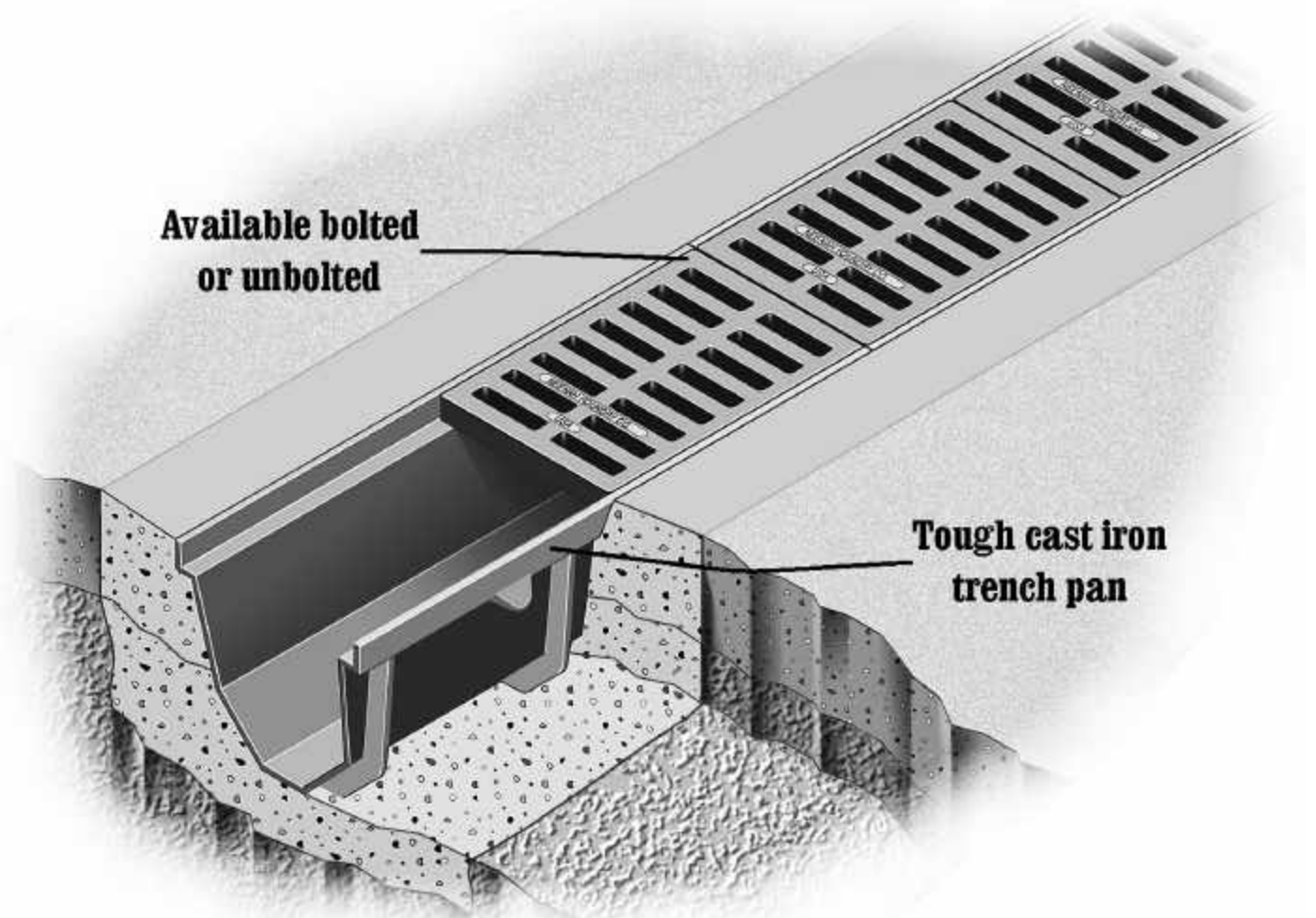


ARE YOU LOOKING FOR AN EASY TO INSTALL,
AFFORDABLE, AND DURABLE TRENCH SYSTEM?



NEENAH'S R-4996 SERIES TRENCH SYSTEM IS YOUR ANSWER!

- DURABILITY AND PERMANENCE OF CAST IRON
- LABOR AND MATERIAL SAVING INSTALLATION
- COMPETITIVELY PRICED
- IRON PANS WILL WITHSTAND ROUGH JOBSITE HANDLING
- TESTED AND PROVEN HYDRAULIC PERFORMANCE
- ASSEMBLY MATERIALS ARE REUSABLE

NEW R-4996 SERIES

HEAVY DUTY SELF-FORMING TRENCH FRAMES WITH GRATED OR SOLID COVERS.

Catalog No.	Standard cover dimensions				Frame Length	Outlet location, sizes available			Available Grate/Cover
	A	B	C	D		Side	Bottom	End	
R-4996-A	8	1	6	9	30	4, 6	4	4	Q **
R-4996-B	10	1	8	10-3/8	30	4, 6, 8	4, 6	4, 6	Q **
R-4996-C	12	1-1/2	10	10	36	4, 6, 8	4, 6, 8	4, 6, 8	A, C, D, L
* R-4996-CA	12	1-1/2	10	10	36	4, 6, 8	4, 6, 8	4, 6, 8	A

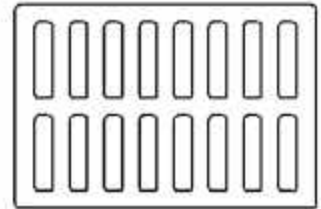
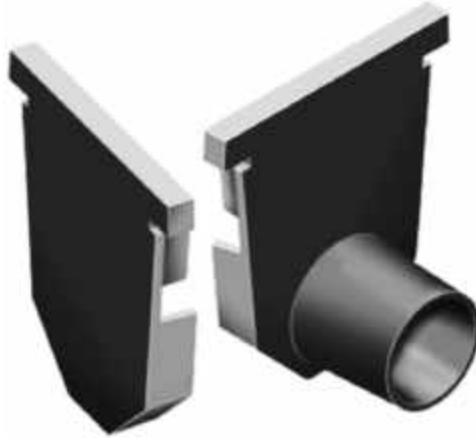
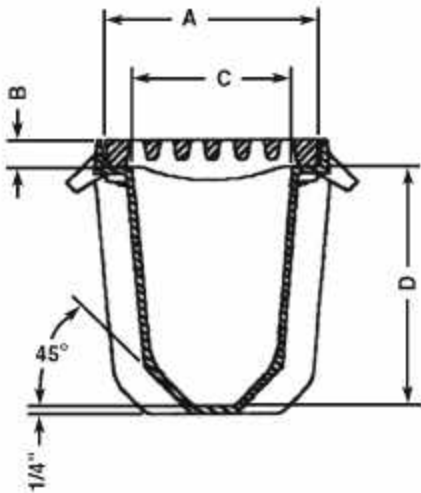
* Aircraft Rated - Standard Bolted

[Dimensions in inches]

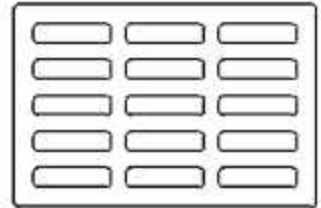
** can be incorporated into plans for ADA compliance

All grates/covers are available bolted to frames if necessary with stainless steel countersunk screws

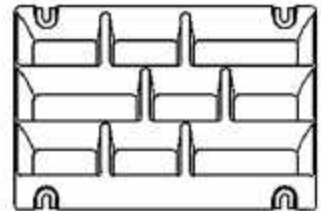
AutoCad drawings are available upon request



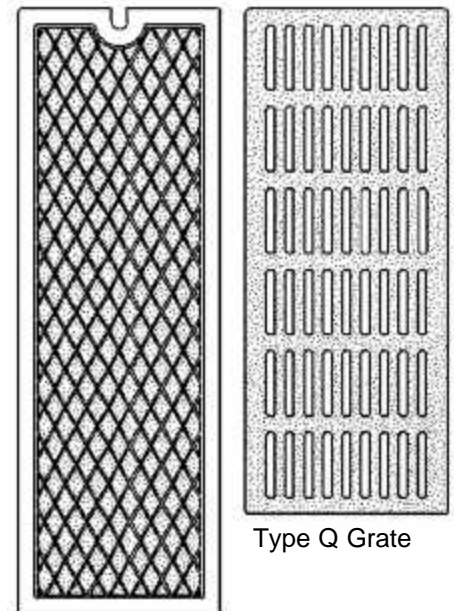
Type A Grate



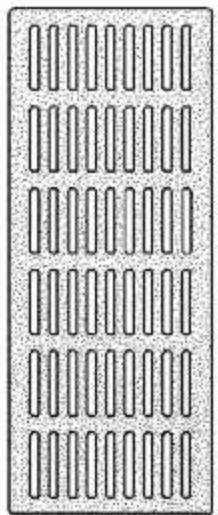
Type C Grate



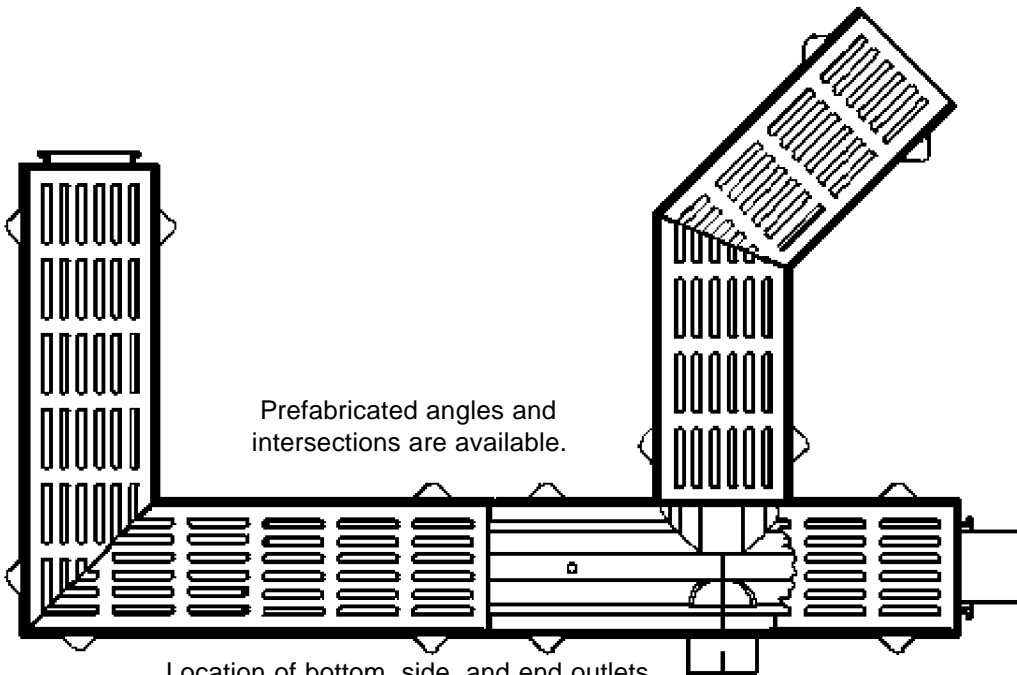
Type L Grate



Type D Cover



Type Q Grate



Prefabricated angles and intersections are available.

Location of bottom, side, and end outlets must be specified by contractor. Side and bottom outlet must be 6" from end.

R-4996 SELF-FORMING TRENCH

EASY AND ECONOMICAL INSTALLATION

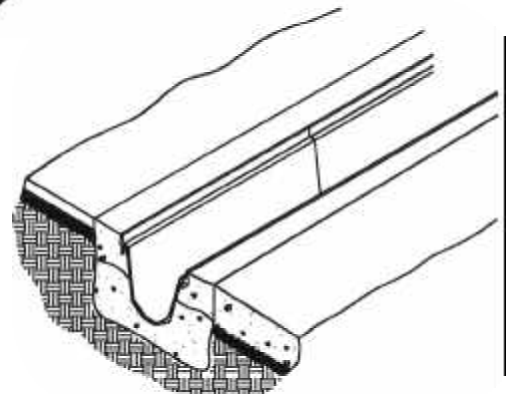
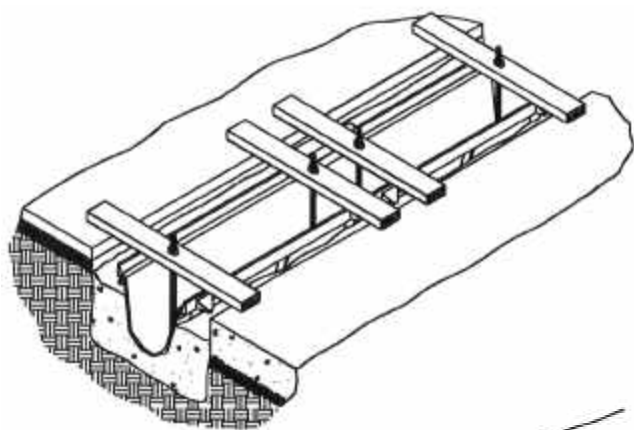
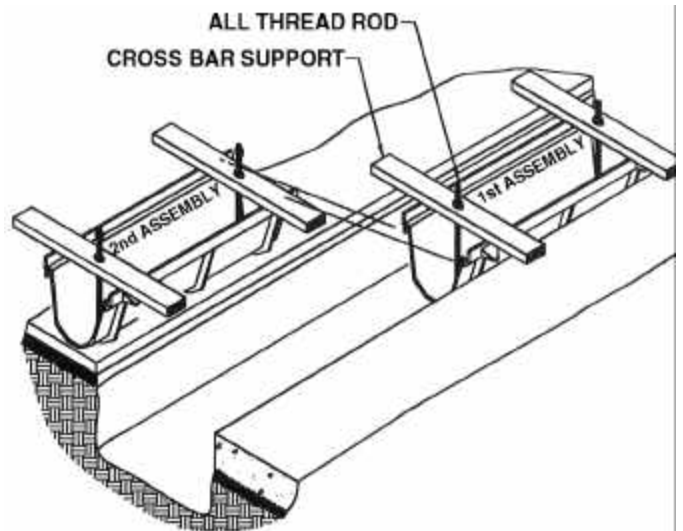
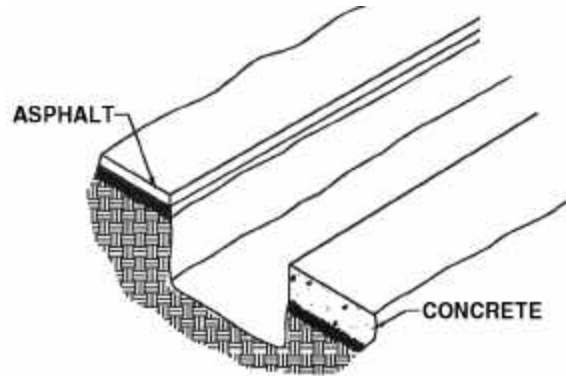
STEP 1 -
Excavate

STEP 2 -
Position trench pans

STEP 3 -
Pour 1st lift of concrete

STEP 4 -
Remove assembly
materials and reuse to
set additional trench
sections

STEP 5 -
Pour concrete to final
grade



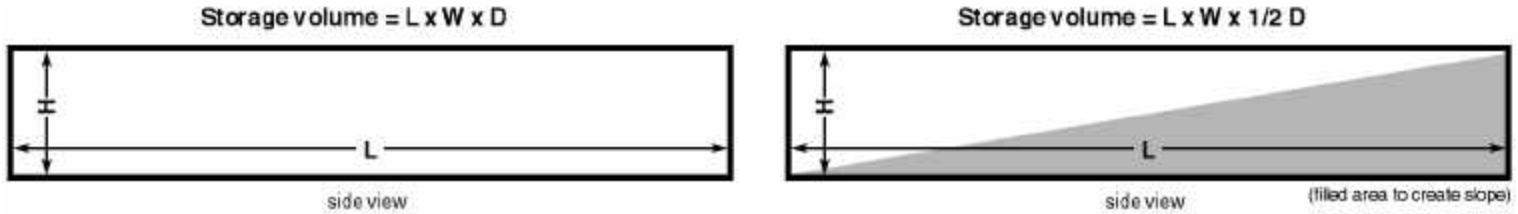
(Installation materials can be saved and reused for future projects.)

HYDRAULIC ANALYSIS

WHY TRENCH SLOPE IS NOT NECESSARY

Building a constant depth trench system is the best choice to maximize storage and volume. Why is this the case? Picture a constant depth trench with the closed and outlet ends at the same elevation. Should you choose to build in slope, you would fill in the closed end with material (such as concrete) and keep the downstream outlet at the same elevation. Building a sloped trench only fills in storage volume on the upstream end.

Another example is water spilling over a dam. Regardless if the water behind the dam is 10 feet deep or 100 feet deep, the outfall flow rate is not effected. If the water is 100 feet deep, there is greater volume for rainfall storage.



HYDRAULICS - DOES THE MANNINGS EQUATION APPLY?

No, it does not. The Manning equation assumes the upstream flow rate equals the downstream flow rate, as in pipe flow. Trench flow is generally introduced along the entire length and the Manning equation does not account for this non-uniform flow. The velocity at the upstream end of the trench is nearly zero whereas the velocity at the outlet is at its greatest.

Those with hydraulics background can reference various non-uniform flow curves, including M1, M2, M3, S1, S2, S3, C1, C3, H2, H3, A2, A3 representing (M) mild, (S) steep, (H) horizontal, and (A) adverse slope conditions. The surface water profile in a Neenah 4996 trench series with a free outfall is an H2 curve. This was proven under full size testing conditions at the University of Wisconsin Hydraulics Facility. Below are the measured flow rates based on that testing:

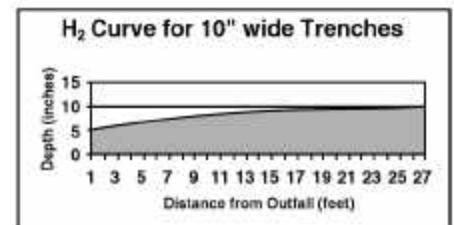
TRENCH	OUTLET SIZE	BOTTOM gpm (cfs)	END gpm (cfs)	SIDE gpm (cfs)	FREE OUTFALL gpm (cfs)
R-4996-A	4"	196 (0.44)	158 (0.35)	152 (0.34)	298 (0.67)
R-4996-B	4"	207 (0.46)	163 (0.36)	156 (0.35)	444 (0.99)
R-4996-B	6"	447 (1.00)	345 (0.77)	308 (0.69)	444 (0.99)
R-4996-C	4"	215 (0.48)	155 (0.35)	149 (0.33)	581 (1.30)
R-4996-C	6"	449 (1.00)	319 (0.71)	296 (0.66)	581 (1.30)
R-4996-C	8"	714 (1.59)	548 (1.22)	415 (0.92)	581 (1.30)

Additional testing on the R-4996-C was conducted for free outfall situations at 0.0%, 0.3% and 0.6% grades. These results were:

SLOPE	0%	0.3%	0.6%
FLOW (cfs)	1.295	1.476	1.571
% CHANGE	-	+13%	+21%
Manning (n=.016) (cfs)	-	1.229	1.737
% error	-	20%	11%

This illustrates that capacity is not significantly altered by slope and that a properly located outlet serves a greater benefit. Furthermore, a slope on the bottom of the trench effectively fills up otherwise useable storage capacity.

A plot of the water depth with the flow introduced uniformly throughout the trench length illustrates the typical H2 curve for an R-4996-C trench.



For additional information, contact our Product Engineering Department.

NF-0302-1MEPD

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