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# Perimeter Security for Historic Buildings: Technical Pilot

United States General Services Administration, Office of the Chief Architect, Center for Historic Buildings

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***Project Overview***

Historically, the intended image of Federal public buildings was to be inviting and accessible to visitors while portraying the aura of importance of the Government in the everyday lives of its citizens. These government buildings sometimes continue to serve the public in their original capacity and sometimes get adapted for a more current function, while maintaining their design integrity. The General Services Administration is committed to upholding the architectural excellence of these important structures while keeping them accessible, functional and safe.

Concerns for security at monumental Federal buildings have increased in the aftermath of the Oklahoma City bombing and the events of September 11, 2001. In many cases, grand historic government buildings, located in densely built urban districts, do not include setbacks from the streetline that would afford them adequate protection from blast damage. Where setbacks do exist, such as public plazas in front of monumental buildings, vehicles can easily approach without the presence of physical barriers.

This report focuses primarily on perimeter vehicular barriers for Federal historic buildings. The goal of this pilot study is to meet the needs of perimeter security criteria in a sensitive manner such that the architectural integrity of the historic building and its urban context are maintained and the pedestrian experience be enhanced rather than diminished.

In December 2000, KressCox Associates created a report entitled Culture and Commerce: Bridging the Federal Triangle for the U.S. General Services Administration. This report was to serve as the conceptual basis for the technical pilot study. In particular, the U.S. General Services Administration desired to test the "garden wall concept" presented in the KressCox report as a prototype through the development of construction document drawings, specifications and an estimate of associated construction costs. In addition, the U.S. General Services Administration sought concepts for alternate versions of the prototype elements for use at two other public buildings chosen to represent diverse historical styles and periods.

The Howard M. Metzenbaum U.S. Courthouse in Cleveland, Ohio was chosen by the U.S. General Services Administration as the prototype project for the technical pilot. Built in 1903 to 1910, the Metzenbaum Courthouse, adjacent to Cleveland's Public Square, is listed on the National Register of Historic Places. The special challenges of this particular facility include the proximity to the street, the vaults under the sidewalks, its prominence on Public Square, and the various amenities on the existing site. The proposed resolution of these issues is illustrated later in this report.

Two other buildings chosen for alternate versions of the principal perimeter security elements are the Auditor's Building and the U.S. Department of Housing and Urban Development Headquarters. Both are located in Washington DC, but vary greatly in materials and historical styles. The design process that evolved from the technical pilot study and the alternate versions has national application for providing perimeter vehicular barriers in a sensitive manner to historic Federal buildings, achieving GSA's goals of preservation, performance, cost containment, public accessibility and design excellence.

***Design Parameters***

The Howard M. Metzenbaum U.S. Courthouse is considered to be a building of Medium Risk. This entails protection against a moving vehicle bomb of a vehicle size of 4000 pounds traveling a maximum practical approach speed up to 30 miles per hour. For Medium Risk buildings, protection is required from a stationary vehicle located at least 20 feet from the exterior wall of the building. This is termed “standoff distance”. The 20 feet minimum distance is measured to the centerline of the vehicle (a sedan). See Table 1. located in Appendix B of this report for the Peak Blast Pressures as they relate to weapon size (in pounds) and standoff distances. This matrix illustrates the tremendous difference a change in the standoff distance creates.

Other design objectives and parameters developed by GSA and the design team include the following:

1. Disguise the protection.
2. Maintain accessibility to the public, i.e. permeability.
3. Security design is part of urban design.
4. Trees are not considered anti-ram.
5. Light standards and other typical streetscape elements are not considered anti-ram unless engineered to do so.
6. Elements can be combined.

Types of passive perimeter security elements include the following:

1. Bollards with foundations.
   Foundations to be tied together. Spacing allows 4 feet clear maximum. Minimum 8” OD, ½” thick, concrete filled steel pipe (5-1/2” DIA solid steel bar). Ideally foundations are in soil.
2. Anti-Ram kneewalls with foundations.
   Three foot height minimum recommended. Eighteen-inch thick reinforced concrete +/-. Can have openings, not greater than 4 feet clear.
3. Planters with foundations.
   Twelve inches below grade required for security protection. Deeper required to be below frostline. Planters 3 foot height above grade. Twelve-inch thick outer wall. Six-inch thick inner wall. Three foot overall width of planter minimum.
4. Surface-mounted planters.
   One-inch indent in slab minimum. Can be any shape or design.
5. Bodies of water.
6. Seating with foundations.
   Seat needs to be higher than axle of wheel.

The Metzenbaum Courthouse prototype incorporates specially designed and structured planters as part of the anti-ram perimeter security. The landscaping at buildings should respond to the conditions of the site including location (urban, suburban, rural), climate, site conditions (drainage, hardscape areas, wetlands, forested areas, etc.), and maintenance operations. Selected plant materials should be suitable for the particular site including hardiness, sun exposure, habit and disease resistance. As many federal buildings are located on urban sites, chosen plant materials should be hardy enough to thrive even in the harsh conditions of urban areas which include salt, soil compaction and pollution. Site design conditions including project limit lines, how the site circulates, drainage and utility locations must be understood and coordinated, especially on renovation projects such as the Metzenbaum Courthouse.

On large sites where the landscape is composed of extensive areas of lawn with trees, mowing may be a primary maintenance effort. In urban areas, typically the landscaping areas are smaller and more intensely planted. On a downtown urban block, such as the Metzenbaum Courthouse site, landscaping may be restricted to only planters and pots. Plantings may be rotated throughout the year for seasonal interest. Plant heights and shapes should be considered to ensure safety by maintaining views through the site.

The level of maintenance that will be provided should be considered when choosing which plant material to use and how to install it. Young plants will require more maintenance to ensure survival that established plants. Irrigation, if budget allows, should be approached like other utilities and coordinated with building systems and access through the site. Irrigation is an initial capital cost for a project, but may pay for itself over a couple years in savings for maintenance. For urban locations with small areas of planting, hand watering is an option. Pruning, weeding and fertilizing are other areas that will require ongoing maintenance.

Design cues for landscape design can be taken from the existing site. In addition to light conditions and orientation, existing plant materials may dictate a direction for the landscape design. At the Metzenbaum Courthouse, existing trees have shown a history of durability on this very exposed urban site. The landscape design solution for this application incorporates matching these existing trees.

Another design parameter for the aesthetic aspects of the perimeter security elements relates to the historical context of the existing building. Taking cues, but not necessarily replicating, historical features, details and materials for perimeter security elements is part of the balance that occurs with any historic preservation project.

***General***

The design of the technical pilot for perimeter security of historic buildings, using the Howard M. Metzenbaum U.S. Courthouse as the prototype, was a collaborative effort. The project was already in the working drawing phase for renovations to the Courthouse, so a design team familiar with the project and its site conditions was already in place. The technical pilot for perimeter security became an extension of that project.

The U.S. General Services Administration, including the Office of the Chief Architect and the regional office, has been involved with decision-making, design issues and discussions with local authorities throughout the design process. Along with van Dijk Westlake Reed Leskosky, providing project management and architectural design, the design team consists of Sasaki Associates for landscape design, Hinman Consulting Engineers for blast engineering, Barber & Hoffman for structural engineering and Project and Construction Services for cost estimating. The team also closely collaborated with the United States Bacruptcy Court, Northern District of Ohio, the City of Cleveland City Planning Commission, Division of Engineering and Construction, Traffic Engineering and the Greater Cleveland Regional Transit Authority.

***Historical Context***

The first step in the design process was acquainting the perimeter security team with the historical and physical context of the Metzenbaum Courthouse. In 1901, architect Arnold W. Brunner of New York City won the competition to design the Cleveland Federal Building, once called the Old Federal Building and now known as the Howard M. Metzenbaum U.S. Courthouse and Federal Building. The structure is located in the heart of Cleveland's central business district at the northeast corner of Public Square.

Brunner's commission places the project in the context of the emerging City Beautiful Movement and Cleveland's Group Plan at the turn of the century. Brunner's Federal Building was the first building of the Cleveland Group Plan to be built, and established the scale and style for the city's subsequent important landmarks. Its site and approach were significant to the city. The Public Library of 1925 directly across Third Street was intentionally patterned after the Federal Building and together the two form the inland terminus of the Group Plan Mall. Its prime site on the newly envisioned mall solidified the prominence and presence of the federal government, integrating public realm, urban design and architectural façade in one.

Today, the Howard M. Metzenbaum U.S. Courthouse remains one of the most significant landmarks within the downtown cityscape of Cleveland. The building is adjacent to Public Square and is a key element in anchoring the economic revival of the central core of Cleveland. It was listed in the National Register of Historic Places in 1974. The incorporation of perimeter security elements require design sensitivity to this important structure in its key urban setting.

***Perimeter Security Zones***

The Metzenbaum Courthouse site was analyzed for the application of anti-ram elements. Zones were created which dictated a variety of perimeter security elements. Clearly, a variety of types of elements is a more interesting design solution than using a single type of element, such as a bollard, around the entire site perimeter. All elements are designed to meet the anti-ram requirements previously established. The form and material of each element is designed to aesthetically compliment the style of the existing building and site conditions. The zones outlined below can and should be combined on various streetscapes.

*Zone 1: Permeable*. It allows physical pedestrian access to the site and is visually “lighter”. Bollards usually meet Zone 1 requirements. Several bollard styles were incorporated into the Metzenbaum project in a variety of locations where a more open feel was desired. Retractable bollards are also an option where vehicular access is required on a limited basis. Retractable bollards are incorporated into the Metzenbaum Courthouse on the north side at an access drive.

*Zone 2: Partially Enclosed.* This is a zone where site conditions allow planters or seating. These are more solid elements and they also add visual interest and public amenity to the site. These appear on the south and west sides of the Metzenbaum Courthouse.

*Zone 3: Planting*. This zone is located where there is a generous distance from the curb to the building. In the case of the Metzenbaum Courthouse, this occurs on the west side where there is already a deep zone accommodating existing locust trees.

*Zone 4: Screen.* This zone incorporates site amenities such as bus shelters, newspaper vending machines, post office boxes, and trash receptacles. All sites, especially urban ones, have site amenities that need to be addressed and coordinated with perimeter security elements. It is advisable to discuss the requirement of the site amenities at a particular site with the local authorities. Sometimes they can be relocated to a different location. At the Metzenbaum Courthouse, the majority of these site amenity elements were grouped on the west side.

*Zone 5: Enclosed.* This is an articulated wall. It can be a combination of bollards and rails, or a more solid wall treatment. This is used to add variety to the perimeter in locations where pedestrian access is not required or desired.

The shape, detail and materials used for the Metzenbaum Courthouse perimeter security elements are addressed in the next section of this report. Copies of the construction documents are also included in the Appendix.

***City Review Process***

As most historic Federal buildings are located in urban environments, local authorities are key team members to the design process. For this technical pilot, the design team and representatives from the General Services Administration met with various individuals and commissions that would be involved with the review of the installation. In the City of Cleveland, this meant meeting with the members of the Planning Commission, Division of Engineering and Construction, Traffic Engineering and the Greater Cleveland Regional Transit Authority.

Some site-specific conditions required close collaboration with City of Cleveland agencies. For example, two of the four streets require narrowing to meet the 20-foot standoff distance. At the Metzenbaum Courthouse, which has vaults under sidewalks on three sides, getting the foundations of the security elements into soil was a challenge. After extensive discussion, the City officials agreed to this approach for the design of the technical pilot. The design team had discussions with the Regional Transit Authority about the location of the bus shelters on the site and the possibilities for relocating them. In addition, the City of Cleveland has utility duct banks that were either worked around or created in the areas that were affected.


HOWARD M. METZENBAUM FEDERAL BUILDING UNITED STATES COURTHOUSE
*Cleveland, Ohio*
*1903-1910*
*Arnold W. Brunner*

A. GRANITE BENCH

*Two granite clad benches are located on the Superior Avenue sidewalk, across from the existing Daniel Chester French statues "Justice" and "Commerce". The seat is intended to provide an opportunity to view the art adorning the building facade, while the reinforced concrete structure of the back serves as a security wall. (Zone 2)*

B. GRANITE BOLLARD

*Pairs of granite clad bollards flank the benches and provide a material transition between the benches and the array of bronze bollards. (Zone 1)*

C. BRONZE BOLLARD

*These are derived from existing oxidized bronze posts at the area ways on the south and east sides of the building. A filter-type security barrier against vehicles, this arrangement allows pedestrian access to the focal point of the main building facade. (Zone 1)*

D. BRONZE RAIL

*An interpretation of the existing roman grilles, these elements are symmetrically located along Superior Avenue, on both sides of the main building entrance. (Zone 5)*

E. STEEL BOLLARD

*The simplified geometry of these elements is a more economic solution for the secondary building facades on East Third Street, East Roadway, and Rockwell Avenue. The steel material is finished to match the oxidized bronze of the existing posts and grilles. (Zone 1)*

F. GRANITE PLANTER

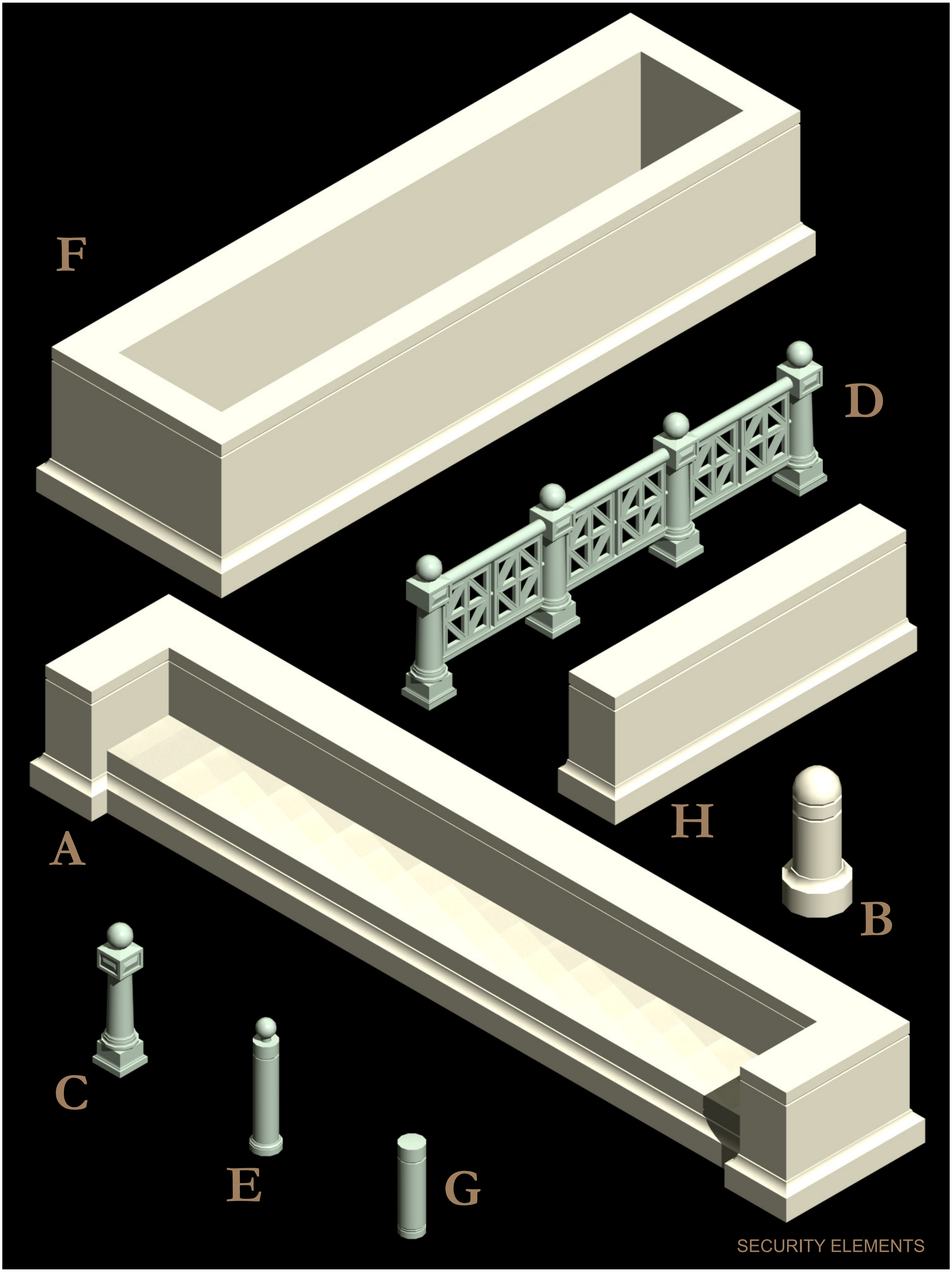
*Face granite on structural concrete and formal articulation complete the theme of blending in with the existing building granite base. (Zone 3)*

G. RETRACTABLE BOLLARD

*Located at points of vehicular access to the building garage from Rockwell Avenue, these manufactured items compliment the design of the other security elements. (Zone 1)*

H. GRANITE SCREEN WALL

*This element is a security barrier as well as a screen for street amenities. The geometry matches the bench and planter, while the granite material relates to the building. (Zone 4)*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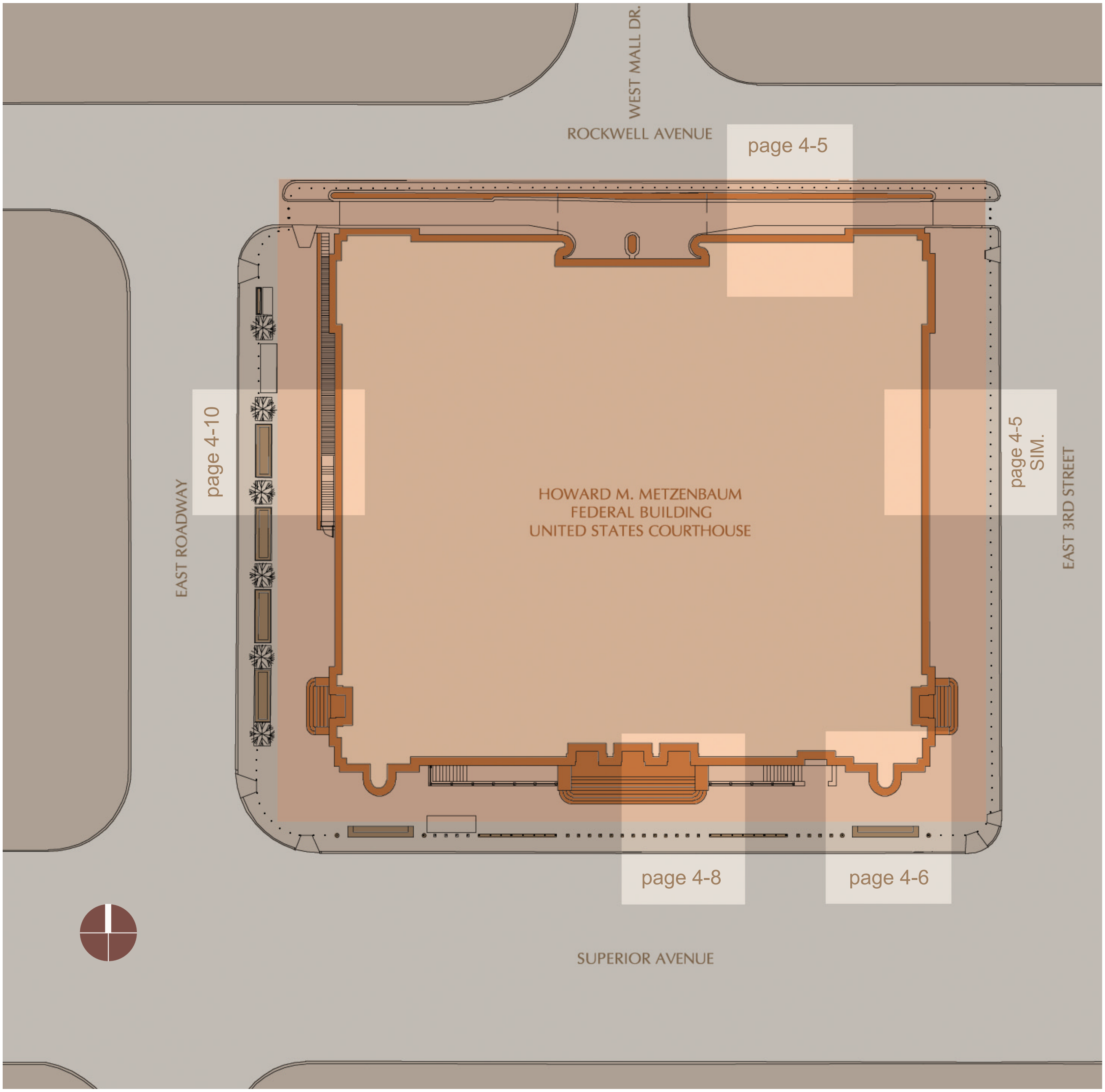
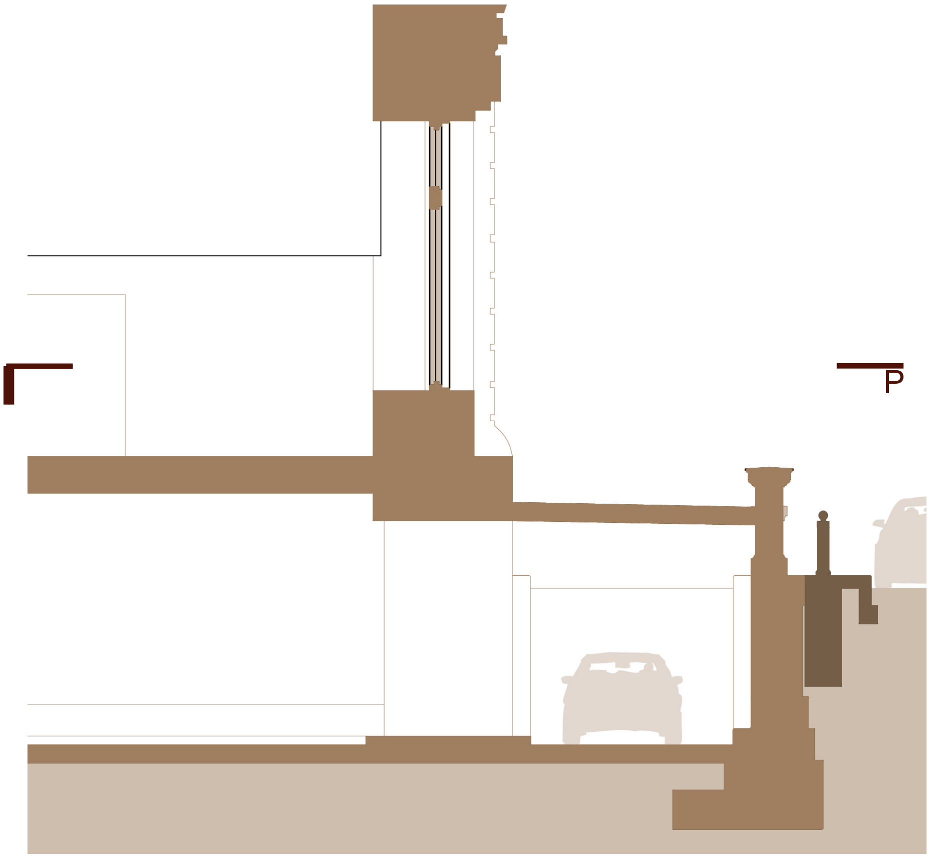
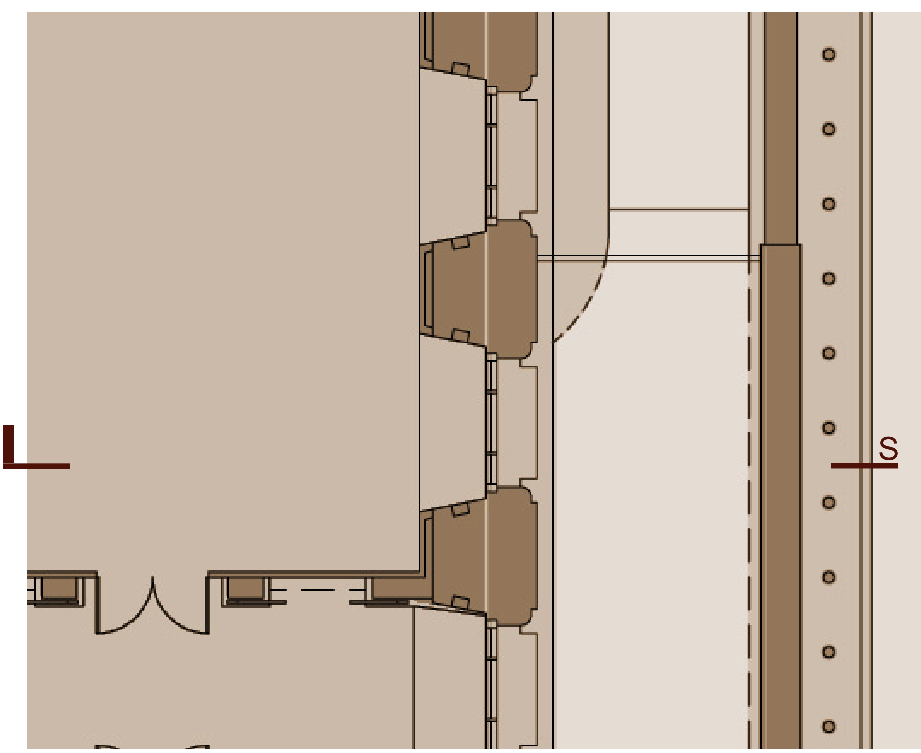
SECURITY ELEMENTS


WEST MALL DR.
ROCKWELL AVENUE
page 4-5
page 4-10
HOWARD M. METZENBAUM
FEDERAL BUILDING
UNITED STATES COURTHOUSE
page 4-5
SIM.
EAST ROADWAY
EAST 3RD STREET
page 4-8
page 4-6
SUPERIOR AVENUE

SITE PLAN

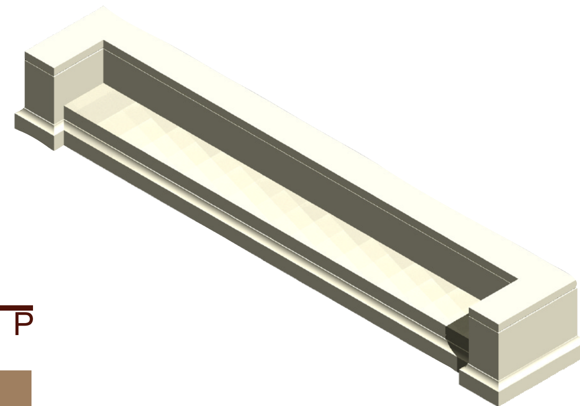



PARTIAL SECTION AT ROCKWELL AVENUE, LOOKING WEST



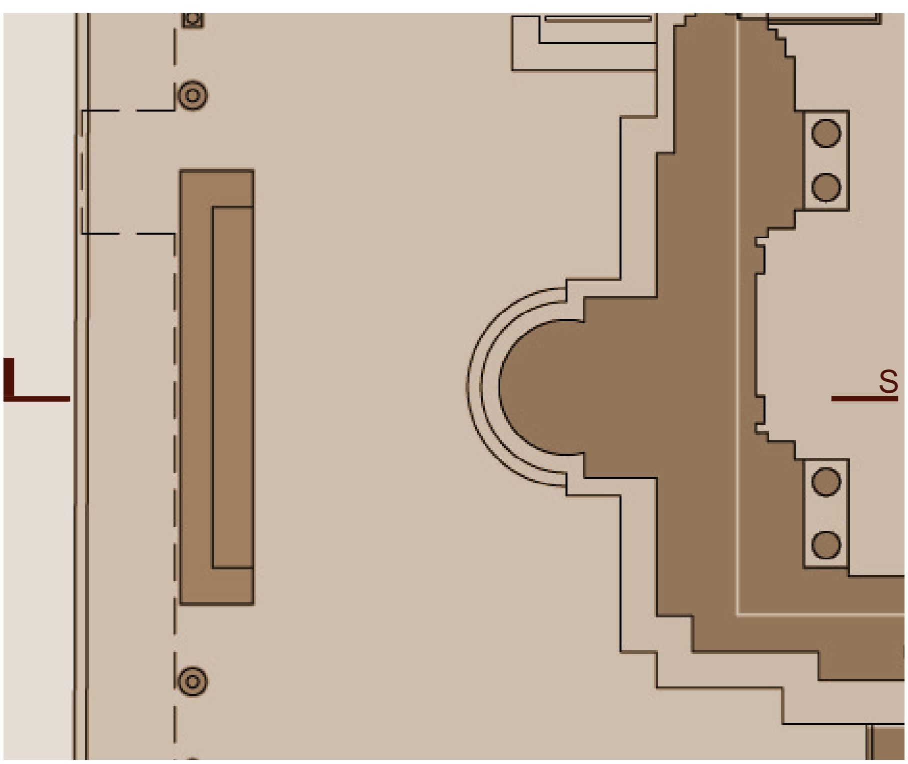

E

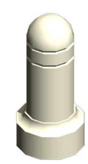
PARTIAL PLAN AT ROCKWELL AVENUE

A

SECTION AT SUPERIOR AVENUE, LOOKING WEST



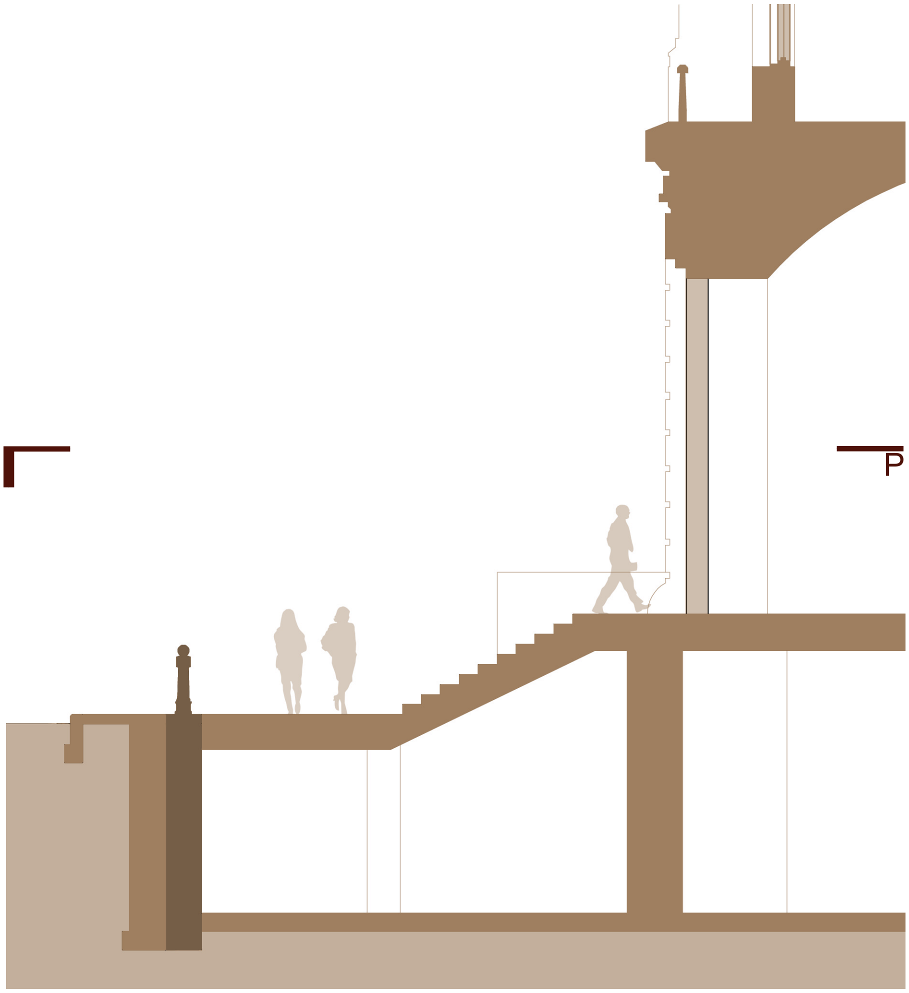



B

PARTIAL PLAN AT SUPERIOR AVENUE

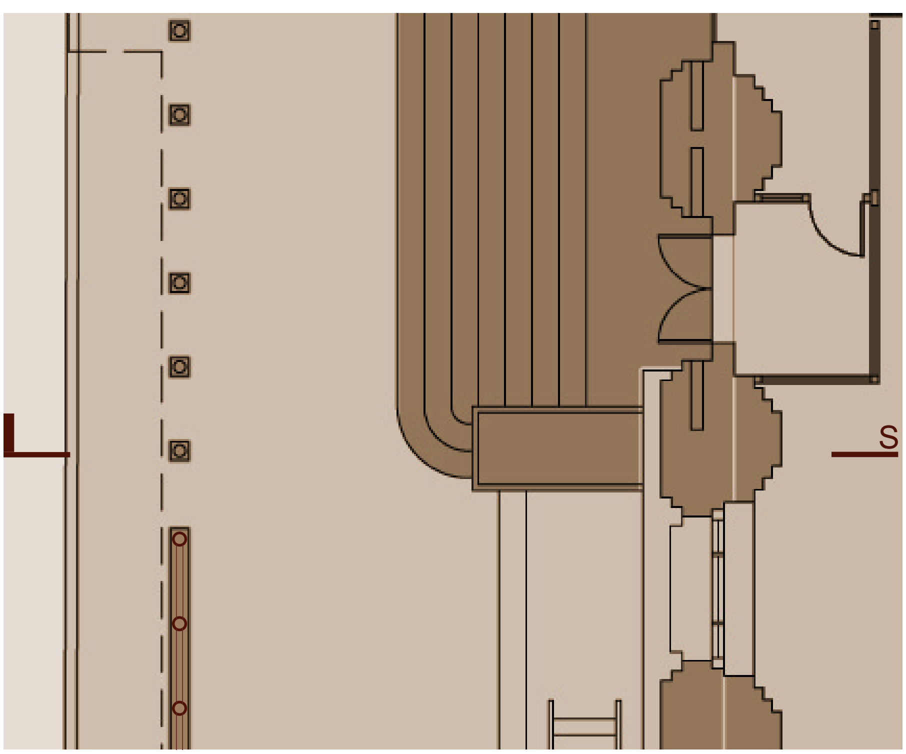
SUPERIOR AVENUE PERSPECTIVE VIEW, LOOKING EAST BEFORE

SUPERIOR AVENUE PERSPECTIVE VIEW, LOOKING EAST AFTER



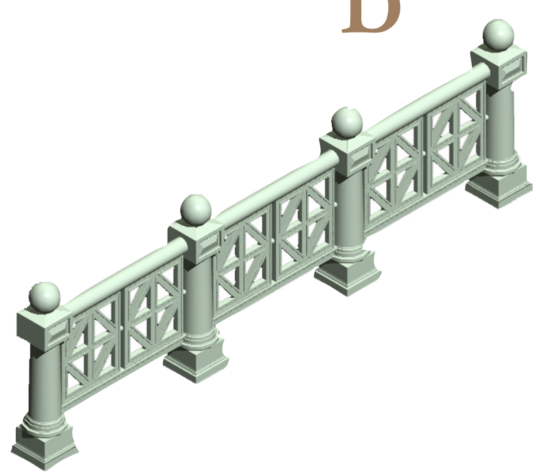

BUILDING SECTION AT SUPERIOR AVENUE, LOOKING WEST

C



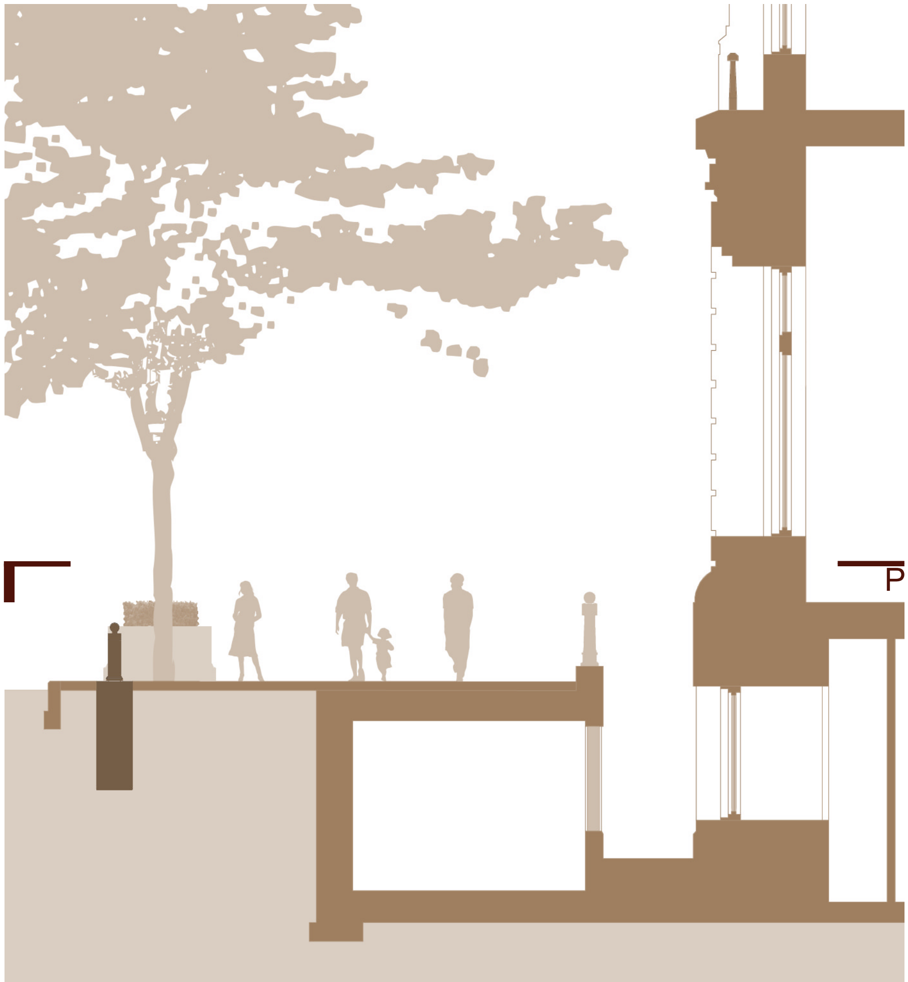

PARTIAL PLAN AT SUPERIOR AVENUE

D



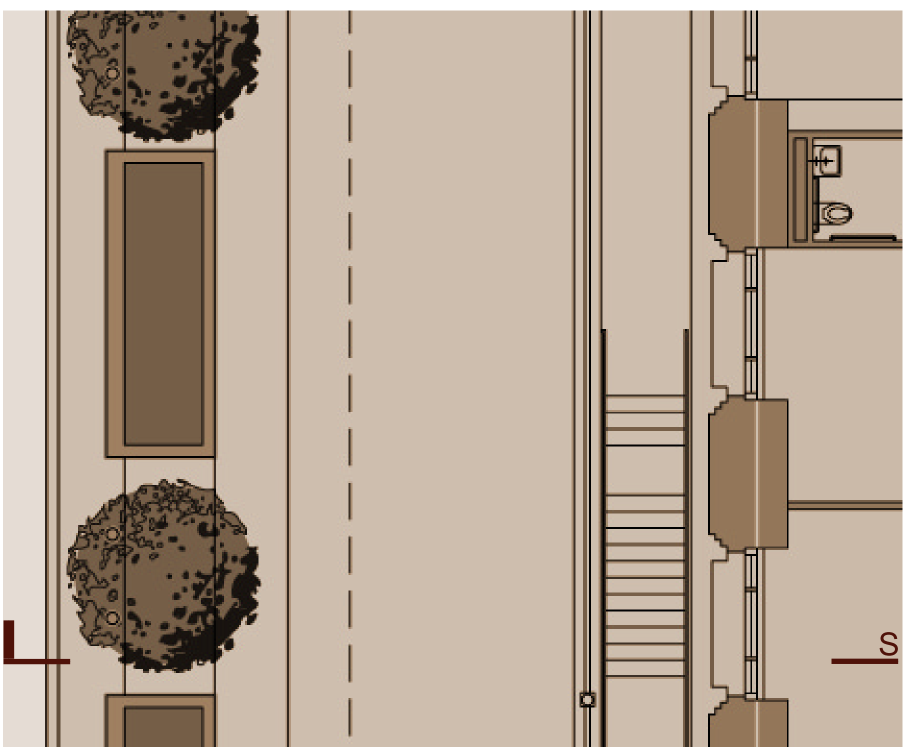

PERSPECTIVE VIEW AT SUPERIOR AVENUE, MAIN BUILDING ENTRANCE BEFORE


PERSPECTIVE VIEW AT SUPERIOR AVENUE, MAIN BUILDING ENTRANCE AFTER

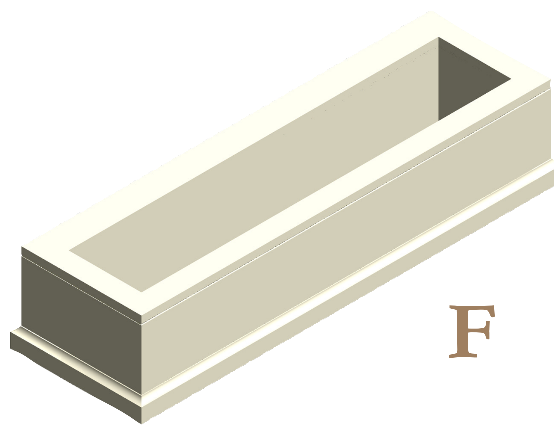



PARTIAL SECTION AT EAST ROADWAY, LOOKING NORTH

E




PARTIAL PLAN AT EAST ROADWAY



F

PERSPECTIVE VIEW AT EAST ROADWAY BEFORE

PERSPECTIVE VIEW AT EAST ROADWAY AFTER

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT HEADQUARTERS
*Washington, DC*
*1963-1968*
*Marcel Breuer*

*Designed by one of the world's leading modern architects, the HUD building was heralded as a major achievement that set high standards for public buildings. At completion, it was acclaimed for its imaginative plan, the boldness of its forms and the dynamic spatial engagement of its surroundings. It is the first federal office building to employ precast concrete and a radical departure from the architecture of its type. In search of a higher quality of design, it symbolically epitomized the devotion of a newly created department to upgrade the nation's cities and housing.*

*The building's monochromatic precast panel skin and the deeply recessed windows provide a setting for an intricate play of light and shadow. The end walls stone planes quietly add to the narrow range of materials. The cast-in-place frame of the building resembles a tree, growing out of a series of robust pairs of pilotis with slanted, angular walls.*

*The structure embraces the landscape with its curvilinear X shape. The sweeping convex curves of the 10 story high walls draw adjacent space inward to sculpt open plazas on each side of the building. Walking around the structure, which dramatically thrusts its body up and outwards, transcends viewing of an object. It is a dynamic experience of space and architectural movement.*

## SECURITY ELEMENTS: ARRAY 1

*These elements establish a visual language for the design of security elements. All bollards and threat side walls require blast analysis and structural design.*

A. BOLLARDS

*These are platonic shapes cast in architectural concrete with stainless steel accents. The array of pyramids and prisms is a formal response to the clean geometry of the building. The slanted surfaces of the pyramids are a reference to the massive pilotis supporting the building. (Zone 1)*

B. BOLLARDS

*These minimal bollards clad in stainless steel are derived from existing site elements. (Zone 1)*

C. RAIL

*Stainless steel cables are spun between bollards to prevent passage without obstructing visual communication. (Zone 5)*

D. SCREEN WALL

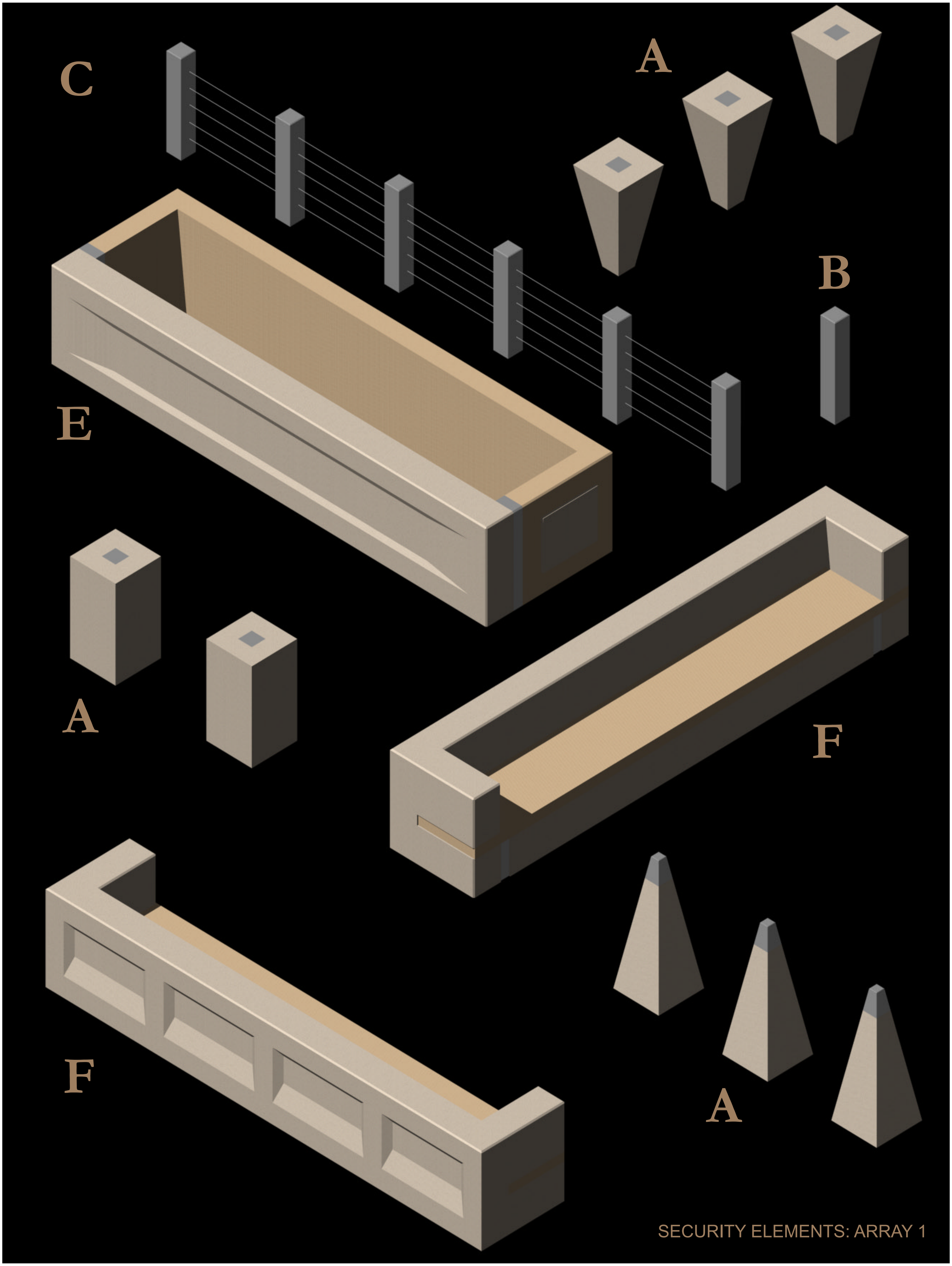
*This element is not shown on its own. The idea is to repeat the motifs established in the backs of elements E and F. The screen wall is used as a barrier to deter passage. It may also be a screen for street vending, standardized trash receptacles and other amenities. (Zone 4)*

E. PLANTER

*The design explores the incorporation of two colors/textures of concrete/stone, with stainless steel accents at joints. The articulation of the back is derived from the building end wall. (Zone 3)*

F. BENCH

*This example shows a basic element with architectural concrete back and sides and a stone seat. The design of the back explores a connection with the building windows articulation. (Zone 2)*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SECURITY ELEMENTS: ARRAY 1

## SECURITY ELEMENTS: ARRAY 2

*These elements establish a visual language for the design of security elements. All bollards and threat side walls require blast analysis and structural design.*

A. BOLLARDS

*These are platonic shapes cast in architectural concrete with stainless steel accents. The array of cones, cylinders and spheres is a formal response to the clean geometry of the building. The curved shapes seek a softer look as opposed to the sharp edge elements in Array 1. (Zone 1)*

B. BOLLARDS

*These minimal round bollards clad in stainless steel are derived from existing site elements. (Zone 1)*

C. RAIL

*Stainless steel cables are spun between bollards to prevent passage without obstructing visual communication. (Zone 5)*

D. SCREEN WALL

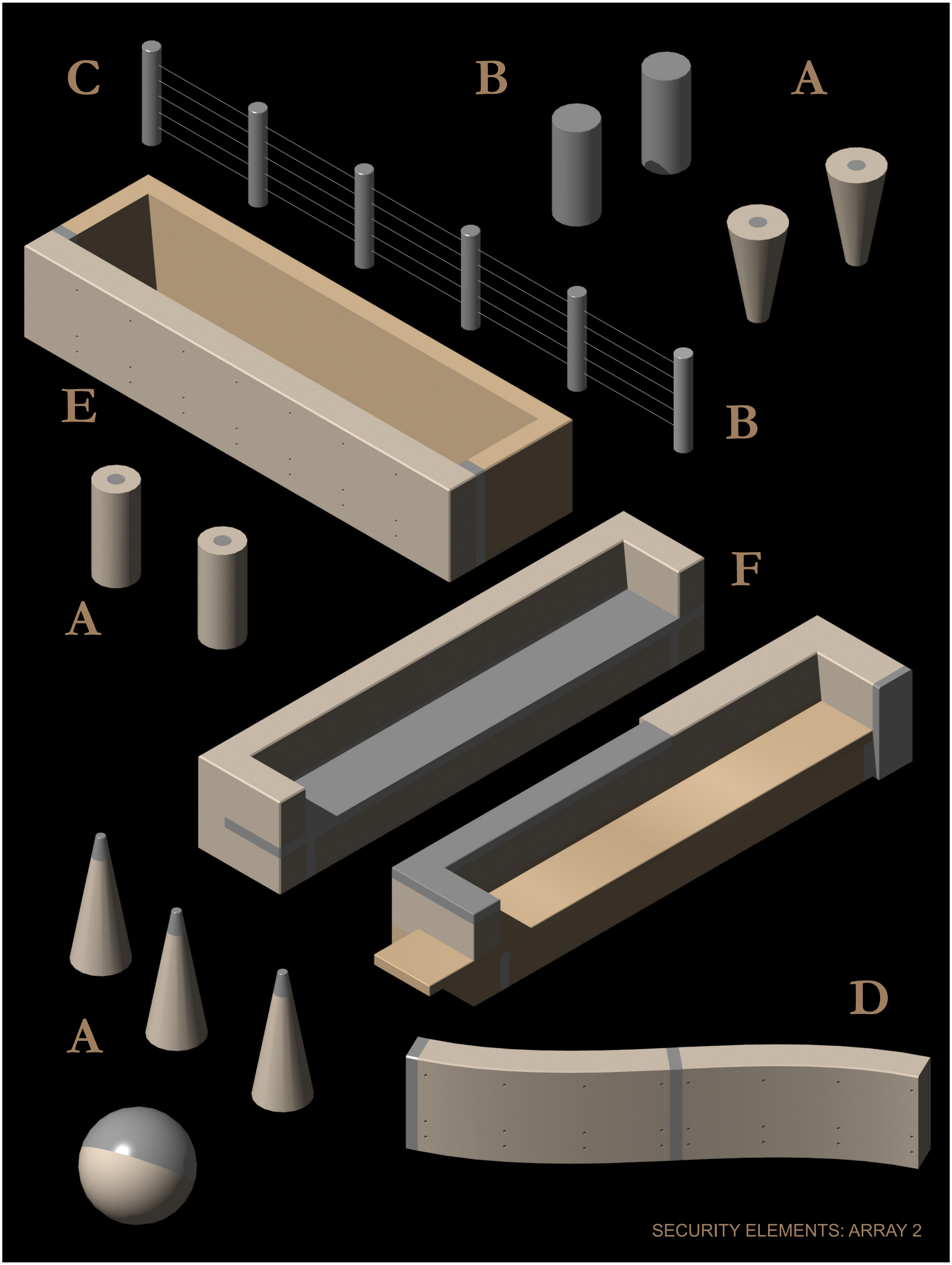
*This element is used as a barrier to deter passage. It may also be a screen for street vending, standardized trash receptacles and other amenities. Architectural concrete is cast in sections with stainless steel treatment at joints. Tie form holes may be left open or plugged with stainless steel inserts. A curve compliments the existing building configuration. It also suggests the sculptural potential of cast-in-place concrete. (Zone 4)*

E. PLANTER

*The design explores the incorporation of two colors/textures of concrete/stone, with stainless steel accents at joints. The open or plugged form tie holes aim at establishing a rhythm similar to that found in element D. (Zone 3)*

F. BENCH

*This example shows a basic element with architectural concrete back and sides and a stainless steel seat. A second example explores a stone seat with fragmentation of the basic element with the introduction of offset planes, projections and joint articulation. (Zone 2)*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SECURITY ELEMENTS: ARRAY 2

AUDITOR'S BUILDING
*Washington, DC*
*1878-1880*
*James G. Hill*

*Originally built to house "The Bureau of Printing and Engraving", the structure was designed by the office of the Supervising Architect of the Treasury. It was commissioned in the period in which Federal Buildings echoed the Romanesque massiveness of H.H. Richardson's work. However, the use of Italianate and contemporary English elements is a stylistic departure from the exuberant Romanesque idiom.*

*Since the 1880 completion, three major additions have been constructed in 1891, 1896 and 1900. All wings of the building are four stories in height and the overall massing caters to the original function - an industrial facility housing an uninterrupted and uniform space for large equipment. The nine story tower adorning the east pavilion and the corbelled base bartizan at the southeast corner add visual interest to the restrained volume penetrated by a regular grid of fenestration. Dark red pressed brick laid in Flemish bond and molded black brick face the load bearing masonry walls culminating in a major corbelled cornice. Terra-cotta ornament, slate roofs and highly crafted ironwork complete the materials palette and bring together a stylistically harmonious building.*

*The Auditor's building stands out in the nation's capital amidst a collection of Federal, Greek revival and Beaux Arts examples. Through sophisticated detailing, it combines different stylistic impulses into a structure of historical, architectural and landmark significance. It was included in the National Register of Historic Places on April 27, 1978.*

## SECURITY ELEMENTS: ARRAY 1

*These elements establish a visual language for the design of security elements. All bollards and threat side walls require blast analysis and structural design.*

A. BOLLARDS
*Ornamental iron shaft and spherical finial are abstracted from existing bollards in the building surroundings. (Zone 1)*

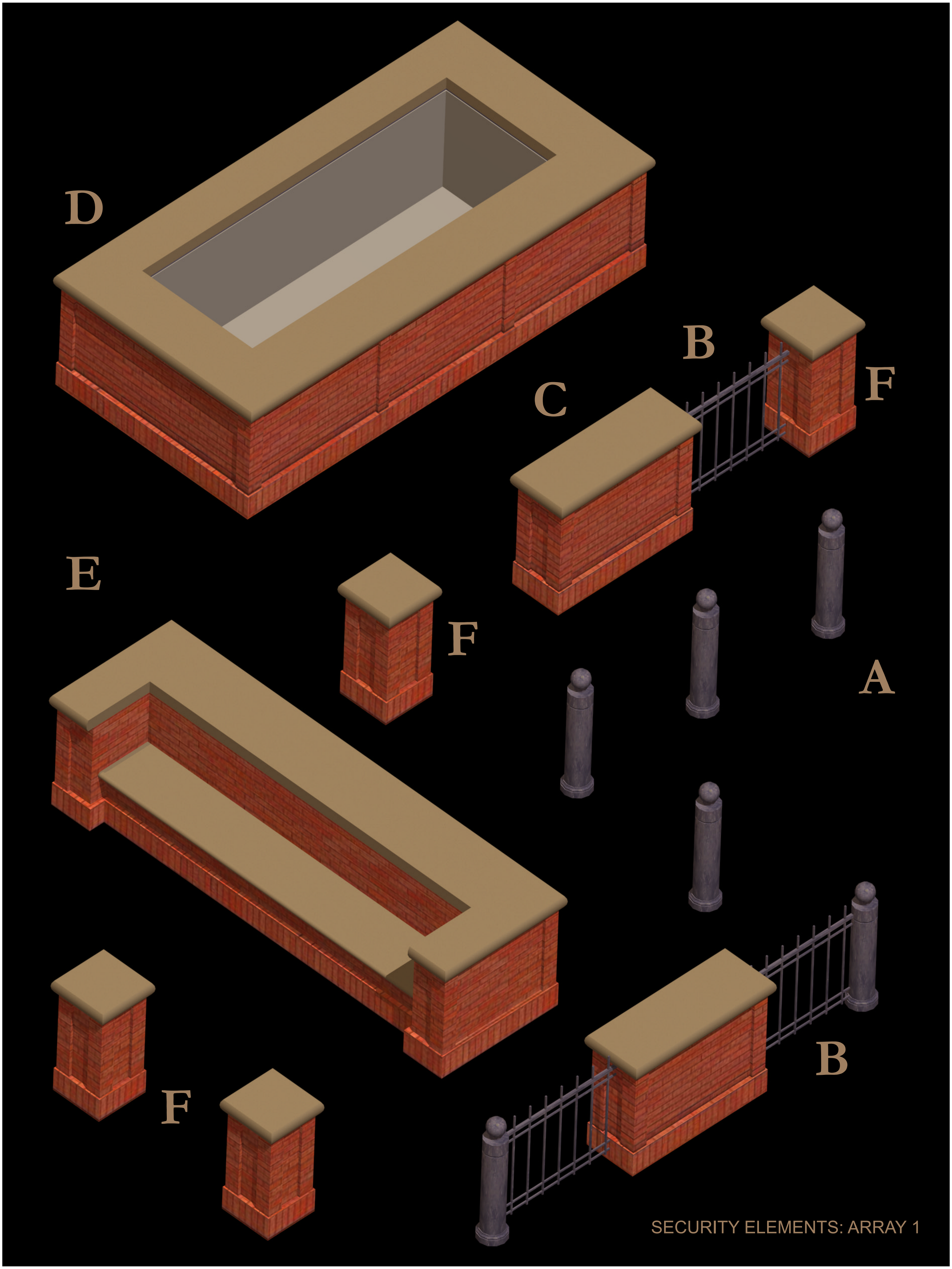
B. RAIL
*A combination of minimalist balusters and rails seeks to compliment the period architecture of the building. (Zone 5)*

C. SCREEN WALL
*The materials (brick and stone) are borrowed from the palette of the existing building. This element establishes a language for all solid security elements. (Zone 4)*

D. PLANTER
*Soldier course base, panelization and stone caps are based on the screen wall example. (Zone 3)*

E. BENCH
*The solid wall motif is further articulated with the addition of a stone seat. (Zone 2)*

F. BOLLARDS
*These are based on the screen wall design. The emphasized corners are a minimal attempt to add design interest to the clean prism that forms the bollard's body. (Zone 1)*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SECURITY ELEMENTS: ARRAY 1

## SECURITY ELEMENTS: ARRAY 2

*These elements establish a visual language for the design of security elements. All bollards and threat side walls require blast analysis and structural design.*

A. BOLLARDS
*Ornamental iron body with fluted shaft and conical finial are reminiscent of existing bollards in the building surroundings. (Zone 1)*

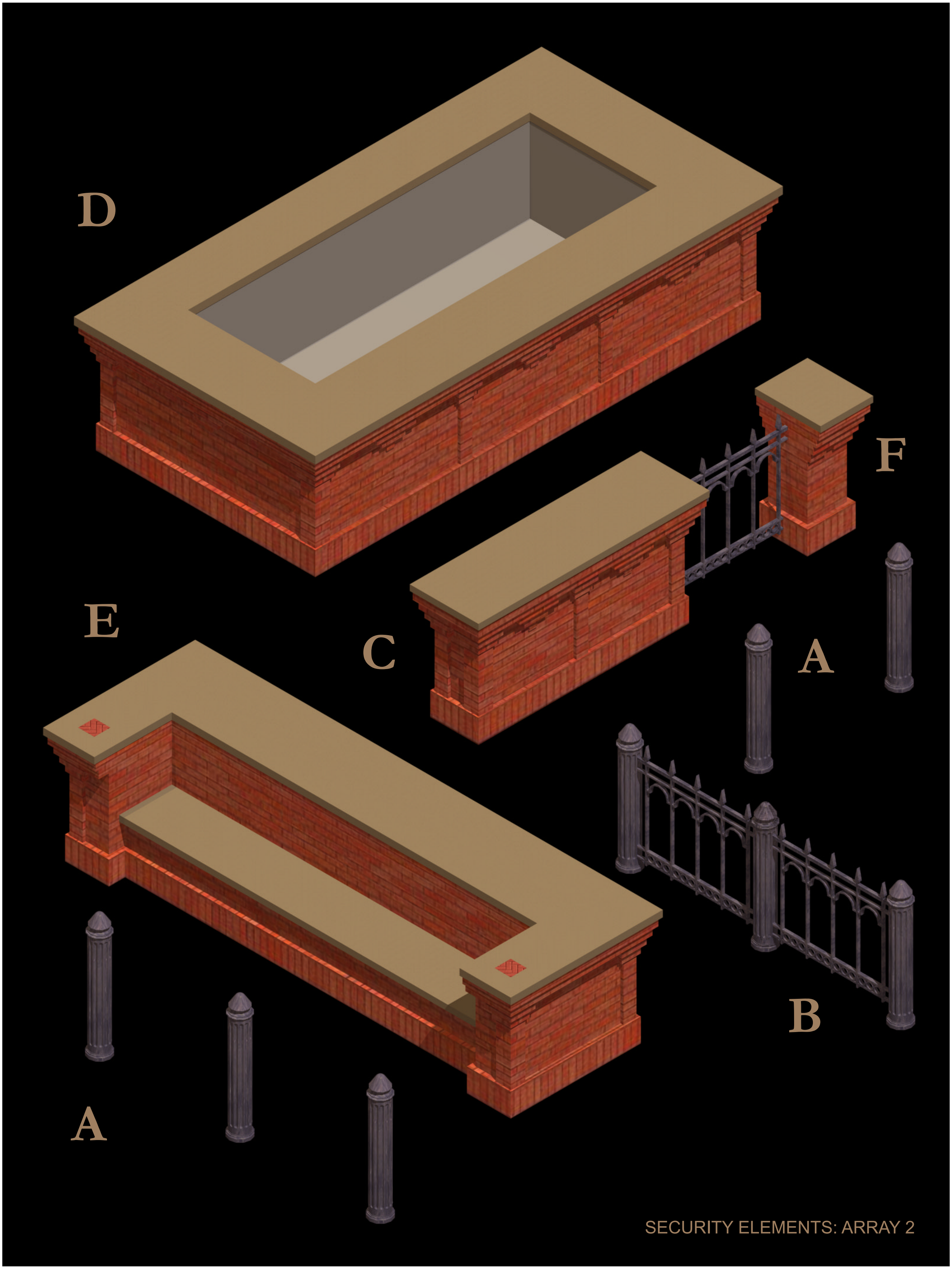
B. RAIL
*A combination of spear heads and arches seeks to compliment the Romanesque detailing of the building. (Zone 5)*

C. SCREEN WALL
*The design is derived from the richly textured facade of the existing building. It establishes a language for all solid security elements. (Zone 4)*

D. PLANTER
*Corbelled brick, coursing, and stone caps are based on the screen wall example. (Zone 3)*

E. BENCH
*The solid wall motif is further articulated with the addition of decorative brick inserts in the stone cap. (Zone 2)*

F. BOLLARDS
*These are formed in brick with detailing similar to Elements C,D, and E. (Zone 1)*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SECURITY ELEMENTS: ARRAY 2

**Non-Disclosure Warning**

The *ISC Security Design Criteria* contains physical security design and construction criteria and standards for Federal buildings and facilities. Disclosure of this data to other than Federal officials or contractors with a specific need to know may compromise the security of the facility and its occupants. The document and the standards and criteria contained therein will be made available ONLY to those Federal officials and/or contractors, contract employees and identified consultants who have a direct need for the information to design/specify/estimate/review a specified project. Precautions should be taken to safeguard and control distribution of the *ISC Security Design Criteria*, and any individuals provided copies will assume responsibility for assuring that the information is secure.

# INTRODUCTION

## Purpose

The Interagency Security Committee (ISC) developed this document to ensure that security becomes an integral part of the planning, design, and construction of new Federal office buildings and major modernization projects. The criteria consider security in all building systems and elements.

The ISC was established by Executive Order 12977 of October 19, 1995 to develop long-term construction standards for locations requiring blast resistance or other specialized security measures. In a series of working group discussions, the ISC revised and updated GSA's 1997 Draft Security Criteria, taking into consideration technology developments, new cost considerations, the experience of practitioners applying the criteria, and the need to balance security requirements with public building environments that remain lively, open, and accessible.

Both the ISC Security Design Criteria and the GSA Draft Security Design Criteria that preceded it grew out of the Department of Justice's (DOJ) Vulnerability Assessment, written at President Clinton's direction after the 1995 Oklahoma City bombing. The three documents speak to a common purpose, but this ISC Security Design Criteria is aimed at major projects and uses a different system than the DOJ Vulnerability Assessment to rate risk and assign protection levels.

Initially, this document will be reviewed by the ISC Long-term Construction Standards Working Group at least once per year to assure it remains up to date.

## Applicability

These criteria apply to new construction of general purpose office buildings and new or lease-construction of courthouses occupied by Federal employees in the United States and not under the jurisdiction and/or control of the Department of Defense. The criteria also apply to lease-constructed projects being submitted to Congress for appropriations or authorization. They do not apply to airports, prisons, hospitals, clinics, border patrol stations, and ports of entry; or to unique facilities, such as those classified by the DOJ Vulnerability Assessment as Level V (the Pentagon, CIA headquarters, etc).

Where prudent and appropriate, the criteria apply to major modernization projects. The principles contained here may be considered for projects not meeting the foregoing definitions.

The criteria are intended for design and security professionals in the development of detailed project requirements. Because the criteria emphasize flexibility and are therefore subject to interpretation, users should consider preparing project-specific requirements for contractors.

While the criteria cover many aspects of facility security, they do not directly address certain threats, such as workplace violence; tactics, such as chemical or biological attacks and sabotage of cyber-based information systems; and operations procedures, such as developing occupant emergency plans.

## Risk Basis

The application of the Security Design Criteria is based on a project-specific risk assessment that looks at threat, vulnerability, and consequences, three important components of risk. Threat is the actual or perceived source of jeopardy. The primary threat addressed by this document is a person or persons using various tactics (weapons, tools, methods) to cause harm. Other threats to buildings, such as earthquakes or hazardous materials stored inside the facility, are beyond the criteria's scope. Vulnerability is the degree to which a facility is susceptible to a threat. Consequences are the negative effects of an event. An additional component of risk – probability or likelihood – is determined using historical and intelligence information, when available.

The government will give the designer a list of project-specific tactics to design to (a multidisciplinary team will select security criteria to meet the facility's needs).

## Security Design Philosophy

These criteria take a flexible and realistic approach to the reliability, safety and security of Federal office buildings. The document considers urban design principles, cost effectiveness, and geographic location; acknowledges acceptance of some risk; and recognizes that Federal buildings must connect with the community in an open, accessible way.

The criteria address the need to save lives and prevent injury as well as protect Federal buildings, functions, and assets. To this end, the document addresses protection zones, moving from the outer elements in – from the perimeter, including streetscape, parking, and sidewalks, to the building envelope, structural design, and interior components. For all protection zones, the criteria offer a broad range of techniques and systems to detect, deter, and delay terrorist and criminal attacks.

How to Use This Document

It is the intent of this document to apply the security design criteria on a building-by-building basis. Once a facility-specific risk assessment is completed, a multidisciplinary project team can use the document to plan security measures for a project's building and site. The team may include security, intelligence, and operations professionals; architects and engineers; and owners and tenants. Specialists in fire protection, cost estimating, communications, and other disciplines should be included as necessary.

The team will use two project-specific products of the risk assessment to make security and design decisions. The first product is a list of design basis tactics. These are the particular criminal or terrorist weapons or acts, such as vehicle bombs or forced entry, that the facility must be designed to. The second product of the risk assessment is a level of protection designation. This will specify the appropriate protection level (Low, Medium/Low, Medium, or Higher) for each building element and sub-element, based on an analysis of threat, vulnerability, consequences, and – if feasible – likelihood.

The team will use the design basis tactics and assigned protection levels to select appropriate criteria from Part II of this document, Design Criteria. Part III of the document, Risk Guidelines, provides additional information on the security implications of some of the criteria to help team members choose measures that best meet the facility's needs.

In Part III of this document, the team will find worksheets to help with criteria selection. Project information in these tables should be protected from potential adversaries. At a minimum, information should not be subject to disclosure under the Freedom of Information Act. Users may classify the tables following Classified National Security Information: E. O. 12958 and its Implementing Directives.

It is extremely important that the team-based security decision-making process be implemented as early in the project as possible to ensure that the most effective and efficient solutions are reached. Security planning should start as soon as a project concept is developed, including during site evaluations and selection.

## 2.0 Site Planning and Landscape Design

*IMPORTANT NOTE: The following criteria do NOT apply to all projects. Follow each criterion only if instructed to by your project-specific risk assessment.*

Effective site planning and landscape design can enhance the security of a facility and eliminate the need for some engineering solutions. Security considerations should be an integral part of all site planning, perimeter definition, lighting, and landscape decisions.

## 2.A Vehicular Control

### 2.A.1 Distance

The preferred distance from a building to unscreened vehicles or parking is _____(project-specific information to be provided). Ways to achieve this distance include creating a buffer zone using design features such as street furniture and bollards that can function as barriers; restricting vehicle access (see 2.A.2 and Ch. 9); and landscaping (see 2.D).

### 2.A.2 Perimeter Protection Zone

Site perimeter barriers are one element of the perimeter protection zone. Perimeter barriers capable of stopping vehicles of _______ lbs., up to a speed of______, shall be installed (project-specific information to be provided). A vehicle velocity shall be used considering the angle of incidence in conjunction with the distance between the perimeter and the point at which a vehicle would likely be able to start a run at the perimeter. A barrier shall be selected that will stop the threat vehicle. Army TM 5-853-1 and TM 5-853-2/AFMAN 32-1071, Volume 2 contain design procedures. In designing the barrier system, consider the following options:

- Using various types and designs of buffers and barriers such as walls, fences, trenches, ponds and water basins, plantings, trees, static barriers, sculpture, and street furniture;
- Designing site circulation to prevent high speed approaches by vehicles; and
- Offsetting vehicle entrances as necessary from the direction of a vehicle's approach to force a reduction in speed.

### 2.A.3 Perimeter Vehicle Inspection

2.A.3.1 Provide space for inspection at a location to be specified.

2.A.3.2 Provide design features for the vehicular inspection point that stop vehicles, prevent them from leaving the vehicular inspection area, and prevent tailgating.

## 2.B Site Lighting

The following are examples of effective site lighting levels: at vehicular and pedestrian entrances, 15 horizontal maintained foot candles; and for perimeter and vehicular and pedestrian circulation areas, 5 horizontal maintained foot candles. In most circumstances, perimeter lighting should be continuous and on both sides of the perimeter barriers, with minimal hot and cold spots and sufficient to support CCTV and other surveillance. However, for safety reasons and/or for issues related to camera technology, lower levels may be desirable. Other codes or standards may restrict site lighting levels.

2.C Site Signage

Confusion over site circulation, parking, and entrance locations can contribute to a loss of site security. Signs should be provided off site and at entrances; there should be on-site directional, parking, and cautionary signs for visitors, employees, service vehicles, and pedestrians. Unless required by other standards, signs should generally not be provided that identify sensitive areas.

2.D Landscaping

Landscaping design elements that are attractive and welcoming can enhance security. For example, plants can deter unwanted entry; ponds and fountains can block vehicle access; and site grading can also limit access. Avoid landscaping that permits concealment of criminals or obstructs the view of security personnel and CCTV, in accordance with accepted CPTED principles.

3.C.4 Garage and Vehicle Service Entrances

All garage or service area entrances for government controlled or employee permitted vehicles that are not otherwise protected by site perimeter barriers shall be protected by devices capable of arresting a vehicle of the designated threat size at the designated speed. This criterion may be lowered if the access circumstances prohibit a vehicle from reaching this speed (see 2.A.2).

## 4.0 Structural Engineering

IMPORTANT NOTE: The following criteria do NOT apply to all projects. Follow each criterion only if instructed to by your project-specific risk assessment.

The intent of these criteria is to reduce the potential for widespread catastrophic structural damage and the resulting injury to people. The designer should exercise good judgment when applying these criteria to ensure the integrity of the structure, and to obtain the greatest level of protection practical given the project constraints. There is no guarantee that specific structures designed in accordance with this document will achieve the desired performance. However, the application of the criteria will enhance structural performance if the design events occur.

There are three basic approaches to blast resistant design: blast loads can be reduced, primarily by increasing standoff; a facility can be strengthened; or higher levels of risk can be accepted. The best answer is often a blend of the three.

The field of protective design is the subject of intense research and testing. These criteria will be updated and revised as new information about material and structural response is made available.

4.A General Requirements

4.A.1 Designer Qualifications

For buildings designed to meet Medium or Higher Protection Levels, a blast engineer must be included as a member of the design team. He/she should have formal training in structural dynamics, and demonstrated experience with accepted design practices for blast resistant design and with referenced technical manuals.

4.A.2 Design Narratives

A design narrative and copies of design calculations shall be submitted at each phase identifying the building-specific implementation of the criteria. Security requirements should be integrated into the overall building design starting with the planning phase.

## RISK GUIDELINES (FOR OFFICIAL USE ONLY)

## General Requirements

1.A Purpose

Part III of the ISC Criteria provides guidance on developing requirements to protect buildings against a variety of criminal and terrorist tactics, including bomb blasts. This document is a basic tool for security, design, and engineering professionals to use for decision-making purposes when planning projects covered by the criteria. The document sets forth minimum performance standards which agencies may exceed based on project-specific considerations.

1.B Applicability

See Part I Section A.

1.C Risk Basis

1.C.1 Project-Specific Requirements

The criteria in this document should be applied using a decision-based approach tailored to each building. The building's specific security requirements should be based on a risk assessment – done at the earliest stages of programming – that considers, at a minimum, the risk factors described in 1.C.3, the tactics identified in 1.E, and the severity level of the risk to the building. Risk evaluations should also use information from a variety of other sources, including physical security surveys and law enforcement/intelligence agencies.

Once the risk has been defined and quantified, funding, costs, site requirements, and other considerations or restrictions should be factored in to develop building-specific design requirements. Building Security Committee and tenant recommendations must be considered. If the desired mitigation of identified risks is not attainable, some portion of the risk may have to be accepted. One of the objectives of a risk assessment system is to achieve a responsible and prudent balance between risk and mitigation measures, recognizing that no agency will have sufficient resources or justification to implement every countermeasure.

1.C.2 <u>Assessment Designations</u>

The criteria in this document use designations ranging from Low to Higher for two purposes. The first is to indicate the severity of the risk to a facility; the second is to designate the appropriate protection level, which means the degree to which the building should offer protection against specific tactics.

1.C.3 <u>Risk Factors</u>

For the purposes of the criteria, risk levels are rated Low, Medium/Low, Medium, or Higher. A Very High risk level could be assigned, but is beyond the scope of these criteria. The risk levels are communicated by tactic severity. For example, the vehicle bomb tactic is categorized according to the varying charge weights of the explosives. The lowest weight dealt with in this document is considered a Low risk; the heaviest weight is a Higher risk.

A building-specific risk assessment should consider the following factors, at a minimum:

– Symbolic Importance: Some facilities are highly visible symbols of this country, either nationally, regionally, or locally. The Alfred P. Murrah Federal Building, for instance, was the primary symbol of the U.S. Government in Oklahoma City.

– Criticality: This measures the degree to which a building houses operations and functions critical to national or regional interests of the United States.

– Consequence: This measures a successful attack's impact on a building's occupants, assets, and functions, as well as on the larger community.

– Threats: These are classified as either criminal or terrorist threats. Tactics may include bombs, forced entry, chemical and biological attacks, criminal acts, etc.

1.C.4 <u>Protection Levels</u>

As used in this document, protection levels Low, Medium/Low, Medium, and Higher refer to how the building is to perform during an emergency, and the degree to which the building and its constituent elements should offer protection against specific tactics. Although it is beyond the scope of these criteria, a Very High Protection Level could be assigned. (Structural protection levels are discussed in Part II 4.A.8.)

The designation of protection levels, as well as the actual planning, design, and construction of a project, should be closely guided by emergency operations objectives to ensure that the resulting occupant emergency plans (OEPs) are reliable, efficient, and cost effective. For example, if an OEP calls for evacuation down a stairwell, the plan for the building should consider where the stairs will discharge, the need for pressurization, and the need for a source of electrical power that will function in that area if a design-basis event occurs. If a project-specific OEP does not exist, use either a generic OEP or an OEP from a similar project.

An entire building should not simply be assigned a single protection level. A facility with a low protection requirement for bomb blast may require a higher protection level for crime; a building's structure may require a higher protection level than its mechanical system; a building requiring low structural protection may need a higher protection level CCTV system.

1.C.5 Risk Assessment Methodology

A security risk assessment for each new or major alteration is essential, first because it channels limited budgets to best minimize risk, and second because it optimizes the performance of a building during a criminal or terrorist event.

The risk assessment is a major element in determining which security criteria apply to a facility. Since many building features, including structure and mechanical and electrical systems, are difficult and costly to change, risk must be carefully and thoughtfully evaluated in all its complexity. Risk assessors should have intelligence on past, current, and future threats. Projections must be made over the life of the facility – as difficult as that may be to do – because of the inflexibility of most building systems, some of which may be designed to last 30-100 years.

Risk assessors also need to consider the separate characteristics as well as the inter-relatedness of building systems. Each element and system – architectural, mechanical, electrical, structural, etc. – should receive its own protection level rating. Throughout the security design process, professionals from many disciplines need to consider how threats and mitigating measures applied to one element affect the rest of the facility.

Currently, there is no government-wide risk assessment system, and this document does not provide such a system.

1.C.6 Project-specific Criteria Tables

Once a project-specific risk assessment is completed, a building's multidisciplinary project security team should use the tables at the end of Part III to determine appropriate criteria for the building. Table 1 provides design basis tactics and their severity levels.

Tables 2 - 9 are designed to communicate criteria and protection levels. They list levels of protection: Low, Medium/Low, Medium, and Higher, and provide countermeasures appropriate to each level. Team members can use columns 1-5 of the tables to select criteria that would provide the desired protection levels, and columns 6-8 to note constraints or other factors and final security solutions.

The tables are intended to be removed from the criteria, copied, and attached to additional sheets of project-specific details and information, as needed. The following is an explanation of the column headings:

- Building Element - The particular component or system being assigned a protection level.
- Tactic – The weapon, action, or method of attack that is the basis of design.
- Criteria – A reference to each criterion number in Part II.
- Countermeasure – The method of protecting the building element against the designated tactic; this column contains one-sentence summaries of the design criteria found in Part II.
- Protection Level/Performance Standards – More specific information on the countermeasure needed to achieve the desired protection level. A dash (-) in this column means a criterion does not apply. Design criteria are detailed in Part II, and application information is in Part III.
- Requirements/Remarks – The space for project-specific figures, such as explosive charge weights, distances, and locations. This area may also include information on operational procedures related to design.
- Considerations/Constraints – The place to fill in physical characteristics relating to the facility or site and non-technical constraints, such as those relating to cost or tenant needs. Requirements unrelated to security often constrain protective system design.
- Protective Measures to be Implemented – The final choice of design criteria and methods to enhance facility security.

1.D Co-location

Agencies that are functionally similar or that require similar levels of protection should be housed in the same location. High-risk tenants, such as law enforcement agencies, should not be co-located with lower risk tenants. If co-location can not be avoided, high-risk tenants should be segregated from publicly accessible areas.

1.E Tactics

It is important to try to identify an aggressor's likely strategy and to identify the severity of the risk to a building. The section below categorizes these strategies into various tactics. For each tactic, the severity of the risk is described from Low to Higher, depending on the events the risk assessment concludes are most likely to occur.

**Site and Landscape Design**

From the earliest programming stages, security considerations should be an integral part of site planning, perimeter definition, lighting, signage, and landscaping decisions. Site and landscape design can help protect a building - particularly by keeping threats away and by incorporating CPTED principles - and decrease the need for costly building engineering solutions to safety concerns. (See Part II 1.A.2 for CPTED references.)

Use the information here as well as in Part II Chapter 2 and Table 2 to specify site and landscaping requirements.

## 2.A Vehicular Control

Blast pressures from an exploding vehicle bomb decrease rapidly with distance from the explosion. Each foot of setback can be of critical importance. When a vehicle bomb is identified as a threat, consideration must be given to how the site design can offer maximum protection to the building, or whether site constraints require design modifications to the structure of the building itself.

There is a need to balance costs, risks, and the technical issues of distance and hardening. Achieving this balance requires the participation of those acquiring sites, security professionals, urban planners, designers, and others.

### 2.A.1 Distance

One design strategy to mitigate blast effects is to maintain as much distance as possible between a vehicle bomb and the facility.

On any given site, the recommended distance may not be available. In that case, the identified threat can be addressed by countermeasures such as perimeter barriers (Ch. 2), structural hardening (Ch. 4) and parking restrictions (Ch. 9); relocation of vulnerable functions within or away from the building; operational procedures, such as increased surveillance; or acceptance of some higher degree of risk.

Table 2 –Site and Landscape Design

| **Building Element** | **Tactics** | **Criteria** | **Counter-measures** | **Protection Levels/ Performance Standards** | | | | **Requirements/ Remarks** | **Additional Considerations /Constraints** | **Protective Measures to be Implemented** |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | **Low** | **Med./Low** | **Med.** | **Higher** | | | |
| Perimeter | A,B | 2.A.1 | Increase distance between vehicles and facility. | 0 ft. | 5 ft. | 50 ft. | 100 ft. | Distance=__ft. | | |
| Perimeter | A,B | 2.A.2 | Keep moving vehicles away from building. | _ | _ | Use barriers to stop __lb. vehicle at __mph. | Use barriers to stop __lb. vehicle at __mph. | See Part III, 1.E.1.1 | | |
| Perimeter | A,D | 2.A.3.1 | Provide space for vehicle inspection. | _ | _ | Consider providing space. | Provide space. | Location: | | |
| Perimeter | A,D | 2.A.3.2 | Provide features for vehicle inspection. | _ | _ | Consider features to stop vehicles, keep them from leaving inspection, and prevent tailgating. | Install features to stop vehicles, keep them from leaving inspection, and prevent tailgating. | | | |
| Parking | | | (see Chs. 4 and 9) | | | | | | | |
| Site Lighting | A,E-H | 2.B | Provide necessary lighting for security and cameras. | _ | Yes | Yes | Yes | | | |
| Signage | A-H | 2.C | Include appropriate signage to reduce confusion. | _ | Yes | Yes | Yes | | | |
| Landscaping | A,E-H | 2.D | Use design elements to enhance security. | _ | Yes | Yes | Yes | | | |

# The Tao of Blast Design

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**Taoism**

- ✓ Taoism seeks to create harmony and balance with one's environment. It is a metaphor for understanding blast design.

**Blast versus Seismic Design**

- ✓ Blast engineering is a specialized field of structural engineering. Blast engineers deal with enormous pressures applied for fractions of a second typically to the outer bays of a building. Seismic engineers deal with cyclical loads applied through the base of structure as shear forces.
- ✓ The small amount of overlap between blast and seismic engineering is in dealing with progressive collapse.

**Rules of Thumb for Blast Design**

- ✓ DO maximize the standoff distance between vehicles and your building.
- ✓ DON'T site your building so that there is a direct approach for fast-moving traffic.
- ✓ DO use passive perimeter barriers to increase the standoff distance.
  - o Bollards
  - o Anti-ram kneewalls
  - o Concrete planters
  - o Benches
  - o Moats
- ✓ DO integrate perimeter security with the landscape architecture.
- ✓ DO use active perimeter barriers for vehicle access points.
  - o Rotating wedge system
  - o Surface-mounted plate system
  - o Retractable bollards
  - o Crash gate
  - o Crash beam
- ✓ DO choose simple and convex building shapes.
- ✓ DO set back the upper floors.
- ✓ DO minimize the number of insets in the building façade.
- ✓ DON'T design overhangs with vehicular traffic below.
- ✓ DON'T use large transfer girders.
- ✓ DO use ductile materials for your structure, such as steel or reinforced concrete.

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- ✓ DO design your floor slabs for upward, as well as downward forces.
- ✓ DO design your building with sufficient structural redundancy for progressive collapse.
- ✓ DON'T locate loading docks and mail delivery areas within 50 feet of critical areas, such as occupied spaces.
- ✓ DO locate high-density areas and essential personnel away from the perimeter of a building and above the ground floor.
- ✓ DON'T allow unsecured parking in the basement or on the roof of your building.
- ✓ DO place stairways for emergency egress as far away from vulnerable locations as possible.
- ✓ DO allow these stairways to discharge away from lobbies, parking areas, or loading areas.
- ✓ DON'T cluster your emergency egress routes.
- ✓ DO provide areas of refuge in high-rise buildings.
- ✓ DO located refuge areas in the inner bays of a building.
- ✓ The best way to approach blast mitigation for new construction is *early* and with a multi-disciplinary blast mitigation team which includes the architect, structural engineer, blast engineer and landscape architect.
- ✓ Retrofits are more expensive, more complicated, less effective and have greater uncertainty.

**Windows**

- ✓ DO minimize the size of your windows.
- ✓ DO use strip windows.
- ✓ DO design hazard mitigating window systems.
- ✓ DO design cladding that is securely fixed to your structure.

**Conclusions**

- ✓ Architectural measures can be as, if not more, effective than structural measures at mitigating blasts. They allow the possibility of aiming for invisible protection.
- ✓ This requires that informed blast design decisions are made early in the design process.