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A guide by which adequate agricultural occupations facilities can be planned and developed for secondary school programs. Specific needs including--(1) site and location, (2) corridors and vestibules, (3) classrooms, (4) classroom equipment, (5) classroom storage, (6) conference rooms, (7) conference room equipment, (8) laboratories, (9) agricultural mechanics shop, (10) agricultural mechanics storage rooms, (11) greenhouse and nursery, and (12) land laboratories are discussed. (RH)

A PLANNING GUIDE FOR

CONSTRUCTING

AND

EQUIPPING

THE AGRICULTURE OCCUPATIONS FACILITY

(An Interim Report)

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PREFACE

The needs of an Agriculture Occupations Curriculum are dynamic and changing. The authors of this publication have kept this in mind in making their recommendations. The results should be worthy of consideration.

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A GUIDE FOR CONSTRUCTING AND EQUIPPING THE AGRICULTURE OCCUPATIONS FACILITY

I. Introduction

The primary purpose of this publication is to provide a guide by which adequate Agriculture Occupations facilities can be planned and developed for secondary school programs. Many of the features involved, however, are also applicable to area secondary centers and post secondary programs.

The economics of building construction, in the face of inflated costs, makes it imperative that all persons involved in planning; school administrators, architects, boards of education, agriculture occupations instructors and others, have a common understanding of building needs and characteristics of programs. The commonalties developed in this publication should result in a quality facility at a lower cost.

The state supervisor of agriculture occupations should be consulted as soon as thought is given toward new construction or remodeling. His experience in visiting numerous facilities and teachers in and out of the state has provided him with a good knowledge of what is needed. This consultative service is offered at no cost to the local school.

The involvement of supervisory staff personnel at the initial and later stages of planning makes the final evaluation and approval of the building plans more expedient.

II. Agricultural Occupations Program-Implications for facilities

As a result of the Vocational Education Act of 1963, the objectives and program of vocational education in agriculture have been broadened considerably, resulting in changes in the facilities required to implement these broadened objectives. The name of the program in Illinois has been changed from vocational agriculture to agricultural occupations. Agricultural occupations programs, as mandated by the Vocational Education Act of 1963, prepare for gainful employment in all occupations requiring knowledge and skills in agricultural subjects. This includes both occupations on the farm and off the farm. It may also include occupations not ordinarily considered as related to agriculture.

Since the passage of the 1963 Act, the occupational areas to be served by the vocational education programs for agricultural occupations have been divided into seven primary parts. They are:

1. Agricultural production.
2. Agricultural supply.
3. Agricultural mechanics.
4. Agricultural products.
5. Agricultural resources.
6. Ornamental horticulture.
7. Forestry.

The agricultural occupations teachers are expected to teach both full-time students preparing for an occupation and adults presently engaged in an agricultural occupation. The classes for the adult students are often held in the evening after regular school hours. Teachers of agricultural occupations must conduct many individual and small group conferences with prospective employers of students, with parents, and with students. A small conference room is, therefore, desirable. They also must, because of the nature of their program involving the placement of students in agricultural businesses for employment experience, keep many detailed records, necessitating an office.

Since the instruction for agricultural occupations is based primarily on the biological sciences, a laboratory facility is essential. The new program in agricultural occupations specifies that students desiring such training must be prepared for agricultural mechanics occupations for employment in agricultural businesses such as farm implement businesses, grain elevators, and so forth. Thus an adequate shop is needed for agricultural mechanics instruction.

Ornamental horticulture is a new and much emphasized instructional segment of an agricultural occupations program. If students are to be prepared for occupations in ornamental horticulture, an adequate greenhouse is required.

A small land laboratory is needed for preparing boys, girls, and adults for nonfarm agricultural supply, agricultural resources, agricultural products, and forestry occupations, A part of the land laboratory may also be used as a nursery in preparing boys and girls for ornamental horticulture occupations. If a small land laboratory is available, it may be used in a variety of ways. In addition to the ways previously mentioned, a land laboratory may provide opportunities for developing the following facilities:

1. Agricultural building and equipment for simulating various nonfarm agricultural business operations.
2. Arboretum.
3. Lath house.
4. Cold frames.
5. Nature trails (for use in developing proficiency in agricultural resources occupations).
6. Woodland demonstration plot.
7. Wildlife demonstration plot.
8. Agricultural recreation demonstration area.
9. Landscaping demonstration area.
10. Plant breeding demonstration plot.
11. Plant propagation demonstration plot.
12. Pond development demonstration area.

Since the program in agricultural occupations will include boys and girls and men and women, adequate toilet and washroom facilities must be provided.

III. Specific Needs of Agriculture Occupations Facilities and Equipment

A. SITE AND LOCATION

The agriculture occupations facility should be designed and constructed as an integral part of the main school plant. In some instances it could mean connecting corridors and/or an L or T shaped wing.

Whatever orientation the agriculture facility has to the rest of the school, it should be equipped to operate as an individual unit. Since many activities are scheduled at times outside of regular school hours, it is necessary to have an independently controlled temperature system.For the same reason, it is necessary that entry and exit be accomplished without using the main school entry and corridors.

The type of activity conducted in the agricultural shop will determine its position in relation to the other components of the school facility. A large parking area and driveway adjacent to the shop service door is very important in making adequate use of the agricultural shop. The large shop door should open to the south or east.

When horticultural instruction is offered, the greenhouse, head house, shade area, and laboratory facilities may necessitate a separate building unit. This integrated unit may be constructed as an L or T shaped unit to the main agriculture facility. The orientation of the horticulture unit as to prevailing winds and sunlight is an important consideration. It is advisable to fence this facility to help deter those bent on vandalizing the greenhouse, growing area, etc.

The agriculture facility should be located on the ground level to facilitate the movement of large items of machinery and equipment in and out of the shop.

Finally, it would seem important that a well designed landscaping plan be followed in blending the agriculture occupations facility with the central school plant.

The observance of these site and location recommendations and those following should result in the development of a unit that is attractive as well as functional.

B. ENTRANCE CORRIDOR OR VESTIBULE

Purpose

To provide convenient access to office, classroom, plant science laboratory and shop from other parts of building.

Function

Reduce heat loss

Reduce congestion caused by traffic

Improve order and efficiency.

Coat Rack

Shelf 1 ft. wide 6 to 8 ft. long, 5 ft. 6 in. high with pipe support for coat hangers.

Consideration should be given to the purchase of a commercial type.

Water Cooler

Refrigerated, cabinet type.

Janitor's Closet

Width 4 ft., length 5 ft. minimum size, equipped with mopsink, storage shelves and broom rack.

Display Case

3 ft. high, 5 ft. wide, glass enclosed, wall mounted, electrically lighted with adjustable shelving.

Women's Rest Room

Entrance from corridor

One small lavatory

Two [redacted] Water Closets
Electrically Operated hand drier recommended

C. CLASSROOM

Size

Width 24 ft. - with a minimum of 780 sq. ft., exclusive of storage room and laboratory space.

Walls should be straight, storage room projecting into classroom considered unsatisfactory.

Color of Walls and Ceilings

Light reflective value of at least 60%.

Material for Walls

Concrete block with carefully tooled joints. Glass block not considered desirable. Plaster preferred.

Those between the shop and classroom complex (conference room, laboratory, etc.) glazed with wire mesh glass -- start at 44 inches above floor.

Material for Ceilings

Sound absorbent material - accoustical tile preferred.

Height of Ceiling

12 ft. if maximum use is to be made of natural lighting - 9 ft. 6 in. minimum.

Floor

Asphalt tile, vinyl tile, inlaid linoleum or hardwood.

Exposed concrete considered unsatisfactory.

Lighting

At least two rows of lights, indirect or semidirect.

Artificial light to provide 30 - 40 ft. candles at working level in poorest lighted area.

If fluorescent, diffusers included to protect from direct glare.

Skylights not considered desirable.

Windows

Windows may be eliminated completely if code regulations are followed in lighting and ventilation.

If windows are used -- (keep to a minimum)

Sills above level of eyes of student when seated -- about 48 in.

Tinted glare reducing glass and/or horizontal venition blinds for light control. (venetian)

Ventilators in lower section

Provide for window screens

Electrical Outlets

Duplex convenience outlets (3 wire grounding type) each 8 ft. lineal distance on each wall. One 240 volt outlet for floor polishing equipment.

Solarization

North light in classroom is preferred. (If windows are used)

Doors

One 3 ft. door to the conference room and another to the agricultural shop.

D. CLASSROOM EQUIPMENT

Chalkboard

Width 42 in. - 48 in.; length 10 ft. - 20 ft.

38 in. above floor

Lower side inclined away from wall to reduce glare

Green color desirable

Bulletin Board

Two preferred, 8 - 12 linear feet, same width as chalkboard.

3-4 linear feet for notices and items of current interest.

4-8 linear feet for items of lasting interest.

Chart Cabinets

Size sufficient to hang charts 3 ft. vertical by 4 ft. horizontal, 20 in. deep. Chart display rack may be part of cabinet.

Tables

Library type, without drawers, sturdy with adequate leg room, 24" x 60 " - 2 students ~~1~~ per table

Plastic laminated top.

Folding tables not considered satisfactory.

Chairs

Standard size 16-18 in. high, welded steel frames with wood bottom and back rest suitable for high school and adult classes.

Folding chairs not considered satisfactory.

Projection Tables

Width 18" -- length 3 ft. -- height $4\frac{1}{2}$ft., 2 shelves, mounted on casters that can be locked in position.

Tilt table top table for overhead projection - $2\frac{1}{2}$' high.

Storage Cabinets

To store teaching aids, supplies, printed materials.

Individual compartments to hold student notebooks and records.

Slanting magazine display racks.

3 - 4 drawer $8\frac{1}{2}$" x 11" filing cabinet

Teacher's Table

Desirable in classroom in addition to teacher's desk.

Easily movable, of height convenient for easy reading.

Projection Screen

Roll up type, built in, 5' x 5' lenticular screen, bracket mounted 2 ft. from wall, in convenient place in classroom.

A screen for overhead projection is best located across the corner of the room. (May be hung from ceiling.)

Shades

Audio-visual blinds or dark shades over horizontal venetian blinds are necessary for use of visual projection equipment. These shades should be wide enough so the room can be darkened with a minimum of effort.

Use draw drapes between shop & classroom.

Air Conditioner

Essential if classroom is to be used for meetings and adult classes during the summer months.

Resource and Reference shelves

30 - 40 lineal ft.

Clock and Signal Bell

Waste Basket

E. CLASSROOM STORAGE

Purpose

To store audio visual materials, equipment and supplies, not adapted to storage in a cabinet and to supplement cabinet storage space.

This room should be mouse and insect proof.

Location

Adjoining classroom and easily accessible.

Size

Width 5 to 6 feet; Length 8 to 10 feet.

Lighting

Artificial light

Electrical Outlets

At least one 120V duplex receptacle (grounding type)

Shelves

Adjustable shelving at least 12" wide along walls. Space may be designed for specific equipment.

F. CONFERENCE ROOM

Purpose

To provide a suitable place for group or individual guidance, for conferences with individuals, and for committee meetings.

Size (optimum)

Width 9 - 10 ft., length 14 - 16 ft.

Location (optimum)

Between classroom and shop. This placement serves as a sound buffer from shop noise.

Lighting

30 - 40 foot candles of artificial light at desk level.

Window in outside wall desirable.

Electrical Outlets

Duplex receptacle 120 volt (3 wire grounding type) in each wall.

Single 240 volt receptacle for air conditioner.

Ventilation

Sliding glass panels between shop and conference room for vocal control and ventilation.

Room size air conditioner

Telephone Jack

Telephone should be provided in the conference room. A special line independent of the main school switchboard is recommended.

Traffic pattern

Access door to classroom, agricultural mechanics shop or plant science green house areas or vestibule.

Glass Paneling

Starting approximately 44 in. above the floor to a point flush with the top of a normal door, extending horizontally and continuously except for necessary supports.

Safety glass panels in walls adjacent to shop.

G. CONFERENCE ROOM EQUIPMENT

Desk

Standard office desk, 60" x 30", steel with linoleum top

Chairs

One standard desk chair

Two office chairs

Filing Cabinet

Two, steel 4-drawer, lettersize, ball bearing drawer slide with lock.

Coat Rack

Shelf 1 ft. wide, 3 ft. long, 5 ft.-6 in. from floor with pipe support for coat hangers below. (Commercial types available)

Adding Machine

Electric, 9 key, mounted on stand.

Typewriter

Standard

Typewriter Table

Bookcase

12 - 15 lineal ft.

Table

a 60" x 30" conference table 30" high

Telephone

Electrical Cut off Switch

Useful in controlling use of power equipment especially in emergency situations.

Miscellaneous

Waste paper basket, stapler, pencil sharpener, 3 hole paper punch, etc.

H. LABORATORY [1]

Purpose

To provide a location for demonstrations, testing, etc., and for storage of certain materials.

Location

It should be easily accessible to the classroom and may in fact be a part of the classroom. (A folding door may be used to separate the laboratory from the classroom in some instances)

Size

Width 10 ft. -- length 12 ft. minimum (if a separate room)

Materials for walls

Glazed tile preferred to facilitate cleaning

Material for Ceilings

Sound absorbent material -- acoustical tile preferred.

Floor

Asphalt or vinyl tile preferred.

Exposed Concrete considered unsatisfactory.

Lighting

Artificial light to provide 30 - 40 foot candles at counter level.

Electrical Outlets

One 120V duplex receptacle grounding type for each 6 lineal feet of counter space.

Refrigerator

To provide 12 cu. ft. temporary storage for serums, inoculants and other supplies requiring refrigeration. Used to vernalize seeds, plants and bulbs.

Storage Cabinets

To provide storage for seed germination equipment, soil testing solutions and equipment, milk testing solutions and equipment.

To provide storage space for equipment (artificial insemination, castration, trimming, clipping, shearing, dehorning, docking, caponizing, etc.)

Storage of laboratory equipment on counter tops considered unsatisfactory.

1. Please refer to the greenhouse section of this publication for recommendations on the plant science laboratory.

Built-in Counter Cabinet Units

Counter 2 ft wide, 32 in high - plastic laminated topped.

Double sink, acid proof

Hot and cold water with a mixing faucet.

Plant Growth Chamber and Plant Boxes

Demonstration table

Provide with gas, water and sink

I. WASHROOM (Men's)

Size

Width 8 - 10 ft. Length 12 - 16 ft.

Location

Entrance from shop

Equipment

Stool, Urinal, and lavatory.

Mirror

~~Towel dispenser and waste container~~ Electrically operated hand drier recommended.

Lockers (if used should be full length size)

Showers (type of program will determine needs if any)

Exhaust fans

J. AGRICULTURAL MECHANICS SHOP

Floor Dimensions

Width 40 to 50 ft. Length 80 to 100 ft.

Floor Material

Smooth concrete, level except in the drain area

A large drain with a clean out sump should be located near the large shop door. This drain area should be 14 x 16 feet with a slope of 1 inch per 10 feet of run.

Another small drain could be located at the opposite end of the shop in the student wash up area.

Floors should be sealed to facilitate quick clean up. Non-skid materials can be applied to floors in operator's area around power machinery

Walls

14 ft. high minimum

Walls should be straight on the inside, pilasters on the inside not satisfactory.

Wall space 5'4" to 8' for cabinets between window groups.

Four or more wall spaces on each side of the shop.

Wall space for cabinets unobstructed by electrical conduit, etc.

Windows

Tinted, glare reducing glass recommended in all windows.

Window height should harmonize with other architecture, if practical

Windows should begin no less than 7 ft. from the floor

Color of Walls and Ceilings

See table of paint colors on page 19.

Ceiling

Improves lighting by reflecting and diffusing.

Considered essential unless insulation and sound proofing included in roof construction.

All fixtures and pipes are at least 12' from the floor.

Heating

Heating system should be quiet

Sufficient for comfortable work in cold weather

Heating units should not occupy floor space in shop

Thermostat control independent of main school heating

Should not circulate dusty air from shop to classroom, laboratory or conference room

Doors

Large door 12 to 14 ft. high by 14 to 16 ft. wide and located on the east or south side of the facility.

Large door spring balanced overhead type, electrically operated considered desirable.

Panels in large door glazed from 4 ft. above floor to 8 ft. above floor.

Located in center of wall if in end of building.

Small door beside large door for added safety in case of emergency.

Small door to prevent heat loss caused by opening large door to enter or leave.

Roof

Supported on trusses making posts unnecessary.

Minimum of 12 ft. clearance between floor and roof trusses.

Special truss supporting beam for one ton hoist across shop near large door.

Flat, gable or arched to harmonize with the architecture of other buildings.

Electrical Service

200 to 300 ampere capacity electrical service is recommended.

120 volt 1-phase service for lights, convenience outlets and small motors

240 volt 1-phase service for welders and larger motors

208 volt single and 3 phase for welders and large motors

Lighting

~~At lease three~~ A minimum of three rows of lights with ~~rows of lights,~~ spacing and wattage to give at least 30 foot candles

Lights controlled from a lockable panel with one row of lights controlled by switches located at each entrance door.

Fixtures mounted 12 ft. above floor

Receptacles

All 120 volt convenience outlets grounding type.

All wall mounted duplex receptacles 40" above floor to clear workbenches

One 120 volt circuit for each 4-6 outlets, minimum #12 wire, 20 ampere breakers

One 120 volt duplex recptacle for each 10 ft. lineal wall space except over benches

One 120 volt duplex receptacle for each 6 ft. lineal wall space over workbenches

Bus bars should be considered but may be expensive

Floor plugs not considered desirable

Water

One hydrant located near floor drain at large shop door on side away from small door and another outside for washing purposes

One janitor sink with hot & cold running water.

Paint Spray Booth

Arrestor dry type booth, 24 ft. long by 15 ft. wide and 12 ft. high

Follow manufacturers recommendation for correct installation and use.

Exhaust Fans

Needed to remove air contaminants such as smoke, gases, fumes, and dusts from shop work.

Usually located in the welding area near large shop door.

Two-speed fans recommended.

A minimum of two fans will be needed if one is a hooded exhaust.

Size of fan varies with each facility. One fan should be 3 feet in diameter.

School building codes should be followed.

A series of floor exhaust stations may be considered when work will involve running engines.

Tool Cabinets

Wall cabinets should be provided at each work area. Tool rooms are not recommended for Agricultural Occupations programs.

Wash-up Area

Long trough type enameled sink 6' long minimum, with a minimum of 4 individually controlled faucets

Soap Dispensers

Towel Dispensers and waste container. (Electrically operated hand drier not recommended)

Mirror

Drive and Parking Area

A surfaced driveway and parking area should be provided near the large service door for additional work space and for the cleaning and storage of machinery.

K. AGRICULTURAL MECHANICS STORAGE ROOM

Purpose

To store lumber, supplies and equipment not adapted to storage in shop.

To store lumber supplies and hardware items that need to be closely inventoried

Size

Width 10 - 12 ft. Length 16 - 22 Ft.

Entrance

From shop only

Door 5 ft. wide located to facilitate movement of long lumber and steel rods.

Equipment

Horizontal lumber storage rack on one side.

Vertical metal storage rack on other side, 5 to 6 ft. wide by 12 ft. high minimum.

Cabinets as needed

Examples of Scientific Color Systems Developed By Leading Paint Manufacturers

Area	Color Dynamics (Pittsburgh)	Color Conditioning (DuPont)
Ceiling	White tinted with Seafoam Green	Flat White
Walls and window casings	Seafoam Green (use same color down to floor. Do not use a dado)	Daylight Green with a dado of light green from the bottom of the window to the floor
Doors, door casings, tool cabinets (inside and outside)	Vista Green	Light Green
Bodies and Non-Critical parts of machines, bodies of machinists vises, bench brackets	Vista Green	Horizon Gray
Edges of tables of power tools, outside of movable guards on machines, top of ripping fence on saw, edges and tops of work benches, jaws of machinists vises	Focal Beige	Spotlight Buff
Paintable portion of handles of machines, handles of vises	Focal Yellow	Spotlight Buff
Silhouttes of tools	Focal Beige	Spotlight Buff
Floor	Dixie Gray	Light Stone
Inside of saw guard, underside of rim of eye shield or grinder, inside of doors on switch and fuse boxes, inside of shields over moving parts	Focal Orange	Alert Orange
Outside of switch and fuse boxes, switch and receptacle plates	Focal Blue	Precaution Blue
Wall panel for hanging fire extinguishers and fire fighting equipment	Focal Red	Fire Protection Red
First aid cabinet	Focal Green with White cross on door	White with Safety Green cross on door
Stumbling, falling, strike-against hazards	Alternate 2" stripes of Black and zone marking yellow	Alternate 2" stripes of black and High Visibility Yellow