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- Master in Industrial Sciences (civil engineering)
- Master in occupational safety & health
- Currently postgraduate student in Fire Safety Engineering
- Professional Firefighter in Brussels (BC)
- Volunteer Firefighter in Oostkamp (leading FF)

- Throughout the presentation I adapted the belgian ranking system to the US ranking system.
- The SI system is used to indicate distances. (Most of the time US units are mentionned as well.)

The Dieweg Fire

Presentation:
Karel Lambert - Brussels Fire Department

Version 0.2
14/03/2011

Dedicated to



PATRICK BATSELIER

11-12-1972
30-08-2008



ALAIN TACQUENIÈRE

31-03-1953
30-08-2008

Dedicated to

All firefighters that were
on scene that day





Contents of this presentation

1. Belgium & Brussels
2. Brussels Fire Department
3. Geography
4. Reconnaissance
5. The building
6. Chain of events
7. Analysis of the events

Belgium



Belgium

“French” fries



Belgian beer



Brussels



Brussels



Brussels, capital of Europe



Brussels Fire Department

- 167 km²
- 1.2 million people
- 7185/km²
- 1.000 career firefighters
- 1 brigade
- 8 stations
- 150 FF on duty 24/24



Water Supply



Due to the high population, water mains are at short distance (100 m – 328 ft) almost everywhere. Water mains deliver 1.000 – 2.000 liters per minute (264 - 528 gpm).

Brussels Fire Department encounters rarely problems with water supply.

Water Supply

Ukkel is the one of the richest communities of Belgium.

Green zones with individual housing are found in Ukkel.

The density of population is lower.

Less water is used

➔ Less water is available.



Basic Fire crew

2 Engines



Driver, 2 NCO's, 3 FF
Flow: 2.000 lpm
(530 gpm)
Water Tank: 2.500 litres
(660 gpm)

2 Ladders



Ladder crew:
2 specialists

Basic Fire crew

Command Car



Battalion Chief
Driver

Ambulance

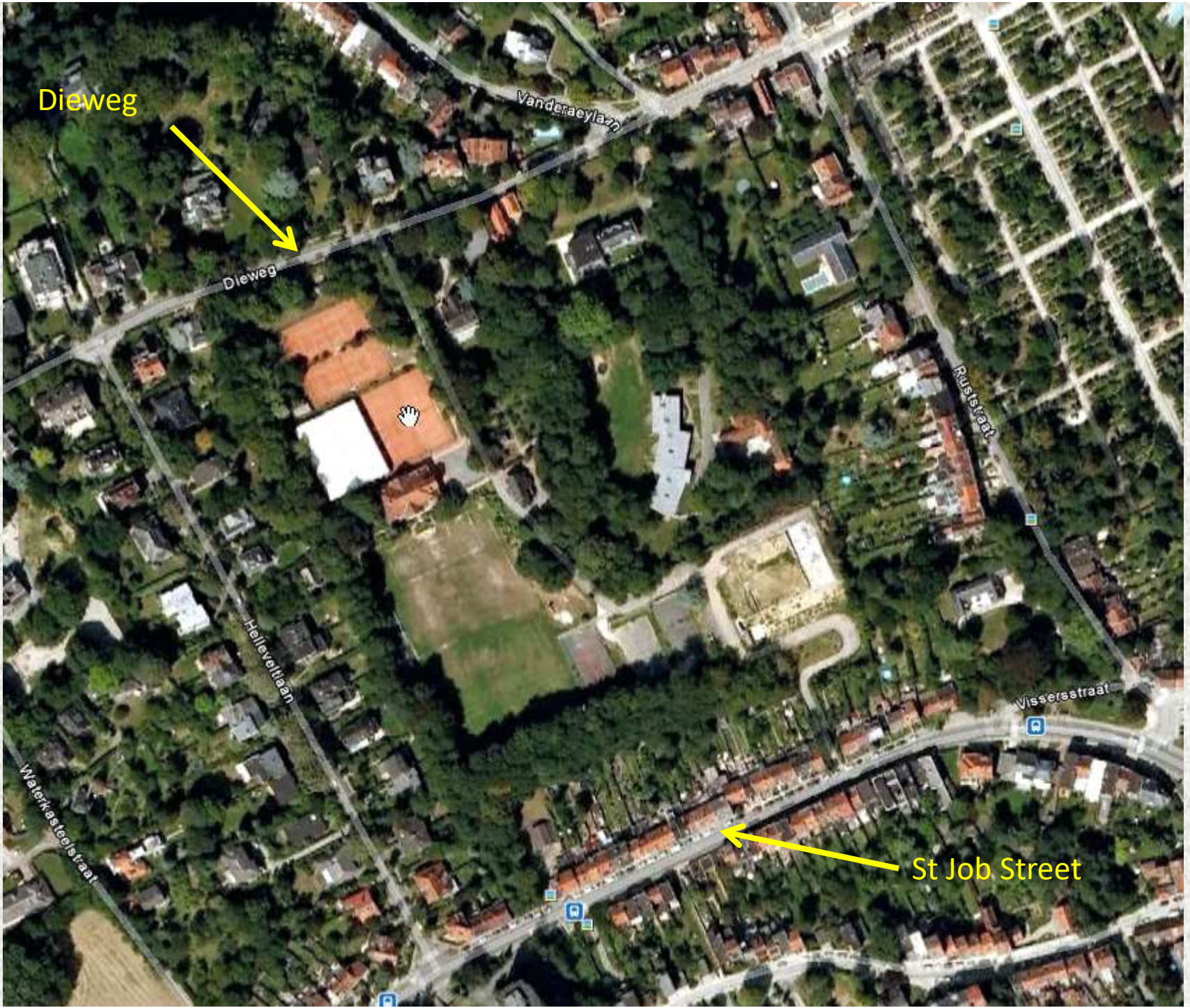


2 paramedics

Timing

- 14h42: Civilian informes Central Dispatch that a building is on fire.
- 14h48: First Engine on site
- 14h54: Second Engine, two aerials, command car and ambulance on site
- 15h28: Rapid Fire Progress kills two firemen

Geography



Dieweg



Dieweg



St Job Street



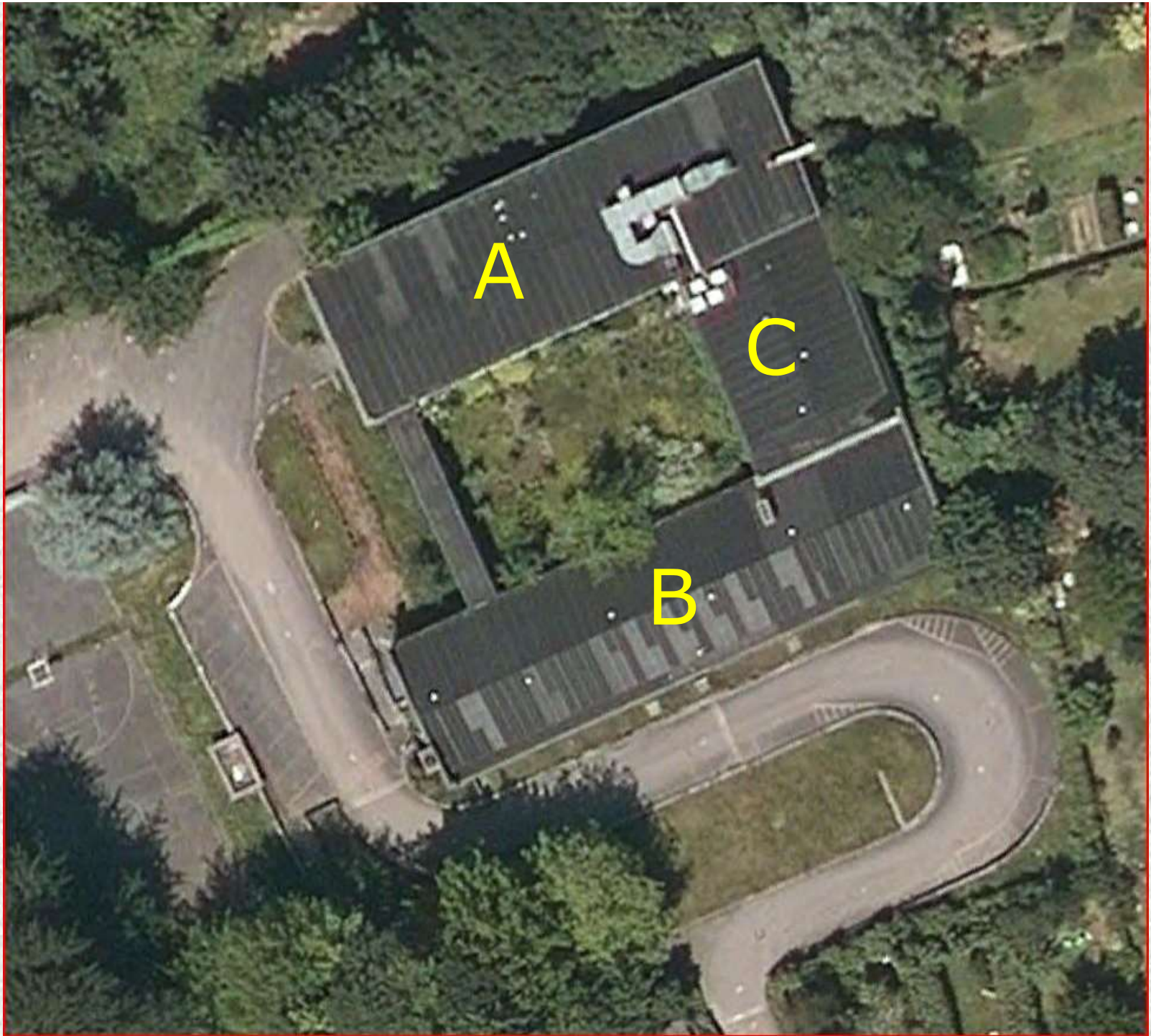
Arrival of units

- First Units receive “Dieweg, no number” as location.
- They arrive through the Dieweg.
- Later “n° 56” is specified as number.
- Reinforcements arrive later via St-Job Street.



The buildings on site





Side Bravo

Side
Charlie

A

C

Side Alfa

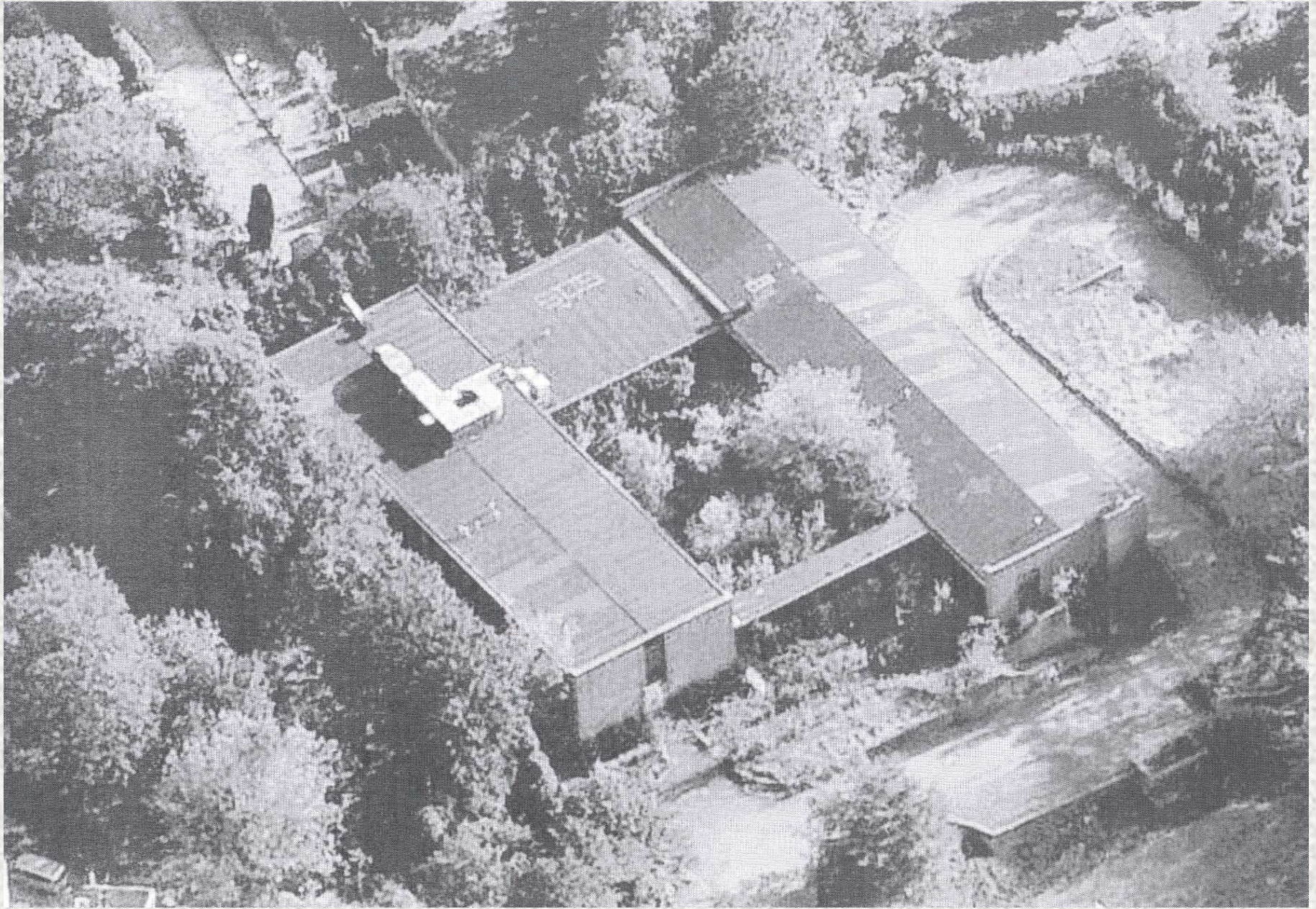
B

Side Delta



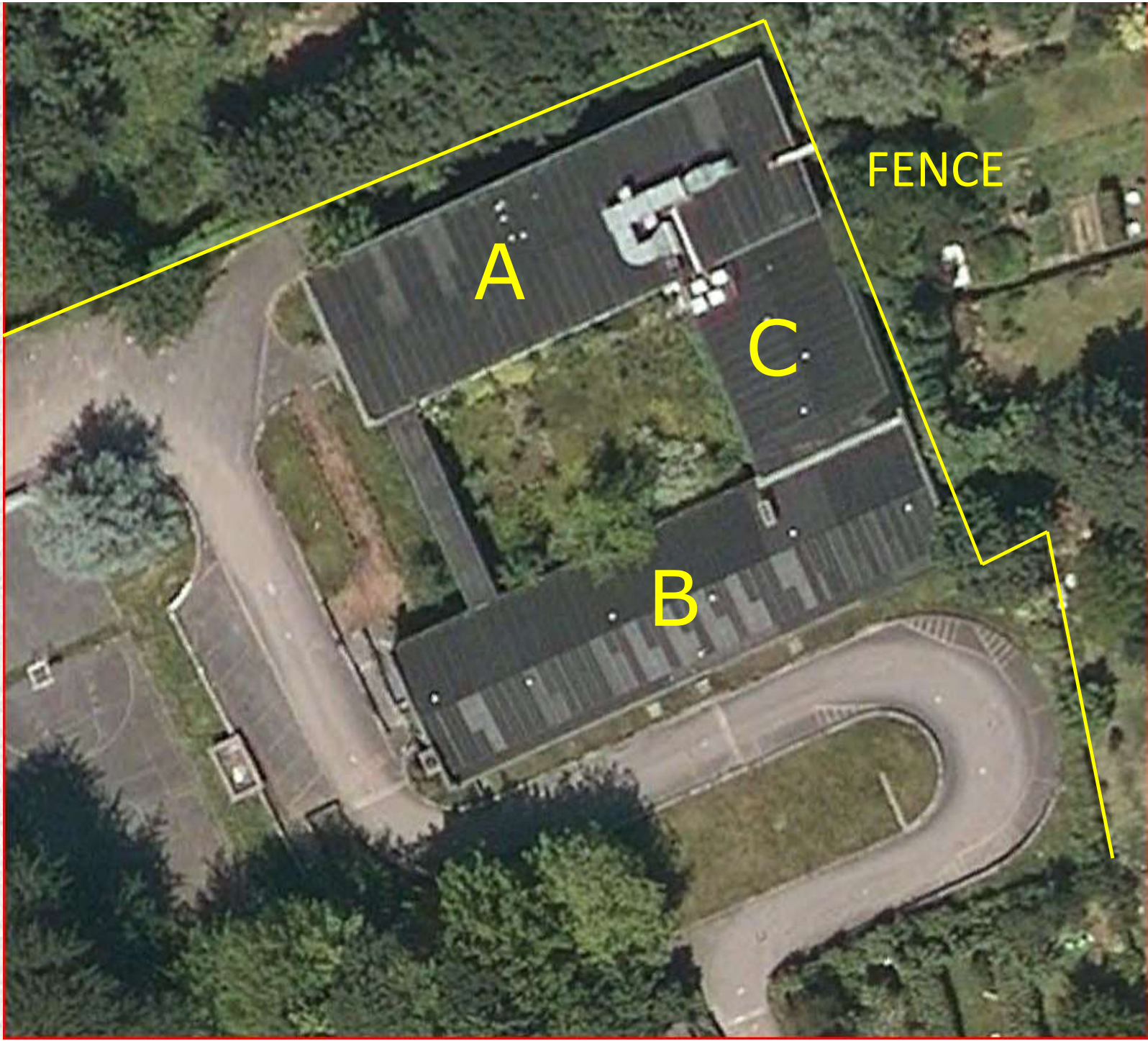
Difference in height

- The terrain between Dieweg and St-job Street is on some kind of hill.
- Dieweg is on higher ground



Problems caused by location

- Distance to neighboring streets
 - ➔ Caused difficult water supply
- Big difference in height between Dieweg and St-Job Street.
 - ➔ Difficulties to do a 360° reconnaissance
 - ➔ No global vision possible



A

B

C

FENCE

Reconnaissance

- 360 ° Reconnaissance was not possible due to fire conditions and the fence between the site and the neighbouring sites.
- Reconnaissance was difficult because of the difference in height
- There was no global view because of smoke.

Some photos that were taken
about a half an hour after arrival



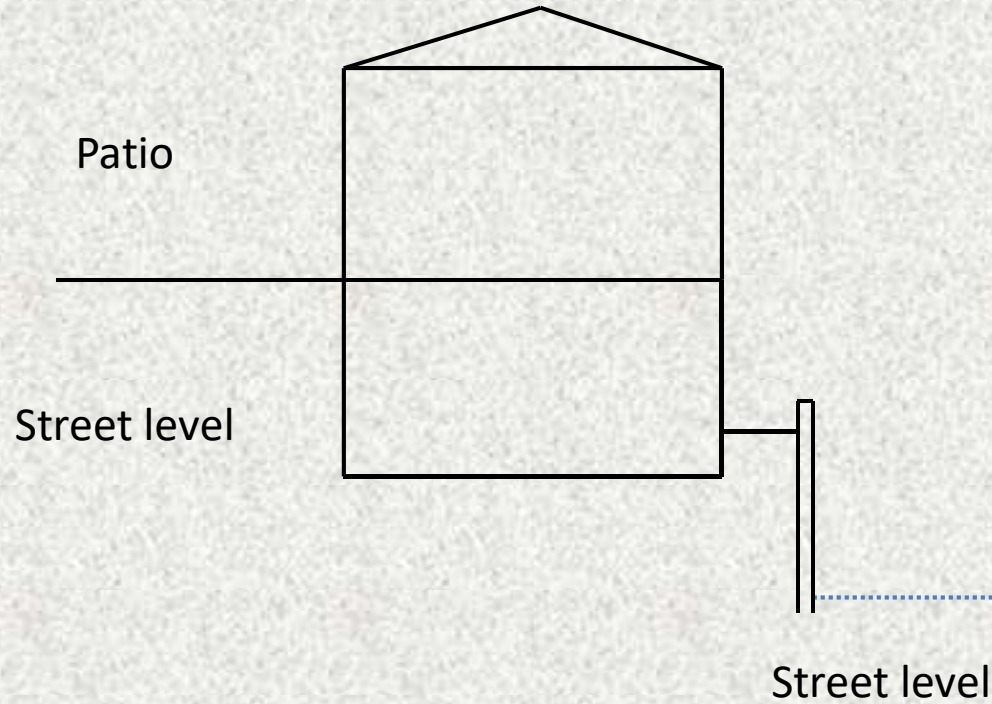
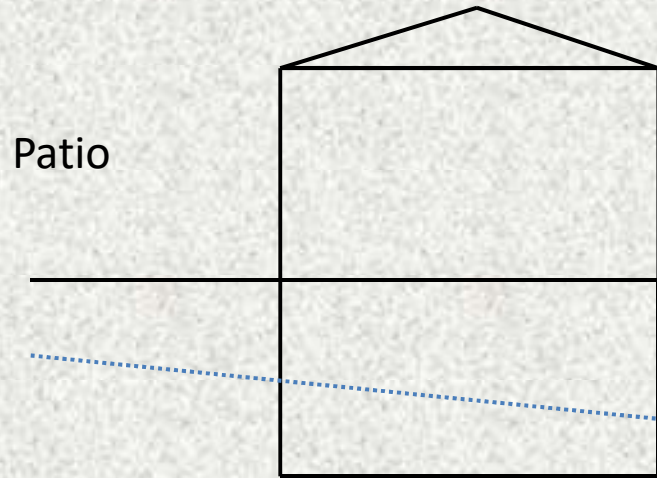
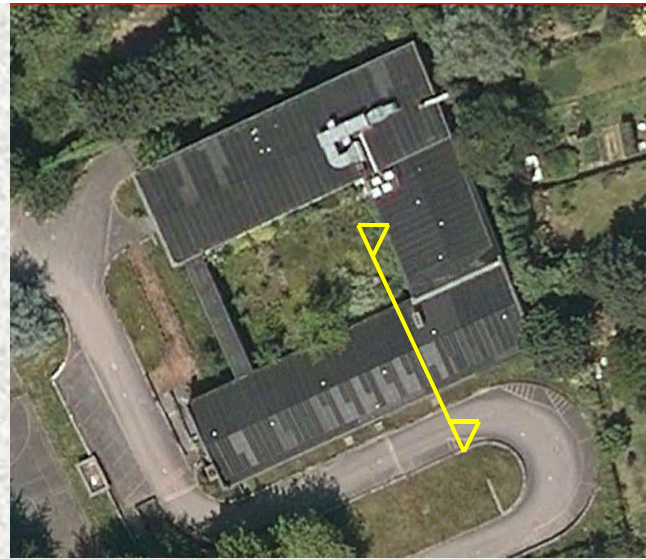
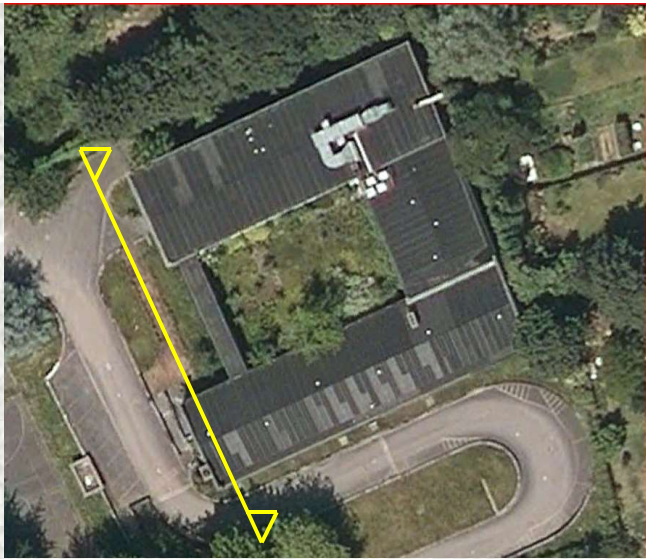
ASSUMPTIONS

- Building A is on Fire
- There is a park between building A and building B
- The trees and the bush in the park are on fire
- The wall that can be seen through the smoke is the wall that separates the park from the adjacent property
- The buildings have 2 floors and a flat roof

Heavy smoke blocks
view on building C







Building A

- 40 metres (131 ft) long / 14 metres (46 ft) wide
- Basement + 2 floors
- Basement is constructed with concrete and steel girders
- Concrete columns and steel girders support 2nd floor
- Long walls of 1st and 2nd floor are lightweight wooden walls that cover the two floors
- The two facades are brick walls



Lightweight
wooden walls



Building B

- 45 metres (148 ft) long / 14 metres (46 ft) wide
- 2 floors (2nd floor = 1st floor building A)
- 1st Floor is constructed with concrete and steel girders and wooden lightweight walls
- The long walls of the 2nd floor are lightweight but cover only one floor.
- The two facades are brick walls

Building B

- Most of the internal walls are lightweight wooden panels.
- The roof has a little inclination
- Volume of the void space in the roof: 500m³ (17.000 ft³)
- The roof is constructed with wood.
- There is an insulation between the void space in the roof and the first floor: Rockwool
- The ceiling of the 1st floor is made of gypsum board.



Building C

- 16 metres (52 ft) long & 43 ft wide
- Basement + 1 floor
- Basement is constructed with concrete and steel girders
- 1st floor is constructed with lightweight materials
- The roof has a slight inclination
- There was a void space under the roof



Film

TASKS

1. Water Supply

Building A is fully involved: 560 m²; 6025 ft²

“Forest Fire”: 432 m²; 4648 ft²

CFR: ca. 1.000 m² * 2 lpm/m² = 2.000 lpm

For the first hydrant a 300 m (984ft) line is pulled to Dieweg. Maximum flow of the hydrant is 1.000 lpm.



TASKS

1. Water Supply

Lots of pressure losses due to long distance.

There was not enough flow coming out of the hose. → Double the hoses

→ We needed three supply lines to have enough water to battle the blaze. Establishing these lines took almost 15 minutes.

TASKS

2. Fire Suppression

First unit on site started with a 45 mm (1' $\frac{3}{4}$) line.

master stream operation was necessary.

Flow needed.

Main Goal: Save building B.

Second line is a 70 mm (2' $\frac{3}{4}$) to attack “forest fire” and prevent it to enter building B.

TASKS

2. Fire Suppression

Third line is again a 45 mm (1' $\frac{3}{4}$) line.

Its goal is to fight the “forrest fire” and prevent the fire to enter building B.

The fourth line is a master stream coming from the first ladder.

The fifth line would have been another master stream coming from the second ladder.

Chain of events

- When the HQ arrives, the first engine is attacking the fire in building A with a \varnothing 45 mm (1 $\frac{3}{4}$ inch) handline.
- The fire in building A is fully involved
- Firefighters were establishing water supply.

Water supply

- Water tender:
2 FF
8.000 L
(2.110 gallon)



Chain of events

- Battallion Chief does reconaissance of side alfa and delta & enters building B
- 1st attack team
- 2nd attack team in the building.

Decision making

- Prevent that the bush fire enters building B.
- *“Building B can be saved.”*
- No smoke present in building B.
- Secondary escape route for 2nd attack team.

Chain of events

- Lieutenant Batselier installs the hoses.
- The BC prefers a two man team.
- BC re-enters the building. The lieutenant asks him to open the valves outside and to install a PPV-fan.

Chain of events

- When the BC exits the building, the crew from headquarters has finished the supply line.
- The BC asks the HQ captain to install a PPV.
- With the arrival of water the second ladder can work as a “water tower”. The BC orders a BC in training to enter the building and replace the ladderman that is inside.

Chain of events

- The man in the basket of the second ladder explains afterwards that he observed flames running along the roof of building B.
- He sent a warning via his radio but the message wasn't heard by anyone.
- At that moment he saw the BC in training enter the building.



Chain of events

- BC in training progresses.
- Captain enters with a team.
- Pressure wave → Parts of the ceiling come down.

Chain of events

- 2nd pressure wave: more pieces fall down. Heat is very intense, untenable.
- She seeks shelter and sends a mayday signal
- 1st attack team attempts to rescue her
- HQ Captain also tries to save her but returns due to intense heat.

Chain of events

- The BC in training realises that she has little time left. She starts a left hand search for the exit. Close to the ground she sees an exit sign.



- She lets herself fall in the stairway she discovered. Normal usage was no longer possible.

Chain of events

- BC in training arrives on the 1st floor and sees light.
- One of the windows is open and she is rescued by colleagues.
- She is literally on fire when exiting



Entry to building made by squatters

Chain of events



- The medical team on site starts medical treatment.
- In the mean time the captain has exited the building and is searching for the two men of the second attack team.

Chain of events

- The second ladder is deployed to open the windows on the second floor.
- Firefighters on the outside see the plates moving as one of the colleagues is banging from the inside
- The ladder is too short to the building to open the panel where the missing firefighters are located.



Final Outcome



- Two firefighters were killed in this tragic incident.
- 7 others got wounded

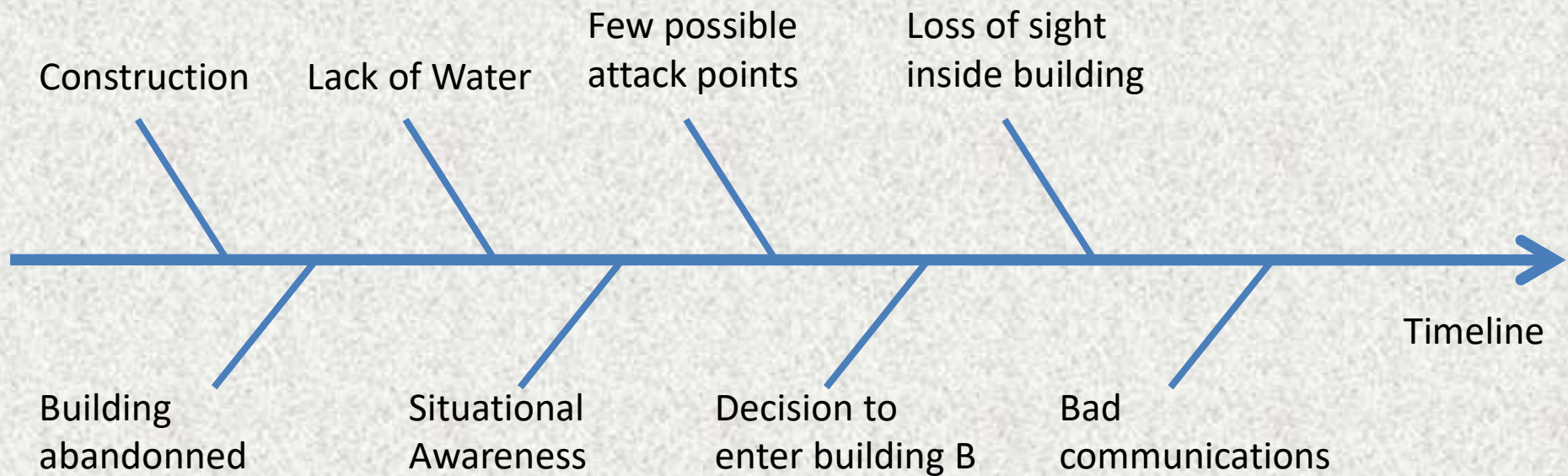


Analysis of the events

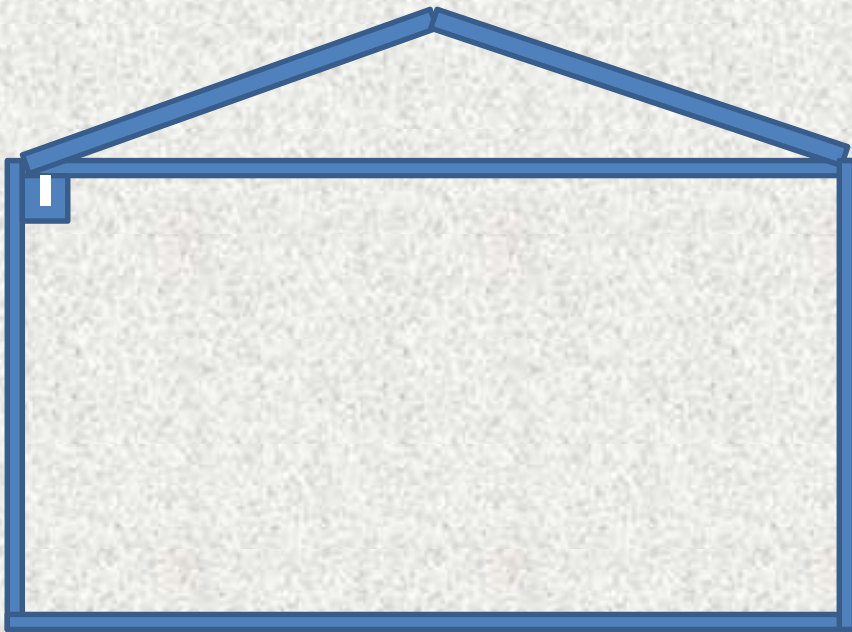
Tree of facts

What did we learn?

Tree of facts

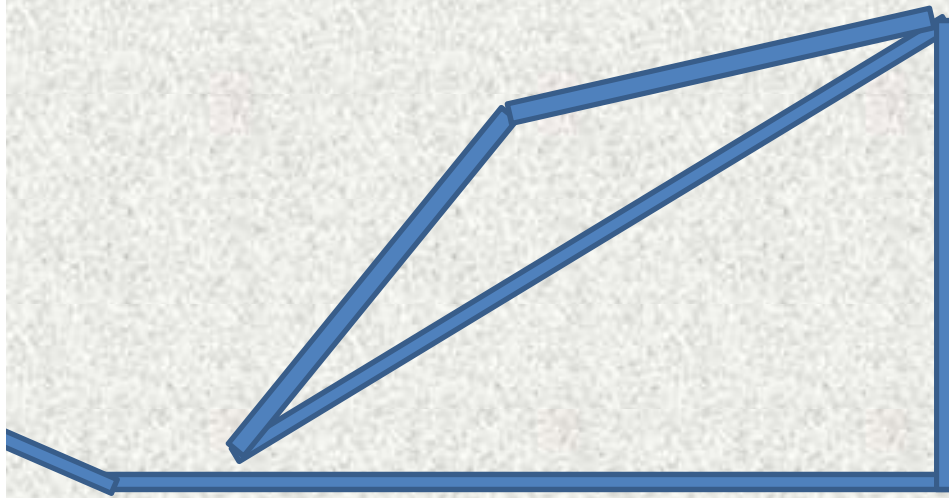


Construction



This is a mousetrap!

Construction



The way the building was constructed was an unknown element.

Such buildings exist. There is nothing we can do to eliminate this “fact”.

Abandoned Building

- The building was abandoned.
- All the window panes have been removed by squatters.
- The owners tried to secure the building by panels in betonplex. On the first floor they used a combination of betonplex, insulation, betonplex.
- The betonplex panels were screwed, not nailed.

Abandoned Building

- Some fire departments have special SOP's in case of an abandoned building.
- In such a SOP there is stipulated that some extra exits should be created before initiating offensive interior operations.
- Although the FF were doing an exterior attack, the removal of some panels would probably have saved the life of one of them.

Abandoned Building

- A captain tried to remove the panels with a crowbar.
- This didn't work because the panels were screwed.
- We did tests afterwards with a rescue saw but that didn't work either because the saw blocked on the insulation.



Lack of Water

- All of our hoses are rolled.
- It takes time to establish a supply line with rolled hoses.
- We needed more hoses.

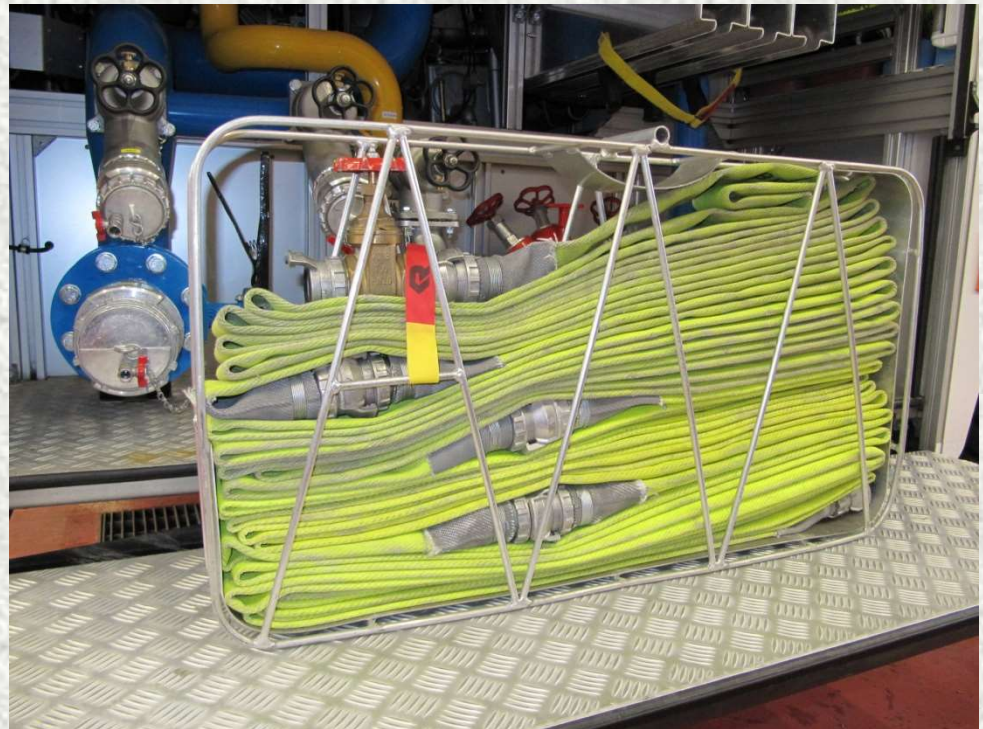


1 exception:
hose reel (weight)



Lack of water

- The length of the hoses on the reel was brought to 120 m after the fire.
- New, lighter reels were placed on the ladders.
- Extra hoses were added to the ladder trucks for long distances.

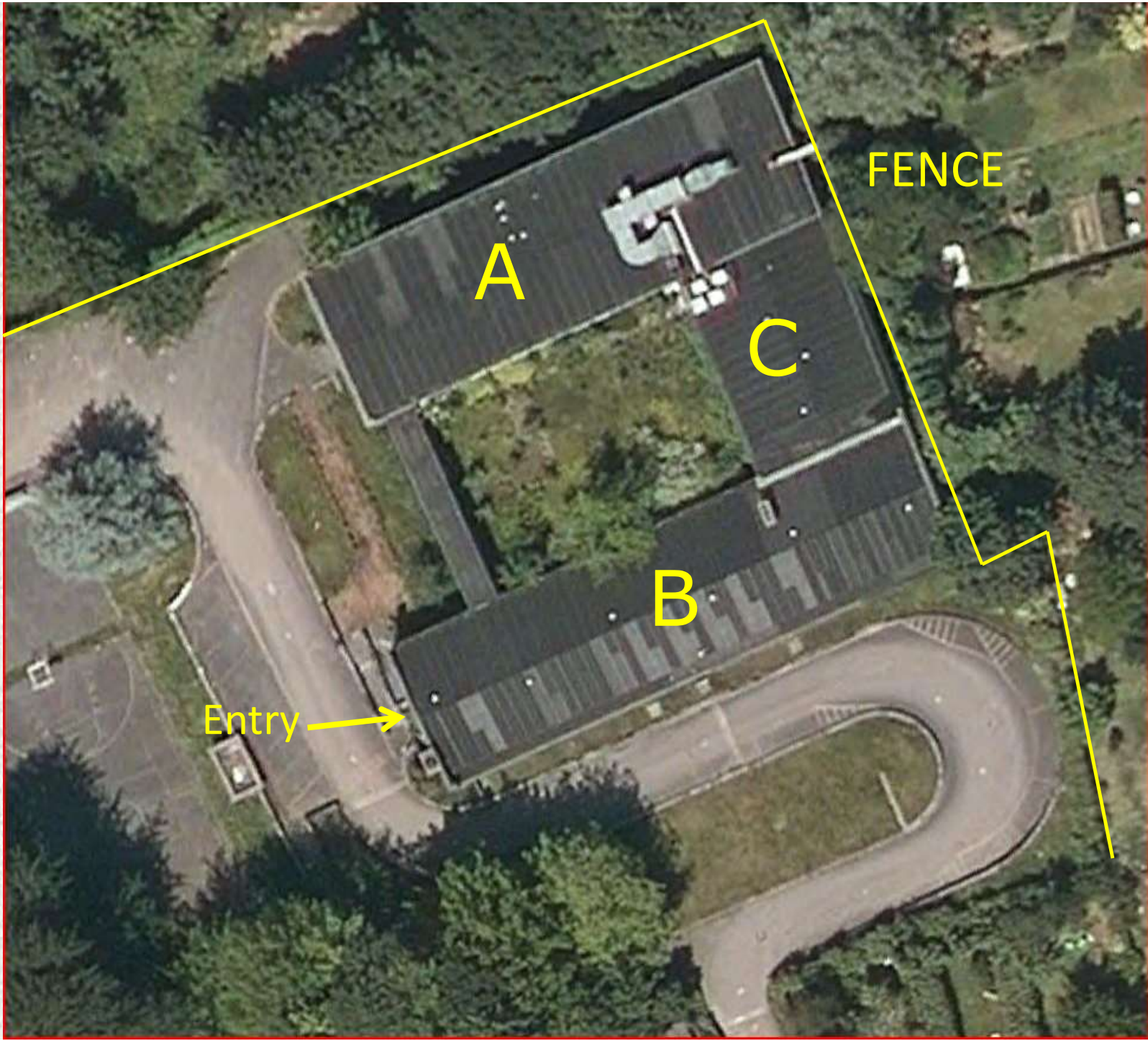


Situational Awareness

- The officers did not understand the composition of the buildings.
- 1st (possible) solution: Antwerp FD
- 2nd solution: Equipping the ladder with a TIC.
- 3rd solution: BC mounts in basket of ladder.

Few Attack points

- Attack via side bravo was impossible due to the heat.
- Side charlie could only be reached through the garden of the neighbours.
- The difference in height (4 m/ 13ft) made it very difficult to enter via side delta.



A

B

C

FENCE

Entry

Decision to enter building B

- In Brussels offensive interior operations is always our first choice.
- This operation actually was “exterior”.
- Most of the time there is no possibility to do a 360 ° reconnaissance.
- A solution could be that we choose to spend more time to do reconnaissance if it is possible.

360 ° Reconnaissance?



Loss of sight in building B

- Suddenly smoke rushes in.
- TIC would have made it easier. Maybe they would have seen the heat in the ceiling
- On the other hand:
The ceiling was insulated.
The collapse of the ceiling

Bad communications

- The man in the ladder testified that he realized things are going wrong before the phenomenon.
- At the time we worked on two different radio channels. This may have caused the problem.
- Maybe the battery of his radio was empty.
- Now we use two radio systems:
 - A new one for the vehicles and communication with dispatch.
 - The old system for the FF on scene.

A film with a message

Quote

“On the fire ground the BC has to make decisions in a very short time with limited resources and a very narrow view on the events.

Months later a group of experts with almost unlimited resources, with all information about the fire will discuss the decisions and tell what should have been decided.”

D. Withouck, Fire Chief in Roeselare (B)

Conversion

- Unit conversions

- 1 gallon = 3,79 liter
- 1 voet = 30,48 cm
- $1\text{m}^2 = 10,76\text{ft}^2$
- 70 mm = $2' \frac{3}{4}$
- 45 mm = $1' \frac{3}{4}$
- 1 bar = 14,5 psi

- Ranks US – Belgium

lieutenant- sergeant
captain - adjudant
BC - luitenant
div. off - kapitein