

# Basements and Special Foundations

Whispers article and sneak preview for 24<sup>th</sup> June London Club talk

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## *Summary*

First, a shock tactic in the hope you will read on!

Is today's Building Owner's Surveyor now acting as Advocate to the Building Owner and design team?

Engineers' drawings have changed. I now see structural phrases on drawings dictated by Building Owners' Surveyors such as notes referring to mass concrete structural blinding, reinforced concrete underpinning, specifications for builders describing the formation of a 'wall' in 1m lengths, superfluous blocks of mass concrete under reinforced retaining walls, forming no engineering function, delaying construction work and compromising health and safety in excavations.

It would seem that the spirit of the Act is dying in many instances and the credibility of the surveying and engineering profession is under threat if we cannot sort this out and provide more consistent advice to our appointing owners and clients. Can we please review the Section 20 interpretation of the various structural components so that the true spirit of the Act can be restored and Surveyors can be given the tools to do their job more effectively and without so much disagreement and loss of time and money to clients.

Two questions keep arising during retrofit basement designs:

- a) What makes a special foundation 'special' and why does this structure receive particular attention in the legislation?
- b) Why is there so much disagreement between surveyors over the interpretation of simple foundation structures within the Act if neither party has a promotional role?

I have recently written an article for the Structural Engineer journal suggesting that the engineering profession needs to do more to train engineers in Party Wall procedures; when the Act applies, how to design responsibly with a duty of care to the Adjoining Owner and how to act in an advisory capacity to the Adjoining Owner's Surveyor. See separate paper if interested.

Health warnings, advance apologies and olive branches are all offered early in this paper, intended to provoke healthy discussion, drawn from a number of exceptional cases in recent times to highlight a potential problem for the future. It concerns me that my observations and experiences are drawn from persons who are experts in their field.

I worry how the non expert can be expected to apply the Act given the lack of agreement between experts. Our building stock is at serious risk of future redundancy if clever engineering solutions are increasingly allowed to prejudice neighbouring property.

In thirty years of practice, I have noticed a marked change in two aspects of Party Wall procedures which concern me, one technical and one procedural.

The first change is a technical point and concerns the complexity of basement construction resulting from commercial pressure on space. This leads to increasingly complex foundation solutions where the Building Owner's substructure is rigidly connected to, or is part of, the Party Wall foundation. See figures 3 and 4 below. Almost all are 'Special Foundations'.

The second change I have noticed is the increasing trend for some Building Owners' Surveyors to act as 'Advocate' to the Building Owner with regard to avoiding the Special Foundation aspects of the Party Wall Act, whilst still prejudicing the Adjoining Owners' rights. I suspect this is, in the main, simply to avoid complicated discussions with Appointing Owners and other surveyors resulting from a lack of clarity in the Section 20 interpretation of the structural terms 'Foundation' and 'Special Foundation'. These 'interpretations' are no longer sufficient to deal with modern basement construction techniques in my opinion. A proportion of this advocacy is however clearly one of commercial expectation to satisfy an Appointing Owner and design team.

The rights of Adjoining Owners are now regularly being prejudiced by a more 'commercial' application of the Party Wall Act and the Section 20 Interpretations need urgent review and must include 'engineering' definitions.

From all of the above, there is a tremendous opportunity for the Pyramus and Thisbe Club to lead the way. Cross party discussions between surveyors and engineers, RICS and I Struct E could see further technical guidance notes following those excellent articles issued to all members dated September 2010. A series of guidance notes or a further revision of the Green book in due course could update the 'interpretation' of Section 20 of the Act which would provide invaluable help to Party Wall Surveyors and design engineers alike.

### *Introduction*

Today's basement extensions are becoming as common as loft conversions. They are becoming larger, with more innovative engineering design and construction techniques creating significant underground development. Some are builder-led with little 'engineering' input. Others are highly engineered.

The public are concerned about the stability of neighbouring property and the impact on ground water and underground streams. Local Authority Town Planning policy is changing as a result, requiring early engagement of engineers and Party Wall surveyors. This is essential when engineers specify 'Special Foundations' as they may not be permitted by the Adjoining Owner even if the surveyors agree and this can lead to months of abortive time and costs.

In my formative years, I had not heard of the Party Wall etc Act or The London Building Acts as a Graduate Engineer, until the first project requiring Party Wall procedures tripped me up! 30 years later I meet many engineers and some have very little knowledge of the Act and do not know when to advise their clients that the Act applies to their designs.

In recent years, as a building surveyor I have surveyed all manner of properties with basements extending from the front of the front garden to the very end of the rear garden. Some of these have created restrictive development potential for the neighbouring property and new owners, surveyors, designers and estate agents are cursing the previous generation of development. This is a relatively new phenomenon but is increasingly common.

#### *A brief recap*

The derivation of the London Building Acts stemmed from the experiences learnt following the Great Fire of London and the rebuilding of many terraced properties with fireproof walls built from stone and brick.

The principle of the Act was for Adjoining Owners to have equal repairing liabilities so that Party Walls did not fall into disrepair. Furthermore the Act developed periodically and the spirit of the Act was to allow a Building Owner reasonable development of the Party Wall, whilst protecting the interests of the Adjoining Owner.

Of considerable importance however, is the fact that the London Building Acts were drafted at a time when complex basements were rare. Unfortunately the Section 20 interpretation of simple structural components can no longer keep up with the technical complexity or commercial pressures of today.

Party Walls were built on their own simple foundations immediately below ground level. Party Wall considerations were based on 'above ground level' separating walls, not subterranean living adjacent to someone's foundations. New terraces of houses are normally built this way. It is the relatively new phenomenon of retro fit basement and subterranean living that has created our current 'Special Foundation' dilemmas in the main.

I doubt that those who crafted the simple Section 20 'interpretations (not definitions) for the structural elements (walls, foundations and special foundations) even anticipated subsequent generations would spend so much time deliberating over their meaning.

Party Wall foundations no longer simply support vertical loads from plain masonry walls above ground. They resist significant horizontal and overturning forces in many

instances now. I would make specific reference to a specific Party structure; the reinforced retaining wall here, since, to an engineer, a retaining wall is an intrinsic part of geotechnical/ foundation engineering, resisting vertical horizontal and overturning forces and normally providing 'support' to a wall and the Adjoining Owner's soil and foundations. It is too simplistic to call part of this single structure a 'wall' and part of it a 'foundation'. To 'want' to do so is to be an advocate, in my opinion, as it ignores the 'Special Foundation aspects. See later.

The majority of points made in this article are based on reinforced concrete underpinning ('Special Foundation') of terraced property but other areas where Party Wall engineering problems arise also include:

- a) Raising a substantial Party Wall in less durable materials.
- b) Raising a Party Wall partly on the Party Wall itself and partly on adjacent new framed structure.
- c) Raising the Party Wall on a cantilever (framed structure).
- d) Significant vertical chases/ slots in Party Walls (eg for columns, services etc).
- e) Method/ site related matters associated with deep excavations and temporary works.
- f) Work to Party Floors (separating floors between flats).

### ***Special Foundations***

It is important to remind ourselves why there is a 'special foundation provision within the Party Wall Act and what this means for Adjoining Owners and their advisors.

Special Foundations are defined specifically in section 20 of the Party Wall etc Act 1996 (and previously in the 1939 London Building Acts) as "an assemblage of beams or rods employed for the purpose of distributing load". In basement construction this normally means a reinforced concrete foundation, often asymmetrical about the Party Wall and often integral with the Building Owner's raft/ ground beams/ pile caps. In the 1920's and 30's this was more commonly associated with steel beams forming foundation grillage bases for framed structures, which sometimes imposed on the Adjoining Owners land, local to column bases but did not provide wholesale support to the Party Wall.

Why are Special Foundations singled out and why do they require specific consent from a neighbour? The Green book says "Special means that reinforcement is used which often creates complex foundations relying on integrity for strength....." This does perhaps not go far enough to explain the significance as 'integrity' only infers 'quality'.

It engineering terms this complexity could be further explained by the 'distribution of loads or forces to adjacent structures'. In other words, that portion of the foundation

immediately beneath the Party Wall is not strong or sufficiently stable enough on its own and the applied forces need to be resisted by adjacent structures remote from the Party Wall foundation. These might be so remote that the Adjoining Owner cannot subsequently use this method of support. Furthermore the distributed loads are transferred into the current Building Owner's structure, therefore any future use of the wall may damage/ cause settlement/cracking of the current Building Owner's premises. The most extreme example of this is a cantilevered piled raft supporting a Party Wall. The neighbour cannot realistically underpin the piles or add additional load to those piles in the future. If he excavates, he removes the skin friction from the piles and this could have disastrous consequences to the current Building Owner.

### ***Three decades of change***

The 3 diagrams below are indicative of the change in underpinning technique during the 30 or so years of my working career to date. The diagrams are simplified and exclude non structural detail such as waterproofing and drainage.

The changing trend is achieving faster construction and achieving more space for the Building Owner, but at what cost to subsequent neighbouring properties?

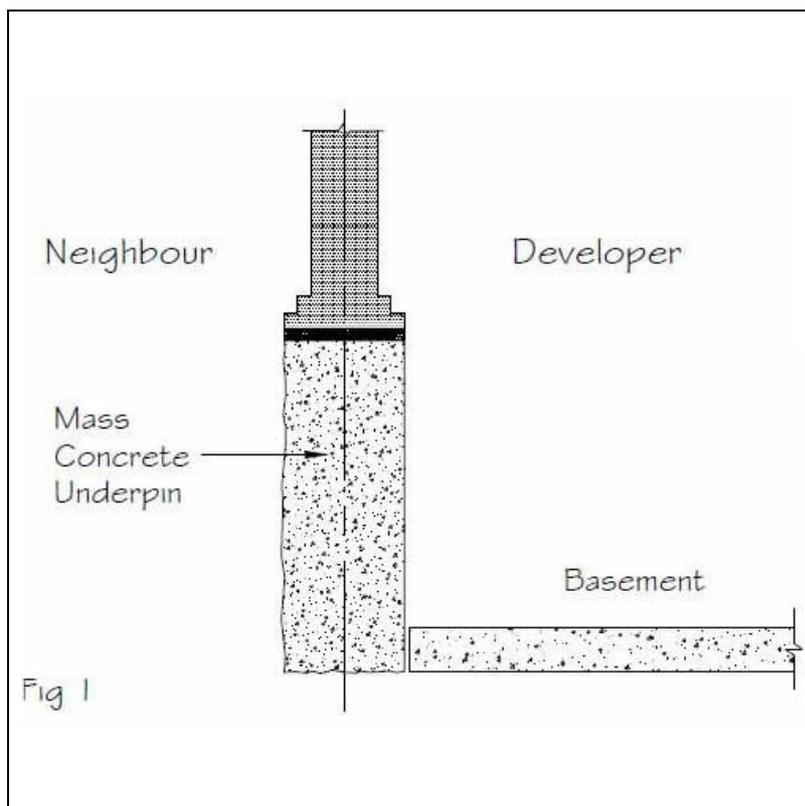


Figure 1. 1980's: A typical mass concrete underpinning scheme. A separate basement raft slab and wall or tanking/ dry lining/ drained cavity were provided.

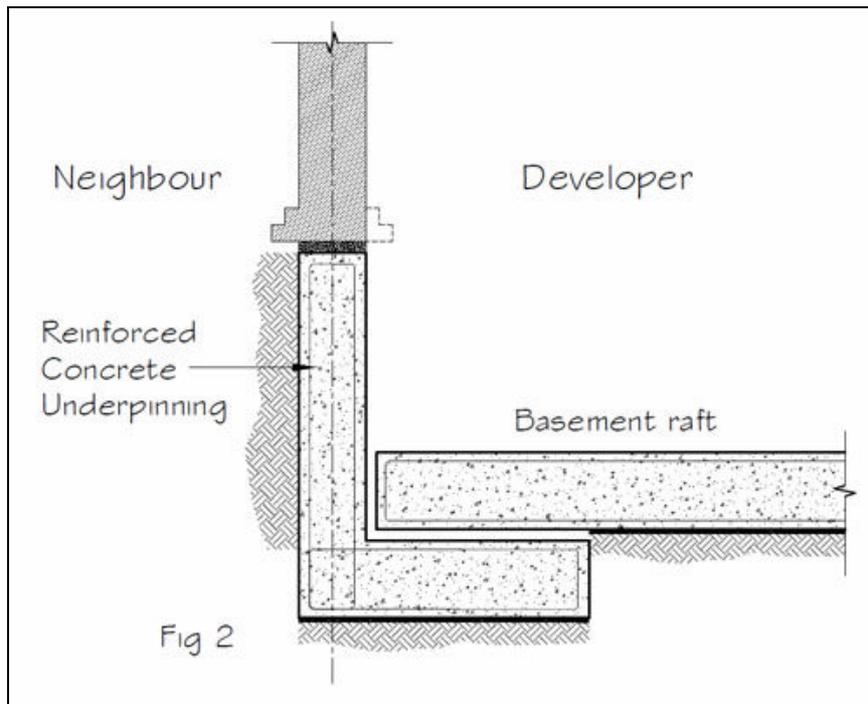


Figure 2. 1990's: To save space, the mass concrete is replaced by reinforced concrete ('Special Foundation') but it is separate from the Building Owner's basement raft and other foundations.

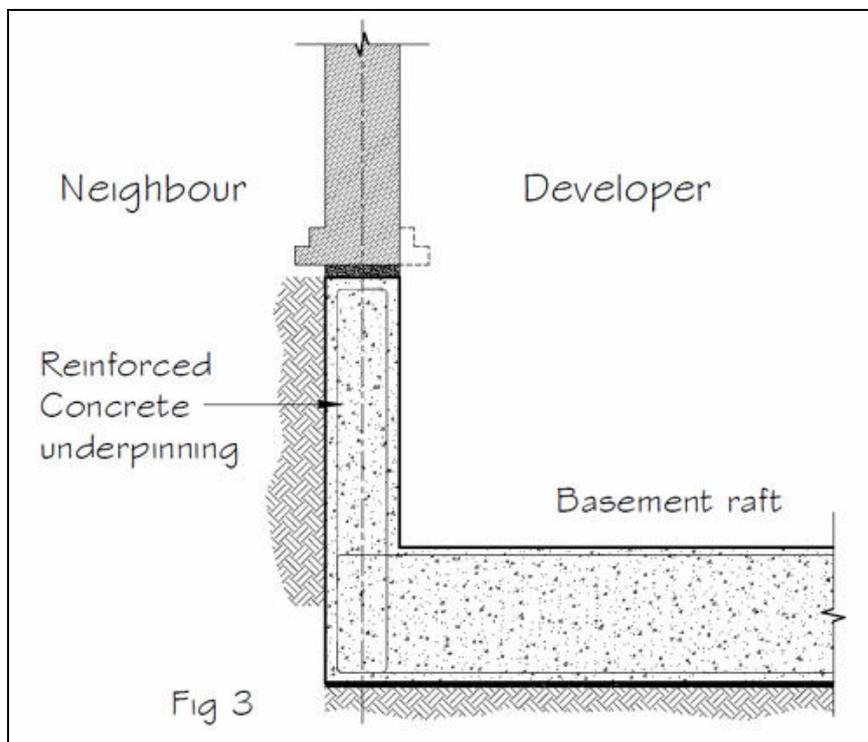


Fig 3. 2000's: To save space and improve watertightness, reinforced underpinning is integral with the Building Owner's raft foundation, sometimes piles, swimming pool, lift pit etc.

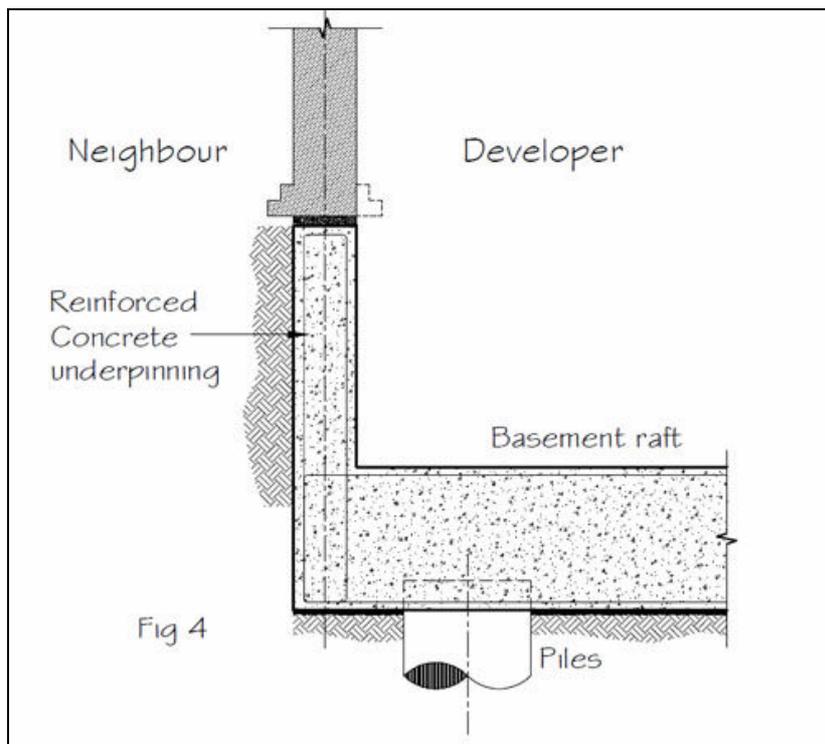


Fig 4. 2010's: Substantial superstructures often include piles and more substantial raft foundations.

Over three to four decades we have seen the demand for additional space virtually eliminate the mass concrete underpinning in Figure 1. It is used in domestic subsidence repairs and the most utilitarian basements where ground water is less of an issue and dry lining with a drained cavity is sufficient (Ciria report 139 and BS 8102, grade 3 environment)

Today's trend for deeper and higher specification basements (High quality residential habitation (grade 4), paper archive storage etc) and faster construction methods (top down construction etc) has seen increasingly complex construction. Architects have 'sculpted' the space available for clients and have asked engineers to increasingly merge the Building Owner's foundation structure with the Party Wall foundations.

The trend is for the Party Wall foundation to become part of the Building Owner's foundation structure (Figures 3), to save space for the Building Owner. In recent months I have viewed proposals for deep piled underpinning of Party Walls, complex raft structures, some piled and all manner of part mass and part reinforced concrete underpinning, with endless arguments regarding what constitutes a wall, a foundation and a special foundation. All have in common, a highly engineered basement for the Building Owner that is rigidly connected to the Party Wall foundation, making any subsequent use of the Party Wall difficult without imparting loads and settlements into the current Building Owner's structure. Figures 3 and 4 above.

Is this how Party Walls should be constructed and founded (underpinned) and is this broad principle at odds with the fundamental principles of a shared 'Party' Wall being more independent of either neighbours' foundations and superstructure?

### ***Opinion***

In my opinion, engineers are creating problems for future generations in some instances, albeit inadvertently in the main by forgetting about the Adjoining Owner's rights when designing projects for their clients. I vet lots of competent designs, but they overlook the restrictions that might burden the adjacent property in the future, whilst striving to assist architects to maximise space, and deal with difficult waterproofing issues and construction sequences.

Engineers need to take a more active role in Party Wall matters generally, but must specifically be more mindful of the 'Special Foundation' provisions of the Party Wall Act when designing basement structures. More training is required to familiarise engineers with the Party Wall legislation and the associated ethics.

It is important that clients and designers encourage the appointment of suitably experienced Party Wall surveyors (many basements are for lay clients who are not familiar with Party Wall procedures and rely on the design team to introduce appropriate surveyors. This often occurs too late in the design process).

I believe the current Section 20 interpretation of simple structural forms (wall/foundation/ special foundation) is insufficient to cope with the modern commercial development pressure.

The dispute resolution aspects of the Act work well, but the interpretations of 'Foundations' and 'Special Foundations' in section 20 are inadequate and the imprecise nature of these interpretations no longer help surveyors to carry out their work properly. They allow the 'enabling' spirit of the Act to be advanced at the expense of the Adjoining Owners' future rights in my opinion.

I would like to see surveyors acting cautiously when interpreting the phrases 'foundation' and 'special foundation' so that the Act protects when in doubt rather than advocating development which might prejudice the rights of neighbours. There are after all several alternative solutions available to a design team, even if a small number of square feet are conceded within a new basement for example. There are too many time and money consuming arguments between surveyors debating what constitutes a Special Foundation. If a more cautious approach were adopted there would be wider agreement and the rights of Adjoining Owners would be better served.

As an Advising Surveyor to the Adjoining Owner's surveyor I now hold ludicrous discussions with Building Owners' engineers. They are embarrassed when asked why their drawings include 'structural mass concrete blinding' and superfluous blocks of mass concrete beneath reinforced concrete retaining walls. Some add construction time and cost and add safety risks by leaving underpinning excavations open longer than normal.

It seems preposterous that some argue that the process of excavating and building reinforced concrete in 1m lengths, below ground is no longer the creation of an underpinning foundation, but is the creation of a wall via a downward extension or downward raising of the wall. Surely the spirit of the Act is truly dead if this trend continues!

These 'tricks of the trade' are of course to avoid 'Special Foundation' discussions and are sometimes 'advanced' by the Building Owner's surveyor. Unfortunately the arbitrary presence of some mass concrete beneath the reinforced concrete does not change the engineering design principles and the special foundation (assemblage of rods for the purposes of distributing load etc) assessment should still take place to assess whether the Adjoining Owner's future rights are prejudiced or not.

I would propose that the term "special foundation" is replaced with the term 'Special Structure', applicable to all 'Party Structures'. This would allow normal good engineering judgement to govern decisions rather than the English dictionary/geometrical shape of foundations to escape the safety net of prudence to look after the Adjoining Owner. This would allow reinforced retaining walls and the raising on a cantilever to be dealt with. It would not adequately deal with separating floors however. Openings beneath such structures should be dealt with under the 3m rule, with excavation for foundations analogous to the removal of support where a supporting wall is removed. Another one for another day however!

Engineers need to engage with the Party Wall profession, to provide 'robust details' or technical guidance notes to assist designers and surveyors. This could be via an update to a future 'Green Book' or via additional guidance notes similar to those produced by the P and T club in September 2010.

Surveyors need to do more in my opinion to safeguard neighbouring property and their future development potential. I see far too many surveyors acting as Advocates for the Building Owners, providing short term 'enabling design solutions' at the expense of the Adjoining Owner AND the long term financial value and development potential of both buildings. Clients and Landlords etc will not thank us in years to come when the buildings are redeveloped and we advise clients that the development potential of the site is less because of works previously carried out.

Put simply, Party Walls should ideally remain separate from other foundations. If we do not act as long term custodians of the wall, nobody else will.

### ***Social engineering***

*This section is from my article for the Institution Of Structural Engineers journal.*

The role of the advising engineer (advising the Adjoining Owners Surveyor is of utmost importance. The engineering complexity is often the reason why a scheme might prejudice an Adjoining Owner and this is not something the surveyors will normally discern themselves. It is therefore essential that the Adjoining Owner's Surveyor appoints an engineer who is able to look beyond the normal technical audit and appraise the 'social engineering' consequences of a scheme and advise the surveyors accordingly.

The Building Owner's surveyor should remind the Building Owner's design team (if involved early enough) of the prejudicial issues and their duty of care to consider the Adjoining Owner's interests.

The advising engineer's role is not a conventional technical audit of engineering adequacy alone. The role of the engineer is to advise the surveyor(s) regarding whether the proposed works:

- a) Are safe and will not cause significant damage to the Adjoining Owner, during or after the works.
- b) Restrict the future use of the Adjoining Owner's property and Party Wall. This is not something engineers are normally used to considering. Ideally this should be written into the engineer's brief to remind them of this role.

The recent P and T technical guidance notes are excellent and the Advising Engineer's guide (Guidance note 10) should be circulated to every engineer when opportunity arises and should not be kept within the P and T club membership. The role of wider 'education' to the industry is a worthy cause which can only further improve the P and T clubs reputation for professionalism within the industry in my opinion.

I would stress that almost all Building Owners' engineers' proposals I vet, for Adjoining Owners' surveyors, are safe and well engineered from a safety and strength point of view. The difficulties arise when insufficient thought is given to the neighbourly matters and specifically the design of 'Special Foundations' and monolithic structures on the Building Owner's land that becomes entangled in the shared Party structure.

### ***Conclusions***

The Party Wall legislation works well for routine dispute resolution when technical definitions are not an issue.

Today's commercial world of development and more advanced design and construction techniques have however pushed the boundaries and many of today's schemes were not envisaged when the London Building Acts and Party Wall Act 1996 was written. As a consequence, engineers and surveyors struggle to agree how the Act should be interpreted when dealing with basements and Special Foundations.

The English language 'interpretation' of some wording within section 20 of the Act is now insufficient for today's complex basements and Party Structures and it is increasingly difficult for Party Wall surveyors to do their job properly, without more technical guidance and consistent advice from structural engineers.

In the writer's opinion, more and more surveyors are in danger of becoming advocates instead of arbitrator, promoting the enabling aspects of the Act at the expense of the Adjoining Owner. This is particularly noticeable amongst less participative surveyors who are not members of the P and T club. The balance has

on occasion tipped too far in favour of development and short term gains, to the detriment of the neighbour and longer term development of property.

The most concerning example of pro development work concerns the bending of the rules concerning the definition of a wall and a foundation. I now see engineers drawings entitled “downward raising of the wall” instead of “underpinning”! I also see that mass concrete blinding is now called a foundation by those advocates trying to avoid Special Foundation discussions. These ‘tricks’ do not assist the construction process, on the contrary, but avoid the Special Foundation provisions of the Act according to some. They still present the same engineering issues that prejudice the Adjoining Owner.

Perhaps the ‘Special Foundation’ provisions go too far the other way, allowing an adversarial Adjoining Owner to simply say “no thank you”. However the complexity of some special foundations IS compromising future generations of property, so if we put the short term interests of the current owners to one side for a moment, this long term custodianship is surely our default role.

I am minded to recommend that all Special Foundations are referred to a ‘third Surveyor’ style engineer, who could preside over the long term considerations but this would need RICS/ I. Struct E style accreditation so that an appropriate panel of structural engineers could be consulted, rather than a mate of one of the surveyors.

Debate over when a wall becomes a foundation with regard to the position of reinforcement is only an issue when surveyors act as advocates. The Party Wall Act needs to be updated and the word ‘Foundation’ should be replaced with the word ‘structure’ so that the focus is on engineering rather than the use of English language and the real business of whether Party Wall works prejudices the neighbouring property or not.

The default position for surveyors, if in doubt, should be ‘no thank you’ rather than ‘ok then’.

### ***Recommendations***

- a) The P and T club could prepare technical guidance to assist surveyors and engineers dealing with the section 20 Interpretations for Special Foundations. Ideally this would follow cross professional discussion with RICS, I Struct E and ICE so that surveyors and engineers embrace it. We need to connect with professionals beyond the P and T club if we are to make a difference.
- b) Such guidance could compliment the recent excellent series dated September 2010 and could be incorporated into a subsequent edition of the Green book. Ideally this would ultimately see a revision to the legislation in time.
- c) If the Act could be updated I would recommend that the party WALL matters refer to ‘above ground’ discussions where there is habitation on both sides of the wall. Everything below ground and below an adjoining Owners habitable

space should be termed a 'Party Structure' and the phrase 'Special Structure' would replace the phrase 'Special Foundation'.

- d) Engineers need to receive more training in Party Wall issues generally but particularly the duty of care and prejudicial issues regarding Adjoining Owners. Instructing surveyors could issue the P and T guidance note 10, September 2010 when instructing Advising Engineers.
- e) It would seem that the spirit of the Act is under considerable pressure from the commercial approach of developers and designers in their quest to maximise space. Updating the tools of the job, in respect of the section 20 interpretations would assist surveyors considerably, even if this were only via a 'best practice' Green Book approach in the short term.
- f) In the meantime I would like to see surveyors use the spirit of the Act and to act conservatively, to preserve our building stock for others to enjoy in the future.

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