FINAL DRAINAGE REPORT
FOR
SCOTTSDALE PERIMETER CENTER
PHASE ONE
C.W.W. JOB NO. 880932

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JANUARY 1989

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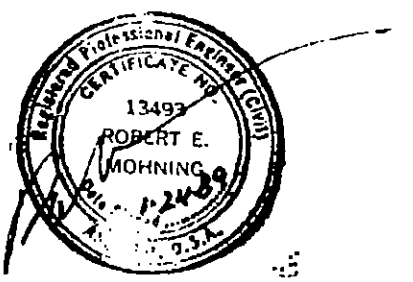


I. INTRODUCTION

The Scottsdale Perimeter Center is located just west of the proposed Outer Loop between Bell Road and Union Hills Drive and east of 83rd Street. Phase One encompasses improvements along Bell Road, 86th Street and Hayden Road in the southern portion of the Perimeter Center (Figure 1).

By legal description, Phase One lies in a portion of the south half of Section 36, Township 4 North, Range 3 East, of the Gila and Salt River Base and Meridian, Maricopa County, Arizona.

II. MASTER DRAINAGE STUDY

Collar, Williams & White Engineering (CWW) completed the Master Drainage Report for Scottsdale Perimeter Center in January of 1988 (revised, June, July of 1988 and January 1989). The study, along with the Grading and Drainage Master Plan, gives a thorough description of the existing drainage conditions and includes data from other related drainage studies. The Master Drainage Study states that under present conditions the subject site would receive part of the 100 year peak discharge of over 6,800 cfs. This runoff would be spread out over a large area "and thus classified as a sheet flow condition". The average depth of flow across the area will be about 1 foot.

The Outer Loop Highway is proposed to be built as an elevated section and will eliminate the sheet flow runoff condition which presently exists by diverting the flows into a detention basin.

The Master Plan calls for the construction of numerous grass lined drainage channels to collect on-site runoff and route it through the Scottsdale Perimeter Center.

III. OFF-SITE DRAINAGE

As stated previously and in the Master Drainage Study, under existing drainage conditions the 100 year off-site peak flow entering the site is over 6800 cfs, occurring as sheet flow about 1 foot deep. Construction of the Outer Loop Highway is expected to reduce this peak through detention of flows upstream of the Highway. The Perimeter Center site will then be subject to an ultimate off-site peak discharge of 722 cfs from the detention basin plus 300± cfs from an adjacent State Land parcel at Pima Road (northeast of the Outer Loop). This off-site drainage is proposed to be routed in a future concrete-lined channel that will be at the eastern edge of the site and therefore does not affect Phase One.

It must be pointed out that the drainage improvements for Phase One are designed to handle on-site flows only. If a major off-site event were to occur before the Outer Loop detention system is in place, there is a possibility that the Phase One drainage improvements will be damaged and/or will fail.

IV. ON-SITE DRAINAGE

A. Streets

The Rational Method was used to calculate 100 year peak flows in the streets. These flows are all generated from within the street right-of-way. A C factor of 0.45 was used for pervious areas based on a B soil with 20% desert cover. The flows and concentration points are shown on the drainage map (Figure 2). The time of concentration calculations and peak discharge worksheets are included in Appendix I.

Catch basins were spaced to ensure that street flow stays within the top of curb for the 100 year event, both on continuous grades and in sag locations.

Flow will be picked up by both curb opening inlets and slotted drains and directed by storm drains to either a channel or culvert. The calculations for inlet capacity and storm drain capacity are included in Appendix II.

B. Channels

The 100 year peak flows from onsite drainage were computed using the HEC-1 model for the Master Drainage Study. These flows did not include flow contribution from the southern half of Bell Road. The flows from the southern half of Bell Road were added to these flows and they were then used to size the grass-lined channels for Phase One (Figure 2). A Mannings n of .027 was used. The channel hydraulic calculations are in Appendix III. During the 100 year peak flow, all channels are at subcritical flow except Channel Q which is at supercritical flow. The required freeboard for all channels is at least 1 foot except for Channel V which is at least 1.6 feet.

C. Culverts

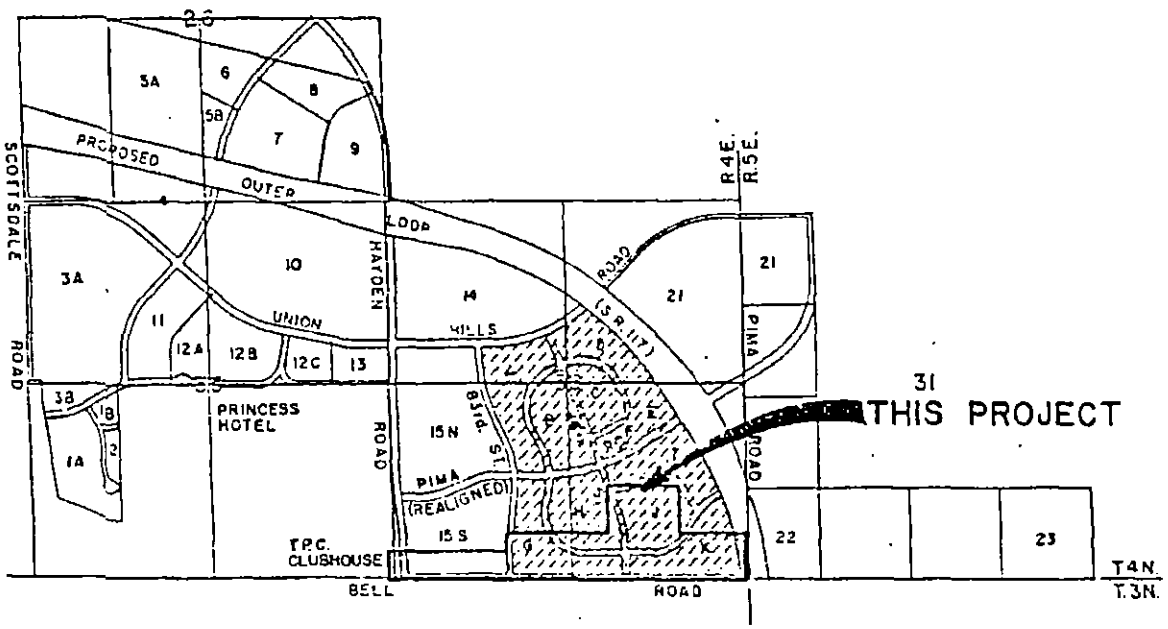
There are three culverts proposed for Phase One that will take flows in the grass lined channels under roads (Figure 2).

The 100 year peak flows from onsite drainage that are in the Master Drainage Report with the addition of flows from the southern half of Bell Road (as mentioned above) were used to size the three culverts. The inlet and outlet control calculations are in Appendix III. The channels will be lined with concrete at both the entrances and exits of the culverts to prevent scouring.

D. Desiltation Basins

There will be several berms constructed in Phase One (see Grading and Drainage Plans) that are designed to detain water to enable sediment to drop out before entering the grass lined channels. These desiltation basins will provide enough storage for the on-site runoff generated from a 100 year, 1 hour storm. The basins will be drained into adjacent channels by bleed-off pipes. The pipes are designed to allow the basins to drain within a 36 hour period. The desiltation basin storage volume and drainage calculations are in Appendix III.

Spillways will be provided to allow a level of protection if the basins were to become full due to off-site flows entering the site. To prevent scouring, the spillway will be gunite lined and the channels in the vicinity of the spillway outfalls will be lined with a landscape fabric.



VICINITY MAP
N.T.S.

Figure 1