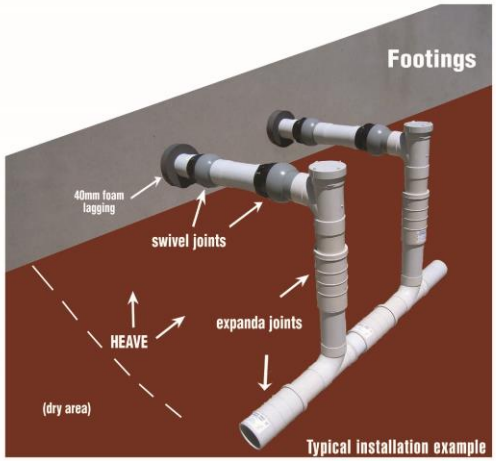
Storm Plastics

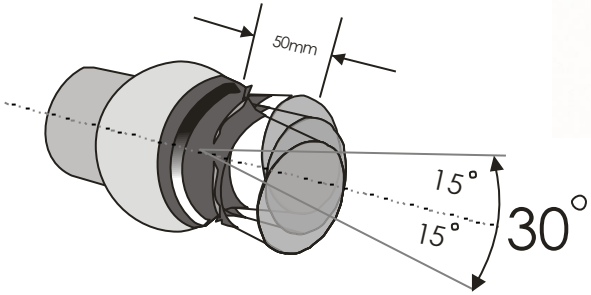
MANUFACTURERS OF SPECIALISED PVC-U PLUMBING PRODUCTS

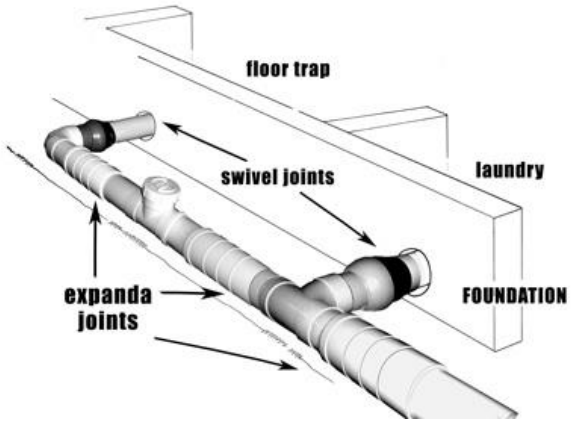
------DRAINAGE REQUIREMENTS – AS 2870-2011 & AS 2032-2006.

THE MAIN PRODUCTS

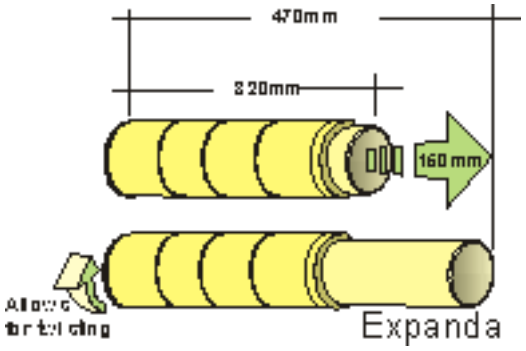


Swivel Expansion Joint
100mm DWV
+/- 50mm Expansion



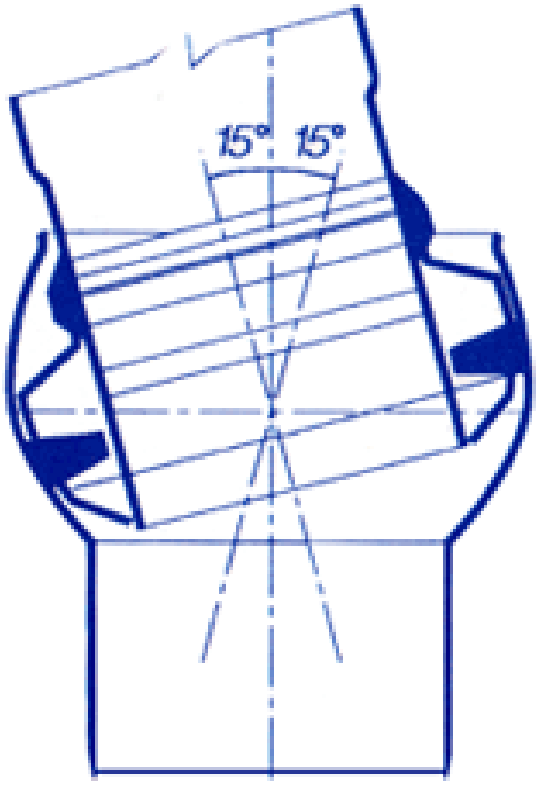


Expander Joint
100DWV
150 mm linear expansion



THE INSIDE COATING

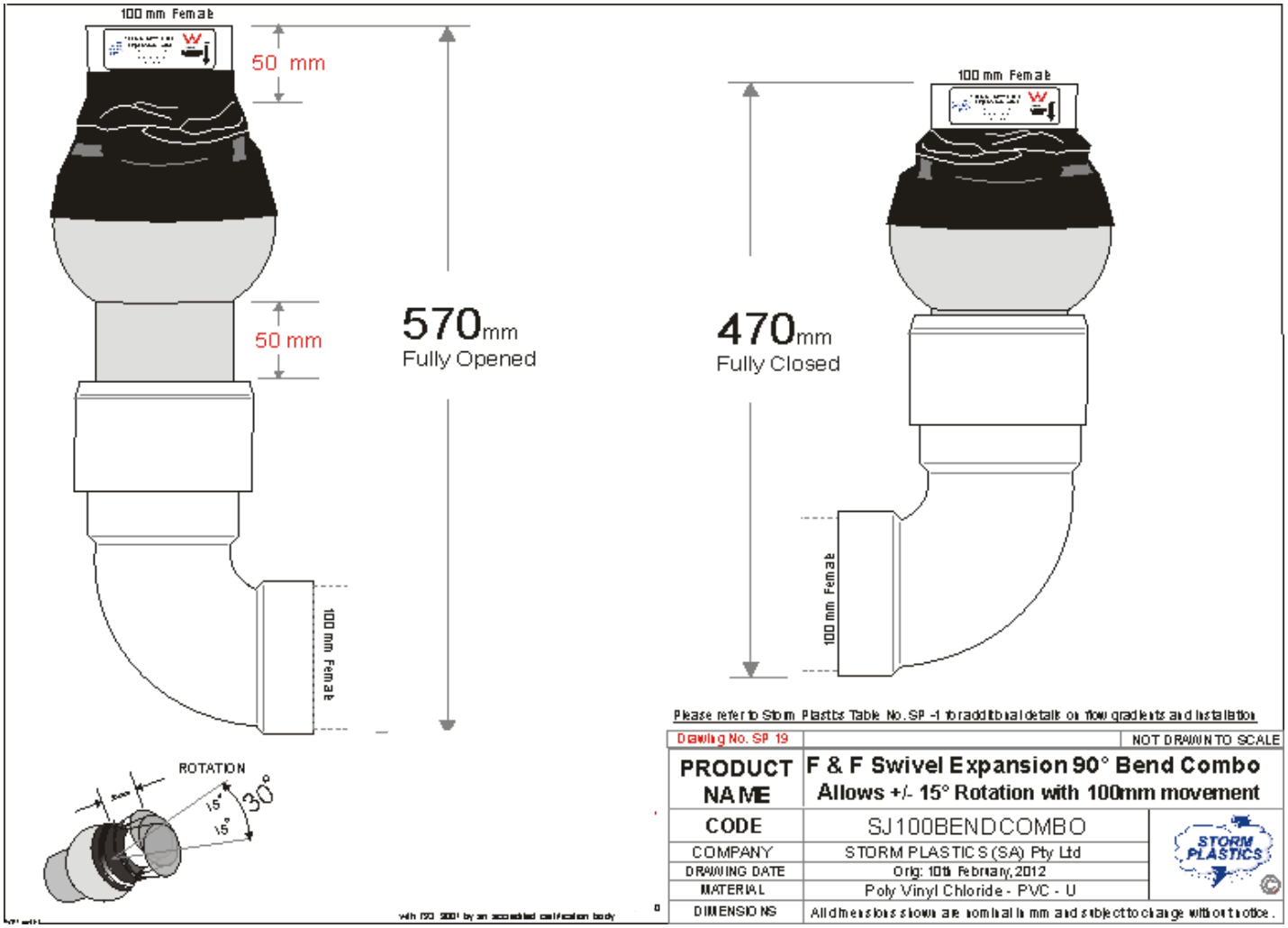
Copper Sulphate Crystals coated section



Dust Protection Tape

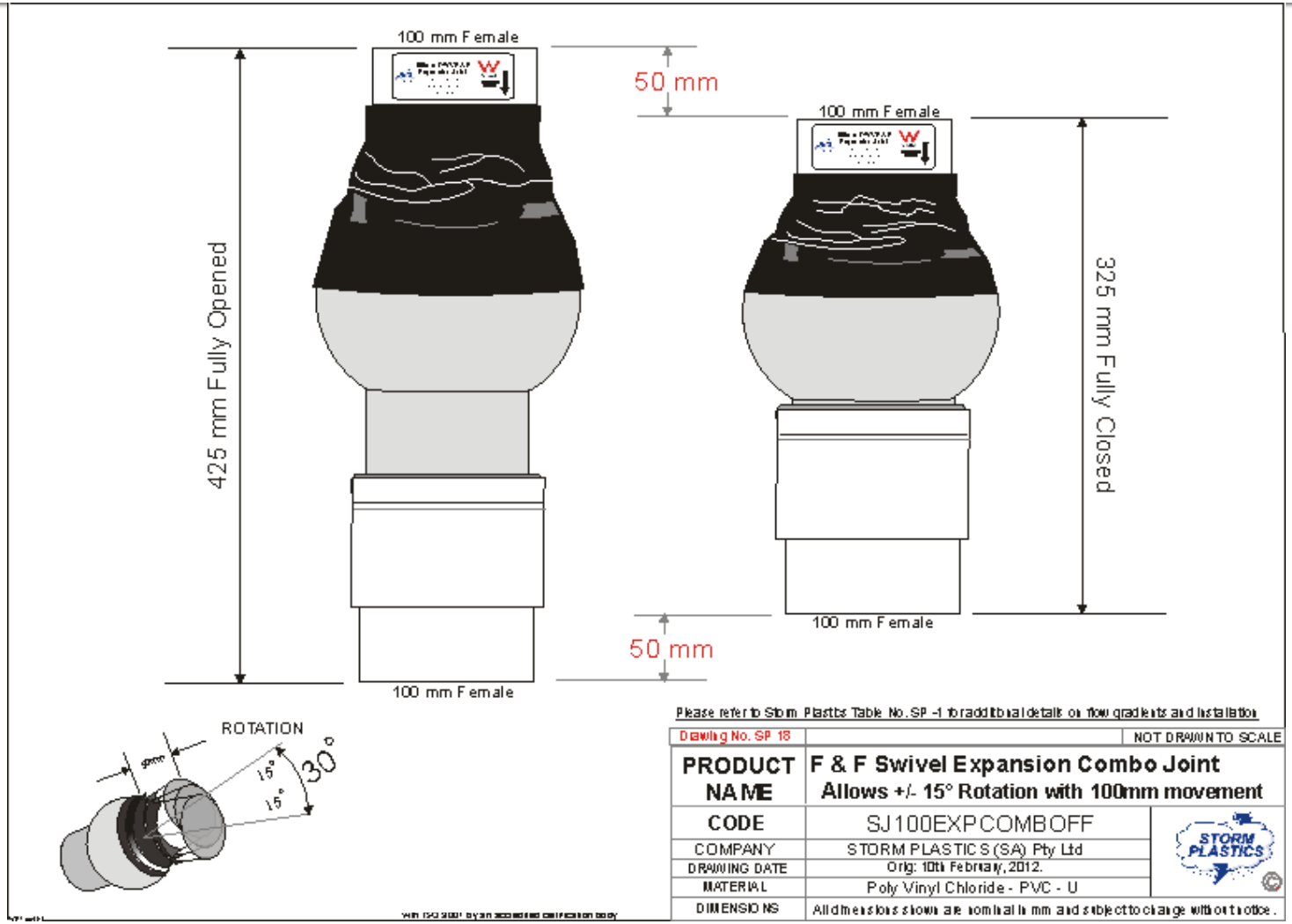
THE COMBO BEND - 100mm MOVEMENT

+ 30 degree DEFLECTION

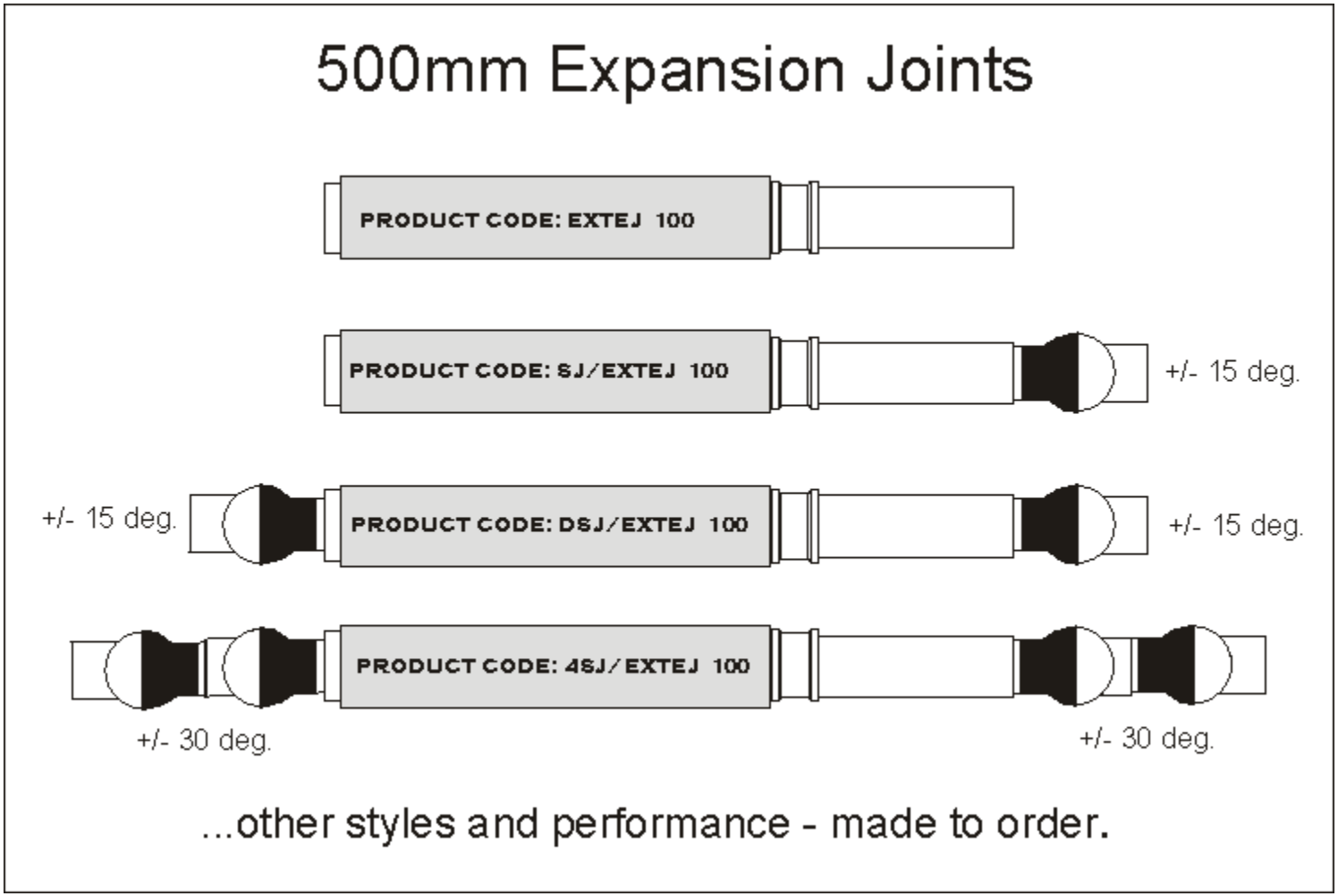


THE COMBO STRAIGHT - 100mm MOVEMENT

+ 30 degree DEFLECTION

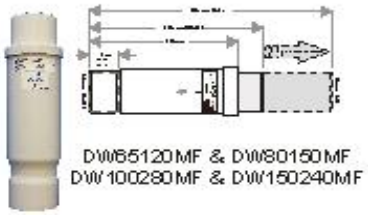


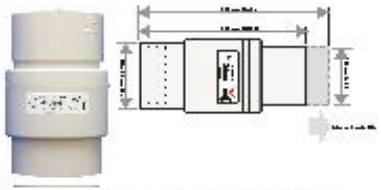
THE 'BAZOOKA' – 500 mm MOVEMENT

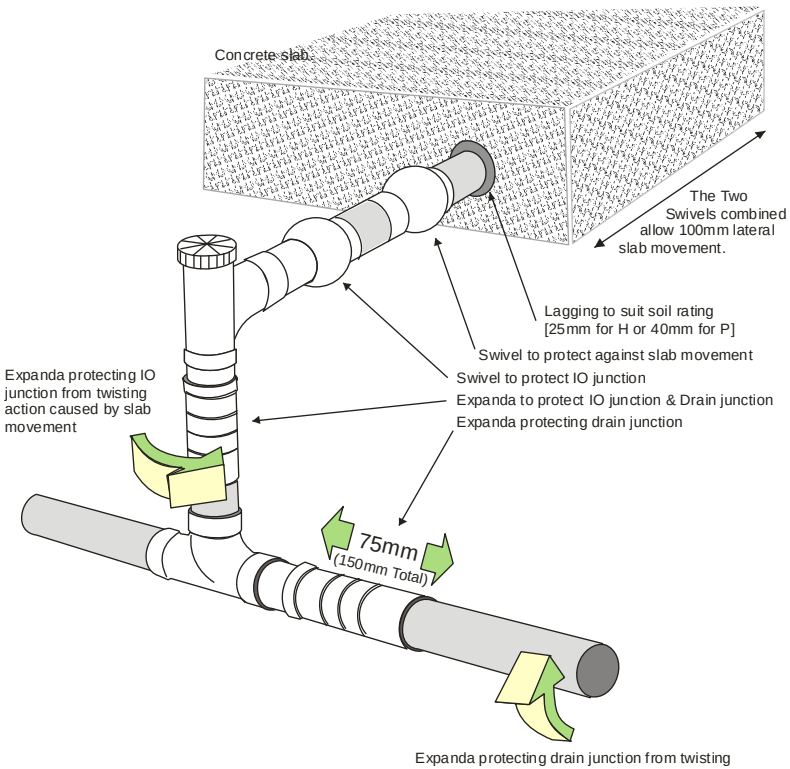


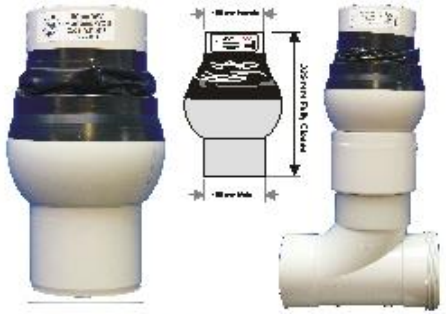
THE RANGE – from 50 mm MOVEMENT …
to suit ALL - ys - requirements


DW4080MF & DW5080MF


DW65120MF & DW80150MF
DW100280MF & DW150240MF


DW100SOFF & MM & MF & MM



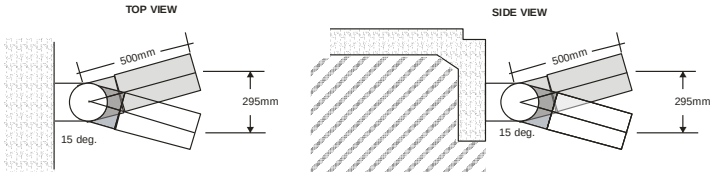

SJ15015


DW4080MF & DW5080MF

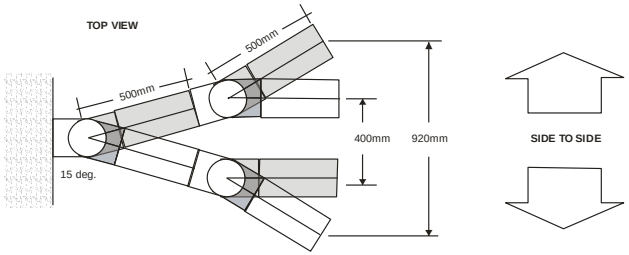
ARTICULATION MOVEMENT

SWIVEL MOVEMENT

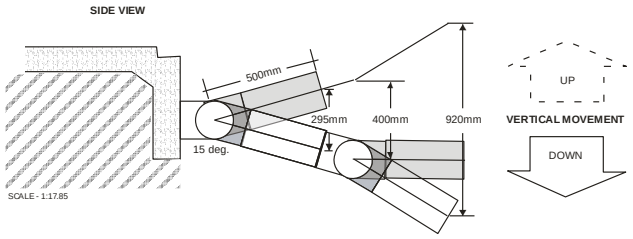
…IN PRACTICE



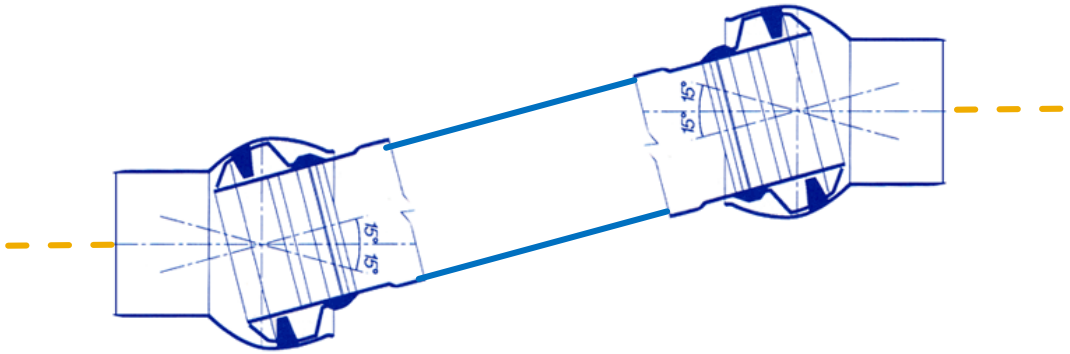
With one Swivel, at a deflection of 15 degrees either side of centre, over a length of 500mm, the Swivel unit allows 295mm of horizontal and vertical movement.



With two Swivels, at a deflection of 15 degrees either side of centre, over a length of approx. 1000mm, the Swivel units allow a pipe deflection of 400mm to 920mm, of horizontal and vertical movement.



By using a combination of Swivel Joints all reactive soil movements can be remedied.



Some applications may only need one, but to have the articulation effect..ie enable misalignment without stressing pipeline, two are required.

NON FLEXIBLE INSTALL

CREEP & SLIP

Bazooka applications

THE STANDARD: AS2870-2011

Now linked to AS3500 and part of the Plumbers code

THE STANDARD: AS2870-2011

As2870-2011 is the most radical change to interpreting Soils and House Engineering we have seen since 1986 and several trades will need to update their current knowledge.

AS 2870-2011 Drainage Requirements

Section 1.

The site classification **shall** be stated on the drawings.

The selected footing system and any required site work and required site drainage **shall** be documented.

MOVING INTO REACTIVE SOILS

In the greater Melbourne area,

Housing developments expand further into areas of REACTIVE SOILS.

MOVING INTO REACTIVE SOILS

In the greater Melbourne area,
60-70% of
Housing developments expand further into areas of REACTIVE SOILS.

Sydney and Brisbane
are
similar

ITS NOT JUST FLOW!!

The Grade of Fall is of great importance.

Reduction from 1:60 to 1:80 in grade, and often shallower (to suit take off heights) causes material-fluid **separation** and **congestion** due to poor **flow** rates.

Already happening.

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Already happening.

SELF CLEANING FLOW IS PARAMOUNT IN REACTIVE SOILS.

FALL DISCHARGE PROBLEMS

SOIL CLASSIFICATION	SOIL DESCRIPTION	DIFFERENTIAL MOVEMENT	SEWER DRAIN GRADE
A	Most sand & rock	Zero	
S	Slightly reactive	0 – 20 mm	
M	Moderately reactive	20 – 40 mm	
H1	Highly reactive	40 – 60 mm	
H2	Very Highly reactive	60 – 75 mm	
E	Extremely reactive	75 mm +	
P	All other soils	As Tested	

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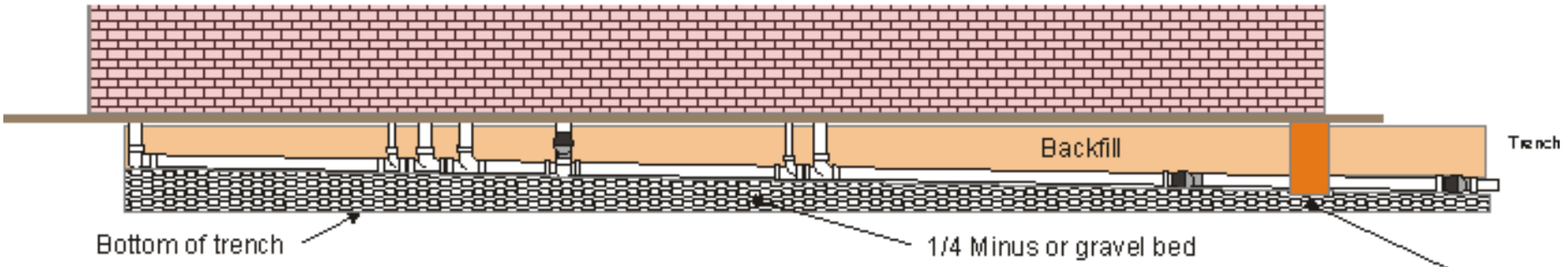
H1	Highly reactive	40 – 60 mm	1 : 50 (200 mm in 10 M)
H2	Very Highly reactive	60 – 75 mm	
E	Extremely reactive	75 mm +	1 : 50 / 1 : 40 (200-250 mm in 10 M)
P	All other soils	As Tested	

FALL DISCHARGE PROBLEMS

DRAIN GRADE FORMED BY 1/4 MINUS OR GRAVEL BED



1. **<u>The drain GRADE should NEVER be created by the 1/4 minus or gravel bed alone</u>**.

   Reasons:- Any leakage from broken pipes or junctions will **filter** thru the gravel and swell the soil. Outside rainwater will capillary to the dry soil **under** the slab and cause structural heave.

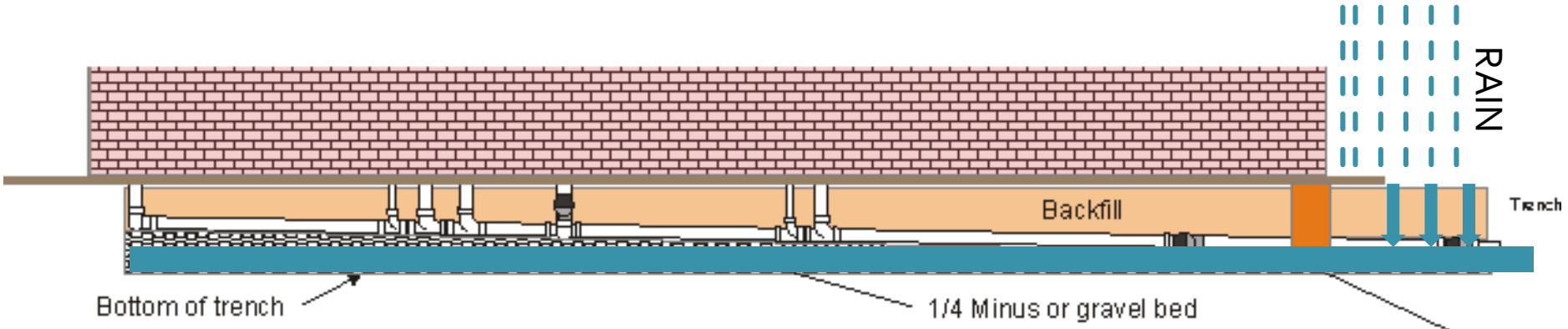
2. **<u>The Clay Plug MUST seal to the bottom of the trench.</u>**

   Reason:- The trench outside the building footprint contains **air** in the backfill and allows rain water to percolate and fill inside much quicker than non trenched ground. Without trench GRADE and without the Clay Plug sealing to the bottom of the trench, water can seep/capillary back **inside** the building footprint and cause structural heave. The level of rainfall and depth of trench are factors that **accelerate** this heave effect.

FALL DISCHARGE PROBLEMS

UNDER SLAB DRAINAGE

DRAIN GRADE FORMED BY 1/4 MINUS OR GRAVEL BED



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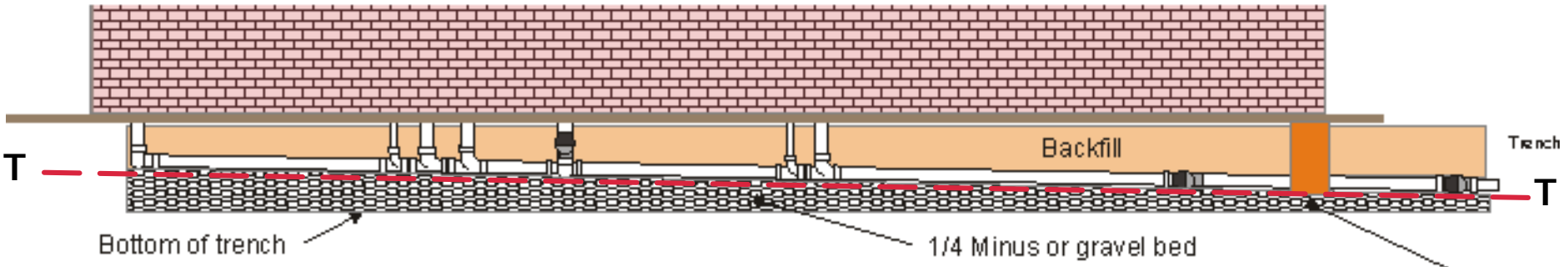

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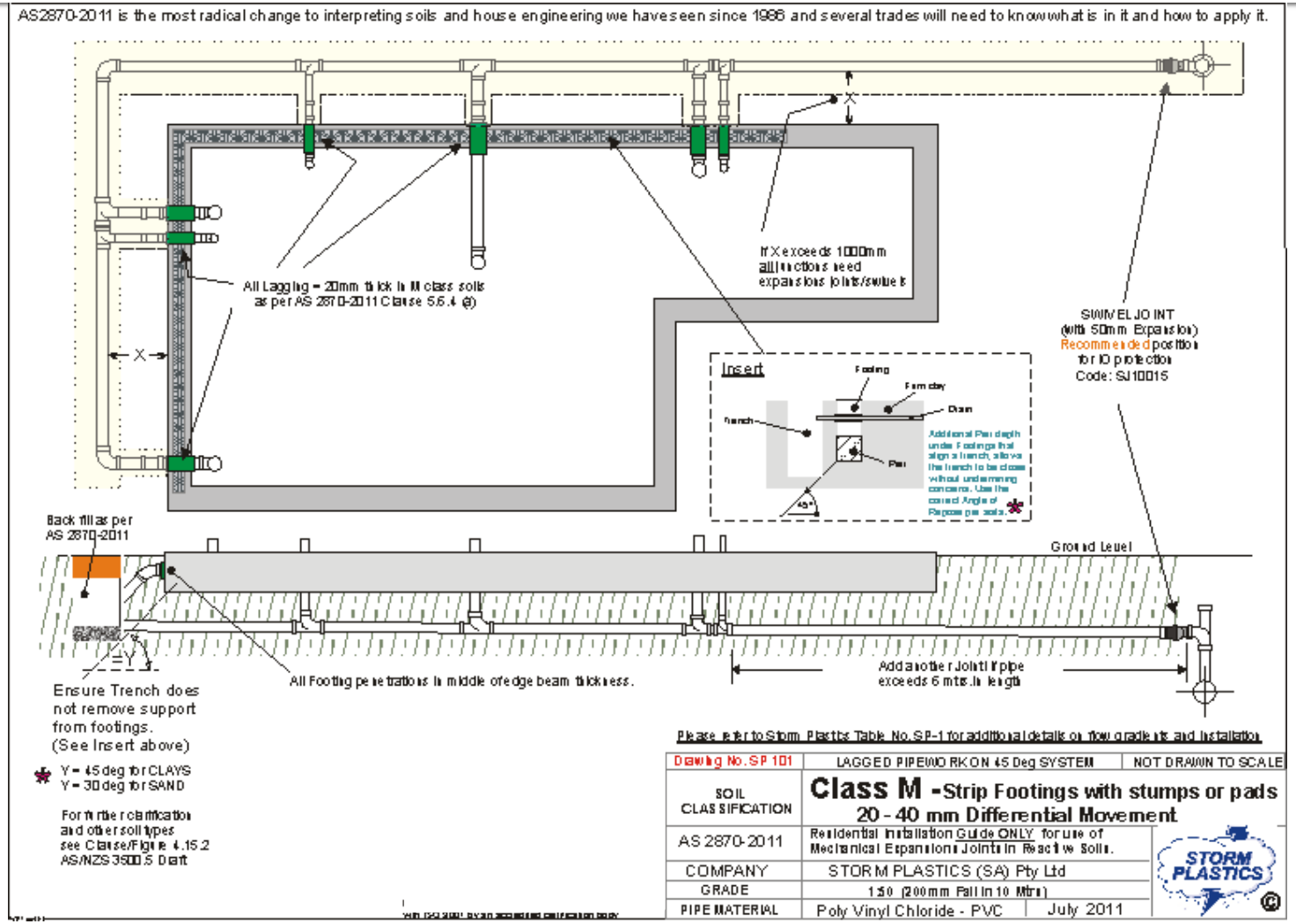
T = Bottom of Trench

EXPANSION JOINT LAYOUT

Unless otherwise specified, these joints are to be set at 50% of their sliding ability



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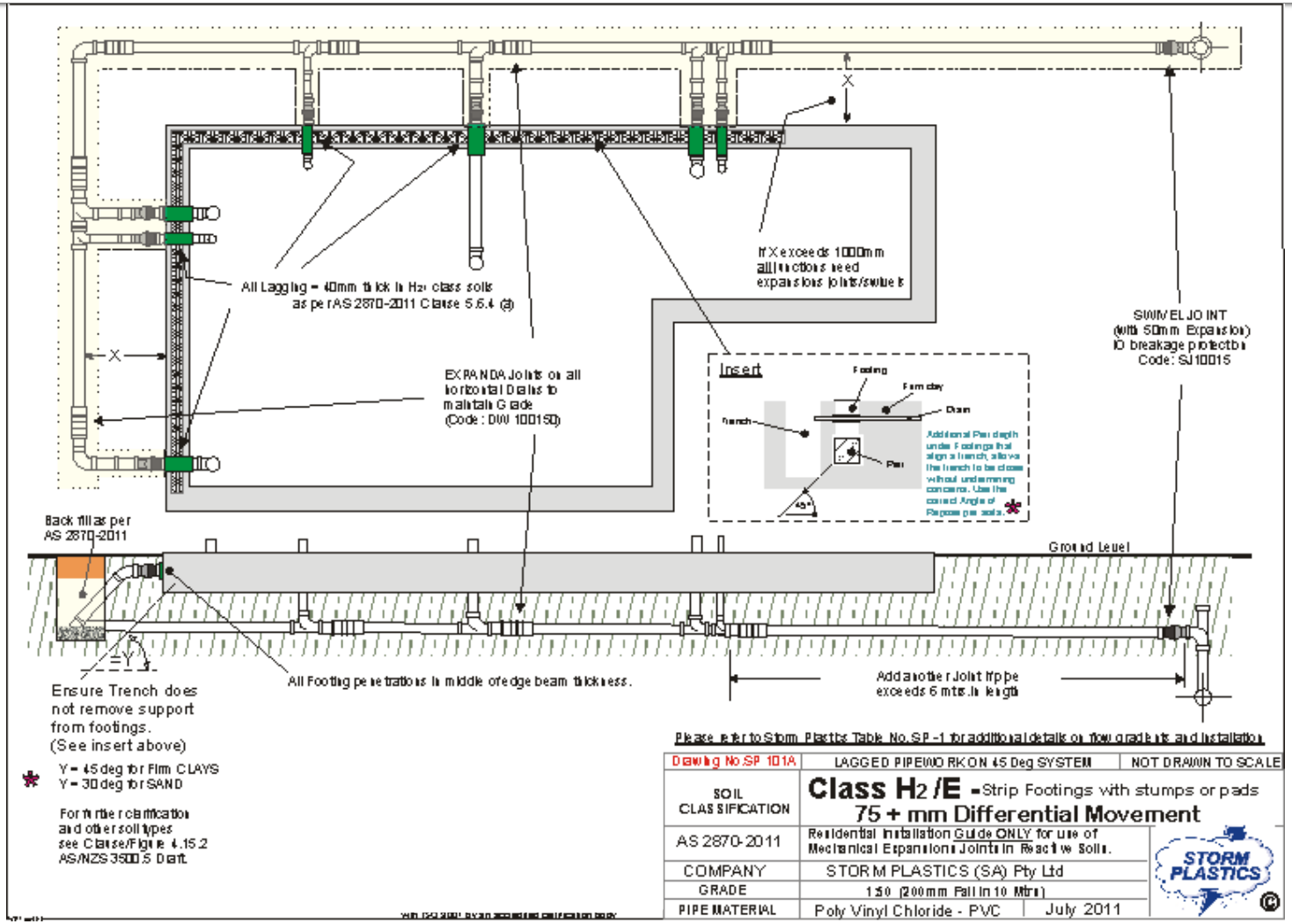

ZERO SIDE AREA

EXPANSION JOINT LAYOUT

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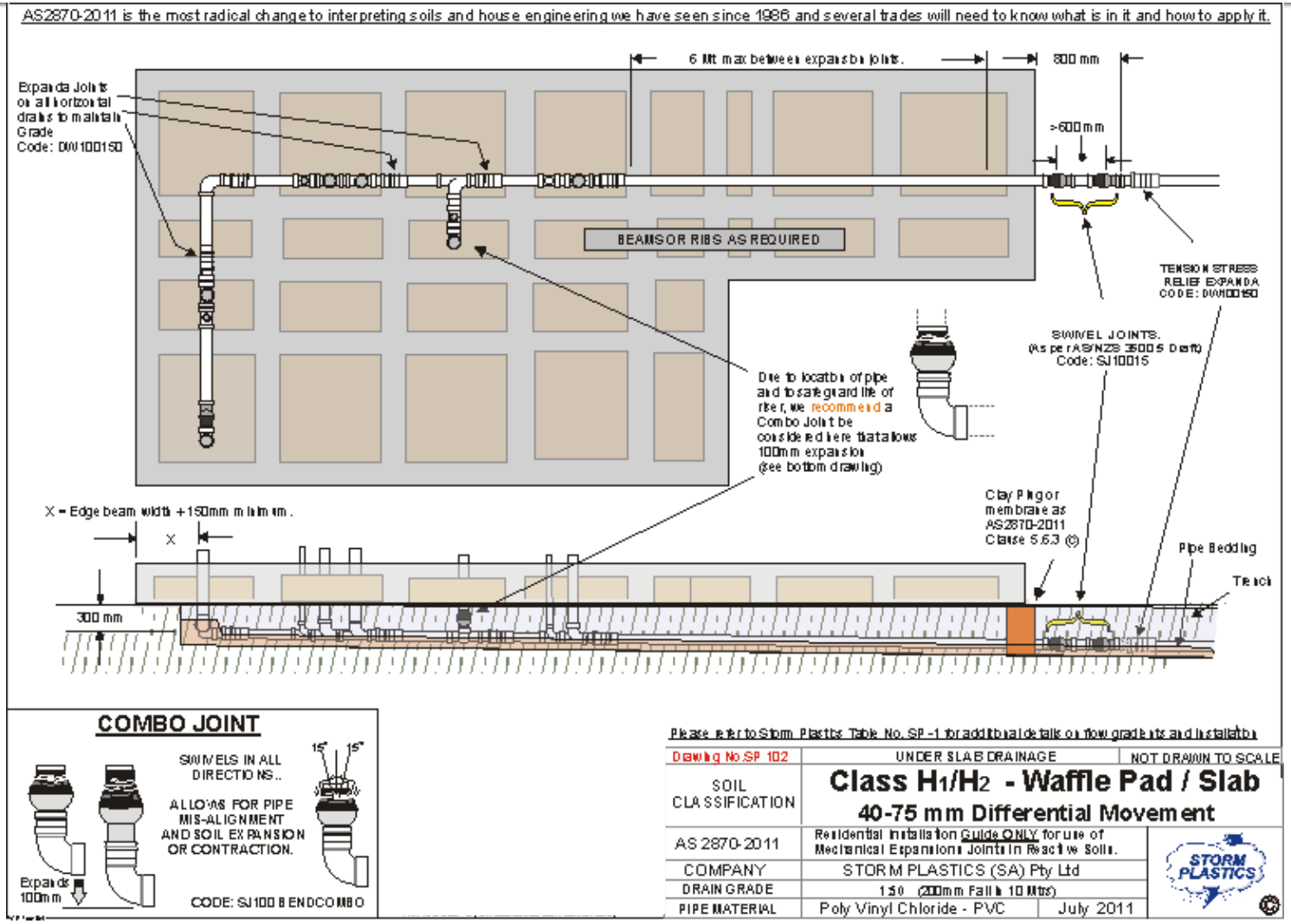
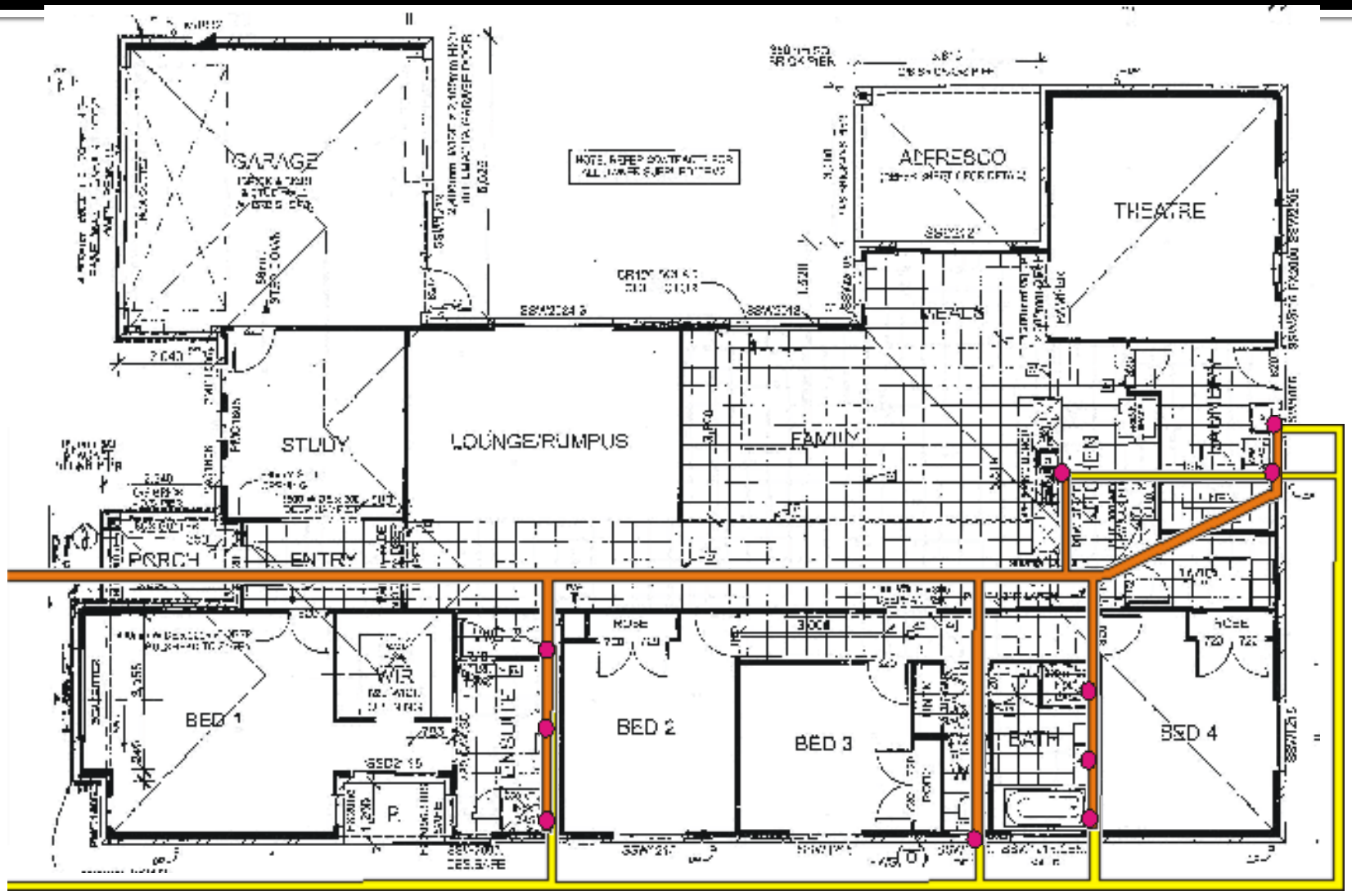
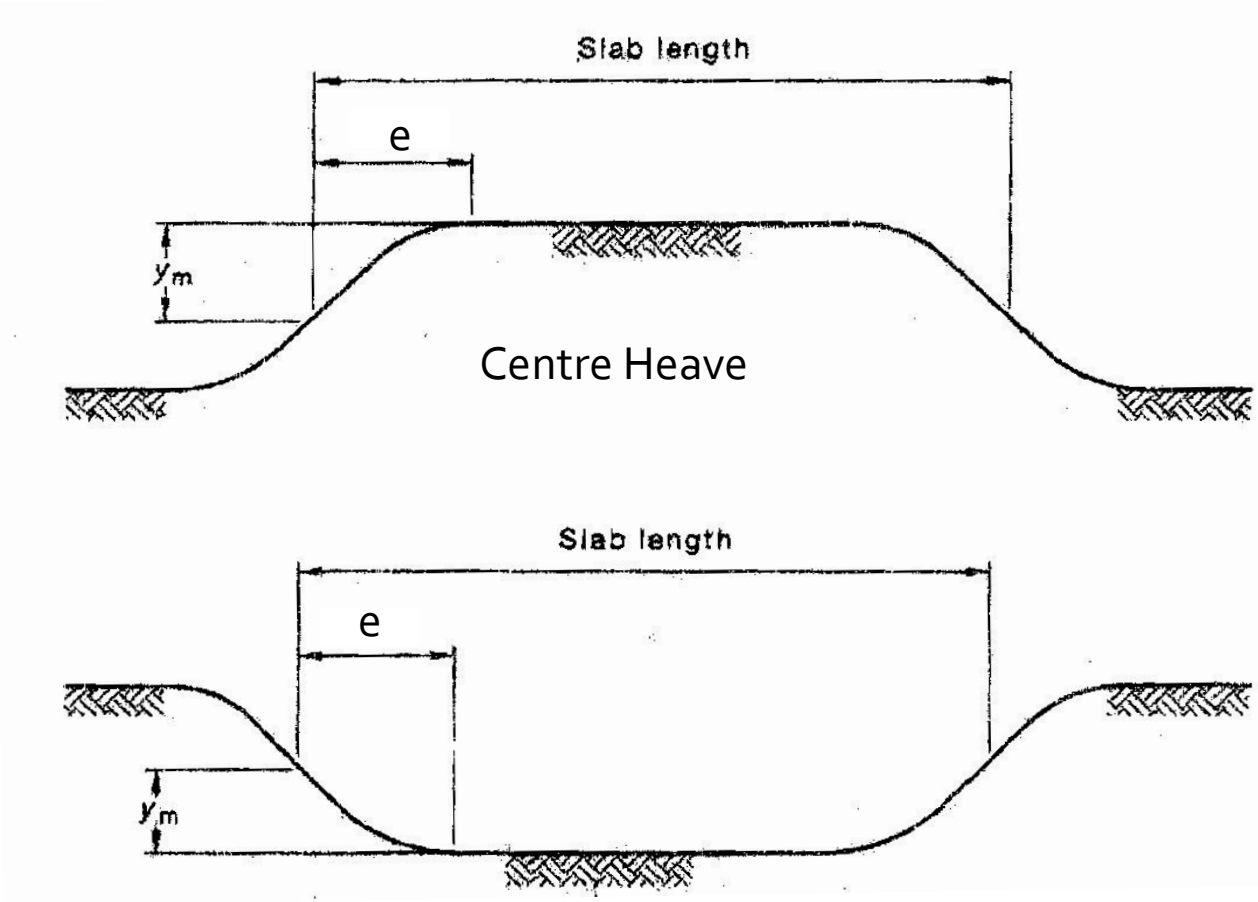


DRAINAGE CHOICES…

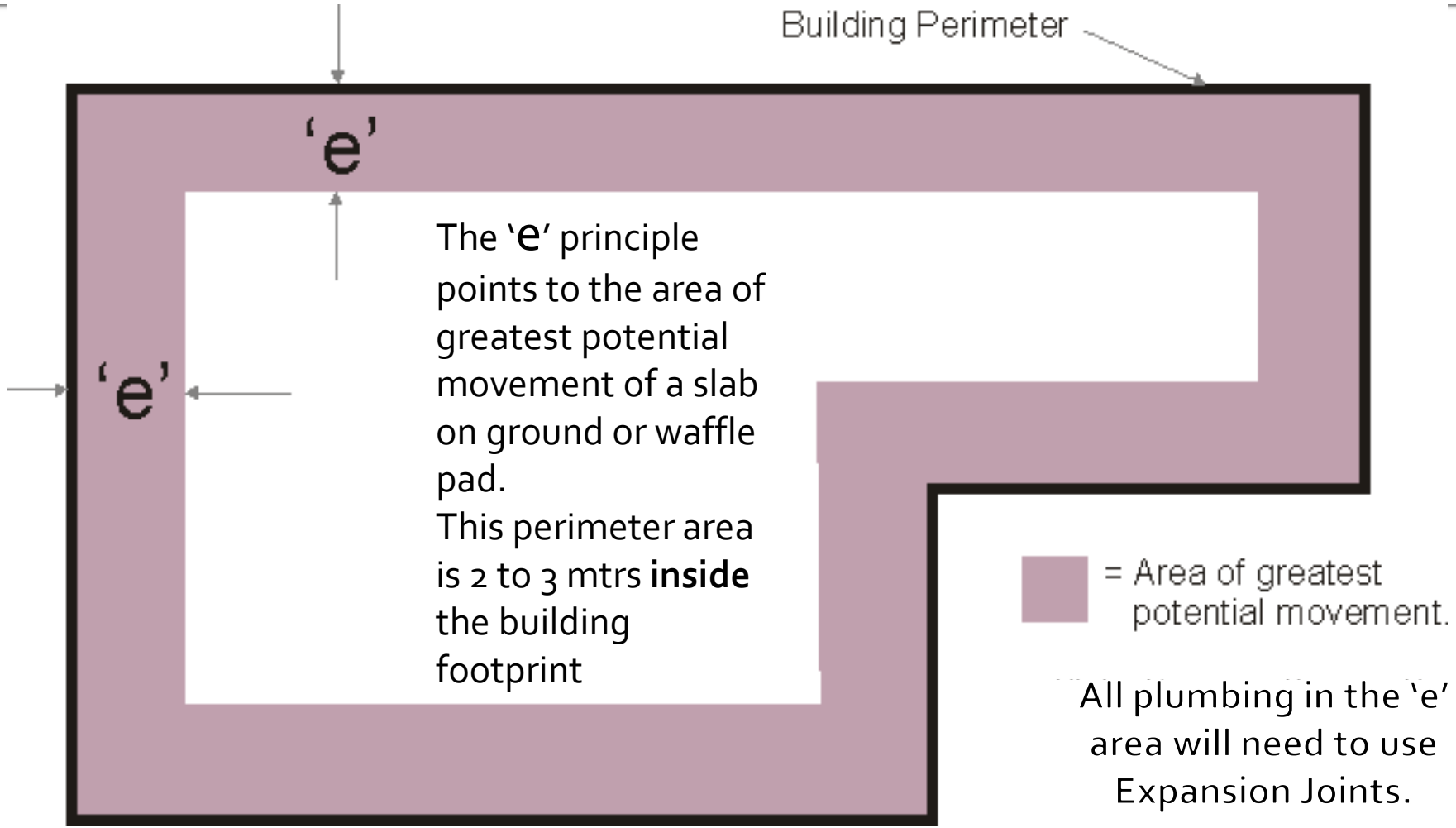


THE 'e' FACTOR

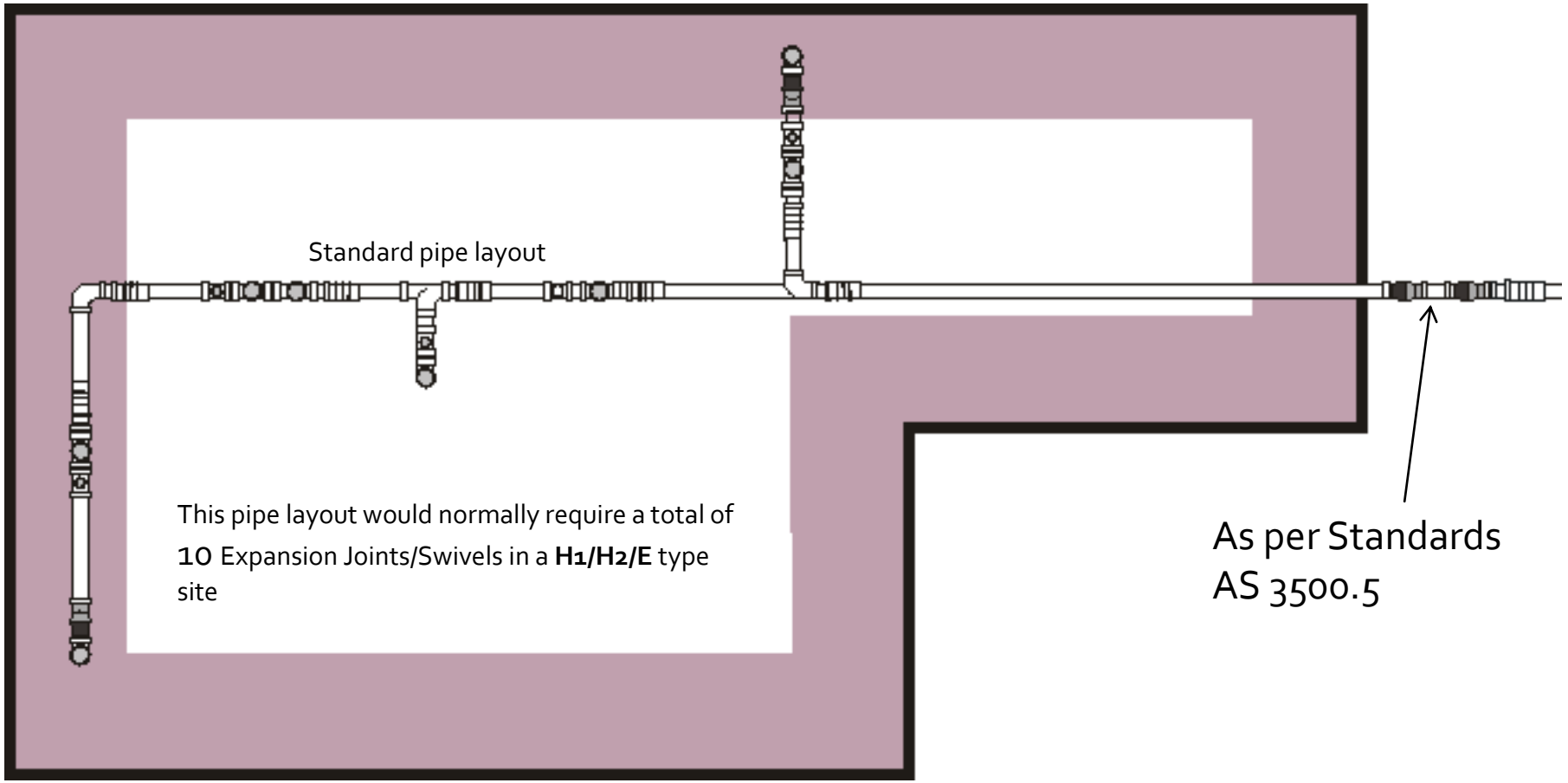
The 'e' Factor came about from the Walsh method mentioned in Appendix F In AS2870-2011 where movement occurs over an 'edge distance' (e) which applies to both Edge and Centre heave on slab design.



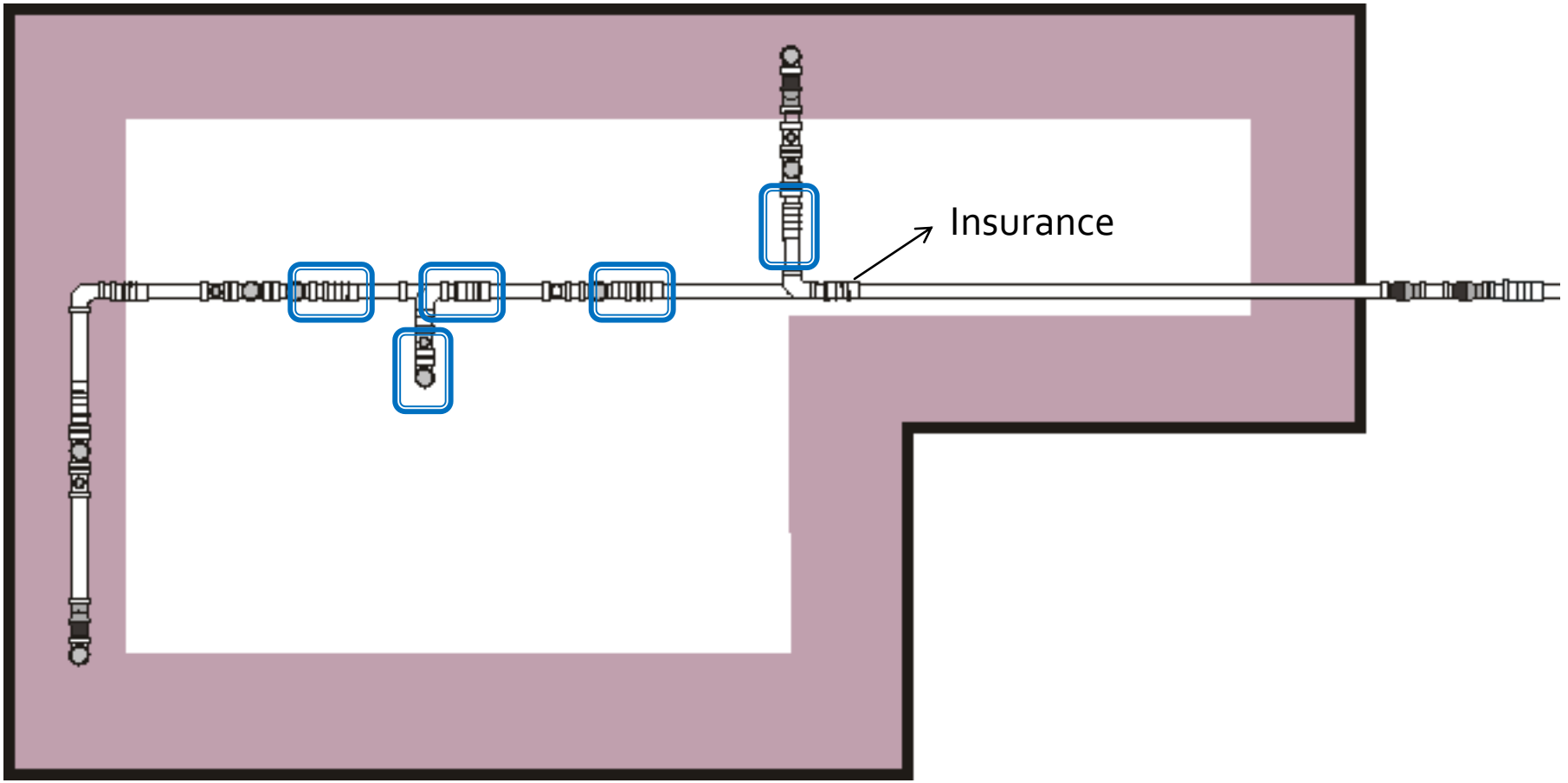
DRAINAGE CHOICES…



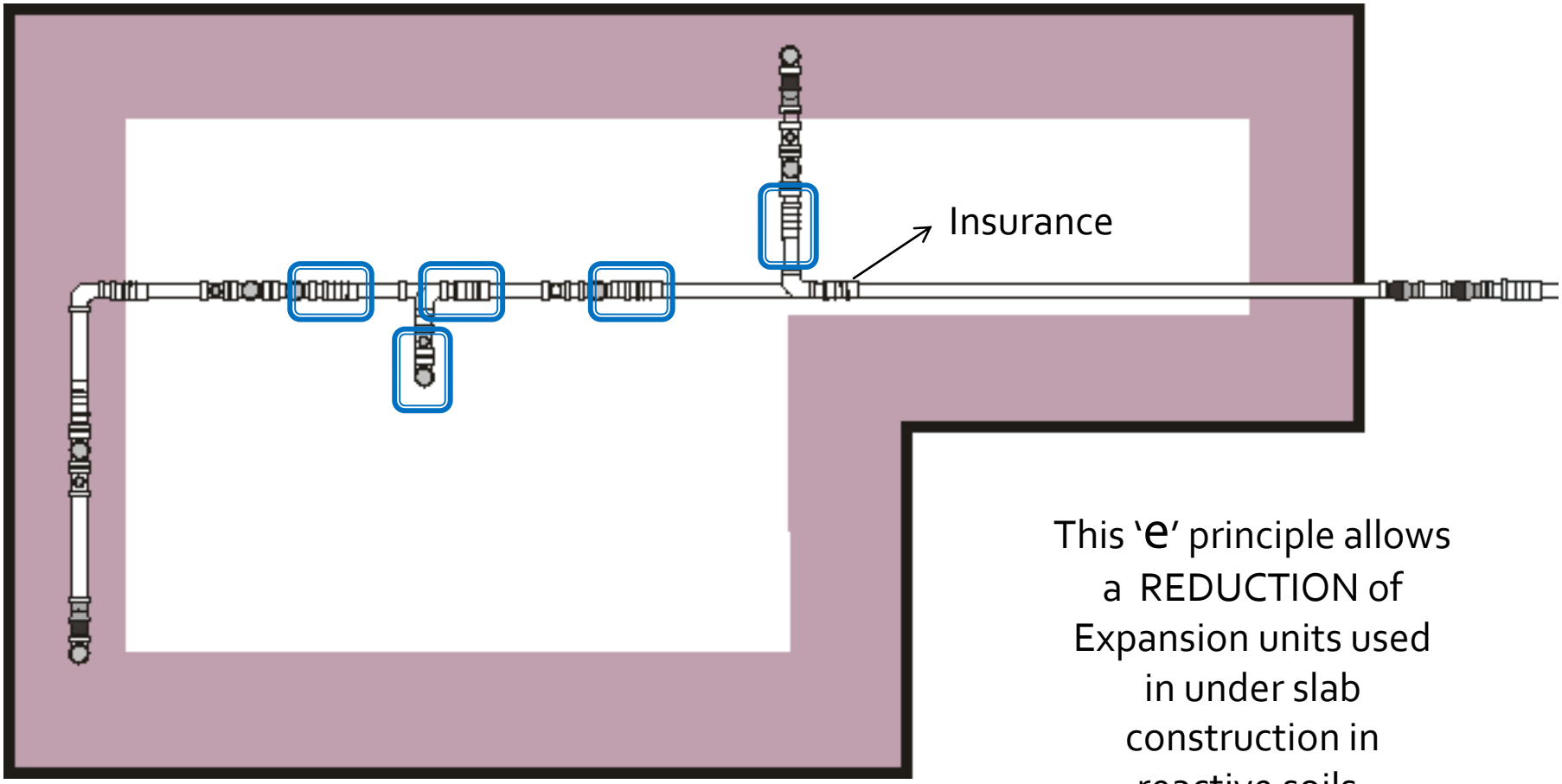
DRAINAGE CHOICES…



DRAINAGE CHOICES…



DRAINAGE CHOICES…



This 'e' principle allows a REDUCTION of Expansion units used in under slab construction in reactive soils.

MORE CONCERNS…

Water problems…?

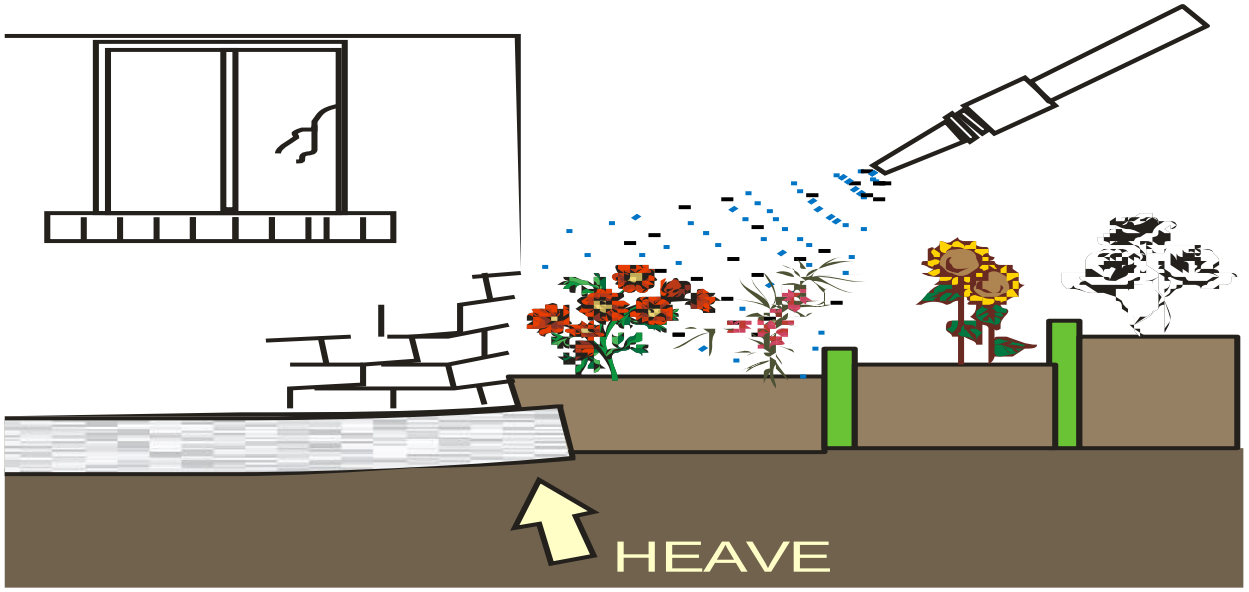
Trench failures occur due to incorrect installation and poor compaction.

Missed !

The root of all problems

WHO IS RESPONSIBLE?

The Owner is responsible for 'unbalanced' garden watering.*(This changes moisture balance)*



MORE MOVEMENT

MORE MOVEMENT

CONDEMNED!

WHEN SOILS MOVE,
ALL ELSE FOLLOWS

CONDEMNED!

DRAINAGE CHOICES

DRAINAGE CHOICES

DRAINAGE CHOICES

DRAINAGE CHOICES

Ready to pour.....

.....ready to break

BUILT IN PROBLEMS

BUILT IN PROBLEMS

THE STANDARD: AS2870-2011

Now incorporates

Flexible Couplings

in

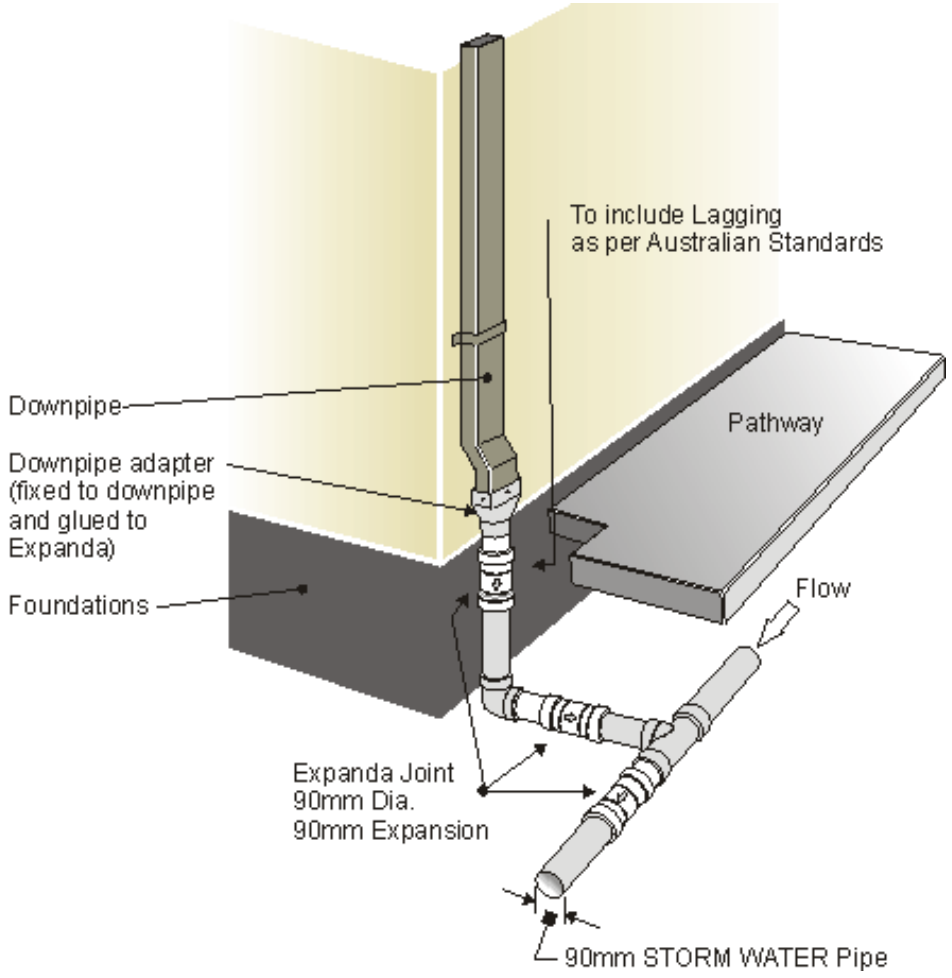
Sewer and Stormwater

installations

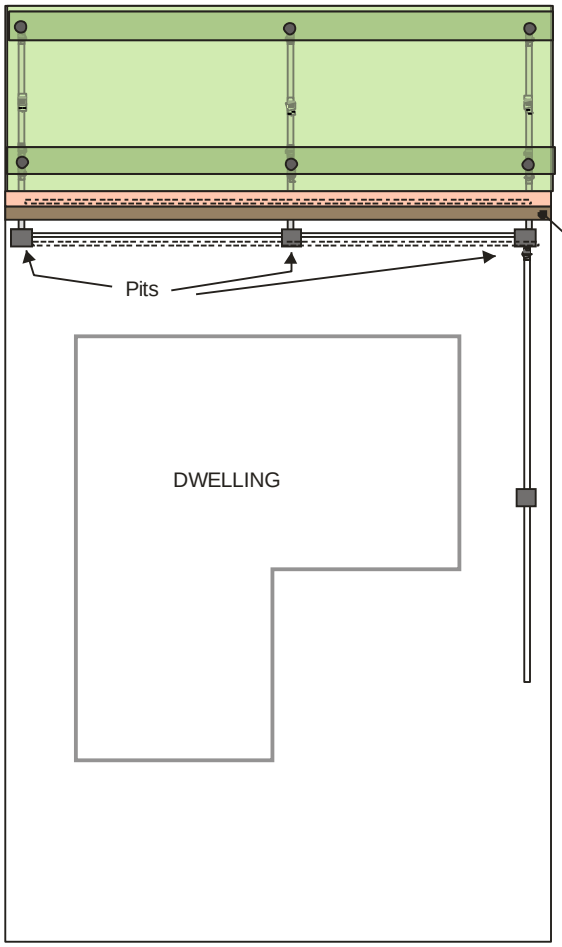
in

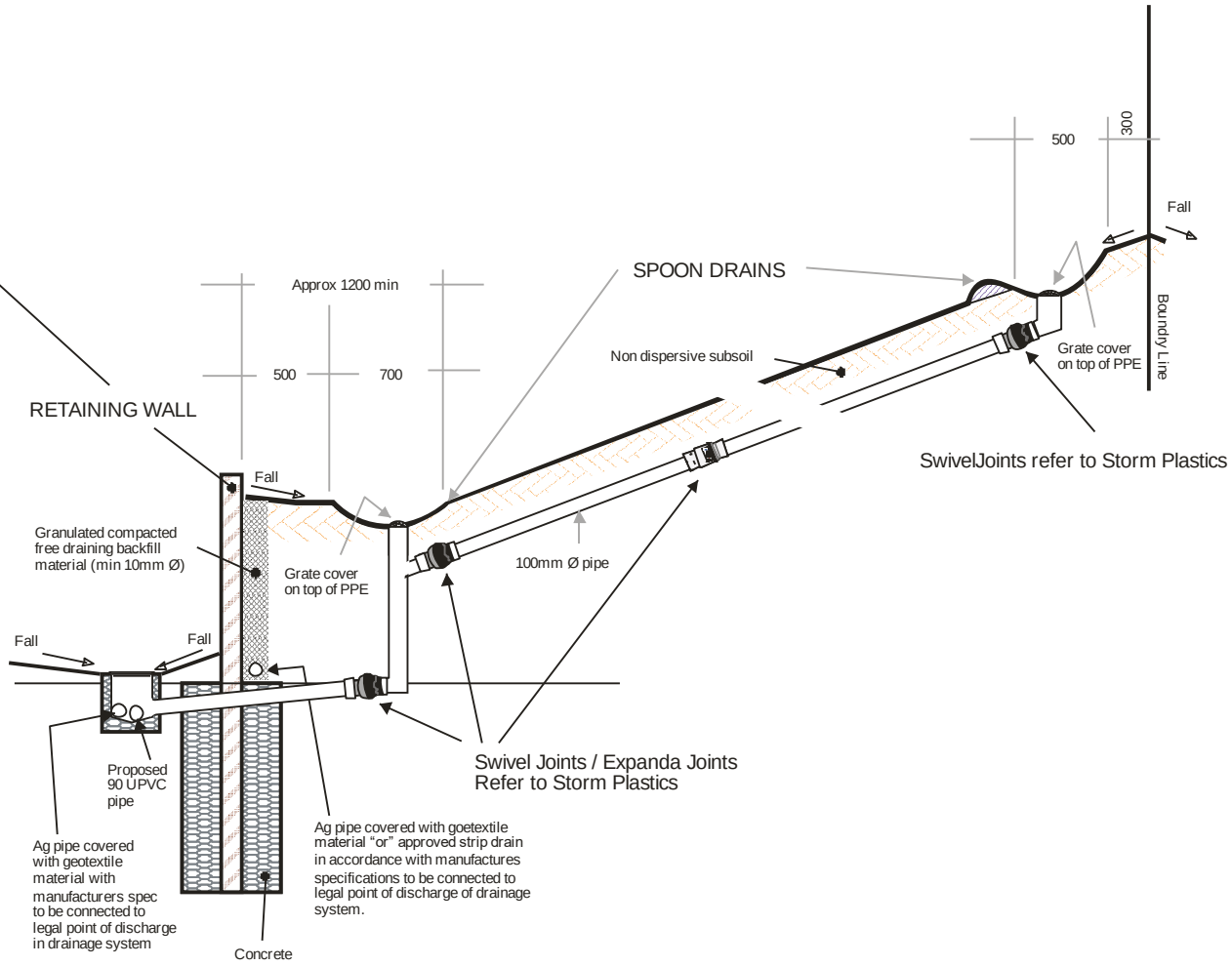
Reactive soils

AS 2870-2011 DRAINAGE REQUIREMENTS



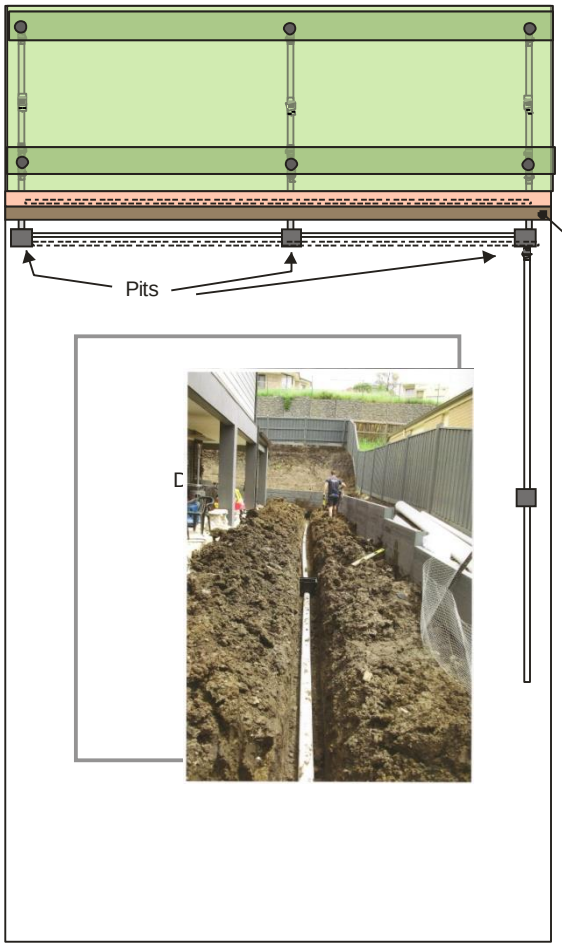
RETENTION WALL DRAINAGE

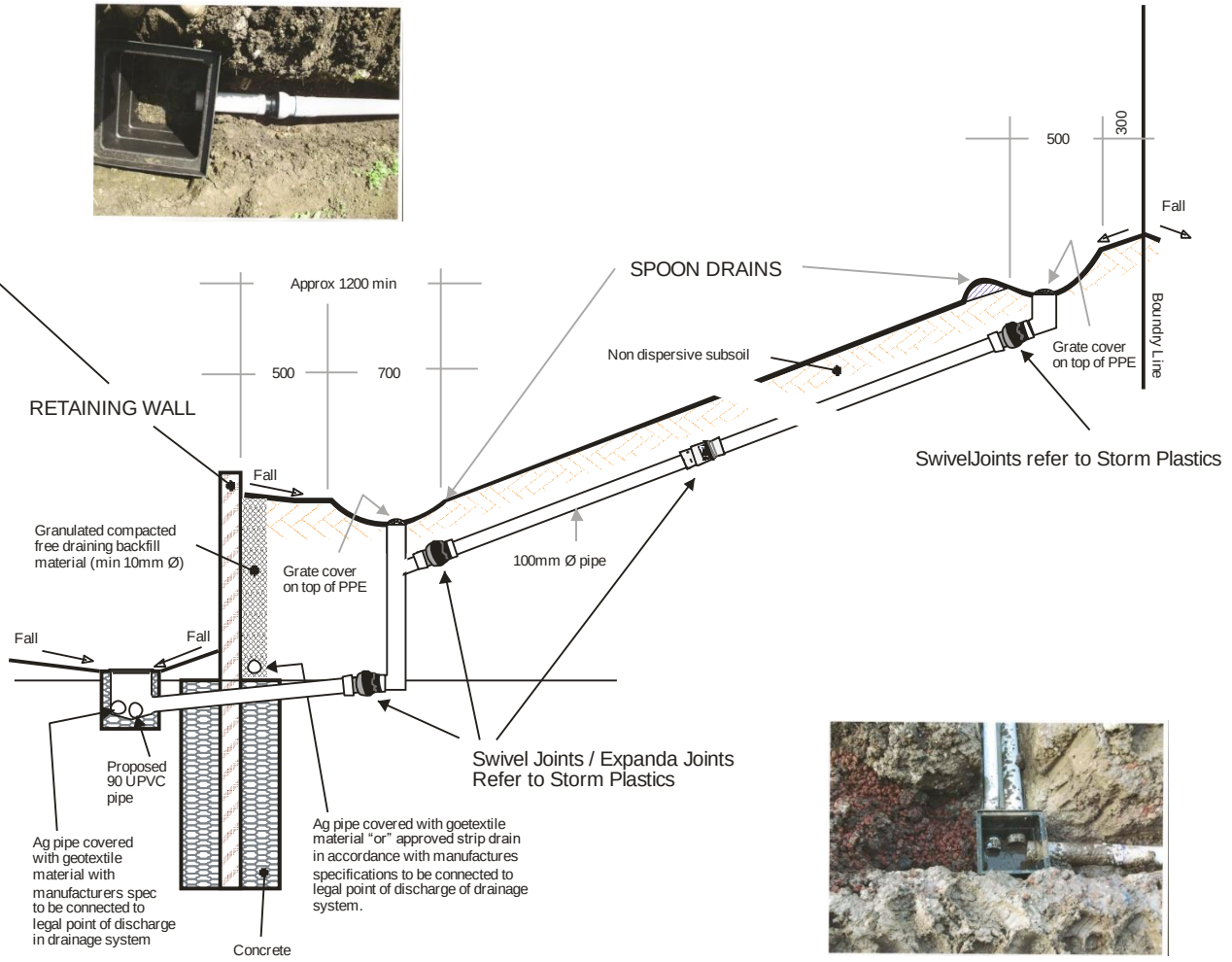




Information courtesy by D Lopes

RETENTION WALL DRAINAGE





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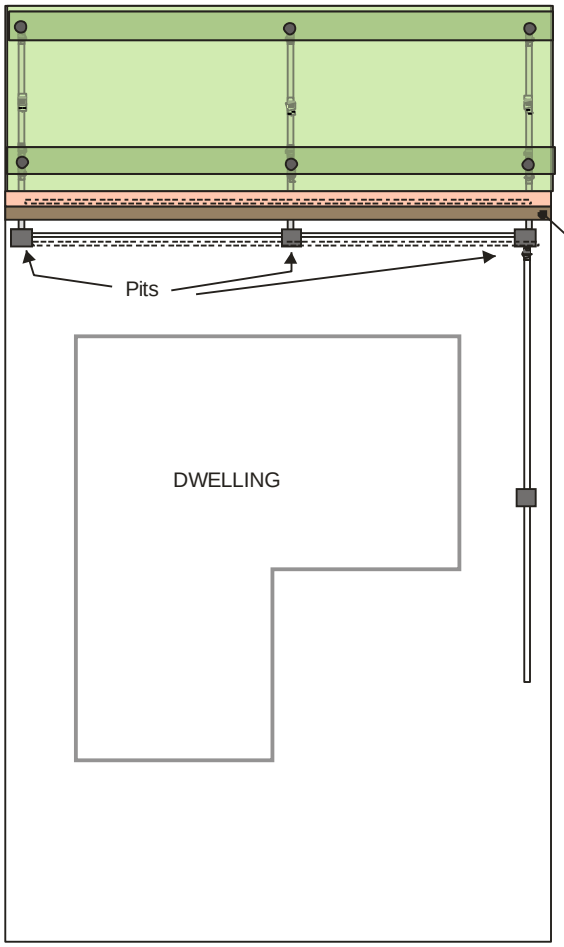
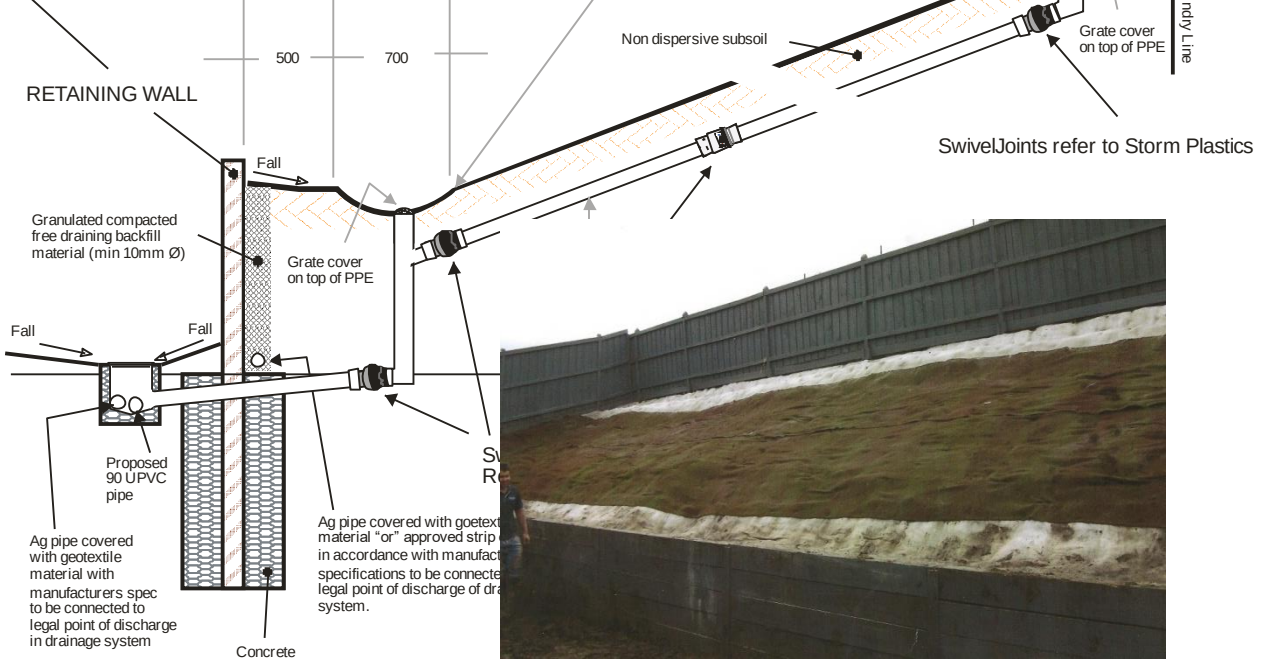
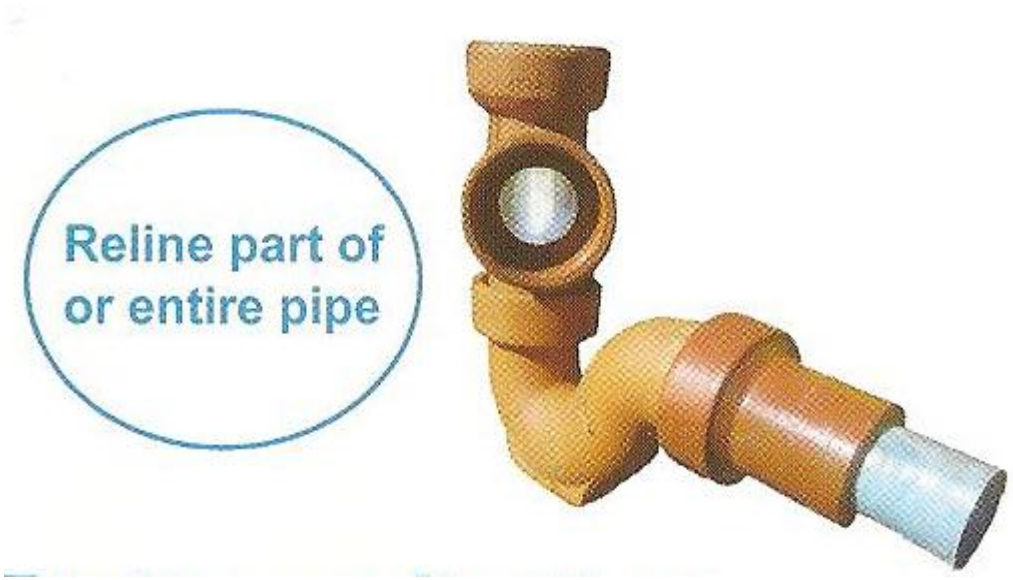




Information courtesy by D Lopes

FLEXIBILITY?



Although a good alternative to replacing and excavating entire drains, re-lining, by design, does not allow for any movement in any reactive soils. Expansion and Swivel Joints are necessary for this method.

What's the problem?

WHAT DOES STANDARDS SAY ?

LAGGING: Must be….a) Non-absorbent
b) very flexible
c) the right thickness

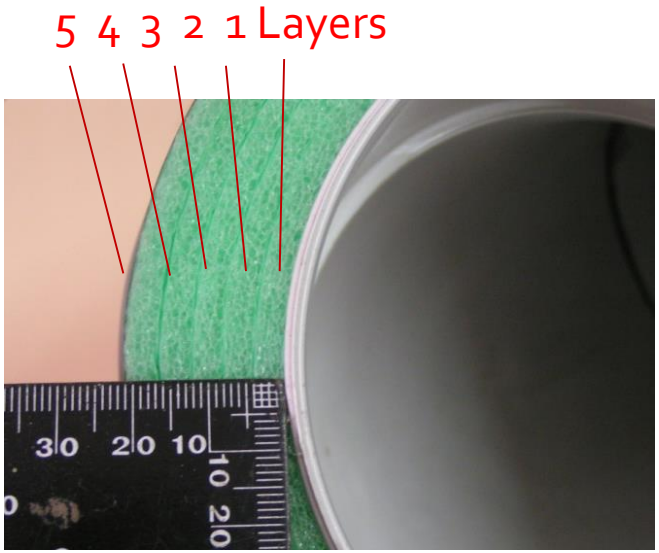
This means…….a minimum of 20mm thick on H1 Soils

And ……a minimum of 40mm thick in H2 and E Soils

CARPET UNDERLAY? – NO.

- Styrene is used as a simple method but is available in only one thickness and has minimal compressibility resulting in high stress-transfer to junctions

- Closed Cell Polyethylene lagging can be layered to provide 20mm on highly reactive sites or 40mm if in extremely reactive areas. Benefits of high compressibility results in reduced stress-transfer to junctions.



REACTIVE SOILS IMPACT

REACTIVE SOILS IMPACT

REACTIVE SOILS IMPACT

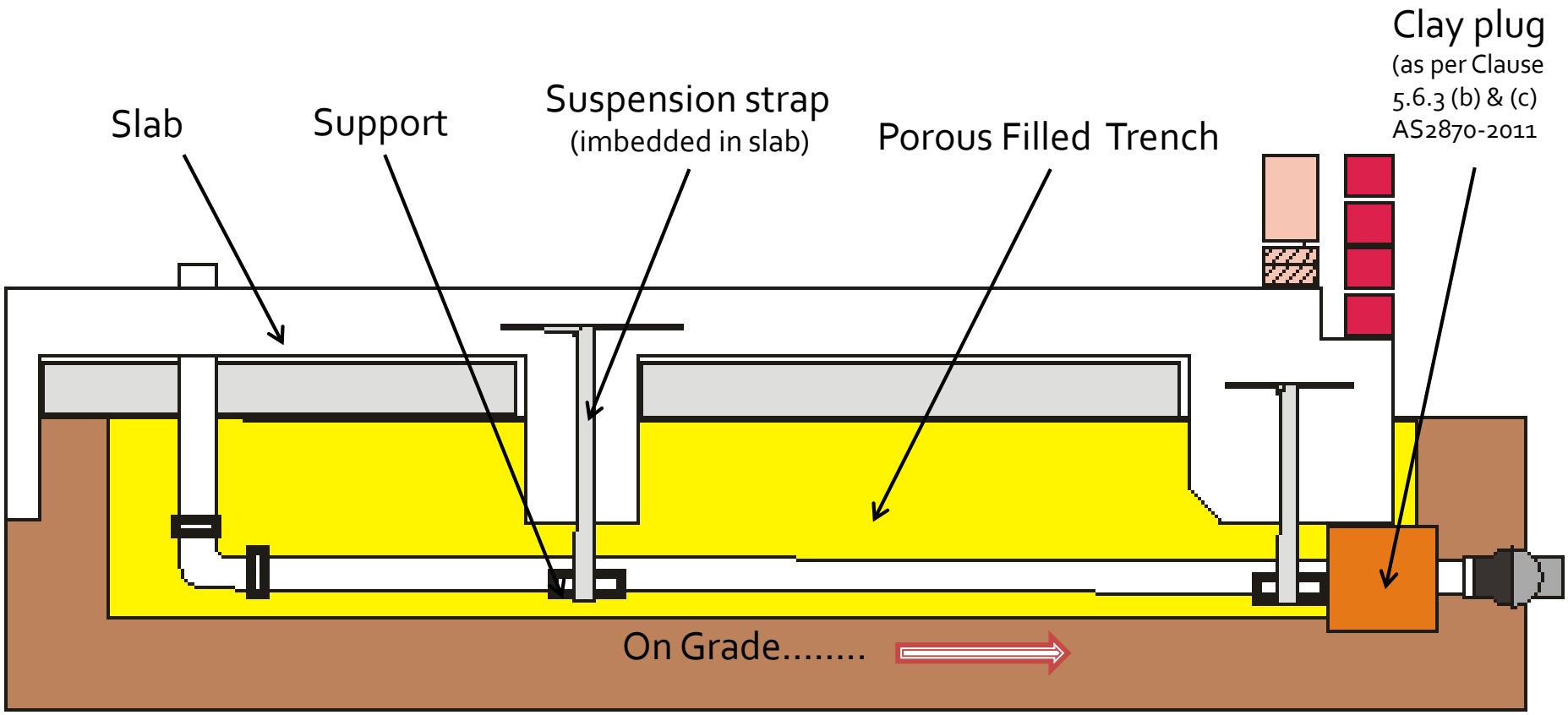
DEEP REPAIR

PROTECTED SYSTEM

SLIPPED....

DRAINAGE SUSPENSION

- Drainage construction alternative:
  - All underslab drainage systems could be tied into the slab. All movement can then be accommodated OUTSIDE the building with one Joint.



DRAINAGE SUSPENSION

DRAINAGE SUSPENSION

RESTRICTED ACCESS INSTALL

TREES ARE CLEVER…

WHO IS RESPONSIBLE?

- Additional Tree planting, after handover, is the responsibility of the Owner.*(This changes the block's soil ratings)*

COULDN'T GIVE A ROOT?

Roots can penetrate Rubber Sleeve Joints with serious consequences.

RUBBER SLEEVES
DON'T EXPAND

AS 2870-2011 DRAINAGE REQUIREMENTS

Clause 5.6.3

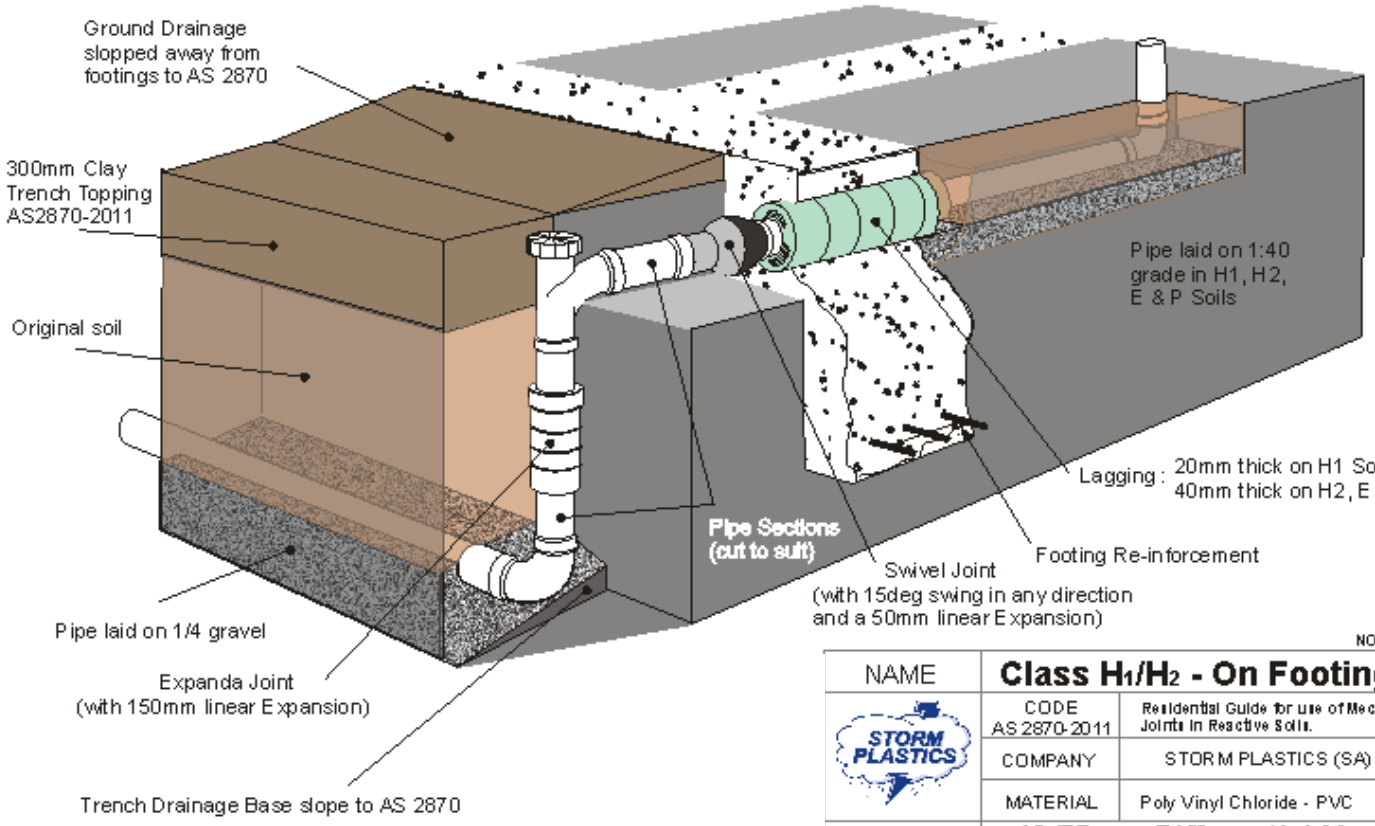
(a).....The drainage system **shall** be completed by the finish of the construction of the building

(b)The base of trenches **shall** be sloped away from the building. Trenches shall be backfilled with clay in the top 300 mm within 1.5m of the building

PLUMBING IN REACTIVE SOILS..

RESIDENTIAL FOOTING in REACTIVE SOILS- H1, H2, as per AS2870-2011 & AS 3500

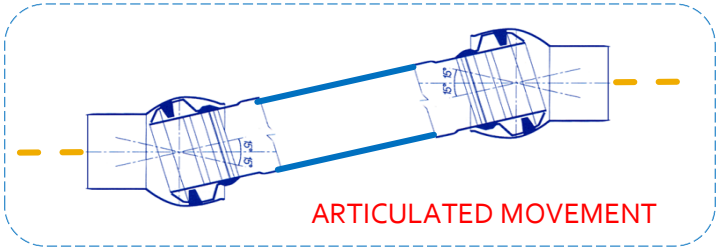
AS2870-2011 is the most radical change to interpreting soils and house engineering we have seen since 1986 and several trades will need to know what is in it and how to apply it.



NOT DRAWN TO SCALE

NAME	Class H_1/H_2 - On Footings		
	CODE AS 2870-2011	Residential Guide for use of Mechanical Expansions Joints in Reactive Soils.	
	COMPANY	STORM PLASTICS (SA) Pty Ltd	
	MATERIAL	Poly Vinyl Chloride - PVC	July 2011
SOIL MOVEMENT	40-75mm Differential Movement		

INSPECTION CHAMBERS



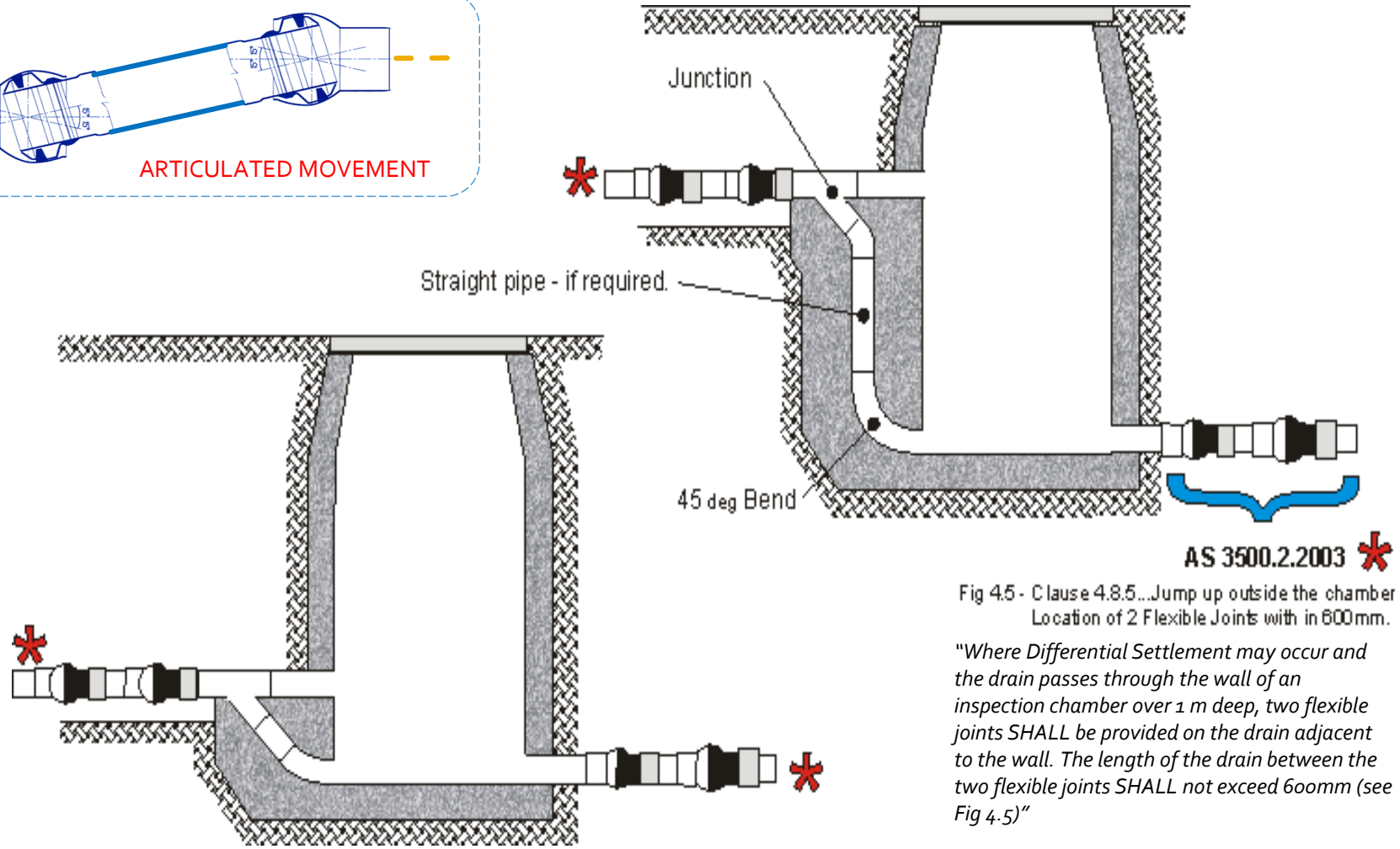
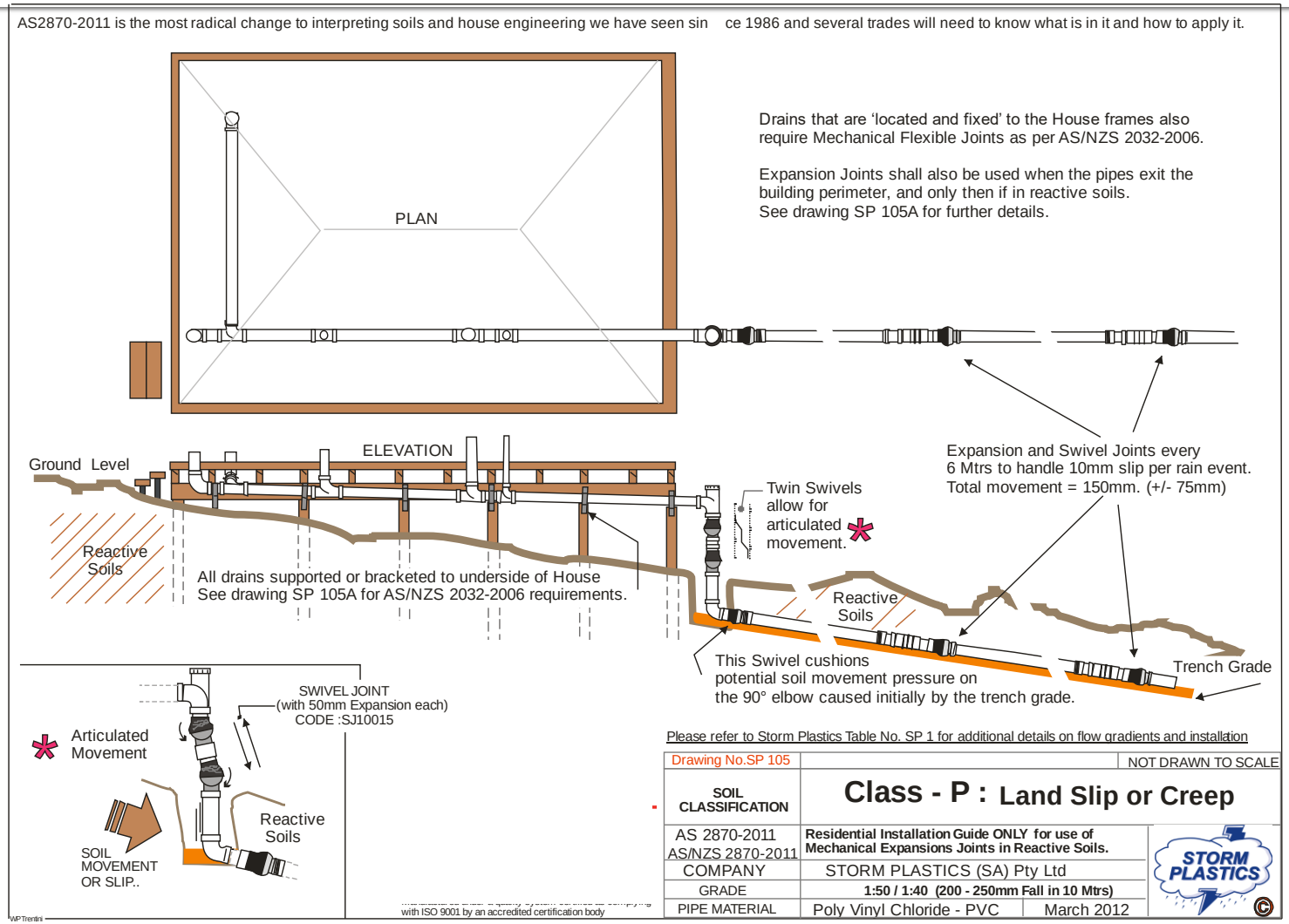


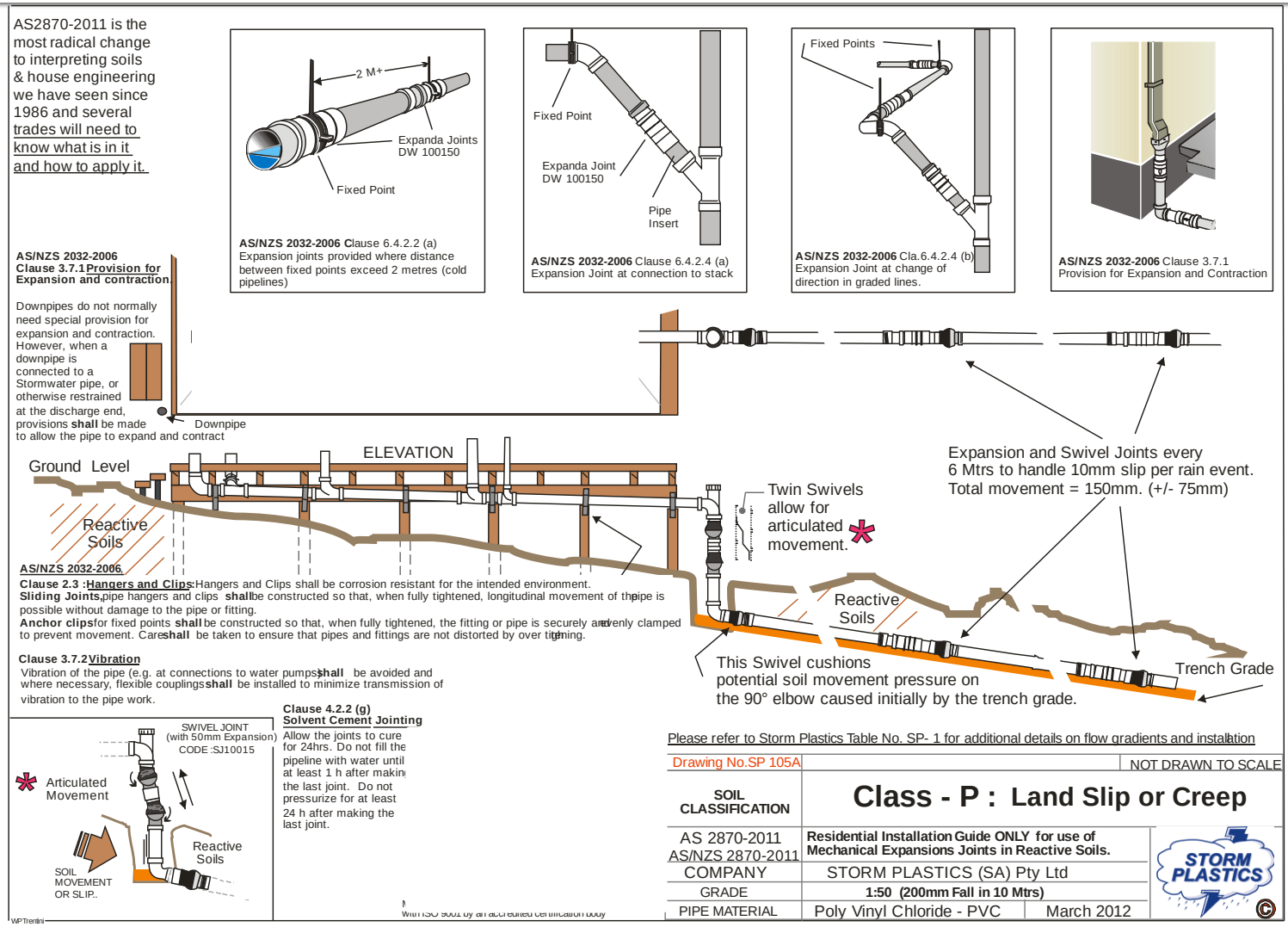
Fig 4.5 - Clause 4.8.5...Jump up outside the chamber Location of 2 Flexible Joints with in 600mm.

"Where Differential Settlement may occur and the drain passes through the wall of an inspection chamber over 1 m deep, two flexible joints SHALL be provided on the drain adjacent to the wall. The length of the drain between the two flexible joints SHALL not exceed 600mm (see Fig 4.5)"

RURAL Applications : H2 / E Class and or SLIP SITES

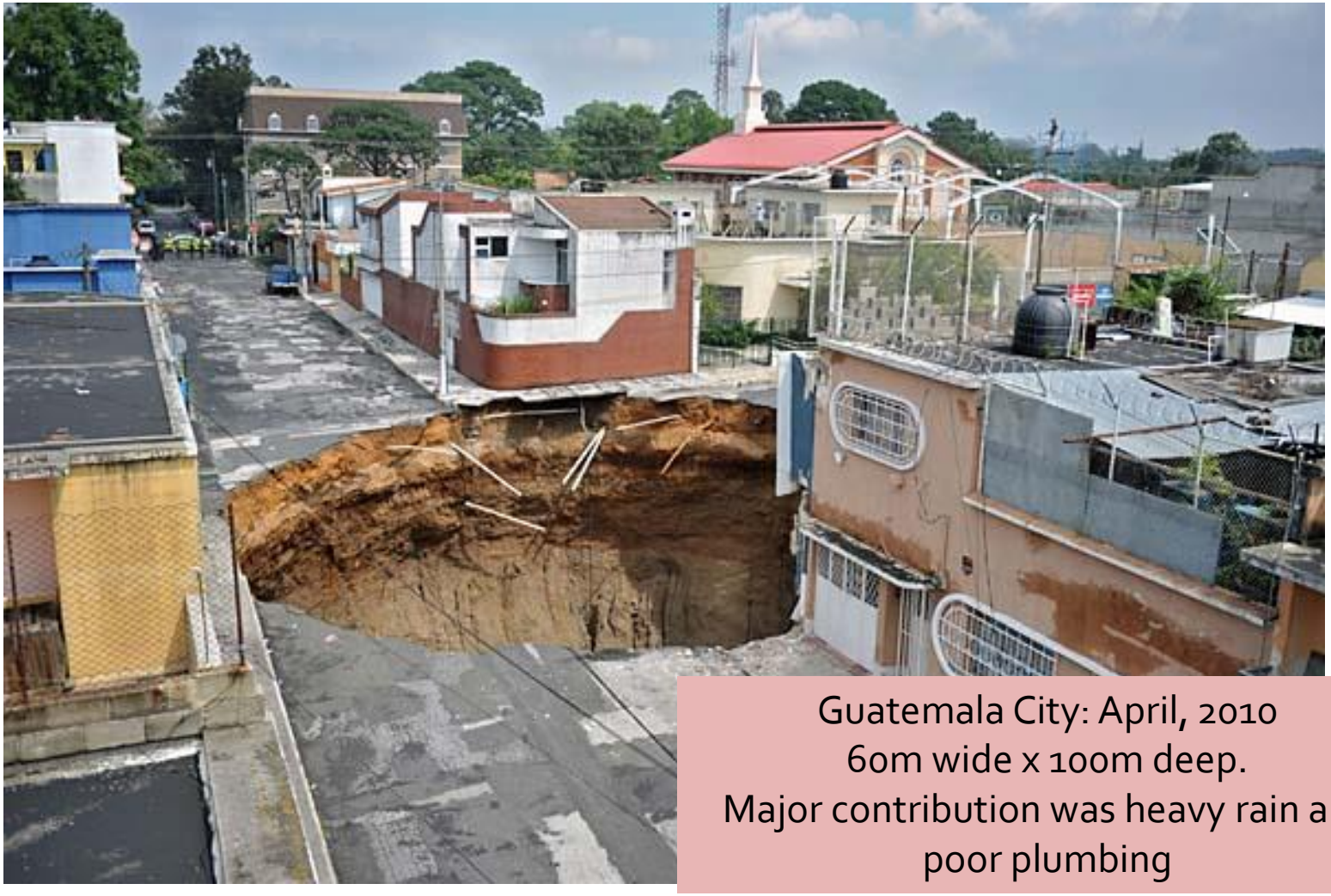


RURAL Applications : H2 / E Class and or SLIP SITES



Is this a plumbing Problem??

Sodic Soil + Plumbing leaks + heavy rainfall = Disaster



Guatemala City: April, 2010
60m wide x 100m deep.
Major contribution was heavy rain and poor plumbing

Summary

60 to 70% of Residential housing,
in Victoria and the
Greater New South Wales area
are currently being **built** on
REACTIVE SOILS.

Drainage problems **will** increase
maintenance costs if
AS 2870-2011 and AS 2032-2006
regulations are **not** followed.


STORM PLASTICS
Storm Plastics
MANUFACTURERS OF SPECIALISED PVC-U PLUMBING PRODUCTS
ENGINEERS AUSTRALIA – STH WEST GROUP - VICTORIA