

**AN-NAJAH NATIONAL UNIVERSITY**

**FACULTY OF ENGINEERING**

**DEPARTMENT OF MECHANICAL ENGINEERING**

**MECHANICAL SYSTEMS FOR RAMALLAH FINANCIAL QUARTER**

**Graduation Project Summary Submitted In Partial Fulfillment Of The Requirements For The degree Of B.Sc. In Mechanical Engineering**

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Changes in our life today are increasing more and more, which acquire high attention to do and resist these natural climatic and outside changes. Building needs many systems to make one of them the mechanical which is the desired one to be in the project. Ramallah Financial Tower deals and includes financial companies, Banks, stores, halls, parking and another offices, this means a lot of varieties so it is important to be done in a suitable way.

As the mechanical system advanced than previous, Ramallah Financial Tower will interest in heating ventilation and air conditioning (heating and cooling by air system using boiler and chiller respectively), plumping system, firefighting system and drainage system. All of these will be done in the suitable places and a saving method.

The main objective for this project to obtain a good usable place indoors, such as (HVAC) system to maintain temperature, humidity and solve trouble ventilation in closed areas. For plumping system used for obtaining clean and reachable water hot and cold all the time in every wanted place in the correct quantity. Drainage system for unclean water like water closets and others which will get rid of them by this system. Firefighting system to be in the safest areas for each one in the tower. So that all of these systems are compatible with each other.

Nowadays, there are many advanced applications like under floor heating and cooling for heating can be hybrid by using boiler and solar cells, also using absorption cycle for cooling.

This project had not been done before.

**Heating Ventilation and Air Conditioning:**

Heating, Ventilation and Air Conditioning (HVAC) systems control the temperature, humidity, ventilation, air movement and quality of air in buildings to a set of specified conditions to obtain human comfort. To achieve this, the systems need to transfer heat and moisture into and out of the air as well as control the level of air pollutants, by directly removing them (filtration).

**Plumbing Systems:**

**Supply Water**

It is the system of pipes, drains fittings, valves, and devices installed in a building for the distribution of water for drinking and washing, and the removal of water wastes, and the skills of working with pipes and plumbing fixtures in any systems. The plumbing industry is a basic due to the need for clean water, and proper collection and transport of wastes.

* Potable Water: water suitable for human drinking.
* Non-potable: use for irrigation, flushing toilets.
* Surface water comes from rain.
* Private water supplies: include wells, springs, or collected rainwater.
* A water supply system is comprised of piping, fitting, valves, and other specialized components.

**Sanitary Drainage**

* Sanitary drainage: any drainage that may include human waste
* Storm drainage: only runoff from roof drains, landscaped areas.
* The two types of drainage are separated because storm drainage does not have to be treated. It can also easily overload the lines of a sanitary drainage disposal system and cause drainage to back up into a building.
* Black water is sewage including human waste, and grey water is sewage not including human waste, such as from kitchen sinks, dishwashers, and lavatories.
* Vents: are pipes connected to the drainage system in various ways, vented to outside air, and designed to serve two primary purposes. First, they allow built-up sewage gases to escape instead of bubbling through the water in the traps. Second, they allow pressure in the system to equalize so that discharging waste does not create a siphon that would drain the water out of the traps.

**Fire Fight systems**

* Fire prevention includes limiting the products of combustion and other hazardous situations that could lead to starting a fire. Fire containment is provided with building materials, and smoke control. Fire suppression is provided by sprinkler systems, standpipes, and other methods.
* Standpipes are pipes that run the height of a building and provide water outlets at each floor to which fire fighting hoses can be connected. They are located within the stairways or in the case of pressurized enclosures, within the lobbies.
* Water is supplied in two ways: from storage tanks and through Siamese connections at ground level for connection with fire department groups like a sprinkler system, the standpipes can be either dry or set. In a wet system, the standpipes are constantly filled with water and are connected to a tank of water at the top of the building that provides a supply of water for immediate use.