THE ISAACS GROUP
CIVIL ENGINEERING DESIGN & LAND SURVEYING
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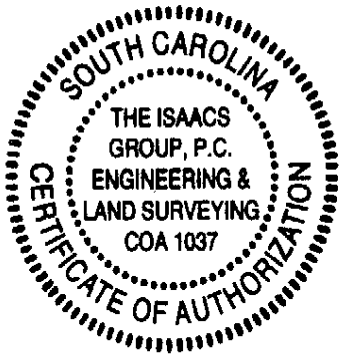
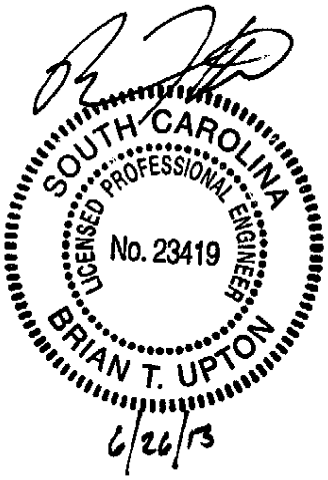
Project Gekko

Paragon Way
Rock Hill, South Carolina

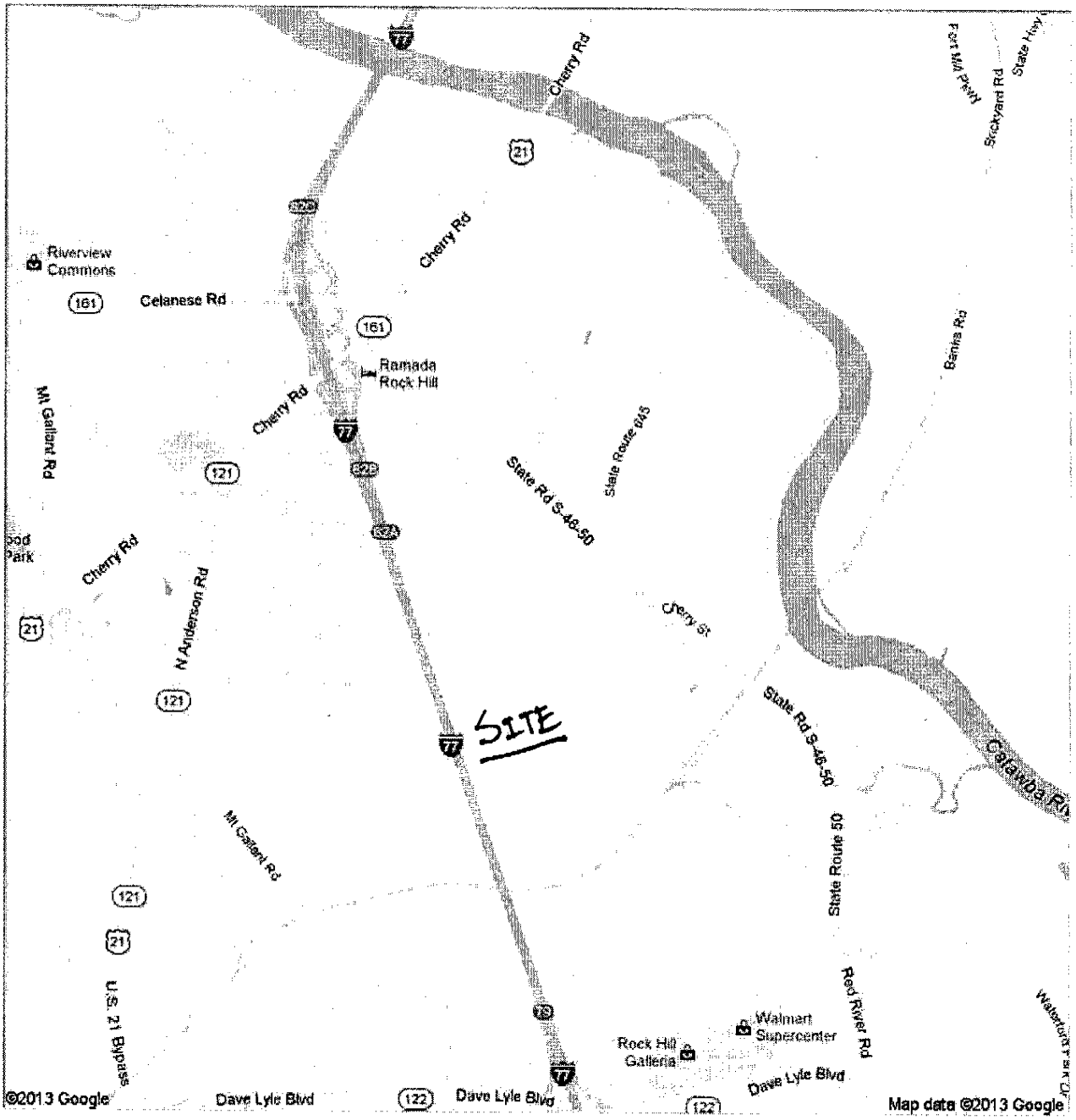
Project Calculations

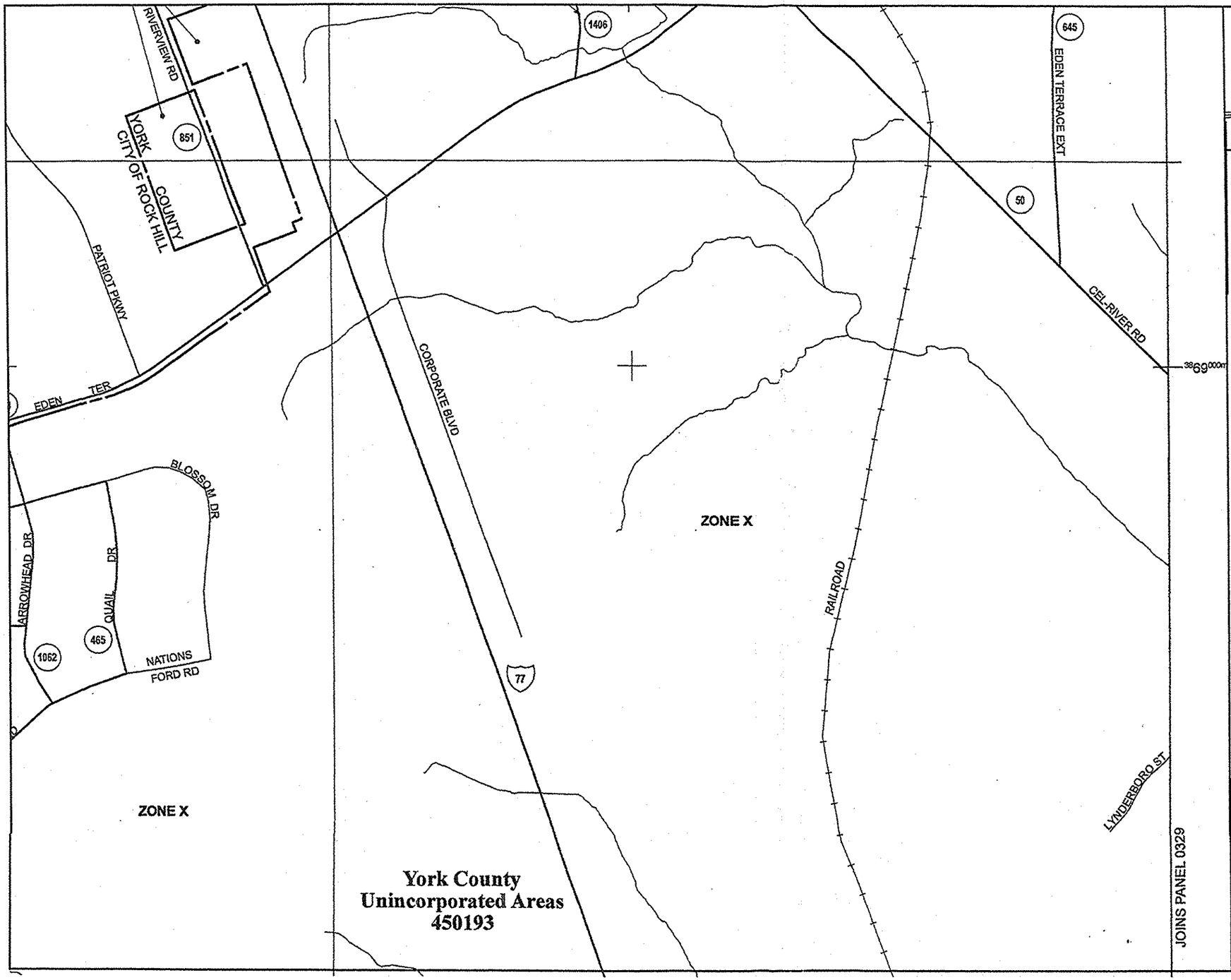




Google

Get Google Maps on your phone
Text the word "GMAPS" to 466453





MAP SCALE 1" = 500'

250 0 250 500 750 1,000 FEET

METE

PANEL 0328E

FIRM

FLOOD INSURANCE RATE MAP

YORK COUNTY,
SOUTH CAROLINA
AND INCORPORATED AREAS

PANEL 328 OF 505

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ROCK HILL, CITY OF	450196	0328	E
YORK COUNTY	450193	0328	E

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

MAP NUMBER
45091C0328E

EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

USGS
science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

The National Map
US Topo

ROCK HILL EAST QUADRANGLE
SOUTH CAROLINA
7.5-MINUTE SERIES

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid: Universal Transverse Mercator, Zone 17S
10 000-foot ticks: South Carolina Coordinate System of 1983

Imagery .... NAIP, April 2009
Roads .... ©2006-2010 Tele Atlas
Names .... GNIS, 2010
Hydrography .... National Hydrography Dataset, 2009
Contours .... National Elevation Dataset, 2011
Boundaries .... Census, IBWC, IBC, USGS, 1972 - 2010

UTM GRID AND 2011 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with version 0.5.10
of the USGS US Topo Product Standard.
A metadata file associated with this product is draft version 0.5.16

QUADRANGLE LOCATION

Lake Wylie	Fort Mill	Waddington
Rock Hill West	Rock Hill East	Catawba NE
Edgmoor	Catawba	Van Wyck

ADJOINING 7.5' QUADRANGLES

ROAD CLASSIFICATION
Interstate Route — State Route
US Route — Local Road
Ramp — 4WD
Interstate Route · US Route · State Route

ROCK HILL EAST, SC
2011


MeB2
BbA
BuB
WyC2
CuB2
CuC2
PcE3
77
MeB2
WeE2
CuB2
CuC3
PcE3
635ft
Barnett Rd

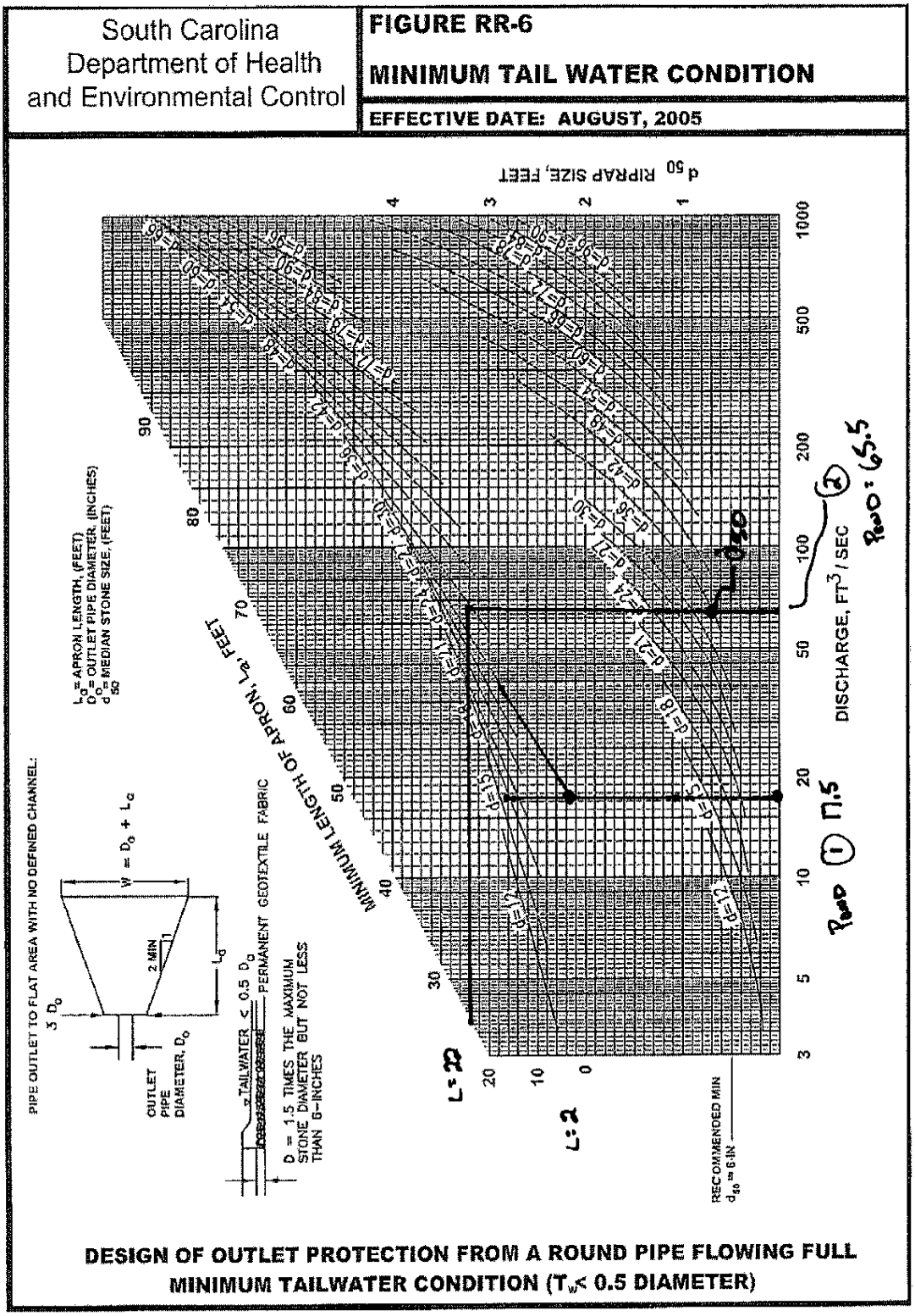
Project Gekko

Paragon Way
Rock Hill, South Carolina

Rip Rap Apron Calculations

Per 25 yr Storm

Figure 9.3.2.1: Design of Rip-Rap Apron Under Minimum Tailwater Conditions (Source: SCDHEC Manual)



Pond 1 ⓘ 17.5

Pond 2 ⓘ 65.5

	Pond 1 (Min.)	Provided	Pond 2 (Min)	Provided
L:	4'	27'	21'	25'
W:	7'	36'	27'	30'
d50:	6"	0.8'	d50: 0.8'	0.8'

Use d50 = 0.8' for both

Project Gekko

Paragon Way
Rock Hill, South Carolina

Diversion Ditch Sizing

THE ISAACS GROUP
Project Gekko
Diversion Ditch Calculations

Storm pipe designed to handle the 10 year flow.

Rational Method used to determine the 10 year flow.

A minimum time of concentration of 5 minutes has been assumed in determining a rainfall intensity of 6.89 for the 10 year design storm.

See C4.1 for Drainage Area Map.

Diversion Ditch #1

A=	23.43	acres
I=	6.89	in/hour
C=	0.93	
Q = (C)(I)(A) =		150.1 cfs
Q (total)=		150.1 cfs

Diversion Ditch #2

A=	4.60	acres
I=	6.59	in/hour
C=	0.93	
Q = (C)(I)(A) =		28.2 cfs
Q (total)=		28.2 cfs

Diversion Ditch #3

A=	7.66	acres
I=	7.03	in/hour
C=	0.93	
Q = (C)(I)(A) =		50.1 cfs
Q (total)=		50.1 cfs

Diversion Ditch #1

tmp#4.txt

Channel Calculator

Given Input Data:

Shape	Trapezoidal
Solving for	Depth of Flow
Flowrate	150.1000 cfs
Slope	0.0133 ft/ft
Manning's n	0.0175
Height	2.0000 ft
Bottom width	10.0000 ft
Left slope	3.0000 ft/ft (V/H)
Right slope	3.0000 ft/ft (V/H)

Computed Results:

Depth	1.3675 ft
Velocity	10.4976 fps
Full Flowrate	273.8285 cfs
Flow area	14.2985 ft2
Flow perimeter	12.8830 ft
Hydraulic radius	1.1099 ft
Top width	10.9117 ft
Area	21.3333 ft2
Perimeter	14.2164 ft
Percent full	68.3757 %

Critical Information

Critical depth	1.8728 ft
Critical slope	0.0049 ft/ft
Critical velocity	7.5439 fps
Critical area	19.8968 ft2
Critical perimeter	13.9482 ft
Critical hydraulic radius	1.4265 ft
Critical top width	11.2485 ft
Specific energy	3.0801 ft
Minimum energy	2.8092 ft
Froude number	1.6167
Flow condition	Supercritical

Diversion Ditch #2

tmp#2.txt

Channel Calculator

Given Input Data:

Shape	Trapezoidal
Solving for	Depth of Flow
Flowrate	28.2000 cfs
Slope	0.0100 ft/ft
Manning's n	0.0175
Height	2.0000 ft
Bottom width	10.0000 ft
Left slope	3.0000 ft/ft (V/H)
Right slope	3.0000 ft/ft (V/H)

Computed Results:

Depth	0.5291 ft
Velocity	5.2374 fps
Full Flowrate	237.4394 cfs
Flow area	5.3843 ft2
Flow perimeter	11.1154 ft
Hydraulic radius	0.4844 ft
Top width	10.3527 ft
Area	21.3333 ft2
Perimeter	14.2164 ft
Percent full	26.4551 %

Critical Information

Critical depth	0.6232 ft
Critical slope	0.0059 ft/ft
Critical velocity	4.4329 fps
Critical area	6.3615 ft2
Critical perimeter	11.3138 ft
Critical hydraulic radius	0.5623 ft
Critical top width	10.4155 ft
Specific energy	0.9554 ft
Minimum energy	0.9348 ft
Froude number	1.2803
Flow condition	Supercritical

Diversion Ditch #3

tmp#3.txt

Channel Calculator

Given Input Data:

Shape	Trapezoidal
Solving for	Depth of Flow
Flowrate	50.1000 cfs
Slope	0.0100 ft/ft
Manning's n	0.0175
Height	2.0000 ft
Bottom width	10.0000 ft
Left slope	3.0000 ft/ft (V/H)
Right slope	3.0000 ft/ft (V/H)

Computed Results:

Depth	0.7540 ft
Velocity	6.4818 fps
Full Flowrate	237.4394 cfs
Flow area	7.7293 ft2
Flow perimeter	11.5895 ft
Hydraulic radius	0.6669 ft
Top width	10.5027 ft
Area	21.3333 ft2
Perimeter	14.2164 ft
Percent full	37.6991 %

Critical Information

Critical depth	0.9112 ft
Critical slope	0.0054 ft/ft
Critical velocity	5.3363 fps
Critical area	9.3884 ft2
Critical perimeter	11.9209 ft
Critical hydraulic radius	0.7876 ft
Critical top width	10.6074 ft
Specific energy	1.4069 ft
Minimum energy	1.3668 ft
Froude number	1.3321
Flow condition	Supercritical

Project Gekko

Paragon Way
Rock Hill, South Carolina

Sediment Basin Calculations

POND 1

THE ISAACS GROUP
Project Gekko 5/1/13
Rock Hill, South Carolina
RISER BASIN DESIGN & CALCS. (CLEARING AND GRUBBING)

BASIN NO. **1 (PRE-DEVELOPED)**
SEDIMENT TRAPPING EFFICIENCY CALCULATION

	Wilkes		soil-type primarily found on-site.	
D_{15}	0.0058	mm	(Soil partial size for WwE2)	SCDHEC BMP HANDBOOK (E19-App E)
V_{15}	0.0000945	ft/sec.	(Settling Velocity for WwE2)	SCDHEC HANDBOOK** (Figure 1 pg 49)
Ratio =	220000		desired "ratio" for 80% trapping efficiency	
q_{po} =	4.65	ft^3/sec	maximum peak outflow	SEE BASIN CALCULATIONS BELOW
A=	2.09	acres		

$$\text{Ratio} = \frac{q_{po}}{A * V15}$$

Ratio= 23552.87 **OK**
Trapping Efficiency= 89.00% See Figure SB-1

BASIN CALCULATIONS

DRAINAGE AREA TO BASIN=	1,883,534	ft^2
DRAINAGE AREA TO BASIN=	**43.24**	ac.
DISTURBED AREA TO BASIN=	38.96	ac.
DEPTH=	8.00	ft
SIDE SLOPE=	3 :1	

	Contour Elev.	Area (sq ft)	Volume (cu ft)	Total (cu ft)	
Bottom :	**549.00**	43,374			
	550.00	47,647	45,511	45,511	
	551.00	52,035	49,841	95,352	
	552.00	56,233	54,134	149,486	
	553.00	61,147	58,690	208,176	
	554.00	75,571	68,359	276,535	
	555.00	81,931	78,751	355,286	
	556.00	86,433	84,182	439,468	
	557.00	91,005	88,719	528,187	⇐ 10 YR STORM
	558.00	95,647	93,326	621,513	
	559.00	100,359	98,003	719,516	
	560.00	105,140	102,750	822,265	

BASIN VOLUME REQUIRED	155,663.97	ft^3	3600 ft3 x DRAINAGE AREA
BASIN VOLUME PROVIDED=	**528,186.50**	ft^3	**GREATER THAN MINIMUM, O.K.**
AREA AT 10 YEAR STORM	91,005.00	ft^2	
% IMPERVIOUS=	0	%	
RUNOFF COEFFICIENT=	0.93		
TIME OF CONCENTRATION=	5.00	min	
10 YR. STORM INTENSITY=	6.89	in/hr	S.C. RAINFALL DATA
$Q10_{IN}$=	**277.07**	ft^3/sec	
$Q10_{OUT}$ ≈ q_{po}	**4.65**	ft^3/sec	

↳ FROM PONDPAK

*Refd. Erosion Related Information for South Carolina Soils
**Refd: South Carolina Stormwater Management and Sediment Control Handbook for Land Disturbance Activates (August 2003)

MASTER DESIGN STORM SUMMARY

Default Network Design Storm File, ID STORMS.RNQ York Co SC 24 Hr

Return Event	Total Depth in	Rainfall Type	RNF File	RNF ID
2	3.6000	Synthetic Curve	DETENT	SCS Type II
10	5.3000	Synthetic Curve	DETENT	SCS Type II
25	6.3000	Synthetic Curve	DETENT	SCS Type II
100	7.9000	Synthetic Curve	DETENT	SCS Type II

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Storage Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond ac-ft
B-POSTDEVELOPED1	AREA	2	10.203		11.9000	179.12		
B-POSTDEVELOPED1	AREA	10	16.189		11.9000	277.45		
B-POSTDEVELOPED1	AREA	25	19.742		11.9000	334.72		
B-POSTDEVELOPED1	AREA	100	25.451		11.9000	425.71		
C-POND1	IN POND	2	10.203		11.9000	179.12		
C-POND1	IN POND	10	16.189		11.9000	277.45		
C-POND1	IN POND	25	19.742		11.9000	334.72		
C-POND1	IN POND	100	25.451		11.9000	425.71		
C-POND1	OUT POND	2	10.197		15.3000	3.83	554.42	7.107
C-POND1	OUT POND	10	16.163		16.3000	4.65	556.84	11.805
C-POND1	OUT POND	25	19.689		17.6500	5.05	558.19	14.689
C-POND1	OUT POND	100	25.383		12.7500	26.66	558.89	16.272
*E-POST-OUT	JCT	2	10.197		15.3000	3.83		
*E-POST-OUT	JCT	10	16.163		16.3000	4.65		
*E-POST-OUT	JCT	25	19.689		17.6500	5.05		
*E-POST-OUT	JCT	100	25.383		12.7500	26.66		

POND 1

Volume Required : 10 yr Storm : 155,664 cf

Q_d : V/t_d $\quad$ Q_d : flow

t_d : 3 days $\quad$ V : Volume

$$Q_d = \frac{155{,}664 \text{ cf}}{3 \text{ days}} = 51{,}888 \text{ cf/day}$$

Use an 8" skimmer

Head : 0.50'

$D = \sqrt{Q_d / (2310 \cdot \sqrt{H})}$

$= \sqrt{51{,}888 / (2310 \cdot \sqrt{.50})}$

$= 5.63''$ min

Use an 8" orifice → per pondpak

POND 2

THE ISAACS GROUP
Project Gekko 5/1/13
Rock Hill, South Carolina
RISER BASIN DESIGN & CALCS. (CLEARING AND GRUBBING)

BASIN NO. 2 (PRE-DEVELOPED)
SEDIMENT TRAPPING EFFICIENCY CALCULATION

	Wilkes		soil-type primarily found on-site:	
D_{15}:	0.0058	mm	(Soil partial size for WwE2)	SCDHEC BMP HANDBOOK (E19-App. E)
V_{15}:	0.0000945	ft/sec	(Settling Velocity for WwE2)	SCDHEC HANDBOOK** (Figure 1 pg 49)
Ratio =	220000		desired "ratio" for 80% trapping efficiency	
q_{po} =	5.03	ft^3/sec	maximum peak outflow	SEE BASIN CALCULATIONS BELOW
A=	0.52	acres		

$$\text{Ratio} = \frac{q_{po}}{A * V15}$$

Ratio= 102360.60 OK
Trapping Efficiency= 87.00% See Figure SB-1

BASIN CALCULATIONS

DRAINAGE AREA TO BASIN=	592,416	ft^2
DRAINAGE AREA TO BASIN=	**13.60**	ac.
DISTURBED AREA TO BASIN=	13.60	ac.
DEPTH=	9.50	ft
SIDE SLOPE=	3	:1

	Contour Elev.	Area (sq ft)	Volume (cu ft)	Total (cu ft)	
Bottom =	**543.00**	3,570			
	544.00	4,627	4,099	4,099	
	545.00	5,796	5,212	9,310	
	546.00	7,079	6,438	15,748	
	547.00	8,474	7,777	23,524	
	548.00	13,092	10,783	34,307	
	549.00	15,298	14,195	48,502	
	550.00	16,811	16,055	64,557	
	551.00	18,381	17,596	82,153	
	552.00	20,007	19,194	101,347	
	553.00	21,690	20,849	122,195	⇐ 10 YR STORM
	554.00	23,429	22,560	144,755	
	555.00	25,225	24,327	169,082	

BASIN VOLUME REQUIRED	48,960.00	ft^3	3600 ft3 x DRAINAGE AREA
BASIN VOLUME PROVIDED=	**111,771.00**	ft^3	**GREATER THAN MINIMUM, O.K.**
AREA AT 10 YR STORM	18,381.00	ft^2	
% IMPERVIOUS=	0	%	
RUNOFF COEFFICIENT=	0.93		
TIME OF CONCENTRATION=	5.00	min	
10 YR STORM INTENSITY=	6.89	in/hr	S.C. RAINFALL DATA
$Q10_{IN}$=	**87.14**	ft^3/sec	
$Q10_{OUT}$ ≈ q_{po}	**5.03**	ft^3/sec	→ per PONPAK

*Refd: Erosion Related Information for South Carolina Soils
**Refd: South Carolina Stormwater Management and Sediment Control Handbook for Land Disturbance Activates (August 2003)

MASTER DESIGN STORM SUMMARY

Default Network Design Storm File, ID STORMS.RNQ York Co SC 24 Hr

Return Event	Total Depth in	Rainfall Type	RNF File	RNF ID
2	3.6000	Synthetic Curve	DETENT	SCS Type II
10	5.3000	Synthetic Curve	DETENT	SCS Type II
25	6.3000	Synthetic Curve	DETENT	SCS Type II
100	7.9000	Synthetic Curve	DETENT	SCS Type II

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Storage Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond ac-ft
B-POSTDEVELOPED1	AREA	2	3.209		11.9000	56.34		
B-POSTDEVELOPED1	AREA	10	5.092		11.9000	87.27		
B-POSTDEVELOPED1	AREA	25	6.209		11.9000	105.28		
B-POSTDEVELOPED1	AREA	100	8.005		11.9000	133.90		
C-POND1	IN POND	2	3.209		11.9000	56.34		
C-POND1	IN POND	10	5.092		11.9000	87.27		
C-POND1	IN POND	25	6.209		11.9000	105.28		
C-POND1	IN POND	100	8.005		11.9000	133.90		
C-POND1	OUT POND	2	3.209		12.5500	4.31	550.12	1.529
C-POND1	OUT POND	10	5.091		12.7000	5.03	552.51	2.572
C-POND1	OUT POND	25	6.209		12.9000	5.38	553.81	3.223
C-POND1	OUT POND	100	8.005		12.1000	44.14	554.51	3.608
*E-POST-OUT	JCT	2	3.209		12.5500	4.31		
*E-POST-OUT	JCT	10	5.091		12.7000	5.03		
*E-POST-OUT	JCT	25	6.209		12.9000	5.38		
*E-POST-OUT	JCT	100	8.005		12.1000	44.14		

Pond 2

Volume Required = 10 yr Storm = 48,960 cf

$Q_d = V/t_d$ $\quad Q_d$ = flow

t_d = 3 days $\quad V$ = Volume

$$Q_d = \frac{48,960 \text{ cf}}{3 \text{ days}} = 16,320 \text{ cf/day}$$

Use AN 8" skimmer

Head = 0.50'

$$D = \sqrt{Q_d / (2.310 \cdot \sqrt{H})}$$

$$= \sqrt{16.320 / (2.310 \cdot \sqrt{.5})}$$

$$= 3.16" \text{ min}$$

Use an 8" orifice → per pondpak

THE ISAACS GROUP
Project Gekko
Rock Hill, South Carolina
Sediment Trap

5/1/13

BASIN NO. 3 (PRE-DEVELOPED)
SEDIMENT TRAPPING EFFICIENCY CALCULATION

	Wilkes		soil-type primarily found on-site:	
D_{15}:	0.0058	mm	(Soil partial size for WwE2)	SCDHEC BMP HANDBOOK (E19-App. E)
V_{15}:	0.0000945	ft/sec	(Settling Velocity for WwE2)	SCDHEC HANDBOOK** (Figure 1 pg. 49)
Ratio =	220000		desired "ratio" for 80% trapping efficiency	
q_{po} =	6.70	ft^3/sec	maximum peak outflow	SEE BASIN CALCULATIONS BELOW
A=	0.81	acres		

$$\text{Ratio} = \frac{q_{po}}{A * V15}$$

Ratio= 87242.40 **OK**
Trapping Efficiency= 85.00% See Figure SB-1

BASIN CALCULATIONS

DRAINAGE AREA TO BASIN=	166,235	ft^2
DRAINAGE AREA TO BASIN=	**3.82**	ac.
DISTURBED AREA TO BASIN=	3.82	ac.
DEPTH=	3.50	ft
SIDE SLOPE=	3	:1

	Contour Elev.	Area (sq ft)	Volume (cu ft)	Total (cu ft)	
Bottom :	**548.00**	6,175			
	549.00	7,428	6,802	6,802	
	550.00	8,760	8,094	14,896	
	551.00	10,161	9,461	24,356	
	552.00	11,626	10,894	35,250	⇦
	553.00	13,154	12,390	47,640	
	553.50	13,678	6,708	54,348	

BASIN VOLUME REQUIRED	13,752.00	ft^3	3600 ft3 x DRAINAGE AREA
BASIN VOLUME PROVIDED=	**35,249.50**	ft^3	**GREATER THAN MINIMUM, O.K.**
SURFACE AREA AT 10 YEAR ELEVATION 552.06	35,400.00	ft^2	
% IMPERVIOUS=	0	%	
RUNOFF COEFFICIENT=	0.93		
TIME OF CONCENTRATION=	5.00	min	
10 YR. STORM INTENSITY=	6.89	in/hr	S.C RAINFALL DATA
$Q10_{IN}$=	**24.48**	ft^3/sec	
$Q10_{OUT}$ ≈ q_{po}	**6.70**	ft^3/sec	

*Refd: Erosion Related Information for South Carolina Soils
**Refd: South Carolina Stormwater Management and Sediment Control Handbook for Land Disturbance Activates (August 2003)

MASTER DESIGN STORM SUMMARY

Default Network Design Storm File, ID STORMS.RNQ York Co SC 24 Hr

Return Event	Total Depth in	Rainfall Type	RNF File	RNF ID
2	3.6000	Synthetic Curve	DETENT	SCS Type II
10	5.3000	Synthetic Curve	DETENT	SCS Type II
25	6.3000	Synthetic Curve	DETENT	SCS Type II
100	7.9000	Synthetic Curve	DETENT	SCS Type II

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Storage Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond ac-ft
B-POSTDEVELOPED1	AREA	2	.901		11.9000	15.82		
B-POSTDEVELOPED1	AREA	10	1.430		11.9000	24.51		
B-POSTDEVELOPED1	AREA	25	1.744		11.9000	29.57		
B-POSTDEVELOPED1	AREA	100	2.248		11.9000	37.61		
C-POND1	IN POND	2	.901		11.9000	15.82		
C-POND1	IN POND	10	1.430		11.9000	24.51		
C-POND1	IN POND	25	1.744		11.9000	29.57		
C-POND1	IN POND	100	2.248		11.9000	37.61		
C-POND1	OUT POND	2	.217		14.4000	.45	551.54	.695
C-POND1	OUT POND	10	.746		12.1000	6.70	552.06	.827
C-POND1	OUT POND	25	1.060		12.0500	13.63	552.41	.925
C-POND1	OUT POND	100	1.564		12.0500	24.11	552.83	1.046
*E-POST-OUT	JCT	2	.217		14.4000	.45		
*E-POST-OUT	JCT	10	.746		12.1000	6.70		
*E-POST-OUT	JCT	25	1.060		12.0500	13.63		
*E-POST-OUT	JCT	100	1.564		12.0500	24.11		

Project Gekko

Paragon Way
Rock Hill, South Carolina

Water Quality Calculations

WETPOND CALCULATIONS

Pond Drainage Information:

Pond No.:	1	
Total Drainage Area-DA (Ac.) =	14.41	See Plan for delineation of Basins
Impervious Area-IA (Ac.) =	12.00	Total Proposed Impervious Area
Percent Impervious Area =	83.28	

Pond Stage-Storage Information:

Perm. Water surface elevation = 547.35

Elevation	Total Surface Area (s.f.)	Cummulative Det'n Volume (cu.ft.)	Cummulative Wet Volume (cu.ft.)	Forebay Surface Area (s.f.)	Forebay Cumulative Volume (cu. ft.)	Percentage of total Volume (20% desired)
543	3,570	0	0	780	0	
544	4,627	0	4,099	1,150	965	
545	5,796	0	9,310	1,576	2,328	
546	7,079	0	15,748	2,059	4,146	
547	8,474	0	23,524	2,598	6,474	
547.35	9,163	0	26,610	0	0	
548	15,298	7,950	34,560	0	0	
549	16,811	24,004	50,615	0	0	
550	18,381	41,600	68,211	0	0	
551	20,007	60,794	87,405	0	0	
552	21,690	81,643	108,253	0	0	
553	23,429	104,202	130,813	0	0	
554	25,225	128,529	155,140			
555.5	26,129	167,045	193,655			0.00%

Permanent Pool Calculations:

Permanent Pool Elevation =	547.35	See Plan
FFV=	0.50	First flush runoff depth (in.)
Storage Required (ac.-ft.) =	0.50	=(FFV*IA) /12
Storage Required (cu. ft.) =	21,780	OK
Storage Provided (cu. ft.) =	23,524	

Temporary Water Quality Volume Calculations:

FFV =	0.500	First flush runoff depth (in.)
Storage Required (ac.-ft.) =	0.60	=(FFV*DA) /12
Storage Required (cu. ft.) =	26,154	
Temporary Water Quality Volume Provided @ elev.:	549.10	

THE ISAACS GROUP
Project Gekko - Pond 1
CONCRETE ANCHOR BUOYANCY CALCULATION

Anti-flotation device for Outlet Structure

See Sheet CS.2 for detail

Height of riser (ft.) =	11.00	Top Elev.= 560.00
Area of Riser (sf.) =	25	Bottom Elev.=549.00
Total Vol. of riser (cf) =	275.0	
Vol of Concrete (cf) =	99.0	
Wt. of structure (lb.) =	14850	
Wt. of H_2O displaced (lb.) =	17160.0	

Conc. pad thickness (in) =	24	12'Lx12'Wx24" Thick Concrete Pad
Conc. pad width/length (ft) =	12	
Vol. of conc. pad (cf) =	288	
Unit wt. of concrete (pcf) =	150	
Wt. of conc. pad (lb.) =	43200	
Wt. of H_2O displaced =	17971.2	

Wt. of H_2O displaced = 35131.2

$$\text{Factor of safety} = \frac{\text{Wt. Conc. Pad + Wt. of Strucutre}}{\text{Wt. of } H_2O \text{ displaced}}$$

F.S.= 1.65

WETPOND CALCULATIONS

Pond Drainage Information:

Pond No	1	
Total Drainage Area-DA (Ac.) =	43.24	See Plan for delineation of Basins
Impervious Area-IA (Ac.) =	28.28	Total Proposed Impervious Area
Percent Impervious Area =	65.40	

Pond Stage-Storage Information:

Perm. Water surface elevation = 553

Elevation	Total Surface Area (s.f.)	Cummulative Det'n Volume (cu.ft.)	Cummulative Wet Volume (cu.ft.)	Forebay Surface Area (s.f.)	Forebay Cumulative Volume (cu. ft.)	Percentage of total Volume (20% desired)
549	43,374	0	0	8,531	0	
550	47,647	0	45,511	9,637	9,084	
551	52,035	0	95,352	10,800	19,303	
552	56,533	0	149,636	12,018	30,712	
553	61,147	0	208,476	13,294	43,368	
554	75,571	68,359	276,835	0	0	
555	81,931	147,110	355,586	0	0	
556	86,433	231,292	439,768	0	0	
557	91,005	320,011	528,487	0	0	
558	95,647	413,337	621,813	0	0	
559	100,359	511,340	719,816	0	0	
560	105,140	614,090	822,565	0	0	

20 80%

Permanent Pool Calculations:

Permanent Pool Elevation =	553	See Plan
FFV=	0.50	First flush runoff depth (in.)
Storage Required (ac.-ft.) =	1.18	=(FFV*IA) /12
Storage Required (cu. ft.) =	51,328	OK
Storage Provided (cu. ft.) =	208,476	

Temporary Water Quality Volume Calculations:

FFV =	0.500	First flush runoff depth (in.)
Storage Required (ac.-ft.) =	1.80	=(FFV*DA) /12
Storage Required (cu. ft.) =	78,481	
Temporary Water Quality Volume Provided @ elev.:	554.09	

Project Gekko

Paragon Way
Rock Hill, South Carolina

Detention Calculations

MASTER DESIGN STORM SUMMARY

Default Network Design Storm File, ID STORMS.RNQ York Co SC 24 Hr

Return Event	Total Depth in	Rainfall Type	RNF File	RNF ID
2	3.6000	Synthetic Curve	DETENT	SCS Type II
10	5.3000	Synthetic Curve	DETENT	SCS Type II
25	6.3000	Synthetic Curve	DETENT	SCS Type II
100	7.9000	Synthetic Curve	DETENT	SCS Type II

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Storage Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond ac-ft
*A-PRE-OUT	JCT	2	3.678		12.3000	26.32		
*A-PRE-OUT	JCT	10	8.831		12.2500	75.90		
*A-PRE-OUT	JCT	25	12.392		12.2500	110.27		
*A-PRE-OUT	JCT	100	18.626		12.2500	169.95		
A-PREDEVELOPED	AREA	2	3.678		12.3000	26.32		
A-PREDEVELOPED	AREA	10	8.831		12.2500	75.90		
A-PREDEVELOPED	AREA	25	12.392		12.2500	110.27		
A-PREDEVELOPED	AREA	100	18.626		12.2500	169.95		
B-POSTDEVELOPED1	AREA	2	7.580		11.9000	137.16		
B-POSTDEVELOPED1	AREA	10	13.138		11.9000	236.07		
B-POSTDEVELOPED1	AREA	25	16.525		11.9000	294.74		
B-POSTDEVELOPED1	AREA	100	22.040		11.9000	388.42		
B-POSTDEVELOPED2	AREA	2	3.281		11.9000	58.08		
B-POSTDEVELOPED2	AREA	10	5.263		11.9000	91.02		
B-POSTDEVELOPED2	AREA	25	6.442		11.9000	110.21		
B-POSTDEVELOPED2	AREA	100	8.339		11.9000	140.68		
BYPASS	AREA	2	.546		12.0000	8.61		
BYPASS	AREA	10	1.371		11.9500	24.09		
BYPASS	AREA	25	1.951		11.9500	34.95		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID		Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
BYPASS		AREA	100	2.975		11.9500	53.78		
C-POND1	IN	POND	2	7.580		11.9000	137.16		
C-POND1	IN	POND	10	13.138		11.9000	236.07		
C-POND1	IN	POND	25	16.525		11.9000	294.74		
C-POND1	IN	POND	100	22.040		11.9000	388.42		
C-POND1	OUT	POND	2	7.577		12.6000	10.64	555.33	4.007
C-POND1	OUT	POND	10	13.136		12.7500	15.32	557.00	7.347
C-POND1	OUT	POND	25	16.522		12.8500	17.48	557.97	9.419
C-POND1	OUT	POND	100	22.037		12.3000	47.63	559.01	11.756
C-POND2	IN	POND	2	3.281		11.9000	58.08		
C-POND2	IN	POND	10	5.263		11.9000	91.02		
C-POND2	IN	POND	25	6.442		11.9000	110.21		
C-POND2	IN	POND	100	8.339		11.9000	140.68		
C-POND2	OUT	POND	2	3.280		12.1500	9.29	551.46	1.618
C-POND2	OUT	POND	10	5.262		12.0500	36.66	552.93	2.358
C-POND2	OUT	POND	25	6.441		12.0500	62.29	553.64	2.644
C-POND2	OUT	POND	100	8.338		12.0000	104.26	554.17	2.913
*E-POST-OUT		JCT	2	11.403		12.0000	25.52		
*E-POST-OUT		JCT	10	19.769		12.0500	67.26		
*E-POST-OUT		JCT	25	24.914		12.0000	103.85		
*E-POST-OUT		JCT	100	33.351		12.0000	171.09		

File.... P:\PONDPACK\13020\3RD SUBMITTAL\13020-PB.PPW

TIME OF CONCENTRATION CALCULATOR

Segment #1: Tc: TR-55 Shallow

Hydraulic Length	1454.00	ft
Slope	.050000	ft/ft
Unpaved		
Avg.Velocity	3.61	ft/sec

Segment #1 Time: .1119 hrs

Segment #2: Tc: TR-55 Sheet

Mannings n	.8000	
Hydraulic Length	100.00	ft
2yr, 24hr P	3.6000	in
Slope	.035000	ft/ft
Avg.Velocity	.06	ft/sec

Segment #2 Time: .4697 hrs

Total Tc: .5816 hrs

File.... P:\PONDPACK\13020\3RD SUBMITTAL\13020-PB.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, %

==== 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.... P:\PONDPACK\13020\3RD SUBMITTAL\13020-PB.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
WOODED - B SOIL	55	31.125			55.00
WOODED - C SOIL	70	31.125			70.00
COMPOSITE AREA & WEIGHTED CN --->		62.250			62.50 (63)

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RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
IMPERVIOUS	98	28.280			98.00
OPEN SPACE	61	14.960			61.00
COMPOSITE AREA & WEIGHTED CN --->		43.240			85.20 (85)

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RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
IMPERVIOUS	98	12.000			98.00
OPEN SPACE	61	2.410			61.00
COMPOSITE AREA & WEIGHTED CN --->		14.410			91.81 (92)

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RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
OPEN SPACE	61	10.600			61.00
COMPOSITE AREA & WEIGHTED CN --->		10.600			61.00 (61)

USER DEFINED VOLUME RATING TABLE

Elevation (ft)	Volume (ac-ft)
553.00	.000
554.00	1.569
555.00	3.377
556.00	5.310
557.00	7.346
558.00	9.489
559.00	11.739
560.00	14.098

USER DEFINED VOLUME RATING TABLE

Elevation (ft)	Volume (ac-ft)
547.35	.000
548.00	.183
549.00	.551
550.00	.955
551.00	1.396
552.00	1.874
553.00	2.392
554.00	2.783
555.00	3.540
555.50	3.835

File.... P:\PONDPACK\13020\3RD SUBMITTAL\13020-PB.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 553.00 ft
Increment = .50 ft
Max. Elev.= 560.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Inlet Box		--->	CV	558.000	558.000
Weir-Rectangular		--->	TW	558.500	560.000
Culvert-Circular	CV	--->	TW	548.500	560.000
Orifice-Circular		--->	CV	553.000	560.000

TW SETUP, DS Channel

OUTLET STRUCTURE INPUT DATA

Structure ID =
Structure Type = Inlet Box

# of Openings	=	1
Invert Elev.	=	558.00 ft
Orifice Area	=	19.5200 sq.ft
Orifice Coeff.	=	.600
Weir Length	=	14.68 ft
Weir Coeff.	=	3.100
K, Submerged	=	.000
K, Reverse	=	1.000
Kb,Barrel	=	.000000 (per ft of full flow)
Barrel Length	=	.00 ft
Mannings n	=	.0000

Structure ID =
Structure Type = Weir-Rectangular

# of Openings	=	1
Crest Elev.	=	558.50 ft
Weir Length	=	25.00 ft
Weir Coeff.	=	3.100000

Weir TW effects (Use adjustment equation)

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OUTLET STRUCTURE INPUT DATA

Structure ID	=	CV	
Structure Type	=	Culvert-Circular	
No. Barrels	=	1	
Barrel Diameter	=	3.0000	ft
Upstream Invert	=	548.50	ft
Dnstream Invert	=	548.05	ft
Horiz. Length	=	83.00	ft
Barrel Length	=	83.00	ft
Barrel Slope	=	.00542	ft/ft

OUTLET CONTROL DATA...

Mannings n	=	.0110	
Ke	=	.1000	(forward entrance loss)
Kb	=	.005175	(per ft of full flow)
Kr	=	.1000	(reverse entrance loss)
HW Convergence	=	.001	+/- ft

INLET CONTROL DATA...

Equation form	=	1	
Inlet Control K	=	.0098	
Inlet Control M	=	2.0000	
Inlet Control c	=	.03980	
Inlet Control Y	=	.6700	
T1 ratio (HW/D)	=	1.158	
T2 ratio (HW/D)	=	1.304	
Slope Factor	=	-.500	

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

At T1 Elev =	551.97 ft	--->	Flow =	42.85	cfs
At T2 Elev =	552.41 ft	--->	Flow =	48.97	cfs

OUTLET STRUCTURE INPUT DATA

Structure ID =
Structure Type = Orifice-Circular

# of Openings = 1
Invert Elev. = 553.00 ft
Diameter = 1.5000 ft
Orifice Coeff. = .600

Structure ID = TW
Structure Type = TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations= 30
Min. TW tolerance = .01 ft
Max. TW tolerance = .01 ft
Min. HW tolerance = .01 ft
Max. HW tolerance = .01 ft
Min. Q tolerance = .10 cfs
Max. Q tolerance = .10 cfs

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = (Inlet Box)

Upstream ID = (Pond Water Surface)
DNstream ID = CV (Culvert-Circular)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
553.00	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
553.50	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
554.00	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
554.50	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
555.00	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
555.50	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
556.00	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
556.50	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
557.00	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
557.50	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
558.00	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
558.50	.00	...	...	...	...	...	Free Outfall	
	E = or > E2= 558.000							
559.00	.00	...	...	...	...	...	Free Outfall	
	E = or > E2= 558.000							
559.50	.00	...	...	...	...	...	Free Outfall	
	E = or > E2= 558.000							
560.00	.00	...	...	...	...	...	Free Outfall	
	E = or > E2= 558.000							

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = (Weir-Rectangular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
553.00	.00	Free Outfall		WS below an invert; no flow.
553.50	.00	Free Outfall		WS below an invert; no flow.
554.00	.00	Free Outfall		WS below an invert; no flow.
554.50	.00	Free Outfall		WS below an invert; no flow.
555.00	.00	Free Outfall		WS below an invert; no flow.
555.50	.00	Free Outfall		WS below an invert; no flow.
556.00	.00	Free Outfall		WS below an invert; no flow.
556.50	.00	Free Outfall		WS below an invert; no flow.
557.00	.00	Free Outfall		WS below an invert; no flow.
557.50	.00	Free Outfall		WS below an invert; no flow.
558.00	.00	Free Outfall		WS below an invert; no flow.
558.50	.00	Free Outfall		WS below an invert; no flow.
559.00	27.40	Free Outfall		H=.50; Htw=.00; Qfree=27.40;
559.50	77.50	Free Outfall		H=1.00; Htw=.00; Qfree=77.50;
560.00	142.38	Free Outfall		H=1.50; Htw=.00; Qfree=142.38;

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = CV (Culvert-Circular)

Mannings open channel maximum capacity: 62.43 cfs
UPstream ID's= ,
DNstream ID = TW (Pond Outfall)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
553.00	.00	...	...	...	...	...	Free Outfall	
		REMARKS: Upstream HW & DNstream TW < Inv.El						
553.50	.98	548.92	Free	Free	.000	.002	Free Outfall	
		CRIT.DEPTH	CONTROL	Vh= .104ft	Dcr= .306ft		CRIT.DEPTH	
554.00	3.55	549.31	Free	Free	.000	.003	Free Outfall	
		CRIT.DEPTH	CONTROL	Vh= .205ft	Dcr= .588ft		CRIT.DEPTH	
554.50	7.37	549.69	Free	Free	.000	.004	Free Outfall	
		CRIT.DEPTH	CONTROL	Vh= .306ft	Dcr= .855ft		CRIT.DEPTH	
555.00	9.50	549.86	Free	Free	.000	.009	Free Outfall	
		CRIT.DEPTH	CONTROL	Vh= .354ft	Dcr= .974ft		CRIT.DEPTH	
555.50	11.25	549.99	Free	Free	.000	.004	Free Outfall	
		CRIT.DEPTH	CONTROL	Vh= .391ft	Dcr= 1.063ft		CRIT.DEPTH	
556.00	12.76	550.10	Free	Free	.000	.005	Free Outfall	
		CRIT.DEPTH	CONTROL	Vh= .421ft	Dcr= 1.135ft		CRIT.DEPTH	
556.50	14.11	550.19	Free	Free	.000	.005	Free Outfall	
		CRIT.DEPTH	CONTROL	Vh= .447ft	Dcr= 1.196ft		CRIT.DEPTH	
557.00	15.32	550.27	Free	Free	.000	.011	Free Outfall	
		CRIT.DEPTH	CONTROL	Vh= .471ft	Dcr= 1.249ft		CRIT.DEPTH	
557.50	16.48	550.34	Free	Free	.000	.011	Free Outfall	
		CRIT.DEPTH	CONTROL	Vh= .492ft	Dcr= 1.297ft		CRIT.DEPTH	
558.00	17.55	550.40	Free	Free	.000	.013	Free Outfall	
		INLET CONTROL...		Equ.1: HW =1.90	dc=1.340		Ac=3.0564	
558.50	18.55	550.47	Free	Free	.000	.012	Free Outfall	
		INLET CONTROL...		Equ.1: HW =1.97	dc=1.380		Ac=3.1739	
559.00	19.48	550.53	Free	Free	.000	.009	Free Outfall	
		INLET CONTROL...		Equ.1: HW =2.03	dc=1.416		Ac=3.2813	
559.50	20.41	550.59	Free	Free	.000	.014	Free Outfall	
		INLET CONTROL...		Equ.1: HW =2.09	dc=1.451		Ac=3.3860	
560.00	21.27	550.64	Free	Free	.000	.004	Free Outfall	
		INLET CONTROL...		Equ.1: HW =2.14	dc=1.482		Ac=3.4804	

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = CV (Culvert-Circular)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
553.00	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
553.50	.98	553.50	Free	548.92	.000	.000	Free Outfall	
		CRIT.DEPTH	CONTROL	Vh= .130ft	Dcr= .369ft		CRIT.DEPTH	
554.00	3.55	554.00	Free	549.31	.000	.000	Free Outfall	
		CRIT.DEPTH	CONTROL	Vh= .279ft	Dcr= .720ft		CRIT.DEPTH	
554.50	7.37	554.50	Free	549.69	.000	.000	Free Outfall	
		H =.75						
555.00	9.51	555.00	Free	549.86	.000	.000	Free Outfall	
		H =1.25						
555.50	11.25	555.50	Free	549.99	.000	.000	Free Outfall	
		H =1.75						
556.00	12.76	556.00	Free	550.10	.000	.000	Free Outfall	
		H =2.25						
556.50	14.10	556.50	Free	550.19	.000	.000	Free Outfall	
		H =2.75						
557.00	15.33	557.00	Free	550.27	.000	.000	Free Outfall	
		H =3.25						
557.50	16.47	557.50	Free	550.34	.000	.000	Free Outfall	
		H =3.75						
558.00	17.53	558.00	Free	550.40	.000	.000	Free Outfall	
		H =4.25						
558.50	18.54	558.50	Free	550.47	.000	.000	Free Outfall	
		H =4.75						
559.00	19.49	559.00	Free	550.53	.000	.000	Free Outfall	
		H =5.25						
559.50	20.40	559.50	Free	550.59	.000	.000	Free Outfall	
		H =5.75						
560.00	21.26	560.00	Free	550.64	.000	.000	Free Outfall	
		H =6.25						

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***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
553.00	.00	Free Outfall		(no Q: ,,CV,)
553.50	.98	Free Outfall		CV, (no Q: ,)
554.00	3.55	Free Outfall		CV, (no Q: ,)
554.50	7.37	Free Outfall		CV, (no Q: ,)
555.00	9.50	Free Outfall		CV, (no Q: ,)
555.50	11.25	Free Outfall		CV, (no Q: ,)
556.00	12.76	Free Outfall		CV, (no Q: ,)
556.50	14.11	Free Outfall		CV, (no Q: ,)
557.00	15.32	Free Outfall		CV, (no Q: ,)
557.50	16.48	Free Outfall		CV, (no Q: ,)
558.00	17.55	Free Outfall		CV, (no Q: ,)
558.50	18.55	Free Outfall		CV, (no Q: ,)
559.00	46.88	Free Outfall		,CV,
559.50	97.91	Free Outfall		,CV,
560.00	163.64	Free Outfall		,CV,

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 547.35 ft
Increment = .50 ft
Max. Elev.= 555.50 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Orifice-Circular		--->	CV	547.350	555.500
Inlet Box		--->	CV	553.700	555.500
Orifice-Circular		--->	CV	549.250	555.500
Weir-Rectangular		--->	TW	554.000	555.500
Culvert-Circular	CV	--->	TW	542.750	555.500
Weir-Rectangular		--->	CV	551.750	555.500

TW SETUP, DS Channel

OUTLET STRUCTURE INPUT DATA

Structure ID =
Structure Type = Orifice-Circular

# of Openings	=	1
Invert Elev.	=	547.35 ft
Diameter	=	.5000 ft
Orifice Coeff.	=	.600

Structure ID =
Structure Type = Inlet Box

# of Openings	=	1
Invert Elev.	=	553.70 ft
Orifice Area	=	16.5900 sq.ft
Orifice Coeff.	=	.600
Weir Length	=	14.68 ft
Weir Coeff.	=	3.100
K, Submerged	=	.000
K, Reverse	=	1.000
Kb,Barrel	=	.000000 (per ft of full flow)
Barrel Length	=	.00 ft
Mannings n	=	.0000

Structure ID =
Structure Type = Orifice-Circular

# of Openings	=	1
Invert Elev.	=	549.25 ft
Diameter	=	1.2500 ft
Orifice Coeff.	=	.600

OUTLET STRUCTURE INPUT DATA

Structure ID =
Structure Type = Weir-Rectangular

# of Openings = 1
Crest Elev. = 554.00 ft
Weir Length = 25.00 ft
Weir Coeff. = 3.100000

Weir TW effects (Use adjustment equation)

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OUTLET STRUCTURE INPUT DATA

Structure ID	= CV	
Structure Type	= Culvert-Circular	
No. Barrels	= 1	
Barrel Diameter	= 3.0000	ft
Upstream Invert	= 542.75	ft
Dnstream Invert	= 542.15	ft
Horiz. Length	= 113.00	ft
Barrel Length	= 113.00	ft
Barrel Slope	= .00531	ft/ft

OUTLET CONTROL DATA...

Mannings n	= .0110	
Ke	= .1000	(forward entrance loss)
Kb	= .005175	(per ft of full flow)
Kr	= .1000	(reverse entrance loss)
HW Convergence	= .001	+/- ft

INLET CONTROL DATA...

Equation form	= 1	
Inlet Control K	= .0098	
Inlet Control M	= 2.0000	
Inlet Control c	= .03980	
Inlet Control Y	= .6700	
T1 ratio (HW/D)	= 1.158	
T2 ratio (HW/D)	= 1.304	
Slope Factor	= -.500	

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

At T1 Elev =	546.22 ft	--->	Flow =	42.85	cfs
At T2 Elev =	546.66 ft	--->	Flow =	48.97	cfs

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OUTLET STRUCTURE INPUT DATA

Structure ID =
Structure Type = Weir-Rectangular

# of Openings = 1
Crest Elev. = 551.75 ft
Weir Length = 6.00 ft
Weir Coeff. = 3.100000

Weir TW effects (Use adjustment equation)

Structure ID = TW
Structure Type = TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations= 30
Min. TW tolerance = .01 ft
Max. TW tolerance = .01 ft
Min. HW tolerance = .01 ft
Max. HW tolerance = .01 ft
Min. Q tolerance = .10 cfs
Max. Q tolerance = .10 cfs

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = CV (Culvert-Circular)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
547.35	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
547.85	.47	547.85	Free	543.04	.000	.000	Free Outfall	
		H =.25						
548.35	.82	548.35	Free	543.13	.000	.000	Free Outfall	
		H =.75						
548.85	1.06	548.85	Free	543.19	.000	.000	Free Outfall	
		H =1.25						
549.25	1.21	549.25	Free	543.22	.000	.000	Free Outfall	
		H =1.65						
549.35	1.25	549.35	Free	543.23	.000	.000	Free Outfall	
		H =1.75						
549.85	1.42	549.85	Free	543.45	.000	.000	Free Outfall	
		H =2.25						
550.35	1.57	550.35	Free	543.74	.000	.000	Free Outfall	
		H =2.75						
550.85	1.70	550.85	Free	543.96	.000	.000	Free Outfall	
		H =3.25						
551.35	1.83	551.35	Free	544.08	.000	.000	Free Outfall	
		H =3.75						
551.75	1.93	551.75	Free	544.15	.000	.000	Free Outfall	
		H =4.15						
551.85	1.95	551.85	Free	544.21	.000	.000	Free Outfall	
		H =4.25						
552.35	2.06	552.35	Free	544.81	.000	.000	Free Outfall	
		H =4.75						
552.85	2.17	552.85	Free	545.66	.000	.000	Free Outfall	
		H =5.25						
553.35	2.27	553.35	Free	546.82	.000	.000	Free Outfall	
		H =5.75						
553.70	2.24	553.70	548.07	548.06	.009	.000	Free Outfall	
		H =5.63						
553.85	2.08	553.85	549.01	549.01	.001	.000	Free Outfall	
		H =4.84						
554.00	1.82	554.00	550.30	550.30	.003	.000	Free Outfall	
		H =3.70						

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = CV (Culvert-Circular)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
554.35	.00	554.35	554.35	554.35	.000	.000	Free Outfall	
				Full riser flow. Q=0 this opening.				
554.85	.00	554.85	554.85	547.26	.000	.000	Free Outfall	
				Full riser flow. Q=0 this opening.				
555.35	.00	555.35	555.35	555.35	.000	.000	Free Outfall	
				Full riser flow. Q=0 this opening.				
555.50	.00	555.50	555.50	555.50	.000	.000	Free Outfall	
				Full riser flow. Q=0 this opening.				

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = (Inlet Box)

Upstream ID = (Pond Water Surface)
DNstream ID = CV (Culvert-Circular)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
547.35	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
547.85	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
548.35	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
548.85	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
549.25	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
549.35	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
549.85	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
550.35	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
550.85	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
551.35	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
551.75	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
551.85	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
552.35	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
552.85	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
553.35	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
553.70	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
553.85	2.64	553.85	Free	549.01	.000	.000	Free Outfall	
		Weir: H =.15						
554.00	7.48	554.00	Free	550.30	.000	.000	Free Outfall	
		Weir: H =.30						

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = (Inlet Box)

Upstream ID = (Pond Water Surface)
DNstream ID = CV (Culvert-Circular)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
554.35	108.84	554.35	554.35	554.35	.000	.000	Free Outfall	
		DS HGL+Loss > crest: Flow set to Downstream outlet.						
554.85	56.12	554.85	Free	547.26	.000	.000	Free Outfall	
		Weir: H =1.15						
555.35	114.13	555.35	555.35	555.35	.000	.000	Free Outfall	
		DS HGL+Loss > crest: Flow set to Downstream outlet.						
555.50	116.16	555.50	555.50	555.50	.000	.000	Free Outfall	
		DS HGL+Loss > crest: Flow set to Downstream outlet.						

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = CV (Culvert-Circular)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
547.35	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
547.85	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
548.35	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
548.85	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
549.25	.00	...	...	...	...	...	Free Outfall	
		WS below an invert; no flow.						
549.35	.04	549.35	Free	543.23	.000	.000	Free Outfall	
		CRIT.DEPTH	CONTROL	Vh= .026ft	Dcr= .073ft		CRIT.DEPTH	
549.85	1.24	549.85	Free	543.45	.000	.000	Free Outfall	
		CRIT.DEPTH	CONTROL	Vh= .161ft	Dcr= .439ft		CRIT.DEPTH	
550.35	3.66	550.35	Free	543.74	.000	.000	Free Outfall	
		CRIT.DEPTH	CONTROL	Vh= .328ft	Dcr= .772ft		CRIT.DEPTH	
550.85	5.83	550.85	Free	543.96	.000	.000	Free Outfall	
		H =.97						
551.35	7.17	551.35	Free	544.08	.000	.000	Free Outfall	
		H =1.47						
551.75	8.09	551.75	Free	544.15	.000	.000	Free Outfall	
		H =1.88						
551.85	8.30	551.85	Free	544.21	.000	.000	Free Outfall	
		H =1.97						
552.35	9.29	552.35	Free	544.81	.000	.000	Free Outfall	
		H =2.47						
552.85	10.19	552.85	Free	545.66	.000	.000	Free Outfall	
		H =2.97						
553.35	11.01	553.35	Free	546.82	.000	.000	Free Outfall	
		H =3.47						
553.70	11.55	553.70	Free	548.06	.000	.000	Free Outfall	
		H =3.83						
553.85	11.78	553.85	Free	549.01	.000	.000	Free Outfall	
		H =3.97						
554.00	11.37	554.00	550.30	550.30	.003	.000	Free Outfall	
		H =3.70						

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = (Orifice-Circular)

Upstream ID = (Pond Water Surface)
DNstream ID = CV (Culvert-Circular)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
554.35	.00	554.35	554.35	554.35	.000	.000	Free Outfall	
				Full riser flow. Q=0 this opening.				
554.85	.00	554.85	554.85	547.26	.000	.000	Free Outfall	
				Full riser flow. Q=0 this opening.				
555.35	.00	555.35	555.35	555.35	.000	.000	Free Outfall	
				Full riser flow. Q=0 this opening.				
555.50	.00	555.50	555.50	555.50	.000	.000	Free Outfall	
				Full riser flow. Q=0 this opening.				

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = (Weir-Rectangular)

Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
547.35	.00	Free Outfall		WS below an invert; no flow.
547.85	.00	Free Outfall		WS below an invert; no flow.
548.35	.00	Free Outfall		WS below an invert; no flow.
548.85	.00	Free Outfall		WS below an invert; no flow.
549.25	.00	Free Outfall		WS below an invert; no flow.
549.35	.00	Free Outfall		WS below an invert; no flow.
549.85	.00	Free Outfall		WS below an invert; no flow.
550.35	.00	Free Outfall		WS below an invert; no flow.
550.85	.00	Free Outfall		WS below an invert; no flow.
551.35	.00	Free Outfall		WS below an invert; no flow.
551.75	.00	Free Outfall		WS below an invert; no flow.
551.85	.00	Free Outfall		WS below an invert; no flow.
552.35	.00	Free Outfall		WS below an invert; no flow.
552.85	.00	Free Outfall		WS below an invert; no flow.
553.35	.00	Free Outfall		WS below an invert; no flow.
553.70	.00	Free Outfall		WS below an invert; no flow.
553.85	.00	Free Outfall		WS below an invert; no flow.
554.00	.00	Free Outfall		WS below an invert; no flow.
554.35	16.05	Free Outfall		H=.35; Htw=.00; Qfree=16.05;
554.85	60.73	Free Outfall		H=.85; Htw=.00; Qfree=60.73;
555.35	121.56	Free Outfall		H=1.35; Htw=.00; Qfree=121.56;
555.50	142.38	Free Outfall		H=1.50; Htw=.00; Qfree=142.38;

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = CV (Culvert-Circular)

Mannings open channel maximum capacity: 61.78 cfs
UPstream ID's= , , ,
DNstream ID = TW (Pond Outfall)

Pond WS Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
547.35	.00	...	...	...	...	...	Free Outfall	
		REMARKS: Upstream HW & DNstream TW < Inv.El						
547.85	.47	543.04	Free	Free	.000	.000	Free Outfall	
		CRIT.DEPTH CONTROL		Vh= .072ft	Dcr= .212ft		CRIT.DEPTH	
548.35	.82	543.13	Free	Free	.000	.002	Free Outfall	
		CRIT.DEPTH CONTROL		Vh= .095ft	Dcr= .280ft		CRIT.DEPTH	
548.85	1.06	543.19	Free	Free	.000	.002	Free Outfall	
		CRIT.DEPTH CONTROL		Vh= .108ft	Dcr= .318ft		CRIT.DEPTH	
549.25	1.21	543.22	Free	Free	.000	.001	Free Outfall	
		CRIT.DEPTH CONTROL		Vh= .117ft	Dcr= .341ft		CRIT.DEPTH	
549.35	1.29	543.23	Free	Free	.000	.003	Free Outfall	
		CRIT.DEPTH CONTROL		Vh= .120ft	Dcr= .351ft		CRIT.DEPTH	
549.85	2.66	543.45	Free	Free	.000	.002	Free Outfall	
		CRIT.DEPTH CONTROL		Vh= .176ft	Dcr= .507ft		CRIT.DEPTH	
550.35	5.23	543.74	Free	Free	.000	.003	Free Outfall	
		CRIT.DEPTH CONTROL		Vh= .253ft	Dcr= .716ft		CRIT.DEPTH	
550.85	7.53	543.96	Free	Free	.000	.006	Free Outfall	
		CRIT.DEPTH CONTROL		Vh= .310ft	Dcr= .864ft		CRIT.DEPTH	
551.35	9.00	544.08	Free	Free	.000	.004	Free Outfall	
		CRIT.DEPTH CONTROL		Vh= .343ft	Dcr= .947ft		CRIT.DEPTH	
551.75	10.00	544.15	Free	Free	.000	.009	Free Outfall	
		CRIT.DEPTH CONTROL		Vh= .365ft	Dcr= 1.001ft		CRIT.DEPTH	
551.85	10.83	544.21	Free	Free	.000	.006	Free Outfall	
		CRIT.DEPTH CONTROL		Vh= .382ft	Dcr= 1.043ft		CRIT.DEPTH	
552.35	20.00	544.81	Free	Free	.000	.008	Free Outfall	
		INLET CONTROL...		Equ.1: HW =2.06	dc=1.435		Ac=3.3405	
552.85	33.81	545.66	Free	Free	.000	.003	Free Outfall	
		INLET CONTROL...		Equ.1: HW =2.91	dc=1.889		Ac=4.6867	
553.35	50.93	546.82	Free	Free	.000	.007	Free Outfall	
		INLET CONTROL...		Submerged:	HW =4.07			
553.70	64.44	548.06	Free	Free	.000	.002	Free Outfall	
		INLET CONTROL...		Submerged:	HW =5.31			
553.85	73.10	549.01	Free	Free	.000	.002	Free Outfall	
		INLET CONTROL...		Submerged:	HW =6.26			
554.00	83.45	550.30	Free	Free	.000	.007	Free Outfall	
		INLET CONTROL...		Submerged:	HW =7.55			

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = CV (Culvert-Circular)

Mannings open channel maximum capacity: 61.78 cfs
UPstream ID's= , , ,
DNstream ID = TW (Pond Outfall)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
554.35	109.77	554.35	Free	Free	.000	.000	Free Outfall	
		INLET CONTROL...		Submerged:	HW =11.60			
554.85	56.12	547.26	Free	Free	.000	.000	Free Outfall	
		INLET CONTROL...		Submerged:	HW =4.51			
555.35	115.35	555.35	Free	Free	.000	.000	Free Outfall	
		INLET CONTROL...		Submerged:	HW =12.60			
555.50	116.16	555.50	Free	Free	.000	.000	Free Outfall	
		INLET CONTROL...		Submerged:	HW =12.75			

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = (Weir-Rectangular)

Upstream ID = (Pond Water Surface)
DNstream ID = CV (Culvert-Circular)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
547.35	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
547.85	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
548.35	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
548.85	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
549.25	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
549.35	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
549.85	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
550.35	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
550.85	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
551.35	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
551.75	.00	...	...	...	...	...	Free Outfall	
	WS below an invert; no flow.							
551.85	.59	551.85	Free	544.21	.000	.000	Free Outfall	
	H=.10; Htw=.00; Qfree=.59;							
552.35	8.64	552.35	Free	544.81	.000	.000	Free Outfall	
	H=.60; Htw=.00; Qfree=8.64;							
552.85	21.46	552.85	Free	545.66	.000	.000	Free Outfall	
	H=1.10; Htw=.00; Qfree=21.46;							
553.35	37.64	553.35	Free	546.82	.000	.000	Free Outfall	
	H=1.60; Htw=.00; Qfree=37.64;							
553.70	50.65	553.70	Free	548.06	.000	.000	Free Outfall	
	H=1.95; Htw=.00; Qfree=50.65;							
553.85	56.60	553.85	Free	549.01	.000	.000	Free Outfall	
	H=2.10; Htw=.00; Qfree=56.60;							
554.00	62.78	554.00	Free	550.30	.000	.000	Free Outfall	
	H=2.25; Htw=.00; Qfree=62.78;							

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID =   (Weir-Rectangular)

Upstream ID =   (Pond Water Surface)
DNstream ID = CV (Culvert-Circular)

Pond WS. Elev. ft	Device Q cfs	(into) HW HGL ft	Converge DS HGL ft	Next DS HGL ft	DS HGL Error +/-ft	Q SUM Error +/-cfs	DS Chan. TW ft	TW Error +/-ft
554.35	.00	554.35	554.35	554.35	.000	.000	Free Outfall	
				Full riser flow. Q=0 this opening.				
554.85	.00	554.85	554.85	547.26	.000	.000	Free Outfall	
				Full riser flow. Q=0 this opening.				
555.35	.00	555.35	555.35	555.35	.000	.000	Free Outfall	
				Full riser flow. Q=0 this opening.				
555.50	.00	.00	555.50	555.50	.000	.000	Free Outfall	
				Full riser flow. Q=0 this opening.				

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, Total Q		Notes		
		Converge		
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
547.35	.00	Free Outfall		(no Q: ,,,,CV,)
547.85	.47	Free Outfall		,CV (no Q: ,,,)
548.35	.82	Free Outfall		,CV (no Q: ,,,)
548.85	1.06	Free Outfall		,CV (no Q: ,,,)
549.25	1.21	Free Outfall		,CV (no Q: ,,,)
549.35	1.29	Free Outfall		,,CV (no Q: ,,)
549.85	2.66	Free Outfall		,,CV (no Q: ,,)
550.35	5.23	Free Outfall		,,CV (no Q: ,,)
550.85	7.53	Free Outfall		,,CV (no Q: ,,)
551.35	9.00	Free Outfall		,,CV (no Q: ,,)
551.75	10.00	Free Outfall		,,CV (no Q: ,,)
551.85	10.83	Free Outfall		,,CV, (no Q: ,)
552.35	20.00	Free Outfall		,,CV, (no Q: ,)
552.85	33.81	Free Outfall		,,CV, (no Q: ,)
553.35	50.93	Free Outfall		,,CV, (no Q: ,)
553.70	64.44	Free Outfall		,,CV, (no Q: ,)
553.85	73.10	Free Outfall		,,,CV,
554.00	83.45	Free Outfall		,,,CV,
554.35	125.81	Free Outfall		,,CV (no Q: ,,)
554.85	116.85	Free Outfall		,,CV (no Q: ,,)
555.35	236.91	Free Outfall		,,CV (no Q: ,,)
555.50	258.53	Free Outfall		,,CV (no Q: ,,)

Project Gekko

Paragon Way
Rock Hill, South Carolina

Storm Drainage Pipe Sizing Calculations

THE ISAACS GROUP
Project Gekko
STORM DRAINAGE CALCULATIONS

Storm pipe designed to handle the 25 year flow.

Rational Method used to determine the 25 year flow.

A minimum time of concentration of 5 minutes has been assumed in determining a rainfall intensity of 7.91 for the 25 year design storm.

AREA A16
A= 1.33 acres
I= 7.91 in/hour
C= 0.98
Q = (C)(I)(A) = 10.3 cfs
Q (total)= 10.3 cfs
Capacity of 24 " HDPE @ 0.52% = 21.2 cfs > 10.3 cfs

AREA A15
A= 1.33 acres
I= 7.91 in/hour
C= 0.98
Q = (C)(I)(A) = 10.3 cfs
Q (total)= 20.6 cfs
Capacity of 24 " HDPE @ 0.52% = 21.2 cfs > 20.6 cfs

AREA A14
A= 1.33 acres
I= 7.91 in/hour
C= 0.98
Q = (C)(I)(A) = 10.3 cfs
Q (total)= 30.9 cfs
Capacity of 30 " HDPE @ 0.52% = 38.4 cfs > 30.9 cfs

AREA A13
A= 1.32 acres
I= 7.91 in/hour
C= 0.98
Q = (C)(I)(A) = 10.2 cfs
Q (total)= 41.2 cfs
Capacity of 36 " HDPE @ 0.52% = 62.5 cfs > 41.2 cfs

AREA A12
A= 1.32 acres
I= 7.91 in/hour
C= 0.98
Q = (C)(I)(A) = 10.2 cfs
Q (total)= 51.4 cfs
Capacity of 36 " HDPE @ 0.52% = 62.5 cfs > 51.4 cfs

AREA A11
A= 1.34 acres
I= 7.91 in/hour
C= 0.98
Q = (C)(I)(A) = 10.4 cfs
Q (total)= 61.8 cfs
Capacity of 42 " HDPE @ 0.52% = 94.3 cfs > 61.8 cfs

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Project Gekko
STORM DRAINAGE CALCULATIONS

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AREA A10

A=	1.36 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	10.5 cfs			
Q (total)=	72.3 cfs			
Capacity of	42 " HDPE @	0.52% =	94.3 cfs	> 72.3 cfs

AREA A9

A=	1.40 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	10.9 cfs			
Q (total)=	83.2 cfs			
Capacity of	42 " HDPE @	0.52% =	94.3 cfs	> 83.2 cfs

AREA A8

A=	1.47 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	11.4 cfs			
Q (total)=	94.6 cfs			
Capacity of	48 " HDPE @	0.52% =	134.7 cfs	> 94.6 cfs

AREA A7

A=	1.62 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	12.6 cfs			
Q (total)=	107.1 cfs			
Capacity of	48 " HDPE @	0.51% =	133.4 cfs	> 107.1 cfs

AREA A6

A=	2.53 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	19.6 cfs			
Q (total)=	126.7 cfs			
Capacity of	48 " HDPE @	0.50% =	132.1 cfs	> 126.7 cfs

AREA A5

A=	1.44 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	11.2 cfs			
Q (total)=	137.9 cfs			
Capacity of	54 " HDPE @	0.51% =	182.6 cfs	> 137.9 cfs

THE ISAACS GROUP
Project Gekko
STORM DRAINAGE CALCULATIONS

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AREA B10

A=	1.46 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	11.3 cfs			
Q (total)=	11.3 cfs			
Capacity of	24 " HDPE @	0.52% =	21.2 cfs >	11.3 cfs

AREA B9

A=	1.38 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	10.7 cfs			
Q (total)=	22.0 cfs			
Capacity of	30 " HDPE @	0.53% =	38.8 cfs >	22.0 cfs

AREA B8

A=	1.32 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	10.2 cfs			
Q (total)=	32.2 cfs			
Capacity of	30 " HDPE @	0.51% =	38.1 cfs >	32.2 cfs

AREA B7

A=	1.32 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	10.2 cfs			
Q (total)=	42.5 cfs			
Capacity of	36 " HDPE @	0.51% =	61.9 cfs >	42.5 cfs

AREA B6

A=	1.32 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	10.2 cfs			
Q (total)=	52.7 cfs			
Capacity of	36 " HDPE @	0.51% =	61.9 cfs >	52.7 cfs

AREA B5

A=	1.32 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	10.2 cfs			
Q (total)=	62.9 cfs			
Capacity of	42 " HDPE @	0.51% =	93.4 cfs >	62.9 cfs

THE ISAACS GROUP
Project Gekko
STORM DRAINAGE CALCULATIONS

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Rational Method used to determine the 25 year flow.

A minimum time of concentration of 5 minutes has been assumed in determining a rainfall intensity of 7.91 for the 25 year design storm.

AREA B4
A= 1.32 acres
I= 7.91 in/hour
C= 0.98
Q = (C)(I)(A) = 10.2 cfs
Q (total)= 73.2 cfs
Capacity of 42 " HDPE @ 0.51% = 93.4 cfs > 73.2 cfs

AREA B3
A= 1.32 acres
I= 7.91 in/hour
C= 0.98
Q = (C)(I)(A) = 10.2 cfs
Q (total)= 83.4 cfs
Capacity of 42 " HDPE @ 0.51% = 93.4 cfs > 83.4 cfs

AREA B2
A= 1.32 acres
I= 7.91 in/hour
C= 0.98
Q = (C)(I)(A) = 10.2 cfs
Q (total)= 93.6 cfs
Capacity of 48 " HDPE @ 0.51% = 133.4 cfs > 93.6 cfs

AREA B1
A= 1.32 acres
I= 7.91 in/hour
C= 0.98
Q = (C)(I)(A) = 10.2 cfs
Q (total)= 103.9 cfs
Capacity of 48 " HDPE @ 0.51% = 133.4 cfs > 103.9 cfs

AREA A4
A= 1.82 acres
I= 7.91 in/hour
C= 0.98
Q = (C)(I)(A) = 14.1 cfs
Q (total)= 255.9 cfs
Capacity of 66 " RCP @ 0.52% = 262.4 cfs > 255.9 cfs

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STORM DRAINAGE CALCULATIONS

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A minimum time of concentration of 5 minutes has been assumed in determining a rainfall intensity of 7.91 for the 25 year design storm.

AREA C15
A= 1.31 acres
I= 7.91 in/hour
C= 0.98
Q = (C)(I)(A) = 10.2 cfs
Q (total)= 10.2 cfs
Capacity of 24 " HDPE @ 0.52% = 21.2 cfs > 10.2 cfs

AREA C14
A= 1.31 acres
I= 7.91 in/hour
C= 0.98
Q = (C)(I)(A) = 10.2 cfs
Q (total)= 20.3 cfs
Capacity of 24 " HDPE @ 0.52% = 21.2 cfs > 20.3 cfs

AREA C13
A= 1.65 acres
I= 7.91 in/hour
C= 0.98
Q = (C)(I)(A) = 12.8 cfs
Q (total)= 33.1 cfs
Capacity of 30 " HDPE @ 0.51% = 38.1 cfs > 33.1 cfs

AREA C12
A= 1.48 acres
I= 7.91 in/hour
C= 0.98
Q = (C)(I)(A) = 11.5 cfs
Q (total)= 44.6 cfs
Capacity of 36 " HDPE @ 0.50% = 61.3 cfs > 44.6 cfs

AREA C11
A= 1.48 acres
I= 7.91 in/hour
C= 0.98
Q = (C)(I)(A) = 11.5 cfs
Q (total)= 56.0 cfs
Capacity of 36 " HDPE @ 0.54% = 63.7 cfs > 56.0 cfs

AREA C10B
A= 0.35 acres
I= 7.91 in/hour
C= 0.98
Q = (C)(I)(A) = 2.7 cfs
Q (total)= 58.8 cfs
Capacity of 36 " HDPE @ 0.52% = 62.5 cfs > 58.8 cfs

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STORM DRAINAGE CALCULATIONS

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A minimum time of concentration of 5 minutes has been assumed in determining a rainfall intensity of 7.91 for the 25 year design storm.

AREA C10A

A=	0.00 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	.0 cfs			
Q (total)=	58.8 cfs			
Capacity of	36 " HDPE @	0.51% =	61.9 cfs	> 58.8 cfs

AREA C9

A=	0.38 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	2.9 cfs			
Q (total)=	61.7 cfs			
Capacity of	42 " HDPE @	0.50% =	92.5 cfs	> 61.7 cfs

AREA C8

A=	0.30 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	2.3 cfs			
Q (total)=	64.0 cfs			
Capacity of	42 " HDPE @	0.56% =	97.9 cfs	> 64.0 cfs

AREA C7

A=	0.77 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	6.0 cfs			
Q (total)=	70.0 cfs			
Capacity of	42 " HDPE @	0.52% =	94.3 cfs	> 70.0 cfs

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STORM DRAINAGE CALCULATIONS

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AREA C6

A=	1.75 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	13.6 cfs			
Q (total)=	83.6 cfs			
Capacity of		42 " HDPE @	0.50% =	92.5 cfs > 83.6 cfs

AREA C4

A=	1.21 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	9.4 cfs			
Q (total)=	9.4 cfs			
Capacity of		18 " HDPE @	0.83% =	12.4 cfs > 9.4 cfs

AREA C5

A=	1.26 acres			
I=	7.91 in/hour			
C=	0.98			
Q = (C)(I)(A) =	9.8 cfs			
Q (total)=	102.7 cfs			
Capacity of		48 " HDPE @	0.60% =	144.7 cfs > 102.7 cfs