MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

MEMORANDUM

TO: Distribution

FROM: Benjamin Chin, Manager
Design Services

DATE: January 17, 1996

SUBJECT: Design Standard (DST) 96-1, Fire Alarm System, Loading Bridges, and Concrete Construction

Effective immediately, please incorporate the following design requirements into your projects and checklists.

**Baltimore/Washington International (BWI) Airport Fire Alarm System**

The Maryland Aviation Administration (MAA) has adopted the Honeywell Fire Alarm system for BWI Airport. All applicable contracts should include the Honeywell Fire Alarm system as a sole source specification. The specified Honeywell Fire Alarm system should function, operate and be compatible with the existing BWI Fire Alarm system.

The specifications should require the Contractor to submit a copy of the as-built fire alarm and sprinkler system drawings to the Engineer for the BWI Fire Rescue Service (FRS).

The specifications should require the Contractor to design and submit to the Engineer a copy of the sprinkler layout on AutoCADD file on disk for the BWI Fire Rescue Service. The Contractor should also design and submit a copy of the fire alarm system floor plans on AutoCADD file on disk to the Engineer for Honeywell to update the Fire Alarm Central Graphic Computer. The MAA presently uses AutoCADD Release 12. You should check with the MAA Project Manager as to which Release should be specified.

**Loading Bridges**

Projects which install and/or modify loading bridges should be designed and specified to allow operation from the forward 2 passenger doors of the aircraft where applicable.

**Concrete Construction**

Please be advised that MAA policy is to design projects based on cast-in-place concrete principles. However, the contract specifications should allow for the submission of pre-cast concrete alternates. The specifications should require the Contractor to submit the required design documentation and calculations to support the substitution of pre-cast concrete.

The MAA has allowed pre-cast concrete design for certain applications where architectural uniformity is a high priority, such as the garage parapet walls. In such cases, you should request MAA approval prior to proceeding.

Should you have any questions regarding this matter, please contact me at 410-859-7093.

BC/jao

Distribution:

Mr. Ian Bricknell (TAMS)
Mr. Emory Carrigan (OPE)
Mr. Brad Collins (DMJM)
Mr. George Eichner (Greiner)
Mr. Ray Heverling (OPE)
Ms. Karen Kuczinski (OPE)
Mr. Ali Logmanni (OPE)
Mr. Derek Moore (Bodouva)
Mr. Chirantan Mukhopadhyay (Parsons)
Mr. Steve Parker (STV)
Mr. Charles Steen (OPE)
Mr. William Tsai (OPE)
Mr. Reginald Weaver (Baker)

cc: Chief Tom McGinnis
Mr. Jay Huber
Mr. Alex Noorani
Mr. Mike West

F:/BEN/UPDATES.DST/DST96-2.DO

**MARYLAND DEPARTMENT OF TRANSPORTATION**
**MARYLAND AVIATION ADMINISTRATION**

**MEMORANDUM**

**TO:** Distribution

**FROM:** Benjamin Chin, Manager
Design Services

**DATE:** February 12, 1996

**SUBJECT:** Design Standard (DST) 96-2, FAA Eastern Region Order EA 5210.1C

The Federal Aviation Administration (FAA) has cancelled FAA Eastern Region Order EA 5210.1C, Safety Requirements on Airports During Agency Funded Construction and Maintenance Activities.

You should continue to use AC 150/5370-2C, Operational Safety on Airports During Construction in your design and preparation of contract documents.

Should you have any questions regarding this matter, please contact me at 410-859-7093.

BC/jao

Distribution:

Mr. Ian Bricknell (TAMS)
Mr. Emory Carrigan (OPE)
Mr. Brad Collins (DMJM)
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Mr. Steve Parker (STV)
Mr. Charles Steen (OPE)
Mr. William Tsai (OPE)
Mr. Reginald Weaver (Baker)

cc: Mr. Alex Noorani
Mr. Mike West

DST 96-3 Repeal of the State Highway Administration (SHA) Highway Development Manual

# Maryland Aviation Administration

*"Striving to do our best in everything we do - dedicated to providing outstanding airport facilities and services"*

**Theodore E. Mathison** **Executive Director**


**MEMORANDUM**

**TO:** Distribution

**FROM:** Benjamin Chin, Manager
Design Services

**DATE:** March 11, 1996

**SUBJECT:** Design Standard (DST) 96-3, Repeal of the State Highway Administration (SHA) Highway Development Manual

Effective immediately, the SHA Highway Development Manual will no longer be used as design policy for our landside (non-airfield) projects. AASHTO's publication, "A Policy on Geometric Design of Highways and Streets 1990" will be used for all project design criteria.

Design exceptions will only be required if your design falls below AASHTO minimum standards. In such cases, you should obtain SHA approval concurrently with Maryland Aviation Administration (MAA) approval.

Selected portions of the HDM will be converted to SI units and reissued as SHA guidelines at a later date.

If you should have any questions regarding this DST, please contact me at 410-859-7093.

BC/jao

Distribution:

Mr. Ian Bricknell (TAMS)
Mr. Emory Carrigan (OPE)
Mr. Brad Collins (DMJM)
Mr. George Eichner (Greiner)
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Mr. Steve Parker (STV)
Mr. Charles Steen (OPE)
Mr. William Tsai (OPE)
Mr. Reginald Weaver (Baker)

cc: Mr. Alex Noorani
Mr. Mike West

BC6 A1/DST96-4.DOC

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

MEMORANDUM

TO: Distribution

FROM: Benjamin Chin, Manager
Design Services

DATE: July 19, 1996

SUBJECT: Design Standard (DST) 96-4, Temporary Support of Excavation

The purpose of this Design Standard is to notify you that we will be issuing the attached Temporary Support of Excavation Specification as an Interim Standard Provisions Addenda. The specification will also be incorporated into the Second Edition of the Standard Provisions.

Should you have any questions regarding this matter, please contact me at 410-859-7093.

BC/jao

Distribution:

Mr. Ian Bricknell (TAMS)
Mr. Emory Carrigan (OPE)
Mr. Brad Collins (DMJM)
Mr. Ray Heverling (OPE)
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Mr. Chirantan Mukhopadhyay (Parsons)
Mr. Steve Parker (STV)
Mr. Charles Steen (OPE)
Mr. William Tsai (OPE)
Mr. Reginald Weaver (Baker)

Enclosure

cc: Ms. Suzette Moore
Mr. Alex Noorani
Mr. Mike West

# TEMPORARY SUPPORT OF EXCAVATION

MARYLAND AVIATION ADMINISTRATION

JULY 1996

# TEMPORARY SUPPORT OF EXCAVATION

## 1.0 GENERAL

In general, excavations shall be supported. The support of excavation shall consider and protect all existing and new utilities, foundations, underground or above ground structures, underground tanks, etc. which are adjacent to or within the limits of excavation. However, if sufficient space is available, the Contractor can use open excavations with suitable side slopes. The open excavation shall be designed by a qualified geotechnical engineer in accordance with OSHA Regulations described in Federal Register, Volume 54, No. 209, October 31, 1989, Rules and Regulations. Open cuts, including partial sloping cuts above the proposed support, shall be reviewed on a case-by-case basis. Unless noted otherwise in this specification, the design and details of the temporary support of excavation shall meet the requirements of the following Codes, Standards or Manuals:

(a) AASHTO - Standard Specifications for Highway Bridges, 1992.

(b) Maryland Department of Transportation, State Highway Administration Standard Specifications for Construction and Materials, 1993.

(c) USS Steel Sheet Piling Design Manual, Updated and Reprinted by FHWA, July 1984.

(d) Federal Register, Volume 54, No. 209, October 31, 1989, Rules and Regulations.

## 2.0 TEMPORARY VERTICAL-WALLS AND COFFERDAMS

### 2.1 Description

The design of temporary structures required for the support of excavations shall be the sole responsibility of the contractor. Design calculations and drawings stamped and prepared by the Contractor's Registered Professional Engineer specializing in Geotechnical Engineering with a minimum of five years experience and registered in the State of Maryland are required.

The Contractor must submit 3 copies of the Support of Excavation shop drawings and calculations to the Engineer at least 7 days prior to the start of the construction for support of excavation. The shop drawings and calculations should be submitted, along with a cover letter, certifying that support of excavation design has been done in conformance with these Support of Excavation specifications. The support of excavation shop drawings and calculations will not be reviewed or approved by the Engineer. The submission of these documents are for the purpose of inspection by the Engineer.

The following list of items summarizes the minimum conditions which shall be considered in the design of temporary vertical-walls or cofferdams.

### 2.2 Earth Pressures and Surcharge Loadings

The active earth pressure coefficient, $K_a$, and the passive earth pressure coefficient,$K_p$, shall be estimated assuming wedge theory based upon a planar surface of sliding as defined by Coulomb theory. The effective angle of internal friction and unit weight used to compute $K_a$ and $K_p$ shall be based upon available geotechnical

information at the site with appropriate consideration given to assigning effective $\phi$ values for cohesive material where the sloping surcharge case must be considered. The value of the friction angle, $\delta$, between the soil and the retaining wall, used for computing the value of $K_a$ and $K_p$ shall not exceed one-third of the value of the effective angle of internal friction, $\phi$, of the soil. The effect of the slope angles, $\beta$ and $\beta'$, shall be considered when evaluating $K_a$ and $K_p$.

## 2.3 Width of Discrete Wall Elements

Where discrete vertical wall elements (soldier beams) are used for support, the width of each vertical element shall be assumed equal to the width of the flange or diameter of the element for driven sections and the diameter of the concrete-filled hole for sections encased in concrete.

## 2.4 Simplified Earth Pressure Distribution from a Retained Granular Soil on a Temporary Flexible Cantilever Retaining Wall or a Temporary Flexible Retaining Wall Supported by One Tier of Bracing or Tie Backs; Reference - AASHTO, 92

A triangular earth pressure diagram shall be used, having a horizontal ordinate equal to $K_{a1}\gamma'_1 h$ at any depth h (see Figures 1 and 4).

Where:

$\gamma'_1$ = effective unit weight of retained soil

h = any depth of excavation

$K_{a1}$ = coefficient of active earth pressure of retained soil

## 2.5 Simplified Earth Pressure Distribution from a Retained Cohesive Soil on a Temporary Flexible Cantilever Retaining Wall or Temporary Flexible Retaining Wall Supported by One Tier of Bracing or Tiebacks; Reference - AASHTO, 92

A triangular earth pressure diagram shall be used. At the top of the wall, the lateral ordinate of the triangle shall be zero, increasing linearly to a value equal to $\gamma'_1 H - 2s_{u1}$ at the final excavation level, i.e. at the total depth, H, from the top of the wall (see Figures 2 and 3).

Where:

$s_{u1}$ = undrained shear strength of the retained cohesive soil.

H = total depth of excavation

Also, the addition of water pressure shall be considered on the supporting wall due to the possibility of water in tension cracks. Also, the following restrictions shall apply:

**2.5.1** The active earth pressure shall not be less than 0.25 times the effective overburden pressure at any depth.

**2.5.2** For sloping cuts above the proposed support system, use the effective shear strength parameters ($c=0$, $\phi$) and the simplified earth pressure distribution in accordance with Section 2.4 of this specification.

## 2.6 Simplified Earth Pressure Distribution on a Portion of Continuous Vertical Wall Element of a Temporary Flexible Cantilevered Wall or the Portion of Temporary Flexible Wall Supported by One or More Tiers of Bracing or Tiebacks Embedded in Granular Soils; Reference - AASHTO, 92

A triangular diagram for the resultant or net passive resistance shall be used, having a horizontal ordinate equal to $(K_{p2} - K_{a2})\gamma'_2.d - K_{a2}\gamma'_1H$ at any depth, d, below the final excavation (see Figures 1 and 2).

Where:

$\gamma'_2$ = effective unit weight of soil below the final excavation

d = any depth of embedment below the final excavation

$K_{a2}$ = coefficient of active earth pressure of soil below final excavation

$K_{p2}$ = coefficient of passive earth pressure of soil below final excavation

## 2.7 Simplified Earth Pressure Distribution on a Portion of Continuous Vertical Wall Element of Temporary Flexible Cantilevered Wall or the Portion of a Temporary Flexible Wall Supported by One or More Tiers of Bracing or Tiebacks Embedded in Cohesive Soils; Reference AASHTO, 92

A rectangular diagram for the resultant or net passive resistance shall be used, having a horizontal ordinate equal to $4s_{u2}-\gamma'_1H$ (see Figures 3 and 4).

Where:

$s_{u2}$ = undrained shear strength of the cohesive soil below the final excavation.

## 2.8 Simplified Earth Pressure Distribution from Granular or Cohesive Soils on the Embedded Portions of Discrete Vertical Wall Elements of Temporary Flexible Cantilevered Walls or of Temporary Flexible Walls Supported by One or More Tiers of Bracing or Tiebacks; Reference - AASHTO, 92

The procedure for determining the resultant passive resistance of a discrete vertical element embedded in soil shall be based on the net passive resistance mobilized by three times the element width or diameter, not to exceed the soldier pile spacing. A depth of 1.5 times the width of the element shall be discounted in developing passive lateral resistance (see Figures 5 through 8).

## 2.9 Construction Equipment and Traffic Loading Surcharge

Surcharge pressures must be added to the earth pressures computed in accordance with Sections 2.4 through 2.8 of this specification. A minimum construction loading surcharge of 600 psf shall be applied to all design cases. A higher value shall be used if applicable. The effect of restricting construction loads from the face of the supporting wall also may be considered.

## 2.10 Ground Water Pressures

Ground water pressures must be added to the earth pressures computed in accordance with Sections 2.4 through 2.8 of this specification. Where soldier piles with timber lagging are used ground water is generally assumed to be below subgrade of the interior excavation. When the wall is intended to prevent all leakage of ground water (tight sheeting), maximum exterior ground water pressures should be used.

## 3.0 SIMPLIFIED DESIGN PROCEDURE FOR RETAINING WALLS

### 3.1 Cantilever Walls

(a) Determine earth pressure diagram and net passive resistance diagram in accordance with Sections 2.2 through 2.10 of this specification.

(b) Sum moments about toe of the embedment to determine the embedment depth, $D_o$, for which the net passive resistance is sufficient to provide equilibrium.

(c) Determine the depth at which the shear in the wall is zero.

(d) Calculate the maximum bending moment at the point of zero shear.

(e) Calculate the design depth ($D_d$) of embedment, $D_d = 1{\cdot}2\ D_o$ to $1{\cdot}4\ D_o$.

### 3.2 Walls Supported by One Tier of Tiebacks

(a) Determine earth pressure diagram and net passive resistance diagram in accordance with Section 2.2 through 2.10 of this specification.

(b) Sum moments about the location of brace or tieback to determine the embedment depth, $D_o$, for which the net passive resistance is sufficient to provide equilibrium.

(c) Sum horizontal forces to determine the horizontal force in the brace or tieback.

(d) Determine depth below the brace or tieback at which the shear in the wall is zero.

(e) Calculate the maximum bending moment at the point of zero shear.

(f) Calculate the design depth ($D_d$) of embedment, $D_d = 1{\cdot}2\ D_o$ to $1{\cdot}4\ D_o$.

## 4.0 SIMPLIFIED EARTH PRESSURE DISTRIBUTIONS FROM VARIOUS SOILS ON TEMPORARY FLEXIBLE WALLS SUPPORTED BY TWO OR MORE TIERS OF TIEBACKS OR BRACES; REFERENCE - AASHTO, 92

**4.1** For granular soils, a rectangular earth pressure diagram shall be used, having a horizontal ordinate equal to $0.65\ K_{a1}\gamma'_1$ at any depth, h, below the top of the wall.

**4.2** For soft to medium stiff clay, a trapezoidal earth pressure diagram shall be used with horizontal ordinate increasing from zero at the top of the wall, to $K_a\gamma H$ at a depth equal to 0.25H. The horizontal ordinate shall remain constant at $K_a\gamma H$ from depths between 0.25H and H.

Where:

$K_a = 1\text{-}m(2q_u/\gamma H)$ but not less than 0.25

$m = 1$ for overconsolidated clays

$= 0.4$ for normally consolidated clays

$\gamma$ = total unit weight of clay

$q_u$ = unconfined compressive strength of clay

**4.3** For stiff to hard clay, a trapezoidal earth pressure diagram shall be used with the horizontal ordinate increasing from zero at the top of wall to $0.4\gamma H$ at a depth equal to 0.25H. The horizontal ordinate shall remain constant at a rectangular earth pressure diagram $0.4\gamma H$ for depths between 0.25H and 0.75H, and then decrease to zero at a depth equal to H.

4.4 Surcharge and water pressure shall be added to the earth pressures in accordance with Sections 2.9 and 2.10 of this specification.

## 5.0 SHEETING, WALERS, BRACES, TIEBACKS AND STRUTS

5.1 Struts, braces and walers should be sized for the above loads at normal allowable working stresses to which it will be subjected in the various construction stages using the appropriate pressure diagrams computed in accordance with Section 4 of this specification. The effect of combined axial and flexural loading, unsupported span lengths and lateral stability of the members must be considered.

For the design of braces, tiebacks, struts, walers and sheeting, the appropriate pressure diagrams computed in accordance with Section 4 of this specification shall be applied for final excavation conditions assuming struts, walers and sheeting to be hinged at brace points, except the uppermost brace point.

5.2 Sheeting, walers, braces, tiebacks and struts must be designed for each intermediate loading condition when portions of the structure or facilities are completed and the lower tiebacks, braces, or struts are removed. Consideration must be given to the possible increase in loading on the upper tiebacks, braces, or struts remaining in place, using some reasonable allowance for arching in the span between the completed structure and the lowest tieback, brace, or strut then in place.

## 6.0 TIMBER LAGGING

Structural grade timber lagging shall be of the following thicknesses, unsurfaced:

| Depth | Required Thickness of Timber Lagging for Clear Spans (S) of: | |
|---|---|---|
| | 5′ < S < 8′ | 8′ < S < 10′ |
| From ground surface to 25 feet | 3" | 4" |
| From 25 feet to 60 feet | 4" | 5" |

The lagging shall be of a timber specie and grade that will provide an allowable working stress of not less than 1,100 psi. In the case of greater soldier pile spacing or the presence of unusually heavy construction surcharge on particularly soft cohesive soils, greater thicknesses of lagging may be required.

## 7.0 WORKING STRESS METHOD

All members in the support structure should be sized using the Working Stress Method as discussed in the AISC Code. Design calculations must consider the effects of combined axial, torsional and flexural loads in the structure. Also, the stability of laterally unsupported members and unsupported span lengths shall be considered.

## 8.0 TIEBACKS OR BRACES

In general, excavations deeper than 12 feet must be braced or supported by tiebacks. The vertical spacing of tiers of tiebacks or braces below the first tier should not

exceed 16 feet center to center during excavation. Where the excavation is near a structure and it is desired to minimize movement of the structure, in lieu of underpinning, the vertical spacing shall not exceed 12 feet, center to center, during excavation. The necessity to remove intermediate braces or tiebacks during construction should be compensated for by increased stiffness of soldier piles.

## 9.0 SOLDIER PILE AND LAGGING WALL

Soldier piles shall be driven or installed in prebored holes. The installed soldier piles should be within a vertical tolerance of 3 inches per 25 feet of length.

Concrete spacers or other approved non-corrosive centering devices shall be used at sufficient intervals to insure concentric spacing for the entire length of pile installed in pre-bored holes.

After placing the soldier pile, the shaft shall be filled with concrete, having a 28-day strength of 3,500 psi from the bottom of the drilled shaft to the dredge line. A lean mix shall be placed in the remainder of the drilled shaft, where lagging is to be installed, completely encasing the pile. Concrete shall be allowed to cure for 72 hours before any excavation may take place.

As the excavation in front of the wall proceeds, timber lagging shall be wedged behind the flange of the soldier piles. The maximum height of unlagged face of excavation shall be established by the designer but shall, in general, not exceed two feet. The unlagged face shall not exceed 15 inches if water flows from face of excavation or if the soil face moves toward the excavation.

Packing shall be done to establish tight contact between the excavation face and the

lagging. Openings between lagging shall be packed with suitable material which will not decay and will allow free drainage of water without loss of soil or packing.

If unstable material is encountered during excavation, measures shall be taken to contain the unstable material in place and prevent ground displacement.

Sufficient quantity of material shall be maintained on hand for lagging, shoring, bracing and other operations for protection of work and for use in case of accident or emergency.

## 10. WORKING OR SHOP DRAWINGS

Details on working drawings shall show appropriate means of posting of struts and walers, lacing struts in both vertical and horizontal planes to provide lateral stability, web and connection stiffeners, brackets, and provisions for wedging and jacking of struts to prevent horizontal movement. Details are a vital element in the adequacy and safety of temporary earth retaining structures and shall be shown completely on the working drawings in conjunction with the methods and sequence of installation of all elements of the structure. Particular attention shall be given to procedures for wedging or jacking of all bracing members to maintain tight contact and to provide for uniformity of load distribution.

Complete details of tiebacks, if used, shall be shown in the shop drawings.

## 11. CONTRACTORS SUBMISSION

The Contractor's submission shall include computations for each stage of the installation of the support system, whether it is supported by cantilevering or bracing.

The design shall indicate that the system is stable both internally and externally. It shall also show that the embedment is sufficiently deep to prevent piping and potential ground loss at the bottom.

No overstress shall be allowed in the design of members in compression.

## 12. CONTROL OF GROUND WATER

The Contractor shall control ground water at the site. This shall include control of stormwater runoff from adjacent ground and structures, methods to control and prevent erosion, and methods to control loss of ground during excavation.

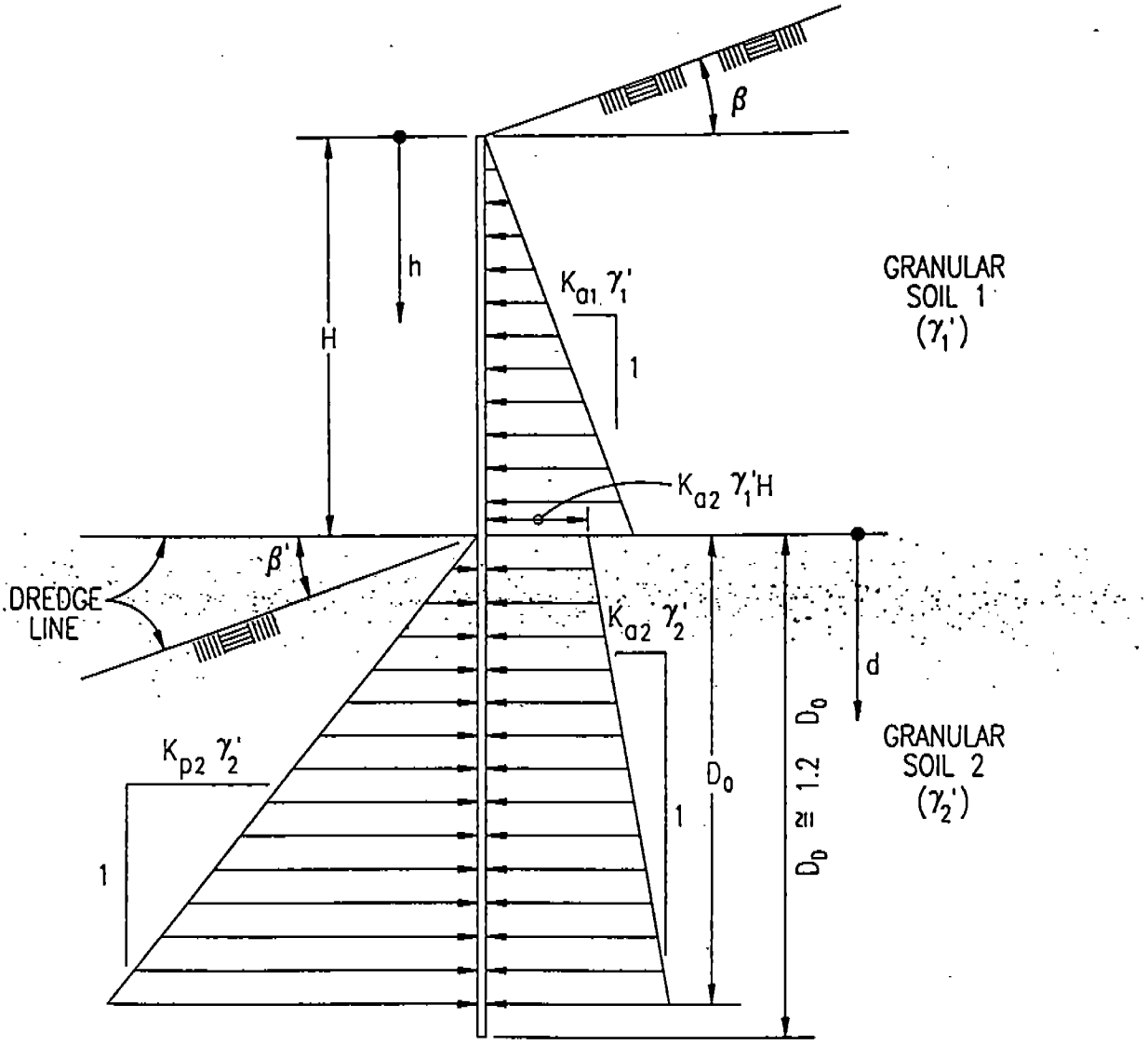
## 13. ADJACENT STRUCTURES

The design of all members must include the effects of loads of street traffic, construction equipment, supported utilities, adjacent structures which are not underpinned, and any other loads that must be carried by the support of excavation system during the construction period.

## 14. METHOD OF MEASUREMENT AND BASIS OF PAYMENT

The work of designing, preparing shop drawings, furnishing, installing, maintaining, and removing the support of excavation system, where required, will not be measured for payment. Rather, the support of excavation system is considered to be incidental to the work required for excavation including the segregation of the excavated material into suitable and unsuitable materials, hauling, storing, rehandling, depositing, backfilling, compacting, disposal, etc. All costs associated with the designing, preparation of shop drawings, furnishing, installation, and removal of the

support of excavation system including pumping, bailing, draining, dewatering devices, and removal thereof, and all other labor, equipment, tools, and incidentals necessary to complete the item, shall be incidental to other items in the Bid.




## PRESSURE DISTRIBUTION

NOTES: (1) SURCHARGE AND WATER PRESSURES MUST BE ADDED TO THE ABOVE EARTH PRESSURES.

(2) FORCES SHOWN ARE PER HORIZONTAL FOOT OF VERTICAL WALL ELEMENT.

SIMPLIFIED EARTH PRESSURE DISTRIBUTION FOR TEMPORARY FLEXIBLE CANTILEVER WALLS WITH CONTINUOUS VERTICAL WALL ELEMENTS – RETAINING GRANULAR SOIL WITH EMBEDMENT IN GRANULAR SOIL

D100447.44/FIGURE1.DWG

Greiner

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BWI

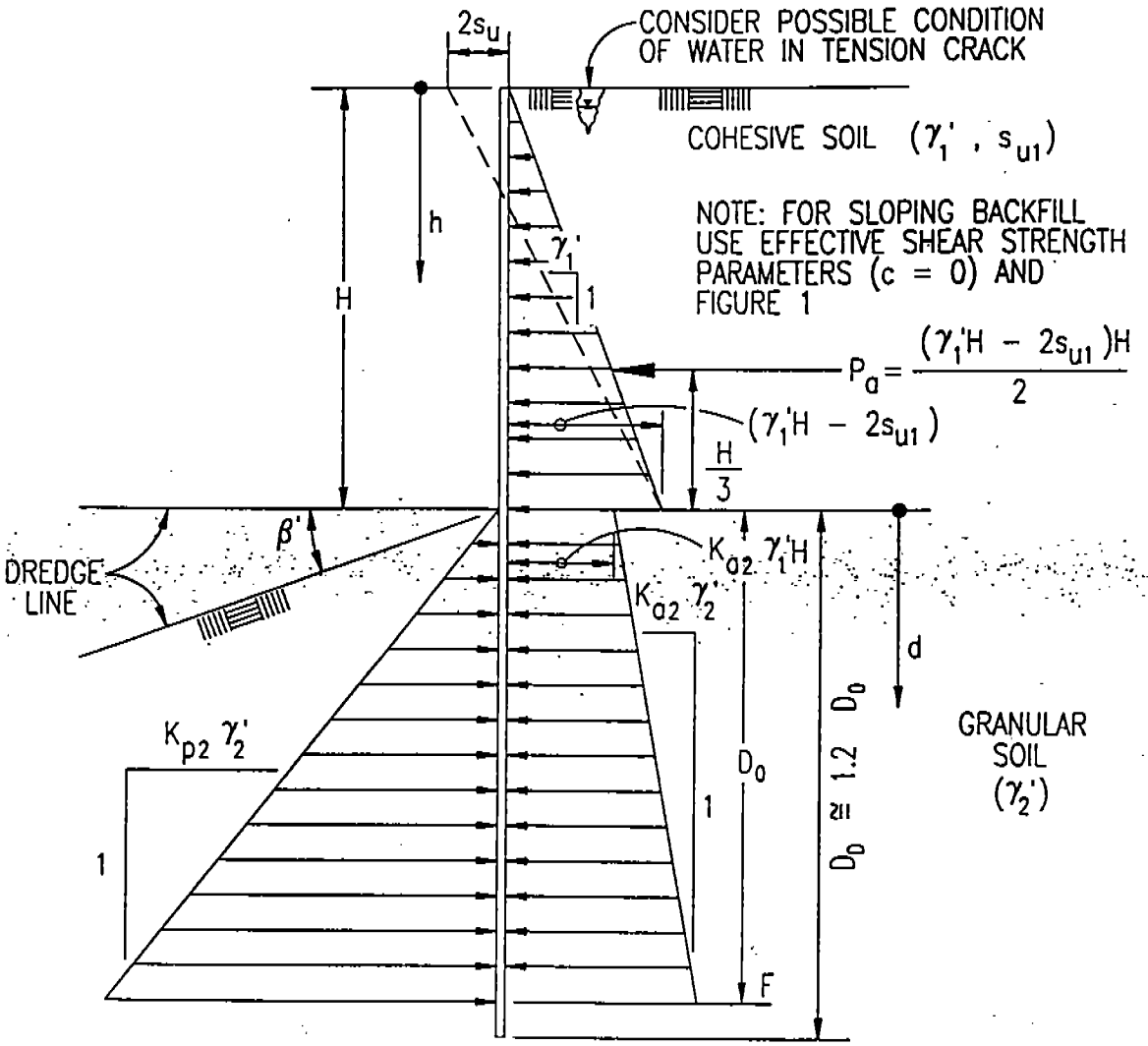
MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

BALTIMORE/WASHINGTON INTERNATIONAL AIRPORT

TITLE: SIMPLIFIED EARTH PRESSURE DISTRIBUTION FOR TEMPORARY SUPPORT OF EXCAVATION

DATE: JULY, 1995 (REV. FEB. 1996)

FIGURE NO.: 1




## PRESSURE DISTRIBUTION

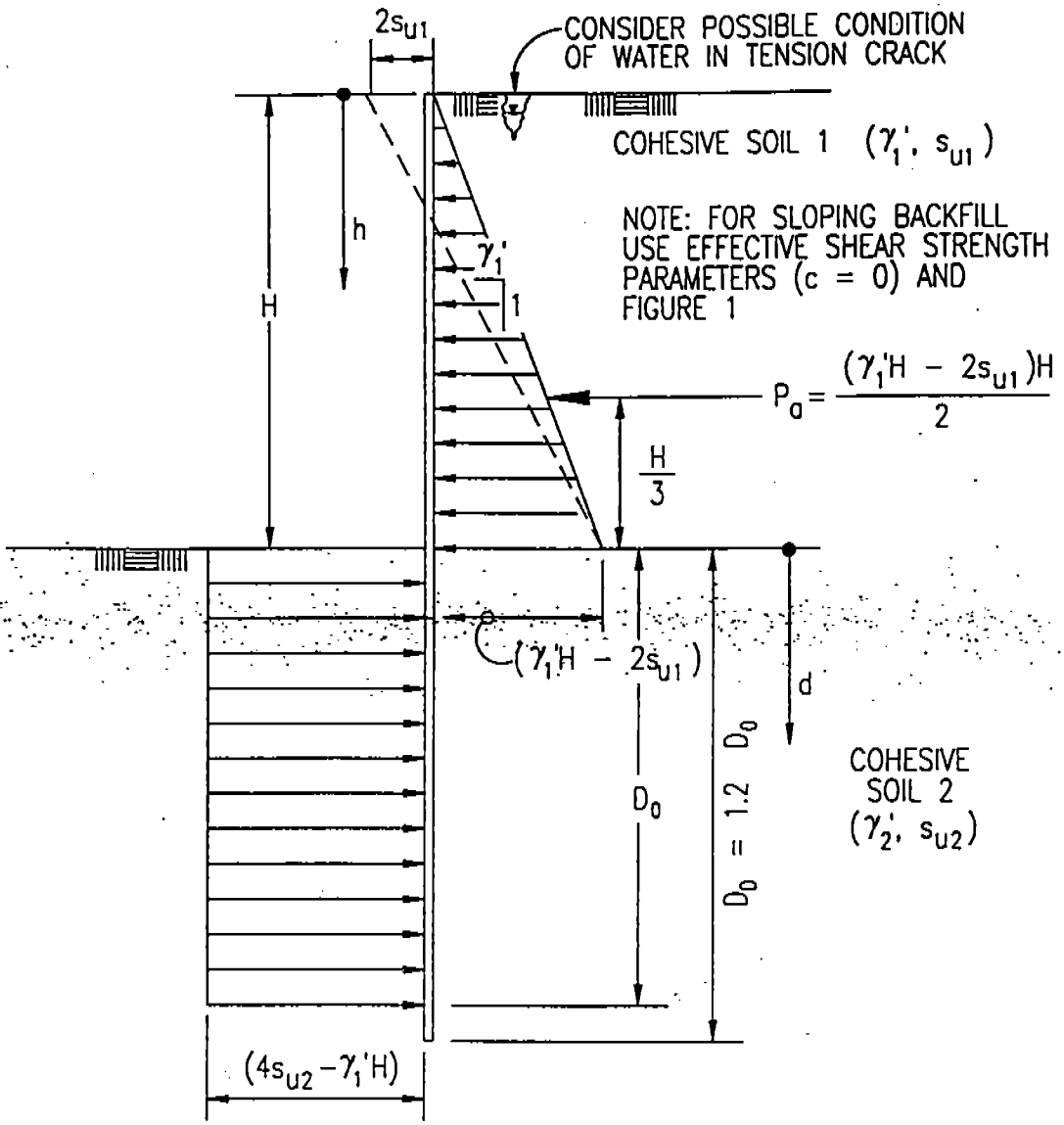
NOTES: (1) SURCHARGE AND WATER PRESSURES MUST BE ADDED TO THE ABOVE EARTH PRESSURES.

(2) FORCES SHOWN ARE PER HORIZONTAL FOOT OF VERTICAL WALL ELEMENT.

SIMPLIFIED EARTH PRESSURE DISTRIBUTION FOR TEMPORARY FLEXIBLE CANTILEVER WALLS WITH CONTINUOUS VERTICAL WALL ELEMENTS – RETAINING COHESIVE SOIL WITH EMBEDMENT IN GRANULAR SOIL

| | | | |
|---|---|---|---|
| Greiner<br>GREINER, INC.<br>CONSULTING ARCHITECTS/ENGINEERS<br>TIMONIUM, MARYLAND | BWI<br>MARYLAND DEPARTMENT OF TRANSPORTATION<br>MARYLAND AVIATION ADMINISTRATION<br>DIVISION OF ENGINEERING<br>BALTIMORE/WASHINGTON INTERNATIONAL AIRPORT | TITLE: SIMPLIFIED EARTH PRESSURE DISTRIBUTION FOR TEMPORARY SUPPORT OF EXCAVATION | |
| | | DATE: JULY, 1995 (REV. FEB. 1996) | FIGURE NO.: 2 |

D044.44/FIGURE2.DWG




PRESSURE DISTRIBUTION

NOTES: (1) SURCHARGE AND WATER PRESSURES MUST BE ADDED TO THE ABOVE EARTH PRESSURES.

(2) FORCES SHOWN ARE PER HORIZONTAL FOOT OF VERTICAL WALL ELEMENT.

SIMPLIFIED EARTH PRESSURE DISTRIBUTION FOR TEMPORARY FLEXIBLE WALLS WITH CONTINUOUS VERTICAL WALL ELEMENTS – RETAINING COHESIVE SOIL WITH EMBEDMENT IN COHESIVE SOIL

D0447.44/FIGURE3.DWG

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BWI

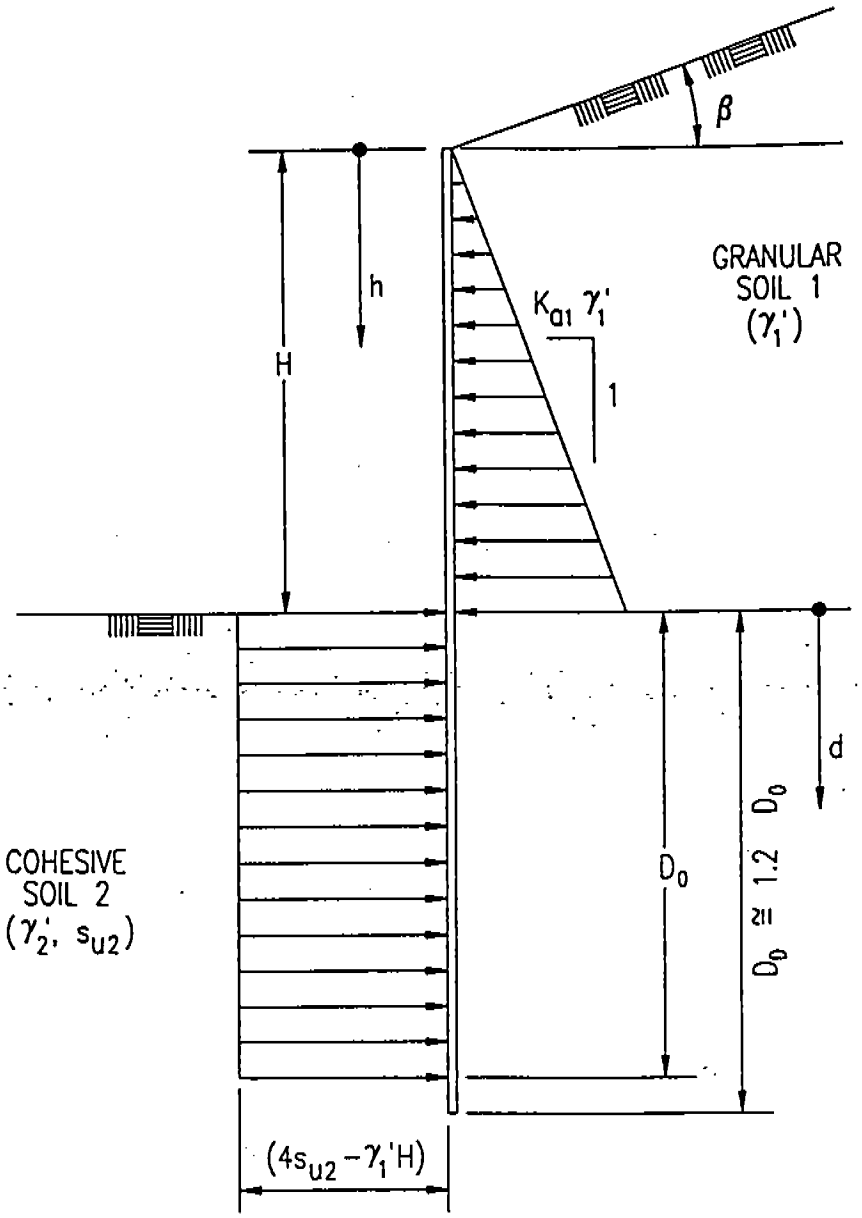
MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

BALTIMORE/WASHINGTON INTERNATIONAL AIRPORT

TITLE: SIMPLIFIED EARTH PRESSURE DISTRIBUTION FOR TEMPORARY SUPPORT OF EXCAVATION

DATE: JULY, 1995 (REV. FEB. 1996)

FIGURE NO. 3




PRESSURE DISTRIBUTION

NOTES: (1) SURCHARGE AND WATER PRESSURES MUST BE ADDED TO THE ABOVE EARTH PRESSURES.

(2) FORCES SHOWN ARE PER HORIZONTAL FOOT OF VERTICAL WALL ELEMENT.

## SIMPLIFIED EARTH PRESSURE DISTRIBUTION FOR TEMPORARY FLEXIBLE WALLS WITH CONTINUOUS VERTICAL WALL ELEMENTS – RETAINING GRANULAR SOIL WITH EMBEDMENT IN COHESIVE SOIL

D0447.47/FIGURE4.DWG

Greiner

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TIMONIUM, MARYLAND

BWI

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

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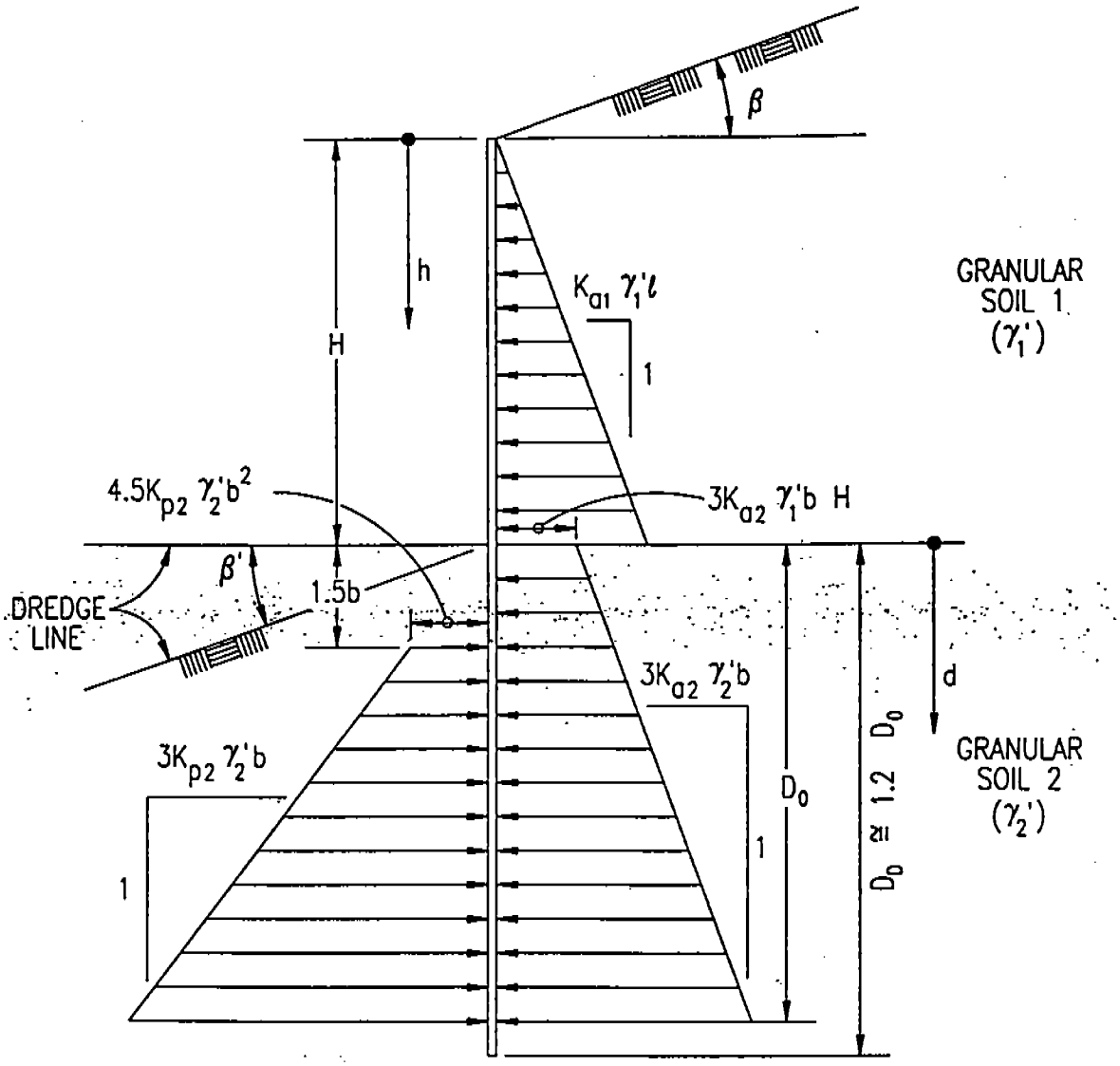
TITLE: SIMPLIFIED EARTH PRESSURE DISTRIBUTION FOR TEMPORARY SUPPORT OF EXCAVATION

DATE: JULY, 1995 (REV. FEB. 1996)

FIGURE NO.: 4




$l$ = CENTER TO CENTER SPACING OF DISCRETE VERTICAL WALL ELEMENTS
b = WIDTH OF DISCRETE VERTICAL WALL ELEMENT

## PRESSURE DISTRIBUTION

NOTE: SURCHARGE AND WATER PRESSURES MUST BE ADDED TO THE ABOVE EARTH PRESSURES.

# SIMPLIFIED EARTH PRESSURE DISTRIBUTION FOR TEMPORARY FLEXIBLE CANTILEVER WALLS WITH DISCRETE VERTICAL WALL ELEMENTS – RETAINING GRANULAR SOIL WITH EMBEDMENT IN GRANULAR SOIL

D0447.44/FIGURE5.DWG

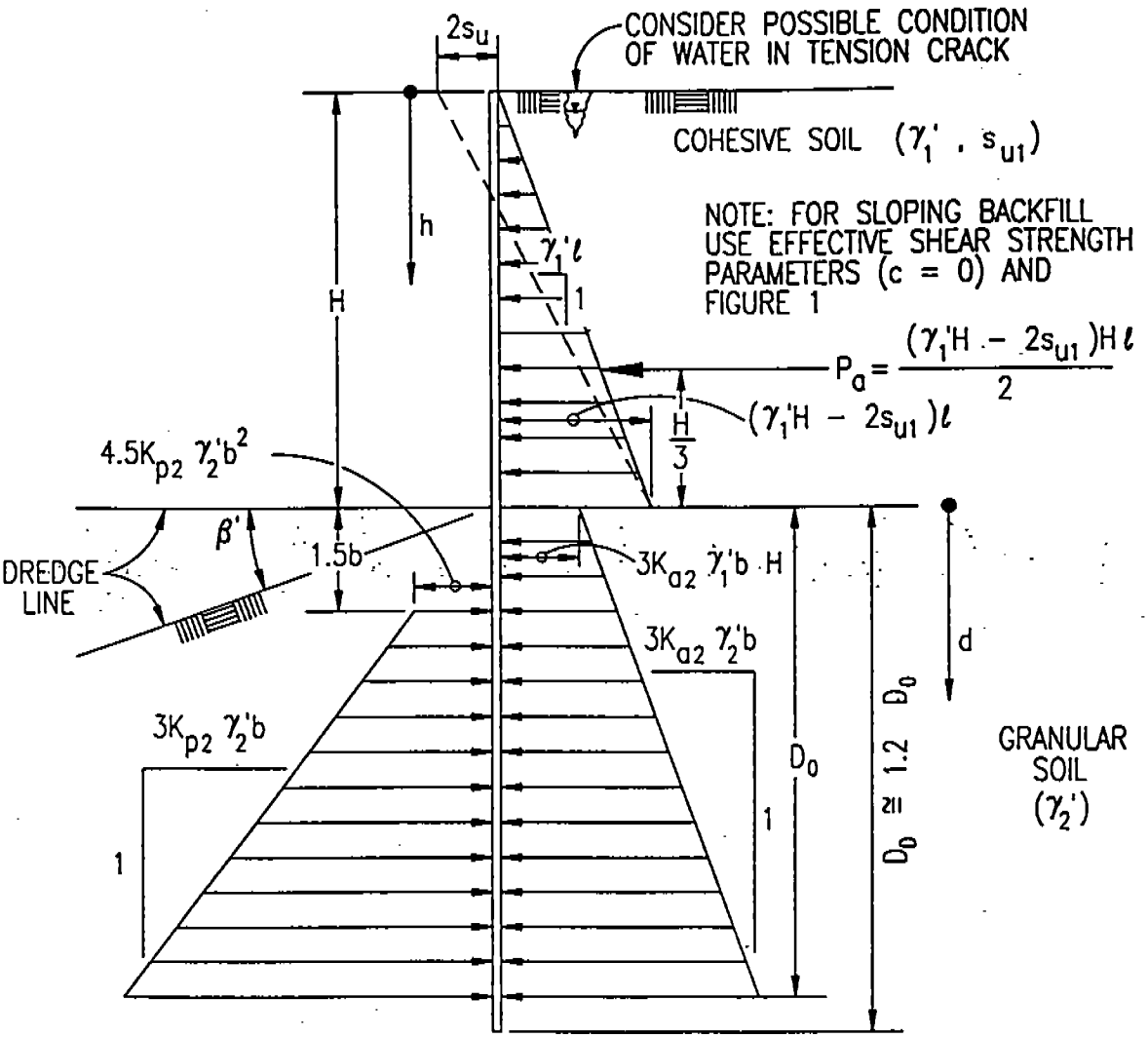
Greiner
GREINER, INC.
CONSULTING ARCHITECTS/ENGINEERS
TIMONIUM, MARYLAND

BWI
MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING
BALTIMORE/WASHINGTON INTERNATIONAL AIRPORT

TITLE: SIMPLIFIED EARTH PRESSURE DISTRIBUTION FOR TEMPORARY SUPPORT OF EXCAVATION

DATE: JULY, 1995 (REV. FEB. 1996)

FIGURE NO.: 5




ℓ = CENTER TO CENTER SPACING OF DISCRETE VERTICAL WALL ELEMENTS
b = WIDTH OF DISCRETE VERTICAL WALL ELEMENT

## PRESSURE DISTRIBUTION

NOTE: SURCHARGE AND WATER PRESSURES MUST BE ADDED TO THE ABOVE EARTH PRESSURES.

SIMPLIFIED EARTH PRESSURE DISTRIBUTION FOR TEMPORARY FLEXIBLE CANTILEVER WALLS WITH DISCRETE VERTICAL WALL ELEMENTS – RETAINING GRANULAR SOIL WITH EMBEDMENT IN GRANULAR SOIL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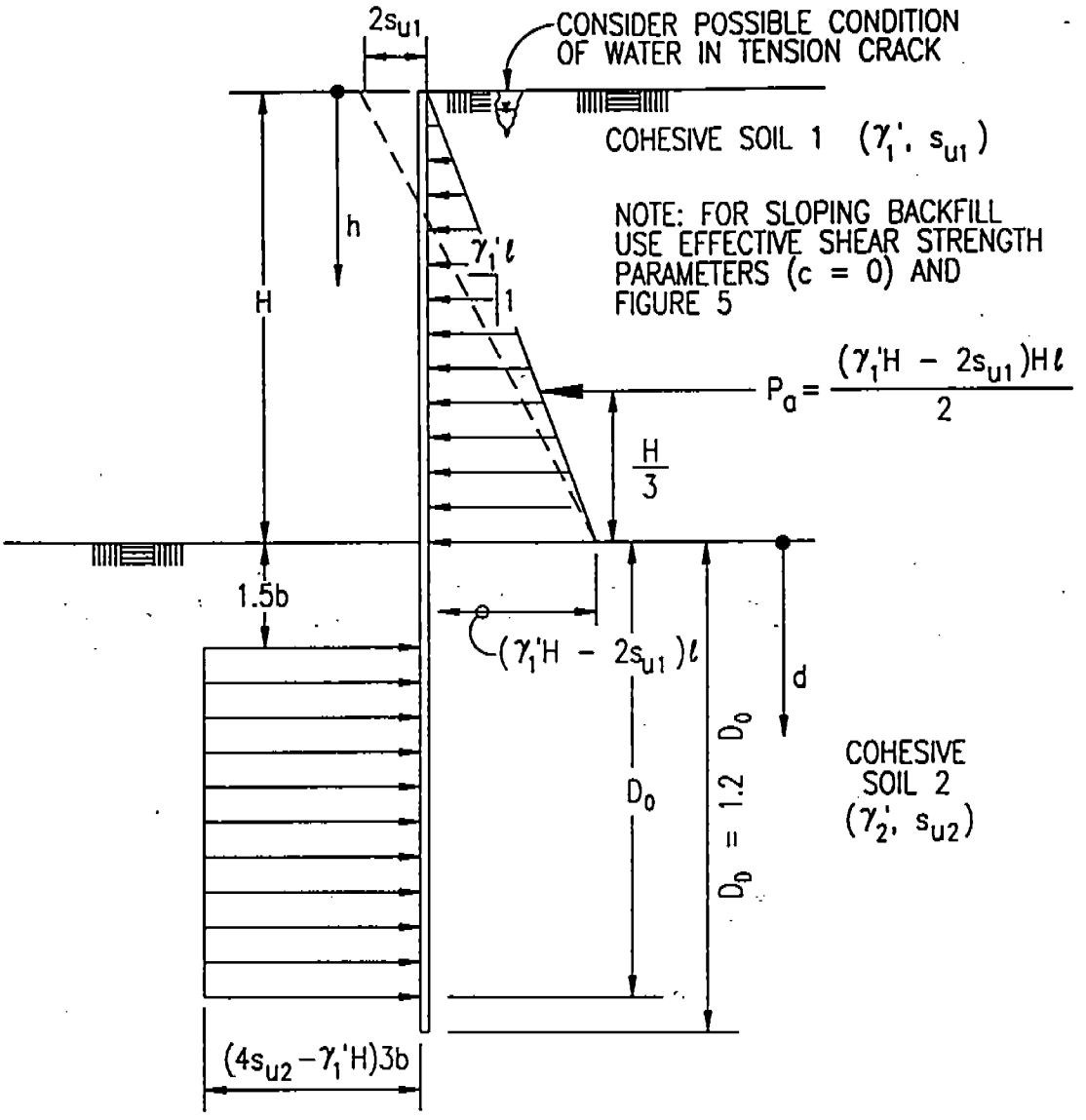
TITLE: SIMPLIFIED EARTH PRESSURE DISTRIBUTION FOR TEMPORARY SUPPORT OF EXCAVATION

DATE: JULY, 1995 (REV. FEB. 1996)
FIGURE NO.: 6

D0447.47/FIGURE6.DWG

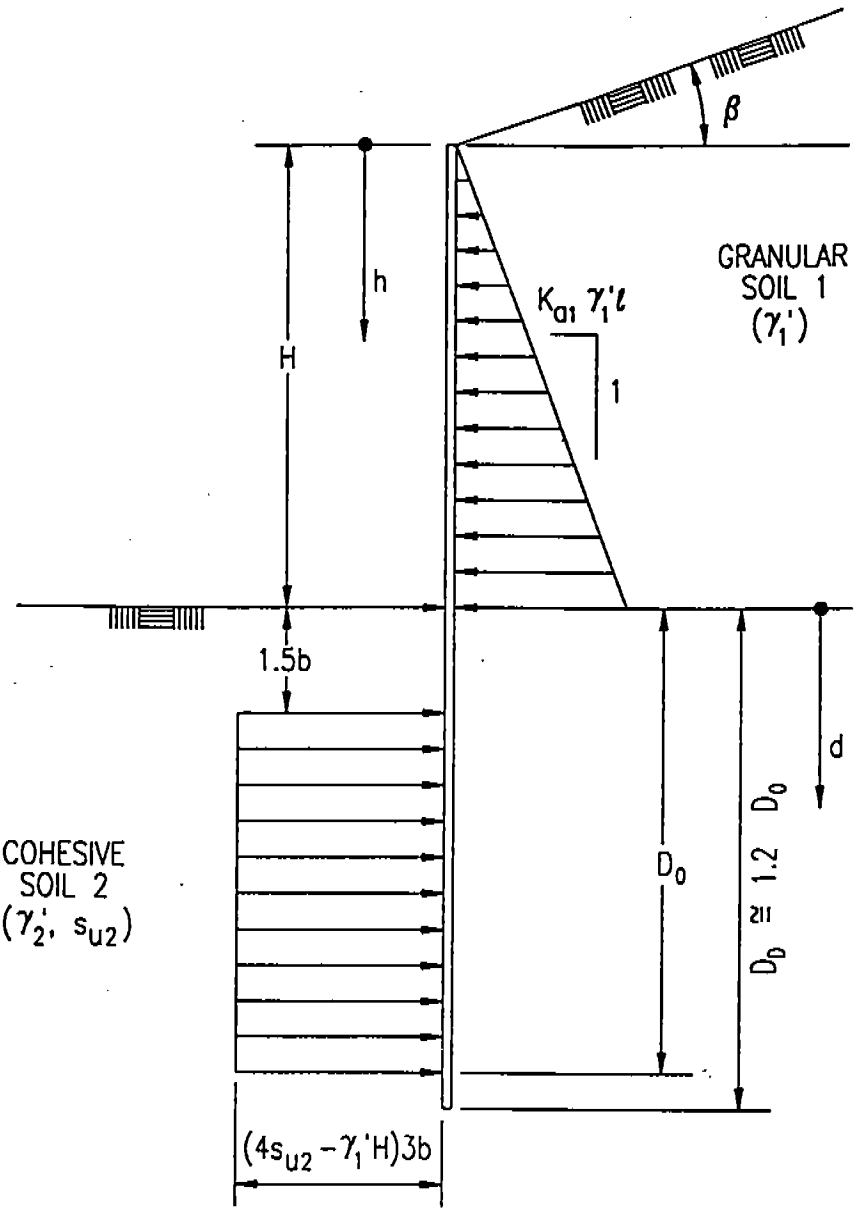



$\ell$ = CENTER TO CENTER SPACING OF DISCRETE VERTICAL WALL ELEMENTS
b = WIDTH OF DISCRETE VERTICAL WALL ELEMENT

## PRESSURE DISTRIBUTION

NOTE: SURCHARGE AND WATER PRESSURES MUST BE ADDED TO THE ABOVE EARTH PRESSURES.

SIMPLIFIED EARTH PRESSURE DISTRIBUTION FOR TEMPORARY FLEXIBLE WALLS WITH DISCRETE VERTICAL WALL ELEMENTS – RETAINING COHESIVE SOIL WITH EMBEDMENT IN COHESIVE SOIL




$\ell$ = CENTER TO CENTER SPACING OF DISCRETE VERTICAL WALL ELEMENTS
b = WIDTH OF DISCRETE VERTICAL WALL ELEMENT

## PRESSURE DISTRIBUTION

NOTE: SURCHARGE AND WATER PRESSURES MUST BE ADDED TO THE ABOVE EARTH PRESSURES.

# SIMPLIFIED EARTH PRESSURE DISTRIBUTION FOR TEMPORARY FLEXIBLE WALLS WITH DISCRETE VERTICAL WALL ELEMENTS – RETAINING GRANULAR SOIL WITH EMBEDMENT IN COHESIVE SOIL

BC6 A:/UPDATES.DST/DST96-5

**MARYLAND DEPARTMENT OF TRANSPORTATION**
**MARYLAND AVIATION ADMINISTRATION**

**MEMORANDUM**

**TO:** Distribution

**FROM:** Benjamin Chin, Manager
Design Services

**DATE:** August 23, 1996

**SUBJECT:** Design Standard (DST) 96-5; Fire Egress Analysis

Effective immediately, all contract plans should include the Fire Egress Analysis. The Fire Egress Analysis should include, at a minimum, the following information.

1. Floor plan(s) showing egress route(s) and distances.
2. General Requirement information, such as applicable codes, regulations and standards; building conditions data; and occupant load calculation(s).
3. Exit Requirement information, such as exit door requirements; exit access travel; and emergency signs and lighting.
4. Additional Requirement information, such as handicapped accessibility; and fire resistive ratings for interior finish and trim.

Enclosed for your guidance is a sample floor plan and fire egress analysis.

Should you have any questions regarding this matter, please contact me at 410-859-7093.

BC/jao

Distribution:

Mr. Ian Bricknell (TAMS)
Mr. Emory Carrigan (OPE)
Mr. Brad Collins (DMJM)
Mr. Ray Heverling (OPE)
Ms. Karen Kuczinski (OPE)
Mr. Ali Logmanni (OPE)
Mr. Steve Lucchesi (Greiner)
Mr. Derek Moore (Bodouva)
Mr. Chirantan Mukhopadhyay (Parsons)
Mr. Charles Steen (OPE)
Mr. William Tsai (OPE)
Mr. Reginald Weaver (Baker)

cc: Captain Woody Cullum (w/enclosures)
Mr. Alex Noorani
Mr. Mike West

# FIRE EGRESS ANALYSIS

## GENERAL REQUIREMENTS

### APPLICABLE CODES, REGULATIONS, AND STANDARDS.

1. BOCA National Plumbing Code.
2. BOCA National Mechanical Code.
3. BOCA National Energy Conservation Code.
4. NFPA 70: National Electrical Code.
5. NFPA 101: Life Safety Code.
6. Uniform Federal Accessibility Standards 36 CFR Part 1191: Americans with Disabilities Act, Accessibility Guidelines for Buildings and Facilities.
7. Environmental Protection Agency Regulations.
8. Occupational Safety and Health Administration Standards.

### BUILDING CONDITIONS DATA.

1. Building occupancy.
   a. Use Group: B, Business (BOCA 303.2).
   b. Classification: Business Class (NFPA 4-1.8 & 8-1.4.1).

2. Building construction.
   a. Existing structure construction type: 2A non-combustible/Protected (BOCA 603).
   b. Fire suppression: Existing automatic sprinkler system installed in accordance with BOCA Section 906.2.

### OCCUPANT LOAD CALCULATION.

1. Allowance occupant load for Business Use Group (BOCA Table 1008.1.2 and NFPA 9-1.7): Business area (Business): 1175 SF x (1 Person/100 Gross SF) = 12 people.

2. Actual occupancy load: Office area: 12 people.

3. Design occupancy load.
   a. Number of occupants determined by largest number generated by either allowance or actual number method (BOCA 1008.1).
   b. Design occupancy load: 12 people.

## EXIT REQUIREMENTS

### EXIT DOOR REQUIREMENTS.

1. Minimum number of exit locations.
   a. For occupancies less than 50 with a maximum travel distance of less than 75 feet: 1 (BOCA 1010.3).
   b. Number of doors provided: 2 Exits.

2. Minimum exit width: 0.15 inches per person (BOCA 1009.2).
   a. Required width: 12 people x 0.15 inches/person = 1.8 inches.
   b. Minimum door width required at each exit door opening: 32 inches (BOCA 1017.3 and NFPA 5-2.1.3.1).
   c. Exit width provided: 36 inches.

3. Door requirements (BOCA 1017.4 and NFPA 5-2.1.4.1, 5-2.1.4.4, and 5-2.1.5)
   a. All doors serving an occupancy of 50 or more shall swing in the direction of egress.
   b. Door latch shall release when subjected to a 15-pound force.
   c. Door shall be readily openable from "occupied" side without use of a key.

### EXIT ACCESS TRAVEL.

1. Maximum length of access travel for business occupancies.
   a. Business Use Group with sprinkler system (BOCA Table 1006.6): 250 FT.
   b. Business Use Group with sprinkler system (NFPA 101, 27-2.6): 300 FT.

2. Actual length of access travel for assembly occupancies.
   a. From remote point A: 57 FT.

### EMERGENCY SIGNS AND LIGHTING.

1. Illuminated exit signs are required throughout facility (BOCA 1023.1).
   a. Signs are required over every exit door.
   b. Supplementary (directional) signs are required whenever door signs are not readily visible from occupied areas.
   c. Emergency power source is required to illuminate signs for 1 hour after loss of primary power (BOCA 1023.4).

2. All means of egress are required to be illuminated by artificial light (BOCA 1024.1).
   a. Minimum illumination level required is 1 foot candle at floor (BOCA 1024.2).

b. Emergency power source is required to illuminate exit paths for 1 hour after loss of primary power (BOCA 1024.4).

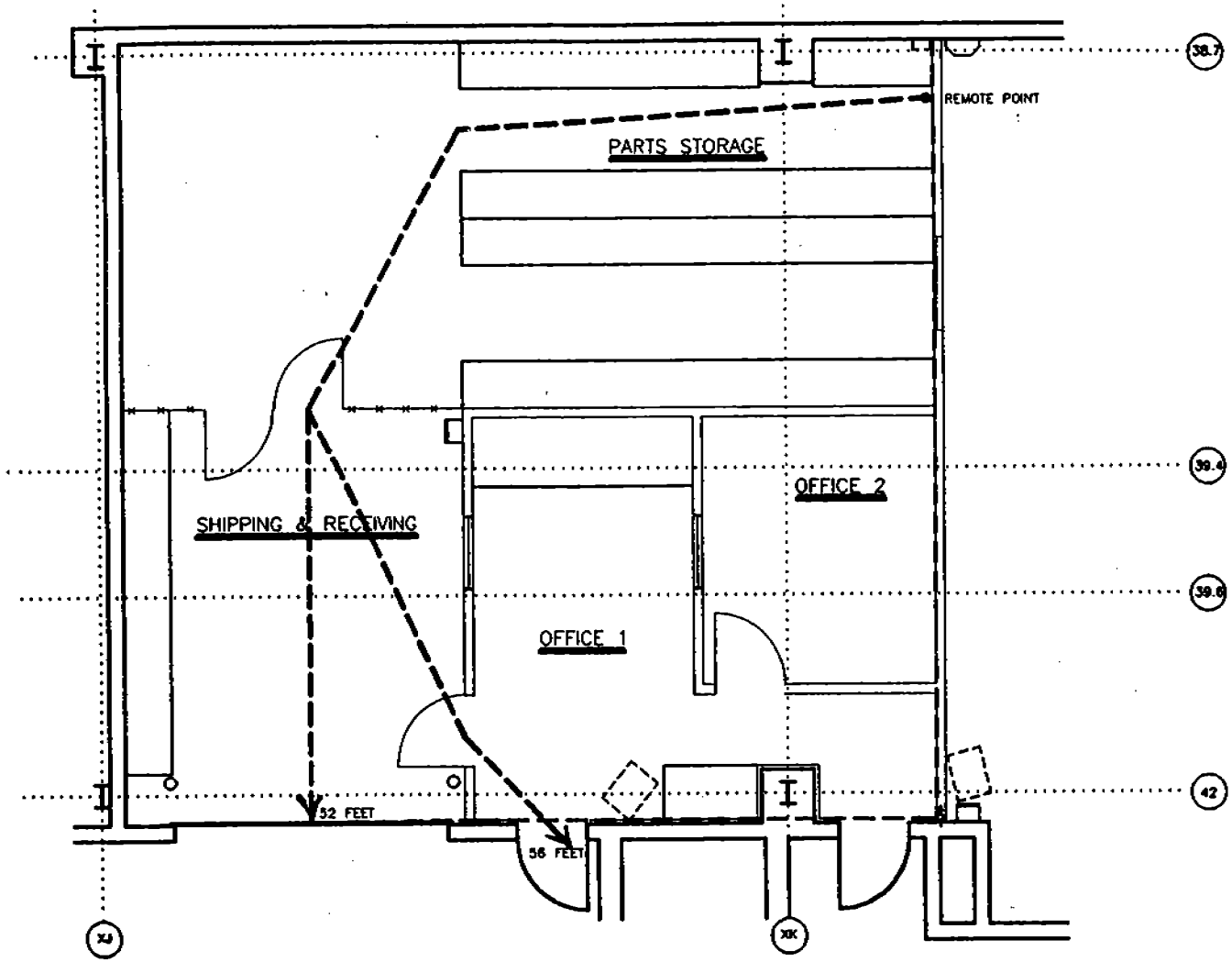
ADDITIONAL REQUIREMENTS

HANDICAPPED ACCESSIBILITY (36 CFR Part 1191).

1. Doorways shall have a minimum clear opening of 32 inches from face of door in 90 degree position and face of stop in frame. (Approximately 33 1/2" minimum door width, nominal 36" wide door).

FIRE RESISTIVE RATINGS FOR INTERIOR FINISH AND TRIM.

1. Exit Access Corridors - Minimum Class II, 26-75 flame spread.
2. Rooms or Enclosed Spaces - Minimum Class III, 76-200 flame spread.
3. Interior Trim - Maximum of 10% Class I, II, or III (927.6) where limited above.
4. Floors - Minimum requirement of DOC FF-1.




FLOOR PLAN

1/8" = 1'-0"

BC6 A:/UPDATES.DST/DST96-6.DOC

**MARYLAND DEPARTMENT OF TRANSPORTATION**
**MARYLAND AVIATION ADMINISTRATION**

**MEMORANDUM**

**TO:** Distribution

**FROM:** Benjamin Chin, Manager
Design Services

**DATE:** August 30, 1996

**SUBJECT:** Design Standard (DST) 96-6, Knox Box System

Effective immediately, all building contract documents should include the installation of the Knox Box System. The Knox Box System is a high security key box designed to give firefighters and emergency services immediate access to locked buildings, elevators, and other secured areas. The Knox Box System has been approved by the Maryland Aviation Administration (MAA) as a sole source procurement.

During the design process, you will need to coordinate the number, size, and location of Knox Boxes with the MAA Fire Marshall. The specifications should require the contractor to complete the Authorization/Order form, and obtain the MAA's authorized signature.

Please add this requirement to your checklist. I have enclosed Knox Box literature for your information.

Should you have any questions regarding this matter, please contact me at 410-859-7093.

BC/jao

Distribution:

Mr. Ian Bricknell (TAMS)
Mr. Emory Carrigan (OPE)
Mr. Brad Collins (DMJM)
Mr. Ray Heverling (OPE)
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Mr. Derek Moore (Bodouva)
Mr. Chirantan Mukhopadhyay (Parsons)
Mr. Charles Steen (OPE)
Mr. William Tsai (OPE)
Mr. Reginald Weaver (Baker)

cc: Captain Woody Cullum
Mr. Alex Noorani

# 1996

EFFECTIVE 1/1/96

# FIRE / POLICE RAPID ENTRY SYSTEM
# AUTHORIZATION / ORDER FORM

FIRE DEPARTMENT KNOX LIFE SAFETY SYSTEM FIRE & RESCUE ENTRY

## IMPORTANT—READ THE FOLLOWING CAREFULLY!

- **Typed or printed form must be complete before mailing!**
- **Detailed instructions on reverse side.**
- **Payment must accompany order—Checks payable to: Knox Company**

**AUTHORIZED SIGNATURE *MUST* APPEAR IN SECTION 6.**

**SECTION 1 — ORDERED BY:**

Company: _____ Date: _____

Street: _____

City / State: _____ Zip: _____

Contact Person: _____ Phone: ( ) _____

Reference P.O. # (Gov. Agencies Only) _____

**SECTION 2 — SHIP TO: (Do not use P.O. Box.)**

Company: _____

Street: _____

City / State: _____ Zip: _____

Contact Person: _____ Phone: ( ) _____

**SECTION 3 — INSTALLATION ADDRESS: (Fire Dept. requires this information.)**

You must list **all** actual installation addresses. This list is confidential.
Attach separate sheet for additional installation addresses.

| Building | Street | City |
|---|---|---|
| | | |
| | | |
| | | |

**SECTION 4 — PAYMENT INFORMATION**

☐ Check or Money Order made payable to Knox ☐ Visa ☐ MasterCard

Card #: _____ Exp. Date. _____

**SECTION 6 — FIRE AGENCY USE ONLY**

BALTIMORE - WASH INTL AIRPORT F/RES

ISSUING AGENCY

Woodrow Cullum

AUTHORIZED SIGNATURE
*MUST HAVE SIGNATURE TO PROCESS*

PS-39-026-02-89

SYSTEM CODE

**FOR KNOX USE ONLY**

| S | Z | O/N |
|---|---|---|
| MD | 8 | |
| VERIFY | | REC'D |
| CHECK # | | AMOUNT |
| REP. | | |

**SECTION 5 — SEE CATALOG FOR STOCK NUMBERS / SEE CATALOG FOR PRICES**

| QTY. | STOCK # | MODEL # / ITEM DESCRIPTION | PRICE PER ITEM | TOTAL PRICE |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

SALES TAX ON CALIFORNIA SHIPMENTS ONLY.
7.25% – SHIPMENTS TO OTHER CA COUNTIES.
7.75% – SHIPMENTS TO ORANGE COUNTY, CA.

FOR ORDERS EXCEEDING $375, CALL FACTORY FOR FREIGHT.

BE CERTAIN TO ATTACH CHECK TO THIS FORM.

| | | |
|---|---|---|
| SUBTOTAL | $ | |
| TAX | $ | CALIF. ONLY |
| SHIPPING & HANDLING | $ | 9.00 |
| TOTAL | $ | |

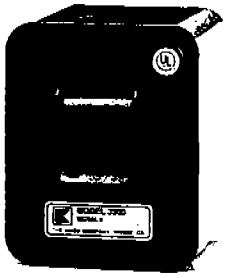
**MAIL COMPLETED FORM ONLY TO:** ☐ KNOX Company, 17672 Armstrong, Irvine, CA 92714

☐ _____

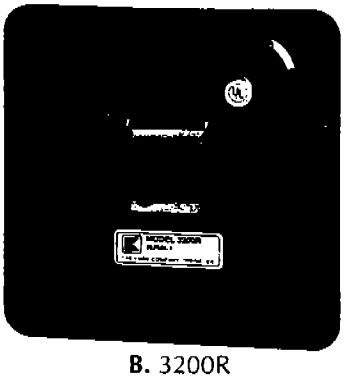
1996

KNOX COMPANY
17672 Armstrong, Irvine, CA 92714
714-252-8181 • Outside CA: 800-552-5669 • Fax: 714-252-0482

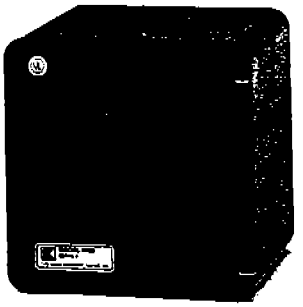
# RAPID ENTRY PRODUCT CATALOG



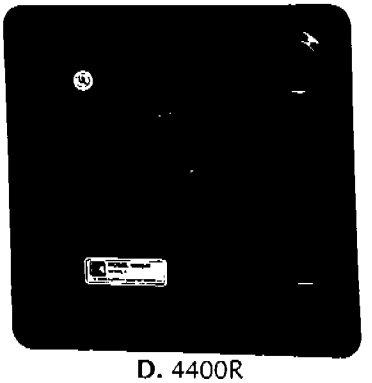
A. 3200



B. 3200R



C. 4400
*(Hinged door.)*



D. 4400R
*(Hinged door.)*

## Key Vaults Series 3200

*Holds up to 10 keys, maximum.*
***Minimum standard for commercial/industrial use.***

**A. 3200 Surface Mount**
5"H x 4"W x 3¼"D Wt: 9 lbs.
**3200TS Surface Mount** with Alarm Tamper Switch
5"H x 4"W x 3¼"D Wt: 9 lbs.

**B. 3200R Recessed Mount**
5"H x 4"W x 3¼"D x with 7" x 7" flange Wt: 10 lbs.
**3200RTS Recessed Mount** with Alarm Tamper Switch
5"H x 4"W x 3¼"D x with 7" x 7" flange Wt: 10 lbs.
**3200RMK Recessed Mounting Kit** for 3200R & 3200RTS
(new masonry construction, only)
**Rust & Corrosion Protection** (Optional)
Aluminized undercoating provides additional protection for extreme wet/damp conditions. Ideal for beach/humid areas

| Stock # | Price |
|---|---|
| 003 Black | $ 148 |
| 004 Aluminum or 005 Dark Bronze | $ 169 |
| 006 Black | $ 186 |
| 007 Aluminum or 008 Dark Bronze | $ 205 |
| 009 Black | $ 189 |
| 010 Aluminum or 011 Dark Bronze | $ 209 |
| 012 Black | $ 227 |
| 013 Aluminum or 014 Dark Bronze | $ 247 |
| 015 | $ 60 |
| 032AL | $ 40 |

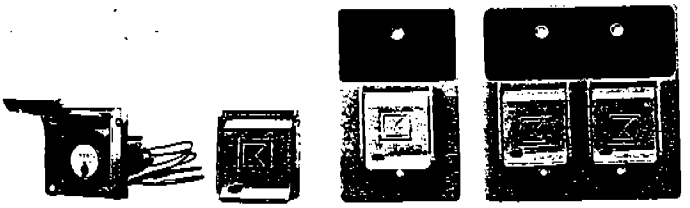
## Key Vaults Series 4400

*Holds up to 50 keys, maximum.*
***Excellent for larger commercial/industrial use.***

**C. 4400 Surface Mount**
7"H x 7"W x 5"D Wt: 29 lbs.
**4400TS Surface Mount** with Alarm Tamper Switch
7"H x 7"W x 5"D Wt: 29 lbs.

**D. 4400R Recessed Mount**
7"H x 7"W x 5"D with 9½" x 9½" flange Wt: 30 lbs.
**4400RTS Recessed Mount** with Alarm Tamper Switch
7"H x 7"W x 5"D with 9½" x 9½" flange Wt: 30 lbs.
**4400RMK Recessed Mounting Kit** for 4400R & 4400RTS
(new masonry construction, only)
**Dual Lock Option** available for all 4400 Models,
either key opens vault
**Rust & Corrosion Protection** (Optional)
Aluminized undercoating provides additional protection for extreme wet/damp conditions. Ideal for beach/humid areas

| Stock # | Price |
|---|---|
| 016 Black | $ 239 |
| 017 Aluminum or 018 Dark Bronze | $ 257 |
| 019 Black | $ 277 |
| 020 Aluminum or 021 Dark Bronze | $ 295 |
| 022 Black | $ 289 |
| 023 Aluminum or 024 Dark Bronze | $ 308 |
| 025 Black | $ 327 |
| 026 Aluminum or 027 Dark Bronze | $ 346 |
| 028 | $ 73 |
| 044B | $ 56 |
| 044AL | $ 45 |

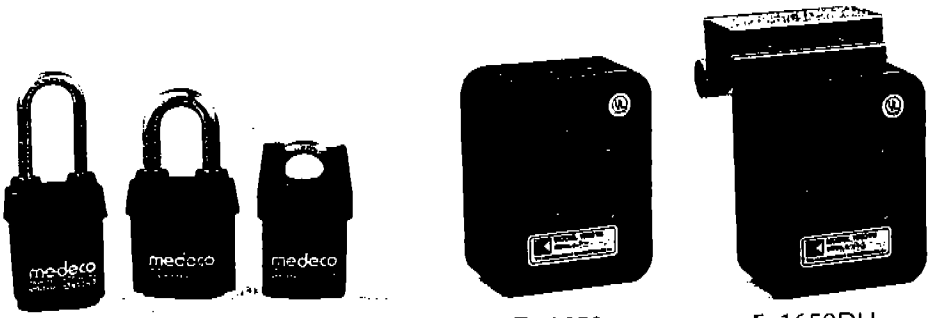


A. KS-2DC B. KS-2PDC C. KS-2DPDC

*( Shown open and closed.)*

## Key Switches

| | Stock # | Price |
|---|---|---|
| **A. KS-2DC** with stainless steel dust cover. 1 3/4"H x 1 1/4"W | 035D | $ 56 |
| **B. KS-2PDC** with stainless steel dust cover assembled on mounting plate with decal. 4 1/2"H x 2 7/8"W, (fits standard single gang elec. box; 2" deep). | 035PD | $ 68 |
| **C. KS-2DPDC** double key switch with stainless steel dust covers assembled on mounting plate with decal. 4 5/8"H x 4 9/16"W, (fits standard duplex gang elec. box; 2" deep). | 0352PD | $ 112 |




A. PL-3 B. PL-4 C. PL-5 D. 1650 E. 1650DH

## Heavy Duty Padlocks

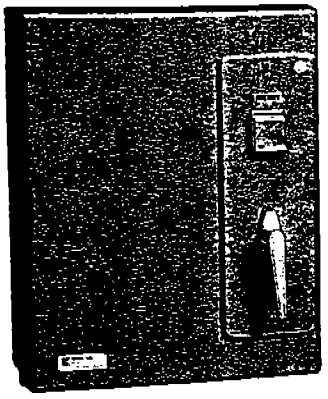
| | Stock # | Price |
|---|---|---|
| **A. PL-3 Steel Padlock** with 5/16" diameter boron alloy 2 3/8" steel shackle. Weather resistant protective body cover; key retained when opened. (Yellow reflective stripe encircles body of padlock, not shown.) | 375 Black | $ 55 |
| **B. PL-4 Steel Padlock** with 7/16" diameter boron alloy 1 7/8" steel shackle. Weather resistant protective body cover; key retained when opened. (Yellow reflective stripe encircles body of padlock, not shown.) **WARNING:** Shackle diameter may be too big for some gates or hasp fittings. Check size before ordering; padlocks are non-refundable. (For additional padlock lengths call Knox.) | 377 Black | $ 70 |
| **C. PL-5 Shrouded Padlock**; steel body with 5/16" diameter boron alloy 3/4" steel shackle. Weather resistant protective body cover; key retained when opened. (Yellow reflective stripe encircles body of padlock, not shown.) | 376 Black | $ 65 |

## Residential Key Lock Boxes

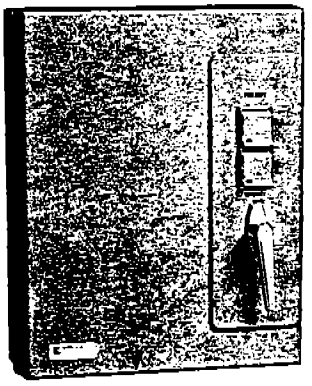
***Single key storage; two key maximum without key tags.***

| | Stock # | Price |
|---|---|---|
| **D. 1650 Surface Mount** 5"H x 4"W x 1 7/8"D Wt: 7 lbs. | 045 Black | $ 105 |
| **E. 1650DH** with stainless steel clip for over door mounting (for temporary medical or residential use only) | 053 Black | $ 118 |

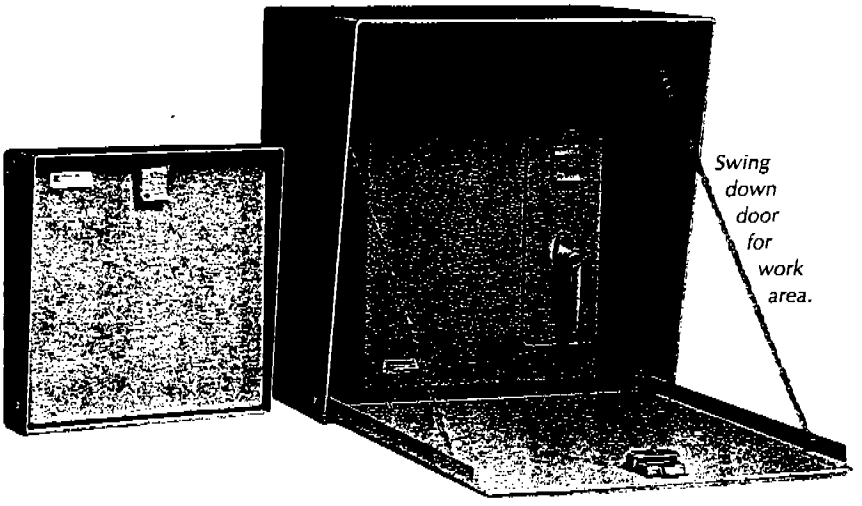
**WARNING:** ***Use of Model 1650 for more than two keys will prevent lock operation. Future needs must be considered. Model 3200 should be ordered if future use may require storage of more than two keys.***



A. 1300



B. 1220
*(Shown with dual lock option.)*




C. 1100

D. 1200WH
*(Enclosed cabinet priced separately.)*

## Haz-Mat Data and Key Storage Cabinets

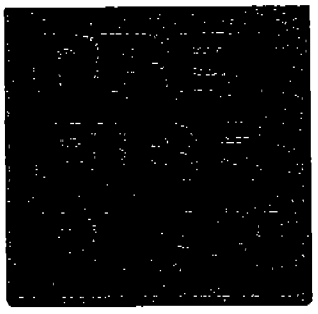
| | Stock # | Price |
|---|---|---|
| **A. 1300 Haz-Mat Data and Key Storage Cabinet** UL Listed | | |
| 18"H x 14½"W x 5" or 7"D Wt: 5" - 62 lbs., 7" - 65 lbs. | | |
| HIGH SECURITY FOR ON-SITE MSDS AND KEY STORAGE | | |
| (27 KEY HOOK PANEL INCLUDED) (See Options for alarm tamper switches and dual locks) | 042 Light Grey 5" | $ 543 |
| | 043 Light Grey 7" | $ 584 |
| **B. 1220 Haz-Mat Data Storage and Key Cabinet** | | |
| 18"H x 14½"W x 5" or 7"D Wt: 5" - 52 lbs., 7" - 55 lbs. | | |
| MEDIUM SECURITY FOR ON-SITE MSDS AND KEY STORAGE | | |
| (9 KEY HOOK PANEL INCLUDED) (See Options for alarm tamper switches and dual locks) | 046 Light Grey 5" | $ 412 |
| | 047 Light Grey 7" | $ 452 |
| **C. 1100 Data Storage Cabinet** information & data storage only (not secure for key storage) | 038 Light Grey | $ 252 |
| **D. 1200WH Weather Housing** best protection for 1300 or 1220 when an exposed outdoor installation is required | | |
| 23"H x 20"W x 14"D Wt: 72 lbs. | 032WH Light Grey | $ 343 |
| **1200RH Rainhood** (not shown) minimum protection when an exposed outdoor installation is required | | |
| 23"H x 20"W x 14"D Wt: 45 lbs. | 032RH Light Grey | $ 233 |
| **Options for Models 1220 & 1300** | | |
| Dual Alarm Tamper Switches | 040A | $ 38 |
| Dual Entry Locks; either key opens vault | 040B | $ 56 |
| Back Panel – 48 key hook panel and brackets | 040E | $ 46 |
| Swing Panel Assy. – 78 key hook panel | 040D | $ 129 |
| Additional Panel (Max of 2 panels – 7" model only) | 040F | $ 101 |
| Document Storage Container (not shown) Plastic "bucket" with "Pre Fire/Haz Mat" label | 040G | $ 7.50 |

A. 001

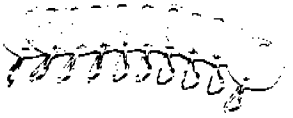
B. 048

C. 001S

D. 001P



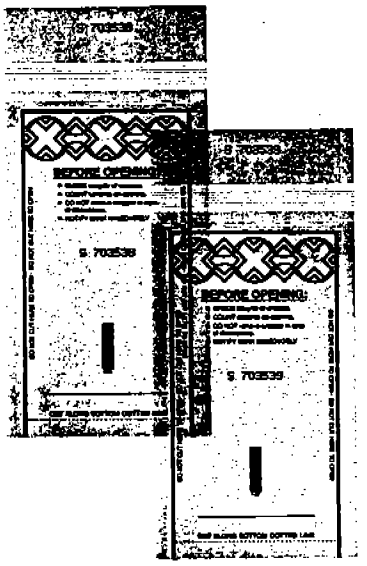
E. 182
*(8" x 8")*



F. Key Tags

G. Key Rings

H. Tamper Seals



I. Tamper Evident Bags

| Accessories *(Decals/products not shown to scale)* | Stock # | Price |
|---|---|---|
| **A. Fire Dept. Reflective Alert Decals** | 001 | $ 1.50 each |
| **B. Fire Dept. Reflective Key Switch Decals** | 048 | $ 3.00 each |
| **C. Sheriff Dept. Reflective Key Switch Decals** | 001S | $ 3.00 each |
| **D. Police Dept. Reflective Key Switch Decals** | 001P | $ 3.00 each |
| **E. Pre-Fire Plan Reflective Decals** (8" square) for use on all Knox cabinets (1300, 1220, 1100) | 182 | $ 11.00 each |
| **F. Key Tags** | 037 | $ 3.00 package of 10 |
| **G. Key Rings** | 039 | $ 3.50 package of 10 |
| **H. Tamper Seals** | 033 | $ 10.00 package of 50 |
| **I. Tamper Evident Bags**; clear with serial number sequencing. (Insert keys into bag & seal; to remove, bag must be cut indicating use) | 0191 | $ 3.00 package of 10 |

KNOX COMPANY
17672 Armstrong, Irvine, CA 92714
714-252-8181 • Outside CA: 800-552-5669 • Fax: 714-252-0482

# TEN REASONS TO INSTALL A KNOX-BOX®

1. Eliminate needless, costly forced entry damage - insurance deductibles may exclude damage repairs.
2. Insure immediate building entry by fire personnel - no delays or waiting for building keys.
3. Protect inventory, equipment, and supplies from unnecessary water damage caused by delay in sprinkler shut-off.
4. Satisfy local fire codes and emergency access ordinances.
5. Save time by not having to drive and unlock your building at 2:00 am for fire department entry.
6. Feel secure - leave building unattended - fire personnel hold only key - can respond to an emergency without your presence.
7. Maintain building security - no damage - building can simply be re-locked after fire alarm investigation.
8. Smart investment - low cost - exact size for your needs.
9. KNOX-BOX® - 20 year reputation - highest security available - attack resistance - UL listed.
10. Hundreds of thousands of devices installed.The chosen solution by 4,000 communities, nationwide - communities just like yours!

It's 2:00 am. The fire alarm in your building is ringing and the fire department responds. With a KNOX-BOX® at the front door, firefighters save time by being able to immediately enter your facility. Within the KNOX-BOX® are your secure building keys.

Immediately seeing the key vault, firefighters don't reach for the ax to break down your front door. Eliminating forced entry means no door replacement costs (not usually covered by your insurance company because of high deductibles). Property damage is prevented with no broken windows, no forced doorframes or locks, no flying glass to injure firefighters.

You arrive on site knowing that you or your representative didn't have to be there before firefighters could enter your building. The fire department has already determined that the small fire was contained by the sprinkler system. It was the reduced emergency response time that meant immediate shut off of the sprinkler water supply resulting in minimal smoke, fire, and water damage to your property.

Even before parking your car, you see that the fire department has already re-locked the front door and replaced your key inside the KNOX-BOX®.

In a time of reduced funding and manpower, your fire department has performed its duties with increased effectiveness and is now free to respond to the next emergency.

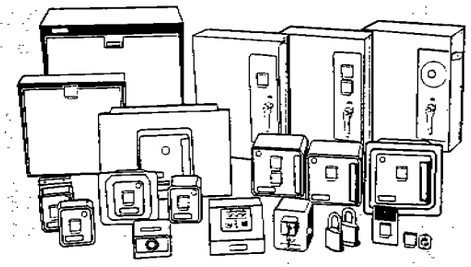
Your minimal expenditure to install a KNOX-BOX® has allowed you, the building owner, to satisfy local fire codes and ordinances while providing peace of mind and guaranteed satisfaction.

For additional fire protection information and a Knox authorization form, contact:

For technical information on the Knox Rapid Entry System call:

KNOX COMPANY

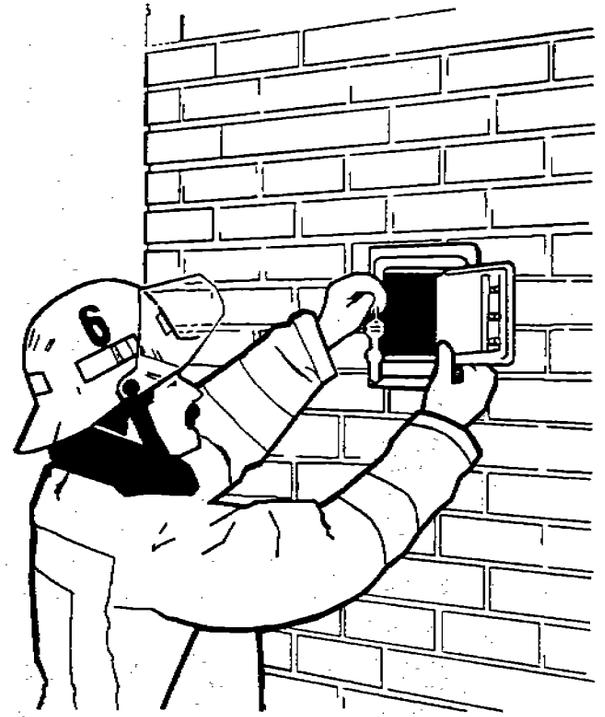
17672 Armstrong, Irvine, CA 92714
714-252-8181 800-552-5669 Fax 714-252-0482



Knox also manufactures and distributes key switches, padlocks, electronic key control devices, and cabinets for key and document storage.

# Fire Department Rapid Entry Systems

KNOX-BOX® and your local fire department, working hand-in-hand to offer the best in fire protection and the finest in secure, rapid emergency access.




## • WHAT IS A KNOX-BOX® SYSTEM?

It's a high-security key box system, designed to give firefighters and emergency services immediate access to locked buildings, elevators, and other secured areas.

## • WHY INSTALL A KNOX-BOX®?

Installation of a Knox-Box® on your property will not only allow firefighters faster access in case of an emergency, but will also prevent expensive forcible entry should emergency services be required while the premises are unoccupied. Costly front doors and entry ways needn't be harmed if entry keys are available on-site.

## • HOW DOES THE KNOX-BOX® SYSTEM WORK?

Following your purchase of a Knox-Box® you will mount it securely on the exterior of your building; recessed-mount models are also available. All necessary access keys will be locked inside by a representative of the fire department; only the fire department's master key can open the box.

The Knox-Box® gives the fire department a simple alternative to expensive, time-consuming forcible entry. The generous interior capacity allows you to store everything emergency personnel may require -- keys, pre-fire plans, electronic entry cards, and more -- completely secured until needed.

## • HOW SECURE IS A KNOX-BOX® SYSTEM?

Security has always been a Knox strong point. Designed for maximum protection, each virtually indestructible box features a special high-security Medeco lock and key. This Medeco restricted locking system guards against unauthorized key duplication. Keys are not available to locksmiths or lock distributors; The Knox Company is the exclusive supplier.

The Knox-Box® system offers maximum security at every step. Each city has an exclusive key code. All Knox-Box® stations in that city are keyed alike -- only the fire department has master keys.

## • WHO CAN AUTHORIZE A KNOX-BOX® SYSTEM?

The Knox Company maintains strict security control by allowing only fire departments to authorize the purchase of each Knox-Box®. This is achieved by using an authorization/order form which you can obtain only from your fire department; the form must be signed by a fire department official before your order can be processed. After verifying the signature, your Knox-Box® is assembled and shipped directly to you. NOTE: Your Knox-Box® will be shipped without keys; only the fire department will be able to secure the box.

## • HOW IS A KNOX-BOX® INSTALLED?

Each Knox-Box® is shipped with complete mounting instructions. Your fire department will direct you in selecting the proper location for mounting. After installation, the fire department will inspect the unit and lock building keys and any other items inside the box. Your Knox-Box® is now ready to provide immediate access for emergency personnel -- 24 hours a day, 365 days a year.

**The Knox Company**
17672 Armstrong • Irvine, California 92714 • Phone in CA: (714) 252-8181
Outside CA: 1-800-552-5669 • FAX: (714) 252-0482

A reprint from the Warsaw, Indiana *Times-Union* on Jan.18, 1992

# New 'Knox-Box' Opening Doors For Firefighters

BY BARRY LEWIS
*Times-Union Staff Writer*

Da-Lite Screen has become the first local business to install a Knox-Box, something very pleasing for members of the Warsaw Fire Department.

The Knox-Box, manufactured by the Knox Company, Newport Beach, Calif., is a form of security box that contains vital information for fire departments.

Inside the steel box, which is mounted outside on a small building in the north parking lot at Da-Lite, a business places keys to the doors, diagrams about the facility, and any other information that could help in extinguishing a fire, including information on any hazardous materials in the building.

The No. 1 advantage of the Knox-Box is the saving of critical time. Only the local fire department has a key to the Knox-Box. Even the business itself does not have a key.

"We are the only ones with a key," Warsaw Fire Chief Kenny Shepherd said. "Not just anybody can get one of these boxes. They have to go through the fire department and be registered."

Shepherd said many times his department will reach the scene of an alarm and if there is no visible fire they wait for someone from that business to arrive and let them in.

"We had one fire I remember and we waited and waited outside for someone to let us in," he said. "Once we got in there was a broken water line. If we had had access to that building through a program like this we could have shut off the water and saved the company a lot of damage."

Shepherd said Da-Lite has been the leader in this newest phase of fire fighting.

"Ever since they were annexed into the city they have been the leaders in a number of things and this is just another one," he said. "They came to us about this. We knew about these types of boxes, but couldn't really endorse any certain one. Now they have started it and only Knox-Boxes will be installed in this area now."

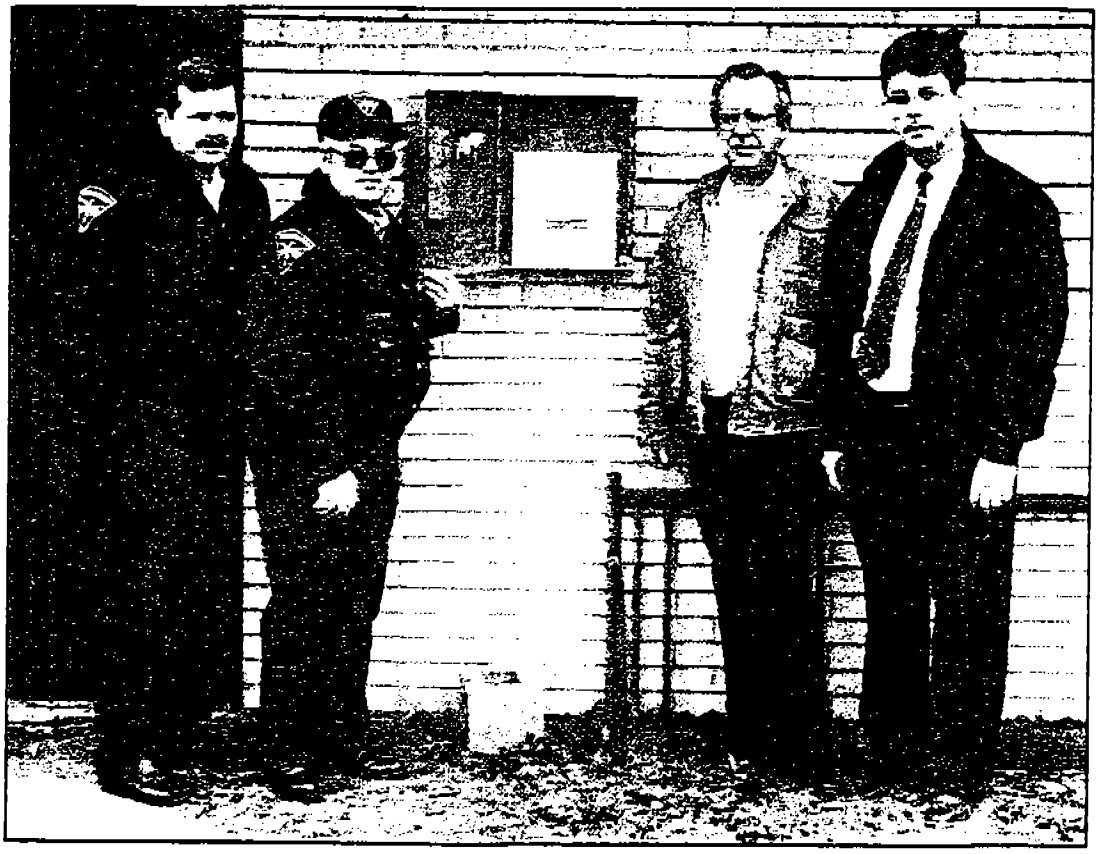
Shepherd said the key to the Da-Lite Knox-Box will work on any other box in the city. That's why this will be the only box allowed in this area.

Dave Miller, Da-Lite technical engineer, explained the reason for installing the box.

"It's basically for the safety of the firemen," he said. "This way they can start to go to work as soon as they arrive on the scene. They'll know what is in the building and where everything is. We just felt that's the least we could do for them."

Shepherd hopes this idea will catch on with other companies.

"We feel like this is an excellent program and we hope this is just the beginning," Shepherd said. "It would be nice to see some of the other companies follow suit. It's really a program which would be in their best interest. You can never tell when just a few minutes could mean a lot when battling a fire."



(L to R) Warsaw Fire Chief Kenny Shepherd, fireman Lee Hartle, and Da-Lite officials Dave Miller and Tom Anderson pose with the new 'Knox-Box' — *Photo by Barry Lewis*

A reprint from the Watertown, South Dakota, *Watertown Public Opinion* on July 6, 1993

# Firefighters will no longer carry keys

By DENNY WARRICK
P.O. Government Editor

**FIREFIGHTERS HERE** will no longer carry keys to local businesses beginning Sept. 1.

An ordinance approved three months ago by the Watertown City Council will ban the longstanding practice starting then.

Instead, firefighters will carry one key capable of opening locked boxes outside businesses that want them.

Firefighters have begun notifying business owners of the change.

**THE CHANGE WAS** necessary because "the number of individual business keys has grown to an unmanageable amount," Fire Chief Al Satter said in a letter prepared for affected businesses.

But Satter's letter added, "We do not wish to lose immediate access to your business or property."

A metal board inside one of the city's fire trucks contains keys to about 100 businesses, but some businesses have provided "two, three, four or more keys," said Frank Cordell, an assistant fire chief.

"That's about 300 keys we have to keep track of, and finding the right key when we pull up to a fire to gain quick access can be a problem," Cordell explained.

**FIREFIGHTERS HAVE** endorsed what is known as the Knox-Box Rapid Entry Security System. The system utilizes a series of different sized boxes that are mounted on the exterior of businesses. Each box holds keys to that company.

All boxes can be opened with a single key. Box prices start at $92, according to Jerry Riley, a firefighter in charge of the change. The store owner is responsible for the cost of the box. Only the fire department will have the master key, Riley said. A copy later may be given to Watertown police, he indicated.

**"MANY TIMES WE** arrive at the scene where everything is locked and secured and the keys we have are obsolete or we do not have keys to gain access," said Jerry Riley, a firefighter involved in the changeover.

"At that moment, the officer in charge has to make a decision to either use forcible entry or wait 15 to 20 minutes and sometimes longer for an owner or manager that is called to finally show up to unlock the premises.

"Forcible entry by breaking into a door or window is a very minimal cost if it means saving a person's life or putting out" a growing fire. If forcible entry is used and the call is a false alarm, Riley said the property was damaged needlessly and security has become a problem.

**EMERGENCY ENTRY BOXES** — Firefighter Jerry Riley shows an opened emergency access box for storing keys to local businesses. Although keys to about 100 firms have ridden with local fire trucks for many years, the practice will end Sept. 1 because the number of keys has grown too large over the years, Riley said. To thwart burglaries, some model boxes have a switch inside to trigger an alarm to police when the boxes are opened, Riley said. (Public Opinion photo by Denny Warrick)

BC6 A:/UPDATES.DST/DST96-7.DOC

**MARYLAND DEPARTMENT OF TRANSPORTATION**
**MARYLAND AVIATION ADMINISTRATION**

**MEMORANDUM**

**TO:** Distribution

**FROM:** Benjamin Chin, Manager
Design Services

**DATE:** September 3, 1996

**SUBJECT:** Design Standard (DST) 96-7, UPS Protection

All contract documents for retrofitting, modifying, or new building construction, which involve data jacks, cabling, etc., shall be designed to include, at a minimum, one duplex outlet on a UPS circuit adjacent to each data jack location. This requirement is in addition to any convenience outlet requirements, and is to provide UPS protection for each PC-CPU and future telephone system which is deployed.

This Design Standard is effective for all projects under design or starting design after September 3, 1996.

Should you have any questions regarding this matter, please contact me at 410-859-7093.

BC/jao

Distribution:

Mr. Ian Bricknell (TAMS)
Mr. Emory Carrigan (OPE)
Mr. Brad Collins (DMJM)
Mr. Ray Heverling (OPE)
Ms. Karen Kuczinski (OPE)
Mr. Ali Logmanni (OPE)
Mr. Steve Lucchesi (Greiner)
Mr. Derek Moore (Bodouva)
Mr. Chirantan Mukhopadhyay (Parsons)
Mr. Charles Steen (OPE)
Mr. William Tsai (OPE)
Mr. Reginald Weaver (Baker)

cc: Mr. Ray Kauffman
Mr. Alex Noorani

DST 96-8 Fire Hydrant (Replaced by DST 99-08)

BC6 A:/UPDATES/DST/DST96-8.DOC

**MARYLAND DEPARTMENT OF TRANSPORTATION**
**MARYLAND AVIATION ADMINISTRATION**

**MEMORANDUM**

**TO:** Distribution

**FROM:** Benjamin Chin, Manager
Design Services

**DATE:** September 10, 1996

**SUBJECT:** Design Standard (DST) 96-8, Fire Hydrant

Attached for your use is a Fire Hydrant specification and details which should be incorporated in all future contract documents for Maryland Aviation Administration (MAA) projects. Section A - Description, Section B - Related Work Specified Elsewhere, and Section I - Method of Payment should be modified as required for each project. In addition, the specification should be re-formatted as needed to be consistent with your contract documents. Revisions to other sections of the specifications will be approved on a case by case basis by the MAA project engineer and MAA Fire Marshall.

Should you have any questions regarding this matter, please contact me at 410-859-7093.

BC/jao

Distribution:

Mr. Ian Bricknell (TAMS)
Mr. Emory Carrigan (OPE)
Mr. Brad Collins (DMJM)
Mr. Ray Heverling (OPE)
Ms. Karen Kuczinski (OPE)
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Mr. Derek Moore (Bodouva)
Mr. Chirantan Mukhopadhyay (Parsons)
Mr. Charles Steen (OPE)
Mr. William Tsai (OPE)
Mr. Reginald Weaver (Baker)

cc: Captain Woody Cullum
Mr. Alex Noorani

# FIRE HYDRANTS

## A. Description

Fire hydrant installation shall include, but not necessarily be limited to, furnishing and installing fire hydrants or relocating fire hydrants in accordance with the Contract Documents. All materials for fire hydrant installation or relocation will be furnished by the Contractor.

## B. Related Work Specified Elsewhere

1. Trench excavation, backfill, and compaction;

2. Water pipe, fitting, and appurtenance installation;

3. Water valve and appurtenance installation.

## C. Referenced Standards From National Fire Protection Association (NFPA)

The most recent edition of the following NFPA applies to these Specifications.

13 - Installation of sprinkler systems

24 - Installation of private fire service mains and their appurtenances

26 - Supervision of valves controlling water supplies

291 - Flow testing and marking of hydrants

1963 - Fire hose connections

## D. Quality Assurance

1. Materials

   The contractor will inspect all materials before and after installation to ensure compliance with the Contract Documents.

2. Field Tests

   a. Fire hydrants installed at the same time as a new water main shall be tested, after installation, by the Contractor, along with the water main, in accordance with following standards that apply: NFPA 13, 24, 26, 291, and 1963.

b. Fire hydrants installed on an existing water main will be visually inspected for leakage by the contractor at the existing water main line pressure before the excavation is backfilled. The hydrant, valve, and connecting pipe shall be leak free under line pressure.

c. Flow test shall be conducted by contractor and witnessed by Fire Marshall.

## E. Submittals

Shop drawings shall be submitted as specified in the "Maryland Aviation Administration Standard Provisions for Construction Contracts" for the fire hydrants furnished, and shall include the following information: product description, parts list, valve and hose connection sizes, operating nut style, and direction of opening.

## F. Fire Hydrants

1. The Contractor may furnish fire hydrants manufactured by American Darling, Model B-62-B; Kennedy Valve, Model K-81-A; or Mueller, Centurian.

2. Hydrant valve opening shall be at least 5-inch diameter net. Inlet connection shall be 6-inch mechanical joint with accessories (glands, plain rubber gaskets, bolts and nuts).

3. Hose connections shall consist of two 2 1/2 -inch diameter hose connections and one 4 1/2-inch diameter steamer or pumper connection threaded as follows: the 2 1/2 -inch nose nozzles shall have National Standard threads and the 4 1/2-inch diameter nozzle shall have Baltimore City Standard threads.

4. Operating nut shall be 5 sided, 1 5/16 inches from point to flat, and shall turn left (counterclockwise) to open.

5. Outer casing shall be one-piece cast iron, designed to permit its extension without excavating.

6. Hydrant design shall be such that when the barrel is broken, it may be replaced without excavating or breaking adjacent pavement; that the entire barrel, including all working parts, along with the main and waste valve seats, may be removed for inspection or repair without excavating or disturbing the ground; and that underground flanges with bolts and nuts are eliminated.

7. The main valve seal shall be compression type sealing against a bronze seat and the valve shall open against pressure.

8. Between elbow and top cap, the barrel shall be made in two parts connected by a swivel segment to permit facing the nozzles in any direction.

9. Bonnet shall be bolted to the standpipe and shall have cast on the top an arrow and the word "Open" indicating the direction for opening.

10. A self opening drain valve shall be provided.

11. All hydrant caps shall be provided with chains that will not rust.

## G. Fire Hydrant Installation

1. Gravel or crushed stone for hydrant foundation shall meet the gradation requirements of AASHTO M 43, Size Number 57.

2. Fire hydrants shall be installed and restrained in accordance with the Standard Details, at the locations shown, and to elevations directed by the Engineer. Hydrants shall be set within a gravel or crushed stone drainage well extending the full width of the trench.

3. Hydrant leads shall be laid level on a firm foundation to insure that the hydrant is set plumb. Backfill around the hydrant shall be compacted so as to obtain a density of at least 95% of maximum when measured in accordance with AASHTO T180, Method D.

4. Where hydrants are to be relocated, the Contractor shall ascertain whether or not the hydrant valve has been restrained before removing the hydrant to be relocated. The lead shall be capped and blocked so that service can be restored to the parent main pending the removal or plugging of the mainline tee.

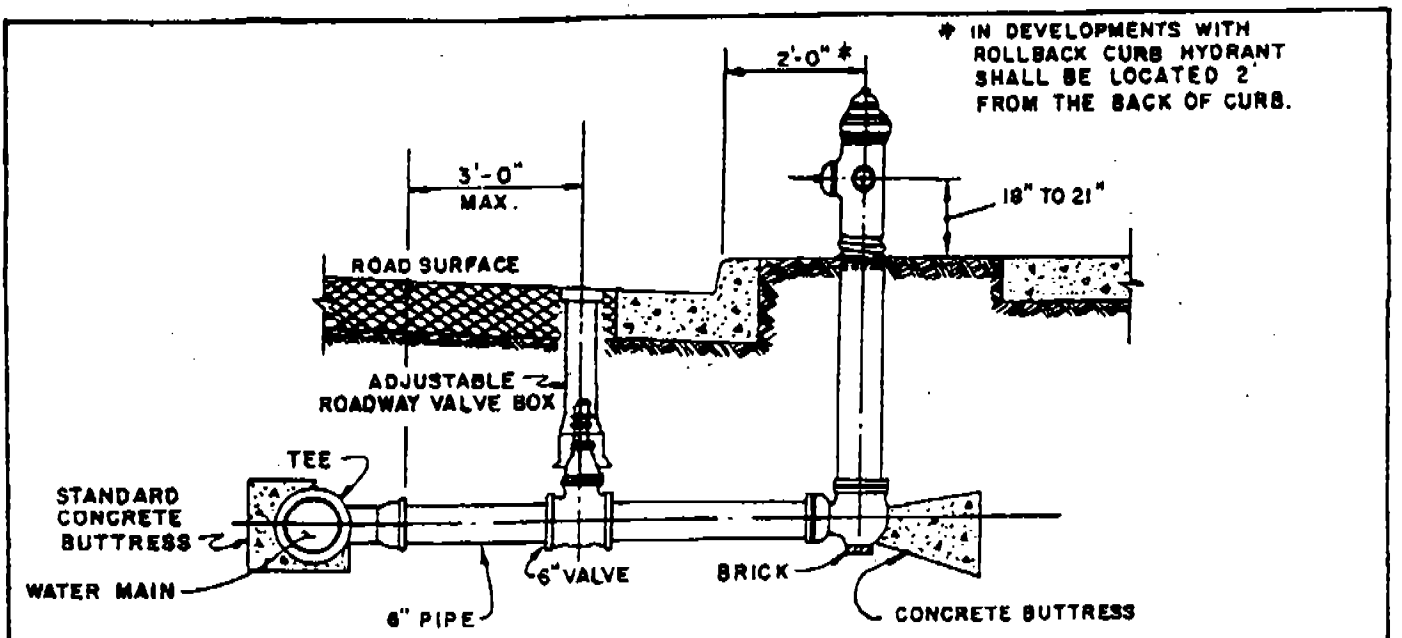
5. The outside of all fire hydrants above the breakaway flange shall be painted with two coats of safety yellow industrial enamel paint as manufactured by Sherwin Williams, or equal. The riser pipe from ground to breakaway flange shall be painted with two coats gloss black industrial enamel paint as manufactured by Sherwin Williams, or equal before installation. Hydrant shall be painted to indicate its GPM per NFPA 291.

## H. Method of Measurement

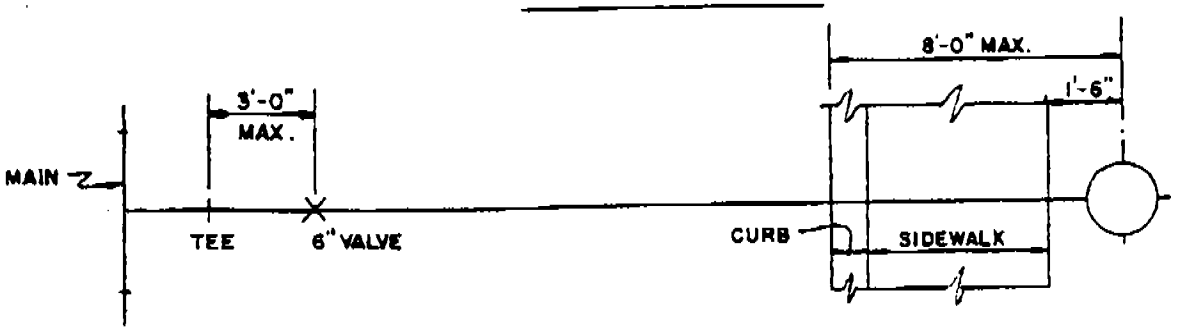
Measurement for fire hydrant installations or relocations will be made of the number of hydrants satisfactorily installed or relocated as shown on the Plans or directed by the Engineer.

## I. Method of Payment

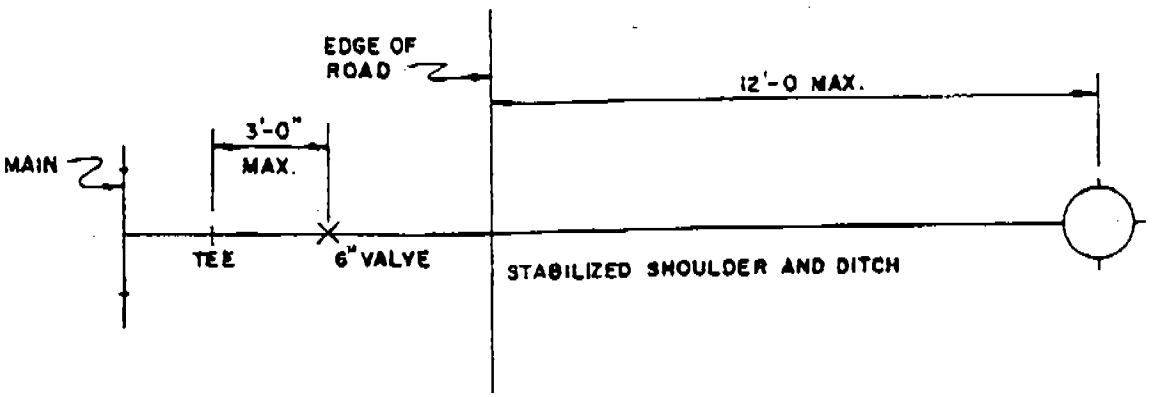
*This section to be added by the design engineer.*



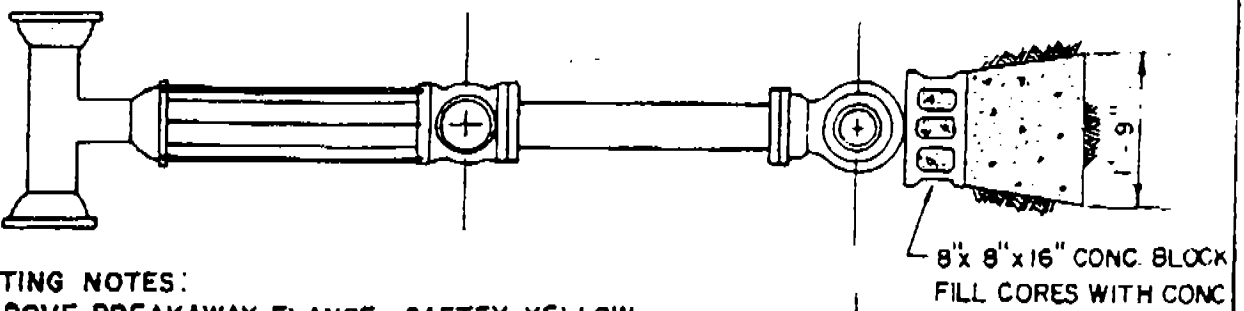

INSTALLATION IN NEW DEVELOPMENT
WITH CURB AND GUTTER



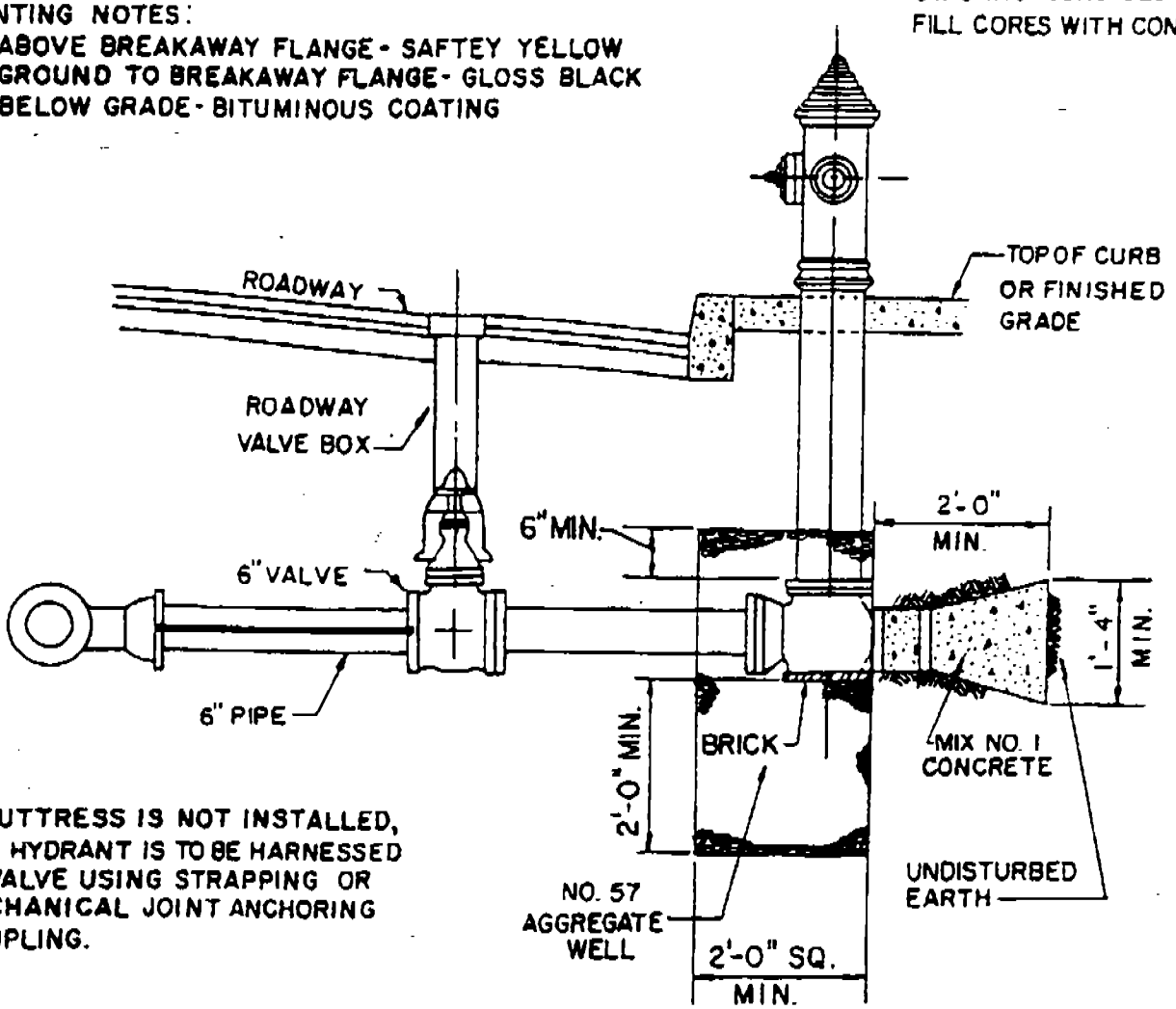

INSTALLATION IN EXISTING STREETS
SIDEWALK ADJACENT TO CURB




INSTALLATION IN STREETS WITHOUT
CURB AND GUTTER



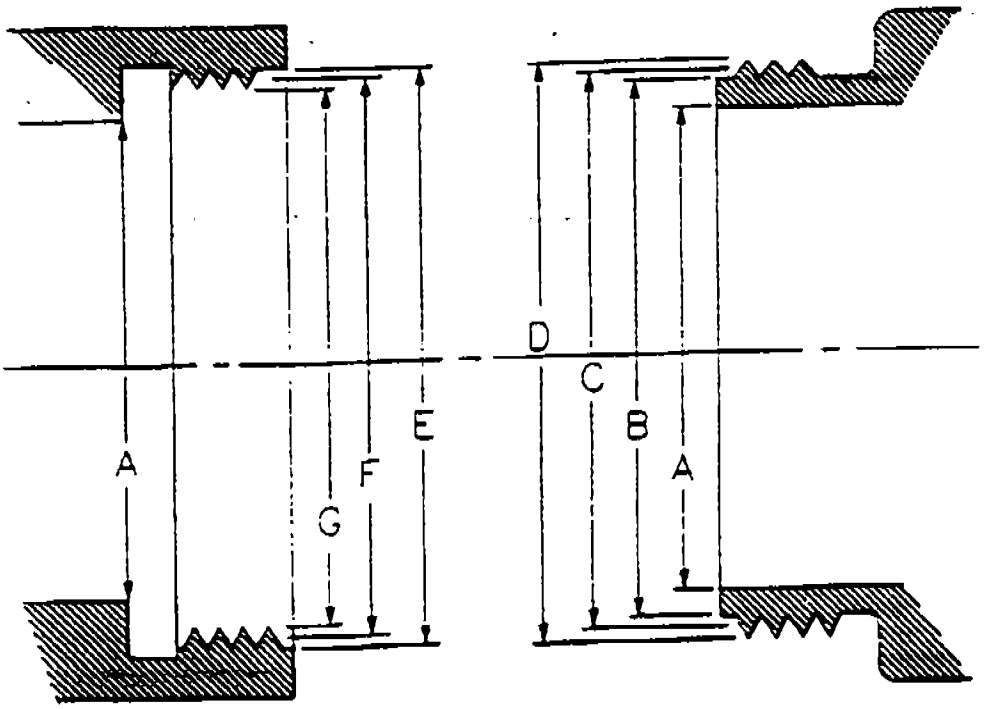

PAINTING NOTES:
ABOVE BREAKAWAY FLANGE - SAFTEY YELLOW
GROUND TO BREAKAWAY FLANGE - GLOSS BLACK
BELOW GRADE - BITUMINOUS COATING




IF BUTTRESS IS NOT INSTALLED, FIRE HYDRANT IS TO BE HARNESSED TO VALVE USING STRAPPING OR MECHANICAL JOINT ANCHORING COUPLING.

* HYDRANT CAP CHAINS SHALL NOT BE PAINTED

APPROVED | REVISED




FEMALE

MALE

| A | E | F | G |
|---|---|---|---|
| COUPLING I.D. | MAJOR DIA. | PITCH DIA. | MINOR DIA. |
| 2 1/2" (7.5 T.P.I.) | 3.0836 (MIN.) | 3.0130 / 2.9970 | 2.9424 / 2.9104 |
| 4 1/2" (4 T.P.I.) | 5.548 / 5.538 | 5.325 / 5.320 | 5.113 / 5.103 |

| A | B | C | D |
|---|---|---|---|
| COUPLING I.D. | MINOR DIA. | PITCH DIA. | MAJOR DIA. |
| 2 1/2" (7.5 T.P.I.) | 2.8954 (MAX.) | 2.9820 / 2.9660 | 3.0686 / 3.0366 |
| 4 1/2" (4 T.P.I.) | 5.044 / 5.034 | 5.260 / 5.255 | 5.477 / 5.467 |

NOTE: 2 1/2" HYDRANT CONNECTION– NATIONAL STANDARD FIRE-HOSE COUPLING SCREW THREAD. (DIMENSIONS SHOWN ABOVE).

4 1/2" HYDRANT CONNECTION– 4 1/2" THREAD SPECIFICATION. (DIMENSIONS SHOWN ABOVE).

DST 96-9 N/A

BC6 A:/FMSMITH.DIS DST 96-10

**MARYLAND DEPARTMENT OF TRANSPORTATION**
**MARYLAND AVIATION ADMINISTRATION**

**MEMORANDUM**

**TO:** Distribution

**FROM:** Ben Chin BC

**DATE:** September 25, 1996

**SUBJECT:** MAA Fire Alarm Issues

Attached is a September 19, 1996 E-Mail from Pat Etherington regarding fire alarm coordination at BWI Airport. You should assume this coordination requirement also includes fire protection, fire egress, and occupant notification. It is my understanding that Mr. Smith does not need to be involved in the day to day coordination between the designer and the fire marshall. **Mr. Smith must be involved in all coordination involving MAA policy.**

Please advise your consultants of this new coordination requirement. Procedurally, you should contact Mr. Smith directly to determine which issues and/or meetings he would like to be involved in.

Let me know if you should have any questions regarding this matter.

BC/jao

Distribution:

Ray Heverling
Ali Logmanni
Charles Steen
Bill Tsai

cc: Mr. Mike Hewitt
Mr. Alex Noorani
Mr. Ricky Smith

**From:** PATRICIA A. ETHERINGTON (AOPAE)
**To:** MAA2:MCW, MAA1:ARDS, MAA1:AGTA, MAA1:ASH, AOGLH,...
**Date:** Thursday, September 19, 1996 11:42 am
**Subject:** MAA SECURITY ALARM ISSUES

On issues involving the fire alarm at BWI Airport, Ricky Smith will be the key point of contact for the Office of Airport Operations. Please be sure he is informed of any issues and/or meetings related to this matter so that he may properly coordinate.

Your cooperation is appreciated.

Gloria,
Please forward this message to Chief McGinnis, Capt. Pace, and Capt. Cullam.

**CC:** MAA1:AELMR, MAA1:ATEM, MAA1:ANJS, MAA1:ADWS