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SWAZILAND COMMERCIAL AGRICULTURAL PRODUCTION AND MARKETING

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UNISWA EQUIPMENT NEEDS ASSESSMENT

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Submitted to:

THE UNITED STATES AGENCY FOR
INTERNATIONAL DEVELOPMENT
SWAZILAND MISSION

Submitted by:

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SECTION I

NEEDS ASSESSMENT FOR UNISWA EQUIPMENT

A. Background

The CAPM project involves a joint Government of Swaziland/ USAID program to increase the agricultural sector's contribution to the national economy of Swaziland. Education and training of students at UNISWA will increase agricultural commercialization. To carry out its role effectively, UNISWA needs adequate facilities and equipment.

The Vice Chancellor's November 1988 Report listed the following UNISWA (Luyengo) objectives:

1. to produce high and middle level trained manpower needed for national development.
2. to provide a center for formal study of agriculture and associated areas of learning.
3. to further the education of professional and other persons working in agriculture and all levels of education.
4. to create, preserve, transmit and increase skills and knowledge in agriculture and related disciplines.
5. to work and forge links with national and international institutions to promote development in agriculture and related areas.
6. to provide a consultative and coordinating machinery for all involved in agro-based industries and education.

The CAPM project is consistent with and supportive of these objectives. The CAPM project focuses on increasing agricultural commercialization particularly on small farms, and in increasing rural employment. The newly restructured curriculum at UNISWA emphasizes agri-business management and practical "farm work experience ... to develop work skills and wholesome work habits."

B. General

1. UNISWA/GOS

The joint effort between the Government of Swaziland and USAID provides funds to improve the facilities and equipment

at UNISWA. The CAPM Project resources are to be used to purchase and integrate new educational, laboratory and farm equipment into the restructured curriculum. The Government of Swaziland funds are designated for renovating and up-grading certain campus structures and many of the facilities at the UNISWA training farm. A draft report, "Restructuring the Luyengo Agricultural Training Facilities," has been compiled; it contains detailed plans and drawings for improving the farm facilities. It is important that both components of this joint project be coordinated and implemented so equipment and facilities can be improved simultaneously and UNISWA can achieve its role in increased commercialization of agriculture in Swaziland.

UNISWA needs specific equipment to provide the practical "hands-on" training that is being built into the restructured curriculum.

2. Procedures

Several previous reports were reviewed. These included the project paper, technical proposal, linkage project report and the draft report on restructuring the Luyengo agricultural training facilities. Meetings or discussions with USAID, Chemonics, Kim Kennedy (COP, CAPM), P.J. van Blokland (Visiting Professor, CAPM), and Betsy Fowler (Procurement Officer, Chemonics) provided additional information about how the equipment met CAPM objectives. The next step involved reviewing previous requests for equipment and other information provided by the UNISWA departments and faculty. During the on-site visit, many meetings with individual faculty were held to discuss what equipment they currently have, justification for their equipment requests and how these requests relate to agricultural commercialization and practical student training. Meetings were also held with the Dean, Dr. G.R. Winter, and the Farm Manager, J.P. Hooft, to obtain a broader perspective of needs and justification for equipment.

C. Recommended Equipment

Recommendations for equipment were divided into the following schedules: animal holding unit, farm equipment, farm security, crop production, student food store, spraying equipment, microscopes, microbiology and plant pathology, land survey, hydrology lab, land use planning lab, welding and woodworking, audio visual, home economics and education center. Schedules A through O provides the specifications for the recommended equipment. The farm security schedule was deleted as it focused on items that dealt primarily with improving the facilities of the farm (such as fences and security lights). These improvements in facilities should be supplied through the funding provided by GOS for farm facilities.

The recommended equipment in Schedule A through O would provide students with experience in caring for farm animals, propagating plants, planting vegetable plots, studying and identifying plant pathogens, examining plant materials and identifying plant diseases, learning land survey techniques, irrigating crops, welding and woodworking, food processing, working with fabrics and learning methods and techniques to teach agriculture to others. These activities should be a part of the students' practical training and the preparation of students to work in commercial agriculture on all types of farms.

The total estimated cost of the equipment purchases amounts to \$220,390 (see table 1). This leaves a reserve of \$47,610 for overseas freight, insurance, forwarding charges, overland charges from South Africa and insurance-in-country.

D. Other Recommendations

1. It is recommended that CAPM, USAID, UNISWA and GOS work together closely on the purchase of the equipment, computers and construction of physical facilities. Some facilities need to be improved or renovated to accommodate the planned use of equipment and computers that are being purchased through the CAPM project. It is important for each of these components to be completed in a timely fashion for the UNISWA students and faculty to obtain maximum benefit from the improvements.

2. It is recommended that USAID, CAPM and UNISWA attempt to keep the Ministry of Education informed about the progress of equipment purchases. When the equipment has been purchased and is set up and operating, it is recommended that the Ministry of Education and other interested parties be invited to UNISWA for a tour and perhaps a dedication. It is important that the Ministry of Education provide the funds to complete the upgrading of the facilities. By keeping the channels of communication open, the chances are greater that a well-coordinated completion of the joint effort between USAID and the Government of Swaziland will occur.

3. Some of the equipment specified in Schedules A through O may be difficult to obtain in the USA with 220V power or metric fittings or calibrations. If they are not available in the States, it is recommended that these items be purchased locally.

SECTION II

TABLES

TABLE 1

ESTIMATED EQUIPMENT COSTS

SCHEDULE	DESCRIPTION	ESTIMATED COST \$
A	Animal Holding Unit	4,681
B	Farm Equipment	66,370
C	Security	Deleted
D	Crop Production	33,070
E	Student Food Store	9,700
F	Spraying Equipment	8,000
G	Microscopes	12,262
H	Microbiology and Plant Pathology	2,932
I	Land Survey	5,480
J	Hydrology Lab	10,000
K	Land Use Planning	28,658
L	Welding and Woodworking	19,638
M	Audio Visual	8,790
N	Home Economics	8,764
O	Education Center	2,045
	Total Estimated Equipment Costs	<u>220,390</u>

SECTION III

SCHEDULES

SCHEDULES A TO O

SCHEDULE A

ANIMAL HOLDING UNIT

<u>ITEM</u>	<u>QTY</u>	<u>DESCRIPTION</u>
A1	1EA	Cow/animal scale: portable/mobile scale complete with holding pen, trailer assembly, and hitch. Capacity is 1400 kilos, holding pen is 68" H x 94" L x 36" W. METRIC required. Equivalent to Sure-weigh model 1259B.
A2	1EA	Diesel Water pumps: small for animal spraying/cleaning.
A3	2EA	Dosing gun: 50 ml automatic drencher, dosage setting from 5 to 50 ml, 5 liter container and shoulder strap. Equivalent to Dosi Supervet Drenching Equipment.
A4	1EA	Sheep shearing machine: 220 volt 50 hz, 3000 cutting strokes per minute, complete with cobs and cutter. Equivalent to Shearmaster by Oster.
A5	2EA	Rigged sheep shears: steel, rigged with buck strap. 6 1/2 inch blade.
A6	3EA	Extra heavy duty hoof trimmer: rubber handle grips, Length: approx 16", blade opening 1-5/8", blade with 1-3/8". With replacement blades.
A7	2EA	Rubber ring Elastrator with 500 rings. 9 1/2" long.
A8	2EA	Burdizzo Emasculator: medium size for calves, 13" long.
A9	10EA	Metric weight tape, overall calibrations: 287 cm, 857 kilos. For beef and dairy cattle.
A10	4EA	Heat Dehorning Iron Set: Copper head is heated and applied over horn. Set includes small, med and lg irons.
A11	2EA	Convex Dehorner: size: 16" dehorner with 25" handles.
A12	2EA	Ear Tagger: with 5000 large un-numbered tags and pens. Equivalent to DuFlex Applicator Tool.

- A13 20EA Kid/Lamb Feeder: 3 ft., size:10" W x 40" L x 5" D.
- A14 20EA Feeders for sheep: for grain, stackable, fiberglass, 4 ft long.
- A15 1EA Chicken plucker: with motor, 8" diameter x 10" wide drum with commercial-duty rubber fingers, portable, heavy-gauge steel, 1/4 horsepower motor, with backsplash to catch feathers. 220 volt, 50 hz.
- A16 1EA Sportsman Circulated Air Incubator: three automatically turned trays, holds total of approx 275 chicken eggs, easy read dial thermometer, 6" fan blade, 225 watt heat element, 220 volt, 50 hz.
- A17 1EA Hatching Incubator: compatible with A16, 2 thermometers, includes hatching trays, automatically turns trays every 2 hours, 5 hatching trays. 220 volt, 50 hz.
- A18 1EA Debeaker: heavy duty, adjustable for chicks, hens, turkeys. Can also be used for wing clipping. 220 volt, 50 hz. Equivalent to Lyon Super Debeaker.
- A19 1EA Set of Poultry Wing Bands (1000 pcs): aluminum, 3/16" wide. Applicator included.
- A20 1EA Filmstrip: Artificial Insemination of Beef and Dairy Cattle.
- A21 1EA Filmstrip: Calving Management.
- A22 1EA Filmstrip: Preventative Health Care for Beef.
- A23 1EA Filmstrip: Introduction to Swine Management.
- A24 1EA Filmstrip: Brood Sow and Litter.
- A25 1EA Filmstrip: Swine Nutrition.
- A26 1EA Bomb Calorimeter: measures energy value of animal/ dairy feed. 220 volt, 50 hz.
- A27 1EA Reflux Unit: measures cellulose in roughage, silage, and hay. 220 volt, 50 hz.

ELECTRICAL EQUIPMENT REQUIRES 220 VOLT, 50 HZ.

SCHEDULE B
FARM EQUIPMENT

<u>ITEM NO.</u>	<u>QTY.</u>	<u>DESCRIPTION</u>
B1	1EA	Milk Pulsator: vacuum, equivalent to DeLaval Interpuls Vacuum Pulsator with DeLaval adapters.
B2	5EA	Milk Measuring equipment unit: for 75 Milking herd, Holstein, equivalent to DeLaval Part No. 967400-81.
B3	1EA	5-Unit Single Stand Elevated Parlor Frames: for milking parlor, without feeders, with doors.
B4	5EA	Feeding Stanchions: with individual feeding troughs, deep trough for Holsteins, open ended.
B5	1EA	Pasture Seeder: Drawbar, two double boxes, tapered, Box capacities: front: 2-1/2 bu; rear: 1-3/8 bu, 10ft rolling width. Equivalent to Brillion, AG Model Sure-Stand Grass Seeder No. SST-1201.
B6	1EA	Front-end Loader: with 2 quick release attachments for gravel and silage, for John Deere 2140 1981 Model Tractor, 75 HP. Equivalent to Bush Hog Model 2400QT.
B7	1EA	Trailer: for grain, 6 ton for John Deere 2140 1981 Model Tractor, two-wheel tandem axle, self-braking, tilting for unloading.
B9	1EA	Electric High Pressure Washer/Cleaner: for washing heavy duty farm equipment, standalone, mobile (2-wheel) 3/4 horsepower. 220 Volt, 50 Hz.
		Irrigation Equipment:
B10	25EA	* 3" plain pipes, 8 meters each (26.6 ft.)
B10A	20EA	* 4" plain pipes, 8 meters each (26.6 ft.)
B10C	25EA	* sprinkler units (risers), 8 meters each, 3/4" outlet double nozzle fitting
B10D	4EA	* 6" in & out hydrants, 10-12" wheels
B11	2EA	Motorcycles: 125 cc, Honda motorcycles, 4 stroke, off-road.

- B12 1EA Grain Auger: 5" grain auger with 5 bushel bulk tank, mobile, 40 ft. long, PTO driven.
- B13 1EA Rolling cultivator, 2 row with 4 spider rear gangs equivalent to Bush Hog 6400 series.
- B14 1EA 2 Row Plateless Planter: for John Deere Tractor Model 2140, fertilizer attachment, 90cm row spacing (adjustable).
- B15 1EA Lime Spreader: Tractor-pull type model for granulated limestone, fertilizer and seed. Approximate hopper capacity 1000 lbs. Stainless steel bottom and rate-control slide. Heavy duty 15" x 5k disk rims. Weather-tight covers with spill guards.
- B16 1EA Feed Mixer Trailer: feed mixing trailer for concentrate and silage, with auger or slotted chain side deliver, for use in feedlot with tractor (not included), heavy duty, approximately 5 ton capacity, open top. Equivalent to Oswalt or Butler feed/mixer.
- B17 1EA Concrete/Cement Mixer: 1/4 to 1/3 cubic yard capacity, 5 HP gasoline engine. Portable model with drawbar.

ELECTRICAL EQUIPMENT REQUIRES 220 VOLT, 50 HZ.

SCHEDULE D

CROP PRODUCTION

<u>ITEM NO.</u>	<u>QTY.</u>	<u>DESCRIPTION</u>
D1	1EA	Mist Propagation Unit: for space 25 meters long by 1 meter wide (greenhouse). 25 meters of 3/4" pipe to run the length of space with heads and mist devices spaced approximately 1 meter apart. Electric pump with timer control timing of mist sprays. 220 volt, 50 hz.
D2	1EA	Soil Steam Sterilizer Unit: electric heat sterilizer capable of maintaining heat at 180 degrees fahrenheit for 30 minutes. Equivalent to John Innes type.
D3	1EA	Rotavator (Rototiller): garden type rototiller with 2 (two) horsepower gasoline engine.
D4	2EA	Precision Vegetable Seeder: opens soil, plants, and spaces seeds, covers seeds, packs soil and marks next row. Includes: a variety of seed plates that will plant most common vegetable seeds; a fertilizer side dresser; and seed storage case. Equivalent to Seedboro Model 1001B Seeder and Attachment.
D5	1EA	Irrigation Pump: to be used with 3" irrigation system. Diesel engine with equivalent of 6 KW of power, 3" suction and 3" discharge pipes.
D6	1SET	Irrigation pipes and sprinklers: enough for a 10-Hectare field.
D6A	25EA	* 3" plain pipes, 8 meters each (26.6 ft)
D6B	25EA	* sprinkler units (risers), 8 meters each 3/4" outlet double nozzle fitting.
D6C	4EA	* 6" in & out hydrants, 10-12" wheels

- D7 1EA Trickle irrigation system for 4-hectare orchard. Trees spaced 6.5 meters apart (emission points). Pigtail (at tree) with four emission devices per emission point. Delivery or discharge of one liter/hr. per emission device. Approximately 1000 meters of 1/2" lateral line, 200 meters of 1/2" main line and 600 orifice outlet emitters. Filter system with self-flashing capability to clean the water in the system. Pump not included.
- D8 2EA Area meters: electronically measures the surface area of leaves. 220 volt, 50 hz. Equivalent to L1-Cor L1-3100 Area Meter.

****ELECTRICAL ITEMS REQUIRE 220 VOLT, 50 HZ.****

SCHEDULE E
STUDENT FOOD STORE

<u>ITEM NO.</u>	<u>QTY</u>	<u>DESCRIPTION</u>
E1	1EA	Compressor/Cooler: for walk-in meat cooler with concrete floor. Cooler approximately 2 meters wide x 3 meters in length x 2 meters in height. Capacity to cool and maintain 32 degrees F. 220 v, 50 HZ.
E2	1EA	Refrigerated Unit: Meat, cheese and milk refrigerated retail display unit. Approximately 4 meters in length x 3/4 meter wide x 1/2 meter deep, open top. Capacity to cool and maintain 32 degrees F. Must not exceed 4 meters in length. 220 v, 50 HZ.
E3	1EA	Small Retail Freezer: display freezer for frozen foods, open top, approximately 2 meter length x 1 meter wide. Capacity to cool and maintain -10 degrees F. 220 v, 50 HZ.
E4	1EA	Refrigerator/Cooler Display Unit: for use in display of fruit and vegetables. Approximately 1 meter wide x 3 meter length. Capacity to cool and maintain 32 degree F. 220 v., 50 HZ.
E5	1EA	Cash Register: Electronic cash register with tape print-out, cash drawer with minimum of 5 coin and 5 bill compartments. 220 v., 50 HZ.
E6	1EA	Electronic Scale: electronic scale that weighs and displays price and weight. Calibrated in grams and kilograms, 5 kilogram capacity, 220 v., 50 HZ. Similar to models used in supermarkets.

ELECTRICAL EQUIPMENT REQUIRES 220 VOLT, 50 HZ.

SCHEDULE F

SPRAYING EQUIPMENT

UNIT NO.	QTY	DESCRIPTION
F1	1EA	Axial Fan Mistblower, 65 liters per minute, diaphragm pump for vineyards and orchards, mounts on rear of tractor, PTO driven, spray both sides or either side, connect hoses to spray tops of tall trees. Includes 10 meter folding boom for spraying under trees; 10 meters of high pressure hose; 2 high pressure spraying guns. Equivalent to Nobili P500 Africa Mistblower.
F2	1EA	Accessories for Item F1 including hoses and spraying guns to reach treetops.
F3	2EA	Protecting Respirator Helmets for spray operators: lightweight fiberglass helmets, swing-up visor with moisture seal allows operator to speak and breathe without removing helmet. Unit includes: helmet; air supply hose and couplings, fan unit, one filter, waistband, an electrical supply lead with plug and 12 volt socket for dash mounting on either side of tractor or bike. Fan unit is worn on waistband, when spraying the unit is plugged into tractor 12 volt system, unit also has integral rechargeable batteries which supply 2 hours running time when disconnected from tractor. Screw-on cartridge type filter.

ELECTRICAL EQUIPMENT REQUIRES 220 VOLT, 50 HZ.

SCHEDULE G

MICROSCOPES

<u>UNIT NO.</u>	<u>QTY</u>	<u>DESCRIPTION</u>
G1	12EA	Dissecting Stereomicroscopes: full-size, professional type instrument with diecast aluminum body. Paired wide-field eyepiece, inclined eyepiece tubes and interlocking interpupillary adjustment. Focusing mechanism with dual knobs, bronze and steel slideways, lifetime lubrication and slip clutch to prevent damage. 10X high eyepoint, widefield eyepiece. Focusing range of 2-1/2" and free working distance of 3-3/4". Provides magnification at 10X or 20X with external dial for instant selection. Diameter of field of view is 17.5mm at 10X or 8.8mm at 20X. With locked in unbreakable opaque stage plate, two built-in illuminators for reflected and transmitted light, plastic dust cover, manual and replacement bulb. 220 volt, 50 hz. Equivalent to Reichert Stereomicroscope Model 42RT.
G2	1EA	Microscope: inclined, binocular body rotatable 360 degrees, focusable nosepiece with low-position coaxial coarse and fine adjustments. Planachromatic objectives 4X, 10X, 40X and 100X oil immersions. Ungraduated mechanical stage, abbe condenser (N.A. 1.25) with iris diaphragm in focusable fork-type mount. 10X wide-field eyepiece, built-in transformer and illuminator with 20-W halogen lamp. 220 volt, 50 hz. Equivalent to Reichert Microstar IV Series 410BGF.
G3	2EA	Replacement lamp for microscope described in G2. Halogen, 20W.

G4

1EA

Zoom Stereomicroscope: with easy-slide stage. 1 to 6.5 magnification ratio and dual illumination. Paired 10X widefield and 15X widefield eyepiece. Both eyetubes with independent focus. Zoom objective system with dial calibrated in 0.5X increments from 0.7X to 4.5X. Interpupillary distance adjustable between 55 and 75mm. Binocular head rotatable 360 degrees, inclined 45 degrees and can be locked in place, working distance 86mm. Built-in dual illumination system provides both reflected and transmitted light. Clear glass stage plate, blue filter and stage chips. Wooden cabinet, eye guards and plastic dust cover. Equivalent to Wolfe Zoom Stereomicroscope SW10ZE.

****ELECTRICAL EQUIPMENT REQUIRES 200 VOLT, 50 HZ.****

SCHEDULE I
LAND SURVEY

<u>ITEM NO.</u>	<u>QTY</u>	<u>DESCRIPTION</u>
I1	3EA	Abney level.
I2	5EA	Tilting Level, standard, metric, with tripod.
I3	3EA	Tilting Level, automatic, metric, with tripod.
I4	4EA	Engineer's Rod: three section, sliding rod which extends to 4 meters. Metric measurement required. Equivalent to David White Engineer's Rod.
I5	10SETS	Enameled Surveyor's Arrows, steel, 14" long. A set includes 10 - 12 arrows.
I6	5EA	Optical Squares.
I7	25EA	Plastic Marking Flags.
I8A	1EA	Measuring Tape, one steel 100 Meter
I8B	1EA	Measuring Tape, one steel 300 Meter
I8C	1EA	Measuring Tape, one nylon 100 Meter
I8D	1EA	Measuring Tape, one nylon 300 Meter
I9	10EA	Line Level (spirit level): 2-1/2 power magnification, includes stadia lines.
I10	4EA	Odometer Measuring Wheels, metric, measures in meters and decimeters up to 1000 meters without resetting the counter.
I11	4EA	Polar Planimeter: fixed arms, metric, equivalent to Chicago Steel.
I12	1EA	Theodolite (or "Transit" level) with Tripod. Measures to the nearest degree and minute. Equivalent to Wild Surveying Equipment Model T16, Metric.

ELECTRICAL EQUIPMENT REQUIRES 220 VOLT, 50 HZ.

SCHEDULE J
HYDROLOGY LAB

<u>ITEM NO.</u>	<u>QTY</u>	<u>DESCRIPTION</u>
J1	1EA	Centrifugal Water Pump: for hydraulics lab system, motor not required - just pump for 1400 RPM motor, 3 inch suction line, with discharge of one liter per second.
J2	1EA	Drip Irrigation System: 500 meters of 1/2" drip line; emitters at 3 ft spacing; self-cleaning filter system.
J3	2EA	Flowmeter: to measure flow in 2 inch irrigation line, metric.
J4	2EA	Pressure Regulator: for 2 inch irrigation line, metric.
J5	1EA	Rainfall Intensity Recorder, measures amount of rain per unit of time. Also known as "Recording Rain Gauge". For weather station, metric system.
J6	1EA	Solar Radiation Meter: for weather station, metric.
J7	1EA	Soil Moisture Tester: Equivalent to Kelway Soil Acidity and Moisture Meter.
J8	1EA	Velocity Head Permeameter: measures the hydraulic conductivity of a soil, metric, portable. Equivalent to Soiltest Basis Flexi-wall Permeameter #457-500.

ELECTRICAL EQUIPMENT REQUIRES 220 VOLT, 50 HZ.

SCHEDULE K

LAND USE PLANNING LAB

<u>ITEM</u> <u>NO.</u>	<u>QTY</u>	<u>DESCRIPTION</u>
K1	10EA	Mirror Stereoscopes: for viewing aerial photos 6 x 6 inches.
K2	10EA	Soil Augers: open-ended bucket augers. Equivalent to Soiltest.
K3	5EA	Double ring Infiltrimeters: steel cylinders, 1 ft. diameter for the inner ring, 1-1/2 ft. tall.
K4	1EA	Cartography Set: includes pens, stencils etc.
K5	5EA	Sediment Samplers: equivalent to "Coshocton Wheel".
K6	10EA	Planimeters: polar planimeter with fixed arms. Equivalent to Chicago Steel.
K7	5EA	Map Storage Racks: hanging.

****ELECTRICAL EQUIPMENT REQUIRES 220 VOLT, 50 HZ.****

SCHEDULE L

WELDING AND WOODWORKING

<u>ITEM NO.</u>	<u>QTY</u>	<u>DESCRIPTION</u>
L1	1EA	Welding Unit, large: 300 amp, 380 volt, air cooled, capable of AC-T1B welding. Equivalent to Transarc KR300 AC welding machine, including cables, electrode holder and welding helmet.
L2	2EA	AC/DC Commercial Arc Welder: 250 amp, 220 volt, 50 Hz, including #4 AWG electrode cable with holder, ground cable with clamp, welding helmet and optional wheel kit if not included. Equivalent to Dayton 3Z564 AC/DC Welder.
L3	2EA	AC Welder: 100 amp, 220 volt, 50 hz, including multi-purpose torch that serves as ground clamp, electrode holder and carbon arc torch, cables and helmet. Equivalent to Dayton 3Z744 100 Amp AC Welder.
L4	4EA	Two Stage OXY/Acetylene Welding/Cutting Commercial Outfit: commercial grade, welds to 1" thick, cuts to 1" thick, brass forged, 2 1/2 " diaphragm, two stage regulators, 2 1/2 inch gauges, large diaphragm. Including striker goggles, 20 ft. of twin 3/16" diameter hose, cutting tip No.1, and welding tips Nos. 3, 5 and 7. Metric fittings. Equivalent to Harris Calorific Commercial Outfit.
L5	1EA	Tradesman 16-1/2", 6-speed Drill Press: adjustable speed, floor model with cast iron construction, rigid ground steel column and spindle runout to 0.002" for repeatable drilling accuracy in metal, wood or plastic. Has 1/2" chuck, 2" diameter quill with four heavy-duty ball bearings and open 2-slot worktable with center drilling hole. Includes 1/2 HP motor with speeds from 420 to 2900 RPM. 220 volt, 50 hz.

- L6 2EA Workshop Bench-top 12", 5-speed Drill Press: cast-iron head, hardened steel gears and ball bearing construction. Depth stop, adjustable table with column lock and quick belt tension release. Steel column with slotted worktable and base. Table tilts 45 degrees right and left for angle drilling, and swings away for drilling large pieces. Has 1/2" chuck, spindle speeds from 500 to 3100 RPM. Includes 1/3 HP motor. 220 volt, 50 cycles.
- L7 2EA Metric Tap and Die Set: professional quality set made of high grade tool steel, machined, hardened and tempered to assure clean, consistently smooth, accurate threads. Set includes 17 taps and 17 one-inch hexagon dies, plus tap and reamer wrench, die stock, T-handle wrenches, metric thread gauge, and screw driver, with case.
- L8 2EA Commercial Bench Grinders: handles all grinding operations including tool and bit sharpening, parts shaping and rust and scale removal. Two-way adjustable tool rest for angle grinding. Shielded ball bearings for smooth operation, compact motor housing, cast wheel guards, spark arrestors, eye shields, exhaust parts for dust collection with 36 grit and 60 grit 10-inch grinding wheels. Enclosed capacitor start 1-HP motor. 220 volt, 50 hz.
- L9 10EA Metric Open End Wrench Set: high grade alloy steel. Openings of close tolerances and heat treated. High polish chrome plating. 9 or 10 piece set with openings from 10mm to 30mm.
- L10 10EA 3/8" Workshop Drill: pistol-grip, variable speed and reversible, drilling capacity of 3/8" in steel and 3/4" in hardwood. No-load RPM from 0-2500. Ball and roller bearings. 220 volt, 50 hz.
- L11 10EA High Speed Drill Bit Set: for commercial and industrial drilling in all metals, plastics and wood. Made of molybdenum tungsten high speed steel, heat treated and precision ground for hardness and accuracy. For use with 3/8" drill, shank 3/8" or less. 30 piece set in sizes from 1mm to 22mm.

- L12 6EA Circular Saw: 7-1/4" professional circular saw, combination blade and blade wrench included, ball and roller bearings, solid state electronic ignition, 220 v., 50 HZ.
- L13 1EA Chain Saw: Two cycle, one cylinder, air cooled gas engine, 20" bar and chain, automatic chain oiler, chain brake and hand guard.
- L14 1EA Radial Arm Saw: Contractor's radial arm 10" saw with steel leg stand, 3-1/2 HP total enclosed motor, automatic brake, level locating pin, anti-kickback attachment, roller head lower blade guard, sawdust elbow with combination blade. 220 v., 50 HZ.
- L15 1EA Belt Sander: 3 x 21" belt sander, for heavy duty use, ball bearings, no-load speed of approximately 1200 RPM. Vacuum system to eliminate dust. 220 v., 50 HZ.
- L16 1EA Belt Sander: 4 x 24" belt sander, for heavy duty use, ball bearings, vacuum system, no-load speed of approximately 1400 RPM. 220 v., 50 HZ.
- L17 1EA Wood Planer: 13" wood planer, cast iron table, 3-knife cutterhead, knife setting gauge. 2 HP motor, 220 v., 50 HZ.
- L18 1EA Table Saw: 12/10" table saw for commercial or industrial use, 1-1/2 HP motor, 220 v., 50 HZ, with rip fence rail and combination blades.
- L19 1EA Wood lathe: for woodworking up to 1 meter in length, with attachments, (copy crafter, 6 and 12" tool rest, spur and cup centers) capacity of 12" power bed and 8" diameter over tool rest, min. 1/2 HP motor, with capacity for speeds of approximately 875, 1350, 2250 and 3450 rpm, key lock or safety switch, set of wood turning tools included. 220 v., 50 HZ.
- L20 2EA Work Center: Self-contained workbench/sawhorse, adjusts to two heights. Approximately 31" wide, 32" high, and 28" deep. Equivalent to Black and Decker Workmate Work Center.

L21	1EA	Metal Lathe: Metal lathe to work with metal up to 1 ft. in length and/or 6" in diameter, full set of controls. 220 v., 50 HZ.
L22	6EA	Heavy Duty Bench Vise: mechanic's vise, 6" jaw width, 6-1/2" opening, hardened steel jaws.
L23	1EA	Anvil: Min. 100 lb. anvil for metal work.
L24	1EA	Forge: Blacksmith forge, approximately 3 ft. x 3 ft. with centrifuge hand blower, use with coal or coke.
L25	3SETS	Blacksmith Tongs: to be used with item L24.
L26	2EA	Electric Engraver: Carbide-tipped engraver. For use in engraving tools. 7200 strokes per minute. 220 v., 50 HZ.

***ELECTRICAL EQUIPMENT REQUIRES 220 VOLT, 50 HZ.**

SCHEDULE M

AUDIO VISUAL

<u>ITEM NO.</u>	<u>QTY</u>	<u>DESCRIPTION</u>
M1	1EA	Carousel Slide Projector: 220 volt, 50 hz. Equivalent to Kodak 4400.
M2	1EA	Film Projector: 16mm, self-loading, projection lamps 24V- 250W Halogen Lamps. Forward projection, reverse and still projection, pause mode, remote control unit. Music power 30W. Portable speaker. 220 volt, 50 hz.
M3	2EA	Overhead Projector: standard, equivalent to Da-Lite PS-360-LC-R Overhead Projector. 220 volt, 50 hz.
M4	1EA	Tape Recorder: battery-operated, cassette, fast-forward, rewind, play, stop, pause.
M5	1EA	Amplifier (audio system): able to connect to tape deck or VCR. Equivalent to Sony TA-444. 220 volt, 50 hz.
M6	2EA	Video Cassette Recorder: Multi System, HQ system DX4 head system, 8-hour recording, 30 or more channel tuner. Format VHS. Systems: SECAM, MESECAM, NTSC 4.43, PAL, NTSC. Equivalent to AKAI VS-53ES. 220 VOLT, 50 HZ.
M7	1EA	VHS Video Camera: portable, features time and date, slow motion, VHS format/Umatic. 220 volt, 50 hz. Equivalent to Sony D x C - M7P CCD Video Camera.
M8	1EA	Portable/folding Overhead Projector: 600 watts, 3 element lens, ultraquiet cooling system, 15-20 lbs. 220 VOLT, 50 HZ.
M10	1EA	Slide Making Kit (photograph slides): equivalent to Ricoh/Kodak/Nikon XR6 or XR7 type SL. 220 VOLT, 50 HZ.

M11	1EA	Audio Cassette Slide Projector: independent lenses, a standard projector lens (77mm), and a special lens (56mm) that enlarges rear screen image of any slide, switch operated. Auto focus system. External speaker jack, and headphone jack. Separate tone and volume control, slide tray. Equivalent to Caramate 4000 by Telex. 220 volt, 50 hz.
M12	1EA	Videomate (VCR and monitor in one unit): video player and 14 inch color monitor in a single unit. Pin socket inlet. Video in & out jacks. Remote control. PAL/NTSC system. 220 volt, 50 hz. Equivalent to Bell & Howell VP 1400 Video Presenter.
M13	1EA	Television Monitor: color, 200V-240V, 50hz/60 HZ, 220W, RGB Multi Input - PERI TV, 2 speaker inputs with remote control, NTSC/NTSC 4.43 - PAL Systems. Equivalent to Sony Trinitron Model KX-27PS1.

****Preference Given To Those Items Serviceable In Swaziland.****

****ELECTRICAL EQUIPMENT REQUIRES 220 VOLT, 50 HZ.****

SCHEDULE O

EDUCATION CENTER

ITEM NO.	QTY	DESCRIPTION
01	2EA	Poultry Scale: metric, 1 kilo increments, housed in steel, top and bottom hooks. 14-1/2" x 11-1/2" x 14-3/4".
02	10EA	Poultry Water Fountain: plastic jug fountain, jug holds one gallon. Equivalent to Little Giant Free-Flo Fount.
03	10EA	Poultry Feeder: plastic flip-top feeder, for 20-25 birds, 6 lb. feed capacity.
04	40EA	Watering can: 5 liter/2 gal, plastic with spout.
06	2EA	Wheelbarrows: heavy duty, pneumatic tire with ball bearings, builder's style - deep, holds 10 cubic feet.
07	10EA	Sickles.
08	5EA	Brush and Corn Knife: 14 gauge steel, 15 inches long.
09	20EA	4-Prong Spading Fork: 11 inch tines, 30" handle.
010	10EA	Spades: balling and root pruning spade, solid shank, 14-15 gauge steel.
011	5EA	Level (line).
012	3EA	Pick-Axe.
013	1EA	Garden Soil Testing Kit: test for PH, nitrogen, phosphorus, and potassium. Equivalent to LaMotte Soil Testing Kit Model EL.