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Smart Classroom Design

Concept Note

September 2018

Background

Rwanda Vision 2020 aims at moving Rwanda from "an agriculture based economy to a knowledge-based society" and middle-income country by 2020. The use of ICT in education is considered an important strategy for achieving this transformation. This is also in line with the strategic goal of the ESSP to strengthen the relevance of education and training to the labour market including the insertion of 21st century skills. As stated in the ICT in Education policy, Rwanda's Vision for ICT in Education is: "To harness the innovative and cost-effective potential of worldclass educational technology tools and resources, for knowledge creation and deepening, to push out the boundaries of education: improve quality, increase access, enhance diversity of learning methods and materials, include new categories of learners, foster both communication and collaboration skills, and build capacity of all those involved in providing education."

ICT is used as a tool to enhance teaching and learning at all education levels, from primary to tertiary education. The Vision 2020 aims at transforming Rwanda into a knowledge-based,

technology-led and middle-income society by the year 2020. Information and Communication Technology (ICT) is considered as a ubiquitous tool that will energize the country's socio-economic development. Enhancing teacher capabilities in and through ICT is one of the strategies used by the Government of Rwanda to develop a high-quality skills and knowledge base, leveraging ICT across various socio-economic sectors of the country.

The introduction of a competency-based curriculum in schools calls for comprehensive change and new thinking about instructional approaches in teaching, learning and assessment processes. The use of ICT in education is seen as a strategic lever for achieving this transformation. It is stated in the curriculum framework that: "The curriculum must enable educators and students to use ICT as a tool to improve the quality of education in all subjects at all levels in teaching and learning practices. ICT must support the emergence of teaching and pedagogical student-centered approaches as well as encourage research, communication, and collaborative learning." ICT in Education policy aims at guiding the establishment of smart classrooms in schools as the main part of ICT in Education.

Proposed Smart classrooms Seating Arrangement

The physical setup of chairs, tables, and presentation in a classroom can significantly influence learning. Instructional communication theory suggests that seating arrangements can impact how the teachers communicates with students and how the students interact with one another, impacting engagement, motivation, and focus. More than 692 smart classrooms across the country have been set up in schools to improve the quality of teaching and learning. The details on the proposed smart classroom seating arrangement are below.

Objectives

- Standardizing existing smart classrooms to support 21st century learning

APPENDEX 1: Proposed Smart Classroom Seating Arrangement Referring to the classroom size standards.

Three options are considered:

1.Building new smart classroom (9/10 m) to accommodate 50 students

2.Merging two existing small classrooms (7/8 m) into one big classroom for smart classroom to accommodate 50 students

3.Remodeling existing small classroom (7/8) where building new or merging two classroom is not possible. The remodeled classroom will accommodate 30 students instead of 50 students.

1. *Newly proposed smart classroom (9/10 meters) with 50 Laptops, back view*

2. *Newly proposed smart classroom (9/10 meters) with 50 Laptops, front view*

3. *Two merged existing (7/8 meters) classrooms to form one smart classroom with 50 laptops, back view*

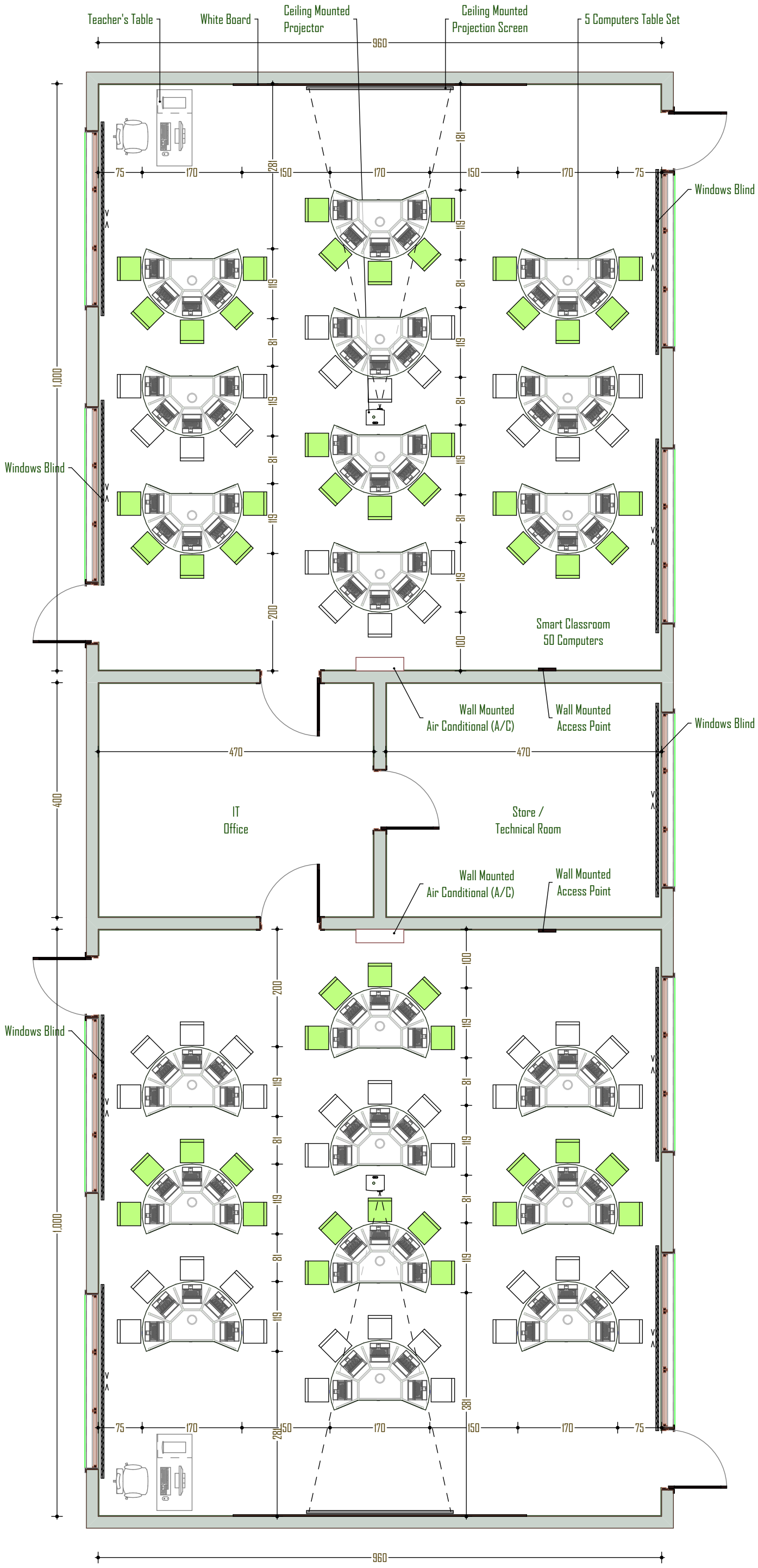
4. *Two merged existing (7/8 meters) classrooms to form one smart classroom with 50 laptops, front view*

5. *Remodeling Existing smart classroom (7/8 meters) with 30 laptops instead of 50 laptops front view*

6. *Remodeling Existing smart classroom (7/8 meters) with 30 laptops instead of 50 laptops back view*

7. *Tables*

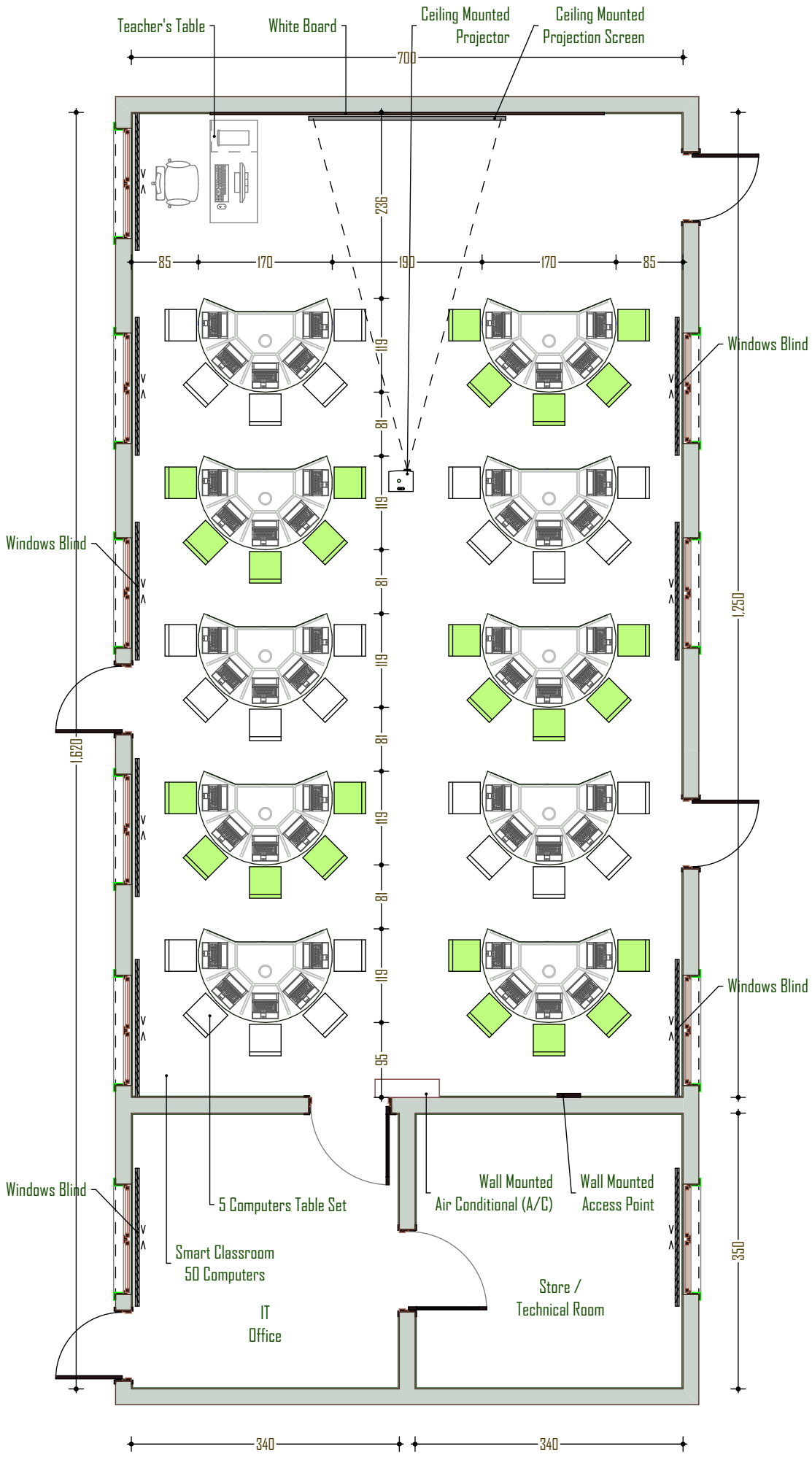
8. Table



TYPICAL SMART CLASSROOMS
SEATING ARRANGEMENT

ALL DIMENSIONS,
IN CENTIMETERS

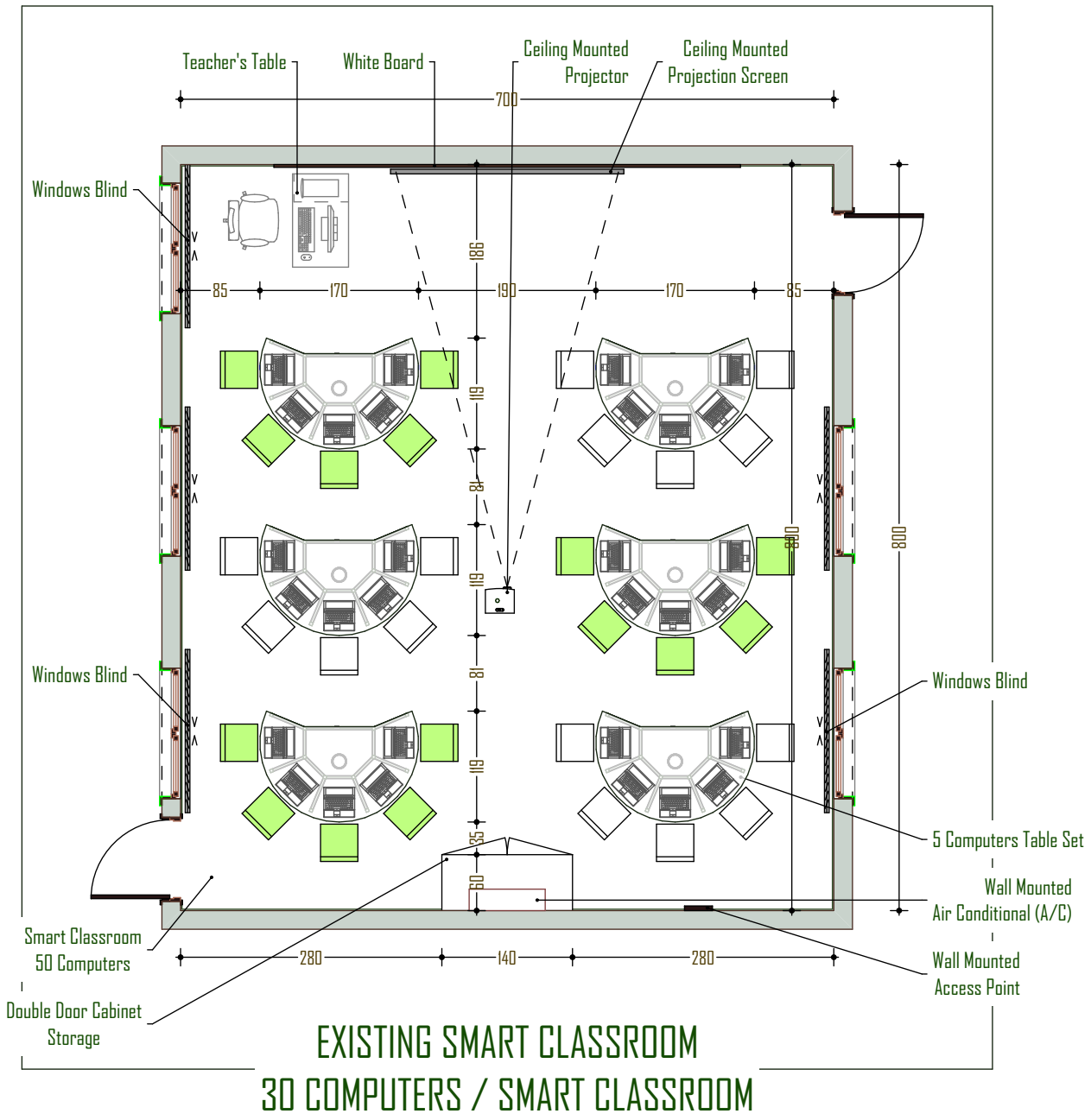
NEW SMART CLASSROOMS
50 COMPUTERS / SMART CLASSROOM



TYPICAL SMART CLASSROOMS
SEATING ARRANGEMENT

ALL DIMENSIONS,
IN CENTIMETERS

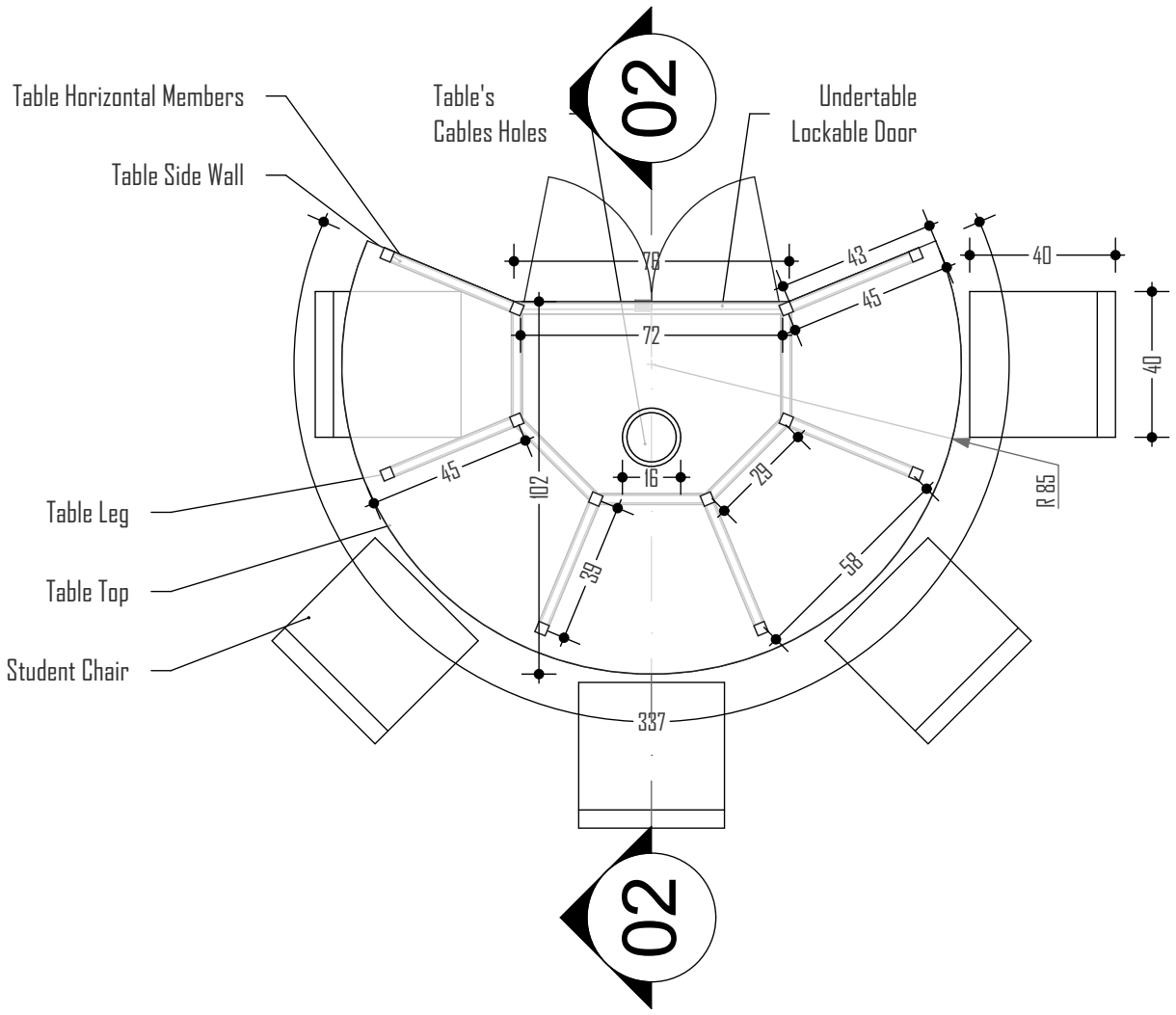
2 MERGED CLASSROOMS TO FORM 1 SMART CLASSROOM
50 COMPUTERS / SMART CLASSROOM



EXISTING SMART CLASSROOM
30 COMPUTERS / SMART CLASSROOM

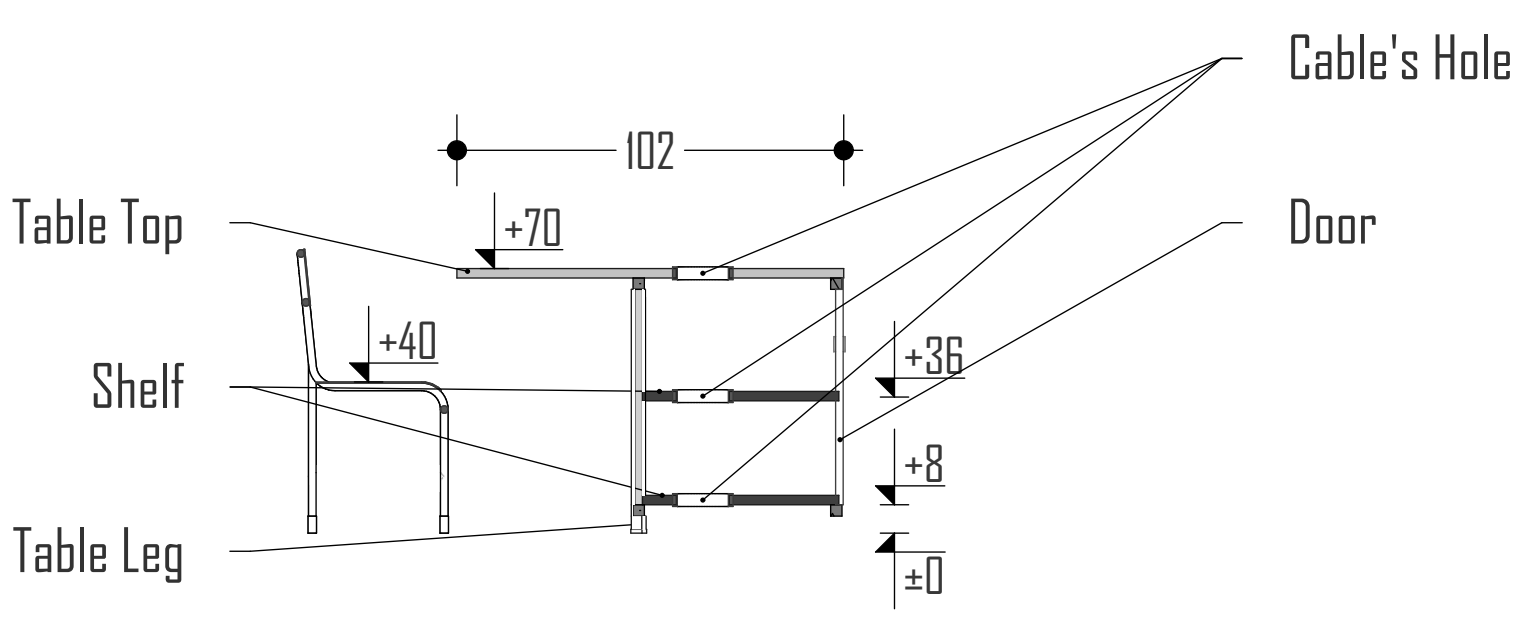
TYPICAL SMART CLASSROOMS
SEATING ARRANGEMENT

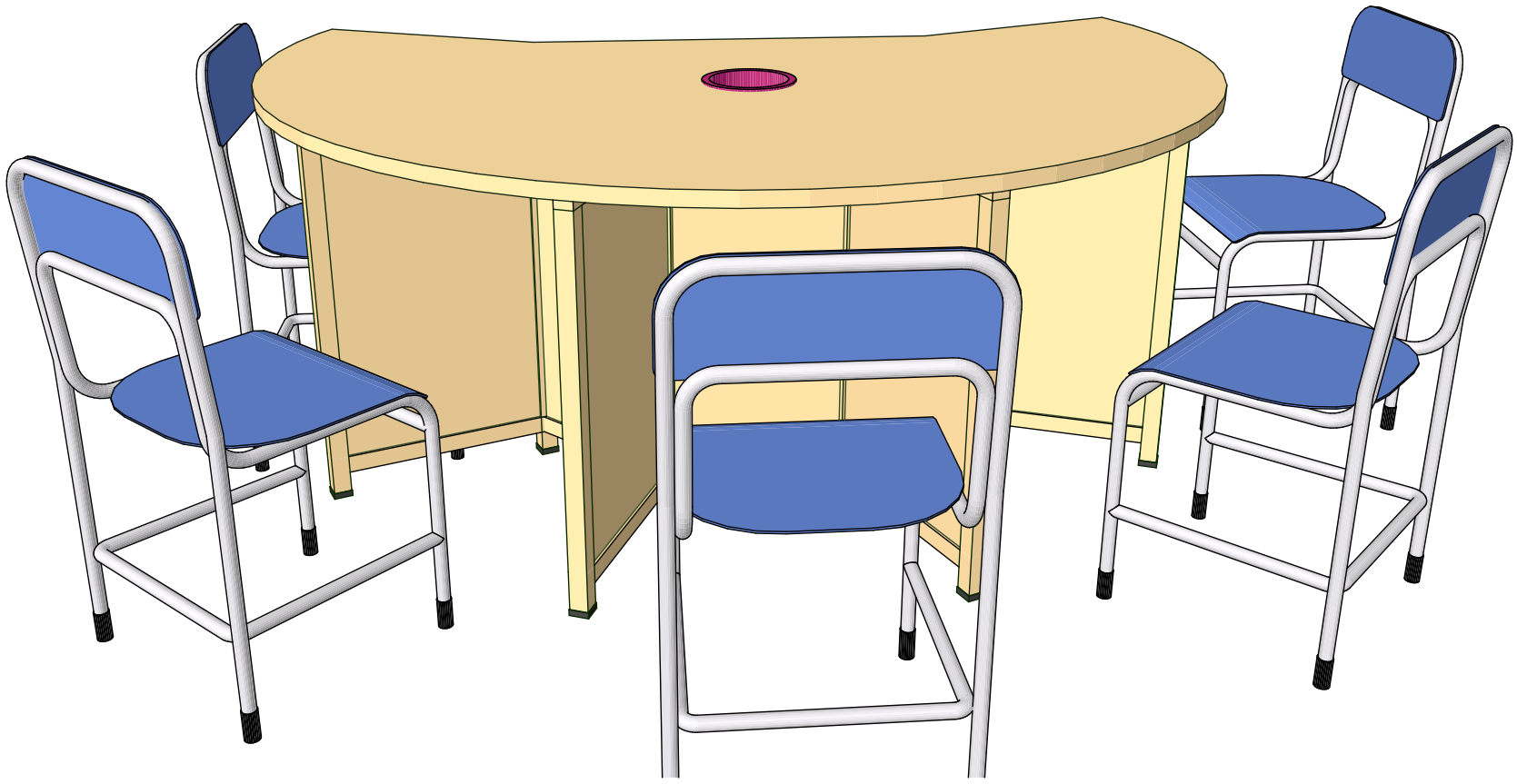
ALL DIMENSIONS,
IN CENTIMETERS



SMART TABLE DETAILS

SECTION 02 - 02





NOTE:

1- FOR BRANCH CIRCUIT AND FEEDER SIZE CALCULATION PLEASE REFER TO VOLTAGE DROP CALCULATION ON DESIGN ANALYSIS.
2- PANEL MAIN BREAKER SHALL BE RESIDUAL CIRCUIT BREAKER WITH OVER CURRENT(RCBO), SEE RCBO TECHNICAL SPECIFICATION IN THIS SHEET.

RCBO TECHNICAL SPECIFICATION:

Stadard(s)	EN/IEC 61009
Rating	6,10,16, 20, 32, 40, 63, 80,100 & 125A
Breaking capacity	6000A
Rated Voltage	220/400V A.C. 50Hz
RCD Type	Type AC
Rated Tripping Current	30mA
Residual Current off time	<0.1S
Operating Characteristics	Type B, Magnetic Operating 3 to 5 times in(Current Rating)
No. of Poles	1P+N(1 module)
Trip	Thermal/Magnetic release
IP Rating	IP20
Terminal Capacity	6-20A - 16mm2, 32-50A - 25mm2,
Terminal Torque	2NM
Installation	Mounting on 35mm DIN rail
Size	17.5mm Width
Endurance Operations	Electrical 10,000, Mechanical 20,000

PANEL BOARD NAME : 01-DP
PHASE TO NEUT: 220 VOLT
SURFACE MOUNTED

PANEL LOCATION: FRONT OF MULTIPURPOSE BUILDING
SINGLE PHASE, 3WIRE, 50HZ

MAIN BREAKER : 40A
Min.BUSBAR RATE:40A

WIRE ,CONDUIT & DESCRIPTIONS			CIRCUIT S LOAD					CIRCUIT S LOAD	WIRE ,CONDUIT & DESCRIPTIONS		
WIRE & CONDUIT	GND WIRE	DESCRIPTION		A	CKT NO	CKT NO	A		DESCRIPTION	GND WIRE	WIRE & CONDUIT
3(1cX1.5mm²)Ø20mm	1.5mm²	LIGHTING (DP/01)	864	16	1	2	16	432	SOCKET (DP/05)	2.5mm²	3(1cX2.5mm²)Ø20mm
3(1cX1.5mm²)Ø20mm	1.5mm²	LIGHTING(DP/02)	344	16	3	4	16	720	SOCKET (DP/06)	2.5mm²	3(1cX2.5mm²)Ø20mm
3(1cX1.5mm²)Ø20mm	1.5mm²	LIGHTING(DP/03)	900	16	5	6	16	900	SOCKET (DP/07)	2.5mm²	3(1cX2.5mm²)Ø20mm
3(1cX1.5mm²)Ø20mm	1.5mm²	LIGHTING(DP/04)	216	16	7	8	16	1212	SPARE	-	-
			2905	-	-	-	-	4080	SUB - TOTAL IN (VA)		

TOTAL CONNECTED LOAD	5470	VA
DEMAND FACTOR	0.7	
DEMAND LOAD (KVA)	3.8	kVA
TOTAL AMPERE	17.4000	A
STANDARD BREAKER SIZE	32	A

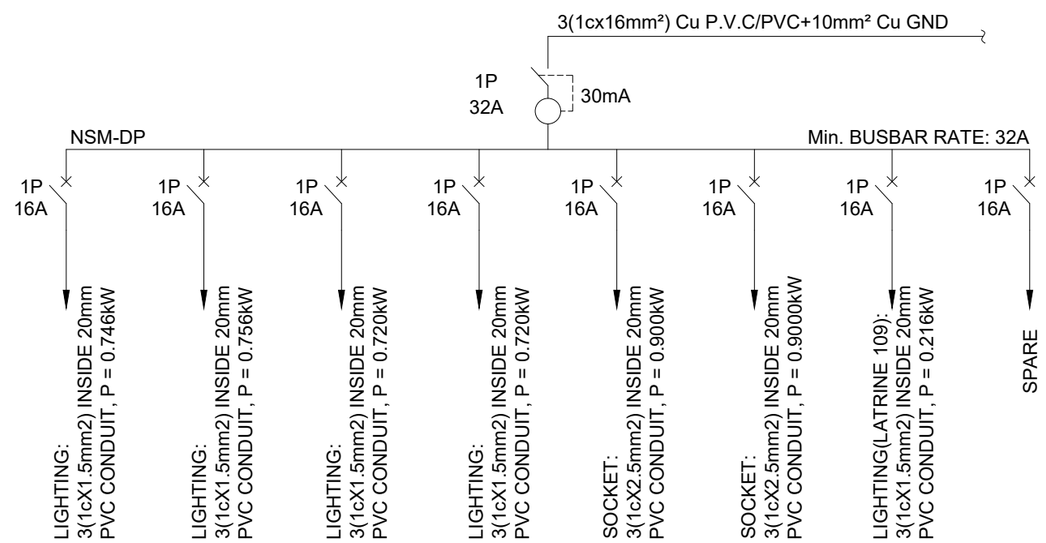
NSM-DP

2(1cx16mm²)Cu P.V.C/PVC+16mm² Cu GND

10mm² BARE COPPER CONDUCTOR

Ø100mm PVC CONDUIT

POWER RISER DIAGRAM



NEW SMART CLASSROOMS
50 COMPUTERS / SMART CLASSROOM -DP SINGLE LINE DIAGRAM

NOTE:

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Operating Characteristics	Type B, Magnetic Operating 3 to 5 times in(Current Rating)
No. of Poles	1P+N(1 module)
Trip	Thermal/Magnetic release
IP Rating	IP20
Terminal Capacity	6-20A - 16mm2, 32-50A - 25mm2,
Terminal Torque	2NM
Installation	Mounting on 35mm DIN rail
Size	17.5mm Width
Endurance Operations	Electrical 10,000, Mechanical 20,000

PANEL BOARD NAME : 01-DP
PHASE TO NEUT: 220 VOLT
SURFACE MOUNTED

PANEL LOCATION: FRONT OF MULTIPURPOSE BUILDING
SINGLE PHASE, 3WIRE, 50HZ

MAIN BREAKER : 40A
Min.BUSBAR RATE:40A

WIRE ,CONDUIT & DESCRIPTIONS			CIRCUIT S LOAD					CIRCUIT S LOAD	WIRE ,CONDUIT & DESCRIPTIONS		
WIRE & CONDUIT	GND WIRE	DESCRIPTION		A	CKT NO	CKT NO	A		DESCRIPTION	GND WIRE	WIRE & CONDUIT
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3(1cX1.5mm²)Ø20mm	1.5mm²	LIGHTING(DP/02)	344	16	3	4	16	720	SOCKET (DP/06)	2.5mm²	3(1cX2.5mm²)Ø20mm
3(1cX1.5mm²)Ø20mm	1.5mm²	LIGHTING(DP/03)	900	16	5	6	16	900	SOCKET (DP/07)	2.5mm²	3(1cX2.5mm²)Ø20mm
3(1cX1.5mm²)Ø20mm	1.5mm²	LIGHTING(DP/04)	216	16	7	8	16	1212	SPARE	-	-
			2905	-	-	-	-	4080	SUB - TOTAL IN (VA)		

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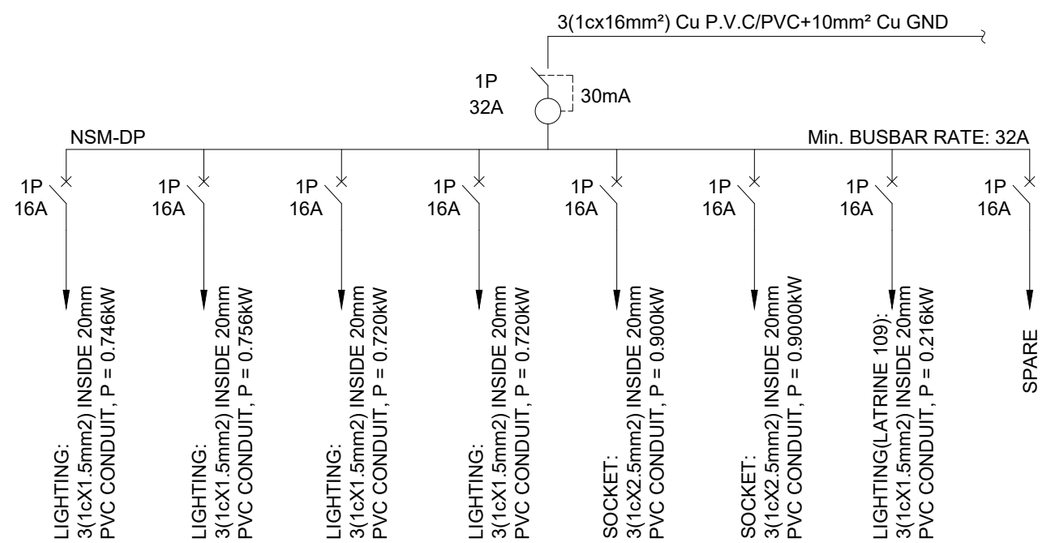
NSM-DP

2(1cx16mm²)Cu P.V.C/PVC+16mm² Cu GND

10mm² BARE COPPER CONDUCTOR

Ø100mm PVC CONDUIT

POWER RISER DIAGRAM



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RCD Type	Type AC
Rated Tripping Current	30mA
Residual Current off time	<0.1S
Operating Characteristics	Type B, Magnetic Operating 3 to 5 times in(Current Rating)
No. of Poles	1P+N(1 module)
Trip	Thermal/Magnetic release
IP Rating	IP20
Terminal Capacity	6-20A - 16mm2, 32-50A - 25mm2,
Terminal Torque	2NM
Installation	Mounting on 35mm DIN rail
Size	17.5mm Width
Endurance Operations	Electrical 10,000, Mechanical 20,000

PANEL BOARD NAME : 02-DP
PHASE TO NEUT: 220 VOLT
SURFACE MOUNTED

PANEL LOCATION: FRONT OF MULTIPURPOSE BUILDING
SINGLE PHASE, 3WIRE, 50HZ

MAIN BREAKER : 40A
Min.BUSBAR RATE:40A

WIRE ,CONDUIT & DESCRIPTIONS			CIRCUIT S LOAD	A	CKT NO	CKT NO	A	CIRCUIT S LOAD	WIRE ,CONDUIT & DESCRIPTIONS		
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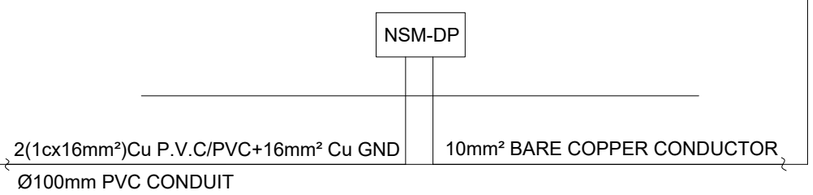
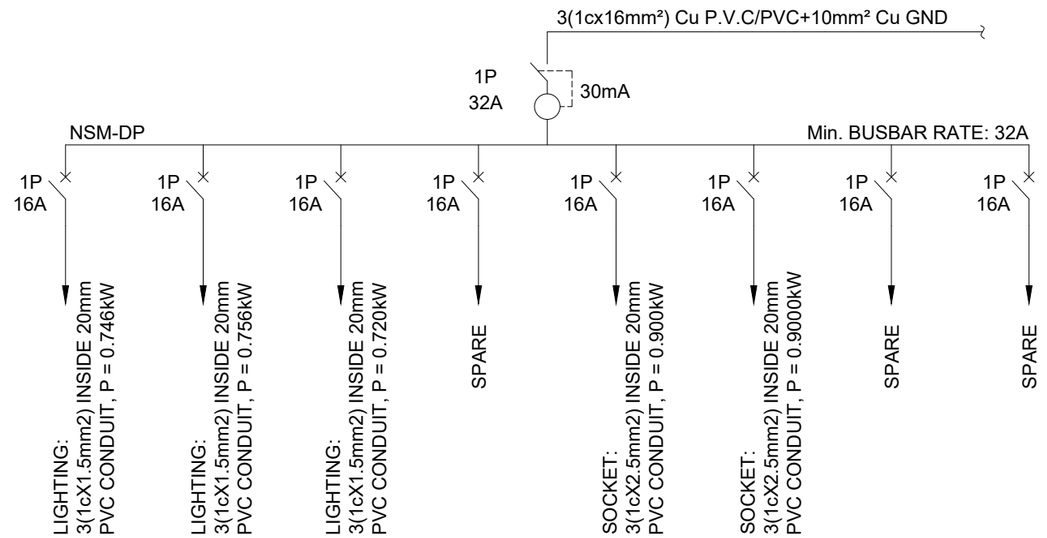
3(1cX1.5mm²)Ø20mm	1.5mm²	LIGHTING(DP/03)	900	16	5	6	16	900	SPARE	-	-
SPACE	-	-	216	16	7	8	16	900	SPARE	-	-
			2905	-	-	-	-	3690	SUB - TOTAL IN (VA)		

TOTAL CONNECTED LOAD	5470	VA
DEMAND FACTOR	0.7	
DEMAND LOAD (KVA)	3.8	kVA
TOTAL AMPERE	17.4000	A
STANDARD BREAKER SIZE	32	A



POWER RISER DIAGRAM



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Trip	Thermal/Magnetic release
IP Rating	IP20
Terminal Capacity	6-20A - 16mm2, 32-50A - 25mm2,
Terminal Torque	2NM
Installation	Mounting on 35mm DIN rail
Size	17.5mm Width
Endurance Operations	Electrical 10,000, Mechanical 20,000

PANEL BOARD NAME : 03-DP — PANEL LOCATION: FRONT OF MULTIPURPOSE BUILDING — MAIN BREAKER : 40A
PHASE TO NEUT: 220 VOLT — SINGLE PHASE, 3WIRE, 50HZ — Min.BUSBAR RATE:40A
SURFACE MOUNTED

WIRE ,CONDUIT & DESCRIPTIONS			CIRCUIT S LOAD					CIRCUIT S LOAD	WIRE ,CONDUIT & DESCRIPTIONS		
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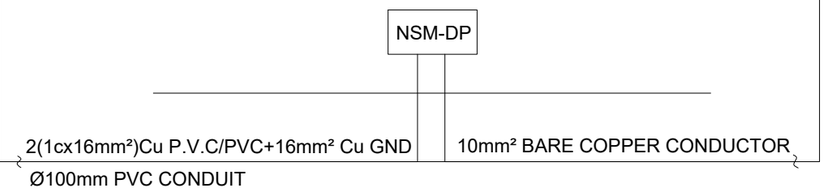
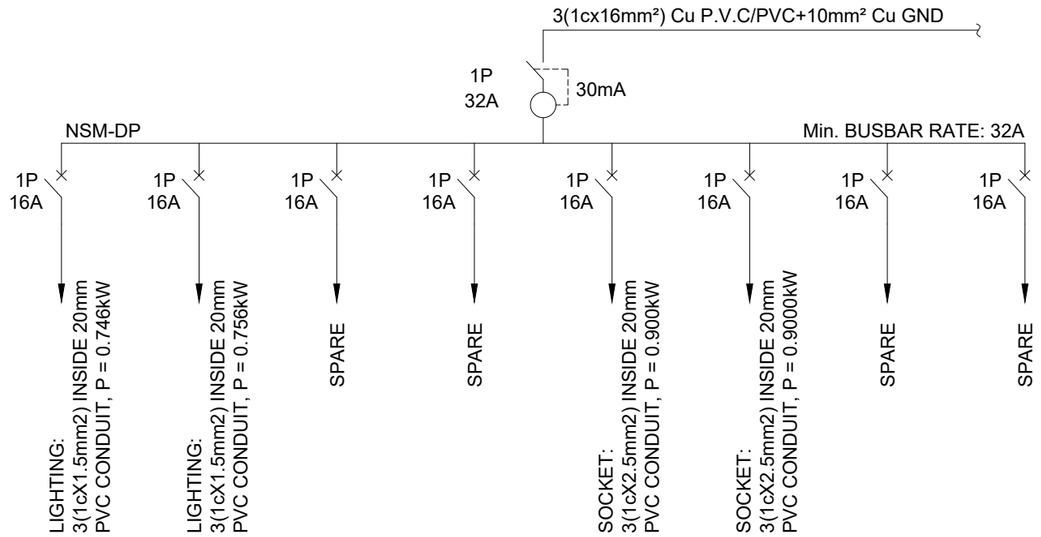
3(1cX1.5mm²)Ø20mm	1.5mm²	LIGHTING(DP/02)	344	16	3	4	16	720	SOCKET (DP/04)	2.5mm²	3(1cX2.5mm²)Ø20mm
SPACE	-	-	900	16	5	6	16	-	SPACE	-	-
SPACE	-	-	216	16	7	8	16	-	SPARE	-	-
			2905	-	-	-	-	1440	SUB - TOTAL IN (VA)		

TOTAL CONNECTED LOAD	5470	VA
DEMAND FACTOR	0.7	
DEMAND LOAD (KVA)	3.8	kVA
TOTAL AMPERE	17.4000	A
STANDARD BREAKER SIZE	32	A



POWER RISER DIAGRAM



EXISTING SMART CLASSROOM