Preliminary Drainage Report

for

LAKESHORE MANOR CONDOMINIUMS

December 18, 2016

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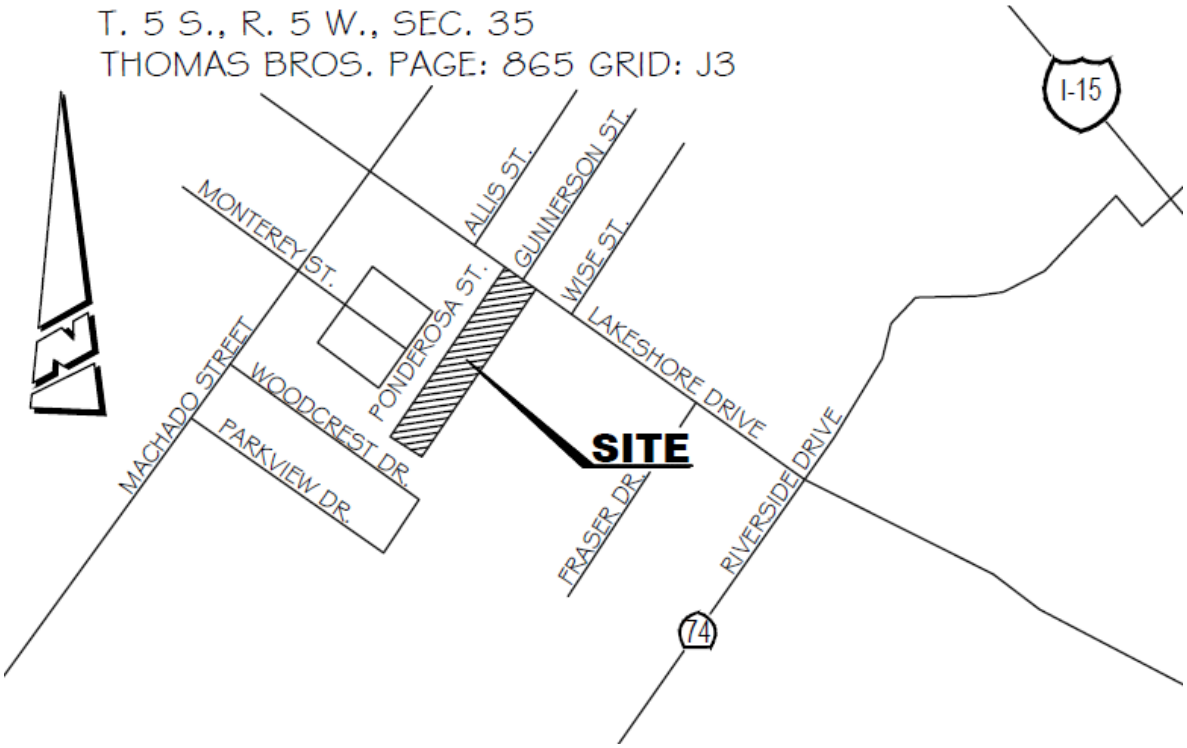
Project # C002001

Project Information:



VICINITY MAP

NOT TO SCALE

SITE ADDRESS:

LAKESHORE DR., LAKE ELSINORE, CA 92530

ASSESSOR'S PARCEL NO.:

379-230-001

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1 INTRODUCTION

1.1. SITE DESCRIPTION

1.1.1. LOCATION

The site is located along Lakeshore Drive just northerly of Lake Elsinore and Riverside Drive (Highway 74), and a few miles westerly of the 15 Freeway.

1.1.2. EXISTING CONDITION

The existing site is approximately 7.5 partially developed vacant land with natural vegetation. The lot has been rough graded and has a sediment basin at the northeasterly corner of the site with gentle 1-2% slopes draining from the southwesterly corner of the site approximately to the northeasterly corner of the site. The sediment basin located at the northeasterly portion of the site has a 24" lateral to the storm drain in Lakeshore Dr. There are existing improvements along Lakeshore Dr. and there is a 60 inch diameter storm drain line in Lakeshore that conveys stormwater from the site to Lake Elsinore. The street improvements are not up to current standards in Lakeshore. The groundwater table is approximately 100 feet deep and the soil type is B with an estimated moderate to high infiltration capacity.

1.1.3. PROPOSED CONDITION

The proposed project is a condominium development,tentative condominium tract map 37280, consisting of 7.28 acres after dedication of additional right of way for Lakeshore Dr. as well as improvements along Lakeshore fronting the property. There are 11 buildings proposed consisting of 104 units, a clubhouse, a pool and spa, a playground, a tennis court and plenty of vegetated open space between proposed buildings. There shall be an onsite storm drain network, catch basins, underground infiltration basins by Stormtech or equivalent, and outlet structures capable of mitigating post construction flowrates to equal approximately the existing flowrates for all modeled storms. The site drainage patterns shall remain consistent with existing patterns to the fullest extent possible. The new improvements and construction of the project shall incorporate roughly 70% new impervious surface area.

1.2. PURPOSE OF REPORT

The purpose of this report is to analyze the hydrological and hydraulic conditions of the subject parcel during modeled flood events and provide recommendations to alleviate and mitigate increased runoff and water quality in accordance with the City of Lake Elsinore and Riverside County Flood Control and Water Conservation District standards and guidelines.

1.3. FLOOD INFORMATION

The project is located in the Santa Ana River watershed, San Jacinto River sub-watershed, just north of Lake Elsinore. FEMA area flood map delineates the site as zone X which states the site is located just outside the area of 0.2% annual chance of flood; and not within any areas of 1% annual chance of flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and not within areas protected by levees from 1% annual chance flood.

2. EXISTING DRAINAGE

2.1. OFFSITE

There are no offsite tributary areas other than meniscal flows between storm drain inlets within Lakeshore Drive that travel along Lakeshore Dr. but do not contribute to onsite area flows.

2.2. ONSITE

The existing approximate tributary drainage area consists of approximately 7.5 partially developed vacant land with no impermeable surface area other than that portion offsite within Lakeshore Dr. The lot has been rough graded with gentle 1-2% slopes draining from the southwesterly corner of the site approximately to the northeasterly corner of the site to a clogged sediment basin as it appears that nobody is maintaining it. The existing street in Lakeshore fronting the property is A.C. pavement with some older improvements. Lakeshore has a 60 and 63 inch storm drain line where there is a 24" storm drain lateral connected to the onsite sediment basin drop inlet. That pipeline conveys stormwater into Lake Elsinore. The existing storm drain lateral was sized to accommodate all onsite tributary area stormwater peak flowrate. The 60 inch line in Lakeshore was sized based on the ultimate conditions noted in the West Elsinore Master Drainage Plan.

3. PROPOSED DRAINAGE

3.1. OFFSITE

The project proposes street improvements within Lakeshore Dr. that are capable of conveying 100 year peak flows and transporting them to the adjacent catch basins. A catch basin on the south corner cutback on lakeshore at the intersection of Gunnerson shall be constructed to utilize a portion of the existing 24" storm drain lateral and collect existing flows along lakeshore as well as flow addition from widening Lakeshore to the ultimate half width along the property frontage.

3.2. ONSITE

The onsite tributary area shall not change in the ultimate condition model and the site area impervious percentage increases to roughly 70%. The primary drainage path is similar to the existing conditions and drains from the southwesterly portion of the site to the northeasterly portion of the site. Flows are conveyed onsite via a curb & gutter system within the onsite private streets and alleys, then into onsite catch basins in sump. The catch basins are sized to capture the 100 year storm event peak flowrates and convey all onsite stormwater into the proposed underground infiltration basins by Stormtech or equivalent via onsite private storm drain piping sized to accommodate all onsite 100 year storm peak flowrates. The basins are sized to store the differential volume from the 100 year, 24 hour storm event conservatively. The basin outlet structures shall convey all excess volume and mitigate increased flowrates to match existing flowrates to the fullest extent possible with orifice plates sized to accommodate all storm event models at various outlet elevations.

4. HYDROLOGY AND HYDRAULIC SUMMARY

Unit hydrology analysis was conservatively utilized to model the 10 and 100 year peak flows and flood volumes for this project. The Riverside County Flood Control and Water Conservation District (RCFCD & WCD) Hydrology Manual and CivilD software were used to develop the hydrological parameters for the 10 and 100 year storm events. Additional background information was obtained through site visits, site survey and document research. The soil classifications for the site are Hydrologic Soil Group “B” per the RCFCD & WCD Hydrology Manual, Plate C-1.41. Peak flows and storm volume calculations were used to determine the differential peak flowrates and differential volumes required for mitigation. Refer to the appendices for all supporting documents and calculations. Flood hydrograph routing and orifice plate outlet calculations shall be provided with final drainage report supporting documents. Preliminary calculations for Stormtech underground detention system have been provided for reference. Lastly, the catch basins and storm drain piping were sized to accommodate onsite peak 100 year flowrates using HEC22 equations and Manning’s n full flow capacity calculations. Hydraulic grade line calculations shall be provided in final drainage report.

4.1. Existing Conditions

10 YEAR UNIT HYDROGRAPH STORM SCENARIOS

Storm	Qp = Peak Flowrate (cfs)	V=storm volume (ft^2)
1 hour	13.0	19,128
3 hour	8.5	22,893
6 hour	7.8	25,297
24 hour	1.9	20,109

100 YEAR UNIT HYDROGRAPH STORM SCENARIOS

Storm	Qp = Peak Flowrate (cfs)	V=storm volume (ft^2)
1 hour	22.2	37,233
3 hour	15.2	57,256
6 hour	14.2	73,848
24 hour	4.3	73,356

4.2. Proposed Conditions

10 YEAR UNIT HYDROGRAPH STORM SCENARIOS

Storm	Qp = Peak Flowrate (cfs)	V=storm volume (ft^2)
1 hour	14.5	21,263
3 hour	9.6	28,991
6 hour	8.9	34,344
24 hour	2.4	57,072

100 YEAR UNIT HYDROGRAPH STORM SCENARIOS

Storm	Qp = Peak Flowrate (cfs)	V=storm volume (ft^2)
1 hour	23.8	37,758
3 hour	16.2	58,832
6 hour	15.1	77,067
24 hour	4.4	96,050

4.3. Conclusions

The 1 hour storm peak flow rate of 23.8 cfs was utilized for onsite stormwater conveyance capacity design. The 26 ft. wide curb to curb conveyance channel (westerly private street) is capable of accommodating 23.8 cfs at 1% slope along the critical location with a maximum depth of flow of 0.48 feet. All other sections of street conveyance have more than adequate capacity for all 100 year peak flows.

By proportion, 83% of the peak flow rate (19.8 cfs) is conveyed up to the northeasterly two 7 ft. wide catch basins in sump. Each basin has sufficient capacity to accommodate all peak flow within the private street and eliminate all offsite flow going into Lakeshore. By proportion, 17% of the peak flow rate (4 cfs) is conveyed up to the northwesterly 7 ft. catch basin in sump, which also has more than sufficient capacity.

The onsite private storm drain lines A through D shall be SDR-35 PVC pipe sized to convey all 100 year peak flowrates from 1% to 0.35% minimum slopes ranging in sizes from 24 inches to 12 inches. All lines drain from the northerly catch basins into the proposed underground Stormtech infiltration basins.

The Stormtech underground infiltration basins were sized to store the difference in volume for the 100 year 24 hour storm events from pre-construction to post-construction of 22,694 cubic feet. The basins are sized to store a total of 24,020 cubic feet of stormwater. No infiltration testing has been performed yet, but shall be performed prior to submittal of the final drainage report and final WQMP. The Phase I report suggested moderate to high infiltration rates, so an assumed 1.25 inch per hour rate has conservatively chosen for preliminary design for the 72 hour drawdown time. 1.25 inches per hour requires a depth of 30 inches to achieve the drawdown time and the basin chambers are designed for 30 inches, plus 12” of void space within the base.

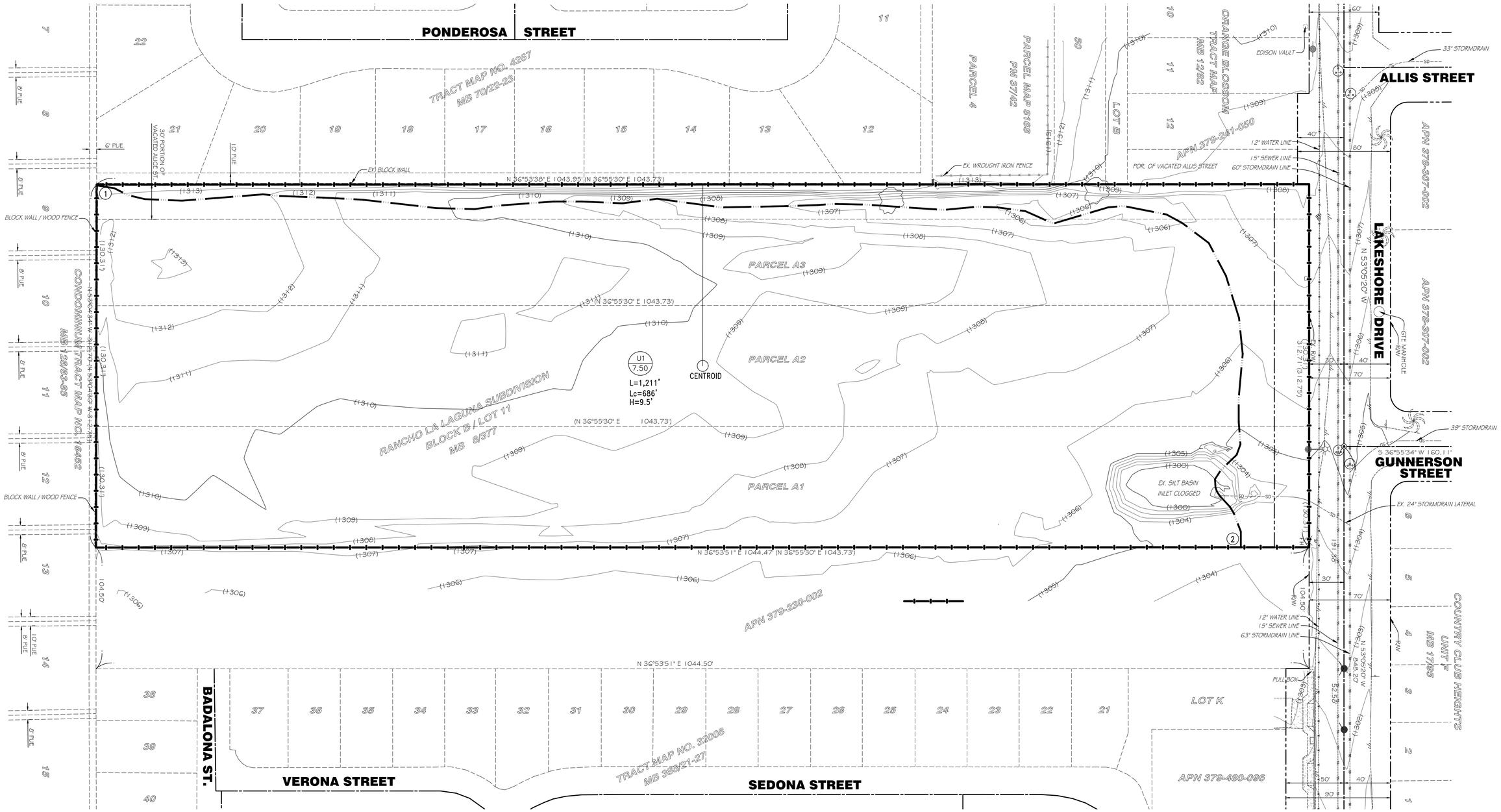
An outlet structure with an orifice plate capable of metering the outflow to match existing flowrates to the fullest extent possible shall be designed to mitigate all proposed condition peak flows. This structure shall be an underground vault with a weir and orifice plate sized at various depth vs. discharge rates and shall outlet into the proposed RCP storm drain lines E though G at slopes of 1% and 1.84% ranging in size from 18 inch to 24” where they enter into Lakeshore Drive and tie into the existing 60 inch RCP four corners storm drain line.

Infiltration of approximately 28,000 cubic feet of storm water is estimated within the proposed basins during the 24 hour storm events and metered outflow is proposed to address hydromodification. Should the City desire to bypass some storm flow to alleviate low Lake Elsinore conditions, we can eliminate the northwesterly catch basin to bypass approximately 17% of all onsite flows, which would discharge directly into the 4 corners storm drain and directly to Lake Elsinore.

APPENDIX

Figure 1

EXISTING CONDITION UNIT HYDROGRAPH HYDROLOGY



GRAPHIC SCALE

40 0 20 40 80 120

(IN FEET)
1 inch =40 ft.

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EXISTING SITE LEGEND

- POWER POLE
- VAULT AS NOTED
- GUY ANCHOR
- VALVE
- STREET LIGHT
- STREET SIGN
- SEWER MANHOLE
- SEWER CLEANOUT
- STORM DRAIN MANHOLE
- FIRE HYDRANT
- PULL BOX
- (1301) MINOR CONTOUR 1 FT. INTERVAL
- (1300) MAJOR CONTOUR 5 FT. INTERVAL
- BLOCK WALL
- FENCE AS NOTED
- SS — SANITARY SEWER LINE
- W — WATER LINE
- SD — STORM DRAIN LINE
- EDGE OF ASPHALT PAVEMENT
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- STREET CENTERLINE
- CONCRETE SURFACE
- BUILDING
- TREE
- PALM TREE

PRE-CONSTRUCTION CONDITION

10 YEAR UNIT HYDROGRAPH STORM SCENARIOS

Storm	Qp = Peak Flowrate (cfs)	V=storm volume (ft³)
1 hour	13.0	19,128
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1 hour	22.2	37,233
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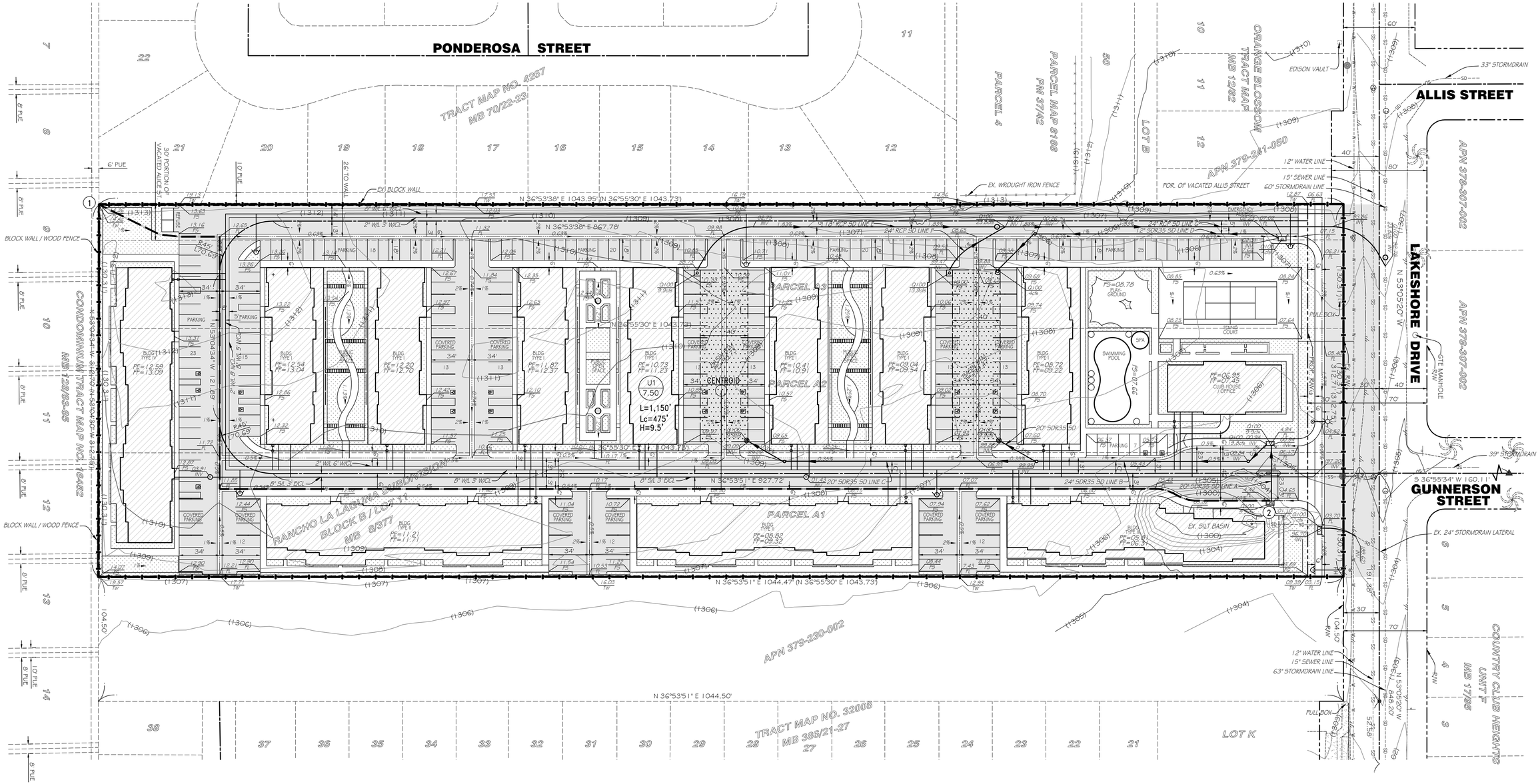
HYDROLOGY LEGEND

- L=XXX' INDICATES FLOW PATH LENGTH
- Lc=XXX' LENGTH UPSTREAM TO CENTROID
- H=XXX' CHANGE IN HEIGHT BETWEEN NODES
- U1 / 7.50 INDICATES SUBAREA DESIGNATION / INDICATES AREA IN ACRES
- X INDICATES NODE
- INDICATES SUBAREA BOUNDARY
- INDICATES FLOWLINE

Figure 2

POST-CONSTRUCTION UNIT HYDROGRAPH HYDROLOGY



PROPOSED LEGEND

- STREET LIGHT
- SEWER MANHOLE
- STORMDRAIN CLEANOUT
- STORMDRAIN MANHOLE
- FIRE HYDRANT
- 7' WIDE CATCH BASIN
- STORMDRAIN BASIN OUTLET STRUCTURE
- STORMDRAIN BASIN INLET STRUCTURE
- 6" SEWER LATERAL
- 2" WATER LATERAL & BFP
- 4" FIRE LATERAL, DCDA, PIV & FCA
- 8" SANITARY SEWER LINE
- 2" IRRIGATION WATER LINE
- 8" WATER LINE
- STORM DRAIN LINE (SIZE/TYPE PER PLAN)
- BLOCK WALL
- 6" CURB
- 6" CURB & GUTTER
- 4' WIDE VALLEY GUTTER
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- STREET CENTERLINE
- BUILDING
- ASPHALT PAVEMENT
- LANDSCAPING
- UNDERGROUND DETENTION BASIN

ABBREVIATIONS

CENTER LINE	CL
PARCEL MAP	PM
MAP BOOK	MB
FLOW LINE	FL
POWER POLE	PP
STORM DRAIN	SD
TOP OF CURB	TC
TOP OF BERM	TB
SEWER LINE	SAL
WATER LINE	WL
BOTTOM	BTM
PARCEL	PAR
FINISHED SURFACE	FS
FINISH GRADE	FG
CUBIC FEET PER SECOND	CFS
PAD ELEVATION	PE
FINISHED FLOOR	FF
EDGE OF PAVEMENT	EP
PROPERTY LINE	P/L
RIGHT-OF-WAY	R/W
INVERT ELEVATION	INV
PUBLIC UTILITY EASEMENT	PUE
TOP OF WALL	TW
ASSESSORS PARCEL NO.	APN
OFFSET DIRECTION FROM C/L	(N,S,E,W)/CL

POST-CONSTRUCTION CONDITION

10 YEAR UNIT HYDROGRAPH STORM SCENARIOS

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File: C02001

Figure 3

ADVANCED DRAINAGE SYSTEMS, INC.

Lakeshore Manor

Lakeshore Dr., Lake Elsinore

STORMWATER CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-740, SC-310, OR APPROVED EQUAL.
2. CHAMBERS SHALL BE MANUFACTURED FROM VIRGIN POLYPROPYLENE OR POLYETHYLENE RESINS.
3. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORT PANELS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
4. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
5. CHAMBERS SHALL MEET ASTM F2922 (POLYETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
6. CHAMBERS SHALL BE DESIGNED AND ALLOWABLE LOADS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
7. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. THE CHAMBER MANUFACTURER SHALL SUBMIT THE FOLLOWING UPON REQUEST TO THE SITE DESIGN ENGINEER FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE:
   a. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY AASHTO FOR THERMOPLASTIC PIPE.
   b. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET. THE 50 YEAR CREEP MODULUS DATA SPECIFIED IN ASTM F2418 OR ASTM F2922 MUST BE USED AS PART OF THE AASHTO STRUCTURAL EVALUATION TO VERIFY LONG-TERM PERFORMANCE.
   c. STRUCTURAL CROSS SECTION DETAIL ON WHICH THE STRUCTURAL EVALUATION IS BASED.
8. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-310/SC-740 SYSTEM

1. STORMTECH SC-310 & SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-310 & SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/SC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS.

   STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm).
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-310 & SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-310 & SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

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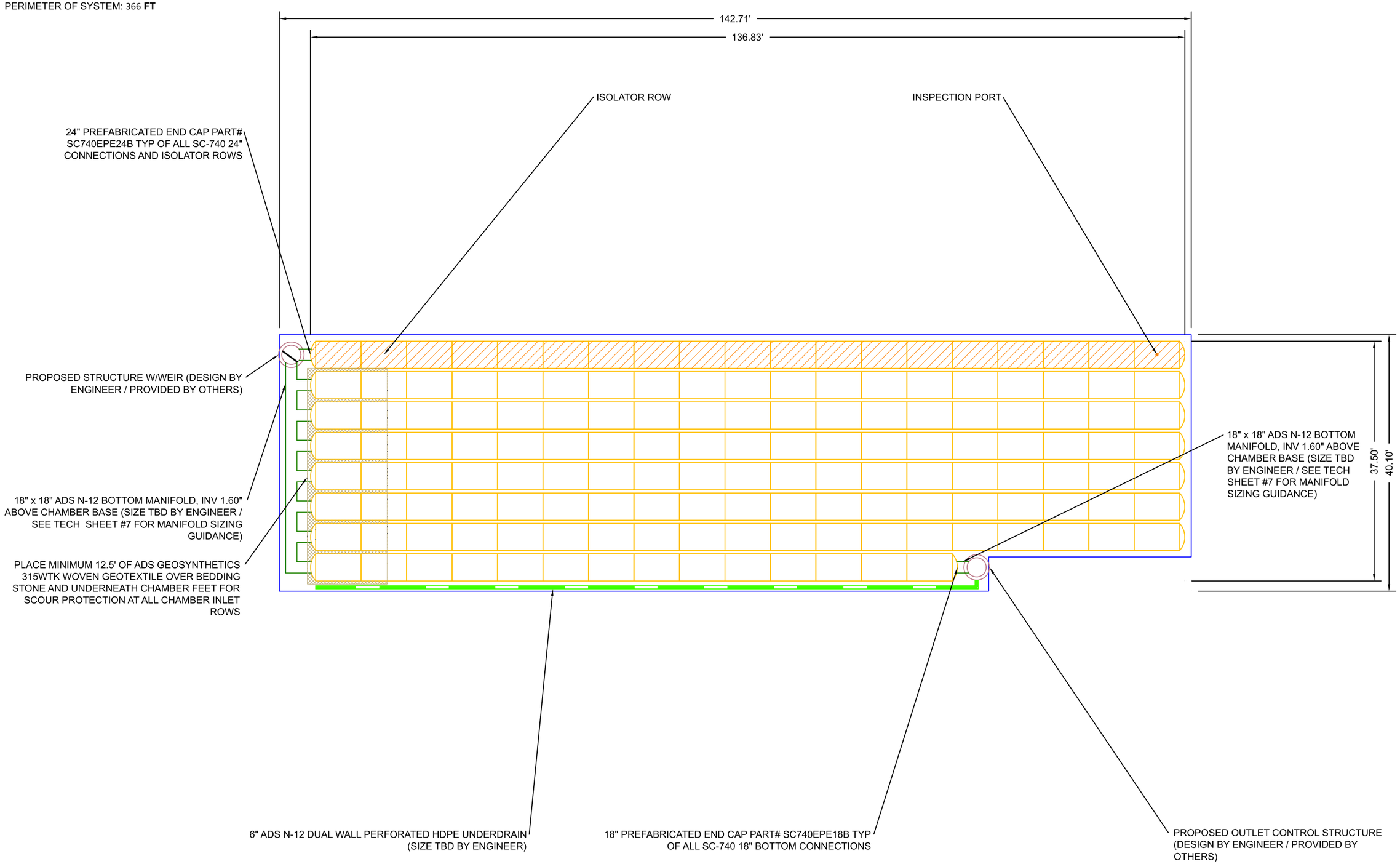
CONCEPTUAL LAYOUT

(147) STORMTECH SC-740 CHAMBERS
(16) STORMTECH SC-740 END CAPS
INSTALLED WITH 6 " COVER STONE, 12 " BASE STONE, 40% STONE VOID
INSTALLED SYSTEM VOLUME: 12010 CF
AREA OF SYSTEM: 5553 **FT²**
PERIMETER OF SYSTEM: 366 **FT**

COMPUTER GENERATED CONCEPTUAL LAYOUT - NOT FOR CONSTRUCTION



Lakeshore Manor
Lakeshore Dr., Lake Elsinore

DATE: 12/26/2016 | DRAWN: JJ
PROJECT #: Tool | CHECKED: ---

REV	DRW	CHK	DESCRIPTION

StormTech®
Detention · Retention · Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

NOT TO SCALE

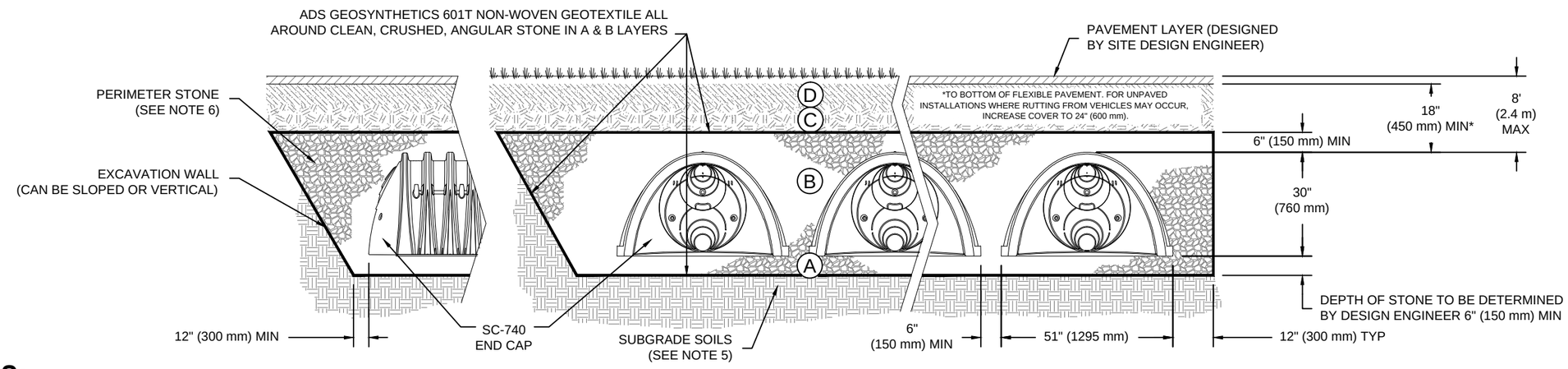
THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4-2 INCH (20-50 mm)	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4-2 INCH (20-50 mm)	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. [2] [3]

PLEASE NOTE:

1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.



NOTES:

1. SC-740 CHAMBERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F2418 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS", OR ASTM F2922 "STANDARD SPECIFICATION FOR POLYETHYLENE (PE) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. "ACCEPTABLE FILL MATERIALS" TABLE ABOVE PROVIDES MATERIAL LOCATIONS, DESCRIPTIONS, GRADATIONS, AND COMPACTION REQUIREMENTS FOR FOUNDATION, EMBEDMENT, AND FILL MATERIALS.
4. THE "SITE DESIGN ENGINEER" REFERS TO THE ENGINEER RESPONSIBLE FOR THE DESIGN AND LAYOUT OF THE STORMTECH CHAMBERS FOR THIS PROJECT.
5. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
6. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
7. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.

Lakeshore Manor
Lakeshore Dr., Lake Elsinore

DATE: 12/26/2016 | DRAWN: JJ
PROJECT #: Tool | CHECKED: ---

REV	DRW	CHK	DESCRIPTION

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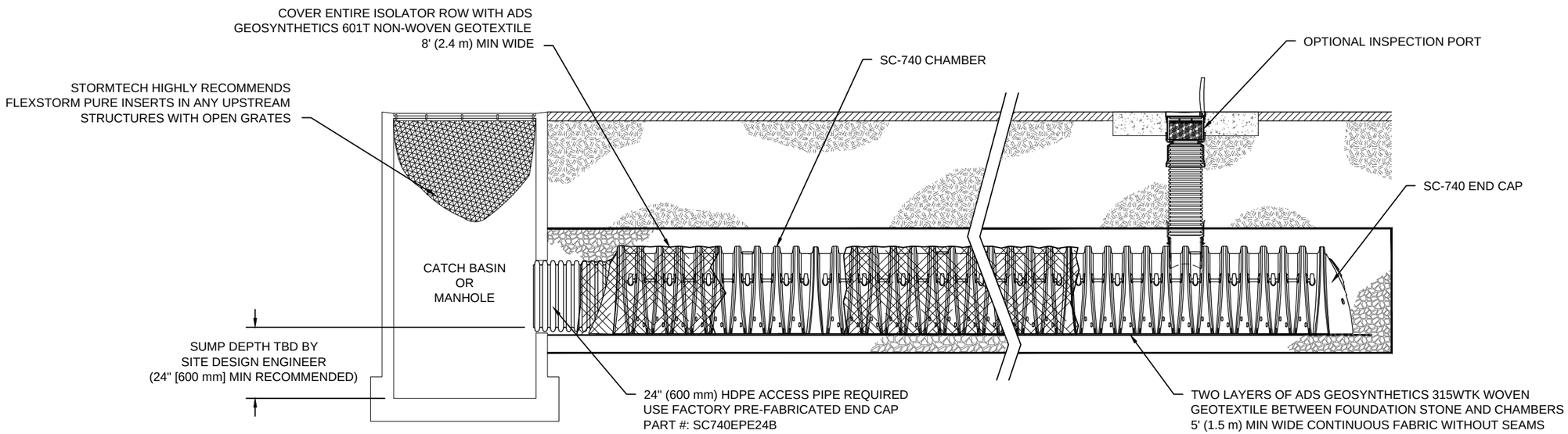


SC-740 ISOLATOR ROW DETAIL

NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

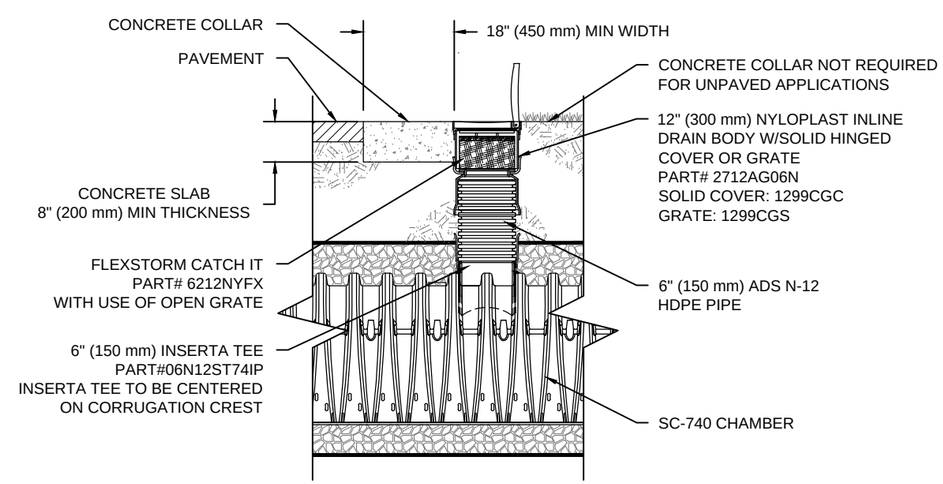
STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



SC-740 6" INSPECTION PORT DETAIL

NTS

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Lakeshore Dr., Lake Elsinore

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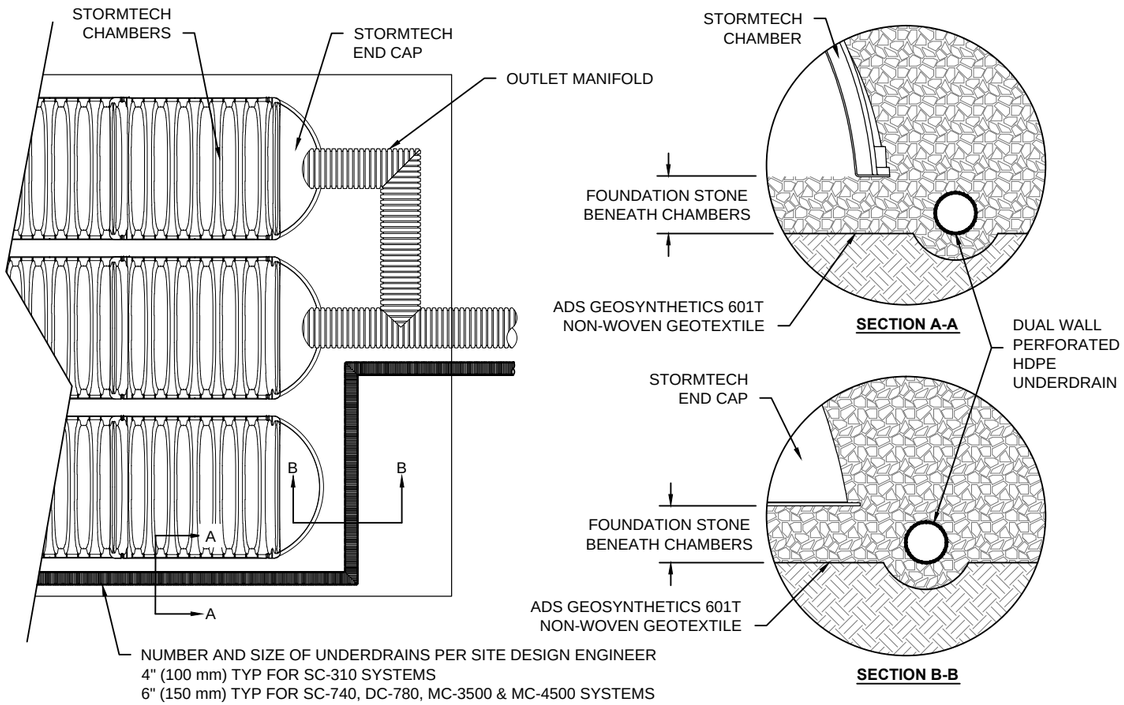
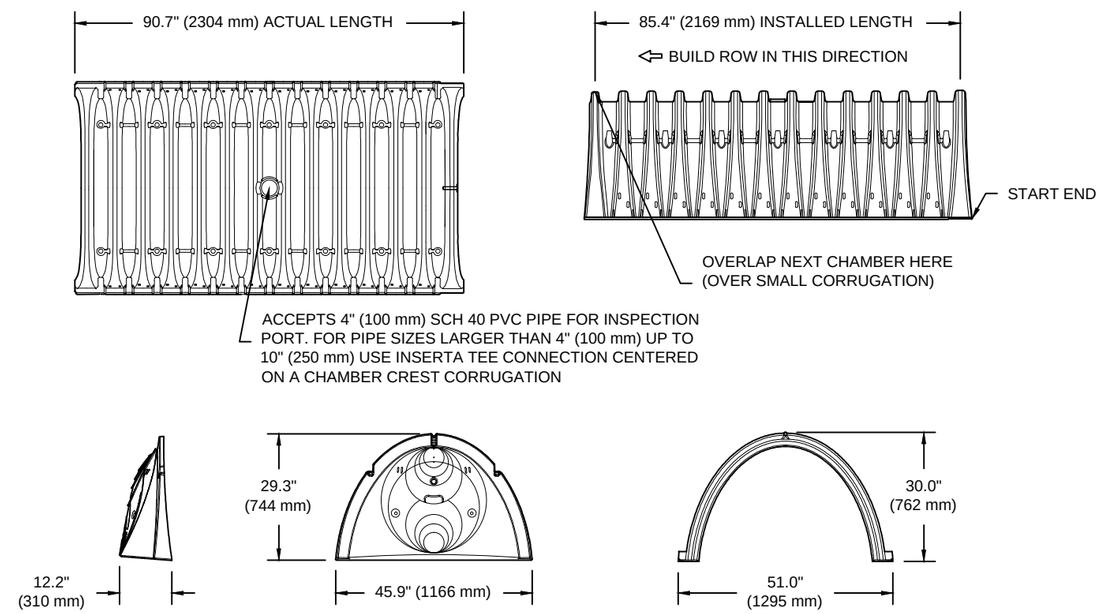
UNDERDRAIN DETAIL

NTS



SC-740 TECHNICAL SPECIFICATION

NTS



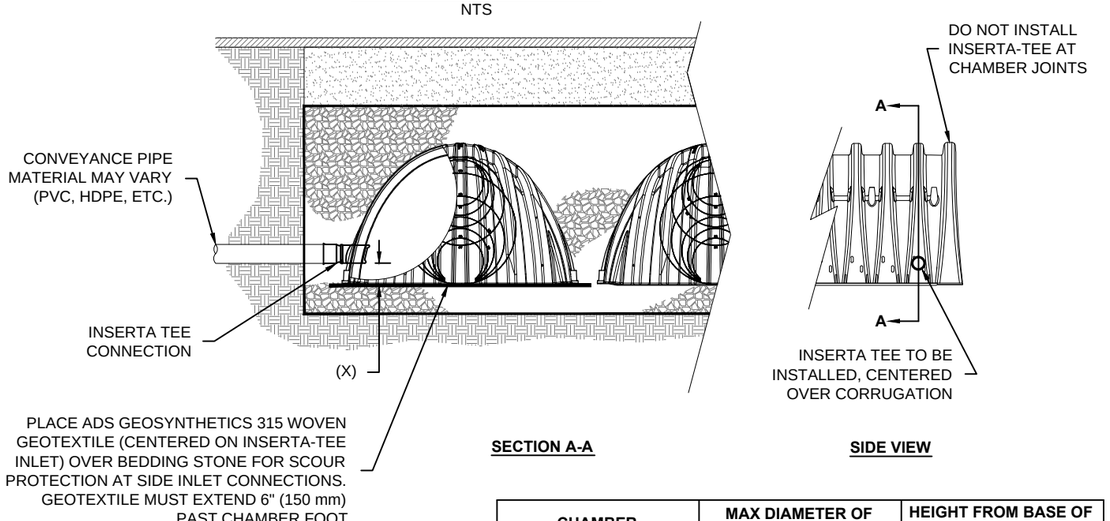
NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS

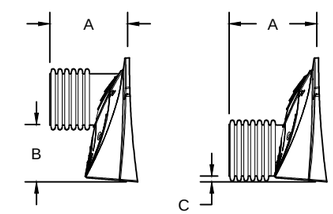
INSERTA TEE DETAIL

NTS



CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

NOTE:
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS.
CONTACT STORMTECH FOR MORE INFORMATION.



STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"

PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T /SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740EPE24B*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740EPE24B ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740EPE24B THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

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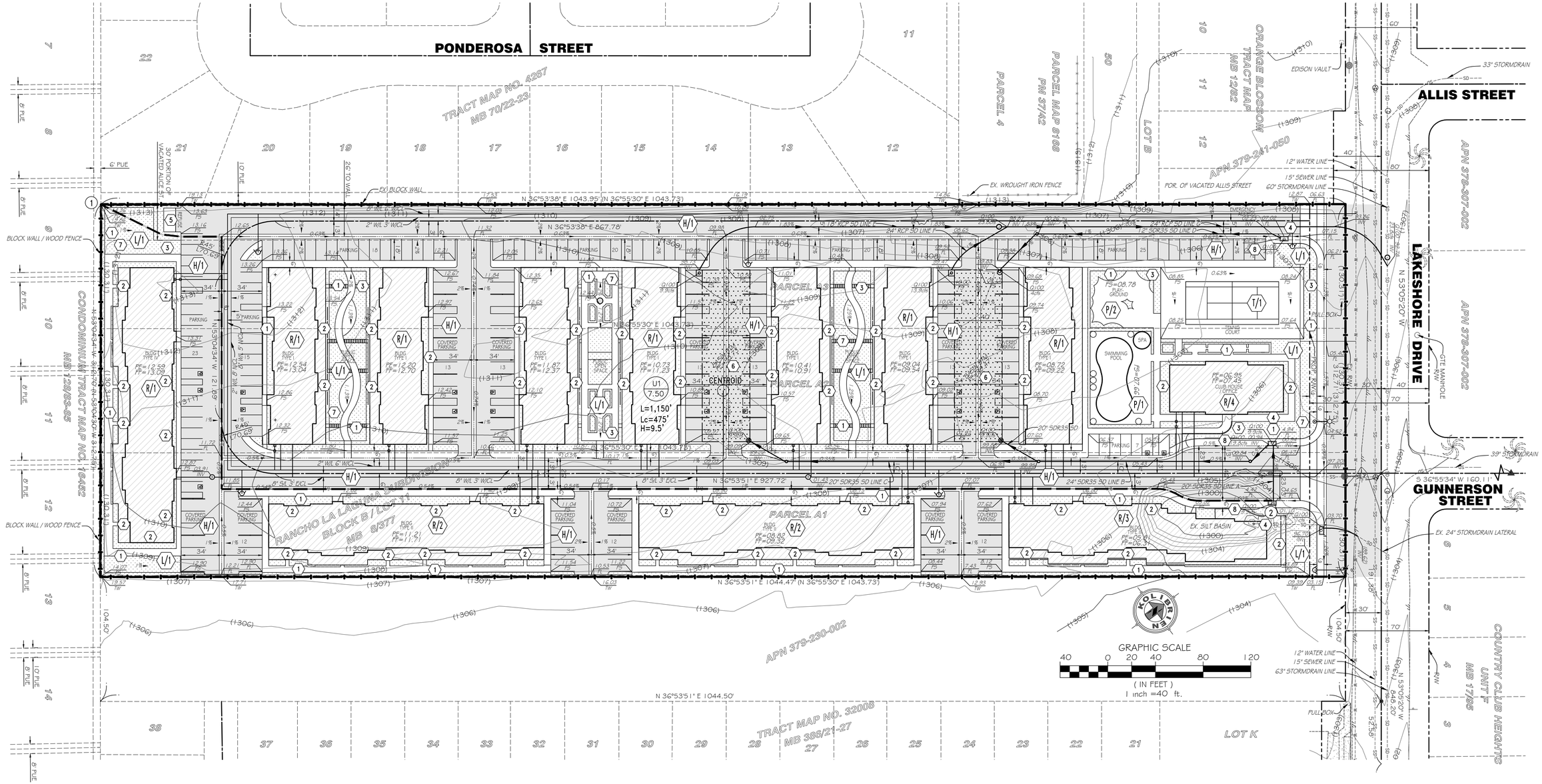
FIGURE 4

PRELIMINARY WATER QUALITY MANAGEMENT PLAN



DRAINAGE MANAGEMENT AREAS

DMA Name or ID	Surface Type(s)	Area (Sq. Ft.)	DMA Type
R/1	Roofs	33459.51	TYPE D, DRAINS TO U/1
R/2	Roofs	10433.9	TYPE D, DRAINS TO U/1
R/3	Roofs	6801.96	TYPE D, DRAINS TO U/1
R/4	Roofs	3943.91	TYPE D, DRAINS TO U/1
P/1	Concrete or Asphalt	5338.38	TYPE D, DRAINS TO N/1
P/2	Concrete or Asphalt	3523.33	TYPE D, DRAINS TO N/1
T/1	Concrete or Asphalt	7200	TYPE D, DRAINS TO N/1
N/1	Concrete or Asphalt	153885	TYPE D, DRAINS TO BMP
U/1	Natural	92543.77	TYPE A, DRAINS TO N/1

DESIGN STORM DEPTH = 0.78"

DESIGN CAPTURE VOLUME = 13,397 CUBIC FEET

PROPOSED BMP VOLUME ON PLANS = 24,000 CUBIC FEET

PROPOSED LEGEND

- STREET LIGHT
- SEWER MANHOLE
- STORMDRAIN CLEANOUT
- STORMDRAIN MANHOLE
- FIRE HYDRANT
- 7' WIDE CATCH BASIN
- STORMDRAIN BASIN OUTLET STRUCTURE
- STORMDRAIN BASIN INLET STRUCTURE
- 6" SEWER LATERAL
- 2" WATER LATERAL & BFP
- 4" FIRE LATERAL, DCDA, PIV & FCA
- 8" SANITARY SEWER LINE
- 2" IRRIGATION WATER LINE
- 8" WATER LINE
- STORM DRAIN LINE (SIZE/TYPE PER PLAN)
- BLOCK WALL
- 6" CURB
- 6" CURB & GUTTER
- 4' WIDE VALLEY GUTTER
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- STREET CENTERLINE
- BUILDING
- ASPHALT PAVEMENT
- LANDSCAPING
- UNDERGROUND DETENTION BASIN

ABBREVIATIONS

CENTER LINE	CL
PARCEL MAP	PM
MAP BOOK	MB
FLOW LINE	FL
POWER POLE	PP
STORM DRAIN	SD
TOP OF CURB	TC
TOP OF BERM	TB
SEWER LINE	S/L
WATER LINE	W/L
BOTTOM	BTM
PARCEL	PAR
FINISHED SURFACE	FS
FINISH GRADE	FG
CUBIC FEET PER SECOND	CFS
PAD ELEVATION	PE
FINISHED FLOOR	FF
EDGE OF PAVEMENT	EP
PROPERTY LINE	P/L
RIGHT-OF-WAY	R/W
INVERT ELEVATION	INV
PUBLIC UTILITY EASEMENT	PUE
TOP OF WALL	TW
ASSESSORS PARCEL NO.	APN
OFFSET DIRECTION FROM C/L	(N,S,E,W)C/L

BMP LEGEND:

- L=XXX' — INDICATES LONGEST FLOW PATH LENGTH
- Lc=XXX' — LONGEST LENGTH UPSTREAM TO CENTROID
- H=XXX' — CHANGE IN HEIGHT BETWEEN NODES
- U1 / 7.50 — INDICATES TOTAL SITE TRIBUTARY AREA DESIGNATION; INDICATES AREA IN ACRES
- X — INDICATES DRAINAGE NODE
- X/# — DRAINAGE MANAGEMENT AREA DESIGNATION
- INDICATES SITE TRIBUTARY AREA BOUNDARY
- INDICATES LONGEST FLOWLINE PATH

BMP NOTES

1. PER SD-10 DROUGHT TOLERANT LANDSCAPING AREA PER LANDSCAPE PLANS
2. PER SD-11 ROOF RUNNOFF CONTROLS, ROOF RUNNOFF DIRECTED TO DOWNSPOUTS THEN ROUTED TO BUFFER AREAS
3. PER SD-12 EFFICIENT IRRIGATION PER LANDSCAPE ARCHITECTURE PLANS
4. PER SD-13 STORM DRAIN SIGNAGE AND CITY OF ELSINORE SPECIFICATIONS
5. PER SD-32 TRASH ENCLOSURES, AND CITY OF ELSINORE STANDARDS
6. PER TC-11 UNDERGROUND INFILTRATION/RETENTION BASINS
7. PER TC-31 VEGETATED LANDSCAPE BUFFER, GRASS OR MULCH WITH DROUGHT PLANTS PER LANDSCAPE PLANS, USED TO TREAT RUNNOFF WHERE POSSIBLE.
8. PER MP-32 CATCH BASIN FILTER INSERTS, ADS OR EQUAL.

KOLIBRIEN
CIVIL / STRUCTURAL / SURVEYING
41593 Winchester Rd., Ste 200, Temecula, CA 92590
Phone: (951) 252-1034 Web: WWW.KOLIBRIEN.BIZ

File: C02001

Appendix A

lakeshore110
10 YEAR PRE-CONSTRUCTION CONDITIONS
1 HOUR STORM

U n i t H y d r o g r a p h A n a l y s i s

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Study date 12/27/16 File: lakeshore110.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6064

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 7.50(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.50(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 1211.00(Ft.)
Length along longest watercourse measured to centroid = 686.53(Ft.)
Length along longest watercourse = 0.229 Mi.
Length along longest watercourse measured to centroid = 0.130 Mi.
Difference in elevation = 9.50(Ft.)
Slope along watercourse = 41.4203 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.062 Hr.
Lag time = 3.74 Min.
25% of lag time = 0.93 Min.
40% of lag time = 1.49 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	0.60	4.50

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	1.50	11.25

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 0.600(In)
Area Averaged 100-Year Rainfall = 1.500(In)

Point rain (area averaged) = 0.970(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 0.970(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.500	78.00	0.000

Total Area Entered = 7.50(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
78.0	78.0	0.268	0.000	0.268	1.000	0.268
					Sum (F) =	0.268

Area averaged mean soil loss (F) (In/Hr) = 0.268
Minimum soil loss rate ((In/Hr)) = 0.134
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

Slope of intensity-duration curve for a 1 hour storm =0.4800

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	133.821	29.055	2.196
2	0.167	267.642	48.084	3.634
3	0.250	401.463	12.226	0.924
4	0.333	535.284	5.432	0.411

```
          5   0.417        669.105          2.963              0.224
          6   0.500        802.926          2.241              0.169
                                   Sum = 100.000   Sum=       7.559
----------------------------------------------------------------------


  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low        (In/Hr)
   1   0.08     4.40      0.512         0.268      ---          0.24
   2   0.17     4.50      0.524         0.268      ---          0.26
   3   0.25     5.40      0.629         0.268      ---          0.36
   4   0.33     5.40      0.629         0.268      ---          0.36
   5   0.42     5.70      0.664         0.268      ---          0.40
   6   0.50     6.40      0.745         0.268      ---          0.48
   7   0.58     7.90      0.920         0.268      ---          0.65
   8   0.67     9.10      1.059         0.268      ---          0.79
   9   0.75    12.80      1.490         0.268      ---          1.22
  10   0.83    25.60      2.980         0.268      ---          2.71
  11   0.92     7.90      0.920         0.268      ---          0.65
  12   1.00     4.90      0.570         0.268      ---          0.30
     Sum =     100.0                                   Sum =     8.4
        Flood volume = Effective rainfall      0.70(In)
         times area       7.5(Ac.)/[(In)/(Ft.)] =       0.4(Ac.Ft)
        Total soil loss =      0.27(In)
        Total soil loss =     0.167(Ac.Ft)
        Total rainfall =      0.97(In)
        Flood volume =       19128.3 Cubic Feet
        Total soil loss =        7285.4 Cubic Feet
        ---------------------------------------------------------------------
         Peak flow rate of this hydrograph =     12.981(CFS)
        ---------------------------------------------------------------------
        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                            1 - H O U R    S T O R M
                       R u n o f f      H y d r o g r a p h
        ---------------------------------------------------------------------
                    Hydrograph in   5   Minute intervals ((CFS))

        ---------------------------------------------------------------------
  Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
  ----------------------------------------------------------------------
    0+ 5       0.0037      0.54  VQ        |         |         |         |
    0+10       0.0137      1.45  |VQ       |         |         |         |
    0+15       0.0271      1.95  | VQ      |         |         |         |
    0+20       0.0440      2.44  |   Q     |         |         |         |
    0+25       0.0624      2.68  |    Q    |         |         |         |
    0+30       0.0836      3.07  |     QV  |         |         |         |
    0+35       0.1098      3.81  |      Q  V         |         |         |
    0+40       0.1432      4.86  |        Q|  V      |         |         |
```

```
                                    lakeshore110
    0+45       0.1881      6.51  |         |  Q   V  |         |         |
    0+50       0.2679     11.58  |         |         |  QV     |         |
    0+55       0.3573     12.98  |         |         |    Q    | V       |
    1+ 0       0.4009      6.34  |         | Q       |         |     V   |
    1+ 5       0.4231      3.23  |     Q   |         |         |       V |
    1+10       0.4325      1.36  | Q       |         |         |        V|
    1+15       0.4375      0.73  |Q        |         |         |        V|
    1+20       0.4388      0.18  Q         |         |         |        V|
    1+25       0.4391      0.05  Q         |         |         |        V|
-----------------------------------------------------------------------
```

lakeshore310

PRE-CONSTRUCTION CONDITIONS
10 YEAR 3 HOUR STORM

U n i t H y d r o g r a p h A n a l y s i s

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Study date 12/27/16 File: lakeshore310.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6064

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 7.50(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.50(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 1211.00(Ft.)
Length along longest watercourse measured to centroid = 686.53(Ft.)
Length along longest watercourse = 0.229 Mi.
Length along longest watercourse measured to centroid = 0.130 Mi.
Difference in elevation = 9.50(Ft.)
Slope along watercourse = 41.4203 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.062 Hr.
Lag time = 3.74 Min.
25% of lag time = 0.93 Min.
40% of lag time = 1.49 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	1.00	7.50

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	2.50	18.75

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 1.000(In)
Area Averaged 100-Year Rainfall = 2.500(In)

Point rain (area averaged) = 1.617(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.617(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.500	78.00	0.000

Total Area Entered = 7.50(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
78.0	78.0	0.268	0.000	0.268	1.000	0.268
					Sum (F) =	0.268

Area averaged mean soil loss (F) (In/Hr) = 0.268
Minimum soil loss rate ((In/Hr)) = 0.134
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	133.821	29.055	2.196
2	0.167	267.642	48.084	3.634
3	0.250	401.463	12.226	0.924
4	0.333	535.284	5.432	0.411
5	0.417	669.105	2.963	0.224
6	0.500	802.926	2.241	0.169

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Sum = 100.000 Sum= 7.559

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	1.30	0.252	0.268	0.227	0.03
2	0.17	1.30	0.252	0.268	0.227	0.03
3	0.25	1.10	0.213	0.268	0.192	0.02
4	0.33	1.50	0.291	0.268	---	0.02
5	0.42	1.50	0.291	0.268	---	0.02
6	0.50	1.80	0.349	0.268	---	0.08
7	0.58	1.50	0.291	0.268	---	0.02
8	0.67	1.80	0.349	0.268	---	0.08
9	0.75	1.80	0.349	0.268	---	0.08
10	0.83	1.50	0.291	0.268	---	0.02
11	0.92	1.60	0.310	0.268	---	0.04
12	1.00	1.80	0.349	0.268	---	0.08
13	1.08	2.20	0.427	0.268	---	0.16
14	1.17	2.20	0.427	0.268	---	0.16
15	1.25	2.20	0.427	0.268	---	0.16
16	1.33	2.00	0.388	0.268	---	0.12
17	1.42	2.60	0.505	0.268	---	0.24
18	1.50	2.70	0.524	0.268	---	0.26
19	1.58	2.40	0.466	0.268	---	0.20
20	1.67	2.70	0.524	0.268	---	0.26
21	1.75	3.30	0.640	0.268	---	0.37
22	1.83	3.10	0.602	0.268	---	0.33
23	1.92	2.90	0.563	0.268	---	0.30
24	2.00	3.00	0.582	0.268	---	0.31
25	2.08	3.10	0.602	0.268	---	0.33
26	2.17	4.20	0.815	0.268	---	0.55
27	2.25	5.00	0.970	0.268	---	0.70
28	2.33	3.50	0.679	0.268	---	0.41
29	2.42	6.80	1.320	0.268	---	1.05
30	2.50	7.30	1.417	0.268	---	1.15
31	2.58	8.20	1.591	0.268	---	1.32
32	2.67	5.90	1.145	0.268	---	0.88
33	2.75	2.00	0.388	0.268	---	0.12
34	2.83	1.80	0.349	0.268	---	0.08
35	2.92	1.80	0.349	0.268	---	0.08
36	3.00	0.60	0.116	0.268	0.105	0.01
Sum =		100.0			Sum =	10.1

Flood volume = Effective rainfall 0.84(In)
times area 7.5(Ac.)/[(In)/(Ft.)] = 0.5(Ac.Ft)
Total soil loss = 0.78(In)
Total soil loss = 0.485(Ac.Ft)
Total rainfall = 1.62(In)

lakeshore310

Flood volume = 22892.9 Cubic Feet
Total soil loss = 21131.5 Cubic Feet

Peak flow rate of this hydrograph = 8.478(CFS)

++

3 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

```
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5       0.0004      0.06  Q         |         |         |         |
  0+10       0.0014      0.15  Q         |         |         |         |
  0+15       0.0025      0.16  Q         |         |         |         |
  0+20       0.0036      0.16  Q         |         |         |         |
  0+25       0.0048      0.17  Q         |         |         |         |
  0+30       0.0069      0.31  VQ        |         |         |         |
  0+35       0.0096      0.39  VQ        |         |         |         |
  0+40       0.0121      0.36  VQ        |         |         |         |
  0+45       0.0158      0.54  |VQ       |         |         |         |
  0+50       0.0189      0.46  |Q        |         |         |         |
  0+55       0.0211      0.31  |Q        |         |         |         |
  1+ 0       0.0239      0.41  |Q        |         |         |         |
  1+ 5       0.0289      0.73  | Q       |         |         |         |
  1+10       0.0361      1.04  | V Q     |         |         |         |
  1+15       0.0438      1.12  |  VQ     |         |         |         |
  1+20       0.0513      1.08  |  VQ     |         |         |         |
  1+25       0.0597      1.22  |   Q     |         |         |         |
  1+30       0.0712      1.66  |    VQ   |         |         |         |
  1+35       0.0829      1.70  |     Q   |         |         |         |
  1+40       0.0944      1.67  |     QV  |         |         |         |
  1+45       0.1089      2.11  |       Q |         |         |         |
  1+50       0.1262      2.51  |        VQ         |         |         |
  1+55       0.1427      2.40  |        QV         |         |         |
  2+ 0       0.1587      2.32  |        Q| V       |         |         |
  2+ 5       0.1753      2.41  |        Q|  V      |         |         |
  2+10       0.1957      2.97  |         |Q  V     |         |         |
  2+15       0.2239      4.10  |         |     QV  |         |         |
  2+20       0.2530      4.22  |         |     Q  V|         |         |
  2+25       0.2862      4.81  |         |        Q|V        |         |
  2+30       0.3357      7.20  |         |         |    V  Q |         |
  2+35       0.3941      8.48  |         |         |        V|  Q      |
  2+40       0.4523      8.45  |         |         |         |  QV     |
  2+45       0.4899      5.46  |         |         |Q        |      V  |
  2+50       0.5064      2.41  |        Q|         |         |       V |
```

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                                    lakeshore310
    2+55       0.5164      1.44  |    Q    |         |         |        V|
    3+ 0       0.5223      0.87  |  Q      |         |         |        V|
    3+ 5       0.5246      0.33  |Q        |         |         |        V|
    3+10       0.5252      0.08  Q         |         |         |        V|
    3+15       0.5254      0.04  Q         |         |         |        V|
    3+20       0.5255      0.02  Q         |         |         |        V|
    3+25       0.5255      0.00  Q         |         |         |         V
-----------------------------------------------------------------------
```

lakeshore610

PRE-CONSTRUCTION CONDITIONS
10 YEAR 6 HOUR STORM

U n i t H y d r o g r a p h A n a l y s i s

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Study date 12/27/16 File: lakeshore610.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6064

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 7.50(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.50(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 1211.00(Ft.)
Length along longest watercourse measured to centroid = 686.53(Ft.)
Length along longest watercourse = 0.229 Mi.
Length along longest watercourse measured to centroid = 0.130 Mi.
Difference in elevation = 9.50(Ft.)
Slope along watercourse = 41.4203 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.062 Hr.
Lag time = 3.74 Min.
25% of lag time = 0.93 Min.
40% of lag time = 1.49 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	1.40	10.50

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	3.50	26.25

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 1.400(In)
Area Averaged 100-Year Rainfall = 3.500(In)

Point rain (area averaged) = 2.264(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.264(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.500	78.00	0.000

Total Area Entered = 7.50(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
78.0	78.0	0.268	0.000	0.268	1.000	0.268
					Sum (F) =	0.268

Area averaged mean soil loss (F) (In/Hr) = 0.268
Minimum soil loss rate ((In/Hr)) = 0.134
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	133.821	29.055	2.196
2	0.167	267.642	48.084	3.634
3	0.250	401.463	12.226	0.924
4	0.333	535.284	5.432	0.411
5	0.417	669.105	2.963	0.224
6	0.500	802.926	2.241	0.169

lakeshore610
Sum = 100.000 Sum= 7.559

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.50	0.136	0.268	0.122	0.01
2	0.17	0.60	0.163	0.268	0.147	0.02
3	0.25	0.60	0.163	0.268	0.147	0.02
4	0.33	0.60	0.163	0.268	0.147	0.02
5	0.42	0.60	0.163	0.268	0.147	0.02
6	0.50	0.70	0.190	0.268	0.171	0.02
7	0.58	0.70	0.190	0.268	0.171	0.02
8	0.67	0.70	0.190	0.268	0.171	0.02
9	0.75	0.70	0.190	0.268	0.171	0.02
10	0.83	0.70	0.190	0.268	0.171	0.02
11	0.92	0.70	0.190	0.268	0.171	0.02
12	1.00	0.80	0.217	0.268	0.196	0.02
13	1.08	0.80	0.217	0.268	0.196	0.02
14	1.17	0.80	0.217	0.268	0.196	0.02
15	1.25	0.80	0.217	0.268	0.196	0.02
16	1.33	0.80	0.217	0.268	0.196	0.02
17	1.42	0.80	0.217	0.268	0.196	0.02
18	1.50	0.80	0.217	0.268	0.196	0.02
19	1.58	0.80	0.217	0.268	0.196	0.02
20	1.67	0.80	0.217	0.268	0.196	0.02
21	1.75	0.80	0.217	0.268	0.196	0.02
22	1.83	0.80	0.217	0.268	0.196	0.02
23	1.92	0.80	0.217	0.268	0.196	0.02
24	2.00	0.90	0.245	0.268	0.220	0.02
25	2.08	0.80	0.217	0.268	0.196	0.02
26	2.17	0.90	0.245	0.268	0.220	0.02
27	2.25	0.90	0.245	0.268	0.220	0.02
28	2.33	0.90	0.245	0.268	0.220	0.02
29	2.42	0.90	0.245	0.268	0.220	0.02
30	2.50	0.90	0.245	0.268	0.220	0.02
31	2.58	0.90	0.245	0.268	0.220	0.02
32	2.67	0.90	0.245	0.268	0.220	0.02
33	2.75	1.00	0.272	0.268	---	0.00
34	2.83	1.00	0.272	0.268	---	0.00
35	2.92	1.00	0.272	0.268	---	0.00
36	3.00	1.00	0.272	0.268	---	0.00
37	3.08	1.00	0.272	0.268	---	0.00
38	3.17	1.10	0.299	0.268	---	0.03
39	3.25	1.10	0.299	0.268	---	0.03
40	3.33	1.10	0.299	0.268	---	0.03
41	3.42	1.20	0.326	0.268	---	0.06
42	3.50	1.30	0.353	0.268	---	0.09

43	3.58	1.40	0.380	0.268	---	0.11
44	3.67	1.40	0.380	0.268	---	0.11
45	3.75	1.50	0.408	0.268	---	0.14
46	3.83	1.50	0.408	0.268	---	0.14
47	3.92	1.60	0.435	0.268	---	0.17
48	4.00	1.60	0.435	0.268	---	0.17
49	4.08	1.70	0.462	0.268	---	0.19
50	4.17	1.80	0.489	0.268	---	0.22
51	4.25	1.90	0.516	0.268	---	0.25
52	4.33	2.00	0.543	0.268	---	0.28
53	4.42	2.10	0.571	0.268	---	0.30
54	4.50	2.10	0.571	0.268	---	0.30
55	4.58	2.20	0.598	0.268	---	0.33
56	4.67	2.30	0.625	0.268	---	0.36
57	4.75	2.40	0.652	0.268	---	0.38
58	4.83	2.40	0.652	0.268	---	0.38
59	4.92	2.50	0.679	0.268	---	0.41
60	5.00	2.60	0.706	0.268	---	0.44
61	5.08	3.10	0.842	0.268	---	0.57
62	5.17	3.60	0.978	0.268	---	0.71
63	5.25	3.90	1.060	0.268	---	0.79
64	5.33	4.20	1.141	0.268	---	0.87
65	5.42	4.70	1.277	0.268	---	1.01
66	5.50	5.60	1.521	0.268	---	1.25
67	5.58	1.90	0.516	0.268	---	0.25
68	5.67	0.90	0.245	0.268	0.220	0.02
69	5.75	0.60	0.163	0.268	0.147	0.02
70	5.83	0.50	0.136	0.268	0.122	0.01
71	5.92	0.30	0.082	0.268	0.073	0.01
72	6.00	0.20	0.054	0.268	0.049	0.01
Sum =		100.0			Sum =	11.2

```
   Flood volume = Effective rainfall      0.93(In)
    times area       7.5(Ac.)/[(In)/(Ft.)] =       0.6(Ac.Ft)
   Total soil loss =      1.33(In)
   Total soil loss =     0.834(Ac.Ft)
   Total rainfall =      2.26(In)
   Flood volume =       25297.4 Cubic Feet
   Total soil loss =       36337.3 Cubic Feet
   ----------------------------------------------------------------
    Peak flow rate of this hydrograph =      7.814(CFS)
   ----------------------------------------------------------------
   ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                       6 - H O U R    S T O R M
                  R u n o f f      H y d r o g r a p h
   ----------------------------------------------------------------
              Hydrograph in   5   Minute intervals ((CFS))

   ----------------------------------------------------------------
```

```
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5       0.0002      0.03  Q         |         |         |         |
  0+10       0.0008      0.09  Q         |         |         |         |
  0+15       0.0015      0.11  Q         |         |         |         |
  0+20       0.0023      0.12  Q         |         |         |         |
  0+25       0.0032      0.12  Q         |         |         |         |
  0+30       0.0040      0.13  Q         |         |         |         |
  0+35       0.0050      0.14  Q         |         |         |         |
  0+40       0.0060      0.14  Q         |         |         |         |
  0+45       0.0070      0.14  Q         |         |         |         |
  0+50       0.0079      0.14  Q         |         |         |         |
  0+55       0.0089      0.14  Q         |         |         |         |
  1+ 0       0.0100      0.15  Q         |         |         |         |
  1+ 5       0.0111      0.16  Q         |         |         |         |
  1+10       0.0122      0.16  Q         |         |         |         |
  1+15       0.0133      0.16  Q         |         |         |         |
  1+20       0.0144      0.16  Q         |         |         |         |
  1+25       0.0156      0.16  QV        |         |         |         |
  1+30       0.0167      0.16  QV        |         |         |         |
  1+35       0.0178      0.16  QV        |         |         |         |
  1+40       0.0190      0.16  QV        |         |         |         |
  1+45       0.0201      0.16  QV        |         |         |         |
  1+50       0.0212      0.16  QV        |         |         |         |
  1+55       0.0224      0.16  QV        |         |         |         |
  2+ 0       0.0235      0.17  QV        |         |         |         |
  2+ 5       0.0247      0.17  QV        |         |         |         |
  2+10       0.0259      0.17  QV        |         |         |         |
  2+15       0.0272      0.18  QV        |         |         |         |
  2+20       0.0284      0.18  QV        |         |         |         |
  2+25       0.0297      0.18  Q V       |         |         |         |
  2+30       0.0310      0.18  Q V       |         |         |         |
  2+35       0.0323      0.18  Q V       |         |         |         |
  2+40       0.0335      0.18  Q V       |         |         |         |
  2+45       0.0345      0.14  Q V       |         |         |         |
  2+50       0.0349      0.07  Q V       |         |         |         |
  2+55       0.0353      0.05  Q V       |         |         |         |
  3+ 0       0.0355      0.04  Q V       |         |         |         |
  3+ 5       0.0358      0.03  Q V       |         |         |         |
  3+10       0.0364      0.09  Q V       |         |         |         |
  3+15       0.0377      0.19  Q V       |         |         |         |
  3+20       0.0392      0.21  Q V       |         |         |         |
  3+25       0.0411      0.29  |QV       |         |         |         |
  3+30       0.0442      0.45  |Q V      |         |         |         |
  3+35       0.0486      0.64  | QV      |         |         |         |
  3+40       0.0540      0.77  |  Q      |         |         |         |
  3+45       0.0600      0.88  |  QV     |         |         |         |
  3+50       0.0668      1.00  |  QV     |         |         |         |
```

```
   3+55       0.0744      1.09  |   QV    |         |         |         |
   4+ 0       0.0827      1.21  |   QV    |         |         |         |
   4+ 5       0.0916      1.30  |    QV   |         |         |         |
   4+10       0.1017      1.47  |    Q V  |         |         |         |
   4+15       0.1132      1.66  |     QV  |         |         |         |
   4+20       0.1260      1.86  |      QV |         |         |         |
   4+25       0.1402      2.06  |       QV|         |         |         |
   4+30       0.1554      2.21  |       Q V         |         |         |
   4+35       0.1713      2.31  |        Q|V        |         |         |
   4+40       0.1885      2.49  |        Q| V       |         |         |
   4+45       0.2070      2.69  |         Q   V     |         |         |
   4+50       0.2264      2.83  |         |Q   V    |         |         |
   4+55       0.2466      2.93  |         |Q    V   |         |         |
   5+ 0       0.2680      3.11  |         | Q     V |         |         |
   5+ 5       0.2924      3.54  |         |   Q     V         |         |
   5+10       0.3226      4.38  |         |      Q  | V       |         |
   5+15       0.3583      5.19  |         |         Q   V     |         |
   5+20       0.3987      5.86  |         |         |  Q   V  |         |
   5+25       0.4443      6.62  |         |         |     Q   V         |
   5+30       0.4981      7.81  |         |         |         |Q  V     |
   5+35       0.5442      6.69  |         |         |     Q   |      V  |
   5+40       0.5639      2.86  |         |Q        |         |       V |
   5+45       0.5725      1.24  |   Q     |         |         |        V|
   5+50       0.5771      0.67  | Q       |         |         |        V|
   5+55       0.5796      0.36  |Q        |         |         |        V|
   6+ 0       0.5803      0.11  Q         |         |         |        V|
   6+ 5       0.5806      0.04  Q         |         |         |        V|
   6+10       0.5807      0.01  Q         |         |         |        V|
   6+15       0.5807      0.01  Q         |         |         |        V|
   6+20       0.5807      0.00  Q         |         |         |        V|
   6+25       0.5807      0.00  Q         |         |         |         V
-----------------------------------------------------------------------
```

lakeshore2410

PRE-CONSTRUCTION CONDITIONS
10 YEAR 24 HOUR STORM

U n i t H y d r o g r a p h A n a l y s i s

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Study date 12/27/16 File: lakeshore2410.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6064

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 7.50(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.50(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 1211.00(Ft.)
Length along longest watercourse measured to centroid = 686.53(Ft.)
Length along longest watercourse = 0.229 Mi.
Length along longest watercourse measured to centroid = 0.130 Mi.
Difference in elevation = 9.50(Ft.)
Slope along watercourse = 41.4203 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.062 Hr.
Lag time = 3.74 Min.
25% of lag time = 0.93 Min.
40% of lag time = 1.49 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	2.50	18.75

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	5.00	37.50

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 2.500(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 3.529(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 3.528(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.500	78.00	0.000

Total Area Entered = 7.50(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
78.0	78.0	0.268	0.000	0.268	1.000	0.268
					Sum (F) =	0.268

Area averaged mean soil loss (F) (In/Hr) = 0.268
Minimum soil loss rate ((In/Hr)) = 0.134
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	133.821	29.055	2.196
2	0.167	267.642	48.084	3.634
3	0.250	401.463	12.226	0.924
4	0.333	535.284	5.432	0.411
5	0.417	669.105	2.963	0.224
6	0.500	802.926	2.241	0.169

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Sum = 100.000 Sum= 7.559

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.028	0.474	0.025	0.00
2	0.17	0.07	0.028	0.473	0.025	0.00
3	0.25	0.07	0.028	0.471	0.025	0.00
4	0.33	0.10	0.042	0.469	0.038	0.00
5	0.42	0.10	0.042	0.467	0.038	0.00
6	0.50	0.10	0.042	0.465	0.038	0.00
7	0.58	0.10	0.042	0.463	0.038	0.00
8	0.67	0.10	0.042	0.462	0.038	0.00
9	0.75	0.10	0.042	0.460	0.038	0.00
10	0.83	0.13	0.056	0.458	0.051	0.01
11	0.92	0.13	0.056	0.456	0.051	0.01
12	1.00	0.13	0.056	0.454	0.051	0.01
13	1.08	0.10	0.042	0.453	0.038	0.00
14	1.17	0.10	0.042	0.451	0.038	0.00
15	1.25	0.10	0.042	0.449	0.038	0.00
16	1.33	0.10	0.042	0.447	0.038	0.00
17	1.42	0.10	0.042	0.445	0.038	0.00
18	1.50	0.10	0.042	0.444	0.038	0.00
19	1.58	0.10	0.042	0.442	0.038	0.00
20	1.67	0.10	0.042	0.440	0.038	0.00
21	1.75	0.10	0.042	0.438	0.038	0.00
22	1.83	0.13	0.056	0.437	0.051	0.01
23	1.92	0.13	0.056	0.435	0.051	0.01
24	2.00	0.13	0.056	0.433	0.051	0.01
25	2.08	0.13	0.056	0.431	0.051	0.01
26	2.17	0.13	0.056	0.430	0.051	0.01
27	2.25	0.13	0.056	0.428	0.051	0.01
28	2.33	0.13	0.056	0.426	0.051	0.01
29	2.42	0.13	0.056	0.424	0.051	0.01
30	2.50	0.13	0.056	0.423	0.051	0.01
31	2.58	0.17	0.071	0.421	0.064	0.01
32	2.67	0.17	0.071	0.419	0.064	0.01
33	2.75	0.17	0.071	0.417	0.064	0.01
34	2.83	0.17	0.071	0.416	0.064	0.01
35	2.92	0.17	0.071	0.414	0.064	0.01
36	3.00	0.17	0.071	0.412	0.064	0.01
37	3.08	0.17	0.071	0.411	0.064	0.01
38	3.17	0.17	0.071	0.409	0.064	0.01
39	3.25	0.17	0.071	0.407	0.064	0.01
40	3.33	0.17	0.071	0.405	0.064	0.01
41	3.42	0.17	0.071	0.404	0.064	0.01
42	3.50	0.17	0.071	0.402	0.064	0.01

43	3.58	0.17	0.071	0.400	0.064	0.01
44	3.67	0.17	0.071	0.399	0.064	0.01
45	3.75	0.17	0.071	0.397	0.064	0.01
46	3.83	0.20	0.085	0.395	0.076	0.01
47	3.92	0.20	0.085	0.394	0.076	0.01
48	4.00	0.20	0.085	0.392	0.076	0.01
49	4.08	0.20	0.085	0.390	0.076	0.01
50	4.17	0.20	0.085	0.389	0.076	0.01
51	4.25	0.20	0.085	0.387	0.076	0.01
52	4.33	0.23	0.099	0.385	0.089	0.01
53	4.42	0.23	0.099	0.384	0.089	0.01
54	4.50	0.23	0.099	0.382	0.089	0.01
55	4.58	0.23	0.099	0.381	0.089	0.01
56	4.67	0.23	0.099	0.379	0.089	0.01
57	4.75	0.23	0.099	0.377	0.089	0.01
58	4.83	0.27	0.113	0.376	0.102	0.01
59	4.92	0.27	0.113	0.374	0.102	0.01
60	5.00	0.27	0.113	0.372	0.102	0.01
61	5.08	0.20	0.085	0.371	0.076	0.01
62	5.17	0.20	0.085	0.369	0.076	0.01
63	5.25	0.20	0.085	0.368	0.076	0.01
64	5.33	0.23	0.099	0.366	0.089	0.01
65	5.42	0.23	0.099	0.364	0.089	0.01
66	5.50	0.23	0.099	0.363	0.089	0.01
67	5.58	0.27	0.113	0.361	0.102	0.01
68	5.67	0.27	0.113	0.360	0.102	0.01
69	5.75	0.27	0.113	0.358	0.102	0.01
70	5.83	0.27	0.113	0.356	0.102	0.01
71	5.92	0.27	0.113	0.355	0.102	0.01
72	6.00	0.27	0.113	0.353	0.102	0.01
73	6.08	0.30	0.127	0.352	0.114	0.01
74	6.17	0.30	0.127	0.350	0.114	0.01
75	6.25	0.30	0.127	0.349	0.114	0.01
76	6.33	0.30	0.127	0.347	0.114	0.01
77	6.42	0.30	0.127	0.345	0.114	0.01
78	6.50	0.30	0.127	0.344	0.114	0.01
79	6.58	0.33	0.141	0.342	0.127	0.01
80	6.67	0.33	0.141	0.341	0.127	0.01
81	6.75	0.33	0.141	0.339	0.127	0.01
82	6.83	0.33	0.141	0.338	0.127	0.01
83	6.92	0.33	0.141	0.336	0.127	0.01
84	7.00	0.33	0.141	0.335	0.127	0.01
85	7.08	0.33	0.141	0.333	0.127	0.01
86	7.17	0.33	0.141	0.332	0.127	0.01
87	7.25	0.33	0.141	0.330	0.127	0.01
88	7.33	0.37	0.155	0.329	0.140	0.02
89	7.42	0.37	0.155	0.327	0.140	0.02
90	7.50	0.37	0.155	0.326	0.140	0.02

91	7.58	0.40	0.169	0.324	0.152	0.02
92	7.67	0.40	0.169	0.323	0.152	0.02
93	7.75	0.40	0.169	0.321	0.152	0.02
94	7.83	0.43	0.183	0.320	0.165	0.02
95	7.92	0.43	0.183	0.318	0.165	0.02
96	8.00	0.43	0.183	0.317	0.165	0.02
97	8.08	0.50	0.212	0.315	0.191	0.02
98	8.17	0.50	0.212	0.314	0.191	0.02
99	8.25	0.50	0.212	0.312	0.191	0.02
100	8.33	0.50	0.212	0.311	0.191	0.02
101	8.42	0.50	0.212	0.309	0.191	0.02
102	8.50	0.50	0.212	0.308	0.191	0.02
103	8.58	0.53	0.226	0.306	0.203	0.02
104	8.67	0.53	0.226	0.305	0.203	0.02
105	8.75	0.53	0.226	0.304	0.203	0.02
106	8.83	0.57	0.240	0.302	0.216	0.02
107	8.92	0.57	0.240	0.301	0.216	0.02
108	9.00	0.57	0.240	0.299	0.216	0.02
109	9.08	0.63	0.268	0.298	0.241	0.03
110	9.17	0.63	0.268	0.296	0.241	0.03
111	9.25	0.63	0.268	0.295	0.241	0.03
112	9.33	0.67	0.282	0.294	0.254	0.03
113	9.42	0.67	0.282	0.292	0.254	0.03
114	9.50	0.67	0.282	0.291	0.254	0.03
115	9.58	0.70	0.296	0.289	---	0.01
116	9.67	0.70	0.296	0.288	---	0.01
117	9.75	0.70	0.296	0.287	---	0.01
118	9.83	0.73	0.311	0.285	---	0.03
119	9.92	0.73	0.311	0.284	---	0.03
120	10.00	0.73	0.311	0.283	---	0.03
121	10.08	0.50	0.212	0.281	0.191	0.02
122	10.17	0.50	0.212	0.280	0.191	0.02
123	10.25	0.50	0.212	0.278	0.191	0.02
124	10.33	0.50	0.212	0.277	0.191	0.02
125	10.42	0.50	0.212	0.276	0.191	0.02
126	10.50	0.50	0.212	0.274	0.191	0.02
127	10.58	0.67	0.282	0.273	---	0.01
128	10.67	0.67	0.282	0.272	---	0.01
129	10.75	0.67	0.282	0.270	---	0.01
130	10.83	0.67	0.282	0.269	---	0.01
131	10.92	0.67	0.282	0.268	---	0.01
132	11.00	0.67	0.282	0.266	---	0.02
133	11.08	0.63	0.268	0.265	---	0.00
134	11.17	0.63	0.268	0.264	---	0.00
135	11.25	0.63	0.268	0.263	---	0.01
136	11.33	0.63	0.268	0.261	---	0.01
137	11.42	0.63	0.268	0.260	---	0.01
138	11.50	0.63	0.268	0.259	---	0.01

139	11.58	0.57	0.240	0.257	0.216	0.02
140	11.67	0.57	0.240	0.256	0.216	0.02
141	11.75	0.57	0.240	0.255	0.216	0.02
142	11.83	0.60	0.254	0.254	---	0.00
143	11.92	0.60	0.254	0.252	---	0.00
144	12.00	0.60	0.254	0.251	---	0.00
145	12.08	0.83	0.353	0.250	---	0.10
146	12.17	0.83	0.353	0.249	---	0.10
147	12.25	0.83	0.353	0.247	---	0.11
148	12.33	0.87	0.367	0.246	---	0.12
149	12.42	0.87	0.367	0.245	---	0.12
150	12.50	0.87	0.367	0.244	---	0.12
151	12.58	0.93	0.395	0.242	---	0.15
152	12.67	0.93	0.395	0.241	---	0.15
153	12.75	0.93	0.395	0.240	---	0.16
154	12.83	0.97	0.409	0.239	---	0.17
155	12.92	0.97	0.409	0.238	---	0.17
156	13.00	0.97	0.409	0.236	---	0.17
157	13.08	1.13	0.480	0.235	---	0.24
158	13.17	1.13	0.480	0.234	---	0.25
159	13.25	1.13	0.480	0.233	---	0.25
160	13.33	1.13	0.480	0.232	---	0.25
161	13.42	1.13	0.480	0.230	---	0.25
162	13.50	1.13	0.480	0.229	---	0.25
163	13.58	0.77	0.325	0.228	---	0.10
164	13.67	0.77	0.325	0.227	---	0.10
165	13.75	0.77	0.325	0.226	---	0.10
166	13.83	0.77	0.325	0.225	---	0.10
167	13.92	0.77	0.325	0.223	---	0.10
168	14.00	0.77	0.325	0.222	---	0.10
169	14.08	0.90	0.381	0.221	---	0.16
170	14.17	0.90	0.381	0.220	---	0.16
171	14.25	0.90	0.381	0.219	---	0.16
172	14.33	0.87	0.367	0.218	---	0.15
173	14.42	0.87	0.367	0.217	---	0.15
174	14.50	0.87	0.367	0.216	---	0.15
175	14.58	0.87	0.367	0.214	---	0.15
176	14.67	0.87	0.367	0.213	---	0.15
177	14.75	0.87	0.367	0.212	---	0.15
178	14.83	0.83	0.353	0.211	---	0.14
179	14.92	0.83	0.353	0.210	---	0.14
180	15.00	0.83	0.353	0.209	---	0.14
181	15.08	0.80	0.339	0.208	---	0.13
182	15.17	0.80	0.339	0.207	---	0.13
183	15.25	0.80	0.339	0.206	---	0.13
184	15.33	0.77	0.325	0.205	---	0.12
185	15.42	0.77	0.325	0.204	---	0.12
186	15.50	0.77	0.325	0.203	---	0.12

187	15.58	0.63	0.268	0.202	---	0.07
188	15.67	0.63	0.268	0.201	---	0.07
189	15.75	0.63	0.268	0.200	---	0.07
190	15.83	0.63	0.268	0.199	---	0.07
191	15.92	0.63	0.268	0.198	---	0.07
192	16.00	0.63	0.268	0.197	---	0.07
193	16.08	0.13	0.056	0.196	0.051	0.01
194	16.17	0.13	0.056	0.195	0.051	0.01
195	16.25	0.13	0.056	0.194	0.051	0.01
196	16.33	0.13	0.056	0.193	0.051	0.01
197	16.42	0.13	0.056	0.192	0.051	0.01
198	16.50	0.13	0.056	0.191	0.051	0.01
199	16.58	0.10	0.042	0.190	0.038	0.00
200	16.67	0.10	0.042	0.189	0.038	0.00
201	16.75	0.10	0.042	0.188	0.038	0.00
202	16.83	0.10	0.042	0.187	0.038	0.00
203	16.92	0.10	0.042	0.186	0.038	0.00
204	17.00	0.10	0.042	0.185	0.038	0.00
205	17.08	0.17	0.071	0.184	0.064	0.01
206	17.17	0.17	0.071	0.183	0.064	0.01
207	17.25	0.17	0.071	0.182	0.064	0.01
208	17.33	0.17	0.071	0.181	0.064	0.01
209	17.42	0.17	0.071	0.180	0.064	0.01
210	17.50	0.17	0.071	0.179	0.064	0.01
211	17.58	0.17	0.071	0.178	0.064	0.01
212	17.67	0.17	0.071	0.178	0.064	0.01
213	17.75	0.17	0.071	0.177	0.064	0.01
214	17.83	0.13	0.056	0.176	0.051	0.01
215	17.92	0.13	0.056	0.175	0.051	0.01
216	18.00	0.13	0.056	0.174	0.051	0.01
217	18.08	0.13	0.056	0.173	0.051	0.01
218	18.17	0.13	0.056	0.172	0.051	0.01
219	18.25	0.13	0.056	0.172	0.051	0.01
220	18.33	0.13	0.056	0.171	0.051	0.01
221	18.42	0.13	0.056	0.170	0.051	0.01
222	18.50	0.13	0.056	0.169	0.051	0.01
223	18.58	0.10	0.042	0.168	0.038	0.00
224	18.67	0.10	0.042	0.167	0.038	0.00
225	18.75	0.10	0.042	0.167	0.038	0.00
226	18.83	0.07	0.028	0.166	0.025	0.00
227	18.92	0.07	0.028	0.165	0.025	0.00
228	19.00	0.07	0.028	0.164	0.025	0.00
229	19.08	0.10	0.042	0.163	0.038	0.00
230	19.17	0.10	0.042	0.163	0.038	0.00
231	19.25	0.10	0.042	0.162	0.038	0.00
232	19.33	0.13	0.056	0.161	0.051	0.01
233	19.42	0.13	0.056	0.160	0.051	0.01
234	19.50	0.13	0.056	0.160	0.051	0.01

235	19.58	0.10	0.042	0.159	0.038	0.00
236	19.67	0.10	0.042	0.158	0.038	0.00
237	19.75	0.10	0.042	0.157	0.038	0.00
238	19.83	0.07	0.028	0.157	0.025	0.00
239	19.92	0.07	0.028	0.156	0.025	0.00
240	20.00	0.07	0.028	0.155	0.025	0.00
241	20.08	0.10	0.042	0.155	0.038	0.00
242	20.17	0.10	0.042	0.154	0.038	0.00
243	20.25	0.10	0.042	0.153	0.038	0.00
244	20.33	0.10	0.042	0.153	0.038	0.00
245	20.42	0.10	0.042	0.152	0.038	0.00
246	20.50	0.10	0.042	0.151	0.038	0.00
247	20.58	0.10	0.042	0.151	0.038	0.00
248	20.67	0.10	0.042	0.150	0.038	0.00
249	20.75	0.10	0.042	0.150	0.038	0.00
250	20.83	0.07	0.028	0.149	0.025	0.00
251	20.92	0.07	0.028	0.148	0.025	0.00
252	21.00	0.07	0.028	0.148	0.025	0.00
253	21.08	0.10	0.042	0.147	0.038	0.00
254	21.17	0.10	0.042	0.147	0.038	0.00
255	21.25	0.10	0.042	0.146	0.038	0.00
256	21.33	0.07	0.028	0.145	0.025	0.00
257	21.42	0.07	0.028	0.145	0.025	0.00
258	21.50	0.07	0.028	0.144	0.025	0.00
259	21.58	0.10	0.042	0.144	0.038	0.00
260	21.67	0.10	0.042	0.143	0.038	0.00
261	21.75	0.10	0.042	0.143	0.038	0.00
262	21.83	0.07	0.028	0.142	0.025	0.00
263	21.92	0.07	0.028	0.142	0.025	0.00
264	22.00	0.07	0.028	0.141	0.025	0.00
265	22.08	0.10	0.042	0.141	0.038	0.00
266	22.17	0.10	0.042	0.140	0.038	0.00
267	22.25	0.10	0.042	0.140	0.038	0.00
268	22.33	0.07	0.028	0.139	0.025	0.00
269	22.42	0.07	0.028	0.139	0.025	0.00
270	22.50	0.07	0.028	0.139	0.025	0.00
271	22.58	0.07	0.028	0.138	0.025	0.00
272	22.67	0.07	0.028	0.138	0.025	0.00
273	22.75	0.07	0.028	0.137	0.025	0.00
274	22.83	0.07	0.028	0.137	0.025	0.00
275	22.92	0.07	0.028	0.137	0.025	0.00
276	23.00	0.07	0.028	0.136	0.025	0.00
277	23.08	0.07	0.028	0.136	0.025	0.00
278	23.17	0.07	0.028	0.136	0.025	0.00
279	23.25	0.07	0.028	0.136	0.025	0.00
280	23.33	0.07	0.028	0.135	0.025	0.00
281	23.42	0.07	0.028	0.135	0.025	0.00
282	23.50	0.07	0.028	0.135	0.025	0.00

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283  23.58     0.07      0.028         0.135     0.025         0.00
284  23.67     0.07      0.028         0.134     0.025         0.00
285  23.75     0.07      0.028         0.134     0.025         0.00
286  23.83     0.07      0.028         0.134     0.025         0.00
287  23.92     0.07      0.028         0.134     0.025         0.00
288  24.00     0.07      0.028         0.134     0.025         0.00
    Sum =     100.0                                   Sum =     8.9
       Flood volume = Effective rainfall      0.74(In)
        times area       7.5(Ac.)/[(In)/(Ft.)] =       0.5(Ac.Ft)
       Total soil loss =      2.79(In)
       Total soil loss =     1.744(Ac.Ft)
       Total rainfall =      3.53(In)
       Flood volume =       20109.1 Cubic Feet
       Total soil loss =       75953.4 Cubic Feet
       ---------------------------------------------------------------------
        Peak flow rate of this hydrograph =      1.886(CFS)
       ---------------------------------------------------------------------
       +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                           24 - H O U R    S T O R M
                      R u n o f f      H y d r o g r a p h
       ---------------------------------------------------------------------
                   Hydrograph in   5   Minute intervals ((CFS))

       ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ----------------------------------------------------------------------
   0+ 5       0.0000      0.01  Q         |         |         |         |
   0+10       0.0002      0.02  Q         |         |         |         |
   0+15       0.0003      0.02  Q         |         |         |         |
   0+20       0.0004      0.02  Q         |         |         |         |
   0+25       0.0006      0.03  Q         |         |         |         |
   0+30       0.0009      0.03  Q         |         |         |         |
   0+35       0.0011      0.03  Q         |         |         |         |
   0+40       0.0013      0.03  Q         |         |         |         |
   0+45       0.0015      0.03  Q         |         |         |         |
   0+50       0.0018      0.04  Q         |         |         |         |
   0+55       0.0020      0.04  Q         |         |         |         |
   1+ 0       0.0023      0.04  Q         |         |         |         |
   1+ 5       0.0026      0.04  Q         |         |         |         |
   1+10       0.0028      0.03  Q         |         |         |         |
   1+15       0.0031      0.03  Q         |         |         |         |
   1+20       0.0033      0.03  Q         |         |         |         |
   1+25       0.0035      0.03  Q         |         |         |         |
   1+30       0.0037      0.03  Q         |         |         |         |
   1+35       0.0039      0.03  Q         |         |         |         |
   1+40       0.0042      0.03  Q         |         |         |         |
   1+45       0.0044      0.03  Q         |         |         |         |
   1+50       0.0046      0.04  Q         |         |         |         |
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1+55	0.0049	0.04	Q	|	|	|	|
2+ 0	0.0052	0.04	Q	|	|	|	|
2+ 5	0.0055	0.04	Q	|	|	|	|
2+10	0.0058	0.04	Q	|	|	|	|
2+15	0.0061	0.04	Q	|	|	|	|
2+20	0.0064	0.04	Q	|	|	|	|
2+25	0.0067	0.04	Q	|	|	|	|
2+30	0.0069	0.04	Q	|	|	|	|
2+35	0.0073	0.05	Q	|	|	|	|
2+40	0.0076	0.05	Q	|	|	|	|
2+45	0.0080	0.05	Q	|	|	|	|
2+50	0.0083	0.05	Q	|	|	|	|
2+55	0.0087	0.05	Q	|	|	|	|
3+ 0	0.0091	0.05	Q	|	|	|	|
3+ 5	0.0094	0.05	Q	|	|	|	|
3+10	0.0098	0.05	Q	|	|	|	|
3+15	0.0102	0.05	Q	|	|	|	|
3+20	0.0105	0.05	Q	|	|	|	|
3+25	0.0109	0.05	Q	|	|	|	|
3+30	0.0113	0.05	Q	|	|	|	|
3+35	0.0116	0.05	QV	|	|	|	|
3+40	0.0120	0.05	QV	|	|	|	|
3+45	0.0124	0.05	QV	|	|	|	|
3+50	0.0128	0.06	QV	|	|	|	|
3+55	0.0132	0.06	QV	|	|	|	|
4+ 0	0.0136	0.06	QV	|	|	|	|
4+ 5	0.0141	0.06	QV	|	|	|	|
4+10	0.0145	0.06	QV	|	|	|	|
4+15	0.0149	0.06	QV	|	|	|	|
4+20	0.0154	0.07	QV	|	|	|	|
4+25	0.0159	0.07	QV	|	|	|	|
4+30	0.0164	0.07	QV	|	|	|	|
4+35	0.0169	0.07	QV	|	|	|	|
4+40	0.0174	0.07	QV	|	|	|	|
4+45	0.0179	0.07	QV	|	|	|	|
4+50	0.0185	0.08	QV	|	|	|	|
4+55	0.0191	0.08	QV	|	|	|	|
5+ 0	0.0196	0.08	QV	|	|	|	|
5+ 5	0.0202	0.08	QV	|	|	|	|
5+10	0.0207	0.07	QV	|	|	|	|
5+15	0.0211	0.07	QV	|	|	|	|
5+20	0.0216	0.07	QV	|	|	|	|
5+25	0.0221	0.07	QV	|	|	|	|
5+30	0.0226	0.07	QV	|	|	|	|
5+35	0.0231	0.08	Q V	|	|	|	|
5+40	0.0237	0.08	Q V	|	|	|	|
5+45	0.0243	0.08	Q V	|	|	|	|
5+50	0.0249	0.08	Q V	|	|	|	|

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5+55       0.0254      0.09  Q V        |          |          |          |
6+ 0       0.0260      0.09  Q V        |          |          |          |
6+ 5       0.0266      0.09  Q V        |          |          |          |
6+10       0.0273      0.09  Q V        |          |          |          |
6+15       0.0279      0.09  Q V        |          |          |          |
6+20       0.0286      0.10  Q V        |          |          |          |
6+25       0.0293      0.10  Q V        |          |          |          |
6+30       0.0299      0.10  Q V        |          |          |          |
6+35       0.0306      0.10  Q V        |          |          |          |
6+40       0.0313      0.10  Q V        |          |          |          |
6+45       0.0320      0.11  Q V        |          |          |          |
6+50       0.0328      0.11  Q V        |          |          |          |
6+55       0.0335      0.11  Q V        |          |          |          |
7+ 0       0.0342      0.11  Q V        |          |          |          |
7+ 5       0.0350      0.11  Q  V       |          |          |          |
7+10       0.0357      0.11  Q  V       |          |          |          |
7+15       0.0364      0.11  Q  V       |          |          |          |
7+20       0.0372      0.11  Q  V       |          |          |          |
7+25       0.0380      0.11  Q  V       |          |          |          |
7+30       0.0388      0.12  Q  V       |          |          |          |
7+35       0.0396      0.12  Q  V       |          |          |          |
7+40       0.0405      0.13  Q  V       |          |          |          |
7+45       0.0414      0.13  Q  V       |          |          |          |
7+50       0.0423      0.13  Q  V       |          |          |          |
7+55       0.0432      0.14  Q  V       |          |          |          |
8+ 0       0.0441      0.14  Q  V       |          |          |          |
8+ 5       0.0451      0.14  Q  V       |          |          |          |
8+10       0.0462      0.15  Q   V      |          |          |          |
8+15       0.0473      0.16  Q   V      |          |          |          |
8+20       0.0484      0.16  Q   V      |          |          |          |
8+25       0.0495      0.16  Q   V      |          |          |          |
8+30       0.0506      0.16  Q   V      |          |          |          |
8+35       0.0517      0.16  Q   V      |          |          |          |
8+40       0.0529      0.17  Q   V      |          |          |          |
8+45       0.0540      0.17  Q   V      |          |          |          |
8+50       0.0552      0.17  Q   V      |          |          |          |
8+55       0.0565      0.18  Q   V      |          |          |          |
9+ 0       0.0577      0.18  Q    V     |          |          |          |
9+ 5       0.0590      0.19  Q    V     |          |          |          |
9+10       0.0604      0.20  Q    V     |          |          |          |
9+15       0.0617      0.20  Q    V     |          |          |          |
9+20       0.0632      0.20  Q    V     |          |          |          |
9+25       0.0646      0.21  Q    V     |          |          |          |
9+30       0.0661      0.21  Q    V     |          |          |          |
9+35       0.0672      0.17  Q    V     |          |          |          |
9+40       0.0678      0.09  Q    V     |          |          |          |
9+45       0.0684      0.08  Q    V     |          |          |          |
9+50       0.0692      0.11  Q    V     |          |          |          |
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 9+55       0.0703      0.17  Q     V   |          |          |          |
10+ 0       0.0716      0.19  Q     V   |          |          |          |
10+ 5       0.0729      0.19  Q     V   |          |          |          |
10+10       0.0741      0.17  Q     V   |          |          |          |
10+15       0.0752      0.16  Q     V   |          |          |          |
10+20       0.0763      0.16  Q     V   |          |          |          |
10+25       0.0774      0.16  Q     V   |          |          |          |
10+30       0.0785      0.16  Q     V   |          |          |          |
10+35       0.0794      0.13  Q     V   |          |          |          |
10+40       0.0801      0.09  Q     V   |          |          |          |
10+45       0.0807      0.09  Q     V   |          |          |          |
10+50       0.0814      0.09  Q      V  |          |          |          |
10+55       0.0820      0.10  Q      V  |          |          |          |
11+ 0       0.0828      0.11  Q      V  |          |          |          |
11+ 5       0.0834      0.09  Q      V  |          |          |          |
11+10       0.0837      0.05  Q      V  |          |          |          |
11+15       0.0840      0.04  Q      V  |          |          |          |
11+20       0.0843      0.05  Q      V  |          |          |          |
11+25       0.0847      0.05  Q      V  |          |          |          |
11+30       0.0851      0.06  Q      V  |          |          |          |
11+35       0.0858      0.10  Q      V  |          |          |          |
11+40       0.0869      0.15  Q      V  |          |          |          |
11+45       0.0880      0.17  Q      V  |          |          |          |
11+50       0.0889      0.12  Q      V  |          |          |          |
11+55       0.0892      0.04  Q      V  |          |          |          |
12+ 0       0.0894      0.03  Q      V  |          |          |          |
12+ 5       0.0911      0.25  Q      V  |          |          |          |
12+10       0.0953      0.61  | Q     V |          |          |          |
12+15       0.1002      0.71  | Q     V |          |          |          |
12+20       0.1056      0.79  |  Q     V|          |          |          |
12+25       0.1116      0.87  |  Q     V|          |          |          |
12+30       0.1179      0.91  |  Q      V          |          |          |
12+35       0.1247      0.99  |  Q      V          |          |          |
12+40       0.1323      1.10  |   Q     |V         |          |          |
12+45       0.1402      1.14  |   Q     | V        |          |          |
12+50       0.1484      1.19  |   Q     | V        |          |          |
12+55       0.1571      1.26  |    Q    |  V       |          |          |
13+ 0       0.1659      1.29  |    Q    |   V      |          |          |
13+ 5       0.1760      1.46  |    Q    |    V     |          |          |
13+10       0.1879      1.73  |     Q   |     V    |          |          |
13+15       0.2003      1.80  |      Q  |      V   |          |          |
13+20       0.2129      1.84  |      Q  |       V  |          |          |
13+25       0.2258      1.86  |      Q  |        V|          |          |
13+30       0.2388      1.89  |      Q  |         V          |          |
13+35       0.2495      1.55  |     Q   |         |V         |          |
13+40       0.2563      1.00  |  Q      |         | V        |          |
13+45       0.2623      0.86  |  Q      |         | V        |          |
13+50       0.2678      0.81  |  Q      |         |  V       |          |
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13+55       0.2732      0.78  |  Q      |          |  V      |          |
14+ 0       0.2785      0.76  |  Q      |          |   V     |          |
14+ 5       0.2847      0.90  |  Q      |          |   V     |          |
14+10       0.2923      1.11  |   Q     |          |    V    |          |
14+15       0.3004      1.17  |   Q     |          |     V   |          |
14+20       0.3085      1.17  |   Q     |          |     V   |          |
14+25       0.3163      1.14  |   Q     |          |      V  |          |
14+30       0.3242      1.15  |   Q     |          |       V |          |
14+35       0.3321      1.15  |   Q     |          |       V |          |
14+40       0.3401      1.15  |   Q     |          |        V|          |
14+45       0.3481      1.16  |   Q     |          |         V          |
14+50       0.3559      1.14  |   Q     |          |         V          |
14+55       0.3635      1.09  |   Q     |          |         |V         |
15+ 0       0.3710      1.09  |   Q     |          |         | V        |
15+ 5       0.3783      1.06  |   Q     |          |         | V        |
15+10       0.3853      1.01  |   Q     |          |         |  V       |
15+15       0.3922      1.01  |   Q     |          |         |  V       |
15+20       0.3990      0.98  |  Q      |          |         |   V      |
15+25       0.4054      0.93  |  Q      |          |         |    V     |
15+30       0.4118      0.92  |  Q      |          |         |    V     |
15+35       0.4173      0.80  |  Q      |          |         |     V    |
15+40       0.4214      0.60  | Q       |          |         |     V    |
15+45       0.4253      0.56  | Q       |          |         |     V    |
15+50       0.4290      0.54  | Q       |          |         |      V   |
15+55       0.4327      0.54  | Q       |          |         |      V   |
16+ 0       0.4363      0.53  | Q       |          |         |      V   |
16+ 5       0.4390      0.39  |Q        |          |         |       V  |
16+10       0.4401      0.16  Q         |          |         |       V  |
16+15       0.4408      0.10  Q         |          |         |       V  |
16+20       0.4412      0.07  Q         |          |         |       V  |
16+25       0.4416      0.05  Q         |          |         |       V  |
16+30       0.4419      0.04  Q         |          |         |       V  |
16+35       0.4422      0.04  Q         |          |         |       V  |
16+40       0.4424      0.03  Q         |          |         |       V  |
16+45       0.4426      0.03  Q         |          |         |       V  |
16+50       0.4429      0.03  Q         |          |         |       V  |
16+55       0.4431      0.03  Q         |          |         |       V  |
17+ 0       0.4433      0.03  Q         |          |         |       V  |
17+ 5       0.4436      0.04  Q         |          |         |       V  |
17+10       0.4439      0.05  Q         |          |         |       V  |
17+15       0.4443      0.05  Q         |          |         |       V  |
17+20       0.4446      0.05  Q         |          |         |       V  |
17+25       0.4450      0.05  Q         |          |         |       V  |
17+30       0.4454      0.05  Q         |          |         |       V  |
17+35       0.4457      0.05  Q         |          |         |       V  |
17+40       0.4461      0.05  Q         |          |         |       V  |
17+45       0.4465      0.05  Q         |          |         |       V  |
17+50       0.4468      0.05  Q         |          |         |       V  |
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17+55       0.4471      0.05  Q          |          |          |        V |
18+ 0       0.4474      0.04  Q          |          |          |        V |
18+ 5       0.4477      0.04  Q          |          |          |        V |
18+10       0.4480      0.04  Q          |          |          |        V |
18+15       0.4483      0.04  Q          |          |          |        V |
18+20       0.4486      0.04  Q          |          |          |        V |
18+25       0.4489      0.04  Q          |          |          |        V |
18+30       0.4492      0.04  Q          |          |          |        V |
18+35       0.4495      0.04  Q          |          |          |        V |
18+40       0.4497      0.03  Q          |          |          |        V |
18+45       0.4499      0.03  Q          |          |          |        V |
18+50       0.4501      0.03  Q          |          |          |         V|
18+55       0.4503      0.02  Q          |          |          |         V|
19+ 0       0.4504      0.02  Q          |          |          |         V|
19+ 5       0.4506      0.03  Q          |          |          |         V|
19+10       0.4508      0.03  Q          |          |          |         V|
19+15       0.4510      0.03  Q          |          |          |         V|
19+20       0.4513      0.03  Q          |          |          |         V|
19+25       0.4516      0.04  Q          |          |          |         V|
19+30       0.4518      0.04  Q          |          |          |         V|
19+35       0.4521      0.04  Q          |          |          |         V|
19+40       0.4523      0.03  Q          |          |          |         V|
19+45       0.4526      0.03  Q          |          |          |         V|
19+50       0.4528      0.03  Q          |          |          |         V|
19+55       0.4529      0.02  Q          |          |          |         V|
20+ 0       0.4531      0.02  Q          |          |          |         V|
20+ 5       0.4533      0.03  Q          |          |          |         V|
20+10       0.4535      0.03  Q          |          |          |         V|
20+15       0.4537      0.03  Q          |          |          |         V|
20+20       0.4539      0.03  Q          |          |          |         V|
20+25       0.4541      0.03  Q          |          |          |         V|
20+30       0.4543      0.03  Q          |          |          |         V|
20+35       0.4546      0.03  Q          |          |          |         V|
20+40       0.4548      0.03  Q          |          |          |         V|
20+45       0.4550      0.03  Q          |          |          |         V|
20+50       0.4552      0.03  Q          |          |          |         V|
20+55       0.4554      0.02  Q          |          |          |         V|
21+ 0       0.4555      0.02  Q          |          |          |         V|
21+ 5       0.4557      0.03  Q          |          |          |         V|
21+10       0.4559      0.03  Q          |          |          |         V|
21+15       0.4561      0.03  Q          |          |          |         V|
21+20       0.4563      0.03  Q          |          |          |         V|
21+25       0.4565      0.02  Q          |          |          |         V|
21+30       0.4566      0.02  Q          |          |          |         V|
21+35       0.4568      0.03  Q          |          |          |         V|
21+40       0.4570      0.03  Q          |          |          |         V|
21+45       0.4572      0.03  Q          |          |          |         V|
21+50       0.4574      0.03  Q          |          |          |         V|
```

```
   21+55       0.4576      0.02  Q          |          |          |         V|
   22+ 0       0.4577      0.02  Q          |          |          |         V|
   22+ 5       0.4579      0.03  Q          |          |          |         V|
   22+10       0.4581      0.03  Q          |          |          |         V|
   22+15       0.4583      0.03  Q          |          |          |         V|
   22+20       0.4585      0.03  Q          |          |          |         V|
   22+25       0.4587      0.02  Q          |          |          |         V|
   22+30       0.4588      0.02  Q          |          |          |         V|
   22+35       0.4590      0.02  Q          |          |          |         V|
   22+40       0.4591      0.02  Q          |          |          |         V|
   22+45       0.4593      0.02  Q          |          |          |         V|
   22+50       0.4594      0.02  Q          |          |          |         V|
   22+55       0.4596      0.02  Q          |          |          |         V|
   23+ 0       0.4597      0.02  Q          |          |          |         V|
   23+ 5       0.4599      0.02  Q          |          |          |         V|
   23+10       0.4600      0.02  Q          |          |          |         V|
   23+15       0.4602      0.02  Q          |          |          |         V|
   23+20       0.4603      0.02  Q          |          |          |         V|
   23+25       0.4604      0.02  Q          |          |          |         V|
   23+30       0.4606      0.02  Q          |          |          |         V|
   23+35       0.4607      0.02  Q          |          |          |         V|
   23+40       0.4609      0.02  Q          |          |          |         V|
   23+45       0.4610      0.02  Q          |          |          |         V|
   23+50       0.4612      0.02  Q          |          |          |         V|
   23+55       0.4613      0.02  Q          |          |          |         V|
   24+ 0       0.4615      0.02  Q          |          |          |         V|
   24+ 5       0.4616      0.02  Q          |          |          |         V|
   24+10       0.4616      0.00  Q          |          |          |         V|
   24+15       0.4616      0.00  Q          |          |          |         V|
   24+20       0.4616      0.00  Q          |          |          |         V|
   24+25       0.4616      0.00  Q          |          |          |         V|
---------------------------------------------------------------------------
```

Appendix B

PRE-CONSTRUCTION CONDITIONS
100 YEAR 1 HOUR STORM

U n i t H y d r o g r a p h A n a l y s i s

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Study date 12/27/16 File: lakeshore1100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6064

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 7.50(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.50(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 1211.00(Ft.)
Length along longest watercourse measured to centroid = 686.53(Ft.)
Length along longest watercourse = 0.229 Mi.
Length along longest watercourse measured to centroid = 0.130 Mi.
Difference in elevation = 9.50(Ft.)
Slope along watercourse = 41.4203 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.062 Hr.
Lag time = 3.74 Min.
25% of lag time = 0.93 Min.
40% of lag time = 1.49 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	0.60	4.50

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	1.50	11.25

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.600(In)
Area Averaged 100-Year Rainfall = 1.500(In)

Point rain (area averaged) = 1.500(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.500	78.00	0.000

Total Area Entered = 7.50(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
78.0	89.8	0.132	0.000	0.132	1.000	0.132
					Sum (F) =	0.132

Area averaged mean soil loss (F) (In/Hr) = 0.132
Minimum soil loss rate ((In/Hr)) = 0.066
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

Slope of intensity-duration curve for a 1 hour storm =0.4800

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	133.821	29.055	2.196
2	0.167	267.642	48.084	3.634
3	0.250	401.463	12.226	0.924
4	0.333	535.284	5.432	0.411

5	0.417	669.105	2.963	0.224
6	0.500	802.926	2.241	0.169
			Sum = 100.000	Sum= 7.559

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1 0.08	4.40	0.792	0.132	---	0.66
2 0.17	4.50	0.810	0.132	---	0.68
3 0.25	5.40	0.972	0.132	---	0.84
4 0.33	5.40	0.972	0.132	---	0.84
5 0.42	5.70	1.026	0.132	---	0.89
6 0.50	6.40	1.152	0.132	---	1.02
7 0.58	7.90	1.422	0.132	---	1.29
8 0.67	9.10	1.638	0.132	---	1.51
9 0.75	12.80	2.304	0.132	---	2.17
10 0.83	25.60	4.608	0.132	---	4.48
11 0.92	7.90	1.422	0.132	---	1.29
12 1.00	4.90	0.882	0.132	---	0.75
Sum =	100.0			Sum =	16.4

Flood volume = Effective rainfall 1.37(In)
times area 7.5(Ac.)/[(In)/(Ft.)] = 0.9(Ac.Ft)
Total soil loss = 0.13(In)
Total soil loss = 0.083(Ac.Ft)
Total rainfall = 1.50(In)
Flood volume = 37233.4 Cubic Feet
Total soil loss = 3601.3 Cubic Feet

Peak flow rate of this hydrograph = 22.196(CFS)

++

1 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

```
Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
-------------------------------------------------------------------------
  0+ 5       0.0100      1.45  VQ        |         |         |         |
  0+10       0.0368      3.89  |V   Q    |         |         |         |
  0+15       0.0706      4.92  |  V  Q   |         |         |         |
  0+20       0.1106      5.80  |    V Q  |         |         |         |
  0+25       0.1534      6.22  |      VQ |         |         |         |
  0+30       0.2007      6.87  |        Q|         |         |         |
  0+35       0.2559      8.02  |         QV        |         |         |
  0+40       0.3223      9.64  |         | Q  V    |         |         |
```

```
                                   lakeshore1100
    0+45       0.4063     12.20  |         |     Q  V|         |         |
    0+50       0.5443     20.03  |         |         |    VQ   |         |
    0+55       0.6972     22.20  |         |         |        Q| V       |
    1+ 0       0.7793     11.92  |         |    Q    |         |     V   |
    1+ 5       0.8240      6.50  |       Q |         |         |       V |
    1+10       0.8419      2.59  |  Q      |         |         |        V|
    1+15       0.8512      1.36  |Q        |         |         |        V|
    1+20       0.8539      0.39  Q         |         |         |        V|
    1+25       0.8548      0.13  Q         |         |         |         V
-----------------------------------------------------------------------
```

lakeshore3100

PRE-CONSTRUCTION CONDITIONS
100 YEAR 3 HOUR STORM

U n i t H y d r o g r a p h A n a l y s i s

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Study date 12/27/16 File: lakeshore3100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6064

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 7.50(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.50(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 1211.00(Ft.)
Length along longest watercourse measured to centroid = 686.53(Ft.)
Length along longest watercourse = 0.229 Mi.
Length along longest watercourse measured to centroid = 0.130 Mi.
Difference in elevation = 9.50(Ft.)
Slope along watercourse = 41.4203 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.062 Hr.
Lag time = 3.74 Min.
25% of lag time = 0.93 Min.
40% of lag time = 1.49 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	1.00	7.50

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	2.50	18.75

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.000(In)
Area Averaged 100-Year Rainfall = 2.500(In)

Point rain (area averaged) = 2.500(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.500	78.00	0.000

Total Area Entered = 7.50(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
78.0	89.8	0.132	0.000	0.132	1.000	0.132
					Sum (F) =	0.132

Area averaged mean soil loss (F) (In/Hr) = 0.132
Minimum soil loss rate ((In/Hr)) = 0.066
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	133.821	29.055	2.196
2	0.167	267.642	48.084	3.634
3	0.250	401.463	12.226	0.924
4	0.333	535.284	5.432	0.411
5	0.417	669.105	2.963	0.224
6	0.500	802.926	2.241	0.169

lakeshore3100
Sum = 100.000 Sum= 7.559

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	1.30	0.390	0.132	---	0.26
2	0.17	1.30	0.390	0.132	---	0.26
3	0.25	1.10	0.330	0.132	---	0.20
4	0.33	1.50	0.450	0.132	---	0.32
5	0.42	1.50	0.450	0.132	---	0.32
6	0.50	1.80	0.540	0.132	---	0.41
7	0.58	1.50	0.450	0.132	---	0.32
8	0.67	1.80	0.540	0.132	---	0.41
9	0.75	1.80	0.540	0.132	---	0.41
10	0.83	1.50	0.450	0.132	---	0.32
11	0.92	1.60	0.480	0.132	---	0.35
12	1.00	1.80	0.540	0.132	---	0.41
13	1.08	2.20	0.660	0.132	---	0.53
14	1.17	2.20	0.660	0.132	---	0.53
15	1.25	2.20	0.660	0.132	---	0.53
16	1.33	2.00	0.600	0.132	---	0.47
17	1.42	2.60	0.780	0.132	---	0.65
18	1.50	2.70	0.810	0.132	---	0.68
19	1.58	2.40	0.720	0.132	---	0.59
20	1.67	2.70	0.810	0.132	---	0.68
21	1.75	3.30	0.990	0.132	---	0.86
22	1.83	3.10	0.930	0.132	---	0.80
23	1.92	2.90	0.870	0.132	---	0.74
24	2.00	3.00	0.900	0.132	---	0.77
25	2.08	3.10	0.930	0.132	---	0.80
26	2.17	4.20	1.260	0.132	---	1.13
27	2.25	5.00	1.500	0.132	---	1.37
28	2.33	3.50	1.050	0.132	---	0.92
29	2.42	6.80	2.040	0.132	---	1.91
30	2.50	7.30	2.190	0.132	---	2.06
31	2.58	8.20	2.460	0.132	---	2.33
32	2.67	5.90	1.770	0.132	---	1.64
33	2.75	2.00	0.600	0.132	---	0.47
34	2.83	1.80	0.540	0.132	---	0.41
35	2.92	1.80	0.540	0.132	---	0.41
36	3.00	0.60	0.180	0.132	---	0.05
Sum =		100.0			Sum =	25.2

Flood volume = Effective rainfall 2.10(In)
times area 7.5(Ac.)/[(In)/(Ft.)] = 1.3(Ac.Ft)
Total soil loss = 0.40(In)
Total soil loss = 0.248(Ac.Ft)
Total rainfall = 2.50(In)

lakeshore3100

Flood volume = 57256.3 Cubic Feet
Total soil loss = 10804.0 Cubic Feet

Peak flow rate of this hydrograph = 15.235(CFS)

++

3 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0 5.0 10.0 15.0 20.0
0+ 5	0.0039	0.57	VQ | | | |
0+10	0.0143	1.50	V Q | | | |
0+15	0.0253	1.61	V Q | | | |
0+20	0.0375	1.76	|V Q | | | |
0+25	0.0526	2.20	|V Q | | | |
0+30	0.0700	2.53	| V Q | | | |
0+35	0.0886	2.69	| V Q | | | |
0+40	0.1069	2.66	| V Q | | | |
0+45	0.1273	2.96	| V Q | | | |
0+50	0.1468	2.83	| VQ | | | |
0+55	0.1648	2.60	| Q | | | |
1+ 0	0.1838	2.77	| Q | | | |
1+ 5	0.2062	3.25	| Q | | | |
1+10	0.2320	3.74	| Q | | | |
1+15	0.2586	3.87	| Q | | | |
1+20	0.2848	3.80	| QV | | | |
1+25	0.3125	4.02	| QV| | | |
1+30	0.3448	4.70	| QV | | |
1+35	0.3776	4.75	| Q|V | | |
1+40	0.4100	4.71	| Q| V | | |
1+45	0.4472	5.40	| Q V | | |
1+50	0.4885	6.00	| | Q V | | |
1+55	0.5287	5.84	| |Q V | | |
2+ 0	0.5681	5.71	| |Q V | | |
2+ 5	0.6084	5.86	| |Q V | | |
2+10	0.6547	6.72	| | Q V| | |
2+15	0.7129	8.46	| | Q |V | |
2+20	0.7726	8.66	| | Q | V | |
2+25	0.8384	9.57	| | Q| V | |
2+30	0.9297	13.26	| | | Q V | |
2+35	1.0347	15.24	| | | QV |
2+40	1.1392	15.19	| | | Q V |
2+45	1.2120	10.56	| | |Q | V |
2+50	1.2523	5.85	| |Q | | V |

```
                                   lakeshore3100
    2+55       1.2823      4.35  |       Q |         |         |        V|
    3+ 0       1.3024      2.92  |    Q    |         |         |        V|
    3+ 5       1.3099      1.10  | Q       |         |         |        V|
    3+10       1.3126      0.38  Q         |         |         |        V|
    3+15       1.3138      0.18  Q         |         |         |        V|
    3+20       1.3144      0.08  Q         |         |         |        V|
    3+25       1.3144      0.01  Q         |         |         |        V|
-----------------------------------------------------------------------
```

lakeshore6100

PRE-CONSTRUCTION CONDITIONS
100 YEAR 6 HOUR STORM

U n i t H y d r o g r a p h A n a l y s i s

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Study date 12/27/16 File: lakeshore6100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6064

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 7.50(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.50(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 1211.00(Ft.)
Length along longest watercourse measured to centroid = 686.53(Ft.)
Length along longest watercourse = 0.229 Mi.
Length along longest watercourse measured to centroid = 0.130 Mi.
Difference in elevation = 9.50(Ft.)
Slope along watercourse = 41.4203 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.062 Hr.
Lag time = 3.74 Min.
25% of lag time = 0.93 Min.
40% of lag time = 1.49 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	1.40	10.50

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	3.50	26.25

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.400(In)
Area Averaged 100-Year Rainfall = 3.500(In)

Point rain (area averaged) = 3.500(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 3.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.500	78.00	0.000

Total Area Entered = 7.50(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
78.0	89.8	0.132	0.000	0.132	1.000	0.132
					Sum (F) =	0.132

Area averaged mean soil loss (F) (In/Hr) = 0.132
Minimum soil loss rate ((In/Hr)) = 0.066
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	133.821	29.055	2.196
2	0.167	267.642	48.084	3.634
3	0.250	401.463	12.226	0.924
4	0.333	535.284	5.432	0.411
5	0.417	669.105	2.963	0.224
6	0.500	802.926	2.241	0.169

lakeshore6100

Sum = 100.000 Sum= 7.559

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.50	0.210	0.132	---	0.08
2	0.17	0.60	0.252	0.132	---	0.12
3	0.25	0.60	0.252	0.132	---	0.12
4	0.33	0.60	0.252	0.132	---	0.12
5	0.42	0.60	0.252	0.132	---	0.12
6	0.50	0.70	0.294	0.132	---	0.16
7	0.58	0.70	0.294	0.132	---	0.16
8	0.67	0.70	0.294	0.132	---	0.16
9	0.75	0.70	0.294	0.132	---	0.16
10	0.83	0.70	0.294	0.132	---	0.16
11	0.92	0.70	0.294	0.132	---	0.16
12	1.00	0.80	0.336	0.132	---	0.20
13	1.08	0.80	0.336	0.132	---	0.20
14	1.17	0.80	0.336	0.132	---	0.20
15	1.25	0.80	0.336	0.132	---	0.20
16	1.33	0.80	0.336	0.132	---	0.20
17	1.42	0.80	0.336	0.132	---	0.20
18	1.50	0.80	0.336	0.132	---	0.20
19	1.58	0.80	0.336	0.132	---	0.20
20	1.67	0.80	0.336	0.132	---	0.20
21	1.75	0.80	0.336	0.132	---	0.20
22	1.83	0.80	0.336	0.132	---	0.20
23	1.92	0.80	0.336	0.132	---	0.20
24	2.00	0.90	0.378	0.132	---	0.25
25	2.08	0.80	0.336	0.132	---	0.20
26	2.17	0.90	0.378	0.132	---	0.25
27	2.25	0.90	0.378	0.132	---	0.25
28	2.33	0.90	0.378	0.132	---	0.25
29	2.42	0.90	0.378	0.132	---	0.25
30	2.50	0.90	0.378	0.132	---	0.25
31	2.58	0.90	0.378	0.132	---	0.25
32	2.67	0.90	0.378	0.132	---	0.25
33	2.75	1.00	0.420	0.132	---	0.29
34	2.83	1.00	0.420	0.132	---	0.29
35	2.92	1.00	0.420	0.132	---	0.29
36	3.00	1.00	0.420	0.132	---	0.29
37	3.08	1.00	0.420	0.132	---	0.29
38	3.17	1.10	0.462	0.132	---	0.33
39	3.25	1.10	0.462	0.132	---	0.33
40	3.33	1.10	0.462	0.132	---	0.33
41	3.42	1.20	0.504	0.132	---	0.37
42	3.50	1.30	0.546	0.132	---	0.41

43	3.58	1.40	0.588	0.132	---	0.46
44	3.67	1.40	0.588	0.132	---	0.46
45	3.75	1.50	0.630	0.132	---	0.50
46	3.83	1.50	0.630	0.132	---	0.50
47	3.92	1.60	0.672	0.132	---	0.54
48	4.00	1.60	0.672	0.132	---	0.54
49	4.08	1.70	0.714	0.132	---	0.58
50	4.17	1.80	0.756	0.132	---	0.62
51	4.25	1.90	0.798	0.132	---	0.67
52	4.33	2.00	0.840	0.132	---	0.71
53	4.42	2.10	0.882	0.132	---	0.75
54	4.50	2.10	0.882	0.132	---	0.75
55	4.58	2.20	0.924	0.132	---	0.79
56	4.67	2.30	0.966	0.132	---	0.83
57	4.75	2.40	1.008	0.132	---	0.88
58	4.83	2.40	1.008	0.132	---	0.88
59	4.92	2.50	1.050	0.132	---	0.92
60	5.00	2.60	1.092	0.132	---	0.96
61	5.08	3.10	1.302	0.132	---	1.17
62	5.17	3.60	1.512	0.132	---	1.38
63	5.25	3.90	1.638	0.132	---	1.51
64	5.33	4.20	1.764	0.132	---	1.63
65	5.42	4.70	1.974	0.132	---	1.84
66	5.50	5.60	2.352	0.132	---	2.22
67	5.58	1.90	0.798	0.132	---	0.67
68	5.67	0.90	0.378	0.132	---	0.25
69	5.75	0.60	0.252	0.132	---	0.12
70	5.83	0.50	0.210	0.132	---	0.08
71	5.92	0.30	0.126	0.132	0.113	0.01
72	6.00	0.20	0.084	0.132	0.076	0.01
Sum =		100.0			Sum =	32.6

```
Flood volume = Effective rainfall      2.71(In)
 times area       7.5(Ac.)/[(In)/(Ft.)] =       1.7(Ac.Ft)
Total soil loss =      0.79(In)
Total soil loss =     0.492(Ac.Ft)
Total rainfall =      3.50(In)
Flood volume =       73848.5 Cubic Feet
Total soil loss =       21436.5 Cubic Feet
--------------------------------------------------------------------
 Peak flow rate of this hydrograph =     14.209(CFS)
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    6 - H O U R    S T O R M
                R u n o f f      H y d r o g r a p h
--------------------------------------------------------------------
            Hydrograph in   5   Minute intervals ((CFS))

--------------------------------------------------------------------
```

```
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0012      0.17  Q         |         |         |         |
  0+10       0.0049      0.55  VQ        |         |         |         |
  0+15       0.0102      0.77  VQ        |         |         |         |
  0+20       0.0160      0.84  VQ        |         |         |         |
  0+25       0.0221      0.88  VQ        |         |         |         |
  0+30       0.0289      0.99  VQ        |         |         |         |
  0+35       0.0368      1.15  V Q       |         |         |         |
  0+40       0.0450      1.19  |VQ       |         |         |         |
  0+45       0.0533      1.21  |VQ       |         |         |         |
  0+50       0.0617      1.22  |VQ       |         |         |         |
  0+55       0.0701      1.22  |VQ       |         |         |         |
  1+ 0       0.0792      1.32  |VQ       |         |         |         |
  1+ 5       0.0893      1.47  | Q       |         |         |         |
  1+10       0.0996      1.51  | VQ      |         |         |         |
  1+15       0.1101      1.52  | VQ      |         |         |         |
  1+20       0.1207      1.53  | VQ      |         |         |         |
  1+25       0.1313      1.54  |  Q      |         |         |         |
  1+30       0.1419      1.54  |  Q      |         |         |         |
  1+35       0.1525      1.54  |  Q      |         |         |         |
  1+40       0.1631      1.54  |  Q      |         |         |         |
  1+45       0.1738      1.54  |  QV     |         |         |         |
  1+50       0.1844      1.54  |  QV     |         |         |         |
  1+55       0.1950      1.54  |  QV     |         |         |         |
  2+ 0       0.2062      1.63  |  QV     |         |         |         |
  2+ 5       0.2179      1.69  |  Q V    |         |         |         |
  2+10       0.2294      1.67  |  Q V    |         |         |         |
  2+15       0.2418      1.80  |  Q V    |         |         |         |
  2+20       0.2544      1.83  |  Q  V   |         |         |         |
  2+25       0.2672      1.85  |  Q  V   |         |         |         |
  2+30       0.2799      1.85  |  Q  V   |         |         |         |
  2+35       0.2927      1.86  |  Q  V   |         |         |         |
  2+40       0.3055      1.86  |  Q   V  |         |         |         |
  2+45       0.3189      1.95  |  Q   V  |         |         |         |
  2+50       0.3334      2.10  |   Q  V  |         |         |         |
  2+55       0.3482      2.14  |   Q   V |         |         |         |
  3+ 0       0.3631      2.16  |   Q   V |         |         |         |
  3+ 5       0.3780      2.17  |   Q   V |         |         |         |
  3+10       0.3936      2.27  |   Q    V|         |         |         |
  3+15       0.4103      2.42  |   Q    V|         |         |         |
  3+20       0.4272      2.46  |   Q     V         |         |         |
  3+25       0.4449      2.57  |    Q    V         |         |         |
  3+30       0.4644      2.82  |    Q    V         |         |         |
  3+35       0.4858      3.11  |     Q   |V        |         |         |
  3+40       0.5087      3.32  |     Q   | V       |         |         |
  3+45       0.5327      3.48  |     Q   | V       |         |         |
  3+50       0.5579      3.67  |      Q  |  V      |         |         |
```

```
   3+55       0.5842      3.82  |      Q  |  V      |         |         |
   4+ 0       0.6117      3.99  |      Q  |   V     |         |         |
   4+ 5       0.6402      4.13  |       Q |    V    |         |         |
   4+10       0.6705      4.40  |       Q |    V    |         |         |
   4+15       0.7028      4.70  |        Q|     V   |         |         |
   4+20       0.7373      5.00  |         Q      V  |         |         |
   4+25       0.7739      5.31  |         Q       V |         |         |
   4+30       0.8120      5.54  |         |Q       V|         |         |
   4+35       0.8513      5.70  |         |Q        V         |         |
   4+40       0.8925      5.98  |         |Q        |V        |         |
   4+45       0.9358      6.28  |         | Q       | V       |         |
   4+50       0.9806      6.50  |         | Q       |  V      |         |
   4+55       1.0264      6.66  |         |  Q      |   V     |         |
   5+ 0       1.0742      6.94  |         |  Q      |    V    |         |
   5+ 5       1.1266      7.61  |         |    Q    |     V   |         |
   5+10       1.1878      8.89  |         |      Q  |       V |         |
   5+15       1.2578     10.16  |         |         Q        V|         |
   5+20       1.3348     11.19  |         |         | Q       |V        |
   5+25       1.4200     12.36  |         |         |   Q     |  V      |
   5+30       1.5178     14.21  |         |         |       Q |    V    |
   5+35       1.6037     12.48  |         |         |   Q     |      V  |
   5+40       1.6478      6.39  |         | Q       |         |       V |
   5+45       1.6710      3.37  |     Q   |         |         |        V|
   5+50       1.6842      1.92  |  Q      |         |         |        V|
   5+55       1.6914      1.05  | Q       |         |         |        V|
   6+ 0       1.6938      0.35  Q         |         |         |        V|
   6+ 5       1.6948      0.14  Q         |         |         |        V|
   6+10       1.6952      0.05  Q         |         |         |        V|
   6+15       1.6953      0.02  Q         |         |         |        V|
   6+20       1.6953      0.00  Q         |         |         |        V|
   6+25       1.6953      0.00  Q         |         |         |         V
-----------------------------------------------------------------------
```

PRE-CONSTRUCTION CONDITIONS
100 YEAR 24 HOUR STORM

U n i t H y d r o g r a p h A n a l y s i s

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Study date 12/27/16 File: lakeshore24100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6064

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 7.50(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.50(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 1211.00(Ft.)
Length along longest watercourse measured to centroid = 686.53(Ft.)
Length along longest watercourse = 0.229 Mi.
Length along longest watercourse measured to centroid = 0.130 Mi.
Difference in elevation = 9.50(Ft.)
Slope along watercourse = 41.4203 Ft./Mi.
Average Manning's 'N' = 0.020
Lag time = 0.062 Hr.
Lag time = 3.74 Min.
25% of lag time = 0.93 Min.
40% of lag time = 1.49 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	2.50	18.75

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	5.00	37.50

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 2.500(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 5.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 5.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.500	78.00	0.000

Total Area Entered = 7.50(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
78.0	89.8	0.132	0.000	0.132	1.000	0.132
					Sum (F) =	0.132

Area averaged mean soil loss (F) (In/Hr) = 0.132
Minimum soil loss rate ((In/Hr)) = 0.066
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	133.821	29.055	2.196
2	0.167	267.642	48.084	3.634
3	0.250	401.463	12.226	0.924
4	0.333	535.284	5.432	0.411
5	0.417	669.105	2.963	0.224
6	0.500	802.926	2.241	0.169

lakeshore24100

Sum = 100.000 Sum= 7.559

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.040	0.234	0.036	0.00
2	0.17	0.07	0.040	0.234	0.036	0.00
3	0.25	0.07	0.040	0.233	0.036	0.00
4	0.33	0.10	0.060	0.232	0.054	0.01
5	0.42	0.10	0.060	0.231	0.054	0.01
6	0.50	0.10	0.060	0.230	0.054	0.01
7	0.58	0.10	0.060	0.229	0.054	0.01
8	0.67	0.10	0.060	0.228	0.054	0.01
9	0.75	0.10	0.060	0.227	0.054	0.01
10	0.83	0.13	0.080	0.226	0.072	0.01
11	0.92	0.13	0.080	0.226	0.072	0.01
12	1.00	0.13	0.080	0.225	0.072	0.01
13	1.08	0.10	0.060	0.224	0.054	0.01
14	1.17	0.10	0.060	0.223	0.054	0.01
15	1.25	0.10	0.060	0.222	0.054	0.01
16	1.33	0.10	0.060	0.221	0.054	0.01
17	1.42	0.10	0.060	0.220	0.054	0.01
18	1.50	0.10	0.060	0.219	0.054	0.01
19	1.58	0.10	0.060	0.218	0.054	0.01
20	1.67	0.10	0.060	0.218	0.054	0.01
21	1.75	0.10	0.060	0.217	0.054	0.01
22	1.83	0.13	0.080	0.216	0.072	0.01
23	1.92	0.13	0.080	0.215	0.072	0.01
24	2.00	0.13	0.080	0.214	0.072	0.01
25	2.08	0.13	0.080	0.213	0.072	0.01
26	2.17	0.13	0.080	0.212	0.072	0.01
27	2.25	0.13	0.080	0.211	0.072	0.01
28	2.33	0.13	0.080	0.211	0.072	0.01
29	2.42	0.13	0.080	0.210	0.072	0.01
30	2.50	0.13	0.080	0.209	0.072	0.01
31	2.58	0.17	0.100	0.208	0.090	0.01
32	2.67	0.17	0.100	0.207	0.090	0.01
33	2.75	0.17	0.100	0.206	0.090	0.01
34	2.83	0.17	0.100	0.206	0.090	0.01
35	2.92	0.17	0.100	0.205	0.090	0.01
36	3.00	0.17	0.100	0.204	0.090	0.01
37	3.08	0.17	0.100	0.203	0.090	0.01
38	3.17	0.17	0.100	0.202	0.090	0.01
39	3.25	0.17	0.100	0.201	0.090	0.01
40	3.33	0.17	0.100	0.200	0.090	0.01
41	3.42	0.17	0.100	0.200	0.090	0.01
42	3.50	0.17	0.100	0.199	0.090	0.01

43	3.58	0.17	0.100	0.198	0.090	0.01
44	3.67	0.17	0.100	0.197	0.090	0.01
45	3.75	0.17	0.100	0.196	0.090	0.01
46	3.83	0.20	0.120	0.195	0.108	0.01
47	3.92	0.20	0.120	0.195	0.108	0.01
48	4.00	0.20	0.120	0.194	0.108	0.01
49	4.08	0.20	0.120	0.193	0.108	0.01
50	4.17	0.20	0.120	0.192	0.108	0.01
51	4.25	0.20	0.120	0.191	0.108	0.01
52	4.33	0.23	0.140	0.191	0.126	0.01
53	4.42	0.23	0.140	0.190	0.126	0.01
54	4.50	0.23	0.140	0.189	0.126	0.01
55	4.58	0.23	0.140	0.188	0.126	0.01
56	4.67	0.23	0.140	0.187	0.126	0.01
57	4.75	0.23	0.140	0.186	0.126	0.01
58	4.83	0.27	0.160	0.186	0.144	0.02
59	4.92	0.27	0.160	0.185	0.144	0.02
60	5.00	0.27	0.160	0.184	0.144	0.02
61	5.08	0.20	0.120	0.183	0.108	0.01
62	5.17	0.20	0.120	0.182	0.108	0.01
63	5.25	0.20	0.120	0.182	0.108	0.01
64	5.33	0.23	0.140	0.181	0.126	0.01
65	5.42	0.23	0.140	0.180	0.126	0.01
66	5.50	0.23	0.140	0.179	0.126	0.01
67	5.58	0.27	0.160	0.179	0.144	0.02
68	5.67	0.27	0.160	0.178	0.144	0.02
69	5.75	0.27	0.160	0.177	0.144	0.02
70	5.83	0.27	0.160	0.176	0.144	0.02
71	5.92	0.27	0.160	0.175	0.144	0.02
72	6.00	0.27	0.160	0.175	0.144	0.02
73	6.08	0.30	0.180	0.174	---	0.01
74	6.17	0.30	0.180	0.173	---	0.01
75	6.25	0.30	0.180	0.172	---	0.01
76	6.33	0.30	0.180	0.172	---	0.01
77	6.42	0.30	0.180	0.171	---	0.01
78	6.50	0.30	0.180	0.170	---	0.01
79	6.58	0.33	0.200	0.169	---	0.03
80	6.67	0.33	0.200	0.168	---	0.03
81	6.75	0.33	0.200	0.168	---	0.03
82	6.83	0.33	0.200	0.167	---	0.03
83	6.92	0.33	0.200	0.166	---	0.03
84	7.00	0.33	0.200	0.165	---	0.03
85	7.08	0.33	0.200	0.165	---	0.04
86	7.17	0.33	0.200	0.164	---	0.04
87	7.25	0.33	0.200	0.163	---	0.04
88	7.33	0.37	0.220	0.162	---	0.06
89	7.42	0.37	0.220	0.162	---	0.06
90	7.50	0.37	0.220	0.161	---	0.06

91	7.58	0.40	0.240	0.160	---	0.08
92	7.67	0.40	0.240	0.159	---	0.08
93	7.75	0.40	0.240	0.159	---	0.08
94	7.83	0.43	0.260	0.158	---	0.10
95	7.92	0.43	0.260	0.157	---	0.10
96	8.00	0.43	0.260	0.157	---	0.10
97	8.08	0.50	0.300	0.156	---	0.14
98	8.17	0.50	0.300	0.155	---	0.14
99	8.25	0.50	0.300	0.154	---	0.15
100	8.33	0.50	0.300	0.154	---	0.15
101	8.42	0.50	0.300	0.153	---	0.15
102	8.50	0.50	0.300	0.152	---	0.15
103	8.58	0.53	0.320	0.152	---	0.17
104	8.67	0.53	0.320	0.151	---	0.17
105	8.75	0.53	0.320	0.150	---	0.17
106	8.83	0.57	0.340	0.149	---	0.19
107	8.92	0.57	0.340	0.149	---	0.19
108	9.00	0.57	0.340	0.148	---	0.19
109	9.08	0.63	0.380	0.147	---	0.23
110	9.17	0.63	0.380	0.147	---	0.23
111	9.25	0.63	0.380	0.146	---	0.23
112	9.33	0.67	0.400	0.145	---	0.25
113	9.42	0.67	0.400	0.144	---	0.26
114	9.50	0.67	0.400	0.144	---	0.26
115	9.58	0.70	0.420	0.143	---	0.28
116	9.67	0.70	0.420	0.142	---	0.28
117	9.75	0.70	0.420	0.142	---	0.28
118	9.83	0.73	0.440	0.141	---	0.30
119	9.92	0.73	0.440	0.140	---	0.30
120	10.00	0.73	0.440	0.140	---	0.30
121	10.08	0.50	0.300	0.139	---	0.16
122	10.17	0.50	0.300	0.138	---	0.16
123	10.25	0.50	0.300	0.138	---	0.16
124	10.33	0.50	0.300	0.137	---	0.16
125	10.42	0.50	0.300	0.136	---	0.16
126	10.50	0.50	0.300	0.136	---	0.16
127	10.58	0.67	0.400	0.135	---	0.26
128	10.67	0.67	0.400	0.134	---	0.27
129	10.75	0.67	0.400	0.134	---	0.27
130	10.83	0.67	0.400	0.133	---	0.27
131	10.92	0.67	0.400	0.132	---	0.27
132	11.00	0.67	0.400	0.132	---	0.27
133	11.08	0.63	0.380	0.131	---	0.25
134	11.17	0.63	0.380	0.130	---	0.25
135	11.25	0.63	0.380	0.130	---	0.25
136	11.33	0.63	0.380	0.129	---	0.25
137	11.42	0.63	0.380	0.129	---	0.25
138	11.50	0.63	0.380	0.128	---	0.25

139	11.58	0.57	0.340	0.127	---	0.21
140	11.67	0.57	0.340	0.127	---	0.21
141	11.75	0.57	0.340	0.126	---	0.21
142	11.83	0.60	0.360	0.125	---	0.23
143	11.92	0.60	0.360	0.125	---	0.24
144	12.00	0.60	0.360	0.124	---	0.24
145	12.08	0.83	0.500	0.123	---	0.38
146	12.17	0.83	0.500	0.123	---	0.38
147	12.25	0.83	0.500	0.122	---	0.38
148	12.33	0.87	0.520	0.122	---	0.40
149	12.42	0.87	0.520	0.121	---	0.40
150	12.50	0.87	0.520	0.120	---	0.40
151	12.58	0.93	0.560	0.120	---	0.44
152	12.67	0.93	0.560	0.119	---	0.44
153	12.75	0.93	0.560	0.119	---	0.44
154	12.83	0.97	0.580	0.118	---	0.46
155	12.92	0.97	0.580	0.117	---	0.46
156	13.00	0.97	0.580	0.117	---	0.46
157	13.08	1.13	0.680	0.116	---	0.56
158	13.17	1.13	0.680	0.116	---	0.56
159	13.25	1.13	0.680	0.115	---	0.56
160	13.33	1.13	0.680	0.114	---	0.57
161	13.42	1.13	0.680	0.114	---	0.57
162	13.50	1.13	0.680	0.113	---	0.57
163	13.58	0.77	0.460	0.113	---	0.35
164	13.67	0.77	0.460	0.112	---	0.35
165	13.75	0.77	0.460	0.112	---	0.35
166	13.83	0.77	0.460	0.111	---	0.35
167	13.92	0.77	0.460	0.110	---	0.35
168	14.00	0.77	0.460	0.110	---	0.35
169	14.08	0.90	0.540	0.109	---	0.43
170	14.17	0.90	0.540	0.109	---	0.43
171	14.25	0.90	0.540	0.108	---	0.43
172	14.33	0.87	0.520	0.108	---	0.41
173	14.42	0.87	0.520	0.107	---	0.41
174	14.50	0.87	0.520	0.107	---	0.41
175	14.58	0.87	0.520	0.106	---	0.41
176	14.67	0.87	0.520	0.105	---	0.41
177	14.75	0.87	0.520	0.105	---	0.42
178	14.83	0.83	0.500	0.104	---	0.40
179	14.92	0.83	0.500	0.104	---	0.40
180	15.00	0.83	0.500	0.103	---	0.40
181	15.08	0.80	0.480	0.103	---	0.38
182	15.17	0.80	0.480	0.102	---	0.38
183	15.25	0.80	0.480	0.102	---	0.38
184	15.33	0.77	0.460	0.101	---	0.36
185	15.42	0.77	0.460	0.101	---	0.36
186	15.50	0.77	0.460	0.100	---	0.36

187	15.58	0.63	0.380	0.100	---	0.28
188	15.67	0.63	0.380	0.099	---	0.28
189	15.75	0.63	0.380	0.099	---	0.28
190	15.83	0.63	0.380	0.098	---	0.28
191	15.92	0.63	0.380	0.098	---	0.28
192	16.00	0.63	0.380	0.097	---	0.28
193	16.08	0.13	0.080	0.097	0.072	0.01
194	16.17	0.13	0.080	0.096	0.072	0.01
195	16.25	0.13	0.080	0.096	0.072	0.01
196	16.33	0.13	0.080	0.095	0.072	0.01
197	16.42	0.13	0.080	0.095	0.072	0.01
198	16.50	0.13	0.080	0.094	0.072	0.01
199	16.58	0.10	0.060	0.094	0.054	0.01
200	16.67	0.10	0.060	0.093	0.054	0.01
201	16.75	0.10	0.060	0.093	0.054	0.01
202	16.83	0.10	0.060	0.092	0.054	0.01
203	16.92	0.10	0.060	0.092	0.054	0.01
204	17.00	0.10	0.060	0.091	0.054	0.01
205	17.08	0.17	0.100	0.091	---	0.01
206	17.17	0.17	0.100	0.090	---	0.01
207	17.25	0.17	0.100	0.090	---	0.01
208	17.33	0.17	0.100	0.090	---	0.01
209	17.42	0.17	0.100	0.089	---	0.01
210	17.50	0.17	0.100	0.089	---	0.01
211	17.58	0.17	0.100	0.088	---	0.01
212	17.67	0.17	0.100	0.088	---	0.01
213	17.75	0.17	0.100	0.087	---	0.01
214	17.83	0.13	0.080	0.087	0.072	0.01
215	17.92	0.13	0.080	0.086	0.072	0.01
216	18.00	0.13	0.080	0.086	0.072	0.01
217	18.08	0.13	0.080	0.086	0.072	0.01
218	18.17	0.13	0.080	0.085	0.072	0.01
219	18.25	0.13	0.080	0.085	0.072	0.01
220	18.33	0.13	0.080	0.084	0.072	0.01
221	18.42	0.13	0.080	0.084	0.072	0.01
222	18.50	0.13	0.080	0.084	0.072	0.01
223	18.58	0.10	0.060	0.083	0.054	0.01
224	18.67	0.10	0.060	0.083	0.054	0.01
225	18.75	0.10	0.060	0.082	0.054	0.01
226	18.83	0.07	0.040	0.082	0.036	0.00
227	18.92	0.07	0.040	0.082	0.036	0.00
228	19.00	0.07	0.040	0.081	0.036	0.00
229	19.08	0.10	0.060	0.081	0.054	0.01
230	19.17	0.10	0.060	0.080	0.054	0.01
231	19.25	0.10	0.060	0.080	0.054	0.01
232	19.33	0.13	0.080	0.080	---	0.00
233	19.42	0.13	0.080	0.079	---	0.00
234	19.50	0.13	0.080	0.079	---	0.00

235	19.58	0.10	0.060	0.079	0.054	0.01
236	19.67	0.10	0.060	0.078	0.054	0.01
237	19.75	0.10	0.060	0.078	0.054	0.01
238	19.83	0.07	0.040	0.078	0.036	0.00
239	19.92	0.07	0.040	0.077	0.036	0.00
240	20.00	0.07	0.040	0.077	0.036	0.00
241	20.08	0.10	0.060	0.076	0.054	0.01
242	20.17	0.10	0.060	0.076	0.054	0.01
243	20.25	0.10	0.060	0.076	0.054	0.01
244	20.33	0.10	0.060	0.075	0.054	0.01
245	20.42	0.10	0.060	0.075	0.054	0.01
246	20.50	0.10	0.060	0.075	0.054	0.01
247	20.58	0.10	0.060	0.075	0.054	0.01
248	20.67	0.10	0.060	0.074	0.054	0.01
249	20.75	0.10	0.060	0.074	0.054	0.01
250	20.83	0.07	0.040	0.074	0.036	0.00
251	20.92	0.07	0.040	0.073	0.036	0.00
252	21.00	0.07	0.040	0.073	0.036	0.00
253	21.08	0.10	0.060	0.073	0.054	0.01
254	21.17	0.10	0.060	0.072	0.054	0.01
255	21.25	0.10	0.060	0.072	0.054	0.01
256	21.33	0.07	0.040	0.072	0.036	0.00
257	21.42	0.07	0.040	0.072	0.036	0.00
258	21.50	0.07	0.040	0.071	0.036	0.00
259	21.58	0.10	0.060	0.071	0.054	0.01
260	21.67	0.10	0.060	0.071	0.054	0.01
261	21.75	0.10	0.060	0.071	0.054	0.01
262	21.83	0.07	0.040	0.070	0.036	0.00
263	21.92	0.07	0.040	0.070	0.036	0.00
264	22.00	0.07	0.040	0.070	0.036	0.00
265	22.08	0.10	0.060	0.070	0.054	0.01
266	22.17	0.10	0.060	0.069	0.054	0.01
267	22.25	0.10	0.060	0.069	0.054	0.01
268	22.33	0.07	0.040	0.069	0.036	0.00
269	22.42	0.07	0.040	0.069	0.036	0.00
270	22.50	0.07	0.040	0.069	0.036	0.00
271	22.58	0.07	0.040	0.068	0.036	0.00
272	22.67	0.07	0.040	0.068	0.036	0.00
273	22.75	0.07	0.040	0.068	0.036	0.00
274	22.83	0.07	0.040	0.068	0.036	0.00
275	22.92	0.07	0.040	0.068	0.036	0.00
276	23.00	0.07	0.040	0.067	0.036	0.00
277	23.08	0.07	0.040	0.067	0.036	0.00
278	23.17	0.07	0.040	0.067	0.036	0.00
279	23.25	0.07	0.040	0.067	0.036	0.00
280	23.33	0.07	0.040	0.067	0.036	0.00
281	23.42	0.07	0.040	0.067	0.036	0.00
282	23.50	0.07	0.040	0.067	0.036	0.00

283	23.58	0.07	0.040	0.067	0.036	0.00
284	23.67	0.07	0.040	0.066	0.036	0.00
285	23.75	0.07	0.040	0.066	0.036	0.00
286	23.83	0.07	0.040	0.066	0.036	0.00
287	23.92	0.07	0.040	0.066	0.036	0.00
288	24.00	0.07	0.040	0.066	0.036	0.00
Sum =		100.0			Sum =	32.3

```
   Flood volume = Effective rainfall      2.69(In)
    times area       7.5(Ac.)/[(In)/(Ft.)] =       1.7(Ac.Ft)
   Total soil loss =      2.31(In)
   Total soil loss =     1.441(Ac.Ft)
   Total rainfall =      5.00(In)
   Flood volume =       73356.3 Cubic Feet
   Total soil loss =       62766.7 Cubic Feet
   ---------------------------------------------------------------------
    Peak flow rate of this hydrograph =      4.281(CFS)
   ---------------------------------------------------------------------
   ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        24 - H O U R    S T O R M
                   R u n o f f      H y d r o g r a p h
   ---------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

   ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ----------------------------------------------------------------------
   0+ 5       0.0001      0.01  Q         |         |         |         |
   0+10       0.0002      0.02  Q         |         |         |         |
   0+15       0.0004      0.03  Q         |         |         |         |
   0+20       0.0006      0.03  Q         |         |         |         |
   0+25       0.0009      0.04  Q         |         |         |         |
   0+30       0.0012      0.04  Q         |         |         |         |
   0+35       0.0015      0.04  Q         |         |         |         |
   0+40       0.0018      0.05  Q         |         |         |         |
   0+45       0.0022      0.05  Q         |         |         |         |
   0+50       0.0025      0.05  Q         |         |         |         |
   0+55       0.0029      0.06  Q         |         |         |         |
   1+ 0       0.0033      0.06  Q         |         |         |         |
   1+ 5       0.0037      0.06  Q         |         |         |         |
   1+10       0.0040      0.05  Q         |         |         |         |
   1+15       0.0043      0.05  Q         |         |         |         |
   1+20       0.0046      0.05  Q         |         |         |         |
   1+25       0.0050      0.05  Q         |         |         |         |
   1+30       0.0053      0.05  Q         |         |         |         |
   1+35       0.0056      0.05  Q         |         |         |         |
   1+40       0.0059      0.05  Q         |         |         |         |
   1+45       0.0062      0.05  Q         |         |         |         |
   1+50       0.0066      0.05  Q         |         |         |         |
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1+55	0.0069	0.06	Q	|	|	|	|
2+ 0	0.0074	0.06	Q	|	|	|	|
2+ 5	0.0078	0.06	Q	|	|	|	|
2+10	0.0082	0.06	Q	|	|	|	|
2+15	0.0086	0.06	Q	|	|	|	|
2+20	0.0090	0.06	Q	|	|	|	|
2+25	0.0094	0.06	Q	|	|	|	|
2+30	0.0098	0.06	Q	|	|	|	|
2+35	0.0103	0.06	Q	|	|	|	|
2+40	0.0108	0.07	Q	|	|	|	|
2+45	0.0113	0.07	Q	|	|	|	|
2+50	0.0118	0.07	Q	|	|	|	|
2+55	0.0123	0.08	Q	|	|	|	|
3+ 0	0.0129	0.08	Q	|	|	|	|
3+ 5	0.0134	0.08	Q	|	|	|	|
3+10	0.0139	0.08	Q	|	|	|	|
3+15	0.0144	0.08	Q	|	|	|	|
3+20	0.0149	0.08	Q	|	|	|	|
3+25	0.0155	0.08	Q	|	|	|	|
3+30	0.0160	0.08	Q	|	|	|	|
3+35	0.0165	0.08	Q	|	|	|	|
3+40	0.0170	0.08	Q	|	|	|	|
3+45	0.0175	0.08	Q	|	|	|	|
3+50	0.0181	0.08	Q	|	|	|	|
3+55	0.0187	0.09	Q	|	|	|	|
4+ 0	0.0193	0.09	Q	|	|	|	|
4+ 5	0.0199	0.09	Q	|	|	|	|
4+10	0.0206	0.09	Q	|	|	|	|
4+15	0.0212	0.09	Q	|	|	|	|
4+20	0.0218	0.10	Q	|	|	|	|
4+25	0.0225	0.10	Q	|	|	|	|
4+30	0.0233	0.10	Q	|	|	|	|
4+35	0.0240	0.11	Q	|	|	|	|
4+40	0.0247	0.11	Q	|	|	|	|
4+45	0.0254	0.11	Q	|	|	|	|
4+50	0.0262	0.11	Q	|	|	|	|
4+55	0.0270	0.12	Q	|	|	|	|
5+ 0	0.0278	0.12	Q	|	|	|	|
5+ 5	0.0286	0.11	Q	|	|	|	|
5+10	0.0293	0.10	Q	|	|	|	|
5+15	0.0299	0.09	Q	|	|	|	|
5+20	0.0306	0.10	Q	|	|	|	|
5+25	0.0313	0.10	Q	|	|	|	|
5+30	0.0320	0.10	Q	|	|	|	|
5+35	0.0328	0.11	Q	|	|	|	|
5+40	0.0336	0.12	Q	|	|	|	|
5+45	0.0344	0.12	Q	|	|	|	|
5+50	0.0352	0.12	Q	|	|	|	|

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5+55       0.0360      0.12  Q          |          |          |          |
6+ 0       0.0369      0.12  Q          |          |          |          |
6+ 5       0.0376      0.10  Q          |          |          |          |
6+10       0.0380      0.07  Q          |          |          |          |
6+15       0.0384      0.06  Q          |          |          |          |
6+20       0.0389      0.06  Q          |          |          |          |
6+25       0.0393      0.07  Q          |          |          |          |
6+30       0.0398      0.07  Q          |          |          |          |
6+35       0.0406      0.12  Q          |          |          |          |
6+40       0.0420      0.20  Q          |          |          |          |
6+45       0.0435      0.22  QV         |          |          |          |
6+50       0.0451      0.24  QV         |          |          |          |
6+55       0.0468      0.25  QV         |          |          |          |
7+ 0       0.0486      0.26  |Q         |          |          |          |
7+ 5       0.0504      0.26  |Q         |          |          |          |
7+10       0.0522      0.27  |Q         |          |          |          |
7+15       0.0541      0.27  |Q         |          |          |          |
7+20       0.0563      0.32  |Q         |          |          |          |
7+25       0.0590      0.40  |Q         |          |          |          |
7+30       0.0620      0.42  |Q         |          |          |          |
7+35       0.0653      0.48  |Q         |          |          |          |
7+40       0.0692      0.56  |VQ        |          |          |          |
7+45       0.0732      0.59  |VQ        |          |          |          |
7+50       0.0777      0.65  |VQ        |          |          |          |
7+55       0.0828      0.73  |VQ        |          |          |          |
8+ 0       0.0880      0.76  | VQ       |          |          |          |
8+ 5       0.0939      0.86  | VQ       |          |          |          |
8+10       0.1009      1.02  | V Q      |          |          |          |
8+15       0.1083      1.06  | V Q      |          |          |          |
8+20       0.1157      1.08  | V Q      |          |          |          |
8+25       0.1233      1.10  | V Q      |          |          |          |
8+30       0.1310      1.11  |  VQ      |          |          |          |
8+35       0.1390      1.16  |  VQ      |          |          |          |
8+40       0.1475      1.24  |  VQ      |          |          |          |
8+45       0.1562      1.26  |  V Q     |          |          |          |
8+50       0.1653      1.32  |  V Q     |          |          |          |
8+55       0.1749      1.40  |   VQ     |          |          |          |
9+ 0       0.1848      1.43  |   VQ     |          |          |          |
9+ 5       0.1953      1.53  |   V Q    |          |          |          |
9+10       0.2070      1.69  |   V Q    |          |          |          |
9+15       0.2189      1.73  |    VQ    |          |          |          |
9+20       0.2313      1.80  |    V Q   |          |          |          |
9+25       0.2443      1.89  |    V Q   |          |          |          |
9+30       0.2574      1.92  |     VQ   |          |          |          |
9+35       0.2710      1.97  |     VQ   |          |          |          |
9+40       0.2852      2.06  |     V Q  |          |          |          |
9+45       0.2995      2.08  |      VQ  |          |          |          |
9+50       0.3143      2.14  |      VQ  |          |          |          |
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 9+55       0.3296      2.22  |      VQ |          |          |          |
10+ 0       0.3451      2.25  |       Q |          |          |          |
10+ 5       0.3585      1.95  |      QV |          |          |          |
10+10       0.3686      1.46  |    Q  V |          |          |          |
10+15       0.3777      1.33  |    Q  V |          |          |          |
10+20       0.3866      1.28  |    Q   V|          |          |          |
10+25       0.3952      1.26  |    Q   V|          |          |          |
10+30       0.4037      1.24  |   Q    V|          |          |          |
10+35       0.4138      1.46  |    Q   V|          |          |          |
10+40       0.4264      1.83  |      Q  V          |          |          |
10+45       0.4397      1.93  |      Q  V          |          |          |
10+50       0.4533      1.97  |      Q  V          |          |          |
10+55       0.4671      2.00  |       Q |V         |          |          |
11+ 0       0.4810      2.02  |       Q |V         |          |          |
11+ 5       0.4947      1.98  |      Q  |V         |          |          |
11+10       0.5079      1.92  |      Q  | V        |          |          |
11+15       0.5210      1.90  |      Q  | V        |          |          |
11+20       0.5341      1.90  |      Q  | V        |          |          |
11+25       0.5471      1.90  |      Q  | V        |          |          |
11+30       0.5602      1.90  |      Q  |  V       |          |          |
11+35       0.5728      1.82  |      Q  |  V       |          |          |
11+40       0.5843      1.68  |     Q   |  V       |          |          |
11+45       0.5956      1.65  |     Q   |   V      |          |          |
11+50       0.6072      1.68  |     Q   |   V      |          |          |
11+55       0.6192      1.75  |     Q   |   V      |          |          |
12+ 0       0.6314      1.76  |      Q  |   V      |          |          |
12+ 5       0.6457      2.08  |       Q |    V     |          |          |
12+10       0.6636      2.60  |         Q    V     |          |          |
12+15       0.6825      2.74  |         Q     V    |          |          |
12+20       0.7021      2.84  |         |Q    V    |          |          |
12+25       0.7224      2.95  |         |Q     V   |          |          |
12+30       0.7431      3.00  |         | Q    V   |          |          |
12+35       0.7644      3.10  |         | Q     V  |          |          |
12+40       0.7869      3.26  |         |  Q    V  |          |          |
12+45       0.8096      3.30  |         |  Q     V|          |          |
12+50       0.8328      3.37  |         |  Q     V|          |          |
12+55       0.8566      3.45  |         |  Q      V          |          |
13+ 0       0.8805      3.48  |         |  Q      V          |          |
13+ 5       0.9061      3.71  |         |   Q     |V         |          |
13+10       0.9343      4.09  |         |     Q   | V        |          |
13+15       0.9631      4.19  |         |     Q   | V        |          |
13+20       0.9922      4.23  |         |     Q   |  V       |          |
13+25       1.0216      4.26  |         |      Q  |   V      |          |
13+30       1.0511      4.28  |         |      Q  |   V      |          |
13+35       1.0772      3.80  |         |    Q    |    V     |          |
13+40       1.0979      3.01  |         | Q       |     V    |          |
13+45       1.1173      2.81  |         |Q        |     V    |          |
13+50       1.1360      2.72  |         Q         |     V    |          |
```

```
13+55       1.1544      2.68  |         Q         |      V  |         |
14+ 0       1.1726      2.64  |         Q         |      V  |         |
14+ 5       1.1921      2.82  |         |Q        |       V |         |
14+10       1.2136      3.12  |         | Q       |       V |         |
14+15       1.2356      3.20  |         | Q       |        V|         |
14+20       1.2575      3.19  |         | Q       |        V|         |
14+25       1.2792      3.14  |         | Q       |         V         |
14+30       1.3008      3.14  |         | Q       |         V         |
14+35       1.3224      3.13  |         | Q       |         |V        |
14+40       1.3439      3.13  |         | Q       |         |V        |
14+45       1.3655      3.13  |         | Q       |         | V       |
14+50       1.3868      3.09  |         | Q       |         | V       |
14+55       1.4077      3.03  |         | Q       |         |  V      |
15+ 0       1.4284      3.01  |         | Q       |         |  V      |
15+ 5       1.4488      2.96  |         |Q        |         |   V     |
15+10       1.4687      2.89  |         |Q        |         |   V     |
15+15       1.4885      2.87  |         |Q        |         |    V    |
15+20       1.5080      2.82  |         |Q        |         |    V    |
15+25       1.5269      2.75  |         |Q        |         |     V   |
15+30       1.5457      2.73  |         Q         |         |     V   |
15+35       1.5633      2.55  |         Q         |         |      V  |
15+40       1.5789      2.26  |        Q|         |         |      V  |
15+45       1.5939      2.19  |       Q |         |         |      V  |
15+50       1.6088      2.16  |       Q |         |         |       V |
15+55       1.6236      2.14  |       Q |         |         |       V |
16+ 0       1.6383      2.13  |       Q |         |         |       V |
16+ 5       1.6488      1.53  |     Q   |         |         |        V|
16+10       1.6525      0.54  | Q       |         |         |        V|
16+15       1.6545      0.28  |Q        |         |         |        V|
16+20       1.6556      0.17  Q         |         |         |        V|
16+25       1.6564      0.11  Q         |         |         |        V|
16+30       1.6568      0.06  Q         |         |         |        V|
16+35       1.6572      0.06  Q         |         |         |        V|
16+40       1.6575      0.05  Q         |         |         |        V|
16+45       1.6578      0.05  Q         |         |         |        V|
16+50       1.6582      0.05  Q         |         |         |        V|
16+55       1.6585      0.05  Q         |         |         |        V|
17+ 0       1.6588      0.05  Q         |         |         |        V|
17+ 5       1.6591      0.05  Q         |         |         |        V|
17+10       1.6596      0.06  Q         |         |         |        V|
17+15       1.6601      0.07  Q         |         |         |        V|
17+20       1.6606      0.07  Q         |         |         |        V|
17+25       1.6611      0.08  Q         |         |         |        V|
17+30       1.6617      0.08  Q         |         |         |        V|
17+35       1.6623      0.09  Q         |         |         |        V|
17+40       1.6629      0.09  Q         |         |         |        V|
17+45       1.6635      0.09  Q         |         |         |        V|
17+50       1.6641      0.08  Q         |         |         |        V|
```

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17+55       1.6646      0.07  Q          |          |          |         V|
18+ 0       1.6650      0.06  Q          |          |          |         V|
18+ 5       1.6654      0.06  Q          |          |          |         V|
18+10       1.6658      0.06  Q          |          |          |         V|
18+15       1.6663      0.06  Q          |          |          |         V|
18+20       1.6667      0.06  Q          |          |          |         V|
18+25       1.6671      0.06  Q          |          |          |         V|
18+30       1.6675      0.06  Q          |          |          |         V|
18+35       1.6679      0.06  Q          |          |          |         V|
18+40       1.6682      0.05  Q          |          |          |         V|
18+45       1.6686      0.05  Q          |          |          |         V|
18+50       1.6689      0.04  Q          |          |          |         V|
18+55       1.6691      0.03  Q          |          |          |         V|
19+ 0       1.6693      0.03  Q          |          |          |         V|
19+ 5       1.6695      0.04  Q          |          |          |         V|
19+10       1.6698      0.04  Q          |          |          |         V|
19+15       1.6701      0.04  Q          |          |          |         V|
19+20       1.6704      0.03  Q          |          |          |         V|
19+25       1.6705      0.01  Q          |          |          |         V|
19+30       1.6705      0.01  Q          |          |          |         V|
19+35       1.6707      0.02  Q          |          |          |         V|
19+40       1.6709      0.04  Q          |          |          |         V|
19+45       1.6712      0.04  Q          |          |          |         V|
19+50       1.6715      0.04  Q          |          |          |         V|
19+55       1.6717      0.03  Q          |          |          |         V|
20+ 0       1.6719      0.03  Q          |          |          |         V|
20+ 5       1.6722      0.04  Q          |          |          |         V|
20+10       1.6724      0.04  Q          |          |          |         V|
20+15       1.6728      0.04  Q          |          |          |         V|
20+20       1.6731      0.04  Q          |          |          |         V|
20+25       1.6734      0.05  Q          |          |          |         V|
20+30       1.6737      0.05  Q          |          |          |         V|
20+35       1.6740      0.05  Q          |          |          |         V|
20+40       1.6743      0.05  Q          |          |          |         V|
20+45       1.6746      0.05  Q          |          |          |         V|
20+50       1.6749      0.04  Q          |          |          |         V|
20+55       1.6751      0.03  Q          |          |          |         V|
21+ 0       1.6754      0.03  Q          |          |          |         V|
21+ 5       1.6756      0.04  Q          |          |          |         V|
21+10       1.6759      0.04  Q          |          |          |         V|
21+15       1.6762      0.04  Q          |          |          |         V|
21+20       1.6765      0.04  Q          |          |          |         V|
21+25       1.6767      0.03  Q          |          |          |         V|
21+30       1.6769      0.03  Q          |          |          |         V|
21+35       1.6772      0.04  Q          |          |          |         V|
21+40       1.6774      0.04  Q          |          |          |         V|
21+45       1.6778      0.04  Q          |          |          |         V|
21+50       1.6780      0.04  Q          |          |          |         V|
```

```
   21+55       1.6783      0.03  Q          |          |          |         V|
   22+ 0       1.6785      0.03  Q          |          |          |         V|
   22+ 5       1.6787      0.04  Q          |          |          |         V|
   22+10       1.6790      0.04  Q          |          |          |         V|
   22+15       1.6793      0.04  Q          |          |          |         V|
   22+20       1.6796      0.04  Q          |          |          |         V|
   22+25       1.6798      0.03  Q          |          |          |         V|
   22+30       1.6800      0.03  Q          |          |          |         V|
   22+35       1.6803      0.03  Q          |          |          |         V|
   22+40       1.6805      0.03  Q          |          |          |         V|
   22+45       1.6807      0.03  Q          |          |          |         V|
   22+50       1.6809      0.03  Q          |          |          |         V|
   22+55       1.6811      0.03  Q          |          |          |         V|
   23+ 0       1.6813      0.03  Q          |          |          |         V|
   23+ 5       1.6815      0.03  Q          |          |          |         V|
   23+10       1.6817      0.03  Q          |          |          |         V|
   23+15       1.6819      0.03  Q          |          |          |         V|
   23+20       1.6821      0.03  Q          |          |          |         V|
   23+25       1.6823      0.03  Q          |          |          |         V|
   23+30       1.6825      0.03  Q          |          |          |         V|
   23+35       1.6828      0.03  Q          |          |          |         V|
   23+40       1.6830      0.03  Q          |          |          |         V|
   23+45       1.6832      0.03  Q          |          |          |         V|
   23+50       1.6834      0.03  Q          |          |          |         V|
   23+55       1.6836      0.03  Q          |          |          |         V|
   24+ 0       1.6838      0.03  Q          |          |          |         V|
   24+ 5       1.6839      0.02  Q          |          |          |         V|
   24+10       1.6840      0.01  Q          |          |          |         V|
   24+15       1.6840      0.00  Q          |          |          |         V|
   24+20       1.6840      0.00  Q          |          |          |         V|
   24+25       1.6840      0.00  Q          |          |          |          V
-----------------------------------------------------------------------
```

Appendix C

POST-CONSTRUCTION CONDITIONS
10 YEAR 1 HOUR STORM

U n i t H y d r o g r a p h A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0
Study date 12/27/16 File: lakeshorep110.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6064

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 7.50(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.50(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 1150.00(Ft.)
Length along longest watercourse measured to centroid = 475.21(Ft.)
Length along longest watercourse = 0.218 Mi.
Length along longest watercourse measured to centroid = 0.090 Mi.
Difference in elevation = 9.50(Ft.)
Slope along watercourse = 43.6174 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.039 Hr.
Lag time = 2.37 Min.
25% of lag time = 0.59 Min.
40% of lag time = 0.95 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	0.60	4.50

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	1.50	11.25

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 0.600(In)
Area Averaged 100-Year Rainfall = 1.500(In)

Point rain (area averaged) = 0.970(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 0.970(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.500	56.00	0.700

Total Area Entered = 7.50(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	56.0	0.511	0.700	0.189	1.000	0.189
					Sum (F) =	0.189

Area averaged mean soil loss (F) (In/Hr) = 0.189
Minimum soil loss rate ((In/Hr)) = 0.094
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.100

Slope of intensity-duration curve for a 1 hour storm =0.4800

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	211.335	45.293	3.424
2	0.167	422.670	42.584	3.219
3	0.250	634.005	8.351	0.631
4	0.333	845.340	3.771	0.285

lakeshorep110
Sum = 100.000 Sum= 7.559

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	4.40	0.512	0.189	---	0.32
2	0.17	4.50	0.524	0.189	---	0.33
3	0.25	5.40	0.629	0.189	---	0.44
4	0.33	5.40	0.629	0.189	---	0.44
5	0.42	5.70	0.664	0.189	---	0.47
6	0.50	6.40	0.745	0.189	---	0.56
7	0.58	7.90	0.920	0.189	---	0.73
8	0.67	9.10	1.059	0.189	---	0.87
9	0.75	12.80	1.490	0.189	---	1.30
10	0.83	25.60	2.980	0.189	---	2.79
11	0.92	7.90	0.920	0.189	---	0.73
12	1.00	4.90	0.570	0.189	---	0.38
Sum =		100.0			Sum =	9.4

Flood volume = Effective rainfall 0.78(In)
times area 7.5(Ac.)/[(In)/(Ft.)] = 0.5(Ac.Ft)
Total soil loss = 0.19(In)
Total soil loss = 0.118(Ac.Ft)
Total rainfall = 0.97(In)
Flood volume = 21268.3 Cubic Feet
Total soil loss = 5145.4 Cubic Feet

Peak flow rate of this hydrograph = 14.510(CFS)

++

1 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

```
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0076      1.11  V Q       |         |         |         |
  0+10       0.0227      2.19  |V  Q     |         |         |         |
  0+15       0.0419      2.79  |  V Q    |         |         |         |
  0+20       0.0641      3.23  |    VQ   |         |         |         |
  0+25       0.0876      3.41  |     QV  |         |         |         |
  0+30       0.1141      3.84  |      Q V|         |         |         |
  0+35       0.1466      4.72  |        Q| V       |         |         |
  0+40       0.1867      5.82  |         |Q   V    |         |         |
  0+45       0.2409      7.88  |         |    Q   V|         |         |
  0+50       0.3409     14.51  |         |         |      V Q|         |
```

```
                                   lakeshorep110
    0+55       0.4274     12.56  |         |         |    Q    |    V    |
    1+ 0       0.4673      5.79  |         |Q        |         |       V |
    1+ 5       0.4844      2.49  |   Q     |         |         |        V|
    1+10       0.4875      0.45  Q         |         |         |        V|
    1+15       0.4883      0.11  Q         |         |         |         V
-----------------------------------------------------------------------
```

POST-CONSTRUCTION CONDITIONS
10 YEAR 3 HOUR STORM

U n i t H y d r o g r a p h A n a l y s i s

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Study date 12/27/16 File: lakeshorep310.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6064

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 7.50(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.50(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 1150.00(Ft.)
Length along longest watercourse measured to centroid = 475.21(Ft.)
Length along longest watercourse = 0.218 Mi.
Length along longest watercourse measured to centroid = 0.090 Mi.
Difference in elevation = 9.50(Ft.)
Slope along watercourse = 43.6174 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.039 Hr.
Lag time = 2.37 Min.
25% of lag time = 0.59 Min.
40% of lag time = 0.95 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	1.00	7.50

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	2.50	18.75

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 1.000(In)
Area Averaged 100-Year Rainfall = 2.500(In)

Point rain (area averaged) = 1.617(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.617(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.500	56.00	0.700

Total Area Entered = 7.50(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	56.0	0.511	0.700	0.189	1.000	0.189
					Sum (F) =	0.189

Area averaged mean soil loss (F) (In/Hr) = 0.189
Minimum soil loss rate ((In/Hr)) = 0.094
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.100

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	211.335	45.293	3.424
2	0.167	422.670	42.584	3.219
3	0.250	634.005	8.351	0.631
4	0.333	845.340	3.771	0.285
			Sum = 100.000	Sum= 7.559

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	1.30	0.252	0.189	---	0.06
2	0.17	1.30	0.252	0.189	---	0.06
3	0.25	1.10	0.213	0.189	---	0.02
4	0.33	1.50	0.291	0.189	---	0.10
5	0.42	1.50	0.291	0.189	---	0.10
6	0.50	1.80	0.349	0.189	---	0.16
7	0.58	1.50	0.291	0.189	---	0.10
8	0.67	1.80	0.349	0.189	---	0.16
9	0.75	1.80	0.349	0.189	---	0.16
10	0.83	1.50	0.291	0.189	---	0.10
11	0.92	1.60	0.310	0.189	---	0.12
12	1.00	1.80	0.349	0.189	---	0.16
13	1.08	2.20	0.427	0.189	---	0.24
14	1.17	2.20	0.427	0.189	---	0.24
15	1.25	2.20	0.427	0.189	---	0.24
16	1.33	2.00	0.388	0.189	---	0.20
17	1.42	2.60	0.505	0.189	---	0.32
18	1.50	2.70	0.524	0.189	---	0.33
19	1.58	2.40	0.466	0.189	---	0.28
20	1.67	2.70	0.524	0.189	---	0.33
21	1.75	3.30	0.640	0.189	---	0.45
22	1.83	3.10	0.602	0.189	---	0.41
23	1.92	2.90	0.563	0.189	---	0.37
24	2.00	3.00	0.582	0.189	---	0.39
25	2.08	3.10	0.602	0.189	---	0.41
26	2.17	4.20	0.815	0.189	---	0.63
27	2.25	5.00	0.970	0.189	---	0.78
28	2.33	3.50	0.679	0.189	---	0.49
29	2.42	6.80	1.320	0.189	---	1.13
30	2.50	7.30	1.417	0.189	---	1.23
31	2.58	8.20	1.591	0.189	---	1.40
32	2.67	5.90	1.145	0.189	---	0.96
33	2.75	2.00	0.388	0.189	---	0.20
34	2.83	1.80	0.349	0.189	---	0.16
35	2.92	1.80	0.349	0.189	---	0.16
36	3.00	0.60	0.116	0.189	0.012	0.10
Sum =		100.0			Sum =	12.8

Flood volume = Effective rainfall 1.06(In)
times area 7.5(Ac.)/[(In)/(Ft.)] = 0.7(Ac.Ft)
Total soil loss = 0.55(In)
Total soil loss = 0.345(Ac.Ft)
Total rainfall = 1.62(In)
Flood volume = 28990.6 Cubic Feet
Total soil loss = 15033.9 Cubic Feet

lakeshorep310

Peak flow rate of this hydrograph = 9.610(CFS)

++

3 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0 2.5 5.0 7.5 10.0
0+ 5	0.0015	0.22	Q | | | |
0+10	0.0044	0.42	VQ | | | |
0+15	0.0066	0.33	VQ | | | |
0+20	0.0100	0.49	VQ | | | |
0+25	0.0149	0.71	V Q | | | |
0+30	0.0214	0.95	|V Q | | | |
0+35	0.0280	0.96	|V Q | | | |
0+40	0.0350	1.01	| V Q | | | |
0+45	0.0431	1.18	| V Q | | | |
0+50	0.0499	1.00	| Q | | | |
0+55	0.0561	0.89	| Q | | | |
1+ 0	0.0633	1.05	| VQ | | | |
1+ 5	0.0732	1.44	| VQ | | | |
1+10	0.0850	1.72	| VQ | | | |
1+15	0.0973	1.78	| V Q | | | |
1+20	0.1088	1.67	| Q | | | |
1+25	0.1221	1.94	| Q | | | |
1+30	0.1383	2.36	| VQ| | | |
1+35	0.1541	2.28	| Q| | | |
1+40	0.1702	2.34	| QV | | |
1+45	0.1901	2.89	| |Q | | |
1+50	0.2119	3.16	| | Q | | |
1+55	0.2324	2.99	| |Q V | | |
2+ 0	0.2527	2.94	| |Q V | | |
2+ 5	0.2736	3.03	| | Q V | | |
2+10	0.2999	3.83	| | Q V | | |
2+15	0.3348	5.06	| | Q | |
2+20	0.3672	4.71	| | Q | V | |
2+25	0.4094	6.12	| | | Q | |
2+30	0.4671	8.38	| | | V | Q |
2+35	0.5333	9.61	| | | | V Q |
2+40	0.5945	8.89	| | | | Q |
2+45	0.6289	5.00	| | Q| | V |
2+50	0.6440	2.19	| Q | | | V |
2+55	0.6541	1.46	| Q | | | | V|
3+ 0	0.6612	1.03	| Q | | | | V|

```
    3+ 5       0.6646      0.48  |Q        |         |         |        V|
    3+10       0.6653      0.11  Q         |         |         |        V|
    3+15       0.6655      0.03  Q         |         |         |        V|
-----------------------------------------------------------------------
```

POST-CONSTRUCTION CONDITIONS
10 YEAR 6 HOUR STORM

U n i t H y d r o g r a p h A n a l y s i s

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Study date 12/27/16 File: lakeshorep610.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6064

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 7.50(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.50(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 1150.00(Ft.)
Length along longest watercourse measured to centroid = 475.21(Ft.)
Length along longest watercourse = 0.218 Mi.
Length along longest watercourse measured to centroid = 0.090 Mi.
Difference in elevation = 9.50(Ft.)
Slope along watercourse = 43.6174 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.039 Hr.
Lag time = 2.37 Min.
25% of lag time = 0.59 Min.
40% of lag time = 0.95 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	1.40	10.50

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	3.50	26.25

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 1.400(In)
Area Averaged 100-Year Rainfall = 3.500(In)

Point rain (area averaged) = 2.264(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.264(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.500	56.00	0.700

Total Area Entered = 7.50(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	56.0	0.511	0.700	0.189	1.000	0.189
					Sum (F) =	0.189

Area averaged mean soil loss (F) (In/Hr) = 0.189
Minimum soil loss rate ((In/Hr)) = 0.094
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.100

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	211.335	45.293	3.424
2	0.167	422.670	42.584	3.219
3	0.250	634.005	8.351	0.631
4	0.333	845.340	3.771	0.285
			Sum = 100.000	Sum= 7.559

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.50	0.136	0.189	0.014	0.12
2	0.17	0.60	0.163	0.189	0.016	0.15
3	0.25	0.60	0.163	0.189	0.016	0.15
4	0.33	0.60	0.163	0.189	0.016	0.15
5	0.42	0.60	0.163	0.189	0.016	0.15
6	0.50	0.70	0.190	0.189	---	0.00
7	0.58	0.70	0.190	0.189	---	0.00
8	0.67	0.70	0.190	0.189	---	0.00
9	0.75	0.70	0.190	0.189	---	0.00
10	0.83	0.70	0.190	0.189	---	0.00
11	0.92	0.70	0.190	0.189	---	0.00
12	1.00	0.80	0.217	0.189	---	0.03
13	1.08	0.80	0.217	0.189	---	0.03
14	1.17	0.80	0.217	0.189	---	0.03
15	1.25	0.80	0.217	0.189	---	0.03
16	1.33	0.80	0.217	0.189	---	0.03
17	1.42	0.80	0.217	0.189	---	0.03
18	1.50	0.80	0.217	0.189	---	0.03
19	1.58	0.80	0.217	0.189	---	0.03
20	1.67	0.80	0.217	0.189	---	0.03
21	1.75	0.80	0.217	0.189	---	0.03
22	1.83	0.80	0.217	0.189	---	0.03
23	1.92	0.80	0.217	0.189	---	0.03
24	2.00	0.90	0.245	0.189	---	0.06
25	2.08	0.80	0.217	0.189	---	0.03
26	2.17	0.90	0.245	0.189	---	0.06
27	2.25	0.90	0.245	0.189	---	0.06
28	2.33	0.90	0.245	0.189	---	0.06
29	2.42	0.90	0.245	0.189	---	0.06
30	2.50	0.90	0.245	0.189	---	0.06
31	2.58	0.90	0.245	0.189	---	0.06
32	2.67	0.90	0.245	0.189	---	0.06
33	2.75	1.00	0.272	0.189	---	0.08
34	2.83	1.00	0.272	0.189	---	0.08
35	2.92	1.00	0.272	0.189	---	0.08
36	3.00	1.00	0.272	0.189	---	0.08
37	3.08	1.00	0.272	0.189	---	0.08
38	3.17	1.10	0.299	0.189	---	0.11
39	3.25	1.10	0.299	0.189	---	0.11
40	3.33	1.10	0.299	0.189	---	0.11
41	3.42	1.20	0.326	0.189	---	0.14
42	3.50	1.30	0.353	0.189	---	0.16
43	3.58	1.40	0.380	0.189	---	0.19
44	3.67	1.40	0.380	0.189	---	0.19

45	3.75	1.50	0.408	0.189	---	0.22
46	3.83	1.50	0.408	0.189	---	0.22
47	3.92	1.60	0.435	0.189	---	0.25
48	4.00	1.60	0.435	0.189	---	0.25
49	4.08	1.70	0.462	0.189	---	0.27
50	4.17	1.80	0.489	0.189	---	0.30
51	4.25	1.90	0.516	0.189	---	0.33
52	4.33	2.00	0.543	0.189	---	0.35
53	4.42	2.10	0.571	0.189	---	0.38
54	4.50	2.10	0.571	0.189	---	0.38
55	4.58	2.20	0.598	0.189	---	0.41
56	4.67	2.30	0.625	0.189	---	0.44
57	4.75	2.40	0.652	0.189	---	0.46
58	4.83	2.40	0.652	0.189	---	0.46
59	4.92	2.50	0.679	0.189	---	0.49
60	5.00	2.60	0.706	0.189	---	0.52
61	5.08	3.10	0.842	0.189	---	0.65
62	5.17	3.60	0.978	0.189	---	0.79
63	5.25	3.90	1.060	0.189	---	0.87
64	5.33	4.20	1.141	0.189	---	0.95
65	5.42	4.70	1.277	0.189	---	1.09
66	5.50	5.60	1.521	0.189	---	1.33
67	5.58	1.90	0.516	0.189	---	0.33
68	5.67	0.90	0.245	0.189	---	0.06
69	5.75	0.60	0.163	0.189	0.016	0.15
70	5.83	0.50	0.136	0.189	0.014	0.12
71	5.92	0.30	0.082	0.189	0.008	0.07
72	6.00	0.20	0.054	0.189	0.005	0.05
Sum =		100.0			Sum =	15.1

```
   Flood volume = Effective rainfall      1.26(In)
    times area       7.5(Ac.)/[(In)/(Ft.)] =       0.8(Ac.Ft)
   Total soil loss =      1.00(In)
   Total soil loss =     0.627(Ac.Ft)
   Total rainfall =      2.26(In)
   Flood volume =       34343.8 Cubic Feet
   Total soil loss =       27290.8 Cubic Feet
   ---------------------------------------------------------------------
    Peak flow rate of this hydrograph =      8.917(CFS)
   ---------------------------------------------------------------------
   ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        6 - H O U R    S T O R M
                   R u n o f f      H y d r o g r a p h
   ---------------------------------------------------------------------
               Hydrograph in   5   Minute intervals ((CFS))

   ---------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
---------------------------------------------------------------------
```

```
0+ 5       0.0029      0.42  VQ        |          |          |          |
0+10       0.0091      0.90  V  Q      |          |          |          |
0+15       0.0163      1.05  V   Q     |          |          |          |
0+20       0.0239      1.10  |V  Q     |          |          |          |
0+25       0.0315      1.11  |V  Q     |          |          |          |
0+30       0.0357      0.61  |VQ       |          |          |          |
0+35       0.0367      0.14  QV        |          |          |          |
0+40       0.0371      0.05  QV        |          |          |          |
0+45       0.0371      0.01  QV        |          |          |          |
0+50       0.0372      0.01  QV        |          |          |          |
0+55       0.0373      0.01  QV        |          |          |          |
1+ 0       0.0380      0.10  QV        |          |          |          |
1+ 5       0.0393      0.19  QV        |          |          |          |
1+10       0.0407      0.21  Q V       |          |          |          |
1+15       0.0422      0.21  Q V       |          |          |          |
1+20       0.0436      0.21  Q V       |          |          |          |
1+25       0.0451      0.21  Q V       |          |          |          |
1+30       0.0466      0.21  Q V       |          |          |          |
1+35       0.0481      0.21  Q V       |          |          |          |
1+40       0.0495      0.21  Q V       |          |          |          |
1+45       0.0510      0.21  Q V       |          |          |          |
1+50       0.0525      0.21  Q V       |          |          |          |
1+55       0.0540      0.21  Q V       |          |          |          |
2+ 0       0.0561      0.31  |QV       |          |          |          |
2+ 5       0.0582      0.30  |QV       |          |          |          |
2+10       0.0604      0.32  |Q V      |          |          |          |
2+15       0.0632      0.40  |Q V      |          |          |          |
2+20       0.0660      0.41  |Q V      |          |          |          |
2+25       0.0689      0.42  |Q V      |          |          |          |
2+30       0.0718      0.42  |Q V      |          |          |          |
2+35       0.0747      0.42  |Q V      |          |          |          |
2+40       0.0776      0.42  |Q V      |          |          |          |
2+45       0.0811      0.51  | Q V     |          |          |          |
2+50       0.0852      0.60  | Q V     |          |          |          |
2+55       0.0895      0.62  | Q V     |          |          |          |
3+ 0       0.0938      0.63  | Q V     |          |          |          |
3+ 5       0.0981      0.63  | Q V     |          |          |          |
3+10       0.1030      0.72  | Q  V    |          |          |          |
3+15       0.1086      0.81  |  Q V    |          |          |          |
3+20       0.1143      0.82  |  Q V    |          |          |          |
3+25       0.1206      0.92  |  Q  V   |          |          |          |
3+30       0.1282      1.10  |   Q V   |          |          |          |
3+35       0.1372      1.30  |    QV   |          |          |          |
3+40       0.1469      1.41  |    Q V  |          |          |          |
3+45       0.1575      1.53  |     QV  |          |          |          |
3+50       0.1687      1.63  |     Q V |          |          |          |
3+55       0.1807      1.74  |     Q  V|          |          |          |
4+ 0       0.1933      1.83  |      Q V|          |          |          |
```

```
   4+ 5       0.2067      1.94  |      Q  V         |         |         |
   4+10       0.2214      2.13  |       Q |V        |         |         |
   4+15       0.2374      2.33  |        Q| V       |         |         |
   4+20       0.2549      2.53  |         Q V       |         |         |
   4+25       0.2737      2.74  |         Q  V      |         |         |
   4+30       0.2934      2.85  |         |Q  V     |         |         |
   4+35       0.3138      2.97  |         |Q   V    |         |         |
   4+40       0.3356      3.16  |         | Q    V  |         |         |
   4+45       0.3587      3.36  |         |  Q    V |         |         |
   4+50       0.3826      3.47  |         |  Q     V|         |         |
   4+55       0.4073      3.59  |         |   Q     V         |         |
   5+ 0       0.4333      3.78  |         |    Q    |V        |         |
   5+ 5       0.4632      4.35  |         |      Q  |  V      |         |
   5+10       0.4995      5.27  |         |         |Q   V    |         |
   5+15       0.5414      6.08  |         |         |   Q  V  |         |
   5+20       0.5879      6.75  |         |         |     Q  V|         |
   5+25       0.6400      7.57  |         |         |         Q V       |
   5+30       0.7014      8.92  |         |         |         |    Q    |
   5+35       0.7453      6.37  |         |         |    Q    |      V  |
   5+40       0.7618      2.40  |        Q|         |         |       V |
   5+45       0.7705      1.27  |    Q    |         |         |        V|
   5+50       0.7775      1.02  |   Q     |         |         |        V|
   5+55       0.7827      0.75  |  Q      |         |         |        V|
   6+ 0       0.7863      0.52  | Q       |         |         |        V|
   6+ 5       0.7880      0.24  Q         |         |         |        V|
   6+10       0.7883      0.05  Q         |         |         |        V|
   6+15       0.7884      0.01  Q         |         |         |         V
-----------------------------------------------------------------------
```

POST-CONSTRUCTION CONDITIONS
10 YEAR 24 HOUR STORM

U n i t H y d r o g r a p h A n a l y s i s

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Study date 12/27/16 File: lakeshorep2410.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6064

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 7.50(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.50(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 1150.00(Ft.)
Length along longest watercourse measured to centroid = 475.21(Ft.)
Length along longest watercourse = 0.218 Mi.
Length along longest watercourse measured to centroid = 0.090 Mi.
Difference in elevation = 9.50(Ft.)
Slope along watercourse = 43.6174 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.039 Hr.
Lag time = 2.37 Min.
25% of lag time = 0.59 Min.
40% of lag time = 0.95 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	2.50	18.75

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	5.00	37.50

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 2.500(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 3.529(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 3.528(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.500	56.00	0.700

Total Area Entered = 7.50(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	56.0	0.511	0.700	0.189	1.000	0.189
					Sum (F) =	0.189

Area averaged mean soil loss (F) (In/Hr) = 0.189
Minimum soil loss rate ((In/Hr)) = 0.094
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.100

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	211.335	45.293	3.424
2	0.167	422.670	42.584	3.219
3	0.250	634.005	8.351	0.631
4	0.333	845.340	3.771	0.285
			Sum = 100.000	Sum= 7.559

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.028	0.335	0.003	0.03
2	0.17	0.07	0.028	0.334	0.003	0.03
3	0.25	0.07	0.028	0.332	0.003	0.03
4	0.33	0.10	0.042	0.331	0.004	0.04
5	0.42	0.10	0.042	0.330	0.004	0.04
6	0.50	0.10	0.042	0.329	0.004	0.04
7	0.58	0.10	0.042	0.327	0.004	0.04
8	0.67	0.10	0.042	0.326	0.004	0.04
9	0.75	0.10	0.042	0.325	0.004	0.04
10	0.83	0.13	0.056	0.323	0.006	0.05
11	0.92	0.13	0.056	0.322	0.006	0.05
12	1.00	0.13	0.056	0.321	0.006	0.05
13	1.08	0.10	0.042	0.320	0.004	0.04
14	1.17	0.10	0.042	0.318	0.004	0.04
15	1.25	0.10	0.042	0.317	0.004	0.04
16	1.33	0.10	0.042	0.316	0.004	0.04
17	1.42	0.10	0.042	0.315	0.004	0.04
18	1.50	0.10	0.042	0.313	0.004	0.04
19	1.58	0.10	0.042	0.312	0.004	0.04
20	1.67	0.10	0.042	0.311	0.004	0.04
21	1.75	0.10	0.042	0.310	0.004	0.04
22	1.83	0.13	0.056	0.308	0.006	0.05
23	1.92	0.13	0.056	0.307	0.006	0.05
24	2.00	0.13	0.056	0.306	0.006	0.05
25	2.08	0.13	0.056	0.305	0.006	0.05
26	2.17	0.13	0.056	0.303	0.006	0.05
27	2.25	0.13	0.056	0.302	0.006	0.05
28	2.33	0.13	0.056	0.301	0.006	0.05
29	2.42	0.13	0.056	0.300	0.006	0.05
30	2.50	0.13	0.056	0.298	0.006	0.05
31	2.58	0.17	0.071	0.297	0.007	0.06
32	2.67	0.17	0.071	0.296	0.007	0.06
33	2.75	0.17	0.071	0.295	0.007	0.06
34	2.83	0.17	0.071	0.294	0.007	0.06
35	2.92	0.17	0.071	0.292	0.007	0.06
36	3.00	0.17	0.071	0.291	0.007	0.06
37	3.08	0.17	0.071	0.290	0.007	0.06
38	3.17	0.17	0.071	0.289	0.007	0.06
39	3.25	0.17	0.071	0.288	0.007	0.06
40	3.33	0.17	0.071	0.286	0.007	0.06
41	3.42	0.17	0.071	0.285	0.007	0.06
42	3.50	0.17	0.071	0.284	0.007	0.06
43	3.58	0.17	0.071	0.283	0.007	0.06
44	3.67	0.17	0.071	0.282	0.007	0.06

45	3.75	0.17	0.071	0.280	0.007	0.06
46	3.83	0.20	0.085	0.279	0.008	0.08
47	3.92	0.20	0.085	0.278	0.008	0.08
48	4.00	0.20	0.085	0.277	0.008	0.08
49	4.08	0.20	0.085	0.276	0.008	0.08
50	4.17	0.20	0.085	0.275	0.008	0.08
51	4.25	0.20	0.085	0.273	0.008	0.08
52	4.33	0.23	0.099	0.272	0.010	0.09
53	4.42	0.23	0.099	0.271	0.010	0.09
54	4.50	0.23	0.099	0.270	0.010	0.09
55	4.58	0.23	0.099	0.269	0.010	0.09
56	4.67	0.23	0.099	0.268	0.010	0.09
57	4.75	0.23	0.099	0.266	0.010	0.09
58	4.83	0.27	0.113	0.265	0.011	0.10
59	4.92	0.27	0.113	0.264	0.011	0.10
60	5.00	0.27	0.113	0.263	0.011	0.10
61	5.08	0.20	0.085	0.262	0.008	0.08
62	5.17	0.20	0.085	0.261	0.008	0.08
63	5.25	0.20	0.085	0.260	0.008	0.08
64	5.33	0.23	0.099	0.258	0.010	0.09
65	5.42	0.23	0.099	0.257	0.010	0.09
66	5.50	0.23	0.099	0.256	0.010	0.09
67	5.58	0.27	0.113	0.255	0.011	0.10
68	5.67	0.27	0.113	0.254	0.011	0.10
69	5.75	0.27	0.113	0.253	0.011	0.10
70	5.83	0.27	0.113	0.252	0.011	0.10
71	5.92	0.27	0.113	0.251	0.011	0.10
72	6.00	0.27	0.113	0.249	0.011	0.10
73	6.08	0.30	0.127	0.248	0.013	0.11
74	6.17	0.30	0.127	0.247	0.013	0.11
75	6.25	0.30	0.127	0.246	0.013	0.11
76	6.33	0.30	0.127	0.245	0.013	0.11
77	6.42	0.30	0.127	0.244	0.013	0.11
78	6.50	0.30	0.127	0.243	0.013	0.11
79	6.58	0.33	0.141	0.242	0.014	0.13
80	6.67	0.33	0.141	0.241	0.014	0.13
81	6.75	0.33	0.141	0.240	0.014	0.13
82	6.83	0.33	0.141	0.239	0.014	0.13
83	6.92	0.33	0.141	0.237	0.014	0.13
84	7.00	0.33	0.141	0.236	0.014	0.13
85	7.08	0.33	0.141	0.235	0.014	0.13
86	7.17	0.33	0.141	0.234	0.014	0.13
87	7.25	0.33	0.141	0.233	0.014	0.13
88	7.33	0.37	0.155	0.232	0.016	0.14
89	7.42	0.37	0.155	0.231	0.016	0.14
90	7.50	0.37	0.155	0.230	0.016	0.14
91	7.58	0.40	0.169	0.229	0.017	0.15
92	7.67	0.40	0.169	0.228	0.017	0.15

93	7.75	0.40	0.169	0.227	0.017	0.15
94	7.83	0.43	0.183	0.226	0.018	0.17
95	7.92	0.43	0.183	0.225	0.018	0.17
96	8.00	0.43	0.183	0.224	0.018	0.17
97	8.08	0.50	0.212	0.223	0.021	0.19
98	8.17	0.50	0.212	0.222	0.021	0.19
99	8.25	0.50	0.212	0.221	0.021	0.19
100	8.33	0.50	0.212	0.220	0.021	0.19
101	8.42	0.50	0.212	0.219	0.021	0.19
102	8.50	0.50	0.212	0.217	0.021	0.19
103	8.58	0.53	0.226	0.216	---	0.01
104	8.67	0.53	0.226	0.215	---	0.01
105	8.75	0.53	0.226	0.214	---	0.01
106	8.83	0.57	0.240	0.213	---	0.03
107	8.92	0.57	0.240	0.212	---	0.03
108	9.00	0.57	0.240	0.211	---	0.03
109	9.08	0.63	0.268	0.210	---	0.06
110	9.17	0.63	0.268	0.209	---	0.06
111	9.25	0.63	0.268	0.208	---	0.06
112	9.33	0.67	0.282	0.207	---	0.07
113	9.42	0.67	0.282	0.206	---	0.08
114	9.50	0.67	0.282	0.205	---	0.08
115	9.58	0.70	0.296	0.204	---	0.09
116	9.67	0.70	0.296	0.203	---	0.09
117	9.75	0.70	0.296	0.202	---	0.09
118	9.83	0.73	0.311	0.202	---	0.11
119	9.92	0.73	0.311	0.201	---	0.11
120	10.00	0.73	0.311	0.200	---	0.11
121	10.08	0.50	0.212	0.199	---	0.01
122	10.17	0.50	0.212	0.198	---	0.01
123	10.25	0.50	0.212	0.197	---	0.02
124	10.33	0.50	0.212	0.196	---	0.02
125	10.42	0.50	0.212	0.195	---	0.02
126	10.50	0.50	0.212	0.194	---	0.02
127	10.58	0.67	0.282	0.193	---	0.09
128	10.67	0.67	0.282	0.192	---	0.09
129	10.75	0.67	0.282	0.191	---	0.09
130	10.83	0.67	0.282	0.190	---	0.09
131	10.92	0.67	0.282	0.189	---	0.09
132	11.00	0.67	0.282	0.188	---	0.09
133	11.08	0.63	0.268	0.187	---	0.08
134	11.17	0.63	0.268	0.186	---	0.08
135	11.25	0.63	0.268	0.185	---	0.08
136	11.33	0.63	0.268	0.185	---	0.08
137	11.42	0.63	0.268	0.184	---	0.08
138	11.50	0.63	0.268	0.183	---	0.09
139	11.58	0.57	0.240	0.182	---	0.06
140	11.67	0.57	0.240	0.181	---	0.06

141	11.75	0.57	0.240	0.180	---	0.06
142	11.83	0.60	0.254	0.179	---	0.07
143	11.92	0.60	0.254	0.178	---	0.08
144	12.00	0.60	0.254	0.177	---	0.08
145	12.08	0.83	0.353	0.176	---	0.18
146	12.17	0.83	0.353	0.176	---	0.18
147	12.25	0.83	0.353	0.175	---	0.18
148	12.33	0.87	0.367	0.174	---	0.19
149	12.42	0.87	0.367	0.173	---	0.19
150	12.50	0.87	0.367	0.172	---	0.19
151	12.58	0.93	0.395	0.171	---	0.22
152	12.67	0.93	0.395	0.170	---	0.22
153	12.75	0.93	0.395	0.169	---	0.23
154	12.83	0.97	0.409	0.169	---	0.24
155	12.92	0.97	0.409	0.168	---	0.24
156	13.00	0.97	0.409	0.167	---	0.24
157	13.08	1.13	0.480	0.166	---	0.31
158	13.17	1.13	0.480	0.165	---	0.31
159	13.25	1.13	0.480	0.164	---	0.32
160	13.33	1.13	0.480	0.164	---	0.32
161	13.42	1.13	0.480	0.163	---	0.32
162	13.50	1.13	0.480	0.162	---	0.32
163	13.58	0.77	0.325	0.161	---	0.16
164	13.67	0.77	0.325	0.160	---	0.16
165	13.75	0.77	0.325	0.159	---	0.17
166	13.83	0.77	0.325	0.159	---	0.17
167	13.92	0.77	0.325	0.158	---	0.17
168	14.00	0.77	0.325	0.157	---	0.17
169	14.08	0.90	0.381	0.156	---	0.22
170	14.17	0.90	0.381	0.155	---	0.23
171	14.25	0.90	0.381	0.155	---	0.23
172	14.33	0.87	0.367	0.154	---	0.21
173	14.42	0.87	0.367	0.153	---	0.21
174	14.50	0.87	0.367	0.152	---	0.21
175	14.58	0.87	0.367	0.151	---	0.22
176	14.67	0.87	0.367	0.151	---	0.22
177	14.75	0.87	0.367	0.150	---	0.22
178	14.83	0.83	0.353	0.149	---	0.20
179	14.92	0.83	0.353	0.148	---	0.20
180	15.00	0.83	0.353	0.148	---	0.21
181	15.08	0.80	0.339	0.147	---	0.19
182	15.17	0.80	0.339	0.146	---	0.19
183	15.25	0.80	0.339	0.145	---	0.19
184	15.33	0.77	0.325	0.145	---	0.18
185	15.42	0.77	0.325	0.144	---	0.18
186	15.50	0.77	0.325	0.143	---	0.18
187	15.58	0.63	0.268	0.142	---	0.13
188	15.67	0.63	0.268	0.142	---	0.13

189	15.75	0.63	0.268	0.141	---	0.13
190	15.83	0.63	0.268	0.140	---	0.13
191	15.92	0.63	0.268	0.140	---	0.13
192	16.00	0.63	0.268	0.139	---	0.13
193	16.08	0.13	0.056	0.138	0.006	0.05
194	16.17	0.13	0.056	0.137	0.006	0.05
195	16.25	0.13	0.056	0.137	0.006	0.05
196	16.33	0.13	0.056	0.136	0.006	0.05
197	16.42	0.13	0.056	0.135	0.006	0.05
198	16.50	0.13	0.056	0.135	0.006	0.05
199	16.58	0.10	0.042	0.134	0.004	0.04
200	16.67	0.10	0.042	0.133	0.004	0.04
201	16.75	0.10	0.042	0.133	0.004	0.04
202	16.83	0.10	0.042	0.132	0.004	0.04
203	16.92	0.10	0.042	0.131	0.004	0.04
204	17.00	0.10	0.042	0.131	0.004	0.04
205	17.08	0.17	0.071	0.130	0.007	0.06
206	17.17	0.17	0.071	0.129	0.007	0.06
207	17.25	0.17	0.071	0.129	0.007	0.06
208	17.33	0.17	0.071	0.128	0.007	0.06
209	17.42	0.17	0.071	0.127	0.007	0.06
210	17.50	0.17	0.071	0.127	0.007	0.06
211	17.58	0.17	0.071	0.126	0.007	0.06
212	17.67	0.17	0.071	0.125	0.007	0.06
213	17.75	0.17	0.071	0.125	0.007	0.06
214	17.83	0.13	0.056	0.124	0.006	0.05
215	17.92	0.13	0.056	0.124	0.006	0.05
216	18.00	0.13	0.056	0.123	0.006	0.05
217	18.08	0.13	0.056	0.122	0.006	0.05
218	18.17	0.13	0.056	0.122	0.006	0.05
219	18.25	0.13	0.056	0.121	0.006	0.05
220	18.33	0.13	0.056	0.121	0.006	0.05
221	18.42	0.13	0.056	0.120	0.006	0.05
222	18.50	0.13	0.056	0.119	0.006	0.05
223	18.58	0.10	0.042	0.119	0.004	0.04
224	18.67	0.10	0.042	0.118	0.004	0.04
225	18.75	0.10	0.042	0.118	0.004	0.04
226	18.83	0.07	0.028	0.117	0.003	0.03
227	18.92	0.07	0.028	0.117	0.003	0.03
228	19.00	0.07	0.028	0.116	0.003	0.03
229	19.08	0.10	0.042	0.115	0.004	0.04
230	19.17	0.10	0.042	0.115	0.004	0.04
231	19.25	0.10	0.042	0.114	0.004	0.04
232	19.33	0.13	0.056	0.114	0.006	0.05
233	19.42	0.13	0.056	0.113	0.006	0.05
234	19.50	0.13	0.056	0.113	0.006	0.05
235	19.58	0.10	0.042	0.112	0.004	0.04
236	19.67	0.10	0.042	0.112	0.004	0.04

237	19.75	0.10	0.042	0.111	0.004	0.04
238	19.83	0.07	0.028	0.111	0.003	0.03
239	19.92	0.07	0.028	0.110	0.003	0.03
240	20.00	0.07	0.028	0.110	0.003	0.03
241	20.08	0.10	0.042	0.109	0.004	0.04
242	20.17	0.10	0.042	0.109	0.004	0.04
243	20.25	0.10	0.042	0.108	0.004	0.04
244	20.33	0.10	0.042	0.108	0.004	0.04
245	20.42	0.10	0.042	0.107	0.004	0.04
246	20.50	0.10	0.042	0.107	0.004	0.04
247	20.58	0.10	0.042	0.106	0.004	0.04
248	20.67	0.10	0.042	0.106	0.004	0.04
249	20.75	0.10	0.042	0.106	0.004	0.04
250	20.83	0.07	0.028	0.105	0.003	0.03
251	20.92	0.07	0.028	0.105	0.003	0.03
252	21.00	0.07	0.028	0.104	0.003	0.03
253	21.08	0.10	0.042	0.104	0.004	0.04
254	21.17	0.10	0.042	0.103	0.004	0.04
255	21.25	0.10	0.042	0.103	0.004	0.04
256	21.33	0.07	0.028	0.103	0.003	0.03
257	21.42	0.07	0.028	0.102	0.003	0.03
258	21.50	0.07	0.028	0.102	0.003	0.03
259	21.58	0.10	0.042	0.102	0.004	0.04
260	21.67	0.10	0.042	0.101	0.004	0.04
261	21.75	0.10	0.042	0.101	0.004	0.04
262	21.83	0.07	0.028	0.100	0.003	0.03
263	21.92	0.07	0.028	0.100	0.003	0.03
264	22.00	0.07	0.028	0.100	0.003	0.03
265	22.08	0.10	0.042	0.099	0.004	0.04
266	22.17	0.10	0.042	0.099	0.004	0.04
267	22.25	0.10	0.042	0.099	0.004	0.04
268	22.33	0.07	0.028	0.099	0.003	0.03
269	22.42	0.07	0.028	0.098	0.003	0.03
270	22.50	0.07	0.028	0.098	0.003	0.03
271	22.58	0.07	0.028	0.098	0.003	0.03
272	22.67	0.07	0.028	0.097	0.003	0.03
273	22.75	0.07	0.028	0.097	0.003	0.03
274	22.83	0.07	0.028	0.097	0.003	0.03
275	22.92	0.07	0.028	0.097	0.003	0.03
276	23.00	0.07	0.028	0.096	0.003	0.03
277	23.08	0.07	0.028	0.096	0.003	0.03
278	23.17	0.07	0.028	0.096	0.003	0.03
279	23.25	0.07	0.028	0.096	0.003	0.03
280	23.33	0.07	0.028	0.096	0.003	0.03
281	23.42	0.07	0.028	0.095	0.003	0.03
282	23.50	0.07	0.028	0.095	0.003	0.03
283	23.58	0.07	0.028	0.095	0.003	0.03
284	23.67	0.07	0.028	0.095	0.003	0.03

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285  23.75     0.07      0.028         0.095     0.003         0.03
286  23.83     0.07      0.028         0.095     0.003         0.03
287  23.92     0.07      0.028         0.095     0.003         0.03
288  24.00     0.07      0.028         0.095     0.003         0.03
    Sum =     100.0                                   Sum =    25.2
       Flood volume = Effective rainfall      2.10(In)
        times area       7.5(Ac.)/[(In)/(Ft.)] =       1.3(Ac.Ft)
       Total soil loss =      1.43(In)
       Total soil loss =     0.895(Ac.Ft)
       Total rainfall =      3.53(In)
       Flood volume =       57072.6 Cubic Feet
       Total soil loss =       38989.9 Cubic Feet
       ---------------------------------------------------------------------
        Peak flow rate of this hydrograph =      2.400(CFS)
       ---------------------------------------------------------------------
       ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                           24 - H O U R    S T O R M
                      R u n o f f      H y d r o g r a p h
       ---------------------------------------------------------------------
                   Hydrograph in   5   Minute intervals ((CFS))

       ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ------------------------------------------------------------------------
   0+ 5       0.0006      0.09  Q         |         |         |         |
   0+10       0.0018      0.17  Q         |         |         |         |
   0+15       0.0030      0.18  Q         |         |         |         |
   0+20       0.0047      0.24  Q         |         |         |         |
   0+25       0.0066      0.28  VQ        |         |         |         |
   0+30       0.0085      0.28  VQ        |         |         |         |
   0+35       0.0105      0.29  VQ        |         |         |         |
   0+40       0.0125      0.29  VQ        |         |         |         |
   0+45       0.0145      0.29  VQ        |         |         |         |
   0+50       0.0168      0.33  VQ        |         |         |         |
   0+55       0.0193      0.37  VQ        |         |         |         |
   1+ 0       0.0219      0.38  VQ        |         |         |         |
   1+ 5       0.0243      0.34  VQ        |         |         |         |
   1+10       0.0264      0.30  VQ        |         |         |         |
   1+15       0.0284      0.29  VQ        |         |         |         |
   1+20       0.0304      0.29  VQ        |         |         |         |
   1+25       0.0323      0.29  VQ        |         |         |         |
   1+30       0.0343      0.29  |Q        |         |         |         |
   1+35       0.0363      0.29  |Q        |         |         |         |
   1+40       0.0383      0.29  |Q        |         |         |         |
   1+45       0.0403      0.29  |Q        |         |         |         |
   1+50       0.0426      0.33  |Q        |         |         |         |
   1+55       0.0451      0.37  |Q        |         |         |         |
   2+ 0       0.0478      0.38  |Q        |         |         |         |
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2+ 5        0.0504      0.38  |Q         |          |          |          |
2+10        0.0530      0.38  |Q         |          |          |          |
2+15        0.0557      0.38  |Q         |          |          |          |
2+20        0.0583      0.38  |Q         |          |          |          |
2+25        0.0610      0.38  |Q         |          |          |          |
2+30        0.0636      0.38  |Q         |          |          |          |
2+35        0.0666      0.43  |QV        |          |          |          |
2+40        0.0698      0.47  |QV        |          |          |          |
2+45        0.0731      0.48  |QV        |          |          |          |
2+50        0.0764      0.48  |QV        |          |          |          |
2+55        0.0797      0.48  |QV        |          |          |          |
3+ 0        0.0830      0.48  |QV        |          |          |          |
3+ 5        0.0863      0.48  |QV        |          |          |          |
3+10        0.0896      0.48  |QV        |          |          |          |
3+15        0.0929      0.48  |QV        |          |          |          |
3+20        0.0962      0.48  |QV        |          |          |          |
3+25        0.0995      0.48  |Q V       |          |          |          |
3+30        0.1029      0.48  |Q V       |          |          |          |
3+35        0.1062      0.48  |Q V       |          |          |          |
3+40        0.1095      0.48  |Q V       |          |          |          |
3+45        0.1128      0.48  |Q V       |          |          |          |
3+50        0.1164      0.52  | QV       |          |          |          |
3+55        0.1203      0.56  | QV       |          |          |          |
4+ 0        0.1242      0.57  | QV       |          |          |          |
4+ 5        0.1282      0.58  | QV       |          |          |          |
4+10        0.1322      0.58  | Q V      |          |          |          |
4+15        0.1361      0.58  | Q V      |          |          |          |
4+20        0.1404      0.62  | Q V      |          |          |          |
4+25        0.1450      0.66  | Q V      |          |          |          |
4+30        0.1496      0.67  | Q V      |          |          |          |
4+35        0.1542      0.67  | Q V      |          |          |          |
4+40        0.1588      0.67  | Q V      |          |          |          |
4+45        0.1635      0.67  | Q V      |          |          |          |
4+50        0.1684      0.72  | Q  V     |          |          |          |
4+55        0.1736      0.76  |  Q V     |          |          |          |
5+ 0        0.1789      0.76  |  Q V     |          |          |          |
5+ 5        0.1836      0.68  | Q  V     |          |          |          |
5+10        0.1877      0.60  | Q  V     |          |          |          |
5+15        0.1917      0.58  | Q  V     |          |          |          |
5+20        0.1960      0.62  | Q  V     |          |          |          |
5+25        0.2005      0.66  | Q   V    |          |          |          |
5+30        0.2051      0.67  | Q   V    |          |          |          |
5+35        0.2101      0.72  | Q   V    |          |          |          |
5+40        0.2153      0.76  |  Q  V    |          |          |          |
5+45        0.2205      0.76  |  Q  V    |          |          |          |
5+50        0.2258      0.77  |  Q  V    |          |          |          |
5+55        0.2311      0.77  |  Q   V   |          |          |          |
6+ 0        0.2364      0.77  |  Q   V   |          |          |          |
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 6+ 5       0.2420      0.81  |  Q   V  |          |          |          |
 6+10       0.2479      0.85  |  Q   V  |          |          |          |
 6+15       0.2538      0.86  |  Q   V  |          |          |          |
 6+20       0.2598      0.86  |  Q   V  |          |          |          |
 6+25       0.2657      0.86  |  Q    V |          |          |          |
 6+30       0.2717      0.86  |  Q    V |          |          |          |
 6+35       0.2779      0.91  |  Q    V |          |          |          |
 6+40       0.2845      0.95  |  Q    V |          |          |          |
 6+45       0.2911      0.96  |  Q    V |          |          |          |
 6+50       0.2977      0.96  |  Q     V|          |          |          |
 6+55       0.3043      0.96  |  Q     V|          |          |          |
 7+ 0       0.3109      0.96  |  Q     V|          |          |          |
 7+ 5       0.3175      0.96  |  Q     V|          |          |          |
 7+10       0.3241      0.96  |  Q     V|          |          |          |
 7+15       0.3308      0.96  |  Q      V          |          |          |
 7+20       0.3377      1.00  |   Q     V          |          |          |
 7+25       0.3449      1.05  |   Q     V          |          |          |
 7+30       0.3521      1.05  |   Q     V          |          |          |
 7+35       0.3597      1.10  |   Q     V          |          |          |
 7+40       0.3676      1.14  |   Q     |V         |          |          |
 7+45       0.3755      1.15  |   Q     |V         |          |          |
 7+50       0.3837      1.20  |   Q     |V         |          |          |
 7+55       0.3922      1.24  |   Q     |V         |          |          |
 8+ 0       0.4008      1.25  |   Q     | V        |          |          |
 8+ 5       0.4100      1.34  |    Q    | V        |          |          |
 8+10       0.4198      1.42  |    Q    | V        |          |          |
 8+15       0.4296      1.43  |    Q    |  V       |          |          |
 8+20       0.4396      1.44  |    Q    |  V       |          |          |
 8+25       0.4495      1.44  |    Q    |  V       |          |          |
 8+30       0.4594      1.44  |    Q    |   V      |          |          |
 8+35       0.4651      0.82  |  Q      |   V      |          |          |
 8+40       0.4667      0.24  Q         |   V      |          |          |
 8+45       0.4676      0.13  Q         |   V      |          |          |
 8+50       0.4686      0.14  Q         |   V      |          |          |
 8+55       0.4699      0.19  Q         |   V      |          |          |
 9+ 0       0.4713      0.21  Q         |   V      |          |          |
 9+ 5       0.4735      0.31  |Q        |   V      |          |          |
 9+10       0.4763      0.41  |Q        |   V      |          |          |
 9+15       0.4793      0.44  |Q        |   V      |          |          |
 9+20       0.4828      0.50  | Q       |   V      |          |          |
 9+25       0.4866      0.56  | Q       |   V      |          |          |
 9+30       0.4906      0.57  | Q       |   V      |          |          |
 9+35       0.4949      0.63  | Q       |    V     |          |          |
 9+40       0.4996      0.68  | Q       |    V     |          |          |
 9+45       0.5045      0.70  | Q       |    V     |          |          |
 9+50       0.5097      0.76  |  Q      |    V     |          |          |
 9+55       0.5153      0.81  |  Q      |    V     |          |          |
10+ 0       0.5210      0.83  |  Q      |    V     |          |          |
```

```
10+ 5       0.5245      0.50  | Q       |     V   |         |         |
10+10       0.5258      0.19  Q         |     V   |         |         |
10+15       0.5267      0.14  Q         |     V   |         |         |
10+20       0.5275      0.12  Q         |     V   |         |         |
10+25       0.5284      0.12  Q         |     V   |         |         |
10+30       0.5293      0.13  Q         |     V   |         |         |
10+35       0.5319      0.38  |Q        |     V   |         |         |
10+40       0.5361      0.61  | Q       |     V   |         |         |
10+45       0.5407      0.67  | Q       |     V   |         |         |
10+50       0.5454      0.69  | Q       |     V   |         |         |
10+55       0.5503      0.70  | Q       |     V   |         |         |
11+ 0       0.5551      0.71  | Q       |     V   |         |         |
11+ 5       0.5597      0.67  | Q       |      V  |         |         |
11+10       0.5640      0.63  | Q       |      V  |         |         |
11+15       0.5683      0.62  | Q       |      V  |         |         |
11+20       0.5727      0.63  | Q       |      V  |         |         |
11+25       0.5770      0.63  | Q       |      V  |         |         |
11+30       0.5814      0.64  | Q       |      V  |         |         |
11+35       0.5852      0.55  | Q       |      V  |         |         |
11+40       0.5885      0.47  |Q        |      V  |         |         |
11+45       0.5916      0.46  |Q        |       V |         |         |
11+50       0.5951      0.50  | Q       |       V |         |         |
11+55       0.5989      0.56  | Q       |       V |         |         |
12+ 0       0.6028      0.57  | Q       |       V |         |         |
12+ 5       0.6092      0.92  |  Q      |       V |         |         |
12+10       0.6178      1.25  |   Q     |       V |         |         |
12+15       0.6268      1.31  |    Q    |        V|         |         |
12+20       0.6364      1.40  |    Q    |        V|         |         |
12+25       0.6464      1.45  |    Q    |        V|         |         |
12+30       0.6565      1.47  |    Q    |         V         |         |
12+35       0.6673      1.57  |     Q   |         V         |         |
12+40       0.6788      1.67  |     Q   |         V         |         |
12+45       0.6905      1.69  |     Q   |         |V        |         |
12+50       0.7026      1.76  |      Q  |         |V        |         |
12+55       0.7151      1.81  |      Q  |         |V        |         |
13+ 0       0.7276      1.82  |      Q  |         | V       |         |
13+ 5       0.7420      2.08  |       Q |         | V       |         |
13+10       0.7579      2.31  |        Q|         |  V      |         |
13+15       0.7741      2.36  |        Q|         |  V      |         |
13+20       0.7906      2.39  |        Q|         |   V     |         |
13+25       0.8071      2.39  |        Q|         |   V     |         |
13+30       0.8236      2.40  |        Q|         |    V    |         |
13+35       0.8365      1.87  |      Q  |         |    V    |         |
13+40       0.8460      1.38  |    Q    |         |    V    |         |
13+45       0.8549      1.29  |    Q    |         |     V   |         |
13+50       0.8635      1.25  |    Q    |         |     V   |         |
13+55       0.8722      1.26  |    Q    |         |     V   |         |
14+ 0       0.8809      1.26  |    Q    |         |     V   |         |
```

```
14+ 5       0.8909      1.46  |    Q    |          |      V  |          |
14+10       0.9023      1.65  |     Q   |          |      V  |          |
14+15       0.9140      1.69  |     Q   |          |      V  |          |
14+20       0.9254      1.67  |     Q   |          |       V |          |
14+25       0.9366      1.63  |     Q   |          |       V |          |
14+30       0.9478      1.62  |     Q   |          |       V |          |
14+35       0.9590      1.63  |     Q   |          |        V|          |
14+40       0.9703      1.63  |     Q   |          |        V|          |
14+45       0.9815      1.64  |     Q   |          |        V|          |
14+50       0.9925      1.59  |     Q   |          |         V          |
14+55       1.0032      1.56  |     Q   |          |         V          |
15+ 0       1.0139      1.55  |     Q   |          |         V          |
15+ 5       1.0243      1.51  |     Q   |          |         |V         |
15+10       1.0344      1.47  |    Q    |          |         |V         |
15+15       1.0445      1.46  |    Q    |          |         |V         |
15+20       1.0542      1.42  |    Q    |          |         | V        |
15+25       1.0637      1.38  |    Q    |          |         | V        |
15+30       1.0731      1.37  |    Q    |          |         | V        |
15+35       1.0813      1.18  |   Q     |          |         |  V       |
15+40       1.0882      1.00  |   Q     |          |         |  V       |
15+45       1.0949      0.97  |  Q      |          |         |  V       |
15+50       1.1015      0.96  |  Q      |          |         |  V       |
15+55       1.1082      0.97  |  Q      |          |         |  V       |
16+ 0       1.1149      0.97  |  Q      |          |         |   V      |
16+ 5       1.1198      0.71  | Q       |          |         |   V      |
16+10       1.1229      0.46  |Q        |          |         |   V      |
16+15       1.1257      0.41  |Q        |          |         |   V      |
16+20       1.1284      0.38  |Q        |          |         |   V      |
16+25       1.1310      0.38  |Q        |          |         |   V      |
16+30       1.1337      0.38  |Q        |          |         |   V      |
16+35       1.1360      0.34  |Q        |          |         |   V      |
16+40       1.1381      0.30  |Q        |          |         |   V      |
16+45       1.1401      0.29  |Q        |          |         |   V      |
16+50       1.1421      0.29  |Q        |          |         |   V      |
16+55       1.1441      0.29  |Q        |          |         |   V      |
17+ 0       1.1461      0.29  |Q        |          |         |   V      |
17+ 5       1.1486      0.38  |Q        |          |         |    V     |
17+10       1.1518      0.46  |Q        |          |         |    V     |
17+15       1.1550      0.47  |Q        |          |         |    V     |
17+20       1.1584      0.48  |Q        |          |         |    V     |
17+25       1.1617      0.48  |Q        |          |         |    V     |
17+30       1.1650      0.48  |Q        |          |         |    V     |
17+35       1.1683      0.48  |Q        |          |         |    V     |
17+40       1.1716      0.48  |Q        |          |         |    V     |
17+45       1.1749      0.48  |Q        |          |         |    V     |
17+50       1.1779      0.44  |Q        |          |         |    V     |
17+55       1.1806      0.40  |Q        |          |         |     V    |
18+ 0       1.1833      0.39  |Q        |          |         |     V    |
```

```
18+ 5       1.1859      0.38  |Q         |          |          |      V   |
18+10       1.1886      0.38  |Q         |          |          |      V   |
18+15       1.1912      0.38  |Q         |          |          |      V   |
18+20       1.1939      0.38  |Q         |          |          |      V   |
18+25       1.1965      0.38  |Q         |          |          |      V   |
18+30       1.1992      0.38  |Q         |          |          |      V   |
18+35       1.2015      0.34  |Q         |          |          |      V   |
18+40       1.2036      0.30  |Q         |          |          |      V   |
18+45       1.2056      0.29  |Q         |          |          |      V   |
18+50       1.2073      0.24  Q          |          |          |      V   |
18+55       1.2087      0.20  Q          |          |          |      V   |
19+ 0       1.2100      0.20  Q          |          |          |      V   |
19+ 5       1.2117      0.24  Q          |          |          |      V   |
19+10       1.2136      0.28  |Q         |          |          |       V  |
19+15       1.2155      0.28  |Q         |          |          |       V  |
19+20       1.2178      0.33  |Q         |          |          |       V  |
19+25       1.2204      0.37  |Q         |          |          |       V  |
19+30       1.2230      0.38  |Q         |          |          |       V  |
19+35       1.2253      0.34  |Q         |          |          |       V  |
19+40       1.2274      0.30  |Q         |          |          |       V  |
19+45       1.2294      0.29  |Q         |          |          |       V  |
19+50       1.2311      0.24  Q          |          |          |       V  |
19+55       1.2325      0.20  Q          |          |          |       V  |
20+ 0       1.2339      0.20  Q          |          |          |       V  |
20+ 5       1.2355      0.24  Q          |          |          |       V  |
20+10       1.2374      0.28  |Q         |          |          |       V  |
20+15       1.2393      0.28  |Q         |          |          |       V  |
20+20       1.2413      0.29  |Q         |          |          |       V  |
20+25       1.2433      0.29  |Q         |          |          |       V  |
20+30       1.2453      0.29  |Q         |          |          |        V |
20+35       1.2473      0.29  |Q         |          |          |        V |
20+40       1.2493      0.29  |Q         |          |          |        V |
20+45       1.2512      0.29  |Q         |          |          |        V |
20+50       1.2529      0.24  Q          |          |          |        V |
20+55       1.2543      0.20  Q          |          |          |        V |
21+ 0       1.2557      0.20  Q          |          |          |        V |
21+ 5       1.2573      0.24  Q          |          |          |        V |
21+10       1.2592      0.28  |Q         |          |          |        V |
21+15       1.2612      0.28  |Q         |          |          |        V |
21+20       1.2629      0.24  Q          |          |          |        V |
21+25       1.2643      0.20  Q          |          |          |        V |
21+30       1.2656      0.20  Q          |          |          |        V |
21+35       1.2672      0.24  Q          |          |          |        V |
21+40       1.2691      0.28  |Q         |          |          |        V |
21+45       1.2711      0.28  |Q         |          |          |        V |
21+50       1.2728      0.24  Q          |          |          |        V |
21+55       1.2742      0.20  Q          |          |          |        V |
22+ 0       1.2755      0.20  Q          |          |          |        V |
```

```
   22+ 5       1.2772      0.24  Q         |         |         |        V |
   22+10       1.2791      0.28  |Q        |         |         |         V|
   22+15       1.2810      0.28  |Q        |         |         |         V|
   22+20       1.2827      0.24  Q         |         |         |         V|
   22+25       1.2841      0.20  Q         |         |         |         V|
   22+30       1.2855      0.20  Q         |         |         |         V|
   22+35       1.2868      0.19  Q         |         |         |         V|
   22+40       1.2881      0.19  Q         |         |         |         V|
   22+45       1.2894      0.19  Q         |         |         |         V|
   22+50       1.2907      0.19  Q         |         |         |         V|
   22+55       1.2921      0.19  Q         |         |         |         V|
   23+ 0       1.2934      0.19  Q         |         |         |         V|
   23+ 5       1.2947      0.19  Q         |         |         |         V|
   23+10       1.2960      0.19  Q         |         |         |         V|
   23+15       1.2974      0.19  Q         |         |         |         V|
   23+20       1.2987      0.19  Q         |         |         |         V|
   23+25       1.3000      0.19  Q         |         |         |         V|
   23+30       1.3013      0.19  Q         |         |         |         V|
   23+35       1.3027      0.19  Q         |         |         |         V|
   23+40       1.3040      0.19  Q         |         |         |         V|
   23+45       1.3053      0.19  Q         |         |         |         V|
   23+50       1.3066      0.19  Q         |         |         |         V|
   23+55       1.3080      0.19  Q         |         |         |         V|
   24+ 0       1.3093      0.19  Q         |         |         |         V|
   24+ 5       1.3100      0.11  Q         |         |         |         V|
   24+10       1.3102      0.02  Q         |         |         |         V|
   24+15       1.3102      0.01  Q         |         |         |         V|
-----------------------------------------------------------------------
```

Appendix D

POST-CONSTRUCTION CONDITIONS
100 YEAR 1 HOUR STORM

U n i t H y d r o g r a p h A n a l y s i s

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Study date 12/27/16 File: lakeshorep1100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6064

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 7.50(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.50(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 1150.00(Ft.)
Length along longest watercourse measured to centroid = 475.21(Ft.)
Length along longest watercourse = 0.218 Mi.
Length along longest watercourse measured to centroid = 0.090 Mi.
Difference in elevation = 9.50(Ft.)
Slope along watercourse = 43.6174 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.039 Hr.
Lag time = 2.37 Min.
25% of lag time = 0.59 Min.
40% of lag time = 0.95 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	0.60	4.50

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	1.50	11.25

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.600(In)
Area Averaged 100-Year Rainfall = 1.500(In)

Point rain (area averaged) = 1.500(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.500	56.00	0.700

Total Area Entered = 7.50(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	74.8	0.305	0.700	0.113	1.000	0.113
					Sum (F) =	0.113

Area averaged mean soil loss (F) (In/Hr) = 0.113
Minimum soil loss rate ((In/Hr)) = 0.056
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.100

Slope of intensity-duration curve for a 1 hour storm =0.4800

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	211.335	45.293	3.424
2	0.167	422.670	42.584	3.219
3	0.250	634.005	8.351	0.631
4	0.333	845.340	3.771	0.285

lakeshorep1100
Sum = 100.000 Sum= 7.559

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	4.40	0.792	0.113	---	0.68
2	0.17	4.50	0.810	0.113	---	0.70
3	0.25	5.40	0.972	0.113	---	0.86
4	0.33	5.40	0.972	0.113	---	0.86
5	0.42	5.70	1.026	0.113	---	0.91
6	0.50	6.40	1.152	0.113	---	1.04
7	0.58	7.90	1.422	0.113	---	1.31
8	0.67	9.10	1.638	0.113	---	1.52
9	0.75	12.80	2.304	0.113	---	2.19
10	0.83	25.60	4.608	0.113	---	4.49
11	0.92	7.90	1.422	0.113	---	1.31
12	1.00	4.90	0.882	0.113	---	0.77
Sum =		100.0			Sum =	16.6

Flood volume = Effective rainfall 1.39(In)
times area 7.5(Ac.)/[(In)/(Ft.)] = 0.9(Ac.Ft)
Total soil loss = 0.11(In)
Total soil loss = 0.071(Ac.Ft)
Total rainfall = 1.50(In)
Flood volume = 37758.8 Cubic Feet
Total soil loss = 3076.0 Cubic Feet

Peak flow rate of this hydrograph = 23.788(CFS)

++

1 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

```
Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
-----------------------------------------------------------------------
  0+ 5       0.0160      2.33  V  Q      |         |         |         |
  0+10       0.0475      4.57  | V   Q   |         |         |         |
  0+15       0.0862      5.62  |  V   Q  |         |         |         |
  0+20       0.1299      6.34  |    V  Q |         |         |         |
  0+25       0.1756      6.63  |       Q |         |         |         |
  0+30       0.2257      7.29  |        QV         |         |         |
  0+35       0.2853      8.65  |         |Q V      |         |         |
  0+40       0.3566     10.36  |         |  Q  V   |         |         |
  0+45       0.4499     13.54  |         |       Q V         |         |
  0+50       0.6137     23.79  |         |         |       V |Q        |
```

```
                                  lakeshorep1100
    0+55       0.7568     20.78  |         |         |      Q  |   V     |
    1+ 0       0.8278     10.31  |         |  Q      |         |       V |
    1+ 5       0.8594      4.58  |     Q   |         |         |        V|
    1+10       0.8653      0.86  |Q        |         |         |        V|
    1+15       0.8668      0.22  Q         |         |         |         V
-----------------------------------------------------------------------
```

lakeshorep3100

POST-CONSTRUCTION CONDITIONS
100 YEAR 3 HOUR STORM

U n i t H y d r o g r a p h A n a l y s i s

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Study date 12/27/16 File: lakeshorep3100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6064

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

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Drainage Area for Depth-Area Areal Adjustment = 7.50(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 1150.00(Ft.)
Length along longest watercourse measured to centroid = 475.21(Ft.)
Length along longest watercourse = 0.218 Mi.
Length along longest watercourse measured to centroid = 0.090 Mi.
Difference in elevation = 9.50(Ft.)
Slope along watercourse = 43.6174 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.039 Hr.
Lag time = 2.37 Min.
25% of lag time = 0.59 Min.
40% of lag time = 0.95 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	1.00	7.50

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	2.50	18.75

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.000(In)
Area Averaged 100-Year Rainfall = 2.500(In)

Point rain (area averaged) = 2.500(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.500	56.00	0.700

Total Area Entered = 7.50(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	74.8	0.305	0.700	0.113	1.000	0.113
					Sum (F) =	0.113

Area averaged mean soil loss (F) (In/Hr) = 0.113
Minimum soil loss rate ((In/Hr)) = 0.056
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.100

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	211.335	45.293	3.424
2	0.167	422.670	42.584	3.219
3	0.250	634.005	8.351	0.631
4	0.333	845.340	3.771	0.285
			Sum = 100.000	Sum= 7.559

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	1.30	0.390	0.113	---	0.28
2	0.17	1.30	0.390	0.113	---	0.28
3	0.25	1.10	0.330	0.113	---	0.22
4	0.33	1.50	0.450	0.113	---	0.34
5	0.42	1.50	0.450	0.113	---	0.34
6	0.50	1.80	0.540	0.113	---	0.43
7	0.58	1.50	0.450	0.113	---	0.34
8	0.67	1.80	0.540	0.113	---	0.43
9	0.75	1.80	0.540	0.113	---	0.43
10	0.83	1.50	0.450	0.113	---	0.34
11	0.92	1.60	0.480	0.113	---	0.37
12	1.00	1.80	0.540	0.113	---	0.43
13	1.08	2.20	0.660	0.113	---	0.55
14	1.17	2.20	0.660	0.113	---	0.55
15	1.25	2.20	0.660	0.113	---	0.55
16	1.33	2.00	0.600	0.113	---	0.49
17	1.42	2.60	0.780	0.113	---	0.67
18	1.50	2.70	0.810	0.113	---	0.70
19	1.58	2.40	0.720	0.113	---	0.61
20	1.67	2.70	0.810	0.113	---	0.70
21	1.75	3.30	0.990	0.113	---	0.88
22	1.83	3.10	0.930	0.113	---	0.82
23	1.92	2.90	0.870	0.113	---	0.76
24	2.00	3.00	0.900	0.113	---	0.79
25	2.08	3.10	0.930	0.113	---	0.82
26	2.17	4.20	1.260	0.113	---	1.15
27	2.25	5.00	1.500	0.113	---	1.39
28	2.33	3.50	1.050	0.113	---	0.94
29	2.42	6.80	2.040	0.113	---	1.93
30	2.50	7.30	2.190	0.113	---	2.08
31	2.58	8.20	2.460	0.113	---	2.35
32	2.67	5.90	1.770	0.113	---	1.66
33	2.75	2.00	0.600	0.113	---	0.49
34	2.83	1.80	0.540	0.113	---	0.43
35	2.92	1.80	0.540	0.113	---	0.43
36	3.00	0.60	0.180	0.113	---	0.07
Sum =		100.0			Sum =	25.9

Flood volume = Effective rainfall 2.16(In)
times area 7.5(Ac.)/[(In)/(Ft.)] = 1.4(Ac.Ft)
Total soil loss = 0.34(In)
Total soil loss = 0.212(Ac.Ft)
Total rainfall = 2.50(In)
Flood volume = 58832.4 Cubic Feet
Total soil loss = 9227.9 Cubic Feet

lakeshorep3100

Peak flow rate of this hydrograph = 16.212(CFS)

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3 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0 5.0 10.0 15.0 20.0
0+ 5	0.0065	0.95	VQ | | | |
0+10	0.0192	1.84	V Q | | | |
0+15	0.0317	1.81	V Q | | | |
0+20	0.0462	2.11	|V Q | | | |
0+25	0.0631	2.46	|V Q | | | |
0+30	0.0825	2.82	| V Q | | | |
0+35	0.1021	2.84	| V Q | | | |
0+40	0.1222	2.91	| V Q | | | |
0+45	0.1440	3.17	| V Q | | | |
0+50	0.1639	2.90	| VQ | | | |
0+55	0.1828	2.73	| Q | | | |
1+ 0	0.2033	2.98	| QV | | | |
1+ 5	0.2279	3.58	| VQ | | | |
1+10	0.2555	4.01	| VQ | | | |
1+15	0.2838	4.10	| Q | | | |
1+20	0.3109	3.93	| Q V| | | |
1+25	0.3409	4.35	| Q V | | |
1+30	0.3753	5.00	| Q|V | | |
1+35	0.4089	4.88	| Q| V | | |
1+40	0.4432	4.97	| Q| V | | |
1+45	0.4833	5.83	| |Q V | | |
1+50	0.5263	6.24	| | Q V | | |
1+55	0.5674	5.98	| |Q V | | |
2+ 0	0.6081	5.90	| |Q V | | |
2+ 5	0.6497	6.04	| | Q V| | |
2+10	0.6998	7.27	| | Q V | |
2+15	0.7630	9.18	| | Q | V | |
2+20	0.8225	8.63	| | Q | V | |
2+25	0.8970	10.82	| | |Q V | |
2+30	0.9956	14.31	| | | QV| |
2+35	1.1072	16.21	| | | | Q |
2+40	1.2112	15.10	| | | Q V |
2+45	1.2737	9.08	| | Q | | V |
2+50	1.3064	4.75	| Q| | | V |
2+55	1.3313	3.62	| Q | | | V|
3+ 0	1.3452	2.01	| Q | | | V|

```
    3+ 5       1.3493      0.61  |Q        |         |         |        V|
    3+10       1.3505      0.16  Q         |         |         |        V|
    3+15       1.3506      0.02  Q         |         |         |         V
-----------------------------------------------------------------------
```

POST-CONSTRUCTION CONDITIONS
100 YEAR 6 HOUR STORM

U n i t H y d r o g r a p h A n a l y s i s

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Study date 12/27/16 File: lakeshorep6100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6064

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 7.50(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.50(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 1150.00(Ft.)
Length along longest watercourse measured to centroid = 475.21(Ft.)
Length along longest watercourse = 0.218 Mi.
Length along longest watercourse measured to centroid = 0.090 Mi.
Difference in elevation = 9.50(Ft.)
Slope along watercourse = 43.6174 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.039 Hr.
Lag time = 2.37 Min.
25% of lag time = 0.59 Min.
40% of lag time = 0.95 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	1.40	10.50

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	3.50	26.25

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.400(In)
Area Averaged 100-Year Rainfall = 3.500(In)

Point rain (area averaged) = 3.500(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 3.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.500	56.00	0.700

Total Area Entered = 7.50(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	74.8	0.305	0.700	0.113	1.000	0.113
					Sum (F) =	0.113

Area averaged mean soil loss (F) (In/Hr) = 0.113
Minimum soil loss rate ((In/Hr)) = 0.056
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.100

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	211.335	45.293	3.424
2	0.167	422.670	42.584	3.219
3	0.250	634.005	8.351	0.631
4	0.333	845.340	3.771	0.285
			Sum = 100.000	Sum= 7.559

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.50	0.210	0.113	---	0.10
2	0.17	0.60	0.252	0.113	---	0.14
3	0.25	0.60	0.252	0.113	---	0.14
4	0.33	0.60	0.252	0.113	---	0.14
5	0.42	0.60	0.252	0.113	---	0.14
6	0.50	0.70	0.294	0.113	---	0.18
7	0.58	0.70	0.294	0.113	---	0.18
8	0.67	0.70	0.294	0.113	---	0.18
9	0.75	0.70	0.294	0.113	---	0.18
10	0.83	0.70	0.294	0.113	---	0.18
11	0.92	0.70	0.294	0.113	---	0.18
12	1.00	0.80	0.336	0.113	---	0.22
13	1.08	0.80	0.336	0.113	---	0.22
14	1.17	0.80	0.336	0.113	---	0.22
15	1.25	0.80	0.336	0.113	---	0.22
16	1.33	0.80	0.336	0.113	---	0.22
17	1.42	0.80	0.336	0.113	---	0.22
18	1.50	0.80	0.336	0.113	---	0.22
19	1.58	0.80	0.336	0.113	---	0.22
20	1.67	0.80	0.336	0.113	---	0.22
21	1.75	0.80	0.336	0.113	---	0.22
22	1.83	0.80	0.336	0.113	---	0.22
23	1.92	0.80	0.336	0.113	---	0.22
24	2.00	0.90	0.378	0.113	---	0.27
25	2.08	0.80	0.336	0.113	---	0.22
26	2.17	0.90	0.378	0.113	---	0.27
27	2.25	0.90	0.378	0.113	---	0.27
28	2.33	0.90	0.378	0.113	---	0.27
29	2.42	0.90	0.378	0.113	---	0.27
30	2.50	0.90	0.378	0.113	---	0.27
31	2.58	0.90	0.378	0.113	---	0.27
32	2.67	0.90	0.378	0.113	---	0.27
33	2.75	1.00	0.420	0.113	---	0.31
34	2.83	1.00	0.420	0.113	---	0.31
35	2.92	1.00	0.420	0.113	---	0.31
36	3.00	1.00	0.420	0.113	---	0.31
37	3.08	1.00	0.420	0.113	---	0.31
38	3.17	1.10	0.462	0.113	---	0.35
39	3.25	1.10	0.462	0.113	---	0.35
40	3.33	1.10	0.462	0.113	---	0.35
41	3.42	1.20	0.504	0.113	---	0.39
42	3.50	1.30	0.546	0.113	---	0.43
43	3.58	1.40	0.588	0.113	---	0.48
44	3.67	1.40	0.588	0.113	---	0.48

45	3.75	1.50	0.630	0.113	---	0.52
46	3.83	1.50	0.630	0.113	---	0.52
47	3.92	1.60	0.672	0.113	---	0.56
48	4.00	1.60	0.672	0.113	---	0.56
49	4.08	1.70	0.714	0.113	---	0.60
50	4.17	1.80	0.756	0.113	---	0.64
51	4.25	1.90	0.798	0.113	---	0.68
52	4.33	2.00	0.840	0.113	---	0.73
53	4.42	2.10	0.882	0.113	---	0.77
54	4.50	2.10	0.882	0.113	---	0.77
55	4.58	2.20	0.924	0.113	---	0.81
56	4.67	2.30	0.966	0.113	---	0.85
57	4.75	2.40	1.008	0.113	---	0.89
58	4.83	2.40	1.008	0.113	---	0.89
59	4.92	2.50	1.050	0.113	---	0.94
60	5.00	2.60	1.092	0.113	---	0.98
61	5.08	3.10	1.302	0.113	---	1.19
62	5.17	3.60	1.512	0.113	---	1.40
63	5.25	3.90	1.638	0.113	---	1.52
64	5.33	4.20	1.764	0.113	---	1.65
65	5.42	4.70	1.974	0.113	---	1.86
66	5.50	5.60	2.352	0.113	---	2.24
67	5.58	1.90	0.798	0.113	---	0.68
68	5.67	0.90	0.378	0.113	---	0.27
69	5.75	0.60	0.252	0.113	---	0.14
70	5.83	0.50	0.210	0.113	---	0.10
71	5.92	0.30	0.126	0.113	---	0.01
72	6.00	0.20	0.084	0.113	0.008	0.08
Sum =		100.0			Sum =	34.0

```
   Flood volume = Effective rainfall      2.83(In)
    times area       7.5(Ac.)/[(In)/(Ft.)] =       1.8(Ac.Ft)
   Total soil loss =      0.67(In)
   Total soil loss =     0.418(Ac.Ft)
   Total rainfall =      3.50(In)
   Flood volume =       77066.5 Cubic Feet
   Total soil loss =       18218.5 Cubic Feet
   ---------------------------------------------------------------------
    Peak flow rate of this hydrograph =     15.140(CFS)
   ---------------------------------------------------------------------
   +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        6 - H O U R    S T O R M
                   R u n o f f      H y d r o g r a p h
   ---------------------------------------------------------------------
               Hydrograph in   5   Minute intervals ((CFS))

   ---------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
```

```
0+ 5       0.0023      0.33  Q          |          |          |          |
0+10       0.0077      0.79  VQ         |          |          |          |
0+15       0.0145      0.99  VQ         |          |          |          |
0+20       0.0217      1.04  V Q        |          |          |          |
0+25       0.0289      1.05  V Q        |          |          |          |
0+30       0.0371      1.20  V Q        |          |          |          |
0+35       0.0463      1.33  |VQ        |          |          |          |
0+40       0.0556      1.36  |VQ        |          |          |          |
0+45       0.0651      1.37  |VQ        |          |          |          |
0+50       0.0745      1.37  |VQ        |          |          |          |
0+55       0.0839      1.37  |VQ        |          |          |          |
1+ 0       0.0943      1.51  | VQ       |          |          |          |
1+ 5       0.1057      1.65  | VQ       |          |          |          |
1+10       0.1172      1.67  | VQ       |          |          |          |
1+15       0.1288      1.69  | VQ       |          |          |          |
1+20       0.1405      1.69  |  Q       |          |          |          |
1+25       0.1521      1.69  |  Q       |          |          |          |
1+30       0.1637      1.69  |  Q       |          |          |          |
1+35       0.1753      1.69  |  Q       |          |          |          |
1+40       0.1869      1.69  |  QV      |          |          |          |
1+45       0.1985      1.69  |  QV      |          |          |          |
1+50       0.2101      1.69  |  QV      |          |          |          |
1+55       0.2218      1.69  |  Q V     |          |          |          |
2+ 0       0.2344      1.83  |  Q V     |          |          |          |
2+ 5       0.2469      1.82  |  Q V     |          |          |          |
2+10       0.2597      1.86  |  Q V     |          |          |          |
2+15       0.2733      1.98  |  Q  V    |          |          |          |
2+20       0.2870      1.99  |  Q  V    |          |          |          |
2+25       0.3008      2.00  |   Q V    |          |          |          |
2+30       0.3146      2.00  |   Q  V   |          |          |          |
2+35       0.3284      2.00  |   Q  V   |          |          |          |
2+40       0.3422      2.00  |   Q  V   |          |          |          |
2+45       0.3570      2.15  |   Q   V  |          |          |          |
2+50       0.3728      2.28  |   Q   V  |          |          |          |
2+55       0.3887      2.31  |   Q   V  |          |          |          |
3+ 0       0.4047      2.32  |   Q    V|          |          |          |
3+ 5       0.4207      2.32  |   Q    V|          |          |          |
3+10       0.4376      2.47  |   Q    V|          |          |          |
3+15       0.4555      2.60  |    Q    V          |          |          |
3+20       0.4736      2.63  |    Q    V          |          |          |
3+25       0.4928      2.78  |    Q    |V         |          |          |
3+30       0.5139      3.06  |     Q   |V         |          |          |
3+35       0.5371      3.37  |     Q   | V        |          |          |
3+40       0.5615      3.54  |      Q  | V        |          |          |
3+45       0.5871      3.72  |      Q  |  V       |          |          |
3+50       0.6138      3.87  |      Q  |  V       |          |          |
3+55       0.6416      4.04  |       Q |   V      |          |          |
4+ 0       0.6705      4.19  |       Q |    V     |          |          |
```

```
    4+ 5       0.7005      4.36  |       Q |    V    |         |         |
    4+10       0.7325      4.65  |        Q|     V   |         |         |
    4+15       0.7667      4.96  |        Q|      V  |         |         |
    4+20       0.8030      5.27  |         Q       V |         |         |
    4+25       0.8415      5.59  |         |Q       V|         |         |
    4+30       0.8812      5.77  |         |Q       V|         |         |
    4+35       0.9222      5.95  |         |Q        V         |         |
    4+40       0.9651      6.24  |         | Q       |V        |         |
    4+45       1.0102      6.54  |         |  Q      | V       |         |
    4+50       1.0565      6.72  |         |  Q      |  V      |         |
    4+55       1.1040      6.90  |         |  Q      |   V     |         |
    5+ 0       1.1535      7.19  |         |   Q     |     V   |         |
    5+ 5       1.2091      8.07  |         |     Q   |      V  |         |
    5+10       1.2746      9.51  |         |        Q|       V |         |
    5+15       1.3487     10.76  |         |         |Q        V         |
    5+20       1.4299     11.79  |         |         |  Q      | V       |
    5+25       1.5198     13.05  |         |         |     Q   |   V     |
    5+30       1.6240     15.14  |         |         |         Q     V   |
    5+35       1.7012     11.20  |         |         | Q       |       V |
    5+40       1.7360      5.06  |         Q         |         |        V|
    5+45       1.7526      2.40  |   Q     |         |         |        V|
    5+50       1.7604      1.14  | Q       |         |         |        V|
    5+55       1.7640      0.52  |Q        |         |         |        V|
    6+ 0       1.7668      0.40  Q         |         |         |        V|
    6+ 5       1.7687      0.28  Q         |         |         |        V|
    6+10       1.7691      0.05  Q         |         |         |        V|
    6+15       1.7692      0.02  Q         |         |         |        V|
-----------------------------------------------------------------------
```

lakeshorep24100

POST-CONSTRUCTION CONDITIONS
100 YEAR 24 HOUR STORM

U n i t H y d r o g r a p h A n a l y s i s

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Study date 12/27/16 File: lakeshorep24100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6064

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 7.50(Ac.) = 0.012 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 7.50(Ac.) = 0.012 Sq. Mi.
Length along longest watercourse = 1150.00(Ft.)
Length along longest watercourse measured to centroid = 475.21(Ft.)
Length along longest watercourse = 0.218 Mi.
Length along longest watercourse measured to centroid = 0.090 Mi.
Difference in elevation = 9.50(Ft.)
Slope along watercourse = 43.6174 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.039 Hr.
Lag time = 2.37 Min.
25% of lag time = 0.59 Min.
40% of lag time = 0.95 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	2.50	18.75

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
7.50	5.00	37.50

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 2.500(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 5.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 5.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
7.500	56.00	0.700

Total Area Entered = 7.50(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	74.8	0.305	0.700	0.113	1.000	0.113
					Sum (F) =	0.113

Area averaged mean soil loss (F) (In/Hr) = 0.113
Minimum soil loss rate ((In/Hr)) = 0.056
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.100

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	211.335	45.293	3.424
2	0.167	422.670	42.584	3.219
3	0.250	634.005	8.351	0.631
4	0.333	845.340	3.771	0.285
			Sum = 100.000	Sum= 7.559

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lakeshorep24100

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.040	0.200	0.004	0.04
2	0.17	0.07	0.040	0.200	0.004	0.04
3	0.25	0.07	0.040	0.199	0.004	0.04
4	0.33	0.10	0.060	0.198	0.006	0.05
5	0.42	0.10	0.060	0.197	0.006	0.05
6	0.50	0.10	0.060	0.196	0.006	0.05
7	0.58	0.10	0.060	0.196	0.006	0.05
8	0.67	0.10	0.060	0.195	0.006	0.05
9	0.75	0.10	0.060	0.194	0.006	0.05
10	0.83	0.13	0.080	0.193	0.008	0.07
11	0.92	0.13	0.080	0.193	0.008	0.07
12	1.00	0.13	0.080	0.192	0.008	0.07
13	1.08	0.10	0.060	0.191	0.006	0.05
14	1.17	0.10	0.060	0.190	0.006	0.05
15	1.25	0.10	0.060	0.190	0.006	0.05
16	1.33	0.10	0.060	0.189	0.006	0.05
17	1.42	0.10	0.060	0.188	0.006	0.05
18	1.50	0.10	0.060	0.187	0.006	0.05
19	1.58	0.10	0.060	0.187	0.006	0.05
20	1.67	0.10	0.060	0.186	0.006	0.05
21	1.75	0.10	0.060	0.185	0.006	0.05
22	1.83	0.13	0.080	0.184	0.008	0.07
23	1.92	0.13	0.080	0.184	0.008	0.07
24	2.00	0.13	0.080	0.183	0.008	0.07
25	2.08	0.13	0.080	0.182	0.008	0.07
26	2.17	0.13	0.080	0.181	0.008	0.07
27	2.25	0.13	0.080	0.181	0.008	0.07
28	2.33	0.13	0.080	0.180	0.008	0.07
29	2.42	0.13	0.080	0.179	0.008	0.07
30	2.50	0.13	0.080	0.178	0.008	0.07
31	2.58	0.17	0.100	0.178	0.010	0.09
32	2.67	0.17	0.100	0.177	0.010	0.09
33	2.75	0.17	0.100	0.176	0.010	0.09
34	2.83	0.17	0.100	0.176	0.010	0.09
35	2.92	0.17	0.100	0.175	0.010	0.09
36	3.00	0.17	0.100	0.174	0.010	0.09
37	3.08	0.17	0.100	0.173	0.010	0.09
38	3.17	0.17	0.100	0.173	0.010	0.09
39	3.25	0.17	0.100	0.172	0.010	0.09
40	3.33	0.17	0.100	0.171	0.010	0.09
41	3.42	0.17	0.100	0.170	0.010	0.09
42	3.50	0.17	0.100	0.170	0.010	0.09
43	3.58	0.17	0.100	0.169	0.010	0.09
44	3.67	0.17	0.100	0.168	0.010	0.09

45	3.75	0.17	0.100	0.168	0.010	0.09
46	3.83	0.20	0.120	0.167	0.012	0.11
47	3.92	0.20	0.120	0.166	0.012	0.11
48	4.00	0.20	0.120	0.166	0.012	0.11
49	4.08	0.20	0.120	0.165	0.012	0.11
50	4.17	0.20	0.120	0.164	0.012	0.11
51	4.25	0.20	0.120	0.163	0.012	0.11
52	4.33	0.23	0.140	0.163	0.014	0.13
53	4.42	0.23	0.140	0.162	0.014	0.13
54	4.50	0.23	0.140	0.161	0.014	0.13
55	4.58	0.23	0.140	0.161	0.014	0.13
56	4.67	0.23	0.140	0.160	0.014	0.13
57	4.75	0.23	0.140	0.159	0.014	0.13
58	4.83	0.27	0.160	0.159	---	0.00
59	4.92	0.27	0.160	0.158	---	0.00
60	5.00	0.27	0.160	0.157	---	0.00
61	5.08	0.20	0.120	0.157	0.012	0.11
62	5.17	0.20	0.120	0.156	0.012	0.11
63	5.25	0.20	0.120	0.155	0.012	0.11
64	5.33	0.23	0.140	0.154	0.014	0.13
65	5.42	0.23	0.140	0.154	0.014	0.13
66	5.50	0.23	0.140	0.153	0.014	0.13
67	5.58	0.27	0.160	0.152	---	0.01
68	5.67	0.27	0.160	0.152	---	0.01
69	5.75	0.27	0.160	0.151	---	0.01
70	5.83	0.27	0.160	0.150	---	0.01
71	5.92	0.27	0.160	0.150	---	0.01
72	6.00	0.27	0.160	0.149	---	0.01
73	6.08	0.30	0.180	0.148	---	0.03
74	6.17	0.30	0.180	0.148	---	0.03
75	6.25	0.30	0.180	0.147	---	0.03
76	6.33	0.30	0.180	0.146	---	0.03
77	6.42	0.30	0.180	0.146	---	0.03
78	6.50	0.30	0.180	0.145	---	0.03
79	6.58	0.33	0.200	0.145	---	0.06
80	6.67	0.33	0.200	0.144	---	0.06
81	6.75	0.33	0.200	0.143	---	0.06
82	6.83	0.33	0.200	0.143	---	0.06
83	6.92	0.33	0.200	0.142	---	0.06
84	7.00	0.33	0.200	0.141	---	0.06
85	7.08	0.33	0.200	0.141	---	0.06
86	7.17	0.33	0.200	0.140	---	0.06
87	7.25	0.33	0.200	0.139	---	0.06
88	7.33	0.37	0.220	0.139	---	0.08
89	7.42	0.37	0.220	0.138	---	0.08
90	7.50	0.37	0.220	0.137	---	0.08
91	7.58	0.40	0.240	0.137	---	0.10
92	7.67	0.40	0.240	0.136	---	0.10

93	7.75	0.40	0.240	0.136	---	0.10
94	7.83	0.43	0.260	0.135	---	0.13
95	7.92	0.43	0.260	0.134	---	0.13
96	8.00	0.43	0.260	0.134	---	0.13
97	8.08	0.50	0.300	0.133	---	0.17
98	8.17	0.50	0.300	0.132	---	0.17
99	8.25	0.50	0.300	0.132	---	0.17
100	8.33	0.50	0.300	0.131	---	0.17
101	8.42	0.50	0.300	0.131	---	0.17
102	8.50	0.50	0.300	0.130	---	0.17
103	8.58	0.53	0.320	0.129	---	0.19
104	8.67	0.53	0.320	0.129	---	0.19
105	8.75	0.53	0.320	0.128	---	0.19
106	8.83	0.57	0.340	0.128	---	0.21
107	8.92	0.57	0.340	0.127	---	0.21
108	9.00	0.57	0.340	0.126	---	0.21
109	9.08	0.63	0.380	0.126	---	0.25
110	9.17	0.63	0.380	0.125	---	0.25
111	9.25	0.63	0.380	0.125	---	0.26
112	9.33	0.67	0.400	0.124	---	0.28
113	9.42	0.67	0.400	0.123	---	0.28
114	9.50	0.67	0.400	0.123	---	0.28
115	9.58	0.70	0.420	0.122	---	0.30
116	9.67	0.70	0.420	0.122	---	0.30
117	9.75	0.70	0.420	0.121	---	0.30
118	9.83	0.73	0.440	0.120	---	0.32
119	9.92	0.73	0.440	0.120	---	0.32
120	10.00	0.73	0.440	0.119	---	0.32
121	10.08	0.50	0.300	0.119	---	0.18
122	10.17	0.50	0.300	0.118	---	0.18
123	10.25	0.50	0.300	0.118	---	0.18
124	10.33	0.50	0.300	0.117	---	0.18
125	10.42	0.50	0.300	0.116	---	0.18
126	10.50	0.50	0.300	0.116	---	0.18
127	10.58	0.67	0.400	0.115	---	0.28
128	10.67	0.67	0.400	0.115	---	0.29
129	10.75	0.67	0.400	0.114	---	0.29
130	10.83	0.67	0.400	0.114	---	0.29
131	10.92	0.67	0.400	0.113	---	0.29
132	11.00	0.67	0.400	0.113	---	0.29
133	11.08	0.63	0.380	0.112	---	0.27
134	11.17	0.63	0.380	0.111	---	0.27
135	11.25	0.63	0.380	0.111	---	0.27
136	11.33	0.63	0.380	0.110	---	0.27
137	11.42	0.63	0.380	0.110	---	0.27
138	11.50	0.63	0.380	0.109	---	0.27
139	11.58	0.57	0.340	0.109	---	0.23
140	11.67	0.57	0.340	0.108	---	0.23

141	11.75	0.57	0.340	0.108	---	0.23
142	11.83	0.60	0.360	0.107	---	0.25
143	11.92	0.60	0.360	0.107	---	0.25
144	12.00	0.60	0.360	0.106	---	0.25
145	12.08	0.83	0.500	0.105	---	0.39
146	12.17	0.83	0.500	0.105	---	0.40
147	12.25	0.83	0.500	0.104	---	0.40
148	12.33	0.87	0.520	0.104	---	0.42
149	12.42	0.87	0.520	0.103	---	0.42
150	12.50	0.87	0.520	0.103	---	0.42
151	12.58	0.93	0.560	0.102	---	0.46
152	12.67	0.93	0.560	0.102	---	0.46
153	12.75	0.93	0.560	0.101	---	0.46
154	12.83	0.97	0.580	0.101	---	0.48
155	12.92	0.97	0.580	0.100	---	0.48
156	13.00	0.97	0.580	0.100	---	0.48
157	13.08	1.13	0.680	0.099	---	0.58
158	13.17	1.13	0.680	0.099	---	0.58
159	13.25	1.13	0.680	0.098	---	0.58
160	13.33	1.13	0.680	0.098	---	0.58
161	13.42	1.13	0.680	0.097	---	0.58
162	13.50	1.13	0.680	0.097	---	0.58
163	13.58	0.77	0.460	0.096	---	0.36
164	13.67	0.77	0.460	0.096	---	0.36
165	13.75	0.77	0.460	0.095	---	0.36
166	13.83	0.77	0.460	0.095	---	0.37
167	13.92	0.77	0.460	0.094	---	0.37
168	14.00	0.77	0.460	0.094	---	0.37
169	14.08	0.90	0.540	0.093	---	0.45
170	14.17	0.90	0.540	0.093	---	0.45
171	14.25	0.90	0.540	0.092	---	0.45
172	14.33	0.87	0.520	0.092	---	0.43
173	14.42	0.87	0.520	0.091	---	0.43
174	14.50	0.87	0.520	0.091	---	0.43
175	14.58	0.87	0.520	0.091	---	0.43
176	14.67	0.87	0.520	0.090	---	0.43
177	14.75	0.87	0.520	0.090	---	0.43
178	14.83	0.83	0.500	0.089	---	0.41
179	14.92	0.83	0.500	0.089	---	0.41
180	15.00	0.83	0.500	0.088	---	0.41
181	15.08	0.80	0.480	0.088	---	0.39
182	15.17	0.80	0.480	0.087	---	0.39
183	15.25	0.80	0.480	0.087	---	0.39
184	15.33	0.77	0.460	0.086	---	0.37
185	15.42	0.77	0.460	0.086	---	0.37
186	15.50	0.77	0.460	0.086	---	0.37
187	15.58	0.63	0.380	0.085	---	0.29
188	15.67	0.63	0.380	0.085	---	0.30

189	15.75	0.63	0.380	0.084	---	0.30
190	15.83	0.63	0.380	0.084	---	0.30
191	15.92	0.63	0.380	0.083	---	0.30
192	16.00	0.63	0.380	0.083	---	0.30
193	16.08	0.13	0.080	0.083	0.008	0.07
194	16.17	0.13	0.080	0.082	0.008	0.07
195	16.25	0.13	0.080	0.082	0.008	0.07
196	16.33	0.13	0.080	0.081	0.008	0.07
197	16.42	0.13	0.080	0.081	0.008	0.07
198	16.50	0.13	0.080	0.080	0.008	0.07
199	16.58	0.10	0.060	0.080	0.006	0.05
200	16.67	0.10	0.060	0.080	0.006	0.05
201	16.75	0.10	0.060	0.079	0.006	0.05
202	16.83	0.10	0.060	0.079	0.006	0.05
203	16.92	0.10	0.060	0.078	0.006	0.05
204	17.00	0.10	0.060	0.078	0.006	0.05
205	17.08	0.17	0.100	0.078	---	0.02
206	17.17	0.17	0.100	0.077	---	0.02
207	17.25	0.17	0.100	0.077	---	0.02
208	17.33	0.17	0.100	0.076	---	0.02
209	17.42	0.17	0.100	0.076	---	0.02
210	17.50	0.17	0.100	0.076	---	0.02
211	17.58	0.17	0.100	0.075	---	0.02
212	17.67	0.17	0.100	0.075	---	0.03
213	17.75	0.17	0.100	0.075	---	0.03
214	17.83	0.13	0.080	0.074	---	0.01
215	17.92	0.13	0.080	0.074	---	0.01
216	18.00	0.13	0.080	0.073	---	0.01
217	18.08	0.13	0.080	0.073	---	0.01
218	18.17	0.13	0.080	0.073	---	0.01
219	18.25	0.13	0.080	0.072	---	0.01
220	18.33	0.13	0.080	0.072	---	0.01
221	18.42	0.13	0.080	0.072	---	0.01
222	18.50	0.13	0.080	0.071	---	0.01
223	18.58	0.10	0.060	0.071	0.006	0.05
224	18.67	0.10	0.060	0.071	0.006	0.05
225	18.75	0.10	0.060	0.070	0.006	0.05
226	18.83	0.07	0.040	0.070	0.004	0.04
227	18.92	0.07	0.040	0.070	0.004	0.04
228	19.00	0.07	0.040	0.069	0.004	0.04
229	19.08	0.10	0.060	0.069	0.006	0.05
230	19.17	0.10	0.060	0.069	0.006	0.05
231	19.25	0.10	0.060	0.068	0.006	0.05
232	19.33	0.13	0.080	0.068	---	0.01
233	19.42	0.13	0.080	0.068	---	0.01
234	19.50	0.13	0.080	0.067	---	0.01
235	19.58	0.10	0.060	0.067	0.006	0.05
236	19.67	0.10	0.060	0.067	0.006	0.05

237	19.75	0.10	0.060	0.066	0.006	0.05
238	19.83	0.07	0.040	0.066	0.004	0.04
239	19.92	0.07	0.040	0.066	0.004	0.04
240	20.00	0.07	0.040	0.066	0.004	0.04
241	20.08	0.10	0.060	0.065	0.006	0.05
242	20.17	0.10	0.060	0.065	0.006	0.05
243	20.25	0.10	0.060	0.065	0.006	0.05
244	20.33	0.10	0.060	0.064	0.006	0.05
245	20.42	0.10	0.060	0.064	0.006	0.05
246	20.50	0.10	0.060	0.064	0.006	0.05
247	20.58	0.10	0.060	0.064	0.006	0.05
248	20.67	0.10	0.060	0.063	0.006	0.05
249	20.75	0.10	0.060	0.063	0.006	0.05
250	20.83	0.07	0.040	0.063	0.004	0.04
251	20.92	0.07	0.040	0.063	0.004	0.04
252	21.00	0.07	0.040	0.062	0.004	0.04
253	21.08	0.10	0.060	0.062	0.006	0.05
254	21.17	0.10	0.060	0.062	0.006	0.05
255	21.25	0.10	0.060	0.062	0.006	0.05
256	21.33	0.07	0.040	0.061	0.004	0.04
257	21.42	0.07	0.040	0.061	0.004	0.04
258	21.50	0.07	0.040	0.061	0.004	0.04
259	21.58	0.10	0.060	0.061	0.006	0.05
260	21.67	0.10	0.060	0.060	0.006	0.05
261	21.75	0.10	0.060	0.060	0.006	0.05
262	21.83	0.07	0.040	0.060	0.004	0.04
263	21.92	0.07	0.040	0.060	0.004	0.04
264	22.00	0.07	0.040	0.060	0.004	0.04
265	22.08	0.10	0.060	0.059	---	0.00
266	22.17	0.10	0.060	0.059	---	0.00
267	22.25	0.10	0.060	0.059	---	0.00
268	22.33	0.07	0.040	0.059	0.004	0.04
269	22.42	0.07	0.040	0.059	0.004	0.04
270	22.50	0.07	0.040	0.059	0.004	0.04
271	22.58	0.07	0.040	0.058	0.004	0.04
272	22.67	0.07	0.040	0.058	0.004	0.04
273	22.75	0.07	0.040	0.058	0.004	0.04
274	22.83	0.07	0.040	0.058	0.004	0.04
275	22.92	0.07	0.040	0.058	0.004	0.04
276	23.00	0.07	0.040	0.058	0.004	0.04
277	23.08	0.07	0.040	0.057	0.004	0.04
278	23.17	0.07	0.040	0.057	0.004	0.04
279	23.25	0.07	0.040	0.057	0.004	0.04
280	23.33	0.07	0.040	0.057	0.004	0.04
281	23.42	0.07	0.040	0.057	0.004	0.04
282	23.50	0.07	0.040	0.057	0.004	0.04
283	23.58	0.07	0.040	0.057	0.004	0.04
284	23.67	0.07	0.040	0.057	0.004	0.04

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285  23.75     0.07      0.040         0.057     0.004         0.04
286  23.83     0.07      0.040         0.057     0.004         0.04
287  23.92     0.07      0.040         0.057     0.004         0.04
288  24.00     0.07      0.040         0.056     0.004         0.04
    Sum =     100.0                                   Sum =    42.3
       Flood volume = Effective rainfall      3.53(In)
        times area       7.5(Ac.)/[(In)/(Ft.)] =       2.2(Ac.Ft)
       Total soil loss =      1.47(In)
       Total soil loss =     0.920(Ac.Ft)
       Total rainfall =      5.00(In)
       Flood volume =       96049.9 Cubic Feet
       Total soil loss =       40073.1 Cubic Feet
       ---------------------------------------------------------------------
        Peak flow rate of this hydrograph =      4.408(CFS)
       ---------------------------------------------------------------------
       ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                           24 - H O U R    S T O R M
                      R u n o f f      H y d r o g r a p h
       ---------------------------------------------------------------------
                   Hydrograph in   5   Minute intervals ((CFS))

       ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ----------------------------------------------------------------------------
   0+ 5       0.0008      0.12  Q         |         |         |         |
   0+10       0.0025      0.24  Q         |         |         |         |
   0+15       0.0043      0.26  VQ        |         |         |         |
   0+20       0.0066      0.33  VQ        |         |         |         |
   0+25       0.0093      0.39  VQ        |         |         |         |
   0+30       0.0121      0.40  VQ        |         |         |         |
   0+35       0.0149      0.41  VQ        |         |         |         |
   0+40       0.0177      0.41  VQ        |         |         |         |
   0+45       0.0205      0.41  VQ        |         |         |         |
   0+50       0.0238      0.47  VQ        |         |         |         |
   0+55       0.0274      0.53  V Q       |         |         |         |
   1+ 0       0.0311      0.54  V Q       |         |         |         |
   1+ 5       0.0344      0.48  VQ        |         |         |         |
   1+10       0.0374      0.42  VQ        |         |         |         |
   1+15       0.0402      0.41  VQ        |         |         |         |
   1+20       0.0430      0.41  VQ        |         |         |         |
   1+25       0.0458      0.41  VQ        |         |         |         |
   1+30       0.0486      0.41  VQ        |         |         |         |
   1+35       0.0515      0.41  VQ        |         |         |         |
   1+40       0.0543      0.41  VQ        |         |         |         |
   1+45       0.0571      0.41  |Q        |         |         |         |
   1+50       0.0603      0.47  |Q        |         |         |         |
   1+55       0.0639      0.53  |VQ       |         |         |         |
   2+ 0       0.0677      0.54  |VQ       |         |         |         |
```

```
2+ 5        0.0714      0.54  |VQ        |          |          |          |
2+10        0.0752      0.54  |VQ        |          |          |          |
2+15        0.0789      0.54  |VQ        |          |          |          |
2+20        0.0827      0.54  |VQ        |          |          |          |
2+25        0.0864      0.54  |VQ        |          |          |          |
2+30        0.0902      0.54  |VQ        |          |          |          |
2+35        0.0943      0.61  |VQ        |          |          |          |
2+40        0.0989      0.66  |VQ        |          |          |          |
2+45        0.1036      0.68  |VQ        |          |          |          |
2+50        0.1083      0.68  |VQ        |          |          |          |
2+55        0.1129      0.68  | Q        |          |          |          |
3+ 0        0.1176      0.68  | Q        |          |          |          |
3+ 5        0.1223      0.68  | Q        |          |          |          |
3+10        0.1270      0.68  | Q        |          |          |          |
3+15        0.1317      0.68  | Q        |          |          |          |
3+20        0.1364      0.68  | Q        |          |          |          |
3+25        0.1411      0.68  | Q        |          |          |          |
3+30        0.1458      0.68  | Q        |          |          |          |
3+35        0.1504      0.68  | Q        |          |          |          |
3+40        0.1551      0.68  | Q        |          |          |          |
3+45        0.1598      0.68  | Q        |          |          |          |
3+50        0.1649      0.74  | Q        |          |          |          |
3+55        0.1704      0.80  |  Q       |          |          |          |
4+ 0        0.1760      0.81  |  Q       |          |          |          |
4+ 5        0.1817      0.82  |  Q       |          |          |          |
4+10        0.1873      0.82  |  Q       |          |          |          |
4+15        0.1929      0.82  |  Q       |          |          |          |
4+20        0.1990      0.88  |  Q       |          |          |          |
4+25        0.2054      0.94  |  Q       |          |          |          |
4+30        0.2119      0.95  |  Q       |          |          |          |
4+35        0.2185      0.95  |  Q       |          |          |          |
4+40        0.2251      0.95  |  QV      |          |          |          |
4+45        0.2316      0.95  |  QV      |          |          |          |
4+50        0.2352      0.53  | Q V      |          |          |          |
4+55        0.2361      0.13  Q   V      |          |          |          |
5+ 0        0.2365      0.05  Q   V      |          |          |          |
5+ 5        0.2391      0.38  |Q  V      |          |          |          |
5+10        0.2441      0.72  | Q V      |          |          |          |
5+15        0.2495      0.79  |  QV      |          |          |          |
5+20        0.2555      0.88  |  QV      |          |          |          |
5+25        0.2620      0.94  |  QV      |          |          |          |
5+30        0.2685      0.95  |  QV      |          |          |          |
5+35        0.2723      0.55  | Q V      |          |          |          |
5+40        0.2734      0.17  Q   V      |          |          |          |
5+45        0.2741      0.10  Q   V      |          |          |          |
5+50        0.2746      0.07  Q   V      |          |          |          |
5+55        0.2751      0.07  Q   V      |          |          |          |
6+ 0        0.2756      0.08  Q   V      |          |          |          |
```

```
 6+ 5       0.2767      0.15  Q    V    |          |          |          |
 6+10       0.2782      0.22  Q    V    |          |          |          |
 6+15       0.2798      0.24  Q    V    |          |          |          |
 6+20       0.2816      0.25  Q    V    |          |          |          |
 6+25       0.2833      0.25  |Q   V    |          |          |          |
 6+30       0.2851      0.26  |Q   V    |          |          |          |
 6+35       0.2874      0.33  |Q   V    |          |          |          |
 6+40       0.2902      0.40  |Q   V    |          |          |          |
 6+45       0.2931      0.42  |Q   V    |          |          |          |
 6+50       0.2960      0.43  |Q   V    |          |          |          |
 6+55       0.2990      0.44  |Q   V    |          |          |          |
 7+ 0       0.3021      0.44  |Q   V    |          |          |          |
 7+ 5       0.3051      0.45  |Q   V    |          |          |          |
 7+10       0.3082      0.45  |Q   V    |          |          |          |
 7+15       0.3114      0.46  |Q   V    |          |          |          |
 7+20       0.3150      0.53  | Q  V    |          |          |          |
 7+25       0.3191      0.60  | Q  V    |          |          |          |
 7+30       0.3234      0.61  | Q  V    |          |          |          |
 7+35       0.3281      0.69  | Q  V    |          |          |          |
 7+40       0.3334      0.76  |  Q  V   |          |          |          |
 7+45       0.3388      0.78  |  Q  V   |          |          |          |
 7+50       0.3447      0.86  |  Q  V   |          |          |          |
 7+55       0.3511      0.93  |  Q  V   |          |          |          |
 8+ 0       0.3576      0.95  |  Q  V   |          |          |          |
 8+ 5       0.3651      1.09  |   Q V   |          |          |          |
 8+10       0.3736      1.23  |   Q V   |          |          |          |
 8+15       0.3822      1.26  |    QV   |          |          |          |
 8+20       0.3910      1.27  |    Q V  |          |          |          |
 8+25       0.3998      1.28  |    Q V  |          |          |          |
 8+30       0.4086      1.28  |    Q V  |          |          |          |
 8+35       0.4180      1.36  |    Q V  |          |          |          |
 8+40       0.4278      1.42  |    Q V  |          |          |          |
 8+45       0.4377      1.44  |    Q V  |          |          |          |
 8+50       0.4482      1.52  |     Q V |          |          |          |
 8+55       0.4591      1.59  |     Q V |          |          |          |
 9+ 0       0.4702      1.61  |     Q V |          |          |          |
 9+ 5       0.4823      1.75  |      QV |          |          |          |
 9+10       0.4953      1.89  |      QV |          |          |          |
 9+15       0.5085      1.92  |      Q V|          |          |          |
 9+20       0.5222      2.00  |       QV|          |          |          |
 9+25       0.5365      2.07  |       QV|          |          |          |
 9+30       0.5509      2.09  |       QV|          |          |          |
 9+35       0.5658      2.17  |       Q V          |          |          |
 9+40       0.5812      2.23  |       Q V          |          |          |
 9+45       0.5967      2.25  |        QV          |          |          |
 9+50       0.6127      2.33  |        Q|V         |          |          |
 9+55       0.6293      2.40  |        Q|V         |          |          |
10+ 0       0.6459      2.42  |        Q|V         |          |          |
```

```
10+ 5       0.6593      1.95  |      Q  |V        |         |         |
10+10       0.6697      1.50  |     Q   | V       |         |         |
10+15       0.6794      1.42  |    Q    | V       |         |         |
10+20       0.6889      1.38  |    Q    | V       |         |         |
10+25       0.6985      1.39  |    Q    | V       |         |         |
10+30       0.7080      1.39  |    Q    | V       |         |         |
10+35       0.7200      1.74  |     Q   |  V      |         |         |
10+40       0.7342      2.06  |       Q |  V      |         |         |
10+45       0.7489      2.13  |       Q |  V      |         |         |
10+50       0.7637      2.16  |       Q |  V      |         |         |
10+55       0.7787      2.17  |       Q |   V     |         |         |
11+ 0       0.7936      2.17  |       Q |   V     |         |         |
11+ 5       0.8081      2.11  |       Q |   V     |         |         |
11+10       0.8222      2.05  |       Q |   V     |         |         |
11+15       0.8363      2.04  |       Q |    V    |         |         |
11+20       0.8503      2.04  |       Q |    V    |         |         |
11+25       0.8643      2.04  |       Q |    V    |         |         |
11+30       0.8784      2.04  |       Q |    V    |         |         |
11+35       0.8916      1.91  |      Q  |     V   |         |         |
11+40       0.9039      1.79  |      Q  |     V   |         |         |
11+45       0.9161      1.77  |      Q  |     V   |         |         |
11+50       0.9287      1.83  |      Q  |     V   |         |         |
11+55       0.9417      1.90  |      Q  |      V  |         |         |
12+ 0       0.9549      1.91  |      Q  |      V  |         |         |
12+ 5       0.9714      2.40  |        Q|      V  |         |         |
12+10       0.9911      2.86  |         |Q     V  |         |         |
12+15       1.0114      2.95  |         |Q      V |         |         |
12+20       1.0325      3.06  |         | Q     V |         |         |
12+25       1.0540      3.13  |         | Q      V|         |         |
12+30       1.0757      3.15  |         | Q      V|         |         |
12+35       1.0984      3.29  |         |  Q     V|         |         |
12+40       1.1220      3.43  |         |  Q      V         |         |
12+45       1.1458      3.45  |         |  Q      V         |         |
12+50       1.1701      3.54  |         |   Q     |V        |         |
12+55       1.1950      3.61  |         |   Q     |V        |         |
13+ 0       1.2199      3.62  |         |   Q     | V       |         |
13+ 5       1.2473      3.98  |         |    Q    | V       |         |
13+10       1.2769      4.30  |         |      Q  |  V      |         |
13+15       1.3070      4.37  |         |      Q  |  V      |         |
13+20       1.3373      4.40  |         |      Q  |   V     |         |
13+25       1.3676      4.40  |         |      Q  |   V     |         |
13+30       1.3980      4.41  |         |      Q  |    V    |         |
13+35       1.4232      3.66  |         |   Q     |    V    |         |
13+40       1.4435      2.95  |         |Q        |     V   |         |
13+45       1.4629      2.82  |         |Q        |     V   |         |
13+50       1.4820      2.76  |         |Q        |     V   |         |
13+55       1.5010      2.76  |         |Q        |      V  |         |
14+ 0       1.5200      2.77  |         |Q        |      V  |         |
```

```
14+ 5       1.5410      3.04  |          | Q        |       V  |          |
14+10       1.5638      3.31  |          |  Q       |        V |          |
14+15       1.5869      3.36  |          |  Q       |        V |          |
14+20       1.6097      3.32  |          |  Q       |         V|          |
14+25       1.6322      3.26  |          |  Q       |         V|          |
14+30       1.6545      3.25  |          | Q        |          V          |
14+35       1.6769      3.25  |          | Q        |          V          |
14+40       1.6993      3.25  |          | Q        |          V          |
14+45       1.7217      3.25  |          |  Q       |          |V         |
14+50       1.7436      3.19  |          | Q        |          |V         |
14+55       1.7651      3.13  |          | Q        |          | V        |
15+ 0       1.7866      3.12  |          | Q        |          | V        |
15+ 5       1.8076      3.05  |          | Q        |          | V        |
15+10       1.8281      2.99  |          |Q         |          |  V       |
15+15       1.8486      2.98  |          |Q         |          |  V       |
15+20       1.8687      2.91  |          |Q         |          |  V       |
15+25       1.8882      2.84  |          |Q         |          |   V      |
15+30       1.9078      2.83  |          |Q         |          |   V      |
15+35       1.9254      2.56  |         Q          |          |   V      |
15+40       1.9413      2.30  |        Q|          |          |    V     |
15+45       1.9568      2.26  |        Q|          |          |    V     |
15+50       1.9722      2.24  |       Q |          |          |    V     |
15+55       1.9876      2.24  |       Q |          |          |     V    |
16+ 0       2.0031      2.24  |       Q |          |          |     V    |
16+ 5       2.0133      1.47  |    Q    |          |          |     V    |
16+10       2.0184      0.75  |  Q      |          |          |     V    |
16+15       2.0226      0.61  | Q       |          |          |     V    |
16+20       2.0264      0.54  | Q       |          |          |     V    |
16+25       2.0301      0.54  | Q       |          |          |     V    |
16+30       2.0339      0.54  | Q       |          |          |     V    |
16+35       2.0372      0.48  |Q        |          |          |     V    |
16+40       2.0401      0.42  |Q        |          |          |      V   |
16+45       2.0430      0.41  |Q        |          |          |      V   |
16+50       2.0458      0.41  |Q        |          |          |      V   |
16+55       2.0486      0.41  |Q        |          |          |      V   |
17+ 0       2.0514      0.41  |Q        |          |          |      V   |
17+ 5       2.0535      0.30  |Q        |          |          |      V   |
17+10       2.0548      0.20  Q         |          |          |      V   |
17+15       2.0561      0.18  Q         |          |          |      V   |
17+20       2.0573      0.18  Q         |          |          |      V   |
17+25       2.0585      0.18  Q         |          |          |      V   |
17+30       2.0598      0.18  Q         |          |          |      V   |
17+35       2.0611      0.18  Q         |          |          |      V   |
17+40       2.0623      0.19  Q         |          |          |      V   |
17+45       2.0637      0.19  Q         |          |          |      V   |
17+50       2.0645      0.12  Q         |          |          |      V   |
17+55       2.0649      0.06  Q         |          |          |      V   |
18+ 0       2.0653      0.05  Q         |          |          |      V   |
```

```
18+ 5       2.0657      0.05  Q          |          |          |       V  |
18+10       2.0660      0.05  Q          |          |          |       V  |
18+15       2.0664      0.06  Q          |          |          |       V  |
18+20       2.0668      0.06  Q          |          |          |       V  |
18+25       2.0672      0.06  Q          |          |          |       V  |
18+30       2.0677      0.06  Q          |          |          |       V  |
18+35       2.0692      0.22  Q          |          |          |       V  |
18+40       2.0717      0.37  |Q         |          |          |       V  |
18+45       2.0744      0.40  |Q         |          |          |       V  |
18+50       2.0768      0.35  |Q         |          |          |       V  |
18+55       2.0788      0.29  |Q         |          |          |       V  |
19+ 0       2.0807      0.28  |Q         |          |          |       V  |
19+ 5       2.0830      0.33  |Q         |          |          |       V  |
19+10       2.0857      0.39  |Q         |          |          |       V  |
19+15       2.0885      0.40  |Q         |          |          |       V  |
19+20       2.0903      0.26  |Q         |          |          |       V  |
19+25       2.0912      0.13  Q          |          |          |       V  |
19+30       2.0919      0.11  Q          |          |          |       V  |
19+35       2.0936      0.24  Q          |          |          |       V  |
19+40       2.0961      0.37  |Q         |          |          |        V |
19+45       2.0988      0.40  |Q         |          |          |        V |
19+50       2.1012      0.35  |Q         |          |          |        V |
19+55       2.1032      0.29  |Q         |          |          |        V |
20+ 0       2.1051      0.28  |Q         |          |          |        V |
20+ 5       2.1074      0.33  |Q         |          |          |        V |
20+10       2.1101      0.39  |Q         |          |          |        V |
20+15       2.1129      0.40  |Q         |          |          |        V |
20+20       2.1157      0.41  |Q         |          |          |        V |
20+25       2.1185      0.41  |Q         |          |          |        V |
20+30       2.1213      0.41  |Q         |          |          |        V |
20+35       2.1242      0.41  |Q         |          |          |        V |
20+40       2.1270      0.41  |Q         |          |          |        V |
20+45       2.1298      0.41  |Q         |          |          |        V |
20+50       2.1322      0.35  |Q         |          |          |        V |
20+55       2.1342      0.29  |Q         |          |          |        V |
21+ 0       2.1361      0.28  |Q         |          |          |        V |
21+ 5       2.1384      0.33  |Q         |          |          |        V |
21+10       2.1411      0.39  |Q         |          |          |        V |
21+15       2.1438      0.40  |Q         |          |          |        V |
21+20       2.1462      0.35  |Q         |          |          |        V |
21+25       2.1482      0.29  |Q         |          |          |        V |
21+30       2.1501      0.28  |Q         |          |          |         V|
21+35       2.1524      0.33  |Q         |          |          |         V|
21+40       2.1551      0.39  |Q         |          |          |         V|
21+45       2.1579      0.40  |Q         |          |          |         V|
21+50       2.1603      0.35  |Q         |          |          |         V|
21+55       2.1623      0.29  |Q         |          |          |         V|
22+ 0       2.1642      0.28  |Q         |          |          |         V|
```

```
   22+ 5       2.1652      0.15  Q          |          |          |         V|
   22+10       2.1655      0.04  Q          |          |          |         V|
   22+15       2.1656      0.02  Q          |          |          |         V|
   22+20       2.1665      0.13  Q          |          |          |         V|
   22+25       2.1681      0.24  Q          |          |          |         V|
   22+30       2.1699      0.26  |Q         |          |          |         V|
   22+35       2.1718      0.27  |Q         |          |          |         V|
   22+40       2.1737      0.27  |Q         |          |          |         V|
   22+45       2.1756      0.27  |Q         |          |          |         V|
   22+50       2.1774      0.27  |Q         |          |          |         V|
   22+55       2.1793      0.27  |Q         |          |          |         V|
   23+ 0       2.1812      0.27  |Q         |          |          |         V|
   23+ 5       2.1831      0.27  |Q         |          |          |         V|
   23+10       2.1849      0.27  |Q         |          |          |         V|
   23+15       2.1868      0.27  |Q         |          |          |         V|
   23+20       2.1887      0.27  |Q         |          |          |         V|
   23+25       2.1906      0.27  |Q         |          |          |         V|
   23+30       2.1924      0.27  |Q         |          |          |         V|
   23+35       2.1943      0.27  |Q         |          |          |         V|
   23+40       2.1962      0.27  |Q         |          |          |         V|
   23+45       2.1981      0.27  |Q         |          |          |         V|
   23+50       2.1999      0.27  |Q         |          |          |         V|
   23+55       2.2018      0.27  |Q         |          |          |         V|
   24+ 0       2.2037      0.27  |Q         |          |          |         V|
   24+ 5       2.2047      0.15  Q          |          |          |         V|
   24+10       2.2049      0.03  Q          |          |          |         V|
   24+15       2.2050      0.01  Q          |          |          |          V
-----------------------------------------------------------------------
```

Appendix E

```
        CIVILCADD/CIVILDESIGN  Engineering Software, (c) 2004   Version
7.0
      ------------------------------------------------------------------
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      Program License Serial Number 6064

      ------------------------------------------------------------------
--
            *** Street Flow Analysis *** Easterly Private Street (full
flow)

            Upstream (headworks) Elevation =      1.000(Ft.)
            Downstream (outlet) Elevation =      0.000(Ft.)
            Runoff/Flow Distance =    100.000(Ft.)
            Maximum flow rate in channel(s) =     23.800(CFS)
      ------------------------------------------------------------------
--


      Top of street segment elevation =      1.000(Ft.)
      End of street segment elevation =      0.000(Ft.)
      Length of street segment  =   100.000(Ft.)
      Height of curb above gutter flowline  =    6.0(In.)
      Width of half street (curb to crown)  =  13.000(Ft.)
      Distance from crown to crossfall grade break  =  11.000(Ft.)
      Slope from gutter to grade break (v/hz) =   0.080
      Slope from grade break to crown (v/hz)  =   0.020
      Street flow is on [2] side(s) of the street
      Distance from curb to property line  =   6.000(Ft.)
      Slope from curb to property line (v/hz) =   0.020
      Gutter width =   2.000(Ft.)
      Gutter hike from flowline =  2.000(In.)
       Manning's N in gutter =  0.0150
       Manning's N from gutter to grade break =  0.0150
       Manning's N from grade break to crown =  0.0150

      Half street cross section data points:
         X-coordinate (Ft.)    Y-coordinate (Ft.)
                   0.0000                0.6200 right of way
                   6.0000                0.5000 top of curb
                   6.0000                0.0000 flow line
                   8.0000                0.1667 gutter end
                   8.0000                0.1667 grade break
                  19.0000                0.3867 crown
      Depth of flow =   0.490(Ft.)
      Average velocity =   3.764(Ft/s)
      Total flow rate in 1/2 street =  11.900(CFS)
      Note:  depth of flow exceeds top of street crown.
      Streetflow hydraulics:
      Halfstreet flow width (curb to crown) =  13.000(Ft.)
      Average flow velocity =   3.76(Ft/s)

      Channel including Gutter and area towards property line:
            Flow Width =      2.000(Ft.)   Flow Area =      0.814(Sq.Ft)
            Velocity =      4.605(Ft/s)  Flow Rate =      3.746(CFS)
            Froude No. = 1.2723
```

```
Channel from outside edge of gutter towards grade break:
      Flow Width =      0.000(Ft.)   Flow Area =      0.000(Sq.Ft)
      Velocity =      0.000(Ft/s)  Flow Rate =      0.000(CFS)
      Froude No. = 0.0000

Channel from grade break to crown:
      Flow Width =     11.000(Ft.)   Flow Area =      2.348(Sq.Ft)
      Velocity =      3.473(Ft/s)  Flow Rate =      8.154(CFS)
      Froude No. = 1.3247

Total flow rate in street =     23.800(CFS)



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7.0
      ------------------------------------------------------------------
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      Program License Serial Number 6064

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--
            *** Street Flow Analysis ***
            FULL PRIVATE STREET ENTRANCE FLOW TO CATCH BASINS

            Upstream (headworks) Elevation =      1.000(Ft.)
            Downstream (outlet) Elevation =      0.000(Ft.)
            Runoff/Flow Distance =    100.000(Ft.)
            Maximum flow rate in channel(s) =     19.800(CFS)
      ------------------------------------------------------------------
--


      Top of street segment elevation =      1.000(Ft.)
      End of street segment elevation =      0.000(Ft.)
      Length of street segment  =   100.000(Ft.)
      Height of curb above gutter flowline  =    6.0(In.)
      Width of half street (curb to crown)  =  26.000(Ft.)
      Distance from crown to crossfall grade break  =  24.000(Ft.)
      Slope from gutter to grade break (v/hz) =   0.080
      Slope from grade break to crown (v/hz)  =   0.020
      Street flow is on [2] side(s) of the street
      Distance from curb to property line  =   6.000(Ft.)
      Slope from curb to property line (v/hz) =   0.020
      Gutter width =   2.000(Ft.)
      Gutter hike from flowline =  2.000(In.)
       Manning's N in gutter =  0.0150
       Manning's N from gutter to grade break =  0.0150
       Manning's N from grade break to crown =  0.0150

      Half street cross section data points:
         X-coordinate (Ft.)    Y-coordinate (Ft.)
                   0.0000                0.6200 right of way
                   6.0000                0.5000 top of curb
                   6.0000                0.0000 flow line
                   8.0000                0.1667 gutter end
                   8.0000                0.1667 grade break
                  32.0000                0.6467 crown
      Depth of flow =   0.476(Ft.)
      Average velocity =   3.121(Ft/s)
      Total flow rate in 1/2 street =   9.900(CFS)
      Streetflow hydraulics:
      Halfstreet flow width (curb to crown) =  17.451(Ft.)
      Average flow velocity =   3.12(Ft/s)

      Channel including Gutter and area towards property line:
            Flow Width =      2.000(Ft.)   Flow Area =      0.785(Sq.Ft)
            Velocity =      4.369(Ft/s)  Flow Rate =      3.429(CFS)
            Froude No. = 1.2293

      Channel from outside edge of gutter towards grade break:
```

```
      Flow Width =      0.000(Ft.)   Flow Area =      0.000(Sq.Ft)
      Velocity =      0.000(Ft/s)  Flow Rate =      0.000(CFS)
      Froude No. = 0.0000

Channel from grade break to crown:
      Flow Width =     15.450(Ft.)   Flow Area =      2.387(Sq.Ft)
      Velocity =      2.711(Ft/s)  Flow Rate =      6.471(CFS)
      Froude No. = 1.2154

Total flow rate in street =     19.800(CFS)



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      ------------------------------------------------------------------
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      Program License Serial Number 6064

      ------------------------------------------------------------------
--
            *** Street Flow Analysis ***
            Half Flow 4 CFS Westerly Secondary Access Private Road

            Upstream (headworks) Elevation =      1.000(Ft.)
            Downstream (outlet) Elevation =      0.000(Ft.)
            Runoff/Flow Distance =    100.000(Ft.)
            Maximum flow rate in channel(s) =      4.000(CFS)
      ------------------------------------------------------------------
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      Top of street segment elevation =      1.000(Ft.)
      End of street segment elevation =      0.000(Ft.)
      Length of street segment  =   100.000(Ft.)
      Height of curb above gutter flowline  =    6.0(In.)
      Width of half street (curb to crown)  =  26.000(Ft.)
      Distance from crown to crossfall grade break  =  24.000(Ft.)
      Slope from gutter to grade break (v/hz) =   0.080
      Slope from grade break to crown (v/hz)  =   0.020
      Street flow is on [1] side(s) of the street
      Distance from curb to property line  =   6.000(Ft.)
      Slope from curb to property line (v/hz) =   0.020
      Gutter width =   2.000(Ft.)
      Gutter hike from flowline =  2.000(In.)
       Manning's N in gutter =  0.0150
       Manning's N from gutter to grade break =  0.0150
       Manning's N from grade break to crown =  0.0150

      Half street cross section data points:
         X-coordinate (Ft.)    Y-coordinate (Ft.)
                   0.0000                0.6200 right of way
                   6.0000                0.5000 top of curb
                   6.0000                0.0000 flow line
                   8.0000                0.1667 gutter end
                   8.0000                0.1667 grade break
                  32.0000                0.6467 crown
      Depth of flow =   0.369(Ft.)
      Average velocity =   2.511(Ft/s)
      Total flow rate in 1/2 street =   4.000(CFS)
      Streetflow hydraulics:
      Halfstreet flow width (curb to crown) =  12.110(Ft.)
      Average flow velocity =   2.51(Ft/s)

      Channel including Gutter and area towards property line:
            Flow Width =      2.000(Ft.)   Flow Area =      0.571(Sq.Ft)
            Velocity =      3.494(Ft/s)  Flow Rate =      1.995(CFS)
            Froude No. = 1.1524

      Channel from outside edge of gutter towards grade break:
```

```
      Flow Width =      0.000(Ft.)   Flow Area =      0.000(Sq.Ft)
      Velocity =      0.000(Ft/s)  Flow Rate =      0.000(CFS)
      Froude No. = 0.0000

Channel from grade break to crown:
      Flow Width =     10.110(Ft.)   Flow Area =      1.022(Sq.Ft)
      Velocity =      1.961(Ft/s)  Flow Rate =      2.005(CFS)
      Froude No. = 1.0870

Total flow rate in street =      4.000(CFS)



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INLET SPACING & SIZING--IN SAG

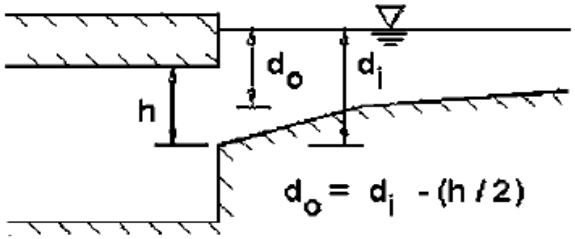
Date: **12/30/2016** Sheet: **1** of **1**
Computed by: **JHJ** Checked by: **JHJ**

INLET	HYDROLOGY DISCHARGE			GUTTER DISCHARGE						INLET DISCHARGE		
	Design Frequency		100 years	Allowable Spread		26 ft	Allowable Depth		0.7 ft	Inlet Type		7 ft--CB 100
No.	Station	Tributary Area Ac	Flowrate ft³/s	Longitude Slope ft/ft	Cross Slope ft/ft	Previous By-pass Flowrate ft³/s	Total Street Flowrate ft³/s	Spread ft	Depth ft	Intercepted Flowrate ft³/s	By-pass Flowrate ft³/s	Efficiency %
1	10+00	1.24	4.0	0.01	0.002	0.0	4.0	26.0	0.37	7.4	0	100.0
2	10+00	3.02	9.9	0.01	0.002	0	9.9	26.0	0.48	10.9	0	100.0
3	10+00	3.02	9.9	0.01	0.002	0	9.9	26.0	0.48	10.9	0	100.0

NOTE:

$d \geq h \Rightarrow orifice$

$d < h \Rightarrow wier$



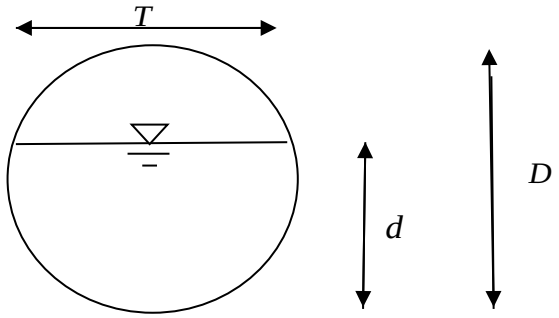
$$Q_i = C_o\ h\ L\ (2\ g\ d_o)^{0.5}$$

C_o = orifice coefficient (0.67)
d_o = effective head on the center of the orifice throat, m (ft)
L = length of orifice opening, m (ft)
A_g = clear area of opening, m^2 (ft^2)
d_i = depth at lip of curb opening, m (ft)
h = height of curb-opening orifice, m (ft)

$$Q_i = C_w\ (L + 1.8\ W)\ d^{1.5}$$

C_w = 1.25 (2.3 In English Units)
L = length of curb opening, m (ft)
W = lateral width of depression, m (ft)
h = height of curb-opening inlet, m (ft)
a = depth of depression, mm (in)

HYDRAULIC PIPE COMPUTATIONS FOR LINE "A"



DIAMETER =	20 in.	SDR-35

$$Q = \frac{K_U}{n} A \left(\frac{A}{P_W} \right)^{2/3} (S_L)^{1/2}$$

K_U	1.486	
S_L	0.005	ft/ft
n	0.011	

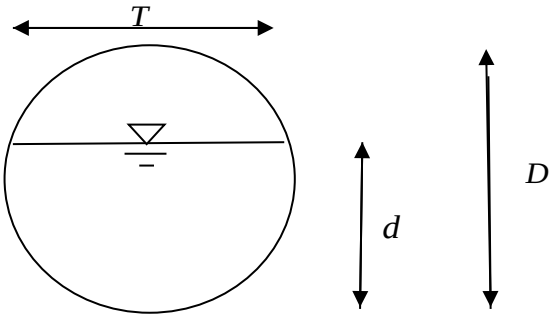
HYDRAULIC ELEMENTS FOR CIRCULAR CHANNEL

d	d/D	θ	A	T	P_W	V	Froud	Q
ft	ft/ft	°	ft^2	ft	ft	ft^2/s	No.	ft^3/s
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.08	0.05	51.68	0.04	0.73	0.75	1.37	1.02	0.06
0.17	0.10	73.74	0.11	1.00	1.07	2.14	1.12	0.24
0.25	0.15	91.15	0.21	1.19	1.33	2.75	1.17	0.57
0.33	0.20	106.26	0.31	1.33	1.55	3.28	1.20	1.02
0.42	0.25	120.00	0.43	1.44	1.75	3.73	1.21	1.59
0.50	0.30	132.84	0.55	1.53	1.93	4.14	1.21	2.28
0.58	0.35	145.08	0.68	1.59	2.11	4.49	1.21	3.06
0.67	0.40	156.93	0.81	1.63	2.28	4.81	1.20	3.92
0.75	0.45	168.52	0.95	1.66	2.45	5.09	1.18	4.84
0.83	0.50	180.00	1.09	1.67	2.62	5.33	1.16	5.81
0.92	0.55	191.48	1.23	1.66	2.78	5.54	1.13	6.81
1.00	0.60	203.07	1.37	1.63	2.95	5.71	1.10	7.81
1.08	0.65	214.92	1.50	1.59	3.13	5.86	1.06	8.79
1.17	0.70	227.16	1.63	1.53	3.30	5.97	1.02	9.73
1.25	0.75	240.00	1.76	1.44	3.49	6.04	0.97	10.60
1.33	0.80	253.74	1.87	1.33	3.69	6.07	0.90	11.36
1.42	0.85	268.85	1.98	1.19	3.91	6.06	0.83	11.98
1.50	0.90	286.26	2.07	1.00	4.16	5.99	0.73	12.39
1.58	0.95	308.32	2.14	0.73	4.48	5.84	0.60	12.49
1.67	1.00	360.00	2.18	0.00	5.24	5.33	∞	11.63

Critical Depth	1.29	ft
Maximum Discharge	12.51	ft^3/s

Completed by:	JHJ
Checked by:	JHJ
Date:	1/7/2017
Sheet:	1 of 1

HYDRAULIC PIPE COMPUTATIONS FOR LINE "B"



DIAMETER =	24 in.	SDR-35

$$Q = \frac{K_U}{n} A \left(\frac{A}{P_W} \right)^{2/3} (S_L)^{1/2}$$

K_U	1.486	
S_L	0.005	ft/ft
n	0.011	

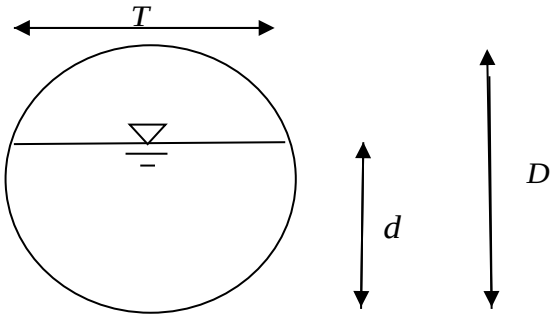
HYDRAULIC ELEMENTS FOR CIRCULAR CHANNEL

d	d/D	θ	A	T	P_W	V	Froud	Q
ft	ft/ft	°	ft^2	ft	ft	ft^2/s	No.	ft^3/s
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.10	0.05	51.68	0.06	0.87	0.90	1.55	1.05	0.09
0.20	0.10	73.74	0.16	1.20	1.29	2.41	1.15	0.39
0.30	0.15	91.15	0.30	1.43	1.59	3.11	1.20	0.92
0.40	0.20	106.26	0.45	1.60	1.85	3.70	1.23	1.66
0.50	0.25	120.00	0.61	1.73	2.09	4.22	1.25	2.59
0.60	0.30	132.84	0.79	1.83	2.32	4.67	1.25	3.70
0.70	0.35	145.08	0.98	1.91	2.53	5.07	1.25	4.97
0.80	0.40	156.93	1.17	1.96	2.74	5.43	1.24	6.37
0.90	0.45	168.52	1.37	1.99	2.94	5.74	1.22	7.87
1.00	0.50	180.00	1.57	2.00	3.14	6.02	1.20	9.45
1.10	0.55	191.48	1.77	1.99	3.34	6.25	1.17	11.07
1.20	0.60	203.07	1.97	1.96	3.54	6.45	1.13	12.70
1.30	0.65	214.92	2.16	1.91	3.75	6.62	1.10	14.30
1.40	0.70	227.16	2.35	1.83	3.96	6.74	1.05	15.83
1.50	0.75	240.00	2.53	1.73	4.19	6.82	1.00	17.24
1.60	0.80	253.74	2.69	1.60	4.43	6.86	0.93	18.48
1.70	0.85	268.85	2.85	1.43	4.69	6.84	0.85	19.48
1.80	0.90	286.26	2.98	1.20	5.00	6.77	0.76	20.15
1.90	0.95	308.32	3.08	0.87	5.38	6.59	0.62	20.31
2.00	1.00	360.00	3.14	0.00	6.28	6.02	∞	18.91

Critical Depth	1.57	ft
Maximum Discharge	20.34	ft^3/s

Completed by:	JHJ
Checked by:	JHJ
Date:	1/7/2017
Sheet:	1 of 1

HYDRAULIC PIPE COMPUTATIONS FOR LINE "C"



DIAMETER =	20 in.	SDR-35

$$Q = \frac{K_U}{n} A \left(\frac{A}{P_W} \right)^{2/3} (S_L)^{1/2}$$

K_U	1.486	
S_L	0.0035	ft/ft
n	0.011	

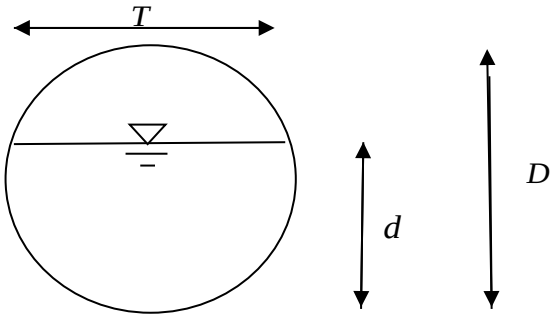
HYDRAULIC ELEMENTS FOR CIRCULAR CHANNEL

d	d/D	θ	A	T	P_W	V	Froud	Q
ft	ft/ft	°	ft^2	ft	ft	ft^2/s	No.	ft^3/s
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.08	0.05	51.68	0.04	0.73	0.75	1.15	0.85	0.05
0.17	0.10	73.74	0.11	1.00	1.07	1.79	0.94	0.20
0.25	0.15	91.15	0.21	1.19	1.33	2.30	0.98	0.47
0.33	0.20	106.26	0.31	1.33	1.55	2.74	1.00	0.85
0.42	0.25	120.00	0.43	1.44	1.75	3.12	1.01	1.33
0.50	0.30	132.84	0.55	1.53	1.93	3.46	1.02	1.90
0.58	0.35	145.08	0.68	1.59	2.11	3.76	1.01	2.56
0.67	0.40	156.93	0.81	1.63	2.28	4.02	1.00	3.28
0.75	0.45	168.52	0.95	1.66	2.45	4.26	0.99	4.05
0.83	0.50	180.00	1.09	1.67	2.62	4.46	0.97	4.86
0.92	0.55	191.48	1.23	1.66	2.78	4.63	0.95	5.70
1.00	0.60	203.07	1.37	1.63	2.95	4.78	0.92	6.53
1.08	0.65	214.92	1.50	1.59	3.13	4.90	0.89	7.36
1.17	0.70	227.16	1.63	1.53	3.30	4.99	0.85	8.14
1.25	0.75	240.00	1.76	1.44	3.49	5.05	0.81	8.87
1.33	0.80	253.74	1.87	1.33	3.69	5.08	0.76	9.51
1.42	0.85	268.85	1.98	1.19	3.91	5.07	0.69	10.02
1.50	0.90	286.26	2.07	1.00	4.16	5.01	0.61	10.37
1.58	0.95	308.32	2.14	0.73	4.48	4.88	0.50	10.45
1.67	1.00	360.00	2.18	0.00	5.24	4.46	∞	9.73

Critical Depth	1.20	ft
Maximum Discharge	10.46	ft^3/s

Completed by:	JHJ
Checked by:	JHJ
Date:	1/7/2017
Sheet:	1 of 1

HYDRAULIC PIPE COMPUTATIONS FOR LINE "D"



DIAMETER =	12 in.	SDR-35

$$Q = \frac{K_U}{n} A \left(\frac{A}{P_W} \right)^{2/3} (S_L)^{1/2}$$

K_U	1.486	
S_L	0.01	ft/ft
n	0.011	

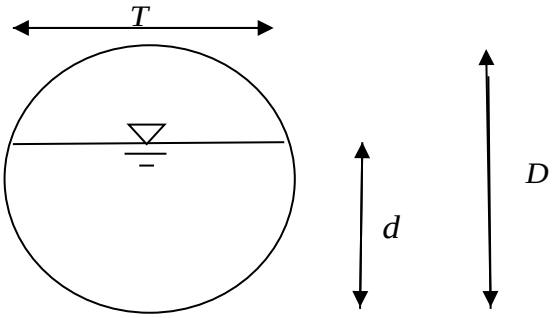
HYDRAULIC ELEMENTS FOR CIRCULAR CHANNEL

d	d/D	θ	A	T	P_W	V	Froud	Q
ft	ft/ft	°	ft^2	ft	ft	ft^2/s	No.	ft^3/s
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.05	0.05	51.68	0.01	0.44	0.45	1.38	1.32	0.02
0.10	0.10	73.74	0.04	0.60	0.64	2.15	1.45	0.09
0.15	0.15	91.15	0.07	0.71	0.80	2.77	1.52	0.20
0.20	0.20	106.26	0.11	0.80	0.93	3.30	1.55	0.37
0.25	0.25	120.00	0.15	0.87	1.05	3.76	1.57	0.58
0.30	0.30	132.84	0.20	0.92	1.16	4.16	1.58	0.82
0.35	0.35	145.08	0.24	0.95	1.27	4.52	1.57	1.11
0.40	0.40	156.93	0.29	0.98	1.37	4.84	1.56	1.42
0.45	0.45	168.52	0.34	0.99	1.47	5.12	1.54	1.75
0.50	0.50	180.00	0.39	1.00	1.57	5.36	1.51	2.11
0.55	0.55	191.48	0.44	0.99	1.67	5.57	1.47	2.47
0.60	0.60	203.07	0.49	0.98	1.77	5.75	1.43	2.83
0.65	0.65	214.92	0.54	0.95	1.88	5.89	1.38	3.18
0.70	0.70	227.16	0.59	0.92	1.98	6.00	1.32	3.53
0.75	0.75	240.00	0.63	0.87	2.09	6.08	1.25	3.84
0.80	0.80	253.74	0.67	0.80	2.21	6.11	1.17	4.12
0.85	0.85	268.85	0.71	0.71	2.35	6.10	1.08	4.34
0.90	0.90	286.26	0.74	0.60	2.50	6.03	0.95	4.49
0.95	0.95	308.32	0.77	0.44	2.69	5.87	0.78	4.52
1.00	1.00	360.00	0.79	0.00	3.14	5.36	∞	4.21

Critical Depth	0.86	ft
Maximum Discharge	4.53	ft^3/s

Completed by:	JHJ
Checked by:	JHJ
Date:	1/7/2017
Sheet:	1 of 1

HYDRAULIC PIPE COMPUTATIONS FOR LINE "E"



DIAMETER =	18 in.	RCP

$$Q = \frac{K_U}{n} A \left(\frac{A}{P_W} \right)^{2/3} (S_L)^{1/2}$$

K_U	1.486	
S_L	0.0183	ft/ft
n	0.013	

HYDRAULIC ELEMENTS FOR CIRCULAR CHANNEL

d	d/D	θ	A	T	P_W	V	Froud	Q
ft	ft/ft	°	ft^2	ft	ft	ft^2/s	No.	ft^3/s
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.08	0.05	51.68	0.03	0.65	0.68	2.07	1.62	0.07
0.15	0.10	73.74	0.09	0.90	0.97	3.23	1.78	0.30
0.23	0.15	91.15	0.17	1.07	1.19	4.16	1.86	0.69
0.30	0.20	106.26	0.25	1.20	1.39	4.95	1.90	1.24
0.38	0.25	120.00	0.35	1.30	1.57	5.63	1.93	1.95
0.45	0.30	132.84	0.45	1.37	1.74	6.24	1.93	2.78
0.53	0.35	145.08	0.55	1.43	1.90	6.78	1.92	3.74
0.60	0.40	156.93	0.66	1.47	2.05	7.25	1.91	4.79
0.68	0.45	168.52	0.77	1.49	2.21	7.67	1.88	5.92
0.75	0.50	180.00	0.88	1.50	2.36	8.04	1.85	7.11
0.83	0.55	191.48	1.00	1.49	2.51	8.36	1.80	8.32
0.90	0.60	203.07	1.11	1.47	2.66	8.62	1.75	9.55
0.98	0.65	214.92	1.22	1.43	2.81	8.84	1.69	10.75
1.05	0.70	227.16	1.32	1.37	2.97	9.00	1.62	11.90
1.13	0.75	240.00	1.42	1.30	3.14	9.11	1.54	12.96
1.20	0.80	253.74	1.52	1.20	3.32	9.16	1.44	13.89
1.28	0.85	268.85	1.60	1.07	3.52	9.15	1.32	14.64
1.35	0.90	286.26	1.68	0.90	3.75	9.04	1.17	15.14
1.43	0.95	308.32	1.73	0.65	4.04	8.80	0.95	15.27
1.50	1.00	360.00	1.77	0.00	4.71	8.05	∞	14.22

Critical Depth	1.40	ft
Maximum Discharge	15.29	ft^3/s

Completed by:	JHJ
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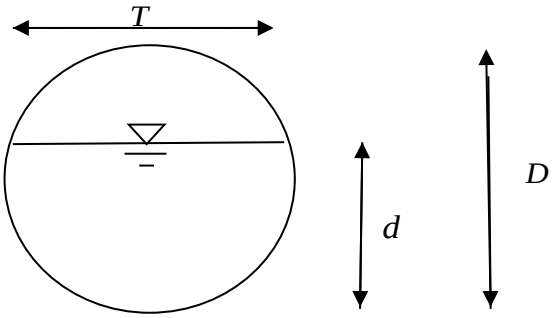
Date:	1/7/2017
Sheet:	1 of 1

HYDRAULIC PIPE COMPUTATIONS FOR LINE "F"



DIAMETER =	24 in.	RCP

$$Q = \frac{K_U}{n} A \left(\frac{A}{P_W} \right)^{2/3} (S_L)^{1/2}$$

K_U	1.486	
S_L	0.01	ft/ft
n	0.013	

HYDRAULIC ELEMENTS FOR CIRCULAR CHANNEL

d	d/D	θ	A	T	P_W	V	Froud	Q
ft	ft/ft	°	ft^2	ft	ft	ft^2/s	No.	ft^3/s
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.10	0.05	51.68	0.06	0.87	0.90	1.85	1.26	0.11
0.20	0.10	73.74	0.16	1.20	1.29	2.89	1.38	0.47
0.30	0.15	91.15	0.30	1.43	1.59	3.72	1.44	1.10
0.40	0.20	106.26	0.45	1.60	1.85	4.43	1.48	1.98
0.50	0.25	120.00	0.61	1.73	2.09	5.05	1.49	3.10
0.60	0.30	132.84	0.79	1.83	2.32	5.59	1.50	4.43
0.70	0.35	145.08	0.98	1.91	2.53	6.07	1.49	5.95
0.80	0.40	156.93	1.17	1.96	2.74	6.50	1.48	7.62
0.90	0.45	168.52	1.37	1.99	2.94	6.87	1.46	9.42
1.00	0.50	180.00	1.57	2.00	3.14	7.20	1.43	11.31
1.10	0.55	191.48	1.77	1.99	3.34	7.48	1.40	13.25
1.20	0.60	203.07	1.97	1.96	3.54	7.72	1.36	15.20
1.30	0.65	214.92	2.16	1.91	3.75	7.92	1.31	17.11
1.40	0.70	227.16	2.35	1.83	3.96	8.06	1.26	18.94
1.50	0.75	240.00	2.53	1.73	4.19	8.16	1.19	20.63
1.60	0.80	253.74	2.69	1.60	4.43	8.21	1.11	22.11
1.70	0.85	268.85	2.85	1.43	4.69	8.19	1.02	23.31
1.80	0.90	286.26	2.98	1.20	5.00	8.10	0.91	24.11
1.90	0.95	308.32	3.08	0.87	5.38	7.88	0.74	24.31
2.00	1.00	360.00	3.14	0.00	6.28	7.20	∞	22.63

Critical Depth	1.68	ft
Maximum Discharge	24.34	ft^3/s

Completed by:	JHJ
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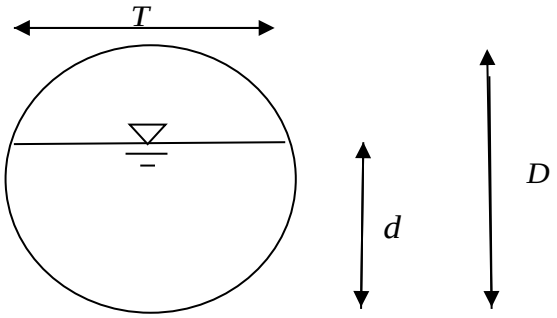
Date:	1/7/2017
Sheet:	1 of 1

HYDRAULIC PIPE COMPUTATIONS FOR LINE "G"



DIAMETER =	24 in.	RCP

$$Q = \frac{K_U}{n} A \left(\frac{A}{P_W} \right)^{2/3} (S_L)^{1/2}$$

K_U	1.486	
S_L	0.0183	ft/ft
n	0.013	

HYDRAULIC ELEMENTS FOR CIRCULAR CHANNEL

d	d/D	θ	A	T	P_W	V	Froud	Q
ft	ft/ft	°	ft^2	ft	ft	ft^2/s	No.	ft^3/s
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.10	0.05	51.68	0.06	0.87	0.90	2.50	1.70	0.15
0.20	0.10	73.74	0.16	1.20	1.29	3.91	1.87	0.64
0.30	0.15	91.15	0.30	1.43	1.59	5.03	1.95	1.49
0.40	0.20	106.26	0.45	1.60	1.85	5.99	2.00	2.68
0.50	0.25	120.00	0.61	1.73	2.09	6.83	2.02	4.19
0.60	0.30	132.84	0.79	1.83	2.32	7.56	2.03	5.99
0.70	0.35	145.08	0.98	1.91	2.53	8.21	2.02	8.05
0.80	0.40	156.93	1.17	1.96	2.74	8.79	2.00	10.31
0.90	0.45	168.52	1.37	1.99	2.94	9.30	1.97	12.75
1.00	0.50	180.00	1.57	2.00	3.14	9.74	1.94	15.30
1.10	0.55	191.48	1.77	1.99	3.34	10.12	1.89	17.92
1.20	0.60	203.07	1.97	1.96	3.54	10.45	1.84	20.56
1.30	0.65	214.92	2.16	1.91	3.75	10.71	1.77	23.15
1.40	0.70	227.16	2.35	1.83	3.96	10.91	1.70	25.62
1.50	0.75	240.00	2.53	1.73	4.19	11.04	1.61	27.91
1.60	0.80	253.74	2.69	1.60	4.43	11.10	1.51	29.91
1.70	0.85	268.85	2.85	1.43	4.69	11.08	1.38	31.53
1.80	0.90	286.26	2.98	1.20	5.00	10.95	1.23	32.62
1.90	0.95	308.32	3.08	0.87	5.38	10.67	1.00	32.88
2.00	1.00	360.00	3.14	0.00	6.28	9.75	∞	30.62

Critical Depth	1.90	ft
Maximum Discharge	32.92	ft^3/s

Completed by:	JHJ
Checked by:	JHJ
Date:	1/7/2017
Sheet:	1 of 1

User Inputs

Chamber Model	SC-740
Outlet Control Structure	Yes (Outlet)
Project Name	Lakeshore Manor
Project Engineer	Kolibrien Corp.
Project Location	Lakeshore Dr., Lake Elsinore
Project Date	12/26/2016
Measurement Type	Imperial
Required Storage Volume	12,000 cubic ft.
Stone Porosity	40%
Stone Foundation Depth	12 in.
Amount of Stone Above Chambers	6 in.
Average Cover Over Chambers	18 in.
Design Constraint	LENGTH
Design Constraint Dimension	144 ft.

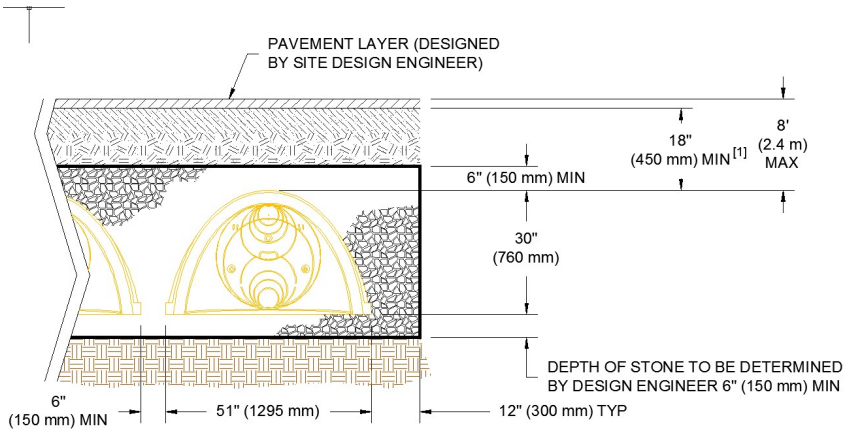
Results

System Volume and Bed Size

Installed Storage Volume	12010 cubic ft.
Storage Volume Per Chamber	81.70 cubic ft.
Number Of Chambers Required	147
Number Of End Caps Required	16
Rows/Chambers	7 row(s) of 19 chamber(s)
Leftover Rows/Chambers	1 row(s) of 14 chamber(s)
Maximum Length	142.71 ft.
Maximum Width	40.10 ft.
Approx. Bed Size Required	5553 square ft.

System Components

Amount Of Stone Required	573 cubic yards
Volume Of Excavation (Not Including Fill)	823 cubic yards
Non-Woven Filter Fabric Required	1393 square yards
Length Of Isolator Row	135.28 ft.
Non-Woven Isolator Row Fabric	120 square yards
Woven Isolator Row Fabric	150 square yards



[1] - TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

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Tech Sheet

StormTech®
Detention • Retention • Water Quality

Manifold Sizing Guidance for StormTech Chamber Systems

Tech Sheet # 7
August, 2012

General:
The design of subsurface chambers systems, as part of a site design, involves many site-specific and regulatory constraints that necessarily leave overall design responsibility with the consulting engineer. However StormTech offers assistance to the design engineer for the layout of chamber systems and the manifolds that connect the chambers to the drainage system. This summarizes methods StormTech uses for calculating the size and configuration of manifolds for the StormTech chamber system.

StormTech manifolds are comprised of smooth interior HDPE pipes, fittings and prefabricated manifold sections that align with proper spacing of the chamber rows. The use of common pipe components enables the engineer to apply simple equations of hydraulics to size the manifold system. Available prefabricated manifolds are shown in Table 1.

	Trunk in. (mm)		SC-310 & RC-310 Manifolds								
Stub in. (mm)	48 (1200)	42 (1050)	36 (900)	30 (750)	24 (600)	18 (450)	15 (375)	12 (300)	10 (250)	8 (200)	6 (150)
12 (300)	NA	NA	NA	NA	Avail	Avail	Avail	Avail	NA	NA	NA
10 (250)	NA	NA	NA	NA	Avail	Avail	Avail	Avail	Avail	NA	NA
8 (200)	NA	NA	NA	NA	Avail	Avail	Avail	Avail	Avail	Avail	NA
6 (150)	NA	NA	NA	NA	Avail	Avail	Avail	Avail	Avail	Avail	Avail

	Trunk in. (mm)		SC-740, DC-780 & RC-750 Manifolds								
Stub in. (mm)	48 (1200)	42 (1050)	36 (900)	30 (750)	24 (600)	18 (450)	15 (375)	12 (300)	10 (250)	8 (200)	6 (150)
24 (600)	Avail	Avail	Avail	Avail	Avail	NA	NA	NA	NA	NA	NA
18 (450)	Avail	Avail	Avail	Avail	Avail	Avail	NA	NA	NA	NA	NA
15 (375)	Avail	Avail	Avail	Avail	Avail	Avail	Avail	NA	NA	NA	NA
12 (300)	Avail	Avail	Avail	Avail	Avail	Avail	Avail	Avail	NA	NA	NA
10 (250)	NA	NA	NA	NA	Avail	Avail	Avail	Avail	Avail	NA	NA
8 (200)	NA	NA	NA	NA	Avail	Avail	Avail	Avail	Avail	Avail	NA
6 (150)	NA	NA	NA	Avail	Avail	Avail	Avail	Avail	Avail	Avail	Avail

	Trunk in. (mm)		MC-3500 & MC-4500 Manifolds								
Stub in. (mm)	48 (1200)	42 (1050)	36 (900)	30 (750)	24 (600)	18 (450)	15 (375)	12 (300)	10 (250)	8 (200)	6 (150)
24 (600)	Avail	Avail	Avail	Avail	Avail	NA	NA	NA	NA	NA	NA
18 (450)	Avail	Avail	Avail	Avail	Avail	Avail	NA	NA	NA	NA	NA
15 (375)	Avail	Avail	Avail	Avail	Avail	Avail	Avail	NA	NA	NA	NA
12 (300)	Avail	Avail	Avail	Avail	Avail	Avail	Avail	Avail	NA	NA	NA

Table 1 Standard Manifolds Manufactured by ADS (special sizes available)

The primary manifold design objectives are; 1) to convey the peak flows to and from the chamber system without causing an unacceptable backwater and 2) to preclude scour of structural stone under the chamber system. StormTech assumes the maximum allowable water surface elevation is at full storage (top of open graded stone). The design engineer may choose to design for a higher maximum water surface elevation. Since the relationship between the inflow hydrographs, outlet control, time to peak and accumulated storage are site specific and complex, StormTech assumes that the peak inlet flow occurs when there is no water in the chambers. This is the worst case condition for scour. StormTech assumes that the chambers are full when the peak outlet flow occurs.

Inlet Manifolds:
Inlet manifold sizing is broken down into two parts: 1) sizing the main trunk and 2) determining the size and number of stubs required. The following guidance includes how to determine main trunk size and a sufficient number of properly sized stub connections.

Inlet Trunk Sizing:
StormTech manifold systems are generally laid level. The analysis of the trunk can be performed by looking at the trunk as an orifice of a short tube and submerged at peak flow. The premise is that the length between the manhole and first stub is relatively short. Thus the orifice

of a short tube can be looked at as the length of main trunk to the first inlet stub. The short tube is the constriction.

Flow in the main trunk is reduced after each stub and headlosses in the balance of the trunk do not control.

The equation for an orifice of a short tube[1] is:

$$Q = Ca\sqrt{2gh}$$

With the variables defined as follows:
Q = maximum flow rate cresting the weir (cfs)
C = 0.75
a = area of manifold trunk (ft^2) (to be determined)
g = 32.2 (ft/s^2)
h = head over center of orifice (ft) (figure 1)

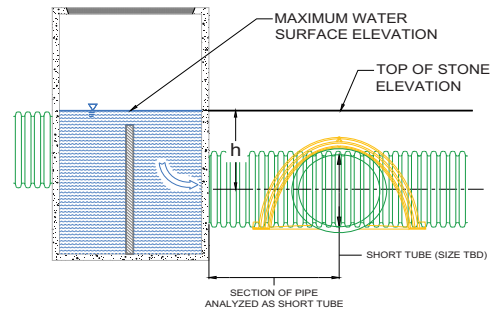

Figure 1 Orifice of a Short Tube

This analysis is used to determine the area of the orifice required to pass the flow rate. A pipe is selected with at least this area.

The design engineer may apply a greater value for "h" if it is not limited by the maximum water surface elevation at the top of stone.

Inlet Stub Sizing:

The number and size of the stubs can be determined by analyzing each inlet stub as a broad crested weir. Weir analysis is dependant upon whether a tailwater condition exists inside the chambers. Unless otherwise determined by the inlet hydrograph, no tail water is used for the analysis (worst case scenario).

The equation for a broad crested weir [1] is:

$$Q = CLH^{3/2}$$

With the variables defined as follows:
Q = flow rate in the stub (cfs)
C = discharge coefficient
L= width of weir (ft)
H = height of water over weir (ft)
b = Length of weir (ft) *(used to determine C)*

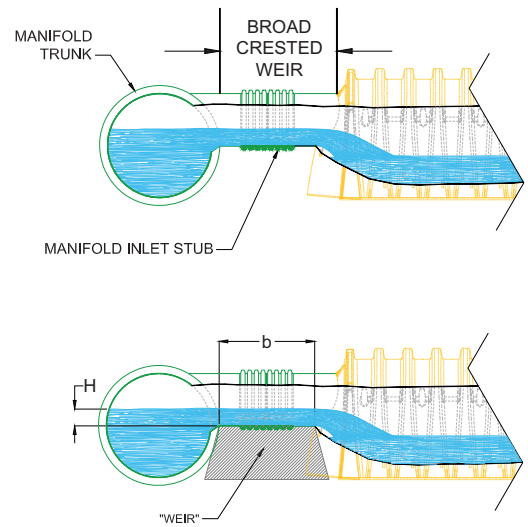

Figure 2 Broad Crested Weir

These parameters are defined in figure 2. When performing the analysis on the weir, the first step is to determine the maximum allowable flow rate through the stubs into the chambers. Table 2 shows the maximum velocities based on scour analysis and pipe size. Specifying scour protection fabric allows higher velocities to be tolerated. **Note: the velocity from Table 2 cannot be multiplied by the area of the pipe to determine the allowable flow rate through the pipe stubs.**

Inlet Pipe Diameter in. (mm)	Maximum Inlet Pipe Velocities ft/s (m/s)
4 (100)	2.43 (0.74)
6 (150)	2.61 (0.80)
8 (200)	2.73 (0.83)
10 (250)	2.44 (0.74)
12 (300)	2.19 (0.67)
15 (375)	2.00 (0.61)
18 (450)	1.88 (0.57)
24 (600)	1.74 (0.53)

Table 2: Maximum inlet velocities for various pipes

When sizing the stubs for a "size on size" manifold, there is no weir formed by the stub. A conservative approach to determine the number of stubs required is to assume an eccentric manifold with the desired stub size and an oversized trunk. Thus if a 24" x 24" manifold is desired then size a 30" x 24" manifold to determine the number of 24" stubs required and use this number of stubs for the 24" x 24" manifold.

Outlet Manifolds:
The purpose of the outlet manifold "hard-pipe connection(s)" is to ensure that there are free-flooding conditions between the StormTech chambers and the outlet control structure. The outlet manifold must be able to pass the design peak outlet flow rate from the chamber system to the outlet control structure and the outlet control structure must in-fact control the flow.

The premise for the StormTech sizing approach is that the outlet control structure has caused the chambers to be full when the peak outlet flow occurs. Essentially, the outlet control structure has impeded flow and caused a backwater in the StormTech chambers. This premise is appropriate for most flow attenuation systems and also simplifies the design. Since the chambers are assumed to be full, the allowable flow through the chamber row is the full chamber flow area multiplied by the acceptable scour velocity. However, when the design intent is to maximize storage in the chambers, the outlet structure would cause a high tailwater and driving head would be small. Under the low driving head scenario, pipe flow is more constricting than chamber row flow.

The outlet manifold sizing then becomes full pipe flow which is dependent upon driving head, headlosses at the pipe entrance, friction losses in the pipes, fitting losses (if a manifold) and exit losses. This is solved by a simple application of the energy equation and the Darcy Weisbach equation for piping connecting two reservoirs; the upstream reservoir elevation being the maximum water surface elevation in the chamber system and the downstream reservoir elevation being the water surface elevation caused by the outlet control (see figure 3).

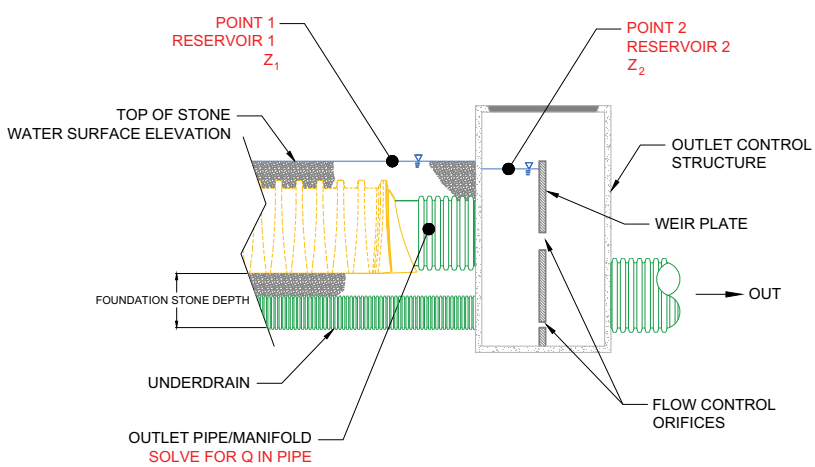

Figure 3, Outlet connections (reservoir-to-reservoir connection)

The formulas to be used are:
Energy Equation [2]:

$$\frac{p_1}{\gamma} + \alpha_1 \frac{v_1^2}{2g} + z_1 = \frac{p_2}{\gamma} + \alpha_2 \frac{v_2^2}{2g} + z_2 + h_L$$

Where:

p/γ = pressure head

$\alpha v^2/2g$ = velocity head

α = kinetic energy correction factor (typically set to 1)

z = elevation

h_L = head loss between sections 1 and 2

Darcy-Weisbach formula[2]:

$$h_f = f \frac{L V^2}{D\ 2g}$$

Where:

h_f = headloss in pipe

$V^2/2g$ = velocity head

L = length of pipe

D = pipe diameter

f = resistance coefficient

Colebrook formula[3]:

$$\frac{1}{\sqrt{f}} = 2.0 \log\left(\frac{\varepsilon/D}{3.7} + \frac{2.51}{Re\sqrt{f}}\right)$$

Where:

f = headloss in pipe

ε/D = equivalent relative roughness

D = pipe diameter

ε = equivalent absolute roughness

Re = Reynolds number

Note: Most hydraulics textbooks contain a copy of the Moody Chart that can be used to calculate f instead of the Colebrook formula.

Headloss in transitions and fitting can be calculated using the formula [2]:

$$h_L = K \frac{V^2}{2g}$$

Where: K_e = 0.5 for a square edged inlet pipe [2]
K_E = 1.0 for a re-entrant (pipe into outlet control structure) [2]
K_L = 2.0 for a branched tee (manifold tee) [4]

StormTech has solved the energy equation and the Darcy Weisbach equation based on a driving head of 0.25 ft, losses that include: 1 square edge inlet, 1 tee, 1 outlet and ≤ 50 ft of pipe and suggests maximum flow rates for stub and manifold sizes as shown in table 3. When the pipe required is larger than the maximum sized pipe that can be inlet into the chamber the pipe size calculated is specified as the main manifold trunk (see table 3). The number of stubs required for the manifold is obtained by dividing the outlet flow rate by the maximum flow rate

from table 3 for the desired stub size. For example, with an outlet flow rate of 6 cfs a 24 in manifold trunk is required for the SC-310 chamber (maximum pipe size is 12 in). To size a 24" x 12" outlet manifold the 6 cfs is divided by 2.0 cfs (maximum outlet flow rate for 12 inch pipe) for a total of three 12 inch stubs required.

Manifold Configuration:
As well as conveying the design flow rates and preventing scour of the foundation stone, the manifold must also disperse the water across the chamber bed and ensure that peak flows readily reach to the outlet control structure. For wide beds with many rows, the manifold stubs should be spread out so that large areas of the bed are not dependent upon flow through stone to fill.

Figure 4 shows an example of a "limiting row" that requires nearly half the chamber bed to be filled via the stone permeability. The flow to the remainder of the bed and to the outlet control structure is limited by the flow through the stone of only one chamber row. Based on the inlet hydrograph and the permeability of the stone this limiting row may cause a backwater condition. In figure 4 there are 9 chambers that will laterally feed the remainder of the bed consisting of 54 chambers.

Outlet Pipe Diameter in. (mm)	Maximum Outlet Pipe Flow Rates cfs (l/s)
6 (150)	0.4 (11.3)
8 (200)	0.7 (19.8)
10 (250)	1.0 (28.3)
12 (300)	2.0 (56.6)
15 (375)	2.7 (76.5)
18 (450)	4.0 (113.3)
24 (600)	7.0 (198.2)
30 (750)	11.0 (311.5)
36 (400)	16.0 (453.1)
42 (1050)	22.0 (623.0)
48 (1200)	28.0 (792.9)

Max. SC-310 pipe connection

Max. SC-740 pipe connection

Table 3: Maximum outlet flow rate for various pipes

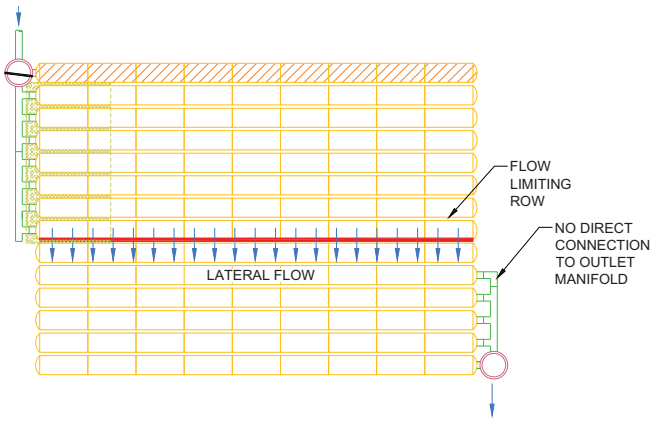

Figure 4: Limiting row of chamber potentially causing backwater

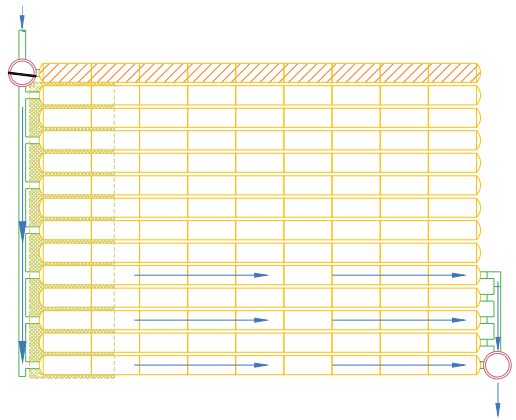

Figure 5: Typical inlet/outlet manifold system

In figure 5 the manifold is spread out to inlet every other row. With this configuration there are now 63 chambers connected to the inlet manifold, laterally feeding 54 chambers that do not have inlet stubs. Also there are three chamber rows connected on both the inlet and outlet ends (creating three direct flow paths from the inlet to the outlet).

The aggregate used for StormTech's chambers have permeability's (Darcy *k* values) that range from 0.1 ft/s (0.03 m/s) to 1.6 ft/s (0.5 m/s) (No. 57 and No. 3 respectively) [5]. StormTech has estimated of flow through the stone beneath the chambers (one direction) as:

Stone Gradation	Darcy "k" ft/s (m/s)	SC-310		SC-740	
		Velocity ft/s (m/s)	Q* cfs (L/s)	Velocity ft/s (m/s)	Q* cfs (L/s)
#3	1.6 (0.5)	0.91 (0.28)	3.04 (86.1)	1.2 (0.37)	4.2 (118.9)
#357, 4, 467, 5	0.6 (0.2)	0.34 (0.10)	1.14 (32.3)	0.4 (0.12)	1.6 (45.3)
#56, 57	0.1 (0.03)	0.06 (0.02)	0.19 (5.4)	0.07 (0.02)	0.26 (7.36)

** Flows listed are one direction only and are based on Darcy' equation of Q = kiA. Assumptions include a hydraulic gradient equal to the height of chamber, 6" of foundation stone, no water ponded in the adjacent chamber row, and a flow path length of 41 inches for the SC-740 and 30 inches for the SC-310.*

The StormTech Technical Services Department can assist the design professional in specifying StormTech stormwater systems. As part of this assistance StormTech has developed a proprietary sizing tool for the inlet manifolds based on the common equations and assumptions listed in this Tech Sheet. Please contact the StormTech Technical Services Department for assistance with sizing inlet manifolds.

Disclaimer: The hydraulic performance of manifolds for detention systems is dependent upon many variables including but not limited to; headwater and tail water conditions, the inflow hydrograph and headloss through the piping system. StormTech has used assumptions to simplify the manifold design process. The design engineer for the project must verify that the assumptions and calculations are appropriate for the specific application.

[1] Brater, E.F. and King, H. W., Handbook of Hydraulics for the Solution of Hydraulic Engineering Problems, 6th ed., McGraw-Hill, New York, 1976
[2] Cassidy, J.J, Chaudhry, M.H., and Roberson, J. A., Hydraulic Engineering, 1 st ed., Houghton Mifflin, Boston, 1988
[3] Gerhart, P.M., Gross, R.J., and Hochstien, J.I. Fundamentals of Fluid Mechanics, 2 nd ed., Addison-Wesley, New York, 1992
[4] Munson, B.R., Okiishi, T.H., and Young, D.F., Fundamentals of Fluid Mechanics, 5 th ed., John Wiley & Sons, Danvers, 2006
[5] Cedergren, H.R., Seepage, Drainage, and Flow Nets, 3rd ed., John Wiley & Sons, New York, 1989

*ADS "Terms and Conditions of Sale" are available on the ADS website, www.ads-pipe.com
StormTech is a registered trademark of StormTech, Inc.

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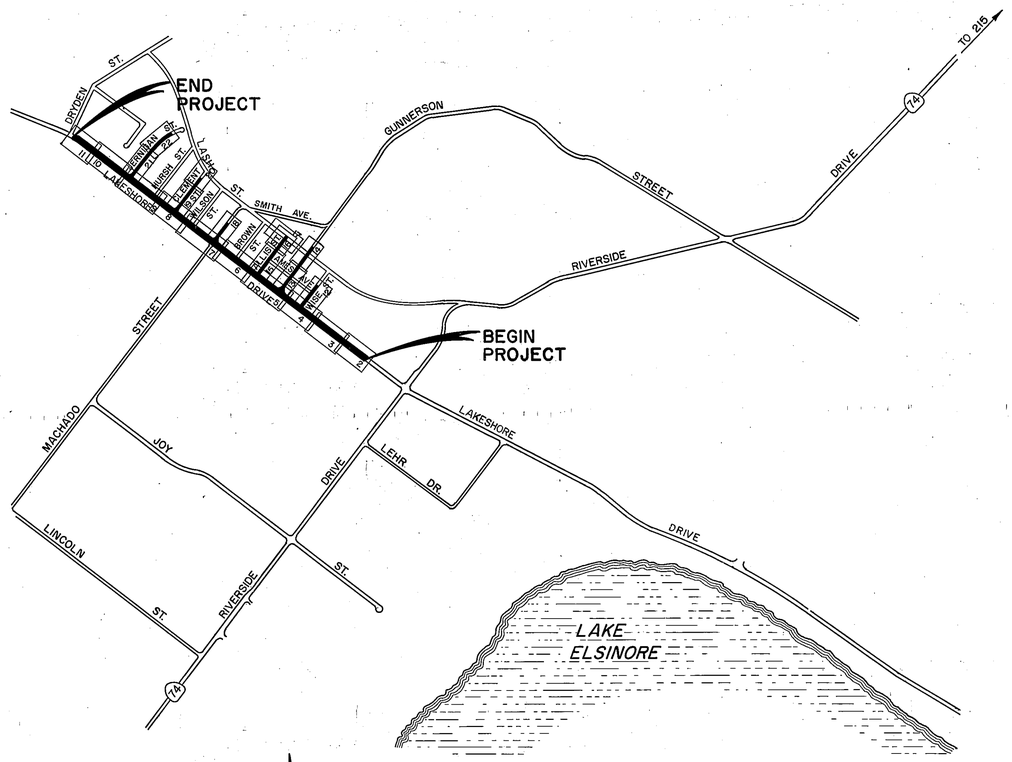
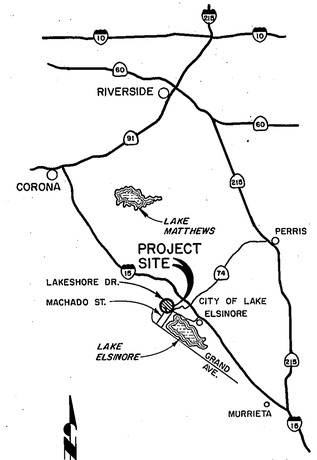
Appendix F

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT



LOCATION MAP

800' 0 800'



VICINITY MAP

N.T.S.

GENERAL NOTES

1. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION.
2. ALL ELEVATIONS SHOWN ARE IN FEET, BASED ON U.S.C. & G.S. DATUM.
3. ALL CROSS SECTIONS TAKEN LOOKING DOWNSTREAM.
4. ELEVATIONS AND LOCATIONS OF UTILITIES ARE SHOWN APPROXIMATELY ON PLANS, 48 HOURS BEFORE EXCAVATION CALL UNDERGROUND SERVICE ALERT 1-800-422-4133. ALL UTILITIES SHALL BE PROTECTED IN PLACE EXCEPT AS NOTED ON PLANS AND SPECIFICATIONS.
5. ALL OPENING RESULTING FROM CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERT, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED AT BOTH ENDS WITH 6" OF CLASS "B" CONCRETE.
6. STREET RESURFACING SHALL BE 0.25' TYPE "B" ASPHALT CONCRETE ON 0.5' CLASS 2 BASE OR IN KIND, WHICHEVER IS GREATER.
7. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS, UNLESS OTHERWISE NOTED.
8. STANDARD DRAWINGS CALLED FOR ON PLAN AND PROFILE SHALL CONFORM TO RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT STANDARD DRAWINGS LISTED ON THIS SHEET.
9. TOP OF DROP INLETS AND CATCH BASINS (WITHOUT CURBS) SHALL BE SET TO MATCH THE CENTERLINE ELEVATIONS OF THE STREET. ELEVATIONS SHOWN ARE APPROXIMATE.

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R.C.F.C. & W.C.D. STANDARD DRAWINGS

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CALTRANS STANDARDS

T11-T13	TRAFFIC CONTROLS	51-53

REGISTERED PROFESSIONAL ENGINEER NEAL L. SMITHHAMMER NO. 16757 EXP. 6-30-97 CIVIL STATE OF CALIFORNIA

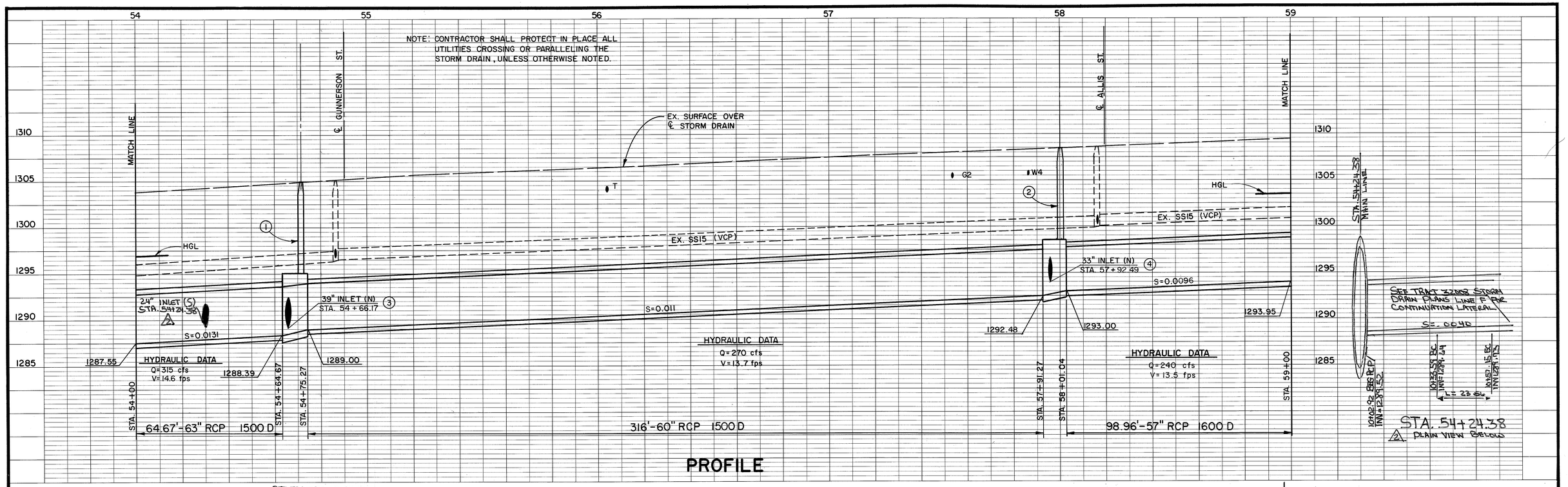
REGISTERED PROFESSIONAL ENGINEER KENNETH L. EDWARDS NO. 12400 Exp. 3/31/97 CIVIL STATE OF CALIFORNIA

AS BUILT

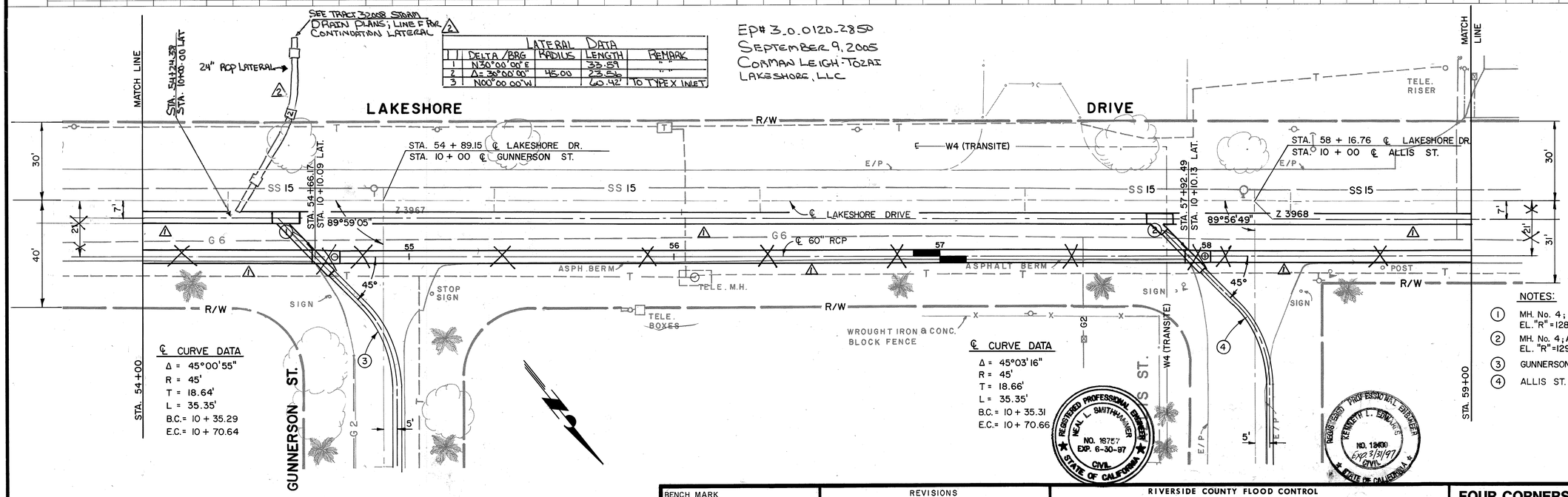
APPROVED BY: C.C.

DATE 9-4-96

CITY OF LAKE ELSINORE	BENCH MARK	REVISIONS	RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	FOUR CORNERS STORM DRAIN STAGE 3 TITLE SHEET	PROJECT NO. 3-0-120
APPROVED BY: CITY ENGINEER R.E. NO. 21837 DATE: 4-4-94	U.S.C. & G.S. DESIGNATION H-17 RIVERSIDE CO. DESIGNATION EL. 32-80 STD. TABLET (4" DIA. BRASS DISC) SET IN TOP 8" CONC. CURB N/W CORNER RIVERSIDE DR. & LAKESHORE DR. EL. = 1280.31	REF. DESCRIPTION APPR. DATE	DESIGNED BY: PRIVITT DRAWN BY: DRD DATE DRAWN: 9-16-87 CHECKED BY: Kong; RECOMMENDED FOR APPROVAL BY: DESIGN ENGINEER R.E. NO. 16757 DATE: 7 MAR 94; APPROVED BY: CHIEF ENGINEER R.E. NO. 12400 DATE: 3-21-94		DRAWING NO. 3-116 SHEET NO. 1 OF 53



PROFILE



LATERAL DATA				
	DELTA/BRG	RADIUS	LENGTH	REMARK
1	N30°00'00"E		33.59'	" "
2	Δ=30°00'00"	45.00	23.56'	" "
3	N00°00'00"W		60.42'	TO TYPE X INLET

EP# 3.0.0120-2850
SEPTEMBER 9, 2005
CORMAN LEIGH-TOZAI
LAKESHORE, LLC

℄ CURVE DATA
Δ = 45°00'55"
R = 45'
T = 18.64'
L = 35.35'
B.C.= 10 + 35.29
E.C.= 10 + 70.64

℄ CURVE DATA
Δ = 45°03'16"
R = 45'
T = 18.66'
L = 35.35'
B.C.= 10 + 35.31
E.C.= 10 + 70.66

PLAN

1"=20'

20' 0 20'

NOTES:

1. MH. No. 4; A=45°, B=39", C=8.1', D_1=60", D_2=63", EL."R"=1289.66, EL. "S"=1289.60
2. MH. No. 4; A=45°, B=33", C=7.5', D_1=57", D_2=60", EL. "R"=1294.08, EL. "S"=1294.03
3. GUNNERSON ST. LATERAL SEE SHT. 13 & 14.
4. ALLIS ST. LATERAL SEE SHT. 15 & 16.

AS BUILT
APPROVED BY: C.C.
DATE 9/9/96

REGISTERED PROFESSIONAL ENGINEER NEAL L. SMITHWINNER NO. 18757 EXP. 6-30-97 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER KENNETH L. EDWARDS NO. 12400 EXP. 3/31/97 CIVIL STATE OF CALIFORNIA

BENCH MARK

REVISIONS			
1	ADDED & DELETED REALIGNMENT		
REF.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

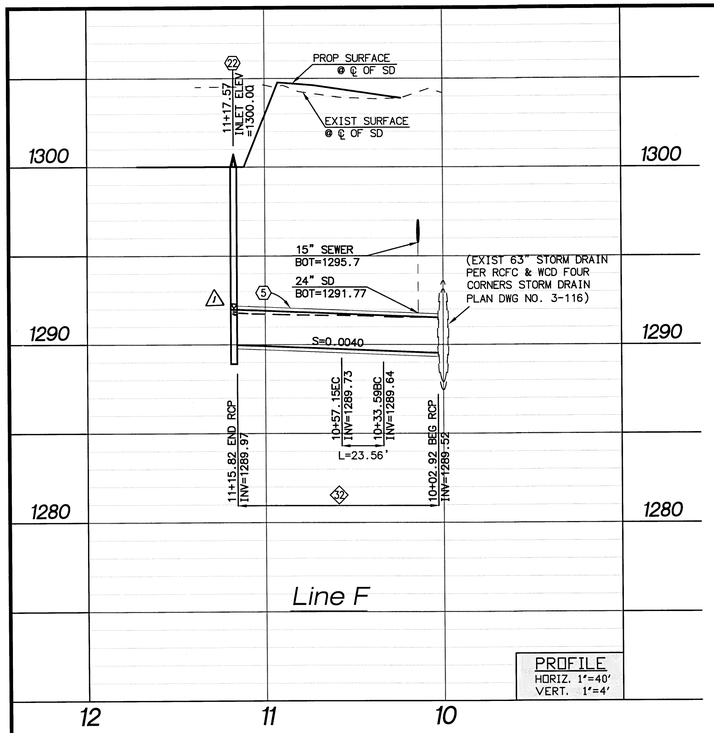
DESIGNED BY: PRIVITT
DRAWN BY: RLR
DATE DRAWN: JULY 1991
CHECKED BY: Kong

RECOMMENDED FOR APPROVAL BY: Neal L. Smithwinner
DESIGN ENGINEER R.E. NO. 16757
DATE: 7 MAR 96

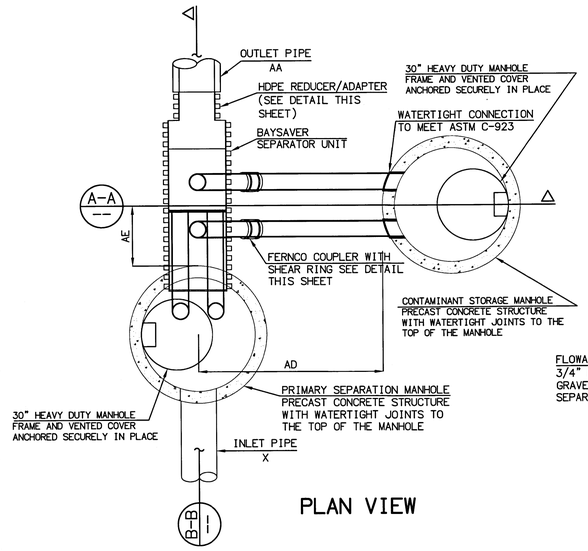
APPROVED BY: Kenneth L. Edwards
CHIEF ENGINEER R.E. NO. 12400
DATE: 3-21-96

FOUR CORNERS STORM DRAIN
STAGE 3
LAKESHORE DRIVE
STA. 54+00 TO STA. 59+00

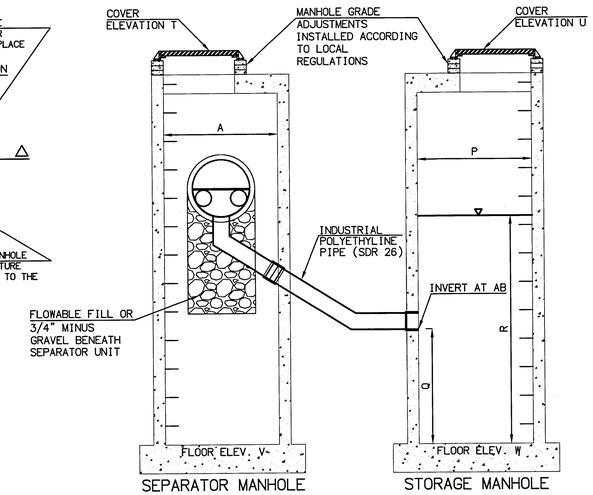
PROJECT NO. 3-0-120
DRAWING NO. 3-116
SHEET NO. 5 OF 53



PROFILE
HORIZ. 1"=40'
VERT. 1"=4'

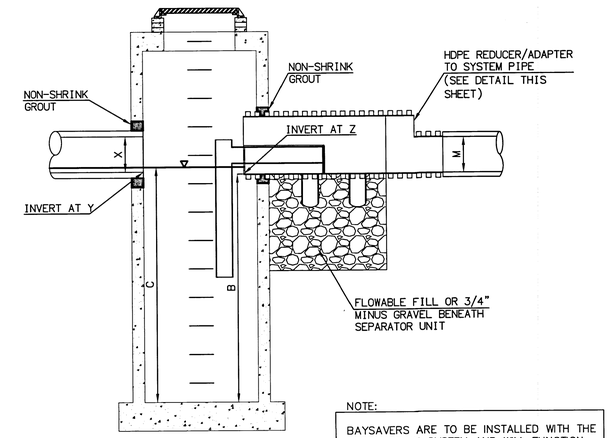


PLAN VIEW



SEPARATOR MANHOLE STORAGE MANHOLE

A-A SECTION



B-B SECTION

NOTE:

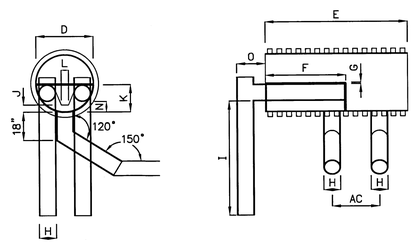
BAYSAVERS ARE TO BE INSTALLED WITH THE STORM DRAIN SYSTEM AND WILL FUNCTION AS SECONDARY SEDIMENT CONTROL DEVICES.

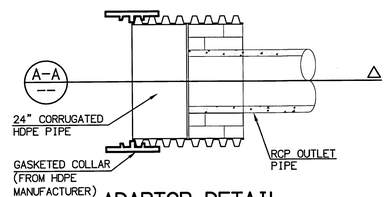
UPON COMPLETION OF SITE STABILIZATION, EACH BAYSAVER SYSTEM SHALL BE FLUSHED CLEAN & THE MANHOLES CLEANED OUT AND REFILLED WITH CLEAN WATER.

Storm Drain Data (PLAN)

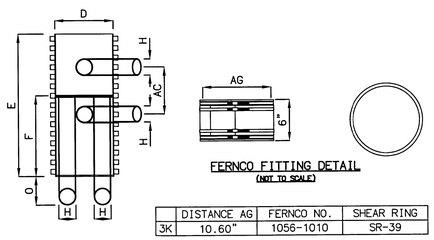
∩	DELTA/BRG	RADIUS	LENGTH	REMARK
1	N66°54'41"E	--	33.59'	" "
2	Δ= 30°00'00"	45.00'	23.56'	" "
3	N36°54'41"E	--	60.42'	" "

Storm Drain Data (PROFILE)			Max Hydraulic Data	
◇	LENGTH	SIZE	D-LOAD Q100 (CFS)	V100 (FPS)
32	112.90'	24"	2000 11.22'	3.64



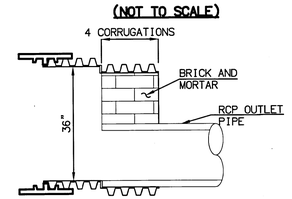


ADAPTOR DETAIL
(NOT TO SCALE)



FERNCO FITTING DETAIL
(NOT TO SCALE)

	DISTANCE AG	FERNCO NO.	SHEAR RING
3K	10.60"	1056-1010	SR-39



A-A SECTION

BAYSAVER MAINTENANCE

BAYSAVER SYSTEMS MUST BE INSPECTED AND MAINTAINED PERIODICALLY. INSPECTION IS MADE BY CHECKING THE DEPTH OF SEDIMENT IN EACH MANHOLE WITH A GRADE STICK OR SIMILAR DEVICE. MAINTENANCE IS REQUIRED WHEN THE SEDIMENT DEPTH IN EITHER MANHOLE EXCEEDS 2 FEET. MINIMUM INSPECTION IS RECOMMENDED TWICE A YEAR TO MAINTAIN OPERATION AND FUNCTION OF BAYSAVER.

MAINTENANCE CONSISTS OF THE FOLLOWING:

A. CONTAMINANT STORAGE MANHOLE

1. REMOVE THE ENTIRE VOLUME OF THE CONTAMINATED WATER BY VACUUM TRUCK.

2. CLEAN THE MANHOLE WALLS AND FLUSH OUT THE MANHOLE USING A HIGH PRESSURE HOSE AND REMOVE FLUSHING WATER BY VACUUM TRUCK. MAKE CERTAIN MANHOLE IS CLEAN.

B. PRIMARY SEPARATION MANHOLE

1. USING A SUBMERSIBLE PUMP, PUMP THE CLEAN WATER FROM THE CENTER OF THE MANHOLE DIRECTLY INTO THE EMPTY STORAGE MANHOLE UNTIL THE WATER LEVEL FALLS TO 1 FOOT ABOVE THE SEDIMENT LAYER.

2. REMOVE THE SETTLED SEDIMENT AND REMAINING WATER BY VACUUM TRUCK.

3. CLEAN THE MANHOLE WALLS AND FLUSH OUT THE MANHOLE USING A HIGH PRESSURE HOSE AND REMOVE FLUSHING WATER BY VACUUM TRUCK. MAKE CERTAIN MANHOLE IS CLEAN.

4. CONTAMINATED MATERIAL REMOVED FROM THE MANHOLES MUST BE DISPOSED OF RESPONSIBLY AND LEGALLY BY THE OPERATOR OF THE VACUUM TRUCK.

BAYSAVER INSTALLATION INSTRUCTIONS

1. EXCAVATION MUST PROVIDE ADEQUATE SPACE TO CONNECT INLET AND OUTLET PIPES TO SEPARATOR MANHOLE AND BAYSAVER UNIT. INSTALL PRECAST DROP STRUCTURES ON SOLID GROUND AS VERIFIED BY A GEOTECHNICAL ENGINEER.

2. VERIFY THE SUBGRADE ELEVATION AGAINST THE MANHOLE DIMENSIONS AND CONNECTING STORM DRAIN INVERTS.

3. MAKING SURE THE BASES ARE LEVEL AND THE STORAGE MANHOLE OPENINGS ARE ALIGNED WITH THE SEPARATOR UNIT, INSTALL PRIMARY AND STORAGE MANHOLES. INSTALL WATERTIGHT GASKETS ON BASE UNITS AND COAT WITH LUBRICATING GREASE (IF REQUIRED). INSTALL ADDITIONAL MANHOLE SECTIONS AS REQUIRED. SEAL LIFT HOLES WITH NON-SHRINK GROUT.

4. BACKFILL BASE SECTIONS OF MANHOLES TO INVERT OF STORAGE MANHOLE CONNECTING PIPES. USING APPROVED BACKFILL MATERIAL, BACKFILL AND COMPACT IN 8 INCH LIFTS. BACKFILL AND COMPACTION SHOULD BE MONITORED BY A GEOTECHNICAL ENGINEER.

5. INSTALL BAYSAVER SEPARATOR UNIT AND CONNECTING PIPES. SEAL ALL CONNECTING JOINTS AND INSTALL SEPARATOR HDPE REDUCER/ADAPTER. CUT EXCESS LENGTH OFF CONNECTING PIPES INSIDE STORAGE MANHOLE.

6. BACKFILL SEPARATOR UNIT AND MANHOLES. AREAS NOT ACCESSIBLE TO COMPACTION EQUIPMENT MUST BE BACKFILLED WITH 3/4" MINUS ANGULAR GRAVEL OR FLOWABLE FILL.

7. INSTALL AND SET MANHOLE COVER GRADE ADJUSTMENT RINGS AS NECESSARY.

8. INSTALL AND SET MANHOLE FRAME AND COVER UNITS.

GENERAL CONSTRUCTION NOTES

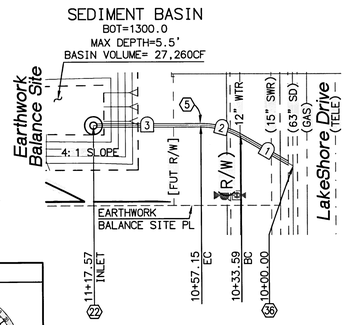
1. ALL WORK MUST BE DONE WITH REGARD FOR THE SAFETY OF THE CONSTRUCTION CREW.

2. ALL WORK AND MATERIALS MUST COMPLY WITH APPLICABLE STATE AND LOCAL REGULATIONS.

3. KNOW THE LOCATION AND DEPTH OF ANY UNDERGROUND UTILITIES BEFORE EXCAVATION BEGINS.

BAYSAVER SYSTEM DIMENSIONS

	DESCRIPTION	3K SYSTEM
	SEPARATOR MANHOLE DIMENSIONS	
A	PRIMARY MANHOLE DIAMETER	60"
B	MANHOLE DEPTH BELOW OUTLET	8' - 0"
C	MINIMUM FLUID DEPTH	8' - 4"
	STANDARD SEPARATOR UNIT DIMENSIONS	
D	SEPARATOR UNIT ID	36"
E	SEPARATOR UNIT LENGTH	78.2"
F	BYPASS PLATE LENGTH	45"
G	WEIR/BYPASS PLATE THICKNESS	3/4"
H	ELBOW AND CONNECTING PIPE OD	10.75"
I	ELBOW LENGTH	48"
J	WEIR HEIGHT ABOVE INVERT	4"
K	BYPASS PLATE HEIGHT ABOVE INVERT	18"
L	WIDTH OF WEIR AT BASE	4 1/2"
M	OUTLET PIPE DIAMETER	24"
N	ELBOW INVERT HEIGHT ABOVE UNIT INVERT	7 1/2"
O	ELBOW PIPE OVERHANG	18"
	STORAGE MANHOLE DIMENSIONS	
P	STORAGE MANHOLE DIAMETER	60"
Q	MANHOLE DEPTH BELOW INLET/OUTLET	48"
R	FLUID DEPTH	8' - 0"
S	TOTAL STORAGE VOLUME	300 CF
	SYSTEM DIMENSIONS AND ELEVATIONS	
T	SEPARATOR MANHOLE COVER ELEVATION	1286.0
U	STORAGE MANHOLE COVER ELEVATION	1286.0
V	SEPARATOR MANHOLE FLOOR ELEVATION	1266.77
W	STORAGE MANHOLE FLOOR ELEVATION	1266.77
X	INLET PIPE ID AND MATERIAL	24" RCP
Y	INLET PIPE INVERT	1274.81
Z	SEPARATOR UNIT INVERT	1274.79
AA	OUTLET PIPE ID AND MATERIAL	24" RCP
AB	CONNECTING PIPE INVERT ELEVATION	1274.76
AC	CONNECTION PIPE SPACING	24"
AD	STORAGE MANHOLE SIDE OFFSET	72 ± 6"
AE	STORAGE MANHOLE DOWNSTREAM OFFSET	24"
AF	BAYSAVER SEPARATOR UNIT ORIENTATION (PLEASE SPECIFY RIGHT OR LEFT)	L R



Storm Drain Notes + Quantities

◇	DESCRIPTION	QUANTITY
1	INSTALL HANCOR 18" HDPE (OR EQUAL)	550 LF
2	INSTALL HANCOR 24" HDPE (OR EQUAL)	815 LF
3	INSTALL HANCOR 30" HDPE (OR EQUAL)	50 LF
4	INSTALL HANCOR 36" HDPE (OR EQUAL)	220 LF
5	INSTALL 24" RCP OR CIPP ALTERNATE	450 LF
6	INSTALL HANCOR F477 18" 45° ELBOW (OR EQUAL)	5 EA
9	INSTALL HANCOR F477 36" 45° ELBOW (OR EQUAL)	1 EA
14	INSTALL HANCOR F477 18" 22.5° ELBOW (OR EQUAL)	4 EA
16	INSTALL HANCOR F477 36" X 24" REDUCER (OR EQUAL)	2 EA
18	CONSTRUCT CONCRETE COLLAR PER RCFC & WCD STD M803	2 EA
19	CONSTRUCT HEADWALL PER DETAIL ON SHEET 6	3 EA
20	CONSTRUCT CUT-OFF WALL PER DETAIL ON SHEET 6	2 EA
22	CONSTRUCT TYPE X INLET PER RCFC & WCD STD CB108	2 EA
23	CONSTRUCT CATCH BASIN PER RCFC & WCD STD CB100	160 LF
24	CONSTRUCT LOCAL DEPRESSION PER RCFC & WCD STD LD201 (SEE PLAN FOR CASE)	336 LF
25	PLACE RIP RAP PER DETAIL ON SHEET 6	50 SF
26	CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFC & WCD STD JS227	1 EA
27	CONSTRUCT MANHOLE PER EVMWD STD. S-5	14 EA
28	INSTALL HANCOR 42" 45° ELBOW (OR EQUAL)	1 EA
29	INSTALL HANCOR F477 42" WYE (OR EQUAL)	1 EA
30	INSTALL HANCOR F477 42" X 36" REDUCER (OR EQUAL)	2 EA
31	INSTALL HANCOR F477 36" X24" REDUCER WYE (OR EQUAL)	4 EA
32	INSTALL HANCOR F477 24" WYE (OR EQUAL)	2 EA
33	INSTALL HANCOR F477 42" X18" REDUCER WYE (OR EQUAL)	5 EA
34	INSTALL HANCOR 42" HDPE (OR EQUAL)	610 LF
35	INSTALL HANCOR F477 18" WYE (OR EQUAL)	1 EA
36	CONSTRUCT JUNCTION STRUCTURE NO. 4 PER RCFC & WCD STD JS229	1 EA
37	INSTALL BAYSAVER SEPERATION SYSTEM PER DETAILS ON SHEET 7	1 EA

North Arrow

Scale 0 40 80

Line F

STA: 10+00.00 TO STA: 11+17.57

BAYSAVER, INC.
1010 DEER HOLLOW DR.
MOUNT AIRY, MD 21771
TEL: (301) 829-6470
FAX: (301) 829-3747

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE 1-800-227-2600
TWO WORKING DAYS BEFORE YOU DIG

BENCHMARK
2½" BRASS DISK IN TOP OF CURB CALTRANS BENCH MARK 13C93
ELEVATION = 1280.129

BASIS OF BEARINGS:
THE BASIS OF BEARING IS THE CENTERLINE OF MACHADO STREET AS SHOWN BY PM 7⁴⁄₂₀, RIVERSIDE COUNTY RECORDS, BEING NORTH 36°55'05" EAST

APPROVED BY:
THESE PLANS HAVE BEEN REVIEWED FOR COMPLIANCE WITH THE APPROPRIATE CONDITIONS OF DEVELOPMENT AND/OR CITY AND STATE LAWS, AND A PERMIT CAN BE ISSUED.
KEN SEUMALO R.C.E. 56915 06/13/05

MARK	REVISIONS	APPR.	DATE
1	ADDED H&L INFORMATION	RKM	8-30-05

DESIGNED BY ____ DRAWN BY ____ CHECKED BY ____

REGISTERED PROFESSIONAL ENGINEER RUDY E. NUNEZ NO. C55955 Exp. 12/31/06 CIVIL STATE OF CALIFORNIA

PREPARED UNDER THE SUPERVISION OF:
R.C.E. C55955 EXP 12/31/06
DATE 3/07/05 6/16/05

RENCivil™
ENGINEERING • SURVEYING • LAND PLANNING
41593 WINCHESTER ROAD, SUITE 120 TEMECULA CA, 92590
PHONE: 951.296.1292 FAX: 951.296.1164

City of Lake Elsinore
IN THE COUNTY OF RIVERSIDE, CALIFORNIA

Storm Drain Plan Line F

STA: 10+00.00 TO STA: 11+17.57

SHEET 7 OF 7 SHTS.
FILE NO. 05-154.7

AS-BUILT BY KAS DATE 11/20/2008

I:\ESB\3dwg\Storm Drain\4208ld07.dwg 5/5/2005 2:43:06 PM PST

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1994 or later.

This map may reflect more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 - - - - 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
$^{24}76^{000m}$N	1000-meter Universal Transverse Mercator grid values, zone 11N
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone VI (FIPSZONE 0406), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
August 28, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

N

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2036G

FIRM

FLOOD INSURANCE RATE MAP

RIVERSIDE COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 2036 OF 3805

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

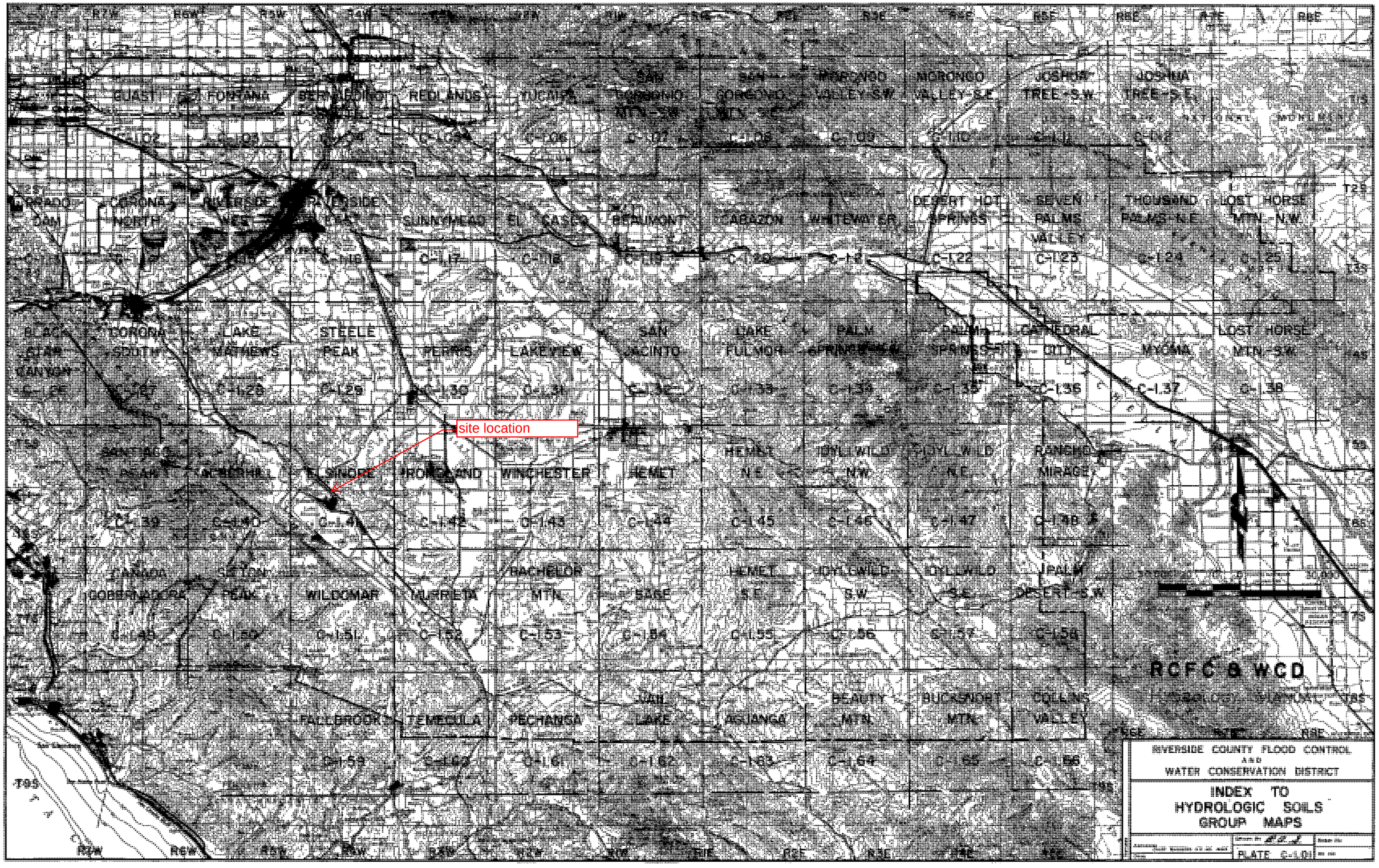
COMMUNITY	NUMBER	PANEL	SUFFIX
LAKE ELSINORE, CITY OF	060636	2036	G
RIVERSIDE COUNTY	060245	2036	G

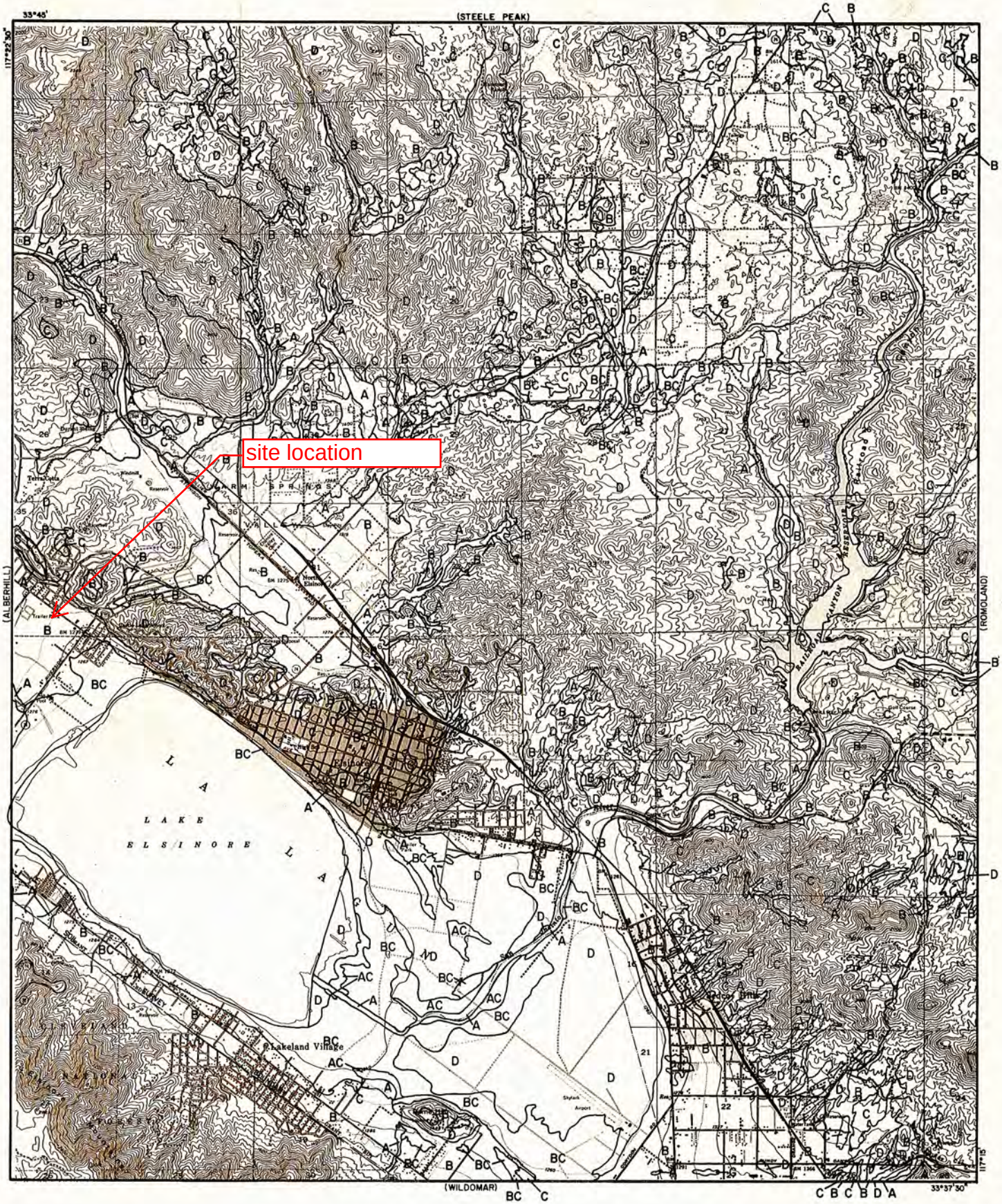
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06065C2036G

EFFECTIVE DATE
AUGUST 28, 2008

Federal Emergency Management Agency


site location
RCFC & WCD
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
INDEX TO
HYDROLOGIC SOILS
GROUP MAPS
PLATE C-1.01



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD

HYDROLOGY MANUAL

N

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR ELSINORE

PLATE C-1.41

Group A — Low runoff potential. Soils having high infiltration rates even when thoroughly wetted and consisting chiefly of deep, well to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B — Soils having moderate infiltration rates when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.

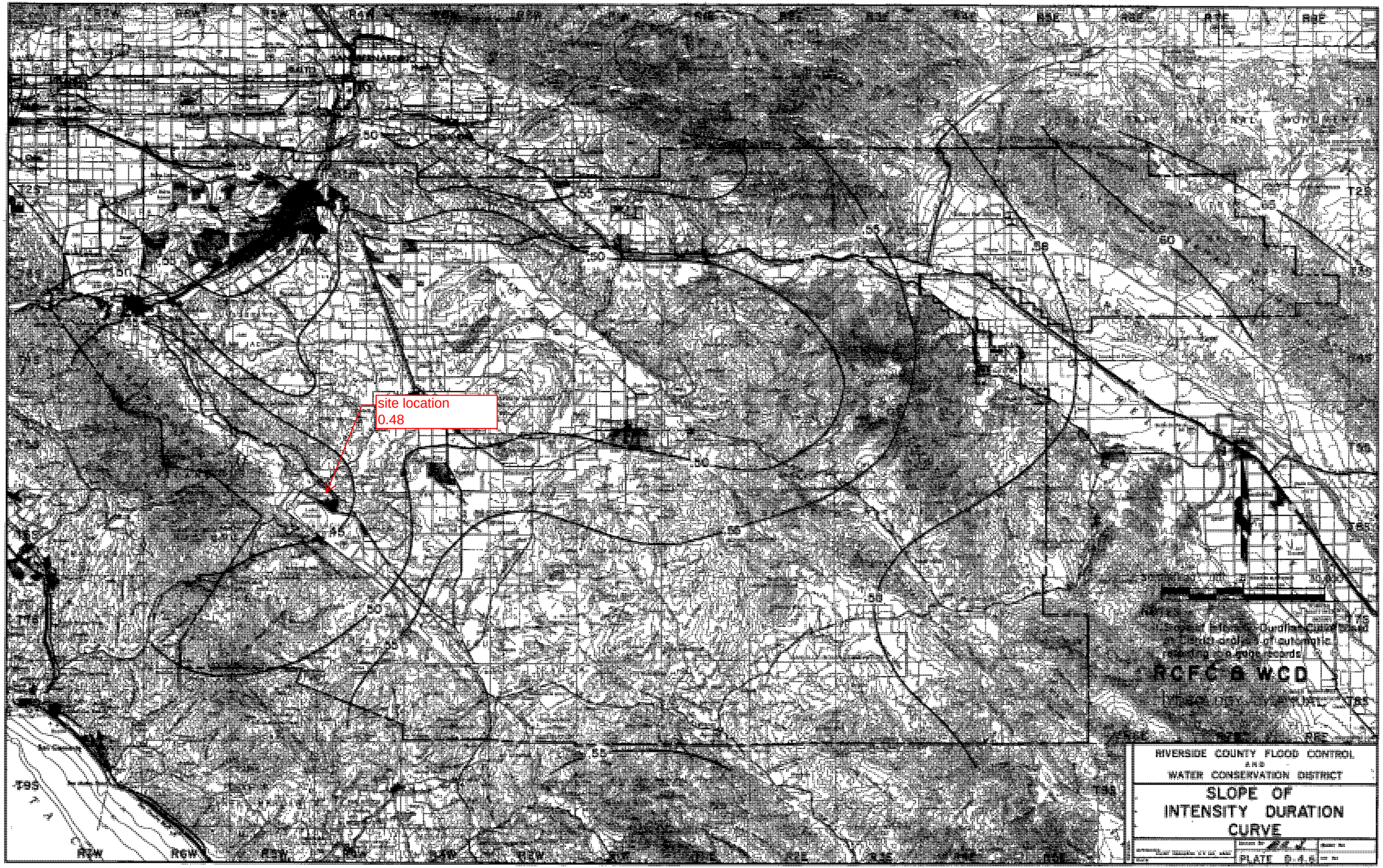
Group C — Soils having slow infiltration rates when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water, or soils with moderately fine to fine texture. These soils have a slow rate of water transmission.

Group D — High runoff potential. Soils having very slow infiltration rates when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very slow rate of water transmission.

In some cases a dual soil designation such as "B-C" has been assigned to an area. This indicates the infiltration characteristics are too variable either geographically or with time, to assign the soil to a single classification. In such cases the more conservative value is recommended for design hydrology.

The SCS and U. S. Forest Service (USFS) have mapped soil types and assigned hydrologic soils classifications in many areas of the District. Using this information the District has compiled generalized hydrologic soils classification maps. These maps are shown on Figures C-l.01 through C-l.66. In areas which have not yet been mapped, SCS or USFS personnel may be able to supply generalized soils information. The District will update the soils maps as additional information becomes available.

Soil Cover Type - The type of vegetation or ground cover on a watershed, and the quality or density of that cover, have a major impact on the infiltration capacity of a given soil. In consideration of cover type and quality the District uses a system developed by the SCS, whose studies on the affect of cover type on runoff potential are believed to represent the most


site location
0.48
RCFC & WCD
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
SLOPE OF
INTENSITY DURATION
CURVE
PLATE D-4.8

RAINFALL INTENSITY—INCHES PER HOUR

CATHEDRAL CITY			CHERRY VALLEY			CORONA			DESERT HOT SPRINGS			ELSINORE - WILDOMAR		
DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR
5	4.14	6.76	5	3.65	5.49	5	3.10	4.78	5	4.39	6.76	5	3.23	4.94
6	3.73	6.08	6	3.30	4.97	6	2.84	4.38	6	3.95	6.08	6	2.96	4.53
7	3.41	5.56	7	3.03	4.56	7	2.64	4.07	7	3.62	5.56	7	2.75	4.21
8	3.15	5.15	8	2.82	4.24	8	2.47	3.81	8	3.35	5.15	8	2.58	3.95
9	2.95	4.81	9	2.64	3.97	9	2.34	3.60	9	3.13	4.81	9	2.44	3.73
10	2.77	4.52	10	2.49	3.75	10	2.22	3.43	10	2.94	4.52	10	2.32	3.54
11	2.62	4.28	11	2.36	3.56	11	2.12	3.27	11	2.78	4.28	11	2.21	3.39
12	2.49	4.07	12	2.25	3.39	12	2.04	3.14	12	2.65	4.07	12	2.12	3.25
13	2.38	3.88	13	2.16	3.25	13	1.96	3.02	13	2.53	3.88	13	2.04	3.13
14	2.28	3.72	14	2.07	3.12	14	1.89	2.92	14	2.42	3.72	14	1.97	3.02
15	2.19	3.58	15	1.99	3.00	15	1.83	2.82	15	2.32	3.58	15	1.91	2.92
16	2.11	3.44	16	1.92	2.90	16	1.77	2.73	16	2.24	3.44	16	1.85	2.83
17	2.04	3.32	17	1.86	2.80	17	1.72	2.66	17	2.16	3.32	17	1.80	2.75
18	1.97	3.22	18	1.80	2.71	18	1.68	2.58	18	2.09	3.22	18	1.75	2.67
19	1.91	3.12	19	1.75	2.64	19	1.63	2.52	19	2.03	3.12	19	1.70	2.60
20	1.85	3.03	20	1.70	2.56	20	1.59	2.46	20	1.97	3.03	20	1.66	2.54
22	1.75	2.86	22	1.61	2.43	22	1.52	2.35	22	1.86	2.86	22	1.59	2.43
24	1.67	2.72	24	1.54	2.32	24	1.46	2.25	24	1.77	2.72	24	1.52	2.33
26	1.59	2.60	26	1.47	2.22	26	1.40	2.17	26	1.69	2.60	26	1.46	2.24
28	1.52	2.49	28	1.41	2.13	28	1.36	2.09	28	1.62	2.49	28	1.41	2.16
30	1.46	2.39	30	1.36	2.05	30	1.31	2.02	30	1.55	2.39	30	1.37	2.09
32	1.41	2.30	32	1.31	1.98	32	1.27	1.96	32	1.50	2.30	32	1.33	2.03
34	1.36	2.22	34	1.27	1.91	34	1.23	1.90	34	1.45	2.22	34	1.29	1.97
36	1.32	2.15	36	1.23	1.85	36	1.20	1.85	36	1.40	2.15	36	1.25	1.92
38	1.28	2.09	38	1.20	1.80	38	1.17	1.81	38	1.36	2.09	38	1.22	1.87
40	1.24	2.02	40	1.16	1.75	40	1.14	1.76	40	1.32	2.02	40	1.19	1.82
45	1.16	1.89	45	1.09	1.64	45	1.08	1.66	45	1.23	1.89	45	1.13	1.72
50	1.09	1.78	50	1.03	1.55	50	1.03	1.58	50	1.16	1.78	50	1.07	1.64
55	1.03	1.68	55	.98	1.47	55	.98	1.51	55	1.09	1.68	55	1.02	1.56
60	.98	1.60	60	.93	1.40	60	.94	1.45	60	1.04	1.60	60	.98	1.50
65	.94	1.53	65	.89	1.34	65	.90	1.40	65	.99	1.53	65	.94	1.44
70	.90	1.46	70	.85	1.29	70	.87	1.35	70	.95	1.46	70	.91	1.39
75	.86	1.41	75	.82	1.24	75	.84	1.30	75	.91	1.41	75	.88	1.35
80	.83	1.35	80	.79	1.20	80	.82	1.26	80	.88	1.35	80	.85	1.31
85	.80	1.31	85	.77	1.16	85	.80	1.23	85	.85	1.31	85	.83	1.27
SLOPE = .580			SLOPE = .550			SLOPE = .480			SLOPE = .580			SLOPE = .480		

STANDARD
INTENSITY-DURATION
CURVES DATA

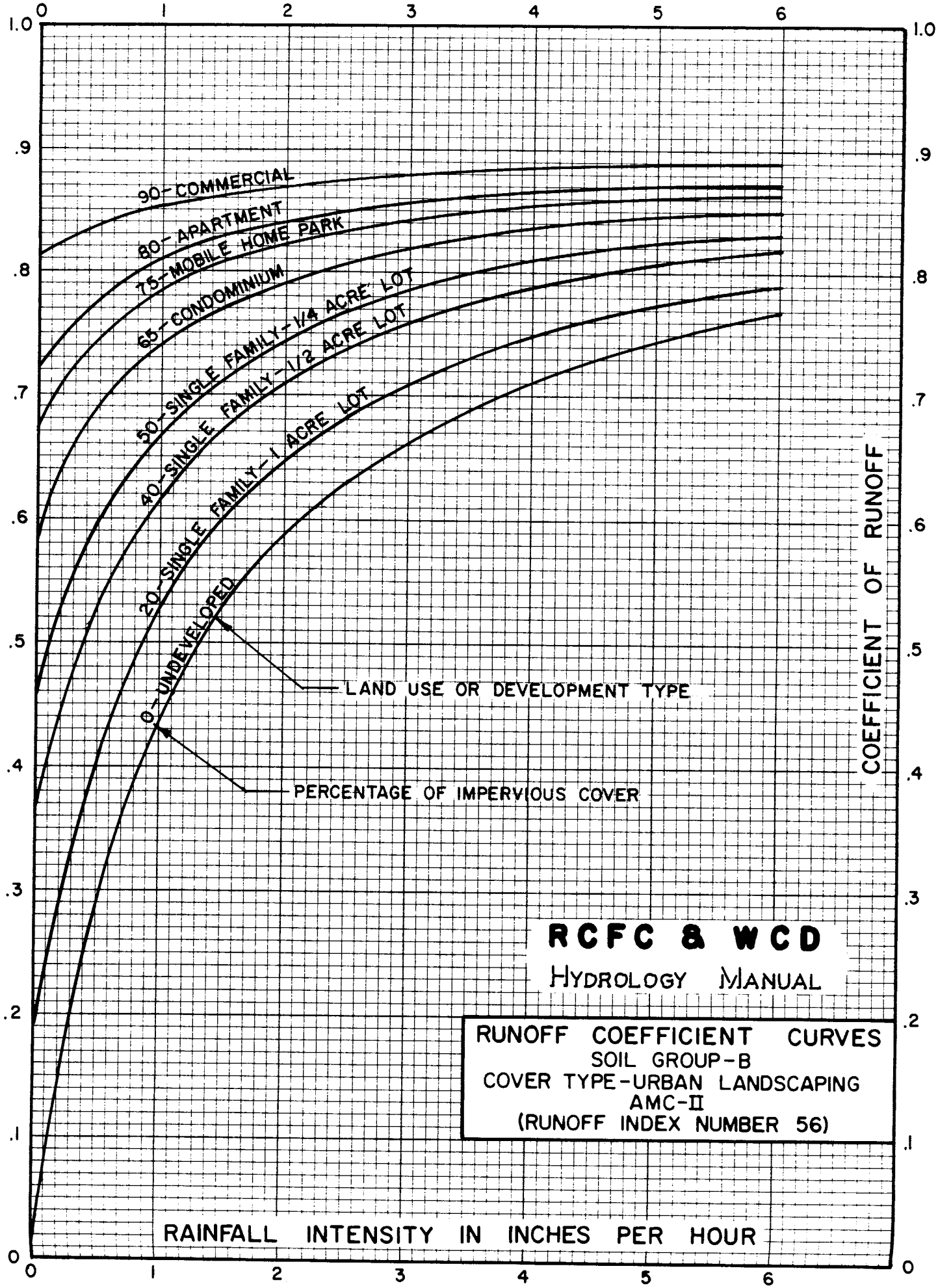
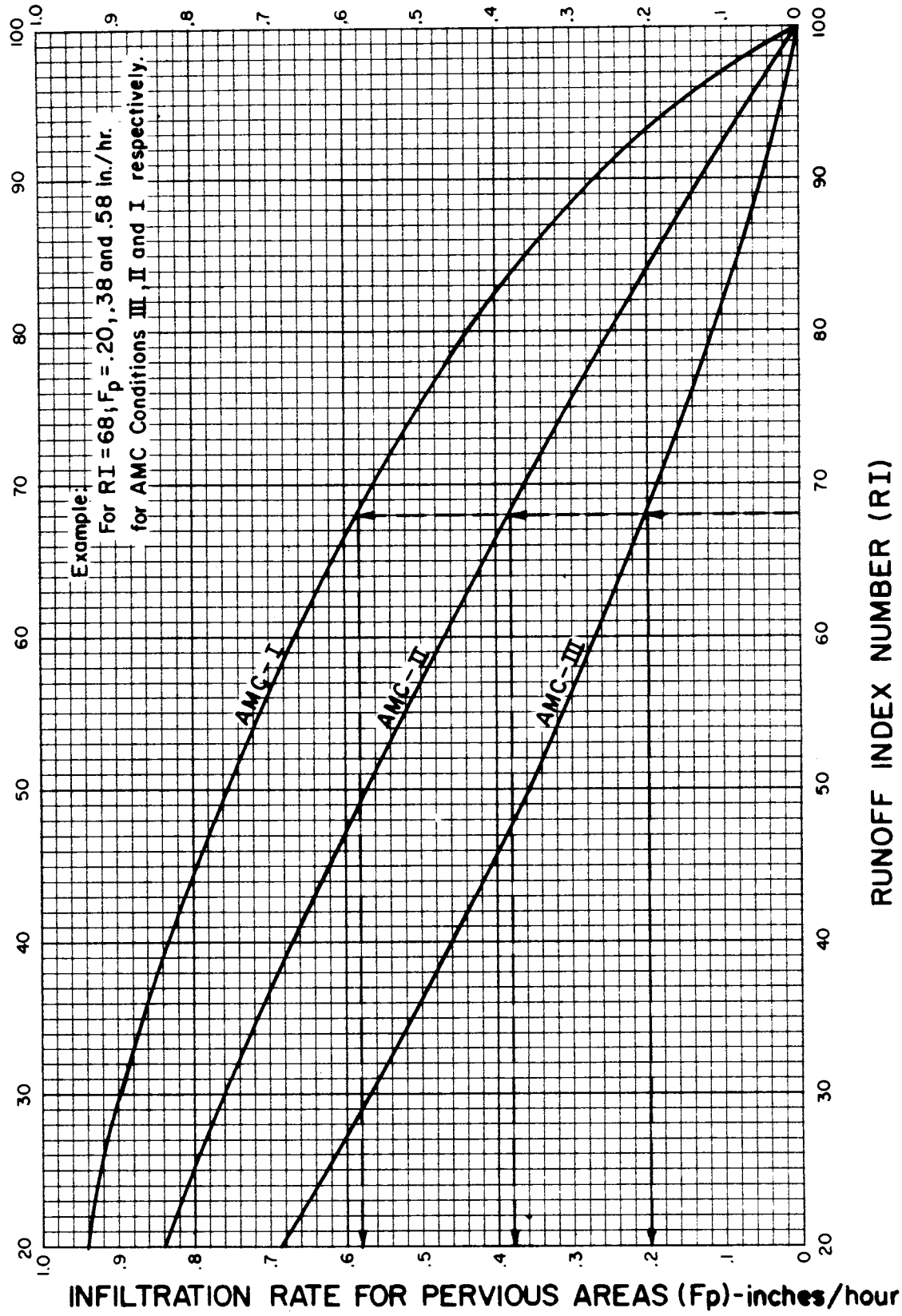

90-COMMERCIAL
80-APARTMENT
75-MOBILE HOME PARK
65-CONDOMINIUM
50-SINGLE FAMILY-1/4 ACRE LOT
40-SINGLE FAMILY-1/2 ACRE LOT
20-SINGLE FAMILY-1 ACRE LOT
0-UNDEVELOPED
LAND USE OR DEVELOPMENT TYPE
PERCENTAGE OF IMPERVIOUS COVER
COEFFICIENT OF RUNOFF
RAINFALL INTENSITY IN INCHES PER HOUR
RCFC & WCD
HYDROLOGY MANUAL
RUNOFF COEFFICIENT CURVES
SOIL GROUP-B
COVER TYPE-URBAN LANDSCAPING
AMC-II
(RUNOFF INDEX NUMBER 56)

PLATE D-5.2

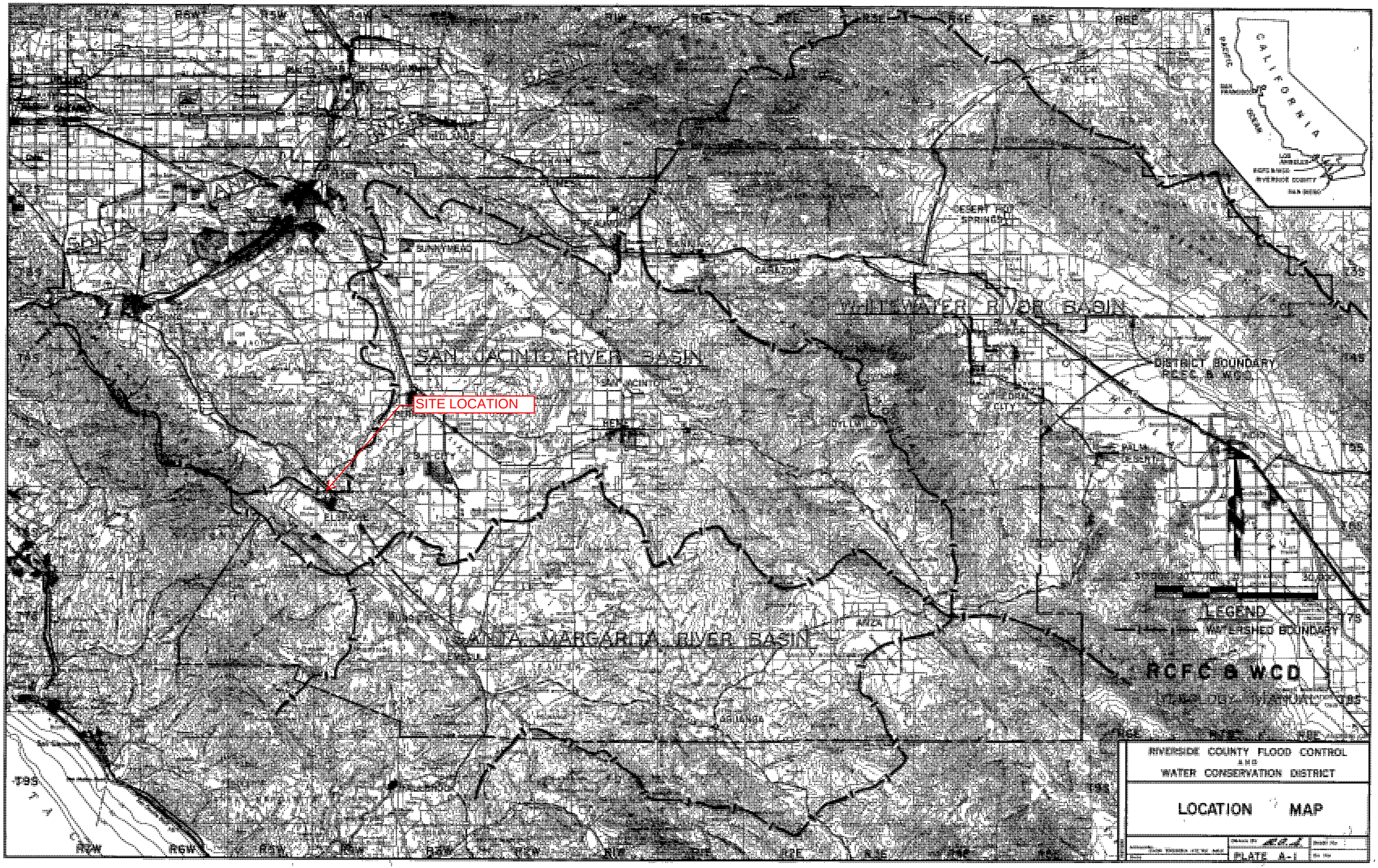


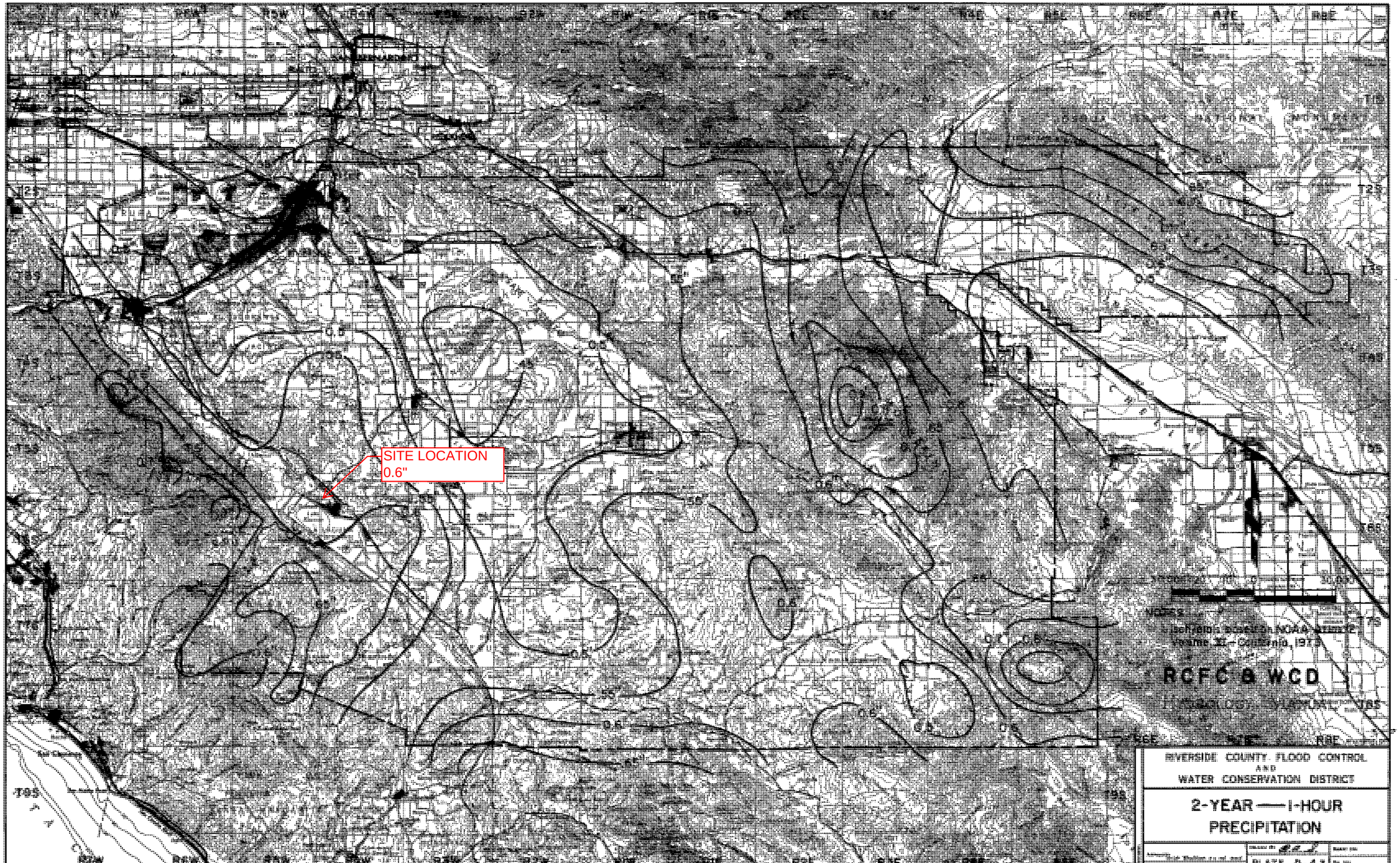
NOTES:
1. R.I. Number-Infiltration relationships are derived from rainfall-runoff relationships in Bibliography item No. 36.

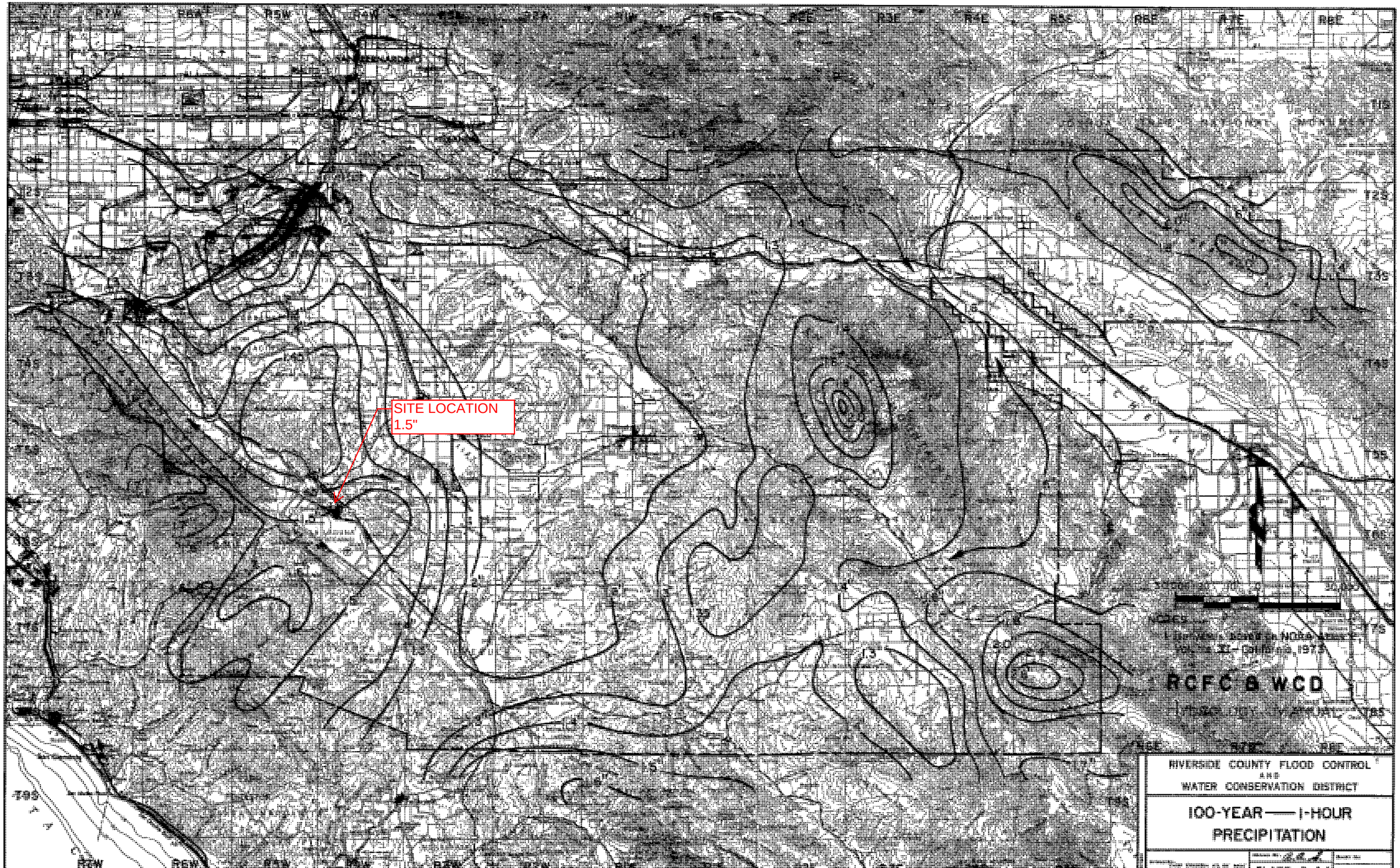
RCFC & WCD

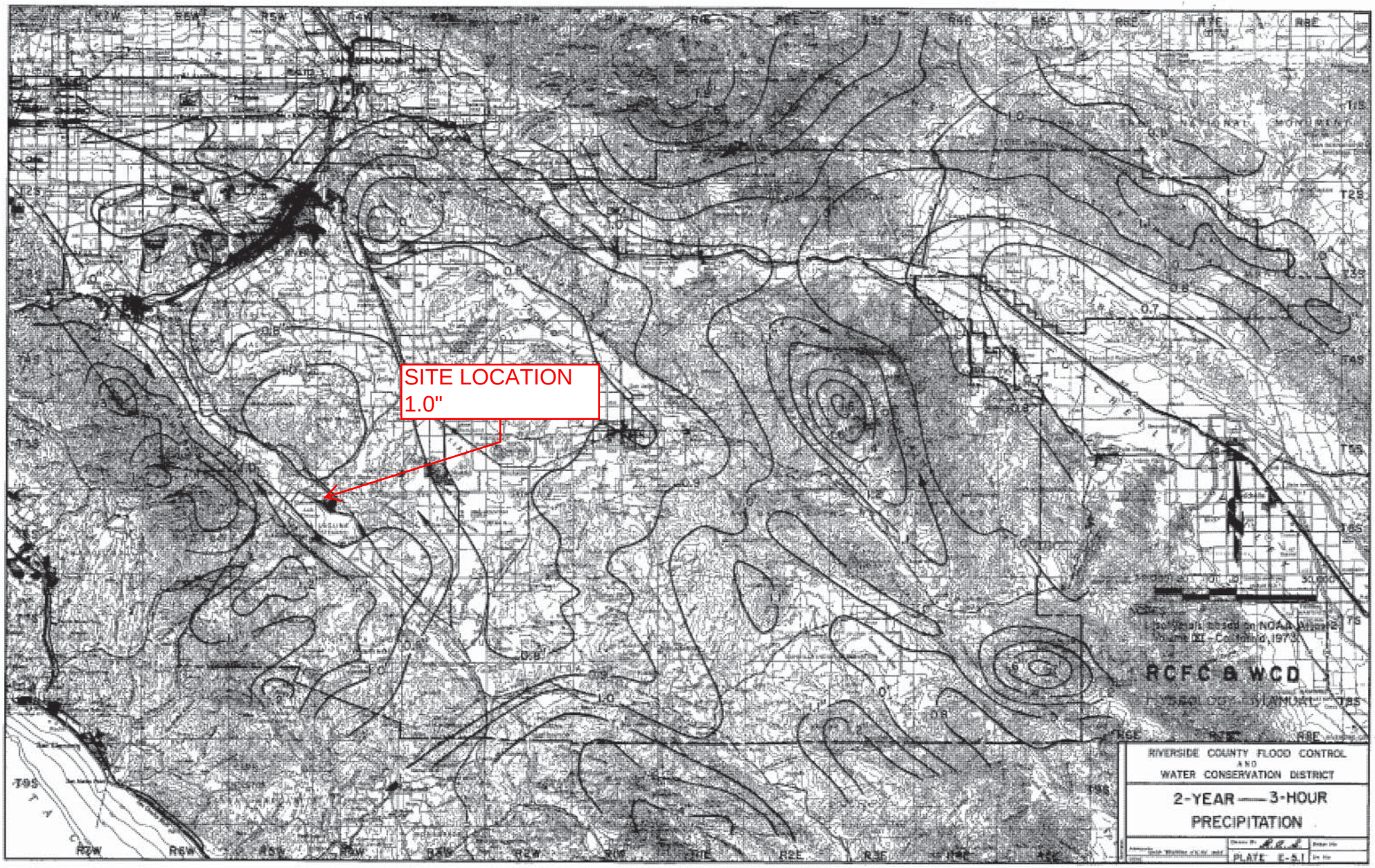
HYDROLOGY MANUAL

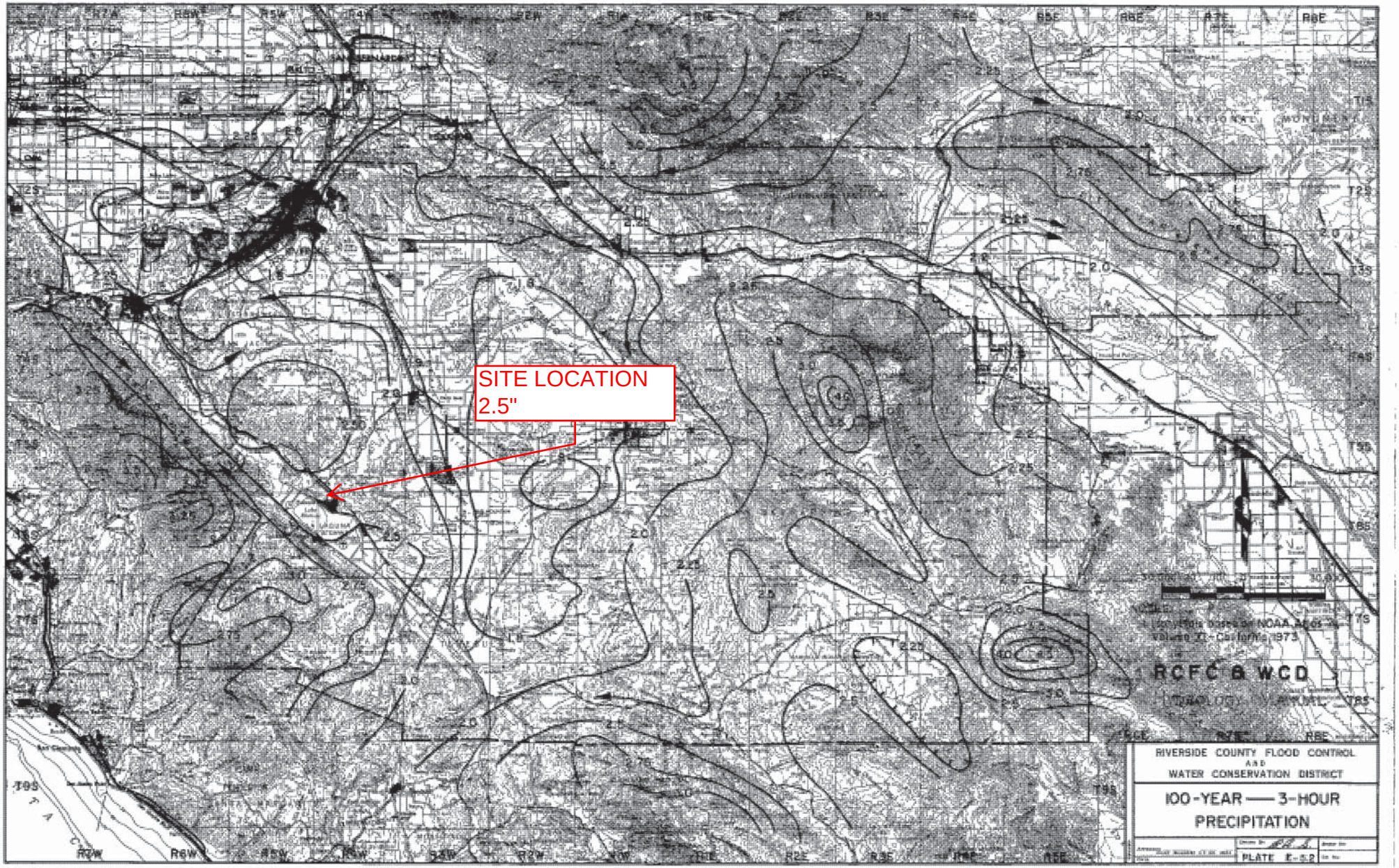
INFILTRATION RATE FOR PERVIOUS AREAS VERSUS RUNOFF INDEX NUMBERS

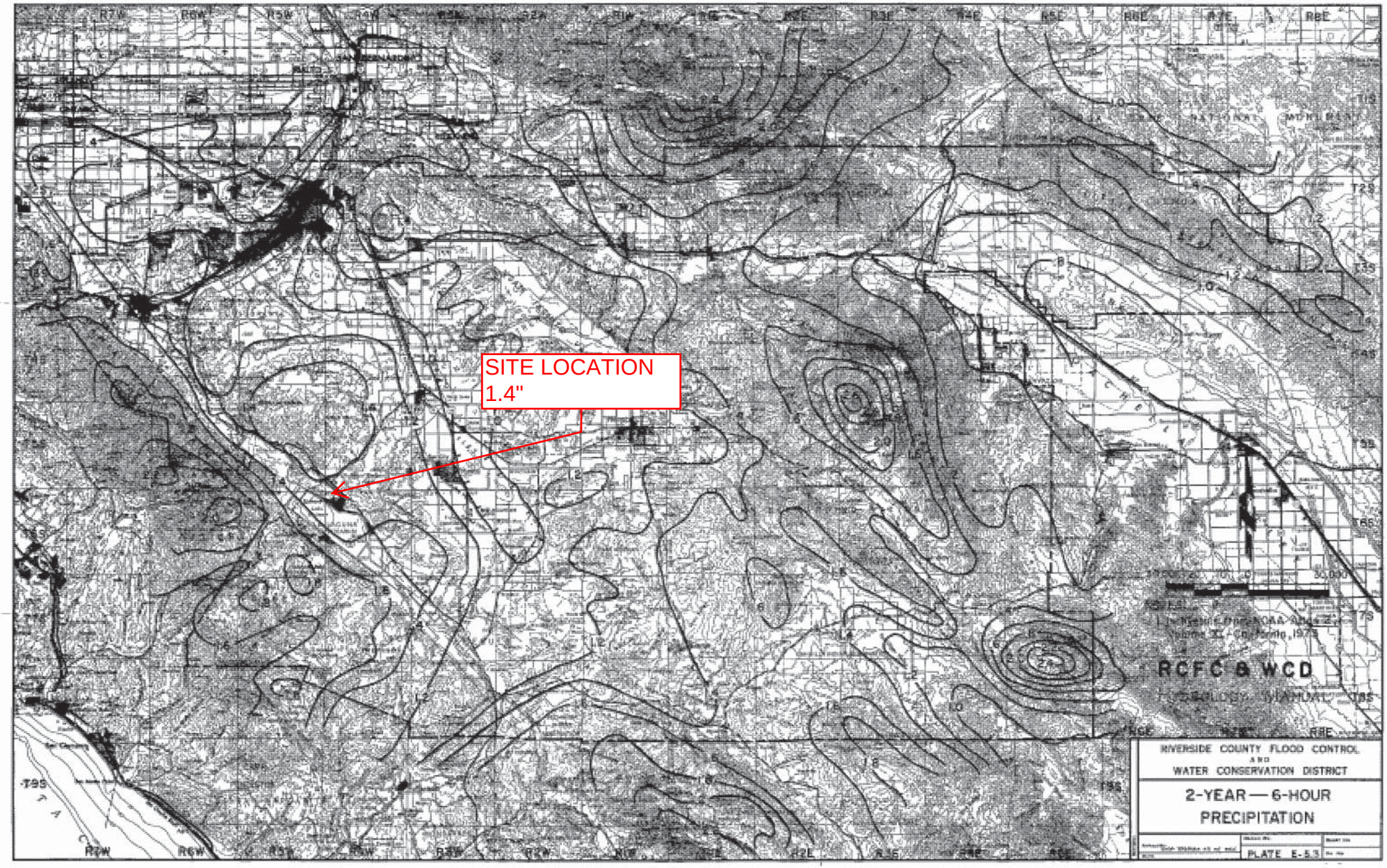

SITE LOCATION
SAN JACINTO RIVER BASIN
WHITEWATER RIVER BASIN
SANTA MARGARITA RIVER BASIN
DISTRICT BOUNDARY
LEGEND
WATERSHED BOUNDARY
RCFC & WCD
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
LOCATION MAP
PLATE A-1

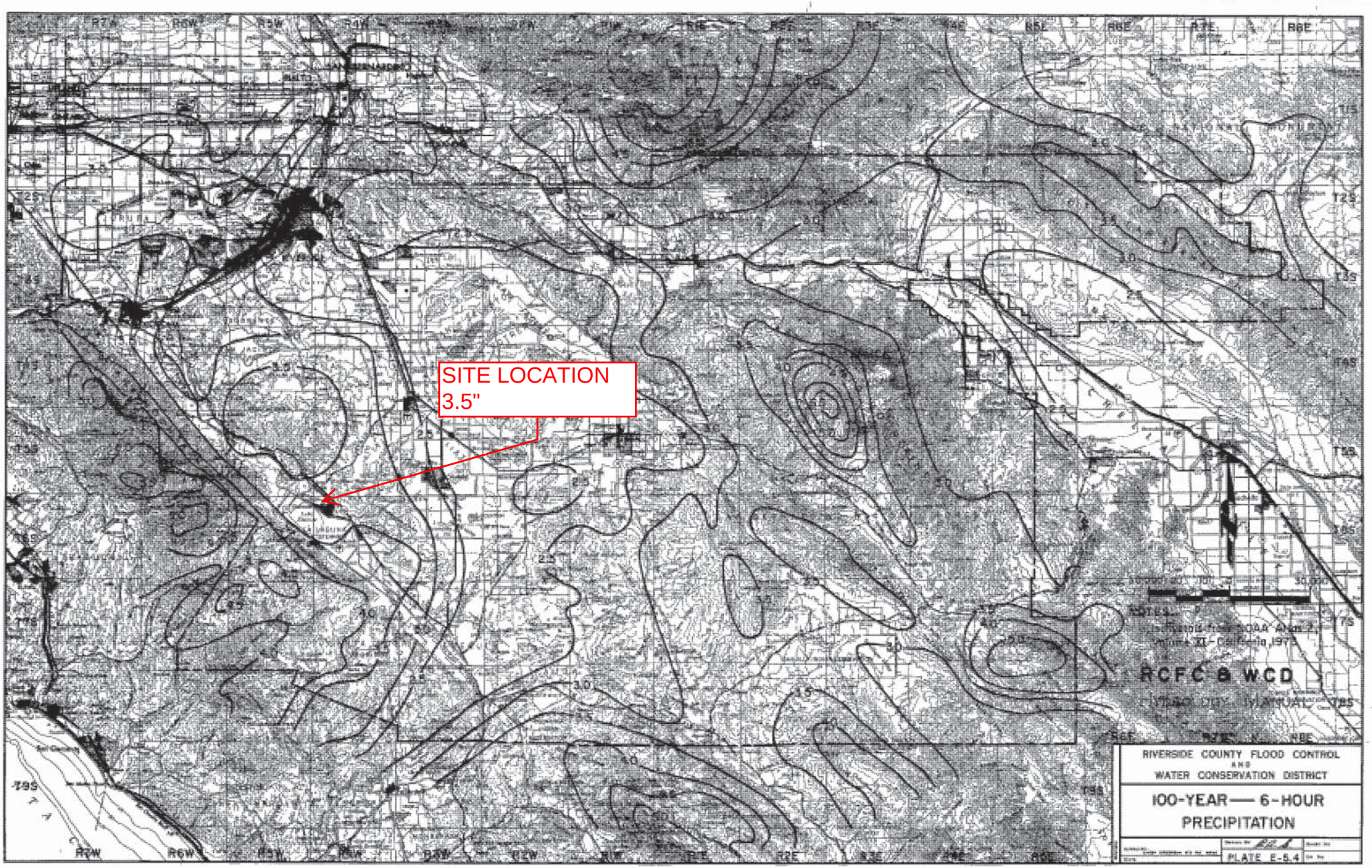

SITE LOCATION
0.6"
RCFC & WCD
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
2-YEAR — 1-HOUR
PRECIPITATION
PLATE D-4.3

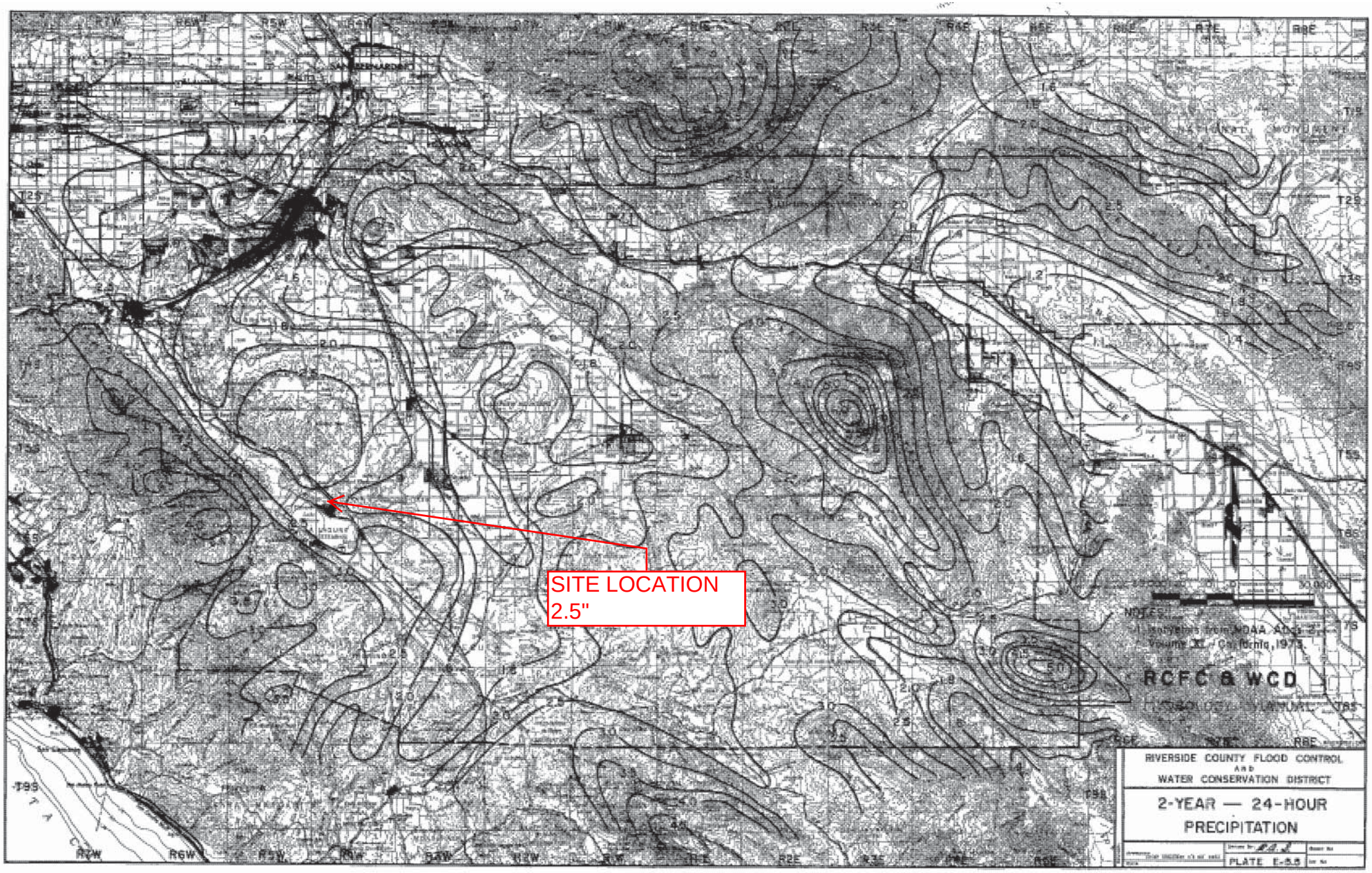

SITE LOCATION
1.5"
RCFC & WCD
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 1-HOUR
PRECIPITATION
PLATE D-4.4

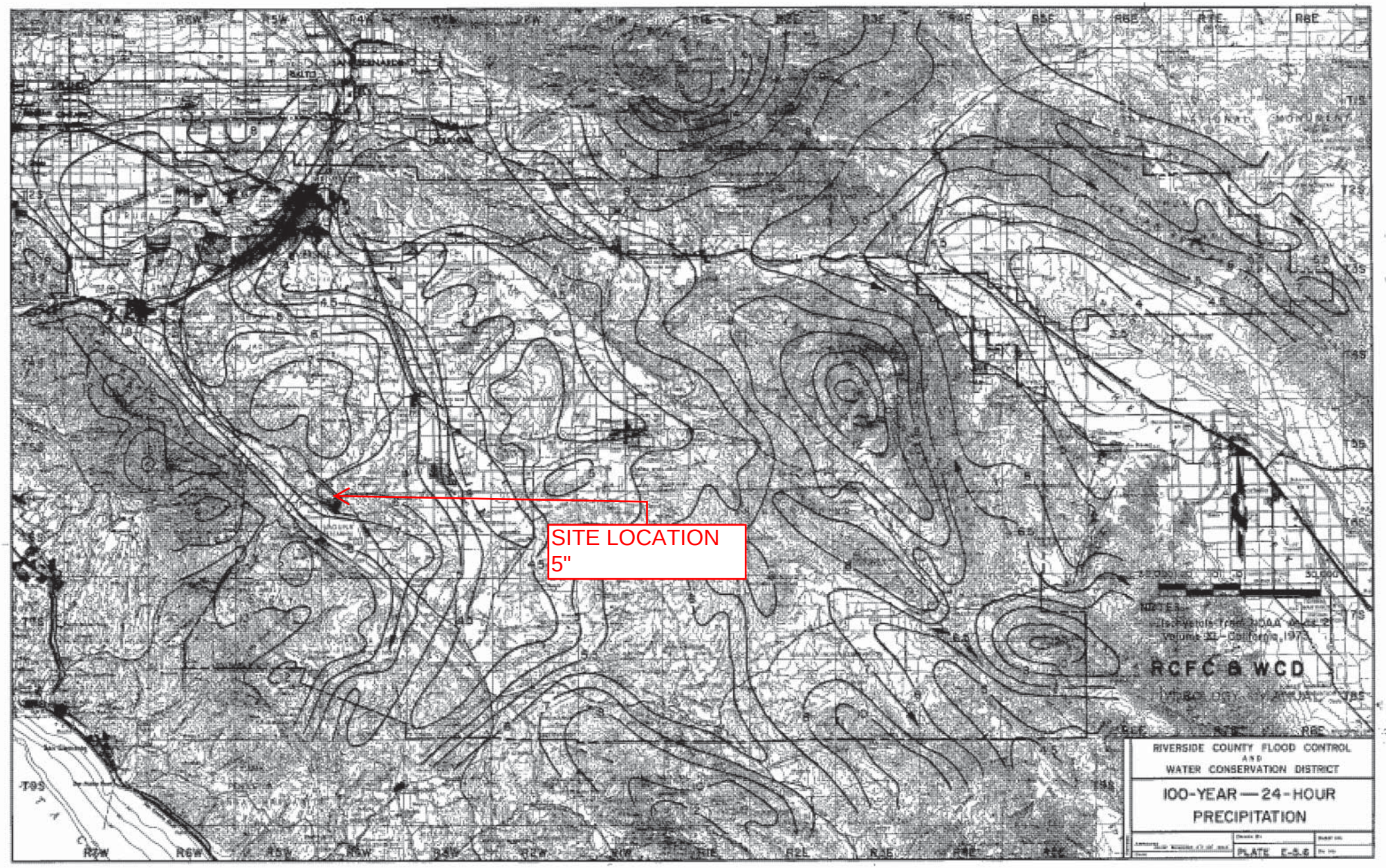

SITE LOCATION
1.0"
RCFC & WCD
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
2-YEAR — 3-HOUR
PRECIPITATION
PLATE E-5.1

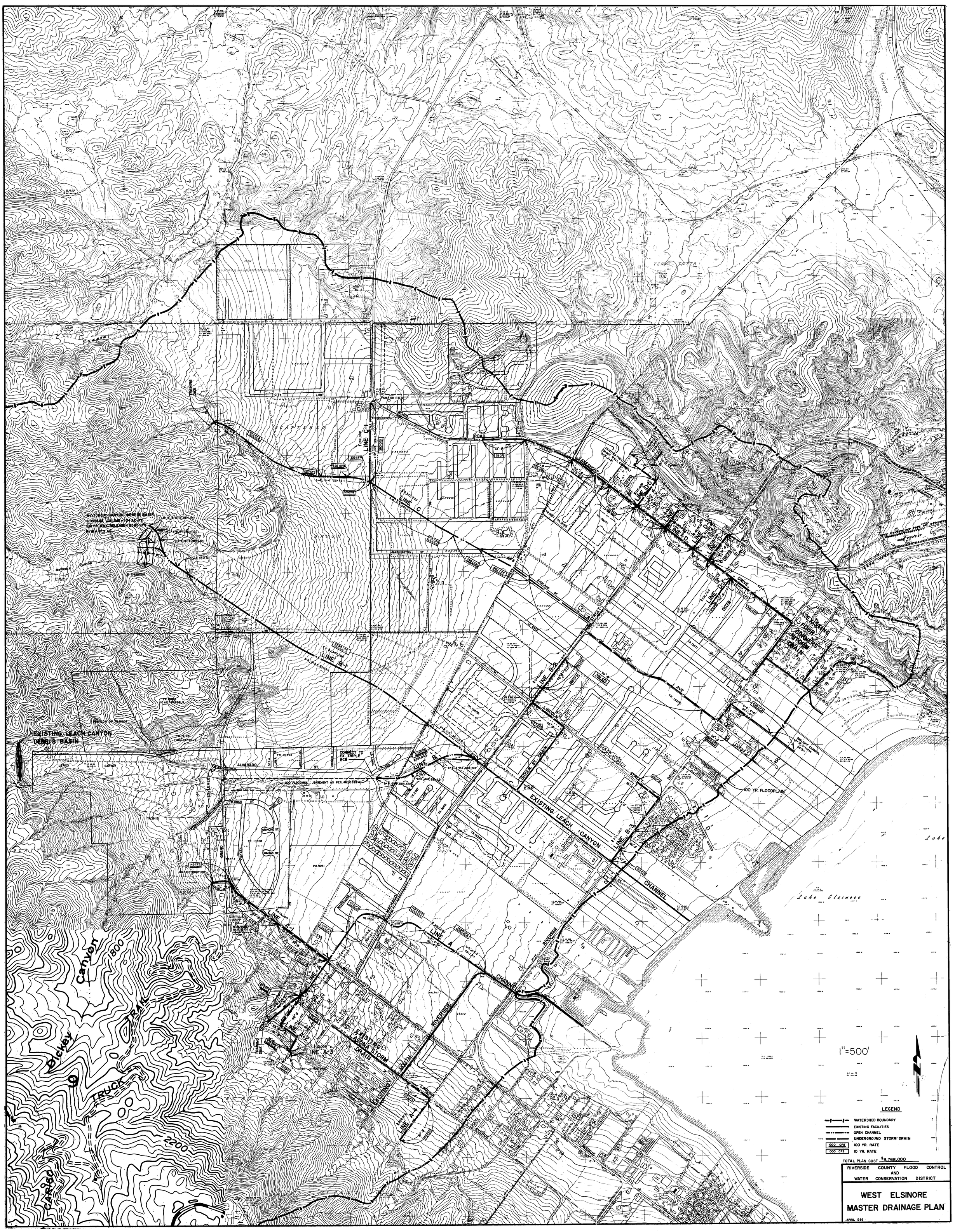

SITE LOCATION
2.5"
RCFC & WCD
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 3-HOUR
PRECIPITATION
PLATE E-5.2


SITE LOCATION
1.4"
RCFC & WCD
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
2-YEAR — 6-HOUR
PRECIPITATION
PLATE E-5.3


SITE LOCATION
3.5"
RCFC & WCD
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 6-HOUR
PRECIPITATION
PLATE E-5.4


SITE LOCATION
2.5"
RCFC & WCD
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
2-YEAR — 24-HOUR
PRECIPITATION
PLATE E-5.5


SITE LOCATION
5"
RCFC & WCD
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 24-HOUR
PRECIPITATION
PLATE E-5.6


McVICKER CANYON DEBRIS BASIN
STORAGE VOLUME = 194 AC-FT.
100 YR. MAX. RELEASE = 225 CFS
DRAINAGE AREA = 173 AC.
EXISTING LEACH CANYON DEBRIS BASIN
LINE C-1
LINE C
LINE B-1
LINE B-2
LINE B-3
LINE B
LINE A-1
LINE A
LINE A-2
LINE A-3
LINE A-4
LINE D
LINE D-1
LINE D-2
LINE D-3
LINE D-4
LINE D-5
EXISTING LEACH CANYON
CHANNEL
EXISTING LAGUNA STORM DRAIN
EXISTING FLOOR STORM DRAIN
COMBINED STORM DRAIN
100 YR. FLOODPLAIN
Lake Elsinore
TERRA COTTA
CANYON
CITY LIMIT
WASHINGTON ST.
ALVARADO
RIVERSIDE
DRIVE
AVENUE
STREET
CHANNEL
Dickey Canyon
TRUCK TRAIL
1800
2200
1"=500'
LEGEND
WATERSHED BOUNDARY
EXISTING FACILITIES
OPEN CHANNEL
UNDERGROUND STORM DRAIN
000 CFS 100 YR. RATE
000 CFS 10 YR. RATE
TOTAL PLAN COST $9,768,000
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
WEST ELSINORE
MASTER DRAINAGE PLAN
APRIL 1986

RIVERSIDE COUNTY FLOOD CONTROL AND
WATER CONSERVATION DISTRICT
RIVERSIDE, CALIFORNIA

MASTER DRAINAGE PLAN

FOR THE

WEST ELSINORE AREA

ZONE 3

APR. 1986

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RIVERSIDE COUNTY FLOOD CONTROL

AND WATER CONSERVATION DISTRICT

Riverside, California

MASTER DRAINAGE PLAN

FOR

THE WEST ELSINORE AREA

ZONE THREE

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PURPOSE

The purpose of this report is to investigate and evaluate the drainage problems of the West Elsinore area and to develop an economical drainage plan which provides flood protection for both existing and future development.

This Master Drainage Plan is located northwest of Lake Elsinore. It is bounded roughly by Lakeshore Drive, Riverside Drive, the Ortega Highway and the ridge line of the Santa Ana Mountains.

The plan presented herein will provide flood protection to the area when implemented, and will be used as a guide for the long term construction scheduling of the primary drainage facilities. The plan will also act as a planning guide for locating and sizing local drainage facilities to be constructed by developers and others within the area.

It should be noted by the reader that this report is a master plan, and therefore, should be read and used with this in mind. Simply stated, this plan is an overview; a study of the drainage problems that exist in a specific geographical area, and a conceptual solution to those problems. As stated elsewhere in this report, the selection of the facilities presented in this plan is based on engineering and economic considerations and is by no means the only solution.

The alignment and location of the facilities proposed in this Master Drainage Plan are general; precise facility locations will be dictated by conditions and other factors existing at the time of design. Similarly, the sizing information shown on the enclosed map is preliminary. A more detailed analysis performed at the design stage will determine final sizing.

SCOPE

The drainage area covered by this plan consists of approximately 10.5 square miles, and ranges from moderately flat valley terrain to foothills with steep slopes. The extent of the studies establishing this master plan includes:

1. Preparation of a drainage area map.

2. Determination of the quantity and points of concentration of storm runoff in the area.

3. Determination of the quantity of debris produced by major canyons in the watershed.

4. Determination of the location and size of the proposed drainage facilities.

5. Investigation of alternative routes and methods as a basis for selecting the most economically and engineeringly sound plan.

6. Preparation of preliminary design plans and supporting cost estimates.

GENERAL DISCUSSION

This report provides a Master Drainage Plan for the West Elsinore area. The plan consists of a debris basin and a system of open channels and underground storm drains. The proposed facilities will carry storm runoff through this area, outletting into Lake Elsinore.

A majority of the developed and developable areas within the plan are located on alluvial fans. Uncontrolled floodwaters affecting such fans can be extremely devastating due to the unpredictability of their flow paths, high velocities, and potential for debris transport.

During periods of runoff, floodwaters, silt, and other debris impact the developing community causing property damage and leaving roads and streets impassable. As development continues to increase in the eastern portion of the watershed, these problems are expected to intensify, thus requiring a greater need for flood protection.

The master drainage plan presented herein provides an economical method of collecting and conveying storm runoff through the study area with the least interruption to public services. The proposed drainage system will also provide an outlet for local drainage facilities built by developers and others as growth occurs in the area. When completed, the facilities will provide the area with improved drainage and protection from the once in 100 year flood.

CRITERIA

The facilities proposed in this plan are intended primarily to collect and control storm flows emanating from the major canyons and convey them safely through the lower valley area outletting them into the lake. Additionally, local urbanized runoff is also addressed.

Open channels are generally considered the only economically feasible means of transporting large flood flows for any appreciable distance and are used where possible. In addition to their role as flow conveyors, open channels provide an outlet for the underground facilities proposed in this plan as well as local drainage facilities to be built by developers and others. All of the open channels proposed in this report are intended to carry the runoff from a 100 year frequency storm.

The underground facilities shown in this plan are proposed only where the application of open channels is not feasible, either because of topographic constraints or existing development. Most of the underground portions of the A, B, and D drainage systems are sized to carry the runoff generated by a 10 year storm event. During a 100 year storm event, the excess flow is expected to be carried in the street section above the facility. In some cases where this is not possible or where dictated by other reasons, underground facilities are sized to convey the 100 year storm runoff. Where possible, the underground storm drains proposed in this plan are located in existing or future street rights of way.

Two reports were used as a basis for computing the amount of debris produced by a watershed during a 100 year storm. These are the "Los Angeles County Flood Control District Report on Debris Production Studies for Mountain Watersheds of Los Angeles County", by William R. Farrel, dated November 1959, and "A New Method of Estimating Debris-Storage Requirements for Debris Basins", by Fred E. Tatum, U. S. Army Corps of Engineers District, dated 1963. The larger and more conservative debris yield from these two methods was used to size the debris basin proposed in the plan.

The alignments of all channels and underground storm drains as well as the location of the debris basin are based on hydraulic efficiency, engineering judgement, and economics.

HYDROLOGY

Two methods of hydrology were used in this plan to determine design discharges. For smaller tributary areas, up to 500 acres in size, the Modified Rational Hydrology Method was used. The Synthetic Unit Hydrograph Method was used for larger areas. The design discharges used in sizing all future appurtenant facilities in the study area should be determined by one of these two methods.

Methodology and supportive data for the rational and synthetic hydrology can be found in the "Riverside County Flood Control and Water Conservation District Hydrology Manual" dated April 1978.

Future land use assumptions used throughout the plan were based on the "City of Lake Elsinore General Plan Land Use Map, 1992", adopted on December 14, 1982.

EXISTING FACILITIES

There are several District operated drainage facilities existing within the West Elsinore Master Drainage Plan. They are the Leach Canyon Debris Dam, the Leach Canyon Channel, the South Riverside Channel, the Laguna Storm Drain, and the Four Corners Storm Drain. A brief description of these existing facilities, which are an integral part of the master plan, follows:

Leach Canyon Debris Dam - This dam was built in 1955 in conjunction with the U. S. Department of Agriculture, Soil Conservation Service. It is located about 3400 feet west of Grand Avenue and has a crest height of 30 feet. The primary purpose of the dam is to capture the debris emanating from Leach Canyon.

Leach Canyon Channel - Leach Canyon Channel, completed by the District in 1979, is a concrete lined trapezoidal channel that stretches from the lake across Riverside Drive to Machado Street. Line B of this plan is proposed to join this facility and extend it upstream.

South Riverside Channel - The District's South Riverside Channel was completed in 1970. This facility, which is about 4000 feet in length, is a concrete lined trapezoidal channel that extends from the lake across Riverside Drive and Grand Avenue to Laguna Drive. This channel serves as a major receptor of runoff generated in the southern portion of the watershed. The upper end of this facility functions as an outlet for the existing Laguna Storm Drain and the proposed Line A-4 of the master plan. In addition, Line A of this plan is proposed to confluence with this existing facility, just upstream of Riverside Drive.

Laguna Storm Drain - The Laguna Storm Drain, completed in 1972, is an underground reinforced concrete pipe that extends northwesterly in Laguna Drive from the upper end of the existing South Riverside Channel to a point just below Sherwood Drive. The facility, which is 1400 feet long, ranges in size from 24 inches to 39 inches in diameter.

Four Corners Storm Drain - The Four Corners Storm Drain is a system of open channel and underground storm drain designed to relieve the flooding problems at the intersection of Riverside and Lakeshore Drives. This drainage system, built in 1981, is proposed to be extended by Line D of this master plan.

RECOMMENDED IMPROVEMENTS

The improvements proposed in this plan are shown on the enclosed map found at the back of this report. Supporting data for all proposed facilities is available at the Riverside County Flood Control and Water Conservation District's office. Costs shown on the enclosed map include construction, right of way and 31% for engineering, administration and contingencies (see Table I, Cost Summary). This map not only shows proposed alignments, but pertinent preliminary size information as well as design flow rates.

In general, the open channels proposed in this plan are trapezoidal shaped facilities with concrete paving on the sides and bottom. The sides slope upward from the bottom at a rate of one foot vertically for every 1.5 feet horizontally. The channels in this plan range in size from a bottom width of 3 feet

to 12 feet and in depth from 4 feet to 11 feet. In addition, the channel right of way required will accommodate the channel as well as one or two maintenance roads.

The proposed underground storm drains generally consist of reinforced concrete pipe (RCP) ranging in size from 27 inches to 96 inches in diameter. The cost of the drains shown in Table I includes manholes and catch basins in addition to the cost of the pipe installed. Manholes are located as necessary with a maximum spacing of 500 feet. Catch basins are not specifically located but the total number of lineal feet is computed and costed.

The design engineer should be aware that during preparation of preliminary plan and profile drawings, a detailed utility search was not completed. This means that, while major known facilities were dealt with, a more thorough search may reveal utilities that will necessitate minor alignment or size changes, or utility relocations.

During the course of this study, controlling the debris produced in the two major watersheds (Leach and McVicker Canyons) was recognized as equally as important as controlling the flood runoff emanating from these canyons. As stated earlier, the U. S. Department of Agriculture Soil Conservation Service built a debris basin in Leach Canyon to capture debris and to prevent it from causing property damage to downstream development. The potential danger from debris, however, still exists in the McVicker Canyon area. It is now the intent of this report to propose a major structure designed to control this problem.

The McVicker Debris Dam is located at the upstream end of Line B-1. The dam height is proposed to be about 46 feet. The topography of this canyon allows for a spillway cut through a notch in the northeast abutment of the dam. The design debris storage volume for this facility is 154 acre-feet of debris.

As mentioned previously, the purpose of this facility is to trap debris and release "clear water". This will allow smaller, less costly facilities to be constructed downstream. While the prime function of the facility is debris reduction, some flow attenuation will be realized, especially during smaller storms or the early stages of design magnitude storms. However, since this peak flow reduction is not guaranteed, the design of downstream facilities assumes that the peak flow rate passes unreduced through the dam.

ALTERNATIVE STUDIES

In developing this Master Drainage Plan a number of alternatives were developed and studied for their hydraulic and economic feasibility.

A combination debris and retention dam was originally envisioned at the site of the proposed McVicker Debris Dam. The alternative structure was over 20 feet higher than the proposed debris dam and was able to reduce an inflow rate of 2530 cfs to

an outflow rate of 900 cfs. The reduced peak flow rate resulted in a less costly downstream facility. However, the cost savings realized in the downstream facility did not nearly offset the increased cost of the higher dam embankment and, therefore, this alternative was disregarded.

Alternative alignments for Lines B and C were also explored (see Figure 1, Page 9). Preliminary study indicates that these alternatives are undesirable due to the following reasons:

1. Severe right of way restrictions are anticipated to be a major problem for Line B because of existing developments. Relocation of existing homes may be required.

2. Topographical constraints are the major setback for the alternative Line C alignment. It is considered unwise and unsafe to propose an alignment running perpendicular to the slope over a considerable distance.

Consideration was also given to changing the designations of Lines B and B-1 from open channels to underground facilities. Preliminary cost estimates indicate that by doing this, the cost increases by 95%. Given the current availability of necessary rights of way and the significant cost differential, the concept of open channels is very well justified.

Another alternative involves the relocation of Line C to an alignment about 400 feet west of Joy Avenue. This alignment would result in a slight decrease in the cost of this facility. However, due to the existing school and other existing development in the area, construction difficulties are anticipated to be a major problem, and hence, this option was dismissed.

A number of other smaller alternatives were pursued and eventually disregarded as being too costly or not providing adequate protection.

CONCLUSIONS

Based on the studies and investigations made for this report, it is concluded that:

1. The West Elsinore area has experienced serious flooding problems in the past. As this area continues to urbanize these damages are expected to increase. A more orderly growth pattern can safely occur with the construction of these proposed facilities.

2. A drainage system is required to safely convey storm runoff through the area with the least interruption to public services. The Master Drainage Plan presented in this report is such a system and is the most feasible of the alternatives studied.

3. The proposed plan lends itself to stage construction as funds become available.

4. The total cost of the recommended improvements, including construction, rights of way, engineering, administration and contingencies, is estimated to be $9,768,000.

RECOMMENDATIONS

It is recommended that:

1. The Master Drainage Plan as set forth herein be adopted by the City Council of the City of Lake Elsinore as part of the overall master plan for the City and be approved by the Riverside County Flood Control and Water Conservation District's Board of Supervisors as part of the overall master plan for the County.

2. The Master Drainage Plan, as set forth herein, be used as a guide for all future developments in the study area and that such developments be required to conform to the plan insofar as possible.

3. The rights of way required for the plan be protected from encroachment.

4. The West Elsinore Area Drainage Plan, prepared by the Riverside County Flood Control and Water Conservation District, be adopted by the City Council of the City of Lake Elsinore and the Riverside County Board of Supervisors as a means through which funding may be procured for implementation of the plan and that other funding sources be investigated and adopted so as to complete the plan at the earliest possible date.

TABLE I

WEST ELSINORE MASTER DRAINAGE PLAN

COST SUMMARY

FACILITY	CONSTRUCTION*	RIGHT OF WAY	TOTAL COST
Line A	$ 649,000	$ 151,000	$ 800,000
A-1	416,000	3,000	419,000
A-2	217,000	0	217,000
A-3	22,000	1,000	23,000
A-4	232,000	0	232,000
Line B	543,000	92,000	635,000
B-1	1,038,000	302,000	1,340,000
B-2	346,000	2,000	348,000
B-3	354,000	0	354,000
Line C	2,067,000	255,000	2,322,000
C-1	145,000	44,000	189,000
Line D	1,010,000	0	1,010,000
D-1	100,000	0	100,000
D-2	106,000	0	106,000
D-3	43,000	0	43,000
D-4	46,000	0	46,000
D-5	121,000	4,000	125,000
McVicker Canyon Debris Basin	1,112,000	347,000	1,459,000
TOTAL	$8,567,000	$1,201,000	$9,768,000

*includes 31% for Engineering, Administration and Contingencies

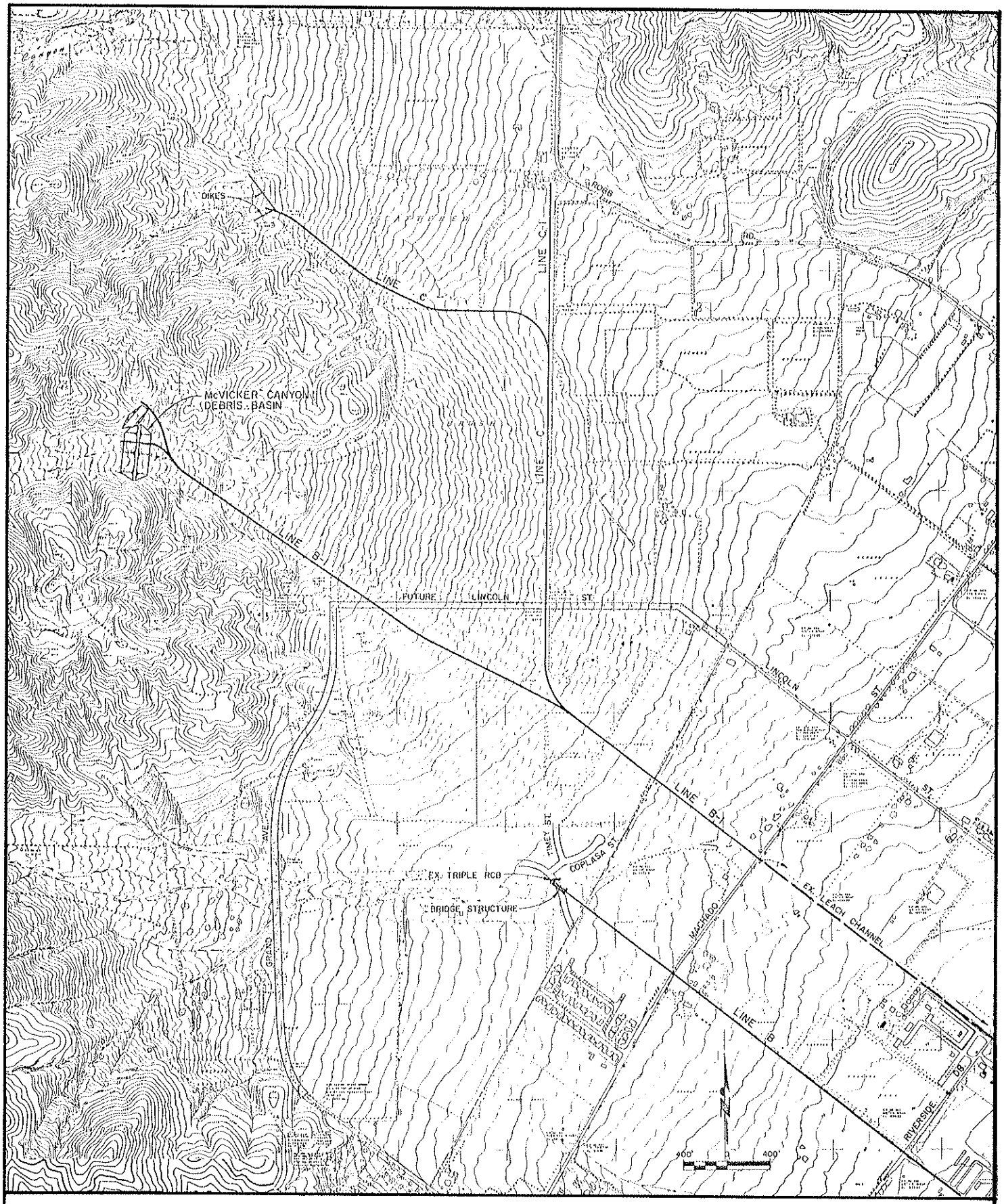

FIGURE 1 – ALTERNATIVE ALIGNMENT FOR LINES B AND C