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RENO DRAINAGE STUDY

ANALYSIS OF THE EVANS CREEK DRAINAGE DEFICIENCY AREA

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W&K GROUP

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MAY 1985

Prepared for:

City of Reno

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PRELIMINARY

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CHAPTER I

INTRODUCTION

A. PROJECT BACKGROUND

The City of Reno, Nevada is located at the base of the eastern slope of the Sierra Nevada Mountain Range in the Truckee Meadows basin. The present population is approximately 101,000. Reno City limits encompasses approximately 28,200 acres and extends from approximately South McCarran Boulevard in the south to the Stead area in the north.

Perhaps the most significant hydrologic feature is the Truckee River that flows northeast out of Lake Tahoe, passing through the Reno-Sparks metropolitan areas before turning north to Pyramid Lake. The Truckee River has caused significant flooding in the past, though the flooding threat has been reduced by flood control dams in the upper reaches.

There have been numerous storm drainage reports (dating back to 1957) dealing not only with the Truckee River flood potential, but local drainage flood potential. Table 1 lists these various studies. In addition, there have been numerous smaller drainage studies completed for various subdivisions in the Reno area.

TABLE 1

STORM DRAINAGE REPORTS

A Master Plan Report on Storm Drainage and Sanitary Sewerage for the City of Reno, October 1957 - Clyde C. Kennedy.

An Addendum Report on Storm Drainage, August 1963 - Kennedy Engineers.

Flood Plain Information, Truckee River, Reno-Sparks-Truckee Meadows, Nevada, October 1970 - Department of the Army, Sacramento District, Corps of Engineers.

City of Reno In-house Storm Drain Deficiency Report, started 1976.

Truckee Meadows Investigation (Reno-Sparks Metropolitan Area) Nevada Plan for Channel Modifications - Truckee River - Twin Lakes Drive to U.S. Highway 395 (River Mile 55.12 to 50.49, March 1982 - Leeds, Hill and Jewett, Inc.

B. PRESENT PROJECT

Although a significant number of the proposed projects in the various drainage reports have been completed, there are still numerous isolated areas within the city where flooding continues to be a problem.

The City of Reno recently authorized a study that would review these various drainage deficiency areas in an attempt to define what the problem or problems are at the various locations. In addition, the City requested that the existing rainfall intensity duration-frequency curve for the Reno area developed in 1960 be updated. During the negotiations, it was decided that rainfall isopleth maps be developed in conjunction with the new rainfall intensity curves which would enhance the rainfall intensity accuracy for those areas not adjacent to the Reno-Cannon International Airport.

The City recently requested that an additional drainage deficiency area be added to the list. There are presently 21 drainage deficiency areas identified as listed in Table 2.

This particular report analyzes Drainage Deficiency Area 21, west of Virginia Street between Peckham and Del Monte.

TABLE 2

STORM DRAINAGE DEFICIENCY AREAS[1]

PRIORITY	LOCATION
1	Stead - including Stead Blvd. and Old State Complex (full drainage study)
2	Huffaker Hills Area
3	Harding and Gulling
4	Plumas Street near West Moana
5	Rewana Farms, north of Peckham
6	Market Street and Miami Way
7	Roberts Street near Yori Avenue (Libby C. Booth School)
8	Thomas Jefferson Drive and Aguila Avenue
9	Belford Road and Sharon Way
10	Second Street at the railroad crossing
11	Charles Drive - Clough Road area
12	Marsh Avenue and LaRue Avenue
13	Riverside Drive and Ralston Street
14	Lake Ridge Golf Course area
15	Panther Valley area
16	Longley Lane and McCarran Blvd.
17	University Drain at Longley Lane
18	Grant Drive and West Moana Lane
19	Parr Blvd. near Catron Drive
20	Dry Creek Drainage
21	West of Virginia Street between Peckham and Del Monte. (Evans Creek Drainage)

[1]Refer to "Reno Drainage Study Preliminary Report: Analysis of Drainage Deficiency Areas Within the City Limits", December 1984, Figure 1.

CHAPTER II

DESIGN CONSIDERATIONS

A. INTRODUCTION

The purpose of the individual Storm Drainage Deficiency Reports is to analyze a particular problem area identified by the City staff as given in the Priority List, Table 2. The design considerations necessary for this analysis are set forth in this chapter.

B. STORM DRAINAGE SYSTEM

The city has storm drainage mapping that is relatively up to date. There are several areas where the existing facilities are inadequate, especially when considering future growth.

Part of the scope of this study is to field verify the existing storm drainage structures at the various drainage deficiency areas and incorporate this storm drainage network in the final map.

C. HYDROLOGY - HYDRAULICS CONSIDERATIONS

1. HYDRAULIC DESIGN

The city has a policy requiring design of the majority of storm water facilities to pass 5-year return frequency storm flows. Major drainage facilities, where the drainage basin is 100 acres or greater, are sized to pass 100-year return frequency storm flows. Although the ordinance does not state it specifically, it is recommended that storm drains sized for 5-year storm events be sized to pass these flows with no static head. This will allow additional flows to pass with some head for storm events exceeding the 5-year return frequency.

2. RATIONAL METHOD

The Rational Method is the most used method in this country for computing quantities of storm water runoff. It allows consideration of local conditions and relates runoff directly to rainfall by the following equation:

$$Q = cia$$

where:
- Q = peak runoff rate in cubic feet per second
- c = runoff coefficient which is actually the ratio of the peak runoff rate for particular surface types and permeabilities to the average rainfall rate for a period known as the time of concentration.
- i = average rainfall intensity in inches per hour for a period equal to the time of concentration.
- a = drainage area in acres

3. RUNOFF COEFFICIENT

The proper selection of runoff coefficient "c" is critical for storm water runoff computations. It is dependent on a number of factors including slope condition and imperviousness of the surface, as well as the degree of saturation.

The expected land use can greatly affect the amount of runoff which will significantly increase with increased development. After discussions with City staff, values of the runoff coefficient "c" were developed based on the present and future Reno Land Use Maps for the area as shown on Figures 1 and 2. They are listed in Table 3.

City of Reno
Present Land Use Map

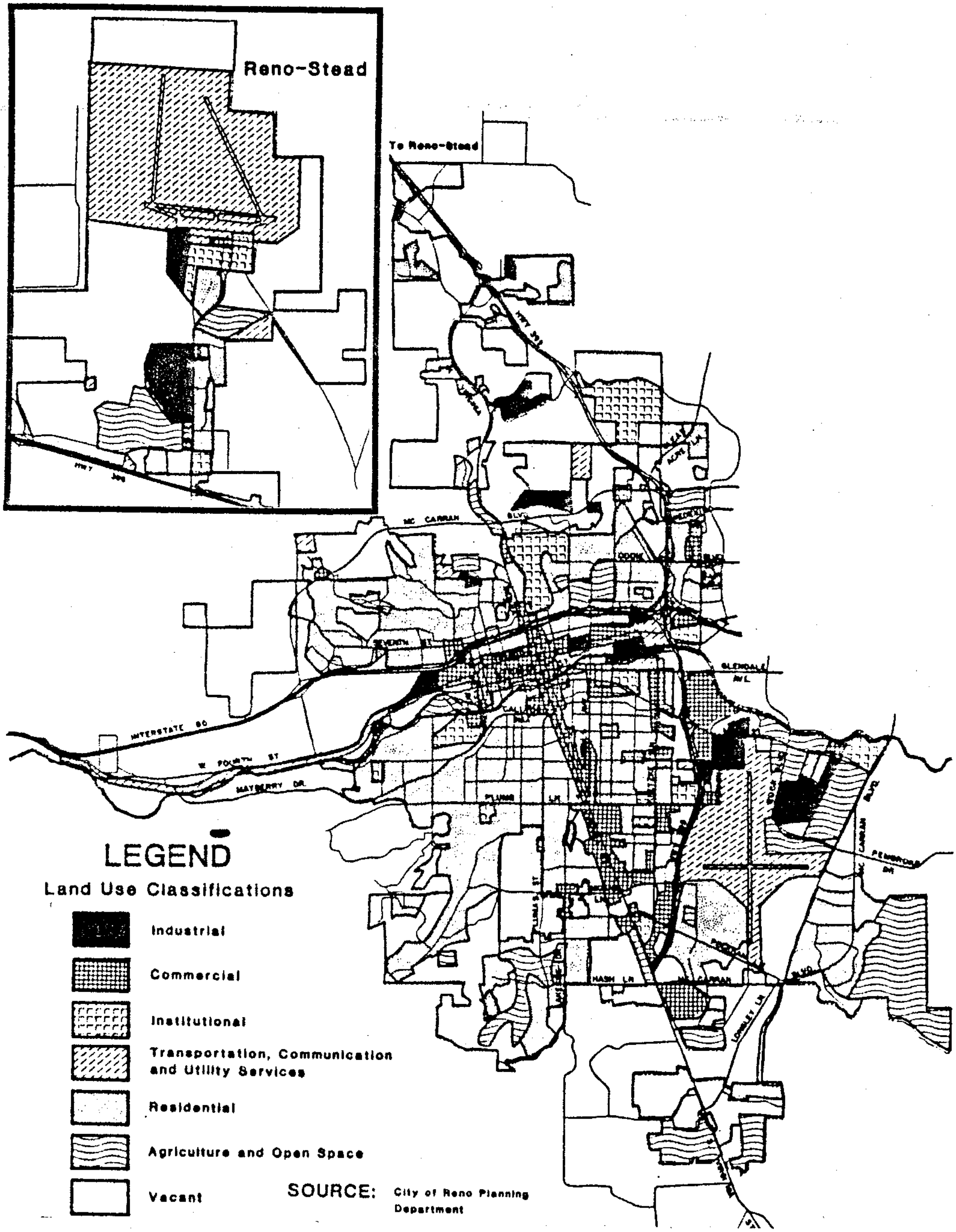


Figure 1

City of Reno

Future Land Use Map

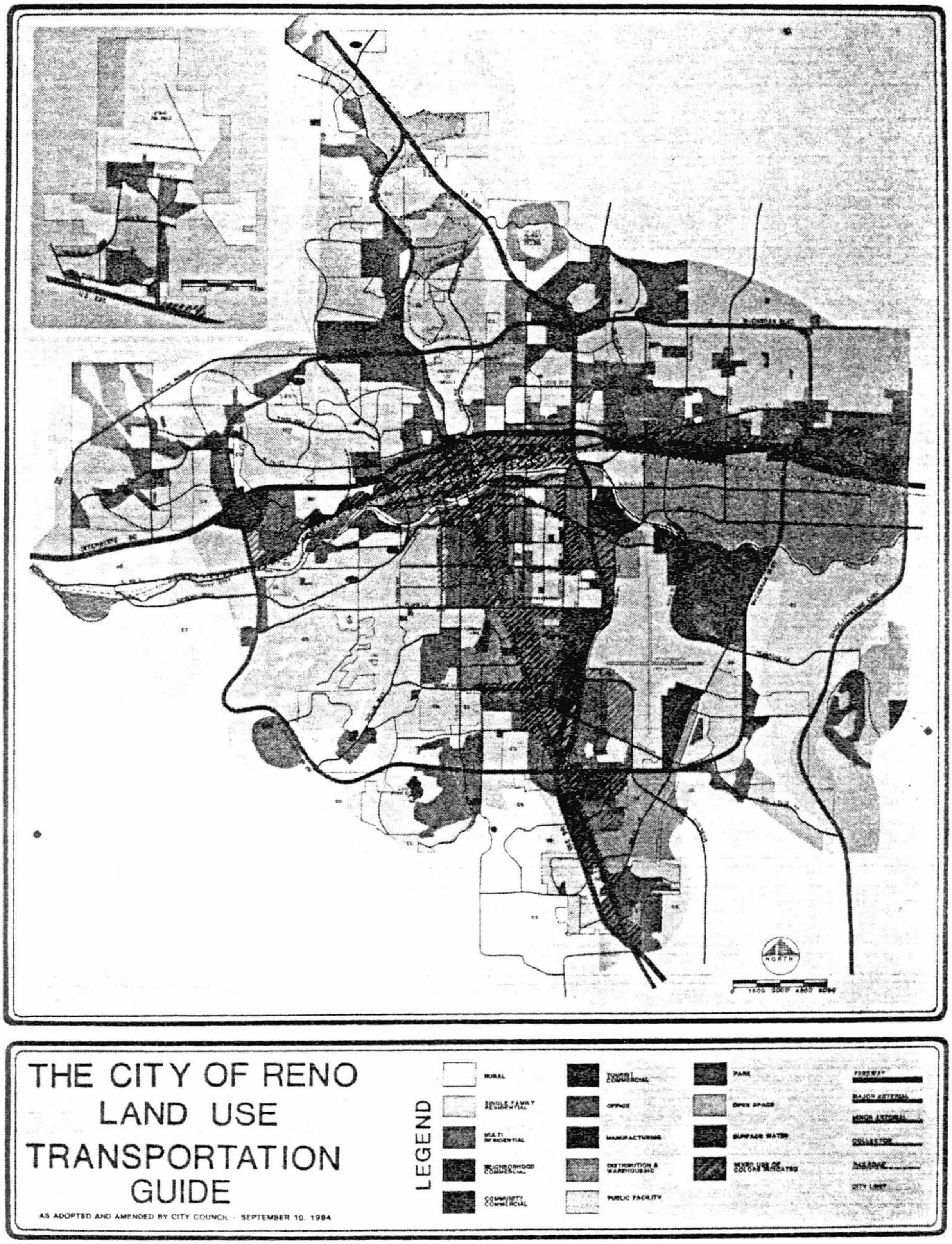


Figure 2

TABLE 3

RUNOFF COEFFICIENTS "C"

Land Use Type	Runoff Coefficient "C"
Rural	0.25-0.35
Single Family Residential	0.45-0.55
Multi-residential	0.60-0.70
Neighborhood Commercial	0.85
Community Commercial	0.85
Tourist Commercial	0.85
Office	0.85
Manufacturing	0.85-0.90
Distribution and Warehousing	0.85-0.90
Public Facility	0.50-0.85
Park	0.25
Open Space	0.20-0.30

These values are somewhat conservative when used for entire areas, as it assumes maximum build-out in all these areas. Substantial portions of rural and low density areas may not develop to full potential. However, it is difficult to determine where growth will or will not develop, and costs of storm water drainage systems are very expensive. Thus, it is generally preferable to size the system for maximum development rather than having to upsize the system later.

The City Ordinance generally does not allow increased runoff from that already existing for new developments. All additional runoff generated from increased development must be kept on site by the use of on-site storage. This is especially true if the increased runoff would exceed the existing downstream storm drainage facilities capacity.

However, exceptions have been allowed in the past. Thus, it is recommended that a more detailed hydraulic study be required for the individual drainage systems at the design or pre-design stage. At this time the actual zoning or land use for the area in question should be re-evaluated to arrive at an acceptable runoff coefficient "c". This report will consider two cases. Case I assumes that additional runoff will be kept on site. This case will use Figure 1, the present land use map, to develop runoff coefficients. Case II assumes that additional runoff will be allowed and maximum development will take place. This case will use Figure 2, the future land use map, to develop runoff coefficients.

4. RAINFALL INTENSITY AND DURATION

An accurate measurement of rainfall intensity and duration "i" is necessary to determine storm water flows for a particular area.

The existing rainfall intensity-duration-frequency (IDF) curves for the Reno area were developed in 1960 and are based on rainfall records through 1939.

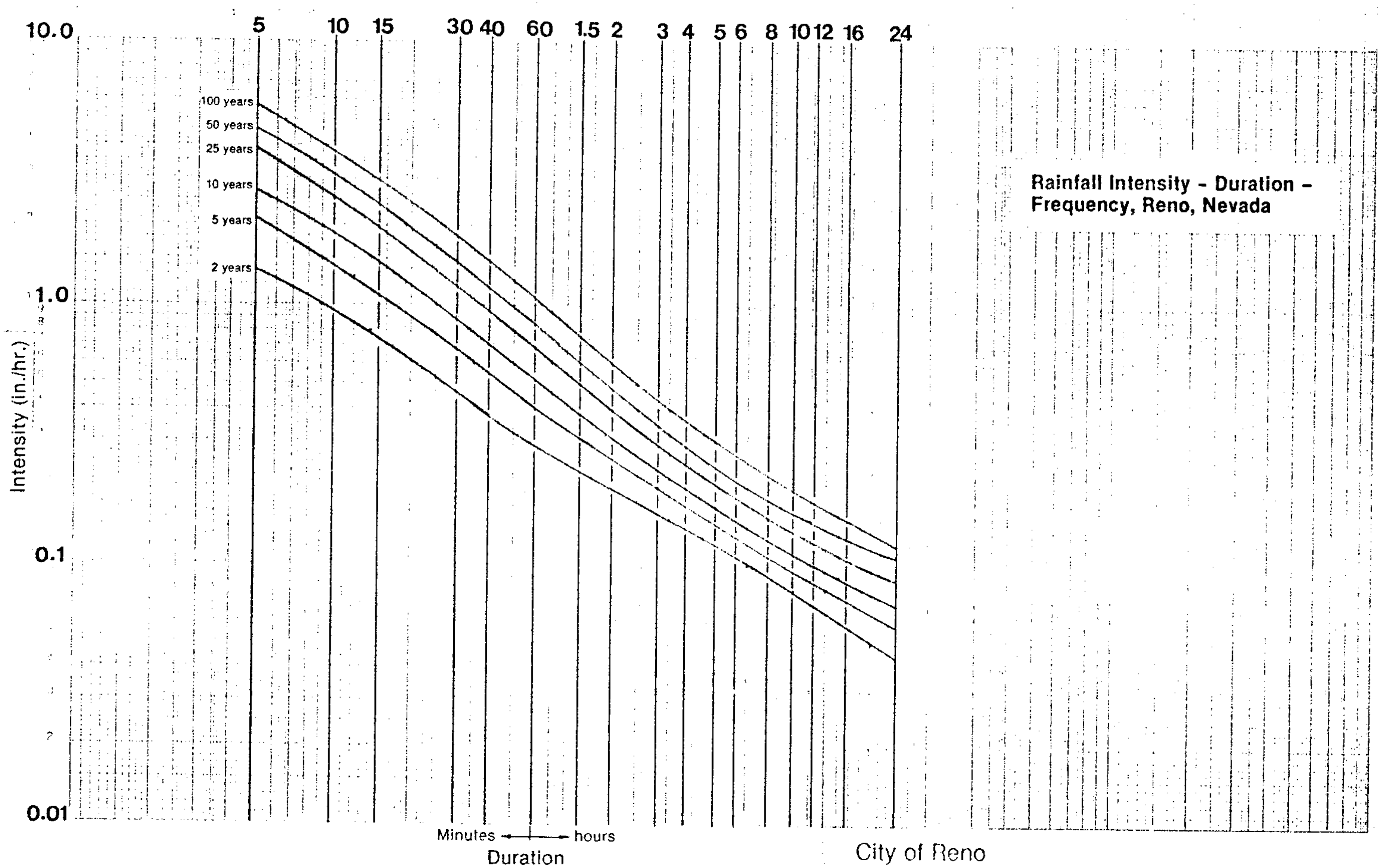
One of the major tasks of this study is to develop new rainfall IDF curves based on more updated data that is available.

In addition, the scope of work includes the analysis of spatial variation of rainfall in the study area. This requires developing rainfall isopleth maps for both the summer and winter seasons, based upon available rain gauging stations in the area.

Three sources of rainfall information were analyzed in developing the rainfall IDF curves. These are:

1) National Weather Service, "Technical Paper No. 40," 1964
2) NOAA "Rainfall Atlas 2 - Volume Vii," 1972
3) Analysis of raw precipitation data from the National Weather Service Climatic Center in Asheville, North Carolina for the Reno-Cannon Airport from 1952 to 1983.

Rainfall IDF curves were developed from each individual source of information. After careful analysis it was decided that the curve based strictly on rainfall records at the Cannon Airport (Figure 3) combined with the use of the rainfall isopleth maps would present the most accurate rainfall intensity records for the various drainages in the study area. It should be noted that the data presented is recommended for use only within the study area. Use of the rainfall IDF curves for areas outside the study area should be done so with caution and careful engineering judgment.



City of Reno

Rainfall Intensity - Duration - Frequency Curves for General Reno Area

Based on Rainfall Data from Cannon Airport Gauging Station

Figure 3

The rainfall isopleth maps are based on nine unofficial gauging stations in the area that have daily rainfall information available for use. These stations are located at Dickerson Road, Royal Drive, Upper Skyline, Ganser, La Veaga Court, Verdi, Sparks Fire Station, Sierra Sage Road, and Christmas Tree.

Each rainfall event at every location was compared and a ratio computed to the corresponding values recorded by the local weather service station at the Reno Cannon Airport. The summer season was assumed to extend from May through October and the winter season was assumed to extend from November through April. The two rainfall isopleth maps are shown as Figures 4 and 5.

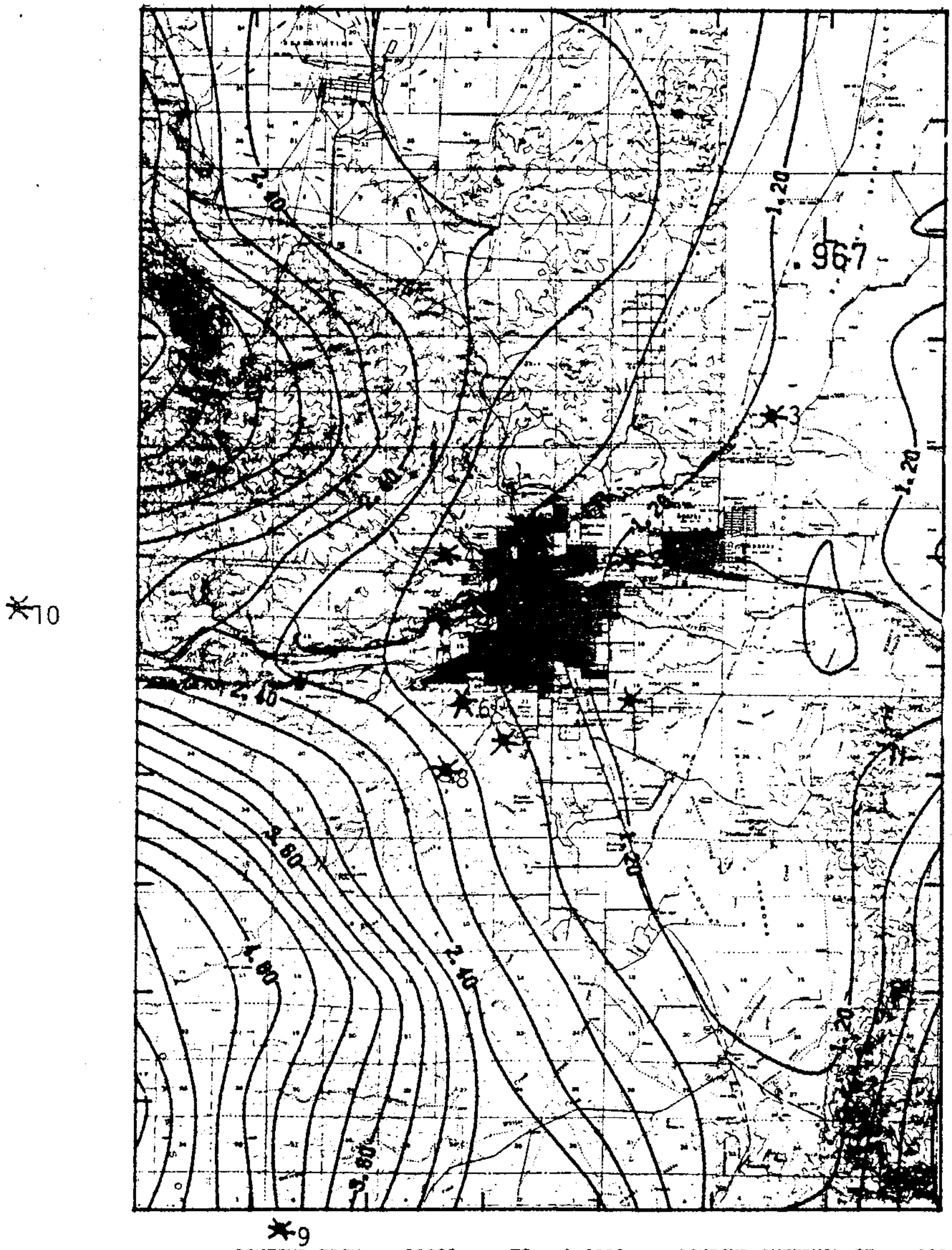
2,000-scale overlays of these isopleth maps have been completed to be used in conjunction with the standard 7.5 minute topographic quadrangle maps of the Reno area.

Figure 6 describes the use of the rainfall isopleth maps for a typical drainage area. Basically the drainage area is divided into subareas, each corresponding to the area under a particular isopleth range. A weighted average is obtained and this average is multiplied by the rainfall intensity taken from the rainfall IDF curve for the Reno-Cannon Airport to derive a modified rainfall intensity for the drainage basin in question.

In using these rainfall isopleth maps, it is recommended that a rainfall intensity correction factor be calculated for both the summer and the winter season. The highest correction factor should be used in calculating the rainfall intensity to be used in the Rational Formula.

City of Reno

Rainfall Isopleth Map for Wet Season November to April



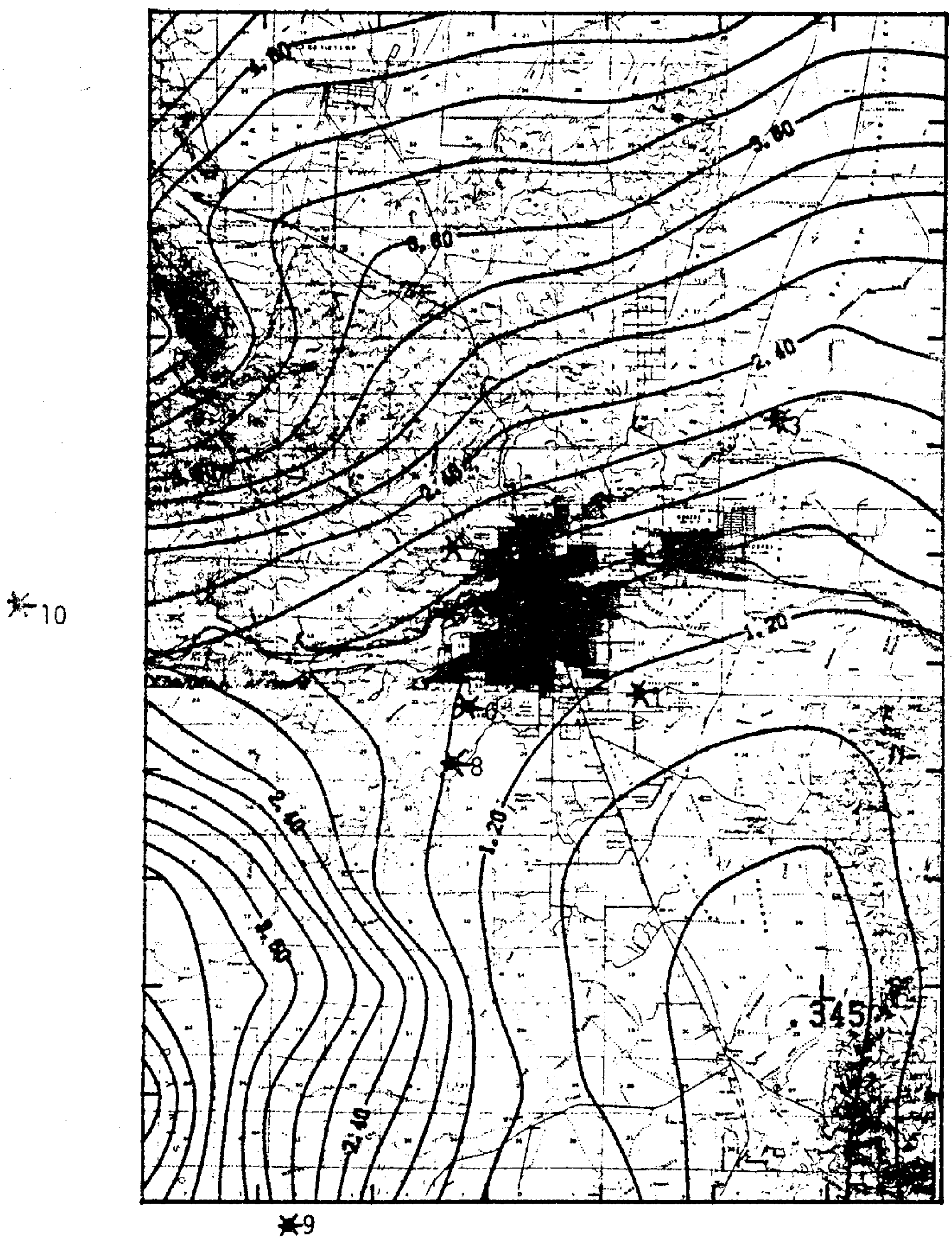
1. Cannon Airport
2. Sparks Fire Station
3. La Veaga Ct.
4. Royal Dr.
5. Dickerson Rd.
6. Ganser
7. Sierra Sage Ln.
8. Upper Skyline
9. Christmas Tree
10. Verdi

CONTOUR FROM .60000 TO 6.0000 CONTOUR INTERVAL OF .60000 PT(3,3)= 4.0873

Figure 4

City of Reno

Rainfall Isopleth Map for Dry Season May to October



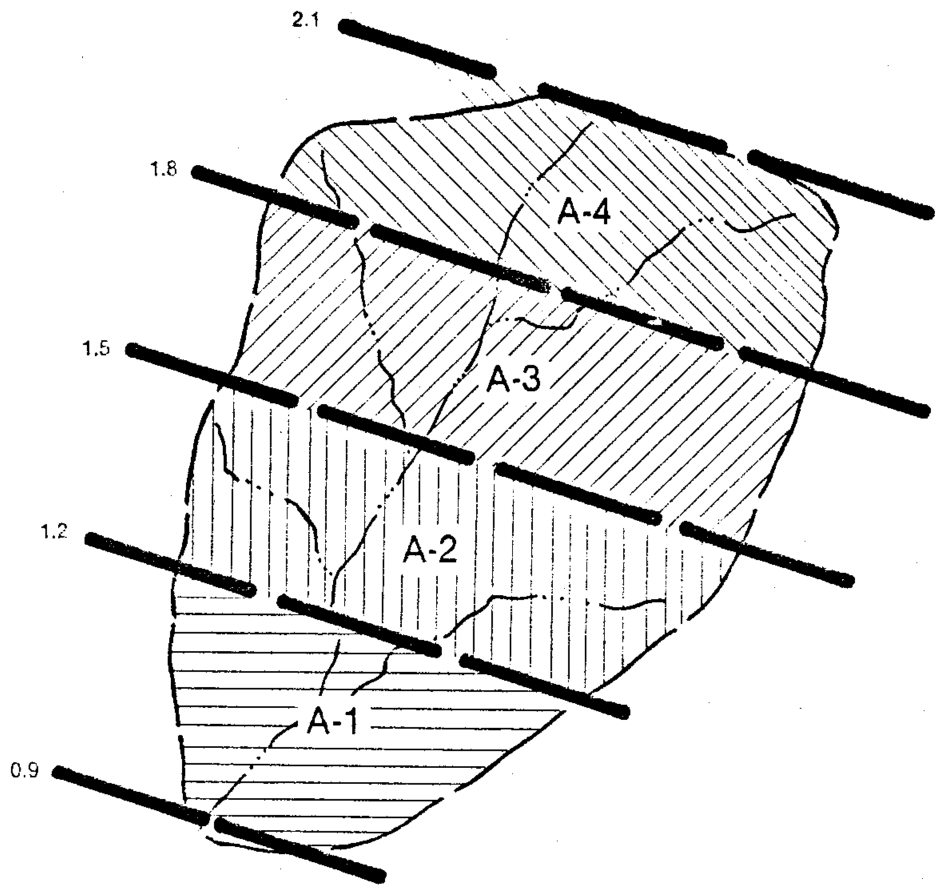
1. Cannon Airport
2. Sparks Fire Station
3. La Veaga Ct.
4. Royal Dr.
5. Dickerson Rd.
6. Ganser
7. Sierra Sage Ln.
8. Upper Skyline
9. Christmas Tree
10. Verdi

CONTOUR FROM .30000 TO 5.4000 CONTOUR INTERVAL OF .30000 PT(8,9)= 2.8281

Figure 5

City of Reno

Rainfall Isopleth Map Usage (Typical Example)



Rainfall Isopleth

Rainfall Intensity Correction Factor =

$$\frac{\text{A-1}\left(\frac{0.9+1.2}{2}\right) + \text{A-2}\left(\frac{1.2+1.5}{2}\right) + \text{A-3}\left(\frac{1.5+1.8}{2}\right) + \text{A-4}\left(\frac{1.8+2.1}{2}\right)}{A_{TOTAL}}$$

NOTE: This modified rainfall intensity factor is multiplied by the rainfall intensity value from the Cannon Airport Curves

Figure 6

5. TIME OF CONCENTRATION

The time of concentration, "t_c", is defined as the flow time from the most remote point in the drainage area to the point in question. It is composed of two parts, inlet time and conduit travel time. Inlet time consists of the time required for water to flow overland from the most remote point in the watershed to a defined channel such as a street gutter plus the gutter flow time to the first inlet. The time of concentration is affected by several factors such as steepness of terrain, vegetation or land cover, and existing soil moisture conditions.

Inlet time in this study for unimproved areas is determined using average overland velocities shown on Figure 7. (From SCS "Urban Hydrology for Small Watersheds", T.R. 55). Inlet time for improved areas can vary widely and accurate values are difficult to obtain. Values between 5 and 30 minutes are normally used. Design inlet times from 5 to 15 minutes are used for developed areas with steep slopes or closely spaced inlets. 10 to 15 minute periods are common for similar areas with flatter slopes and for areas with widely spaced inlets and/or very gentle slopes, inlet times of 20 to 30 minutes are normally used.

It is recommended that a minimum inlet time of 10 minutes be adopted by the City in this and future runoff analyses. A 5 minute time of concentration is unreasonable except for very small drainages and will give exceedingly high runoff valves that field analysis does not support.

D. ANALYSIS OF DRAINAGE DEFICIENCY AREAS

The third phase of this project addressed in the report in Chapter III is PROBLEM IDENTIFICATION. As is stated in Chapter I, twenty potential drainage deficiency areas have been identified by City staff for review.

Average Velocities for Estimating Travel for Overland Flow

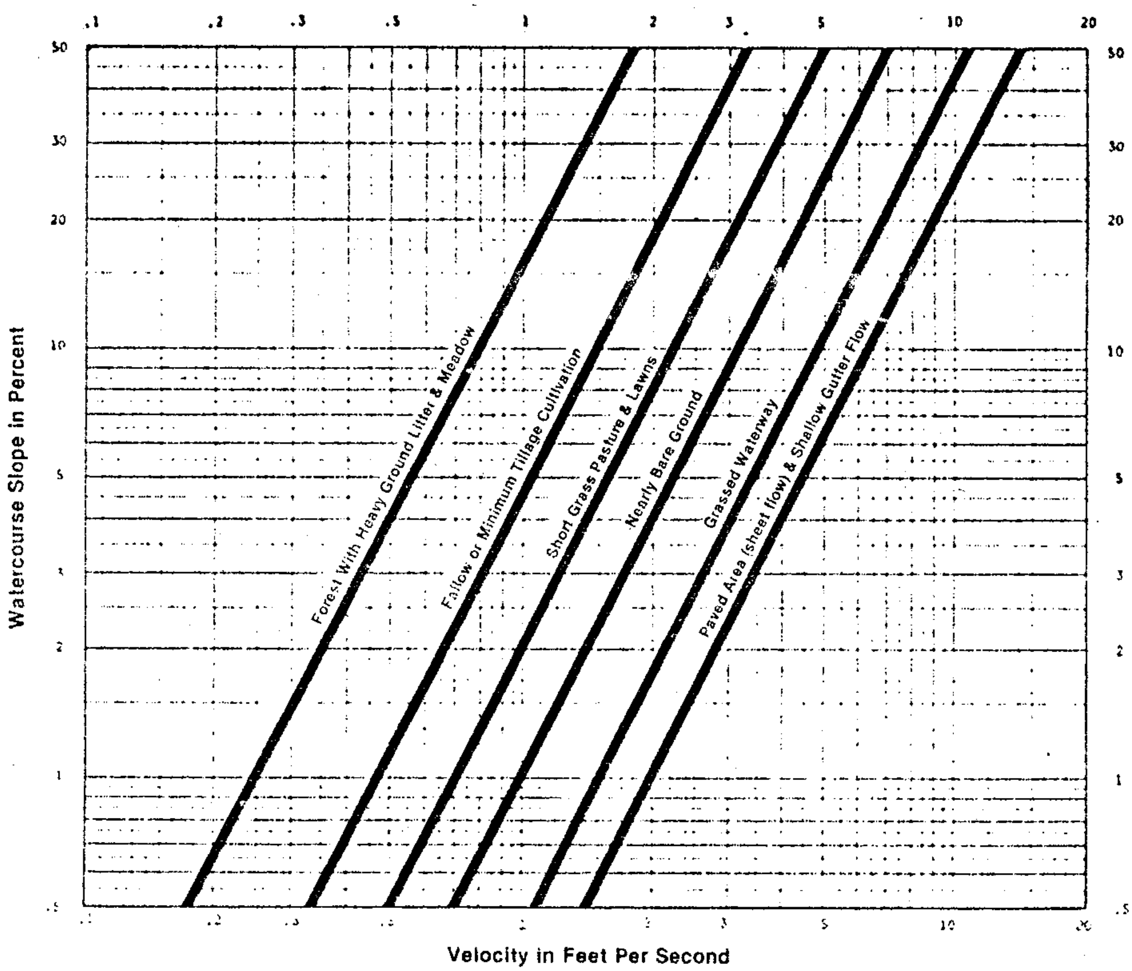


Figure 7

We propose to analyze these deficiency areas in the following manner: The existing storm drainage facilities will be plotted on 500 scale mapping available from Washoe County Department of Comprehensive Planning (formerly Regional Administrative Planning Agency) and will be field verified. Generally the flooding will occur at a particular node such as a culvert crossing. The drainage basin that contributes to a particular node will be identified. This drainage basin will be broken into sub-areas if required, each corresponding to the proposed land use (refer to Figures 1 and 2). Each land use has a runoff coefficient "C" assigned to it. A weighted average "C" will be calculated for the particular drainage basin.

A time of concentration "t_c" will be calculated as described in Section II-C-5 above. From this time of concentration, a rainfall intensity can be obtained from the rainfall IDF curve for the Reno-Cannon Airport. A modified rainfall intensity will be derived using the rainfall isopleth maps as described in Section II-C-4.

With this information, storm runoff flows for a five year return frequency storm (Q_5) and a one-hundred year return frequency storm (Q_{100}) can be calculated. These flows will be compared with the existing storm drainage node capacity to determine if the existing system is undersized. If the system is adequately sized, but flooding still occurs, attempts will be made to pinpoint where the problem may be, such as excessive siltation or poor inlet configuration.

CHAPTER III

FIELD ANALYSIS AND CONCLUSIONS

A. INTRODUCTION

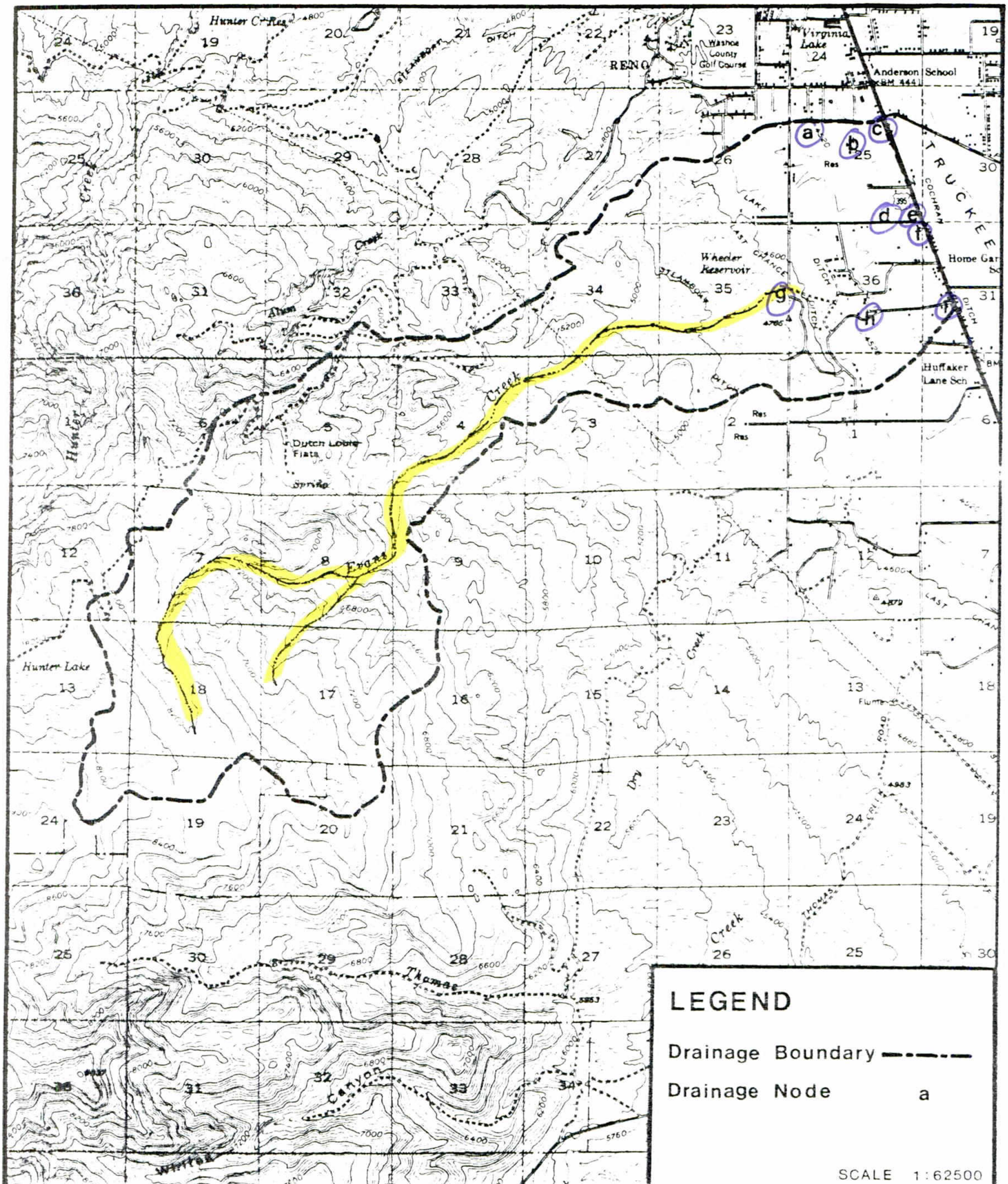
The drainage deficiency area west of Virginia Street between Peckham and Del Monte is a large drainage system encorporating Evans Creek drainage as well as several minor drainages to the north in the Wheeler Reservoir and Lakeridge Golf Course areas. (Refer to Figure 8 on the following page and Figure 9 attached to the back of this report.) It is a relatively narrow drainage running from west to east approximately eight miles long.

There has been relatively recent development along Virginia Street and more is slated for the future, thus some sort of drainage planning should be completed in the near future. This report is the first step in the planning process.

B. FIELD ANALYSIS

The Evans Creek drainage area consists largely of unimproved grassy hillsides with sparse sagebrush and other vegetation. Development begins to take over farther down the drainage. Proceeding east, rural and park, single family, multi-family and finally along Virginia Street, industrial/manufacturing is encountered.

Evans Creek flows east north east. Its drainage basin is approximately 6570 acres. It flows through undeveloped hillsides until it ties into the Last Chance Ditch just upstream of Lakeside Drive. There is a concrete and wood weir on Last Chance Ditch that acts as a spillway. Street flows on Lakeside Drive proceed north in a 12-inch RCP emptying into Lake Ditch.



City of Reno

Study Area And Drainage Boundary

Figure 8

Evans Creek crosses Lakeside Drive via a 9 foot by 5 foot box culvert and continues east through pasture land. It crosses under the Lake Ditch which is contained in a concrete flume across the creek. There is a bridge crossing on Del Monte Lane. At Bonde Lane, just downstream of the bridge crossing, the creek makes a sharp turn crossing at the end of the road in a 36-inch steel pipe. There is significant erosion at the inlet side of the pipe. The creek continues east through pasture land before turning somewhat north and again crosses Del Monte Lane in approximately a 65" x 40" CMP arch and then crosses South Virginia Street in an 8 foot by 3 foot box culvert. It crosses under the Cochran Ditch and proceeds east in a large concrete flume presently under construction.

There is a small private drainage to the north of Evans Creek. Irrigation flows are taken off Lake Ditch east of Lakeside Drive. These flows cross Talbot Lane in an 18-inch CMP and proceed east through pasture land to Virginia Street. The inlet of the pipe crossing at Virginia has a concrete headwall and grate. It is totally filled up with brush but appears to be a 24-inch RCP. East of Virginia, it ties into a pipe network estimated to be 12-inch in diameter by City staff and eventually ties into the Cochran Ditch.

Street flows on McCarran east of Talbot flow east in ditches on both sides of the road. A 24" RCP carries flows to the north across McCarran approximately 700 feet or 800 feet west of the intersection with Virginia. These flows turn north in a ditch emptying into Cochran Ditch. Remaining Street flows reach Virginia Street and cross in an 18-inch RCP.

Street flows on McCarran west of Talbot Lane proceed as overland flow to the west entering drop inlets at the intersection with Lakeside Drive. A pipe network begins at the intersection on Lakeside Drive draining to the north. Storm flows from the Wheeler Reservoir drainage, Lakeridge Golf Course and

Manzanita Lane areas all flow to this pipe network on Lakeside Drive. This pipe system turns east on Singingwood Drive and then on to Meadow Springs Drive. A separate system is located on Manzanita that ties into the pipe on Meadow Springs Drive. a 42-inch RCP proceeds east from the intersection of Meadow Springs Drive and Warren Way exiting into a drainage ditch. Flows enter a 96" x 42" CMP arch crossing Baker Lane and continue through the Willow Brook Apartment complex in a concrete lined ditch. Flows pass under the Cochran Ditch and cross South Virginia Street just south of Peckham Lane in a 76"x48" CMP arch culvert which reduces to a 72" x 48" CMP arch culvert.

C. ESTIMATED STORM RUNOFF

Estimated storm runoff is calculated for both the 5-year and the 100-year storm at selected nodes. These nodes are shown on Figure 8 and Figure 9, the project boundary appended at the back of the report. Table 4 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 winter storms which give more conservative values than the summer storms (refer to the wet and dry isopleth maps, Figures 4 and 5).

Another point of interest is that the estimated storm runoff flows actually decrease downstream in certain cases. This is most evident on Evans Creek (nodes g, h and i). Although the contributing area increases significantly, the time of concentration and, therefore, the intensity decreases over the larger drainage area. The slopes are relatively steep to node g,

TABLE 4 - EVANS CREEK EXISTING DRAINAGE FACILITIES SUMMARY

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 - Manzanita Ln. and Warren Way	42" RCP	50	220	570	295	760
b - Willowbrook Apt. complex just east of Baker Ln.	76"x48" CMP arch	120-170	210	515	280	800
c - South Virginia St. just south of Peckham Ln.	72"x48" CMP arch	100-150	230	565	330	800
d - McCarran Blvd. approx. 700 feet west of South Virginia St.	24" RCP crossing McCarran and ditch to the north	13-30	5	10	10	25
e - McCarran Blvd. and South Virginia Street	18" RCP across South Virginia	7-9	5	10	15	35
f - South Virginia just south of McCarran Blvd.	24" RCP	13-22	30	85	60	160
g - Evans Creek at Last Chance Ditch and crossing Lakeside Dr.	9'x5' box culvert across Lakeside	290-410	1280	2990	1335	3110
h - Evans Creek crossing Del Monte Ln.	Bridge 14'x3' clearance	210	1160	2720	1205	2770
i - Evans Creek crossing Del Monte Ln. and South Virginia St.	Del Monte - 5'x3½' CMP arch S. Virginia - 8'x3' box culvert	120-192	1135	2570	1225	2775

but downstream Evans Creek flows through flat pasture land. This tends to slow the flows down acting as a natural storage basin and actually takes the high peaks off the flows.

D. CONCLUSIONS

It is obvious from Table 4 that the majority of existing structures are severely undersized for the estimated 5-year storm flows.

It is appropriate to discuss the effects of the drainage canals on storm flows. Evans Creek crosses three canals; Last Chance, Lake and Cochran. It actually enters Last Chance and spills over a spillway. It crosses under the Lake and Cochran Ditches. These irrigation ditches take flow from the Truckee River. Only so much water is alloted for irrigation, the majority being used in a four month period during the spring and summer. At this time, the canals are flowing close to full. Talking to the owners of the canals, the capacities are close to 1000 cfs. and they are essentially closed off during the winter.

At first glance, it would appear that using the canals for excess flows would be an alternative solution to upsizing the drainage structures. However, there can be significant storms in the summer when the canals are flowing full. In fact, most canals have spillways at the various creek crossings where excess flows can be dumped should a severe summer storm hit during peak canal capacity. One owner said that as little as a 0.25 inch rainfall can cause flooding of the canals. Thus, instead of acting as a buffer, the flows from the canals could actually increase the estimated storm runoff in a drainage basin.

There are presently two major drainage crossings of South Virginia in our study area, node c in the north just south of Peckham Lane and node i in the south just north of Del Monte Lane. For the most part, the storm waters north of McCarran Blvd. flow north and storm waters south of McCarran Blvd. flow south.

The crossing of South Virginia, just south of McCarran (node f), is a private drainage system and unless the City wants to take over the responsibility of this system, it is suggested to leave it alone. It is only slightly undersized for existing flows although its capacity is significantly impacted by all the garbage and trash built up at the inlet. It is recommended that the owner be requested to keep the inlet clear of debris so as not to create a potential flooding hazard at Virginia.

It is recommended that flows north of McCarran be routed to node c, and flows south of McCarran be routed to node i.

There is not much area available for storm storage basins in the northern drainage especially east of Lakeside Drive. There is open pasture land just upstream and west of the Baker Lane culvert crossing that may have potential as a storage basin site. If this is not feasible, then all nodes will eventually need to be upsized to handle the estimated 5-year flows.

The Evans Creek drainage has much potential for storage basins. It flows through undeveloped relatively barren hillsides in its upper reaches above and west of Lakeside Drive. This drainage valley could be used as a storage basin with some sort of check perhaps at the Last Chance Ditch. Downstream of Lakeside Drive, Evans Creek meanders through flat pasture land. It would probably not be that difficult to form a lake to serve as a buffer to take the peaks off the flows. The cost of the land and its future use must be taken into account. If this area is to stay as pasture land for the foreseeable future, having a storage basin that would only fill up during peak storms would have little impact on the use.

If it becomes a residential site or manufacturing/industrial site, the impacts and associated land costs could be significant and it might be more appropriate to upsize the drainage structures.

24 Jul 86

Hal; Re: SPPCo letter of 21Jul86
EVANS CREEK FLOODING

We are aware of the problem listed. The downstream area, Capurro, has had City approval of the 2001 project in which Evans Creek chanel work is a part. I will get w/ Leann to review schedule etc. Perhaps we can elicit a cooperative effort to allow the chanel work.

As stated in letter, all efforts to coordinate & work out with County was to no avail. At this point we will re-contact & develop a plan of attack.

Will evaluate funding sources, availability, responsibility etc. Will make no committments until review with all parties is accomplished.

Will keep you posted

Willard

RECEIVED
JUL 22 1986
Engineering Div.

Sierra Pacific Power Company

a Sierra Pacific Resources company

July 21, 1986

Mr. Harold Schilling
City Manager
City of Reno

Mr. Millard Reed
City Engineer
City of Reno

Robert L. VanWagoner, Esq.
City Attorney
City of Reno
P.O. Box 1900
Reno, Nevada 89505

Dear Sirs:

There are currently several potential and existing problems related to the Evans Creek drainage channel recently constructed across the northern boundary of the Sierra Plaza office complex site on DeLucchi Lane. As the construction agent for the building's owner, and as its primary tenant, Sierra Pacific Power Company is concerned about these areas and feels they should be addressed before any additional significant damage occurs.

As a condition of the major project review for Sierra Plaza (MPR 18-84), the City imposed the following requirements with regard to Evans Creek:

a. With development provide a channel to City standards to contain the 100 year flood based on the Soil Conservation Service study from the Cochrane Ditch east to Dry Creek;

* * *

d. Provide an easement to the City for the 100 year flood channel.

The improvements for Sierra Plaza, including the new Evans Creek Channel, were accepted by the City of Reno on January 6, 1986. (See attachment "A" to this letter.) During the President's Day weekend floods in early February, the new channel caused several problems because of its relation to development and improvements both upstream and downstream from Sierra Plaza. A brief description of each problem area follows:

P.O. Box 10100 Reno, Nevada 89520-0026 Telephone 702/689-4011

1. <u>Siltation</u>. The new channel extends from the Cochrane and Balsi Ditches on the west to the Sierra Plaza site's eastern boundary. From its western end to the point where it crosses under Neil Road, the ditch is concrete lined, 10 to 12 feet deep and approximately 20 feet wide. From that point to its eastern end it is unlined, with a depth of approximately 15 feet and a width of 40 feet at the bottom flaring to 70 feet at the top.

At its eastern end, the new channel joins old Evans Creek, which is only two to three feet deep and approximately five to six feet wide. Due to this disparity in capacity, during periods of high runoff the flow to the new channel is partially obstructed at the point where it joins old Evans Creek and is not swift enough to carry away silt. This occurred during the President's Day floods and a three to five foot accumulation of silt resulted in the unlined portion of the new channel. The silt severely reduces the channel's capacity, which could result in the flooding of nearby development, including Sierra Plaza and other nearby residential and commercial buildings. Clearly, the City should take steps to clean out this silt and prevent further similar accumulations.

2. <u>Eastern Boundary Outlet/New Development</u>. As described above, the new channel has a very restricted outlet at its eastern boundary. During the February floods, water built up in the channel to the extent that it eventually overflowed its banks. Unless some provision is made for extension of the channel across the adjacent Capurro property, this problem will be re-occurring with resultant damage to nearby properties.

During development of Sierra Plaza, an attempt was made to negotiate with Mr. Capurro for extension of the channel to the old Dry Creek Channel, which would be adequate to carry away any drainage. Mr. Capurro was unwilling to grant the easement necessary for the extension, so the problem remains unresolved. Neither the City nor Washoe County, in whose jurisdiction the Capurro property is currently located, was willing to condemn the necessary easement.

As the occupant of nearby property, Sierra Pacific risks substantial damage if this problem is not addressed, and the Company has voiced its concern about adjacent development to the City of Reno planning staff. A letter concerning future development is being sent to the City of Reno planning staff concurrently with this letter.

3. Unimproved Portion of Evans Creek. At its western end, the new channel joins an unimproved portion of Evans Creek running from the eastern boundary of South Virginia Street to the western boundary of the Sierra Plaza site. As part of the development of I-580, a new box culvert will be installed under South Virginia Street. The land between the box culvert and the beginning of the new channel is located in Washoe County, and we realize that it is not within the City of Reno's jurisdiction. However, that unimproved portion creates a bottleneck which causes upstream drainage to flow out and over adjacent property, rather than being directed into the new channel. As a result, in times of high runoff, the upstream drainage is likely to "sheet" across the Sierra Plaza site and may also flood portions of DeLucchi Lane. Until the unimproved portion is brought up to the standards of the box culvert and the new channel, proper drainage is simply not possible.

Another related problem stems from the concrete diversion structure located at the junction of the Balsi and Cochrane Ditches and the new channel. The structure was destroyed in the February flooding, and cannot be replaced until the design of the nearby unimproved portion of Evans Creek is decided upon. Replacement of the diversion structure would involve substantial expenditures and Sierra Pacific is unwilling to undertake this project until it can be sure that the structure would not have to be replaced to accommodate future development of Evans Creek.

During the February floods, some damage was experienced at Sierra Plaza as a result of the inadequacy of the drainage provided by the channel. Sierra Pacific does not intend to seek recompense from the City for those damages, but feels that it is imperative that the City address the areas described above in order to prevent future damage to Sierra Plaza and nearby properties. It is clear that resolution of some of the problems will require cooperation between the City of Reno and Washoe County and Sierra Pacific has sent a letter to appropriate County personnel outlining the problems which are located within their jurisdiction.

Attachment "B" to this letter is a detailed map showing each of the problem areas described above. We would like to meet with the appropriate members of the planning staff, the City Engineer's office, and the City Attorney's office to address these problems, define potential solutions and outline areas where County cooperation is needed. If the appropriate representative of the City will contact Peggy Manes, Senior

Attorney, at 689-4850, we can begin the process of setting up a meeting in the next few weeks.

Very truly yours,

THOMAS PARKER
Vice President-Construction

mj
Enclosures

Attachment "A"

7 Lpt. 14hr. 37,000

City of Reno

POST OFFICE BOX 1900 • RENO, NEVADA 89505

January 6, 1986

Sierra Pacific Power Company
P.O. Box 10100
Reno, NV 89520

Attention: Jim Davelport, Sr. Construction Engineer

RE: PUBLIC IMPROVEMENTS - SIERRA PLAZA (MPR-18-84)

Dear Sir:

The City of Reno, based on verification by Mishcelle J. Smith, P.E., of S.E.A., the engineering entity for the project, accepts that the improvements as installed in the referenced development except those as listed below for which a cash bond has been posted are substantially in accordance with City requirements.

Exceptions:

1. Sack north side of channel wall from station 105+50 to Neil Road bridge.
2. Clean gutter on DeLucchi Lane from station 100+75 to 102+50.

Any public improvements are accordingly being accepted by the City for operation and maintenance, and this area is bieng provided with those services and facilities furnished to other portions of the City.

Sincerely,

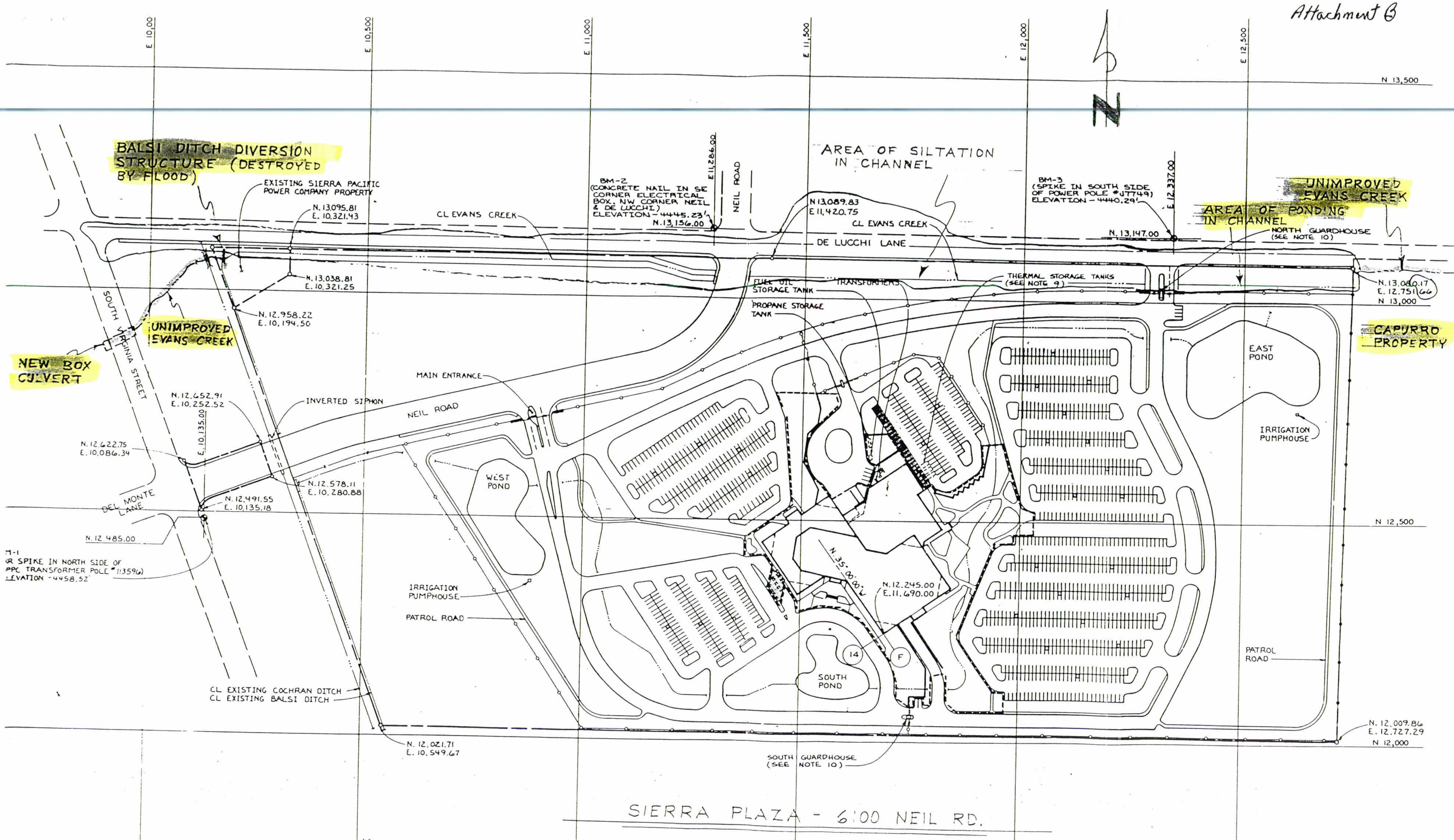
Millard G. Reed

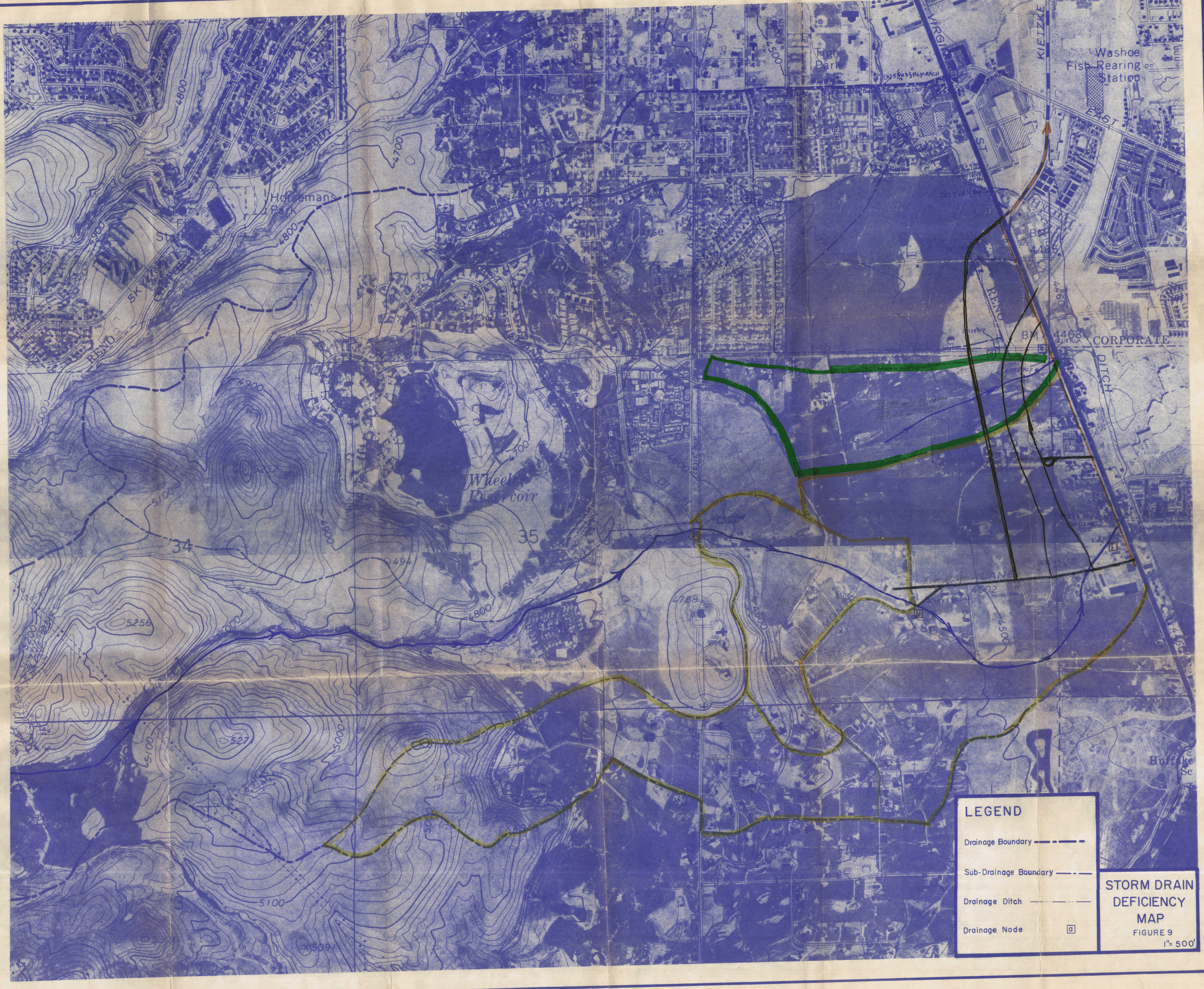
Millard G. Reed, P.E.
City Engineer

MGR:lr

xc: S.E.A.

Attachment B





Washoe
Fish Rearing
Station
KIETZKE
CORPORATE
DITCH
RENO
Horsemans
Park
Wheeler
Reservoir
34
35
4800
4900
5000
5100
LEGEND
Drainage Boundary
Sub-Drainage Boundary
Drainage Ditch
Drainage Node
STORM DRAIN
DEFICIENCY
MAP
FIGURE 9
1"= 500'