INTERPRETATION OF REGULATIONS

(TITLE 24, PARTS 2-CBC 2007 SECTIONS 803.9.1.1, 1614A1.12 AND 2506.2.1)

METAL SUSPENSION SYSTEMS FOR LAY-IN PANEL CEILINGS - IR 25-5

PURPOSE: THE PURPOSE OF THIS IR IS TO PROVIDE GUIDELINES FOR THE INSTALLATION OF METAL SUSPENSION SYSTEMS FOR LAY-IN CEILINGS FOR PROJECTS APPROVED UNDER THE 2007 CBC. FOR PROJECTS SUBMITTED UNDER THE 2001 CBC, SEE IR 25-2.

1. GENERAL REQUIREMENTS:

THE FOLLOWING REQUIREMENTS APPLY TO CEILING SYSTEMS WHOSE TOTAL WEIGHT, INCLUDING CEILING MOUNTED AIR TERMINALS, SERVICES AND LIGHT FIXTURES, DOES NOT EXCEED FOUR (4) PSF. HEAVIER SYSTEMS, AND THOSE SUPPORTING LATERAL LOADS FROM PARTITIONS, WILL REQUIRE SPECIAL DESIGN DETAILS.

1.1 #12 GAGE WIRE SHALL BE 0.106 INCHES IN DIAMETER CONFORMING TO ASTM A641. #12 GAGE WIRE SHALL BE SOFT ANNEALED, GALVANIZED STEEL WIRE WITH A CLASS 1 COATING.

1.2 #12 GAGE HANGER WIRES MAY BE USED FOR UP TO AND INCLUDING 4 FT. BY 4 FT. GRID SPACING AND SHALL BE ATTACHED TO MAIN RUNNERS.

1.3 PROVIDE #12 GAGE HANGER WIRES AT THE ENDS OF ALL MAIN AND CROSS RUNNERS WITHIN EIGHT (8) INCHES OF THE SUPPORT OR WITHIN ONE-FOURTH (1/4) OF THE LENGTH OF THE END TEE, WHICHEVER IS LEAST, FOR THE PERIMETER OF THE CEILING AREA. PERIMETER WIRES ARE NOT REQUIRED WHEN THE LENGTH OF THE END TEE IS EIGHT (8) INCHES OR LESS.

1.4 PROVIDE TRAPEZE OR OTHER SUPPLEMENTARY SUPPORT MEMBERS AT OBSTRUCTIONS TO TYPICAL HANGER SPACING. PROVIDE ADDITIONAL HANGERS, STRUTS OR BRACES AS REQUIRED AT ALL CEILING BREAKS, SOFFITS, OR DISCONTINUOUS AREAS. HANGER WIRES THAT ARE MORE THAN 1 (HORIZONTAL) IN 6 (VERTICAL) OUT OF PLUMB ARE TO HAVE COUNTER-SLOPING WIRES.

1.5 CEILING GRID MEMBERS SHALL BE ATTACHED TO TWO (2) ADJACENT WALLS PER ASCE 7-05, SECTION 13.5.6.2(B). CEILING GRID MEMBERS SHALL BE AT LEAST 3/4 INCH CLEAR OF OTHER WALLS. IF WALLS RUN DIAGONALLY TO CEILING GRID SYSTEM RUNNERS, ONE END OF MAIN AND CROSS RUNNERS SHOULD BE FREE, AND A MINIMUM OF 3/4 INCH CLEAR OF WALL.

1.6 THE WIDTH OF THE PERIMETER SUPPORTING CLOSURE ANGLE SHALL BE NOT LESS THAN 2 INCHES.

1.7 AT THE PERIMETER OF THE CEILING AREA WHERE MAIN OR CROSS RUNNERS ARE NOT CONNECTED TO THE ADJACENT WALL, PROVIDE INTERCONNECTION BETWEEN THE RUNNERS AT THE FREE END TO PREVENT LATERAL SPREADING. A METAL STRUT OR A #16 GAGE WIRE WITH A POSITIVE MECHANICAL CONNECTION TO THE RUNNER MAY BE USED. WHERE THE PERPENDICULAR DISTANCE FROM THE WALL TO THE FIRSTPARALLEL RUNNER IS 12 INCHES OR LESS, THIS INTERLOCK IS NOT REQUIRED.

1.8 EXPANSION JOINTS SHALL BE PROVIDED IN THE CEILING AT INTERSECTIONS OF CORRIDORS AND AT JUNCTIONS OF CORRIDORS WITH LOBBIES OR OTHER SIMILAR AREAS. DSA IR 25-5 METAL SUSPENSION SYSTEMS (ISS 06-22-09) FOR LAY-IN PANEL CEILINGS PAGE 2 OF 13

1.9 PROVIDE LATERAL-FORCE BRACING ASSEMBLIES CONSISTING OF A COMPRESSION STRUT AND FOUR (4) #12 GAGE SPLAYED BRACING WIRES ORIENTED 90 DEGREES FROM EACH OTHER.

1.10 THE SPACING OF THE BRACING ASSEMBLIES MUST BE SHOWN ON THE CONSTRUCTION DOCUMENTS. PROVIDE BRACING ASSEMBLIES AT LOCATIONS NOT MORE THAN ONE HALF (1/2) THE CALCULATED SPACING IN EACH DIRECTION FROM EACH PERIMETER WALL AND AT THE EDGES OF ANY CHANGE IN ELEVATION OF THE CEILING.

SUBSTANTIATING CALCULATIONS OR TEST REPORTS FOR THE BRACING ASSEMBLIES ARE WAIVED IF THE FOLLOWING REQUIREMENTS ARE MET:

- BRACING ASSEMBLIES SPACED AT A MAXIMUM OF 12 FEET BY 12 FEET ON CENTERS FOR SCHOOL BUILDINGS AND 8 FEET BY 12 FEET ON CENTERS FOR ESSENTIAL SERVICES BUILDINGS, AND
- THE MAXIMUM SLENDERNESS RATIO (KL/R) OF THE COMPRESSION STRUT IS 200 OR LESS.

1.11 THE SLOPE OF BRACING WIRES SHALL NOT EXCEED 45 DEGREES FROM THE PLANE OF THE CEILING AND WIRES SHALL BE TAUT. SPLICES IN WIRES ARE NOT PERMITTED WITHOUT SPECIAL DSA APPROVAL.

1.12 COMPRESSION STRUTS SHALL NOT BE MORE THAN 1 (HORIZONTAL) IN 6 (VERTICAL) OUT OF PLUMB.

1.13 SUSPENDED ACOUSTICAL CEILING SYSTEMS WITH A CEILING AREA OF 144 SQUARE FEET OR LESS, AND FIRE RATED SUSPENDED ACOUSTICAL CEILING SYSTEMS WITH A CEILING AREA OF 96 SQUARE FEET OR LESS, SURROUNDED BY WALLS WHICH CONNECT DIRECTLY TO THE STRUCTURE ABOVE OR WALLS INDEPENDENTLY BRACED ABOVE CEILING TO STRUCTURE ABOVE, DO NOT REQUIRE BRACING ASSEMBLIES WHEN ATTACHED TO TWO ADJACENT WALLS.

1.14 FOR CEILING AREAS EXCEEDING 2500 SQUARE FEET A SEISMIC SEPARATION JOINT SHALL BE PROVIDED TO DIVIDE THE CEILING INTO AREAS NOT EXCEEDING 2500 SQUARE FEET. ALTERNATIVELY, STRUCTURAL ANALYSIS SHALL BE PERFORMED TO DEMONSTRATE COMPLIANCE WITH ASCE 7-05, SECTION 13.5.6.2.2(D).

1.15 PENETRATIONS THROUGH THE CEILING FOR SPRINKLER HEADS AND OTHER SIMILAR DEVICES THAT ARE NOT I NTEGRALLY TIED TO THE CEILING SYSTEM IN THE LATERAL DIRECTION SHALL HAVE A TWO (2) INCH OVERSIZED RING, SLEEVE OR ADAPTER THROUGH THE CEILING TILE TO ALLOW FREE MOVEMENT OF ONE (1) INCHIN ALL HORIZONTAL DIRECTIONS. ALTERNATIVELY, SWING JOINTS MAY BE PROVIDED PER ASCE 7-05, SECTION 13.5.6.2.2(E).

1.16 FASTEN #12 HANGER WIRES WITH NOT LESS THAN THREE (3) TIGHT TURNS. FASTEN #10 OR #12 BRACING WIRES WITH FOUR (4) TIGHT TURNS. MAKE ALL TIGHT TURNS WITHIN A DISTANCE OF 1-1/2 INCHES. HANGER OR BRACING WIRE ANCHORS TO THE STRUCTURE SHOULD BE INSTALLED IN SUCH A MANNER THAT THE DIRECTION OF THE ANCHOR ALIGNS AS CLOSELY AS POSSIBLE WITH THE DIRECTION OF THE WIRE.

NOTE: WIRE TURNS MADE BY MACHINE WHERE BOTH STRANDS HAVE BEEN DEFORMED OR BENT IN WRAPPING CAN WAIVE THE 1-1/2 INCH REQUIREMENT, BUT THE NUMBER OF TURNS SHOULD BE MAINTAINED, AND BE AS TIGHT AS POSSIBLE.

1.17 SEPARATE ALL CEILING HANGER AND BRACING WIRES AT LEAST SIX (6) INCHES FROM ALL UNBRACED DUCTS, PIPES, CONDUIT, ETC.

1.18 WHEN DRILLED-IN CONCRETE ANCHORS OR SHOT-IN ANCHORS ARE USED IN REINFORCED CONCRETE FOR HANGER WIRES, 1 OUT OF 10 WIRE/ANCHOR ASSEMBLIES MUST BE FIELD TESTED FOR 200 LBS. IN TENSION. WHEN DRILLED-IN CONCRETE ANCHORS ARE USED FOR BRACING WIRES, 1 OUT OF 2 WIRE/ANCHOR ASSEMBLIES MUST BE FIELD TESTED FOR 440 LBS. IN TENSION IN THE DIRECTION OF THE WIRE. SHOT-IN ANCHORS IN CONCRETE ARE NOT PERMITTED FOR BRACING WIRES.

NOTE: DRILLED-IN OR SHOT-IN ANCHORS REQUIRE SPECIAL DSA APPROVAL PRIOR TO USE IN PRESTRESSED CONCRETE. DSA IR 25-5 METAL SUSPENSION SYSTEMS (ISS 06-22-09) FOR LAY-IN PANEL CEILINGS PAGE 3 OF 13

1.19 ATTACH ALL LIGHT FIXTURES AND CEILING MOUNTED AIR TERMINALS, TO THE CEILING GRID RUNNERS TO RESIST A HORIZONTAL FORCE EQUAL TO THE WEIGHT OF THE FIXTURES. SCREWS OR APPROVED FASTENERS ARE REQUIRED.

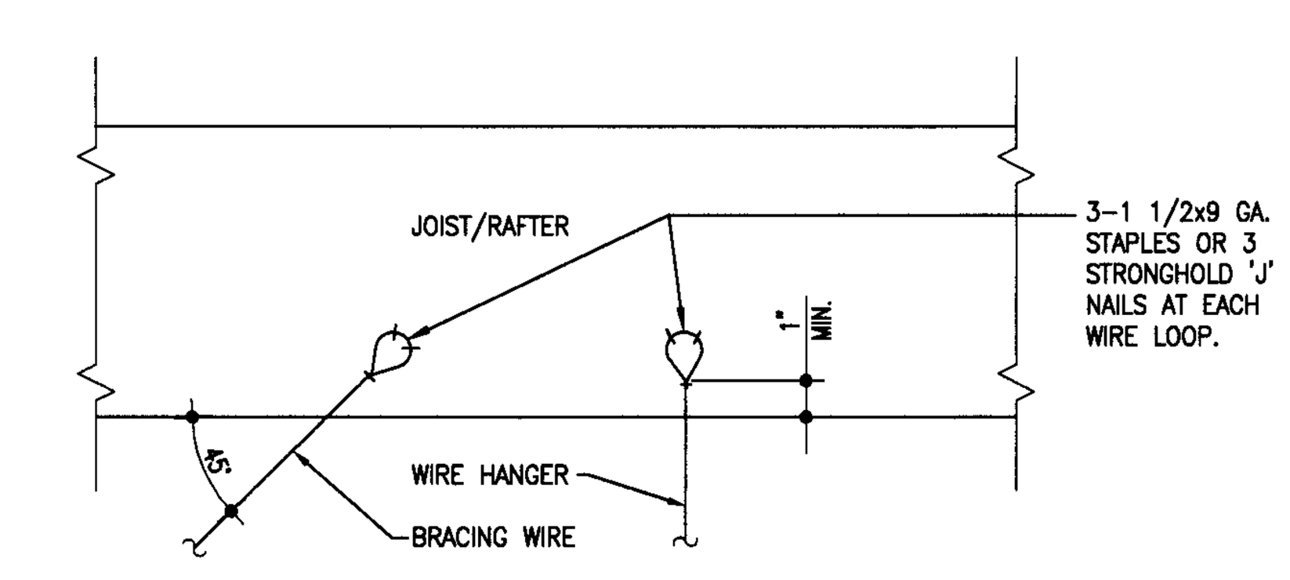
1.20 FLUSH OR RECESSED LIGHT FIXTURES, WEIGHING LESS THAN 56 LBS. AND MECHANICAL TERMINALS AND SERVICES, WEIGHING LESS THAN 20 LBS., MAY BE SUPPORTED DIRECTLY ON THE RUNNERS OF A HEAVY DUTY GRID SYSTEM BUT, I N ADDITION, THEY MUST HAVE A MINIMUM OF TWO (2) #12 GAGE SLACK SAFETY WIRES ATTACHED TO THE FIXTURE AT DIAGONAL CORNERS AND ANCHORED TO THE STRUCTURE ABOVE. ALL 4 FT. X 4 FT. LIGHT FIXTURES MUST HAVE SLACK SAFETY WIRES AT EACH CORNER.
ALL FLUSH OR RECESSED LIGHT FIXTURES WEIGHING 56 LBS. OR MORE AND MECHANICAL TERMINALS AND SERVICES, WEIGHING 20 LBS. OR MORE, MUST BE INDEPENDENTLY SUPPORTED BY NOT LESS THAN FOUR (4) TAUT #12 GAGE WIRES, EACH ATTACHED TO THE FIXTURE AND TO THE STRUCTURE ABOVE. THE FOUR (4) TAUT #12 GAGE WIRES, INCLUDING THEIR ATTACHMENT TO THE STRUCTURE ABOVE, MUST BE CAPABLE OF SUPPORTING FOUR (4) TIMES THE WEIGHT OF THE UNIT.

1.21 SUPPORT SURFACE MOUNTED LIGHT FIXTURES BY AT LEAST TWO POSITIVE DEVICES WHICH SURROUND THE CEILING RUNNER AND WHICH ARE EACH SUPPORTED FROM THE STRUCTURE ABOVE BY A #12 GAGE WIRE. SPRING CLIPS OR CLAMPS THAT CONNECT ONLY TO THE RUNNER ARE NOT ACCEPTABLE. PROVIDE ADDITIONAL SUPPORTS WHEN LIGHT FIXTURES ARE 8 FT. OR LONGER. MAXIMUM SPACING BETWEEN SUPPORTS SHALL NOT EXCEED 8 FEET.

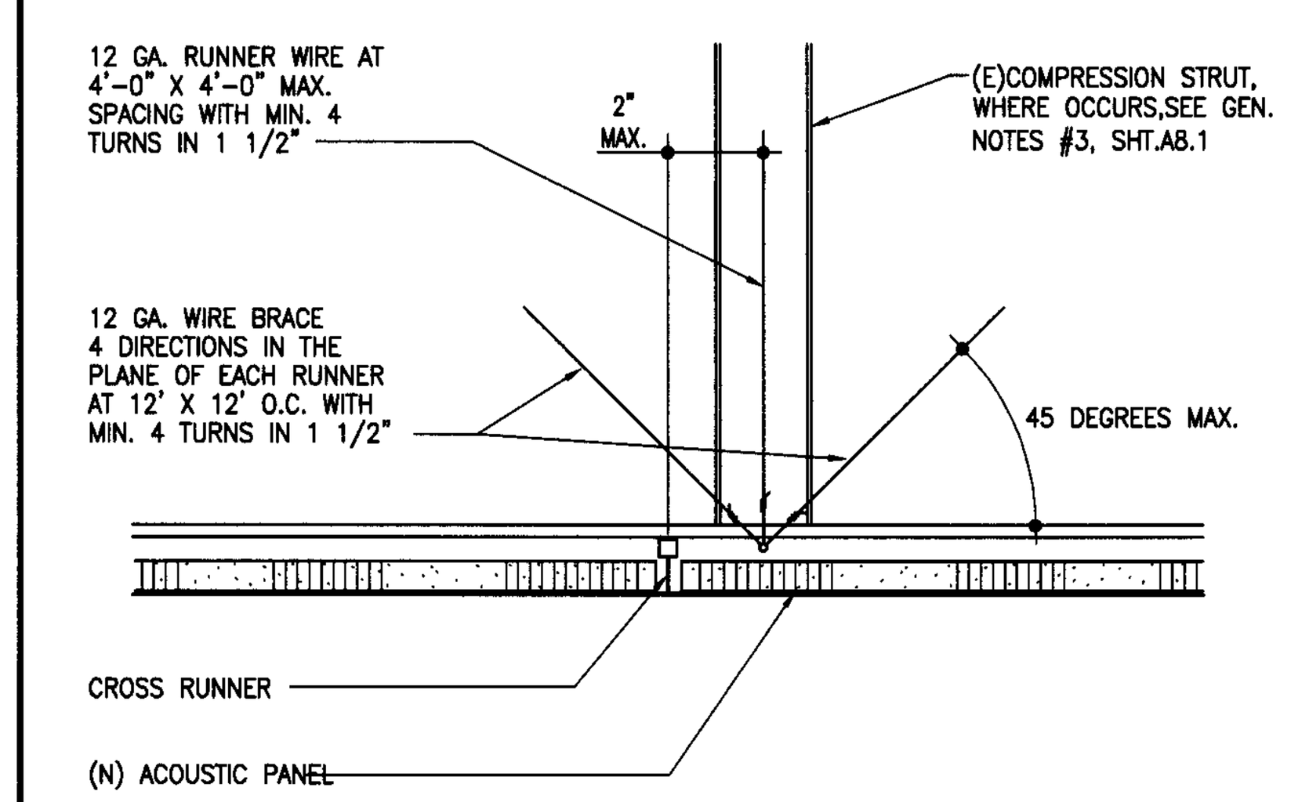
1.22 SUPPORT PENDANT MOUNTED LIGHT FIXTURES DIRECTLY FROM THE STRUCTURE ABOVE WITH HANGER WIRES OR CABLES PASSING THROUGH EACH PENDANT HANGER AND CAPABLE OF SUPPORTING TWO (2) TIMES THE WEIGHT OF THE FIXTURE. A BRACING ASSEMBLY, PER FIGURE 1, IS REQUIRED WHERE THE PENDANT HANGER PENETRATES THE CEILING. SPECIAL DETAILS ARE REQUIRED TO ATTACH THE PENDANT HANGER TO THE BRACING ASSEMBLY TO TRANSMIT HORIZONTAL FORCE. IF THE PENDANT MOUNTED LIGHT FIXTURE IS DIRECTLY AND INDEPENDENTLY BRACED BELOW THE CEILING, I.E. AIRCRAFT CABLES TO WALLS, THEN BRACE ASSEMBLY IS NOT REQUIRED ABOVE THE CEILING. SEE IR 16-9 FOR ADDITIONAL REQUIREMENT FOR PENDENT MOUNTED FIXTURES.

1.23 THE CEILING GRID SYSTEM MUST BE RATED AS HEAVY DUTY AS DEFINED BY ASTM C635. A LIST OF ACCEPTABLE GRID SYSTEMS MUST BE SHOWN ON THE DRAWINGS. THE GRID SYSTEMS SPECIFIED MUST BE ACCEPTABLE IN ACCORDANCE WITH IR A-5. THE FOLLOWING INFORMATION MUST BE INCLUDED ON THE DRAWINGS FOR EACH ACCEPTABLE GRID SYSTEM SPECIFIED:
CLASSIFICATION OF CEILING GRID IS HEAVY DUTY.
MANUFACTURER'S CATALOG NUMBER - MAIN RUNNER ARMSTRONG HEAVY DUTY 7501HRC
MANUFACTURER'S CATALOG NUMBER - CROSS RUNNER ARMSTONG HEAVY DUTY XL7541HRC
MANUFACTURER'S CATALOG NUMBER OF DETAIL FOR RUNNER SPLICE ARMSTONG HEAVY DUTY 7804HRC

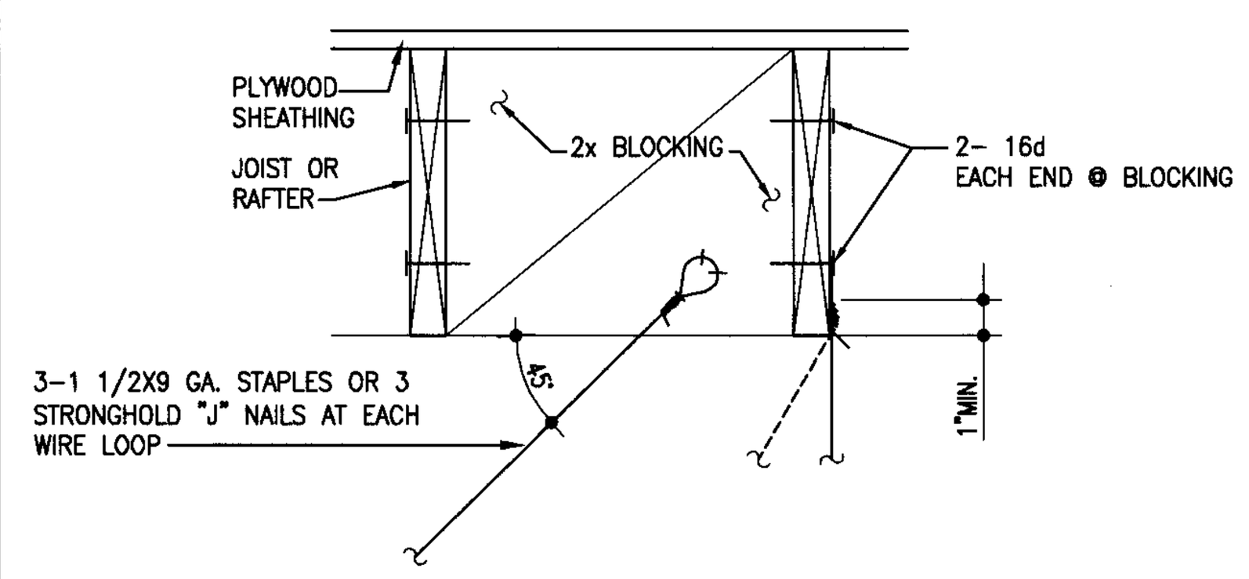
SUSPENSION SYST. FOR LAY-IN CLG. NOTES — 17 / A9.02
SCALE : N.T.S.



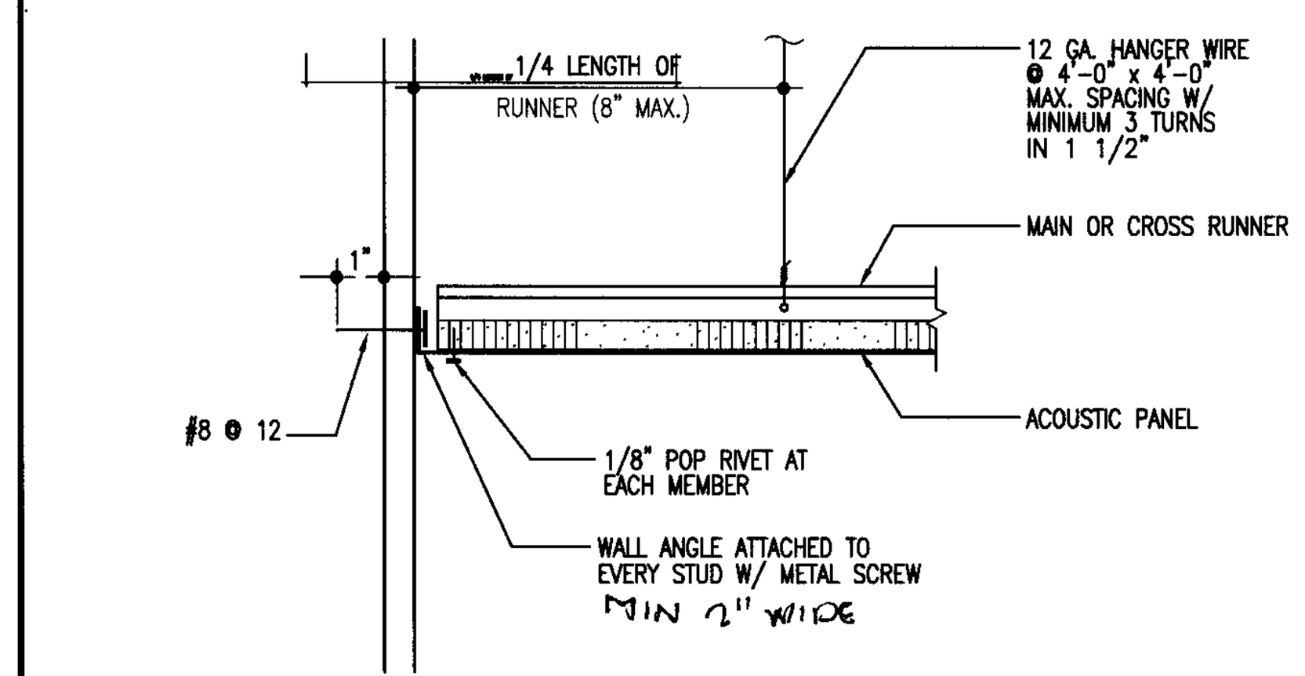
WIRE CONNECTION TO RAFTERS — 5 / A9.02
SCALE : 3"=1'-0"



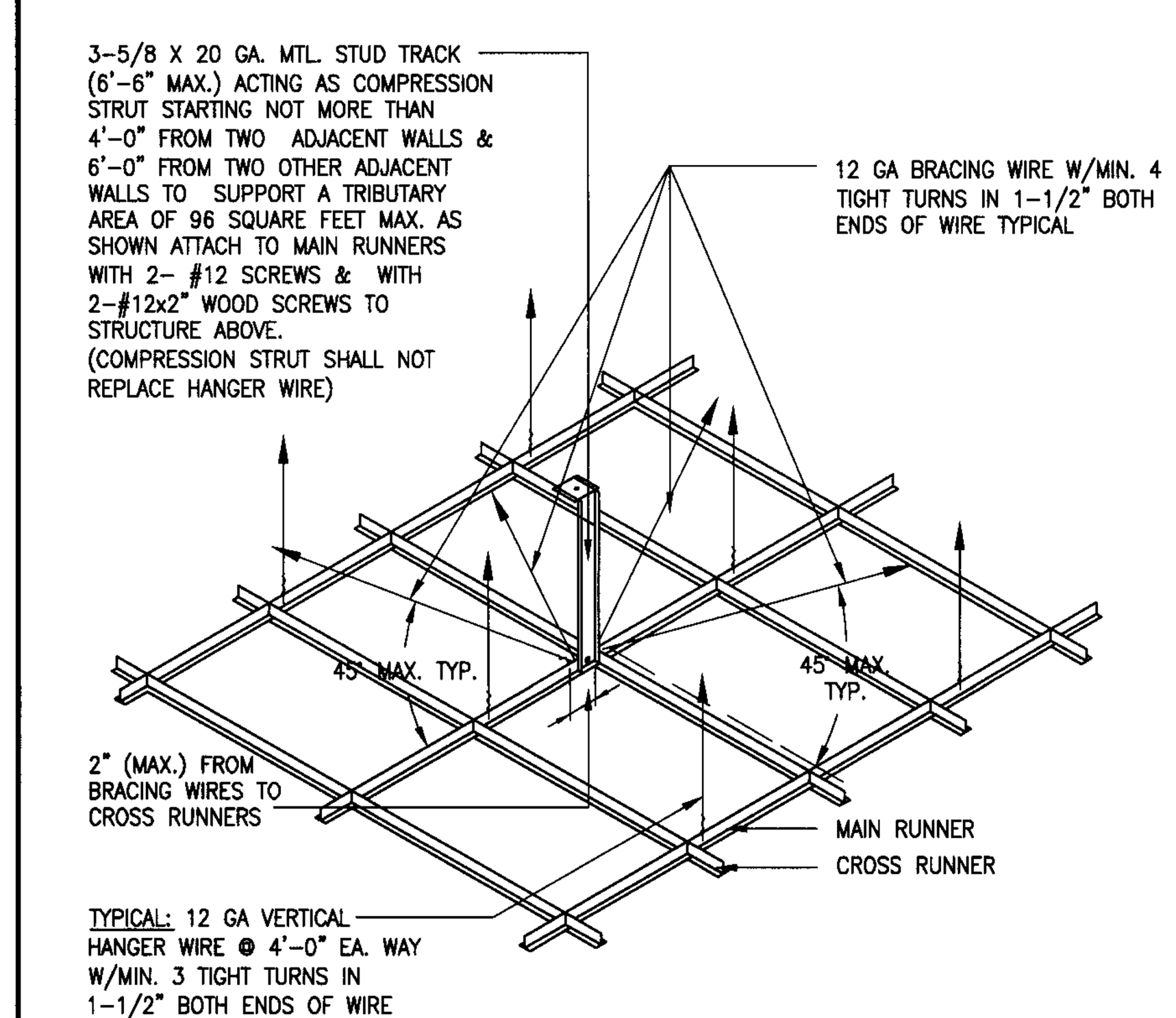
SUSPENDED ACOUSTICAL CEILING PANEL — 4 / A9.02
SCALE : 3"=1'-0"



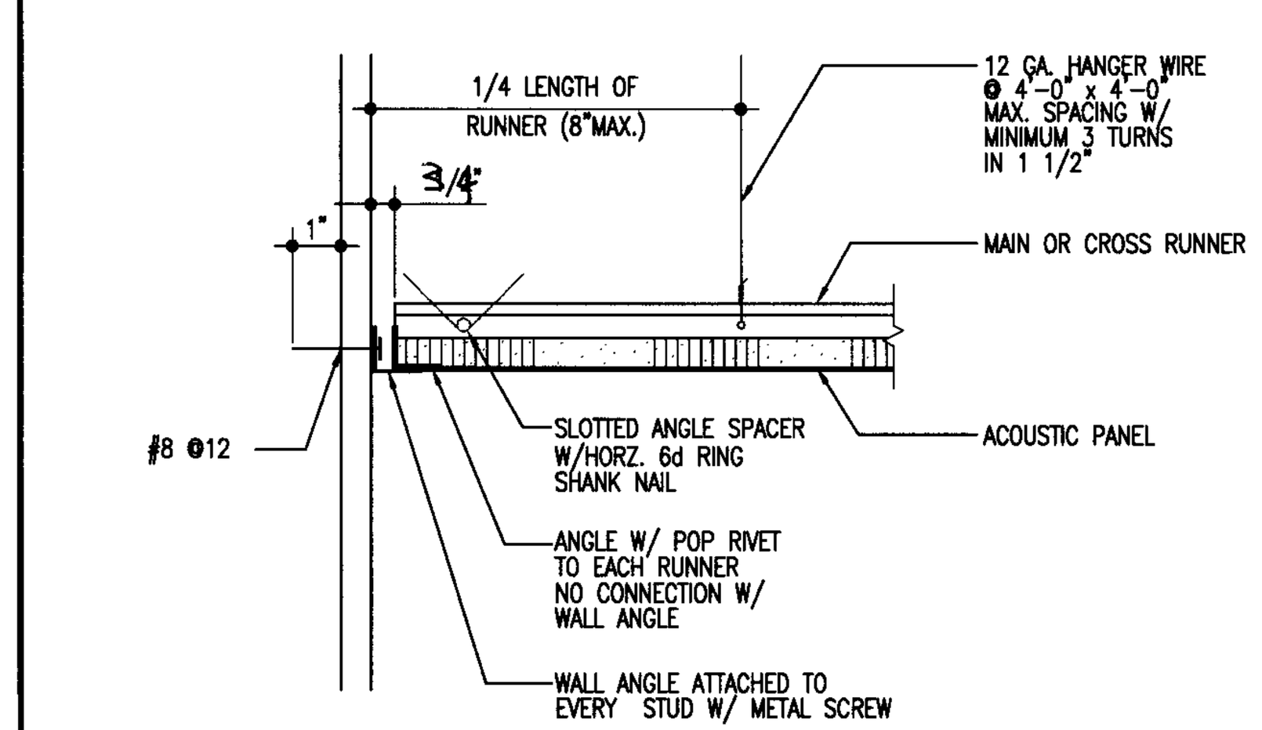
BRACING WIRE CONNECTIOIN TO JOIST — 6 / A9.02
SCALE : 1 1/2"=1'-0"



ACOUSTICAL CEILING @ FIXED SIDE — 3 / A9.02
SCALE : 3"=1'-0"



COMPRESSION STRUT — 7 / A9.02
SCALE : NO SCALE



ACOUSTICAL CEILING @ FLOAT SIDE — 2 / A9.02
SCALE : 3"=1'-0"

FLEWELLING&MOODY
architects education

HEADQUARTERS OFFICE:
141 South Lake Avenue, 2nd Floor
Pasadena, California 91101
626.449.6787 FAX 626.449.8477
E-Mail: fm-pasadena@flewelling-moody.com

ANTELOPE VALLEY OFFICE:
1035 West Lancaster Boulevard
Lancaster, California 93534
661.949.0771 FAX 661.949.2843
E-Mail: fm-lancaster@flewelling-moody.com

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MODERNIZATION PROJECT AT EVERGREEN ELEMENTARY SCHOOL
2600 ROSE MARIE DRIVE
BAKERSFIELD, CA 93304

BAKERSFIELD CITY SCHOOL DISTRICT

CEILING DETAILS AND NOTES

Job No. 1894

Date 1-26-2010

A9.02