CERTIFICATE OF AUTHENTICITY

THIS IS TO CERTIFY THAT THE FOLLOWING ELECTRONIC RECORDS ARE TRUE AND ACCURATE REPRODUCTIONS OF THE ORIGINAL RECORDS OF JAMES CITY COUNTY GENERAL SERVICES DEPARTMENT- STORMWATER DIVISION; WERE SCANNED IN THE REGULAR COURSE OF BUSINESS PURSUANT TO GUIDELINES ESTABLISHED BY THE LIBRARY OF VIRGINIA AND ARCHIVES; AND HAVE BEEN VERIFIED IN THE CUSTODY OF THE INDIVIDUAL LISTED BELOW.

BMP NUMBER: **CC031**

DATE VERIFIED: **May 17, 2012**

QUALITY ASSURANCE TECHNICIAN: **Leah Hardenbergh**

Leah Hardenbergh

LOCATION: WILLIAMSBURG, VIRGINIA

Stormwater Division

MEMORANDUM

DATE: March 12, 2010

TO: Michael J. Gillis, Virginia Correctional Enterprises Document Management Services

FROM: Jo Anna Ripley, Stormwater

PO: 270712

RE: Files Approved for Scanning

General File ID or BMP ID: CC031

PIN: 4820100005A

Subdivision, Tract, Business or Owner Name (if known): Williamsburg Jamestown Airport

Property Description: Airport

Site Address: 100 Marclay Road

(For internal use only) **Box** 20 **Drawer:** N/A

Agreements: (in file as of scan date) **N** **Book or Doc#:** **Page:**

Comments

STORM WATER DRAINAGE COMPUTATIONS

For

APRON EXPANSION (19,000 S.Y.)

(PHASE I)

DOAV PROJECT NO. CS9010-19

T.B.I. PROJECT NO. 4205-0001

JCC CASE NO. SP-63-01

MAR 2002
RECEIVED
PLANNING DEPARTMENT

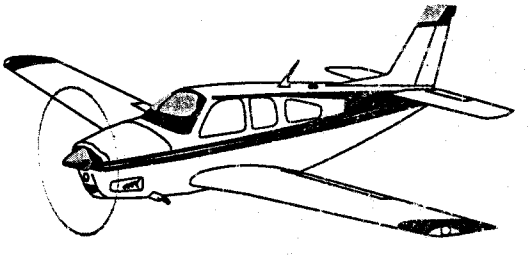
WILLIAMSBURG-JAMESTOWN AIRPORT

Prepared For:

WILLIAMSBURG-JAMESTOWN AIRPORT, INC.

Williamsburg, Virginia

CC031
C2 INFL TRENCH
SP-63-01



BY:

TALBERT&BRIGHT

ENGINEERING & PLANNING CONSULTANTS
10105 KRAUSE ROAD, SUITE 100
CHESTERFIELD, VIRGINIA 23832
PHONE: 804-768-6878 FAX: 804-768-6871

FEBRUARY 2002

TBI Project No. 4205-0001

SET NO. ____

DATE: _____

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = WILL-JAM.RNQ Apron

Storm Tag Name = Dev..2

Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
Storm Frequency = 2 yr
Total Rainfall Depth= 3.5000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

	Node ID		Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
	JGG STORM		AREA	1.941		12.1000	23.12	
Outfall	OUTFALL 1		JCT	1.938		12.1500	22.76	
	POND 1	IN	POND	1.941		12.1000	23.12	
	POND 1	OUT	POND	1.938		12.1500	22.76	39.89

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = WILL-JAM.RNQ Apron

Storm Tag Name = Dev..2

Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
Storm Frequency = 2 yr
Total Rainfall Depth= 3.5000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
ADD 1A	ADD	UN	1.941		12.1000	23.12	JGG STORM	
		DL	1.941		12.1000	23.12		
		DN	1.941		12.1000	23.12	POND 1	IN
POND ROUTE 1	PONDrt	UN	1.941		12.1000	23.12	POND 1	IN
POND ROUTE 1			1.938		12.1500	22.76	POND 1	OUT
		DL	1.938		12.1500	22.76		
		DN	1.938		12.1500	22.76	OUTFALL 1	

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = WILL-JAM.RNQ Apron

Storm Tag Name = Dev.10

Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
Storm Frequency = 10 yr
Total Rainfall Depth= 5.8000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

	Node ID		Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
	JGG STORM		AREA	3.903		12.1000	45.78	
Outfall	OUTFALL 1		JCT	3.891		12.2000	38.58	
	POND 1	IN	POND	3.903		12.1000	45.78	
	POND 1	OUT	POND	3.891		12.2000	38.58	40.35

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = WILL-JAM.RNQ Apron

Storm Tag Name = Dev.10

Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
Storm Frequency = 10 yr
Total Rainfall Depth= 5.8000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
ADD 1A	ADD	UN	3.903		12.1000	45.78	JGG STORM	
		DL	3.903		12.1000	45.78		
		DN	3.903		12.1000	45.78	POND 1	IN
POND ROUTE 1	PONDrt	UN	3.903		12.1000	45.78	POND 1	IN
POND ROUTE 1			3.891		12.2000	38.58	POND 1	OUT
		DL	3.891		12.2000	38.58		
		DN	3.891		12.2000	38.58	OUTFALL 1	

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = WILL-JAM.RNQ Apron

Storm Tag Name = Dev100

Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 8.0000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

	Node ID		Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
	JGG STORM		AREA	5.857		12.1000	67.51	
Outfall	OUTFALL 1		JCT	5.817		12.2500	44.63	
	POND 1	IN	POND	5.857		12.1000	67.51	
	POND 1	OUT	POND	5.817		12.2500	44.63	40.72

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = WILL-JAM.RNQ Apron

Storm Tag Name = Dev100

Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 8.0000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
ADD 1A	ADD	UN	5.857		12.1000	67.51	JGG STORM	
		DL	5.857		12.1000	67.51		
		DN	5.857		12.1000	67.51	POND 1	IN
POND ROUTE 1	PONDrt	UN	5.857		12.1000	67.51	POND 1	IN
POND ROUTE 1			5.817		12.2500	44.63	POND 1	OUT
		DL	5.817		12.2500	44.63		
		DN	5.817		12.2500	44.63	OUTFALL 1	

Type.... SCS Unit Hyd. (HYG output)
Name.... JGG STORM Tag: Dev..2
File.... C:\HAESTAD\PPKW\SAMPLE\JGG APRON EXPANSION.PPW
Storm... TypeII 24hr Tag: Dev..2

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm
Duration = 24.0000 hrs Rain Depth = 3.5000 in
Rain Dir = C:\HAESTAD\PPKW\RAINFALL\
Rain File -ID = SCSTYPES.RNF - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\HAESTAD\PPKW\SAMPLE\
HYG File - ID = JGG.HYG - JGG STORM Dev..2
Tc = .3744 hrs
Drainage Area = 11.100 acres Runoff CN= 86
Calc.Increment= .04992 hrs Out.Incr.= .0500 hrs
HYG Volume = 1.941 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
6.8500	.00	.00	.00	.00	.01
7.1000	.01	.01	.01	.02	.02
7.3500	.02	.03	.03	.03	.04
7.6000	.04	.04	.05	.05	.05
7.8500	.06	.06	.07	.07	.07
8.1000	.08	.08	.09	.09	.09
8.3500	.10	.11	.11	.12	.12
8.6000	.13	.14	.14	.15	.16
8.8500	.17	.18	.18	.19	.20
9.1000	.21	.22	.23	.24	.24
9.3500	.25	.26	.26	.27	.28
9.6000	.28	.29	.30	.31	.32
9.8500	.33	.34	.35	.37	.38
10.1000	.40	.41	.43	.45	.47
10.3500	.49	.51	.53	.56	.58
10.6000	.61	.64	.66	.70	.73
10.8500	.77	.81	.85	.89	.93
11.1000	.98	1.04	1.10	1.16	1.24
11.3500	1.33	1.42	1.52	1.63	1.79
11.6000	2.04	2.48	3.21	4.34	5.98
11.8500	8.28	11.37	15.10	18.89	21.82
12.1000	23.12	22.52	20.36	17.42	14.45
12.3500	11.88	9.85	8.32	7.13	6.17
12.6000	5.39	4.75	4.23	3.81	3.48
12.8500	3.21	2.99	2.81	2.65	2.51
13.1000	2.39	2.28	2.20	2.12	2.05
13.3500	1.99	1.93	1.88	1.83	1.78
13.6000	1.73	1.69	1.65	1.61	1.57
13.8500	1.53	1.49	1.46	1.43	1.39
14.1000	1.36	1.33	1.30	1.28	1.26
14.3500	1.24	1.22	1.21	1.19	1.18
14.6000	1.17	1.15	1.14	1.13	1.12

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
Duration      = 24.0000 hrs     Rain Depth = 5.8000 in
Rain Dir      = C:\HAESTAD\PPKW\RAINFALL\
Rain File -ID = SCSTYPES.RNF - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\HAESTAD\PPKW\SAMPLE\
HYG File - ID = JGG.HYG - JGG STORM Dev.10
Tc            = .3744 hrs
Drainage Area = 11.100 acres  Runoff CN= 86

============================================
Computational Time Increment   =   .04992 hrs
Computed Peak Time             =  12.0797 hrs
Computed Peak Flow             =    45.85 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =  12.1000 hrs
Peak Flow, Interpolated Output =    45.78 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:Area 1 CN
              CN   =   86
              Area =      11.100 acres
              S    =   1.6279 in
              0.2S =    .3256 in

               Cumulative Runoff
              -------------------
                      4.2196 in
                       3.903 ac-ft

HYG Volume...          3.903 ac-ft (area under HYG curve)

***** UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .37437 hrs (ID: TC Area 1)
Computational Incr, Tm =   .04992 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    33.59 cfs
Unit peak time      Tp =   .24958 hrs
Unit receding limb, Tr =   .99832 hrs
Total unit time,    Tb =  1.24790 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 8.0000 in
Rain Dir      = C:\HAESTAD\PPKW\RAINFALL\
Rain File -ID = SCSTYPES.RNF - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\HAESTAD\PPKW\SAMPLE\
HYG File - ID = JGG.HYG - JGG STORM Dev100
Tc            = .3744 hrs
Drainage Area = 11.100 acres  Runoff CN= 86

============================================
Computational Time Increment   =   .04992 hrs
Computed Peak Time             =  12.0797 hrs
Computed Peak Flow             =    67.73 cfs

Time Increment for HYG File    =    .0500 hrs
Peak Time, Interpolated Output =  12.1000 hrs
Peak Flow, Interpolated Output =    67.51 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:Area 1 CN
              CN   =   86
              Area =      11.100 acres
              S    =   1.6279 in
              0.2S =    .3256 in

               Cumulative Runoff
              -------------------
                      6.3314 in
                       5.857 ac-ft

HYG Volume...          5.857 ac-ft (area under HYG curve)

***** UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .37437 hrs (ID: TC Area 1)
Computational Incr, Tm =   .04992 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    33.59 cfs
Unit peak time      Tp =   .24958 hrs
Unit receding limb, Tr =   .99832 hrs
Total unit time,    Tb =  1.24790 hrs
```

File.... C:\HAESTAD\PPKW\SAMPLE\JGG APRON EXPANSION.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = 1
Structure Type    = Culvert-Circular
-----------------------------------
No. Barrels       =         2
Barrel Diameter   =    2.0000 ft
Upstream Invert   =     37.77 ft
Dnstream Invert   =     37.13 ft
Horiz. Length     =     80.00 ft
Barrel Length     =     80.00 ft
Barrel Slope      =    .00800 ft/ft

OUTLET CONTROL DATA...
Mannings n        =     .0130
Ke                =     .1000  (forward entrance loss)
Kb                =   .012411  (per ft of full flow)
Kr                =     .1000  (reverse entrance loss)
HW Convergence    =      .001  +/- ft

INLET CONTROL DATA...
Equation form     =         1
Inlet Control K   =     .0078
Inlet Control M   =    2.0000
Inlet Control c   =    .02920
Inlet Control Y   =     .7400
T1 ratio (HW/D)   =     1.132
T2 ratio (HW/D)   =     1.203
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 =     40.03 ft  --->  Flow =     15.55 cfs
At T2 Elev =     40.18 ft  --->  Flow =     17.77 cfs


Structure ID      = TW
Structure Type    = TW SETUP, DS Channel
-----------------------------------
FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations=    30
Min. TW tolerance =   1.00 ft
Max. TW tolerance =   1.00 ft
Min. HW tolerance =   1.00 ft
Max. HW tolerance =   1.00 ft
Min.  Q tolerance =   1.00 cfs
Max.  Q tolerance =   1.00 cfs
```

File.... C:\HAESTAD\PPKW\SAMPLE\JGG APRON EXPANSION.PPW

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = 1 (Culvert-Circular)

Mannings open channel maximum capacity: 21.76 cfs
Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

NUMBER OF BARRELS = 2
EACH FLOW = SUM OF BARRELS x FLOW FOR ONE BARREL

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
37.77	.00	Free Outfall		
		Upstream HW & DNstream TW < Inv.El		
38.27	2.21	Free Outfall		
		CRIT.DEPTH CONTROL	Vh= .126ft	Dcr= .362ft CRIT.DEPTH
38.77	8.25	Free Outfall		
		CRIT.DEPTH CONTROL	Vh= .262ft	Dcr= .713ft CRIT.DEPTH
39.27	16.98	Free Outfall		
		INLET CONTROL...	Equ.1: HW =1.50	dc=1.039 Ac=1.6479
39.77	26.23	Free Outfall		
		INLET CONTROL...	Equ.1: HW =2.00	dc=1.303 Ac=2.1675
40.27	37.29	Free Outfall		
		INLET CONTROL...	Submerged: HW =2.50	
40.77	45.44	Free Outfall		
		INLET CONTROL...	Submerged: HW =3.00	
41.27	52.22	Free Outfall		
		FULL FLOW...Lfull=60.03ft	Vh=1.073ft	HL=1.980ft
41.77	57.38	Free Outfall		
		FULL FLOW...Lfull=71.14ft	Vh=1.296ft	HL=2.570ft
42.00	59.63	Free Outfall		
		FULL FLOW...Lfull=73.59ft	Vh=1.400ft	HL=2.818ft

Free Outfall?

Type.... Composite Rating Curve
Name.... OUTLET 1

File.... C:\HAESTAD\PPKW\SAMPLE\JGG APRON EXPANSION.PPW

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

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
37.77	.00	Free Outfall		None contributing
38.27	2.21	Free Outfall		1
38.77	8.25	Free Outfall		1
39.27	16.98	Free Outfall		1
39.77	26.23	Free Outfall		1
40.27	37.29	Free Outfall		1
40.77	45.44	Free Outfall		1
41.27	52.22	Free Outfall		1
41.77	57.38	Free Outfall		1
42.00	59.63	Free Outfall		1

↳ what about dwns channel flow?

INFILTRATION RATING TABLE CALCULATIONS

Infilt.(cfs) = (.5200 (in/hr) * Area) * Ku
Where: Ku = units conversion factor

W.S.Elev ft	Total Area acres	Infilt. cfs
No storage at this elevation... infiltration set to zero.		
37.77	.0020	.00
38.27	.0042	.00
38.77	.0073	.00
39.27	.0152	.01
39.77	.0309	.02
40.27	.3766	.20
40.77	1.9035	1.00
41.27	3.2558	1.71
41.77	3.7573	1.97
42.00	4.0000	2.10

Infil

Infiltration Rating?

Job File: C:\HAESTAD\PPKW\SAMPLE\JGG APRON EXP OVERALL.PPW
Rain Dir: C:\HAESTAD\PPKW\RAINFALL\

==========
JOB TITLE
==========

Williamsburg-Jamestown Airport Apron Expansion
Area 2 Drainage - Proposed Dual 18" RCP's
Williamsburg-Jamestown Airport
DOAV Project No. CS9010-19
Talbert & Bright Project No. 4205-0001
James City County Case No. SP-63-01

S/N: C21705506A87 Talbert & Bright
PondPack Ver: 7.0 (325) Compute Time: 07:34:10 Date: 02-21-2002

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = WILL-JAM.RNQ Apron

Storm Tag Name = 10 yr

Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
Storm Frequency = 10 yr
Total Rainfall Depth= 5.8000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

	Node ID		Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
	HYDRO AREA 1		HYG	3.891		12.2000	38.58	
	INLET	IN	POND	5.067		12.2000	63.96	
	INLET	OUT	POND	5.066		12.4000	41.98	34.30
Outfall	OUTFALL 1		JCT	5.066		12.4000	41.98	
	STORM AREA 2		AREA	2.708		12.2250	25.45	

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = WILL-JAM.RNQ Apron

Storm Tag Name = 10 yr

Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
Storm Frequency = 10 yr
Total Rainfall Depth= 5.8000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
ADD AREA 2	ADD	UN	2.708		12.2250	25.45	STORM AREA 2	
		DL	2.708		12.2250	25.45		
		DN	5.067		12.2000	63.96	INLET	IN
AREA 1	ADD	UN	3.891		12.2000	38.58	HYDRO AREA 1	
		DL	3.891		12.2000	38.58		
		DN	5.067		12.2000	63.96	INLET	IN
POND REACH 2	PONDrt	UN	5.067		12.2000	63.96	INLET	IN
POND REACH 2			5.066		12.4000	41.98	INLET	OUT
		DL	5.066		12.4000	41.98		
		DN	5.066		12.4000	41.98	OUTFALL 1	

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = WILL-JAM.RNQ Apron

Storm Tag Name = 100 yr

Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 8.0000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

	Node ID		Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
	HYDRO AREA 1		HYG	5.817		12.2500	44.63	
	INLET	IN	POND	7.589		12.2250	82.21	
	INLET	OUT	POND	7.587		12.5500	44.08	34.72
Outfall	OUTFALL 1		JCT	7.587		12.5500	44.08	
	STORM AREA 2		AREA	4.090		12.2250	37.85	

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = WILL-JAM.RNQ Apron

Storm Tag Name = 100 yr

Data Type, File, ID = Synthetic Storm SCSTYPES.RNF TypeII 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 8.0000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
ADD AREA 2	ADD	UN	4.090		12.2250	37.85	STORM AREA 2	
		DL	4.090		12.2250	37.85		
		DN	7.589		12.2250	82.21	INLET	IN
AREA 1	ADD	UN	5.817		12.2500	44.63	HYDRO AREA 1	
		DL	5.817		12.2500	44.63		
		DN	7.589		12.2250	82.21	INLET	IN
POND REACH 2	PONDrt	UN	7.589		12.2250	82.21	INLET	IN
POND REACH 2			7.587		12.5500	44.08	INLET	OUT
		DL	7.587		12.5500	44.08		
		DN	7.587		12.5500	44.08	OUTFALL 1	

File.... C:\HAESTAD\PPKW\SAMPLE\JGG APRON EXP OVERALL.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Open Space	61	2.700			61.00
Paved Area	98	5.200			98.00

COMPOSITE AREA & WEIGHTED CN ---> 7.900 85.35 (85)

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
Duration      = 24.0000 hrs     Rain Depth = 5.8000 in
Rain Dir      = C:\HAESTAD\PPKW\RAINFALL\
Rain File -ID = SCSTYPES.RNF - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = C:\HAESTAD\PPKW\SAMPLE\
HYG File - ID = JGG OVR.HYG - STORM AREA 2 10 yr
Tc            = .5563 hrs
Drainage Area = 7.900 acres  Runoff CN= 85

============================================
Computational Time Increment   =   .07417 hrs
Computed Peak Time             =  12.2380 hrs
Computed Peak Flow             =    25.49 cfs

Time Increment for HYG File    =    .0250 hrs
Peak Time, Interpolated Output =  12.2250 hrs
Peak Flow, Interpolated Output =    25.45 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:STORM AREA 2
              CN   =   85
              Area =       7.900 acres
              S    =   1.7647 in
              0.2S =    .3529 in

               Cumulative Runoff
              -------------------
                      4.1142 in
                       2.708 ac-ft

HYG Volume...          2.708 ac-ft (area under HYG curve)

***** UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .55627 hrs (ID: STORM AREA 2)
Computational Incr, Tm =   .07417 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =   .7491)

Unit peak,          qp =    16.09 cfs
Unit peak time      Tp =   .37085 hrs
Unit receding limb, Tr =  1.48339 hrs
Total unit time,    Tb =  1.85424 hrs
```

File.... C:\HAESTAD\PPKW\SAMPLE\JGG APRON EXP OVERALL.PPW

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
29.11	-----	.0100	.0000	.000	.000
30.00	-----	.0300	.0573	.017	.017
31.00	-----	.0600	.1324	.044	.061
32.00	-----	.1100	.2512	.084	.145
33.00	-----	.1400	.3741	.125	.270
34.00	-----	.3700	.7376	.246	.515
35.00	-----	5.0000	6.7301	2.243	2.759
36.00	-----	10.0000	22.0711	7.357	10.116
37.00	-----	15.0000	37.2475	12.416	22.532
38.00	-----	20.0000	52.3205	17.440	39.972

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

File.... C:\HAESTAD\PPKW\SAMPLE\JGG APRON EXP OVERALL.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 29.11 ft
Increment = .50 ft
Max. Elev.= 38.00 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
Culvert-Circular	1	--->	TW	29.110	38.000
TW SETUP, DS Channel					

File.... C:\HAESTAD\PPKW\SAMPLE\JGG APRON EXP OVERALL.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = 1
Structure Type    = Culvert-Circular
-----------------------------------
No. Barrels       =         2
Barrel Diameter   =    1.5000 ft
Upstream Invert   =     29.11 ft
Dnstream Invert   =     19.66 ft
Horiz. Length     =    170.00 ft
Barrel Length     =    170.26 ft
Barrel Slope      =    .05559 ft/ft

OUTLET CONTROL DATA...
Mannings n        =     .0130
Ke                =     .2000  (forward entrance loss)
Kb                =   .018213  (per ft of full flow)
Kr                =     .2000  (reverse entrance loss)
HW Convergence    =      .001  +/- ft

INLET CONTROL DATA...
Equation form     =         1
Inlet Control K   =     .0078
Inlet Control M   =    2.0000
Inlet Control c   =    .02920
Inlet Control Y   =     .7400
T1 ratio (HW/D)   =     1.108
T2 ratio (HW/D)   =     1.179
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 = 30.77 ft ---> Flow = 7.58 cfs
At T2 Elev = 30.88 ft ---> Flow = 8.66 cfs

```
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
```

File.... C:\HAESTAD\PPKW\SAMPLE\JGG APRON EXP OVERALL.PPW

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = 1 (Culvert-Circular)

Mannings open channel maximum capacity: 26.64 cfs
Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

NUMBER OF BARRELS = 2
EACH FLOW = SUM OF BARRELS x FLOW FOR ONE BARREL

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
29.11	.00	Free Outfall		
		Upstream HW & DNstream TW < Inv.El		
29.61	1.78	Free Outfall		
		CRIT.DEPTH CONTROL Vh= .124ft Dcr= .351ft CRIT.DEPTH		
30.11	6.47	Free Outfall		
		CRIT.DEPTH CONTROL Vh= .263ft Dcr= .685ft CRIT.DEPTH		
30.61	12.92	Free Outfall		
		CRIT.DEPTH CONTROL Vh= .431ft Dcr= .983ft CRIT.DEPTH		
31.11	19.90	Free Outfall		
		CRIT.DEPTH CONTROL Vh= .653ft Dcr= 1.216ft CRIT.DEPTH		
31.61	24.75	Free Outfall		
		INLET CONTROL... Submerged: HW =2.50		
32.11	28.75	Free Outfall		
		INLET CONTROL... Submerged: HW =3.00		
32.61	32.26	Free Outfall		
		INLET CONTROL... Submerged: HW =3.50		
33.11	35.42	Free Outfall		
		INLET CONTROL... Submerged: HW =4.00		
33.61	38.31	Free Outfall		
		INLET CONTROL... Submerged: HW =4.50		
34.11	41.01	Free Outfall		
		INLET CONTROL... Submerged: HW =5.00		
34.61	43.54	Free Outfall		
		INLET CONTROL... Submerged: HW =5.50		
35.11	45.93	Free Outfall		
		INLET CONTROL... Submerged: HW =6.00		
35.61	48.20	Free Outfall		
		INLET CONTROL... Submerged: HW =6.50		
36.11	50.37	Free Outfall		
		INLET CONTROL... Submerged: HW =7.00		

File.... C:\HAESTAD\PPKW\SAMPLE\JGG APRON EXP OVERALL.PPW

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = 1 (Culvert-Circular)

Mannings open channel maximum capacity: 26.64 cfs
Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

NUMBER OF BARRELS = 2
EACH FLOW = SUM OF BARRELS x FLOW FOR ONE BARREL

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
36.61	52.45	Free Outfall		INLET CONTROL... Submerged: HW =7.50
37.11	54.45	Free Outfall		INLET CONTROL... Submerged: HW =8.00
37.61	55.46	Free Outfall		FULL FLOW...Lfull=170.03ft Vh=3.827ft HL=16.442ft
38.00	56.11	Free Outfall		FULL FLOW...Lfull=170.03ft Vh=3.917ft HL=16.832ft

File.... C:\HAESTAD\PPKW\SAMPLE\JGG APRON EXP OVERALL.PPW

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

WS Elev, Total Q		Notes		
		Converge		
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
29.11	.00	Free Outfall		None contributing
29.61	1.78	Free Outfall		1
30.11	6.47	Free Outfall		1
30.61	12.92	Free Outfall		1
31.11	19.90	Free Outfall		1
31.61	24.75	Free Outfall		1
32.11	28.75	Free Outfall		1
32.61	32.26	Free Outfall		1
33.11	35.42	Free Outfall		1
33.61	38.31	Free Outfall		1
34.11	41.01	Free Outfall		1
34.61	43.54	Free Outfall		1
35.11	45.93	Free Outfall		1
35.61	48.20	Free Outfall		1
36.11	50.37	Free Outfall		1
36.61	52.45	Free Outfall		1
37.11	54.45	Free Outfall		1
37.61	55.46	Free Outfall		1
38.00	56.11	Free Outfall		1

INFILTRATION RATING TABLE CALCULATIONS

Infilt.(cfs) = (.0100 (in/hr) * Area) * Ku
Where: Ku = units conversion factor

W.S.Elev ft	Total Area acres	Infilt. cfs
No storage at this elevation... infiltration set to zero.		
29.11	.0100	.00
29.61	.0199	.00
30.11	.0328	.00
30.61	.0471	.00
31.11	.0648	.00
31.61	.0887	.00
32.11	.1131	.00
32.61	.1279	.00
33.11	.1599	.00
33.61	.2673	.00
34.11	.6199	.01
34.61	2.5639	.03
35.11	5.4660	.06
35.61	7.8459	.08
36.11	10.5006	.11
36.61	12.9298	.13
37.11	15.5149	.16
37.61	17.9646	.18
38.00	20.0000	.20

TRANSMITTAL SHEET

ENVIRONMENTAL → STORMWATER

Project: Williamsburg-Jamestown Airport, Apron Expansion

County Plan No. SP-63-01

Assigned BMP No.: CC031

BMP Type: INFIL Trench

RECEIVED ON
FEB 11 '10
Stormwater Division

Information Enclosed:

- ☐ Record Drawings (Asbuilts)
- ☐ Construction Certification
- ☒ Computations
- ☐ Other :

Found this report. I sifted through it for critical info. Please put this in CC031 file, if there is one in SWD files.

(CC031 is in GIS + database.)

Name: Scott J Thomas

Date: 2/10/10

Signature: [signature]

Date Record Created:

Created By:

WS_BMPNO: CC031

Print Form

PRINTED ON:
Friday, March 12, 2010
12:22:56 PM

WATERSHED	CC
BMP ID NO	031
PLAN NO	SP-63-01
TAX PARCEL	(48-2)(1-5A)
PIN NO	4820100005A
CONSTRUCTION DATE	
PROJECT NAME	Williamsburg-Jamestown Airport
FACILITY LOCATION	100 Marclay Rd
CITY-STATE	Williamsburg VA
CURRENT OWNER	Williamsburg-Jamestown Airport
OWNER ADDRESS	100 Marclay Rd
OWNER ADDRESS 2	
CITY-STATE-ZIP CODE	Williamsburg, VA 23185
OWNER PHONE	
MAINT AGREEMENT	No
EMERG ACTION PLAN	No

Get Last BMP No

Return to Menu

MAINTENANCE PLAN	No	CTRL STRUC DESC	
SITE AREA acre	126.63	CTRL STRUC SIZE inches	
LAND USE		OTLT BARRL DESC	
old BMP TYP	Infiltration Trench	OTLT BARRL SIZE inch	
JCC BMP CODE	C2 Infiltration Trench 1.0		
POINT VALUE		EMERG SPILLWAY	No
		DESIGN HW ELEV	
		PERM POOL ELEV	
SVC DRAIN AREA acres		2-YR OUTFLOW cfs	0.00
		10-YR OUTFLOW cfs	0.00
		REC DRAWING	No
SERVICE AREA DESCRI			
IMPERV AREA acres	0.00	CONSTR CERTIF	No
RECV STREAM			
EXT DET-WQ-CTRL	No	LAST INSP DATE	
WTR QUAL VOL acre-ft		INTERNAL RATING	
CHAN PROT CTRL	No	MISC/COMMENTS	
CHAN PROT VOL acre-ft			
SW/FLOOD CONTROL	No	Apron Expansion	
GEOTECH REPORT	No		

Inspected by:

Additional Comments: