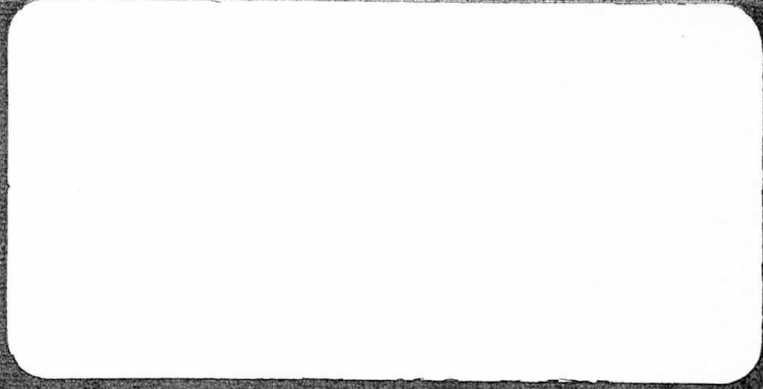


P-2



WINZLER & KELLY
Consulting Engineers

RENO DRAINAGE STUDY
ANALYSIS OF THE
PARR BLVD./CATRON DRIVE
DRAINAGE DEFICIENCY AREA

AREA 19 OF 21

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PRELIMINARY

A. INTRODUCTION

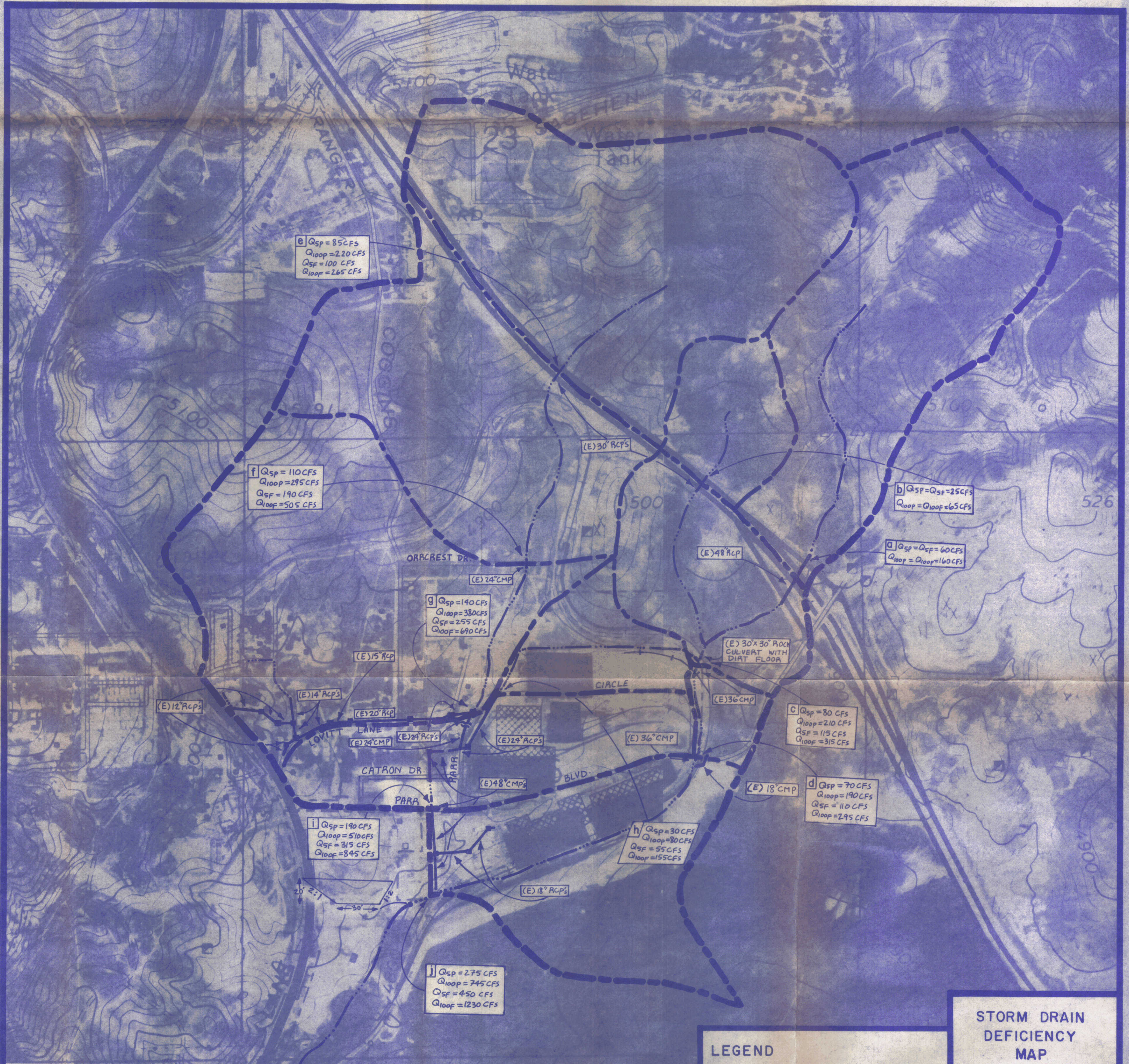
The Parr Blvd./Catron Drive drainage deficiency area is a large drainage system consisting of approximately 785 acres.

The drainage basin is intersected in the middle by U.S. 395. The flows begin in the underdeveloped hills in the northeast and generally flows southwest in existing drainage ditches after crossing U.S. 395 via three separate pipe culverts. (Refer to Figure 1 attached to the back of this report.)

B. FIELD ANALYSIS

The Present Land Use Map shows the drainage basin to consist largely of unimproved and vacant land (89%) with the remainder consisting almost entirely of industrial development (8%). There is a very small area of single family residential.

The Future Land Use Map indicates a marked increase in single family residential (33%), a moderate increase in industrial or distribution and warehousing (31%), with the remainder as unimproved, open space, and rural. There is a very small area of multi-residential and neighborhood commercial (totaling less than 4%).



e $Q_{sp} = 85 \text{ CFS}$
 $Q_{loop} = 220 \text{ CFS}$
 $Q_{sf} = 100 \text{ CFS}$
 $Q_{loof} = 265 \text{ CFS}$

f $Q_{sp} = 110 \text{ CFS}$
 $Q_{loop} = 295 \text{ CFS}$
 $Q_{sf} = 190 \text{ CFS}$
 $Q_{loof} = 505 \text{ CFS}$

b $Q_{sp} = Q_{sf} = 25 \text{ CFS}$
 $Q_{loop} = Q_{loof} = 65 \text{ CFS}$

a $Q_{sp} = Q_{sf} = 60 \text{ CFS}$
 $Q_{loop} = Q_{loof} = 160 \text{ CFS}$

g $Q_{sp} = 140 \text{ CFS}$
 $Q_{loop} = 380 \text{ CFS}$
 $Q_{sf} = 255 \text{ CFS}$
 $Q_{loof} = 690 \text{ CFS}$

c $Q_{sp} = 80 \text{ CFS}$
 $Q_{loop} = 210 \text{ CFS}$
 $Q_{sf} = 115 \text{ CFS}$
 $Q_{loof} = 315 \text{ CFS}$

d $Q_{sp} = 70 \text{ CFS}$
 $Q_{loop} = 190 \text{ CFS}$
 $Q_{sf} = 110 \text{ CFS}$
 $Q_{loof} = 295 \text{ CFS}$

i $Q_{sp} = 190 \text{ CFS}$
 $Q_{loop} = 510 \text{ CFS}$
 $Q_{sf} = 315 \text{ CFS}$
 $Q_{loof} = 845 \text{ CFS}$

h $Q_{sp} = 30 \text{ CFS}$
 $Q_{loop} = 80 \text{ CFS}$
 $Q_{sf} = 55 \text{ CFS}$
 $Q_{loof} = 155 \text{ CFS}$

j $Q_{sp} = 275 \text{ CFS}$
 $Q_{loop} = 745 \text{ CFS}$
 $Q_{sf} = 450 \text{ CFS}$
 $Q_{loof} = 1230 \text{ CFS}$

LEGEND
 Drainage Boundary
 Sub-Drainage Boundary
 Drainage Node

STORM DRAIN DEFICIENCY MAP
FIGURE 1
 AREA 19 OF 21
 9/85
 1" = 500'

This change in runoff coefficient, all else being equal, would increase the runoff approximately 65%, a significant increase. Thus, care must be used in allowing future development before first analyzing the existing and future drainage requirements.

The drainage area consists largely of relatively steep, unimproved grassy hillsides with sparse sagebrush and other vegetation in the northern upper reaches. This gives way to flatter terrain and minor industrial development consisting mainly of warehouses in the Parr Boulevard and Parr Circle area.

There are two main subdrainages. One crosses U.S. 395 through a 30-inch RCP culvert and continues south across Orrcrest Drive in a 24-inch CMP. There is a storm drain system on Lovitt Lane which carries the street flows from Lovitt Lane and Emery Drive and Carson Lane. This system and the previously mentioned ditch, flow south in a 24-inch pipe until they reach the 48-inch CMP crossing Parr Boulevard.

There is also another 24-inch storm drain on Parr Circle which carries the Parr Circle area flows and the ditch flows from north of Parr Circle. This system also reaches the 48-inch CMP system and crosses Parr Blvd. in a 48-inch CMP.

The major part of flows from the other main drainage crosses U.S. 395 in a 48-inch RCP and joins the rest of this subdrainage flow which crosses U.S. 395 through a 30-inch RCP, before reaching the railroad tracks.

Once the flows cross the railroad tracks, they proceed south in a ditch paralleling Parr Circle and cross Parr Blvd. via a 36-inch CMP. The flows from east of the railroad track cross Parr Boulevard in an 18-inch CMP and proceed southwest in a drainage ditch along the south side of the warehouses located at the intersection of Parr Boulevard and east Parr Circle.

The ditch from this subdrainage and the 48-inch CMP from the other subdrainage join and proceed south in a major drainage ditch beginning approximately 750 feet south of Parr Boulevard.

C. ESTIMATED STORM RUNOFF

Estimated storm runoff for a 5-year as well as a 100-year storm is calculated at selected nodes. These nodes and the related flows are shown on Figure 1, the project boundary map appended at the back of this report. Table 1 summarizes these nodes, giving location, description of node, capacity of node, and estimated storm runoff at the node. The existing capacity assumes inlet control. Generally, a range is given. The lower value assumes no head at the inlet, while the higher value is at maximum head on the culvert.

It should be noted that the storm runoffs are based on summer storms, which give more conservative values than the winter storms. (Refer to the wet and dry isopleth maps in the Reno Drainage Study Preliminary Report: Deficiency areas Within the City Limits, December, 1984.)

D. CONCLUSIONS

The existing drainage structures, for the most part, are significantly undersized for even the present land use 5-year storm event (refer to Table 1).

In the first subdrainage discussed, the entire system down to Parr Boulevard is undersized.

The small subdrainage to the north of Parr Circle and the major subdrainage near the end of this drainage (nodes g and i) are both significantly undersized, as is evident from Table 1. In the other main subdrainage, the culverts crossing U.S. 395 are adequate for even the 100-year storm event assuming maximum head on the culvert, however the railroad crossing and the culverts crossing Parr Boulevard are somewhat undersized for even the present land use 5-year storm event.

The drainage ditch along the south side of the warehouses located at the intersection of Parr Boulevard and east Parr Circle seems to be adequate for the predicted flows at node d. The major drainage ditch, downstream of this ditch, has an extremely high capacity of 5000 cfs which is quite adequate for even the estimated future runoffs.

It is recommended that the undersized pipes in the upper reaches of the drainage basin remain as it will aid in slowing or reducing flows reaching the developed area downstream. In addition, use of storage basins upstream of node c, e and f is advisable since it would hold back flows from reaching the downstream nodes, thus negating the need for major storm drainage upsizing. Part of these upstream areas are shown as distribution and warehousing and single family residential on the future land use map and as basically vacant or unimproved on the present land use map. However, it is doubtful that much development will occur in these areas in the near future. Furthermore, the use of storage basins is a cost effective solution compared to replacing the existing storm drain structures which can be very costly.

The only storm drain system for which replacement is recommended, is the relatively small system on Parr Circle. This system, as mentioned before, carries the flows from the small subdrainage area north of Parr Circle and is significantly undersized.

Table 1 - Parr Blvd./Catron Drive
Existing Storm Drainage Facilities

Node and Location	Existing Storm Drainage System	Existing Capacity (cfs)	Estimated Flows Present Land Use		Estimated Flows Future Land Use	
			Q5(cfs)	Q100(cfs)	Q5(cfs)	Q100(cfs)
a - Pipe crossing U.S. 395 approx. 0.1 miles north of intersection with Parr Blvd.	48" RCP	70-170 <i>ok</i>	60	160	60	160
b - Pipe crossing U.S. 395 approx. 0.3 miles north of intersection with Parr Blvd.	30" RCP	22-70 <i>ok</i>	25	65	25	65
c - Rock culvert and pipe crossing RR just north of Parr Circle	30"x30" square rock culvert with dirt floor 36" CMP	20-70 <i>30</i> 35-65 <i>30</i>	80	210	115	315
d - Pipes crossing Parr Blvd. at intersection with Parr Circle	36" CMP 18" CMP	35-65 <i>30</i> 6-25	70	190	110	295
e - Pipe crossing U.S. 395 approx. 0.6 miles north of intersection with Parr Blvd.	30" RCP	22-90 <i>50</i>	85	220	100	265
f - Pipe crossing Orrcrest Drive	24" CMP	13-20 <i>100</i>	110	295	190	505
g - Storm drain pipe turning south just east of Lovitt Lane	24" RCP	13-26 <i>200</i>	140	380	255	690

Table 1 - Continued

Node and Location	Existing Storm Drainage System	Existing Capacity (cfs)	Estimated Flows Present Land Use		Estimated Flows Future Land Use	
			Q5(cfs)	Q100(cfs)	Q5(cfs)	Q100(cfs)
h - Beginning of storm drain on Parr Circle	24" RCP	13-26	50	30	55	155
i - Pipe inlet crossing Parr Blvd.	48" CMP	70-115	200	190	315	845
j - Beginning of ditch on west side of Western Pacific Railroad	drainage ditch	5000	0/L	275	450	1230