



**BITUMEN FOR WATERPROOFING
THROUGHTOUT HISTORY**



Your Host :

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Tar pit in fire [Yanchao, Taiwan]



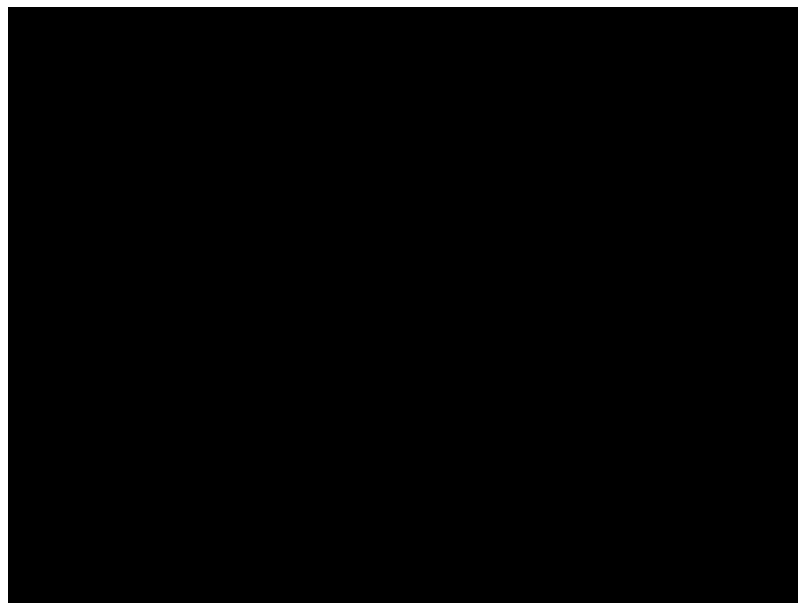
The cradle of civilization

- Through the ages, tar and bitumen deposits had been easily available at many places on earth.
- Some say that is highly probable that flaming tar pits would have attracted nomad humans who were passing by.
- Since this environment was bringing them warmth and security by night, some of these nomads would have gradually decided to settle by.
- Some of these settling areas grew up to a point where a community organization came up => civilization was born.

The Sumerians

- According to archeologists, Iraqi's sand hold the remains to the oldest known civilization, the Sumerians.
- Sumerians were very well organized people who were cultivating, trading and importing goods.
- They were also brilliant and ambitious builders who were using bricks and mortar.
- They used tar and bitumen in their constructions. First as mortar compounds and later as waterproofing membranes.

The Sumerians



Front view of Ziggurat of Ur ruin

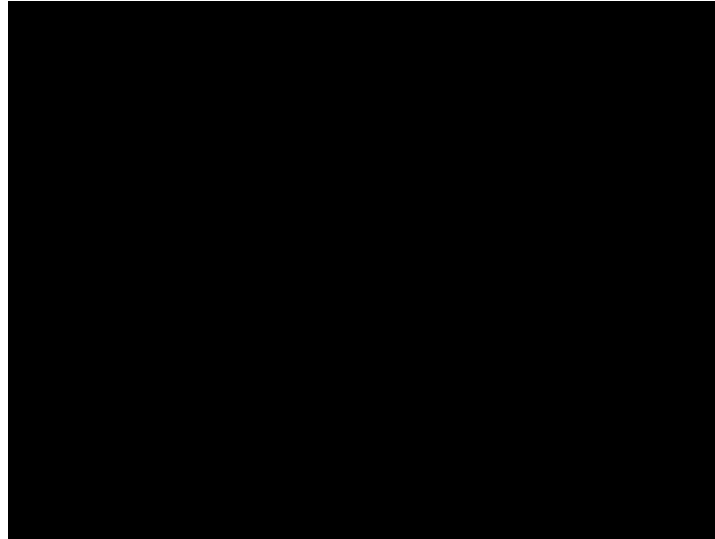


Thousands of years old tar membranes found on Ziggurat of Ur walls

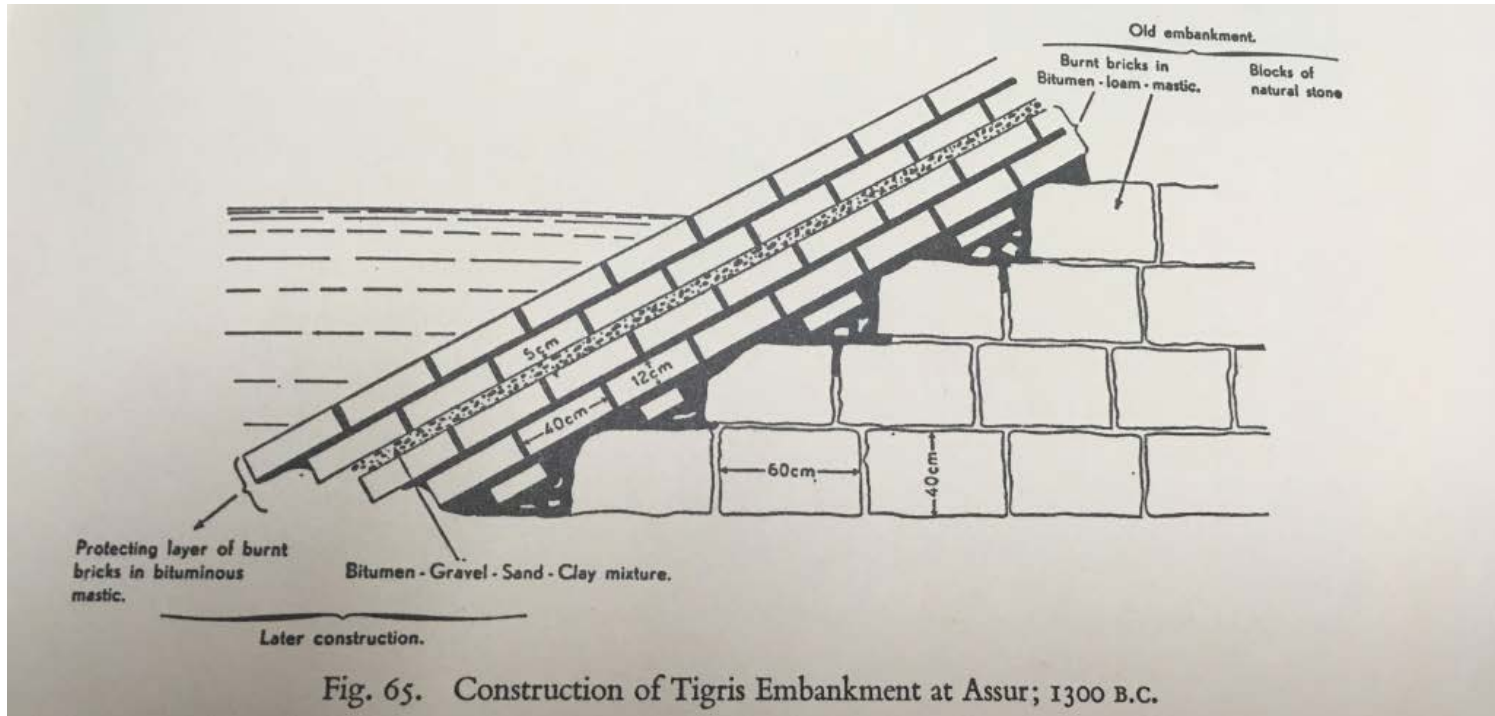


Tar in the everyday life of the Irakiis

The Sumerian myth behind the Noah arch

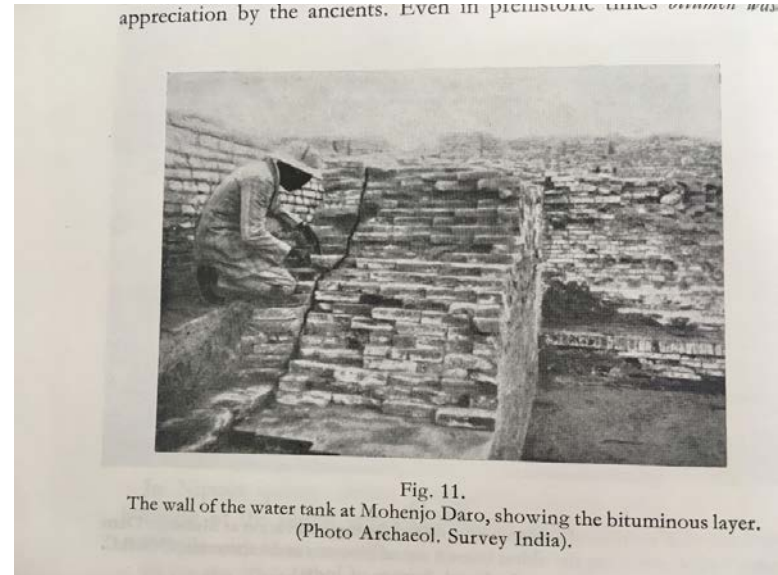
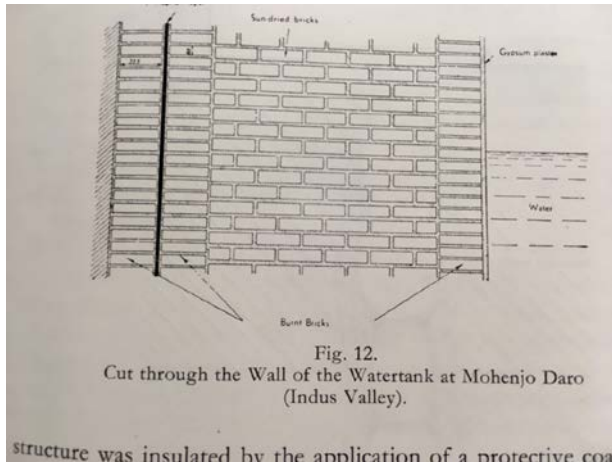


Tar is being used for over 5000 years
Very old tar membrane were found by archeologists



Davey, N. (1961). "History of building materials"

Ancient construction details found in the Indus valley (India)



Forbes, R. J. (1966). Studies in Ancient Technology, Vol I, Brill Archive

Some building codes requirements

2009 – IRC, R406.2 – Concrete and masonry foundation waterproofing.

When required, Walls shall be waterproofed in accordance with one of the following:

1. Two-ply hot-mopped felts.
2. Fifty five pound (25 kg) roll roofing.
3. Six-mil (0.15 mm) polyvinyl chloride.
4. Six-mil (0.15 mm) polyethylene.
5. **Forty-mil (1 mm) polymer-modified asphalt.**
6. Sixty-mil (1.5 mm) flexible polymer cement.
7. One-eighth inch (3 mm) cement-based, fiber-reinforced, waterproof coating.
8. **Sixty-mil (1.5 mm) solvent-free liquid-applied synthetic rubber.**

National Building Code of Canada 2015 – 9.13.3 Waterproofing

The materials used to waterproof must be in conformity with to one of the followings :

- a) ASTM D 1227, « Emulsified Asphalt Used as a Protective Coating for Roofing »;
- b) ASTM D 3019, « Lap Cement Used with Asphalt Roll Roofing, Non-Fibered, Asbestos-Fibered, and Non-Asbestos-Fibered »;
- c) ASTM D 4479ID 4479M, « Asphalt Roof Coatings - Asbestos-Free »;
- d) ASTM D 4637ID 4637M, « EPDM Sheet Used In Single-Ply Roof Membrane »;
- e) ASTM D 481IID 481IM, « Non vulcanized (Uncured) Rubber Sheet Used as Roof Flashing »;
- f) ASTM D 6878ID 6878M, « Thermoplastic Polyolefin Based Sheet Roofing »;
- g) ONGC 37-GP-9Ma, « Unfilled cutback asphalt for damp proofing »;
- h) CGSB-37.50-M, « Rubberized bitumen, hot applied »;
- i) CGSB-37.54, « Vinyl polychloride membrane »;
- j) ONGC 37-GP-56M, « Modified Bituminous Membrane »;
- k) CGSB-37.58-M, « Elastomeric Membrane »;
- l) CSA-A123.2, « Bitumen covered Felt for roofing »;
- m) CSA-A123.4, « Bitumen for multi-ply roof waterproofing »;
- n) CSA A123.17, « Asphalt Glass Felt Used in Roofing and Waterproofing ».

Modern foundation waterproofed with standard bitumen membrane



Modern foundation waterproofed with bitumen-modified membrane



A typical case where a bitumen base membrane you should not use



Discussion with audience

- Pros and cons
- Preparation
- Procedure
- Cost
- Durability