

MASTER DEVELOPMENT DRAINAGE PLAN

for

HILL PROPERTIES

October, 1995
Project # 93-006

Prepared for:
HILL DEVELOPMENT CORPORATION
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DRAINAGE REPORT STATEMENT

ENGINEER'S STATEMENT

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the City/County for drainage reports and said report is in conformity with the master plan of the basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing

Kent D. Rockwell, P.E.
Kent D. Rockwell, P.E.



DEVELOPER'S STATEMENT

I, the developer, have read and will comply with all the requirements specified in this drainage report and plan.

HILL DEVELOPMENT CORPORATION

BY: Donald C. Hare
DONALD C. HARE, V.P.

TITLE: Vice President

ADDRESS: 3170 Sheiks Place
Colorado Springs, CO 80904

CITY OF COLORADO SPRINGS

Filed in accordance with Section 15-3-906 of the code of the City of Colorado Springs, 1980, as amended.

Phil R. Galt
CITY ENGINEER

10/27/95
DATE

**MASTER DEVELOPMENT DRAINAGE PLAN
for
HILL PROPERTIES**

PURPOSE

The purpose of the Master Development Drainage Plan for Hill Properties is to identify major site drainage issues associated with the development. The Master Development Drainage Plan (M.D.D.P.) illustrates a conceptual plan for major storm drainage improvements such as channels, storm sewers, culverts and detention ponds. This will serve as a guide for planning and design for subsequent preliminary and final drainage reports. The M.D.D.P. follows the guidelines of the City-County Drainage Criteria Manual, as well as the Master Plan for MESA DRAINAGE BASIN approved on March 31, 1986.

This plan mainly addresses the proposed improvements in the Mesa Drainage Basin. Hill Properties consists of land which also drains into Camp Creek Basin and Douglas Creek Basin, these areas were not studied in detail.

HILL PROPERTIES

Hill Properties consists of 1325.5 acres of land generally located south of Garden of the Gods Road, east of 30th street with Fillmore street and Centennial Boulevard running through the property. Figure 1 shows the area on a Vicinity Map.

LAND USE

The land uses and densities planned for Hill Properties are taken from the revised Master Plan for Hill Properties, approved February, 1994. The existing development consists of approximately 424.1 acres with 901.4 acres remaining to be developed. See Exhibit 1 in the attached map packet for specific land uses. The land use for off site sub-basin M-19 at the southeast corner of the site is shown in the current zone book as PUD. For this area 1/8 of an acre residential lot was used for the run off curve.

SOILS INFORMATION

Soils information was obtained from "Soil Survey of El Paso County, Colorado " date June, 1981. The majority of the soils in the basin are hydrologic group "A+B" with some "C+D" soils included. Figure 2 shows the location of the soils types.

Map Symbol	Soil Name	Hydrologic Group
3	Ascalon	B
18	Chaseville/Midway	A
75	Razor/Midway	C/D

MAPPING AND SURVEYING

The sources of mapping and field information used in this study are listed below:

1. "Pikeview and "Colorado Springs" 7.5 minute series and quadrangle maps prepared by the U.S. Geological Survey (USGS), dated 1986.
2. Topographic map, scale 1" = 100' provided by Hill Development Corporation, Aerial Photography, 1983.
3. FIMMS Mapping, City of Colorado Springs, Scale 1" = 200'

SUMMARY OF DATA

The sources of information used in the development of this study are listed below:

1. City of Colorado Springs, and El Paso County "Drainage Criteria Manual," October, 1987m revised November, 1991 and October, 1994.
2. Soil Survey for El Paso County, Colorado, US Department of Agriculture, Soil Conservation Service, June, 1980.
3. "Flood Insurance Studies for Colorado Springs and El Paso County, Colorado," prepared by Federal Emergency Management Agency (FEMA), 1985.
4. "Master Plan for Mesa Drainage Basin" report prepared by Gilbert, Meyer, & Sams, Inc., March, 1986.

HYDROLOGIC ANALYSIS

CLIMATE

This area of El Paso County can be described as the foot-hills, with total precipitation amounts typical of a semi-arid region. Winters are generally cold and dry, and summers relatively warm and dry. Precipitation ranges from 12 to 14 inches per year, with the majority of this moisture occurring in spring and summer in the form of rainfall. Thunderstorms are common during the summer months.

DRAINAGE CRITERIA

The current City of Colorado Springs/El Paso County Drainage Criteria was utilized in the preparation of this study. Calculations were performed to determine the runoff quantities generated during the 10 year and 100 year frequency storms for the developed condition. The SCS Method was used according to the criteria for basins larger than 100 acres. The Rational Method was used for sizing improvements in areas where the basin is smaller than 100 acres. Pond sizing and flow rates for the ponds are based upon the SCS method.

The Rational Method's "C" values used for this report are according to the "Drainage Criteria Manual", other than the type "A" soils. In areas where the type "A" soils are not to be disturbed, the "C" value was left as an "A" type soil.

DRAINAGE PATTERNS

CAMP CREEK BASIN - At this time there are approximately 162 acres of land which drains to Camp Creek. Within this 162 acres, approximately 50 acres will remain undeveloped open space; 20 acres is the existing Garden of the Gods Club; 7 acres is an existing single family residence and 85 acres of future developed land. The area north of the Garden of the Gods Club flows from east to west to 30th street. The area south of the Club generally flows north to south then west to 30th street. The exact flows and outfall points for the future development of land within this basin will be determined at the time of Preliminary/Final Drainage Reports for platting.

DOUGLAS CREEK BASIN - Sub-basin DC1 consists of approximately 35 acres of undeveloped open space that sheet flows north onto Arrows West. Approximately 10 acres of future golf course, 7.5 acres of undeveloped open space and 4 acres of future R-5 development drains to the east to the proposed Chelsea Glen Project. The Master study for Chelsea Glen shows facilities to pick up fully developed flows from Hill Properties at no expense to Hill Properties. The flows from this are equivalent or less than these shown in the Master study

Sub-basin DC2 consists of approximately 57 acres and drains to an existing detention pond west of Windmill Avenue which was constructed with the improvements for Mesa Vista at Kissing Camels Estates. This pond has the capacity to store the 100 year storm as described in the Mesa Vista Drainage Report.

Sub-basin DC3 was also described in the Mesa Vista Drainage Report and flows to an existing 30" RCP west of Windmill Court. This facility serves approximately 14 acres of land.

Sub-basin DC4 flows to a 24" RCP that was installed at the south end of Holland Park on the west side of Centennial Boulevard. This pipe was installed during the construction of Centennial Boulevard for picking up flows from Hill Properties. The exact flows from this basin and the pipe capacities will be addressed at time of future development.

MESA BASIN - (EAST FORK)

Sub-basin M1 consists of 30.45 acres. Flows from M1 will overland flow to an existing 30" CMP extended north from existing Hill Circle. This existing system was constructed with the development of Fairways at Kissing Camels Estates Filing No. 1 and discharges onto the Kissing Camels Golf Course.

Sub-basin M2 consists of 75.78 acres. Flows from M2 will overland flow the across proposed golf course then be piped through proposed residential development and outlet onto the existing golf course mentioned above. Sub-basins M1 and M2 combine at the low point of M2, an existing detention berm/pond (DP2). This berm was not modeled into the HEC 1 analysis due to the small size.

Sub-basin M3 consists of 36.51 acres. Runoff from M3 will sheet flow from existing R-1 development and golf course on the east and proposed R-1 development and golf course on the west. These two areas flow into a wide swale that extends from the berm noted in M2 to an existing 36" CMP (DP3) under Kissing Camels Drive. The 10/100 year flows at DP3 are 51/146 cubic feet per second (cfs). The estimated capacity of the 36" CMP is 48 cfs and was recommended to be replaced in the Mesa Drainage Basin Master Plan. The existing 36" pipe has the capacity to convey the 10 year storm, the 100 year overflow will overtop Kissing Camels Drive, flow across the parking lot of the Kissing Camels Golf Club to the Driving Range area of the golf course. With the swale in the parking lot having the capacity to convey the 100 year overflow, the 36" CMP pipe will remain in place.

Sub-basin M4 consists of 74.38 acres. This area is completely developed and will remain as apartments, duplexes and 52% golf course. The runoff from the apartments enters the golf course driving range and combines with the flow from the 36" pipe (DP3) flow through the golf course along a wide gentle swale to 2 - 48" CMP at Hill Circle (DP4). Runoff from the homes along Camels Ridge drive flow into the golf course to DP4. Runoff from the homes along Hill Circle flow southeasterly on Hill Circle to a 4' and 6' inlet recently installed with Mesa Vista Subdivision. The existing twin 48" CMP have the capacity to convey both the 10 year and 100 year storms, 95/252 cfs.

Sub-basin M5 consists of 98.15 acres. This area is undeveloped at this time except for Centennial Boulevard which runs along the east boundary of M5. The northeast portion of the residential area south of Mesa Vista will flow onto the office/commercial area along Centennial Boulevard and continue through the office/commercial to the proposed new Pond 5 located approximately 500 feet north of Fillmore and 750 feet west of Centennial Boulevard. Runoff from the western portion of M5 will flow into a proposed natural trapezoidal channel from the outlet of the twin 48" CMP to the Pond 5. The 10/100 flows into Pond 5 (DP 5) are 238/529 cfs. The outlet flow is 86/112 cfs with a 36" RCP pipe. The Mesa Basin Report recommends keeping the outlet at 48 cfs, the same as the existing 24" CMP under Fillmore. The report also says that the developer can adjust flow rates from different facilities as long as the flow at MESA STUDY Design Point 14 (DP19) is the same. When development occurs in this area on the north side of Fillmore, the 24" CMP will be replaced with a 36" RCP. Further discussion of the proposed pond and facilities is in the construction improvements portion of the report.

Sub-basin M6 consists of 19.94 acres. M6 is fully developed residential. This area drains to three existing 18" CMP culvert crossings under Hill Circle into the M5 sub-basin. These pipes will be extended with 18" RCP to the proposed channel and Pond 5 mentioned previously.

Sub-basin M17.1 contains 29.1 acres. When developed this sub-basin south of Fillmore will be office/commercial and open space. The 86/112 cfs from Pond 5 will be conveyed through this sub-basin by a combination of 36" RCP pipe and natural open channel where the open space will remain. Drop structures or intermittent channel lining will be provided where velocities dictate. Runoff from M17.1 will overland to the open space channel then into Pond 17. The 10/100 year flows at DP17.1 are 91/140 cfs. The outflow is 80/99 cfs with a 30" RCP pipe. Further discussion of the proposed pond and facilities is in the construction improvements portion of the report.

Sub-basin M17.2 contains 22.3 acres. This land will be similar to M17.1 and be a combination of office/commercial and open space. Runoff from M17.2 will overland to the natural channel. The outlet from pond 17 will outlet into this channel. The 10/100 year flows at DP17.2 are 102/156 cfs.

Sub-basin M18.1 consists of 39.9 acres. M18.1 will have a combination of office, R-20 and open space when developed. Runoff will overland flow to an existing natural channel where it will combine with flow from DP17.2 and run into proposed Pond No. 18. The 10/100 year flow into the pond is 157/268 cfs. The proposed outflow rates from Pond No. 18 are 95/109 cfs with a 36" RCP pipe. See the construction improvements portion for further information on Pond No. 18.

Sub-basin M18.2 contains 35.6 acres of land. A portion of this land will be developed into R-20 (10%), the majority will remain natural open space. Flows from 18.2 overland to the existing East Fork channel then south into M19. Flows at DP18.2 are 141/211 cfs. At this DP18.2 the East fork leaves Hill Properties.

Sub-basin M19 contains 60.5 acres of land. 35 acres of this sub-basin is land not owned by Hill Development. Hill Development land will be 1 acre of office with the remaining being natural open space. Flows from this proposed office development will sheet flow to the East Fork channel just below DP18.2. Runoff from the open space will overland flow to the channel. The 35 acres offsite was modeled as 1/8 acre residential with overland and street flow. Flows at DP19 are 236/399 cfs. The Master Plan for Mesa Drainage Basin limits these flows to 437 cfs (shown as Design Point 14 in the Master Plan). This was an agreed upon number in the Master Study.

MESA BASIN - (WEST FORK)

Sub-basin M7 contains 33.79 acres. M7 is a combination of existing residential development, golf course and future residential development. Runoff from this area sheet flows from the residential area onto the golf course to an existing 18"x29" CMP pipe under Kissing Camels Drive. The 10/100 year flows at this point are 12/36 cfs. The capacity of the CMP pipe is 17 cfs so a portion of the 100 year storm will overtop Kissing Camels drive and continue down the golf course. The Mesa drainage Basin Master Plan recommended replacing this pipe with a larger one; however, with the available 100 year overflow provided, the existing pipe will remain in place.

Sub-basin M11 contains 24.2 acres and is comprised of future R-1, R-9, and golf course land. Runoff from this area sheet flows from residential lots onto the future extension of Hill Circle, street flow to existing Hill Circle at the northern end of existing development (Subdivision No. 10). The 10/100 year flows for this area are 23/56 cfs. Curb inlets will be installed at the north end of Subdivision No. 10 and a 30" RCP will carry the runoff to the east and south along the golf course and outlet into a wide swale along the west side of Fairway No. 17.

Sub-basin M9 consists of 54 acres of existing golf course, existing R-1 development, and proposed R-5 development. Runoff from this area sheet flows from the golf course and residential development into swales and ditches along the existing streets to proposed Pond #9. This will be a private non-reimbursable facility. A new 30" RCP inlet will be constructed at Kissing Camels Drive and extended through the proposed Courtyard at Kissing Camels Development according to the approved drainage report for Courtyard. 30" and 36" RCP in Filing No. 1 of this development has been constructed. This pipe outlets onto the golf course in sub-basin M8.

Sub-basin M8 consists of 79.52 acres of existing golf course and R-5 lands. Sub-basins M7, M11 and M9 flow onto M8 and continue in wide swales in the golf course down to the existing golf course Detention Pond 8. This pond is a private facility, the improvements proposed to the pond are reimbursable according to the Master Study. The 10/100 year flows into Pond 8 are 53/140 cfs. The proposed outflow are 9/17 cfs with an 18" RCP pipe. The 18" RCP and headwall will be constructed at elevation 6401.5 to allow the continual storage of irrigation water and the ungated outlet will allow storm water detention storage. This new 18" RCP will connect into an existing storm sewer manhole and 27" RCP located in the Office Park at Kissing Camels. The maximum discharge rate for this facility was recommended to be 39 cfs in the Master Plan for Mesa Drainage Basin. The Master Plan also recommends the outflow structure provide 100 year overflow capabilities. In a fully developed condition this pond has the capacity to hold the 100 year storm. With the Kissing Camels Maintenance facility being located just south and east of the low point below the dam area, and the pond having the capability to hold the storm, in the unlikely event the outlet would become plugged, the maintenance personnel would have the time to clear the structure prior to another major storm event. Details of the outlet structure are described in the construction improvements section of the report. The existing access road into the maintenance facility will act as an emergency overflow in the event over topping occurs.

Sub-basin M10 contains 30 acres. This area is partially developed at this time. The existing R-1 and future R-5 land (12 acres) will drain to an existing storm sewer manhole inlet at the southeast corner of the Kissing Camels Golf Course maintenance facility. The total flow to this manhole is 28/53 cfs. This is the same 27" RCP outlet mentioned above and has the capacity to carry the 100 year flow. A portion of the Coronado school playing field and parking lot (10 acres) drain to an existing 4' sump inlet at the southeast corner of the parking lot. The 10/100 year flows are 14/27 at this point. The existing sump inlet has an approximate capacity of 12 cfs with ponding in the parking lot, the remaining flow will overtop the school entry drive onto Fillmore Street. The Office Park at Kissing Camels (8 acres) will drain to existing inlets in the entry drive. These 3 areas combine at Fillmore into an existing 36" steel pipe under Fillmore Street. The 10/100 year flows at DP10 are 30/65 cfs. The existing 36" pipe has the capacity to carry the developed flows.

Sub-basin M12 contains 73.5 acres of existing R-1 development. This sub-basin is completely developed. The runoff from M12 is street and ditch flow to the existing channel on the south side of Inwood Road northwest of Coronado High School. The 10/100 year flows at DP12 of 33/86 cfs flow in the natural channel approximately 300 feet to an existing 20" steel pipe under a maintenance drive northwest of the school building. The 20" pipe has an estimated capacity of 18 cfs. The Master Plan for Mesa Drainage Basin recommended replacing the 20" pipe with a 36" RCP. The 36" RCP at 2.5% grade has a capacity of 125 cfs. The flow continues in the natural channel to an existing 48" CMP at the northwest corner of the school building. There are no signs of erosion on

the natural channel, it is well established with vegetation. There is currently construction taking place on Coronado High School, it is not known whether they intend to change any of the drainage way. The existing 48" CMP has the capacity to convey the 100 year storm. These facilities are within sub-basin M13.

Sub-basin M13 contains 60.5 acres of land. This area is made up of existing apartments, Coronado High school and the MESA Water treatment facility. Runoff from this basin generally flows to the natural channel noted above, to the existing 48" CMP under Fillmore street. The 10/100 year flows at the inlet of the 48" CMP (DP13) are 55/147 cfs. This facility has the capacity to convey the 100 year flows.

Sub-basin M14 contains 53.3 acres. This area is currently undeveloped. The Master Plan for this area shows a combination of R-10, R-20, office, and open space for future development. Runoff from M14 will overland flow to new inlets constructed over the proposed 48" RCP running from the 48" pipe under Fillmore (DP13 to DP14), as well as to new inlets constructed over the proposed 36" RCP running from the 36" steel pipe under Fillmore (DP10 to DP14). Both the 48" and the 36" RCP systems are public reimbursable facilities according to the Master Plan for Mesa Drainage Basin. The 10/100 year flows at DP14 are 116/281 cfs. The Master Plan for Mesa Drainage Basin recommends a Public Detention Pond be constructed at DP14 to limit flows to 300 cfs. Since fully developed flows are under this 300 cfs requirement, the pond will be built to limit the outlet to 151 cfs (100 year). Rip rap dissipation basins will be built at the outlets of the two proposed pipes and rip rap channel lining will be constructed as needed. These public facilities will be reimbursable as described in said Master Plan. The outlet size was based on the size of the pond that could be installed at this location. Construction of this pond will take place when development occurs in sub-basin M14.

Sub-basin M15 contains 37.1 acres of land. This area will be partially developed into R-20 and open space. Runoff from this sub-basin will overland flow to the existing natural channel. According to the Master Plan for Mesa Drainage Basin, the existing natural channel will be maintained by the City of Colorado Springs. Structural treatment along the channel will be done only at "hot spots" and will consist of rip rap erosion protection (bedding course, filter fabric, and rock wearing surface), grade control structures and maintenance access facilities. The 10/100 year flows at DP 15 are 99/165 cfs.

Sub-basin M16 contains 101.6 acres of land. Holmes Junior High is on the western portion of this site along with some existing undeveloped land not part of Hill Properties. The portion of land owned by Hill Properties is designated public and private open space on the master plan. These areas overland flow to the same natural channel mentioned in sub-basin M15 and the treatment of the channel will be the same, as stated above. The 10/100 year flows of DP16 are 119/247 cfs. This corresponds to DP 27 in the Master Plan.

The flows from DP16 and DP19 combine to be DP16/19, being the confluence of the "East Fork" and the "West Fork" channels. The 10/100 year flows at DP16/19 are 318/597 cfs. This corresponds to Design Point 15 on the Mesa Master Plan. The Master Plan does not show a limiting flow rate at this point, but the 597 cfs 100 year flow is significantly lower than the fully developed 1169 cfs rate with no detention.

MISCELLANEOUS SUB-BASINS

Sub-basins M20 and M21 contain 15.8 acres and 28.7 acres respectively. These two areas will be developed into PIP-2, PIP-1 and open space. They are located north of Fillmore Street and east of Centennial Boulevard. These two areas overland flow to the east. According to the Master Plan for Mesa Drainage Basin, this land "will be developed in a fashion to limit runoff to a rate not to exceed the capacity of downstream structures." At this time, Hill Properties does not have a plan for development of this area. The type of detention and analysis of the downstream facilities will be done at the time of development and platting. With the installation of Centennial Boulevard north from Fillmore the basins have been split in accordance with the Master Plan.

Sub-basins M22, M23 and M24 are south of Fillmore Street and east of the proposed Centennial Boulevard extension. Since the exact alignment and grade of Centennial have not been set, it is difficult to determine the exact location of runoff and facilities for these areas. It is recommended that these areas be studied in detail when development will occur or Centennial Boulevard is constructed, which ever comes first.

"EAST FORK" IMPROVEMENTS

Facilities that may be required in sub-basins M1, M2, M3, parts of M5 and M7 due to future development will be private and maintained by the Kissing Camels Home Owner's Association. These facilities are not reimbursable according to the Master Plan for Mesa Basin and were not designed for this report. These private facilities will be addressed at time of development in the individual platting drainage reports.

According to the Master Plan for Mesa Basin, Sub-basins M4 and M5 was to have 3 detention ponds and piping systems between the ponds installed north of Fillmore. All of these facilities were to be reimbursable against the drainage fees according to the Master Plan (Pgs VIII-II) and the preliminary cost estimate Table 10.

Sub-basin M4 is fully developed. The Mesa Drainage Basin Master Report proposed a reimbursable detention pond (A) in the golf course driving range area. This facility will not be constructed due to the twin 48" CMP at Hill Circle having the capacity to convey the 100 year storm.

Sub-basin M5 has the following reimbursable and non-reimbursable facilities proposed for this area:

- A. Extend the existing twin 48" CMP with 48" RCP for approximately 100 feet to the new proposed channel. Non-reimbursable, Private.
- B. Extend the existing 24" RCP for approximately 55 feet to the new proposed channel. Non-reimbursable, Private.
- C. Construct approximately 210 feet of 24" RCP and 850 feet of 18" RCP to connect the existing culverts along Hill Circle to the new proposed channel and Pond 5. Non-reimbursable, Private.

- D. Construct approximately 720 feet of channel from the twin 48" outlet to the proposed Pond 5. The channel will be a trapezoid section with 8' bottom width and 4' depth. A 4' wide concrete trickle channel will be installed to control erosion. See figure 3 for typical section. Non-reimbursable, Private
- E. Construct a junction box at Centennial Boulevard, 350 feet of 42" RCP and 350 feet of 48" RCP from existing Centennial Boulevard to the proposed Pond 5. Two 20 foot inlets will be constructed along this line to pick up flow coming off of the adjacent office/commercial area. Reimbursable, Public.
- F. Construct 80 feet of 36" RCP and 180 feet of 24" RCP with 2 - 10' inlets and 2 - 6' inlets for the street intersection and office/commercial areas. Reimbursable, Public.
- G. Construct proposed Pond 5. Embankment of approximately 70,000 c.y.; 260 L.F. 4' wide concrete low flow channel; 600 s.y. of rip rap; 700 L.F. 36" RCP outlet pipe, and a single stage outlet structure. Reimbursable, Private.

Construction of this pond is only required when the existing Fillmore Detention area will be filled in. The existing detention area has the capacity to hold the 100 year developed storm. The existing release rate is 38/53 cfs. This pond and new 36" crossing under Fillmore will occur when development takes place in the area of the pond or when development takes place along the west side of Centennial Boulevard, north of Fillmore.

Sub-basin M17.1 will have the following private facilities constructed upon development of this area south of Fillmore Street. The facilities are noted as reimbursable or not reimbursable.

- A. Extend the 36" RCP outlet pipe from Pond 5 approximately 600 L.F. to the natural channel with a 115 s.y. rip rap energy dissipator. Public, Reimbursable.
- B. The channel will be left natural where ever possible, rip rap slope protection will be placed at major bends and drop structures. Private, Non-reimbursable.
- C. Construct proposed Pond 17. Embankment at approximately 10,000 cy. 520 l.f. of 30" RCP outlet pipe, and 115 s.y. rip rap energy dissipator. The proposed roadway will act as an emergency overflow. Buildings will be designed above the roadway to allow this as an emergency measure. Private, Reimbursable.

Sub-basins M17.2 and M18.1 have the following private reimbursable and non-reimbursable facilities proposed.

- A. Construct proposed Pond 18. Embankment of approximately 25,000 c.y.; 280 L.F. of 30" RCP outlet pipe; single stage inlet structure, and 150 s.y. of rip rap energy dissipator. Private, Reimbursable.
- B. The channel will be left natural where ever possible, rip rap slope protect will be placed at major bends and drop structures if required. Private, Non-reimbursable.

The "East Fork" channel through sub-basin M19 is not within the Hill Properties ownership. This channel will be left natural where ever possible, rip rap slope protection will be placed at major bends and drop structures if required. This work will be done when M19 is developed at that owners expense. According to the Master Plan, these improvements are not reimbursable.

"WEST FORK" IMPROVEMENTS

Improvements for sub-basins M9 and M11 are non-reimbursable and will be designed and installed when Hill Circle is extended north from Kissing Camels Subdivision No. 10.

Sub-basin M8 has the following reimbursable facilities proposed for this area.

- A. Installation of 491 l.f. of 18" and 27" RCP outlet pipe for Pond 8 (existing golf course pond); concrete headwall inlet structure with rip rap; Type 2 Manhole.

Sub-basin M13 will have the existing 40 l.f. of 20" steel pipe removed and replaced with 40 l.f. of 36" RCP. This facility is located on City land and is an access to a City utility. This facility will be replaced at the time of expansion of the Mesa Water Treatment Plant by the City.

Sub-basin M14 will have the following improvements installed at the time that development will occur in the area of the improvement.

- A. Install 1100 l.f. 48" RCP from the south end of the existing 48" CMP at DP13 east to the existing drainage way (DP-14); Install 2-Type 1 manholes; 48" RCP FES; 330 s.y. rip rap energy dissipator (reimbursable).
- B. Install 1000 l.f. of 36" RCP from the existing 36" steel pipe at DP10 to the natural drainage way (DP-14); Install 2-Type 1 manholes; 2 - 20' D-10-R inlets on Fillmore to pick up Fillmore Street run off and emergency overflow from Basin 10; install 2 - 10' D-10-R inlets on new public street with 36"RCP outlet; 300 s.y. rip rap energy dissipator. (reimbursable)
- C. Install Pond 14; install 230 l.f 42" RCP w/ 2 FES for Pond outlet; approximately 18,000 c.y. of embankment; 700 s.y. rip rap spillway and dissipator (reimbursable).

Sub-basin M16 will have the following improvements installed at the time that development will occur. Rip rap treatment on the "Hot Spots" along the main stem channel with concrete grade control structures at pertinent locations. This main channel will need to be studied in detail when development occurs in M14 and M15. At that time the extent of the improvements required will be determined.

CONSTRUCTION COST ESTIMATE:

"EAST FORK" North of Fillmore -

Sub-basin	Item	Quantity	Unit Cost	Total Cost
M5.A	48" RCP	200 L.F.	65.00	13,000.00
	Concrete Collar	2 EA	500.00	1,000.00
	48" FES	2 EA	900.00	1,800.00
	Private - Non Reimbursable			
M5.B	24" RCP	265 L.F.	26.00	6,890.00
	Remove & Replace 24" FES	1 EA	150.00	150.00
	18" RCP	850 L.F.	20.00	17,000.00
	Private - Non Reimbursable			
M5.C	Fine Grading	720 L.F.	4.00	2,880.00
	Concrete Trickle Channel	720 L.F.	9.00	6,480.00
	Private - Non Reimbursable			
M5.D	42" RCP	350 L.F.	60.00	21,000.00
	48" RCP	350 L.F.	65.00	22,750.00
	48" RCP Bend	1 EA	900.00	900.00
	Type I Manhole	1 EA	2,500.00	2,500.00
	20'D-10-R	1 EA	9,000.00	9,000.00
	30'D-10-R	1 EA	13,000.00	13,000.00
	Public - Reimbursable			
M5.E	24" RCP	180 L.F.	26.00	4,680.00
	36" RCP	80 L.F.	45.00	3,600.00
	6' D-10-R	2 EA	3,000.00	6,000.00
	10' D-10-R	2 EA	4,500.00	9,000.00
	Public - Reimbursable			
M5.F (pond)	Embankment	95,000 C.Y.	1.15	109,250.00
	Concrete Trickle Channel	260 L.F.	9.00	2,340.00
	Rip Rap	600 S.Y.	50.00	30,000.00
	36" RCP (Public)	700 L.F.	45.00	31,500.00
	Outlet Structure	1 EA	2,000.00	2,000.00
	Asphalt Remove & Replace	530 S.Y.	4.00	2,120.00
	Private - Reimbursable			
Subtotal Sub-basin M5 (reimbursable)				269,640.00
15% Engineering and Contingency				40,446.00
Total M5				310,086.00

"EAST FORK" South of Fillmore

Sub-basin	Item	Quantity	Unit Cost	Total Cost
M17.1.A	36" RCP	600 L.F.	\$ 45.00	\$ 27,000.00
	36" RCP FES	1 EA	800.00	800.00
	Rip Rap	115 S.Y.	50.00	5,750.00
	Public - Reimbursable			
M17.1.C Pond 17	Embankment	25,000 C.Y.	1.25	31,250.00
	30" RCP	650 L.F.	40.00	26,000.00
	30" RCP FES	2 EA	750.00	1,500.00
	Rip Rap	115 S.Y.	50.00	5,750.00
	Private - Reimbursable			
		Subtotal Sub-basin M17.1		98,050.00
		15% Engineering and Contingency		14,707.00
		Total M17.1		112,757.00
M18.1.A Pond 18	Embankment	25,000 C.Y.	1.25	31,250.00
	30" RCP	280 L.F.	40.00	11,200.00
	30" RCP FES	2 EA	750.00	1,500.00
	Rip Rap	115 S.Y.	50.00	5,750.00
	Public - Reimbursable			
		Subtotal Sub-basin M18.1		49,700.00
		15% Engineering and Contingency		7,455.00
		Total M18.1		57,155.00
		TOTAL "EAST FORK" - Reimbursable		\$479,998.00

"WEST FORK" North of Fillmore

M8 Pond 8	27" RCP	212 L.F.	47.00	9,964.00
	18" RCP	279 L.F.	37.00	10,323.00
	Type 2 Manhole	1 EA	1,500.00	1,500.00
	Headwall w/rip rap	1 EA	2,400.00	2,400.00
	Private-Reimbursable			
		Subtotal Sub-basin M8		24,187.00
		15% Engineering and Contingency		3,628.00
		Total M8		27,815.00

M9	Excavation	2,000 C.Y.	1.50	3,000.00
Pond 9	30" RCP	100 L.F.	40.00	4,000.00
	Reseeding	1 L.S.	500.00	500.00
	Private, Non-Reimbursable			
		Subtotal Sub-basin M9		7,500.00
		15% Engineering and Contingency		1,125.00
		Total M9		8,625.00
M13	Remove 20" Steel Pipe	40 L.F.	5.00	200.00
	36" RCP	40 L.F.	45.00	1,800.00
	36" FES	2 EA	800.00	1,600.00
	Reseeding	1 L.S.	500.00	500.00
	Public - Reimbursable			
		Subtotal Sub-basin M13		4,100.00
		15% Engineering and Contingency		615.00
		Total M13		4,715.00
<u>"WEST FORK"</u>	South of Fillmore -			
M14.A	48" RCP	1100 L.F.	90.00	99,000.00
	48" FES	1 EA	1,000.00	1,000.00
	Type 1 Manhole	2 EA	5,000.00	10,000.00
	Rip Rap	330 S.Y.	50.00	25,000.00
	Public - Reimbursable			
M14.B	36" RCP	1000 L.F.	55.00	55,000.00
	20' D-10-R	2 EA	6,000.00	12,000.00
	10' D-10-R	2 EA	4,500.00	9,000.00
	Type I Manhole	2 EA	5,000.00	10,000.00
	Rip Rap	300 S.Y.	50.00	15,000.00
	Public - Reimbursable			
M14.C	42" RCP	230 L.F.	65.00	14,950.00
(pond 14)	42" FES	2 EA	950.00	1,900.00
	Grading	18,000 C.Y.	2.50	45,000.00
	Rip Rap	700 S.Y.	50.00	35,000.00
	Public - Reimbursable			
		Subtotal Sub-basin M14		321,950.00
		15% Engineering and Contingency		48,292.00
		Total M14		377,242.00

M16	Rip Rap Concrete Control Structure Public - Reimbursable	5,900 L.F. 4 EA	60.00 2,000.00	354,000.00 8,000.00
		Subtotal Sub-basin M16		362,000.00
		15% Engineering and Contingency		54,300.00
		Total M16		416,300.00
		TOTAL "WEST FORK" - Reimbursable		\$ 798,257.00

Note: Costs for M16 taken from Mesa Basin study. This channel section will need to be studied when development occurs. In addition, this land is now owned by the Park and Recreation Department, treatment of the drainage way will have to be approved by them as well.

DRAINAGE FEES:

The drainage and bridge fees for the future developed areas within the Camp Creek and Douglas Creek Basins will be determined at the time of platting since there are no major facilities to be constructed within these two major basins.

Drainage fees for Mesa Basin will be split up into three separate areas: (1) East Fork, (2) West Fork, and (3) East of Centennial. The drainage fees are split in these areas due to the facility requirements in the East Fork and West Fork areas.

(1) East Fork

There are approximately 198 acres of developable Hill land within the East Fork area. The current fee of \$4,715.00/acre will generate \$933,570.00 in 1995 dollars to the basin. The reimbursable facilities within the East Fork area are \$479,998.00

(2) West Fork

There are approximately 115 acres of developable Hill land within the West Fork area. This will generate \$542,225.00 to the basin. The reimbursable facilities within the West Fork area total \$798,257.00

(3) East of Centennial

There are approximately 89 acres of Hill owned land east of Centennial Boulevard that are developable. This will generate \$419,635.00 dollars of revenue. Approximately \$24,000 in Public - Reimbursable facilities will be required for the Hill Properties section of Centennial Boulevard. There are approximately \$36,000 worth of Public - Reimbursable facilities east of Centennial, north of Fillmore. Exact design and facilities will be determined when the final alignment and design is determined as described in the Master Plan.

Total developable Hill land - 402 acres x \$4715.00/AC	\$ 1,895,430.00
Total reimbursable facilities for Hill Property (Public and Private)	\$ 1,338,255.00

The Master Plan for Mesa Basin noted that Hill Properties had 600 acres of undeveloped developable land included in the Basin Fee calculation. The actual developable area is 475 acres. 72.41 acres of land has been developed since the Master Plan was adopted, 402 acres of land remain to be developed. The Master Plan showed \$1,282,100 in Public and Private Reimbursable facilities using 1986 costs.

It is requested that when platting of this developable Hill land occurs, the City accept financial assurances for drainage fees to pay for the facilities as they are required. As of this date, the City has accepted \$140,102.20 worth of assurances to pay for future facilities. These dollars are not included in the 402 acres of land to be developed.

APPENDIX

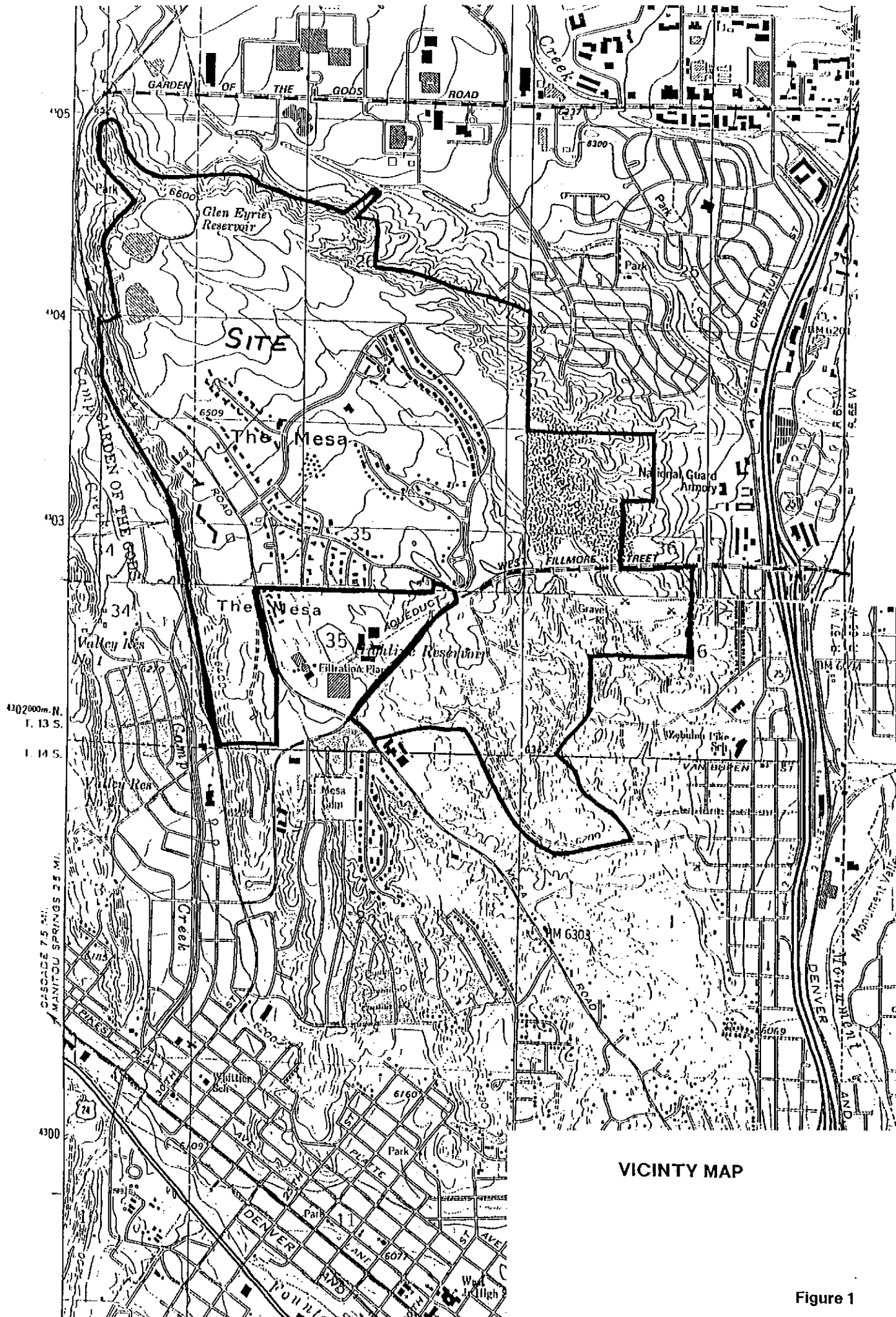
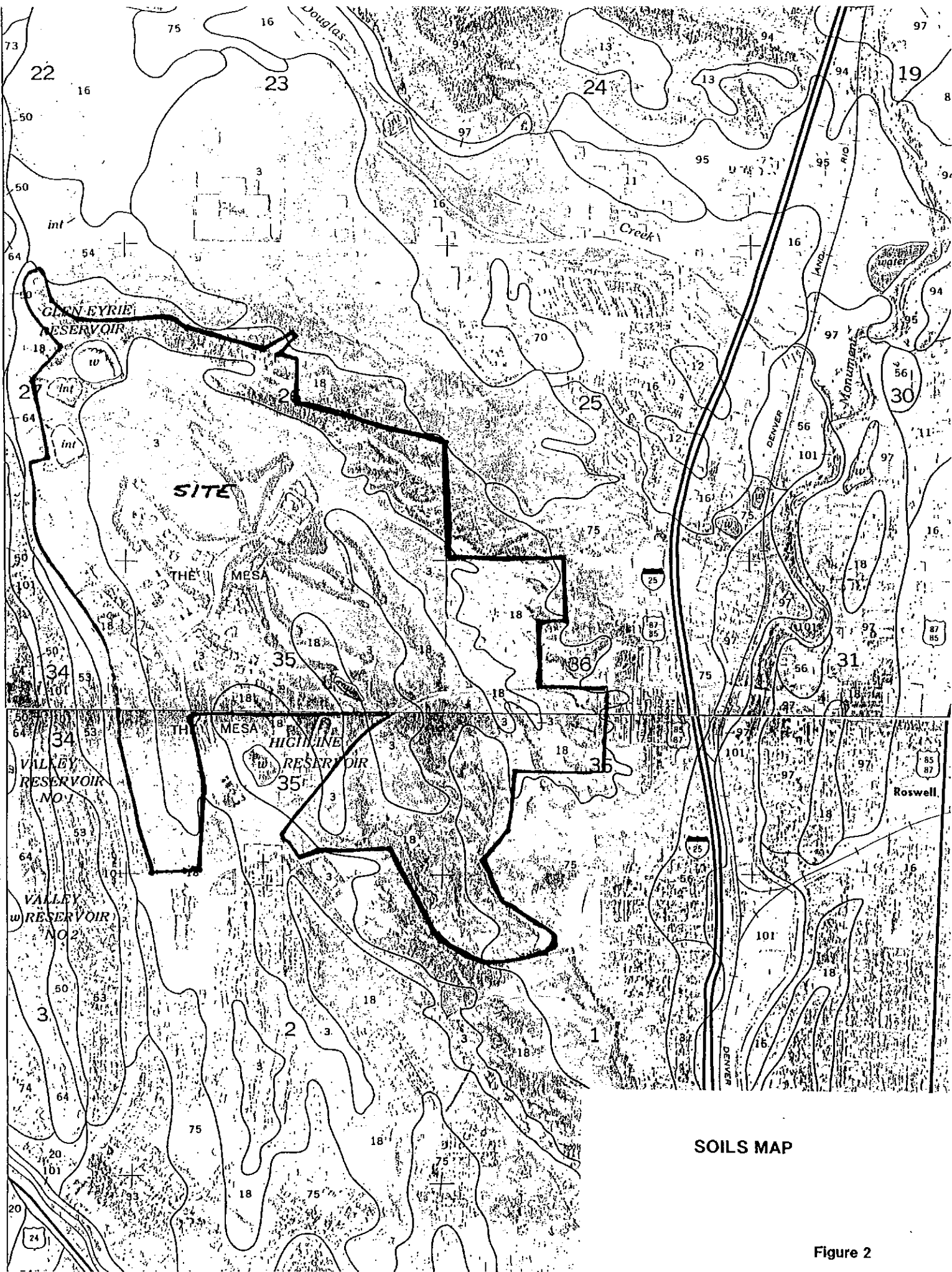
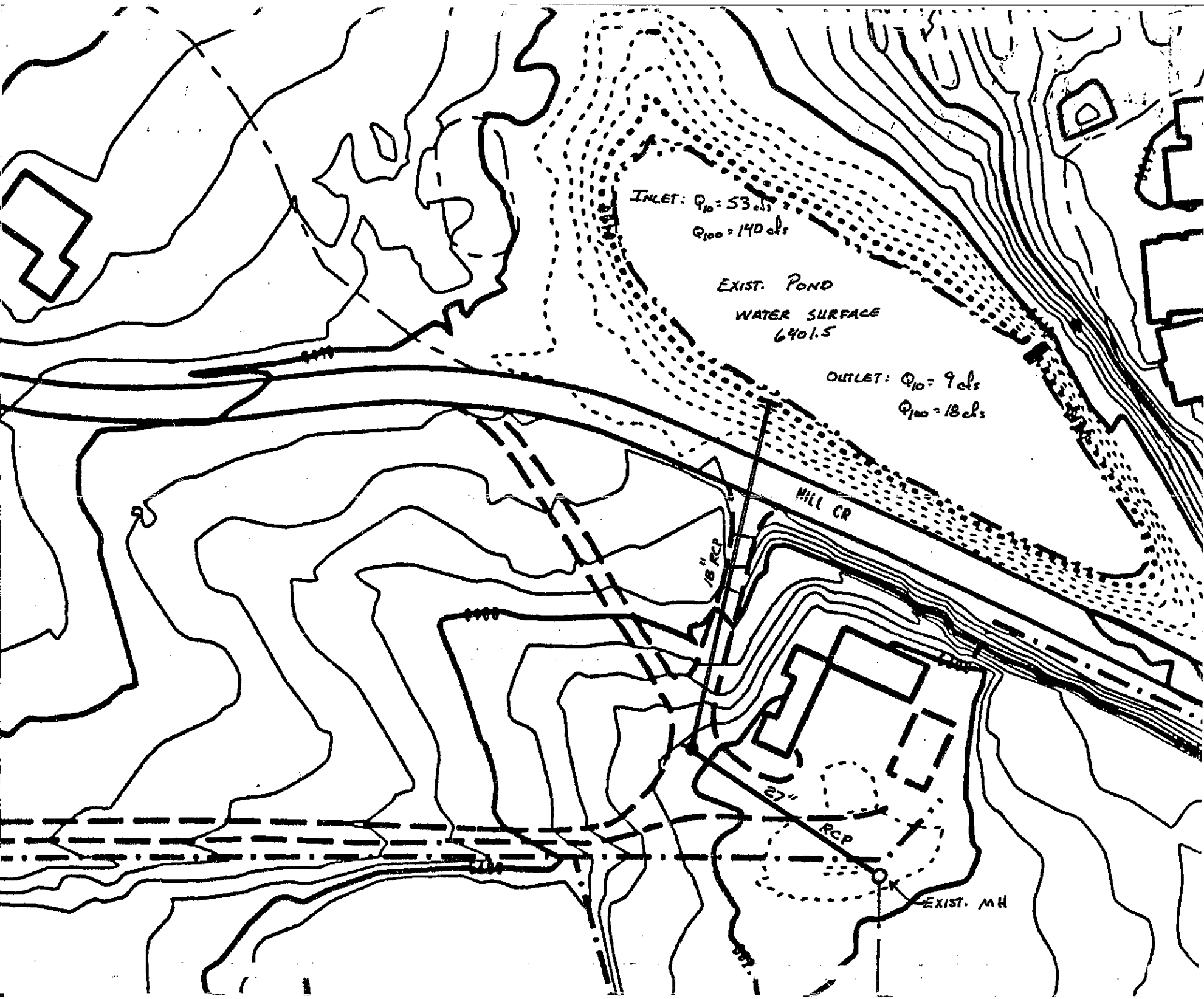


Figure 1

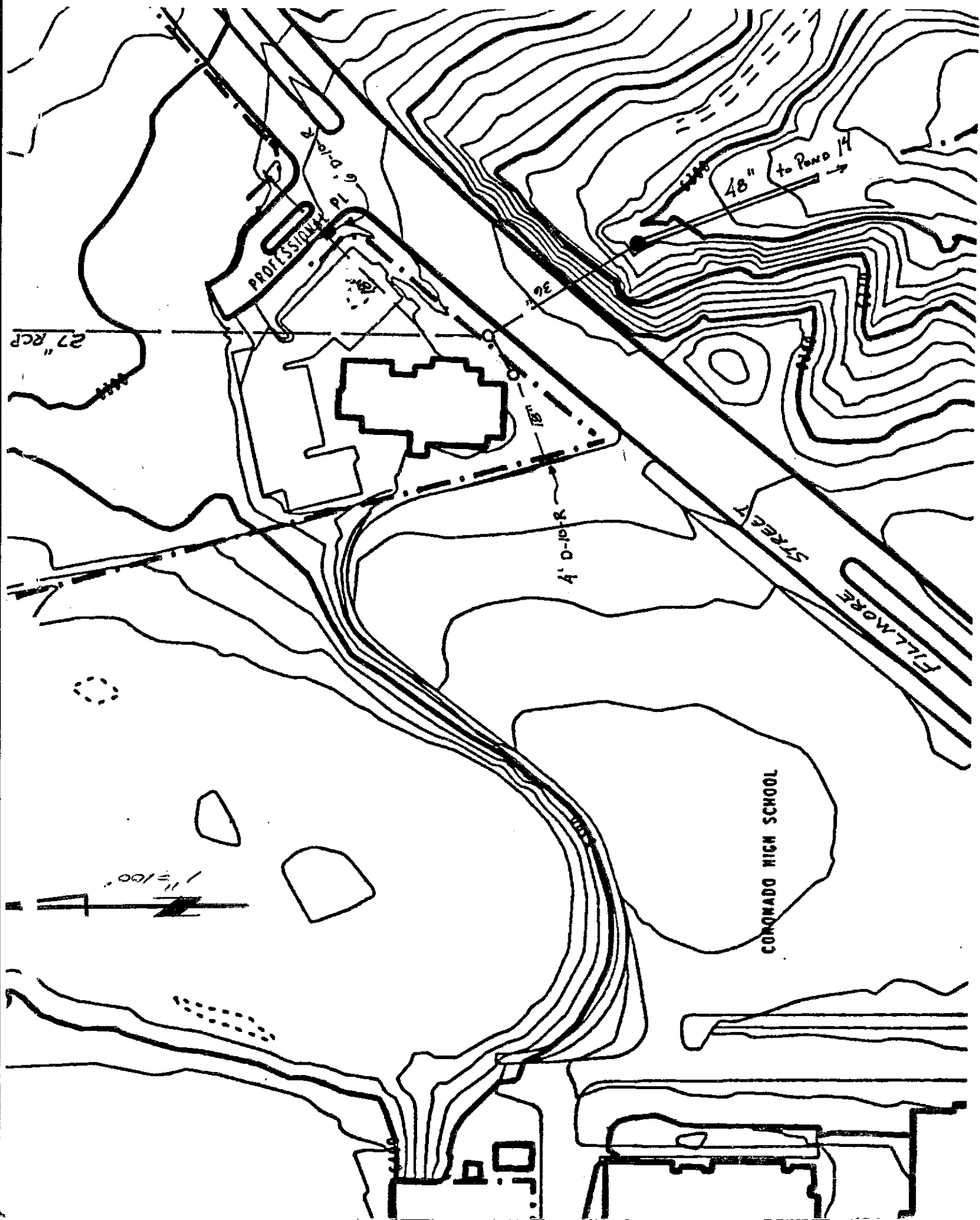


SOILS MAP

Figure 2



KISSING CAMELS GOLF COURSE POND



PROFESSOR PL

48" to Pond 14

FILLMORE STREET

FILLMORE

CORONADO HIGH SCHOOL

27" RCP

4' D-10-R

1" = 100'

2010-9-6 PL D-10-R

36"

15"

100'

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

1 ID KISSING CAMELS MDDP

2 ID ROCKWELL-MINCHOW CONSULTANTS, INC. - 93-006 - TDM 5-15-95

3 ID 24 HR - 10 & 100 YEAR STORMS, FILE: HIDEV15.DAT

4 ID DEVELOPED CONDITION, FLOWS TO MAIN CONFLUENCE, POND #8 REMAINS IN PLACE

5 ID WITH POND #5 AT DP5

6 ID WITH POND #9 AT DP9

7 ID WITH POND #14 AT DP14

8 ID WITH POND #17 AT DP17.1

9 ID WITH POND #18 AT DP18.1

*** FREE ***

*DIAGRAM

10 IT 5 0 0 288

11 IO 5

12 JR PREC .682 1.0

13 KK M1

14 KM RUNOFF FROM BASIN M1

15 IN 30

16 PB 4.4

17 PC 0.0 .0015 .0045 .0080 .0120 .0165 .0210 .0255 .0320 .0460

18 PC .0600 .1000 .7000 .7500 .7800 .8000 .8200 .8300 .8400 .8500

19 PC .8600 .8675 .8750 .8825 .8900 .8975 .9050 .9115 .9180 .9240

20 PC .9300 .9350 .9400 .9450 .9500 .9550 .9600 .9650 .9700 .9750

21 PC .9800 .9825 .9850 .9875 .9900 .9925 .9950 .9975 1.000

22 BA .0471

23 LS 0 68

24 UD 0.32

25 KK RTM1

26 KM ROUTE M1 THRU M2

27 RK 1000 .034 .03 0 TRAP 20 10

28 KK M2

29 KM RUNOFF FROM M2

30 BA .1302

31 LS 0 67.5

32 UD 0.47

33 KK DP2

34 KM COMBINE RUNOFF FROM M2 & ROUTED RTM1

35 HC 2

36 KK RTDP2

37 KM ROUTE DP2 THRU M3

38 RK 900 .04 .03 0 TRAP 15 10

39 KK M3

40 KM RUNOFF FROM M3

41 BA .0570

42 LS 0 65

43 UD 0.33

LINE	ID	1	2	3	4	5	6	7	8	9	10
44	KK	DP3									
45	KM	COMBINE ROUTED DP2 WITH M3									
46	HC	2									
47	KK	RTDP3									
48	KM	ROUTE DP3 THRU M4									
49	RK	2900	.019	.03	0	TRAP	15	10			
50	KK	M4									
51	KM	RUNOFF FROM M4									
52	BA	.1162									
53	LS	0	74								
54	UD	0.41									
55	KK	DP4									
56	KM	COMBINE ROUTED RTM3 WITH M4									
57	HC	2									
58	KK	RTDP4									
59	KM	ROUTE DP4 THRU M5									
60	RK	1600	.018	.013	0	TRAP	5	1			
61	KK	M5									
62	KM	RUNOFF FROM M5									
63	BA	.1534									
64	LS	0	84								
65	UD	0.29									
66	KK	M6									
67	KM	RUNOFF FROM M6									
68	BA	.0312									
69	LS	0	85								
70	UD	0.30									
71	KK	RTM6									
72	KM	ROUTE M6 THRU M5									
73	RK	1500	.018	.013	0	TRAP	2	1			
74	KK	DP5									
75	KM	COMBINE ROUTED FLOWS FROM DP4 & M6 WITH M5									
76	HC	3									
77	KK	POND5									
78	KM	ROUTE FLOWS THRU POND #5 (36" RCP, SQUARE HW)									
79	KO	3									
80	RS	1	ELEV	6377.5							
81	SQ	0	5	28	82	95	110	125	130	345	
82	SA	0	.1418	.8868	1.1455	1.5597	1.9651	2.3990	2.4839	2.5253	
83	SE	6377.5	6378	6380	6385	6390	6395	6400	6401	6401.5	
	*	SS	6401	50	3.0	1.5					
84	ST	6401	500	3.0	1.5						

LINE	ID	1	2	3	4	5	6	7	8	9	10
126	KK	POND18									
127	KM	ROUTE FLOWS THRU POND #18 (30" RCP, SQUARE HW)									
128	KO	3									
129	RS	1	ELEV	6224							
130	SQ	0	51	93	116	543	1322				
131	SA	0	.062	.292	1.589	1.956	2.323				
132	SE	6224	6230	6240	6250	6252	6254				
	*	SS	6250	50	3.0	1.5					
133	ST	6254	500	3.0	1.5						
134	KK	RT18.1									
135	KM	ROUTE DP18.1 THRU M18.2									
136	RK	700	.031	.03	0	TRAP	8	2			
137	KK	M18.2									
138	KM	RUNOFF FROM M18.2									
139	BA	.0556									
140	LS	0	82.3								
141	UD	0.20									
142	KK	DP18.2									
143	KM	COMBINE ROUTED DP18.1 WITH M18.2									
144	HC	2									
145	KK	RT18.2									
146	KM	ROUTE DP18.2 THRU M19									
147	RK	1600	.031	.03	0	TRAP	8	2			
148	KK	M19									
149	KM	RUNOFF FROM M19									
150	BA	.0946									
151	LS	0	83								
152	UD	0.20									
153	KK	DP19									
154	KM	COMBINE ROUTED RTM18.2 WITH M19									
155	HC	2									
156	KK	M7									
157	KM	RUNOFF FROM M7									
158	BA	.0528									
159	LS	0	66								
160	UD	0.27									
161	KK	RTM7									
162	KM	ROUTE M7 THRU M8									
163	RK	3000	.021	.03	0	TRAP	20	10			
164	KK	M8									
165	KM	RUNOFF FROM M8									
166	BA	.1243									
167	LS	0	66								
168	UD	0.45									

LINE	ID	1	2	3	4	5	6	7	8	9	10
169	KK	M11									
170	KM	RUNOFF FROM BASIN M11									
171	BA	.0467									
172	LS	0	71.6								
173	UD	0.36									
174	KK	RTM11									
175	KM	ROUTE M11 THRU M9									
176	RK	2600	.03	.03	0	TRAP	4	4			
177	KK	M9									
178	KM	RUNOFF FROM M9									
179	BA	.0844									
180	LS	0	69								
181	UD	0.45									
182	KK	DP9									
183	KM	COMBINE ROUTED RTM11 WITH M9									
184	HC	2									
185	KK	POND9									
186	KM	ROUTE FLOWS THRU POND #9 (30" RCP)									
187	KO	3									
188	RS	1	ELEV	6463							
189	SQ	0	16	37	45	158					
190	SA	0.0	.624	.701	.771	1.000					
191	SE	6463	6465	6467	6468	6468.5					
	*	SS	6468	25	3.0	1.5					
192	ST	6468	200	3.0	1.5						
193	KK	RTDP9									
194	KM	ROUTE FLOW FROM DP9 THRU M8									
195	RK	1800	.025	.03	0	TRAP	20	10			
196	KK	DP8									
197	KM	COMBINE ROUTED FLOW FROM DP9 & M7 WITH M8									
198	HC	3									
199	KK	POND8									
200	KM	ROUTE FLOWS THRU POND #8 (EXISTING "GOLF COURSE POND" WITH 18" RCP)									
201	KO	3									
202	RS	1	ELEV	6401.5							
203	SQ	0	8.5	15	20	220					
204	SA	2.12	2.35	2.73	3.25	3.5					
205	SE	6402	6404	6406	6408	6408.5					
	*	SS	6406	25	3.0	1.5					
206	ST	6408	200	3.0	1.5						
207	KK	RTM8									
208	KM	ROUTE DP8 THRU M10									
209	RK	1300	.023	.013	0	TRAP	2	1			

LINE	ID	1	2	3	4	5	6	7	8	9	10
210	KK	M10									
211	KM	RUNOFF FROM M10									
212	BA	.0512									
213	LS	0	77								
214	UD	0.35									
215	KK	DP10									
216	KM	COMBINE ROUTED DP8 WITH M10									
217	HC	2									
218	KK	RTM10									
219	KM	ROUTE DP10 THRU M14									
220	RK	1700	.029	.018	0	TRAP	8	1			
221	KK	M12									
222	KM	RUNOFF FROM M12									
223	BA	.1148									
224	LS	0	70								
225	UD	0.43									
226	KK	RTM12									
227	KM	ROUTE M12 THRU M13									
228	RK	1700	.024	.024	0	TRAP	3	1			
229	KK	M13									
230	KM	RUNOFF FROM M13									
231	BA	.0949									
232	LS	0	67								
233	UD	0.39									
234	KK	DP13									
235	KM	COMBINE ROUTED M12 WITH M13									
236	HC	2									
237	KK	RTM13									
238	KM	ROUTE DP13 THRU M14									
239	RK	1700	.029	.018	0	TRAP	8	1			
240	KK	M14									
241	KM	RUNOFF FROM M14									
242	BA	.0653									
243	LS	0	78								
244	UD	0.23									
245	KK	DP14									
246	KM	COMBINE ROUTED FLOWS FROM M10 & M13 WITH M14									
247	HC	3									
248	KK	POND14									
249	KM	ROUTE FLOWS THRU POND #14 (48" RCP)									
250	KO	3									
251	RS	1	ELEV	6302							
252	SQ	0	20	60	90	110	130	145	160		
253	SA	0	0.16	0.25	0.34	0.53	0.80	1.05	1.26		

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
13	M1	
	V	
	V	
25	RTM1	
	.	
28	.	M2
	.	.
	.	.
33	DP2.....	
	V	
	V	
36	RTDP2	
	.	
39	.	M3
	.	.
	.	.
44	DP3.....	
	V	
	V	
47	RTDP3	
	.	
50	.	M4
	.	.
	.	.
55	DP4.....	
	V	
	V	
58	RTDP4	
	.	
61	.	M5
	.	.
	.	.
66	.	M6
	.	V
	.	V
71	.	RTM6
	.	.
	.	.
74	DP5.....	
	V	
	V	
77	POND5	
	V	
	V	
85	RTDP5	
	.	
88	.	M17.1
	.	.
	.	.
93	DP17.1.....	
	V	

96	POND17	V		
		V		
		V		
104	RT17.1			
107			M17.2	
112	DP17.2.....			
		V		
		V		
115	RT17.2			
118			M18.1	
123	DP18.1.....			
		V		
		V		
126	POND18			
		V		
		V		
134	RT18.1			
137			M18.2	
142	DP18.2.....			
		V		
		V		
145	RT18.2			
148			M19	
153	DP19.....			
156			M7	
			V	
			V	
161			RTM7	
164			M8	
169			M11	
			V	
			V	
174			RTM11	
177				M9
182			DP9.....	
			V	
			V	
185			POND9	
			V	

193	.	.	.	V
	.	.	RTDP9	.

196	.	DP8.....	.	.
	.	V	.	.
	.	V	.	.
199	.	POND8	.	.
	.	V	.	.
	.	V	.	.
207	.	RTM8	.	.

210	.	.	M10	.

215	.	DP10.....	.	.
	.	V	.	.
	.	V	.	.
218	.	RTM10	.	.

221	.	.	M12	.
	.	.	V	.
	.	.	V	.
226	.	.	RTM12	.

229	.	.	.	M13

234	.	.	DP13.....	.
	.	.	V	.
	.	.	V	.
237	.	.	RTM13	.

240	.	.	.	M14

245	.	DP14.....	.	.
	.	V	.	.
	.	V	.	.
248	.	POND14	.	.
	.	V	.	.
	.	V	.	.
256	.	RTP14	.	.

259	.	.	M15	.

264	.	DP15.....	.	.
	.	V	.	.
	.	V	.	.
267	.	RTM15	.	.

270	.	.	M16	.

275	.	DP16.....	.	.

278	.	DP1619.....	.	.

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

HEC1 S/N: 1343000554 HMVersion: 6.33 Data File: C:\DATA\TDM\H1DEV15.DAT

```

*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*   MAY 1991                       *
*   VERSION 4.0.1E                 *
*
* RUN DATE 05/16/1995 TIME 08:17:34 *
*
*****

```

```

*****
*
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
*   609 SECOND STREET          *
*   DAVIS, CALIFORNIA 95616    *
*   (916) 756-1104            *
*
*****

```

```

KISSING CAMELS MDDP
ROCKWELL-MINCHOW CONSULTANTS, INC. - 93-006 - TDM 5-15-95
24 HR - 10 & 100 YEAR STORMS, FILE: H1DEV15.DAT
DEVELOPED CONDITION, FLOWS TO MAIN CONFLUENCE, POND #8 REMAINS IN PLACE
WITH POND #5 AT DP5
WITH POND #9 AT DP9
WITH POND #14 AT DP14
WITH POND #17 AT DP17.1
WITH POND #18 AT DP18.1

```

```

11 IO      OUTPUT CONTROL VARIABLES
          IPRNT      5 PRINT CONTROL
          IPLOT      0 PLOT CONTROL
          QSCAL      0. HYDROGRAPH PLOT SCALE

```

```

IT        HYDROGRAPH TIME DATA
          NMIN      5 MINUTES IN COMPUTATION INTERVAL
          IDATE     1 0 STARTING DATE
          ITIME     0000 STARTING TIME
          NQ        288 NUMBER OF HYDROGRAPH ORDINATES
          NDDATE    1 0 ENDING DATE
          NDTIME    2355 ENDING TIME
          ICENT     19 CENTURY MARK

```

```

COMPUTATION INTERVAL 0.08 HOURS
TOTAL TIME BASE      23.92 HOURS

```

ENGLISH UNITS

```

DRAINAGE AREA      SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION  FEET
FLOW               CUBIC FEET PER SECOND
STORAGE VOLUME     ACRE-FEET
SURFACE AREA       ACRES
TEMPERATURE        DEGREES FAHRENHEIT

```

```

JP        MULTI-PLAN OPTION
          NPLAN      1 NUMBER OF PLANS

```

```

JR        MULTI-RATIO OPTION
          RATIOS OF PRECIPITATION
          0.68      1.00

```

*** **

 * *
 77 KK * POND5 *
 * *

79 KO OUTPUT CONTROL VARIABLES
 IPRNT 3 PRINT CONTROL
 IPLOT 0 PLOT CONTROL
 QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

80 RS STORAGE ROUTING
 NSTPS 1 NUMBER OF SUBREACHES
 ITYP ELEV TYPE OF INITIAL CONDITION
 RSVRIC 6377.50 INITIAL CONDITION
 X 0.00 WORKING R AND D COEFFICIENT

82 SA AREA 0.0 0.1 0.9 1.1 1.6 2.0 2.4 2.5 2.5

83 SE ELEVATION 6377.50 6378.00 6380.00 6385.00 6390.00 6395.00 6400.00 6401.00 6401.50

81 SQ DISCHARGE 0. 5. 28. 82. 95. 110. 125. 130. 345.

84 ST TOP OF DAM
 TOPEL 6401.00 ELEVATION AT TOP OF DAM
 DAMWID 500.00 DAM WIDTH
 COQD 3.00 WEIR COEFFICIENT
 EXPD 1.50 EXPONENT OF HEAD

COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	0.02	0.95	6.01	12.75	21.54	32.43	34.88	36.13
ELEVATION	6377.50	6378.00	6380.00	6385.00	6390.00	6395.00	6400.00	6401.00	6401.50

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HYDROGRAPH AT STATION POND5
 FOR PLAN 1, RATIO = 0.68

PEAK OUTFLOW IS 86. AT TIME 6.83 HOURS

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW					
		6-HR	24-HR	72-HR	23.92-HR	(CFS) (HR)	
(CFS)		86.	6.83		43.	14.	14.
(INCHES)		0.751	0.978	0.978	0.978		
(AC-FT)		21.	28.	28.	28.		

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE				
		6-HR	24-HR	72-HR	23.92-HR	(AC-FT) (HR)
8.	6.83	3.	1.	1.	1.	

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE				
		6-HR	24-HR	72-HR	23.92-HR	(FEET) (HR)
6386.72	6.83	6381.60	6378.85	6378.85	6378.85	

CUMULATIVE AREA = 0.54 SQ MI

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HYDROGRAPH AT STATION POND5
FOR PLAN 1, RATIO = 1.00

PEAK OUTFLOW IS 112. AT TIME 7.08 HOURS

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW				(CFS)	(HR)	
		6-HR	24-HR	72-HR	23.92-HR			
		112.	7.08		87.	28.	28.	28.
		(INCHES) 1.512	1.963	1.963	1.963			
		(AC-FT) 43.	56.	56.	56.			

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE				(AC-FT)	(HR)
		6-HR	24-HR	72-HR	23.92-HR		
23.	7.08	12.	3.	3.	3.		

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE				(FEET)	(HR)
		6-HR	24-HR	72-HR	23.92-HR		
6395.66	7.08	6388.98	6380.98	6380.98	6380.98		

CUMULATIVE AREA = 0.54 SQ MI

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96 KK * POND17 *
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98 KO OUTPUT CONTROL VARIABLES
IPRNT 3 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

99 RS STORAGE ROUTING
NSTPS 1 NUMBER OF SUBREACHES
ITYP ELEV TYPE OF INITIAL CONDITION
RSVRIC 6278.00 INITIAL CONDITION
X 0.00 WORKING R AND D COEFFICIENT

101 SA AREA 0.0 0.0 0.2 0.4 0.6 1.0 1.4 1.5

102 SE ELEVATION 6278.00 6280.00 6284.00 6288.00 6292.00 6296.00 6300.00 6301.00

100 SQ DISCHARGE 0. 15. 51. 71. 87. 100. 110. 730.

103 ST TOP OF DAM
TOPEL 6300.00 ELEVATION AT TOP OF DAM
DAMWID 200.00 DAM WIDTH
COQD 3.00 WEIR COEFFICIENT
EXPD 1.50 EXPONENT OF HEAD

COMPUTED STORAGE-ELEVATION DATA

STORAGE 0.00 0.03 0.42 1.55 3.61 6.79 11.61 13.08
ELEVATION 6278.00 6280.00 6284.00 6288.00 6292.00 6296.00 6300.00 6301.00

*** **

HYDROGRAPH AT STATION POND17
FOR PLAN 1, RATIO = 0.68

PEAK OUTFLOW IS 79. AT TIME 7.67 HOURS

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW					(CFS)	(HR)	15.
		6-HR	24-HR	72-HR	23.92-HR	23.92-HR			
		79.	7.67		47.	15.			
		(INCHES) 0.759	0.988	0.988	0.988				
		(AC-FT) 23.	30.	30.	30.				

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE					(AC-FT)	(HR)
		6-HR	24-HR	72-HR	23.92-HR	23.92-HR		
2.	7.67	1.	0.	0.	0.			

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE					(FEET)	(HR)
		6-HR	24-HR	72-HR	23.92-HR	23.92-HR		
6289.92	7.67	6284.50	6280.10	6280.10	6280.09			

CUMULATIVE AREA = 0.57 SQ MI

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HYDROGRAPH AT STATION POND17
FOR PLAN 1, RATIO = 1.00

PEAK OUTFLOW IS 98. AT TIME 9.00 HOURS

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW					(CFS)	(HR)	31.
		6-HR	24-HR	72-HR	23.92-HR	23.92-HR			
		98.	9.00		91.	31.			
		(INCHES) 1.476	1.978	1.978	1.978				
		(AC-FT) 45.	60.	60.	60.				

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE					(AC-FT)	(HR)
		6-HR	24-HR	72-HR	23.92-HR	23.92-HR		
6.	9.00	5.	1.	1.	1.			

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE					(FEET)	(HR)
		6-HR	24-HR	72-HR	23.92-HR	23.92-HR		
6295.47	9.00	6293.33	6282.85	6282.85	6282.86			

CUMULATIVE AREA = 0.57 SQ MI

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126 KK * POND18 *
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128 KO OUTPUT CONTROL VARIABLES
IPRNT 3 PRINT CONTROL
IPL0T 0 PLOT CONTROL
OSCAL 0 HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

129 RS STORAGE ROUTING
 NSTPS 1 NUMBER OF SUBREACHES
 ITYP ELEV TYPE OF INITIAL CONDITION
 RSVRIC 6224.00 INITIAL CONDITION
 X 0.00 WORKING R AND D COEFFICIENT

131 SA AREA 0.0 0.1 0.3 1.6 2.0 2.3

132 SE ELEVATION 6224.00 6230.00 6240.00 6250.00 6252.00 6254.00

130 SQ DISCHARGE 0. 51. 93. 116. 543. 1322.

133 ST TOP OF DAM
 TOPEL 6254.00 ELEVATION AT TOP OF DAM
 DAMWID 500.00 DAM WIDTH
 COQD 3.00 WEIR COEFFICIENT
 EXPD 1.50 EXPONENT OF HEAD

COMPUTED STORAGE-ELEVATION DATA

STORAGE 0.00 0.12 1.75 10.29 13.83 18.11
 ELEVATION 6224.00 6230.00 6240.00 6250.00 6252.00 6254.00

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HYDROGRAPH AT STATION POND18
 FOR PLAN 1, RATIO = 0.68

PEAK OUTFLOW IS 93. AT TIME 6.42 HOURS

PEAK FLOW TIME MAXIMUM AVERAGE FLOW
 (CFS) 6-HR 24-HR 72-HR 23.92-HR (CFS) (HR)
 93. 6.42 58. 19. 19. 19.
 (INCHES) 0.807 1.044 1.044 1.044
 (AC-FT) 29. 37. 37. 37.

PEAK STORAGE TIME MAXIMUM AVERAGE STORAGE
 6-HR 24-HR 72-HR 23.92-HR (AC-FT) (HR)
 2. 6.42 1. 0. 0. 0.

PEAK STAGE TIME MAXIMUM AVERAGE STAGE
 6-HR 24-HR 72-HR 23.92-HR (FEET) (HR)
 6239.94 6.42 6233.02 6226.76 6226.76 6226.77

CUMULATIVE AREA = 0.66 SQ MI

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HYDROGRAPH AT STATION POND18
 FOR PLAN 1, RATIO = 1.00

PEAK OUTFLOW IS 107. AT TIME 6.75 HOURS

PEAK FLOW TIME MAXIMUM AVERAGE FLOW
 (CFS) 6-HR 24-HR 72-HR 23.92-HR (CFS) (HR)
 107. 6.75 105. 37. 37. 37.
 (INCHES) 1.463 2.059 2.059 2.059
 (AC-FT) 52 73 73 73

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE				
		6-HR	24-HR	72-HR	23.92-HR	(AC-FT) (HR)
5.	6.75	4.	1.	1.	1.	

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE				
		6-HR	24-HR	72-HR	23.92-HR	(FEET) (HR)
6245.90	6.75	6245.02	6230.72	6230.72	6230.72	

CUMULATIVE AREA = 0.66 SQ MI

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185 KK * POND9 *
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187 KO OUTPUT CONTROL VARIABLES
IPRNT 3 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

188 RS STORAGE ROUTING
NSTPS 1 NUMBER OF SUBREACHES
ITYP ELEV TYPE OF INITIAL CONDITION
RSVRIC 6463.00 INITIAL CONDITION
X 0.00 WORKING R AND D COEFFICIENT

190 SA AREA 0.0 0.6 0.7 0.8 1.0

191 SE ELEVATION 6463.00 6465.00 6467.00 6468.00 6468.50

189 SQ DISCHARGE 0. 16. 37. 45. 158.

192 ST TOP OF DAM
TOPEL 6468.00 ELEVATION AT TOP OF DAM
DAMWID 200.00 DAM WIDTH
COQD 3.00 WEIR COEFFICIENT
EXPD 1.50 EXPONENT OF HEAD

COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	0.42	1.74	2.48	2.92
ELEVATION	6463.00	6465.00	6467.00	6468.00	6468.50

*** **

HYDROGRAPH AT STATION POND9
FOR PLAN 1, RATIO = 0.68

PEAK OUTFLOW IS 22. AT TIME 6.75 HOURS

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW				
		6-HR	24-HR	72-HR	23.92-HR	(CFS) (HR)
		22	6.75	7	3	3

(INCHES) 0.524 0.711 0.711 0.711
 (AC-FT) 4. 5. 5. 5.

PEAK STORAGE TIME MAXIMUM AVERAGE STORAGE
 1. 6.75 6-HR 24-HR 72-HR 23.92-HR (AC-FT) (HR)
 0. 0. 0. 0.

PEAK STAGE TIME MAXIMUM AVERAGE STAGE
 6465.59 6.75 6-HR 24-HR 72-HR 23.92-HR (FEET) (HR)
 6463.90 6463.31 6463.31 6463.31

CUMULATIVE AREA = 0.13 SQ MI

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HYDROGRAPH AT STATION POND9
 FOR PLAN 1, RATIO = 1.00

PEAK OUTFLOW IS 64. AT TIME 6.67 HOURS

PEAK FLOW TIME MAXIMUM AVERAGE FLOW
 (CFS) 64. 6.67 24-HR 72-HR 23.92-HR (CFS) (HR)
 18. 6. 6. 6.
 (INCHES) 1.242 1.599 1.599 1.599
 (AC-FT) 9. 11. 11. 11.

PEAK STORAGE TIME MAXIMUM AVERAGE STORAGE
 3. 6.67 6-HR 24-HR 72-HR 23.92-HR (AC-FT) (HR)
 1. 0. 0. 0.

PEAK STAGE TIME MAXIMUM AVERAGE STAGE
 6468.05 6.67 6-HR 24-HR 72-HR 23.92-HR (FEET) (HR)
 6464.95 6463.65 6463.65 6463.65

CUMULATIVE AREA = 0.13 SQ MI

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 199 KK * POND8 *
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201 KO OUTPUT CONTROL VARIABLES
 IPRNT 3 PRINT CONTROL
 IPLOT 0 PLOT CONTROL
 QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

202 RS STORAGE ROUTING
 NSTPS 1 NUMBER OF SUBREACHES
 ITYP ELEV TYPE OF INITIAL CONDITION
 RSVRIC 6401.50 INITIAL CONDITION
 X 0.00 WORKING R AND D COEFFICIENT

204 SA AREA 2.1 2.3 2.7 3.3 3.5

205 SE ELEVATION 6402.00 6404.00 6406.00 6408.00 6408.50

203 SQ DISCHARGE 0. 9. 15. 20. 220.

206 ST TOP OF DAM
TOPEL 6408.00 ELEVATION AT TOP OF DAM
DAMWID 200.00 DAM WIDTH
COQD 3.00 WEIR COEFFICIENT
EXPD 1.50 EXPONENT OF HEAD

COMPUTED STORAGE-ELEVATION DATA

STORAGE 0.00 4.47 9.54 15.52 17.20
ELEVATION 6402.00 6404.00 6406.00 6408.00 6408.50

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HYDROGRAPH AT STATION POND8
FOR PLAN 1, RATIO = 0.68

PEAK OUTFLOW IS 9. AT TIME 8.58 HOURS

PEAK FLOW TIME MAXIMUM AVERAGE FLOW
(CFS) 6-HR 24-HR 72-HR 23.92-HR (CFS) (HR)
9. 8.58 8. 4. 4. 4.
(INCHES) 0.234 0.514 0.514 0.514
(AC-FT) 4. 8. 8. 8.

PEAK STORAGE TIME MAXIMUM AVERAGE STORAGE
5. 8.58 6-HR 24-HR 72-HR 23.92-HR (AC-FT) (HR)
4. 2. 2. 2.

PEAK STAGE TIME MAXIMUM AVERAGE STAGE
6404.04 8.58 6-HR 24-HR 72-HR 23.92-HR (FEET) (HR)
6403.83 6403.00 6403.00 6403.00

CUMULATIVE AREA = 0.31 SQ MI

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HYDROGRAPH AT STATION POND8
FOR PLAN 1, RATIO = 1.00

PEAK OUTFLOW IS 17. AT TIME 9.00 HOURS

PEAK FLOW TIME MAXIMUM AVERAGE FLOW
(CFS) 6-HR 24-HR 72-HR 23.92-HR (CFS) (HR)
17. 9.00 17. 10. 10. 10.
(INCHES) 0.500 1.187 1.187 1.187
(AC-FT) 8. 20. 20. 20.

PEAK STORAGE TIME MAXIMUM AVERAGE STORAGE
12. 9.00 6-HR 24-HR 72-HR 23.92-HR (AC-FT) (HR)
11. 6. 6. 6.

PEAK STAGE TIME MAXIMUM AVERAGE STAGE
6406.97 9.00 6-HR 24-HR 72-HR 23.92-HR (FEET) (HR)
6406.63 6404.62 6404.62 6404.62

CUMULATIVE AREA = 0.31 SQ MI

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 248 KK * POND14 *
 * *

250 KO OUTPUT CONTROL VARIABLES
 IPRNT 3 PRINT CONTROL
 IPLOT 0 PLOT CONTROL
 QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

251 RS STORAGE ROUTING
 NSTPS 1 NUMBER OF SUBREACHES
 ITYP ELEV TYPE OF INITIAL CONDITION
 RSVRIC 6302.00 INITIAL CONDITION
 X 0.00 WORKING R AND D COEFFICIENT

253 SA AREA 0.0 0.2 0.3 0.3 0.5 0.8 1.0 1.3

254 SE ELEVATION 6302.00 6304.00 6306.00 6308.00 6310.00 6312.00 6314.00 6316.00

252 SQ DISCHARGE 0. 20. 60. 90. 110. 130. 145. 160.

255 ST TOP OF DAM
 TOPEL 6316.00 ELEVATION AT TOP OF DAM
 DAMWID 200.00 DAM WIDTH
 COQD 3.00 WEIR COEFFICIENT
 EXPD 1.50 EXPONENT OF HEAD

COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	0.11	0.51	1.10	1.96	3.28	5.13	7.44
ELEVATION	6302.00	6304.00	6306.00	6308.00	6310.00	6312.00	6314.00	6316.00

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HYDROGRAPH AT STATION POND14
 FOR PLAN 1, RATIO = 0.68

PEAK OUTFLOW IS 93. AT TIME 6.42 HOURS

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW					
		6-HR	24-HR	72-HR	23.92-HR	(CFS)	(HR)
		93.	6.42		28.	11.	11.
		(CFS)					
		0.412	0.667	0.667	0.667		
		(INCHES)					
		14.	23.	23.	23.		
		(AC-FT)					

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE					
		6-HR	24-HR	72-HR	23.92-HR	(AC-FT)	(HR)
1.	6.42	0.	0.	0.	0.		

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE					
		6-HR	24-HR	72-HR	23.92-HR	(FEET)	(HR)
6308.32	6.42	6304.30	6303.02	6303.02	6303.01		

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HYDROGRAPH AT STATION POND14
FOR PLAN 1, RATIO = 1.00

PEAK OUTFLOW IS 151. AT TIME 6.67 HOURS

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW				(CFS)	(HR)	
		6-HR	24-HR	72-HR	23.92-HR			
(CFS)		151.	6.67		62.	25.		25.
(INCHES)		0.910	1.470	1.470	1.470			
(AC-FT)		31.	50.	50.	50.			

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE				(AC-FT)	(HR)
		6-HR	24-HR	72-HR	23.92-HR		
6.	6.67	1.	0.	0.	0.		

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE				(FEET)	(HR)
		6-HR	24-HR	72-HR	23.92-HR		
6314.81	6.67	6306.93	6304.16	6304.16	6304.16		

CUMULATIVE AREA = 0.63 SQ MI

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
 TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION		
				RATIO 1	RATIO 2	
				0.68	1.00	
HYDROGRAPH AT		M1	0.05	1	FLOW	14. 38.
			TIME		6.25	6.17
ROUTED TO		RTM1	0.05	1	FLOW	14. 38.
			TIME		6.25	6.25
HYDROGRAPH AT		M2	0.13	1	FLOW	28. 78.
			TIME		6.42	6.33
2 COMBINED AT		DP2	0.18	1	FLOW	41. 113.
			TIME		6.33	6.33
ROUTED TO		RTDP2	0.18	1	FLOW	40. 112.
			TIME		6.42	6.33
HYDROGRAPH AT		M3	0.06	1	FLOW	12. 37.
			TIME		6.25	6.25
2 COMBINED AT		DP3	0.23	1	FLOW	51. 146.
			TIME		6.33	6.33
ROUTED TO		RTDP3	0.23	1	FLOW	51. 144.
			TIME		6.42	6.42
HYDROGRAPH AT		M4	0.12	1	FLOW	48. 111.
			TIME		6.33	6.25
2 COMBINED AT		DP4	0.35	1	FLOW	95. 252.
			TIME		6.42	6.33
ROUTED TO		RTDP4	0.35	1	FLOW	95. 250.
			TIME		6.42	6.33
HYDROGRAPH AT		M5	0.15	1	FLOW	150. 278.
			TIME		6.17	6.17
HYDROGRAPH AT		M6	0.03	1	FLOW	32. 58.
			TIME		6.17	6.17
ROUTED TO		RTM6	0.03	1	FLOW	31. 57.
			TIME		6.17	6.17
3 COMBINED AT		DP5	0.54	1	FLOW	238. 529.
			TIME		6.25	6.25
ROUTED TO		POND5	0.54	1	FLOW	86. 112.
			TIME		6.83	7.08

** PEAK STAGES IN FEET **

1	STAGE	6386.72	6395.66
	TIME	6.83	7.08

ROUTED TO	RTDP5	0.54	1	FLOW	86.	112.
		TIME			6.83	7.08
HYDROGRAPH AT	M17.1	0.04	1	FLOW	33.	67.
		TIME			6.08	6.08
2 COMBINED AT	DP17.1	0.57	1	FLOW	91.	140.
		TIME			6.58	6.08
ROUTED TO	POND17	0.57	1	FLOW	79.	98.
		TIME			7.67	9.00
		** PEAK STAGES IN FEET **				
	1	STAGE			6289.92	6295.47
		TIME			7.67	9.00
ROUTED TO	RT17.1	0.57	1	FLOW	79.	98.
		TIME			7.75	9.08
HYDROGRAPH AT	M17.2	0.04	1	FLOW	50.	87.
		TIME			6.08	6.08
2 COMBINED AT	DP17.2	0.61	1	FLOW	98.	153.
		TIME			6.08	6.08
ROUTED TO	RT17.2	0.61	1	FLOW	95.	151.
		TIME			6.08	6.08
HYDROGRAPH AT	M18.1	0.05	1	FLOW	48.	94.
		TIME			6.08	6.08
2 COMBINED AT	DP18.1	0.66	1	FLOW	143.	245.
		TIME			6.08	6.08
ROUTED TO	POND18	0.66	1	FLOW	93.	107.
		TIME			6.42	6.75
		** PEAK STAGES IN FEET **				
	1	STAGE			6239.94	6245.90
		TIME			6.42	6.75
ROUTED TO	RT18.1	0.66	1	FLOW	93.	107.
		TIME			6.42	6.75
HYDROGRAPH AT	M18.2	0.06	1	FLOW	59.	111.
		TIME			6.08	6.08
2 COMBINED AT	DP18.2	0.72	1	FLOW	136.	209.
		TIME			6.17	6.08
ROUTED TO	RT18.2	0.72	1	FLOW	136.	205.
		TIME			6.17	6.08
HYDROGRAPH AT	M19	0.09	1	FLOW	105.	194.
		TIME			6.08	6.08
2 COMBINED AT	DP19	0.81	1	FLOW	236.	399.
		TIME			6.08	6.08
HYDROGRAPH AT	M7	0.05	1	FLOW	14.	42.
		TIME			6.17	6.17
ROUTED TO	RTM7	0.05	1	FLOW	14.	41.
		TIME			6.33	6.25
HYDROGRAPH AT	M8	0.12	1	FLOW	24.	71.

				TIME	6.42	6.33		
HYDROGRAPH AT	M11	0.05	1	FLOW	18.	43.		
		TIME			6.25	6.25		
ROUTED TO	RTM11	0.05	1	FLOW	17.	42.		
		TIME			6.33	6.33		
HYDROGRAPH AT	M9	0.08	1	FLOW	21.	58.		
		TIME			6.33	6.33		
2 COMBINED AT	DP9	0.13	1	FLOW	39.	100.		
		TIME			6.33	6.33		
ROUTED TO	POND9	0.13	1	FLOW	22.	64.		
		TIME			6.75	6.67		
		** PEAK STAGES IN FEET **						
	1	STAGE			6465.59	6468.05		
		TIME			6.75	6.67		
ROUTED TO	RTDP9	0.13	1	FLOW	22.	62.		
		TIME			6.75	6.67		
3 COMBINED AT	DP8	0.31	1	FLOW	53.	140.		
		TIME			6.42	6.33		
ROUTED TO	POND8	0.31	1	FLOW	9.	17.		
		TIME			8.58	9.00		
		** PEAK STAGES IN FEET **						
	1	STAGE			6404.04	6406.97		
		TIME			8.58	9.00		
ROUTED TO	RTM8	0.31	1	FLOW	9.	17.		
		TIME			8.58	9.00		
HYDROGRAPH AT	M10	0.05	1	FLOW	29.	62.		
		TIME			6.25	6.25		
2 COMBINED AT	DP10	0.36	1	FLOW	30.	65.		
		TIME			6.25	6.25		
ROUTED TO	RTM10	0.36	1	FLOW	29.	65.		
		TIME			6.25	6.25		
HYDROGRAPH AT	M12	0.11	1	FLOW	33.	86.		
		TIME			6.33	6.33		
ROUTED TO	RTM12	0.11	1	FLOW	33.	85.		
		TIME			6.42	6.33		
HYDROGRAPH AT	M13	0.09	1	FLOW	22.	63.		
		TIME			6.33	6.25		
2 COMBINED AT	DP13	0.21	1	FLOW	55.	147.		
		TIME			6.33	6.33		
ROUTED TO	RTM13	0.21	1	FLOW	54.	146.		
		TIME			6.42	6.33		
HYDROGRAPH AT	M14	0.07	1	FLOW	50.	104.		
		TIME			6.08	6.08		
3 COMBINED AT	DP14	0.63	1	FLOW	116.	281.		
		TIME			6.25	6.25		

ROUTED TO POND14 0.63 1 FLOW 93. 151.
TIME 6.42 6.67

** PEAK STAGES IN FEET **

1 STAGE 6308.32 6314.81
TIME 6.42 6.67

ROUTED TO RTP14 0.63 1 FLOW 93. 151.
TIME 6.50 6.67

HYDROGRAPH AT M15 0.06 1 FLOW 19. 55.
TIME 6.08 6.08

2 COMBINED AT DP15 0.69 1 FLOW 99. 165.
TIME 6.42 6.17

ROUTED TO RTM15 0.69 1 FLOW 99. 165.
TIME 6.50 6.25

HYDROGRAPH AT M16 0.16 1 FLOW 23. 82.
TIME 6.33 6.25

2 COMBINED AT DP16 0.85 1 FLOW 119. 247.
TIME 6.42 6.25

2 COMBINED AT DP1619 1.66 1 FLOW 318. 597.
TIME 6.17 6.17

**AGREEMENT
PRIVATE MAINTENANCE OF DRAINAGE FACILITIES**

THIS AGREEMENT is made this 13th day of AUGUST, 2001, by and between The Kissing Camels Property Owners Association, a Colorado Non-profit Corporation together with its successor and assigns, hereinafter called ("KCPOA") and THE CITY OF COLORADO SPRINGS, a Colorado municipal corporation (the "CITY").

RECITALS:

1. Hill Development Corporation has had accepted by the "CITY" a drainage report and plans for certain private detention ponds and appertenant private drainage structures located generally north and west of the intersection of Fillmore Street and Centennial Boulevard ("Drainage Facilities"), as shown and described in the drainage report entitled *Master Development Drainage Plan for Hill Properties* and further described on the construction plans by Kiowa Engineering called *Final Design Drawings Detention Basin No. 5A and 5B Mesa Drainage Basin* which were filed by the "CITY" on November 1, 2000.

2. "KCPOA" is willing to agree, for itself, its successors and assigns, to maintain in perpetuity the "Drainage Facilities" as described above.

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is acknowledged, the parties agree as follows:

1. The "Drainage Facilities" are and shall remain the property of "KCPOA" its successors or assigns.

2. Flood Damage Repair Responsibilities

The "CITY" shall have the right to enter the property and make any necessary immediate repairs to damaged "Drainage Facilities" where such damaged sections threaten the strength and stability of existing adjacent facilities which are maintained by the "CITY", the costs of such repairs are to be paid by "KCPOA" as set forth in paragraph 3.

3. Routine Maintenance Responsibilities

"KCPOA" agrees to maintain in perpetuity the "Drainage Facilities", with no obligation therefor by the "CITY." By way of elaboration and not by limitation, "KCPOA" shall maintain the "Drainage Facilities" in conformity with the Drainage Report and Plans, including but not limited to maintaining the cross sections as shown in the Drainage Report and Plans; replacing construction materials as needed from time to time; removal of lodged materials in the drainage Facilities from time to time; and generally rendering the "Drainage Facilities" unencumbered by obstacles or blockages which might render the "Drainage Facilities" incapable to handle the water flow through them.

4. The "CITY" shall have the right to enter the property for inspection purposes. In the event "KCPOA" shall fail to maintain the "Drainage Facilities" as required by this Agreement, the "CITY" shall give thirty (30) days written notice of such failure, during which time "KCPOA" may cure the failure. If "KCPOA" does not cure or commence to cure as provided in this paragraph, or fails thereafter to complete curing the default within a reasonable period of time once a cure is commenced, the "CITY" may make any and all necessary repairs and invoice "KCPOA" for all costs incurred in curing the failure. "KCPOA" will make prompt re-payment to the "CITY." In the event "KCPOA" fails to repay the "CITY" may initiate a special assessment against any or all of the above property pursuant to Chapter 7, Article I, Parts 1, 2 and 3 of the Code of the City of Colorado Springs as the same may be amended from time to time. The parties hereto and their successors and assigns hereby expressly waive any notice of hearing and objection to the initiation of the special assessment and the determination by the "CITY" of the cost of the assessment.

J. Patrick Kelly El Paso Cty, CO
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5. This Agreement shall be binding upon the parties, their successors and assigns, and shall be governed by and interpreted in accordance with the laws of the State of Colorado. This Agreement shall be recorded in El Paso County, Colorado. The benefits and burdens of this Agreement shall run with the land.

Donald C. Hare

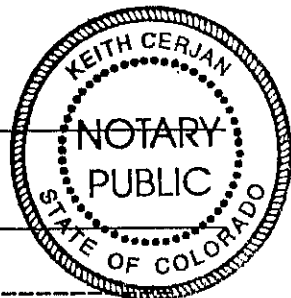
By: Donald C. Hare
Director, Kissing Camels Property Owners Association

STATE OF COLORADO)
)ss.
COUNTY OF EL PASO)

The foregoing instrument was subscribed and acknowledged before me this 13th day of AUGUST, 2001, by Donald C. Hare, Director of Kissing Camels Property Owners Association.

WITNESS my hand and official seal.

Keith Cerjan
NOTARY PUBLIC
My Commission Expires: 03/14/2004



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CITY OF COLORADO SPRINGS, a Colorado Municipal Corporation

By: David R. Lethbridge
David R. Lethbridge
Subdivision Engineering Review Manager

FOR THE CITY ENGINEER
CITY OF COLORADO SPRINGS

APPROVED AS TO FORM:
Robert J. Mose
SENIOR ATTORNEY
CITY OF COLORADO SPRINGS

For the City Attorney: _____

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