

2-2-3 Equipment List and Basic Design Drawing

The equipment which has been planned based on the examination and analysis that described in Section 2-2-2 “Basic plan (Equipment plan)” and outline design drawings such as schematic diagram of PV system; general arrangement plan for PV system and plans for ancillary facilities are described hereinafter.

(1) Schedule of planned equipment

The schedule of planned equipment is as shown in Table 2-11 below.

Table 2-11 Schedule of planned equipment

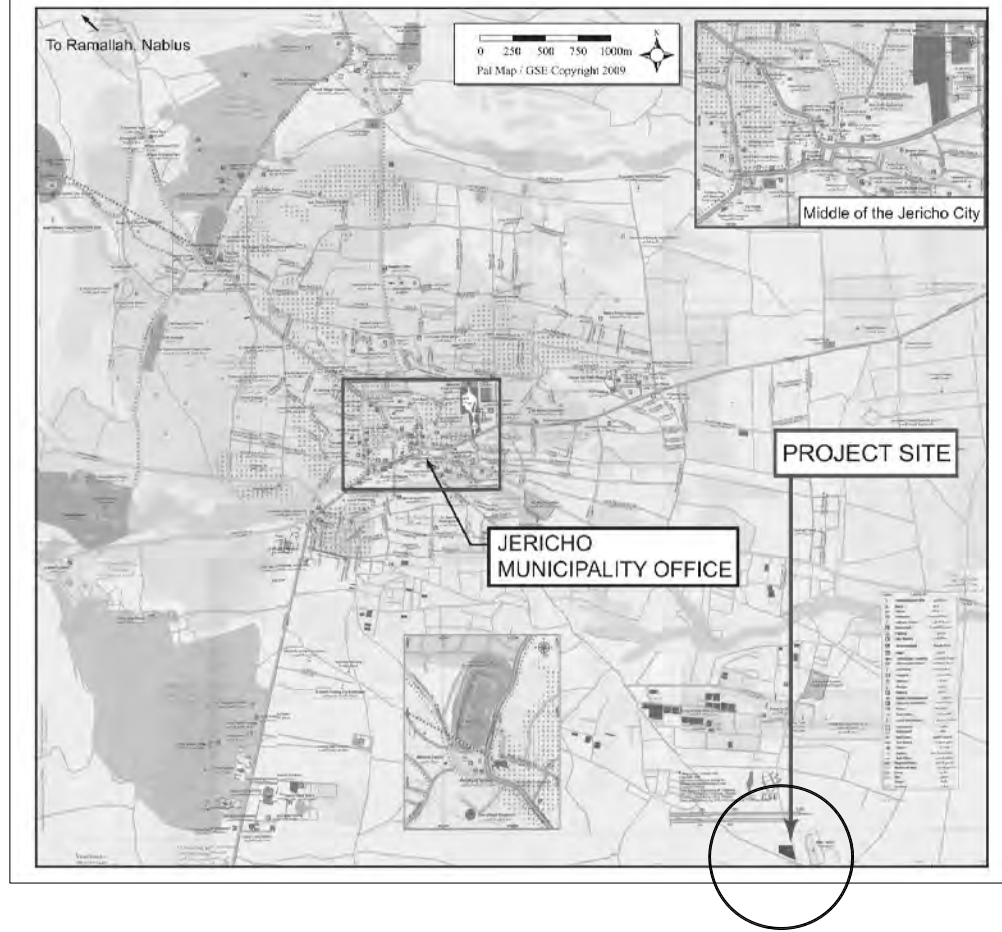
No.	Item	Specification	Quantity	Location
EQ-01	PV modules	Mono or poly-crystalline cells or thin film amorphous cells with rating capacity of 300KWp or more	1 lot	Outside
EQ-02	Supporting structures for PV modules	Hot-dipped galvanized steel frames	1 lot	Outside
EQ-03	Power conditioners	Rating capacity of 300KW or more and output voltage shall be 380V	1 lot	In Monitor Building More than two (2) units
EQ-04	Connection boxes	Devices to be installed: DC circuit breakers, etc.	1 lot	Outside
EQ-05	Collection boxes	Device to be installed: DC circuit breaker	1 lot	Outside
EQ-06	Data management and monitoring system (incl. personal computer)	<ul style="list-style-type: none"> • Personal computer • CRT (19 inch or bigger) • Data sensing instruments • Signal transmitter • UPS (more than 10 minutes capacity) • Color printer (compatible with A3 size) • Software for data monitoring • Software for display 	1 lot	In Monitor Building
EQ-07	Meteorological observation instruments	Solar radiation meter	1 No.	Outside
EQ-08		Thermometer	2 No.	Outside
EQ-09	Display	Flat panel 32 inch or bigger (Liquid crystal or PDP)	1 No.	In Monitor Building
EQ-10	Substation equipment	Including a network transformer (33KV→380V、630kVA)	1 lot	In Substation Building
EQ-11	Camera	Fixed outdoor colored camera	14 No.	Outside
EQ-12	LCD Monitor	Flat panel 21 inch or bigger (Liquid crystal)	1 No.	In Monitor Building
EQ-13	Digital Video Recorder	Digital image recorder with hard disk (600GB or more)	1 No.	In Monitor Building
EQ-14	Additional Hard Disk	Internal hard disk (2.4TB or more)	1 No.	In Monitor Building
EQ-15	Power Supply Unit	Input: AC 220V Output: AC 24V, 5 ampere and more	1 No.	In Monitor Building
EQ-16	Cabinet Rack	Indoor self standing type Dimension: 570 mm (W) x 440 mm (D) x 2000mm (H)	1No.	In Monitor Building

Source: Preparatory Survey Team

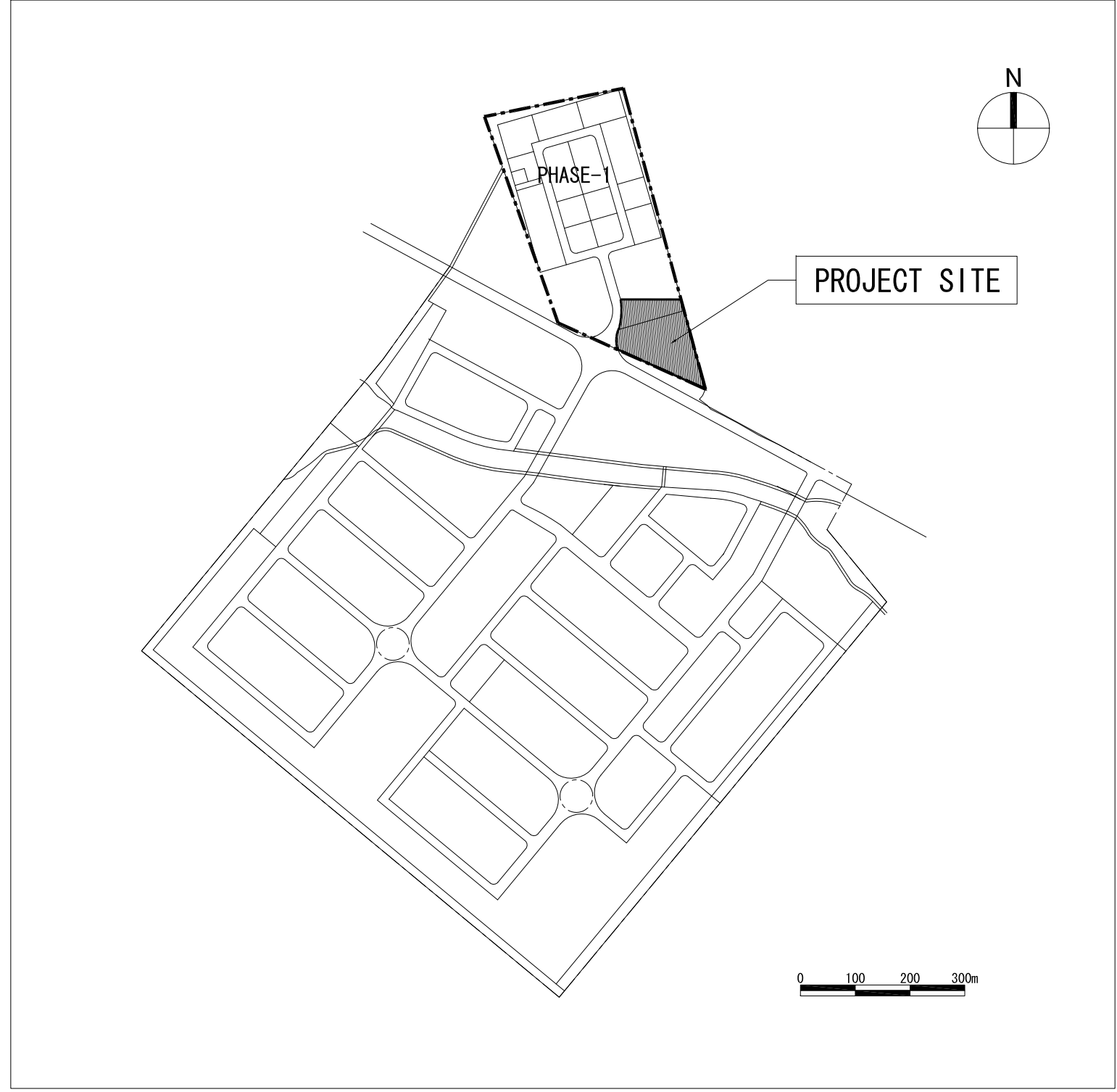
(2) Outline design drawing

See attached following outline design drawings.

PV-00	Site Map
PV-01	Equipment Schedule for PV System and General Arrangement for PV System
PV-02	Single Line Diagram for PV System
PV-03	Schematic Diagram for PV System, Compound Lighting and CCTV System
PV-04	System Block Diagram for CCTV System
PV-05	Exterior Wiring Plan for PV System
PV-06	Exterior Wiring Plan for Compound Lighting and CCTV System
A-01	Monitor Building Plan
A-02	Monitor Building Elevation/Section
A-03	Substation Building Plan
A-04	Substation Building Elevation
A-05	Substation Building Section



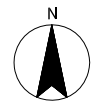
LOCATION MAP



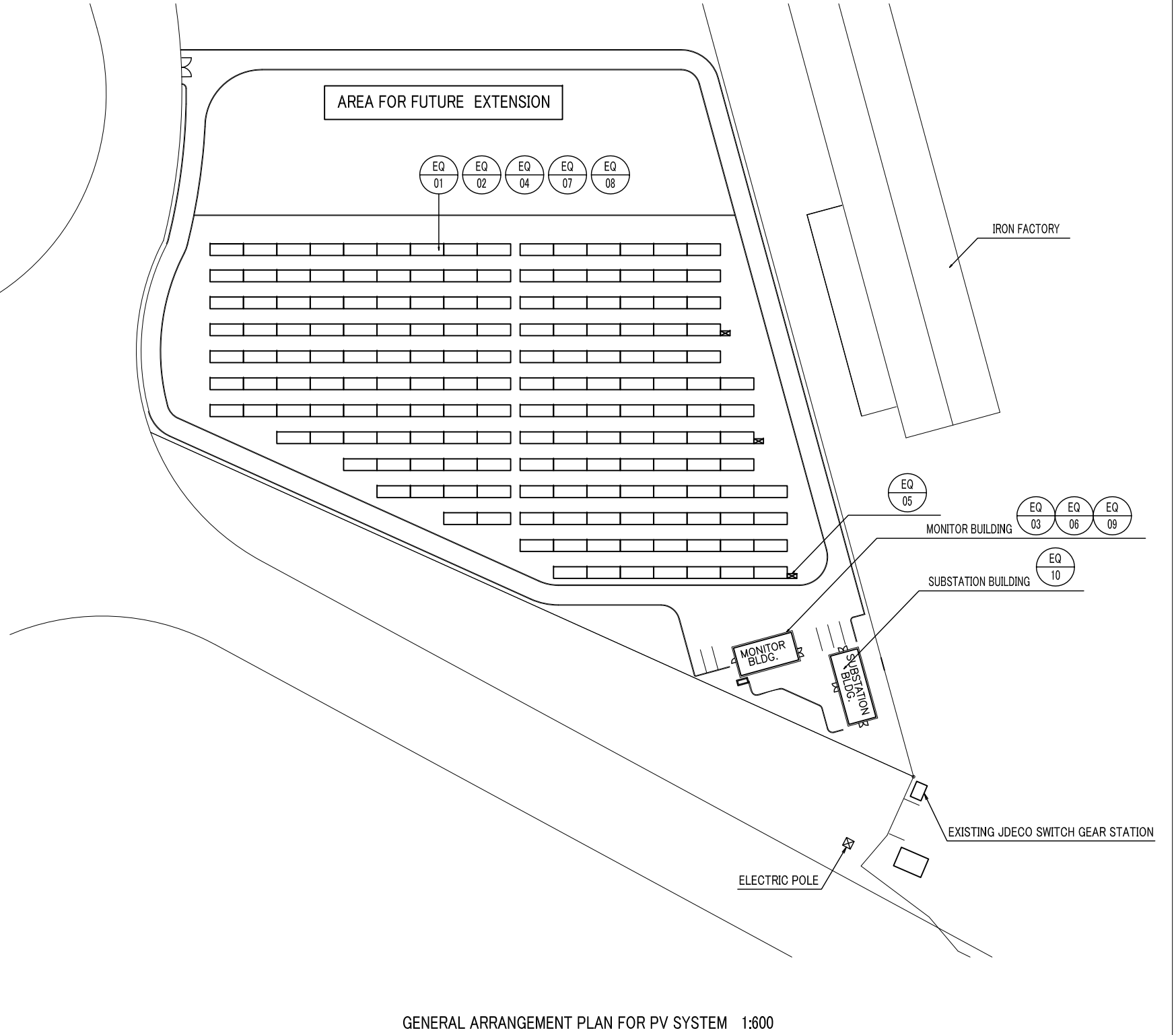
JERICHO AGRO-INDUSTRIAL PARK (PLANNING)

EQUIPMENT SCHEDULE FOR PV SYSTEM

NO.	ITEM	SPECIFICATION	QUANTITY	LOCATION
EQ-01	PVMODULES	MONO OR POLY-CRYSTALLINE CELLS OR THIN FILM AMORPHOUS CELLS WITH RATING CAPACITY OF 300KW OR MORE	1Lot	OUTSIDE
EQ-02	SUPPORTING STRUCTURES FOR PV MODULES	HOT-DIPPED GALVANIZED STEEL FRAMES	1Lot	OUTSIDE
EQ-03	POWER CONDITIONERS	RATING CAPACITY OF 300KW OR MORE AND OUTPUT VOLTAGE SHALL BE 380V RATED EFFICIENCY: 90% OR MORE AC OUTPUT POWER FACTOR: 0.95 OR MORE HARMONICS: INTEGRATION 5% OR LESS EACH DIMENSION 3% OR LESS PROTECTION DEVICES a) OVER VOLTAGE RELAY (OVR) b) UNDER VOLTAGE RELAY (UVR) c) OVER FREQUENCY RELAY (OFR) d) UNDER FREQUENCY RELAY (UFR) e) PROTECTION OF ISLANDING OPERATION PASSIVE AND ACTIVE METHOD GRADE OF PROTECTION: IP20 OR MORE	1Lot	IN MONITOR BUILDING MORE THAN TWO (2) UNITS
EQ-04	CONNECTION BOX	DEVICES TO BE CONTAINED a) CIRCUIT BREAKERS(MCCB) b) DIODE FOR REVERSE POWER PROTECTION SURGE PROTECTION c) DEVICES d) TERMINAL BLOCK GRADE OF PROTECTION: IP53 OR MORE	1Lot	OUTSIDE
EQ-05	COLLECTION BOX	DEVICES TO BE CONTAINED a) CIRCUIT BREAKERS (MCCB) GRADE OF PROTECTION: IP53 OR MORE	1Lot	OUTSIDE
EQ-06	DATA MANAGEMENT AND MONITORING SYSTEM (INCL. PERSONAL COMPUTER)	·PERSONAL COMPUTER ·CRT(19INCH OR BIGGER) ·DATA SENSING INSTRUMENTS · SIGNAL TRANSMITTER ·UPS(MORE THAN 10 MINUTES CAPACITY) · COLOR PRINTER (COMPATIBLE WITH A3 SIZE) · SOFTWARE FOR DATA MONITORING ·SOFTWARE FOR DISPLAY	1Lot	IN MONITOR BUILDING
EQ-07	METEOROLOGICAL OBSERVATION INSTRUMENTS	SOLAR RADIATION METER	1No.	OUTSIDE
EQ-08		THERMOMETER	2Nos.	OUTSIDE
EQ-09	DISPLAY	FLAT PANEL 32 INCH OR BIGGER (LIQUID CRYSTAL OR PDP)	1No.	IN MONITOR BUILDING
EQ-10	SUBSTATION EQUIPMENT	INCLUDING A NETWORK TRANSFORMER (33KV-380V, 630KVA)	1Lot	IN SUBSTATION BUILDING



JERICO AGRO-INDUSTRIAL PARK (PHASE I)



GENERAL ARRANGEMENT PLAN FOR PV SYSTEM 1:600



PROJECT TITLE
THE PROJECT FOR INTRODUCTION OF CLEAN ENERGY BY SOLAR ELECTRICITY GENERATION SYSTEM IN PALESTINE

GENERAL NOTE

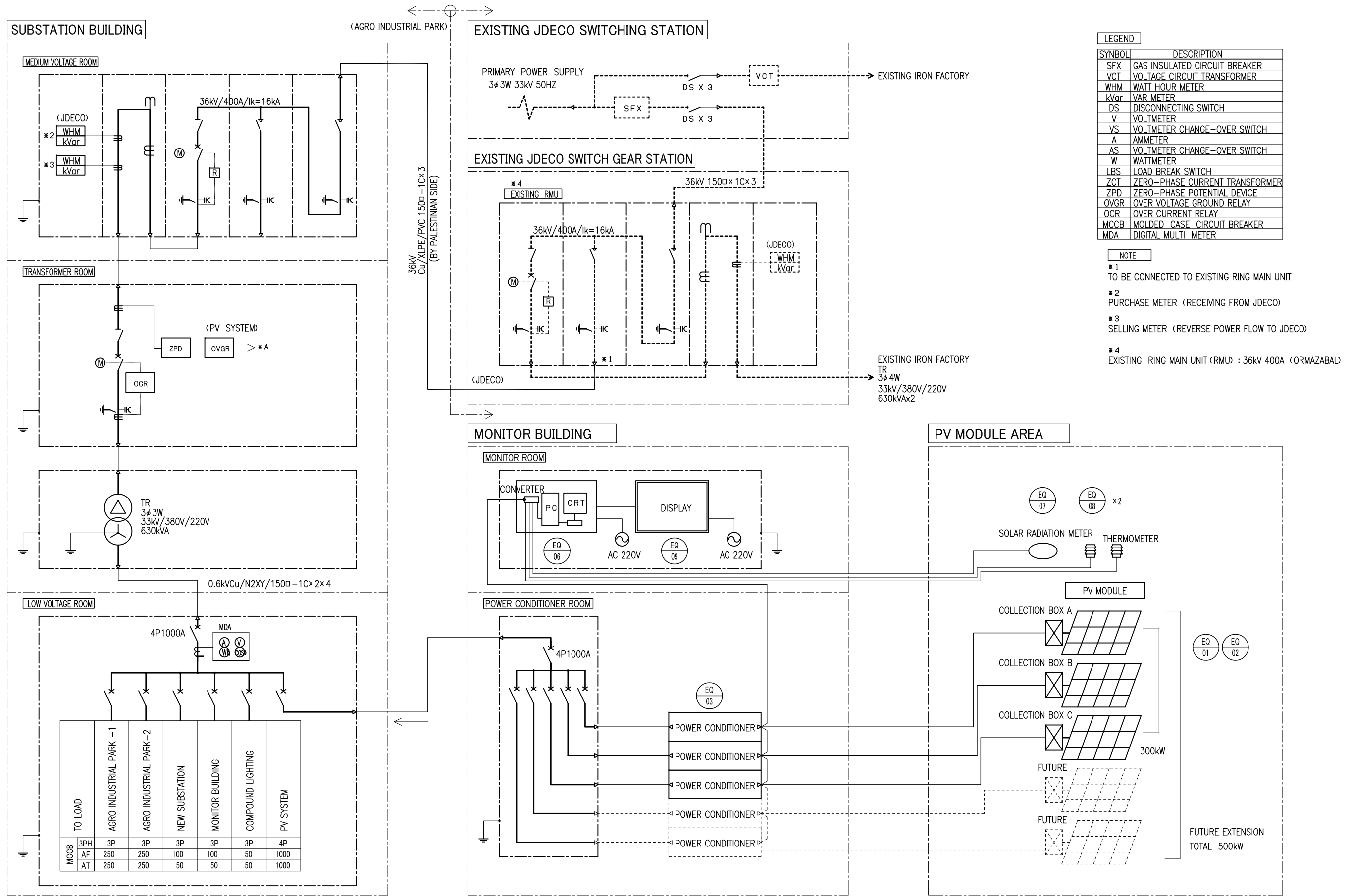
NO.	DATE	DESCRIPTIONS	BY	APPRO.	CHECKED BY

SCALE
A1 1:600
A3 1:1200
DATE
JUL. 2010
DRAWING BY
CHECKED BY

DWG TITLE
EQUIPMENT SCHEDULE FOR PV SYSTEM & GENERAL ARRANGEMENT FOR PV SYSTEM
DESIGNED BY

DWG NO
PV-01

ORIENTAL CONSULTANTS CO., LTD.

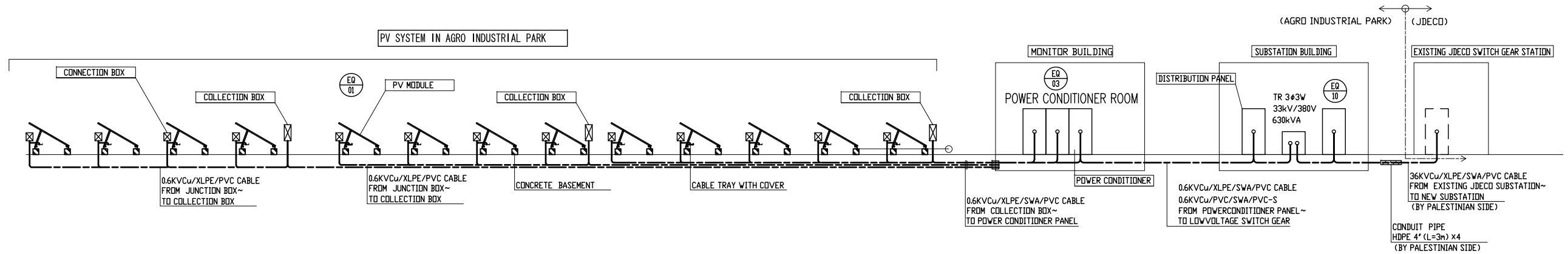
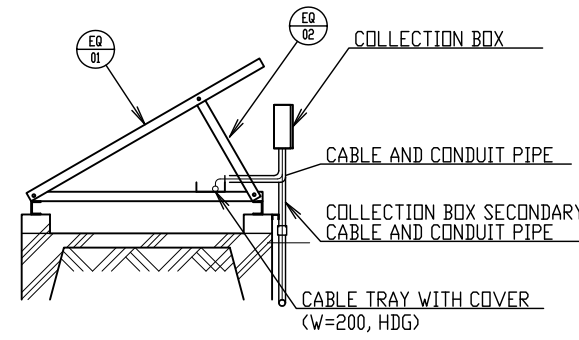


SYMBOL	DESCRIPTION
SFX	GAS INSULATED CIRCUIT BREAKER
VCT	VOLTAGE CIRCUIT TRANSFORMER
WHM	WATT HOUR METER
kVar	VAR METER
DS	DISCONNECTING SWITCH
V	VOLTMETER
VS	VOLTMETER CHANGE-OVER SWITCH
A	AMMETER
AS	VOLTMETER CHANGE-OVER SWITCH
W	WATTMETER
LBS	LOAD BREAK SWITCH
ZCT	ZERO-PHASE CURRENT TRANSFORMER
ZPD	ZERO-PHASE POTENTIAL DEVICE
OVGR	OVER VOLTAGE GROUND RELAY
OCR	OVER CURRENT RELAY
MCCB	MOLDED CASE CIRCUIT BREAKER
MDA	DIGITAL MULTI METER

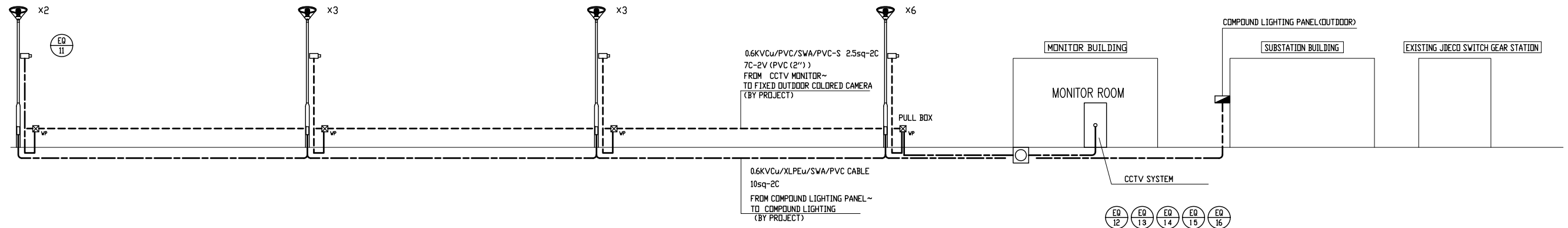
- NOTE**
- *1 TO BE CONNECTED TO EXISTING RING MAIN UNIT
 - *2 PURCHASE METER (RECEIVING FROM JDECO)
 - *3 SELLING METER (REVERSE POWER FLOW TO JDECO)
 - *4 EXISTING RING MAIN UNIT (RMU) : 36kV 400A (ORMAZABAL)

SINGLE LINE DIAGRAM FOR PV SYSTEM

LEGEND		
SYMBOL	DESCRIPTION	NOTES
---	CABLE / CONDUIT	UNDER GROUND
---	CABLE / CONDUIT	IN CEILING
---	CABLE / CONDUIT	EXPOSED
---	CABLE TRAY WITH COVER	ON THE TRAY
○	HANDHOLE	
⊠	SWITCH GEAR PANEL	OUTDOOR
⊠	DISTRIBUTION BOARD	INDOOR
⊠	CONNECTING BOX	
⊠	COLLECTING BOX	
⊠	PULL BOX	WAER PROOF TYPE
⊠	COMPOUND LIGHTING	
⊠	FIXED OUTDOOR COLORED CAMERA	



SCHMATIC DIAGRAM FOR PV SYSTEM

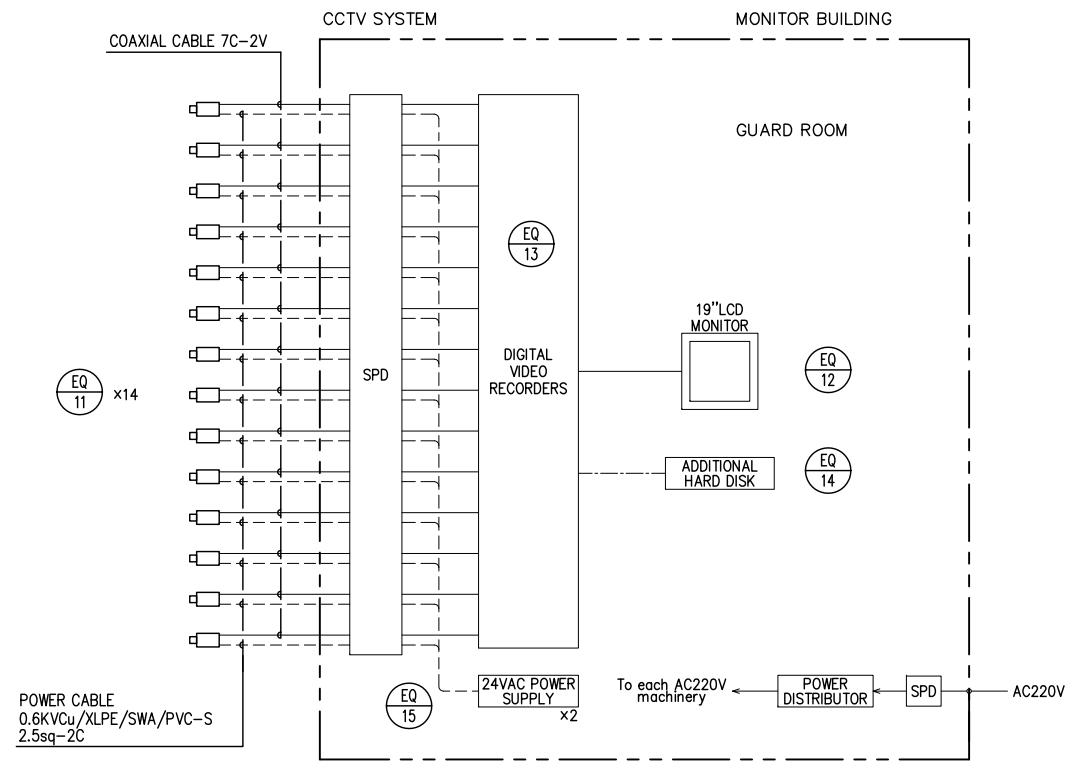


COMPOUND LIGHTING AND CCTV SYSTEM

NO	DATE	DESCRIPTIONS	BY	APPD	CHECKED BY
REVISIONS					

SCALE	NS
DATE	JUL. 2010
DRAWING BY	
CHECKED BY	

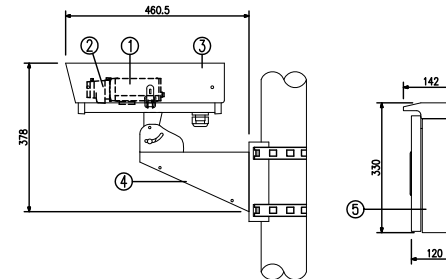
SYSTEM BLOCK DIAGRAM



FIXED OUTDOOR COLORED CAMERA

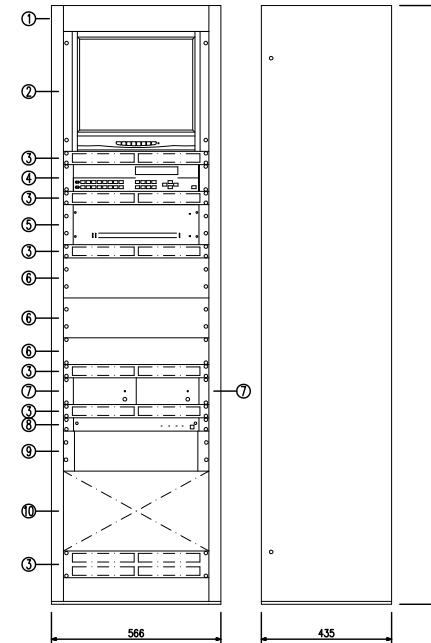
EQ 11 x14

- ① COLOR CAMERA
- ② VARIFOCAI-IR LENS
- ③ OUTDOOR CAMERA HOUSING
- ④ WALL MOUNTING BRACKET
- ⑤ SPD



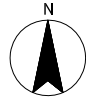
■COLOR CAMERA	
Power Source	24 V AC, 5 A, 50/60 Hz
Image Device	1/3 type IT-CCD
Resolution	Horizontal: 500 lines
Minimum Illumination	0.01 lx (F1.0)(B&W mode, incandescent lamp)
Others	Day/Night function, 64 times electron sensitivity up, Privacy Masking(4 places), Dynamic Adjustment of the camera side with a menu key is possible
■VARIFOCAI-IR LENS	
Focal Length	8.5 - 40 mm
Maximum Aperture Ratio	1:1.3 - 1.7
Image Format Size	4.8 (H)x 3.6 (V) mm(1/3 type)
Angle of View	Horizontal: 33.5° - 7.1° Vertical: 24.4° - 5.3°
■OUTDOOR CAMERA HOUSING	
Finish	Panel: Die-cast aluminum, light-beige, paint Others: Aluminum, off-white, paint
■WALL MOUNTING BRACKET	
Angle Adjustment	Horizontal: 360° Vertical: Up 15° - down 60°
Finish	Stainless steel, off-white, paint
■OTHERS	With Paul, SPD

CCTV SYSTEM

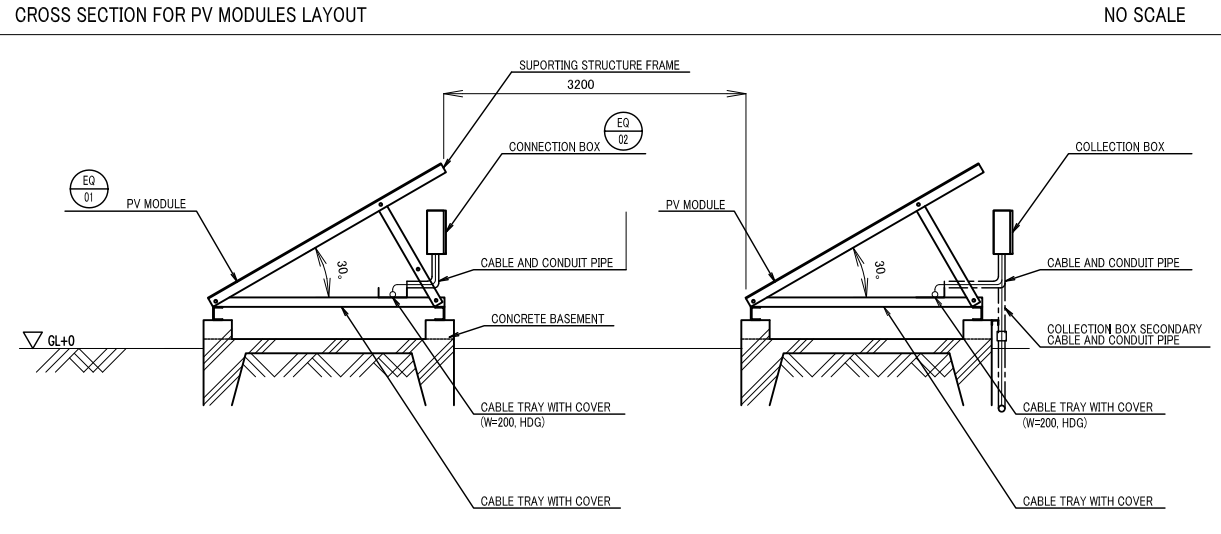
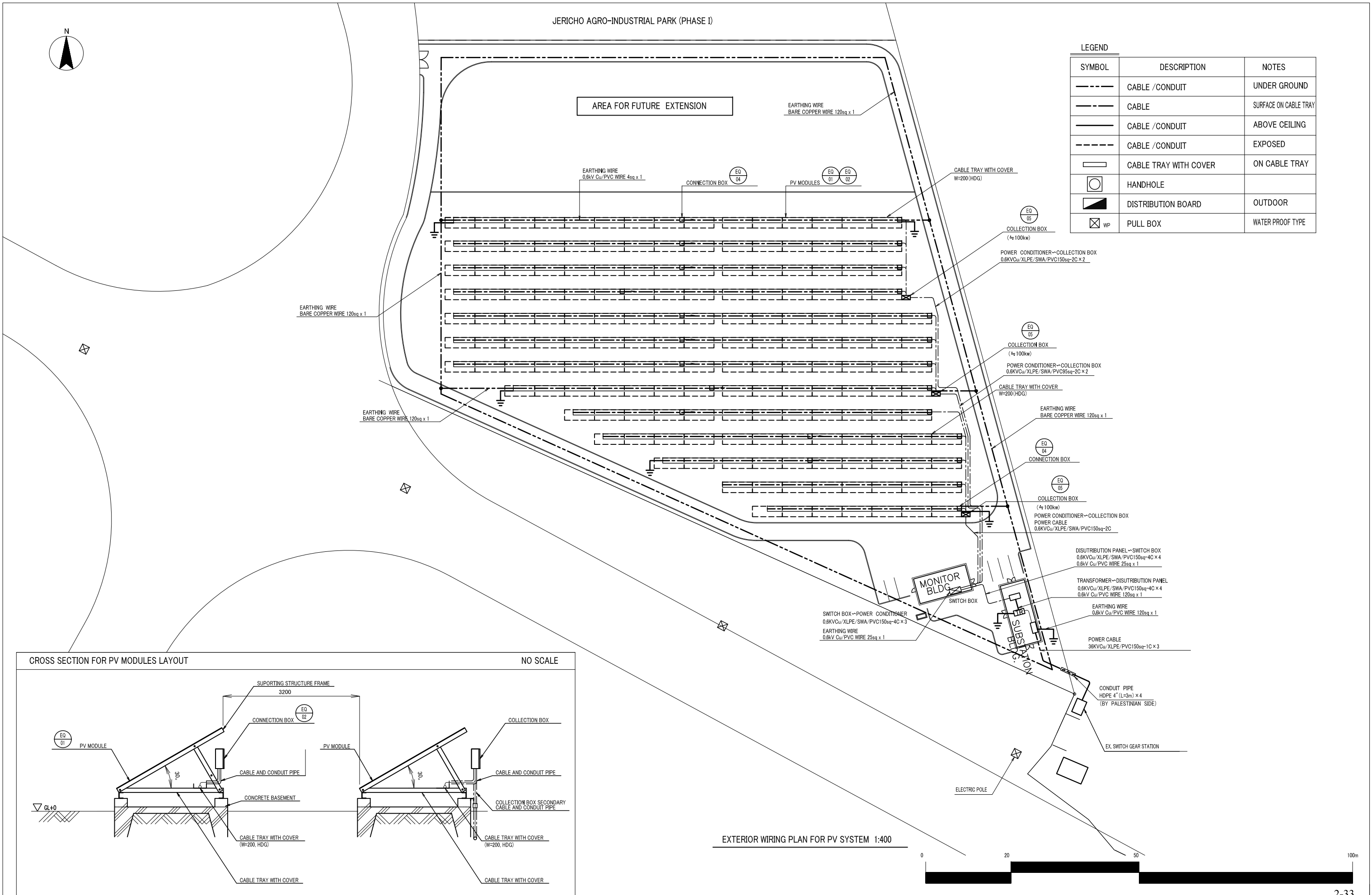


No.	NAME
1	CABINET RACK
2	19" LCD MONITOR
3	PERFORATED PANEL
4	DIGITAL VIDEO RECORDER
5	ADDITIONAL HARD DISK
6	BLANK PANEL
7	24VAC POWER SUPPLY
8	POWER DISTRIBUTOR
9	JUNCTION PANEL
10	Space of SPD

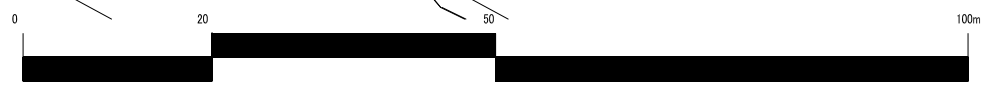
EQ 12		Power Source	230 V AC
■19" LCD MONITOR		LCD Panel	19" XGA-TFT
		Viewing Angle	Ver:155°, Hor:165°
		Input	composite x6, Audio x1, PC Audio x1
		Output	composite x2
		Others	Speaker
EQ 13		■DIGITAL VIDEO RECORDER	
		Image Compression System	Motion-JPEG
		Pixels	720x240 pixels
		Input	Picture x16, link, sound, alarm x16
		Output	Picture x16, monitor x2, sound, control x4
		Recording Medium	E-IDE Hard Disk 600 GB (300 GB x2)
		Screen Display	1-, 4-, 9-, 16- segment screen sequence, electronic 2x zoom
		Picture Quality	64 kB, 40 kB, 32 kB, 24 kB, 16 kB
		Recording Rate	Max. 120 image/s
		Others	Pre-alarm motion recording, a motion / a search / the email transmission of a message / a Web function. A copy is possible in DVD - R / USB memory. Language choice (Japanese / English / French). Mirroring, enlargement HDD x2 are possible Access to a cascade: MAX.8 Each individual camera, recording interval, image quality, recording time with built-in timer, you can set.
EQ 14		■ADDITIONAL HARD DISK	
		Recording Medium	Internal Hard Disk 2.4 TB (300 GB x8)
		Others	Digital recorder to one per two additional possible
EQ 15		■24VAC POWER SUPPLY	
		Output Power	24 V AC, 5 A, 50/60 Hz for camera and remote control unit
		■OTHERS	POWER DISTRIBUTOR, JUNCTION PANEL, Space of SPD



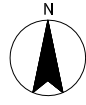
LEGEND		
SYMBOL	DESCRIPTION	NOTES
	CABLE / CONDUIT	UNDER GROUND
	CABLE	SURFACE ON CABLE TRAY
	CABLE / CONDUIT	ABOVE CEILING
	CABLE / CONDUIT	EXPOSED
	CABLE TRAY WITH COVER	ON CABLE TRAY
	HANDHOLE	
	DISTRIBUTION BOARD	OUTDOOR
	PULL BOX	WATER PROOF TYPE



EXTERIOR WIRING PLAN FOR PV SYSTEM 1:400

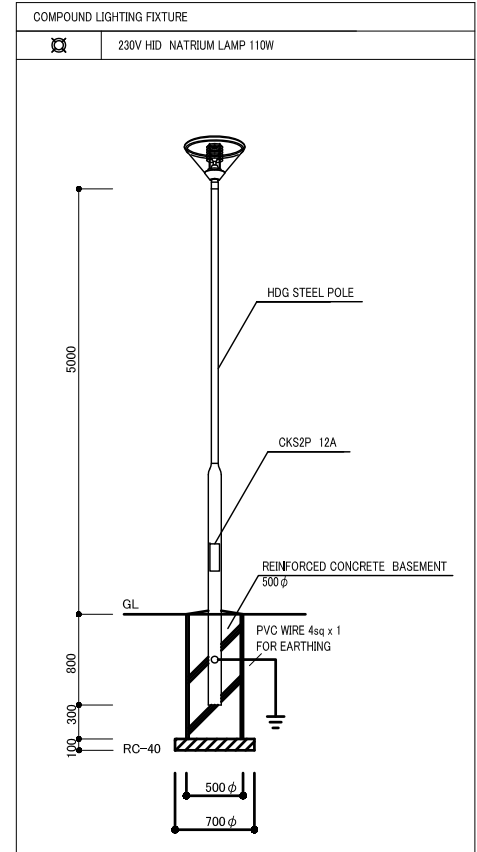
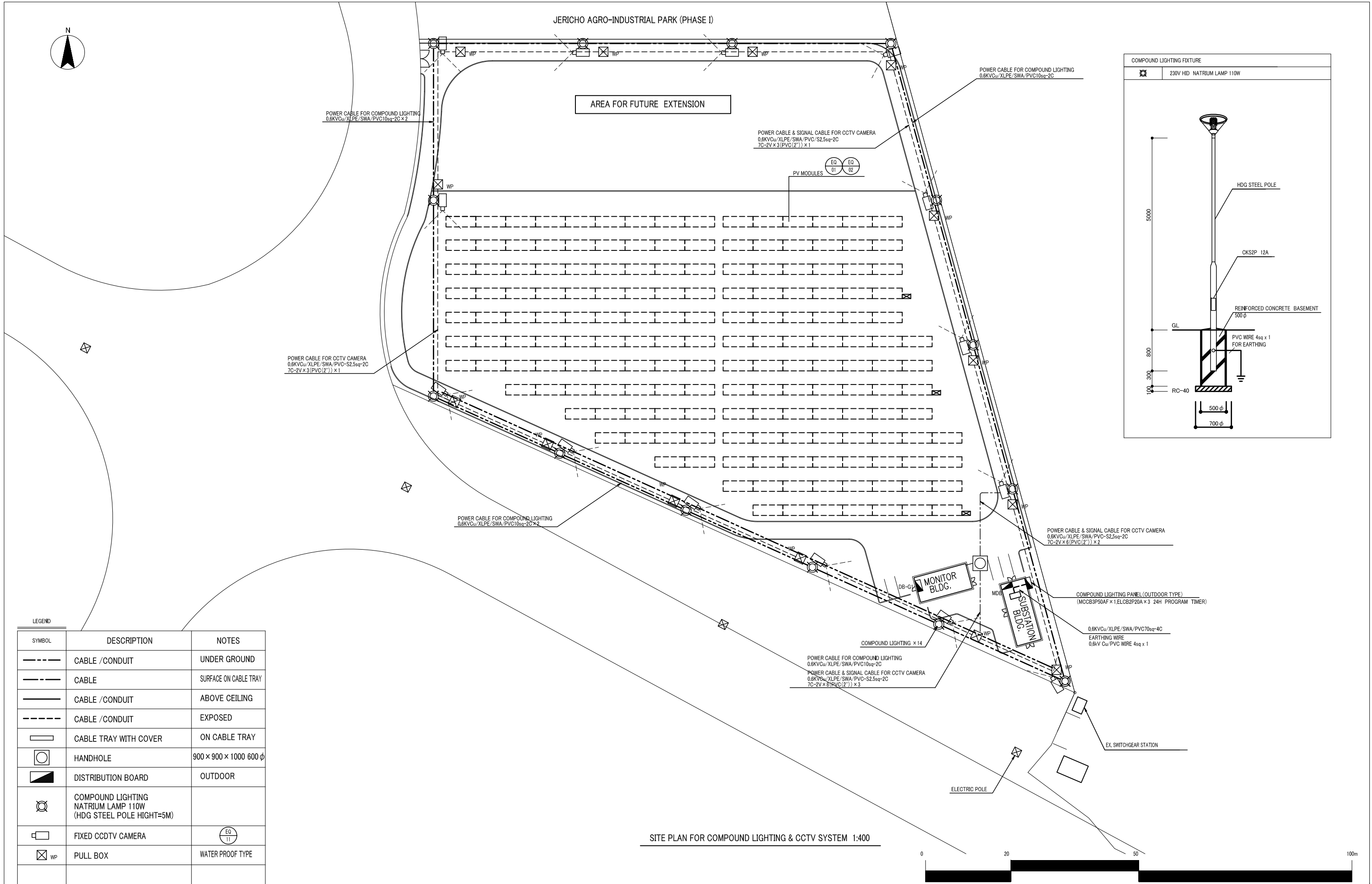


NO	DATE	DESCRIPTIONS	BY	APP'D	CHECKED BY



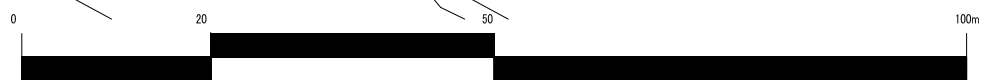
JERICO AGRO-INDUSTRIAL PARK (PHASE I)

AREA FOR FUTURE EXTENSION



SYMBOL	DESCRIPTION	NOTES
---	CABLE /CONDUIT	UNDER GROUND
---	CABLE	SURFACE ON CABLE TRAY
---	CABLE /CONDUIT	ABOVE CEILING
---	CABLE /CONDUIT	EXPOSED
---	CABLE TRAY WITH COVER	ON CABLE TRAY
○	HANDHOLE	900 x 900 x 1000 600 φ
■	DISTRIBUTION BOARD	OUTDOOR
⊙	COMPOUND LIGHTING NATRIUM LAMP 110W (HDG STEEL POLE HIGHT=5M)	
□	FIXED CCTV CAMERA	EQ II
⊗ WP	PULL BOX	WATER PROOF TYPE

SITE PLAN FOR COMPOUND LIGHTING & CCTV SYSTEM 1:400



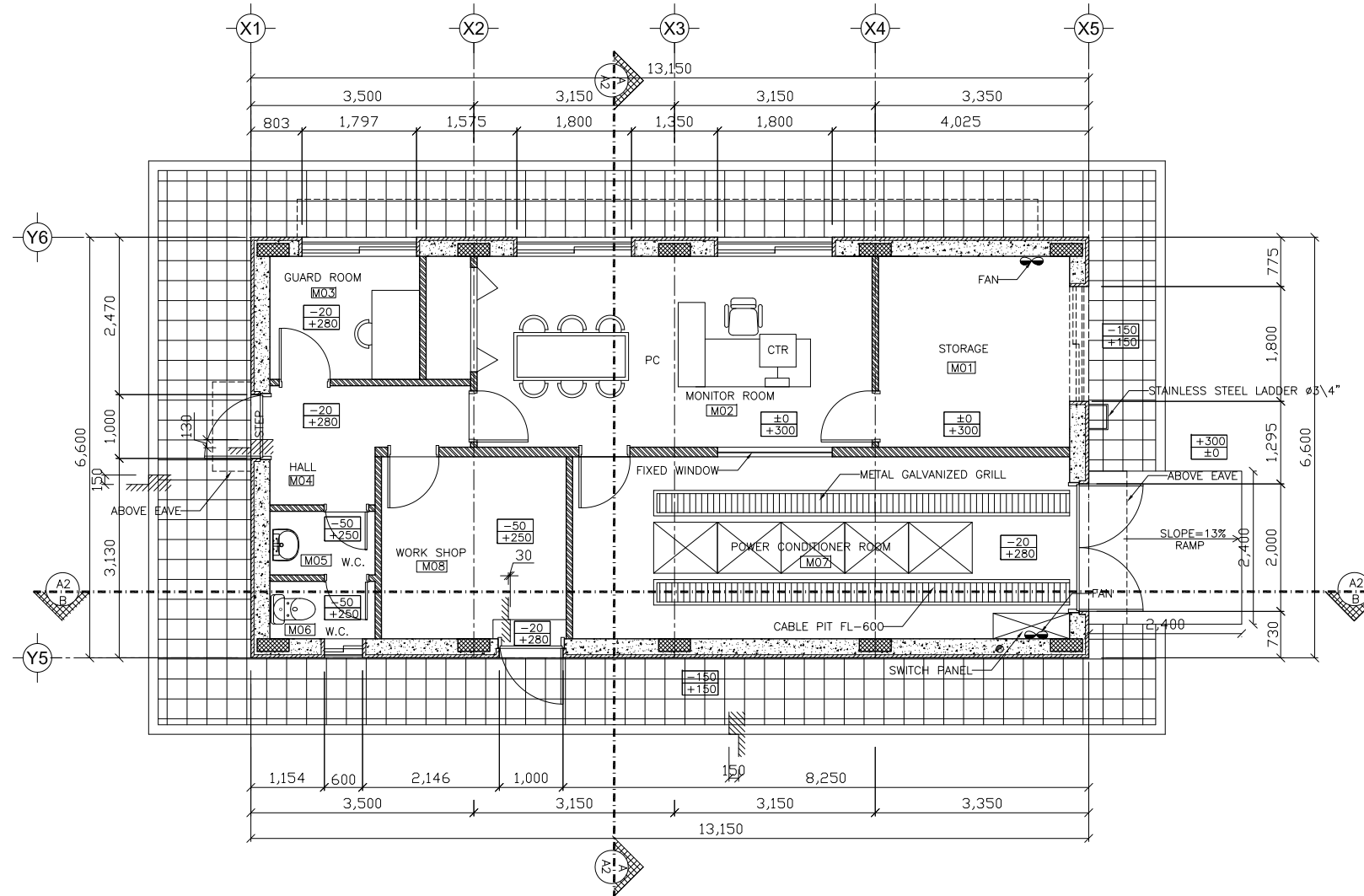
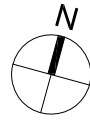
PROJECT TITLE
**THE PROJECT FOR INTRODUCTION OF CLEAN ENERGY
 BY SOLAR ELECTRICITY GENERATION SYSTEM
 IN PALESTINE**

GENERAL NOTE

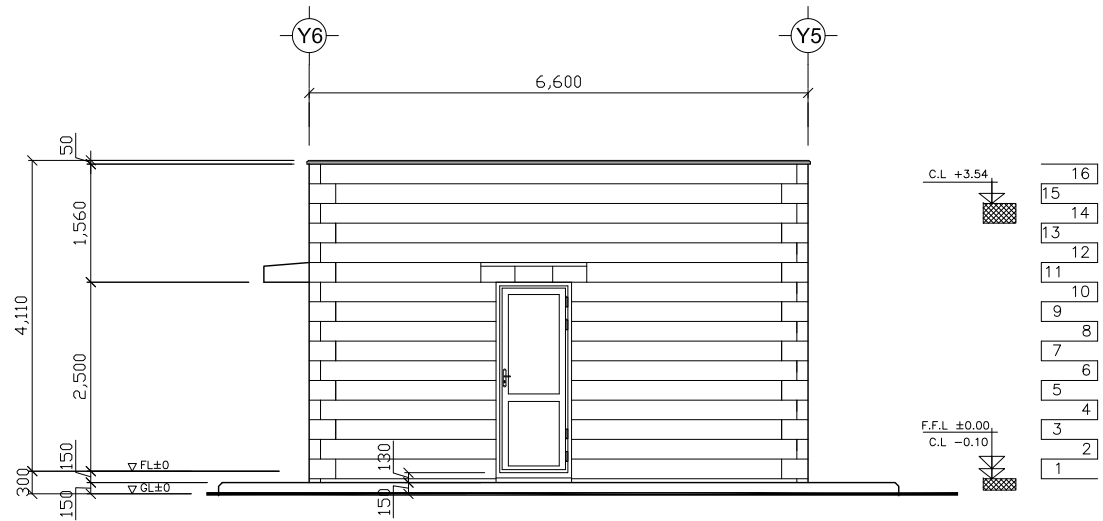
NO	DATE	DESCRIPTIONS	BY	APP'D	CHECKED BY

SCALE
 A1 1:400
 A3 1:800
 DATE
 JUL. 2010

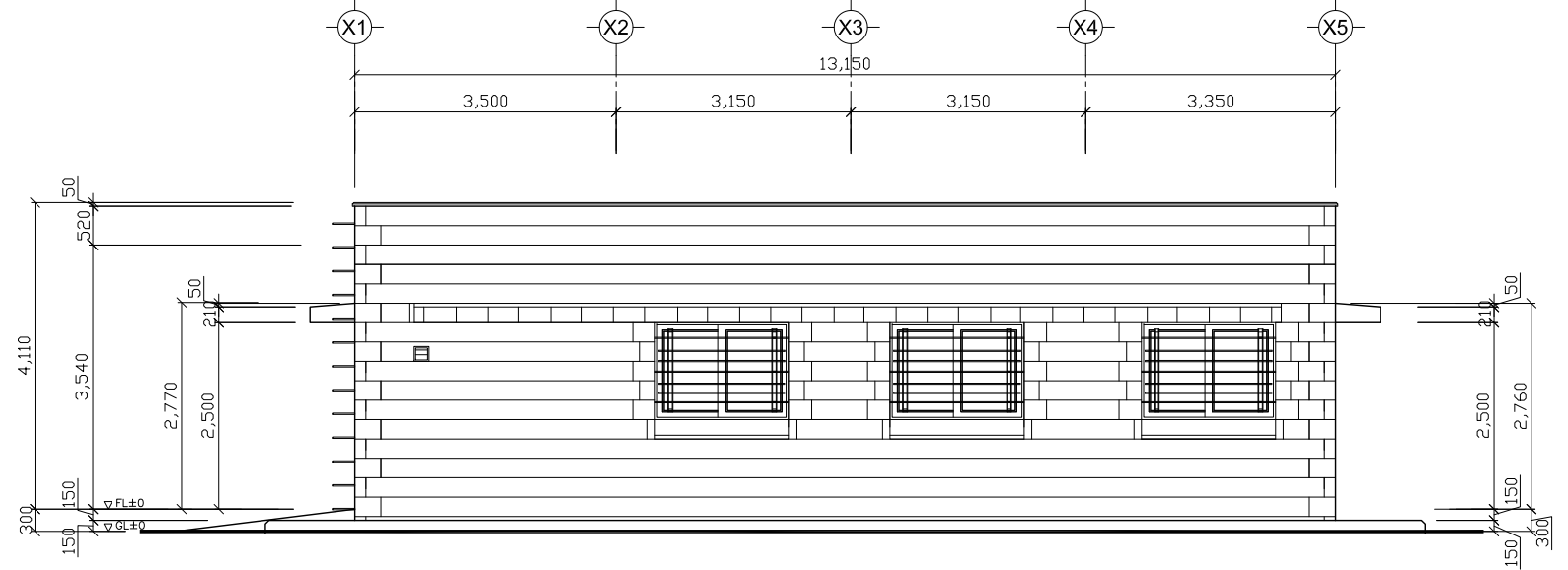
DWG TITLE
**EXTERIOR WIRING PLAN FOR COMPOUND LIGHTING
 & CCTV SYSTEM**
 DESIGNED BY
ORIENTAL CONSULTANTS CO., LTD.
 DWG NO
PV-06



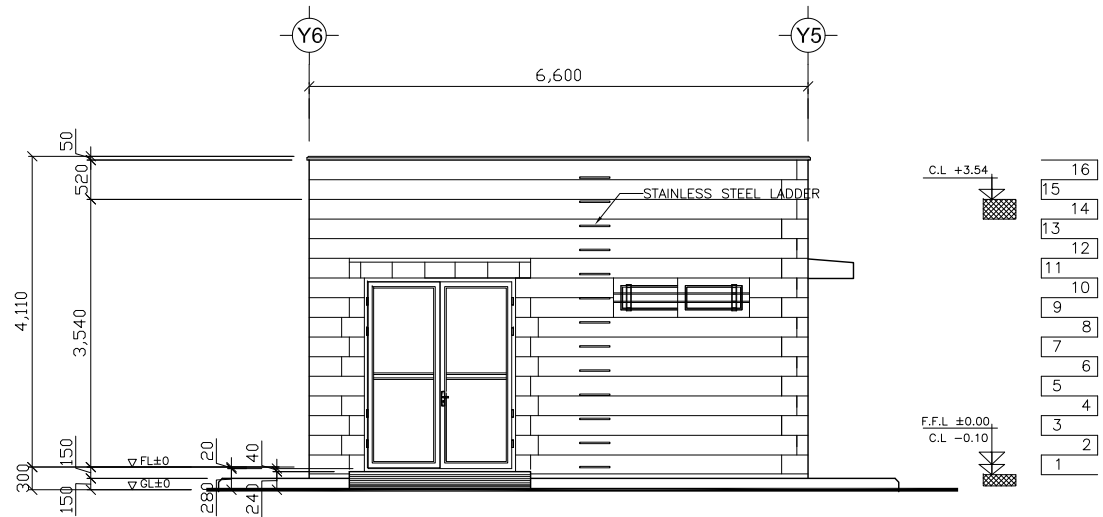
FLOOR PLAN



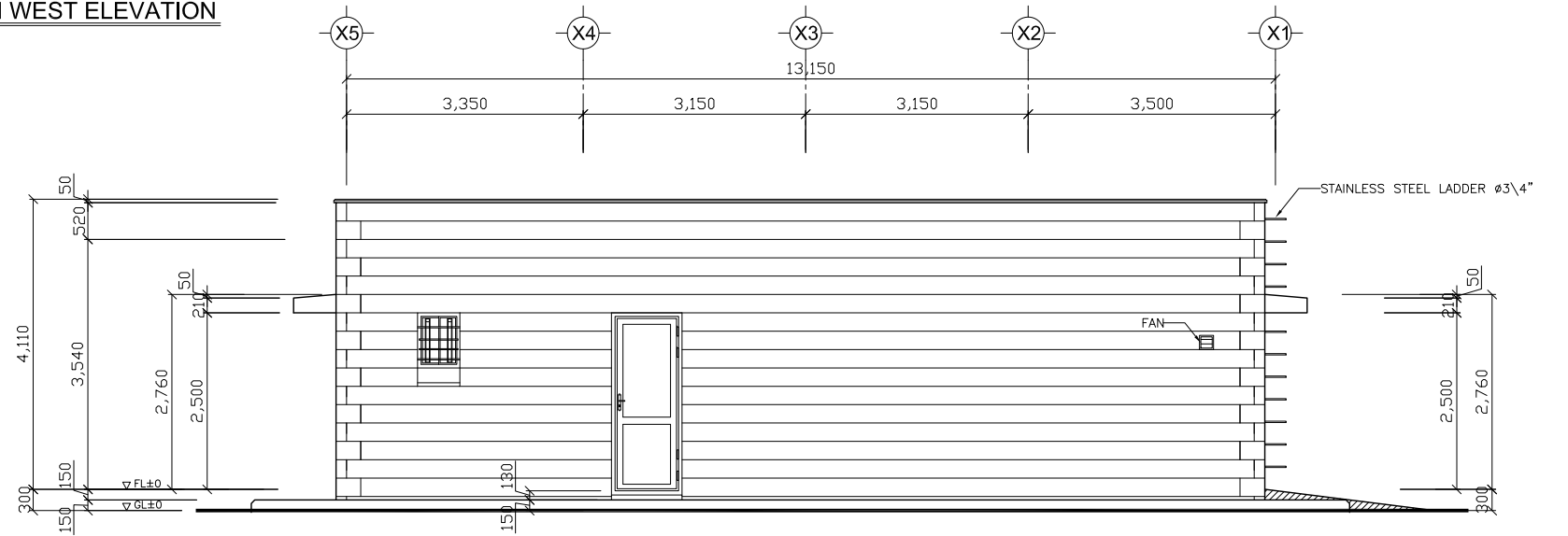
SOUTH WEST ELEVATION



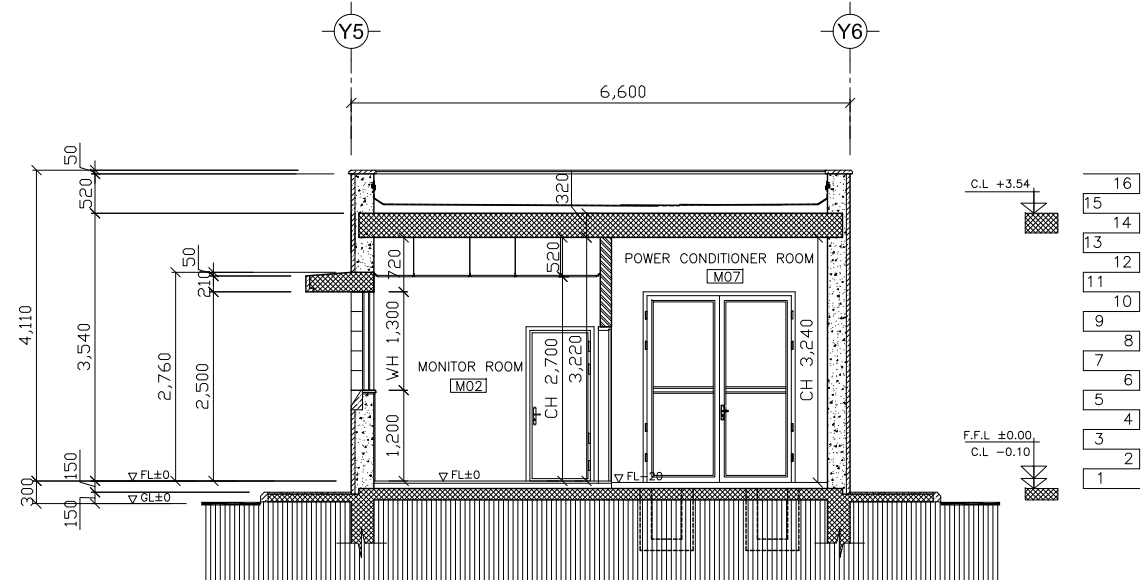
NORTH WEST ELEVATION



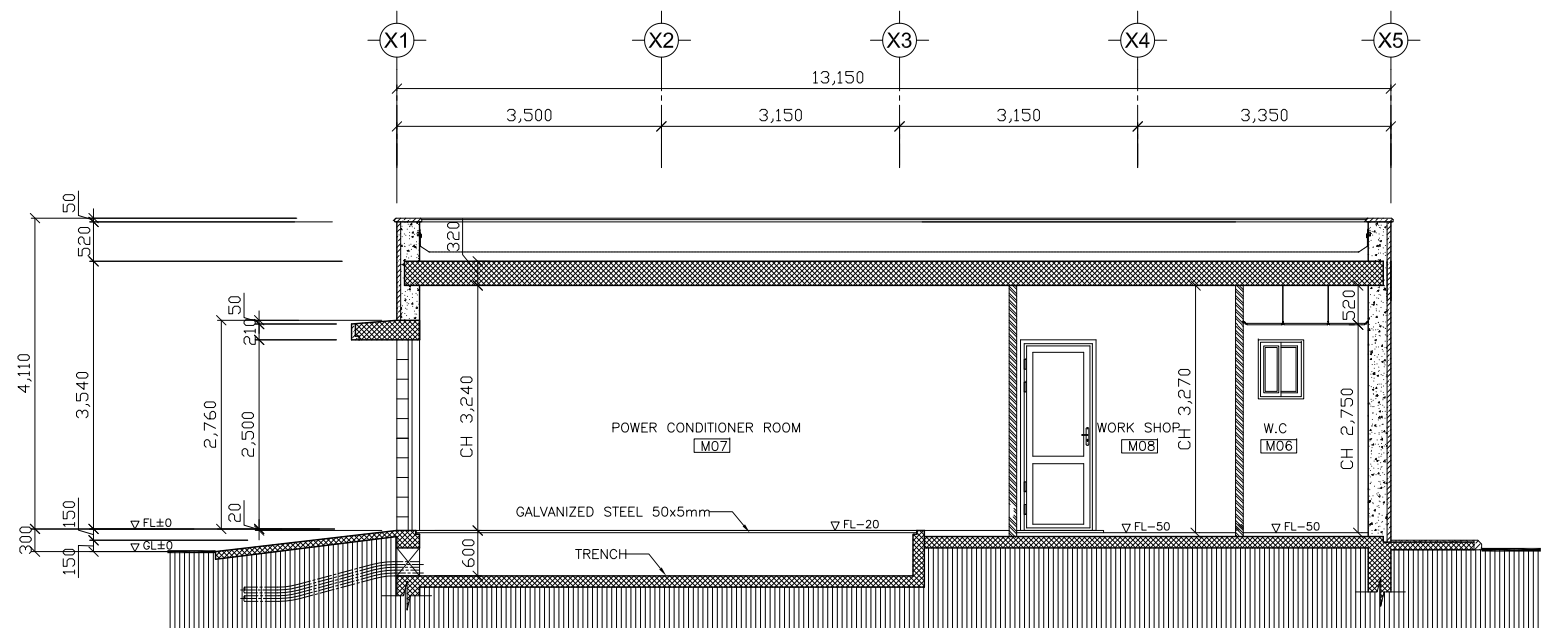
NORTH EAST ELEVATION



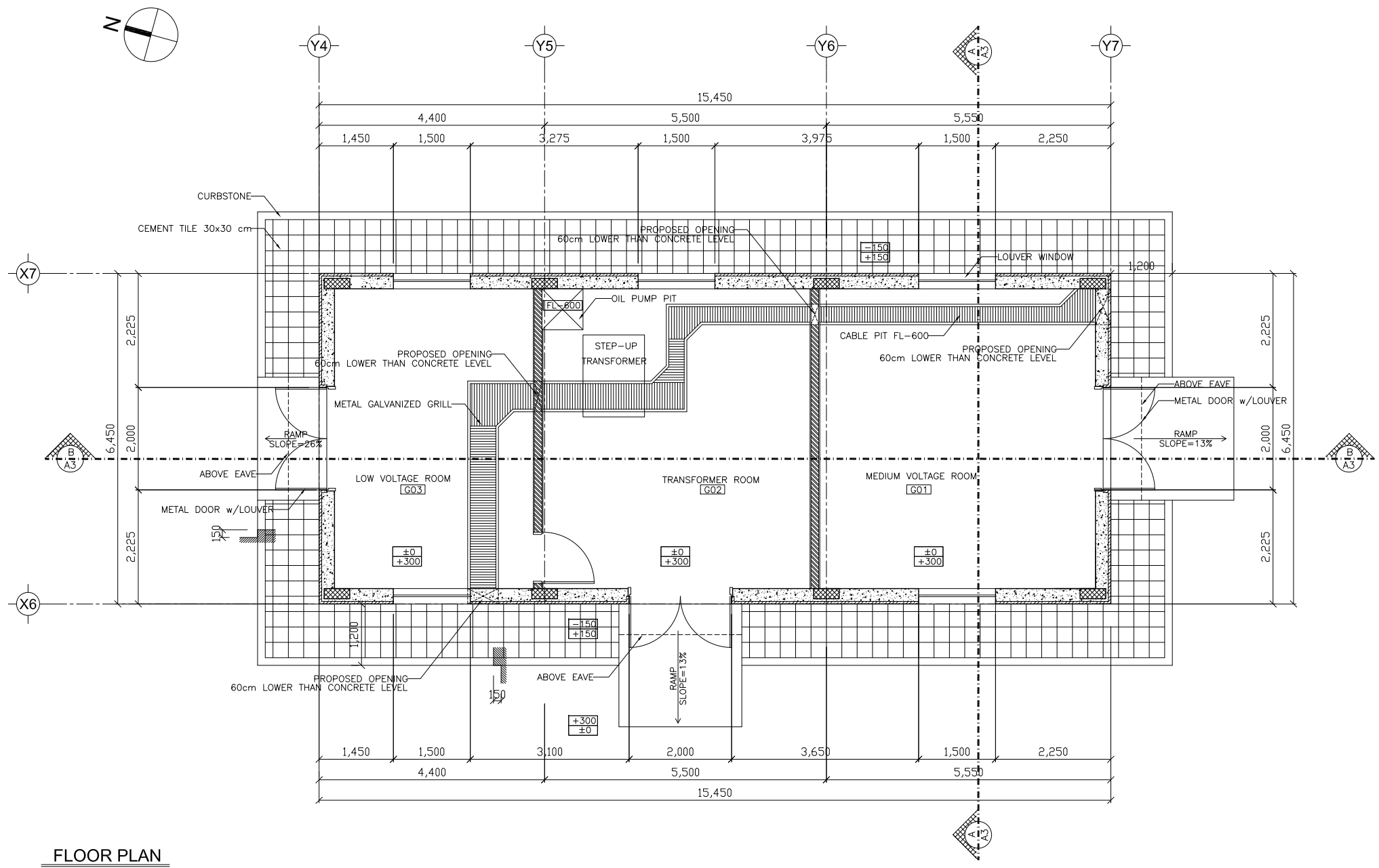
SOUTH EAST ELEVATION



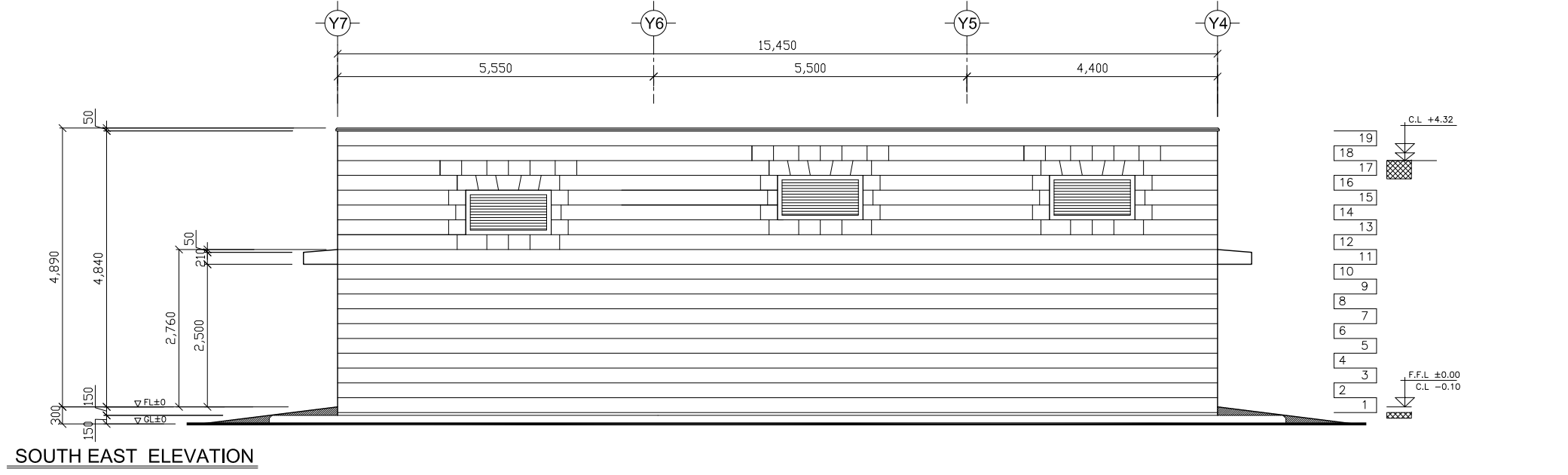
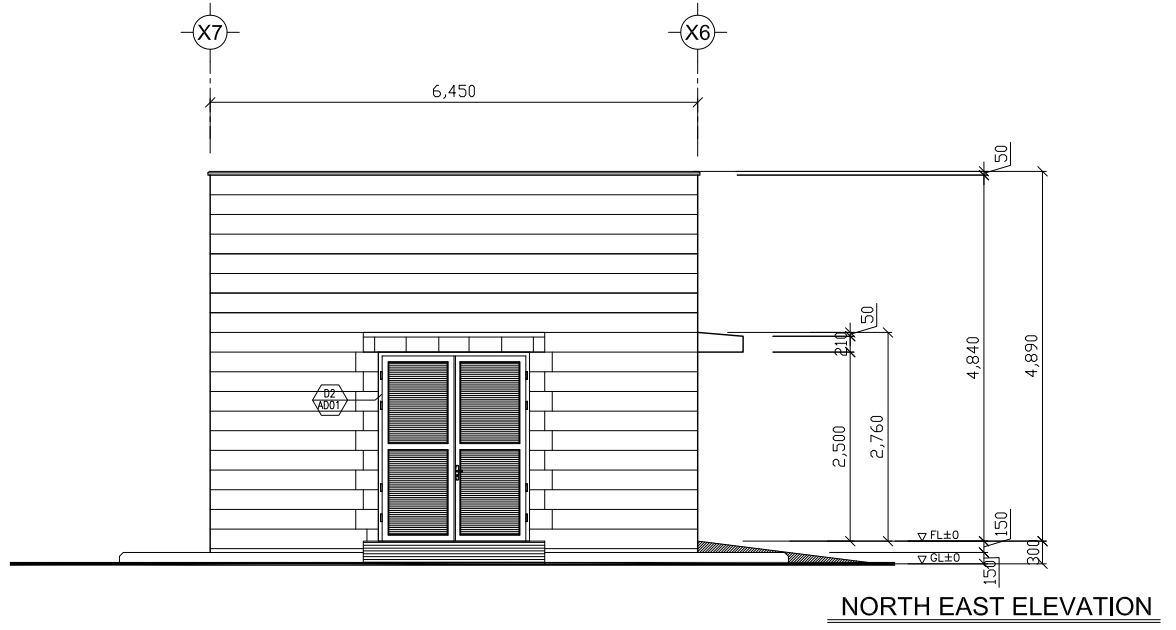
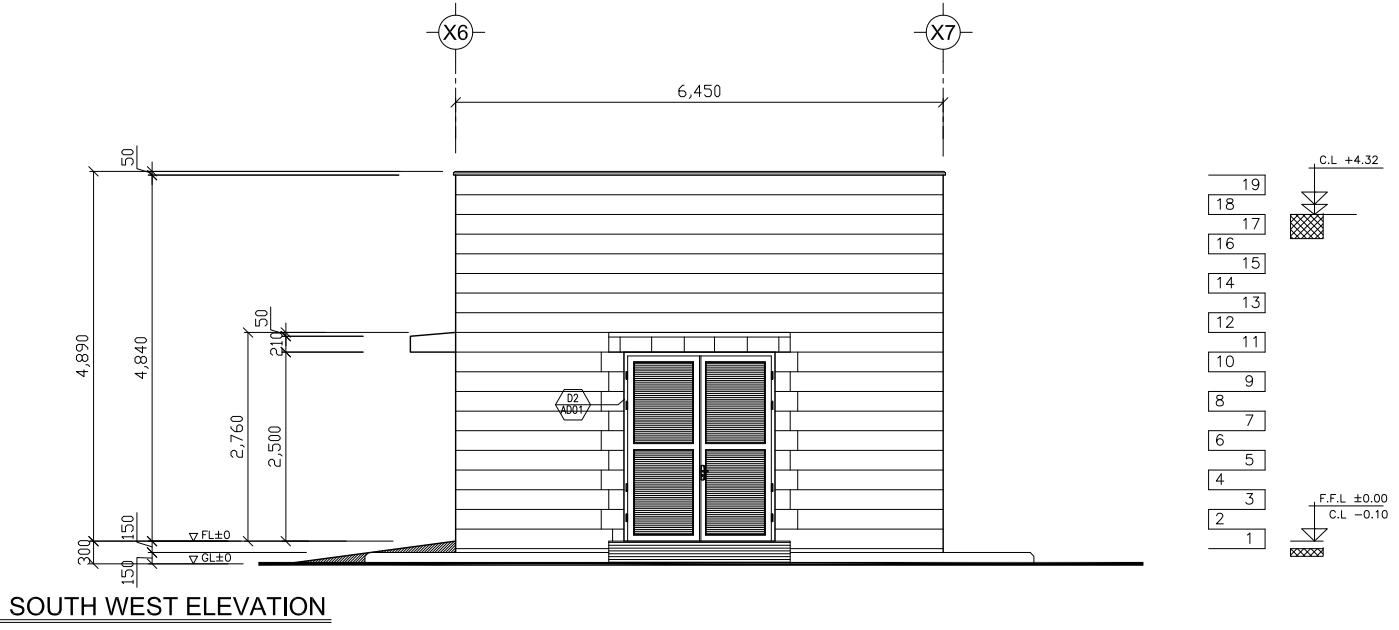
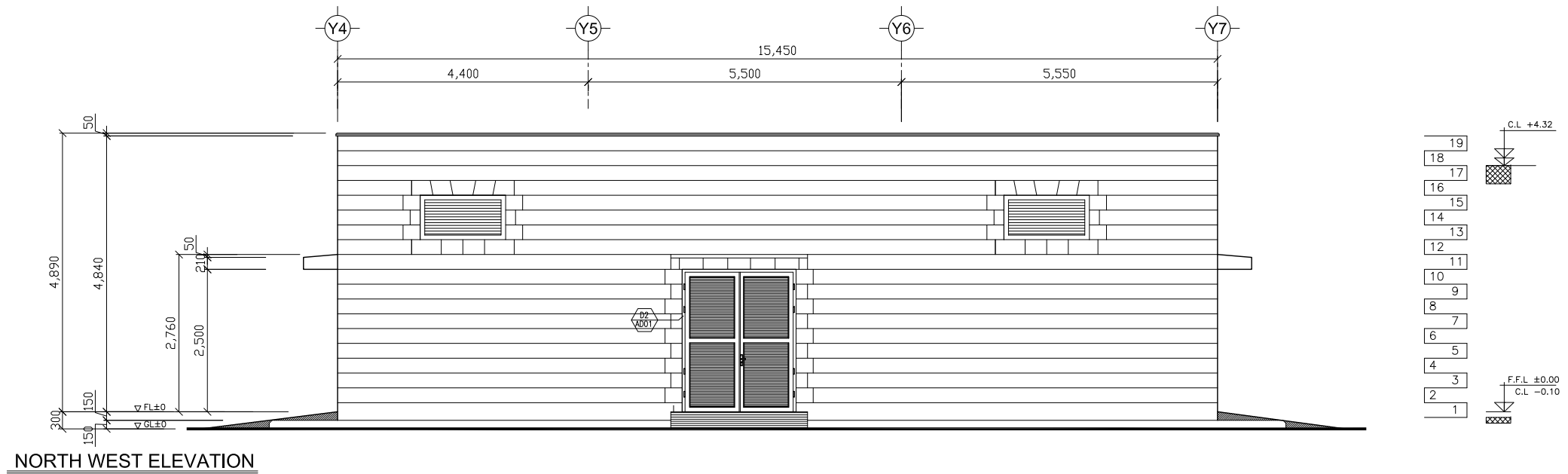
SECTION A-A



SECTION B-B



FLOOR PLAN

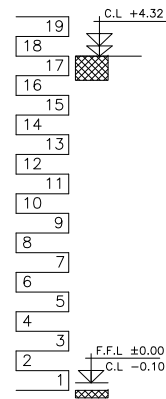
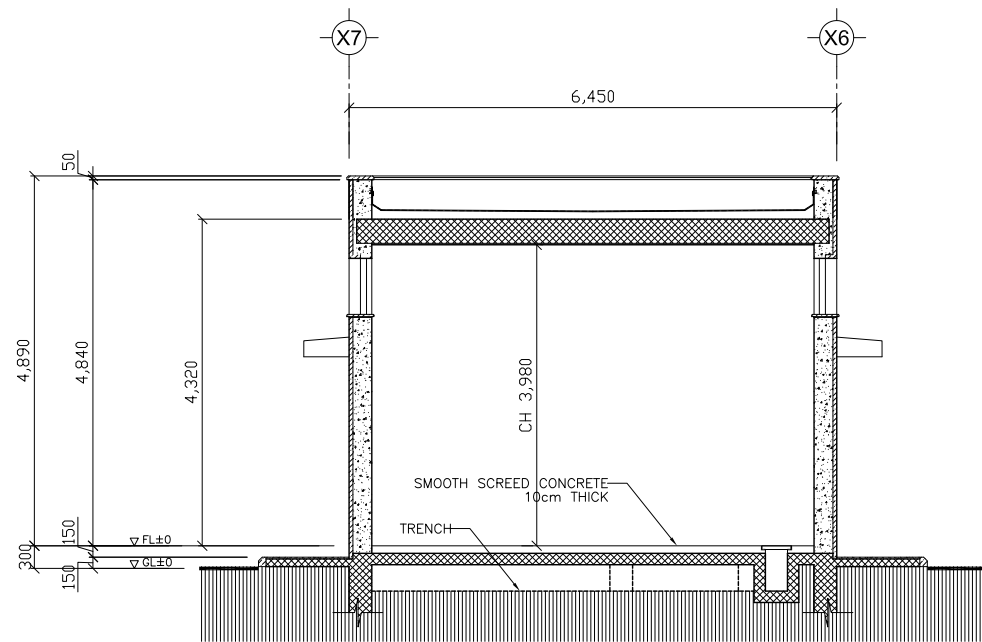


PROJECT TITLE
**THE PROJECT FOR INTRODUCTION OF CLEAN ENERGY
 BY SOLAR ELECTRICITY GENERATION SYSTEM
 IN PALESTINE**

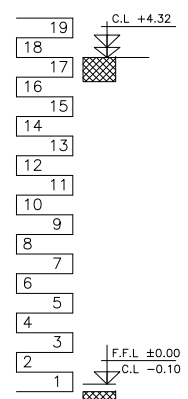
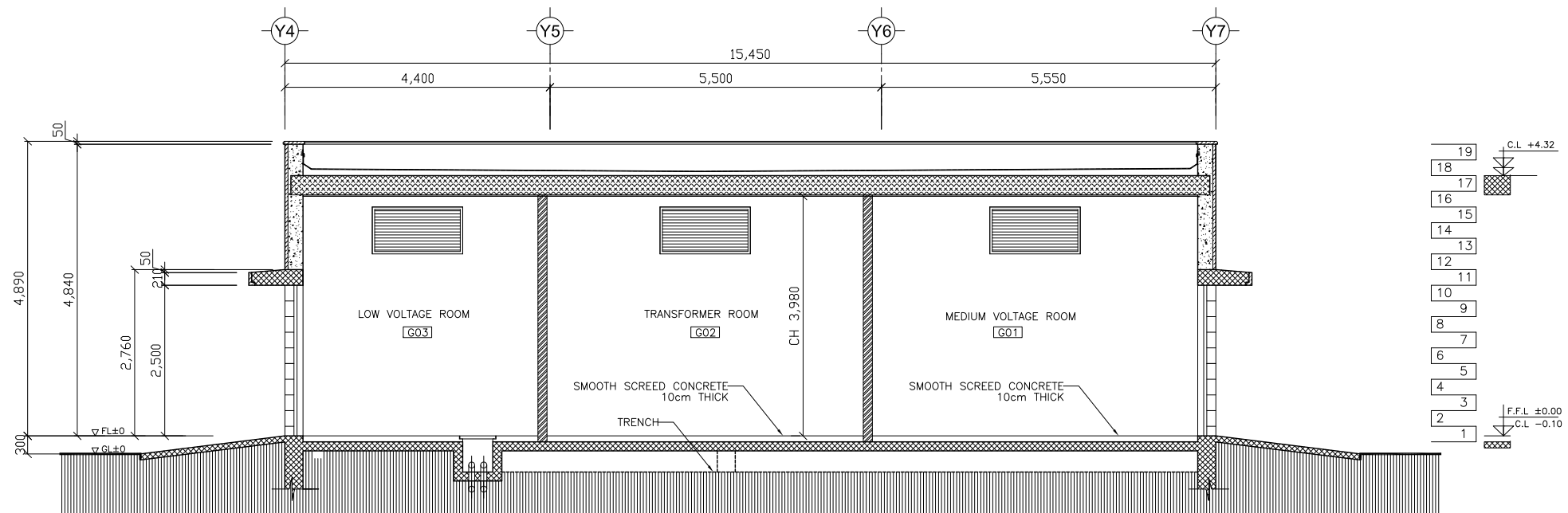
GENERAL NOTE

NO	DATE	DESCRIPTIONS	BY	APP'D	CHECKED BY

SCALE: 1:100
 DATE: JUL. 2010
 DRAWING NO: **A-04**
 DESIGNED BY: **ORIENTAL CONSULTANTS CO., LTD.**
 CHECKED BY:



SECTION A-A



SECTION B-B

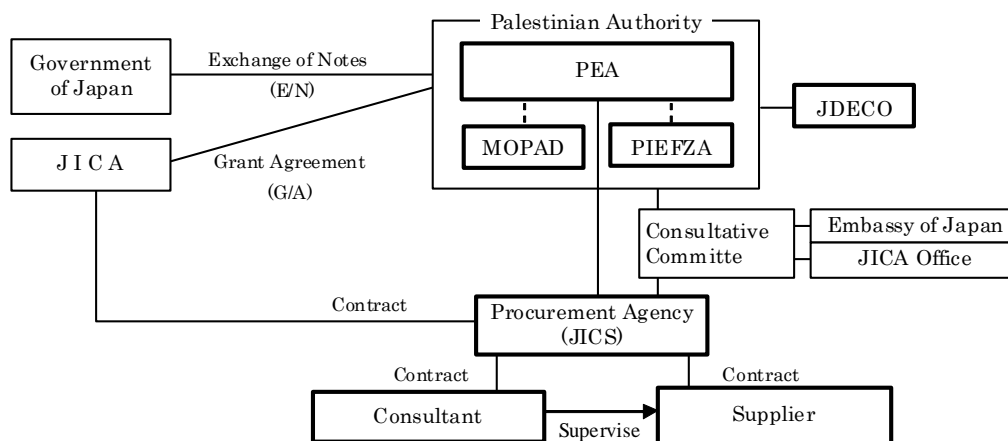
2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

(1) Basic matters

1) Implementation scheme

The Project shall be implemented according to the implementation scheme of the authorities/ organizations concerned illustrated in Fig. 2-6 and the PEA shall coordinate with other relevant and/or supporting authorities/ organizations such as Ministry of Planning and Administration (MOPAD) and PIEFZA, and JDECO which owns and manage the existing power distribution lines.



Source: Preparatory Survey Team

Fig. 2-6 Project Implementation Scheme

2) Exchange of Notes (E/N)

The contents of the Program Grant Aid for Environment and Climate Change (hereinafter referred to as “GAEC”) shall be decided by the E/N to be signed between the Government of Japan and the Palestinian Authority. Project objectives, implementation schedule, terms and conditions, amount of the grant and so on shall be enumerated in the E/N based on the confirmation.

3) Details of Procedures

Details of procedures on procurement and services under GAEC will be agreed between the authorities of the two governments concerned at the time of the signing of the Grant Agreement (hereinafter referred to as “G/A”).

Essential points to be agreed are outlined as follows:

- a) JICA will supervise the implementation of the Project.
- b) Products and services will be procured and provided in accordance with “Procurement Guidelines for the Program Grant Aid for Environment and Climate Change” established by JICA.
- c) The Recipient will conclude a contract with the Agent.
- d) The Agent is the representative acting in the name of the Recipient concerning all transfer of funds to the Agent.

4) Procurement Management Agent

Procurement Management Agent is designated to conduct the procurement services of products and services (including fund management, preparing tenders, contracts) for GAEC on behalf of the Recipient. The Agent is an impartial and specialized organization that will render services according to the Agent Agreement with the Recipient. The Agent is recommended to the Recipient by the Government of Japan and agreed between the two Governments in the Agreed Minutes (“A/M”).

5) Detail design and supervision policies of the Japanese consultant

The Japanese consultant that will be employed to do detail design and supervise the work for the Project shall fulfill its roles in order to implement the Project smoothly and achieve the purpose of the cooperation under the “Guidelines for Consulting Works concerning Grant Aid” issued by JICA. The firm therefore shall conduct all necessary work and make efforts to be trusted by the Procurement Management Agent and the Project executing and implementing agency of Palestine National Authority, considering fairness and neutrality for Japanese suppliers.

(2) Utilization of local transportation company

The Project site is a part of the land allocated for JAIP (Phase-1) which is located at southern fringe of Jericho municipality in the West Bank in Palestine.

Transportation routes are between Japan and Israel, and Israel and the Project site in Jericho. It would be appropriate to employ a Japanese transportation company for the transportation between Japan and Israel for making equipment shipping procedures smoothly and for reliable shipping to maintain the project implementation schedule. As for the inland transportation between Israel and the Project site in Jericho, on the other hand, it would be effective to utilize local transportation companies because they are familiar with the local transportation situations under the supervision of the

Japanese transportation company or the equipment supplier in order to achieve project installation work within intended installation period and with required quality.

(3) Utilization of local firms for equipment installation

Local firms have no experience in installing PV system of the size to be procured by the Project and have insufficient knowledge and abilities required for their installation. Thus, a Japanese firm shall be the prime contractor of the Project and oversee the entire installation work. And, it would be possible to carry out economical and high quality installation work by using local firms after providing an appropriate training and guidance for their skilled workers under the supervision of the prime contractor.

(4) Utilization of local consultants

Although there are some consulting firms in Palestine capable of providing architectural and engineering service, there are no such consultants that have sufficient knowledge of the PV system and installation thereof, such as the one to be installed for the Project, and that can provide consulting services at a neutral position.

In general, it is evaluated that local consulting firms, including architectural and engineering design offices, do not have sufficient experiences to become a prime consultant to handle a large scale project, such as foreign assistant projects. For this reason, local consulting firms will be utilized as the sub-consultants of the Japanese consultants for the Project and transfer of technologies shall be provided to them through project implementation.

2-2-4-2 Implementation Conditions

As a result of the survey, it was found out that the local firms and/or contractors have as yet little experience of procurement and/or installation of the PV system. And, therefore, local firms and/or contractors shall carry out unpacking of shipping crates/cases, construction of foundation and assembling and installation of equipment while technical experts dispatched by the contractor or supplier shall carry out adjustment and commissioning as well as initial guidance and guidance for operation and maintenance. Furthermore, since local engineers and workers lack experience of assembling and installation of the PV system equipment, technical experts dispatched by the contractor or supplier shall provide necessary training for such assembling and installation works in advance.

Sequence of Installation:

The sequence of the installation work is as follows:

- 1) Construction of foundation and installation of steel-frame supports for PV modules
- 2) Unpacking of shipping crates/cases, hauling and assembling of equipment and installation of equipment
- 3) Adjustment and trial-run
- 4) Initial operation guidance
- 5) Guidance for operation and maintenance
- 6) Acceptance test and handover

Construction and Installation Schedule:

Schedule of construction of foundation, installation of steel-frame supports for PV modules and installation of equipment is as shown in Table 2-19 hereinafter:

(1) Matters to be considered for installation

1) Installation method of HT transformer and auxiliary equipment

Specifications of HT transformer and its auxiliary equipment to be procured for the Project shall be same as the ones that JDECO usually use. Therefore, it is essential to discuss the matters concerning the installation of such transformer and equipment.

2) Security measures

In Palestine, the internal situation in West Bank and Gaza are quite different from each other and peace and order in Gaza is still precarious. On the other hand, the West Bank is relatively quite stable compared to Gaza and general situation of peace and order has been fairly improved compared to the past. The study team has never encountered with any troubles concerning security and safety measures in Ramallah where government function of Palestine is concentrated in and the Preparatory Survey Team frequently visited during the preparatory surveys. However, since there will be a possibility of occurrence of unforeseen state of affairs concerning security and safety measures, it is essential to be well prepared for such incident.

Although Jericho where the project site is located is most stable area in the West Bank, tensions escalated in elsewhere in the West Bank can easily be spread to all over the West Bank. Israeli settlements scattered in and around the West Bank are also an element of conflict and there will be a possibility of escalating tensions in the West Bank at any time.

In case of emergency such as armed uprising etc., the consultant and the prime contractor/supplier should contact the Japanese Embassy in Israel and JICA Office in Palestine and provide and share information to and with their staff engaged in

project implementation for taking appropriate measures as well as to confirm their safety.

In addition, an emergency call network shall be established and a mobile phone shall be provided to each and every person who is engaged in project implementation. Furthermore, whenever it is necessary to move close to a concerned area, personnel shall move by two cars.

3) Preparation of implementation schedule

When preparing the project implementation schedule, it shall be considered to commence construction of foundation for PV modules with steel-made support frames as well as ancillary facilities such as Monitor Building and Substation Building, as early as practically possible.

Furthermore, transportation of the equipment shall be divided into two shipments; first shipment should include PV modules, steel-made support frames, connection boxes, cables, and so on which can be manufactured in a relatively short period of time and remaining equipment such as power conditioners, distribution panels etc should be transported by second shipment.

(2) Considerations for procurement

Procurement plan shall be decided on by obtaining latest information as to security and safety related matters bearing in mind that access to the West Bank and movement within the West Bank would possibly be restricted at any time due to road blockade and strengthening of inspection by Israeli army.

Equipment and materials to be locally procured for the Project should be selected from those that have uniform quality and stable supply. During project implementation period, it is necessary to confirm that material specifications meet required levels with reference to the mill sheet of reinforcing bars and the results of concrete strength tests and so on.

2-2-4-3 Scope of Works

For the implementation of the Project, the Government of Japan and the Recipient shall be responsible for the procurement and installation of the project components as shown in Table 2-12 below:

Table 2-12 Major Undertakings to be borne by each Government

No.	Components	To be covered by Grant Aid	To be covered by Recipient Side
1.	Space for the installation of equipment		●
2.	Space for ancillary facilities		●
3.	Space for storing equipment and materials		●
4.	Primary high tension cable (33kv) for new substation		●
5.	Land leveling works (incl. removal of existing building)		●
6.	Retaining wall works (incl. embankment for access road)		●
7.	Cost of equipment and materials	●	
8.	Cost of packing and transporting equipment and construction materials	●	
9.	Cost of inland transportation of equipment and construction materials	●	
10.	Cost of delivering, installing and adjusting equipment and construction materials	●	
11.	Cost of soft components	●	
12.	Tax exemption (customs duties, VAT)		●
13.	Securing access road to site		●
14.	Construction of site office	●	
15.	Removal of existing perimeter fence		●

Source: Preparatory Survey Team

2-2-4-4 Consultant Supervision

The Japanese consultant will engage in the supervision of the Project pursuant to the following policies:

- Since the PV system will be composed of three (3) main components; i.e. PV system, display system and measurement and monitor system components, the Consultant will confirm whether the system interfaces meet the specifications.
- As the site area for the installation of equipment is quite large, the Consultant will supervise the installation and construction works so as to enable the said works to be completed within specified time schedule by monitoring the work progress as necessary.
- The Consultant will monitor the progress of technology transfer to be provided by the supplier/contractor so that the staff of the Implementing Agency may be able to acquire reasonable know-how as to the installation, adjustment and testing of the equipment.
- The Consultant will collect security related information and will share the same with the supplier/contractor to assure the safety of their staff and personnel.

Under these policies, as part of the supervision work of the consultant for this Project, the consultant will station one management engineer on the project site and other expert engineers will be dispatched in accordance with the progress of the installation and construction works.

And in Japan, during manufacturing or before shipping the equipment, the Consultant will witness the tests and inspections of the equipment and materials at manufacturers' plants/factories to confirm that the equipment and materials meet the specifications. The consultant will engage in the following supervision works:

- Confirmation and approval of shop drawings (incl. for construction works) and necessary documents for equipment and materials
- Attending to factory inspection/test
- Supervising the progress and safety control of the supplier/contractor
- Attending to equipment installation and construction works, adjustment and trial-run
- Approval of acceptance test procedures and test implementation plan
- Attending to the acceptance test (final inspection) and issue completion certificate of the installation work
- Implementing technical assistance called soft component
- Preparation of monthly progress reports and completion report to be submitted to the related organizations

2-2-4-5 Quality Control

(1) Inspection and acceptance test implementation plan (equipment work)

1) Basic policy

During the period of manufacturing of the equipment, the Consultant shall review all shop drawings for the equipment and installation and construction works to be submitted by the Contractor in terms of conformity with the contract documents and technical specifications and shall give necessary approvals.

And further, during the period of the installation and construction works, the Consultant shall review the statement of methodology including implementation structure, installation and construction schedules, sequence of installation and construction, and so on in terms of appropriateness of the same and shall give necessary approvals.

2) Quality inspection by the Consultant

As for the quality inspection for the equipment, the following inspections and acceptance test shall be conducted prior to the handover of the equipment.

a. Factory inspection

Prior to the shipment of the equipment out of the factory, each and all equipment shall be inspected as to their conformity with required specifications and performance test for the system shall also conducted.

b. Collation inspection prior to shipment

Though quantities of the principal equipment shall be confirmed at the time of the factory inspection, quantities of all equipment shall be confirmed during collation inspection prior to shipment to be conducted by third party inspection agency. Place of inspection shall be manufacturer's packing warehouse.

c. Interim inspection

Interim inspection (on-site acceptance inspection) shall be conducted for the equipment with the presence of the Consultant immediately after completion of adjustment of the equipment one after the other.

At the inspection, various test data required for the acceptance test shall be collected with the presence of the Consultant through the operation of the equipment by the expert who engaged with installation and adjustment of the said equipment. And, at the same time, specification of single and reciprocal operation of the equipment and quantities shall also be confirmed.

The interim inspection shall be held at last day of adjustment and commissioning of the equipment.

d. Acceptance test and handover

After completion of guidance on operation, counterparts of the Project with the presence of the Consultant shall verify required efficiency/performance and functions. Acceptance test shall be conducted by operating actual PV system.

After completion of the acceptance test, results of the test and data collected during the interim inspection shall be confirmed among the counterparts, the Consultant and the Contractor. Then, the Project will be handed over to the Implementation Agency (the Palestinian Energy Authority).

(2) Quality control plan (construction work)

1) Basic policy

At the time of preparation of the proposed tender documents, the outline design drawings shall be prepared after reviewing construction details using local materials and widely adopted local construction method with giving consideration

of construction situation in Palestine and the maintenance cost.

And, as for the technical specifications, reference shall be made to Palestinian Standard, Japanese Architectural Standard Specification (JASS), Japan Industrial Standard (JIS), British Standard (BS), and American Society for Testing and Materials (ASTM) and so on in order to secure high quality of the construction and installation works.

During the construction of equipment foundation and ancillary facilities for the Project, the Consultant shall review all the submittals from the Contractor such as statement of methodology including implementing structure, construction and installation schedules, and shop drawings in terms of conformity of such submittals with the contract documents and technical specifications and give necessary approvals.

2) Quality inspection by the Consultant

On site, the Consultant shall review and/or examine the statement of methodology and material sample in terms of conformity of the construction materials and construction quality with the relevant technical specifications and give necessary approvals prior to the commencement of each category of the construction work.

And, after the commencement of each category of the construction work, the Consultant shall conduct inspections as necessary in accordance with check sheets highlighting important check points prepared based on the approved statement of methodology.

Although all construction materials used for the Project can be procured locally, random inspection shall be conducted as necessary in order to secure the required quality in addition to obtaining manufacturer's warranty.

a. Earth work and foundation work

Since the extent of the area for construction of concrete foundation for installation of PV modules is quite large, appropriate work plan and curing plan shall be prepared with consideration of earth excavation, curing of excavated surfaces, placing of concrete, backfilling and compaction and so on.

b. Re-bar work

The Consultant shall confirm the mill certificate prepared by the manufacturer and submitted by the Contractor. And, at the same time, the Consultant shall also conduct random inspections of the reinforcing steel bars regarding the yield strength in terms of conformity with the relevant technical

specifications.

And, the Consultant shall review the shop drawings and inspect re-bar arrangement regarding joints, anchorage, quantities, concrete coverage, and so on for each element of reinforced concrete structure.

c. Concrete work

There are two (2) ready mixed concrete plants in Jericho. They are located at a distance of within one hour by delivery truck from the project site and the daily production capacity, the materials storage condition and the quality control in production are acceptable. Therefore, ready mixed concrete shall be adopted for the strength categories required by this report under structural design. The items of inspections and their methodologies for quality control of concrete which shall be conducted by the contractor with the presence of the Consultant are described as follows:

A. Materials for concrete

Material	Item to be inspected	Method of inspection
Cement	Hydration heat	Dissolution heat
Sand/ Gravel/ Crushed Stone	Grading	Sieve analysis
	Absolute dry specific gravity	Specific gravity and water absorption test
	Alkali aggregate reaction	Alkali-reactive test
Water	Organic impurities etc.	Water quality test

B. Trial mix for ready-mixed concrete

Item to be inspected	Method of inspection
Assumption of compressive strength	Compression test machine
Slump	Slump cone
Concrete humidity	Hygrometer
Air content	Manometer
Chloride volume	Measuring instrument for salt

C. Inspection before casting concrete

Item to be inspected	Method of inspection
Time taken for mixing and casting concrete	Review log book / stop watch
Slump	Slump cone
Concrete temperature	Thermometer
Air contents	Manometer / Air pressure gauge
Chloride volume	Chloride test paper

D. Inspection of completed concrete work

Item to be inspected	Method of inspection
Compressive strength for structural concrete	Schmidt hammer
Accuracy / precision (plumb)	Plum bob, measuring tape
Accuracy / precision (floor slab levelness)	Auto level, measuring tape
Finish	Visual inspection

2-2-4-6 Procurement Plan

(1) Suppliers of equipment and materials

Principal equipment for the Project is as follows:

- 1) PV modules
- 2) Power conditioners (incl. step-up transformers)

And, non-principal materials and equipment for the Project is as follows:

- 1) Connection boxes
- 2) Collection boxes
- 3) Supporting structure for PV modules
- 4) Data management and monitoring system (incl. personal computer and software)
- 5) Meteorological observation instruments (Solar radiation meter and Thermometer)
- 6) Display
- 7) Substation equipment (incl. network transformer 33KV→380V、 630kVA)
- 8) Surveillance cameras
- 9) LCD Monitor
- 10) Digital Video Recorder
- 11) Additional Hard Disk
- 12) Power Supply Unit
- 13) Cabinet Rack
- 14) Low voltage distribution panels
- 15) Electrical cables
- 16) Control cables
- 17) Grounding materials
- 18) Construction materials and equipment such as concrete to be used for the construction and installation works

Among the non-principal equipment and materials mentioned above, the construction materials such as cement, aggregates, reinforcing steel bars, lumbers for shuttering and so on as well as network transformer (33KV→380V、 630kVA) to be conformed with JDECO technical specification and some electrical cables shall be procured locally since these materials are widely distributed and available in Palestine

and their quality are in conformity with International Standards.

On the other hand, since the remaining non-principal equipment and materials are not being manufactured and/or distributed in Palestine, such equipment shall be procured from overseas. However, it is essential that the supplier for such equipment and materials has an agent in Palestine or has appropriate after-service network as the provision of the after-sales services of the PV system is indispensable.

As for the procurement from overseas, the principal equipment shall be procured from Japan as explained in Section 2-2-1-8 (2) and the non-principal materials and equipment shall also be procured from Japan.

As a result, the principal and non-principal equipment and materials will be sourced as shown in Table 2-13 below:

Table 2-13 List of Sources of Equipment and Materials

Name of Equipment	Source of Procurement		
	Palestine	Japan	Third Country
[Principal Equipment]			
PV modules		○	
Power conditioners (incl. step-up transformers)		○	
[Non-principal Equipment]			
Connection boxes		○	
Collection boxes		○	
Supporting structures for PV modules		○	
Data management and monitoring system (incl. personal computer and software)		○	
Meteorological observation instruments (Solar radiation meter and Thermometer)		○	
Display		○	
Substation equipment (incl. network transformer 33KV→380V、630kVA)	○		
Surveillance cameras (incl. LCD monitor etc.)		○	
Low voltage distribution panels		○	
Electrical cables	○	○	
Control cables		○	
Ratio (%)	%	%	%

Name of Material	Source of Procurement		
	Palestine	Japan	Third Country
[Materials]			
Construction Materials:			
Reinforcing steel bars	○		
Structural Steel (PV supporting frame)		○	
Cement, aggregates (sand and crushed stone)	○		
Plywood and lumbers for formwork	○		
Concrete secondary products (slab blocks, etc.)	○		
Stone veneers	○		
Doors and window sashes	○		
Floor terrazzo	○		
Finish materials (tiles, ceiling boards, paints, etc.)	○		
Materials for Mechanical Work:			
Pipes (incl. accessories)	○		
Sanitary wares	○		
Exhaust fans and air-conditioners	○		
Materials for Electrical Work:			
Cables and wires	○		
Ratio (%)	%	%	%

Source: Preparatory Survey Team

(2) Procurement plan

The procurement contract shall include responsibility for design, manufacture, coating, factory test and inspection, packing, transportation, installation, trial testing by the suppliers; acceptance inspection pursuant to the specifications of equipment prepared by the Consultant, and delivery of the equipment and facilities after fully confirming the operation by site tests and inspections. The suppliers shall obtain approval for inland transportation and installation work, prepare necessary documents relevant to the installation work on site, and have sufficient discussions with the Implementing Agency. Equipment installation shall be conducted with the following policies:

1) Installation work

As local firms have lack of experience in installing PV system, they shall conduct unpacking of the equipment and materials, construction of foundations and facilities, assembling and installation of the equipment. Technical experts to be dispatched by the contractor and/or supplier shall be in charge of equipment adjustment, trial-run, initial operation guidance. And, as local firms have lack of experience in assembling and installing the PV system, the said technical experts shall provide the local firms with training for installation prior to the commencement of the installation of the equipment.

a. Sequence of installation work

- 1) Construction of foundation and installation of steel-frame supports for PV modules
- 2) Unpacking of shipping crates/cases, assembling of equipment and installation of PV modules
- 3) Cabling and wiring for PV modules
- 4) Adjustment and trial-run
- 5) Initial operation guidance
- 6) Guidance for operation and maintenance
- 7) Acceptance test and handover

b. Construction schedule

Construction schedule for foundations and ancillary facilities and equipment installation schedule is shown in Table 2-19 hereinafter.

Required man-days for unpacking, assembling and installation of equipment, and other works including adjustment and trial run will be collected from manufacturers of the PV system in Japan. In addition, a civil engineer and an electrical, who will be working as translator from time to time, will be

assigned for the duration of corresponding work.

c. Local Engineer

Two (2) local engineers will be assigned for the Project to oversee unpacking, assembling and installation of PV system equipment. However, since it is quite new to Palestine to install such PV system, those local engineers have to take three (3) days training to be conducted by the expert to be assigned by the contractor and/or supplier prior to start overseeing the installation work.

2) Technology transfer to PEA

This Project assumes that total capacity of the PV system might be expanded to 500KWp by self-effort of Palestine. And therefore, the supplier shall provide technology transfer to the staff of the PEA for their installation, adjustment and trial-run during project implementation period so that the PEA may be able to install and configure the PV system on its own after the completion of the Project.

(3) Transportation plan

1) Equipment and materials to be procured in Palestine

As for the materials to be procured locally consist mainly of the construction materials such as cement, re-bars, etc, the supplier will directly procure from the local suppliers and deliver such materials to the project site by themselves. In addition, the supplier will subcontract the construction work to local contractor.

2) Equipment and materials to be procured in Japan

There are three (3) major ports in Israel; namely, Ashdod Port, Haifa Port and Eilat Port. However, most seaborne cargoes are unloaded and handled at the ports in Ashdod and Haifa that have better port facilities. And, since shipping route between Yokohama and Ashdod has most numbers of liners, all equipment to be procured from Japan for this Project shall be shipped from Yokohama and unloaded at Ashdod port. Then, after clearing customs, the equipment shall be delivered to the project site by inland transportation between Israel and Palestine which shall be arranged by the supplier.

3) Classification of equipment transportation

As for the inland transportation of the equipment from port of discharge in Israel and the project site in Palestine, trailer and/or container truck shall be used for the inland transportation. In addition, giving consideration of procurement situations of the trailers and/or container trucks and transporting route, 20 foot containers shall be used and total weight thereof shall be less than 23 tons.

Travelling time from Ashdod port to the project site will be approximately five (5) hours.

2-2-4-7 Initial Operation Guidance Plan

PV system with the capacity of 300 KWp provided by the Project is to be introduced for the first time for the PEA. And, installation of the grid-connected PV system with reverse power flow will be first case in Palestine. Therefore, it is indispensable to provide guidance on initial operation for the counterparts in order to realize sustainable operation of the PV system to be installed by this Project.

Target organization for the initial operation guidance shall be the PEA that will be responsible for the operation and maintenance of the systems. And, instructors for the initial operation guidance shall be the engineers who have been dispatched by the supplier and engaged in the installation the systems.

Outline of the initial operation guidance for the PV system and CCTV system is described as follows:

(1) PV system

1) Items, contents and methods of guidance

The initial operation guidance for the PV system consist of PV modules, connection boxes, collection boxes and power conditioners which are main components of the system, monitoring equipment, meteorological observation devices, and display which are supplementary equipment, system equipment of the substation for grid-connection, and so on will be conducted by the engineers who have been engaged in the installation work to the staff from the PEA. The contents and methods of the initial operation guidance are as shown in Table 2-14 below.

Table 2-14 Initial Operation Guidance for PV System

Item	Contents	Guidance Method
Initial Operation Guidance	<ul style="list-style-type: none"> • To provide guidance on visual inspection items for PV modules, confirmation of module connections, and measurement of grounding resistance. • To provide guidance on visual inspection items for connection boxes, confirmation of its connection with PV modules and power conditioners, as well as confirmation of insulation resistance, open voltage, polarity, etc. • To provide guidance on visual inspection items for power conditioners, confirmation of its connection with connection boxes, collection boxes and substation equipment, as well as confirmation of insulation resistance and phase rotation, method of measurement of grounding resistance, etc. • To provide guidance on visual inspection items for substation equipment, confirmation of connection with power conditioners and main incoming cable, insulation resistance, grounding resistance, phase rotation, etc. • To provide guidance on protection switching gears and relays to be equipped with power conditioners and substation equipment and confirmation of their functions and method of setting. • To provide guidance on method of operation and shut-off, and method of measurement such as voltage of power to be generated and received. • To provide guidance on personal computer (PC) and power conditioners, confirmation of connection with display system and operation of data management and monitoring system and display system. • To provide guidance on connection of watt-hour meter and reading quantity of power being generated, power demand and quantity of power being sold through the grid. • To provide guidance on visual inspection items for meteorology observation instruments, confirmation of its connection, and collection and handling the data. 	<p><u>Initial Operation:</u> To explain equipment operation and provide guidance including on-the-job training for equipment handling and operation by using the operation manuals and to confirm trainees' learning level i.e. proficiency.</p> <p><u>Operation:</u> To practice system operation and daily and regular inspections as well as data collection and analysis by using manufacturers' shop drawings, operation manuals, schematic diagrams, etc and to confirm trainees' learning level i.e. proficiency through on-the-job training.</p>

Source: Preparatory Survey Team

2) Implementing plan

The initial operation guidance will be conducted on the project site by an engineer who has been dispatched by the contractor with a local engineer for two (2) weeks after the installation, adjustment and trial-run of the PV system.

(2) CCTV system

1) Items, contents and method of guidance

The initial operation guidance for CCTV system will be conducted by the engineers who have been engaged in the installation work to the staff from the PEA. The contents and methods of the initial operation guidance are as shown in Table 2-15 below.

Table 2-15 Initial Operation Guidance for CCTV System

Item	Contents	Guidance Method
Initial Operation Guidance	<ul style="list-style-type: none"> • To explain outline of the system. • To explain function and specification of system components such as CCTV camera, monitor, etc. • To practice stating the system, daily operation, operation sequence including shutting off the system. • To explain items malfunctions and ways and means of troubleshooting. • To provide guidance on maintenance items for daily and regular inspections and to practice the maintenance of the system. 	<p><u>Initial Operation:</u> To explain equipment operation and provide guidance including on-the-job training for equipment handling and operation by using the operation manuals and to confirm trainees' learning level i.e. proficiency.</p> <p><u>Operation:</u> To practice system operation and daily and regular inspections by using manufacturers' shop drawings, operation manuals, schematic diagrams, etc and to confirm trainees' learning level i.e. proficiency through on-the-job training.</p>

Source: Preparatory Survey Team

2) Implementing plan

The initial operation guidance will be conducted on the project site by an engineer who has been engaged in the installation work with a local engineer for two (2) days after the installation, adjustment and trial-run of the CCTV system.

2-2-4-8 Soft Component (Technical Assistance) Plan

(1) Necessity of the Soft-Component Works (technical assistance)

The capacity of the PV system which will be installed by Japanese Grant Aid i.e. 300kW shall be the biggest in Palestine, although there are some PV systems with power-generating capacity of 5-10 kW. This shall be the first case for the both organization of the PEA and power distribution company i.e. JDECO to operate the PV system of such capacity.

On introduction of the new system, staff training is needed to practice appropriate operation and maintenance. Establishment of a new work-flow for maintenance staff from data compilation to data analysis and situation prediction is also required. In addition, staff is required to be skilled enough to analyze and recover from the basic system trouble. A close coordination with JDECO is also required in order to secure safe and stable operation of power distribution network.

As described above, to achieve the objective of “The Project for Introduction of Clean Energy by Solar Electricity Generation System” as a Japanese Grant Aid, staff improvement of knowledge and skill on operation and maintenance of the PV system is necessary. Therefore, the Preparatory Survey Team proposes the implementation of “Training program for capacity building on management, operation and maintenance of solar electricity generation system” as the Soft-Component Work.

(2) Outline of the Soft-Component Works (technical assistance)

The outline of the Soft-Component Works named “Training program for capacity building on management, operation and maintenance of solar electricity generation system” is described as below:

1) Outcome of the training program

The objective of the training program is to formulate the foundation for smooth project start-up of the grant aid “The Project for Introduction of Clean Energy by Solar Electricity Generation System”.

2) Outputs of the training program

The following four (4) outputs should be achieved when the training program has been completed:

- ① The trainees understand the operation and maintenance method of the PV system and the equipment thereof.
- ② The trainees understand its purpose and method of meteorological and other relevant data accumulation including compilation and processing thereof.
- ③ The trainees understand how to prevent and handle with troubles concerning the grid-connected PV system.
- ④ The trainees understand continuous power flow form the PV system to the existing power grid.

(3) Contents, target group and schedule of the Soft-Component Works

Activities of the training program for expected outputs are as shown in the Table 2-16 below:

Table 2-16 Outputs and activities of the Training Program

Outputs	Activities
1. The trainees understand the operation and maintenance method of the PV system and its equipment	1-1 Provide technical guidance for planning of equipment renewal since service life of each component for PV system varies and it is required to renew each component appropriately 1-2 Provide technical guidance for appropriate dispatching of expert since it is recommended that periodical inspection and/or repairing work shall be carried out by the expert from manufacturer of the equipment 1-3 Develop textbook about PV system and conduct the training program including practical training 1-4 Conduct the trainees to develop a maintenance manual, which includes the maintenance structure 1-5 Conduct the trainees to develop the utilities maintenance guideline 1-6 Test the trainees' comprehension at the end of the training program
2. The trainees understand its purpose and method of data accumulation including data compilation and processing.	2-1 Develop textbook about the purpose and method of data accumulation including data compilation and processing, and conduct training program including practical training 2-2 Develop textbook about the method of data archive/utilization, and conduct training program including practical training 2-3 Conduct the trainees to develop a manual for data accumulation method
3. The trainees understand how to prevent and handle with the system troubles and/or malfunctions concerning the PV system and grid-connection with power distribution network.	3-1 Develop textbook about how to prevent and handle with the PV system trouble, and conduct training program including practical training 3-2 Develop textbook about how to prepare and accumulate the trouble shooting reports and conduct the training program including practical training. 3-3 Test the trainees' comprehension at the end of the training program 3-4 Conduct the trainees to develop a manual on prevention and handling with the system troubles, which includes daily level troubleshooting way and preparation/accumulation way of trouble reports.
4. The trainees understand the continuous power system to the power distribution network owned and managed by JDECO (grid-connected system)	4-1 Develop textbook about network system and conduct the training program including practical training.

Source: Preparatory Survey Team

As described in the Table 2-16 above, the contents of the training program are divided into three (3) categories as follows: 1) Operation and maintenance method of the PV system and its equipment, 2) Data utilization method of collected data from the

system operation, and 3) and 4) operation of power distribution network.

On the other hand, target group (trainees) of the said training program is as shown in the Table 2-17 below:

Although operation and maintenance of the PV system and ancillary facilities procured, installed and constructed by the Project will be carried out by PEA, two (2) engineers from PIEFZA are included in the list of trainees since their cooperation will be inevitable after JAIP has been commenced its operation.




Table 2-17 List of Trainees (Target Group for the Training Program)

No.	Organization	Number of Trainees
1	In charge of maintenance, PEA	4
2	In charge of renewal energy, PEC	1
3	Engineers of PIEFZA	2
4	JDECO (Jericho Branch)	2
5	JDECO (Head Office)	1
Total		10

Source: Preparatory Survey Team

And, assumed implementation schedule of the Soft-Component Works is as shown in the Table 2-18 below:

Table 2-18 Schedule of the Training Program

2011	November	December	January
Preparation work In Japan	 0.4MM		
Training Program In Palestine		 1.0MM	
Reporting etc. In Japan			 0.1MM

Source: Preparatory Survey Team

2-2-4-9 Implementation Schedule

Most rational implementation schedule for the procurement and installation work of the Project is as shown in Table 2-19 below. Total project implementation period will be 18 months that is 4.5 months for detailed design and tender process, 12.5 months for procurement and 1 month for soft component.

Table 2-19 Implementation Schedule

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Detailed Design		■	(Field Survey)											
	□	□	(Works in Japan)	□			(Tender Process)	□			(4.5 Months)			
Procurement and Installation														
	□								□					
	(12.5 Months)			■										
Soft Component														
						(1.5 Months)			(Soft Component)			□	■	□

Source: Preparatory Survey Team

2-3 Obligations of Recipient Country

Upon the implementation of this Project as a grant aid from Japan, Palestine shall be responsible for undertaking those items indicated in Section 2-2-4-3 “Scope of Works” and both governments of Japan and Palestine have confirmed the needs for taking the following measures:

(1) Undertakings to be borne by Palestinian side

1) Procedures for land

In this Project, procured equipment and materials will be installed at a part of the land (approx. 1.3ha) allocated for JAIP Phase-I. However, land preparation including cutting, filling, and compaction and levelling of the project site is expected to be completed on or around September 2010.

2) Tax exemption

The Palestinian Authority will exempt customs duties, domestic taxes and other charges for Japanese nationals entering into the recipient country to procure and install equipment and materials based on the procurement contract of the Project and to implement various activities. The Palestinian Authority will also facilitate prompt processing of customs clearance of procured equipment and materials, and exempt import duties and VAT for such equipment and materials.

3) Convenience provision

To accord all engineers dispatched by the contractor and/or supplier, whose services may be required in connection with the supply of the products and the services under the verified contract, such conveniences as may be necessary for their entry into Palestine and stay therein for the performance of their work.

4) Banking Arrangement (B/A), Authorization to Pay (A/P)

The Palestinian Authority will open a bank account in its name at a Japanese bank and issue A/P to the bank. Based on the B/A, the Palestinian side should bear an advising commissions of an Authorization to Pay and payment commissions to the Bank.

(2) Works by Palestine

Site for this Project will be provided at free of charge by PIEFZA that is in jurisdiction of the development of the JAIP. And, since construction of access road to the project site and land preparation and levelling are and will be implemented by UNDP assistance through contribution from the Government of Japan, the undertaking by the PEA which is the Implementing Agency of the Project is as follow:

1) Laying high tension (33kv) incoming cable to substation

Palestinian side shall provide incoming high tension underground cable which shall be laid from existing JDECO switching gear station to new substation which will be built by the Project for grid-connected PV system with reverse power flow.

2-4 Project Operation and Maintenance Plan

2-4-1 Operation and Maintenance Plan

Operation and maintenance structure and inspection items for the PV system to be provided by the Project are described hereinafter:

(1) Operation and Maintenance Structure

Operation and maintenance of the PV system and ancillary facilities procured, installed and constructed by the Project will be carried out by PEA, under supervision of PEC which is an agency within jurisdiction of PEA and responsible for utilization of the renewable energy, that is planning to employ two (2) electrical engineers and a security guard (night duty) for that purposes.

The organization chart of PEA⁷ is shown in Fig. 2-7 below:

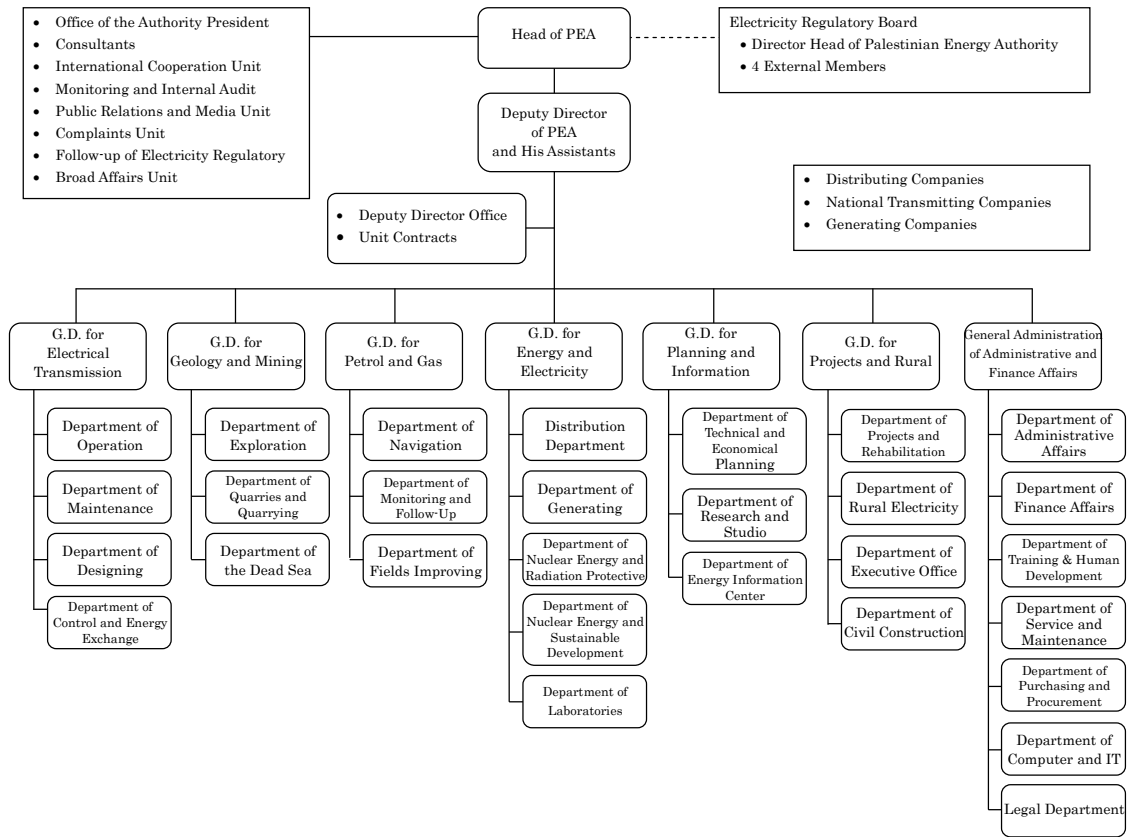


Fig. 2-7 Organization Chart of PEA

And, the organization chart of PEC⁸ is shown in Fig. 2-8 below:

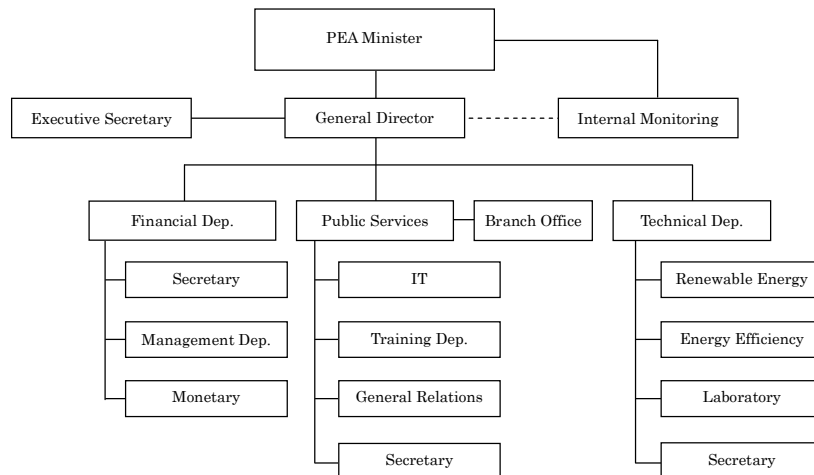


Fig. 2-8 Organization Chart of PEC

⁷ PEA has about 200 staff as of April 2010.

⁸ PEC has 20+ staff as of April 2010.

However, the operation and maintenance of high tension substation with auxiliary equipment shall be entrusted to JDECO that is in jurisdiction of power distribution network in Jericho.

(2) PV System Inspection Items

1) Routine inspection (more than once a month)

- a. Visual inspection: for PV modules, connecting boxes, power conditioners, etc.
- b. Measurement and Test: None
- c. Work items: Cleaning etc.

2) Regular inspection (more than twice a year in accordance with the rules of JEM-TR288):

- a. Visual and touch inspection: for PV modules, connecting boxes, power conditioners, etc.
- b. Measurement of insulation resistance: for connection boxes, power conditioners, switching gears, etc.
- c. Open voltage: Relay terminal boxes

(3) Spare parts and Consumables

1) Spare parts

- a. PV modules (2% of total capacity)

2) Consumables (for power conditioners and distribution panels)

- a. 1 pc each of lamp
- b. 1 pc each of fuse

2-4-2 Operation and Maintenance Cost

The equipment procured by this grant aid project will mainly consist of PV modules, power conditioners, meteorology observation system, monitoring system (PC), display, substation equipment and so on. Since all such equipment will be newly installed, items for operation and maintenance costs that corresponding budget allocation are necessary will be as follows:

- (1) Cost for administration of sale of power generated by PV system
- (2) Cost of electricity for operation of measurement and monitoring system, display, etc.
- (3) Cost of personnel expenses for regular cleaning for PV modules
- (4) Cost of personnel expenses for operation and maintenance for PV system, substation, and mechanical and electrical works in general for ancillary facilities
- (5) Cost of procurement of water for living

(6) Cost of spare parts and consumables

Outline of the above-mentioned operation and maintenance costs are described hereinafter:

(1) Cost for administration of sale of power generated by PV system

Although it is assumed that the sale price of the electricity and administration system of the sale volume of the electricity will be set forth as the terms and conditions in the agreement to be concluded between the PEA and JDECO, any expenses to be incurred for administration of the sale volume of the electricity shall be supplemented by the sales of the electricity.

(2) Electricity charges for operation of measurement and monitoring system, display, etc.

Electricity charge to be incurred for the operation of the measurement and monitoring system and a display (32 inch) as well as for the ancillary facilities such as monitor building and substation and outdoor light and so on is estimated at NIS 7,200 per annum.

(3) Cost of personnel expenses for regular cleaning for PV modules

Cost of personal expenses for regular cleaning of the PV modules once a month is estimated at NIS 9,000 per annum.

(4) Cost of personnel expenses for operation and maintenance for PV system, substation, and mechanical and electrical works in general for ancillary facilities

Since the PV system and its ancillary facilities that will be procured and installed by this Project is completely a new facility, it is assumed that two (2) operation and maintenance staff and a security guard will have to be newly employed. Thus, cost of such personnel expenses i.e. salaries for such new employees are estimated at NIS 108,000 per annum.

(5) Cost of procurement of water for living

There is no piped water distribution network on the project site. And, therefore, water for living for operation and maintenance staff to be stationed at the monitor building has to be procured from other source until the time JAIP would start operation. Cost of procurement of such water is estimated at NIS 1,200 per annum with assumption of monthly average consumption of 4.0 m³ of water.

(6) Cost of spare parts and consumables

Measurement and monitoring system to be installed on site will include an ink-jet printer that will be placed in the monitor building. And, it is assumed that ink cartridge of the printer has to be replaced four (4) times a year. Thus, cost of replacing ink cartridge is estimated at NIS 600 per annum.

Furthermore, procurement of spare parts and consumables for ancillary facilities such as monitor building and substation building as well as outdoor light will also be required.

Costs mentioned above are summarized in Table 2-20 below.

Table 2-20 Estimated Operation and Maintenance Costs

Unit: New Israel Shekel (NIS)

Cost Item	1st year	2 nd year and after	Remarks
Cost for administration of sale of power generated by PV system	0.00	0.00	
Electricity charge for operation of measurement and monitoring system, display and so on	7,740	7,740	1,500KWh/month
Cost of personnel expenses for regular cleaning for PV modules	9,000	9,000	15 man-days/month
Cost of personnel expenses for operation and maintenance for PV system, substation, and mechanical and electrical works in general for ancillary facilities	108,000	108,000	
Cost of procurement of water for living	1,200	1,200	4.0 m3 /month
Cost of spare parts and consumables	2,400	2,400	
TOTAL	128,340	128,340	

Note: NIS 1.00 = JPY 25.15

Source: Preparatory Survey Team

CHAPTER 3
PROJECT EVALUATION AND
RECOMMENDATIONS

Chapter 3 Project Evaluation and Recommendations

3-1 Project Effect

(1) Expected effects by implementation of the Project

The specific direct and indirect effects (results) etc expected to be achieved by the implementation of the Project are as shown in the Table 3-1 below:

Table 3-1 Project Effects

Current Situation and Issues	Measures in the Project	Direct Effects	Indirect Effects and Extent of Improvement
<p>(1) Palestine lacks abilities and funds to manage reduction of greenhouse gases (GHG) economic growth at the same time.</p> <p>(2) Infrastructures for renewable energy are not yet established and no policies such as subsidy are not yet prepared and/or implemented.</p> <p>(3) No laws and/or regulations for power generation project are established yet.</p>	<p>(1) Introduction of grid-connected photovoltaic (PV) system.</p> <p>(2) Technical guidance for operation and maintenance of the PV system by Soft Component (Technical Assistance)</p>	<p>(1) Reduction of <u>290.6 tons</u> of greenhouse gas (CO₂) will be achieved. (refer to Table 3-3)</p> <p>(2) Expenditures by the National Treasury can be reduced because of reduction of imports of electricity due to own power generation by photovoltaic (PV) system. Furthermore, electricity charges for common facilities for Agro-Industrial Park can be saved in future.</p>	<p>(1) Introduction of photovoltaic (PV) system will contribute to extension and expansion of solar power generation in Palestine.</p> <p>(2) Since world-wide extension and expansion of PV system is expected in near future, its allied industries will be promoted in Palestine through extension of PV system in Palestine.</p>

Source: Preparatory Survey Team

(2) Showcase effects

Although it is expected that the Project will receive many visitors from other donors, international organization, universities and so on since the PV system to be procured and installed by the Project will be a first case of grid-connected PV system with reverse power flow in Palestine, showcase effects of the Project are as shown in Table 3-2 below:

Table 3-2 Showcase Effects

No.	Indicators	Project Site (Jericho Agro-Industrial Park :JAIP)
1.	Place of Installation	Located in the southern fringe of the Jericho Municipality, about 4.5 km from the city center
2.	Number of vehicles to and from the JAIP (Total number of vehicles estimated in Stages I and II)	According to F/S Report for JAIP, the daily traffic volume to and from JAIP is estimated to be <u>575</u> vehicle in Stage I and <u>2,730</u> vehicles in Stage II. Thus, annual traffic volume is estimated to be <u>859,300</u> vehicles (3,305 x 52 weeks x 5 days/week).
3.	Number of employees the JAIP (Total number of employees estimated for Stages I, II and III)	According to F/S Report for JAIP, total number of employees in JAIP is estimated at <u>7,000</u> i.e. 710, 2520 and 3,770 for Stages I, II and III respectively.
4.	Others	Total population (approx. <u>40,000</u>) of Jericho Municipality (2007)

Source: Preparatory Survey Team

(3) Effect of reduction of carbon dioxide (CO₂)

Direct effect by the implementation of the Project is a reduction of CO₂, an amount of which is estimated at approx. 290.6 ton/year as shown in Table 3-3 below when it is assumed that the power generated by the photovoltaic system to be procured and installed by the Project is the substitution for the power generated by the power plant burning heavy oil. The said reduction of CO₂ is equivalent to the amount of CO₂ absorption by 21,000 cedar trees and is equivalent to the saving of about 107.2 kilo-liter of heavy oil.

Table 3-3 Amount of Greenhouse Gas (CO₂) Reductions

Project Site/ Output	Jericho Agro-Industrial Park/ 300kW
Lifecycle emission of carbon dioxide (CO ₂) by Gas-combined Cycle Power Plant (g-CO ₂ /kWh) ¹	742.1
Lifecycle emission of carbon dioxide (CO ₂) by PV System (g-CO ₂ /kWh) ²	53.4
Expected amount of Power Generation (kWh)	422,000
Amount of CO ₂ Reduction (t-CO ₂ /y) when substitute power generation by PV system	$(742.1-53.4) \times 422,000/1,000,000=$ <u>290.6</u>

Source: Prepared by the Preparatory Survey Team based on data provided by New Energy and Industrial Technology Development Organization (NEDO)

It is expected that an enlightening effect for the renewable energy in Palestine will be heightened through the installation of first large-scale PV system in Jericho where drawn

¹ Data provided by New Energy and Industrial Technology Development Organization (NEDO)

² Data provided by New Energy and Industrial Technology Development Organization (NEDO)

considerable attention from the whole world as most desirable location for the installation of solar power generation system. And, as for the indirect effects of the Project, it is expected to realize supplying a part of power demand in Palestine and the reduction of consumption of fossil fuel and GHG through further extension and expansion of PV system with reverse power flow in Palestine in near future which will enable to contribute to measures and policies to be taken for the climate change in the world and Palestine that is a member nation of the Cool Earth Partnership.

3-2 Recommendations

In Palestine, Palestinian Energy & Environment Research Center (PEC) which is an agency within jurisdiction of Palestinian Energy Authority (PEA) takes the lead in efforts for reduction of greenhouse gases through promotion and extension of clean energy. However, Palestine is facing with delaying introduction of necessary technologies for renewable energy and lack of fund for implementing projects and is expecting technical and financial supports from advanced nations and international organizations. Thus, taking an opportunity for Japan's Grant Aid, Palestine is intending to develop renewable energy towards prevention of global warming.

This Project is an important project for a start of extension and expansion of PV system in Palestine and will be a catalyst for realizing commercial-base solar power generation in near future in Palestine. Thus, Palestine will be able to contribute to the prevention of global warming from now on.

3-2-1 Issues to be addressed by the recipient country and recommendations

It is quite important to attempt extension and expansion of the PV system in Palestine which is one mean of utilization of the renewable energy by taking an opportunity for introduction of the PV system through implementation of the Project. It is therefore provision and establishment of various national policies and measures such as tax incentive, subsidy, feed-in tariff and renewable portfolio standard (RPS) which defines ratio of production renewable energy by the power company will be necessary.

And, as for the regulations relevant to the electric power industry, New Electrical Law which has come into effect in May 2009 prescribes establishment of Palestinian Electricity Regulatory Council (PERC) which will be an advisory committee for approval and permission of matters relevant to the electric power industry once it has established in near future. Furthermore, it is also expected to establish Palestine Transmission Electrical Limited (PTEL) which will be a

comprehensive management company³ for transmission lines in the West Bank and the establishment of PTEL will enable Third Party Access⁴ (TPA). It is therefore establishment of a structure for PERC that will function substantially is an urgent subject.

3-2-2 Technical cooperation and tie-up with other donors

Technical and financial supports from advanced nations including Japan and international organizations etc. will be inevitable in order to realize the installation of PV system at each residential unit, work place and place of business as well as commercial-base power generation in Palestine while attempting further extension and expansion of PV system. And, therefore, technical cooperation by private sector in Japan through JICA in the fields of production of solar panels, systemization of grid-connection with reverse power flow, large-scale battery system, smart grid, and so on as well as financial support will be necessary.

³ PTEL is also planning to provide its own transmission lines.

⁴ Any third party i.e. power company can connect their power with the grid (grid-connection with reverse power flow).