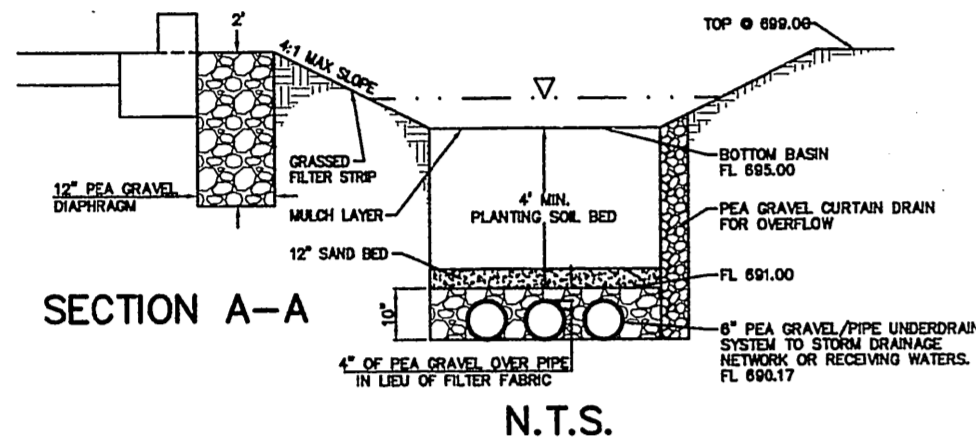


SAM'S CLUB BIORETENTION

NORTH
SCALE: 1"=60



SECTION A-A

N.T.S.

Sam's Store Bioretention Volume Calculations

Volume calculation formula: ISWM Section 1.2.3.2
 $WQ_v = [1.5R_p A] / 12$ $R_p = 0.05 + 0.008 I$, I is % impervious cover

Drainage area tabulation:

Acres	Drainage Area Designation
1.07	B651-A
0.26	B652-A
0.25	B652-B
0.77	B653-C
0.64	B653-A
0.81	B654-A
0.37	B654-B
0.29	B654-C
0.07	B654-D
1.28	B654-E
7.31	Total drainage area acres
-2.11	less acres in grass areas
5.20	impervious acres for treatment

WQ Volume Calculations:

5.20 retail-comm. Ac.at 90% impervious $V = [1.5(5.20)(60)] / 12 = 0.96$ acre-feet
 Total storage volume required = 0.96 acre-feet

SAM'S CLUB BIORETENTION BASIN VOLUME CALCULATIONS

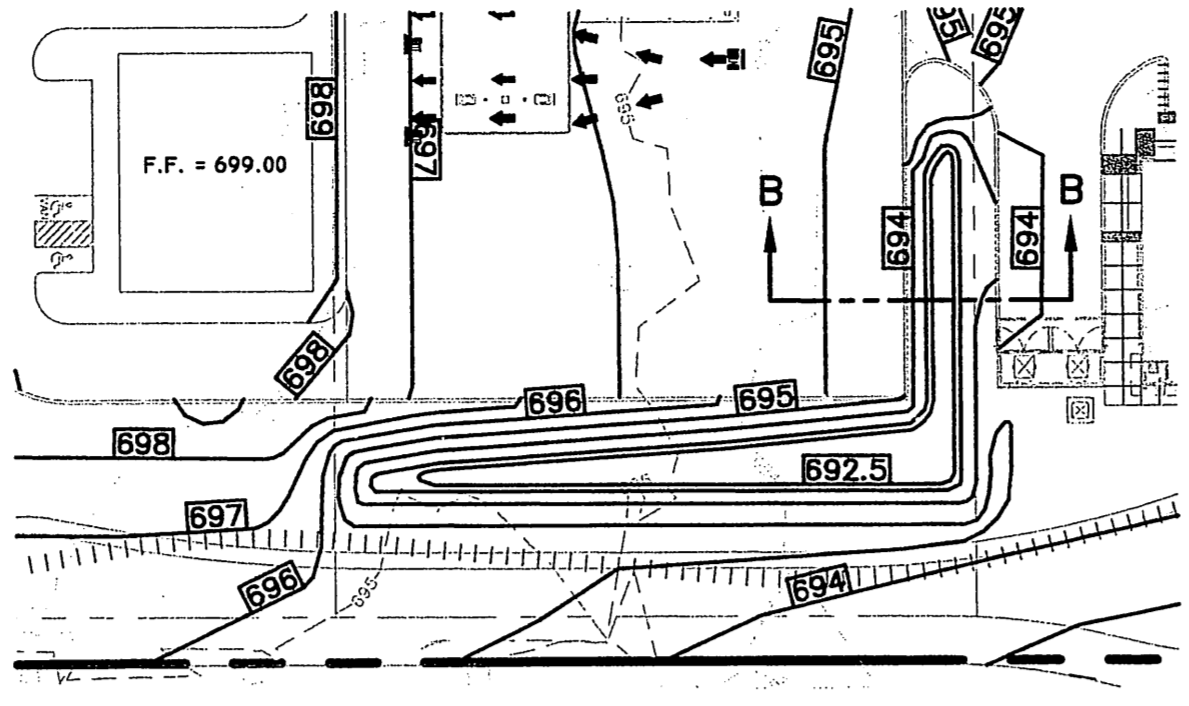
Elevation (ft)	Planimeter (sq-ft)	Area (acres)	A1+A2+sqg(A1*A2) (ac-ft)	Volume (ac-ft)	Volume Sum (ac-ft)
692.50	690	0.062	0.000	0.00	0.00
693.00	940	0.093	0.203	0.31	0.31
694.00	1,500	0.136	0.397	1.01	1.32
695.00	3,000	0.271	0.682	1.89	3.20
695.50	5,000	0.432	0.932	1.64	4.83

SAM'S BIORETENTION OUTLET STRUCTURE INPUT DATA

Structure ID = 7
 Structure Type = Inlet Box
 # of Openings = 1
 Invert Elev. = 694.00 ft
 Orifice Area = 16.000 sq-ft
 Orifice Coeff. = 0.60
 Weir Length = 18.00 ft
 Weir Coeff. = 3.000

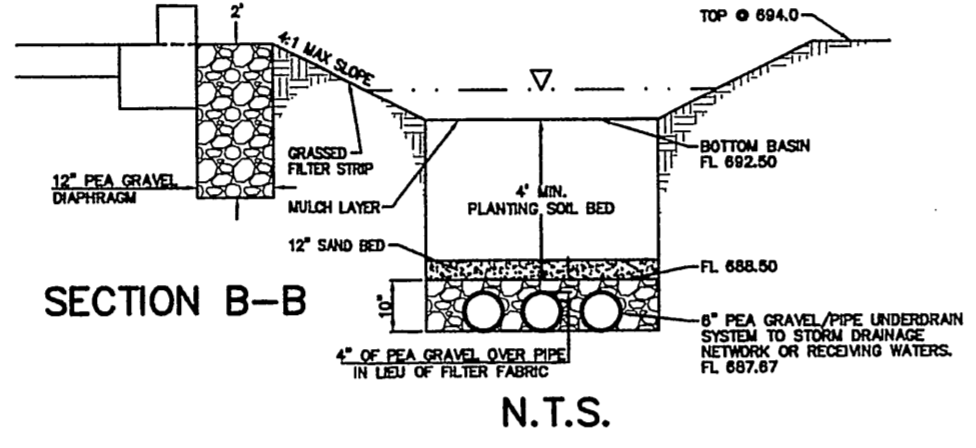
**** COMPOSITE OUTFLOW SUMMARY ****

WS Elev., Total Q	Elev.	Q	TS Elev	Error	Notes
692.50	0.00	Free Outfall	None contributing		
693.00	0.00	Free Outfall	None contributing		
693.25	0.00	Free Outfall	None contributing		
693.50	0.00	Free Outfall	None contributing		
693.75	0.00	Free Outfall	None contributing		
694.00	0.00	Free Outfall	None contributing		
694.25	4.50	Free Outfall	6		
694.50	12.73	Free Outfall	6		
694.75	23.38	Free Outfall	6		
695.00	36.00	Free Outfall	6		
695.25	48.43	Free Outfall	6		
695.50	53.00	Free Outfall	6		



SAM'S GAS BIORETENTION

NORTH
SCALE: 1"=60



SECTION B-B

N.T.S.

Sam's Gas Bioretention Volume Calculations

Volume calculation formula: ISWM Section 1.2.3.2
 $WQ_v = [1.5R_p A] / 12$ $R_p = 0.05 + 0.008 I$, I is % impervious cover

Drainage area tabulation:

Acres	Drainage Area Designation
1.28	B651-E
1.28	total drainage area acres
-0.31	less acres in grass areas
0.97	impervious acres for treatment

WQ Volume Calculations:

0.97 retail-comm. Ac.at 90% impervious $V = [1.5(0.97)(60)] / 12 = 0.10$ acre-feet
 Total storage volume required = 0.10 acre-feet

SAM'S GAS BIORETENTION BASIN VOLUME CALCULATIONS

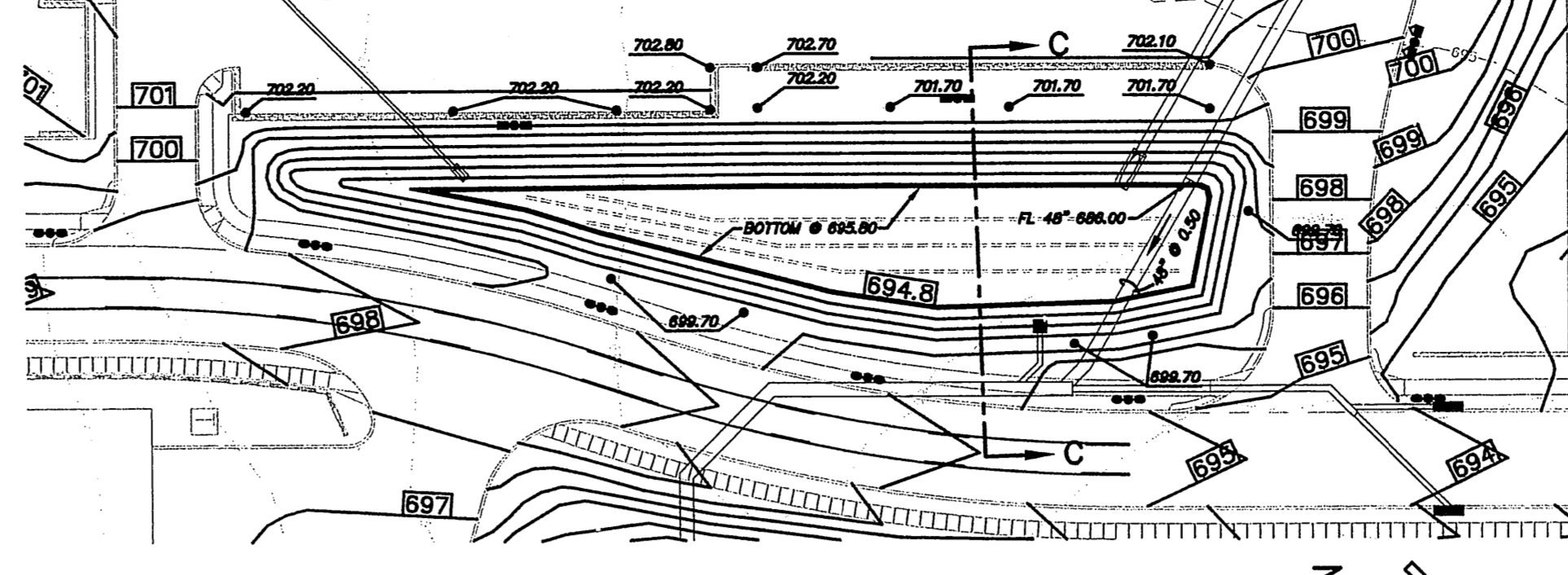
Elevation (ft)	Planimeter (sq-ft)	Area (acres)	A1+A2+sqg(A1*A2) (ac-ft)	Volume (ac-ft)	Volume Sum (ac-ft)
692.50	690	0.062	0.000	0.00	0.00
693.00	940	0.093	0.203	0.31	0.31
694.00	1,500	0.136	0.397	1.01	1.32
695.00	3,000	0.271	0.682	1.89	3.20
695.50	5,000	0.432	0.932	1.64	4.83

SAM'S GAS BIORETENTION OUTLET STRUCTURE INPUT DATA

Structure ID = 6
 Structure Type = Inlet Box
 # of Openings = 1
 Invert Elev. = 694.00 ft
 Orifice Area = 9.0000 sq-ft
 Orifice Coeff. = 0.60
 Weir Length = 18.00 ft
 Weir Coeff. = 3.000

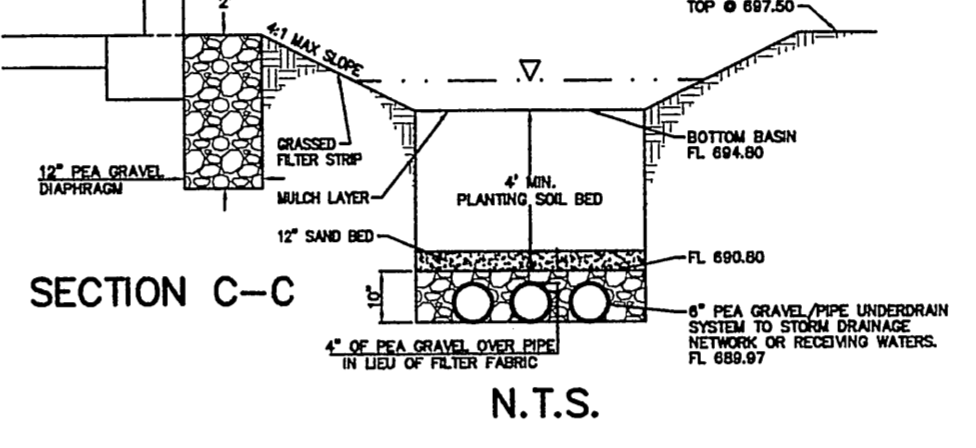
**** COMPOSITE OUTFLOW SUMMARY ****

WS Elev., Total Q	Elev.	Q	TS Elev	Error	Notes
692.50	0.00	Free Outfall	None contributing		
693.00	0.00	Free Outfall	None contributing		
693.25	0.00	Free Outfall	None contributing		
693.50	0.00	Free Outfall	None contributing		
693.75	0.00	Free Outfall	None contributing		
694.00	0.00	Free Outfall	None contributing		
694.25	4.50	Free Outfall	6		
694.50	12.73	Free Outfall	6		
694.75	23.38	Free Outfall	6		
695.00	36.00	Free Outfall	6		
695.25	48.43	Free Outfall	6		
695.50	53.00	Free Outfall	6		



WAL-MART EAST BIORETENTION

NORTH
SCALE: 1"=60



SECTION C-C

N.T.S.

W-M Store (East) Bioretention Volume Calculations

Volume calculation formula: ISWM Section 1.2.3.2
 $WQ_v = [1.5R_p A] / 12$ $R_p = 0.05 + 0.008 I$, I is % impervious cover

Drainage area tabulation:

Acres	Drainage Area Designation
1.09	B657-A
0.08	B657-B
1.50	B657-C
0.11	B657-D
0.73	B657-E
0.50	B657-F
0.25	B657-G
0.18	B657-H
1.79	B658
0.04	B659-A
0.25	B659-B
6.32	total drainage area acres
-0.61	less acres in grass areas
5.71	impervious acres for treatment

WQ Volume Calculations:

5.71 retail-comm. Ac.at 90% impervious $V = [1.5(5.71)(60)] / 12 = 0.61$ acre-feet
 Total storage volume required = 0.61 acre-feet

W-M EAST BIORETENTION BASIN VOLUME CALCULATIONS

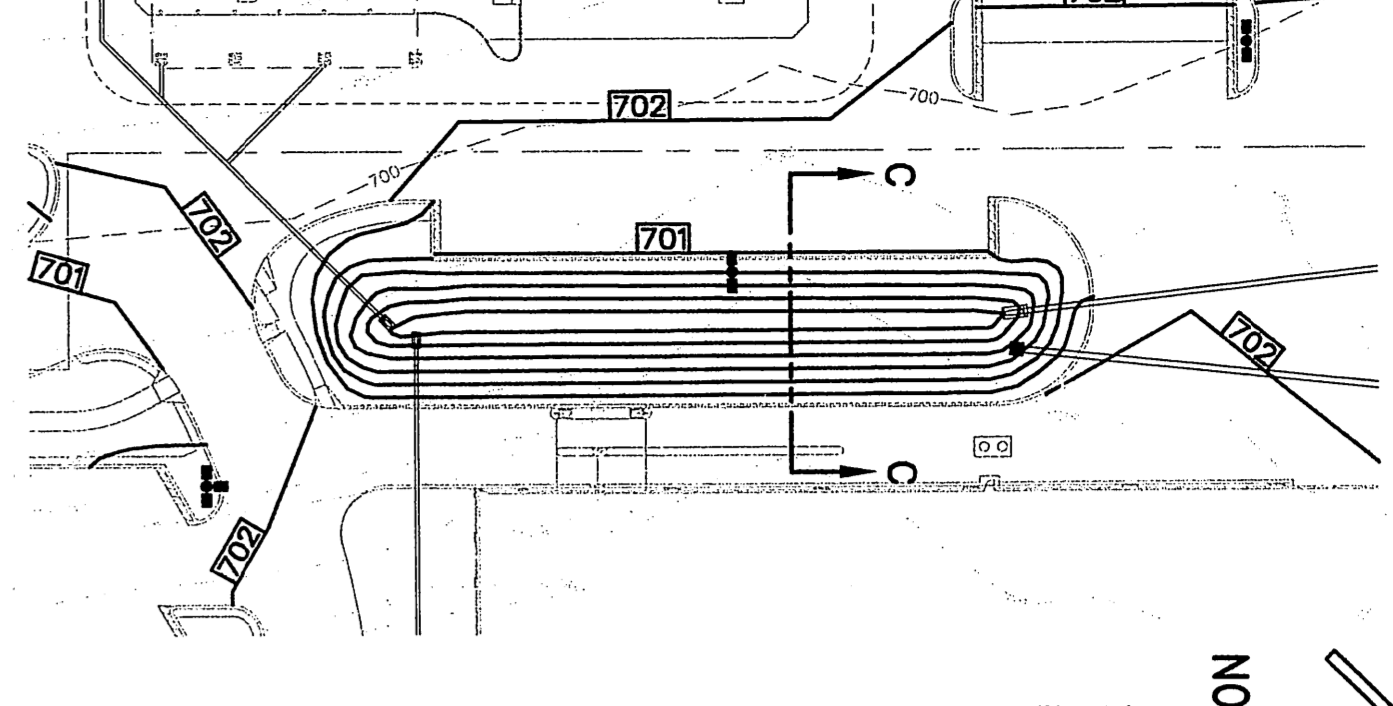
Elevation (ft)	Planimeter (sq-ft)	Area (acres)	A1+A2+sqg(A1*A2) (ac-ft)	Volume (ac-ft)	Volume Sum (ac-ft)
694.80	2,820	0.065	0.000	0.00	0.00
695.00	2,760	0.063	0.044	0.14	0.14
696.00	3,480	0.080	0.204	0.28	0.42
697.00	4,200	0.096	0.358	0.51	0.93
698.00	5,370	0.122	0.509	0.60	1.53
699.00	5,760	0.131	0.578	0.70	2.23
698.75	6,000	0.138	0.618	0.75	2.98

W-M EAST BIORETENTION OUTLET STRUCTURE INPUT DATA

Structure ID = 5
 Structure Type = Inlet Box
 # of Openings = 2
 Invert Elev. = 697.50 ft
 Orifice Area = 16.0000 sq-ft
 Orifice Coeff. = 0.60
 Weir Length = 18.00 ft
 Weir Coeff. = 3.000

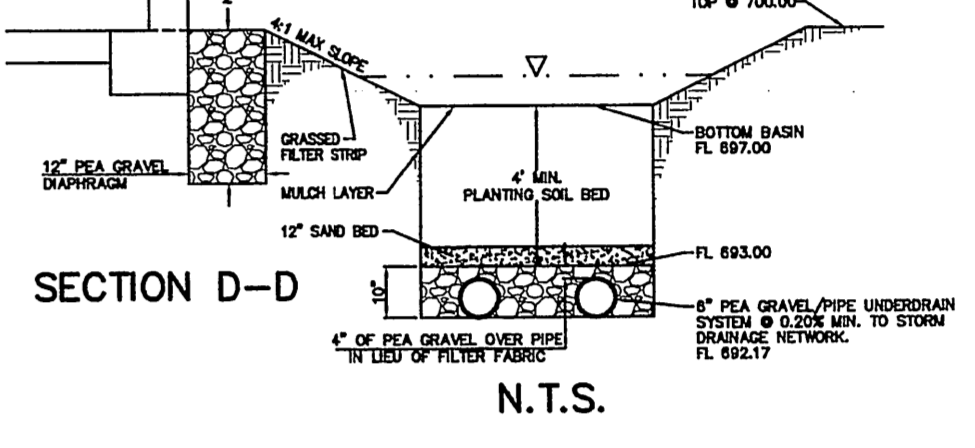
**** COMPOSITE OUTFLOW SUMMARY ****

WS Elev., Total Q	Elev.	Q	TS Elev	Error	Notes
694.80	0.00	Free Outfall	None contributing		
695.00	0.00	Free Outfall	None contributing		
695.25	0.00	Free Outfall	None contributing		
695.50	0.00	Free Outfall	None contributing		
695.75	0.00	Free Outfall	None contributing		
696.00	0.00	Free Outfall	None contributing		
696.25	0.00	Free Outfall	None contributing		
696.50	0.00	Free Outfall	None contributing		
696.75	0.00	Free Outfall	None contributing		
697.00	0.00	Free Outfall	None contributing		
697.25	0.00	Free Outfall	None contributing		
697.50	4.50	Free Outfall	5		
697.75	14.98	Free Outfall	5		
698.00	34.35	Free Outfall	5		
698.25	51.64	Free Outfall	5		
698.50	67.08	Free Outfall	5		



WAL-MART WEST BIORETENTION

NORTH
SCALE: 1"=60



SECTION D-D

N.T.S.

W-M Store (West) Bioretention Volume Calculations

Volume calculation formula: ISWM Section 1.2.3.2
 $WQ_v = [1.5R_p A] / 12$ $R_p = 0.05 + 0.008 I$, I is % impervious cover

Drainage area tabulation:

Acres	Drainage Area Designation
0.03	B665-A
0.03	B665-B1
0.03	B665-B2
0.02	B665-B3
0.03	B665-B4
0.03	B665-B5
1.05	B665-C
0.65	B665-D
1.87	total drainage area acres
-0.27	less acres in grass areas
1.60	impervious acres for treatment

WQ Volume Calculations:

1.60 retail-comm. Ac.at 90% impervious $V = [1.5(1.60)(60)] / 12 = 0.17$ acre-feet
 Total storage volume required = 0.17 acre-feet

W-M WEST BIORETENTION BASIN VOLUME CALCULATIONS

Elevation (ft)	Planimeter (sq-ft)	Area (acres)	A1+A2+sqg(A1*A2) (ac-ft)	Volume (ac-ft)	Volume Sum (ac-ft)
697.00	0.00	0.000	0.000	0.00	0.00
698.00	0.00	0.022	0.042	0.02	0.02
699.00	0.00	0.033	0.082	0.02	0.04
700.00	0.00	0.175	0.272	0.12	0.16
701.00	0.00	0.170	0.259	0.15	0.31

W-M WEST BIORETENTION OUTLET STRUCTURE INPUT DATA

Structure ID = 8
 Structure Type = Inlet Box
 # of Openings = 1
 Invert Elev. = 701.00 ft
 Orifice Area = 9.0000 sq-ft
 Orifice Coeff. = 0.60
 Weir Length = 12.00 ft
 Weir Coeff. = 3.000

**** COMPOSITE OUTFLOW SUMMARY ****

WS Elev., Total Q	Elev.	Q	TS Elev	Error	Notes
698.00	0.00	Free Outfall	None contributing		
698.25	0.00	Free Outfall	None contributing		
698.50	0.00	Free Outfall	None contributing		
698.75	0.00	Free Outfall	None contributing		
699.00	0.00	Free Outfall	None contributing		
699.25	0.00	Free Outfall	None contributing		
699.50	0.00	Free Outfall	None contributing		
699.75	0.00	Free Outfall	None contributing		
700.00	0.00	Free Outfall	None contributing		
700.25	0.00	Free Outfall	None contributing		
700.50	0.00	Free Outfall	None contributing		
700.75	0.00	Free Outfall	None contributing		
701.00	4.50	Free Outfall	8		
701.25	12.73	Free Outfall	8		
701.50	23.38	Free Outfall	8		
702.00	36.00	Free Outfall	8		

REVISION DESCRIPTION
DATE
No.

Bioretention Basins Plans & Volume Calculations

Rayzor Ranch North
 West University Dr. (U.S. Highway 380)
 Denton, Texas

STATE OF TEXAS
 PROFESSIONAL ENGINEER
 M. J. D. [Signature]
 DATE: 7-22-08
 JOB No. 2006029
 DRAWN BY: BLG
 DESIGNED BY: OCS
 CHECKED BY: MJD
 DATE: July 22, 2008
 SCALE: N.T.S.
 SHEET: EX. J