Out of Scope

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From: Michael Belsham
Sent: Friday, 6 May 2016 1:41 p.m.
To: 'Ed Claridge'
Subject: RE: Tall building structural proposal - confidential [IN-CONFIDENCE:RELEASE EXTERNAL]

Ed,

Thank-you for sending this through. The proposal is invaluable to inform our thinking on amendment to C/VM2.

Having a quick look I was encouraged to see some robustness in design with High Challenge Fires however equivalent severity looks no more than 30 minute FR.

There doesn't appear any consideration of height or good practise particularly protection to columns. One of the references for tall buildings is "Fire safe design: A new approach to multi-storey steel-framed buildings (Second edition)". This stresses importance of protection of columns:

"It was concluded that, until more was understood about how much of a column could be left exposed, in the subsequent tests and in any design recommendations, columns should be protected for their full height. Protecting columns over their full height is important if damage is to be confined to the fire floor."

I note the reference to AS/NZS 1170 and would question compliance to B1/VM1.

Kind Regards,

Michael Belsham
FIRE ENGINEER

Building System Performance Branch | Building Resources & Markets
Ministry of Business, Innovation & Employment
Level 5, 15 Stout Street, PO Box 1473, Wellington 6143

BUILDING PERFORMANCE

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT

From: Ed Claridge [mailto:ed.claridge@aucklandcouncil.govt.nz]
Sent: Friday, 6 May 2016 1:01 p.m.
To: Michael Belsham
Subject: Tall building structural proposal - confidential
Importance: High

Hi Michael,

Here is the proposal which includes the 'piecemeal' approach to the approvals. The project are not yet aware that I have sent this to you so I would appreciate this being treated with confidence. Also we have not completed our review so I do not wish to make any assertions about its acceptability or not which may influence your thinking. It would be appropriate to inform the project that I have sent this to you but perhaps I do that when

a) if you wish to take this further following review and
b) if we council get into any dispute regarding matters that would benefit from MBIE's involvement.

My initial thoughts are that splitting this into 2 parts and seeking approval for this prior to the FEB process being initiated is problematic and potentially inappropriate. The proposal may be sufficiently robust and conservative that it may not need to be viewed in the context of an holistic design, but that would be contrary to robust engineering practice and what they are trying to achieve I believe in terms of rationalising the structural fire design and value engineering. At the moment I have not seen much to indicate that the proposal considers any consideration of risk with regards to building height. Council will need to complete its review but I expect that we will need to have a number of discussions regarding these issues as well as how, for example, they propose to demonstrate the fire related requirements of B1.

Regards

Ed Claridge | Principal Fire Engineer
Ph (09) 353 9372 | s 9(2)(b)(ii)
Auckland Council, 35 Graham Street, Auckland
Visit our website: www.aucklandcouncil.govt.nz

From s 9(2)(a)
Sent: Wednesday, 4 May 2016 8:25 p.m.
To: Ed Claridge; s 9(2)(a)
Cc: s 9(2)(a)
Subject: FW: s 9(2)(b)(ii) structural fire engineering: design fires
Importance: High

Ed, s 9(2)(a)

As discussed and agreed at meeting of Thursday 14 April 2016, s 9(2)(b)(ii) will provide the s 9(2)(b)(ii) Structure (L03 to top) Fire Engineering Brief in following Parts, with associated timeframes:

- Part 1 "Design Fires for Structural Fire Engineering" = Imminent
- Part 2 "Analysis of Structure in Response to Structural Design Fire" = Deliverable 2 weeks following resolution/ agreement with Auckland Council of Part 1 above.

Please find attached Part 1 referenced above, as dated 29 April 2016.

We note that scope of this review is proposed to be to office levels (being level 09 to 38) only, however we wish to continue dialogue re ability/ merit in extending this analysis to other levels of the tower also (L03 to L07). We also note that some Project elements referenced within attached are under review by the Project Team, reflecting current status of Design (being start of Detailed Design period).

As you are aware, Council's independent structural fire design regulatory reviewer is s 9(2)(b)(ii) . Council has engaged s 9(2)(a) direct as regulatory reviewer, with Council directing and managing any review scope required of s 9(2)(a) independent of s 9(2)(b)(ii) Council has advised that s 9(2)(b)(ii) can liaise direct with s 9(2)(a) to action and complete this scope of works – a sensible approach which is appreciated. Please can you issue attached Part 1 document to s 9(2)(a) allow his review of and agreement to same to commence - which will ultimately (we hope) lead to s 9(2)(b)(ii) producing Part 2 noted above.

Should s 9(2)(a) have any queries in relation to attached, we would encourage communication direct between s 9(2)(a) and s 9(2)(b)(ii) s 9(2)(a)

As discussed at meeting of Thursday 14 April 2016, following resolution/ agreement of both Part 1 and Part 2 of Tower (L03 to top) Fire Engineering Brief documents noted above to a state suitable to Auckland Council and s 9(2)(b)(ii) will proceed with balance of scope required of s 9(2)(b)(ii) to complete this Fire Engineering design for s 9(2)(b)(ii)

We look forward to Council response.

Kind regards

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From: s 9(2)(a)
Sent: Friday, 29 April 2016 1:09 PM
s 9(2)(a)

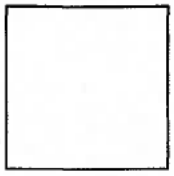
Subject: s 9(2)(b)(ii) structural fire engineering: design fires
Importance: High

Tony,

Please find enclosed our updated advice for the structural design fires for structural fire engineering for the s 9(2)(b)(ii) structure.
This covers the design fires for the office levels, which is the part of the structure where the bulk of fire engineering analysis is directed.

Regards,
s 9(2)(a)

My preferred communication medium is email or txt message. If you have trouble contacting me by phone please try these other methods.



s 9(2)(b)(ii)

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s 9(2)(b)(ii)

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s 9(2)(b)(ii)

From: Ed Claridge [mailto:ed.claridge@aucklandcouncil.govt.nz]
Sent: Wednesday, 20 April 2016 10:55 a.m.
To: Michael Belsham

Cc: Chris Rutledge
Subject: RE: B1 and C6 - structural stability in fire [UNCLASSIFIED]

Thanks Michael,

Sorry for the delay in replying but I wanted to send an email out first as I feel it would be beneficial for you to see this and councils view on the subject, refer attached. Hopefully the attached may help provide some clarification for this particular tall building project. The situation is getting more complicated by the day it seems given that we have more than one project on the table at the moment where these issues are being discussed and are critical to the design and consenting for the projects.

In response to the question below I have no issues with informing the other parties. In fact the whole process surrounding how this question gets answered needs to be robust because of the implications if we do not get the right answer.

I am also of the opinion that the answer may differ depending on project scale and specifics (i.e. construction type and height, type use etc.) and also how designers propose to demonstrate compliance with both B1 and C6. One of the challenges that we have as a consenting authority is that for large projects where specific consenting strategies are proposed that mean we do not see one single consent lodgement containing all of the code clauses, that it is not unusual for them to split them up and seek isolated approvals. Clearly in the case where they are seeking approvals for B1, C6 and C1-C5 all at different times and in isolation of each other, a significant amount of pressure is applied to the BCA to accept such an approach. Further for said projects it almost becomes impossible for the BCA to go back once the approvals are given irrespective of the consequences. The fact that many BCAs appear then to be accepting producer statement without question on these matters also does not help.

So please feel free to inform the other parties and seek their input. All I would ask is that the process surrounding this and the decision making is sound. Some people involved have a significant vested interest in the outcome of these decisions (both financially and professionally) and clearly any advice or position they take will be influenced by that interest.

Regards

Ed Claridge | Principal Fire Engineer
Ph (09) 353 9372 | s 9(2)(a)
Auckland Council, 35 Graham Street, Auckland
Visit our website: www.aucklandcouncil.govt.nz

From: Michael Belsham [mailto:Michael.Belsham@mbie.govt.nz]
Sent: Friday, 15 April 2016 5:07 p.m.
To: Ed Claridge
Cc: Chris Rutledge
Subject: RE: B1 and C6 - structural stability in fire [UNCLASSIFIED]

Ed,

We've discussed the query in house and we wish to inform the other parties of the question before this is answered to allow others to put forward any supporting evidence to support their position.

Kind Regards,

Michael Belsham
FIRE ENGINEER

Building System Performance Branch | Building Resources & Markets
Ministry of Business, Innovation & Employment
Level 5, 15 Stout Street, PO Box 1473, Wellington 6143

From: Ed Claridge [mailto:ed.claridge@aucklandcouncil.govt.nz]
Sent: Friday, 15 April 2016 2:47 p.m.
To: Michael Belsham
Subject: RE: B1 and C6 - structural stability in fire [UNCLASSIFIED]

Thanks Michael,

I have not replied to 'all' and will leave this to you if you would like to forward this email on.

So in response to Brian's email there are two questions I believe to clarify. The first two sentences relate to the B1 performances clauses.

The problem we have is that in summary (and if you can condense the designers view and responses to the actual matter in hand) the issue is that yes B1/VM and 1170 do provide a means to demonstrate compliance with B1. However the argument being put forward, (although being done so with lots of wording) is that B1/VM is not a code requirement and therefore we can't force them to follow that. The post fire stability and wind load may well be in B1/VM but because the code B1 performance clauses does not itself require you to consider fire and wind together there is nothing requiring them to meet this. Therefore they run the argument that they only have to meet C6.

The second part is about application of the VM. We have 2 separate examples where this is relevant:

- Low rise example, 3 storey building:

The original fire design was fully compliant with VM using Te calculations. This required 30min fire rated structure and steelwork was passively protected to meet a 30minute FRR using an intumescent paint system

A consent amendment has been lodged where they have undertaken limiting temperature calculations and shown, in their view, that the steel structure requires no passive protection. There are lots of issues with this design including misuse and abuse of the Te calculations to get the answer they want. Notwithstanding these issues with the technical calculations or lack of, with this design, the design should be a fully compliant C/VM2 design approach but with additional limiting temperature calculations undertaken to prove that the steel can inherently achieve the required fire rating.

- High rise example, 40+ stories

The design is a C/VM2 approach. They are choosing to adopt option 2.4c), i.e. develop a design fire to represent the full burnout scenario. We don't know more than this at the moment, except that for both examples (I actually have 3 on-going with this problem) the designer is stating that they will meet B1 by demonstrating only and in isolation C6.

Is that clear?

I can send you a second document to provide further discussion of this from the designer if that would help?

Regards

Ed Claridge | Principal Fire Engineer
Ph (09) 353 9372 s 9(2)(a)
Auckland Council, 35 Graham Street, Auckland
Visit our website: www.aucklandcouncil.govt.nz

From: Brian Meacham [mailto:Brian.Meacham@mbie.govt.nz]
Sent: Wednesday, 6 April 2016 1:47 p.m.
To: Michael Belsham; Chris Rutledge; Mike Cox; David McGuigan
Cc: Mike Stannard
Subject: RE: B1 and C6 - structural stability in fire [UNCLASSIFIED]

Michael,

As we discussed yesterday and at 1pm today, the fact that C clauses include impacts on structural performance unfortunately makes the issue complicated. I again point out I am not an expert on all the aspects of the code, or the legal system, but my personal view is that Clause C6 does not exempt the structural engineer from responsibility for demonstrating that there is a low probability of the building becoming unstable during fire.

Clause B1.3.1 must be met (low probability of rupturing, becoming unstable, losing equilibrium, or collapse...) as well as B1.3.4 (Due allowance shall be made for: (a) the consequences of failure, ... (e) accuracy limitations inherent in the methods used to predict the stability of buildings). At a minimum, I would expect that the structural engineer would have to demonstrate how C6 quantitatively achieves these B1 clauses.

Also, I understand that there are provisions in the B1/VM and/or loading standards to demonstrate structural stability during and after fire (2.5% lateral load, 5 kpa wind load), but I am not an expert on this and do not know exactly where / how these apply.

As to the specific issue below, I might also ask Ed the question: is the C/VM2 being applied, in its totality, for compliance with fire provisions of the code, or is it just proposed to use one of the C/VM2 approaches for the structural fire engineering issue? I ask in part because I would not think only part of C/VM2 can be used (it is my understanding it needs to be followed in total or the fire parts need to follow a specific design approach as well).

Regards,
Brian

From: Michael Belsham
Sent: Wednesday, 6 April 2016 1:37 p.m.
To: Chris Rutledge; Mike Cox; Brian Meacham; David McGuigan
Cc: Mike Stannard
Subject: FW: B1 and C6 - structural stability in fire [UNCLASSIFIED]

Working example of the issue just discussed...

Kind Regards,

Michael Belsham
FIRE ENGINEER

Building System Performance Branch | Building Resources & Markets
Ministry of Business, Innovation & Employment
Level 5, 15 Stout Street, PO Box 1473, Wellington 6143

BUILDING PERFORMANCE

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT

From: Ed Claridge [mailto:ed.claridge@aucklandcouncil.govt.nz]
Sent: Tuesday, 5 April 2016 2:19 p.m.
To: Michael Belsham; Brian Meacham
Subject: B1 and C6 - structural stability in fire

Hi Michael, Brian,

We have received the following response regarding our request for a PS1 and PS2 covering NZBC Clause B1 for a design which was amended following a 'specific structural design' which has removed the passive fire protection to the steel work originally specified by the original fire designer. The response is basically saying they don't need a producer statement covering B1 as B1 is met by meeting C6. At the moment I am uncomfortable with this response but my main concern is that this is the s 9(2)(b)(ii) and s 9(2)(a) design team that may be arguing the same for the s 9(2)(b)(ii) tall building so I possibly need to understand the situation more clearly going forward given that we are expecting to see the structural FEB for that design very soon.

Would you mind taking a look at the following response and confirming this for more or providing any comment on its applicability to low rise (which is this building) and also potentially for the tall buildings we will be seeing.

Any advice would be appreciated:

The extent and methods for Compliance with Clause B2 Durability are not altered by this amendment to consent. Therefore Clause B2 is not covered by the Producer Statements submitted with this consent amendment. Clause B1 Structure requires that (structure in) buildings shall have a low probability of becoming unstable and that the physical conditions that affect stability include fire. However the Code clause is not specific on how this is achieved. The Verification Method B1/VM1 cites the Structural Design Actions Standards and NZ materials standards (in particular NZS3404) as compliance documents which are deemed to satisfy the Building Code. Neither the Structural Design Actions Standards nor the materials standards describe specifically how to achieve compliance for stability during fire. However, this specific requirement is explicitly covered by the performance requirements of Clause C6 Structural Stability during Fire.
Accordingly, compliance with Clause C6 provides the fire requirements for a solution which is deemed to comply with Clause B1 to the extent required by the general (non-specific) requirement for the (structure in) building to have a low probability of becoming unstable accounting for the physical conditions that affect stability include fire

Provisions

FUNCTIONAL REQUIREMENT

C6.1 Structural systems in *buildings* must be constructed to maintain structural stability during *fire* so that there is:

(a) a low probability of injury or illness to occupants,

(b) a low probability of injury or illness to *fire* service personnel during rescue and firefighting operations, and

(c) a low probability of direct or consequential damage to adjacent *household units* or *other property*.

PERFORMANCE

C6.2 Structural systems in *buildings* that are necessary for structural stability in *fire* must be designed and constructed so that they remain stable during *fire* and after *fire* when required to protect *other property* taking into account:

(a) the *fire* severity,

(b) any automatic fire sprinkler systems within the *buildings*,

(c) any other active *fire safety systems* that affect the *fire* severity and its impact on structural stability, and

(d) the likelihood and consequence of failure of any *fire safety systems* that affect the *fire* severity and its impact on structural stability.

C6.3 Structural systems in *buildings* that are necessary to provide firefighters with safe access to floors for the purpose of conducting firefighting and rescue operations must be designed and constructed so that they remain stable during and after *fire*.

C6.4 Collapse of building elements that have lesser *fire* resistance must not cause the consequential collapse of elements that are required to have a higher *fire* resistance.

Hence, for this consent amendment, which focusses specifically on structural stability during fire, Clause C6 is the appropriate specific Code Clause to cite for general compliance with Clause B1. The Producer Statements submitted with this consent amendment appropriately reference the more specific Code Clause C6 (rather than providing a qualified extent of compliance with Clause B1).
Compliance with the fire severity requirements from C/VM2 for compliance with Clause C6 and compliance with Section 11 in NZS3404 for achieving adequate fire resistance to maintain stability during fire is deemed to meet the stability requirements to the extent required by Clause B1.

Regards

Ed Claridge | Principal Fire Engineer
Ph (09) 353 9372 | s 9(2)(a)
Auckland Council, 35 Graham Street, Auckland
Visit our website: www.aucklandcouncil.govt.nz

Auckland Council
Te Kaunihera o Tāmaki Makaurau

Ministry of Business, Innovation & Employment
Level 5, 15 Stout Street,
Wellington 6143

14/04/2016

Attention: Michael Belsham

Dear Michael,

Clarification Request - NZBC Code Clauses B1 and C6

Auckland Council is currently in receipt of two building consent applications that have undertaken specific structural fire engineering analysis to remove the applied passive fire protection to the steel structure. Council is also in advanced discussions on a project involving a tall building in excess of 40 stories in height, in which specific fire engineering design has been proposed for the structure. In all cases the designer has presented arguments to suggest that the only applicable Code clause for the structural fire design is that of NZBC C6. When questioned about the need to demonstrate compliance with the structural code clauses and specifically B1, the designer presents the argument that C6 compliance can be undertaken in isolation and that in achieving compliance with C6, that this also demonstrates compliance with B1.

Statements made by the applicants include

> *"...compliance with clause C6 provides the fire requirements for a solution which is deemed to comply with clause B1 to the extent required..."*

and

> *"...Clause C6 is the appropriate specific code clause to cite for compliance with the more general clause B1."*

Council does not currently accept this position and has specific concerns with regards to issues such as post fire stability and how those requirements can be achieved by meeting only Clause C6. This is of particular concern when considering very tall buildings.

Council requests the Ministry to provide advice with regards to the relationship between Code Clauses B1 and C6, specifically the question;

> **Does demonstrating compliance with NZBC Clause C6 also demonstrate compliance with B1 without further assessment?**

Council would welcome further discussion on this matter and would also suggest that it would be appropriate for the Ministry to review the opinions expressed for the specific projects when considering the above question. This may also be of benefit to all parties to ensure that other associated aspects of code compliance are not overlooked. Council would be happy to supply further evidence should this be requested to support this request.

If you have any further queries regarding this matter, please don't hesitate to contact the undersigned.

Yours faithfully

Ed Claridge
Principle Fire Engineer
ed.claridge@aucklandcouncil.govt.nz
BUILDING CONTROL- 35 Graham Street, Auckland Central

From: Michael Belsham
Sent: Friday, 15 April 2016 3:49 p.m.
To: 'Ed Claridge'
Subject: RE: B1 and C6 - structural stability in fire [UNCLASSIFIED]

I'm still very confused. Compliance with one clause cannot show compliance with another as they are independent. Compliance with B1 must still be demonstrated.

Nevertheless how can you show stability after the fire in C6?

Kind Regards,

Michael Belsham
FIRE ENGINEER

Building System Performance Branch | Building Resources & Markets
Ministry of Business, Innovation & Employment
Level 5, 15 Stout Street, PO Box 1473, Wellington 6143

BUILDING PERFORMANCE

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT

From: Ed Claridge [mailto:ed.claridge@aucklandcouncil.govt.nz]
Sent: Friday, 15 April 2016 2:47 p.m.
To: Michael Belsham
Subject: RE: B1 and C6 - structural stability in fire [UNCLASSIFIED]

Thanks Michael,

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Ed Claridge | Principal Fire Engineer
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From: Brian Meacham [mailto:Brian.Meacham@mbie.govt.nz]
Sent: Wednesday, 6 April 2016 1:47 p.m.
To: Michael Belsham; Chris Rutledge; Mike Cox; David McGuigan
Cc: Mike Stannard
Subject: RE: B1 and C6 - structural stability in fire [UNCLASSIFIED]

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Regards,
Brian

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Sent: Wednesday, 6 April 2016 1:37 p.m.
To: Chris Rutledge; Mike Cox; Brian Meacham; David McGuigan
Cc: Mike Stannard
Subject: FW: B1 and C6 - structural stability in fire [UNCLASSIFIED]

Working example of the issue just discussed...

Kind Regards,

Michael Belsham
FIRE ENGINEER

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BUILDING PERFORMANCE

From: Ed Claridge [mailto:ed.claridge@aucklandcouncil.govt.nz]
Sent: Tuesday, 5 April 2016 2:19 p.m.
To: Michael Belsham; Brian Meacham
Subject: B1 and C6 - structural stability in fire

Hi Michael, Brian,

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Provisions

FUNCTIONAL REQUIREMENT

C6.1 Structural systems in *buildings* must be constructed to maintain structural stability during *fire* so that there is:

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PERFORMANCE

C6.2 Structural systems in *buildings* that are necessary for structural stability in *fire* must be designed and constructed so that they remain stable during *fire* and after *fire* when required to protect *other property* taking into account:

(a) the *fire* severity,

(b) any automatic fire sprinkler systems within the *buildings*,

(c) any other active *fire safety systems* that affect the *fire* severity and its impact on structural stability, and

(d) the likelihood and consequence of failure of any *fire safety systems* that affect the *fire* severity and its impact on structural stability.

C6.3 Structural systems in *buildings* that are necessary to provide firefighters with safe access to floors for the purpose of conducting firefighting and rescue operations must be designed and constructed so that they remain stable during and after *fire*.

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Hence, for this consent amendment, which focusses specifically on structural stability during fire, Clause C6 is the appropriate specific Code

Clause to cite for general compliance with Clause B1. The Producer Statements submitted with this consent amendment appropriately reference the more specific Code Clause C6 (rather than providing a qualified extent of compliance with Clause B1).
Compliance with the fire severity requirements from C/VM2 for compliance with Clause C6 and compliance with Section 11 in NZS3404 for achieving adequate fire resistance to maintain stability during fire is deemed to meet the stability requirements to the extent required by Clause B1

Regards

Ed Claridge | Principal Fire Engineer
Ph (09) 353 9372 s 9(2)(a)
Auckland Council, 35 Graham Street, Auckland
Visit our website: www.aucklandcouncil.govt.nz

Out of Scope

9

From: Michael Belsham
Sent: Friday, 15 April 2016 5:07 p.m.
To: 'Ed Claridge'
Cc: Chris Rutledge
Subject: RE: B1 and C6 - structural stability in fire [UNCLASSIFIED]

Ed,

We've discussed the query in house and we wish to inform the other parties of the question before this is answered to allow others to put forward any supporting evidence to support their position.

Kind Regards,

Michael Belsham
FIRE ENGINEER

Building System Performance Branch | Building Resources & Markets
Ministry of Business, Innovation & Employment
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Sent: Friday, 15 April 2016 2:47 p.m.
To: Michael Belsham
Subject: RE: B1 and C6 - structural stability in fire [UNCLASSIFIED]

Thanks Michael,

I have not replied to 'all' and will leave this to you if you would like to forward this email on.

So in response to Brian's email there are two questions I believe to clarify. The first two sentences relate to the B1 performances clauses.

The problem we have is that in summary (and if you can condense the designers view and responses to the actual matter in hand) the issue is that yes B1/VM and 1170 do provide a means to demonstrate compliance with B1. However the argument being put forward, (although being done so with lots of wording) is that B1/VM is not a code requirement and therefore we can't force them to follow that. The post fire stability and wind load may well be in B1/VM but because the code B1 performance clauses does not itself require you to consider fire and wind together there is nothing requiring them to meet this. Therefore they run the argument that they only have to meet C6.

The second part is about application of the VM. We have 2 separate examples where this is relevant:

- Low rise example, 3 storey building:

The original fire design was fully compliant with VM using Te calculations. This required 30min fire rated structure and steelwork was passively protected to meet a 30minute FRR using an intumescent paint system

A consent amendment has been lodged where they have undertaken limiting temperature calculations and shown, in their view, that the steel structure requires no passive protection. There are lots of issues with this design including misuse and abuse of the Te calculations to get the answer they want. Notwithstanding these issues with the technical calculations or lack of, with this design, the design should be a fully compliant C/VM2 design approach but with additional limiting temperature calculations undertaken to prove that the steel can inherently achieve the required fire rating.

- High rise example, 40+ stories

The design is a C/VM2 approach. They are choosing to adopt option 2.4c), i.e. develop a design fire to represent the full burnout scenario. We don't know more than this at the moment, except that for both examples (I actually have 3 on-going with this problem) the designer is stating that they will meet B1 by demonstrating only and in isolation C6.

Is that clear?

I can send you a second document to provide further discussion of this from the designer if that would help?

Regards

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From: Brian Meacham [mailto:Brian.Meacham@mbie.govt.nz]
Sent: Wednesday, 6 April 2016 1:47 p.m.
To: Michael Belsham; Chris Rutledge; Mike Cox; David McGuigan
Cc: Mike Stannard
Subject: RE: B1 and C6 - structural stability in fire [UNCLASSIFIED]

Michael,

As we discussed yesterday and at 1pm today, the fact that C clauses include impacts on structural performance unfortunately makes the issue complicated. I again point out I am not an expert on all the aspects of the code, or the legal system, but my personal view is that Clause C6 does not exempt the structural engineer from responsibility for demonstrating that there is a low probability of the building becoming unstable during fire.

Clause B1.3.1 must be met (low probability of rupturing, becoming unstable, losing equilibrium, or collapse...) as well as B1.3.4 (Due allowance shall be made for: (a) the consequences of failure, ... (e) accuracy limitations inherent in the methods used to predict the stability of buildings). At a minimum, I would expect that the structural engineer would have to demonstrate how C6 quantitatively achieves these B1 clauses.

Also, I understand that there are provisions in the B1/VM and/or loading standards to demonstrate structural stability during and after fire (2.5% lateral load, 5 kpa wind load), but I am not an expert on this and do not know exactly where / how these apply.

As to the specific issue below, I might also ask Ed the question: is the C/VM2 being applied, in its totality, for compliance with fire provisions of the code, or is it just proposed to use one of the C/VM2 approaches for the

structural fire engineering issue? I ask in part because I would not think only part of C/VM2 can be used (it is my understanding it needs to be followed in total or the fire parts need to follow a specific design approach as well).

Regards,
Brian

From: Michael Belsham
Sent: Wednesday, 6 April 2016 1:37 p.m.
To: Chris Rutledge; Mike Cox; Brian Meacham; David McGuigan
Cc: Mike Stannard
Subject: FW: B1 and C6 - structural stability in fire [UNCLASSIFIED]

Working example of the issue just discussed...

Kind Regards,

Michael Belsham
FIRE ENGINEER

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BUILDING PERFORMANCE

From: Ed Claridge [mailto:ed.claridge@aucklandcouncil.govt.nz]
Sent: Tuesday, 5 April 2016 2:19 p.m.
To: Michael Belsham; Brian Meacham
Subject: B1 and C6 - structural stability in fire

Hi Michael, Brian,

We have received the following response regarding our request for a PS1 and PS2 covering NZBC Clause B1 for a design which was amended following a 'specific structural design' which has removed the passive fire protection to the steel work originally specified by the original fire designer. The response is basically saying they don't need a producer statement covering B1 as B1 is met by meeting C6. At the moment I am uncomfortable with this response but my main concern is that this is the s 9(2)(b)(ii) and s 9(2)(a) design team that may be arguing the same for the s 9(2)(b)(ii) tall building so I possibly need to understand the situation more clearly going forward given that we are expecting to see the structural FEB for that design very soon.

Would you mind taking a look at the following response and confirming this for more or providing any comment on its applicability to low rise (which is this building) and also potentially for the tall buildings we will be seeing.

Any advice would be appreciated:

The extent and methods for Compliance with Clause B2 Durability are not altered by this amendment to consent. Therefore Clause B2 is not covered by the Producer Statements submitted with this consent amendment. Clause B1 Structure requires that (structure in) buildings shall have a low probability of becoming unstable and that the physical conditions that affect stability include fire. However the Code clause is not specific on how this is achieved. The Verification Method B1/VM1 cites the Structural Design Actions Standards and NZ materials standards (in particular NZS3404) as compliance documents which are deemed to satisfy the Building Code. Neither the Structural Design Actions Standards nor the materials standards describe specifically how to achieve compliance for stability during fire. However, this specific requirement is explicitly covered by the performance requirements of Clause C6 Structural Stability during Fire.
Accordingly, compliance with Clause C6 provides the fire requirements for a solution which is deemed to comply with Clause B1 to the extent required by the general (non-specific) requirement for the (structure in) building to have a low probability of becoming unstable accounting for the physical conditions that affect stability include fire

Provisions

FUNCTIONAL REQUIREMENT

C6.1 Structural systems in *buildings* must be constructed to maintain structural stability during *fire* so that there is:

(a) a low probability of injury or illness to occupants,

(b) a low probability of injury or illness to *fire* service personnel during rescue and firefighting operations, and

(c) a low probability of direct or consequential damage to adjacent *household units* or *other property*.

PERFORMANCE

C6.2 Structural systems in *buildings* that are necessary for structural stability in *fire* must be designed and constructed so that they remain stable during *fire* and after *fire* when required to protect *other property* taking into account:

(a) the *fire* severity,

(b) any automatic fire sprinkler systems within the *buildings*,

(c) any other active *fire safety systems* that affect the *fire* severity and its impact on structural stability, and

(d) the likelihood and consequence of failure of any *fire safety systems* that affect the *fire* severity and its impact on structural stability.

C6.3 Structural systems in *buildings* that are necessary to provide firefighters with safe access to floors for the purpose of conducting firefighting and rescue operations must be designed and constructed so that they remain stable during and after *fire*.

C6.4 Collapse of building elements that have lesser *fire* resistance must not cause the consequential collapse of elements that are required to have a higher *fire* resistance.

Hence, for this consent amendment, which focusses specifically on structural stability during fire, Clause C6 is the appropriate specific Code

Clause to cite for general compliance with Clause B1. The Producer Statements submitted with this consent amendment appropriately reference the more specific Code Clause C6 (rather than providing a qualified extent of compliance with Clause B1).
Compliance with the fire severity requirements from C/VM2 for compliance with Clause C6 and compliance with Section 11 in NZS3404 for achieving adequate fire resistance to maintain stability during fire is deemed to meet the stability requirements to the extent required by Clause B1.

Regards

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From: Michael Belsham
Sent: Friday, 15 April 2016 11:56 a.m.
To: 'Ed Claridge'
Subject: RE: Fire Engineering Brief Guidance Final [UNCLASSIFIED]
Attachments: RE: B1 and C6 - structural stability in fire [UNCLASSIFIED]

Thanks Ed,

Good call, I'm going to remove the sentence completely.

PS I'm getting our structural engineers onto your query however does the note from Brian M attached help?

Kind Regards,

Michael Belsham
FIRE ENGINEER

Building System Performance Branch | Building Resources & Markets
Ministry of Business, Innovation & Employment
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BUILDING PERFORMANCE

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT

From: Ed Claridge [mailto:ed.claridge@aucklandcouncil.govt.nz]
Sent: Friday, 15 April 2016 9:42 a.m.
To: Michael Belsham
Subject: RE: Fire Engineering Brief Guidance Final [UNCLASSIFIED]

A few more comments on the guidance.

Some areas are tricky and probably fewer words are better at this stage?

Take a look at the track changes

Regards

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From: Michael Belsham [mailto:Michael.Belsham@mbie.govt.nz]
Sent: Wednesday, 13 April 2016 5:18 p.m.
To: Ed Claridge
Subject: Fire Engineering Brief Guidance Final [UNCLASSIFIED]

I'm still playing with this not sure I've landed it. Difficult part is role of peer and regulatory review.

Have a look. I need to finalise by Friday to have it front of Steering Group Tuesday.

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