400-D-3
Ray Street
Fallbrook Woods
Fallbrook Inc.

on spreadsheet

FOR USE WITH 1987 CORPS WETLANDS DELINEATION MANUAL

Project Title: RAY SIKLER — File Number: LUC RAY

Transect: U21 — Plot: UPL — Date: 6/27/92

DATA VEGETATION	Stratum and Species (DOMINANTS ONLY)		Dominance Ratio	Percent Dominance	Wetland Status
	TREE	0			
	SAPLING	0			
	SHRUB	0			
	GROUND				
	Vicia cracca		1/195	5%	(UPL)
	Phleum pratense		70/195	36%	FACU
	Hypericum perforatum		50/195	26%	UPL
	Daucus carota		20/195	10%	(UPL)
	Solidago canadensis		20/195	10%	(FACU)
	Rudbeckia serotina		5/195	3%	(FACU-)
	Dactylis glomerata		20/195	10%	(FACU)

Note: use asterisk * to indicate FAC-, FACU, or UPL species with observed adaptions to wetland hydrology

TALLY (Dominants ONLY)

OBL	FACW	FAC	*FAC-	*FACU	*UPL	FAC-	FACU	UPL
							1	1

SUBTOTAL (HYDROPHYTES): 0 — SUBTOTAL: 2

TOTAL: 2

100 x SUBTOTAL (HYDROPHYTES) / TOTAL = 0/2 = 0% = PERCENT HYDROPHYTES

DESCRIBE VEGETATION DISTURBANCE:

DESCRIBE ADAPTATIONS:

DATA -- SOIL — Soil Taxonomy:

Corps of Engineers Regional Drainage Class: — Criterion:

Is Published Soil Survey Available? Yes [ ] No [ ] Title/Date:

Soil Type Mapped: — Field Observations Confirm Type Mapped? Yes [ ] No [ ]

Depth	Horizon	Matrix Color (Munsell, Moist)	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, Iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
6"		10YR 3/3		
*				

Remarks:

* fill - gravel pieces
tried 5 places, couldn't get core deeper than 6"

Sketch Landscape Position:

FOR USE WITH 1987 CORPS WETLANDS DELINEATION MANUAL

SOIL DETERMINATION

NOTE:
1. "NO" to all the following is evidence that the soil is NOT HYDRIC
2. This checklist is valid for use by the New England Corps of Engineers and outside the six New England States may be inappropriate
3. This interpretive routine may be inappropriate in unusual cases

Yes No

[ ] [ ] Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season (attach an explanation of the basis for your conclusions)

[ ] [ ] The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology

[ ] [ ] The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology

[ ] [ ] The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes No

[ ] [ ] 1. Within 6 inches of the soil surface there are:

Yes No

[ ] [ ] a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

[ ] [ ] b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

[ ] [ ] c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout

[ ] [ ] 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

[ ] [ ] a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent

[ ] [ ] b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent

[ ] Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colorimetric test for ferrous iron test (α,α - Dipyridil), or other measurements and observations

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy

** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks

DATA A DELINEATION HYDROLOGY

NOTE:
1. Hydrology is often the most difficult feature to observe
2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season

[ ] Recorded Data

Stream, lake or tidal gage — Identification: _____

Aerial Photograph — Identification: _____

Other — Identification: _____

[ ] No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS

Depth to Free Water: _____

Depth to Saturation: _____

Describe Altered Hydrology _____

[ ] Inundated

[ ] Saturated in upper 12 inches

[ ] Water Marks

[ ] Drift Lines

[ ] Sediment Deposits

[ ] Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS

Project Title: RAY STREET

Delineator: ECOANALYSTS, INC. MBM

Transect: W21 Plot: UPL Date: 8/27/92

	Yes	No
Greater than 50 Percent Hydrophytes?	[ ]	[X]
Hydric Soils Criterion Met?	[ ]	[X]
Wetland Hydrology Present?	[ ]	[X]
IS THIS DATAPOINT WITHIN A WETLAND?	[ ]	[X]

Remarks

disturbed area

FOR USE WITH 1987 CORPS WETLANDS DELINEATION MANUAL

Project Title: RAY STREET

File Number: CEC-RAY

Transect: CO3 Plot: WET Date: 8/27/92

DATA VEGETATION	Stratum and Species (DOMINANTS ONLY)	Dominance Ratio	Percent Dominance	Hdr Status
TREE				
	Pinus strobus	20/683	29%	FACU
	Acer rubrum	182/683	71%	FAC
SAPLING		25/25	100%	FAC-
SHRUB				
	Viburnum recognitum	10/10	100%	FACW-
GROUND				
	Impatiens capensis	70/150	46%	FACW
	Onoclea sensibilis	50/150	33%	FACW
	Maianthemum canadense	10/150	7%	(FAC-)
	Equisetum sp.	10/150	7%	(LINK)
	Rubus hispidus	10/150	7%	(FACW)

Note: use asterisk * to indicate FAC-, FACU, or UPL species with observed adaptions to wetland hydrology

TALLY (Dominants ONLY)

OBL	FACW	FAC	FAC-	FACU	UPL	FAC-	FACU	UPL
	3	2					1	

SUBTOTAL (HYDROPHYTES): 5 SUBTOTAL: 1

TOTAL: 6

100 x SUBTOTAL (HYDROPHYTES) / TOTAL = 5/6 = 83% = PERCENT HYDROPHYTES

DESCRIBE VEGETATION DISTURBANCE: none

DESCRIBE ADAPTATIONS:

DATA SOIL | Soil Taxonomy:

Corps of Engineers Regional Drainage Class: Criterion:

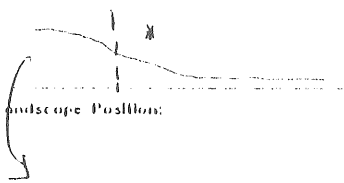
Is Published Soil Survey Available? Yes [ ] No [ ] Title/Date: Cumberland Co.

Soil Type Mapped: Scantic Field Observations Confirm Type Mapped? Yes [ ] No [ ]

Depth	Horizon	Matrix Color (Munsell, Moist)	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, Iron or manganese nodules or concretions, restrictive layers, root distribution, additional observations, etc.
0"		5Y 3/1	mottles - dark yellowish brown, common and distinct	silt loam
12"		5Y 5/2		
18"		5Y 5/2		

Remarks:

Sketch Landscape Position:



FOR USE WITH 1987 CORPS WETLANDS DELINEATION MANUAL

SOIL DETERMINATION

NOTE:
1. "NO" to all the following is evidence that the soil is NOT HYDRIC
2. This checklist is only for use by the New England Corps of Engineers and outside the six New England States may be inappropriate
3. This interpretive routine may be inappropriate in unusual cases

Yes No

[ ] [ ] Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season (attach an explanation of the basis for your conclusions)

[ ] [ ] The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology

[X] [ ] The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology

[ ] [ ] The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes NO

[ ] [ ] 1. Within 6 inches of the soil surface there are:

Yes No

[ ] [ ] a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

[ ] [ ] b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

[ ] [ ] c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

[ ] [ ] 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following.

Yes No

[ ] [ ] a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 1 or less; the mottles are of least 10% in abundance and distinct or prominent

[ ] [ ] b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 1 or less and mottles are of least 10% in abundance and distinct or prominent

[ ] Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colorimetric test for ferrous iron test (α,α-Dipyridil), or other measurements and observations

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy

** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks

DATA & DETERMINATION HYDROLOGY

NOTE:
1. Hydrology is often the most difficult feature to observe
2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season

[ ] Recorded Data

Stream, lake or tidal gage — Identification: _____

Aerial Photograph — Identification: _____

Other — Identification: _____

[ ] No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS

Depth to Free Water: ~6"

Depth to Saturation: Surface

Describe Altered Hydrology: _____

[ ] Inundated

[X] Saturated in upper 12 inches

[ ] Water Marks

[ ] Drift Lines

[ ] Sediment Deposits

[X] Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS

Project Title: RAY STREET

Delineator: ECO-ANALYSTS, INC. MBM

Transect: Plot: Date

Yes No

Greater than 50 Percent Hydrophytes? [X] [ ]

Hydric Soils Criterion Met? [X] [ ]

Wetland Hydrology Present? [X] [ ] IS THIS DATAPOINT WITHIN A WETLAND? [X] [ ]

Remarks

FOR USE WITH 1987 CORPS WETLANDS DELINEATION MANUAL

Project Title: RAY STREET File Number: LUCIRAY

Transect: W3 Plot: UPL Date: 8/27/92

DATA VEGETATION	Stratum and Species (DOMINANTS ONLY)	Abundance Ratio	Percent Dominance	OBL Status
TREE				
	Pinus strobus	6664/6664	100%	FACU
SAPLING				
	Acer rubrum	5/30	17%	(FAC)
	Crataegus sp	5/30	17%	(FACU)
	Quercus rubra	20/30	67%	FACU
SHRUB				
	Viburnum recognitum	20/25	80%	FACW-
	Acer saccharum	5/25	20%	FACU
GROUND				
	Smilacena racemosa	15/75	20%	FACU-
	Gaultheria procumbens	15/75	20%	FACU
	Maianthemum canadense	20/75	27%	FAC-
	Vaccinium angustifolium	15/75	20%	FACU-
	Prunus sp.	5/75	7%	(FACU)
	Viburnum recognitum	5/75	7%	(FACW-)

Note: use asterisk * to indicate FAC-, FACW, or OBL species with observed adaptions to wetland hydrology

TALLY (Dominants ONLY)

OBL	FACW	FAC	FAC-	FACU	UPL	FAC-	FACU	UPL
	1					1	6	

SUBTOTAL (HYDROPHYTES): 1 SUBTOTAL: 7

TOTAL: 8

100 x SUBTOTAL (HYDROPHYTES) / TOTAL = 1/8 = 12.5% = PERCENT HYDROPHYTES

DESCRIBE VEGETATION DISTURBANCE:

DESCRIBE ADAPTATIONS:

DATA — SOIL Soil Taxonomy:

Corps of Engineers Regional Drainage Class: Criterion:

Is Published Soil Survey Available? Yes [ ] No [ ] Title/Date: Cumberland Co.

Soil Type Mapped: Scantic Hydric Inclusions Condition Type Mapped? Yes [X] No [ ]

Depth	Horizon	Matrix Color(s)	Mottle Color(s)	Mottle Abundance, Size, and Contrast; Texture, Concretions, Structure, etc.
0"		10YR 3/2		
12"		10YR 3/2		
14"		10YR 3/2	no mottles	
	refusal			

Remarks:

Sketch Landscape Position:

FOR USE WITH 1987 CORPS WETLANDS DELINEATION MANUAL

SOIL DETERMINATION

NOTE:
1. "NO" in all the following is evidence that the soil is NOT HYDRIC
2. This checklist is valid for use by the New England Corps of Engineers, use outside the six New England States may be inappropriate
3. This interpretive routine may be inappropriate in unusual cases

Yes No

[ ] [ ] Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season (attach an explanation of the basis for your conclusions)

[ ] [ ] The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology

[ ] [ ] The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.

[ ] [ ] The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes No
[ ] [ ] 1. Within 6 inches of the soil surface there are:

Yes No
[ ] [ ] a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

[ ] [ ] b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

[ ] [ ] c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

[ ] [ ] 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No
[ ] [ ] a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent

[ ] [ ] b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

[ ] Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (α,α,-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

DATA & DETERMINATION HYDROLOGY

NOTE:
1. Hydrology is often the most difficult feature to observe
2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc
3. Interpretation of hydrology may require repeated observations over more than one season

[ ] Recorded Data

Stream, lake or tidal gage — Identification: ______

Aerial Photograph — Identification: ______

Other — Identification: ______

[ ] No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: ______

Depth to Saturation: ______

Describe Altered Hydrology: ______

[ ] Inundated

[ ] Saturated in upper 12 inches

[ ] Water Marks

[ ] Drift Lines

[ ] Sediment Deposits

[ ] Drainage Patterns within Wetlands

Remarks:

CONCLUSIONS

Project Title: RAY STREET

Delineator: ECO-ANALYSIS, INC.

Transect: W3 Plot: UPL Date: 8/27/92

	Yes	No
Greater than 50 Percent Hydrophytes?	[ ]	[X]
Hydric Soils Criterion Met?	[ ]	[X]
Wetland Hydrology Present?	[ ]	[X]

IS THIS DATAPOINT WITHIN A WETLAND? Yes [ ] No [X]

Remarks:

NOTE: This form replaces the original checklist ... Corps of Engineers ... 1987

EROSION AND SEDIMENTATION CONTROL PLAN
FALLBROOK WOODS, PORTLAND, MAINE

The following plan for controlling sedimentation and erosion from this project is based upon sound conservation practices as those outlined in the "Maine Erosion and Sedimentation Control Handbook For Construction: Best Management Practices" and Recommended Practices of the USDA Soil Conservation Service.

INTRODUCTION

This report addresses the erosion and sedimentation controls for the proposed Fallbrook Woods in Portland. The owner, Fallbrook Corporation, proposes the construction of a 56-bed boarding healthcare facility. The project will consist of a single building and associated parking areas, a site access drive and gravel fire lane.

The site contains 12.6 acres and is located on an undeveloped back parcel west of Ray Street and south of Allen Avenue in the North Deering area of Portland. The site gains access to Ray Street over Merrymeeting Drive; a private way extending westerly from Ray Street which is the access drive for Fallbrook Condominiums. Merrymeeting Drive dead-ends at the site boundary. Much of the area adjacent to the parcel is residentially developed.

SITE TOPOGRAPHY AND COVER COMPLEX

NOTE: Refer to the Existing Conditions, Plan Sheet 1 for site characteristics and wetland identification numbers.

The parcel is mostly wooded with the exception of a graded gravel access road and cleared area in the northwestern area of the site. The gravel road extends from the dead-end of Merrymeeting Drive into the site for approximately 350 feet. A small area of overgrown grasses and brush has resulted from previous clearing over a small section of the site near the gravel road. The woods on site are a mix of mature pine and oak with some secondary growth. The undergrowth is generally vegetated with low shrubs and plants.

The topography of the site is characterized by a ledgy knoll on the northeast end and a second knoll located 500 ft. southerly from this point. Three wetlands have also been identified on site by Eco Analysts, Inc. and mapped by LUC.

As one enters the parcel from Merrymeeting Drive, the topography slopes gently downhill along the gravel road and rises gently to the left (or east) to the first knoll mentioned. A low drainage between

the gravel drive and the knoll is occupied by wetland 1 while wetland 2 extends offsite to the right (or west) of the gravel drive. Both wetlands are small isolated drainage pockets.

A low saddle between the two prominent knolls forms a drainage channel which flows into a large wetland (wetland 3) which occupies roughly 25% of the site in the central and southern areas. This entire wetland and the knolls onsite drain through an intermittent stream to a culvert on Ray Street adjacent to the southeastern property corner.

SITE SOILS

The site soils were obtained from the U.S.D.A - Soil Conservation Service Medium Intensity Maps for Cumberland County.

The site boundaries have been scaled onto the site to determine hydrologic soil groups. The soil boundaries are depicted on the Pre-Development and Post-Development Drainage and Erosion & Sedimentation Control Plans, Sheets 3 and 6. The soils and their hydrologic soil groups are further listed below:

Mapping Symbol	Soil Name	Hydrologic Soil Group
Hr, Hs	Hollis	C/D (Use D)
Bg	Belgrade	C
Sn	Scantic	D
Bu	Buxton	C

DRAINAGE

The site has been divided into 2 watersheds and several sub-watersheds for both pre- and post-development conditions. The site design will incorporate two detention basins, several rip-rap swales and a number of grass swales andculverts to control and detain stormwater.

There are two major site discharge points which have been analyzed. One is at the culvert at the southwest property corner at Ray Street which receives the majority of the site drainage. The second is at an existing piped outlet to wetland 2 at the northwest end of the site. Refer to the Stormwater Management Report and The Grading, and Utilities Sheet 4 for the design of this system.

SENSITIVE AREAS

The planning and design of the project especially with regards to the building siting and paved parking and access road have tried to preserve the wetland areas and stream wherever possible. For the purposes of applying erosion and sedimentation controls, we have identified the following as sensitive areas:

1. Wetland 3 and the intermittent stream contained therein.

Work adjacent to or within wetland 3 will be protected and carefully supervised to minimize the possibility of sedimentation or erosion to this area.

2. Piles of Pond Spoils: Refer to "Pond Construction Specifics" for a more detailed discussion of this area.

CONSTRUCTION SCHEDULE

Site Construction is expected to commence in late fall 1992. Therefore, attention to winter and late season erosion control specifications on this report are critical to successfully stabilizing the site. The following is the proposed schedule for construction:

COMPLETE	START
1. Installation of erosion control measures	Fall 1992
2. Clear and grub	Fall 1992
3. Driveway, utility, and building construction	Fall/Winter '92
4. Detention basin construction and expansion	Fall 1992
5. Final grading and seeding	Late Spring '93
6. Reseed non-catch areas	Summer 1993
7. Removal of erosion control	Summer 1993

SPECIFIC EROSION AND SEDIMENTATION CONTROL PRACTICES

The construction of the Fallbrook Woods Subdivision shall incorporate the following procedures.

POND CONSTRUCTION SPECIFICS (FOR DETENTION BASINS A AND B)

1. Dam Construction

The foundation area shall be cleared of trees, logs, roots, stumps, brush, boulders, sod, and rubbish and the topsoil.

Fill material for the dam shall consist of excavated silt and clay. All fill material shall be free of sod, roots, frozen soil, stones greater than 6" in diameter and other objectionable material. All snow, ice, or frozen fill shall commence in the lowest point of the cutoff trench (if required) and/or dam and continue in horizontal lifts no greater than 12". Modified proctor densities of 95% (ASTM-D-1557) shall be obtained in each lift prior to adding additional lifts. The distribution and gradation of the fill shall be such that no lenses, pockets, streaks, or layers of substantially different materials are placed in the dam. Fill adjacent to the discharge pipe and antiseep collar shall also be compacted to 95% modified Proctor. Where the temporary diversion channel cuts through the dam, if required, the dam shall be filled to allow for 2:1 side slopes for the channel.

Fill material shall be excavated from the proposed pond area upstream from the dam. Spoils not used for the dam shall be deposited in the spoils area.

During the excavation, soils shall be stockpiled to save silts and clays for the dam (or placed in dam immediately); topsoil for final grading, and sand/sandy loam for the pond floor.

All pond outlets shall receive plunge pools or rip-rap aprons as specified. The natural channels downstream from the ponds shall be disturbed as little as possible.

Any disturbed sections of the receiving channels shall be stabilized with D50 = 3" or larger rip-rap.

The construction of the ponds shall commence during a period of minimal flow with a dry short range weather forecast. Once under construction, the ponds shall be built in the most expedient manner possible until complete.

If the construction of the ponds should be hampered by rain and excessive runoff the site must be stabilized in a manner which results in as little sediment entering downstream channels as possible.

Detention basin side slopes greater than 3:1 shall be protected by erosion control blanketing (see plans for locations and specifications).

2. **Stockpiles of Pond Spoils**
Stockpiles from the pond excavation shall be located upstream from the pond in the designated area.

Prior to stockpiling the spoils, the anticipated toe of slope shall be lined with haybales and/or silt fence as noted on the details.

Pond stockpiles shall be relatively flat on top and shall have side slopes no steeper than 2:1.

Once the disturbed area adjacent to the pond has undergone final grading it shall be seeded and mulched within 7 days.

Stockpiles from the pond shall be classified as a "Sensitive Area" and shall adhere to the seeding and mulching specifications outlined in the "Temporary Seeding and Mulching Table."

GENERAL EROSION AND SEDIMENTATION CONTROL PRACTICES
The following general erosion control practices will be used to prevent erosion and sedimentation before, during and after the construction of this project. Special care shall be used at all

times in an effort to: (1) limit disturbance and hence erosion (2) correct any erosion problems immediately (3) regularly monitor the practices implemented and (4) revegetate disturbed areas as soon as possible.

Stone-Check Dams
Stone check dams will be installed as shown on the plans. These check dams reduce flow velocities in swales and serve to filter and capture sediment before traveling downstream.

Swales
Swales will be used to direct runoff to the detention basin. In areas with steep slopes or high discharges, rip-rap or erosion mat has been used. All the swales have been designed to handle the 25 year storm event.

Haybales and /or Silt Fence

1. Haybales or silt fencing shall be installed at the toes of slopes near wetlands or streams, below any dike construction (out of the receiving channels), and along the more expansive fill slopes.

2. The locations requiring haybales and/or silt fence are noted on the plans. This erosion protection is not limited to only these areas and may be required elsewhere as directed by SCS or the engineer.

Outlet Protection
The outlets from the culverts shall be protected with rip-rap aprons. The 25 year discharges were used in the design of these aprons.

Inlet Protection
All culvert inlets shall be protected as noted on the Rip-Rap Headwall Detail unless otherwise noted on the plans. The rip-rap at the inlet shall be the same size as the rip-rap for the aprons at the outlet.

Erosion Mat
Erosion control mats shall be used on steep slopes as noted on the plans, specifically on the fill slope adjacent to the rear of the building.

Construction Entrance
A gravel construction entrance shall be installed wherever construction equipment will be entering a public road on a regular basis. The locations and specifications for these entrances are noted on the plans and details.

Temporary Perforated Risers
Detention basins A and B shall be fitted with temporary perforated filters at the outlets. See plans for locations and details. The

temporary risers can be removed and the design outlet orifice installed once the basins and all upgradient areas are stabilized.

CONSTRUCTION PHASE
The following general practices will be used to prevent erosion during construction of this project.

1. Only those areas under active construction will be cleared and left in an untreated or unvegetated condition. If final grading, loaming and seeding will not occur within 15 days see Item No. 4.

2. After clearing and prior to stripping and grubbing, silt fence and/or haybales will be installed around catch basins, at the toe of slope and in areas as located on the plans to protect against any construction related erosion. Immediately following construction of culverts and swales, stone check dams shall be installed, as shown on the plans.

3. Topsoil will be stockpiled when necessary in areas which have minimum potential for erosion and will be kept as far as possible from existing drainage areas and wetlands. All stockpiles expected to remain longer than 15 days shall be:

   A. Treated with anchored mulch (within 5 days of the last deposit of stockpiled soil).

   B. Seeded with conservation mix and mulched immediately. Stockpiles expected to remain longer than 3 days shall be encircled with haybales or silt fence at the toe of the pile.

4. All disturbed areas expected to remain longer than 15 days shall be:

   A. Treated with anchored mulch immediately, OR

   B. Seeded with conservation mix of perennial rye grass (0.9 lbs/1000 sq. ft.) and mulched immediately.

5. All grading will be held to a maximum 3:1 slope where practical. Greater slopes may be used in ledge cut. All slopes will be stabilized with permanent seeding immediately after final grading is complete. (It is understood that immediately means within 7 days of the completion of work. See Post-Construction Revegetation for seeding specification)

6. All culverts will be protected with stone rip-rap headwalls (D^{50} = 4" unless otherwise specified) at inlets and outlets. Road ditches will be rock lined where excessive flows or velocities might occur. The locations of these ditches are noted on the plans.

7. Construction traffic will be directed over the construction entrances and proposed roads. Any areas subject to rutting will be stabilized immediately. The gravel construction entrance shall be maintained by the addition of more gravel as needed as the voids become filled. The public roadway shall be swept daily should mud be tracked onto it.

EROSION CONTROL FOR DETENTION BASINS

1. The construction of the detention basins shall only take place between June 15th and September 15th, unless prior approval is obtained to extend this "window".

2. The construction of the detention basins shall commence during a period of minimal flow with a dry short range weather forecast. Once under construction, the detention basin shall be completed in the most expedient manner possible.

3. If the construction of the detention basins should be hampered by rain and excessive runoff the site must be stabilized by mulching with hay (see Item 3 Post-Construction Revegetation for rates) and tacked with a photodegradable netting.

4. The sequence for the construction of the detention basins shall be as follows:

   A. Install erosion controls as shown on plan.

   B. Clear and grub only the area required for the detention basin construction.

   C. Excavate and grade as shown on the plans.

   D. Loam, fertilize, seed and mulch the disturbed areas the day final grades are reached.

POST CONSTRUCTION REVEGETATION

The following general practices will be used to prevent erosion as soon as an area is ready to undergo final grading.

1. A minimum of 4" of loam will be spread over disturbed areas and graded to a uniform depth and natural appearance.

2. If final grading is reached during the normal growing season (4/15 to 9/15), permanent seeding will be done as specified below. Prior to seeding, limestone shall be applied at a rate of 138 lbs/1000 sq. ft. and 10:20:20 fertilizer at a rate of 18.4 lbs/1000 sq. ft. will be applied. Broadcast seeding at the following rates:

Lawns:	"Emerald Blend" or approved equal	6 lbs/1000 sq. ft.
Ditches and Detention Basins:	Creeping Red Fescue	0.46 lbs/1000 sq. ft.
	Red Top	0.05 lbs/1000 sq. ft.
	Tall Fescue	0.46 lbs/1000 sq. ft.

3. An area shall be mulched immediately after it has been seeded. Mulching shall consist of hay mulch, hydro-mulch, erosion control mats or any suitable substitute deemed acceptable by the Design Engineer.

   A. Hay mulch shall be applied at the rate of 2 tons per acre. Hay mulch shall be secured by either (1) being driven over by tracked construction equipment on grades of 5% and less or (2) blanketed by tacked photodegradable/biodegradable netting on grades between 5% and 15%.

   B. Hydro-mulch shall consist of a mixture of either asphalt, wood fibre or paper fibre and water sprayed over a seeded area. Hydro-mulch shall not be used between 9/15 and 4/15.

   C. Erosion control mats shall consist of interlocking excelsior or wood fibers with mulch net backing on one side. Install per manufacturers specifications.

4. Construction shall be planned to eliminate the need for seeding between September 15th and April 15th. Should seeding be necessary between these dates, the following procedure shall be followed:

   A. Only unfrozen loam shall be used.

   B. Loaming, seeding and mulching will not be done over snow cover. If snow exists, it must be removed prior to placement of seed.

   C. Where permanent seeding is necessary, Annual Winter Rye (1.2 lbs/1000 s.f.) shall be <u>added</u> to the previously noted rates.

   D. Where temporary seeding is required, Annual Winter Rye (2.6 lbs/1000 s.f.) shall be sown <u>instead</u> of the previously noted seeding rate.

   E. Fertilizing, seeding and mulching shall be done on loam the day the loam is spread.

F. For slopes up to 15%, hay mulch shall be secured with photodegradable/ biodegradable netting. Tracking by machinery alone will not suffice.

G. All slopes greater than 15% will require erosion control mats.

5. Where erosion control netting is called for in swales, the swale may be either:

A. Seeded, mulched, and blanketed with photodegradable/ biodegradable netting.

B. Seeded and blanketed with netting containing excelsior.

All netting shall be anchored as per the Manufacturer's specs.

6. Following final seeding, the site will be inspected every 30 days until 80% cover has been established. Reseeding will be carried out by the contractor within 10 days of notification by the engineer that the existing catch is inadequate.

MAINTENANCE SCHEDULE

The contractor shall be responsible for installing, monitoring, maintaining, repairing, replacing and removing all of the erosion and sedimentation controls or appointing a qualified subcontractor to do so. Land Use Consultants shall inspect the erosion controls on a regular basis to ensure compliance with the plans and specifications.

Maintenance measures will be applied as needed during the entire construction cycle. After each rainfall, a visual inspection will be made of all erosion and sedimentation controls to insure their continuing function as designed.

1. Haybale barriers and silt fence shall be inspected and repaired once a week or immediately following any significant rainfall. Sediment trapped behind these barriers shall be excavated when it reaches a depth of 6 inches and redistributed to areas undergoing final grading. Should the haybale barriers prove to be ineffective, the contractor shall replace them and reinforce them with silt fencing.

2. Stone check dams and perforated riser pipes shall be visually inspected once a week or after each significant rainfall and repaired as needed. Sediment trapped behind these devices shall be removed once it attains a depth equal to 1/2 the height of the dam or riser. The sediment removed shall be distributed off-site or to an area undergoing final grading. The sediment and the removal thereof shall be handled in a manner which does not promote erosion or sedimentation.

EROSION CONTROL REMOVAL

1. An area is considered stable if:

   A. It is paved.

   B. The seeded areas have 80% growth of planted seeds.

2. Haybales and silt fence shall be removed once the areas upstream are stable. The haybales and silt fence shall be disposed of legally and properly off-site. All sediment trapped behind these controls shall be:

   A. Distributed to an area undergoing final grading.

   B. Graded in an aesthetic manner to conform to the topography, fertilized, seeded and mulched in accordance with the rates previously stated.

3. The sediment trapped behind/around/in stone check dams, perforated risers, and detention basin, shall be removed and relocated off-site or to an area undergoing final grading.

   The sediment trapped by these devices shall <u>not</u> be regraded locally since they exist in drainage ways. The rip-rap from the check dams and risers may be either: (1) removed or (2) regraded in an aesthetic manner which does not inhibit flow or create erosion.

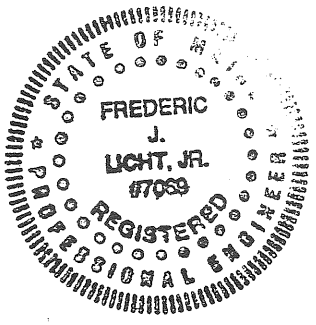
4. Once all the trapped sediments have been removed from the temporary sedimentation devices, the disturbed areas must be regraded in an aesthetic manner to conform to the surrounding topography. Once graded these disturbed areas must be loamed (if necessary) fertilized, seeded and mulched in accordance with the rates previously stated.

<u>CONCLUSION</u>

The construction of Fallbrook Woods, if constructed as detailed on these plans and according to this report, should not result in any significant erosion or sedimentation either on or off site.

Prepared by:

Frederic J. Licht, P.E.
Associate



92-65-MA

Fallbrook Woods

Ray St

134

FALLBROOK, INC.
7 SHADY LN. 781-5604
FALMOUTH, ME 04105

4/6 19 93

52-133/112
44

City of Falmouth $ 1800.13

Pay to the Order of Eighteen Hundred & 13/100 Dollars

CITIBANK

Citibank (Maine), N.A.
200 U.S. Route 1
Falmouth, ME 04105

Edgar Guthrie

Memo

⑈011201335⑈ 44813990⑈12 0134

CITY OF PORTLAND, MAINE
Department of Planning and Urban Development
SUBDIVISION/SITE DEVELOPMENT

COST ESTIMATE OF IMPROVEMENTS TO BE COVERED BY PERFORMANCE GUARANTEE

Date 03/30/93

Name of Project FALLBROOK WOODS
Address/Location MERRYMEETING DRIVE PORTLAND MAINE
Developer FALLBROOK INC.
Form of Performance Guarantee ESCROW ACCOUNT SHAWMUT BANK
Type of Development: — Subdivision X Site Plan (Major/Minor)

ITEM	QUANTITY	UNIT COST	SUBTOTAL	COMPLETED
1. STREET/SIDEWALK:				
Road	LUMP SUM	30,000	30,000	
Granite Curbing	n/a			
Sidewalks	LUMP SUM	3,500	3,500	
Esplanades	n/a			
Monuments	n/a			
Street Lighting	n/a			
Other				
2. SANITARY SEWER:				
Manholes	4/ea	1,875	7,500	
Piping	530 LF	34	18,000	
Connections	LUMP SUM	1,850	1,850	
Other				
3. STORM DRAINAGE:				
Manholes	n/a			
Catch Basins	2ea.	1,250	2,500	
Piping				
Detention Basin	lump sum	3,000	3,000	
Other				
4. SITE LIGHTING	7/ea	520.	3,640	
5. EROSION CONTROL	lump sum	2,500	2,500	
6. RECREATION AND OPEN SPACE AMENITIES	n/a			
7. LANDSCAPING (Attach breakdown of plant materials, quantities, and unit costs)	lump sum	25,000	25,000	
8. MISCELLANEOUS				
		total	105,890	

TOTAL AMOUNT OF PERFORMANCE GUARANTEE _____ Approved _____
X 1.7% = INSPECTION FEE _____ Approved _____

Planning & Urban Development

Joseph E. Gray Jr.
Director

CITY OF PORTLAND

October 9, 1992

Mr. William R. Walsh
Land Use Consultants Inc.
One India Street
Portland, ME 04101

RE: Fallbrook Woods
CSO Credits

Dear Mr. Walsh:

We have received your letter to Joseph Gray dated September 22, 1992 requesting CSO credits for the Fallbrook Woods development. As you are aware, no formal policy to allocate credits received for sewer rehabilitation projects undertaken by the City has been developed at this time. To date, credits have been allocated on a case by case basis by the manager's office. The consent decree states that additions to the sewer system will be calculated at the time building and plumbing permits are issued. Therefore, credits cannot be awarded until those permits are issued. However, it is my understanding that the City has a sufficient number of credits in your project and credits will probably be available at the time the required permits are issued.

If you have further questions, please feel free to call.

Sincerely,

Melodie A. Esterberg

Melodie A. Esterberg, PE
Development Review Coordinator

cc: Joseph E. Gray, Jr., Director of Planning and Urban Development
George Flaherty, Director of Parks and Public Works
Deb Andrews, Senior Planner
Bill Goodwin, Environmental Engineer

LAND USE CONSULTANTS INC

J. David Haynes, R.L.A.
David A. Kamila, P.E.
Bradley H. Hare, R.L.A.
Frederic Licht, Jr., P.E.
John D. Roberts, P.L.S.

September 22, 1992

2608

Mr. Joseph E. Gray, Jr.
Director of Planning
City Hall
389 Congress Street
Portland, Maine 04101

Fallbrook Woods Boarding Health Care Facility

Dear Mr. Gray:

On behalf of Fallbrook, Inc., I am writing you to request credits for discharge into the combined stormwater and sewer system. As you may be aware, Fallbrook, Inc. is proposing a 56 bed boarding health care facility off Ray Street in Portland. This facility will discharge into the existing combined sewer system in Ray Street by extending the existing sewer system to the proposed facility.

It is our understanding that the City of Portland is under a consent decree from the State of Maine Department of Environmental Protection to remove stormwater from combined systems at a ratio of 5:1 (stormwater : sewage inflow). I have spoken with both Ms. Melodie Esterberg of your office and Mr. William Goodwin of Public Works whom both thought that credits would be available for this project. I understand that there is no formal process in place for this request so Melodie suggested I put the request directly to you.

As originally approved by the City of Portland, this site contained 65 condominiums, of which 28± were located in the area in which the new facility is proposed. This would translate to the following flows into the combined system.

Total Flow = 28 units x 2 bedrooms/unit x 120 GPD* = 6720, GPD

For the proposed project we are projecting the following flows:

56 beds x 100 GPD* =	5600 GPD
25 employees x 15 GPD/employee =	375 GPD
Total flow	5975 GPD

* Based on the State of Maine Subsurface Wastewater Disposal Rules, Chapter 241.

Therefore the total credits requested for the Fallbrook Woods facility would be:

Credits Required = 5975 GPD x 5 = 29,875 GPD

I trust that this information is sufficient, should you require anything further, please call.

Respectfully,

William R. Walsh

WRW/b

c.c.: Mr. Stephen Guthrie
Mr. Robert Feeney
Ms. Melodie Esterberg - Portland Planning Dept.
Mr. William Goodwin - Portland Public Works

LAND USE CONSULTANTS INC

September 18, 1992 2608

STORMWATER MANAGEMENT REPORT
FALLBROOK WOODS
PORTLAND, MAINE

INTRODUCTION

This report addresses the stormwater analysis conducted for the proposed Fallbrook Woods in Portland. The owner, Fallbrook Incorporated, proposes the construction of a 56-bed boarding health care facility. The project will consist of a single building and associated parking areas, a site access drive and gravel fire lane.

The site contains 12.6 acres and is located on an undeveloped back parcel west of Ray Street and south of Allen Avenue in the North Deering area of Portland. The site gains access to Ray Street over Merrymeeting Drive; a private way extending westerly from Ray Street which is the access drive for Fallbrook Condominiums. Merrymeeting Drive dead-ends near the site boundary. Much of the area adjacent to the parcel is residentially developed.

METHODOLOGY

For this study, a clone of the Soil Conservation Service (SCS) TR-20 Computer Modeling Method was used. This method was used to evaluate the peak flow rates for the 2, 10, and 25-year recurrence interval storm events for the pre(1981) and post-development conditions. The SCS Type III, 24-hour storm distribution was used.

The software used for the analysis was Hydrocad Version 3.02 developed by Applied Microcomputer Systems of Chocorua, N.H.

SITE TOPOGRAPHY AND COVER COMPLEX

NOTE: Refer to the Existing Conditions, Plan Sheet 2 for site characteristics and wetland identification numbers.

The parcel is mostly wooded with the exception of a graded gravel access road and cleared area in the northwestern area of the site. The gravel road extends from the dead-end of Merrymeeting Drive into the site for approximately 350 feet. A small area of overgrown grasses and brush has resulted from previous clearing over a small section of the site near the gravel road. The woods on site are a mix of mature pine and oak with some secondary growth. The undergrowth is generally vegetated with low shrubs and plants.

The topography of the site is characterized by a ledgy knoll on the northeast end and a second knoll located 500 ft. southerly from this point. Three wetlands have also been identified on site by Eco Analysts, Inc. and located by LUC.

As one enters the parcel from Merrymeeting Drive, the topography slopes gently downhill along the gravel road and rises gently to the left (or east) to the first knoll mentioned. A low drainage between the gravel drive and the knoll is occupied by wetland 1 while wetland 2 extends off-site to the right (or west) of the gravel drive. Both wetlands are small isolated drainage pockets.

A low saddle between the two prominent knolls forms a drainage channel which flows into a large wetland (wetland 3) which occupies roughly 25% of the site in the central and southern areas. This entire wetland and the knolls on-site drain through an intermittent stream to a culvert on Ray Street adjacent to the southeastern property corner.

SITE SOILS
The site soils were obtained from the U.S.D.A - Soil Conservation Service Medium Intensity Soil Survey Maps for Cumberland County.

The site boundaries have been scaled onto the site to determine hydrologic soil groups. The soil boundaries are depicted on the Pre-Development and Post-Development Drainage and Erosion & Sedimentation Control Plans, Sheets 3 and 6. The site soils and their hydrologic soil groups are further listed below:

Mapping Symbol	Soil Name	Hydrologic Soil Group
Hr, Hs	Hollis	C/D (Use D)
Bg	Belgrade	C
Sn	Scantic	D
Bu	Buxton	C

PRE-DEVELOPMENT DRAINAGE
NOTE: Refer to the pre-development drainage plan of Fallbrook Woods dated 9/15/92 for details.

For the pre-development condition, the site was divided into its two natural watersheds, A and B, as delineated on the aforementioned plan.

WATERSHED A
Watershed A is located in the northwestern portion of the site, encompassing 2.4± acres, included within this area is 1.2± of meadow, 1.1± acres of woods and 0.1± acres of gravel drive. Generally this watershed drains to the east and west into a small wetland swale which conveys the flow off-site to the south towards "The Residences" condominiums. From here, it enters a

12" PVC inlet in "The Residences" storm drainage system. The calculated pre-development peak flow rates for Watershed A as it discharges off-site are:

Q_2 = 2.1 CFS Q_{10} = 4.7 CFS Q_{25}= 6.0 CFS

WATERSHED B

Watershed B includes the remaining portion of the site as well as off-site area to the east, south and west. It was broken down into 4 sub-watersheds labelled B1 thru B4 on the plan. The entire watershed encompasses 15.6 ± acres of which 10.8± acres are wooded, 3.4± acres are grassed, 1.0± acres is meadow and 0.4± is impervious.

Generally the runoff in this watershed travels to the southeast via sheet, shallow concentrated and then channel flow thru on existing intermittent stream which discharges off-site. After leaving the southeast corner of the site, the flow travels between two residential lots towards Ray Street where it discharges into a combined sewer and stormwater system via a 10" CMP inlet. The calculated peak flow rates for Watershed B into the 10" inlet are:

Q_2= 8.1 CFS Q_{10}= 19.0 CFS Q_{25}= 24.6 CFS

Based on these calculations, the existing 10" inlet is inadequate in size to convey all storm events. Therefore, the flow is detained behind the inlet until it can be accepted by the system.

POST-DEVELOPMENT DRAINAGE

NOTE: Refer to the Post-Development Drainage Plan for Fallbrook Woods dated 9/15/92 for details.

As is the pre-development condition, the site was again broken down into Watershed A and B and the same discharge points were analyzed. On-site detention will be used, one basin in Watershed A and two basins in Watershed B, to detain post-development peak flow rates and discharge them at pre-development levels.

WATERSHED A

Post-Development Watershed A is located in the northwestern portion of the site. The Watershed will include the front portion of the proposed building and the majority of the proposed impervious drives and parking. Watershed A will encompass 2.4± acres of which 0.3± acres will be wooded, 1.1± acres will be grassed, 0.3± acres will be meadow and 0.7± acres will be impervious. As in the pre-development condition the runoff will generally flow from the east and west via sheet flow towards the center of the watershed. From here it will flow to south via the existing wetland channel to twin 12" RCP culverts which will pass beneath Merrymeeting Drive and into a proposed detention basin.

The basin will use a combination of outlets consisting of a 12" culvert for the 2- and 25-year storm events and an emergency weir to direct any flows greater than the 25-year storm. During large storm events, the detention basin will surcharge and runoff will be stored in the basin as well as the wetland on the east side of Merrymeeting Drive. As in the pre-development condition, this watershed discharges off-site through an existing swale and into a 12" PVC inlet in "The Residences" condominiums storm drainage system. The calculated Post-Development Peak Flow Rates for Watershed A for the 2, 10, and 25-year storm events are:

Q_2= 1.8 CFS Q_{10}= 3.7 CFS Q_{25}= 4.4 CFS

WATERSHED B

Post-Development Watershed B encompasses the southern portion of the site, most of which will remain undeveloped at this time. The only development will be in the northern portion of the watershed which will include the rear of the proposed building and the fire access road. Watershed B was broken down into 7 sub-watersheds labelled B1, B3, B4, B10, B11, B12 and B13 on the Post-Development Watershed Plan. Two small detention basins will be used in this watershed to detain peak flow rates.

Watershed B encompasses 15.6± acres of which 3.9± acres are grassed, 1.6± acres are meadow, 0.2± acres are gravel drive, 8.9± acres are wooded and 1.0± acres are impervious. Generally the runoff flows to the southeast towards Wetland #3. The detention basins will be located to the north of the fire access drive which will serve as an embankment for each of the basins. The outlet for both basins, will consist of orifices and weirs to control the flow. After exiting the basins, the runoff will travel through Wetland #3 to the southeast corner of the property. At this corner, a new pipe will be installed via an existing easement and connected by a new manhole into the combined storm and sanitary system in Ray Street. The calculated post-development flow rates to the proposed storm drain for the 2-, 10-, and 25-year storm events are:

Q_2= 8.1 CFS Q_{10}= 17.2 CFS Q_{25}= 23.0 CFS

SUMMARY

Two watersheds have been analyzed for the 2, 10, and 25-year recurrence interval storm events. The proposed boarding healthcare facility will not significantly change the boundaries or general flow paths of either watershed.

The following table summarizes the peak flow rates for the 2-, 10-, and 25-year recurrence interval storm events for both watersheds A and B for the pre- and post-development conditions:

	PRE-DEVELOPMENT Q(CFS)			POST-DEVELOPMENT Q(CFS)		
WATERSHED	2-YR	10-YR	25-YR	2-YR	10-YR	25-YR
A	2.1	4.7	6.0	1.8	3.7	4.4
B	8.1	19.0	24.6	8.1	17.2	23.0

CONCLUSION

The site on which Fallbrook Woods is proposed is divided into two separate and distinct watersheds. Watershed A which discharges to the west empties into "The Residences" condominiums stormwater system. By utilizing the proposed detention basin, the post-development peak flow rates for Watershed A will be less than the existing (pre-development) flow rates.

In the pre-development condition, Watershed B discharges off-site via an existing intermittent stream and then into a 10" CMP inlet in the Ray Street combined storm and sanitary sewer system. Based on these calculations, this existing inlet is insufficient in size to convey any of the storms analyzed and therefore ponding behind this inlet is presently occurring.

For the post-development condition, we are proposing two detention basins to control the peak flow rates and discharge them below pre-development levels via the existing intermittent stream. We also recommend extending the combined storm and sanitary sewer system from Ray Street to the southeastern property corner via an existing easement across abutting parcels. It may be possible to increase the size of the pipe (from 10") to alleviate some of the existing flooding which is presently occurring. However, since this is a combined sewer/stormwater system, the city would need to agree to accept the increase in storm flows to the system.

Therefore, by utilizing the proposed detention basins, the post-development peak flow rates will be at or below pre-development levels and existing flooding problems will not be increased and may be somewhat less.

Respectfully submitted,

William R. Walsh, III
Engineer

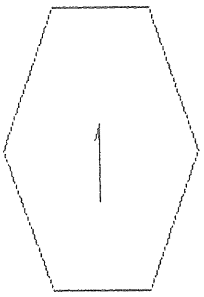
David A. Kamila, P.E.

WW/b

STATE OF MAINE
DAVID
A.
KAMILA
3197
REGISTERED
PROFESSIONAL ENGINEER

Pre-Development Drainage Calculations

WATERSHED ROUTING



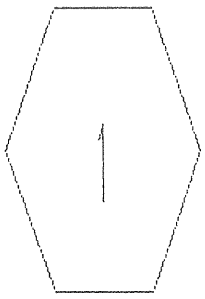
SUBCATCHMENT 1 WATERSHED A

ACRES	CN	
1.16	78	D, MEADOW
1.12	77	D, WOODS
.16	91	D, GRAVEL DRIVE
2.44	78	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= 2.1 CFS @ 12.25 HRS
VOLUME= .21 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	7.1
n=.24 L=40' P2=3 in s=.02 '/'		
TR-55 SHEET FLOW	Segment ID:B-C	10.1
n=.6 L=25' P2=3 in s=.02 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID:C-D	2.7
Unpaved Kv=16.1345 L=360' s=.019 '/' V=2.22 fps		
	Total Length= 425 ft	Total Tc= 19.9

WATERSHED ROUTING ==========



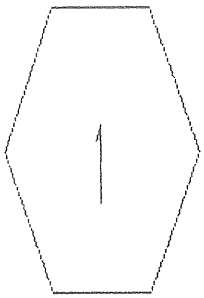
SUBCATCHMENT 1 WATERSHED A

ACRES	CN	
1.16	78	D, MEADOW
1.12	77	D, WOODS
.16	91	D, GRAVEL DRIVE
2.44	78	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 4.7 CFS @ 12.23 HRS
VOLUME= .46 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	7.1
n=.24 L=40' P2=3 in s=.02 '/'		
TR-55 SHEET FLOW	Segment ID:B-C	10.1
n=.6 L=25' P2=3 in s=.02 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID:C-D	2.7
Unpaved Kv=16.1345 L=360' s=.019 '/' V=2.22 fps		
	Total Length= 425 ft	Total Tc= 19.9

WATERSHED ROUTING ==========



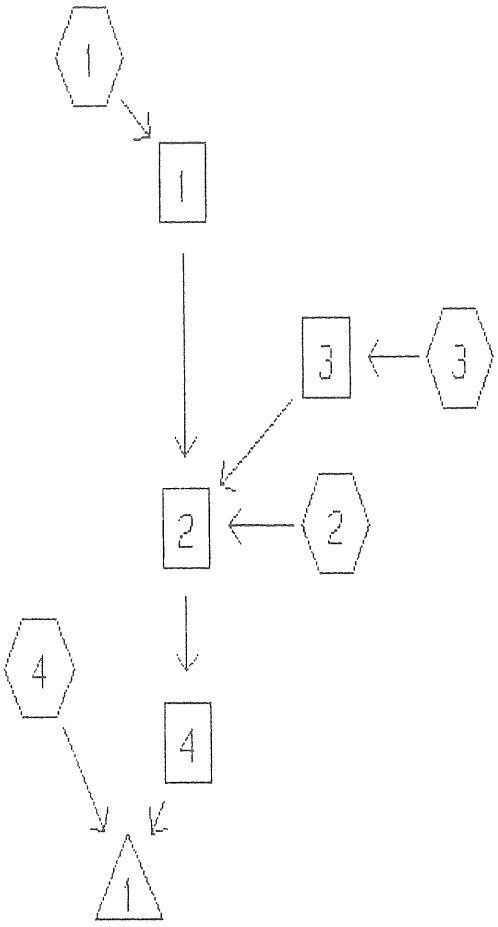
SUBCATCHMENT 1 WATERSHED A

ACRES	CN	
1.16	78	D, MEADOW
1.12	77	D, WOODS
.16	91	D, GRAVEL DRIVE
2.44	78	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 6.0 CFS @ 12.23 HRS
VOLUME= .58 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	7.1
n=.24 L=40' P2=3 in s=.02 '/'		
TR-55 SHEET FLOW	Segment ID:B-C	10.1
n=.6 L=25' P2=3 in s=.02 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID:C-D	2.7
Unpaved Kv=16.1345 L=360' s=.019 '/' V=2.22 fps		
	Total Length= 425 ft	Total Tc= 19.9

WATERSHED ROUTING ==========



RUNOFF BY SCS TR-20 METHOD: TYPE III 24-HOUR RAINFALL= 3.0 IN, SCS U.H.

SUBCAT NUMBER	AREA (ACRE)	Tc (MIN)	--GROUND COVERS (%CN)--				WGT'D CN	C	PEAK (CFS)	Tpeak (HRS)	VOL (AF)
1	2.15	17.3	51%70	29%71	12%74	7%77	72	-	1.3	12.23	.13
			1%98	-	-	-					
2	2.56	7.4	9%71	40%70	4%78	47%77	74	-	2.2	12.09	.18
3	1.89	30.8	11%74	25%70	35%80	22%77	77	-	1.3	12.41	.15
			7%98	-	-	-					
4	9.03	44.2	11%70	26%80	61%77	2%98	77	-	5.1	12.60	.73

REACH ROUTING BY STOR-IND METHOD

REACH NO.	DIAM (IN)	BOTTOM WIDTH (FT)	DEPTH (FT)	SIDE SLOPES (FT/FT)		n	LENGTH (FT)	SLOPE (FT/FT)	PEAK VEL. (FPS)	TRAVEL TIME (MIN)	PEAK Qout (CFS)
1	-	1.5	1.0	.50	.50	.050	170	.0210	1.7	1.7	1.3
2	-	2.0	2.0	.01	.01	.080	265	.0200	.6	6.8	3.4
3	-	5.0	1.0	.01	.01	.080	180	.0340	.6	4.8	1.2
4	-	2.0	1.0	.50	.50	.050	490	.0100	1.7	4.9	3.3

POND ROUTING BY STOR-IND METHOD

POND NO.	OUTLET DEVICES	START ELEV. (FT)	FLOOD ELEV. (FT)	PEAK ELEV. (FT)	PEAK STORAGE (AF)	---PEAK FLOW--- Qin (CFS)	Qout (CFS)	ATTEN. (%)	LAG (MIN)
1	2	76.9	81.0	79.5	.30	8.1	3.2	60	45.8

SUBCATCHMENT 1 PRE W/S B1

ACRES	CN	
1.10	70	C WOODS
.63	71	C MEADOW
.25	74	C LAWN
.14	77	D WOODS
.03	98	IMPERV
2.15	72	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= 1.3 CFS @ 12.23 HRS
VOLUME= .13 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	16.3
n=.24 L=80' P2=3 in s=.01 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	BC	.9
Unpaved Kv=16.1345 L=90' s=.01 '/' V=1.61 fps		
DIRECT ENTRY	CD	.1
	Total Length= 170 ft Total Tc=	17.3

SUBCATCHMENT 2 PRE SUB W/S 2

ACRES	CN	
.23	71	MEADOW C
1.02	70	WOODS C
.10	78	MEADOW D
1.21	77	WOODS D
2.56	74	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= 2.2 CFS @ 12.09 HRS
VOLUME= .18 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	6.8
n=.24 L=60' P2=3 in s=.05 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID:BC	.5
Unpaved Kv=16.1345 L=145' s=.09 '/' V=4.84 fps		
DIRECT ENTRY	SEGMENT CD	.1
	Total Length= 205 ft Total Tc=	7.4

SUBCATCHMENT 3 PRE SUB W/S B3

ACRES	CN	
.21	74	C GRASS
.47	70	C WOODS
.67	80	D GRASS
.41	77	D WOODS
.13	98	IMPERV
1.89	77	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= 1.3 CFS @ 12.41 HRS
VOLUME= .15 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	13.0
n=.24 L=90' P2=3 in s=.022 '/'		
TR-55 SHEET FLOW	Segment ID:BC	17.0
n=.6 L=70' P2=3 in s=.043 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment IDCD	.7
Unpaved Kv=16.1345 L=145' s=.041 '/' V=3.27 fps		
DIRECT ENTRY	Segment ID:DE	.1
	Total Length= 305 ft Total Tc=	30.8

SUBCATCHMENT 4 PRE W/S B4

ACRES	CN	
1.00	70	C WOODS
2.31	80	D GRASS
5.53	77	D WOODS
.19	98	IMPERV
9.03	77	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= 5.1 CFS @ 12.60 HRS
VOLUME= .73 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	42.4
n=.6 L=150' P2=3 in s=.02 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID:BC	1.7
Unpaved Kv=16.1345 L=200' s=.015 '/' V=1.98 fps		
DIRECT ENTRY	Segment ID:CD	.1
	Total Length= 350 ft Total Tc=	44.2

REACH 1 SWALE AT UPPER SECTION WET 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	.2	.1
.2	.4	.5
.3	.6	1.0
.4	1.0	1.9
.6	1.6	3.7
.8	2.5	6.6
1.0	3.5	10.6

1.5' x 1' CHANNEL
SIDE SLOPE= .5 '/'
n= .05
LENGTH= 170 FT
SLOPE= .021 FT/FT

STOR-IND METHOD
MAX. DEPTH= .33 FT
PEAK VELOCITY= 1.7 FPS
TRAVEL TIME = 1.7 MIN
Qin = 1.3 CFS @ 12.23 HRS
Qout= 1.3 CFS @ 12.25 HRS
ATTEN= 0 % LAG= 1.2 MIN
IN/OUT= .13 / .13 AF

REACH 2 SHALLOW DRAINAGE IN WET 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	4.4	2.6
.4	16.8	15.3
.6	37.2	44.3
.9	75.7	114.1
1.2	146.4	275.1
1.6	259.2	589.2
2.0	404.0	1064.8

2' x 2' CHANNEL
SIDE SLOPE= .01 '/'
n= .08
LENGTH= 265 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .21 FT
PEAK VELOCITY= .6 FPS
TRAVEL TIME = 6.8 MIN
Qin = 3.4 CFS @ 12.16 HRS
Qout= 3.4 CFS @ 12.34 HRS
ATTEN= 1 % LAG= 10.9 MIN
IN/OUT= .46 / .46 AF

REACH 3 WETLAND 3 BETWEEN SUBCATCH3 AND STREAM

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	1.5	.8
.2	5.0	4.0
.3	10.5	10.7
.4	20.6	26.3
.6	39.0	61.4
.8	68.0	129.0
1.0	105.0	230.2

5' x 1' CHANNEL
SIDE SLOPE= .01 '/'
n= .08
LENGTH= 180 FT
SLOPE= .034 FT/FT

STOR-IND METHOD
MAX. DEPTH= .11 FT
PEAK VELOCITY= .6 FPS
TRAVEL TIME = 4.8 MIN
Qin = 1.3 CFS @ 12.41 HRS
Qout= 1.2 CFS @ 12.48 HRS
ATTEN= 2 % LAG= 3.7 MIN
IN/OUT= .15 / .15 AF

REACH 4 STREAM IN WETLANDS 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	.2	.1
.2	.5	.4
.3	.8	.9
.4	1.2	1.7
.6	1.9	3.1
.8	2.9	5.5
1.0	4.0	8.6

2' x 1' CHANNEL
SIDE SLOPE= .5 '/'
n= .05
LENGTH= 490 FT
SLOPE= .01 FT/FT

STOR-IND METHOD
MAX. DEPTH= .61 FT
PEAK VELOCITY= 1.7 FPS
TRAVEL TIME = 4.9 MIN
Qin = 3.4 CFS @ 12.34 HRS
Qout= 3.3 CFS @ 12.41 HRS
ATTEN= 2 % LAG= 4.3 MIN
IN/OUT= .46 / .45 AF

POND 1 BACKWATER AREA AT 10INCH CMP WETLANDS 3

STARTING ELEV= 76.9 FT
FLOOD ELEV= 81.0 FT

ELEVATION (FT)	CUM.STOR (CF)
76.9	0
78.0	83
79.0	4013
80.0	21893
81.0	67093

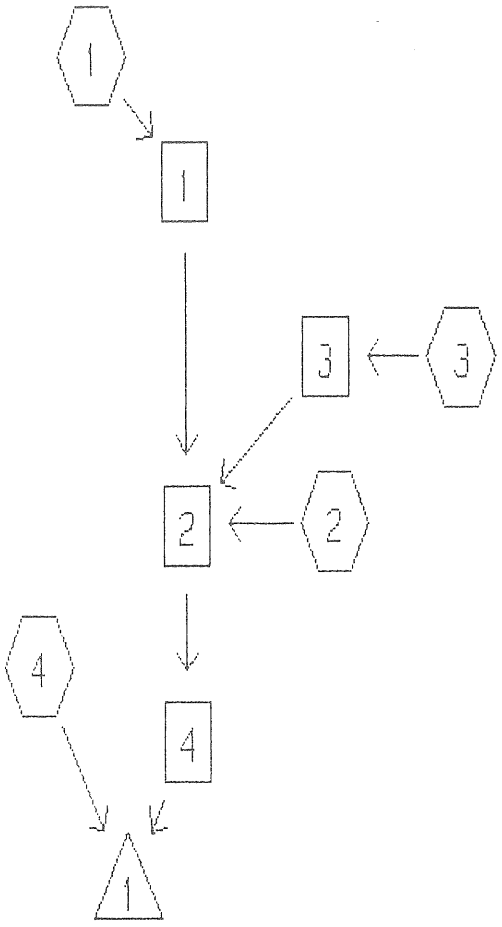
STOR-IND METHOD
PEAK ELEVATION= 79.5 FT
PEAK STORAGE = 13111 CF
Qin = 8.1 CFS @ 12.53 HRS
Qout= 3.2 CFS @ 13.30 HRS
ATTEN= 60 % LAG= 45.8 MIN
IN/OUT= 1.18 / 1.18 AF

INVERT (FT)	OUTLET DEVICES
76.9	**10" CULVERT**
	n=.02 L=12' S=.01'/' Ke=.8 Cc=.9 Cd=.5 TW=.5'
79.8	**15' BROAD-CRESTED RECTANGULAR WEIR**
	Q=C L H^1.5 C=2.78, 2.93, 0, 0, 0, 0, 0, 0

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
76.9	0.0	0.0	.1	.2	.4	.5	.7	1.0	1.2	1.4
77.9	1.5	1.6	1.8	2.0	2.1	2.3	2.4	2.5	2.6	2.7
78.9	2.8	2.8	2.9	3.0	3.1	3.2	3.2	3.3	3.4	3.4
79.9	4.8	7.3	10.5	14.3	18.5	23.4	28.9	34.8	41.2	48.0
80.9	54.8	62.0								

WATERSHED ROUTING ==========



RUNOFF BY SCS TR-20 METHOD: TYPE III 24-HOUR RAINFALL= 4.7 IN, SCS U.H.

SUBCAT NUMBER	AREA (ACRE)	Tc (MIN)	--GROUND COVERS (%CN)--				WGT'D CN	C	PEAK (CFS)	Tpeak (HRS)	VOL (AF)
1	2.15	17.3	51%70	29%71	12%74	7%77	72	-	3.4	12.21	.32
			1%98	-	-	-					
2	2.56	7.4	9%71	40%70	4%78	47%77	74	-	5.4	12.08	.42
3	1.89	30.8	11%74	25%70	35%80	22%77	77	-	2.9	12.39	.34
			7%98	-	-	-					
4	9.03	44.2	11%70	26%80	61%77	2%98	77	-	11.7	12.57	1.63

REACH ROUTING BY STOR-IND METHOD

REACH NO.	DIAM (IN)	BOTTOM WIDTH (FT)	DEPTH (FT)	SIDE SLOPES (FT/FT)		n	LENGTH (FT)	SLOPE (FT/FT)	PEAK VEL. (FPS)	TRAVEL TIME (MIN)	PEAK Qout (CFS)
1	-	1.5	1.0	.50	.50	.050	170	.0210	2.2	1.3	3.4
2	-	2.0	2.0	.01	.01	.080	265	.0200	.8	5.3	8.8
3	-	5.0	1.0	.01	.01	.080	180	.0340	.8	4.0	2.9
4	-	2.0	1.0	.50	.50	.050	490	.0100	2.2	3.8	8.7

POND ROUTING BY STOR-IND METHOD

POND NO.	OUTLET DEVICES	START ELEV. (FT)	FLOOD ELEV. (FT)	PEAK ELEV. (FT)	PEAK STORAGE (AF)	---PEAK FLOW--- Qin (CFS)	Qout (CFS)	ATTEN. (%)	LAG (MIN)
1	2	76.9	81.0	80.2	.67	19.0	12.7	33	23.7

SUBCATCHMENT 1 PRE W/S B1

ACRES	CN	
1.10	70	C WOODS
.63	71	C MEADOW
.25	74	C LAWN
.14	77	D WOODS
.03	98	IMPERV
2.15	72	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 3.4 CFS @ 12.21 HRS
VOLUME= .32 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	16.3
n=.24 L=80' P2=3 in s=.01 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	BC	.9
Unpaved Kv=16.1345 L=90' s=.01 '/' V=1.61 fps		
DIRECT ENTRY	CD	.1
	Total Length= 170 ft Total Tc=	17.3

SUBCATCHMENT 2 PRE SUB W/S 2

ACRES	CN	
.23	71	MEADOW C
1.02	70	WOODS C
.10	78	MEADOW D
1.21	77	WOODS D
2.56	74	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 5.4 CFS @ 12.08 HRS
VOLUME= .42 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	6.8
n=.24 L=60' P2=3 in s=.05 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID:BC	.5
Unpaved Kv=16.1345 L=145' s=.09 '/' V=4.84 fps		
DIRECT ENTRY	SEGMENT CD	.1
	Total Length= 205 ft Total Tc=	7.4

SUBCATCHMENT 3 PRE SUB W/S B3

ACRES	CN	
.21	74	C GRASS
.47	70	C WOODS
.67	80	D GRASS
.41	77	D WOODS
.13	98	IMPERV
1.89	77	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 2.9 CFS @ 12.39 HRS
VOLUME= .34 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	13.0
n=.24 L=90' P2=3 in s=.022 '/'		
TR-55 SHEET FLOW	Segment ID:BC	17.0
n=.6 L=70' P2=3 in s=.043 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment IDCD	.7
Unpaved Kv=16.1345 L=145' s=.041 '/' V=3.27 fps		
DIRECT ENTRY	Segment ID:DE	.1
	Total Length= 305 ft Total Tc=	30.8

SUBCATCHMENT 4 PRE W/S B4

ACRES	CN	
1.00	70	C WOODS
2.31	80	D GRASS
5.53	77	D WOODS
.19	98	IMPERV
9.03	77	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 11.7 CFS @ 12.57 HRS
VOLUME= 1.63 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	42.4
n=.6 L=150' P2=3 in s=.02 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID:BC	1.7
Unpaved Kv=16.1345 L=200' s=.015 '/' V=1.98 fps		
DIRECT ENTRY	Segment ID:CD	.1
	Total Length= 350 ft Total Tc=	44.2

REACH 1 SWALE AT UPPER SECTION WET 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	.2	.1
.2	.4	.5
.3	.6	1.0
.4	1.0	1.9
.6	1.6	3.7
.8	2.5	6.6
1.0	3.5	10.6

1.5' x 1' CHANNEL
SIDE SLOPE= .5 '/'
n= .05
LENGTH= 170 FT
SLOPE= .021 FT/FT

STOR-IND METHOD
MAX. DEPTH= .57 FT
PEAK VELOCITY= 2.2 FPS
TRAVEL TIME = 1.3 MIN
Qin = 3.4 CFS @ 12.21 HRS
Qout= 3.4 CFS @ 12.23 HRS
ATTEN= 0 % LAG= .9 MIN
IN/OUT= .32 / .32 AF

REACH 2 SHALLOW DRAINAGE IN WET 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	4.4	2.6
.4	16.8	15.3
.6	37.2	44.3
.9	75.7	114.1
1.2	146.4	275.1
1.6	259.2	589.2
2.0	404.0	1064.8

2' x 2' CHANNEL
SIDE SLOPE= .01 '/'
n= .08
LENGTH= 265 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .30 FT
PEAK VELOCITY= .8 FPS
TRAVEL TIME = 5.3 MIN
Qin = 9.3 CFS @ 12.14 HRS
Qout= 8.8 CFS @ 12.24 HRS
ATTEN= 5 % LAG= 6.3 MIN
IN/OUT= 1.08 / 1.08 AF

REACH 3 WETLAND 3 BETWEEN SUBCATCH3 AND STREAM

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	1.5	.8
.2	5.0	4.0
.3	10.5	10.7
.4	20.6	26.3
.6	39.0	61.4
.8	68.0	129.0
1.0	105.0	230.2

5' x 1' CHANNEL
SIDE SLOPE= .01 '/'
n= .08
LENGTH= 180 FT
SLOPE= .034 FT/FT

STOR-IND METHOD
MAX. DEPTH= .16 FT
PEAK VELOCITY= .8 FPS
TRAVEL TIME = 4.0 MIN
Qin = 2.9 CFS @ 12.39 HRS
Qout= 2.9 CFS @ 12.45 HRS
ATTEN= 2 % LAG= 3.3 MIN
IN/OUT= .34 / .34 AF

REACH 4 STREAM IN WETLANDS 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	.2	.1
.2	.5	.4
.3	.8	.9
.4	1.2	1.7
.6	1.9	3.1
.8	2.9	5.5
1.0	4.0	8.6

2' x 1' CHANNEL
SIDE SLOPE= .5 '/'
n= .05
LENGTH= 490 FT
SLOPE= .01 FT/FT

STOR-IND METHOD
MAX. DEPTH= 1.00 FT
PEAK VELOCITY= 2.2 FPS
TRAVEL TIME = 3.8 MIN
Qin = 8.8 CFS @ 12.24 HRS
Qout= 8.7 CFS @ 12.31 HRS
ATTEN= 2 % LAG= 4.2 MIN
IN/OUT= 1.08 / 1.08 AF

POND 1 BACKWATER AREA AT 10INCH CMP WETLANDS 3

STARTING ELEV= 76.9 FT
FLOOD ELEV= 81.0 FT

ELEVATION (FT)	CUM.STOR (CF)
76.9	0
78.0	83
79.0	4013
80.0	21893
81.0	67093

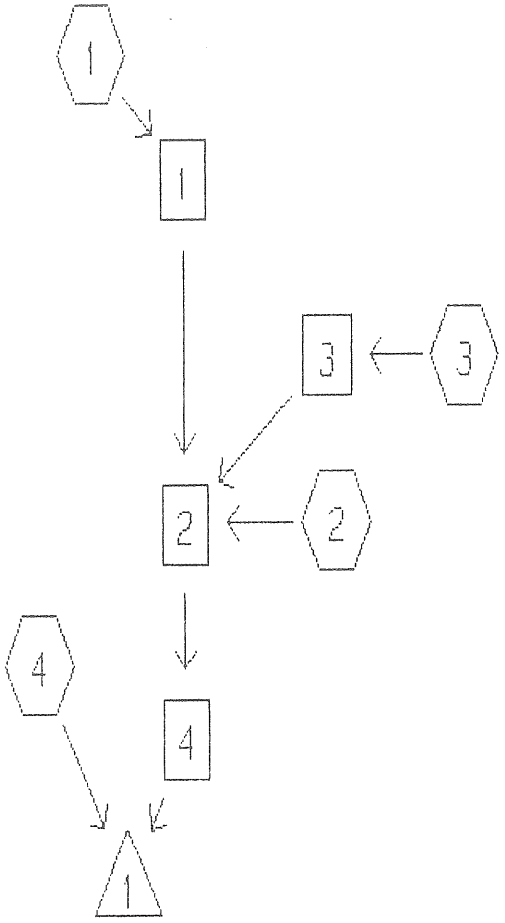
STOR-IND METHOD
PEAK ELEVATION= 80.2 FT
PEAK STORAGE = 29060 CF
Qin = 19.0 CFS @ 12.48 HRS
Qout= 12.7 CFS @ 12.87 HRS
ATTEN= 33 % LAG= 23.7 MIN
IN/OUT= 2.71 / 2.71 AF

INVERT (FT)	OUTLET DEVICES
76.9	10" CULVERT n=.02 L=12' S=.01'/' Ke=.8 Cc=.9 Cd=.5 TW=.5'
79.8	15' BROAD-CRESTED RECTANGULAR WEIR Q=C L H^1.5 C=2.78, 2.93, 0, 0, 0, 0, 0, 0

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
76.9	0.0	0.0	.1	.2	.4	.5	.7	1.0	1.2	1.4
77.9	1.5	1.6	1.8	2.0	2.1	2.3	2.4	2.5	2.6	2.7
78.9	2.8	2.8	2.9	3.0	3.1	3.2	3.2	3.3	3.4	3.4
79.9	4.8	7.3	10.5	14.3	18.5	23.4	28.9	34.8	41.2	48.0
80.9	54.8	62.0								

WATERSHED ROUTING ==========



RUNOFF BY SCS TR-20 METHOD: TYPE III 24-HOUR RAINFALL= 5.5 IN, SCS U.H.

SUBCAT NUMBER	AREA (ACRE)	Tc (MIN)	--GROUND COVERS (%CN)--				WGT'D CN	C	PEAK (CFS)	Tpeak (HRS)	VOL (AF)
1	2.15	17.3	51%70 1%98	29%71 -	12%74 -	7%77 -	72	-	4.6	12.21	.43
2	2.56	7.4	9%71	40%70	4%78	47%77	74	-	7.1	12.08	.54
3	1.89	30.8	11%74 7%98	25%70 -	35%80 -	22%77 -	77	-	3.7	12.39	.44
4	9.03	44.2	11%70	26%80	61%77	2%98	77	-	15.0	12.56	2.09

REACH ROUTING BY STOR-IND METHOD

REACH NO.	DIAM (IN)	BOTTOM WIDTH (FT)	DEPTH (FT)	SIDE SLOPES (FT/FT)		n	LENGTH (FT)	SLOPE (FT/FT)	PEAK VEL. (FPS)	TRAVEL TIME (MIN)	PEAK Qout (CFS)
1	-	1.5	1.0	.50	.50	.050	170	.0210	2.4	1.2	4.6
2	-	2.0	2.0	.01	.01	.080	265	.0200	.9	5.0	11.6
3	-	5.0	1.0	.01	.01	.080	180	.0340	.8	3.8	3.7
4	-	2.0	1.0	.50	.50	.050	490	.0100	2.3	3.6	11.4

POND ROUTING BY STOR-IND METHOD

POND NO.	OUTLET DEVICES	START ELEV. (FT)	FLOOD ELEV. (FT)	PEAK ELEV. (FT)	PEAK STORAGE (AF)	---PEAK FLOW--- Qin (CFS)	Qout (CFS)	ATTEN. (%)	LAG (MIN)
1	2	76.9	81.0	80.3	.80	24.6	18.1	26	20.1

SUBCATCHMENT 1 PRE W/S B1

ACRES	CN	
1.10	70	C WOODS
.63	71	C MEADOW
.25	74	C LAWN
.14	77	D WOODS
.03	98	IMPERV
2.15	72	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 4.6 CFS @ 12.21 HRS
VOLUME= .43 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	16.3
n=.24 L=80' P2=3 in s=.01 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	BC	.9
Unpaved Kv=16.1345 L=90' s=.01 '/' V=1.61 fps		
DIRECT ENTRY	CD	.1
	Total Length= 170 ft Total Tc=	17.3

SUBCATCHMENT 2 PRE SUB W/S 2

ACRES	CN	
.23	71	MEADOW C
1.02	70	WOODS C
.10	78	MEADOW D
1.21	77	WOODS D
2.56	74	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 7.1 CFS @ 12.08 HRS
VOLUME= .54 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	6.8
n=.24 L=60' P2=3 in s=.05 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID:BC	.5
Unpaved Kv=16.1345 L=145' s=.09 '/' V=4.84 fps		
DIRECT ENTRY	SEGMENT CD	.1
	Total Length= 205 ft Total Tc=	7.4

SUBCATCHMENT 3 PRE SUB W/S B3

ACRES	CN	
.21	74	C GRASS
.47	70	C WOODS
.67	80	D GRASS
.41	77	D WOODS
.13	98	IMPERV
1.89	77	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 3.7 CFS @ 12.39 HRS
VOLUME= .44 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	13.0
n=.24 L=90' P2=3 in s=.022 '/'		
TR-55 SHEET FLOW	Segment ID:BC	17.0
n=.6 L=70' P2=3 in s=.043 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment IDCD	.7
Unpaved Kv=16.1345 L=145' s=.041 '/' V=3.27 fps		
DIRECT ENTRY	Segment ID:DE	.1
	Total Length= 305 ft Total Tc=	30.8

SUBCATCHMENT 4 PRE W/S B4

ACRES	CN	
1.00	70	C WOODS
2.31	80	D GRASS
5.53	77	D WOODS
.19	98	IMPERV
9.03	77	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 15.0 CFS @ 12.56 HRS
VOLUME= 2.09 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	42.4
n=.6 L=150' P2=3 in s=.02 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID:BC	1.7
Unpaved Kv=16.1345 L=200' s=.015 '/' V=1.98 fps		
DIRECT ENTRY	Segment ID:CD	.1
	Total Length= 350 ft Total Tc=	44.2

REACH 1 SWALE AT UPPER SECTION WET 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	.2	.1
.2	.4	.5
.3	.6	1.0
.4	1.0	1.9
.6	1.6	3.7
.8	2.5	6.6
1.0	3.5	10.6

1.5' x 1' CHANNEL
SIDE SLOPE= .5 '/'
n= .05
LENGTH= 170 FT
SLOPE= .021 FT/FT

STOR-IND METHOD
MAX. DEPTH= .66 FT
PEAK VELOCITY= 2.4 FPS
TRAVEL TIME = 1.2 MIN
Qin = 4.6 CFS @ 12.21 HRS
Qout= 4.6 CFS @ 12.22 HRS
ATTEN= 0 % LAG= .8 MIN
IN/OUT= .43 / .43 AF

REACH 2 SHALLOW DRAINAGE IN WET 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	4.4	2.6
.4	16.8	15.3
.6	37.2	44.3
.9	75.7	114.1
1.2	146.4	275.1
1.6	259.2	589.2
2.0	404.0	1064.8

2' x 2' CHANNEL
SIDE SLOPE= .01 '/'
n= .08
LENGTH= 265 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .34 FT
PEAK VELOCITY= .9 FPS
TRAVEL TIME = 5.0 MIN
Qin = 12.3 CFS @ 12.13 HRS
Qout= 11.6 CFS @ 12.24 HRS
ATTEN= 6 % LAG= 6.1 MIN
IN/OUT= 1.41 / 1.40 AF

REACH 3 WETLAND 3 BETWEEN SUBCATCH3 AND STREAM

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	1.5	.8
.2	5.0	4.0
.3	10.5	10.7
.4	20.6	26.3
.6	39.0	61.4
.8	68.0	129.0
1.0	105.0	230.2

5' x 1' CHANNEL
SIDE SLOPE= .01 '/'
n= .08
LENGTH= 180 FT
SLOPE= .034 FT/FT

STOR-IND METHOD
MAX. DEPTH= .19 FT
PEAK VELOCITY= .8 FPS
TRAVEL TIME = 3.8 MIN
Qin = 3.7 CFS @ 12.39 HRS
Qout= 3.7 CFS @ 12.44 HRS
ATTEN= 2 % LAG= 3.4 MIN
IN/OUT= .44 / .44 AF

REACH 4 STREAM IN WETLANDS 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	.2	.1
.2	.5	.4
.3	.8	.9
.4	1.2	1.7
.6	1.9	3.1
.8	2.9	5.5
1.0	4.0	8.6

2' x 1' CHANNEL
SIDE SLOPE= .5 '/'
n= .05
LENGTH= 490 FT
SLOPE= .01 FT/FT

STOR-IND METHOD
MAX. DEPTH= 1.18 FT
PEAK VELOCITY= 2.3 FPS
TRAVEL TIME = 3.6 MIN
Qin = 11.6 CFS @ 12.24 HRS
Qout= 11.4 CFS @ 12.30 HRS
ATTEN= 2 % LAG= 4.0 MIN
IN/OUT= 1.40 / 1.40 AF

POND 1 BACKWATER AREA AT 10INCH CMP WETLANDS 3

STARTING ELEV= 76.9 FT
FLOOD ELEV= 81.0 FT

ELEVATION (FT)	CUM.STOR (CF)
76.9	0
78.0	83
79.0	4013
80.0	21893
81.0	67093

STOR-IND METHOD
PEAK ELEVATION= 80.3 FT
PEAK STORAGE = 35021 CF
Qin = 24.6 CFS @ 12.47 HRS
Qout= 18.1 CFS @ 12.81 HRS
ATTEN= 26 % LAG= 20.1 MIN
IN/OUT= 3.49 / 3.49 AF

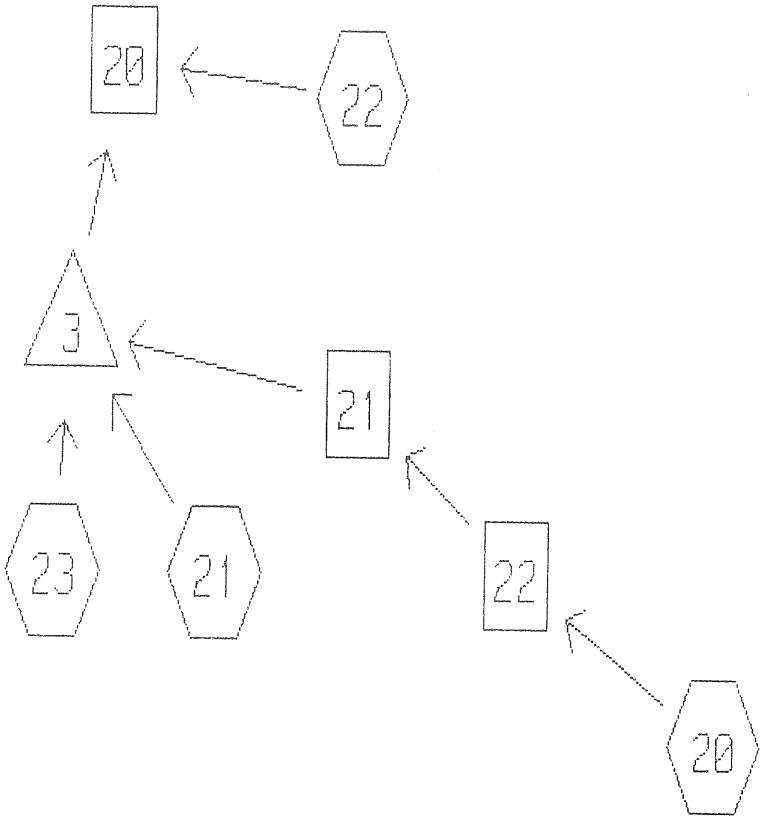
INVERT (FT)	OUTLET DEVICES
76.9	10" CULVERT n=.02 L=12' S=.01'/' Ke=.8 Cc=.9 Cd=.5 TW=.5'
79.8	15' BROAD-CRESTED RECTANGULAR WEIR Q=C L H^1.5 C=2.78, 2.93, 0, 0, 0, 0, 0, 0

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
76.9	0.0	0.0	.1	.2	.4	.5	.7	1.0	1.2	1.4
77.9	1.5	1.6	1.8	2.0	2.1	2.3	2.4	2.5	2.6	2.7
78.9	2.8	2.8	2.9	3.0	3.1	3.2	3.2	3.3	3.4	3.4
79.9	4.8	7.3	10.5	14.3	18.5	23.4	28.9	34.8	41.2	48.0
80.9	54.8	62.0								

Post-Development Drainage Calculations

WATERSHED ROUTING



SUBCATCHMENT REACH POND LINK

RUNOFF BY SCS TR-20 METHOD: TYPE III 24-HOUR RAINFALL= 3.0 IN, SCS U.H.

SUBCAT NUMBER	AREA (ACRE)	Tc (MIN)	--GROUND COVERS (%CN)--				WGT'D CN	C	PEAK (CFS)	Tpeak (HRS)	VOL (AF)
20	.58	17.5	17%70	64%80	19%98	-	82	-	.7	12.21	.06
21	1.31	19.1	31%80	18%78	15%70	36%98	85	-	1.7	12.22	.16
22	.34	26.0	41%80	18%78	18%70	24%98	82	-	.3	12.33	.04
23	.21	10.4	86%80	14%98	-	-	83	-	.3	12.11	.02

REACH ROUTING BY STOR-IND METHOD

REACH NO.	DIAM (IN)	BOTTOM WIDTH (FT)	DEPTH (FT)	SIDE SLOPES (FT/FT)		n	LENGTH (FT)	SLOPE (FT/FT)	PEAK VEL. (FPS)	TRAVEL TIME (MIN)	PEAK Qout (CFS)
20	12.0	-	-	-	-	.009	25	.0100	6.3	.1	2.0
21	-	2.0	2.0	.10	.10	.080	190	.0130	.6	5.1	.6
22	12.0	-	-	-	-	.013	30	.0050	2.8	.2	.7

POND ROUTING BY STOR-IND METHOD

POND NO.	OUTLET DEVICES	START ELEV. (FT)	FLOOD ELEV. (FT)	PEAK ELEV. (FT)	PEAK STORAGE (AF)	---PEAK FLOW--- Qin (CFS)	Qout (CFS)	ATTEN. (%)	LAG (MIN)
3	2	104.5	107.0	105.2	.05	2.5	1.7	31	13.4

SUBCATCHMENT 20 SUB-WATERSHED A-20

ACRES	CN	
.10	70	D, WOODS
.37	80	D, GRASS
.11	98	IMP.
.58	82	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= .7 CFS @ 12.21 HRS
VOLUME= .06 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	7.1
n=.24 L=40' P2=3 in s=.02 '/'		
TR-55 SHEET FLOW	Segment ID: B-C	10.1
n=.6 L=25' P2=3 in s=.02 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID: C-D	.3
Unpaved Kv=16.1345 L=45' s=.019 '/' V=2.22 fps		
	Total Length= 110 ft	Total Tc= 17.5

SUBCATCHMENT 21 SUB WATERSHED A-21

ACRES	CN	
.40	80	D, GRASS
.24	78	D, MEADOW
.20	70	D, WOODS
.47	98	IMPERVIOUS
1.31	85	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= 1.7 CFS @ 12.22 HRS
VOLUME= .16 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	17.8
n=.6 L=80' P2=3 in s=.05 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID: B-C	1.3
Unpaved Kv=16.1345 L=145' s=.013 '/' V=1.84 fps		
	Total Length= 225 ft	Total Tc= 19.1

SUBCATCHMENT 22 SUB-WATWERSHED A-22

ACRES	CN	
.14	80	D, GRASS
.06	78	D, MEADOW
.06	70	D, WOODS
.08	98	IMPERVIOUS
.34	82	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= .3 CFS @ 12.33 HRS
VOLUME= .04 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	24.4
n=.6 L=65' P2=3 in s=.015 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID: B-C	1.6
Unpaved Kv=16.1345 L=295' s=.035 '/' V=3.02 fps		
	Total Length= 360 ft	Total Tc= 26.0

SUBCATCHMENT 23 SUB-W/S A-23

ACRES	CN	
.18	80	D, GRASS
.03	98	IMP
.21	83	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= .3 CFS @ 12.11 HRS
VOLUME= .02 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	10.4
n=.24 L=65' P2=3 in s=.02 '/'		

REACH 20 12" PVC OFF-SITE

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	0.0	.1
.2	.1	.5
.3	.2	1.0
.7	.6	4.3
.8	.7	5.0
.9	.7	5.5
.9	.8	5.5
1.0	.8	5.5
1.0	.8	5.1

12" PIPE

n= .009
LENGTH= 25 FT
SLOPE= .01 FT/FT

STOR-IND METHOD
MAX. DEPTH= .42 FT
PEAK VELOCITY= 6.3 FPS
TRAVEL TIME = .1 MIN
Qin = 2.0 CFS @ 12.43 HRS
Qout= 2.0 CFS @ 12.43 HRS
ATTEN= 0 % LAG= 0.0 MIN
IN/OUT= .27 / .27 AF

REACH 21 CHANNEL THRU WETLAND

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.8	.4
.4	2.4	2.0
.6	4.8	5.0
.9	9.1	11.7
1.2	16.8	26.5
1.6	28.8	54.4
2.0	44.0	95.8

2' x 2' CHANNEL
SIDE SLOPE= .1 '/'
n= .08
LENGTH= 190 FT
SLOPE= .013 FT/FT

STOR-IND METHOD
MAX. DEPTH= .22 FT
PEAK VELOCITY= .6 FPS
TRAVEL TIME = 5.1 MIN
Qin = .7 CFS @ 12.21 HRS
Qout= .6 CFS @ 12.29 HRS
ATTEN= 7 % LAG= 4.9 MIN
IN/OUT= .06 / .06 AF

REACH 22 CULVERT UNDER DRIVE

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	0.0	.1
.2	.1	.2
.3	.2	.5
.7	.6	2.1
.8	.7	2.5
.9	.7	2.7
.9	.8	2.7
1.0	.8	2.7
1.0	.8	2.5

12" PIPE

n= .013
LENGTH= 30 FT
SLOPE= .005 FT/FT

STOR-IND METHOD
MAX. DEPTH= .34 FT
PEAK VELOCITY= 2.8 FPS
TRAVEL TIME = .2 MIN
Qin = .7 CFS @ 12.21 HRS
Qout= .7 CFS @ 12.21 HRS
ATTEN= 0 % LAG= .1 MIN
IN/OUT= .06 / .06 AF

POND 3 DETENTION BASIN

STARTING ELEV= 104.5 FT
FLOOD ELEV= 107.0 FT

ELEVATION (FT)	CUM.STOR (CF)
104.5	0
105.0	1200
106.0	5660
107.0	14828

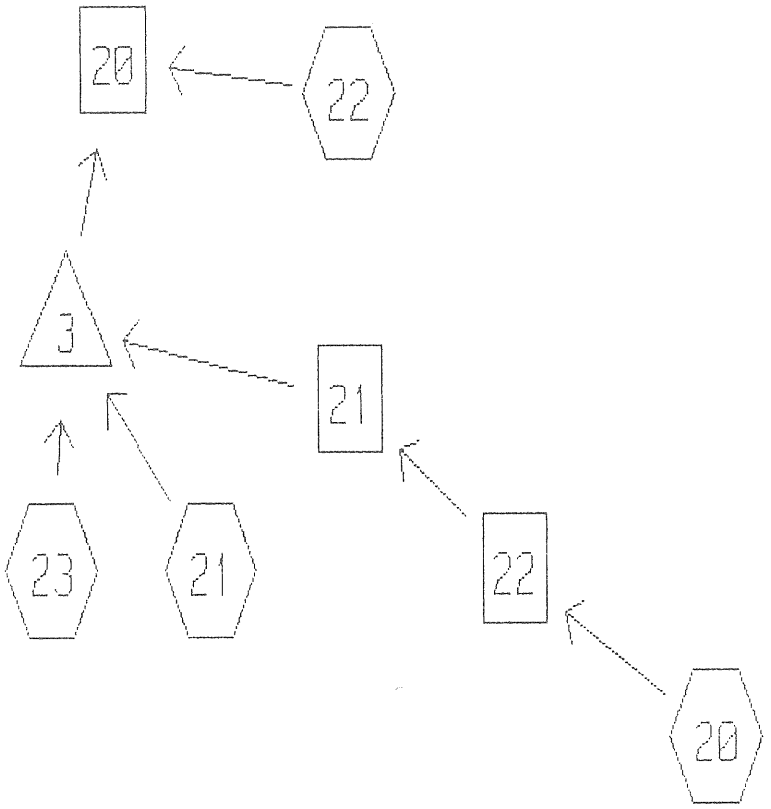
STOR-IND METHOD
PEAK ELEVATION= 105.2 FT
PEAK STORAGE = 2113 CF
Qin = 2.5 CFS @ 12.23 HRS
Qout= 1.7 CFS @ 12.45 HRS
ATTEN= 31 % LAG= 13.4 MIN
IN/OUT= .24 / .24 AF

INVERT (FT)	OUTLET DEVICES
104.5	12" ORIFICE Q=.6 PI r^2 SQR(2g) SQR(H-r)
106.5	5' BROAD-CRESTED RECTANGULAR WEIR Q=C L H^1.5 C=2.8, 3.1, 0, 0, 0, 0, 0, 0

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
104.5	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
105.5	2.7	2.9	3.2	3.4	3.6	3.8	4.0	4.1	4.3	4.5
106.5	4.6	5.2	6.2	7.4	8.8	10.3				

WATERSHED ROUTING



--20 METHOD: TYPE III 24-HOUR RAINFALL= 4.7 IN, SCS U.H.

--GROUND COVERS (%CN)--				WGT'D CN	C	PEAK (CFS)	Tpeak (HRS)	VOL (AF)	PEAK VEL. (FPS)	TRAVEL TIME (MIN)	PEAK Qout (CFS)
17%70	64%80	19%98	-	82	-	1.3	12.20	.12	7.2	.1	3.7
31%80	18%78	15%70	36%98	85	-	3.2	12.22	.31	.8	4.2	1.3
41%80	18%78	18%70	24%98	82	-	.7	12.32	.07	3.3	.1	1.3
86%80	14%98	-	-	83	-	.6	12.11	.05			

RUNOFF BY SCS TR-20 METHOD: TYPE III 24-HOUR RAINFALL= 4.7 IN, SCS U.H.

SUBCAT NUMBER	AREA (ACRE)	Tc (MIN)	--GROUND COVERS (%CN)--				WGT'D CN	C	PEAK (CFS)	Tpeak (HRS)	VOL (AF)
20	.58	17.5	17%70	64%80	19%98	-	82	-	1.3	12.20	.12
21	1.31	19.1	31%80	18%78	15%70	36%98	85	-	3.2	12.22	.31
22	.34	26.0	41%80	18%78	18%70	24%98	82	-	.7	12.32	.07
23	.21	10.4	86%80	14%98	-	-	83	-	.6	12.11	.05

REACH ROUTING BY STOR-IND METHOD

REACH NO.	DIAM (IN)	BOTTOM WIDTH (FT)	DEPTH (FT)	SIDE SLOPES (FT/FT)		n	LENGTH (FT)	SLOPE (FT/FT)	PEAK VEL. (FPS)	TRAVEL TIME (MIN)	PEAK Qout (CFS)
20	12.0	-	-	-	-	.009	25	.0100	7.2	.1	3.7
21	-	2.0	2.0	.10	.10	.080	190	.0130	.8	4.2	1.3
22	12.0	-	-	-	-	.013	30	.0050	3.3	.1	1.3

POND ROUTING BY STOR-IND METHOD

POND NO.	OUTLET DEVICES	START ELEV. (FT)	FLOOD ELEV. (FT)	PEAK ELEV. (FT)	PEAK STORAGE (AF)	---PEAK FLOW--- Qin (CFS)	Qout (CFS)	ATTEN. (%)	LAG (MIN)
3	2	104.5	107.0	105.7	.10	4.9	3.1	36	14.9

SUBCATCHMENT 20 SUB-WATERSHED A-20

ACRES	CN	
.10	70	D, WOODS
.37	80	D, GRASS
.11	98	IMP.
.58	82	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 1.3 CFS @ 12.20 HRS
VOLUME= .12 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	7.1
n=.24 L=40' P2=3 in s=.02 '/'		
TR-55 SHEET FLOW	Segment ID: B-C	10.1
n=.6 L=25' P2=3 in s=.02 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID: C-D	.3
Unpaved Kv=16.1345 L=45' s=.019 '/' V=2.22 fps		
	Total Length= 110 ft	Total Tc= 17.5

SUBCATCHMENT 21 SUB WATERSHED A-21

ACRES	CN	
.40	80	D, GRASS
.24	78	D, MEADOW
.20	70	D, WOODS
.47	98	IMPERVIOUS
1.31	85	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 3.2 CFS @ 12.22 HRS
VOLUME= .31 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	17.8
n=.6 L=80' P2=3 in s=.05 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID: B-C	1.3
Unpaved Kv=16.1345 L=145' s=.013 '/' V=1.84 fps		
	Total Length= 225 ft	Total Tc= 19.1

SUBCATCHMENT 22 SUB-WATWERSHED A-22

ACRES	CN	
.14	80	D, GRASS
.06	78	D, MEADOW
.06	70	D, WOODS
.08	98	IMPERVIOUS
.34	82	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= .7 CFS @ 12.32 HRS
VOLUME= .07 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	24.4
n=.6 L=65' P2=3 in s=.015 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID: B-C	1.6
Unpaved Kv=16.1345 L=295' s=.035 '/' V=3.02 fps		
	Total Length= 360 ft	Total Tc= 26.0

SUBCATCHMENT 23 SUB-W/S A-23

ACRES	CN	
.18	80	D, GRASS
.03	98	IMP
.21	83	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= .6 CFS @ 12.11 HRS
VOLUME= .05 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	10.4
n=.24 L=65' P2=3 in s=.02 '/'		

REACH 20 12" PVC OFF-SITE

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	0.0	.1
.2	.1	.5
.3	.2	1.0
.7	.6	4.3
.8	.7	5.0
.9	.7	5.5
.9	.8	5.5
1.0	.8	5.5
1.0	.8	5.1

12" PIPE

n= .009
LENGTH= 25 FT
SLOPE= .01 FT/FT

STOR-IND METHOD
MAX. DEPTH= .63 FT
PEAK VELOCITY= 7.2 FPS
TRAVEL TIME = .1 MIN
Qin = 3.7 CFS @ 12.42 HRS
Qout= 3.7 CFS @ 12.42 HRS
ATTEN= 0 % LAG= 0.0 MIN
IN/OUT= .54 / .54 AF

REACH 21 CHANNEL THRU WETLAND

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.8	.4
.4	2.4	2.0
.6	4.8	5.0
.9	9.1	11.7
1.2	16.8	26.5
1.6	28.8	54.4
2.0	44.0	95.8

2' x 2' CHANNEL
SIDE SLOPE= .1 '/'
n= .08
LENGTH= 190 FT
SLOPE= .013 FT/FT

STOR-IND METHOD
MAX. DEPTH= .31 FT
PEAK VELOCITY= .8 FPS
TRAVEL TIME = 4.2 MIN
Qin = 1.3 CFS @ 12.20 HRS
Qout= 1.3 CFS @ 12.26 HRS
ATTEN= 6 % LAG= 3.6 MIN
IN/OUT= .12 / .12 AF

REACH 22 CULVERT UNDER DRIVE

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	0.0	.1
.2	.1	.2
.3	.2	.5
.7	.6	2.1
.8	.7	2.5
.9	.7	2.7
.9	.8	2.7
1.0	.8	2.7
1.0	.8	2.5

12" PIPE

n= .013
LENGTH= 30 FT
SLOPE= .005 FT/FT

STOR-IND METHOD
MAX. DEPTH= .51 FT
PEAK VELOCITY= 3.3 FPS
TRAVEL TIME = .1 MIN
Qin = 1.3 CFS @ 12.20 HRS
Qout= 1.3 CFS @ 12.20 HRS
ATTEN= 0 % LAG= .1 MIN
IN/OUT= .12 / .12 AF

POND 3 DETENTION BASIN

STARTING ELEV= 104.5 FT
FLOOD ELEV= 107.0 FT

ELEVATION (FT)	CUM.STOR (CF)
104.5	0
105.0	1200
106.0	5660
107.0	14828

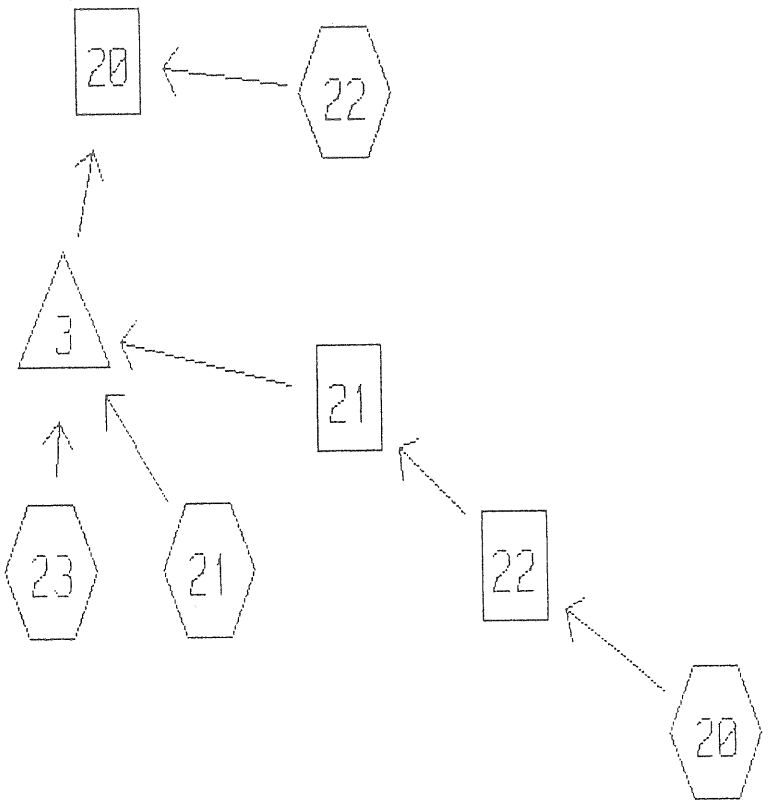
STOR-IND METHOD
PEAK ELEVATION= 105.7 FT
PEAK STORAGE = 4235 CF
Qin = 4.9 CFS @ 12.22 HRS
Qout= 3.1 CFS @ 12.47 HRS
ATTEN= 36 % LAG= 14.9 MIN
IN/OUT= .48 / .47 AF

INVERT (FT)	OUTLET DEVICES
104.5	12" ORIFICE Q=.6 PI r^2 SQR(2g) SQR(H-r)
106.5	5' BROAD-CRESTED RECTANGULAR WEIR Q=C L H^1.5 C=2.8, 3.1, 0, 0, 0, 0, 0, 0

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
104.5	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
105.5	2.7	2.9	3.2	3.4	3.6	3.8	4.0	4.1	4.3	4.5
106.5	4.6	5.2	6.2	7.4	8.8	10.3				

WATERSHED ROUTING ==========



RUNOFF BY SCS TR-20 METHOD: TYPE III 24-HOUR RAINFALL= 5.5 IN, SCS U.H.

SUBCAT NUMBER	AREA (ACRE)	Tc (MIN)	--GROUND COVERS (%CN)--				WGT'D CN	C	PEAK (CFS)	Tpeak (HRS)	VOL (AF)
20	.58	17.5	17%70	64%80	19%98	-	82	-	1.7	12.20	.15
21	1.31	19.1	31%80	18%78	15%70	36%98	85	-	4.0	12.22	.38
22	.34	26.0	41%80	18%78	18%70	24%98	82	-	.8	12.31	.09
23	.21	10.4	86%80	14%98	-	-	83	-	.7	12.10	.06

REACH ROUTING BY STOR-IND METHOD

REACH NO.	DIAM (IN)	BOTTOM WIDTH (FT)	DEPTH (FT)	SIDE SLOPES (FT/FT)		n	LENGTH (FT)	SLOPE (FT/FT)	PEAK VEL. (FPS)	TRAVEL TIME (MIN)	PEAK Qout (CFS)
20	12.0	-	-	-	-	.009	25	.0100	7.4	.1	4.4
21	-	2.0	2.0	.10	.10	.080	190	.0130	.8	4.0	1.6
22	12.0	-	-	-	-	.013	30	.0050	3.5	.1	1.7

POND ROUTING BY STOR-IND METHOD

POND NO.	OUTLET DEVICES	START ELEV. (FT)	FLOOD ELEV. (FT)	PEAK ELEV. (FT)	PEAK STORAGE (AF)	---PEAK FLOW--- Qin (CFS)	Qout (CFS)	ATTEN. (%)	LAG (MIN)
3	2	104.5	107.0	106.0	.12	6.1	3.7	39	16.0

SUBCATCHMENT 20 SUB-WATERSHED A-20

ACRES	CN	
.10	70	D, WOODS
.37	80	D, GRASS
.11	98	IMP.
.58	82	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 1.7 CFS @ 12.20 HRS
VOLUME= .15 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	7.1
n=.24 L=40' P2=3 in s=.02 '/'		
TR-55 SHEET FLOW	Segment ID: B-C	10.1
n=.6 L=25' P2=3 in s=.02 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID: C-D	.3
Unpaved Kv=16.1345 L=45' s=.019 '/' V=2.22 fps		
	Total Length= 110 ft	Total Tc= 17.5

SUBCATCHMENT 21 SUB WATERSHED A-21

ACRES	CN	
.40	80	D, GRASS
.24	78	D, MEADOW
.20	70	D, WOODS
.47	98	IMPERVIOUS
1.31	85	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 4.0 CFS @ 12.22 HRS
VOLUME= .38 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	17.8
n=.6 L=80' P2=3 in s=.05 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID: B-C	1.3
Unpaved Kv=16.1345 L=145' s=.013 '/' V=1.84 fps		
	Total Length= 225 ft	Total Tc= 19.1

SUBCATCHMENT 22 SUB-WATWERSHED A-22

ACRES	CN	
.14	80	D, GRASS
.06	78	D, MEADOW
.06	70	D, WOODS
.08	98	IMPERVIOUS
.34	82	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= .8 CFS @ 12.31 HRS
VOLUME= .09 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	24.4
n=.6 L=65' P2=3 in s=.015 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID: B-C	1.6
Unpaved Kv=16.1345 L=295' s=.035 '/' V=3.02 fps		
	Total Length= 360 ft	Total Tc= 26.0

SUBCATCHMENT 23 SUB-W/S A-23

ACRES	CN	
.18	80	D, GRASS
.03	98	IMP
.21	83	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= .7 CFS @ 12.10 HRS
VOLUME= .06 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	10.4
n=.24 L=65' P2=3 in s=.02 '/'		

REACH 20 12" PVC OFF-SITE

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	0.0	.1
.2	.1	.5
.3	.2	1.0
.7	.6	4.3
.8	.7	5.0
.9	.7	5.5
.9	.8	5.5
1.0	.8	5.5
1.0	.8	5.1

12" PIPE

n= .009
LENGTH= 25 FT
SLOPE= .01 FT/FT

STOR-IND METHOD
MAX. DEPTH= .72 FT
PEAK VELOCITY= 7.4 FPS
TRAVEL TIME = .1 MIN
Qin = 4.4 CFS @ 12.42 HRS
Qout= 4.4 CFS @ 12.42 HRS
ATTEN= 0 % LAG= .1 MIN
IN/OUT= .67 / .67 AF

REACH 21 CHANNEL THRU WETLAND

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	.8	.4
.4	2.4	2.0
.6	4.8	5.0
.9	9.1	11.7
1.2	16.8	26.5
1.6	28.8	54.4
2.0	44.0	95.8

2' x 2' CHANNEL
SIDE SLOPE= .1 '/'
n= .08
LENGTH= 190 FT
SLOPE= .013 FT/FT

STOR-IND METHOD
MAX. DEPTH= .35 FT
PEAK VELOCITY= .8 FPS
TRAVEL TIME = 4.0 MIN
Qin = 1.7 CFS @ 12.20 HRS
Qout= 1.6 CFS @ 12.26 HRS
ATTEN= 6 % LAG= 3.5 MIN
IN/OUT= .15 / .15 AF

REACH 22 CULVERT UNDER DRIVE

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	0.0	.1
.2	.1	.2
.3	.2	.5
.7	.6	2.1
.8	.7	2.5
.9	.7	2.7
.9	.8	2.7
1.0	.8	2.7
1.0	.8	2.5

12" PIPE

n= .013
LENGTH= 30 FT
SLOPE= .005 FT/FT

STOR-IND METHOD
MAX. DEPTH= .59 FT
PEAK VELOCITY= 3.5 FPS
TRAVEL TIME = .1 MIN
Qin = 1.7 CFS @ 12.20 HRS
Qout= 1.7 CFS @ 12.20 HRS
ATTEN= 0 % LAG= .1 MIN
IN/OUT= .15 / .15 AF

Data for 2608-FALLBROOK; POST-DEV., W/S A, 25 YR STM
Prepared by LAND USE CONSULTANTS 21 Sep 92
HydroCAD 3.02 000511 (c) 1986-1992 Applied Microcomputer Systems

POND 3 DETENTION BASIN

STARTING ELEV= 104.5 FT
FLOOD ELEV= 107.0 FT

ELEVATION (FT)	CUM.STOR (CF)
104.5	0
105.0	1200
106.0	5660
107.0	14828

STOR-IND METHOD
PEAK ELEVATION= 106.0 FT
PEAK STORAGE = 5443 CF
Qin = 6.1 CFS @ 12.21 HRS
Qout= 3.7 CFS @ 12.48 HRS
ATTEN= 39 % LAG= 16.0 MIN
IN/OUT= .59 / .58 AF

INVERT (FT)	OUTLET DEVICES
104.5	**12" ORIFICE**
	Q=.6 PI r^2 SQR(2g) SQR(H-r)
106.5	**5' BROAD-CRESTED RECTANGULAR WEIR**
	Q=C L H^1.5 C=2.8, 3.1, 0, 0, 0, 0, 0, 0

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
104.5	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
105.5	2.7	2.9	3.2	3.4	3.6	3.8	4.0	4.1	4.3	4.5
106.5	4.6	5.2	6.2	7.4	8.8	10.3				

Data for 2608-FALLBROOK; POST-DEV., W/S A, 25 YR STM
Prepared by LAND USE CONSULTANTS 21 Sep 92
HydroCAD 3.02 000511 (c) 1986-1992 Applied Microcomputer Systems

POND 3 DETENTION BASIN

STARTING ELEV= 104.5 FT
FLOOD ELEV= 107.0 FT

ELEVATION (FT)	CUM.STOR (CF)
104.5	0
105.0	1200
106.0	5660
107.0	14828

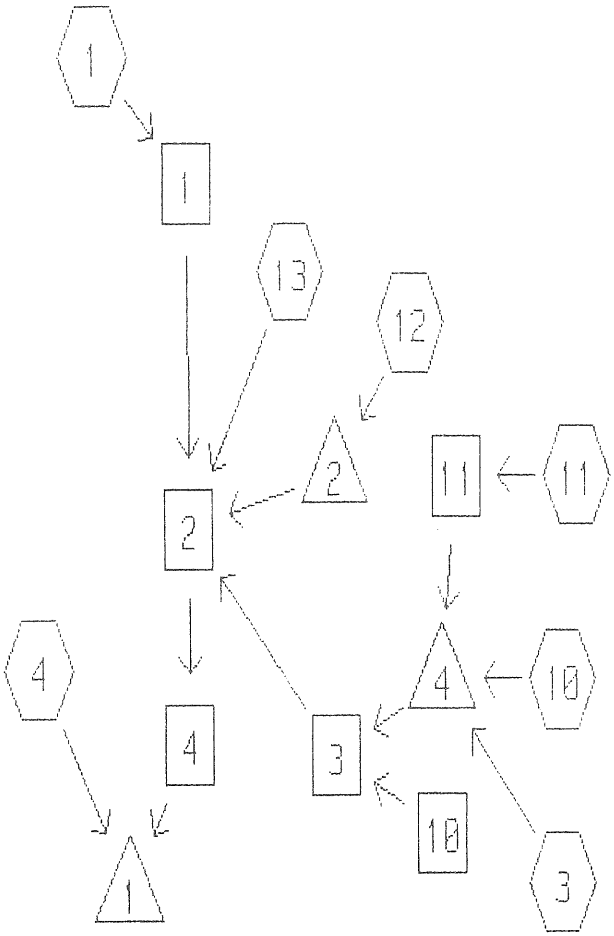
STOR-IND METHOD
PEAK ELEVATION= 106.0 FT
PEAK STORAGE = 5443 CF
Qin = 6.1 CFS @ 12.21 HRS
Qout= 3.7 CFS @ 12.48 HRS
ATTEN= 39 % LAG= 16.0 MIN
IN/OUT= .59 / .58 AF

INVERT (FT)	OUTLET DEVICES
104.5	**12" ORIFICE**
	Q=.6 PI r^2 SQR(2g) SQR(H-r)
106.5	**5' BROAD-CRESTED RECTANGULAR WEIR**
	Q=C L H^1.5 C=2.8, 3.1, 0, 0, 0, 0, 0, 0

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
104.5	0.0	0.0	.2	.4	.6	.9	1.3	1.7	2.1	2.4
105.5	2.7	2.9	3.2	3.4	3.6	3.8	4.0	4.1	4.3	4.5
106.5	4.6	5.2	6.2	7.4	8.8	10.3				

WATERSHED ROUTING



SUBCATCHMENT REACH POND LINK

RUNOFF BY SCS TR-20 METHOD: TYPE III 24-HOUR RAINFALL= 3.0 IN, SCS U.H.

SUBCAT NUMBER	AREA (ACRE)	Tc (MIN)	--GROUND COVERS (%CN)--				WGT'D CN	C	PEAK (CFS)	Tpeak (HRS)	VOL (AF)
1	2.15	17.3	51%70 1%98	29%71 -	12%74 -	7%77 -	72	-	1.3	12.23	.13
3	1.82	30.8	12%74 7%98	26%70 3%91	39%80 -	13%77 -	78	-	1.3	12.41	.16
4	9.09	44.2	11%70	27%80	60%77	2%98	77	-	5.1	12.60	.73
10	.78	13.6	13%70 8%91	18%71 -	38%78 -	23%98 -	81	-	.9	12.15	.08
11	.42	7.8	29%80	71%98	-	-	93	-	.9	12.07	.07
12	.74	9.2	15%89 23%98	32%71 -	24%78 -	5%80 -	82	-	1.0	12.10	.08
13	.60	11.9	57%70	18%71	25%74	-	71	-	.4	12.14	.03

REACH ROUTING BY STOR-IND METHOD

REACH NO.	DIAM (IN)	BOTTOM WIDTH (FT)	DEPTH (FT)	SIDE SLOPES (FT/FT)		n	LENGTH (FT)	SLOPE (FT/FT)	PEAK VEL. (FPS)	TRAVEL TIME (MIN)	PEAK Qout (CFS)
1	-	1.5	1.0	.50	.50	.050	170	.0210	1.7	1.7	1.3
2	-	2.0	2.0	.01	.01	.080	265	.0200	.6	7.0	3.1
3	-	5.0	1.0	.01	.01	.080	180	.0340	.7	4.6	1.5
4	-	2.0	1.0	.50	.50	.050	490	.0100	1.6	5.0	3.0
10	10.8	-	-	-	-	.013	30	.0050	0.0	0.0	0.0
11	4.9	-	-	-	-	.013	122	.0810	8.1	.3	.9

POND ROUTING BY STOR-IND METHOD

POND NO.	OUTLET DEVICES	START ELEV. (FT)	FLOOD ELEV. (FT)	PEAK ELEV. (FT)	PEAK STORAGE (AF)	---PEAK FLOW--- Qin (CFS)	Qout (CFS)	ATTEN. (%)	LAG (MIN)
1	2	76.9	81.0	79.6	.33	8.1	3.3	59	57.4
2	2	93.0	96.5	94.1	.02	1.0	.4	61	19.3
4	2	89.5	94.0	92.2	.05	2.4	1.5	38	27.0

SUBCATCHMENT 1 SUB W/S B1

ACRES	CN	
1.10	70	C WOODS
.63	71	C MEADOW
.25	74	C LAWN
.14	77	D WOODS
.03	98	IMPERV
2.15	72	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= 1.3 CFS @ 12.23 HRS
VOLUME= .13 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	16.3
n=.24 L=80' P2=3 in s=.01 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	BC	.9
Unpaved Kv=16.1345 L=90' s=.01 '/' V=1.61 fps		
DIRECT ENTRY	CD	.1
	Total Length= 170 ft Total Tc=	17.3

SUBCATCHMENT 3 SUB W/S B3

ACRES	CN	
.21	74	C GRASS
.47	70	C WOODS
.71	80	D GRASS
.24	77	D WOODS
.13	98	IMPERV
.06	91	D, GRAVEL DRIVE
1.82	78	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= 1.3 CFS @ 12.41 HRS
VOLUME= .16 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	13.0
n=.24 L=90' P2=3 in s=.022 '/'		
TR-55 SHEET FLOW	Segment ID:BC	17.0
n=.6 L=70' P2=3 in s=.043 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment IDCD	.7
Unpaved Kv=16.1345 L=145' s=.041 '/' V=3.27 fps		
DIRECT ENTRY	Segment ID:DE	.1
	Total Length= 305 ft Total Tc=	30.8

SUBCATCHMENT 4 PRE W/S B4

ACRES	CN	
1.00	70	C WOODS
2.45	80	D GRASS
5.45	77	D WOODS
.19	98	IMPERV
9.09	77	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= 5.1 CFS @ 12.60 HRS
VOLUME= .73 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	42.4
n=.6 L=150' P2=3 in s=.02 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID:BC	1.7
Unpaved Kv=16.1345 L=200' s=.015 '/' V=1.98 fps		
DIRECT ENTRY	Segment ID:CD	.1
	Total Length= 350 ft Total Tc=	44.2

SUBCATCHMENT 10 SUB W/S B-10

ACRES	CN	
.10	70	C, WOODS
.14	71	C, MEADOW
.30	78	D, MEADOW
.18	98	IMPERVIOUS
.06	91	D, GRAVEL DRIVE
.78	81	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= .9 CFS @ 12.15 HRS
VOLUME= .08 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	12.9
n=.24 L=60' P2=3 in s=.01 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID: B-C	.6
Unpaved Kv=16.1345 L=85' s=.023 '/' V=2.45 fps		
DIRECT ENTRY	SEGMENT I.D.: C-D	.1
	Total Length= 145 ft Total Tc=	13.6

SUBCATCHMENT 11 SUB W/S 11

ACRES	CN	
.12	80	D, GRASS
.30	98	IMPERVIOUS
.42	93	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= .9 CFS @ 12.07 HRS
VOLUME= .07 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	7.8
n=.24 L=45' P2=3 in s=.02 '/'		

SUBCATCHMENT 12 SUB W/S B-12

ACRES	CN	
.11	89	C, GRAVEL DRIVE
.24	71	C, MEADOW
.18	78	D, MEADOW
.04	80	D, GRASS
.17	98	IMPERVIOUS
.74	82	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= 1.0 CFS @ 12.10 HRS
VOLUME= .08 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	5.6
n=.24 L=30' P2=3 in s=.02 '/'		
TR-55 SHEET FLOW	Segment ID: B-C	3.6
n=.24 L=66' P2=3 in s=.3 '/'		
	Total Length= 96 ft	Total Tc= 9.2

SUBCATCHMENT 13 SUB W/S B-13

ACRES	CN	
.34	70	C, WOODS
.11	71	C, MEADOW
.15	74	C, GRASS
.60	71	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 3.0 IN
PEAK= .4 CFS @ 12.14 HRS
VOLUME= .03 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	11.4
n=.6 L=50' P2=3 in s=.06 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID: B-C	.4
Unpaved Kv=16.1345 L=120' s=.092 '/' V=4.89 fps		
DIRECT ENTRY	Segment ID: C-D	.1
	Total Length= 170 ft	Total Tc= 11.9

REACH 1 SWALE AT UPPER SECTION WET 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	.2	.1
.2	.4	.5
.3	.6	1.0
.4	1.0	1.9
.6	1.6	3.7
.8	2.5	6.6
1.0	3.5	10.6

1.5' x 1' CHANNEL
SIDE SLOPE= .5 '/'
n= .05
LENGTH= 170 FT
SLOPE= .021 FT/FT

STOR-IND METHOD
MAX. DEPTH= .33 FT
PEAK VELOCITY= 1.7 FPS
TRAVEL TIME = 1.7 MIN
Qin = 1.3 CFS @ 12.23 HRS
Qout= 1.3 CFS @ 12.25 HRS
ATTEN= 0 % LAG= 1.2 MIN
IN/OUT= .13 / .13 AF

REACH 2 SHALLOW DRAINAGE IN WET 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	4.4	2.6
.4	16.8	15.3
.6	37.2	44.3
.9	75.7	114.1
1.2	146.4	275.1
1.6	259.2	589.2
2.0	404.0	1064.8

2' x 2' CHANNEL
SIDE SLOPE= .01 '/'
n= .08
LENGTH= 265 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .21 FT
PEAK VELOCITY= .6 FPS
TRAVEL TIME = 7.0 MIN
Qin = 3.2 CFS @ 12.29 HRS
Qout= 3.1 CFS @ 12.42 HRS
ATTEN= 4 % LAG= 8.0 MIN
IN/OUT= .54 / .54 AF

REACH 3 WETLAND 3 BETWEEN SUBCATCH3 AND STREAM

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	1.5	.8
.2	5.0	4.0
.3	10.5	10.7
.4	20.6	26.3
.6	39.0	61.4
.8	68.0	129.0
1.0	105.0	230.2

5' x 1' CHANNEL
SIDE SLOPE= .01 '/'
n= .08
LENGTH= 180 FT
SLOPE= .034 FT/FT

STOR-IND METHOD
MAX. DEPTH= .12 FT
PEAK VELOCITY= .7 FPS
TRAVEL TIME = 4.6 MIN
Qin = 1.5 CFS @ 12.62 HRS
Qout= 1.5 CFS @ 12.67 HRS
ATTEN= 0 % LAG= 3.5 MIN
IN/OUT= .30 / .30 AF

REACH 4 STREAM IN WETLANDS 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	.2	.1
.2	.5	.4
.3	.8	.9
.4	1.2	1.7
.6	1.9	3.1
.8	2.9	5.5
1.0	4.0	8.6

2' x 1' CHANNEL
SIDE SLOPE= .5 '/'
n= .05
LENGTH= 490 FT
SLOPE= .01 FT/FT

STOR-IND METHOD
MAX. DEPTH= .59 FT
PEAK VELOCITY= 1.6 FPS
TRAVEL TIME = 5.0 MIN
Qin = 3.1 CFS @ 12.42 HRS
Qout= 3.0 CFS @ 12.50 HRS
ATTEN= 2 % LAG= 4.9 MIN
IN/OUT= .54 / .54 AF

REACH 10 CULVERT IN FIRE ACCESS DR.

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	0.0	0.0
.2	.1	.2
.3	.2	.4
.6	.5	1.6
.7	.5	1.9
.8	.6	2.0
.8	.6	2.0
.9	.6	2.0
.9	.6	1.9

10.8" PIPE

n= .013
LENGTH= 30 FT
SLOPE= .005 FT/FT

STOR-IND METHOD
MAX. DEPTH= 0.00 FT
PEAK VELOCITY= 0.0 FPS
TRAVEL TIME = 0.0 MIN
Qin = 0.0 CFS @ 0.00 HRS
Qout= 0.0 CFS @ 0.00 HRS
ATTEN= 0 % LAG= 0.0 MIN
IN/OUT= 0.00 / 0.00 AF

REACH 11 CULVERT FROM COURTYARD

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
0.0	0.0	0.0
.1	0.0	.1
.1	0.0	.2
.3	.1	.8
.3	.1	.9
.4	.1	1.0
.4	.1	1.0
.4	.1	1.0
.4	.1	.9

4.9" PIPE

n= .013
LENGTH= 122 FT
SLOPE= .081 FT/FT

STOR-IND METHOD
MAX. DEPTH= .33 FT
PEAK VELOCITY= 8.1 FPS
TRAVEL TIME = .3 MIN
Qin = .9 CFS @ 12.07 HRS
Qout= .9 CFS @ 12.08 HRS
ATTEN= 0 % LAG= .3 MIN
IN/OUT= .07 / .07 AF

POND 1 BACKWATER AREA AT 10INCH CMP WETLANDS 3

STARTING ELEV= 76.9 FT
FLOOD ELEV= 81.0 FT

ELEVATION (FT)	CUM.STOR (CF)
76.9	0
78.0	83
79.0	4013
80.0	21893
81.0	67093

STOR-IND METHOD
PEAK ELEVATION= 79.6 FT
PEAK STORAGE = 14208 CF
Qin = 8.1 CFS @ 12.57 HRS
Qout= 3.3 CFS @ 13.53 HRS
ATTEN= 59 % LAG= 57.4 MIN
IN/OUT= 1.27 / 1.27 AF

INVERT (FT)	OUTLET DEVICES
76.9	**10" CULVERT**
	n=.02 L=12' S=.01'/' Ke=.8 Cc=.9 Cd=.5 TW=.5'
79.8	**15' BROAD-CRESTED RECTANGULAR WEIR**
	Q=C L H^1.5 C=2.78, 2.93, 0, 0, 0, 0, 0, 0

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
76.9	0.0	0.0	.1	.2	.4	.5	.7	1.0	1.2	1.4
77.9	1.5	1.6	1.8	2.0	2.1	2.3	2.4	2.5	2.6	2.7
78.9	2.8	2.8	2.9	3.0	3.1	3.2	3.2	3.3	3.4	3.4
79.9	4.8	7.3	10.5	14.3	18.5	23.4	28.9	34.8	41.2	48.0
80.9	54.8	62.0								

POND 2 POND #2 AT FIRE ACCESS

STARTING ELEV= 93.0 FT
FLOOD ELEV= 96.5 FT

ELEVATION (FT)	CUM.STOR (CF)
93.0	0
94.0	750
95.0	2900
96.0	6350
96.5	8725

STOR-IND METHOD
PEAK ELEVATION= 94.1 FT
PEAK STORAGE = 904 CF
Qin = 1.0 CFS @ 12.10 HRS
Qout= .4 CFS @ 12.42 HRS
ATTEN= 61 % LAG= 19.3 MIN
IN/OUT= .08 / .08 AF

INVERT (FT)	OUTLET DEVICES
93.0	**4" ORIFICE**
	Q=.6 PI r^2 SQR(2g) SQR(H-r)
95.8	**5' BROAD-CRESTED RECTANGULAR WEIR**
	Q=C L H^1.5 C=2.8, 3.1, 0, 0, 0, 0, 0, 0

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
93.0	0.0	0.0	.1	.2	.2	.2	.3	.3	.3	.4
94.0	.4	.4	.4	.4	.5	.5	.5	.5	.5	.6
95.0	.6	.6	.6	.6	.6	.6	.7	.7	.7	1.1
96.0	2.0	3.0	4.3	5.7	7.4	9.3				

POND 4 POND 4 BEHIND FIRE ACCESS DRIVE

STARTING ELEV= 89.5 FT
FLOOD ELEV= 94.0 FT

ELEVATION (FT)	CUM.STOR (CF)
89.5	0
90.0	205
91.0	815
92.0	1827
93.0	4120
94.0	8570

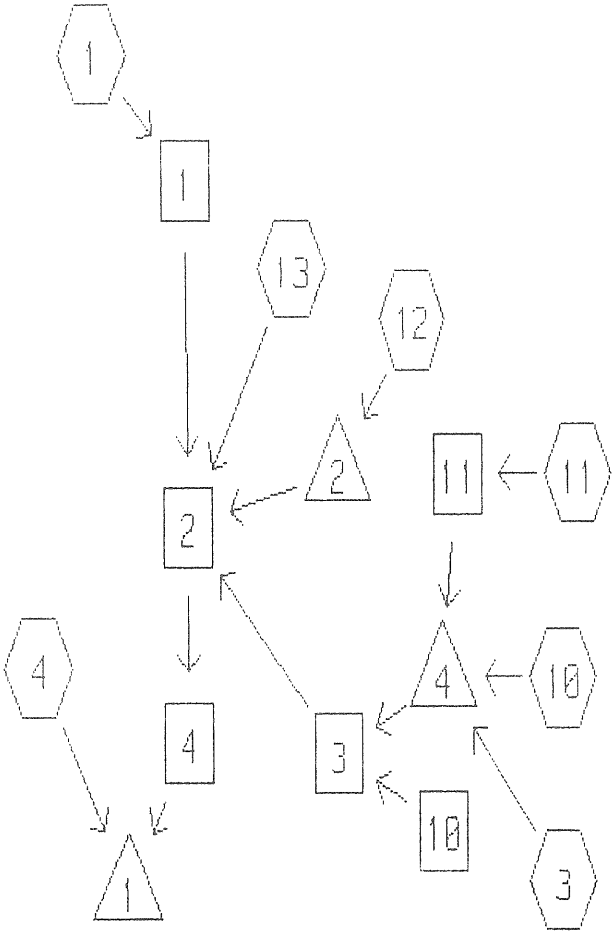
STOR-IND METHOD
PEAK ELEVATION= 92.2 FT
PEAK STORAGE = 2248 CF
Qin = 2.4 CFS @ 12.17 HRS
Qout= 1.5 CFS @ 12.62 HRS
ATTEN= 38 % LAG= 27.0 MIN
IN/OUT= .30 / .30 AF

INVERT (FT)	OUTLET DEVICES
89.5	6" ORIFICE Q=.6 PI r^2 SQR(2g) SQR(H-r)
93.5	15" HORIZONTAL ORIFICE Q=.6 Area SQR(2gH)

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
89.5	0.0	0.0	.1	.2	.4	.5	.6	.6	.7	.8
90.5	.8	.9	.9	1.0	1.0	1.1	1.1	1.1	1.2	1.2
91.5	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.5	1.5	1.5
92.5	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.8	1.8	1.8
93.5	1.8	3.7	4.5	5.1	5.7	6.1				

WATERSHED ROUTING



RUNOFF BY SCS TR-20 METHOD: TYPE III 24-HOUR RAINFALL= 4.7 IN, SCS U.H.

SUBCAT NUMBER	AREA (ACRE)	Tc (MIN)	--GROUND COVERS (%CN)--				WGT'D CN	C	PEAK (CFS)	Tpeak (HRS)	VOL (AF)
1	2.15	17.3	51%70 1%98	29%71 -	12%74 -	7%77 -	72	-	3.4	12.21	.32
3	1.82	30.8	12%74 7%98	26%70 3%91	39%80 -	13%77 -	78	-	2.9	12.39	.34
4	9.09	44.2	11%70	27%80	60%77	2%98	77	-	11.7	12.57	1.64
10	.78	13.6	13%70 8%91	18%71 -	38%78 -	23%98 -	81	-	1.9	12.14	.16
11	.42	7.8	29%80	71%98	-	-	93	-	1.5	12.07	.12
12	.74	9.2	15%89 23%98	32%71 -	24%78 -	5%80 -	82	-	2.1	12.10	.16
13	.60	11.9	57%70	18%71	25%74	-	71	-	1.0	12.13	.09

REACH ROUTING BY STOR-IND METHOD

REACH NO.	DIAM (IN)	BOTTOM WIDTH (FT)	DEPTH (FT)	SIDE SLOPES (FT/FT)		n	LENGTH (FT)	SLOPE (FT/FT)	PEAK VEL. (FPS)	TRAVEL TIME (MIN)	PEAK Qout (CFS)
1	-	1.5	1.0	.50	.50	.050	170	.0210	2.2	1.3	3.4
2	-	2.0	2.0	.01	.01	.080	265	.0200	.8	5.7	6.1
3	-	5.0	1.0	.01	.01	.080	180	.0340	.8	3.9	3.1
4	-	2.0	1.0	.50	.50	.050	490	.0100	2.0	4.2	6.0
10	10.8	-	-	-	-	.013	30	.0050	0.0	0.0	0.0
11	12.0	-	-	-	-	.013	122	.0810	9.4	.2	1.6

POND ROUTING BY STOR-IND METHOD

POND NO.	OUTLET DEVICES	START ELEV. (FT)	FLOOD ELEV. (FT)	PEAK ELEV. (FT)	PEAK STORAGE (AF)	---PEAK FLOW--- Qin (CFS)	Qout (CFS)	ATTEN. (%)	LAG (MIN)
1	2	76.9	81.0	80.1	.64	17.2	11.7	32	25.4
2	2	93.0	96.5	94.7	.05	2.1	.5	75	26.0
4	2	89.5	94.0	93.6	.15	5.0	3.3	33	25.2

SUBCATCHMENT 1 SUB W/S B1

ACRES	CN	
1.10	70	C WOODS
.63	71	C MEADOW
.25	74	C LAWN
.14	77	D WOODS
.03	98	IMPERV
2.15	72	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 3.4 CFS @ 12.21 HRS
VOLUME= .32 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	16.3
n=.24 L=80' P2=3 in s=.01 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	BC	.9
Unpaved Kv=16.1345 L=90' s=.01 '/' V=1.61 fps		
DIRECT ENTRY	CD	.1
	Total Length= 170 ft Total Tc=	17.3

SUBCATCHMENT 3 SUB W/S B3

ACRES	CN	
.21	74	C GRASS
.47	70	C WOODS
.71	80	D GRASS
.24	77	D WOODS
.13	98	IMPERV
.06	91	D, GRAVEL DRIVE
1.82	78	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 2.9 CFS @ 12.39 HRS
VOLUME= .34 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	13.0
n=.24 L=90' P2=3 in s=.022 '/'		
TR-55 SHEET FLOW	Segment ID:BC	17.0
n=.6 L=70' P2=3 in s=.043 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment IDCD	.7
Unpaved Kv=16.1345 L=145' s=.041 '/' V=3.27 fps		
DIRECT ENTRY	Segment ID:DE	.1
	Total Length= 305 ft Total Tc=	30.8

SUBCATCHMENT 4 PRE W/S B4

ACRES	CN	
1.00	70	C WOODS
2.45	80	D GRASS
5.45	77	D WOODS
.19	98	IMPERV
9.09	77	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 11.7 CFS @ 12.57 HRS
VOLUME= 1.64 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	42.4
n=.6 L=150' P2=3 in s=.02 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID:BC	1.7
Unpaved Kv=16.1345 L=200' s=.015 '/' V=1.98 fps		
DIRECT ENTRY	Segment ID:CD	.1
	Total Length= 350 ft Total Tc=	44.2

SUBCATCHMENT 10 SUB W/S B-10

ACRES	CN	
.10	70	C, WOODS
.14	71	C, MEADOW
.30	78	D, MEADOW
.18	98	IMPERVIOUS
.06	91	D, GRAVEL DRIVE
.78	81	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 1.9 CFS @ 12.14 HRS
VOLUME= .16 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	12.9
n=.24 L=60' P2=3 in s=.01 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID: B-C	.6
Unpaved Kv=16.1345 L=85' s=.023 '/' V=2.45 fps		
DIRECT ENTRY	SEGMENT I.D.: C-D	.1
	Total Length= 145 ft Total Tc=	13.6

SUBCATCHMENT 11 SUB W/S 11

ACRES	CN	
.12	80	D, GRASS
.30	98	IMPERVIOUS
.42	93	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 1.5 CFS @ 12.07 HRS
VOLUME= .12 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	7.8
n=.24 L=45' P2=3 in s=.02 '/'		

SUBCATCHMENT 12 SUB W/S B-12

ACRES	CN	
.11	89	C, GRAVEL DRIVE
.24	71	C, MEADOW
.18	78	D, MEADOW
.04	80	D, GRASS
.17	98	IMPERVIOUS
.74	82	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 2.1 CFS @ 12.10 HRS
VOLUME= .16 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	5.6
n=.24 L=30' P2=3 in s=.02 '/'		
TR-55 SHEET FLOW	Segment ID: B-C	3.6
n=.24 L=66' P2=3 in s=.3 '/'		
	Total Length= 96 ft Total Tc=	9.2

SUBCATCHMENT 13 SUB W/S B-13

ACRES	CN	
.34	70	C, WOODS
.11	71	C, MEADOW
.15	74	C, GRASS
.60	71	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 4.7 IN
PEAK= 1.0 CFS @ 12.13 HRS
VOLUME= .09 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	11.4
n=.6 L=50' P2=3 in s=.06 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID: B-C	.4
Unpaved Kv=16.1345 L=120' s=.092 '/' V=4.89 fps		
DIRECT ENTRY	Segment ID: C-D	.1
	Total Length= 170 ft Total Tc=	11.9

REACH 1 SWALE AT UPPER SECTION WET 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	.2	.1
.2	.4	.5
.3	.6	1.0
.4	1.0	1.9
.6	1.6	3.7
.8	2.5	6.6
1.0	3.5	10.6

1.5' x 1' CHANNEL
SIDE SLOPE= .5 '/'
n= .05
LENGTH= 170 FT
SLOPE= .021 FT/FT

STOR-IND METHOD
MAX. DEPTH= .57 FT
PEAK VELOCITY= 2.2 FPS
TRAVEL TIME = 1.3 MIN
Qin = 3.4 CFS @ 12.21 HRS
Qout= 3.4 CFS @ 12.23 HRS
ATTEN= 0 % LAG= .9 MIN
IN/OUT= .32 / .32 AF

REACH 2 SHALLOW DRAINAGE IN WET 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	4.4	2.6
.4	16.8	15.3
.6	37.2	44.3
.9	75.7	114.1
1.2	146.4	275.1
1.6	259.2	589.2
2.0	404.0	1064.8

2' x 2' CHANNEL
SIDE SLOPE= .01 '/'
n= .08
LENGTH= 265 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .26 FT
PEAK VELOCITY= .8 FPS
TRAVEL TIME = 5.7 MIN
Qin = 6.4 CFS @ 12.22 HRS
Qout= 6.1 CFS @ 12.31 HRS
ATTEN= 5 % LAG= 5.2 MIN
IN/OUT= 1.18 / 1.18 AF

REACH 3 WETLAND 3 BETWEEN SUBCATCH3 AND STREAM

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	1.5	.8
.2	5.0	4.0
.3	10.5	10.7
.4	20.6	26.3
.6	39.0	61.4
.8	68.0	129.0
1.0	105.0	230.2

5' x 1' CHANNEL
SIDE SLOPE= .01 '/'
n= .08
LENGTH= 180 FT
SLOPE= .034 FT/FT

STOR-IND METHOD
MAX. DEPTH= .17 FT
PEAK VELOCITY= .8 FPS
TRAVEL TIME = 3.9 MIN
Qin = 3.3 CFS @ 12.61 HRS
Qout= 3.1 CFS @ 12.68 HRS
ATTEN= 7 % LAG= 3.9 MIN
IN/OUT= .62 / .62 AF

REACH 4 STREAM IN WETLANDS 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	.2	.1
.2	.5	.4
.3	.8	.9
.4	1.2	1.7
.6	1.9	3.1
.8	2.9	5.5
1.0	4.0	8.6

2' x 1' CHANNEL
SIDE SLOPE= .5 '/'
n= .05
LENGTH= 490 FT
SLOPE= .01 FT/FT

STOR-IND METHOD
MAX. DEPTH= .83 FT
PEAK VELOCITY= 2.0 FPS
TRAVEL TIME = 4.2 MIN
Qin = 6.1 CFS @ 12.31 HRS
Qout= 6.0 CFS @ 12.38 HRS
ATTEN= 2 % LAG= 3.9 MIN
IN/OUT= 1.18 / 1.18 AF

REACH 10 CULVERT IN FIRE ACCESS DR.

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	0.0	0.0
.2	.1	.2
.3	.2	.4
.6	.5	1.6
.7	.5	1.9
.8	.6	2.0
.8	.6	2.0
.9	.6	2.0
.9	.6	1.9

10.8" PIPE

n= .013
LENGTH= 30 FT
SLOPE= .005 FT/FT

STOR-IND METHOD
MAX. DEPTH= 0.00 FT
PEAK VELOCITY= 0.0 FPS
TRAVEL TIME = 0.0 MIN
Qin = 0.0 CFS @ 0.00 HRS
Qout= 0.0 CFS @ 0.00 HRS
ATTEN= 0 % LAG= 0.0 MIN
IN/OUT= 0.00 / 0.00 AF

REACH 11 CULVERT FROM COURTYARD

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	0.0	.2
.2	.1	.9
.3	.2	2.0
.7	.6	8.5
.8	.7	9.9
.9	.7	10.8
.9	.8	10.9
1.0	.8	10.8
1.0	.8	10.1

12" PIPE

n= .013
LENGTH= 122 FT
SLOPE= .081 FT/FT

STOR-IND METHOD
MAX. DEPTH= .26 FT
PEAK VELOCITY= 9.4 FPS
TRAVEL TIME = .2 MIN
Qin = 1.5 CFS @ 12.07 HRS
Qout= 1.6 CFS @ 12.07 HRS
ATTEN= 0 % LAG= .3 MIN
IN/OUT= .12 / .12 AF

POND 1 BACKWATER AREA AT 10INCH CMP WETLANDS 3

STARTING ELEV= 76.9 FT
FLOOD ELEV= 81.0 FT

ELEVATION (FT)	CUM.STOR (CF)
76.9	0
78.0	83
79.0	4013
80.0	21893
81.0	67093

STOR-IND METHOD
PEAK ELEVATION= 80.1 FT
PEAK STORAGE = 27819 CF
Qin = 17.2 CFS @ 12.54 HRS
Qout= 11.7 CFS @ 12.96 HRS
ATTEN= 32 % LAG= 25.4 MIN
IN/OUT= 2.82 / 2.82 AF

INVERT (FT) OUTLET DEVICES

76.9 **10" CULVERT**
n=.02 L=12' S=.01'/' Ke=.8 Cc=.9 Cd=.5 TW=.5'

79.8 **15' BROAD-CRESTED RECTANGULAR WEIR**
Q=C L H^1.5 C=2.78, 2.93, 0, 0, 0, 0, 0, 0

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
76.9	0.0	0.0	.1	.2	.4	.5	.7	1.0	1.2	1.4
77.9	1.5	1.6	1.8	2.0	2.1	2.3	2.4	2.5	2.6	2.7
78.9	2.8	2.8	2.9	3.0	3.1	3.2	3.2	3.3	3.4	3.4
79.9	4.8	7.3	10.5	14.3	18.5	23.4	28.9	34.8	41.2	48.0
80.9	54.8	62.0								

POND 2 POND #2 AT FIRE ACCESS

STARTING ELEV= 93.0 FT
FLOOD ELEV= 96.5 FT

ELEVATION (FT)	CUM.STOR (CF)
93.0	0
94.0	750
95.0	2900
96.0	6350
96.5	8725

STOR-IND METHOD
PEAK ELEVATION= 94.7 FT
PEAK STORAGE = 2347 CF
Qin = 2.1 CFS @ 12.10 HRS
Qout= .5 CFS @ 12.53 HRS
ATTEN= 75 % LAG= 26.0 MIN
IN/OUT= .16 / .16 AF

INVERT (FT) OUTLET DEVICES

93.0 **4" ORIFICE**
Q=.6 PI r^2 SQR(2g) SQR(H-r)

95.8 **5' BROAD-CRESTED RECTANGULAR WEIR**
Q=C L H^1.5 C=2.8, 3.1, 0, 0, 0, 0, 0, 0

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
93.0	0.0	0.0	.1	.2	.2	.2	.3	.3	.3	.4
94.0	.4	.4	.4	.4	.5	.5	.5	.5	.5	.6
95.0	.6	.6	.6	.6	.6	.6	.7	.7	.7	1.1
96.0	2.0	3.0	4.3	5.7	7.4	9.3				

POND 4 POND 4 BEHIND FIRE ACCESS DRIVE

STARTING ELEV= 89.5 FT
FLOOD ELEV= 94.0 FT

ELEVATION (FT)	CUM.STOR (CF)
89.5	0
90.0	205
91.0	815
92.0	1827
93.0	4120
94.0	8570

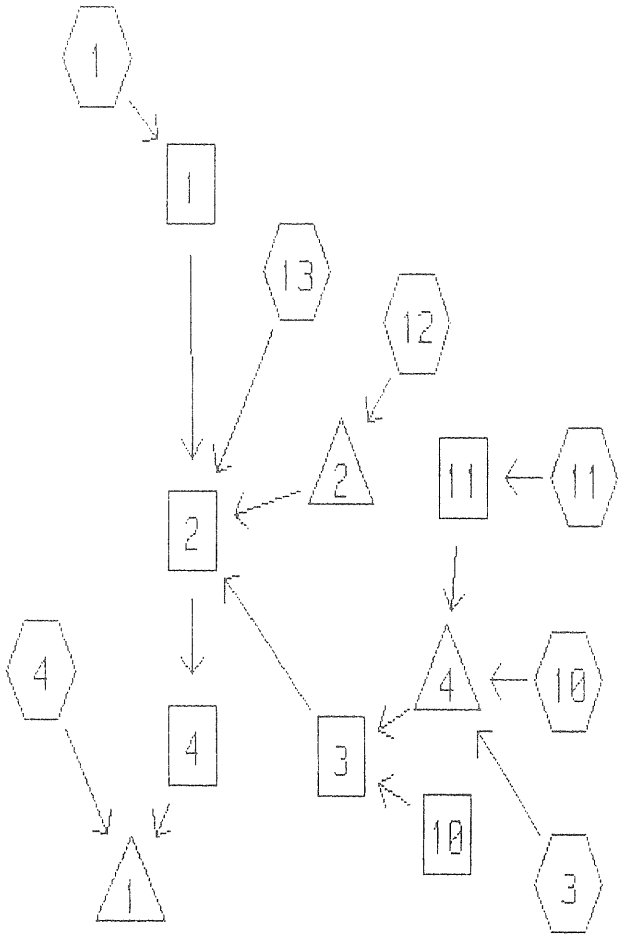
STOR-IND METHOD
PEAK ELEVATION= 93.6 FT
PEAK STORAGE = 6699 CF
Qin = 5.0 CFS @ 12.19 HRS
Qout= 3.3 CFS @ 12.61 HRS
ATTEN= 33 % LAG= 25.2 MIN
IN/OUT= .62 / .62 AF

INVERT (FT)	OUTLET DEVICES
89.5	6" ORIFICE Q=.6 PI r^2 SQR(2g) SQR(H-r)
93.5	15" HORIZONTAL ORIFICE Q=.6 Area SQR(2gH)

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
89.5	0.0	0.0	.1	.2	.4	.5	.6	.6	.7	.8
90.5	.8	.9	.9	1.0	1.0	1.1	1.1	1.1	1.2	1.2
91.5	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.5	1.5	1.5
92.5	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.8	1.8	1.8
93.5	1.8	3.7	4.5	5.1	5.7	6.1				

WATERSHED ROUTING



SUBCATCHMENT REACH POND LINK

RUNOFF BY SCS TR-20 METHOD: TYPE III 24-HOUR RAINFALL= 5.5 IN, SCS U.H.

SUBCAT NUMBER	AREA (ACRE)	Tc (MIN)	--GROUND COVERS (%CN)--				WGT'D CN	C	PEAK (CFS)	Tpeak (HRS)	VOL (AF)
1	2.15	17.3	51%70 1%98	29%71 -	12%74 -	7%77 -	72	-	4.6	12.21	.43
3	1.82	30.8	12%74 7%98	26%70 3%91	39%80 -	13%77 -	78	-	3.7	12.38	.44
4	9.09	44.2	11%70	27%80	60%77	2%98	77	-	15.1	12.56	2.11
10	.78	13.6	13%70 8%91	18%71 -	38%78 -	23%98 -	81	-	2.4	12.14	.20
11	.42	7.8	29%80	71%98	-	-	93	-	1.8	12.07	.14
12	.74	9.2	15%89 23%98	32%71 -	24%78 -	5%80 -	82	-	2.6	12.09	.20
13	.60	11.9	57%70	18%71	25%74	-	71	-	1.4	12.13	.12

REACH ROUTING BY STOR-IND METHOD

REACH NO.	DIAM (IN)	BOTTOM WIDTH (FT)	DEPTH (FT)	SIDE SLOPES (FT/FT)		n	LENGTH (FT)	SLOPE (FT/FT)	PEAK VEL. (FPS)	TRAVEL TIME (MIN)	PEAK Qout (CFS)
1	-	1.5	1.0	.50	.50	.050	170	.0210	2.4	1.2	4.6
2	-	2.0	2.0	.01	.01	.080	265	.0200	.8	5.3	8.0
3	-	5.0	1.0	.01	.01	.080	180	.0340	.8	3.5	4.9
4	-	2.0	1.0	.50	.50	.050	490	.0100	2.1	3.9	7.9
10	10.8	-	-	-	-	.013	30	.0050	0.0	0.0	0.0
11	4.9	-	-	-	-	.013	122	.0810	8.1	.3	.9

POND ROUTING BY STOR-IND METHOD

POND NO.	OUTLET DEVICES	START ELEV. (FT)	FLOOD ELEV. (FT)	PEAK ELEV. (FT)	PEAK STORAGE (AF)	---PEAK FLOW--- Qin (CFS)	Qout (CFS)	ATTEN. (%)	LAG (MIN)
1	2	76.9	81.0	80.3	.78	23.0	17.2	25	19.1
2	2	93.0	96.5	95.1	.07	2.6	.6	78	27.7
4	2	89.5	94.0	93.8	.17	6.2	4.9	21	16.2

SUBCATCHMENT 1 SUB W/S B1

ACRES	CN		
1.10	70	C	WOODS
.63	71	C	MEADOW
.25	74	C	LAWN
.14	77	D	WOODS
.03	98		IMPERV
2.15	72		

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 4.6 CFS @ 12.21 HRS
VOLUME= .43 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	16.3
n=.24 L=80' P2=3 in s=.01 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	BC	.9
Unpaved Kv=16.1345 L=90' s=.01 '/' V=1.61 fps		
DIRECT ENTRY	CD	.1
	Total Length= 170 ft Total Tc=	17.3

SUBCATCHMENT 3 SUB W/S B3

ACRES	CN		
.21	74	C	GRASS
.47	70	C	WOODS
.71	80	D	GRASS
.24	77	D	WOODS
.13	98		IMPERV
.06	91	D,	GRAVEL DRIVE
1.82	78		

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 3.7 CFS @ 12.38 HRS
VOLUME= .44 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	13.0
n=.24 L=90' P2=3 in s=.022 '/'		
TR-55 SHEET FLOW	Segment ID:BC	17.0
n=.6 L=70' P2=3 in s=.043 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment IDCD	.7
Unpaved Kv=16.1345 L=145' s=.041 '/' V=3.27 fps		
DIRECT ENTRY	Segment ID:DE	.1
	Total Length= 305 ft Total Tc=	30.8

SUBCATCHMENT 4 PRE W/S B4

ACRES	CN	
1.00	70	C WOODS
2.45	80	D GRASS
5.45	77	D WOODS
.19	98	IMPERV
9.09	77	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 15.1 CFS @ 12.56 HRS
VOLUME= 2.11 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID:AB	42.4
n=.6 L=150' P2=3 in s=.02 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID:BC	1.7
Unpaved Kv=16.1345 L=200' s=.015 '/' V=1.98 fps		
DIRECT ENTRY	Segment ID:CD	.1
	Total Length= 350 ft Total Tc=	44.2

SUBCATCHMENT 10 SUB W/S B-10

ACRES	CN	
.10	70	C, WOODS
.14	71	C, MEADOW
.30	78	D, MEADOW
.18	98	IMPERVIOUS
.06	91	D, GRAVEL DRIVE
.78	81	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 2.4 CFS @ 12.14 HRS
VOLUME= .20 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	12.9
n=.24 L=60' P2=3 in s=.01 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID: B-C	.6
Unpaved Kv=16.1345 L=85' s=.023 '/' V=2.45 fps		
DIRECT ENTRY	SEGMENT I.D.: C-D	.1
	Total Length= 145 ft Total Tc=	13.6

SUBCATCHMENT 11 SUB W/S 11

ACRES	CN	
.12	80	D, GRASS
.30	98	IMPERVIOUS
.42	93	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 1.8 CFS @ 12.07 HRS
VOLUME= .14 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	7.8
n=.24 L=45' P2=3 in s=.02 '/'		

SUBCATCHMENT 12 SUB W/S B-12

ACRES	CN	
.11	89	C, GRAVEL DRIVE
.24	71	C, MEADOW
.18	78	D, MEADOW
.04	80	D, GRASS
.17	98	IMPERVIOUS
.74	82	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 2.6 CFS @ 12.09 HRS
VOLUME= .20 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	5.6
n=.24 L=30' P2=3 in s=.02 '/'		
TR-55 SHEET FLOW	Segment ID: B-C	3.6
n=.24 L=66' P2=3 in s=.3 '/'		
	Total Length= 96 ft Total Tc=	9.2

SUBCATCHMENT 13 SUB W/S B-13

ACRES	CN	
.34	70	C, WOODS
.11	71	C, MEADOW
.15	74	C, GRASS
.60	71	

SCS TR-20 METHOD
TYPE III 24-HOUR
RAINFALL= 5.5 IN
PEAK= 1.4 CFS @ 12.13 HRS
VOLUME= .12 AF

Method	Comment	Tc (min)
TR-55 SHEET FLOW	Segment ID: A-B	11.4
n=.6 L=50' P2=3 in s=.06 '/'		
SHALLOW CONCENTRATED/UPLAND FLOW	Segment ID: B-C	.4
Unpaved Kv=16.1345 L=120' s=.092 '/' V=4.89 fps		
DIRECT ENTRY	Segment ID: C-D	.1
	Total Length= 170 ft Total Tc=	11.9

REACH 1 SWALE AT UPPER SECTION WET 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	.2	.1
.2	.4	.5
.3	.6	1.0
.4	1.0	1.9
.6	1.6	3.7
.8	2.5	6.6
1.0	3.5	10.6

1.5' x 1' CHANNEL
SIDE SLOPE= .5 '/'
n= .05
LENGTH= 170 FT
SLOPE= .021 FT/FT

STOR-IND METHOD
MAX. DEPTH= .66 FT
PEAK VELOCITY= 2.4 FPS
TRAVEL TIME = 1.2 MIN
Qin = 4.6 CFS @ 12.21 HRS
Qout= 4.6 CFS @ 12.22 HRS
ATTEN= 0 % LAG= .8 MIN
IN/OUT= .43 / .43 AF

REACH 2 SHALLOW DRAINAGE IN WET 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.2	4.4	2.6
.4	16.8	15.3
.6	37.2	44.3
.9	75.7	114.1
1.2	146.4	275.1
1.6	259.2	589.2
2.0	404.0	1064.8

2' x 2' CHANNEL
SIDE SLOPE= .01 '/'
n= .08
LENGTH= 265 FT
SLOPE= .02 FT/FT

STOR-IND METHOD
MAX. DEPTH= .28 FT
PEAK VELOCITY= .8 FPS
TRAVEL TIME = 5.3 MIN
Qin = 8.2 CFS @ 12.51 HRS
Qout= 8.0 CFS @ 12.57 HRS
ATTEN= 3 % LAG= 3.8 MIN
IN/OUT= 1.51 / 1.51 AF

REACH 3 WETLAND 3 BETWEEN SUBCATCH3 AND STREAM

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	1.5	.8
.2	5.0	4.0
.3	10.5	10.7
.4	20.6	26.3
.6	39.0	61.4
.8	68.0	129.0
1.0	105.0	230.2

5' x 1' CHANNEL
SIDE SLOPE= .01 '/'
n= .08
LENGTH= 180 FT
SLOPE= .034 FT/FT

STOR-IND METHOD
MAX. DEPTH= .21 FT
PEAK VELOCITY= .8 FPS
TRAVEL TIME = 3.5 MIN
Qin = 4.9 CFS @ 12.56 HRS
Qout= 4.9 CFS @ 12.61 HRS
ATTEN= 0 % LAG= 3.2 MIN
IN/OUT= .78 / .77 AF

REACH 4 STREAM IN WETLANDS 3

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	.2	.1
.2	.5	.4
.3	.8	.9
.4	1.2	1.7
.6	1.9	3.1
.8	2.9	5.5
1.0	4.0	8.6

2' x 1' CHANNEL
SIDE SLOPE= .5 '/'
n= .05
LENGTH= 490 FT
SLOPE= .01 FT/FT

STOR-IND METHOD
MAX. DEPTH= .95 FT
PEAK VELOCITY= 2.1 FPS
TRAVEL TIME = 3.9 MIN
Qin = 8.0 CFS @ 12.57 HRS
Qout= 7.9 CFS @ 12.61 HRS
ATTEN= 1 % LAG= 2.1 MIN
IN/OUT= 1.51 / 1.50 AF

REACH 10 CULVERT IN FIRE ACCESS DR.

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
.1	0.0	0.0
.2	.1	.2
.3	.2	.4
.6	.5	1.6
.7	.5	1.9
.8	.6	2.0
.8	.6	2.0
.9	.6	2.0
.9	.6	1.9

10.8" PIPE

n= .013
LENGTH= 30 FT
SLOPE= .005 FT/FT

STOR-IND METHOD
MAX. DEPTH= 0.00 FT
PEAK VELOCITY= 0.0 FPS
TRAVEL TIME = 0.0 MIN
Qin = 0.0 CFS @ 0.00 HRS
Qout= 0.0 CFS @ 0.00 HRS
ATTEN= 0 % LAG= 0.0 MIN
IN/OUT= 0.00 / 0.00 AF

REACH 11 CULVERT FROM COURTYARD

DEPTH (FT)	END AREA (SQ-FT)	DISCH (CFS)
0.0	0.0	0.0
0.0	0.0	0.0
.1	0.0	.1
.1	0.0	.2
.3	.1	.8
.3	.1	.9
.4	.1	1.0
.4	.1	1.0
.4	.1	1.0
.4	.1	.9

4.9" PIPE

n= .013
LENGTH= 122 FT
SLOPE= .081 FT/FT

STOR-IND METHOD
MAX. DEPTH= .41 FT
PEAK VELOCITY= 8.1 FPS
TRAVEL TIME = .3 MIN
Qin = 1.8 CFS @ 12.07 HRS
Qout= .9 CFS @ 12.00 HRS
ATTEN= 49 % LAG= 0.0 MIN
IN/OUT= .14 / .14 AF

POND 1 BACKWATER AREA AT 10INCH CMP WETLANDS 3

STARTING ELEV= 76.9 FT
FLOOD ELEV= 81.0 FT

ELEVATION (FT)	CUM.STOR (CF)
76.9	0
78.0	83
79.0	4013
80.0	21893
81.0	67093

STOR-IND METHOD
PEAK ELEVATION= 80.3 FT
PEAK STORAGE = 34011 CF
Qin = 23.0 CFS @ 12.58 HRS
Qout= 17.2 CFS @ 12.90 HRS
ATTEN= 25 % LAG= 19.1 MIN
IN/OUT= 3.61 / 3.61 AF

INVERT (FT)	OUTLET DEVICES
76.9	**10" CULVERT**
	n=.02 L=12' S=.01'/' Ke=.8 Co=.9 Cd=.5 TW=.5'
79.8	**15' BROAD-CRESTED RECTANGULAR WEIR**
	Q=C L H^1.5 C=2.78, 2.93, 0, 0, 0, 0, 0, 0

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
76.9	0.0	0.0	.1	.2	.4	.5	.7	1.0	1.2	1.4
77.9	1.5	1.6	1.8	2.0	2.1	2.3	2.4	2.5	2.6	2.7
78.9	2.8	2.8	2.9	3.0	3.1	3.2	3.2	3.3	3.4	3.4
79.9	4.8	7.3	10.5	14.3	18.5	23.4	28.9	34.8	41.2	48.0
80.9	54.8	62.0								

POND 2 POND #2 AT FIRE ACCESS

STARTING ELEV= 93.0 FT
FLOOD ELEV= 96.5 FT

ELEVATION (FT)	CUM.STOR (CF)
93.0	0
94.0	750
95.0	2900
96.0	6350
96.5	8725

STOR-IND METHOD
PEAK ELEVATION= 95.1 FT
PEAK STORAGE = 3119 CF
Qin = 2.6 CFS @ 12.09 HRS
Qout= .6 CFS @ 12.56 HRS
ATTEN= 78 % LAG= 27.7 MIN
IN/OUT= .20 / .19 AF

INVERT (FT)	OUTLET DEVICES
93.0	**4" ORIFICE**
	Q=.6 PI r^2 SQR(2g) SQR(H-r)
95.8	**5' BROAD-CRESTED RECTANGULAR WEIR**
	Q=C L H^1.5 C=2.8, 3.1, 0, 0, 0, 0, 0, 0

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
93.0	0.0	0.0	.1	.2	.2	.2	.3	.3	.3	.4
94.0	.4	.4	.4	.4	.5	.5	.5	.5	.5	.6
95.0	.6	.6	.6	.6	.6	.6	.7	.7	.7	1.1
96.0	2.0	3.0	4.3	5.7	7.4	9.3				

POND 4

POND 4 BEHIND FIRE ACCESS DRIVE

STARTING ELEV= 89.5 FT
FLOOD ELEV= 94.0 FT

ELEVATION (FT)	CUM.STOR (CF)
89.5	0
90.0	205
91.0	815
92.0	1827
93.0	4120
94.0	8570

STOR-IND METHOD
PEAK ELEVATION= 93.8 FT
PEAK STORAGE = 7480 CF
Qin = 6.2 CFS @ 12.29 HRS
Qout= 4.9 CFS @ 12.56 HRS
ATTEN= 21 % LAG= 16.2 MIN
IN/OUT= .78 / .78 AF

INVERT (FT)	OUTLET DEVICES
89.5	6" ORIFICE Q=.6 PI r^2 SQR(2g) SQR(H-r)
93.5	15" HORIZONTAL ORIFICE Q=.6 Area SQR(2gH)

TOTAL DISCHARGE vs ELEVATION

FEET	0.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
89.5	0.0	0.0	.1	.2	.4	.5	.6	.6	.7	.8
90.5	.8	.9	.9	1.0	1.0	1.1	1.1	1.1	1.2	1.2
91.5	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.5	1.5	1.5
92.5	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.8	1.8	1.8
93.5	1.8	3.7	4.5	5.1	5.7	6.1				