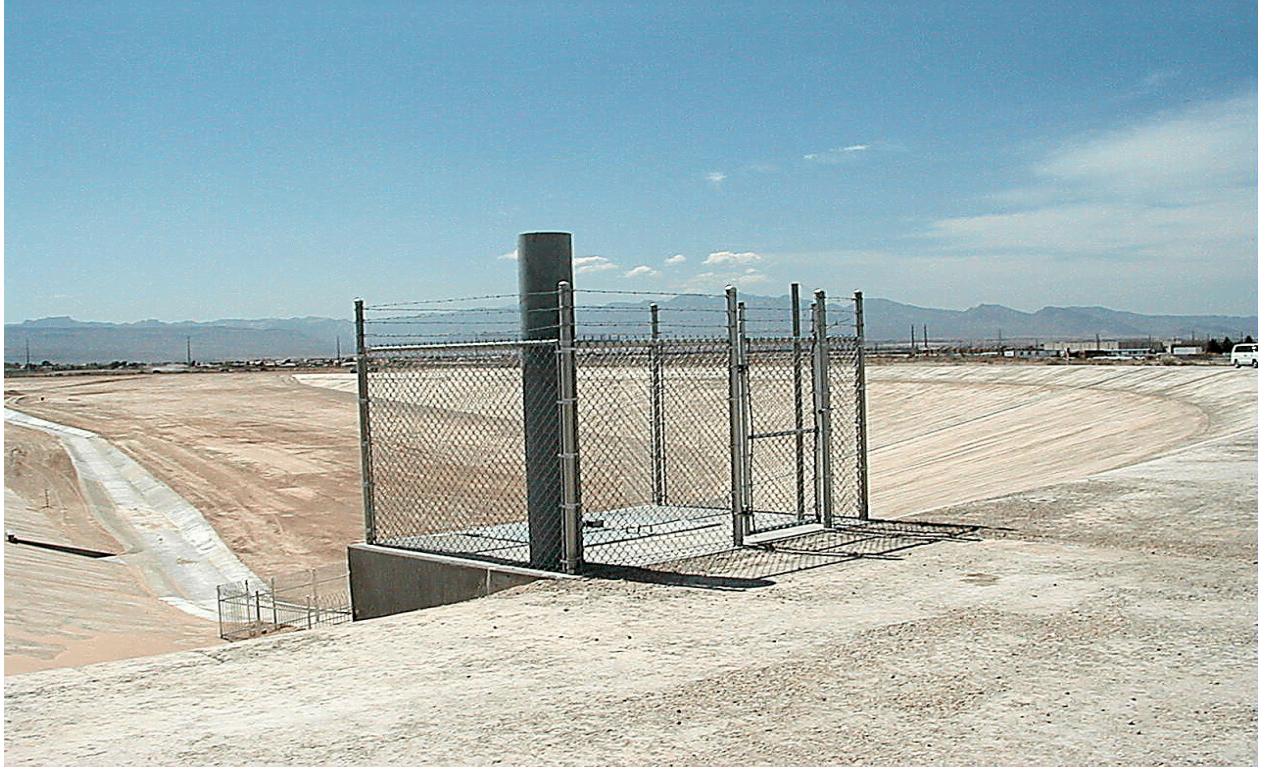


Photo 4. Tropicana Detention Basin. Instrumentation vault and precipitation gage (pipe).