Training Manual

The Installation of Siphonic Pipework

The Engineered Rainwater Solution

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Training Manual: The Installation of Siphonic Pipework

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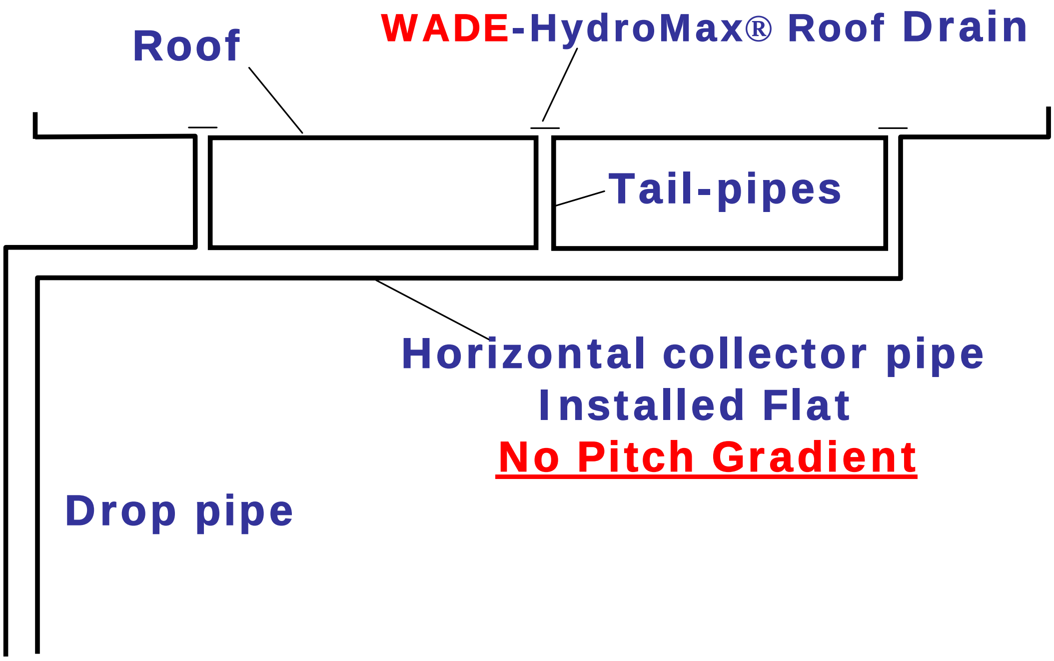
Overview of Principals of Siphonic Drainage

The Wade-HydroMax™ siphonic drainage solution was developed by **HydroMax™** to advance the siphonic principles to create a powerful means of literally sucking the rainwater from the roof. Using small diameter pipework running at full-bore flow, **Wade-HydroMax™** provides approximately **ten** times more flow capacity than an equivalently sized gravity pipe.

To enable **Wade-HydroMax™** to drain with such high performance, the system designer utilizes the **Wade-HydroTechnic™** analytical design software program to optimize an Engineered Drainage Solution.

The key to the functionality of any siphonic roof drainage system is the sizing of the pipe system to balance flow rates in the outlets.

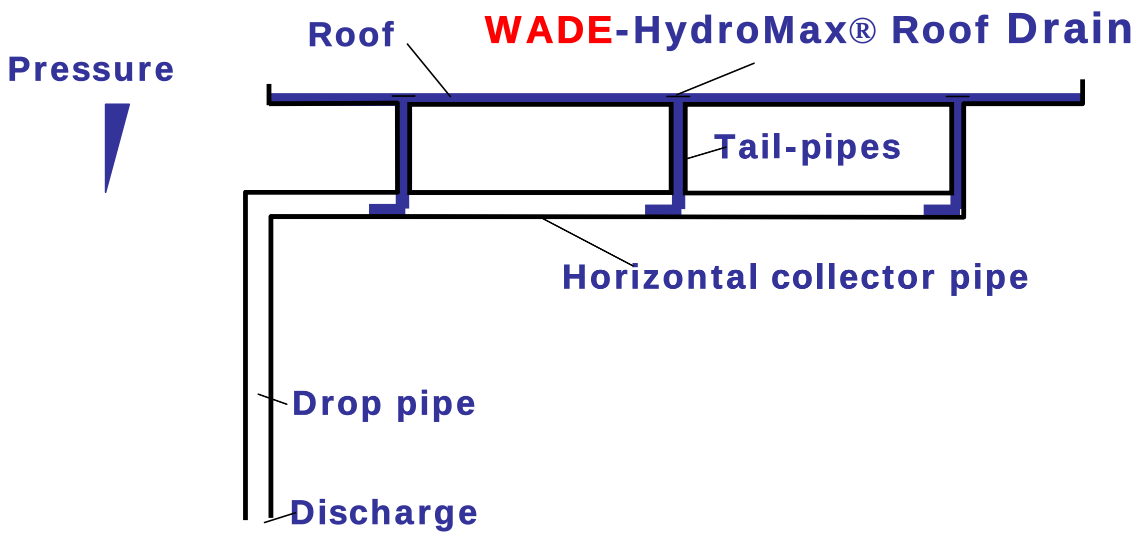


A key feature of our siphonic system is the specially designed WADE-HydroMax® roof drain outlet. The unique design incorporates an inducer (or baffle plate) above the outlet pipe. The tailpipe below the outlet is of a relatively small diameter (compared to a gravity pipe) and a series of tail-pipes connect to a carrier pipe normally installed immediately below the roof. This carrier pipe is installed horizontally at high level and runs to a convenient point in the building where it drops to ground level with a connection into the below grade drainage system. This connection should be made through an increaser to the gravity sized pipe, connecting to a wye branch and the wye section taken to grade level and terminated with a WADE-HydroMax® siphonic termination vent ref# WHV-3100

As water builds up on the roof or in the gutter, the inducer of the WADE-HydroMax® roof drain outlet becomes submerged preventing air from entering the tailpipe and restricting vortex formation. Prior to the rainfall event, the pipe has no water inside - only air. As the rain starts to fall further air ingress is prevented at the roof drain and only water enters the pipe. The movement of the water quickly draws the air out of the pipe in a process known as 'priming'. When all of the air has been removed from the system it is said to be fully primed and the pipe work is running full-bore with water. (See following stages of priming)

In this condition the hydraulic driving force conveying water from the roof ceases to be the small head of water built up around the roof outlet as used in a conventional gravity drainage system and instead becomes the head generated by the full height of the building. Siphonic systems are thus able to efficiently remove large quantities of water in small diameter pipes.

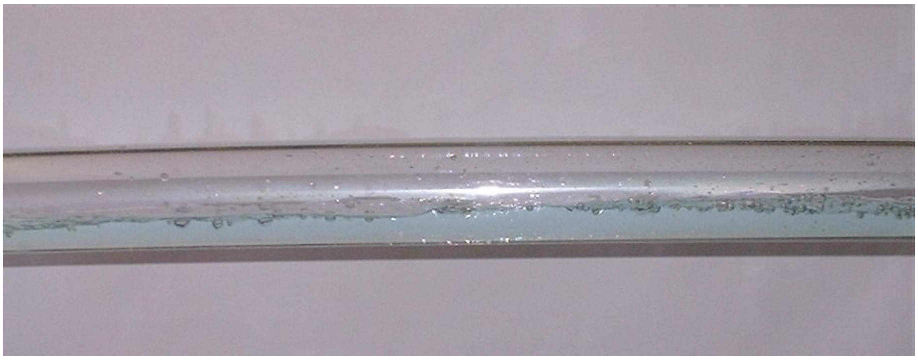
The advanced WADE-HydroTechnic™ software enables the design engineer to create a system with the correct sizes to ensure the best possible configuration, rapid prime and optimum performance.

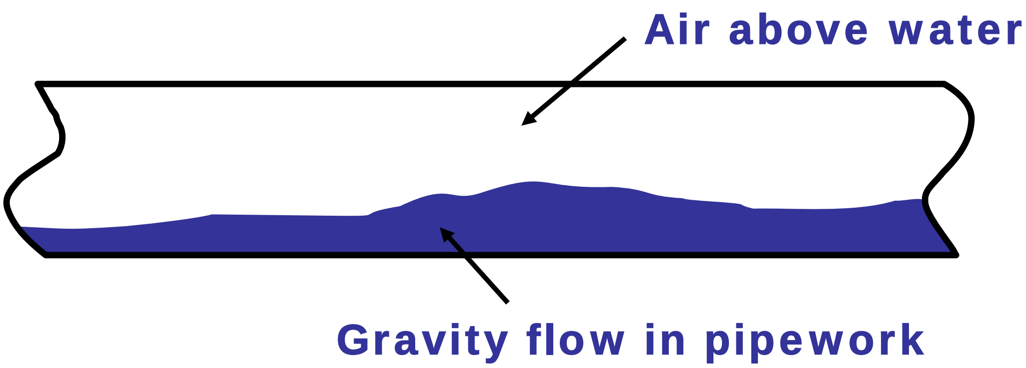


Priming of main pipework

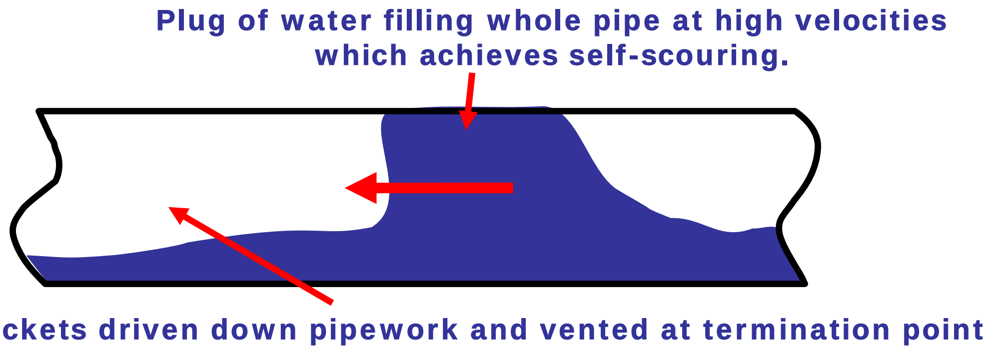
At the start of a rainstorm the pipework is empty and initial rainfall will flow through a gravity flow pattern. The tailpipe will continue to discharge water into the carrier pipe and as more water is supplied to the main carrier pipe it will also start to prime in a process that follows three further flow phases.

Stage 1 – Wavy or Gravity Flow

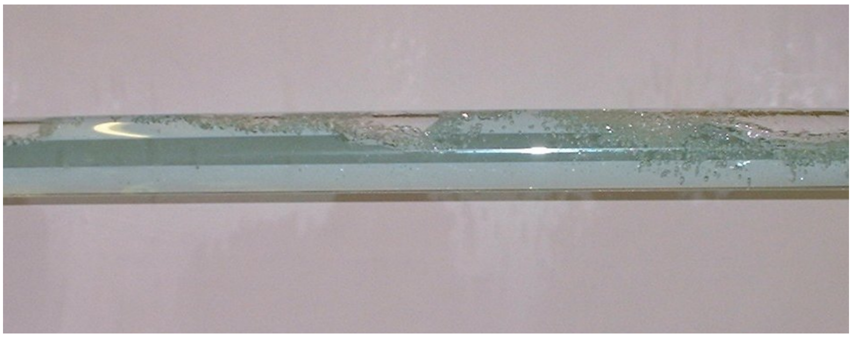




Stage 2, Plug Flow:
The water surges to fill the pipe for short lengths and carries out pockets of air trapped between these full bore sections of flow.
This flow pattern is typically achieved between 10% and 15% of the design rainfall intensity.
Importantly, self-scouring velocities are achieved at this stage.

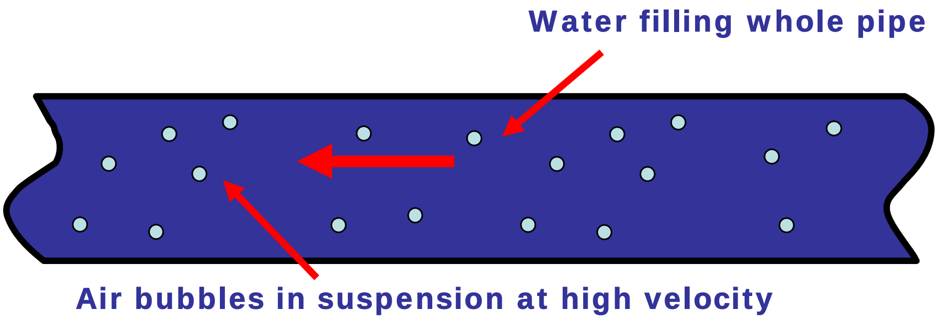


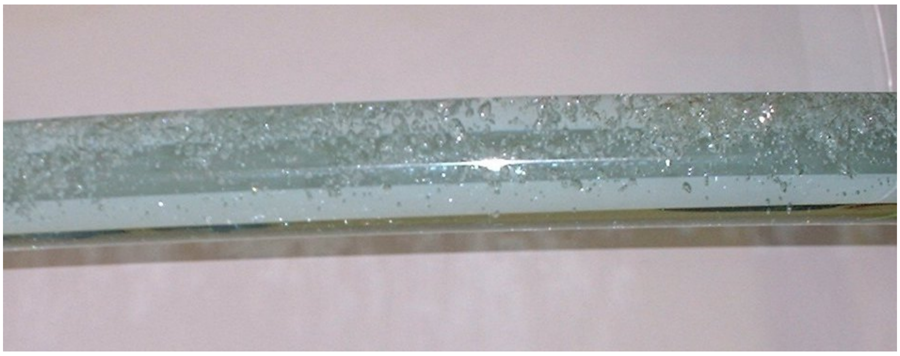
Tests have shown that self-scouring can be achieved at as low as 10% to 15% of the design rainfall rate.



Stage 3, Bubble Flow:

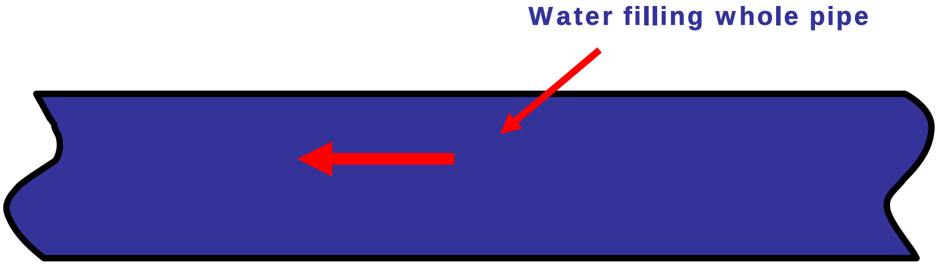
As the rainfall intensifies the water almost fills the whole of the pipe and any remaining air is carried out as bubbles entrained in the water.



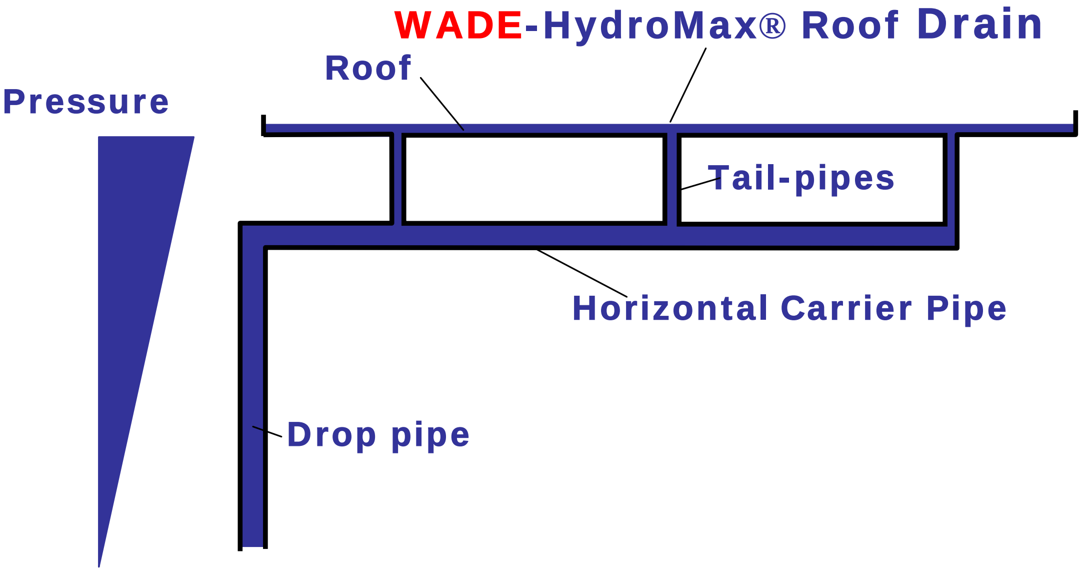


Stage 4, Full-Bore Flow:

No air remains in the pipework leaving the pipes to run full bore.
The system is now utilizing the full height of the building to draw water off the roof.



Fully Primed



When the piping system is fully primed, the whole height of the building is used to provide the energy to create a powerful siphonic action.

Once the rain storm starts to abate, air will be admitted to the system and the flow patterns above will reversed in a process known as de-priming. This takes place seamlessly in a smooth controlled manner which mirrors the storm profile.

Furthermore, when the rainfall rate increases again, prime is quickly re-established therefore providing a highly efficient Engineered Roof Drainage System.

WADE-HydroMax® WH-301 Overflow Drain

Interpreting Design Data and Drawings

The plumbing contractor/installer will be supplied the following data:

A full set of Construction-Issue drawings including:-

- Roof layout showing positions of siphonic roof drains with each drain tagged
- Floor plans showing routes of high-level siphonic pipework with sufficient detail to instruct the installer on the size, orientation, crown (top) of pipe invert level and support of the pipe, fittings and drains
- A detail drawing of the roof drain installation and flashing
- Typical sectional views and details

And for each individual siphonic system:-

- Pipe Run sections
- Isometric Schematic Diagram showing all lengths (Not drawn to scale for clarity)
- 'Overall Parameters' data sheets detailing hydraulic results.

The Roof layout drawing is issued to the contractor prior to start date to allow the correct positioning and installation of outlets.

The Floor plan(s) indicate the routes of siphonic pipework within the building and will clearly identify installation heights of pipework above a suitable datum, diameters of pipework and will show distances to pipework from grid-lines or points of reference. Drawings will also show locations of sectional views and details. All heights shown on installation drawings are from datum to the top of pipe level which are to be constant throughout runs of pipework unless specified otherwise.

The Sectional Detail drawings are provided to show the typical configuration of tailpipes and main carrier pipes and will indicate the height of pipework, bracketry required to support pipework from structure of building and how the designer has envisaged the method of supporting pipework. Care should be taken to ensure that the building structure matches that shown on this drawing. (*See following section regarding the reporting of alterations and variations*)

The List of pipe and fitting sections should be read in conjunction with Isometric Schematic Diagram and will identify the relative position of each fabricated section.

The Bill of Materials lists all items supplied for each individual siphonic system and includes totals of materials used.

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The Overall Parameters data sheets are output from the HydroTechnic™ design software and are used to determine the dimensions of all items supplied for site installation. These sheets indicate the diameters, lengths and orientation of all pipework in each siphonic system. The orientation of each item follows the X, Y, Z co-ordinate system shown in fig.1

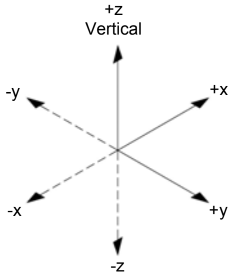


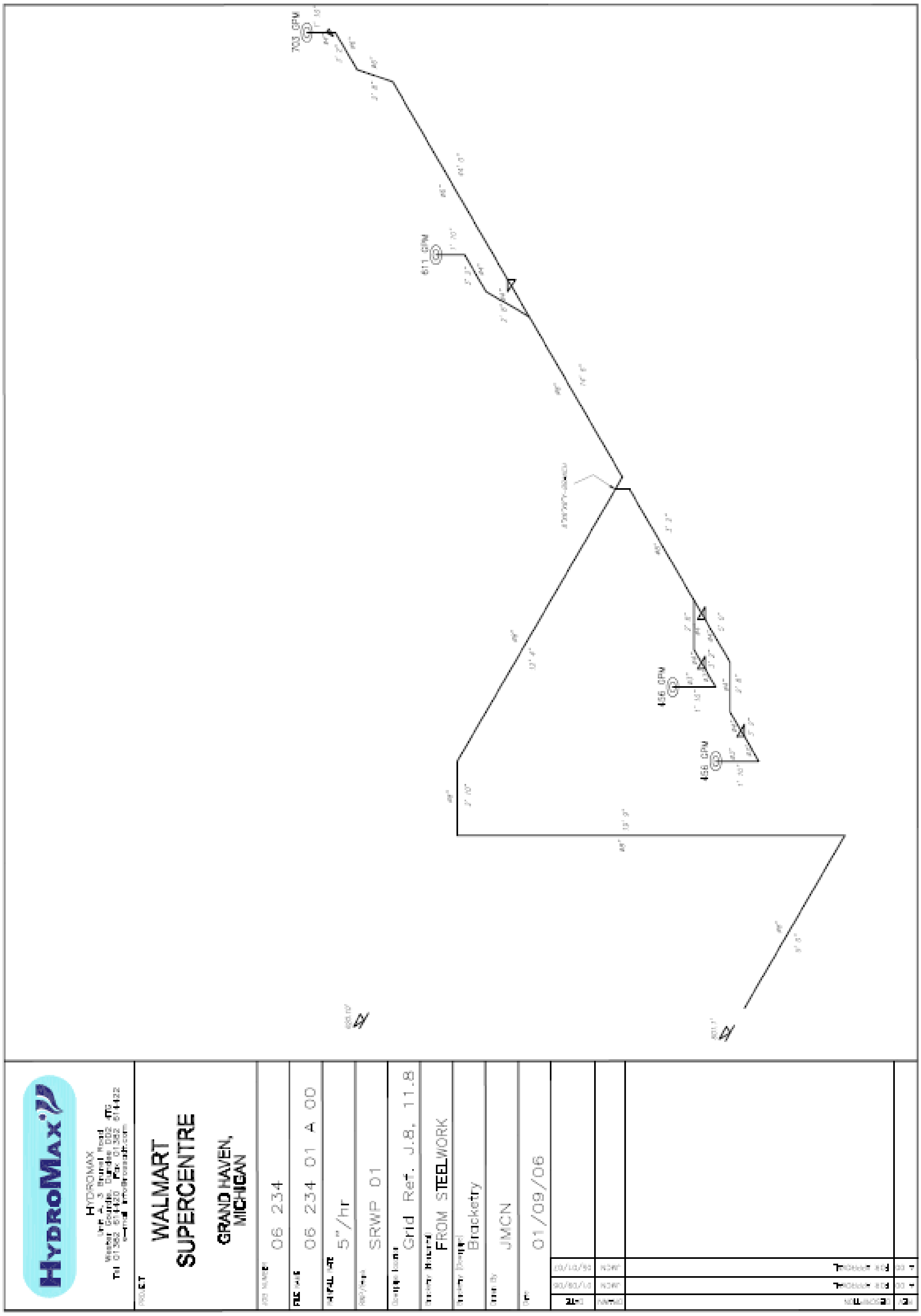
Figure 1

It is essential that the all of the above items are referred to throughout the installation of siphonic pipework. Checks should be made to ensure that all drawing information accurately reflects the actual layout of the building. Although every care is taken during the design and drawing process, it is possible that a design variation may be required.

Failure to install pipework exactly as designed and supplied may adversely affect the siphonic action. The Installer should immediately report to designer any issue which may prevent the pipework from being installed ***EXACTLY*** as designed.

For this purpose, a Request for Alteration should be made. The installer should provide as much information as possible – including a dimensioned sketch where applicable – and return to designer. The designer will input this information into Hydrotechnic programme and advise installer of results.

No alteration should be carried out until confirmation of approval has been received from designer.


HYDROMAX
WALMART SUPERCENTRE
GRAND HAVEN, MICHIGAN
06 234
06 234 01 A 00
5"/hr
SRWP 01
Grid Ref. J.8, 11.8
FROM STEELWORK
Bracketry
JMCN
01/09/06
703 GPM
611 GPM
456 GPM
456 GPM

Project: WALMART GRAND HAVEN
System: SRWP 01
Client: PB2
Reference: 06 234 01 A 00
Designer: JMCN
Date: 09/03/06

System Designed By

Tyler Wade

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2301 24th Street
City
Zip
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Design Software Supplied By

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DD8 1SG
Scotland, UK
+44 1307 840 434
info@hydromax.com

HYDROMAX Leaders in Siphonic Drainage

Pressure Calculation Results

	Current
Out of Balance	0.9 ft
Minimum Pressure	-16.767 ft
Maximum Pressure	1.744 ft
Minimum Velocity	5.849 ft/sec
Minimum Vertical Velocity	14.276 ft/sec
Maximum Velocity	19.79 ft/sec
Discharge Velocity	9.057 ft/sec
Fill time	20 seconds
Pass/Fail?	PASS

Tail Pressures

1	-3.154 ft
2	-2.977 ft
3	-2.254 ft
4	-2.735 ft

Material Parameters

Material	Actual Diameter	Nominal Diameter	K/Roughness
PVC sch 40 solid	8"	8"	0.15
PVC sch 40 solid	4"	4"	0.15
PVC sch 40 solid	3"	3"	0.15
PVC sch 40 solid	6"	6"	0.15
PVC sch 40 solid	10"	10"	0.15

Overall Parameters

No.	Type	Diameter	Length	Height	Direction	Flowrate	Velocity	Headloss	Pressure	Loading
1	Discharge	10"		0		2226 gpm	9.06 ft/sec	1' 3½"	0 ft	0 lb/ft

2	Pipe	10"	17'	0	+Y	2226 gpm	9.06 ft/sec	5½"	0.471 ft	40.55 lb/ft
3	Expansion	8"		0		2226 gpm	14.28 ft/sec	5"	-0.998 ft	26.5 lb/ft
4	Pipe	8"	20'	0	+Y	2226 gpm	14.28 ft/sec	1' 9½"	0.794 ft	26.5 lb/ft
5	90° radius bend	8"		0		2226 gpm	14.28 ft/sec	11½"	1.744 ft	26.5 lb/ft
6	Pipe	8"	9' 11"	9' 11"	+Z	2226 gpm	14.28 ft/sec	10½"	-7.284 ft	26.5 lb/ft
7	Pipe	8"	10' 5"	10' 5"	+Z	2226 gpm	14.28 ft/sec	11"	-16.767 ft	26.5 lb/ft
8	90° radius bend	8"		0		2226 gpm	14.28 ft/sec	11½"	-15.817 ft	26.5 lb/ft
9	Pipe	8"	1'	0	+X +Y	2226 gpm	14.28 ft/sec	1"	-15.727 ft	26.5 lb/ft
10	Pipe	8"	1' 10"	0	+X +Y	2226 gpm	14.28 ft/sec	2"	-15.563 ft	26.5 lb/ft
11	45° elbow	8"		0		2226 gpm	14.28 ft/sec	10½"	-14.677 ft	26.5 lb/ft
12	Pipe	8"	6' 2"	0	+Y	2226 gpm	14.28 ft/sec	6½"	-14.124 ft	26.5 lb/ft
13	Pipe	8"	6' 2"	0	+Y	2226 gpm	14.28 ft/sec	6½"	-13.571 ft	26.5 lb/ft
14	Junction	8"		0		1314 gpm	8.43 ft/sec	1' 4"	-10.195 ft	26.5 lb/ft
15	90° radius bend	8"		0		1314 gpm	8.43 ft/sec	4"	-9.864 ft	26.5 lb/ft
16	Pipe	8"	7' 3"	0	+X	1314 gpm	8.43 ft/sec	3"	-9.633 ft	26.5 lb/ft
17	Pipe	8"	7' 3"	0	+X	1314 gpm	8.43 ft/sec	3"	-9.403 ft	26.5 lb/ft
18	Junction	8"		0		703 gpm	4.51 ft/sec	-6½"	-9.15 ft	26.5 lb/ft
19	Expansion	6"		0		703 gpm	7.81 ft/sec	2"	-9.612 ft	14.3 lb/ft
20	Pipe	6"	22'	0	+X	703 gpm	7.81 ft/sec	10"	-8.764 ft	14.3 lb/ft
21	Pipe	6"	22'	0	+X	703 gpm	7.81 ft/sec	10"	-7.917 ft	14.3 lb/ft
22	45° elbow	6"		0		703 gpm	7.81 ft/sec	3"	-7.652 ft	14.3 lb/ft
23	Pipe	6"	1' 4"	0	+X -Y	703 gpm	7.81 ft/sec	½"	-7.601 ft	14.3 lb/ft
24	Pipe	6"	1' 4"	0	+X -Y	703 gpm	7.81 ft/sec	½"	-7.549 ft	14.3 lb/ft
25	45° elbow	6"		0		703 gpm	7.81 ft/sec	3"	-7.284 ft	14.3 lb/ft
26	Expansion	4"		0		703 gpm	17.72 ft/sec	1' 6½"	-9.688 ft	7.3 lb/ft
27	Pipe	4"	1'	0	+X	703 gpm	17.72 ft/sec	4"	-9.366 ft	7.3 lb/ft
28	Pipe	4"	2' 2"	0	+X	703 gpm	17.72 ft/sec	8½"	-8.669 ft	7.3 lb/ft
29	90° radius bend	4"		0		703 gpm	17.72 ft/sec	1' 5½"	-7.206 ft	7.3 lb/ft
30	Pipe	4"	11"	11"	+Z	703 gpm	17.72 ft/sec	3½"	-7.828 ft	7.3 lb/ft
31	Pipe	4"	3½"	3½"	+Z	703 gpm	17.72 ft/sec	1"	-8.027 ft	7.3 lb/ft
32	Flexible joint (reducer)	4"		0		703 gpm	17.72 ft/sec	5"	-7.616 ft	0 lb/ft
33	WH-500 with Dome (120 to 1280 GPM)	5"		0		703 gpm	11.77 ft/sec	1"	-3.154 ft	0 lb/ft
34	Branch	4"		0		611 gpm	15.4 ft/sec	2' 10"	-9.15 ft	7.3 lb/ft
35	Pipe	4"	1' 2"	0	+X -Y	611 gpm	15.4 ft/sec	3½"	-8.864 ft	7.3 lb/ft
36	Pipe	4"	1' 6"	0	+X -Y	611 gpm	15.4 ft/sec	4½"	-8.499 ft	7.3 lb/ft
37	45° elbow	4"		0		611 gpm	15.4 ft/sec	1' ½"	-7.468 ft	7.3 lb/ft
38	Pipe	4"	1'	0	+X	611 gpm	15.4 ft/sec	3"	-7.224 ft	7.3 lb/ft
39	Pipe	4"	2' 2"	0	+X	611 gpm	15.4 ft/sec	6½"	-6.695 ft	7.3 lb/ft
40	90° radius bend	4"		0		611 gpm	15.4 ft/sec	1' 1½"	-5.59 ft	7.3 lb/ft
41	Pipe	4"	11"	11"	+Z	611 gpm	15.4 ft/sec	2½"	-6.283 ft	7.3 lb/ft
42	Pipe	4"	3½"	3½"	+Z	611 gpm	15.4 ft/sec	1"	-6.505 ft	7.3 lb/ft
43	Flexible joint (reducer)	4"		0		611 gpm	15.4 ft/sec	3½"	-6.195 ft	0 lb/ft
44	WH-500 with Dome (120 to 1280 GPM)	5"		0		611 gpm	10.23 ft/sec	1"	-2.977 ft	0 lb/ft
45	Branch	8"		0		912 gpm	5.85 ft/sec	5"	-10.529 ft	26.5 lb/ft
46	45° elbow	8"		0		912 gpm	5.85 ft/sec	2"	-10.38 ft	26.5 lb/ft
47	Pipe	8"	2'	0	-X	912 gpm	5.85 ft/sec	½"	-10.349 ft	26.5 lb/ft
48	Pipe	8"	1' 2"	0	-X	912 gpm	5.85 ft/sec	0	-10.331 ft	26.5 lb/ft
49	Junction	8"		0		456 gpm	2.92 ft/sec	-4"	-10.27 ft	26.5 lb/ft
50	Expansion	4"		0		456 gpm	11.49 ft/sec	1' 1½"	-11.048 ft	7.3 lb/ft
51	Pipe	4"	2' 6"	0	-X	456 gpm	11.49 ft/sec	4"	-10.705 ft	7.3 lb/ft
52	Pipe	4"	2' 6"	0	-X	456 gpm	11.49 ft/sec	4"	-10.363 ft	7.3 lb/ft
53	45° elbow	4"		0		456 gpm	11.49 ft/sec	7"	-9.788 ft	7.3 lb/ft
54	Pipe	4"	1' 4"	0	-X -Y	456 gpm	11.49 ft/sec	2"	-9.606 ft	7.3 lb/ft
55	Pipe	4"	1' 4"	0	-X -Y	456 gpm	11.49 ft/sec	2"	-9.423 ft	7.3 lb/ft
56	45° elbow	4"		0		456 gpm	11.49 ft/sec	7"	-8.848 ft	7.3 lb/ft
57	Pipe	4"	1' 7"	0	-X	456 gpm	11.49 ft/sec	2½"	-8.631 ft	7.3 lb/ft
58	Expansion	3"		0		456 gpm	19.79 ft/sec	1' 1"	-11.594 ft	4.4 lb/ft
59	Pipe	3"	1' 7"	0	-X	456 gpm	19.79 ft/sec	10½"	-10.701 ft	4.4 lb/ft
60	90° radius bend	3"		0		456 gpm	19.79 ft/sec	1' 10"	-8.876 ft	4.4 lb/ft
61	Pipe	3"	11"	11"	+Z	456 gpm	19.79 ft/sec	6"	-9.276 ft	4.4 lb/ft
62	Pipe	3"	3½"	3½"	+Z	456 gpm	19.79 ft/sec	2"	-9.404 ft	4.4 lb/ft
63	Flexible joint (reducer)	3"		0		456 gpm	19.79 ft/sec	1' 7"	-7.803 ft	0 lb/ft
64	WH-500 with Dome (120 to 1280 GPM)	5"		0		456 gpm	7.63 ft/sec	½"	-2.254 ft	0 lb/ft
65	Branch	4"		0		456 gpm	11.49 ft/sec	1' 7"	-10.27 ft	7.3 lb/ft
66	Pipe	4"	1' 4"	0	-X -Y	456 gpm	11.49 ft/sec	2"	-10.087 ft	7.3 lb/ft
67	Pipe	4"	1' 4"	0	-X -Y	456 gpm	11.49 ft/sec	2"	-9.904 ft	7.3 lb/ft
68	45° elbow	4"		0		456 gpm	11.49 ft/sec	7"	-9.33 ft	7.3 lb/ft
69	Pipe	4"	1' 7"	0	-X	456 gpm	11.49 ft/sec	2½"	-9.113 ft	7.3 lb/ft
70	Expansion	3"		0		456 gpm	19.79 ft/sec	1' 1"	-12.075 ft	4.4 lb/ft
71	Pipe	3"	1' 7"	0	-X	456 gpm	19.79 ft/sec	10½"	-11.183 ft	4.4 lb/ft
72	90° radius bend	3"		0		456 gpm	19.79 ft/sec	1' 10"	-9.357 ft	4.4 lb/ft

Installation of Siphonic Pipework

Siphonic drainage is an engineered piping system. All piping components form part of the hydraulic design calculation engineered to create a siphonic action and make the system function.

The Installer must refer to drawings and design calculation sheets to identify correct configuration, lengths of pipes, locations of bends, wye branches and reducers. It is essential that the installation follows the design.

Where a change to the drawn pipe routing or to the calculation design lists is required, the installer should notify the person responsible for the design to make the necessary re-calculation.

Permitted tolerances are as follows:

Piping 4" (100mm) and smaller shall be installed within + or – 4" of the designed length.

Piping larger than 4" (100mm) shall be installed within + or – 8" of the designed length.

Before beginning the installation of siphonic pipework, the installer should:

- Ensure the drawings and design information are in hand.
- Check all necessary materials – pipework, bracketry, loose items, etc. – are on site and in good condition.
- Check that the siphonic roof drains are installed in roof/gutter and are accessible for connection.
- Check that the drawings supplied accurately reflect the layout of building and that all heights and reference dimensions are accurate and achievable.
- Check that the access equipment is suitable and safe for site conditions.

If necessary, contact the relevant personnel to rectify any of the above points.

The piping system will comprise of swept fittings with ¼ (90°) or ⅛ (45°) bends and ⅛ (45°) wye branches.

<u>¼ (90°) branches are not permitted at any time.</u>
(If a right angle connection is required it should be made using a ⅛ (45°) wye branch connecting to a ⅛ (45°) bend.)

Cleanout/Access Points should not be incorporated into a siphonic piping system (because they will normally create an air-pocket which will interfere with the siphonic action).

The only permitted use of cleanout/access points are where the fitting protects the integrity of the interior of the pipe without creating an air-pocket. If necessary, we recommend a removable spool piece.

It is important to note that the velocity of the water within the system ensures self-scouring of the pipework.

Installation of Horizontal Pipework

The horizontal pipework should be installed level without any pitch gradient. This is to ensure speedy priming process which creates the siphonic action.

The horizontal pipe is installed with top of pipe (crown) level. Any changes in diameter are created with the transition slope at the invert. The drawings will notate the Top of Pipe level (t.o.p.)

Please Note: ASPE Plumbing Engineering and Design Standard 45 states eccentric reducers be used where available with the crown of the pipe remaining level. If eccentric reducers are not available e.g. cast iron, then concentric reducers can be used in lieu of eccentric without design change.

The horizontal (carrier) pipework will be suspended from the structure of the building by means of pre-determined fixing methods.

Generally, support fixings will be installed consistent with accepted industrial practice at no more than the pipe manufacturer's written instruction or with the governing plumbing codes for piping full of water.

Additional brackets shall be installed at both sides of every change of direction.

Additional brackets shall be installed at each side of every Wye branch.

Tail pipes must be supported on vertical and horizontal sections.

In addition to the above brackets, pipework should be bracketed to building structure to form lateral restraint at convenient locations. ASPE Plumbing Engineering and Design Standard 45 recommends that if hangers are more than 18” long then sway bracing must be fitted at no more than 30ft intervals. This is to reduce the possibility of movement and vibration during operating conditions.

As the installation of horizontal carrier pipe progresses, checks should be made to ensure that specified heights to top of pipe level can be achieved throughout run and that branches in carrier pipe coincide with outlet locations.

Connecting to Roof Drains

Ensure the roof drain has the correct connection for compatibility with the piping materials.

The Installer must refer to design calculation sheets to identify correct lengths of pipes, locations of reducers, etc for each tail-pipe connecting to the horizontal carrier pipe.

Reducers can be concentric type when installed on the vertical section of the tail-pipe below the roof drain.

Increase in diameter on the vertical section of the tail-pipe below the roof drain is not permitted.

Vertical Pipework (Downpipes)

The vertical pipework (downpipe) will be supported from the structure of the building by means of pre-determined fixing methods.

When fixing to cladding rails, a length of secondary support steel or channel rail should first be attached to structural elements of cladding. Pipe supports can then be positioned to suit locations as required. The spacing of brackets should be in accordance with the pipe manufacturers written instructions.

Generally, pipework will be designed to be as close as possible to supporting structure.

Refer to assembly detail drawing for typical layout.

Reducers placed on the vertical just after an elbow turning down shall have the flat side oriented with the outside radius of the elbow.

Connection to Below Grade Drainage

A common method of connecting siphonic pipework to underground pipework is my means of a expansion fitting on to a wye branch. The wye section should rise to grade level and be terminated with a WADE-HydroMax® siphonic vent piece reference WHV-3100.

If the connection is to a different piping material this should be made by using a transition adaptor coupling (e.g. Anaco).

An alternative method of termination of siphonic pipework is to discharge into a below grade chamber or manhole.

When siphonic pipework is designed to terminate in manhole, all sections of the below grade pipework must be fully tested before trenching is in-filled. (See also later section on testing methods).

Flare out the discharge piping prior to the diameter given on the design drawings to decrease the velocity to less than 3.0 ft/sec.

All of the above installation methods should be carried out in accordance with relevant working codes of practice and to current safety codes. (See also section on Safety)

General

Roof/gutter outlets must be plugged during construction to prevent ingress of debris.

During construction, temporary means of draining the roof plugs should be to prevent damage caused by flooding or water ingress. Plugs should only be removed from the roof drains and pipework after completion of the installation and all debris have been cleared from the roof.

Under no circumstances should a siphonic drain be uncovered within a concrete deck or slab prior to the final membrane installation and the roof has been cleaned. It is recommended that in this installation process, temporary disks are installed to bolt securely onto the roof drain body to prevent concrete residues and cement dust entering the roof drain and/or permanent piping.

Testing Procedures

Inspection and Testing Procedures

All siphonic pipework must be tested prior to the installation of insulation (where required) and the final handover to client. Testing must be carried out as described in the relevant method statement.

It is impractical to perform an operational or flow test of a siphonic system and this is not therefore required. Required testing to permit full warranty of the Wade HydroMax siphonic roof drainage system by Tyler Pipe Company is as follows:

1. The purpose of testing the PIPE is to inspect for workmanship (installation) and product quality.
2. The required testing is equivalent to ASTM and or manufacture's testing requirements for the applicable piping material.
3. For Cast Iron soil pipe and Schedule 40 PVC, 10 foot of water column, 4.3 psi is sufficient to determine acceptability of the piping material.
4. Although ASPE Plumbing Engineering and Design Standard 45, Section 12 recommends other testing methods, piping systems tested in accordance with the procedure defined in the Wade-HydroMax Installation Manual ensure the system will properly function and are fully warranted by Tyler Pipe Company.
5. The use of air test is not recommended by Tyler Pipe Company. The use of air tests create negative safety issues and should not be employed.
6. A WADE-HydroMax® check-list must be completed and signed prior to the insulation being affixed.

General Piping Details.

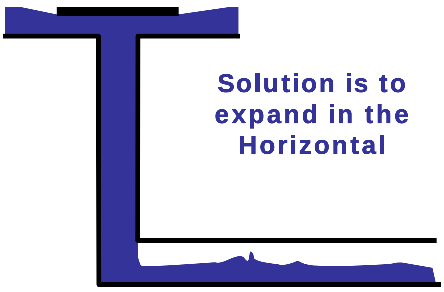
Tail Pipes

Expansion in the Tail pipes

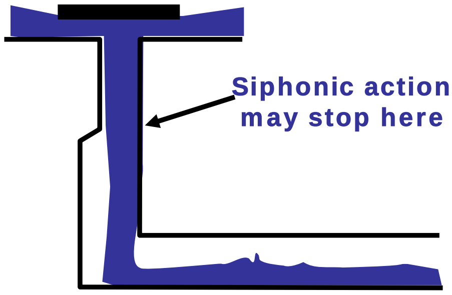
Tail pipes should not expand in the vertical if at all possible because it may be possible for the water to jet through the increase in diameter which would fail to prime the tail-pipe.

Expansion in the horizontal part of the tail is perfectly acceptable using concentric reducers with the slope on the invert and will not affect priming.

Recommended –
Expansion in horizontal

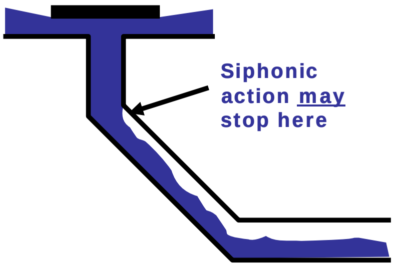


**Not recommended –
Expansion in vertical**

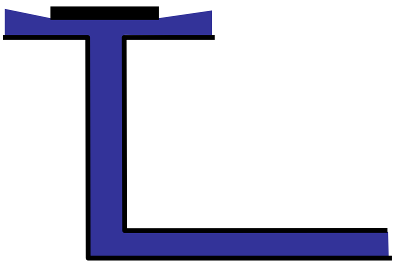


Where it is absolutely necessary to expand in the vertical, the designer will provide the necessary pipe sizing information within the design information.

Sloping Tail-pipes are Not Recommended



Solution – Use only Vertical and Horizontal Sections

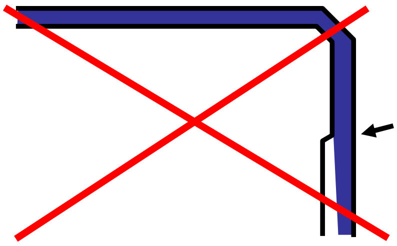


Tail pipes should drop vertically and then horizontally, rather than slope at 45 degrees. It is very likely that 45 degree tails will not prime efficiently, and so the tail will not achieve the required capacity.

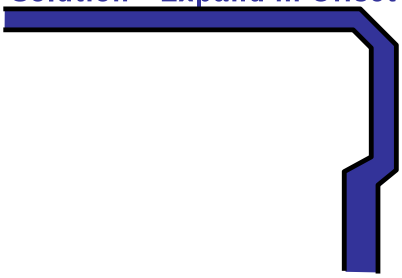
…nsion in vertical pipes

For similar reasons to those given for tailpipes, vertical pipes, (or rainwater downpipes, downspouts, downleaders or stacks as they are also known), should never expand in the vertical. If the drop pipe requires a larger section for head loss reasons this must always be in the upper section. If the drop pipe needs to be a larger diameter at its base the following detail should be used.

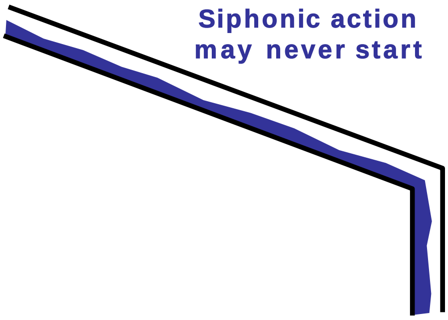
Expansion in the vertical downpipe is not permitted.



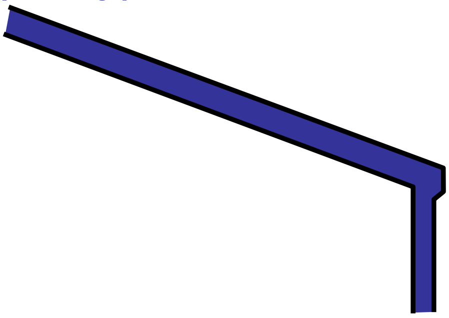
Solution – Expand in Offset



Sloping the Horizontal Collector Pipe is Not Recommended



If absolutely necessary to install sloping collector pipes, the designer can design-in a reducer to force the priming process.



Small 1½" (40mm) or 2" (50mm) diameter pipework can be susceptible to blockage by debris, and it recommended that small diameter horizontal pipework is plugged during installation to prevent ingress of debris.

Safety

All work described in this Training Manual must be carried out in accordance with the relevant codes of practice for site working. All installers should be trained in safe working practices – including working at heights, materials handling, etc.

Installers must also comply with local Health & Safety requirements for individual sites and relevant method statements.

Damaged electrical equipment should not be used under any circumstances.

It is the responsibility of the installer to ensure the good working order of these tools.

Periodic safety checks must be carried out on all electrical equipment.

Provision will be made for the supply of Personal Protection Equipment to all installers. This equipment should be used at all times as required.