

**SUBDIVISION COMMITTEE
METROPOLITAN AREA PLANNING COMMISSION**

**AGENDA ITEM NO. 7
OCTOBER 18, 2001**

**STAFF REPORT
(Preliminary Plat)**

CASE NUMBER: SUB 2001-105 -- GRAY'S FIFTH ADDITION

OWNER/APPLICANT: Alice W. Wall Revocable Trust, Attn: Percival J. Kirk, Trustee, 1531 N. Ridgewood, Wichita, KS 67208; (Contract purchaser) Gray Development, Inc., Attn: Billy Gray, 204 N. Woodchuck, Wichita, KS 67212

SURVEYOR/ENGINEER: Baughman Company, P.A., 315 Ellis, Wichita, KS 67211

LOCATION: Northeast corner of Hoover Road and 47th St. South

SITE SIZE: 127.5 Acres

NUMBER OF LOTS

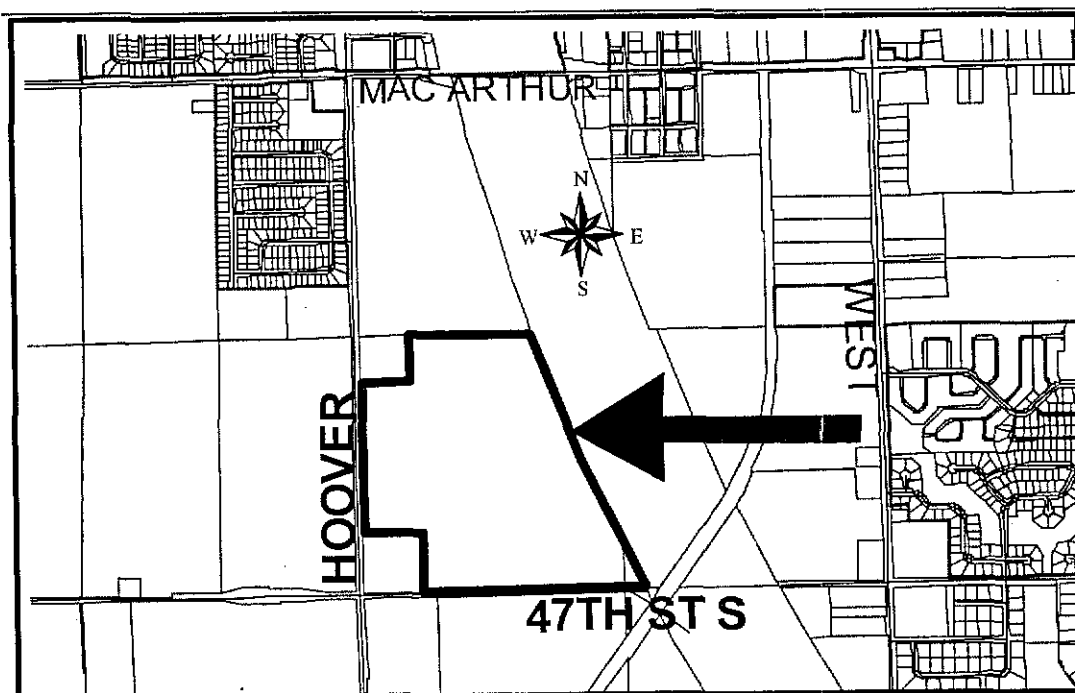
Residential:	305
Office:	
Commercial:	
Industrial:	
Total:	305

MINIMUM LOT AREA: 7,000 Sq. Ft.

CURRENT ZONING: SF-20, Single-Family Residential

PROPOSED ZONING: SF-5, Single-Family Residential

VICINITY MAP



NOTE: This is unplatted property located in the County within three miles of the City of Wichita. It is in an area designated as "2030 Urban Service Area" by the Wichita-Sedgwick County Comprehensive Plan. Since the site does not abut the City of Wichita, annexation cannot be obtained at this time except by island annexation through the County. If annexation does not occur, a zone change request to SF-5, Single-Family Residential will be needed to allow for the lot sizes being platted.

STAFF COMMENTS:

- A. Prior to this plat being scheduled for City Council review, annexation of the property will need to be completed. Upon annexation, the property will be zoned SF-5, Single-Family Residential and allow for the lot sizes being platted.
- B. If annexation does not occur, a zone change request to SF-5, Single-Family Residential will be needed to allow for the lot sizes being platted. This plat will be subject to approval of any associated zone change and any related conditions of such a zone change. Prior to this plat being heard by the MAPC, a zone change shall have been submitted and approved by the MAPC.
- C. The Applicant shall guarantee the extension of City water and sanitary sewer to serve the lots being platted.
- D. City Engineering needs to comment on the need for any guarantees or easements.
- E. Traffic/County Engineering needs to comment on the need for street improvements (e.g. southbound left turn lane on Hoover). County Engineering has requested a guarantee for a sidewalk and signalized pedestrian crossing along Hoover Road.
- F. County/City Engineering needs to comment on the status of the applicant's drainage concept. A Master Lot Grading Plan is needed. A Levee permit from County Engineering is required for the pond construction in Reserve A. The Soil Conservation District should be contacted regarding elimination of the terraces.
- G. MAPD recommends relocating 44th St. South to the south to eliminate direct lot access.
- H. The final plat shall state in the plat's text the purposes of the proposed reserves as well as the ownership and maintenance responsibilities.
- I. Provisions shall be made for ownership and maintenance of the proposed reserves. The applicant shall either form a lot owners' association prior to recording the plat or shall submit a covenant stating when the association will be formed, when the reserves will be deeded to the association and who is to own and maintain the reserves prior to the association taking over those responsibilities. This covenant shall also provide for the Homeowners' Association to maintain the "parking strip" located between this site's south property line and driving surface for 47th St. South.
- J. For those reserves being platted for drainage purposes, the required covenant which provides for ownership and maintenance of the reserves shall grant, to the appropriate governing body, the authority to maintain the drainage reserves in the event the owner(s) fail to do so. The covenant shall provide for the cost of such maintenance to be charged back to the owner(s) by the governing body.

SUB 2001-105 – Preliminary Plat of GRAY'S FIFTH ADDITION

October 18, 2001 - Page 3

- K. Reserve A shall be extended to the internal streets to the west to increase its accessibility and usefulness for all homeowners in the Addition. This may be accomplished through access easements through the lots or extensions of the Reserve.
- L. The setbacks platted along 47th St. and Hoover need to be increased to 35 feet to conform with the Zoning setback standard for County section line roads.
- M. Based upon the Comprehensive Plan, a pathway is shown along the east line of this site. The Land Use Division of MAPD has requested that the plat include a public access easement within Reserve A.
- N. The Applicant shall guarantee the paving of the proposed interior streets to the urban street standard. Sidewalks shall also be provided along one side of all through, non-cul-de-sac streets. A guarantee will be needed for the paving of 47th Street from Hoover to Clara.
- O. County Fire Department has advised that the streets need to be installed and approved prior to any construction being permitted or building permits being issued.
- P. The applicant shall submit a covenant which provides for four (4) off-street parking spaces per dwelling unit on each lot which abuts a 58-foot street. The covenant shall inventory the affected lots by lot and block number and shall state that the covenant runs with the land and is binding on future owners and assigns.
- Q. On the final plat, the MAPC signature block needs to reference "J.D. Michaelis, Chair".
- R. The County Fire Department/ GIS needs to comment on the plat's street names. GIS has requested that South 44th Cir. be renamed 44th Cir. S. In addition, South 44th Ct. should be renamed as 44th Ct. S.
- S. The applicant shall submit a copy of the instrument which establishes the pipeline easements on the property, which verifies that the easements shown are sufficient and that utilities may be located adjacent to and within the easements.
- T. The applicant's agent shall determine any setback requirements for the pipelines by researching the text of the pipeline agreements. If a setback from the pipeline easements is provided for in the pipeline easement agreements, it shall be indicated on the face of the plat.
- U. The Subdivision regulations discourage the inclusion of pipeline easements within the perimeter of residential lots. It is recommended that the pipeline crossing the northern line of the plat be included within a Reserve, or in the alternative a restrictive covenant provided identifying the pipeline easement.
- V. The Applicant is reminded that a platting binder is required with the final plat. Approval of this plat will be subject to submittal of this binder and any relevant conditions found by such a review.
- W. The plat's text shall include language that a drainage plan has been developed for the plat and that all drainage easements, rights-of-way, or reserves shall remain at established grades or as modified with the approval of the applicable City or County Engineer, and unobstructed to allow for the conveyance of stormwater.

- X. The applicant shall install or guarantee the installation of all utilities and facilities which are applicable and described in Article 8 of the MAPC Subdivision Regulations. (Water service and fire hydrants required by Article 8 for fire protection shall be as per the direction and approval of the Chief of the Fire Department.)
- Y. The applicant's engineer is advised that the Register of Deeds is requiring the name(s) of the notary public, who acknowledges the signatures on this plat, to be printed beneath the notary's signature.
- Z. To receive mail delivery without delay, and to avoid unnecessary expense, the applicant is advised of the necessity to meet with the U.S. Postal Service Growth Management Coordinator (Phone 316-946-4556) prior to development of the plat so that the type of delivery, and the tentative mailbox locations can be determined.
- AA. The applicant is advised that various State and Federal requirements (specifically but not limited to the Army Corps of Engineers, Kanopolis Project Office, Rt. 1, Box 317, Valley Center, KS 67147) for the control of soil and wind erosion and the protection of wetlands may impact how this site can be developed. It is the applicant's responsibility to contact all appropriate agencies to determine any such requirements.
- BB. The owner of the subdivision should be aware of the fact that the development of any subdivision greater than five (5) acres in size may require an NPDES Storm Water Discharge Permit from the Kansas Department of Health and Environment in Topeka. Further, on all construction sites, the City of Wichita requires that best management practices be used to reduce pollutant loadings in storm water runoffs.
- CC. Perimeter closure computations shall be submitted with the final plat tracing.
- DD. Recording of the plat within thirty (30) days after approval by the City Council and/or County Commission.
- EE. The representatives from the utility companies should be prepared to comment on the need for any additional utility easements to be platted on this property.
- FF. The applicant is reminded that a disk shall be submitted with the final plat tracing to the Planning Department detailing this plat in digital format in AutoCAD. This will be used by the City and County GIS Department.

STAFF REPORT
(Final Plat, Overall Preliminary Plat Approved 10/18/01)

CASE NUMBER: SUB 2001-105 -- GRAY'S FIFTH ADDITION

OWNER/APPLICANT: Alice W. Wall Revocable Trust, Attn: Percival J. Kirk, Trustee, 41412 N. Clear Crossing Road, Anthem, AZ 85086-1076; (Contract purchaser) Gray Development, Inc., Attn: Billy Gray, 204 N. Woodchuck, Wichita, KS 67212

SURVEYOR/ENGINEER: Baughman Company, P.A., 315 Ellis, Wichita, KS 67211

LOCATION: Northeast corner of Hoover Road and 47th St. South

SITE SIZE: 42.22 Acres

NUMBER OF LOTS

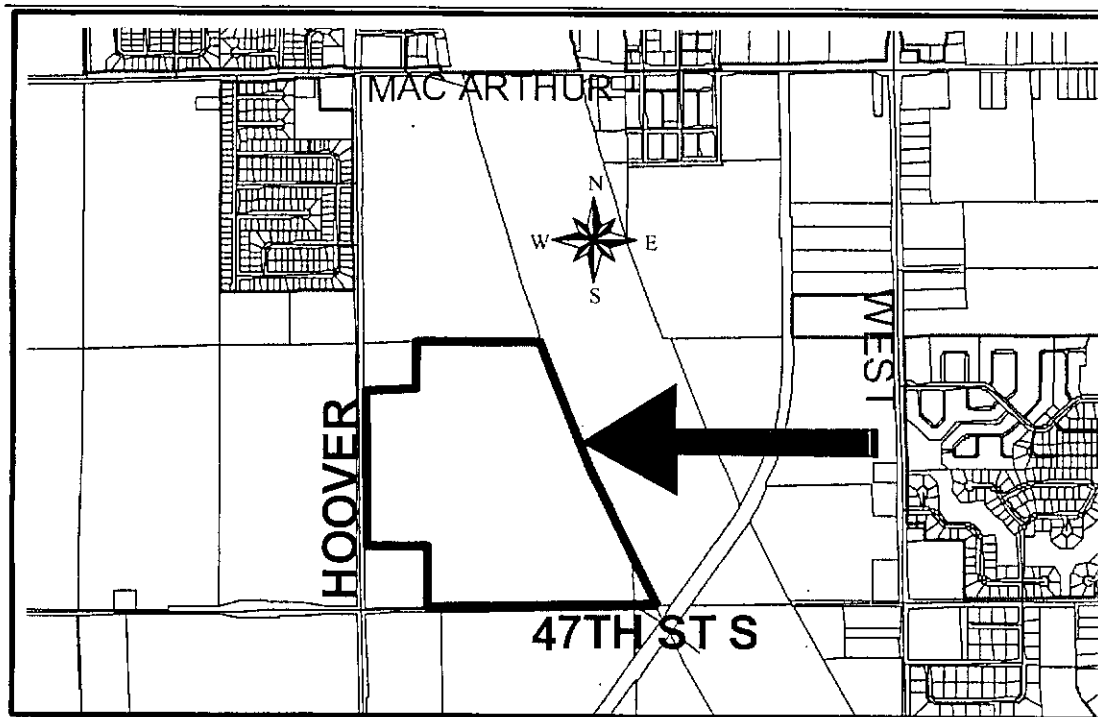
Residential:	112
Office:	
Commercial:	
Industrial:	
Total:	112

MINIMUM LOT AREA: 8,078 Sq. Ft.

CURRENT ZONING: SF-20, Single-Family Residential

PROPOSED ZONING: SF-5, Single-Family Residential

VICINITY MAP



NOTE: This is unplatted property located in the County within three miles of the City of Wichita. It is in an area designated as "2030 Urban Service Area" by the Wichita-Sedgwick County Comprehensive Plan. Since the site does not abut the City of Wichita, annexation cannot be obtained at this time except by island annexation through the County. If annexation does not occur, a zone change request to SF-5, Single-Family Residential will be needed to allow for the lot sizes being platted.

An overall preliminary plat was approved for this site on October 18, 2001. This plat encompasses the northern portion of that preliminary plat, and represents the first phase of development.

- A. Prior to this plat being scheduled for City Council review, annexation of the property will need to be completed. Upon annexation, the property will be zoned SF-5, Single-Family Residential and allow for the lot sizes being platted.
- B. If annexation does not occur, a zone change request to SF-5, Single-Family Residential will be needed to allow for the lot sizes being platted. This plat will be subject to approval of any associated zone change and any related conditions of such a zone change. Prior to this plat being heard by the MAPC, a zone change shall have been submitted and approved by the MAPC.
- C. The Applicant shall guarantee the extension of City water and sanitary sewer to serve the lots being platted.
- D. City Engineering needs to comment on the need for any guarantees or easements. *The Applicant shall meet with Storm Water Management prior to final plat submittal.*
- E. County Engineering needs to comment on the need for street improvements. *County Engineering has requested a guarantee for a sidewalk and signalized pedestrian crossing along Hoover Road; however actual construction will be based on traffic warrants. Left turn lanes are required along both Hoover and 47th St. South.*
- F. County/City Engineering needs to comment on the status of the applicant's drainage plan. *A Drainage Plan and Master Lot Grading Plan is needed. A Levee permit from County Engineering is required for the pond construction in Reserve A. The Soil Conservation District should be contacted regarding elimination of the terraces.*
- G. County Fire Department requests a temporary 20-ft access road adjacent to the plat on the south line from Hoover to Doris.
- H. Provisions shall be made for ownership and maintenance of the proposed reserves. The applicant shall either form a lot owners' association prior to recording the plat or shall submit a covenant stating when the association will be formed, when the reserves will be deeded to the association and who is to own and maintain the reserves prior to the association taking over those responsibilities. This covenant shall also provide for the Homeowners' Association to maintain the "parking strip" located between this site's south property line and driving surface for 47th St. South.
- I. For those reserves being platted for drainage purposes, the required covenant which provides for ownership and maintenance of the reserves shall grant, to the appropriate governing body, the authority to maintain the drainage reserves in the event the owner(s) fail to do so. The covenant shall provide for the cost of such maintenance to be charged back to the owner(s) by the governing body.

- J. Based upon the Comprehensive Plan, a pathway is shown along the east line of this site. The Land Use Division of MAPD has requested that the plat include a public access easement within Reserve A.
- K. The Applicant shall guarantee the paving of the proposed interior streets to the urban street standard. Sidewalks shall also be provided along one side of all through, non-cul-de-sac streets.
- L. County Fire Department has advised that the streets need to be installed and approved prior to any construction being permitted or building permits being issued.
- M. The applicant shall submit a covenant which provides for four (4) off-street parking spaces per dwelling unit on each lot which abuts a 58-foot street. The covenant shall inventory the affected lots by lot and block number and shall state that the covenant runs with the land and is binding on future owners and assigns.
- N. On the final plat, the MAPC signature block needs to reference "J.D. Michaelis, Chair".
- O. The applicant shall submit a copy of the instrument which establishes the pipeline easements on the property, which verifies that the easements shown are sufficient and that utilities may be located adjacent to and within the easements.
- P. The applicant's agent shall determine any setback requirements for the pipelines by researching the text of the pipeline agreements. If a setback from the pipeline easements is provided for in the pipeline easement agreements, it shall be indicated on the face of the plat.
- Q. The Subdivision regulations discourage the inclusion of pipeline easements within the perimeter of residential lots. It is recommended that the pipeline crossing the northern line of the plat be included within a Reserve, or in the alternative a restrictive covenant provided identifying the pipeline easement. southbound left turn lane. **The Applicant intends to retain the pipeline easements on the lots. A restrictive covenant will be needed.**
- R. The plat's text shall include language that a drainage plan has been developed for the plat and that all drainage easements, rights-of-way, or reserves shall remain at established grades or as modified with the approval of the applicable City or County Engineer, and unobstructed to allow for the conveyance of stormwater.
- S. The applicant shall install or guarantee the installation of all utilities and facilities which are applicable and described in Article 8 of the MAPC Subdivision Regulations. (Water service and fire hydrants required by Article 8 for fire protection shall be as per the direction and approval of the Chief of the Fire Department.)
- T. The applicant's engineer is advised that the Register of Deeds is requiring the name(s) of the notary public, who acknowledges the signatures on this plat, to be printed beneath the notary's signature.
- U. To receive mail delivery without delay, and to avoid unnecessary expense, the applicant is advised of the necessity to meet with the U.S. Postal Service Growth Management Coordinator (Phone 316-946-4556) prior to development of the plat so that the type of delivery, and the tentative mailbox locations can be determined.

- V. The applicant is advised that various State and Federal requirements (specifically but not limited to the Army Corps of Engineers, Kanopolis Project Office, Rt. 1, Box 317, Valley Center, KS 67147) for the control of soil and wind erosion and the protection of wetlands may impact how this site can be developed. It is the applicant's responsibility to contact all appropriate agencies to determine any such requirements.
- W. The owner of the subdivision should be aware of the fact that the development of any subdivision greater than five (5) acres in size may require an NPDES Storm Water Discharge Permit from the Kansas Department of Health and Environment in Topeka. Further, on all construction sites, the City of Wichita requires that best management practices be used to reduce pollutant loadings in storm water runoffs.
- X. Perimeter closure computations shall be submitted with the final plat tracing.
- Y. Recording of the plat within thirty (30) days after approval by the City Council and/or County Commission.
- Z. The representatives from the utility companies should be prepared to comment on the need for any additional utility easements to be platted on this property. **Southwestern Bell and KGE have requested additional easements.**
- AA. The applicant is reminded that a disk shall be submitted with the final plat tracing to the Planning Department detailing this plat in digital format in AutoCAD. This will be used by the City and County GIS Department.

CLOSURE - GRAY'S 5TH ADDITION

PT 1	North: 22765.3250	East :	35579.7041
Line	Course: N 00-01-39 E	Length:	608.9900
PT 2	North: 23374.3149	East :	35579.9964
Line	Course: N 89-34-13 E	Length:	560.0500
PT 3	North: 23378.5153	East :	36140.0306
Line	Course: N 00-01-39 E	Length:	466.7000
PT 4	North: 23845.2152	East :	36140.2546
Line	Course: N 89-34-13 E	Length:	1210.5000
PT 5	North: 23854.2940	East :	37350.7206
Line	Course: S 19-21-34 E	Length:	2.0100
PT 6	North: 23852.3976	East :	37351.3869
Line	Course: S 19-21-34 E	Length:	413.3300
PT 7	North: 23462.4383	East :	37488.4030
Line	Course: S 20-34-50 E	Length:	512.9600
PT 8	North: 22982.2160	East :	37668.7208
Line	Course: S 21-51-07 E	Length:	234.8000
PT 9	North: 22764.2867	East :	37756.1156
Line	Course: N 89-58-21 W	Length:	1507.4100
PT 10	North: 22765.0102	East :	36248.7057
Line	Course: N 00-01-39 E	Length:	5.5000
PT 11	North: 22770.5102	East :	36248.7084
Line	Course: N 89-58-21 W	Length:	120.0000
PT 12	North: 22770.5678	East :	36128.7084
Line	Course: S 00-01-39 W	Length:	5.5000
PT 13	North: 22765.0678	East :	36128.7057
Line	Course: N 89-58-21 W	Length:	549.0000
PT 1	North: 22765.3313	East :	35579.7058

Existing Drainage Basin

The existing drainage area is comprized of 237 ac of primarily agricultural land. The area is evenly sloped, mostly west to east, but with a slight tendency to the south.

Existing Time of Concentration

Time of concentration has been calculated following the method outlined in TR-55.

$$T_{t_1} = \frac{0.007 (nL)^{0.8}}{P_2^{0.5} S_0^{0.4}}$$

L = length of sheet flow = 100'
 n = 0.2 approx avg for card.
 P_2 = 3.5 2-yr 24-hr rainfall
 S_0 = avg land slope = 0.013 ft/ft

$$T_{t_1} = 0.23 \text{ hr}$$

$$T_{t_2} = \frac{L}{3600 V}$$

L = flow length = 1800
 V = 0.8 from Fig 3-1, TR-55, $S_0 = 0.013$

$$T_{t_2} = 0.63 \text{ hr}$$

$$T_{t_3} = \frac{L}{3600 V}$$

L = flow length = 5500
 V = $16.1345 \sqrt{S_0}$ Appendix F, TR-55
 V = 0.48 ft/s

$$T_{t_3} = 3.2 \text{ hr}$$

$$T_c = T_{t_1} + T_{t_2} + T_{t_3} = 4.06 \Rightarrow 4 \text{ hr}$$

Offsite Basin to North Line of Gray's 5th Add

$$T_{t1} = T_{t1 \text{ exist}} = 0.23$$

$$T_{t2} = T_{t2 \text{ exist}} = 0.63$$

$$T_{t3} = \frac{2500}{3600(0.48)} = 1.4$$

$$T_c = 2.3 \text{ hr}$$

Travel Time through Gray 5th

$$T_{t4} = \frac{3000}{3600(0.48)} = 1.7 \text{ hr}$$

Gray 5th Add.

Assume $T_c = T_{t4}$, this assumes that the residential areas have a quick response, and that the overland flow through the reserve controls the Time of Concentration.

These values were used for input into HEC-1

Results:

	2-yr	5-yr	10-yr	100-yr
Existing	55	93	119	218
Travel Time T_{t4}	2.4	2.1	2.0	1.8
Developed	67	107	134	239
increase in flow	22%	15%	12%	10%

Increased flow rates above, do not reflect existing detention effects created by the 2-36" CMP.

Check existing Q @ 2-36" CMP

$$Q_{barrel} = 218/2 = 109$$

$$y_n = 2.8'$$

$$y_c = 2.9'$$

from nomograph HW/D = 3.5

$$HW = 10.5' \Rightarrow WS_{elev} = 1294.8$$

Check w/ T.W control, y_n nearly equal to y_c

$$\frac{P_1}{\rho g} + \frac{V_1^2}{2g} + WS_1 = \frac{P_2}{\rho g} + \frac{V_2^2}{2g} + WS_2 + h_f + h_e + h_x$$

$$WS_1 = 1287.1 + 1.5 \frac{\bar{V}^2}{2g} + S_f L$$

$$S_f = \left[\frac{V_n}{1.49 R^{2/3}} \right]^2 = \left[\frac{(15.4)(0.24)}{(1.49)(0.75)^{2/3}} \right]^2$$

$$S_f = 0.09 \text{ ft/ft}$$

$$h_f = (0.09)(50)$$

$$h_f = 4.5 \text{ ft}$$

$$h_{x+e} = 1.5 \frac{(15.4)^2}{2g} = 5.5$$

$$WS_1 = 1297.1$$

either case over tops road.

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*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* MAY 1991 *
* VERSION 4.0.1E *
* Lahey F77L-EM/32 version 5.01 *
* Dodson & Associates, Inc. *
* RUN DATE 11/28/01 TIME 10:18:27 *
*****

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*****
*
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 551-1748 *
*****

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X X XXXXXXXX XXXXX X
X X X X X XX
X X X X X
XXXXXXXX XXXX X XXXXX X
X X X X X
X X X X X
X X XXXXXXXX XXXXX XXX

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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

HEC-1 INPUT

```

1
LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID GRAY'S 5TH ADDITION
*
2 IT 5 15NOV01 0000 300 2000
3 IO 3 0
4 JR PREC 1.0000 1.3143 1.5143 1.7714 2.0000 2.2286
*DIAGRAM
*
* EXISTING
5 KK EXIST
6 BA 0.3703 35min 24hr
7 PB 3.5 1.42 3.5
8 IN 60 4.375 60
9 PC 0 0.011 0.022 0.035 0.048 0.063 0.080 0.098 0.120 0.147
10 PC 0.181 0.235 0.663 0.772 0.820 0.854 0.880 0.902 0.921 0.937
11 PC 0.952 0.965 0.978 0.989 1.000
12 UD 2.4
13 LS 0 75
*
14 KK OFFDEV
15 BA .1875
16 UD 1.32
17 LS 0 75
*
18 KK TRAV
19 RS 1 FLOW 0
20 RC .20 .20 .20 3000 .0009
21 RX 0 30 44 51 53 61 350 575
22 RY 1290 1287 1286 1285.5 1285.5 1286 1288 1290
*
23 KK ONSITE
24 BA .1828
25 UD .9
26 LS 0 80
*
27 KK COMBO
28 HC 2
*
29 ZZ

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INPUT LINE      (V) ROUTING      (--->) DIVERSION OR PUMP FLOW
NO.            (.) CONNECTOR  (<---) RETURN OF DIVERTED OR PUMPED FLOW

5             EXIST
.
.
14            .      OFFDEV
.              V
.              V
18            .      TRAV
.
.
23            .      .      ONSITE
.              .
.              .
27            .      COMBO.....

```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```

*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*   MAY 1991                    *
*   VERSION 4.0.1E              *
*   Lahey F77L-EM/32 version 5.01 *
*   Dodson & Associates, Inc.    *
*   RUN DATE 11/28/01 TIME 10:18:27 *
*****

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*****
*
*   U.S. ARMY CORPS OF ENGINEERS *
*   HYDROLOGIC ENGINEERING CENTER *
*   609 SECOND STREET            *
*   DAVIS, CALIFORNIA 95616     *
*   (916) 551-1748              *
*
*****

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GRAY'S 5TH ADDITION

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

IT           HYDROGRAPH TIME DATA
              NMIN       5  MINUTES IN COMPUTATION INTERVAL
              IDATE      15NOV 1  STARTING DATE
              ITIME      0000  STARTING TIME
              NQ         300  NUMBER OF HYDROGRAPH ORDINATES
              NDDATE     16NOV 1  ENDING DATE
              NDTIME     0055  ENDING TIME
              ICENT      20  CENTURY MARK

              COMPUTATION INTERVAL  0.08 HOURS
              TOTAL TIME BASE       24.92 HOURS

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ENGLISH UNITS

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

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JP           MULTI-PLAN OPTION
              NPLAN      1  NUMBER OF PLANS

JR           MULTI-RATIO OPTION
              RATIOS OF PRECIPITATION
              1.00      1.31      1.51      1.77      2.00      2.23

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*****
*
* 5 KK      *   EXIST *
*
*****

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8 IN          TIME DATA FOR INPUT TIME SERIES
              JXMIN      60  TIME INTERVAL IN MINUTES
              JXDATE     15NOV 1  STARTING DATE

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*** *** *** *** ***

HYDROGRAPH AT STATION EXIST
FOR PLAN 1, RATIO = 1.00

TOTAL RAINFALL = 3.50, TOTAL LOSS = 2.20, TOTAL EXCESS = 1.30

+ PEAK FLOW (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			24.92-HR
			6-HR	24-HR	72-HR	
+ 55.	14.50	37.	12.	12.	12.	12.
		(INCHES) 0.920	1.237	1.237	1.237	1.237
		(AC-FT) 18.	24.	24.	24.	24.

CUMULATIVE AREA = 0.37 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION EXIST
FOR PLAN 1, RATIO = 1.31

TOTAL RAINFALL = 4.60, TOTAL LOSS = 2.47, TOTAL EXCESS = 2.13

+ PEAK FLOW (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			24.92-HR
			6-HR	24-HR	72-HR	
+ 93.	14.42	61.	20.	20.	20.	20.
		(INCHES) 1.535	2.034	2.034	2.034	2.034
		(AC-FT) 30.	40.	40.	40.	40.

CUMULATIVE AREA = 0.37 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION EXIST
FOR PLAN 1, RATIO = 1.51

TOTAL RAINFALL = 5.30, TOTAL LOSS = 2.61, TOTAL EXCESS = 2.69

+ PEAK FLOW (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			24.92-HR
			6-HR	24-HR	72-HR	
+ 119.	14.42	78.	26.	25.	25.	25.
		(INCHES) 1.956	2.580	2.580	2.580	2.580
		(AC-FT) 39.	51.	51.	51.	51.

CUMULATIVE AREA = 0.37 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION EXIST
FOR PLAN 1, RATIO = 1.77

TOTAL RAINFALL = 6.20, TOTAL LOSS = 2.75, TOTAL EXCESS = 3.45

+ PEAK FLOW (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			24.92-HR
			6-HR	24-HR	72-HR	
+ 154.	14.33	100.	33.	32.	32.	32.
		(INCHES) 2.518	3.314	3.314	3.314	3.314
		(AC-FT) 50.	65.	65.	65.	65.

CUMULATIVE AREA = 0.37 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION EXIST
FOR PLAN 1, RATIO = 2.00

TOTAL RAINFALL = 7.00, TOTAL LOSS = 2.85, TOTAL EXCESS = 4.15

+ PEAK FLOW (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			24.92-HR
			6-HR	24-HR	72-HR	

UNIT HYDROGRAPH
81 END-OF-PERIOD ORDINATES

1.	3.	6.	9.	13.	18.	24.	30.	38.	45.
52.	57.	62.	64.	66.	66.	66.	66.	63.	61.
58.	55.	51.	47.	43.	38.	34.	30.	27.	25.
22.	20.	18.	17.	15.	14.	12.	11.	10.	9.
8.	8.	7.	6.	6.	5.	5.	4.	4.	3.
3.	3.	3.	2.	2.	2.	2.	2.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL RAINFALL = 3.50, TOTAL LOSS = 2.20, TOTAL EXCESS = 1.30

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
(CFS)	(HR)	6-HR	24-HR	72-HR	24.92-HR
+	40.	20.	6.	6.	6.
	13.25	1.002	1.279	1.279	1.279
		(INCHES)			
		(AC-FT)	10.	13.	13.
		CUMULATIVE AREA = 0.19 SQ MI			

HYDROGRAPH AT STATION OFFDEV
FOR PLAN 1, RATIO = 1.00

TOTAL RAINFALL = 3.50, TOTAL LOSS = 2.20, TOTAL EXCESS = 1.30

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
(CFS)	(HR)	6-HR	24-HR	72-HR	24.92-HR
+	40.	20.	6.	6.	6.
	13.25	1.002	1.279	1.279	1.279
		(INCHES)			
		(AC-FT)	10.	13.	13.
		CUMULATIVE AREA = 0.19 SQ MI			

HYDROGRAPH AT STATION OFFDEV
FOR PLAN 1, RATIO = 1.31

TOTAL RAINFALL = 4.60, TOTAL LOSS = 2.47, TOTAL EXCESS = 2.13

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
(CFS)	(HR)	6-HR	24-HR	72-HR	24.92-HR
+	69.	34.	11.	10.	10.
	13.17	1.664	2.095	2.095	2.095
		(INCHES)			
		(AC-FT)	17.	21.	21.
		CUMULATIVE AREA = 0.19 SQ MI			

HYDROGRAPH AT STATION OFFDEV
FOR PLAN 1, RATIO = 1.51

TOTAL RAINFALL = 5.30, TOTAL LOSS = 2.61, TOTAL EXCESS = 2.69

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
(CFS)	(HR)	6-HR	24-HR	72-HR	24.92-HR
+	88.	43.	13.	13.	13.
	13.08	2.114	2.654	2.654	2.654
		(INCHES)			
		(AC-FT)	21.	27.	27.
		CUMULATIVE AREA = 0.19 SQ MI			

HYDROGRAPH AT STATION OFFDEV
FOR PLAN 1, RATIO = 1.77

TOTAL RAINFALL = 6.20, TOTAL LOSS = 2.75, TOTAL EXCESS = 3.45

PEAK FLOW (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
115.	13.08	55.	17.	17.	17.	
		(INCHES) 2.714	3.403	3.403	3.403	
		(AC-FT) 27.	34.	34.	34.	

CUMULATIVE AREA = 0.19 SQ MI

*** **

HYDROGRAPH AT STATION OFFDEV
FOR PLAN 1, RATIO = 2.00

TOTAL RAINFALL = 7.00, TOTAL LOSS = 2.85, TOTAL EXCESS = 4.15

PEAK FLOW (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
138.	13.08	66.	21.	20.	20.	
		(INCHES) 3.261	4.091	4.091	4.091	
		(AC-FT) 33.	41.	41.	41.	

CUMULATIVE AREA = 0.19 SQ MI

*** **

HYDROGRAPH AT STATION OFFDEV
FOR PLAN 1, RATIO = 2.23

TOTAL RAINFALL = 7.80, TOTAL LOSS = 2.94, TOTAL EXCESS = 4.86

PEAK FLOW (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
163.	13.08	77.	24.	23.	23.	
		(INCHES) 3.817	4.796	4.796	4.796	
		(AC-FT) 38.	48.	48.	48.	

CUMULATIVE AREA = 0.19 SQ MI

* *
18 KK * TRAV *
* *

HYDROGRAPH ROUTING DATA

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

20 RC NORMAL DEPTH CHANNEL
ANL 0.200 LEFT OVBANK N-VALUE
ANCH 0.200 MAIN CHANNEL N-VALUE
ANR 0.200 RIGHT OVBANK N-VALUE
RLNTH 3000. REACH LENGTH
SEL 0.0009 ENERGY SLOPE
ELMAX 0.0 MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

--- LEFT OVBANK --- + ----- MAIN CHANNEL ----- + --- RIGHT OVBANK ---
22 RY ELEVATION 1290.00 1287.00 1286.00 1285.50 1285.50 1286.00 1288.00 1290.00

21 RX DISTANCE 0.00 30.00 44.00 51.00 53.00 61.00 350.00 575.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	0.09	0.30	0.82	1.94	3.68	6.03	8.99	12.55	16.71
OUTFLOW	0.00	0.08	0.40	1.33	3.53	7.62	14.10	23.46	36.08	52.33
ELEVATION	1285.50	1285.74	1285.97	1286.21	1286.45	1286.68	1286.92	1287.16	1287.39	1287.63
STORAGE	21.46	26.80	32.62	38.93	45.70	52.95	60.67	68.86	77.53	86.67
OUTFLOW	72.56	97.62	127.76	162.56	202.22	246.95	296.96	352.46	413.65	480.74
ELEVATION	1287.87	1288.10	1288.34	1288.58	1288.82	1289.05	1289.29	1289.53	1289.76	1290.00

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HYDROGRAPH AT STATION TRAV
FOR PLAN 1, RATIO = 1.00

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
+ (CFS)	(HR)		6-HR	24-HR	72-HR	24.92-HR
+ 14.	15.67	(CFS)	12.	5.	5.	5.
		(INCHES)	0.602	0.984	0.984	0.984
		(AC-FT)	6.	10.	10.	10.
PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
+ (AC-FT)	(HR)		6-HR	24-HR	72-HR	24.92-HR
+ 6.	15.67		5.	2.	2.	2.
PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
+ (FEET)	(HR)		6-HR	24-HR	72-HR	24.92-HR
+ 1286.91	15.58		1286.85	1286.16	1286.14	1286.14

CUMULATIVE AREA = 0.19 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION TRAV
FOR PLAN 1, RATIO = 1.31

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
+ (CFS)	(HR)		6-HR	24-HR	72-HR	24.92-HR
+ 25.	15.25	(CFS)	22.	9.	8.	8.
		(INCHES)	1.068	1.689	1.689	1.689
		(AC-FT)	11.	17.	17.	17.
PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
+ (AC-FT)	(HR)		6-HR	24-HR	72-HR	24.92-HR
+ 10.	15.25		8.	3.	3.	3.
PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
+ (FEET)	(HR)		6-HR	24-HR	72-HR	24.92-HR
+ 1287.19	15.25		1287.11	1286.29	1286.26	1286.26

CUMULATIVE AREA = 0.19 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION TRAV
FOR PLAN 1, RATIO = 1.51

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
+ (CFS)	(HR)		6-HR	24-HR	72-HR	24.92-HR
+ 34.	15.08	(CFS)	28.	11.	11.	11.
		(INCHES)	1.403	2.183	2.183	2.183
		(AC-FT)	14.	22.	22.	22.
PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
+ (AC-FT)	(HR)		6-HR	24-HR	72-HR	24.92-HR

12.	15.08	10.	4.	4.	4.
PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE		
+ (FEET)	(HR)	6-HR	24-HR	72-HR	24.92-HR
1287.35	15.08	1287.25	1286.36	1286.33	1286.33
CUMULATIVE AREA =		0.19 SQ MI			

*** *** *** *** ***

HYDROGRAPH AT STATION TRAV
FOR PLAN 1, RATIO = 1.77

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW		
+ (CFS)	(HR)	6-HR	24-HR	72-HR	24.92-HR
+ 46.	15.00	(CFS)	38.	14.	14.
		(INCHES)	1.866	2.855	2.855
		(AC-FT)	19.	29.	29.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE		
+ (AC-FT)	(HR)	6-HR	24-HR	72-HR	24.92-HR
15.	15.00	13.	5.	5.	5.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE		
+ (FEET)	(HR)	6-HR	24-HR	72-HR	24.92-HR
1287.54	15.00	1287.41	1286.45	1286.42	1286.42
CUMULATIVE AREA =		0.19 SQ MI			

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HYDROGRAPH AT STATION TRAV
FOR PLAN 1, RATIO = 2.00

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW		
+ (CFS)	(HR)	6-HR	24-HR	72-HR	24.92-HR
+ 58.	14.92	(CFS)	46.	18.	17.
		(INCHES)	2.300	3.479	3.479
		(AC-FT)	23.	35.	35.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE		
+ (AC-FT)	(HR)	6-HR	24-HR	72-HR	24.92-HR
18.	14.83	15.	6.	6.	6.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE		
+ (FEET)	(HR)	6-HR	24-HR	72-HR	24.92-HR
1287.69	14.83	1287.54	1286.52	1286.49	1286.49
CUMULATIVE AREA =		0.19 SQ MI			

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HYDROGRAPH AT STATION TRAV
FOR PLAN 1, RATIO = 2.23

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW		
+ (CFS)	(HR)	6-HR	24-HR	72-HR	24.92-HR
+ 70.	14.83	(CFS)	55.	21.	20.
		(INCHES)	2.752	4.124	4.124
		(AC-FT)	28.	41.	41.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE		
+ (AC-FT)	(HR)	6-HR	24-HR	72-HR	24.92-HR
21.	14.83	17.	7.	7.	7.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE		
+ (FEET)	(HR)	6-HR	24-HR	72-HR	24.92-HR

(AC-FT) 13. 16. 16. 16.

CUMULATIVE AREA = 0.18 SQ MI

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HYDROGRAPH AT STATION ONSITE
FOR PLAN 1, RATIO = 1.00

TOTAL RAINFALL = 3.50, TOTAL LOSS = 1.86, TOTAL EXCESS = 1.64

PEAK FLOW + (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			24.92-HR
			6-HR	24-HR	72-HR	
64.	12.67	26.	8.	8.	8.	
		(INCHES) 1.303	1.625	1.625	1.625	
		(AC-FT) 13.	16.	16.	16.	

CUMULATIVE AREA = 0.18 SQ MI

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HYDROGRAPH AT STATION ONSITE
FOR PLAN 1, RATIO = 1.31

TOTAL RAINFALL = 4.60, TOTAL LOSS = 2.05, TOTAL EXCESS = 2.55

PEAK FLOW + (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			24.92-HR
			6-HR	24-HR	72-HR	
102.	12.58	40.	12.	12.	12.	
		(INCHES) 2.032	2.531	2.531	2.531	
		(AC-FT) 20.	25.	25.	25.	

CUMULATIVE AREA = 0.18 SQ MI

*** **

HYDROGRAPH AT STATION ONSITE
FOR PLAN 1, RATIO = 1.51

TOTAL RAINFALL = 5.30, TOTAL LOSS = 2.14, TOTAL EXCESS = 3.16

PEAK FLOW + (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			24.92-HR
			6-HR	24-HR	72-HR	
128.	12.58	49.	15.	15.	15.	
		(INCHES) 2.514	3.137	3.137	3.137	
		(AC-FT) 25.	31.	31.	31.	

CUMULATIVE AREA = 0.18 SQ MI

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HYDROGRAPH AT STATION ONSITE
FOR PLAN 1, RATIO = 1.77

TOTAL RAINFALL = 6.20, TOTAL LOSS = 2.24, TOTAL EXCESS = 3.96

PEAK FLOW + (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			24.92-HR
			6-HR	24-HR	72-HR	
161.	12.58	62.	19.	19.	19.	
		(INCHES) 3.147	3.939	3.939	3.939	
		(AC-FT) 31.	38.	38.	38.	

CUMULATIVE AREA = 0.18 SQ MI

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HYDROGRAPH AT STATION ONSITE
FOR PLAN 1, RATIO = 2.00

TOTAL RAINFALL = 7.00, TOTAL LOSS = 2.31, TOTAL EXCESS = 4.69

PEAK FLOW + (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
191.	12.58	73.	23.	22.	22.	
		(INCHES)	3.716	4.668	4.668	4.668
		(AC-FT)	36.	46.	46.	46.

CUMULATIVE AREA = 0.18 SQ MI

*** **

HYDROGRAPH AT STATION ONSITE
FOR PLAN 1, RATIO = 2.23

TOTAL RAINFALL = 7.80, TOTAL LOSS = 2.36, TOTAL EXCESS = 5.44

PEAK FLOW + (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
221.	12.58	84.	27.	26.	26.	
		(INCHES)	4.291	5.408	5.408	5.408
		(AC-FT)	42.	53.	53.	53.

CUMULATIVE AREA = 0.18 SQ MI

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* *
27 KK * COMBO *
* *

28 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

*** **

HYDROGRAPH AT STATION COMBO
FOR PLAN 1, RATIO = 1.00

PEAK FLOW + (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
67.	12.67	35.	13.	12.	12.	
		(INCHES)	0.880	1.300	1.300	1.300
		(AC-FT)	17.	26.	26.	26.

CUMULATIVE AREA = 0.37 SQ MI

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HYDROGRAPH AT STATION COMBO
FOR PLAN 1, RATIO = 1.31

PEAK FLOW + (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
107.	12.67	57.	21.	20.	20.	
		(INCHES)	1.438	2.105	2.105	2.105
		(AC-FT)	28.	42.	42.	42.

CUMULATIVE AREA = 0.37 SQ MI

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HYDROGRAPH AT STATION COMBO
FOR PLAN 1, RATIO = 1.51

PEAK FLOW + (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
134.	12.67	73.	26.	25.	25.	
		(INCHES) 1.824	2.654	2.654	2.654	
		(AC-FT) 36.	52.	52.	52.	
CUMULATIVE AREA =			0.37 SQ MI			

*** *** *** *** ***

HYDROGRAPH AT STATION COMBO
FOR PLAN 1, RATIO = 1.77

PEAK FLOW + (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
171.	12.58	93.	34.	33.	33.	
		(INCHES) 2.342	3.390	3.390	3.390	
		(AC-FT) 46.	67.	67.	67.	
CUMULATIVE AREA =			0.37 SQ MI			

*** *** *** *** ***

HYDROGRAPH AT STATION COMBO
FOR PLAN 1, RATIO = 2.00

PEAK FLOW + (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
204.	12.58	112.	40.	39.	39.	
		(INCHES) 2.819	4.066	4.066	4.066	
		(AC-FT) 56.	80.	80.	80.	
CUMULATIVE AREA =			0.37 SQ MI			

*** *** *** *** ***

HYDROGRAPH AT STATION COMBO
FOR PLAN 1, RATIO = 2.23

PEAK FLOW + (CFS)	TIME (HR)	(CFS)	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
239.	12.58	132.	47.	46.	46.	
		(INCHES) 3.307	4.758	4.758	4.758	
		(AC-FT) 65.	94.	94.	94.	
CUMULATIVE AREA =			0.37 SQ MI			

1

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION						
				RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6	
				1.00	1.31	1.51	1.77	2.00	2.23	
HYDROGRAPH AT	EXIST	0.37	1	FLOW	55.	93.	119.	154.	186.	218.
				TIME	14.50	14.42	14.42	14.33	14.33	14.33
HYDROGRAPH AT	OFFDEV	0.19	1	FLOW	40.	69.	88.	115.	138.	163.
				TIME	13.25	13.17	13.08	13.08	13.08	13.08
ROUTED TO	TRAV	0.19	1	FLOW	14.	25.	34.	46.	58.	70.
				TIME	15.67	15.25	15.08	15.00	14.92	14.83

** PEAK STAGES IN FEET **
1 STAGE 1286.91 1287.19 1287.35 1287.54 1287.69 1287.83

				TIME	15.58	15.25	15.08	15.00	14.83	14.83
HYDROGRAPH AT										
+	ONSITE	0.18	1	FLOW	64.	102.	128.	161.	191.	221.
				TIME	12.67	12.58	12.58	12.58	12.58	12.58
2 COMBINED AT										
+	COMBO	0.37	1	FLOW	67.	107.	134.	171.	204.	239.
				TIME	12.67	12.67	12.67	12.58	12.58	12.58

*** NORMAL END OF HEC-1 ***