

IWB, Projector and Speaker Installation Design for Capital Works

Version 2.81 – September 2010

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Preface

Audience

DET NSW

Department of Services, Technology and Administration

Selected Contractors and Suppliers

Abbreviations used

AV	Audio Visual
BER	Building Education Revolution
DET	Department of Education and Training
DSO	Double Socket Outlet
DTO	Dual Telecommunications Outlet
DVD	Digital Versatile Disk
EIP	Equipment Input Panel
EOP	Equipment Output Panel
FFL	Finished Floor Level
GLS 1	General Learning Space type 1
GPO	General Purpose Outlet
Homebase	Typical primary school classroom
IP	Internet Protocol
ITD	Information Technology Directorate
IWB	Interactive Whiteboard
LAN	Local Area Network
LHS	Left Hand Side
MCW	Major Capital Works
PVC	Polyvinylchloride
USB	Universal Serial Bus
RCA	Radio Corporation of America
RHS	Right Hand Side
RU	Rack Unit
VCR	Video Cassette Recorder
VGA	Video Graphics Array
XGA	Extended Graphic Array

Related documents

Title	Version	Issued By
Infrastructure & Installation for IWB Bundles – Discretionary Purchases	Version 1.2 Release Date 8/6/2010	Interactive Classroom Project
ICD IWB & RE Installation Guide	Version 2.3-2 Release Date 1/2/2010	Interactive Classroom Project

Summary of Revision Changes

Change Version 2.6c to 2.7	Type
Clarification to locations of the EIP and EOP	Update

Change Version 2.7 to 2.8	Type
Reformat of document	Update
Labelling of Panels	New
Bill of Materials for types of installs	New
IWB optimal placement	New
Quality Assurance - Testing	New
Change Version 2.8 to 2.81	
Inclusion of direction to IWB component installation documents	New

1 Overview

The infrastructure cabling is a standard design for pre-cabling which allows for future installation of an IWB, Projector and speakers. The design is based on the standard DET recommended equipment.

The infrastructure cabling design is to be used in Capital works where refurbished and new classrooms are included.

1.1 Building Education Revolution Works

Specific to the Building Education Revolution (BER) works it is a mandatory requirement that all cables are concealed behind the wall. Surface mounted duct of any construction are not allowed.

Other works may have other requirements.

1.2 Installation Instructions for IWB Components

The installation instruction for the IWB components associated with this infrastructure is found in the following documents. These documents are available from the Interactive Classroom Project.

- Infrastructure & Installation for IWB Bundles – Discretionary Purchases Version 1.2 Release Date 8/6/2010.
- ICD IWB & RE Installation Guide – Version 2.3-2 Release Date 1/2/2010

2 Scope of Design

The infrastructure provides for an “Equipment Input Panel” (EIP) to be provided in the proximity of the teacher’s desk. Interconnecting cables are run from this panel within the wall structures to the “Equipment Output Panel” (EOP) located on the right hand side of the wall mounted projector location.

The connectivity provided on the panels is USB, two VGA/XGA, S-Video, Composite Video and Stereo Audio.

Network outlets in the form of a DTO are to be provided adjacent to the Equipment Output Panel location to allow for future connection of the projector and a wireless Access Point. A DTO is also provided at the Equipment Input Panel to allow the network connection of a PC/Laptop.

Two double socket outlets (DSO) are to be provided at the EOP and one at the EIP. The EOP DSOs will provide connection for the projector, powered speakers and a future wireless Access Point. The EIP DSOs will provide for the IWB (should it be an older Panaboard) and PC/Laptop.

The wall supporting the equipment is to be reinforced to carry the weight of the equipment at the specified locations.

The installed cables are to be tested to ensure connectivity and functionality.

2.1 Equipment Panels – Cavity Walls

Cavity walls may include plaster studded, masonry double brick/veneer or other timber structures. A minimum depth of 70mm is required to allow compliance with bend radii at the rear of the equipment panels. If this is not available solid wall panels are to be used however the cables are to still be run in the wall cavity.

The application specific connectors are socket to socket through adapters.

The panels are typically used with flush fitting mounting hardware for use with cavity walls.

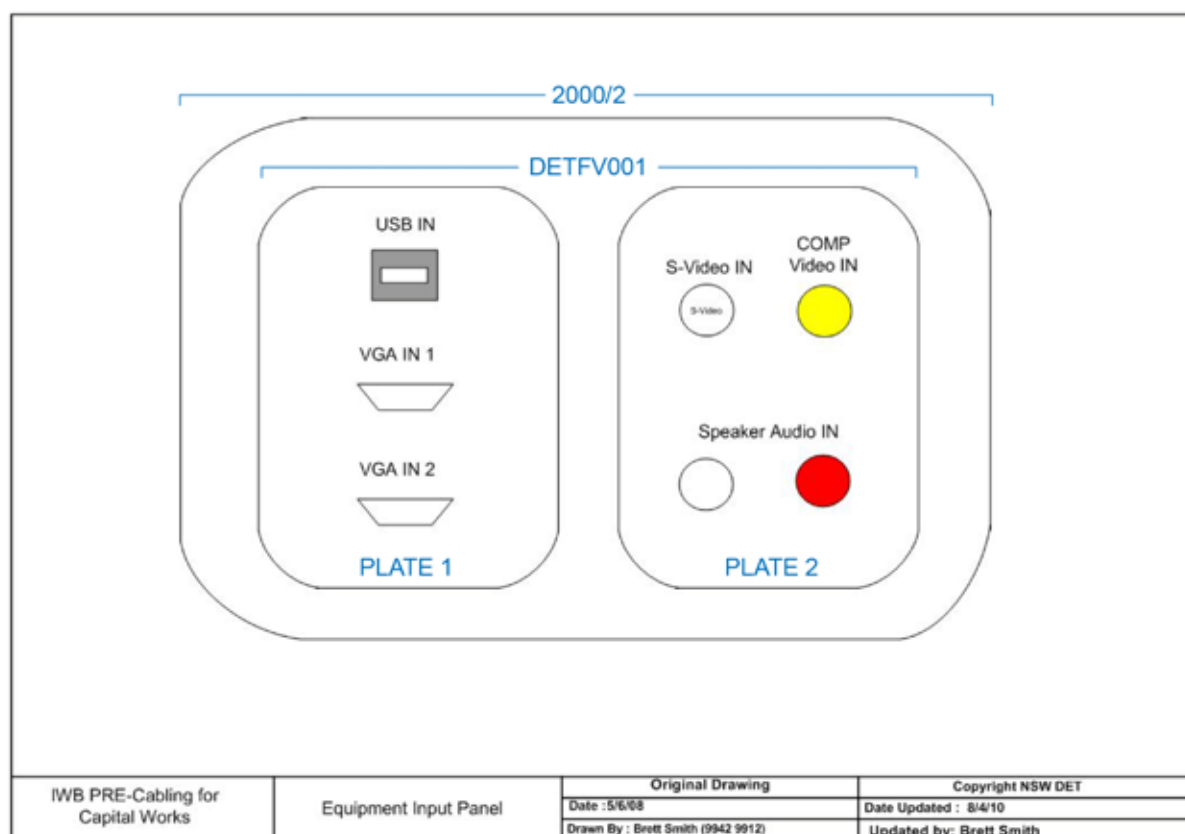
2.1.1 Equipment Input Panel

The through adapters and labelling for the panel is listed in the table below:

Connector(s)	Labelling
1 x USB Type A socket with a 20cm (max) USB 2.0 Extender attached at the rear of the panel	USB IN
2 x HD15 sockets	VGA IN 1 VGA IN 2
1 x DIN 4 socket	S-Video IN
1 x Yellow RCA socket	Comp Video IN
1 x Red RCA socket	Speaker Audio IN
1 x White RCA socket	

2.1.1.1 Equipment Input Panel Layout

The preferred layout of the Equipment Input Panel is as per the diagram below.



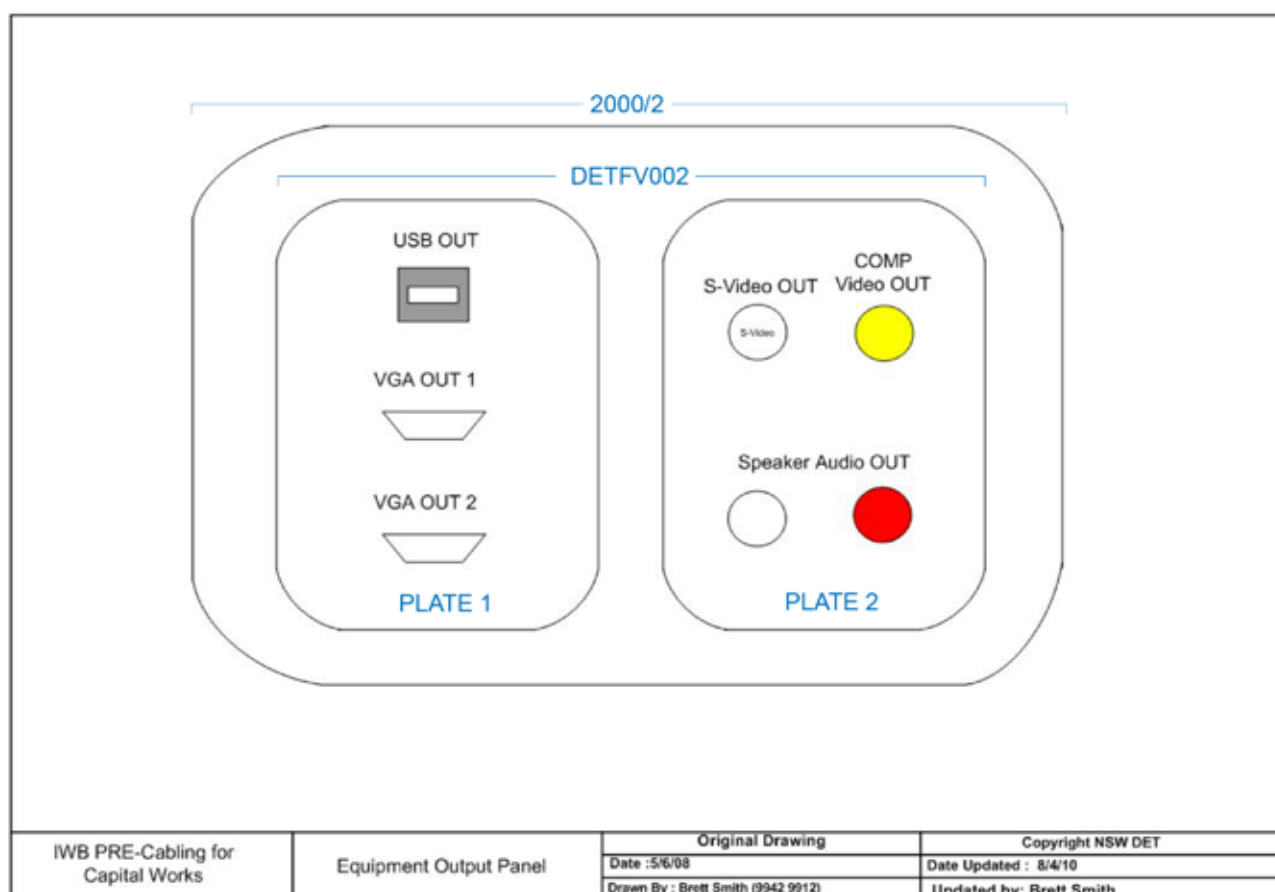
2.1.2 Equipment Output Panel

The through adapters and labelling for the panel is listed in the table below:

Connector(s)	Labelling
1 x USB Type A socket	USB OUT
2 x HD15 sockets	VGA OUT 1 VGA OUT 2
1 x DIN 4 socket	S-Video OUT
1 x Yellow RCA socket	Comp Video OUT
1 x Red RCA socket	Speaker Audio OUT
1 x White RCA socket	

2.1.2.1 Equipment Output Panel Layout

The preferred layout of the Equipment Input Panel is as per the diagram below.



2.2 Equipment Panels for Solid Walls

2.2.1 19" Panel and Frame

In case where the equipment is to be installed on a solid wall thus making the storage of cable slack impossible the following wall mount brackets may be used..

The wall mount brackets are commercially available 100mm deep, 2RU 19" panel mounts. These mounts are to be fitted with top and bottom covers. Rack Technologies and Hallam Racks make these types of brackets.

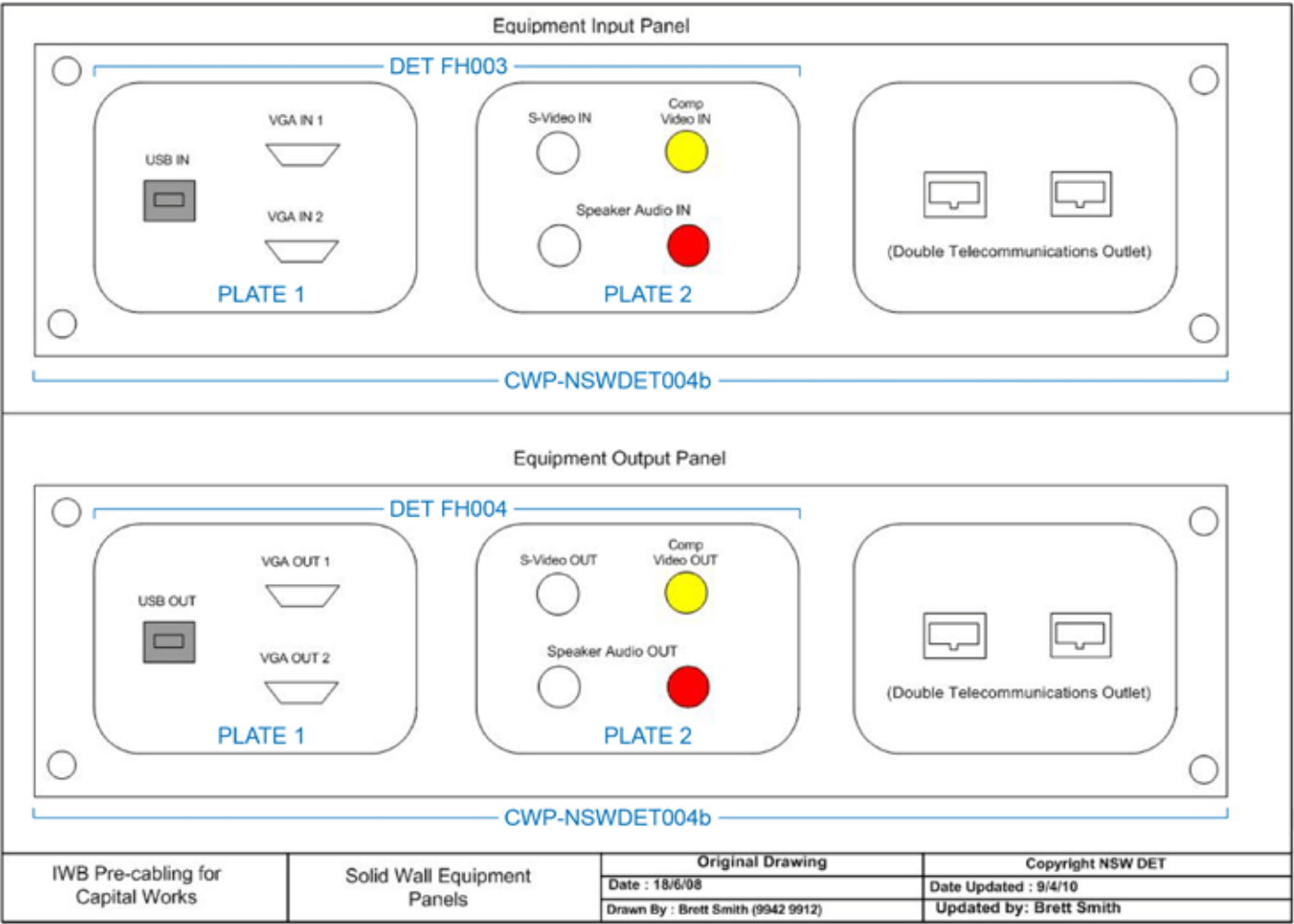
The interconnecting cables will be run in surface mounted ducting. This ducting is to be made of durable material with a secured lid. The material must be capable of being painted to suit the environment

The EIP and EOP will be fitted to a 2RU panel and the Clipsal 2000 series faceplates with the application specific will be fitted horizontally to this panel. The panels will be fitted on the left and middle sections.

The DTO will be fitted on the right section of the panel.

The DSO MUST NOT be fitted in to the wall mount bracket.

The layout of the panels is as below:



2.2.1.1 Cable Bend Radius Restrictions

The 2RU wall mount bracket has sufficient space to allow the bend radius of the VGA/XGA cables to not be exceeded. Both brackets may be used for minimal cable storage.

Consideration of cable length must be made at the time of installation/purchase such that excessive length is not stored. Typical cable lengths available are three, five and ten metres.

2.2.2 PVC Adaptable Box

An alternative to the 19" panel and frame is the mounting of the standard equipment panels on to a PVC adaptable box.

The box will require a suitable depth to ensure that the bend radii of the cables are not exceeded.

The adaptable box is not suitable for storage of cable slack.

2.3 Labelling Requirement

The labelling used for each of the components must be as per the layout drawings in this document.

The labelling method used for the printing the characters onto the panels are to be permanent and indelible. Methods such as engraving with ink injection and chemically inert printer inking are considered acceptable.

Hand written with permanent pens or laminated adhesive labels are NOT acceptable.

The size of the characters are to be as per the ratio of lettering to components above drawings

2.4 Vendors

Vendor of these panels are

Alectro Custom Wall Plates - 1300 174 433 - info@alectro.com.au

Other vendors of a panel with the same component specifications may be available. The layout of the panel may vary but the labelling must be the same.

2.5 Bill of Materials

Below are bill of materials required to perform different installation environment. Some mounting hardware is included to provide guidance as to mounting methods. However other hardware components may be required.

Please note that lengths of cables may vary depending on the type of installation. However maximum cable lengths will be stated.

2.5.1 Cavity Walls

These cavity walls allow the cables to be concealed within the wall cavity.

Component	Quantity	Typical Length	Maximum Length
Equipment Input Panel (inclusive of short USB 2.0 Extender)	1		
Equipment Output panel	1		
Mounting Bracket 2 gang vertical	2	Clipsal 2154P2	
VGA/XGA Cable F/F	2	3 & 5	5
S-Video Cable F/F	1	3 & 5	5
Stereo Audio Cable RCA F/F	1	3 & 5	5
Composite Video Cable F/F	1	3 & 5	5
USB 2.0 Extender	1	5	5

2.5.2 Solid Walls

There are two types of solid wall materials, the 3 way 19 inch panel mount and an adaptable box with the standard equipment panels. If storage of cable slack is a premium then the 2RU 19" panel system should be used.

Component	Quantity	Typical Length	Maximum Length
Equipment Input Panel (inclusive of short USB 2.0 Extender)	1		
Equipment Output panel	1		
2RU 19" wall mount panel + Frame or Adaptable PVC box (if cable storage is not required)	2		
VGA/XGA Cable F/F	2	3 & 5	5
S-Video Cable F/F	1	3 & 5	5
Stereo Audio Cable RCA F/F	1	3 & 5	5
Composite Video Cable F/F	1	3 & 5	5
USB 2.0 Extender	1	5	5

2.6 Interconnecting Cables

The cables interconnecting the panels must be as short as possible. Any cable slack will be secured and contained within cavity spaces.

The cables are to be factory terminated.

The cables that do not have screw connections (S-Video, USB & RCA) are to be secured such that they are not disconnected should the cable be inadvertently pulled.

2.6.1 Analogue Video Cable

The quality of the HD15 pin analogue video cable will be a minimum of XGA at 10m. The cable must be fitted with noise filters and the analogue colour conductors must be coaxial.

The composite video cable is to be a 75 ohm 20 AWG coaxial cable terminated with RCA male connectors.

2.6.2 Audio Cabling

The quality of the unamplified Audio cabling must be a minimum of two twisted pair sets of 24 AWG conductor size, each pair with its own drain wire and foil sheath.

2.6.3 S-Video Cabling

The quality of the S-Video cable must be a minimum of two 30 AWG stranded coaxial cables in a 90% tinned copper braided shield.

2.6.4 USB Cabling

The EIP has been fitted with a special shortened version of a USB 2.0 Extender. This uses the same connectivity as the previous USB cabling. The 5m USB Extender cable below will plug into the female type A socket of the shortened USB extender.

The interconnecting cable between the EIP & EOP will be a 5m "USB 2.0 Extender" cable. The USB Extender cable is to be installed with the electronics (Socket) end at the EOP. The USB connections at both ends are to be affixed securely together.

Given the length of the extender cable is 5m this will place a restriction on the distance that the EIP can be installed from the EOP.

2.7 Layout of Infrastructure

2.7.1 IWB Location

The location of the IWB relative to the classroom environment requires consideration. Factors to consider when locating the IWB are:

Proximity to Light Sources:

The IWB should be located in a location that is as far removed from the affects of light sources. If it can not be then the light sources are to be managed by blinds or switching where applicable.

Proximity to Heaters:

The heaters require considerable clearance for its operation. The IWB and its associated equipment must not be within 1m laterally as a minimum.

Proximity to Furniture:

The use of the IWB require person to move in and around the front and sides of the IWB. Thus the placement of large and/or bulky furniture may restrict optimal use of the IWB.

Proximity to trafficable areas:

The IWB/projector is a relatively sensitive piece of equipment excess movements of people and or object may lead to damage to the equipment or the people.

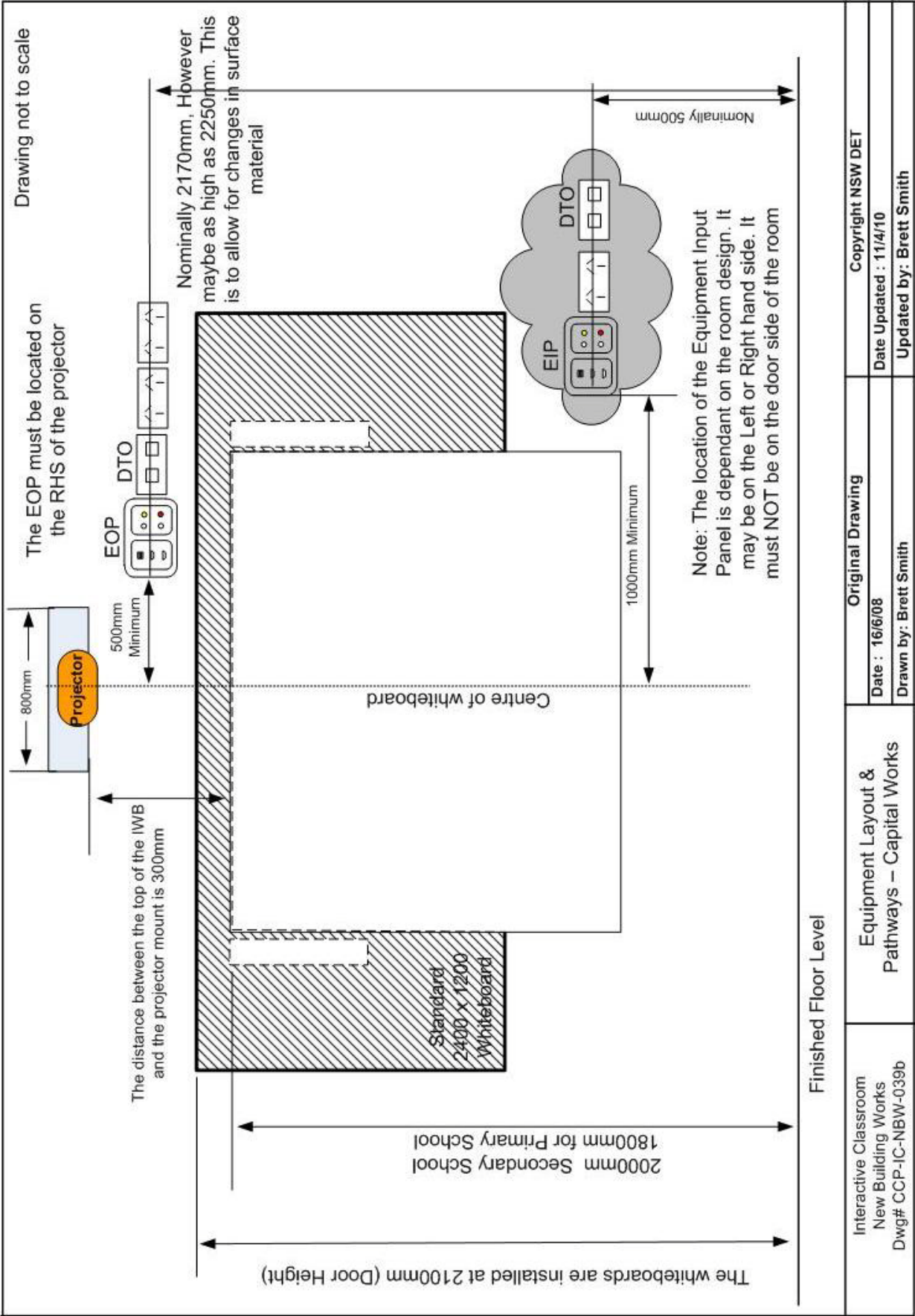
2.7.2 Panel Locations

The location of the EIP can be on the right or the left hand side. The choice of which side will be determined by the suitability of the space to house input devices. The teacher desk side may be most suitable. Locations that lead to disruption of passageways or create congestion are not acceptable.

The EIP must be the closest panel to the IWB regardless of left or right orientation.

The EIP is to be nominally installed at a height of 500mm (centred) from the finished floor level and must be a minimum of 1000mm from the centre line of the IWB/projector. The height of the EIP may be installed as low as 300mm.

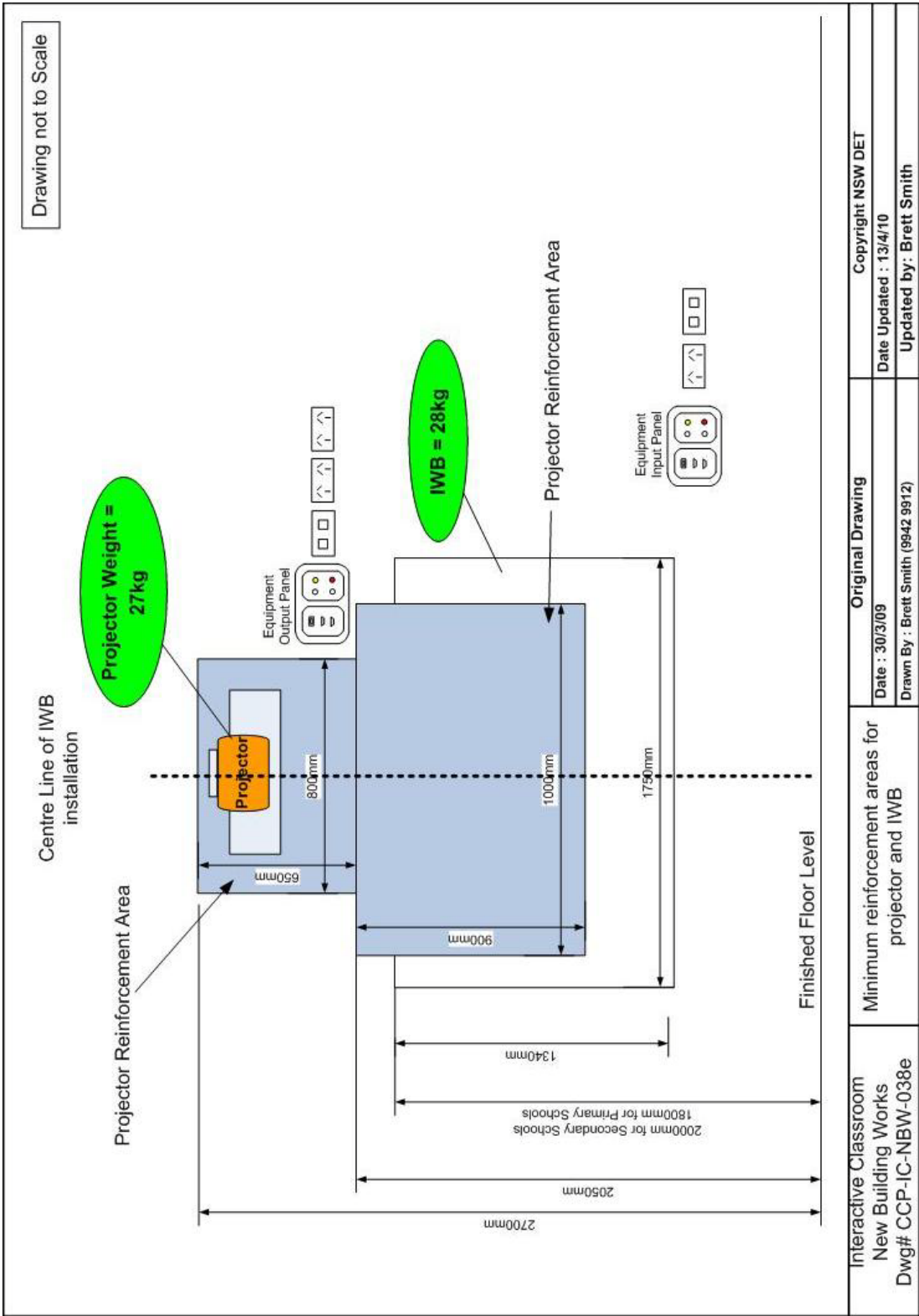
The EOP must always be on the RHS of the projector and a minimum of 500mm from the centre line of the IWB/projector. The height to the centre of the EOP is nominally 2170mm. However due to changes in building materials and associated difficulty of installation the height may be as high as 2250mm.



2.8 Wall Reinforcement

The wall is to be reinforced using the appropriate materials to carry the weight of the specified equipment.

The below drawing shows the weights and the areas that need to be reinforced.



2.9 Cable Routing at Installation Time

The information below is intended to provide builders and installers with an understanding of the cable routing requirements.

2.9.1 Cabling – using SMART Speakers

2.9.1.1 USB Cabling

The SMART speakers are to be installed level with the top of the IWB and as close as possible to the side of the IWB. It is mandatory that the Master speaker is to be placed on the same side as the Equipment Input Panel.

A USB cable is to be run from the Equipment Output Panel to the Type B socket on the bottom of the speaker. The SMART Speakers are supplied with a suitable 5m USB cable. However it is preferable that this cable be as short as possible. Shorter USB Type A/B Male/Male cables may be sourced commercially. The supplied 5m cable is not to be cut and re-terminated.

Another USB cable is to be run from the Type A socket on the bottom of the SMART Master speaker to the input on the IWB. The USB cable provided with the IWB is suitable for this.

2.9.1.2 Audio Cabling

A stereo audio cable – RCA plug to plug is to be run from the Equipment Output Panel to the stereo inputs on the bottom of the SMART Master speaker.

This audio connection provides for audio from AV devices.

2.9.1.3 Cable Storage

All cable slack is to be stored neatly and securely behind the IWB.

2.9.2 Cabling - not using SMART Speakers

The USB cabling will be run from the Equipment Output Panel directly to the input connector on the IWB.

A stereo audio cable – RCA plug is to be run from the Equipment Output Panel to the stereo inputs on the master powered speaker.

2.9.2.1 USB Cabling Length Limitation

The USB standard cabling has a maximum length limit of 5 metres. Two USB Extenders have been built into the infrastructure however wherever possible keep USB cable length as short as possible.

The USB cable use to connect to the EOP must not exceed 5m.

The USB cable used to connect to the EIP must not exceed 5m.

If a longer lead is required a USB 2.0 Extender may be to be used. However as the infrastructure contains two Extenders already the addition of more extenders will reduce the through put of the USB.

2.10 Quality Assurance – Testing

2.10.1 Connectivity

2.10.1.1 Continuity

The installed cables are to be tested to ensure that the continuity is maintained. It is possible that during the installation process the friction fit connects have been dislodged.

2.10.1.2 Alignment

The correct alignment/orientation is to be tested for the like cables: VGA and RCA cables. This is to ensure that the correct cable connected to the right connectors.

2.10.2 Integrity

The cables are to be tested to ensure that the integrity of the cable has not been compromised by excessive bend radii or damage during installation.

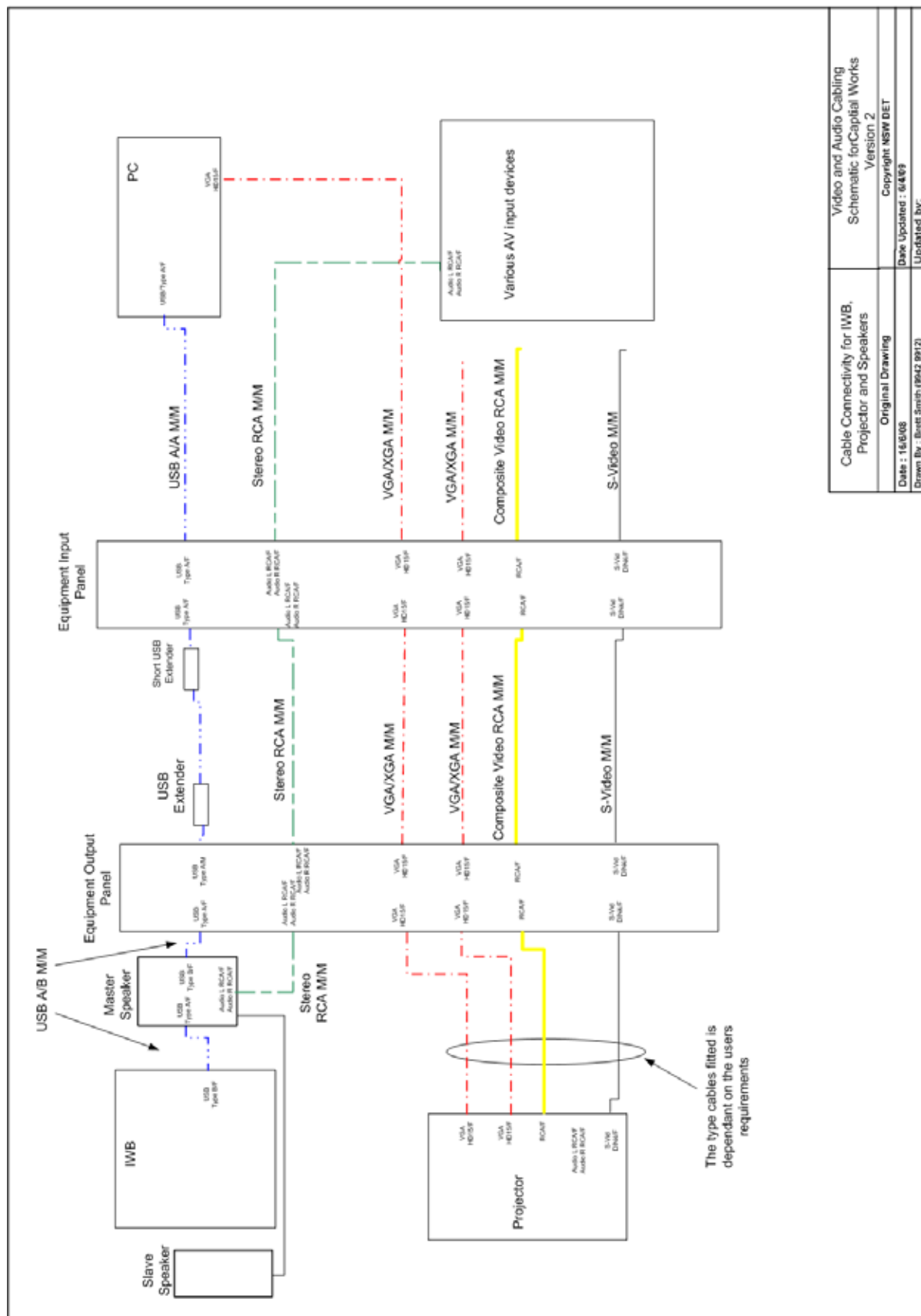
The specific testing for the function of each cable/connector is recommended.

2.10.3 Warranties

All the components of this installation will be included in the standard defects and liability period of the works.

2.11 Wiring Diagram

The wiring diagram shows the fixed and flexible cabling plus the leads required to connect the projector and various input devices.



3 Notes

This document is based on *IWB, Projector and Speaker Installation design - for Capital Works, Version 2.81, 8th September 2010, NSW Department of Education and Training, Information Technology Directorate.*