# **PART 1 - GENERAL**

* 1. **SUMMARY**
		1. Metal suspension systems for acoustic tile ceilings.
		2. Related Work:
			1. Requirements in Addenda, Alternates, Conditions, and Division 1 collectively apply to this work.
			2. Gypsum Board: Section 09 29 00.
			3. Acoustical Ceiling Tile: Section 09 80 00.

# **SUBSTITUTIONS**

 Only written approval of the Architect, by addenda or change order, will permit substitutions for materials specified. Refer to Section 01 25 13 for procedure.

# **QUALITY ASSURANCE**

* + 1. Design Criteria: Suspension system to limit deflection of finished ceiling to 1/360 of span or less.
		2. Allowable Tolerance: 1/8" maximum permissible variation from true plane measured from 10' straight edge placed on finished ceiling surface.
		3. Requirements Of Regulatory Agencies:
			1. Part 2, Title 24, CBC, current Edition.
			2. DSA Interpretation of Regulations, Manual: IR 25-1, IR 25-2, IR 25-3, latest publication.

3. ASCE 7-10, Section 13.5.6.

* + 1. Reference Standards:
			1. Lathing and Plastering Reference Specifications by California Lathing and Plastering Association, Inc. (CLPCA).
			2. State of California Listing No. 1060-049: State Fire Marshall approval for specific ceiling systems.
			3. ICC Report No. ESR-2631: Suspended Ceilings.
			4. American Society for Testing Materials (ASTM)
				1. E84-13a - Surface Burning Characteristics of Building Materials:

Flame Spread Index; 25 or less: Class A flame rating.

Smoke Developed Index: 0.

* + - * 1. C635/C635M-13 - Standard specification for the manufacturer, performance, and testing metal suspension systems for acoustical tile and lay-in panel ceilings.
				2. C636/C636M-13 - Standard practice for installation of metal ceiling suspension systems for acoustical tile and lay-in panels.
				3. C645-13 - Standard specifications for non-load (AXAIL) bearing steel studs, tees (TRACK) and furring channels for screw application of gypsum board.
				4. C841-03(current) - Standard specifications for installation of interior lathing and furring.
				5. E119-12a - Standard methods of fire tests of building construction and materials.
			1. Underwriter's Laboratories (UL) Fire Resistance Directory (latest edition).

# **SUBMITTALS**

* + 1. Product data sheets: listing dimensions, loading capacity and Standard compliance.
		2. Samples: 12" long samples of main tee and furring cross tee with couplings.

# **PROJECT CONDITIONS**

* + 1. Environmental Requirements:
			1. Verify weather tightness of area to receive suspension system prior to installation.
			2. Wet trade work to be thoroughly dry and complete prior to installation.
			3. Installation to begin only when temperatures and humidity conditions closely approximate interior conditions, which will exist when area is, complete and occupied.
			4. Heating and air-conditioning systems to be operating prior to, during, and after installation.

# **MAINTENANCE**

Furnish additional material equal to 3% of ceiling area.

# **WARRANTY**

General: One (1) year warranty for work of this Section.

# **PART 2 -** **PRODUCTS**

* 1. **MATERIALS**
		1. Wire: Galvanized, soft annealed steel wire; Federal Specifications QQ-W-461, Class 1; U.S. wire gauges.
			1. Tie Wire: 12 gauge minimum, 0.16 inches in diameter conforming to ASTM 641-09.
			2. Hanger Wire (For Suspended Drywall Ceilings): 8 gauge wire for maximum supported area of 12 SF.
			3. Hanger wire (For Suspended Acoustical Tile Lay-In System): 12 gauge minimum for up to and including 4' x 4' grid spacing and attached to main runners.
			4. Diagonal brace wire: 12 gauge minimum.
	2. **CEILING SYSTEM GENERAL NOTES:**
		+ 1. Ceiling system components shall comply with ASTM C635-07 and Section 5.1 of ASTM E580-10a.
			2. The ceiling grid system must be rated heavy duty as defined by ASTM C635-08.
			3. Ceiling Systems. The following ceiling system(s) is/are a part of the Scope of this Project:

 Manufacturer's Name: Chicago Metallic

 Product Evaluation Report Type and Number: ESR-2631

 Manufacturer's Model Number – Main Runner: 200

 Manufacturer's Catalog Number – Cross Runner: 1214.

* + - 1. Seismic Wall Clip: Manufacturer's Model: 1496
			2. Ceiling panels shall not support any light fixtures, air terminals or devices.
			3. For ceiling installations utilizing acoustical tile panels of mineral or glass fiber, it is not mandatory to provide ¾" clearance between the acoustical tile panels and the wall on the sides of the ceiling which are free to slip. For all other ceiling panel types, provide ¾" clearance between the ceiling panel and the wall on the sides of the ceiling free to slip.
	1. **MATERIALS**:
		1. Ceiling wire shall be Class 1 zinc coated (galvanized carbon steel conforming to ASTM A641-09a. Wire shall be #12 gauge (0.106" diameter) with soft temper and minimum tensile strength = 70 ksi.
		2. Galvanized sheet steel (including that used for metal stud and track compression struts/post) shall conform to ASTM A653-11, or other equivalent sheet steel listed in Section A2.1 of the North American Specification for the Design of Cold-Formed Steel Structural Members 2007, including supplement 2, dated 2010 (AISI S100-07/S2-10) Material 43 mil (18 gauge) and lighter shall have minimum yield strength of 33 ksi. Material 54 mil (16 gauge) and heavier shall have a minimum yield strength of 50 ksi.
		3. Electrical metallic tube (EMT) shall be ANSI C80.3/UL 797 carbon steel with G90 galvanizing. EMT shall have minimum yield strength (Fy) of 30 ksi and minimum ultimate strength (Fu) of 48 ksi.
	2. **OTHER ACCEPTABLE MANUFACTURERS:**
		1. Armstrong Industries Inc., Prelude Series AL7200 per DSA approval number PA-041.
	3. **USG INTERIOR DONN SUSPENDED CEILING SYSTEM PER DSA APPROVAL NUMBER PA-030.**
		1. Fasteners: As recommended by manufacturer.
		2. Miscellaneous Moldings and Hardware:
		3. Outside Miter Moldings: No. 1452, by Chicago Metallic.
		4. Hold-Down Clips: No. 935, by Chicago Metallic.

# **PART 3 - EXECUTION**

* 1. **GENERAL**
		1. Examine area receiving suspension system and identify conditions, which will adversely affect installation. Do not begin installation until adverse conditions have been remedied.
		2. Shop fabricate all radiused or curved members.
		3. Provide additional hanger wires where imposed loads cause deflection exceeding 1/360 span. Connect hanger wire with three tight turns, wrapped tightly, to structure and components.
		4. Gypboard ceiling should not support building components other than air conditioning/heating grilles or light fixtures. All such components shall be supported either directly from main runners, or by supplemental framing which is supported by main runners. No vertical loads other than gypsum board dead load shall be applied to cross-furring.
		5. Provide additional hangers and framing members as required to adequately support large openings, vertical soffit faces, and other concentrated loads.
		6. Suspension systems shall be accurately placed, rigid, and true to plane.

# **INSTALLATION - ACOUSTICAL TILE SUSPENSION SYSTEM**

* + 1. Main runners shall be spaced at 4'-0" on center and cross members spaced at 2'-0" on center. Splices and intersections of tees shall be made by an interlocking device, which draws the member tightly together and prevents torsional deflection and maintains a flush joint. Intersections shall be capable of withstanding at least 180 pounds tension or compression.
		2. 12 gauge (minimum) hanger wires may be used for up to and including 4'- 0" x 4'-0" grid spacing along main runners. Splices will not be permitted in hanger wires.
		3. Provide 12 gauge hanger wires at ends of main and cross runners within 8" from support or within 1/4 of the length to the end tee, whichever is least, for the perimeter of the ceiling area. End connections for runners, which are designed and detailed to resist the applied horizontal forces, may be used in lieu of the 12 gauge hanger wires subject to DSA/SSS review and approval.
		4. Provide trapeze or other supplementary support members at obstructions to main hanger spacing. Provide additional hangers struts or braces as required at ceiling breaks, soffits or discontinuous areas. Hanger wires that are more than 1 in 6 out of plumb are to have counter-sloping wires. Provide outside miter molding and hold-down clips at vertical applications. Perimater wires are not required when the length of the end tee is less than 8".
		5. Ceiling grid members may be attached to not more than two adjacent walls. Ceiling grid members should be at least 1/2" free 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" clear of wall.
		6. 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 angle with a positive mechanical connection to the runner shall be used. Where the perpendicular distance from the wall to the first parallel runner is 12" or less of the length of the end runner, (whichever is least,) this interlock is not required.
		7. Provide sets of four 12 gauge splayed bracing wires oriented 90° from each other at the following spacing:
			1. For school buildings, place sets of bracing wires at a spacing not more than 12' by 12' on center.
			2. Provide bracing wires at locations not more than 1/2 the spacings given above from each perimeter wall and at the edge of vertical ceiling offsets for both school and hospital buildings.
			3. The slope of these wires should not exceed 45° from the plane of the ceiling and should be taut without causing the ceiling to lift. Splices in bracing wires are not to be permitted without special DSA/SSS approval.
		8. Fasten hanger wires with not less than three tight turns. Fasten bracing wires with four tight turns. Make tight turns within a distance of 1-1/2". Hanger or bracing wire anchors to the structure should be installed in such a manner that the direction of the wire aligns as closely as possible with the direction of the forces acting on the wire.
		9. Separate ceiling hanging and bracing wires at least 6" from unbraced ducts, pipes, and conduit. It is acceptable to attach lightweight items, such as single electrical conduit not exceeding 3/4" nominal diameter, to hanger wires using connectors acceptable to DSA/SSS.
		10. When drilled-in concrete anchors, or shot-in anchors are used in reinforced concrete for hanger wires, 1 out of 10 must be field tested for 200 pounds of tension. When drilled-in concrete anchors are used for bracing wires, 1 out of two must be field tested for 440 pounds of tension. Shot-in anchors in concrete are not permitted for bracing wires.
		11. Attach each light fixture to the ceiling grid runners to resist a horizontal force equal to the weight of the fixture.
		12. Flush or recessed light fixtures and air terminals or services weighing less than 56 pounds may be supported directly on the runners of a heavy duty grid system, but in addition, they must have a minimum of two 12 gauge slacksafety wires attached to the fixture at diagonal corners and anchored to the structure above. 4' x 4' light fixtures must have slack safety wires at each corner.
		13. Flush or recessed light fixtures and air terminals or services weighing 56 pounds or more must be independently supported by not less than four taut 12 gauge wires each attached to the fixture and to the structure above regardless of the type of ceiling grid system used. The four taut 12 gauge wires including their attachment to the structure above must be capable of supporting four times the weight of the unit.
		14. 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 gauge wire. Spring clips or clamps that connect only to the runner are not acceptable. Provide additional supports when light fixtures are 8' or longer.
		15. Support pendant-mounted light fixtures directly from the structure above with hanger wires or cables passing through each pendant hanger and capable of supporting 4 times the weight of the fixture. Special details shown on Drawings are necessary for this condition at the ceiling grid.
		16. Refer to Drawing for additional suspension system requirements and specifications.

# **COMPRESSION STRUTS**

* + 1. Install compression struts at all ceiling suspensions systems and secure system with tie wires as shown on Drawings. Compression struts shall not be more than 1" (horizontal or vertical) out of plumb.
		2. Provide hanger wires, splayed at 45°, within 3" of intersection between main runner and cross runner.
		3. Compression strut and splayed hanger wires, unless otherwise indicated on Drawings, shall be provided as follows:
			1. Locate within 6' of wall.
			2. Locate at maximum of 12' on center.

# **ADJUSTING**

* + 1. Check for level, adjust, complete connections.
		2. Remove all damaged components and replace with new undamaged components.

END OF SECTION