7-1 General.

A. Purpose.

This chapter outlines project development guidance and planning and design considerations for upgrading existing facilities. It also presents strategies for physical development, outlines preplanning decisions, and give guidance for siting and facility selection peculiar to projects that require the modernization and improvement of existing facilities for use by Army Service Schools.

B. Applicability.

This guidance will apply to a wide range of small-, medium-, and large-scale projects and should be used with the criteria and guidance for new construction contained in the preceding chapters. The guidance will typically apply to projects involving additions, alterations, conversions, or replacement of existing facilities. It will also apply to projects involving the relocation of existing facilities and be useful for planning projects requiring phased construction and overlaps in the design-build process. The guidance may also apply to alternative approaches for upgrading. These include: step-by-step total replacement projects; the acquisition or erection of specially designed portable or relocatable facilities; the addition, expansion, or conversion of existing facilities by building of new permanent facilities; or the lease/procurement of new or improved operations or office-type furniture and equipment. For example, a step-by-step total replacement approach might require functional activities to be temporarily relocated for a short time to unimproved but adequate facilities during each upgrading phase; for less extensive projects, gradual unobstructive improvement of facilities and equipment might be required while major functions continue to operate in the same place.

C. Factors Affecting Individual Projects.

When a project's constraints indicate the need to upgrade existing facilities, several administrative, budgetary, and construction factors must be considered. These include the condition of existing operations; type of existing construction; relative historic significance of existing structures; timing and character of modernization and improvement projects; appropriation for and funding level; approval procedures of relevant construction programs; and, at the local level, the budgetary priorities and scheduling constraints imposed by installation manpower and material resources limitations. For projects involving historic structures or districts, the guidelines in TM 5-801-1 should be followed.

D. Development of Project Options.

Modernization and improvement projects involve a wide range of design and construction constraints and opportunities; thus, the using service must first investigate and evaluate the suitability and effectiveness of many construction programs and upgrade alternatives. This assessment should be guided by pre-planning decisions that define the scope and magnitude of required improvements. These procedures, especially those concerned with pre-planning data and preliminary identification of improvement projects, can draw heavily on activities described in TRADOC Pamphlet 415-1.

7-2 Pre-Planning Decisions.

A. Basic Decisions.

The main objective of pre-planning decisions is to identify a strategy for physical development that will improve existing operations. The functional characteristics and physical condition of existing operations are the most influential factors. Thus, the requirements of these operations must first be estimated before selecting an approach. The following should be considered:

(1) The functional character of existing operations.

(2) The physical character of presently occupied space.

(3) The need for technical assistance in assessing potential for upgrade.

(4) The long-range desirability of project accomplishment.

(5) The availability of funds for project completion.

B. Functional Character of Existing Operations.

A pre-planning decision concerning whether upgrading is required usually depends on the functional character of current operations and how much the existing facilities limit their accomplishment. A review of the functional criteria given in preceding chapters should indicate how well the functional objectives of Army service schools are now being met. The using agency should make a simple but objective evaluation of current operations based on the project-specific functional and planning and design criteria and the general guidance contained in Chapters 2, 3, and 4. Functional characteristics of existing operations can be rated according to the procedures given below. The results will show, quantitatively, the level of operational effectiveness; when considered with factors that affect project urgency, they will reflect the need for upgrade relative to the operations' functional characteristics and physical condition.

(1) Rating Existing Operations.

Based on the planning criteria and functional objectives contained in Chapters 2, 3, and 4, a

quantitative rating of conformity to requirements should be developed for each functional activity. Low rating, nonconforming, or exceptional conditions must be documented as being below a prescribed standard. For example, the general characteristics and specific functions of current operations can be described in terms of their relative conformity on a sliding scale between 0 and 10, where 10 would show the highest rating of conformity and 0 would show nonconformity. However, where minimum standards are set by Army engineering and construction regulations, the minimum standard will be scaled at 5; 0 to 4 will be below standard and 6 to 10 above standard. Whole increments will be scaled at 10 percent above or below standard, 50 percent below standard will be zero (0), and 50 percent above will be ten (10). Specific features with performance standards should be rated. A general rating should be done for each functional indicator listed in Table 7-1.

(2) Format.
Table 7-2 shows a graphic format that can be used to apply the general method for rating existing operations. Using Table 7-1 as a guide, an aggregate rating can be achieved by applying the following qualifications to the rating for each indicator: fair, 6 or 5; poor, 4 or 3; and very poor, 2 or 1. The rating for each indicator listed in Table 7-1 is then multiplied by the number indicating importance immediately following the indicators. This number represents the relative importance of each characteristic in terms of overall operational effectiveness. The first three indicators have the most impact on Army service school operations, the second two are important for individual activities, and the last two are only generally important to overall operational effectiveness. Aggregate ratings will usually fall into the following categories: excellent ratings will be above 125, good ratings will be between 105 and 125; fair, between 75 and 105; poor, between 45 and 75; and very poor, below 45.

(3) Factors Affecting Project Urgency.
The project's urgency will depend on the scale and complexity of operations, the geographical field of operation, and the mission-peculiar requirements of each activity. However, such factors are not easily quantified; they must therefore be considered on a project-by-project basis. They should be evaluated with the rating of the indicators listed in Table 7-1 to properly determine a project's urgency. Ratings in Table 7-2 that show a low degree of conformity to functional and operational requirements should be given high priority for project accomplishment. In general, a conformity rating of below 4 for each indicator will usually be enough to show a need for considering urgent construction. When the individual rating of conformity for factors a, b, or c is 9 or less, accomplishment of the entire project should be considered urgent. Such projects will require immediate authorization under the proper military construction program. Field inspection indicates the need for some upgrading in almost all service schools. Even relatively small activities usually have special mission-peculiar requirements that are not met or that may need improvement. Generally, when low ratings are analyzed in terms of the physical character of facilities, the poor condition of existing temporary-type facilities will usually require an upgrade strategy involving either conversion of existing permanent facilities or construction of new facilities. Paragraph 7-2c below discusses the impact that the physical character of facilities has on choosing a proper upgrade strategy.

C. Physical Character of Facilities.
Table 7-3 shows upgrading potentials related to the physical character of facilities for nine hypothetical field conditions. The most important physical factor is the type of construction housing current operations. Where temporary construction is greatly deteriorated or deficient such that functional deficiencies are increased or cannot be corrected, complete relocation would be a proper physical development strategy. This might require either converting existing facilities or building new ones; in some cases, a combination of both might be needed. When the scale of operation is very large and the amount of converted space is less than half the total space required, totally new construction may be appropriate. Table 7-3 lists other construction classifications and existing conditions as alternate upgrading approaches. The appropriateness of each option will be determined by project requirements and by the extent and composition of individual functional activities requiring upgrade. In Table 7-3, the location of each example facility is considered to be either the most desirable or at least suitable in terms of maintaining effective service school operations.

D. Project Desirability.
Table 7-4 shows the comparative levels of project development required either to modernize and improve existing facilities or to build new facilities for Army service school operations having similar staff and space needs. The actual cost of new or improved facilities must be set according to procedures in AR 415-17. The desirability of individual rehabilitation/conversion projects will depend on factors affecting future needs, especially long-range physical development (see paragraph 7-3a below). In general, the initial estimate of the need for upgrade should be based on a review of an organization's existing and projected operations and functional objectives. Project desirability should be determined by the organizational and functional requirements given in Chapters 2, 3, and 4. The guidelines contained in Table 7-4 are for illustration only. Preliminary estimates should describe costs in

Functional Indicators	Weighted Value	Criteria Reference	Evaluation Procedure
Location	3	Refer to Chapter 2.	Evaluate the existing operational relationships to determine 1) wheter the functional and physical requirements related to the location of individual service schools have been observed, and 2) wheter the existing location allows for effective physical relationshps between Army service school operations and related functional activities.
Functional Activity Relationships	3	Refer to Chapter 4 for the general space organization principles and physical relationships requirements of individual activities.	The present organization of space should be evaluated to determine whether the proper functional relationahps exist.
Circulation	3	Refer to Chapters 2 and 4.	Evaluate existing operational relationships to determine whether the proper pattern of visitor/ staff circulation will allow maintenance of functional integrity within major activity zones.
Climate Control and Acoustic Isolation	2	Refer to Chapter 3 and to individual space criteria in Chapter 4.	Evaluate existing operations to determine whether the special environmental and climate control requirements of functional areas and individual activities are properly provided for.
Flexibility	2	Refer to specific guidance and criteria contained in Chapters 2 and 3.	Evaluate existing operations to determine whether present conditions conform to flexibility requirements. Conditions related to spatial environment, functional areas, partitions, support systems, and physical adaptability are the most significant factors affecting the flexibility of existing space. Conditions related to equipment, furnishings, and surface materials tend to have less impact on flexibility. In most instances movable objects can be readily adapted or changed; fixed elements present more lasting constraints on long-term operational effectiveness.
Special Construction	1	Refer to Chapters 3 and 4.	Evaluate existing operations to determine whether special construction features typically required by Army service schools conform to the functional standards for individual activities and the regulations governing the standard of operations.
General Design	1	Refer to Chapters 2, 3, and 4.	Evaluate existing operations to determine whether the minimum recommended standards for functionally effective design have been observed. Primary and support facilities should conform to the minimum design standards relative to the existing scale of operations.

Table 7-1
Characteristics of Existing Operations.

	Functional Indicator	Characteristics of Conformity: Excellent	Good	Fair	Poor	Very Poor	Importance Factor	Rating
a.	Locational Considerations	9					3	27
b.	Functional Activity Relationships				3		3	9
c.	circulation and Security		7				3	21
d.	Climate Control and Acoustic Isolation				3		2	6
e.	Flexibility and Adaptability				2		2	4
f.	Special Construction Considerations			5			1	5
g.	General Design Considerations				3		1	3
	A Aggregate Rating							75

Table 7-2
Example Rating of Existing Operations.

terms of the scope, complexity, and sophistication of upgrading requirements, including long-term and site improvements. Where the total project requirements estimate shows the need for expenditures above 50 percent of the cost of new construction, the feasibility of providing totally new facilities should be studied. Such studies should compare the anticipated short-, or intermediate- and long-term building and site upgrading costs. They should also compare the maintenance and operating cost of using existing facilities with the construction, maintenance, and operating costs of new construction.

(1) Feasibility of Large-Scale Upgrading.
Table 7-4 compares upgrading costs to new construction costs to illustrate the feasibility of large-scale upgrade in terms of space and staff requirements. These costs are related to the gross area requirements for totally rehabilitated or converted facilities. The three points shown on the graph represent four example designs in Chapter 6. Space needs for each example are based on the requirements for a full range of functional activities provided within optimum physical relationships. By using a factor of 50 percent for allowable upgrading costs, one can predict both the feasibility of individual upgrading projects, and the possibility or desirability that new construction will be an acceptable upgrade option. The reverse of this type of analysis might help the using service determine the size and scope of activities that could be reasonably allowed for by existing space. Normally, it will be helpful; however, the structure of some service schools

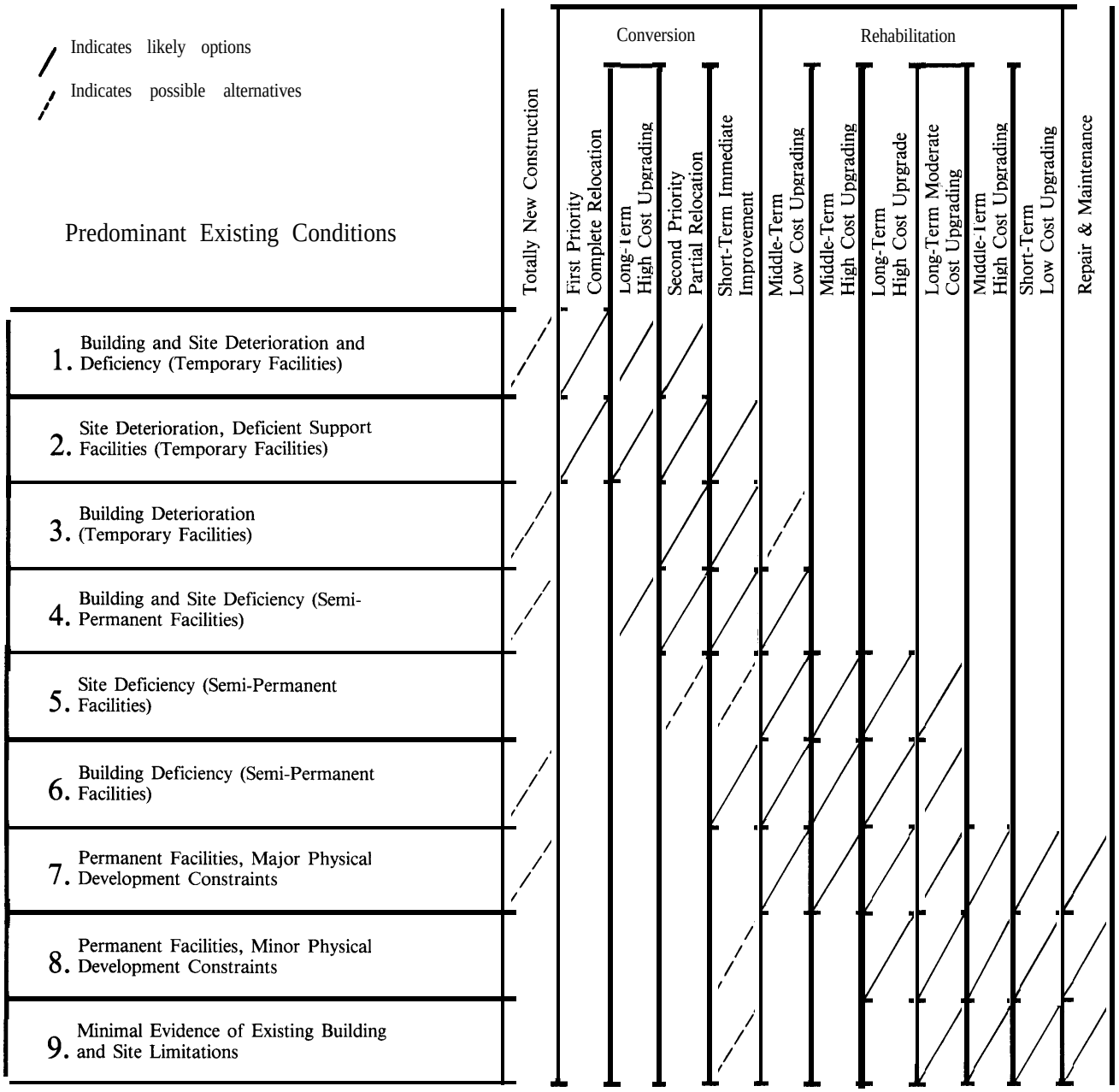


Table 7-3
Upgrading Potentials.

or activities and the physical constraints and opportunities that are unique to conditions of each site and building tend to lower the accuracy of this means of using the guidelines.

(2) Partial Upgrading.
The need for partial new construction can be determined on a zone basis by identifying a few vital upgrade needs. For example, a first analysis of the upgrade requirements estimate may show that the need for new facilities will be limited to instructional shops or that major reconstruction will be required only in the training administration areas. Here, the service should try to do this as part of a larger program for total rehabilitation or total replacement. The percentages of the project shown in the example space allocations contained in Table 7-5 should be used for guidance. In general, upgraded space should have space allocations similar to new construction. Again, where 50 percent of new construction costs are exceeded by typical rehabiliation/conversion approaches, totally new facilities should be provided.

(3) Alternatives to Total Replacement.
When the need for relocation is identified and conversion of existing facilities seems most appropriate, at least two different partial upgrade options should be fully developed and studied before the final choice.

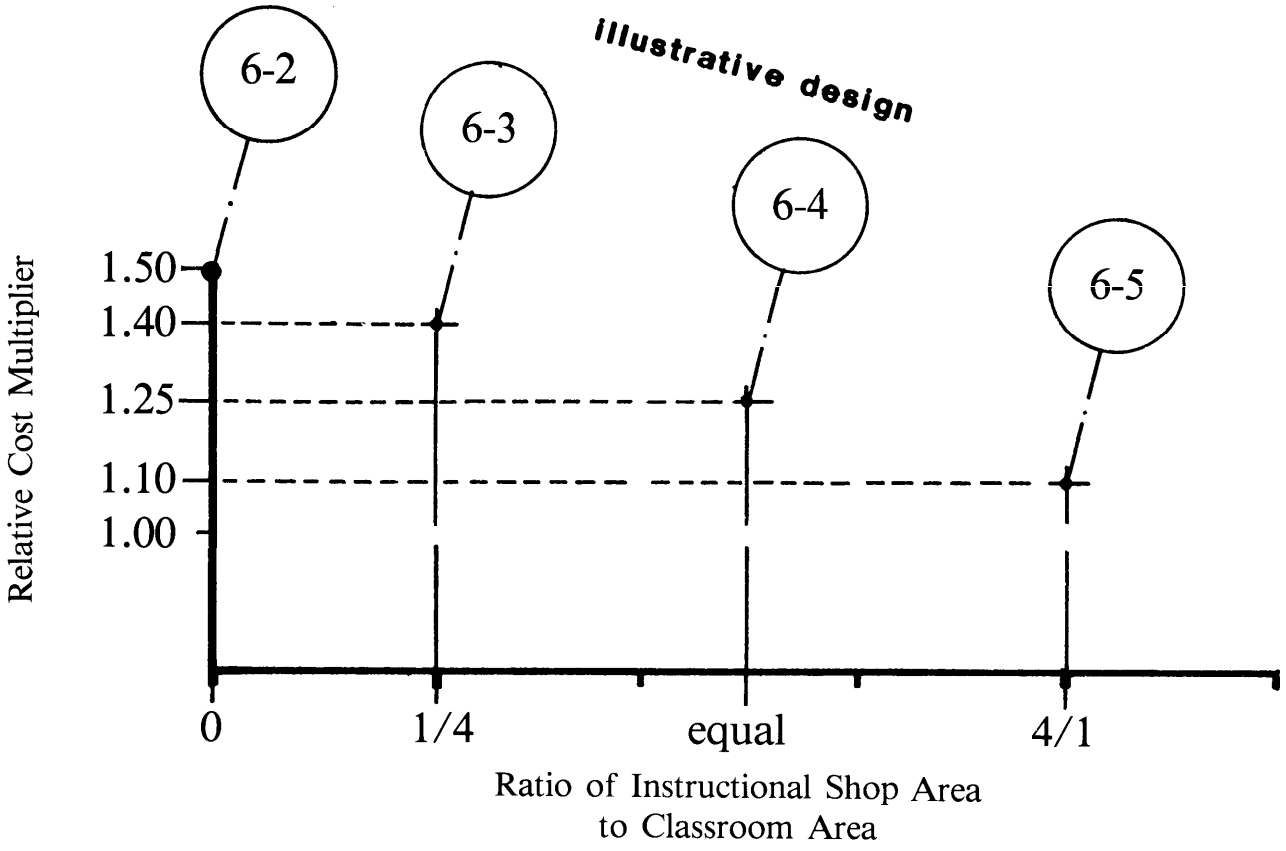


Table 7-4
Project Feasibility Guidelines.

Illustrative Design Ratio of instructional shop area to classroom area	6-2 30,000 sf 0	6-3 150,000 sf 1/4	6-4 150,000 sf 4/1	6-5 400,000 sf equal
Training Spaces	.81	.66	.81	.65
Training Support Spaces	.03	.06	.05	.03
Administration Spaces	.10	.17	.10	.25
Shared Spaces	.06	.11	.05	.07

Table 7-5
Example Space Allocations.

For example, one choice might emphasize interior changes in room layouts and circulation, and the other, exterior adjustments to building form. This should be done to evaluate the cost-effectiveness of upgrade options where the sites are similar or where location is not the major factor of the project's suitability. Options should consider expanding the inadequate space in buildings made mostly of substantial, permanent-type materials. Where there are enough options, converting spatially adequate but mechanically and structurally obsolete, temporary-type construction should not be considered. Where construction costs for an alternative to total replacement will exceed 50 percent of the cost of new construction, a third alternative must be considered: building a new facility. Also, where the square foot costs for partial upgrade, including relocations, exceed 50 percent of the square foot cost for a corresponding portion of new construction, the following should be considered:

a. The incremental development and ultimate replacement of existing facilities by building conventional, permanent facilities.

b. Acquisition of modular, pre-engineered facilities functioning concurrently with existing facilities as a short- or middle-term option.

E. Project Funding.
Completing upgrade projects depends largely on a careful rating of the various funding programs. Funds for constructing new facilities are typically authorized under and governed by major MCA programs and procedures. Funding for upgrade projects reflects a variety of characteristics connected with modernization and improvement projects. Funding limitations imposed by specific construction programs must be recognized when setting project priorities. There may be a large difference between actual upgrading requirements and the cost, type, and classification of modernization and improvement projects allowed under specific construction programs. Also, since the responsibility for approvals and the range of authorizations varies and since there are specific limitations to use of appropriated and nonappropriated funds, no single construction program or level and source of funding will always be acceptable for a given project objective. The following should guide project funding decisions:

(1) Program Limitations.
For small-scale upgrade projects, consider use of OMA funds authorized for maintenance and repair per local approval. This is very important where MCA program limitations severely limit funding resources or where certain physical limitations (a site or facility may not be available) may effectively reduce or prohibit carrying out some project objectives. Also, self-help improvement methods may be used for low-priority upgrading projects. Larger-scale projects with urgent requirements are usually given a high priority and would most likely be done under urgent minor MCA authorizations. In setting project priorities, it is important to note that use of urgent minor MCA funds requires a different approval procedure than OMA funding. It also has a higher authorization level; thus, most large-scale upgrade projects involving the existing facilities will be accomplished under minor MCA programs. This will allow the appropriate review of project requirements, and a final determination as to whether new construction might be more effective for achieving functional objectives.

(2) Program Characteristics.
A general review of the specific program characteristics in the AR 415 series (particularly ARs 415-15, 415-20, and 415-35), and the criteria in AR 420-10 governing maintenance and repair activities funding should be used to identify appropriate programs.

F. Technical Assistance.
When the using service must determine detailed mechanical and technical requirements, technical assistance will usually be sought from the local Facilities Engineer. The condition of existing mechanical, structural, and environmental systems may indicate a need for professional engineering assistance. This will usually involve preparing a preliminary evaluation of mechanical, structural, and environmental systems and the effect their physical conditions have on mission performance. This is very important for large operations and for those that foresee a need to greatly increase or improve present physical facilities over the long term. Sometimes, technical assistance may be needed to plan and design engineering systems accurately for substantial expansion of primary and support facilities. Extensive upgrade requirements, especially where new construction may be needed, will usually require specific technical expertise, such as mechanical engineering, structural engineering, site engineering, equipment and furnishing specification, or other specialized knowledge. Specific guidance follows on the main requirements for and sources of technical assistance.

(1) Principal Requirements.
Technical assistance is primarily required:

a. Where identifying functional requirements depends on accurately assessing the condition of mechanical, electrical, environmental, and structural systems.

b. Where complex cost factors must be identified and detailed estimates of long-range and life-cycle costs for building and site development must be accurate and reliable.

c. Where the need for extensive upgrading of environmental and mechanical services is already apparent.

d. Where cost estimates must indicate the extent that new facilities are competitive with the life-cycle costs and the potential use of newly modernized and improved facilities.

e. Where requirements for sophisticated technical, mechanical, and/or special operations-related equipment have been established, and procurement and installation schedules and standards are needed to assure proper use.

(2) Sources of Assistance.
The using service may ask for technical assistance from local installation planning, engineering, and construction services and from local communications-electronics personnel. Where local support is limited or not available, the using service may seek help from outside consultants. In all cases, the request for supportive technical or professional expertise should be processed by the installation DEH or by a Corps District Office.

7-3 Establishing Project Requirements.

A. Overview.
To properly establish modernization and improvement project requirements, the using service must consider specific programming, planning, and design factors that affect the physical development of existing facilities for use by service schools. As a minimum, this task should establish:

(1) The extent and character of upgrade needed for each functional activity.

(2) The appropriate building and site conditions relative to specific upgrade requirements.

(3) The impact on operations that might result from a specific sequence of upgrade actions or the particular priority assigned to project accomplishment.

B. Determining Individual Upgrading Needs.
The main planning decision that will influence selection of a proper construction program is determining the extent and character of individual upgrade requirements. In general, the extent of upgrade requirements is determined by organizing data gathered by analyzing existing conditions in terms of the short-, intermediate-, and long-range requirements of present or projected operations. How well facilities suit the needs of a service school activity at a given time should then be assessed. This can be done by comparing existing conditions and needs with the general functional and operational requirements and physical and environmental criteria contained here and in other relevant documents. Project location and existing primary and support facilities will largely decide upgrade options and needs.

(1) Project Location.
When the analysis of existing conditions or extent and character of upgrade requirements shows that operations should be relocated, specific site selection requirements related to project location must be set. New sites are usually determined by evaluating the impact of location factors on mission accomplishment. Thus, the using service should describe the most desirable location, stating the important factors to be considered in site selection. In preparing specific project location criteria, location factors that affect site selection should be arranged in two major categories.

a. Operational Environment.
The operational environment describes location factors to be considered when selecting which component areas or single activities will be included in the scope of upgrade needs. Future demand for and supply of essential support services provided either by a specific functional activity or by service schools operations in general influence components selection and the sequence of upgrade work. A description of operational factors affecting project location should indicate:

- The primary physical relationship to related functional activities.
- The main characteristics of adjacent activities.
- The main environmental characteristics of candidate sites.
- The functional characteristics of individual activities.
- The operational factors that significantly affect the physical requirements of existing operations.

b. Physical Environment.
A description of physical factors affecting project location should indicate:

- Accessibility.
- Circulation.
- Site features.
- Real property facilities.
- Surrounding land use and other man-made features.
- Site or building structures that might ease or obstruct upgrade.

(2) Primary and Support Facilities.
When an alternative site with primary and support facilities must satisfy functional requirements, the

Type	Requirements
Rehabilitation	Applicability: Upgrading facilities currently used for service school activities.
	Construction: Additions, expansions, extensions, and partial alteration, replacement, or relocation of existing facilities, and the permanent installation of equipment and facilities for functional purposes such as instructional shops or environmental and mechanical services, or for any other functional purposes requiring permanently installed equipment or facilities.
Minor Rehabilitation	Applicability: Minor rehabilitation is upgrading work that can be done in place.
	Construction: Surface treatments such as painting, lighting, or floor covering, furnishing or equipment, or the minor partitioning of space that requires no substantial alteration of primary building systems, constitute minor rehabilitation activities that could be done under local provisions for self-help projects.
Major Rehabilitation	Applicability: Major rehabilitation is upgrading work which involves the entire facility and requires extensive physical change. Major rehabilitation is the approach which should be considered when an analysis of existing conditions and an estimate of functional and operational requirements indicate that the total upgrading effort, considering long-term project accomplishment, will be cost-effective when compared to the costs of either converting or new construction.
	Construction: Major rehabilitation includes all activity described under the general type above. Depending on existing conditions, jaor rehabilitation may include either the temporary conversion of nondesignated facilities which are preferably adjacent or in close proximity to the currently occupied facilities undergoing physical and functional improvement, or the provision of temporary, relocatable, or portable buildings for required functional purposes within the time/use limitations of specific construction programs.
Conversion	Applicability: Conversion is the upgrading of an existing facility not presently used for functional purposes.
	Construction: Conversion includes construction activities similar to those referred to as appropriate for rehabilitation of existing facilities. The conversion alternative may involve the complete and permanent relocation of existing operations from one facility to another. It is usually required where adjacent facilities cannot be used with currently occupied space, and where contiguous physical and functional relationships must be maintained. The cost of conversion may be greater than rehabilitation-oriented construction and may exceed the 50 percent limiation relative to the cost of new construction. Both the cost and the availability of an appropriate alternative location for the permanent relocation of operations will be a determining factor choosing the conversion alternative. A study should be made of the feasibility of total new construction if dramatic changes can be anticipated after upgrading and, also, existing facilities present limitations on operational flexibility. Also, when alternate locations are not acceptable, the extended use of portable or relocatable facilities should be considered until the conversion of appropriate existing facilities is possible.
New Construction	Applicability: This alternate refers to either the total replacement of existing facilities with ground-up new construction or the partial replacement of existing facilities with the long-term view toward ultimate total replacement. New construction should be considered an appropriate upgrade option where cost-effectiveness and project feasibility studies show that it is economically and functionally more desirable than either conversion or rehabilitation of existing facilities.
	Construction: When considering the cost of construction, the 50 percent factor will be the main indicator of economic feasibility. While long-term functional and operational efficiency and the impact on mission effectiveness should govern the choice on a functional basis. This alternative includes: the conventional construction of permanent-type new facilities as an addition to or partial replacement of existing facilities, the construction or acquisition of modular-type facilities which are classified as semi-permanent or temporary construction and used for intermediate occupancy until either more adequate facilities or new construction funds are made available, the acquisition or lease of short-term relocatable or removable-type facilities such as pre-engineered or modular buildings, equipment, or mobile units. Urgent upgrading requirement for operations presently housed in deficient temporary facilities and having no immediate prospect of relocating to adequate existing facilities represent conditions where construction of totally new facilities would be most appropriate.
Conservation	Applicability: This approach generally refers to the repair and maintenance activities needed to conserve the effective condition of existing facilities.
	Construction: Conservation activities include minor self-help construction projects and the acquisition of furnishings and equipment that upgrade existing operations without requiring major adjustments in physical relationships or alterations to existing facilities.

Table 7-6
Potential Upgrading Alternatives.

Space Name	conservation	rehabilitiation	conversion	construction
Conference Classrooms	f/g	p/f	p/f	g/e
Laboratory Classrooms	f/g	p/f	p/f	g/e
Instructional Shops	p/f	p/f	p/f	g/e
Self-Paced Classrooms	f/g	f/g	f/g	p/f
Computer-Aided Instruction Classrooms	p/f	f/g	f/g	p/f
Seminar Classroom	f/g	f/g	f/g	p/f
Auditorium/Theater	f/g	f/g	p/f	g/e
Instructor Preparation	f/g	f/g	f/g	p/f
Instructor Rehearsal	f/g	f/g	f/g	g/e
Counseling Offices	f/g	f/g	f/g	p/f
Remedial Instruction	f/g	f/g	f/g	p/f
Technical Library	f/g	f/g	f/g	g/e
Study Areas	f/g	p/f	f/g	p/f
Projection Room	f/g	p/f	vp/p	vp/p
Administrative Offices	f/g	f/g	g/e	p/f
Conference Rooms	f/g	f/g	g/e	p/f
Student Lounge	f/g	f/g	g/e	p/f
Snack/Vending Rooms	f/g	p/f	vp/p	vp/p
Bookstore	f/g	p/f	vp/p	vp/p
Janitor	f/g	p/f	vp/p	vp/p
Storage	f/g	p/f	vp/p	vp/p

ratings:
e = excellent
g = good
f = fair
p = poor
vp = very poor

Table 7-7
Upgrading Requirements for
Individual Functional Activities.

facilities must be rated for their short-term, intermediate, and long-range potential to satisfy future physical development objectives. This is a primary requirement, since long-term operations continuity is essential to mission effectiveness. The site selection process should compare functional requirements to physical and operational factors like those described in paragraph 7-4a below.

(3) Potential Upgrading Alternatives.
Table 7-6 describes the main upgrade options that apply to modernizing and improving facilities for use by Army service schools. Used with Table 7-7, it provides guidance for determining the character of construction options. When combined with priorities set for project accomplishment, these options will determine the pre-design concepts and development strategies that satisfy the needs of selected functional activities. In general, identifying project priorities and setting pre-design concepts depend on consideration of the upgrade options described in Table 7-6.

(4) Individual Activity Requirements.
The specific type and number of activities that need upgrade will depend on how well they conform to essential functional requirements and minimum operating standards. The extent and character of upgrade needs for individual activities can be estimated with a method like the one for rating existing operations. Table 7-7 outlines the functional areas that may need improvement and the upgrading activities to be done. Following each functional activity are ratings of existing conditions which show the best upgrade option for a given field condition. In general, upgrade options depend both on a project's specific location constraints and on the condition of existing facilities.

C. Determining Building/Site Suitability.
For both buildings now occupied by service schools and those proposed as suitable for occupancy, the condition of existing buildings and sites affects both the accomplishment of project objectives and the provision of functional requirements. To properly decide the suitability of existing building/site conditions, the using service should evaluate each facility; they should then decide to what extent present conditions inhibit or enhance the short-, intermediate-, and long-term satisfaction of project objectives. See Sections 2-3 and 2-4 to determine the applicability of general functional and operational criteria to locational, building and site constraints, and project-specific requirements. In general, how well existing building/site conditions are suited to specific project requirements depends on the following factors:

(1) Building/Site Relationships.
The suitability of the location of facilities on a site depends on the physical development factors outlined in Table 7-8. The items show in Figure 7-1 give more guidance for determining building/site suitability.

(2) Building Size and Form.
The suitability of the building's size and form is very important to modernization and improvement projects. Since these characteristics must conform to the functional requirements of service school activities, a situation in which the building already conforms well will be most cost-effective. In general, the physical character and spatial pattern (height, length, and width) of existing spaces and the physical relationship needs of both individual functional activities and general functional areas (zones) must be considered together; this will allow the using service to determine how suitable a building's size and form are. The suitability of usable floor area and the number of floor levels will depend on the potential for satisfying the functional needs of a specific scale and intensity of operation. Thus, the suitability of building size will not be determined based on just gross area of aggregate space requirements as derived from generally applicable square-foot-per-person rations. The primary criterion must be functional effectiveness. Applying the functional space standards and principles of space organization in this guide will be important in determining suitability. Figures 7-2 and 7-3 show several physical constraints that should be considered in deciding the appropriateness of a building's size and form.

(3) Configuration of Existing Space.
In terms of allowing for functional needs of a particular scale of operation, the form of existing space will be a large factor in deciding the suitability of alternate facilities or sites. Thus, the physical characteristics and interior layout of existing buildings should be studied for their conformity to general space organization standards (see Chapter 4) and to specific operational needs. To properly access the relative value of space patterns in available structures, many possible layouts should be developed and studied to compare them to the size and form, interior partition layout, structural system, and circulation and fenestration pattern of an existing building. The examples of desirable field conditions provided in Figures 7-4, 7-5, and 7-6 show several space patterns and upgrade options. Table 7-9 lists concerns that should be used to determine appropriate space layouts.

Operational Characteristics

Requirements	References	Special Considerations
Each site should have the potential to satisfy: A. Specific operational needs. B. Proper physical and functional relationships, walking distances from Bachelor's Quarters, and cafeteria. C. Need for shared use of facilities (e.g., access road, parking, utility services), which will not interfere with essential functional requirements.	Chapter 2. Also see illustrative examples.	Consider existing and projected functional activities. Where existing facilities have or will have direct relationship to related activities, this will influence locational requirements of support facilities and site elements. If future operations require an increase greater than 50 percent of existing facilities, consider totally new construction.

Physical Characteristics

Requirements	References	Special Considerations
Each site should have; A. Potential to accomodate life cycle, usefulness, and utility requirements of current, and projected operations. B. Rectangular configurations; ample surrounding space for development. C. Site boundaries providing potential for future development not exceeding a 50 percent growth factor.	Chapter 2: Utility Support Criteria. Chapter 6: Requirement examples for different sizes of service schools.	Where configuration and space are inappropriate, there should be potential for expansion to adjacent sites for future adjustment. Avoid building and site shapes, topographical conditions, and site elevations which might inhibit provision and distribution of adequate mechanical utility services.

Table 7-8
Physical Development Factors.

Building Site Relationships

Requirements	References	Special Considerations
It must be possible to: A. Conform to established functional requireents. Building/site elements must be properly located and have adequate capacity to accommodate functional requirements. B. Provide proper building/site relationships. To potential for adequate site development must be apparent. C. Avoid potentially damaging or costly physical or climatological conditions. Over exposed facilities will have extensive HVAC maintenance, operations, and landscaping requirements. D. Provide unobstructed access for exapsion (pedestrian, vehicular) for two sides of existing facilities, so as not to limit future development options or impede accomplishment of separation of staff, visitor, and shop access essential to functional effectiveness.	Chapter 2: specific site development guidance	Where overexposure is already a constraint on operations, rehabilitation must provide protective landscaping to minimize operating costs. Extensive building perimeter caused by irregular building shape makes expansion of structural and mechanical systems difficult. Rocky and sloping sites also make expansion of relocation of existing utilities difficult and costly.

Adjacent Activities and Facilities

Requirements	References	Special Considerations
Consider functional character in terms of their relatedness to service school activities. Consider compatibility of physical and architectural characteristics of surrounding buildings with ultimate physical character of upgraded facilities. Consider building/site relationships on all sides in terms of access, site circulation requirements, and future development constraints and opportunities.		

Table 7-8 (Continued)
Physical Development Factors

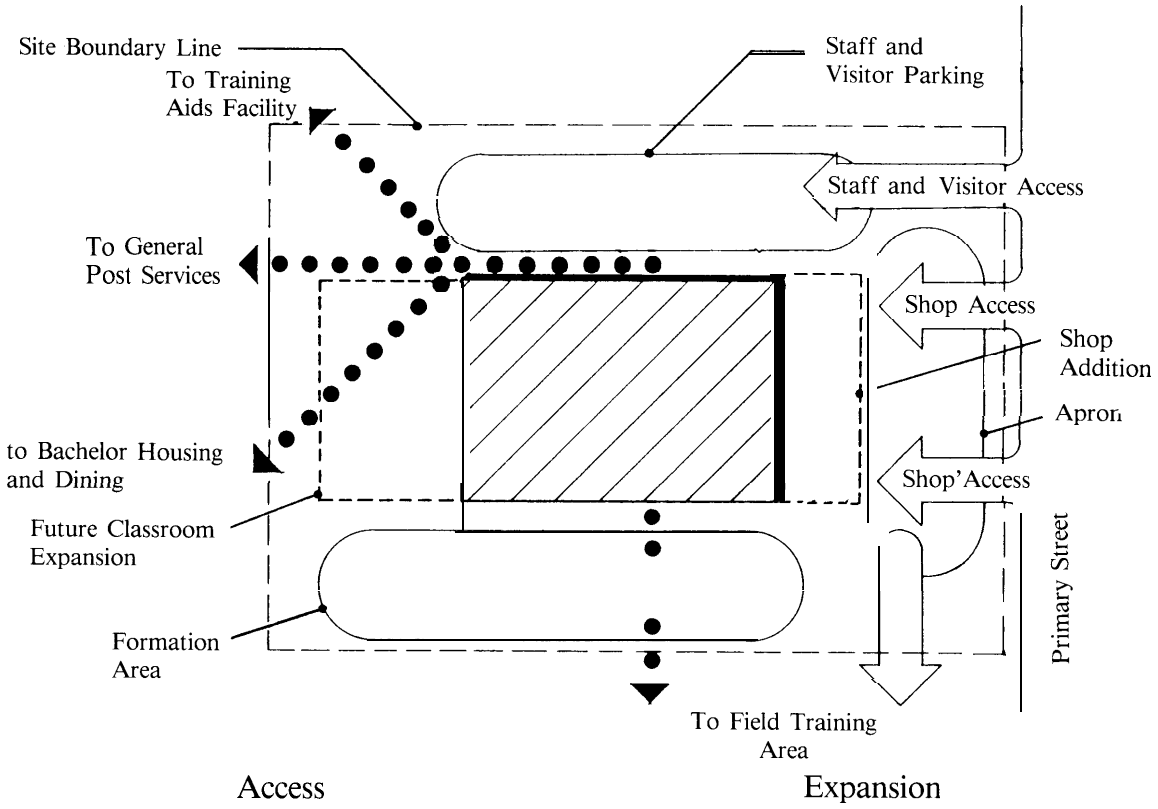


Figure 7-1
Typical Location Considerations.

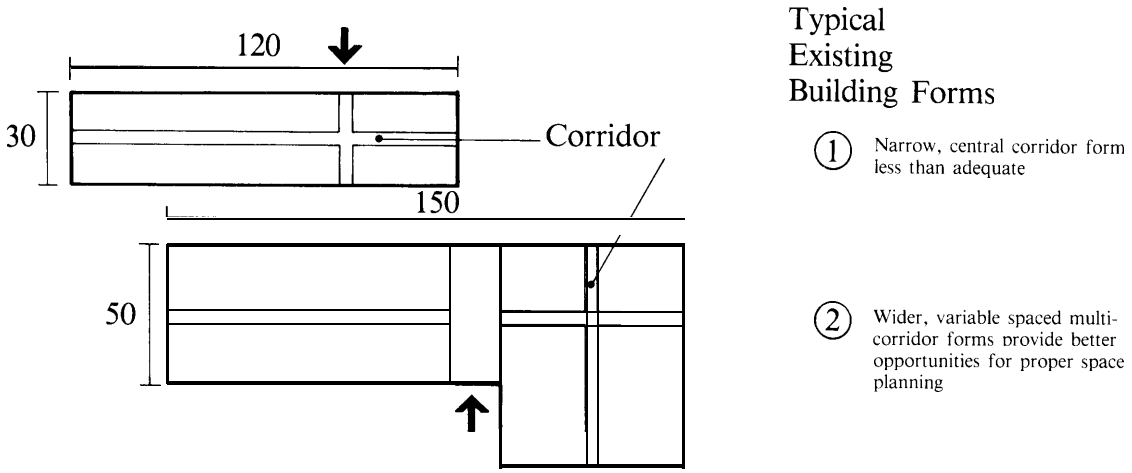


Figure 7-2
Typical Building Size and Form Considerations.

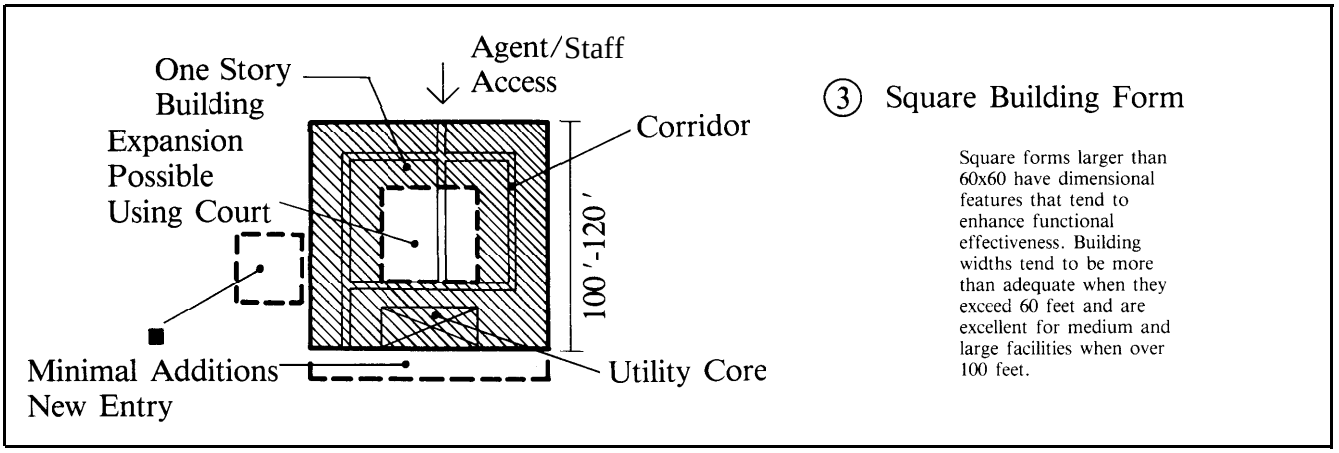


Figure 7-3
Square Building Size and Form Considerations.

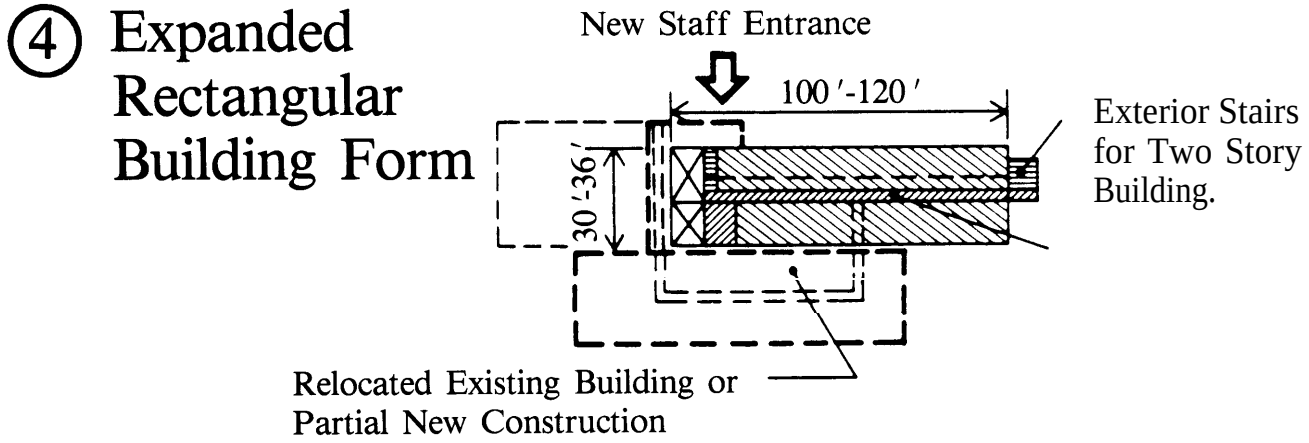


Figure 7-4
Expanded Building Size and Form Considerations.

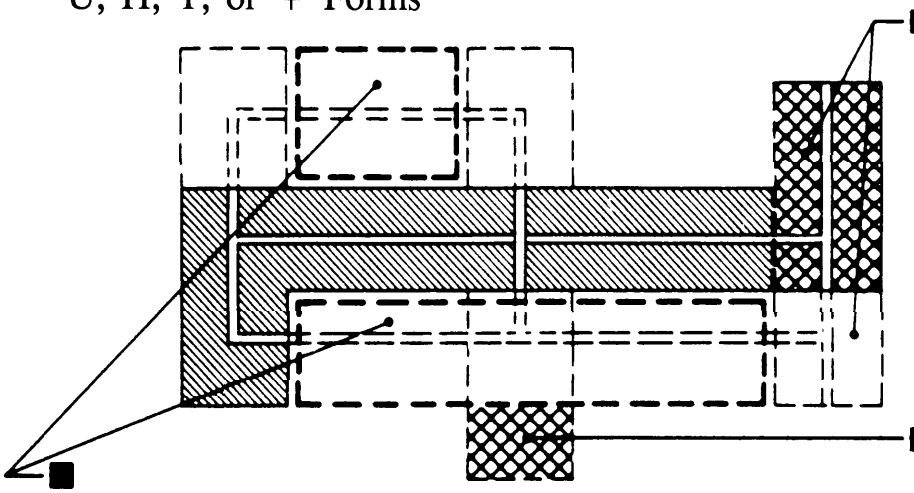
D. Desirable Building and Site Conditions.
Existing buildings that are not adequate are not viable candidates for upgrade. These buildings should be avoided unless there is potential for either relocating other existing facilities or providing new facilities by partial construction; in all cases, adaptability of the existing building form, adequacy of floor area, and suitability of space patterns to the functional needs of service school activities are the desirable traits. Simple building perimeters normally will present few, if any, problems in completing upgrade objectives. Thus, irregular shapes have been chosen for Figure 7-7 to show the more difficult conditions that should be avoided in deciding how suitable an existing building or site is for service school use.

7-4 Establishing Project Sequence.

A. General.
Project sequence refers to the step-by-step order in which facilities are changed or upgraded to the desired standard of operations. To decide the sequence of modernization and improvement work, the using service must consider the impact of relocation or rehabilitation on the overall effectiveness of service school operations. When identifying project requirements, the using service should also consider the actual physical constraints and opportunities imposed by various upgrade options. Here, the using service should indicate the immediate and short-term impact that various construction actions may have on the on-going daily operations of Army service schools. The

⑤ Expanded Irregular Building Form

U, H, T, or + Forms



■ Excess space not compatible with functional needs.

■ Existing space not functionally useful. Could be held for future use or removed.

■ In-fill of existing building form for additional space.

Figure 7-5
Expanded Irregular Building Size and Form Considerations

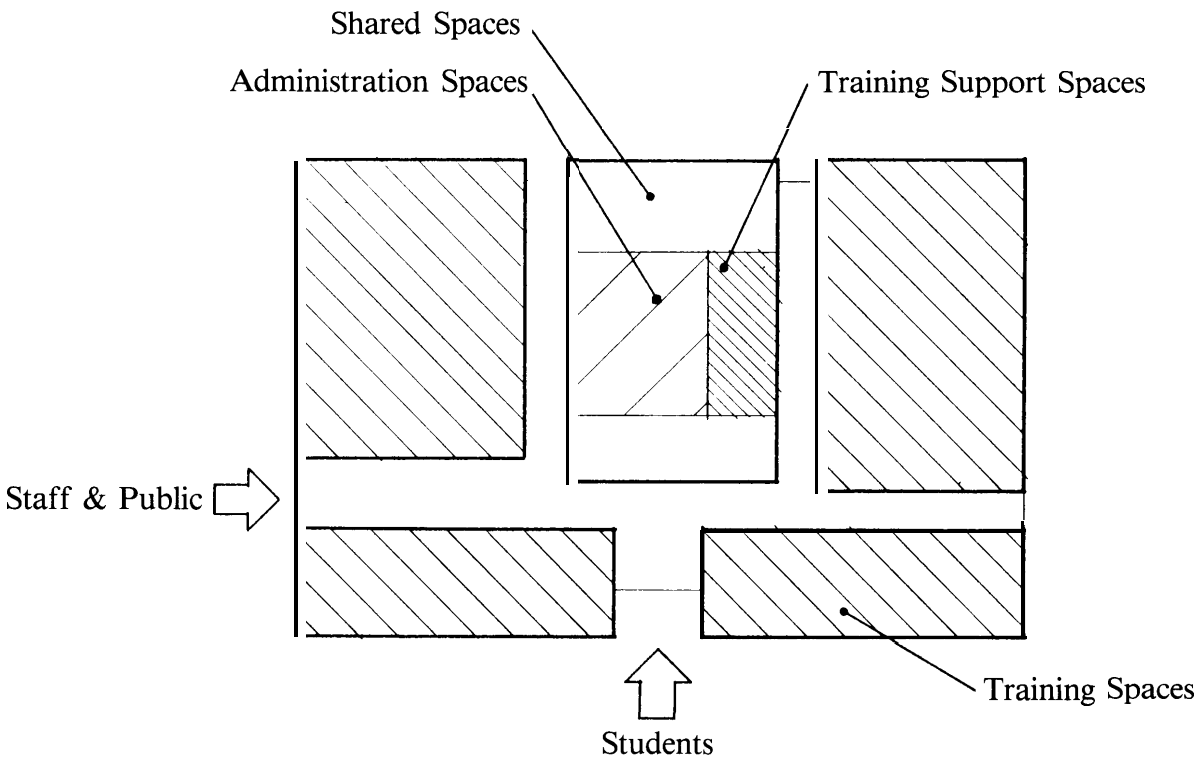


Figure 7-6
Desirable Space Configuration.

Items	Concerns
Space Adaptability	Physical characteristics which enhance cohesive nature of service school operations and administrative support spaces.
(a) Positive Opportunities	Simple building shape; building width-length between 50-100 ft., relatively open floor plan; circulation; access pattern which allows development of central corridor system.
(b) Negative Constraints	Building width under 30 ft.; limited access; off-set or irregular corridor; short structural spans
Mechanical - Structural	Most direct and effective means of distributing mechanical service; suitability; long-term usefulness
(a) Corridor Systems/ Perimeter Walls	Straight corridors, simple perimeter best suited to mechanical requirements
(b) Use of Existing System or Development of New Systems	Openness; need for incremental expansion; structural integrity; adequate ductwork and piping; capacity for supply of future electrical, plumbing services; technical assistance may be required here
Expansion	Future potential; adjustment, reorganization or relocation of relatively fixed position spaces, i.e., mechanical rooms, restrooms, instructional shops, and laboratory classrooms.
Space Partitions	Suitability ot project-specific requirements, compatibility with functional relationships and space requirements.
(a) Location	Avoidance of unnecessary impediments to expansion and flexibility.
(b) Large Open Spaces and Double Loaded Corridor	Less need for extensive interior renovation; reduction of construction costs
Circulation Patterns	Suitability
(a) Location	Future site and building access requirements
(b) Existing Interior Circulation Patterns, Location of Major and Mintor Corridor Systems	Relationship to major functional activities, to stairs, to visitor and staff entrances; separation of public, private, and confidential access
Outside Awareness	Visual privacy, natural light (location, potential usefulness, costs), direct fresh air
(a) Existing Features: skylights, exhaust fans, windows, skylighted artiums, perimeter ventilation, interior courts, new wall fenestration locations.	Compatibility with essential functional requirements
(b) Too Much Ouside Awareness	Difficulty in upgrading vs. buildings with little or no fenestration
(c) Small, Permanent type Warehouses, Service Buildings in Good Locations	Prime for upgrading for instructional shop areas
Interior Flexibility	Interior flexibility is enhanced by combining relatively stable interior functional spaces and support and buliding service areas and locating them in or near existing or proposed interior fixed partition spaces. Also, by consolidating entrances and stairs with existing or proposed mechanical equipment space, which is located on building perimeter, vertical supply shafts can be easily expanded to supply either new or relocated functional areas or future additions.
(a) Location of Fixed Partition Spaces: mechanical equipment space, toilets, stairs, major and minor entrances and corridors.	

Table 7-9
Space Layout Checklist.

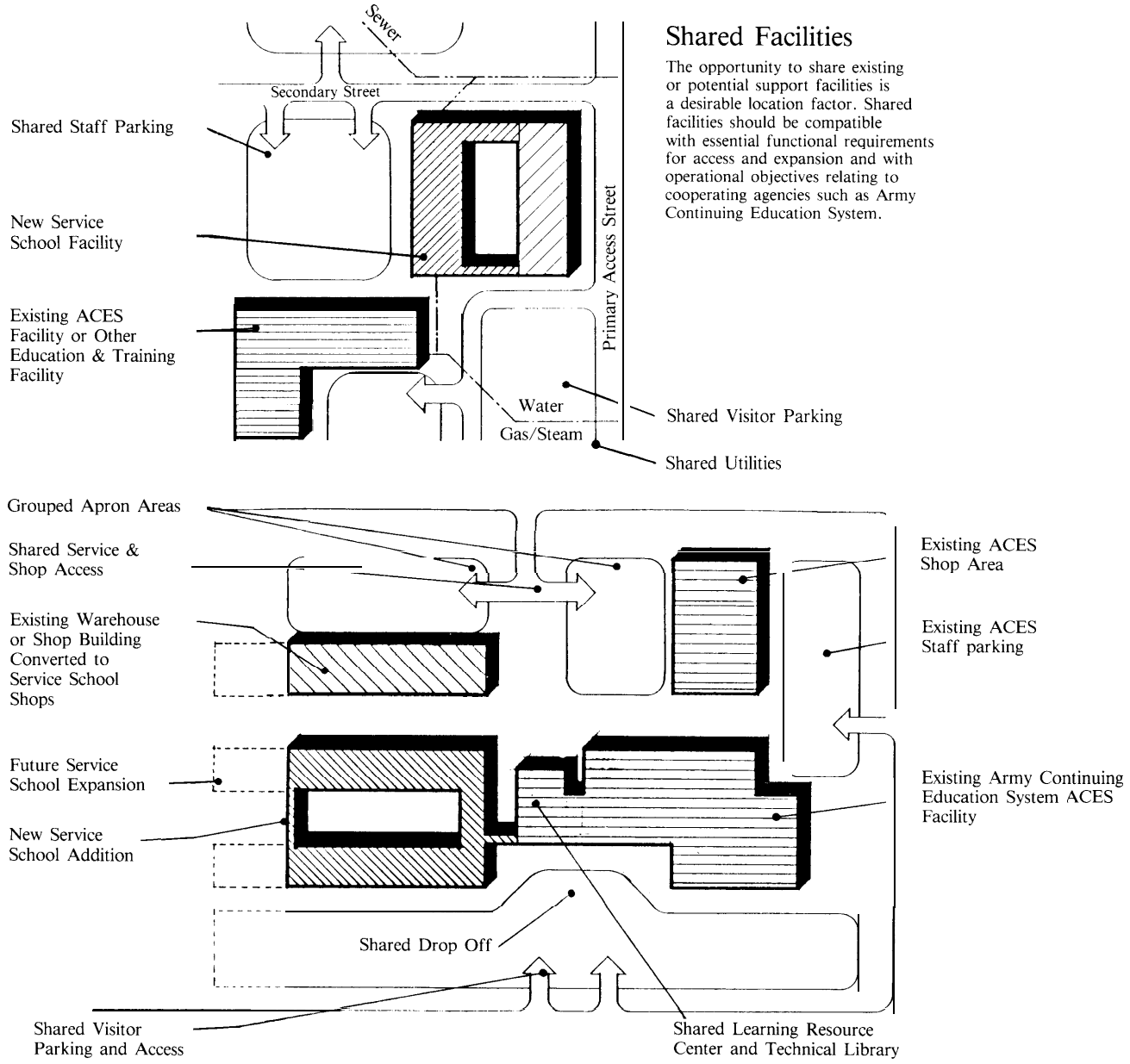


Figure 7-7
Building and Size Configuration.

space organization standards in Chapter 4 should be used with the following guidance to set up the proper sequence for upgrade.

B. Concurrent and Conflicting Improvements.
The impact of a predictable sequence of upgrade activities on daily operations will usually help produce a functionally effective space organization which fulfills both immediate and long-term functional needs. Interruptions caused by improving one or more activity areas may have a large negative impact on other, unchanged functions; the result is a general loss of effectiveness. To avoid these problems, relocation of on-going functions essential to effective operations should be considered as a first step where:

(1) Two or three concurrent upgrade activities may isolate or make ineffective a critical operation that does not need upgrade.

(2) The effectiveness of nearby or related activities can be decreased by extensive upgrade work, even though their present location properly relates them to either dependent or supervisory activities.

7-5 Special Design Guidance.

A. General.
The general planning and design criteria used to develop pre-design concepts for new Army service school facilities (Chapter 2) must be adjusted

somewhat to relate to the new projects. Sometimes, mechanical and technical criteria may require a local interpretation. If exceptions to criteria or requirements are needed, they should be identified before planning requirements are set. Exceptions to construction requirements that will improve or eliminate functional defects in an existing facility or site should be considered essential. Sometimes, exceptions may be needed to carry out long-range operational objectives.

B. Basic Guidance.
When fixing proper design concepts, avoid setting initial project constraints that might limit or impede the development of functionally effective facilities. For example, once a proper upgrade strategy is set up, such as either conversion or rehabilitation, avoid limiting design options. The proper combination of strategies and sequence of work for an upgrade option must be indicated. This is especially true where project or program limitations will require upgrade work to take place within a severely constrained time schedule. Here, project development guidance should include a well-defined set of step-by-step procedures for each upgrade option. These instructions might speed the design process by defining where specific upgrade options apply, such as conservation, partial renovation, and new construction, as well as conversion of unoccupied space. For example, step-by-step procedures might be needed for a physical development strategy that calls for expanding existing activities into adjacent found space by means of newly constructed intervening space. Such projects may require exceptions to specific construction criteria; for example, they might allow for planning new mechanical systems and utility services for substandard facilities which will not be upgraded immediately. They might also be needed for incremental development over an extended time for site requirements such as visitor and staff parking, vehicle and pedestrian access and circulation, and landscaping. Special design requirements for facility upgrade should be established only after the general design guidance and the criteria given below have been considered.

C. Special Design Procedure.
The using service is responsible for developing the specific background information, design guidance, and functional requirements needed to prepare pre-design concepts. Design procedures for rehabilitation/ conversion projects differ from those for building new facilities in that the using service has more flexibility in controlling how a project is done. However, this flexibility can be lost when design procedures do not provide for the full development of at least two or three alternative pre-design concepts for a given upgrade requirement. Technical help may be needed to develop such design options.

D. Pre-Design Concepts.
The following factors should be considered in developing pre-design concepts for modernization and improvement projects:

(1) Long-Range Upgrading Strategies.
The using service must always keep in mind that project limitations can endanger future expansion and flexibility. Such limitations relate mostly to short-term piecemeal authorizations for individual facility and site improvements. Also, budget limitations may inhibit the provision of project features that reflect the need for future long-term facility expansion. Cost increases for long-range projects and comprehensive planning must be considered as the main ways to avoid limiting future expansion and flexibility.

(2) Special Operational Relationships.
The physical development plans of these agencies often influence functional relationships to related activities such as Army Continuing Education System (ACES). For example, a relationship of a cooperative or supportive basis may lessen or prevent the need for certain upgrade programs, or may in effect determine the need for others. Opportunities to develop shared-use facilities or to provide functional help to certain activities should be identified before obsolete facilities are improved, especially where such opportunities may influence a facility's location.

(3) Exceptions to Construction Criteria.
Most project development procedures usually provide for exceptions to specific construction criteria. However, exceptions to generally applicable construction criteria or to local installation requirements for site planning and design should be sought only for projects whose main objective of achieving functional and operational effectiveness would otherwise be greatly threatened. In general, such exceptions will be made only after reviewing the merits of alternatives and the specific impact that adherence to governing standards would have on achieving essential project objectives.

7-6 Establishing Design Requirements.

A. Site Planning Considerations.
Project site planning requirements are established based on physical development objectives approved by the local using service. Generally, individual site planning requirements can be identified by a thorough survey of the existing conditions using project objectives and limitations as guidelines. However, basic project limitations may prevent the achievement of maximum site development standards. This is especially true of rehabilitation work on facilities occupied by service school activities. Location constraints usually prevent major changes to the layout of existing site elements.

separation. Increases in the minimum separation distance might be required where optimum locations are constrained by inappropriate or conflicting nearby activities that make the operational environment less effective.

(3) Visual Approach.
Persons approaching a service school facility by car normally view the building from an oncoming angle of 30 to 45 degrees, rather than from directly in front. This oblique view gives the proper advance identification needed for turning into the entrance drives. Thus, the location of existing or projected site elements such as parked cars, eye-level flowering trees, or groups of evergreen plantings that might obscure views of signs or activity indicators either should be avoided or removed. Also, groups of trees should be selectively thinned and pruned.

(4) Access.
Setting design requirements for access points will depend on the character and intensity of operations as fixed by pre-planning decisions and on the site-specific development opportunities identified during site selection. Generally, vehicle and pedestrian access to existing rehabilitated or converted facilities must reinforce functional objectives. Site planning and building orientation factors should determine the proper design, location, and sometimes, the relocation and redesign of such site elements as access roads, on-site drives, parking, and pedestrian walkways. Refer to Chapters 2 and 4 for guidance on developing specific site planning considerations for various types of access, such as public, private, staff, and service.

(5) Site Circulation Systems and Parking.
Existing or redeveloped site conditions should allow safe, convenient pedestrian and vehicle circulation. Existing or redeveloped parking systems should clearly distinguish between various types of groups and individuals who might use the existing or converted facility. Desirable layouts of existing roads, parking, and walkways should be adopted only where they are consistent with fixed requirements for security and efficient operation and where they avoid locations directly over underground utilities. Redesign of pedestrian and vehicle circulation systems should conform to the guidelines in DA Architectural and Engineering Instructions (AEI) Design Criteria, TM 5-803-5, and TM 5-822-2. Specific site circulation criteria in Chapter 2 offer more guidance.

C. Landscape Planting.
The importance of landscape planting depends mainly on a site's physical characteristics and on the needs of each rehabilitation/conversion project. Budget limitations and priorities for physically upgrading a site will also influence the importance landscape planting has in project development. In all cases, however, landscape planting should be considered as a positive, effective, and sometimes essential way to accomplish functional and operating objectives. For example, the use of landscape planting is often an effective way to reduce heating and cooling requirements as well as related facility operating costs. Many landscape planting techniques can increase overall attractiveness and design image while providing confidential screening, weather protection, and sun-screening. The relative attractiveness of site access points, building approaches, and entrances to existing facilities usually influences appreciation and respect for the services provided within.

D. Site Lighting.
Existing sites and facilities may not provide for or conform to even the minimum site lighting requirements needed for physical security and operational effectiveness. Provision of adequate lighting for operations areas must be a high priority in rehabilitation/conversion projects. Generally, provisions for site lighting will depend both on the scope and extent of requirements for site and facility upgrade and on the level of sophistication allowed by project authorizations. Such provisions should conform to criteria given in Chapter 2.

E. Site Signage.
Upgrade of existing facilities can be improved by use of site signage. Where rehabilitation/conversion projects are mostly concerned with upgrading presently occupied space, site signage can greatly increase the control and separation of visitor traffic without major effort. Site signage and picto-graphic symbols should always be coordinated with interior signage systems for design and information consistency. Chapter 2 gives general criteria for site signage that may apply to rehabilitation/conversion projects.

F. Site Furniture and Equipment.
Rehabilitation/conversion projects will usually require two categories of site elements: site furniture and site equipment. Typically, these site elements are used to assist or increase the operational effectiveness of functional activities. Site equipment is an outside operational requirement that must be provided for where specifically identified. It includes: transformers, electric poles, mechanical vaults, various types of service school operational equipment, and utility meters. Items such as bollards, curb markers, relocatable signs, and other outside functional elements are considered site furniture. While there may be essential requirements for certain items in both categories, provision of site furniture for rehabilitation/conversion projects will be subject to a specific program's overall limitations and priorities. Initial site furniture requirements can be minimized by

Accounting for such constraints and limitations, every effort must be made to achieve the highest possible standard in improving site planning. Site elements which usually require improvement include major points of vehicle and pedestrian access, site circulation, and major overhead and underground utility lines.

B. Site Elements.
Figure 7-8 shows several areas of a site which need improvement, but on which little development should occur. The following site elements are important for the open space they represent:

(1) Easements.
Depending on the specific expansion and flexibility requirements related to individual rehabilitation/ conversion projects, the design and development of site elements which provide easement or dedicated areas should generally reflect the need for future building or site expansion. Existing landscaping or new site planning identified as a project requirement should not unduly obstruct the future development of dedicated areas. Easement should provide accent and interest. This can be done by planting low to medium shrubs next to either new or existing walk areas. Possible expansion of existing or future facilities may require relocating existing shrubs.

(2) **Buffer Zones.**
The general area next to the project boundaries should be designated as unavailable for construction. Buffer zones or setbacks are important site planning provisions that allow proper breathing room and separate an existing facility from adjacent uses. Preferred distances for rehabilitation/conversion projects should be as large as needed; they should consider the proximity of existing trees or other plants. Roadways and parking areas should be at least 20 feet from project boundaries. Single-story structures should be at lest 60 feet apart. Two-story structures should be at least 80 feet apart. Where one- or two-story structures are adjacent, they should be at least 70 feet apart. These minimum dimensions should be observed where functional requirements do not mandate greater

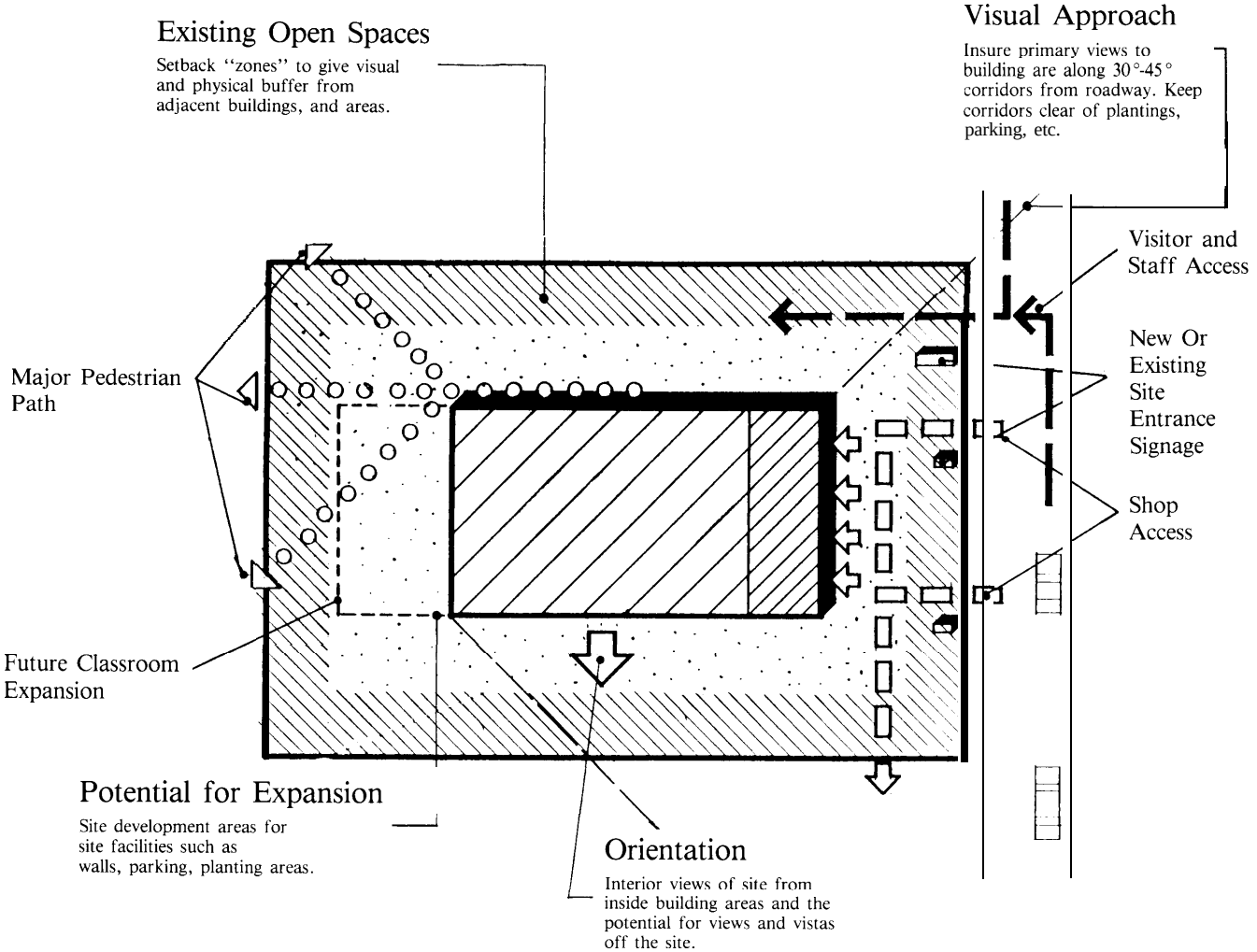


Figure 7-8
Site Elements.

re-using existing features or by using surface techniques such as pavement painting or changes in surface or ground material. This type of minimal requirement will generally occur where later upgrade will provide new site furniture. Provision of site furniture should be coordinated with other visually identifiable site elements. Project limitations may preclude acquiring new site furniture or require that existing items, which are adequate and otherwise meet basic functional requirements, be retained and upgraded. Where new and existing site furniture and equipment are combined, coordination of surface, color, and shape is important to establish a harmonious group of site elements. The scale and aesthetics of site furniture should be related to the materials, forms, and details used to upgrade the building.

G. Existing Utility support.
Existing site utilities should be able to support current and projected operational requirements. Local Facilities Engineering personnel will help the using service determine the site suitability of utility support. For the first estimate, the utility inventory report in the Installation Yearly Real Property Survey for a specific site for facility will be a reliable source of information. More utility support may be needed when preliminary estimates of building requirements are compared with available utility support. Probable requirements can be derived from the mechanical and utility requirements presented in the example designs in Chapter 6. Estimates of requirements for an entire service school facility should consider local variations in the design assumptions relative to orientation, climate, and the engineering value of various construction materials. Partial requirements for rehabilitation/conversion projects can be determined by factoring in the proportion of new construction requirements for upgrade. Where utility support is very inadequate, engineering studies will be needed to determine the magnitude of additional requirements. This is especially important if, all other factors considered, the site is still the best choice for service school activities. The main objective of such engineering studies should be to isolate the mechanical and utility needs directly associated with limited upgrading to compare costs. Engineering studies should also show the best way to provide the new mechanical and utility services. Utility support should always be provided so that future upgrade and expansion will not use obsolete utility systems or impair the effectiveness of adequate ones.

H. Relocation of Existing Support Facilities.
Locations of adequate utility and support facilities should not interfere with carrying out of rehabilitation/conversion objectives or providing essential building/site elements. Where the current location of utilities, roads, drives, sidewalks, paved terraces, or other support facilities would prohibit operational efficiency and the accomplishment of basic functional objectives, they should be relocated. Siting of relocated facilities should be shown on the rehabilitation/conversion site plan and should comply with currently accepted standards for support facilities.

I. Redesigning Existing Facilities.
Existing nondesignated facilities generally have an established architectural character, although it may not be appropriate to the architectural and functional requirements of service school activities. Specific functional requirements will be used to determine how inadequate a facility's design or space arrangement is. Specific functional requirements will also be used to determine the scope of required redesign and will influence the order in which the steps in the rehabilitation/conversion process are done. Environmental and interior design considerations, individual space criteria, and space organization rules should be evaluated to decide the specific redesign recommendations and work sequence in rehabilitation/conversion projects. The general design requirements for new construction in Chapters 3 and 4 offer more guidance for setting specific upgrade requirements.

J. Typical Field Application of Designs.
The description of typical field conditions in this chapter, and the example designs for new construction in Chapter 6 provide general planning and design guidance for rehabilitation/conversion projects. Functional requirements for a given scale of operations remain comparable, despite the physical conditions and facilities for which they were developed. However, the direct or exclusive use of example requirements alone will not adequately justify project-specific requirements. The general design guidance for new construction and the examples of new construction requirements will be the main source for project justification only when they are adapted to the requirements of existing conditions and used with appropriate upgrade options. The upgrading of existing facilities must always respond to the physical character, the planning and design constraints, and the limitations of each project. Upgrading may respond to needs in ways that reflect a more individual approach to physical development than is desirable for new construction; however, it should produce the same high standard of design.