

Culvert Designer/Analyzer Report				
XS C-C EX. 100-YR				
Analysis Component				
Storm Event	Design	Discharge	214.84 cfs	
Peak Discharge Method: User-Specified				
Design Discharge	214.84 cfs	Check Discharge	214.84 cfs	
Tailwater Conditions: Constant Tailwater				
Tailwater Elevation	N/A ft			
Name	Description	Discharge	HW Elev.	Velocity
Culvert-1	2-48 inch Circular	214.86 cfs	665.27 ft	10.16 ft/s
Weir	Roadway	0.00 cfs	665.27 ft	N/A
Total		214.86 cfs	665.27 ft	N/A

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Bentley Systems, Incorporated

Haestad Surveying And Engineering, LLC

Haestad Methods Solution Center

Watertown, CT 06795 USA

Project Engineer: sam@hanna-se.com

CulvertMaster v10.3 [10/03/06/03]

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Culvert Designer/Analyzer Report				
XS C-C EX. 100-YR				
Component Culvert-1				
Culvert Summary				
Computed Headwater Elev	665.27 ft	Discharge	214.86 cfs	
Inlet Control HW Elev.	664.82 ft	Tailwater Elevation	N/A ft	
Outlet Control HW Elev.	665.27 ft	Control Type	Outlet Control	
Headwater Depth/Height	1.38			
Grades				
Upstream Invert	659.75 ft	Downstream Invert	659.43 ft	
Length	166.57 ft	Constructed Slope	0.001921 ft/ft	
Hydraulic Profile				
Profile	CompositeM2PressureProfile	Depth, Downstream	3.14 ft	
Slope Type	Mild	Normal Depth	N/A ft	
Flow Regime	Subcritical	Critical Depth	3.14 ft	
Velocity Downstream	10.16 ft/s	Critical Slope	0.006099 ft/ft	
Section				
Section Shape	Circular	Mannings Coefficient	0.013	
Section Material	Concrete	Span	4.00 ft	
Section Size	48 inch	Rise	4.00 ft	
Number Sections	2			
Outlet Control Properties				
Outlet Control HW Elev.	665.27 ft	Upstream Velocity Head	1.14 ft	
Ke	0.20	Entrance Loss	0.23 ft	
Inlet Control Properties				
Inlet Control HW Elev.	664.82 ft	Flow Control	Submerged	
Inlet Type	Groove end projecting	Area Full	25.1 ft²	
K	0.00450	HDS S Chart	1	
M	2.00000	HDS S Scale	3	
C	0.03170	Equation Form	1	
Y	0.69000			
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Culvert Designer/Analyzer Report
XS C-C EX. 100-YR

Component:Weir

Hydraulic Component(s): Roadway				
Discharge	0.00	cfs	Allowable HW Elevation	665.27 ft
Roadway Width	138.43	ft	Overtopping Coefficient	2.90 US
Low Point	665.78	ft	Headwater Elevation	N/A ft
Discharge Coefficient (Cr)	2.90		Submergence Factor (Ks)	1.00
Tailwater Elevation	-9.999.00	ft		

Sta (ft)	Elev. (ft)
0.00	666.70
26.99	666.58
54.32	666.09
80.23	665.78
106.84	665.82
132.07	665.88
161.97	665.97
188.00	666.40

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EX. CULVERT SUMMARY TABLE

CULVERT		Q100 (cfs)	VELOCITY 100 -YEAR (ft/s)	WSEL 100-YEAR (ft)
PRE-DEVELOPMENT	2/EA 48" RCP	214.84	10.16	665.27
POST-DEVELOPMENT	2/EA 48" RCP	221.31	10.33	665.44
CAPACITY		233.86	10.66	665.78

* NOTES *

1. HSE PERFORMED A FIELD SURVEY FOR CULVERT FLOWLINE AND ROADWAY CENTERLINE ELEVATIONS USED IN THIS STUDY.
2. EXISTING DUAL 48" RCP UNDER TxDOT SERVICE ROAD IS CAPABLE OF HANDLING INCREASE IN FLOWS WITHOUT OVERTOPPING ROADWAY.

EX. CULVERT CAPACITY CALCULATIONS

Culvert Designer/Analyzer Report XS C-C CAPACITY 100-YR				
Overtopping Analysis				
Name	Description	Discharge	HW Elev.	Velocity
Culvert-1	2-48 inch Circular	233.88 cfs	665.78 ft	10.66 ft/s
Weir	Roadway	0.00 cfs	665.78 ft	N/A
Total	-----	233.88 cfs	665.78 ft	N/A
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EX. CULVERT POST-DEVELOPMENT CALCULATIONS

Culvert Designer/Analyzer Report XS C-C PROP. 100-YR				
Analysis Component				
Storm Event	Design	Discharge	221.31 cfs	
Peak Discharge Method: User-Specified				
Design Discharge	221.31 cfs	Check Discharge	221.31 cfs	
Tailwater Conditions: Constant Tailwater				
Tailwater Elevation	N/A ft			
Name	Description	Discharge	HW Elev.	Velocity
Culvert-1	2-48 inch Circular	221.33 cfs	665.44 ft	10.33 ft/s
Weir	Roadway	0.00 cfs	665.44 ft	N/A
Total		221.33 cfs	665.44 ft	N/A

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Culvert Designer/Analyzer Report				
XS C-C PROP. 100-YR				
Component: Culvert-1				
Culvert Summary				
Computed Headwater Elev.	665.44 ft	Discharge	221.33 cfs	
Inlet Control HW Elev.	664.98 ft	Tailwater Elevation	N/A ft	
Outlet Control HW Elev.	665.44 ft	Control Type	Outlet Control	
Headwater Depth/Height	1.42			
Grades				
Upstream Invert	659.75 ft	Downstream Invert	659.43 ft	
Length	166.57 ft	Constructed Slope	0.001921 ft/ft	
Hydraulic Profile				
Profile	Composite M2 Pressure Profile	Depth, Downstream	3.18 ft	
Slope Type	Mild	Normal Depth	N/A ft	
Flow Regime	Subcritical	Critical Depth	3.18 ft	
Velocity Downstream	10.33 ft/s	Critical Slope	0.006291 ft/ft	
Section				
Section Shape	Circular	Mannings Coefficient	0.013	
Section Material	Concrete	Span	4.00 ft	
Section Size	48 inch	Rise	4.00 ft	
Number Sections	2			
Outlet Control Properties				
Outlet Control HW Elev.	665.44 ft	Upstream Velocity Head	1.21 ft	
Ke	0.20	Entrance Loss	0.24 ft	
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Discharge Coefficient (Cr)	2.90		Submergence Factor (Ks)	1.00
Tailwater Elevation	-9.999.00	ft		

Sta (ft)	Elev. (ft)
0.00	666.70
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REVISIONS

#	REVISION	DATE

DEVELOPER / OWNER:
ROBERT TATE
2824 W. 7TH
STREET / SUITE 100
FORT WORTH, TX 76107

CULVERMASTER
CALCS.

1.535 ACRES COMMERCIAL
DEVELOPMENT OUT OF THE
DAVIS ADDITION
LOT 32R1, BLOCK 5
802 E. CRINER STREET
CITY OF GRANDVIEW
JOHNSON COUNTY, TEXAS

HANNA
SURVEYING
& ENGINEERING LLC.

HSE

HANNA SURVEYING AND ENGINEERING, LLC.
ENGINEERING FIRM NUMBER F-22119
SURVEYING FIRM NUMBER 10194633
SAM@HANNA-SE.COM

STATE OF TEXAS
REGISTERED
PROFESSIONAL ENGINEER
109945
SAMUEL C. HANNA


AUGUST 14, 2024

ISSUE DATE:
JUNE 14, 2024

PROJECT NO.:
23-788

SHEET NUMBER
C-3.4

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