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Museological Assessment on the Present Condition of Water Wells of the Mohammedan Anglo Oriental (MAO) College -A Cultural Asset.

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ABSTRACT:

"Water is life" and life on earth is linked to water. Our existence is dependent on water in many ways and one could say that our whole civilization is built on the use of water. The watering place has always been the focal point of life on earth. First animal and then human kind clustered around their sources of fresh water. Both animals and humans can exist for weeks without food but without water life ceases within days. "Wells" were one of human's earliest construction activities, dated earliest in Neolithic era. The necessity of water and its exploitation by the man shows the technological advances made in the sector by various modern methods. India is a country with a rich architectural heritage and the number of monuments and their scale are very large. In this paper I am emphasizing on present condition of the water-wells in the Mohammedan Anglo Oriental (MAO) College, which had played a pivotal role to quench the thrust of water and other basic needs of society. They are significant part and partial of the built heritage of MAO College. Severe attempts has been done in preservation and conservation of the S.S Hall campus comprising Victoria gate, University, Mosque and Centre Vista, but no one has bothered to include the decimal status of water-wells which were the consequential part of those buildings.

Key words: *civilization, MAO College, architectural heritage, built heritage, preservation and conservation.*

1. INTRODUCTION

"Water is life" and life on earth is linked to water. Our existence is dependent on water in many ways and one could say that our whole civilization is built on the use of water. Water well is an excavation or structure used to access ground water. They are usually constructed by digging, drilling or boring deep holes in the ground until you hit water. Water is then drawn up, usually by pump. Old fashioned wells have buckets that are lowered into the well to collect water and then raised either by hand or mechanically. Wells are often the primary source of water in underdeveloped countries, but the water from them is often polluted with minerals that can cause health problems. Well water usually requires treatment before consumption. The watering place has always been the focal point of life on earth. First animal and then human kind clustered around their sources of fresh water. Both animals and humans can exist for weeks without food but without water life ceases within days. Wells were one of human's earliest construction activities.

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The epoch of the ancient Greek extended from 600 to 100 years before Christ. The technology of constructions and used material was very important for durability and quality of water supply facilities. Wood, stones, bricks or metal was used among other things. Besides that they used tools, machines, levers, rolls, blocks and pulleys, ships, wagons, carts and metal gearwheels. The world's oldest known wells located in CYPRUS dated to 7500 B.C. The earliest wells are known from Neolithic era. Neolithic refers to the time period roughly about 6000-8,000 BC. The oldest known well has been found in the archaeological excavation of the settlement of Atlityam in Israel to 8100-7500 BC, as shown in **Fig 1.**

Well construction seems to date from the time of the adoption of series of behaviours common to the people of a given region. These behaviours include the widespread use of farming, the keeping of domestic animals, and the use of metal (copper) tools. By the time of progression in development from the use of the copper tools, to bronze tools to widespread use of iron tools (iron age 1000-2000 BC)wells were commonly constructed. Wood-lined wells are known from the early Neolithic for example in Germany and Austria. From the Iron Age onward wells are common archaeological features, both with shaft and shaft-lining made from wickerwork. Step wells are common in the west of India. In these wells, the water may be reached by descending a set of steps, as shown in **Fig.2**. They may be covered and are often of architectural significance. Many step wells were also used for leisure, providing relief from the daytime heat.

A Persian Qanat is an ancient water collection system made up of a series of wells and linked underground water channels that collects flowing water from a source usually a distance away, stores it, and then brings the water to the surface using gravity; as shown in **Fig.3**. Much of the population of Iran and other arid countries in Asia and North Africa historically depended upon the water from Qanats; the areas of population corresponded closely to the areas where Qanats are possible. In Egypt Shadoofs and Sakieh are used. When both are compared the Sakieh is much more efficient, as it can bring up water from a depth of 10 metres (versus the 3 metres of the shadoof). The Sakieh is the Egyptian version of the Noria. From the early Bronze Age city of Mohenjo-Daro, located archaeologists have found hundreds of ancient wells, water pipes; as shown in the **Fig.4**. The first evidence of the purposeful construction of the water supply for irrigation and drainage system in Europe comes from Bronze Age. The experience of humankind from the very beginning testifies to the importance and safety of groundwater as water source, particularly springs and wells. The realization of the importance of pure and healthy water for people leads to the evolution of water wells and development of society, agriculture, trades and commerce.

Fig.1. Oldest known well found in archeological excavation in Israel to 8100- 7500 BC.

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Fig.2. Step wells in India

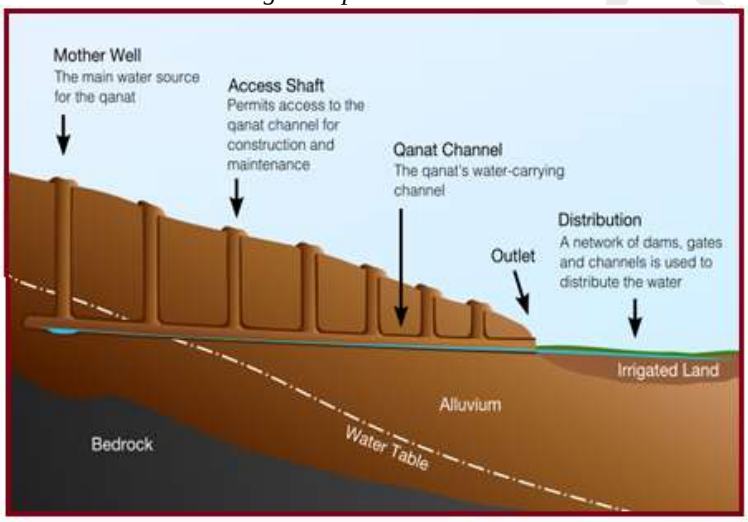

Fig.3. Schematic diagram Of Persian Qanat system.

Fig.4. Wells found during Mohenjo-Daro period

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1.1. Origin and development of water wells

Until recent centuries all water wells were pump less hand-dugs wells. They were dug by hand until the beginning of 19th century. Hand-dug wells are excavation with diameters large enough to accommodate on or more person with shovels digging down to below the water table. Then driven wells were introduced which were simply created in unconsolidated material with a whole structure which consist of a hardened drive point and a screen (perforated pipe). Beginning in the 1800s, Water wells began to be mechanically drilled for the first time, originating in the United States in 1808.

The Chinese are credited with developing the percussion method of well construction. In continuous use for 4000 years, the percussion system of drilling began with frame works percussion drilling techniques of the Chinese people. The first adequately documented spring pole well in America was drilled by David and Joseph Ruffener in 1808, on the bank of Kanawha River Charleston, West Virginia. A lot of wells were started with the drilling spring poles which are shown is **Fig.5**. This method required strong and considerable time. The outfit was simple a long pole, a weight to anchor the bit end, a fulcrum, stirrup, manila rope, oak rods, down hole tools including percussion bit. More tools and other improvements would be added to drill string as time went on. Leg power on a spring pole was only as reliable as the strength and endurance of the man. Therefore later, this technique was replaced by horse powered machines in 1870s, as shown in **Fig.6.**

As time went on, more and more engines and broilers together were developed in drilling machine known as a foot-drilling machine with traction attachment were introduced in 1900s; as shown in **Fig.7.** And finely rotatory drilling machine confer drilling technology became common in the early 20th century; as shown in **Fig.8,** aided by Howard Hughes.

***Fig.5. People use drilling spring poles for water Harvesting*.**

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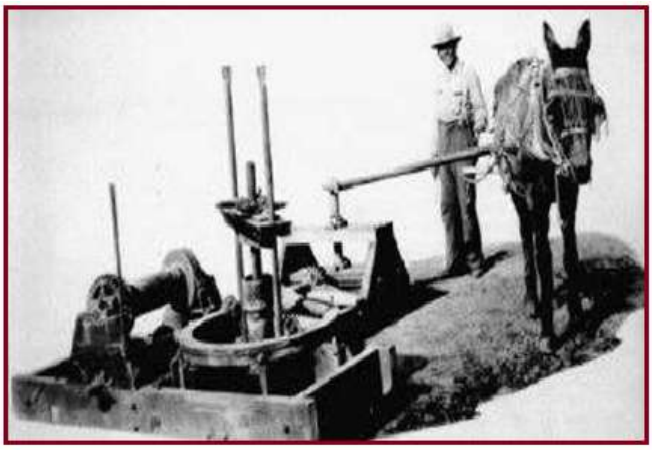

Fig.6. Horse power is used for drilling during 18th C.

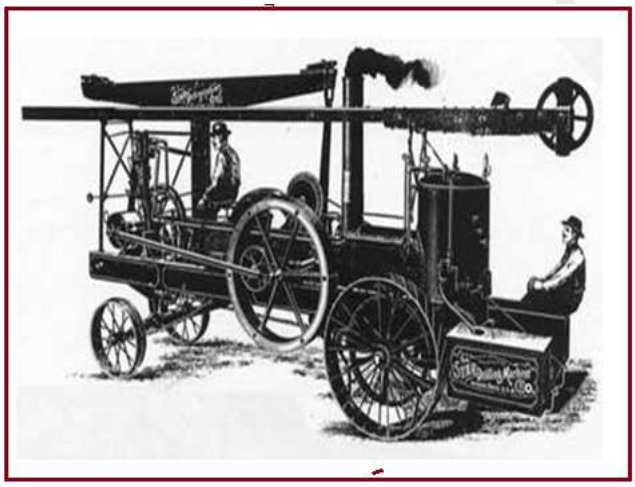

Fig.7. Foot drilling machine used in 19th C.

Fig.8. Rotary drilling technology in 20th century.

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1.2. Types of water wells

Water wells are devices or systems used to draw water from the ground to the surface for human use. When it rains, water trickles down through soil and then gets trapped in solid rock. This water is usually very pure and clean after being filtered by sand and stone. This fresh water usually collects at least fifty feet below the ground, and often much deeper than that. In order to access this highly desirable water, people have used various types of wells for centuries. There are three major categories of water wells:

1.2.1. Dug wells
1.2.2. Driven Wells
1.2.3. Drilled wells

1.2.1. Dug wells

Historically, dug wells were excavated by hand shovel to below the water table until incoming water exceeded the digger's bailing rate; as shown in the ***Fig.9***. The well was lined with stones, bricks, tile, or other material to prevent collapse, and was covered with a cap of wood, stone, or concrete tile. Because of the type of construction, bored wells can go deeper beneath the water table than can hand-dug wells. Dug and bored wells have a large diameter and expose a large area to the aquifer. These wells are able to obtain water from less-permeable materials such as very fine sand, silt, or clay. Woodingdean well, hand dug between 1858 and 1862, is claimed to be the world's deepest hand dug well at 1,285 feet. The big well in Greensburg, Kansas billed as the world's largest hand dug well.

Fig.9. Wells Dug by Hand

Disadvantages:

This type of wells are usually shallow and lack continuous Casing and Grouting, making them subject to contamination from nearby surface sources, and they go dry during periods of drought if the water table drops below the well bottom.

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1.2.2. Driven Wells

Driven wells are constructed by a small-diameter pipe into shallow water-bearing sand or gravel. Usually a screened well point is attached to the bottom of the casing before driving; as shown in **Fig.10**. These wells are relatively simple and economical to construct but they can tap only shallow water and are easily contaminated from nearby surface sources because they are not sealed with grouting material.

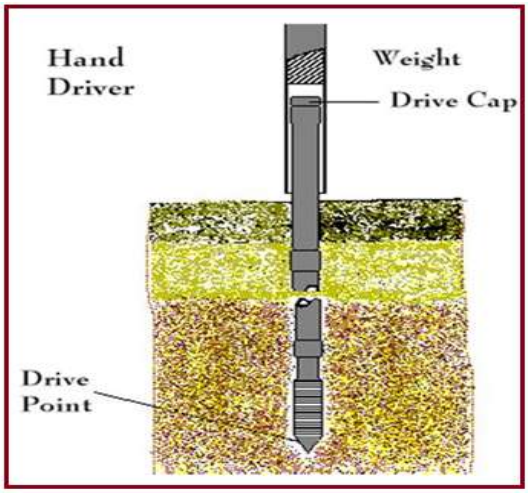

Fig.10. Image of screening at the bottom of well

Disadvantages:

The driven well can only achieve penetration of 1-2 meters into the water table.

1.2.3. Drilled wells

Drilled wells are constructed by either cable tool (percussion) or rotary-drilling machines. Drilled wells that penetrate unconsolidated material require installation of casing and a screen to prevent inflow of sediment and collapse. They can be drilled more than 1,000 feet deep; as shown in **Fig.11**. The space around the casing must be sealed with grouting material of either neat cement or bentonite clay to prevent contamination by water draining from the surface downward around the outside of the casing. **Numerous techniques** are possible for drilled wells they are as follow.

(a) Manual drilling

In these cheap manual resources are used. For example, gimlets called augurs which are turned with muscle power. The most frequently used techniques are:-

- **Hand-augur** drilling
- **Percussion** drilling
- **Water injection (**or water **jetting)** drilling

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- **Sludge** drilling.

(b) Light motor-driven

In these pumps and compressors are used to dig the ground.

- **Rotary-percussion drilling,**
- **Rotary drilling**

(c) Heavy drilling machinery

This is used to reach great depths. These drilling methods are often **mounted on large**, well-equipped **Lorries**. They use **rotary drilling tools.**

Drilled-well types are further divided into two categories, based on the type of well aquifer.

(i) Shallow or unconfined wells: These are completed in the uppermost saturated aquifer at the upper unconfined aquifer.

(ii) Deep or confined wells: These are sunk through an impermeable stratum into an aquifer that is sandwiched between two impermeable strata. The majority of deep aquifers are classified as artesian, because the hydraulic head in a confined well is higher than the level of the top of the aquifer. If the hydraulic head in a confined well is higher than the land surface it is a "Flowing Artesian Well".

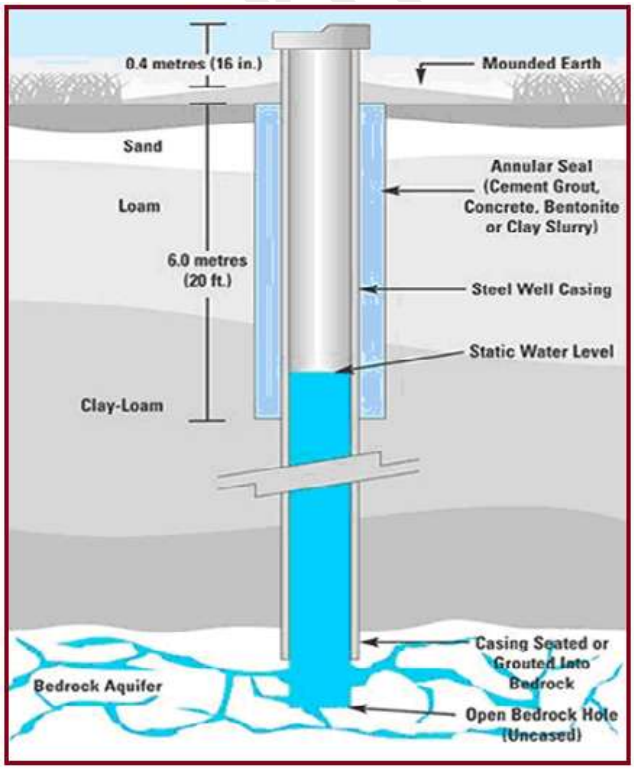

Fig.11. Schematic dig. Of drilled well

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1.3. Water wells in India

In the first century AD, the slippery shores of the major rivers were tamed by the construction of *Ghats*, long, shallow sets of stairs and landings. The same approach was applied to the construction of a new kind of well known as step wells. Step wells are commonly known as Bawdi or Baoli. They are wells or ponds in which the water may be reached by descending a set of steps. They may be covered and protected and are often having architectural significance. They also may be multi-storeyed having a bullock which turns the water wheel commonly known as "Rahat" to raise the water in the well to the first or second floor.

Rahat or waterwheel was used to draw water from wells. It is a mechanical water lifting device operated usually by draught animals like bullocks, buffaloes or camels. Today Rahat is disappearing due to introduction of electric pumps to draw water from the wells; as shown in the **Fig. 12.** The earliest stepwells were date to about 550 AD, but the most famous were built in medieval times. There are suggestions that they may have originated much earlier, and precursors to them can be seen in the Indus Valley civilisation. The city of Mohenjo-Daro has also wells which may be the predecessors of the stepwells, about 700 wells have been discovered in just one section of the city.

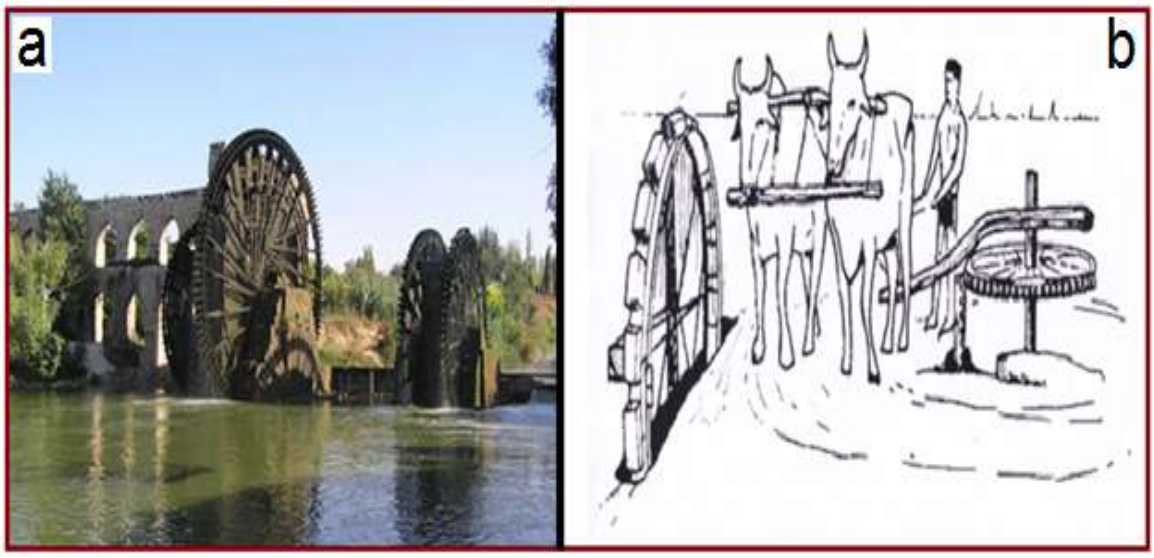

Fig.12. Rahat used to draw water from water bodies

In the northern Indian states of Rajasthan and Gujarat, the problem of water is a profound one. At the edge of the Thar Desert, the area sees torrential seasonal monsoons, and then watches the water disappear almost immediately. With summers routinely over 100 degrees, and silt soil that would not hold water in ponds, a practical solution was needed for locals and travellers along the local trade routes, this lead to the development of step wells. The architecture of the wells varies by type, by time, and by location. Builders dug deep trenches into the earth for the groundwater. They lined the walls of these trenches with blocks of stone without using mortar and created stairs leading down to the water. Step wells usually consist of two parts, a vertical shaft from

which water is drawn and the surrounding inclined subterranean passageways chambers and steps which provide access to the well. The galleries and chambers surrounding these wells were often carved profusely with elaborate detail to keep it cool. These step wells were even proven to be withstanding earthquakes in the range of 7.6 on the Richter scale. The majority of surviving step wells originally also served a leisure purpose as well as providing water. This was because the base of the well provided relief from daytime heat. Temples and resting areas with beautiful carvings are built into many of the wells. Stepwells also served as a place for social gatherings and religious ceremonies. The use and the condition of step wells began to decline during reign of the British Raj, they were horrified by the unsanitary condition of these drinking water bathing spots. They began to install pumps and pipes, and eventually outlawed the use of step wells.

1.3.1. Wells of MAO College and their uses

Water is the basic requirement of life and as the human settlement, because permanent in due course of history, the needs for constant water supply grew up due to the multifarious profession and daily needs of human society, which included agriculture, horticulture production, cottage industry and house hold work. The habitations which was close to the water bodies like rivers, ponds and lakes and waterfalls were enough to cater the above needs of the local population. They have devised the means to transport the water in pots by water channel and in ponds for storage and use, but the land settlements which were not close to water sources, they have started digging the wells to harvest the water from the underneath water from the underneath water table of earth, initially these wells were made to use and after the deposition of sand they use to abandoned it. It was a cumbersome procedure to dig deep into the earth so they have started constructing the walls of stone or terracotta bricks. We find such examples of masonry wells in Indus valley civilization. It circular construction of brick walls, which provide joint less construction of a large tube deep into the earth which was dug up to the water table.

The method was very simple first they use to dig, then they desired the circular pit into the earth and then they use to make a wooden circle, which have the thickness of wall to be constructed, leaving the centre area open, just like a truck tire. This was placed in the pit and on it they use to construct the circular brick structure. Slowly the remove the earth beneath from the wooden circle which was called “chaak chalana”. Due to the weight of brick structure it was used to move down slowly, this process was repeated again and again till the excavation of water table. The circular wall which was compressed by the surroundings earth does not get cracked due to the weight and the equal pressure of the surrounding earth. In this manner the well was constructed in ancient and till early modern period and with the advent of hand pump and tube wells. The technology of digging and constructing of wells were forgotten by the society. In MAO College the three wells which have been made to provide water, were made in the same manner which shows by **Fig.13.**

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Fig.13. Water Wells of the MAO College

Water was harvested by using animals like bulls, and buckets, to fetch the water were made of Ox skins. It was lowered in the wells and pulled by the bulls. This method was called "Paer Chalana"; as shown in **Fig.14.**

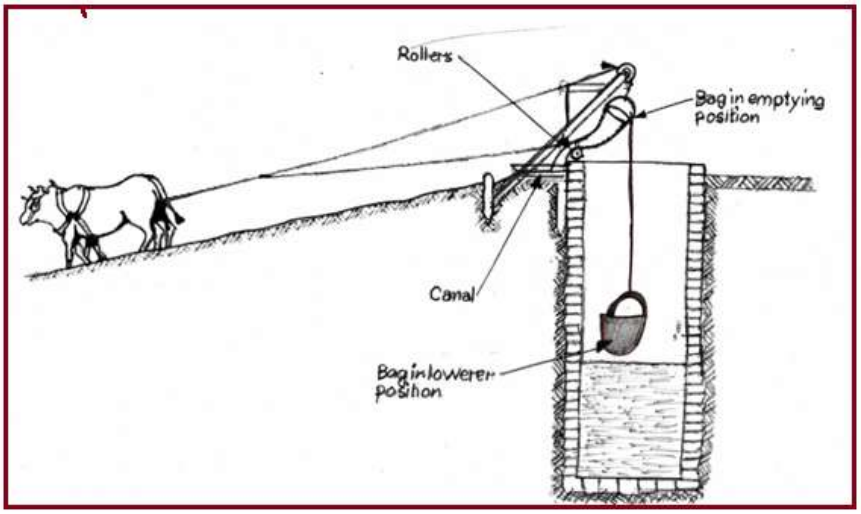

Fig.14. Sketch diagram of paer chalana

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The water was released on the specially built platform at the top of the well, which was connected into the water channel for use in lawns, watering plants and gardens. For daily use of the life "The Bhishtis" use to take water in the "Mushk", which was made up of full Goat skin and water was restored in the backroom of earthen pots, which is called "Ghada or Matka".

1.3.1. a. Present status of MAO wells

Present condition of the water wells of MAO College are discussed below:

- The wells of MAO College at present is not in use, due to the advancement of the technology and the grown needs of water has forced to adopt more efficient water harvesting techniques, like electric tube wells, submergible, pump etc.

- The water well situated in the east wing's dining hall of MAO College is in good condition although it is a dried well. But the structure is almost intact. There are few cracks on the surface projection wall of the well which can be easily restored which are designated by **Fig. 15.**

Fig. 15. Earlier image of wells in the east wing of MAO College their present condition, developed cracks and inside images of the wells

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- The second water well on the west wing of MAO College is broken and the top of the well is covered with concrete layer which shows by **Fig.16.**

Fig.16. Well of the west wing of the MAO collage is covered by concrete.

- The third water well which is situated in front of the Victoria gate slightly away from the road and situated in the nursery is also in quite good condition shows by **Fig. 17**.

Fig.*17. Well in front of Victoria gate is covered inside the room and their bad condition*

- The fourth water well is situated in the campus of the Sir Syed house, which is intact and requires less masonry restoration is shown by **Fig.18**.

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- Other wells which were situated in different old bungalows have been covered or cannot be located right now.

- The need is to restore these wells in original condition with little effort, so that the present and the coming generation can get a glimpse of the past water harvesting system.

Fig18. The well situated in the campus of Sir Syed House and their inside mage

CONCLUSION

The development of human society is natural phenomenon and man has made thousand of innumerable inventions to comfort his life and every technique is used to replace the older one. The necessity of water and its exploitation by the man shows the technological advances made in the sector by various methods. The construction of well and harvesting of water from it was a dominant feature of human society till the advent of modern era, and is still in remote areas the wells are operational. In case of MAO College, these wells have played a pivotal role to quench the thrust of water and other needs. They are part and partial of the built heritage of MAO College, and there is a try to preserve the S.S Hall campus comprising Victoria gate, University, Mosque and Centre Vista. But no one has bothered to include the decimal status of the well which is the part of the building. Therefore, the need is to preserve these wells in their original shape as they are in quite good shape and can be restored with very much less intervention.

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