Determination 2008/32

Dispute regarding the venting of a branch drain using an air admittance valve to a building at 122 Remuera Road, Auckland

1. The matter to be determined

1.1 This is a determination under Part 3 Subpart 1 of the Building Act 20041 ("the Act") made under due authorisation by me, John Gardiner, Manager Determinations, Department of Building and Housing ("the Department"), for and on behalf of the Chief Executive of that Department. The applicant is the owner, Verne Developments Limited, acting through a firm of consulting engineers ("the applicant"). The other parties are the Auckland City Council ("the territorial authority").

1.2 The territorial authority has declined to issue a building consent because the proposed method of venting a branch drain in a proposed medical centre does not comply with the Building Code Clause G13 "Foul water".

2. The building

2.1 The proposed building is a medical centre containing 3 levels of office accommodation and 1 level of carparking at basement level.

2.2 In a letter to the applicant dated 8 February 2008 the territorial authority said:

> [Drawing] shows a branch drain with an air admittance [valve] installed. As this drain is greater than 10 metres in length it needs to have an open vent installed.

The territorial authority advised the application was "on hold" pending the resolution of the matter.

2.3 The branch drain is shown in figure 1. It is located on level 2 of the building and is approximately 13 metres in length. It is vented by an air admittance valve ("AAV").

[1] The Building Act 2004 is available from the Department's website at www.dbh.govt.nz.

The branch drain serves two WC pans, and two wash hand basins which each discharge through a separate floor waste gully. The branch drain is unable to be connected to an adjacent open vent because of a conflict with the building's structure.

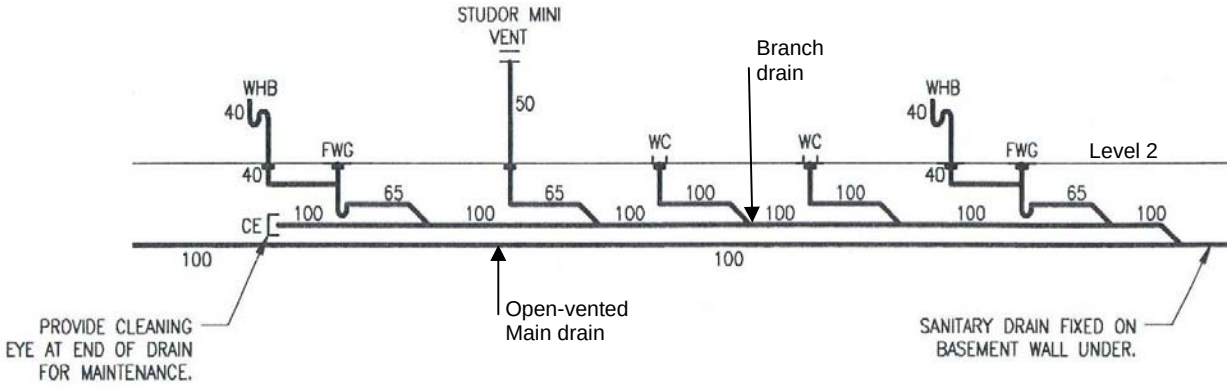

Figure 1: Schematic layout of the branch drain

2.4 In its application to the Department the applicant submitted that:

> [The] plumbing design uses an Air Admittance Valve to protect the water seals on fixture traps that are located on an over-distance branch drain.
>
> Australian Standard 3500.2 20032, Clause 6.9.1, permits the use of [air admittance valves] to ventilate branch drains.
>
> It is assumed that the [territorial authority's] refusal lies around the exclusion the [Department] has applied to the use of Australian Standard 3500.2 for use in New Zealand.
>
> . . . if the Australian Authorities are prepared to condone the use of [air admittance valves] to vent a branch drain, then clearly New Zealand, being a signatory to and part of the committee that formulates and compiles this joint AS/NZ Standard, should surely accept this simple design enhancement.
>
> From a technical plumbing viewpoint, the exclusion of [air admittance valves] in this situation has no sound basis.

3. The legislation

3.1 The relevant Clause from the Building Code Clause G13 "Foul Water" says (emphasis added):

> Clause G13.3.1 The plumbing system shall be constructed to:
>
> (c) Avoid the likelihood of foul air and gases entering buildings . . .
>
> Clause G13.3.2 The drainage system shall:
>
> (e) Be ventilated to avoid the likelihood of foul air and gases accumulating in the drainage system and sewer . . .

3.2 The relevant parts from the Acceptable Solutions for Clause G13 include the following:

3.2.1 Acceptable Solution G13/AS1 'Sanitary Plumbing', Table 5 (part) says:

Table 5: Venting requirements
Paragraphs 4.5.2, 4.6.2, 5.1.1, 5.5.1, 5.5.2 and 5.8.1

Stacks

Stack vent: All stacks discharging to another stack or to a *drain* require an open vent, sized in accordance with Table 6. Venting with an *air admittance valve* is permitted only on second and subsequent stacks as at least one open vent (the stack vent, if acting as main *drain* vent) is required to ventilate the *drain*.

Venting of main drains

Main *drains* discharging to the *sewer* or to an on-site disposal system are required to be vented with a minimum 80 mm open vent.

Venting of branch drains

Branch *drains* connected to a vented *drain* that exceed 10 m in length require venting with an open vent, sized in accordance with Table 6.

3.2.2 Acceptable Solution G13/AS2 'Drainage', Table 3 says:

Table 3: Venting Requirements for Drains
Paragraph 4.1.2

Stacks acting as drain vent

Stack vent: All stacks discharging to a *drain* require an open vent, sized in accordance with Table 6 in G13/AS1. Venting with an *air admittance valve* is permitted only on second and subsequent stacks as at least one open vent (the stack vent, if acting as main *drain* vent) is required to ventilate the *drain*.

Venting of main drains

Main *drains* discharging to the *sewer* or to an on-site disposal system are required to be vented with a minimum 80 mm open vent.

Venting of branch drains

Branch *drains* connected to a vented *drain* that exceed 10 m in length require venting with an open vent, sized in accordance with Table 6 in G13/AS1.

3.2.3 Acceptable Solution G13/AS3 'Plumbing and Drainage' says:

> Clause 1.0.3 Modifications to AS/NZS 3500.2[2] Clause 6.9.1. Delete "and to ventilate branch drains".

AS/NZS 3500.2 Clause 6.9.1 is therefore amended to say:

> Air admittance valves complying with AS/NZS 4936 may be used in sanitary plumbing systems for trap vents, group vents and stack vents ~~and to ventilate branch drains~~. They shall not be used for the upstream venting of a main drain.

4. The draft determination

4.1 The draft determination was sent to the parties on 14 April 2008. The applicant accepted the draft without comment.

[2] Australia and New Zealand Joint Standard AS/NZS 3500:- Plumbing and drainage Part 2: 2003 Sanitary plumbing and drainage

4.2 In an email to the Department the territorial authority said it accepted the draft because the length of the branch drain only exceeded the 10 metre maximum drain length in Table 5 of G13/AS1 by about 3 metres. However, the territorial authority submitted that only an open vent could provide surety of compliance with Clause G13.3.2 (e) and preserve water seals to appliances. The territorial authority believed the reliance on AAV's exposed building users to unnecessary risk.

4.3 In response I note the principal function of AAV's is protect the water seals of fixture traps to avoid foul air and gases entering buildings. In this instance the requirements of G1.3.2 (e) will also be met because the number of fixtures on the branch drain will ensure air is drawn into the drain when the fixtures are discharged. There are therefore situations when there would be insufficient fixtures to ensure air is drawn in through an AAV and an open vent would be required.

5. Discussion

5.1 Drainage systems shall comply with Building Code Clause G13 and in particular Clauses G13.3.1(c) and G13.3.2(e) to, respectively, prevent foul air and gases entering buildings and to avoid the likelihood of foul air and gases accumulating in the drainage system and sewer. The performance requirements of Clauses G13.3.1(c) and G13.3.2(e) are quite different. However, G13.3.2(e) suggests that drainage systems should be open vented.

Ventilation of drains and sewers

5.2 Foul air (incorporating sewer gases) will be produced and accumulate in drains and sewers. Foul air is lighter than normal air and will tend to accumulate at high points within the plumbing and drainage system, generally at the head of a stack or drain, and at fixture traps.

5.3 Main drains and branch drains have traditionally (and under previous legislation) been open vented.

The operation of AAVs

5.4 An AAV is designed to allow fresh air to enter the plumbing/drainage system and prevent foul air escaping from the system.

5.5 An AAV operates only under slight negative pressure. Stacks and branch drains with AAV's are ventilated when air is drawn in though the AAVs when sanitary fixtures (such as toilets) discharge into the stack or drain.

5.6 I note that G13/AS1 permits the use of an AAV to vent a stack, but only where the stack is not also acting as a drain vent. The question therefore arises - what is the difference between venting a stack under G13/AS1 and venting a branch drain using an AAV?

Prevention of foul air and gases entering buildings (Clause 13.3.1, G13/AS1)

5.7 A sanitary plumbing system incorporating a vertical stack with smaller diameter pipe work, numerous branches and multiple fixtures is very likely to be subject to positive and negative pressures.

5.8 The primary function of the AAV in this situation is to protect the water seals of fixture traps from any pressure fluctuations to avoid foul air and gases entering buildings. Any AAV will allow air to be drawn air into the system under negative pressure.

5.9 An AAV will not allow foul air to escape from the plumbing system. I note that Clause G13.3.1 does not require foul air to be prevented from accumulating in the plumbing system.

Avoiding the likelihood of foul air and gases accumulating in the drainage system and sewer (Clause 13.3.2, G13/AS2)

5.10 A drainage system, normally consisting of large diameter graded pipes is not likely to be subjected to the same pressure fluctuations as a plumbing system given that the drain would need to flow full bore to generate such pressures. It is therefore less likely that an AAV connected to a drain vent would operate. Principles of drainage design in AS/NZS3500.2 are such that the drain should not flow full bore at any time.

Summary

5.11 Main drains must be ventilated by either an open drain vent, or an open stack vent which acts as a drain vent. Only one open stack vent is required if there is more than one stack connected to the drain. Second and subsequent stacks can be vented with open vents, or alternatively, AAV's.

5.12 Clearly there is a conflict between the solutions offered by G13/AS1 and G13/AS2. However, venting second and subsequent stacks with AAV's is directly comparable to a drainage system having branch drains (over 10 metres in length) being vented using AAVs.

5.13 While it is possible that more fixtures will discharge into a stack than into a branch drain, venting using an AAV sized in accordance with Clause 6.9 of AS/NZS 3500.2 will provide enough air to allow for proper functioning of the stack or drain.

5.14 The Acceptable Solutions G13/AS1 and G13/AS2 offer one means, but not the only means, of complying with the Building Code. It is important to note that AS/NZS3500.2 in its unmodified form is an Australasian standard. Given that the territorial authority need only be "satisfied on reasonable grounds" and that the Acceptable Solution is not a mandatory means of compliance, the territorial Authority would be well within its powers to accept this design as an alternative solution based on a well-proven joint Standard.

5.15 In summary, venting branch drains with suitably-sized AAV's is an acceptable alternative to the use of an open vent.

6. The decision

6.1 In accordance with section 188 of the Building Act 2004, I confirm that the use of an AAV on the branch drain as described herein complies with the Building Code and according reverse the territorial authority's to decline to issue the building consent.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 9 May 2008.

John Gardiner
Determinations Manager