**INTRODUCTION:**

Al-oyoon hospital, north of Nablus, located at the top of the north mountain at Nablus-Aseera street.

The hospital has four departments A,B,C and D.

In this project, only the mechanical systems of department A and C are calculated , A and C department has four stores , each on has an area more than 2000 m2.

In this project, there is many mechanical systems was designed, like:

1. HVAC systems (heating, cooling, ventilation, fresh air, exhaust are systems).
2. Potable water system (hot water supply and return, cold water supply).
3. Drainage system.
4. Venting system.
5. Fire fighting system.
6. Medical gases system.

**HVAC SYSTEM:**

* Select inside design condition (Temperature, relative humidity).
* Select outside design condition (Temperature, relative humidity).
* Select unconditioned temperature.
* Find over all heat transfer coefficient Uo for wall, ceiling, floor, door, windows, below grade.
* Find area of wall, ceiling, floor, door, windows, below grade.
* Find Qs conduction.
* Find V inf , V vent .
* Find Qs, QL vent, inf.
* Find Q domestic hot water.
* Find Q total and Q boiler.

The heating load calculation begins with the determination of heat loss through a variety of building envelope components and situations.

1- Walls

2- Roofs

3- Windows

4- Doors

5\_ Basement Walls Basement Floors

6\_ Infiltration Ventilation

**POTABLE WATER:**

 The pipes conveying water to water closets shall be of sufficient size to supply the water at a rate required for adequate flushing without unduly reducing the pressure at other fixtures Separate sewer connections.

 Every building intended for human habitation or occupancy on premises abutting on a street in which there is a public sewer shall have a separate connection.

1) No slope is required on potable water. It's pressurized.

2) There is a freeze line called out in the local plumbing code. Seeing
as it's cold autumn and winter, it sounds like here, and our freeze line in 3'-0" minimum, and that's "top of pipe", not centerline.

3) I know you'll need a water meter with any applicable strainers, and a backflow preventer to keep dirty water from getting back into the city water system.

4) I believe (at least according to the code we're currently working

**DRINAGE AND VENT SYSTEMS:**

 In modern [plumbing](http://en.wikipedia.org/wiki/Plumbing), a drain-waste-vent is a system that removes [sewage](http://en.wikipedia.org/wiki/Sewage) and [grey water](http://en.wikipedia.org/wiki/Greywater) from a building and vents the gases produced by said waste. Waste is produced at [fixtures](http://en.wikipedia.org/wiki/Fixtures) such as toilets, sinks and showers, and exits the fixtures through a [trap](http://en.wikipedia.org/wiki/Trap_%28plumbing%29), a dipped section of pipe that always contains water. All fixtures must contain traps to prevent gases from backing up into the house. Through traps, all fixtures are connected to waste lines, which in turn take the waste to a [soil stack](http://en.wikipedia.org/w/index.php?title=Soil_stack&action=edit&redlink=1), or soil vent pipe, which extends from the building drain at its lowest point up to and out of the roof. Waste is removed from the building through the building drain and taken to a sewage line, which leads to a [septic system](http://en.wikipedia.org/wiki/Septic_system) or a [public sewer](http://en.wikipedia.org/wiki/Sanitary_sewer). [Cesspits](http://en.wikipedia.org/wiki/Cesspit) are generally prohibited in developed areas.

**FIRE FIGHTING SYSTEM:**

 Fire protection is the prevention and reduction of the hazards associated with fire. If involves the study of the behavior compartment, suppression and investigation of fire and its related emergencies as will as the research and development production, testing and application of mitigating.

Structural fire protection (in land – based buildings, offshore construction or based on board ship) is typically achieved via three means:

1. passive fire protection: use of integral, fire-resistance rated wall and floor assemblies that are used to form fire components intended to limit the spread of fire, or occupancy separations, or fire wall, to keep fires, high temperatures and flue gases within the fire component of origin, thus enabling fire fighting and evacuation.
2. Active fire protection: manual and automatic detection and suppression of fires, as in using and installing a fire sprinkler system or finding the fire (fire alarm) and or extinguishing it.
3. Education: the building occupants, operators, and emergency personal know the building, its means of active fire protection and passive fire protection, its weak spots and strengths to ensure the highest possible level of safety.

**MEDICAL GASES:**

Medical gases are very important in hospitals, the main application of it inside the surgery operations rooms and in patient rooms to help the patients.

There is many medical gases are used in hospitals, like:

• Oxygen (O2)

• Medical Air (MA)

• Medical Vacuum (MV)

• Nitrous Oxide (N2O)

• Nitrogen (N2)

• Instrumental Air (IA)

• Carbon Dioxide (CO2)

• Waste Anesthesia Gas Disposal (WAGD or EVAC)