

November 4, 2020

Michael Grabczyk
20120 E. Mainstreet
Parker, CO 80138

RE: Murphy Express – Drainage Conformance Letter – #SP20-019

Dear Michael,

This Drainage Conformance Letter has been prepared for the proposed Murphy Express located at 12405 South Parker Road. The purpose of this letter is to show that the proposed development conforms to the Storm Drainage and Environmental Criteria Manual for the Town of Parker and the Parker & Pine Retail Final Drainage Report Version 1 prepared by Kimley Horn dated November 2019.

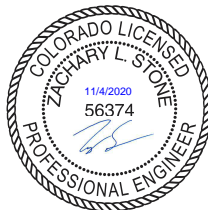
The project site is a portion of Lot 1 Block 3 within the Parker Auto Plaza Filing No. 1 located in the Southwest Quarter of Section 10, Township 6 South, Range 66 West of the 6th Principal Meridian, Town of Parker, County of Douglas, State of Colorado. The site is bounded by South Parker Road (State Highway No. 83) to the east, Pine Lane to north, Twenty Mile Road to the west, and an existing detention pond and Baldwin Gulch to the south. The site is currently vacant.

The existing site generally slopes to the northwest. In the existing conditions sheet flow to an existing inlet northwest of the proposed site. The existing underground storm drain system conveys stormwater to an existing detention pond which ultimately discharges into Baldwin Gulch. The proposed Murphy Express occupies approximately 1.09 acres of vacant land covered mostly by native grasses and weeds. An on-site storm sewer system is being proposed, which will convey stormwater to the northwest corner of the site. The proposed storm sewer system connects and ultimately discharges into the existing storm sewer system south of the site which has been sized to receive flows from the developed property. Inlet capacity calculations are included with this memo (Attachment A).

The project site was studied in the Parker & Pine Retail Final Drainage Report Version 1 prepared by Kimley Horn dated November 2019. Per said report, this site lies within Basin 5.0. The impervious percentage assigned to this basin was 85%. The impervious percentage for the proposed Murphy Express at 12405 South Parker Street was calculated to be 68%. Since the proposed development is below the 85% imperviousness estimated by the Parker & Pine Final Drainage Report Version 1, the existing drainage facilities should be sufficient to safely convey the runoff from the proposed Murphy site and not negatively impact adjacent properties.

Sincerely,
GALLOWAY

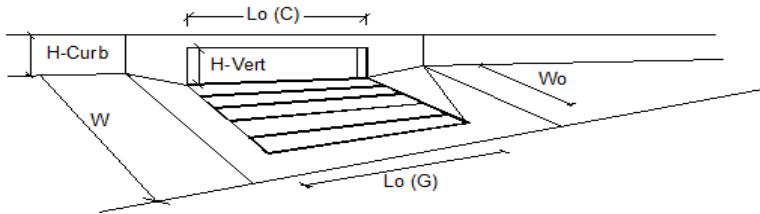
Zachary Stone, PE
Civil Engineering Project Engineer
ZacharyStone@GallowayUS.com



Appendix A – Inlet Capacity Calculations

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018

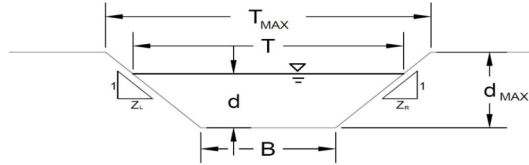


Design Information (Input)	MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity*			
Total Inlet Interception Capacity	0.7	1.5	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	0.0	0.2	cfs
Capture Percentage = Q_i/Q_c =	100	86	%

AREA INLET IN A SWALE

Enter Your Project Name Here

Inlet 1



This worksheet uses the NRCS vegetative 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							
Manning's n (Leave cell D16 blank to manually enter an n value)			n =	0.030						
Channel Invert Slope			S ₀ =	0.0800 ft/ft						
Bottom Width			B =	0.00 ft						
Left Side Slope			Z ₁ =	10.00 ft/ft						
Right Side Slope			Z ₂ =	10.00 ft/ft						
Check one of the following soil types:			Choose One:							
Soil Type:	Max. Velocity (V _{MAX})	Max Froude No. (F _{MAX})	<input type="checkbox"/> Non-Cohesive <input checked="" type="checkbox"/> Cohesive <input type="checkbox"/> Paved							
Non-Cohesive	5.0 fps	0.60								
Cohesive	7.0 fps	0.80								
Paved	N/A	N/A								
Max. Allowable Top Width of Channel for Minor & Major Storm			T _{MAX} =	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px;">Minor Storm</td> <td style="width: 50px;">Major Storm</td> <td style="width: 20px;">feet</td> </tr> <tr> <td style="text-align: center;">16.00</td> <td style="text-align: center;">16.00</td> <td></td> </tr> </table>	Minor Storm	Major Storm	feet	16.00	16.00	
Minor Storm	Major Storm	feet								
16.00	16.00									
Max. Allowable Water Depth in Channel for Minor & Major Storm			d _{MAX} =	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px;">Minor Storm</td> <td style="width: 50px;">Major Storm</td> <td style="width: 20px;">feet</td> </tr> <tr> <td style="text-align: center;">1.00</td> <td style="text-align: center;">1.00</td> <td></td> </tr> </table>	Minor Storm	Major Storm	feet	1.00	1.00	
Minor Storm	Major Storm	feet								
1.00	1.00									
Allowable Channel Capacity Based On Channel Geometry										
MINOR STORM Allowable Capacity is based on Top Width Criterion			Q _{allow} =	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px;">Minor Storm</td> <td style="width: 50px;">Major Storm</td> <td style="width: 20px;">cfs</td> </tr> <tr> <td style="text-align: center;">48.6</td> <td style="text-align: center;">48.6</td> <td></td> </tr> </table>	Minor Storm	Major Storm	cfs	48.6	48.6	
Minor Storm	Major Storm	cfs								
48.6	48.6									
MAJOR STORM Allowable Capacity is based on Top Width Criterion			d _{allow} =	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px;">Minor Storm</td> <td style="width: 50px;">Major Storm</td> <td style="width: 20px;">ft</td> </tr> <tr> <td style="text-align: center;">0.80</td> <td style="text-align: center;">0.80</td> <td></td> </tr> </table>	Minor Storm	Major Storm	ft	0.80	0.80	
Minor Storm	Major Storm	ft								
0.80	0.80									
Water Depth in Channel Based On Design Peak Flow										
Design Peak Flow			Q _c =	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px;">Minor Storm</td> <td style="width: 50px;">Major Storm</td> <td style="width: 20px;">cfs</td> </tr> <tr> <td style="text-align: center;">0.5</td> <td style="text-align: center;">1.3</td> <td></td> </tr> </table>	Minor Storm	Major Storm	cfs	0.5	1.3	
Minor Storm	Major Storm	cfs								
0.5	1.3									
Water Depth			d =	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px;">Minor Storm</td> <td style="width: 50px;">Major Storm</td> <td style="width: 20px;">feet</td> </tr> <tr> <td style="text-align: center;">0.14</td> <td style="text-align: center;">0.20</td> <td></td> </tr> </table>	Minor Storm	Major Storm	feet	0.14	0.20	
Minor Storm	Major Storm	feet								
0.14	0.20									
<p style="color: red; font-weight: bold;">Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'</p> <p style="color: red; font-weight: bold;">Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'</p>										

AREA INLET IN A SWALE

Enter Your Project Name Here

Inlet 1

Inlet Design Information (Input)

Type of Inlet: Inlet Type =

Angle of Inclined Grate (must be <= 30 degrees): $\theta = 0.00$ degrees

Width of Grate: $W = 3.00$ feet

Length of Grate: $L = 3.00$ feet

Open Area Ratio: $A_{RATIO} = 0.70$

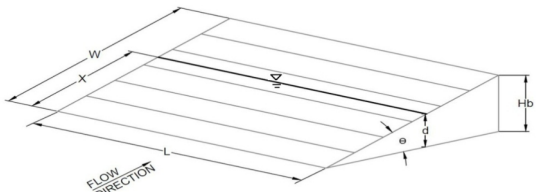
Height of Inclined Grate: $H_B = 0.00$ feet

Clogging Factor: $C_f = 0.50$

Grate Discharge Coefficient: $C_d = 0.96$

Orifice Coefficient: $C_o = 0.64$

Weir Coefficient: $C_w = 2.05$



Water Depth at Inlet (for depressed inlets, 1 foot is added for depression):

	MINOR	MAJOR	
d =	0.14	0.20	
Q_a =	0.9	1.7	cfs
Bypassed Flow, Q_b =	0.0	0.0	cfs
Capture Percentage = Q_a/Q_o = C%	100	100	%

Total Inlet Interception Capacity (assumes clogged condition)

Warning 04: Froude No. exceeds USDCM Volume I recommendation.

Scenario: Base
Current Time Step: 0.000Hr
Conduit FlexTable: Combined Pipe/Node Report

Label	Start Node	Stop Node	Length (Unified) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Headloss (ft)
P-1 (1) (MOC46_STS)	MH-2	S-2 (MOC46_STS)	143.7	5,803.91	5,802.35	5,803.05	5,801.62	0.010	1.56
P-2 (MOC46_STS)	S-2 (MOC46_STS)	S-3 (MOC46_STS)	51.7	5,802.38	5,801.73	5,801.52	5,801.00	0.010	0.65
P-3 (MOC46_STS)	S-3 (MOC46_STS)	O-1	67.1	5,801.85	5,801.01	5,800.90	5,800.20	0.010	0.84

\\galfs1.graa.lcl\dwgs\Murphy Oil USA\CO, Parker - MOC000046.20 - Parker & Pine\3 Permit CDs\3.04 Grading-Drainage Studies\3.04.2 Proposed Drainage Reports - Info\StormCAD\MOC46_STS.stsw