F. E. MORAN Inc.

Fire Protection

EARLY SUPPRESSION FAST RESPONSE (ESFR) OBSTRUCTION GUIDE

F. E. MORAN Inc.

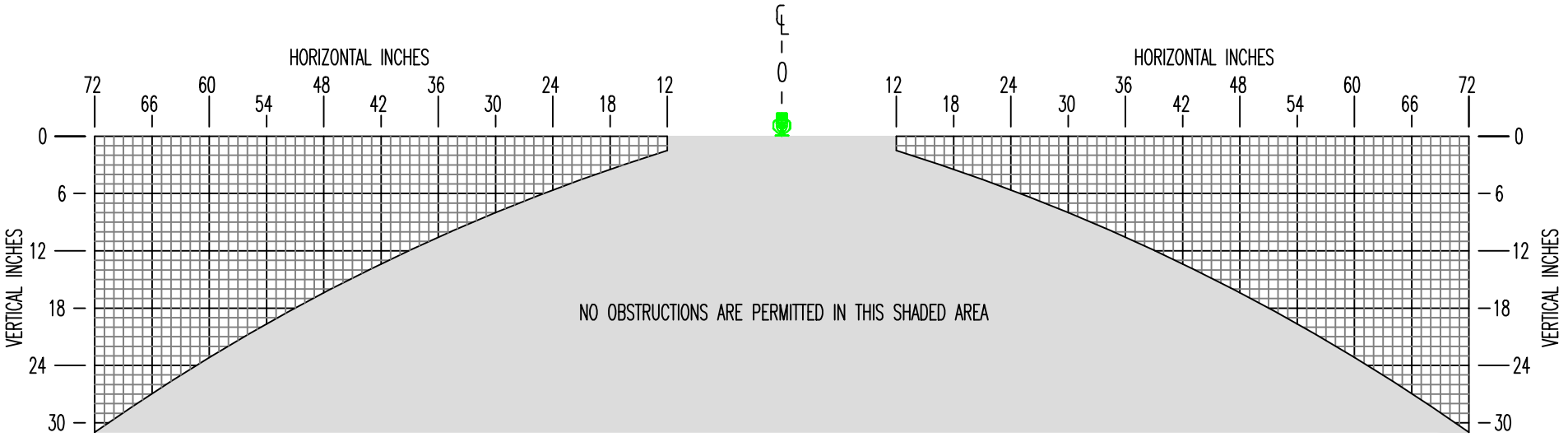
Fire Protection

SUBJECT: ESFR GUIDELINES

SHEET No.: 001

BY: KLC

DATE: 10/26/2016



DETAIL 1: SOLID OBSTRUCTIONS AT CEILING LEVEL

FM GLOBAL SOLID OBSTRUCTIONS AT CEILING LEVEL NOTES:

OBSTRUCTIONS EXTENDING FROM A POINT AT OR ABOVE THE LEVEL OF A SPRINKLER TO A POINT BELOW THE SPRINKLER DEFLECTOR CAN COMPLETELY BLOCK A SIGNIFICANT PORTION OF THE SPRINKLER DISCHARGE. TYPICAL EXAMPLES OF THIS TYPE OF OBSTRUCTION INCLUDE, BUT ARE NOT LIMITED TO: CONCRETE OR STEEL BEAMS, STEEL GIRDERS, JOISTS OR TRUSSES WHOSE WEBS ARE LESS THAN 70% OPEN, DRAFT CURTAINS, ETC.

LOCATE SPRINKLERS IN RELATION TO THE OBSTRUCTIONS SUCH THAT THE "UMBRELLA" OF DISCHARGE PATTERN PASSES BENEATH THE OBSTRUCTION.

LOCATE SPRINKLERS SO THAT THE VERTICAL DISTANCE FROM THE SPRINKLER DEFLECTOR TO THE BOTTOM OF THE OBSTRUCTION AND THE HORIZONTAL DISTANCE FROM THE NEAREST EDGE OF THE OBSTRUCTION ARE AS SHOWN IN THE ABOVE DETAIL.

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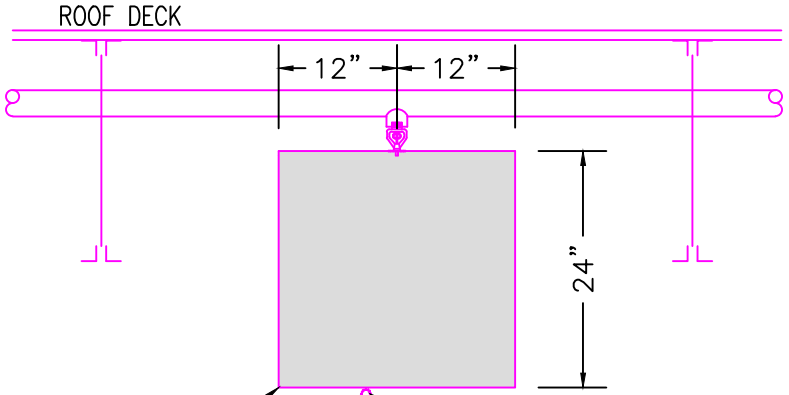
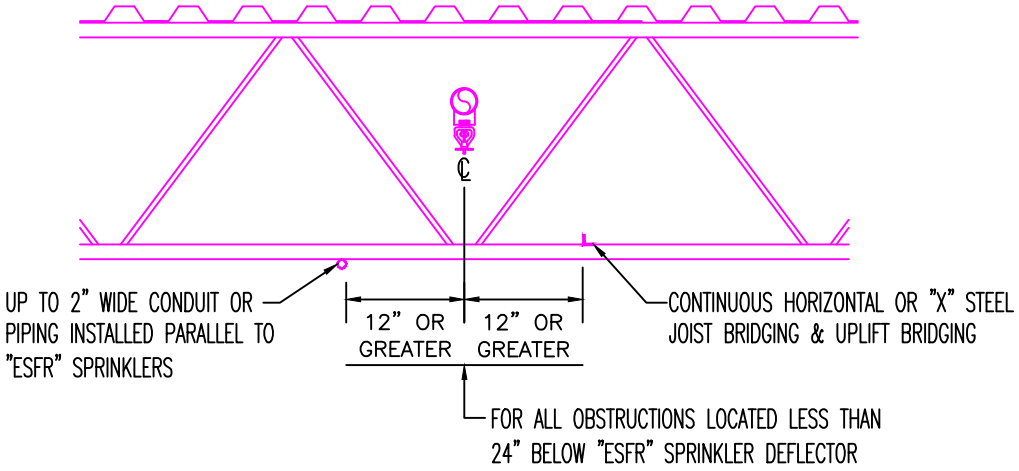
IF THE OBSTRUCTION IS AT LEAST 2 FEET BELOW THE DEFLECTOR, DISREGARD IT.



IF THE OBSTRUCTION IS AT LEAST 2 FEET BELOW THE DEFLECTOR, DISREGARD IT. IF THE OBSTRUCTION IS CLOSER THAN 2 FEET TO THE DEFLECTOR, THE SPRINKLER MUST BE AT LEAST 12" HORIZONTALLY FROM THE EDGE OF THE OBSTRUCTION.



DETAIL 2: CONTINUOUS OBSTRUCTIONS UP TO 2 INCHES IN WIDTH (CONDUIT, PIPE, JOIST BRIDGING, ETC.)

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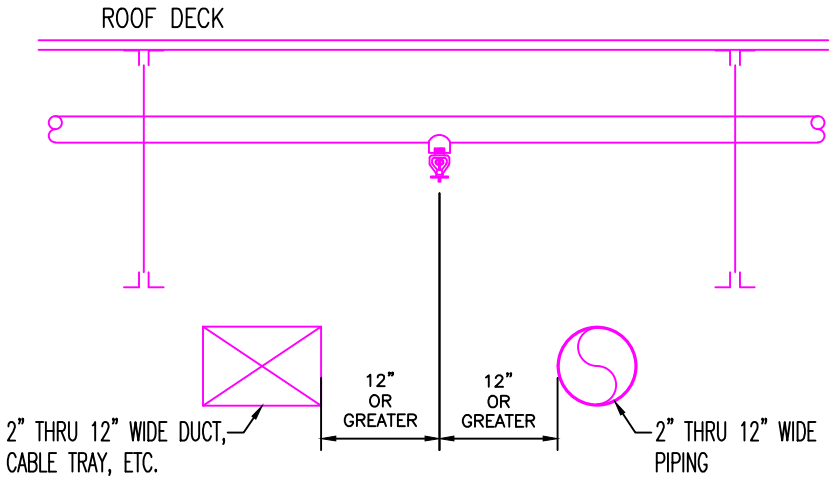
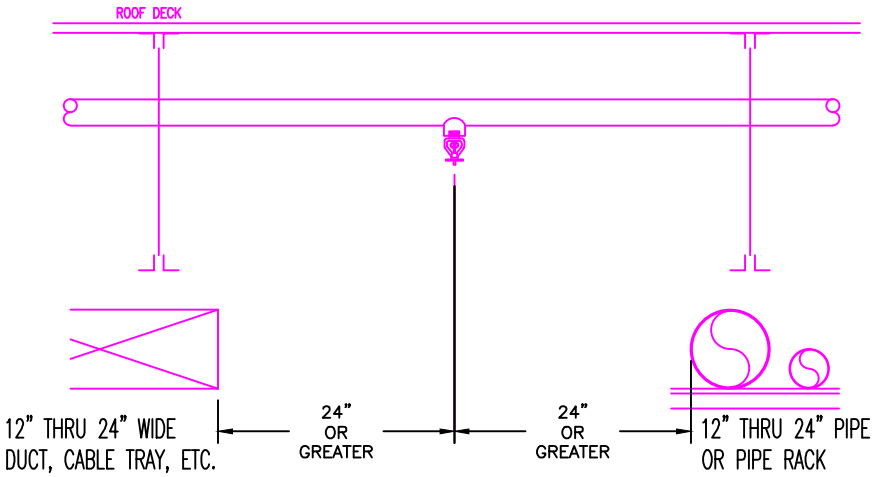


THE SPRINKLER MUST BE AT LEAST 12" HORIZONTALLY FROM THE EDGE OF THE OBSTRUCTION.

DETAIL 3: CONTINUOUS OBSTRUCTIONS GREATER THAN 2 INCHES, UP TO 12 INCHES IN WIDTH (SMALL DUCTS, LARGER PIPES, BOTTOM CHORD OF JOISTS, ETC.)



THE SPRINKLER MUST BE AT LEAST 24" HORIZONTALLY FROM THE EDGE OF THE OBSTRUCTION.

DETAIL 4: CONTINUOUS OBSTRUCTIONS GREATER THAN 12 INCHES, UP TO 2 FEET IN WIDTH (DUCTS, FLUORESCENT LIGHTS IN ROWS, RACKS OF PIPES, ETC.)

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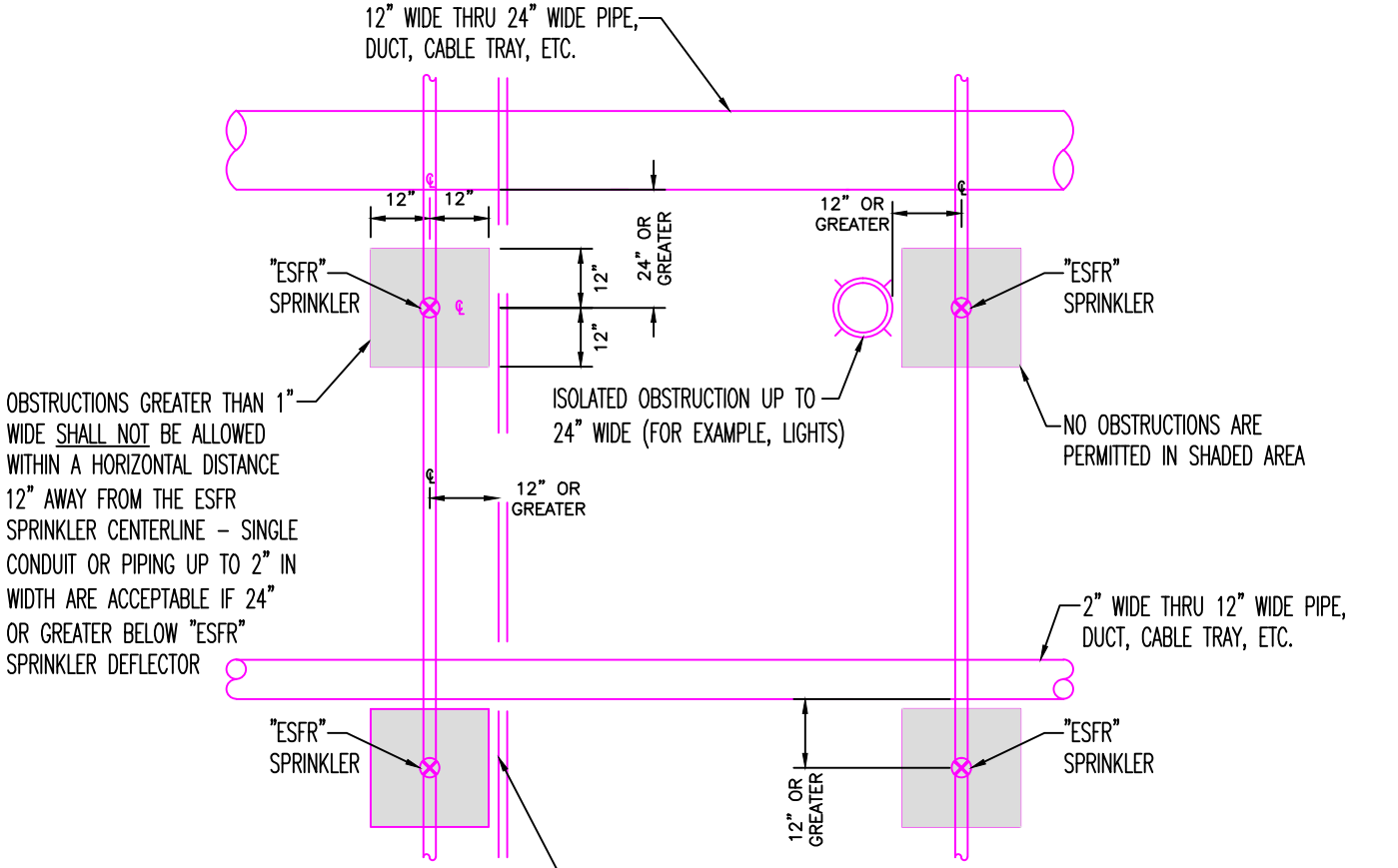

DETAIL 5: CONTINUOUS OBSTRUCTIONS 2 INCHES UP TO 24 INCHES IN WIDTH (CONDUIT, PIPE, JOIST BRIDGING, ETC.)

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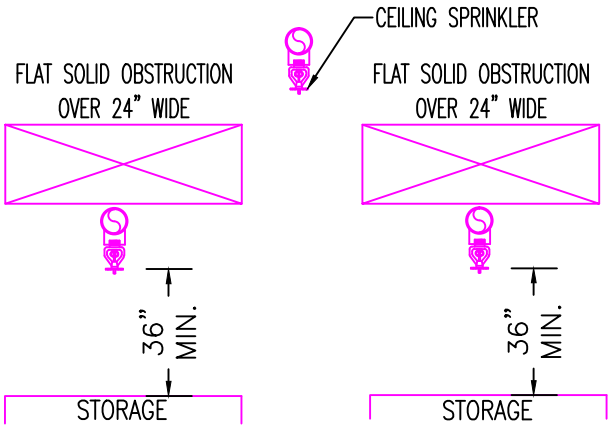
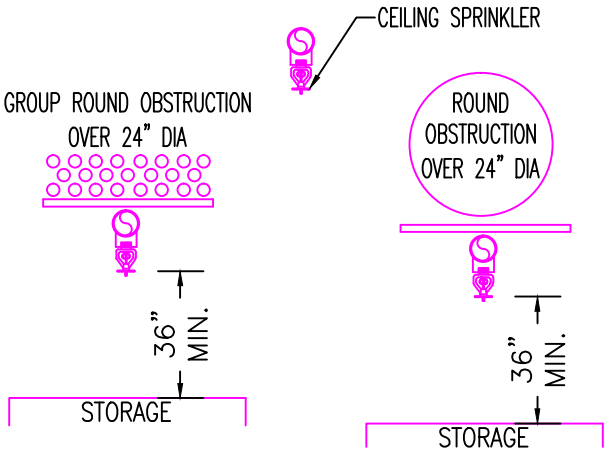
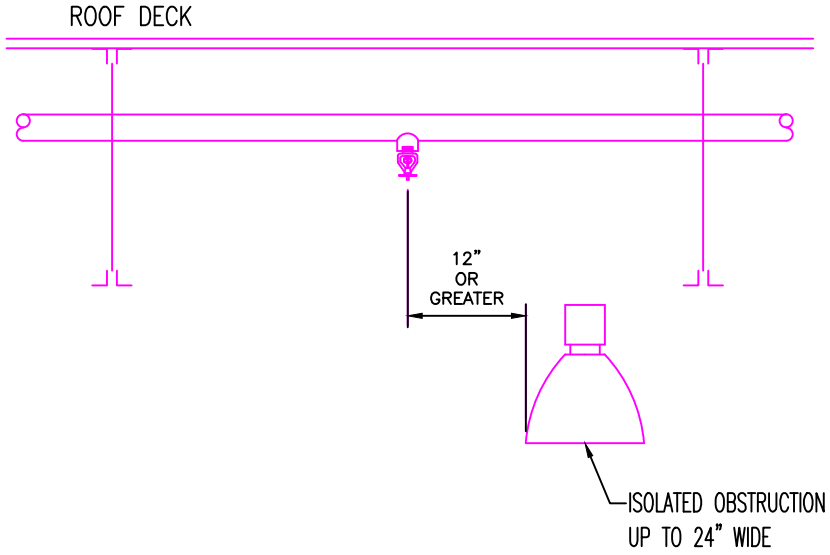


IF THE OBSTRUCTION IS CONTINUOUS, FLAT, HORIZONTAL AND SOLID, INSTALL A LINE OF SPRINKLERS WITH THE THERMAL SENDING ELEMENTS LOCATED A MAXIMUM OF 13.0 IN. BELOW THE OBSTRUCTION. USE THE SAME TYPE SPRINKLER USED AT THE CEILING, AND SPACE THEM A MAXIMUM OF 8.0 FT APART. MAINTAIN AT LEAST 36 IN. BETWEEN THE SPRINKLER DEFLECTOR AND THE TOP OF THE STORAGE.



IF THE OBSTRUCTION IS CONTINUOUS AND NOT FLAT (AS IN THE CASE OF A CIRCULAR DUCT) OR IS NOT SOLID (AS IN THE CASE OF GROUPED CONDUIT), INSTALL A FLAT BARRIER UNDER THE OBSTRUCTION AT LEAST AS WIDE AS THE OBSTRUCTION. INSTALL A LINE OF SPRINKLERS WITH THE THERMAL SENSING ELEMENTS LOCATED A MAXIMUM OF 13.0 IN. BELOW THE OBSTRUCTION. USE THE SAME TYPE SPRINKLER USED AT THE CEILING, AND SPACE THEM A MAXIMUM OF 8.0 FT APART. MAINTAIN AT LEAST 36 IN. BETWEEN THE SPRINKLER DEFLECTOR AND THE TOP OF THE STORAGE.

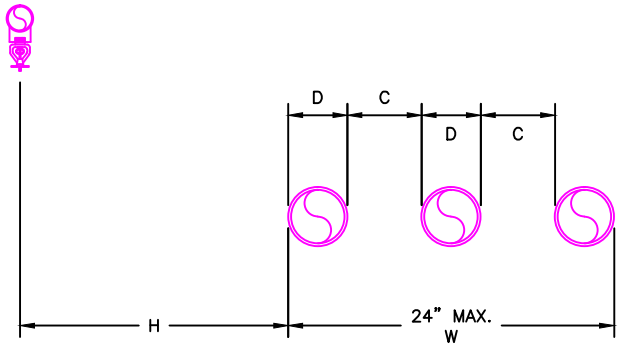
DETAIL 6: CONTINUOUS OBSTRUCTIONS GREATER THAN 2 FEET IN WIDTH (LARGE DUCTS, ETC.)



THE SPRINKLER MUST BE AT LEAST 12" HORIZONTALLY FROM THE EDGE OF THE OBSTRUCTION.
ISOLATED (NON-CONTINUOUS) OBSTRUCTIONS GREATER THAN 2 FEET WIDE (ROUND LIGHTS, ETC.).

DETAIL 7: ISOLATED (NON-CONTINUOUS) OBSTRUCTIONS UP TO 2 FEET WIDE (ROUND LIGHTS, ETC.)

INDIVIDUAL OR GROUP OBSTRUCTION:
IF C IS GREATER THAN 6 TIMES D, THEN TREAT EACH AS AN INDIVIDUAL CONTINUOUS OBSTRUCTION
IF C IS LESS THAN 6 TIMES D, THEN TREAT AS A GROUP OBSTRUCTION



GROUP OBSTRUCTION:
IF W IS EQUAL TO OR LESS THAN 12", THEN H WILL BE EQUAL TO OR LESS THAN 12"
IF W IS EQUAL TO OR LESS THAN 24", THEN H WILL BE EQUAL TO OR LESS THAN 24"
IF W IS GREATER THAN 24", SEE DETAIL 6

DETAIL 8: GROUP OBSTRUCTION

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FM GLOBAL ESFR SPRINKLER (PENDENT-TYPE) NOTES:

1. THE FOLLOWING NOTES ARE PROVIDED TO ENSURE THAT THE WORK ASSOCIATED WITH THE TENANT IMPROVEMENTS DO NOT HAVE AN IMPACT ON THE ROOF LEVEL ESFR SYSTEMS.
2. PRIOR TO THE START OF CONSTRUCTION, THE SPRINKLER CONTRACTOR SHALL CLOSELY COORDINATE WITH ALL OTHER TRADES – INCLUDING, BUT NOT LIMITED TO, STRUCTURAL STEEL, MECHANICAL, ELECTRICAL, PLUMBING, DATA PROCESSING, AND MATERIAL HANDLING – TO ENSURE THE WATER DISCHARGE FROM ESFR SPRINKLERS WILL NOT BE OBSTRUCTED FROM REACHING BURNING COMMODITIES AT HIGH VOLUME AND HIGH MOMENTUM.
3. THE STANDARD TO BE UTILIZED IN IDENTIFYING ESFR SPRINKLER PLACEMENT AND OBSTRUCTION ISSUES SHALL BE THE LATEST VERSION OF FM GLOBAL PROPERTY LOSS PREVENTION DATA SHEET 2-0.
4. THE FOLLOWING ARE THE MOST COMMON RULES FOUND IN THE STANDARD FOR HANDLING OBSTRUCTIONS LOCATED ENTIRELY BELOW THE SPRINKLERS. COMPLIANCE WITH THESE RULES IN NO WAY RELIEVES THE CONTRACTOR FROM FULL COMPLIANCE WITH THE STANDARD.

a. INDIVIDUAL OBSTRUCTIONS THAT ARE ¾ IN. WIDE OR LESS AND AT LEAST 4 IN. BELOW THE SPRINKLER DEFLECTOR MAY BE IGNORED. DEFINITION OF INDIVIDUAL: OBJECTS AND OBSTRUCTIONS ARE CONSIDERED "INDIVIDUAL" ONLY IF THEY ARE SEPARATED FROM THE NEAREST ADJACENT OBJECT OR OBSTRUCTION BY A DISTANCE OF AT LEAST 6 TIMES THEIR LEAST DIMENSION. FOR EXAMPLE, A GROUP OF SIX 1 IN. DIAMETER CONDUIT SPACED 1 IN. APART WOULD BE TREATED AS A GROUP AND WOULD CREATE AN OBSTRUCTION 11 IN. WIDE. IF THE SAME GROUP OF CONDUIT WERE SPACED 6 IN. APART, IT WOULD BE TREATED AS SIX 1 IN. WIDE OBJECTS. SEE DETAIL 8.

b. CONTINUOUS OBSTRUCTIONS NO WIDER THAN 2 IN. SHALL BE LOCATED AT LEAST 12 IN. HORIZONTALLY FROM THE CENTERLINE OF THE SPRINKLER OR AT LEAST 24 IN. VERTICALLY BELOW THE SPRINKLER DEFLECTOR. SEE DETAIL 2 AND 5.

c. CONTINUOUS OR ISOLATED OBSTRUCTIONS WIDER THAN 2 IN. AND NO WIDER THAN 12 IN. SHALL BE LOCATED AT LEAST 12 IN. HORIZONTALLY FROM THE CENTERLINE OF THE SPRINKLER. SEE DETAIL 3 AND 5.

d. CONTINUOUS OR ISOLATED OBSTRUCTIONS WIDER THAN 12 IN. AND NO WIDER THAN 24 IN. SHALL BE LOCATED AT LEAST 24 IN. HORIZONTALLY FROM THE CENTERLINE OF THE SPRINKLER. SEE DETAIL 4 AND 5.

e. OBSTRUCTIONS GREATER THAN 24 IN. WIDE THAT ARE CONTINUOUS, FLAT, HORIZONTAL AND SOLID WILL REQUIRE AN ADDITIONAL LINE OF SPRINKLERS WITH THE THERMAL SENSING ELEMENTS LOCATED A MAXIMUM OF 13 IN. BELOW THE OBSTRUCTION. USE THE SAME TYPE SPRINKLER USED AT THE CEILING, AND SPACE THEM A MAXIMUM OF 8 FT APART. MAINTAIN AT LEAST 36 IN. BETWEEN THE SPRINKLER DEFLECTOR AND THE TOP OF THE STORAGE. SEE DETAIL 6.

f. OBSTRUCTIONS LOCATED MORE THAN 36 IN. BELOW ESFR SPRINKLERS WILL NOT DISRUPT THE DISCHARGE PATTERN BUT CANNOT BE IGNORED BECAUSE THEY CAN OBSTRUCT WATER PENETRATION INTO FLUES IN STORAGE. OBSTRUCTIONS LOCATED DIRECTLY OVER FLUES MUST BE AT LEAST 36 IN. ABOVE THE FLUE.

5. VERTICAL DUCT WORK SUPPLYING UNIT HEATERS SHALL BE CENTERED BETWEEN ESFR SPRINKLERS.
6. THE CONTRACTOR SHALL SPACE ESFR SPRINKLERS WITH CONSIDERATION OF THE LOCATION OF ALL SKYLIGHTS SO THAT AN ESFR SPRINKLER IS NOT LOCATED DIRECTLY UNDERNEATH A SKYLIGHT. REFER TO ARCHITECTURAL DRAWINGS FOR THE LOCATIONS OF SKYLIGHTS. INDICATE COORDINATION ON THE SHOP DRAWINGS.
7. ESFR SPRINKLER LOCATIONS SHALL BE COORDINATED WITH THE LIGHTING FIXTURE LOCATIONS, IN ORDER TO AVOID POTENTIAL OBSTRUCTION ISSUES. INDICATE COORDINATION ON THE SHOP DRAWINGS.
8. COORDINATE THE LOCATION OF ALL HIGH VOLUME LOW SPEED (HVLS) CEILING FANS SUCH THAT THE FAN HUB IS INSTALLED CENTERED BETWEEN FOUR ESFR SPRINKLERS AND THAT THE TOP OF THE FAN BLADES (AIRFOILS) ARE A MINIMUM OF 36 IN. BELOW THE SPRINKLER DEFLECTOR. INDICATE COORDINATION ON THE SHOP DRAWINGS.
9. GENERAL GUIDELINES FOR PROVIDING PROTECTION BELOW CONVEYORS, CATWALKS, STAIR CROSS OVERS, AND OTHER SIMILAR OBSTRUCTIONS ARE AS FOLLOWS SUBJECT TO APPROVAL OF THE LOCAL AHJ:

a. SPRINKLERS SHOULD NOT BE REQUIRED BELOW ANY FLOOR SUPPORTED CONVEYORS REGARDLESS OF WIDTH.

b. SPRINKLERS SHOULD NOT BE REQUIRED BELOW "HUNG" CONVEYORS WIDER THAN 24 IN., UNLESS OVER HIGH-PILED STORAGE, THEN ESFR OBSTRUCTION RULES APPLY. SPRINKLER PROTECTION SHALL CONSIST OF ESFR SPRINKLERS (OF THE SAME TYPE AT THE CEILING).