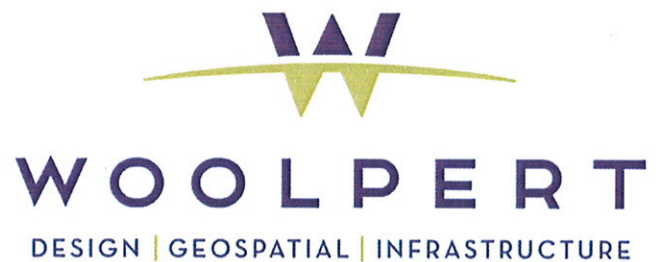


DRAINAGE ANALYSIS REPORT

for:
**KYB Manufacturing
Entrance Improvements
Franklin, IN**

May 16, 2012



DRAINAGE ANALYSIS REPORT

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Reference Material

Storm Sewer Calculations

INTRODUCTION

This report outlines the storm water management system designed to serve the KYB Manufacturing entrance improvements. The KYB improvements consist of a new entrance road, roundabout, sidewalk and parking areas.

DETENTION ANALYSIS

No detention is required for this project. The impacted areas are part of a previously approved master drainage plan for the entire property. The improvements will drain into new storm sewers that will connect to the existing storm system. The existing storm sewer system then provides conveyance to the existing detention pond.

STORM SEWER

All storm sewers have been designed to convey the 10yr. storm hydraulic grade line (HGL) within the crown of the pipes.

Please refer to Section 1 for all storm sewer calculations and drainage area map.

CONCLUSION

The proposed improvements have been designed in accordance with the City of Franklin requirements. The proposed storm sewer systems have been designed to adequately convey the storm water to the existing storm sewers and ultimately to the existing detention pond. Therefore, no adverse impacts are anticipated as a result of this development.

STORM SEWER DESIGN

Page 1

Hydraflow Storm Sewers Extension v12.04

KYB
Weighted C Calculations

STR #: 2.1

Cover Type	C Value	Area (ac.)
Open Space	0.2	2.18
Impervious	0.85	0.02
Total Area =		2.2

Weighted C Value = 0.21

STR #: 1.2

Cover Type	C Value	Area (ac.)
Open Space	0.2	0.4
Impervious	0.85	0.59
Total Area =		0.99

Weighted C Value = 0.59

Name.... 1.2

File.... G:\DE\Clients\Takenaka\72416 KYB Entrance\Engineering\Storm Design\tcs.ppw

.....
TIME OF CONCENTRATION CALCULATOR
.....

Segment #1: Tc: TR-55 Sheet

Mannings n .2400
Hydraulic Length 100.00 ft
2yr, 24hr P 2.6600 in
Slope .022500 ft/ft

Avg.Velocity .11 ft/sec

Segment #1 Time: .2489 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length 42.00 ft
Slope .029700 ft/ft
Unpaved

Avg.Velocity 2.78 ft/sec

Segment #2 Time: .0042 hrs

Segment #3: Tc: TR-55 Shallow

Hydraulic Length 118.00 ft
Slope .014900 ft/ft
Paved

Avg.Velocity 2.48 ft/sec

Segment #3 Time: .0132 hrs

=====
Total Tc: .2663 hrs = 16 min.
=====

Type.... Tc Calcs
Name.... 2.1

Page 1.01

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.....
TIME OF CONCENTRATION CALCULATOR
.....

Segment #1: Tc: TR-55 Sheet

Mannings n .2400
Hydraulic Length 100.00 ft
2yr, 24hr P 2.6600 in
Slope .007500 ft/ft

Avg.Velocity .07 ft/sec

Segment #1 Time: .3862 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length 340.00 ft
Slope .008700 ft/ft
Unpaved

Avg.Velocity 1.50 ft/sec

Segment #2 Time: .0628 hrs

=====
Total Tc: .4489 hrs

= 27min.
=====

Tc Equations used...

==== SCS TR-55 Sheet Flow =====

$$Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))$$

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, %

==== SCS TR-55 Shallow Concentrated Flow =====

Unpaved surface:

$$V = 16.1345 * (Sf**0.5)$$

Paved surface:

$$V = 20.3282 * (Sf**0.5)$$

$$Tc = (Lf / V) / (3600\text{sec/hr})$$

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

