



Where Creativity Meets Functionality

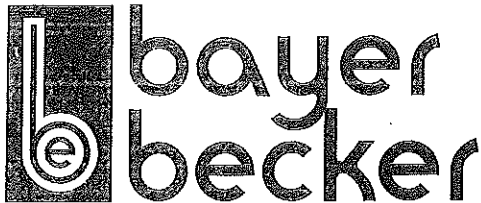
PROJECT #: 15M053.000 SHEET _____ OF _____
PROJECT: THE OAKS (KEEFE TRACTS 2 & 3)
CLIENT NAME: _____
SUBJECT: _____
DRAWN BY: _____ DATE: _____
CHECKED BY: _____ DATE: _____

SUMMARY OF L/Q STRATEGY FOR RESIDENTIAL POD & TAYLOR STREET:

1. BUILDING 1/2 = DIRECT ROOF TOP RUNOFF TO STORMTECH SYSTEM
LOCATED ON WEST SIDE OF BUILDING
2. BUILDING 3/4: DIRECT ROOF RUNOFF TO STORMTECH SYSTEM
LOCATED ON EAST SIDE OF BUILDING. ALSO DIRECT
TAYLOR ST. RUNOFF TO THIS SYSTEM
3. BUILDING 5/6 & CARPORT HOMES: DIRECT ROOF RUNOFF & PARKING LOT to
STORMTECH SYSTEM LOCATED UNDER PARKING LOT.
4. PRIVATE STREETS C/D: ASSUME BAND OF PERMEABLE PAVERS ALONG
ENTIRE LENGTH OF STREET WILL SERVE TO
TREAT STREET RUNOFF.

5. ~~TAYLOR STREET~~ = ~~STREET NOT~~ ~~TO BE~~ ~~BMP.~~
~~ASSUME RE~~ ~~AT/IN-SEE~~ ~~IMPROVED~~

WITH ESSENTIALLY
SAME TYPE OF
SURFACE W/in each
area, why the large
difference in coverage



Where Creativity Meets Functionality

BUILDINGS 1 & 2 WQ DESIGN: (FUTURE)

PROJECT #: 15M053.000 SHEET _____ OF _____

PROJECT: THE OAKS & KEEFE TOWNS 2 & 3

CLIENT NAME: _____

SUBJECT: _____

DRAWN BY: JSD DATE: 6/15/16

CHECKED BY: _____ DATE _____

$WQ_v \text{ Req'd} = 1,107 \text{ FT}^3 \text{ (SEE SPREADSHEET)}$

USE STORM-TECH MC-4500 UNITS: $L = 52"$, $W = 100"$, $H = 60"$

- LENGTH INSTALLED CHAMBER = $48.3"$
- LENGTH INSTALLED END CAP = $30.7"$
- 9" STONE FOUNDATION
- STORAGE PER CHAMBER (MEASURED TO CROWN OF CHAMBER)

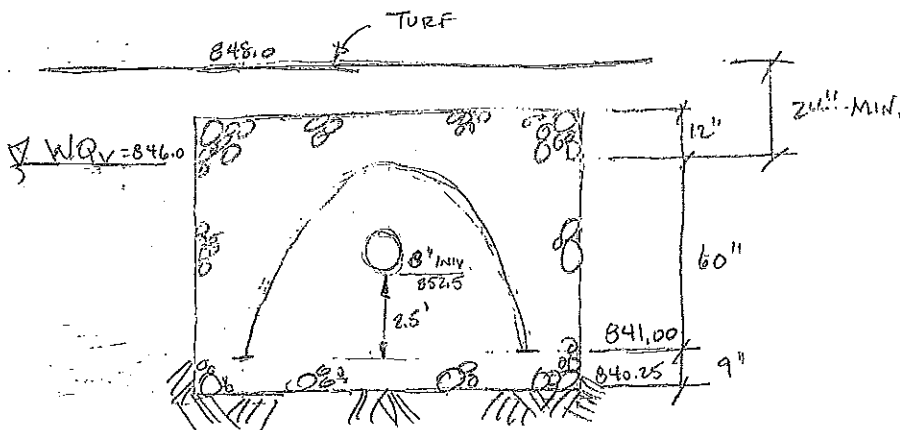
MIDDLE CHAMBER = 147.99 FT^3

END CAP = 95.76 FT^3

LENGTH REQ'D TO ACHIEVE WQ_v @ CHAMBER CROWN:

$$L = \frac{1617 \text{ FT}^3 - (2)(95.76 \text{ FT}^3)}{147.99} = 9.63 \approx \underline{10 \text{ CHAMBERS}}$$

$$\text{LENGTH OF SYSTEM} = (10 \times 48.3") + (2 \times 30.7") = 544.4" = \underline{45.37'}$$





Water Quality Volume

Project: Keefe Tract 2 & 3
Job No.: 15M053.000
Basin ID: Building 1/2 WQ Basin (Future)

Designed By: JSD
Checked By:
Revised By:

Date: 6/17/16
Date:
Date:

Required Water Quality Volume

$$WQ_v = P C A / 12$$

Site Drainage Area (A) = 0.55 acres (To Basin) $WQ_v = 0.031$ acre-ft.

Rainfall Depth (P) = 0.75 in. Sediment Storage Allowance = 20 %
Sediment Storage Allowance = 0.01 Ac-ft

Runoff Coefficient (C) = 0.90
 $C = 0.858/3 - 0.78/2 + 0.774/1 + 0.04$ (55% Impervious)

Total $WQ_v = 0.037$ Ac-ft
= 1,617 cu.ft.

Water Quality Release Rate

$$Q_{wqv} = \text{Total } WQ_v / RT$$

Required Retention Time (RT) 48 hours

$$Q_{wqv} = 0.009 \text{ cfs}$$

Provided Retention Time (PT) #DIV/0! hours

Water Quality Outlet Orifice

Contour Areas

	Elevation ft	Area ft ²	Volume ft ³	Cum. Vol. ft ³	Elevation at V	Storage at Elev
Basin Inv. =			0.00	0.00		#VALUE!
Contour 1 =					#VALUE!	#VALUE!
Contour 2 =						#VALUE!
Contour 3 =						#VALUE!
Contour 4 =						#VALUE!
Contour 5 =						#VALUE!
Contour 6 =						#VALUE!
Contour 7 =						#VALUE!
Contour 8 =						#VALUE!
Contour 9 =						#VALUE!
Contour 10 =						#VALUE!
Contour 11 =						#VALUE!
Contour 12 =						#VALUE!
Contour 13 =						#VALUE!
Contour 14 =						#VALUE!

$$Q = N C_d A_o (2 g \Delta h)^{1/2}$$

$$C_d =$$

$$A_o = 0.0000 \pi D^2/4 \text{ for circular orifices; } = h * w \text{ for rectangular orifices}$$

$$g = \text{ft/sec}^2$$

$$Q = 0.000 \text{ cfs}$$

$$\text{Orifice } h = \text{inch} \quad \text{Orifice } w = \text{inch} (= 0 \text{ for circular orifice})$$
$$\text{Number of orifices } = N =$$

$$\Delta h_{avg} = (\text{Elev at V} - \text{Basin Inv})/2 - 1/2 h = \text{ft}$$



Where Creativity Meets Functionality

PROJECT #: 15m053-000 SHEET _____ OF _____

PROJECT: THE DRIVE / KEEPER TENTS 213

CLIENT NAME: _____

SUBJECT: _____

DRAWN BY: JSD DATE: 8/1/16

CHECKED BY: _____ DATE _____

BUILDINGS 314 / TAYLOR ST. WP DESIGN:

DRAINAGE AREA (STM DA'S 111, 112, 114) = 1.17 ACRES

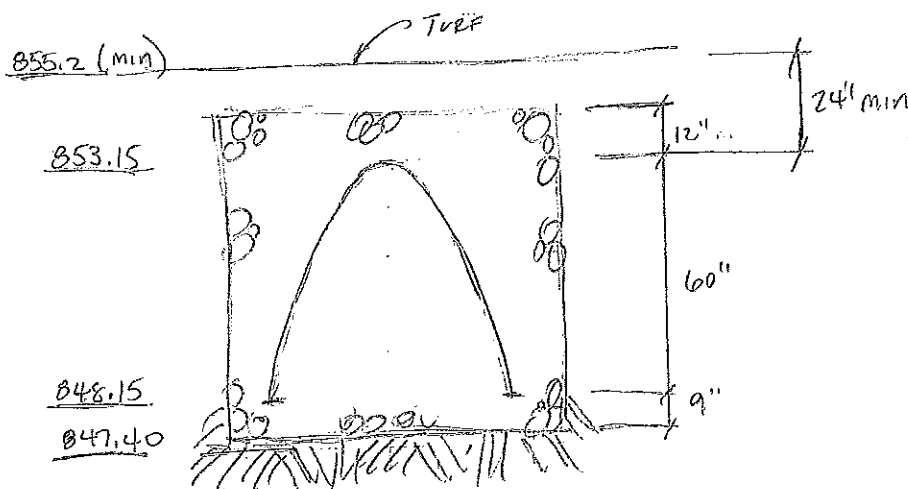
WQV REQ'D = 2,385 FT³

- USE STORM TECH MC-4500 UNITS :
- L=50", W=100", H=60"
 - LENGTH INSTALLED = 48.3"
 - END CAP INSTALLED L = 30.7"
 - 9" STONE FOUNDATION
 - STORAGE PER CHAMBER (MEASURED TO CROWN OF CHAMBER)
 - MIDDLE CHAMBER = 147.99 FT³
 - END CHAMBER = 95.76 FT³

LENGTH REQ'D TO ACHIEVE WQV @ CHAMBER CROWN =

$$L = \frac{2,385 \text{ FT}^3 - (2)(95.76 \text{ FT}^3)}{147.99 \text{ FT}^3} = 14.82 \text{ CHAMBERS} \approx \underline{15}$$

$$\text{LENGTH OF SYSTEM} = (15)(48.3") + (2)(30.7") = 785.9" = \underline{65.49'}$$





Water Quality Volume

Project: Keefe Tracts 2 & 3
 Job No.: 15M053-000
 Basin ID: Taylor Street WQ Basin

Designed By: JSD
 Checked By:
 Revised By:

Date: 7/29/16
 Date:
 Date:

Required Water Quality Volume

$$WQ_v = P C A / 12$$

Site Drainage Area (A) = 1.17 acres (To Basin) $WQ_v = 0.046$ acre-ft.
 Rainfall Depth (P) = 0.75 in. Sediment Storage Allowance = 20 %
 Sediment Storage Allowance = 0.01 Ac-ft
 Runoff Coefficient (C) = 0.62
 I = 0.82

Total $WQ_v = 0.055$ Ac-ft
 = 2,385 cu.ft.

Water Quality Release Rate

$$Q_{wqv} = \text{Total } WQ_v / RT$$

Required Retention Time (RT) 48 hours

$Q_{wqv} = 0.014$ cfs

Provided Retention Time (PT) 46.69 hours

Water Quality Outlet Orifice

Contour Areas

	Elevation ft	Area ft ²	Volume ft ³	Cum. Vol. ft ³	Elevation at V	Storage at Elev
Basin Inv. =	847.40	0.00	0.00	0.00		
Contour 1 =	853.15	0.00	2411.00	2411.00	853.09	2384.83
Contour 2 =						
Contour 3 =						
Contour 4 =						
Contour 5 =						
Contour 6 =						
Contour 7 =						
Contour 8 =						
Contour 9 =						
Contour 10 =						
Contour 11 =						
Contour 12 =						
Contour 13 =						
Contour 14 =						

$$Q = N C_d A_o (2 g \Delta h)^{1/2}$$

$$C_d = 0.61$$

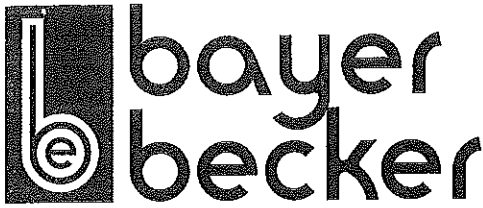
$$A_o = 0.00 \pi D^2 / 4 \text{ for circular orifices; } = h * w \text{ for rectangular orifices}$$

$$g = 32.20 \text{ ft/sec}^2$$

$$Q = 0.014 \text{ cfs}$$

Orifice h = 0.563 inch
 Orifice w = 0.00 inch (= 0 for circular orifice)
 Number of orifices = N = 1

$$\Delta h_{avg} = (\text{Elev at V} - \text{Basin Inv}) / 2 - 1/2 h = 2.82 \text{ ft}$$



Where Creativity Meets Functionality

PROJECT #: 15M063.000 SHEET _____ OF _____

PROJECT: THE OAKS & KEEFE TRAILS 2¹/₃

CLIENT NAME: _____

SUBJECT: _____

DRAWN BY: JSD DATE: 6/15/16

CHECKED BY: _____ DATE _____

BUILDING S&B WQ DESIGN: (PROPOSED)

WQ_V REQ'D = 2.491 FT³ (SEE SPREAD SHEET)

USE STORMTECH MC-4500 UNITS: L = 52" , W = 100" , H = 60"

LENGTH OF INSTALLED CHAMBER = 48.3"

LENGTH OF INSTALLED END CAP = 30.7"

9" STONE FOUNDATION

STORAGE PER CHAMBER (MEASURED TO CROWN OF CHAMBER)

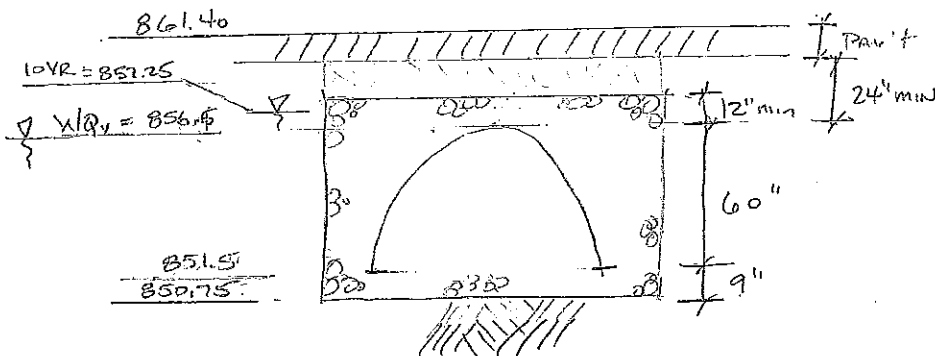
MIDDLE CHAMBER = 147.99 FT³

ENDS CAP = 95.76 FT³

LENGTH REQ'D TO ACHIEVE WQ_V @ CHAMBER CROWN:

$$L = \frac{(2.491 \text{ FT}^3 - (2)(95.76 \text{ FT}^3))}{147.99 \text{ FT}^3} = 15.54 \text{ chambers} \approx \underline{\underline{16}}$$

$$L = (16 \times 48.3") + (2 \times 30.7") = 834.2" = \underline{\underline{69.52 \text{ FT}}}$$



SPE WEIR IN DOWNSTREAM CB TO PASS 10 YEAR EVENT:

WEIR ELEV. = 856.5

LENGTH = 2'

Q₁₀ = 3.87 cfs

$$\left. \begin{array}{l} \text{WEIR ELEV.} = 856.5 \\ \text{LENGTH} = 2' \\ Q_{10} = 3.87 \text{ cfs} \end{array} \right\} \rightarrow Q = CLH^{3/2} \rightarrow H = \left(\frac{Q}{C.L} \right)^{2/3}$$

$$H = \left(\frac{3.87 \text{ cfs}}{(3.0)(2')} \right)^{2/3} = 0.75'$$

$$10 \text{ YEAR W.S.E.} = 856.5 + 0.75' = 857.25$$



Water Quality Volume

Project: Keefe Tract 2 & 3 Designed By: JSD Date: 6/17/16
 Job No.: 15M053.000 Checked By: _____ Date: _____
 Basin ID: Building 5/6 & Carriage Homes WQ Basin (Proposed) Revised By: _____ Date: _____

Required Water Quality Volume

$$WQ_v = P C A^{1/2}$$

Site Drainage Area (A) = 1.23 acres (To Basin) $WQ_v =$ 0.047 acre-ft.

Rainfall Depth (P) = 0.75 in. Sediment Storage Allowance = 20 %
 Sediment Storage Allowance = 0.01 Ac-ft

Runoff Coefficient (C) = 0.61
 $C = 0.85813 - 0.7812 + 0.7741 + 0.04$ (55% Impervious)

Total $WQ_v =$ 0.056 Ac-ft
 $=$ 2,451 cu.ft.

Water Quality Release Rate

$$Q_{wqv} = \text{Total } WQ_v / RT$$

Required Retention Time (RT) 48 hours

$Q_{wqv} =$ 0.014 cfs

Provided Retention Time (PT) 48.33 hours

Water Quality Outlet Orifice

Contour Areas

	Elevation ft	Area ft ²	Volume ft ³	Cum. Vol. ft ³	Elevation at V	Storage at Elev
Basin Inv. =			0.00	0.00		#VALUE!
Contour 1 =					#VALUE!	#VALUE!
Contour 2 =						#VALUE!
Contour 3 =						#VALUE!
Contour 4 =						#VALUE!
Contour 5 =						#VALUE!
Contour 6 =						#VALUE!
Contour 7 =						#VALUE!
Contour 8 =						#VALUE!
Contour 9 =						#VALUE!
Contour 10 =						#VALUE!
Contour 11 =						#VALUE!
Contour 12 =						#VALUE!
Contour 13 =						#VALUE!
Contour 14 =						#VALUE!

$$Q = N C_d A_o (2 g \Delta h)^{1/2}$$

$C_d =$ 0.60

$A_o =$ 0.0017 $\pi D^2/4$ for circular orifices; $= h * w$ for rectangular orifices

$g =$ 32.20 ft/sec²

$Q =$ 0.014 cfs

Orifice $h =$ 0.563 inch Orifice $w =$ 0.00 inch (= 0 for circular orifice)
 Number of orifices = $N =$ 1

$\Delta h_{avg} = (\text{Elev at V} - \text{Basin Inv})/2 - 1/2 h =$ 2.88 ft