EPC STORMWATER REVIEW COMMENTS IN ORANGE BOXES WITH BLACK TEXT

MEMORANDUM

Please update this date accordingly when the submitted drainage report for the vacate replat is approved.

Please be aware that since the vacate replat project which is submitting the drainage report that is referenced is actively being reviewed, additional comments on this report may be generated due to changes and any comments from staff on that report.

Project No.: 24-0388 EPC Project Number: PPR2315

usiness Park 2- Drainage Compliance Letter

construct a carwash located within the Claremont Business
st corner of Marksheffel Road and Meadowbrook Parkway, in El Paso County, Colorado. The site is currently vacant and identified as Lot 1 of the Claremont Business Park 23 Filing No. 2. The lot is 1.48 acres.

typo. Delete the "3"

The proposed development will consist of a 4,591+/--square foot building with access drives, parking areas, sidewalk areas, and landscaping. This lot was initially contemplated for development as part of the overall development permit of the Claremont Business Park. As parcels within the master development area progressed, updated reports were amended and approved. The last update for this specific lot was included in the Final Drainage Report For Claremont Business Park 2, Filing No.2. dated February 2023 by MS Civil Consultants (The Final Drainage Study). The overall master drainage study concluded that water quantity (detention) was included as part of the regional detention facility for the Claremont Business Park.; however, water quality would be required on Lot 1. The purpose of this letter is to demonstrate that the proposed development of the Super Star Carwash is in compliance with the assumptions of the final drainage report.

Specify that for this report the "PCD Filing Number is VR233"

No regional detention pond supports Clarmont Business Park. Please correct

Runoff Comparison

The proposed SSCW lot is part of basin B within the Final Drainage Study. Below is a summary of the anticipated runoff from the prior drainage reports

Comparison	Runoff Coefficient (5 year)	Runoff Coefficient (100 year)	Area (Acres)	Runoff (5 year - CFS)	Runoff (100 year - CFS)
Basin B (Per Final Drainage Report)	0.81	0.88	1.5	6.0	10.9
SSCW (Proposed)	0.44	0.67	1.5	2.4	8.2

The proposed development for the Super Star Carwash will have less designed runoff than those contemplated in the Final Drainage Study.

Per Resolution 16-426:

Please identify in the text where the flow from this site is being conveyed to. Is your storm system connecting to an existing storm pipe stub (provide size and type)?

970.223.5556 | 3665 JFK Parkway, Bldg. 2, Suite 100 | Fort Collins, CO 80525-3152
www.AyresAssociates.com

Please include the Four-Step Process (ECM Appendix I.7.2.A.)

The Final Drainage Study proposed a WQ pond to treat the runoff from Lot 1. See comment on page 3 of this document.

Water Quality

Water Quality was not included as part of the improvements for the Claremont Business Park. The Final Drainage Study requires that the undeveloped portions of the site provide water quality on their individual lots. The SSCW proposes to construct a hydrodynamic separator to serve the water quality requirements for it's development. The

Underground WQ treatment will need to be approved, applicant must submit a deviation request explaining why above ground is not feasible. Deviation are typically only accepted for constrained sites.

Conclusion

The proposed SSCW complies with The Final Drainage Report for the Claremont Business Park Filing No.2. The regional drainage facility provides the water quantity for the SSCW lot. The SSCW will install a Contech Hydrodynamic separator to provide water quality.

In summary, the SSCW is in general compliance with the original development assumptions and no additional improvements to the storm sewer system beyond those noted is necessary.

If you should have any questions, please feel free to contact me at 262-522-4901.

Is the WQ volume treated with a pond or separator? Clarify text.

Sincerely,

Add signature blocks to incude Engr stamp

Drainage Reports

Design Engineer's Statement:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

_____ _____

[Name, P.E. #_____]Date

Owner/Developer's Statement:

I, the owner/developer have read and will comply with all of the requirements specified in this drainage report and plan.

_____ _____

[Name, Title]Date

[Business Name]

[Address]

El Paso County:

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

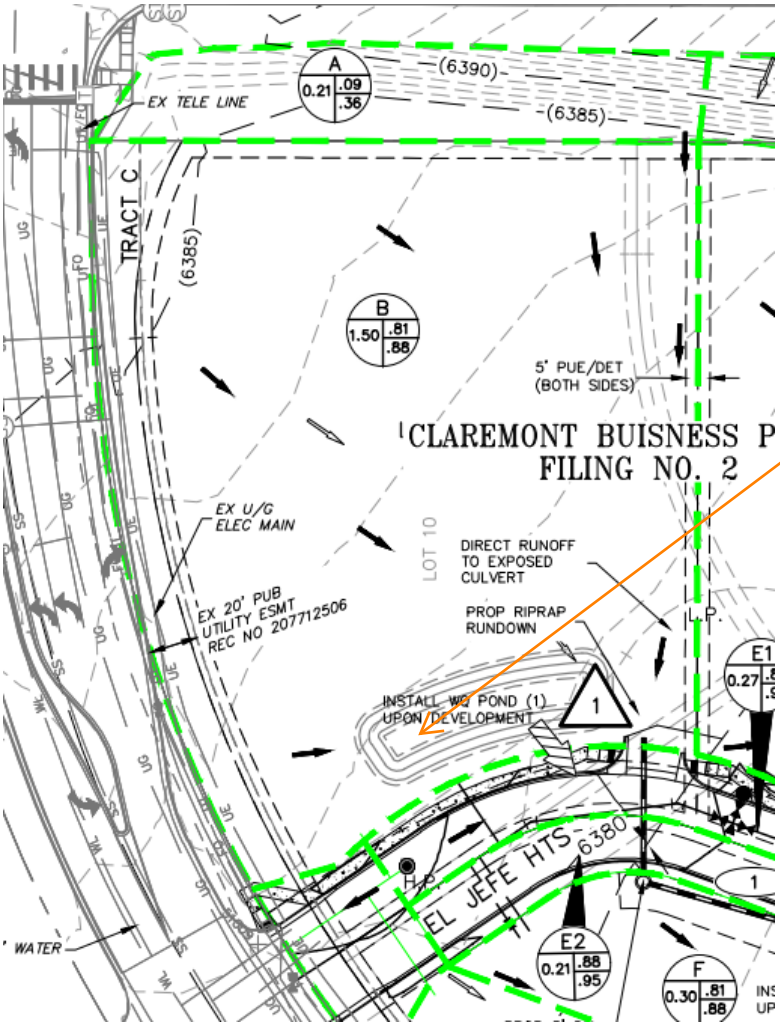
_____ _____

County Engineer / ECM Administrator Date

Conditions:

Supporting Documents

Please update this document as changes are made to the vacate replat final drainage report due to staff review comments.



Water Quality was proposed to be achieved by a pond per the Final Drainage Report.

SUPER STAR BASIN

BASIN SUMMARY			
BASIN	AREA (ACRES)	Q_5	Q_{100}
A	0.21	0.1	0.7
B	1.50	6.0	10.9
C	0.12	0.1	0.4
C1	0.17	0.1	0.5
D	0.77	3.2	5.9
D1	0.78	3.3	6.0

(EXHIBIT ABOVE IS PORTION OF CLAREMONT BUSINESS PARK FILING NO.2 – PROPOSED DRAINAGE MAP)

SSCW ONSITE DRAINAGE CALCULATIONS

Per the final drainage drainage report of the original subdivision (PCD File SF2014) and per the report submitted with the vacate replat (VR233) site runoff is not intended to drain to meadowbrook parkway. If proposing to drainage to Meadowbrook, analysis of total flow including this developments flow within meadowbrook parkway shall be provided as well as the ultimate outfall fro flow within meadowbrook.

Please also address the stormwater engineers comment regarding water quality for this area as 100% of the site shall be treated per ECM appendix I.

We need to know how much disturbed area is untreated and if there are any exclusions that apply to those areas. So please create a basic overview map (or modify an existing drainage map) with color shading/hatching that shows areas tributary to each PBMP (pond, runoff reduction, etc.) and those disturbed areas that are not treated by a PBMP, with the applicable exclusion labeled (ex: 20% up to 1ac of development can be excluded per ECM App I.7.1.C.1 and exclusions listed in ECM App I.7.1.B.#). An accompanying summary table on this map would also be very helpful (example provided):

How will the runoff from OFF1 be treated? If you will use exclusions for this basin, clearly state in the PBMP form and the Drainage Letter text.

Please label all storm facilitites

MEADOWBROOK PARKWAY

OFF1 0.42 | 0.43 | 0.06

A1 0.03 | 0.89 | 0.86

B1 0.11 | 0.89 | 0.86

A2 0.82 | 0.78 | 0.64

A3 0.10 | 0.43 | 0.00

356.33 sf

486.69 sf

472.31 sf

2,722.44 sf

457.78 sf

1,122.14 sf

0.48 sf

Basin ID	Total Area (ac)	Total Proposed Disturbed Area (ac)	Area Trib to Pond A (ac)	Disturbed Area Treated via Runoff Reduction (ac)	Disturbed Area Excluded from WQ per ECM App I.7.1.C.1 (ac)	Disturbed Area Excluded from WQ per ECM App I.7.1.B.# (ac)	Applicable WQ Exclusions (App I.7.1.B.#)
A	4.50	4.50	4.50	-	-	-	
B	1.25	1.25	-	1.00	0.25	-	
C	6.00	4.00	-	-	-	4.00	ECM App I.7.1.B.5
D	2.50	2.50	1.00	-	0.50	1.00	ECM App I.7.1.B.7
E	3.00	-	3.00	-	-	-	
F	8.25	-	-	-	-	-	
Total	25.50	12.25	8.50	1.00	0.75	5.00	
Comments		*[For each row, the sum of the values in Columns 4-7 must be greater than or equal to the value in Column 3 above.]*	*[Values in this column can be more than Column 3 if over-treating non-disturbed areas of the same land-use.]*	*[See RR calc spreadsheet.]*	*[Total must be <20% of site and <1ac.]*		

Total Disturbed Area Treated (ac)	Total Disturbed Area Excluded from WQ (ac)	Non-Excluded Area to be Treated (value must exceed Total Proposed Disturbed Area) (ac)
9.50	5.75	15.25

Provide in the text of your report a narrative description of the proposed sub-basins. Identify the appropriate design points as well.

account for offsite flow entering the site

Label all storm drains and provide flow arrows to all watersheds to clearly show drainage patterns.

Where does the runoff in the highlighted section go? It appears to collect on the back of the proposed curb. If this never combines with the rest of A2 this should be its own basin and will need to have WQ accounted for.

please provide the drainage plan as the last page of the report.

RUNOFF SUMMARY

BASIN	AREA (AC)	5-YEAR RUNOFF (CFS)	100-YEAR RUNOFF (CFS)
A1	0.03	0.10	0..23
A2	0.89	1.99	5.53
A3	0.89	0.0	0.30
B1	0.12	0.35	0.86
OFF1	0.52	0.0	1.25

DRAINAGE LEGEND

BASIN DESIGNATION
RUNOFF COEFFICIENT (100-YR)
RUNOFF COEFFICIENT (5-YR)
AREA IN ACRES
DRAINAGE BASIN BOUNDARY

N

0 10 20 40
GRAPHIC SCALE IN FEET

AYRES ASSOCIATES
3665 JFK PARKWAY
BUILDING 2, SUITE 100
FORT COLLINS, CO
80525
262.522.4901
www.AyresAssociates.com

SUPERSTAR CARWASH
MEADOWBROOK PKWY
COLORADO SPRING, CO 80915

DRAINAGE PLAN

Drawn By: AJJ
Checked By: SEM
Date: 03/16/2023
Project No. 24-0409
Sheet Number
C5.1

The runoff coefficients provided do not match coefficients in table 6-6 of the County adopted Chapter 6 of the 2014 City of Colorado springs DCM. please revise all coefficients accordingly to match. See link below https://library.municode.com/co/el_paso_county/codes/drainage_criteria_manual?nodeId=VO1UP

Peak Runoff using Rational Method

Designer: Scott Maier
Company: Ayres Associates
Date: 3/16/2023
Project: SUPER STAR CAR WASH
Location: MEADOWBROOK, Mesa County

Version 2.00 released May 2017

Cells of this color are for required user-input
Cells of this color are for optional override values
Cells of this color are for calculated results based

$t_{minimum}$ = 5 (urban)
$t_{minimum}$ = 10 (non-urban)

Selected t_c = max{$t_{minimum}$, min(Computed t_c, Regional t_c)}

Select UDFCD location for NOAA Atlas 14 Rainfall Depths from the pulldown list OR enter your own depths obtained from the NOAA website (click this link)

1-hour rainfall depth, P1 (in) =	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
	0.83	1.11	1.38	1.69	2.17	2.58	3.14

Rainfall Intensity Equation Coefficients =	a	b	c
	28.50	10.00	0.786

$I(in/hr) = \frac{a * P_1}{(b + t_c)^c}$

$Q(cfs) = CIA$

Subcatchment Name	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C							Overland (Initial) Flow Time					Channelized (Travel) Flow Time							Time of Concentration			Rainfall Intensity, I (in/hr)							Peak Flow, Q (cfs)						
				2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	Flow Length L_i (ft)	(ft) (Optional)	(ft) (Optional)	Flow Slope S_i (ft/ft)	Flow Time t_i (min)	Flow Length L_t (ft)	(ft) (Optional)	D/S Elevation (ft) (Optional)	Channelized Flow Slope S_t (ft/ft)	NRCS Conveyance Factor K	Channelized Flow Velocity V_t (ft/sec)	Channelized Flow Time t_t (min)	Computed t_c (min)	Regional t_c (min)	Selected t_c (min)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
Basin A1	0.03	B	100.0	0.84	0.86	0.86	0.88	0.89	0.89	0.90	10.00			0.250	0.48	50.00			0.010	20	2.00	0.42	0.90	9.36	5.00	2.80	3.76	4.68	5.73	7.36	8.75	10.65	0.07	0.10	0.12	0.15	0.20	0.23	0.29
Basin A2	0.82	B	77.0	0.62	0.64	0.68	0.73	0.76	0.78	0.82	50.00			0.250	2.01	200.00			0.010	20	2.00	1.67	3.68	14.60	5.00	2.80	3.76	4.68	5.73	7.36	8.75	10.65	1.41	1.99	2.60	3.44	4.57	5.63	7.14
Basin A3	0.10	B	0.0	0.00	0.00	0.06	0.25	0.33	0.43	0.54	10.00			0.020	5.00	100.00			0.010	15	1.50	1.11	6.11	27.85	10.00	2.23	3.00	3.73	4.57	5.87	6.98	8.50	0.00	0.00	0.02	0.11	0.19	0.30	0.46
Basin B1	0.11	B	100.0	0.84	0.86	0.86	0.88	0.89	0.89	0.90	10.00			0.020	1.10	20.00			0.020	20	2.83	0.12	1.22	9.10	5.00	2.80	3.76	4.68	5.73	7.36	8.75	10.65	0.26	0.35	0.44	0.55	0.72	0.86	1.06
Basin OFF1	0.42	B	0.0	0.00	0.00	0.06	0.25	0.33	0.43	0.54	20.00			0.250	3.07	50.00			0.030	20	3.46	0.24	3.31	26.53	10.00	2.23	3.00	3.73	4.57	5.87	6.98	8.50	0.00	0.00	0.09	0.48	0.81	1.25	1.91

Show calculation for total site flows that are reported on page 1. Flows with different Tc should not be added.

Please verify the imperviousness of this basin as it appear a bit low.

Verify runoff coefficients, it is not typical to have a runoff coefficient of 0 and the 10-yr is low as well. Provide backup for the source of these runoff coefficients and follow City of Colorado Springs DCM standards.

Use Tc = 5. The min Tc for urbanized areas is 5 min per Chapter 6 of the 2014 City of Colorado Springs DCM. Review and revise Tc to follow the criteria. See link in comment above.

Map Scale: 1:834 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 40 80 160 240

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 20, Sep 2, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 19, 2018—Sep 23, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	0.0	0.5%
10	Blendon sandy loam, 0 to 3 percent slopes	B	1.4	58.1%
28	Ellicott loamy coarse sand, 0 to 5 percent slopes	A	1.0	41.3%
Totals for Area of Interest			**2.4**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Provide storm drain calculations as well as inlet calcs,

MHFD-Inlet, Version 5.01 (April 2021)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Basin A2	Basin A1	Basin A3
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	AREA
Hydraulic Condition	On Grade	In Sump	Swale
Inlet Type	CDOT/Denver 13 Combination	CDOT/Denver 13 Combination	User-Defined

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	2.0	0.1	0.0
Major Q_{Known} (cfs)	5.6	0.2	0.3

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

Overland Slope (ft/ft)			
Overland Length (ft)			
Channel Slope (ft/ft)			
Channel Length (ft)			

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

CALCULATED OUTPUT

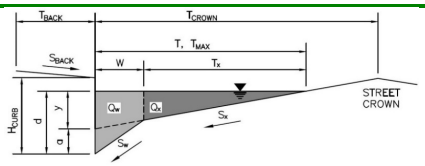
Minor Total Design Peak Flow, Q (cfs)	**2.0**	**0.1**	**0.0**
Major Total Design Peak Flow, Q (cfs)	**5.6**	**0.2**	**0.3**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.8	N/A	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	3.2	N/A	0.0

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Super Star Car Wash - Meadowbrook

Inlet ID: Basin A2



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	10.0	ft
Gutter Width	W =	1.00	ft
Street Transverse Slope	S_X =	0.048	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.007	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.0	10.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion

MAJOR STORM Allowable Capacity is based on Depth Criterion

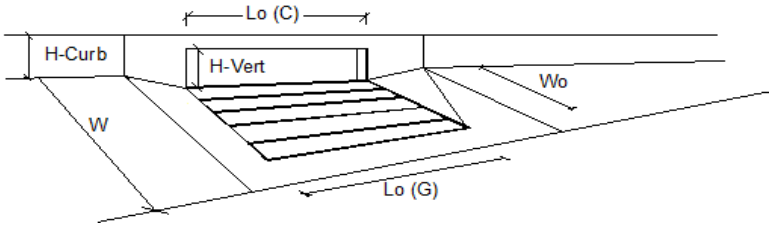
	Minor Storm	Major Storm	
Q_{allow} =	**9.9**	**9.9**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT/Denver 13 Combination		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	2.0	2.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	3.00	3.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	1.73	1.73	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	0.50	0.50	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

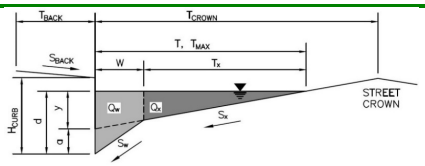
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.2**	**2.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.8**	**3.2**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**61**	**43**	**%**

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Super Star Car Wash - Meadowbrook

Inlet ID: Basin A1



Gutter Geometry:

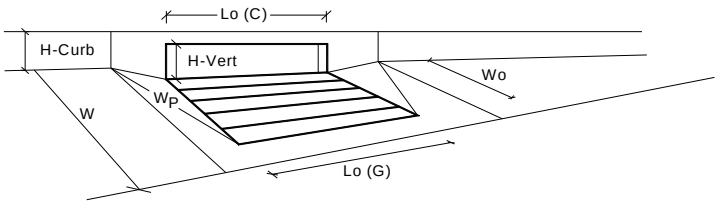
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	20.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	18.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	18.0	18.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT/Denver 13 Combination)	Type =	CDOT/Denver 13 Combination		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.8	5.8	inches
Grate Information		MINOR	MAJOR	Override Depths
Length of a Unit Grate	L_o (G) =	3.00	3.00	feet
Width of a Unit Grate	W_o =	1.73	1.73	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	0.43	0.43	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	3.30	3.30	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	0.60	0.60	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	3.00	3.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.50	6.50	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	5.25	5.25	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	0.00	0.00	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.70	3.70	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.66	0.66	

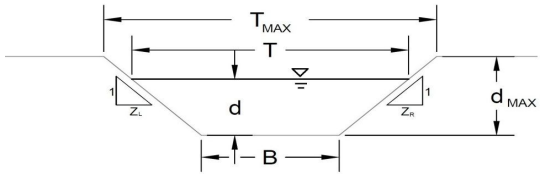
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	0.509	0.509	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.32	0.32	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.91	0.91	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	0.91	0.91	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.3**	**3.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.1	0.2	cfs

AREA INLET IN A SWALE

Super Star Car Wash - Meadowbrook

Basin A3



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D, or E =	C	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0050	ft/ft
Bottom Width	B =	5.00	ft
Left Side Slope	Z1 =	4.00	ft/ft
Right Side Sloe	Z2 =	4.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- ☐ **Non-Cohesive**
- ☐ **Cohesive**
- ☐ **Paved**

		Minor Storm	Major Storm	
Maximum Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**17.00**	**17.00**	**ft**
Maximum Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**1.50**	**1.50**	**ft**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**24.0**	**24.0**	**cfs**
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	**1.50**	**1.50**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**0.0**	**0.3**	**cfs**
Water Depth	d =	**0.09**	**0.40**	**ft**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

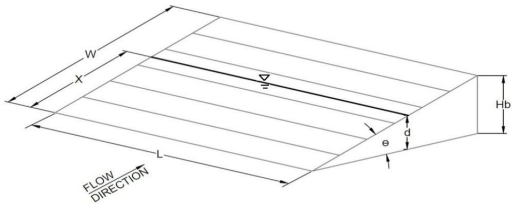
AREA INLET IN A SWALE

Super Star Car Wash - Meadowbrook

Basin A3

Inlet Design Information (Input)

Type of Inlet	User-Defined	Inlet Type =	User-Defined	
Angle of Inclined Grate (must be <= 30 degrees)		θ =	0.00	degrees
Width of Grate		W =	2.22	ft
Length of Grate		L =	2.22	ft
Open Area Ratio		A_{RATIO} =	0.60	
Height of Inclined Grate		H_B =	0.00	ft
Clogging Factor		C_f =	0.50	
Grate Discharge Coefficient		C_d =	N/A	
Orifice Coefficient		C_o =	0.64	
Weir Coefficient		C_w =	2.05	



		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.09	0.40	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**0.3**	**3.2**	**cfs**
Bypassed Flow	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Qa/Qo	**C% =**	**100**	**100**	**%**

WATER QUALITY CALCULATIONS

Contech Engineered Solutions LLC
9025 Centre Pointe Drive, Suite 400
West Chester, OH 45069
Phone: (513) 645-7000
Fax: (513) 645-7993
www.ContechES.com

Underground WQ treatment will need to be approved, applicant must submit a deviation request explaining why above ground is not feasible.

March 15, 2023

Austin Johrendt
Ayres Associates Inc.
3376 Packerland Dr.
Ashwaubenon, WI 54115

RE: SuperStar Carwash – Colorado Springs, CO

Dear Mr. Johrendt,

This letter is to address the stormwater treatment capability of the CDS 4040-8 that is proposed for SuperStar Carwash project. The design parameters provided to Contech are a water quality treatment flow rate of 4.99 cfs, with a peak bypass flow rate of 7.08 cfs. The CDS 4040-8 model has been verified to treat a maximum water quality treatment flow rate of 6.0 cfs, further discussion on CDS pollutant removal verification is below.

The Colorado Springs pollutant removal standard requires the stormwater control measure shall be designed to treat stormwater runoff in a manner expected to reduce the event mean concentration (EMC) of total suspended solids (TSS) to a median value of 30 mg/L or less. Per the Urban Drainage and Flood Control District (UDFCD) Criteria Manual Volume 3 (2015), Chapter 1, Table 1-2, commercial site median influent TSS EMC is estimated to be 85 mg/L.

A median effluent TSS concentration of 30 mg/L or less can be substantiated by the CDS Field Verification report which was conducted under the TARP Tier II protocol, and has been verified by the New Jersey Corporation for Advanced Technology (NJCAT). The Field Verification report can be found at the following link, and is attached for convenience:
http://www.njcat.org/uploads/newDocs/NJCATTECHNOLOGYVERIFICATIONMSBCDSFINAL81012.pdf

As highlighted on page 23, the CDS demonstrated during field evaluation a median TSS effluent concentration of 26.0 mg/L, from a median influent TSS EMC of 154.0 mg/L, which meets and exceeds the 30 mg/L effluent TSS requirement. Suspended Solids Parameters are further described in the report on page 32, also highlighted for convenience.

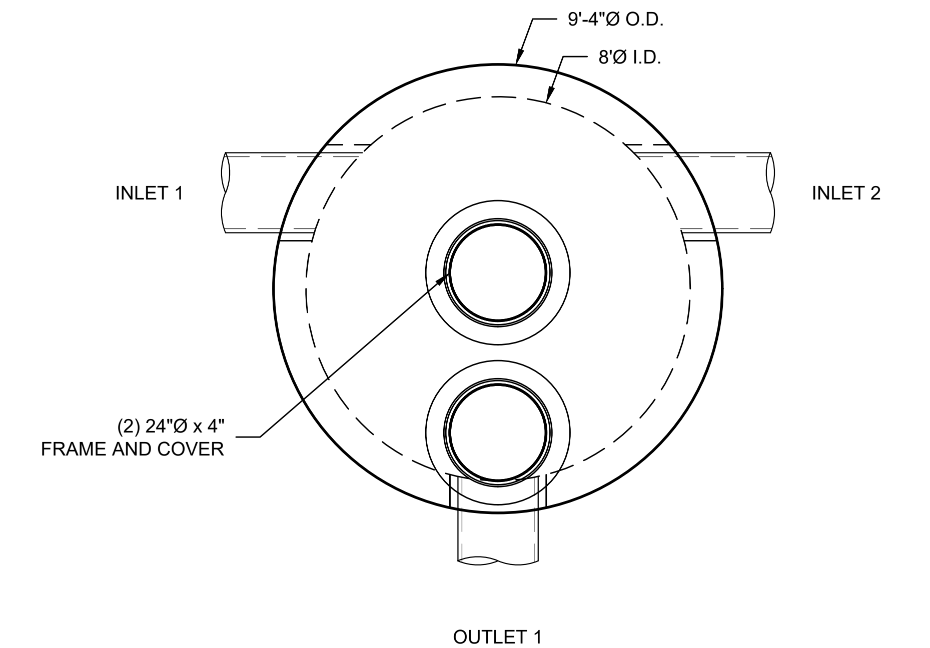
Please feel free to contact me with any further questions.

Sincerely,

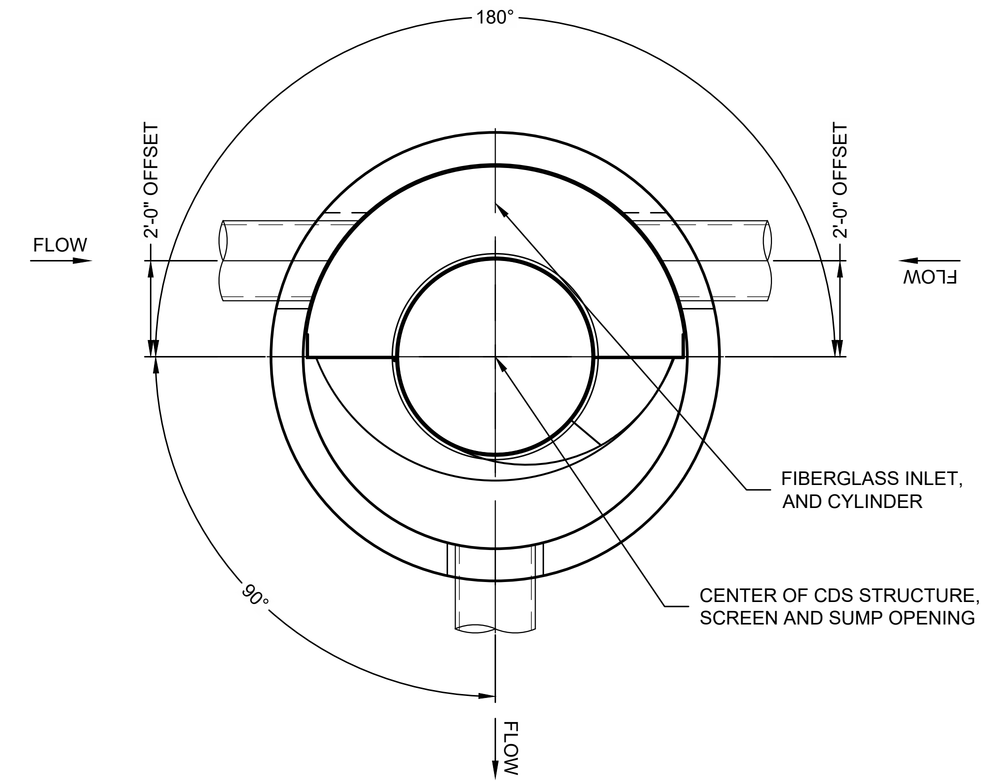
Doug Miller

Contech Engineered Solutions, LLC

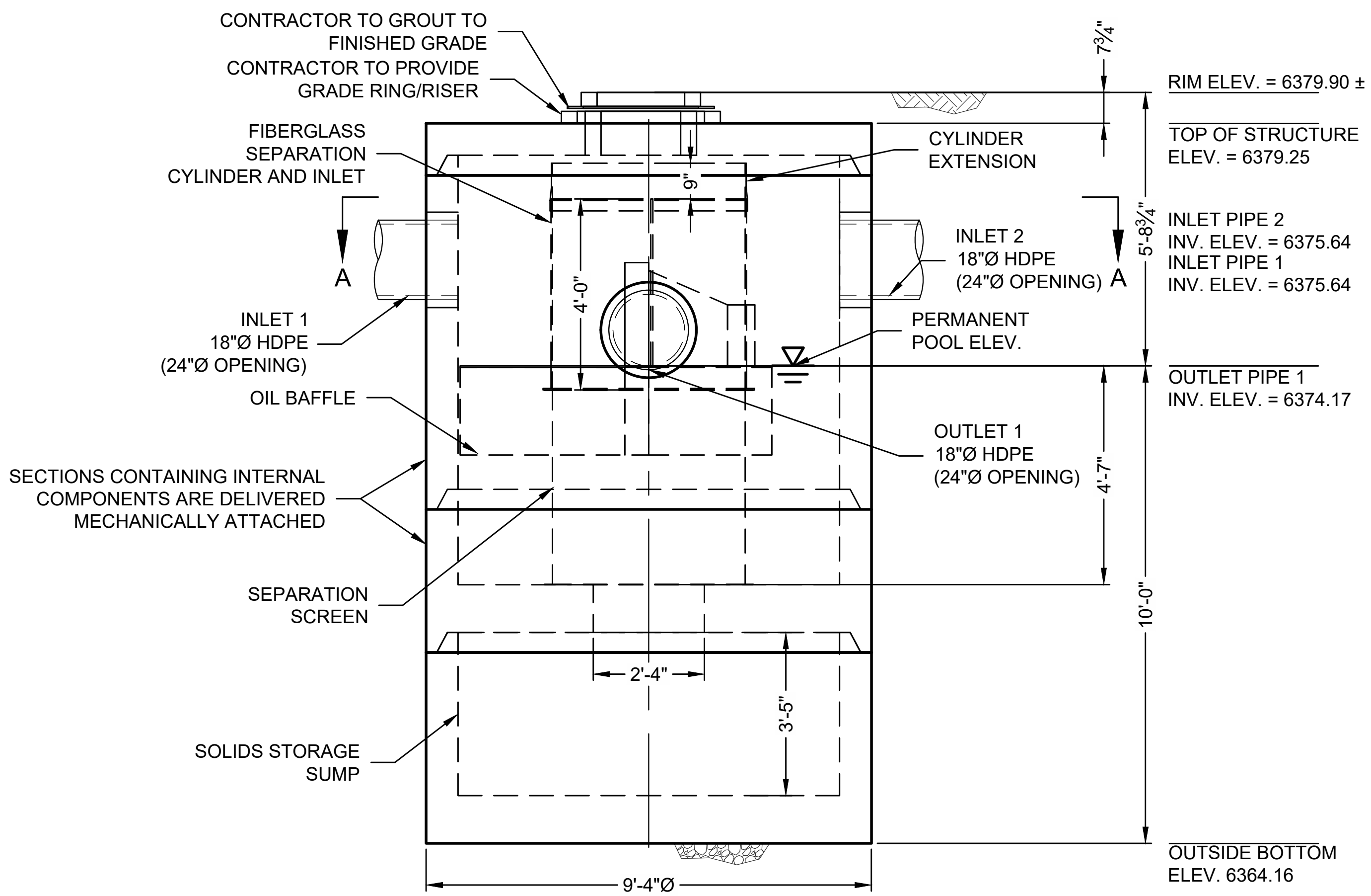
Cc: Craig Fairbaugh, Regional Regulatory Manager, Contech Engineered Solutions



PLAN VIEW



SECTION A-A



ELEVATION VIEW

MATERIAL LIST (PROVIDED BY CONTECH)

COUNT	DESCRIPTION	INSTALLED BY
1	FIBERGLASS INLET AND CYLINDER	CONTECH
1	2400 micron, 4' O.D. x 4.08' SEP. SCREEN	CONTECH
1	HARDWARE KIT	CONTECH
1	1'-9" FT. CYLINDER EXTENSION	CONTRACTOR
1	SEALANT FOR JOINTS	CONTRACTOR
2	24"Ø x 4" FRAME AND COVER, EJ#41600389, OR EQUIV.	CONTRACTOR

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
3. CDS 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. IF REQUIRED, PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.
6. CDS 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 CDS MANHOLE STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPE(S). 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 = 35000 LBS.
STRUCTURE IS DELIVERED IN 3 PIECES

MAX FOOTPRINT = Ø9'-4"

CONTECH
PROPOSAL
DRAWING

LPICO
5819 / 453342
LAYOUT 1A
4040-8-FGIS

I:\MERLIN\PROJECTACTIVE\744800\744893\744893-10-CDS\DRAWINGS\744893-10-CDS4040-8 CONFAB.DWG 3/6/2023 11:57 AM

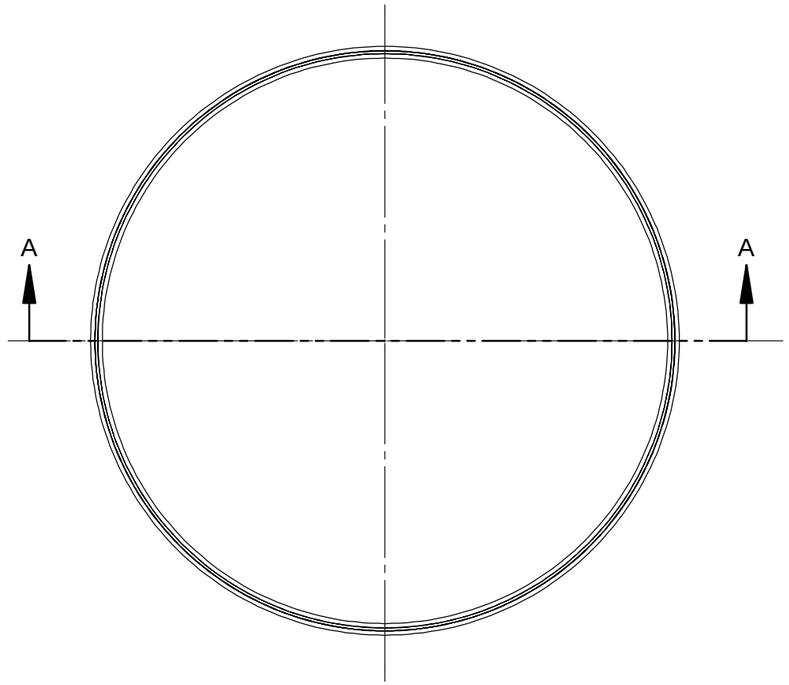
MARK	DATE	REVISION DESCRIPTION	BY

CDS4040-8-C - 744893-10
SUPERSTAR CARWASH
COLORADO SPRINGS, CO
for SYSTEM: CONTECH CDS
HYDRODYNAMIC SEPARATOR

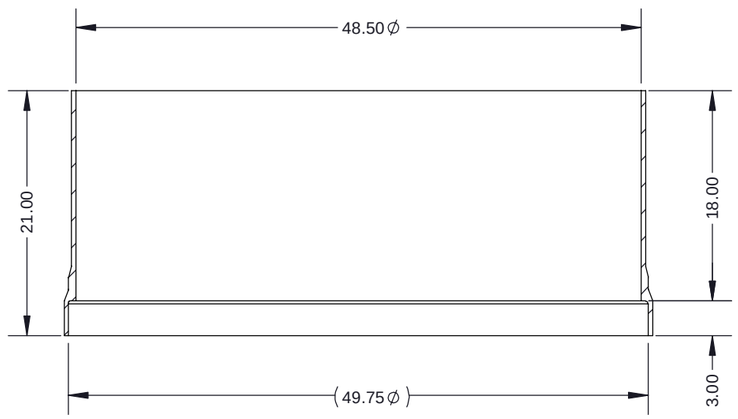
CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9100 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,788,848; 6,641,720; 6,511,595; 6,581,783; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

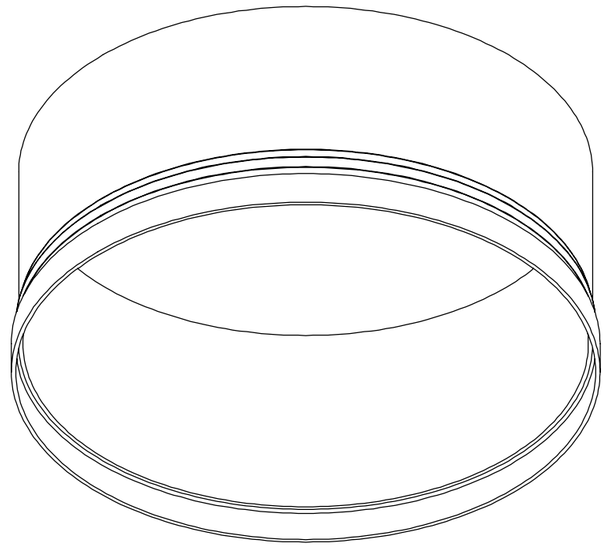
DATE: 03/06/23	SCALE: 1/4" = 1'-0"
DESIGNED: TNB	DRAWN: TNB
CHECKED: TNB	APPROVED: TNB
PROJECT No.: 744893	SEQUENCE No.: 10
SHEET: 1 OF 1	



TOP VIEW



SECTION A-A



ISOMETRIC VIEW

NOTES:
1. SEE SITE SPECIFIC DRAWINGS FOR REQUIRED CYLINDER EXTENSION HEIGHT
2. SEE CYLINDER EXTENSION INSTALLATION GUIDE FOR ADDITIONAL INFORMATION

CDS®

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

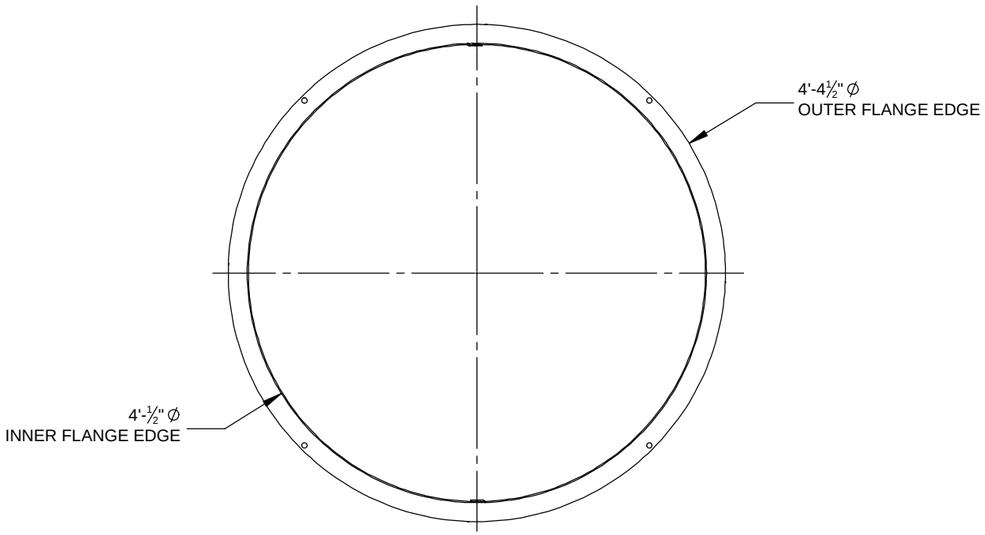
REFERENCE DETAIL
1.5 FT CYLINDER EXTENSION
CDS - 40 SERIES

THIRD ANGLE PROJECTION

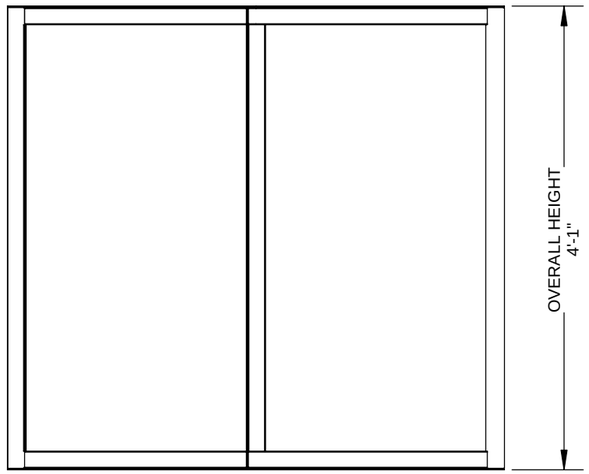
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

TOLERANCES:
FRACTIONAL ± 1/16
ANGLES ± 1 DEGREE
TWO PLACE DECIMAL ± 0.06
THREE PLACE DECIMAL ± 0.030

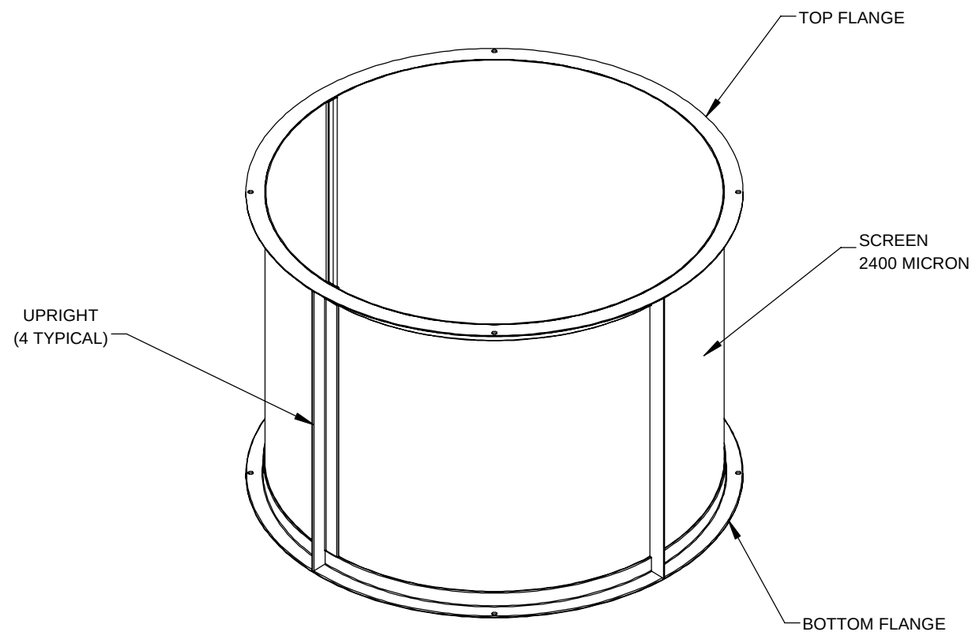
PART NUMBER: 325-002788		
APPROVED BY: M. BROOKS	DRAWN BY: J. BELL	
APPROVED BY DATE: 2022.03.10	DRAWN BY DATE: 2022.02.11	REV: B
SCALE: N/A	SHEET 1 OF 1	



TOP VIEW



SIDE VIEW



ISOMETRIC VIEW

NOTES:
1. SEE SITE SPECIFIC DRAWINGS FOR REQUIRED SCREEN ASSEMBLY
2. SEE CDS UNIT ASSEMBLY AND INSTALLATION GUIDE FOR ADDITIONAL INFORMATION

CDS®

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

REFERENCE DETAIL
SCREEN ASSEMBLY
CDS4040 2400 MICRON

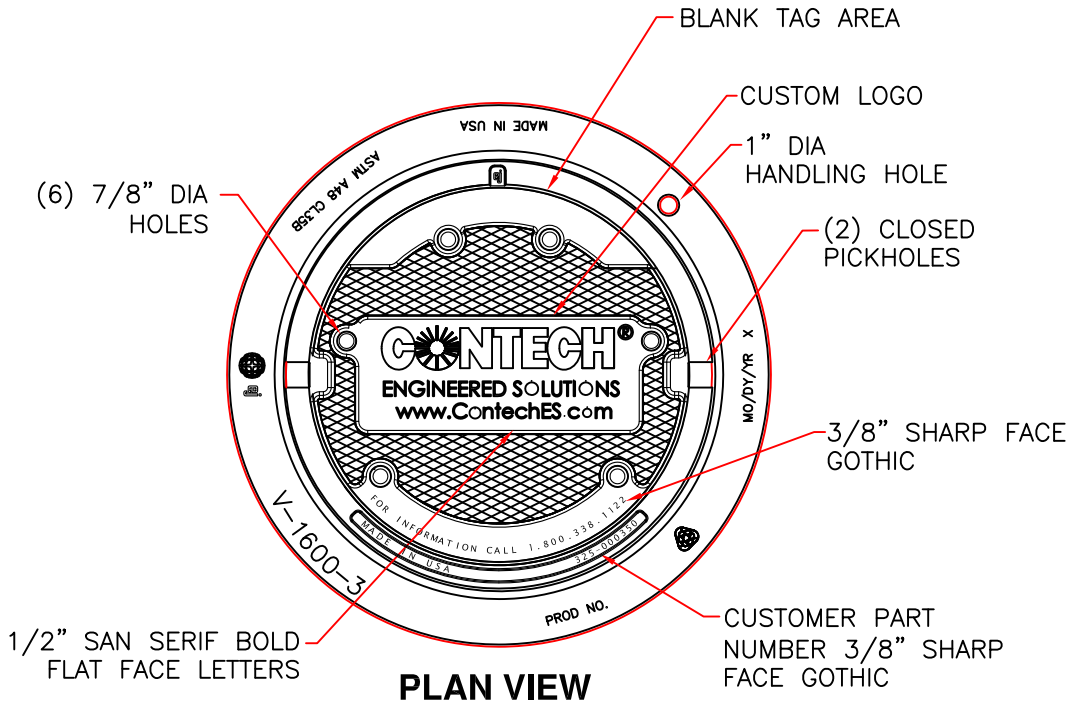
THIRD ANGLE PROJECTION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

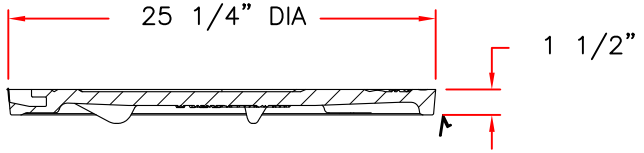
TOLERANCES:
FRACTIONAL ± 1/16
ANGLES ± 1 DEGREE
TWO PLACE DECIMAL ± 0.06
THREE PLACE DECIMAL ± 0.030

PART NUMBER: 335-000388		
APPROVED BY: M. BROOKS	DRAWN BY: C. CALDON	
APPROVED BY DATE: 2021.12.13	DRAWN BY DATE: 2022.02.16	REV: A
SCALE: N/A	SHEET 1 OF 1	

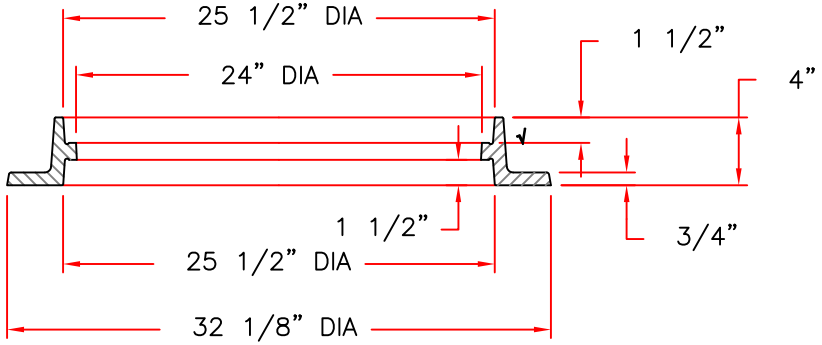
V1600-3 V1610-3 Assembly



PLAN VIEW



COVER SECTION



RING SECTION

Product Number

41600389

Design Features

-Materials
  Frame
    Gray Iron (CL35B)
  Cover
    Gray Iron (CL35B)

-Design Load
  Heavy Duty
-Open Area
  n/a
-Coating
  Undipped
-√Designates Machined Surface

Certification

-
-ASTM A48
-
-Country of Origin: USA

Major Components

41600310
41600374

Drawing Revision

05/02/2008 Designer: DEW
6/20/2017 Revised By: DAE

Disclaimer

Weights (lbs./kg) dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

Contact

800 626 4653
ejco.com