



# University of Leicester

**DEPARTMENT OF ENGINEERING**

**PHOTO-VOLTAIC DEMONSTRATION**

**AND RESEARCH FACILITY**

**TECHNICAL DETAILS**

Dr Hans Bleijs

Department of Engineering

University Road, Leicester LE1 7RH

Tel. 0116 252 2553, fax. 0116 252 2619

Email: [j.bleijs@leicester.ac.uk](mailto:j.bleijs@leicester.ac.uk)

## UNIVERSITY OF LEICESTER

### PHOTO-VOLTAIC DEMONSTRATION AND RESEARCH FACILITY

<b>Location</b>	Concrete Laboratory, Department of Engineering (ULDE)
<b>Scientific Officer</b>	Dr Hans (J.A.M.) Bleijs, Lecturer in Engineering
<b>Design</b>	Dr Bleijs/Dr Simmons (ULDE) & PV Facades
<b>Installer</b>	PV Facades (Romsey) Ltd
<b>Date of installation</b>	November 2004
<b><u>PV System Details</u></b>	
<b>Installed power</b>	11.5 kW <sub>p</sub> (under STC @ 1000W/m <sup>2</sup> )
<b>Energy yield</b>	7,500 kWh per year (estimated)
<b>Position</b>	Pitched roof
<b>Integration type</b>	Over-roof (Photo 1)
<b>Mounting system</b>	Modules clamped to Schuco sub-frame, riveted to existing roof corrugations (Photo 2)
<b>Roof area</b>	South-West slope: 106 m <sup>2</sup> ; PV modules: 82 m <sup>2</sup>
<b>Orientation</b>	-45 <sup>0</sup> (South-West)
<b>Inclination (hor.)</b>	16 <sup>0</sup>
<b>PV modules</b>	64 x BP Solar Saturn 7180, in 4 horizontal rows
<b>Configuration</b> (see Figure 1)	Arrays 1 & 2: 4 modules each (series connected) Array 3: 6 modules (series connected) Array 4: 6 modules (parallel connected) Array 5: 12 modules (2 strings of 6 modules in parallel) Arrays 6 & 7: 16 modules each (2 strings of 8 in parallel)
<b>Inverters</b> (see Photo3)	SMA Sunny Boy series: SB700 (2x), SB1100E, SB1100LV, SB1700E, SB2500 (2x), mounted inside building
<b>Grid connection</b>	3-phase with G59 protection (Figure 3)
<b>Special features</b>	All module connections marshalled to a patch panel inside building (see Photo 3 & Figure 2)

## **Instrumentation and data monitoring/display**

<b>Data monitoring</b>	SMA Sunny Boy Control <sup>+</sup> and DataTaker DT800 with associated software
<b>Data storage</b>	PC with UPS and LAN connection
<b>Sensors</b>	1 reference pyranometer (Kipp CM3, horizontal) 1 silicon solarimeter (IKS Sensol, horizontal) 2 silicon solarimeters (IKS Sensol, in-plane, left & right) 1 ambient temperature (PT100) 4 module temperatures (PT100)
<b>Transducers</b>	DC current & voltage (at input of each inverter) DC kWh meter (at input of each inverter) Overall AC kWh meter (3-phase) Import/export AC kWh meter (3-phase)
<b>Display</b>	19" TFT screen with instantaneous and historical data Wall-mounted BP Solar Saturn 7180 module (full size)

## **Photos and schematics**



Photo 1 PV array on roof of the Concrete Laboratory



Photo 2 Module mounting frame



Photo 3 Electrical installation inside Concrete Laboratory

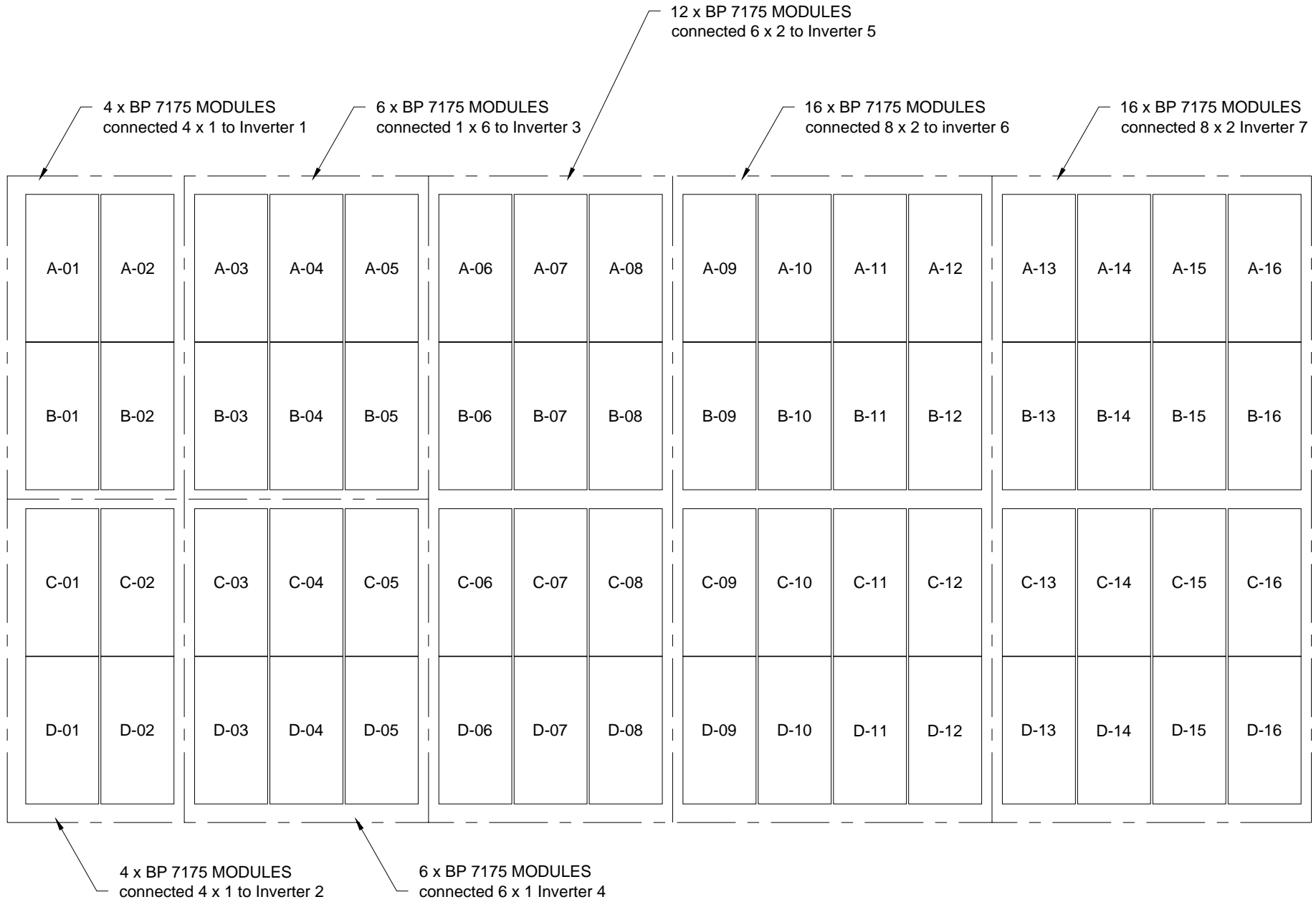


Figure 1 Module Lay-out

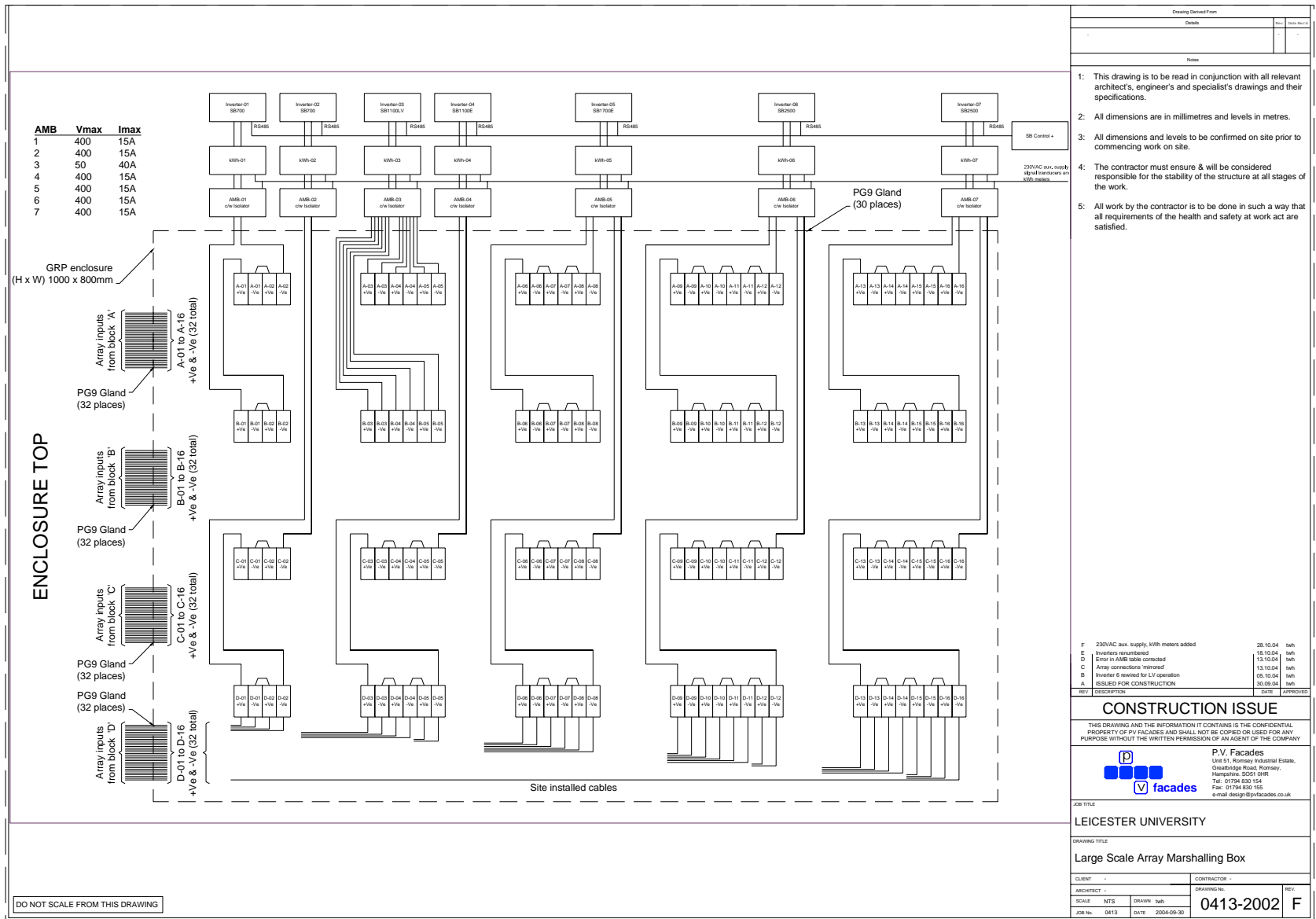
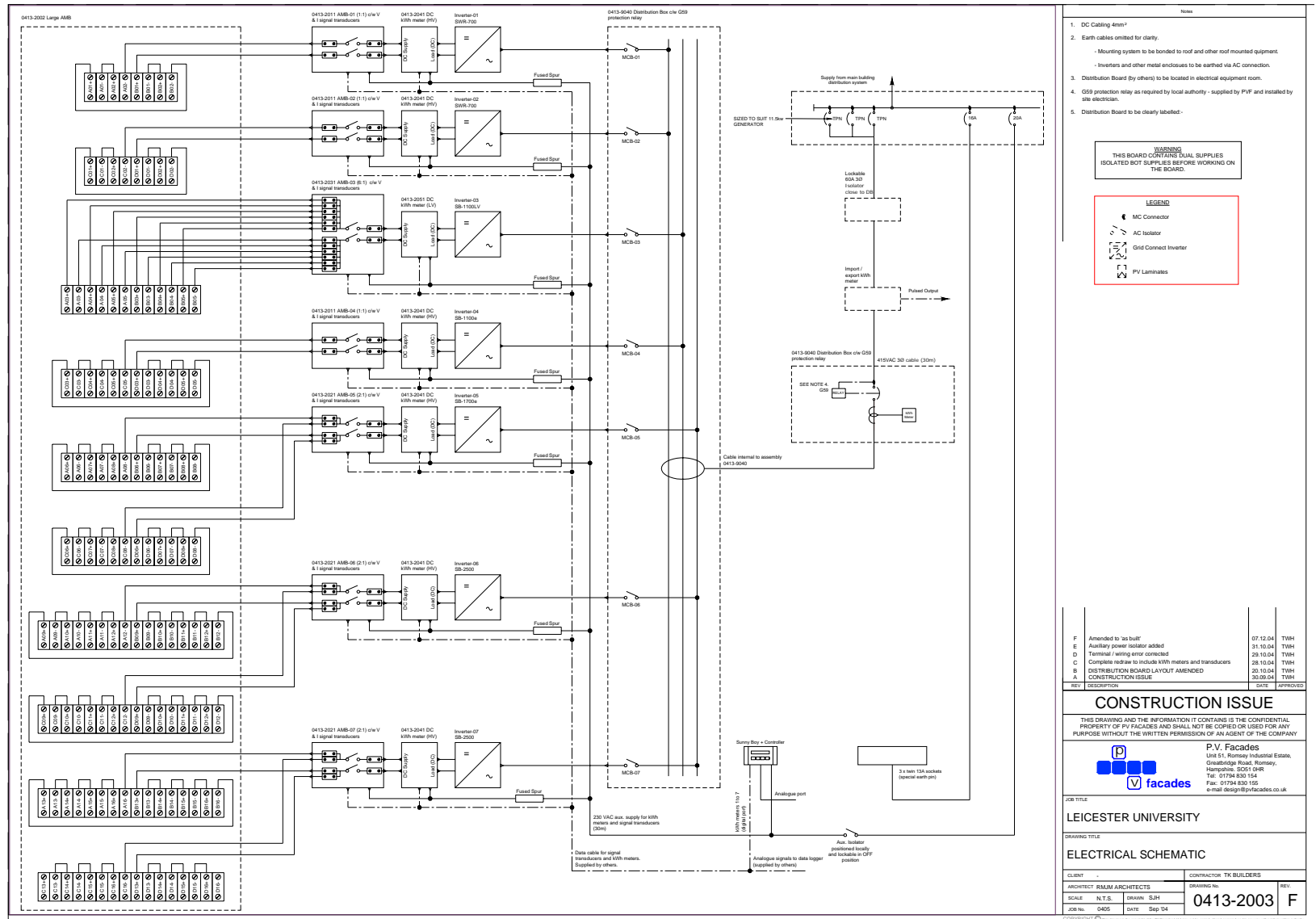
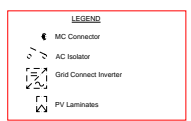


Figure 2 PV Array Interconnection Box



- Notes
- DC Cabling 4mm<sup>2</sup>
  - Earth cables omitted for clarity.
    - Mounting system to be bonded to roof and other roof mounted equipment.
    - Inverters and other metal enclosures to be earthed via AC connection.
  - Distribution Board (by others) to be located in electrical equipment room.
  - GSI protection relay as required by local authority - supplied by PVT and installed by site electrician.
  - Distribution Board to be clearly labelled.

**WARNING**  
THIS BOARD CONTAINS SEVERAL SUPPLIES ISOLATED BUT SUPPLIES BEFORE WORKING ON THE BOARD.



REV	DESCRIPTION	DATE	APPROVED
F	Amended to 'as built'	07.12.04	TWH
E	Auxiliary power Isolator added	31.10.04	TWH
D	Terminal wiring error corrected	23.10.04	TWH
C	Complete redraw to include kWh meters and transducers	28.10.04	TWH
B	DISTRIBUTION BOARD LAYOUT AMENDED	20.10.04	TWH
A	CONSTRUCTION ISSUE	20.09.04	TWH

**CONSTRUCTION ISSUE**

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**P.V. Facades**  
 Unit 51, Romney Industrial Estate,  
 Gainsborough Road, Romney,  
 Hastings, SS20 0HR  
 Tel: 01734 830 154  
 Fax: 01734 830 165  
 e-mail design@pvfacades.co.uk

JOB TITLE  
**LEICESTER UNIVERSITY**

**ELECTRICAL SCHEMATIC**

SUBJECT	CONTRACTOR	TK BUILDERS	REV
ARCHITECT	RAMM ARCHITECTS	DRAWING NO.	
SCALE	N.T.S.	DRAWN	SRH
JOB No.	0405	DATE	Sep 04
			<b>0413-2003 F</b>

Figure 3 Electrical Schematic of the PV System