Appendix L

Stormwater Management and Pollution Prevention Plan - Gateway Summit

PUTNAM ENGINEERING, PLLC.
Engineers and Architects

STORMWATER MANAGEMENT
AND
STORMWATER POLLUTION PREVENTION PLAN

FOR

GATEWAY SUMMIT

TOWN OF CARMEL, COUNTY OF PUTNAM
NEW YORK

MARCH 2004

PUTNAM ENGINEERING, PLLC. Engineers and Architects
4 Old Route 6, Brewster, New York 10509 • (845) 279-6789 • Fax (845) 279-6769 • Email: putnamengineering@rcn.com

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AND
STORMWATER POLLUTION PREVENTION PLAN
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NEW YORK

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STORMWATER MANAGEMENT
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I. BACKGROUND INFORMATION

A. Project Description

1. The Applicant proposes five (5) alternate layouts which range from a three (3) lot subdivision, up to a ten (10) lot subdivision on 96.2 acres located along Route 6, between Old Route 6 and Simpson Road, Tax Map 55-1-23, 24, 25 and Tax Map 55.11-1-32 in the Town of Carmel. The property abuts Centennial Ridge Golf Club on the north, land of Putnam County on the west, and vacant land to the east.

   In the various alternate plans, the subdivided lots are planned to be used for mix use consisting of a hotel and conference center, retail, office, restaurant, YMCA, and senior housing/assisted living.

2. Access to the site is from Route 6, east of the intersection with Old Route 6. The site will connect to the Fairways project located on the Centennial Ridge Golf Club.

3. In this Report, a hybrid drainage basin map and SPPP has been prepared that best exemplifies the maximum development that may take place. The site is to be served by a 3,500 foot $\pm$ road.

   The proposed site will be serviced by Carmel Sewer District #2 and Carmel Water District #2 for sewage disposal and water supply provisions respectively.

4. A location map is provided on Drawing C-100 which is made a part of this Stormwater Management and Stormwater Pollution Prevention Plan.

5. Erosion Control Plan has also been prepared and is made part of the Plan (Drawing C-103).

6. Site limitations have been analyzed in the design of the site layout and infrastructure. Critical constraints are shown on the Plan.

7. In this analysis, a total of thirty-one (31) ponds are proposed to be constructed to meet the stormwater management and treatment objectives for the proposed conceptual plans. Twenty (20) of the ponds are to be Design Type III with the remaining eleven (11) as Design Type I.

8. Temporary erosion control measures such as stabilized construction entrance, silt fence, silt trap, sediment basin and diversion swale are proposed to be used during the construction of the project. Please refer to drawings titled 'Erosion Control Plan' in the submitted drawing set. Permanent slope stabilization (vegetation), detention ponds, rip rap outlet protection and sump catch basin/manholes will provide permanent erosion control for the developed project. Proposed detention ponds will also provide stormwater treatment and attenuation to the project.

9. Construction of the project will begin upon final approval of the Planning Board which is anticipated to be in the Fall of 2004. The expected date of completion of the project is Fall of 2005.

10. Regulated environmental areas, conservation areas, easements, etc. are shown on the Construction Drawings.

B. Existing (Pre Development) Conditions

1. Topography under existing conditions is shown on drawing titled 'Existing Condition Plan'. Also shown on the map are drainage patterns including ditches, culverts, permanent streams, intermittent streams, wetlands or other water bodies and existing roads.

2. The Site Plan shows existing land use, open space, public facilities, utility lines, water supply wells on site and predominant vegetation cover types.

C. Proposed (Post Development) Conditions

1. The completed project, including building location, roads, final grading, parking, drainage, detention ponds, sewer system, water supply, and types of easements are shown on the Site Layout Plan, Grading Plan and Utility Plan.

2. Changes to land surfaces, including areas of cuts and fills, changes in vegetative cover types, and proposed contours for the road are shown on the Grading Plans.

3. Construction sequences will be discussed in the attached Appendix section of this report once a specific layout has been selected.

D. Design Pollutant Description

Three (3) design points have been chosen for pre and post drainage conditions. In order to maximize efficiency in reducing pollutant loadings, ponds have been arranged to work in sequence, otherwise known as a 'train'.

II. STORMWATER MANAGEMENT AND CONVEYANCE

A. To provide stormwater attenuation and treatment for the proposed development, extended detention ponds are proposed which will be followed by detention ponds.
The extended detention ponds have been sized to hold the 2 year storm runoff for 24 hours. Detention ponds are designed to hold the 2 year storm runoff for 6 hours.

B. Stormwater Conveyance System

Drainage swales, catch basins, manholes, interceptor drains and HDPE pipes are used to collect and transport the runoff from the developed site. Rip rap outlet protection is provided at each outfall of the conveyance system. Please refer to appendix section of this report for calculations of these structures.

C. Runoff Analysis

SCS TR-55 Method is used to estimate runoff for this project in both pre and post development conditions. A computer modeling program "HEC-1", developed by U.S. Army Corps of Engineers is used in aiding the analysis.

Total analysis area is 130.58 acres for pre development condition and 130.58 acres for post development condition.

D. Pre and Post Development Peak Runoff Comparison at Design Points 1, 2 & 3

Peak runoff is computed and compared to determine the impact the project will have on existing hydrology.

Design Point #1:

Event (Yr)	**2**	**10**	**25**	**100**
Pre Development (cfs)	43	90	125	181
Post Development (cfs)	14	34	88	191

Design Point #2:

Event (Yr)	2	10	25	100
Pre Development (cfs)	9	27	41	65
Post Development (cfs)	9	24	35	54

Design Point #3:

Event (Yr)	2	10	25	100
Pre Development (cfs)	10	26	37	57
Post Development (cfs)	7	19	28	43

Runoffs are less than pre development condition with one exception. Design Point #1 has a 10 cfs increase for the 100 year storm event. Please be aware that modification to outlet structures will be performed and the post development peak flows will be reduced.

III. STORMWATER POLLUTION TREATMENT

A. Methodology - Coefficient Method

Coefficient Method is used to estimate the pollutant generated for both pre and post development condition. Pollutant loading rates are taken from Table 9 on Page 40 of "Reducing the Impacts of Stormwater Runoff from New Development" published by the New York State Department of Environmental Conservation, and values suggested by Terrene Institute, 1994. These tables are attached in the Appendix section of this report together with a spreadsheet for the calculations. Formula for calculating pollutant loading per year is given below:

L = Area x Pollutant Loading Rate.

B. Proposed BMPs Pollutant Removal Efficiency

BMP A: First Flush Detention Pond (Design 1)

The following table provides estimates of pollutant removal rates:

Pollutant	Percent Removal	NYCDEP Mandated Removal
Total Phosphorous	20 - 40%	20%
Total Nitrogen	20 - 40%	20%
BOD	20 - 40%	20%
TSS	60 - 80%	60%

BMP B: Extended Detention Pond (Design 3)

The following table provides estimates of pollutant removal rates:

Pollutant	Percent Removal	NYCDEP Mandated Removal
Total Phosphorous	60 - 80%	60%
Total Nitrogen	40 - 60%	40%
BOD	40 - 60%	40%
TSS	80 - 100%	80%

C. Pre and Post Development Pollutant Loading Comparison at Design Point

Design Point #1	TP	TN	BOD	TSS
Pre Development (lb/yr)	12.11	207.13	901.11	14,218.16
Post Development (lb/yr)	14.29	211.84	1214.98	5,393.09
Net Change (lb/yr)	+2.18	+4.71	+313.87	-8825.07

Design Point #2	TP	TN	BOD	TSS
Pre Development (lb/yr)	3.36	80.52	201.30	4,361.50
Post Development (lb/yr)	3.14	73.79	301.49	3,223.71
Net Change (lb/yr)	-0.22	-6.73	+100.19	-1,137.79

Design Point #3	TP	TN	BOD	TSS
Pre Development (lb/yr)	2.50	60.17	150.42	3,529.10
Post Development (lb/yr)	1.91	46.69	123.46	2,480.40
Net Change (lb/yr)	-0.59	-13.48	-26.96	-1048.7

Comparison of Design Point #1 indicates increase loadings of phosphorous, nitrogen and BOD. The analysis performed was based strictly on the proposed ponds shown and no credit has been taken for additional measure (swales, deep sumps, filter strips, etc.).

Comparison at Design Point #2 indicates reductions in phosphorous, nitrogen and suspended solids. The BOD level will increase. Likewise, additional treatment can be added that will lower these values.

Design Point #3 has decrease across the board in phosphorous, nitrogen, BOD and suspended solids.

IV. EROSION AND SEDIMENT CONTROL

A. Temporary Erosion and Sediment Control Facilities

1. Temporary erosion and sediment control facilities employed in the design of this project are silt fence, stabilized construction entrances, temporary sediment basin, silt traps, temporary diversion swales and erosion control blanket.

2. The design details and implementation schedule for these facilities are shown on the Erosion Control Plans.

B. Permanent Erosion and Sediment Control Facilities

1. Permanent erosion and sediment control facilities employed in the design of this project include immediate slope stabilization, rip rap outlet protection, detention ponds and catch basin/manhole sump.

V. MAINTENANCE OF STORMWATER AND EROSION CONTROL FACILITIES

The project will have certain drainage improvements that will be owned and maintained by the Town of Carmel. Certain other improvements will be owned and maintained by individual lot owners.

A. Temporary Measures

1. Silt Fence

Sediments shall be removed from behind the fence when it becomes 0.5 feet deep at the fence. It should also be inspected weekly and after each storm event repair shall be performed as needed.

2. Diversion Swale

Proposed rip rap and grass swales are used as diversion swales during the construction phase. These swales are to be inspected weekly for scour and erosion. Remove deposits or sediment or other obstructions.

3. Construction Entrance

Construction entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public rights-of-way. Visual inspection shall be performed daily throughout the project construction, top dressing with additional stone or additional length as conditions demand, and repair and/or cleanout of any measures used to trap sediment. All sediment spilled, dropped, washed or tracked onto public rights-of-way must be removed immediately.

4. Sediment Basin

Visual inspection of the basin embankment, outlet structure and dewatering device shall be performed every 3 month, prior to any forecasted storms and after all storm events. Repairs shall be made as needed.

Sediment should be removed every six (6) months or when sediment accumulation reaches the design cleanout level, in order to preserve the available stormwater management capacity of the sediment basin and to prevent the outlet orifices or filter medium from becoming clogged. Also, unless removed, accumulated sediment may become unsightly.

The level of sediment at which cleanout is required shall be marked on a fixed reference point. Some methods to accomplish this are:

a. Set stake in sediment storage area with painted mark showing cleanout elevation.

b. When using a riser type outlet, a paint mark on the pipe

shows cleanout elevation.

5. Curb Inlet Protection

Inlet protection shall be inspected weekly and after each storm event. Sediments and debris shall be removed from behind the fence if present. repair shall be performed as needed.

B. Long Term Maintenance Notes

1. Maintenance of the facilities shall include periodic inspections, inspections following major storm events, mowing of the grass swales and detention basins (at least twice a year), removal of debris and litter from catch basins, grates, detention basins and swales, sediment removal from detention basins when it has accumulated to a depth of five (5) inches.

The maintenance activities in the right of way shall be conducted by the developer until completion of the project at which time the facilities shall be dedicated to the Town. The Town Highway Department will then have the responsibility for performing the maintenance. The maintenance on the individual lots will be the responsibility of the lot owners, as outlined on their individual site plans.

2. Maintenance of the regional attenuation basins shall consist of inspection after each major storm event in the first few months after construction. Thereafter, the inspections should be made annually. Items to be checked during the inspection include: differential settlement, erosion, leakage, tree growth on embankment, condition of rip rap in the inlet and outlet, sediment accumulation and condition of grass on floor of basin.

Basin should be mowed at least twice a year to prevent woody growth. Litter and debris shall be removed during each mowing operation. Silt or eroded materials should also be removed to maintain a vegetated cover.

3. Grassed waterways should be mowed and kept clear of debris and sediment. Brush and trees should not be permitted to grow in the flowpath. Vehicular traffic should be excluded, except for maintenance or where adequate protection has been provided for crossing.

Maintain a vigorous sod by applying lime and a complete fertilizer, as needed. Repair bare or eroded areas immediately, reseed and mulch.

4. Construction entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public rights of way. This will require periodic top dressing with additional stone or additional length as condition demand and repair and/or

cleanout of any measures used to trap sediment. All sediment spilled, dropped, washed or tracked onto public right of way must be removed immediately.

5. Water quality inlets should be cleaned out at least twice a year to accomplish pollutant removal. Inlet structures usually are cleaned out with a vacuum pump. The resulting slurry of water, sediment and other contaminants can be transported to a treatment plant or approved landfill for disposal. An alternative disposal method would be to carefully siphon out each chamber, without creating a slurry, and allow it to infiltrate over a nearby grass area. The remaining grit and sediment can be removed and trucked to a landfill for final disposal. It is important to keep maintenance records and clean out schedules as part of the water quality inlet maintenance process.

6. Inspection: Detention ponds and silt traps should be inspected periodically for the first few months after construction and on an annual basis thereafter. Detention ponds should be inspected after major storm events to ensure that small orifices and inlets remain open. Particular attention should be given to:

    - Evidence of clogging of outlet control device.
    - Erosion of the flow path through the detention facility.
    - Subsidence, erosion, cracking or tree growth on the embankment.
    - Condition of the emergency spillway.
    - Accumulation of sediment around the riser.
    - Adequacy of upstream/downstream channel erosion control measures.
    - Erosion of the pond bed and banks.
    - Sources of erosion in the contributory drainage which should be stabilized.

7. Mowing: The upper stage, side slopes, embankment and emergency spillway of a detention pond should be mowed at least twice a year to discourage woody growth and control weeds.

8. Sediment Removal: Sediment should be removed periodically in order to preserve the available stormwater management capacity of the detention pond and to prevent the outlet orifices or filter medium from becoming clogged. Also, unless removed, accumulated sediment may become unsightly. While more frequent cleanout may be needed around outlet control structures, a typical cleanout cycle for the lower stage of an extended detention facility should range from five (5) to ten (10) years.

A. Sediment basins shall be maintained the same as indicated for other structural measures; the level of sediment at which cleanout is required shall be marked on some fixed point. Some methods to accomplish this are:

- Set stake in sediment storage area with painted mark showing cleanout elevation.
- When using a riser type outlet, a paint mark on the pipe shows cleanout elevation.

VI. LIST OF ENFORCEMENT ACTIONS

There is no existing enforcement action against the applicant. Any alleged violation of law related to the activity for which approval is sought.

VII. LIST OF APPROVALS

The following is a list of the approvals required for this project and the status of same:

Approval	Type	Status
Town of Carmel Planning Board	Subdivision Approval	In Progress
Town of Carmel Planning Board	Site Plan Approval	In Progress
Town of Carmel Env. Conservation Board	Wetlands	In Progress
Putnam County Health Department	Water Supply/Sewage Disposal	In Progress
NYC Department of Env. Protection	Sewage Disposal/Drainage/SPPP	In Progress
NYS Department of Env. Conservation	SPDES/ SPPP	In Progress

VIII. LIST OF VALID PERMITS AND EXPIRATION DATES

None.

IX. CONCLUSION

As discussed in previous sections of this report, the development of the Gateway Summit will not have negative impacts on existing conditions in the vicinity of the site.

APPENDIX A

EXISTING CONDITIONS
CURVE NUMBERS
TIME OF CONCENTRATION
HEC-1 DRAINAGE REPORTS

(REFER TO ENCLOSED CD)

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 11-06-2003

nt : putnam State: Checked: _____ Date: _____
t e: existing condition-basin 1
area : 1

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)					
an Districts	Avg % imperv				
ommercial & business	85	-	-	4.47(94)	-
ER AGRICULTURAL LANDS					
sh - brush, weed, grass mix	poor	-	-	3.39(77)	-
ds	good	-	15.7(55)	48.4(70)	-
al Area (by Hydrologic Soil Group)			15.7	56.2	
			====	====	

AREA: 1 TOTAL DRAINAGE AREA: 71.96 Acres WEIGHTED CURVE NUMBER: 69

IMPERVIOUS % $\frac{.85(4.47)}{71.96} = 5\%$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ect : gateway summit User: pml Date: 09-30-2003

ty : putnam State: Checked: ____ Date: _____
i : existing conditions
rea : 2

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
Y DEVELOPED URBAN AREAS (Veg Estab.)					
reets and roads					
Dirt (w/ right-of-way)		-	-	.25(87)	-
R AGRICULTURAL LANDS					
h - brush, weed, grass mix	good	-	5.2(48)	-	-
s	good	-	15.2(55)	12.9(70)	-
1 Area (by Hydrologic Soil Group)			20.4	13.1	
			====	====	

REA: 2 TOTAL DRAINAGE AREA: 33.55 Acres WEIGHTED CURVE NUMBER: 60

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ect : gateway summit User: pml Date: 09-30-2003

t : putnam State: Checked: _____ Date: _____
i : existing conditions
rea : 3

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
R AGRICULTURAL LANDS s	good	-	10.1(55)	11.4(70)	3.57(77)
.1 Area (by Hydrologic Soil Group)			10.1	11.4	3.57

REA: 3 TOTAL DRAINAGE AREA: 25.07 Acres WEIGHTED CURVE NUMBER: 65

Type.... Tc Calcs
Name.... PRE-1

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

::
T OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: TR-55 Sheet
Description: woods

Mannings n	.4000	
Hydraulic Length	250.00	ft
2yr, 24hr P	3.5000	in
Slope	.032000	ft/ft
Avg.Velocity	.12	ft/sec

Segment #1 Time: .5902 hrs

Segment #2: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length	40.00	ft
Slope	.050000	ft/ft
Unpaved		
Avg.Velocity	3.61	ft/sec

Segment #2 Time: .0031 hrs

Segment #3: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length	40.00	ft
Slope	.100000	ft/ft
Unpaved		
Avg.Velocity	5.10	ft/sec

Segment #3 Time: .0022 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

Segment #4: Tc: TR-55 Shallow
cription: unpaved

Hydraulic Length	60.00	ft
Slope	.117000	ft/ft
Unpaved		
Avg.Velocity	5.52	ft/sec

Segment #4 Time: .0030 hrs

Segment #5: Tc: TR-55 Channel
Description: ditch

Flow Area	100.5000	sq.ft
Wetted Perimeter	60.34	ft
Hydraulic Radius	1.67	ft
Slope	.057000	ft/ft
Mannings n	.0350	
Hydraulic Length	980.00	ft
Avg.Velocity	14.28	ft/sec

Segment #5 Time: .0191 hrs

Total Tc: .6175 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

==== SCS TR-55 Shallow Concentrated Flow ==========

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

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==== SCS Channel Flow ==========

R = Aq / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

Tc = (Lf / V) / (3600sec/hr)

Where: R = Hydraulic radius
Aq = Flow area, sq.ft.
Wp = Wetted perimeter, ft
V = Velocity, ft/sec
Sf = Slope, ft/ft
n = Mannings n
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

" E OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Sheet
Description: woods

Mannings n	.4000
Hydraulic Length	200.00 ft
2yr, 24hr P	3.5000 in
Slope	.050000 ft/ft

Avg.Velocity .13 ft/sec

Segment #1 Time: .4130 hrs

Segment #2: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length	100.00 ft
Slope	.070000 ft/ft
Unpaved	

Avg.Velocity 4.27 ft/sec

Segment #2 Time: .0065 hrs

Segment #3: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length	100.00 ft
Slope	.100000 ft/ft
Unpaved	

Avg.Velocity 5.10 ft/sec

Segment #3 Time: .0054 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

Segment #4: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length 430.00 ft
Slope .186000 ft/ft
Unpaved

Avg.Velocity 6.96 ft/sec

Segment #4 Time: .0172 hrs

Segment #5: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length 330.00 ft
Slope .430000 ft/ft
Unpaved

Avg.Velocity 10.58 ft/sec

Segment #5 Time: .0087 hrs

Segment #6: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length 480.00 ft
Slope .075000 ft/ft
Unpaved

.Velocity 4.42 ft/sec

Segment #6 Time: .0302 hrs

Segment #7: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length 90.00 ft
Slope .178000 ft/ft
Unpaved

Avg.Velocity 6.81 ft/sec

Segment #7 Time: .0037 hrs

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Segment #8: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length 350.00 ft
Slope .054000 ft/ft
Unpaved

Avg.Velocity 3.75 ft/sec

Segment #8 Time: .0259 hrs

Total Tc: .5106 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

Equations used...

==== SCS TR-55 Sheet Flow ====

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

==== SCS TR-55 Shallow Concentrated Flow ====

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

::
T OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: TR-55 Sheet
Description: woods

Mannings n	.4000	
Hydraulic Length	230.00	ft
2yr, 24hr P	3.5000	in
Slope	.052000	ft/ft

Avg.Velocity .14 ft/sec

Segment #1 Time: .4547 hrs

Segment #2: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length	220.00	ft
Slope	.055000	ft/ft

Unpaved

Avg.Velocity 3.78 ft/sec

Segment #2 Time: .0162 hrs

Segment #3: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length	85.00	ft
Slope	.094000	ft/ft

Unpaved

Avg.Velocity 4.95 ft/sec

Segment #3 Time: .0048 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

Segment #4: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length 575.00 ft
Slope .188000 ft/ft
Unpaved

Avg.Velocity 7.00 ft/sec

Segment #4 Time: .0228 hrs

Segment #5: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length 110.00 ft
Slope .109000 ft/ft
Unpaved

Avg.Velocity 5.33 ft/sec

Segment #5 Time: .0057 hrs

Segment #6: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length 290.00 ft
Slope .435000 ft/ft
Unpaved

Velocity 10.64 ft/sec

Segment #6 Time: .0076 hrs

Segment #7: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length 115.00 ft
Slope .191000 ft/ft
Unpaved

Avg.Velocity 7.05 ft/sec

Segment #7 Time: .0045 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

Segment #8: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length	230.00	ft
Slope	.009000	ft/ft
Unpaved		
Avg.Velocity	1.53	ft/sec

Segment #8 Time: .0417 hrs

Total Tc: .5580 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

Equations used...

==== SCS TR-55 Sheet Flow ====

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

==== SCS TR-55 Shallow Concentrated Flow ====

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

2 YEAR STORM

UNDEVELOPED

10 YEAR STORM

UNDEVELOPED

25 YEAR STORM

UNDEVELOPED

100 YEAR STORM

UNDEVELOPED

APPENDIX B

DEVELOPED CONDITIONS

CURVE NUMBERS
TIME OF CONCENTRATION
HEC-1 DRAINAGE REPORTS

(REFER TO ENCLOSED CD)

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-28-2003

nt : putnam State: Checked: ____ Date: _____
t. e: developed conditions - BASIN 1
area : 1

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)					
idential districts	Avg % imperv				
by average lot size)					
/4 acre	38	-	-	2.44(83)	-
al Area (by Hydrologic Soil Group)				2.44	
				====	

AREA: 1 TOTAL DRAINAGE AREA: 2.44 Acres WEIGHTED CURVE NUMBER: 83

IMPERVIOUS % = 38

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ect : gateway summit User: pml Date: 10-31-2003

it : putnam State: Checked: ____ Date: _____
:i : developed condition-basin 1
irea : 2q

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
Y DEVELOPED URBAN AREAS (Veg Estab.)				
space (Lawns,parks etc.)				
od condition; grass cover > 75%	-	-	0.34(74)	-
rvious Areas				
ved parking lots, roofs, driveways	-	-	0.59(98)	-
reets and roads				
Paved; curbs and storm sewers	-	-	.015(98)	-
R AGRICULTURAL LANDS				
low -cont. grass (non grazed) ----	-	-	.115(71)	-
sh - brush, weed, grass mix good	-	-	0.10(65)	-
l ea (by Hydrologic Soil Group)			1.16	

REA: 2q TOTAL DRAINAGE AREA: 1.16 Acres WEIGHTED CURVE NUMBER: 85

Impervious % = $\frac{.59 + .015}{1.16} = 52$

* THE IMPERVIOUS AREA = 0.015' REPRESENTS WATER SURFACE IN QUALITY POND

* THE USE OF MEADOW IS IN/AROUND THE POND.

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-28-2003

nt : putnam State: Checked: ____ Date: _____
ti e: developed conditions
area : 3A

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)					
idential districts	Avg % imperv				
by average lot size)					
/4 acre	38	-	-	5.78(83)	-
al Area (by Hydrologic Soil Group)				5.78 ====	

AREA: 3 TOTAL DRAINAGE AREA: 5.78 Acres WEIGHTED CURVE NUMBER: 83

IMPERVIOUS % = 38

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-28-2003

nt : putnam State: Checked: ____ Date: _____
ti e: developed conditions
area : 3B

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)				
ervious Areas				
~~aved parking lots, roofs, driveways~~ SURFACE WATER	-	-	.05(98)	-
ER AGRICULTURAL LANDS				
dow -cont. grass (non grazed) ----	-	-	0.12(71)	-
al Area (by Hydrologic Soil Group)			.17 ====	

AREA: 3r TOTAL DRAINAGE AREA: .17 Acres WEIGHTED CURVE NUMBER: 79

IMPERVIOUS % = $\frac{.05}{.17}$ = 29%

THE IMPERVIOUS AREA REPRESENTS WATER SURFACE AREA IN THE DETENTION POND

PLEASE NOTE THAT THE USE OF MEADOW - NON GRASED GRASS IS USED AT POND LOCATIONS. I BELIEVE THIS TO BE THE CLOSEST FIT FOR COVER PURPOSES.

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-28-2003

it : putnam State: Checked: ____ Date: _____
:i e: developed conditions
irea : 4

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
Y DEVELOPED URBAN AREAS (Veg Estab.)					
~~roofs and roads~~					
~~Paved; curbs and storm sewers~~ WATER SURFACE AREA		-	-	.25(98)	-
idential districts	Avg % imperv				
oy average lot size)					
'8 acre (town houses)	65	-	-	12.4(90)	-
ER AGRICULTURAL LANDS					
low -cont. grass (non grazed) ----		-	-	.53(71)	-
il Area (by Hydrologic Soil Group)				13.1 ====	

AREA: 4 TOTAL DRAINAGE AREA: 13.18 Acres WEIGHTED CURVE NUMBER: 89

IMPERVIOUS % = $\frac{.65(12.4) = 8.06}{.25 = 0.25}$ $\frac{8.31}{8.31}$ $\frac{8.31}{13.18} = 63$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-28-2003

it : putnam State: Checked: _____ Date: _____
t. e: developed conditions
area : 5

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)					
idential districts	Avg % imperv				
by average lot size)					
/8 acre (town houses)	65	-	0.44(85)	4.13(90)	-
al Area (by Hydrologic Soil Group)			.44	4.13	
			====	====	

AREA: 5 TOTAL DRAINAGE AREA: 4.57 Acres WEIGHTED CURVE NUMBER: 90

IMPERVIOUS % = 65

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-28-2003

nty : putnam State: Checked: ____ Date: _____
t e: developed conditions
area : 6r

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
	Acres (CN)			
ER AGRICULTURAL LANDS				
dow -cont. grass (non grazed) ----	-	-	.38(71)	-
al Area (by Hydrologic Soil Group)			.38	
			====	

AREA: 6 TOTAL DRAINAGE AREA: .38 Acres WEIGHTED CURVE NUMBER: 71

THE DETENTION POND HAS 168 ft^2 OF SURFACE WATER = .0038 Ac. AND I DECIDED NOT TO INTRODUCE A (CN) CALC. FOR THIS.

IMPERVIOUS % = $\frac{168\,ft^2}{.38(43560)}$ = .01 = 1%

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-28-2003

ıty : putnam State: Checked: _____ Date: _____
ti :: developed conditions
ırea : 7

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
:Y DEVELOPED URBAN AREAS (Veg Estab.)				
ı space (Lawns,parks etc.)				
ɔod condition; grass cover > 75%	-	0.55(61)	0.03(74)	-
ɜrvious Areas				
ıved parking lots, roofs, driveways	-	0.58(98)	0.29(98)	-
~~treets and roads~~				
~~Paved; curbs and storm sewers~~ WATER SURFACE AREA	-	-	0.08(98)	-
ƎR AGRICULTURAL LANDS				
ɜh - brush, weed, grass mix good	-	1.41(48)	.58(65)	-
ıl Area (by Hydrologic Soil Group)		2.54 ====	.98 ====	

\REA: 7 TOTAL DRAINAGE AREA: 3.52 Acres WEIGHTED CURVE NUMBER: 67

IMPERVIOUS % = $\frac{.58 + .29 + .08}{3.52} = \frac{.95}{3.52} = 27\%$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ect : gateway summit User: pml Date: 10-30-2003

it : putnam State: Checked: _____ Date: _____
:i e: developed conditions-basin 1
irea : 8q

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
.Y DEVELOPED URBAN AREAS (Veg Estab.)				
ı space (Lawns,parks etc.)				
ɔod condition; grass cover > 75%	-	-	0.31(74)	-
ɜrvious Areas				
ıved parking lots, roofs, driveways	-	1.05(98)	1.19(98)	-
~~treets and roads~~				
~~Paved; curbs and storm sewers~~ WATER SURFACE AREA	-	-	0.12(98)	-
ƎR AGRICULTURAL LANDS				
low -cont. grass (non grazed) ----	-	0.05(58)	0.31(71)	-
ɜh - brush, weed, grass mix good	-	1.25(48)	0.54(65)	-
a rea (by Hydrologic Soil Group)		2.35	2.47	
		====	====	

AREA: 8q TOTAL DRAINAGE AREA: 4.82 Acres WEIGHTED CURVE NUMBER: 78

IMPERVIOUS % = $\frac{1.05 + 1.19 + 0.12}{4.82} = 49$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-30-2003

nt : putnam State: Checked: ____ Date: _____
t e: developed conditions-basin 1
area : 9r1

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)				
n space (Lawns,parks etc.)				
ood condition; grass cover > 75%	-	-	0.12(74)	-
ervious Areas				
~~aved parking lots, roofs, driveways~~ WATER SURFACE	-	-	0.06(98)	-
ER AGRICULTURAL LANDS				
dow -cont. grass (non grazed) ----	-	-	0.06(71)	-
sh - brush, weed, grass mix good	-	-	0.06(65)	-
al Area (by Hydrologic Soil Group)			.3	

AREA: 9r1 TOTAL DRAINAGE AREA: .3 Acres WEIGHTED CURVE NUMBER: 76

IMPERVIOUS % = $\frac{.06}{.30}$ = 20

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-27-2003

it : putnam State: Checked: _____ Date: _____
t: e: developed condition
irea : 9r2

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)					
n space (Lawns,parks etc.)					
ood condition; grass cover > 75%		-	.18(61)	.12(74)	-
ervious Areas					
~~ved parking lots, roofs, driveways~~	WATER SURFACE	-	.01(98)	.02(98)	-
ER AGRICULTURAL LANDS					
low -cont. grass (non grazed) ----		-	.12(58)	-	-
sh - brush, weed, grass mix	good	-	-	.09(65)	-
ll Area (by Hydrologic Soil Group)			.31	.23	
			====	====	

AREA: 9r2 TOTAL DRAINAGE AREA: .54 Acres WEIGHTED CURVE NUMBER: 66

IMPERVIOUS % = $\frac{.12}{.54}$ = 22

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-27-2003

nt : putnam State: Checked: _____ Date: _____
t: e: developed condition
area : 9r3

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)					
n space (Lawns,parks etc.)					
ood condition; grass cover > 75%		-	.02(61)	.14(74)	-
ervious Areas					
~~aved parking lots, roofs, driveways~~	WATER SURFACE	-	-	.04(98)	-
ER AGRICULTURAL LANDS					
sh - brush, weed, grass mix	good	-	-	.10(65)	-
al Area (by Hydrologic Soil Group)			.02	.28	
			====	====	

AI : 9r3 TOTAL DRAINAGE AREA: .3 Acres WEIGHTED CURVE NUMBER: 73

IMPERVIOUS % = $\frac{.04}{.30} = 13$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-27-2003

nt : putnam State: Checked: ____ Date: _____
ti : developed condition
area : 9r4

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)					
n space (Lawns,parks etc.)					
ood condition; grass cover > 75%		-	-	.14(74)	-
ervious Areas					
~~aved parking lots, roofs, driveways~~ WATER SURFACE		-	-	.04(98)	-
ER AGRICULTURAL LANDS					
sh - brush, weed, grass mix	good	-	-	.06(65)	-
al Area (by Hydrologic Soil Group)				.24 ====	

AF : 9r4 TOTAL DRAINAGE AREA: .24 Acres WEIGHTED CURVE NUMBER: 76

IMPERVIOUS % = $\frac{.04}{.24}$ = 17

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-27-2003

nt : putnam State: Checked: ____ Date: _____
t e: developed condition
area : 9r5

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)					
n space (Lawns,parks etc.)					
ood condition; grass cover > 75%		-	.20(61)	.07(74)	-
ervious Areas					
~~ved parking lots, roofs, driveways~~	WATER SURFACE	-	-	.05(98)	-
ER AGRICULTURAL LANDS					
sh - brush, weed, grass mix	good	-	-	.37(65)	-
al Area (by Hydrologic Soil Group)			.2	.49	
			====	====	

V : 9r5 TOTAL DRAINAGE AREA: .69 Acres WEIGHTED CURVE NUMBER: 67

IMPERVIOUS % = $\frac{.05}{.69}$ = 7

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-30-2003

nt-- : putnam State: Checked: ____ Date: _____
t e: developed conditions-basin 1
area : 10q / 10A

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)				
n space (Lawns,parks etc.)				
ood condition; grass cover > 75%	-	-	0.02(74)	-
ervious Areas				
~~aved parking lots, roofs, driveways~~ WATER SURFACE AREA	-	-	0.03(98)	-
treets and roads				
Paved; curbs and storm sewers	-	-	0.13(98)	-
ER AGRICULTURAL LANDS				
low -cont. grass (non grazed) ----	-	-	0.10(71)	-
sh - brush, weed, grass mix good	-	-	0.36(65)	-
a' rea (by Hydrologic Soil Group)			.64 ====	

AREA: 10q TOTAL DRAINAGE AREA: .64 Acres WEIGHTED CURVE NUMBER: 74

IMPERVIOUS % = $\frac{0.13 + 0.03}{.64} = 25$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 11-04-2003

nt-- : putnam State: Checked: ____ Date: _____
t e: developed condition-basin 1
area : 10r / 10B

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)				
n space (Lawns,parks etc.)				
ood condition; grass cover > 75%	-	-	.02(74)	-
ervious Areas				
~~aved parking lots, roofs, driveways.~~ WATER SURFACE	-	-	.01(98)	-
ER AGRICULTURAL LANDS				
dow -cont. grass (non grazed) ----	-	-	.21(71)	-
sh - brush, weed, grass mix good	-	-	.13(65)	-
al Area (by Hydrologic Soil Group)			.37 ====	

AREA: 10r TOTAL DRAINAGE AREA: .37 Acres WEIGHTED CURVE NUMBER: 70

IMPERVIOUS % = $\frac{.01}{.37} = 3$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-29-2003

nt : putnam State: Checked: ____ Date: _____
ti e: developed condition
area : 11q aka 11A

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)				
n space (Lawns,parks etc.)				
ood condition; grass cover > 75%	-	-	0.53(74)	-
ervious Areas				
~~aved parking lots, roofs, driveways~~ WATER SURFACE AREA	-	-	0.04(98)	-
treets and roads				
Paved; curbs and storm sewers	-	-	1.21(98)	-
ER AGRICULTURAL LANDS				
low -cont. grass (non grazed) ----	-	-	0.10(71)	-
sh - brush, weed, grass mix good	-	-	0.82(65)	-
al rea (by Hydrologic Soil Group)			2.7 ====	

AREA: 11q TOTAL DRAINAGE AREA: 2.7 Acres WEIGHTED CURVE NUMBER: 82

IMPERVIOUS % = $\frac{1.21 + 0.04}{2.7} = 46$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-29-2003

nt : putnam State: Checked: ____ Date: _____
ti e: developed condition
area : 11r aka 1|B

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)				
n space (Lawns,parks etc.)				
ood condition; grass cover > 75%	-	-	.06(74)	-
ervious Areas				
~~aved parking lots, roofs, driveways~~ WATER SURFACE AREA	-	-	.03(98)	-
ER AGRICULTURAL LANDS				
dow -cont. grass (non grazed) ----	-	-	.10(71)	-
sh - brush, weed, grass mix good	-	-	0.13(65)	-
al Area (by Hydrologic Soil Group)			.32	

AREA: 11r TOTAL DRAINAGE AREA: .32 Acres WEIGHTED CURVE NUMBER: 72

IMPERVIOUS % = $\frac{.03}{.32}$ = 9

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-29-2003

ity : putnam State: Checked: _____ Date: _____
ti : developed condition
rea : 12q

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
Y DEVELOPED URBAN AREAS (Veg Estab.)				
space (Lawns,parks etc.)				
od condition; grass cover > 75%	-	-	0.76(74)	-
ervious Areas				
ved parking lots, roofs, driveways	-	-	1.62(98)	-
reets and roads				
~~Paved; curbs and storm sewers~~ WATER SURFACE AREA	-	-	0.07(98)	-
R AGRICULTURAL LANDS				
low -cont. grass (non grazed) ----	-	-	0.21(71)	-
sh - brush, weed, grass mix good	-	-	0.18(65)	-
al rea (by Hydrologic Soil Group)			2.84 ====	

AREA: 12 TOTAL DRAINAGE AREA: 2.84 Acres WEIGHTED CURVE NUMBER: 87

IMPERVIOUS % - $\frac{1.62 + .07}{2.84} = 60$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-29-2003

nt" : putnam State: Checked: ____ Date: _____
t e: developed condition
area : 13q a.k.a. 13A

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)				
n space (Lawns,parks etc.)				
ood condition; grass cover > 75%	-	-	0.23(74)	-
ervious Areas				
aved parking lots, roofs, driveways	-	0.05(98)	0.56(98)	-
treets and roads				
~~Paved; curbs and storm sewers~~ WATER SURFACE	-	0.02(98)	-	-
ER AGRICULTURAL LANDS				
low -cont. grass (non grazed) ----	-	0.20(58)	-	-
sh - brush, weed, grass mix good	-	-	0.03(65)	-
a' rea (by Hydrologic Soil Group)		.27 ====	.82 ====	

AREA: 13q TOTAL DRAINAGE AREA: 1.09 Acres WEIGHTED CURVE NUMBER: 85

IMPERVIOUS % = $\frac{.05 + .56 + .02}{1.09} = 58$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-30-2003

nt" : putnam State: Checked: ____ Date: _____
t e: developed condition
area : 13r a.k.a. 13B

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)				
n space (Lawns,parks etc.)				
ood condition; grass cover > 75%	-	.02(61)	-	-
ER AGRICULTURAL LANDS				
low -cont. grass (non grazed) ----	-	0.10(58)	-	-
sh - brush, weed, grass mix good	-	0.03(48)	-	-
al Area (by Hydrologic Soil Group)		.15		
		====		

AREA: 13r TOTAL DRAINAGE AREA: .15 Acres WEIGHTED CURVE NUMBER: 56

WATER SURFACE AREA IS ≈ .004 AC.

IMP. % = $\frac{.004}{.15}$ = 2%

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-30-2003

nt : putnam State: Checked: ____ Date: _____
ti e: developed condition
area : 14q a.ka 14A

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)				
n space (Lawns,parks etc.)				
ood condition; grass cover > 75%	-	0.04(61)	-	-
ervious Areas				
~~aved parking lots, roofs, driveways~~ WATER SURFACE	-	0.03(98)	-	-
treets and roads				
Paved; curbs and storm sewers	-	0.21(98)	0.11(98)	0.10(98)
ER AGRICULTURAL LANDS				
low -cont. grass (non grazed) ----	-	0.14(58)	-	-
al Area (by Hydrologic Soil Group)		.42	.11	.1
		====	====	====

AREA: 14q TOTAL DRAINAGE AREA: .63 Acres WEIGHTED CURVE NUMBER: 87

IMPERVIOUS % = $\frac{.03 + .21 + .11 + .10}{.63} = 71$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-30-2003

ity : putnam State: Checked: ____ Date: _____
ti : developed condition
area : 14r a.k.a. 14B

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)				
n space (Lawns,parks etc.)				
ood condition; grass cover > 75%	-	0.06(61)	-	-
ervious Areas				
~~ved parking lots, roofs, driveways~~ WATER SURFACE AREA	-	0.01(98)	-	-
ER AGRICULTURAL LANDS				
low -cont. grass (non grazed) ----	-	0.07(58)	-	-
al Area (by Hydrologic Soil Group)		.14		

AR 14r TOTAL DRAINAGE AREA: .14 Acres WEIGHTED CURVE NUMBER: 62

IMPERVIOUS % = $\frac{.01}{.14}$ = 7

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-30-2003

it : putnam State: Checked: ____ Date: _____
: e: developed condition
irea : 15q

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)				
n space (Lawns,parks etc.)				
ood condition; grass cover > 75%	-	0.16(61)	-	-
ervious Areas				
aved parking lots, roofs, driveways	-	2.42(98)	-	-
treets and roads				
~~Paved; curbs and storm sewers~~ WATER SURFACE AREA	-	0.04(98)	-	-
ER AGRICULTURAL LANDS				
low -cont. grass (non grazed) ----	-	0.14(58)	-	-
sh - brush, weed, grass mix good	-	1.00(48)	-	-
a' rea (by Hydrologic Soil Group)		3.76 ====		

AREA: 15q TOTAL DRAINAGE AREA: 3.76 Acres WEIGHTED CURVE NUMBER: 82

IMPERVIOUS % = $\frac{2.42 + 0.04}{3.76} = 65$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-30-2003

nt : putnam State: Checked: _____ Date: _____
t. e: developed condition
area : 16q a.k.a. 16A

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)				
n space (Lawns,parks etc.)				
ood condition; grass cover > 75%	-	0.50(61)	-	-
ervious Areas				
aved parking lots, roofs, driveways	-	1.79(98)	-	-
treets and roads				
~~Paved; curbs and storm sewers~~ WATER SURFACE AREA	-	0.07(98)	-	-
ER AGRICULTURAL LANDS				
low -cont. grass (non grazed) ----	-	0.14(58)	-	-
al Area (by Hydrologic Soil Group)		2.5		

AREA: 16q TOTAL DRAINAGE AREA: 2.5 Acres WEIGHTED CURVE NUMBER: 88

IMPERVIOUS % = $\frac{.07 + 1.79}{2.5} = 74$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-30-2003

it : putnam State: Checked: _____ Date: _____
t. e: developed condition
area : 16r aka 16B

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
Y DEVELOPED URBAN AREAS (Veg Estab.)				
n space (Lawns,parks etc.)				
ood condition; grass cover > 75%	-	0.09(61)	-	-
ervious Areas				
~~aved parking lots, roofs, driveways~~ WATER SURFACE AREA	-	0.01(98)	-	-
ER AGRICULTURAL LANDS				
low -cont. grass (non grazed) ----	-	0.07(58)	-	-
al Area (by Hydrologic Soil Group)		.17		

AF : 16r TOTAL DRAINAGE AREA: .17 Acres WEIGHTED CURVE NUMBER: 62

IMPERVIOUS % = $\frac{.01}{.17}$ = 6

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-30-2003

nt : putnam State: Checked: ____ Date: _____
t. e: developed condition
area : 17r

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
		Acres (CN)			
LY DEVELOPED URBAN AREAS (Veg Estab.)					
n space (Lawns,parks etc.)					
ood condition; grass cover > 75%		-	1.15(61)	0.10(74)	0.27(80)
ervious Areas					
~~aved parking lots, roofs, driveways~~		-		0.01(98)	0.20(98)
treets and roads					
Paved; curbs and storm sewers		-	0.51(98)	-	-
ER AGRICULTURAL LANDS					
low -cont. grass (non grazed) ----		-	-	0.09(71)	-
ds	good	-	3.19(55)	1.43(70)	1.29(77)
a rea (by Hydrologic Soil Group)			4.85	1.63	1.76

AREA: 17r TOTAL DRAINAGE AREA: 8.24 Acres WEIGHTED CURVE NUMBER: 67

WATER SURFACE

ROCK

impervious % = $\frac{.51 + .20 + .01}{8.24} = 9$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gareway summit User: pml Date: 10-28-2003

ity : putnam State: Checked: ____ Date: _____
t: e: developed conditions
area : 18q1 a.k.a. 18A

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)					
n space (Lawns,parks etc.)					
ood condition; grass cover > 75%		-	0.24(61)	0.04(74)	-
ervious Areas					
aved parking lots, roofs, driveways		-	0.92(98)	-	-
treets and roads					
~~Paved; curbs and storm sewers~~ WATER SURFACE AREA		-	.035(98)	.005(98)	-
ER AGRICULTURAL LANDS					
ds - grass combination	good	-	0.64(58)	-	-
ds	good	-	0.93(55)	-	-
al rea (by Hydrologic Soil Group)			2.76	.045	
			====	====	

AREA: 18q1 TOTAL DRAINAGE AREA: 2.81 Acres WEIGHTED CURVE NUMBER: 71

IMPERVIOUS % = $\frac{.035 + .005 + .92}{2.81} = 34$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gareway summit User: pml Date: 10-28-2003

nt : putnam State: Checked: _____ Date: _____
t e: developed conditions
area : 18q2 a.ka. 18B

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)					
n space (Lawns,parks etc.)					
ood condition; grass cover > 75%		-	.15(61)	.14(74)	-
ervious Areas					
~~aved parking lots, roofs, driveways~~	WATER SURFACE AREA	-	0.06(98)	-	-
treets and roads					
Paved; curbs and storm sewers		-	.015(98)	.005(98)	-
al Area (by Hydrologic Soil Group)			.225 ====	.145 ====	

AREA: 18q2 TOTAL DRAINAGE AREA: .37 Acres WEIGHTED CURVE NUMBER: 74

IMPERVIOUS % = $\frac{.06}{.37}$ = 16

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ect : gateway summit User: pml Date: 10-30-2003

it : putnam State: Checked: ____ Date: _____
: e: developed condition - BASIN 1
irea : 19

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
Y DEVELOPED URBAN AREAS (Veg Estab.)					
space (Lawns,parks etc.)					
od condition; grass cover > 75%		-	-	-	0.05(80)
reets and roads					
Paved; open ditches (w/right-of-way)		-	-	.02(92)	-
R AGRICULTURAL LANDS					
low -cont. grass (non grazed)	----	-	0.05(58)	1.29(71)	-
sh - brush, weed, grass mix	good	-	0.42(48)	1.29(65)	-
ds	good	-	3.63(55)	7.83(70)	0.43(77)
al Area (by Hydrologic Soil Group)			4.1	10.4	.48

AREA: 19 TOTAL DRAINAGE AREA: 15.01 Acres WEIGHTED CURVE NUMBER: 66

IMPERVIOUS % = $\frac{.02}{15.01} = 0$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gareway summit User: pml Date: 10-28-2003

nt : putnam State: Checked: _____ Date: _____
t: e: developed conditions - BASIN 2
area : 20q1 a.k.a 20A

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)				
n space (Lawns,parks etc.)				
ood condition; grass cover > 75%	-	2.34(61)	-	-
ervious Areas				
aved parking lots, roofs, driveways	-	2.48(98)	-	-
treets and roads				
~~Paved; curbs and storm sewers~~ WATER SURFACE AREA	-	0.15(98)	-	-
al Area (by Hydrologic Soil Group)		4.97 ====		

AREA: 20q1 TOTAL DRAINAGE AREA: 4.97 Acres WEIGHTED CURVE NUMBER: 81

IMPERVIOUS % = $\frac{2.48 + 0.15}{4.97} = 53$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gareway summit User: pml Date: 10-28-2003

nt : putnam State: Checked: _____ Date: _____
t e: developed conditions - BASIN 2
area : 20q2 AKa 20B

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)				
n space (Lawns,parks etc.)				
ood condition; grass cover > 75%	-	0.48(61)	-	-
ervious Areas				
aved parking lots, roofs, driveways	-	0.57(98)	-	-
treets and roads				
~~Paved; curbs and storm sewers~~ WATER SURFACE AREA	-	.09(98)	-	-
al Area (by Hydrologic Soil Group)		1.14 ====		

AREA: 20q2 TOTAL DRAINAGE AREA: 1.14 Acres WEIGHTED CURVE NUMBER: 82

IMPERVIOUS % = $\frac{.57+.09}{1.14} = 58$

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gareway summit User: pml Date: 10-28-2003

nt : putnam State: Checked: _____ Date: _____
ti : developed conditions - BASIN 2
area : 21

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)					
n space (Lawns,parks etc.)					
ood condition; grass cover > 75%		-	-	.10(74)	-
ER AGRICULTURAL LANDS					
dow -cont. grass (non grazed)	----	-	.20(58)	.35(71)	-
sh - brush, weed, grass mix	good	-	.25(48)	.40(65)	-
ds	good	-	.40(55)	.24(70)	-
al Area (by Hydrologic Soil Group)			.85	1.09	

Ak : 21 TOTAL DRAINAGE AREA: 1.94 Acres WEIGHTED CURVE NUMBER: 62

IMPERVIOUS % =

WATER SURFACE AREA = $\frac{396\ ft^2}{84,506\ ft^2} = 0.4$ use ∅

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ect : gateway summit User: pml Date: 10-30-2003

ity : putnam State: Checked: _____ Date: _____
:i : developed condition - BASIN 2
irea : 22r

COVER DESCRIPTION	Hydrologic Soil Group A	B	C	D
		Acres (CN)		
.Y DEVELOPED URBAN AREAS (Veg Estab.)				
ı space (Lawns,parks etc.)				
)od condition; grass cover > 75%	-	-	0.03(74)	-
:rvious Areas				
~~ıved parking lots, roofs, driveways~~ WATER SURFACE	-	-	0.02(98)	-
:R AGRICULTURAL LANDS				
low -cont. grass (non grazed) ----	-	-	0.12(71)	-
sh - brush, weed, grass mix good	-	-	0.60(65)	-
ıl Area (by Hydrologic Soil Group)			.77	
			====	

AREA: 22 TOTAL DRAINAGE AREA: .77 Acres WEIGHTED CURVE NUMBER: 67

IMPERVIOUS % =

water surface = $\frac{.02}{.77}$ = 3

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ject : gateway summit User: pml Date: 10-30-2003

nty : putnam State: Checked: ____ Date: _____
t: e: developed condition - BASIN 2
ar.. : 23

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
LY DEVELOPED URBAN AREAS (Veg Estab.)					
n space (Lawns,parks etc.)					
ood condition; grass cover > 75%		-	-	0.07(74)	-
ervious Areas					
~~ved parking lots, roofs, driveways~~	WATER SURFACE	-	-	0.02(98)	-
ER AGRICULTURAL LANDS					
low -cont. grass (non grazed) ----		-	-	0.11(71)	-
sh - brush, weed, grass mix	good	-	-	0.34(65)	-
al Area (by Hydrologic Soil Group)				.54 ====	

AREA: 23 TOTAL DRAINAGE AREA: .54 Acres WEIGHTED CURVE NUMBER: 69

IMPERVIOUS % = $\frac{.02}{.54}$ = 4

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ect : gateway summit User: pml Date: 11-04-2003

t : putnam State: Checked: _____ Date: _____
i : developed condition-basin 2
rea : 24

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
Y DEVELOPED URBAN AREAS (Veg Estab.)					
reets and roads					
Dirt (w/ right-of-way)		-	-	0.25(87)	-
R AGRICULTURAL LANDS					
low -cont. grass (non grazed)	----	-	-	0.23(71)	-
h - brush, weed, grass mix	good	-	0.65(48)	-	-
ls	good	-	13.8(55)	8.27(70)	-
l Area (by Hydrologic Soil Group)			14.4	8.75	
			====	====	

R : 24 TOTAL DRAINAGE AREA: 23.2 Acres WEIGHTED CURVE NUMBER: 61

IMPERVIOUS % = $\frac{.25}{23.20}$ = 1%

RUNOFF CURVE NUMBER COMPUTATION Version 2.10

ect : gateway summit User: pml Date: 10-30-2003

it : putnam State: Checked: _____ Date: _____
i : developed condition - BASIN 3
irea : 25

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
R AGRICULTURAL LANDS ls	good	-	10.1(55)	5.41(70)	3.57(77)
l Area (by Hydrologic Soil Group)			10.1	5.41	3.57

REA: 25 TOTAL DRAINAGE AREA: 19.08 Acres WEIGHTED CURVE NUMBER: 63

IMPERVIOUS % = 0

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Sheet
Description: grass

Mannings n	.2400
Hydraulic Length	50.00 ft
2yr, 24hr P	3.5000 in
Slope	.100000 ft/ft
Avg.Velocity	.20 ft/sec

Segment #1 Time: .0686 hrs

Segment #2: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length	20.00 ft
Slope	.250000 ft/ft
Unpaved	
Avg.Velocity	8.07 ft/sec

Segment #2 Time: .0007 hrs

Segment #3: Tc: TR-55 Shallow
Description: paved

Hydraulic Length	100.00 ft
Slope	.020000 ft/ft
Paved	
Avg.Velocity	2.87 ft/sec

Segment #3 Time: .0097 hrs

Total Tc: .0790 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

Tc Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

==== SCS TR-55 Shallow Concentrated Flow ==========

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

::
IME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: TR-55 Sheet
Description: grass

Mannings n	.2400	
Hydraulic Length	70.00	ft
2yr, 24hr P	3.5000	in
Slope	.071000	ft/ft
Avg.Velocity	.19	ft/sec

Segment #1 Time: .1030 hrs

Segment #2: Tc: TR-55 Shallow
Description: paved

Hydraulic Length	65.00	ft
Slope	.031000	ft/ft
Paved		
Avg.Velocity	3.58	ft/sec

Segment #2 Time: .0050 hrs

==========
Total Tc: .1080 hrs
==========

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

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c Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

==== SCS TR-55 Shallow Concentrated Flow ==========

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Sheet
Description: grass

Mannings n	.2400	
Hydraulic Length	50.00	ft
2yr, 24hr P	3.5000	in
Slope	.050000	ft/ft
Avg.Velocity	.15	ft/sec

Segment #1 Time: .0905 hrs

Segment #2: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length	120.00	ft
Slope	.020000	ft/ft
Unpaved		
Avg.Velocity	2.28	ft/sec

Segment #2 Time: .0146 hrs

Segment #3: Tc: TR-55 Shallow
Description: paved

Hydraulic Length	260.00	ft
Slope	.010000	ft/ft
Paved		
Avg.Velocity	2.03	ft/sec

Segment #3 Time: .0355 hrs

Total Tc: .1407 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

==== SCS TR-55 Shallow Concentrated Flow ==========

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Sheet
Description: grass

Mannings n	.2400	
Hydraulic Length	30.00	ft
2yr, 24hr P	3.5000	in
Slope	.070000	ft/ft
Avg.Velocity	.16	ft/sec

Segment #1 Time: .0526 hrs

Segment #2: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length	145.00	ft
Slope	.125000	ft/ft
Unpaved		
Avg.Velocity	5.70	ft/sec

Segment #2 Time: .0071 hrs

Total Tc: .0596 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

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c Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

==== SCS TR-55 Shallow Concentrated Flow ==========

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

IME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Sheet
Description: grass

Mannings n	.2400	
Hydraulic Length	55.00	ft
2yr, 24hr P	3.5000	in
Slope	.180000	ft/ft

Avg.Velocity .26 ft/sec

Segment #1 Time: .0585 hrs

Segment #2: Tc: TR-55 Shallow
Description: paved

Hydraulic Length	185.00	ft
Slope	.054000	ft/ft

Paved

Avg.Velocity 4.72 ft/sec

Segment #2 Time: .0109 hrs

Total Tc: .0694 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

==== SCS TR-55 Shallow Concentrated Flow ==========

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

::
IME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: TR-55 Sheet
Description: grass

Mannings n	.2400	
Hydraulic Length	50.00	ft
2yr, 24hr P	3.5000	in
Slope	.010000	ft/ft
Avg.Velocity	.08	ft/sec

Segment #1 Time: .1723 hrs

Total Tc: .1723 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

: Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

::
TIME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: TR-55 Sheet
Description: grass

Mannings n	.2400	
Hydraulic Length	100.00	ft
2yr, 24hr P	3.5000	in
Slope	.200000	ft/ft
Avg.Velocity	.31	ft/sec

Segment #1 Time: .0905 hrs

Segment #2: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length	60.00	ft
Slope	.400000	ft/ft
Unpaved		
Avg.Velocity	10.20	ft/sec

Segment #2 Time: .0016 hrs

Segment #3: Tc: TR-55 Shallow
Description: paved

Hydraulic Length	90.00	ft
Slope	.040000	ft/ft
Paved		
Avg.Velocity	4.07	ft/sec

Segment #3 Time: .0061 hrs

Total Tc: .0983 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

'c Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

==== SCS TR-55 Shallow Concentrated Flow ==========

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

::
TIME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: TR-55 Sheet
Description: grass

Mannings n	.2400	
Hydraulic Length	80.00	ft
2yr, 24hr P	3.5000	in
Slope	.130000	ft/ft

Avg.Velocity .25 ft/sec

Segment #1 Time: .0900 hrs

Segment #2: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length	60.00	ft
Slope	.200000	ft/ft

Unpaved

Avg.Velocity 7.22 ft/sec

Segment #2 Time: .0023 hrs

==========
Total Tc: .0923 hrs
==========

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

Tc Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

==== SCS TR-55 Shallow Concentrated Flow ==========

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW
Title... 5

TIME OF CONCENTRATION CALCULATOR

5

Segment #1: Tc: TR-55 Sheet
Description: grass

Mannings n	.2400	
Hydraulic Length	55.00	ft
2yr, 24hr P	3.5000	in
Slope	.180000	ft/ft

Avg.Velocity .26 ft/sec

Segment #1 Time: .0585 hrs

Segment #2: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length	20.00	ft
Slope	.500000	ft/ft

Unpaved

Avg.Velocity 11.41 ft/sec

Segment #2 Time: .0005 hrs

Total Tc: .0590 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW
Title... 5

c Equations used...

==== SCS TR-55 Sheet Flow ====

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

==== SCS TR-55 Shallow Concentrated Flow ====

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Sheet
Description: grass

Mannings n	.2400	
Hydraulic Length	30.00	ft
2yr, 24hr P	3.5000	in
Slope	.067000	ft/ft
Avg.Velocity	.16	ft/sec

Segment #1 Time: .0535 hrs

Segment #2: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length	60.00	ft
Slope	.270000	ft/ft
Unpaved		
Avg.Velocity	8.38	ft/sec

Segment #2 Time: .0020 hrs

Total Tc: .0555 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

==== SCS TR-55 Shallow Concentrated Flow ==========

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Sheet
Description: pavement

Mannings n	.0110
Hydraulic Length	300.00 ft
2yr, 24hr P	3.5000 in
Slope	.050000 ft/ft
Avg.Velocity	2.59 ft/sec

Segment #1 Time: .0322 hrs

Segment #2: Tc: TR-55 Shallow
Description: paved

Hydraulic Length	200.00 ft
Slope	.050000 ft/ft
Paved	
Avg.Velocity	4.55 ft/sec

Segment #2 Time: .0122 hrs

Total Tc: .0445 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

==== SCS TR-55 Shallow Concentrated Flow ==========

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

::
'IME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: TR-55 Sheet
Description: woods

Mannings n	.4000	
Hydraulic Length	90.00	ft
2yr, 24hr P	3.5000	in
Slope	.033000	ft/ft

Avg.Velocity .10 ft/sec

Segment #1 Time: .2575 hrs

Segment #2: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length	140.00	ft
Slope	.157000	ft/ft
Unpaved		

Avg.Velocity 6.39 ft/sec

Segment #2 Time: .0061 hrs

Segment #3: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length	260.00	ft
Slope	.385000	ft/ft
Unpaved		

Avg.Velocity 10.01 ft/sec

Segment #3 Time: .0072 hrs

==========
Total Tc: .2708 hrs
==========

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

`c Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

==== SCS TR-55 Shallow Concentrated Flow ==========

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

::
'ME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: TR-55 Sheet
Description: grass

Mannings n	.2400	
Hydraulic Length	70.00	ft
2yr, 24hr P	3.5000	in
Slope	.071000	ft/ft

Avg.Velocity .19 ft/sec

Segment #1 Time: .1030 hrs

Segment #2: Tc: TR-55 Shallow
Description: unpaved

Hydraulic Length	40.00	ft
Slope	.025000	ft/ft

Unpaved

Avg.Velocity 2.55 ft/sec

Segment #2 Time: .0044 hrs

==========
Total Tc: .1073 hrs
==========

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

==== SCS TR-55 Shallow Concentrated Flow ==========

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

```
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
IME OF CONCENTRATION CALCULATOR
.:::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
```

Segment #1: Tc: TR-55 Sheet
Description: grass

Mannings n	.2400	
Hydraulic Length	60.00	ft
2yr, 24hr P	3.5000	in
Slope	.133000	ft/ft
Avg.Velocity	.24	ft/sec

Segment #1 Time: .0708 hrs

Segment #2: Tc: TR-55 Channel
Description: ditch

Flow Area	100.5000	sq.ft
Wetted Perimeter	60.34	ft
Hydraulic Radius	1.67	ft
Slope	.031000	ft/ft
Mannings n	.0350	
Hydraulic Length	350.00	ft
Avg.Velocity	10.53	ft/sec

Segment #2 Time: .0092 hrs

Total Tc: .0801 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

NV - same as pre. dev. flow path.

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

Tc Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

==== SCS Channel Flow ==========

R = Aq / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

Tc = (Lf / V) / (3600sec/hr)

Where: R = Hydraulic radius
Aq = Flow area, sq.ft.
Wp = Wetted perimeter, ft
V = Velocity, ft/sec
Sf = Slope, ft/ft
n = Mannings n
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

IME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Sheet
Description: grass

Mannings n	.2400	
Hydraulic Length	60.00	ft
2yr, 24hr P	3.5000	in
Slope	.120000	ft/ft
Avg.Velocity	.23	ft/sec

Segment #1 Time: .0738 hrs

Total Tc: .0738 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

::
IME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: TR-55 Sheet
Description: grass

Mannings n	.2400	
Hydraulic Length	40.00	ft
2yr, 24hr P	3.5000	in
Slope	.050000	ft/ft

Avg.Velocity .15 ft/sec

Segment #1 Time: .0757 hrs

Total Tc: .0757 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

'c Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

::
TME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: TR-55 Sheet
Description: grass

Mannings n	.2400	
Hydraulic Length	30.00	ft
2yr, 24hr P	3.5000	in
Slope	.067000	ft/ft
Avg.Velocity	.16	ft/sec

Segment #1 Time: .0535 hrs

Total Tc: .0535 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

Tc Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Sheet
Description: grass

Mannings n	.2400	
Hydraulic Length	30.00	ft
2yr, 24hr P	3.5000	in
Slope	.067000	ft/ft
Avg.Velocity	.16	ft/sec

Segment #1 Time: .0535 hrs

Total Tc: .0535 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

File.... C:\DRAINAGE\7114-GATEWAY\TC CALCS.PPW

Equations used...

==== SCS TR-55 Sheet Flow ==========

Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, ft/ft

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

·oject : gateway summit User: pml Date: 11-07-2003

)1 y : putnam State: Checked: ____ Date: _____
iL .tle: developed conditions

---------- Subarea #1 - 24 ----------

.ow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
ıeet	3.5	120	.05	h					0.274
ıallow Concent'd		280	.114	u					0.014
ıallow Concent'd		350	.06	u					0.025

Time of Concentration = 0.31*
=====

---------- Subarea #2 - 25 ----------

.ow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
ıeet	3.5	200	.075	h					0.351
ıallow Concent'd		80	.15	u					0.004
)en Channel		380	.308		.04	1.0	1.5		0.007

Time of Concentration = 0.36*
=====

--- Sheet Flow Surface Codes ---

A Smooth Surface
Fallow (No Res.)
C Cultivated < 20 % Res.
D Cultivated > 20 % Res.
E Grass-Range, Short
F Grass, Dense
G Grass, Burmuda
H Woods, Light
I Woods, Dense
J Range, Natural

--- Shallow Concentrated --- Surface Codes ---

P Paved
U Unpaved

2 YEAR STORM

DEVELOPED

10 YEAR STORM

DEVELOPED

25 YEAR STORM

DEVELOPED

100 YEAR STORM

DEVELOPED

APPENDIX C

SUMMARY TABLES
PRE VS. POST PEAK DISCHARGES

GATEWAY SUMMIT

SUMMARY OF PEAK FLOWS

STORM EVENT	PRE DEVELOPMENT FLOW			POST DEVELOPMENT		
	1	2	3	1	2	3
2 YR	43	9	10	14	9	7
10YR	90	27	26	34	24	19
25 YR	125	41	37	88	35	28
100 YR	181	65	57	191	54	43

APPENDIX D

STORMWATER CONVEYANCE
SWALES
PIPE
OUTLETS

STORMWATER COLLECTION SYSTEM

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APPENDIX E

PRE AND POST POLLUTANT LOADINGS

(REFER TO ENCLOSED CD)

DESIGN POINT #1

	1	2	3A	3B	4	6	7	8	9	5	10	11	11.6	11.5	11.4	11.3	11.2	11.1
	3.08	2.05	6.18	0.02	0.45	3.90	2.23	0.63	2.21	23.50	8.86	4.81	0.05	0.12	0.08	0.06	0.05	0.14
1Q	1.23																	
2Q		0.82																
3Q			2.47															
3R	0.99	0.66	1.98	0.02														
4Q					0.18													
6Q						1.56												
7Q							0.89											
8Q								0.25										
9Q									0.88									
5Q										9.4								
10Q											3.54							
11Q												1.92						
IIR6	0.79	0.52	1.58	0.01	0.14	1.25	0.71	.20	0.71	7.52	2.83	1.54	0.04					
IIR5	0.63	0.42	1.27	0.01	0.12	1.00	0.57	0.16	0.57	6.01	2.27	1.23	0.03	0.10				
IIR4	0.50	0.34	1.01	0.01	0.09	0.80	0.46	0.13	0.45	4.81	1.81	0.99	0.03	0.08	0.06			
IIR3	0.40	0.27	0.81	.01	0.07	0.64	0.37	0.10	0.36	3.85	1.45	0.79	0.02	0.06	0.45	0.05		
IIR2	0.32	0.21	0.65	.01	0.06	0.51	0.29	0.08	0.29	3.08	1.16	0.63	002	0.05	0.04	0.04	0.04	
IIR1	0.26	0.17	0.52	.01	0.05	0.41	0.23	0.07	0.23	2.46	0.93	0.50	0.01	0.04	0.03	0.03	0.03	0.11
SUBTOTAL	0.26	0.17	0.52	.01	0.05	0.41	0.23	0.07	0.23	2.46	0.93	0.50	0.01	0.04	0.03	0.03	0.03	0.11
																	TOTAL	6.09

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ENGINEERS and ARCHITECTS
4 OLD ROUTE 6, BREWSTER, NEW YORK 10509
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PHOSPHOROUS REMOVALS

60 / 20

DESIGN POINT #1
PHOSPHOROUS REMOVALS

GATEWAY SUMMIT
ROUTE 6
TOWN of CARMEL

DESIGN POINT #1

	12A	12B	13A	13B	14	15A	15B	16	17	18	19
	0.81	0.04	1.01	0.03	4.06	2.78	0.02	2.53	3.18	1.80	2.46
12Q	0.32										
12R	0.26	0.03									
13Q			0.40								
13R	0.21	0.03	0.32	0.02							
14Q					1.62						
15Q						1.11					
15R						0.89	0.02				
16R	0.17	0.02	0.26	0.02	1.30	0.71	0.01	2.02			
17Q									1.27		
18Q									0.51	0.72	
19											2.46
SUBTOTAL	0.17	0.02	0.26	0.02	1.30	0.71	0.01	2.02	0.51	0.72	2.46
										SUBTOTAL	8.20
										TOTAL	14.29

DESIGN POINT #2

	20A	20B	21	22	23
	2.75	1.26	1.90	0.04	2.44
20AQ	1.10				
20BQ	0.44	0.50			
21Q			0.76		
22Q	0.18	0.20	0.30	0.02	
23					2.44
SUBTOTAL	0.18	0.20	0.30	0.02	2.44
				TOTAL	3.14

DESIGN POINT #3

	24				
	1.91				
24	1.91				
				TOTAL	1.91

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PHOSPHOROUS REMOVALS

60 / 20

DESIGN POINT #1, 2, &3
PHOSPHOROUS REMOVALS

GATEWAY SUMMIT
ROUTE 6
TOWN of CARMEL

DESIGN POINT #1

	1	2	3A	3B	4	6	7	8	9	5	10	11	11.6	11.5	11.4	11.3	11.2	11.1
	24.65	15.84	49.46	0.36	4.70	28.08	17.24	7.96	23.60	182.16	74.54	44.85	0.78	1.72	1.49	0.84	0.72	2.08
1Q	14.76																	
2Q		9.50																
3Q			29.68															
3R	11.83	7.60	23.74	0.29														
4Q					2.82													
6Q						16.85												
7Q							10.34											
8Q								4.78										
9Q									14.16									
5Q										109.30								
10Q											44.72							
11Q												26.91						
IIR6	9.47	6.08	18.99	0.23	2.26	13.48	8.28	3.62	11.33	87.44	35.78	21.53	0.62					
IIR5	7.57	4.87	15.19	0.18	1.80	10.78	6.62	3.06	9.06	69.95	28.62	17.22	0.50	1.38				
IIR4	6.06	3.89	12.16	0.15	1.44	8.63	5.30	2.45	7.25	55.96	22.90	13.78	0.40	1.10	1.19			
IIR3	4.85	3.11	9.72	0.12	1.16	6.90	4.24	1.96	5.80	44.77	18.32	11.02	0.32	0.88	0.95	0.67		
IIR2	3.88	2.49	7.78	0.09	0.92	5.52	3.39	1.57	4.64	35.81	14.66	8.82	0.26	0.70	0.76	0.54	0.58	
IIRI	3.10	1.99	6.22	0.08	0.74	4.42	2.71	1.25	3.71	28.65	11.72	7.05	0.20	0.56	0.61	0.43	0.46	1.66
SUBTOTAL	3.10	1.99	6.22	0.08	0.74	4.42	2.71	1.25	3.71	28.65	11.72	7.05	0.20	0.56	0.61	0.43	0.46	1.66
																	TOTAL	75.56

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ENGINEERS and ARCHITECTS
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NITROGEN REMOVALS

40 / 20

DESIGN POINT #1
NITROGEN REMOVALS

GATEWAY SUMMIT
ROUTE 6
TOWN of CARMEL

DESIGN POINT #1

	12A	12B	13A	13B	14	15A	15B	16	17	18	19
	7.64	0.67	9.39	0.44	34.14	23.43	0.45	34.80	32.66	16.85	54.33
12Q	4.58										
12R	3.67	0.54									
13Q			5.63								
13R	2.93	0.43	4.51	0.35							
14Q					20.48						
15Q						14.06					
15R						11.24	0.36				
16R	2.35	0.34	3.61	0.28	16.38	8.99	0.29	27.84			
17Q									19.60		
18Q									11.76	10.11	
19											54.33
SUBTOTAL	2.35	0.34	3.61	0.28	16.38	8.99	0.29	27.84	11.76	10.11	54.33
										SUBTOTAL	136.28
										TOTAL	211.84

DESIGN POINT #2

	20A	20B	21	22	23
	28.38	12.64	15.96	0.60	57.00
20AQ	17.03				
20BQ	10.22	7.58			
21Q			9.58		
22Q	6.13	4.55	5.75	0.36	
23					57.00
SUBTOTAL	6.13	4.55	5.75	0.36	57.00
				TOTAL	73.79

DESIGN POINT #3

	24				
	46.69				
24	46.69				
				TOTAL	46.69

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ENGINEERS and ARCHITECTS
4 OLD ROUTE 6, BREWSTER, NEW YORK 10509
(845) 279-6784 FAX (845) 279-6764

NITROGEN REMOVALS

40 / 20

DESIGN POINT #1, 2, &3
NITROGEN REMOVALS

GATEWAY SUMMIT
ROUTE 6
TOWN of CARMEL

DESIGN POINT #1

	1	2	3A	3B	4	6	7	8	9	5	10	11	11.6	11.5	11.4	11.3	11.2	11.1
	75.84	57.00	157.36	0.96	31.10	83.20	62.00	48.23	163.40	587.60	1076.80	360.96	2.40	5.52	4.08	2.56	2.24	6.16
1Q	45.50																	
2Q		34.20																
3Q			94.42															
3R	36.40	27.36	75.53	0.77														
4Q					18.66													
6Q						49.92												
7Q							37.20											
8Q								28.93										
9Q									98.04									
5Q										352.56								
10Q											646.06							
11Q												216.58						
IIR6	29.12	21.89	60.42	0.61	14.93	39.94	29.76	23.15	78.43	282.05	516.86	173.20	1.92					
IIR5	23.93	17.51	49.54	0.49	11.94	31.95	23.81	18.52	62.75	225.64	413.46	138.61	1.54	4.42				
IIR4	18.64	14.01	38.67	0.39	9.55	25.56	19.05	14.82	50.20	180.51	330.79	110.89	1.23	3.53	3.26			
IIR3	14.91	11.21	30.94	0.31	7.64	20.47	15.24	11.85	40.16	144.41	264.63	88.71	0.98	2.83	2.61	2.05		
IIR2	11.93	8.97	24.75	0.25	6.11	16.36	12.19	9.48	32.13	115.53	211.71	70.97	0.79	2.26	2.09	1.64	1.79	
IIR1	9.54	7.17	19.80	0.20	4.89	13.09	9.75	7.59	25.70	92.42	169.37	56.77	0.63	1.81	1.67	1.31	1.43	4.93
SUBTOTAL	9.54	7.17	19.80	0.20	4.89	13.09	9.75	7.59	25.70	92.42	169.37	56.77	0.63	1.81	1.67	1.31	1.43	4.93
																	SUBTOTAL	428.07

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BOD REMOVALS

40 / 20

DESIGN POINT #1
BOD REMOVALS

GATEWAY SUMMIT
ROUTE 6
TOWN of CARMEL

DESIGN POINT #1

	12A	12B	13A	13B	14	15A	15B	16	17	18	19
	61.28	1.70	75.46	1.20	375.18	257.52	1.10	171.43	242.99	136.20	151.48
12Q	36.77										
12R	29.41	1.36									
13Q			45.28								
13R	23.53	1.09	36.22	0.96							
14Q					225.06						
15Q						154.51					
15R						123.61	0.88				
16R	18.83	0.87	28.98	0.77	180.05	98.89	0.70	137.14			
17Q									145.79		
18Q									87.48	81.72	
19											151.48
SUBTOTAL	18.83	0.87	28.98	0.77	180.05	98.89	0.70	137.14	87.48	81.72	151.48
										SUB TOTAL	786.91
										TOTAL	1214.98

DESIGN POINT #2

	20A	20B	21	22	23
	231.29	92.89	198.54	1.60	152.86
20AQ	138.77				
20BQ	83.26	55.73			
21Q			107.12		
22Q	49.96	33.44	64.27	0.96	
23					152.86
SUBTOTAL	49.96	33.44	64.27	0.96	152.86
				TOTAL	301.49

DESIGN POINT #3

	24				
	123.46				
24	123.46				
				TOTAL	123.46

PUTNAM ENGINEERING LLC
ENGINEERS and ARCHITECTS
4 OLD ROUTE 6, BREWSTER, NEW YORK 10509
(845) 279-6769 FAX (845) 279-6769

BOD REMOVALS

40 / 20

DESIGN POINT #1, 2, &3
BOD REMOVALS

GATEWAY SUMMIT
ROUTE 6
TOWN of CARMEL

DESIGN POINT #1

	1	2	3A	3B	4	6	7	8	9	5	10	11	11.6	11.5	11.4	11.3	11.2	11.1
	1154.19	766.08	2736.94	62.76	192.75	1749.20	833.29	861.12	1233.21	9871.68	8980.84	1344.99	105.19	210.47	167.52	135.02	114.26	337.51
1Q	230.84																	
2Q		153.22																
3Q			547.39															
3R	92.34	61.29	218.96	25.10														
4Q					38.55													
6Q						349.44												
7Q							166.66											
8Q								172.24										
9Q									246.64									
5Q										1974.36								
10Q											1797.77							
11Q												269.00						
11R6	36.93	24.51	87.58	10.04	15.42	139.78	66.66	68.89	98.68	789.73	719.11	107.60	42.08					
11R5	14.77	9.81	35.03	4.02	6.17	55.91	26.66	27.56	39.46	315.89	287.64	43.04	16.83	84.19				
11R4	5.91	3.92	14.01	1.61	2.47	22.36	10.67	11.02	15.79	126.36	115.06	17.22	6.73	33.68	67.01			
11R3	2.36	1.57	5.61	0.64	0.99	8.95	4.27	4.41	6.31	50.54	46.02	6.89	2.69	13.47	26.80	54.01		
11R2	0.91	0.63	2.24	0.26	0.39	3.58	1.71	1.76	2.53	20.22	18.41	2.74	1.08	5.39	10.72	21.60	45.70	
11R1	0.38	0.24	0.90	0.10	0.16	1.43	0.68	0.71	1.01	8.09	7.36	1.10	0.43	2.16	4.29	8.64	18.28	135.00
SUBTOTAL	0.38	0.24	0.90	0.10	0.16	1.43	0.68	0.71	1.01	8.09	7.36	1.10	0.43	2.16	4.29	8.64	18.28	135.00
																	SUBTOTAL	190.96

PUTNAM ENGINEERING PLLC
ENGINEERS and ARCHITECTS
4 OLD ROUTE 6, BREWSTER, NEW YORK 10509
(845) 279-6789 FAX (845) 279-6789

SUSPENDED SOLIDS REMOVALS

80 / 60

DESIGN POINT #1
SUSPENDED SOLIDS REMOVALS

GATEWAY SUMMIT
ROUTE 6
TOWN of CARMEL

DESIGN POINT #1

	12A	12B	13A	13B	14	15A	15B	16	17	18	19
	257.92	123.35	319.87	67.71	446.84	2825.76	28.66	1917.19	1713.06	487.25	3744.14
12Q	51.58										
12R	20.63	49.34									
13Q			63.97								
13R	8.25	19.74	25.59	27.08							
14Q					823.37						
15Q						565.15					
15R						226.06	11.46				
16R	3.30	7.89	10.24	10.83	329.35	90.42	4.59	766.88			
17Q									342.61		
18Q									137.04	97.45	
19											3744.14
SUBTOTAL	3.30	7.89	10.24	10.83	329.35	90.42	4.59	766.88	139.04	97.45	3744.14
										SUB TOTAL	5402.13
										TOTAL	5393.09

DESIGN POINT #2

	20A	20B	21	22	23
	2389.16	482.89	1924.44	26.20	3103.10
20AQ	477.83				
20BQ	95.57	96.58			
21Q			384.89		
22Q	19.11	19.32	76.98	5.20	
23					3103.10
SUBTOTAL	19.11	19.32	76.98	5.20	3103.10
				TOTAL	3223.71

DESIGN POINT #3

	24				
	2480.40				
24	2480.40				
				TOTAL	2480.40

PUTNAM ENGINEERING LLC
ENGINEERS and ARCHITECTS
4 OLD ROUTE 6, BREWSTER, NEW YORK 10509
(845) 279-6784 FAX (845) 279-6769

SUSPENDED SOLIDS REMOVALS

80/60

DESIGN POINT #1, 2, #3
SUSPENDED SOLIDS REMOVALS

GATEWAY SUMMIT
ROUTE 6
TOWN of CARMEL

APPENDIX F

TEMPORARY SEDIMENT BASIN DESIGN

(INTENTIONALLY LEFT BLANK)

APPENDIX G

CONSTRUCTION SEQUENCE

(INTENTIONALLY LEFT BLANK)

APPENDIX H

SOILS MAPS
USGS MAP

APPENDIX I

APPLICATION CHECKLIST FOR SPPP

APPENDIX J

SOIL TEST RESULTS

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APPENDIX K

EXTENDED DETENTION VOLUME SIZING AND DISCHARGE CALCULATIONS

(REFER TO ENCLOSED CD)

GATEWAY SUMMIT

QUALITY BASIN THEORETICAL STORAGE VOLUMES

BASIN	POND	EXCESS RUNOFF	BASIN AREA	VOLUME CALCULATION
1	1Q	2.48"	2.44 AC	2.48/12 x 2.44 x 43,560 = 21,966 CF
2	2Q	2.79"	1.16 AC	2.79/12 x 1.16 x 43,560 = 11,748 CF
3	3Q	2.48"	5.78 AC	2.48/12 x 5.78 x 43,560 = 52,034 CF
10	10Q	1.80"	0.64 AC	1.80/12 x 0.64 x 43,560 = 4,182 CF
12	12Q	2.97"	2.84 AC	2.97/12 x 2.84 x 43,560 = 30,618 CF
4	4Q	3.08"	13.18 AC	3.08/12 x 13.18 x 43,560 = 147,358 CF
8	8Q	2.48"	4.82 AC	2.48/12 x 4.82 x 43,560 = 43,392 CF
11	11Q	2.57"	2.70 AC	2.57/12 x 2.70 x 43,560 = 25,189 CF
5	5Q	3.13"	4.57 AC	3.13/12 x 4.57 x 43,560 = 51,924 CF
7	7Q	1.57"	3.52 AC	1.57/12 x 3.52 x 43,560 = 20,061 CF
13	13Q	2.88"	1.09 AC	2.88/12 x 1.09 x 43,560 = 11,395 CF
14	14Q	3.12"	0.63 AC	3.12/12 x 0.63 x 43,560 = 7,135 CF
15	15Q	2.90"	3.76 AC	2.90/12 x 3.76 x 43,560 = 39,581 CF
16	16Q	3.18"	2.50 AC	1.89/12 x 2.81 x 43,560 = 19,279 CF
18	18Q	1.89"	2.81 AC	3.18/12 x 2.50 x 43,560 = 28,859 CF
20	20Q	2.66"	4.97 AC	2.66/12 x 4.97 x 43,560 = 47,989 CF

GATEWAY SUMMIT

PEAK STAGES FOR 100 YR STORM

POND	TOP OF BERM	PEAK STAGE	FREE BOARD (FT)
1Q	714.00	712.89	1.11
2Q	706.00	704.77	1.23
3Q	694.15	693.15	1.00
3R	688.00	686.87	1.15
10Q	678.15	677.15	1.00
10R	530.00	528.45	1.55
12Q	530.00	528.73	1.27
4Q	530.20	529.18	1.02
8Q	524.00	522.88	1.12
11Q	514.00	512.92	1.08
11R	506.25	505.24	1.01
5Q	590.20	589.19	1.01
6R	580.00	578.41	1.59
7Q	510.00	508.80	1.20
9R1	500.00	498.89	1.11
9R2	494.00	492.80	1.20
9R3	488.00	486.80	1.20
9R4	482.00	480.82	1.18
9R5	476.00	474.37	1.63
13Q	486.00	484.71	1.29
13RQ1	480.00	478.06	1.94
14Q	438.00	436.54	1.46
14RQ1	432.00	429.61	2.39
15Q	436.10	435.09	1.01
16Q	436.00	434.91	1.09
16R1	430.00	428.72	1.28
17R	420.00	418.56	1.44
18Q1	440.00	438.81	1.19
18Q2	434.00	432.76	1.24
20Q1	442.10	441.06	1.04
20Q2	436.00	434.91	1.09
21R	432.00	428.96	3.04
22R	424.00	421.45	2.55
23R	418.00	415.09	2.91