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FTO-3

Issued: **March 1985**
Revised: **October 2016**

Subject: **Fire Escapes**

References: **N.J.A.C. 5:23-6,**
Rehabilitation Subcode

A number of codes contain provisions, with the most common being those enforced under the Uniform Fire Code, that require existing buildings lacking a second means of egress to be equipped with fire escapes. Fire escapes may be installed on existing buildings to provide a second means of egress.

All new fire-escape installations -- or replacements of existing installations -- require a construction permit, and shall comply with the Rehabilitation Subcode and this Formal Technical Opinion (FTO). However, existing installations need not be replaced provided they are properly maintained and comply with the requirements of the Rehabilitation Subcode applicable to the building.

Fire escapes shall be permitted only as provided in the Rehabilitation Subcode (N.J.A.C. 5:23-6). This FTO is intended to provide uniform guidelines and a uniform interpretation to meet the intent of the code.

Where an applicant seeks approval for an alternate design (or pre-engineered fire escape) meeting the intent of N.J.A.C. 5:23-6, or where the local enforcing agency questions the structural stability of the existing building to support the loads imposed by the loaded fire escape, then an engineering analysis and certification shall be required.

Fire escapes shall comply with either of the following two methods:

Method One (Specification Methodology)

CONSTRUCTION DETAILS

A. LANDING PLATFORM SIZES: (See page 8 for fabrication details.)

- 1) Single-stair-width platforms shall be a minimum of 40 inches wide.
- 2) Double-stair-width platforms, or single-stair-width platforms with adjacent passageways, shall be a minimum of 50 inches wide.
- 3) Platform lengths shall be a minimum of 36 inches where exits do not open onto

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platforms. Where exits open onto the platform, the platform length shall be increased to be a minimum of 24 inches longer than the opening width, as follows: a minimum of 18 inches shall be located adjacent to the stair and a minimum of 6 inches shall be located opposite the stair.

B. LANDING PLATFORM COMPONENTS: (See page 9 for fabrication details.)

- 1) Floor surface shall be 1/4-inch steel floor plate material or 1 1/4-inch by 1/8-inch steel grating. Maximum allowable spacing of support members shall be 24 inches on center.
- 2) Floor surface support members shall be a minimum of 2 1/2-inch by 2 1/2-inch by 1/4-inch steel angles, 50 inches in length maximum, and not spaced over 24 inches on center.
- 3) Platform support brackets shall be a minimum of 3 inches, spaced not over 48 inches on center (increase top angle sizes to 4-inch by 3-inch by 1/4-inch angles where brackets must also support stair stringers).
- 4) All finished floor surfaces shall be securely attached and of a slip-resistant material. Stairs shall not have a variation exceeding 3/16 inch in the depth of adjacent treads or in the height of adjacent risers. The tolerance between the largest and smallest riser or between the largest and smallest tread shall not exceed 3/8 inch in any flight of stairs.

C. STAIR FLIGHT COMPONENTS: (See page 10 for fabrication details.)

- 1) Treads shall be a minimum of 8 inches in depth and risers a maximum of 8 inches in height, with a minimum of 22 inches clearance between stringers. Treads shall be a minimum of 1/8-inch steel floor plate. Nosing of stairways shall be not less than 3/4 inches and not more than 1 1/4 inches.
- 2) Stringers shall be a minimum of 1/4-inch by 8-inch steel plate. The maximum vertical distance between platforms, and between a platform and grade, shall be 12 feet.
- 3) The angle of the stairs shall not exceed 45 degrees from the horizontal plane. Should existing site conditions not permit a 45-degree angle, the local construction official may approve an angle of up to 60 degrees.

D. GUARD/HANDRAIL COMPONENTS: (See page 11 for fabrication details.)

- 1) Platform guards shall have a minimum vertical height of 42 inches above the platform floor surface. Where guards exceed 44 inches in height, a handrail shall also be installed at a height of 34 to 38 inches. Guards shall be a minimum of 1 1/4-inch diameter standard steel pipe rails supported by a minimum of 2-inch by 2-inch by 1/4-inch steel tube posts, spaced at a maximum of 48 inches on center, and 5/8-inch square steel bar balusters having a maximum of 4 inches clear spacing between balusters.
- 2) Stair handrails/guard handrails shall be not less than 34 inches, nor more than

38 inches, above the tread's nosing. Guard balusters shall have a maximum clear spacing of 4 inches. If the fire escape is more than 20 feet in height and/or does not reverse direction at intermediate landings, the guards shall be at least 42 inches in height. Use the same criteria for the material type as required above for platform guards.

E. COUNTERBALANCED SWINGING STAIRS:

Counterbalanced swinging stairs may be permitted from lowest platform landing to grade, where a fixed stair flight would not be feasible due to site constraints. The counterweight mechanism must be of the type that balances about a pivot, without the use of cables. The lowest fire-escape platform shall be a maximum of 12 feet above grade.

F. LADDERS: (See page 10 for fabrication details.)

Fixed and counterbalanced ladders may be permitted from lowest platform landing to grade, where either a fixed stair flight or a counterbalanced swinging stair is not feasible due to site constraints. Ladders must be vertical or positively inclined. No negatively inclined ladders will be permitted. Minimum clearance between center of rungs and building walls shall be 7 inches. Ladder rails shall be of steel construction, and shall be not less than 1/2 inch by 2 1/2 inches in size and not less than 16 inches apart. Rungs shall not be less than 7/8-inch diameter, shall be welded to rails, and shall not be spaced less than 10 inches or more than 12 inches on center. The lowest rung shall not be more than 12 inches above the level of the ground or landing platform.

G. FASTENERS: (See page 9 for fabrication details.)

Anchorage details shall be submitted by a licensed design professional for all types of anchorage that will be installed. Platform support brackets to masonry walls shall use 7/8-inch diameter (minimum) through bolts for top bracket bolts and 3/4-inch diameter (minimum) expansion bolts for bottom bracket bolts. Top bracket bolts shall be properly anchored into existing wall construction so that full strength of the bolt can be developed in tension. (Anchorage details shall be submitted by a licensed design professional for all types of anchorage that will be installed.)

H. OPENING PROTECTIVE:

- 1) In existing buildings 3 stories or more in height, all door openings leading directly to a fire escape shall be protected by a minimum of 3/4-hour fire-rated door assemblies. Window openings directly adjacent to a fire escape shall be safety glazed in accordance with Section 2406.4.3 of the building subcode. No type of fire-escape exit door or window is to be located so that the distance from the fire-escape landing platform to the bottom of the door or window opening exceeds 8 inches.
- 2) Minimum acceptable exit door size shall be 2 feet, 8 inches clear width by 6 feet, 8 inches in height.

- 3) A window as a means of access to a fire escape shall be permitted when the window serves a single dwelling unit. Where a window is used, it shall provide a minimum clear opening of at least 24 inches wide by 30 inches high in the case of double-hung windows and at least 18 inches wide by 48 inches high in the case of casement windows. The window sill shall be located within 36 inches above the finished floor on the interior side of the window.

I. GENERAL CONSTRUCTION NOTES:

- 1) All structural and miscellaneous steel fire-escape components shall conform to the latest American Institute of Steel Construction (AISC) specification for the design, fabrication, and erection of structural steel for buildings, unless noted otherwise.
- 2) All structural steel members shall be a minimum of American Society for Testing and Materials (ASTM) A-36 grade of steel.
- 3) All welding of fire-escape components shall be with either E60 or E70 electrodes and shall conform to all requirements of the latest American Welding Society (AWS) Code, unless noted otherwise.
- 4) All fillet-type welds shall be continuous, unless noted otherwise. Where welding is used to develop the full strength of the members being jointed, only full penetration, groove-type welds shall be used.
- 5) All welds shall be ground smooth, and all sharp edges and burrs shall be removed in areas of travel, or wherever they may be a hazard to fire-escape users.
- 6) All metal fasteners used to connect structural steel members to building walls shall be of galvanized steel, unless noted otherwise.
- 7) All structural and miscellaneous steel components shall receive both a shop coat and a finish coat of a rust-resistant paint. The finish coat shall be applied after erection of fire escape.

J. FABRICATION DETAILS: See following pages 8 through 11.

Method Two (Design Methodology)

A. CONSTRUCTION:

- 1) The fire escape shall be designed to support a live load of 100 pounds per square foot.
- 2) Fire escapes constructed of wood not less than a nominal 2 inches thick are permitted on buildings of Type V construction. In all other construction types, they shall be constructed of steel or other approved, noncombustible materials.

- 3) Walkways and railings located over, or supported by, combustible roofs in buildings of Type III and IV construction are permitted to be constructed of wood not less than a nominal 2 inches thick.

B. LANDING PLATFORM COMPONENTS:

- 1) A landing at the foot of stairs shall be not less than 40 inches wide by 36 inches long and shall be located not more than 8 inches below a window or door. Where exits open to a platform, the platform length shall be increased to a minimum of 24 inches longer than the opening width of the door. A double-width platform, or single-width platform with adjacent passageways, shall be a minimum of 50 inches wide.
- 2) All finished floor surfaces shall be securely attached and of a slip-resistant material. Stairs shall not have a variation exceeding $3/16$ inch in the depth of adjacent treads or in the height of adjacent risers. The tolerance between the largest and smallest riser, or between the largest and smallest tread, shall not exceed $3/8$ inch in any flight of stairs.

C. STAIR FLIGHT COMPONENTS:

- 1) Treads shall be a minimum of 8 inches in depth and risers a maximum of 8 inches in height, with a minimum 22 inches clearance between stringers. Nosing of stairways shall be not less than $3/4$ inches and not more than $1\ 1/4$ inches.
- 2) The maximum vertical distance between platforms, and between a platform and grade, shall be 12 feet.
- 3) The angle of the stairs shall not exceed 45 degrees from the horizontal plane. Should existing site conditions not permit a 45-degree angle, the local construction official may approve an angle of up to 60 degrees.

D. GUARD/HANDRAIL COMPONENTS:

- 1) Platform guards shall be at least 42 inches in height, measured vertically above the leading edge of the tread or adjacent walking surface. Guards shall be constructed for a concentrated load of 200 pounds applied at any point and in any direction along the top railing member. In other than dwelling units in Groups R-2, R-3, and R-5, guards shall also be designed and constructed for a uniform load of 50 pounds per foot applied horizontally at the required guard height, and a simultaneous uniform load of 100 pounds per foot applied vertically downward at the top of the guard. The concentrated and uniform loading conditions shall not be applied simultaneously. Open guards shall have balusters, or shall be of solid material such that a sphere with a diameter of 4 inches cannot pass through any opening.
- 2) Stair handrails/guards shall be on both sides of the stairway. The handrail shall be not less than 34 inches nor more than 38 inches, measured vertically above the leading edge of the treads or above the finished floor of the

landing or walking surface. Handrails shall be constructed for a concentrated load of 200 pounds applied at any point and in any direction. In other than dwelling units in Groups R-2, R-3, and R-5, handrails shall also be designed and constructed for a uniform load of 50 pounds per foot applied in any direction. The concentrated and uniform loading conditions shall not be applied simultaneously.

E. COUNTERBALANCED SWINGING STAIRS:

Counterbalanced swinging stairs shall be permitted from lowest platform landing to grade, where a fixed stair flight would not be feasible due to site constraints. Counterweight mechanism must be of the type that balances about a pivot, without the use of cables. The lowest fire-escape platform shall be a maximum of 12 feet above grade.

F. LADDERS:

Fixed and counterbalanced ladders shall be permitted from lowest platform landing to grade, where either a fixed stair flight or a counterbalanced swinging stair is not feasible due to site constraints. Ladders must be vertical or positively inclined. No negatively inclined ladders will be permitted. Minimum clearance between center of rungs and building walls shall be 7 inches. Ladders shall be of steel construction, and shall be not less than 1/2 inch by 2 1/2 inches in size and not less than 16 inches apart. Rungs shall be not less than 7/8-inch diameter, shall be welded to rails, and shall not be spaced less than 10 inches or more than 12 inches on center. The lowest rung shall not be more than 12 inches above the level of the ground or landing platform.

G. FASTENERS:

Anchorage details shall be submitted by a licensed design professional for all types of anchorage that will be installed.

H. OPENING PROTECTIVE:

- 1) In existing buildings 3 stories or more in height, all door openings leading directly to a fire escape shall be protected by a minimum of 3/4-hour fire-rated door assemblies. Window openings directly adjacent to a fire escape shall be safety glazed in accordance with Section 2406.4.3 of the building subcode. No type of fire-escape exit door or window is to be located so that the distance from the fire-escape landing platform to the bottom of the door or window opening exceeds 8 inches.
- 2) Minimum acceptable exit door size shall be 2 feet, 8 inches clear width by 6 feet, 8 inches in height.
- 3) A window as a means of access to a fire escape shall be permitted when the window serves a single dwelling unit. Where a window is used, it shall provide a minimum clear opening of at least 24 inches wide by 30 inches high in the case

of double-hung windows and at least 18 inches by 48 inches in the case of casement windows. The window sill shall be located within 36 inches above the finished floor on the interior side of the window.

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I. GENERAL CONSTRUCTION NOTES:

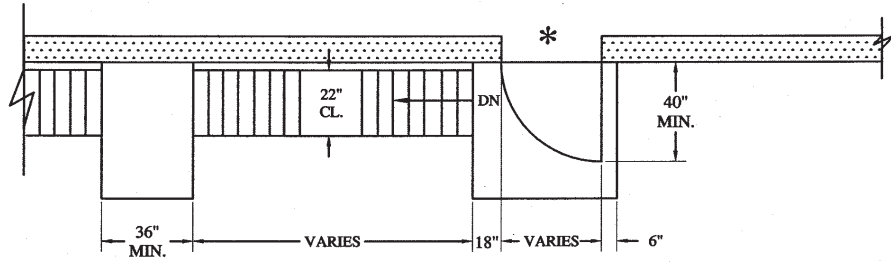
- 1) All structural and miscellaneous steel fire-escape components shall conform to the latest AISC specification for the design, fabrication, and erection of structural steel for buildings.
- 2) All structural steel members shall be a minimum of ASTM A-36 grade of steel.
- 3) All welding of fire-escape components shall be with either E60 or E70 electrodes and shall conform to all requirements of the latest AWS Code.
- 4) All metal fasteners used to connect structural steel members to building walls shall be of galvanized steel.
- 5) All structural and miscellaneous steel components shall receive both a shop coat and a finish coat of a rust-resistant paint. The finish coat shall be applied after erection of the fire escape.
- 6) All fillet-type welds shall be continuous, unless noted otherwise. Where welding is used to develop the full strength of the members being jointed, only full penetration, groove-type welds shall be used.
- 7) All welds shall be ground smooth, and all sharp edges and burrs shall be removed in areas of travel, or wherever they may be a hazard to fire-escape users.

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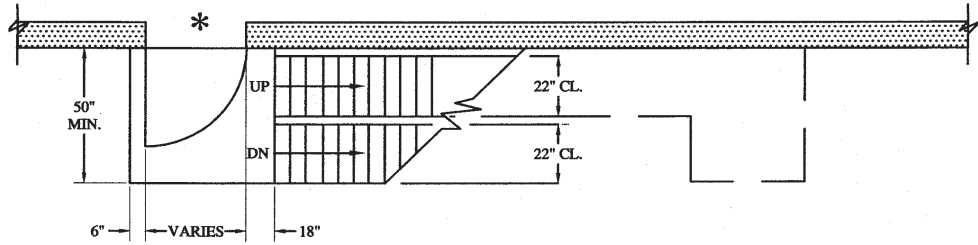
PURSUANT TO AUTHORITY OF N.J.S.A. 52:27D-119 ET SEQ., AS AMENDED, THE ABOVE FORMAL TECHNICAL OPINION IS CONSIDERED TO BE BINDING UPON ALL CODE OFFICIALS.

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FABRICATION DETAILS

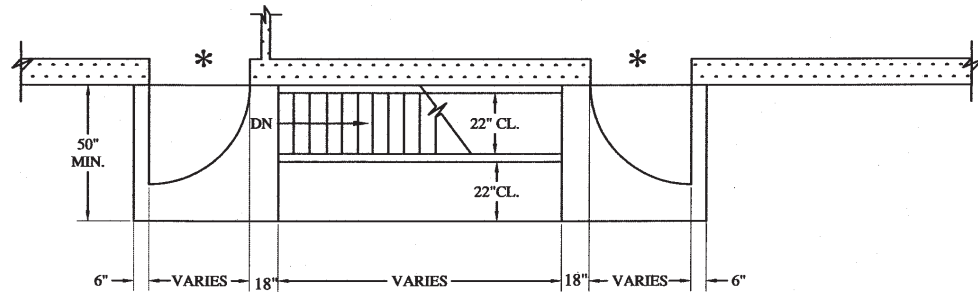


SINGLE STAIR WIDTH PLATFORMS



DOUBLE STAIR WIDTH PLATFORMS

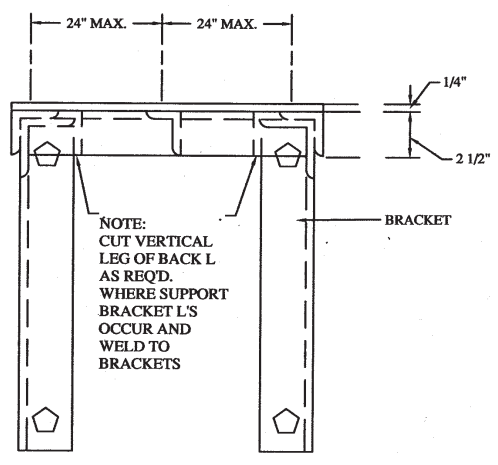
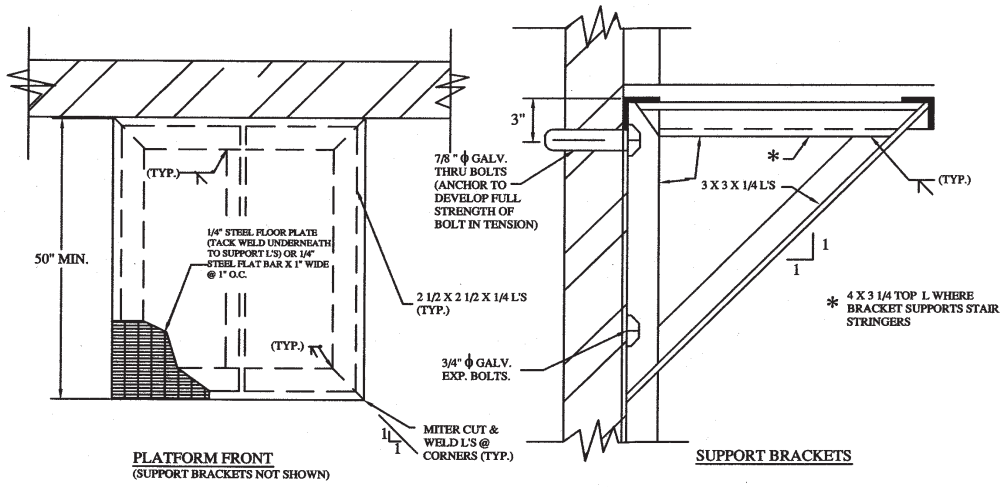
* APPROVED EXIT DOOR OR WINDOW



SINGLE STAIR WIDTH PLATFORMS WITH ADJACENT PASSAGEWAYS

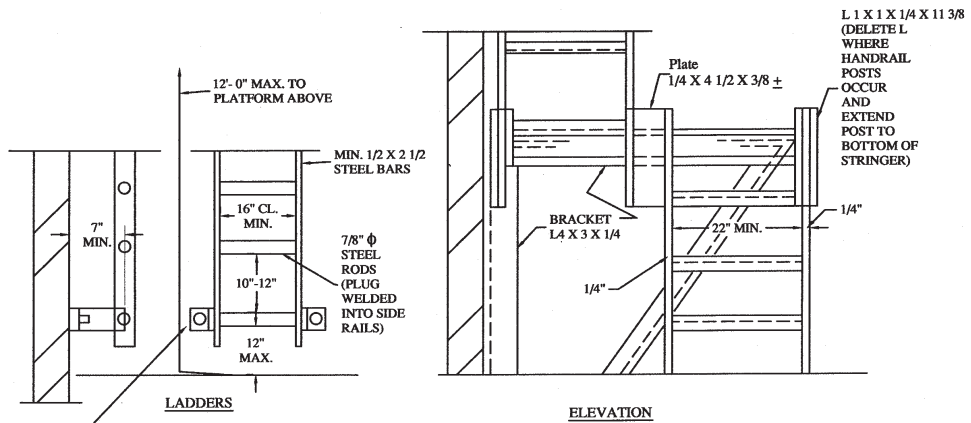
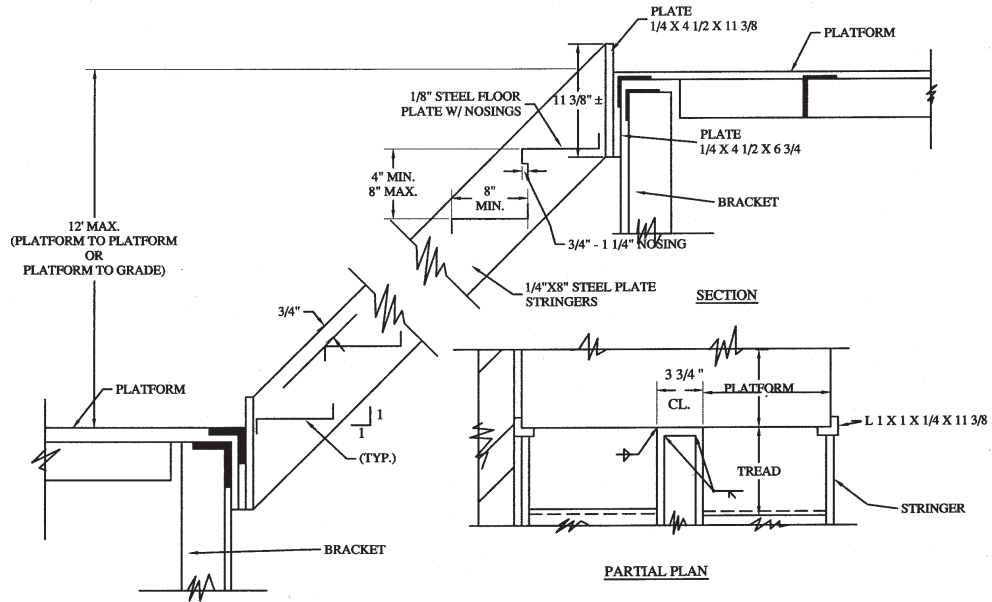
* APPROVED EXIT DOOR OR WINDOW

DETAILS OF LANDING PLATFORM SIZES



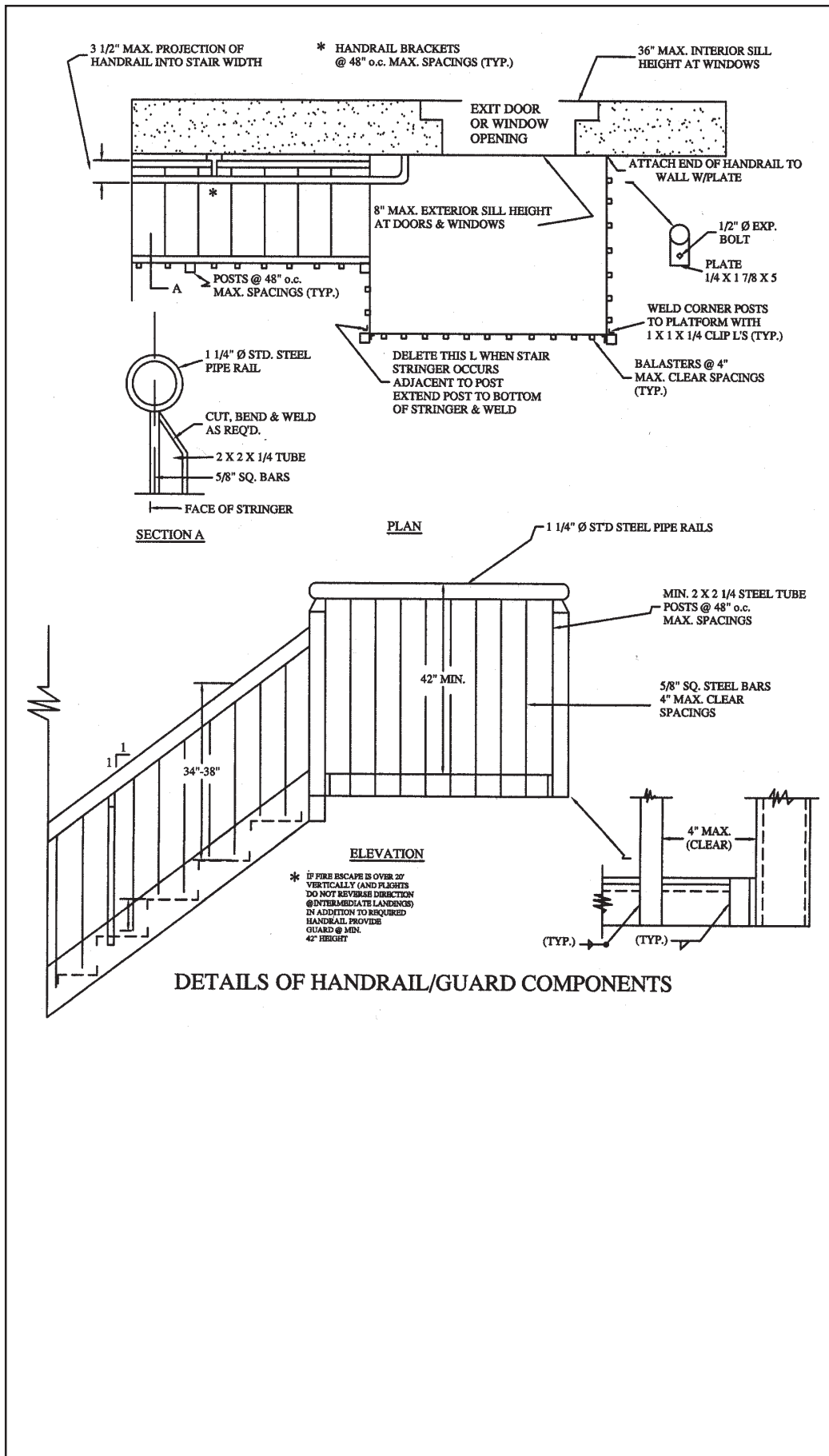
DETAILS OF LANDING PLATFORM COMPONENTS

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5 X 8 X 1/4 BENT PLATE CLIP L'S @ 72" O.C. MAXIMUM SPACINGS (ANCHOR TO WALL WITH 3/4" φ EXP. BOLTS)

DETAILS OF STAIR FLIGHT COMPONENTS



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