Project name:	Centene Data Center Addition	Calculated By:	J.M.B.
Project number:	209-4511.10	Checked By:	G.M.S.
Project Location:	O'Fallon, Missouri	Date:	11/5/2020

Bend Coefficients:

$5^0 = 0.06$	$20^0 = 0.24$	$35^0 = 0.4$	$50^0 = 0.50$	$65^0 = 0.57$	$80^0 = 0.65$
$10^0 = 0.11$	$25^0 = 0.30$	$40^0 = 0.43$	$55^0 = 0.52$	$70^0 = 0.60$	$85^0 = 0.67$
$15^0 = 0.18$	$30^0 = 0.35$	$45^0 = 0.47$	$60^0 = 0.55$	$75^0 = 0.62$	$90^0 = 0.70$

Revisions:

Structure Number	LINE Upper structure	LINE Lower structure	FLOW LINE ELEVATIONS Upper structure	FLOW LINE ELEVATIONS Lower Structure	Length (ft)	Flowline Grade ft/ft	Pipe Size (in.)	Full Flow Cap. (cfs)	Total (Q) (cfs)	Mean Full Flow Vel.(V) (ft/s)	Bend Coef.	Curve Coef.	Velocity Head (Vh) (ft)	QVh (ft^4/s)	Pipe Coef. (n)	HEAD LOSS Hr (ft)	Junction (ft)	Bend (ft)	Curve (ft)	Total H_{tot}	Hydraulic Elevations Upper F.L. + Dia.	Lower H.E. +Hr	Lower H.E.	Structure Upper H.E. + H_{tot}	TOP Structure Elevation	Free Board	Structure Number
EX 5	EX 5	EX 4	542.59	541.83	76.75	0.0099	18	10.48	6.00	3.40	0.00	0.00	0.18	1.07	0.013	0.25	0.00	0.25	0.00	0.25	544.09	544.25	544.00	544.50	551.25	6.75	EX 5
EX 4	EX 4	EX 3	541.83	540.10	172.26	0.0100	18	10.56	7.91	4.48	0.00	0.00	0.31	2.46	0.013	0.98	0.23	0.44	0.00	0.67	543.33	542.96	541.98	544.00	549.75	5.75	EX 4
EX 3	EX 3	EX 2	539.90	538.87	103.07	0.0100	21	15.88	9.38	3.90	0.00	0.00	0.24	2.22	0.013	0.36	0.00	0.33	0.00	0.33	541.65	540.98	540.62	541.98	548.00	6.02	EX 3
EX 2	EX 2	EX 1	538.67	537.47	120.16	0.0100	21	15.88	9.53	3.96	0.30	0.00	0.24	2.32	0.013	0.43	0.02	0.07	0.00	0.09	540.42	539.82	539.39	540.51	550.17	9.66	EX 2
EX 1	EX 1		537.47																			100 YR POND HGL=		539.39			EX 1
EX 6	EX 6	EX 4	542.50	542.33	27.00	0.0063	12	2.83	1.91	2.43	0.70	0.00	0.09	0.18	0.013	0.08	0.12	0.06	0.00	0.19	543.50	544.08	544.00	544.26	548.42	4.16	EX 6
EX 4	EX 4		541.83																			HGL STRUCTURE #2=		544.00			EX 4
EX 8	EX 8	EX 7	548.59	540.00	285.79	0.0297	10	3.79	1.55	2.84	0.00	0.00	0.13	0.19	0.013	1.43	0.17	0.00	0.00	0.17	549.33	542.26	540.83	549.50	550.00	0.50	EX 8
EX 7	EX 7		540.00																			100 YR POND HGL=		539.39			EX 7
1	1	EX 10	543.50	543.03	15.00	0.0313	12	6.32	3.77	4.80	0.00	0.00	0.36	1.35	0.013	0.17	0.00	0.50	0.00	0.50	544.50	544.20	544.03	545.00	548.04	3.04	1
EX 10	EX 10	EX 9	538.78	537.53	37.00	0.0338	12	6.57	3.77	4.80	0.30	0.00	0.36	1.35	0.013	0.41	0.00	0.11	0.00	0.11	539.78	539.80	539.39	539.91	547.86	7.95	EX 10
EX 9	EX 9		537.53																			100 YR POND HGL=		539.39			EX 9

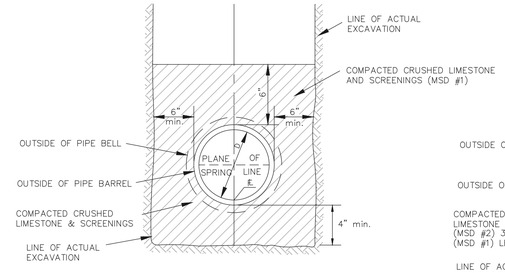
MEAN FULL FLOW VELOC $V = Q_{ACT}/A_{PIPE}$
FRICTION LOSS (H_f): $Hf = 2.87\ n^2\ (LV^2/d^{1.33})$
VELOCITY HEAD: $V_h = V^2/2g$

JUNCTION LOSES (JUNC.) = $[Q_{out}Vh_{out} - Sum\ (Q_{in}V_{in})]x1.33/[Q_{out}]$
BEND LOSES (BEND) = (V^h) * ANGLE COEFFICIENT
CURVE LOSS=V_h*CURVE COEFFICIENT

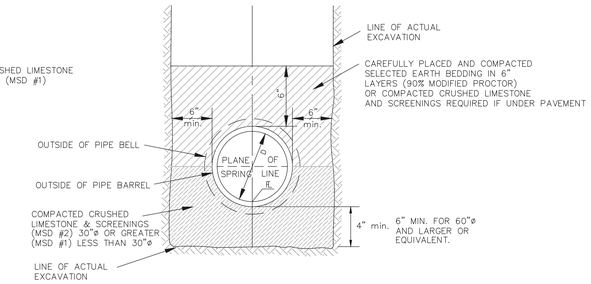
Note:
1. IF MORE THAN ONE INCOMING LINE, CALC. EACH BEND LOSS AND ADD TOGETHER.
2. NO STRUCTURE LOSES TO BE CALCULATED AT A DROP
3. IF $QV_{h(in)} > QV_{h(out)}$, NO JUNCTION LOSES TO BE CALCULATED.

Note(s):

PIPE HYDRAULICS - 15-YEAR
(PER CITY REGULATIONS)

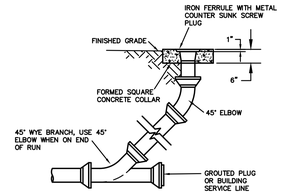


PIPE BEDDING CLASS "C"
(FOR ALL PIPE EXCEPT REINFORCED CONCRETE PIPE)

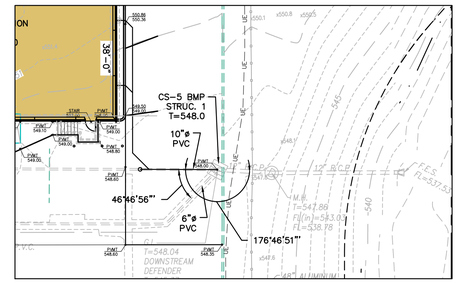


PIPE BEDDING CLASS "C"
(MODIFIED FOR REINFORCED CONCRETE PIPE)

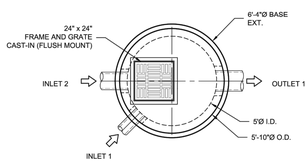
PIPE BEDDING DETAILS
(n.t.s.)



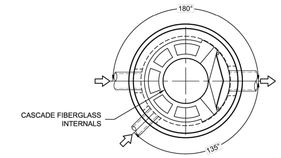
CLEANOUT
(n.t.s.)



STORM SEWER PLAN
SCALE: 1"=20'



PLAN VIEW
(INTERNALS NOT SHOWN)



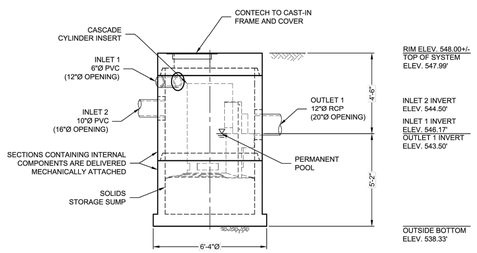
SECTION FOR PIPE ORIENTATION
(TOP SLAB NOT SHOWN)

MATERIAL LIST (PROVIDED BY CONTECH)

COUNT	DESCRIPTION	INSTALLED BY
1	CS-5 FIBERGLASS CYLINDER INSERT, STD.	CONTECH
4	CS-5 ALUMINUM INSTALLATION BRACKET	CONTECH
1	24" INLET TRAY	CONTRACTOR
1	SEALANT FOR JOINTS	CONTRACTOR
1	24" x 24" FRAME & GRATE, EJ#45624050A01, OR EQUIV.	CONTECH

SITE DESIGN DATA

WATER QUALITY FLOW RATE	1.51 CFS
PEAK FLOW RATE	3.77 CFS
RETURN PERIOD OF PEAK FLOW	10 YRS



ELEVATION VIEW

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
3. CASCADE SEPARATOR WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. STRUCTURE SHALL MEET AASHTO HS-20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 2', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
5. CASCADE SEPARATOR STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CASCADE SEPARATOR MANHOLE STRUCTURE.
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. ALL PIPE CENTERLINES TO MATCH PIPE OPENING CENTERLINES.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

STRUCTURE WEIGHT
APPROXIMATE HEAVIEST PICK = 12000 LBS.
OF 2 PIECES

MAXIMUM FOOTPRINT = 6'-4"Ø

CONTECH
CONTRACT
DRAWING

KIEN-MSD LAYOUT 1A

MARK	DATE	REVISION DESCRIPTION	BY

CS-5 - 663381-10
CENTENE DATA CENTER BUILDING EXPANSION
SAINT PETERS, MO
for SYSTEM: STRUCTURE 1

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
800.338.1122 513.645.7000 513.645.7993 fax
CASCADE separator™

DATE: 11/17/20
DESIGNED: MBB | DRAWN: KMC
CHECKED: MBB | APPROVED: MBB
PROJECT No.: 663381 | SEQUENCE No.: 10
SHEET: 1 OF 1

DETAIL - STORM STRUC. NO. 1
(N.T.S. – FOLLOW DIMENSIONS)

DETAIL DRAWINGS NOTE:

THE DETAIL DRAWINGS SHOWN HERE ARE FOR REFERENCE ONLY AND SUBJECT TO FINAL DESIGN. STRUCTURE TO BE INSTALLED PER MANUFACTURER RECOMMENDATIONS.

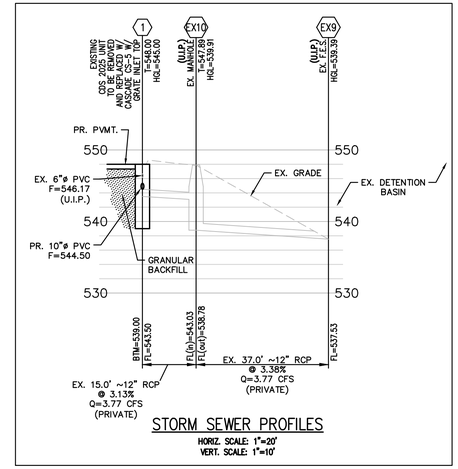
PROJECT: Centene Data Center Building Expansion — PROJ. NO: 209-4511.10

Table 2: Roof Runoff and Dock Drainage to CDS Hydrodynamic Separator
Peak Discharge and Pretreatment Pipe Size for Water Quality(WQ) Storm

STEP 1: Compute Rv(Volumetric Runoff Coefficient)			
Drainage Area(A):	1.06		A(Acres - to BMP)
%Impervious:	85.0		(%)
Rv(Volumetric Runoff Coefficient):	0.82		Rv=.05+.009*I
STEP 2: Compute Curve Number(CN)			
Rainfall Depth(P):	1.14	P(Inches)*	*Rainfall Depth = 1.14" for WQ Storm
Compute Runoff Volume(Qa):	0.93		Qa=PxRv
Compute CN:	98.0		CN=1000/((10+5P+10Qa-10x(Qa^2 + 1.25QaP)^.5)
STEP 3: Compute Peak Runoff Rate for Water Quality(WQ) Storm			
Time of Concentration(tc):	6	Minutes (Assumed)	
(tc):	0.10	Hours	
Compute Initial Abstraction(ia):	0.040		Ia=(200/CN)-2
Compute Ia/P Ratio:	0.03541	Ia/P	
Unit Peak Factor(qu):	980	From Figure D.11.1	
Drainage Area(Am):	0.0017	sq.mi.(Am=A/640)	
Post-Developed Peak Discharge for Water Quality(WQ) Storm (Qp):	1.51	cfs	Qp=qu*Am*Qa
STEP 4: Water Quality Volume (WQv)			
Drainage Area(A):	1.06		A(Acres - to BMP)
%Impervious:	85.0		(%)
(WQv):	3,575	Cu. FT	WQv=((1.14*(.05+.009)*A/12)*43560)

Wq Flow Rate Capacity Required:	1.51	c.f.s.
Wq Flow Rate Capacity Provided:	2.31	c.f.s.
BMP Selected:	CONTECH CASCADE CS-5	

M:\draw4500\209451\14511.10\Stormwater\Water Quality Calcs - CDS.xls



STORM SEWER PROFILES
HORIZ. SCALE: 1"=20'
VERT. SCALE: 1"=10'

PREPARED BY:
STOCK & ASSOCIATES Consulting Engineers, Inc.
257 Chesterfield Business Parkway
St. Louis, MO 63005 PH. (636)
530-9100 FAX (636) 530-9130
e-mail: general@stockassoc.com
Web: www.stockassoc.com

SITE IMPROVEMENT PLANS FOR:
CENTENE DATA CENTER BUILDING EXPANSION
6430 WELDON SPRING ROAD
CITY OF O'FALLON, MISSOURI 63376

STATE OF MISSOURI — GEORGE MICHAEL STOCK — NUMBER PE-25116 — PROFESSIONAL ENGINEER
12/28/2020
GEORGE M. STOCK E-25116
CIVIL ENGINEER
CERTIFICATE OF AUTHORITY NUMBER: 000996

REVISIONS:

1	2020–11–11 – 75% CD SET
2	2020–12–15 – 100% PERMIT/BID SET
3	2020–12–28 – REVISED PER CITY COMMENTS

DRAWN BY: J.M.B.	CHECKED BY: G.M.S.
DATE: 11/6/2020	JOB NO: 209–4511.10
DUCKETT CREEK #: –	BASE MAP #: –
S.C.C. H&T #: –	H&T S.U.P. #: –
M.D.N.R. #: MORA–	

SHEET TITLE:
SEWER DETAILS AND HYDRAULICS

SHEET NO.: C7.0

DRAWING FILE: M:\draw4500\209451\14511.10\Stormwater\14511_CS-5SP.dwg LAYOUT: CD-Sa-Ver Title PLOTTED: Dec 24, 2020 - 7:36am PLOTTED BY: jack-b.kuenzig