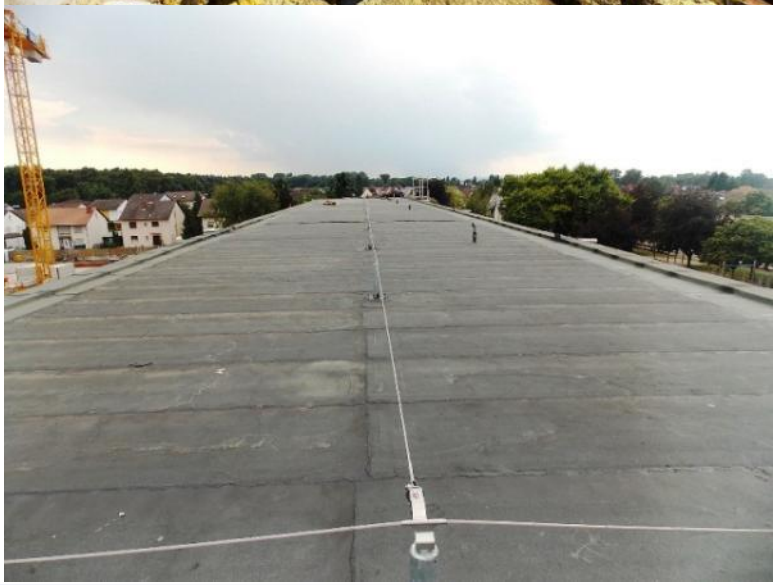
Case Study

"Water Damage Grundschule Rülzheim"

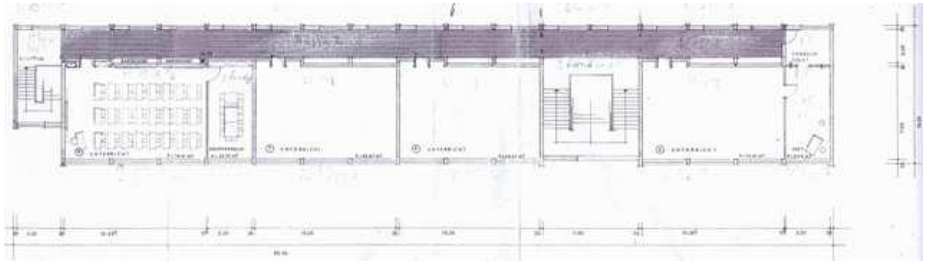
The Project

- Water Damage to Grundschule Rülzheim
- DBK Germany is also located in Rülzheim
- 675 M² total area of drying
- 3rd floor all areas wet from roof leak
- 2nd floor 1/3 of the areas wet from roof leak due to more rain before securing the temporary roofing repairs
- Summer break from school was July 22nd through Sept 3rd 2013
- Bid was awarded to DBK Germany on July 18th 2013 due to the new Drymatic drying system
- Two other German Water Damage contractors also bid on the job using the traditional drying technology used in the German market and needing 28+ days to complete each area
- DBK‘s bid was slightly below the two other contractors bids
- DBK structure work – detach and reset baseboard



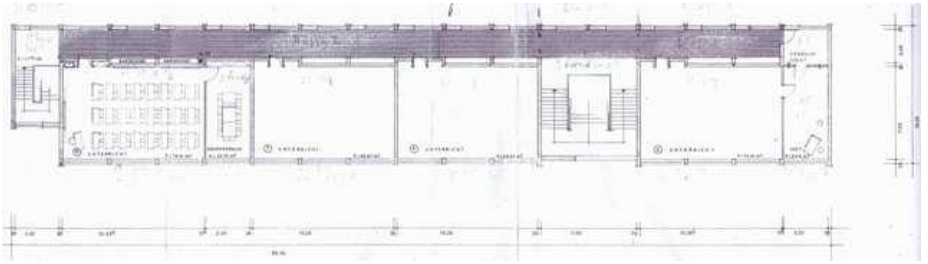
The Background

- 1950's Grundschule (Elementary School)
- Weather related loss
  - Tornado took the complete roof structure off at 21:30 on June 20th 2013.
  - Caused large amounts of water to enter into the 3rd floor of the school
  - Temporary roof was installed and finished on July 12th 2013
  - Water continued to enter the structure causing more damage to the 3rd floor and into the 2nd floor areas until the roof was temporary repaired
- Client is the city of Rülzheim and was managed by a local Architect



The Background

- Architect requested that we start on the second floor first so that they can get those areas back into operation first before school started in Sept 2013
- Architect had their own contractor's for the demolition/removal of wet materials, temporary electrical work, reconstruction and contents removal
- Architect request that we install HEPA filtered air scrubbing devices in both stairwell areas on the 3rd floor due to the old ceiling tiles with possible asbestos containing material
- We requested that all wet ceiling materials be removed – they only removed the hallway areas, but not the classroom areas



Questions that were addressed

- Access required >> We needed full access during our operations which started on July 17th and ended on Aug 8th 2013, key was provided
- Equipment needs >> 6 Drymatic's, 9 Air movers, 9 Drymatic Boost boxes, power boxes and extension cables, 1 large and 1 small HEPA air filtration air scrubber
- Other Equipment needs >> thermal camera, moisture meters, distance measure, digital camera, thermo hygrometer, ladders
- Electrical needs >> 2 temporary electrical power boxes with 3 power junction boxes
- H&S risk assessment >> Electrical, lifting, working in hot conditions and working on ladders
- Other issues >> Coordination of other contractors working on the school, equipment security, meeting and on-site visits by Mayor, Journalist, Architect and Indoor air quality professional
- Labour required >> 3 for equipment loading, set up and take down, 2 for ongoing monitoring and equipment moving and resetting

Questions that were addressed

- Questions we need answers on:
  - Who is our point of contact for submitting the bid?
  - If we receive the job, who will be our point of contact for onsite coordination?
  - What is the time frame? When do you expect a start date for drying?
  - Is there a goal as to when you expect the drying to be finished?
  - What will be the access times? 8-5 M-F? Weekend work? Will we have access afterhours and on the weekends?
  - Will we have a Key to the building? Or will someone need to let us in and out?
  - Security? How will we have a guarantee that our equipment will remain safe and secure while we are not there?
  - What are the phases of the project? We understand that the ceilings will be removed in all of the classrooms, halls and staircases – how long will that take? Will we come in after it is all finished? Or once each section is completed we follow behind?
  - What will happen with the contents of each classroom? Will it stay? Will we need to move them around? E.g. classroom H13 has lockers/cupboards that will need to be moved away from the walls – who will be responsible for that?
  - Will other trades be working in the areas during our drying process?
  - What is the drying goal? How will it be measured? Moisture mapping with moisture meters and Infrared Camera of walls, ceilings and floors before the job and verified at the end? Data logging on a daily basis e.g. Rh, Temp and GPK to verify the equipment and methods have dried each area? Or is it the based on the moisture content of the each type of building materials? Or a combination of all of the above?

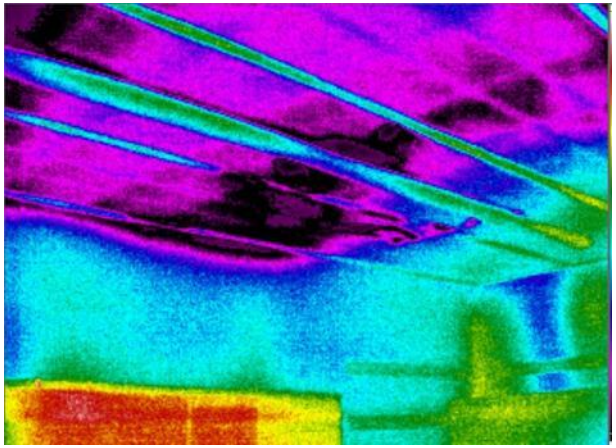
The Initial Survey - Construction

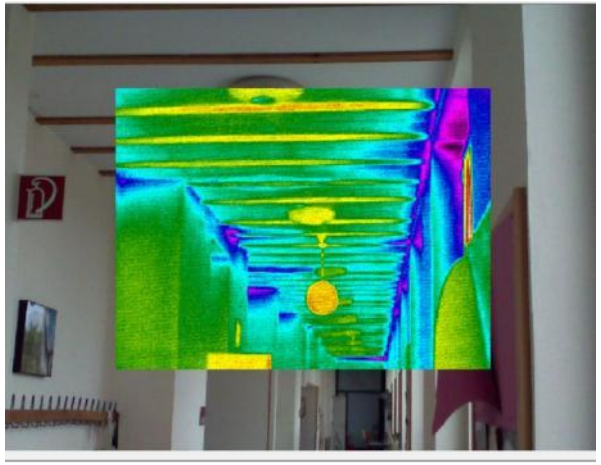
- Roofing was a pitched roof with wood framed construction and metal roof coverings and a concrete deck
- Temporary roofing was a flat roof with asphalt roof coverings laid over plywood which was laid on the concrete deck
- Flooring throughout was concrete based with a welded linoleum surface
- Walls were block construction with plaster covering
- Ceilings were a block construction with gypsum/plasterboard in hallways and classrooms and acoustic tiles with insulation in the stairwell's

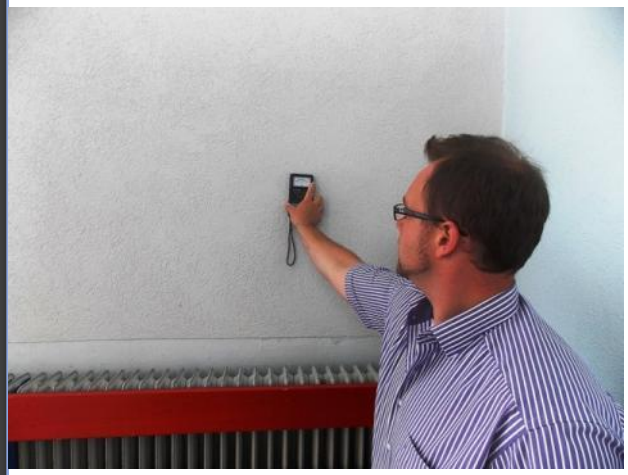
The Initial Survey

- The initial survey of the damage was the morning following the tornado on June 21st 2013
- Two other surveys and contractor meeting were conducted on June 21st and July 15th 2013
- Two people were needed to complete all surveys and each lasted about 2.5 hours to complete
- Euipment used to measure moisture
  - FLIR B20HSV Infrared Camera
  - Fluke TiR32 Infrared Camera
  - Tramex Moisture Encounter Plus moisture meter
  - Tramex Concrete Encounter CME4 moisture meter
  - Tramex MRH 3 moisture and humidity measurement meter
  - Tramex RWS Roof and Wall Scanner deep penetrating measurement meter
- This equipment was used during the complete drying process and for drying verification

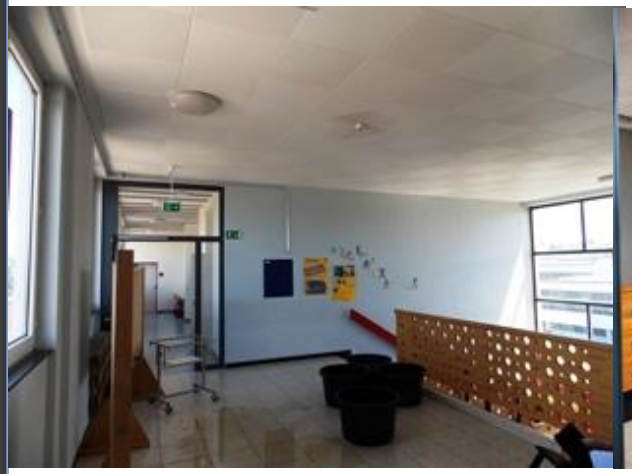
The Initial Survey







The Initial Survey






The Initial Survey

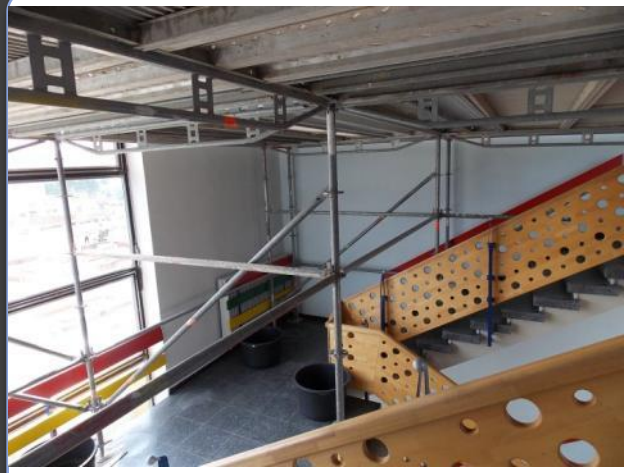


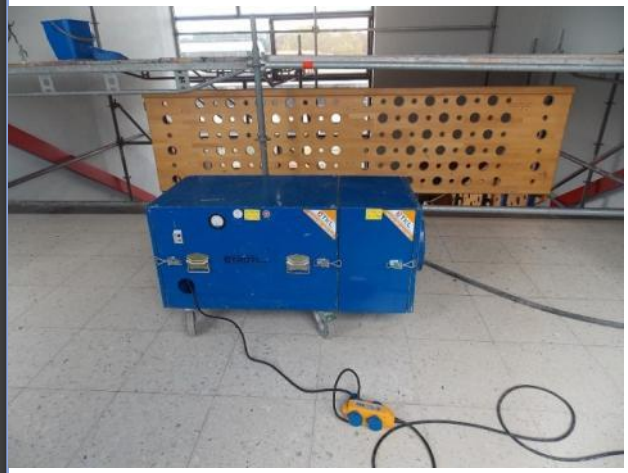



The Project

- 2nd Floor:
  - Large corridor/hallway – Ceiling areas
  - Classroom H07 – Ceiling and partial wall areas
- 3rd Floor
  - Landing/Stairwell large - Ceiling and partial wall areas
  - Landing/Stairwell small - Ceiling and partial wall areas
  - Classroom H11 – Ceiling and partial wall areas
  - Classroom H12 – Ceiling and partial wall areas
  - Classroom H13 – Ceiling and partial wall areas
  - Classroom H14 – Ceiling and partial wall areas
  - Classroom H15/16 – Ceiling and partial wall areas

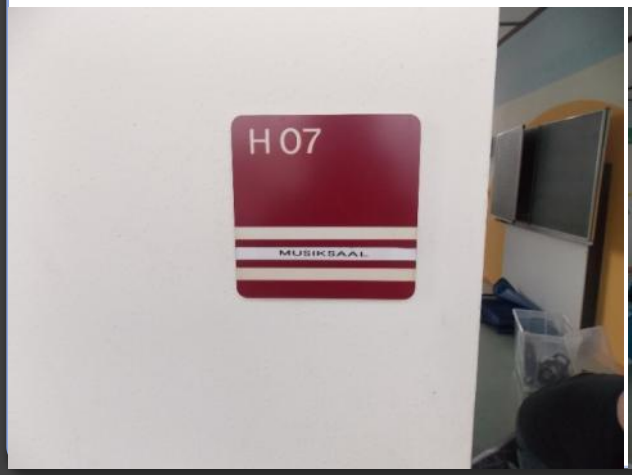
The Project – Other equipment needs





The Project – 2nd Floor Classroom

- Consisted of a large classroom with drywall ceilings
- Ceilings were not removed prior to starting the drying process and were wet in places
- 2 Drymatic's, 2 boost boxes and 2 air movers were used for the total drying process of these areas



The Project – 2nd Floor Hallways

- Consisted of a long hallway and a short hallway with high ceilings
- Ceilings were removed prior to starting the drying process
- 2 Drymatic's, 2 boost boxes and 3 air movers were used for the total drying process of these areas

The Project – 3rd Floor Hallways

- Consisted of a long hallway and a short hallway with high ceilings
- Ceilings were removed prior to starting the drying process
- 3 Drymatic's, 4 boost boxes and 6 air movers were used for the total drying process of these areas

The Project – 3rd Floor Stairwells

- Included one large stairwell with a lower landing area and one small stairwell with acoustic ceiling tiles and insulation
- 2 Drymatic's, 2 boost boxes, 2 air movers, 1 large and 1 small HEPA air scrubbing machine were used for the total drying process of these areas



The Project – 3rd Floor Classroom

- Consisted of a large classroom with drywall ceilings
- Ceilings were not removed prior to starting the drying process and were wet in places
- 1 Drymatic's, 1 boost boxes and 1 air movers were used for the total drying process of these areas

The Project – 3rd Floor Classroom

- Consisted of a large classroom with drywall ceilings
- Ceilings were not removed prior to starting the drying process and were wet in places
- 1 Drymatic, 1 boost box and 1 air mover were used for the total drying process of these areas

The Project – 3rd Floor Classroom

- Consisted of a large classroom with drywall ceilings
- Ceilings were not removed prior to starting the drying process and were wet in places
- 1 Drymatic, 1 boost box and 1 air mover were used for the total drying process of these areas

The Project – 3rd Floor Classroom

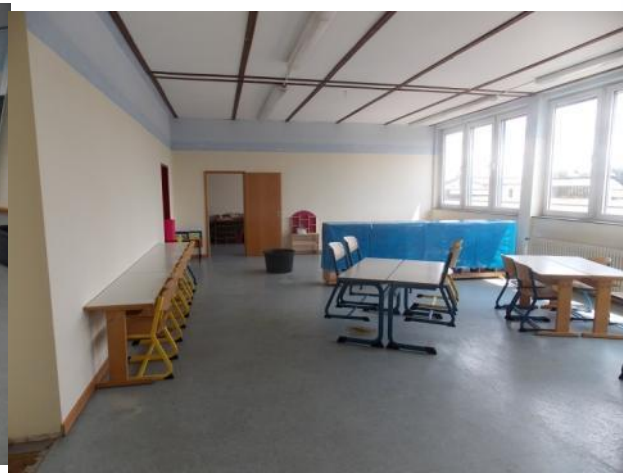
- Consisted of a large classroom with drywall ceilings
- Ceilings were not removed prior to starting the drying process and were wet in places
- 1 Drymatic, 1 boost box and 1 air mover were used for the total drying process of these areas

The Project – 3rd Floor Classroom

- Consisted of a large classroom with drywall ceilings
- Ceilings were not removed prior to starting the drying process and were wet in places
- 1 Drymatic, 1 boost box and 1 air mover were used for the total drying process of these areas

The Project – 3rd Floor Classroom

- Consisted of a large classroom with drywall ceilings
- Ceilings were not removed prior to starting the drying process and were wet in places
- 1 Drymatic, 1 boost box and 1 air mover were used for the total drying process of these areas



The Monitoring – Rh, Temp & GPK

Date and Time of Readings: 22/7/13 @ 14:00 hrs

Area	Rh	Temp	Td	GPK
Outside	32.3	33	14.1	9
Hallway LG 1 OG	36.3	32	15.4	10
Hallway LG 2 OG	32.7	35	16	11
Class room H07	84.9	35	32	30
Hallway SM 2 OG	36.4	34	16.9	11
Class room H 12	89.2	34	31.8	29
Class room H 11	35.5	34	16.5	11
Class room H 14	86.2	37	34.1	34

Date and Time of Readings: 7/08/13 @ 12:00 hrs

Area	Rh	Temp	Td	GPK
Outside	65.3	26	18.9	13
Staircase LG 2 OG	43.6	33	18.8	13
Hallway LG 2 OG	38.4	35	18.6	13
Hallway SM 2 OG	37	36	18.7	13
Staircase SM 2 OG	50.3	30	18.4	13
Class room H 11	33.6	38	19.1	13
Class room H 12	33.9	37	18.4	13
Class room H 13	43.4	33	18.8	13
Class room H 14	40.6	36	20.4	14
Class Room H15/16	38.9	34	17.9	12

The Final Survey

- The initial survey of the damage was the morning following the tornado on June 21st 2013
- Two other surveys and contractor meeting were conducted on June 21st and July 15th 2013
- Two people were needed to complete all surveys and each lasted about 2.5 hours to complete
- Euipment used to measure moisture
  - FLIR B20HSV Infrared Camera
  - Fluke TiR32 Infrared Camera
  - Tramex Moisture Encounter Plus moisture meter
  - Tramex Concrete Encounter CME4 moisture meter
  - Tramex MRH 3 moisture and humidity measurement meter
  - Tramex RWS Roof and Wall Scanner deep penetrating measurement meter
- This equipment was used during the complete drying process and for drying verification

The Final Survey






The Final Survey



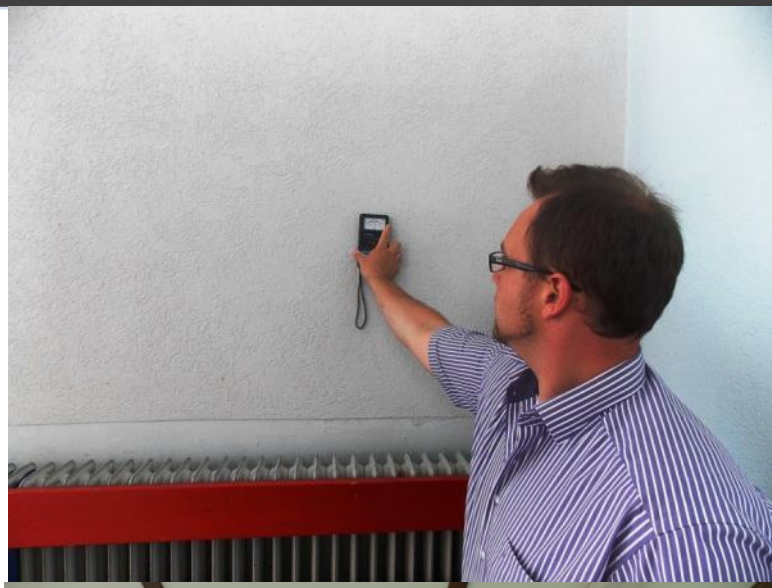



The Equipment Power Consumption

- 2 Power Boxes panels meter readings total combined was 9800 kWh used
- 6 Drymatic's used 4077 kWh – 680 kWh average
- 9 Boost box's used 3121 kWh – 347 kWh average with 2124 hours used – 243 hours runtime average
- 9 air movers used 1954 kWh with 2124 hrs used - 236 hours runtime average
- 2 air scrubbers used 610 kWh with 240 hrs used – 120 hours runtime average
- 10 ½ days total to dry the complete structure!

Personal Requirements

- Project Manager hours
  - For initial investigation planning and putting the bid together = 8 hrs or 1 work days
  - For job set-up, monitoring and takedown = 56 hrs or 7 work days
- Technician hours
  - For job set-up, monitoring and takedown = 80 hrs or 10 work days
- Other Assistant hours
  - For job set-up, and takedown = 8 hrs or 1 work day



The Conclusions

- DBK started the drying of the 2nd floor on 19.07.13 and finished on 31.0713.
- The drying of the 3rd floor was also partially started on 19.07.13 and continued till the entire 3rd floor was determined to be dried and all remaining equipment was removed on 08.08.13.
- Drying of these areas was verified using the moisture detection equipment, as well as conducting complete and detailed moisture mapping of these areas from prior to the start of the job, during the progress of the drying phase and at completion prior to removal of the drying equipment.

The Conclusions

- Visual and Infrared images were taken throughout the process as well as environmental conditions readings of Temperature, Relative Humidity and GPK (grains per kilogram) to also help in the determination of bring these affected areas to a dry state and drying standard.
- Drying using the DBK's Drymatic Heat drying system proved to be more effective and 65% faster than the traditional drying equipment being used in Germany and Europe
- Proper project and equipment management proved to be very useful in our success
- Moisture investigation with the right tools and knowledge of water damage restoration done before, during and after this project helped proved the drying success and set the client at ease

Outcome

- City was very pleased with the work that we did and the amount of time it took us to complete the drying process
- Architect and construction management was very pleased with the work and amazed on how fast we were able to complete the drying
- Completed the job without and demolition needed for drying
- Job was well within budget and time
- Press stories in the local news papers
- Reconstruction was completed before the new school year started