

Report on the Fire and Rescue Service of Mekelle / Ethiopia

Michael Heiland, Fire Department Witten
supported by



The city of Mekelle is located 700 km from Addis Ababa in the northern part of Ethiopia at about 2100 m altitude. From three sides encircled by high mountain ranges, the city covers currently on about 10 km long and 5 km wide. The inhabitants are not exactly verifiable. The details vary from 250,000 to 300,000. A study predicts for the next six years to rise to one million inhabitants. Due to persistently poor income of the rural population and a relatively good standard of living in the city, many people think of work and a better life in the town.

The economic factor of the city of Mekelle is based on an increasing number of industrial companies and the increase of students. With currently 33,000 students, the university is well above their capacity, which is also clearly seen in the accommodations. The main share of the industrial sector is the textile production. A plant is in operation, a second before completion and a third is in planning. Mesfin is a tank car manufacturer with a capacity of 1,000 trucks per year. Currently IVECO supplies the driver-cabin with the chassis. The tank and the tender are completely built by Mesfin. In some month, production is enhanced by collaboration with the German truck manufacturer MAN. In future the truck chassis are assembled in Mekelle as well.

The construction sector is also a considerable range. In part, the new residential areas extend up to one kilometer length. Many high-rise buildings are currently under construction, to take over the new inhabitants. At the moment, the city of Mekelle experienced a very strong growth and transformation process, but some sectors are not equal.

Structural fire protection

Approximately 95% of the buildings in Mekelle consist of 1-2 storey buildings where 1-2 families live. Here is only a risk, which takes place if a fire is spreading to the neighboring building, since the distances between the buildings to each other usually are only one to two meters. The building construction is always a cast concrete skeleton which is lined with hollow blocks. A wooden construction is very rare to find. With very few exceptions, the buildings are without a basement and have no city gas. Hot water is, if at all, by high-mounted water heater using solar power.

Cooking is done either electrically or with gas from bottles. Traditionally cooked with charcoal, which is also widely used in poorer and older districts.



The water supply is very irregular and the pressure in the pipes is very low.

The whole city currently has 19 underground hydrants of German production, from which the firefighters can take the water. Thus, the water supply for the entire city is more or less not to be considered for fire fighting.

Approximately 5% of the stock are buildings mid-height, between 7 m and 22 m. Mostly it's the residential and commercial buildings in the first row on major roads or multi-storey settlement units in the suburbs.



Approximately 10-15 buildings are well above 22 m and should therefore be classified as high-rise buildings.



Many houses are equipped with a huge atrium that extends generally from the ground floor to the top floor. Around the atrium are arranged arcades, where the apartments are adjoin directly or which leads corridors in the different wings of the building. As a rule, almost all buildings have only one staircase that connects all floors throughout. Smoke or fire compartments are completely unknown. Another problem is that in many buildings the atriums have been completed by a glass roof, so the fire smoke and heat can not be dissipated to the outside. The smoke accumulates beneath the dome and the smoke line reduces inevitably towards the ground floor.

The toxic and obscure smoke filled unhindered the Atrium, the lobby (escape routes) as well as the staircase and makes a safe escape impossible.

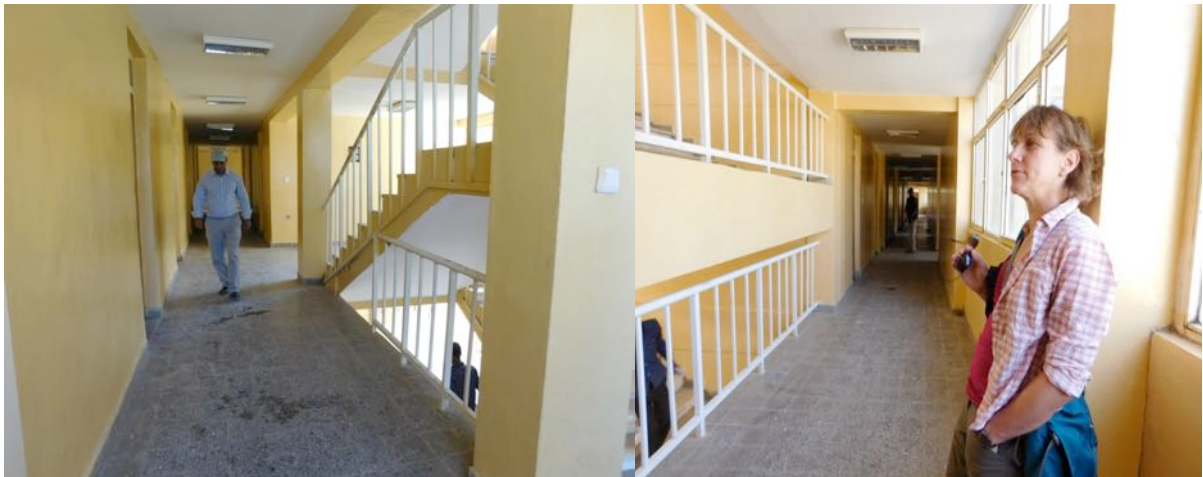


Entrance to the building



opposite: stairs to all floors

Unfortunately, all the stairways are continuously open and have no fire or smoke protection towards the corridors.



In this corridor live 160 students. The building has 4 floors. A fire in the groundfloor rooms would have a catastrophe effect, since the second escape stairway at the other end of the corridor, would be impassable as well.

In many buildings, the second escape route is an external, open spiral staircase with a diameter of about 1.2 m. Either long shaped buildings, as well as star-shaped buildings had only one such emergency staircase.



In order to locate an initial fire in such a large building and eventually fight at an early stage, it requires a fire alarm system that is informed by smoke detectors. In the buildings now under construction, it is questionable whether a fire alarm system is planned. At least the newly built city hall and the "Planet Hotel" are equipped with them. The above hotel had neither a fire alarm system, nor the hose reel of the wall hydrant were connected. However, that was anyway not possible, because there was no water pipe at all.



Building medium and high altitudes shall be equipped with fire fighting equipment facilities to ensure both - a safe escape, as well as fighting a fire. Both were non-existent.

From a certain height a sprinkler and a fire service lift is an appropriate means to ensure a spread of fire and fire-fighting. Both seem to be not planned in the skyscrapers under construction. However, in one of the high-rise buildings, a second, closed stairwell is provided. The one who can reach it through the smoke-filled corridors, encounters an approximately 0.9 m wide staircase, which is meant for the staff. As a rescue stairway for a hotel with about 160 rooms, it is not suitable, but safer than the spiral staircase exterior.

Law and orders for the construction of such tall buildings seem not to be given. That some buildings still have some rudimentary fire protection equipment, has probably something to do with the planning architect. He had built other structures somewhere before and knew about the installation. The head of the fire brigade and his deputy are policemen who are in charge since a few years ago, because the conditions in the former fire service made this necessary. For this reason, the leadership of the fire department is not trained particularly in these systems and is also not involved in the planning of high buildings by law.

There are also big Problems involving the fire brigades access to many of the buildings. The buildings of medium and upper height must have a place to set up a turntable ladder. But none of the Buildings I visited, had appropriate trafficked surfaces in the rear area. Almost all buildings are divided by a corridor in a front and rear part of the building, where only one side of the building is facing the street. The rear apartments are almost always in an unpaved part of the plot (Fig. 2)



Fig 1: Frontside to the street



Fig.2: Rear appartements from left and right building no access



Fig. 3: no access because of electric cable and high pavement

The necessary mounting surfaces for a turntable ladder do not exist, that has to do with the fact, that there is no aerial rescue vehicles.

Conclusion:

In all buildings where it would be necessary, smoke or fire zones are missing. Because of the open design, the spread of toxic fire smoke and heat is possible without hindrance in all parts of the building. The second structural emergency route is missing. A second escape route can not be ensured by the fire service also, because aerial rescue vehicles are missing.

In high-rise buildings and large building complexes such as the university, the hospital, great schools, office buildings, etc., facilities for early fire detection and fire fighting are missing.

Deflecting fire protection

In Germany we count one firefighter per 1000 population. That would mean for Mekelle a thickness of 250-300 firefighter. In fact, the fire brigade consists of two senior police officers, two shift foremen and 13 staff, divided into two shifts. The daily shift is 1/5.

The amazing thing is the use of statistics in Mekelle. One might think that the daily shift was completely overwhelmed for such a large and busy city. The opposite is the case. At just 40 appearances in the last year, the colleagues are more exposed to the underuse as an overload.

However, they have the 40 operations already exceeded this year, so that the growth of the city can be felt even by them.



It is also interesting, that they also know a protection target of 10 min. And have achieved it in 92.5% of the cases. The 40 missions divided into 36 smaller and 4 larger fires. However, they could not explain on what criteria they fix this. The left table shows the water consumption and the right one divided the number of fires per month.

The guardhouse, which was previously a bakery, is divided into a large dormitory with simultaneous tire warehouse and an office for the two leaders.



The communication to the operation site is operated by only two Tetra portable radios. Alarming occurs via the telephone before the guardhouse. There is only one emergency number in Addis Ababa. In Mekelle, firefighters will be notified via normal telephone number. An integrated control center for police, fire and rescue service is in preparation and is to run until February 2016th



The only functioning fire truck is a pumper with 6,000 liters of water and 1,000 liters of foam concentrate from the year 2008. The vehicle has run 12,000 km and is in good condition, but no inspection has been carried out since commissioning. The only Mercedes Benz workshop is located in Addis Ababa and since there is no reserve fire engine, the vehicle can not travel to the capital for inspection.



The second fire engine on the picture on the right is defective and serves rather a museum than fire fighting.



On the next screen you can view the complete "personal" protection of the colleagues. There are only these six sets working clothing, which mostly does not fit the fire fighters properly. The protective function is not designed for an internal fire attack. However, it has a good protection against the sun, not more.



The helmets are useless. There are helmets without an inner part or motorcycle helmets. (Jet and full-face helmets)



The fire fighters life saving breathing apparatus (BA) is not available. There are not even masks with filters. Firemen safety boots and gloves are also missing.

The fighting equipment is not suitable to carry out a proper fire-fighting. The fire department has been equipped in Ethiopia with British connections. One of the only existing 6 B-hoses is

equipped with a German-hose-coupling and is used to fill the vehicle on a German hydrant with a German standpipe. For this purpose, the dome cover is screwed and the tube is hung into it. Since the matching coupling piece is missing, a direct refueling through the vehicle-side terminals is not possible. One of the remaining five tubes has a large hole, which was hastily patched with electrical tape. Another one has a missing pin, so that also this compound loses water. One hose holds only 2 bar pressure, then he breaks away from the coupling. There remaining two B-hoses with 40m length, can be used for fire fighting. However, it is also not possible to take a B-hoses for an inside attack. There is no water-divider, no C-hoses and no C-nozzles.

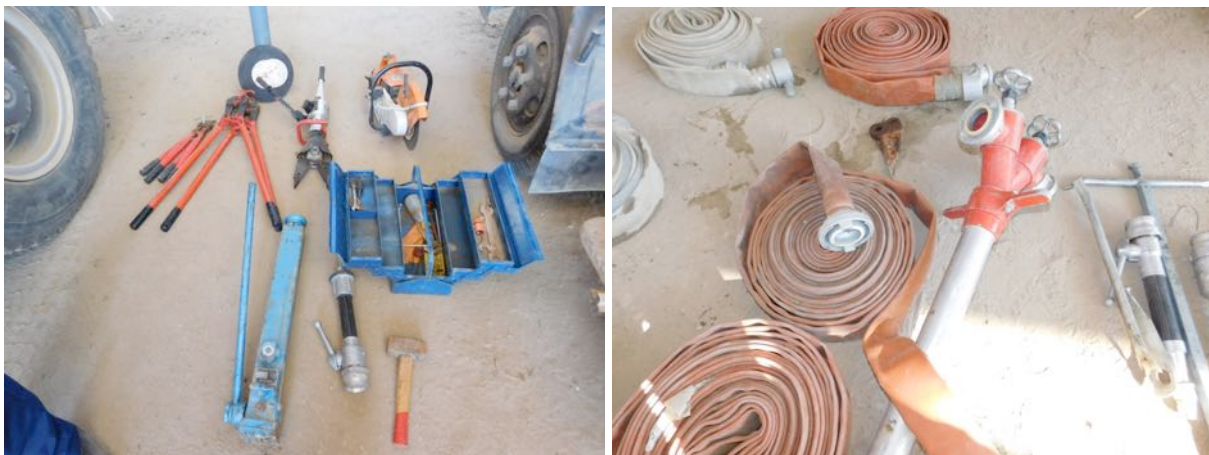
Seen Sarcastically, the system is coherent: no protection for the inside attack, no breathing apparatus for inside attack, no tubes for the inside attack – the only possibility is an external attack with two B-hoses. Putting water on the fire as far as it comes from the car and wait what happens. But this waiting only takes max. 15 minutes, then the water is consumed out of the car.

Help is only in sight, when the airport fire fighter have no landing within the coming period or the cement factory fire fighters don't provide any fire safety guarding.

Otherwise the fire pumper must be disconnected from the hose and to be refueled at any of the 19 hydrants in Mekelle city..

The presence of 2 fast attack reels with semi-stable hoses I leave unmentioned, as it may be tactically used only for manageable fires and they are playing in Mekelle rather a subordinate role.

The equipment for the technical assistance also has a very small scale and is sufficient for only a few small technical applications.



The only available ladder in Mekelle is in two parts and reaches a height of about six meters. There is no turntable ladder or similar, except in the capital Addis Ababa. Jump rescuer or something similar are also not available. Both, fires in height, as well as rescuing people from buildings are not affordable and must be left to stand by destiny. An inside attack would be suicide and under these conditions, beyond question.



Conclusion:

A classic firefighters inside attack to save peoples live and to avoid structural damage to buildings is not possible for Mekelle firefighters, without damage one's health or only with loss of their own lives!

Due to lack of protective equipment and the turntable ladder, the saving of human lives from 6 m height is NOT possible!

Rescue services

Untill now, there has been no professional rescue teams in Mekelle. Injured people were taken to hospital with the next pick up. An initial treatment of patients at the accident site in analogy to the First Aid is entirely absent. With the donation of the two ambulance cars, the foundation has been laid, to call the beginning of an on-scene-life-support. At the same time the cars were an opportunity to implement the non-existing emergency number, and to organize an around the clock control center.

The first training sessions with the cars and the equipments are successfully completed and the first secondary transport of an spine injured patient to the airport has already taken place. Enthusiasm for the new and patient-friendly technology is noticeable and must be strengthened by further successful operations.

The equipment of the vehicles must be expanded somewhat, but for the time being, the material is sufficient for a few scenarios. It becomes difficult for the next inspection or repair, since they are also Mercedes vehicles.



Conclusion:

The Rescue Service System is started rolling and still needs to be pushed forward one time or another, until the need of the rescue cars is in the mind of everybody.

Prospect:

On November 3, I presented my knowledge to the mayor of Mekelle in a comprehensive 60-page presentation. Beginning with the explanation why fire in our days and ages are far more dangerous to life and faster as 10 years ago, about the physiology of toxic gases and heat with respect to the human lungs, to the fire problems which pass through all the major buildings in his city. Furthermore, I presented solutions in relation to the non-existing fire water supply, the lack of training of the fire brigade and how to deal with the under construction high-rise buildings. I told him alternatives for existing buildings, such as the subsequent installation of fire alarm systems or the installation of a pressurized ventilation system. I explained him the principle of a sprinkler system and the meaning of firefighter lifts. Of course, I also made him unmistakably clear, that ladders and necessary protective equipment for the firefighters are life saving for many people. Since he holds the office of mayor only about four weeks, a restrained reaction on his part was understandable. As a former state finance minister, he is not particularly familiar with disaster management.

When he is visiting Witten, we should speak together about the situation and the measures once again. At the same time he should visit various companies and institutions, to see the intensity with which the problem of fire protection is operated in our country and to see the needs of a good fire department, which further minimizes the rest number of risk.

I would appreciate, if the cooperation between the fire departments could be further developed and intensified. For the citizens and firefighters of Mekelle, our knowledge is literally "life saving".

Mekelle / Witten in November 2015

Michael Heiland