SHOOKS RUN

DRAINAGE BASIN
PLANNING STUDY

TECHNICAL APPENDIX
VOLUME I - HYDROLOGY

prepared for
City of Colorado Springs, Colorado
Department of Planning & Development
City Engineering Division

155 East Pikes Peak Avenue, Suite 200
Colorado Springs, Colorado 80903-3675
Project No. 90-899
TABLE OF CONTENTS

VOLUME I — HYDROLOGY
A. TR-20 Routing Schematic
B. TR-20 Existing Condition Basin Parameter Calculations
C. TR-20 Existing Condition Routing Parameter Calculations
D. TR-20 Future Condition Basin Parameter Calculations
E. TR-20 Analysis — Existing Condition
F. TR-20 Analysis — Future Condition
G. TR-20 Analysis — Diversion Improvement Alternative
H. TR-20 Analysis — Detention Improvement Alternative
I. Rational Method Existing Condition Calculations
J. Rational Method Future Condition Calculations
K. Hydrology Map and Hydrology Alternatives Map

VOLUME II — HYDRAULICS
A. Equivalent Culvert Calculations for HEC-2 Analysis
B. Existing Pikes Peak Avenue/El Paso Street/Kiowa Street Culvert System Calculations for HEC-2 Analysis
C. Existing Platte Avenue/Boulder Street Culvert System Calculations for HEC-2 Analysis
D. HEC-2 Analysis — Existing Condition
   Fountain Creek to Kiowa Street
   Kiowa Street to Boulder Street
   Boulder Street to Patty Jewett Golf Course
   Patty Jewett Golf Course to Downstream of Paseo Road
   Paseo Road to Van Buren Channel Diversion
E. HEC-2 Analysis — Future Condition
   Fountain Creek to Kiowa Street
   Kiowa Street to Boulder Street
   Boulder Street to Patty Jewett Golf Course
   Patty Jewett Golf Course to Downstream of Paseo Road
   Paseo Road to Van Buren Channel Diversion
F. Preliminary Design Plans

VOLUME III — IMPROVEMENT ALTERNATIVES ANALYSIS
A. Soft-Lined Full Improvement Alternative Hydraulic Calculations
B. Structural Full Improvement Alternative Hydraulic Calculations
C. Soft-Lined Full Improvement with Complete Shocks Run Diversion at the Van Buren Channel Alternative Hydraulic Calculations
D. Soft-Lined Full Improvement with Detention Ponding Along the Channel Alternative Hydraulic Calculations
E. Soft-Lined Channel Side-Slopes Only Improvement with Crossing Maintenance Alternative Hydraulic Calculations
F. Estimate of Probable Construction Costs for Proactive Maintenance Program Alternative
G. Estimate of Probable Construction Costs for Soft-Lined Full Improvement Alternative
H. Estimate of Probable Construction Costs for Structural Full Improvement Alternative
I. Estimate of Probable Construction Costs for Soft-Lined Full Improvement with Complete Shocks Run Diversion at the Van Buren Channel Alternative
J. Estimate of Probable Construction Costs for Soft-Lined Full Improvement with Detention Ponding Along the Channel Alternative
K. Estimate of Probable Construction Costs for Soft-Lined Channel Side-Slopes Only Improvement with Crossing Maintenance Alternative
L. Estimate of Probable Construction Costs for Recommended Improvements
A. TR-20 ROUTING SCHEMATIC
B. TR-20 EXISTING CONDITION
BASIN PARAMETER CALCULATIONS
TB-20 EXISTING BASIN PARAMETERS

Basin A-1 - A = 6.5 AC = 0.102 sq mi

\[ CN = 20\% \text{ Open Space}, \text{ Woods (Good Condition), Soil B} + 80\% \text{ Open Space, Woods, Good Condition), Soil B} \]

\[ CN = (0.20)(0.55) + (0.80)(2.73) = 1.77 \]

TC = 650' woodland, forest @ 15,000 lb

\[ TC = (650)(15,000)(1.6) \]

\[ = 18,900 \text{ natural channel} \]

\[ = 18,900 \text{ natural channel} \times 0.05 \times 4 \times 0.06 \times 0.32 = 25 \]

\[ A_{\text{min}} = 0.132 \text{ ac} \]

Basin A-2 - A = 60 AC = 0.104 sq mi

\[ CN = \text{Open Space, Woods, Good Condition, Soil B} \]

\[ CN = 77 \]

TC = 600' woodland, forest @ 15,000 lb

\[ TC = (600)(15,000)(1.6) \]

\[ = 18,000 \text{ natural channel} \]

\[ A_{\text{min}} = 0.132 \text{ ac} \]

Basin A-3 - A = 108 AC = 0.169 sq mi

\[ CN = \text{Open Space, Woods, Good Condition, Soil B} + 90\% \text{ Open Space, Woods, Good Condition, Soil B} \]

\[ CN = (0.10)(0.55) + (0.90)(0.75) = 0.73 \]

\[ A_{\text{min}} = 0.132 \text{ ac} \]
TC = 580' owland/four @ 8.0% 
= 1.8(1.01-0.01525)20
= \frac{4.281}{3.832} = 20

=> 240' natural land @ 6.0% 
= 1.01525\frac{400}{200} \text{ fps} = 10.06\text{ fps}

(400' owland/four @ 8.0%)

Basin A-4 - A = 117Ac = 0.183 sq mi

\text{CN} = 45\% \text{ Open Space, Week Ground, Soil D w/ 30\% Rock Outcrop + 10\% Residential, 2 Units/Ac. Soil A (Use Soil B + 30\% Residential, 2 Units/Ac. Soil A (Use Soil B)}

\text{CNave} = (0.45)(0.77) + (0.05)(0.8) + (0.10)(0.75) + (0.40)(0.72) = 0.75

TC = 600' owland/four @ 23.0% 
= \frac{1.8(1.01-0.01525)600}{\sqrt{2.302}}

= \frac{1500}{1050} \text{ fps}

(400' owland/four)

\text{fps} = \frac{2500}{2800} = \frac{10500}{12000} (0.0568)\text{ fps} = \frac{10500}{12000} (0.0568)\text{ fps}

24,FM = 0.10 in.

Basin A-5 - A = 62Ac = 0.097 sq mi

\text{CN} = 15\% \text{ Open Space, Week Ground, Soil D w/ 30\% Rock Outcrop + 50\% Open Space, Week Ground, Grass, 2 Units/Ac. Soil A (Use Soil B + 35\% Residential, 2 Units/Ac. Soil A (Use Soil B)}

\text{CNave} = (0.15)(0.77) + (0.50)(0.69) + (0.35)(0.72) = 0.71

TC = 100' owland/four @ 2.0% 
= \frac{1.8(1.01-0.01525)100}{\sqrt{2.302}} = 12

(400' owland/four @ 4.1%)

\text{fps} = \frac{1500}{1300} = \frac{1500}{1300} (0.044)\text{ fps} = \frac{1500}{1300} (0.044)\text{ fps}
\[ \text{Flow} = 1400\text{ cfs} \times \text{elevation} @ Z_1 = 2.450 = \left(\frac{6.80}{2.25}\right) \]

- \( 2') \text{high ECP} = 11 \text{ fps} \\
- \( 4\text{.5' eCP} = \left(\frac{6.80}{2.25}\right) \quad \text{fps} \\
- \left(\frac{4.10}{2.00}\right) \quad \text{fps} \]

\[
\text{Flow} = \frac{1400}{11} = 127.27 \text{ fps} \\
\text{Flow} = \frac{1400}{127.27} = 11.00 \text{ fps} \quad (\text{horizontal section with} \quad b = 10', \text{and} \quad d = 2')
\]

23 min = 0.38 hr

\[
\text{Basin A-16} - \ A = 7.4 \text{ Ac} = 0.116 \text{ sq mi}
\]

\[
\begin{align*}
\text{CN} & = 550 \text{ Open Space, Woods, Good Condition, Soil D with Rock Outcrops} + \\
& = 950 \text{ Open Space, Fair Condition, Grass Cover, Soil E}
\end{align*}
\]

\[
\text{CN}_{\text{ Ave.}} = (0.05)(71) + (0.05)(69) = 69
\]

\[
\text{TC} = \frac{500}{3.50} \text{ Soil B} = 140.0 \text{ fps} \quad \text{Triangular section with} \quad b = 20\text{ ft} \text{, and} \quad d = 1.3\text{ ft}
\]

\[31 \text{ min = 0.52 hr}
\]

\[
\text{Basin A-7} - \ A = 6.14 \text{ Ac} = 0.095 \text{ sq mi}
\]

\[
\begin{align*}
\text{CN} & = 800 \text{ Open Space, Fair Condition, Grass Cover, Soil E with Business, Neighborhood Areas, Soil B} \\
& = 200 \text{ Open Space, Fair Condition, Grass Cover, Soil E}
\end{align*}
\]

\[
\text{CN}_{\text{ Ave.}} = (0.80)(69) + (0.10)(92) = 74
\]

\[
\text{TC} = \frac{500}{3.50} \text{ Soil B} = \text{Triangular section with} \quad b = 20\text{ ft} \text{, and} \quad d = 1.3\text{ ft}
\]

\[1000 \text{ cfs} \times \text{elevation} @ Z_1 = 2.450 = \left(\frac{6.80}{2.25}\right) \]

- \( 2') \text{high ECP} = 11 \text{ fps} \\
- \( 4\text{.5' eCP} = \left(\frac{6.80}{2.25}\right) \quad \text{fps} \\
- \left(\frac{4.10}{2.00}\right) \quad \text{fps} \]

\[
\text{Flow} = \frac{1000}{11} = 90.91 \text{ fps} \\
\text{Flow} = \frac{1000}{90.91} = 11.00 \text{ fps} \quad (\text{horizontal section with} \quad b = 100', \text{and} \quad d = 1')
\]
1500' - 54'' Ave RCP and Street @ 1/100 (24'', 250')
- 54'' RCP = 12 fps
- Street = \( \frac{(\frac{24}{120})}{54'} \times (0.010) = 0.015 \) fps
- Ave = \( \frac{12 + 0.015}{2} \) fps = \( \frac{1500}{9} \) ft
Ax = \( \frac{1500}{9} \) ft  = \( \frac{1500}{9} \) ft
Ax = \( \frac{1500}{9} \) ft

Bassin A-B - A = 0.100 ac = 0.100 sq mi

\( \text{CN} = 0.10 \times 0.99 \times 0.20 \times 0.10 = 0.0022 \)

TC = 1.00

\( 400' \text{ grass swale@ 0.88} = \left( \frac{400 - 0.88}{20} \right) = 1.86 \)

\( 450' \text{ street@ 1.29} = \left( \frac{450 - 1.29}{20} \right) = 2.3 \)

\( 1300' \text{ Ave RCP and Street@ 1/100 (24'', 250')} \)
- 24'' RCP = 8 fps
- Street = \( \frac{(\frac{24}{120})}{54'} \times (0.010) = 0.015 \) fps
Ax = \( \frac{12 + 0.015}{2} \) fps = \( \frac{1500}{9} \) ft
Ax = \( \frac{1500}{9} \) ft
31 mm = 0.032 ft
(Section 9) CN = 55% Open Space, Few Condition Grass Cover, Soil A (5\% Soil B) Residential, 4 U/s/Ac, Soil A (5\% Soil B) 1+500 Residential, 4 U/s/Ac, Soil B + 10\% Business, Neighborhood Areas, Soil B + 10\% Business, Commercial Areas, Soil B

CN 100" (0.835) (0.05) + (0.05) (0.05) (0.01) (1.25) = 5.0

TC = 1000' overlaid, June 30, 1989

= 650 gss sval 0.999

= 650 (0.999) / 1.160

= 0.56' per 0.01' = 7

= 1000' sval 0.009

= 1000 (0.009) / 1.160

= 0.86' per 0.01' = 7

= 4700' 15' KCP and sheet 0.009

= 4700 (0.009) / 1.160

= 36' Ave KCP = 10 ft/s

= 36' Ave KCP = 10 ft/s

= 4700 / 1.160 / 0.009

= 0.57' per 0.01' = 7

Ave = 10 + 7 = 17

Basin A-9: A = 92' Hc = 0.144 sq m

(Section 10) CN = 55% Open Space, Few Condition Grass Cover, Soil A (5\% Soil B) Residential, 4 U/s/Ac, Soil A (5\% Soil B) 1+500 Residential, 4 U/s/Ac, Soil B + 10\% Business, Neighborhood Areas, Soil B (5\% Soil B) and Soil B

CN 100" (0.835) (0.05) + (0.05) (0.05) (0.01) (1.25) = 7.3

TC = 1000' overlaid, June 30, 1989

= 550 (0.835) (0.05) + (0.05) (0.05) (0.01) (1.25) = 6
WILSON & COMPANY
ENGINEERS & ARCHITECTS

= 400 grass swale @ 2.8% (0.05 m/300 m) = (0.05 \times 300) / 400 = 0.0375 \times 300 = 112.5 \\
(20 to 0.5) \\

= 800' street @ 0.12% \((1,000/800) = (0.0012) / (0.004) = 3.0 \times 800 = 2,400 \\
(1/2 - 0.6' street, d = 0.4') \\

= 800 grass swale @ 1.4% \((1,000 / 800) = (0.014) / (0.004) = 2.4 \times 800 = 5,760 \\
(1/2 - 0.6' street, d = 0.4') \\

= 1,000' street @ 0.12% \((1,000 / 1,000) = (0.0012) / (0.004) = 3.0 \times 1,000 = 900 \\
(1/2 - 0.6' street, d = 0.4') \\

= 500' 72" Ave RCP @ 0.6% \((0.6 / 0.6) = 1.0 \times 500 = 500 \\

25 mm = 0.134 sqm 

(Section B) 

CN = 80% open space, 20% grass, 90% 0.07 m, 10% Rock Outcrop + 20% Residential, 1 Unit / Acre, Soil D w/ 50% Rock Outcrop + 20% Residential, 2 Units / Acre, Soil A (Use Soil B) + 35% Residential, 3 Units / Acre, Soil C

CN = 1.0 + 0.5(0.2) + 0.4(0.2) + 0.1(0.2) + 0.1(0.2) = 1.25 

TC = 250\text{Downward Force} @ 20.06\% \((480 / 260) = \sqrt{85.0} = 9.2 \times 250 = 2,300 \\
\text{2,400 street @ 0.6%} \((1,000 / 2,400) = (0.0012) / (0.004) = 3.0 \times 2,400 = 7,200 \\
(1/2 - 0.6' street, d = 0.4') \\

= 900' 24' Ave RCP and Street @ 0.6% \((0.6 / 700) = 0.000857 \times 900 = 0.77 \\
\text{24' Ave RCP} = 0.77 \times 24 = 18.48 

18.48 mm = 0.30 h
Section B-2  A = 5.2  AC = 0.0810 gp

CN = 20% Open Space; Few Cond. Great Corn, Soil A (Use Soil B) + 50% Residential
2 Units/AC, Soil A (Use Soil B) + 25% Residential, 3 Units/AC,
Soil A (Use Soil B) + 50% Residential, 4 Units/AC, Soil A (Use Soil B)
+ 20% Business, Neighborhood Areas, Soil A (Use Soil B)

CN Ave = (0.10)(69)+(0.05)(70)+(0.25)(78)+(0.10)(75)+(0.20)(92) = 73

TC = 300' overlook, grass @ 9.1% (6.198-6.698) = (9.1%) = 12

= 250' grass single @ 6.8% (6.198-6.698) = 6.698 = 4 fps

= 150' street @ 3.8% (6.198-6.698) = 3.8% = 6.4 fps

= 300' - 50' RCP and street @ 3.7% (6.198-6.698)

- 30' 2CP = 16 fps
- street => (0.00)(3.8)(12.6) = 0.072 fps

CN Ave = 73

19 mm = 0.132 ka

Basin B-3  A = 8.4  AC = 0.131 sqm

CN = 10% Open Space; Few Cond. Great Corn, Soil A (Use Soil B) + 50% Residential
3 Units/AC, Soil A (Use Soil B) + 10% Residential, 3 Units/AC,
Soil A (Use Soil B) + 50% Residential, 6 Units/AC, Soil A (Use Soil B)
+ 10% Business, Neighborhood Areas, Soil A (Use Soil B)

CN Ave = (0.10)(69)+(0.05)(70)+(0.25)(78)+(0.10)(75)+(0.10)(92) = 76

TC = 100' overlook, grass @ 4.0% (6.198-6.698) = (4.0%) = 10

= 600' glass double @ 2.0% (6.198-6.698) = 6.198 = 2 fps

19 mm = 0.132 ka
=> 1000 street @ 8.5°F  \[\frac{(20°F - 60°F)}{100} = \frac{(60°F - 40°F)}{10.0°F} \times \frac{60°F}{10.0°F} = \frac{1000}{100} = \frac{10}{1} = \frac{10°F}{1°F}\]

=> 3000 54" RCP and street @ 1.9°F \[\frac{(6°F - 10°F)}{5000\text{ ft}}\]

- 54" RCP = 17 fps
- 8" street => \(\frac{(1.69°F + 0.5°F)}{300\text{ ft}} \times \frac{(0.009)^2}{(0.6')^2}\) = 0.47 fps

\[\frac{3500}{0.47} = \frac{11.9\text{ fps}}{(11.9\text{ fps}) \times \frac{5}{6}} = \frac{3720}{0.47}\]

\[25\text{ min} = 0.13\text{ hr}\]

Basin B - 4  \(A = 78.4\text{ ft}^2 = 0.12\text{ ac}\) m of

\[(\text{Section 14}) \ C\ N = \frac{5°F}{87°F - \text{Soil B}} \text{ for } \frac{5°F}{87°F - \text{Soil B}} \text{ at } 30°F\]

\[(\text{Section 14}) \ C\ N_{\text{ave}} = \frac{0.05\text{ m}(77) + (0.05\text{ m})(84) + (1.0\text{ m})(84) + (1.0\text{ m})(72) + (0.2\text{ m})(72)}{7.3} = 7.3\]

\[TC = 300\text{ overland } \times \frac{0.099}{300} = \frac{0.099}{300} = 0.00033\]

\[45°\text{ grass slope } \times 22°F \times \frac{(20°F - 63°F)}{40°F} = \frac{20°F - 63°F}{40°F} = 0.22°F \times \frac{20°F}{40°F} = \frac{4°F}{1°F} = 4°F\]

\[\text{Street } 54°F  \times \frac{10°F}{5°F} = \frac{10°F}{1°F} = 10°F\]

\[\frac{250°F}{6°F} = \frac{250°F}{6°F} = \frac{250°F}{0.2°F} = \frac{250°F}{0.2} = 25°F\]

\[\text{Concrete}  \times \frac{0.099}{300} = \frac{0.099}{300} = 0.00033\]

\[\text{Concrete}  \times \frac{0.099}{300} = \frac{0.099}{300} = 0.00033\]

\[\text{Concrete}  \times \frac{0.099}{300} = \frac{0.099}{300} = 0.00033\]
=> 250'-24" BCP and Sheet @ 20% \left(\frac{250'-24"}{250'}\right)

- 24" BCP = 10 fps
- sheet = \left(\frac{0.64''}{64''}\right) \times 0.020'' = 4 fps
\begin{align*}
\text{Total} &= \frac{14}{2} = 7 \text{ fps} = \approx 19 \text{ m/s}
\end{align*}

24 min = 0.40 hr

Basin B-5 - A = 6.18 ft² = 0.1103 sq m

\text{CN} \rightarrow 95\% \text{ Residential}, 14 \text{ Units} / \text{Ac}, \text{ Soil A} (\text{Use Soil B}) + 50\% \text{ Business, Neighborhood Areas}, \text{ Soil A} (\text{Use Soil B})

\text{CN}_{wet} = (0.15 \times 75) + 0.05(2.7) = 7.6

TC \rightarrow 100 \text{ outflow gpm} \times 2.05 = \frac{1.05(1.05 - 0.05)}{50}

\Rightarrow 1000 \text{ sheet} \times 1.05 \left(\frac{250'-24''}{1000}\right) \times 0.020'' + \frac{0.04''}{250'} \times 0.020'' \times 0.01'' = 3 \text{ fps} \Rightarrow \frac{1000}{1000} = 6

\Rightarrow 3.100 - 3.6\text{'' Ac BCP} = \frac{19}{6} \left(\frac{250'-60''}{300''}\right)

- 3.6\text{'' Ac BCP} = 13 \text{ fps}
- sheet = \left(\frac{0.44''}{64''}\right) \times 0.004'' = 4 \text{ fps}
\begin{align*}
\text{Total} &= \frac{10}{4} = 8.5 \text{ fps} \Rightarrow \frac{1000}{1000} = 10
\end{align*}

24 min = 0.40 hr
Basin B-6 - A = 0.074 Acre = 0.108 sq mi

Section 16 - CN = 65.8% Residential, 4 Units/Ac, Soil B (Use Soil B) + 20.3% Residential, 0 Units/Ac, Soil A (Use Soil B) + 5.0% Business, Neighborhood Areas, Soil A (Use Soil B) + 9.0% Business, Commercial Areas, Soil A (Use Soil B)

\[ CN_{ave} = \frac{0.15}{75} + \frac{0.5}{60} + \frac{0.5}{92} + \frac{0.10}{92} = 0.30 \]

\[ TC = 100' \text{ outlined grass} = \frac{1.5 \times 1.1 - 0.25 \times 100}{0.25} = 12 \]

\[ = 4000' \text{ street} \times 2 \times 0.8 \left( \frac{0.25}{100} \right) = \frac{40}{60} \times 0.04 \times 0.025 \times 4 = 0.08 \text{ in} \Rightarrow 1.3 \text{ in} \]

25 min = 0.40 hr

Basin B-7 - A = 0.74 Acre = 0.108 sq mi

Section 17 - CN = 10.0% Open Space, Fair Condition, Grass Cover, Soil A (Use Soil B) and Soil B + 90.0%

Residential, 4 Units/Ac, Soil A (Use Soil B) + 5.0% Business, Neighborhood Areas, Soil A (Use Soil B) + 9.0% Business, Commercial Areas, Soil A (Use Soil B)

\[ CN_{ave} = \frac{0.10}{60} + 0.70 \times \frac{0.20}{92} + \frac{0.20}{92} = 0.30 \]

\[ TC = 100' \text{ outlined grass} = \frac{1.8 \times (1.1 - 0.25 \times 100)}{0.25} = 12 \]

\[ = 2100' \text{ street} \times 2 \times 0.8 \left( \frac{0.25}{100} \right) = \frac{21}{40} \times 0.04 \times 0.025 \times 4 = 0.08 \text{ in} \Rightarrow 0.7 \text{ in} \]

\[ = 1000' \text{ grass channel} \times 1(2.0) \left( \frac{0.25}{100} \right) = \frac{1000}{40} \times 0.04 \times 0.025 \times 4 = 0.08 \text{ in} \Rightarrow 0.7 \text{ in} \]

(trapezoidal section w/60° sides, b=10' and d=2')

\[ = 1000' \text{ concrete channel} \times 1(1.7) \left( \frac{0.25}{100} \right) = \frac{1000}{40} \times 0.04 \times 0.025 \times 4 \times 0.8 = 0.08 \text{ in} \Rightarrow 0.7 \text{ in} \]

(trapezoidal section w/60° sides, b=10' and d=2')

25 min = 0.40 hr
WILSON E COMPANY
ENGINEERS
ARCHITECTS

DATE: July 31, 1991

Basin C - A = 96 ac = 0.1150 sq mi

Section 18
CN = 20% Open Space, Fair Condition, Grass Cover, Soil B + 80% Residential,
1 Unit / Ac, Soil A (Use Soil B) and Soil E

CNmax = (0.20)(0.9) + (0.80)(0.75) = 0.74

TC = 250' overland @ 3.2% \( \frac{1.2}{250} = \frac{0.12}{250} = \frac{0.00048}{250} = 0.0000056 \)

= 600' grass slope @ 1.8% \( \frac{1.2}{600} = \frac{0.0002}{600} = \frac{0.000000333}{600} = 0.00000000055 \)

(1.2% slope x600 ft x 0.80 = 0.96 ft)

= 3750' sheet @ 1.5% \( \frac{1.2}{3750} = \frac{0.00032}{3750} = \frac{0.0000000856}{3750} = 0.0000000000230 \)

(1.2% slope x 3750 ft x 0.80 = 0.96 ft)

= 1800' grass channel @ 1.0% \( \frac{1.2}{1800} = \frac{0.0001}{1800} = \frac{0.000000055}{1800} = 0.0000000000305 \)

(1.0% slope x 1800 ft x 0.80 = 0.96 ft)

Basin D - A = 50 ac = 0.1257 sq mi

Section 19
CN = 30% Open Space, Wooded, Good Condition, Soil D with Back Out Cup + 70%
Residential, 2 Units / Ac, Soil A (Use Soil B) and Soil E + 20% Residential,
2 Units / Ac, Soil D with 80% Back Out Cup + 5% Residential, 4 Units / Ac, Soil A
(Use Soil A = 550 Business, Neighborhood Houses, Soil E)

CNmax = (0.30)(0.77) + (0.20)(0.73) + (0.50)(0.70) + (0.05)(0.92) = 0.77

TC = 4500' overland @ 2.6% \( \frac{1.2}{4500} = \frac{0.000266667}{4500} = 0.0000000005888 \)

= 1450' sheet @ 4.0% \( \frac{1.2}{1450} = \frac{0.000821429}{1450} = 0.000000000568 \)

(1.2% slope x 1450 ft x 0.80 = 0.96 ft)

= 1350' - 30' RCP and Sheet @ 2.4% \( \frac{1.2}{1350} = \frac{0.000733333}{1350} = 0.000000000541 \)

= 30' RCP = 13 fps

= Sheet = \( \frac{(1.2)}{(0.064)} \) ft = 7 fps

(1.2% slope x 1800 ft x 0.80 = 0.96 ft)

\( \text{Flow} = \frac{0.064}{2} = 0.032 \) fps

\( \frac{1800}{0.032} = 56250 \)
Basis D-2 - A = 96 Ac = 0.150 sq mi

(Section 2a) \( C_N = 75 \) for Poor-Moist, Good-Confining Soil D w/ 30% Back Offcup + 55% Residential, 3 Units/1000 sq ft, Soil D w/ 30% Back Offcup + 65% Residential, 4 Units/1000 sq ft. Soil A (Use Soil B) w/ 75% Residential, 5 Units/1000 sq ft.

\[ C_{N,\text{ave}} = (0.10)(77)(0.60)(85) + (0.15)(75)(10)(95) = 7.4 \]

\[ TC = 600 \times \text{cement & forest @ 5000} = 15 \]

\[ \Rightarrow 750 \text{ sheet @ 135} = (0.75)(0.0135)(0.05) = 0.00075 \text{ in.} \]

\[ \Rightarrow 400 \text{ glass side @ 1250} = (0.4)(0.0125)(0.05) = 0.0005 \text{ in.} \]

\[ \Rightarrow 1050 \text{ sheet @ 800} = (1.05)(0.008)(0.05) = 0.00042 \text{ in.} \]

\[ \Rightarrow 1300 \text{ - 80 ft. each sheet @ 2.00} = (1300)(0.002) = 2.60 \text{ in.} \]

\[ \Rightarrow 0.015 \text{ in.} \times 0.90 \text{ in.} = 0.015 \times 0.90 \]

Basis D-3 - A = 57 Ac = 0.899 sq mi

(Section 2b) \( C_N = 75 \) for Residential, 4 Units/1000 sq mi, 3 Units/1000 sq ft. Soil A (Use Soil B).

\[ C_N = 75 \]

\[ TC = 100 \times \text{cement & sheet @ 2.00} = \frac{100(1.0 - 0.15)}{0.20} = 12 \]
August 1, 1981

Wilson & Company

1800' x 30' @ 0.006 (6299 - 6299)

2200' x 30' @ 0.007 (6299 - 6299)

20' @ 0.016

A = 97.56 ft²

CN = 75

TC = 2.50' on grade @ 0.079 (0.674 - 0.674) = 1.861 (1.00 - 0.05) 75 = 13

2200' x 30' @ 0.016 (6299 - 6299) = 1.849 (1.00 - 0.05) 20.5 = 6.5 ft² = 10.15

A = 22.5 × 11 = 285

22.5 = 8.3 ft²

Section 22: CN => Residential, 4 Units / Acre, Soil A (Use Soil B) and Soil B

CN = 75

TC = 2.50' on grade @ 0.079 (0.674 - 0.674) = 1.861 (1.00 - 0.05) 75 = 13

2200' x 30' @ 0.016 (6299 - 6299) = 1.849 (1.00 - 0.05) 20.5 = 6.5 ft² = 10.15

A = 22.5 × 11 = 285

Section 23: CN => 50% Open Space, Few Condominiums, Grass Cover, Soil A (Use Soil B) + 50% Residential, 4 Units / Acre, Soil A (Use Soil B) + 100% House, 100% role, 50% Business, Commercial Areas, Soil A (Use Soil B) + 50% Business, Commercial Areas, Soil A (Use Soil B)

CN = 75

TC = 100' on grade @ 2.0 ft² = 0.841 (1.00 - 0.05) 100 = 12
WILSON & COMPANY
ENGINEERS & ARCHITECTS

DATE August 1, 1991

=> 950' street @ 2.9% \( \frac{\text{Depth of Flow}}{\text{Crown}} \) = \( \frac{0.40}{2.9 \times 10^{-2}} \) \( \frac{\text{Crown}}{\text{Crown}} \) \( \text{Flow} \) = 4500

=> 950' street @ 2.9% \( \frac{\text{Depth of Flow}}{\text{Crown}} \) = \( \frac{0.40}{2.9 \times 10^{-2}} \) \( \frac{\text{Crown}}{\text{Crown}} \) \( \text{Flow} \) = 4500

- 48" dia. 
- gas channel \( \frac{0.40}{0.20} \) \( \frac{0.014}{0.20} \) \( \frac{0.20}{9.5} \) \( \frac{0.20}{5} \) \( \text{Flow} \) = 28

Basin D-6 - \( A = 62 \text{ Ac} = 0.09 \) sq. m

- \( \text{CN} \) = Residential, 4 units/Ac, Soil A

- \( \text{CN} \) = 75

- \( TC \) = 100\% 

- 2.500' street @ 2.9% \( \frac{\text{Depth of Flow}}{\text{Crown}} \) = \( \frac{0.40}{2.9 \times 10^{-2}} \) \( \frac{\text{Crown}}{\text{Crown}} \) \( \text{Flow} \) = 3500

- \( 28 \text{ min} = 0.37 \text{ h} \)

Basin D-7 - \( A = 71 \text{ Ac} = 0.11 \text{ sq. m} \)

- \( \text{CN} \) = Residential, 4 units/Ac, Soil A (Use Soil B) + 50% Business, Neighborhood Trees, Soil A

- \( \text{CN}_{\text{corr}} = (0.90)(0.95) + (0.05)(0.42) + (0.05)(0.42) = 0.84 \)

- \( TC = 100\% \) 

- \( 28 \text{ min} = 0.37 \text{ h} \)
= 1700' street @ 2.0% \left( \frac{4.29 \times 2.29}{1700} \right)^{0.49} \left( \frac{4.0}{120} \right)^{0.36} (0.05)^{0.5} = \frac{1700}{(0.440, 0.46)} = 6 

= 200' - 48" RC pipe @Sheet = 2.0\% \left( \frac{4.29 \times 2.29}{200} \right) 
- Ave RC pipe = 10 fps 
- Street = \left( \frac{4.0}{120} \left( \frac{0.440}{0.25} \right)^{0.5} \right) \left( 0.05 \right)^{0.5} = 2 fps 
- Ave = \frac{18}{2} = 6 fps = \frac{2000}{10} \cdot \frac{1}{5} = 3.2 min = 0.05 h

Basin D-B - A = 65 AC = 0.1025 mi

(Section 2) CN = Residential, 4 Units/AC, Soil A (Use Soil D)

CN = 75

TC = \frac{100 \text{ overland}}{\text{gus}} \cdot \frac{2.0\%}{2.0\%} = \frac{100}{\sqrt{2.0\%}} = 12 

= 3.0\% \text{ street} \times 2.0\% \left( \frac{4.29 \times 2.29}{200} \right) \left( \frac{0.440}{120} \left( \frac{0.25}{0.05} \right)^{0.5} \right) \left( 0.05 \right)^{0.5} = 8 fps \Rightarrow \frac{2800}{(5600) \cdot \frac{1}{5}} \cdot 12 

21 min = 0.35 h

Basin D-Q - A = 69 AC = 0.108 sq mi

(Section 2) CN = 55% Open Space, Few Condition Grass Cover, Soil A (Use Soil D) + 25% Residential

4 Units/AC, Soil A (Use Soil D) + 25% Business, Neighborhood Uses, Soil A

CN = 70 \times (0.55) \times 0.5 + (0.25) \times 0.5 + (0.25) \times 0.5 = 75 

TC = \frac{100 \text{ overland}}{\text{gus}} \cdot \frac{2.0\%}{2.0\%} = \frac{100}{\sqrt{2.0\%}} = 12 

= 3.0\% \text{ street} \times 2.0\% \left( \frac{4.29 \times 2.29}{2100} \right) \left( \frac{0.440}{120} \left( \frac{0.25}{0.05} \right)^{0.5} \right) \left( 0.05 \right)^{0.5} = 8 fps \Rightarrow \frac{2800}{(6000) \cdot \frac{1}{5}} \cdot 12 

21 min = 0.35 h
Basin D-10 - A = 60 Ac = 0.103 sq mi

(Case 1b) C N = 0.25% Open Space, Few Green, Low Gross Cover, Soil A (Very Good) + 40% Residential, 4 Units/AC, Soil A (Very Good) + 100% Business, Neighborhood: Soil A + 20% Residential, 4 Units/AC, Soil C + 10% Residential, 4 Units/AC, Soil C + 5% Business, Neighborhood: Average, Soil C

C N A ve = (0.15/0.9) + (0.10/0.25) + (0.10/0.92) + (0.20/0.83) + (0.10/0.90) + (0.05/0.94) = 0.8

T C ⇒ 100% overhead grass @ 2.0% F = $1,800,000 / 100 = 12
⇒ 550' street @ 1.0% (550 / 200) = 1.0 ($650 / 200) (0.01) = 74.244$ ⇒ 550′ street = 2

⇒ 3150° - 54° AC of CP and street @ 2.0% (652.2 - 648) / 652.2

- 54° AC of CRP = 20TPS

Street = (1.49 / 0.025 / 0.025) / 2.5 = 5 TPS
(3/4 AC of 240°, d = 0.4)

A = 25 / 0.25 = 100 TPS and 3150° / 12 = 4

18 min = 0.30 h

Basin D-11 - A = 100 Ac = 0.15 sq mi

(Case 2a) C N = 0.25% Residential, 4 Unit/AC, Soil A (Very Good) + 50% Residential, 8 Unit/AC, Soil A (Very Good) + 50% Business, Commercial, Average, Soil A (Very Good)

C N A ve = (0.10/0.75) + (0.05/0.85) + (0.05/0.92) = 76

T C ⇒ $1,800,000 / 100 = 12
⇒ 3350' street @ 2.0% (3350 / 3350) = 1.0 (490 / 200) (0.01) / 2 = 64.944$ ⇒ 3350′ street = 1
=> 700' - 48" RCP and Street @ 6% (\text{\textsuperscript{118}\textsuperscript{-\textsuperscript{120}}})

- 48" RCP - 28 fps
- Street - \left(\frac{\text{1,500}}{200,000} \times 0.04\right)^\text{1/2} = 8 fps

\text{Due} = \frac{28 + 8}{2} = 18 fps \Rightarrow \frac{700}{18} \approx 1

20 min = 0.33 hr

\text{Basin D - 12} - A = 100\text{AC} = 0.15625 \text{ sq mi}

\text{Load} \Rightarrow 25\% \text{ Residential}, 4 \text{ Units/AC}, 1.8 \text{ Soil A (Gr. Soil B)} + 10\% \text{ Business,}
\text{Neighborhood} - i.e., 4 \text{ Soil A (Gr. Soil B)} + 10\% \text{ Business, Commercial,}
\text{Schools, Parks, Soil C (Gr. Soil B)} + 40\% \text{ Residential, 4 Units/AC, Soil C,}
\text{Business, Neighborhood, Parks, Soil C}

\text{CN} = (0.85 \times 75 + 0.15 \times 92) + (0.10 \times 64) + (0.40 \times 88) + (0.05 \times 94) = 83

\text{TC} \Rightarrow 100' \text{ overflow area} @ 2.0\% = \frac{1.04 \times 0.25 	imes 100}{90} = 12

\Rightarrow 2500' \text{ Street} @ 4.1\% = \frac{2500 \times 9.0 \times 0.04}{200} \times 0.01 = 8
\left(\frac{1}{2} - \text{60'} \text{ Street} \right. \left. d - 0.6\right)

\Rightarrow 1000' - 30" \text{ RCP and Street @ 6\% (\text{\textsuperscript{118}\textsuperscript{-\textsuperscript{120}}})}

- 30" RCP = 12 fps
- Street = \left(\frac{1.49 \times 9.0 \times 0.04}{200,000} \times 0.01\right)^\text{1/2} = 5 fps
\left(\frac{1}{2} - \text{60'} \text{ Street} \right. \left. d - 0.6\right)

\text{Due} = \frac{12 + 5}{2} = 8.5 fps \Rightarrow \frac{1000}{8.5} \approx 120

20 min = 0.33 hr
Basin D-13 - A: 102 Acre = 0.159

(Section 3D) Cn = 50% Residential, 4 units/acre, Soil B: 45% Residential, 4 units/acre, Soil C: 55% Residential, 8 units/acre, Soil C

Cn = [0.50] [0.45] [0.05] = 0.79

TC = 100' Overland grass @ 2.00" = \( \frac{1.00 (1.00 - 0.25) \times 100}{12} \) = 10

=> 1000' sheet @ 2.00" = \( \frac{1000 (0.25 - 0.10) - (0.25 - 0.10) \times 4.00\times 0.25 - 4.00}{0.25 - 0.10} \) = 3.0

(1/40" sheet, d = 0.4"")

=> 2750' = 125' REC and sheet @ 1.38" = \( \frac{2750 \times 0.0138 \times 125}{2750} \)

- 30' REC: 11 lbs
- Sheet: 0.0138 / 0.25 = 0.055 lbs
(1/40" sheet, d = 0.4"")

24 min = 0.40"".

Basin D-14 - A: 108 Acre = 0.169

(Section 3D) Cn = 70% Residential, 4 units/acre, Soil B: 15% Residential, 4 units/acre, Soil C: 15% Business, Neighborhood Areas, Soil B: 50% Business, Neighborhood Areas, Soil C

Cn = [0.70] [0.15] [0.15] = 0.79

TC = 100' Overland grass @ 2.00" = \( \frac{1.00 (1.00 - 0.25) \times 100}{12} \) = 10

=> 1850' sheet @ 2.00" = \( \frac{1850 (0.25 - 0.10) - (0.25 - 0.10) \times 4.00\times 0.25 - 4.00}{0.25 - 0.10} \) = 3.0

(1/40" sheet, d = 0.4"")
\[ V_{100}' = 54" \text{ Ave RCP and Street @ 0.8%} \left( \frac{1244 - 628}{2100} \right) \]
\[ = 54" \text{ Ave RCP} = 11 \text{ fps} \]
\[ S_{\text{Street}} = \left( \frac{20.04}{0.40} \right) / 100 = 0.4 \text{ fps} \]
\[ \frac{1}{2} \times 40 = 20 \text{ fps} \]
\[ \text{Ave} = 14 \text{ fps} \Rightarrow \frac{2100}{14} = 150 \text{ in} \]

\[ 21 \text{ min} = 0.235 \text{ hr} \]

Bassin D-15 - A = 100 ft^2, C = 0.156 sq mi

(Section 59)

\[ C_s = 0.06 \text{ (60)} + 0.25 \text{ (79)} + 0.25 \text{ (85)} + 0.05 \text{ (90)} + 0.25 \text{ (92)} + 0.15 \text{ (94)} = 85 \]

\[ T_C = 200 \text{ (220)} \left( \frac{1244 - 628}{2100} \right) = \frac{1244}{2100} = 0.7 \]

\[ 1400 \text{ ft} \left( \frac{0.8}{700} \right) = 0.1 \text{ fps} \]

\[ \left( \frac{0.8}{700} \right) = 0.2 \text{ fps} \]

\[ \Rightarrow 1850 - 90" \text{ RCP and Street @ 0.9%} \left( \frac{1244 - 628}{1850} \right) \]

\[ = 90" \text{ RCP} = 16 \text{ fps} \]

\[ S_{\text{Street}} = \left( \frac{20.04}{0.40} \right) / 100 = 0.4 \text{ fps} \]

\[ \frac{1}{2} \times 40 = 20 \text{ fps} \]

\[ \text{Ave} = \frac{14 \times 20}{10} = 110 \text{ in} \]

\[ 21 \text{ min} = 0.235 \text{ hr} \]
Basin D - 16 - A = 88 Ac = 0.138 sq mi

(Section 2) CN = 57% Residential, 4 Units/ Ac, Soil A (Top Soil B) + 25% Open Space, Fair Condition Grass Cover, Soil C

C_Nave = (0.05)(75) + (0.25)(69) + (0.1)(79) = 75

TC = 150' oval with grass @ 2.7% (412/12) x (1/250) = 381/125 = 3.05

=> 38100 grass square @ 1.0% (38100)(.01) = 381 sq ft = 3.5 ft

(triangular section/20+1=0, d=1.5
24 mm = 0.48 in

Basin E - A = 81 Ac = 0.138 sq mi

(Section 2) CN = 45% Open Space, Fair Condition Grass Cover, Soil B + 45% Open Space, Fair Condition Grass Cover, Soil C + 5% Residential, 8 Units/Ac, Soil B + 5% Business, Neighborhood Hvac, Soil C

C_Nave = (0.45)(69) + (0.45)(79) + (0.05)(89) + (0.05)(94) = 76

TC = 100' oval with grass @ 2.0% = 1.00(1/250) x 50 = 0.12

=> 500' sheet @ 3.5% (412/12) x (1/250) = 412/125 = 3.26

(triangular section/20+1=0, d=0.4

=> 200' grass square @ 1.8% (412/12) x (1/250) = 412/125 = 3.26

(triangular section/20+1=0, d=0.4

26 mm = 0.43 in

Basin F - A = 78 Ac = 0.122 sq mi

(Section 2) CN = 20% Open Space, Fair Condition Grass Cover, Soil C + 40% Residential, 4 Units/Ac, Soil E + 25% Residential, 8 Units/Ac, Soil B + 5% Residential, 8 Units/Ac, Soil C + 5% Business, Neighborhood Hvac, Soil C + 5% Business, Commercial Hvac, Soil E

C_Nave = (0.20)(79) + (0.4)(89) + (0.05)(89) + (0.05)(79) + (0.05)(79) + (0.05)(94) + (0.05)(92) = 81
TC \Rightarrow 100 \text{ oval tank} 50 \text{gal} \times \frac{1,000 \text{ lb}}{100 \text{ gal}} = \frac{100 \times 62 - 45 \times 90}{520} = 70 \text{ lb} \Rightarrow 40 \text{ gal} \text{ sheet} \times \frac{1,000 \text{ lb}}{100 \text{ gal}} = (144 \text{ gal} \times 0.04) = 6.18 \text{ gal} 0.18 \text{ gal} \frac{1}{2} \text{ sheet} = 0.4 \Rightarrow \frac{430}{2} = 1\text{ gal} \Rightarrow 355 \text{ gal} \text{ sheet} \times \frac{1,000 \text{ lb}}{100 \text{ gal}} = (150 \text{ gal} \times 0.04) = 6.18 \text{ gal} 0.18 \text{ gal} \frac{1}{2} \text{ sheet} = 0.4 \Rightarrow \frac{350}{2} = 1\text{ gal}\text{ guess}\text{ max} = \frac{350}{100} = 3.5 \text{ gal} \\
\text{Triangular section} \times 4 \text{ sides, } d = 2 = 27 \text{ min} = 0.45 \text{ hr}

\text{Basin G} \quad A = 824 \text{ ac} = 0.128 \text{ sq mi}

\text{Sections} \quad CN = 75\% \text{ Residential, 4 units/ ac, Soil B + 15\% \text{ Residential, 8 units/ ac, Soil B + 50\% Business, Neighborhood Parks, Soil B + 50\% Business, Commercial Parks, Soil B}

\text{CN max} \times (0.05)(75) + (0.05)(85) + (0.05)(92) + (0.05)(98) = 9 \text{ B}

TC \Rightarrow 100 \text{ oval tank} 50 \text{ gal} \times \frac{1,000 \text{ lb}}{100 \text{ gal}} = \frac{100 \times 62 - 45 \times 90}{37.2} = 70 \text{ lb} \Rightarrow 1350 \text{ gal} \text{ sheet} \times \frac{1,000 \text{ lb}}{100 \text{ gal}} = (1350 \text{ gal} \times 0.04) = 6.18 \text{ gal} 0.18 \text{ gal} \frac{1}{2} \text{ sheet} = 0.4 \Rightarrow \frac{1350}{2} = 1\text{ gal} \Rightarrow 2750 \text{ gal} \text{ sheet} \times \frac{1,000 \text{ lb}}{100 \text{ gal}} = (2750 \text{ gal} \times 0.04) = 6.18 \text{ gal} 0.18 \text{ gal} \frac{1}{2} \text{ sheet} = 0.4 \Rightarrow \frac{2750}{2} = 1\text{ gal}

\text{Basin H} \quad A = 119 \text{ ac} = 0.186 \text{ sq mi}

\text{Sections} \quad CN = 95\% \text{ Residential, 4 units/ ac, Soil A + (use Soil B) and Soil B + 15\% \text{ Business, Neighborhood Parks, Soil B}}

\text{CN max} \times (0.05)(75) + (0.05)(98) = 7.6

\text{Basin H} \quad A = 119 \text{ ac} = 0.186 \text{ sq mi}

\text{Sections} \quad CN = 95\% \text{ Residential, 4 units/ ac, Soil A + (use Soil B) and Soil B + 15\% \text{ Business, Neighborhood Parks, Soil B}}

\text{CN max} \times (0.05)(75) + (0.05)(98) = 7.6
TC ≈ 100'000'000g @ 2.0°/d = \frac{180-0.22}{360} \times 12 = 6'

⇒ 6'60' Street E - 1.10% (1800 - 60') = \frac{1.10}{100} \times 70 \times 1.00\% 
(\text{1/40 Street d = 0.6'}) 

Ave = \frac{6'60'}{4} = 1'65' = 28

40 mm = 0.67 ft

Basin I-1 - A = 97 Ac = 0.152 sq mi

(Section 30) CN = 70% Residential, 4 Units/Ac, Soil A (Use Soil B) and Soil B + 10% Business, Neighborhood Areas, Soil A (Use Soil B) and Soil B

CN Ave = (0.70)(75) + (0.10)(92) = 77

TC = 100'000'000g @ 2.0°/d = \frac{180-0.22}{360} \times 12 = 6'

⇒ 9000' Street E - 1.10% (\frac{60'-0.06'}{9000}) = \frac{1.10}{100} \times 70 \times 1.00\%
(\text{1/40 Street d = 0.6'})

⇒ 100' - 48 RCP and Street @ 0.49 ft (\frac{60'-0.06'}{100})

- 46'' RCP = 7 fps
- Street = \frac{60'-0.06'}{100} \times 0.49 = 3 fps
(\text{1/40 Street d = 0.6'})

Ave = \frac{60'}{4} = 15' fps = \frac{1950}{4} = 4

33 mm = 0.55 ft

Basin I-2 - A = 110 Ac = 0.172 sq mi

(Section 40) CN = 25% Open Space, Few Condition (Small Corn, Soil B + 70% Residential), 4 Units/Ac, Soil A (Use Soil B) and Soil B + 5% Business, Neighborhood Areas, Soil A (Use Soil B) and Soil B

CN Ave = (0.25)(69) + (0.70)(75) + (0.05)(92) = 74
TC = \frac{100 \text{ year} \times \text{guss} @ 2.0\%}{9.625} = \frac{1.2}{0.325} = 3.75 \text{ yrs}

=> 700' Street @ 1/60 (0.08 - 0.085)/0.0625 \div (0.144/0.8) = 0.833
(\text{half} - 40 \text{ street}, d = 0.4')

=> 700 - 48 RCP and Street @ 0.1\% (0.02 - 0.049)

- 48' RCP = 7.4 ps

- Street = \frac{0.75}{0.00025} \div 0.00025 = \frac{22,000}{500} = 500 ps

Ax = \frac{A}{2} = \frac{200}{2} = 100

=> 23 min = 0.38 hr

Basin J - A = 98\text{ Ac} = 0.153 \text{ sq km}

(Sector 4) CN = 90\% Residential, 4 Units/AC, Soil B + 10\% Business, Neighborhood

Arens, Soil B

CNave = 0.90(75) + 0.10(25) = 77

TC = \frac{100 \text{ year} \times \text{guss} @ 2.0\%}{9.625} = \frac{1.2}{0.325} = 3.75 \text{ yrs}

=> 5500' Street @ 1/60 (0.08 - 0.085)/0.0625 \div (0.144/0.8) = 0.833
(\text{half} - 40 \text{ street}, d = 0.4')

30 min = 0.50 hr

Basin K - A = 70\text{ Ac} = 0.141 \text{ sq km}

(Sector 4) CN = 10\% Open Space, Few Condition Guess Cena, Soil B + 80\% Residential,
4 Units/AC, Soil A (Ug, Soil B) and Soil B + 10\% Business,
Commercial Arens, Soil B

CNave = 0.10(69) + 0.80(25) + 0.10(12) = 76
TC: 100'C = \frac{100}{12} \approx 8.33\text{ ft.}

\Rightarrow 2350\text{ ft} \times 100\frac{1}{12} = 2350 \times 0.083 = 196\text{ ft}.

\Rightarrow 2050 - 54\text{ Ave. RCP and Guess X 0.75/2050 = 0.79/2050}

-54\text{ Ave. RCP = 10 fps}

\Rightarrow -\text{Guess X} = \frac{(4.00/0.011)(0.01)}{(0.50/0.011)} \approx 12\text{ fps.}

\Rightarrow 10\text{ Ave. C-C} = 12\text{ fps}. \Rightarrow \frac{2050}{12} = 169.167

[Calculation]

\Rightarrow 38\text{ min} = 2.3\text{ hr.}

Basin K = 2 - A = 84\text{ Ac} = 0.113\text{ sq mi.}

(Section 48) CN = 70% Residential, 4% Units/Ec, Soil A (Use Soil B) + 10% Business, Neighborhood Ames, Soil A (Use Soil B). and Soil B

\Rightarrow CN = \frac{0.90(0.75)+0.10(0.92)}{77} = 0.77

\Rightarrow \text{TC} = \frac{2050\text{ ft}}{12} = \frac{2050}{12} = 169.167

\Rightarrow 2350\text{ ft} \times 100\frac{1}{12} = 2350 \times 0.083 = 196\text{ ft.}

\Rightarrow 300 - 27\text{ RCP and Street @ 0.75/300 = 0.75/300 = 2.5 fps.}

-27\text{ RCP and Street @ 0.75/300 = 0.75/300 = 2.5 fps.}

\Rightarrow 44\text{ min} = 0.73\text{ hr.}
Basin K-3

- A: 5.9 AC = 2.09 sq m

(Section 4a)

CN = Residential, 4 units/AC, Soil A (V2, Soil L)

CN = 75

TC = 100\% overlap grass @ 2.09

\[ TC = \frac{100}{2.09} = 49 \]

\[ \Rightarrow 1050' \text{ street} \times 1.25 \left( \frac{1.00 - 0.08}{1.00} \right)^{0.5} \times \left( \frac{1.00}{0.08} \right)^{0.5} = 3.4 \text{ fps} \Rightarrow \frac{1050}{3.4} \approx 310' \]

\[ \Rightarrow 2500 - 24' \text{ RCP and swale} @ 0.60 \left( \frac{0.60 - 0.04}{2.500} \right) - 6.6 \text{ fps} \]

- Swale @ 0.60

- Guess swale = 6.6 fps

- triangular section w/ 49\% overlap, swale @ 1.00

\[ A = \frac{2500 - 24'}{8} = 250' \]

\[ \Rightarrow \frac{250}{6.6} \approx 38 \text{ hrs} \]

25 mm = 0.138 hr

---

Basin K-4

- A: 6.4 AC = 0.100 sq m

(Section 4a)

CN = 50% Open Space, Pan Condition Grass/Con, Soil A (Use Soil B) + 25% Residential

- 4 units/AC, Soil B (Use Soil A) + 50% Residential, 4 units/AC, Soil C + 15% Business/Neighborhood, Soil A (Use Soil B)

CN = 0.09/0.05/0.25/0.10/0.05/0.15/0.25 + 0.05/0.15/0.25 = 78

TC = 100\% overlap grass @ 2.09

\[ TC = \frac{100}{2.09} = 49 \]

\[ \Rightarrow 1800' \text{ street} \times 1.25 \left( \frac{1.00 - 0.08}{1.00} \right)^{0.5} \times \left( \frac{1.00}{0.08} \right)^{0.5} = 4.8 \text{ fps} \Rightarrow \frac{1800}{4.8} = 375' \]

\[ \Rightarrow 1350 - 24' \text{ RCP and street} \times 1.00 \left( \frac{0.60 - 0.04}{1.350} \right) - 24 \text{ fps} \]

- 24' Ave RCP = 7 fps
Wilson & Company Engineers & Architects
Pro. Shadys Run Sheet 26
Wilson County

Basin Parameters

\[-\text{Street} = \left(\frac{1.49}{0.60} \right) \left(0.09\right)^{1/2} = 4 \text{ fps}\]

\[-\text{Ave} = \frac{1}{2} \times 5 = 2.5 \text{ fps} \Rightarrow (5.5 \times 10) = 4 \]

\[c = \text{min} = 0.40 \text{ cu} \]

Basin L-1 - A= 88Ac = 0.138 sq mi

(Section 4a) CN => 50% Open Space, Four-Condition Grass Cover, Soil B, 80% Residential, 4 Units/acre, Soil B + 10% Business, Neighborhood Areas, Soil B

\[\text{CNave} = 0.05 + 0.80(0.05) + 0.15(0.92) = 77\]

\[TC = \frac{100 \text{ over and grass @ 2.0%}}{0.60} = \frac{18(1.1-0.25)}{0.60} = 12\]

\[=> 3500 \text{ sqft} @ 2.109 = \left(\frac{1.1}{1.0} \right) \left(0.09\right)^{1/2} \]

\[=> 2100 - 30'' \text{ ave RC and street @ 2.0%} \left(\frac{4 \times 5 = 0.04}{2.0}\right)\]

\[-30'' \text{ ave RC and } = \text{15 fps}\]

\[-\text{Street} = \left(\frac{1.49}{0.60} \right) \left(0.09\right)^{1/2} = 4 \text{ fps}\]

\[-\text{Ave} = \frac{1}{2} \times 4.5 \text{ fps} \Rightarrow (5.5 \times 10) = 4\]

\[c = \text{min} = 0.43 \text{ cu} \]

Basin L-2 - A= 99Ac = 0.165 sq mi

(Section 4b) CN => Residential, 4 Units/acre, Soil B

CN= 75

\[TC = \frac{100 \text{ over and grass @ 2.0%}}{0.60} = \frac{18(1.1-0.25)}{0.60} = 12\]
August 7, 1991

Wilson & Company
Engineers & Architects

2,000' sheet @ 2% (\(\frac{0.04}{0.02}\)) = \(\frac{1.0}{\frac{0.04}{0.02}}\) \(\approx 6\) fps \(\Rightarrow 2,000\) 
(1/2-50' sheet, d=0.5")

2950' - 4c' Ave RCPI and sheet @ 1/70 (\(\frac{0.04}{0.02}\))
- 4c' Ave RCPI = 14 fps

- sheet = \(\frac{1.4}{0.01}\) \(\frac{0.02}{2450}\) \(\approx 6.5\) fps
(1/2-50' sheet, d=0.5")

Ave = \(\frac{19}{2}\) \(\approx 9.5\) fps \(\Rightarrow 2450\) 
= \(\frac{19}{2450}\) \(\approx 0.8\) 
23 min = 0.38 hr

Basin L-S = A = 86 AC = 0.134 sf mi

(Sect 4B) CN \(\Rightarrow 85/50\) Residential, 4-Wk, AC, Soil A (VSC, So S, B) + 50/50 Business, Neighborhood Areas, Soil A (VSC, So S, B)

\(C_n = 0.85(0.15) + 0.16(0.92) = 0.9\)

\(75 \Rightarrow 100\) overland grass @ 2.0" = \(\frac{100}{0.02}\) \(\approx 12.5\) cfs

\(2,000\)' sheet @ 0.9% (\(\frac{0.04}{2450}\)) = \(\frac{1.4}{0.02}\) \(\approx 6.5\) fps 
(1/2-40' sheet, d=0.4")

\(2,000\) - 24" Ave RCPI @ 0.8% (\(\frac{0.04}{2400}\))
- 24" Ave RCPI = 7.4 fps

- sheet = \(\frac{1.4}{0.01}\) \(\frac{0.02}{2400}\) \(\approx 5.7\) fps
(1/2-40' sheet, d=0.4")

Ave = \(\frac{10}{5.7}\) \(\approx 1.8\) fps \(\Rightarrow 2,000\) 
= \(\frac{10}{2,000}\) \(\approx 0.05\) 
32 min = 0.53 hr
(Section 4) CN = Residential, 4 Units/Ac, Soil A (Use Soil B)

CN = 75

TC = 100% overland grass @ 2.0% = \frac{1.8(11-0.25)}{8.25} \cdot \frac{1}{100} = 12

\Rightarrow 400' sheet @ 0.5% \frac{(400^2 - 0.25)}{400} = \frac{(400)(400)}{400} = 400'

(1/2-60' sheet, d=0.4')

\Rightarrow 3000' - 30' RCP and sheet @ 0.5% \frac{(3000^2 - 0.25)}{3000} = 5'

- 30' RCP @ 8 fps

- sheet = \frac{(0.494)(400)}{20.04}(10.00) = 3 fps

(1/2-40' sheet, d=0.4')

avg = \frac{11}{2} = 5.5 fps \Rightarrow \frac{11}{8} \approx 1.37

25 mm = 0.42 hr

Basin L-6 = A = 77.36 Ac = 0.180 59 mi

(Section 50) CN = Business, Neighborhood Areas, Soil A (Use Soil B) + 20% Agricultural

CN = (0.80)(75) + (0.20)(92) = 78

TC = 100% overland grass @ 2.0% = \frac{1.8(11-0.25)}{8.25} \cdot \frac{1}{100} = 12

\Rightarrow 7200' sheet @ 0.9% \frac{(7200^2 - 0.25)}{7200} = \frac{(7200)(7200)}{7200} = 4 fps \Rightarrow (4\times 0.9) = 3.6

4.2 mm = 0.70
Basin L-6 - A = 60 ac = 0.094 sq mi

\[ C_{\text{Base}} = (0.10)(0.197) + (0.25)(0.4) = 0.104 \] 

\[ T_{\text{Base}} = \frac{\sqrt{B(1 - 0.25)}}{\text{AC}^{0.5}} = 12 \] 

\[ \text{TC} = 100 \text{\% area and grass @ 2.0\%} = \frac{100(0.05 - 0.02)}{100} = 3.3 \text{ fps} \]

\[ \text{TC} = 2300 \times \text{Area of CP and Sheet} = 2300 \times (4058 - 0.01) = 2300 \times 0.01 = 23 \]

\[ \text{Area} = 23 \times 5.5 \text{ fps} = 128 \text{ fps} \]

\[ \text{Area} = 23 \text{ fps} \times 128 \text{ fps} = 2864 \text{ fps} \]

\[ \text{Area} = 23 \times 5.5 \text{ fps} = 128 \text{ fps} \]

\[ \text{Area} = 23 \times 5.5 \text{ fps} = 128 \text{ fps} \]

\[ \text{Area} = 23 \times 5.5 \text{ fps} = 128 \text{ fps} \]

Basin L-6 - A = 60 ac = 0.094 sq mi

\[ C_{\text{Base}} = (0.10)(0.197) + (0.25)(0.4) = 0.104 \] 

\[ T_{\text{Base}} = \frac{\sqrt{B(1 - 0.25)}}{\text{AC}^{0.5}} = 12 \] 

\[ \text{TC} = 100 \text{\% area and grass @ 2.0\%} = \frac{100(0.05 - 0.02)}{100} = 3.3 \text{ fps} \]

\[ \text{TC} = 2300 \times \text{Area of CP and Sheet} = 2300 \times (4058 - 0.01) = 2300 \times 0.01 = 23 \]

\[ \text{Area} = 23 \times 5.5 \text{ fps} = 128 \text{ fps} \]

\[ \text{Area} = 23 \times 5.5 \text{ fps} = 128 \text{ fps} \]

\[ \text{Area} = 23 \times 5.5 \text{ fps} = 128 \text{ fps} \]

\[ \text{Area} = 23 \times 5.5 \text{ fps} = 128 \text{ fps} \]
1750' - 42'' BCP and street @ 11\% (0.011) = 11 fps
- 42'' Ave BCP = 11 fps
- Street = \( \frac{\sqrt{0.011}}{0.0049} \) = 0.645 ft
- 50' - 50' street, d = 0.5
- Ave = \( \frac{5}{8} \times 1.5 fps = 1.5 \) fps
- 350' grass and channel @ 10\% = (0.010) (0.0049) = 0.00045 fps = 0.00045
- 850' (0.056) = 1
- 3D min = 0.50

Basin N = 1
- A = 91 H Ac = 0.142 59

(CN) = 10% Open Space, Fair Condition Grass Cover, Soil B + 85% Residential,
- 90' off
- Soil B (0.2 Soil B) and Soil B = 5% Business, Neighborhood
- Areas, Soil B

CNAVE = (0.10) (0.85) 75 + (0.05) 92 = 75

TC = 100' overland grass @ 2.00 fps = (0.0049) (0.0011) (0.10) = 0.000045

1750' street @ 2.00 fps = (0.056) (0.0049) (0.0011) = 0.0000056
- 50' - 50' street, d = 0.5

3300' - 24'' BCP and street @ 10\% (0.0049) = 0.00049
- 24'' Ave BCP = 7 fps
- Street = (0.0049) (0.0011) = 2.4 fps
- 50' - 50' street, d = 0.5
- Ave = 1.5 fps = 0.15

2B min = 0.47
Basin M-2 - $A = 10.7$ ha = 0.1167 sq mi

(Sector 54) CN = 10% Open Space; Farmland Grass, Ground, Soil C + 55% Residential, 4 Units/acre, Soil A (Use Soil B) + 20% Business, Neighborhood Home, Soil A (Use Soil B)

\[
CN_{Ave} = (0.10)(75) + (0.50)(75) + (0.05)(75) + (0.05)(75) = 37.
\]

TC = 100' overland gross @ 2.0' pl. = \(\frac{100(1.11 - 0.25)}{3200} = 12\)

\[
\Rightarrow 1500 \text{sheet} @ 1.9% (\frac{1500 - 100}{1200}) = \left(\frac{1.9}{3200}\right) 1200 \text{ ft} = 4.8 \Rightarrow \text{ Acre} = \frac{1500}{4.8} = 312.5.
\]

\[
\Rightarrow 1100 \times 0.5 \text{ ft} = 0.5 \text{ ft} \left(\frac{1.11 - 0.25}{100}\right)
\]

- Ave BCP = 5 ps

- Sheet = \(\frac{1.49}{10.000} \times 10.000 = 1.49 \text{ fps}\)

- Ave = \(\frac{2}{1.49} = 3.5 \text{ fps} \Rightarrow \frac{1500}{3.5} = 429\)

\[
\Rightarrow 1150 \text{ - vertical bound} = \frac{1150}{3.5} = 331 \text{ ft} \left(\frac{1.11 - 0.25}{100}\right)
\]

(Basin area) Sector 4, side 5, side 6 = 2.0, and d = 3

ZB = Ave = 0.147 ps

Basin M-2 - $A = 79$ ha = 0.123 sq mi

(Sector 55) CN = 20% Residential, 4 Units/acre, Soil A (Use Soil B) + 60% Business, Neighborhood Home, Soil A (Use Soil B) + 20% Business, Commercial

\[
CN_{Ave} = (0.20)(75) + (0.60)(92) + (0.20)(92) = 89.
\]

TC = 100' overland gross @ 2.0' pl. = \(\frac{100(1.11 - 0.25)}{3200} = 12\)

\[
\Rightarrow 1500 \text{ sheet} @ 1.9% (\frac{1500 - 100}{1200}) = \left(\frac{1.9}{3200}\right) 1200 \text{ ft} = 4.8 \Rightarrow \text{ Acre} = \frac{1500}{4.8} = 312.5.
\]

\[
\Rightarrow 1800 \times 0.5 \text{ ft} = 0.5 \text{ ft} \left(\frac{1.11 - 0.25}{100}\right)
\]

- Ave BCP = 5 ps

- Sheet = \(\frac{1.49}{10.000} \times 10.000 = 1.49 \text{ fps}\)

- Ave = \(\frac{2}{1.49} = 3.5 \text{ fps} \Rightarrow \frac{1800}{3.5} = 514\)

\[
\Rightarrow 1150 \text{ - vertical bound} = \frac{1150}{3.5} = 328 \text{ ft} \left(\frac{1.11 - 0.25}{100}\right)
\]

(Basin area) Sector 4, side 5, side 6 = 2.0, and d = 3

ZB = Ave = 0.147 ps
August 27, 1991

WILSON & COMPANY

Shocks Run

TP-20 Entergy

Basin Parameters

\[ 4850' - 30" \times \text{RCP and Sheet} @ 12\% \left( \frac{0.09 - 0.09}{4850} \right) \]

- Sheet: \(1.2\% \times \left( \frac{4850}{12} \right) = 4\text{fps} \)
- Sheet: \(\left( \frac{1}{2} \right) \times \text{Sheet} \times d = 0.1\% \)

\[ \text{RUC} = \frac{4}{4850} \times 12 \]

\[ 3\text{fps} \times 7\text{fps} \Rightarrow \frac{4850}{12\text{fps}} = 12 \]

\[ 35\text{mm} = 0.088\text{h} \]

Basin N - \( A = 102\text{ft}^2 = 0.5949\text{ m}^2 \)

\( \text{(Section 5b)} \) CN = 0.29 B. Space, Fill Condston Grass Group, Soil A (Vic Soil E) + 100 B. Space, Fill Condston Grass Group, Soil A (Vic Soil E) + 100 B. Space, Fill Condston Grass Group, Soil A (Vic Soil E) + 100 B. Space, Fill Condston Grass Group, Soil A (Vic Soil E)

\( CN = (0.15) (0.19) (0.30) (0.75) (0.120) (0.92) + (0.35) (0.92) = 83 \)

\( \text{TC} = 100 \text{ out of } 0.25 \times 1.25 = \frac{12}{1250} \times 0.25 = 12 \)

\[ \text{RUC} = \frac{4850}{12\text{fps}} \times \left( \frac{0.09 - 0.09}{4850} \right) \times \left( \frac{0.09 - 0.09}{4850} \right) = 3\text{fps} \times 7\text{fps} \Rightarrow \frac{4850}{12\text{fps}} = 12 \]

\[ 2700 - 24\text{ out of } 0.25 \times 0.25 \]

- Sheet: \(1.2\% \times \left( \frac{2700}{12} \right) = 4\text{fps} \)
- Sheet: \(\left( \frac{1}{2} \right) \times \text{Sheet} \times d = 0.1\% \)

\[ \text{RUC} = \frac{4850}{12\text{fps}} \times \left( \frac{0.09 - 0.09}{4850} \right) \times \left( \frac{0.09 - 0.09}{4850} \right) = 3\text{fps} \times 7\text{fps} \Rightarrow \frac{4850}{12\text{fps}} = 12 \]

\[ 35\text{mm} = 0.088\text{h} \]
Basin D-1 - A = 101 Ac = 0.1565 sq mi

(Section 57) CN = 60% Residential, 4 Units/acre, Soil A (U.S. Soil Group B) + 20% Residential, 4 Units/acre, Soil A (U.S. Soil Group B) + 20% Business, No Irrigation, Soil A + Soil B

\[ CN_{Base} = (0.60)(0.25) + (0.20)(0.85) + (0.20)(0.92) = 0.80 \]

\[ TC = 100\% \text{ of } 0.80 = 1 \frac{80}{100} = 0.80 \]

\[ \Rightarrow 2450 \text{ sheet} @ 0.94/0.04 = (2450/0.04)(0.94/0.04) = 2450 \times 22.9 \text{ fps} \]
\[ (1/40\text{ sheet, } d = 0.4) \]

\[ \Rightarrow 1550 - 22 \text{ in. } \text{ sheet} @ 1.94 \times (1550 - 22)/1550 = 11 \text{ fps} \]
\[ - \text{ sheet} = (1.94/0.04)(0.94/0.04) = 15 \text{ fps} \]
\[ (1/40\text{ sheet, } d = 0.4) \]

\[ \text{ Ave } = 15/2 = 7.5 \text{ fps} \Rightarrow (0.04/2) = 3 \]

25 mm = 0.42 hi

Basin D-2 - A = 684Ac = 0.106 sq mi

(Section 58) CN = 70% Residential, 4 Units/acre, Soil A (U.S. Soil Group B) + 10% Residential, 8 Units/acre, Soil A (U.S. Soil Group B) + 20% Business, No Irrigation, Soil A (U.S. Soil Group B)

\[ CN_{Base} = (0.70)(0.25) + (0.10)(0.85) + (0.20)(0.92) = 0.79 \]

\[ TC = 100\% \text{ of } 0.79 = 1 \frac{79}{100} = 0.79 \]

\[ \Rightarrow 700 \text{ sheet} @ 2.94/0.94 = (700/0.94)(2.94/0.94) = 700 \times 3.24 \text{ fps} \]
\[ (1/40\text{ sheet, } d = 0.4) \]

\[ \Rightarrow 790 - 15 \text{ in. } \text{ sheet} @ 3.24 \times (790 - 15)/790 = 2 \text{ fps} \]

(0.04/2) = 3
\[ \Rightarrow 1050' = 24' \times \text{the RC} \text{ and guess } \text{ guess } \frac{\text{gallons}}{\text{acre}-\text{month}} = 4.8 \% \left( \frac{1000}{1050} \right) \]

\[ = 24' \times \text{the RC} = 10' \times \text{fps} \]

\[ \text{guess } \text{ guess } \left( \frac{1.4}{0.060} \right) \left( \frac{0.099}{0.080} \right)^{0.5} = 3 \times \text{fps} \]

\[ \text{Average } \theta = 9.3 \%	imes \text{fps} \Rightarrow \text{intersect } 2 \]

\[ \Rightarrow 950' \times \text{sheet } \left( \frac{0.01}{1.00} \right) \left( \frac{0.08}{0.75} \right) \left( \frac{0.006}{0.080} \right)^{0.5} = 4 \times \text{fps} \Rightarrow \frac{950}{1950} = 4 \]

\[ \frac{21}{14} = 0.3 \times \text{h} \]

Basin 0-3 - A = 75' A = 0.1145 sq m

\[ \text{Section 59) } C_N = 1093 \text{ Open Space, Fair Condition, Grass, Cool, Soil A (Use Soil B) + } \]

\[ 7090 \text{ Residential, 4 Uana & AC, Soil A (Use Soil B) and Soil B + } \]

\[ 2090 \text{ Residential, 8 Uana / AC, Soil A (Use Soil B) and Soil B } \]

\[ C_{N_{ave}} = 0.10 \times 69 + 0.10 \times 75 + 0.10 \times 85 = 76 \]

\[ \text{TC} = 1000 \text{ on Lawn} \times \text{grass} \times 8.09 = \frac{1.1 \times (1.025) \times 1000}{520} \Rightarrow 12 \]

\[ \Rightarrow 5000 \text{ sheet } \times 0.8 \left( \frac{0.01}{1.00} \right) \left( \frac{0.01}{0.75} \right)^{0.5} \left( \frac{0.006}{0.080} \right)^{0.5} = 7 \times \text{fps} \Rightarrow \frac{1000}{1950} = 7 \]

\[ \frac{19}{14} = 0.3 \times \text{h} \]

Basin 0-4 - A = 75' A = 0.1175 sq m

\[ \text{Section 60) } C_N = 1093 \text{ Open Space, Fair Condition, Grass, Cool, Soil B + 85% } \]

\[ 5090 \text{ Residential, 4 Uana & AC, Soil A (Use Soil B) and Soil B + 1099 } \]

\[ 5090 \text{ Residential, 8 Uana / AC, Soil A (Use Soil B) and Soil B } \]

\[ C_{N_{ave}} = 0.05 \times 69 + 0.05 \times 75 + 0.10 \times 92 = 76 \]

\[ \text{TC} = 1000 \text{ on Lawn} \times \text{grass} \times 8.09 = \frac{1.1 \times (1.025) \times 1000}{520} \Rightarrow 12 \]

\[ \Rightarrow 5000 \text{ sheet } \times 0.8 \left( \frac{0.01}{1.00} \right) \left( \frac{0.01}{0.75} \right)^{0.5} \left( \frac{0.006}{0.080} \right)^{0.5} = 7 \times \text{fps} \Rightarrow \frac{1000}{1950} = 7 \]

\[ \frac{19}{14} = 0.3 \times \text{h} \]
August 29, 1991

=> DA50 - 50' Acreage and Sheet=1.5% (2400)

- 30' Acre RCP = 14 fps
- Sheet = \( \frac{0.15}{20.4} \times \frac{0.4}{30} \times \frac{1}{0.03} \times \frac{4}{3} \times 54 fps \)
  \[ \frac{19}{9} = 2.1 fps = \frac{2.1}{9} \times 4 \]
  \[ 20 \text{ min} = 0.33 \text{ h} \]

Basin 0-5 + A: 89AC = 0.130 sq m

(Section 6) CN => 45% Residential, 4% Units/Al, Soil B + 55% Business, Neighborhood
  \[ \text{CN}_{\text{ave}} = (0.45)(55) + (0.55)(92) = 84 \]
  \[ TC = 100 - \frac{\text{overland flow}}{2.0\%} = 100 - \frac{1.31 - 0.2371}{12} \]
  \[ = \frac{2200\text{ sheet} @ 20\%}{2200} \times \frac{64}{2200} = \frac{2200}{2200} = 6 \]
  \[ \frac{12 - 0.4}{2200} \]
  \[ \Rightarrow 2000 - 42' Acreage and Sheet @ 1.5% (2400) \]
  \[ - 42' Acre RCP = 15 fps \]
  \[ - \text{Sheet} = \frac{0.15}{20.4} \times \frac{0.4}{30} \times \frac{1}{0.03} \times \frac{1}{3} \times 40 fps \]
  \[ \frac{17}{9} = 1.9 fps = \frac{1.9}{8.5(60)} \times 4 \]
  \[ 20 \text{ min} = 0.33 \text{ h} \]
Basin 0-6

- \( A = 114.4 \text{ac} = 0.1178 \text{sq km} \)

(Sec 62) \( C_N = 30\% \) Residential, 4 Units per acre, Soil A (Use Soil B) + 70\% Business, Neighborhood trees, Soil A (Use Soil B)

\[ C_{NAVE} = (0.30)(75) + (0.70)(92) = 87 \]

\( T_C = 50' \text{ rainfall area} \times 1.0 \times 0.30 = \frac{1.0}{0.30} = 3 \)

\[ C_{MAX} = 85' \text{ street} \\
\frac{(85' - 8')}{85' + 8'} = \frac{1}{1.012} = 0.990 \]

\[ (0.990)^2(0.012)^2 = 0.012 \] 6 fps \[ 18 \times 6 = 108 \times 0.1 = 10.8 \]

\[ 15 \text{ mm} = 0.125 \text{ hr} \]

Basin 0-7

- \( A = 84.4 \text{ac} = 0.131 \text{sq km} \)

(Sec 63) \( C_N = 10\% \) Open Space, Fav. Condition, Guess Covers, Soil A (Use Soil B) and Soil B + 40\% Residential, 4 Units per acre, Soil A (Use Soil B) and Soil B + 20\% Business, Neighborhood trees, Soil A (Use Soil B) and Soil B + 40\% Business, Commercial, Trees, Soil A (Use Soil B)

\[ C_{NAVE} = (0.10)(69) + (0.05)(75) + (0.40)(92) + (0.15)(92) = 89 \]

\( T_C = 100' \text{ rainfall area} \times 1.0 \times 0.30 = \frac{1.0}{0.30} = 3.0 \)

\[ C_{MAX} = 2250' \text{ street} \\
\frac{(2250 - 8')}{2250 + 8'} = \frac{1}{1.012} = 0.990 \]

\[ (0.990)^2(0.012)^2 = 0.012 \] 5 fps \[ 18 \times 5 = 90 \times 0.1 = 9.0 \]
August 29, 1991

\[ \Rightarrow 1500 \div 66 \text{ acre feet per day} \div 1.7\% \times \left( \frac{755 - 605}{1550} \right) \]

\[ - \frac{2}{6} \text{ the PCD} = 12 \text{ fps} \]

\[ - \text{ street } = \left( \frac{44}{1000} \right) \left( \frac{1.01}{0.01} \right)^{0.5} = 4 \text{ fps} \]

\[ \left( \frac{1}{2} - 40 \text{ street, } d = 0.4 \right) \]

\[ \text{ Ave} = \frac{16}{8} = 8 \text{ fps} \Rightarrow \left( \frac{1500}{8 \times 60} \right)^{3/2} \]

\[ 23 \text{ min} = 0.38 \text{ h} \]

**Basin 0-8 - A = 68 \text{ acre} \times 0.10659 \text{ m}^3**

(Section 6a) \( CN = 15\% \text{ Curve number Guse curve, Soil B + 15\% Residential, } 40\text{ acre/ha Soil } A + \text{ Vic. Soil } D \text{ and soil } B + 15\% \text{ Residential, } 8 \text{ acre/ha Soil } B + 60\% \text{ Business, Neighborhood Area, Soil } A + \text{ Vic. Soil } B \text{ and Soil } E \)

\[ CN_{ave} = \left( \frac{0.15}{40} \right) \left( \frac{0.15}{75} \right) + (0.10)(85) + (0.10)(92) = 85 \]

\[ TC = Z500 \times \text{ mean gain} @ 2.0\% \left( \frac{425 - 605}{250} \right) = \frac{181}{250} \times 250 = 181 \]

\[ = 400 \text{ gain } \times \text{ daily} \left( \frac{425 - 605}{700} \right) = \frac{44}{700} \times 0.065 = 44 \text{ fps} \Rightarrow \left( \frac{181}{250} \right)^{3/2} \]

\[ = 1550 \text{ sheet } @ 1.7\% \left( \frac{755 - 605}{1550} \right) = \left( \frac{44}{1000} \right) \left( \frac{0.01}{0.01} \right)^{0.5} = 44 \text{ fps} \Rightarrow \left( \frac{181}{250} \right)^{3/2} \]

\[ = 550 \times 48 \text{ acre/ft and sheet } @ 1.7\% \left( \frac{605 - 605}{550} \right) \]

\[ - 48 \times \text{ PCD } = \left( \frac{44}{1000} \right) \left( \frac{0.01}{0.01} \right)^{0.5} = 7 \text{ fps} \]

\[ - \text{ sheet } = \left( \frac{44}{1000} \right) \left( \frac{0.01}{0.01} \right)^{0.5} = 3 \text{ fps} \]

\[ \text{ Ave} = \frac{10}{8} = 5 \text{ fps} \Rightarrow \left( \frac{550}{8 \times 60} \right)^{3/2} \]

\[ 23 \text{ min} = 0.45 \text{ h} \]
August 29, 1991

**Basin 0-9 - A: 60 AC = 0.034 sq mi**

(Section 65) \( CN = 85\% \) Residential, 4 Units/Ac, Soil A (Loam Soil), 5% Trash Soil B, 5%% Residential, 4 Units/Ac, Soil E + 10% Business, Neighborhood Acreage, Soil B

\[ CN_{ave} = (0.85)(75) + (0.05)(85) + (0.10)(92) = 77 \]

\[ TC = 100 \times \text{overland flow @ 2.0%} = \frac{1(611-626)}{20} \times 100 = 12 \]

\[ = 800 \times \text{sheet @ 2.5%} = \frac{800 - 800}{800} = 12 \]

\[ = 800 \times \text{sheet @ 2.5%} = \frac{800 - 800}{800} = 12 \]

\[ = 800 \times \text{sheet @ 2.5%} = \frac{800 - 800}{800} = 12 \]

\[ \text{then } E = 5 \text{fps } \Rightarrow 1000 = \frac{1500}{20} = 75 \text{fps} \]

\[ \text{then } E = 5 \text{fps } \Rightarrow 1000 = \frac{1500}{20} = 75 \text{fps} \]

\[ \text{then } E = 5 \text{fps } \Rightarrow 1000 = \frac{1500}{20} = 75 \text{fps} \]

**Basin 0-10 - A: 74 AC = 0.116 sq mi**

(Section 66) \( CN = 15\% \) Residential, 4 Units/Ac, Soil A + 85% Business, Neighborhood Acreage, Soil B

\[ CN_{ave} = (0.15)(75) + (0.85)(92) = 89 \]

\[ TC = 100 \times \text{overland flow @ 2.0%} = \frac{1(611-626)}{20} \times 100 = 12 \]

\[ = 2000 \times \text{sheet @ 2.5%} = \frac{2000 - 2000}{2000} = 12 \]

\[ = 2000 \times \text{sheet @ 2.5%} = \frac{2000 - 2000}{2000} = 12 \]

\[ = 2000 \times \text{sheet @ 2.5%} = \frac{2000 - 2000}{2000} = 12 \]

\[ = 2000 \times \text{sheet @ 2.5%} = \frac{2000 - 2000}{2000} = 12 \]

\[ \text{then } E = 5 \text{fps } \Rightarrow 1000 = \frac{1500}{20} = 75 \text{fps} \]

\[ \text{then } E = 5 \text{fps } \Rightarrow 1000 = \frac{1500}{20} = 75 \text{fps} \]

\[ \text{then } E = 5 \text{fps } \Rightarrow 1000 = \frac{1500}{20} = 75 \text{fps} \]
\[
\Rightarrow 1450 - 4u_4 \text{ Ave. Com} \text{ and Sheet} @ 1.5\% \left(\frac{1402 - 600}{1450}\right)
\]
\[
- 4u_4 \text{ Ave. Com} = \left(\frac{1402}{600}\right) \left(\frac{1.5}{100}\right) = 4\text{fps}
\]
\[
- \text{ Sheet} = \left(\frac{1.4}{0.8}\right) \left(\frac{0.015}{0.8}\right) = 4\text{fps}
\]
\[
\text{ Ave} = \frac{11}{2} = 5.5\text{fps} \Rightarrow (5.5\text{fps}) \frac{4}{10} = 23\text{ min} = 0.38\text{ hr}
\]

Basin 0-11-A = 105.42 = 105.42 m²

(Section 6) CN => 70% Residential, 4 units/acre, Soil A (Vee Soil B) and Soil B +
5% Residential, 8 units/acre, Soil B + 15% Residential, 4 units/acre,
Soil C + 10% Business/Neighborhoods, Soil A (Vee Soil B)

\[
\text{CN}_{\text{ave}} = (0.70)(75) + (0.05)(85) + (0.15)(83) + (0.10)(92) = 78
\]

\[
\text{TC} = 100 \times \text{Ave. Com} \text{ and Sheet} @ 3.0\% = \frac{100 \times 4}{30} = 13.33
\]

\[
\Rightarrow 850 \times \text{ Sheet} \times (0.28) = (0.30)(0.28)(0.015) = 4\text{fps} \Rightarrow 850
\]
\[
(\frac{1}{2} \text{ Ave. Com} \text{ and Sheet} @ 3.0\%)
\]

\[
\Rightarrow 4300 - 132 \text{ Ave. Com} \text{ and Sheet} @ 6\% \left(\frac{5955 - 5955}{4300}\right)
\]
\[
- 132 \text{ Ave. Com} = (0.30)(2.5)(4.0) = 12\text{fps}
\]
\[
- \text{ Sheet} = (1.49)(2.5)(0.015) = 4\text{fps}
\]
\[
\text{ Ave} = \frac{11}{2} = 5.5\text{fps} \Rightarrow (5.5\text{fps}) \frac{4}{10} = 23\text{ min} = 0.38\text{ hr}
\]
Basin D-12 - A = 70.4 ft = 0.109 sq mi

(Section 6B) CN = 50% Residential, 4 units/acre, Soil A (Veeg Soil B) + 5% Residential,
6 units/acre, Soil A (Veeg Soil B) + 30% Business, Neighborhood
plazas, Soil A (Veeg Soil B) + 60% Business, Commercial
plazas, Soil A (Veeg Soil B)

\[ CN_{ave} = \frac{(0.05)(25) + (0.05)(85) + (0.30)(72) + (0.60)(92)}{100} = 0.51 \]

\[ TC = \frac{500 \text{ square yards}}{2} \times \frac{10^{3}}{10^{6}} = \frac{500 \times 1}{10^{3}} = 0.5 \times 10^{3} \]

\[ \Rightarrow 400 \text{ street} \times \frac{0.05}{0.2} \times \frac{25}{100} \times \frac{0.05}{0.2} \times \frac{1}{10} = 0.48 \]

\[ \Rightarrow 3700 - 30 \text{ yards} \times \frac{0.05}{0.2} \times \frac{25}{100} \times \frac{0.05}{0.2} \times \frac{1}{10} = 0.48 \]

\[ \text{ave} = \frac{12}{6} = 2 \text{ fps } \Rightarrow 3700 \text{ min} = 0.17 \text{ ft} \]

Basin P-1 - A = 68.4 ft = 0.106 sq mi

(Section 6B) CN = 25% Open Space, Tau Condition, Grass Cover, Soil B + 30% Business, Neighborhood
plazas, Soil B + 30% Open Space, Tau Condition, Grass Cover, Soil C + 15% Business, Neighborhood
plazas, Soil C

\[ CN_{ave} = \frac{0.25(0.25) + 0.3(0.25) + 0.3(0.25) + 0.15(0.25)}{4} = 0.28 \]

\[ TC = 100 \text{ square yards} \times \frac{10^{3}}{10^{6}} = 1 \times 10^{3} \times 10^{3} \]

\[ \Rightarrow 1050 \text{ street} \times \frac{0.05}{0.2} \times \frac{25}{100} \times \frac{0.05}{0.2} \times \frac{1}{10} = 0.48 \]

\[ \Rightarrow 1050 \text{ min} = 1.75 \text{ ft} \]
2450' - 30' x CMP / Press. width / 8 feet / 0.089 - 0.046
2450

- 30' x CMP = 0.089 x 1.12 = 0.099 x 1.12 = 0.111

- 40' x CMP = 0.099 x 1.75 = 0.099 x 1.75 = 0.173

- Cross-slope = \((\frac{0.099}{0.046}) \times (0.089) = 4.8\%\)

- Triangle section with both sides and d = 1 ft

Area = \(\frac{1}{2} \times 5\) = \(\frac{25}{2}\) = 12.5

2450 = \(\frac{2500}{0.5\%}\)

2450' = 30' x CMP and Press. width x 1.12

- 30' x CMP = \((\frac{0.099}{1.12}) \times (0.015) = 0.099\)

- Cross-slope = \((\frac{0.099}{0.046}) \times (0.015) = 3.8\%\)

- Triangle section with both sides and d = 1 ft

Area = \(\frac{1}{2} \times 4.5\) = \(\frac{22.5}{2}\) = 11.25

2450 = \(\frac{22.5}{0.5\%}\)
Basin P-2  
- $h = 9.4 \text{ ft} \quad A = 0.155 \text{ sq mi}$

(Section 71) CN $\Rightarrow 50\%$ Open Space, Fair Condition, Grass Cover, Soil A (Use Soil B) + 3000 Business, Neighborhood Parks, Soil A (Use Soil B) + 2500 Open Space, Fair Condition, Grass Cover, Soil C + 2500 Residential, 4 Units/acre, Soil C + 2500 Business, Neighborhood Parks, Soil C

$CN_{ave} = (0.05)(0.9) + (0.5)(0.7) + (0.25)(0.92) + (0.25)(0.79) + (0.25)(0.82) + (0.25)(0.74) = 0.86$

$TC = 100 \text{ runoff} \times \text{grass @ } 2.09" = 0.15(0.25)100 = 12$

$\Rightarrow 3300 \text{ street @ } 1.6" = 0.15(0.25)100 = 0.06\% = 6\text{ fps}$

$1\% - 40'\text{ street, d = 0.3"}$

$= 250' - 48'\text{ the emb and grass @ } 2.9\% = \frac{0.0525}{0.250} = 0.21$

$= 9.9' \text{ the emb} = \frac{1.09}{1.09} \times \frac{0.25}{0.08} = 4.08$

$= 4.9' \text{ the emb} = \frac{1.09}{1.09} \times \frac{0.25}{0.08} = 4.08$

$= 1.11\text{ min}$

$= 6.0\text{ fps}$

$= 1.11\text{ min}$

$= 0.48$

Basin Q  
- $h = 7.8 \text{ ft} \quad A = 0.114 \text{ sq mi}$

(Section 72) CN $\Rightarrow 50\%$ Industrial, Light Areas, Soil A (Use Soil B) + 2500 Business, Neighborhood Parks, Soil A (Use Soil B) + 2500 Open Space, Fair Condition, Grass Cover, Soil C + 2500 Residential, 4 Units/acre, Soil C + 2500 Business, Neighborhood Parks, Soil C

$CN_{ave} = (0.05)(0.88) + (0.25)(0.92) + (0.25)(0.86) + (0.25)(0.79) + (0.25)(0.74) = 0.86$

$TC = 100 \text{ runoff} \times \text{grass @ } 2.09" = 0.15(0.25)100 = 12$

$\Rightarrow 1600 \text{ street @ } 2.09" = \frac{1.09}{1.09} \times \frac{0.25}{0.08} = 4.08$

$= 1.11\text{ min}$

$= 6.0\text{ fps}$

$= 1.11\text{ min}$

$= 0.48$
Basin B-1 - A = 96.46 ± 0.1 m²

(Section 73) CN = 60% Business, Neighborhood Areas, Soil A (Ure Soil B) + 40% Business, Commercial Areas, Soil A (Ure Soil B)

\[ C_{NAve} = 0.6(0.72) + 0.4(0.92) = 0.8 \]

\[ TC = \frac{100 \times \text{overland area} \times \text{CN} \times 0.8}{100} = 4\, \text{fps} \]

\[ \Rightarrow 24'' \times \text{average depth} = \frac{12(0.60)(0.10)(0.8)}{0.8} = 4\, \text{fps} \]

\[ 24'' = 0.60 \times \text{average depth} = \frac{12(0.60)(0.10)(0.8)}{0.8} = 4\, \text{fps} \]

\[ \Rightarrow 1000 \times \text{average depth} = \frac{12(0.60)(0.10)(0.8)}{0.8} = 4\, \text{fps} \]

\[ \Rightarrow 24'' = 0.60 \times \text{average depth} = \frac{12(0.60)(0.10)(0.8)}{0.8} = 4\, \text{fps} \]

\[ \Rightarrow 20'' \text{arc RC and street} = \frac{1000}{0.8} = 1250 \text{fps} \]

Basin B-2 - A = 78.32 ± 0.1 m²

(Section 74) CN = 30% Industrial, Light Areas, Soil A (Ure Soil B) + 50% Business, Neighborhood Areas, Soil A (Ure Soil B) + 55% Residential, 4 units /Ac, Soil C + 10% Industrial, Light Areas, Soil C

\[ C_{NAve} = 0.3(0.88) + 0.5(0.55) + 0.2(0.10) + 0.1(0.55) = 0.86 \]
TC = 100' overland guess @ 2.0% = 1.81(1.11 - 0.015) = 1.72

\[ TC = \frac{1.81(1.11 - 0.015)}{0.04} = 12 \]

\[ \Rightarrow 200'\text{ sheet} \times 4.9\% = \frac{2000}{6.3} \times 0.04 \times 0.04 = 8\text{ fps} \Rightarrow \text{TR} = 0.04 \text{ h} \]

\[ \Rightarrow 200' \times 24' = 4800 \text{ ft} \times 0.04 = 192 \text{ fps} \]

\[ \text{Ave} = \frac{24}{2} = 12 \text{ fps} \Rightarrow 192 = \frac{12}{0.04} \]
Basin S-2 - A = 55 acre, E = 0.08 lb 59 mi

(Section 7.4) CN => 26% grass, 75% open space, 5% forest, 5% gravel

\[
CN = 0.1586H(0.25)H(0.05)(75)H(0.05)(91)H(0.05)(79) = 81
\]

\[
TC = 100 \times \text{dilution, ws} \times \text{dilution, ws} = 12
\]

\[
= 2,000 \times \text{dilution, ws} \times \text{dilution, ws} = 8 \times 8 = 64
\]

\[
= 2,000 \times \text{dilution, ws} \times \text{dilution, ws} = 8 \times 8 = 64
\]

\[
= 950 - 50 = 900
\]

- 30 sec PCT = 21 fps
- Sheet = (14.45 m/0.62) 50°E = 8 fps
- 1/8 sec, d = 0.6

\[
\text{time} = 2.94 \times 8 = 23.54 > 14.34 \times 8
\]

\[
= 1000 \times \text{dilution, ws} \times \text{dilution, ws} = 1000
\]

26 min = 0.43 hr

Basin T - A = 90 acre, E = 0.141 sq mi

(Section 7.4) CN => 10% grass, 80% open space, 10% forest, 5% gravel

\[
CN = 0.1586H(0.05)H(0.25)(80)H(0.15)(88)H(0.05)(88) = 84
\]
TC ⇒ 100% overlaid, T G = \frac{1180.1 - 0.90 \times 100}{30.9} = 4

⇒ 100% street @ 0.781 \frac{\text{in}}{1000} = \frac{(1.64)^2 \times 0.016}{(0.001)^2} = 1.15 \text{fps} ⇒ 75 \text{fps} = 8
(1\% - 60\% street, d = 0.4)

⇒ 24\% are CVP and street @ 50\% \frac{59.7 - 59.5}{1150}

- 24\% are CVP: \frac{1.04}{0.04} \frac{1/2}{1/12} \frac{1000}{0.001} = 9 \text{ fps}
- street = \frac{1.04}{0.04} \frac{0.01}{0.01} \frac{1/2}{1/12} \frac{1000}{0.001} = 9 \text{ fps}
(1\% - 60\% street, d = 0.4)

\text{ave} = \frac{12}{24} = 0.5 \text{ fps} ⇒ (9.50) = 2

⇒ 950' natural channel @ 0.47 \frac{59.5 - 59.1}{7500} = \frac{1150}{0.5} \frac{1/45.9}{0.001} = 2.4 \text{ fps} ⇒ 950' = \frac{950}{2.4} = 397
(48\% earth, 2\% rocks, 1\% water, 3\% earth)

basin L - A = 87\% \frac{0.136 \times 9 \times 1}{1}

(Section 7B) CN ⇒ 25% Residential, 4 Units/Acre, Soil A (Use Soil B) + 25% Open Space; Poor Condition, Grass Cover, Soil A (Use Soil B) + 25% Industrial, Light Traffic, Soil A (Use Soil B) + 5% Residential, 4 Units/Acre, Soil C + 5% Open Space, Light Traffic, Soil C + 5% Business, Neighbourhood Trees, Soil C

\text{CNAME} = (0.20(0.75)0.05(0.91) + 0.20(0.88)0.15(0.83)0.15(0.91) + 0.05(0.94) = 8.1

TC ⇒ 100% overlaid, T G = \frac{1180.1 - 0.20 \times 100}{12.5} = 2

⇒ 700' street @ 1.48 \frac{\text{in}}{1000} = \frac{(1.64)^2 \times 0.016}{(0.001)^2} = 700 \text{ fps} ⇒ 700
(1\% - 48\% street, d = 0.4)

⇒ 350' 24\% CVP and street @ 11.5 \frac{400 - 900}{1150}

- 24\% ave CVP = 8 \text{ fps}
- street = \frac{1.64}{0.04} \frac{400}{0.001} (0.01) = 3.4 \text{ fps}
(1\% - 48\% street, d = 0.4)

\text{ave} = \frac{1}{2} \times \frac{5.5}{1.5} \times 3.4 \text{ fps} = \frac{250}{2} = 1
200 S 2.1% (400-600) @ 300
(12.5) 4
(1/10) 3
1

550-20" Ave RCP 7 fps

550-20" Ave RCP 7 fps

1250 S 5.5% (500-20) @ 3
(12.5) 4
(1/10) 3
1

200-24" Ave RCP 24 fps

200-24" Ave RCP 24 fps

2050 S 10% (500-20) @ 3
(12.5) 4
(1/10) 3
1

33 min = 0.55 hr
C. TR-20 EXISTING CONDITION
ROUTING PARAMETER CALCULATIONS
Routing Through Basin A-2

\[ \Rightarrow 500\text{ ft. natural channel } @ 5.20\text{%} \left( \frac{520}{500} \right) = \left( 0.84 \times 5.20 \right) \left( 0.02 \right) = 0.5 \text{ fps} \]
(Trapezoidal Section width \( b \)), sides, \( b = 10\), and \( d = 2 \)

\[ x = \left( \frac{b}{2} \right) \left( \frac{0.052}{10} \right) = 0.092 \]

\[ m = \log \left[ \frac{22.0^3}{14.14 + 11.3}\right] / \log 32.0 = 1.51 \]

Routing Through Basin A-3

\[ \Rightarrow 250\text{ ft. natural channel } @ 2.15\text{%} \left( \frac{250}{250} \right) = \left( 0.84 \times 2.15 \right) \left( 0.02 \right) = 0.5 \text{ fps} \]
(Trapezoidal Section width \( b \)), sides, \( b = 10\), and \( d = 3 \)

\[ x = \left( \frac{b}{2} \right) \left( \frac{0.052}{10} \right) = 0.071 \]

\[ m = \log \left[ \frac{57.0^3}{14.14 + 11.3} \right] / \log 37.0 = 1.49 \]

Routing Through Basin A-4

\[ \Rightarrow 550\text{ ft. grass-lined channel } @ 4.0\text{%} \left( \frac{550}{550} \right) = \left( 0.84 \times 4.0 \right) \left( 0.04 \right) = 1.0 \text{ fps} \]
(Trapezoidal Section width \( b \)), sides, \( b = 10\), and \( d = 2.5 \)

\[ x = \left( \frac{b}{2} \right) \left( \frac{0.040}{10} \right) = 0.70 \]

\[ m = \log \left[ \frac{31.0^3}{14.14 + 11.3} \right] / \log 31.0 = 1.46 \]

Routing Through Basin A-5

\[ \Rightarrow 1800\text{ ft. grass-lined channel } @ 1.7\text{%} \left( \frac{1800}{1800} \right) = \left( 0.84 \times 1.7 \right) \left( 0.02 \right) = 0.7 \text{ fps} \]
(Trapezoidal Section width \( b \)), sides, \( b = 10\), and \( d = 3\)

\[ x = \left( \frac{b}{2} \right) \left( \frac{0.020}{10} \right) = 0.05 \]

\[ m = \log \left[ \frac{16.0^3}{14.14 + 11.3} \right] / \log 16.0 = 1.41 \]
Routing through Basin A-6

\[
\text{\Rightarrow 1400' gross (incl. channel) @ 2.75' (6.35 - 6.75) = (1.449 \times 6.27)\left(0.012\right) = 7 \text{ fps}}
\]

(Typical section w/ 4-tile sides, b=50' h=15', and d=1.5')

\[
X = \left(\frac{0.49}{0.50}\right) = 0.985 \quad m = \log\left[\frac{380.50\left(1 + \frac{0.152}{0.14}\right)^{0.44}}{1.15}\right] \quad \text{m=1.63}
\]

Routing through Basin A-7

\[
\text{\Rightarrow 1500-54' the RCP and channel @ 1.5' (6.75 - 6.75) = (1.449 \times 6.35)\left(0.012\right) = 7 \text{ fps}}
\]

(Via street only) Typical section w/ 50' 6' sides, and d=1.5')

\[
X = \left(\frac{0.49}{0.50}\right) = 0.985 \quad m = 1.63
\]

Routing Basins A-1 thru A-7 through Basin A-10

\[
\text{\Rightarrow 2500-60' RCP and channel @ 1.5' (6.18 - 6.18) = (1.449 \times 6.00)\left(0.013\right) = 7 \text{ fps}}
\]

(Via street only) Typical section w/ 50' 6' sides, and d=1.5')

\[
X = \left(\frac{0.49}{0.50}\right) = 0.985 \quad m = 1.63
\]

Routing Basin A-9

\[
\text{\Rightarrow 2400-36' RCP and channel @ 0.85' (6.12 - 6.12) = (1.449 \times 6.00)\left(0.013\right) = 4 \text{ fps}}
\]

(Via street only) Typical section w/ 50' 6' sides, and d=0.6')

\[
X = \left(\frac{0.49}{0.50}\right) = 0.985 \quad m = 1.63
\]
Routing through Basin A-10

\[ \Rightarrow 1450^0 - 60^0 \text{ arc RCP and Street@ 1.25} \left( \frac{1.8}{1450} \right) = \left( \frac{1450}{1.8} \right) \cdot 3 \left( \frac{0.01}{1450} \right) \cdot 14 \text{ fps} \]

(Use 60^0 RCP only)

\[ X = 0.005 \left( \frac{0.01}{1450} \right) = 0.000035 \]

\[ m = \log \left[ \frac{240}{1 + \left( \frac{15}{1 + 10} \right)^{10}} \right] / \log 14.0 = 1.44 \]

Routing through Basin B-2

\[ \Rightarrow 150^0 - 90^0 \text{ arc RCP and Street@ 2.17} \left( \frac{2.17}{150} \right) = \left( \frac{180}{100} \right) \cdot 0.007 \cdot 7 \text{ fps} \]

(Use 90^0 RCP Only)

\[ X = 0.005 \left( \frac{0.007}{150} \right) = 0.000005 \]

\[ m = 1.33 \]

Routing through Basin B-3

\[ \Rightarrow 250^0 - 90^0 \text{ arc RCP and Street@ 2.25} \left( \frac{2.25}{250} \right) = \left( \frac{150}{2.25} \right) \cdot 0.007 \cdot 17 \text{ fps} \]

(Use 90^0 RCP Only)

\[ X = 0.005 \left( \frac{0.007}{150} \right) = 0.000005 \]

\[ m = \log \left[ \frac{160}{1 + \left( \frac{15}{1 + 10} \right)^{10}} \right] / \log 16.0 = 1.10 \]

Routing through Basin B-1 through Basin B-5

\[ \Rightarrow 300^0 - 90^0 \text{ arc RCP and Street@ 2.00} \left( \frac{2.00}{300} \right) = \left( \frac{150}{2.00} \right) \cdot 0.007 \cdot 17 \text{ fps} \]

(Use 90^0 RCP Only)

\[ X = 0.005 \left( \frac{0.007}{150} \right) = 0.000005 \]

\[ m = \log \left[ \frac{160}{1 + \left( \frac{15}{1 + 10} \right)^{10}} \right] / \log 16.0 = 1.14 \]
Routing Basin B-4 through Basin B-5

\[ x = \frac{0.94}{0.058} = 16.1 \quad w_a = 1.33 \]

Routing Basins B-1 thru B-5 through Basin B-9

\[ x = \frac{0.94}{0.014} = 67.1 \quad w_a = 1.33 \]

Routing Basin B-6 through Basin B-9

\[ x = \frac{0.94}{0.014} = 67.1 \quad w_a = \log_{10} \left( \frac{240.58}{\frac{1}{10} + \frac{1}{10}} \right) \approx 15.1 \]
### Templeton Gap Road Culvert Crossing

**Cast Iron Utility Pipe** through Crown of Culvert at Center of Templeton Gap Road

**7/16 of Opening at Utility Crossing**

**Semi-Circular CMP Arch w/ Concrete Bottom**

<table>
<thead>
<tr>
<th>Ele.</th>
<th>H</th>
<th>H/D</th>
<th>G</th>
<th>Hb(dC)</th>
<th>H</th>
<th>H</th>
<th>Outlet Hw</th>
<th>Outlet A</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.0</td>
<td>0.7</td>
<td>0.08</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.5</td>
<td>1.2</td>
<td>0.14</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.0</td>
<td>1.7</td>
<td>0.20</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.5</td>
<td>2.2</td>
<td>0.26</td>
<td>90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33.0</td>
<td>2.7</td>
<td>0.32</td>
<td>120</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33.5</td>
<td>3.2</td>
<td>0.38</td>
<td>160</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.0</td>
<td>3.7</td>
<td>0.44</td>
<td>210</td>
<td>2.4</td>
<td>0.3</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.5</td>
<td>4.2</td>
<td>0.50</td>
<td>260</td>
<td>2.8</td>
<td>0.4</td>
<td>2.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.0</td>
<td>4.7</td>
<td>0.56</td>
<td>320</td>
<td>3.2</td>
<td>0.6</td>
<td>3.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.5</td>
<td>5.2</td>
<td>0.62</td>
<td>380</td>
<td>3.5</td>
<td>0.9</td>
<td>3.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36.0</td>
<td>5.7</td>
<td>0.68</td>
<td>450</td>
<td>3.9</td>
<td>1.3</td>
<td>4.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36.5</td>
<td>6.2</td>
<td>0.74</td>
<td>520</td>
<td>4.2</td>
<td>1.7</td>
<td>5.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37.0</td>
<td>6.7</td>
<td>0.80</td>
<td>580</td>
<td>4.5</td>
<td>2.1</td>
<td>5.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37.5</td>
<td>7.2</td>
<td>0.86</td>
<td>640</td>
<td>4.7</td>
<td>2.6</td>
<td>6.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38.0</td>
<td>7.7</td>
<td>0.91</td>
<td>700</td>
<td>4.9</td>
<td>3.1</td>
<td>7.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38.5</td>
<td>8.2</td>
<td>0.97</td>
<td>760</td>
<td>5.2</td>
<td>3.5</td>
<td>8.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39.0</td>
<td>8.7</td>
<td>1.03</td>
<td>820</td>
<td>5.5</td>
<td>3.9</td>
<td>8.7</td>
<td>800</td>
<td>950</td>
<td>85</td>
</tr>
<tr>
<td>39.5</td>
<td>9.2</td>
<td>1.09</td>
<td>880</td>
<td>5.6</td>
<td>4.1</td>
<td>9.2</td>
<td>850</td>
<td>950</td>
<td>85</td>
</tr>
<tr>
<td>40.0</td>
<td>9.7</td>
<td>1.15</td>
<td>940</td>
<td>5.6</td>
<td>4.6</td>
<td>9.7</td>
<td>880</td>
<td>950</td>
<td>85</td>
</tr>
<tr>
<td>40.5</td>
<td>10.2</td>
<td>1.21</td>
<td>1000</td>
<td>5.9</td>
<td>5.1</td>
<td>10.2</td>
<td>910</td>
<td>980</td>
<td>98</td>
</tr>
<tr>
<td>41.0</td>
<td>10.7</td>
<td>1.27</td>
<td>1060</td>
<td>5.9</td>
<td>5.5</td>
<td>10.7</td>
<td>940</td>
<td>980</td>
<td>98</td>
</tr>
<tr>
<td>41.5</td>
<td>11.2</td>
<td>1.33</td>
<td>1120</td>
<td>6.0</td>
<td>5.9</td>
<td>11.2</td>
<td>970</td>
<td>980</td>
<td>98</td>
</tr>
<tr>
<td>42.0</td>
<td>11.7</td>
<td>1.39</td>
<td>1180</td>
<td>6.1</td>
<td>6.3</td>
<td>11.7</td>
<td>1000</td>
<td>990</td>
<td>99</td>
</tr>
<tr>
<td>42.5</td>
<td>12.2</td>
<td>1.45</td>
<td>1240</td>
<td>6.2</td>
<td>6.7</td>
<td>12.2</td>
<td>1030</td>
<td>990</td>
<td>99</td>
</tr>
<tr>
<td>43.0</td>
<td>12.7</td>
<td>1.51</td>
<td>1300</td>
<td>6.3</td>
<td>7.1</td>
<td>12.7</td>
<td>1060</td>
<td>991</td>
<td>99</td>
</tr>
</tbody>
</table>
Van Buren Channel Diversion at Templeton Gap Road

Railroad Culvert Crossing

3-72" CMP w/ Steel Plates across lower portion

<table>
<thead>
<tr>
<th>Elev.</th>
<th>H/H</th>
<th>H/H/D</th>
<th>Q/Basel</th>
<th>Total Q</th>
<th>A/Basel</th>
<th>Total A</th>
</tr>
</thead>
<tbody>
<tr>
<td>34.7</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>0.2</td>
<td>0.6</td>
</tr>
<tr>
<td>35.0</td>
<td>0.2</td>
<td>0.1</td>
<td>1</td>
<td>3</td>
<td>0.2</td>
<td>0.6</td>
</tr>
<tr>
<td>35.5</td>
<td>0.8</td>
<td>0.3</td>
<td>5</td>
<td>15</td>
<td>1.2</td>
<td>3.6</td>
</tr>
<tr>
<td>36.0</td>
<td>1.3</td>
<td>0.5</td>
<td>11</td>
<td>33</td>
<td>2.6</td>
<td>7.8</td>
</tr>
<tr>
<td>36.5</td>
<td>1.8</td>
<td>0.7</td>
<td>20</td>
<td>60</td>
<td>4.0</td>
<td>14.4</td>
</tr>
<tr>
<td>37.0</td>
<td>2.5</td>
<td>0.9</td>
<td>26</td>
<td>78</td>
<td>6.1</td>
<td>18.3</td>
</tr>
<tr>
<td>37.5</td>
<td>2.8</td>
<td>1.1</td>
<td>35</td>
<td>105</td>
<td>7.5</td>
<td>22.5</td>
</tr>
<tr>
<td>38.0</td>
<td>3.3</td>
<td>1.3</td>
<td>41</td>
<td>133</td>
<td>7.5</td>
<td>22.4</td>
</tr>
<tr>
<td>38.5</td>
<td>3.6</td>
<td>1.5</td>
<td>49</td>
<td>147</td>
<td>7.5</td>
<td>22.4</td>
</tr>
<tr>
<td>39.0</td>
<td>3.9</td>
<td>1.7</td>
<td>65</td>
<td>165</td>
<td>7.5</td>
<td>22.8</td>
</tr>
<tr>
<td>39.5</td>
<td>4.2</td>
<td>1.9</td>
<td>68</td>
<td>170</td>
<td>7.5</td>
<td>22.9</td>
</tr>
<tr>
<td>40.0</td>
<td>4.4</td>
<td>2.1</td>
<td>64</td>
<td>164</td>
<td>7.5</td>
<td>23.0</td>
</tr>
<tr>
<td>40.5</td>
<td>4.8</td>
<td>2.2</td>
<td>68</td>
<td>204</td>
<td>7.5</td>
<td>23.1</td>
</tr>
<tr>
<td>41.0</td>
<td>6.3</td>
<td>2.4</td>
<td>72</td>
<td>216</td>
<td>7.5</td>
<td>23.2</td>
</tr>
<tr>
<td>41.5</td>
<td>6.8</td>
<td>2.6</td>
<td>75</td>
<td>225</td>
<td>7.5</td>
<td>23.3</td>
</tr>
<tr>
<td>42.0</td>
<td>7.3</td>
<td>2.8</td>
<td>78</td>
<td>234</td>
<td>7.5</td>
<td>23.4</td>
</tr>
<tr>
<td>42.5</td>
<td>7.8</td>
<td>3.0</td>
<td>81</td>
<td>243</td>
<td>7.5</td>
<td>23.5</td>
</tr>
<tr>
<td>43.0</td>
<td>8.3</td>
<td>3.2</td>
<td>84</td>
<td>252</td>
<td>7.5</td>
<td>23.6</td>
</tr>
</tbody>
</table>
Overflow - Railroad and Templeton Gap Road

Overflow to Van Buren Channel  Overflow to Brooks Run

\[ Q = C L H^{0.5} \quad C = 3.0 \]

<table>
<thead>
<tr>
<th>Van</th>
<th>Van</th>
<th>Van</th>
<th>Van</th>
<th>Streak</th>
<th>Streak</th>
<th>Streak</th>
<th>Streak</th>
<th>Streak</th>
<th>Streak</th>
<th>Streak</th>
<th>Streak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Analyze as Simple Well
- \[ Q = C L H^{0.5} \]
- \[ C = 3.0 \]
<table>
<thead>
<tr>
<th>Elev</th>
<th>Van Buren Collected</th>
<th>Van Buren Runoff</th>
<th>Van Buren Avenue Total</th>
<th>Shakes Run Collected</th>
<th>Shakes Run Runoff</th>
<th>Shakes Run Avenue Total</th>
<th>Shakes Run Collected</th>
<th>Shakes Run Runoff</th>
<th>Shakes Run Avenue Total</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>31.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>31.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>32.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>32.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>33.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>33.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>34.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>34.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>35.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>35.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>36.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>36.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>37.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>37.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>38.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>38.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>39.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>39.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>40.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>40.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>41.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>41.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>42.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>42.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>43.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Van Brunn Channel Uplstream of Templeton Gap Road- Convered by \( h = \frac{1}{6} \), d = 0.5, e = 0.1, and \( 0.6 \):**

\[
\frac{V}{6.000} \times \frac{3}{6} = 20.7 \text{ cfs} \Rightarrow Q = (23.02)(14.13) = 952 \text{ cfs}
\]

**Van Brunn Channel Dammage of Templeton Gap Road- Convered by \( h = \frac{1}{6} \), d = 0.1, e = 0.1, and \( 0.9 \):**

\[
\frac{V}{6.000} \times \frac{3}{6} = 21.0 \text{ cfs} \Rightarrow Q = (21.02)(16.0) = 423 \text{ cfs}
\]
Routing Basins A & F Through Basin C

\[ \frac{285}{3850} \text{ gals/min/channel} \times \frac{1}{100} \times \frac{y_0}{x_0} \left( \frac{1240}{260} \right) = \left( \frac{90}{120} \right) \times (60 \text{ gal}) \times (10 \text{ ft}) = 7.04 \text{ fps} \]

\[ \frac{(144)}{(90)} = 1.60 \times \frac{(0.104)}{(0.022)} = 0.80 \]

\[ m = \log \left( \frac{1200}{40} \sqrt{1 + \frac{1}{1200} \left( \frac{1}{1200} \right)} \right) / \log 260 = 1.45 \]

Routing Basin D-1 Through Basins D-2, D-3, and D-5

\[ \frac{3700}{3850} \times \frac{260}{90} \times \frac{260}{120} = \frac{1}{1.41} \times \frac{90}{120} \times \frac{120}{10} = 17 \text{ fps} \]

\[ \frac{(144)}{(120)} = 1.20 \times \frac{(0.063)}{(0.019)} = 9.64 \]

\[ m = \log \left( \frac{1200}{40} \sqrt{1 + \frac{1}{1200} \left( \frac{1}{1200} \right)} \right) / \log 9.6 = 1.54 \]

Routing Basin D-2 Through Basins D-3

\[ 2300 \times \frac{260}{90} \times \frac{260}{120} \times \frac{2300}{90} = \frac{1}{1.41} \times \frac{90}{120} \times \frac{120}{10} = 7 \text{ fps} \]

\[ \frac{(144)}{(120)} = 1.20 \times \frac{(0.063)}{(0.019)} = 9.64 \]

\[ m = \log \left( \frac{1200}{40} \sqrt{1 + \frac{1}{1200} \left( \frac{1}{1200} \right)} \right) / \log 9.6 = 1.54 \]

Routing Basin D-3 Through Basins D-5

\[ 3100 \times \frac{260}{90} \times \frac{260}{120} \times \frac{3100}{90} = \frac{1}{1.41} \times \frac{90}{120} \times \frac{120}{10} = 5 \text{ fps} \]

\[ \frac{(144)}{(120)} = 1.20 \times \frac{(0.063)}{(0.019)} = 9.64 \]

\[ m = \log \left( \frac{1200}{40} \sqrt{1 + \frac{1}{1200} \left( \frac{1}{1200} \right)} \right) / \log 9.6 = 1.54 \]

Routing Basins D-1 thru D-5 Through Basin D-9

\[ 1750 \times \frac{260}{90} \times \frac{260}{120} \times \frac{1750}{90} = \frac{1}{1.41} \times \frac{90}{120} \times \frac{120}{10} = 6 \text{ fps} \]

\[ \frac{(144)}{(120)} = 1.20 \times \frac{(0.063)}{(0.019)} = 9.64 \]

\[ m = \log \left( \frac{1200}{40} \sqrt{1 + \frac{1}{1200} \left( \frac{1}{1200} \right)} \right) / \log 9.6 = 1.54 \]
Routing Basin D-7

\[ 2250 - 45^\circ \text{ from CP and street} @ 0.179 \times \frac{60.0}{1.49} \times \frac{1}{0.061} = 445 \text{ ft} \]

\( X = 0.04 \times 0.25 \times 1.22 \quad m = 1.25 \)

Routing Basin D-6 & D-5 through Basin D-10

\[ 2400 - 54^\circ \text{ from CP and street} @ 2.12 \times \frac{60.0}{1.49} \times \frac{1}{0.061} = 1.79 \times 150 = 800 \text{ ft} \]

(Use Street Only = 5 Triangular Sections at 50 to 1 sides and d = 0.9)

\[ X = 0.99 \times 0.021 \times 2.47 \quad m = 1.33 \]

Routing Basin D-4 through Basin D-1

\[ 1800 \text{ street} @ 2.50 \times \frac{1.20 - 0.02}{1.20} = 0.94 \times 0.025 \times 7 \text{ fps} \]

(Street at 0.045, height of 1.0, and d = 0.5)

\[ X = 0.94 \times 0.025 \times 2.52 \quad m = 1.33 \]

Routing Basins D-1 thru D-5 and D-9 & D-4 through Basin D-10

\[ 2250 - 78^\circ \text{ from CP and street} @ 0.179 \times \frac{60.0}{1.49} \times \frac{1}{0.061} = 10 \text{ fps} \]

(Use Street Only = 5 Triangular Sections at 50 to 1 sides and d = 1.1)

\[ X = 0.99 \times 0.025 \times 2.52 \quad m = 1.33 \]

Routing Basins D-1 thru D-10 through Basin D-15

\[ 2700 - 90^\circ \text{ from CP and street} @ 0.179 \times \frac{60.0}{1.20} \times \frac{1}{0.061} = 8 \text{ fps} \]

(Use Street Only = 5 Triangular Sections at 50 to 1 sides and d = 1.2)

\[ X = 0.99 \times 0.025 \times 1.75 \quad m = 1.33 \]
Routing Basin D-11 through Basin D-15

\[ x = \frac{1.49}{0.005} = 0.08 \]

\[ w = \log \left[ \frac{34.0}{(1 + 1.49)^{10/5}} \right] / \log 10 = 1.49 \]

Routing Basin D-13

\[ x = \frac{1.49}{0.005} = 4.55 \]

\[ w = \log \left[ \frac{16.0}{1 + \frac{1.49}{0.005}} \right] / \log 10 = 1.10 \]

Routing Basin D-14

\[ x = \frac{1.49}{0.005} = 3.18 \]

\[ w = \log \left[ \frac{23.5}{1 + \frac{1.49}{0.005}} \right] / \log 10 = 0.96 \]

Routing Basin D-12 thru D-14 through Basin D-15

\[ x = \frac{1.49}{0.005} = 0.98 \]

\[ w = \log \left[ \frac{84.0}{(1 + 1.49)^{10/5}} \right] / \log 10 = 0.94 \]
# Patty Jonevett Detention Pond

Revised Based on Field Survey by City Engineering Division
December 1991

## Outlet

$2 - 49''$ CIP $\Rightarrow$ Headwall Entrance $\Rightarrow L_S = 0.2''$

<table>
<thead>
<tr>
<th>Elev. (ft)</th>
<th>HW</th>
<th>HW/D</th>
<th>Inlet Q</th>
<th>H (in.)</th>
<th>Outlet HW</th>
<th>Outlet Q</th>
<th>Total Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>04.5</td>
<td>–</td>
<td>–</td>
<td>0.3</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>05.0</td>
<td>0.5</td>
<td>0.8</td>
<td>0.4</td>
<td>0.3</td>
<td>10</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>05.5</td>
<td>1.5</td>
<td>0.8</td>
<td>1.4</td>
<td>0.3</td>
<td>10</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>06.0</td>
<td>2.5</td>
<td>0.8</td>
<td>1.7</td>
<td>0.3</td>
<td>10</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>06.5</td>
<td>3.5</td>
<td>0.8</td>
<td>2.0</td>
<td>0.3</td>
<td>10</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>08.0</td>
<td>4.5</td>
<td>1.3</td>
<td>2.8</td>
<td>1.5</td>
<td>4.1</td>
<td>–</td>
<td>17.0</td>
</tr>
<tr>
<td>09.0</td>
<td>5.5</td>
<td>1.3</td>
<td>3.1</td>
<td>1.5</td>
<td>4.1</td>
<td>–</td>
<td>17.0</td>
</tr>
<tr>
<td>10.0</td>
<td>6.5</td>
<td>1.3</td>
<td>3.3</td>
<td>1.5</td>
<td>4.1</td>
<td>–</td>
<td>17.0</td>
</tr>
<tr>
<td>11.0</td>
<td>7.5</td>
<td>1.3</td>
<td>3.5</td>
<td>1.5</td>
<td>4.1</td>
<td>–</td>
<td>17.0</td>
</tr>
<tr>
<td>12.0</td>
<td>8.5</td>
<td>1.3</td>
<td>3.7</td>
<td>1.5</td>
<td>4.1</td>
<td>–</td>
<td>17.0</td>
</tr>
<tr>
<td>13.0</td>
<td>9.5</td>
<td>1.3</td>
<td>3.9</td>
<td>1.5</td>
<td>4.1</td>
<td>–</td>
<td>17.0</td>
</tr>
<tr>
<td>14.0</td>
<td>10.0</td>
<td>1.3</td>
<td>4.1</td>
<td>1.5</td>
<td>4.1</td>
<td>–</td>
<td>17.0</td>
</tr>
</tbody>
</table>

Note: The table represents the flow rates (Q in cfs) at different elevations (Elev.). The HW/D column indicates the height measured from the detention pond bottom in inches (in.), and H column shows the total height in inches at each elevation.
**Spillway**

\[ Q = CH^{3/2} \quad C = 3.0 \]

<table>
<thead>
<tr>
<th>Elev</th>
<th>H</th>
<th>L</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.5</td>
<td>0.5</td>
<td>451</td>
<td>480</td>
</tr>
<tr>
<td>19.0</td>
<td>1.0</td>
<td>452</td>
<td>1385</td>
</tr>
<tr>
<td>19.5</td>
<td>1.5</td>
<td>453</td>
<td>2446</td>
</tr>
<tr>
<td>20.0</td>
<td>2.0</td>
<td>454</td>
<td>3850</td>
</tr>
</tbody>
</table>

**Embankment Overflow**

\[ Q = CH^{3/2} \quad C = 3.0 \]

<table>
<thead>
<tr>
<th>Elev</th>
<th>H</th>
<th>L</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.5</td>
<td>0.5</td>
<td>451</td>
<td>480</td>
</tr>
<tr>
<td>19.0</td>
<td>1.0</td>
<td>452</td>
<td>1385</td>
</tr>
<tr>
<td>19.5</td>
<td>1.5</td>
<td>453</td>
<td>2446</td>
</tr>
<tr>
<td>20.0</td>
<td>2.0</td>
<td>454</td>
<td>3850</td>
</tr>
</tbody>
</table>
### Patty Jewett Detention Pond - Stage/Storage/Discharge Summary

<table>
<thead>
<tr>
<th>Elev.</th>
<th>Area(Acre)</th>
<th>Total Volume(FT)</th>
<th>Outlet</th>
<th>Spillway</th>
<th>Embankment</th>
<th>Total Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>04.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05.0</td>
<td>0.35</td>
<td>0.09</td>
<td>10</td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>06.0</td>
<td>1.04</td>
<td>0.78</td>
<td>30</td>
<td></td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>07.0</td>
<td>1.61</td>
<td>2.11</td>
<td>12</td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>08.0</td>
<td>2.18</td>
<td>3.31</td>
<td>170</td>
<td></td>
<td></td>
<td>170</td>
</tr>
<tr>
<td>09.0</td>
<td>2.53</td>
<td>6.63</td>
<td>450</td>
<td></td>
<td></td>
<td>450</td>
</tr>
<tr>
<td>10.0</td>
<td>2.89</td>
<td>9.06</td>
<td>710</td>
<td></td>
<td></td>
<td>710</td>
</tr>
<tr>
<td>11.0</td>
<td>3.22</td>
<td>25.10</td>
<td>250</td>
<td></td>
<td></td>
<td>250</td>
</tr>
<tr>
<td>12.0</td>
<td>3.55</td>
<td>70.50</td>
<td>150</td>
<td></td>
<td></td>
<td>150</td>
</tr>
<tr>
<td>13.0</td>
<td>3.89</td>
<td>9.28</td>
<td>310</td>
<td></td>
<td></td>
<td>310</td>
</tr>
<tr>
<td>13.5</td>
<td>4.04</td>
<td>21.81</td>
<td>320</td>
<td></td>
<td></td>
<td>320</td>
</tr>
<tr>
<td>14.0</td>
<td>4.20</td>
<td>38.21</td>
<td>450</td>
<td></td>
<td></td>
<td>450</td>
</tr>
<tr>
<td>14.5</td>
<td>4.33</td>
<td>75.40</td>
<td>205</td>
<td></td>
<td></td>
<td>205</td>
</tr>
<tr>
<td>15.0</td>
<td>4.46</td>
<td>107.60</td>
<td>355</td>
<td></td>
<td></td>
<td>355</td>
</tr>
<tr>
<td>15.5</td>
<td>4.59</td>
<td>129.86</td>
<td>360</td>
<td></td>
<td></td>
<td>360</td>
</tr>
<tr>
<td>16.0</td>
<td>4.72</td>
<td>252.22</td>
<td>370</td>
<td></td>
<td></td>
<td>370</td>
</tr>
<tr>
<td>16.5</td>
<td>4.88</td>
<td>346.62</td>
<td>380</td>
<td></td>
<td></td>
<td>380</td>
</tr>
<tr>
<td>17.0</td>
<td>5.04</td>
<td>471.10</td>
<td>390</td>
<td></td>
<td></td>
<td>390</td>
</tr>
<tr>
<td>17.5</td>
<td>5.21</td>
<td>591.65</td>
<td>400</td>
<td></td>
<td></td>
<td>400</td>
</tr>
<tr>
<td>18.0</td>
<td>5.35</td>
<td>42.21</td>
<td>410</td>
<td></td>
<td></td>
<td>410</td>
</tr>
<tr>
<td>18.5</td>
<td>5.75</td>
<td>450.06</td>
<td>420</td>
<td></td>
<td></td>
<td>420</td>
</tr>
<tr>
<td>19.0</td>
<td>6.15</td>
<td>480.01</td>
<td>450</td>
<td></td>
<td></td>
<td>450</td>
</tr>
<tr>
<td>19.5</td>
<td>6.55</td>
<td>51.21</td>
<td>480</td>
<td></td>
<td></td>
<td>480</td>
</tr>
<tr>
<td>20.0</td>
<td>6.95</td>
<td>54.59</td>
<td>510</td>
<td></td>
<td></td>
<td>510</td>
</tr>
</tbody>
</table>

January 8, 1992
Routing Basin D-10

\[ x = 2450 \text{ ft}, \text{ Unc lined channel } \cdot \left( 0.05 \left( \frac{600 - 2000}{600} \right)^2 \right) = 0.41 \text{ ft}, \text{ \# of wells : } 8 \text{ fps} \]

\( \log 3200 = 300.0 \left( \frac{1.11}{1.11} \right) \text{ ft} \]

Routing Basin E

\[ x = 1250 \text{ ft}, \text{ Convex lined channel } \cdot \left( 0.05 \left( \frac{600 - 2000}{600} \right)^2 \right) = 0.41 \text{ ft}, \text{ \# of wells : } 29 \text{ fps} \]

\( \log 310 = 0.01 \left( \frac{1.11}{1.11} \right) \text{ ft} \]

Routing Basin F

\[ x = 700 \text{ ft}, \text{ Natural channel } \cdot \left( 0.05 \left( \frac{600 - 2000}{600} \right)^2 \right) = 0.41 \text{ ft}, \text{ \# of wells : } 6 \text{ fps} \]

\( \log 59 = 0.01 \left( \frac{1.11}{1.11} \right) \text{ ft} \]

Routing Basin H through Basin J-2

\[ x = 2650 \text{ ft}, \text{ Natural channel } \cdot \left( 0.05 \left( \frac{600 - 2000}{600} \right)^2 \right) = 0.41 \text{ ft}, \text{ \# of wells : } 6 \text{ fps} \]

\( \log 59 = 0.01 \left( \frac{1.11}{1.11} \right) \text{ ft} \]

Routing Basin G through Basin J-2

\[ x = 1050 \text{ ft}, \text{ Natural channel } \cdot \left( 0.05 \left( \frac{600 - 2000}{600} \right)^2 \right) = 0.41 \text{ ft}, \text{ \# of wells : } 3 \text{ fps} \]

\( \log 78 = 0.01 \left( \frac{1.11}{1.11} \right) \text{ ft} \]
Routing Basin I-2 through Basin I-2

\[
\text{=> 6.50' natural channel: } \frac{Q}{A_{ch}} = \frac{0.44}{6.50} = \frac{44}{650} = 0.067 \text{ fps}
\]
\[
\text{(Triangular section: } w/2 = 1.50, b = 2.00, h = 0.50, d = 3.0)
\]
\[
x = \left(\frac{h}{0.44}\right) \left(\frac{A_{ch}}{2000}\right) = 0.22 \quad w = \log \left[28.0 + \frac{0.05}{1+0.02}\right] = \log 28.0 = 1.459
\]

Routing Basin I-1 through Basin I-2

\[
\text{=> 480 - 48' flow pipe and sheet \(0.05'\) } = \left(\frac{0.44}{480}\right) \left(\frac{0.05}{0.05}\right) = 0.17 \text{ fps}
\]
\[
\text{(Use sheet only: } \text{Trapezoidal section: } w/2 = 0.55, b = 2.0, \text{ and } d = 0.8)
\]
\[
x = \left(\frac{0.44}{0.05}\right) \left(\frac{0.05}{2000}\right) = 0.115 \quad w = 1.53
\]

Routing Basin I

\[
\text{=> 100 - 10' flow pipeline: } \frac{Q}{A_{ch}} = \frac{0.44}{100} = \frac{44}{1000} = 0.044 \text{ fps}
\]
\[
\text{(Triangular section: } w/2 = 1.0, b = 2.0, h = 0.5, d = 0.3)
\]
\[
x = \left(\frac{h}{0.44}\right) \left(\frac{A_{ch}}{2000}\right) = 0.20 \quad w = \log \left[28.0 + \frac{0.05}{1+0.02}\right] = \log 28.0 = 1.452
\]

Routing Basin K-2

\[
\text{=> 500 - 60' flow pipe and sheet \(0.08'\) } = \left(\frac{0.44}{500}\right) \left(\frac{0.08}{0.08}\right) = 0.007 \text{ fps}
\]
\[
\text{(Use 60' flow pipe only: } \text{Trapezoidal section: } w/2 = 1.0, b = 2.0, \text{ and } d = 0.44)
\]
\[
x = \left(\frac{h}{0.44}\right) \left(\frac{A_{ch}}{2000}\right) = 4.27 \quad w = \log \left[19.4 + \frac{0.05}{1+0.02}\right] = \log 19.4 = 1.32
\]

Routing Basin K-3

\[
\text{=> 2750 - 60' flow pipe and sheet \(0.08'\) } = \left(\frac{0.44}{2750}\right) \left(\frac{0.08}{0.08}\right) = 0.004 \text{ fps}
\]
\[
\text{(Use 60' flow pipe only: } \text{Trapezoidal section: } w/2 = 1.0, b = 2.0, \text{ and } d = 0.49)
\]
\[
x = \left(\frac{h}{0.44}\right) \left(\frac{A_{ch}}{2000}\right) = 3.97 \quad w = \log \left[24.0 + \frac{0.05}{1+0.02}\right] = \log 24.0 = 1.44
Routing Basin K-4

\[ V = 2800 \text{ ft}^3 \text{ water, RCP and grass cattle } \pm 10\% \]
\[ V = \frac{2500 - 0.05}{2500} = 0.999 \]
\[ \frac{2400}{2500} = 0.96 \text{ ft}^3 \]
\[ \frac{2500}{2500} = 1.0 \text{ ft}^3 \]
\[ X = \frac{0.999}{0.96} \]
\[ m = \log \left[ \frac{2400}{2940} \times \left( \frac{1}{1.00} \times \frac{1}{1.00} \right)^{0.5} \right] = 0.1 \]

Routing Basin L-7

\[ V = 1250 \text{ ft}^3 \text{ natural channel } \pm 10\% \]
\[ V = \frac{1250}{1250} = 1.0 \]
\[ X = \frac{0.999}{0.96} \]
\[ m = \log \left[ \frac{7500}{600} \times \left( \frac{1}{1.00} \times \frac{1}{1.00} \right)^{0.5} \right] = 1.3 \]

Routing Basin L-2

\[ V = 4500 \text{ ft}^3 \text{ bank only } \pm 10\% \]
\[ V = \frac{4500}{4500} = 1.0 \]
\[ X = \frac{0.999}{0.96} \]
\[ m = 1.3 \]

Routing Basin L-4

\[ V = 3000 \text{ ft}^3 \text{ RCP and grass cattle } \pm 10\% \]
\[ V = \frac{3000}{3000} = 1.0 \]
\[ X = \frac{0.999}{0.96} \]
\[ m = 1.3 \]

Routing Basin L-3 and L-4 through Basin L-6

\[ V = 2800 \text{ ft}^3 \text{ RCP and grass cattle } \pm 10\% \]
\[ V = \frac{2800}{2800} = 1.0 \]
\[ X = \frac{0.999}{0.96} \]
\[ m = 1.3 \]
Routing Basin L-5 through Basin L-6

\[ X = \frac{0.048}{0.085} = 0.57 \quad m = 1.35 \]

Routing Basin L-3 through Basin L-7

\[ X = \frac{0.040}{0.085} = 0.47 \quad m = 1.33 \]

Routing Basin M-1 through Basin M-2

\[ X = \frac{0.040}{0.085} = 0.47 \quad m = 1.33 \]

Routing Basin N through Basin M-2

\[ X = \frac{0.040}{0.085} = 0.47 \quad m = 1.33 \]
Routing Basin O-1 through Basin O-3

\[ x = \frac{0.06}{0.02} \times 5.05 = 1.42 \quad m \log \left[ \frac{4.48}{(1+0.944)} \right] / \log 19.4 = 1.42 \]

Routing Basin O-2 through Basin O-3

\[ x = \frac{0.06}{0.02} \times 2.18 = 2.18 \quad m \log \left[ \frac{4.48}{(1+0.944)} \right] / \log 19.4 = 1.42 \]

Routing Basin O-4 through Basin O-5

\[ x = \frac{0.06}{0.02} \times 5.31 = 1.32 \quad m \log \left[ \frac{4.48}{(1+0.944)} \right] / \log 19.4 = 1.42 \]

Routing Basin O-1 through Basin O-4

\[ x = \frac{0.06}{0.02} \times 4.35 = 2.18 \quad m \log \left[ \frac{4.48}{(1+0.944)} \right] / \log 19.4 = 1.42 \]

Routing Basin O-2 through Basin O-5

\[ x = \frac{0.06}{0.02} \times 4.35 = 2.18 \quad m \log \left[ \frac{4.48}{(1+0.944)} \right] / \log 19.4 = 1.42 \]
Routing Basins 0-1 through Basin 0-8

\[ \frac{1}{250 - 48'} \text{ min} \left( \frac{1}{100} \text{ ft}^2 \right) \times 0.018 \times \frac{0.018}{1000} \text{ ft}^2 = 0.00018 \text{ ft}^2 \]

(Use street only) Triangular Section w/50% sides and \( d = 1.6' \)

\[ X = (0.016)(0.0092) = 0.15 \quad W = 1.8 \]

Routing Basins 0-1 through Basin 0-9

\[ \frac{1}{600 - 48'} \text{ min} \left( \frac{1}{100} \text{ ft}^2 \right) \times 0.018 \times \frac{0.018}{1000} \text{ ft}^2 = 0.00018 \text{ ft}^2 \]

(Use street only) Triangular Section w/50% sides and \( d = 1.6' \)

\[ X = (0.016)(0.0092) = 0.15 \quad W = 1.8 \]

Routing Basins 0-1 through Basin 0-11

\[ \frac{1}{1200 - 72'} \text{ min} \left( \frac{1}{100} \text{ ft}^2 \right) \times 0.018 \times \frac{0.018}{1000} \text{ ft}^2 = 0.00018 \text{ ft}^2 \]

(Use 12' wide CAM only) Triangular Section w/50% sides, \( b = 7.7', d = 9' \)

\[ X = (0.016)(0.0092) = 0.15 \quad W = \log \left[ 94.6 \left( \frac{1}{1 + 0.0125 \times 0.09} \right) \right] \log 124.0 = 1.51 \]

Routing Basin P-2

\[ \frac{1}{500 - 72'} \text{ min} \left( \frac{1}{100} \text{ ft}^2 \right) \times 0.018 \times \frac{0.018}{1000} \text{ ft}^2 = 0.00018 \text{ ft}^2 \]

(Trapezoidal Section w/10% sides, \( b = 10' \), and \( d = 2.5' \))

\[ X = (0.016)(0.0092) = 0.15 \quad W = \log \left[ 94.6 \left( \frac{1}{1 + 0.0125 \times 0.09} \right) \right] \log 124.0 = 1.51 \]

Routing Basins P-2 and P-3 through Basin P-5

\[ \frac{1}{2950 - 48'} \text{ min} \left( \frac{1}{100} \text{ ft}^2 \right) \times 0.018 \times \frac{0.018}{1000} \text{ ft}^2 = 0.00018 \text{ ft}^2 \]

(Use 50% sidewalk only) Triangular Section w/50% sides, \( d = 1.6' \)

\[ X = (0.016)(0.0092) = 0.15 \quad W = 1.8 \]
Routing Basins A through C through Basin P-3

1. $Q = 20 \times 10^3 \text{ cfs}$, $a = 1.1 \times 10^3 \text{ ft}^2$, $S_{0} = 0.0003$, $S_{U} = 0.0005$


tan $\theta = \frac{0.0003}{0.0005} = 0.6$

$Q = 1.41 \times 10^3 \text{ cfs}$

$X(a) = 0.79$

$m = 0.33$

Routing Basin Q

1. $Q = \frac{1}{300} \times 10^3 \text{ cfs}$, $a = 1.2 \times 10^3 \text{ ft}^2$, $S_{0} = 0.0005$, $S_{U} = 0.0005$


tan $\theta = \frac{0.0005}{0.0005} = 1$

$Q = 0.5 \times 10^3 \text{ cfs}$

$X(a) = 0.14$

$m = 1.5$

Routing Basin R-2

1. $Q = \frac{1}{500} \times 10^3 \text{ cfs}$, $a = 1.2 \times 10^3 \text{ ft}^2$, $S_{0} = 0.0005$, $S_{U} = 0.0005$


tan $\theta = \frac{0.0005}{0.0005} = 1$

$Q = 0.3 \times 10^3 \text{ cfs}$

$X(a) = 0.22$

$m = 1.5$

Routing Basin R-3

1. $Q = \frac{1}{800} \times 10^3 \text{ cfs}$, $a = 1.2 \times 10^3 \text{ ft}^2$, $S_{0} = 0.0005$, $S_{U} = 0.0005$


tan $\theta = \frac{0.0005}{0.0005} = 1$

$Q = 0.2 \times 10^3 \text{ cfs}$

$X(a) = 0.20$

$m = 1.5$

Routing Basin T

1. $Q = \frac{1}{600} \times 10^3 \text{ cfs}$, $a = 1.2 \times 10^3 \text{ ft}^2$, $S_{0} = 0.0005$, $S_{U} = 0.0005$


tan $\theta = \frac{0.0005}{0.0005} = 1$

$Q = 0.1 \times 10^3 \text{ cfs}$

$X(a) = 0.16$

$m = 1.5$
Routing Basin U

2450\textsuperscript{-}natural channel \@ 0.99\% (2450 - 588\textsuperscript{m}) = \frac{1.49}{0.58} \times \frac{1008.0}{1008.5} \times (0.099)^{0.2} = 7.65 s

(Trapezoidal section \( x = \frac{b}{2} \) sides, \( b = 20 \text{ ft}, d = 18\text{ ft} \))

\( X = \frac{1.49}{0.58} \times \frac{0.099}{20} = 0.119 \)

\( m = \log \left[ \frac{1008.0^{0.5} \left( \frac{1}{20} \right) }{1008.5^{0.5} (1+0.081)^{0.5}} \right] = \log 1008.0 = 1.51 \)
D. TR-20 FUTURE CONDITION
BASIN PARAMETER CALCULATIONS
TR-20 FUTURE BASIN PARAMETERS

Only the subbasins where basin parameters are anticipated to change due to future development are included, all other subbasins are anticipated to remain unchanged from existing basin parameters. The basin leaving parameters for future development conditions are also anticipated to remain unchanged from existing conditions.

Basin A-6 - A = 74.6 Ac = 0.116 sq mi

(Section 6) CN = 55% Open Space, Weeks, Good Condition, Soil D w/50% Rock Outcrop

Residential: 8 Units/AC, Soil B + T 5% Business, Neighborhood Areas, Soil B

\[ CN_{AW} = 0.05 \times (77H(0.80)(0.69H(0.05)(0.85))(0.10)(0.92)) = 73 \]

TC = 31 min = 0.52 hr (same as existing basin parameters)

Basin A-7 - A = 61.4 Ac = 0.095 sq mi

(Section 7) CN = 55% Residential, 8 Units/AC, Soil B + 45% Business, Neighborhood Areas, Soil B

\[ CN_{AW} = 0.55 \times (85H(0.45)(0.92)) = 88 \]

TC = 19 min = 0.32 hr (same as existing basin parameters)

Basin A-8 - A = 64.4 Ac = 0.100 sq mi

(Section 8) CN = 50% Open Space, Poor Condition, Grass Cover, Soil B + 20% Residential, 8 Units/AC, Soil B + 50% Residential, 8 Units/AC, Soil B + 20% Business, Neighborhood Areas, Soil B + 5% Business, Commercial Areas, Soil B

\[ CN_{AW} = 0.05 \times (69H(0.20)(0.75H(0.50)(0.85))(0.20)(0.92))(0.05)(0.92)) = 84 \]
TC ⇒ 31 min = 0.152 hr (Same as Existing Basin Parameters)

Basin A-9 - A = 98 Ac = 0.145 sg m

(Section 9) CN ⇒ 50% Residential, 3 units/AC, Soil B + 55% Residential, 4 units/AC, Soil B + 15% Residential, 8 units/AC, Soil B + 15% Business, Neighborhood Areas, Soil B + 10% Business, Commercial Areas, Soil B

\[ CN_{AWR} = (0.05)(70) + (0.55)(75) + (0.15)(85) + (0.15)(92) \times (0.10)(92) = 81 \]

TC ⇒ 34 min = 0.157 hr (Same as Existing Basin Parameters)

Basin A-10 - A = 92 Ac = 0.144 sg m

(Section 10) CN ⇒ 15% Open Space, 70% Grass Cover, Soil A (Use Soil B) and Soil B + 90% Residential, 10 units/AC, Soil A (Use Soil B) and Soil B + 10% Business, Neighborhood Areas, Soil A (Use Soil B) and Soil B

\[ CN_{AWR} = (0.15)(64) + (0.75)(75) + (0.10)(92) = 76 \]

TC ⇒ 25 min = 0.125 hr (Same as Existing Basin Parameters)

Basin D-15 - A = 100 Ac = 0.156 sg m

(Section 13) CN ⇒ 50% Open Space, 70% Grass Cover, Soil A (Use Soil B) + 75% Open Space, 70% Grass Cover, Soil C + 25% Residential, 4 units/AC, Soil C + 50% Residential, 8 units/AC, Soil A (Use Soil B) + 25% Business, Neighborhood Areas, Soil A (Use Soil B), Soil B, and Soil C + 15% Business, Commercial Areas, Soil C

\[ CN_{AWR} = (0.05)(64) + 0.25(79) + 0.25(83) + 0.10(90) + 0.25(92) + (0.15)(94) = 86 \]

TC ⇒ 21 min = 0.13 hr (Same as Existing Basin Parameters)
Basin P-3 - $A = 716 \text{ ft}^2, \text{AC} = 0.150 \text{ sp mi}$

(Section 71) $CN = 35\% \text{ Business, Neighborhood Areas, Soil A } (\text{Use Soil B}) + 10\% \text{ Open Space, Fan Cond. Grass Cover, Soil C } + 25\% \text{ Residential, 4 \text{ Units/acre, Soil C } + 30\% \text{ Business, Neighborhood Areas, Soil C}}$

$CN_{\text{new}} = (0.35)(0.71)+0.10(0.74)+0.25(0.83)+0.30(0.94) = 0.89$

$T_C = 29 \text{ min} = 0.48 \text{ hr} \quad \text{(Same as Existing Basin Parameters)}$

Basin Q - $A = 73 \text{ ft}^2, \text{AC} = 0.114 \text{ sp mi}$

(Section 72) $CN = 50\% \text{ Industrial, Light Areas, Soil A } (\text{Use Soil B}) + 25\% \text{ Business, Neighborhood Areas, Soil C } + 25\% \text{ Residential, 4 \text{ Units/acre, Soil C } + 100\% \text{ Business, Neighborhood Areas, Soil C}}$

$CN_{\text{new}} = (0.05)(0.88)+0.25(0.72)+0.25(0.82)+0.10(0.94) = 0.87$

$T_C = 20 \text{ min} = 0.33 \text{ hr} \quad \text{(Same as Existing Basin Parameters)}$

Basin S-2 - $A = 55 \text{ ft}^2, \text{AC} = 0.1086 \text{ sp mi}$

(Section 76) $CN = 10\% \text{ Open Space, Fan Cond. Grass Cover, Soil A } (\text{Use Soil B}) + 10\% \text{ Industrial, Light Areas, Soil A } (\text{Use Soil B}) + 50\% \text{ Residential, 4 \text{ Units/acre, Soil C } + 50\% \text{ Residential, 4 \text{ Units/acre, Soil C } + 100\% \text{ Industrial, Light Areas, Soil C}}$

$CN_{\text{new}} = (0.10)(0.69)+0.10(0.88)+0.05(0.75)+0.05(0.83)+0.10(0.91) = 0.83$

$T_C = 26 \text{ min} = 0.43 \text{ hr} \quad \text{(Same as Existing Basin Parameters)}$
Basin U-A = 87 Acre = 0.136 sq mi

(Section 78) CN ⇒ 20% Residential, 4 Units/acre, Soil A (Use Soil B) + Sod Open Space, Fair Condition, Grass Cover, Soil A (Use Soil B) + 40% Industrial, Light industry, Soil A (Use Soil B) + 15% Residential, 4 Units/acre, Soil C + 50% Industrial, Light Industry, Soil C + 50% Business, Neighborhood, Grass, Soil C

\[ CN_{mix} = (0.10)(75) + (0.05)(69) + (0.40)(68) + (0.15)(83) + (0.15)(91) + (0.05)(99) = 84 \]

TC = 33 mm = 0.65 in (Same as Existing Basin Parameters)
E. TR-20 ANALYSIS
EXISTING CONDITION
<table>
<thead>
<tr>
<th>TITLE</th>
<th>SUMMARY</th>
<th>INPUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHORES RUN 24-BO</td>
<td>TYPE IIA DISTRIBUTION EXISTING CONDITION</td>
<td></td>
</tr>
<tr>
<td>RAINFALL</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>0.0000</td>
<td>0.0005</td>
<td>0.015</td>
</tr>
<tr>
<td>0.0080</td>
<td>0.0089</td>
<td>0.0120</td>
</tr>
<tr>
<td>0.0165</td>
<td>0.0220</td>
<td>0.0275</td>
</tr>
<tr>
<td>0.0278</td>
<td>0.0370</td>
<td>0.0450</td>
</tr>
<tr>
<td>0.0350</td>
<td>0.0470</td>
<td>0.0600</td>
</tr>
<tr>
<td>0.0420</td>
<td>0.0600</td>
<td>0.0800</td>
</tr>
<tr>
<td>0.0500</td>
<td>0.0800</td>
<td>0.1200</td>
</tr>
<tr>
<td>0.0600</td>
<td>0.1200</td>
<td>0.1800</td>
</tr>
<tr>
<td>0.0700</td>
<td>0.1800</td>
<td>0.2700</td>
</tr>
<tr>
<td>0.0800</td>
<td>0.2700</td>
<td>0.4000</td>
</tr>
<tr>
<td>0.0900</td>
<td>0.4000</td>
<td>0.6000</td>
</tr>
<tr>
<td>0.1000</td>
<td>0.6000</td>
<td>1.0000</td>
</tr>
<tr>
<td>0.1200</td>
<td>1.0000</td>
<td>1.0000</td>
</tr>
<tr>
<td>0.1600</td>
<td>1.0000</td>
<td>1.0000</td>
</tr>
<tr>
<td>ENDTBL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BGCFLCH</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>0.0100</td>
<td>0.0200</td>
<td>0.0300</td>
</tr>
<tr>
<td>0.0200</td>
<td>0.0400</td>
<td>0.0600</td>
</tr>
<tr>
<td>0.0300</td>
<td>0.0600</td>
<td>0.0900</td>
</tr>
<tr>
<td>0.0500</td>
<td>0.1200</td>
<td>0.1800</td>
</tr>
<tr>
<td>0.0700</td>
<td>0.2700</td>
<td>0.4000</td>
</tr>
<tr>
<td>0.0900</td>
<td>0.4000</td>
<td>0.6000</td>
</tr>
<tr>
<td>0.1000</td>
<td>0.6000</td>
<td>1.0000</td>
</tr>
<tr>
<td>0.1200</td>
<td>1.0000</td>
<td>1.0000</td>
</tr>
<tr>
<td>END</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>---------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**ENDFILE**
<table>
<thead>
<tr>
<th>REACH</th>
<th>RUNOFF</th>
<th>ADDHYD</th>
<th>REACH</th>
<th>RUNOFF</th>
<th>ADDHYD</th>
<th>REACH</th>
<th>RUNOFF</th>
<th>ADDHYD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>0.169</td>
<td>75.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>5</td>
<td>2.3</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>950.0</td>
<td>1.70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>0.185</td>
<td>75.0</td>
<td>0.40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>2.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>1300.0</td>
<td>1.95</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>0.097</td>
<td>71.0</td>
<td>0.28</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>1400.0</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>5</td>
<td>1</td>
<td>0.316</td>
<td>69.0</td>
<td>0.52</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>7</td>
<td>1</td>
<td>2</td>
<td>1500.0</td>
<td>1.59</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>7</td>
<td>3</td>
<td>0.095</td>
<td>76.0</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>7</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>8</td>
<td>2</td>
<td>0.100</td>
<td>87.0</td>
<td>0.52</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>9</td>
<td>2</td>
<td>8</td>
<td>2800.0</td>
<td>1.43</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>9</td>
<td>1</td>
<td>0.145</td>
<td>80.0</td>
<td>0.67</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>10</td>
<td>1</td>
<td>2</td>
<td>2250.0</td>
<td>1.82</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td>10</td>
<td>3</td>
<td>1</td>
<td>1450.0</td>
<td>4.35</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>10</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>11</td>
<td>1</td>
<td>0.134</td>
<td>75.0</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>12</td>
<td>1</td>
<td>2</td>
<td>1150.0</td>
<td>2.62</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>12</td>
<td>1</td>
<td>0.081</td>
<td>76.0</td>
<td>0.72</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>12</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>13</td>
<td>4</td>
<td>1</td>
<td>3550.0</td>
<td>6.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>16</td>
<td>5</td>
<td>1</td>
<td>2800.0</td>
<td>5.49</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>15</td>
<td>2</td>
<td>4</td>
<td>3700.0</td>
<td>2.26</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>15</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>15</td>
<td>1</td>
<td>0.107</td>
<td>76.0</td>
<td>0.40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>15</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16</td>
<td>16</td>
<td>2</td>
<td>0.108</td>
<td>80.0</td>
<td>0.42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>17</td>
<td>4</td>
<td>1</td>
<td>2800.0</td>
<td>1.89</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>17</td>
<td>2</td>
<td>8</td>
<td>2700.0</td>
<td>0.93</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>17</td>
<td>17</td>
<td>1</td>
<td>0.109</td>
<td>76.0</td>
<td>0.40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>17</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>17</td>
<td>17</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>18</td>
<td>18</td>
<td>2</td>
<td>5</td>
<td>3850.0</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>18</td>
<td>7</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>1</td>
<td>2</td>
<td>0.015</td>
<td>74.4</td>
<td>0.85</td>
<td>740</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>---</td>
<td>---</td>
<td>--------</td>
<td>------</td>
<td>------</td>
<td>-----</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AROHYD</td>
<td>18</td>
<td>2</td>
<td>1</td>
<td>0.015</td>
<td>74.4</td>
<td>0.85</td>
<td>740</td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>19</td>
<td>2</td>
<td>0.008</td>
<td>74.0</td>
<td>0.70</td>
<td>740</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>20</td>
<td>3</td>
<td>0.150</td>
<td>74.0</td>
<td>0.80</td>
<td>740</td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>21</td>
<td>3</td>
<td>6</td>
<td>2790.5</td>
<td>3.07</td>
<td>1.22</td>
<td>810</td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>21</td>
<td>2</td>
<td>0.099</td>
<td>74.5</td>
<td>0.75</td>
<td>740</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RLYHYD</td>
<td>21</td>
<td>4</td>
<td>7</td>
<td>5</td>
<td>820</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>22</td>
<td>3</td>
<td>0.144</td>
<td>73.5</td>
<td>0.73</td>
<td>730</td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>23</td>
<td>4</td>
<td>2150.0</td>
<td>1.99</td>
<td>1.22</td>
<td>840</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>23</td>
<td>2</td>
<td>0.198</td>
<td>74.0</td>
<td>0.74</td>
<td>840</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGHYD</td>
<td>27</td>
<td>1</td>
<td>1</td>
<td>850</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>27</td>
<td>2</td>
<td>5</td>
<td>3790.5</td>
<td>5.45</td>
<td>1.58</td>
<td>970</td>
<td></td>
</tr>
<tr>
<td>AROHYD</td>
<td>27</td>
<td>5</td>
<td>2</td>
<td>900</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RLYHYD</td>
<td>27</td>
<td>5</td>
<td>2</td>
<td>850</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>28</td>
<td>2</td>
<td>0.097</td>
<td>74.5</td>
<td>0.74</td>
<td>850</td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>28</td>
<td>3</td>
<td>2</td>
<td>2290.0</td>
<td>1.57</td>
<td>1.23</td>
<td>910</td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>28</td>
<td>2</td>
<td>0.002</td>
<td>74.5</td>
<td>0.74</td>
<td>910</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AROHYD</td>
<td>25</td>
<td>4</td>
<td>1</td>
<td>850</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>26</td>
<td>2</td>
<td>0.102</td>
<td>74.5</td>
<td>0.74</td>
<td>910</td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>26</td>
<td>4</td>
<td>1800.0</td>
<td>2.52</td>
<td>1.23</td>
<td>910</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>27</td>
<td>2</td>
<td>0.106</td>
<td>75.5</td>
<td>0.75</td>
<td>910</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AROHYD</td>
<td>27</td>
<td>4</td>
<td>2</td>
<td>790</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>27</td>
<td>5</td>
<td>2</td>
<td>1790.0</td>
<td>1.75</td>
<td>1.27</td>
<td>980</td>
<td></td>
</tr>
<tr>
<td>AROHYD</td>
<td>27</td>
<td>5</td>
<td>2</td>
<td>990</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>28</td>
<td>6</td>
<td>2</td>
<td>3690.0</td>
<td>2.47</td>
<td>1.22</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>28</td>
<td>6</td>
<td>0.102</td>
<td>79.0</td>
<td>0.70</td>
<td>1010</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AROHYD</td>
<td>29</td>
<td>2</td>
<td>5</td>
<td>850</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>29</td>
<td>3</td>
<td>4</td>
<td>2290.0</td>
<td>2.52</td>
<td>1.32</td>
<td>1050</td>
<td></td>
</tr>
<tr>
<td>AROHYD</td>
<td>29</td>
<td>5</td>
<td>1</td>
<td>1040</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>30</td>
<td>4</td>
<td>0.156</td>
<td>74.0</td>
<td>0.87</td>
<td>1050</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>30</td>
<td>4</td>
<td>0.156</td>
<td>74.0</td>
<td>0.87</td>
<td>1050</td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>31</td>
<td>4</td>
<td>3</td>
<td>2000.0</td>
<td>4.35</td>
<td>1.40</td>
<td>1050</td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>31</td>
<td>5</td>
<td>0.199</td>
<td>79.0</td>
<td>0.40</td>
<td>1080</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGHYD</td>
<td>33</td>
<td>5</td>
<td>1</td>
<td>890</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>33</td>
<td>6</td>
<td>1790.0</td>
<td>2.36</td>
<td>1.41</td>
<td>1100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>33</td>
<td>5</td>
<td>0.169</td>
<td>79.5</td>
<td>0.75</td>
<td>1110</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AROHYD</td>
<td>33</td>
<td>5</td>
<td>1</td>
<td>1120</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>35</td>
<td>6</td>
<td>2</td>
<td>2900.0</td>
<td>1.73</td>
<td>1.23</td>
<td>1170</td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>35</td>
<td>6</td>
<td>0.156</td>
<td>85.0</td>
<td>0.75</td>
<td>1180</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AROHYD</td>
<td>35</td>
<td>6</td>
<td>2</td>
<td>1190</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>35</td>
<td>7</td>
<td>4</td>
<td>1200.0</td>
<td>0.88</td>
<td>1.49</td>
<td>1190</td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>35</td>
<td>7</td>
<td>4</td>
<td>1200.0</td>
<td>0.98</td>
<td>1.49</td>
<td>1190</td>
<td></td>
</tr>
<tr>
<td>AROHYD</td>
<td>37</td>
<td>7</td>
<td>4</td>
<td>1190</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>37</td>
<td>8</td>
<td>2</td>
<td>6150.0</td>
<td>6.67</td>
<td>1.64</td>
<td>1210</td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>38</td>
<td>8</td>
<td>2</td>
<td>6150.0</td>
<td>6.67</td>
<td>1.64</td>
<td>1210</td>
<td></td>
</tr>
<tr>
<td>ADRHYD</td>
<td>1</td>
<td>51</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>1880</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>---</td>
<td>----</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>1</td>
<td>51</td>
<td>5</td>
<td>0.984</td>
<td>85.0</td>
<td>0.27</td>
<td>1880</td>
<td></td>
</tr>
<tr>
<td>ADRHYD</td>
<td>1</td>
<td>51</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1700</td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>5</td>
<td>52</td>
<td>5</td>
<td>2</td>
<td>2890.0</td>
<td>1.51</td>
<td>1.72</td>
<td>1710</td>
</tr>
<tr>
<td>RUNOFF</td>
<td>1</td>
<td>52</td>
<td>2</td>
<td>1</td>
<td>5.17</td>
<td>77.0</td>
<td>0.51</td>
<td>1720</td>
</tr>
<tr>
<td>ADRHYD</td>
<td>4</td>
<td>52</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1730</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADRHYD</td>
<td>1</td>
<td>52</td>
<td>1</td>
<td>3</td>
<td>1740</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>5</td>
<td>53</td>
<td>1</td>
<td>7</td>
<td>1750.0</td>
<td>0.21</td>
<td>1.62</td>
<td>1760</td>
</tr>
<tr>
<td>ADRHYD</td>
<td>5</td>
<td>54</td>
<td>1</td>
<td>1</td>
<td>1770</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>1</td>
<td>54</td>
<td>1</td>
<td>2</td>
<td>1780.0</td>
<td>0.19</td>
<td>1.67</td>
<td>1780</td>
</tr>
<tr>
<td>REACH</td>
<td>7</td>
<td>54</td>
<td>2</td>
<td>1</td>
<td>1790.0</td>
<td>7.19</td>
<td>1.75</td>
<td>1790</td>
</tr>
<tr>
<td>RUNOFF</td>
<td>1</td>
<td>54</td>
<td>1</td>
<td>1</td>
<td>1800.0</td>
<td>0.19</td>
<td>1.67</td>
<td>1800</td>
</tr>
<tr>
<td>ADRHYD</td>
<td>4</td>
<td>54</td>
<td>1</td>
<td>2</td>
<td>1810</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADRHYD</td>
<td>4</td>
<td>54</td>
<td>1</td>
<td>2</td>
<td>1820</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>2</td>
<td>55</td>
<td>2</td>
<td>0.127</td>
<td>89.0</td>
<td>0.28</td>
<td>1830</td>
<td></td>
</tr>
<tr>
<td>ADRHYD</td>
<td>4</td>
<td>55</td>
<td>1</td>
<td>3</td>
<td>1840</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>7</td>
<td>56</td>
<td>3</td>
<td>1</td>
<td>1850.0</td>
<td>0.48</td>
<td>1.87</td>
<td>1850</td>
</tr>
<tr>
<td>RUNOFF</td>
<td>1</td>
<td>56</td>
<td>2</td>
<td>0.139</td>
<td>82.0</td>
<td>0.38</td>
<td>1860</td>
<td></td>
</tr>
<tr>
<td>ADRHYD</td>
<td>5</td>
<td>56</td>
<td>2</td>
<td>3</td>
<td>1870</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>1</td>
<td>57</td>
<td>1</td>
<td>0.158</td>
<td>90.0</td>
<td>0.42</td>
<td>1880</td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>1</td>
<td>58</td>
<td>2</td>
<td>0.101</td>
<td>79.0</td>
<td>0.25</td>
<td>1890</td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>5</td>
<td>59</td>
<td>1</td>
<td>4</td>
<td>1900.0</td>
<td>5.05</td>
<td>1.82</td>
<td>1900</td>
</tr>
<tr>
<td>REACH</td>
<td>5</td>
<td>59</td>
<td>2</td>
<td>5</td>
<td>1910.0</td>
<td>2.12</td>
<td>1.72</td>
<td>1910</td>
</tr>
<tr>
<td>ADRHYD</td>
<td>4</td>
<td>59</td>
<td>4</td>
<td>3</td>
<td>1920</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>2</td>
<td>59</td>
<td>2</td>
<td>0.113</td>
<td>76.0</td>
<td>0.22</td>
<td>1930</td>
<td></td>
</tr>
<tr>
<td>ADRHYD</td>
<td>5</td>
<td>60</td>
<td>1</td>
<td>2</td>
<td>1940</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>6</td>
<td>60</td>
<td>3</td>
<td>1</td>
<td>1950.0</td>
<td>2.21</td>
<td>1.42</td>
<td>1950</td>
</tr>
<tr>
<td>RUNOFF</td>
<td>1</td>
<td>60</td>
<td>2</td>
<td>0.117</td>
<td>76.0</td>
<td>0.22</td>
<td>1960</td>
<td></td>
</tr>
<tr>
<td>ADRHYD</td>
<td>4</td>
<td>60</td>
<td>1</td>
<td>1</td>
<td>1970</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>6</td>
<td>61</td>
<td>1</td>
<td>1</td>
<td>1980.0</td>
<td>5.37</td>
<td>1.91</td>
<td>1980</td>
</tr>
<tr>
<td>RUNOFF</td>
<td>1</td>
<td>61</td>
<td>2</td>
<td>0.126</td>
<td>84.0</td>
<td>0.27</td>
<td>1990</td>
<td></td>
</tr>
<tr>
<td>ADRHYD</td>
<td>4</td>
<td>61</td>
<td>1</td>
<td>3</td>
<td>2000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>1</td>
<td>62</td>
<td>2</td>
<td>0.17</td>
<td>97.0</td>
<td>0.25</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>7</td>
<td>62</td>
<td>1</td>
<td>2</td>
<td>2020.0</td>
<td>6.47</td>
<td>1.85</td>
<td>2020</td>
</tr>
<tr>
<td>RUNOFF</td>
<td>1</td>
<td>62</td>
<td>1</td>
<td>1</td>
<td>2030.0</td>
<td>0.21</td>
<td>1.71</td>
<td>2030</td>
</tr>
<tr>
<td>ADRHYD</td>
<td>4</td>
<td>62</td>
<td>1</td>
<td>1</td>
<td>2040</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADRHYD</td>
<td>4</td>
<td>62</td>
<td>1</td>
<td>1</td>
<td>2050</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>7</td>
<td>64</td>
<td>1</td>
<td>2</td>
<td>2060.0</td>
<td>1.42</td>
<td>1.32</td>
<td>2060</td>
</tr>
<tr>
<td>RUNOFF</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>0.156</td>
<td>89.0</td>
<td>0.15</td>
<td>2070</td>
<td></td>
</tr>
<tr>
<td>ADRHYD</td>
<td>4</td>
<td>64</td>
<td>1</td>
<td>1</td>
<td>2080</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>5</td>
<td>64</td>
<td>1</td>
<td>2</td>
<td>2090.0</td>
<td>1.51</td>
<td>1.33</td>
<td>2090</td>
</tr>
<tr>
<td>RUNOFF</td>
<td>1</td>
<td>64</td>
<td>2</td>
<td>0.094</td>
<td>77.0</td>
<td>0.22</td>
<td>2100</td>
<td></td>
</tr>
<tr>
<td>ADRHYD</td>
<td>4</td>
<td>65</td>
<td>1</td>
<td>2</td>
<td>2110</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>1</td>
<td>66</td>
<td>1</td>
<td>0.111</td>
<td>87.0</td>
<td>0.29</td>
<td>2120</td>
<td></td>
</tr>
<tr>
<td>ADRHYD</td>
<td>4</td>
<td>66</td>
<td>1</td>
<td>4</td>
<td>2130</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH</td>
<td>A7</td>
<td>2</td>
<td>1</td>
<td>4300.0</td>
<td>1.29</td>
<td>1.51</td>
<td>2187</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>----</td>
<td>---</td>
<td>---</td>
<td>--------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>RUNOFF</td>
<td>A7</td>
<td>2</td>
<td>0.184</td>
<td>78.0</td>
<td>0.26</td>
<td>1440</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADRYD 4</td>
<td>A7</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>2187</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF 1</td>
<td>A8</td>
<td>1</td>
<td>0.108</td>
<td>91.0</td>
<td>0.27</td>
<td>2176</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADRYD 4</td>
<td>A8</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>2187</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADRYD 4</td>
<td>A8</td>
<td>1</td>
<td>8</td>
<td>2</td>
<td>2187</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF 1</td>
<td>A8</td>
<td>1</td>
<td>0.123</td>
<td>89.0</td>
<td>0.26</td>
<td>2176</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADRYD 4</td>
<td>A7</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2187</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF 1</td>
<td>A9</td>
<td>2</td>
<td>0.126</td>
<td>83.0</td>
<td>0.26</td>
<td>2176</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADRYD 4</td>
<td>A7</td>
<td>7</td>
<td>7</td>
<td>2</td>
<td>1</td>
<td>5000.0</td>
<td>0.37</td>
<td>1.30</td>
</tr>
<tr>
<td>RUNOFF 1</td>
<td>A7</td>
<td>7</td>
<td>2</td>
<td>0.162</td>
<td>89.0</td>
<td>0.26</td>
<td>2176</td>
<td></td>
</tr>
<tr>
<td>ADRYD 4</td>
<td>A7</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>2187</td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH 7</td>
<td>A7</td>
<td>1</td>
<td>2</td>
<td>2900.0</td>
<td>1.42</td>
<td>1.23</td>
<td>2276</td>
<td></td>
</tr>
<tr>
<td>RUNOFF 1</td>
<td>A7</td>
<td>1</td>
<td>0.126</td>
<td>86.0</td>
<td>0.20</td>
<td>2176</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADRYD 4</td>
<td>A7</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2187</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH 7</td>
<td>A7</td>
<td>1</td>
<td>2</td>
<td>630.0</td>
<td>0.79</td>
<td>1.33</td>
<td>2276</td>
<td></td>
</tr>
<tr>
<td>ADRYD 4</td>
<td>A7</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>2187</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH 7</td>
<td>A7</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>1500.0</td>
<td>0.14</td>
<td>1.50</td>
<td>2276</td>
</tr>
<tr>
<td>RUNOFF 1</td>
<td>A7</td>
<td>1</td>
<td>0.114</td>
<td>86.0</td>
<td>0.20</td>
<td>2176</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADRYD 4</td>
<td>A7</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2187</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF 1</td>
<td>A7</td>
<td>1</td>
<td>0.114</td>
<td>83.0</td>
<td>0.26</td>
<td>2176</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADRYD 4</td>
<td>A7</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2187</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH 7</td>
<td>A7</td>
<td>2</td>
<td>2</td>
<td>1500.0</td>
<td>0.22</td>
<td>1.31</td>
<td>2276</td>
<td></td>
</tr>
<tr>
<td>ADRYD 4</td>
<td>A7</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>2187</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF 1</td>
<td>A7</td>
<td>2</td>
<td>0.117</td>
<td>81.0</td>
<td>0.26</td>
<td>2176</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUNOFF 1</td>
<td>A7</td>
<td>2</td>
<td>0.086</td>
<td>81.0</td>
<td>0.42</td>
<td>2176</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADRYD 4</td>
<td>A7</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2187</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH 7</td>
<td>A7</td>
<td>2</td>
<td>1</td>
<td>2150.0</td>
<td>0.20</td>
<td>1.31</td>
<td>2180</td>
<td></td>
</tr>
<tr>
<td>ADRYD 4</td>
<td>A7</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>2187</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH 7</td>
<td>A7</td>
<td>2</td>
<td>2</td>
<td>1900.0</td>
<td>0.16</td>
<td>1.59</td>
<td>2220</td>
<td></td>
</tr>
<tr>
<td>RUNOFF 1</td>
<td>A7</td>
<td>2</td>
<td>0.141</td>
<td>84.0</td>
<td>0.27</td>
<td>2150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADRYD 4</td>
<td>A7</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2187</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REACH 7</td>
<td>A7</td>
<td>2</td>
<td>1</td>
<td>2450.0</td>
<td>0.19</td>
<td>1.51</td>
<td>2170</td>
<td></td>
</tr>
<tr>
<td>RUNOFF 1</td>
<td>A7</td>
<td>2</td>
<td>0.136</td>
<td>81.0</td>
<td>0.55</td>
<td>2180</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADRYD 4</td>
<td>A7</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2187</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ENDATA

| ICHEM 1 | 0.05 | 2510 |
| COMPUT 2 | 0.0 | 3.10 | 1.0 | 7.2 | 0.0 | 2520 |
| ENDCMP 1 | 2530 |
| ICHEM 6 | 0.05 | 2560 |
| COMPUT 2 | 0.0 | 3.60 | 1.0 | 7.2 | 0.0 | 2580 |
| ENDCMP 1 | 2590 |

ENDJOB 2

END

****************************************************************************************************80-80 LIST (CONTINUED)****************************************************************************************************
COMPUTER PROGRAM FOR PROJECT FORMULATION - HYDROLOGY USER NOTES

THE USERS MANUAL FOR THIS PROGRAM IS THE MAY 1982 DRAFT OF TR-20. CHANGES FROM THE 2/14/74 VERSION INCLUDE:

REACH ROUTING - The modified ATT-XIN ROUTING PROCEDURE REPLACES THE COMEX METHOD. INPUT DATA PREPARED FOR PREVIOUS PROGRAM VERSIONS USING COMEX ROUTING COEFFICIENTS WILL NOT RUN ON THIS VERSION.

THE PREFERRED TYPES OF DATA ENTRY IS CROSS SECTION DATA REPRESENTATIVE OF A REACH. IT IS RECOMMENDED THAT THE OPTIONAL CROSS SECTION DISCHARGE-AREA PLOTS BE OBTAINED WHENEVER NEW CROSS SECTION DATA IS ENTERED. THE PLOTS SHOULD BE CHECKED FOR REASONABleness AND ACCURACY OF INPUT DATA FOR THE COMPUTATION OF "**" VALUES USED IN THE ROUTING PROCEDURE.

GUIDELINES FOR DETERMINING OR ANALYZING REACH LENGTHS AND COEFFICIENTS "**" ARE AVAILABLE IN THE USERS MANUAL. SUMMARY TABLE 2 DISPLAYS REACH ROUTING RESULTS AND ROUTING PARAMETERS FOR COMPARISON AND CHECKING.

HYDROGRAPh GENERATION - THE PROCEDURE TO CALCULATE THE INTEGRAL TIME INTERVAL AND PEAK TIME OF THE UNIT HYDROGRAPH HAVE BEEN IMPROVED. PEAK DISCHARGES AND TIMES MAY DIFFER FROM THE PREVIOUS VERSION. OUTPUT HYDROGRAPHS ARE STILL INTERPOLATED, PRINTED, AND ROUTED AT THE USER SELECTED MAIN TIME INCREMENT.

INTERMEDIATE PEAKS - METHOD ADDED TO PROVIDE DISCHARGES AT INTERMEDIATE POINTS WITHIN REACHES WITHOUT ROUTING.

OTHER - THIS VERSION CONTAINS SOME ADDITIONS TO THE INPUT AND NUMERICAL MODIFICATIONS TO THE OUTPUT. USER OPTIONS HAVE BEEN MODIFIED AND AUGMENTED ON THE JOB RECORD. RAINSTORMS ADDED, ERROR AND WARNING MESSAGES EXPANDED, AND THE SUMMARY TABLES COMPLETELY REVISED. THE PRINTOUT OPTION IS NOT OPERATIONAL AT THIS TIME.

PROGRAM QUESTIONS OR PROBLEMS SHOULD BE DIRECTED TO HYDRAULIC ENGINEERS AT THE SEC NATIONAL TECHNICAL CENTERS:

CHESTER, PA (NORTHEAST) -- 215-499-3521. FORT WORTH, TX (SOUTH) -- 314-521-2542 (FTS).
LINCOLN, NE (MIDWEST) -- 405-553-7858 (FTS). PORTLAND, OR (WEST) -- 425-409-7001 (FTS).
OR HYDROLOGY UNIT, ENGINEERING DIVISION, LAHAN, MO -- 417-723-8139 (FTS).

PROGRAM CHANGES SINCE MAY 1982:

12/17/81 - CORRECT PEAK RATE FACTOR FOR USER ENTERED DUMPED
CORRECT REACH ROUTING PEAK TRAVEL TIME PRINTED WITH FULLPRINT OPTION

5/2/83 - CORRECT COMPUTATIONS FOR ---
1. DIVISION OF BASEFLOW IN DIVERGENT OPERATION
2. HYDROGRAPH VOLUME SPLIT BETWEEN BASEFLOW AND ABOVE BASEFLOW
3. CROSS SECTION DATA PLOTTING POSITION
4. INTERMEDIATE PEAK WHEN "FROM" AREA IS LARGER THAN "THRU" AREA
5. STORAGE ROUTED REACH TRAVEL TIME FOR MULTIEP-END HYDROGRAPH
6. ORDERING "FLOW-TABLE" FILE FROM SUMMARY TABLE 43 DATA
7. BASEFLOW ENTERED AS HAGEDY
8. LOW FLOW SPLIT DURING DIVERGENT PROCEDURE #2 WHEN SECTION RATING START AT DIFFERENT ELEVATIONS

ENHANCEMENTS ---
1. REPLACE USER MANUAL ERROR CODES (PAGE 4-9 TO 4-11) WITH MESSAGES
2. LABEL OUTPUT HYDROGRAPH FILES WITH CROSS SECTION/STRUCTURE, ALTERNATE AND STORM NO'S

9/6/92 - CORRECT IMPORT AND OUTPUT ERRORS FOR INTERMEDIATE PEAKS
CORRECT COMBINATION OF RATING TABLES FOR DIVERGENT
CHECK REACH ROUTING PARAMETERS FOR ACCEPTABLE LIMITS
ELIMINATE MAXIMUM REACH TRAVEL TIME WHEN ATT-XIN COEFFICIENT EQUALS ONE
EXECUTIVE CONTROL OPERATION INCREM  MAIN TIME INCREMENT = .05 HOURS

EXECUTIVE CONTROL OPERATION COMPUT  FROM SECTION 17 TO SECTION 78
STARTING TIME = .00  RAIN DEPTH = 1.00  RAIN DURATION = 1.00  RAIN TABLE NO. = 1  ANT. HEIGHT = 300  COND. = 2
ALTERNATE NO. = 1  STOP NO. = 1  MAIN TIME INCREMENT = .05 HOURS

### WARNING REACH 2 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###

### WARNING REACH 9 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###

### WARNING REACH 6 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###

### WARNING REACH 7 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###

### WARNING REACH 10 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###

### WARNING REACH 12 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###

### WARNING REACH 15 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###

### WARNING REACH 15 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###

### WARNING REACH 20 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###

### WARNING REACH 27 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###

### WARNING REACH 31 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###

### WARNING REACH 32 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###

### WARNING REACH 35 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###

### WARNING REACH 36 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###

### WARNING REACH 42 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###

### WARNING REACH 44 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###

### WARNING REACH 45 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###

### WARNING REACH 51 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###

### WARNING REACH 54 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ###
WARNING REACH 59 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 60 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 61 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 62 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 63 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 64 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 65 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 66 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 71 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 77 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***

EXECUTIVE CONTROL OPERATION ENDCMP
COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL OPERATION IMPER  MAIN TIME INCREMENT = .05 HOURS

EXECUTIVE CONTROL OPERATION COMPUT  FROM SECTION 1 TO SECTION 78
STARTING TIME = .00  MAIN DEPTH = 4.50  MAIN DURATION = 1.00  MAIN TABLE MD = 7  ANT. MOIST. CONE = 2
ALTERNATE MD = 1  STORM MD = 2  MAIN TIME INCREMENT = .05 HOURS

WARNING REACH 2 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 4 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 5 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 6 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 7 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 10 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 12 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 13 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 15 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 21 ATT-KIN COEFF.C1 GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT ***
WARNING REACH 27 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 28 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 29 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 30 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 31 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 32 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 33 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 34 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 35 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 36 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 37 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 38 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 39 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 40 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 41 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 42 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 43 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 44 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 45 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 46 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 47 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 48 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 49 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 50 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 51 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 52 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 53 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 54 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 55 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 56 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 57 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 58 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 59 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 60 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 61 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 62 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 63 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 64 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 65 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 66 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 67 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 68 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 69 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 70 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 71 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT

WARNING REACH 72 ATT-KIN COEFF.(C) GREATER THAN 0.667. CONSIDER REDUCING MAIN TIME INCREMENT
### WARNING
- Reach 76 Att-Kin Coeff. (C) Greater Than 0.667. Consider reducing main time increment.

### WARNING
- Reach 76 Att-Kin Coeff. (C) Greater Than 0.667. Consider reducing main time increment.

### WARNING
- Reach 77 Att-Kin Coeff. (C) Greater Than 0.667. Consider reducing main time increment.

EXECUTIVE CONTROL OPERATION ENDCMP

COMPUTATIONS COMPLETED FOR PAGE 2

EXECUTIVE CONTROL OPERATION ENDDUB

RECORD 10  2560

RECORD 10  2570
### Summary Table 1 - Selected Results of Standard and Executive Control Instructions in the Order Performed

[A headword in the same paragraph] After the peak discharge time and rate (CFM) values indicate a flat top hydrograph, a question mark (?) indicates a hydrograph with peak as last point.

<table>
<thead>
<tr>
<th>Section/Standards</th>
<th>Rain Antic Main</th>
<th>Precipitation</th>
<th>Peak Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure Control</td>
<td>Drainage Table</td>
<td>Moist Time</td>
<td></td>
</tr>
</tbody>
</table>

**ID** | **Operation** | **Area** (SQ MI) | **Cond** | **Increm** | **Begin** | **Amount** | **Duration** | **Amount** | **Elevation** Time | **Rate** | **Rate** |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Runoff</td>
<td>0.10</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.79</td>
<td>---</td>
<td>5.10</td>
<td>59.79</td>
</tr>
<tr>
<td>2</td>
<td>Reach</td>
<td>0.10</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.79</td>
<td>---</td>
<td>6.10</td>
<td>69.79</td>
</tr>
<tr>
<td>3</td>
<td>Runoff</td>
<td>0.09</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.98</td>
<td>---</td>
<td>6.09</td>
<td>92.04</td>
</tr>
<tr>
<td>4</td>
<td>AddHyd</td>
<td>0.20</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.98</td>
<td>---</td>
<td>6.10</td>
<td>152.67</td>
</tr>
<tr>
<td>5</td>
<td>Reach</td>
<td>0.20</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.97</td>
<td>---</td>
<td>6.20</td>
<td>172.99</td>
</tr>
<tr>
<td>6</td>
<td>Runoff</td>
<td>0.17</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.97</td>
<td>---</td>
<td>6.17</td>
<td>109.05</td>
</tr>
<tr>
<td>7</td>
<td>AddHyd</td>
<td>0.77</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.97</td>
<td>---</td>
<td>6.19</td>
<td>250.17</td>
</tr>
<tr>
<td>8</td>
<td>Reach</td>
<td>0.77</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.97</td>
<td>---</td>
<td>6.19</td>
<td>250.17</td>
</tr>
<tr>
<td>9</td>
<td>Runoff</td>
<td>0.28</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.97</td>
<td>---</td>
<td>6.19</td>
<td>250.17</td>
</tr>
<tr>
<td>10</td>
<td>AddHyd</td>
<td>0.30</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.97</td>
<td>---</td>
<td>6.17</td>
<td>126.48</td>
</tr>
<tr>
<td>11</td>
<td>Reach</td>
<td>0.50</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.97</td>
<td>---</td>
<td>6.17</td>
<td>126.48</td>
</tr>
<tr>
<td>12</td>
<td>Runoff</td>
<td>0.50</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.97</td>
<td>---</td>
<td>6.17</td>
<td>126.48</td>
</tr>
<tr>
<td>13</td>
<td>Runoff</td>
<td>0.10</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.97</td>
<td>---</td>
<td>6.20</td>
<td>351.99</td>
</tr>
<tr>
<td>14</td>
<td>Runoff</td>
<td>0.10</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.97</td>
<td>---</td>
<td>6.19</td>
<td>51.28</td>
</tr>
<tr>
<td>15</td>
<td>AddHyd</td>
<td>0.16</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.97</td>
<td>---</td>
<td>6.16</td>
<td>374.51</td>
</tr>
<tr>
<td>16</td>
<td>Reach</td>
<td>0.64</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.97</td>
<td>---</td>
<td>6.20</td>
<td>374.51</td>
</tr>
<tr>
<td>17</td>
<td>Runoff</td>
<td>0.12</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.97</td>
<td>---</td>
<td>6.19</td>
<td>42.51</td>
</tr>
<tr>
<td>18</td>
<td>AddHyd</td>
<td>0.76</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.97</td>
<td>---</td>
<td>6.19</td>
<td>42.51</td>
</tr>
<tr>
<td>19</td>
<td>Reach</td>
<td>0.76</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.97</td>
<td>---</td>
<td>6.19</td>
<td>42.51</td>
</tr>
<tr>
<td>20</td>
<td>Runoff</td>
<td>0.09</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.97</td>
<td>---</td>
<td>6.19</td>
<td>66.98</td>
</tr>
<tr>
<td>21</td>
<td>AddHyd</td>
<td>0.85</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>0.97</td>
<td>---</td>
<td>6.17</td>
<td>66.98</td>
</tr>
<tr>
<td>22</td>
<td>Runoff</td>
<td>0.10</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>1.00</td>
<td>---</td>
<td>6.19</td>
<td>91.66</td>
</tr>
<tr>
<td>23</td>
<td>Reach</td>
<td>0.10</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>1.00</td>
<td>---</td>
<td>6.19</td>
<td>91.66</td>
</tr>
<tr>
<td>24</td>
<td>Runoff</td>
<td>0.22</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>1.00</td>
<td>---</td>
<td>6.19</td>
<td>389.97</td>
</tr>
<tr>
<td>25</td>
<td>AddHyd</td>
<td>0.22</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>1.00</td>
<td>---</td>
<td>6.19</td>
<td>389.97</td>
</tr>
<tr>
<td>26</td>
<td>Reach</td>
<td>0.22</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>71.0</td>
<td>28.00</td>
<td>1.00</td>
<td>---</td>
<td>6.19</td>
<td>389.97</td>
</tr>
</tbody>
</table>

**Note:** All operations are performed in the order listed.
<table>
<thead>
<tr>
<th>ID</th>
<th>OPERATION</th>
<th>AREA</th>
<th>COND</th>
<th>INCREM</th>
<th>BEGIN</th>
<th>AMOUNT</th>
<th>DURATION</th>
<th>AMOUNT</th>
<th>ELEVATION</th>
<th>TIME</th>
<th>RATE</th>
<th>RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>REACH</td>
<td>0.02</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>25.00</td>
<td>.89</td>
<td>---</td>
<td>6.19</td>
<td>46.91</td>
<td>77.2</td>
</tr>
<tr>
<td>2</td>
<td>RUNOFF</td>
<td>0.17</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>25.00</td>
<td>.93</td>
<td>---</td>
<td>6.12</td>
<td>97.47</td>
<td>77.4</td>
</tr>
<tr>
<td>3</td>
<td>ASHYD</td>
<td>0.28</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>26.00</td>
<td>.91</td>
<td>---</td>
<td>6.17</td>
<td>299.99</td>
<td>78.2</td>
</tr>
<tr>
<td>4</td>
<td>REACH</td>
<td>0.12</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>24.00</td>
<td>.77</td>
<td>---</td>
<td>6.14</td>
<td>72.41</td>
<td>592.5</td>
</tr>
<tr>
<td>5</td>
<td>REACH</td>
<td>0.12</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>24.00</td>
<td>.77</td>
<td>---</td>
<td>6.17</td>
<td>299.99</td>
<td>78.2</td>
</tr>
<tr>
<td>6</td>
<td>REACH</td>
<td>0.12</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>24.00</td>
<td>.97</td>
<td>---</td>
<td>6.18</td>
<td>711.19</td>
<td>616.9</td>
</tr>
<tr>
<td>7</td>
<td>RUNOFF</td>
<td>0.10</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>25.00</td>
<td>.92</td>
<td>---</td>
<td>6.18</td>
<td>74.79</td>
<td>725.7</td>
</tr>
<tr>
<td>8</td>
<td>ASHYD</td>
<td>0.57</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>26.00</td>
<td>.88</td>
<td>---</td>
<td>6.17</td>
<td>183.82</td>
<td>672.3</td>
</tr>
<tr>
<td>9</td>
<td>RUNOFF</td>
<td>0.11</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>24.00</td>
<td>1.15</td>
<td>---</td>
<td>6.16</td>
<td>97.41</td>
<td>905.0</td>
</tr>
<tr>
<td>10</td>
<td>REACH</td>
<td>0.57</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>.89</td>
<td>25.74</td>
<td>6.28</td>
<td>363.69</td>
<td>826.8</td>
</tr>
<tr>
<td>11</td>
<td>REACH</td>
<td>0.11</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>1.25</td>
<td>32.45</td>
<td>6.26</td>
<td>87.70</td>
<td>804.5</td>
</tr>
<tr>
<td>12</td>
<td>ASHYD</td>
<td>0.68</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>.92</td>
<td>36.01</td>
<td>6.26</td>
<td>150.72</td>
<td>698.5</td>
</tr>
<tr>
<td>13</td>
<td>RUNOFF</td>
<td>0.11</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>1.03</td>
<td>---</td>
<td>6.15</td>
<td>89.52</td>
<td>821.2</td>
</tr>
<tr>
<td>14</td>
<td>ASHYD</td>
<td>0.74</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>1.94</td>
<td>56.52</td>
<td>6.24</td>
<td>522.49</td>
<td>665.1</td>
</tr>
<tr>
<td>15</td>
<td>ASHYD</td>
<td>2.03</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>.90</td>
<td>61.02</td>
<td>6.31</td>
<td>1099.89</td>
<td>524.7</td>
</tr>
<tr>
<td>16</td>
<td>DIVERT</td>
<td>1.20</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>1.41</td>
<td>37.97</td>
<td>6.73</td>
<td>878.49</td>
<td>732.4</td>
</tr>
<tr>
<td>17</td>
<td>ASHYD</td>
<td>0.67</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>1.7</td>
<td>59.47</td>
<td>6.21</td>
<td>181.40</td>
<td>229.4</td>
</tr>
<tr>
<td>18</td>
<td>REACH</td>
<td>0.83</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>1.7</td>
<td>78.75</td>
<td>6.98</td>
<td>155.95</td>
<td>187.1</td>
</tr>
<tr>
<td>19</td>
<td>RUNOFF</td>
<td>0.15</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>1.82</td>
<td>---</td>
<td>6.41</td>
<td>98.95</td>
<td>795.0</td>
</tr>
<tr>
<td>20</td>
<td>ASHYD</td>
<td>0.98</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>2.07</td>
<td>60.21</td>
<td>6.47</td>
<td>251.68</td>
<td>217.2</td>
</tr>
<tr>
<td>21</td>
<td>RUNOFF</td>
<td>0.08</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>.89</td>
<td>---</td>
<td>6.08</td>
<td>70.79</td>
<td>907.4</td>
</tr>
<tr>
<td>22</td>
<td>RUNOFF</td>
<td>0.15</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>.92</td>
<td>---</td>
<td>6.14</td>
<td>99.52</td>
<td>672.6</td>
</tr>
<tr>
<td>23</td>
<td>REACH</td>
<td>0.15</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>.92</td>
<td>---</td>
<td>6.23</td>
<td>99.28</td>
<td>691.1</td>
</tr>
<tr>
<td>24</td>
<td>RUNOFF</td>
<td>0.09</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>.92</td>
<td>---</td>
<td>6.11</td>
<td>65.58</td>
<td>773.9</td>
</tr>
<tr>
<td>25</td>
<td>ASHYD</td>
<td>0.24</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>.94</td>
<td>---</td>
<td>6.17</td>
<td>116.90</td>
<td>611.0</td>
</tr>
<tr>
<td>26</td>
<td>RUNOFF</td>
<td>0.15</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>.98</td>
<td>---</td>
<td>6.12</td>
<td>95.27</td>
<td>712.9</td>
</tr>
<tr>
<td>27</td>
<td>REACH</td>
<td>0.17</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>.97</td>
<td>---</td>
<td>6.26</td>
<td>73.61</td>
<td>517.4</td>
</tr>
<tr>
<td>28</td>
<td>RUNOFF</td>
<td>0.15</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>.99</td>
<td>---</td>
<td>6.17</td>
<td>104.68</td>
<td>707.7</td>
</tr>
<tr>
<td>29</td>
<td>ASHYD</td>
<td>0.28</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>29.00</td>
<td>.93</td>
<td>---</td>
<td>6.21</td>
<td>178.28</td>
<td>672.2</td>
</tr>
<tr>
<td>30</td>
<td>REACH</td>
<td>0.08</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>25.00</td>
<td>.98</td>
<td>---</td>
<td>6.15</td>
<td>68.57</td>
<td>879.1</td>
</tr>
<tr>
<td>31</td>
<td>ASHYD</td>
<td>0.26</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>25.00</td>
<td>.94</td>
<td>---</td>
<td>6.19</td>
<td>245.72</td>
<td>675.9</td>
</tr>
<tr>
<td>32</td>
<td>REACH</td>
<td>0.10</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>25.00</td>
<td>.90</td>
<td>---</td>
<td>6.18</td>
<td>387.81</td>
<td>550.3</td>
</tr>
<tr>
<td>33</td>
<td>RUNOFF</td>
<td>0.10</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>25.00</td>
<td>.89</td>
<td>---</td>
<td>6.17</td>
<td>19.16</td>
<td>712.2</td>
</tr>
<tr>
<td>34</td>
<td>REACH</td>
<td>0.10</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>25.00</td>
<td>.87</td>
<td>---</td>
<td>6.25</td>
<td>57.15</td>
<td>598.1</td>
</tr>
<tr>
<td>35</td>
<td>RUNOFF</td>
<td>0.11</td>
<td>2</td>
<td>0.05</td>
<td>0</td>
<td>7.10</td>
<td>25.00</td>
<td>.98</td>
<td>---</td>
<td>6.12</td>
<td>88.72</td>
<td>795.7</td>
</tr>
<tr>
<td>ID</td>
<td>Operation</td>
<td>Area</td>
<td>Cond</td>
<td>Incr</td>
<td>Mins</td>
<td>Precipitation</td>
<td>Runoff</td>
<td>Elev</td>
<td>Time</td>
<td>Rate</td>
<td>Rate</td>
<td></td>
</tr>
<tr>
<td>----</td>
<td>------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>--------------</td>
<td>--------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(in)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(hr)</td>
<td>(CSF)</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**AlterNative 1 Storm 1**

1. **SECTION 25**
   - Area: 5.25
   - Cond: 2
   - Incr: 0.05
   - Mins: 6.10
   - Precipitation: 29.96
   - Runoff: 4.17
   - Elev: 176.9
   - Time: 498.4

2. **SECTION 26**
   - Area: 7.10
   - Cond: 2
   - Incr: 0.05
   - Mins: 7.10
   - Precipitation: 29.96
   - Runoff: 6.12
   - Elev: 176.9
   - Time: 522.2

3. **SECTION 27**
   - Area: 10.10
   - Cond: 2
   - Incr: 0.05
   - Mins: 7.10
   - Precipitation: 29.96
   - Runoff: 7.12
   - Elev: 176.9
   - Time: 576.8

4. **SECTION 28**
   - Area: 13.10
   - Cond: 2
   - Incr: 0.05
   - Mins: 7.10
   - Precipitation: 29.96
   - Runoff: 8.12
   - Elev: 176.9
   - Time: 629.4

5. **SECTION 29**
   - Area: 16.10
   - Cond: 2
   - Incr: 0.05
   - Mins: 7.10
   - Precipitation: 29.96
   - Runoff: 8.12
   - Elev: 176.9
   - Time: 682.1

6. **SECTION 30**
   - Area: 19.10
   - Cond: 2
   - Incr: 0.05
   - Mins: 7.10
   - Precipitation: 29.96
   - Runoff: 8.12
   - Elev: 176.9
   - Time: 734.8

7. **SECTION 31**
   - Area: 22.10
   - Cond: 2
   - Incr: 0.05
   - Mins: 7.10
   - Precipitation: 29.96
   - Runoff: 8.12
   - Elev: 176.9
   - Time: 787.5

8. **SECTION 32**
   - Area: 25.10
   - Cond: 2
   - Incr: 0.05
   - Mins: 7.10
   - Precipitation: 29.96
   - Runoff: 8.12
   - Elev: 176.9
   - Time: 840.2
<table>
<thead>
<tr>
<th>ID</th>
<th>OPERATION</th>
<th>AREA</th>
<th>COND</th>
<th>INC</th>
<th>BEGIN</th>
<th>AMOUNT</th>
<th>DURATION</th>
<th>AMOUNT</th>
<th>ELEVATION</th>
<th>TIME</th>
<th>RATE</th>
<th>RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RUNOFF</td>
<td>.12</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>20.00</td>
<td>1.21</td>
<td>---</td>
<td>9.15</td>
<td>117.87</td>
<td>973.7</td>
</tr>
<tr>
<td>2</td>
<td>RUNOFF</td>
<td>.25</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>28.00</td>
<td>.79</td>
<td>---</td>
<td>6.62</td>
<td>1572.74</td>
<td>328.9</td>
</tr>
<tr>
<td>3</td>
<td>RUNOFF</td>
<td>.13</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.80</td>
<td>1.04</td>
<td>---</td>
<td>9.11</td>
<td>199.87</td>
<td>899.2</td>
</tr>
<tr>
<td>4</td>
<td>RUNOFF</td>
<td>.19</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>20.00</td>
<td>.92</td>
<td>---</td>
<td>6.31</td>
<td>96.65</td>
<td>519.6</td>
</tr>
<tr>
<td>5</td>
<td>RUNOFF</td>
<td>.15</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>20.00</td>
<td>.94</td>
<td>---</td>
<td>6.23</td>
<td>96.49</td>
<td>679.2</td>
</tr>
<tr>
<td>6</td>
<td>REACH</td>
<td>.15</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.97</td>
<td>---</td>
<td>6.35</td>
<td>87.71</td>
<td>587.1</td>
</tr>
<tr>
<td>7</td>
<td>RUNOFF</td>
<td>.17</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>20.00</td>
<td>.83</td>
<td>---</td>
<td>6.13</td>
<td>112.72</td>
<td>655.2</td>
</tr>
<tr>
<td>8</td>
<td>ADOWD</td>
<td>.12</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>26.00</td>
<td>.99</td>
<td>---</td>
<td>6.19</td>
<td>157.23</td>
<td>534.2</td>
</tr>
<tr>
<td>9</td>
<td>ADOWD</td>
<td>.18</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.79</td>
<td>---</td>
<td>6.74</td>
<td>999.20</td>
<td>505.0</td>
</tr>
<tr>
<td>10</td>
<td>ADOWD</td>
<td>.13</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>1.07</td>
<td>---</td>
<td>6.21</td>
<td>101.36</td>
<td>781.9</td>
</tr>
<tr>
<td>11</td>
<td>REACH</td>
<td>.19</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.92</td>
<td>---</td>
<td>6.20</td>
<td>91.05</td>
<td>510.0</td>
</tr>
<tr>
<td>12</td>
<td>ADOWD</td>
<td>.15</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.97</td>
<td>---</td>
<td>6.20</td>
<td>279.20</td>
<td>608.8</td>
</tr>
<tr>
<td>13</td>
<td>ADOWD</td>
<td>.14</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.93</td>
<td>---</td>
<td>6.26</td>
<td>747.70</td>
<td>765.1</td>
</tr>
<tr>
<td>14</td>
<td>ADOWD</td>
<td>.14</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.81</td>
<td>---</td>
<td>6.77</td>
<td>1175.70</td>
<td>267.7</td>
</tr>
<tr>
<td>15</td>
<td>REACH</td>
<td>.34</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>26.00</td>
<td>.91</td>
<td>---</td>
<td>8.32</td>
<td>1111.98</td>
<td>263.4</td>
</tr>
<tr>
<td>16</td>
<td>ADOWD</td>
<td>.15</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.99</td>
<td>---</td>
<td>6.19</td>
<td>108.41</td>
<td>682.4</td>
</tr>
<tr>
<td>17</td>
<td>ADOWD</td>
<td>.09</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.82</td>
<td>---</td>
<td>6.82</td>
<td>1175.70</td>
<td>267.7</td>
</tr>
<tr>
<td>18</td>
<td>ADOWD</td>
<td>.13</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.78</td>
<td>---</td>
<td>6.78</td>
<td>76.50</td>
<td>542.6</td>
</tr>
<tr>
<td>19</td>
<td>ADOWD</td>
<td>.15</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.92</td>
<td>---</td>
<td>6.28</td>
<td>76.50</td>
<td>542.6</td>
</tr>
<tr>
<td>20</td>
<td>RUNOFF</td>
<td>.11</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.97</td>
<td>---</td>
<td>6.25</td>
<td>67.99</td>
<td>519.5</td>
</tr>
<tr>
<td>21</td>
<td>ADOWD</td>
<td>.27</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.95</td>
<td>---</td>
<td>8.31</td>
<td>142.39</td>
<td>527.2</td>
</tr>
<tr>
<td>22</td>
<td>REACH</td>
<td>.27</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.93</td>
<td>---</td>
<td>6.28</td>
<td>161.73</td>
<td>651.8</td>
</tr>
<tr>
<td>23</td>
<td>RUNOFF</td>
<td>.09</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.89</td>
<td>---</td>
<td>6.15</td>
<td>64.89</td>
<td>700.4</td>
</tr>
<tr>
<td>24</td>
<td>ADOWD</td>
<td>.14</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>26.00</td>
<td>.97</td>
<td>---</td>
<td>6.30</td>
<td>1178.74</td>
<td>480.2</td>
</tr>
<tr>
<td>25</td>
<td>REACH</td>
<td>.13</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.93</td>
<td>---</td>
<td>6.27</td>
<td>171.56</td>
<td>706.4</td>
</tr>
<tr>
<td>26</td>
<td>RUNOFF</td>
<td>.10</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>1.07</td>
<td>---</td>
<td>6.17</td>
<td>82.12</td>
<td>651.2</td>
</tr>
<tr>
<td>27</td>
<td>ADOWD</td>
<td>.48</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.95</td>
<td>---</td>
<td>6.27</td>
<td>223.11</td>
<td>907.7</td>
</tr>
<tr>
<td>28</td>
<td>ADOWD</td>
<td>.55</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>29.00</td>
<td>.87</td>
<td>---</td>
<td>6.78</td>
<td>1235.71</td>
<td>271.4</td>
</tr>
<tr>
<td>29</td>
<td>RUNOFF</td>
<td>.14</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.99</td>
<td>---</td>
<td>6.15</td>
<td>102.70</td>
<td>744.4</td>
</tr>
<tr>
<td>30</td>
<td>REACH</td>
<td>.14</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.97</td>
<td>---</td>
<td>6.27</td>
<td>88.87</td>
<td>602.7</td>
</tr>
<tr>
<td>31</td>
<td>RUNOFF</td>
<td>.14</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.89</td>
<td>---</td>
<td>6.12</td>
<td>108.70</td>
<td>700.1</td>
</tr>
<tr>
<td>32</td>
<td>ADOWD</td>
<td>.29</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.82</td>
<td>---</td>
<td>6.18</td>
<td>177.80</td>
<td>605.7</td>
</tr>
<tr>
<td>33</td>
<td>RUNOFF</td>
<td>.14</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>1.07</td>
<td>---</td>
<td>6.20</td>
<td>76.62</td>
<td>570.7</td>
</tr>
<tr>
<td>34</td>
<td>REACH</td>
<td>.14</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.88</td>
<td>---</td>
<td>6.18</td>
<td>55.18</td>
<td>688.3</td>
</tr>
<tr>
<td>35</td>
<td>RUNOFF</td>
<td>.14</td>
<td>2</td>
<td>.05</td>
<td>.5</td>
<td>7.10</td>
<td>24.00</td>
<td>.97</td>
<td>---</td>
<td>6.27</td>
<td>114.71</td>
<td>562.6</td>
</tr>
</tbody>
</table>
### Summary Table 1 - Selected Results of Standards and Executive Control Instructions in the Order Performed

(4 star(s) after the peak discharge time and rate (CS) values indicates a flat top hydrograph. A question mark (?) indicates a hydrograph with peak as last point.)

<table>
<thead>
<tr>
<th>Section</th>
<th>Operation</th>
<th>Area</th>
<th>#</th>
<th>Cond.</th>
<th>Increm.</th>
<th>Rain</th>
<th>Precipitation</th>
<th>Runoff</th>
<th>Elevation</th>
<th>Peak Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALTERNATE</td>
<td>STORM 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SECTION 50</td>
<td>RUNOFF</td>
<td>0.12</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>1.00</td>
<td>24.00</td>
<td>0.00</td>
<td>6.72</td>
<td>1220.96</td>
</tr>
<tr>
<td>SECTION 51</td>
<td>REACH</td>
<td>0.22</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>1.00</td>
<td>24.00</td>
<td>0.00</td>
<td>6.40</td>
<td>1078.87</td>
</tr>
<tr>
<td>SECTION 51</td>
<td>RUNOFF</td>
<td>0.12</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.00</td>
<td>24.00</td>
<td>0.00</td>
<td>6.49</td>
<td>81.29</td>
</tr>
<tr>
<td>SECTION 51</td>
<td>REACH</td>
<td>0.24</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>1.00</td>
<td>24.00</td>
<td>0.00</td>
<td>6.42</td>
<td>167.42</td>
</tr>
<tr>
<td>SECTION 51</td>
<td>RUNOFF</td>
<td>0.09</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.00</td>
<td>24.00</td>
<td>0.00</td>
<td>6.09</td>
<td>117.77</td>
</tr>
<tr>
<td>SECTION 51</td>
<td>REACH</td>
<td>0.62</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>24.00</td>
<td>1.00</td>
<td>6.28</td>
<td>218.59</td>
</tr>
<tr>
<td>SECTION 52</td>
<td>RUNOFF</td>
<td>0.22</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>24.00</td>
<td>1.00</td>
<td>6.27</td>
<td>208.71</td>
</tr>
<tr>
<td>SECTION 52</td>
<td>REACH</td>
<td>0.21</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>24.00</td>
<td>0.99</td>
<td>6.19</td>
<td>94.89</td>
</tr>
<tr>
<td>SECTION 52</td>
<td>RUNOFF</td>
<td>0.57</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>24.00</td>
<td>0.00</td>
<td>6.20</td>
<td>282.56</td>
</tr>
<tr>
<td>SECTION 52</td>
<td>REACH</td>
<td>0.86</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>24.00</td>
<td>1.02</td>
<td>6.24</td>
<td>447.55</td>
</tr>
<tr>
<td>SECTION 52</td>
<td>RUNOFF</td>
<td>0.59</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>24.00</td>
<td>0.00</td>
<td>6.86</td>
<td>1229.18</td>
</tr>
<tr>
<td>SECTION 52</td>
<td>REACH</td>
<td>0.42</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>25.00</td>
<td>0.86</td>
<td>6.79</td>
<td>1821.67</td>
</tr>
<tr>
<td>SECTION 53</td>
<td>RUNOFF</td>
<td>0.14</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>25.00</td>
<td>0.97</td>
<td>6.18</td>
<td>97.98</td>
</tr>
<tr>
<td>SECTION 53</td>
<td>REACH</td>
<td>0.42</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>25.00</td>
<td>0.86</td>
<td>6.86</td>
<td>1435.27</td>
</tr>
<tr>
<td>SECTION 53</td>
<td>RUNOFF</td>
<td>0.14</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>25.00</td>
<td>0.97</td>
<td>6.18</td>
<td>97.98</td>
</tr>
<tr>
<td>SECTION 54</td>
<td>RUNOFF</td>
<td>0.17</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>26.00</td>
<td>1.09</td>
<td>6.12</td>
<td>145.62</td>
</tr>
<tr>
<td>SECTION 54</td>
<td>REACH</td>
<td>0.24</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>26.00</td>
<td>0.99</td>
<td>6.17</td>
<td>222.67</td>
</tr>
<tr>
<td>SECTION 54</td>
<td>RUNOFF</td>
<td>0.57</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>26.00</td>
<td>0.00</td>
<td>6.85</td>
<td>1612.20</td>
</tr>
<tr>
<td>SECTION 54</td>
<td>REACH</td>
<td>0.86</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>26.00</td>
<td>0.00</td>
<td>6.55</td>
<td>1518.02</td>
</tr>
<tr>
<td>SECTION 55</td>
<td>RUNOFF</td>
<td>0.12</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>26.00</td>
<td>1.00</td>
<td>6.21</td>
<td>196.22</td>
</tr>
<tr>
<td>SECTION 55</td>
<td>REACH</td>
<td>0.58</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>26.00</td>
<td>0.00</td>
<td>6.55</td>
<td>1518.02</td>
</tr>
<tr>
<td>SECTION 56</td>
<td>RUNOFF</td>
<td>0.26</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>26.00</td>
<td>1.09</td>
<td>6.25</td>
<td>1515.29</td>
</tr>
<tr>
<td>SECTION 56</td>
<td>REACH</td>
<td>0.26</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>26.00</td>
<td>1.21</td>
<td>6.10</td>
<td>177.48</td>
</tr>
<tr>
<td>SECTION 56</td>
<td>RUNOFF</td>
<td>0.61</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>26.00</td>
<td>1.09</td>
<td>6.11</td>
<td>1868.76</td>
</tr>
<tr>
<td>SECTION 57</td>
<td>RUNOFF</td>
<td>0.18</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>26.00</td>
<td>1.15</td>
<td>6.13</td>
<td>145.87</td>
</tr>
<tr>
<td>SECTION 58</td>
<td>RUNOFF</td>
<td>0.11</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>26.00</td>
<td>1.00</td>
<td>6.10</td>
<td>95.51</td>
</tr>
<tr>
<td>SECTION 59</td>
<td>REACH</td>
<td>0.22</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>25.00</td>
<td>1.35</td>
<td>6.23</td>
<td>152.90</td>
</tr>
<tr>
<td>SECTION 59</td>
<td>RUNOFF</td>
<td>0.11</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>25.00</td>
<td>1.09</td>
<td>6.16</td>
<td>94.73</td>
</tr>
<tr>
<td>SECTION 59</td>
<td>REACH</td>
<td>0.24</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>25.00</td>
<td>1.13</td>
<td>6.14</td>
<td>235.45</td>
</tr>
<tr>
<td>SECTION 59</td>
<td>RUNOFF</td>
<td>0.11</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>25.00</td>
<td>0.97</td>
<td>6.09</td>
<td>48.53</td>
</tr>
<tr>
<td>SECTION 59</td>
<td>REACH</td>
<td>0.28</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>25.00</td>
<td>1.07</td>
<td>6.12</td>
<td>122.80</td>
</tr>
<tr>
<td>SECTION 60</td>
<td>RUNOFF</td>
<td>0.30</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>25.00</td>
<td>1.07</td>
<td>6.17</td>
<td>235.90</td>
</tr>
<tr>
<td>SECTION 60</td>
<td>REACH</td>
<td>0.12</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>25.00</td>
<td>1.07</td>
<td>6.10</td>
<td>94.73</td>
</tr>
<tr>
<td>SECTION 60</td>
<td>RUNOFF</td>
<td>0.50</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>25.00</td>
<td>1.07</td>
<td>6.10</td>
<td>122.80</td>
</tr>
<tr>
<td>SECTION 61</td>
<td>RUNOFF</td>
<td>0.12</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>25.00</td>
<td>1.11</td>
<td>6.10</td>
<td>155.17</td>
</tr>
<tr>
<td>SECTION 61</td>
<td>REACH</td>
<td>0.62</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>25.00</td>
<td>1.11</td>
<td>6.12</td>
<td>570.46</td>
</tr>
<tr>
<td>SECTION 61</td>
<td>RUNOFF</td>
<td>0.57</td>
<td>7</td>
<td>2</td>
<td>0.05</td>
<td>3.10</td>
<td>25.00</td>
<td>1.11</td>
<td>6.12</td>
<td>570.46</td>
</tr>
</tbody>
</table>