SCHOOL SCIENCE FACILITIES PLANNER

Foreword

Science education comprises an essential component of the *North Carolina Standard Course of Study*. That document sets forth goals that can enable the student to become scientifically literate and have a substantial knowledge of the concepts, conceptual networks, and process skills that can equip him or her to continue to learn and think logically. It is widely recognized that a scientifically literate society is essential if this state and the nation are to successfully compete in an increasingly broad, complex and technological society.

As is the curriculum described in the Course of Study, facilities that appropriately support safe and effective instruction in the sciences are essential to providing each student optimal opportunities for learning. A growing body of research shows positive student performance implications related to school climate and order--variables directly attributable, in part, to facilities design. Well-designed science facilities can enhance both the teacher's ability to teach and the success of the student's learning experience.

This publication describes science programs and facilities and is a supplement to the *North Carolina Public School Facilities Guidelines*. It is a resource that can assist design professionals to plan facilities that effectively meet the evolving needs of public schools in North Carolina. We hope you find it useful.

Phillip J. Kirk, Jr.

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State Board of Education

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BACKGROUND AND OVERVIEW

Each school day nearly 1.25 million children enter classrooms in the public schools of North Carolina. Beginning with the youngest, science is a vital part of their curriculum and is taught regularly throughout the year. Developmentally appropriate, integrated instruction in earth, life, and physical sciences follows the student through the conclusion of the public school experience.

The design professional will face the challenge of melding necessary physical components that can support classroom and laboratory science instruction into a facility shared with programs and services in other curriculum and support areas. Provision for the child with special physical or educational needs presents additional and unique considerations to the design process for an integrated facility.

The most effective facility design will reflect a marriage of sound program planning by school system personnel and knowledgeable, inventive application of design principles by the design professional and will embody flexibility sufficient to sustain current and emerging approaches to providing science instruction. These planning guidelines are intended to enhance that endeavor.

SCIENCE EDUCATION

It is the mission of science education in the public schools to ensure that all students become scientifically literate--that is, that they possess a substantial knowledge of concepts, conceptual networks, and process skills that enable continued learning and logical thinking. Program strands and goals for science education provide the basis for the curriculum and include (1) the nature of science, (2) science as inquiry, (3) science and technology, (4) science in social and personal perspectives, and (5) science concepts. These program goals are the source for all science education objectives.

The science curriculum is offered through integrated study of the identified program goals in the areas of earth, environmental, life, and physical science. Recent advances in science and technology are highlighted throughout. The student gains a broader and more comprehensive understanding of program goals as the grade level advances.

From the student=s earliest exposure, experiential learning is recommended. An experiential, inquiry-based instructional program is essential to student understanding of science at all levels, beginning with the lowest grades. In this way, science program goals are achievable by all students and can provide the student with a rewarding learning experience and a sense of accomplishment.

USING THE FACILITIES PLANNER

This publication is intended as a reference document for designers of public school facilities.

Its purpose is to provide descriptions of school science programs and the facilities that can support them. It is neither comprehensive nor all-inclusive, but provides an initial understanding of the nature and purposes of instructional programs around which facility designs may evolve. The guidelines supersede neither state or local codes or regulations nor federal or state legislation regarding building design and construction, access, safety, or other pertinent issues.

Some aspects of all science programs and facilities are similar in nature and are described in the introductory portions of this guide. Subsequent sections focus on the peculiar requirements of individual courses or program areas. Sample floor plans supplement and clarify printed descriptions and are not intended for direct replication within facility designs. Because it is a policy of the National Science Teachers Association that classes greater than 24 students in size pose a potential safety risk, sample plans shown in this guide are designed accordingly. Local program requirements and available state and local resources should be considered in determining student capacity for actual facilities design.

As a design takes shape, it is likely that additional, more detailed information will be needed about the programs, equipment, and purposes that will function within the facility. Several resources that should prove useful are provided in the *Additional Resources* section near the end of the publication. In addition, staff consultants with the Science Education Section of the North Carolina Department of Public Instruction are available to discuss areas of concern and may be contacted by phone at (919) 807-3838.

Facilities Design

Designing school facilities challenges the collective planning skills and creativity of educators and design professionals. Providing desirable learning environments for a variety of science education programs can introduce particularly complex issues into that collaboration. At least two unique characteristics of science education facilities emphasize the importance of good design decisions.

First is the high cost of space and equipment, relative to that for most other teaching stations in a school. The required volume of space for laboratories will significantly exceed that for a lecture setting, while equipment costs may be many times greater.

Second is the inflexibility of some laboratory designs. Facilities may require relatively large floor spaces with special infrastructure. Such facilities may be less flexible, in that they can be very expensive to renovate and poorly located for some other uses. In general, laboratories can more easily be converted to other types of laboratories than to spaces for purely classroom use.

This section identifies design considerations that are common to most school science facilities. Requirements unique to specific facilities are described in a subsequent portion of the publication.

CLASSROOMS

Each program will require access to classroom space sufficient for anticipated student enrollments. Classrooms will serve as assembly areas where students may receive group instruction, plan, research, use audiovisual materials, and access computer resources. In situations where several laboratories are located in proximity and classrooms are shared, a small assembly area may be considered for each laboratory.

Most elementary science will be taught in the regular classroom, which should contain a minimum of from 1,000 to 1,200 square feet. A designated multi-discipline project room of approximately 1,000 square feet, to serve more than one program (e.g. science, art, math, social studies), can enhance the elementary science program.

Classrooms for grades six through eight should contain a minimum of from 850 to 1,000 square feet; classrooms for grades nine through twelve a minimum of from 750 to 850 square feet. If a classroom is combined with a laboratory, significant additional area is required. Classrooms smaller than 1,000 square feet should not exceed a 3:2 length-to-width ratio, with a minimum width for any such space of 24 feet.

The typical classroom space should have dry marker and tack boards, individual student tables and chairs, a demonstration table, and a teacher desk and chair. A conference table for six should be considered, and should be separated from the classroom by a transparent partition. Ample storage for audiovisual equipment and materials, printed instructional resources, and teacher and student files should be provided. A minimum of one permanently mounted television monitor should be provided, as should cabling and outlets for computers and other communications systems.

Room size should be increased by 15 to 20 square feet per computer, and future usage of computers and other technology should be considered in sizing and equipping spaces. Natural light should be controlled to permit the use of television and other instructional technology. A communications system, to include a telephone, should be provided for informational and emergency use.

Exterior classroom windows should equal at least six percent of the floor area, with a minimum of one that can be used for ventilation or emergency rescue. This window must be operable from the inside and provide opening dimensions of at least 20 inches wide and at least 24 inches high and no less than 5.7 square feet. Maximum sill height shall be 32 inches through grade five and 44 inches for grade six and above. An exterior door may be substituted for this window.

Classrooms without an exterior wall should have interior windows into a laboratory or similar space to provide an ample daylight source. With certain exceptions, classrooms without exterior windows should provide secondary egress, either directly or through an adjoining room, to an exit corridor that is separated by one-hour rated construction from the primary exit corridor.

LABORATORIES

While multi-purpose science laboratories may be necessitated by exceptionally small school sizes, in general science laboratories are custom designed for specific programs. Laboratories should provide work environments in which practical application of instruction and skills practice may be accomplished effectively and safely. Floor area is determined by the peculiar purposes and nature of instruction. A minimum of 45 square feet per individual for laboratories, exclusive of storage and preparation rooms, and a minimum of 60 square feet per individual for lab/classroom combinations, provides good planning figures. Ceiling height should be at least 10' - 0".

Supply and equipment storage should be located convenient to work areas so that a minimum of travel and congestion results. Wide aisles should be positioned between work stations, in front of storage cabinetry, and around fixed equipment. Equipment and casework should be positioned for ease of cleaning around their bases, and cabinets should fit flush to walls for the same reason.

Windows in a laboratory can provide natural lighting that, at times, may be sufficient for student activities and thereby reduce energy costs. Natural lighting may also be of value during emergencies or egress from the building during power failure. Vinyl tile is usually suitable for laboratory floors. A floor drain might be considered in the vicinity of the emergency shower.

Safety equipment should include eye goggle sanitation cabinets and emergency eye wash fountains and/or combined flexible eyewash/drench hoses (GS 115C-166-1668). A master gas cut-off valve or switch, accessible only by the teacher, should be provided where laboratories are equipped to use gas, and a master cut-off for electrical power is desirable. Fire extinguishers should be provided in each laboratory, as should a two-way communication system for informational and emergency use.

In chemistry laboratories, an emergency deluge shower should be provided. Chemistry laboratories should also be equipped with teacher-controlled fume hoods that can maintain a slight negative air pressure in the room and prevent the spread of odors to other parts of the building. Chemical storerooms and teacher prep areas should be designed to provide four to six air exchanges per hour. Timers with outside controls can assure appropriate air quality.

TEACHER WORK STATIONS

Each teacher should have a work station which comprises, as a minimum, an adequately lighted desk-height work surface with computer terminal and telephone, chair, a lockable legal-size filing cabinet, and a secure locker for storage of teaching materials and personal items. In high schools particularly, while an occasional private office may be justified, teacher work stations are often located in common areas.

Work areas should be equipped with shelf space for books and other printed material and storage for audiovisuals and other teaching aids. One or more tables with chairs can contribute to the flexibility and utilization of the area. Teacher workrooms for the preparation of instructional materials should be located adjacent to the work station area.

STORAGE AREAS

Storage is required for equipment, materials and supplies, and for some student projects. Where laboratories utilize shared storage facilities, cabinetry and shelving should reflect the peculiar needs of each. Secure storage that meets all safety and fire codes must be provided for chemical or other hazardous supplies. Materials storage requirements will vary with the type of activities, but should be located convenient to the materials receiving door and in a location that provides an orderly flow of materials into the work area. Note: All storage cabinets in prep rooms should be master keyed.

Inexpensive equipment, tools, or utensils that receive frequent use are often stored in wall panels or cabinets for easy accessibility and inventory. More expensive items, especially those that are used only occasionally, will require a lockable storage room or cabinet. Storage areas may be used to isolate noisy laboratories from adjacent quiet areas. Each teacher will need a lockable storage cabinet or closet for securing instructional materials and aids in the laboratory, particularly where the permanent teacher work station is located in a common area not contiguous to the lab.

OUTDOOR SPACES

Spaces outside the building can be essential to the successful implementation of certain science curricula as instructional areas or laboratories. Such spaces will be tailored to the curricula of selected courses or programs and, while an integral part of the facility design, may not occur in proximity to the building proper. Examples of outlying spaces include land labs, nature trails, and greenhouses.

The school site holds great instructional potential for science and a number of other subjects, and should be designed with science education and environmental learning in mind. Effective schoolyard habitats can utilize, by design or enhancement, trees, meadows, ponds and wetlands, and other environmental elements.

SHARED SPACES

Flexibility in facility design encourages space sharing, which can increase utilization and reduce costs. A single classroom, as an example, may serve two or more laboratories. Another means of increasing flexibility is through the sharing of special equipment or work areas, depending upon the size of the school. A third alternative would have two or more programs sharing a single laboratory space, but with materials storage spaces for each. However, a centralized chemical inventory system is imperative for safety.

Space sharing need not necessarily be limited to science programs. A greenhouse, for example, might be shared among science and horticulture classes. Shared curriculum support areas such as conference rooms, career resource rooms, and computer labs offer other venues for efficiency in design. Science laboratories should only be used for science instruction.

SAFETY AND SECURITY

Security of science education facilities and equipment is of primary concern from economic, accountability, and liability perspectives. Controlled access to classrooms, file servers, laboratories, and support areas should be assured in the design of the facility.

No consideration in facilities planning is more important than safety. School planners should keep abreast of current statutes and codes related to building and occupant safety as they relate to the design of science education facilities.

AMERICANS WITH DISABILITIES ACT (ADA) GUIDELINES

(Source: NSTA Guide to School Science Facilities)

Since good science experiences are important for the student, they must be available to each student. Restricting the disabled or physically challenged student to different facilities is illegal. The obligation to accommodate persons with disabilities increases when renovations are planned.

The 1977 Individuals with Disabilities in Education Act (IDEA) defines the rights of the special education student in U.S. schools. IDEA mandates the inclusion of the student with disabilities in school programming more clearly than ever before. All science classrooms should be built to accommodate each student who chooses to study in them. Providing wheelchair access, communication devices for the hearing-impaired student, and Braille assistance for the blind student in regular science classrooms must be considered in planning and building today=s school facilities. Co-teaching by special educators in the regular classroom is becoming more common and is being incorporated into best practice, since it is difficult to prove that studying a laboratory science in a special education classroom provides equal opportunity to learn.

The American Disabilities Act of 1990 (ADA) defines standards for physical access to facilities for all persons, including students and teachers who use public buildings. For purposes of the Act, a handicap is defined as a Adeterminable physical or mental characteristic of an individual which may result from disease, injury, congenital condition of birth, or functional disorder which is unrelated to the individual=s qualifications for employment or promotion.@

Guidelines for applying the ADA are found in the *Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities* (ADAAG). They are enforced by the Department of Justice. Because the ADAAG regulations are not specific to science facilities, some interpretation is required. The recommendations in this publication include regulations and adaptations of related guidelines.

Generally, architects are familiar with the basic requirements of accessibility. Many schools built before 1990 are not accessible to disabled persons. While these schools may remain compliant by making reasonable progress toward expanded access, they have an obligation to provide complete accessibility when they start a renovation. Typical deficiencies found in older buildings include steps, narrow doors and aisles, a lack of elevators, workstations that cannot be used by the student in a wheelchair, and controls that require movements that are not possible for persons with disabilities.

The ADA requires that existing deficiencies be corrected as each area in the building is renovated. A percentage of the renovation costs must be spent on upgrading the remainder of the building along the path of travel from the entrance to the renovated space. Doors and aisles must be wide enough for wheelchairs (32" for doorways and 36" for aisles), toilet facilities must be wheelchair accessible, and emergency facilities must be built at appropriate heights on all new construction.

Each area of the school used by any student must have access for physically disabled persons built in during new construction. A person in a wheelchair should be able to move without assistance from the parking lot to every essential area of the school. In science laboratories, this often means adjusting the height of some laboratory facilities and sinks, widening aisles, and relocating equipment. The dimensions given in the following are the adult requirements, which apply to persons age 13 or older.

Laboratory workstations: Many equipment manufacturers have developed workstations with lowered decks and lever, push-button, or electronic controls that can be used in place of regular lab stations to accommodate disabled students. These stations may be equipped with water, gas, electrical power, and sockets for apparatus rods. Controls should not require tight grasping, pinching, twisting of the wrist, or exerting more than five pounds of force to operate. If mobile workstations and portable equipment are used, space to accommodate them should be provided in every laboratory.

Laboratory sinks: Laboratory sinks are a special challenge because the ADAAG specifies a sink depth of no more than 6.5 inches so that a wheelchair can sit under the sink without having the sink too high. The sink=s rim must be at a maximum height of 34 inches for adult students. This leaves little space for a heavy sink assembly. A minimum vertical knee space of 27 inches and knee-space width of 30 inches are prescribed. Sinks must have lever-controlled faucets or a similar alternative.

Fume hoods: Fume hood manufacturers seem to have lagged behind. They have lowered decks to the necessary 34-inch maximum, but many have yet to develop the necessary controls. Knee space requirements for seating at a fume hood are the same as for sinks. Portable fume hoods are appropriate alternatives to built-in units.

Safety showers and eyewashes**:** The standard emergency shower/eyewash unit has the eyewash bowl mounted 38 inches above the floor, and the pull handle for the shower at about 68 inches above the floor. Assuming that the shower can be side accessed, these can be modified to approximately 32-34 inches and 54 inches, respectively, to accommodate disabled (as well as other) students. The objective is to have the eyewash spout height at a maximum of 36 inches above the floor--the standard for a drinking fountain. If there is a second shower or eyewash in the room, these may be at standard height. A flexible-hose combined eyewash/drench hose unit may be installed at the lab station.

***Other adaptations*:** Wall cabinets are a potential hazard for students and teachers with disabilities--particularly to those who are visually impaired. Sharp or unexpected corners should be avoided, and all upper cabinets should have base cabinets beneath them. It is advisable to build in wiring for communication equipment for hearing-impaired students so that electronic aids can be easily installed.

Some guidelines for children 12 years old or younger are also available, but they are not yet enforceable. For planners, the key factor to remember is that accessibility for students with disabilities is mandatory.

Programs and Facilities

The following pages describe science programs and provide sample floor plans for clarification purposes only. Sample floor plans supplement and clarify printed descriptions and are not intended for direct replication within facility designs. Because it is a policy of the National Science Teachers Association that classes greater than 24 students in size pose a potential safety hazard, sample plans shown in this guide are designed accordingly. Local program requirements and available state and local resources should be considered in determining student capacity for actual facilities design.

COURSE TITLE: ELEMENTARY SCIENCE (K-5) North Carolina graduation requirements include elementary grade sciences taught as laboratory sciences.

COURSE DESCRIPTIONS:

Kindergarten: The focus will center on students using all the five senses to make observations of events in both indoor and outdoor settings that make up their world. The strands that provide a context for teaching the content throughout all goals are:

Explore a variety of materials
Utilize observed data to make predictions
Generate attributes and uses of common objects and organisms

Grade 1: The focus will center on students using the senses to make observations, using their own rules for classification, and experimenting to find out about the properties of living and non-living objects. The strands that provide a context for teaching the content throughout all goals are:

Explore a variety of materials
Utilize observed data to classify objects
Generate properties of common objects

Grade 2: The focus will center on students analyzing collected data over a period of time to make predictions and understand change. Students are to look at heat as a way of changing properties of objects and motion as being related to position and time. The strands that provide a context for teaching the context throughout all goals are:

Conducting long-term investigations to define changes
Using tools to collect data
Looking at change in properties

Grade 3: The focus will center on students understanding the regularities in systems; that a system is an organized group of related objects or components that form a whole; and that systems can consist of plants, soils, mineral particles, and the earth/moon/sun. The strands that provide a context for teaching the content through out all goals are:

Explore the properties of soil through plant investigations
Observe and record data to understand the sun's changes in position
Generate data to support the period of time called a month

Grade 4: The focus is to think and analyze in terms of systems, which will help students keep track of objects, organisms, and events. The strands that provide a context for teaching the content throughout all goals are:

Predict, observe, and record results of simple experiments

Observe and examine structural characteristics and behaviors of animals
Generate ideas to solve simple problems

Grade 5: The focus is to look at energy as a property of substances, its functions within the earth and its environment, and its effect on the earth's processes and atmospheric movement. The stands that provide a context for the teaching the content throughout all goals are:

Explore energy interactions
Create and maintain a model ecosystem
Recognize the forms of energy

TYPES OF INSTRUCTION:
Inquiry-based; hands-on laboratory; lecture/demonstration; collaborative learning

TYPICAL ACTIVITIES:
Classroom instruction; laboratory activities; individual and small-group projects; greenhouse and animal observation; utilization of technology, including computers and calculators

SHARED SPACE OPTIONS:
Pre-kindergarten through grade 3 science should be integrated with other subjects and activities. The self-contained classroom will require adequate table and floor space where activities can be conducted easily. Sinks and counters at appropriate student height are needed, so frequent hand washing and clean-up can be accomplished with minimum assistance.

Grade 4 and 5 classrooms should have greater capacity to accommodate science activities. Provision should be made to integrate science into classroom projects by providing sinks, flat surfaces, electricity, video connections, and overnight storage of projects in the classroom.

SPACE REQUIREMENTS:
1. A minimum of 40 square feet per student is desirable for a stand-alone laboratory--960 square feet for a class of 24 students.*
2. A minimum of 45 square feet per student is desirable for a multiple-use classroom where science is taught, or 1,080 square feet for a class of 24 students.*
3. An additional 10 square feet of space per student (240 square feet of space for 24 students) is desirable for preparation space for the teacher and storage space. This may be remote and may be shared with other multiple-use classrooms.
4. An additional 15 square feet of space is needed for each computer station and approximately 20 additional square feet to accommodate each student with disabilities.

*The National Science Teachers Association recommends a maximum class size of 24.

PECULIAR NEEDS:

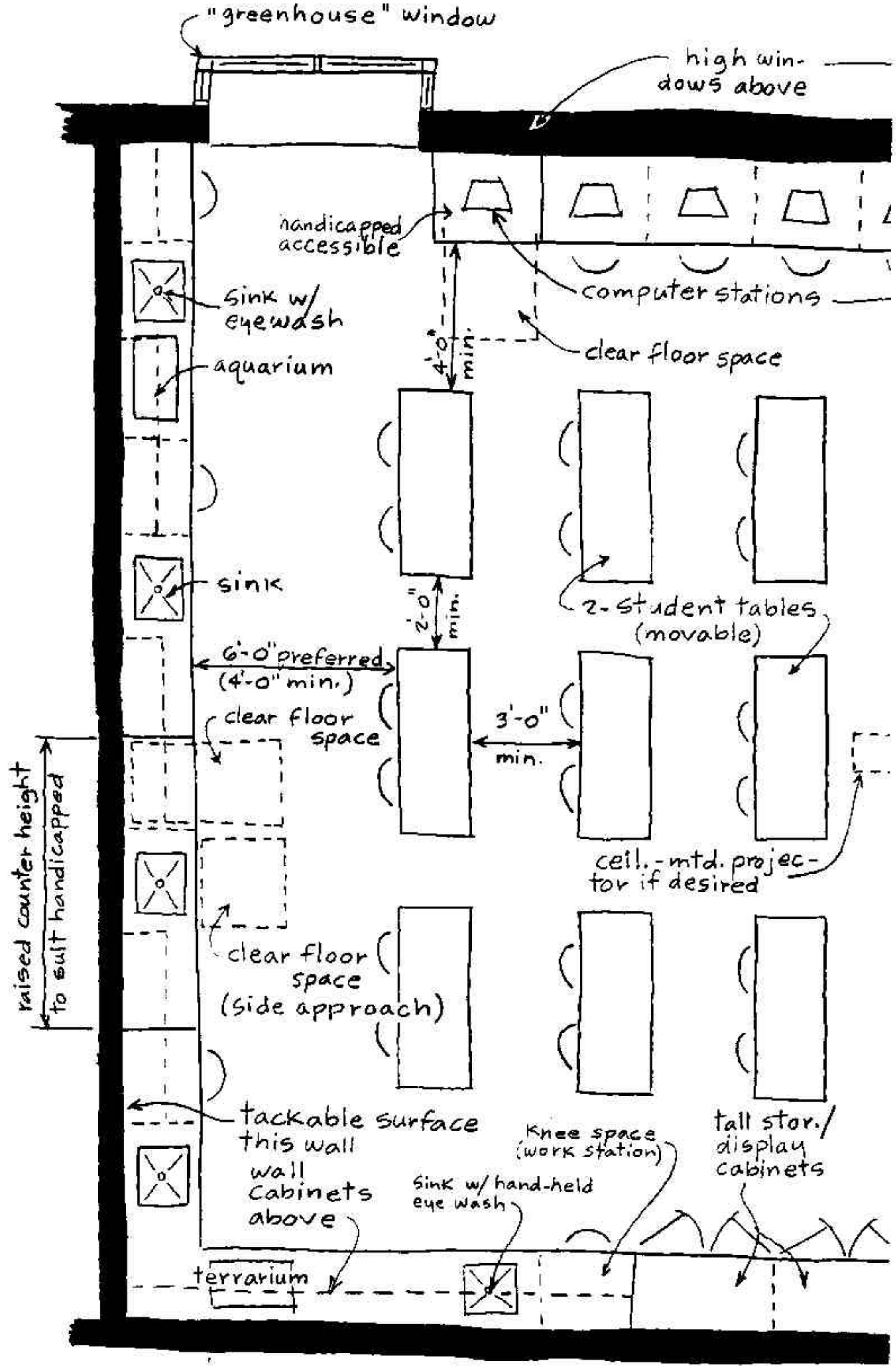
1. Six computer stations linked to the Internet with data logging capability
2. Greenhouse center (small attached windows with shelves facing the sun) or optional separate greenhouse.
3. Dry erase boards
4. Overhead projection screen
5. Access to outdoor activity center or garden
6. Safety equipment for every science classroom and/or laboratory:Fire blanket
   - Fire extinguisher (ABC)
   - Spill control center
   - Safety shield
   - Goggles and goggle sanitizer
   - Heat-resistant gloves
   - Aprons
   - Eye wash and/or flexible eye wash/drench-hose units
   - Broken glass disposal container

FURNISHINGS AND EQUIPMENT:

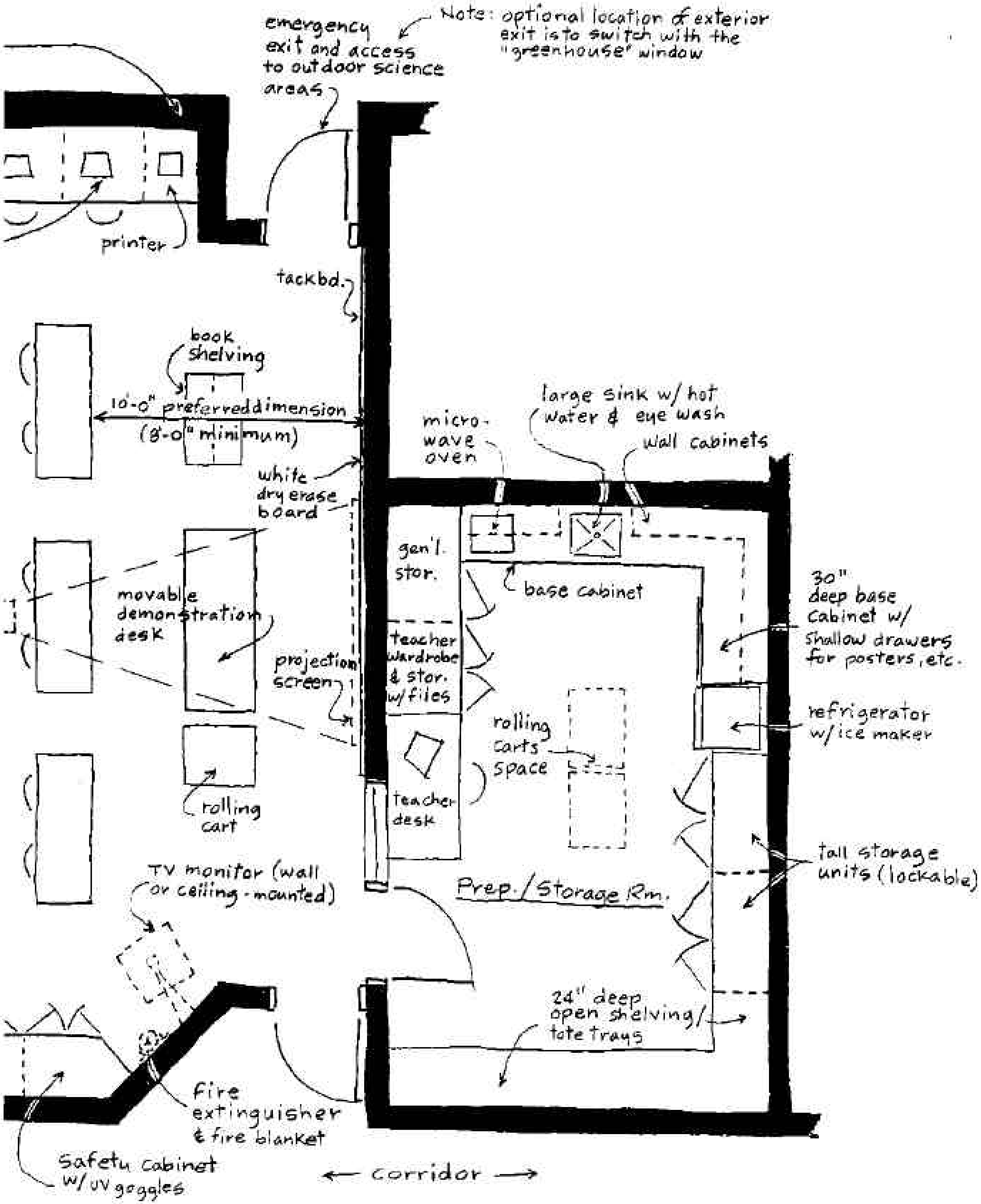
1.Typical Furniture
   Flat-topped moveable tables of appropriate size for students.
2. Typical Casework
   A. Base cabinets with sink (hot and cold water supply) mounted at student height, with an eye wash
   B. Additional Awet areas@
   C. Storage cabinets with adjustable shelves over base cabinets
   D. Full height storage cabinets
   E. Display cabinets
   F. Tote tray storage
3. Typical Equipment:
   A. Safety equipment (see above)
   B. Microscopes and typical laboratory equipment
   C. Aquarium
   D. Terrarium
   E. Window greenhouse

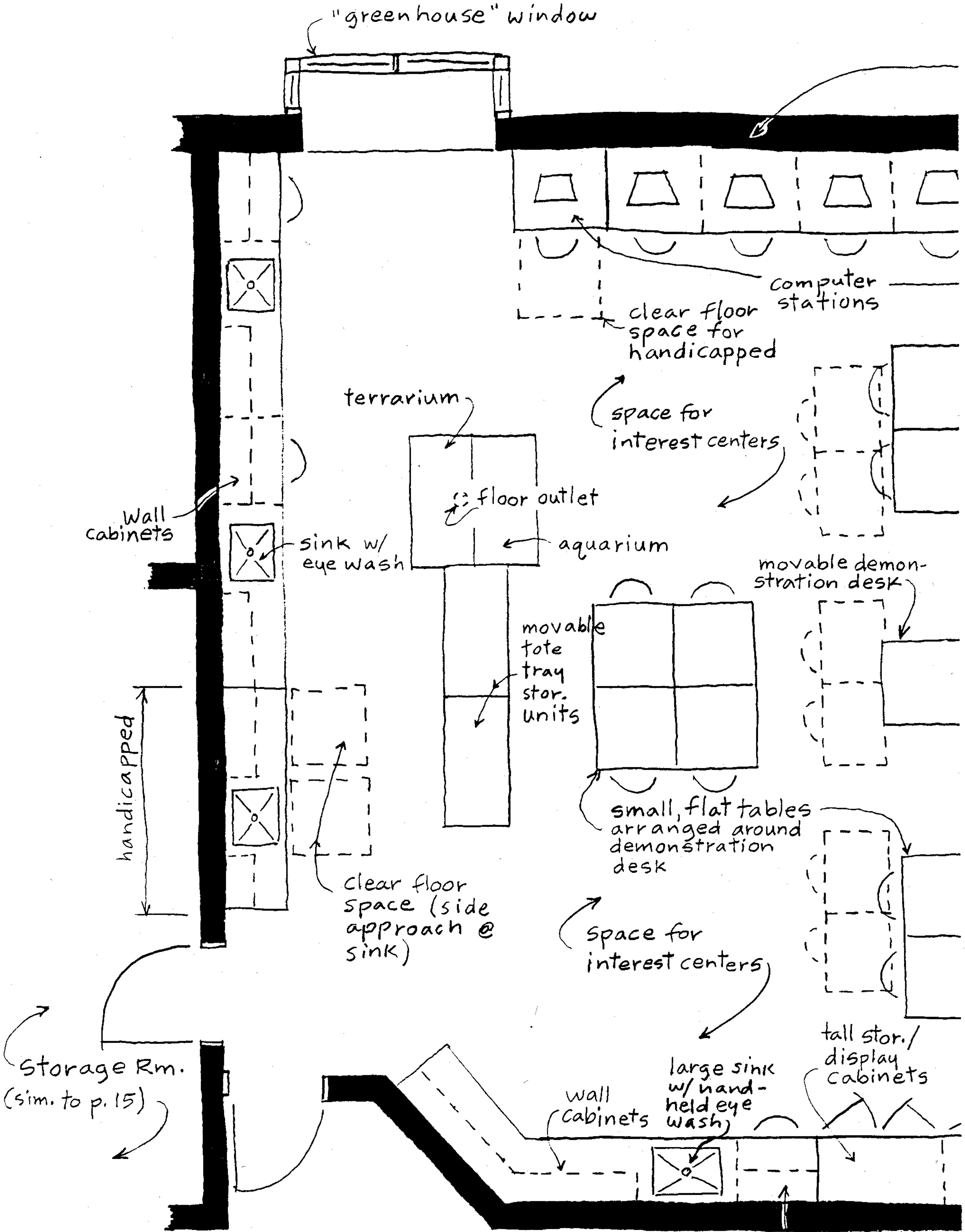
SPECIAL NOTES:

1 Telephone for teacher
2. Adequate ventilation systems/portable units
3. Emergency disconnect switch for electrical power

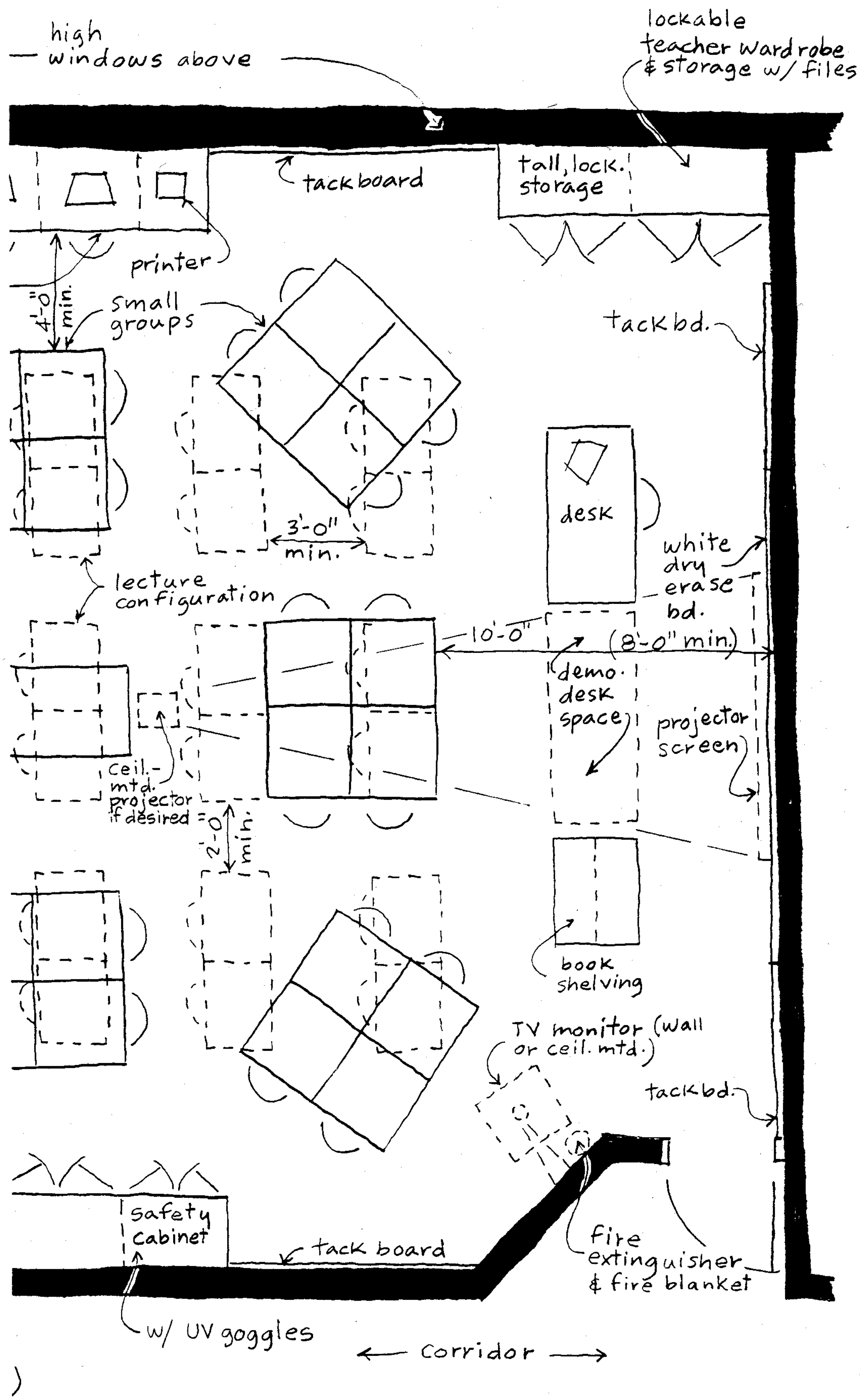


"DEDICATED"/ "SPECIALIZED"
ELEMENTARY SCIENCE CLASSROOM
(DISCOVERY ROOM)


emergency exit and access to outdoor science areas
Note: optional location of exterior exit is to switch with the "greenhouse" window
printer
tackbd.
book shelving
10'-0" preferred dimension (8'-0" minimum)
white dry erase board
movable demonstration desk
projection screen
rolling cart
TV monitor (wall or ceiling-mounted)
fire extinguisher & fire blanket
safety cabinet w/ UV goggles
corridor
micro-wave oven
large sink w/ hot water & eye wash
wall cabinets
gen'l. stor.
base cabinet
30" deep base cabinet w/ shallow drawers for posters, etc.
teacher wardrobe & stor. w/files
rolling carts space
refrigerator w/ice maker
teacher desk
Prep./Storage Rm.
tall storage units (lockable)
24" deep open shelving/tote trays



MULTIPLE-USE ELEMENTARY CLASSROOM (Where Science Can be Taught)


high
windows above
lockable
teacher wardrobe
& storage w/ files
tack board
tall, lock.
storage
printer
4'-0" min.
small
groups
tack bd.
3'-0"
min.
desk
white
dry
erase
bd.
lecture
configuration
10'-0"
(8'-0" min.)
demo.
desk
space
projector
screen
ceil.-
mtd.
projector
if desired
2'-0" min.
book
shelving
TV monitor (wall
or ceil. mtd.)
tack bd.
safety
cabinet
tack board
fire
extinguisher
& fire blanket
w/ UV goggles
corridor

COURSE TITLE: MIDDLE LEVEL SCIENCE (6-8) North Carolina graduation requirements include middle grades sciences taught as laboratory sciences.

COURSE DESCRIPTIONS:

Grade 6: Learners will study the patterns of natural and technological systems. The strands provide a context for teaching content throughout all goals. In-depth studies include:

Lithosphere
Matter and energy flow in an ecosystem
Solar system
Energy transfer

Grade 7: Learners will study the interactions and limiting factors of natural and technological systems. The strands provide a context for teaching content throughout all goals. In-depth studies include:

Atmosphere
Cell theory
Genetics/Heredity
Matter

Grade 8: Learners will study the constancy and change of natural and technological systems. The strands provide a context for teaching content throughout all goals. In-depth studies include:

Hydrosphere
Population dynamics
Evolution theory
Motion and forces

TYPES OF INSTRUCTION:

Inquiry-based; hands-on laboratory; lecture/demonstration; collaborative learning

TYPICAL ACTIVITIES:

Classroom instruction; laboratory activities; individual and small-group projects; observation of organisms; utilization of technology, including computers,CBLs and probe ware

PROGRAM LOCATIONS AND RELATIONSHIPS:

Should be located near other science laboratory/classrooms and storage areas.

SHARED SPACE OPTIONS:

The middle school offers opportunities for integrating other subjects with science by grouping several facilities, such as mathematics and applied sciences, with related subjects.

SPACE REQUIREMENTS:

1. A minimum of 45 square feet per student is desirable for a stand-alone laboratory--1,080

square feet for a class of 24 students.*
2. A minimum of 60 square feet per student is desirable for a combination laboratory/classroom--1440 square feet for a class of 24 students.*

*The National Science Teachers Association recommends a maximum class size of 24.

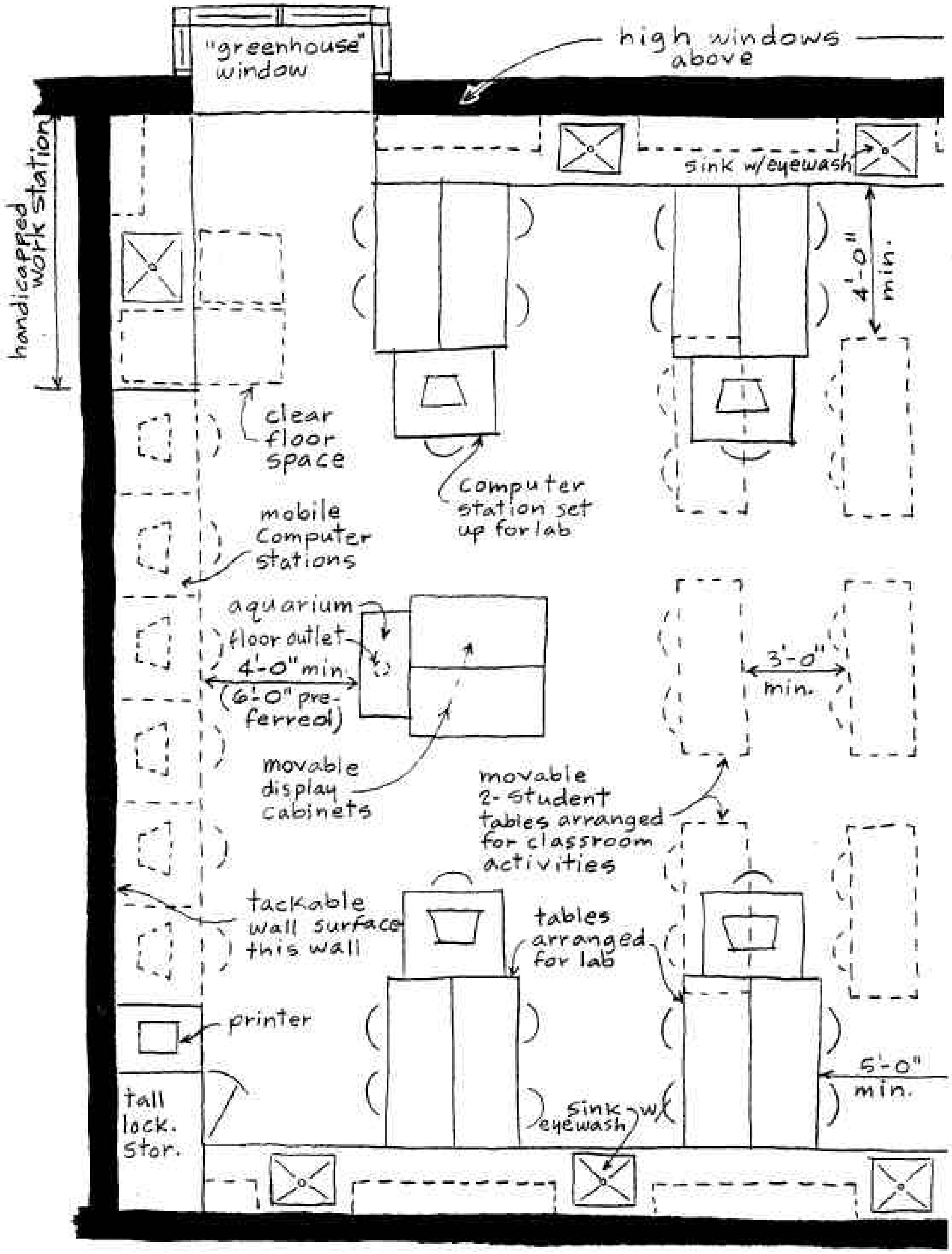
PECULIAR NEEDS:

1. Six computer stations linked to the Internet, with data-logging capability
2. Greenhouse center (small attached windows with shelves facing the sun) or optional separate greenhouse
3. Teacher preparation/storage area, with proper ventilation, and lockable chemical storage cabinets
4. Fume hoods where laboratory/classroom is used for chemistry
5. Gas supply
6. Dry erase boards
7. Overhead projection screen
8. Safety Equipment for every science classroom and/or laboratory:
    - Acid, flammable, corrosive cabinets
    - Fire blanket
    - Chemical-resistant aprons
    - Fire extinguisher (ABC)
    - Spill control center
    - Safety shield
    - Goggles and goggle sanitizer
    - Heat and acid-resistant gloves
    - Safety/chemical inventory software
    - Broken glass disposal container
    - MSDS display

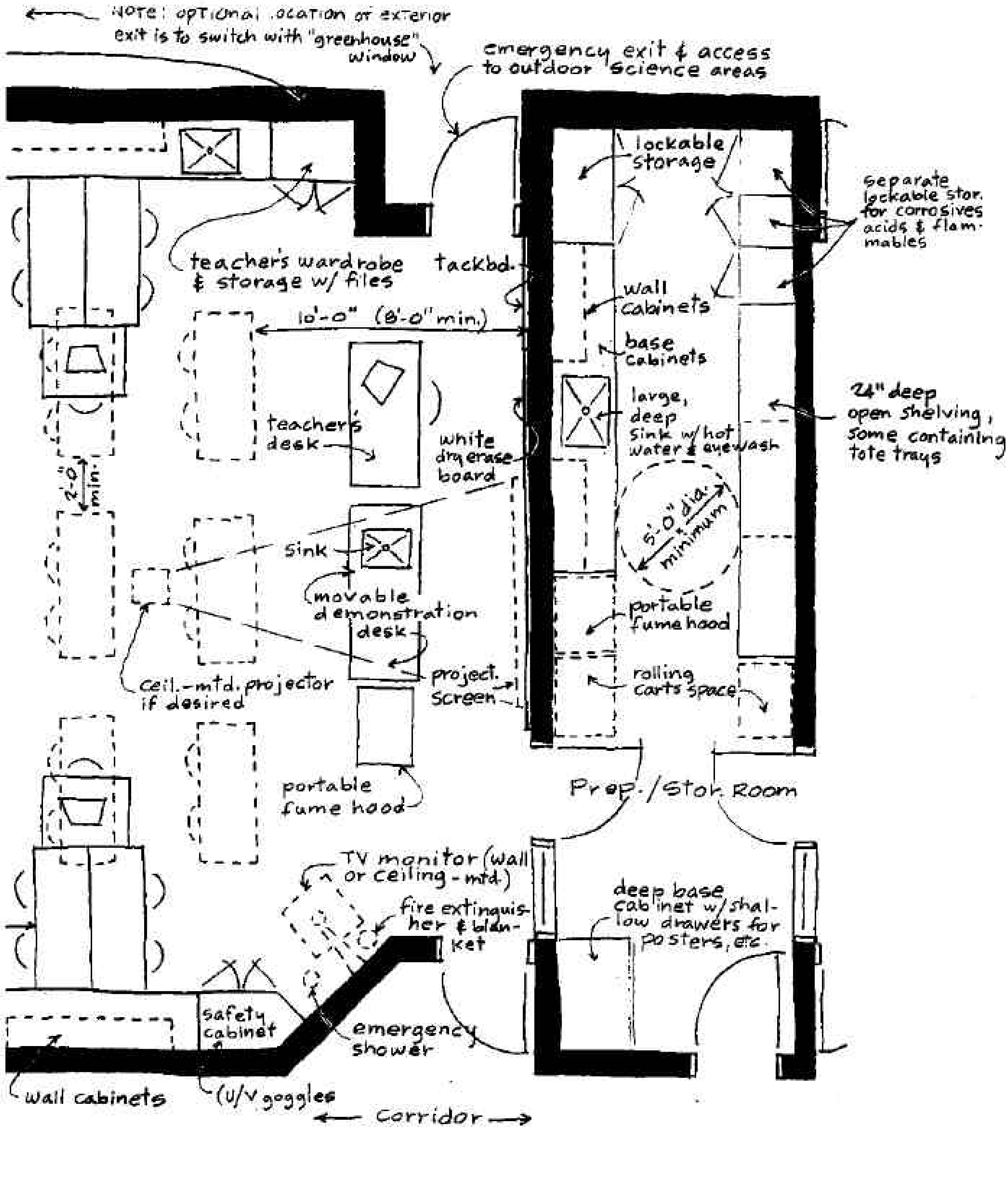
FURNISHINGS AND EQUIPMENT:

1.Typical Furniture
    A. Student laboratory tables with deep sinks and flat top work areas
    B. Teacher desk and file cabinets
    C. Teacher demonstration table with a sink (hot and cold water supply)
    D. Work bench-type tables and chairs
2. Typical Casework
    A. Base cabinets with sink (cold water supply)
    B. Storage cabinets with adjustable shelves over base cabinets
    C. Full height storage cabinets
    D. Display cabinets

SPECIAL NOTES: Telephone for teacher; Emergency power disconnect; Portable propane or electric hot plates



"FLEXIBLE" LABORATORY/CLASSROOM for MIDDLE SCHOOL SCIENCE


Note: optional location of exterior exit is to switch with "greenhouse" window
emergency exit & access to outdoor science areas
lockable storage
separate lockable stor. for corrosives acids & flammables
teacher's wardrobe & storage w/ files
tackbd.
wall cabinets
base cabinets
10'-0" (8'-0" min.)
large, deep sink w/ hot water & eyewash
24" deep open shelving, some containing tote trays
teacher's desk
white dry erase board
2'-0" min.
5'-0" dia. minimum
sink
movable demonstration desk
portable fume hood
ceil.-mtd. projector if desired
project. screen
rolling carts space
portable fume hood
Prep./Stor. Room
TV monitor (wall or ceiling-mtd.)
fire extinguisher & blanket
deep base cabinet w/ shallow drawers for posters, etc.
safety cabinet
emergency shower
wall cabinets
(U/V goggles
Corridor

COURSE TITLE: BIOLOGY (9-12) North Carolina graduation requirements include a biology course taught as a laboratory science.

COURSE DESCRIPTION:

The biology curriculum is designed to continue student investigations of the biological sciences begun in grades K-8. The inquiry in high school is expanded to include more abstract concepts, such as the function of DNA, biological evolution, and the interdependence of organisms. The curriculum will include inquiry into the following content areas:

The cell
Molecular basis of heredity
Biological evolution
Interdependence of organisms
Matter, energy, and organization in living systems
Behavior of organisms

TYPES OF INSTRUCTION:

Inquiry-based; hands-on laboratory; lecture/demonstration; collaborative learning

TYPICAL ACTIVITIES:

Classroom instruction; laboratory activities; individual and small-group projects;
Observations of organisms; utilization of technology, including CLBs and probe ware

MAXIMUM RECOMMENDED CLASS SIZE: 24*

PROGRAM LOCATIONS AND RELATIONSHIPS:

Should be located near other science laboratory/classrooms and chemical storage areas

SHARED SPACE OPTIONS:

Other science laboratories:

A. Chemistry
B. Earth/Environmental Science

SPACE REQUIREMENTS:

1. A minimum of 45 square feet per student is desirable for a stand-alone laboratory--1,080 square feet for a class of 24 students.*
2. A minimum of 60 square feet per student is desirable for a combination laboratory/classroom--1,440 square feet for a class of 24 students.*

* The National Science Teachers Association recommends a maximum class size of 24.

PECULIAR NEEDS:

1. Six computer stations linked to the Internet
2. Greenhouse center (small attached windows with shelves facing the sun) or optional separate greenhouse.
3. Teacher preparation/storage area with proper ventilation and lockable chemical storage cabinets.
4. Fume hood when laboratory/classroom is also used for chemistry.
5. Gas supply
6. Safety equipment:
    - Acid, flammable, and corrosive cabinets
    - Fire blanket
    - Fire extinguisher ABC
    - Spill control center
    - Safety shield
    - Goggles and goggle sanitizer
    - Heat- and acid-resistant gloves
    - Chemical-resistant aprons
    - Broken glass disposal container
    - MSDS display
    - Safety/chemical inventory software

FURNISHINGS AND EQUIPMENT:

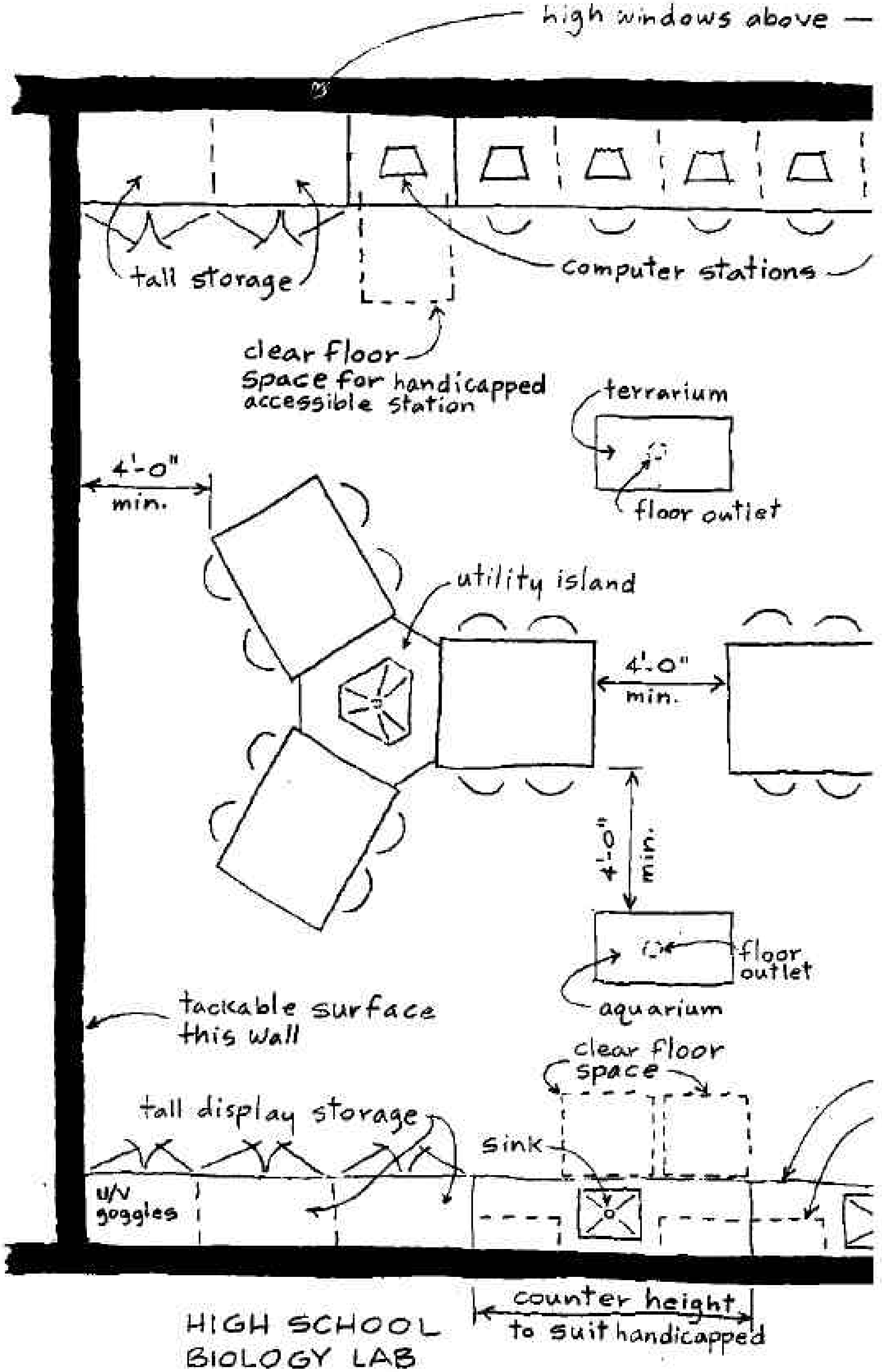
1.Typical Furniture
    - A. Student laboratory tables with deep sinks and flat top work areas
    - B. Teacher desk and file cabinets
    - C. Teacher demonstration table with a sink (hot and cold water supply)
    - D. Work bench type tables and chairs

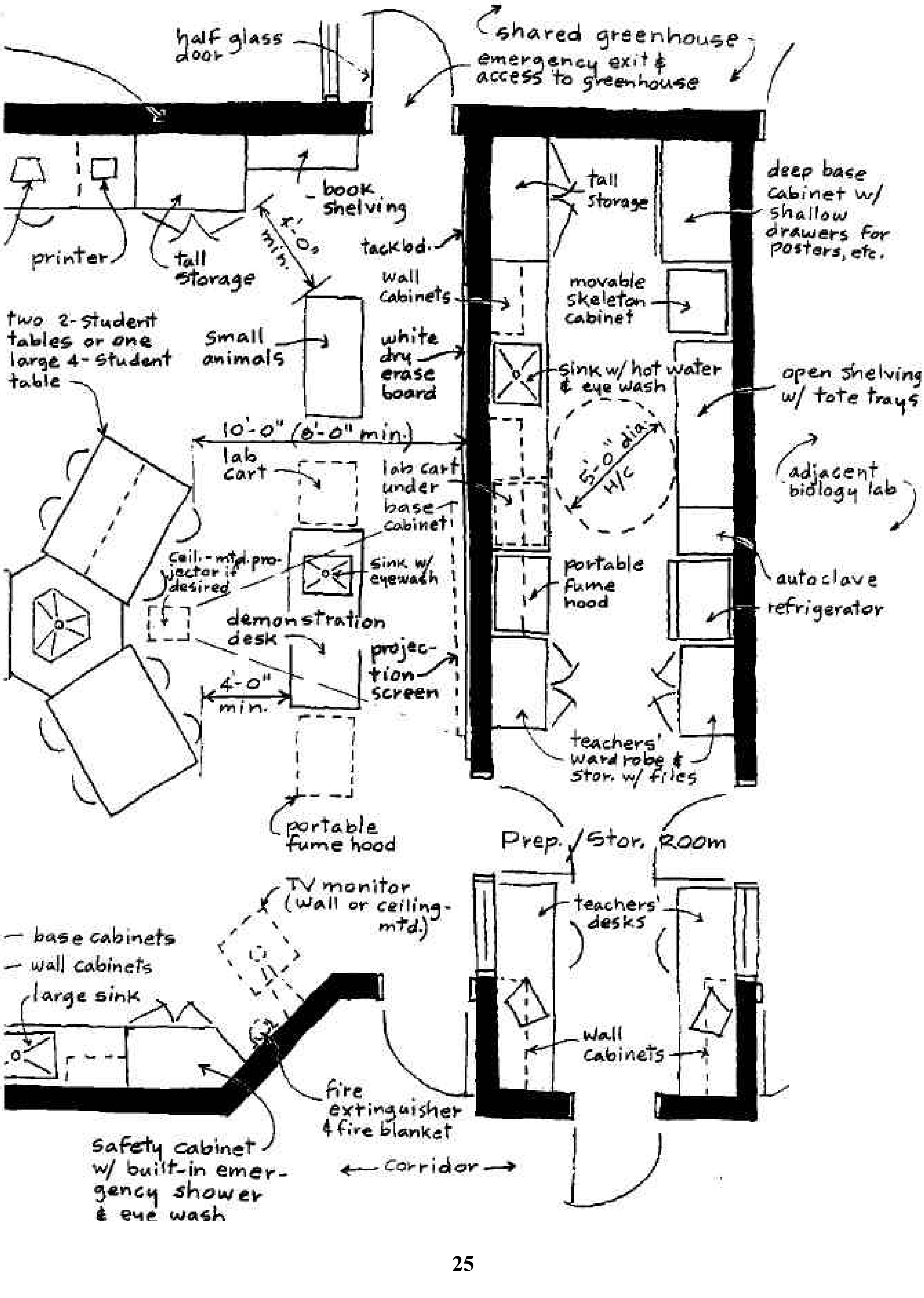
2. Typical Casework
    - A. Base cabinet with sink (cold water supply)
    - B. Storage cabinets with adjustable shelves over base cabinets
    - C. Full-height storage cabinets

` 3. Typical Equipment:
    - A. Safety equipment (see above)
    - B. Microscopes and typical laboratory equipment
    - C. Aquarium
    - D. Projection microscope
    - E. Non-mercury thermometer

SPECIAL NOTES:

1 Telephone for teacher
2. Built-in and/or portable ventilation systems
3. Emergency power disconnect
4. Emergency disconnect for gas supply


high windows above
tall storage
computer stations
clear floor
space for handicapped
accessible station
terrarium
floor outlet
4'-0"
min.
utility island
4'-0"
min.
4'-0"
min.
floor
outlet
aquarium
tackable surface
this wall
clear floor
space
tall display storage
sink
U/V
goggles
counter height
to suit handicapped
HIGH SCHOOL
BIOLOGY LAB


half glass door
shared greenhouse
emergency exit & access to greenhouse
book shelving
printer
tall storage
x'-0" min.
tackbd.
tall storage
deep base cabinet w/ shallow drawers for posters, etc.
wall cabinets
movable skeleton cabinet
two 2-student tables or one large 4-student table
small animals
white dry erase board
sink w/ hot water & eye wash
open shelving w/ tote trays
10'-0" (8'-0" min.)
5'-0" dia. H/C
lab cart
lab cart under base cabinet
adjacent biology lab
ceil.-mtd. projector if desired
sink w/ eyewash
portable fume hood
autoclave
refrigerator
demonstration desk
projection screen
4'-0" min.
teachers' ward robe & stor. w/ files
portable fume hood
Prep./Stor. Room
TV monitor (wall or ceiling-mtd.)
teachers' desks
— base cabinets
— wall cabinets
large sink
wall cabinets
fire extinguisher & fire blanket
safety cabinet w/ built-in emergency shower & eye wash
← corridor →

COURSE TITLE: CHEMISTRY (9-12) North Carolina graduation requirements include a chemistry course taught as a laboratory science.

COURSE DESCRIPTION:

The chemistry curriculum encourages students to continue their investigation of the structure of matter, along with chemical reactions and the conservation of energy in these reactions. Inquiry is applied to the study of the transformation, composition, structure, and properties of substances. The course focuses on basic chemical concepts and incorporates activities that promote investigations to reinforce the concepts. The curriculum includes inquiry into the following content areas:

Structure of atoms
Structure and properties of matter
Chemical reactions
Conservation of energy and matter
Interaction of energy and matter

TYPES OF INSTRUCTION:

Inquiry-based; hands-on; lecture/demonstration; collaborative learning

TYPICAL ACTIVITIES:

Classroom instruction; laboratory activities; individual and small-group projects; chemistry investigations; utilization of technology, including computers, CBLs, and probe ware

MAXIMUM RECOMMENDED CLASS SIZE: 24*

PROGRAM LOCATIONS AND RELATIONSHIPS:

Should be located near other science laboratory/classrooms and chemical storage areas

SHARED SPACE OPTIONS:

1. Other science laboratories:
   Biology
   Physics
   Physical Science
   Earth/Environmental Science

SPACE REQUIREMENTS:

1. A minimum of 45 square feet per student is desirable for a stand-alone laboratory-- 1,080 square feet for a c2. A minimum of 60 square feet per student is desirable for a combination lass of 24 students.*
laboratory/classroom--1,440 square feet for a class of 24 students.*

* The National Science Teachers Association recommends a maximum class size of 24.

PECULIAR NEEDS:

1. Six computer stations linked to the Internet, with data logging capability
2. Teacher preparation/storage area, with proper ventilation, and lockable chemical storage cabinets
3. Fume hood
4. Gas supply
5. Dry-erase boards
6. Overhead projection screen
7. Safety equipment for every science classroom and/or laboratory;

Acid, flammable, corrosive cabinets
Fire blanket
Fire extinguisher ABC
Spill control center
Safety shield
.Heat- and acid-resistant gloves
Goggles and goggle sanitizer
Chemical-resistant aprons
Safety/chemical inventory software
Broken glass disposal container
USDS display

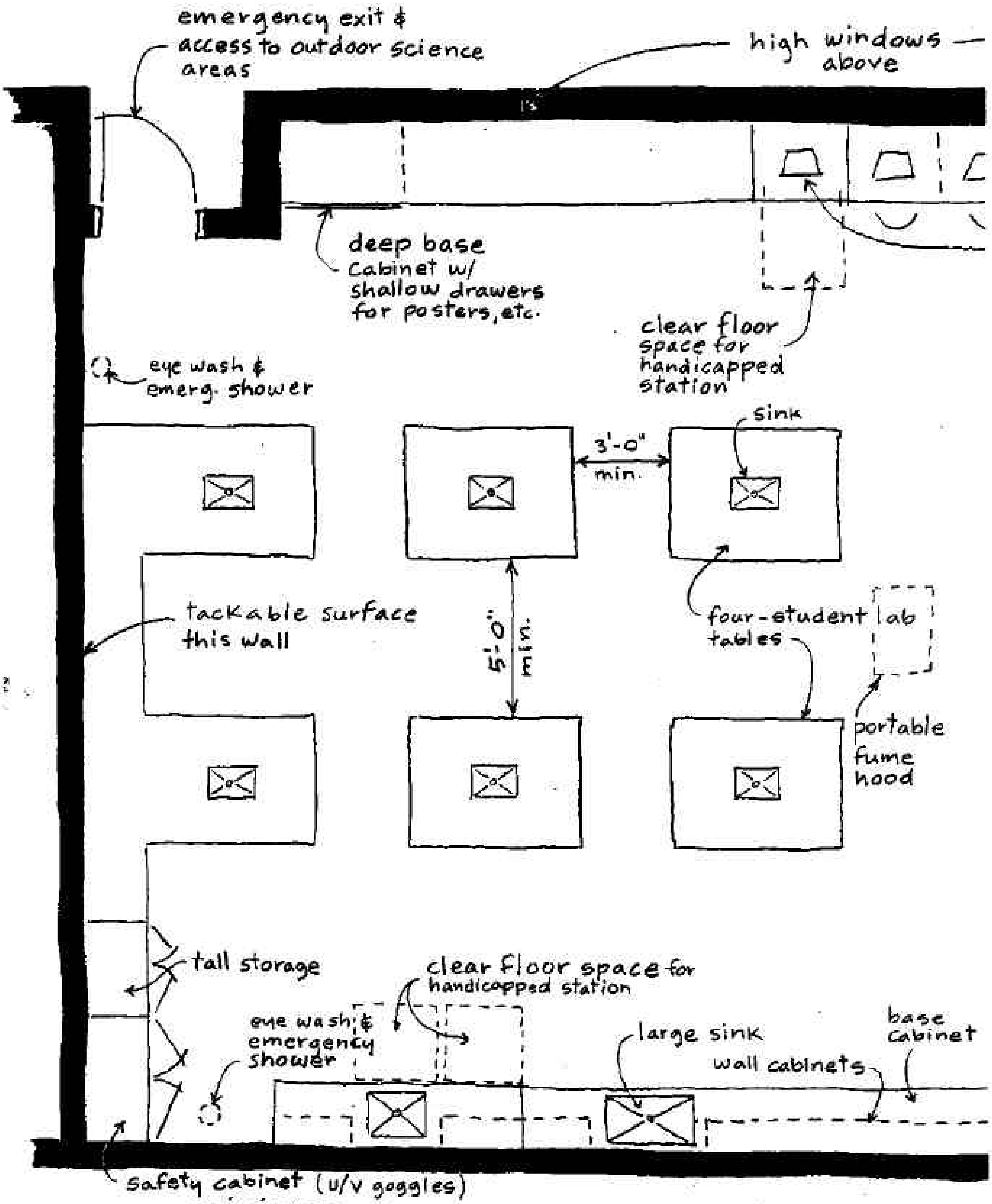
FURNISHINGS AND EQUIPMENT:

1.Typical Furniture
   A. Student laboratory tables with deep sinks and flat top work areas
   B. Teacher desk and file cabinets
   C. Teacher demonstration table with a sink (hot and cold water supply)
   D. Work bench-type tables and chairs
2. Typical Casework
   A. Base cabinets with sink (cold water supply)
   B. Storage cabinets with adjustable shelves over base cabinets
   C. Full-height storage cabinets
   D. Display cabinets

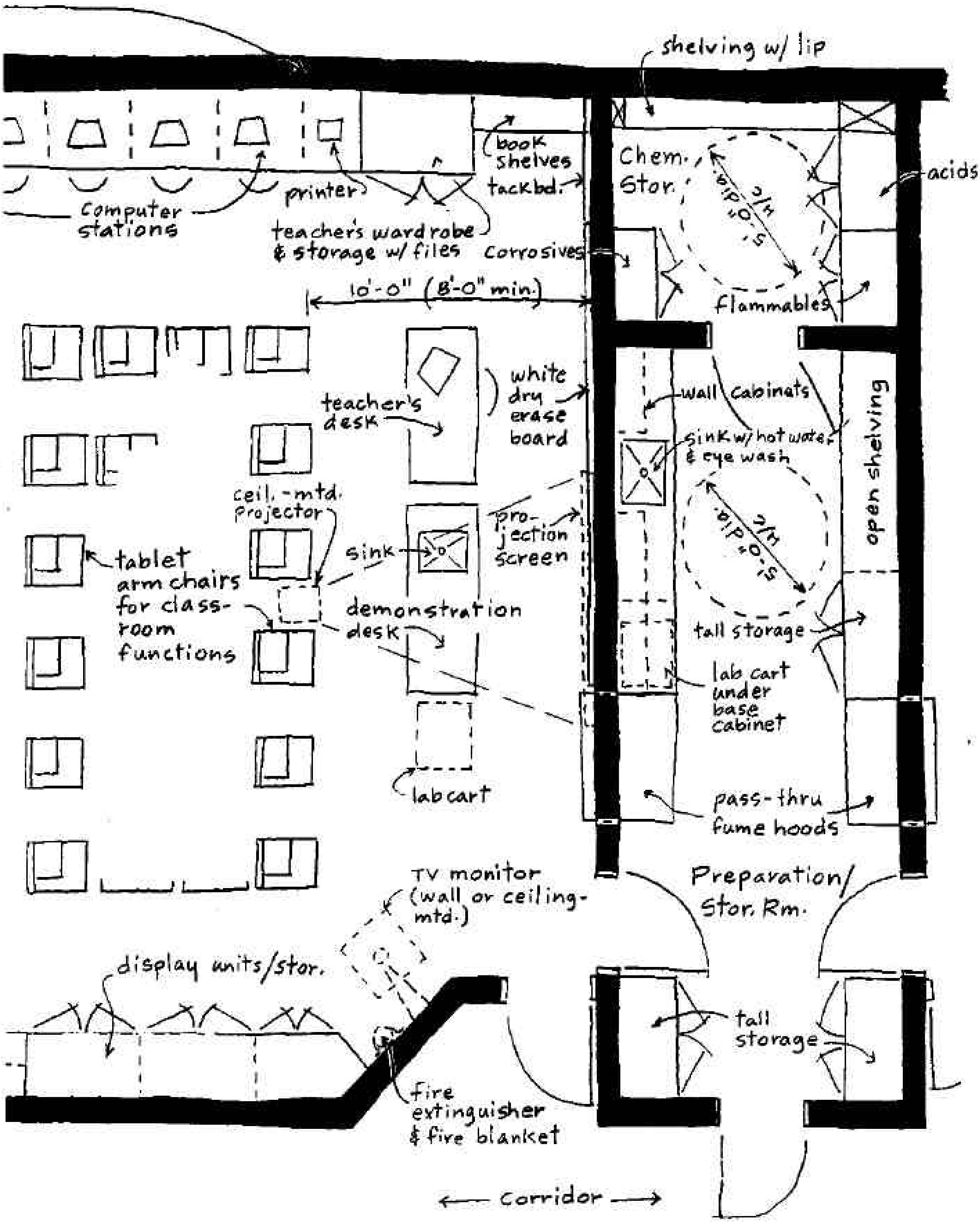
` 3. Typical Equipment:
   A. Safety equipment (see above)
   B. Typical laboratory equipment
   C. Electronic and analytical balances
   D. Computer and calculator interface data logging units
   E. Electronic balances
   F. Non-mercury thermometer

SPECIAL NOTES:

1 Telephone for teacher
2. Adequate ventilation systems, including portable units
3. Emergency power disconnect switch
4. Emergency disconnect for gas supply
5. Portable propane or electric hot plates



COMBINED CHEMISTRY CLASSROOM / LAB
HIGH SCHOOL


shelving w/ lip
book shelves
tackbd.
computer stations
printer
teacher's wardrobe & storage w/ files
Chem. Stor.
5'-0" dia. H/C
acids
corrosives
flammables
10'-0" (8'-0" min.)
teacher's desk
white dry erase board
wall cabinets
sink w/ hot water & eye wash
open shelving
ceil.-mtd. projector
pro-jection screen
sink
5'-0" dia. H/C
tablet arm chairs for class-room functions
demonstration desk
tall storage
lab cart under base cabinet
lab cart
pass-thru fume hoods
TV monitor (wall or ceiling-mtd.)
Preparation/ Stor. Rm.
display units/stor.
tall storage
fire extinguisher & fire blanket
← corridor →

COURSE TITLE: EARTH/ENVIRONMENTAL SCIENCE (9-12) North Carolina graduation requirements include an earth/environmental science course taught as a laboratory science.

COURSE DESCRIPTION:

The earth science curriculum will focus on inquiry into the functions of the earth's systems. Emphasis is placed on matter, energy, crustal dynamics, environmental awareness, and the cycles that circulate energy and material through the earth system. The areas of inquiry will include:

- Energy in the earth system
- Geochemical cycles
- Origin and evolution of the earth system
- Origin and evolution of the universe
- Human interactions with the earth's geologic and environmental systems

TYPES OF INSTRUCTION:

Inquiry-based; hands-on; lecture/demonstration; collaborative learning

TYPICAL ACTIVITIES:

Classroom instruction; laboratory activities; individual and small-group projects; and geology, meteorology, astronomy, oceanography experimentation and observation; utilization of technology, including computers, CBLs, and probe ware

MAXIMUM RECOMMENDED CLASS SIZE: 24*

PROGRAM LOCATIONS AND RELATIONSHIPS:

Should be located near other science laboratory/classrooms and chemical storage areas.

SHARED SPACE OPTIONS:

Other science laboratories:

- Biology
- Physics
- Physical Science
- Chemistry

SPACE REQUIREMENTS:

1. A minimum of 45 square feet per student for a stand-alone laboratory is desirable--1,080 square feet for a class of 24 students.*
2. A minimum of 60 square feet per student for a combination laboratory/classroom is desirable--1440 square feet for a class of 24 students.*

*****The National Science Teachers Association recommends a maximum class size of 24.

PECULIAR NEEDS:

1. Six computer stations linked to the Internet, with data logging capability
2. Teacher preparation/storage area, properly vented to the outside, with lockable chemical storage cabinets.
3. Fume hood when laboratory/classroom is also used for chemistry.
4. Gas supply
5. Dry-erase boards
6. Overhead projection screen
7. Access to roof-mounted weather instruments
8. Safety equipment for each science classroom and/or laboratory: Acid cabinet
   Fire blanket
   First aid kit
   Fire extinguisher (ABC)
   Safety shield
   Goggles and goggle sanitizer
   Heat- and acid-resistant gloves
   Aprons
   Safety/chemical inventory software

FURNISHINGS AND EQUIPMENT:

1.Typical Furniture
   A. Student laboratory tables with deep sinks and flat-top work areas
   B. Teacher desk and file cabinets
   C. Teacher demonstration table with a sink (hot and cold water supply)
   D. Work bench-type tables and chairs
2. Typical Casework
   A. Base cabinets with sinks (cold water supply)
   B. Storage cabinets with adjustable shelves over base cabinets
   C. Full-height storage cabinets
   D. Display cabinets

` 3. Typical Equipment:
   A. Safety equipment (see above)
   B. Stereo microscopes
   C. Astronomical telescope
   D. Typical laboratory equipment
   E. Computer and calculator interface data logging units

SPECIAL NOTES:

1 Telephone for teacher
2. Adequate ventilation systems
3. Emergency disconnect switch for all electrical equipment
4. Emergency disconnect for gas supply

SAMPLE PLAN: Similar to biology

COURSE TITLE: PHYSICAL SCIENCE (9-12) North Carolina graduation requirements include a physical science course taught as a laboratory science.

COURSE DESCRIPTION:

The physical science curriculum is designed to continue the investigation of the concepts that guide inquiry in the practice of science begun in earlier grades. The course will provide a rich knowledge base and a foundation for the continued study of science. The curriculum will integrate the following topics from both chemistry and physics:

Structure of atoms
Structure and properties of matter
Motion and forces
Conservation of energy, matter, and charge

TYPES OF INSTRUCTION:

Inquiry-based, hands-on; lecture/demonstration; collaborative learning

TYPICAL ACTIVITIES:

Classroom instruction; laboratory activities; individual and small-group projects; chemistry and physics experiments; utilization of technology, including computers, CBLs, and graphing calculators

MAXIMUM RECOMMENDED CLASS SIZE: 24*

PROGRAM LOCATIONS AND RELATIONSHIPS:

Should be located near other science laboratory/classrooms and chemical storage areas.

SHARED SPACE OPTIONS:

1. Other science laboratories:
   Chemistry
   Earth/Environmental science
   Physics

SPACE REQUIREMENTS:

1. A minimum of 45 square feet per student for a stand-alone laboratory is desirable--1,080 square feet for a class of 24 students.*
2. A minimum of 60 square feet per student for a combination laboratory/classroom is desirable--1,440 square feet for a class of 24 students.*

*****The National Science Teachers Association recommends a maximum class size of 24.

PECULIAR NEEDS:

1. Six computer stations linked to the Internet, with data logging capability
2. Power supply units for electricity experiments
3. Teacher preparation/storage area properly vented and/or portable ventilating system and

with lockable chemical storage cabinet.
4. Fume hood and/or portable ventilation when laboratory/classroom is also used for chemistry
5. Gas supply or portable propane or electric hot plates
6. Safety equipment for each science classroom and/or laboratory:

Acid cabinet
Fire blanket
Fire extinguisher (ABC)
Spill control center
Safety shield
Goggles and goggle sanitizer
Heat- and acid-resistant gloves
Chemical-resistant aprons
Safety/chemical inventory software
Broken glass disposal container
MSOS sheets display

FURNISHINGS AND EQUIPMENT:

1.Typical Furniture
   A. Student laboratory tables with deep sinks and flat top work areas
   B. Teacher desk and file cabinets
   C. Teacher demonstration table with a sink (hot and cold water supply)
   D. Work bench-type tables and chairs
2. Typical Casework
   A. Base cabinet with sinks (cold water supply)
   B. Storage cabinets with adjustable shelves over base cabinets
   C. Full-height storage cabinets
` 3. Typical Equipment:
   A. Safety equipment (see above)
   B. Typical laboratory equipment
   C. Student and teacher power supplies
   C. Computer and calculator interface data logging units.

SPECIAL NOTES:

1 Telephone for teacher
2. Built-in and/or portable ventilation systems
3. Emergency disconnect switch for all electrical equipment
4. Emergency disconnect for gas supply

SAMPLE PLAN: Similar to physics

COURSE TITLE: PHYSICS (9-12) North Carolina graduation requirements include a physics course taught as a laboratory science.

COURSE DESCRIPTION:

Physics, the most fundamental of the natural sciences, is quantitative in nature and uses the language of mathematics to describe natural phenomena. Inquiry is applied to the study of matter and energy and their interaction. The following topics are Auncovered@ in this curriculum:

- Conservation of mass and energy
- Conservation of momentum
- Waves
- Fields
- Interactions of matter and energy

TYPES OF INSTRUCTION:

Inquiry-based; hands-on; lecture/demonstration; collaborative learning

TYPICAL ACTIVITIES:

Classroom instruction; laboratory activities; individual and small-group projects and physics experiments; utilization of technology, including computers, CBLs, and graphing calculators

MAXIMUM RECOMMENDED CLASS SIZE: 24*

PROGRAM LOCATIONS AND RELATIONSHIPS:

Should be located near other science laboratory/classrooms and chemical storage areas

SHARED SPACE OPTIONS:

1. Other science laboratories:
   - Chemistry
   - Earth/Environmental science
   - Physical science

SPACE REQUIREMENTS:

1. A minimum of 45 square feet per student is desirable for a stand-alone laboratory-- 1,080 square feet for a class of 24 students.*
2. A minimum of 60 square feet per student is desirable for a combination laboratory/classroom--1,440 square feet for a class of 24 students.*

*****The National Science Teachers Association recommends a maximum class size of 24.

PECULIAR NEEDS:

A. Six computer stations linked to the Internet, with data logging capability

B. Power supply units for electricity experiments

C. Teacher preparation/storage area properly vented and/or with portable ventilation, and with lockable chemical storage cabinets

D. Fume hood when laboratory/classroom is also used for chemistry or physical science

E. Gas supply

F. Safety equipment for every science classroom and/or laboratory:

Acid cabinet
Fire blanket
Fire extinguisher (ABC)
Spill control center
Safety shield
Goggles and goggle sanitizer
Heat- and acid-resistant gloves
Chemical-resistant aprons
Safety/chemical inventory software

FURNISHINGS AND EQUIPMENT:

1.Typical Furniture

A. Student laboratory tables with at least one deep sink and flat-top work areas

B. Teacher desk and file cabinets

C. Teacher demonstration table (8') with a sink (hot and cold water supply)

D. Work bench-type tables and chairs

2. Typical Casework

A. Base cabinet with sinks (cold water supply)

B. Storage cabinets with adjustable shelves over base cabinets

C. Full-height storage cabinets

` 3. Typical Equipment:

A. Safety equipment (see above)

B. Typical laboratory equipment

C. Student power supplies for electricity experiments

D. Computer and calculator interface data logging units

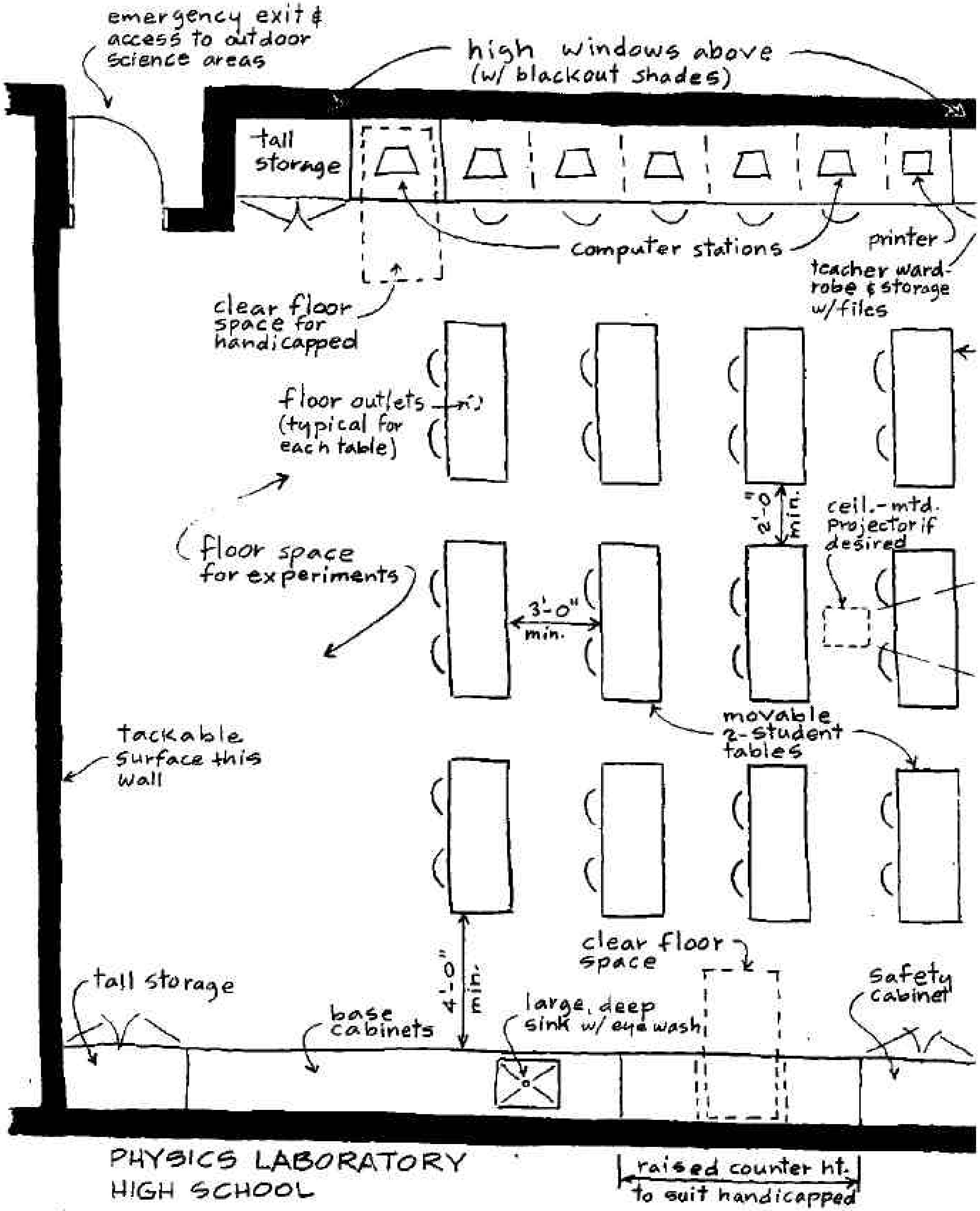
SPECIAL NOTES:

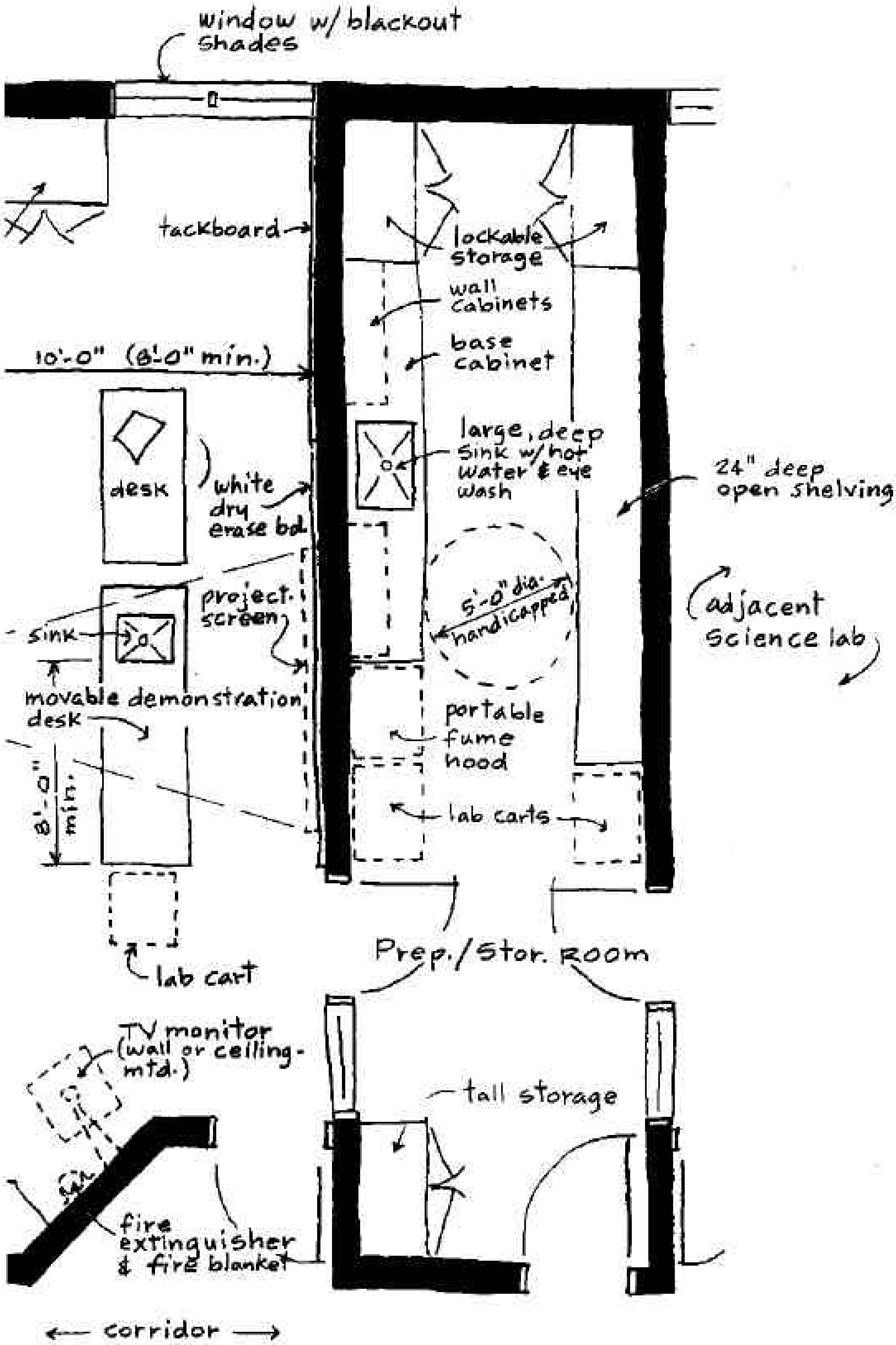
1 Telephone for teacher

2. Adequate built-in and/or portable ventilation systems

3. Emergency disconnect switch for all electrical equipment

4. Emergency disconnect for gas supply


emergency exit & access to outdoor science areas
high windows above (w/ blackout shades)
tall storage
computer stations
printer
teacher wardrobe & storage w/files
clear floor space for handicapped
floor outlets (typical for each table)
2'-0" min.
ceil.-mtd. projector if desired
floor space for experiments
3'-0" min.
movable 2-student tables
tackable surface this wall
clear floor space
tall storage
base cabinets
4'-0" min.
large, deep sink w/ eye wash
safety cabinet
PHYSICS LABORATORY
HIGH SCHOOL
raised counter ht. to suit handicapped


window w/ blackout shades
tackboard
lockable storage
wall cabinets
base cabinet
10'-0" (8'-0" min.)
desk
white dry erase bd.
large, deep sink w/ hot water & eye wash
24" deep open shelving
5'-0" dia. handicapped
project. screen
sink
adjacent science lab
movable demonstration desk
portable fume hood
8'-0" min.
lab carts
lab cart
Prep./Stor. Room
TV monitor (wall or ceiling-mtd.)
tall storage
fire extinguisher & fire blanket
corridor

SAMPLE CHECKLIST FOR ELEMENTARY SCHOOL SCIENCE*

(Adapt and expand these guidelines to suit identified program requirements. Elementary science rooms are not considered to be separate instructional spaces in North Carolina.)

Category	Guidelines	GOOD	FAIR	POOR	Comments
Is there adequate floor space for the students to work safely?	Usually at least 850-1,000 square feet Sufficient space between desks or tables Four-foot aisles (three-foot ADA minimum)				
Is the space flexible?	Rectangular room without alcoves				
Is there room for open-floor activities?	24-foot minimum room width Movable student tables Movable teacher=s table				
Is there adequate space for the teacher?	Secure storage and desk Space available to teacher during planning time				
Is the power supply adequate and safe?	Sufficient circuits and outlets to serve program and technology needs Ground-fault interrupters in Awet@ areas				
Is lighting adequate?	Directed and diffused to avoid glare 50-75 foot-candles per square foot at work surfaces				
Can lighting levels be controlled?	Room-darkening shades or blinds Switches to reduce lighting by 50%				
Is there adequate and safe storage?	Secure teacher storage for materials Space for lab and AV equipment				
Is there good infrastructure for communication?	Telephone or two-way intercom for emergencies Network wiring for computers Cable for video communications				
Are there counters or tables for investigation?	Counters and tables age-appropriate heights, per state building code and public schools facilities guidelines				

Is there a water supply suitable for investigation?	One sink at adult level; one or two additional at child level High-arched faucets and deep bowls				
Is there adequate space for displays?	Counter and floor space Shelves and display cabinets Easily reached tack boards				
Is there space to keep living organisms?	Shelves at windows for plants Grow lights Terrariums or aquariums				
Does the space meet ADA requirements?	At least one wheelchair-accessible counter and sink Accessible safety equipment, doors and passages (per code)				
Are fire and safety measures in place?	Fire and safety equipment Adequate fire exits Adequate room ventilation				

* Adapted from *NSTA Guide to School Science Facilities.*

SAMPLE CHECKLIST FOR MIDDLE SCHOOL SCIENCE*

(Adapt and expand these guidelines to suit identified program requirements.)

Category	Guidelines	GOOD	FAIR	POOR	Comments
Is there adequate floor space for the students to work safely?	Usually at least 1,000-1,200 square feet Sufficient space between desks or tables Four-foot aisles				
Is there adequate space for the teacher?	Secure storage and desk Not in shared classroom				
Is the power supply adequate and safe?	Sufficient circuits and outlets to serve program and technology needs Sufficient outlets at lab stations Ground-fault interrupters				
Is lighting adequate?	Directed and diffused to avoid glare 50-75 foot-candles per square foot at work surfaces				
Can lighting levels be controlled?	Room-darkening shades or blinds Switches to reduce lighting by 50%				
Is there adequate safe storage and a secure place for chemicals?	Separate lockable room or closet Space for separation of incompatible chemicals Adequate ventilation Emergency lighting				
Is there good infrastructure for communication?	Telephone or two-way intercom for emergencies Network wiring for computers Cable for video TV or video projector				
Are there tables or counters for investigation?	36" counter height for adults; 30"-36" for students Tables 25"-30" for students Movable lab tables or fixed lab stations				

Is there water supply suitable for investigation?	3-6 student sinks At least one large sink High-arched swivel faucets				
Is there space to keep living organisms?	Greenhouse or window shelves for plants Grow lights Terrariums or aquariums (Note: This space may be shared with exploring biotechnology classes.)				
Is the preparation space adequate and secure?	Lockable storage and/or preparation space Adequate ventilation				
Does the space meet ADA requirements?	At least one wheelchair accessible work station Accessible safety equipment, doorways, and passages (per code)				
Are fire and safety measures in place?	Fire and safety equipment Adequate fire exits				
Are there exhaust fans to vent smoke and fumes?	Exhaust fans vented outside the building and maintain a slight negative pressure in the room and/or portable ventilation systems				
Are a safety shower and eyewash pro-vided where chem-icals are used?	Dual eyewash within 25' of every workstation if hazardous chemicals are used Combination shower/eyewash available				

*Adapted from *NSTA Guide to School Science Facilities.*

SAMPLE CHECKLIST FOR HIGH SCHOOL SCIENCE*

(Adapt and expand these guidelines to suit identified program requirements.)

Category	Guidelines	GOOD	FAIR	POOR	Comments
Is there adequate floor space for stu-dents to work safely?	Usually 45 sq. ft./student minimum for science labs Additional space for classroom/lab combinations Sufficient space between lab or work stations Four-foot aisles				
Is there adequate teacher space?	Secure storage and desk Not in shared classroom				
Is the power supply adequate and safe?	Sufficient circuits and outlets to serve program and technology needs Sufficient outlets at lab stations Ground-fault interruptors				
Is there adequate lighting?	Directed and diffused to avoid glare 50-75 foot-candles at work surfaces				
Can lighting levels be controlled?	Room-darkening shades or blinds Switches to reduce lighting by 50%				
Is there adequate safe storage and a secure place for chemicals?	Separate lockable room or closet Space for separation of incompatible chemicals Adequate ventilation system				
Is there adequate and secure preparation space?	Lockable preparation room At least 5 sq. ft. per student Adequate ventilation system				
Is there good infrastructure for communications?	Telephone or two-way intercom for emergencies Network wiring for computers Cable for video TV or video projector				

Are there tables or counters for investigation?	36" counter height Movable lab tables or fixed stations Epoxy resin work surfaces, where lab materials so indicate				
Is natural gas or other heat source available?	Natural gas or hotplates One service per four students Safety shut-off in classroom				
Is there water supply suitable for investigation?	At least one sink per four students Swivel and high-arched faucets Deep bowls Hot (maximum 110 degrees) and cold water				
Is there adequate space for displays?	Shelves Display cabinets				
Is there space for long-term investigation?	Separate holding space for projects Space in the classroom				
Does the space meet ADA requirements?	At least one wheelchair-accessible workstation Accessible safety equipment, doorways, and passages (per code)				
Are fire and safety measures in place?	Fire and safety equipment Adequate fire exits				
Is a fume hood provided where required?	Required if hazardous chemicals are used Vented to outside of building Recirculating unit with filters and/or portable units may fit some applications				
Are a safety shower and eyewash provided?	Dual eyewash within 10 seconds of every workstation Eyewash and shower available for simultaneous use Combination unit may be applicable				

*Adopted from *NSTA Guide to School Science Facilities.*

Resources

Biehl, James T.; Motz, LaMoine L.; and West, Sandra S., *NSTA Guide to School Science Facilities,* 1999, National Science Teachers Association, Arlington, VA.

Designs for Science Facilities, 1971, Minnesota State Department of Education, St. Paul, MN.

Look of the Future: Report of the Governor's Committee on High School Science Laboratories for the 21st Century, 1992, State of Maryland, Baltimore, MD.

North Carolina Public School Facilities Guidelines, 1998, North Carolina Department of Public Instruction, Raleigh, NC.

North Carolina Standard Course of Study and Introduction to the Competency-Based Curriculum, 1995, North Carolina Department of Public Instruction, Raleigh, NC.

Science Facilities Design Guidelines, 1994, Maryland State Department of Education, Baltimore, MD.

Regulatory References

Science as lab in North Carolina:
- GS 116-96
- GS 116-87

Eye protection (goggles defined; type defined; visitors to lab must wear);
- GS 115C-166-168
- ANSI Z87.1-168

Eye wash (temperature of water; location; inspection; ten-second rule):
- ANSI Z358.1-1990