DRAINAGE PLAN

STONEHEDGE 3RD ADDITION

WICHITA, SEDGWICK COUNTY, KANSAS

Prepared By

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January 9, 2004

NARRATIVE

This report provides information and supporting documentation to support the "Drainage Plan" for the property located in the Northwest Quarter of Section 32, T-26-S, R-2-E in Sedgwick County, Kansas.

The "Drainage Plan" being submitted herein in intended to serve as a guide for the design of parking and storm water sewer improvements to the proposed development. Modifications to structures, pipes, etc. may be made as necessary during the final design in order to obtain the most economical design and construction possible.

The plat is 2.85 acre two lot subdivision that will fill in part of an existing pond and place a reserve around the remaining pond. The site is a part of an overall drainage basin of 75.8 acres draining to the single cell 8' x 3' reinforced concrete box culvert beneath Rock Road. The land use is largely industrial office parks and storage facilities. Sheet two of the drainage plan delineates the entire basin of which approximately 10.5 acres is intercepted by upstream by-pass stormwater sewer inlets that drain into the pond three-hundred and fifty feet south of our site. The effective drainage area is 65.3 acres. The storage volume necessary to detain the 100-yr storm was calculated based on the capacity of the box culvert using HY-8. The box has enough capacity to flush the six hour storm, but a high intensity fifteen minute time of concentration storm event would require 1.8 ac.-ft. of storage volume. See sheet one of the hand calculations for details. The pond's existing storage volume is 3.69 ac-ft. We do not want to diminish the storage volume to the 1.8 ac.-ft. that would be required, but match or exceed the existing storage volume by mitigating the original area lost with a dry detention pond east of the site. See tables below.

EXIST. POND STORAGE VOL.

ELEV.	AREA	VOL.
(city)	(ac.)	ac.-ft
195	0.71	0.75
196	0.79	0.84
197	0.89	0.97
198	1.04	1.13
199	1.22	
Total		3.69

PROP. POND w/MITIGATED AREA

ELEV.	AREA	VOL.
(city)	(ac.)	ac.-ft
195	0.50	0.65
196	0.80	0.86
197	0.91	0.98
198	1.05	1.21
199	1.36	
Total		3.70

The pond will only receive direct runoff from approximately ten acres of sheet flow, one 30" RCP that drains the back parking area of the business north of our site (LSI, Inc.) and four type II by-pass inlets. The by-pass inlet pipes will be extended from their existing position and discharge at the face to the proposed retaining wall.

The dry detention pond will be connected to the existing pond by a 30" RCP culvert that will have a drive that connects the existing office park with Thirty-fifth Street North. The culvert's capacity has been calculated using HY-8. See HY-8 summery sheet for details.

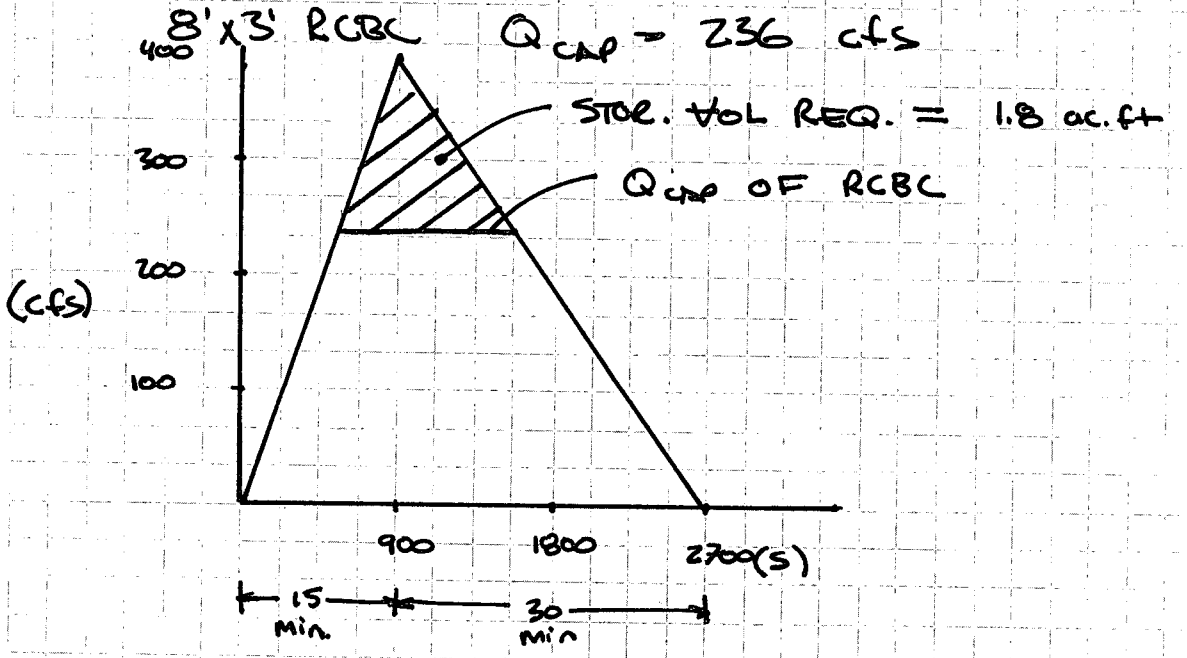
In the event that there is blockage in the box culvert or obstructions downstream the proposed east panhandle area of lot one will be depressed to an elevation no greater than a 199.0 to allow for the pond to overtop into the street right-of-way. The lowest elevation of the existing structures adjacent to the pond is 201.4.

∴ DRAINAGE AREA @ 8'X3' RCBC ROCK ROAD

TOTAL D.A. = 75.8 ac.

— APPROX. 10.85 ac. INTERCEPTED BY U/S SWS SYSTEM @ DRAINS TO POND 350 FEET SOUTH OF RESERVE H.

EFFECTIVE D.A. = 65.3 ac.
T_c = 15 min
C_5 = .65
C_{100} = .80
i_5 = 4.56
i_{100} = 7.37
Q_5 = 194 cfs
Q_{100} = 385 cfs



TRY SIX HOUR STORM DURATION.

D.A. = 65.3 i_{100} = .99 C = .80
Q_{100} = 52 cfs

THE EXIST. BOX HAS SUFFICIENT CAPACITY TO PASS THE 6 HR PEAK FLOW RATE.

∴ SHORT HIGH INTENSITY STORM EVENT

PROP. 30" RCP

CURRENT DATE: 10-29-2003
CURRENT TIME: 08:56:32

FILE DATE: 10-29-2003
FILE NAME: STNHNG4

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FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1
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CULV NO.	SITE DATA: INLET ELEV. (ft)	SITE DATA: OUTLET ELEV. (ft)	SITE DATA: CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS / SHAPE / MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	195.00	194.70	68.00	1 RCP	2.50	2.50	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: STNHNG4 DATE: 10-29-2003

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
195.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
196.48	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.00	1
197.21	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.00	1
197.95	30.0	30.0	0.0	0.0	0.0	0.0	0.0	0.00	1
198.82	40.0	40.0	0.0	0.0	0.0	0.0	0.0	0.00	1
200.01	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.00	1
201.04	60.0	57.2	0.0	0.0	0.0	0.0	0.0	2.33	8
201.12	70.0	57.7	0.0	0.0	0.0	0.0	0.0	11.93	7
201.17	80.0	58.0	0.0	0.0	0.0	0.0	0.0	21.34	5
201.22	90.0	58.4	0.0	0.0	0.0	0.0	0.0	31.23	5
201.27	100.0	58.6	0.0	0.0	0.0	0.0	0.0	40.66	4
201.00	56.9	56.9	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: STNHNG4 DATE: 10-29-2003

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
195.00	0.000	0.00	0.00	0.00
196.48	0.000	10.00	0.00	0.00
197.21	0.000	20.00	0.00	0.00
197.95	0.000	30.00	0.00	0.00
198.82	0.000	40.00	0.00	0.00
200.01	0.000	50.00	0.00	0.00
201.04	-0.002	60.00	0.50	0.83
201.12	-0.002	70.00	0.38	0.54
201.17	-0.004	80.00	0.61	0.76
201.22	-0.003	90.00	0.41	0.46
201.27	-0.005	100.00	0.70	0.70

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 10-29-2003
CURRENT TIME: 08:56:32

FILE DATE: 10-29-2003
FILE NAME: STNHNG4

PERFORMANCE CURVE FOR CULVERT 1 - 1(2.50 (ft) BY 2.50 (ft)) RCP

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	195.00	0.00	0.00	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
10.00	196.48	1.48	1.48	1-S2n	1.00	1.05	0.99	0.86	5.51	1.37
20.00	197.21	2.21	2.21	1-S2n	1.51	1.52	1.42	1.22	6.97	1.65
30.00	197.95	2.91	2.95	2-M2c	2.11	1.86	1.86	1.49	7.68	1.84
40.00	198.82	3.82	3.74	2-M2c	2.50	2.11	2.11	1.70	9.07	1.99
50.00	200.01	5.01	4.94	2-M2c	2.50	2.32	2.32	1.89	10.57	2.11
57.18	201.04	6.04	5.85	2-M2c	2.50	2.48	2.48	2.05	11.71	2.21
57.69	201.12	6.12	5.91	2-M2c	2.50	2.49	2.49	2.20	11.79	2.30
58.05	201.17	6.17	5.96	2-M2c	2.50	2.49	2.49	2.34	11.84	2.38
58.36	201.22	6.22	6.00	6-S2n	2.50	2.50	2.40	2.47	12.14	2.45
58.64	201.26	6.26	6.12	4-S2n	2.50	2.50	2.40	2.59	12.20	2.52

El. inlet face invert 195.00 ft El. outlet invert 194.70 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	195.00 ft
OUTLET STATION	68.00 ft
OUTLET ELEVATION	194.70 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0044
CULVERT LENGTH ALONG SLOPE	68.00 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	CIRCULAR
BARREL DIAMETER	2.50 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	GROOVED END PROJECTION
INLET DEPRESSION	NONE

CURRENT DATE: 10-29-2003
CURRENT TIME: 08:56:32

FILE DATE: 10-29-2003
FILE NAME: STNHNG4

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TAILWATER

****

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	5.00 ft
SIDE SLOPE H/V (X:1)	4.0
CHANNEL SLOPE V/H (ft/ft)	0.002
MANNING'S n (.01-0.1)	0.030
CHANNEL INVERT ELEVATION	194.70 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	194.70 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	194.70	0.000	0.00	0.00	0.00
10.00	195.56	0.259	0.86	1.37	0.08
20.00	195.92	0.264	1.22	1.65	0.11
30.00	196.19	0.267	1.49	1.84	0.14
40.00	196.40	0.269	1.70	1.99	0.16
50.00	196.59	0.270	1.89	2.11	0.18
60.00	196.75	0.272	2.05	2.21	0.19
70.00	196.90	0.273	2.20	2.30	0.21
80.00	197.04	0.274	2.34	2.38	0.22
90.00	197.17	0.275	2.47	2.45	0.23
100.00	197.29	0.276	2.59	2.52	0.24

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ROADWAY OVERTOPPING DATA

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ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	72.00 ft
CREST LENGTH	100.00 ft
OVERTOPPING CREST ELEVATION	201.00 ft

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8'x3'-RCBC EXISTING CONDITIONS
1

CURRENT DATE: 01-09-2004
CURRENT TIME: 11:25:39

FILE DATE: 01-09-2004
FILE NAME: STNHNG3

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FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULV NO.	SITE DATA: INLET ELEV. (ft)	SITE DATA: OUTLET ELEV. (ft)	SITE DATA: CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS / SHAPE / MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	191.50	191.30	110.00	1 RCB	8.00	3.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: STNHNG3 DATE: 01-09-2004

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
191.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
193.07	40.0	40.0	0.0	0.0	0.0	0.0	0.0	0.00	1
193.97	80.0	80.0	0.0	0.0	0.0	0.0	0.0	0.00	1
194.76	120.0	120.0	0.0	0.0	0.0	0.0	0.0	0.00	1
195.62	160.0	160.0	0.0	0.0	0.0	0.0	0.0	0.00	1
196.68	200.0	200.0	0.0	0.0	0.0	0.0	0.0	0.00	1
197.95	240.0	235.6	0.0	0.0	0.0	0.0	0.0	3.01	11
198.21	280.0	227.9	0.0	0.0	0.0	0.0	0.0	50.94	5
198.38	320.0	216.4	0.0	0.0	0.0	0.0	0.0	101.93	4
198.54	360.0	203.4	0.0	0.0	0.0	0.0	0.0	155.43	4
198.62	385.0	194.7	0.0	0.0	0.0	0.0	0.0	186.80	3
197.90	236.1	236.1	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: STNHNG3 DATE: 01-09-2004

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
191.50	0.000	0.00	0.00	0.00
193.07	0.000	40.00	0.00	0.00
193.97	0.000	80.00	0.00	0.00
194.76	0.000	120.00	0.00	0.00
195.62	0.000	160.00	0.00	0.00
196.68	0.000	200.00	0.00	0.00
197.95	-0.008	240.00	1.39	0.58
198.21	-0.010	280.00	1.12	0.40
198.38	-0.004	320.00	1.69	0.53
198.54	-0.002	360.00	1.20	0.33
198.62	-0.006	385.00	3.46	0.90

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 01-09-2004
CURRENT TIME: 11:25:39

FILE DATE: 01-09-2004
FILE NAME: STNHNG3

PERFORMANCE CURVE FOR CULVERT 1 - 1(8.00 (ft) BY 3.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FULL FLOW HDS5 <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	191.50	0.00	0.00	0-NF	0.00	0.00	0.00	0.04	0.00	0.00
40.00	193.07	1.57	1.02	6-FFt	1.06	0.92	1.06	1.13	4.71	4.06
80.00	193.97	2.47	1.90	6-FFt	1.69	1.46	1.69	1.77	5.92	5.14
120.00	194.76	3.26	2.86	6-FFt	2.24	1.92	2.24	2.32	6.70	5.84
160.00	195.62	4.12	3.95	6-FFt	3.00	2.32	2.24	2.83	8.94	6.36
200.00	196.68	5.13	5.18	4-FFt	3.00	2.69	3.00	3.32	8.33	6.78
235.59	197.94	6.22	6.44	4-FFt	3.00	3.00	3.00	3.78	9.82	7.13
227.94	198.21	5.97	6.71	4-FFt	3.00	2.94	3.00	4.23	9.50	7.42
216.38	198.38	5.61	6.88	4-FFt	3.00	2.84	3.00	4.67	9.02	7.68
203.37	198.53	5.23	7.03	4-FFt	3.00	2.72	3.00	5.10	8.47	7.90
194.74	198.62	4.99	7.12	4-FFt	3.00	2.65	3.00	5.37	8.11	8.03

El. inlet face invert 191.50 ft El. outlet invert 191.30 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	191.50 ft
OUTLET STATION	110.00 ft
OUTLET ELEVATION	191.30 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0018
CULVERT LENGTH ALONG SLOPE	110.00 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	8.00 ft
BARREL RISE	3.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (90-45 DEG.)
INLET DEPRESSION	NONE

CURRENT DATE: 01-09-2004
CURRENT TIME: 11:25:39

FILE DATE: 01-09-2004
FILE NAME: STNHNG3

****

TAILWATER

****

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	9.00 ft
SIDE SLOPE H/V (X:1)	0.0
CHANNEL SLOPE V/H (ft/ft)	0.002
MANNING'S n (.01-0.1)	0.013
CHANNEL INVERT ELEVATION	191.34 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	191.30 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	191.34	0.000	0.00	0.00	0.00
40.00	192.43	0.685	1.09	4.06	0.10
80.00	193.07	0.688	1.73	5.14	0.16
120.00	193.62	0.681	2.28	5.84	0.21
160.00	194.13	0.671	2.79	6.36	0.26
200.00	194.62	0.660	3.28	6.78	0.31
240.00	195.08	0.650	3.74	7.13	0.35
280.00	195.53	0.639	4.19	7.42	0.39
320.00	195.97	0.629	4.63	7.68	0.43
360.00	196.40	0.619	5.06	7.90	0.47
385.00	196.67	0.613	5.33	8.03	0.50

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ROADWAY OVERTOPPING DATA

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ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	72.00 ft
CREST LENGTH	100.00 ft
OVERTOPPING CREST ELEVATION	197.90 ft

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PROPOSED 8'x3' RCBC

CURRENT DATE: 01-09-2004
CURRENT TIME: 11:28:54

FILE DATE: 01-09-2004
FILE NAME: STNHNG

****
FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULV NO.	SITE DATA: INLET ELEV. (ft)	SITE DATA: OUTLET ELEV. (ft)	SITE DATA: CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS / SHAPE / MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	192.00	191.30	210.00	1 RCB	8.00	3.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: STNHNG DATE: 01-09-2004

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
192.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
195.69	40.0	40.0	0.0	0.0	0.0	0.0	0.0	0.00	1
196.23	80.0	80.0	0.0	0.0	0.0	0.0	0.0	0.00	1
196.68	120.0	120.0	0.0	0.0	0.0	0.0	0.0	0.00	1
197.09	160.0	160.0	0.0	0.0	0.0	0.0	0.0	0.00	1
197.46	200.0	200.0	0.0	0.0	0.0	0.0	0.0	0.00	1
198.63	240.0	240.0	0.0	0.0	0.0	0.0	0.0	0.00	1
199.26	280.0	246.2	0.0	0.0	0.0	0.0	0.0	32.52	5
199.48	320.0	238.6	0.0	0.0	0.0	0.0	0.0	79.99	4
199.66	360.0	229.7	0.0	0.0	0.0	0.0	0.0	129.46	4
199.75	385.0	223.7	0.0	0.0	0.0	0.0	0.0	158.57	3
199.00	248.6	248.6	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: STNHNG DATE: 01-09-2004

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
192.00	0.000	0.00	0.00	0.00
195.69	0.000	40.00	0.00	0.00
196.23	0.000	80.00	0.00	0.00
196.68	0.000	120.00	0.00	0.00
197.09	0.000	160.00	0.00	0.00
197.46	0.000	200.00	0.00	0.00
198.63	0.000	240.00	0.00	0.00
199.26	-0.005	280.00	1.31	0.47
199.48	-0.004	320.00	1.45	0.45
199.66	-0.002	360.00	0.87	0.24
199.75	-0.006	385.00	2.76	0.72

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 01-09-2004
CURRENT TIME: 11:28:54

FILE DATE: 01-09-2004
FILE NAME: STNHNG

PERFORMANCE CURVE FOR CULVERT 1 - 1(8.00 (ft) BY 3.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FULL FLOW HDS5 <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	194.77	0.00	0.00	0-NF	0.00	0.00	0.00	0.04	0.00	0.00
40.00	195.69	3.69	0.53	6-FFt	0.87	0.92	0.87	1.13	5.73	4.06
80.00	196.23	4.23	1.46	6-FFt	1.38	1.46	1.38	1.77	7.27	5.14
120.00	196.68	4.68	2.51	6-FFt	1.81	1.92	1.81	2.32	8.27	5.84
160.00	197.09	5.09	3.71	6-FFt	2.21	2.32	2.21	2.83	9.04	6.36
200.00	197.46	5.46	5.08	4-FFt	2.59	2.69	2.59	3.32	9.65	6.78
240.00	198.63	6.36	6.63	4-FFt	3.00	3.00	3.00	3.78	10.00	7.13
246.17	199.26	6.58	7.26	4-FFt	3.00	3.00	3.00	4.23	10.26	7.42
238.56	199.48	6.32	7.48	4-FFt	3.00	3.00	3.00	4.67	9.94	7.68
229.66	199.65	6.02	7.65	4-FFt	3.00	2.95	3.00	5.10	9.57	7.90
223.67	199.75	5.83	7.75	4-FFt	3.00	2.90	3.00	5.37	9.32	8.03

El. inlet face invert 192.00 ft El. outlet invert 191.30 ft
El. inlet throat invert 0.00 ft El. inlet crest 194.77 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	194.70 ft
OUTLET STATION	210.00 ft
OUTLET ELEVATION	191.30 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0033
CULVERT LENGTH ALONG SLOPE	210.00 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	8.00 ft
BARREL RISE	3.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (90-45 DEG.)
INLET DEPRESSION	YES

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IMPROVED INLET FOR CULVERT 1 - 1(8.00 (ft) BY 3.00 (ft)) RCB

DIS-CHARGE Flow (cfs)	HEAD-WATER Elev. (ft)	INLET CONTROL Depth (ft)	OUTLET CONTROL Depth (ft)	FLOW TYPE <F4>	CREST CONTROL Elev. (ft)	FACE CONTROL Elev. (ft)	THROAT CONTROL Elev. (ft)	TAILWATER Elev. (ft)
0	194.77	0.00	0.00	0-NF	194.77	192.00	0.00	191.34
40	195.69	3.69	0.53	6-FFt	195.69	193.57	0.00	192.43
80	196.23	4.23	1.46	6-FFt	196.23	194.46	0.00	193.07
120	196.68	4.68	2.51	6-FFt	196.68	195.26	0.00	193.62
160	197.09	5.09	3.71	6-FFt	197.09	196.11	0.00	194.13
200	197.46	5.46	5.08	4-FFt	197.46	197.13	0.00	194.62
240	198.63	6.36	6.63	4-FFt	197.81	198.36	0.00	195.08
246	199.26	6.58	7.26	4-FFt	197.86	198.58	0.00	195.53
239	199.48	6.32	7.48	4-FFt	197.80	198.32	0.00	195.97
230	199.65	6.02	7.65	4-FFt	197.72	198.02	0.00	196.40
224	199.75	5.83	7.75	4-FFt	197.67	197.83	0.00	196.67

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****
********** TAILWATER **********
****

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	9.00 ft
SIDE SLOPE H/V (X:1)	0.0
CHANNEL SLOPE V/H (ft/ft)	0.002
MANNING'S n (.01-0.1)	0.013
CHANNEL INVERT ELEVATION	191.34 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	191.30 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	191.34	0.000	0.00	0.00	0.00
40.00	192.43	0.685	1.09	4.06	0.10
80.00	193.07	0.688	1.73	5.14	0.16
120.00	193.62	0.681	2.28	5.84	0.21
160.00	194.13	0.671	2.79	6.36	0.26
200.00	194.62	0.660	3.28	6.78	0.31
240.00	195.08	0.650	3.74	7.13	0.35
280.00	195.53	0.639	4.19	7.42	0.39
320.00	195.97	0.629	4.63	7.68	0.43
360.00	196.40	0.619	5.06	7.90	0.47
385.00	196.67	0.613	5.33	8.03	0.50

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********** ROADWAY OVERTOPPING DATA **********
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ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	190.00 ft
CREST LENGTH	80.00 ft
OVERTOPPING CREST ELEVATION	199.00 ft

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