



Technological Advancements and Safer Working Practices Leading to Firewall Structural Design

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Showcasing a Transformer on Fire



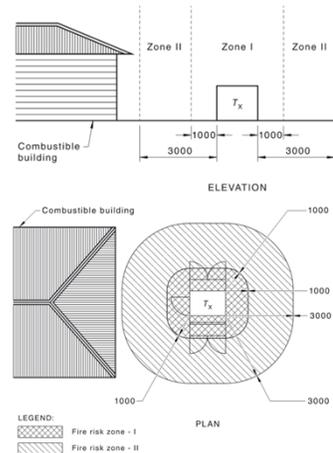
Referenced from: https://www.youtube.com/watch?v=YZipeaAkuC0&ab_channel=zuurvlees

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Why Firewalls?

- To protect structures and other equipment/assets in the case of a malfunction
- Different Fire Risk Zones
- Size and oil capacity of TX determines the Fire Risk Zones
- No structures, including firewalls should be in Zone 1



AS2067-2016 Substation Installations Exceeding 1kV

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What are Firewalls?

- Non combustible structures that act as a fire barrier for a period of time.
- Usually constructed from concrete or masonry.
- Concrete has a high degree of fire resistance.

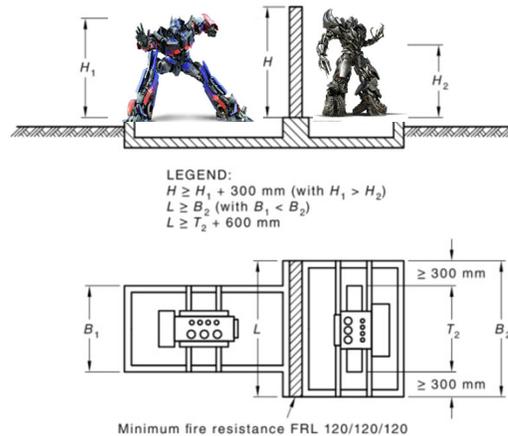


FIGURE 6.1 SEPARATING WALLS BETWEEN TRANSFORMERS

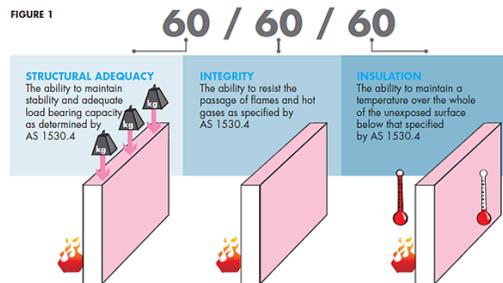
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Fire Resistance Levels

- The Fire Resistance Levels (FRL) are represented by three numbers
- Commonly 120/120/120 or 240/240/240 used in substations
- These numbers stand for the time a structure can provide:
 - Structural Adequacy
 - Integrity
 - Insulation

FIGURE 1

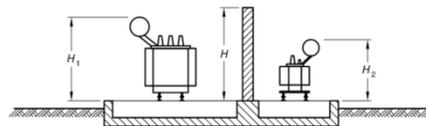


Referenced from: <https://blog.siniat.com.au/how-to-select-a-fire-rated-wall-or-ceiling>

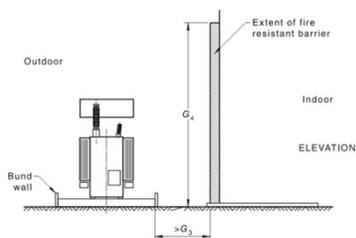
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Different Firewall Systems

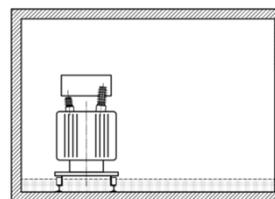
Cantilevered Wall



Building Wall



Enclosed Walls



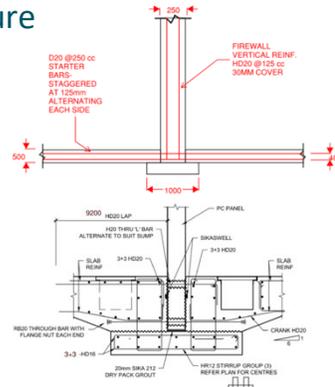
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Cantilevered Precast Concrete Wall

- Firewall to be constructed between two transformers or separating a transformer from other assets
- A cantilevered (lollipop) structure
- Attracts large loads



Photo of Tuakau Substation (South Auckland) During Construction



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Fire Wall Height Analysis

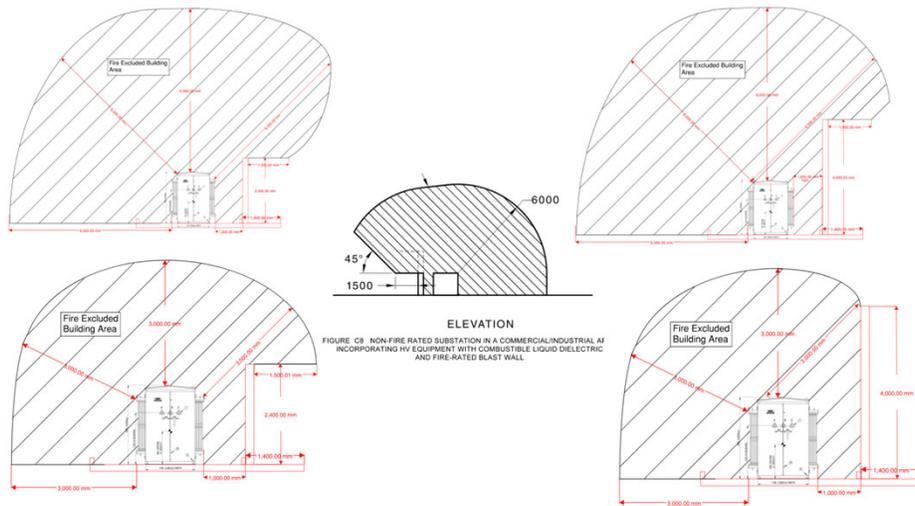


FIGURE C3 NON-FIRE RATED SUBSTATION IN A COMMERCIAL/INDUSTRIAL AT INCORPORATING HV EQUIPMENT WITH COMBUSTIBLE LIQUID DIELECTRIC AND FIRE-RATED BLAST WALL

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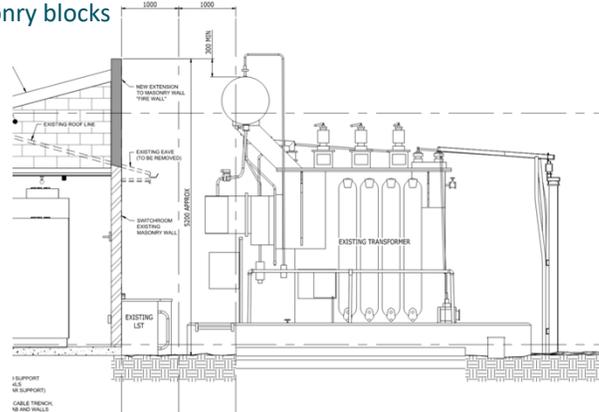


Masonry Building Wall Extension

- Due to the close proximity of the transformer to the existing switchroom building, the wall had to be extended to prevent fire spilling on to the metal roof
- Walls are made from masonry blocks



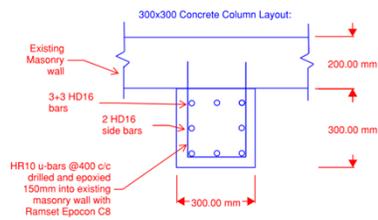
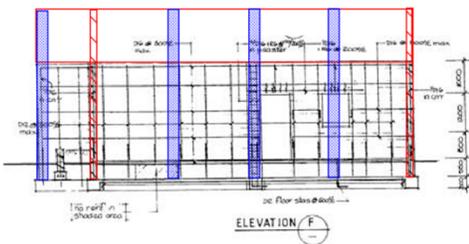
Photo of Coatesville Substation (North Auckland)



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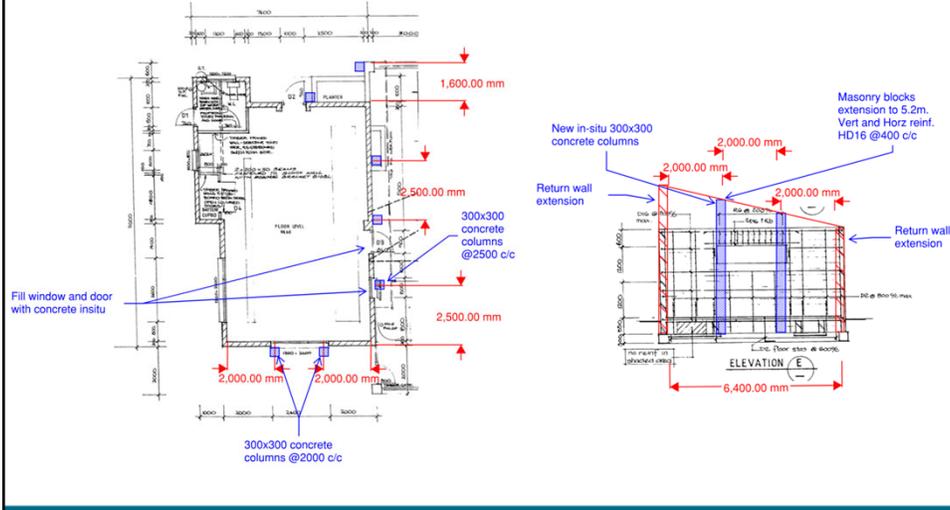
Adding Columns



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Column Layout

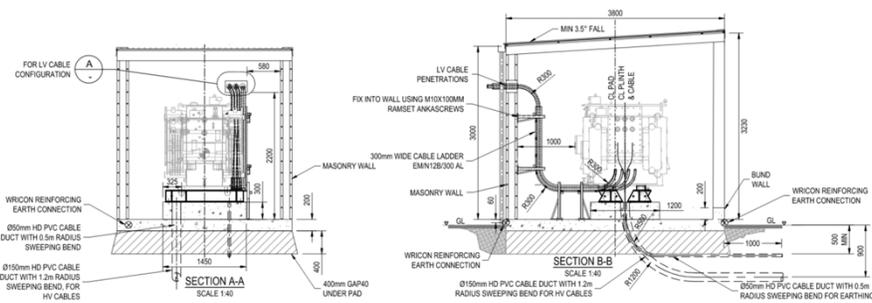


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Hybrid System Enclosing Transformer

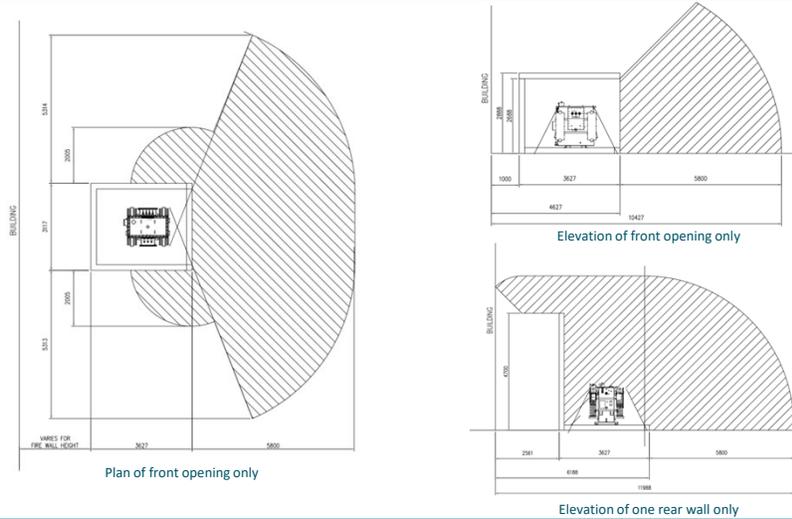
- A building surrounding the transformer with the front open
- A hybrid of masonry walls and precast concrete panel (Flatslab) roof (with metal roofing above)
- Commonly used in the commercial space



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Wall Positioning Fire Analysis



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References

- AS2067-2016 Substation Installations Exceeding 1KV
- <https://blog.siniat.com.au/how-to-select-a-fire-rated-wall-or-ceiling>
- https://www.youtube.com/watch?v=YZipeaAkuC0&ab_channel=zuurvlees

Projects Used:

- Akura Substation (Aurora Energy in Masterton)
- Tuakau Substation (Counties Energy in Waikato)
- Coatesville Substation (Vector in North Auckland)
- Temperzone Manufacturing (Electrix in South Auckland)

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THANK YOU
QUESTIONS?