04 April 2025

Loan/Grant No. and Title	: 4268-PHI: Supporting Innovation in the Philippine Technical and Vocational Education and Training System Project
Contract No. and Title	: **CW303/F - Design and Build of Regional TVET Innovation Center (RTIC) of NCR (Regional Training Center) including Rehabilitation/ Renovation/Repair of TTI's existing facilities**

ADDENDUM NO. 1

Sr. No.	Clause No.	Original (instead of)	Addendum/ Amendment (Read As)
1	Section 6. Employer's Requirements Annexes	-	*The following Annexes shall form part of Section 6. Employer's Requirements:* Annex E – RTIC Focal Area Showcase Components and Innovation Makerspace Specifications Annex G - Requirements for rehabilitation / renovation works

DDG FELIZARDO R. COLAMBO
Bids and Awards Committee (BAC) - B Chairperson/
Deputy Director General for Special Concerns

East Service Road, South Luzon Expressway (SLEX), Fort Bonifacio, Taguig City 1630
Land Line: (+632) 8888-5641 to 46 ▪ CP Number: (+63) 917-4794370 (text only) ▪ Telefax No.: (+632) 8893-2454
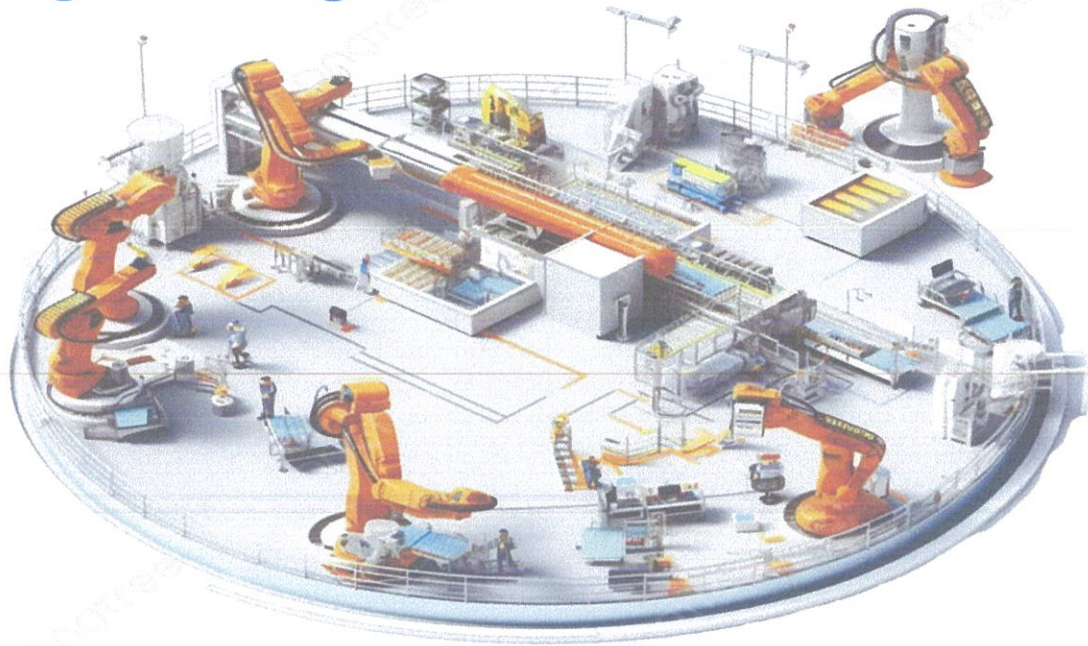www.tesda.gov.ph ▪ contactcenter@tesda.gov.ph

Sa TESDA, Kayang Kaya

Annex E – RTIC Focal Area Showcase

Design and Build of Regional TVET Innovation Center (RTIC) of NCR (Regional Training Center) including Rehabilitation/ Renovation/Repair of TTI's existing facilities

RTIC NCR

Mechatronics; Industrial Automation and Control Engineering

Conceptual Image for Reference Only

Focus Area Showcase: Key Components, Equipment, and Recommended Innovation Makerspace Specifications

Annex E : RTIC Showcase / Equipment

General Equipment Components @ RTIC-NCR

The proposed items in this annex serve only as a **general guide and overview** to the expected equipment, functions, and spatial complexity. This aims to ensure **preparedness for power requirements, anticipating higher and applicable load demands, and strategically placing utility tapping points within the new innovation center.**

The Design and Build Contractor is expected to engage in detailed discussions with TESDA, its consultants, and representatives to finalize and refine the equipment list and determine the applicable power requirements for each area.

Before proceeding with schematic and detailed Architectural and Engineering design, the design-build contractor must arrange a comprehensive meeting with TESDA, its representatives, and consultants to clarify and agree upon the design, utility, power requirements and methodologies. This ensures alignment with the contract timeline and proper coordination with other services, as well as Architectural and Engineering disciplines.

This list shall **align with other annexes and sections**, and any equipment mentioned or included in other sections/annexes but not explicitly listed here is assumed to be part of the final design and considerations to ensure a **complete, functional, and code-compliant system**. This includes, but is not limited to, elevators/lifts, HVAC systems, ventilation, fans and exhausts, fire suppression systems, internet/data/Wi-Fi, public address, alarm system security, required RFIDs and other essential equipment required for the facility's operation in other areas. (i.e Roof Deck, Common Areas)

1. MULTI-DISCIPLINARY HEAVY FABRICATION WORKSHOP

Equipment Category	Detailed Equipment	Equipment Description	Quantity
1. CNC Equipment	CNC Milling Machine	Computer controlled milling machine for precise cutting and shaping	1
2. Lathe	Metal/ Wood Lathe	Machine for shaping metal	1
3. Mill/ Router	Metal/ Wood Router	Used for hollowing out an area in a piece of wood	1
4. Welding Equipment	• MIG Welder • Welding Helmet • Welding Gloves • Welding Apron • Welding Wire • Welding Clamps	Comprehensive welding station	1
5. Hand Tools	• Screwdrivers Set Variety of sizes and types (Phillips,flathead, etc.) • Pliers Set Variety of types (needle-nose, slip-joint, etc.) • Wire Cutters For cutting and stripping wire • Precision Knife For fine cutting and trimming tasks • Hammers Various types for different tasks (claw hammer, ball-peen hammer, etc.) • Saws	Basic set of hand tools for various tasks	1
6. Drilling Tools	Bench Drill Press	Stationary drill for precise hole placement	1
	Bandsaw	For cutting wood or metal	1

	Circular Saw	Portable saw for cutting wood	1
	Jigsaw	Portable saw for cutting curves	1
	Metal Shear	For cutting sheet metal	1
7. Bending Tools	Metal Bender	For bending metal rods and bars	1
	Sheet Metal Brake	For bending sheet metal	1
8. Measurement Tools	• Calipers • Micrometer • Ruler • Square • Protractor • Tape Measure	Comprehensive measurement tools set	2
9. Safety Equipment	• Eye Protection • Ear Protection • Dust Masks • Fire Extinguisher	Safety equipment for various tasks	10 sets
10. Other Tools	Sanding Machine	For smoothing and finishing wood and metal	1
	Bench Grinder	For sharpening tools and grinding metal	1
	Belt Sander	For smoothing and finishing large surfaces	1
	Clamping Tools Set (C-clamps, Bar Clamps, Bench Vise)	For securely holding work pieces	1
11. Compressor/ Vacuum	Industrial Air Compressor	An air compressor capable of providing the needed air pressure and flow for a CNC machine.	
	Industrial Vacuum System	A vacuum system designed for use with a CNC machine.	
12. Consumables	CNC Milling Bits	For use with the CNC machine	10
	Lathe Cutting Tools	For use with the lathes	10
	Router Bits	For use with the router	10
	Drill Bits	For use with the drill press	20

	Bandsaw Blades	For use with the bandsaw	5
	Circular Saw Blades	For use with the circular saw	5
	Jigsaw Blades	For use with the jigsaw	10
	Sandpaper	For use with the sanding machine and belt sander	50
	Grinding Wheels	For use with the bench grinder	5
	Screws, Nails, Fasteners	Assorted sizes and types for various projects	100
13. Furniture	Workbenches	Heavy-duty tables for performing work	4
	Storage Cabinet	For securely storing tools and materials	2
	Chairs	For sitting while working	20
	Tool Chests	For organizing and storing small tools	2
14. General Purpose Equipment	240V Single Phase Outlet	Standard wall outlets for various tools and machines	16
15. CNC and other high capacity equipment	415V Three Phase Outlet	High-capacity outlets for heavy machinery like the CNC machine and welder	5
16. Electrical Outlets	240V GFCI Single Phase Outlet	Ground fault circuit interrupter outlets for safety for CNC, Milling, Lathe and Router	4
TOTAL OUTLETS			**24**

2. SMART FACTORY DEMOSTRATIONAL AREA

Demonstrational Equipment for SMART Factory Showcase

Equipment Category	Description	Equipment Description	Quantity
1. Product Stimulation Table	Simulates product assembly Workbench	Workbench & Dummy Product	2
2. Automated Guided Vehicles (AGVs)	Transports products between stations	AGV Robots, Charging Stations, & Guidance Infrastructure	3,2,1
3. Smart Conveyor Belts	Moves items along production line	Belt Conveyor, Speed Controllers, & Sorters	2,2,1
4. Collaborative Robots (Cobots)	Performs precise, repetitive tasks	Robot Arm, Grippers, & Safety Features	2,4,2
5. Industrial Robots	Handles heavy-duty tasks	Heavy-duty Robotic Arm, Application Specific Tooling, & Robot Controller	1,2,1
6. 3D Printers	Manufactures prototypes or parts	Industrial-grade 3D printer, Filament/Resin, & 3D modeling software	1,10,1
7. Various IoT Sensors	Monitors and collects data	Variety of Sensors, IoT Gateway, & Data Acquisition System (DAQ)	2,2,1
8. Machine Vision Systems	Inspects products for quality control	High-Speed Cameras, Lighting, & Image Processing Software	2,2,1
9. Industrial PCs	Controls and manages factory systems	High-performance PC, Industrial Monitors, & Specialized Software	2,2,1

10. Digital Twin Software	Simulates physical factory in a digital environment	Digital Twin Platform & High performance Server	1 each
11. Augmented Reality (AR) Devices	Assists in machine maintenance, training, and assembly	AR Headsets & AR Software	1 each
12. Smart Storage Units	Stores and retrieves products automatically	Automated Storage and Retrieval System (AS/RS), Inventory Management Software, & Barcodes or RFID Tags	1,1,100

Electrical Outlet Points

Equipment Category	Suggested Quantity	Power Supply Type	No. of Outlets
1. Product Stimulation Table	2	Single Phase 240V 1P	2
2. Automated Guided Vehicles (AGVs)	3	Single Phase 240V 1P	3
3. SMART Conveyor Belts	2	Three Phase 240V 3P	2
4. Collaborative Robots (Cobots)	2	Three Phase 240V 3P	2
5. Industrial Robots	1	Three Phase 240V 3P	1
6. Industrial 3D Printers	1	Single Phase 240V 1P	1
7. Various IoT Sensors	10	Single Phase 240V 1P	10
8. Machine Vision Systems	2	Single Phase 240V 1P	2
9. Industrial PCs	2	Single Phase 240V 1P	2
10. Digital Twin Software	1	Single Phase 240V 1P	1
11. Augmented Reality (AR) Devices	1	Single Phase 240V 1P	1

	1	Three Phase 240V 3P	1
12. Smart Storage Units	1	Three Phase 240V 3P	1
TOTAL OUTLETS			

Equipment Category	Equipment Description	Quantity
13. Regular 3D Printers	High-Resolution 3D Printers (For prototyping and model creation)	5
14. Filament	PLA Filament (standard for most general-purpose printing)	10
	PLA Filament (standard for most general-purpose printing)	10
	Specialty Filament (flexible, wood-infused, metal-infused, etc.)	10
15. Printer Maintenance	Print Bed Surface	2
	Replacement Nozzles	5
	Cleaning and Scraping Tools	2
16. Design Software	CAD Software License (like Tinkercad, Fusion 360)	
17. Computers	Computers (For 3D modelling, research, etc.)	2
18. Post-processing	Deburring Tools	2 sets
	Sandpaper Assortment	2 sets
19. Safety Equipment	Fire Extinguisher	1
	Fume Extractor (particularly for ABS or other noxious materials)	1
20. Measurement Tools	Calipers (For precise measurements)	5
	Level (For ensuring proper alignment)	5
21. Safety Equipment	Safety Glasses (Eye protection)	20
	First Aid Kits (Emergency treatment)	2
22. Workshop Furniture	Workbenches (Workstation for users)	3
	Drafting Chairs (Adjustable seating for users)	18
	Computer Desks (Workstation for staff)	2
	Office Chairs (Seating for staff)	2
	3D Printer Stands/Cabinets (Dedicated housing for 3D printers)	5
23.	Filament Storage Boxes	5
	Tool Storage Box	1

3. EQUIPMENT FOR ELECTRONICS, ROBOTICS AND IOT WORKSHOP (MEZZANINE LEVEL)

Equipment Category	Equipment Description	Quantity	Details
1. Microcontrollers	Arduino Uno	8	Open-source electronic prototyping platform enabling users to create interactive electronic objects.
2. Microcontrollers	Raspberry Pi 4	8	Compact computer board used for a variety of applications and projects.
3. Microcontrollers	ESP32	8	A series of low-cost, low-power system on a chip microcontrollers with integrated Wi-Fi and dual-mode Bluetooth.
4. Microcontrollers	ESP8266	8	A low-cost Wi-Fi chip with full TCP/IP stack and MCU capability.
5. Sensors	Various Sensors	8 (sets)	Sensor kits for a variety of IoT projects or equivalent: - DHT22 (Temperature & Humidity Sensor) - PIR Motion Sensor - HC-SR04 (Ultrasonic Distance Sensor)

			• Photocell (Light Sensor) • MPU6050 (Gyroscope & Accelerometer) • Reed Switch (Magnetic Sensor) • Soil Moisture Sensor • MQ-2 Gas Sensor • Load Cell & HX711 Amplifier Weight Sensor) • Sound Sensor (Microphone Module) • Infrared Obstacle Avoidance Snsor • LDR (Light Dependent Resistor) • Hall Effect Sensor (Magnetic Field) • Pulse Rate Sensor
6. Actuators	Various Actuators (Servo Motors, DC Motors, LEDs)	8 (sets)	Actuator kits for robotics and IoT projects or equivalent: • Servo Motor (SG90) • DC Motors • Stepper Motor (28BYJ-48 with ULN2003 Driver) • Brushless DC Motor • Solenoid

			• Piezoelectric Actuator • Linear Actuator • Relay Module • LED Light Strip • Speaker/Buzzer
7. IoT Modules	Various IoT Modules	8 (sets)	IoT module kits for various connectivity options or equivalent: • ESP8266 WiFi Module • HC-05 Bluetooth Module • SIM800L GSM Module • NEO-6M GPS Module • RAKWireless LoRa Module • XBee Pro S2C • RFID reader and tags
8. Circuit Components	Basic Electronics Components Kit (Resistors, Capacitors, Diodes, Transistors, ICs, Breadboards, Jumper wires, Power supplies)	8	Basic electronics kits for building and testing circuits. • Resistors (Assorted) • Capacitors (Assorted) • Diodes • Transistors (Assorted) • Integrated Circuits (Assorted) • Breadboards • Jumper Wires (Assorted) • DC Power Supply • LED (Assorted) • Switches (Assorted) • Relays

			• Stepper Motors • Motor Driver ICs • FPGA Development Boards • Function Generator
9. Displays	Various Displays	8 (sets)	Variety of display types for different project needs. • 7" TFT LCD Display • OLED Display Module • 32x8 LED Matrix Panel
10. Computers	Laptop Computers	6	Following specification or above: • i5 or Ryzen 5 • 16 GB RAM • 500GB SSD • FHD screen • USB and HDMI ports • Battery life of more than 5 hours
11. Laser Cutter	High Resolution Laser Cutter	1	For laser cutting of patterns and parts
12. Robotic Arms	ABB's GoFa or UFactory 850 collaborative robot	2	High-speed, high-precision collaborative industrial robotic arm.
13. Soldering Tools	Soldering Tools Set	8	Essential tools for assembling electronic components. • High-Precision Soldering Station • Lead-Free Solder Wire • Desoldering Pump • Soldering Tips (Variety pack)

			• Solder Wick • Flux Pen • Tip Tinner • Helping Hands with Magnifying Glass • Safety Glasses • Soldering Mat
14. Measurement Tools	Multimeter	8	Instrument for testing electrical connections and activity.
	Oscilloscope	2	Instrument for observing varying signal voltages
15. Hand Tools	Hand Tools Set (Screwdrivers, Pliers, Wire Cutters, Precision knife)	8	Essential tools for manual work on projects • Set of pliers • Set of screw drivers • Set of wire markers • Wire strippers • Digital multi-meter • Wire crimpers • Clamp ammeter • Mobile tool trolley • Plastic cable tray 1 m × 1.5" × 1.5"
16. Other Tools	Other Tools Set	8	Additional tools for constructing and securing electronic projects. • Heat shrink tubing • Adhesive tapes • Heat gun • PCBs • PCB Etching solution

			• Heat shrink tubing (assorted sizes) • PCBs and PCB Etching solution • Precision Knife Set
17. 3D Printing Tools	3D Printer	2	For fabricating custom parts and components.
18. Safety Equipment	Safety Equipment Set	8	Safety equipment to ensure user safety during hands-on work. • Safety Glasses • Fume Extractor for Soldering • Antistatic Mat • Ear Plugs • First Aid Kit • Fire Extinguisher (special for electrical fires) • Safety Gloves (for handling hot or sharp objects) • Ear Protection (if using noisy tools) • Emergency Exit Signage

Furniture

Category	Furniture	Quantity	Description
19. Workstations	Workbenches/Tables	10	Sturdy workbenches for hands-on work.
	Comfortable Chairs	8	Comfortable chairs for extended work periods.
	Computer Desks	6	Desks for computers and electronics work.
	Computers for Design/Coding	6	Computers for design and coding tasks.

20. Storage	Storage Cabinets for Tools	2	Cabinets for storing tools and equipment.
	Storage Cabinets for Components	2	Cabinets for storing electronic components.
	Shelves for Projects/Robots	2	Shelves for displaying projects and robots.
	Rolling Tool Chests	2	Mobile tool chests for flexible workspace.
	Filing Cabinet for Documentation	1	Cabinet for storing documentation and records.
21. Safety & Cleanup	Soldering/ Hot Work Station	1	Dedicated station for soldering and hot work.
	Safety Equipment Storage	1	Storage for safety equipment like goggles and gloves.
	Trash/ Recycling Bins	2	Bins for waste management
	First Aid Kit	1	First aid kit for minor injuries.
	Fire Extinguisher	1	Fire extinguisher for safety.
22. Teaching & Presentation	Large Whiteboards	4	Whiteboards for teaching and brainstorming
	Large Screen TVs	1	TV for presentations and media display.
23. Meeting Room	Conference Table	12	Large conference room table
	Large Screen TV	1	TV for presentations and media display
	Conference Room Chairs	12	Comfortable chairs for the conference table

Electrical Outlet Points (240V – Single Phase)

Equipment Category	Quantity	Electrical Points per Unit	Total Electrical Points
Desks (Workbenches/ Tables + Computer Desks)	16	4	64

3D Printers	2	2	4
Computers for Design/ Coding	6	2	12
Large Screen TVs	3	2	6
Meeting Room Conference Table	6	2	12
Total Electrical Outlets			**98**

4. INCUBATION, CO-WORKING AND EVENT SPACE

Category	Item	Quantity
24. Co-Working Space	Office Chairs on Rollers	23
	Foldable tables on rollers	23
25. Dining Area	Dining Tables	2
	Dining Chairs	8
26. Pantry	Refrigerator	1
	Microwave Oven	1
	Electric Kettle	1
	Coffee Maker	1
	Water Dispenser	1
	Dish Rack	1
	Storage Cabinets	As needed
	Cutlery & Crockery	As needed
27. Sofa Area	5- seater sofas	3
	Coffee tables	3
28. Small Incubation Rooms (5x)	Mobile tables on rollers	4

	Office Chairs	20
	Large Whiteboards	5
	Notice board	5
29. Large Incubation Room (1x)	Mobile tables on rollers	6
	Office Chairs	6
	Large Whiteboard	1
	Notice board	1
30. Telephone Booths	Single-person desk	3
	Office Chairs	3

Electrical Outlet Points

Category	Item	Outlet Points Needed	Voltage
Co-working Space	Foldable tables on rollers	23	240V 1P
Incubation Rooms	Desk Points	23	240V 1P
Dining Area	Dining tables	2	240V 1P
	Dining Chairs	8	240V 1P
Pantry	Refrigerator	1	240V 1P
	Microwave Oven	1	240V 1P
	Electric Kettle	1	240V 1P
	Coffee Maker	1	240V 1P
	Water Dispenser	1	240V 1P
Sofa Area	Coffee Tables	3	240V 1P
	Total Outlet Points	**64**	

Design and Build of Regional TVET Innovation Center (RTIC) of NCR (Regional
Training Center) including Rehabilitation/ Renovation/Repair of TTI's existing facilities

Project: Regional TVET Innovation Center (RTIC) for NCR
Name of Support Facility: RTC-NCR
Address: TESDA Complex Gate 2, Taguig City

Item No.	Picture Taken	Location	Description	Qty	Unit	Program of Work to be done
			Room 201 Mechatronics (Laboratory)	78.51	sq.m	**Tiling Works** - Removal and clearing of existing floor tiles; - Re-installation of non-skid floor tiles.
				72.76	sq.m	**Painting Works** - Repainting of interior and exterior walls.
				1	lot	**Electrical Sytem Works** - Repair and replacement of existing electrical system; - Repair and replacement of all electrical fixtures; - Provision of electrical system for LED tube lights.
			Room 202 Mechatronics (Lecture Area)	63.94	sq.m	**Painting Works** - Repainting of Interior and exterior walls; - Repainting of rubberized paint on flooring.
				1	lot	**Electrical Sytem Works** - Repair and replacement of existing electrical system; - Repair and replacement of all electrical fixtures; - Provision of electrical system for LED tube lights.
			Room 203 Lecture Room (Common)	63.94	sq.m	**Painting Works** - Repainting of interior and exterior walls. - Removal of existing vinyl tiles and Repainting of rubberized paint on flooring
				1	lot	**Electrical Sytem Works** - Repair and replacement of existing electrical system; - Repair and replacement of all electrical fixtures; - Provision of electrical system for LED tube lights.
			Room 204 Trainer's Methodology (Lecture Room)	1	lot	**Electrical Sytem Works** - Repair and replacement of existing electrical system; - Repair and replacement of all electrical fixtures; - Provision of electrical system for LED tube lights.
			Room 205 Trainer's Methodology (Laboratory)	1	lot	**Electrical Sytem Works** - Repair and replacement of existing electrical system; - Repair and replacement of all electrical fixtures; - Provision of electrical system for LED tube lights.
			Room 206 PV Systems Installation (Lecture Room)	37.8	sq.m	**Painting Works** - Repainting of interior, exterior walls and ceiling.
1		2ND FLOOR (MAIN BUILDING)		34.96	sq.m	**Painting Works** - Rubberized painting on flooring.

		34.96	sq.m	**Electrical Sytem Works** - Repair and replacement of existing electrical system; - Repair and replacement of all electrical fixtures; - Provision of electrical system for LED tube lights.
Room 207 PV Systems Installation (Laboratory Room)		37.8	sq.m	**Painting Works** - Repainting of interior and exterior walls and ceiling.
		34.96	sq.m	**Painting Works** - Removal and replacement of existing viny; and application of Rubberized paint on flooring
Room 208 & 209 PV Systems Installation (Lecture Room & Laboratory)		69.92	sq.m	**Tiling Works** - Re-installation of 30cm x 30cm non-skid floor tiles
		1	lot	**Electrical Sytem Works** - Repair and replacement of existing electrical system; - Repair and replacement of all electrical fixtures; - Provision of electrical system for LED tube lights.
		74.52	sq.m	**Painting Works** - Repainting of interior and exterior walls
		69.92	sq.m	**Ceiling Works** - Repair and reinstallation of ceiling system and ceiling boards - Painting of new installed ceiling boards.
Hallway		46.00	sq.m	**Ceiling Works** - Repair and reinstallation of ceiling system and ceiling boards - Painting of new installed ceiling boards.
		1.00	lot	**Electrical Sytem Works** - Repair and replacement of existing electrical system; - Repair and replacement of all electrical fixtures; - Provision of electrical system for LED tube lights.
Comfort Room (Male & Female)		1.00	lot	**Plumbing Works** - Repair and replacement of plumbing system and fixture.
Lecture Room (2nd Floor)		1.0	lot	**Electrical Sytem Works** - Repair and replacement of existing electrical system; - Repair and replacement of all electrical fixtures; - Provision of electrical system for LED tube lights.
		60.0	sq.m	**Ceiling Works** - Repair and reinstallation of ceiling system and ceiling boards - Painting of new installed ceiling boards.
		1.0	lot	**Electrical Sytem Works** - Repair and replacement of existing electrical system; - Repair and replacement of all electrical fixtures; - Provision of electrical system for LED tube lights.

#	Photo	Building	Area	Qty	Unit	Works
2		WELDING BUILDING	Practical Working Area (Ground Floor)	1.0	lot	**Roofing Works** - Repair and replacement of existing roofing. - Painting and repainting of new installed roofing.
			Water Jet/ CNC Plasma Cutting Area	20.0	sq.m	**Painitng Works** - Repainting of interior and exterior walls - Rubberized paint on flooring
			Additional Lecture Area (Elevated)	97.7	sq.m	**Construction Works/ Electrical System Works** - Installation of steel post with H-BEAM - Installation of wall partition - Installation of vinyl tiles flooring - Installation of corrugated roof - Painting of interior and exterior walls - Painting of new installed roofing - Painting of installled steel post with H-BEAM - Installation of electrical system (wall outlets, and LED tube lights)
			Grinding Area	1.00	lot	**Roofing Works** - Repair and replacement to corrugated roof - Extension of roof height to atleast 10ft.
3		PMS BUILDING	Practical Working Area (Petron Area)	501.5	sq.m	**Painting Works** - Rubberized paint of flooring
			Lecture Room	46.71	sq.m	**Painting Works** - Repainting of interior and exterior wall and existing ceiling
				1.00	lot	**Electrical Sytem Works** - Repair and replacement of existing electrical system; - Repair and replacement of all electrical fixtures; - Provision of electrical system for LED tube lights.
			Comfort Room	12.90	sq.m	**Painting Works** - Repainting of interior and exterior wall and existing ceiling
						Plumbing Works - Repair and replacement of plumbing system and fixture
				1.00	lot	**Electrical Sytem Works** - Repair and replacement of existing electrical system; - Repair and replacement of all electrical fixtures; - Provision of electrical system for LED tube lights.

| | | | Tool Room | 88.53 | sq.m | **Painting Works**
- Repainting of interior and exterior wall and existing ceiling
- Rubberized paint on flooring |