

Palestine Polytechnic University



College of Engineering & Technology
Mechanical Engineering Department

H.V.A.C. Engineering

Design A Mechanical Systems
For A Social Building In Hebron

Prepared by:
MUTAZ DWEIK

















































Supervisor :
Dr. KAZEM OSAILY

Hebron , Palestine
April 2018

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MECHANICAL LEGENED

	FLOOR DRAIN (SIPHONE-TRAP)		WATER METER
	FLOOR DRAIN (JUNCTION BOX)		WATER METER BOX (WMB)
	CLEAN OUT		GATE VALVE
	ROOF & BALCONY DRAIN		NON RETURN VALVE
	SEWER MANHOLE (MH)		FLOAT
	RAIN WATER MANHOLE (RWM)		8mm GAS SHUTOFF VALVE
	FIRE HOSE CABINET		G.S.P COLD WATER SUPPLY
	EXHAUST FAN		G.S.P HOT WATER SUPPLY
	UPVC DRAINAGE PIPE		CITY MAIN WATER PIPE
	GALVANIZED STEEL WATER PIPE		POLYETHYLENE COLD WATER PIPE
	2" UPVC DRAINAGE PIPE		POLYETHYLENE HOT WATER PIPE
	4" UPVC DRAINAGE PIPE		COPPER GAS PIPE INSIDE 20MM P.V.C PIPE
	6" UPVC DRAINAGE PIPE		COLD WATER PIPE
	4" UPVC VENT PIPE		HOT WATER PIPE
	GAS COLLECTOR		HOT WATER RETURN PIPE
	WATER COLLECTOR		IRRIGATION PIPE
	WATER PUMP		FIRE FIGHTING WATER PIPE
	FREE DISCHARGE PIPE		VENT PIPING
	CONDENSED PIPE		REFRIGERANT PIPES
	GAS CABINET		DRAIN LINE
	FINISH ROOF LEVEL		DRAIN POINT
	FLOOR DRAIN		WATER PUMP
	CW and HW collector		VENT COWL
	WATER COOLER		GULLY TRAP

ABBREVIATION

SYMBOL	DESIGNATION	SYMBOL	DESIGNATION
V.P	VENT PIPE	AC	AIR CONDITIONING
R.W.P	RAIN WATER PIPE	AFC	ABOVE FALSE CEILING
DR.P	DRAINAGE PIPE	EF	EXHAUST FAN
W.P	WATER PIPE	FC	FALSE CEILING
B.S.P	BLACK STEEL PIPE	GV	GLOBE VALVE
Ⓟ	ELECTRICAL WATER HEATER	HB	HOSE BIBB
FA	FROM ABOVE	HWS	HOT WATER SUPPLY
TA	TO ABOVE	HWR	HOT WATER RETURN
HVAC	HEATING VENTILATION& AIR CONDITIONING	IL	INVERT LEVEL
TB	TO BELLOW	IR	IRRIGATION
FB	FROM BELLOW	MH	MANHOLE
NTS	NOT TO SCALE	PEX	POLYVINYL CHLORIDE
FD	FLOOR DRAIN	PVC	CROSS LINKED POLYETHYLENE
QTY	QUANTITY	RC	REINFORCED CONCRETE
UG	UNDER GROUND	UT	UNDER TILES
VP	VENT PIPE	FP	FIRE FIGHTING
FE	FIRE EXTINGUISHER	FHC	FIRE HOSE CABINET

EQUIPMENT SCHEDULE:—

REF.	DESCRIPTION	LOCATION	QTY	CAPACITY (L/S) (EACH)	ESTIM. POWER (KW) (EACH)	NOTES
B1	BOILER	Mechanical Room	1	101.3 KW	1.0	
PH1 & PH2	HEATNG PUMPS—Circulation Pump	Mechanical Room	2	18.2 m3/h, 3.3 bar	1.0	(ONE SET) ONE DUTY ONE STANDBY
PW1 & PW2	DOMESTIC WATER PUMPS	Mechanical Room	2	4.64 l/s 16.7 m3/h, 3.3 bar	1.0	(ONE BOOSTER SET) WITH PRESSURE VESSEL & CONTROL PANEL
PF1 & PFJ	FIRE FIGHTING MAIN PUMP FIRE FIGHTING JOCKEY PUMP	Mechanical Room	1 1	1.0 L/S, 400 Kpa 0.4 L/S, 450 Kpa	1.0 0.5	(ONE SET) WITH CONTROL PANEL
PSUB1 & PSUB2	SUBMERSIBLE PUMPS	Mechanical Room	2	1.0 L/S, 80 Kpa	0.5	(ONE SET) WITH CONTROL PANEL (FOR Water over flow).
PW1	GREY WATER PUMPS	Mechanical Room	2	1.0 L/S, 80 Kpa	0.5	(ONE SUMP PIT) WITH CONTROL PANEL (FOR GREY WATER)
PW1	MAKE UP WATER PUMPS	Mechanical Room	2	1.0 L/S, 80 Kpa	0.5	(ONE SUMP PIT)WITH CONTROL PANEL (FOR FOR FEEDING FIRE WATER TANK)

⑦ EXHAUST FAN SCHEDULE							
MARK NO.	ASSEMBLY TYPE	AIR VOLUME FLOW (L/S)	MOTOR POWER (WATTS)	SOUND dba @3m	POWER SUPPLY (V/PH/HZ)	QUANTITY	REMARKS
EX.A.F—01	WALL MOUNTED EXTRACT FAN	61	16	45	220/1/50	8	KITCHEN
EX.A.F—02	WALL MOUNTED EXTRACT FAN	25	15	38	220/1/50	24	TOILET

Date:
2/04/2018

Drawing Scale:
NTS

Drawing No.

M00

PALESTINE
POLYTECHNIC UNIVERSITY

College of Engineering
Department of Mechanical Engineering
H.V.A.C. Engineering



Designed AND DRAWN By:
Mutaz Dweik

Supervisor:
Dr. KAZEM OSAILY




Project Name:
Mechanical Systems
for Headquarters Charities
building in Hebron


Drawing Title:

Tabels of Contents
, Legends And Abbreviation

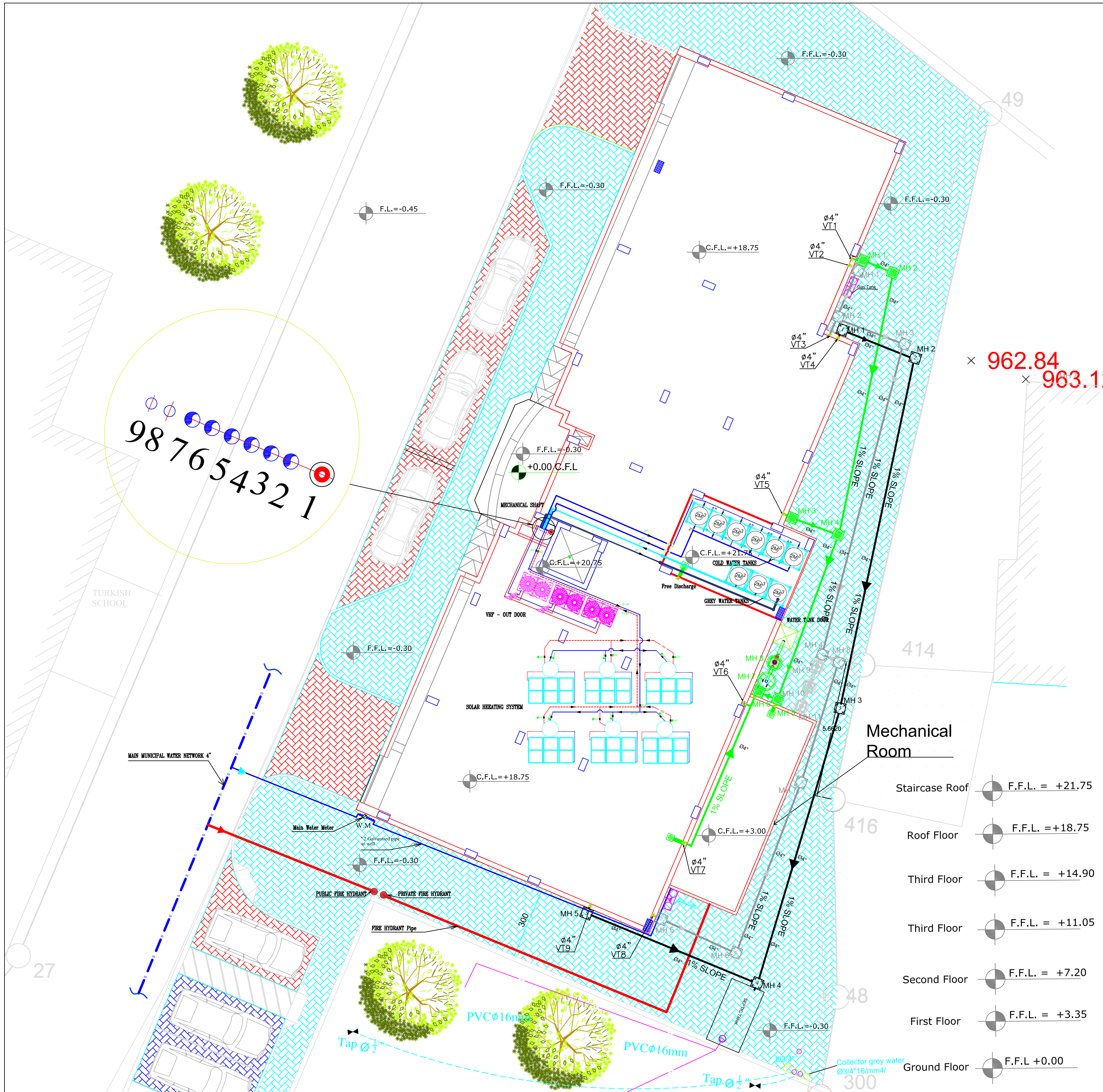
Notes:

All dimensions are in Meters
Unless otherwise shown.
All spot levels are in Meters.

 Hollow blockwork.
 Reinforced concrete column/wall.
 Plain concrete walls.

 955.00m SL
+0.00m





LIST OF Grey Water manholes :-

Manhol NO.	Top level (m)	Invert level(m)	Outlet level(m)	Depth (cm)	type	DiameterØ	Cover type
MH 1	-0.30	-0.80	-0.45	50	Circular Ston	60 cm	Concrete
MH 2	-0.30	-0.87	-0.52	57	Circular Ston	60 cm	Concrete
MH 3	-0.30	-0.945	-0.595	64.5	Circular Ston	60 cm	Concrete
MH 4	-0.30	-1.155	-0.805	85.5	Circular Ston	60 cm	Concrete
MH 5	-0.30	-0.80	-0.45	50	Circular Ston	60 cm	Concrete
MH 6	-0.30	-0.88	-0.53	58	Circular Ston	60 cm	Concrete
MH 7	-0.30	-1.00	-0.65	70	Circular Ston	60 cm	Concrete
MH 8	-0.30	-1.1	-0.75	80	Circular Ston	60 cm	Concrete
MH 9	-0.30	-1.55	-1.20	1.25	Circular Ston	125cm	Concrete
MH 10	-0.30	-1.55	-1.20	1.25	Circular Ston	125cm	Concrete
MH 11	-0.30	-1.55	-1.20	1.25	Circular Ston	125cm	Concrete

LIST OF Black Water manholes :-

ManHolNO.	Top level (m)	Invert level(m)	Outlet level(m)	Depth (cm)	type	DiameterØ	Cover type
MH 1	-0.30	-0.80	-0.45	50	Circular Ston	60 cm	Concrete
MH 2	-0.30	-0.88	-0.53	58	Circular Ston	60 cm	Concrete
MH 3	-0.30	-1.075	-0.725	77.5	Circular Ston	60 cm	Concrete
MH 4	-0.30	-1.24	-0.89	94	Circular Ston	60 cm	Concrete
MH 5	-0.30	-0.80	-0.45	50	Circular Ston	60 cm	Concrete

LIST OF Rain(Storm Water) manholes :-

Manhol NO.	Top level (m)	Invert level(m)	Outlet level(m)	Depth (cm)	type	DiameterØ	Cover type
MH 1	-0.30	-0.80	-0.45	50	Circular Ston	60 cm	Concrete
MH 2	-0.30	-0.86	-0.51	56	Circular Ston	60 cm	Concrete
MH 3	-0.30	-0.80	-0.45	50	Circular Ston	60 cm	Concrete
MH 4	-0.30	-1.02	-0.67	72	Circular Ston	60 cm	Concrete
MH 5	-0.30	-1.14	-0.79	84	Circular Ston	60 cm	Concrete
MH 6	-0.30	-1.21	0.86	91	Circular Ston	60 cm	Concrete
MH 7	-0.30	-1.55	-1.20	1.25	Circular Ston	125cm	Concrete
MH 8	-0.30	-1.55	-1.20	1.25	Circular Ston	125cm	Concrete

LIST OF Water Pipes :-

Pipe NO.	Type of Pipes and Diameter
1	Ø4" FIRE FIGHTING RISER
2	Ø2" HOT WATER RETURN
3	Ø2" HOT WATER SUPPLY
4	Ø2" COLD WATER SUPPLY FROM ROOF TANK TO COLLECTOR
5	Ø2" GREY WATER TREAT TO WATER CLOSET
6	Ø2" COLD WATER SUPPLY TO ROOF TANK
7	Ø2" GREY WATER TO SAND ROOF TANK
8	Ø1" LIQUID REFREGERANT
9	Ø1" GAS REFREGERANT

LIST OF Water Vents Stack :-

Vents NO.	Type of Vents and Diameter
1	Ø4" STORM WATER
2	Ø4" GREY WATER
3	Ø4" GREY WATER
4	Ø4" BLACK WATER
5	Ø4" STORM WATER
6	Ø4" STORM WATER
7	Ø4" STORM WATER
8	Ø4" GREY WATER
9	Ø4" BLACK WATER

Date:
02/04/2018

Drawing Scale:
1/100


Drawing No.
M01

PALESTINE
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College of Engineering

Department of Mechanical Engineering

H.V.A.C. Engineering







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Supervisor:
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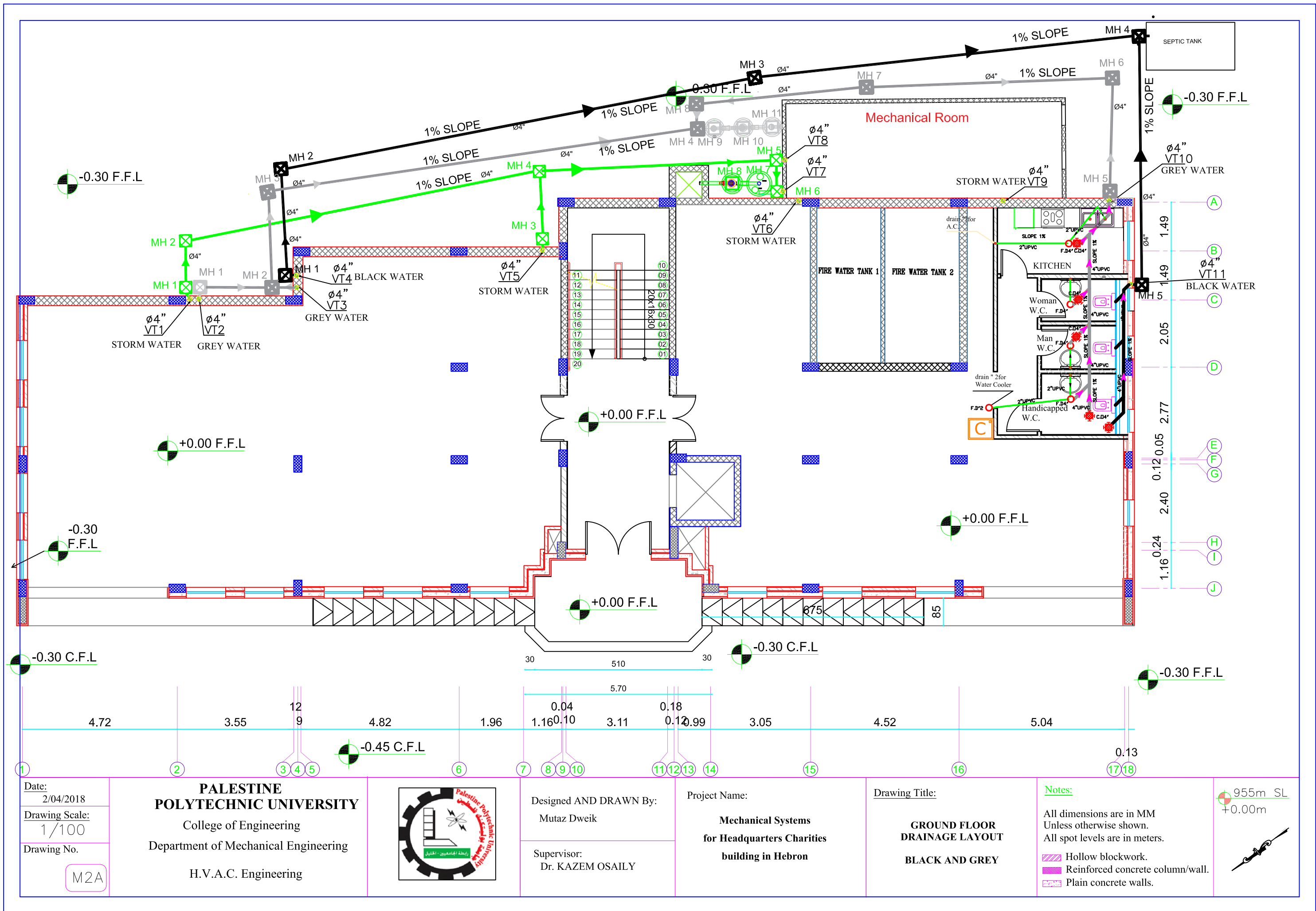
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for Headquarters Charities
building in Hebron**

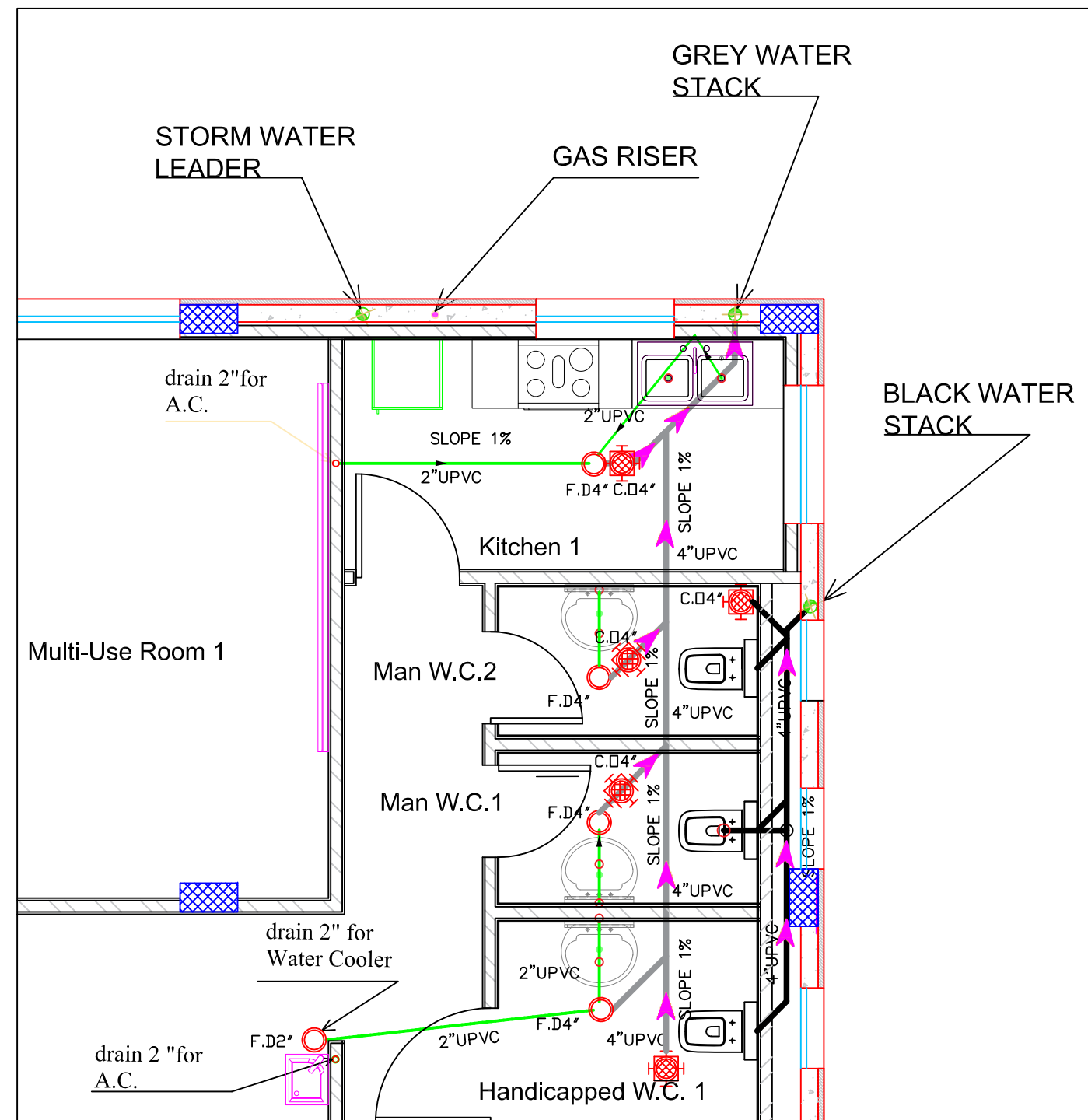
Drawing Title:
SITE PLAN



Notes:
All dimensions are in Meters
Unless otherwise shown.
All spot levels are in Meters.
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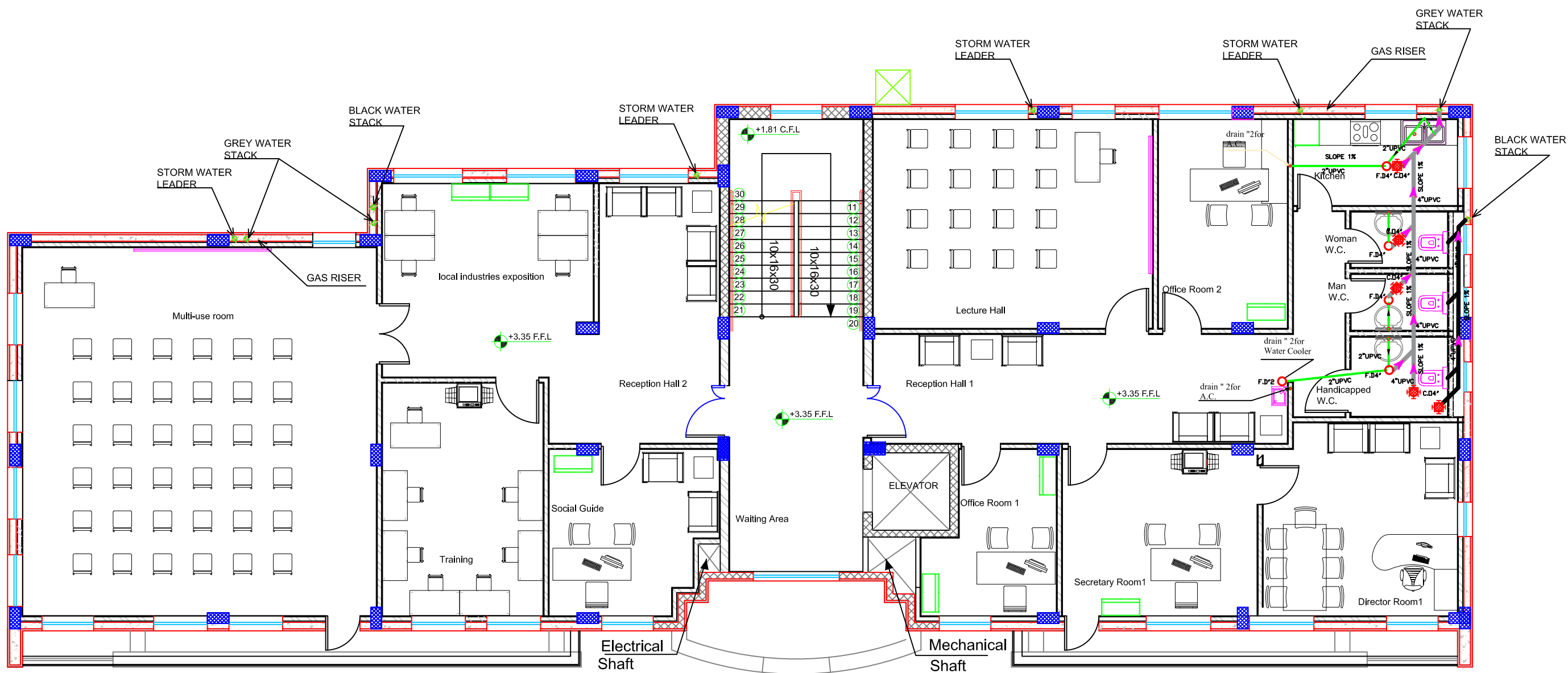
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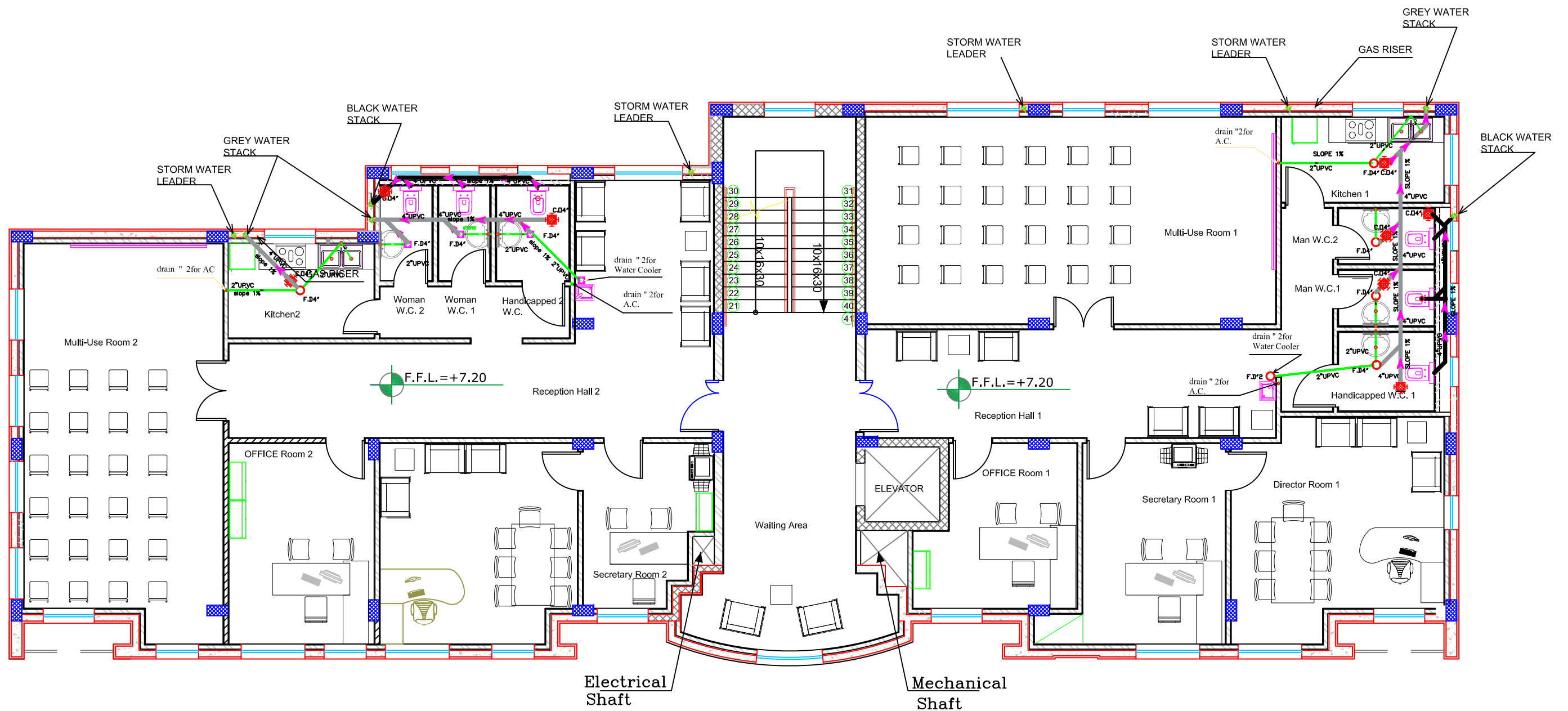



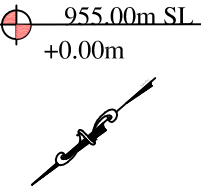


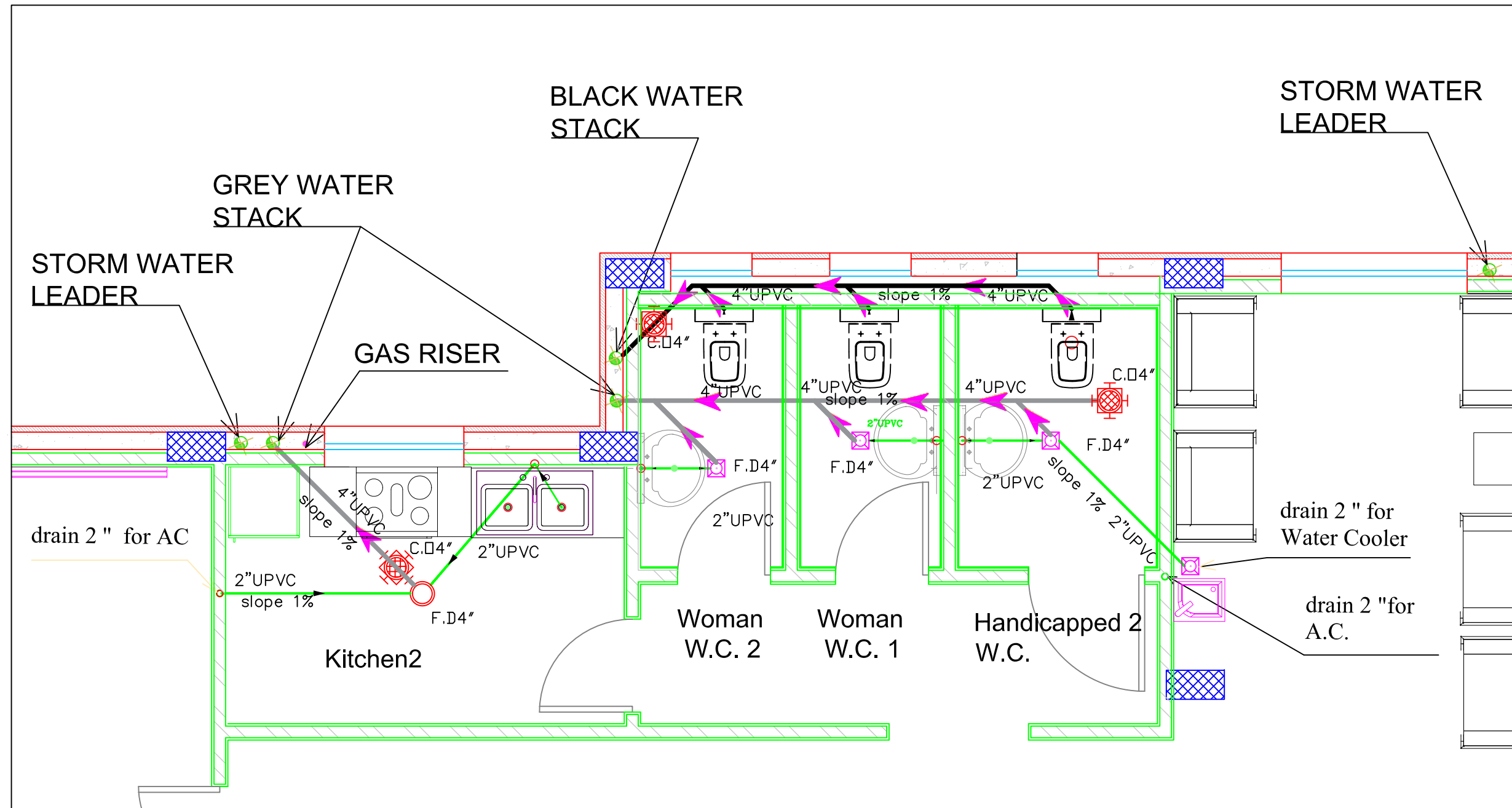
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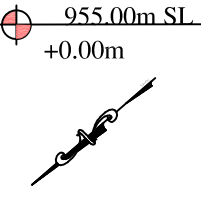


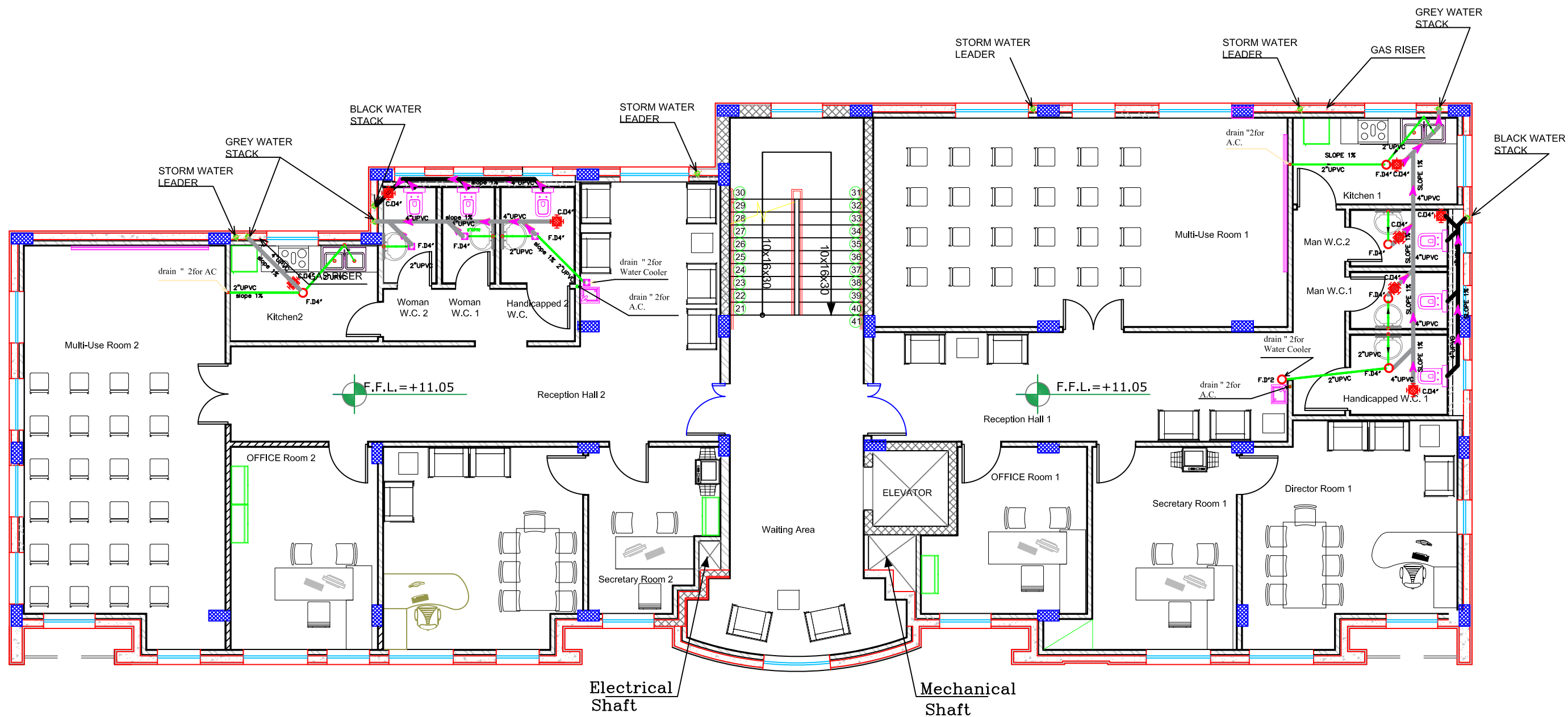
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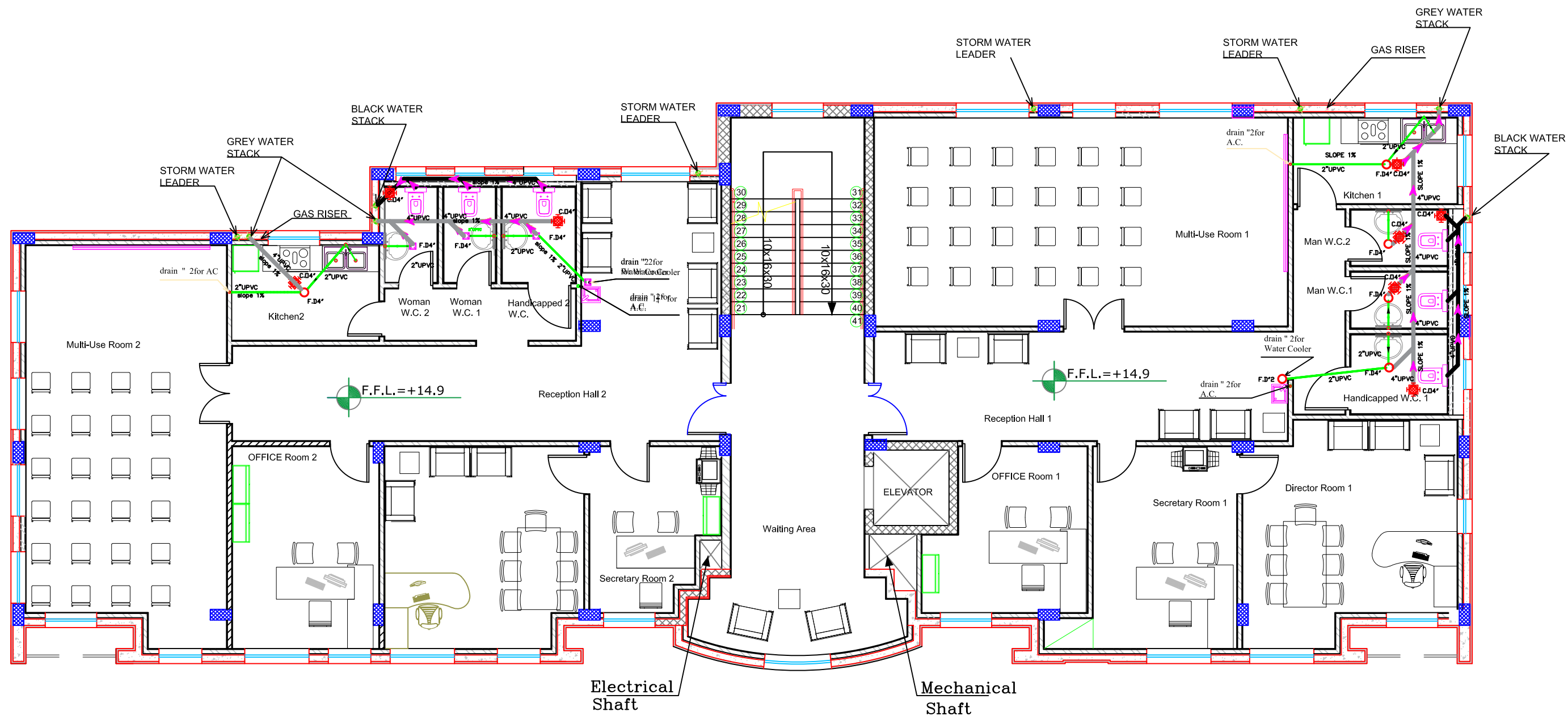
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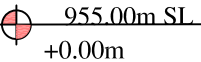



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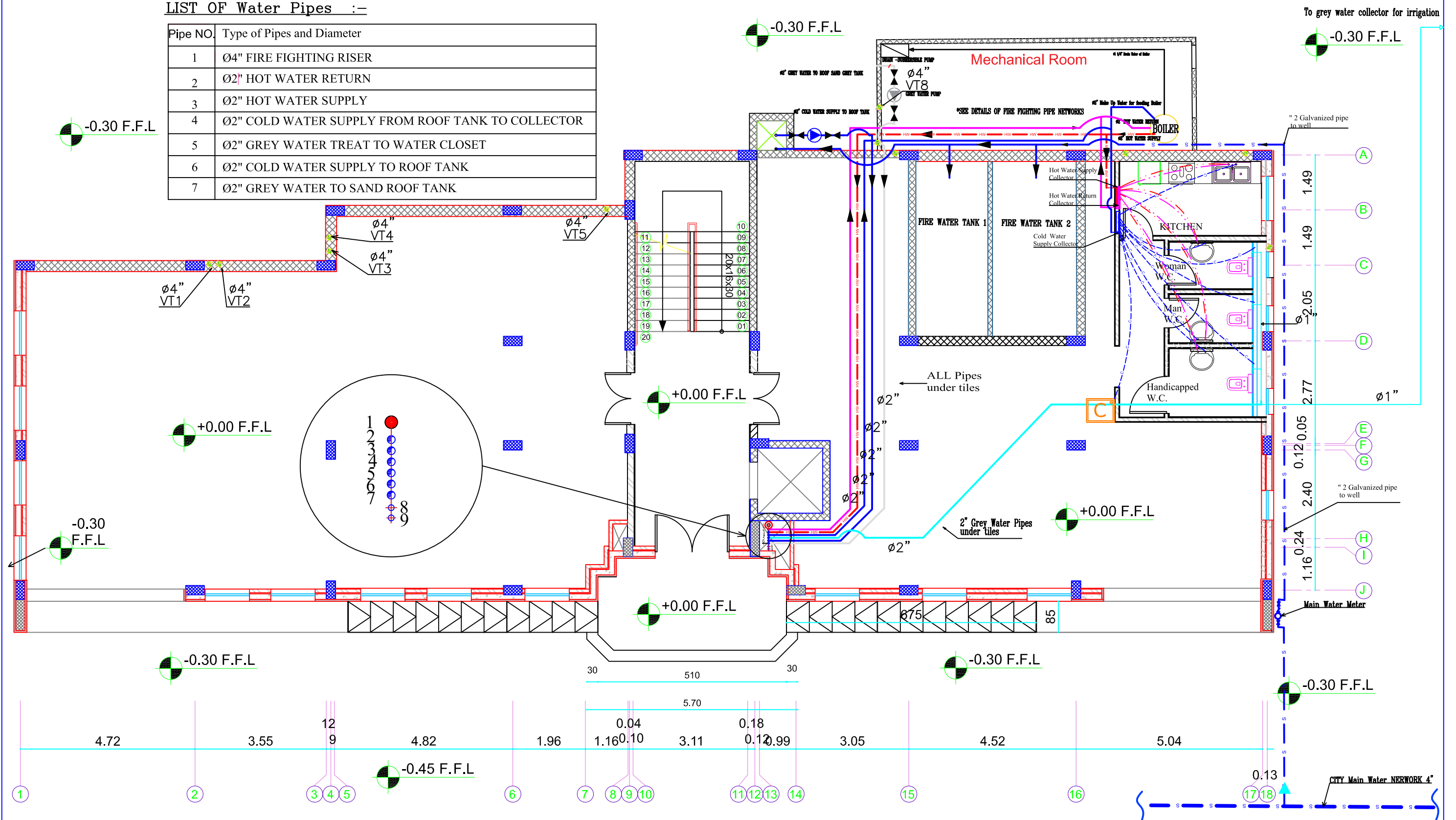
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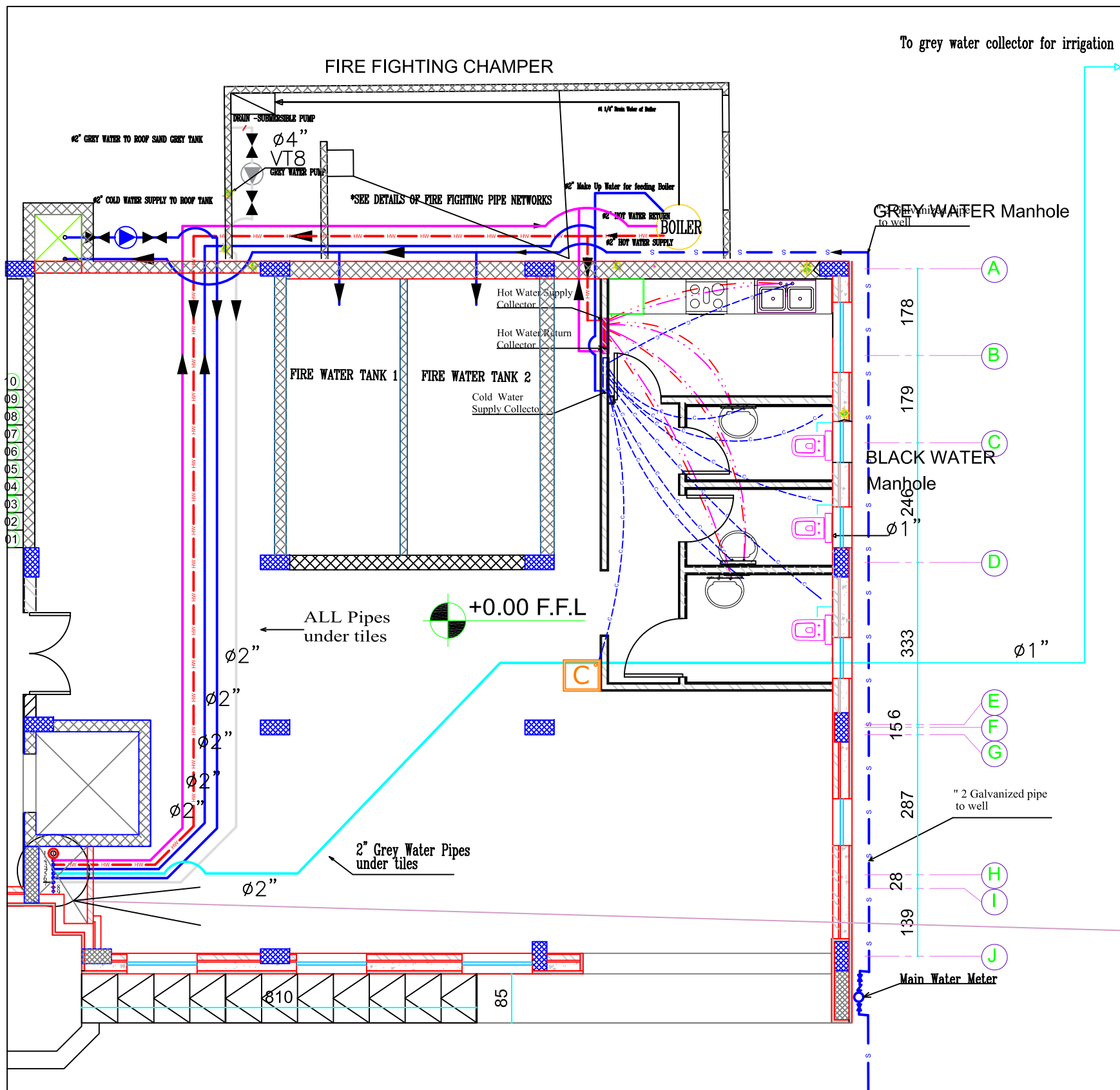
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LIST OF Water Pipes :-

Pipe NO.	Type of Pipes and Diameter
1	Ø4" FIRE FIGHTING RISER
2	Ø2" HOT WATER RETURN
3	Ø2" HOT WATER SUPPLY
4	Ø2" COLD WATER SUPPLY FROM ROOF TANK TO COLLECTOR
5	Ø2" GREY WATER TREAT TO WATER CLOSET
6	Ø2" COLD WATER SUPPLY TO ROOF TANK
7	Ø2" GREY WATER TO SAND ROOF TANK

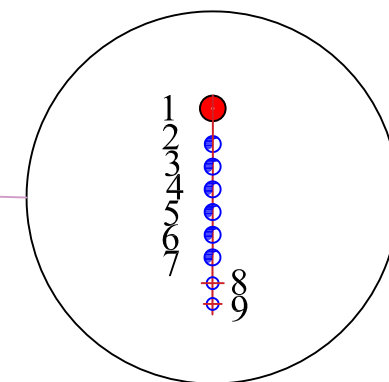




<p>Date: 2/04/2018</p> <p>Drawing Scale: 1/100</p> <p>Drawing No. M7A</p>	<p>PALESTINE POLYTECHNIC UNIVERSITY</p> <p>College of Engineering</p> <p>Department of Mechanical Engineering</p> <p>H.V.A.C. Engineering</p>		<p>Designed AND DRAWN By: Mutaz Dweik</p> <p>Supervisor: Dr. KAZEM OSAILY</p>	<p>Project Name: Mechanical Systems for Headquarters Charities building in Hebron</p>	<p>Drawing Title: GROUND FLOOR WATER LAYOUT COLD AND HOT WATER SUPPLY AND HOT WATER RETURN PIPES</p>	<p>Notes:</p> <p>All dimensions are in MM Unless otherwise shown. All spot levels are in meters.</p> <p> Hollow blockwork. Reinforced concrete column/wall. Plain concrete walls. </p>	<p>955m SL +0.00m</p>
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LIST OF Water Pipes :-

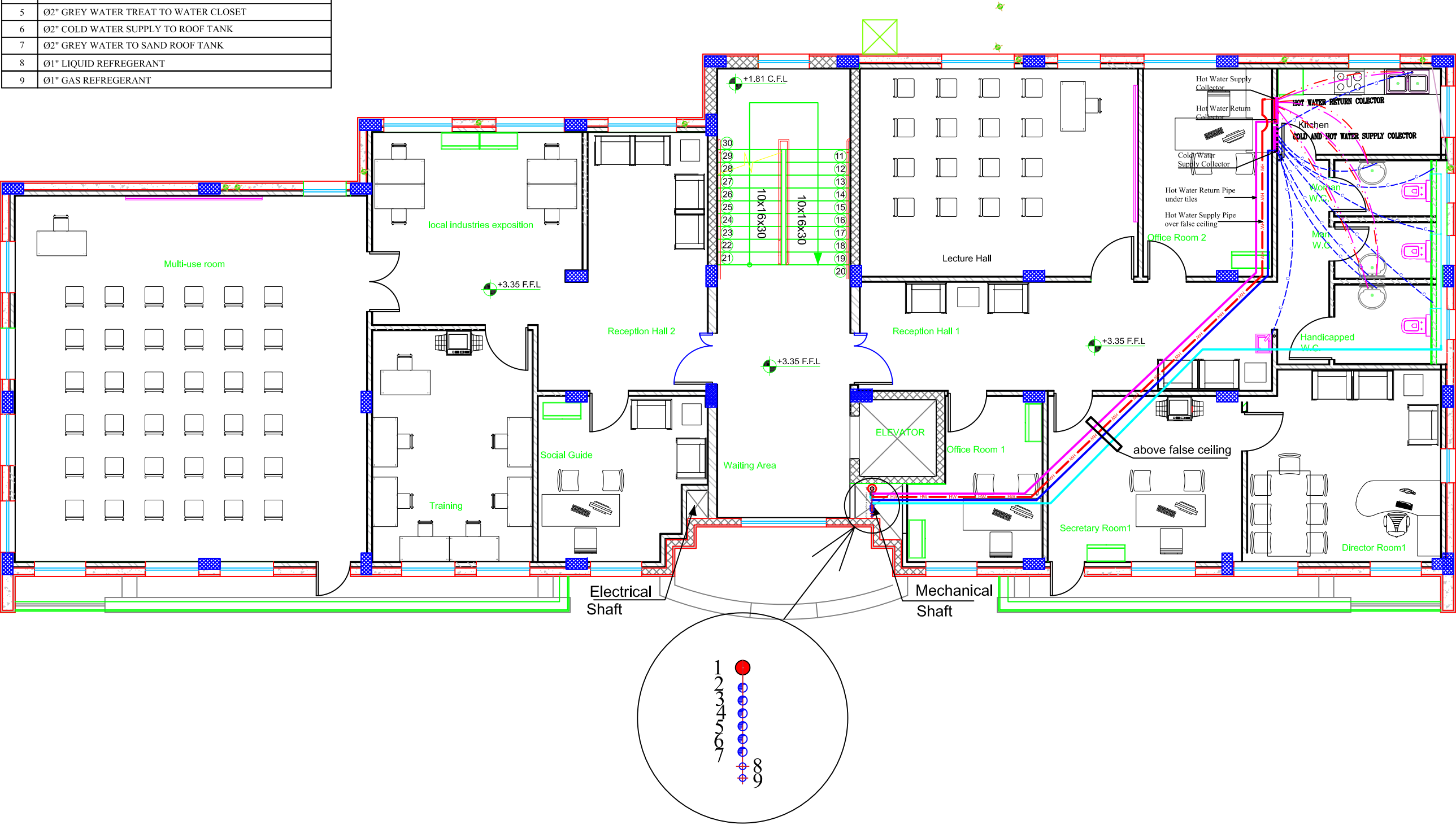
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6	Ø2" COLD WATER SUPPLY TO ROOF TANK
7	Ø2" GREY WATER TO SAND ROOF TANK



Date: 2/04/2018 Drawing Scale: NTS Drawing No. M7B	PALESTINE POLYTECHNIC UNIVERSITY College of Engineering Department of Mechanical Engineering H.V.A.C. Engineering		Designed AND DRAWN By: Mutaz Dweik	Project Name: Mechanical Systems for Headquarters Charities building in Hebron	Drawing Title: GROUND FLOOR WATER LAYOUT COLD AND HOT WATER SUPPLY AND HOT WATER RETURN PIPES	Notes: All dimensions are in MM Unless otherwise shown. All spot levels are in meters. [Hatched Box] Hollow blockwork. [Dotted Box] Reinforced concrete column/wall. [Solid Box] Plain concrete walls.	955m SL +0.00m 
			Supervisor: Dr. KAZEM OSAILY				

LIST OF Water Pipes :-

Pipe NO	Type of Pipes and Diameter
1	Ø4" FIRE FIGHTING RISER
2	Ø2" HOT WATER RETURN
3	Ø2" HOT WATER SUPPLY
4	Ø2" COLD WATER SUPPLY FROM ROOF TANK TO COLLECTOR
5	Ø2" GREY WATER TREAT TO WATER CLOSET
6	Ø2" COLD WATER SUPPLY TO ROOF TANK
7	Ø2" GREY WATER TO SAND ROOF TANK
8	Ø1" LIQUID REFREGERANT
9	Ø1" GAS REFREGERANT



Date:
2/04/2018

Drawing Scale:
1/100


Drawing No.
M08

PALESTINE
POLYTECHNIC UNIVERSITY

College of Engineering

Department of Mechanical Engineering

H.V.A.C. Engineering



Designed AND DRAWN By:
Mutaz Dweik

Supervisor:
Dr. KAZEM OSAILY




Project Name:


Mechanical Systems
for Headquarters Charities
building in Hebron


Drawing Title:

FIRST FLOOR WATER LAYOUT
COLD ,HOT AND GREY WATER

Notes:

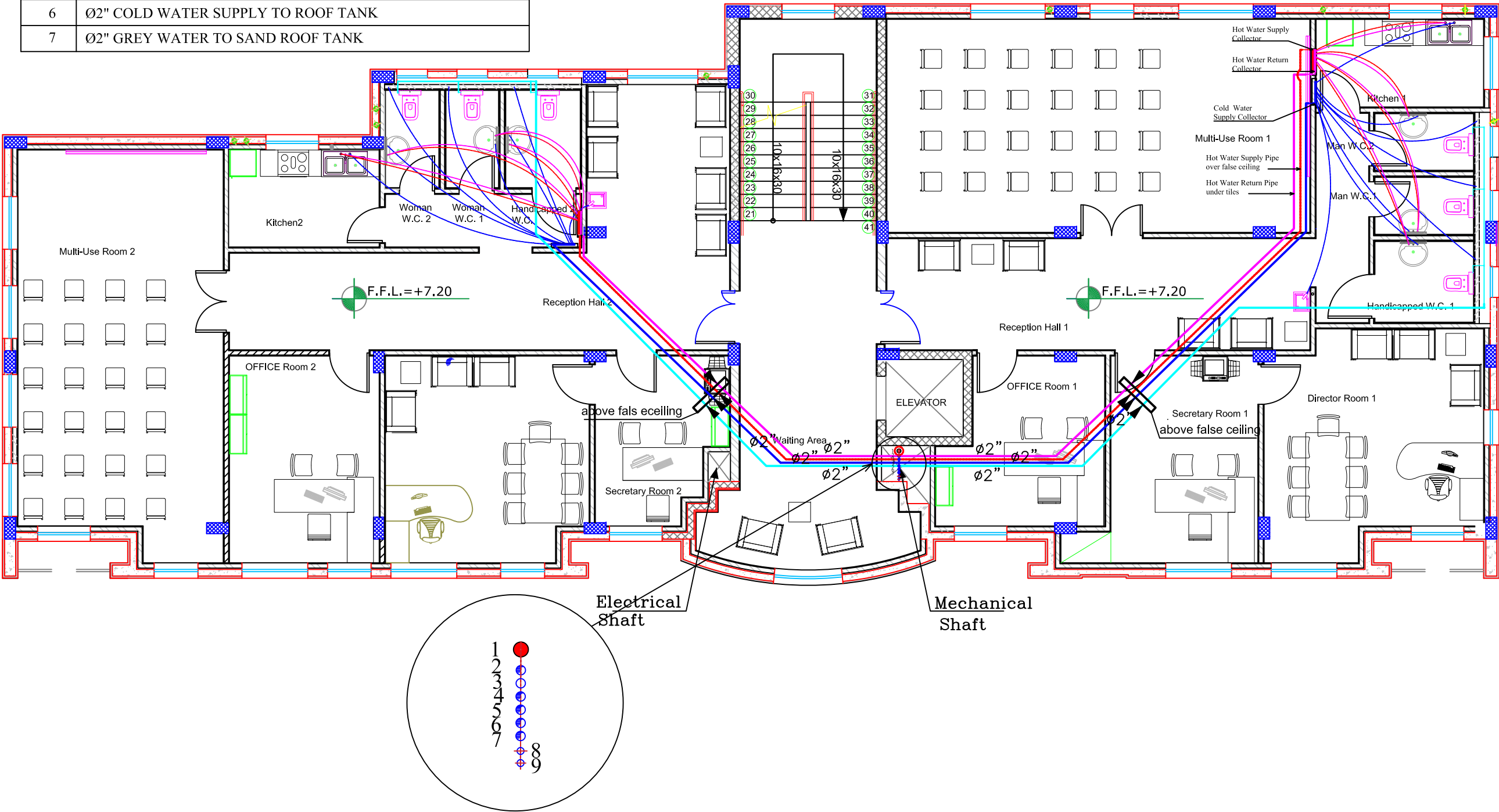
All dimensions are in MM
Unless otherwise shown.
All spot levels are in meters.
 Hollow blockwork.
 Reinforced concrete column/wall.
 Plain concrete walls.







 955.00m SL
+0.00m

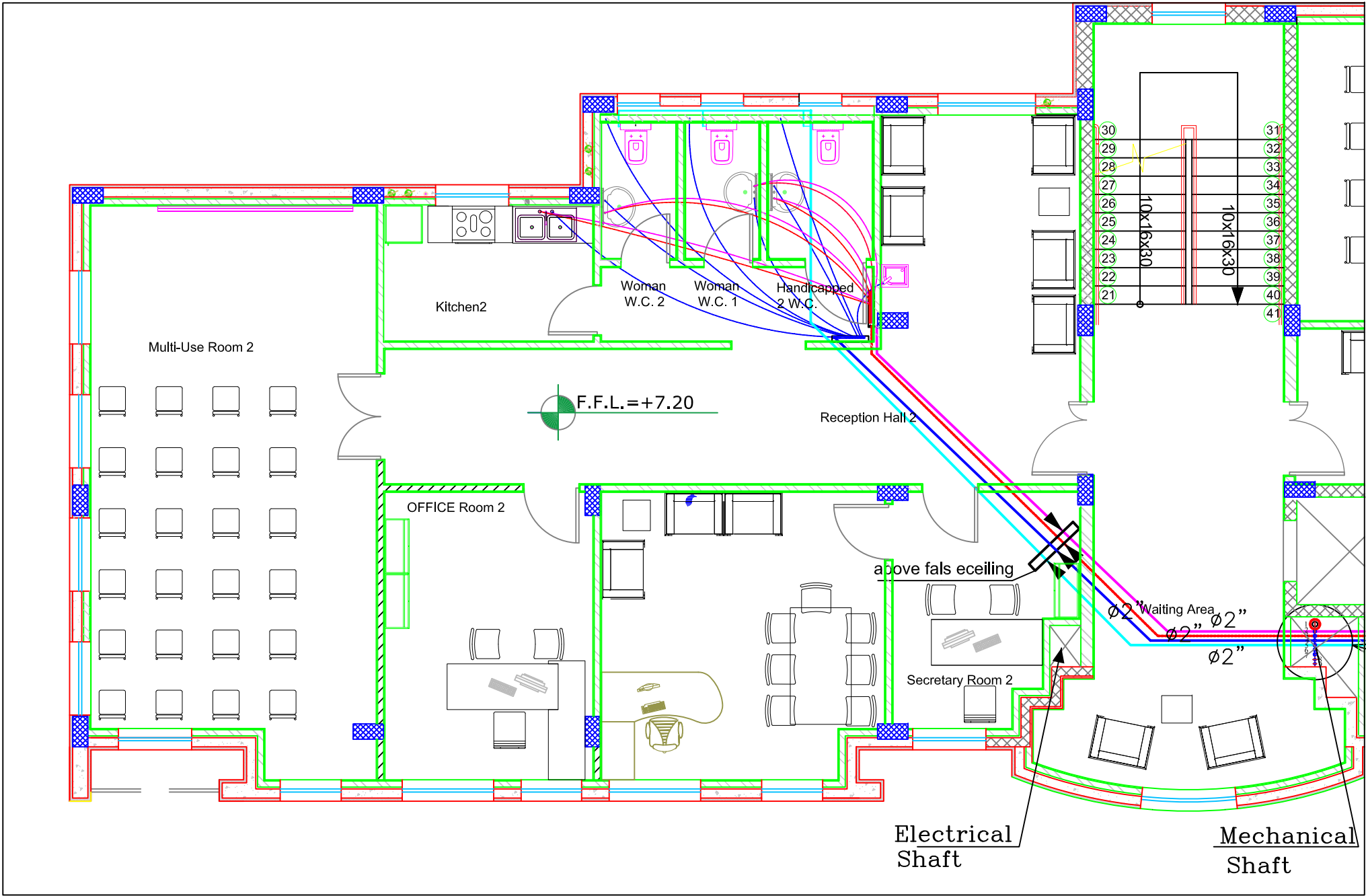


LIST OF Water Pipes :-

Pipe NO.	Type of Pipes and Diameter
1	Ø4" FIRE FIGHTING RISER
2	Ø2" HOT WATER RETURN
3	Ø2" HOT WATER SUPPLY
4	Ø2" COLD WATER SUPPLY FROM ROOF TANK TO COLLECTOR
5	Ø2" GREY WATER TREAT TO WATER CLOSET
6	Ø2" COLD WATER SUPPLY TO ROOF TANK
7	Ø2" GREY WATER TO SAND ROOF TANK

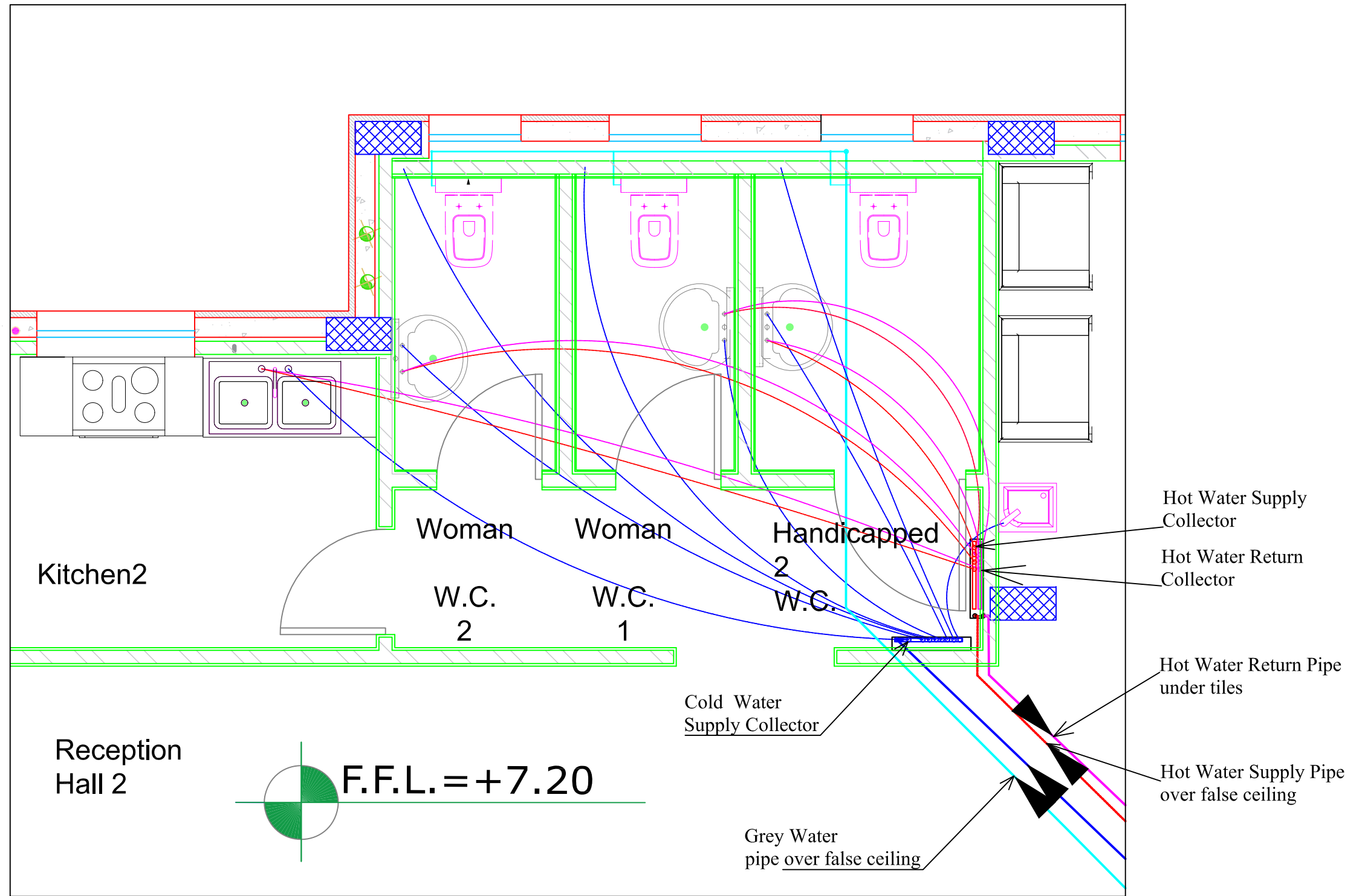




<div>Date: 2/04/2018</div> <div>Drawing Scale: 1/100</div> <div>Drawing No. M9A</div>	<div>PALESTINE POLYTECHNIC UNIVERSITY</div> <div>College of Engineering</div> <div>Department of Mechanical Engineering</div> <div>H.V.A.C. Engineering</div>	<div></div> <div>Designed AND DRAWN By: Mutaz Dweik</div> <div>Supervisor: Dr. KAZEM OSAILY</div>	<div>Project Name:</div> <div>Mechanical Systems for Headquarters Charities building in Hebron</div>	<div>Drawing Title:</div> <div>SECOND FLOOR WATER LAYOUT</div> <div>Cold, Hot and Grey Water</div>	<div>Notes:</div> <div>All dimensions are in MM Unless otherwise shown. All spot levels are in meters.</div> <div> Hollow blockwork.</div> <div> Reinforced concrete column/wall.</div> <div> Plain concrete walls.</div>	<div> 955.00m SL +0.00m</div> <div></div>
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LIST OF Water Pipes :-

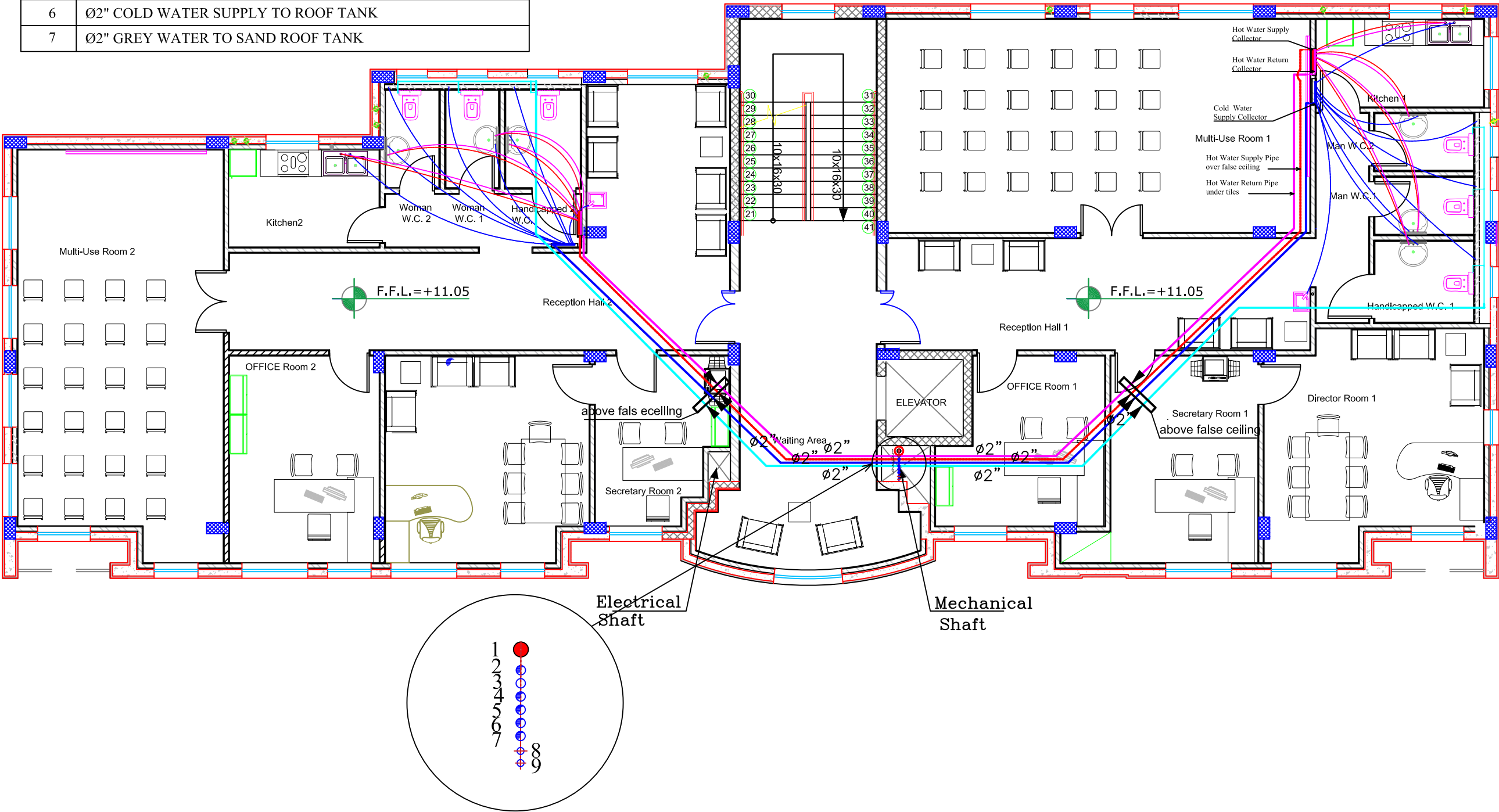
Pipe NO.	Type of Pipes and Diameter
1	Ø4" FIRE FIGHTING RISER
2	Ø2" HOT WATER RETURN
3	Ø2" HOT WATER SUPPLY
4	Ø2" COLD WATER SUPPLY FROM ROOF TANK TO COLLECTOR
5	Ø2" GREY WATER TREAT TO WATER CLOSET
6	Ø2" COLD WATER SUPPLY TO ROOF TANK
7	Ø2" GREY WATER TO SAND ROOF TANK









<p>Date: 2/04/2018</p> <p>Drawing Scale: NTS</p> <p>Drawing No. M9C</p>	<p>PALESTINE POLYTECHNIC UNIVERSITY</p> <p>College of Engineering</p> <p>Department of Mechanical Engineering</p> <p>H.V.A.C. Engineering</p>		<p>Designed AND DRAWN By: Mutaz Dweik</p> <p>Supervisor: Dr. KAZEM OSAILY</p>	<p>Project Name: Mechanical Systems for Headquarters Charities building in Hebron</p>	<p>Drawing Title: SECOND FLOOR WATER LAYOUT</p> <p>Cold, Hot and Grey Water</p>	<p>Notes:</p> <p>All dimensions are in MM Unless otherwise shown. All spot levels are in meters.</p> <p>Hollow blockwork.</p> <p>Reinforced concrete column/wall.</p> <p>Plain concrete walls.</p>	<p>955.00m SL +0.00m</p> 
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LIST OF Water Pipes :-

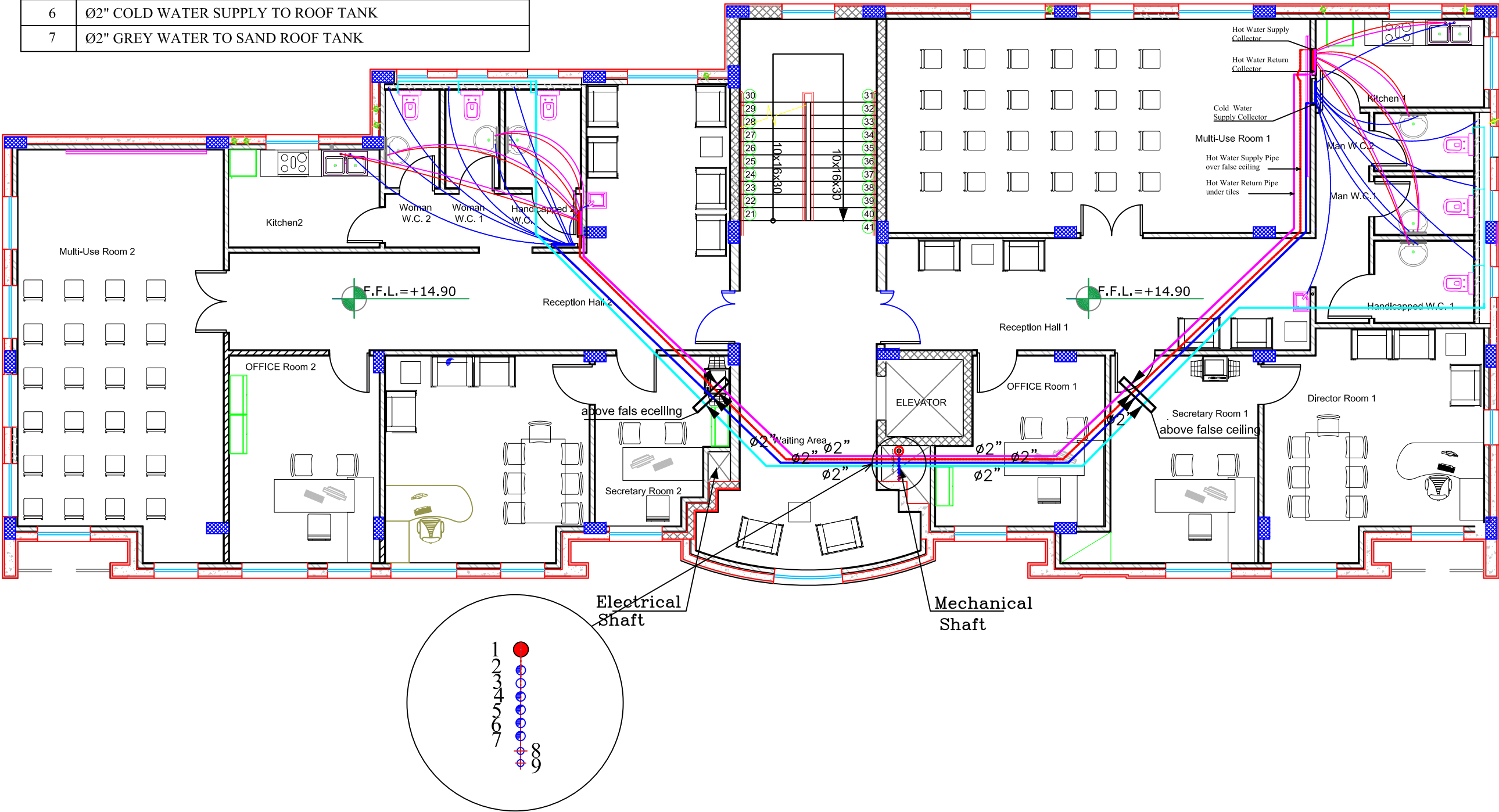
Pipe NO.	Type of Pipes and Diameter
1	Ø4" FIRE FIGHTING RISER
2	Ø2" HOT WATER RETURN
3	Ø2" HOT WATER SUPPLY
4	Ø2" COLD WATER SUPPLY FROM ROOF TANK TO COLLECTOR
5	Ø2" GREY WATER TREAT TO WATER CLOSET
6	Ø2" COLD WATER SUPPLY TO ROOF TANK
7	Ø2" GREY WATER TO SAND ROOF TANK









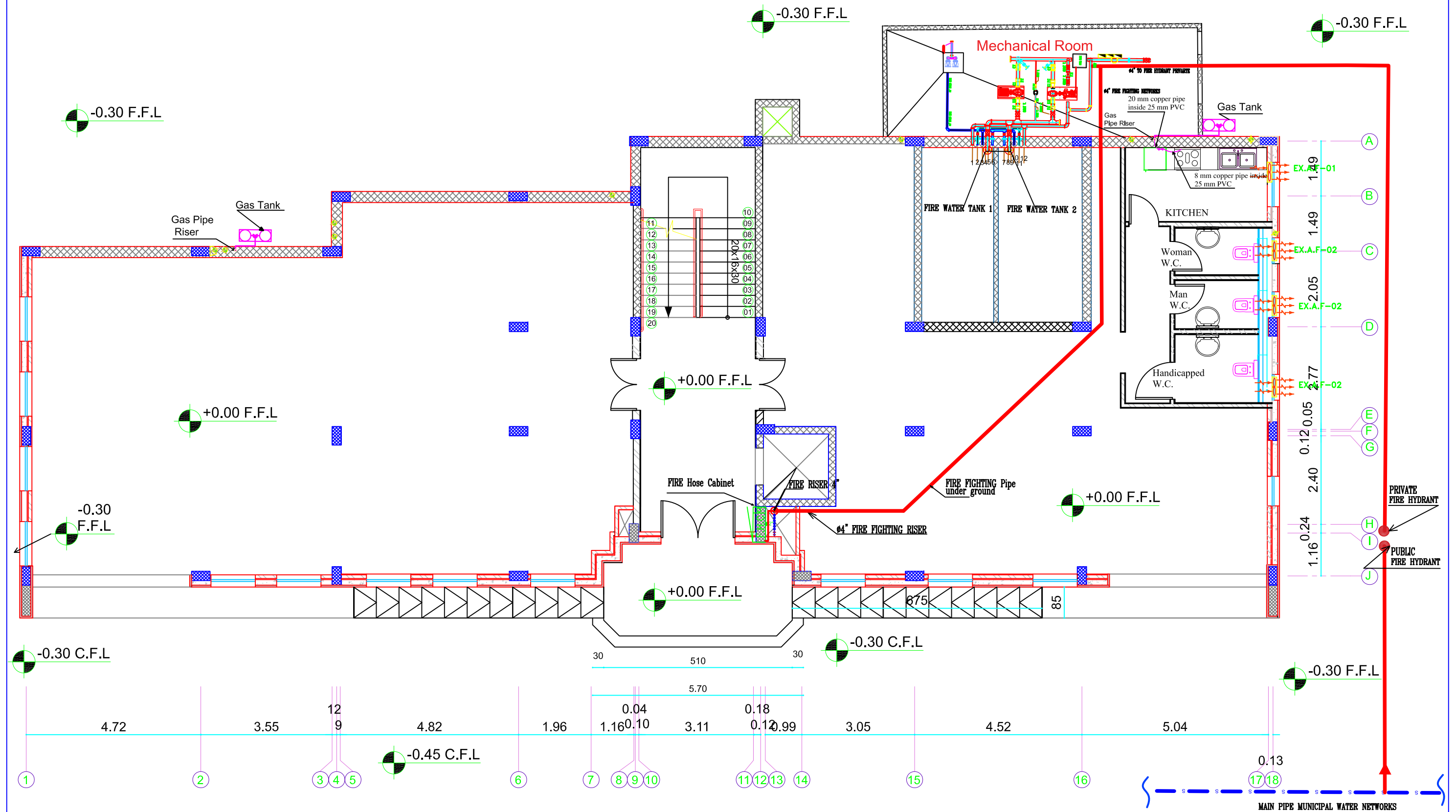
<div>Date: 2/04/2018</div> <div>Drawing Scale: 1/100</div> <div>Drawing No. M10</div>	<div>PALESTINE POLYTECHNIC UNIVERSITY</div> <div>College of Engineering</div> <div>Department of Mechanical Engineering</div> <div>H.V.A.C. Engineering</div>	<div></div>	<div>Designed AND DRAWN By: Mutaz Dweik</div> <div>Supervisor: Dr. KAZEM OSAILY</div>	<div>Project Name:</div> <div>Mechanical Systems for Headquarters Charities building in Hebron</div>	<div>Drawing Title:</div> <div>THIRD FLOOR WATER LAYOUT</div> <div>Cold, Hot and Grey Water</div>	<div>Notes:</div> <div>All dimensions are in MM Unless otherwise shown. All spot levels are in meters.</div> <div> Hollow blockwork.</div> <div> Reinforced concrete column/wall.</div> <div> Plain concrete walls.</div>	<div> 955.00m SL +0.00m</div> <div></div>
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LIST OF Water Pipes :-

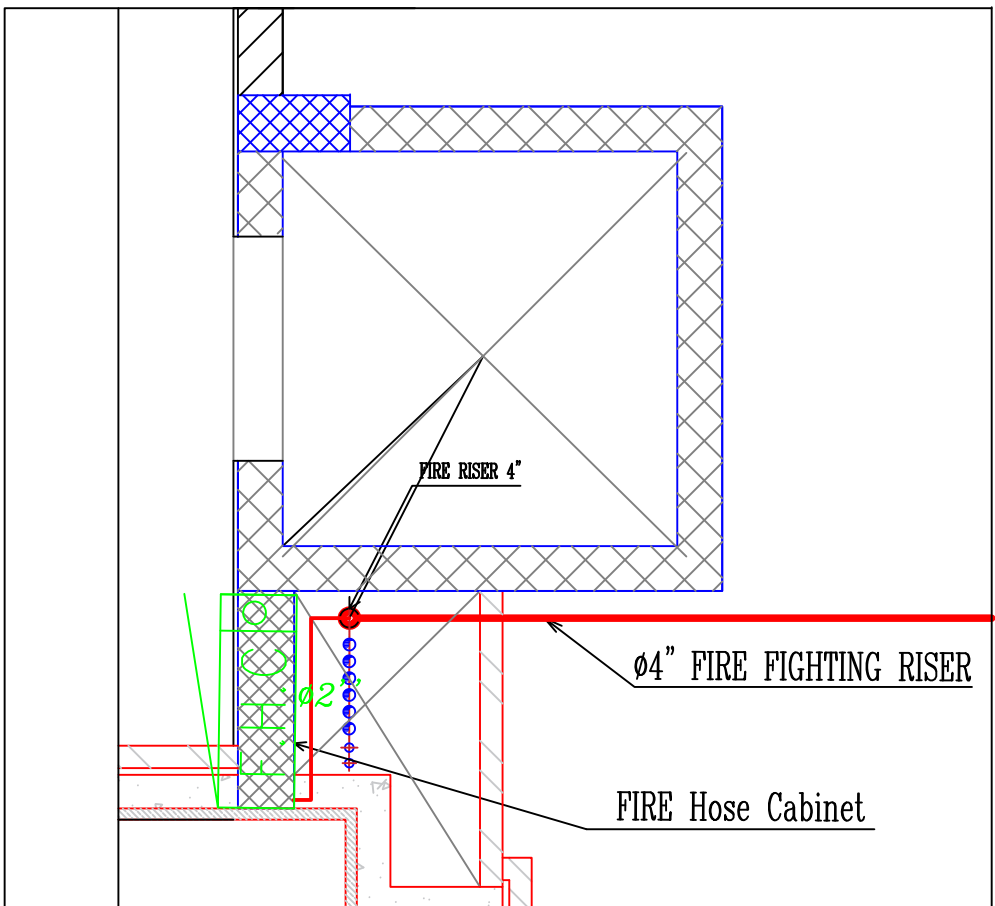
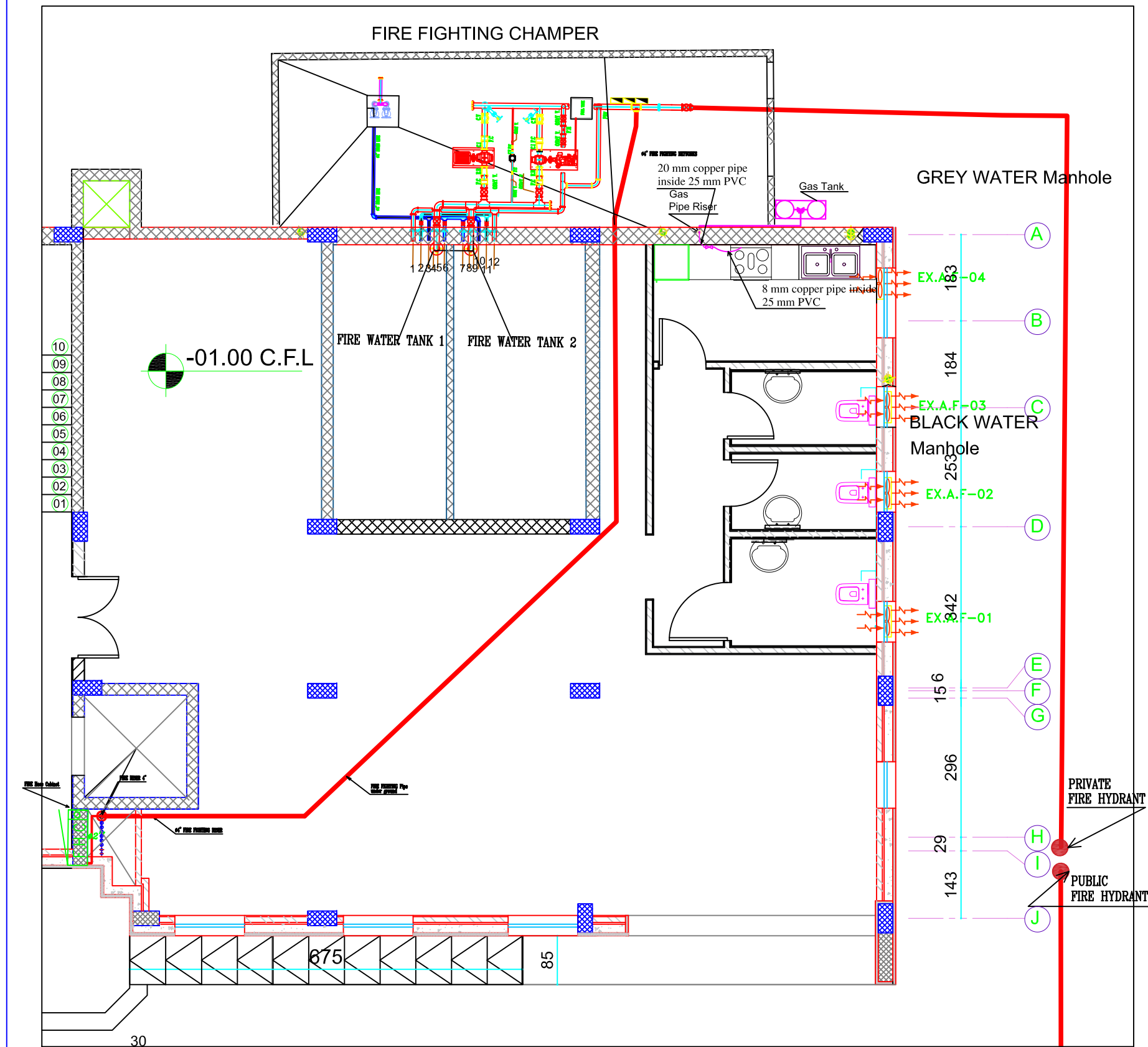
Pipe NO.	Type of Pipes and Diameter
1	Ø4" FIRE FIGHTING RISER
2	Ø2" HOT WATER RETURN
3	Ø2" HOT WATER SUPPLY
4	Ø2" COLD WATER SUPPLY FROM ROOF TANK TO COLLECTOR
5	Ø2" GREY WATER TREAT TO WATER CLOSET
6	Ø2" COLD WATER SUPPLY TO ROOF TANK
7	Ø2" GREY WATER TO SAND ROOF TANK





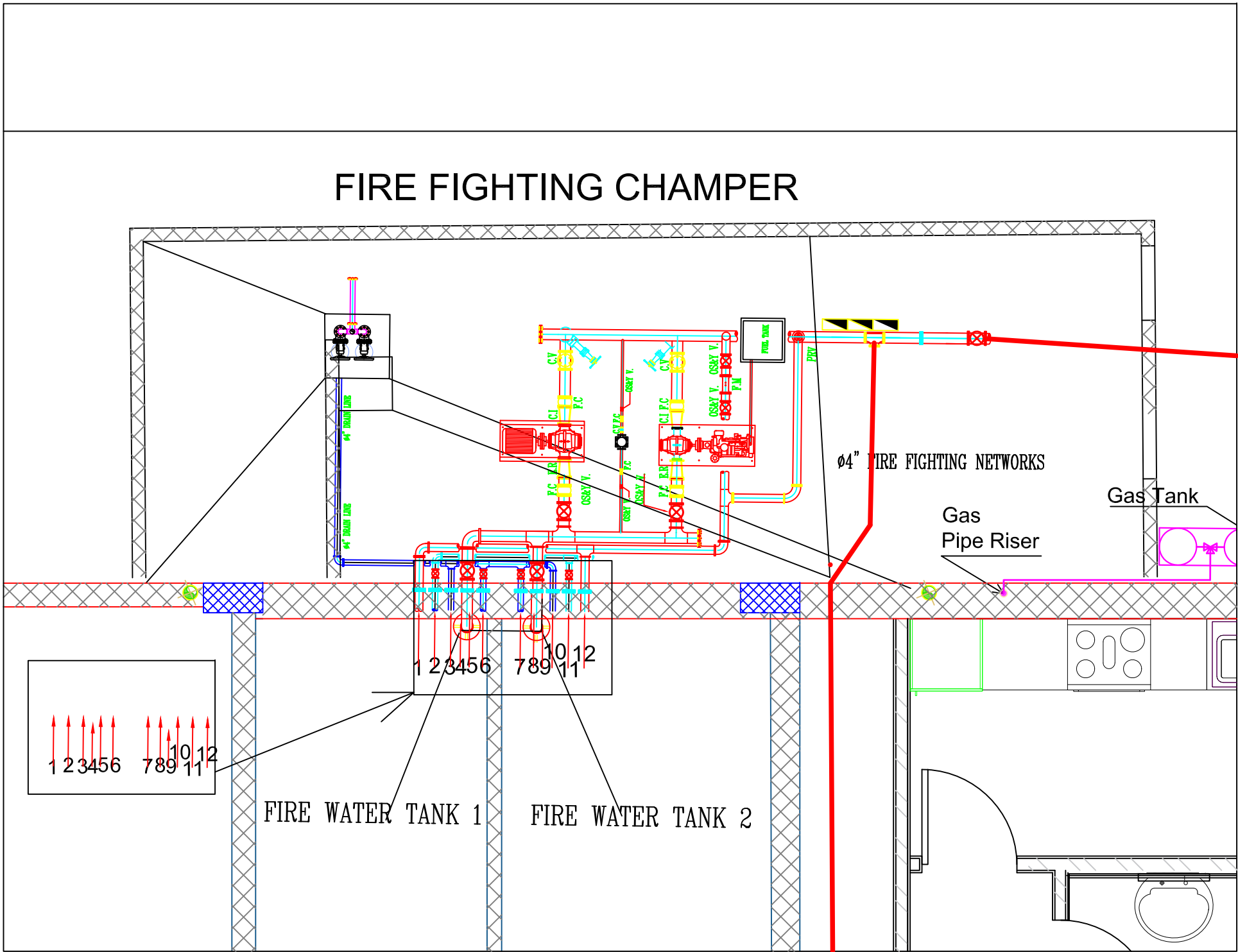
<div>Date: 2/04/2018</div> <div>Drawing Scale: 1/100</div> <div>Drawing No. M11</div>	<div>PALESTINE POLYTECHNIC UNIVERSITY</div> <div>College of Engineering</div> <div>Department of Mechanical Engineering</div> <div>H.V.A.C. Engineering</div>	<div></div> <div>Designed AND DRAWN By: Mutaz Dweik</div> <div>Supervisor: Dr. KAZEM OSAILY</div>	<div>Project Name:</div> <div>Mechanical Systems for Headquarters Charities building in Hebron</div>	<div>Drawing Title:</div> <div>FOURTH FLOOR WATER LAYOUT</div> <div>Cold,Hot and Grey Water</div>	<div>Notes:</div> <div>All dimensions are in MM Unless otherwise shown. All spot levels are in meters.</div> <div> Hollow blockwork.</div> <div> Reinforced concrete column/wall.</div> <div> Plain concrete walls.</div>	<div> 955.00m SL +0.00m</div> <div></div>
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Date: 2/04/2018	PALESTINE POLYTECHNIC UNIVERSITY College of Engineering Department of Mechanical Engineering H.V.A.C. Engineering		Designed AND DRAWN By: Mutaz Dweik	Project Name: Mechanical Systems for Headquarters Charities building in Hebron	Drawing Title: GROUND FLOOR FIRE FIGHTING PIPE, GAS AND VENT LAYOUT	Notes: All dimensions are in MM Unless otherwise shown. All spot levels are in meters. Hollow blockwork. Reinforced concrete column/wall. Plain concrete walls.	 955m SL +0.00m
Drawing Scale: 1/100			Supervisor: Dr. KAZEM OSAILY				
Drawing No. M12A							



Date: 2/04/2018 Drawing Scale: NTS Drawing No. M12B	PALESTINE POLYTECHNIC UNIVERSITY College of Engineering Department of Mechanical Engineering H.V.A.C. Engineering		Designed AND DRAWN By: Mutaz Dweik Supervisor: Dr. KAZEM OSAILY	Project Name: Mechanical Systems for Headquarters Charities building in Hebron	Drawing Title: GROUND FLOOR FIRE FIGHTING PIPE, GAS AND VENT LAYOUT	Notes: All dimensions are in MM Unless otherwise shown. All spot levels are in meters. Hollow blockwork. Reinforced concrete column/wall. Plain concrete walls.	955m SL +0.00m 
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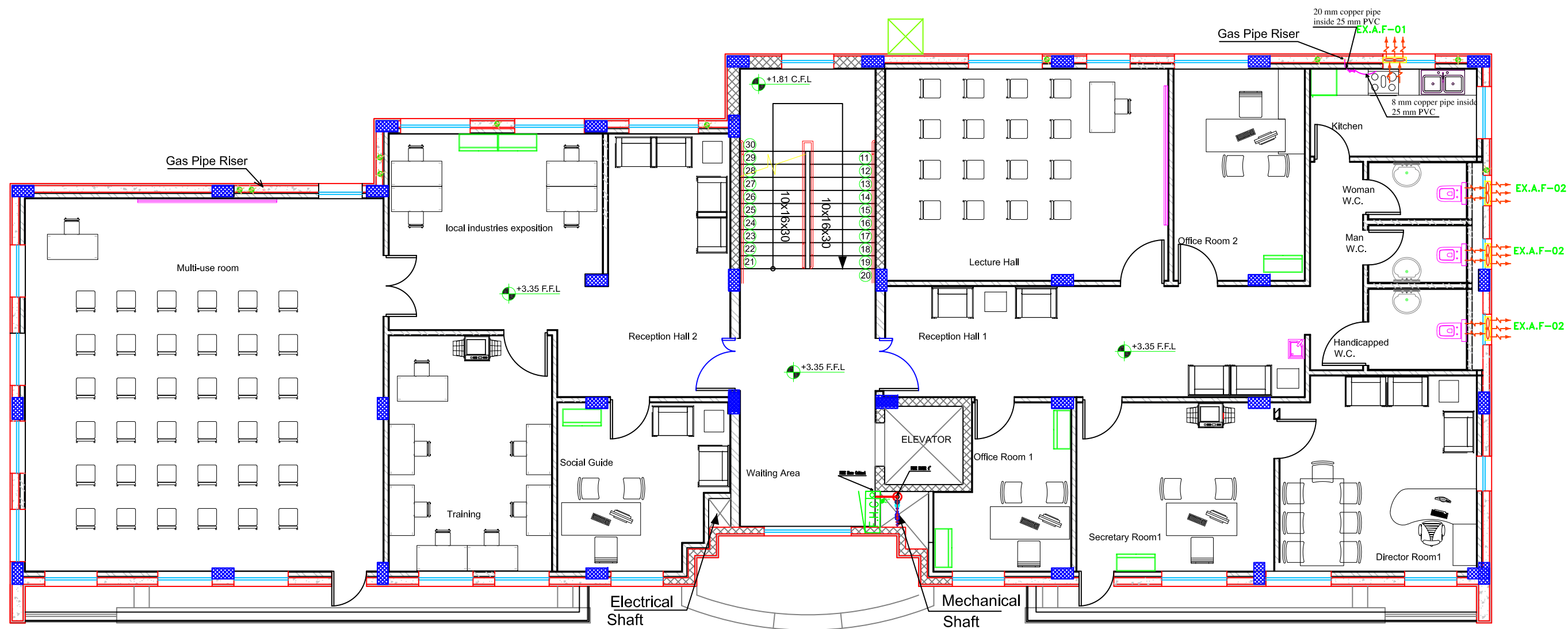




LIST OF Water Pipes For Fier Tank:–

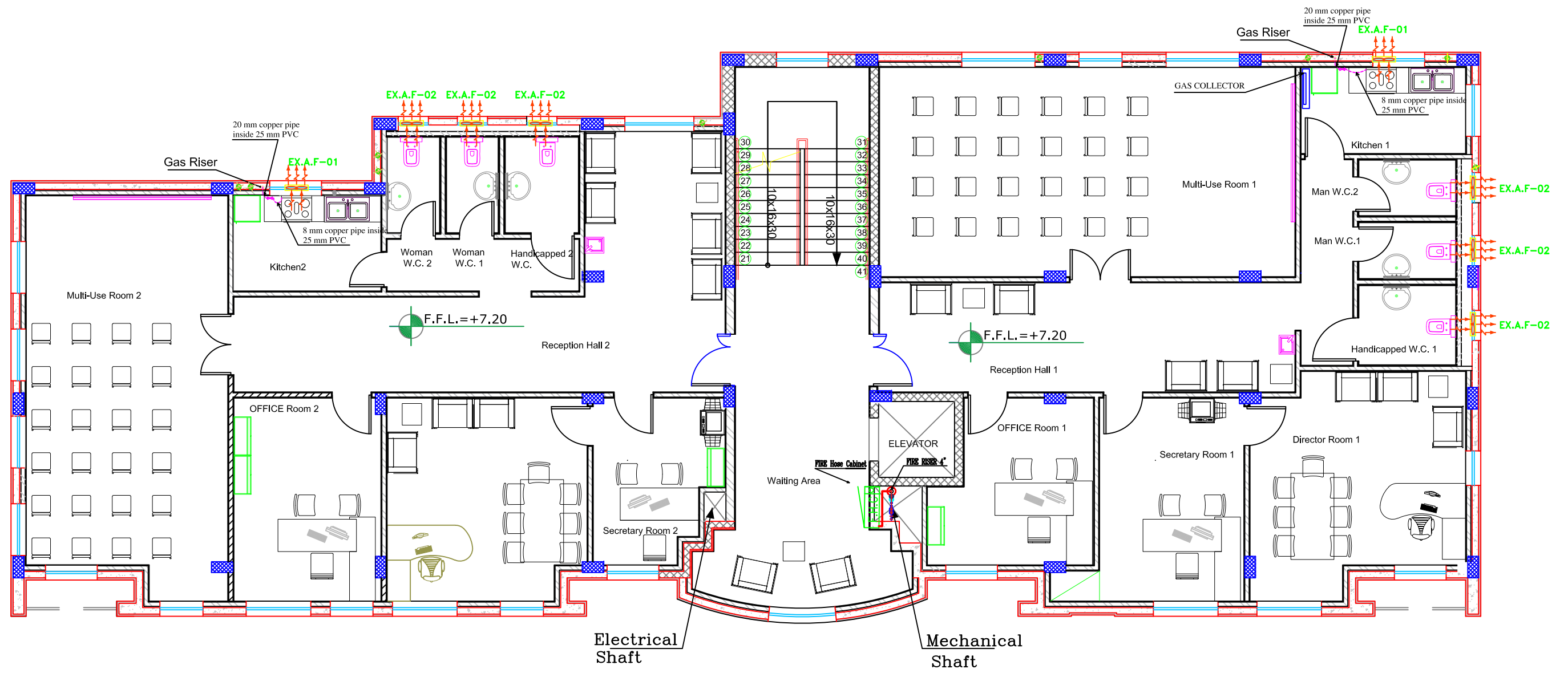
Pipe NO.	Type of Pipes and Diameter
1	Ø8" PRESSURE RELIEF & TEST FLOW PIPE LINE INLET
2	Ø4" FILLING LINE WITH FLOAT VALVE
3	Ø4" OVER FLOW PIPE
4	Ø400 mm ANTI VORTEX PLATE
5	Ø8" SUCTION PIPE LINE
6	Ø4" DRAIN LINE
7	Ø4" DRAIN LINE
8	Ø8" SUCTION PIPE LINE
9	Ø400 mm ANTI VORTEX PLATE
10	Ø4" OVER FLOW PIPE
11	Ø4" FILLING LINE WITH FLOAT VALVE
12	Ø8" PRESSURE RELIEF & TEST FLOW PIPE LINE INLET







LEGEND:

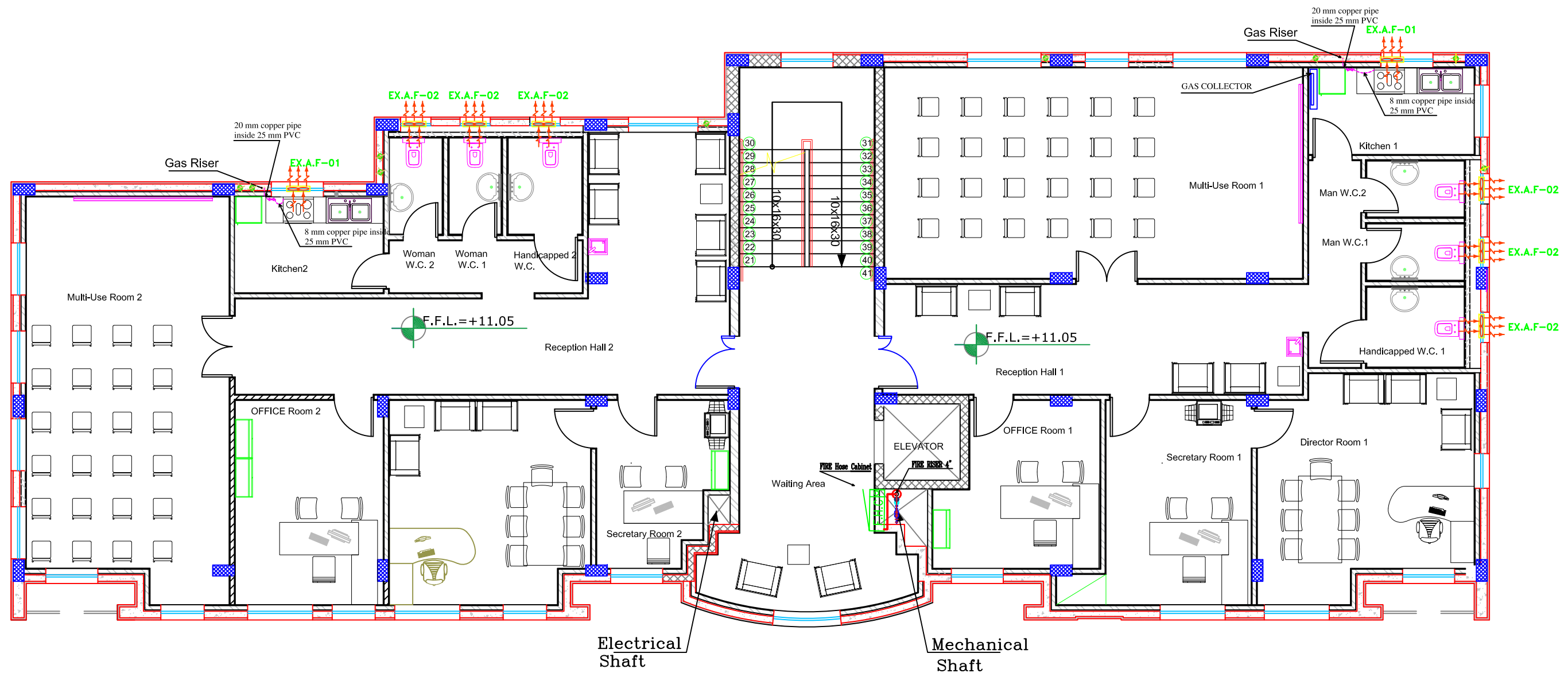
No.	ABBREV.	SYMBOL	DESCRIPTION
1	C.V.		CHECK VALVE
2	(OS&Y) G.V.		(OS&Y) GATE VALVE
3	EX.J.		EXPANSION JOINT
4	St.		STRAINER
5	(OS&Y) G.V.		(OS&Y) GATE VALVE THREADED
6	C.V.		CHECK VALVE THREADED
7	C.P.		CONTROL PANEL
9	P.R.V.		PRESSURE RELIEF VALVE
10	B.V.		BALL VALVE


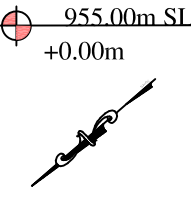


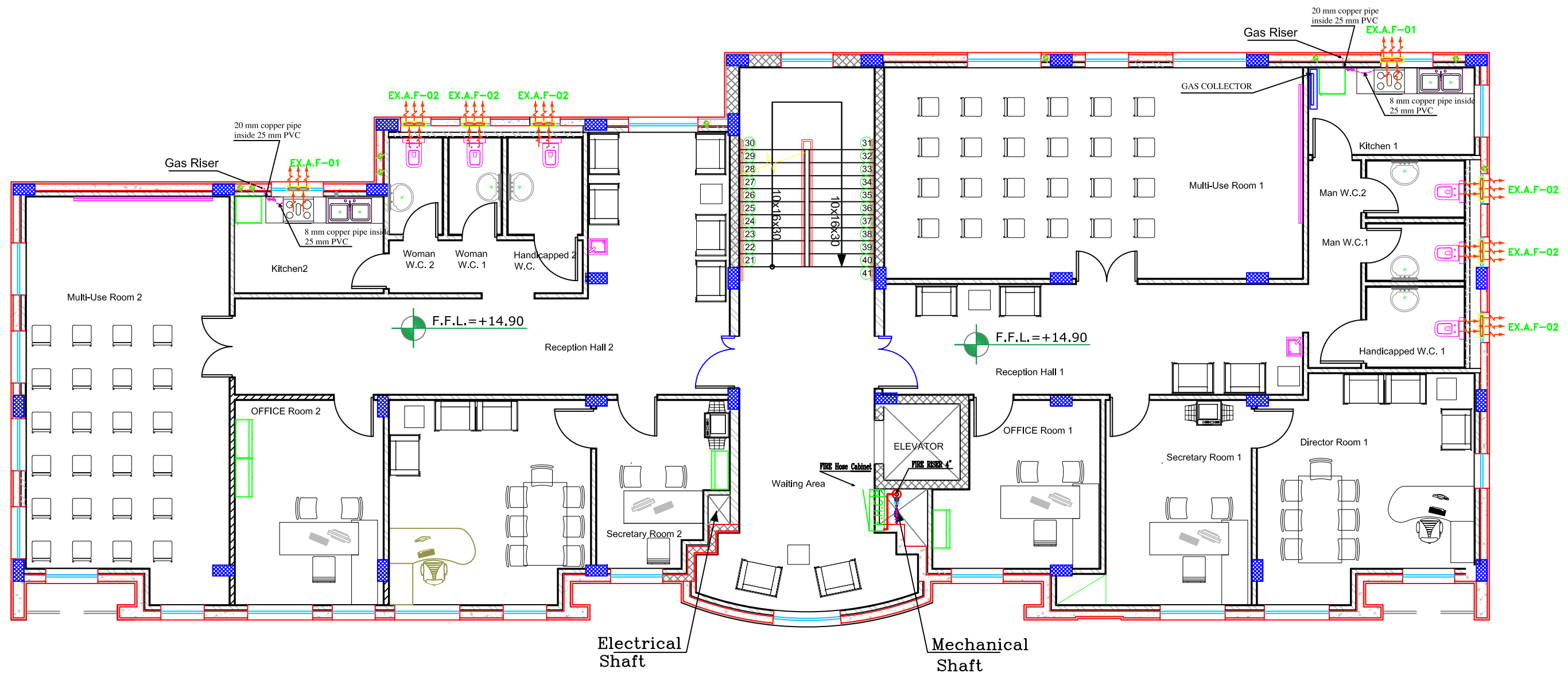
Date: 2/04/2018 Drawing Scale: 1/100 Drawing No. M13	PALESTINE POLYTECHNIC UNIVERSITY College of Engineering Department of Mechanical Engineering H.V.A.C. Engineering		Designed AND DRAWN By: Mutaz Dweik Supervisor: Dr. KAZEM OSAILY	Project Name: Mechanical Systems for Headquarters Charities building in Hebron	Drawing Title: FIRST FLOOR Fire fighting ,Gas And Vent LAYOUT	Notes: All dimensions are in MM Unless otherwise shown. All spot levels are in meters. Hollow blockwork. Reinforced concrete column/wall. Plain concrete walls.	955.00m SL +0.00m 
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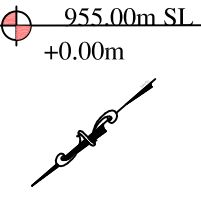


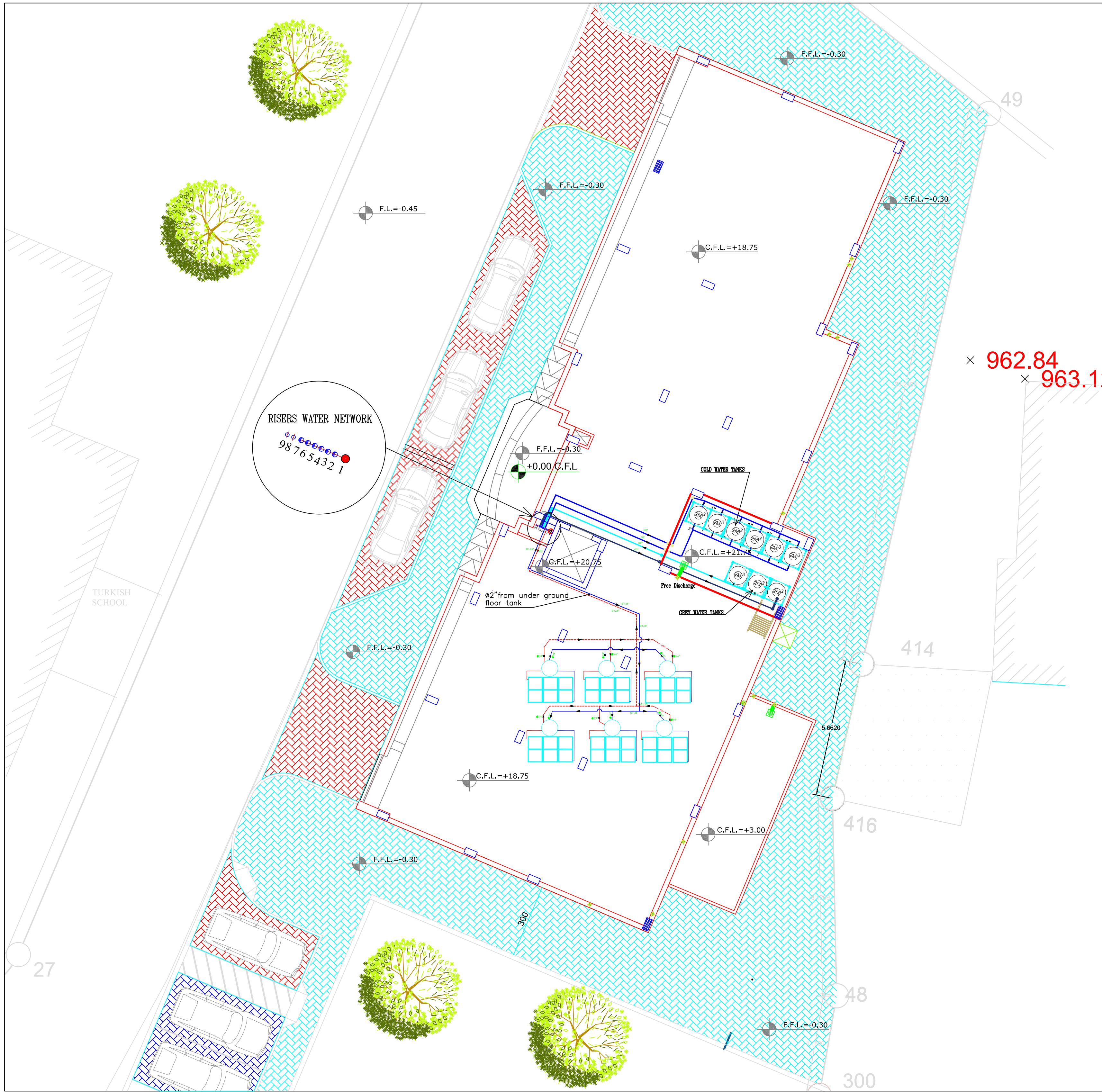
<div>Date: 2/04/2018</div> <div>Drawing Scale: 1/100</div> <div>Drawing No. M14</div>	<div>PALESTINE POLYTECHNIC UNIVERSITY</div> <div>College of Engineering</div> <div>Department of Mechanical Engineering</div> <div>H.V.A.C. Engineering</div>		<div>Designed AND DRAWN By: Mutaz Dweik</div> <div>Supervisor: Dr. KAZEM OSAILY</div>	<div>Project Name:</div> <div>Mechanical Systems for Headquarters Charities building in Hebron</div>	<div>Drawing Title:</div> <div>SECOND FLOOR Fier fighting ,Gas and Vent LAYOUT</div>	<div>Notes:</div> <div>All dimensions are in MM Unless otherwise shown. All spot levels are in meters.</div> <div> Hollow blockwork.</div> <div> Reinforced concrete column/wall.</div> <div> Plain concrete walls.</div>	<div> 955.00m SL +0.00m</div> <div></div>
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Date: 2/04/2018 Drawing Scale: 1/100 Drawing No. M15	PALESTINE POLYTECHNIC UNIVERSITY College of Engineering Department of Mechanical Engineering H.V.A.C. Engineering		Designed AND DRAWN By: Mutaz Dweik Supervisor: Dr. KAZEM OSAILY	Project Name: Mechanical Systems for Headquarters Charities building in Hebron	Drawing Title: THIRD FLOOR Fier fighting ,Gas and Vent LAYOUT	Notes: All dimensions are in MM Unless otherwise shown. All spot levels are in meters. Hollow blockwork. Reinforced concrete column/wall. Plain concrete walls.	 955.00m SL +0.00m
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Date: 2/04/2018 Drawing Scale: 1/100 Drawing No. M16	PALESTINE POLYTECHNIC UNIVERSITY College of Engineering Department of Mechanical Engineering H.V.A.C. Engineering		Designed AND DRAWN By: Mutaz Dweik Supervisor: Dr. KAZEM OSAILY	Project Name: Mechanical Systems for Headquarters Charities building in Hebron	Drawing Title: FOURTH FLOOR Fier fighting ,Gas and Vent LAYOUT	Notes: All dimensions are in MM Unless otherwise shown. All spot levels are in meters. Hollow blockwork. Reinforced concrete column/wall. Plain concrete walls.	
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MECHANICAL LEGENED			
	FLOOR DRAIN (SIPHON-TRAP)		WATER METER
	FLOOR DRAIN (JUNCTION BOX)		WATER METER BOX (WMB)
	CLEAN OUT		GATE VALVE
	ROOF & BALCONY DRAIN		NON RETURN VALVE
	BLACK WATER MANHOLE (MH)		FLOAT
	RAIN WATER MANHOLE (RWM)		8mm GAS SHUTOFF VALVE
	GREY WATER MANHOLE (MH)		G.S.P COLD WATER SUPPLY
	FIRE HOSE CABINET		G.S.P HOT WATER SUPPLY
	EXHAUST FAN		CITY MAIN WATER PIPE
	UPVC DRAINAGE PIPE		POLYETHYLENE COLD WATER PIPE
	GALVANIZED STEEL WATER PIPE		POLYETHYLENE HOT WATER PIPE
	Ø2" UPVC DRAINAGE PIPE		COPPER GAS PIPE INSIDE 20MM P.V.C PIPE
	Ø4" UPVC DRAINAGE PIPE		COLD WATER PIPE
	Ø6" UPVC DRAINAGE PIPE		HOT WATER PIPE
	Ø4" UPVC VENT PIPE		HOT WATER RETURN PIPE
	GAS COLLECTOR		IRRIGATION PIPE
	WATER COLLECTOR		FIRE FIGHTING WATER PIPE
	WATER PUMP		VENT PIPING
	FREE DISCHARGE PIPE		REFRIGERANT PIPES
	CONDENSED PIPE		DRAIN LINE
	GAS CABINET		DRAIN POINT
	FINISH ROOF LEVEL		WATER PUMP
	FLOOR DRAIN		VENT COWL
	CW and HW collector		WATER COOLER

LIST OF Water Pipes Risers :-

Pipe NO.	Type of Pipes and Diameter
1	Ø4" FIRE FIGHTING RISER
2	Ø2" HOT WATER RETURN
3	Ø2" HOT WATER SUPPLY
4	Ø2" COLD WATER SUPPLY FROM ROOF TANK TO COLLECTOR
5	Ø2" GREY WATER TREAT TO WATER CLOSET
6	Ø2" COLD WATER SUPPLY TO ROOF TANK
7	Ø2" GREY WATER TO SAND ROOF TANK
8	Ø1" LIQUID REFREGERANT
9	Ø1" GAS REFREGERANT

Date:
02/04/2018

Drawing Scale:
1/100

Drawing No.

M17

PALESTINE
POLYTECHNIC UNIVERSITY

College of Engineering

Department of Mechanical Engineering

H.V.A.C. Engineering



Designed AND DRAWN By:
Mutaz Dweik

Supervisor:
Dr. KAZEM OSAILY

Project Name:

Mechanical Systems
for Headquarters Charities
building in Hebron

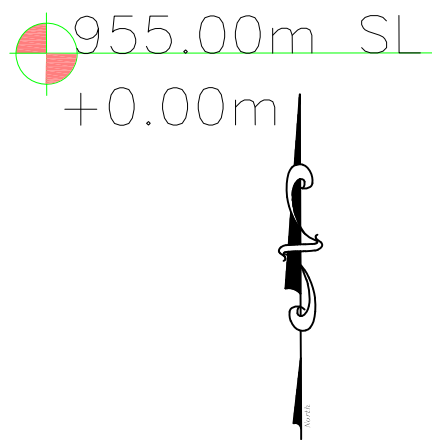
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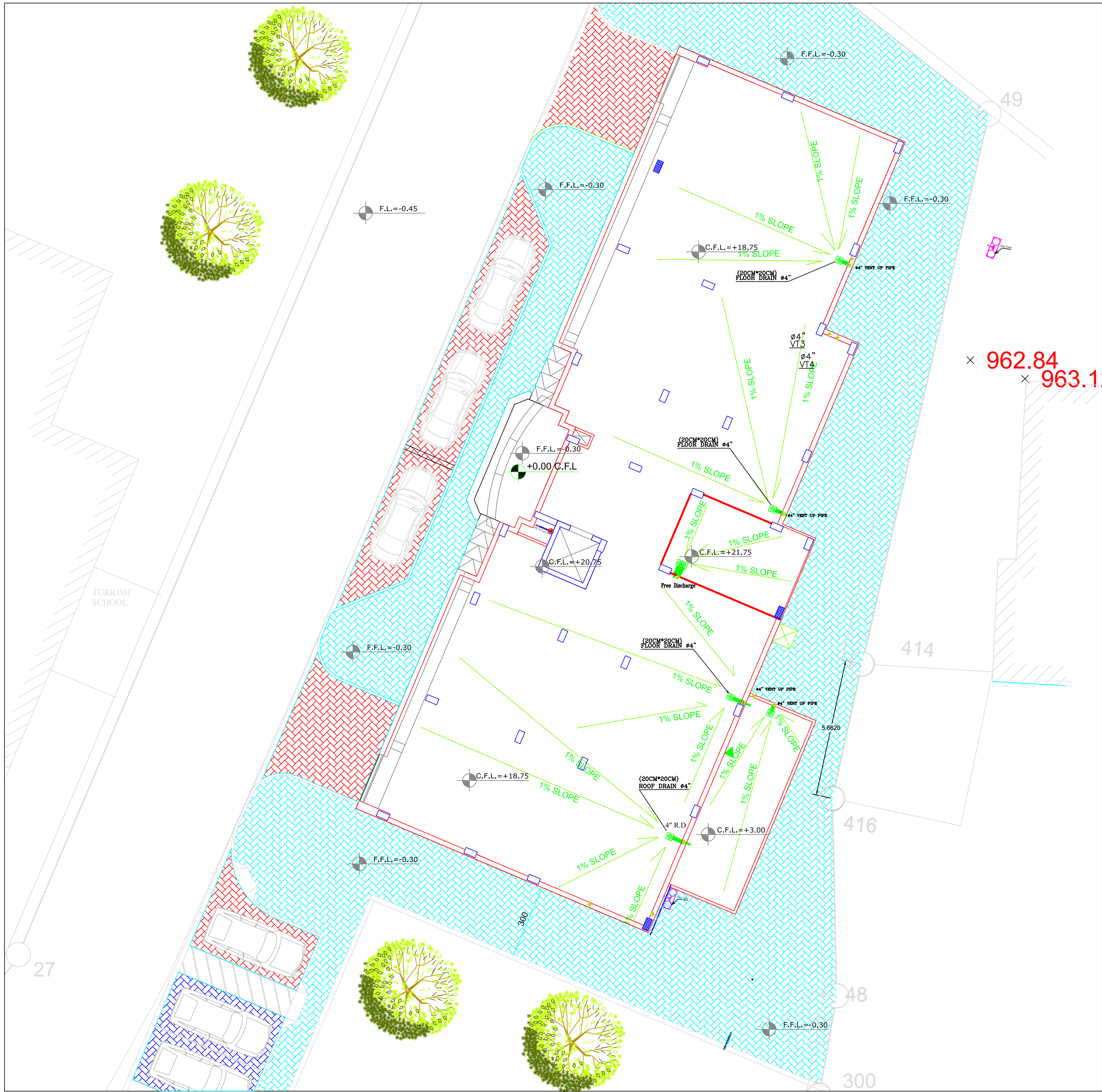
Roof Water Layout

Notes:

All dimensions are in Meters
Unless otherwise shown.
All spot levels are in Meters.

Hollow blockwork.
 Reinforced concrete column/wall.
 Plain concrete walls.





MECHANICAL LEGENED			
	FLOOR DRAIN (SIPHONE-TRAP)		WATER METER
	FLOOR DRAIN (JUNCTION BOX)		WATER METER BOX (WMB)
	CLEAN OUT		GATE VALVE
	ROOF & BALCONY DRAIN		NON RETURN VALVE
	SEWER MANHOLE (MH)		FLOAT
	RAIN WATER MANHOLE (RWM)		8mm GAS SHUTOFF VALVE
	FIRE HOSE CABINET		G.S.P COLD WATER SUPPLY
	EXHAUST FAN		G.S.P HOT WATER SUPPLY
	UPVC DRAINAGE PIPE		CITY MAIN WATER PIPE
	GALVANIZED STEEL WATER PIPE		POLYETHYLENE COLD WATER PIPE
	02" UPVC DRAINAGE PIPE		POLYETHYLENE HOT WATER PIPE
	04" UPVC DRAINAGE PIPE		COPPER GAS PIPE INSIDE 20MM P.V.C. PIPE
	06" UPVC DRAINAGE PIPE		COLD WATER PIPE
	04" UPVC VENT PIPE		HOT WATER PIPE
	GAS COLLECTOR		HOT WATER RETURN PIPE
	WATER COLLECTOR		IRRIGATION PIPE
	WATER PUMP		FIRE FIGHTING WATER PIPE
	FREE DISCHARGE PIPE		VENT PIPING
	CONDENSED PIPE		REFRIGERANT PIPES
	GAS CABINET		DRAIN LINE
	FINISH ROOF LEVEL		DRAIN POINT
	FLOOR DRAIN		WATER PUMP
	CW and HW collector		VENT COWL
	WATER COOLER		

Date:
02/04/2018

Drawing Scale:
1/100

Drawing No.

M18

PALESTINE
POLYTECHNIC UNIVERSITY

College of Engineering

Department of Mechanical Engineering

H.V.A.C. Engineering



Designed AND DRAWN By:
Mutaz Dweik

Supervisor:
Dr. KAZEM OSAILY

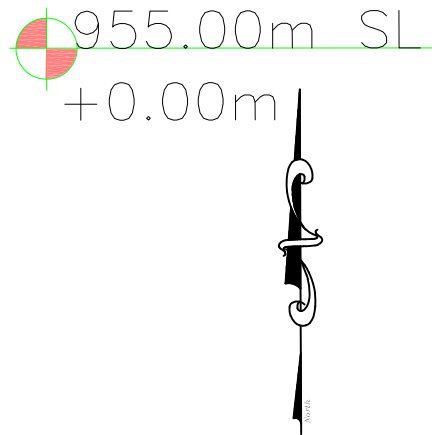
Project Name:
**Mechanical Systems
for Headquarters Charities
building in Hebron**

Drawing Title:
**Roof Rain Water
Drainage layout**

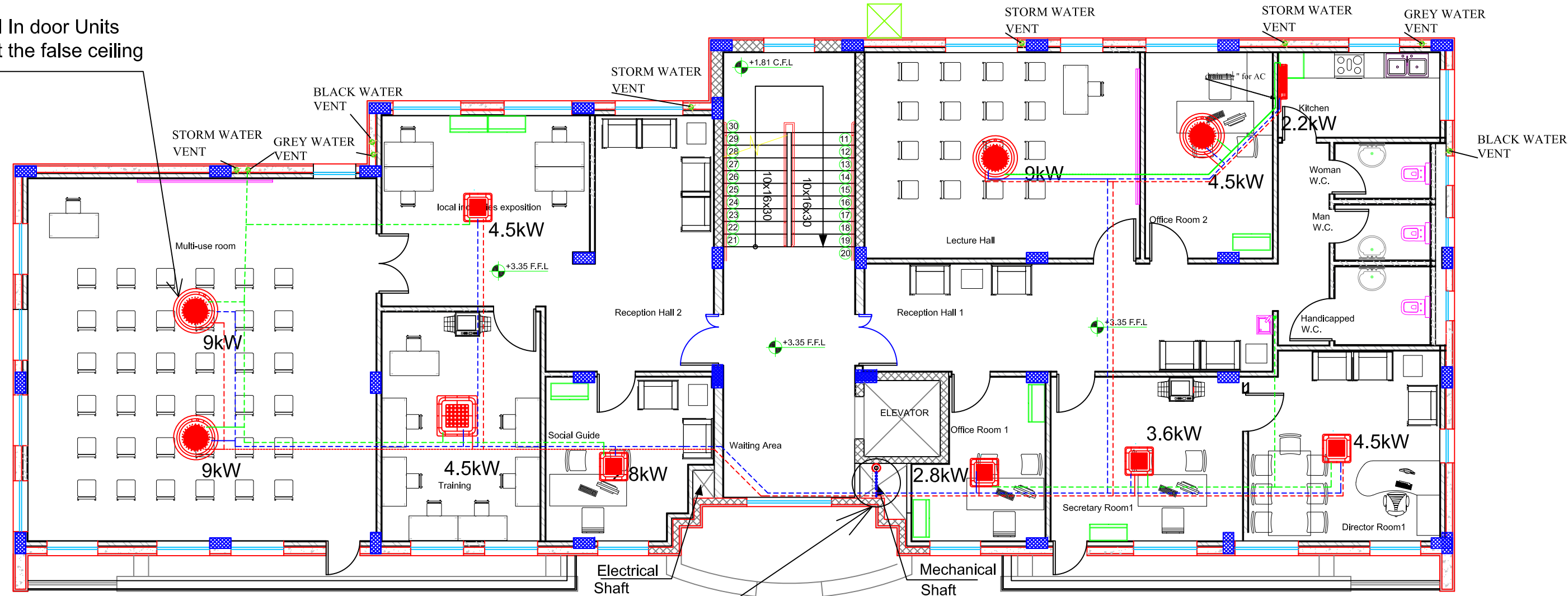
Notes:

All dimensions are in Meters
Unless otherwise shown.
All spot levels are in Meters.

Hollow blockwork.
 Reinforced concrete column/wall.
 Plain concrete walls.








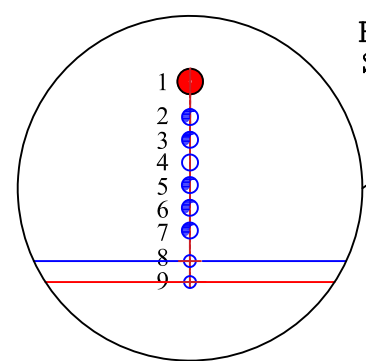
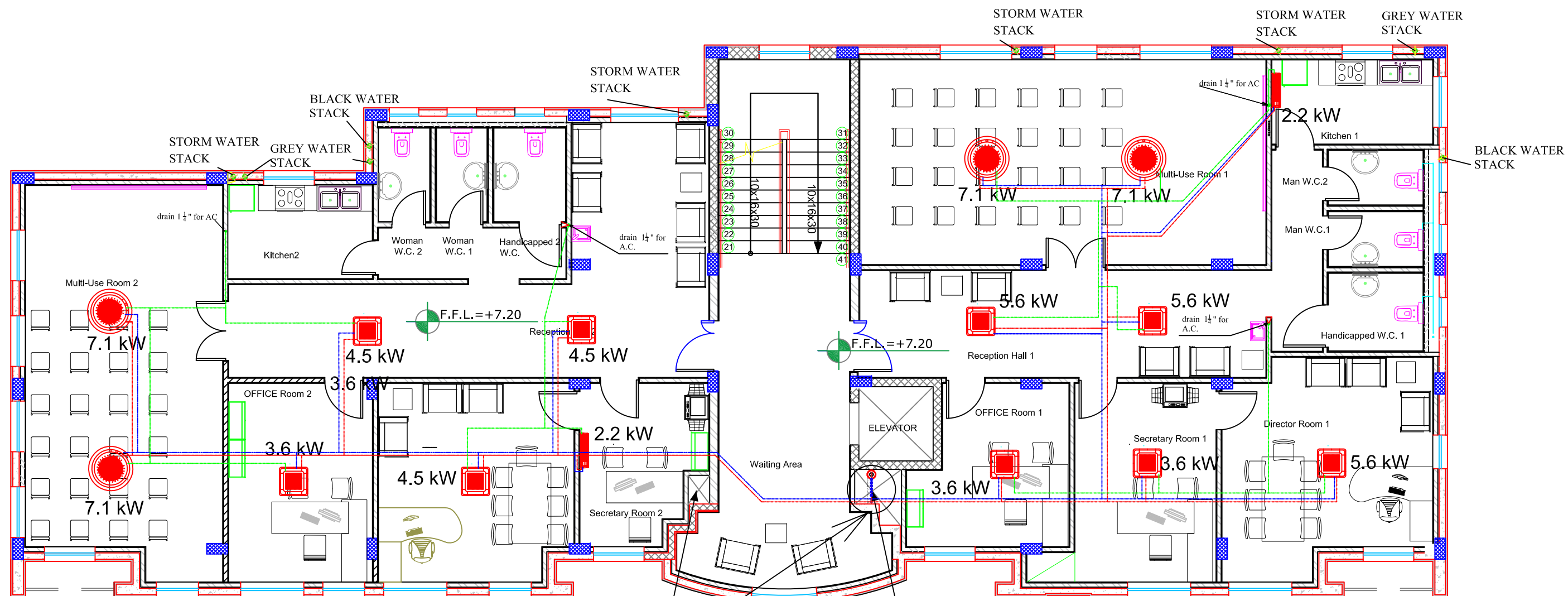
All In door Units
at the false ceiling



LIST OF Refrigerant Pipes :-



8	Ø1" LIQUID REFREGERANT
9	Ø1" GAS REFREGERANT

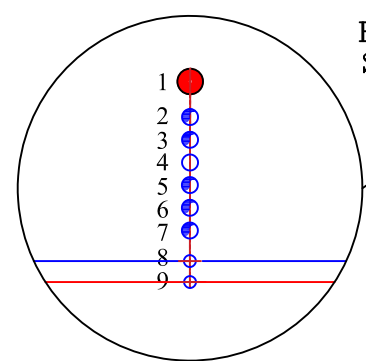
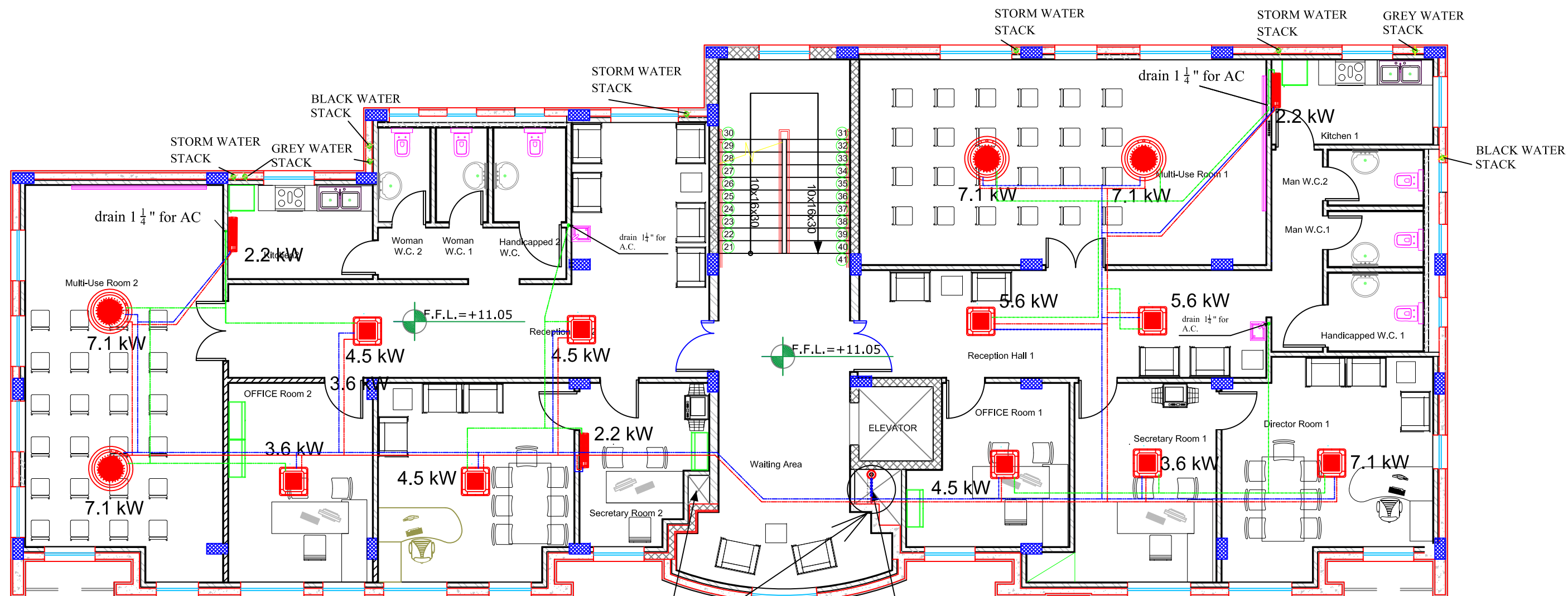
<p>Date: 2/04/2018</p> <p>Drawing Scale: 1/100</p> <p>Drawing No. M19</p>	<p>PALESTINE POLYTECHNIC UNIVERSITY</p> <p>College of Engineering Department of Mechanical Engineering H.V.A.C. Engineering</p>		<p>Designed AND DRAWN By: Mutaz Dweik</p> <p>Supervisor: Dr. KAZEM OSAILY</p>	<p>Project Name: Mechanical Systems for Headquarters Charities building in Hebron</p>	<p>Drawing Title: FIRST FLOOR HVAC SYSRTEM LAYOUT</p>	<p><u>Notes:</u></p> <p>All dimensions are in MM Unless otherwise shown. All spot levels are in meters.</p> <p> Hollow blockwork.  Reinforced concrete column/wall.  Plain concrete walls.</p>	<p>955.00m SL +0.00m</p> 
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LIST OF Refrigerant Pipes:-







8	Ø1" LIQUID REFREGERANT
9	Ø1" GAS REFREGERANT

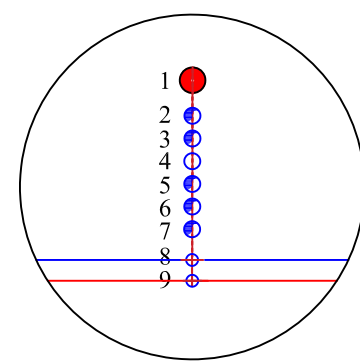
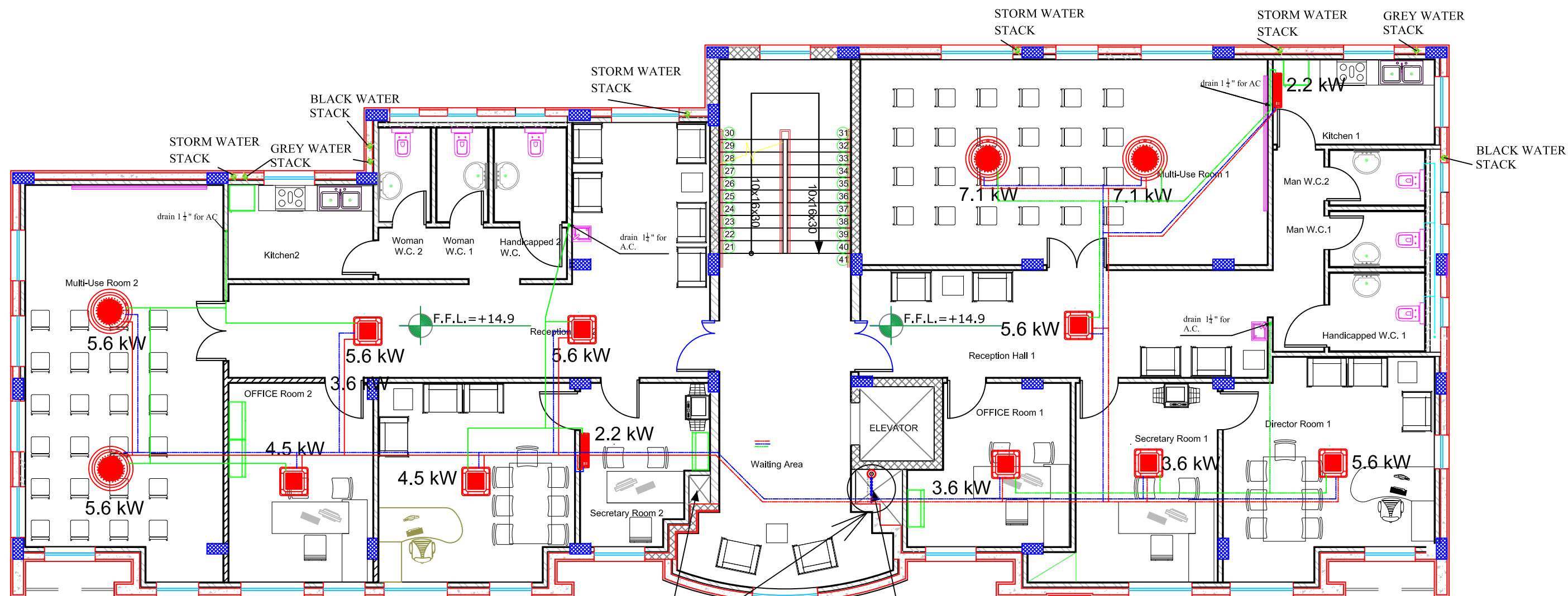
<p>Date: 2/04/2018</p> <p>Drawing Scale: 1/100</p> <p>Drawing No. M20</p>	<p>PALESTINE POLYTECHNIC UNIVERSITY</p> <p>College of Engineering</p> <p>Department of Mechanical Engineering</p> <p>H.V.A.C. Engineering</p>		<p>Designed AND DRAWN By: Mutaz Dweik</p> <p>Supervisor: Dr. KAZEM OSAILY</p>	<p>Project Name: Mechanical Systems for Headquarters Charities building in Hebron</p>	<p>Drawing Title: SECOND FLOOR HVAC SYSTEM LAYOUT</p>	<p>Notes:</p> <p>All dimensions are in MM Unless otherwise shown. All spot levels are in meters.</p> <p>Hollow blockwork.</p> <p>Reinforced concrete column/wall.</p> <p>Plain concrete walls.</p>	<p>955.00m SL +0.00m</p> 
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LIST OF Refrigerant Pipes:-



8	Ø1" LIQUID REFREGERANT
9	Ø1" GAS REFREGERANT

<p>Date: 2/04/2018</p> <p>Drawing Scale: 1/100</p> <p>Drawing No. M21</p>	<p>PALESTINE POLYTECHNIC UNIVERSITY</p> <p>College of Engineering</p> <p>Department of Mechanical Engineering</p> <p>H.V.A.C. Engineering</p>		<p>Designed AND DRAWN By: Mutaz Dweik</p> <p>Supervisor: Dr. KAZEM OSAILY</p>	<p>Project Name: Mechanical Systems for Headquarters Charities building in Hebron</p>	<p>Drawing Title: THIRD FLOOR HVAC SYSTEM LAYOUT</p>	<p>Notes:</p> <p>All dimensions are in MM Unless otherwise shown. All spot levels are in meters.</p> <p> Hollow blockwork.  Reinforced concrete column/wall.  Plain concrete walls.</p>	<p> 955.00m SL +0.00m</p> 
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LIST OF Refrigerant Pipes:-

8	Ø1" LIQUID REFREGERANT
9	Ø1" GAS REFREGERANT

Date: 2/04/2018 Drawing Scale: 1/100 Drawing No. M22	PALESTINE POLYTECHNIC UNIVERSITY College of Engineering Department of Mechanical Engineering H.V.A.C. Engineering		Designed AND DRAWN By: Mutaz Dweik	Project Name: Mechanical Systems for Headquarters Charities building in Hebron	Drawing Title: FOURTH FLOOR HVAC SYSTEM LAYOUT	Notes: All dimensions are in MM Unless otherwise shown. All spot levels are in meters. Hollow blockwork. Reinforced concrete column/wall. Plain concrete walls.	955.00m SL +0.00m 
			Supervisor: Dr. KAZEM OSAILY				

A cross-sectional diagram of a 1/2 round manhole. The main body is a semi-circle with a flat bottom. A horizontal pipe enters from the left, labeled 'INLET PIPES'. A horizontal pipe exits to the right, labeled 'OUTLET PIPE'. A vertical pipe enters from the top, labeled '1/2 ROUND BRANCH CHANNEL BEND'. The main channel is labeled '1/2 ROUND MAIN CHANNEL'. The bottom of the manhole is covered with a grate, indicated by small circles.

Diagram illustrating a trenchless sewer repair method using sliplining. The diagram shows an existing pipe (labeled 'EXISTING') being replaced by a new pipe (labeled '1/2 ROUND MAIN'). The new pipe is inserted from the left, through an inlet pipe, and extends to the right, past the existing pipe's end. The inlet and outlet pipes are also labeled.

1/2 ROUND MAN CHANNEL

OUTLET PIPE

BENCHING

SECTION THROUGH MAIN CHANNEL

A schematic diagram of a 1/2 round branch channel bend. It shows a circular main channel with a 180-degree bend. Two inlet pipes enter from the left, and one outlet pipe exits to the right. The bend is labeled "1/2 ROUND BRANCH CHANNEL BEND".

SECTION THROUGH MAIN CHANNEL

Diagram illustrating the components of a cooking gas vented steel cabinet with lock:

- COOKING GAS VENTILATED STEEL CABINET WITH LOCK
- COOKING GAS BOTTLE (12 Kg)
- COOKING GAS REGULATOR
- SHUT OFF VALVE
- Ø 1/2" COPPER COLL.
- COPPER PIPES 20mm (INSULATED)

Diagram illustrating the components of a cooking gas ventilated steel cabinet with lock:

- COOKING GAS VENTILATED STEEL CABINET WITH LOCK
- COOKING GAS BOTTLE (48 Kg)
- COOKING GAS REGULATOR
- SHUT OFF VALVE
- Ø 1/2" COPPER COLL.
- COPPER PIPES 20mm (INSULATED)

Diagram illustrating the connection of a cooking gas vented stove to a steel cabinet with a lock. The components shown are:

- COOKING GAS VENTED
- STEEL CABINET WITH LOCK
- COOKING GAS BOTTLES (48 Kg EA)
- COOKING GAS REGULATOR
- SHUT OFF VALVE
- Ø 1/2" COPPER COLL.
- COPPER PIPES 20mm (INSULATED)

COOKING GAS CABINET DETAIL
(2 X 48 Kg)

# (CM)	H (CM)	T(b) CM)	T(w) CM)
60	50-100	12	7.5
80	100-150	12	12
100	150-250	13	14
120	>250	14	14

Diagram illustrating the cross-section of a manhole structure, showing various components and dimensions:

- CAST IRON COVER**: Located at the top of the structure.
- REFER TO SEPARATE DETAIL**: Points to the cover detail.
- PRE-CAST MANHOLE RING**: The main vertical structure of the manhole.
- Ø**: Diameter of the manhole opening.
- T(w)**: Thickness of the manhole wall.
- T(b)**: Thickness of the base.
- 10cm**: Dimension for the top flange of the manhole ring.
- 15cm**: Dimension for the base reinforcement slab.
- 15cm REINFORCED CONCRETE BASE (CONCRETE 8-200)**: The base of the manhole structure.
- 3cm SCREED**: A layer below the base.
- DRAINAGE PIPE**: Located at the bottom of the structure.
- BENDING**: Indicated for the drainage pipe.
- BASE REINFORCEMENT (BAR Ø 15 CM C/C @ 100MM SECTIONS)**: Reinforcement for the base.
- F.F.L.**: Finished Floor Level, indicated at the top left.
- Ø**: Diameter of the manhole opening.
- 10cm**: Dimension for the top flange of the manhole ring.
- 15cm**: Dimension for the base reinforcement slab.

The diagram illustrates a cross-section of a manhole assembly. At the top, a horizontal line is labeled 'FSL' (Finished Surface Level). Below it, a sloped roof structure is shown. The main vertical shaft is lined with 'PRE-CAST MANHOLE RING' sections. Horizontal 'IRON STEPS' are provided for access, with dimensions of 'Ø20mm G.V. BARS' and '30 cm APART'. A vertical dimension line on the right indicates a height of '2' meters. The shaft terminates in a circular opening with a diameter of 'Ø' and a height of '10cm'. This opening is surrounded by a '15cm REINFORCED CONCRETE BASE (CONCRETE B-200)'. Below the base is a '3cm SCREED' layer, followed by 'BASE REINFORCEMENT' consisting of 'Ø20MM @ 15 CM C/C IN BOTH DIRECTIONS'. A 'DRAINAGE PIPE' is shown at the bottom, with a '50x100' opening. The entire assembly is supported by a '15cm' thick base layer.

Technical drawing of a 45° elbow connection. The drawing shows a cross-section of the assembly. A cast iron cover is shown at the top, with a label "CAST IRON COVER REFER TO SEPARATE DETAIL". Below the cover is a cleanout. The main body of the elbow is surrounded by 200mm concrete. The elbow is labeled "45° ELBOW". The concrete is labeled "200MM CONCRETE SURROUNDS". The elbow is connected to a horizontal pipe labeled "(1) BRANCH". The main body of the elbow is labeled "BENCHING". The cleanout is labeled "CLEANOUT". The main body of the elbow is labeled "950MM G.V. BARS". The main body of the elbow is labeled "F.F.L." (Finish Floor Level).

A cross-sectional diagram of a wellhead assembly. At the top, a horizontal line represents the ground surface. Below it, a thick layer is labeled 'MORTAR'. A vertical pipe passes through the mortar, capped with a 'C/O COVER'. The pipe has several horizontal slots. Below the mortar, the pipe is labeled 'JOINT'. Further down, there is a section labeled 'JOINT (1 HP 8)'. The pipe then tapers, labeled 'TAPER'. Below the taper, there is another section labeled 'JOINT (2 HP 8)'. The pipe ends in a vertical section labeled 'WELL COMPACTED SOIL'.

A detailed cross-sectional diagram of a Gas Collector Cabinet. The cabinet is mounted on a concrete base 7 cm thick. Inside, four vertical 8mm soft copper pipes (labeled '8mm SOFT COPPER PIPES INSIDE Ø20MM P.V.C. PIPES') are connected to a horizontal manifold at the top. The manifold is supported by a 'SUPPORT' and has a 'UNION' on its right side. A '1/2" GAS COLLECTOR' pipe enters from the left. Each vertical pipe has a 'BALL VALVE' and a 'COUPLING' near the bottom. An 'ELECTRICAL GAS DETECTOR' is shown as a rectangular box with two circular terminals, connected to the piping system. A '1/2" BALL VALVE' is located on the right side of the cabinet. The floor level is indicated by a dashed line.

GAS COLLECTOR CABINET

1/2" GAS COLLECTOR

SUPPORT

UNION

8mm SOFT COPPER PIPES INSIDE Ø20MM P.V.C. PIPES

BALL VALVE

COUPLING

1/2" BALL VALVE

ELECTRICAL GAS DETECTOR

Ø12MM SOFT COPPER PIPES INSIDE Ø20MM P.V.C. PIPES

FLOOR LEVEL

CONCRETE BASE 7 CM

GAS COLLECTOR CABINET

The diagram illustrates the cross-section of a pipe being filled with sand. The pipe is represented by a circle with a diameter of 30cm. It is surrounded by sand, which is indicated by a stippled pattern. The sand is divided into two equal sections by a vertical line, each measuring 30cm in width. The entire assembly is contained within a square frame that is 60cm wide and 60cm high. Labels 'PIPE' and 'SAND' point to their respective components. The caption below the diagram is 'FILLING PIPE DETAILS'.

11/2" G.P.C.W.
FROM ROOF TANK

60

19 50 50 50 50 50 50 19

DRINKING FOUNTAIN PLAN
SCALE 1/25

DRINKING FOUNTAIN PLAN
SCALE 1/25

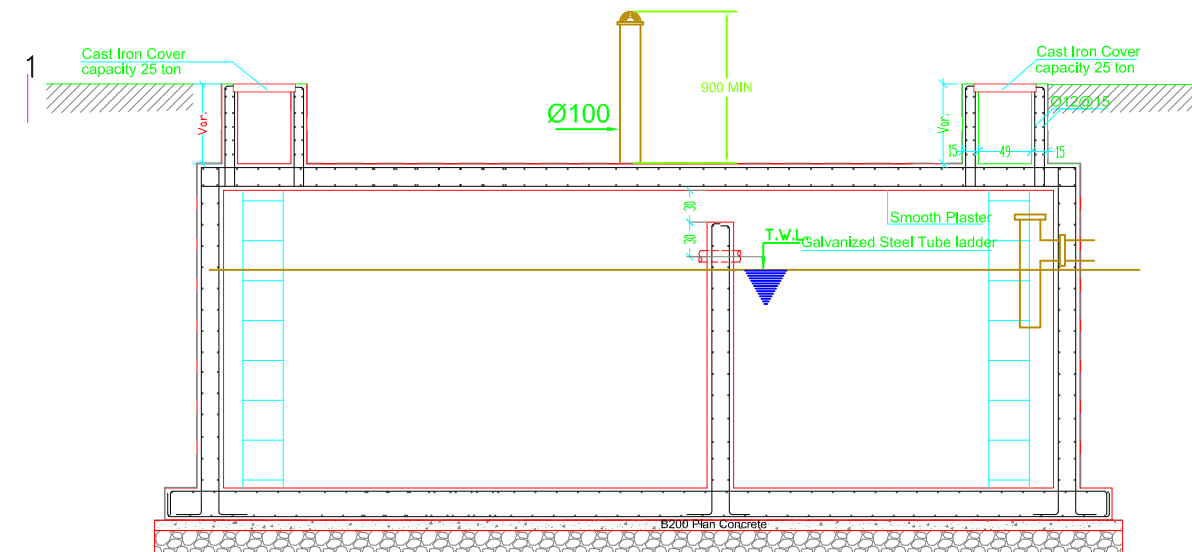
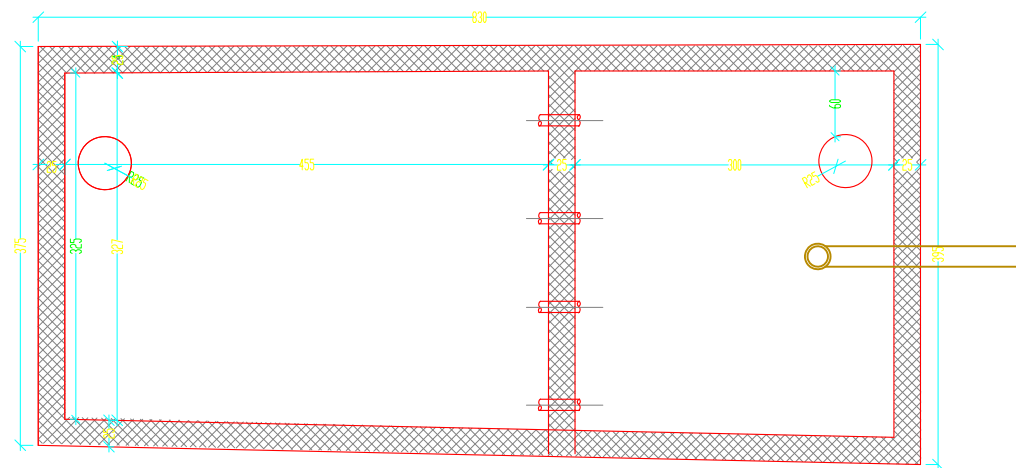
DRINKING FOUNTAIN ELEVATION
SCALE 1/25

SECTION A-A

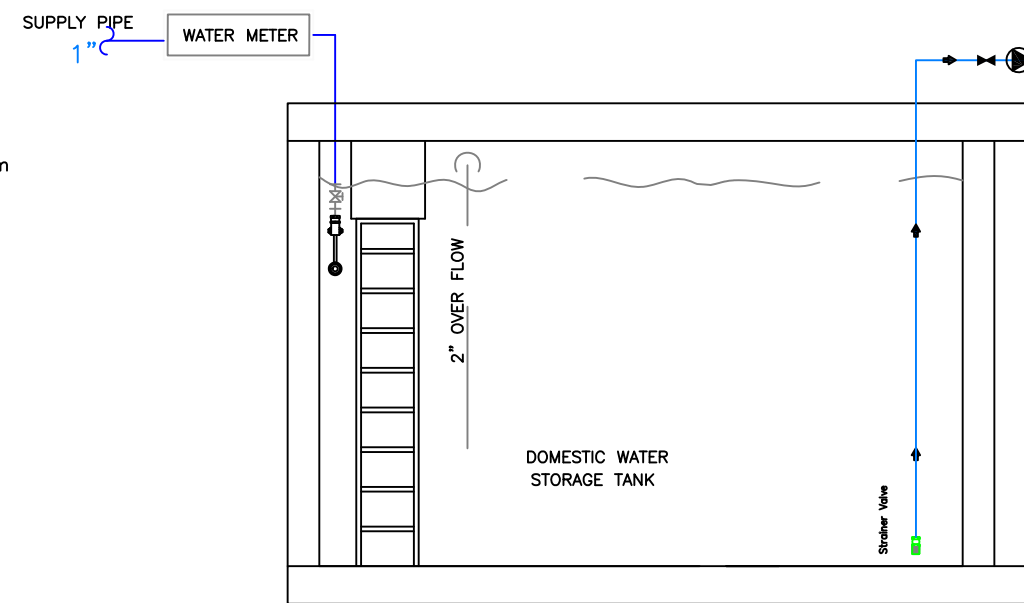
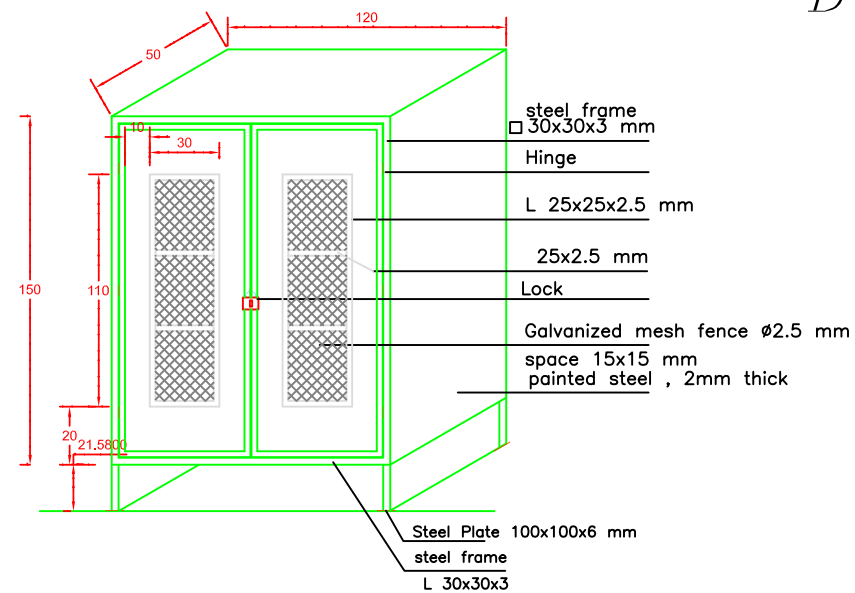
SCALE 1/10

Diagram showing a cross-section of a window frame assembly. The assembly includes a window frame, a hinge, a metal angle, and a 2" P.V.C. pipe. The frame is supported by a concrete wall with external plastering. The window frame is made of galvanized mesh fence with a 1/2" x 1/2" spacing. The frame is 60" wide and 65" high. The hinge is 10" wide. The metal angle is 40" x 40" x 3". The 2" P.V.C. pipe is 50" long. The frame is supported by a concrete wall with external plastering. The window frame is made of galvanized mesh fence with a 1/2" x 1/2" spacing. The frame is 60" wide and 65" high. The hinge is 10" wide. The metal angle is 40" x 40" x 3". The 2" P.V.C. pipe is 50" long.



MD1

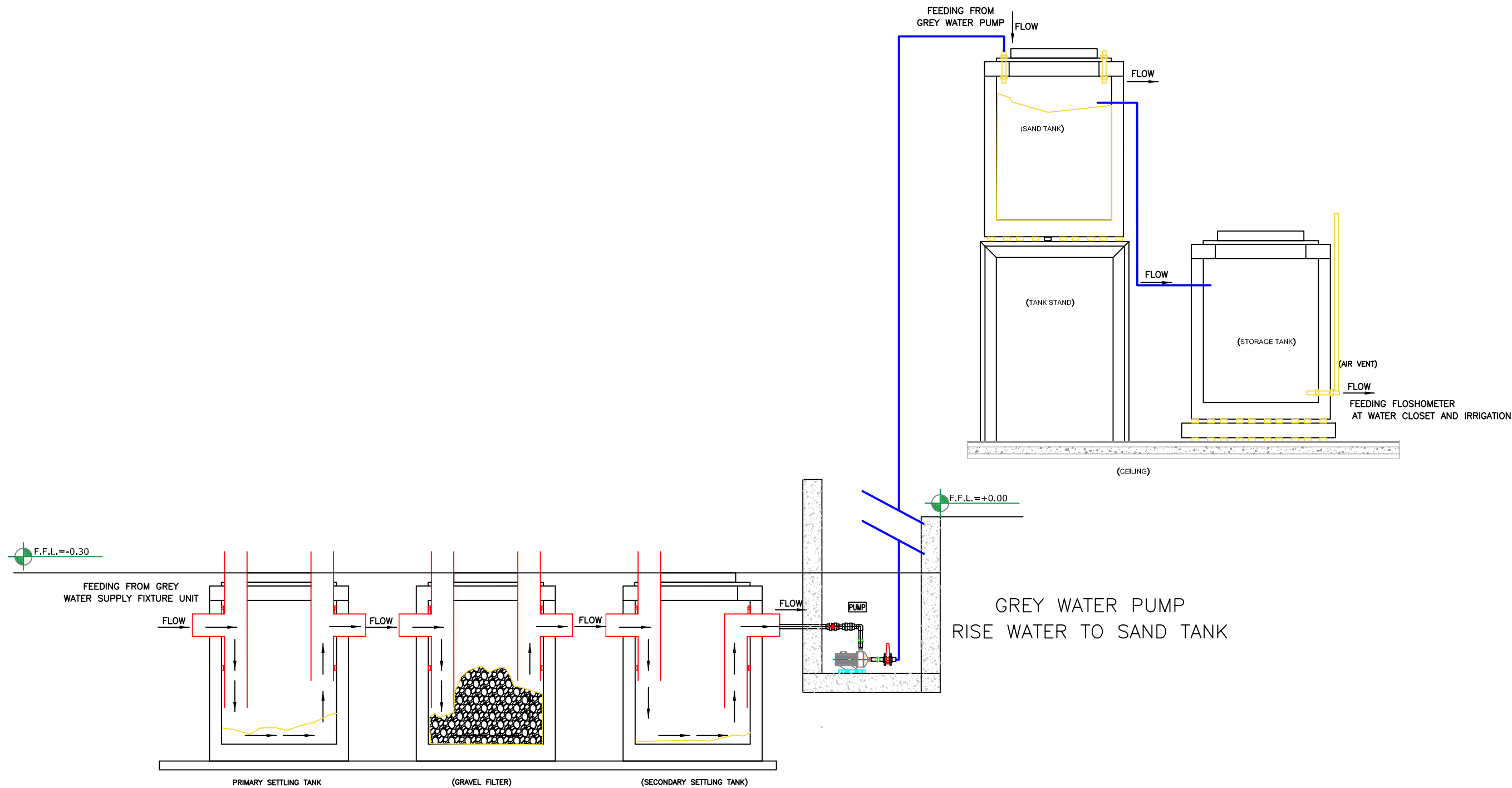


Septic Tank
Details









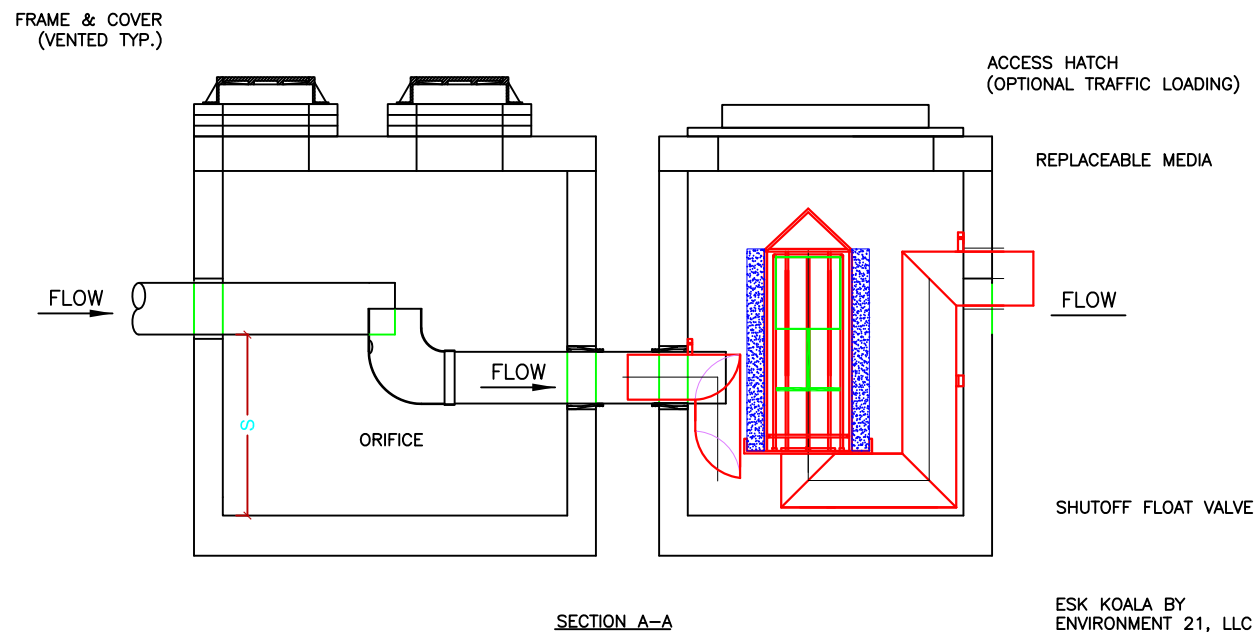
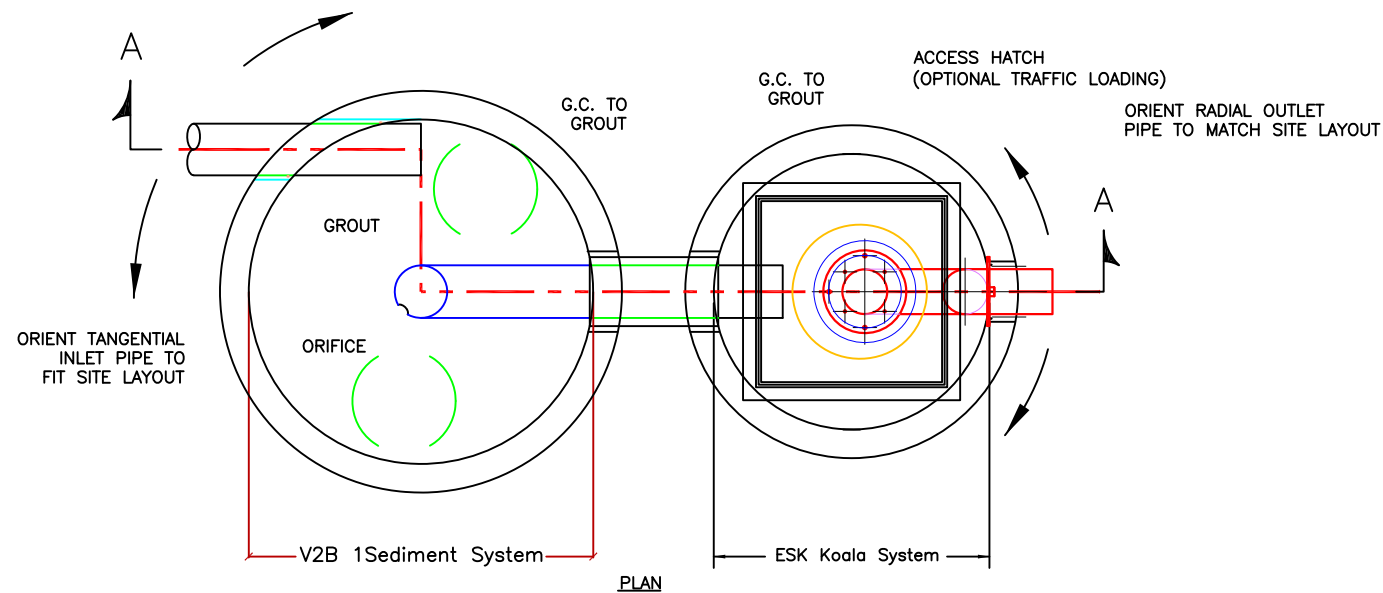
Water well

Date: 2/04/2018 Drawing Scale: NTS Drawing No. MD2	PALESTINE POLYTECHNIC UNIVERSITY College of Engineering Department of Mechanical Engineering H.V.A.C. Engineering		Designed AND DRAWN By: Mutaz Dweik Supervisor: Dr. KAZEM OSAILY	Project Name: Mechanical Systems for Headquarters Charities building in Hebron	Drawing Title: Mechanical Details	Notes: All dimensions are in Meters Unless otherwise shown. All spot levels are in Meters. Hollow blockwork. Reinforced concrete column/wall. Plain concrete walls.	955.00m SL +0.00m 
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GREY WATER TANKS

<div>Date: 2/04/2018</div> <div>Drawing Scale: NTS</div> <div>Drawing No. MD3</div>	<div>PALESTINE POLYTECHNIC UNIVERSITY</div> <div>College of Engineering</div> <div>Department of Mechanical Engineering</div> <div>H.V.A.C. Engineering</div>	<div></div>	<div>Designed AND DRAWN By: Mutaz Dweik</div> <div>Supervisor: Dr. KAZEM OSAILY</div>	<div>Project Name:</div> <div>Mechanical Systems for Headquarters Charities building in Hebron</div>	<div>Drawing Title:</div> <div>Mechanical Details</div>	<div>Notes:</div> <div>All dimensions are in Meters Unless otherwise shown. All spot levels are in Meters.</div> <div> Hollow blockwork.  Reinforced concrete column/wall.  Plain concrete walls.</div>	<div> 955.00m SL +0.00m</div> <div></div>
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ESK Model	Max. Flow (gpm)	Structure ID (in)	Sump Depth(in)	Inlet Min Cover Depth(in)	Outlet Min Cover Depth(in)	Outlet Pipe OD Dia(in)	Total Volume(gal)	Oil Storage Volume(Gal)
1.5	24	48	32	19	20	6	251	72
3	48	48	32	19	20	6	251	72
6	95	48	32	19	20	6	251	72
10	159	48	32	19	20	6	251	72
15	238	48	38	24	25	8	298	133
20	317	48	38	24	25	8	298	133
30	476	60	48	26	27	12	588	269
40	634	60	48	26	27	12	588	269
50	793	72	68	25	26	12	1199	426
65	1030	72	68	25	26	12	1199	426
80	1268	72	68	25	26	12	1199	426
100	1585	96	68	25	26	12	2131	758
110	1744	96	78	36	37	16	2444	988
120	1902	96	78	36	37	16	2444	988
130	2061	96	78	36	37	16	2444	988
140	2219	96	78	36	37	16	2444	988
150	2378	96	78	36	37	16	2444	988
160	2536	96	78	36	37	16	2444	988
170	2695	96	78	36	37	16	2444	988
180	2853	96	78	36	37	16	2444	988
190	3012	96	78	36	37	16	2444	988
200	3170	96	78	36	37	16	2444	988
225	3566	120	88	37	38	20	4308	2144
250	3963	120	88	37	38	20	4308	2144
275	4359	120	88	37	38	20	4308	2144
300	4755	120	88	37	38	20	4308	2144

STORM WATER TANKS