

FEASA – Fire Engineers Association of SA



Presented by

Wynand Engelbrecht

Consultant: Firefighting Operations

076 453 4589

ISSUES ADDRESSED HERE:



1. ECSA & fire engineering.
2. Fire protection in private dwellings
3. Infra-structure: fire water provision.
4. Fire rational designs - fire engineering as a specialist field.
5. The need to have Fire by-laws updated.
6. Fire Rational Design considerations – thinking off-center.
7. Fire Operations challenges.
 1. Buildings under construction.
 2. Big Box developments.
 3. High rise building protection.

Fire protection in private dwellings



1. It is almost a given that if plans indicate a fire wall and a fire door between the house and the garage, then such a plan is acceptable. Plans for single family dwellings are never referred to the Fire Safety Division; however, when there are as little as four units in a townhouse complex the development is evaluated by Fire Safety.
2. A dwelling in excess of 500 sq m may present any number of the challenges a commercial building of that size will present.
3. Fire deaths throughout the world happen mostly in dwellings, yet these plans are passed without a second glance .
4. It is time cities review their fire by-laws, to include smoke detection, home sprinklers and fire extinguishers, to mention a few elements.

ECSA registered professionals and others



1. FIRE RATIONAL DESIGNS.

Competent person (fire engineering) – ECSA professional

1. **Pr Eng / Pr Eng Tech / Pr Eng Techni**

2. RATIONAL DESIGNS.

Fire Protection Practitioners – design

1. **Smoke ventilation**
2. **Water-based automated suppression systems**
3. **Fire detection**
4. **Passive fire protection**

3. SYSTEMS INSPECTIONS.

Fire Protection Systems Inspectors

1. **Systems as in (2) above**

Municipal infra-structure



- Metro Councils and municipalities are not coping with the water provision demands whether in industrial, commercial or residential developments.
- This places the landowner in an impossible situation where rates & taxes are paid but the infra-structure does not get developed by the Councils.
- Just the water package on an average sized sprinkler system alone comes to R2,5 million; for water which in most instances should have been fed from the mains.

Infra-structure (2)



- Big box developments (major warehousing) and high rise building development require mains 300mm (+).
- Nominal fire water flow 6,000 l/min @ static pressure of 600kPa is required to support these types of development.

Infra-structure (3)



- The dimensions of these big box warehouses are such that an Aggressive Internal Attack by fire teams is virtually impossible.
- Defensive firefighting requires high nozzle flows at high pressures.
- Defensive firefighting requires the acquisition of elevated aerial devices; Turn-table ladders and Hydraulic Platforms come with a price tag of R9million to R12million.

Infra-structure (4)



FIRE BRIGADE SERVICES

- SANS 10090 is the SABS standard for Community (Fire) Protection.
- Only a small number of cities have referenced this standard in their by-laws.
- No single city in the RSA complies with SANS 10090.
- Why do the cities feel themselves justified in insisting land developers and business owners must comply with the law, if the cities themselves cannot deliver fire brigade services in terms of any internally recognised standards?

UNCHECKED DEVELOPMENT



Question

Should Councils attract or allow massive building construction development to go 'unchecked' in their jurisdictions.

UNTIL OR UNLESS

- *Their fire brigade service delivery is not aligned to SANS 10090?*
- *Fire water reticulation has not been professionally addressed?*

NATIONAL FIRE CODE



There is a need for a
National Fire Code
Which could form the basis for
Fire By-laws

FRD and fire load



We ought to consider the fire load potential

But

Mostly the load is not known as engineers and architects are never fully *au fait* with what exact activities will be conducted in the structure on completion; this is specially true in industrial buildings.

SANS 10400-T/W



Provides for compliance of the shell.

But the shell is (mostly) not the major risk factor.

The fire load



The fire load comes with the addition of:

- Chemicals
- Heaters
- Carpets
- Vinyl
- Furniture
- The human element

FIRE RATIONAL DESIGNS



ONLY

‘competent persons (fire engineering)’

ECSA registered professionals

May compile

Fire Rational Designs

FIRE RATIONAL DESIGNS (2)



If the professional indemnity rests on the engineer,
what then is the resultant expectation regarding
professional indemnity -

If

the BCO allows the fire department to alter or insist on
altering a rational design?

Does the indemnity shift to the Council?

FIRE RATIONAL DESIGNS (3)



And if no-one in the Fire Department holds professional liability due to its officers not being ECSA registered professionals

Then

Should not the engineer be allowed to submit the fire rational design directly to the BCO?

What principal difference is there between mechanical engineering submissions and fire engineering submissions?

FIRE RATIONAL DESIGNS (4)



BUT

If the engineer does not have a thorough knowledge of all aspects of fire behaviour, fire risk assessment and firefighting operations,

THEN

Such a person should not be acknowledged by the BCO as being a 'competent person (fire engineering)' unless the services of a recognised competent person in these fields is engaged in preparing the FRD

FIRE RATIONAL DESIGNS (5)



REMEMBER

If the engineer does not have a thorough knowledge of all aspects of fire behaviour, fire risk assessment and firefighting operations,

THEN

The BCO is not obliged to recognise such an individual as being competent.

There is no carte blanche recognition of an engineer as 'competent'.

The form 2 appointment and the acknowledgement by the BCO that the engineer is recognised for the specific rational design, is ***ad hoc***; for that reason there is a form 2 appointment on each contract.

Rational designs & town planning



Town planning and fire protection

A minimum of 16 parking bays are required for the sprinkler system water tanks and pump house positioning

OFF-CENTRE RATIONAL REASONING



- **Refuges in high rise buildings NFPA101 – Life Safety Code**
 - **Refuges in Big Boxes**
 - **Rooftop swimming pools**
 - **Boreholes for water supplies**
- **One pressed steel panel tank / Two cylindrical**
 - **Hose racks / Hose reels**

OFF-CENTRE RATIONAL REASONING (2)



- **Refuges in high rise buildings NFPA101 – Life Safety Code**
- **Refuges in Big Boxes**
 - An ESFR sprinkler system in a 30 m high warehouse is not a Life Safety measure.
 - A sprinkler system in the roof void of a big box retail outlet 16 meters high cannot be considered to be a Life Safety measure.

Dr. Philip de Vos (CSIR 1998) proved beyond any doubt sprinklers will only activate with great difficulty beyond 9 meters and not at all beyond 11 meters.

OFF-CENTRE RATIONAL REASONING (3)



- 1, 000, 000 Liters of water in two sprinkler tanks
- 2, 000 Liters of water carried on a major fire engine
- Queuing **500** fire engines for a fire in a warehouse – REALLY?

**Johannesburg + Ekurhuleni + Tshwane + CT = <200 fire engines
(Ladders and platforms excluded)**

CONSIDER THIS



- **SPRINKLER DESIGN**

- Design for 260 SQ M “assumed area of operation”
- 19 sprinkler heads
- Design density 5,5 mm/m²/min
- 137 liters per minute
- $19 \times 137 = 2603$ l/min
- 2 x 300,000 tanks = 600,000 liters
- 230 minutes of operation – 4 HOURS
- PLUS the inflow requirement

CONSIDER THIS (2)



THE STRUCTURAL ENGINEER

Will certify the structure fire stability only to –

30 minutes

CONSIDER THIS (3)



In spite of these over-engineered tank capacities:

SANS 10287 does not provide for a connection from the tanks where the fire brigade may draw water from for operations

This component should be a standard inclusion in any sprinkler design submission

CONSIDER THIS (4)



- To have a swimming pool with a capacity of **60,000** filled the owner must first get a permit in drought stricken areas.

BUT

To empty a 500,000 liter capacity sprinkler tank into the storm water drainage

AND

To have it re-filled after maintenance

There is no requirement for a permit

CONSIDER THIS (5)



Hose reel (30 meters x 19mm)



Hose rack (90 meters x 44mm)



CONSIDER THIS (6)



CONSIDER THIS (7)



NFPA 20 submersible pumps



CONSIDER THIS (8)



An engineer certified borehole is an acceptable water supply for a sprinkler system



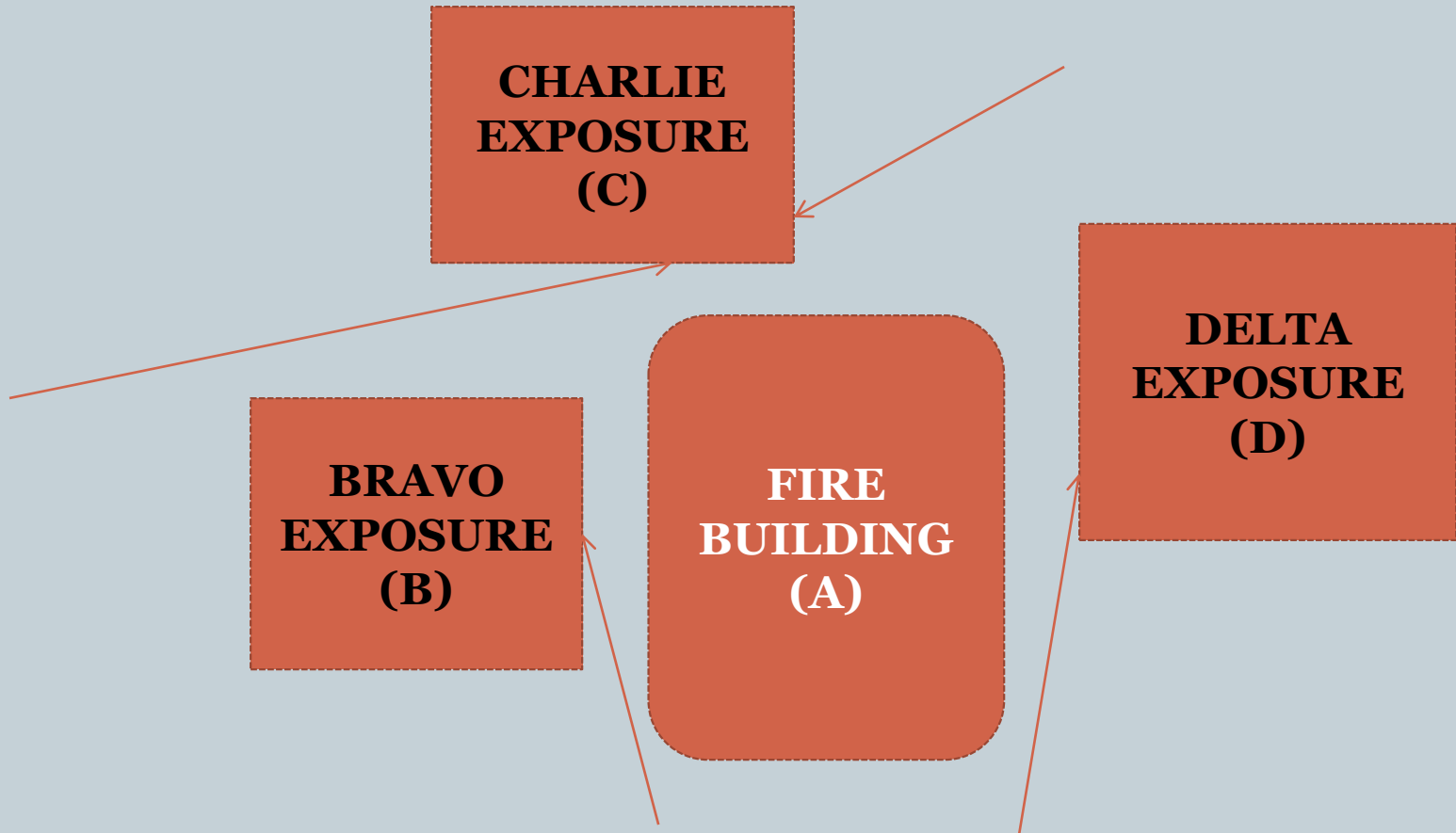
FIREFIGHTING CHALLENGES



Even if the reasoning should be that a building owner is responsible for its own water provision, the fire department is compelled to protect exposures.

So the three adjoining buildings on sides B, C & D have to be protected.

PROTECTING THE EXPOSURES



PROTECTING EXPOSURES (2)



Strategy on Building A – **Offensive** :
Less water / Aggressive Internal Attack

Strategy to protect buildings B / C / D
Defensive

Excessively large quantities of water flow required
Elevated platforms and aerial ladders

PROTECTING EXPOSURES (3)



One could reason the owners of Building A (fire building) are responsible for their own fire water.

HOWEVER

The protection of buildings B, C & D in the event of a fire
is the responsibility of
the
City Council

Environmental challenges & Fire



Access through roofs and vertical operations

Solar panels

Screens and cladding

SPECIAL ISSUES: FIRE OPS

GREEN BUILDINGS - STEEL SCREENS



SPECIAL ISSUES: FIRE OPS

GREEN BUILDINGS - SOLAR PANELS



Construction phase



Do buildings burn while under construction?



Construction phase



The Fire Safety Division signs off and recommends approval of the Fire Plan by the BCO

Thereafter the Fire safety Division has relatively little to do with the erection of the structure until it's completed

The Municipal Fire Safety Inspector should hold authority in terms of Fire By-laws to enforce sanction on non-compliance

The engineer (fire) sees the contract through



The 'competent person (fire engineering)' – ECSA registered has an oversight function during construction

On behalf of the Council the BCO takes responsibility during construction

Certifications



If all is found in order on final fire compliance inspection:

- **Fire Compliance certified**

Which aides towards the

- **Occupancy Certification being issued**

There are two phases where the fire risk is somewhat neglected



1. Construction

Fire Safety as well as Fire Ops need to be more involved during construction

2. Post-occupancy

Out of the hands of the BCO

Now the fire by-laws need to be in place to regulate the fire load and associated issues

There is a major gap in the consultation value chain



1. Those people defined in the NBR as ‘competent persons (fire engineering)’ are not necessarily competent to interrogate fire operational issues on the new development
1. The fire safety division may not necessarily be competent to interrogate those operational issues

The development consultation sorely lacks this input which can only sensibly be contributed by someone with excellent fire operations experience

By-Laws – Firefighting Operations



City Councils do not generally have by-laws

to regulate

Firefighting Operational preparedness

during the construction phase

Example: The High rise building



- Fire Brigade access on building site
- Fire Water provision
- Level identification
- Travel to fire floor
- Safety issues with open structures not built in yet

Summary



- BCO's need to note the massively negative impact of insufficient municipal fire water provision on development.
 - Town engineers and politicians have to be made aware of this component
- ECSA registered engineers (competent persons fire engineering) should be allowed to submit fire rational designs directly to the BCO without having to justify it to the fire department. The Fire Department does however have to be fully informed regarding the FRD – there is a very fine line here.
- It is of absolute importance that the Fire Ops Commander should be consulted when big box developments, new high rise building plans and shopping mall developments are discussed, so that fire operations are thoroughly considered in the planning stages.

Summary (2)



- BCO's need to note the importance of having fire rational designs compiled and submitted by ECSA registered engineers only – 'competent persons (fire engineering)'.
- Not all ECSA registered engineers are competent to compile or to submit a fire rational design – only those who have proof that ECSA recognises them for this discipline.
- The CFO needs to be aware of the danger in attempting to have alterations to a submitted fire rational design enforced, considering the serious consequences in terms of professional liability.

Summary (3)



- The onus for negotiating with the City's Fire Ops Commander should primarily be on the 'competent person (fire engineering)' .
- The BCO should never consider approving a building plan on major developments if either the City's Fire Ops Commander or a person recognised to be a competent person in this discipline, has commented on the plans.

Summary (4)



- The City's fire by-laws should make provision for the comments of the Fire Ops Commander to be noted on the building plans indicating his recommendations have been considered in the fire rational design
- Where the city does not employ a Fire Ops Commander, a consultant with similar back-ground and experience as a city Fire Ops Commander needs to be consulted by the competent person so as to ensure an operations viewpoint has been interrogated.