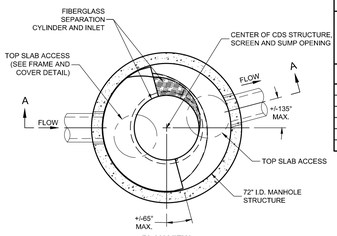


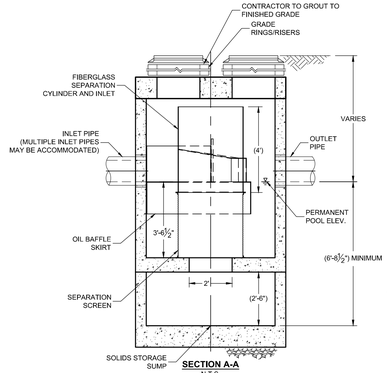
PLAN VIEW
N.T.S.

CDS3030 DESIGN NOTES

CDS3030 RATED TREATMENT CAPACITY IS 3.0 CFS, OR PER LOCAL REGULATIONS. MAXIMUM HYDRAULIC INTERNAL BYPASS CAPACITY IS 20.0 CFS. IF THE SITE CONDITIONS EXCEED 20.0 CFS, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

THE STANDARD CDS3030 CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

DESIGNATION (MODEL SUFFIX)	CONFIGURATION DESCRIPTION
G	GRATED INLET ONLY (NO INLET PIPE)
GP	GRATED INLET WITH INLET PIPE OR PIPES
K	CURB INLET ONLY (NO INLET PIPE)
KP	CURB INLET WITH INLET PIPE OR PIPES
B	SEPARATE OIL BAFFLE (SINGLE INLET PIPE REQUIRED FOR THIS CONFIGURATION)
W	SEDIMENT WEIR FOR NJDEP / NJCAT CONFORMING UNITS



SECTION A-A
N.T.S.

FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	E
WATER QUALITY FLOW RATE (CFS)	1.575
PEAK FLOW RATE (CFS)	1.575
RETURN PERIOD OF PEAK FLOW (YRS)	15
SCREEN APERTURE (2400 OR 4700)	2400

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	549.24	PVC	12"
INLET PIPE 2	*	*	*
OUTLET PIPE	549.24	PVC	12"
RIM ELEVATION			555.79

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH STORMWATER SOLUTIONS REPRESENTATIVE. www.contechstormwater.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE AND CASTINGS SHALL MEET AASHTO HS20 LOAD RATING.

INSTALLATION NOTES
1. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
2. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
3. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
4. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
5. 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.

PART 1 - GENERAL

1.1 DESCRIPTION

A. SCOPE

THE CONTRACTOR SHALL FURNISH ALL LABOR, EQUIPMENT AND MATERIALS NECESSARY TO INSTALL THE STORMWATER TREATMENT DEVICE(S) (SWTD) AND APPURTENANCES SPECIFIED IN THE DRAWINGS AND THESE SPECIFICATIONS.

1.2 QUALITY ASSURANCES

A. INSPECTION

ALL COMPONENTS SHALL BE SUBJECT TO INSPECTION BY THE ENGINEER AT THE PLACE OF MANUFACTURE AND/OR INSTALLATION. ALL COMPONENTS ARE SUBJECT TO BE REJECTED OR IDENTIFIED FOR REPAIR IF THE QUALITY OF MATERIALS AND MANUFACTURING DO NOT COMPLY WITH THE REQUIREMENTS OF THIS SPECIFICATION. COMPONENTS WHICH HAVE BEEN IDENTIFIED AS DEFECTIVE MAY BE SUBJECT FOR REPAIR. FINAL ACCEPTANCE OF THE COMPONENT IS CONTINGENT UPON THE DISCRETION OF THE ENGINEER.

B. WARRANTY

THE MANUFACTURER SHALL GUARANTEE THE SWTD COMPONENTS AGAINST ALL MANUFACTURER ORIGINATED DEFECTS IN MATERIALS OR WORKMANSHIP FOR A PERIOD OF TWELVE (12) MONTHS FROM THE DATE THE COMPONENTS ARE DELIVERED TO THE OWNER FOR INSTALLATION. THE MANUFACTURER SHALL BE NOTIFIED OF REPAIR/REPLACEMENT ISSUES IN WRITING WITHIN THE REFERENCED WARRANTY PERIOD. THE MANUFACTURER SHALL, UPON ITS DETERMINATION OF REPAIR, CORRECT OR REPLACE ANY MANUFACTURER ORIGINATED DEFECTS IDENTIFIED BY WRITTEN NOTICE WITHIN THE REFERENCED WARRANTY PERIOD. THE USE OF SWTD COMPONENTS SHALL BE LIMITED TO THE APPLICATION FOR WHICH IT WAS SPECIFICALLY DESIGNED.

C. MANUFACTURER'S PERFORMANCE CERTIFICATE

THE SWTD MANUFACTURER SHALL SUBMIT TO THE ENGINEER OF RECORD A "MANUFACTURER'S PERFORMANCE CERTIFICATION" CERTIFYING THAT EACH SWTD IS CAPABLE OF ACHIEVING THE SPECIFIED REMOVAL EFFICIENCIES AS LISTED IN THESE SPECIFICATIONS. THE CERTIFICATION SHALL BE SUPPORTED BY INDEPENDENT THIRD-PARTY RESEARCH.

1.3 SUBMITTALS

A. SHOP DRAWINGS

THE CONTRACTOR SHALL PREPARE AND SUBMIT SHOP DRAWINGS IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE SHOP DRAWINGS SHALL DETAIL HORIZONTAL AND VERTICAL DIMENSIONING, REINFORCEMENT AND JOINT TYPE AND LOCATIONS.

PART 2 - PRODUCTS

2.1 MATERIALS AND DESIGN

A. PRECAST CONCRETE COMPONENTS

PRECAST CONCRETE COMPONENTS SHALL CONFORM TO APPLICABLE SECTIONS OF ASTM C 478, ASTM C 857 AND ASTM C 858 AND THE FOLLOWING:

1. CONCRETE SHALL ACHIEVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4,000 POUNDS PER SQUARE-INCH (PSI);
2. UNLESS OTHERWISE NOTED, THE PRECAST CONCRETE SECTIONS SHALL BE DESIGNED TO WITHSTAND LATERAL EARTH AND AASHTO H-20 TRAFFIC LOADS;
3. CEMENT SHALL CONFORM TO ASTM C 150;
4. AGGREGATES SHALL CONFORM TO ASTM C 33;
5. REINFORCING STEEL SHALL BE DEFORMED BILLET-STEEL BARS, WELDED STEEL WIRE OR DEFORMED WELDED STEEL WIRE CONFORMING TO ASTM A 615, A 185 OR A 497, RESPECTIVELY;
6. JOINTS SHALL BE SEALED WITH PREFORMED JOINT SEALING COMPOUND CONFORMING TO ASTM C 990 AND
7. SHIPPING OF COMPONENTS SHALL NOT BE INITIATED UNTIL A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI IS ATTAINED OR FIVE (5) CALENDAR DAYS AFTER FABRICATION HAS EXPIRED, WHICHEVER OCCURS FIRST.

B. INTERNAL COMPONENTS AND APPURTENANCES

INTERNAL COMPONENTS AND APPURTENANCES SHALL CONFORM TO THE FOLLOWING:

1. SCREEN AND SUPPORT STRUCTURE SHALL BE MANUFACTURED OF TYPE 316 AND 316L STAINLESS STEEL CONFORMING TO ASTM F 1267-01;
2. HARDWARE SHALL BE MANUFACTURED OF TYPE 316 STAINLESS STEEL CONFORMING TO ASTM A 320;
3. FIBERGLASS COMPONENTS SHALL CONFORM TO THE NATIONAL BUREAU OF STANDARDS PS-15 AND COATED WITH AN ISOPHALIC POLYESTER GELCOAT AND
4. ACCESS SYSTEM(S) CONFORM TO THE FOLLOWING:
   A. MANHOLE CASTINGS SHALL BE DESIGNED TO WITHSTAND AASHTO H-20 LOADINGS AND MANUFACTURED OF CAST-IRON CONFORMING TO ASTM A 48 CLASS 30.
   B. HATCH SYSTEMS SHALL BE DESIGNED TO WITHSTAND AASHTO H-20 LOADINGS. HATCH SYSTEMS NOT SUBJECT TO DIRECT TRAFFIC SHALL BE MANUFACTURED OF GRADE 5086 ALUMINUM. HATCH SYSTEMS SUBJECT TO DIRECT TRAFFIC LOADS SHALL BE MANUFACTURED OF STEEL CONFORMING TO ASTM A36-93A, SUPPLIED WITH A HOT-DIP GALVANIZED FINISH CONFORMING TO ASTM A 123 AND ACCESS DOORS BOLTED TO THE FRAME.

2.2 PERFORMANCE

A. REMOVAL EFFICIENCIES

1. THE SWTD SHALL BE CAPABLE OF ACHIEVING AN 80 PERCENT AVERAGE ANNUAL REDUCTION IN THE TOTAL SUSPENDED SOLID LOAD.
2. THE SWTD SHALL BE CAPABLE OF CAPTURING AND RETAINING 100 PERCENT OF POLLUTANTS GREATER THAN OR EQUAL TO [4.7 MILLIMETERS (MM) OR 2.4 MILLIMETERS (MM)] REGARDLESS OF THE POLLUTANT'S SPECIFIC GRAVITY (I.E.: FLOATABLE AND NEUTRALLY BUOYANT MATERIALS) FOR FLOWS UP TO THE DEVICE'S RATED-TREATMENT CAPACITY. THE SWTD SHALL BE DESIGNED TO RETAIN ALL PREVIOUSLY CAPTURED POLLUTANTS ADDRESSED BY THIS SUBSECTION UNDER ALL FLOW CONDITIONS.
3. THE SWTD SHALL BE CAPABLE OF CAPTURING AND RETAINING TOTAL PETROLEUM HYDROCARBONS. THE SWTD SHALL BE CAPABLE OF ACHIEVING A REMOVAL EFFICIENCY OF 92 AND 78 PERCENT WHEN THE DEVICE IS OPERATING AT 25 AND 50 PERCENT OF ITS RATED-TREATMENT CAPACITY. THESE REMOVAL EFFICIENCIES SHALL BE BASED ON INDEPENDENT THIRD-PARTY RESEARCH FOR INFLUENT OIL CONCENTRATIONS REPRESENTATIVE OF STORM WATER RUNOFF (20 ± 5 MG/L). THE SWTD SHALL BE GREATER THAN 99 PERCENT EFFECTIVE IN CONTROLLING DRY-WEATHER ACCIDENTAL OIL SPILLS. THE SWTD SHALL BE CAPABLE OF UTILIZING SORBENT MEDIA TO ENHANCE REMOVAL AND RETENTION OF PETROLEUM BASED POLLUTANTS.

B. HYDRAULIC CAPACITY

1. THE SWTD SHALL PROVIDE A RATED-TREATMENT CAPACITY, WHICH IS CONSISTENT WITH GOVERNING WATER TREATMENT REGULATIONS, AT ITS RATED-TREATMENT CAPACITY, THE DEVICE SHALL BE CAPABLE OF ACHIEVING GREATER THAN 65 PERCENT REMOVAL OF PARTICLES TYPICALLY FOUND IN ROADSIDE SEDIMENTS. THIS REMOVAL EFFICIENCY SHALL BE SUPPORTED BY INDEPENDENT THIRD-PARTY RESEARCH UTILIZING SAMPLES CONSISTENT WITH THE NURP GRADATION OR FINER.
2. THE SWTD SHALL MAINTAIN THE PEAK CONVEYANCE CAPACITY OF THE DRAINAGE NETWORK AS DEFINED BY THE ENGINEER.

C. STORAGE CAPACITY

1. 1. THE SWTD SHALL BE DESIGNED WITH A SUMP CHAMBER FOR THE STORAGE OF CAPTURED SEDIMENTS AND OTHER NEGATIVELY BUOYANT POLLUTANTS IN BETWEEN MAINTENANCE CYCLES. THE MINIMUM STORAGE CAPACITY PROVIDED BY THE SUMP CHAMBER SHALL BE IN ACCORDANCE WITH THE VOLUME LISTED IN TABLE 1. THE BOUNDARIES OF THE SUMP CHAMBER SHALL BE LIMITED TO THAT WHICH DO NOT DEGRADE THE SWTD'S TREATMENT EFFICIENCY AS CAPTURED POLLUTANTS ACCUMULATE. THE SUMP CHAMBER SHALL BE SEPARATE FROM THE TREATMENT PROCESSING PORTION(S) OF THE SWTD TO MINIMIZE THE PROBABILITY OF FINE PARTICLE RE-SUSPENSION. IN ORDER TO NOT RESTRICT THE OWNER'S ABILITY TO MAINTAIN THE SWTD, THE MINIMUM DIMENSION PROVIDING ACCESS FROM THE GROUND SURFACE TO THE SUMP CHAMBER SHALL BE 20 INCHES IN DIAMETER.
2. THE SWTD SHALL BE DESIGNED TO CAPTURE AND RETAIN TOTAL PETROLEUM HYDROCARBONS GENERATED BY WET-WEATHER FLOW AND DRY-WEATHER GROSS SPILLS. THE MINIMUM STORAGE CAPACITY PROVIDED BY THE SWTD SHALL BE IN ACCORDANCE WITH THE VOLUME LISTED IN TABLE 1 BELOW.

CDS Model	Treatment Capacity (cfs)/(L/s)	Minimum Sump Storage Capacity (yd³)/(m³)	Minimum Oil Storage Capacity (gal)/(L)
CDS3040	3.0 (85.0)	2.1 (1.6)	205 (776)
CDS3030-D	3.0 (85.0)	2.1 (1.6)	205 (776)
CDS3030-DV	3.0 (85.0)	2.1 (1.6)	205 (776)

D. ALTERNATE TREATMENT TECHNOLOGIES AND SIZING CRITERIA

THE SIZING CRITERIA FOR TREATMENT SYSTEMS MUST CONFORM TO THE RECOMMENDED LOADING RATE AND 3RD PARTY TESTING DATA REQUIREMENTS AS MENTIONED BELOW:

1. CDS SCREENING SYSTEMS – DESIGNED FOR FULL TREATMENT OF THE RUNOFF RATE AT A LOADING RATE NOT TO EXCEED THE CRITICAL FLOW IN THE INLET, IN ORDER TO ACHIEVE 80% TSS REMOVAL EFFICIENCY. (80% TSS REMOVAL BASED ON A AVERAGE PARTICLES SIZE OF 63 MICRON)
2. VORTEX SEPARATION SYSTEMS – DESIGNED FOR FULL TREATMENT OF THE RUNOFF RATE AT A LOADING RATE NOT TO EXCEEDING 24 GPM/FT2, IN ORDER TO ACHIEVE 80% TSS REMOVAL EFFICIENCY. THE HYDRAULIC CAPACITY SHOULD NOT EXCEED A LOADING RATE OF 100 GPM/FT2 TO PREVENT SCOURING OF PREVIOUSLY CAPTURED PARTICLES. 80% TSS REMOVAL BASED ON A AVERAGE PARTICLES SIZE OF 63 MICRON)
3. GRAVITY SYSTEMS – DESIGNED FOR FULL TREATMENT OF THE RUNOFF RATE AT A LOADING RATE NOT TO EXCEEDING 10 GPM/FT2, IN ORDER TO ACHIEVE 80% TSS REMOVAL EFFICIENCY. THE GRAVITY UNITS WILL NOT EXCEED LUMINAR FLOW CONDITION PARAMETERS IN THE TREATMENT UNIT BUT WILL PROVIDE A BYPASS SYSTEM TO PREVENT TURBULENCE FROM ACCRUING IN THE SYSTEM. (SEE "STOKES LAW" FOR GRAVITY SETTLING REQUIREMENTS OF PARTICLES. 80% TSS REMOVAL BASED ON A AVERAGE PARTICLES SIZE OF 63 MICRON)

ADDITIONALLY, THE PERFORMANCE OF THE UNIT MUST BE EVALUATED BY A THIRD PARTY AND VERIFIED IN A PROGRAM THAT ALLOWS A MORE-OR-LESS DIRECT COMPARISON TO OTHER TECHNOLOGIES. PERFORMANCE SHOULD BE THIRD PARTY VERIFIED, AND REMOVAL EFFICIENCIES ACROSS THE SPECTRUM OF PARTICLE SIZES REPORTED, AT A RANGE OF HYDRAULIC LOADING RATES VARYING OVER A RANGE OF AT LEAST 25 TO 125% OF THE MANUFACTURER'S ADVERTISED 'WATER TREATMENT' LOADING RATE.

2.3 MANUFACTURER

THE MANUFACTURER OF THE SWTD SHALL BE ONE THAT IS REGULARLY ENGAGED IN THE ENGINEERING DESIGN AND PRODUCTION OF SYSTEMS DEPLOYED FOR THE TREATMENT OF STORM WATER RUNOFF FOR AT LEAST FIVE (5) YEARS AND WHICH HAVE A HISTORY OF SUCCESSFUL PRODUCTION, ACCEPTABLE TO THE ENGINEER. IN ACCORDANCE WITH THE DRAWINGS, THE SWTD(S) SHALL BE A CDS® DEVICE MANUFACTURED BY:

CONTECH ENGINEERED SOLUTIONS
9025 CENTRE POINTE DR., SUITE 400
WEST CHESTER, OH 45069
(800) 338-1122

PART 3 - EXECUTION

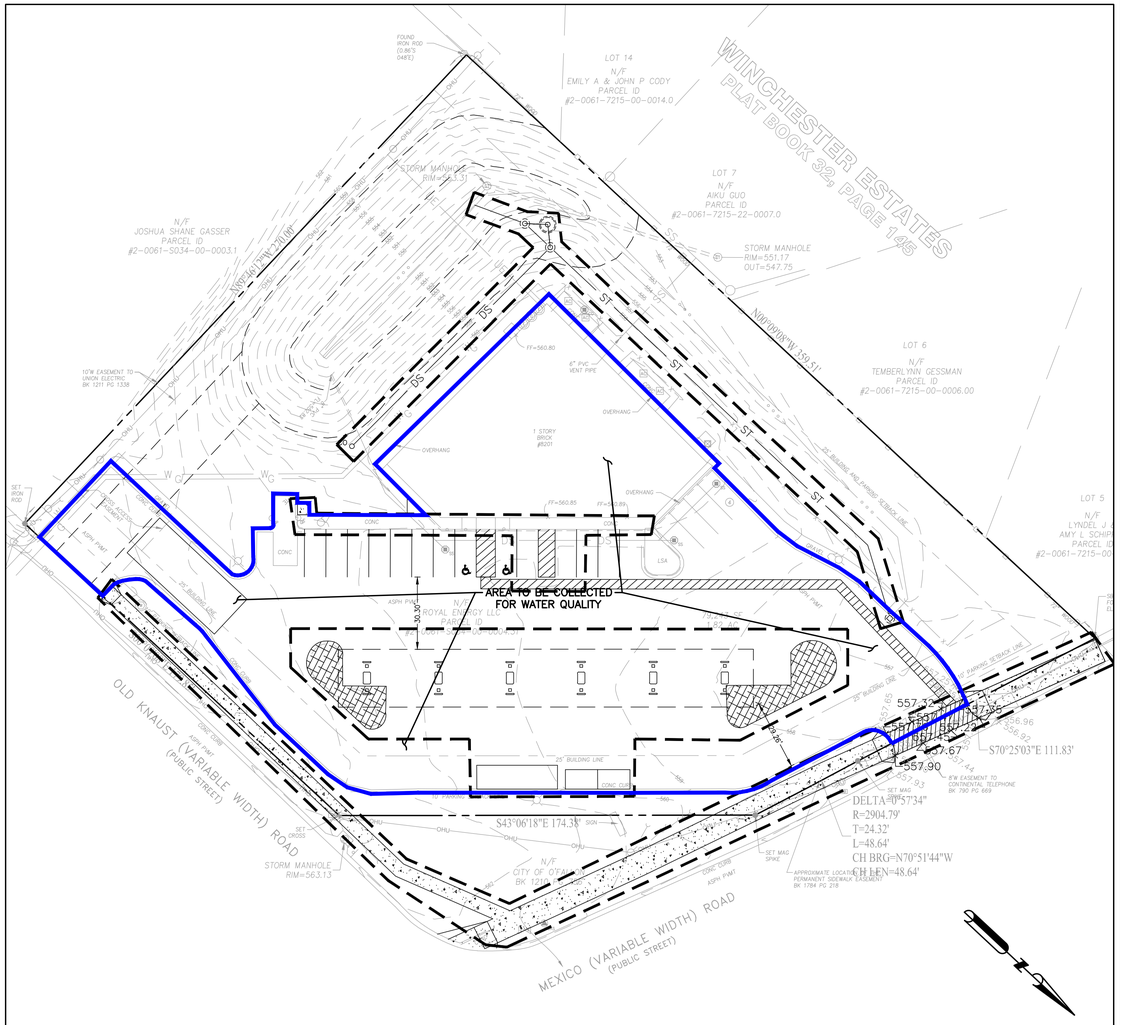
3.1 HANDLING AND STORAGE

1. 1. THE CONTRACTOR SHALL EXERCISE CARE IN THE STORAGE AND HANDLING OF THE SWTD COMPONENTS PRIOR TO AND DURING INSTALLATION. ANY REPAIR OR REPLACEMENT COSTS ASSOCIATED WITH EVENTS OCCURRING AFTER DELIVERY IS ACCEPTED AND UNLOADING HAS COMMENCED SHALL BE BORN BY THE CONTRACTOR.

3.2 INSTALLATION

1. THE SWTD SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND RELATED SECTIONS OF THE CONTRACT DOCUMENTS. THE MANUFACTURER SHALL PROVIDE THE CONTRACTOR INSTALLATION INSTRUCTIONS AND OFFER ON- SITE GUIDANCE DURING THE IMPORTANT STAGES OF THE INSTALLATION AS IDENTIFIED BY THE MANUFACTURER AT NO ADDITIONAL EXPENSE. A MINIMUM OF 72 HOURS NOTICE SHALL BE PROVIDED TO THE MANUFACTURER PRIOR TO THEIR PERFORMANCE OF THE SERVICES INCLUDED UNDER THIS SUBSECTION.
2. THE CONTRACTOR SHALL FILL ALL VOIDS ASSOCIATED WITH LIFTING PROVISIONS PROVIDED BY THE MANUFACTURER. THESE VOIDS SHALL BE FILLED WITH NON-SHRINKING GROUT PROVIDING A FINISHED SURFACE CONSISTENT WITH ADJACENT SURFACES. THE CONTRACTOR SHALL TRIM ALL PROTRUDING LIFTING PROVISIONS FLUSH WITH THE ADJACENT CONCRETE SURFACE IN A MANNER WHICH LEAVES NO SHARP POINTS OR EDGES.

1 CONTECH CDS3030 DETAIL & SPECIFICATIONS
NOT TO SCALE



SCALE: 1" = 30'

WATER QUALITY VOLUME $WQ_V = (P\ R_V\ A) / 12$

P = 1.14 INCHES
A = 0.94 ACRES 0.00147 SQ MILES
I = 100 PERCENT
R_V = .05 + 0.009(I)
= 0.95
WQ_V = 0.085 ACRE-FT = 3695 FT^3

RUNOFF VOLUME

Q_a = 1.08 WATERSHED INCHES

$$CN = \frac{1000}{10 + 5P + 10Q_A - 10 * (SQRT(Q_A2 + 1.25 * Q_A * P))]}$$

= 99.51

USING

Tc = 6 MINUTES = 0.1 HOURS
I_a = (200/CN)-2
= 0.01
I_a/P = 0.009
q_u = 990 CSM/IN. (FROM TR-55 EXHIBIT 4-II)
Q_p = q_u * A * Q_a
= 1.575 CFS 1.575 < 3.0 OK
(MAX ALLOWABLE TREATMENT FLOW FOR A 6' CONTECH CDS = 3.0 CFS)

FLOW SPITTER DESIGN

Q_p = c * A (SQRT(64.4 * H_b))
H_b = (Q_p/c * A)2 / 64.4
c = 0.6
A = 0.785 12" PIPE
H_b = 0.173
h = 0.17 + D/2
= 0.67 FEET

THEREFORE SET THE LINE OF THE BYPASS PIPE AT 549.31 + 0.67 = 549.98

Revisions

0	ISSUED FOR REVIEW	08/10/21
1	CITY COMMENTS	01/23/23
2	CITY COMMENTS	02/13/23
3	CITY COMMENTS	03/15/23
4	CITY COMMENTS	03/28/23
4	CITY COMMENTS	05/05/23

PROJECT TITLE
Royal Fuels
8201 Mexico Rd.
O'Fallon, MO 63376

MB Engineering, Inc.
14851 Remington Road
Marion, IL 62959
(314) 368-3040

STATE OF MISSOURI
MICHAEL A. BUESCHER
NUMBER E-20010187 14
REGISTERED PROFESSIONAL ENGINEER
5/5/23

Michael A. Buescher, P.E. Civil Engineering
Missouri P.E. E-20010187 14

MB Engineering, Inc. Missouri Authority No. E-2015041404

The Professional Engineer's seal affixed to this sheet indicates that the named Engineer has prepared or directed the preparation of the material shown only on this sheet. Other drawings and documents not exhibiting this seal shall not be considered prepared by or the responsibility of the undersigned.

Developer / Owner Information
ROYAL ENERGY, LLC

Typical Details

P+Z No. 23-000415
Approval Date
Permit No. CSP23-000002

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C3-02