

INVESTIGATING COMMITTEE DECISION

COMPLAINT ABOUT A CHARTERED PROFESSIONAL ENGINEER AND CHARTERED MEMBER OF ENGINEERING NEW ZEALAND

In accordance with:

Chartered Professional Engineers of New Zealand Act 2002

Chartered Professional Engineers of New Zealand Rules (No 2) 2002

Institution of Professional Engineers Rules

Institution of Professional Engineers Disciplinary Regulations

Prepared by an Investigating Committee

11 December 2018



engineering
new zealand
Institute of Engineering Professionals

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EXECUTIVE SUMMARY

1. In October 2014 the complainant engaged an engineering firm (**company A**) to provide detailed design and construction monitoring of an architecturally designed house. The respondent engineer signed off the Producer Statement – Design (**PS1**) on-behalf of company A.
2. In June 2015 the council approved the design, and construction of the complainant’s house began in October 2015.
3. In April 2016, in response to the issues raised by the complainant, the respondent amended the design. Following this, the complainant engaged an engineer from another firm (**company B**) to review the design. Company B raised concerns about the bracing with the respondent and the design was amended twice before being finalised.
4. After discussions with the new engineer and the respondent, the complainant was unhappy with the respondent’s amended design and the contract between the parties ended.
5. In October 2016 the complainant complained to Engineering New Zealand about the respondent’s performance. This investigation relates to the respondent’s design of the complainant’s home in 2015.

DECISION

6. The Investigating Committee’s review of the relevant standards, along with consideration of expert advice, indicates there were serious issues with the load paths in the original design and issues with the amended design. This is a departure from what is expected of a reasonable structural engineer engaged to provide design services for this type of structure.
7. The Investigating Committee considers that a failure to comply with standards of this nature is a serious matter, and not something to be lightly dismissed.
8. The Investigating Committee does not consider there are any grounds to dismiss the complaint and, accordingly, has determined it should be referred to a Disciplinary Committee in accordance with Rule 60(a) of the Chartered Professional Engineers of New Zealand Rules (No 2) 2002 and clause 11 of the Engineering New Zealand Disciplinary Regulations.

BACKGROUND

COMPLAINT

9. In October 2014 the complainant engaged company A to prepare a structural design for their house. The respondent signed off the PS1.
10. After construction began, the complainant raised concerns with company A about the adequacy of the framing and foundations in the design. The complainant was not satisfied with the response to their concerns, and on 3 October 2016 they complained to Engineering New Zealand¹ about the respondent.
11. Following an initial investigation, the complaint about the respondent's failure to respond or co-operate with the complainant was dismissed, but the complaint about the adequacy of the engineering work was referred to an Investigating Committee for formal investigation.
12. The issues referred to us for investigation are:
 - whether the designs provided by the respondent, including the initial, amended, and final designs, were adequate; and
 - if not, did the respondent meet the competency standards expected of a reasonable engineer in providing engineering services for the initial, amended, and final designs?

INVESTIGATING COMMITTEE

13. The Investigating Committee must decide whether to refer the complaint to alternative dispute resolution, to a disciplinary hearing or to dismiss the complaint.
14. The Committee considered the bundle of documents provided by Engineering New Zealand dated 27 June 2018. This included independent expert advice provided by Principal Structural Engineer CMEngNZ CPEng IntPE(NZ) from Opus International Consultants (**the expert**).

INFORMATION GATHERED

BACKGROUND

15. The architectural design of the complainant's house was prepared by an architectural design company. In October 2014 the complainant engaged company A to prepare a structural design of the house.
16. The scope of work was:

Detailed design and documentation

1. Structural design and preparation of sketches for the architects to detail for:
 - (i) Roof support beams and associated posts and foundations
 - (ii) Bracing
 - (iii) Concrete block walls
 - (iv) Landscaping items
 - (v) Miscellaneous details as required

¹ On 1 October 2017, The Institution of Professional Engineers New Zealand changed their trading name to Engineering New Zealand. The Institution of Professional Engineers New Zealand remains Engineering New Zealand's legal name.

2. Structural drawings for the foundations of the house incorporating the requirements for TC2 foundation design.

Liaison with the geotechnical consultants to establish the most suitable foundation for the site.

3. Issue Producer Statement – Design [PS1] and Design Memorandum.

Construction monitoring

1. Observation of construction to be charged on a time and reimbursable cost basis.
2. Attendance at site to ensure the structural elements built are compliant with the intent of the structural design.
3. Issue Producer Statement – Construction review [PS4].

ORIGINAL DESIGN: 16 SEPTEMBER 2015

17. The original structural design was prepared by an employee of company A² who was, according to the complainant, overseen by the respondent. The respondent does not recall whether they supervised the employee in the design stage but says that company A has internal checking processes in place, so somebody would have checked the design. The respondent accepts that they signed the PS1 in respect of this property on behalf of company A.
18. In June 2015 the Council approved the design, and in October 2015 construction of the house began. The respondent says that company A carried out site inspections during construction.

NZS 3604: TIMBER-FRAMED BUILDINGS

19. NZS 3604 Timber-framed buildings (**NZS 3604**) provides prescribed methods for the design and construction for timber-framed, low-rise buildings to meet the requirements of the Building Code without the need for specific engineering design.³
20. In many, if not in most cases, small portions of the building go beyond NZS 3604 and those are the areas that need to be subject to specific engineering design.

CONCERNS RAISED WITH RESPONDENT

21. According to the complainant, after construction began, the construction company raised concerns with the complainant about the adequacy of the framing and foundations.
22. On 7 March 2016, the complainant sent an email to company A outlining their concerns.

MEETING - 9 MARCH 2016

23. On 9 March 2016, in an attempt to resolve these concerns, the respondent attended a meeting on-site with the complainant and the complainant's partner who was an engineer from another engineering firm (**company B**).
24. The respondent's recollection is that prior to the meeting they had not personally been to the site. They were not entirely clear what the complainant wanted to discuss at the meeting, as the

² This employee has since left company A and is not a Member of Engineering New Zealand or a CPEng.

³ <https://www.building.govt.nz/building-code-compliance/how-the-building-code-works/using-nzs-3604-timber-framed-buildings/>

respondent found the complainant's email to be vague. The respondent says that at the meeting the complainant's partner led most of the discussion.

25. They discussed the bracing design and foundation. The complainant's partner considered that the front frames should be welded to form portal frames and questioned the lack of stirrups in the foundation. The respondent explained the reasons why portal frames would not work in this instance. The respondent had not had an opportunity to review the documents, so they were unable to go into detail at the meeting. The respondent advised the complainant and the complainant's partner that they would need to review the drawings prior to finalising their view. However, while on site the respondent issued some amended instructions to the construction company relating to the bracing.
26. After the meeting, on 9 March 2016, the complainant's partner emailed the complainant a list of five questions regarding the structural design of the property being: the bracing for the front wall; the wall linings of the main lintel span; the garage roof strap bracing; the internal foundation beam thickenings; and a diaphragm or alternative system for the north-south bracing lines.
27. The complainant forwarded these to the architect, who sent them to the respondent.
28. On 10 March 2016 the respondent emailed the complainant and responded to each of their questions stating:

"The existing bracing for the front wall...will be incorporated along with the bracing straps in the roof plain [sic]...the loads required along this line are significantly less than those required by NZS 3604;

The walls each side of the main lintel span...both have linings both sides and with appropriate fixings will achieve the capacity of a BLG element;

The garage roof requires strap bracing... and this will be communicated to the builder;

Additional ties [for the foundation] are not required; and amended system has been instructed to the builder."

29. The respondent concluded that:

"While it is normal to pick up various items as noted above during the construction of the house, we are confident that both the design and construction has been carried out in accordance with the requirements of this site and conservatively in some instances, and foresee no issues with respect to the structure as built on site."

AMENDED DESIGN - 10 MARCH 2016

30. Later the same day, the respondent carried out calculations to check whether any further design changes were required. They did not think any further changes were needed, so company A issued an amended instruction to the construction company by email. This was based on the respondent's verbal instruction of 9 March 2016.

Design reviews

31. On 16 March 2016 the respondent received an email from another engineer from company B advising him that they had been engaged to report on the structural and foundation design for the property.
32. At some stage the complainant also engaged another engineer, to act as an independent reviewer.

33. On 5 April 2016 the respondent received a call from the complainant's lawyer to organise a meeting between the complainant's lawyer, the construction company, the architectural company, the respondent, and the complainant. The respondent indicated that they were surprised by this, as they had anticipated the usual peer review process, whereby the engineers would work through the technical detail together.
34. On 6 April 2016, the complainant's lawyer emailed the respondent, setting a meeting date for 11 April 2016. Later that day, the complainant's lawyer sent the respondent a draft report from company B, dated 29 March 2016, for discussion at the meeting.
35. The draft report concluded that in company B's opinion, the respondent had not established that the bracing and foundation designs met the requirements of the Building Code. Several at risk elements were identified, which company B said would result in an unsatisfactory sequence of failure. Company B further said that it could not recommend construction and recommended that advice be sought from the Council regarding whether a Code Compliance Certificate could be issued with specified areas of non-compliance.
36. Specific concerns raised were related to:
 - Schedule of inspections
 - Design Philosophy
 - Bracing calculations
 - Gravity, live, snow load designs, beams and posts
 - Foundations
 - Detailed drawings
 - Construction monitoring
37. The bracing calculations were one of the key concerns identified by company B. Company B indicated that in their view the bracing design was inadequate and did not comply with the requirements of NZS 3604. The report listed several considerations which they believed should have been included in the calculations. Company B concluded that the bracing had not been sufficiently designed.

MEETING - 12 APRIL 2016

38. On 7 April 2016, the respondent emailed the complainant's lawyer indicating that usual procedure, and in accordance with industry guidelines, was for engineers to meet first to discuss technical issues, before jointly reporting or meeting with other parties. The respondent advised that until the meeting between engineers occurred, company A did not consider the meeting suggested by the complainant's lawyer was appropriate. The respondent further said that company A was willing to meet with company B in accordance with usual procedure.
39. It was agreed that the initial meeting would occur between the engineers. A meeting was held at company A on 12 April 2016. The respondent, and two engineers from company B were present.
40. According to the respondent, during the meeting the foundations and the bracing were discussed as follows:
 - **Foundation:** The engineers from company B advised that they had concerns about the concrete slab, which they considered to be non-compliant. After some discussion, they agreed with the respondent that the concrete slab and the foundation were compliant.

- **Bracing:** The engineers from company B advised the respondent that they had prepared a new bracing design. The respondent considered this to be unusual for a peer review. The engineers from company B advised that they used a ceiling diaphragm and portal frames for their design. The respondent explained that they did not consider those features to be appropriate for the property in question. At the request of company B's engineers, the respondent agreed to provide comments on the bracing system company B had designed.
41. After the meeting, the respondent sent an email to the complainant for clarification as to whether company A was to continue to be involved in the project. In response, the complainant asked the respondent to confirm what had happened at the meeting and to clarify what was to be done to remedy the concerns raised by company B.
 42. The respondent responded to the complainant's email and advised that company A considered the foundation was compliant and that the issues with the bracing were relatively minor in nature and could be resolved prior to construction being completed.
 43. The complainant then forwarded the respondent an email containing company B's report of the meeting. The engineers at company B confirmed that they agreed with the company A's rationale for the foundation design. In relation to the structural bracing one of the engineers from company B noted that the respondent "accepts that the original bracing design provided by company A was not sufficient".
 44. The respondent responded saying that they did not wholly agree with the comments made by company B about the bracing.
 45. In their statement to Engineering New Zealand, the respondent says that they acknowledged that the original bracing design submitted prior to the additional instructions of 9 March 2016 was insufficient in terms of the relevant standards, based on company B's calculations. However, the respondent considered that this could be amended by minor changes to the design. The respondent considered that this could be done at minimal cost and without delaying completion of the project and said: "for me, it was simply a case of continuing to work with company B to finalise the changes to the design."
 46. The complainant responded on 14 April 2016 asking for a meeting time so that they could discuss the disagreements and consider company A's involvement. The meeting would include the complainant, the complainant's lawyer, company B, and the construction company. A meeting was scheduled for 19 April 2016 at 9am.
 47. Between 12 and 18 April 2016, the respondent and another engineer at company A reviewed the company A bracing design. They determined that further strengthening work would be required and prepared a new bracing design. This design was based on the original design with the respondent's additional instructions and added an additional multi-brace strap over the master bedroom, and one additional change of a wall lining to bracedline gib.

MEETING - 19 APRIL 2016

48. On 19 April 2016 a meeting was held at the complainant's lawyer's premises, with the complainant's lawyer, the respondent, the complainant, the complainant's partner, builders from the construction company, engineers from company B, and the independent review engineer engaged by the complainant. The respondent wasn't aware that the independent review engineer was involved in the project in any way until this meeting. The respondent was advised that the independent review engineer role was to review company A's design and comments from company B.

49. The independent review engineer agreed with company B's view of the bracing. At the meeting, the respondent was given a copy of a company B report dated 15 April 2016, which they had not seen before.
50. At the meeting, the respondent explained that the original bracing design needed to be changed, acknowledged and apologised for this, explained what needed to be done, and advised that they were happy to discuss it further with company B.
51. The meeting concluded with the decision that company B would review the amended design and calculations provided by the respondent.
52. Following the meeting, at 1.30pm, the respondent emailed company B the amended bracing design and calculations. At 11.48pm the complainant emailed the respondent, an engineer from company B, the independent review engineer, and the complainant's lawyer, requesting that all correspondence be copied to them, the independent review engineer, and the complainant's lawyer. The complainant also requested the structural calculations.
53. On 22 April 2016 an engineer from company B emailed the respondent a bracing review summary, outlining nine items which they considered needed clarification. The respondent arranged for two other engineers at company A to review and respond to company B's request, because the respondent was on leave that week.

FINAL DESIGN - 29 APRIL 2016

54. On 29 April 2016 an engineer from company A sent company B the further updated plan, calculations, and response to the bracing review.
55. On 10 May 2016 company B issued a further report which considered the updated bracing plan provided by company A on 29 April 2016. The report identified six issues with the bracing. Company B accepted amended calculations from company A for two out of the six issues.

AMENDED FINAL DESIGN - 26 MAY 2016

56. The respondent and another engineer at company A prepared an updated bracing plan in response to the company B report, which was provided to the complainant on 26 May 2016 by company A's solicitors. The respondent says that they consider this is a compliant bracing plan.
57. At this point company A's contract was terminated by the complainant and they ceased to be the engineering firm for them.

COMPLAINT TO ENGINEERING NEW ZEALAND

58. On 3 October 2016 the complainant's lawyers lodged a formal complaint with Engineering New Zealand against the respondent.
59. The complainant raised four complaints about the respondent. In response to these complaints the respondent provided a detailed statement. Only two of those complaints are relevant to the issues before the Investigating Committee.
60. The complainant is concerned the respondent did not act competently when:
 - overseeing the structural design of the house; and
 - preparing updated structural designs for company B.

RESPONSE TO COMPLAINT

The respondent

61. In respect of overseeing the structural design of the complainant's house, the respondent stated that they are unable to confirm whether they checked the original design prepared by another engineer from company A. However, the respondent acknowledges they signed the PS1 on behalf of company A, and acknowledged their responsibility as a manager of company A.
62. The respondent recognises that the original design of part of the wall bracing system was insufficient in terms of the relevant standards and required changes, but they are of the view that those changes were minor.
63. In respect of preparing updated structural designs, the respondent acknowledges that there were some differences in opinion between company B and company A. The respondent further states that there are different ways to achieve compliance. The respondent says that the changes made by company A were minor and resulted in a design which complies with the relevant standards.
64. The respondent's response to this matter included a statement from another engineer at company C. The engineer from company C's statement provides an expert review of the final design which was sent to the complainant on 26 May 2016.
65. The engineer from company C concludes that overall their view is that the 26 May 2016 design meets the requirements of NZS 3604.

INDEPENDENT EXPERT ADVICE

66. During the initial investigation, Engineering New Zealand engaged an expert to provide a high-level expert review of the adequacy of the original structural design and the amended designs, including the final design.

Foundations

67. In respect of the foundation, the expert states that the ground beams and floor slab size and reinforcement appear to be in the right order for the arrangement of piles shown on the original drawing.

Original design: 16 September 2015

68. The expert concludes that the architectural design of the house presented structural design challenges which were not understood by the original designer at company A. They noted that the original design appears to have been undertaken using the standard NZS 3604 approach using the Gib EzyBrace Bracing Software. They further observed that the load path adopted in the original design is not standard practice for timber framed buildings designed in accordance with NZS 3604 and therefore specific engineering design was required for this building
69. The expert's opinion is that a senior structural engineer should have been involved at the outset of the structural design so that the issues presented by the architectural design could have been identified and addressed. A Chartered Professional Engineer should have recognised the complexity of the building and the associated load paths.
70. The expert concludes that the original structural design was deficient and there were serious errors included in the drawings issued for construction.

Amended design: 10 March 2016

71. The expert states the amended design identified some issues with the original design and sought to address these errors. However, the amended design did not fully address the load path issues in the original design. The expert concludes that despite some issues being addressed in the amended design, they are not convinced that the amended design was adequate.

Final design 29 April 2016 and amendment of 26 May 2016

72. The expert considers the final design, including the May amendment “has a fully considered load path and would be expected to be compliant with Clause B1 of the New Zealand Building Code, assuming the wall linings were extended to the roof in the amended design”.

Difference between the company B and company A approaches

73. The expert considers that there are two main differences between the approaches taken by company B and company A:

- **Portal Frames along front wall:** The expert considers that both approaches are acceptable but that company B’s concern that the front wall had insufficient bracing and deformation control appears well founded.
- **Lateral load transfer to bracing walls:** The expert concludes that the company A approach was valid.

Conclusions

74. The expert considers there were serious issues with the load path in the original design and it was a departure from what is expected in the structural engineering profession. The amended design appears to have addressed the issues in the original design, with the possible exception regarding the wall linings. The expert concludes that the final design issued by company A has a fully considered load path and appears to comply with Clause B1 of the New Zealand Building Code.

DECISION

ROLE OF THE INVESTIGATING COMMITTEE

75. As the Investigating Committee, it is our role to determine whether to refer this complaint to a Disciplinary Committee in accordance with rule 60 of the Chartered Professional Engineers of New Zealand Rules (No2) 2002 and clause 11 of the Engineering New Zealand Disciplinary Regulations. This determination is to be made after considering the grounds for dismissal set out in rule 57 and clause 8. If none of these grounds to dismiss the complaint apply, then the complaint must be referred to a Disciplinary Committee.

76. The complaint referred to us for consideration relates to whether the designs provided by the respondent, including the initial, amended, and final designs, were adequate. And, if not, whether the respondent met the competency standards expected of a reasonable engineer in providing engineering services for the initial, amended, and final designs. Our assessment is therefore not just with the adequacy of the final design, but whether the respondent acted reasonably at all stages of their involvement in the design of the complainant’s house.

77. Having considered all the relevant information, we have decided to refer the complaint to a Disciplinary Committee. The reasons for our decision are set out below.

DISCUSSION

Original design

78. In September 2015, an engineer of company A prepared the house designs which were dated 16 September 2015. The respondent says that engineers are supervised at company A, and the designs would have been checked by a senior staff member at company A. The respondent signed the PS1.
79. Chartered Professional Engineers should be aware, before approving designs, that their client, building consent authorities, construction contractors, and others will rely on them.
80. The IPENZ Guidelines on Producer Statements (Practice Note 1) states that:⁴

“A PS1 is intended for use by a suitably qualified, competent design professional (i.e. Chartered Professional Engineer) as a statement of opinion. The opinion is based on reasonable grounds that certain aspects of proposed building work will comply with the Building Code, if the work is constructed according to the referenced documentation (e.g. engineering design drawings and specifications).”

81. When approving designs and signing a PS1 a Chartered Professional Engineer should acknowledge the responsibility, and corresponding potential liability, that arises. Therefore, all work should be subject to an appropriate quality assurance process (checking and review).
82. The expert noted that the original design had been undertaken using a standard NZS 3604 approach, which they said, in this case, not appropriate as specific engineering design was required. Therefore, the original design was deficient and had serious errors.
83. The respondent accepts the original plans were not adequate.
84. We agree with the respondent and the expert that the original design of 16 September 2015 was not adequate. However, we disagree with the respondent’s view that the changes required to make the design adequate were minor. We are of the view that this was a departure from the expected standards and are of the view that a reasonably competent engineer should understand the parts of a design which have gone beyond the scope of NZS 3604.
85. Given the errors in the design, it is concerning to us that the respondent has then gone on to sign a PS1. That is, they gave their professional opinion that these designs would be compliant with the Building Code. We do not believe the evidence reasonably supported that opinion in this case.

Amended design

86. In March 2016, after meeting with the complainant and the complainant’s partner, the respondent amended the original design.
87. In their response to the complaint, the respondent states that they did not agree with the comments made by company B (in April 2016) about the inadequacy of the amended design. However, the respondent did consider that some further strengthening would be required, and those changes were the basis of the final design (April/May 2016).

⁴ Issued January 2014. Refer to 3.2.1.

88. The expert's view is the March 2016 amended design did not fully address the load path issues in the original design. They conclude that despite some of the issues being addressed, they are not convinced that the amended design was adequate.
89. We accept that the respondent was attempting to resolve the issue with their client by reviewing the design. We also accept the evidence that there are different approaches to reaching a satisfactory design conclusion.
90. However, it is difficult for us to accept that the amended design from March 2016 was adequate when it was altered on two more occasions. We defer to the view of the independent expert on this matter and favour her view, that the amended design of 10 March 2016 was not adequate.
91. We do not consider this to be the standard of performance that is expected of a competent professional engineer.

Final design

92. The respondent produced a final design on 29 April 2016 (including the amendments of 26 May 2016).
93. The respondent says that they believe that the changes they made to the plans were minor and resulted in a design that complied with the relevant standards.
94. In support of the respondent, the engineer from company C states they also believe that the final designs would have sufficient wall and roof bracing loads and that this would comply with NZS 3604. The Investigating Committee notes that some elements of the lateral strength of the building are beyond the scope of NZS 3604 and therefore required specific engineering design in order to comply with the Building Code.
95. The expert also considers that, with some minor reservations, the final designs were adequate.
96. We accept the statements of the respondent, the engineer from company C and the expert that the final design of 29 April 2016, including the amendment of 26 May 2016 was adequate.

Alternative Dispute Resolution

97. As an Investigating Committee, we may also consider referring the matter to alternative dispute resolution under rule 60 and clause 13 of the Engineering New Zealand Disciplinary Regulations.
98. The Adjudicator has already considered the merits of alternative dispute resolution and rejected it:

I have considered the possibility of alternative dispute resolution but the descriptions of the meetings between the engineers and the complainant indicate that this is unlikely to assist. The dispute appears to have quickly escalated from an initial site meeting in March 2016 to the termination of [company A's] contract in May 2016.

99. We agree with the Adjudicator's view.

PROVISIONAL DECISION

100. On 5 October 2018 the Investigating Committee made a provisional decision to refer this complaint to a Disciplinary Committee pursuant to Rule 60(a) of the Chartered Professional Engineers of New Zealand Rules (No 2) 2002 and clause 11 (a) of the Engineering New Zealand Disciplinary Regulations.
101. The Investigating Committee invited the parties to provide comment on the provisional decision. Counsel for the respondent advised that they had no comment on the provisional decision.

102. Counsel for the complainant provided comment on the provisional decision which related to the background of the complaint being raised. In response to the complainant's comments, the respondent's counsel submitted that they did not consider the complainant's comments were likely to assist the Investigating Committee decide whether or not there are any grounds to dismiss the complaint and should not be considered.
103. We agree with the respondent's submissions, that is, the complainant's submissions relate to matters that were dismissed by the Adjudicator, or do not assist us in making our decision.
104. On that basis, our decision remains unchanged.

FINAL DECISION

105. Considering all the information, including the expert advice provided by the expert, the parties' submissions on the provisional decision, and for the reasons set out above, the matter is referred to a Disciplinary Committee pursuant to rule 60(a) and clause 11(a) of the Engineering New Zealand Disciplinary Regulations.
106. In our view, the matter for determination by the Disciplinary Committee is whether the respondent acted competently and in accordance with the Code of Ethical Conduct in approving the original design and the amended design.

Chair of Investigating Committee