

5.9 Family Housing Visual Zone

5.9.1 Visual Character

Fort Lee's woodlands, rolling hills, and stream valleys create a rich natural setting for family housing areas and provide buffers that insulate these areas from surrounding land uses. The edge of the forest is a valuable amenity when housing is placed along it. The general quality of the housing units themselves is good, and the recent addition of wooden fences represents a good approach to screening outdoor storage, patios and mechanical equipment. However, often the air conditioning compressors are unscreened by landscaping or fencing and, therefore, detract from the image of the house entries.

In a few locations on-street parking creates visual clutter and an appearance of expansive paving without relief from landscaping. These areas, particularly at Yorktown Drive, should be reorganized to separate the parking from the roadway and provide landscaping to screen the parking and create visual divisions within the larger area. Coordinated fencing of appropriate scale should be used to screen air conditioning equipment, mechanical access doorways, and provide screening for patio areas.

Family Housing Visual Zone Analysis

5.9.2.1 Main Entrance

- 1** The main entrances to the central housing areas are via north and southbound Sisisky Boulevard and westbound Battle Drive.
- 2** The main entrance to the Jackson Circle housing is from Route 36.

5.9.2.2 Circulation

- 3** Circulation within the central housing area is via a network of interconnecting streets and numerous cul-de-sacs.
- 4** Circulation in Jackson Circle is via a single loop road which has two short cul-de-sacs.

5.9.2.3 Focal Points

- 5** The central housing area has a single focal point which is the chapel at the corner of Sisisky Boulevard and Battle Drive.

5.9.2.4 Open Space

- 6** The central housing area is surrounded by the Open Space and Field Training visual zone which provides a deep woods backdrop to the neighborhoods.
- 7** The central area also has a recreational open space at the center of the group of neighborhoods. This area includes outdoor recreational activities as well as a daycare center and youth center.
- 8** Jackson Circle housing had a central open space that the houses on the inside of the loop road back up to. Houses on the outside of the road backup to the surrounding Open Space and Field Training visual zone.

5.9.2.5 Buffer

9 The central housing area neighborhoods are well-buffered from Sisisky Boulevard by a wide planted area along the sides and a wooded fence behind the houses.

10 The Jackson Circle neighborhood is minimally buffered from Route 36 by trees and an iron fence.

5.9.2.6 Primary Road

11 The primary roads within the central housing area are Sisisky Boulevard. and Battle Drive.

12 The primary road in the Jackson Circle area is Jackson Circle.

5.9.2.7 Secondary Road

13 Yorktown Drive is the secondary road in the central housing area that connects between and across Sisisky Boulevard and Battle Drive.

5.9.2.8 Significant Vegetation

14 The older neighborhoods in the central housing area have many individual mature trees, street trees and groups of trees that give a generally wooded impression.

15 The newer neighborhoods in the central housing area have many young, recently planted trees along streets and in open spaces between and behind the houses.

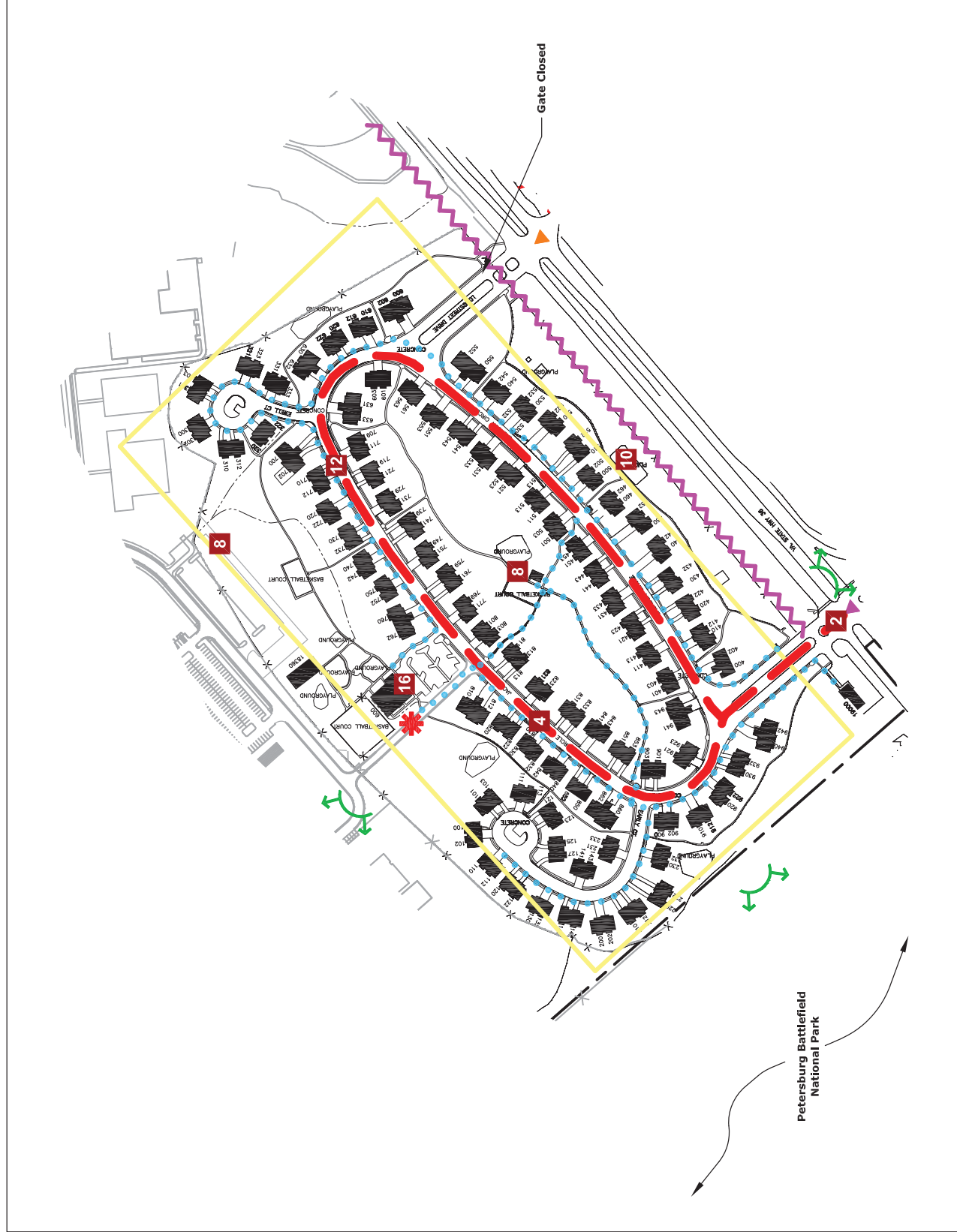
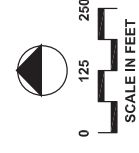
16 The Jackson Circle housing area has some mature trees and some younger trees that are beginning to produce some shade and visual effect.

5.9.2.9 Good Views

17 The central housing area has a number of views within the neighborhoods which give a very good impression of living there.



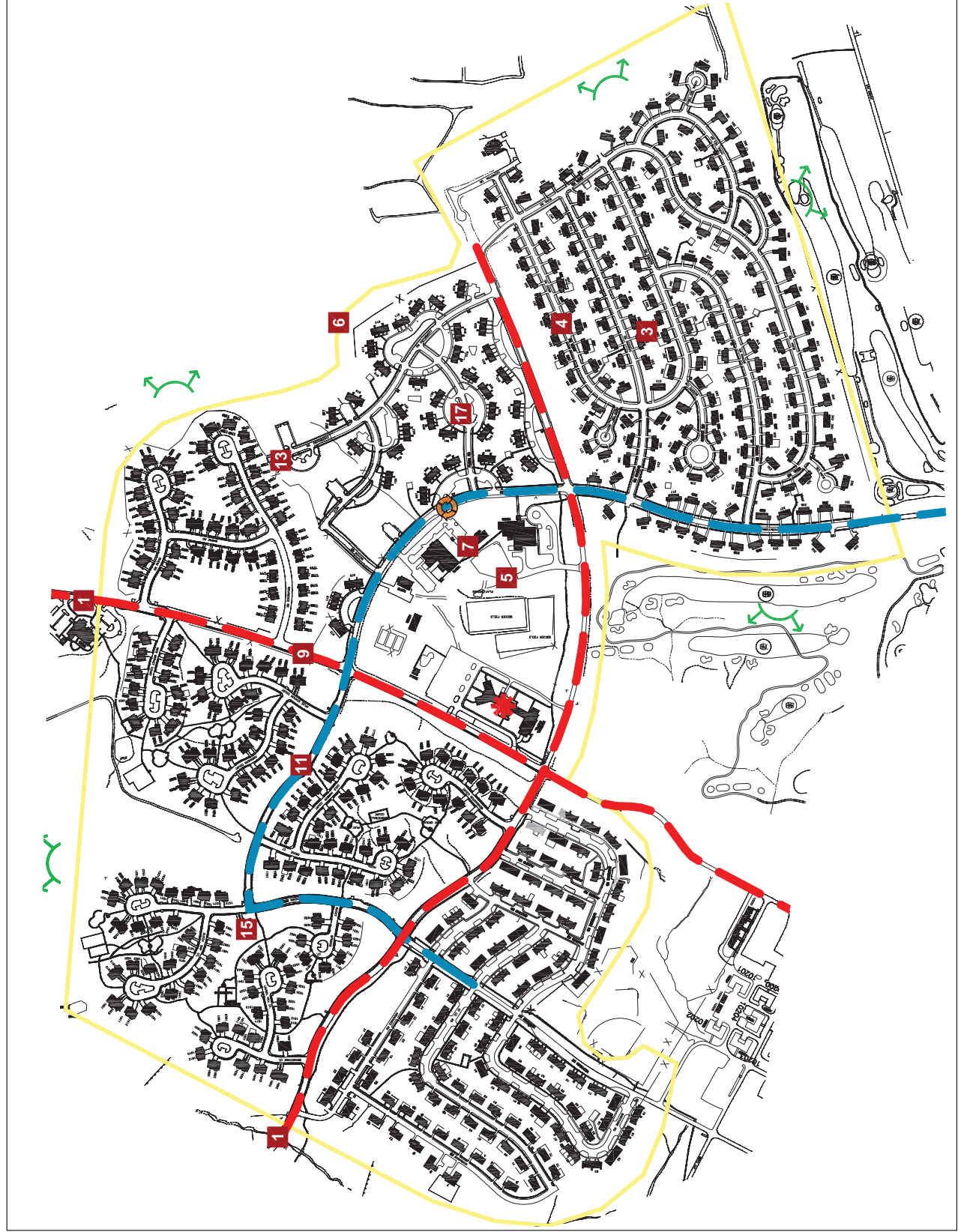
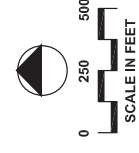
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5.9.3 Assets

5.9.3.1 Site Planning

- Rolling hills and forested areas provide rich natural setting for housing areas (Fig. 5.61).

5.9.3.2 Buildings

- The new Harrison Villa residences have a high quality appearance (Fig. 5.62).

5.9.3.3 Circulation

- Circulation in the central housing areas is efficient and convenient to arrive and depart.

5.9.3.4 Plant Material

- Many mature trees grow in and around the central housing area (Fig. 5.63).

5.9.3.5 Site Elements

- There are many useful and attractive site elements in the central housing area open space and recreation complex (Fig. 5.64).

5.9.3.6 Force Protection

- Follow AT/FP standard recommended force protection in this area.



Fig. 5.61 - Road and homes fit the natural topography.



Fig. 5.62 - Harrison Villa residences.



Fig. 5.63 - There is abundant shade in the Monroe Manor area.



Fig. 5.64 - Bus shelters are conveniently located in the family housing neighborhoods.

5.9.4 Liabilities

5.9.4.1 Site Planning

- The Jackson Circle housing area is isolated from the rest of the cantonment area (Fig. 5.65).

5.9.4.2 Buildings

- The older housing in the central housing area is predominantly lacking in architectural appeal.

5.9.4.3 The Shoppette at Lee Avenue and Route 36 needs façade improvements (Fig. 5.66).

5.9.4.4 Circulation

- The relationship between the street and parking at some residences causes congested streets and an apparent overabundance of cars (Fig. 5.67).
- Circulation in the Jackson Circle is complicated by the need to wait for a traffic light at the entrance to Route 36.

5.9.4.5 Plant Material

- Much of the landscaping in the older neighborhoods is past its prime.

5.9.4.6 Site Elements

- The lack of screening of mechanical equipment and personal storage gives some areas a cluttered appearance (Fig. 5.68).

5.9.4.7 Force Protection

- Follow AT/FP standard recommended force protection in this area.



Fig. 5.65 - Typical duplex housing in the Madison Park neighborhood.



Fig. 5.66 - The Shoppette lacks the appeal of a contemporary retail establishment.

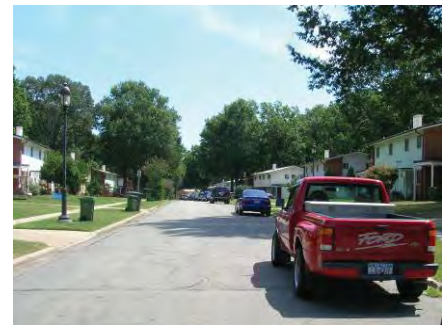


Fig. 5.67 - On-street parking dominates the landscape in Monroe



Fig. 5.68 - The duplexes at Madison Park all have heat pumps right at the front entrances.

5.9.5 Family Housing Visual Zone Recommendations

Note: Item numbers correspond to the locations of the recommendations on Map Fig. 5.20.

5.9.5.1 Site Planning

- 1** Redevelop the older neighborhoods as planned to include more open space and pedestrian access.

5.9.5.2 Buildings

- 2** Replace the existing housing with newer styles such as that used in Harrison Villa.

5.9.5.3 Circulation

- 3** Plan the streets and parking areas so there is less on-street parking.

5.9.5.4 Plant Material

- 4** Improve individual identity to rear patio areas with hedges and other landscaping.

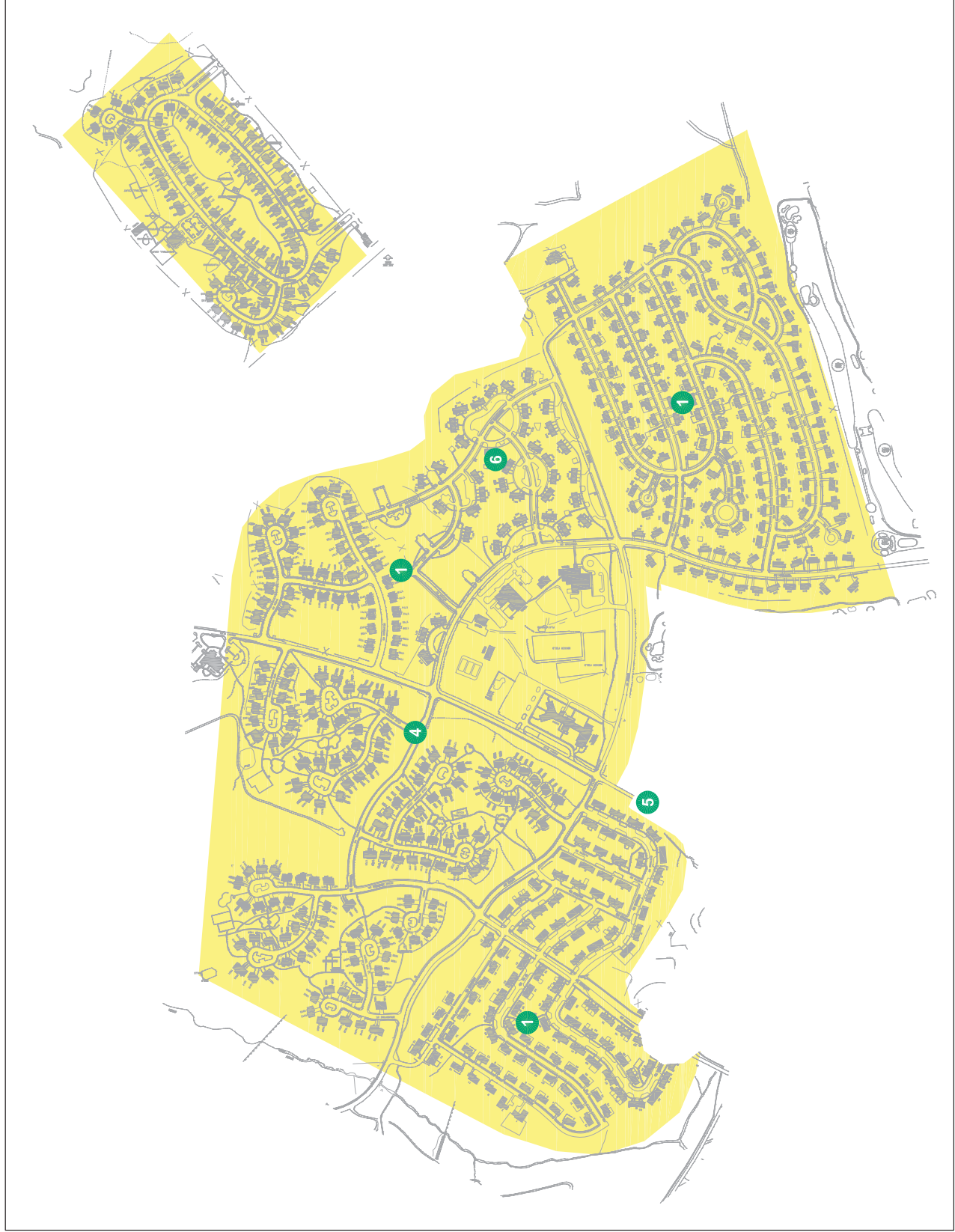
5.9.5.5 Site Elements

- 5** Replace highway type low pressure sodium street lights with residential scale standards throughout housing neighborhoods.
- 6** Provide plantings or low wooden fence to screen view of air compressor units located at front of individual units.

5.9.5.6 Force Protection

- Follow AT/FP standard recommended force protection in this area

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5.10 Open Space and Field Training Visual Zone

5.10.1 Visual Character

Woodland areas surround and run throughout Fort Lee creating a natural setting for field training and separating various areas of the post installation. The woodlands are one of Fort Lee's most valuable visual assets and are managed to protect and enhance their natural forest image. Occasionally areas of woodland must be harvested. These cleared areas should be restricted to locations out of view from the main roadways and other active areas of the post. The edge of the forest should appear to be natural with a diversity of species and understory growth.

Pathways used for troop movements should be paved and well drained. A system of storm water management should be developed to minimize soil erosion caused by run-off from other developed areas of the post. Finally, areas for outdoor group instruction should be carefully located and designed to best support that activity, with consideration given to wind protection, sun orientation and other microclimatic conditions.

5.10.2 Open Space and Field Training Visual Zone Analysis

5.10.2.1 Main Entrance

- 1** There are many points of access to this zone but the golf course and the troop crossing on VA Route 36 are where the greatest number of users enters the zone.

5.10.2.2 Circulation

- 2** Visitors to the open spaces at Fort Lee generally have tertiary roads and trails on which to move.
- 3** The largest capacity parking lots are at the golf course and the recreation complex.

5.10.2.3 Focal Points

- 4** The most visible unit in the open space system is the golf course.
- 5** Bailey Creek and its tributaries and Blackwater Swamp are the main natural features in the zone.

5.10.2.4 Open Space

- 6** Most of the open space at Fort Lee is wooded but there are openings of all sizes where wildlife is most apparent.

5.10.2.5 Buffer

- 7** The open space is large enough in most places to effectively buffer against intrusion from adjacent land uses.

5.10.2.6 Primary Road

- 8** Sisisky Boulevard and Adams Avenue are the primary roads that pass through the open space zone.

5.10.2.7 Secondary Road

- 9** Byrd Avenue and Lee Avenue are the secondary roads of this zone.
- 10** Lee Avenue runs north-south intersect Byrd Avenue and Sisisky Boulevard.

5.10.2.8 Significant Vegetation

- 11** A variety of forest types occupy most of the open space zone except where clearings exist for various land uses such as the Petroleum School.
- 12** The golf course and recreation complex are the largest areas of grassland in the open space zone.

5.10.2.9 Good Views

- 13** Views across the golf course in most directions are picturesque.
- 14** Views along Bailey Creek are intimate and serene, and provide good opportunities for viewing wildlife.

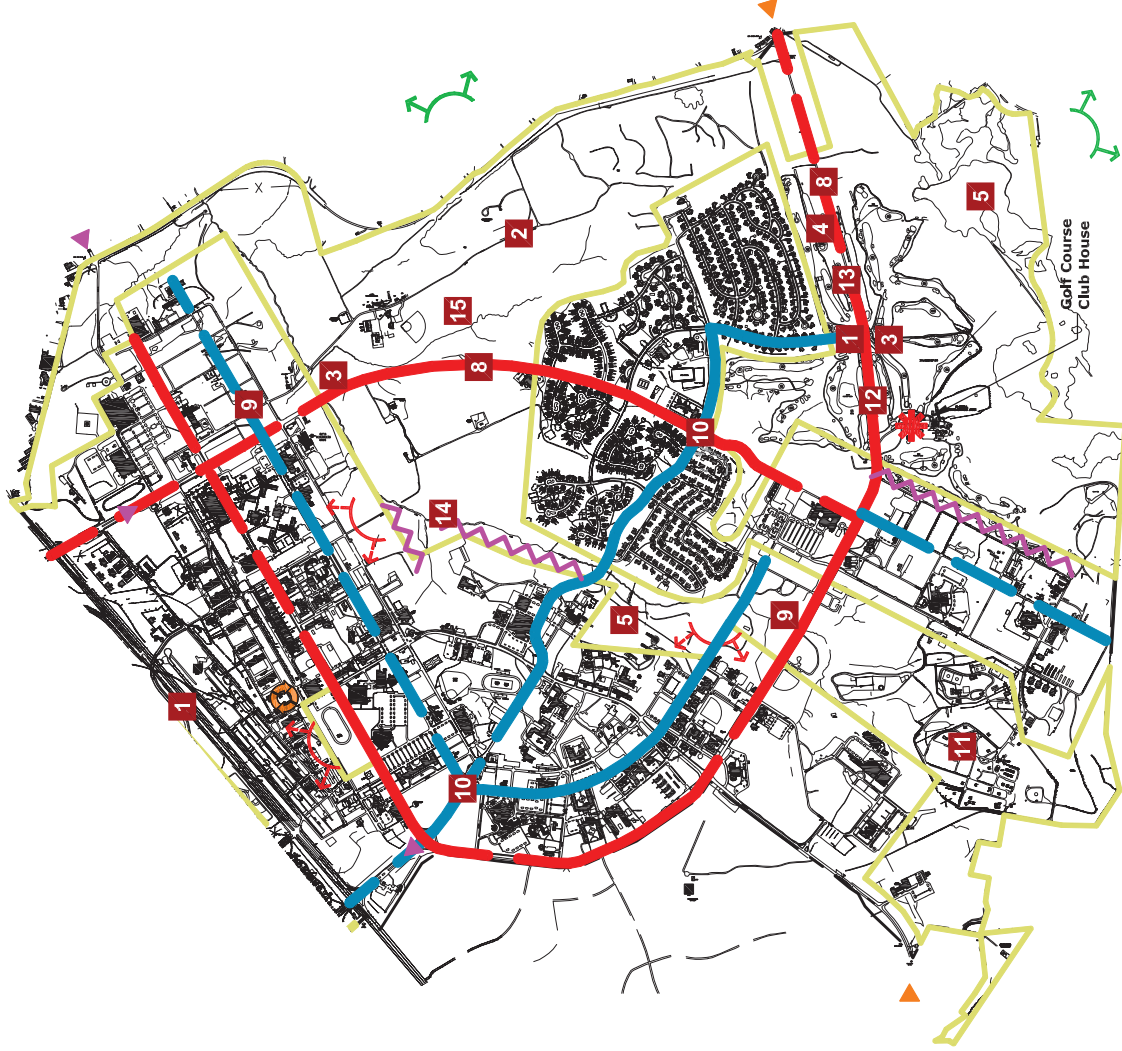
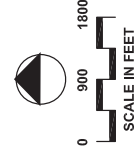
5.10.2.10 Historical and/or Architecturally Significant Features

Not applicable.

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5.10.3 Assets

5.10.3.1 Site Planning

- The Open Space and Field Training Zone in the cantonment area is almost completely interconnected.

5.10.3.2 Buildings

- There are few buildings and those that do exist are small in scale and blend with their natural settings (Fig. 5.69).

5.10.3.3 Circulation

- Access to the main components of the open space system is good with major parking lots at key locations and numerous points where pedestrians can enter.

5.10.3.4 Plant Material

- The Bailey Creek Valley provides rich natural setting for training exercises (Fig. 5.70).

5.10.3.5 Site Elements

- The training equipment in the zone blends into the natural setting (Figs. 5.71 and 5.72).

5.10.3.6 Force Protection

- Major gathering points in the zone are not directly accessible to vehicles.



Fig. 5.69 - Structures located at the Outdoor Recreation Center.



Fig. 5.70 - The golf course clubhouse.



Fig. 5.71 - Equipment sited to protect trees.



Fig. 5.72 - Field training equipment has been designed to blend with wooded setting.

5.10.4 Liabilities

5.10.4.1 Site Planning

- The lack of an adequate storm water management program causes erosion of swales and stream valleys (Fig. 5.73).

5.10.4.2 Buildings

N/A

5.10.4.3 Circulation

- Some sections of the trail system in the zone are not adequately linked so users must use roads to make complete circuits.

5.10.4.4 Plant Material

- Some stands of trees lack the variety of species needed to provide good wildlife habitat.
- The area between Adams Avenue and the Petroleum School includes large areas of previously developed sites and lacks vigorous re-vegetation (Fig. 5.74).

5.10.4.5 Site Elements

- Some of the play equipment, fencing and other elements at the main complex are aged and deteriorating.

5.10.4.6 Force Protection

- Follow AT/FP standard recommended force protection in this area.



Fig. 5.73 - Photo of eroded stream bank.



Fig. 5.74 - Areas of previous development lack re-vegetation.

5.10.5 Recommendations for Open Space and Field Training Visual Zone

Note: Item numbers correspond to the locations of the recommendations on Map Fig. 5.22.

5.10.5.1 Site Planning

- 1** Prevent unsightly effects of erosion. Repair washed out areas at culverts. Replace deep open trenches with wider, shallower, more gently sloping swales.

5.10.5.2 Buildings

- 2** Retrofit the structures at the Petroleum School to produce a more unified appearance.
- 3** Retrofit or rehabilitate older recreational structures at the recreation complex to achieve a more unified architectural style.

5.10.5.3 Circulation

- 4** Maintain roadways through the forest as troop movement pathways leading to major training areas.

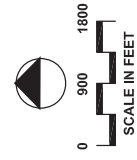
5.10.5.4 Plant Material

- 5** Maintain the natural forest edge allowing for understory growth and a transition area between the mowed areas and full height canopy trees of the forest.
- 6** Develop a troop movement pathway flanking Sisisky Boulevard.

5.10.5.5 Site Elements

- 7** Replace deteriorating and aged play equipment and other elements at the recreation complex.

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Map 5.22:

**Open Space and Field
Training Visual Zone
Recommendation Map**



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5.11 ORDNANCE SCHOOL TRAINING COMPLEX VISUAL ZONE (OTSC)

5.11.1 Visual Character

North of the main cantonment Fort Lee, as a result of BRAC, is developing and constructing an entire school campus. The site formerly designated TA-5 is under construction at this time (Fig. 5.74). This facility is unique in that it is under construction and will create a distinctive visual character once construction is completed. The OTSC visual zone includes the former TA-5 training area bounded on the south by Route 36, on the west by Petersburg National Park, and on the north by Temple Avenue. On the north side of Temple Avenue the northern Fort Lee training area is located. It is predominately wooded training and range facilities. On the northern end of this training/ range area is the “North Range”. The North Range will be included in the OSTC Visual zone for the purposes of this document. An ADG has been created for the new facilities on the Ordnance School Training Complex and will be accessed for the visual zone analysis of this zone. The OSTC site and the North Range area are located in forested areas with forested edges along both sides of the primary arterial roadways. These forested areas and roadways are major assets, creating a buffer between Colonial Heights and Fort Lee.



Fig. 5.74 - The Ordnance School Training Complex site located on the former TA-5.

5.11.2 Ordnance School Training Complex Visual Zone Analysis (OTSC)

5.11.2.1 Main Entrance

- 1** There will be one primary entry via new bridge from the existing cantonment over Route 36 and into the new Ordnance School Complex.

5.11.2.2 Circulation

- 2** Visitors to the OTSC at Fort Lee will generally have secondary roads and sidewalks on which to move.

- 3** Parking lots are located relative to each building.

5.11.2.3 Focal Points

- 4** The most visible elements are the five story school and training buildings and the barracks.

- 5** A wetlands area bisects the OTSC to create training on the east side and housing and support on the west side. They will remain undisturbed during construction.

5.11.2.4 Open Space

- 6** There will be no undisturbed open space after construction is completed.

5.11.2.5 Buffer

- 7** The forested areas along the primary roadways effectively buffer against intrusion from adjacent land uses.

5.11.2.6 Primary Road

- 8** Route 36 and Temple Avenue are the primary roads that pass around the OTSC zone. River Road connecting Route 36 and Temple has been permanently closed.

5.11.2.7 Secondary Road

- 9** The 11th Avenue street extension and bridge connect to the OTSC loop road.

- 10** The loop road will connect to the Temple Avenue north training range gate.

5.11.2.8 Significant Vegetation

- 11** A variety of forest types occupy the area of the large wetlands which will remain in the center of the site.

5.11.2.9 Good Views

- 12** Views across OTSC zone in most directions will be of the forested edge along main highways as well as the wetlands area.

5.11.2.10 Historical and/or Architecturally Significant Features

- 13** Petersburg National Battlefield Park is located on the western edge of the OTSC visual zone

5.11.3 Assets

5.11.3.1 Site Planning

- The OTSC visual zone area is completely interconnected (Fig. 5.75).

5.11.3.2 Buildings

- There are many buildings in the OTSC of large scale (Fig. 5.76).

5.11.3.3 Circulation

- Access to main buildings and functions is excellent with major parking lots at key locations and numerous points where pedestrians can enter.

5.11.3.4 Plant Material

- Forested areas provide a rich natural setting for the OTSC.

5.11.3.5 Site Elements

- Mechanical equipment is well screened.

5.10.3.6 Force Protection

- Major gathering points in the zone are not directly accessible to vehicles.



Fig. 5.75 - The OSTC visual zone is completely interconnected for vehicular and pedestrian traffic.



Fig. 5.76 - Large scale buildings in the OTSC visual zone.

5.11.4 Liabilities-

- New facilities are under construction.

5.11.5 Recommendations for Ordnance School Training Complex Visual Zone-

- New facilities are under construction.

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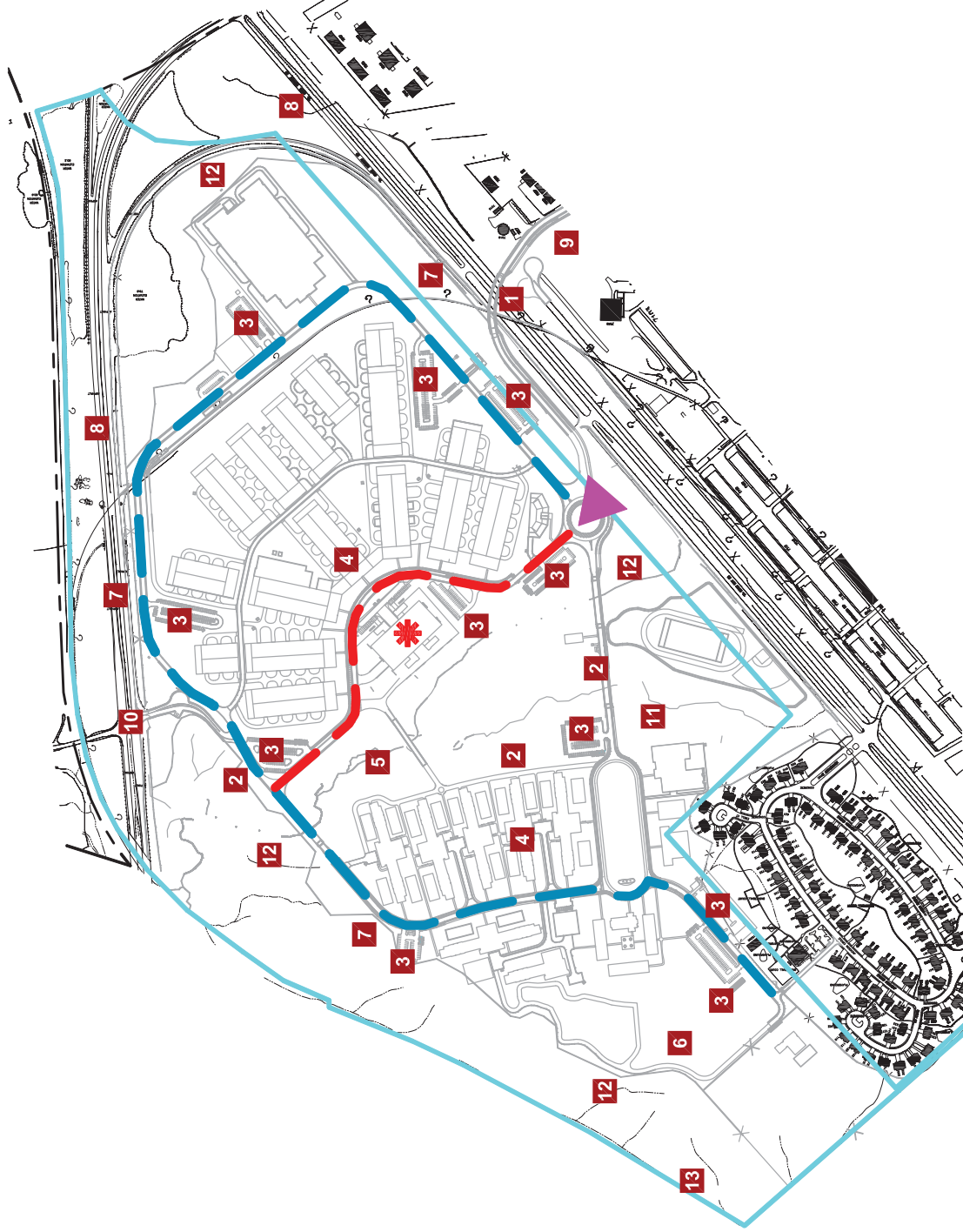
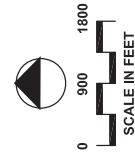
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LEGEND

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SECTION 6

IMPROVEMENT PROJECTS

6.1 INTRODUCTION

6.1.1 Section 6 consists of projects generated from the recommendations presented in the visual zone analysis section starting at the data gathered and site analysis completed. The projects consist of enhancement of a single visual element or improvement of an area that includes a variety of visual elements. Depending on the project scope and cost, the projects could include: Military Construction (MILCON), Non-Appropriated Funds (NAF), Other Procurement, Army (OPA) and maintenance and repair, local minor construction, and self-help. Each improvement project is described and cost-estimated in enough detail to place each project within the appropriate project list or annual work plan, in an appropriate Fiscal Year, within the statutorily correct funding program. Projects require a Capital Investment Strategy.

6.1.2 The paragraphs below discuss each project and include existing conditions, project descriptions, design concepts, cost estimates, photographs and a site plan.

6.1.3 [Appendix G](#) of this Army Installation Design Guide, the Prioritized Improvement Projects List, records information on each project and prioritizes them in accordance with the installation goals and objectives stated in [paragraph 3.2](#), Goals, Objectives and Recommendations. The appendix is an interactive form and designed to be altered as circumstances affecting prioritization change.

6.2 CONVERT BYRD AVENUE BETWEEN SISISKY BOULEVARD AND 22ND STREET TO A CENTRAL TROOP MOVEMENT SPINE

6.2.1 Existing Conditions

Sisisky Boulevard is a primary entry into the northeastern cantonement area from Route 36. Adams, Byrd and Carver Avenues intersect with Sisisky Boulevard near the Sisisky gate and extend westward continuing around the cantonement area creating the historic crecent shaped primary vehicular circulation system and resulting development pattern. Multiple north-south roadways intersect with Byrd Avenue between Sisisky and 22nd Street which will be affected by the proposed modifications. In addition, many parking lots are aligned with Byrd Avenue and will require modification and reconfiguration to accommodate the pedestrian spine. Byrd Avenue is lined with randomly placed mature shade trees which should be preserved and utilized in the proposed development plan.

General observations of the development area include:

- Mature shade trees exist throughout the development area.
- Many roadways intersect with Byrd Avenue and will require realignment or closure to accommodate the pedestrian spine.
- Existing and proposed development adjacent to Byrd Avenue consist of Barracks and training facilities.

6.2.2 Project Description

The proposed redevelopment area extends along Byrd Avenue between Sisisky Boulevard and 22nd Street and includes new special paving, pedestrian nodes, landscape development and compatible site elements.

6.2.3 Design Concept

The extent of the redevelopment project is to provide pedestrian oriented spaces and troop movement pathways to safely and efficiently move troops along a pedestrian

spine, which links barracks and training facilities. Specific design recommendations include:

- Provide trees along both sides of the troop movement spine. Trees should include three to four species planted on a broken linear pattern. The broken linear configuration will provide visual continuity, yet allow for trees to die or be removed without negatively impacting the overall design scheme. A single linear grouping should consist of three to eight trees of a single species, spaced between 30 and 40 feet on center.
- Provide pedestrian nodes at regular intervals along the troop movement trail and secondary walkways to provide shade, shelter and to encourage troop interaction. The size of the node is dependant on the pedestrian traffic associated with the adjacent facilities and walkways.
- Provide unified paving materials and patterns to create a cohesive design theme throughout the entire pedestrian spine.
- Provide site elements, signage, lighting and furnishings which are compatible with each other as well as with the architectural character of the adjacent facilities.

6.2.4 Cost Estimate

Refer to Appendix G

6.2.5 Site Plan

Refer to Map 6.1 and 6.1A

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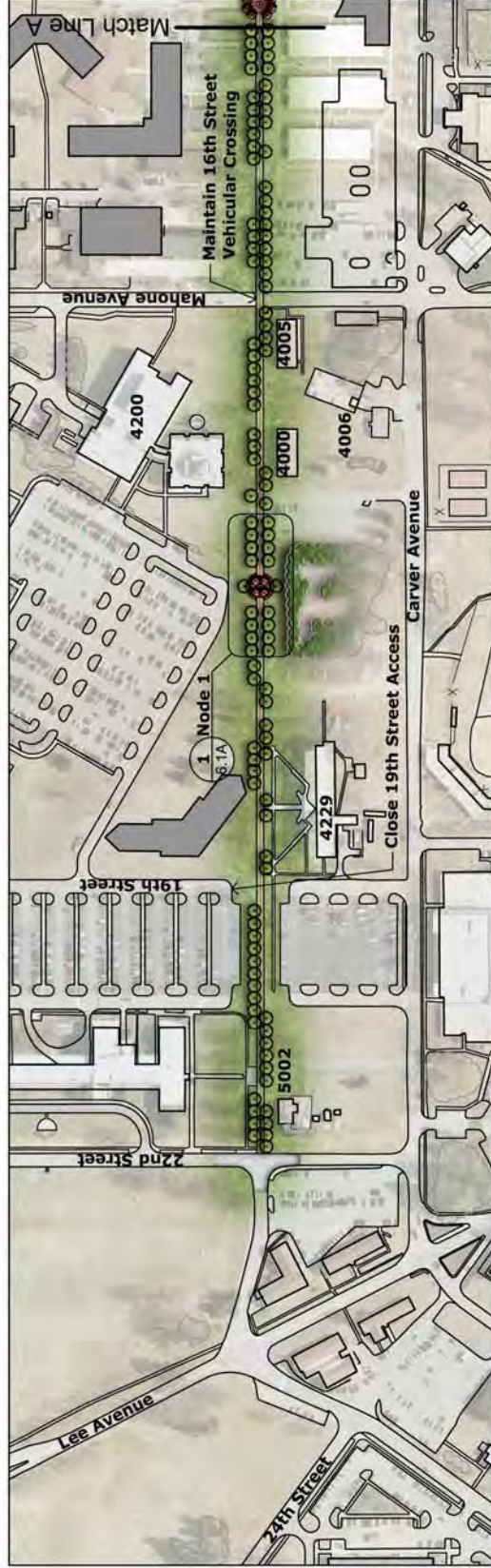


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- Base Boundary
 - Perimeter Fencing
 - Existing Tree
 - Proposed Tree
 - Proposed Flowering Tree
 - Proposed Evergreen Tree
 - Proposed Shrub Bed
 - Buildings
 - Potential Projects

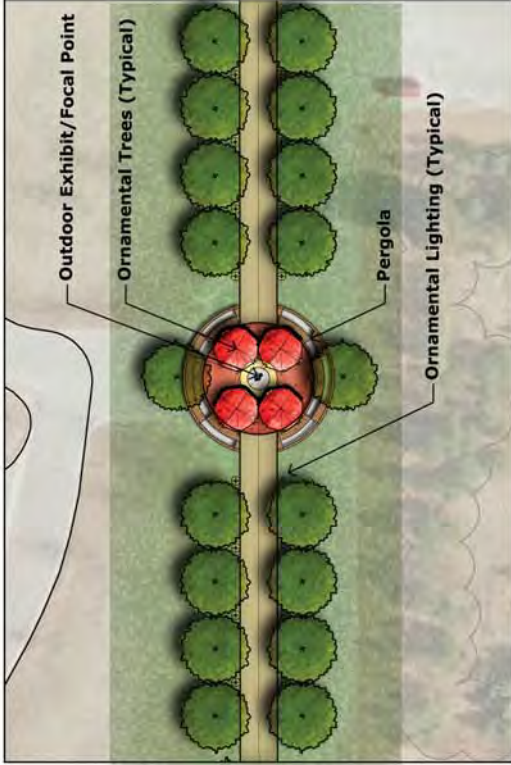


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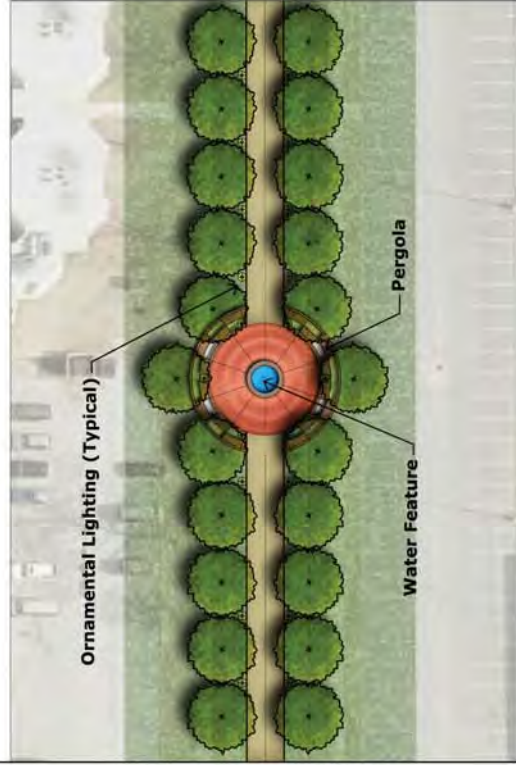
PARSONS
Map 6.1:
Convert Byrd Avenue to a
Central Troop Movement
Spine



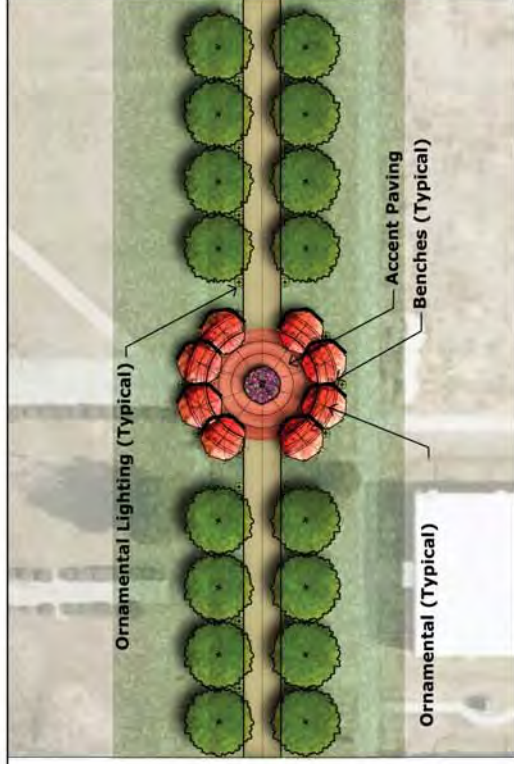
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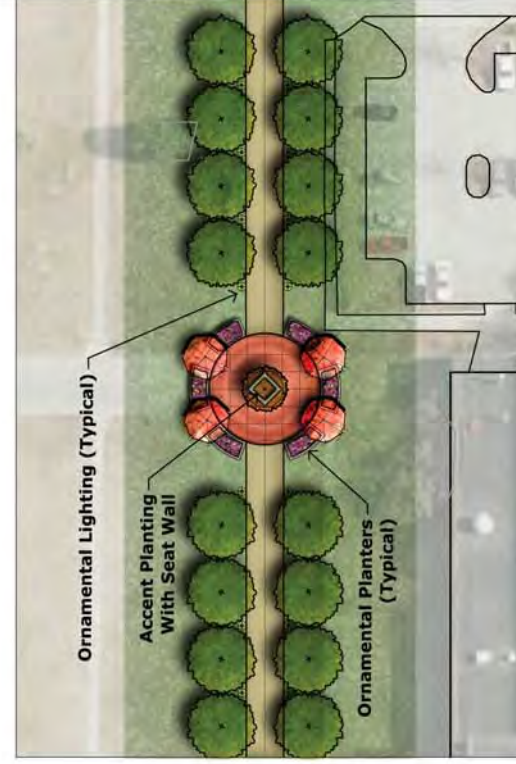
1 Node 1 on Byrd Avenue Pedestrian Mall
6.1A



3 Node 3 on Byrd Avenue Pedestrian Mall
6.1A



2 Node 2 on Byrd Avenue Pedestrian Mall
6.1A



4 Node 4 on Byrd Avenue Pedestrian Mall
6.1A



**INSTALLATION
DESIGN GUIDE**
Fort Lee, Virginia

LEGEND

- Base Boundary
- Perimeter Fencing
- Existing Tree
- Proposed Tree
- Proposed Flowering Tree
- Proposed Evergreen Tree
- Proposed Shrub Bed
- Buildings



UNITED STATES
ARMY GARRISON

PARSONS
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Map 6.1A:

**Convert Byrd Avenue to a
Central Troop Movement
Spine Enlargements**

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6.3 UPGRADE ADAMS AVENUE TROOP MOVEMENT TRAIL BETWEEN SISISKY BOULEVARD AND 41ST STREET

6.3.1 Existing Conditions

Adams Avenue is the primary north-south vehicular circulation spine within the cantonement area. Its historic crescent shaped configuration has had a major influence in the development patterns within the cantonement area. This development plan addresses approximately three miles of Adams Avenue from Sisisky Boulevard southward to 41st Street. Many troop barracks and training facilities are located along this section of Adams Avenue. Approximately 20 roadways intersect with Adams Avenue within the project area. The roadway and adjacent property is gently sloped, however mature shade trees, roadway light fixtures and many drainage swales exist along the roadway and will need to be addressed during the planning process.

General observations of the development area include:

- Mature shade trees exist throughout the development area and should be protected and utilized during the troop trail development process.
- Many roadways intersect with Adams Avenue and will need to be addressed during the planning process.
- Existing and proposed development adjacent to Adams Avenue consist of Barracks and training facilities.
- Open drainage swales exist at several locations along the roadway.
- Existing sidewalks are non-contiguous and are undersized to accommodate required troop movement activities.
- Street tree planting and landscape development is not adequate for the primary vehicular circulation route within the cantonment area.
- Pedestrian crossings are not well defined creating potential safety issues.

6.3.2 Project Description

The proposed development along Adams Avenue will be subdivided into four distinct priority improvement project development areas:

- From Sisisky Boulevard to 19th Street;
- From 19th Street to 27th Street;
- From 27th Street to 34th Street; and
- From 34th Street to 41st Street.

Each of these development areas consist of pedestrian circulation improvements, enhanced landscape development, improved informational signage, security lighting and compatible site elements.

6.3.3 Design Concept

The Adams Avenue troop movement corridor design is intended to provide safe efficient troop movement capabilities, while at the same time improving the visual appearance of the roadway corridor. Specific design recommendations include:

- Provide a contiguous troop movement pathway of sufficient width to accommodate troops running four abreast.
- Provide street tree plantings along both sides of Adams Avenue to improve visual appearance and to reinforce the roadway heirarchy.
- Provide safe well defined pedestrian crossings at roadway and parking lot intersections.
- Provide consistant signage that is compatible with Fort Lee standards.
- Provide safety and security lighting that is consistant throughout the development area and is compatible with site features and elements.
- Provide site elements that are compatible with each other as well as with the adjacent architectural character of the development area.

6.3.4 Cost Estimate

Refer to Appendix G

6.3.5 Site Plan

Refer to Map 6.2, 6.3, 6.4, and 6.5

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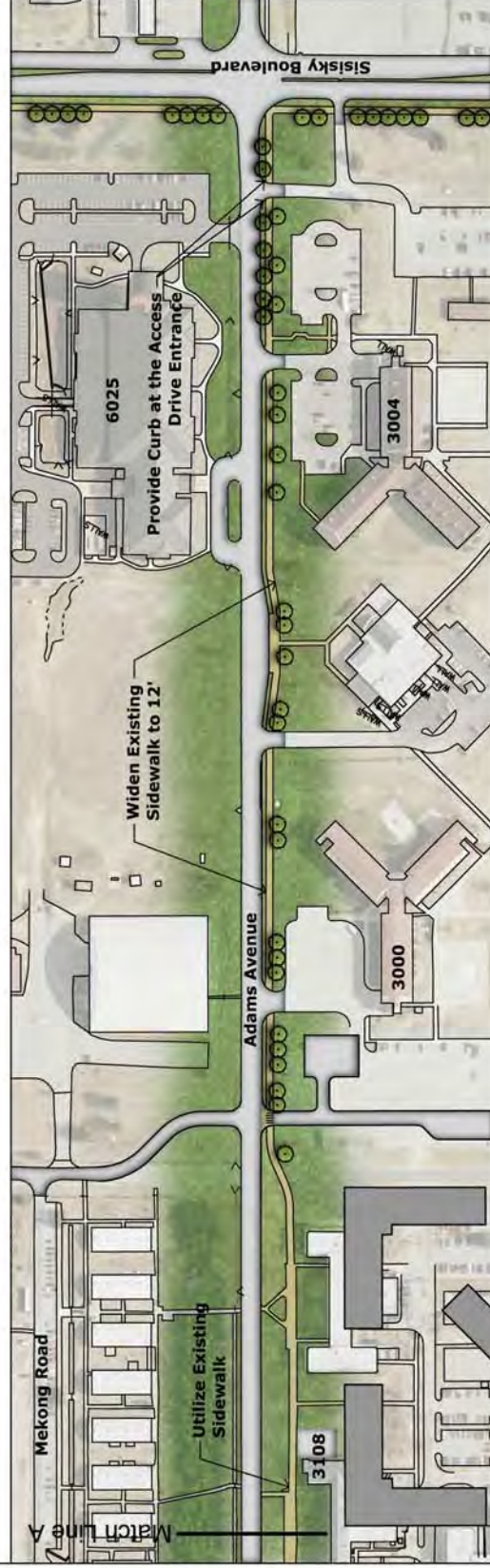
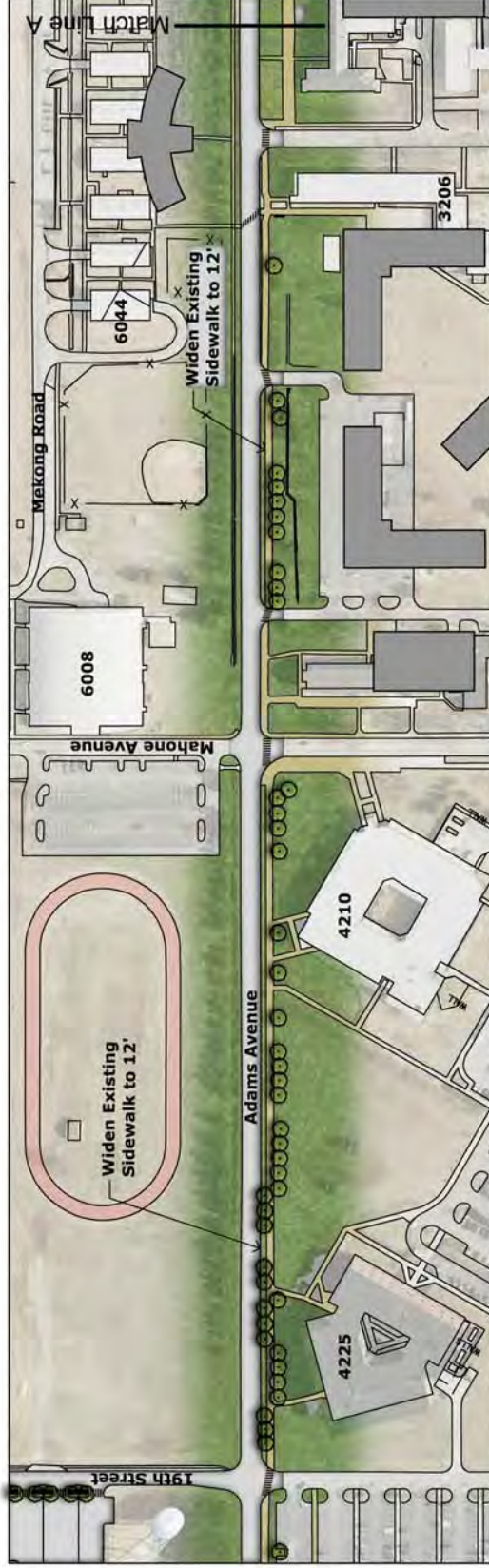
- Base Boundary
- Perimeter Fencing
- Existing Tree
- Proposed Tree
- Proposed Flowering Tree
- Proposed Evergreen Tree
- Proposed Shrub Bed
- Buildings
- Potential Projects



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Map 6.2:
Upgrade Adams Avenue
Between Sisisky Blvd.
and 19th Street



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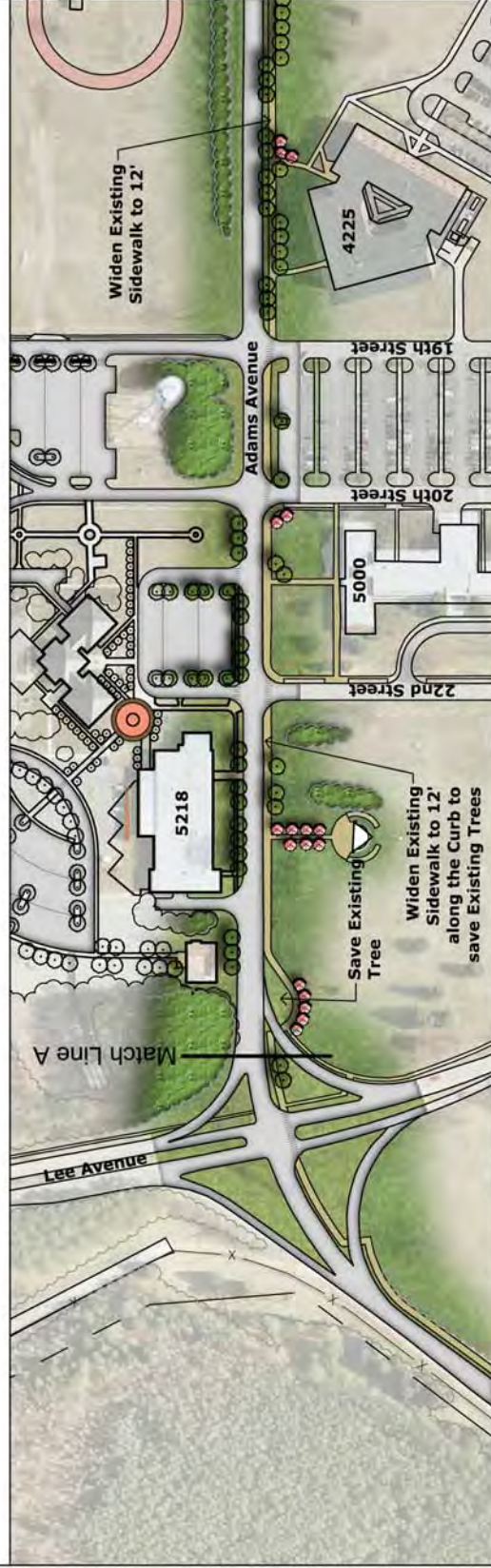
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- Proposed Shrub Bed
- Buildings



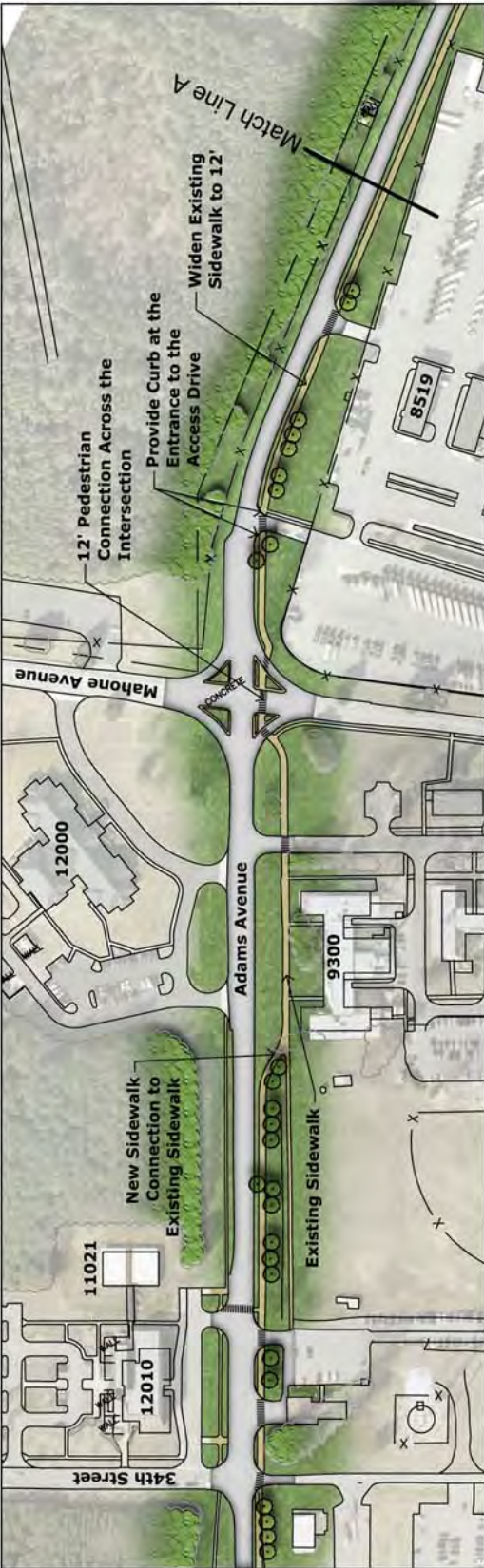
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Map 6.3:









Upgrade Adams Avenue
Between 19th Street
and 27th Street



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LEGEND

Base Boundary	
Perimeter Fencing	
Existing Tree	
Proposed Tree	
Proposed Flowering Tree	
Proposed Evergreen Tree	
Proposed Shrub Bed	
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Map 6.4:
**Upgrade Adams Avenue
 Between 27th Street
 and 34th Street**

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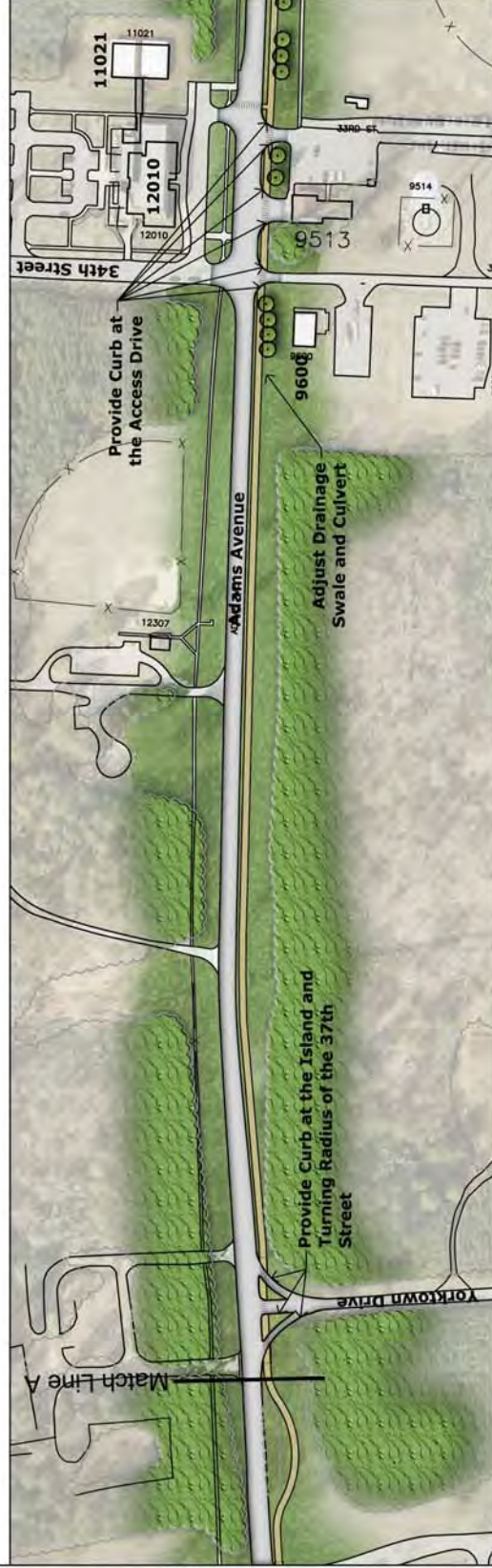
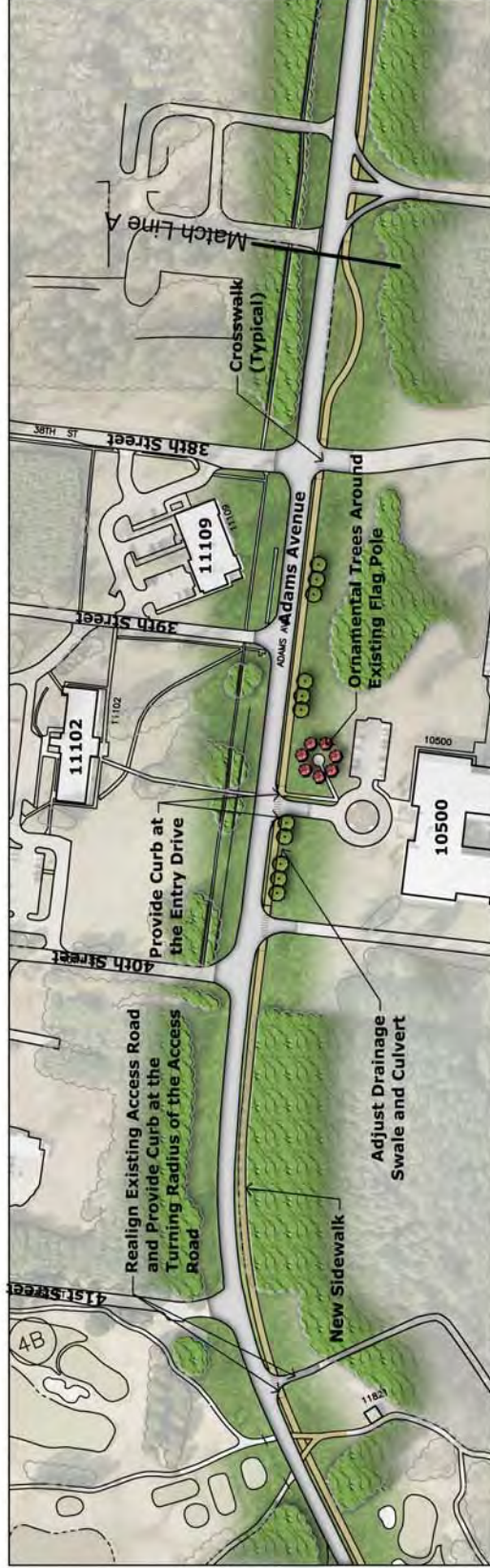
- Base Boundary
- Perimeter Fencing
- Existing Tree
- Proposed Tree
- Proposed Flowering Tree
- Proposed Evergreen Tree
- Proposed Shrub Bed
- Buildings



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PARSONS

Map 6.5:
Upgrade Adams Avenue
Between 34th Street
and 41st Street



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6.4 BUILDING 8401 AND 8402 SITE AND LANDSCAPE IMPROVEMENTS

6.4.1 Existing Conditions

Buildings 8401 and 8402 are multi-story barracks facilities with intergal dining facilities. The buildings are aligned on east-west axis with the dining facilities sharing a common service court. Each building is laidout in a U-shape configuration, creating an internal courtyard arrangement.

The courtyard space is not well developed. A small, out-of-scale pavilion exists at the center of each courtyard. In additon, the courtyard lacks adequate landscape development and compatible site furnishings.

A large undeveloped green space is located to the northwest of Building 8401. The green space includes many mature shade trees and well defined open spaces which could be used for various recreational activities, picnic pavilions and troop gathering spaces.

General observations of the site in and around Buildings 8401 and 8402 include:

- The internal courtyard space created by building configuration is well defined.
- Courtyard lacks appropriate site development and usable gathering spaces.
- Courtyard lacks adequate landscape development
- Courtyard lacks compatible site furnishings.
- The barracks complex lacks adequate recreational activities and appropriate outdoor gathering spaces for group activities.
- A large undeveloped green space exists to the northwest of Building 8401 that includes large mature shade trees and is easily accessible from Buildings 8401 and 8402.

6.4.2 Project Description

The project includes recreational and open space improvements to the courtyards and undeveloped open space in and around Buildings 8401 and 8402.

6.4.3 Design Concept

The goal of the proposed improvements is to provide localized outdoor gathering and activity spaces of sufficient size and quality to encourage troop interaction. Increased physical activities can improve the quality of life and the physical and mental wellbeing of the troops. Design recommendations include:

- Provide new enlarged troop gathering pavilion within each courtyard.
- Improve landscape development within the courtyards including naturalized mass tree plantings at the courtyard periphery and formalized tree plantings near the pavilions.
- Provide new site furnishings compatible with each other and with the adjacent architectural character of the site.
- Provide benches and trash receptacles around the courtyard pavilions.
- Provide two sand volleyball courts in the adjacent green space.
- Provide pedestrian trails that link the green space with the barracks facilities.
- Provide picnic pavilion and picnic tables within the green space.

6.4.4 Cost Estimate

Refer to Appendix G

6.4.5 Site Plan

Refer to Map 6.6

- LEGEND**
- Base Boundary
 - Perimeter Fencing
 - Existing Tree
 - Proposed Tree
 - Proposed Flowering Tree
 - Proposed Evergreen Tree
 - Proposed Shrub Bed
 - Buildings



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6.5 LEE CLUB SITE AND BUILDING IMPROVEMENTS

6.5.1 Existing Conditions

The Lee Club building is located at the end of Lee Avenue and near the PXtra community services facilities. Lee Club, a typical Officer Club, serves breakfast, lunch, and dinner; parties, weddings, and special events are also conducted inside the club. It has well maintained pool in the backyard; however, the building complex lacks the visual qualities generally associated with an installation officer club. There is adequate parking near the main building. AT/FP compliance issues exist that do not meet Army standards. In addition, landscaping is minimal around the Lee Club. Additional observations about the Lee Club facility include:

- A plain and non-descript main building entry, located on the western end of the structure, is not well identified.
- The entire front building façade lacks a cohesive architectural appearance; it appears somewhat piece meal in construction, and is in need of painting and repair.
- The porte cochere, or covered vehicle drop off, at the main entry, is difficult to find when approaching the building in a vehicle.
- AT/FP compliance issues exist around the Lee Club building.
- The overall appearance of the structure is that of a large wood southern vernacular building without architectural detailing.
-

6.5.2 Project Description

Project includes façade treatments of the north side of the building for visual enhancement, entrance definition, and landscape and AT/FP improvements.

6.5.3 Design Concept

The goal of the Lee Club façade improvements is to provide an improved visual appearance of the building. The vehicular circulation will be rerouted from the north side of the building. Design recommendations include:

- Remove and replace the building front façade with a combination of glazing, columns, and veneer materials.
- Provide a relocated porte cochere to comply with AT/FP requirements.
- Provide standing seam metal roofing system in place of the existing shingle roofing.
- Create a well defined entrance to the basement that is integrated with the architectural theme of the Lee Club.
- Remove the driveway in front of the Lee Club and replace with an entry plaza and landscape development.
- Provide a new exterior emergency stair system to the second floor according to local code requirements.
- Provide architecturally compatible site elements.

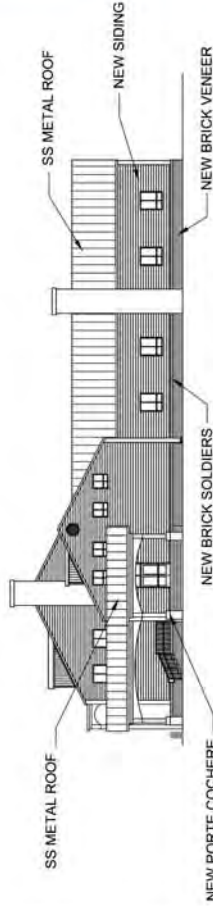
6.5.4 Cost Estimate

Refer to Appendix G

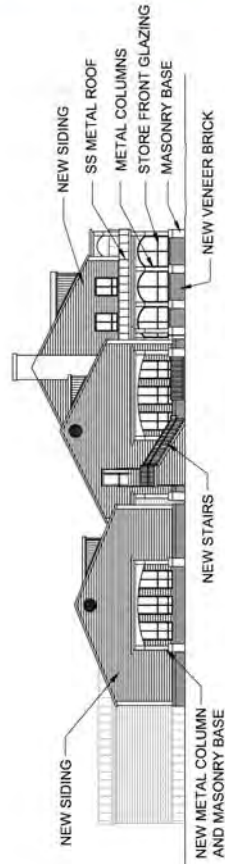
6.5.5 Site Plan

Refer to Map 6.7

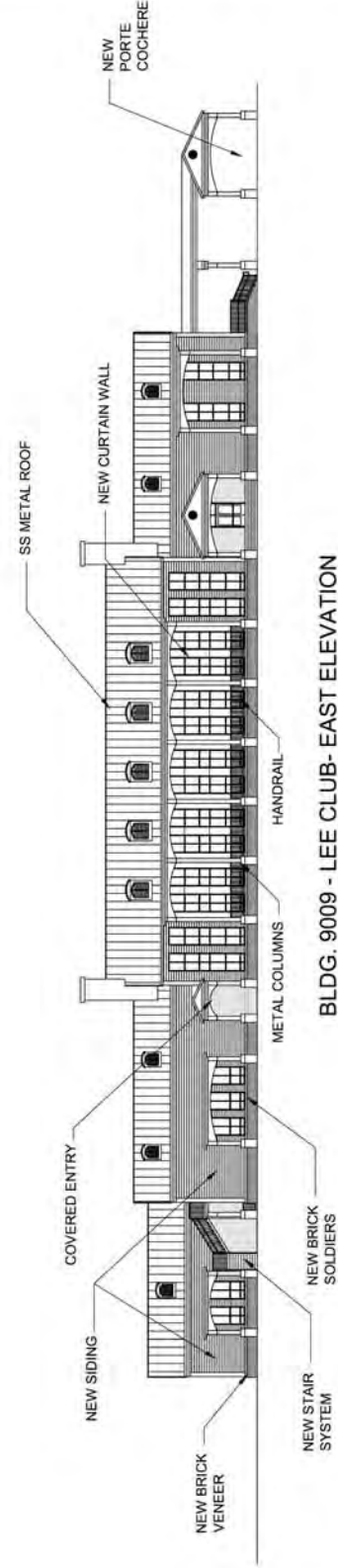
- LEGEND**
- Base Boundary
 - Perimeter Fencing
 - Existing Tree
 - Proposed Tree
 - Proposed Flowering Tree
 - Proposed Evergreen Tree
 - Proposed Shrub Bed
 - Buildings



BLDG. 9009 - LEE CLUB - PORTE COCHERE NORTH ELEVATION



BLDG. 9009 - LEE CLUB- SOUTH ELEVATION



BLDG. 9009 - LEE CLUB- EAST ELEVATION

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6.6 PXTRA COMPLEX BUILDINGS AND SITE IMPROVEMENTS

6.6.1 Existing Conditions

The PXtra complex is located north of the Lee Club and Battle Drive adjacent to Mahone Avenue. The complex consists of many community service facilities including Buildings 9025 (PXtra), 4300 (Theater), 4307 (Bank), 9040 (Bowling Alley), 9030 (Post Office), 9028 (Soldier Support Center), and 9024 (PAO facilities). Visual liabilities exist at many locations throughout the complex including unscreened service areas and non-compatible site furnishings and building facades. AT/FP standoff violations occur along roadways, service areas and parking lots. In addition, the site lacks sufficient pedestrian linkage between buildings making up the complex. General observations for the PXtra complex include:

- The PXtra lacks distinctive identifiable entries to its many functional areas. There are large expanses of wall surfaces that lack visual appeal.
- Redundant service and delivery areas serving the PXtra lack sufficient screening from Battle Drive.
- The Post Office and Soldier Support building lack well defined entries and have mixed and outdated façade treatments.
- All of the buildings lack well defined entries.
- Vehicular circulation around and between buildings create pedestrian conflicts and AT/FP standoff violations.
- All of the buildings making up the complex have outdated and non-compatible façade treatments.
- Building entries lack sufficient shade structures.
- Complex lacks compatible site furnishings and amenities.
- The complex lacks adequate pedestrian linkage between buildings and often conflicts with vehicular traffic.

- The complex lacks quality outdoor gathering space for employees and patrons.
- Battle Drive violates AT/FP standoff requirements from the PXtra.
- Confusing traffic circulation exists at the parking lots west of Buildings 9025, 9028 and 9030.
- Parking lots lack adequate landscape development.

6.6.2 Project Description

The proposed improvements to the PXtra complex will be subdivided into five distinct development categories. Each of the development categories can be implemented independently of the other. The five categories include proposed improvements to parking, roadways, pedestrian circulation, entry plazas and building façade treatment. The intent of the proposed modifications to the PXtra complex is to improve AT/FP compliance, create order, provide pedestrian oriented spaces and maximize parking, while at the same time improving the function, safety and visual appearance of the complex. Each of the development categories is described below in greater detail.

6.6.3 Parking Improvements Design Concept

Proposed improvements to the PXtra campus parking includes the reconfiguration of the existing parking lot located west of Buildings 9025, 9028 and 9030. The reconfigured parking complies with the 25 meter standoff, improves vehicular circulation and reduces pedestrian conflicts. The existing south parking lot located between Buildings 9024, 9040 and 9025A is eliminated to comply with AT/FP requirements. In addition, the removal of the south parking lot provides opportunities to reconfigure and screen the service court associated with Building 9025. A second major parking area is proposed on the east side of the complex which will help to offset the loss of parking resulting from the reconfiguration of the existing western parking and the elimination of the south parking lot. In addition, the proposed east parking lot is centrally located to most of the buildings within the complex and is directly adjacent to the pedestrian spine. Design recommendations include:

- Eliminate the south parking lot to provide enhanced green space development and to provide opportunities to reconfigure and screen the existing service court serving Building 9025.
- Provide AT/FP compliant parking and roadways throughout the PXtra complex.
- Provide a new eastern parking lot directly adjacent to the pedestrian spine.
- Reconfigure west parking lot to provide 25 meter standoff from Buildings 9025, 9028 and 9030 and to improve vehicular circulation and pedestrian safety.
- Provide controlled access into the service courts serving Buildings 9024, 9028 and 9030.
- Provide landscaped medians to include shade trees, shrubs and groundcover to provide needed shade and to help breakup the expanse of paving.

6.6.4 Cost Estimate

Refer to Appendix G

6.6.5 Roadway Improvements Design Concept

Proposed improvements to the roadways serving the PXtra campus include the reconfiguration of Battle Drive, the addition of an eastern perimeter loop road that links Battle Drive with Mahone Avenue and the removal of internal campus vehicular circulation that violates the AT/FP standoff requirements. Battle Drive is reconfigured to provide 25 meter standoff between the roadway and Building 9025. The reconfigured Battle Drive also provides an opportunity to reconfigure and visually screen the service court serving Building 9025. The eastern perimeter loop road provides an improved access into the PXtra complex from Battle Drive and Mahone Avenue. The loop road also provide the opportunity to develop the centrally located eastern parking lot. Design recommendations include:

- Realign Battle Drive to accommodate AT/FP standoff requirements from Building 9025.

- Reconfigure service court at the southeast corner of Building 9025 in addition to screen walls and landscape development.
- Eliminate redundant service court located at the southwest corner of Building 9025. Reconfigure interior of building to accommodate removal.
- Reconfigure Lee Club parking lots located south of Battle Drive to accommodate the reconfigured Battle Drive. Reconfigured parking lot improves vehicular and pedestrian circulation and access to the pedestrian spine.
- Improve access into the PXtra complex from Battle Drive and Mahone Avenue by providing a new eastern perimeter loop road.
- Minimize vehicular and pedestrian conflicts and improve AT/FP standoff by eliminating the vehicular circulation that currently bisects the site, passing between Buildings 9025, 9040 and 9028.
- Provide street trees along the realigned Battle Drive and the new eastern perimeter loop road. Trees should include three to four species planted on a broken linear pattern. The broken linear configuration will provide visual continuity of the roadway system, yet allow for trees to die or be removed without negatively impacting the overall design scheme. A single linear grouping should consist of three to eight trees of a single species, spaced between 30 and 40 feet on center.

6.6.6 Cost Estimate

Refer to Appendix G

6.6.7 Pedestrian Circulation Improvements Design Concept

Proposed improvements to the PXtra campus pedestrian circulation system include a central pedestrian spine which will link all of the major facilities and parking lots within the campus. The pedestrian spine includes shade structures and compatible site elements and furnishings. Design recommendations include:

- Provide a pedestrian spine that originates at the west parking lot near the entries into Buildings 9025 and 9028. The spine should extend southeast between Buildings 9028 and 9025 towards the eastern parking lot and the northeast corner of Building 9040. The spine shall make a 90 degree turn to the southwest and extends south of Battle Drive towards the Lee Club.
- Provide pedestrian nodes and shade structures adjacent to the pedestrian spine to provide shade and gathering spaces for patrons.
- Plant trees on both sides of the pedestrian spine to provide shade and to reinforce the linear design theme.
- Extend the pedestrian spine southward across Battle Drive towards the Lee Club, to reinforce the pedestrian friendly PXtra campus.

6.6.8 Cost Estimate

Refer to Appendix G

6.6.9 Entry Plaza Improvements Design Concept

Proposed improvements to the PXtra entry plaza are primarily driven by the required 25 meter AT/FP standoff between the facilities and adjacent parking. The entry plazas located at the main entrance to the Building 9025 PXtra, 9030 Post Office, 9028 Soldier Support Center includes intergal planters and bench walls that provide a second layer of defence against a vehicle attack. The entry plazas for all campus buildings are located directly adjacent to the pedestrian spine which provide easy access between parking and campus buildings. Design recommendations include:

- Provide planters and removable bollards to provide a secondary layer of defense from a vehicular attack on the building. The planters, in conjunction with the landscape development will also provide human scale to the space and create gathering areas and a sense of enclosure to the space.

- Provide compatible enhanced paving materials at the entry plazas to reinforce the architectural character of the building, help to unify the campus and to define the space.
- Integrate the plaza development with the pedestrian spine by utilizing compatible, yet unique materials.
- Provide shade trees and benches that align with the grid created by the pedestrian spine to unify the total campus development.
- Provide unified site furnishings that are compatible with the architectural features of the campus facilities.

6.6.10 Cost Estimate

Refer to Appendix G

6.6.11 Building Façade Improvements Design Concept

The goal of the PXtra buildings façade improvements is to provide an improved visual appearance of the building, well identified entrances with covered pedestrian walkways, and coordination with the pedestrian spine created to link the PXtra and the Lee Club. Design recommendations for all buildings include:

- Replace existing Mansard assemblies with a new system that provides a covered pedestrian walkway. Place well defined entry canopies or porches at the primary entrances. Maintain the existing brick veneer of the buildings. Create aesthetically pleasing entries with a combination of glazing, panels, columns, and veneer materials.
- Place gathering pavilions near the new pedestrian spine walkway that are complimentary to the façade treatments of the buildings.
- Provide standing seam metal roofing system for the new Mansard roofs, entries and pavilions.
- Provide new store front glazing at each main building entrance to create visual interest which is

complimentary to the overall architectural character of the buildings.

- Aesthetically enhance the secondhand store entrance and storefront façade.
- Provide architecturally compatible site elements.

6.6.12 Cost Estimate

Refer to Appendix G

6.6.13 Site Plan

Refer to Map 6.8, 6.8A, 6.8B, and 6.8C

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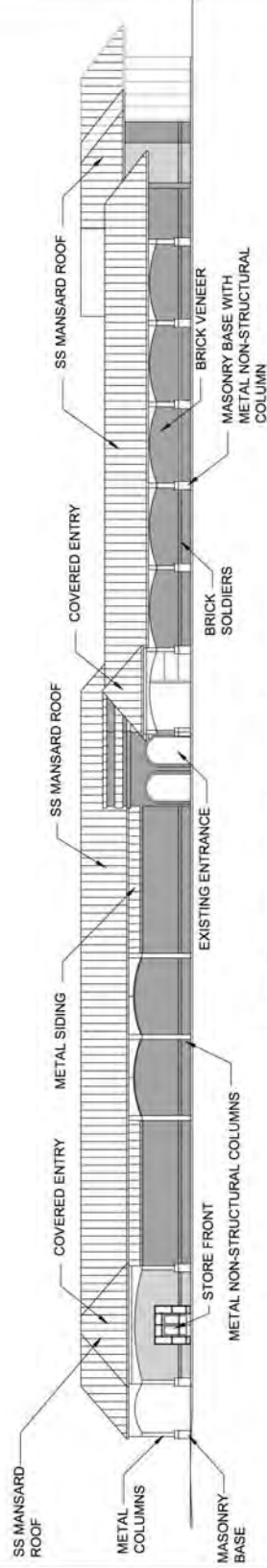
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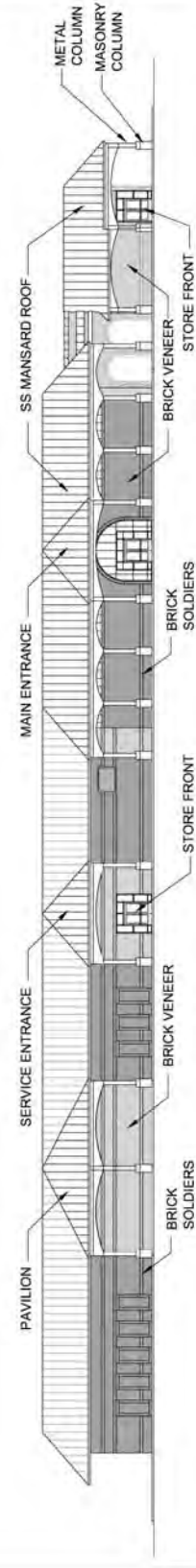
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BLDG. 9025 - PXTRA



① BLDG. 9025 - PXTRA - WEST ELEVATION



② BLDG. 9025 - PXTRA MAIN ENTRANCE - NORTH ELEVATION

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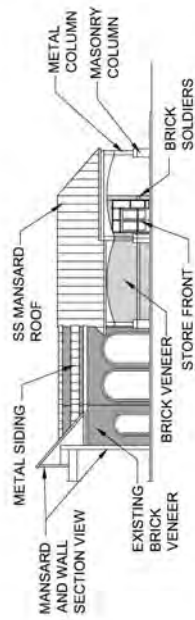
Map 6.8A:

**PXtra Complex
Building Improvements**

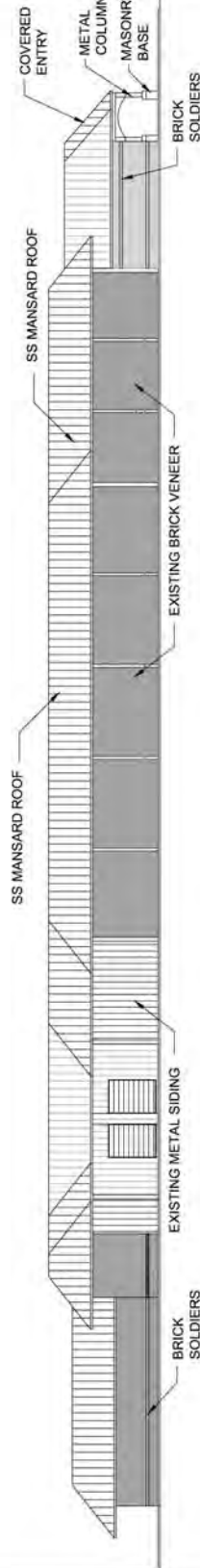
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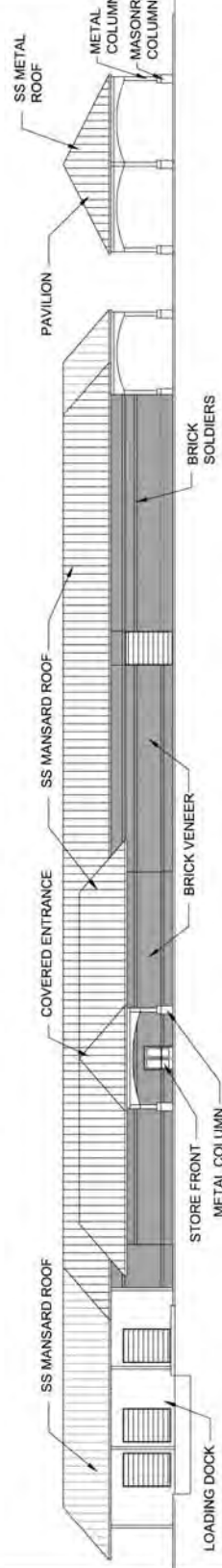
BLDG. 9025 - PXTRA



① BLDG. 9025 - LAUNDRY AND FOOD COURT ENTRANCE- NORTH ELEVATION



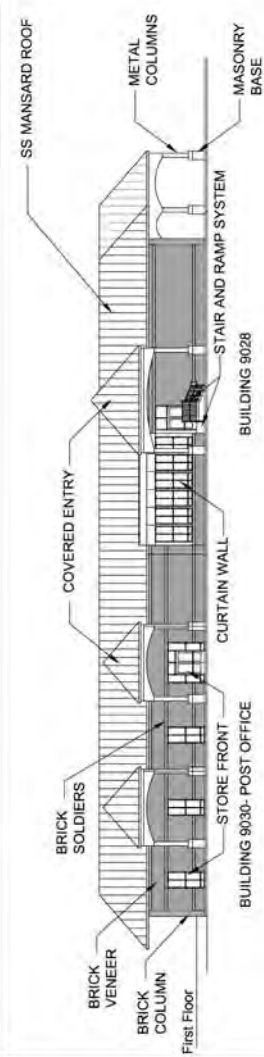
② BLDG. 9025 - PXTRA BATTLE DRIVE- SOUTH ELEVATION



③ BLDG. 9025 - TRIFT STORE ENTRANCE - EAST ELEVATION



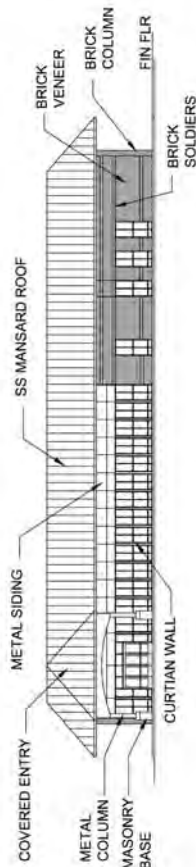
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① **BLDG. 9030 - POST OFFICE - WEST ELEVATION**

BLDG. 9024 - PUBLIC AFFAIRS

BLDG. 9040 - BOWLING ALLEY

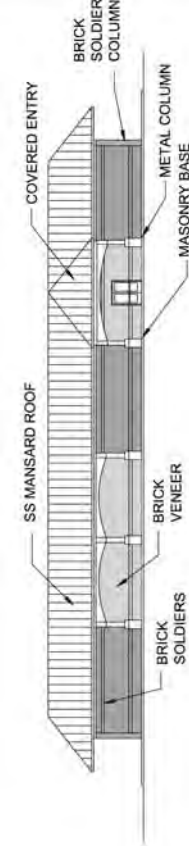


② **BUILDING 9028- SOUTH ELEVATION**



③ **BLDG. 9024 - PUBLIC AFFAIRS- SOUTH ELEVATION**

NOTE: BOTH SIDES THE SAME



④ **BLDG. 9040 - BOWLING ALLEY- WEST ELEVATION**

NOTE: FACING NEW PARKING AREA



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6.7 COMMISSARY AND PX PARKING LOT LANDSCAPE IMPROVEMENTS

6.7.1 Existing Conditions

The PX and Commissary is located in the northern edge of the contonement area, at the corner of Sisisky Boulevard and Adams Avenue. Due to the facilities function, the complex includes large expansive parking lots. With the exception of the westernmost parking area near the Commissary, the parking lots are void of mature shade trees. Large end islands and medians exist within the parking lot which help to breakup the large expanse of parking; however, they lack unifying landscape development. In addition, a large unsightly service court is located on the north side of the PX which is highly visible from the secondary Shop Road gate facilities. General observations for the PX / Commissary include:

- Well maintained mature shade trees exist at the southwest end of the parking area near the Commissary and Sisisky Boulevard.
- Large end islands and traffic medians exist throughout the parking lots, however they are nearly void of landscape development.
- Existing landscape development in and around the PX and Commissary campus is healthy and well maintained.
- The highly visible service court located on the northeast side of the PX lacks organization and is unattractive.
- The entries into the parking lots are not well defined and lack landscape development.

6.7.2 Project Description

The proposed improvements for the PX / Commissary campus are primarily intended to improve the visual appearance and comfort of the site. Improvements include coordinated landscape development throughout the parking lots and access points in addition to the visual improvements to the northeastern service court.

6.7.3 Design Concept

The landscape development associated with the parking lots is intended to define the access points and roadway hierarchy within the parking lots. Primary access points/entry node from Adams Avenue and Sisisky Boulevard shall include special landscape treatment. The special treatment shall include shade and ornamental trees and a unifying blend of shrubs, groundcover and annual plantings. Primary internal circulation corridors from Sisisky Boulevard and Adams Avenue shall be planted with a prominent variety of shade trees to reinforce the roadway hierarchy. Secondary internal roadways shall be planted with a smaller contrasting variety/species of shade tree. Internal parking lot medians shall be planted with flowering ornamental trees to provide seasonal color and variety to the total planting scheme. In addition, it is proposed that the highly visible northwest service court be contained within a decorative screen wall and supplemented with landscape screening. Specific design recommendations include:

- Primary access points/entry nodes from Adams Avenue and Sisisky Boulevard shall be planted with a unique variety of trees, shrubs, groundcover and flowering annuals.
- Primary roadway hierarchy defined by prominent species of shade trees.
- Secondary roadway hierarchy defined by a smaller contrasting variety of shade tree.
- Parking lot medians planted with flowering ornamental trees to provide seasonal color and variety to the total landscape development.
- Provide decorative screen wall enclosure and landscape enhancements to the northeast service court. Contain the randomly parked trailers to a defined organized space behind the walls.
- Provide evergreen screening northwest of Quartermaster Road to additionally screen the northeast service court from the secondary Shop Road gate facilities.

6.7.4 Cost Estimate

Refer to Appendix G

6.7.5 Site Plan

Refer to Map 6.9

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- LEGEND**
- Base Boundary
 - Perimeter Fencing
 - Existing Tree
 - Proposed Tree
 - Proposed Flowering Tree
 - Proposed Evergreen Tree
 - Proposed Shrub Bed
 - Buildings

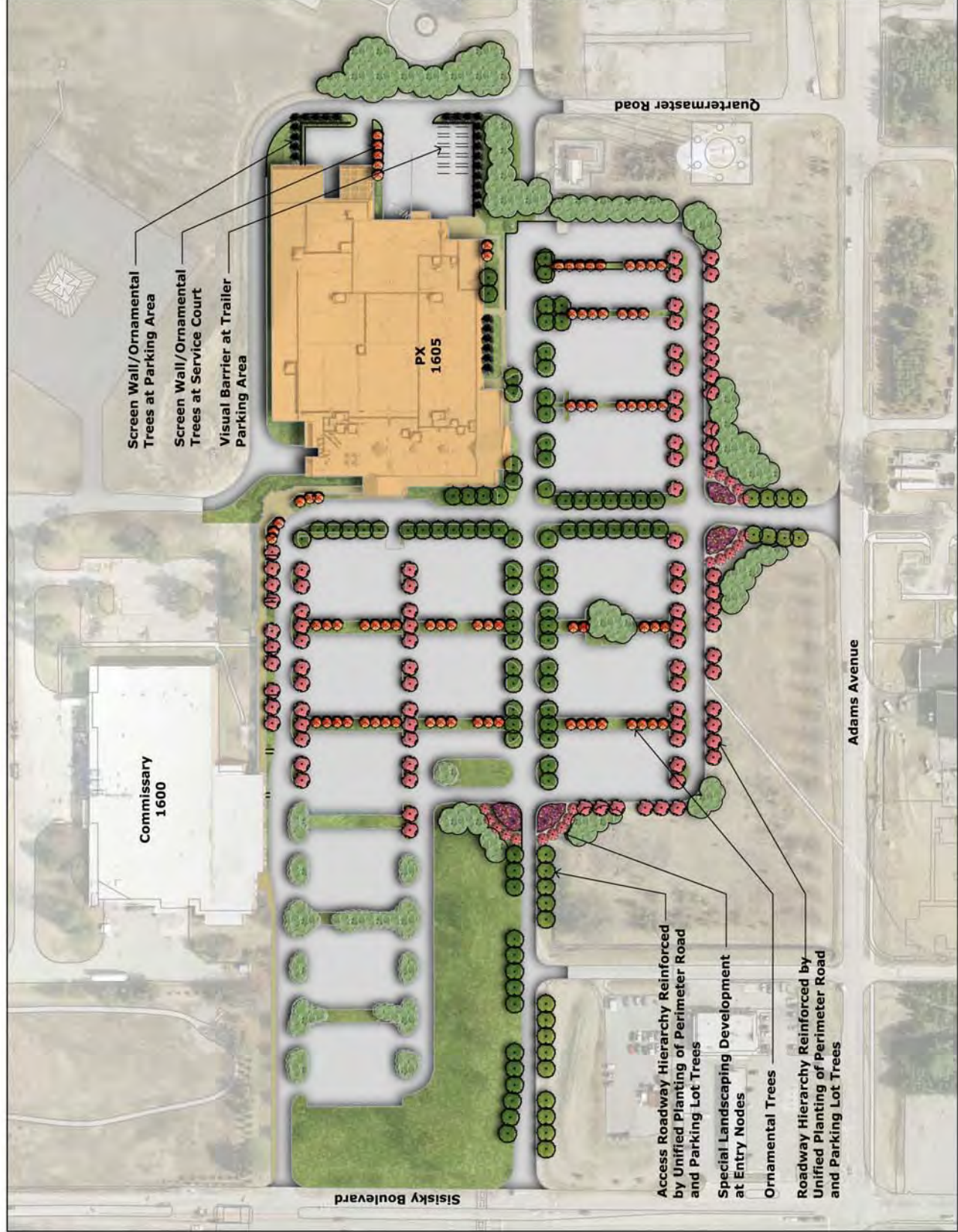


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Map 6.9:

**Commissary and PX
Parking Lot Landscaping
Improvements**



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6.8 MUSEUM CAMPUS SITE IMPROVEMENTS

6.8.1 Existing Conditions

The Museum campus is located at the northwest corner of the contonement area, north of the intersection of Lee and Adams Avenues. The site consists of two separate Museum facilities, Buildings 5218 and 5219, the Women's Museum. Building 5218, the main facility, is directly adjacent to Adams Avenue and is not easily accessible form the two existing parking lots that serve the campus.

Parking lots are accessed from Shop Road and Adams Avenue. Shop Road provides access to the west parking lot and Adams Avenue provides access to the east parking lot.

AT/FP standoff requirements are violated by the two parking lots, in addition to an access road that passes between Buildings 5218 and 5217.

General observations for the Museum complex include:

- The main entrance to the main campus facility is directly adjacent to Adams Avenue and is not easily accessible to parking lot facilities.
- Parking / roadway AT/FP standoff violations exist at both facilities.
- The service court for Building 5218 is in clear view of the main entrance to the Women's Museum.
- The sculpture garden located northeast of the Women's Museum is not well maintained.
- The west parking lot is located at the rear of the Museum facilities.
- Heavy truck and POV traffic occurs on the access road that passes between Buildings 5217 and 5218.
- The west parking lot lacks a sense of connection with the Museum buildings.
- Landscape development lacks appropriate maintenance.

6.8.2 Project Description

The plan proposed the realignment and reconfiguration of roadways, intersections and parking lots; the reconfiguration of service courts; and the expansion of both Museum facilities.

6.8.3 Design Concept

The intent of the proposed improvements to the Museum campus is to provide a cohesive site development plan which improves the function, safety and visual appearance of the campus. Design recommendations include:

- Elimination of the southwest access drive between Buildings 5217 and 5218.
- Reconfigure and expand the west parking lot to accommodate future parking requirements.
- Provide an enhanced pedestrian node/gathering point at the pivotal point of the buildings and parking lots. The proposed enhancements include a shade pergola, compatible site furnishings, benches and trash receptacles.
- Relocate Building 5218 service court from the northeast to the southwest side of the building and reconfigure the existing service court to become the main entrance into the facility. The proposed modifications will create a cohesive campus setting and improve the visual appearance and function of the site
- Reconfigure the west and east parking lots to comply with 25 meter AT/FP standoff requirements.
- Provide improved landscape development and associated maintenance.
- Provide approximately 7,500-square-foot expansion to the northwest side of Building 5218.
- Provide approximately 5,500-square-foot expansion to the northwest side of the Women's Museum, Building 5219.

- Construct a traffic circle at the intersection of 20th Street and Shop Road.
- Reconfigure parking lot at the southeast corner of 20th Street and Shop Road to accommodate the proposed traffic circle.

6.8.4 Cost Estimate

Refer to Appendix G

6.8.5 Site Plan

Refer to Map 6.10

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LEGEND

- Base Boundary
- Perimeter Fencing
- Existing Tree
- Proposed Tree
- Proposed Flowering Tree
- Proposed Evergreen Tree
- Proposed Shrub Bed
- Buildings



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Map 6.10:

**Museum Campus
Site Improvements**

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6.9 DEVELOP A TROOP MOVEMENT PATHWAY FLANKING SISISKY BOULEVARD BETWEEN SHOP ROAD AND CARVER AVENUE

6.9.1 Existing Conditions

The project area is located in the northeast portion of the contonement area along Sisisky Boulevard, between Shop Road and Carver Avenue. The project area is relatively flat and void of major vegetation. No major constraints pose a problem for development. General observations for the troop mevement pathway include:

- Gentle slope throughout the site.
- Minimal vegetation exists that would require removal to accommodate pathway development.
- Few existing vehicular / pedestrian conflicts exist.

6.9.2 Project Description

The proposed development consists of a 12-foot wide troop movement trail and associated site furnishings and landscape development.

6.9.3 Design Concept

The proposed 12-foot wide troop movement pathway is located on the west side of Sisisky Boulevard between Shop Road and Carver Avenue. The proposed troop trail joins with the eastern terminus of the proposed Byrd Avenue conversion to a pedestrain mall, discussed Section 6.2 above. Design recommendations include:

- Installation of a 12-foot wide troop movement trail between Shop Road and Carver Avenue.
- Provide compatible site elements including trash receptacles and light fixtures.

6.9.4 Cost Estimate

Refer to Appendix G

6.9.5 Site Plan

Refer to Map 6.11

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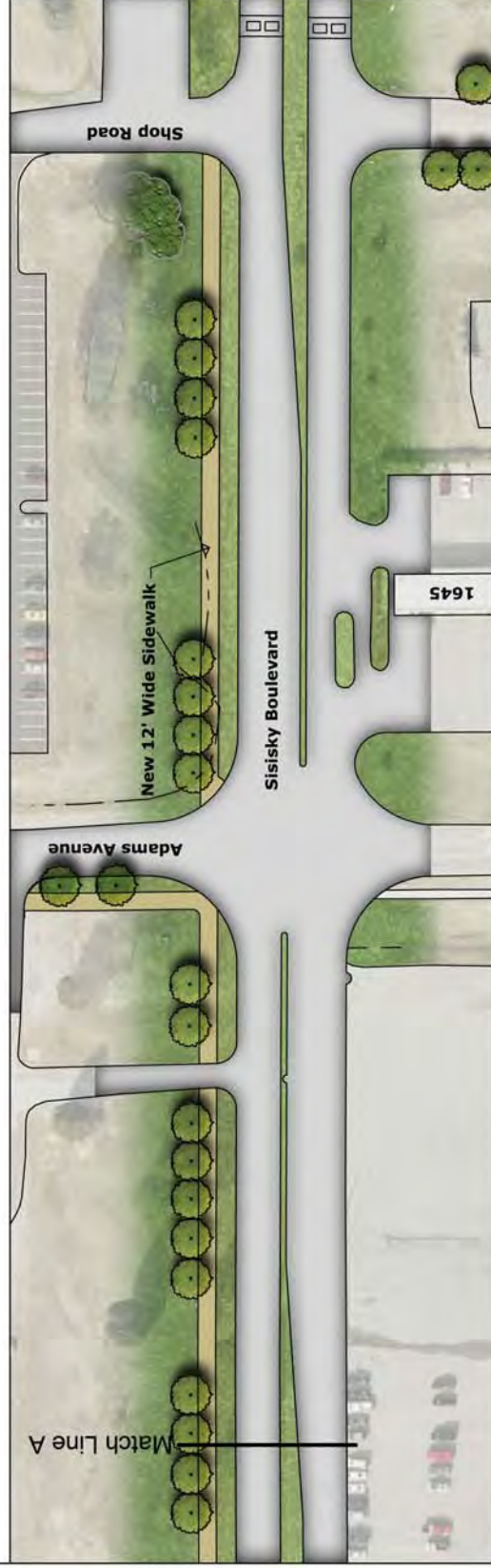


LEGEND

- Base Boundary
- Perimeter Fencing
- Existing Tree
- Proposed Tree
- Proposed Flowering Tree
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- Buildings



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Map 6.11: Troop Movement Pathway Flanking Sisisky Blvd. Between Shop Road and Carver Avenue.	



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Links

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SECTION 7

SITE PLANNING DESIGN STANDARDS

7.1 INTRODUCTION

7.1.1 Site Planning is the process of arranging an external physical environment in complete detail to include the structures, circulation patterns, and other elements that form the built environment. The site planning and design process is used to develop a project that fulfills facility requirements and creates the optimal relationship with the natural site. See [TM 5-803-14, *Site Planning and Design*](#) for detailed guidance on site planning to include program analysis, site analysis, site verification, and concept development. This TM also discusses site design guidelines, describes the steps in the site planning process, and contains examples of various sketches/diagrams developed in support of these steps. Also see [TI 800-01, *Design Criteria, Chap. 3, Site Planning and Design Criteria*](#). Environmental documentation will be prepared prior to site selection to support the construction activity in accordance [AR 200-2, *Environmental Effects of Army Actions*](#).

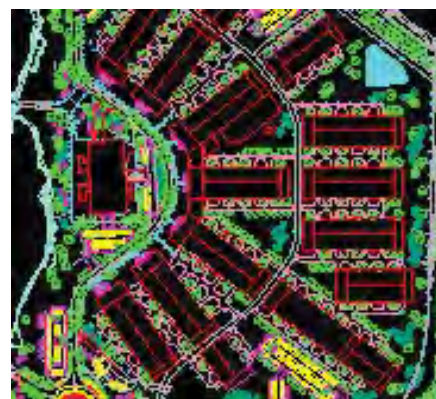


Fig. 7.1 - Site plan from the Ordnance School Campus.

7.1.2 The site planning component provides the spatial arrangement of the installation (Fig. 7.1). The installation master plan provides information that forms the foundation for site planning. The master plan is a mechanism for ensuring that individual projects are sited to meet overall installation requirements. [AR 210-20, *Master Planning for Army Installations*](#), and the [Master Planning Instructions \(MPI\)](#), provide additional information concerning the master plan.

7.1.3 The other five design components are dependent upon site planning for their location and

spatial relationships. The other five components are identified below and discussed in Sections 8-12.

- [Section 8 - Buildings Design Standards](#)
- [Section 9 - Circulation Design Standards](#)
- [Section 10 - Landscape Design Standards](#)
- [Section 11 - Site Elements Design Standards](#)
- [Section 12 - Force Protection Design Standards](#)

7.2 SITE PLANNING OBJECTIVES

7.2.1 The goal of site planning for the installation is to produce an attractive, sustainable development. Sustainability requires the built environment to be designed and constructed to preserve and enhance the natural environment. Manmade facilities are designed as a part of the environment to minimize negative environmental impacts. General site planning techniques resulting in sustainable development are cost efficient because they conserve energy and reduce construction and maintenance cost. Typical site planning objectives include the following.

7.2.1.1 Preserve natural site features such as topography, hydrology, vegetation, and tree cover.

7.2.1.2 Locate facilities with consideration of climatic conditions such as wind, solar orientation, and microclimate.

7.2.1.3 Preserve the natural site by molding development to fill around existing land forms and features. This development approach minimizes extensive earthwork, preserves existing drainage patterns, and preserves existing vegetation.

7.2.1.4 Plan for facilities to be clustered to preserve land and reduce construction cost. Clustering should occur on the flattest land areas. Room for expansion

should be provided. When clustering facilities Force Protection measures must be considered.

7.3 SITE PLANNING CONSIDERATIONS

7.3.1 The primary “fit” of the development to its environment is initially determined by the site analysis and subsequent site planning. The determination of primary issues that provide basic location and organization of spatial relationships are determined during the site planning (Fig. 7.2).

7.3.2 Accessibility. Any building or facility used only by able-bodied personnel need not be accessible to the disabled. Nevertheless, when feasible and appropriate, seek to incorporate accessibility measures into the design since the facility use may change over time (military exclusion is provided by [UFAS 4.1.4 \(2\)](#)). All other structures or facilities must meet the standards of the [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#) and the [Uniform Federal Accessibility Standards \(UFAS\)](#), with the most stringent standards applied in the event of conflicting guidelines. (See [AR 420-70](#), Chapter 2, Paragraph 2.8). This includes the avoidance of site barriers through the use of curb cuts, ramps, handrails, and grade-level entrances to avoid site barriers. Provide designated handicapped parking spaces in all major parking lots and drop-off zones for persons with mobility impairments. Modify existing structures for handicapped accessibility whenever possible, especially community facilities that are most likely to be used by families, veterans or visitors.

7.3.3 Environmental. Environmental issues to consider in the preparation of a site plan include any action or proposal that has a detrimental affect on a site area's land, water, or air quality. The location of facilities on land that results in minimal disturbance to the existing topography, vegetation, and drainage patterns greatly reduces the negative impact on the environment. It is the Garrison Commanders responsibility to ensure that all National Environmental Policy Act (NEPA) documentation is started before the site selection process, as this process feeds the 1391 process.

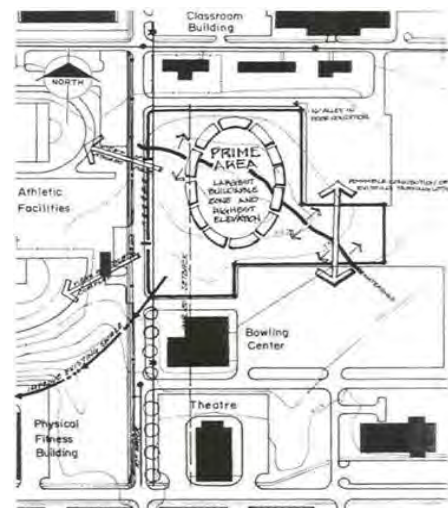


Fig. 7.2 - A sample Site Opportunity and Constraint Plan.

7.3.3.1 NEPA requires that an Environmental Impact Statement (EIS) be submitted to the U.S. EPA for major projects that may significantly effect the environment. An Environmental Assessment (EA) should have been prepared previous to an EIS. The EPA reviews and responds to filed impact statements. Information pertaining to Environmental Impact Statements and their submission can be found at the following EPA websites.

- [Environmental Impact Statement \(EIS\)](#)
- [Submitting Environmental Impact Statements \(EISs\)](#)

7.3.3.2 Federal law requires that prior to the undertaking of activities which effect the nation's waterways, described as "navigable waters of the United States" and "waters of the United States" to include wetlands, a permit must be acquired. Information regarding statutory, administrative, and judicial matters, including general regulatory policy, definitions of "waters of the United States" and "navigable waters", and processing of permits can be obtained at the following Corps of Engineers website.

- [Statutory, Administrative, and Judicial Materials](#)

7.3.3.3 Include procedures for mitigating environmental concerns in the early stages of project development. To the maximum extend possible avoid siting development or individual buildings in environmentally sensitive areas. The installation master plan environmental overlay should be reviewed prior to the development for areas designated as threatened and endangered species habitat areas.

7.4 SITE PLANNING DESIGN CRITERIA

The site planning component of installation design comes first in the design process and determines the general location of the other components. Consequently, site planning must consider the criteria for architectural design, circulation, landscape

architecture, site elements, and force protection. Site planning criteria is divided into two categories, natural conditions and manmade conditions. Each is discussed separately in the following paragraphs. These criteria are to be utilized for the assessment of the visual and spatial impacts of site planning.

7.5 NATURAL CONDITIONS

7.5.1 Topography. The natural terrain is a major determinant of the layout and form of the installation. The following guidelines should be used to maintain the natural topography of the installation (Figs. 7.3 and 7.4).

7.5.1.1 Maintain natural ground slopes and elevations.

7.5.1.2 Align roadways and buildings along topographic lines.

7.5.1.3 Locate facilities that have expansive ground coverage on relatively flat terrain.

7.5.1.4 Use moderately sloping areas for buildings with less ground coverage area.

7.5.1.5 Avoid development on steep slopes.

7.5.1.6 Avoid development in natural drainage ways and flood plains.

7.5.1.7 Provide a reasonable balance of cut and fill.

7.5.2 Hydrology. The site planning team will consider the following hydrologic concerns for natural drainage corridors, floodplains, and waterways during the site planning process.

7.5.2.1 Preserve and maintain natural drainage areas and floodplains.

7.5.2.2 Limit development in floodplains to open spaces and recreation uses.

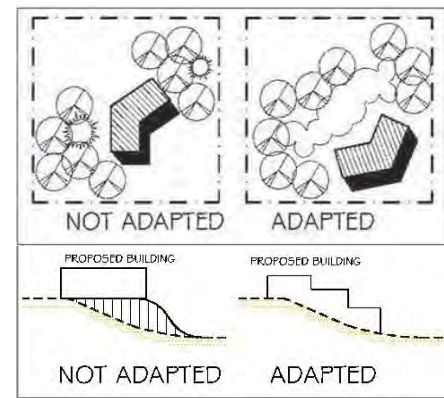


Fig. 7.3 - Accommodate Natural Conditions.

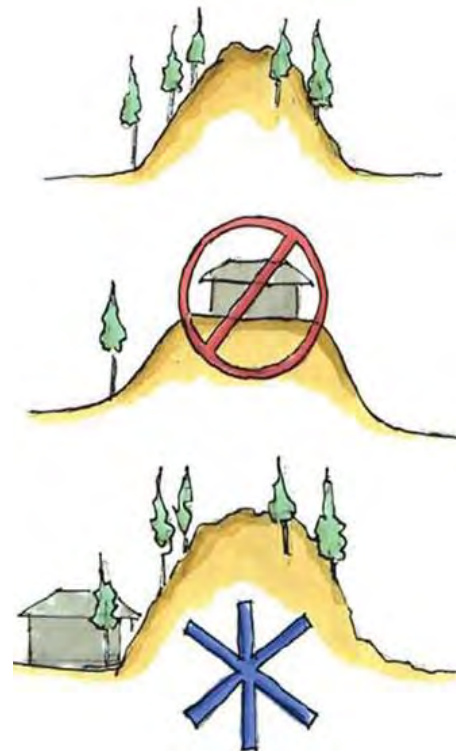


Fig. 7.4 - Develop Around Natural Landforms.

7.5.2.3 Preserve rivers, lakes, streams, or other waterways, and incorporate them into the design layout.

7.5.3 Climate. The installation will be designed in response to local climatic conditions to provide a more comfortable environment, and reduce the demands for heating and cooling (Fig. 7.5).

7.5.3.1 Temperate Regions. Design and site development to balance the effects of seasonal thermal variations promoting both winter and summer cooling in terms of seasonal solar orientation and prevailing winds.

Shade parking lots with trees planted in islands and around the perimeter.

Preserve and develop large open areas of grass planted with groves of trees to provide shade and cooler microclimatic conditions.

7.5.3.2 Views and Vistas. The installation will be designed to preserve and enhance scenic and other attractive views and vistas, and to screen unattractive views and vistas. Visual extensions through open spaces provide a sense of orientation, relief, and enjoyment.

Preserve and take advantage of views into adjacent Petersburg National Battlefield.

Preserve and take advantage of views of wetland and open space.

7.5.4 Vegetation. The installation will be designed to protect and preserve existing native vegetation. This preservation reduces maintenance and enhances sustainability. A preferred plant matrix ([Appendix O, Plant Palette](#)) is included in this IDG. (Also, see [Section 10 – Landscape Design Component](#)).

Army and Fort Lee policy requires the use of low maintenance, native species of trees, shrub and ground cover.

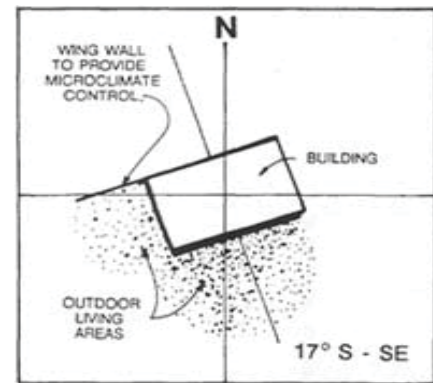


Fig. 7.5 - Building orientation for passive solar heating and cooling in the temperate region.

7.6 MANMADE SITE CONDITIONS

7.6.1 The site plan provides the locations of the manmade development that will occur on site. It establishes the spatial relationships as well as the relationships between manmade and existing natural features. Manmade site conditions include all development on the installation to include buildings, roadways, parking lots, walkways, walls, fences, utilities, and other facilities. Buildings, roadways, parking lots and above ground utilities are the primary manmade visual determinants.

7.6.2 The following site planning guidelines will be used in the visual and spatial review of the installation:

7.6.2.1 Cluster buildings to reduce impact on the natural environment, and reduce roadways and utility corridors needed to serve the development, however, at the same time giving full consider to antiterrorism and force protection requirements.

7.6.2.2 Locate large buildings in relatively flat areas to reduce the cut and fill and preserve the natural vegetation and drainage and orient to topography (Fig. 7.6).

7.6.2.3 Minimize solar heat gain for cooling and maximize solar heat gain and retention for heating.

7.6.2.4 Site buildings with consideration for the microclimate conditions of the site that result in variances in wind or light because of adjacent land forms, structures, or trees.

7.6.2.5 Orient outdoors pedestrian areas for most comfortable exposure.

7.6.2.6 Utilize lighter colored building surfaces exposed to the sun and darker colors on recessed surfaces to absorb radiation.

7.6.2.7 Orient windows according to impact of climatic conditions.

7.6.2.8 Locate development on leeward side of hills.

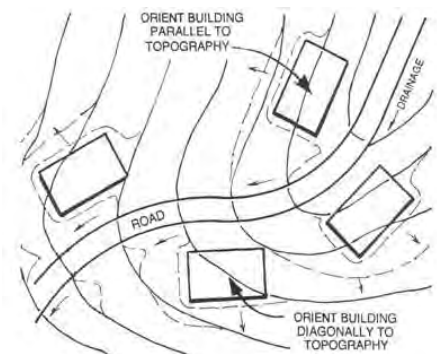


Fig. 7.6 - Orient Buildings and Roads to Topography.

7.6.2.9 Design and locate roads to provide a hierarchy of traffic carrying capacities.

7.6.2.10 Locate roads to blend with topography and vegetation.

7.6.2.11 Design and locate parking lots to minimize visual impact of broad expanses of pavement and vehicles (Fig. 7.7).

7.6.2.12 Design and locate pedestrian walkways and bicycle paths to fit the physical environment, and provide a comfortable pedestrian experience, limiting conflicts with vehicular traffic.

7.6.2.13 Locate trees and shrubs to buffer harsh natural conditions.

7.6.2.14 Deciduous material provides for sun in the winter and shade in the summer. Evergreen material provides windbreaks for cold north winds.

7.6.2.15 Design and locate site elements to blend with and enhance the physical environmental.

7.6.2.16 Force Protection requirements should be designed and located to blend with the physical environment.

7.6.2.17 Specific Fort Lee Criteria

Building Orientation and Siting. Orientation of buildings parallel to street should take precedence over irregular solar orientation in siting. An energy efficiency study may be required to permit siting to occur when building is beyond 10° off the east-west axis.

Set back the building so that its facade plane is aligned with other buildings on the same street.

Where more than one street grid pattern exists, choose the most important frontage to orient the building.

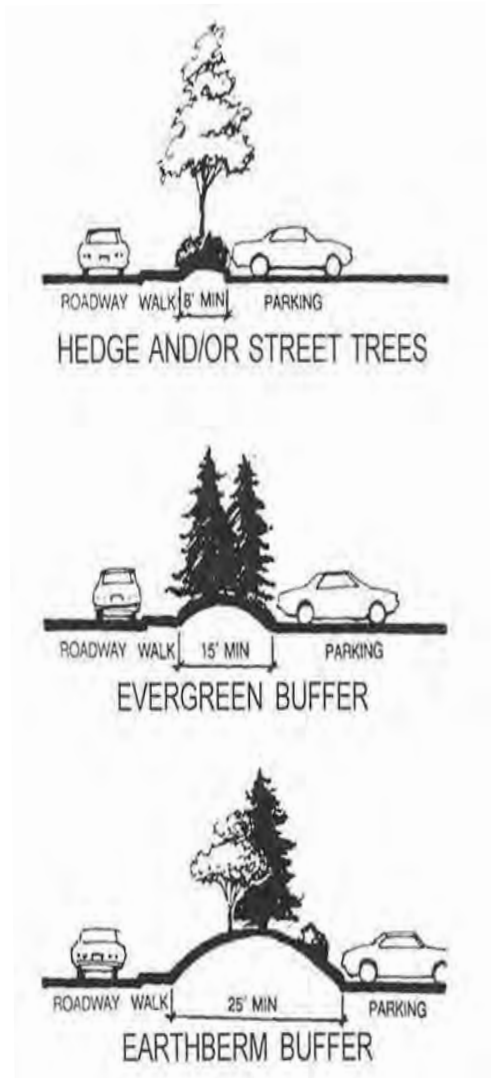


Fig. 7.7 - Screen parking areas with berms and landscaping.

Spaces between buildings will be regularly shaped rectangles, which are therefore more useful for parking and service areas.

DoD regulations require all new buildings to be oriented with the broad side within 15 degrees to 20 degrees of due east-west. In general, this may lead to energy savings in buildings with certain massing proportions. However, in many circumstances, specific analysis of the actual design may indicate site development inefficiencies resulting from the awkward orientation where prevailing street grids and existing adjacent buildings are oriented otherwise. Moreover, other measures may be taken in the specific building design to optimize energy efficiency, such as shading devices at window openings, coordination of deciduous tree plantings, overall building envelope massing and certain types of sky lighting. This type of analysis is strongly recommended so that buildings are oriented according to the solar guideline (i.e. 15 degrees to east-west) only when it is clear that this will indeed be effective for the actual building design. If solar orientation will not significantly affect the particular building, then it should be oriented squarely with the street or existing building grid.

Buildings Flanking Formal Open Space. Formal open spaces are desirable and should be defined by the location, placement, and scale of surrounding buildings. In some locations, the elements of this type of space already exist and need only be completed by the careful planning of building locations and landscaping. In other areas a totally new configuration of building groups needs to be created (Fig. 7.8).

The central axis of an open space establishes reference line for symmetric placement of buildings on both sides. The buildings should then be set back equally on both sides of the centerline.

Building fronts facing each other on opposite sides of the space should be designed with similar massing and proportions where possible.

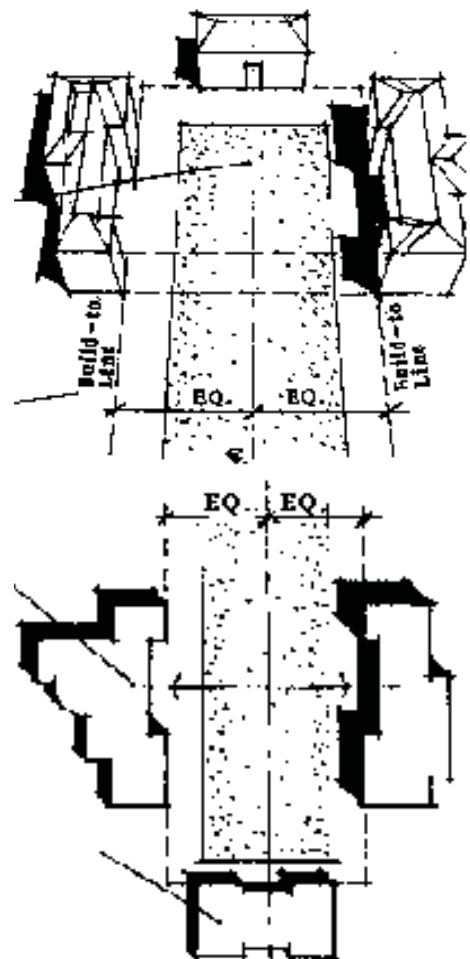


Fig. 7.8 - Buildings sited around common open space should be symmetrically arranged.

Buildings located at the end of an axis should be designed with symmetrical facade with entrance or feature opening at center. Function of building should be of some importance.

Warehouse and Storage Yards. Careful siting of warehouses and planning of fenced storage yards is essential to insure that these industrial functions are properly screened from more public areas. When locating storage facilities, the guidelines in Figures 7.9 and 7.10 should be followed.



Fig. 7.9 - Views of warehouses should be screened from adjacent roadway.

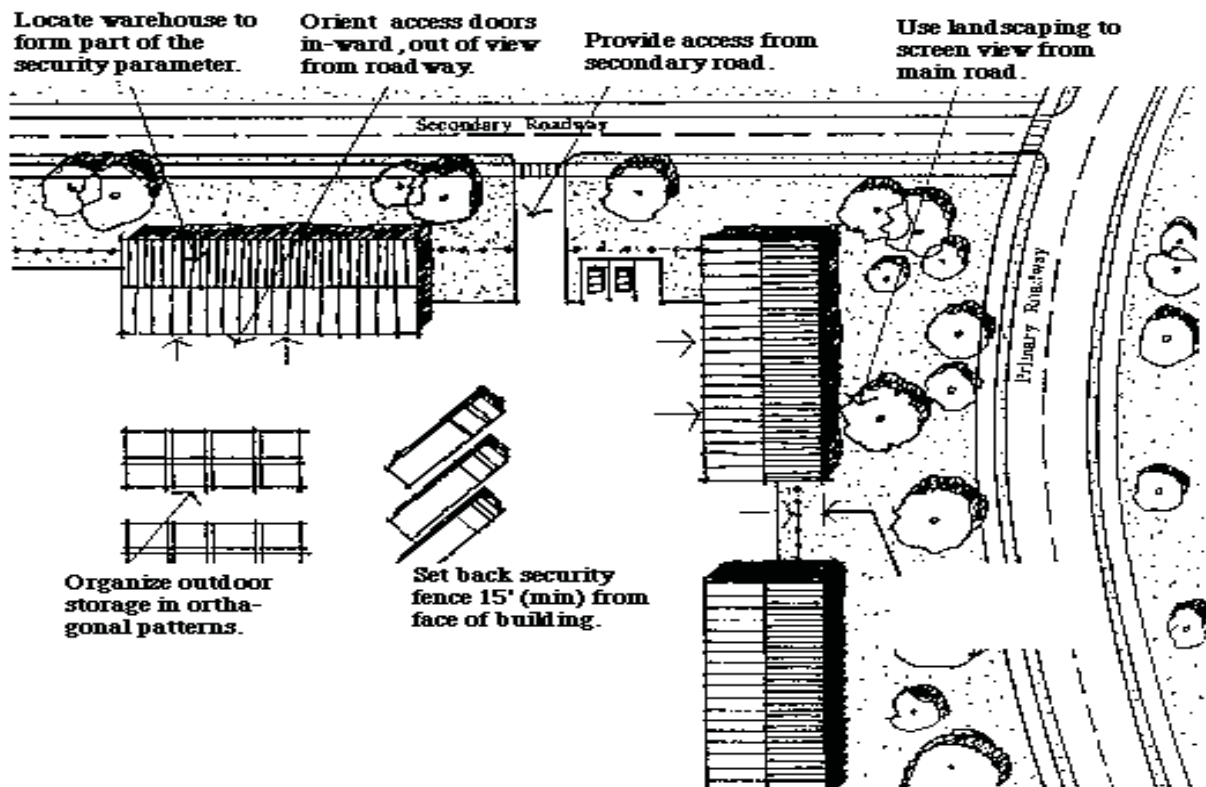


Fig. 7.10 - Guidelines for organizing a service yard.

Family Housing Development. Provide open recreation space between housing clusters allowing view to forested areas and breaking up density of development.

New housing development should take full advantage of mature forested areas. Siting should maximize this natural amenity (Fig. 7.11).

Parking lots should be planned with trees and planting island to break up excessive paving in residential areas.

Recreational facilities close to the residential areas should be periodically upgraded and should accommodate several age groups.

Drainage in Lawn Areas. Ditches should be eliminated wherever possible by the use of culverts and underground piping. An overall drainage plan as an engineering study should be conducted by the DEL for underground piping

Grass Drainage Swales. Where drainage is minimal and water flow does not require underground piping, grass swales are an appropriate solution. Wide shallow ditches transferring water to a catch basin or lawn inlet should create as little interruption in lawn areas as possible.

Swale location and design will be determined by drainage requirements and surrounding site layout. Round off grade transitions to prevent vegetation and soil erosion (Fig. 7.12).

Field Stone may be required in areas adjacent to drainage structures, such as lawn inlets, to further prevent soil erosion. If excessive riprap is required and the depth of the swale creates a drainage ditch, underground piping and drainage should then be considered by an engineering study (Fig. 7.13).

The following criteria apply to the design of grass swales:

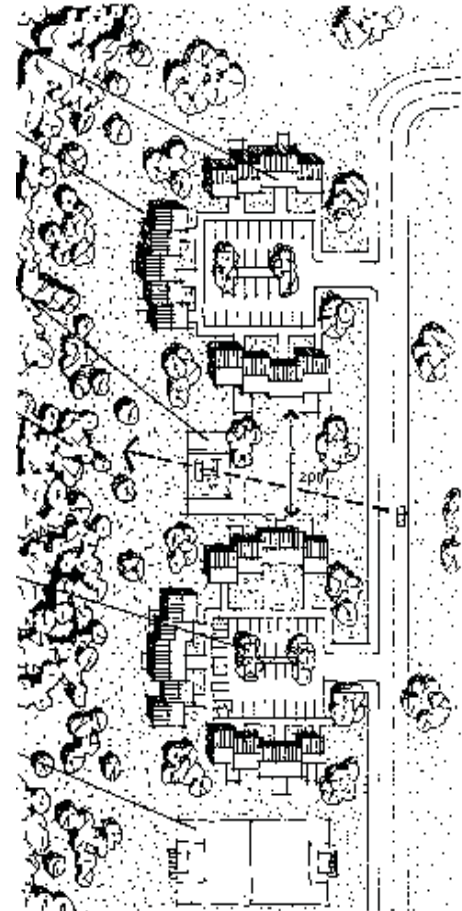


Fig. 7.11 – A conceptual plan showing the preferred relationships between residential units, open space, parking and recreation.



Fig. 7.12 - Where feasible, drainage ditches should be piped underground or broadened into more naturalistic swales.

- Longitudinal Slope
 - Grass 2 percent minimum
8 percent maximum
 - Riprap 00 percent maximum
- Cross Slope
 - Side 2 percent minimum
1:5 percent maximum
 - Back 1:10 percent maximum

Swales should be wide and shallow at the top and should increase in depth at their bottom or low point.

Tree and shrub vegetation should be kept out of grass swales (Fig. 7.14).

Low Impact Development. Low Impact Development (LID) is an innovative stormwater management approach with a basic principle that is modeled after nature: manage rainfall at the source using uniformly distributed decentralized micro-scale controls. LID's goal is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source. Techniques are based on the premise that storm-water management should not be seen as storm-water disposal. Instead of conveying and managing / treating stormwater in large, costly end-of-pipe facilities located at the bottom of drainage areas, LID addresses stormwater through small, cost-effective landscape features located at the lot level. These landscape features, known as Integrated Management Practices (IMPs), are the building blocks of LID. Almost all components of the urban environment have the potential to serve as an IMP. This includes not only open space, but also rooftops, streetscapes, parking lots, side-walks, and medians (Fig. 7.15).

LID is a versatile approach that can be applied equally well to new development, urban retrofits, and redevelopment / revitalization projects. LID-related objectives at Fort Lee include:

Identify LID techniques which are applicable to development at Fort Lee and develop parameters for implementing these techniques. Examples of LID techniques that may be used at Fort Lee are:

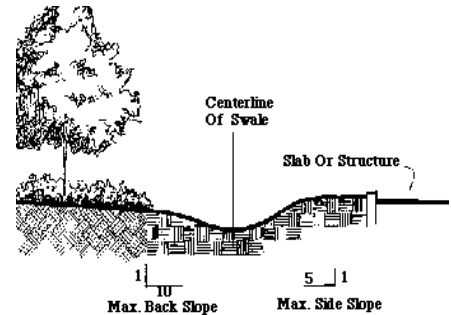


Fig. 7.13 - A typical cross-section of a grass drainage swale.



Fig.7.14 - Drainage ditches are difficult to maintain and impede mowing of the surrounding lawn areas.

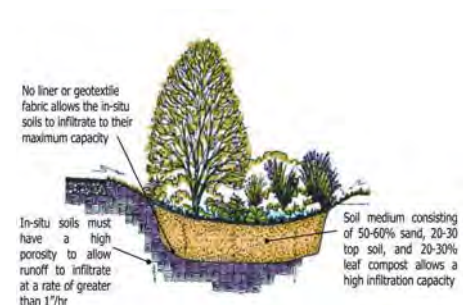


Fig.7.15 - Low Impact Development is an innovative stormwater management approach with a basic principle that is modeled after nature, such as the swale shown above.

- bio-retention;
- permeable paving;
- soil amendments; and
- grass swales.

Implement LID techniques into Fort Lee's stormwater management practices.

7.7 ARMY STANDARDS

The cited Army Standards shall be met.

- [Technical Manual \(TM\) 5-803-14, *Site Planning and Design*](#)
- [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#)
- [Uniform Federal Accessibility Standards \(UFAS\)](#)

7.8 REFERENCES

The following references are provided for guidance.

- [Unified Facilities Criteria \(UFC\) 2-600-01, *Installation Design, Chap 7*](#)
- [Army Regulation \(AR\) 200-2, *Environmental Effects of Army Actions*](#)
- [Technical Instructions \(TI\) 800-01, *Design Criteria*](#)
- [Technical Instructions \(TI\) 801-02, *Family Housing*](#)
- [Technical Instructions \(TI\) 804-01, *Area Planning, Site Planning, and Design*](#)
- [Technical Manual \(TM\) 5-820-1/ Air Force AFM 88-5, Chap. 1, *Surface Drainage Facilities for Airfields and Heliports*](#)

- [Technical Manual \(TM\) 5-820-3/Air Force AFM 88-5, Chap. 3, *Drainage and Erosion-Control Structures for Airfields and Heliports*](#)
- [Technical Manual \(TM\) 5-820-4/Air Force AFM 88-5, Chap. 4, *Drainage for Areas Other Than Airfields*](#)
- [Technical Manual \(TM\) 5-822-2, *General Provisions and Geometric Design for Roads, Streets, Walks, and Open Storage Areas*](#)
- [Technical Manual \(TM\) 5-822-5, *Pavement Design for Roads, Streets, Walks, and Open Storage Areas*](#)
- [Master Planning Instructions \(MPI\)](#)
- [Whole Building Design](#)
- [Low Impact Development Center](#)
- [Prince George's County Maryland Department of Environmental Resources, Environmental Services Division](#)
- [Virginia Stormwater Management Program.](#)

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SECTION 8

BUILDING DESIGN STANDARDS

8.1 INTRODUCTION

8.1.1 The design character of an installation's buildings affect the installations overall image. The visual analysis of buildings and related structures helps define visual zones and themes and is an important part of an installation's assets and liabilities assessment.

8.1.2 The building design component encompasses the character of the buildings as well as the arrangement of buildings to one another and to their environment. Architectural style, materials, and colors indigenous to the region provide regional flavor to an installation while historical and culturally significant buildings give a sense of heritage (Fig. 8.1).

8.1.3 The visual analysis of a structure also includes concern for accessibility, use of materials, placement of entrances, incorporation of additions and renovations, the incorporation of plazas and courtyards, interior design and the appropriateness and quality of building maintenance.

8.1.4 This section provides: 1) the objectives and visual determinants that should be utilized to identify and assess the building design quality of the installation; 2) guidelines to preserve and sustain the existing architectural environment as new campus groupings are developed (Fig. 8.2) and existing buildings are renovated or expanded; and 3) standards and guidance pertaining to the development and maintenance of the various interiors and exteriors of buildings on the installation.

8.2 BUILDING OBJECTIVES

8.2.1 Sustainability. The architectural style of existing and future buildings should reflect and



Fig. 8.1 - The Aerial Delivery Building is a landmark building at Fort Lee.



Fig. 8.2 - New buildings in TA-5, Ordnance School Training Campus at Fort Lee.

reinforce the sustainability of the installation. Sustainable design reduces construction and maintenance cost and conserves energy through proper construction and materials selection. See [Appendix D](#) for a more complete discussion on Sustainable Design.

8.2.2 Building Design Objectives

8.2.2.1 Adapt building designs to natural site conditions (Fig. 8.3).

8.2.2.2 Design buildings in clusters to preserve land and reduce construction and maintenance costs.

8.2.2.3 Develop a coherent architectural style that results in the blending of new and old structures. Create distinguishing architectural elements such as wall curves and bows with vertical and horizontal elements functionally represented such as the Aerial Delivery building. However, when considering historical buildings one should be able to differentiate between the historic fabric and the new material.

8.2.2.4 Design buildings to include more floors in a vertical structure that results in a smaller footprint and more efficiently utilizes limited installation land areas.

8.2.2.5 Combine multiple activities in one building to reduce the number of buildings required and more efficiently utilize limited installation land areas.

8.2.2.6 Design multiple use facilities with the capability to quickly change interior layouts to accommodate changing requirements.

8.2.2.7 Use indigenous construction materials and practices that require less energy to produce and transport and may be recycled at the end of their usefulness.

8.2.2.8 Locate windows to maximize natural light, ventilation and outward views (Fig. 8.4).

8.2.2.9 Consider adaptive reuse of buildings once their initial use is no longer required.

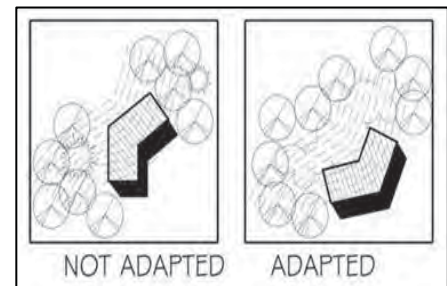


Fig. 8.3 - Adapt Building Design to Site Conditions.



Fig. 8.4 - Locate windows to maximize natural light.

8.2.3 Visual Zones

Visual zones are cohesive areas of clearly organized complexes of buildings with well-defined open spaces in-between. The entire Fort Lee site has been divided into the following visual zones (Fig. 8.5):

- GW / Gateway Zone
- LT / Living-Training Zone
- CC / Community Center Zone
- IA / Industrial Area Zone
- TF / Tenant Facilities Zone
- FH / Family Housing Zone
- OS / Open Space and Field Training Zone
- OSTC / Ordnance School Training Complex/ TA-5/ North Range

Each of these areas must be coordinated through the application of the design criteria to insure a strong, unified image.

8.2.4 Architectural Themes

8.2.4.1 A strong architectural theme for each visual zone should be identified and enforced for new buildings as well as for additions and renovations of existing buildings within each zone. An architectural theme has been developed for the TA-5 facilities soon to be constructed for the Ordnance Training School Complex (Fig. 8.6).

8.2.4.2 The new buildings of the past decade at Fort Lee show a slight departure from the architectural themes established by the designs of more permanent buildings of the previous two decades at Fort Lee. During the building campaign of the previous two decades, the use of red brick with limestone/cast stone trim for the Headquarters building and several other structures nearby created a



Fig. 8.5 - Fort Lee has been divided into several visual zones.



Fig. 8.6 - The TA-5 architectural theme will be applied to all of the buildings to be located on TA-5.

strong architectural theme for future development in that area.

8.2.4.3 But the new buildings of the past decade deviated from extensive use of stucco and instead started using brick, a more permanent building material in combination with brown trim and brown standing seam metal roofing. Limestone and cast stone were employed to accentuate building entrances and in fenestration. Now this trend should continue in the evolution of a major architectural theme across the post for future new buildings, gradually replacing stucco of existing buildings with brick as part of renovation and alteration projects' scope (Fig. 8.7).

8.2.4.4 Traditional brick theme is evident in older buildings at Fort Lee and the new buildings are being built with contemporary brick theme. Recommendations to continue and strengthen this emerging architectural character are presented later in this section.

8.2.5 Sustainability

8.2.5.1 The architectural style of existing and future buildings should reflect and reinforce the sustainability of the installation. Sustainable design reduces construction and maintenance cost and conserves energy through proper construction and materials selection. See [Appendix D](#) for a more complete discussion on Sustainable Design.

8.2.5.2 Fort Lee set goals to achieve "Silver" level by the year 2006 and "Gold" level by the year 2007. The eligibility criteria and requirements for these levels are listed in the LEED Program for "Green" buildings.

8.2.6 Technical & Engineering Aspects

Consideration of performance aspects of building components such as life cycle costs and value engineering may require refinements to the recommendations in this section. These Design Criteria area intended to control the appearance of building materials. Responsibility for adequate and appropriate technical performance of building



Fig. 8.7 – New construction in the training area represents the latest architectural trend at Fort Lee.

components lies with the project manager, DEL, architect, engineer, builder and/or construction manager.

8.3 STRUCTURAL CHARACTER

8.3.1 Historical Context

8.3.1.1 The structural character of buildings within an installation varies according to the buildings' use and the era in which they were built. Building campaigns of each era leave a mark of the period's architectural style that over the years might result in a mix of different characters with incompatibilities (Fig. 8.8).

8.3.1.2 The difference in character may also result when the historical context of an installation, and existing adjacent buildings' character and scale is not considered while developing designs for new buildings or renovation and addition projects.

8.3.1.3 The pattern of development of Fort Lee is a result of a series of building campaigns beginning in 1917. The national emergencies of World War I and World War II each required massive buildups, which took the form of extensive grids of one- and two-story wooden structures.

8.3.1.4 Nearly all of these structures are now demolished as areas have been redeveloped with more permanent larger structures. However, the basic infrastructure, the pattern of roads and general layout of the post, remains somewhat a permanent legacy of the first building campaign. The distinctive crescent-shaped layout of the main cantonment is largely a result of the railroad and roadway alignments dating to pre-Civil War.

8.3.1.5 In recent years, a great deal of effort has been directed towards demolishing the World War II era wooden buildings, leaving very few historic structures at Fort Lee. Building 4300 (Lee Playhouse) and Building 3206 (barracks) are significant historic buildings. They are eligible for listing and inclusion to the NRHP (Fig. 8.9). These historic buildings, while not listed on the register, may require replacement of deteriorated building elements or rehabilitation in



Fig. 8.8 - Building campaigns from each era leave a mark of that period's architectural style at Fort Lee.



Fig. 8.9 - Building 4300, Lee Playhouse.

order to maintain them. Any such changes must be done in a manner that is sensitive to the historic character of the building and the surrounding buildings in its visual zone. The SHPO will also need to be consulted during any changes or development projects to these buildings. Recommendations of *The Secretary of the Interior's Standards for Rehabilitation of Historic Buildings* should also be followed. They address issues as diverse as building materials, building elements, building interiors, building site, and special considerations, such as additions, energy conservation, handicapped accessibility, and fire/life safety. For further guidance use [Army Regulation 200-4](#) and [Department of the Army Pamphlet 200-4](#). Specific requirements and recommendations for the treatment of historic properties are available in the National Park Service's [Secretary of the Interior's Standards for the Treatment of Historic Properties](#). A working awareness of historic preservation policies and procedures followed by the Army Corp of Engineers can be found in the [Technical Instruction \(TI\) 800-01, Design criteria, Chap. 16, Preservation of Historic Structures](#). Also see [Appendix M, Historic Preservation Guidelines](#).

8.3.1.6 Fort Lee is representative of the over-all trend in redevelopment for military installations, which has moved towards fewer and larger more permanent buildings, and away from repetitious grids of temporary structures. This is due in part to efficiencies required by the pragmatic demands of the building functions, as well as the economies of mechanical building systems and energy conservation (Fig. 8.10).

8.3.1.7 The demolition effort has created larger development sites and has set the stage for continuation of the current trend into the post's future development.

8.3.2 Visual Determinants

8.3.2.1 Scale, massing and articulation, form, fenestration, materials, color, and texture are visual determinants that shape a building's character. During the visual analysis of Fort Lee's buildings, each of these determinants should be reviewed to create a set of recommendations for future



Fig. 8.10 - Temporary structure located at Fort Lee.

development that provides a consistent and coherent “sense of order” and “sense of place” as the designs for new buildings or renovation projects are developed and executed. The techniques for reviewing the impact of each of these visual determinants on the structural character are explained below.

8.3.2.2 Scale

Scale refers to the size of a building facade in relation to humans. Buildings that include predominant vertical facades, which dwarf the individual, are defined as monumental in scale. Monumental architectural design is typically utilized for more ceremonial buildings. These buildings make use of large, glazed areas at entrances and oversized fenestration elements to create a scale appropriate to the building's use (Fig. 8.11). Buildings with more horizontal facades designed to relate more to the size of the human figure are defined as human scale (Fig. 8.12).

8.3.2.3 Recommendations

The scale of most buildings on Fort Lee campus should be more human than monumental. Where the scale of different buildings is consistent in a single area, it results in a strong unified image. All new construction should maintain compatibility of scale with adjacent buildings. Scale and relief should be provided through proper use of roof form, fenestration, building articulation and landscape plantings.

8.3.2.4 Massing and Articulation

8.3.2.4.1 Massing of a building refers to its overall bulk or volume. Massing does not occur in isolation. Site design, building layout planning and building elevation design all influence the massing decisions. The footprint, overall size and proportions, and height of a building's envelope contribute to its mass (Fig. 8.13).

8.3.2.4.2 Although the Footprint of a new building must vary to accommodate its functional program



Fig. 8.11 - Monumental scale and massing building 1109.



Fig. 8.12 - Human scale and massing at the Fort Lee Federal Credit Union building.

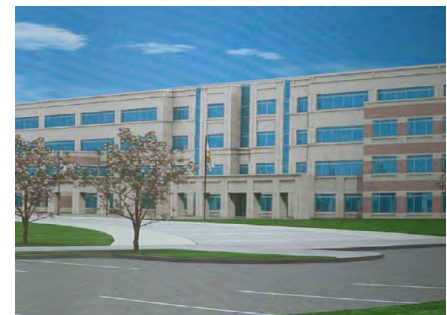


Fig.8.13 - Elements of a building elevation on the new SCoE HQ facility.

requirements, it should be carefully developed to meet the building's desired size and proportion requirements.

8.3.2.4.3 The size and proportions of a new building if located in a cluster of existing buildings should be designed to make it compatible with the architectural theme of adjacent structures in the same visual zone. Compatibility should be achieved by use of form, fenestration, color and material choices.

8.3.2.4.4 The height of a new building should be determined partially by the height of its neighbors. A new high-rise building should not be located on a site directly adjacent to lower-rise buildings. If alternate suitable site is not feasible, a transitional element should be provided. Transition may be achieved by locating the new building at increased spatial interval, changing the form of the new building by a gradual increase in its height, or relating the new building to a human scale by incorporation of horizontal features (Fig. 8.14).

8.3.2.5. Recommendations

8.3.2.5.1 The new building's functional program may dictate floor areas, its overall bulk and height. In any single area, the heights of buildings should be matched, so that a consistent scale is maintained. Differences in floor-to-floor heights and sloping sites may require some variation. However, in general, alignment of all major building features is preferred. These include general fenestration, cornice lines, belt courses and roof lines, all of which should be aligned with adjacent buildings whenever possible.

8.3.2.5.2 Although specific program requirements may require higher or lower structures, wherever feasible, the following Recommended Maximum Building Heights should be applied. The Preferred Building Height represents an ideal height for all buildings in the visual zone.

8.3.2.5.3 Although floor areas and overall bulk of buildings must vary to accommodate required functions of the building program, the architectural design solution should resolve the awkward

	GW	LT	CS	IA	TF	FH	OS
1 Story	●						○
2 Stories			○	●		●	●
3 Stories		○	●		○		
4 Stories		●			●		

● = Maximum Allowed ○ = Preferred Bldg. Ht.

Fig. 8.14 – Recommended maximum building heights.

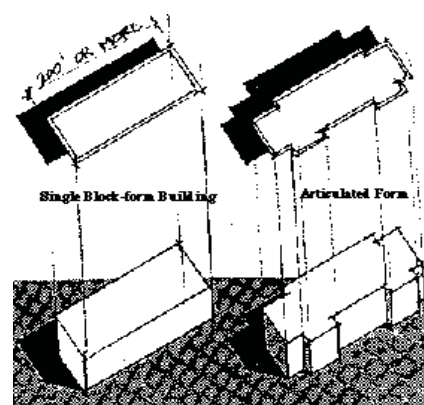


Fig. 8.15 – Articulate large buildings to minimize their mass.

differences by carefully shaping the building's mass and by articulating the facade design. The following illustrations recommend such design solutions for different sizes of buildings (Fig. 8.15).

8.3.2.5.4 Simple block-forms for larger buildings appear awkward and out-of-scale when located among smaller-scaled structures. When the program requires a large building mass, the form should be "articulated" by modulating the facade plane (Fig. 8.16). This breaks up the otherwise massive form and reduces the apparent scale to better fit with the surrounding buildings. The example below shows a large building, which has been "articulated" to appear as three smaller rectangular forms. A central gallery flanked by two pavilions.

8.3.2.5.5 When program requires a large building area on a single floor, the form should be "articulated" by modulating the facade plane.

8.3.2.5.6 When program requires a large building mass in a two or three story structure, the form should be "articulated" by modulating the facade plane.

8.3.2.5.7 Tall, massive buildings, when placed among much smaller buildings, may appear awkward and out-of-place. When the program requires a taller building in an area of smaller structures, the design of the taller building must be "articulated" to reflect the predominant scale of the surrounding area. The following design techniques should be used where appropriate (Figs. 8.17 and 8.18):

- Match cornice line height where adjacent buildings have prominent cornice features.
- Match belt courses or other important lines of vertical articulations.
- Step-back upper stories above prevailing cornice line.

8.3.2.6 Form

The form of a building is determined by its size, mass, shape and proportions. The use of similar building

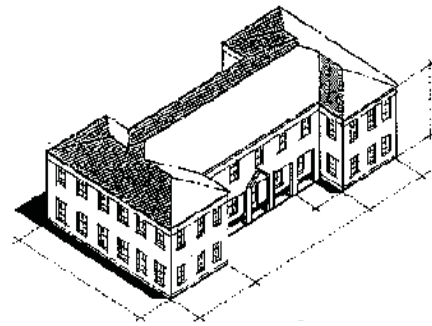


Fig. 8.16 – An example of articulated building form.

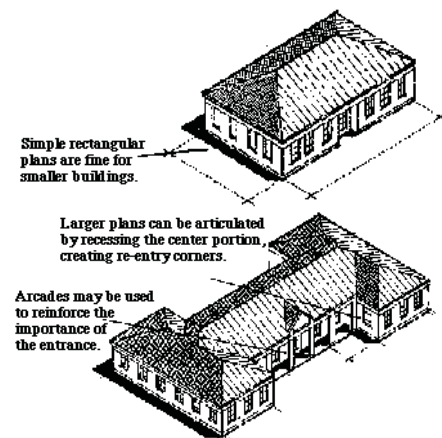


Fig. 8.17 – One-story buildings with large footprints should be articulated.

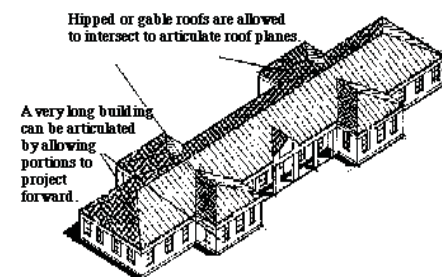


Fig. 8.18 – Long building should be articulated at multiple points along their length.

forms provides continuity to the installation architectural impact. The result is a more aesthetically pleasing environment.

8.3.2.7 Fenestration

Building fenestration includes features such as doors, windows, and building decoration details. These features should be similar in arrangement, design, size, and proportion for architectural compatibility and visual consistency and continuity. The rhythm, pattern and proportions of window openings are major factors in a building's design character. Proper use of building fenestration breaks up mass (Fig. 8.19).

8.3.2.8 Recommendations

8.3.2.8.1 Where a building is located at a prominent location with a lot of visibility in GW, LT, CC or TF visual zones, the formality of its facades needs to be strengthened with careful placement of windows.

8.3.2.8.2 The examples in the figures show how newer buildings at Fort Lee have employed fenestration in the contemporary brick theme:

8.3.2.8.3 Horizontal strip windows at higher sill level set in brick masonry recesses that extend from column to column. This sun-shading device has been employed cleverly to add dramatic fenestration to the façade (Fig. 8.20).

8.3.2.8.4 Facades of the sides where sun-shading is not required continue the window pattern without the recessed masonry to extend the architectural expression on all four sides of the building.

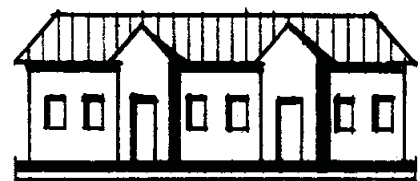
8.3.2.8.5 Brick detailing around window openings as in traditional brick theme is not required

8.3.2.8.6 Cast stone / lime stone is not used at sills and heads of windows but has been utilized in continuous horizontal bands across heads of windows to accentuate the horizontal expression and bring the façade down to human scale.

8.3.2.8.7 Ground floor mechanical louvers are vertically aligned with the masonry recesses.



Undesirable: Continuous Unbroken Mass



Projections and Residential Scale Openings Break Up Mass

Fig. 8.19 - Fenestration breaks up mass.



Fig. 8.20 - The ASTF uses fenestration to modulate building mass.

8.3.2.8.8 The form of this large building has been "articulated" by modulating the facade plane by breaking up the otherwise massive form and reducing the apparent scale to better fit with the surrounding buildings (Fig. 8.21).

8.3.2.8.9 The building looks like a number of small buildings in a complex.

8.3.2.8.10 Each broken mass has been treated with a different arrangement of windows and balancing the contrast with use of horizontal and vertical limestone / cast stone bands of various widths (Fig. 8.22).

8.3.2.8.11 Entrances have been accentuated by steel frame and semi-circular glass canopies.

8.3.2.8.12 The brick towers without windows at lower level add to their massive character.

8.3.2.8.13 The towers at the top with different shade of brick color and roof with its arc add special interest to the building mass.

8.3.2.8.14 The traditional brick theme around the post is accentuated by careful detailing around window and door openings. Most of the new buildings in GW, LT, CS, OSTC, and TF visual zones at Fort Lee are carrying forward the current contemporary brick theme. New construction in these zones, adjacent to buildings with traditional brick theme should follow the tradition by using the recommended examples of sill, head and jamb brick detailing. If no precedent exists, but the visual zone has surrounding buildings with traditional brick theme, choose one of these examples (Fig. 8.23).

8.3.2.9 Materials

The use of the same materials in the exterior finish and trim of buildings helps provide visual continuity (Fig. 8.24).

8.3.2.10 Color

The use of a color scheme that is consistent throughout the installation, where possible, results in



Fig. 8.21 – The Aerial Delivery Training Facility is articulated to reduce its mass.



Fig. 8.22 - An example of how fenestration should be employed for buildings with the traditional brick theme.



Fig. 8.23 - Traditional brick patterns to be used around windows.

a continuity of buildings and contributes to a sense of place (Fig. 8.24).

However, color schemes throughout the installation might vary according to the visual zone and visual theme in which the structure is located.

8.3.2.11 Texture

8.3.2.11.1 The use of materials of similar texture in buildings helps to provide visual continuity for the installation.

8.3.2.11.2 Materials and color selection guidelines and recommendations are provided in Section 8.14.

8.3.3 Architectural Themes

Fort Lee installation already has two strong architectural themes that employ brick extensively; traditional brick theme and contemporary brick theme. The third theme uses painted stucco but since the future trend is towards the use of more permanent materials, and materials with integral colors, themes using painted stucco should be gradually replaced in the design programs for new buildings as well as renovations and additions projects. The following photos illustrate examples of two brick themes that should be continued and reinforced across the installation (Fig. 8.25).

8.3.3.1 Traditional Brick Theme

In all visual zones except SS and FH, where adjacent buildings predominantly show traditional brick theme, the design of new buildings should relate in scale and materials to some of the existing traditional significant buildings.

8.3.3.1.1 Mifflin Hall with brick as predominant building material, pitched metal roofs, and wide overhangs above properly scaled window openings, has created a vocabulary for a formal building form of the traditional brick theme (Fig. 8.26).

8.3.3.1.2 Just as the Mifflin Hall building, a few one-story brick buildings have set vocabulary for design of



Fig. 8.24 - Color scheme for new storage building in the Industrial area.

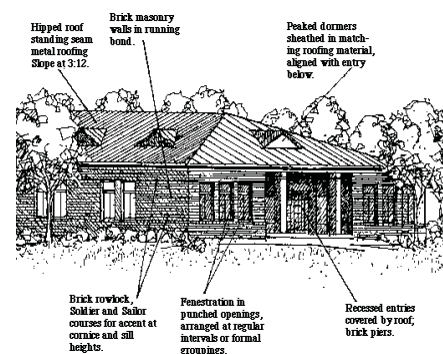


Fig. 8.25 - Criteria for contemporary brick exterior patterns.



Fig. 8.26 - Mifflin Hall, soon to be replaced, is the predominate building at the Lee Gate.

new single-story brick buildings in all visual zones except SS and FH. The following figures show how brick coursing has been used for accent.

8.3.3.1.3 The Gatehouse is the first structure one sees when approaching the Post at the Gateway Zone. The structure should be simple but well designed. Brick and sloped metal roof should be used. Appropriate lighting and site furnishings should be incorporated to improve the visual image.

8.3.3.1.4 The new warehouse structures should be brick exterior, standing seam metal roofing and brick wainscoting to articulate the building form that matches other buildings in the SS zone. Although a number of existing warehouse buildings have used painted stucco for exterior walls, future warehouse structures should use more permanent materials with integral colors (Fig. 8.27).

8.3.3.1.5 Any new family housing which may be developed in the future is to follow these design guidelines. Emphasis is given to stepping the plan to give greater individual identity to each dwelling unit. Brick masonry is recommended, though vinyl siding surfaces may also be used in coordination with brick. Conceptual plan of “stepped” family housing units is shown below (Fig. 8.28):

8.3.3.2 Contemporary Brick Theme

This theme should be used for all building function types in all visual zones except warehousing in SS zone and residential structures in FH zone. The predominant material in these buildings is brick and cast stone / limestone to be used for accent.

8.4 BUILDING ENTRANCES

8.4.1 A building entrance is a primary feature of any building design. The entrance should be defined and recognizable as the point of entry regardless of the size or importance of the building.

8.4.2 The entrance to a building should be in a prominent location and should be oriented toward the



Fig. 8.27- Brick water tables should be used on the facades of new warehouse buildings.

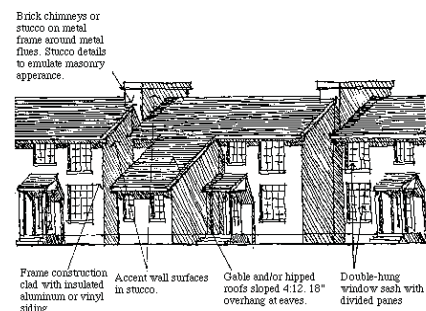
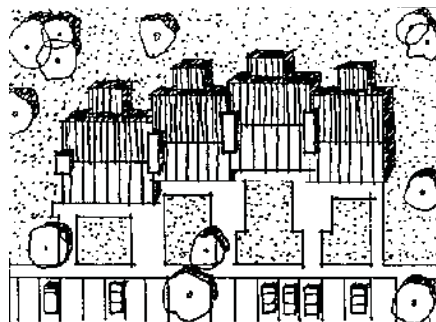


Fig. 8.28 - Plan and elevation views illustrating design criteria for multi-family units.

primary adjacent public spaces such as a courtyard, lawn, parking lot, or street (Fig. 8.29).

8.4.3 The details of an entrance should be designed to provide continuity with other entrances to the building and the entrances of adjacent buildings.

8.4.4 The following criteria apply to building entrances:

8.4.4.1 Cast stone / Lime stone to accentuate entrance (Fig. 8.30);

8.4.4.2 Recessed entrance opening at human scale with a special pointed arched opening above to express major entry point (Fig. 8.31);

8.4.4.3 Major entry at the center of the elevation with vertically aligned window openings;

8.4.4.4 Paired openings to create an interesting rhythm;

8.4.4.5 Consistent head and sill heights for all windows;

8.4.4.6 Cast stone / Lime stone wainscoting at the street level.

8.4.4.7 Imposing glazed block faced wall that follows building form and roof profile to express major entrance at the center of building.

8.4.4.8 The entrance is further articulated by recessed entry points at human scale, window openings punctuating the glazed block wall above, and a special opening at the apex.

8.4.4.9 Interplay of roof forms to add interesting massing (Fig. 8.32).

8.4.4.10 Rhythm of windows on both floors of the brick masses flanking the entrance repeated in central glazed block mass to extend the architectural expression.



Fig. 8.29 - The primary entrances to the Soldier One Stop building is well defined and in a prominent location.



Fig. 8.30 - Accent materials are used at the Kenner Army Medical Clinic to reduce the mass of large windowless walls.



Fig. 8.31- Accent material is used at the ASTF to reduce the vertical mass of the building.



Fig. 8.32 – Accent material used at the 49th Quartermaster Group to emphasize the roofline.

8.4.4.11 Small square louver openings and glazed block accent squares finesse the articulation (Fig. 8.33).

8.5 SERVICE AREAS

8.5.1 Service areas, such as loading docks and trash dumpsters, should be screened from the views of primary use areas such as entrances, courtyards, gathering areas, streets and parking lots (Fig. 8.34).

8.5.2 Fort Lee building design standards recommend mechanical systems equipment to be located in “yards” and not mounted on building roofs. Roof mounted equipment is discouraged however, if roof top equipment is specified it must be well integrated into the design. The equipment should also be screened from primary views.

8.5.3 Screening enclosures should be designed by using walls and landscaping. The enclosure walls should be between six and eight feet high and should be constructed with the same materials as the adjacent building (Fig. 8.35).

8.5.4 Trash and garbage collection areas must be located a minimum of 25 meters from troop billeting, family housing areas (containing more than 12 units), and stand-alone retail facilities. They will be placed a minimum of 10 meters (33 feet) from all other inhabited structures ([UFC 4-010-01](#), Table B-1).

8.6 BUILDING ACCESSIBILITY

8.6.1 All structures or facilities, other than the exceptions mentioned below, must meet the [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#) and the [Uniform Federal Accessibility Standards \(UFAS\)](#) accessibility standards. The more stringent standards apply in the event of conflicting guidelines (Fig. 8.36).

8.6.1.1 Any building or facility that is specifically restricted by occupancy classification to use only by able-bodied personnel during the expected useful life of the building or facility need not be accessible (military exclusion is provided by [UFAS 4.1.4 \[2\]](#)), but



Fig. 8.33 - Accent material is used at the Clark Fitness Center to diminish the height of the wall in appearance.



Fig. 8.34 - The PX loading and receiving dock requires screening from primary view.

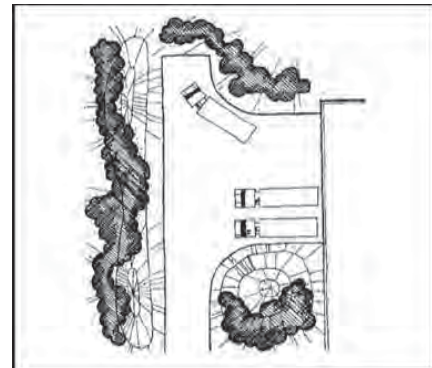


Fig. 8.35 - Plants and berms in service area presents a positive visual image.

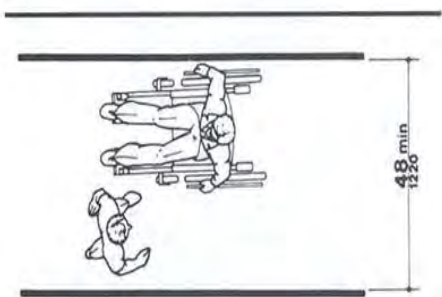


Fig. 8.36 - Facilities must meet UFAS standards.

accessibility is recommended since the intended use of the facility may change with time.

8.6.1.2 In particular, the following facilities need not be designed to be accessible: unaccompanied personnel housing, closed messes, vehicle, and aircraft maintenance facilities.

8.7 SEISMIC POLICY

8.7.1 The minimum performance objective for Army facilities is Substantial Life-Safety. To ensure compliance, seismic evaluations and mitigation of unacceptable seismic risks shall be performed. Higher levels of seismic protection for mission essential facilities will be considered in the evaluation.

8.7.2 Seismic evaluation. Guidance for the seismic evaluation of existing facilities is given in [TI 809-05, *Seismic Design Evaluation and Rehabilitation for Buildings*](#). Buildings will have a seismic evaluation performed when:

- A change in the building's use causes a change in the occupancy category, as defined in [TI 809-04, *Seismic Design for Buildings*](#), to a category of greater importance (lower category number).
- A project is planned which causes the capacity of the structural system or components to be reduced to 90 percent or less of original stability and strength.
- A project will significantly extend the facility's useful life or will significantly increase the facility's value and the cost exceeds 50 percent of the current replacement value.
- A facility is damaged or is deemed to be an exceptionally high risk to occupants or to the public.

8.7.3 Exceptions to Seismic Evaluations. Existing facilities are exempt from seismic evaluation if:

- The original design was done according to the provisions of the 1982 or later edition of [TM 5-809-10](#), or the 1988 or later edition of TM 5-809-1.
- Replacement is scheduled within 5 years.
- The facility is intended only for minimal human occupancy, and occupied by persons for a total of less than 2 hours a day.
- The facility is a one or two family dwelling, two stories or less, located in Zone 1 or 2, as shown in [TM 5-809-10](#).
- The gross area is less than 3000 square feet (275 square meters). Mitigation of unacceptable seismic risks. If the seismic evaluation determines that the facility does not meet Substantial Life-Safety or higher performance standards, as appropriate, unacceptable seismic risks will be mitigated. Rehabilitation will be performed in accordance with [TI 809-05](#).

8.7.4 New Facilities or Additions or Extension of Existing Facilities. New facilities and additions or extension of existing facilities will be designed to provide the level of seismic protection required by [TI 809-04](#).

8.8 INDIGENOUS STRUCTURES

Sustainability in the design and construction of buildings includes incorporating time-proven building designs that are indigenous to the region. Indigenous design elements should be utilized in the design of new buildings.

8.9 HISTORIC ARCHITECTURE

8.9.1 The visual integrity of historic buildings or districts on the installation will be preserved and protected (Fig. 8.37). Fort Lee has two buildings – 3206 and 4300 – that are eligible for being listed as historic. The installation is currently developing a



Fig. 8.37 - The Lee Playhouse is eligible for listing on the National Register.

Historic Preservation Plan for Building 4300 that will provide a guideline of upgrades to the facility while maintaining the building's National Register integrity. Army's management of historic properties is pursuant to the duties and responsibilities established by Congress under the National Historic Preservation Act (NHPA). The NHPA also created the NRHP as the official listing of the nation's historic properties considered worthy of preservation. When working with historic properties the Army uses the following three categories:

8.9.1.1 Historic Buildings or Structures: These are significant buildings or structures, which are listed on or eligible for listing to the NRHP.

8.9.1.2 Historic District: A distinct group of buildings, structures, or landscapes that possesses significance and are listed on or eligible for listing to the National Register.

8.9.1.3 National Historic Landmarks: Buildings, structures, or landscapes listed in the National Register, but also recognized as nationally significant. National Historic Landmarks can either be listed individually or as a district.

8.9.2 For further guidance use [Army Regulation 200-4](#) and [Department of the Army Pamphlet 200-4](#). Specific requirements and recommendations for the treatment of historic properties are available in the National Park Service's [Secretary of the Interior's Standards for the Treatment of Historic Properties](#). A working awareness of historic preservation policies and procedures followed by the Army Corp of Engineers can be found in the [Technical Instruction \(TI\) 800-01, Design criteria, Chap. 16, Preservation of Historic Structures](#).

8.9.3 See [Appendix M, Historic Preservation Guidelines](#).

8.10 RENOVATIONS AND ADDITIONS

8.10.1 When existing buildings are renovated or additions are constructed, the architectural character of the renovation or addition should be

compatible with the architectural character of the existing building and the adjacent buildings (Fig. 8.38). This compatibility includes the use of materials, color, shape, size, scale, and massing in the addition or renovation that blends with the architectural character of the existing structure. However, when renovating or adding to historical buildings one should be able to differentiate between the historic fabric and the new material.

8.10.2 At Fort Lee it is preferred that only permanent materials, such as brick and cast stone be used. Therefore, future renovation projects should not propose using stucco and should include replacement of existing stucco exteriors with brick or other masonry veneers.

8.10.3 Renovations and additions projects might also require closing existing exterior openings, and replacement of windows. The following recommended design solutions should be considered at Fort Lee.

8.10.3.1 Securing Existing Openings

8.10.3.1.1 Where an existing brick masonry opening must be closed, allow the original profile of the opening to remain so that the overall effect of the building's fenestration will be preserved.

Do this by infilling with masonry to match the surrounding brick color, pattern, and coursing.

8.10.3.1.2 Infill masonry should be flush with or recessed back from surrounding wall plane.

8.10.3.1.3 Do not damage existing jambs, head or sill of masonry opening.

8.10.3.2 Replacement Horizontal Strip Windows

8.10.3.2.1 The overall appearance of horizontal strip windows should be maintained where this style of fenestration already exists and windows require replacement (Figs. 8.39 and 8.40). This can be accomplished by selecting matching dark colors for all non-transparent surfaces within the original opening, including mullions, sash, insulated panels, and

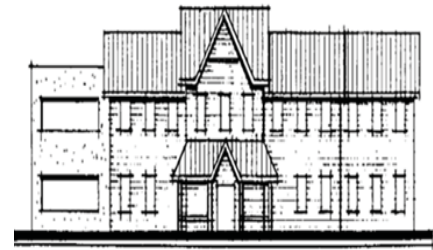


Fig. 8.38 - Renovations and additions should be compatible with the original architecture, not like the extension to the left in the example above.

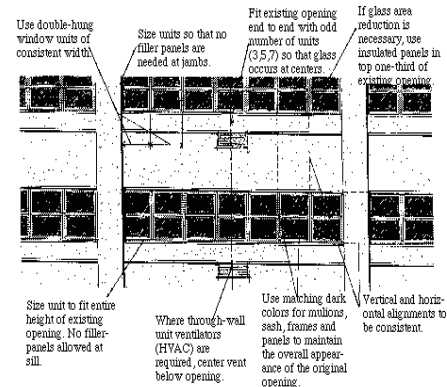


Fig. 8.39 - Criteria for renovation of existing horizontal strip windows.

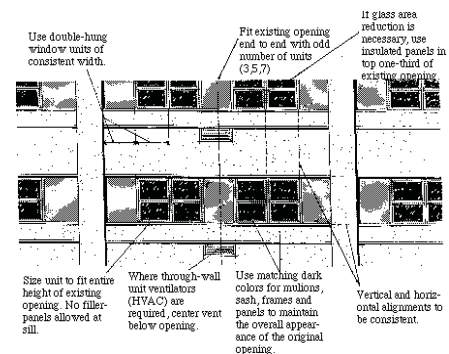


Fig. 8.40 - Criteria for replacement of existing horizontal strip windows.

flashing. From a distance, the overall opening will "read" rather than the individual window unit, and the pattern and proportions of the original building fenestration will be maintained.

8.11 PLAZAS AND COURTYARDS

Plazas and courtyards can be located as part of the primary entrance to a building, or as an extension of non-primary entrance areas to the outside. Wide, paved entrance plazas need vehicular barriers. Plazas and courtyards are discussed in greater detail in Section 7, Site Planning (Fig. 8.41).

8.12 BUILDING MAINTENANCE

8.12.1 General. Buildings designed and constructed to incorporate sustainable design criteria should minimize life cycle, energy and maintenance costs through proper selection of forms, materials, and construction details.

8.12.2 Interior Maintenance. Individual organizations across the installation may need to modify their interior spaces to suit their changing functional requirements. These modifications should be carried out as comprehensive design projects that follow design standards established for the installation, in order to avoid adverse impact to the building's interior environment and sustainability. The modification work, if not coordinated, may block thermostats, HVAC diffusers and returns affecting indoor air quality and wasting energy. The self-help modification work may also degrade lighting, and jeopardize life safety.

8.12.3 Work Order Requests. Follow the Work Order Requests system established by DEL Operations Division. A work order helps the DEL engineers to develop appropriate design decisions that follow and reinforce the building standards of Fort Lee installation.

8.12.4 Standard Equipment List. DEL Operations Division has a list of standard mechanical and electrical equipment to be used across the installation in the interest of efficient maintenance.

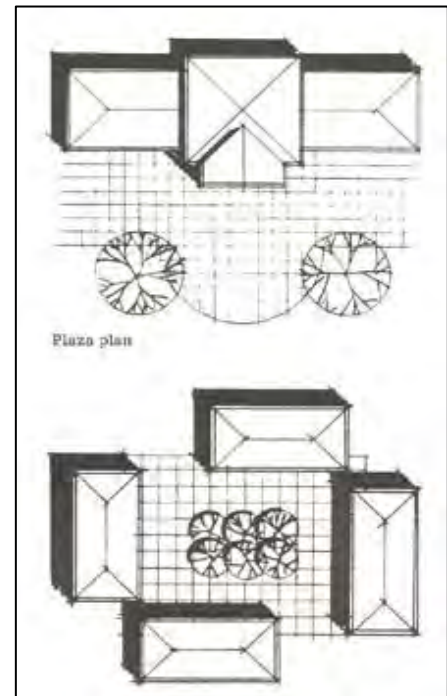


Fig. 8.41 - Plazas and courtyards are good uses of space between buildings.

8.13 INTERIOR DESIGN

8.13.1 Introduction. Inhabited spaces, that require the selection of furnishings or equipment, should be designed by professional interior designers. Interior design impacts the functioning and productivity of people. People spend much of their time inside, working, eating, sleeping, and relaxing. The productivity, comfort, and safety of the personnel in the facilities they inhabit are directly related to the quality of interior design provided within the facility. Also, interiors should be designed and appointed to reflect the purpose of each organization in the Fort Lee hierarchy (Fig. 8.42).

8.13.2 Interior design is required on building construction and renovation projects regardless of the funding source. General interior design guidance and interior design guidance for medical facilities and family housing is provided at the following websites.

- General Guidance. [Design Guide \(DG\) 1110-3-122, *Design Guide for Interiors*](#).
- Medical Facilities. Interior design guidance for medical facilities is furnished in [Military Handbook 1191, *Medical Military Construction Program Facilities Design and Construction Criteria*](#).
- Family Housing. Interior design for family housing will be in accordance with [Technical Instruction \(TI\) 801-02, *Family Housing*](#).

8.13.3 [Engineering Regulation \(ER\) 1110-345-122, *Engineering and Design, Interior Design*](#), defines projects that require interior design, design requirements and responsibilities of participants, and methods and funding for execution of interior design. For cost estimating see [Air Force Interior Design Guides, Chap. 3, Cost Estimating Guide](#).



Fig. 8.42 – Interiors should be designed for the purpose and use of the space.

8.13.4 Space Planning.

8.13.4.1 Space planning is the basic building block of the facilities program for administration and operational facilities. [Army Regulation \(AR\) 405-70, Utilization of Real Property](#) (Appendix D) provides numerical planning allowances and addresses the quantities for programming space for personnel and equipment.

8.13.4.2 Space planning takes into consideration the following; who will be using a space, how this space will be used, what activities will take place there, and the interaction of other people in the building. Professionally trained interior designers are best at gathering the required information to formulate a space utilization plan.

8.13.4.2.1 Bubble Diagrams. Bubble diagrams show the working relationship of one group to another. They do not represent a space plan or floor plan, but the relationship of organizations to one another. The adjacency requirements for individuals, user groups, and support functions which the diagrams represent, depict the relational analysis. Bubble diagrams assist in organizing an existing facility as well as a new facility (Fig. 8.43).

8.13.4.2.2 Blocking Diagram. An extension of the bubble diagram is the block diagram. The blocking diagram is made more uniform and regular in shape enabling it to fit inside the proposed floor plan (Fig. 8.44).

8.13.4.2.3 The next step in the process is the development of the actual space plan. The layout of the space plan is detailed to the workstation level.

8.13.4.3 Excellence of design should not imply added expense but economy of construction while providing functional efficiency and livability of a facility. Carefully worked out functional planning will not only produce a more efficient facility but will also produce a more attractive building, both inside and outside.

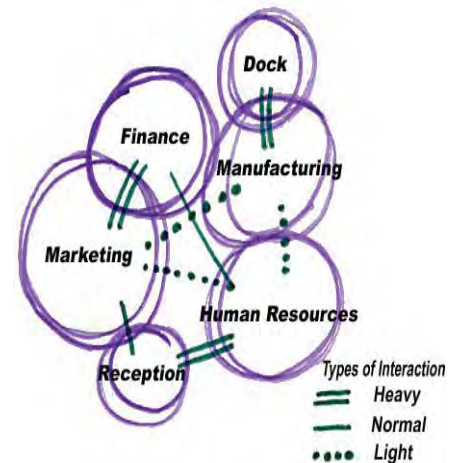


Fig. 8.43 - A typical bubble diagram indicating group relationships.

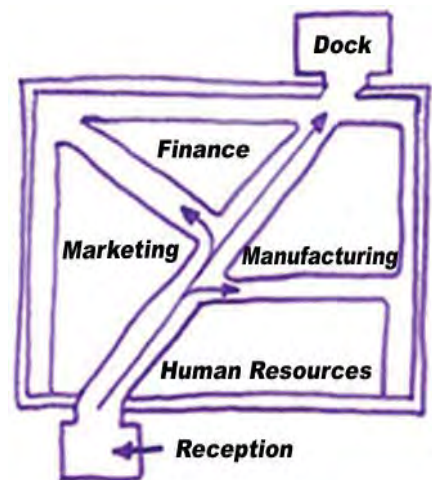


Fig. 8.44 - A typical blocking diagram demonstrating the fit into the floor plan.

8.13.4.4 Floor plan layouts should avoid wasted space due to inefficient corridor layout, unnecessary lobbies, and monumental space. An efficiency analysis comparing gross floor areas with net floor areas should be developed.

8.13.4.5 Computer areas should be separated from adjacent areas by perimeter partitions with one-hour fire rating.

8.13.4.6 Office space should be of modular design to permit maximum flexibility. Mechanical, electrical, utility shafts, elevators, stairs and toilet facilities should be consolidated into core areas. Utility systems should be collocated to allow maximum flexibility for future use modifications and interior partition relocations.

8.13.5 Electrical and Communications.

8.13.5.1 Electrical power supply in the United States is available in a number of configurations, the most common of which are 120/240 Volt single-phase three wire, 120/208 Volt 3-phase 4-wire, and 277/480 Volt 3-phase 4-wire.

8.13.5.1.1 Design standards for interior electrical systems are found in [Unified Facilities Criteria \(UFC\) 3-520-01, Interior Electrical Systems](#). Compliance with this UFC is mandatory for the design of interior electrical systems. This UFC:

- Establishes criteria for the design of interior electrical systems.
- Establishes system-level design criteria.
- Establishes facility-level criteria for interior electrical systems,
- Provides a starting point for determining the applicable design criteria for a facility.

8.13.5.1.2 Facilities outside the United States must comply with the applicable host nation standards; refer to [Technical Manual 5-688, Foreign Voltages and Frequencies Guide](#), for additional information.

8.13.5.2 Communications systems handle the transport of telephone and data networks (e.g. video, multi-media, teleconferencing, data transfer, facsimile transmission, and voice conversation).

8.13.5.2.1 The design criteria for interior wiring of communications and information system is found in the Installation Information Infrastructure Architecture (I3A) Design and Implementation Guide. This guide shall be used as the basis for designing both the premises distribution system (inside plant) and the outside plant cable distribution system for all new construction and renovation projects. The Installation Information Infrastructure Architecture (I3A) Design and Implementation Guide is Appendix A of [U.S. Army Corps of Engineers engineering technical letter \(ETL\) 1110-3-502, Telephone and Network Distribution System Design and Implementation Guide](#).

8.13.5.3 Distribution. Distribution of electrical and electronic systems through a building is generally accomplished through branched distribution. A central chase or trunk will run the length or height of the facility, and then horizontal distribution systems run from a central connection closet to the end user. This distribution may be overhead or underfoot, in many instances it is a combination of the two (Fig. 8.45).

8.13.6 Color.

8.13.6.1 Color plays an important role in the design of interior environments. Color has a large impact on how we feel and behave in a space. Its quality affects emotions directly and immediately. Successful interior designs harmonize form, space, light, and color.

8.13.6.2 Information on color and light, optical effects, basic color theory, color schemes, and applying color in facilities can be found in Corps of Engineers, [Design Guide \(DG\) 1110-3-122, Design Guide for Interiors](#), Chap. 3, Light and Color and in the Air Force Interior Design Guides, Chap. 9, Color Principles, [Part 1](#) and [Part 2](#).

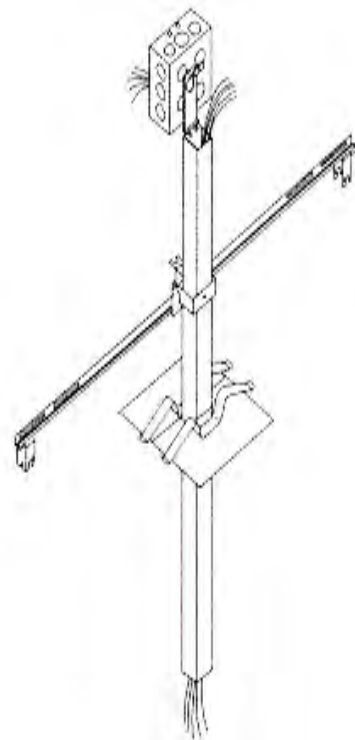


Fig. 8.45 – A system furniture utility column for electrical and communication distribution.

8.13.7 Acoustics.

8.13.7.1 Acoustics as an environmental variable significantly impacts the human impression of an interior environment. Productivity, speech intelligibility, privacy, safety, positive user attitude and response, and environmental comfort all depend on proper acoustic design. The interior designer is concerned with reducing unwanted noise and preserving desirable sound in a space. Sound can be controlled in the following three ways: eliminate the source, isolate the source, i.e. provide a barrier between the user and the source or mask the offending sound (Fig. 8.46).

8.13.7.2 A discussion of the dynamics and control of acoustics can be found in the [Design Guide \(DG\) 1110-3-122, Design Guide for Interiors](#), Chap. 5.

8.13.8 Interior Lighting.

8.13.8.1 Lighting will be designed with the work activities being performed in mind. Always supplement overhead lighting with task lighting and use architectural lighting in entrances, corridors, waiting rooms, and other spaces to light artwork and provide interest.

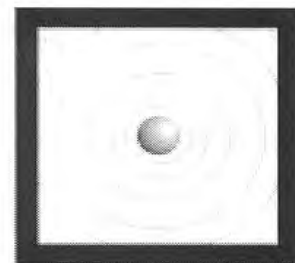
8.13.8.2 For Army installation buildings to achieve a high quality lighting environment, lighting equipment/systems selected must satisfy both performance and aesthetics. Factors for consideration in this selection are based on the following: lumens per watt, color temperature, color rendering index, life and lumen maintenance, availability, switching, dimming capability, and cost.

8.13.8.3 Lighting design approaches and lighting applications can be found in the following publications:

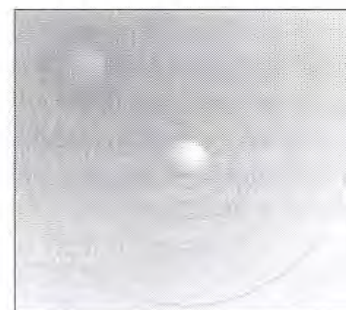
- [Technical Instructions \(TI\) 811-16, Lighting Design; Design Guide for Interiors, DG 1110-3-122](#) Chap. 5
- [Air Force Interior Design Guides, Chap. 10](#)



Elimination



Isolation



Masking

Fig. 8.46 – Three concepts for control noise sources.

- [Unified Facilities Criteria \(UFC\) 3-520-01, Interior Electrical Systems](#), Appendix F.

8.13.8.4 Lighting conservation measures

8.13.8.4.1 Installing energy efficient lighting systems is essential in order to reduce energy consumption at Fort Lee. Consider following fixture types (Fig. 8.47):

8.13.8.4.2 Fluorescent fixtures containing electronic ballast which will operate up to 4 – 32 watt fluorescent lamps. The preferred fixture will be a high efficiency T-8, three tube two by four foot lay-in or surface mount unit. In areas where glare control is not a requirement, use standard clear prismatic acrylic lenses. Computer rooms, labs, conference areas need glare control where the lighting fixtures should utilize parabolic louvers.

8.13.8.4.3 Incandescent fixtures should be limited to minor areas as a standby source or rough duty functions, since they are not a good choice due to their short life and poor efficacy – lumens per watt. In those instances where incandescent type fixtures are desired, compact fluorescent should be considered since they provide higher efficacy and good color rendition.

8.13.8.5 Lighting Maintenance, Types, and Problem Solving. Information on lighting maintenance, types, and lamp trouble-shooting is found in [TM 5-683, Electrical Interior Facilities, Chap. 9](#).

8.13.8.6 Design lighting levels for indoor areas should be as follows: (1 lux = .093 footcandles)

Task Area

Design Illumination

- | | |
|---|---------|
| • Non-working areas, corridors, lobbies and service areas | 108 lux |
| • Circulation and minimum reading areas | 323 lux |

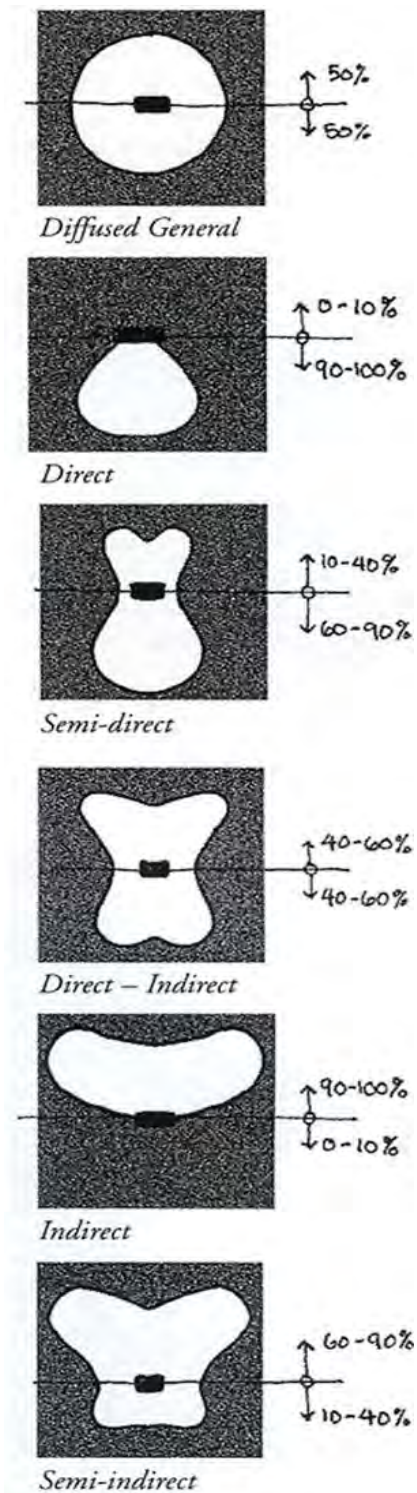


Fig. 8.47 - Typical Distribution of Light by direction.

- Work stations, computer rooms, and general office areas 538 lux

8.13.9 Finishes. Interior finish standardization is important for administrative and financial reasons. Standardization presents a unifying element throughout all buildings that is more cost effective, efficient, and easy to maintain.

8.13.10 Installation Finishes Standards. Installation finishes standards are found in [Appendix I, Interior Finishes Standards](#) of this guide (Fig. 8.48).

8.13.11 Signage.

8.13.11.1 Signage may be informational, directional, or regulatory. Informational signage provides the user with information and includes room or area labels, bulletin boards, menus, artwork descriptions, and emergency information. Directional signage directs circulation and provides orientation. It includes entry directories, directional arrows, and maps. The purpose of regulatory signage is control: providing prohibitions, warnings, emergency instructions, and use restrictions.

8.13.11.2 Interior signage is covered in detail in [Technical Manual \(TM\) 5-807-10, Signage](#). The manual includes graphics for the following: directional, identification signs, information, and pictograms.

8.13.12 Interior Operations Policies.

To preserve the quality of facilities, operations policy is set between the user and the installation management. The user is responsible for preserving the visual appearance of the facility, and installation management is responsible for providing maintenance needed to preserve facility quality. Interior operations policies address the following issues (See [Appendix N, Housekeeping Rules \(Example\)](#)):

- Housekeeping responsibilities.
- Policy to prevent and eliminate visual clutter.



Fig. 8.48 – direct and Indirect lighting design located at a building main entry.

- Carpet cleaning, repair, and replacement policy.
- Height restrictions for partitions and furniture.
- Policy on buildings modifications including: partitions, painting, window treatment, HVAC, lighting, and the installation of communications and electric wiring.
- Maintenance of directories and signage.
- Smoking and eating locations.
- Procurement information on matching or compatible furniture.
- Policy on personalization and plants.

8.13.12.1 Interior Appearance Policy. The following are Army standards to follow.

- Keep work areas cleared of clutter. Cleanup, throw away.
- Avoid hanging things in the work area. Find another way to refer to organization charts, personnel listings, and calendars, other than having them hung on walls or partitions except framed artwork, diplomas, awards, etc.
- Notes and references hung on partition walls should be kept below the height of the partitions. Some things may be mounted on the partitions by hooking into the metal supports between the partitions, but not by hooking into the fabric.
- Anything not contributing to the overall décor of the work area should be put in a drawer or on a shelf behind a closed door.
- Do not overwhelm the work area décor with an excess of plants or personal artifacts (Fig. 8.49).

- Thin out your files.
- Keep walkways into work areas open and free of clutter. Do not store things on the floor, or on top of shelves, or partitions.
- Office chiefs should consider the overall office appearance and visual contrasts between work areas.
- Be sure that anything you do in your work area contributes to color coordination, rather than detracts from it.
- Keep vacant workstations and common areas clean. Do not use them as a dumping area for things you do not know what to do with.



Fig. 8.49 - Waiting area with well balanced décor.

8.14 EXTERIOR BUILDING MATERIALS AND COLOR

8.14.1 Building materials with their color and texture provide a cohesive and consistent architectural character through the installation and within each visual zone. A limited palette of durable, low maintenance materials should be used that, while encouraging a variety of expression, Material should reflect the function of a building, and its hierarchy within the installation. Use the following guidelines when selecting exterior building materials.

- Choose materials for their longevity and maintenance characteristics (Fig. 8.50).
- Use materials with integral colors - avoid painting exterior colors (Fig. 8.51).
- Use installation standard colors for exterior walls. Add accent colors sparingly. Accent colors can be used in recesses and to accent certain portions of a buildings façade.

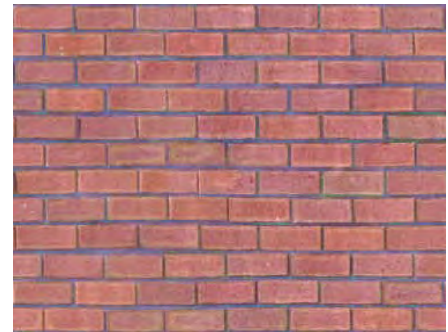


Fig. 8.50 - Brick and brick like materials are low maintenance product and a preferred material at Fort Lee.



Fig. 8.51 - Veneer brick and buff accent brick on the MEPs building creates a preferred color and appearance at Fort Lee.

- Use pre-finished material where possible - gutters, window frames, door frames, etc.
- Use blended colors on pitched roofs.

8.14.2 Material and Color Selection

8.14.2.1 Purpose. The purpose of this section is to set guidelines for color and material selections on new construction, renovations and maintenance work. These selections have been coordinated to establish a strong unified image for the post.

8.14.2.2 Review Procedure. To insure proper coordination, colors and materials are to be presented for review by both the project contracting officer's representative and the installation DEL (or representative). The presentation should be made by the project's designer (A/E) or builder (if project does not involve a design A/E). Samples of all major building materials to be used in the project must be presented together. Sizes of the samples must be large enough to give an accurate impression of their appearance and juxtaposition (what is seen next to what) in the completed project. For renovations, samples of major existing materials (such as brick masonry) should be included in the presentation. For large painting projects, a small portion of the total job (such as a single window) should be completed as a sample to be approved before final selection/approval.

8.14.2.3 Exterior Material Selection. The materials and colors of the major permanent buildings already existing on post have been taken into consideration and in some cases are to be used as the basis for matching new materials. The specific visual zones to be matched are cited in the [Appendix K, Exterior Materials Charts](#).

8.14.2.4 Exterior Building Color. Color is closely linked to the appropriate selection of exterior building materials and is a critical design element in relating adjacent buildings and creating a compatible visual environment within an installation.

8.14.2.5 Exterior Color Selection. Color charts have been developed for specific geographical areas giving consideration to climate, geography, culture, facility function, historical context, architectural character, etc. Color changes will be implemented during normally scheduled paint cycles (see [Appendix L, Exterior Color Charts](#)). Fort Lee's geographical location makes it part of the Central Atlantic geographical area (Fig. 8.52).



Fig. 8.52 - The Army system for exterior color sets is based on geographical region.

8.15 KEY FACILITY TYPES STANDARDIZATION

8.15.1 The Assistant Chief of Staff for Installation Management (ACSIM) establishes Army facility standards and approves deviations from the standards.

8.15.2 Residential Communities Initiative.

8.15.2.1 The intent of the Residential Communities Initiative (RCI) is to improve the housing for military families by providing quality housing that is built in attractive neighborhoods. Fort Lee is engaged in an aggressive housing construction program. All existing housing has been transferred to the RCI program. The new MILCON family home construction, once completed, will be transferred in phases into the RCI program beginning October 2007 and completed in December 2008.

8.15.2.2 The Military Housing Privatization Initiative (MHPI) legislation allows developers to build housing to local standards. In those areas where local standards do not meet the quality of life requirements of soldiers, the Community Development and Management Plan (CDMP) process allows a negotiated determination of those standards. To ensure a uniform level of quality throughout RCI, Headquarters, Department of the Army has developed a ["Quality Standards for New and Replacement Residential Communities Initiative \(RCI\) Family Housing"](#) to be used as reference points during CDMP preparation.

8.15.2.3 All RCI projects planned or under design will meet the "Gold" SPiRiT rating (as of 18 March 2003). See [Assistant Secretary of the Army](#)

Memorandum Subject: Sustainable Design and Development Requirements, dated 18 March 2003.

8.15.3 Department of the Army (DA), Facilities Standardization Program.

8.15.3.1 Under the DA Facilities Standardization program, standard design packages are developed for facility types that are repetitively designed and constructed at Army installations. These design packages are developed to the definitive design level (10 percent - 15 percent) and once approved are mandatory for Army MILCON (Fig. 8.53).

8.15.3.2 Currently, there are thirty one 31 DA standard design packages. Headquarters, U.S. Army Corps of Engineers has established eight Centers of Standardization to develop and maintain the definitive and design packages. See [Appendix P, DA Facilities Standardization Program Centers of Standardization](#) for a list of the various centers and the facility type assigned to each center. ([Centers of Standardization homepage](#).)

Army Chapel Design Standards are complete and approved. See [The Army Standard for Chapel Construction – January 2004](#) and Memorandum for Record, subject: [The Army Standards for Chapels](#), dated 21 January 2004.

8.15.4 Unaccompanied Personnel Housing (Army Barracks Modernization Program).

8.15.4.1 The Army's Barracks Modernization Program is based upon a whole community approach providing modernized private living and sleeping areas for soldiers as well as a more functional work environment. This is being realized with the construction and renovation of barracks, and associated Company Operations Facilities (COF), Battalion Headquarters (BN HQ) and Brigade Headquarters BDE HQ), and Dining Facilities (DFAC). For a detailed discussion of the Army Barracks Modernization Program see the [Army Barracks Master Plan](#). The Army Barracks Master Plan only includes requirements for activity duty permanent party soldiers' barracks.



Fig. 8.53 - Standard design dining facility for permanent party personnel.

8.15.4.2 Army Barracks Standards. The Army Barracks Modernization Program design criterion gives commanders and contractors the direction to incorporate best business practices around a modular floor plan. The [Army Barracks Master Plan, Appendix I, Army Barracks Standards](#), promotes barracks with an appropriate balance between private and common areas. The Vice Chief of Staff of the Army (VCSA) specified the “New Army Barracks Construction Criteria” in his [Memorandum Subject: New Barracks Construction Criteria, dated 11 July 2002](#) in which he strongly endorsed the new standards. The criterion was further revised in [Memorandum Subject: Revised Barracks Construction Criteria, dated 1 May 2003](#) which makes the following four changes to the Army Barracks Standards:

- Establishes the two-bedroom/one bath module as the standard module (Fig. 8.54);
- Requires installation of a stove or cook top;
- Requires laundries in the barracks; and
- Eliminates the separate soldier community building.

See the above memorandum for detailed guidance.

8.15.4.3 Furnishings.

8.15.4.3.1 Acquisition of new furnishings is planned and accomplished in concert with the facility design and construction schedule so that delivery of the new furnishings coincides with the beneficial occupancy date (BOD).

8.15.4.3.2 The U.S. Army Interior Design Manual (IDM) for Single Soldiers provides guidance to help furniture managers prepare order packages. The manual uses standard Army furniture specifications; i.e. medium oak wood furnishings or acceptable wood/steel alternatives; construction and fabric specification, and specific information for authorized items of furniture. The manual also contains standard living/sleeping room arrangements, and SCB plans with color schemes. The manual includes information

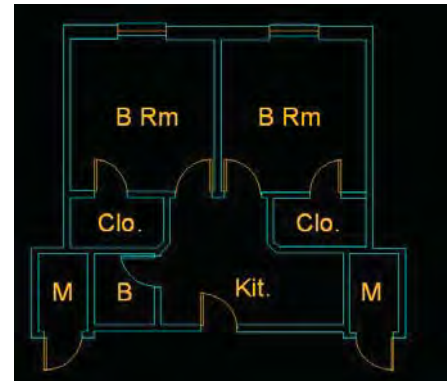


Fig. 8.54 - Standard design 1+1E module for UEPH permanent party personnel.

on waiver requirements, the procurement process, order forms, and final inspection checklist.

8.15.4.4 Construction design criteria for COFs, BBN HQ buildings, BDE buildings, and DFAC facilities can be viewed on the web at [ProjNet](#).

8.15.5 Army Lodging.

8.15.5.1 The Army Lodging Standards promote economies in serving the Army traveler, but not at the expense of quality or service. The standards define the facilities and the level of service the Army traveler should expect.

8.15.5.2 The following standards provide the level of service that a guest should expect when they travel to an Army installation. That expected level of service should be consistent from installation to installation. The following documents provide the service, operations, and facilities standards for Army Lodging.

- [Army Lodging Standards for Service](#)
- [Army Lodging Standards for Operations](#)
- [Army Lodging Standards for Facilities](#)

8.15.6 Morale, Welfare, and Recreation (MWR) Branded Theme Operations.

8.15.6.1 The U.S. Army Community and Family Support Center (CFSC) through its Theme Operations, offers comprehensive theme packages pertaining to restaurants and entertainment centers. The packages are customized to the installation.

8.15.6.2 CFSC will conduct an assessment for market viability, provide architectural designs, and other promotional items. Information on the CFSC Branded Theme Operations to include how to get a theme operation, management support, and food service support is located on the CFSC website at the [Army Brand Theme Operations Home Page](#).

8.15.7 Range Standards.

8.15.7.1 The Army Sustainable Range Program (SRP), proponent is HQDA Office Deputy Chief of Staff Operations, ODCSOPS/G3 (DAMO-TRS), phone number (703) 692-6410. To contact SRP technical support, call (256) 895-1535 or e-mail RTPL@HND01.usace.army.mil.

8.15.7.2 The SRP develops and manages standard designs for Army Ranges in accordance with AR 210-21 and Training Circular 25-8 Army Training Ranges. The Range Standards are available on the following web pages.

- Design Manual for Remote Target Systems (RETS) Ranges, [CEHCN 1110-1-23 Manual](#).
- [Revised Range Design/Construction Interface Standards](#).
- Unexploded Ordinance Considerations in the Planning, Design, and Construction of Ranges, [Supplement to CEHNC 1110-1-23 Manual](#).

8.16 PHYSICAL SECURITY REQUIREMENTS

To assure the required physical measures are met the installation Provost Marshall or Physical Security Officer will be coordinated with during the planning, design, and construction of all construction projects. ([AR 190-13, The Army Physical Security Program](#), Para 1-26) See [Section 12, Force Protection](#) for a more detailed discussion regarding Antiterrorism measures.

8.17 SALE AND OUTLEASE OF ARMY ASSETS

8.17.1 In an effort to offset some of the impacts of constrained resources, the Army has implemented initiatives that improve cost effectiveness and efficiency of installation operations. To the extent permitted by law, funds that become available as a result of these initiatives are retained by, or returned to, garrison commanders.

8.17.2 The Office of the Assistant Secretary of the Army for Financial Management and Comptroller (OASA (FM&C)) has developed the "[Sales and Outlease of Army Assets - Installation Guide](#)" to assist garrison commanders in using the sales and outlease program. The guide provides an overview of major policies, procedures, and responsibilities pertaining to the following three major initiatives of the program including the sale of Real Property, Outlease of Real Property, and Outlease of Personal Property.

The guide provides hyperlinks to Sale and Outlease governing regulations and legal and informational references.

8.18 ARMY STANDARDS

The cited Army Standards shall be met.

- [Army Regulation \(AR\) 420-70, *Buildings and Structures*](#)
- [Unified Facilities Criteria \(UFC\) 3-520-01, *Interior Electrical Systems*](#)
- [Unified Facilities Criteria \(UFC\) 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*](#)
- [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#)
- [Uniform Federal Accessibility Standards \(UFAS\)](#)
- [Secretary of the Interior's Standards for the Treatment of Historic Properties](#)
- [U.S. Army Corps of Engineers Engineering Technical Letter \(ETL\) 1110-3-502, *Telephone and Network Distribution System Design and Implementation Guide*](#)
- [Standards of Seismic Safety for Existing Federally Owned and Leased Buildings](#)

- [Army Barracks Master Plan, Appendix I, Army Barracks Standards](#)
- [Memorandum Subject: Revised Barracks Construction Criteria, dated 1 May 2003](#)
- [Quality Standards for New and Replacement Residential Communities Initiative \(RCI\) Family Housing](#)
- [Army Lodging Standards](#)
- Design Manual for Remote Target Systems (RETS) Ranges, [CEHCN 1110-1-23 Manual](#)
- Unexploded Ordinance Considerations in the Planning, Design, and Construction of Ranges, [Supplement to CEHNC 1110-1-23 Manual](#)
- [Revised Range Design/Construction Interface Standards](#)

8.19 REFERENCES

The following references are provided for guidance.

- [Army Regulation \(AR\) 190-13, *The Army Physical Security Program*](#)
- [Army Regulation \(AR\) 200-1, *Environmental Protection and Enhancement*](#)
- [Army Regulation \(AR\) 200-2, *Environmental Effects of Army Actions*](#)
- [Army Regulation \(AR\) 200-4, *Cultural Resources Management*](#)
- [Army Regulation \(AR\) 405-45, *Real Property Inventory Management*](#)
- [Army Regulation \(AR\) 405-70, *Utilization of Real Property*](#)

- [Unified Facilities Criteria \(UFC\) 2-600-01, *Installation Design*, Chap 8](#)
- [Unified Facilities Criteria \(UFC\) 1-200-01, *Design: General Building Requirements*, 31 July 2002](#)
- [Engineering Regulation \(ER\) 1110-345-122, *Engineering and Design, Interior Design*](#)
- [Department of the Army Pamphlet \(DA PAM\) 200-4, *Cultural Resources Management*](#)
- [U.S. Army Corps of Engineers, Design Guide \(DG\) 1110-3-122, *Design Guide for Interiors*](#)
- [Department of Defense \(DoD\) Interior Design Website](#)
- [Military Handbook 1191, *Medical Military Construction Program Facilities Design and Construction Criteria*](#)
- [Technical Instructions \(TI\) 800-01, *Design Criteria*](#)
- [Technical Instructions \(TI\) 809-04, *Seismic Design for Buildings*](#)
- [Technical Instructions \(TI\) 809-05, *Seismic Design Evaluation and Rehabilitation for Buildings*](#)
- [Technical Instructions \(TI\) 811-16, *Lighting Design*](#)
- [Technical Manual \(TM\) 5-683, *Electrical Interior Facilities*](#)
- [Technical Manual \(TM\) 5-688, *Foreign Voltage and Frequencies Guide*](#)
- [Technical Manual \(TM\) 5-809-10/Navy NAVFAC P-355/Air Force AFM 88-3, Chap 13, *Seismic Design for Buildings*](#)

- [Technical Manual \(TM\) 5-809-10-2/Navy NAVFAC P-355.2/Air Force AFM 88-3, Chap 13, Sec B, *Seismic Design Guidelines for Upgrading Existing Buildings*](#)
- [Army Barracks Master Plan](#)
- [Air Force Sustainable Facilities Guide](#)
- [Air Force Interior Design Guides](#)
- Office of the Assistant Secretary of the Army for Financial Management and Comptroller (OASA (FM&C)) [Sales and Outlease of Army Assets - Installation Guide](#)
- [Assistant Chief of Staff for Installation Management, Sustainable Design and Development Website](#)
- U.S Army Corps of Engineers, Engineering Research and Development Center, Construction Engineering Research Laboratory (CERL), [Sustainable Design and Development Website](#)
- [U.S. Army Corps of Engineers Engineering Technical Letter \(ETL\) 1110-3-502, Telephone and Network Distribution System Design and Implementation Guide](#)
- [Whole Building Design Guide](#)
- Unified Facilities Guide Specifications (UFGS), "Division 12 - Furnishings", [Construction Criteria Base](#)
- [Engineering and Construction Bulletins](#)

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