

Hydraulic Flow Rates for Sump  
And Flow By Conditions  
For  
Calgary and Southern Alberta  
Catch Basin Grates



Trojan Industries Inc.

January 2015

This is the first draft copy of theoretical hydraulic flow rates for Trojan's set of catch basin grates. These values have not been verified. Please let us know if there are any apparent errors or omissions. These values are theoretical values that have been calculated using the methods from HEC 22. Where possible, these values have been compared with those derived by others. Please note that the values referenced to Calgary Stantec (1996) were taken from the City of Calgary design standards as posted on the City of Calgary website in 2013. Values attributed to Wilson (1983) are from his thesis, "Capacities of Catch Basin Inlets Based on Use in Alberta" Values attributed to Townsend and Moss (1980) were measured from a model study.

These values are given with and without a safety factor (SF) so that the design engineer can choose when and how to include this and /or any other safety factor. The safety factor used herein is 0.5 \* the intercepted flow rate. The safety factor is intended to allow for some trash clogging but does not preclude the need for catch basin maintenance. It should be emphasized that when flat grates (without side inlets) such as the K-3 or TK-51 (without side inlet) are prone to clogging and should not be used in sump locations without an additional safety factor.

These values are provided for the purpose of assisting in the selection of an appropriate style and number of grates. Each municipality has their own preferred styles of grates. Some grates have fallen out of favour such as the TF-33, the TF-35 and the K-2. Many of the grates have additional options such as two piece side inlets or locking grates. It is essential to check the design standards for the municipality for which the design being done to ensure the correct styles and options are chosen.

The selection of the concrete slab used on the top of the concrete catch basin depends on which frame and grate is selected. The TF-50 (with side inlet) goes on a sloped slab whereas the TF-51 without side inlet goes on a flat slab (K-3). Furthermore, northern and southern Alberta use different concrete slabs so it is important to select a frame and grate that is appropriate to the region of interest.

Finally, there are various naming systems used across the province. Some names are ambiguous such as the TF-51 which can be the name of the frame and grate with or without the side inlet. Some frame and grates such as the K-7 come in either a single or, more commonly, a double which should be clarified in the design. A double consists of a double frame with two grates that goes on one concrete catch basin.

When in doubt, give us a call! Take the time to do it right and avoid a Change Order later!

**An Engineer's Guide to Specifying Manhole Covers, Grates and Frames for Calgary and Airdrie**

N.B. The City of Calgary is specifying undipped/Uncoated municipal castings only.

**Manhole Covers & Frames**

TF-50	Standard	M-Top Slab	Can get locking with cam lock
		Logo	Can get with one vent hole for sanitary or plugs
TF-48	1270 mm Cover	COC Logo or Blank	

\* TF-49 is old term for Frame and Cover for F-50

**Curb and Gutter Grates & Frames**

TF-51A (T-K1A)* or Type C	Two piece side inlet to facilitate side grate replacement			Slots are diagonal
		C top Slab	Grate is flat & Rectangular	Locking side inlet
TF-51 (TK-1)* or Type C	One piece side inlet			Slots are diagonal
		C top slab	Grate is flat & rectangular	

\* Specify with curb inlet to ensure inclusion of curb inlet

**Just Gutter Grates & Frames**

TF-51 (T-K1)**(K-3)	Flat	K-3 top slab	Can get locking	K-3 top slab
TK-2	Double frame with two grates of K2		sloped	K-2 top slab

\* Specify without curb inlet to avoid getting curb inlet

**Circular Grates & Frames**

TF-50	Round grate Calgary	M-top slab	
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Ductile iron is used for thinner or larger parts and parts at risk of damage by snowplows (Side Inlets)
The following items are made with ductile iron: TF-50 grate and 90 mm frame, one and two piece T-K1A side inlet & side inlet grate, Tk-1 grate & K-2 grate
City of Calgary specifics ASTM A48 CL20 for gray iron
City of Calgary specifics ASTM A536 60-40-18 for ductile iron

Always check the specifications for the municipality for which the drainage is being designed.

Drawings for these and other municipal castings are available on our website: [trojanindustries.com](http://trojanindustries.com)

Save time and money by calling if municipal specs differ from this chart.

## **AASHTO M 306 Standard Specification for Drainage, Sewer, Utility and Related Castings**

What is AASHTO M-360 Standard Specification for Drainage, Sewer, Utility and Related Castings? How is this different from H-20 and HS-20?

H-20 and HS-20 are AASHTO standards from 1944 which were originally intended for bridge and road loading. They detail a representative truck having axles of a particular axle load and location that would represent most of the trucks that the road or bridge would be subject to. The H-20 truck is represented as having a front axle of 8000 lbs. (35.6 kN) while the rear axle is 32,000 lbs. (142.3 kN). The HS-20 allows for an additional rear axle of 32,000 lbs. (142.3 kN). While this standard does not address municipal casting *per se*, the general application of this standard to castings has been that if the casting can bear the 16,000 lb. axle, the casting is considered to meet the equivalent of the H-20 or HS-20 standard.

Using this type of standard for municipal castings has many issues including:

*What is an appropriate area over which to apply the load? For how long? How should the per axle load be divided? Does a 'wheel' include both of the dual wheels? What about super singles? Is a safety factor included or should one be added? What about materials standards? Manufacturing quality? Inspection and certification?*

In Canada, a similar problem has developed with engineers trying to use a bridge/road standard (CL-W) to specify municipal castings. The CL-W standard does not specifically address municipal castings. Again, it does not answer the above questions.

The AASHTO system has since introduced the M-306 standard to address these issues.

Issues addressed in the M-306 standard that are not addressed in either the H-20/HS-20 system or the CL-W system:

- Loading details are specified: A 178 kN load is applied to an area 229mm by 229mm at a constant rate between 45 kg/sec. The load is held for 1 minute. The testing machine must be NIST compliant. To pass this test, there can be no cracks and any deformation must be less than 3.2mm.
- The material is specified: ASTM A 48 Class 35B for gray cast iron and ASTM A 536 Grad 80-55-06.
- Quality of manufacture is specified.
- Inspection and Certification is required.
- A safety factor of 2.5 times is used.

Why isn't ASTM A 48 or ASTM A 536 designation enough without M-306?

The traditional load tests done on test rods for the cast iron and ductile iron is ASTM A 48 and A 536 only measure the strength of the iron without considering the shape of the final casting. It is possible for a casting to fail the proof load test (due to poor design in shape) while passing the strength requirements for the material itself.

N.B. In 2012, the City of Edmonton switched to a modified form of the M-306 standard.

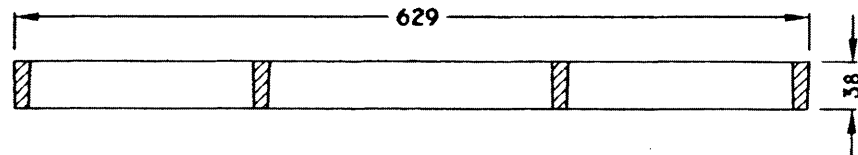
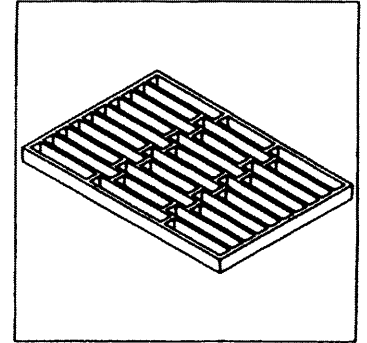
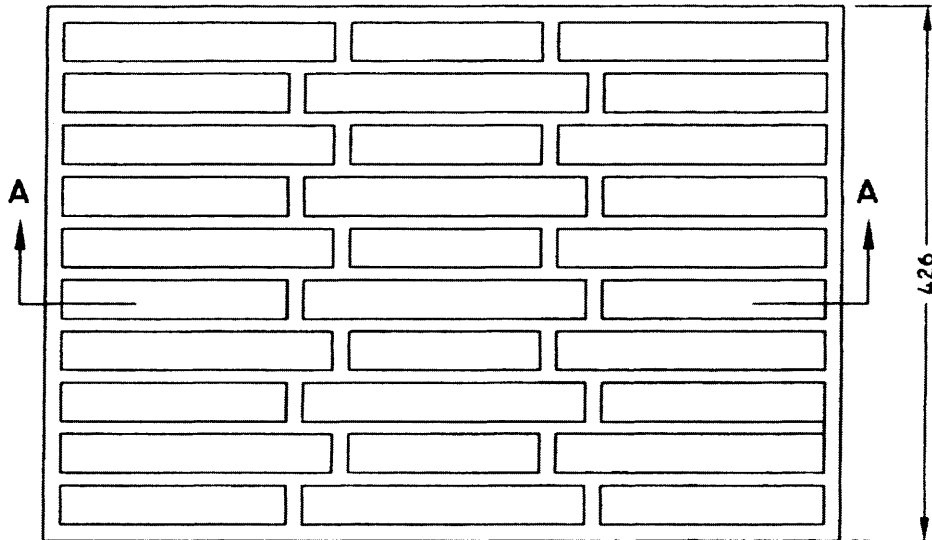


Please note that drawings are approximate and not to be used for engineering purposes – please contact us for specific dimensions.

## STANDARD GRATE

T-KI

PLAN



SECTION A-A

ISO 9001-2000 CERTIFIED

RATED FOR HS-20 LIVE LOAD

MEASUREMENTS IN MILLIMETERS

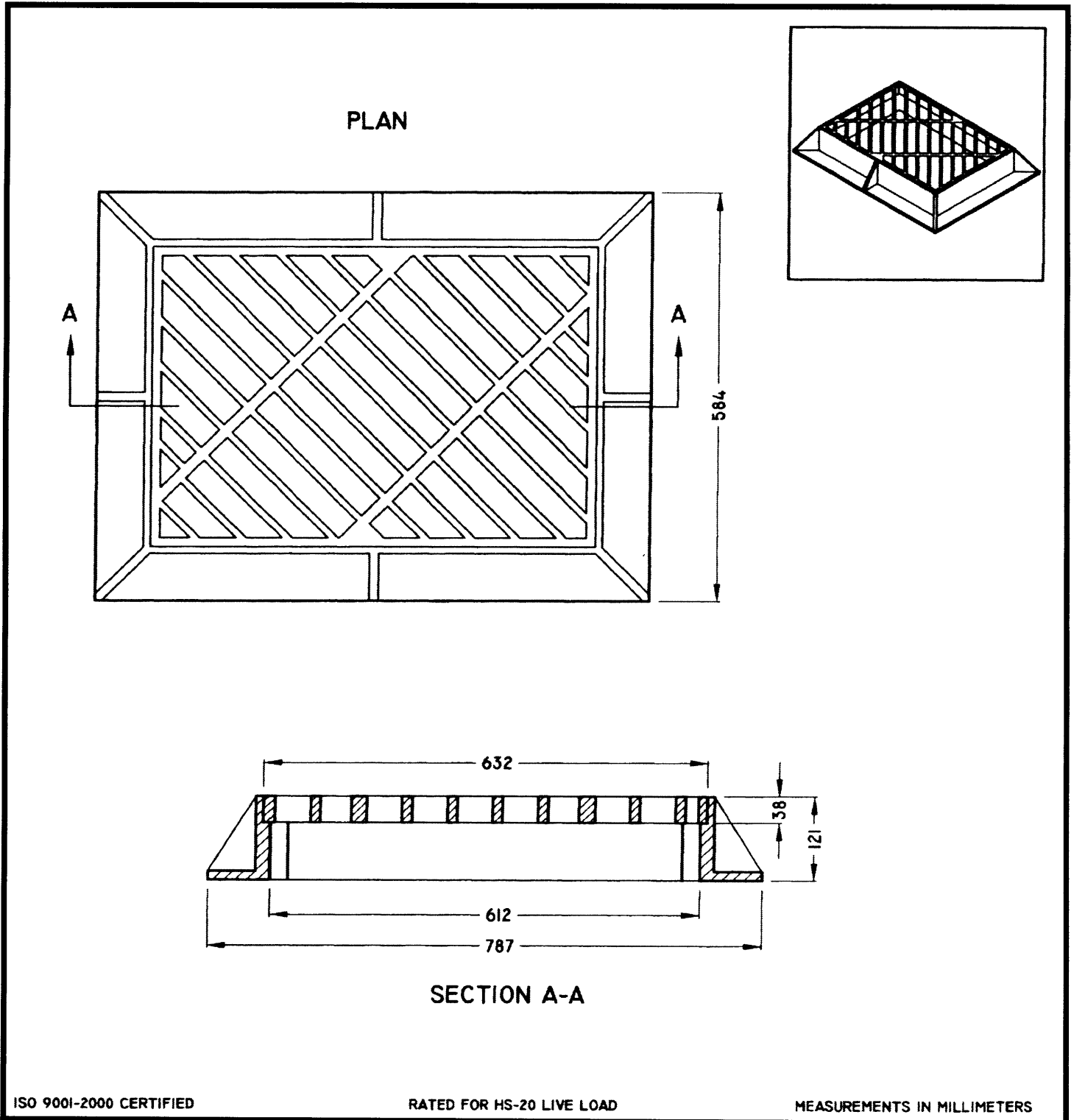
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Please note that drawings are approximate and not to be used for engineering purposes – please contact us for specific dimensions.

## FRAME AND GRATE

K-1/TF-5I



ISO 9001-2000 CERTIFIED

RATED FOR HS-20 LIVE LOAD

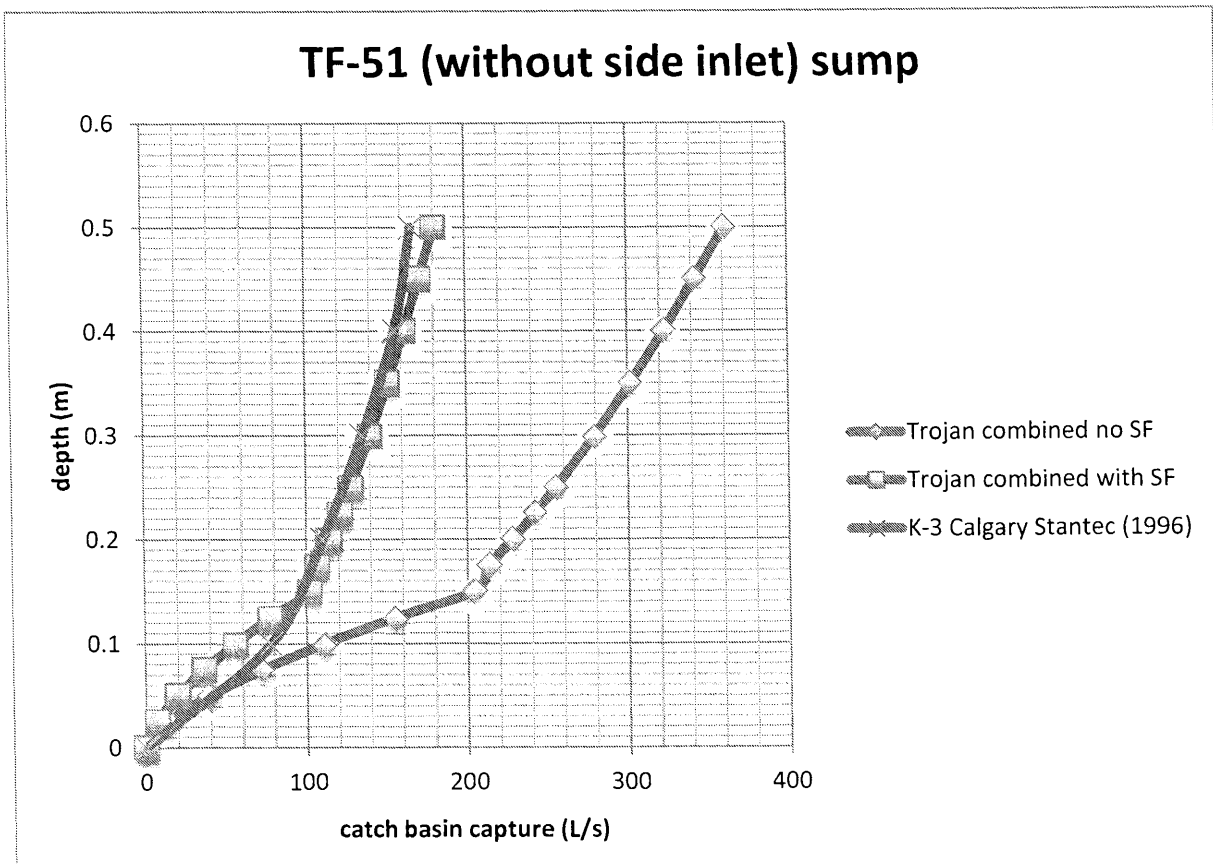
MEASUREMENTS IN MILLIMETERS

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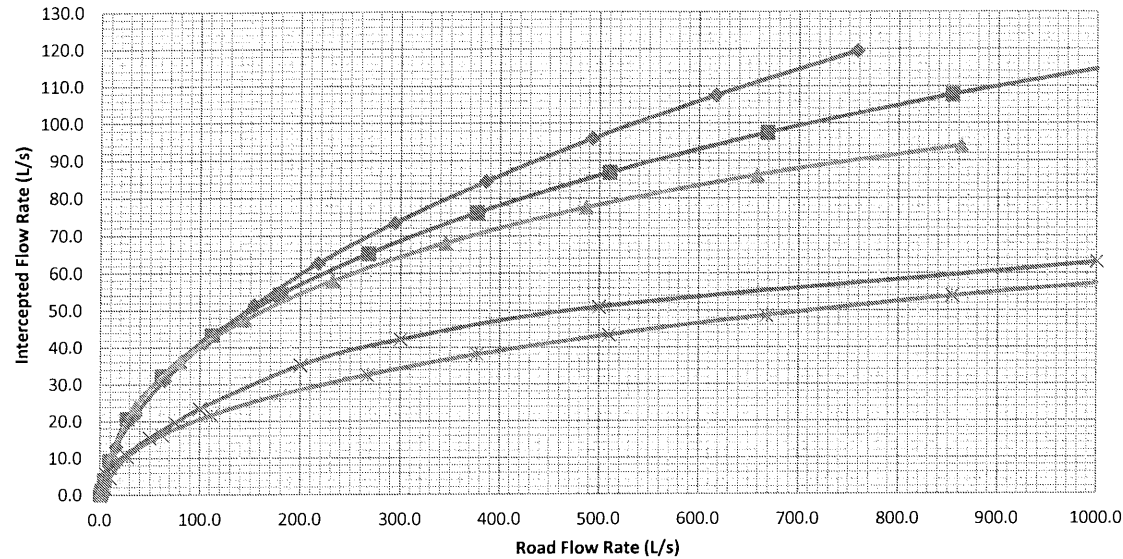
TF-51 (without side inlet) sump condition

Trojan (2014) without safety factor		Trojan with SF		K-3 Calgary Stantec (1996)	
depth (m)	Q combined (L/s)	Q combined (L/s)	depth (m)	Q (L/s)	
0	0	0	0.000	0	
0.025	14	7	0.100	78	
0.050	39	20	0.200	110	
0.075	72	36	0.300	135	
0.100	111	56	0.400	156	
0.125	155	78	0.500	166	
0.150	204	102			
0.175	213	107			
0.200	228	114			
0.225	242	121			
0.250	255	128			
0.300	279	140			
0.350	302	151			
0.400	323	161			
0.450	342	171			
0.500	361	180			

N.B. grate is not sloped when installed without side inlet



### TROJAN TF-51 (no side inlet) Intercepted Flow Rate for Cross Slope 0.015



K3 Stantec Calgary (1996)

Road Flow (L/s)	Intercepted (L/s)
0	0.0
6	6.0
10	7.6
25	10.8
50	15.5
75	19.6
100	23.5
200	35.2
300	42.2
500	51.0
1000	63.0

SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.1	0.1	0.21
0.020	0.9	0.8	0.34
0.030	2.6	2.5	0.45
0.040	5.5	5.4	0.54
0.050	15.8	12.9	0.63
0.060	35.6	21.9	0.71
0.070	64.6	31.2	0.79
0.080	103.8	41.1	0.87
0.090	154.4	51.6	0.94
0.100	217.6	62.8	1.00
0.110	294.4	73.5	1.07
0.120	385.9	84.6	1.14
0.130	493.0	95.9	1.20
0.140	616.7	107.6	1.26
0.150	757.9	119.5	1.32

SL 0.03

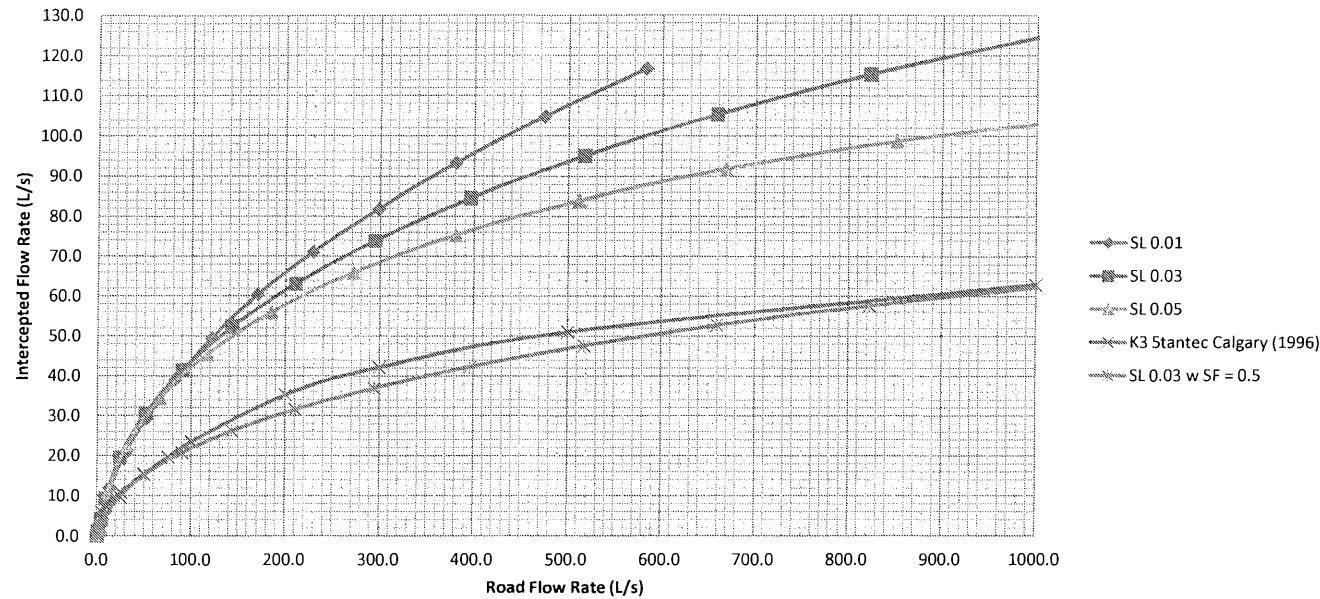
Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF = 0.5 (L/s)
0.010	0.2	0.1	0.37	0.1
0.020	1.5	1.3	0.59	0.6
0.030	4.4	4.2	0.78	2.1
0.040	9.6	9.3	0.94	4.6
0.050	27.3	20.7	1.09	10.4
0.060	61.7	32.3	1.24	16.2
0.070	111.8	43.4	1.37	21.7
0.080	179.7	54.3	1.50	27.2
0.090	267.4	65.2	1.62	32.6
0.100	376.9	76.1	1.74	38.1
0.110	509.9	86.9	1.86	43.4
0.120	668.4	97.4	1.97	48.7
0.130	853.9	107.7	2.07	53.9
0.140	1068.1	117.7	2.18	58.8

SL 0.05

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.3	0.1	0.37
0.020	1.9	1.6	0.59
0.030	5.7	5.4	0.78
0.040	12.4	11.2	0.94
0.050	35.2	23.9	1.09
0.060	79.7	36.2	1.24
0.070	144.3	47.5	1.37
0.080	232.0	58.1	1.50
0.090	345.2	68.1	1.62
0.100	486.6	77.5	1.74
0.110	658.3	86.2	1.86
0.120	862.8	94.0	1.97



**TROJAN TF-51 (no side inlet) Intercepted Flow Rate for Cross Slope 0.02**



K3 Stantec Calgary (1996)

Road Flow (L/s)	Intercepted (L/s)
0	0.0
6	6.0
10	7.6
25	10.8
50	15.5
75	19.6
100	23.5
200	35.2
300	42.2
500	51.0
1000	63.0

SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.1	0.1	0.21
0.020	0.9	0.8	0.34
0.030	2.6	2.5	0.45
0.040	5.5	5.4	0.54
0.050	14.0	12.1	0.63
0.060	29.7	20.4	0.71
0.070	52.2	29.4	0.79
0.080	82.6	39.1	0.87
0.090	121.6	49.4	0.94
0.100	170.1	60.4	1.00
0.110	228.9	71.0	1.07
0.120	298.8	82.0	1.14
0.130	380.4	93.3	1.20
0.140	474.6	104.9	1.26
0.150	582.0	116.7	1.32

SL 0.03

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF = 0.5 (L/s)
0.010	0.2	0.1	0.37	0.1
0.020	1.5	1.3	0.59	0.6
0.030	4.4	4.2	0.78	2.1
0.040	9.6	9.3	0.94	4.6
0.050	24.2	19.6	1.09	9.8
0.060	51.4	30.6	1.24	15.3
0.070	90.5	41.4	1.37	20.7
0.080	143.0	52.2	1.50	26.1
0.090	210.6	63.1	1.62	31.5
0.100	294.6	73.9	1.74	36.9
0.110	396.5	84.6	1.86	42.3
0.120	517.5	95.1	1.97	47.6
0.130	658.9	105.4	2.07	52.7
0.140	822.1	115.3	2.18	57.7
0.150	1008.1	124.9	2.28	62.4

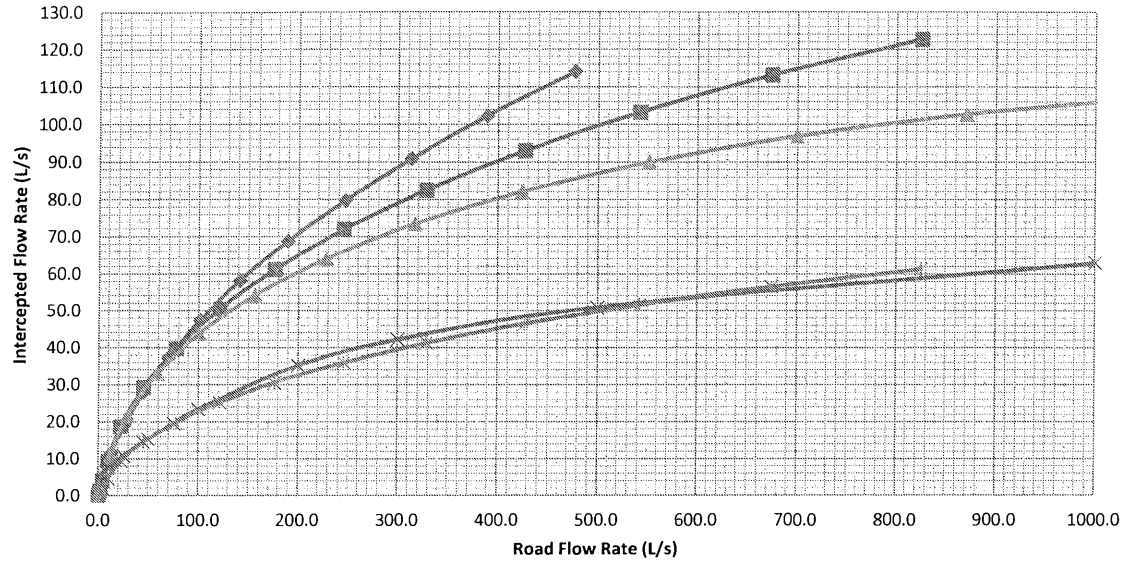
SL 0.05

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.3	0.1	0.48
0.020	1.9	1.6	0.76
0.030	5.7	5.4	1.00
0.040	12.4	11.2	1.22
0.050	31.3	22.6	1.41
0.060	66.3	34.4	1.60
0.070	116.8	45.4	1.77
0.080	184.6	56.0	1.93
0.090	271.9	66.0	2.09
0.100	380.4	75.4	2.25
0.110	511.9	84.1	2.40
0.120	668.1	91.9	2.54
0.130	850.7	98.8	2.68
0.140	1061.3	104.6	2.82

TROJAN TF-51 (no side inlet)

Cross Slope 0.025

### TROJAN TF-51 (no side inlet) Intercepted Flow Rate for Cross Slope 0.025



K3 Stantec Calgary (1996)

Road Flow (L/s)	Intercepted (L/s)
0	0.0
6	6.0
10	7.6
25	10.8
50	15.5
75	19.6
100	23.5
200	35.2
300	42.2
500	51.0
1000	63.0

SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.1	0.1	0.21
0.020	0.9	0.8	0.34
0.030	2.6	2.5	0.45
0.040	5.5	5.4	0.54
0.050	12.9	11.5	0.63
0.060	26.1	19.3	0.71
0.070	44.8	28.0	0.79
0.080	69.9	37.4	0.87
0.090	101.9	47.5	0.94
0.100	141.6	58.4	1.00
0.110	189.6	68.9	1.07
0.120	246.5	79.7	1.14
0.130	312.9	90.9	1.20
0.140	389.4	102.4	1.26
0.150	476.5	114.1	1.32

SL 0.03

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF = 0.5 (L/s)
0.010	0.2	0.1	0.37	0.1
0.020	1.5	1.3	0.59	0.6
0.030	4.4	4.2	0.78	2.1
0.040	9.6	9.3	0.94	4.6
0.050	22.4	18.7	1.09	9.4
0.060	45.2	29.2	1.24	14.6
0.070	77.6	39.8	1.37	19.9
0.080	121.0	50.4	1.50	25.2
0.090	176.5	61.2	1.62	30.6
0.100	245.3	71.9	1.74	35.9
0.110	328.4	82.5	1.86	41.3
0.120	427.0	93.0	1.97	46.5
0.130	542.0	103.2	2.07	51.6
0.140	674.4	113.2	2.18	56.6
0.150	825.3	122.7	2.28	61.3

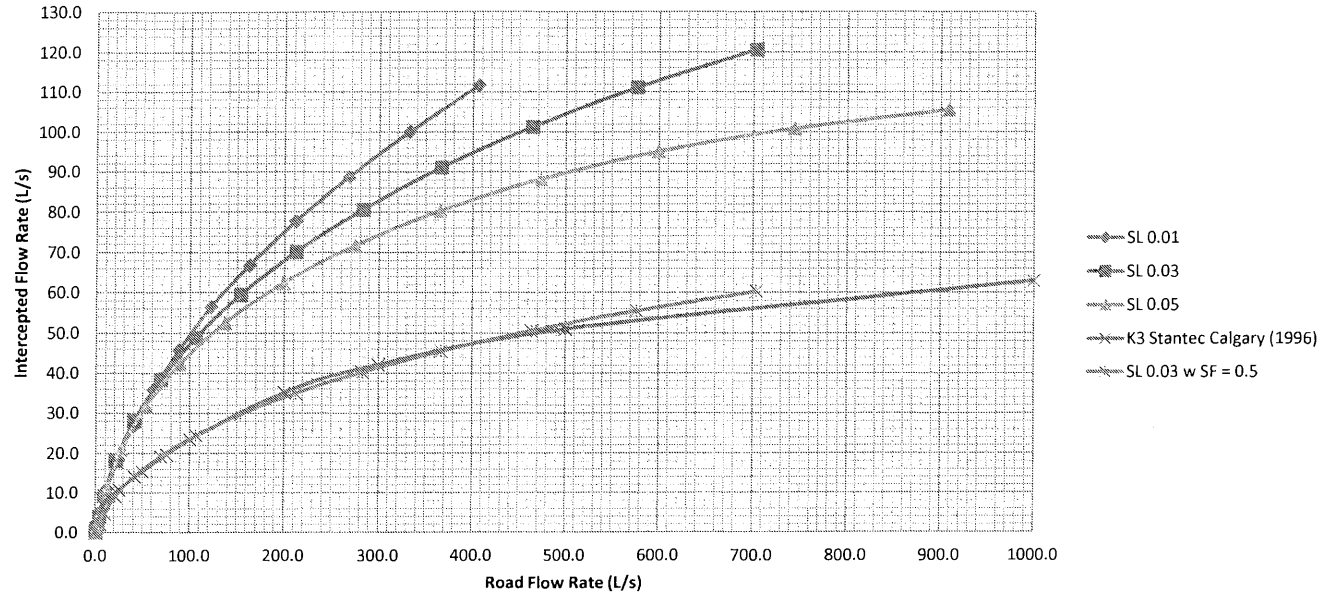
SL 0.05

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.3	0.1	0.48
0.020	1.9	1.6	0.76
0.030	5.7	5.4	1.00
0.040	12.4	11.2	1.22
0.050	28.9	21.7	1.41
0.060	58.3	32.9	1.60
0.070	100.2	43.7	1.77
0.080	156.2	54.1	1.93
0.090	227.9	64.1	2.09
0.100	316.7	73.4	2.25
0.110	424.0	82.1	2.40
0.120	551.2	90.0	2.54
0.130	699.7	96.9	2.68
0.140	870.7	102.7	2.82
0.150	1065.5	107.4	2.95

TROJAN TF-51 (no side inlet)

Cross Slope 0.03

### TROJAN TF-51 (no side inlet) Intercepted Flow Rate for Cross Slope 0.03



K3 Stantec Calgary (1996)

Road Flow (L/s)	Intercepted (L/s)
0	0.0
6	6.0
10	7.6
25	10.8
50	15.5
75	19.6
100	23.5
200	35.2
300	42.2
500	51.0
1000	63.0

SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.1	0.1	0.21
0.020	0.9	0.8	0.34
0.030	2.6	2.5	0.45
0.040	5.5	5.4	0.54
0.050	12.2	11.1	0.63
0.060	23.7	18.5	0.71
0.070	39.9	26.8	0.79
0.080	61.4	35.9	0.87
0.090	88.8	45.9	0.94
0.100	122.6	56.5	1.00
0.110	163.4	66.9	1.07
0.120	211.7	77.6	1.14
0.130	267.9	88.7	1.20
0.140	332.6	100.1	1.26
0.150	406.1	111.7	1.32

SL 0.03

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF = 0.5 (L/s)
0.010	0.2	0.1	0.37	0.1
0.020	1.5	1.3	0.59	0.6
0.030	4.4	4.2	0.78	2.1
0.040	9.6	9.3	0.94	4.6
0.050	21.2	18.1	1.09	9.1
0.060	41.1	28.2	1.24	14.1
0.070	69.1	38.4	1.37	19.2
0.080	106.3	48.9	1.50	24.4
0.090	153.8	59.5	1.62	29.7
0.100	212.4	70.1	1.74	35.0
0.110	283.0	80.7	1.86	40.3
0.120	366.6	91.1	1.97	45.5
0.130	464.0	101.2	2.07	50.6
0.140	576.0	111.1	2.18	55.6
0.150	703.5	120.6	2.28	60.3

SL 0.05

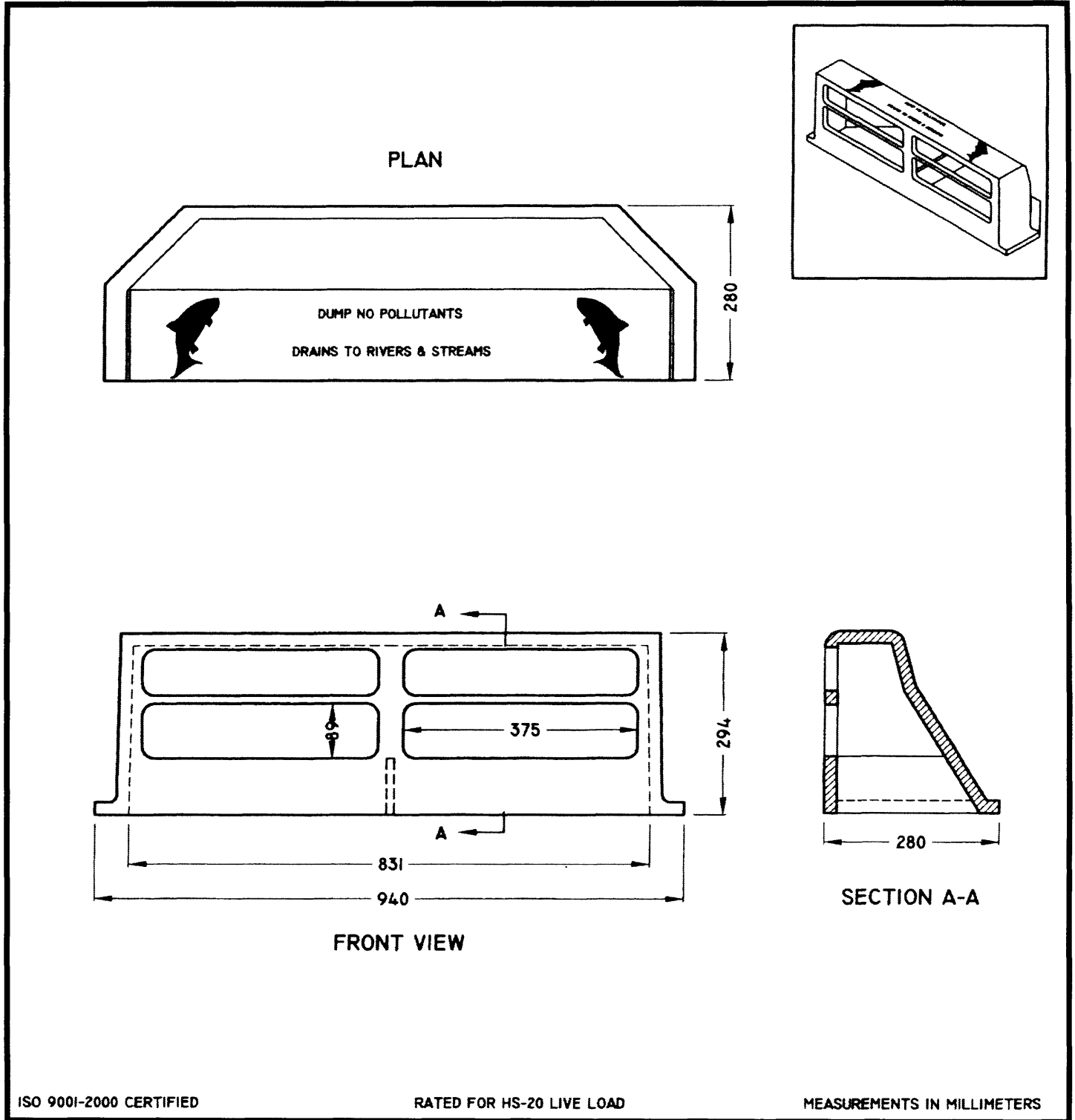
Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.3	0.1	0.48
0.020	1.9	1.6	0.76
0.030	5.7	5.4	1.00
0.040	12.4	11.2	1.22
0.050	27.3	21.0	1.41
0.060	53.0	31.8	1.60
0.070	89.2	42.3	1.77
0.080	137.3	52.6	1.93
0.090	198.5	62.4	2.09
0.100	274.2	71.7	2.25
0.110	365.4	80.3	2.40
0.120	473.3	88.2	2.54
0.130	599.0	95.1	2.68
0.140	743.7	100.9	2.82
0.150	908.2	105.6	2.95



Please note that drawings are approximate and not to be used for engineering purposes – please contact us for specific dimensions.

## 1 PIECE SIDE INLET

K-I/TF-5I



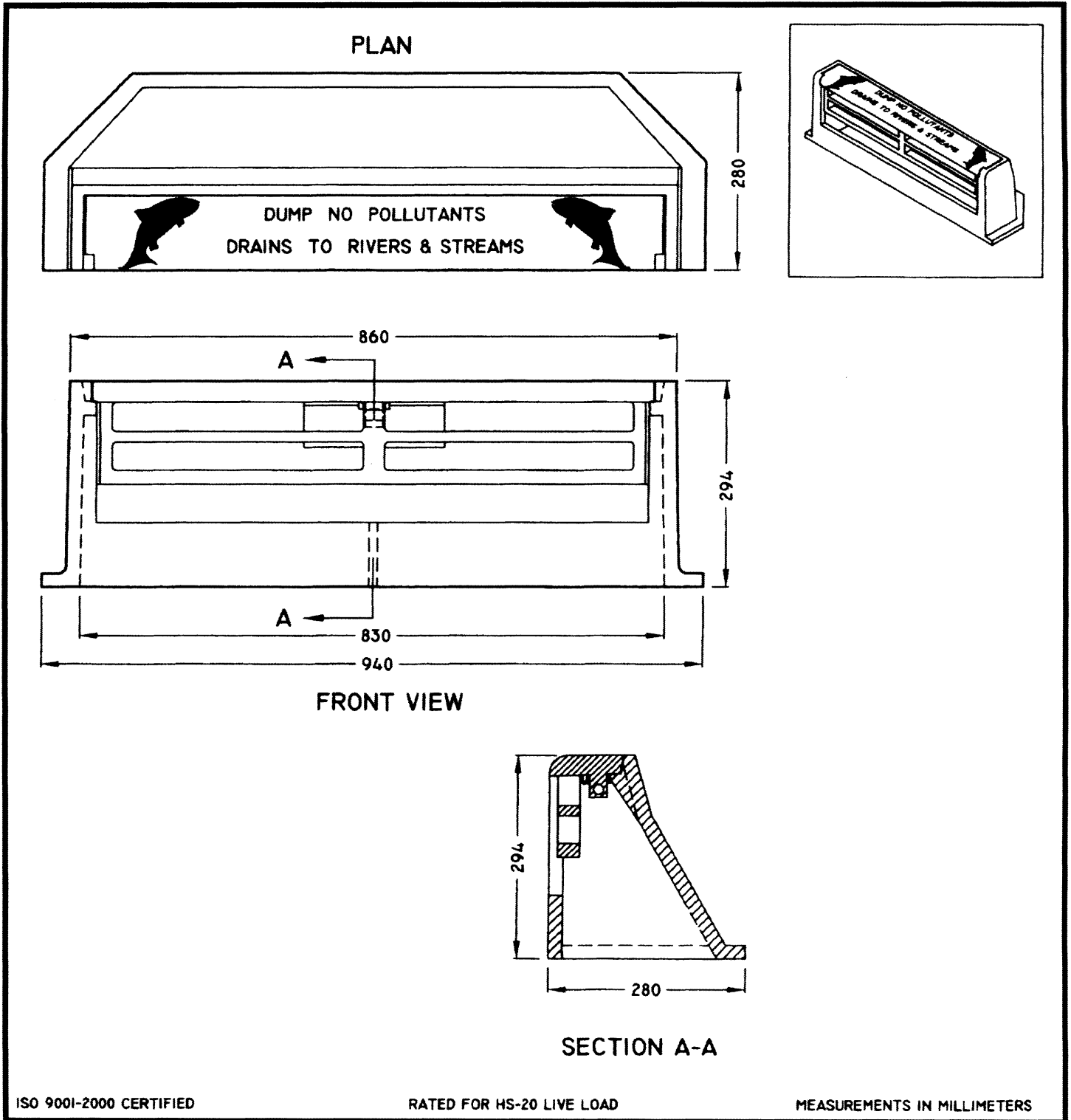
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CALGARY • EDMONTON, ALBERTA



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## 2 PIECE SIDE INLET WITH LOCK

K-1A/51A



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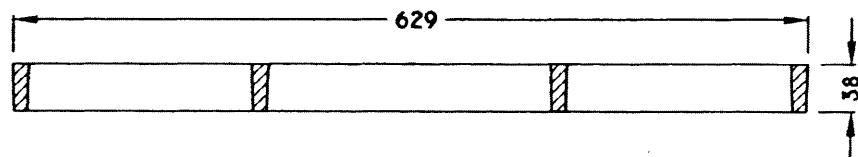
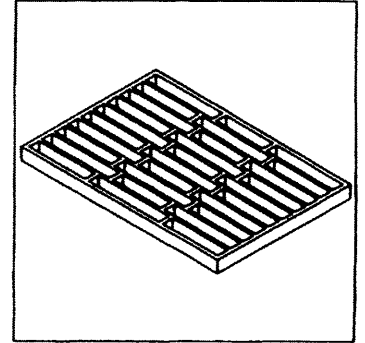
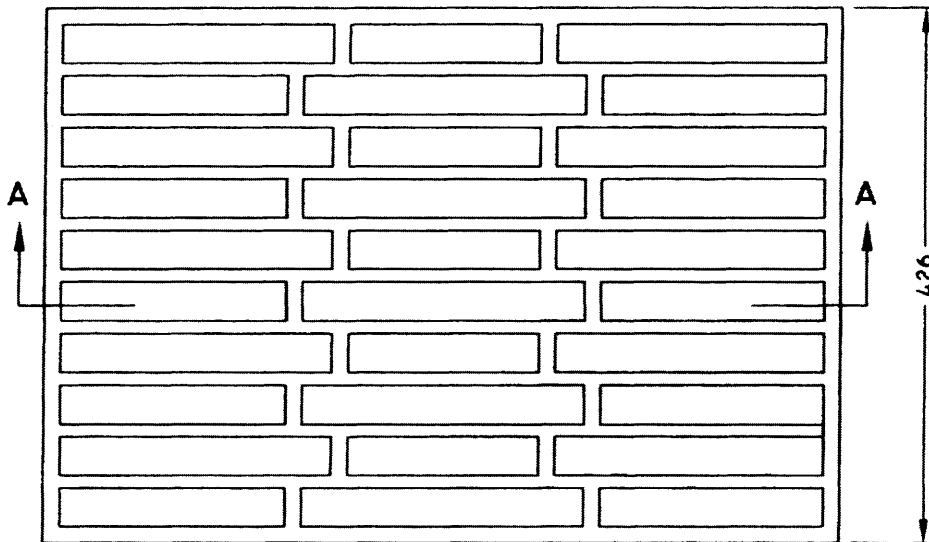


Please note that drawings are approximate and not to be used for engineering purposes – please contact us for specific dimensions.

## STANDARD GRATE

T-KI

PLAN



SECTION A-A

ISO 9001-2000 CERTIFIED

RATED FOR HS-20 LIVE LOAD

MEASUREMENTS IN MILLIMETERS

**TROJAN INDUSTRIES INC.**  
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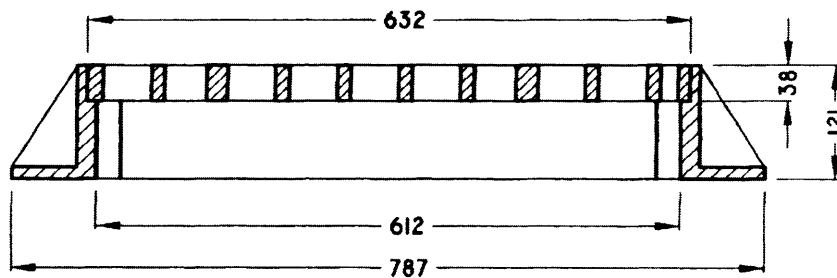
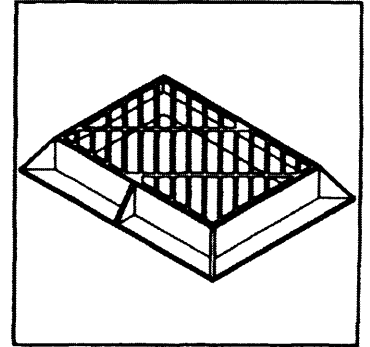
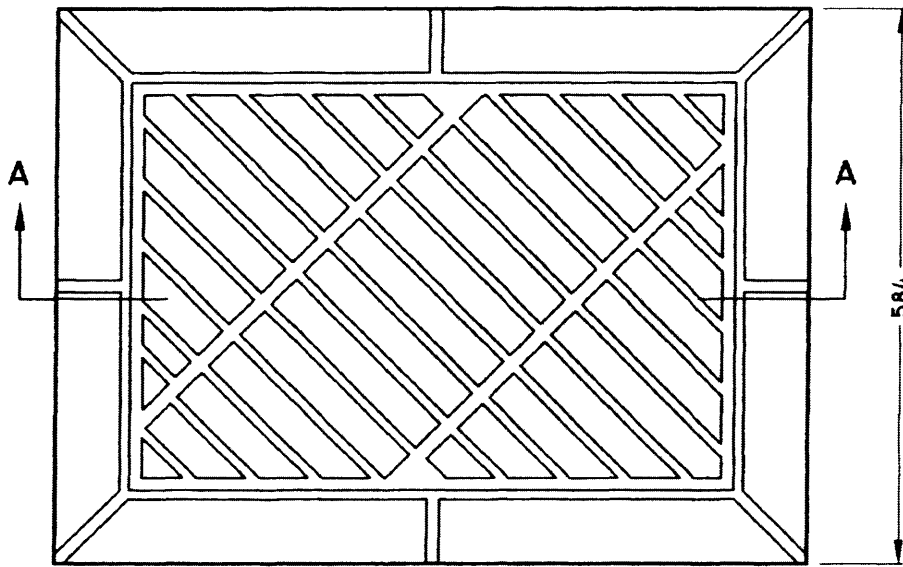


Please note that drawings are approximate and not to be used for engineering purposes – please contact us for specific dimensions.

## FRAME AND GRATE

K-1/TF-5I

PLAN



SECTION A-A

ISO 9001-2000 CERTIFIED

RATED FOR HS-20 LIVE LOAD

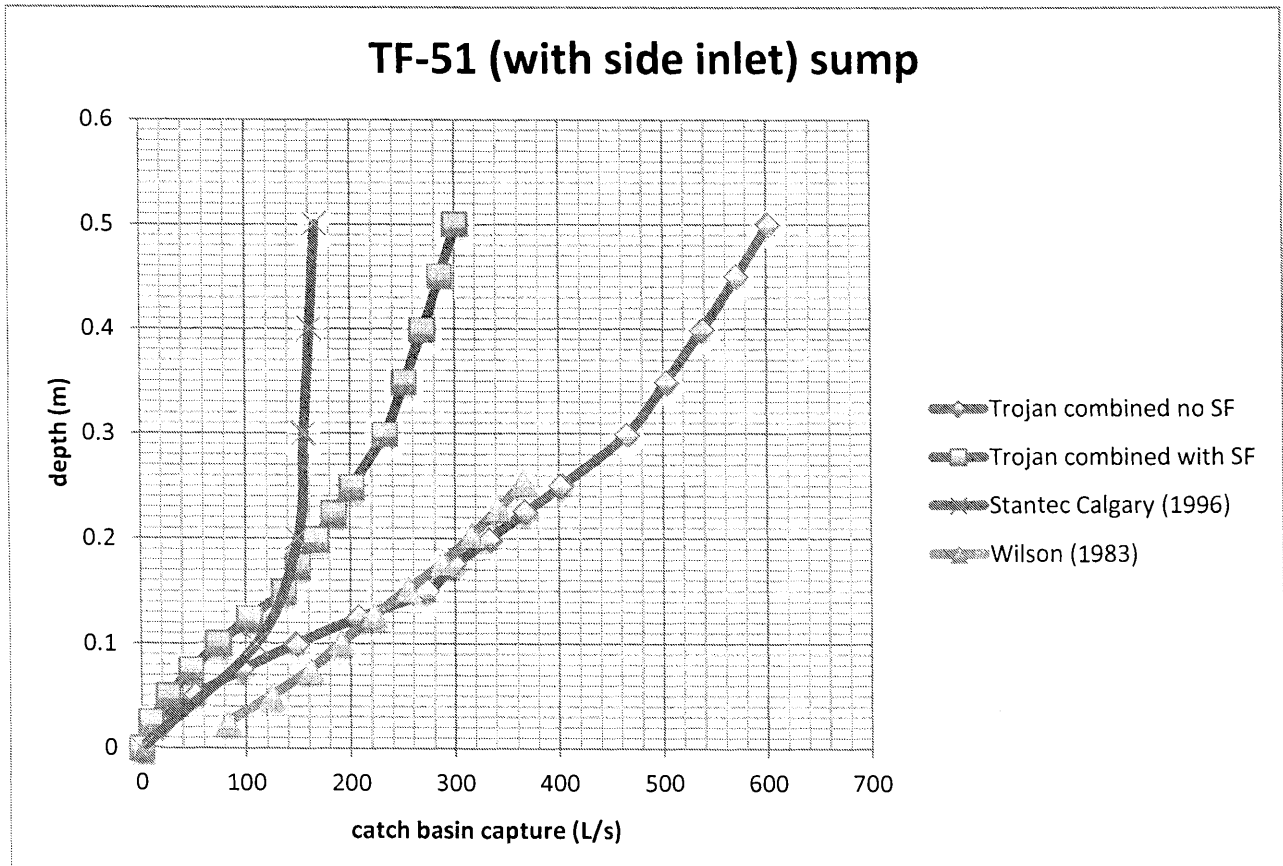
MEASUREMENTS IN MILLIMETERS

**TROJAN INDUSTRIES INC.**  
CALGARY • EDMONTON, ALBERTA

TF-51 (with side inlet) sump condition

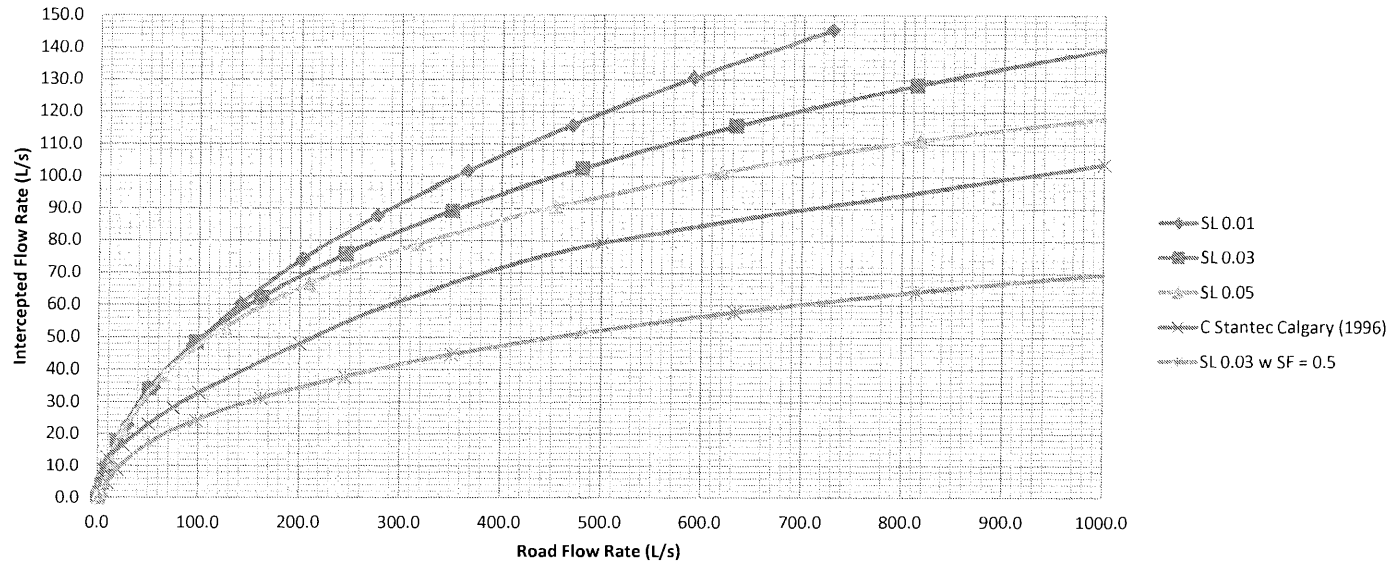
Trojan (2014) without safety factor		Trojan with SF	Wilson (1983)		Stantec Calgary (1996)	
depth (m)	Q combined (L/s)	Q combined (L/s)	depth (m)	Q (L/s)	depth (m)	Q (L/s)
0	0	0	0.025	83	0.000	0
0.025	19	9	0.051	125	0.100	110
0.050	52	26	0.076	162	0.200	150
0.075	96	48	0.102	191	0.300	156
0.100	148	74	0.127	223	0.400	161
0.125	207	104	0.152	255	0.500	166
0.150	273	136	0.178	288		
0.175	300	150	0.203	316		
0.200	334	167	0.229	342		
0.225	368	184	0.254	366		
0.250	402	201				
0.300	466	233				
0.350	503	252				
0.400	538	269				
0.450	571	286				
0.500	602	301				

N.B. grate is not sloped when installed without side inlet





**TROJAN TF-51 (with side inlet) Intercepted Flow Rate for Cross Slope 0.015**



C Stantec Calgary (1996)

Road Flow (L/s)	Intercepted (L/s)
0	0.0
6	9.0
10	12.7
25	16.5
50	23.0
75	28.2
100	32.8
200	48.0
300	61.1
500	79.3
1000	104.0

SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.1	0.1	0.21
0.020	0.9	0.8	0.34
0.030	2.6	2.5	0.45
0.040	5.5	5.4	0.54
0.050	11.1	10.8	0.63
0.060	29.3	22.7	0.71
0.070	56.3	34.6	0.79
0.080	93.5	47.2	0.87
0.090	141.9	60.4	0.94
0.100	202.7	74.3	1.00
0.110	276.9	87.8	1.07
0.120	365.6	101.7	1.14
0.130	469.8	115.9	1.20
0.140	590.5	130.5	1.26
0.150	728.5	145.4	1.32

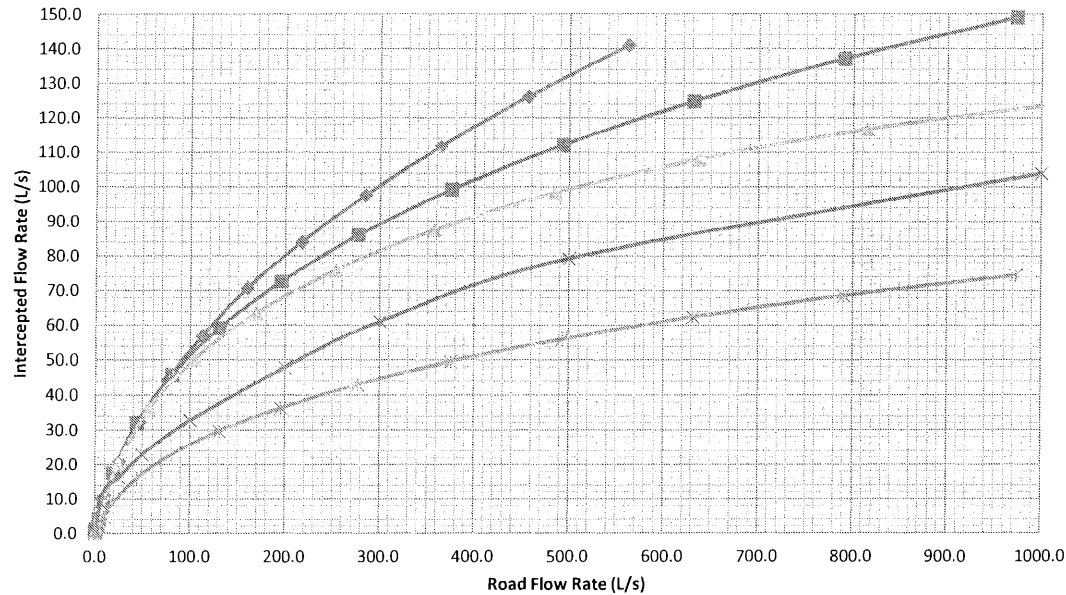
SL 0.03

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF = 0.5 (L/s)
0.010	0.2	0.1	0.37	0.1
0.020	1.5	1.3	0.59	0.7
0.030	4.4	4.2	0.78	2.1
0.040	9.6	9.3	0.94	4.7
0.050	19.2	17.9	1.09	9.0
0.060	50.7	34.2	1.24	17.1
0.070	97.6	48.5	1.37	24.2
0.080	161.9	62.3	1.50	31.1
0.090	245.7	75.9	1.62	37.9
0.100	351.0	89.3	1.74	44.7
0.110	479.6	102.6	1.86	51.3
0.120	633.3	115.7	1.97	57.8
0.130	813.8	128.4	2.07	64.2
0.140	1022.7	140.8	2.18	70.4

SL 0.05

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.3	0.1	0.48
0.020	1.9	1.7	0.76
0.030	5.7	5.4	1.00
0.040	12.4	11.2	1.22
0.050	24.7	20.8	1.41
0.060	65.4	38.4	1.60
0.070	125.9	53.1	1.77
0.080	209.0	66.4	1.93
0.090	317.2	79.0	2.09
0.100	453.2	90.7	2.25
0.110	619.2	101.5	2.40
0.120	817.6	111.3	2.54
0.130	1050.6	119.9	2.68

**TROJAN TF-51 (with side inlet) Intercepted Flow Rate for Cross Slope 0.02**



C Stantec Calgary (1996)

Road Flow (L/s)	Intercepted (L/s)
0	0.0
6	9.0
10	12.7
25	16.5
50	23.0
75	28.2
100	32.8
200	48.0
300	61.1
500	79.3
1000	104.0

SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.1	0.1	0.21
0.020	0.9	0.8	0.34
0.030	2.6	2.5	0.45
0.040	5.5	5.4	0.54
0.050	10.7	10.5	0.63
0.060	25.3	21.0	0.71
0.070	46.5	32.2	0.79
0.080	75.5	44.2	0.87
0.090	112.9	57.0	0.94
0.100	159.8	70.7	1.00
0.110	216.8	84.0	1.07
0.120	284.8	97.7	1.14
0.130	364.4	111.7	1.20
0.140	456.5	126.2	1.26
0.150	561.7	141.0	1.32

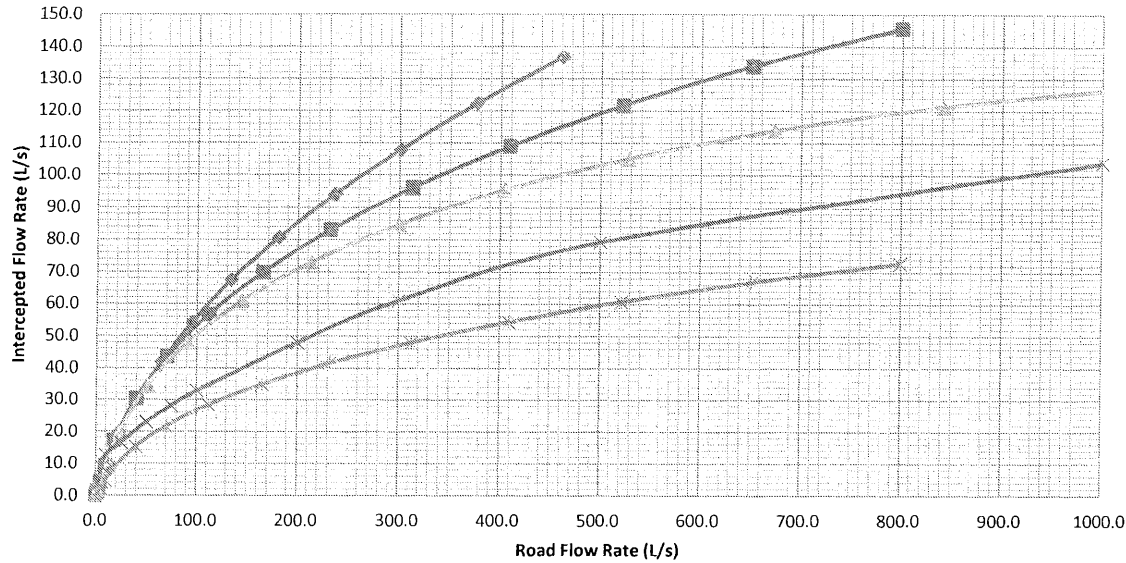
SL 0.03

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF = 0.5 (L/s)
0.010	0.2	0.1	0.37	0.1
0.020	1.5	1.3	0.59	0.7
0.030	4.4	4.2	0.78	2.1
0.040	9.6	9.3	0.94	4.7
0.050	18.6	17.5	1.09	8.8
0.060	43.8	32.0	1.24	16.0
0.070	80.6	45.8	1.37	22.9
0.080	130.7	59.2	1.50	29.6
0.090	195.6	72.7	1.62	36.3
0.100	276.8	86.0	1.74	43.0
0.110	375.5	99.2	1.86	49.6
0.120	493.3	112.2	1.97	56.1
0.130	631.2	124.9	2.07	62.4
0.140	790.7	137.2	2.18	68.6
0.150	972.9	149.0	2.28	74.5

SL 0.05

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.3	0.1	0.48
0.020	1.9	1.7	0.76
0.030	5.7	5.4	1.00
0.040	12.4	11.2	1.22
0.050	24.0	20.4	1.41
0.060	56.5	36.1	1.60
0.070	104.1	50.2	1.77
0.080	168.7	63.4	1.93
0.090	252.5	75.8	2.09
0.100	357.3	87.5	2.25
0.110	484.8	98.3	2.40
0.120	636.8	108.1	2.54
0.130	814.9	116.8	2.68
0.140	1020.8	124.2	2.82

### TROJAN TF-51 (with side inlet) Intercepted Flow Rate for Cross Slope 0.025



C Stantec Calgary (1996)

Road Flow (L/s)	Intercepted (L/s)
0	0.0
6	9.0
10	12.7
25	16.5
50	23.0
75	28.2
100	32.8
200	48.0
300	61.1
500	79.3
1000	104.0

SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.1	0.1	0.00
0.020	0.9	0.8	0.21
0.030	2.6	2.5	0.45
0.040	5.5	5.4	0.54
0.050	10.6	10.3	0.63
0.060	22.9	19.8	0.71
0.070	40.7	30.3	0.79
0.080	64.7	41.8	0.87
0.090	95.6	54.3	0.94
0.100	134.1	67.6	1.00
0.110	180.8	80.6	1.07
0.120	236.3	94.1	1.14
0.130	301.2	108.0	1.20
0.140	376.1	122.3	1.26
0.150	461.6	136.9	1.32

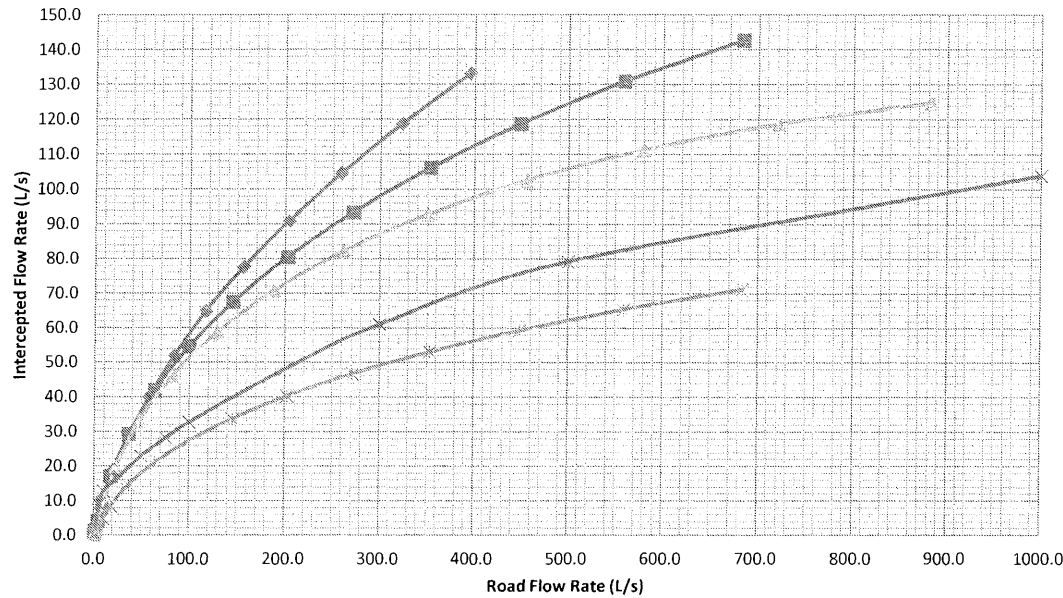
SL 0.03

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF = 0.5 (L/s)
0.010	0.2	0.1	0.37	0.1
0.020	1.5	1.3	0.59	0.7
0.030	4.4	4.2	0.78	2.1
0.040	9.6	9.3	0.94	4.7
0.050	18.3	17.3	1.09	8.6
0.060	39.6	30.5	1.24	15.2
0.070	70.4	43.6	1.37	21.8
0.080	112.0	56.7	1.50	28.4
0.090	165.5	69.9	1.62	35.0
0.100	232.2	83.1	1.74	41.5
0.110	313.1	96.1	1.86	48.1
0.120	409.2	109.0	1.97	54.5
0.130	521.7	121.6	2.07	60.8
0.140	651.5	133.9	2.18	66.9
0.150	799.6	145.7	2.28	72.8

SL 0.05

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.3	0.1	0.48
0.020	1.9	1.7	0.76
0.030	5.7	5.4	1.00
0.040	12.4	11.2	1.22
0.050	23.6	20.1	1.41
0.060	51.1	34.5	1.60
0.070	90.9	48.0	1.77
0.080	144.6	60.9	1.93
0.090	213.7	73.1	2.09
0.100	299.8	84.7	2.25
0.110	404.2	95.4	2.40
0.120	528.3	105.2	2.54
0.130	673.5	113.9	2.68
0.140	841.1	121.3	2.82
0.150	1032.2	127.4	2.95

**TROJAN TF-51 (with side inlet) Intercepted Flow Rate for Cross Slope 0.03**



- ◆ SL 0.01
- ◆ SL 0.03
- ◆ SL 0.05
- ◆ C Stantec Calgary (1996)
- ◆ SL 0.03 w SF = 0.5

C Stantec Calgary (1996)

Road Flow (L/s)	Intercepted (L/s)
0	0.0
6	9.0
10	12.7
25	16.5
50	23.0
75	28.2
100	32.8
200	48.0
300	61.1
500	79.3
1000	104.0

SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.1	0.1	0.21
0.020	0.9	0.8	0.34
0.030	2.6	2.5	0.45
0.040	5.5	5.4	0.54
0.050	10.4	10.2	0.63
0.060	21.3	18.9	0.71
0.070	36.7	28.8	0.79
0.080	57.5	39.9	0.87
0.090	84.0	52.0	0.94
0.100	116.9	65.0	1.00
0.110	156.7	77.7	1.07
0.120	203.9	91.0	1.14
0.130	259.1	104.7	1.20
0.140	322.6	118.8	1.26
0.150	394.9	133.2	1.32

SL 0.03

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF = 0.5 (L/s)
0.010	0.2	0.1	0.37	0.1
0.020	1.5	1.3	0.59	0.7
0.030	4.4	4.2	0.78	2.1
0.040	9.6	9.3	0.94	4.7
0.050	18.1	17.1	1.09	8.5
0.060	36.8	29.3	1.24	14.7
0.070	63.6	41.8	1.37	20.9
0.080	99.5	54.6	1.50	27.3
0.090	145.5	67.5	1.62	33.8
0.100	202.5	80.5	1.74	40.2
0.110	271.4	93.4	1.86	46.7
0.120	353.2	106.2	1.97	53.1
0.130	448.7	118.7	2.07	59.3
0.140	558.7	130.9	2.18	65.4
0.150	684.0	142.6	2.28	71.3

SL 0.05

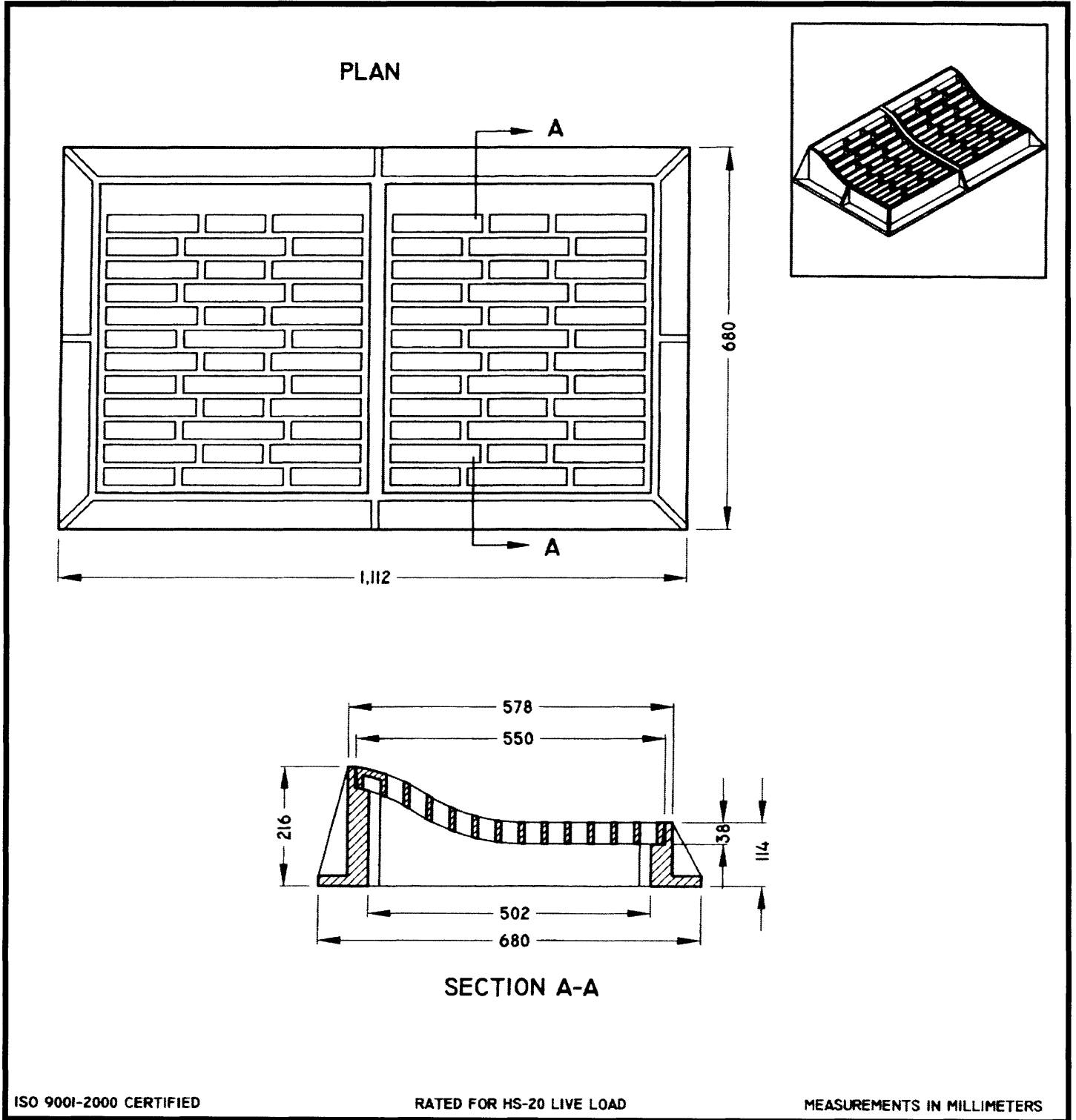
Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.3	0.1	0.48
0.020	1.9	1.7	0.76
0.030	5.7	5.4	1.00
0.040	12.4	11.2	1.22
0.050	23.3	19.9	1.41
0.060	47.6	33.2	1.60
0.070	82.2	46.2	1.77
0.080	128.5	58.7	1.93
0.090	187.8	70.8	2.09
0.100	261.4	82.2	2.25
0.110	350.4	92.9	2.40
0.120	456.0	102.6	2.54
0.130	579.3	111.3	2.68
0.140	721.3	118.7	2.82
0.150	883.0	124.8	2.95



Please note that drawings are approximate and not to be used for engineering purposes – please contact us for specific dimensions.

## FRAME AND GRATE

K-2



ISO 9001-2000 CERTIFIED

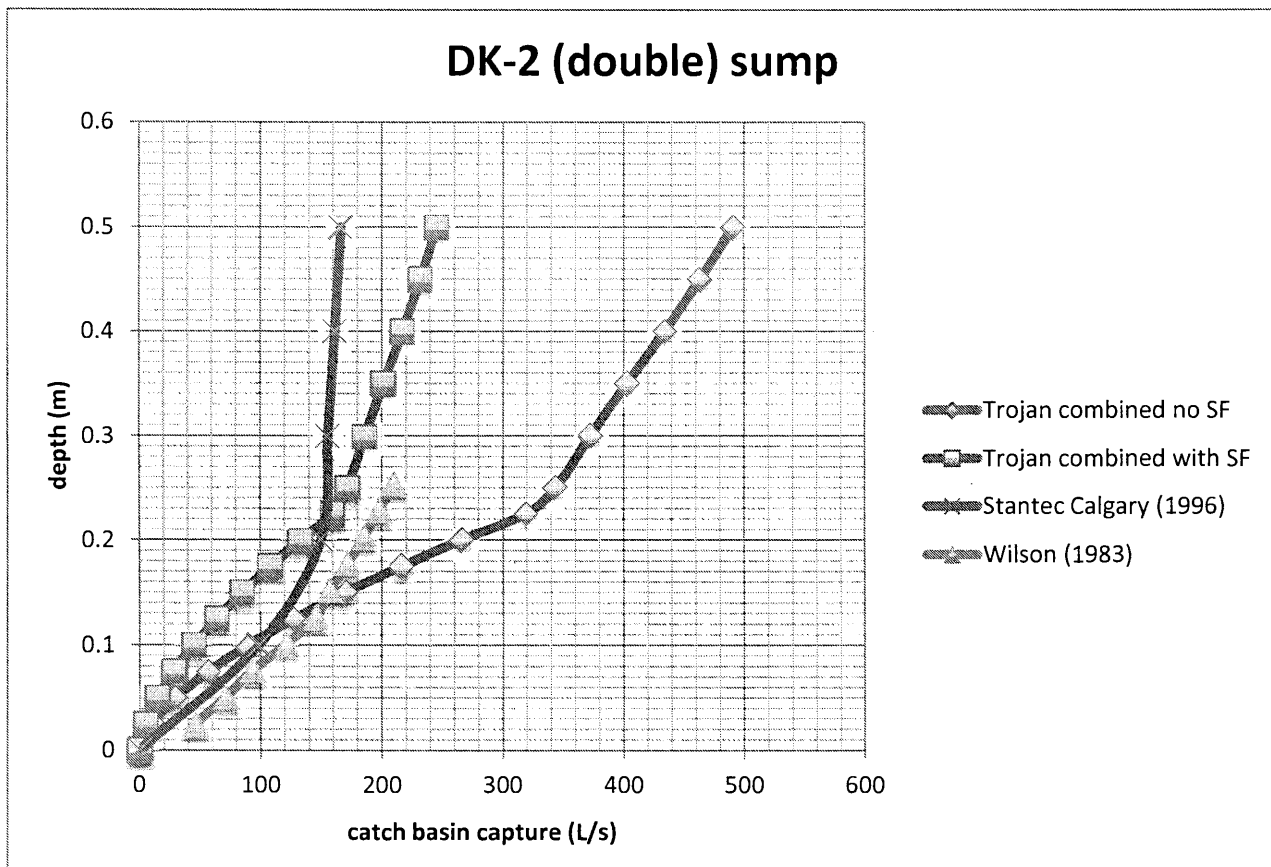
RATED FOR HS-20 LIVE LOAD

MEASUREMENTS IN MILLIMETERS

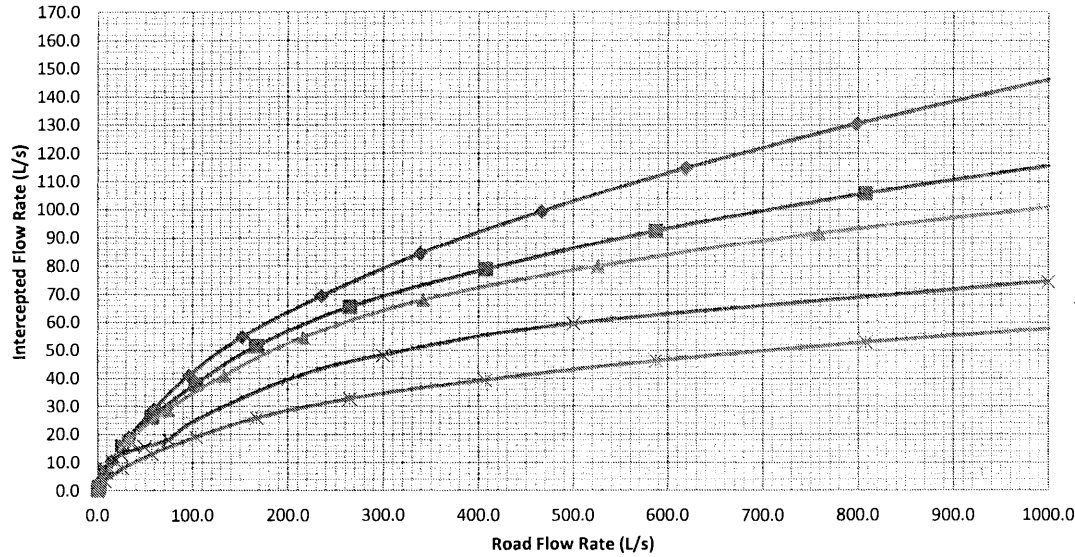
**TROJAN INDUSTRIES INC.**  
CALGARY • EDMONTON, ALBERTA

DK-2 (double) sump condition

Trojan (2014) without safety factor		Trojan with SF		Wilson (1983)		Stantec Calgary (1996)	
depth (m)	Q combined (L/s)	Q combined (L/s)	depth (m)	Q (L/s)	depth (m)	Q (L/s)	
0	0	0	0.025	46	0.000	0	
0.025	10	5	0.051	71	0.100	98	
0.050	30	15	0.076	94	0.200	150	
0.075	57	28	0.102	122	0.300	156	
0.100	90	45	0.127	146	0.400	161	
0.125	128	64	0.152	157	0.500	166	
0.150	170	85	0.178	172			
0.175	216	108	0.203	186			
0.200	266	133	0.229	198			
0.225	319	160	0.254	210			
0.250	343	172					
0.300	372	186					
0.350	402	201					
0.400	434	217					
0.450	463	232					
0.500	491	245					



**TROJAN DK-2 (double) Intercepted Flow Rate  
for Cross Slope 0.015**



K2 Stantec Calgary (1996)

Road Flow (L/s)	Intercepted (L/s)
0	0.0
8	8.0
15	10.6
25	12.8
50	15.7
75	18.2
100	24.4
200	39.6
300	48.4
500	59.6
1000	74.7

SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.1	0.1	0.21
0.020	0.9	0.9	0.34
0.030	4.6	4.2	0.45
0.040	15.0	10.7	0.54
0.050	32.9	19.1	0.63
0.060	59.6	29.2	0.71
0.070	96.5	41.2	0.79
0.080	152.9	54.9	0.87
0.090	235.3	69.4	0.94
0.100	339.1	84.6	1.00
0.110	466.4	99.4	1.07
0.120	618.8	114.7	1.14
0.130	798.1	130.5	1.20
0.140	1006.1	146.6	1.26

SL 0.03

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 SF=0.5 (L/s)
0.010	0.2	0.2	0.37	0.1
0.020	1.6	1.6	0.59	0.8
0.030	8.0	6.8	0.78	3.4
0.040	26.1	15.7	0.94	7.9
0.050	57.0	26.2	1.09	13.1
0.060	103.2	38.0	1.24	19.0
0.070	167.1	51.5	1.37	25.7
0.080	264.8	65.6	1.50	32.8
0.090	407.5	79.0	1.62	39.5
0.100	587.4	92.5	1.74	46.2
0.110	807.8	105.9	1.86	52.9
0.120	1071.8	119.1	1.97	59.6

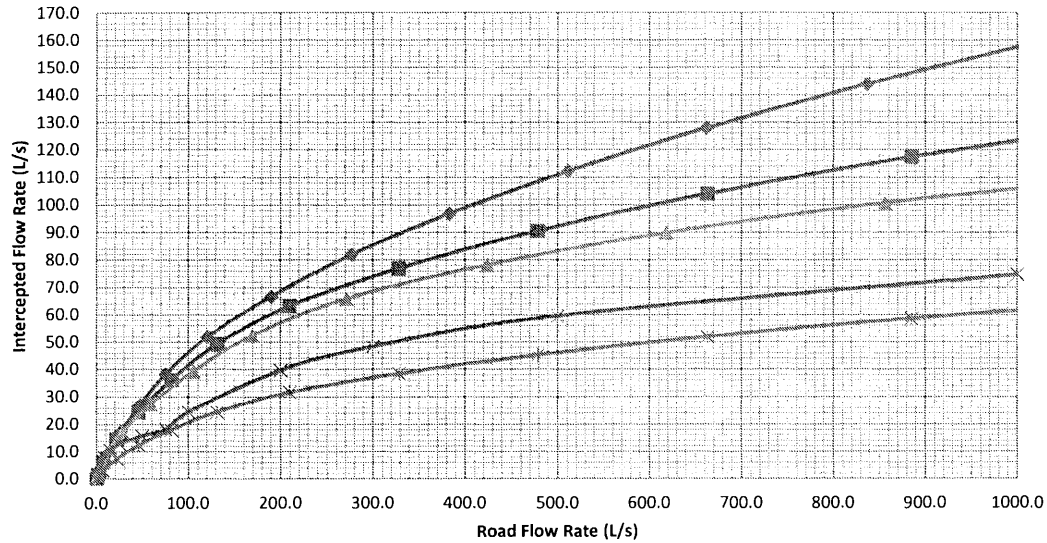
SL 0.05

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.3	0.3	0.48
0.020	2.0	2.0	0.76
0.030	10.3	8.5	1.00
0.040	33.6	18.0	1.22
0.050	73.6	28.8	1.41
0.060	133.2	41.1	1.60
0.070	215.7	54.5	1.77
0.080	341.8	68.0	1.93
0.090	526.1	80.1	2.09
0.100	758.3	91.5	2.25
0.110	1042.8	102.3	2.40

TROJAN DK-2 (double)

Cross Slope 0.02

**TROJAN DK-2 (double) Intercepted Flow Rate  
for Cross Slope 0.02**



K2 Stantec Calgary (1996)

Road Flow (L/s)	Intercepted (L/s)
0	0.0
8	8.0
15	10.6
25	12.8
50	15.7
75	18.2
100	24.4
200	39.6
300	48.4
500	59.6
1000	74.7

SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.1	0.1	0.21
0.020	0.9	0.9	0.34
0.030	4.0	3.8	0.45
0.040	12.3	9.6	0.54
0.050	26.3	17.3	0.63
0.060	47.1	26.9	0.71
0.070	75.7	38.4	0.79
0.080	121.1	52.0	0.87
0.090	189.6	66.6	0.94
0.100	276.3	81.9	1.00
0.110	382.9	96.8	1.07
0.120	510.9	112.2	1.14
0.130	661.9	127.9	1.20
0.140	837.2	144.0	1.26
0.150	1038.3	160.5	1.32

SL 0.03

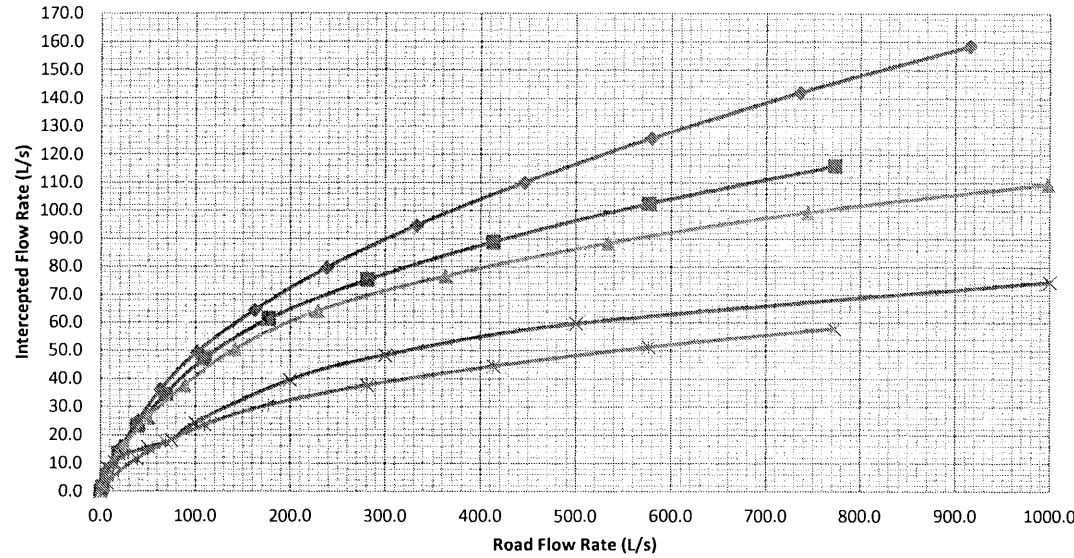
Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 SF=0.5 (L/s)
0.010	0.2	0.2	0.37	0.1
0.020	1.6	1.6	0.59	0.8
0.030	7.0	6.2	0.78	3.1
0.040	21.4	14.6	0.94	7.3
0.050	45.6	24.6	1.09	12.3
0.060	81.6	36.1	1.24	18.0
0.070	131.1	49.2	1.37	24.6
0.080	209.8	63.2	1.50	31.6
0.090	328.4	77.0	1.62	38.5
0.100	478.6	90.6	1.74	45.3
0.110	663.2	104.0	1.86	52.0
0.120	885.0	117.4	1.97	58.7
0.130	1146.4	130.5	2.07	65.3

SL 0.05

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.3	0.3	0.48
0.020	2.0	2.0	0.76
0.030	9.0	7.9	1.00
0.040	27.6	16.9	1.22
0.050	58.8	27.3	1.41
0.060	105.3	39.2	1.60
0.070	169.3	52.4	1.77
0.080	270.9	65.9	1.93
0.090	424.0	78.2	2.09
0.100	617.9	89.9	2.25
0.110	856.2	100.7	2.40
0.120	1142.5	110.8	2.54



**TROJAN DK-2 (double) Intercepted Flow Rate for Cross Slope 0.025**



K2 Stantec Calgary (1996)

Road Flow (L/s)	Intercepted (L/s)
0	0.0
8	8.0
15	10.6
25	12.8
50	15.7
75	18.2
100	24.4
200	39.6
300	48.4
500	59.6
1000	74.7

SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.1	0.1	0.21
0.020	0.9	0.9	0.34
0.030	3.7	3.5	0.45
0.040	10.7	8.8	0.54
0.050	22.4	16.0	0.63
0.060	39.6	25.1	0.71
0.070	63.2	36.1	0.79
0.080	102.1	49.6	0.87
0.090	162.2	64.4	0.94
0.100	238.7	79.7	1.00
0.110	332.8	94.7	1.07
0.120	446.2	110.1	1.14
0.130	580.1	125.9	1.20
0.140	735.8	142.0	1.26
0.150	914.7	158.5	1.32

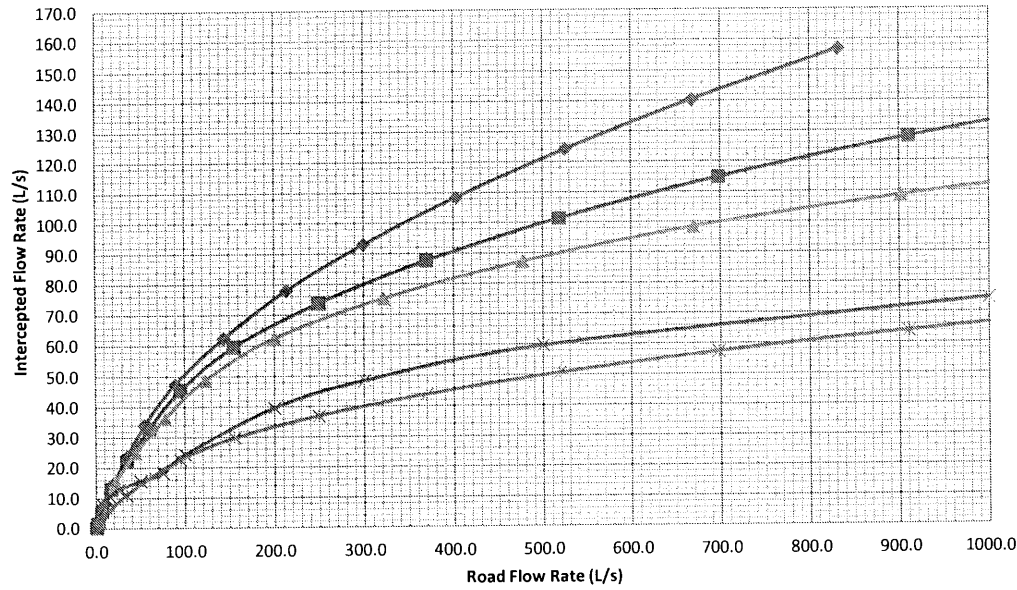
SL 0.03

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 SF=0.5 (L/s)
0.010	0.2	0.2	0.37	0.1
0.020	1.6	1.6	0.59	0.8
0.030	6.4	5.9	0.78	2.9
0.040	18.5	13.7	0.94	6.8
0.050	38.7	23.3	1.09	11.6
0.060	68.6	34.4	1.24	17.2
0.070	109.5	47.1	1.37	23.6
0.080	176.9	61.2	1.50	30.6
0.090	281.0	75.2	1.62	37.6
0.100	413.4	89.0	1.74	44.5
0.110	576.5	102.6	1.86	51.3
0.120	772.9	116.0	1.97	58.0

SL 0.05

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.3	0.3	0.48
0.020	2.0	2.0	0.76
0.030	8.3	7.4	1.00
0.040	23.9	15.9	1.22
0.050	50.0	26.0	1.41
0.060	88.6	37.6	1.60
0.070	141.4	50.4	1.77
0.080	228.3	64.0	1.93
0.090	362.7	76.6	2.09
0.100	533.6	88.5	2.25
0.110	744.3	99.4	2.40
0.120	997.8	109.6	2.54

### TROJAN DK-2 (double) Intercepted Flow Rate for Cross Slope 0.03



K2 Stantec Calgary (1996)

Road Flow (L/s)	Intercepted (L/s)
0	0.0
8	8.0
15	10.6
25	12.8
50	15.7
75	18.2
100	24.4
200	39.6
300	48.4
500	59.6
1000	74.7

SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.1	0.1	0.21
0.020	0.9	0.9	0.34
0.030	3.5	3.3	0.45
0.040	9.6	8.2	0.54
0.050	19.7	15.0	0.63
0.060	34.6	23.7	0.71
0.070	54.9	34.2	0.79
0.080	89.4	47.5	0.87
0.090	144.0	62.5	0.94
0.100	213.5	77.9	1.00
0.110	299.5	93.0	1.07
0.120	403.1	108.4	1.14
0.130	525.6	124.2	1.20
0.140	668.3	140.3	1.26
0.150	832.3	156.9	1.32

SL 0.03

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 SF=0.5 (L/s)
0.010	0.2	0.2	0.37	0.1
0.020	1.6	1.6	0.59	0.8
0.030	6.0	5.6	0.78	2.8
0.040	16.6	13.0	0.94	6.5
0.050	34.2	22.2	1.09	11.1
0.060	59.9	33.0	1.24	16.5
0.070	95.1	45.4	1.37	22.7
0.080	154.9	59.5	1.50	29.8
0.090	249.4	73.7	1.62	36.9
0.100	369.8	87.6	1.74	43.8
0.110	518.7	101.3	1.86	50.7
0.120	698.1	114.8	1.97	57.4
0.130	910.4	128.0	2.07	64.0
0.140	1157.5	140.9	2.18	70.5

SL 0.05

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.3	0.3	0.48
0.020	2.0	2.0	0.76
0.030	7.8	7.1	1.00
0.040	21.5	15.2	1.22
0.050	44.1	25.0	1.41
0.060	77.4	36.2	1.60
0.070	122.8	48.8	1.77
0.080	199.9	62.4	1.93
0.090	321.9	75.3	2.09
0.100	477.5	87.3	2.25
0.110	669.6	98.4	2.40
0.120	901.3	108.6	2.54
0.130	1175.3	117.8	2.68

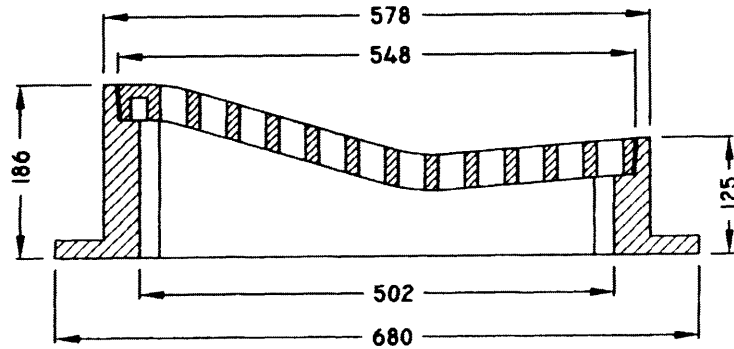
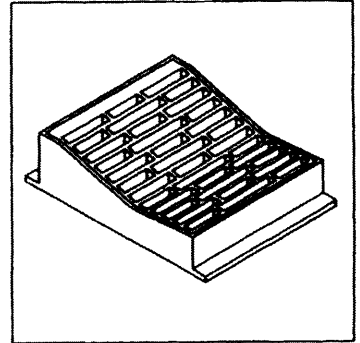
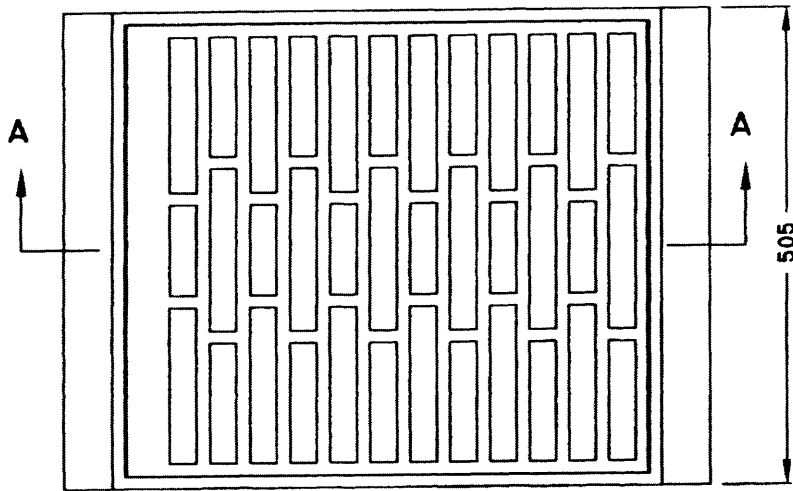


Please note that drawings are approximate and not to be used for engineering purposes – please contact us for specific dimensions.

## SINGLE FRAME AND GRATE

T-K7

PLAN



SECTION A-A

ISO 9001-2000 CERTIFIED

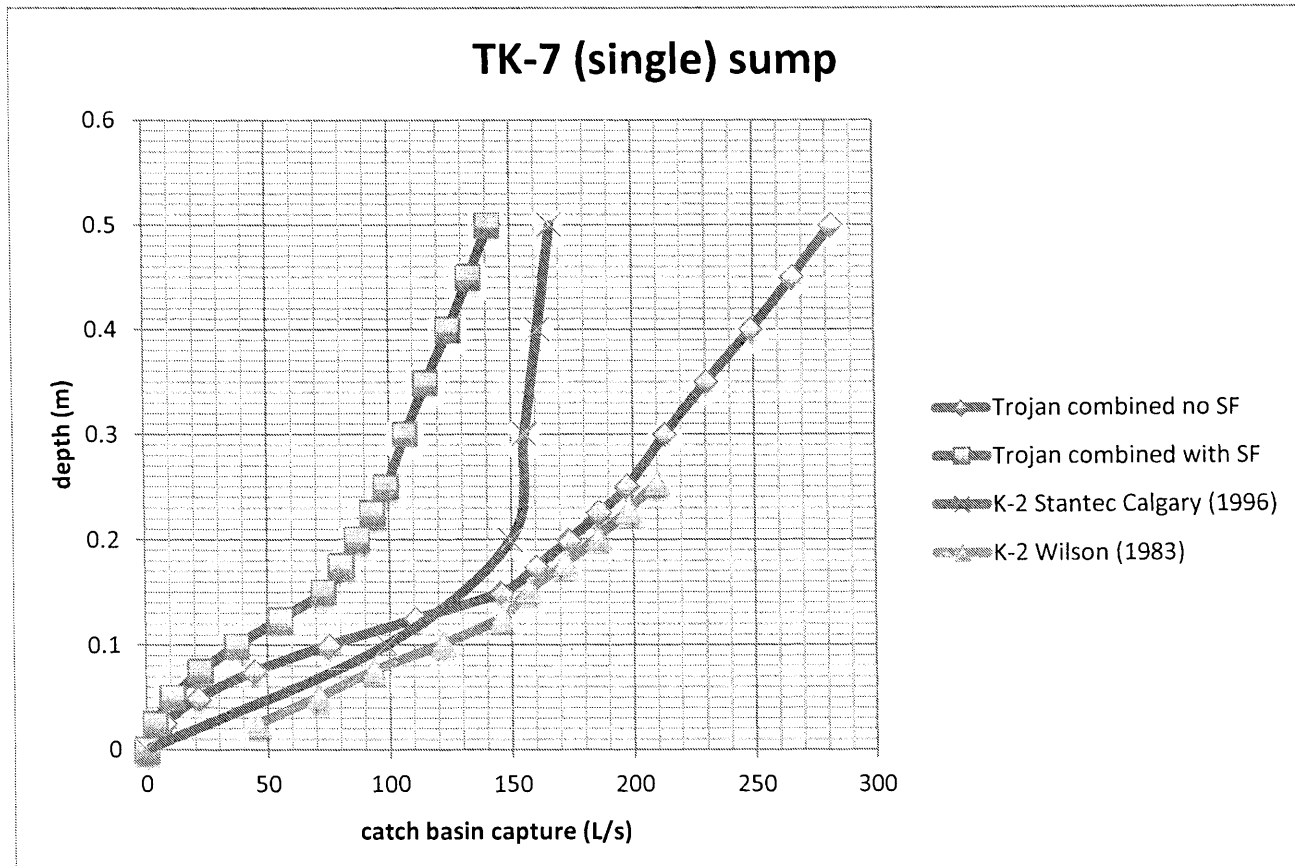
RATED FOR HS-20 LIVE LOAD

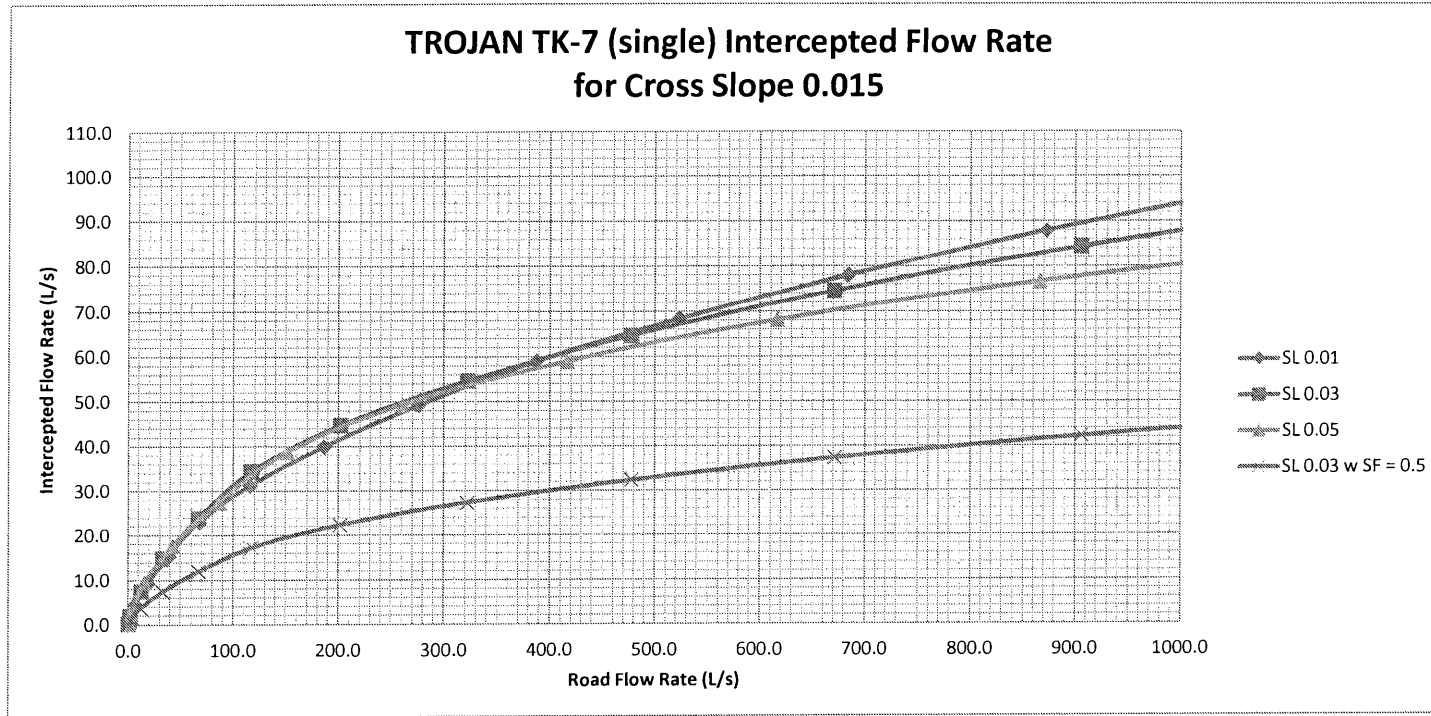
MEASUREMENTS IN MILLIMETERS

**TROJAN INDUSTRIES INC.**  
CALGARY • EDMONTON, ALBERTA

TK-7 (single) sump condition

Trojan (2014) without safety factor		Trojan with SF		K-2 Wilson (1983)		K-2 Stantec Calgary (1996)	
depth (m)	Q combined (L/s)	Q combined (L/s)	depth (m)	Q (L/s)	depth (m)	Q (L/s)	Q (L/s)
0	0	0	0.025	46	0.000	0	
0.025	7	4	0.051	71	0.100	98	
0.050	22	11	0.076	94	0.200	150	
0.075	45	22	0.102	122	0.300	156	
0.100	75	38	0.127	146	0.400	161	
0.125	111	55	0.152	157	0.500	166	
0.150	146	73	0.178	172			
0.175	160	80	0.203	186			
0.200	174	87	0.229	198			
0.225	186	93	0.254	210			
0.250	197	99					
0.300	213	107					
0.350	231	115					
0.400	249	124					
0.450	266	133					
0.500	282	141					





SL 0.01

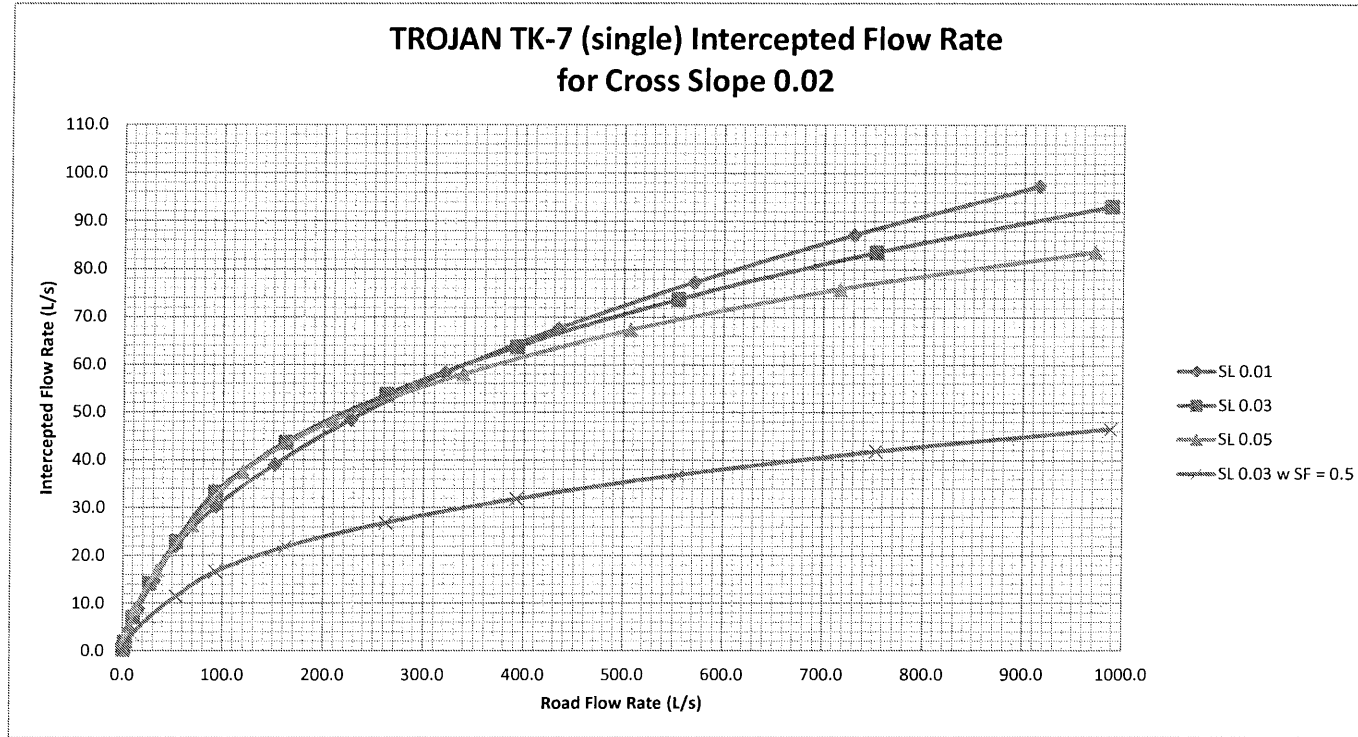
depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.2	0.2	0.21
0.020	1.1	1.1	0.34
0.030	7.0	4.7	0.45
0.040	19.0	9.3	0.54
0.050	38.7	15.4	0.63
0.060	67.6	23.0	0.71
0.070	116.5	31.2	0.79
0.080	186.0	39.9	0.87
0.090	275.6	49.1	0.94
0.100	387.3	59.0	1.00
0.110	522.8	68.4	1.07
0.120	684.1	78.0	1.14
0.130	872.8	87.9	1.20
0.140	1090.6	98.1	1.26

SL 0.03

depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF = 0.5 (L/s)
0.010	0.3	0.3	0.37	0.2
0.020	2.0	1.9	0.59	1.0
0.030	12.1	7.5	0.78	3.8
0.040	32.8	14.9	0.94	7.4
0.050	67.0	23.9	1.09	11.9
0.060	117.0	34.4	1.24	17.2
0.070	201.9	44.7	1.37	22.4
0.080	322.2	54.7	1.50	27.3
0.090	477.4	64.6	1.62	32.3
0.100	670.8	74.6	1.74	37.3
0.110	905.6	84.4	1.86	42.2
0.120	1184.9	93.9	1.97	47.0

SL 0.05

depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.4	0.4	0.48
0.020	2.5	2.5	0.76
0.030	15.6	9.5	1.00
0.040	42.4	17.6	1.22
0.050	86.5	27.4	1.41
0.060	151.1	38.7	1.60
0.070	260.6	49.3	1.77
0.080	416.0	59.0	1.93
0.090	616.3	68.2	2.09
0.100	866.0	76.7	2.25
0.110	1169.1	84.5	2.40



SL 0.01

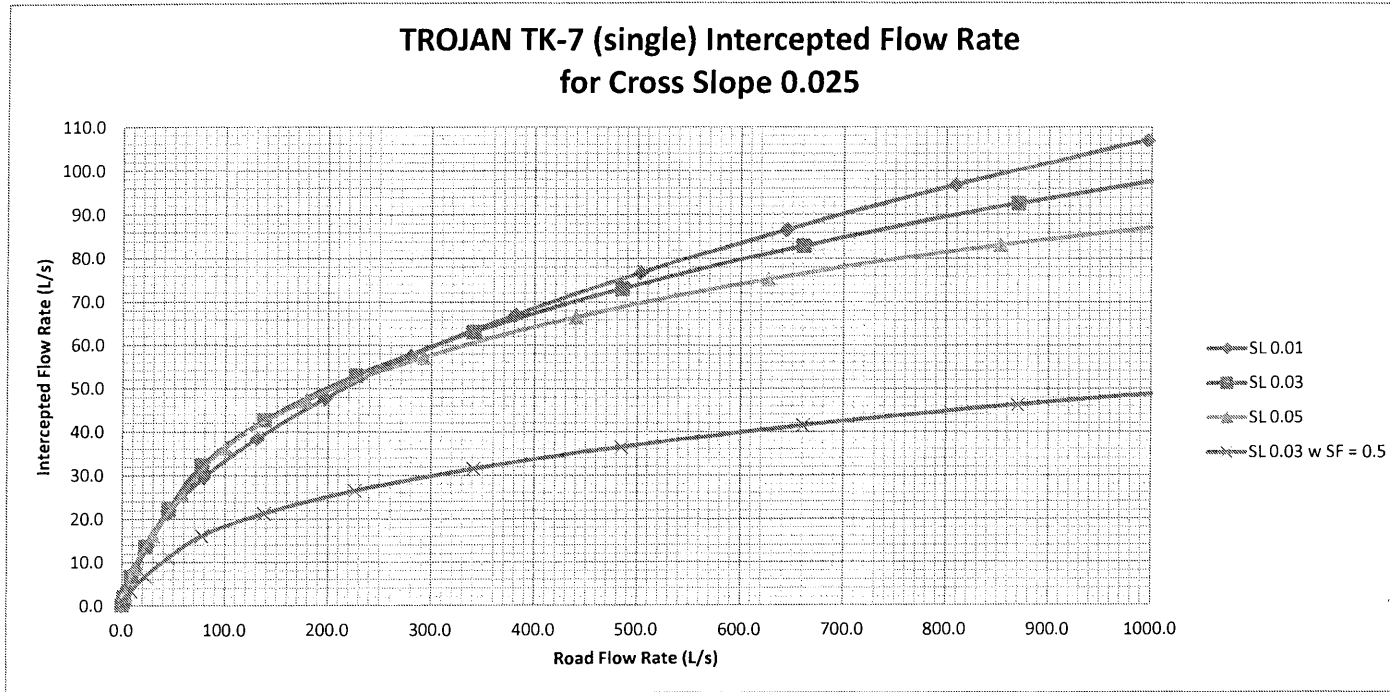
depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.2	0.2	0.21
0.020	1.1	1.1	0.34
0.030	5.9	4.3	0.45
0.040	15.3	8.8	0.54
0.050	30.8	14.7	0.63
0.060	53.3	22.1	0.71
0.070	93.5	30.4	0.79
0.080	151.4	39.1	0.87
0.090	226.5	48.4	0.94
0.100	320.3	58.3	1.00
0.110	434.5	67.6	1.07
0.120	570.5	77.3	1.14
0.130	730.0	87.2	1.20
0.140	914.3	97.4	1.26

SL 0.03

depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF = 0.5 (L/s)
0.010	0.3	0.3	0.37	0.2
0.020	2.0	1.9	0.59	1.0
0.030	10.1	7.1	0.78	3.5
0.040	26.6	14.2	0.94	7.1
0.050	53.3	23.0	1.09	11.5
0.060	92.3	33.2	1.24	16.6
0.070	161.9	43.7	1.37	21.8
0.080	262.3	53.7	1.50	26.9
0.090	392.3	63.8	1.62	31.9
0.100	554.8	73.8	1.74	36.9
0.110	752.5	83.6	1.86	41.8
0.120	988.2	93.2	1.97	46.6

SL 0.05

depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.4	0.4	0.48
0.020	2.5	2.5	0.76
0.030	13.1	9.0	1.00
0.040	34.3	16.9	1.22
0.050	68.8	26.4	1.41
0.060	119.2	37.5	1.60
0.070	209.0	48.2	1.77
0.080	338.6	58.0	1.93
0.090	506.4	67.3	2.09
0.100	716.2	75.9	2.25
0.110	971.5	83.8	2.40



SL 0.01

depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.2	0.2	0.21
0.020	1.1	1.1	0.34
0.030	5.2	4.1	0.45
0.040	13.2	8.4	0.54
0.050	26.1	14.1	0.63
0.060	44.7	21.3	0.71
0.070	79.6	29.6	0.79
0.080	130.7	38.4	0.87
0.090	197.0	47.8	0.94
0.100	280.1	57.7	1.00
0.110	381.4	67.1	1.07
0.120	502.4	76.7	1.14
0.130	644.3	86.7	1.20
0.140	808.6	96.8	1.26
0.150	996.3	107.1	1.32

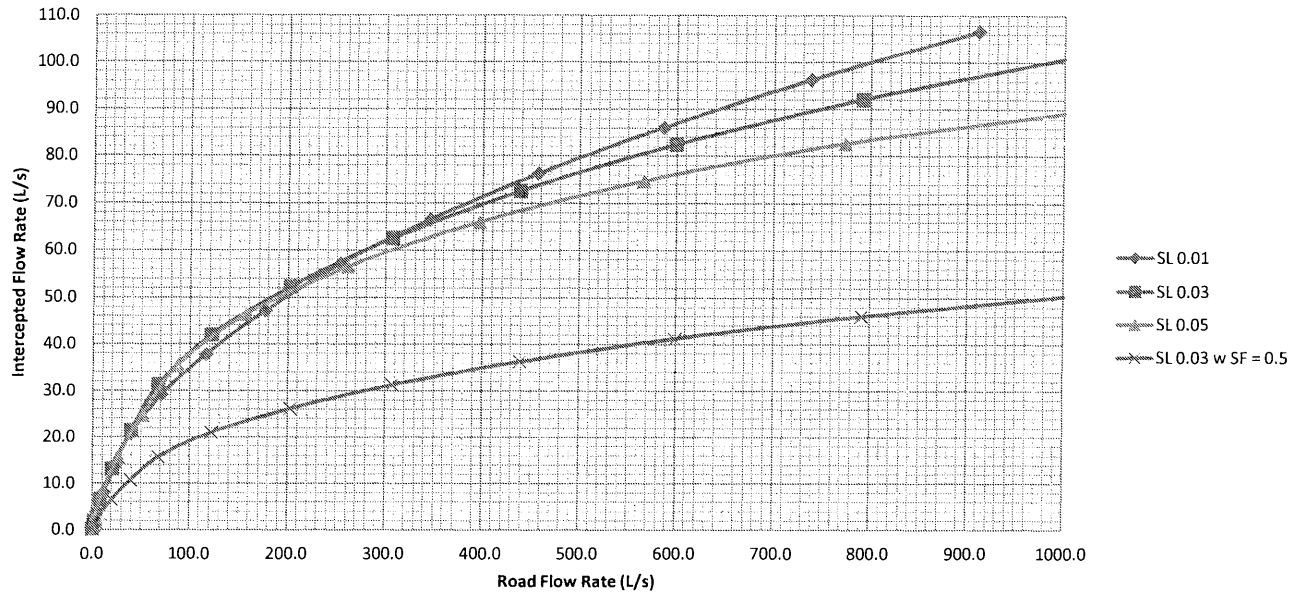
SL 0.03

depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF = 0.5 (L/s)
0.010	0.3	0.3	0.37	0.2
0.020	2.0	1.9	0.59	1.0
0.030	9.0	6.8	0.78	3.4
0.040	22.8	13.6	0.94	6.8
0.050	45.1	22.2	1.09	11.1
0.060	77.5	32.2	1.24	16.1
0.070	137.9	42.8	1.37	21.4
0.080	226.3	53.0	1.50	26.5
0.090	341.2	63.1	1.62	31.5
0.100	485.1	73.1	1.74	36.6
0.110	660.7	83.0	1.86	41.5
0.120	870.2	92.6	1.97	46.3
0.130	1116.0	101.9	2.07	51.0

SL 0.05

depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.4	0.4	0.48
0.020	2.5	2.5	0.76
0.030	11.6	8.6	1.00
0.040	29.4	16.2	1.22
0.050	58.3	25.5	1.41
0.060	100.0	36.4	1.60
0.070	178.0	47.2	1.77
0.080	292.2	57.2	1.93
0.090	440.5	66.6	2.09
0.100	626.3	75.3	2.25
0.110	852.9	83.2	2.40
0.120	1123.4	90.2	2.54

**TROJAN TK-7 (single) Intercepted Flow Rate  
for Cross Slope 0.03**



SL 0.01

depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.2	0.2	0.21
0.020	1.1	1.1	0.34
0.030	4.7	3.9	0.45
0.040	11.7	8.0	0.54
0.050	22.9	13.6	0.63
0.060	39.0	20.6	0.71
0.070	70.4	29.0	0.79
0.080	116.8	37.8	0.87
0.090	177.3	47.2	0.94
0.100	253.3	57.1	1.00
0.110	346.1	66.6	1.07
0.120	457.0	76.3	1.14
0.130	587.2	86.2	1.20
0.140	738.1	96.3	1.26
0.150	910.6	106.6	1.32

SL 0.03

depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF = 0.5 (L/s)
0.010	0.3	0.3	0.37	0.2
0.020	2.0	1.9	0.59	1.0
0.030	8.2	6.5	0.78	3.2
0.040	20.3	13.1	0.94	6.6
0.050	39.7	21.5	1.09	10.8
0.060	67.6	31.3	1.24	15.7
0.070	121.9	42.0	1.37	21.0
0.080	202.3	52.3	1.50	26.2
0.090	307.1	62.5	1.62	31.2
0.100	438.7	72.6	1.74	36.3
0.110	599.5	82.4	1.86	41.2
0.120	791.5	92.1	1.97	46.0
0.130	1017.1	101.4	2.07	50.7

SL 0.05

depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.4	0.4	0.48
0.020	2.5	2.5	0.76
0.030	10.6	8.3	1.00
0.040	26.2	15.7	1.22
0.050	51.2	24.8	1.41
0.060	87.3	35.4	1.60
0.070	157.4	46.4	1.77
0.080	261.2	56.5	1.93
0.090	396.5	66.0	2.09
0.100	566.4	74.7	2.25
0.110	773.9	82.7	2.40
0.120	1021.9	89.7	2.54



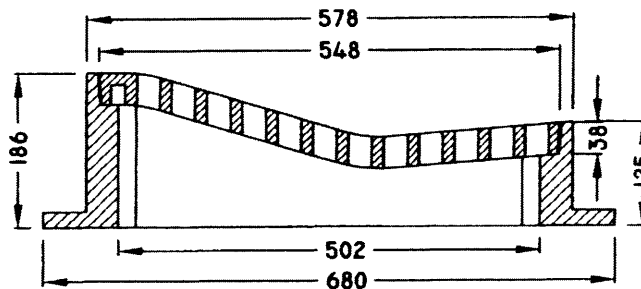
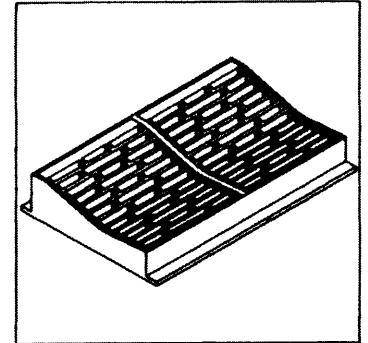
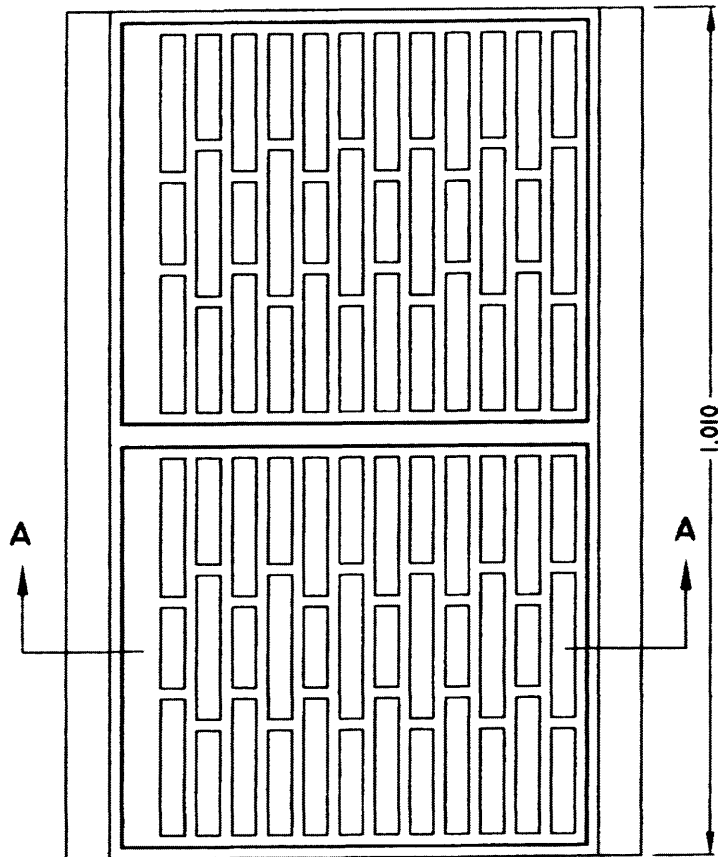


Please note that drawings are approximate and not to be used for engineering purposes – please contact us for specific dimensions.

## DOUBLE FRAME AND GRATE

T-K7

PLAN



SECTION A-A

ISO 9001-2000 CERTIFIED

RATED FOR HS-20 LIVE LOAD

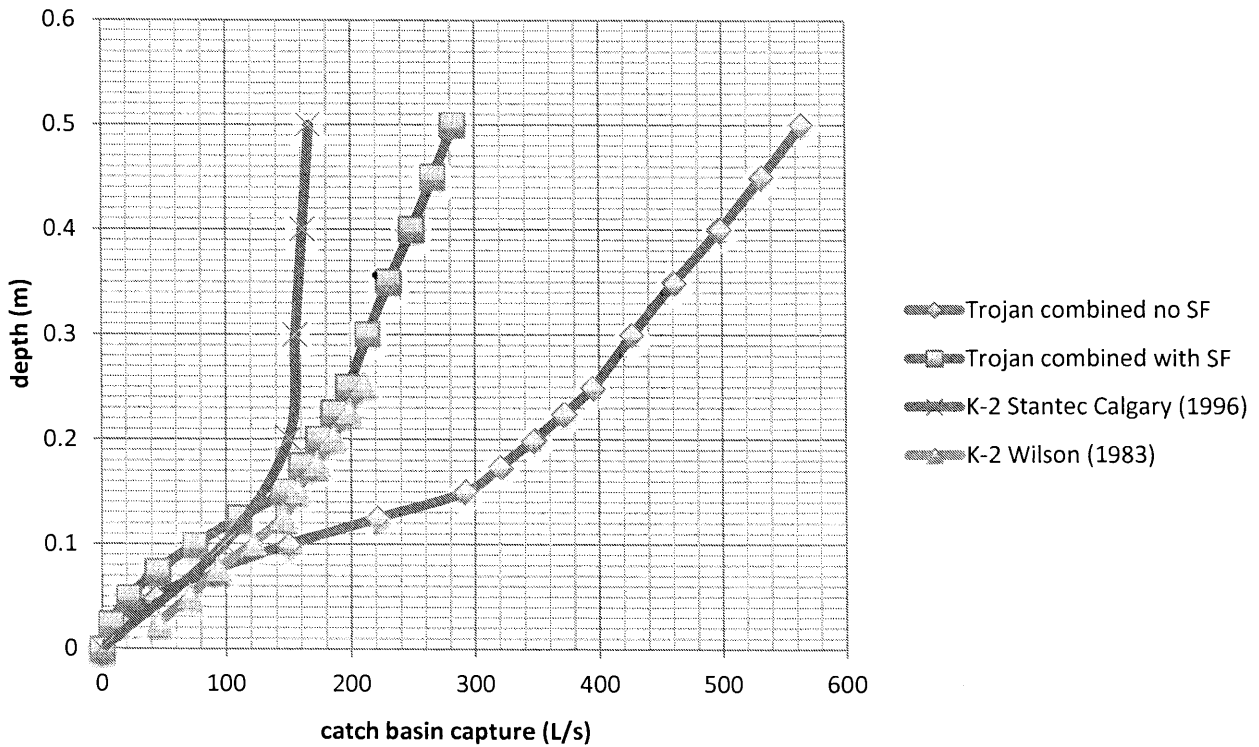
MEASUREMENTS IN MILLIMETERS

**TROJAN INDUSTRIES INC.**  
CALGARY • EDMONTON, ALBERTA

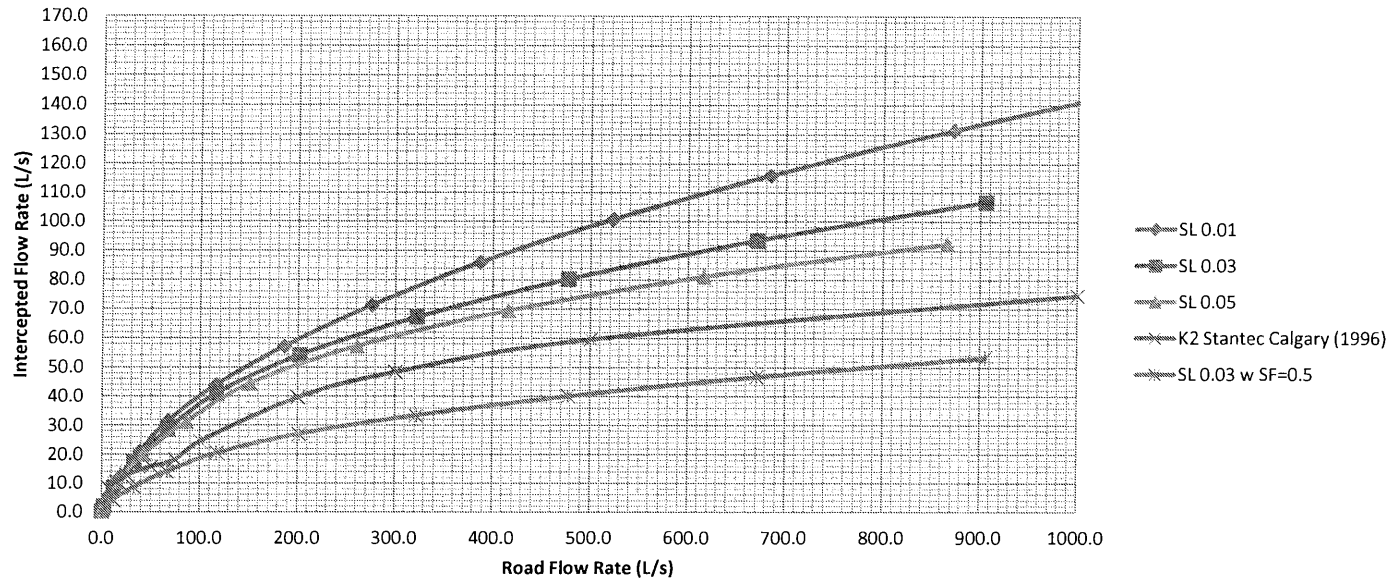
DK-7 (single) sump condition

Trojan (2014) without safety factor		Trojan with SF		K-2 Wilson (1983)		K-2 Stantec Calgary (1996)	
depth	Q combined	Q combined	depth	Q	depth	Q	
(m)	(L/s)	(L/s)	(m)	(L/s)	(m)	(L/s)	
0	0	0	0.025	46	0.000	0	
0.025	15	7	0.051	71	0.100	98	
0.050	43	22	0.076	94	0.200	150	
0.075	90	45	0.102	122	0.300	156	
0.100	150	75	0.127	146	0.400	161	
0.125	221	111	0.152	157	0.500	166	
0.150	292	146	0.178	172			
0.175	321	160	0.203	186			
0.200	347	174	0.229	198			
0.225	372	186	0.254	210			
0.250	395	197					
0.300	427	213					
0.350	461	231					
0.400	498	249					
0.450	532	266					
0.500	564	282					

DK-7 (double) sump



### TROJAN DK-7 (double) Intercepted Flow Rate for Cross Slope 0.015



K2 Stantec Calgary (1996)

Road Flow (L/s)	Intercepted (L/s)
0	0.0
8	8.0
15	10.6
25	12.8
50	15.7
75	18.2
100	24.4
200	39.6
300	48.4
500	59.6
1000	74.7

SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.2	0.2	0.21
0.020	1.1	1.1	0.34
0.030	7.0	5.6	0.45
0.040	19.0	12.2	0.54
0.050	38.7	20.9	0.63
0.060	67.6	31.5	0.71
0.070	116.5	43.9	0.79
0.080	186.0	57.1	0.87
0.090	275.6	71.2	0.94
0.100	387.3	86.1	1.00
0.110	522.8	100.8	1.07
0.120	684.1	115.9	1.14
0.130	872.8	131.5	1.20
0.140	1090.6	147.6	1.26

SL 0.03

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF=0.5 (L/s)
0.010	0.3	0.3	0.37	0.2
0.020	2.0	1.9	0.59	1.0
0.030	12.1	8.6	0.78	4.3
0.040	32.8	17.5	0.94	8.8
0.050	67.0	28.5	1.09	14.2
0.060	117.0	41.1	1.24	20.5
0.070	201.9	54.2	1.37	27.1
0.080	322.2	67.2	1.50	33.6
0.090	477.4	80.3	1.62	40.2
0.100	670.8	93.6	1.74	46.8
0.110	905.6	106.8	1.86	53.4

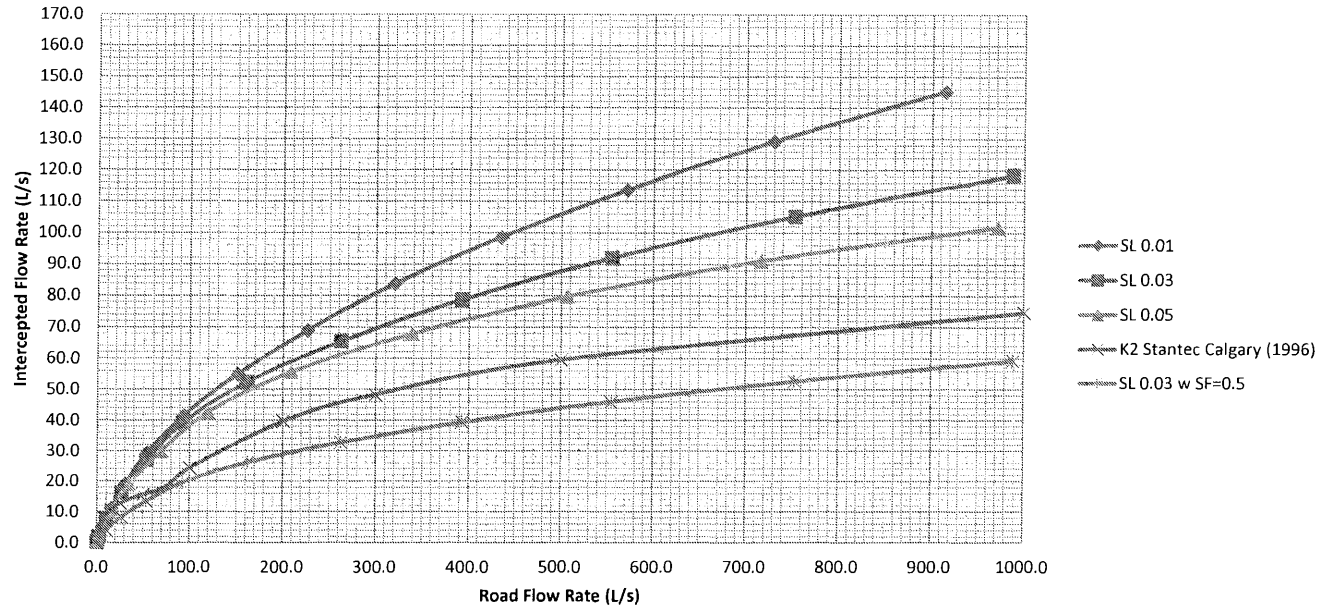
SL 0.05

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.4	0.4	0.48
0.020	2.5	2.5	0.76
0.030	15.6	10.5	1.00
0.040	42.4	20.0	1.22
0.050	86.5	31.4	1.41
0.060	151.1	44.4	1.60
0.070	260.6	57.3	1.77
0.080	416.0	69.5	1.93
0.090	616.3	81.2	2.09
0.100	866.0	92.5	2.25

TROJAN DK-7 (double)

Cross Slope 0.02

### TROJAN DK-7 (double) Intercepted Flow Rate for Cross Slope 0.02



K2 Stantec Calgary (1996)

Road Flow (L/s)	Intercepted (L/s)
0	0.0
8	8.0
15	10.6
25	12.8
50	15.7
75	18.2
100	24.4
200	39.6
300	48.4
500	59.6
1000	74.7

SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.2	0.2	0.21
0.020	1.1	1.1	0.34
0.030	5.9	5.0	0.45
0.040	15.3	11.0	0.54
0.050	30.8	19.1	0.63
0.060	53.3	29.2	0.71
0.070	93.5	41.5	0.79
0.080	151.4	54.8	0.87
0.090	226.5	69.0	0.94
0.100	320.3	83.9	1.00
0.110	434.5	98.5	1.07
0.120	570.5	113.7	1.14
0.130	730.0	129.3	1.20
0.140	914.3	145.3	1.26

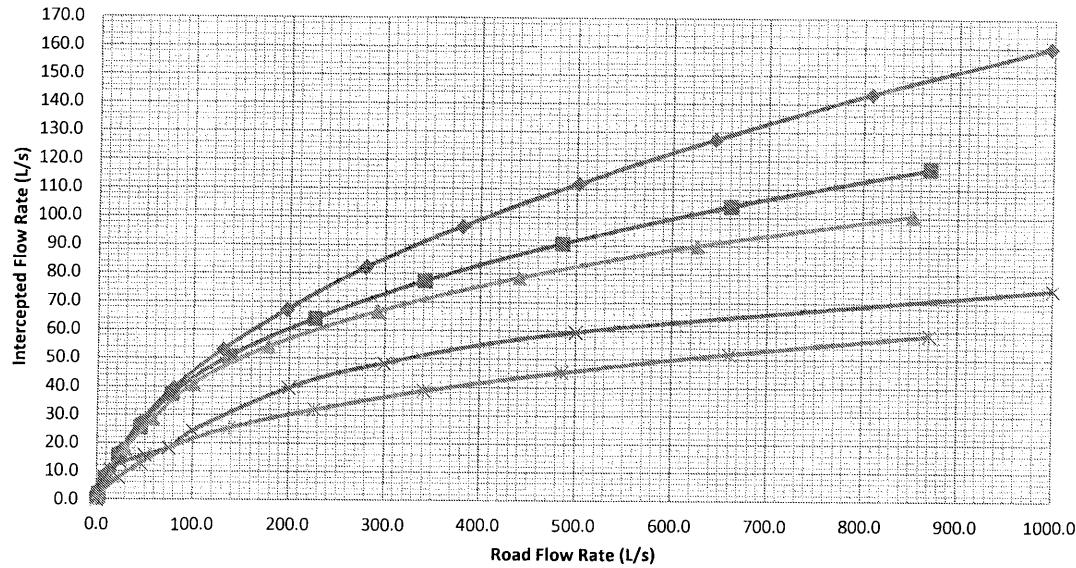
SL 0.03

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF=0.5 (L/s)
0.010	0.3	0.3	0.37	0.2
0.020	2.0	1.9	0.59	1.0
0.030	10.1	7.9	0.78	3.9
0.040	26.6	16.4	0.94	8.2
0.050	53.3	26.9	1.09	13.4
0.060	92.3	39.1	1.24	19.5
0.070	161.9	52.3	1.37	26.2
0.080	262.3	65.5	1.50	32.7
0.090	392.3	78.7	1.62	39.4
0.100	554.8	92.0	1.74	46.0
0.110	752.5	105.2	1.86	52.6
0.120	988.2	118.4	1.97	59.2

SL 0.05

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.4	0.4	0.48
0.020	2.5	2.5	0.76
0.030	13.1	9.8	1.00
0.040	34.3	18.8	1.22
0.050	68.8	29.8	1.41
0.060	119.2	42.5	1.60
0.070	209.0	55.6	1.77
0.080	338.6	67.9	1.93
0.090	506.4	79.8	2.09
0.100	716.2	91.1	2.25
0.110	971.5	101.8	2.40

### TROJAN DK-7 (double) Intercepted Flow Rate for Cross Slope 0.025



K2 Stantec Calgary (1996)

Road Flow (L/s)	Intercepted (L/s)
0	0.0
8	8.0
15	10.6
25	12.8
50	15.7
75	18.2
100	24.4
200	39.6
300	48.4
500	59.6
1000	74.7

SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.2	0.2	0.21
0.020	1.1	1.1	0.34
0.030	5.2	4.6	0.45
0.040	13.2	10.2	0.54
0.050	26.1	17.7	0.63
0.060	44.7	27.3	0.71
0.070	79.6	39.6	0.79
0.080	130.7	53.0	0.87
0.090	197.0	67.2	0.94
0.100	280.1	82.1	1.00
0.110	381.4	96.8	1.07
0.120	502.4	111.9	1.14
0.130	644.3	127.5	1.20
0.140	808.6	143.5	1.26
0.150	996.3	159.9	1.32

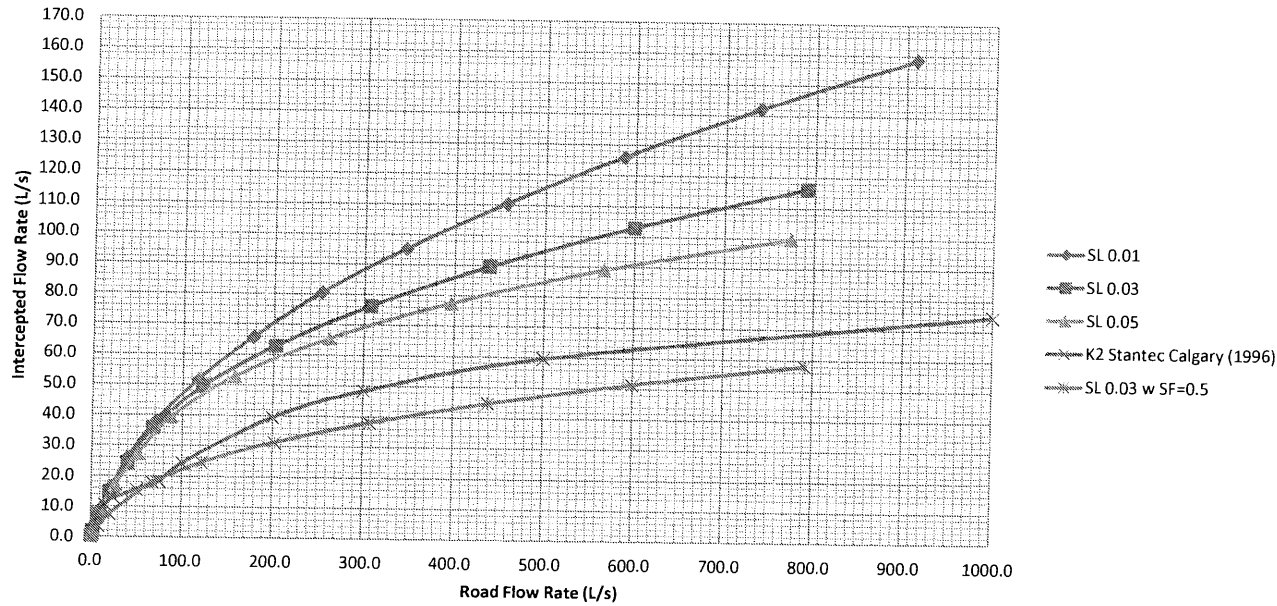
SL 0.03

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF=0.5 (L/s)
0.010	0.3	0.3	0.37	0.2
0.020	2.0	1.9	0.59	1.0
0.030	9.0	7.4	0.78	3.7
0.040	22.8	15.4	0.94	7.7
0.050	45.1	25.5	1.09	12.8
0.060	77.5	37.4	1.24	18.7
0.070	137.9	50.7	1.37	25.4
0.080	226.3	64.0	1.50	32.0
0.090	341.2	77.4	1.62	38.7
0.100	485.1	90.7	1.74	45.4
0.110	660.7	104.0	1.86	52.0
0.120	870.2	117.2	1.97	58.6

SL 0.05

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.4	0.4	0.48
0.020	2.5	2.5	0.76
0.030	11.6	9.2	1.00
0.040	29.4	17.9	1.22
0.050	58.3	28.5	1.41
0.060	100.0	40.9	1.60
0.070	178.0	54.1	1.77
0.080	292.2	66.6	1.93
0.090	440.5	78.6	2.09
0.100	626.3	90.0	2.25
0.110	852.9	100.7	2.40

### TROJAN DK-7 (double) Intercepted Flow Rate for Cross Slope 0.03



K2 Stantec Calgary (1996)

Road Flow (L/s)	Intercepted (L/s)
0	0.0
8	8.0
15	10.6
25	12.8
50	15.7
75	18.2
100	24.4
200	39.6
300	48.4
500	59.6
1000	74.7

SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.2	0.2	0.21
0.020	1.1	1.1	0.34
0.030	4.7	4.3	0.45
0.040	11.7	9.5	0.54
0.050	22.9	16.6	0.63
0.060	39.0	25.8	0.71
0.070	70.4	38.0	0.79
0.080	116.8	51.5	0.87
0.090	177.3	65.7	0.94
0.100	253.3	80.6	1.00
0.110	346.1	95.3	1.07
0.120	457.0	110.5	1.14
0.130	587.2	126.1	1.20
0.140	738.1	142.1	1.26
0.150	910.6	158.4	1.32

SL 0.03

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF=0.5 (L/s)
0.010	0.3	0.3	0.37	0.2
0.020	2.0	1.9	0.59	1.0
0.030	8.2	7.0	0.78	3.5
0.040	20.3	14.7	0.94	7.3
0.050	39.7	24.4	1.09	12.2
0.060	67.6	35.9	1.24	18.0
0.070	121.9	49.4	1.37	24.7
0.080	202.3	62.8	1.50	31.4
0.090	307.1	76.3	1.62	38.1
0.100	438.7	89.6	1.74	44.8
0.110	599.5	103.0	1.86	51.5
0.120	791.5	116.2	1.97	58.1

SL 0.05

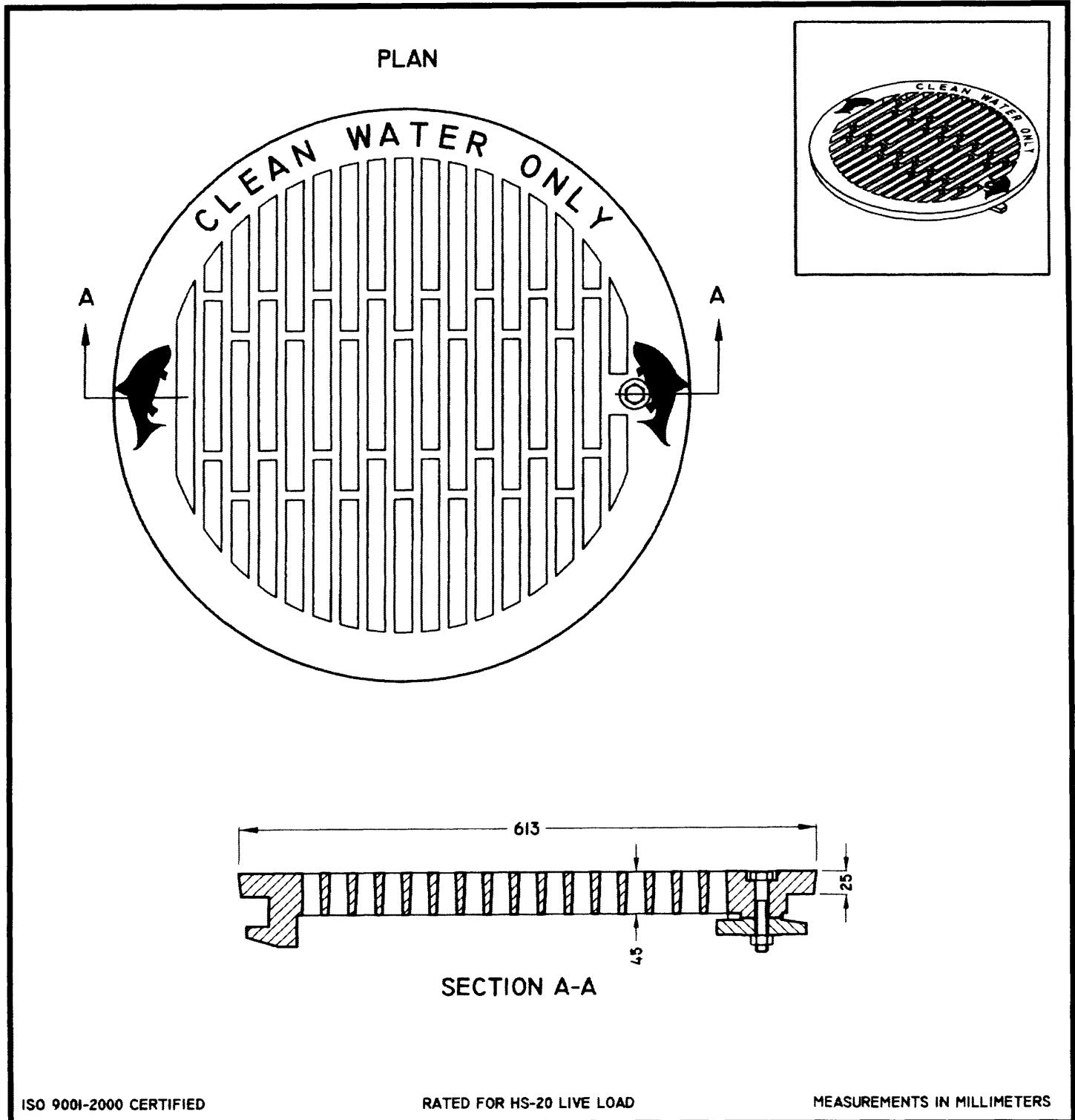
Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.4	0.4	0.48
0.020	2.5	2.5	0.76
0.030	10.6	8.8	1.00
0.040	26.2	17.1	1.22
0.050	51.2	27.4	1.41
0.060	87.3	39.4	1.60
0.070	157.4	52.8	1.77
0.080	261.2	65.5	1.93
0.090	396.5	77.6	2.09
0.100	566.4	89.0	2.25
0.110	773.9	99.8	2.40



Please note that drawings are approximate and not to be used for engineering purposes – please contact us for specific dimensions.

## LOCKING GRATE

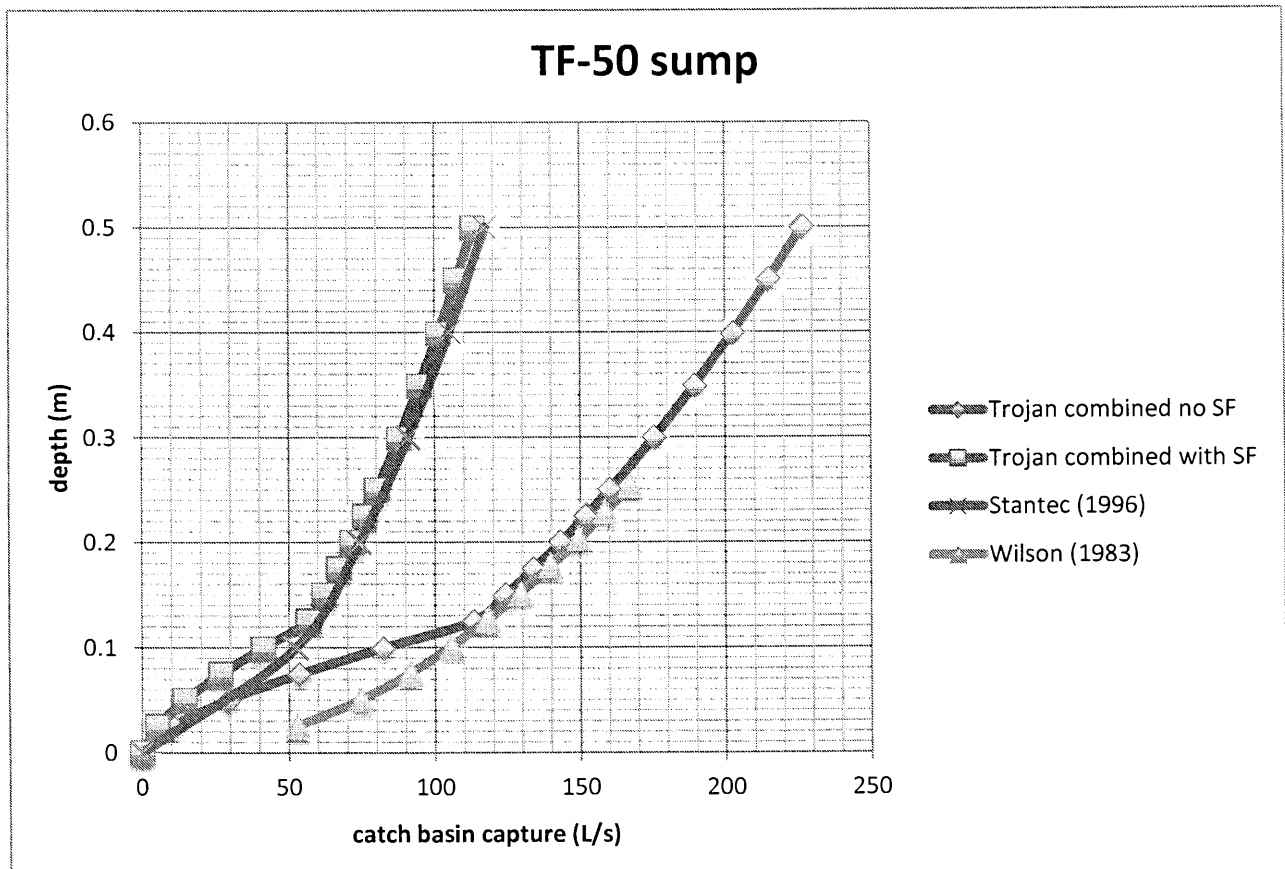
TF-50



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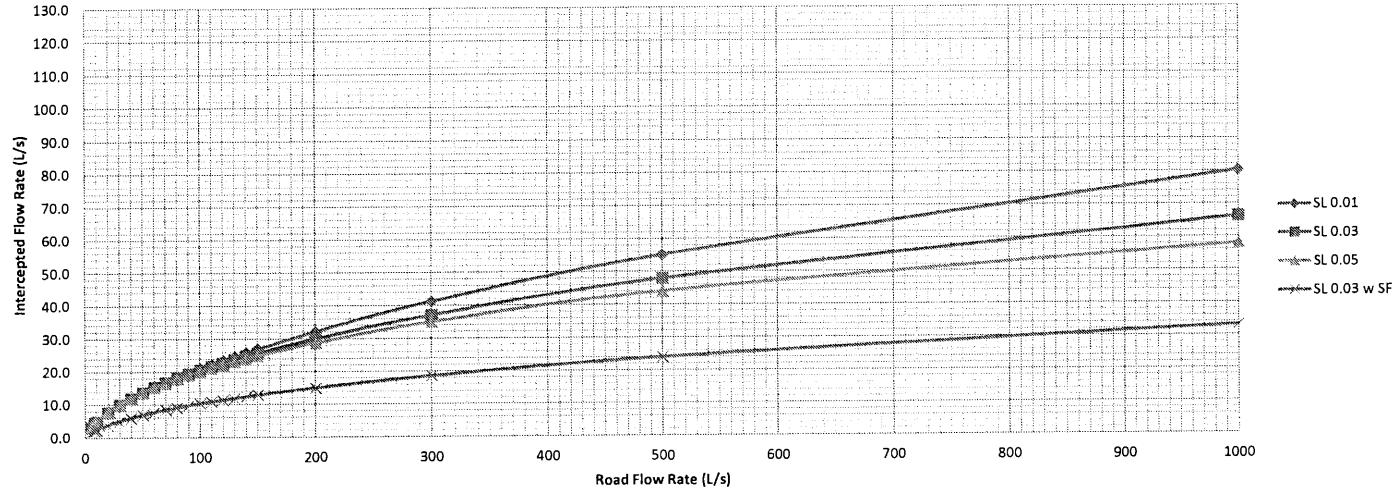
TF-50 sump condition

Trojan (2014) without safety factor		Trojan with SF		Stantec (1996)		Wilson (1983)	
depth	Q combined	Q combined	depth	Q	depth	Q	
(m)	(L/s)	(L/s)	(m)	(L/s)	(m)	(L/s)	
0	0	0	0.00	0	0.025	53	
0.025	10	5	0.10	52.4	0.051	75	
0.050	29	15	0.20	74.2	0.076	92	
0.075	54	27	0.30	90.8	0.102	106	
0.100	82	41	0.40	104.9	0.127	118	
0.125	113	57	0.50	117.3	0.152	130	
0.150	124	62			0.178	140	
0.175	134	67			0.203	150	
0.200	143	72			0.229	159	
0.225	152	76			0.254	167	
0.250	160	80					
0.300	176	88					
0.350	190	95					
0.400	203	101					
0.450	215	107					
0.500	227	113					





TROJAN TF-50 Intercepted Flow Rate for Cross Slope 0.015



Intercepted Flow Rates

Road Flow Rate	SL 0.01	SL 0.03	SL 0.05	SL 0.03 w SF
(L/s)	(L/s)	(L/s)	(L/s)	(L/s)
5	3.1	3.1	3.2	1.5
8	4.2	4.2	4.3	2.1
10	4.8	4.8	5.0	2.4
20	7.6	7.6	7.9	3.8
30	9.8	9.8	10.3	4.9
40	11.8	11.8	12.1	5.9
50	13.5	13.6	13.7	6.8
60	15.2	15.3	15.2	7.7
70	16.7	16.8	16.5	8.4
80	18.2	18.1	17.8	9.1
90	19.5	19.3	18.9	9.7
100	20.9	20.5	20.0	10.3
110	22.1	21.6	21.1	10.8
120	23.4	22.7	22.0	11.3
130	24.6	23.7	23.0	11.9
140	25.7	24.7	23.9	12.3
150	26.9	25.6	24.8	12.8
200	32.1	29.9	28.6	15.0
300	41.2	37.0	34.9	18.5
500	55.1	47.9	44.0	23.9
1000	80.3	66.3	58.1	33.2

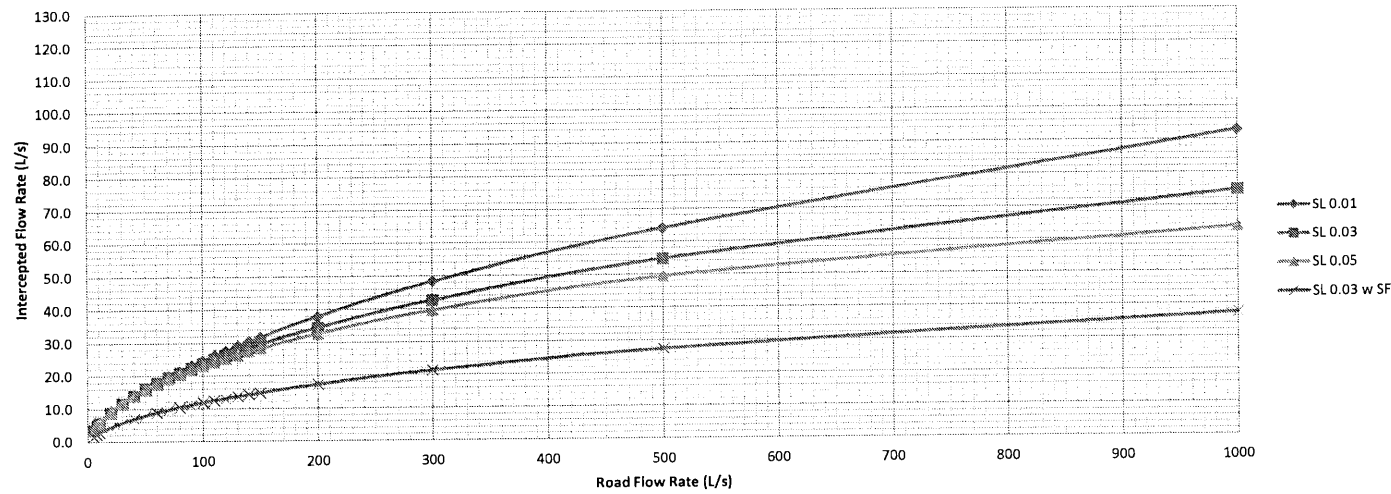
Depth

Road Flow Rate	SL 0.01	SL 0.03	SL 0.05
(L/s)	(m)	(m)	(m)
5	0.021	0.017	0.015
8	0.024	0.020	0.018
10	0.027	0.022	0.020
20	0.035	0.028	0.026
30	0.040	0.033	0.030
40	0.045	0.036	0.033
50	0.049	0.040	0.036
60	0.052	0.042	0.039
70	0.055	0.045	0.041
80	0.058	0.047	0.043
90	0.061	0.049	0.045
100	0.063	0.051	0.047
110	0.065	0.053	0.048
120	0.068	0.055	0.050
130	0.070	0.057	0.052
140	0.072	0.058	0.053
150	0.073	0.060	0.054
200	0.082	0.067	0.061
300	0.095	0.078	0.070
500	0.115	0.094	0.085
1000	0.150	0.122	0.111

Velocity

Road Flow Rate	SL 0.01	SL 0.03	SL 0.05
(L/s)	(m/s)	(m/s)	(m/s)
5	0.35	0.52	0.64
8	0.39	0.59	0.71
10	0.41	0.62	0.76
20	0.49	0.74	0.90
30	0.55	0.82	1.00
40	0.59	0.88	1.07
50	0.62	0.94	1.13
60	0.65	0.98	1.19
70	0.67	1.02	1.23
80	0.70	1.05	1.28
90	0.72	1.08	1.31
100	0.74	1.11	1.35
110	0.76	1.14	1.38
120	0.77	1.17	1.41
130	0.79	1.19	1.44
140	0.80	1.21	1.47
150	0.82	1.23	1.49
200	0.88	1.33	1.61
300	0.97	1.47	1.78
500	1.11	1.67	2.02
1000	1.32	1.99	2.41

TROJAN TF-50 Intercepted Flow Rate for Cross Slope 0.02



Intercepted Flow Rates

Road Flow Rate	SL 0.01	SL 0.03	SL 0.05	SL 0.03 w SF
(L/s)	(L/s)	(L/s)	(L/s)	(L/s)
5	3.5	3.6	3.7	1.8
8	4.9	4.9	5.1	2.4
10	5.6	5.7	5.9	2.8
20	8.9	8.9	9.3	4.5
30	11.5	11.6	11.9	5.8
40	13.8	14.0	14.0	7.0
50	15.9	16.1	15.8	8.0
60	17.8	17.8	17.5	8.9
70	19.7	19.5	19.0	9.7
80	21.4	21.0	20.4	10.5
90	23.0	22.4	21.8	11.2
100	24.6	23.7	23.0	11.9
110	26.1	25.0	24.2	12.5
120	27.6	26.2	25.3	13.1
130	29.0	27.4	26.4	13.7
140	30.4	28.5	27.4	14.3
150	31.7	29.6	28.3	14.8
200	37.9	34.5	32.7	17.3
300	48.3	42.5	39.6	21.3
500	64.1	54.7	49.4	27.3
1000	93.0	74.7	63.6	37.3

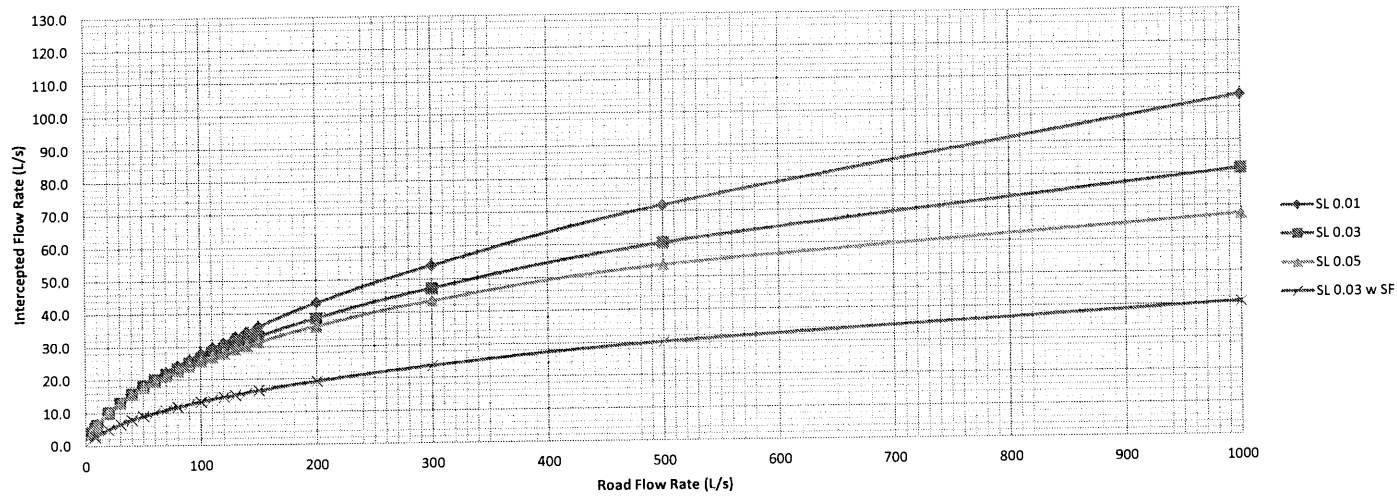
Depth

Road Flow Rate	SL 0.01	SL 0.03	SL 0.05
(L/s)	(m)	(m)	(m)
5	0.023	0.019	0.017
8	0.027	0.022	0.020
10	0.030	0.024	0.022
20	0.038	0.031	0.028
30	0.045	0.036	0.033
40	0.050	0.041	0.037
50	0.054	0.044	0.040
60	0.058	0.047	0.043
70	0.062	0.050	0.045
80	0.065	0.053	0.048
90	0.068	0.055	0.050
100	0.070	0.057	0.052
110	0.073	0.059	0.054
120	0.075	0.061	0.056
130	0.078	0.063	0.057
140	0.080	0.065	0.059
150	0.082	0.067	0.061
200	0.091	0.074	0.067
300	0.106	0.086	0.079
500	0.129	0.105	0.095
1000	0.167	0.136	0.123

Velocity

Road Flow Rate	SL 0.01	SL 0.03	SL 0.05
(L/s)	(m/s)	(m/s)	(m/s)
5	0.37	0.56	0.68
8	0.42	0.63	0.77
10	0.44	0.67	0.81
20	0.53	0.80	0.97
30	0.59	0.88	1.07
40	0.63	0.95	1.15
50	0.67	1.01	1.22
60	0.70	1.05	1.28
70	0.73	1.09	1.33
80	0.75	1.13	1.37
90	0.77	1.17	1.41
100	0.79	1.20	1.45
110	0.81	1.23	1.48
120	0.83	1.25	1.52
130	0.85	1.28	1.55
140	0.86	1.30	1.58
150	0.88	1.33	1.61
200	0.94	1.43	1.73
300	1.05	1.58	1.91
500	1.19	1.79	2.17
1000	1.42	2.14	2.59

TROJAN TF-50 Intercepted Flow Rate for Cross Slope 0.025



Intercepted Flow Rates

Road Flow Rate	SL 0.01 (L/s)	SL 0.03 (L/s)	SL 0.05 (L/s)	SL 0.03 w SF (L/s)
5	3.9	4.0	4.1	2.0
8	5.4	5.5	5.7	2.7
10	6.3	6.4	6.6	3.2
20	10.0	10.1	10.5	5.0
30	13.0	13.1	13.2	6.6
40	15.6	15.8	15.6	7.9
50	18.0	18.0	17.6	9.0
60	20.2	20.0	19.5	10.0
70	22.3	21.8	21.2	10.9
80	24.3	23.5	22.7	11.7
90	26.1	25.0	24.2	12.5
100	27.9	26.5	25.5	13.3
110	29.6	28.0	26.8	14.0
120	31.3	29.3	28.0	14.7
130	32.9	30.6	29.2	15.3
140	34.5	31.8	30.3	15.9
150	36.0	33.0	31.3	16.5
200	43.1	38.4	36.0	19.2
300	54.2	47.2	43.4	23.6
500	71.8	60.3	53.6	30.1
1000	103.9	81.4	67.5	40.7

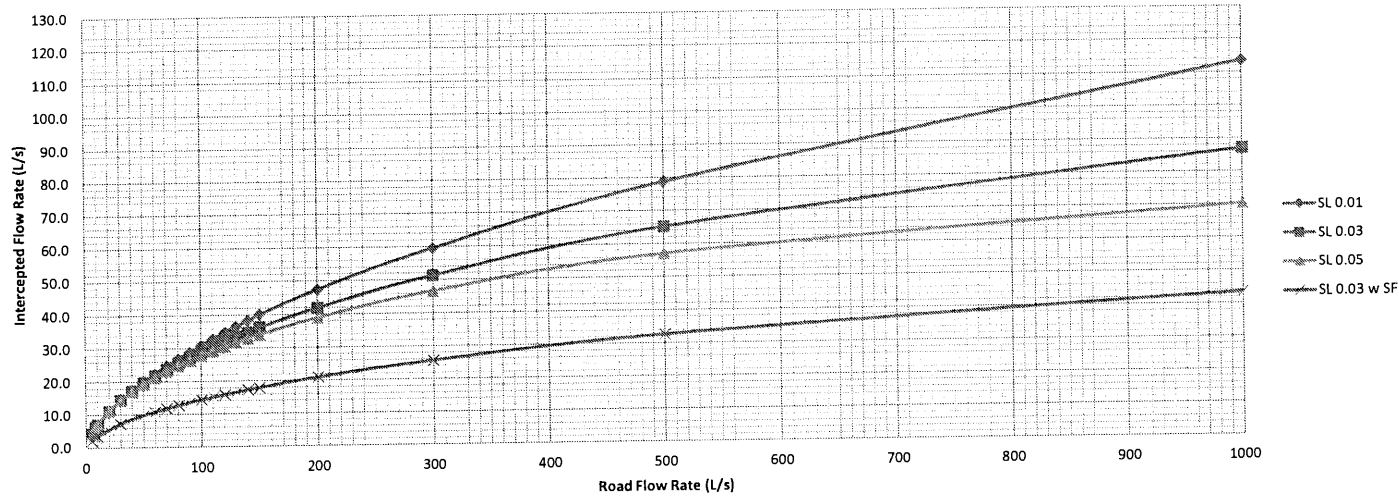
Depth

Road Flow Rate (L/s)	SL 0.01 (m)	SL 0.03 (m)	SL 0.05 (m)
5	0.025	0.020	0.018
8	0.030	0.024	0.022
10	0.032	0.026	0.024
20	0.042	0.034	0.031
30	0.049	0.040	0.036
40	0.054	0.044	0.040
50	0.059	0.048	0.044
60	0.063	0.051	0.047
70	0.067	0.054	0.049
80	0.070	0.057	0.052
90	0.073	0.060	0.054
100	0.076	0.062	0.057
110	0.079	0.064	0.059
120	0.082	0.067	0.061
130	0.084	0.069	0.062
140	0.087	0.071	0.064
150	0.089	0.072	0.066
200	0.099	0.081	0.073
300	0.115	0.094	0.085
500	0.140	0.114	0.103
1000	0.181	0.148	0.134

Velocity

Road Flow Rate (L/s)	SL 0.01 (m/s)	SL 0.03 (m/s)	SL 0.05 (m/s)
5	0.40	0.60	0.72
8	0.44	0.67	0.81
10	0.47	0.71	0.86
20	0.56	0.85	1.02
30	0.62	0.94	1.13
40	0.67	1.01	1.22
50	0.71	1.06	1.29
60	0.74	1.11	1.35
70	0.77	1.16	1.40
80	0.79	1.20	1.45
90	0.82	1.23	1.49
100	0.84	1.27	1.53
110	0.86	1.30	1.57
120	0.88	1.33	1.61
130	0.90	1.35	1.64
140	0.91	1.38	1.67
150	0.93	1.40	1.70
200	1.00	1.51	1.82
300	1.11	1.67	2.02
500	1.26	1.90	2.30
1000	1.50	2.26	2.73

TROJAN TF-50 Intercepted Flow Rate for Cross Slope 0.03



Intercepted Flow Rates

Road Flow Rate	SL 0.01	SL 0.03	SL 0.05	SL 0.03 w SF
(L/s)	(L/s)	(L/s)	(L/s)	(L/s)
5	4.3	4.4	4.5	2.2
8	5.9	6.0	6.3	3.0
10	6.9	7.0	7.3	3.5
20	11.0	11.2	11.4	5.6
30	14.3	14.6	14.4	7.3
40	17.2	17.3	17.0	8.7
50	19.9	19.7	19.2	9.8
60	22.4	21.8	21.2	10.9
70	24.7	23.8	23.0	11.9
80	26.9	25.6	24.7	12.8
90	28.9	27.4	26.3	13.7
100	30.9	29.0	27.7	14.5
110	32.9	30.5	29.1	15.3
120	34.7	32.0	30.4	16.0
130	36.5	33.4	31.6	16.7
140	38.3	34.7	32.8	17.4
150	40.0	36.0	33.9	18.0
200	47.4	41.8	38.9	20.9
300	59.5	51.2	46.6	25.6
500	78.8	65.1	57.0	32.6
1000	113.6	87.0	70.2	43.5

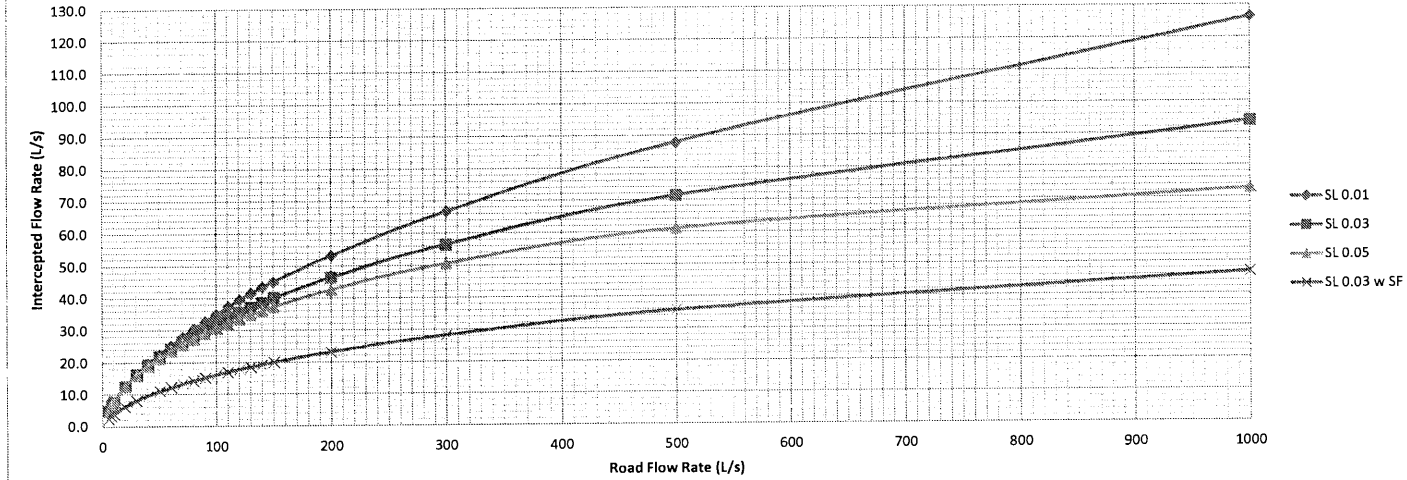
Depth

Road Flow Rate	SL 0.01	SL 0.03	SL 0.05
(L/s)	(m)	(m)	(m)
5	0.027	0.022	0.020
8	0.032	0.026	0.023
10	0.035	0.028	0.026
20	0.045	0.036	0.033
30	0.052	0.042	0.039
40	0.058	0.047	0.043
50	0.063	0.051	0.047
60	0.068	0.055	0.050
70	0.072	0.058	0.053
80	0.075	0.061	0.056
90	0.079	0.064	0.058
100	0.082	0.067	0.061
110	0.085	0.069	0.063
120	0.088	0.071	0.065
130	0.090	0.074	0.067
140	0.093	0.076	0.069
150	0.095	0.078	0.070
200	0.106	0.086	0.079
300	0.124	0.101	0.091
500	0.150	0.122	0.111
1000	0.194	0.158	0.144

Velocity

Road Flow Rate	SL 0.01	SL 0.03	SL 0.05
(L/s)	(m/s)	(m/s)	(m/s)
5	0.41	0.62	0.76
8	0.47	0.70	0.85
10	0.49	0.74	0.90
20	0.59	0.88	1.07
30	0.65	0.98	1.19
40	0.70	1.05	1.28
50	0.74	1.11	1.35
60	0.77	1.17	1.41
70	0.80	1.21	1.47
80	0.83	1.25	1.52
90	0.86	1.29	1.56
100	0.88	1.33	1.61
110	0.90	1.36	1.64
120	0.92	1.39	1.68
130	0.94	1.42	1.71
140	0.96	1.44	1.75
150	0.97	1.47	1.78
200	1.05	1.58	1.91
300	1.16	1.75	2.12
500	1.32	1.99	2.41
1000	1.57	2.36	2.86

TROJAN TF-50 Intercepted Flow Rate for Cross Slope 0.0375



Intercepted Flow Rates

Road Flow Rate	SL 0.01 (L/s)	SL 0.03 (L/s)	SL 0.05 (L/s)	SL 0.03 w SF (L/s)
5	4.8	4.9	5.1	2.4
8	6.6	6.8	7.0	3.4
10	7.7	7.9	8.2	3.9
20	12.3	12.6	12.6	6.3
30	16.1	16.3	16.0	8.1
40	19.4	19.3	18.8	9.6
50	22.5	21.9	21.3	11.0
60	25.3	24.3	23.5	12.2
70	27.9	26.5	25.5	13.3
80	30.4	28.5	27.3	14.3
90	32.8	30.4	29.0	15.2
100	35.0	32.2	30.6	16.1
110	37.2	33.9	32.1	17.0
120	39.3	35.5	33.5	17.8
130	41.4	37.1	34.8	18.5
140	43.3	38.5	36.1	19.3
150	45.0	40.0	37.3	20.0
200	53.1	46.3	42.5	23.1
300	66.6	56.5	50.6	28.2
500	88.0	71.3	61.1	35.6
1000	126.4	93.8	72.8	46.9

Depth

Road Flow Rate (L/s)	SL 0.01 (m)	SL 0.03 (m)	SL 0.05 (m)
5	0.029	0.024	0.021
8	0.035	0.028	0.026
10	0.038	0.031	0.028
20	0.049	0.040	0.036
30	0.057	0.046	0.042
40	0.063	0.051	0.047
50	0.069	0.056	0.051
60	0.073	0.060	0.054
70	0.078	0.063	0.058
80	0.082	0.067	0.061
90	0.086	0.070	0.063
100	0.089	0.072	0.066
110	0.092	0.075	0.068
120	0.095	0.078	0.070
130	0.098	0.080	0.073
140	0.101	0.082	0.075
150	0.104	0.084	0.077
200	0.115	0.094	0.085
300	0.134	0.109	0.099
500	0.163	0.132	0.120
1000	0.211	0.172	0.156

Velocity

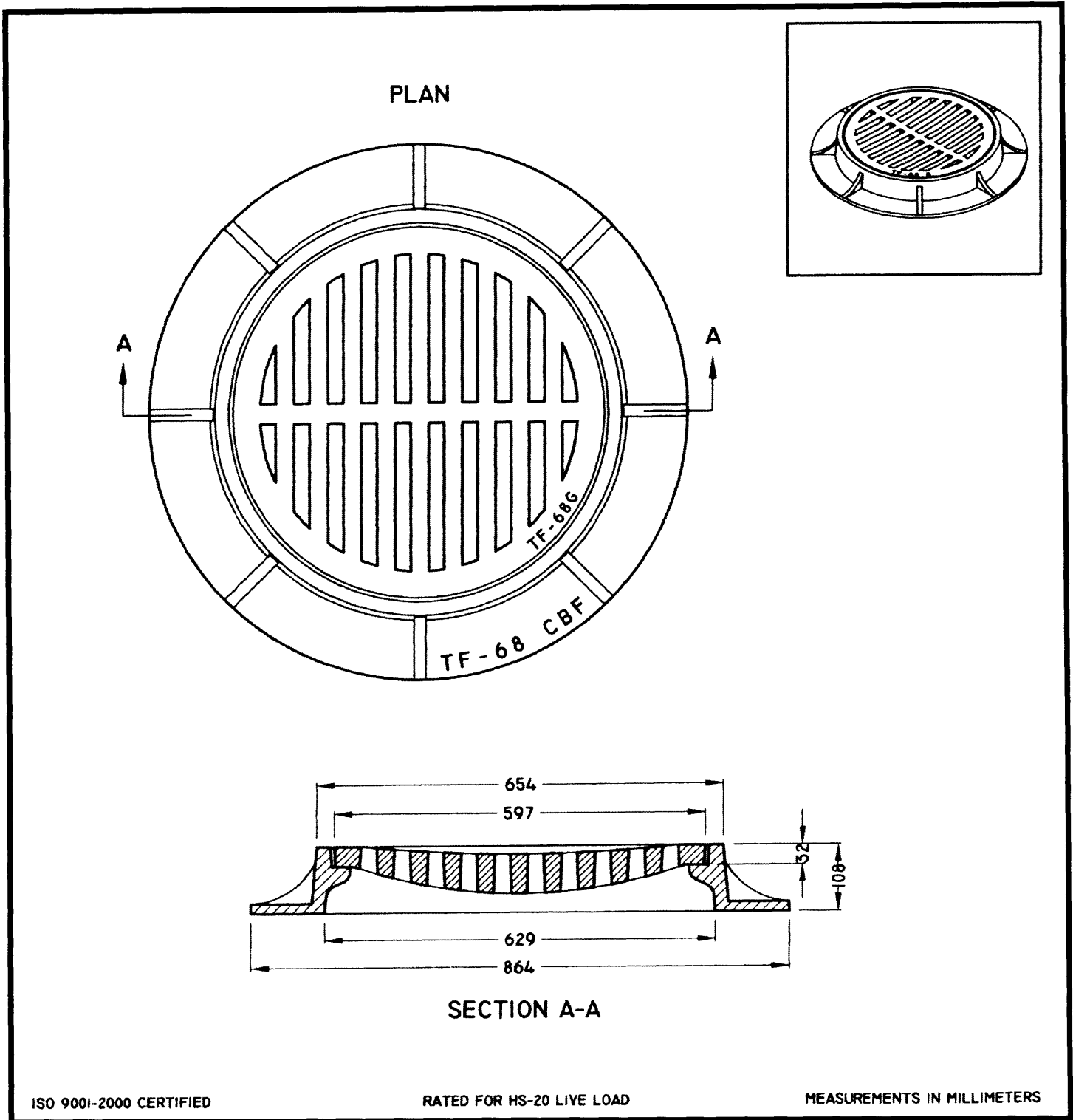
Road Flow Rate (L/s)	SL 0.01 (m/s)	SL 0.03 (m/s)	SL 0.05 (m/s)
5	0.44	0.66	0.80
8	0.49	0.74	0.90
10	0.52	0.79	0.95
20	0.62	0.94	1.13
30	0.69	1.04	1.25
40	0.74	1.11	1.35
50	0.78	1.18	1.43
60	0.82	1.23	1.49
70	0.85	1.28	1.55
80	0.88	1.33	1.61
90	0.91	1.37	1.65
100	0.93	1.40	1.70
110	0.95	1.44	1.74
120	0.97	1.47	1.78
130	0.99	1.50	1.81
140	1.01	1.53	1.85
150	1.03	1.55	1.88
200	1.11	1.67	2.02
300	1.22	1.85	2.24
500	1.39	2.10	2.54
1000	1.66	2.50	3.03



Please note that drawings are approximate and not to be used for engineering purposes – please contact us for specific dimensions.

## STANDARD FRAME AND GRATE

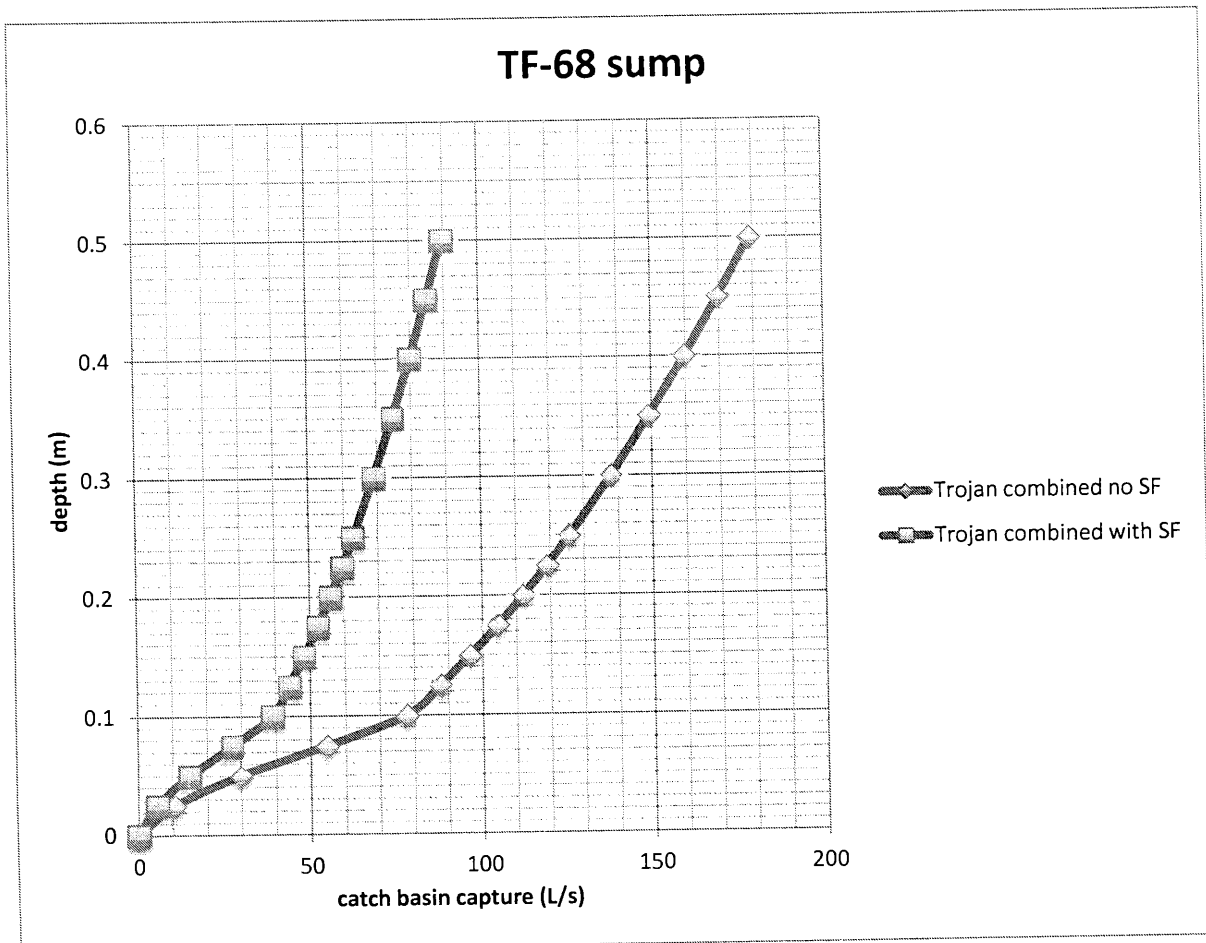
TF-68

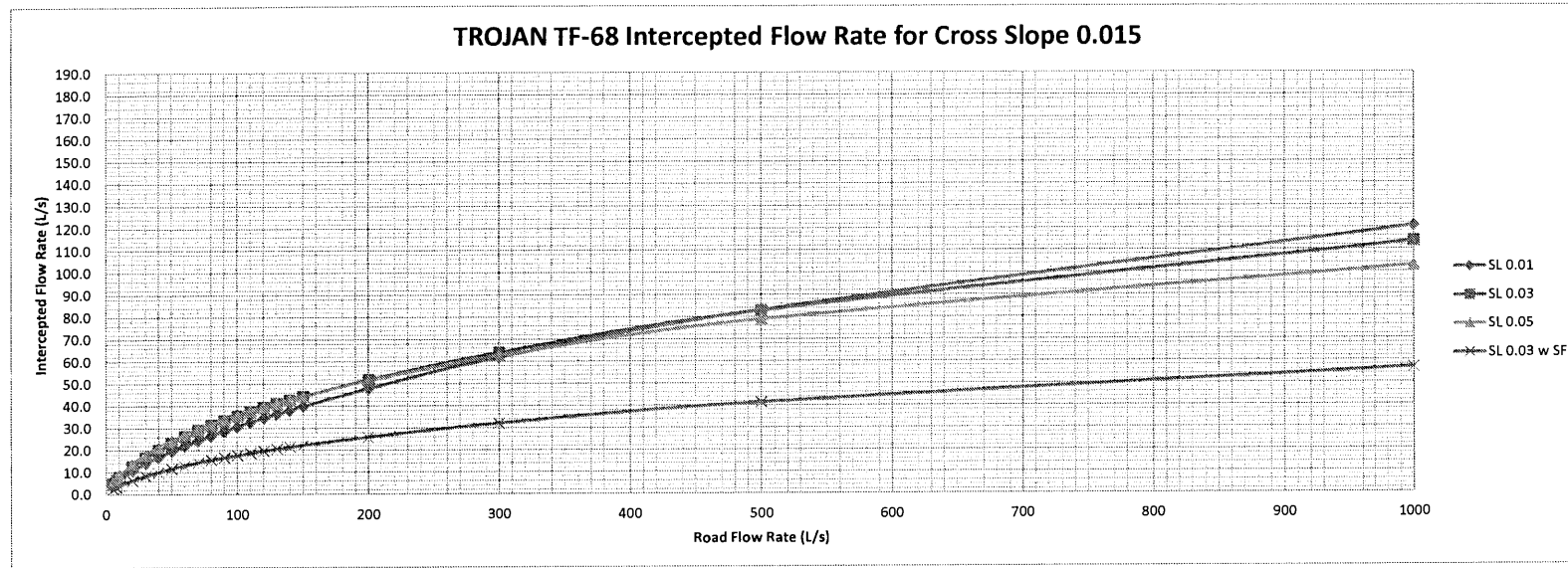


**TROJAN INDUSTRIES INC.**  
CALGARY • EDMONTON, ALBERTA

TF-68 sump condition

Trojan (2014) without safety factor		Trojan with SF
depth (m)	Q combined (L/s)	Q combined (L/s)
0	0	0
0.025	11	5
0.050	30	15
0.075	55	27
0.100	78	39
0.125	88	44
0.150	96	48
0.175	104	52
0.200	112	56
0.225	119	59
0.250	126	63
0.300	138	69
0.350	149	75
0.400	160	80
0.450	170	85
0.500	179	89





Intercepted Flow Rates

Road Flow Rate	SL 0.01 (L/s)	SL 0.03 (L/s)	SL 0.05 (L/s)	SL 0.03 w SF (L/s)
5	4.2	4.9	5.3	2.5
8	5.8	6.8	7.4	3.4
10	6.8	8.0	8.6	4.0
20	10.8	12.7	13.8	6.4
30	14.1	16.7	18.1	8.3
40	17.0	20.1	21.4	10.1
50	19.6	23.3	24.4	11.7
60	22.1	26.3	27.0	13.1
70	24.4	28.9	29.5	14.4
80	26.6	31.2	31.7	15.6
90	28.7	33.4	33.8	16.7
100	30.7	35.4	35.8	17.7
110	32.6	37.4	37.7	18.7
120	34.5	39.2	39.5	19.6
130	36.3	41.0	41.2	20.5
140	38.1	42.7	42.8	21.4
150	39.8	44.4	44.4	22.2
200	47.9	51.8	51.4	25.9
300	62.0	64.1	62.6	32.1
500	83.1	82.8	78.8	41.4
1000	120.8	113.8	102.8	56.9

Depth

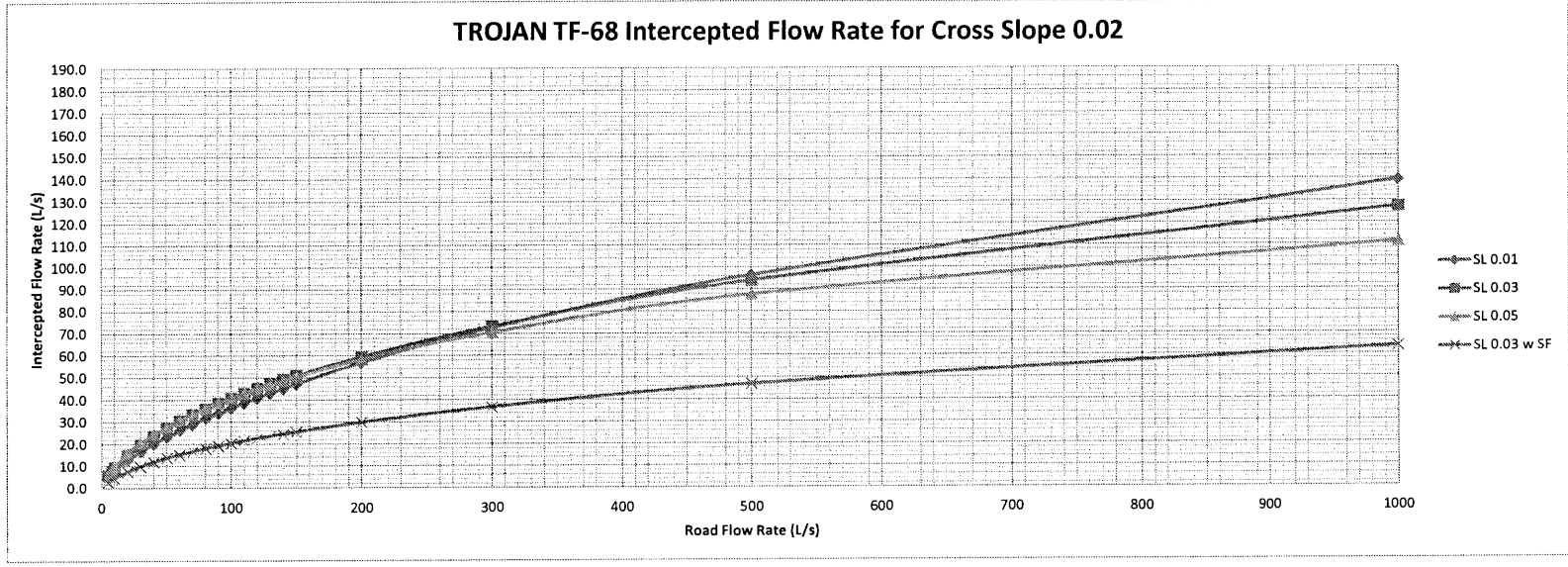
Road Flow Rate (L/s)	SL 0.01 (m)	SL 0.03 (m)	SL 0.05 (m)
5	0.021	0.017	0.015
8	0.024	0.020	0.018
10	0.027	0.022	0.020
20	0.035	0.028	0.026
30	0.040	0.033	0.030
40	0.045	0.036	0.033
50	0.049	0.040	0.036
60	0.052	0.042	0.039
70	0.055	0.045	0.041
80	0.058	0.047	0.043
90	0.061	0.049	0.045
100	0.063	0.051	0.047
110	0.065	0.053	0.048
120	0.068	0.055	0.050
130	0.070	0.057	0.052
140	0.072	0.058	0.053
150	0.073	0.060	0.054
200	0.082	0.067	0.061
300	0.095	0.078	0.070
500	0.115	0.094	0.085
1000	0.150	0.122	0.111

Velocity

Road Flow Rate (L/s)	SL 0.01 (m/s)	SL 0.03 (m/s)	SL 0.05 (m/s)
5	0.35	0.52	0.64
8	0.39	0.59	0.71
10	0.41	0.62	0.76
20	0.49	0.74	0.90
30	0.55	0.82	1.00
40	0.59	0.88	1.07
50	0.62	0.94	1.13
60	0.65	0.98	1.19
70	0.67	1.02	1.23
80	0.70	1.05	1.28
90	0.72	1.08	1.31
100	0.74	1.11	1.35
110	0.76	1.14	1.38
120	0.77	1.17	1.41
130	0.79	1.19	1.44
140	0.80	1.21	1.47
150	0.82	1.23	1.49
200	0.88	1.33	1.61
300	0.97	1.47	1.78
500	1.11	1.67	2.02
1000	1.32	1.99	2.41



TROJAN TF-68 Intercepted Flow Rate for Cross Slope 0.02



Intercepted Flow Rates

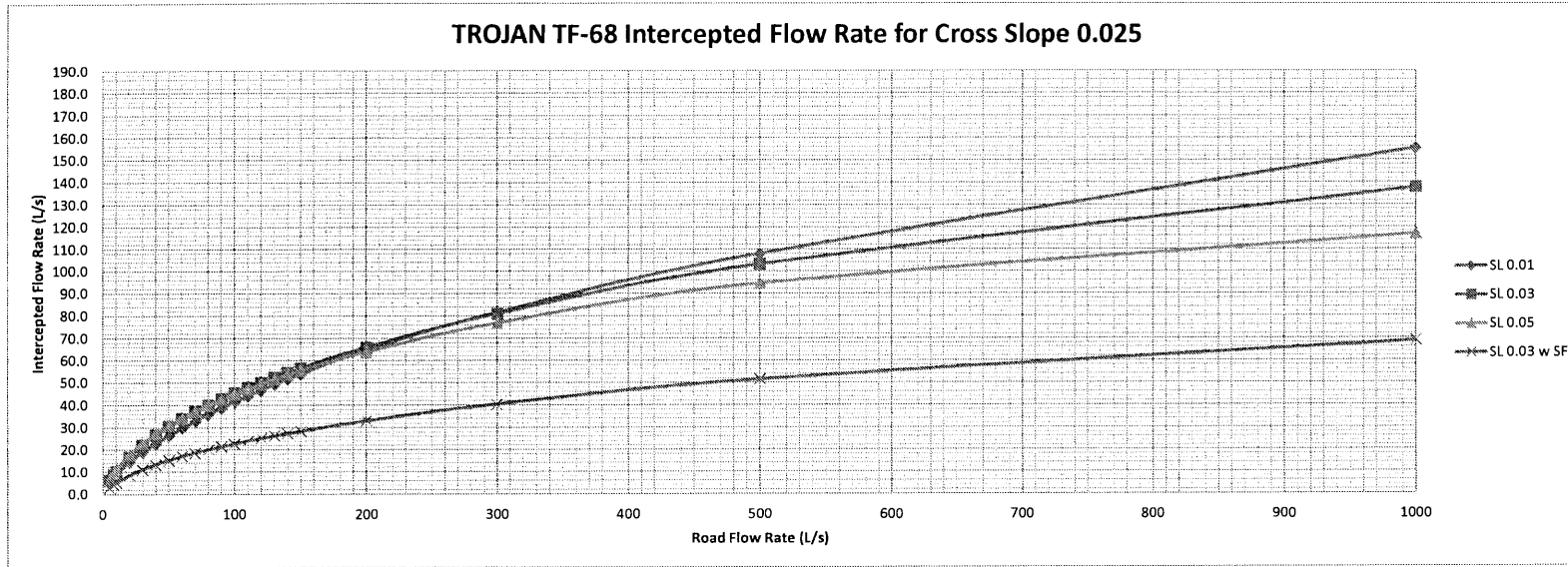
Road Flow Rate	SL 0.01	SL 0.03	SL 0.05	SL 0.03 w SF
(L/s)	(L/s)	(L/s)	(L/s)	(L/s)
5	4.9	5.7	6.1	2.8
8	6.8	7.9	8.5	4.0
10	7.9	9.2	9.9	4.6
20	12.6	14.9	16.1	7.4
30	16.5	19.5	20.7	9.8
40	20.0	23.7	24.5	11.8
50	23.2	27.4	27.9	13.7
60	26.1	30.5	30.9	15.2
70	28.8	33.3	33.7	16.7
80	31.5	36.0	36.3	18.0
90	34.0	38.4	38.6	19.2
100	36.3	40.8	40.9	20.4
110	38.7	43.0	43.0	21.5
120	40.9	45.1	45.0	22.6
130	43.1	47.2	46.9	23.6
140	45.2	49.1	48.7	24.6
150	47.2	51.0	50.5	25.5
200	56.8	59.5	58.3	29.7
300	72.7	73.3	70.5	36.6
500	96.4	94.0	87.7	47.0
1000	139.4	127.2	111.4	63.6

Depth

Road Flow Rate	SL 0.01	SL 0.03	SL 0.05
(L/s)	(m)	(m)	(m)
5	0.023	0.019	0.017
8	0.027	0.022	0.020
10	0.030	0.024	0.022
20	0.038	0.031	0.028
30	0.045	0.036	0.033
40	0.050	0.041	0.037
50	0.054	0.044	0.040
60	0.058	0.047	0.043
70	0.062	0.050	0.045
80	0.065	0.053	0.048
90	0.068	0.055	0.050
100	0.070	0.057	0.052
110	0.073	0.059	0.054
120	0.075	0.061	0.056
130	0.078	0.063	0.057
140	0.080	0.065	0.059
150	0.082	0.067	0.061
200	0.091	0.074	0.067
300	0.106	0.086	0.079
500	0.129	0.105	0.095
1000	0.167	0.136	0.123

Velocity

Road Flow Rate	SL 0.01	SL 0.03	SL 0.05
(L/s)	(m/s)	(m/s)	(m/s)
5	0.37	0.56	0.68
8	0.42	0.63	0.77
10	0.44	0.67	0.81
20	0.53	0.80	0.97
30	0.59	0.88	1.07
40	0.63	0.95	1.15
50	0.67	1.01	1.22
60	0.70	1.05	1.28
70	0.73	1.09	1.33
80	0.75	1.13	1.37
90	0.77	1.17	1.41
100	0.79	1.20	1.45
110	0.81	1.23	1.48
120	0.83	1.25	1.52
130	0.85	1.28	1.55
140	0.86	1.30	1.58
150	0.88	1.33	1.61
200	0.94	1.43	1.73
300	1.05	1.58	1.91
500	1.19	1.79	2.17
1000	1.42	2.14	2.59



Intercepted Flow Rates

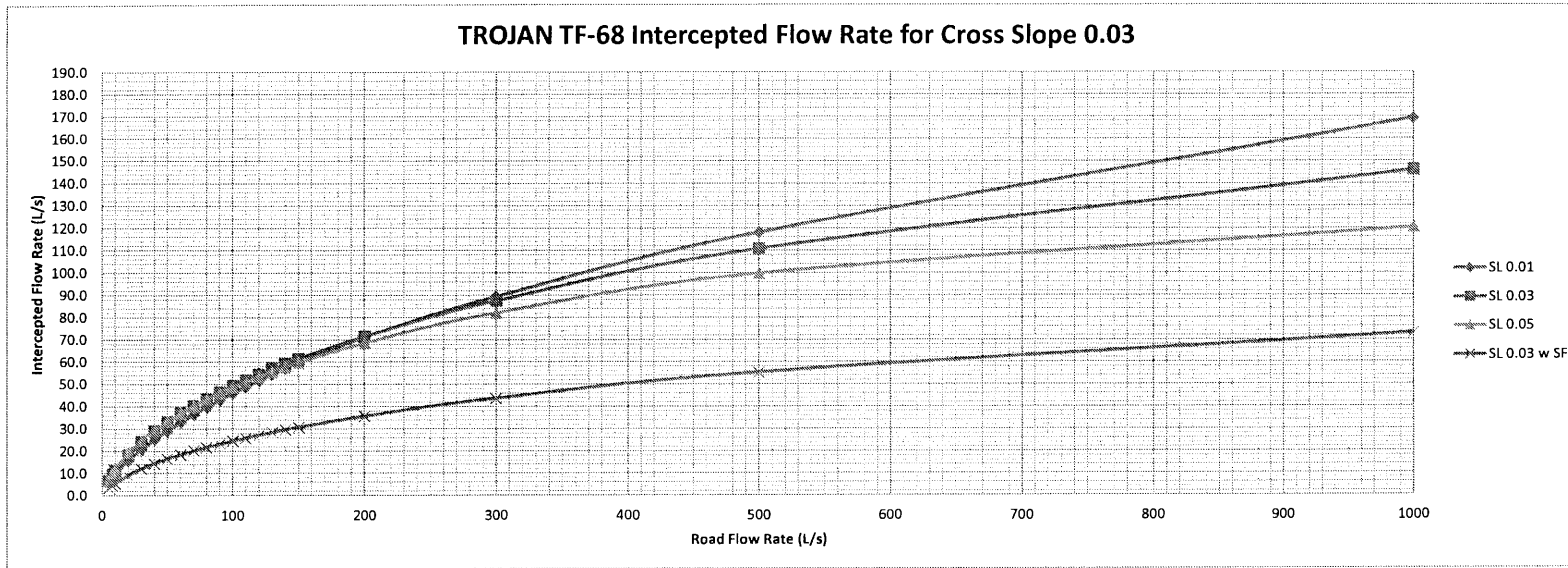
Road Flow Rate	SL 0.01	SL 0.03	SL 0.05	SL 0.03 w SF
(L/s)	(L/s)	(L/s)	(L/s)	(L/s)
5	5.5	6.3	6.7	3.1
8	7.6	8.8	9.4	4.4
10	8.9	10.3	11.1	5.2
20	14.3	16.7	17.9	8.4
30	18.7	22.0	22.9	11.0
40	22.7	26.7	27.1	13.4
50	26.3	30.5	30.8	15.2
60	29.6	33.9	34.2	17.0
70	32.8	37.1	37.2	18.5
80	35.8	40.0	40.0	20.0
90	38.6	42.8	42.7	21.4
100	41.4	45.4	45.1	22.7
110	44.0	47.8	47.4	23.9
120	46.6	50.2	49.6	25.1
130	49.1	52.4	51.7	26.2
140	51.5	54.5	53.6	27.3
150	53.8	56.6	55.5	28.3
200	64.8	65.9	63.9	32.9
300	81.5	80.9	76.9	40.5
500	107.9	103.1	94.5	51.6
1000	155.3	137.7	116.9	68.8

Depth

Road Flow Rate	SL 0.01	SL 0.03	SL 0.05
(L/s)	(m)	(m)	(m)
5	0.025	0.020	0.018
8	0.030	0.024	0.022
10	0.032	0.026	0.024
20	0.042	0.034	0.031
30	0.049	0.040	0.036
40	0.054	0.044	0.040
50	0.059	0.048	0.044
60	0.063	0.051	0.047
70	0.067	0.054	0.049
80	0.070	0.057	0.052
90	0.073	0.060	0.054
100	0.076	0.062	0.057
110	0.079	0.064	0.059
120	0.082	0.067	0.061
130	0.084	0.069	0.062
140	0.087	0.071	0.064
150	0.089	0.072	0.066
200	0.099	0.081	0.073
300	0.115	0.094	0.085
500	0.140	0.114	0.103
1000	0.181	0.148	0.134

Velocity

Road Flow Rate	SL 0.01	SL 0.03	SL 0.05
(L/s)	(m/s)	(m/s)	(m/s)
5	0.40	0.60	0.72
8	0.44	0.67	0.81
10	0.47	0.71	0.86
20	0.56	0.85	1.02
30	0.62	0.94	1.13
40	0.67	1.01	1.22
50	0.71	1.06	1.29
60	0.74	1.11	1.35
70	0.77	1.16	1.40
80	0.79	1.20	1.45
90	0.82	1.23	1.49
100	0.84	1.27	1.53
110	0.86	1.30	1.57
120	0.88	1.33	1.61
130	0.90	1.35	1.64
140	0.91	1.38	1.67
150	0.93	1.40	1.70
200	1.00	1.51	1.82
300	1.11	1.67	2.02
500	1.26	1.90	2.30
1000	1.50	2.26	2.73



Intercepted Flow Rates

Road Flow Rate	SL 0.01	SL 0.03	SL 0.05	SL 0.03 w SF
(L/s)	(L/s)	(L/s)	(L/s)	(L/s)
5	5.9	6.8	7.2	3.4
8	8.3	9.6	10.2	4.8
10	9.7	11.3	12.0	5.6
20	15.7	18.4	19.4	9.2
30	20.7	24.3	24.8	12.1
40	25.1	29.1	29.4	14.5
50	29.1	33.2	33.4	16.6
60	32.8	36.9	37.0	18.5
70	36.3	40.4	40.3	20.2
80	39.7	43.5	43.3	21.8
90	42.9	46.5	46.1	23.3
100	45.9	49.3	48.7	24.7
110	48.9	52.0	51.2	26.0
120	51.7	54.5	53.5	27.3
130	54.5	57.0	55.7	28.5
140	57.2	59.3	57.8	29.6
150	59.8	61.5	59.8	30.7
200	71.1	71.5	68.6	35.7
300	89.4	87.5	82.1	43.7
500	118.1	110.8	99.9	55.4
1000	169.2	146.1	120.4	73.0

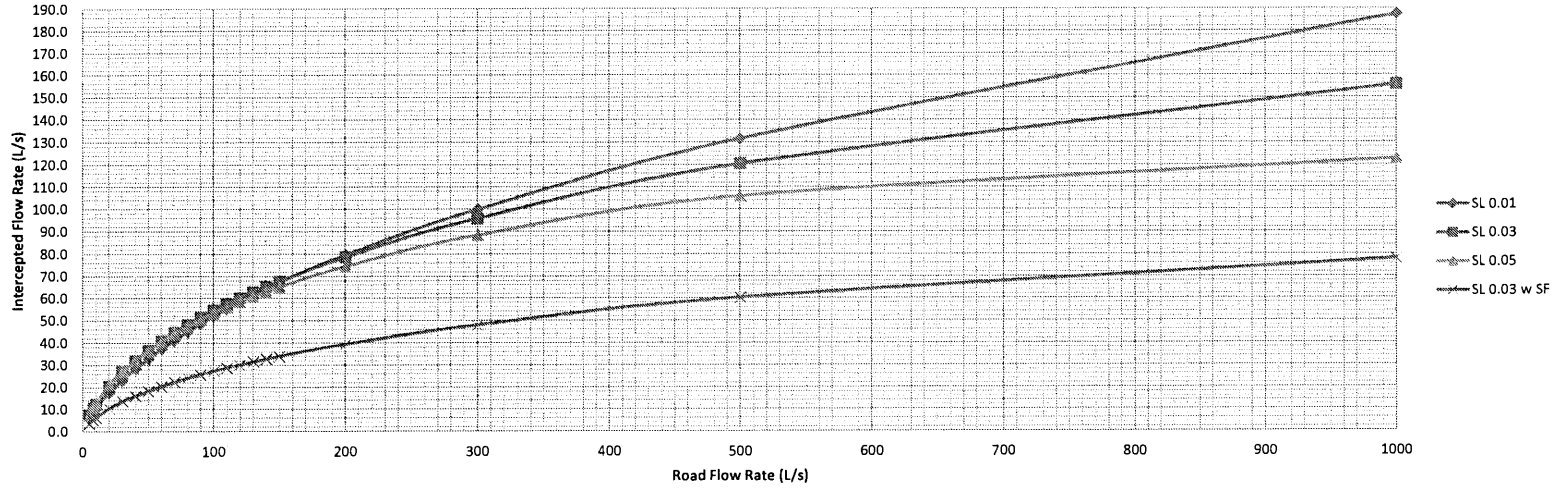
Depth

Road Flow Rate	SL 0.01	SL 0.03	SL 0.05
(L/s)	(m)	(m)	(m)
5	0.027	0.022	0.020
8	0.032	0.026	0.023
10	0.035	0.028	0.026
20	0.045	0.036	0.033
30	0.052	0.042	0.039
40	0.058	0.047	0.043
50	0.063	0.051	0.047
60	0.068	0.055	0.050
70	0.072	0.058	0.053
80	0.075	0.061	0.056
90	0.079	0.064	0.058
100	0.082	0.067	0.061
110	0.085	0.069	0.063
120	0.088	0.071	0.065
130	0.090	0.074	0.067
140	0.093	0.076	0.069
150	0.095	0.078	0.070
200	0.106	0.086	0.079
300	0.124	0.101	0.091
500	0.150	0.122	0.111
1000	0.194	0.158	0.144

Velocity

Road Flow Rate	SL 0.01	SL 0.03	SL 0.05
(L/s)	(m/s)	(m/s)	(m/s)
5	0.41	0.62	0.76
8	0.47	0.70	0.85
10	0.49	0.74	0.90
20	0.59	0.88	1.07
30	0.65	0.98	1.19
40	0.70	1.05	1.28
50	0.74	1.11	1.35
60	0.77	1.17	1.41
70	0.80	1.21	1.47
80	0.83	1.25	1.52
90	0.86	1.29	1.56
100	0.88	1.33	1.61
110	0.90	1.36	1.64
120	0.92	1.39	1.68
130	0.94	1.42	1.71
140	0.96	1.44	1.75
150	0.97	1.47	1.78
200	1.05	1.58	1.91
300	1.16	1.75	2.12
500	1.32	1.99	2.41
1000	1.57	2.36	2.86

TROJAN TF-68 Intercepted Flow Rate for Cross Slope 0.0375



Intercepted Flow Rates

Road Flow Rate	SL 0.01 (L/s)	SL 0.03 (L/s)	SL 0.05 (L/s)	SL 0.03 w SF (L/s)
5	6.5	7.4	7.8	3.7
8	9.2	10.6	11.2	5.3
10	10.8	12.5	13.3	6.2
20	17.6	20.5	21.2	10.3
30	23.3	27.0	27.2	13.5
40	28.3	32.1	32.2	16.1
50	32.9	36.7	36.6	18.3
60	37.2	40.8	40.5	20.4
70	41.2	44.6	44.1	22.3
80	45.0	48.1	47.4	24.1
90	48.6	51.4	50.4	25.7
100	52.1	54.5	53.3	27.2
110	55.5	57.4	55.9	28.7
120	58.8	60.2	58.4	30.1
130	61.9	62.8	60.8	31.4
140	64.8	65.4	63.0	32.7
150	67.5	67.8	65.1	33.9
200	79.6	78.6	74.4	39.3
300	99.8	95.8	88.4	47.9
500	131.6	120.4	105.9	60.2
1000	187.4	155.8	122.8	77.9

Depth

Road Flow Rate (L/s)	SL 0.01 (m)	SL 0.03 (m)	SL 0.05 (m)
5	0.029	0.024	0.021
8	0.035	0.028	0.026
10	0.038	0.031	0.028
20	0.049	0.040	0.036
30	0.057	0.046	0.042
40	0.063	0.051	0.047
50	0.069	0.056	0.051
60	0.073	0.060	0.054
70	0.078	0.063	0.058
80	0.082	0.067	0.061
90	0.086	0.070	0.063
100	0.089	0.072	0.066
110	0.092	0.075	0.068
120	0.095	0.078	0.070
130	0.098	0.080	0.073
140	0.101	0.082	0.075
150	0.104	0.084	0.077
200	0.115	0.094	0.085
300	0.134	0.109	0.099
500	0.163	0.132	0.120
1000	0.211	0.172	0.156

Velocity

Road Flow Rate (L/s)	SL 0.01 (m/s)	SL 0.03 (m/s)	SL 0.05 (m/s)
5	0.44	0.66	0.80
8	0.49	0.74	0.90
10	0.52	0.79	0.95
20	0.62	0.94	1.13
30	0.69	1.04	1.25
40	0.74	1.11	1.35
50	0.78	1.18	1.43
60	0.82	1.23	1.49
70	0.85	1.28	1.55
80	0.88	1.33	1.61
90	0.91	1.37	1.65
100	0.93	1.40	1.70
110	0.95	1.44	1.74
120	0.97	1.47	1.78
130	0.99	1.50	1.81
140	1.01	1.53	1.85
150	1.03	1.55	1.88
200	1.11	1.67	2.02
300	1.22	1.85	2.24
500	1.39	2.10	2.54
1000	1.66	2.50	3.03

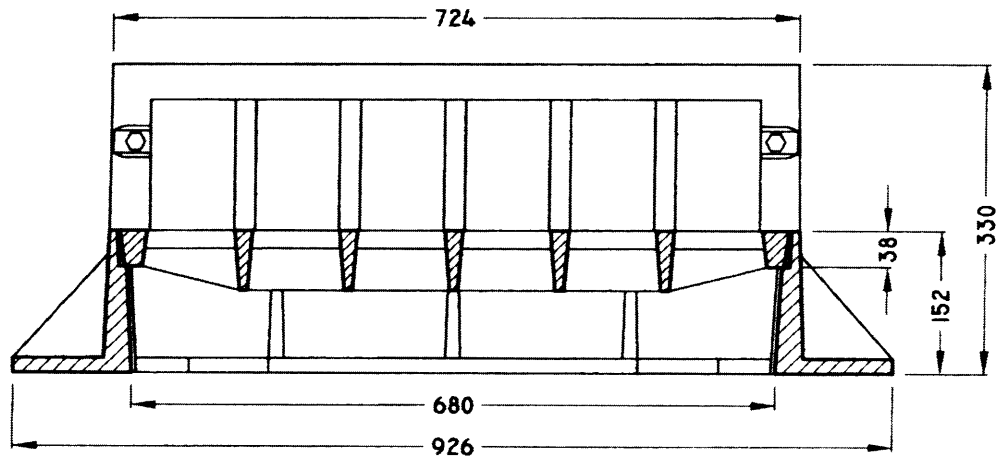
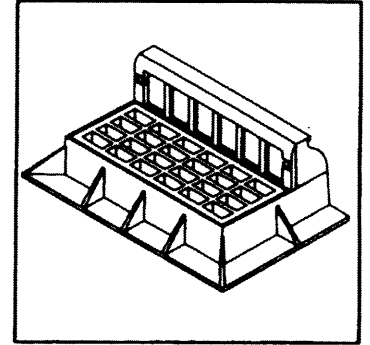
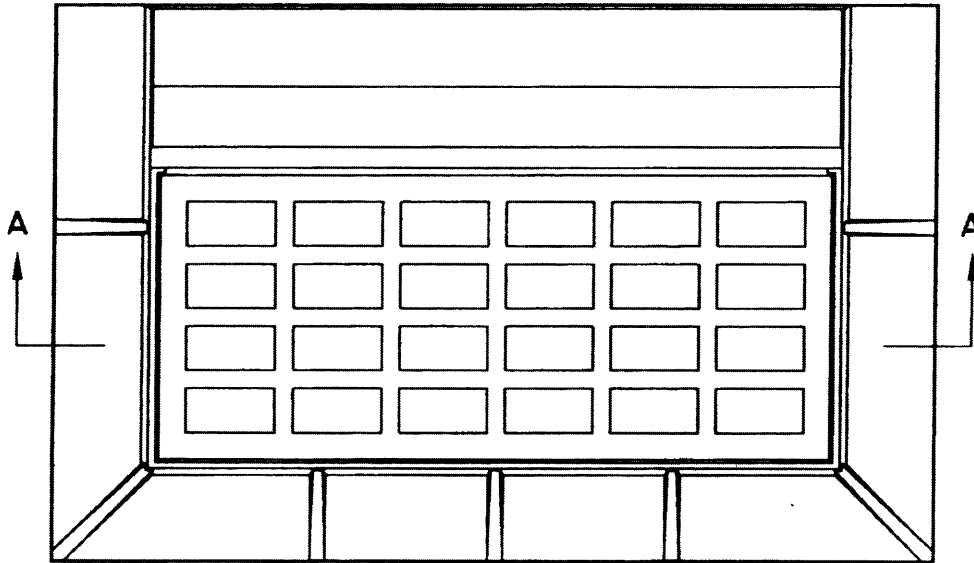


Please note that drawings are approximate and not to be used for engineering purposes – please contact us for specific dimensions.

## FRAME, GRATE AND SIDE INLET

TF-70

PLAN



SECTION A-A

ISO 9001-2000 CERTIFIED

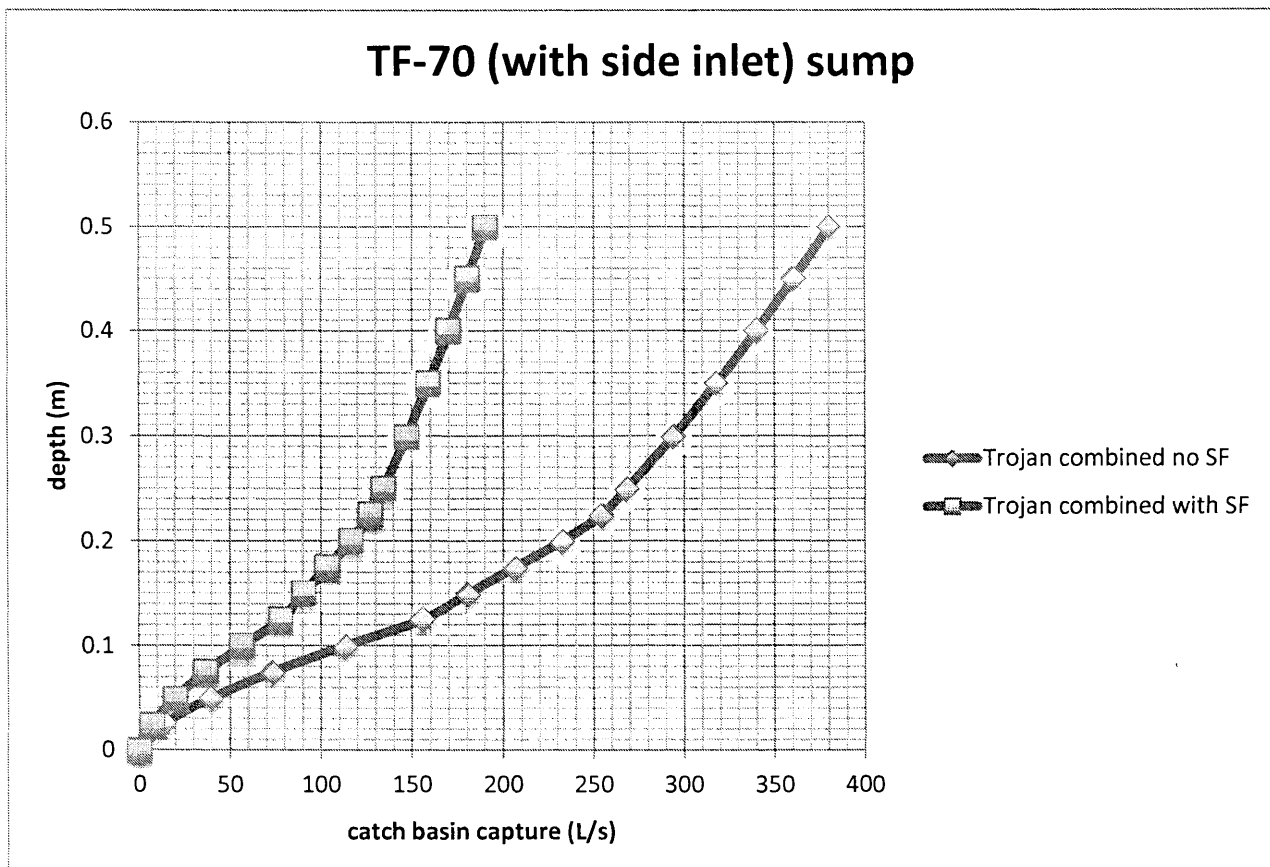
RATED FOR HS-20 LIVE LOAD

MEASUREMENTS IN MILLIMETERS

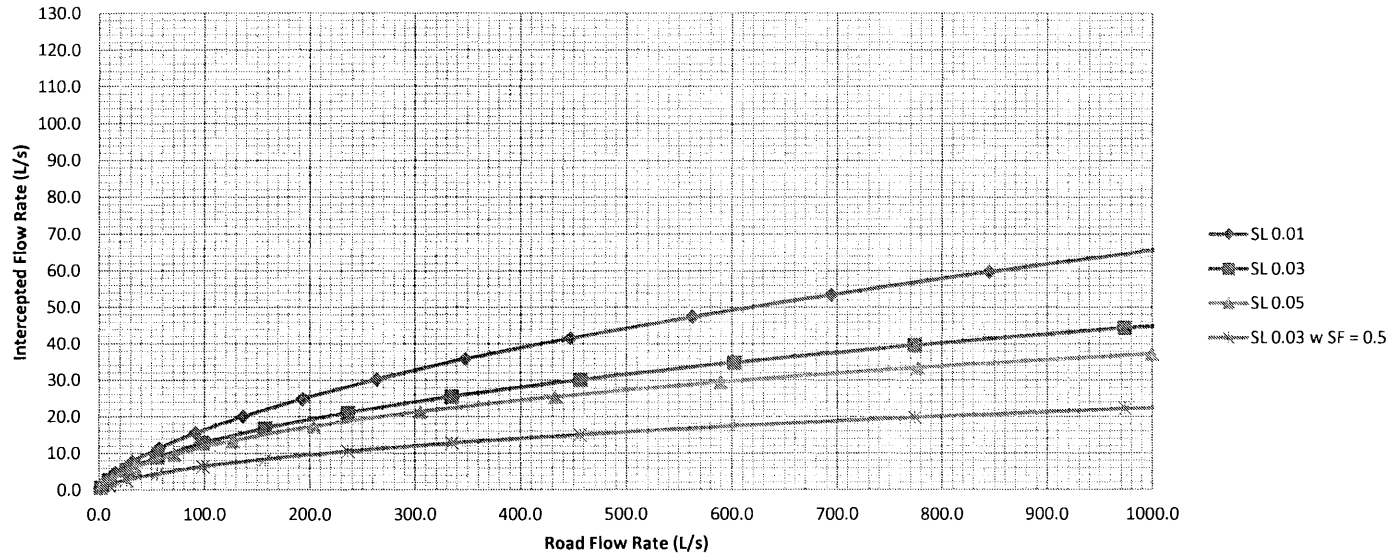
**TROJAN INDUSTRIES INC.**  
CALGARY • EDMONTON, ALBERTA

TF-70 (with side inlet) sump condition

Trojan (2014) without safety factor		Trojan with SF
depth (m)	Q combined (L/s)	Q combined (L/s)
0	0	0
0.025	14	7
0.050	40	20
0.075	74	37
0.100	113	57
0.125	156	78
0.150	181	91
0.175	207	103
0.200	233	116
0.225	254	127
0.250	268	134
0.300	294	147
0.350	318	159
0.400	340	170
0.450	361	180
0.500	380	190



**TROJAN TF-70 (with side inlet) Intercepted Flow Rate  
for Cross Slope 0.015**



SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	1.0	0.6	0.21
0.020	5.4	2.3	0.34
0.030	15.2	4.7	0.45
0.040	31.7	7.8	0.54
0.050	56.6	11.4	0.63
0.060	91.0	15.5	0.71
0.070	136.2	20.0	0.79
0.080	193.3	24.9	0.87
0.090	263.4	30.2	0.94
0.100	347.6	35.9	1.00
0.110	446.9	41.5	1.07
0.120	562.2	47.4	1.14
0.130	694.5	53.4	1.20
0.140	844.7	59.7	1.26
0.150	1013.8	66.1	1.32

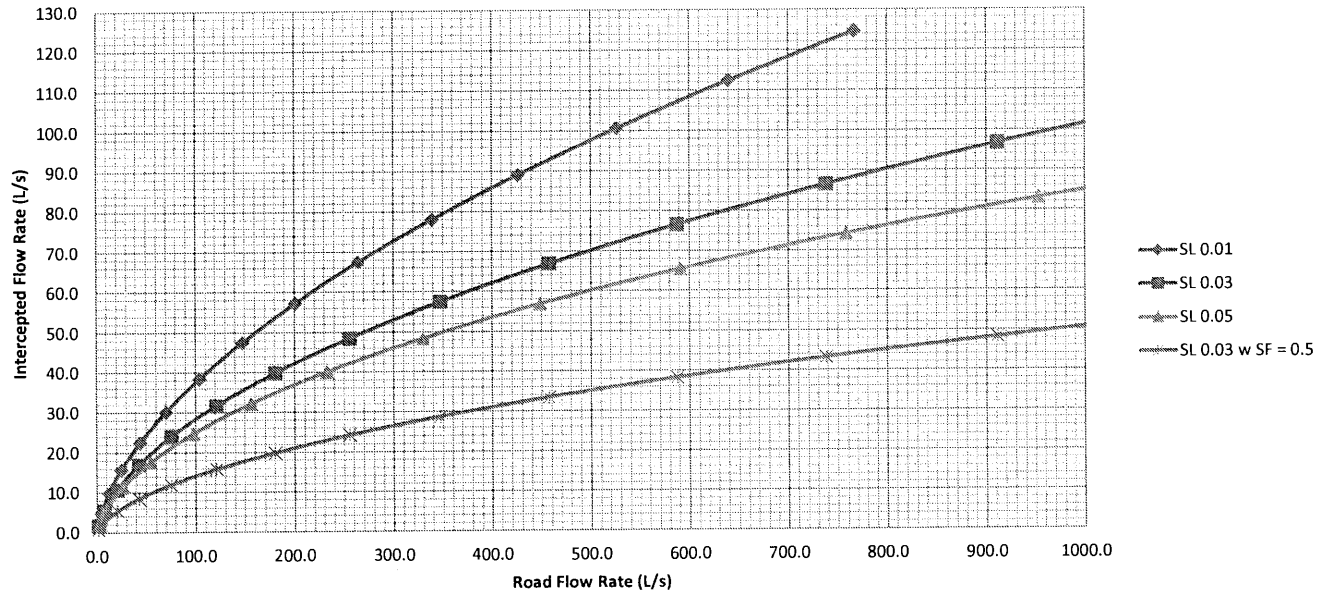
SL 0.03

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF = 0.5 (L/s)
0.010	1.7	0.8	0.37	0.4
0.020	9.4	2.7	0.59	1.4
0.030	26.2	5.5	0.78	2.8
0.040	55.0	9.0	0.94	4.5
0.050	98.0	12.8	1.09	6.4
0.060	157.7	16.8	1.24	8.4
0.070	235.9	21.1	1.37	10.6
0.080	334.8	25.6	1.50	12.8
0.090	456.3	30.2	1.62	15.1
0.100	602.1	34.9	1.74	17.4
0.110	774.0	39.6	1.86	19.8
0.120	973.7	44.4	1.97	22.2
0.130	1202.9	49.2	2.07	24.6

SL 0.05

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	2.2	0.9	0.37
0.020	12.1	3.1	0.59
0.030	33.9	6.2	0.78
0.040	71.0	9.7	0.94
0.050	126.6	13.4	1.09
0.060	203.5	17.4	1.24
0.070	304.6	21.4	1.37
0.080	432.3	25.5	1.50
0.090	589.1	29.5	1.62
0.100	777.3	33.5	1.74
0.110	999.2	37.3	1.86
0.120	1257.0	40.9	1.97

### TROJAN TF-70 (with side inlet) Intercepted Flow Rate for Cross Slope 0.02



SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.8	1.6	0.21
0.020	4.3	5.0	0.34
0.030	11.8	9.8	0.45
0.040	24.5	15.6	0.54
0.050	43.5	22.4	0.63
0.060	69.7	30.0	0.71
0.070	104.0	38.4	0.79
0.080	147.3	47.5	0.87
0.090	200.4	57.2	0.94
0.100	264.1	67.5	1.00
0.110	339.1	78.1	1.07
0.120	426.2	89.1	1.14
0.130	526.1	100.6	1.20
0.140	639.5	112.4	1.26
0.150	767.0	124.7	1.32

SL 0.03

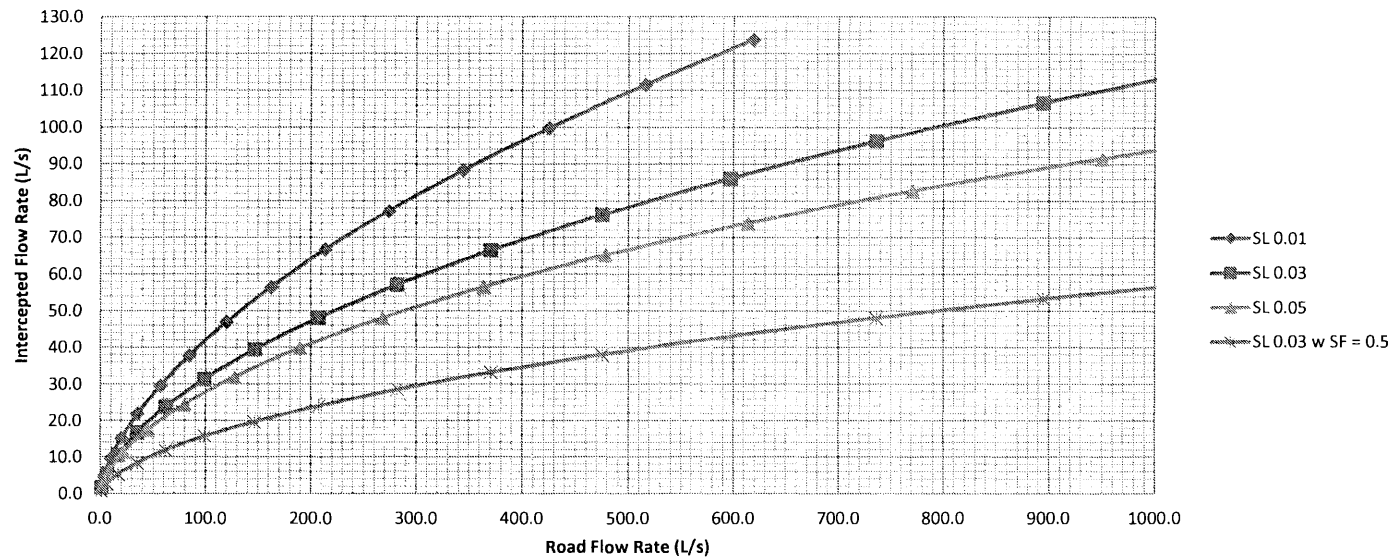
Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF = 0.5 (L/s)
0.010	1.4	1.8	0.37	0.9
0.020	7.4	5.5	0.59	2.8
0.030	20.5	10.7	0.78	5.3
0.040	42.5	17.0	0.94	8.5
0.050	75.4	24.0	1.09	12.0
0.060	120.8	31.6	1.24	15.8
0.070	180.2	39.8	1.37	19.9
0.080	255.2	48.4	1.50	24.2
0.090	347.1	57.5	1.62	28.7
0.100	457.4	66.9	1.74	33.4
0.110	587.4	76.6	1.86	38.3
0.120	738.2	86.6	1.97	43.3
0.130	911.2	96.8	2.07	48.4
0.140	1107.6	107.1	2.18	53.6
0.150	1328.5	117.7	2.28	58.8

SL 0.05

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	1.8	1.9	0.48
0.020	9.6	5.9	0.76
0.030	26.4	11.4	1.00
0.040	54.9	17.7	1.22
0.050	97.3	24.6	1.41
0.060	155.9	32.2	1.60
0.070	232.6	40.1	1.77
0.080	329.4	48.4	1.93
0.090	448.2	56.9	2.09
0.100	590.5	65.5	2.25
0.110	758.3	74.3	2.40
0.120	953.1	83.1	2.54
0.130	1176.4	91.9	2.68



**TROJAN TF-70 (with side inlet) Intercepted Flow Rate for Cross Slope 0.025**



SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.7	1.5	0.21
0.020	3.6	4.9	0.34
0.030	9.8	9.5	0.45
0.040	20.2	15.3	0.54
0.050	35.7	22.0	0.63
0.060	56.9	29.5	0.71
0.070	84.7	37.8	0.79
0.080	119.7	46.9	0.87
0.090	162.6	56.5	0.94
0.100	214.0	66.8	1.00
0.110	274.5	77.3	1.07
0.120	344.7	88.3	1.14
0.130	425.1	99.7	1.20
0.140	516.3	111.6	1.26
0.150	619.0	123.8	1.32

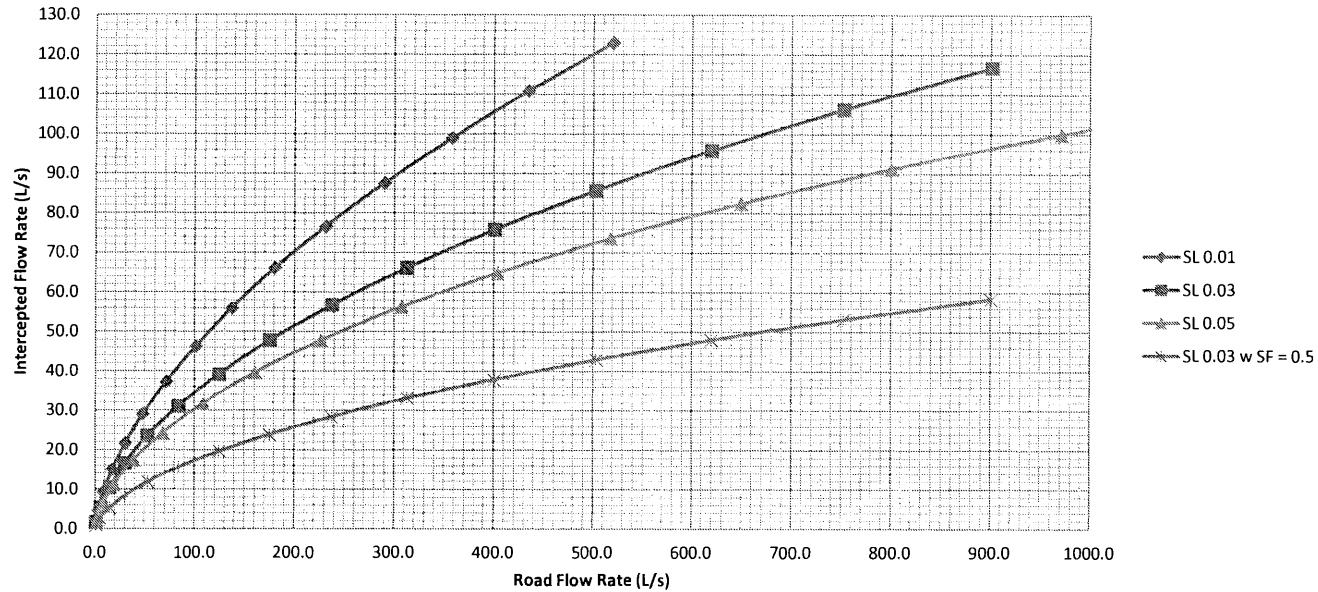
SL 0.03

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF = 0.5 (L/s)
0.010	1.2	1.7	0.37	0.9
0.020	6.3	5.4	0.59	2.7
0.030	17.0	10.5	0.78	5.3
0.040	35.0	16.8	0.94	8.4
0.050	61.8	23.8	1.09	11.9
0.060	98.6	31.3	1.24	15.7
0.070	146.7	39.5	1.37	19.7
0.080	207.4	48.1	1.50	24.0
0.090	281.7	57.1	1.62	28.6
0.100	370.6	66.5	1.74	33.2
0.110	475.4	76.2	1.86	38.1
0.120	597.0	86.1	1.97	43.1
0.130	736.3	96.3	2.07	48.2
0.140	894.3	106.7	2.18	53.3
0.150	1072.1	117.2	2.28	58.6

SL 0.05

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	1.6	1.9	0.48
0.020	8.1	5.8	0.76
0.030	22.0	11.3	1.00
0.040	45.2	17.5	1.22
0.050	79.8	24.4	1.41
0.060	127.3	31.9	1.60
0.070	189.4	39.8	1.77
0.080	267.7	48.1	1.93
0.090	363.6	56.6	2.09
0.100	478.5	65.2	2.25
0.110	613.7	74.0	2.40
0.120	770.7	82.8	2.54
0.130	950.5	91.6	2.68
0.140	1154.6	100.3	2.82

**TROJAN TF-70 (with side inlet) Intercepted Flow Rate for Cross Slope 0.03**



SL 0.01

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	0.6	1.5	0.21
0.020	3.2	4.8	0.34
0.030	8.5	9.3	0.45
0.040	17.3	15.0	0.54
0.050	30.4	21.6	0.63
0.060	48.4	29.1	0.71
0.070	71.8	37.4	0.79
0.080	101.3	46.3	0.87
0.090	137.4	55.9	0.94
0.100	180.6	66.2	1.00
0.110	231.4	76.6	1.07
0.120	290.3	87.6	1.14
0.130	357.7	99.0	1.20
0.140	434.3	110.8	1.26
0.150	520.2	122.9	1.32

SL 0.03

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)	SL 0.03 w SF = 0.5 (L/s)
0.010	1.1	1.7	0.37	0.9
0.020	5.5	5.3	0.59	2.7
0.030	14.7	10.4	0.78	5.2
0.040	30.0	16.6	0.94	8.3
0.050	52.7	23.5	1.09	11.8
0.060	83.8	31.1	1.24	15.5
0.070	124.4	39.2	1.37	19.6
0.080	175.5	47.8	1.50	23.9
0.090	238.0	56.8	1.62	28.4
0.100	312.8	66.1	1.74	33.1
0.110	400.8	75.8	1.86	37.9
0.120	502.8	85.7	1.97	42.9
0.130	619.6	95.9	2.07	48.0
0.140	752.1	106.3	2.18	53.1
0.150	901.1	116.7	2.28	58.4

SL 0.05

Depth (m)	Road Flow (L/s)	Intercepted (L/s)	Velocity (m/s)
0.010	1.4	1.8	0.48
0.020	7.1	5.8	0.76
0.030	19.0	11.2	1.00
0.040	38.8	17.3	1.22
0.050	68.1	24.2	1.41
0.060	108.2	31.7	1.60
0.070	160.7	39.6	1.77
0.080	226.6	47.8	1.93
0.090	307.2	56.3	2.09
0.100	403.8	64.9	2.25
0.110	517.4	73.7	2.40
0.120	649.1	82.5	2.54
0.130	799.9	91.3	2.68
0.140	971.0	100.0	2.82
0.150	1163.3	108.7	2.95