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Oakhurst Dairy – New Milk Cooler**SECTION 05210 - STEEL JOISTS****PART 1 – GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Open-web K-series steel joists.
  - 2. LH-series long-span steel joists.
  - 3. Joist accessories.

**1.3 DEFINITIONS**

- A. Special Joists: Joists requiring modification by the manufacturer to support nonuniform, unequal, or special loading conditions that invalidate SJI's "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders."

**1.4 PERFORMANCE REQUIREMENTS**

- A. Structural Performance: Provide special joists and connections capable of withstanding design loads within limits and under conditions indicated.
  - 1. Design Loads: As indicated in the Structural Notes and Special Joist Diagrams on the Drawings.
  - 2. Design joists to withstand design loads with live load deflections no greater than the following:
    - a) Floor Joists: Vertical deflection of 1/360 of the span.
    - b) Roof Joists: Vertical deflection of 1/360 of the span.
- B. Engineering Responsibility: Engage a joist manufacturer who utilizes a qualified professional engineer to prepare design calculations, shop drawings, and other structural data for steel joists.

**1.5 SUBMITTALS**

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data: For each type of joist, accessory, and product indicated.
- C. Shop Drawings: Show layout, mark, number, type, location, and spacings of joists. Include joining and anchorage details, bracing, bridging, accessories; splice and connection locations and details; and attachments to other construction.
  - 1. Indicate locations and details of anchorage devices and bearing plates to be embedded in other construction.

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2. For special joists, a comprehensive engineering analysis signed and sealed by the qualified professional engineer responsible for its preparation.
- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

**1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: A firm experienced in manufacturing joists similar to those indicated for this Project and with a record of successful in-service performance.
1. Manufacturer must be certified by SJI to manufacture joists complying with SJI standard specifications and load tables.
  2. Assumes responsibility for engineering special joists to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
  3. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of joists that are similar to those indicated for this Project in material, design, and extent.
- B. SJI Specifications: Comply with SJI's "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders" (hereafter, "Specifications"), applicable to types of joists indicated.
- C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel"; and AWS D1.3 "Structural Welding Code--Sheet Steel."

**1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications."
- B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

**1.8 SEQUENCING**

- A. Deliver steel bearing plates and other devices to be built into concrete and masonry construction.

**PART 2 - PRODUCTS****2.1 MATERIALS**

- A. Steel: Comply with SJI's "Specifications" for chord and web members.
- B. High-Strength Bolts and Nuts: ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.
1. Finish: Plain, uncoated.
- C. Welding Electrodes: Comply with AWS standards.

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- A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15. **Verify compatibility of primer with finish coat, where finish coat is specified.**

**2.3 K-SERIES STEEL JOISTS**

- A. Manufacture steel joists according to "Standard Specifications for Open Web Steel Joists, K-Series," in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord; of joist type indicated.
1. Joist Type: K-series steel joists.
- B. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- C. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."
- D. Camber joists according to SJI's "Specifications" unless otherwise indicated.
- E. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

**2.4 LONG-SPAN STEEL JOISTS**

- A. Manufacture steel joists according to "Standard Specifications for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series," in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as follows:
1. Joist Type: LH-series steel joists.
  2. End Arrangement: Underslung.
  3. Top-Chord Arrangement: Parallel.
- B. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- C. Camber long-span steel joists according to SJI's "Specifications" unless otherwise indicated.
- D. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

**2.5 JOIST ACCESSORIES**

- A. Bridging: Provide bridging anchors and number of rows of bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span.
- B. Bridging: **All bridging shall be diagonal, even if it is not required by SJI.**
1. Furnish additional erection bridging if required.
- C. Provide bottom chord extensions for joists and girders as indicated in the Drawings.

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- D. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

**2.6 CLEANING AND SHOP PAINTING**

- A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories to be primed by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.
- B. Apply one shop coat of primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.
- C. Painting of joists and joist accessories, if required, is specified in Division 9 Section "Painting."

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine supporting substrates, embedded bearing plates, and abutting structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 INSTALLATION**

- A. Do not install joists until supporting construction is in place and secured.
- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJL's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.
  - 1. Before installation, splice joists delivered to Project site in more than one piece.
  - 2. Space, adjust, and align joists accurately in location before permanently fastening.
  - 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
  - 4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads have been applied.
- C. Field weld joists to supporting steel framing or bearing plates. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Bolt joists to supporting steel framework using high-strength structural bolts, unless otherwise indicated. Comply with RCSC's "Allowable Stress Design Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
- E. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

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- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Field welds will be visually inspected according to AWS D1.1.
- C. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following procedures, as applicable:
  - 1. Radiographic Testing: ASTM E 94 and ASTM E 142.
  - 2. Magnetic Particle Inspection: ASTM E 709.
  - 3. Ultrasonic Testing: ASTM E 164.
  - 4. Liquid Penetrant Inspection: ASTM E 165.
- D. Bolted connections will be visually inspected.
  - 1. High-strength, field-bolted connections will be tested and verified according to procedures in RCSC's "Allowable Stress Design Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts."
- E. Correct deficiencies in Work that inspections and test reports have indicated are not in compliance with specified requirements.
- F. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

**3.4 REPAIRS AND PROTECTION**

- A. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories, bearing plates and abutting structural steel.
  - 1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
  - 2. Apply a compatible primer of the same type as the shop primer used on adjacent surfaces.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure joists and accessories are without damage or deterioration at time of Substantial Completion.

END OF SECTION 05210