

مركز البحوث والدراسات



Palestine Polytechnic University  
College of Engineering & Technology  
Mechanical Engineering Department

HVAC Engineering

Project Title:

Design of mechanical system for the bank Palestine - Asira office

Prepared by:

Tariq Ziad Hamadneh

Supervisor :

Eng. Mohammad Awad

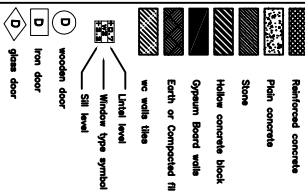
Jan 2016

Notes:

- DIMENSIONS ARE TO BE READ NOT MEASURED.
- ALL DIMENSIONS IN M
- ALL LEVELS ARE IN M
- LEVELS MUST BE CHECKED AND VERIFIED PRIOR TO CONSTRUCTION.

Legend:

SYMBOLS:



ABBREVIATIONS:

- \*F.L. First floor level
- \*S.D. Steel Door
- \*M.S. Metal Sheet
- \*A.S. Aluminium sash window
- \*V.V. Vertical
- \*H.V. Horizontal
- \*S.C. Section
- \*E. Equal
- \*E.S. Equal
- \*T.D. Timber Door
- \*G.A.V. Galvanized
- \*D. Diameter

Palestine Polytechnic University

Mechanical Eng. Department

Ref. And Air cond. Engineering

Graduation Project

Project name:

Mechanical services for residual building

GROUND FLOOR

DESIGNER :

TARIQ ZIAD HAMADNEH

DRAWN :

BANK OF PALESTINE

Drawing Title :

Cover page

Supervisor :

Eng. Mohammad awad

Graduation Project

DATE: DEC 2015 Sheet No

SCALE: NTS

**ABBREVIATIONS :**

ABBR.	DESIGNATION	ABBR.	DESIGNATION	ABBR.	DESIGNATION
AHU	AIR HANDLING UNIT	HMS	HOT WATER SUPPLY	RPK	REVOLUTION PER MINUTE
B	BOLTER	HW/R	HOT WATER RETURN	RW	RAIN WATER
BSP	BLACK STEEL PIPE	IL	INNER LEVEL	RWD	RAIN WATER DRAIN
C	DEGREE CENTIGRADE	KPa	KILOPASCALS	RWP	RAIN WATER PIPE
CH	CHILLER	KW	KILOWATT	SA	SOUND ATTENUATOR
CHT	CHILLED/HEATING WATER	L	LITER	T	TEMPERATURE
CHW	CHILLED WATER	LL	LOW LEVEL	TH	THERMOSTAT
CND	CONDENSATE	L/S	LITER PER SECOND	Thb	DRY BULB TEMPERATURE
CCO	CEILING CLEAN OUT OPENING	M/S	METER PER SECOND	Typ	WET BULB TEMPERATURE
CO	CLEAN OUT OPENING	MERCH.	MECHANICAL	T.L.	TOP LEVEL
CMS	COLD WATER	MH	MANHOLE	TYP	TYPICAL
CXT	CLOSED EXPANSION TANK	NO.	NUMBER	U	HEAT TRANSFER COEFFICIENT
DG	DOOR GRILL	NTS	NOT TO SCALE	UG	UNDER GROUND
DG	DOOR DISTRIBUTION	P	PRESSURE / PUMP	UPVC	UNPLASTICIZED PVC
Dp	DRAIN PIPE	PG	PRESSURE GAUGE	VD	VOLUME DAMPER
Dp	DRAIN PIPE	PVC	CROSS LINKED POLYETHYLENE	VP	VENT PIPE
EG	EXHAUST GRILL	QTY	QUANTITY	W	WATT
FCU	FAN COOL UNIT	RG	RETURN AIR GRILLE	W	FLOOR GRILL OR OTHER IN MODEL
FD	FLOOR DRAIN	RH	RELATIVE HUMIDITY		

**LIST OF DRAWINGS:-**

DWG. NO.	DESCRIPTION	SCALE
M001	LIST OF DRAWINGS, LEGEND, ABB	NTS
M002	SITE PLAN	1/250
M003	Master Plan	1/100
M004	GROUND FLOOR - Drain	1/100
M005	Ground Floor - water	1/100
M006	Slope Layout	1/100
M007	Roof Layout	1/100
M008	GROUND FLOOR - FIRE FIGHTING	1/100
M009	In door Unit - VRF	1/100
M010	Ground Floor - Ventilation	NTS
M011	DETAILS	NTS

**LEGEND :**

Number	SYMBOL	DESIGNATION	Number	SYMBOL	DESIGNATION
1		COLD WATER SUPPLY	16		CLEAN OUT
2		HOT WATER SUPPLY	17		ROOF & BALCONY DRAIN
3		Collector and cold water	18		FLOOR DRAIN JUNCTION BOX
4		Radded	19		Hot water tank cylindrical
5		Valve	20		Laundry
6		Water tank	21		Bedded
7		pump	22		Brackets
8		Water meter	23		CAPPED GAS PIPE INSURED WITH PVC PIPE
9		G.S.P	24		Solar heater
10		water closet	25		Zodiace
11		Manhole	26		Insulating outdoor
12		4kg system fire extinguisher	27		GAS CABINET
13		ROOF & BALCONY DRAIN	28		SPLIT INDOOR UNIT
14		pipe ventilation 4	29		SPLIT OUTDOOR UNIT
15		FLOOR DRAIN	30		EXHAUST FAN

NOTES:

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**Legend:**

**SYMBOLS:**

- Reinforced concrete
- Plain concrete
- Stone
- Hollow concrete block
- Openwork board with Earth or compacted fill
- we walls tiles
- Lintel level
- Window type symbol
- sill level
- wooden door
- iron door
- glass door

**ABBREVIATIONS:**

- \*F.L. Finish floor level
- \*S.D. Section
- \*E. Equal
- \*TD. Timber Door
- \*G.W. Glass Window
- \*W. Wood window
- \*S.G. Steel grill level
- \*C.W. Cement
- \*D.W. Ductile Welded

Palestine Polytechnic University  
Mechanical Eng. Department

Ref. and Air cond. Engineering  
Graduation Project

Project name:  
Mechanical services for residual building

**GROUND FLOOR**

DESIGNER :  
**TARIQ ZIAD HAMADNEH**

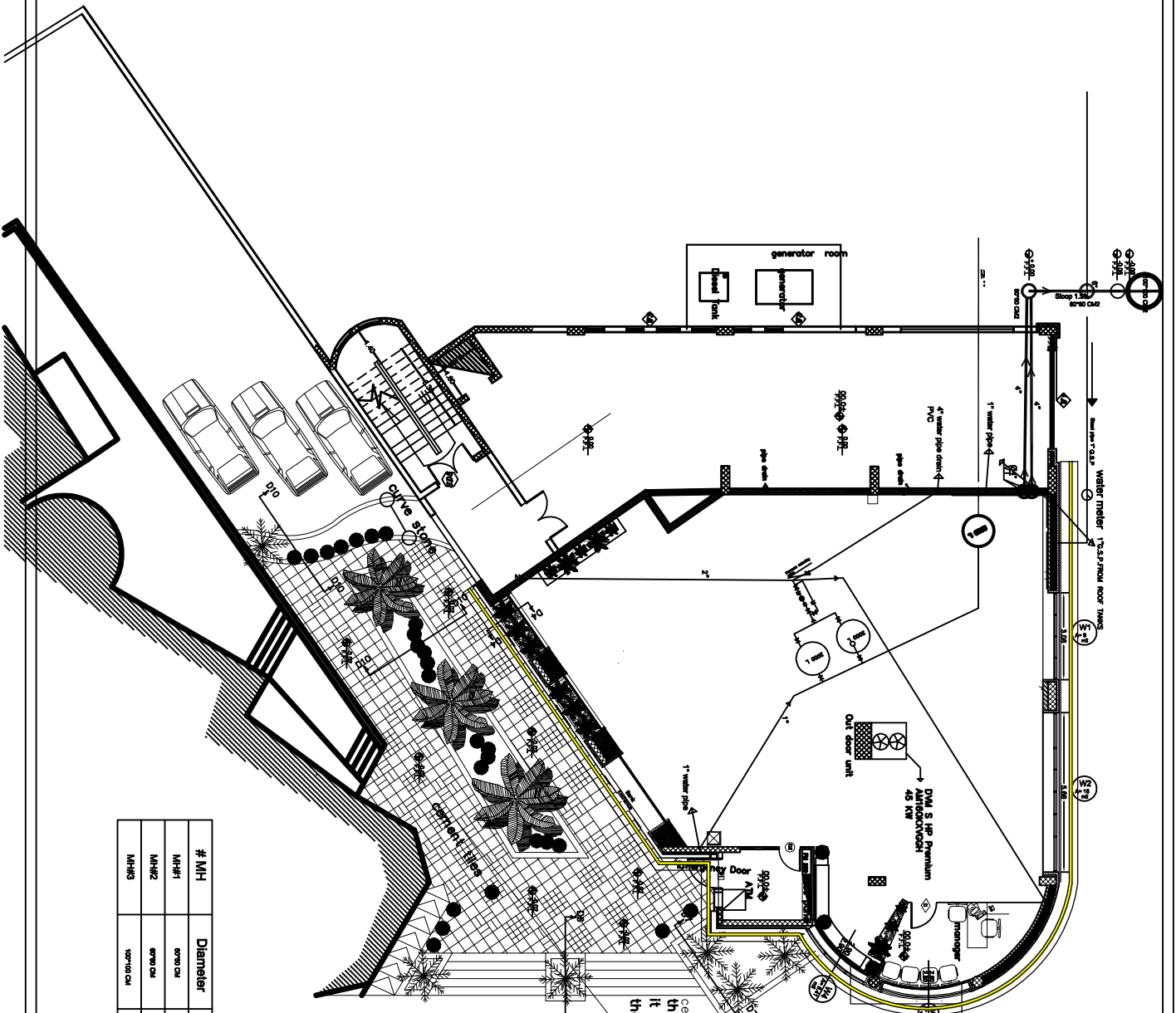
DRAWN :  
**BANK OF PALESTINE**

Drawing Title :  
**GENERAL Details**

Supervisor :  
Eng: Mohamad awad

Graduation Project  
DATE: DEC 2015  
SCALE: NTS

Sheet No  
**M001**



cement tiles ( yellow color )  
 this road will closed  
 it will designed as a pedestrian area for the bank  
 the other side of the street will be as a cat station for

# MH	Diameter	Invert level	Depth	Outlet	Type
MH#1	800 cu	-80 cm	-80 cm	-86 cm	REGULAR
MH#2	800 cu	-84 cm	-88 cm	-84 cm	REGULAR
MH#3	1000 cu	-87.18 cm	-72.18 cm	-87.18 cm	REGULAR

**Notes:**  
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**Legend:**  
 \* SYMBOLS:

- Reinforced concrete
- Plain concrete
- Stone
- Half concrete block
- Gypsum Board walls
- Earth or Compacted fill
- we walls tiles
- Level level
- Window type symbol
- Sill level
- wooden door
- iron door
- glass door

**ABBREVIATIONS:**  
 \* F.F.L. Finish floor level \* SD Steel Door  
 \* C.L. Concrete level \* AW Aluminum window  
 \* S.C. Sill level \* T.C Tempered glass  
 \* E Equal  
 \* 10 Aluminum Door \* SS Stainless steel  
 \* 10 Threshold Door \* O.V.U. Overhead

Mechanical Eng. Department  
 Ref And Air cond.Engineering  
 Graduation Project

Project name:  
 Mechanical services for  
 residual building

**GROUND FLOOR**

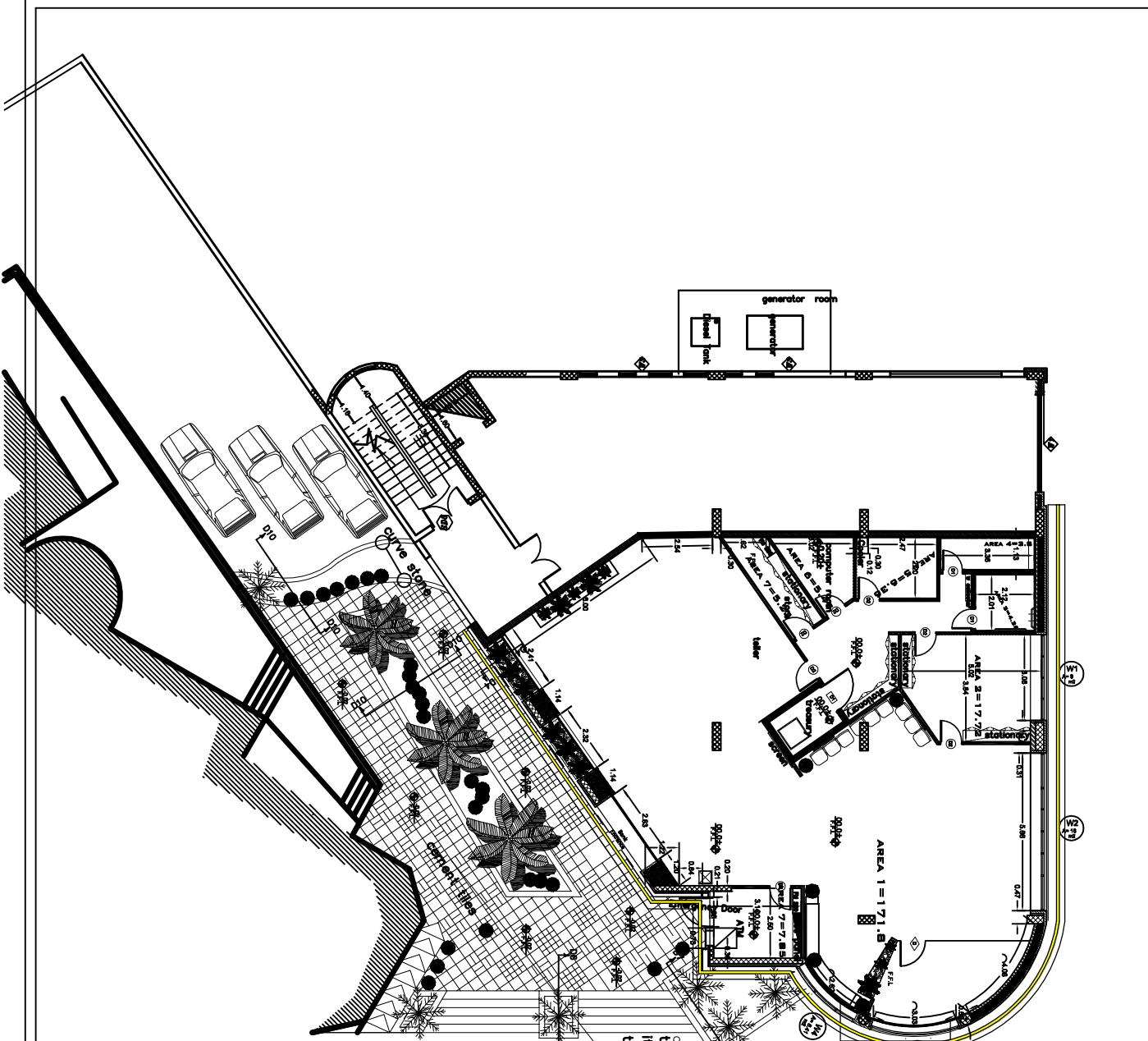
DESIGNER :  
 TARIQ ZIAD HAMADNEH

OWNER :  
 BANK OF PALESTINE

Drawing Title :  
 Site Plan

Supervisor :  
 Eng. Mohamed Awad

Graduation Project  
 DATE: DEC 2016 Sheet No  
 SCALE: NTS M002



cement tiles ( yellow color )  
 this road will closed  
 it will designed as a pedestrian area for the bank  
 the other side of the street will be as a cat station for

**Notes:**  
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 - ALL DIMENSIONS ARE IN M.  
 - DIMENSIONS MUST BE CHECKED AND VERIFIED PRIOR TO CONSTRUCTION.

**Legend:**

- SYMBOLS:**  
 Reinforced concrete  
 Plain concrete  
 Stone  
 Hollow concrete block  
 Gypsum Board walls  
 Earth or Compacted fill  
 wet walls tiles  
 Level level  
 Window type symbol  
 Sill level  
 wooden door  
 iron door  
 glass door

**ABBREVIATIONS:**  
 \* F.F.L. Finish floor level \* SD Steel Door  
 \* C.L. Concrete level \* MW Aluminium window  
 \* S.C. Section \* TO Tempered glass  
 \* E Equal \* SD Steel grill  
 \* AD Aluminium Door \* SS Stainless steel  
 \* TD Timber Door \* O.M.U. Overhead

Mechanical Eng. Department  
 Bel'And Air cond.Engineering  
 Graduation Project

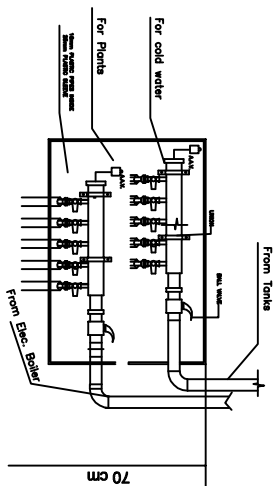
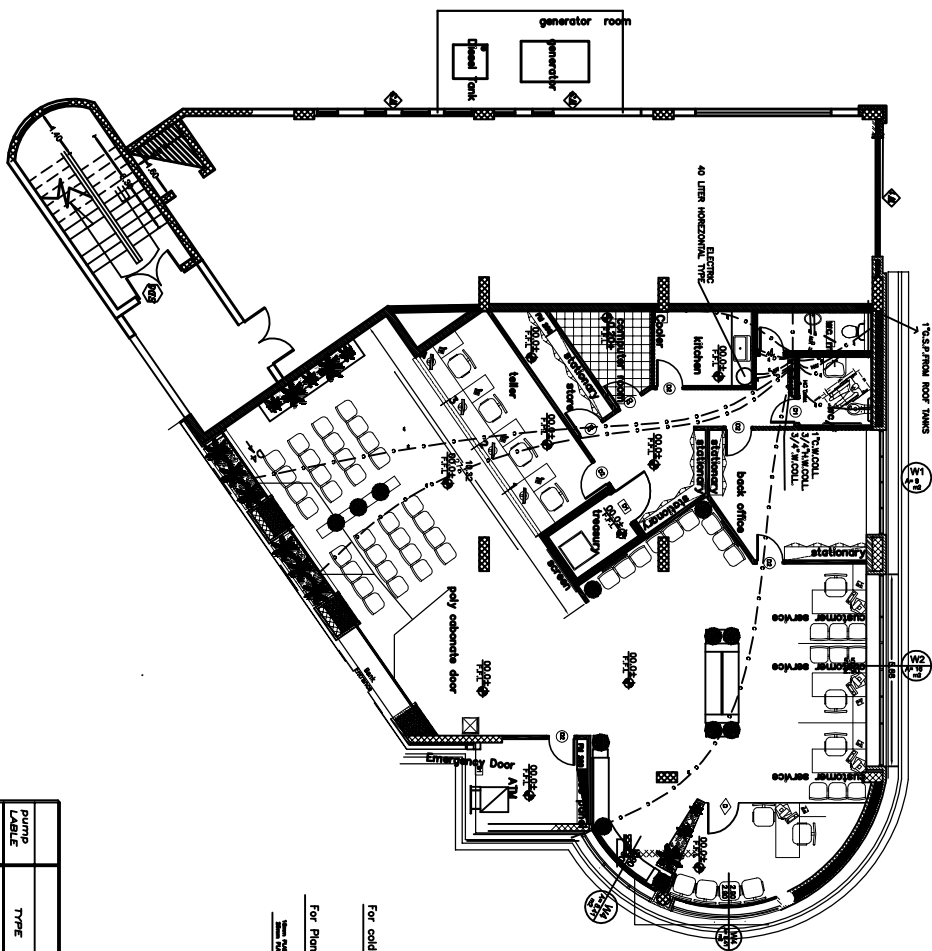
Project name:  
 Mechanical services for  
 residual building

**GROUND FLOOR**  
 DESIGNER :  
**TARIQ ZIAD HAMADNEH**  
 OWNER :  
**BANK OF PALESTINE**  
 Drawing Title :  
**Master Plan**

Supervisor :  
 Eng: Mohamed awad

Graduation Project  
 DATE: DEC 2015 Sheet No  
 SCALE: NTS **M003**





PUMPS SCHEDULE			
PUMP LABEL	TYPE	SERVED AREA (m <sup>2</sup> /h)	HEAD (m)
P-1	PRESSURIZED PUMP	4	21
			5.5

ELECTRIC BOILER SCHEDULE			
Exec. Boil LABEL	TYPE	SERVED AREA (m <sup>2</sup> )	CAPACITY (L)
E.B.1	HORIZONTAL TYPE	40	2800

**Notes:**

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- ALL LEVELS ARE IN M.
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**Legend:**

**SYMBOLS:**

- Reinforced concrete
- Plain concrete
- Stone
- Half concrete block
- Gypsum Board wall
- Earth or Compacted fill
- we walls tiles
- Level level
- Window type symbol
- Sill level
- wooden door
- iron door
- glass door

**ABBREVIATIONS:**

- \* F.F.L. Finish floor level
- \* S.D. Steel Door
- \* C.I.L. Concrete level
- \* A.M. Aluminium window
- \* S.S.C. Section
- \* T.O. Tempered glass
- \* E. Equal
- \* S.D. Steel grill
- \* A.D. Aluminium Door
- \* S.S. Stainless steel
- \* T.D. Timber Door
- \* O.V.U. Overhead

Mechanical Eng. Department  
 Ref And Air cond.Engineering  
 Graduation Project

Project name:  
 Mechanical services for  
 residual building

**GROUND FLOOR**

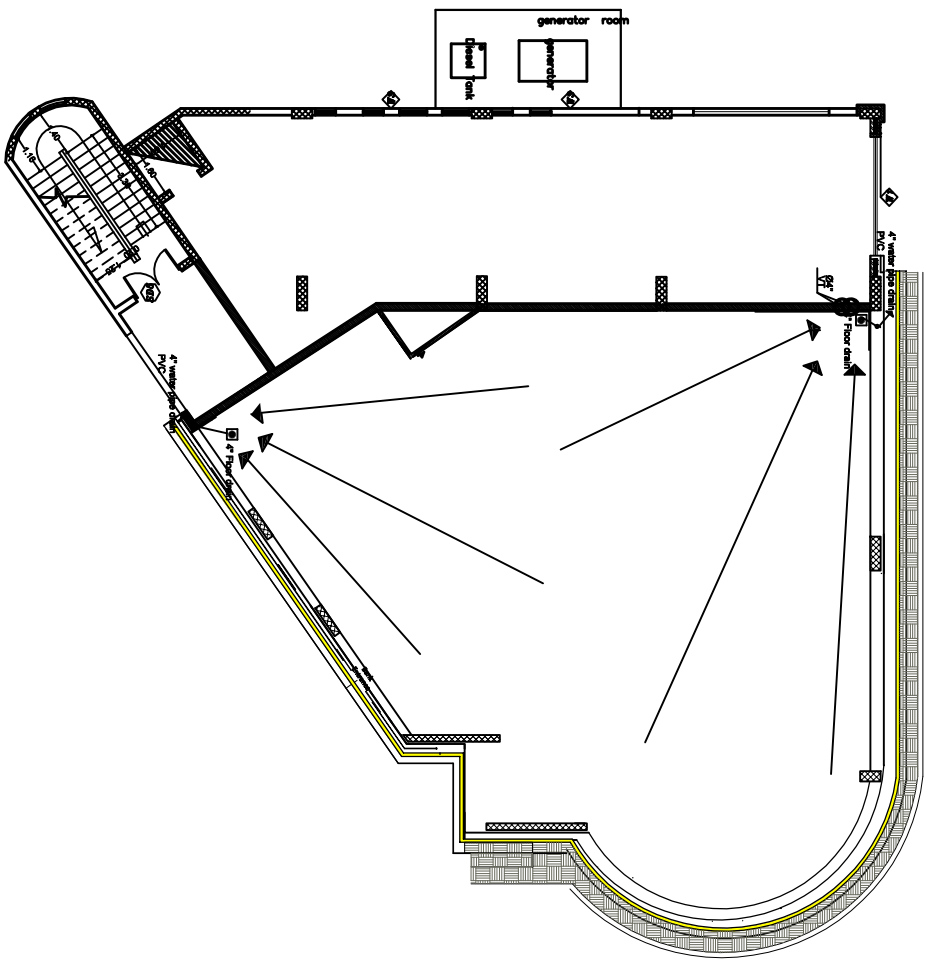
DESIGNER :  
**TARIQ ZIAD HAMADNEH**

OWNER :  
**BANK OF PALESTINE**

Drawing Title :  
**Ground Floor - Water**

Supervisor :  
 Eng. Mohamed awad

Graduation Project  
 DATE: DEC 2015 Sheet No  
 SCALE: NTS **M005**



**Notes:**

- DIMENSIONS ARE TO BE READ NOT MEASURED.
- ALL DIMENSIONS ARE IN METERS.
- ALL LEVELS ARE IN M.
- WORK IS NOT BE ORDERED AND VERIFIED PRIOR TO CONSTRUCTION.

**Legend:**

**SYMBOLS:**

- Reinforced concrete
- Plain concrete
- Stone
- Half concrete block
- Gypsum Board walls
- Earth or Compacted fill
- no walls tiles
- Level level
- Window type symbol
- Sill level
- wooden door
- iron door
- glass door

**ABBREVIATIONS:**

- \* F.F.L. Finish floor level \* SD Steel Door
- \* C.L. Concrete level \* MW Aluminium window
- \* S.C. Section
- \* T.O. Turned glass
- \* E. Equal
- \* SD Steel grill
- \* AD Aluminium Door \* SS Stainless steel
- \* TD Timber Door \* O.V.L. Overhead

Palestine Polytechnic University  
 Mechanical Eng. Department  
 Ref And Air cond.Engineering  
 Graduation Project

**Project name:**  
 Mechanical services for residual building

**GROUND FLOOR**

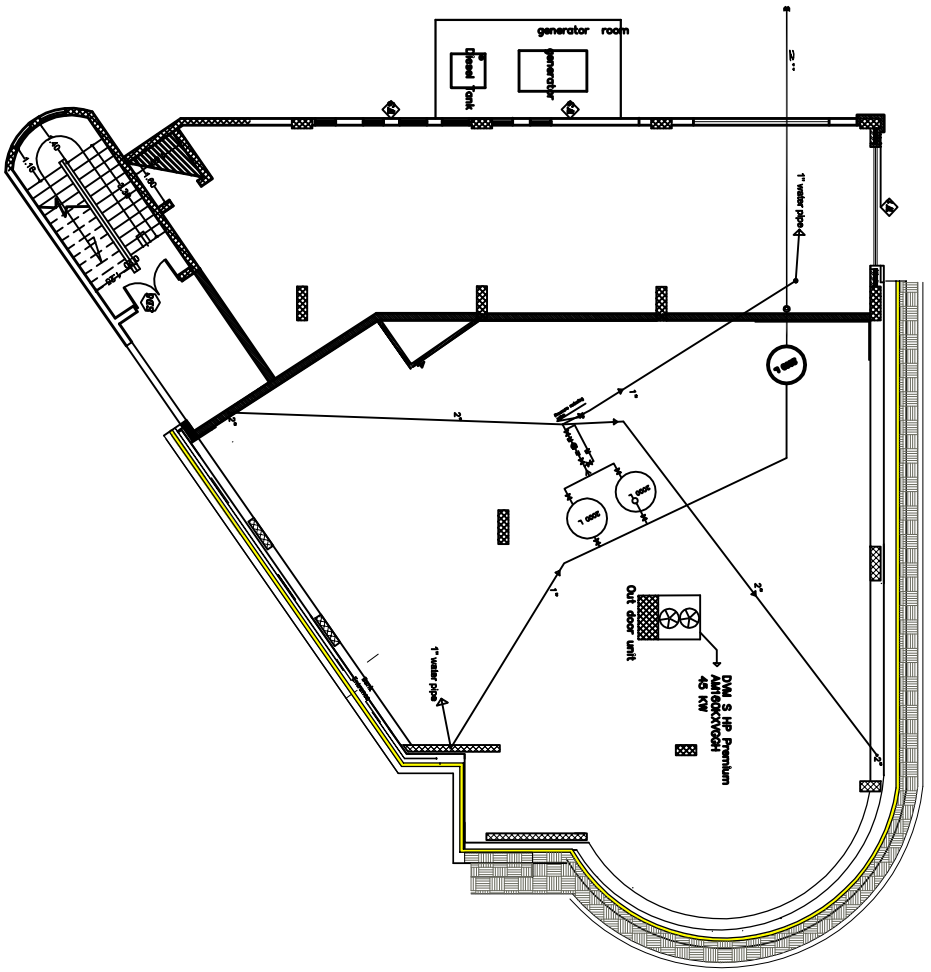
**DESIGNER :**  
 TARIQ ZIAD HAMADNEH

**OWNER :**  
 BANK OF PALESTINE

**Drawing Title :**  
 Slope Layout

**Supervisor :**  
 Eng: Mohamed awad

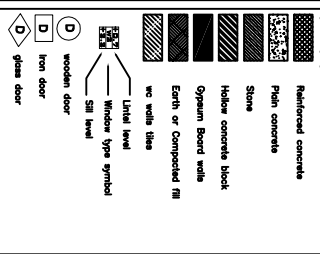
**Graduation Project**  
 DATE: DEC 2015 Sheet No  
 SCALE: NTS M006



**Notes:**

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**Legend:**



**ABBREVIATIONS:**

- \* F.F.L. Finish floor level
- \* SD Steel Door
- \* C.L. Concrete level
- \* MW Aluminium window
- \* S.C. Section
- \* TO Tempered glass
- \* E Equal
- \* SD Steel grill
- \* AD Aluminium Door
- \* SS Stainless steel
- \* TD Timber Door
- \* O.V.U. Overhead

Palestine Polytechnic University  
 Mechanical Eng. Department  
 Ref And Air cond.Engineering  
 Graduation Project

**Project name:**  
 Mechanical services for residual building

**GROUND FLOOR**

**DESIGNER :**  
 TARIQ ZIAD HAMADNEH

**OWNER :**  
 BANK OF PALESTINE

**Drawing Title :**  
 Roof Layout

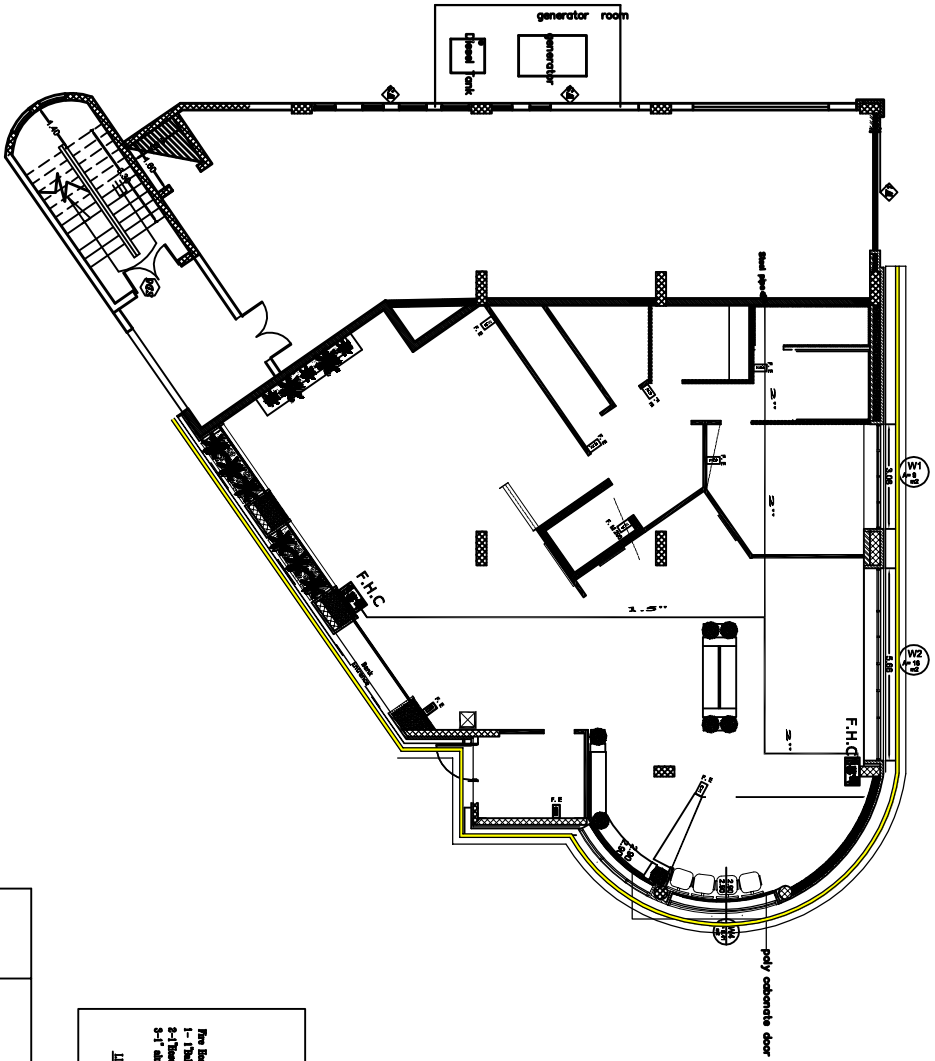
**Supervisor :**  
 Eng: Mohamed awad

**Graduation Project**

**DATE:** DEC 2016 **Sheet No**

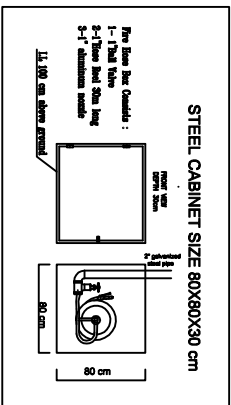
**SCALE:** NTS **M007**





PUMPS SCHEDULE					
PUMP LABEL	TYPE	SERVED AREA (m <sup>2</sup> )	FLOW (L/m <sup>3</sup> )	HEAD (m)	MOTOR DATA
P.P	PRESSURIZED PUMP	ROOF TOP FEEDING PK	22.3	55	1.1 220 1 50 1

SYMBOL	NAME
	Hand Fire Extinguisher
	Fire Hose Cabinet



- Notes:**
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  - ALL LENGTHS ARE IN M.
  - WORKS MUST BE ORDERED AND VERIFIED PRIOR TO CONSTRUCTION.

**Legend:**

SYMBOLS:	DESCRIPTION:
	Reinforced concrete
	Plain concrete
	Stone
	Hollow concrete block
	Gypsum Board wall
	Earth or Compacted fill
	wall tiles
	Level level
	Window type symbol
	Sill level
	wooden door
	iron door
	glass door

**ABBREVIATIONS:**

- \* F.F.L. Finish floor level
  - \* S.D. Steel Door
  - \* C.C.L. Concrete level
  - \* A.W. Aluminium window
  - \* S.C.C. Section
  - \* T.C. Tempered glass
  - \* E. Equal
  - \* S.D. Steel grill
  - \* A.D. Aluminium Door
  - \* S.S. Stainless steel
  - \* T.D. Timber Door
  - \* O.W.V. Opened
- Palestine Polytechnic University  
 Mechanical Eng. Department  
 Ref And Air cond.Engineering  
 Graduation Project

**Project name:**  
 Mechanical services for residual building

**GROUND FLOOR**

**DESIGNER :**  
 TARIQ ZIAD HAMADNEH

**OWNER :**  
 BANK OF PALESTINE

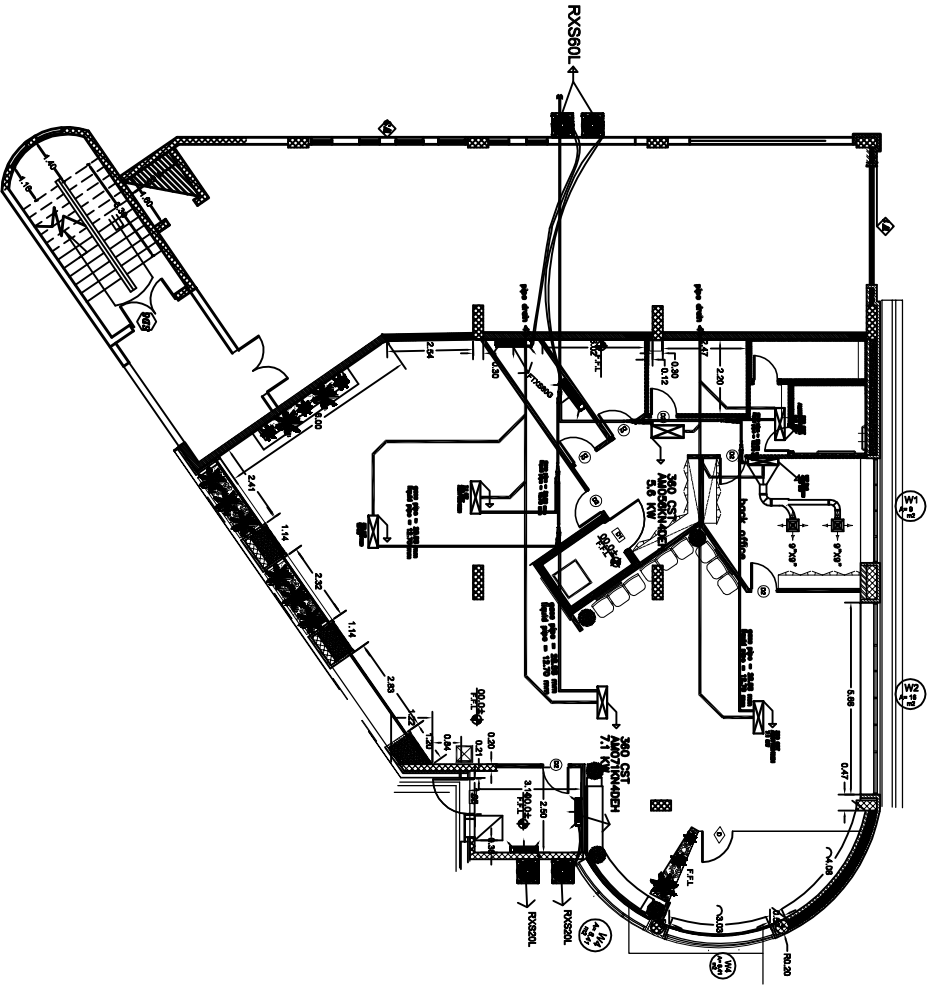
**Drawing Title :**  
 Fire Fighting

**Supervisor :**  
 Eng: Mohamed awad

**Graduation Project**

**DATE:** DEC 2015 **Sheet No**

**SCALE:** NTS **M008**



**SPLIT UNITS SCHEDULE**

INDOOR UNIT NO.	INDOOR UNIT TYPE	AIR FLOW (m <sup>3</sup> /min)	COOLING CAPACITY (kW)	HEATING CAPACITY (kW)	ELECTRICAL DATA (VOLT)	WTZ	#	QTY
<b>GROUND FLOOR</b>								
SFO1	WALL MOUNTED	16	5.90	0.65	4.80	220	50	2
SFO2	WALL MOUNTED	8	2.33	0.328	2.5	220	50	2

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**Legend:**

**SYMBOLS:**

- Reinforced concrete
- Plain concrete
- Stone
- Half concrete block
- Gypsum Board wall
- Earth or Compacted fill
- we walls tiles
- Level level
- Window type symbol
- Sill level
- wooden door
- iron door
- glass door

**ABBREVIATIONS:**

- \* F.F.L. Finish floor level
- \* SD Steel Door
- \* C.L. Concrete level
- \* MW Aluminium window
- \* S.C. Sill
- \* SSC Sill
- \* T.T. Tempered glass
- \* E Equal
- \* SD Steel grill
- \* AD Aluminium Door
- \* SS Stainless steel
- \* TD Timber Door
- \* O.V.U. Overhead

Palestine Polytechnic University  
 Mechanical Eng. Department  
 Ref And Air cond.Engineering  
**Graduation Project**

**Project name:**  
 Mechanical services for residual building

**GROUND FLOOR**

**DESIGNER :**  
 TARIQ ZIAD HAMADNEH

**OWNER :**  
 BANK OF PALESTINE

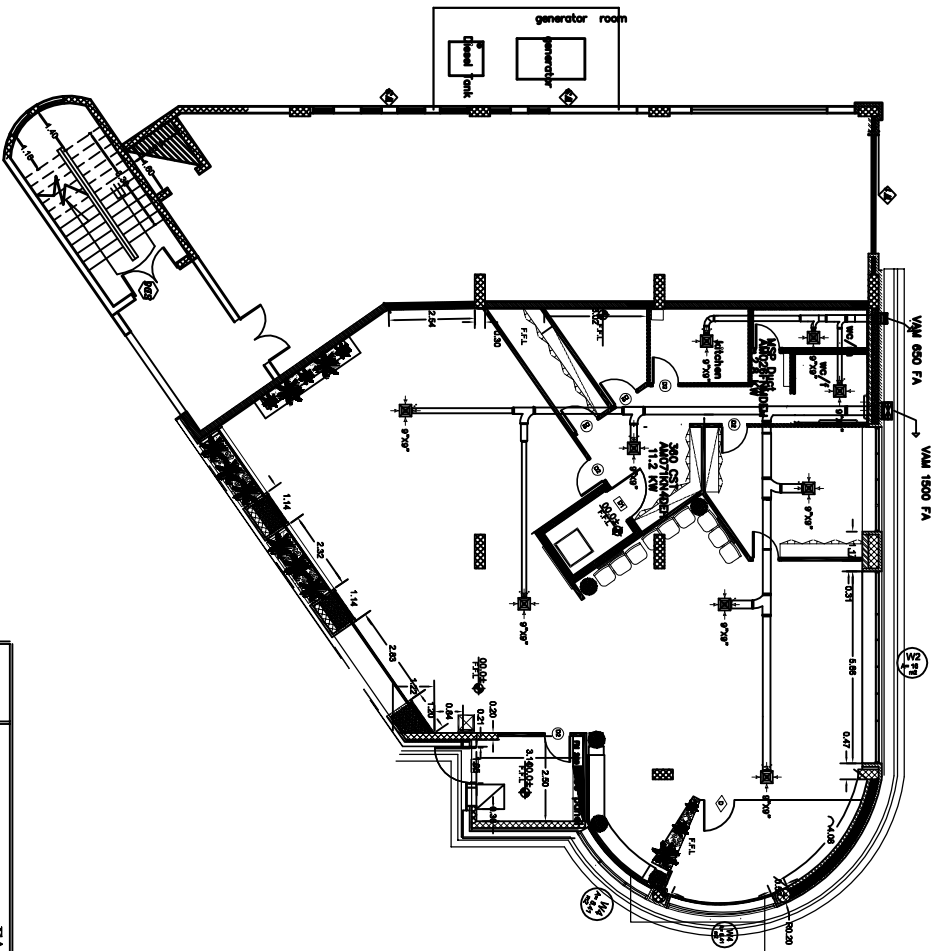
**Drawing Title :**  
 In door Unit - VRF

**Supervisor :**  
 Eng. Mohamed awad

**Graduation Project**

**DATE:** DEC 2015 **Sheet No**

**SCALE:** NTS **M009**



FANS SCHEDULE

FAN LABEL	TYPE	SERVED AREA	FLOW (CFM)	HEAD (IN)	W	MOTOR DATA	VOLTS	#
FAN-1	INLINE FAN	TOILET/KITCHEN	350	0.40	30	220	1	50
FAN-2	INLINE FAN	Customer service GROUND FLOOR	2000	0.80	15	220	1	50

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Legend:

**SYMBOLS:**

- Reinforced concrete
- Plain concrete
- Stone
- Half concrete block
- Gypsum Board walls
- Earth or Compacted fill
- vc walls tiles
- Label level
- Window type symbol
- Sill level
- wooden door
- iron door
- glass door

**ABBREVIATIONS:**

- F.F.L. Finish floor level
- SD Slab Door
- C.L. Concrete level
- NW Aluminium window
- SWC Section
- TO Tempered glass
- E Equal
- SD Slab grill
- AD Aluminium Door
- SS Stainless steel
- TD Timber Door
- ONLY/COMPANED

Palestine Polytechnic University  
 Mechanical Eng. Department  
 Ref And Air cond.Engineering  
 Graduation Project

Project name:  
 Mechanical services for residual building

**GROUND FLOOR**

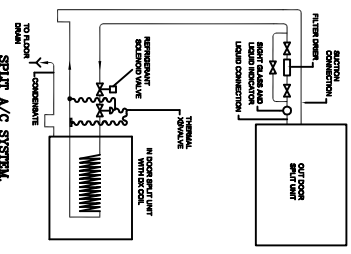
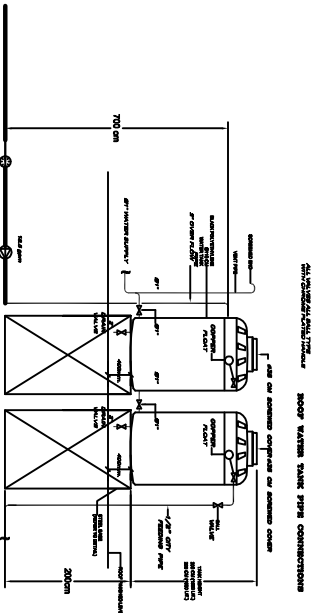
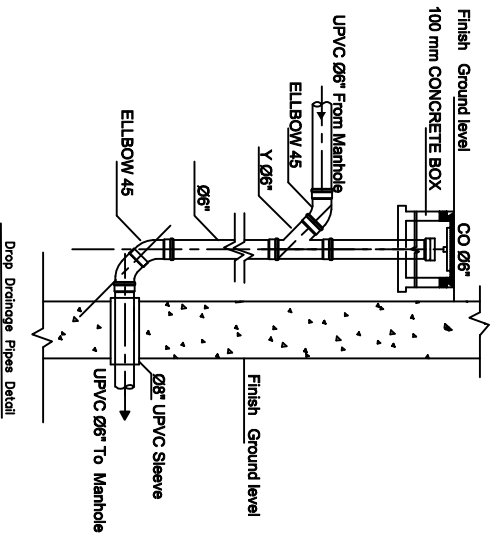
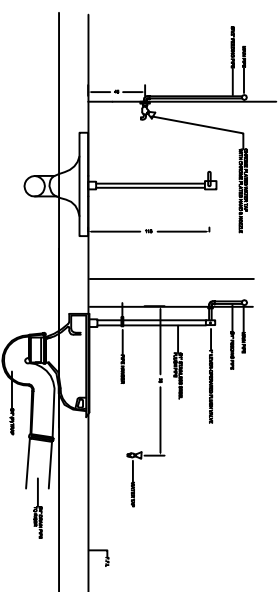
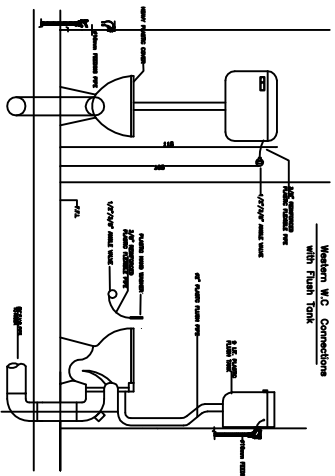
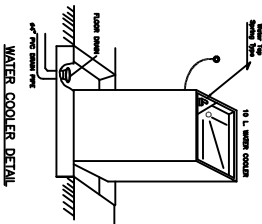
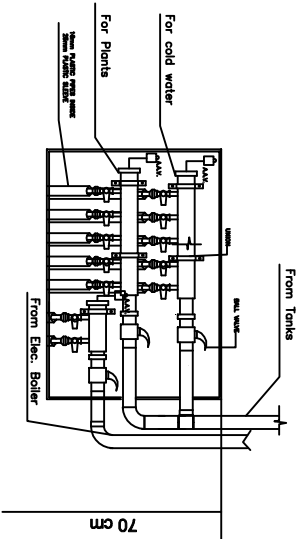
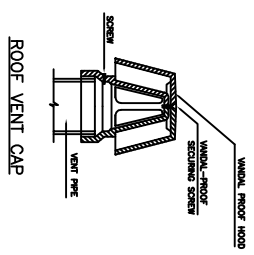
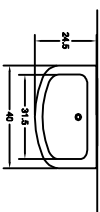
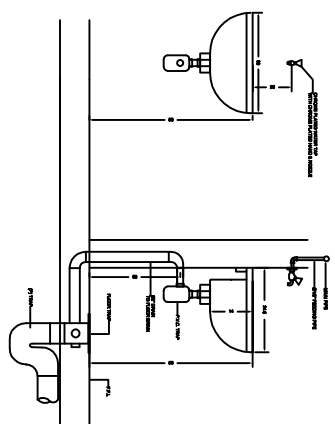
DESIGNER :  
 TARIQ ZIAD HAMADNEH

OWNER :  
 BANK OF PALESTINE

Drawing Title :  
 Ground Floor - Ventilation

Supervisor :  
 Eng. Mohamed awad

Graduation Project  
 DATE: DEC 2015 Sheet No  
 SCALE: NTS M010



**Notes:**  
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 \* ALL LEADS ARE IN M.  
 \* UNLESS NOTED OTHERWISE, ALL WORK IS TO BE DONE IN ACCORDANCE WITH THE S.P.D.C. CODE OF PRACTICE FOR CONSTRUCTION.

**Legend:**

**SYMBOLS:**

- Reinforced concrete
- Plain concrete
- Stone
- Half concrete block
- Gypsum Board wall
- Earth or Compacted fill
- we walls tiles
- Label level
- Window type symbol
- Sill level
- wooden door
- iron door
- glass door

**ABBREVIATIONS:**

- \* F.F.L. Finish floor level
- \* SD Steel Door
- \* C.L. Concrete level
- \* MW Aluminium window
- \* S.S.C. Sill
- \* T.C. Tapered glass
- \* E Equal
- \* 40 Aluminium Door
- \* SS Stainless steel
- \* TD Timber Door
- \* O.W.L. Ombre

**Project name:**  
 Mechanical services for residual building

**GROUND FLOOR**

**DESIGNER :**  
 TARIQ ZIAD HAMADNEH

**OWNER :**  
 BANK OF PALESTINE

**Drawing Title :**  
 Details

**Supervisor :**  
 Eng. Mohamed awad

**Graduation Project**

**DATE:** DEC 2015 **Sheet No**

**SCALE:** NTS **M011**