SECTION 05400
COLD-FORMED METAL FRAMING

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PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cold-Formed Metal Framing of the following types:
   1. Load-bearing wall framing.
   2. Exterior non-load-bearing wall framing.
   3. Floor joist framing.
   4. Roof trusses.
   5. Roof rafter framing.
   6. Ceiling joist framing.

B. Accessories.

1.2 RELATED SECTIONS

A. Section 09100 - Metal Support Assemblies.

B. Section 09110 - Non-Load Bearing Steel Framing.

1.3 REFERENCES

A. American Iron and Steel Institute (AISI):
   1. COSP - Specification for the Design of Cold-Formed Steel Structural Members, Code of Standard Practice.
   2. AISI S100 - North American Specifications for the Design of Cold Formed Steel Structural Members.
   3. AISI S200 - North American Standard for Cold-Formed Steel Framing - General Provisions.
   4. AISI S201 - North American Standard for Cold-Formed Steel Framing - Product Data.
   5. AISI S211 - North American Standard for Cold-Formed Steel Framing - Wall Stud Design.
   6. AISI S212 - North American Standard for Cold-Formed Steel Framing - Header Design.
   7. AISI S213 - North American Standard for Cold-Formed Steel Framing - Lateral Design.

B. ASTM International (ASTM):
   1. ASTM A36 - Standard Specification for Carbon Structural Steel.

2. ASTM A123 - Standard Specification for Zinc, Hot Dipped Galvanized, Coatings on Iron and Steel Products.
3. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated, Galvanized, or Zinc-Iron Alloy-Coated, Galvannealed, by the Hot-Dip Process
4. ASTM A1003 - Standard Specification for Steel Sheet, Carbon, Metallic and Nonmetallic-Coated for Cold-Formed Framing Members.
5. ASTM C150 - Standard Specifications for Portland Cement.
6. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
7. ASTM C1007 - Standard Specification for Installation of Load Bearing, Transverse and Axial, Steel Studs and Related Accessories
8. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic Cement Grout, Non-shrink.
9. ASTM C1513 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
10. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
11. ASTM E488 - Standard Test Methods for Strength of Anchors in Concrete Elements.
12. ASTM E1190 - Standard Test Methods for Strength of Power Actuated Fasteners Installed in Structural Members.

C. American Welding Society (AWS):
1. AWS D.1.3 - Structural Welding Code - Sheet Steel.

D. Gypsum Association (GA):
1. GA-600 - Fire Resistance Design Manual.

E. Military Specifications (DOD):
1. DOD-P-21035 - Specification Galvanizing Repair Coating.

F. The Society for Protective Coatings (SSPC):
1. SSPC-Paint 20 - Zinc Rich Primers - Type I Inorganic And Type II Organic.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data:
1. Manufacturer's product data, including manufacturer's technical data sheet.
2. Catalog pages illustrating products to be incorporated into project.
3. Material Safety Data Sheets.

C. Shop Drawings: Include plans, sections, elevations, layouts, profiles and product component locations, including anchorage, bracing, fasteners, accessories, and finishes.
1. Show connection details with screw types and locations, weld lengths and locations, and other fastener requirements.
2. Where prefabricated or prefinished panels are to be provided, depict panel configurations, dimensions and locations.

D. Delegated Design Submittals: Submit structural calculations as follows:
1. Structural calculations prepared by manufacturer for approval. Submittal shall be sealed by a professional engineer registered in the State in which the project is located.
2. Description of design criteria.
3. Engineering analysis depicting stress and deflection requirements for each framing application.
4. Selection of framing components, accessories and welded connection requirements.
5. Verification of attachments to structure and adjacent framing components.

E. Informational Submittals:
   1. Test and Evaluation Reports:
      a. Certified test reports showing compliance with specified performance characteristics and physical properties.
   2. Manufacturer's Instructions: Submit manufacturer's storage and installation instructions.
   3. Source Quality Control: Submit documentation verifying that components and materials specified in this Section are from single manufacturer.
   4. Manufacturer's Reports: Manufacturer's field reports specified.
   5. Qualification Statements:
      a. Submit letter of verification for manufacturer's qualifications.
      b. Submit letter of verification for structural engineer's qualifications.
      c. Submit letter of verification for installer's qualifications.
      d. Submit letter of verification for welder's qualifications.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Company specializing in manufacturing products specified in this section with a minimum five years documented experience.
   2. Having sufficient capacity to produce and deliver required materials without causing delay in work.

B. Structural Engineer:
   1. Professional engineer registered in the state in which the project is located.
   2. Having a minimum of five years of experience with projects of similar scope.

C. Installer Qualifications: Company acceptable to manufacturer and specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.

D. Welders: Certified by the AWS within the previous 12 months.

E. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

F. Sustainability Standards Certification: Provide certification for ____ materials certified by _____ in accordance with _____.

G. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate mock-up as acceptable to Architect and provide temporary foundations and support.
   1. Dimensions and Process: Construct to _____ feet (_____ mm) using proposed procedures, colors, textures, finishes and quality of work.
   2. Purpose: To judge quality of work, substrate preparation, operation of equipment and material application.
   3. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
   4. Do not proceed with work prior to receipt of written acceptance of mock-up.
   5. Retain mock-up during construction as a standard for comparison with completed work.
   6. Do not alter or remove mock-up until work is completed or removal is authorized.
   7. Approved mock-up may remain part of finished work.

1.6 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate work of this Section with work of other trades for proper time and sequence to avoid construction delays.

B. Preinstallation Conference: Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.

C. Sequencing: Sequence work of this section in accordance with manufacturer's written recommendations for sequencing construction operations.

D. Scheduling: Schedule work of this Section in accordance with appropriate sections in Division 01.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements:
1. Deliver material in accordance with manufacturer's written instructions.
2. Deliver materials in manufacturer's original packaging with identification labels intact and in sizes to suit project.

B. Storage and Handling Requirements:
1. Store materials protected from exposure to harmful weather conditions and at temperature conditions per the recommendations of AISI COSP Section F3.

C. Packaging Waste Management:
1. Separate waste materials for reuse and recycling in accordance with appropriate sections in Division 01.
2. Remove packaging materials from site and dispose of at appropriate recycling facilities.
3. Collect and separate for disposal packaging material of the following types in appropriate onsite bins for recycling:
   a. Paper.
   b. Plastic.
   c. Polystyrene.
   d. Corrugated cardboard.
4. Fold metal and plastic banding; flatten and place in designated area for recycling.
5. Remove from site:
   a. Pallets.
   b. _____.
6. b. Remove from site and return to supplier or manufacturer:
   a. Pallets.
   b. _____.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Telling Industries, LLC, which is located at: Corporate Headquarters/Sales 4420 Sherwin Rd.; Willoughby, OH 44094; Toll Free Tel: 866-372-6384; Tel: 440-974-3370; Fax: 440-974-3408; Email:request info (sales.corp@tellingindustries.com); Web:http://www.BUILDSTRONG.com
1. 4420 Sherwin Road; Willoughby, OH 44094; ASD Toll Free: 866-372-6384; Phone: 440-974-3370; Fax: 440-974-3408; Email: sales.corp@tellingindustries.com; Web:

www.buildstrong.com AND
2. 2105 Larrick Road; Cambridge, OH 43725; ASD Phone: 740-435-8900; Fax: 740-435-8915 AND
3. 1400 Southwire Drive; Osceola, AR 72370; ASD Phone: 870-563-6065; Fax: 870-563-2471 AND
4. 1050 Kennedy Road; Windsor, CT 06095; ASD Phone: 860-731-7975; Fax: 860-731-7976.

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 PERFORMANCE AND DESIGN REQUIREMENTS

A. Design system components per AISI S100. Provide for movement of components due to thermal variations without damage, failure, or excessive stress on components.

B. Compute structural properties per AISI S100.

C. Design exterior wall system for environmental loads as outlined in the AIS S100 latest edition to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.

D. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

E. Maximum Allowable Deflection:
1. Gypsum Board: L/360 of span under total design loads.
2. Exterior Insulation Finish System: L/360 of span under total design loads.
3. Plaster or Stucco: L/360 of span under total design loads.
4. Brick Veneer: L/600 of span under total design loads.
5. Horizontal Assemblies: L/360 of span under total design loads.

F. Fire-resistive Rating: Where indicated on drawings, provide materials and construction identical to those assemblies whose fire resistance rating has been determined per ASTM E119 by a testing and inspecting organization acceptable to authorities having jurisdiction.
1. Meet or exceed fire resistance requirements outlined under provisions of the GA-600 Fire Resistance Design Manual for wall and ceiling assemblies.

G. Sustainability Characteristics: _____.

H. Compatibility: Ensure components and materials are compatible with specified accessories and adjacent materials.

2.3 LOAD-BEARING WALL FRAMING

A. Steel Studs, Basis of Design: Steel Studs; as manufactured by Telling Industries, LLC.
1. Description: C-shaped steel studs of web depths indicated, punched, with stiffened flanges.
2. Type: Standard.
3. Type: As indicated on Drawings.
4. Minimum Base Metal Thickness: 20 gauge, 0.0329 inch (0.84 mm).
5. Minimum Base Metal Thickness: 18 gauge, 0.0428 inch (1.09 mm).
6. Minimum Base Metal Thickness: 16 gauge, 0.0538 inch (1.37 mm).
7. Minimum Base Metal Thickness: 14 gauge, 0.0677 inch (1.72 mm).
8. Minimum Base Metal Thickness: 12 gauge, 0.0966 inch (2.45 mm).

9. Minimum Base Metal Thickness: 10 gauge, 0.1180 inch (2.997 mm).
10. Minimum Base Metal Thickness: As indicated on Drawings.
11. Flange Width: 1-3/8 inches (35 mm).
12. Flange Width: 1-5/8 inches (41 mm).
13. Flange Width: 2 inches (51 mm).
14. Flange Width: 2-1/2 inches (63 mm).
15. Flange Width: 3 inches (76.2 mm).
16. Flange Width: 3-1/2 inches (88.9 mm).
17. Flange Width: As indicated on Drawings.
18. Web Depth: 250 depth, 2-1/2 inch (64 mm).
19. Web Depth: 350 depth, 3-1/2 inch (89 mm).
20. Web Depth: 362 depth, 3-5/8 inch (92 mm).
21. Web Depth: 400 depth, 4 inch (102 mm).
22. Web Depth: 550 depth, 5-1/2 inch (140 mm).
23. Web Depth: 600 depth, 6 inch (152.4 mm).
24. Web Depth: 725 depth, 7-1/4 inch (184 mm).
25. Web Depth: 800 depth, 8 inch (203 mm).
26. Web Depth: 925 depth, 9-1/4 inch (235 mm).
27. Web Depth: 1000 depth, 10 inch (254 mm).
28. Web Depth: 1150 depth, 11-1/2 inch (292 mm).
29. Web Depth: 1200 depth, 12 inch (305 mm).
30. Web Depth: 1350 depth, 13-1/2 inch (342.9 mm).
31. Web Depth: 1400 depth, 14 inch (355.6 mm).
32. Web Depth: 16 inches (406.4 mm).
33. Web Depth: As indicated on Drawings.
34. Section Properties: As indicated on Drawings.

B. Steel Track, Basis of Design: Steel Track; as manufactured by Telling Industries, LLC.
1. Description: U-shaped steel track, of web depths indicated, unpunched, with straight flanges.
2. Type: Standard.
3. Type: As indicated on Drawings.
4. Minimum Base Metal Thickness: 20 gauge, 0.0329 inch (0.84 mm).
5. Minimum Base Metal Thickness: 18 gauge, 0.0428 inch (1.09 mm).
6. Minimum Base Metal Thickness: 16 gauge, 0.0538 inch (1.37 mm).
7. Minimum Base Metal Thickness: 14 gauge, 0.0677 inch (1.72 mm).
8. Minimum Base Metal Thickness: 12 gauge, 0.0966 inch (2.45 mm).
9. Minimum Base Metal Thickness: 10 gauge, 0.1180 inch (2.997 mm).
10. Minimum Base Metal Thickness: As indicated on Drawings.
11. Flange Width: 1-1/4 inches (32 mm), unless otherwise indicated.
12. Flange Width: As indicated on Drawings.
13. Web Depth: 250 depth, 2-1/2 inch (64 mm).
14. Web Depth: 350 depth, 3-1/2 inch (89 mm).
15. Web Depth: 362 depth, 3-5/8 inch (92 mm).
16. Web Depth: 400 depth, 4 inch (102 mm).
17. Web Depth: 550 depth, 5-1/2 inch (140 mm).
18. Web Depth: 600 depth, 6 inch (152.4 mm).
19. Web Depth: 725 depth, 7-1/4 inch (184 mm).
20. Web Depth: 800 depth, 8 inch (203 mm).
21. Web Depth: 925 depth, 9-1/4 inch (235 mm).
22. Web Depth: 1000 depth, 10 inch (254 mm).
23. Web Depth: 1150 depth, 11-1/2 inch (292 mm).
24. Web Depth: 1200 depth, 12 inch (305 mm).
25. Web Depth: 1350 depth, 13-1/2 inch (342.9 mm).
26. Web Depth: 1400 depth, 14 inch (355.6 mm).
27. Web Depth: 16 inches (406.4 mm).

28. Web Depth: Match stud web depth.
29. Web Depth: As indicated on Drawings.

C. Steel Box or Back-to-Back Headers, Basis of Design: Steel Box or Back-to-Back Headers; as manufactured by Telling Industries, LLC.
1. Description: C-shapes used to form header beams of web depths indicated, unpunched, with stiffened flanges.
2. Minimum Base Metal Thickness: 16 gauge, 0.0538 inch (1.37 mm).
3. Minimum Base Metal Thickness: 14 gauge, 0.0677 inch (1.72 mm).
4. Minimum Base Metal Thickness: 12 gauge, 0.0966 inch (2.45 mm).
5. Minimum Base Metal Thickness: 10 gauge, 0.1180 inch (2.997 mm).
6. Flange Width: 1-3/8 inches (35 mm).
7. Flange Width: 1-5/8 inches (41 mm).
8. Flange Width: 2 inches (51 mm).
9. Flange Width: 2-1/2 inches (63 mm).
10. Flange Width: 3-1/2 inches (88.9 mm).
11. Web Depth: As indicated on Drawings.

D. Opening Framing, Basis of Design: Titan Header RO System; as manufactured by Telling Industries, LLC.
1. Minimum Base Metal Thickness: As required by design.
2. Minimum Flange Width: As required by design.

E. U-Channel Assembly, Basis of Design: U-Channel; as manufactured by Telling Industries, LLC.
1. Description: U-Channel for lateral bracing for exterior curtain wall framing,
2. load-bearing walls or high interior partitions constructed of structural studs.
3. U-Channel Size: 1-1/2 inches (38.1 mm).
4. Minimum Base Metal Thickness: 16 gauge, 0.0538 inch (1.37 mm).

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs, Basis of Design: Steel Studs; as manufactured by Telling Industries, LLC.
1. Description: C-shaped steel studs of web depths indicated, punched, with stiffened flanges.
2. Type: Standard.
3. Type: As indicated on Drawings.
4. Minimum Base Metal Thickness: 20 gauge, 0.0329 inch (0.84 mm).
5. Minimum Base Metal Thickness: 18 gauge, 0.0428 inch (1.09 mm).
6. Minimum Base Metal Thickness: 16 gauge, 0.0538 inch (1.37 mm).
7. Minimum Base Metal Thickness: 14 gauge, 0.0677 inch (1.72 mm).
8. Minimum Base Metal Thickness: 12 gauge, 0.0966 inch (2.45 mm).
9. Minimum Base Metal Thickness: 10 gauge, 0.1180 inch (2.997 mm).
10. Minimum Base Metal Thickness: As indicated on Drawings.
11. Flange Width: 1-3/8 inches (35 mm).
12. Flange Width: 1-5/8 inches (41 mm).
13. Flange Width: 2 inches (51 mm).
14. Flange Width: 2-1/2 inches (63 mm).
15. Flange Width: 3 inches (76.2 mm).
16. Flange Width: 3-1/2 inches (88.9 mm).
17. Flange Width: As indicated on Drawings.
18. Web Depth: 250 depth, 2-1/2 inch (64 mm).
19. Web Depth: 350 depth, 3-1/2 inch (89 mm).
20. Web Depth: 362 depth, 3-5/8 inch (92 mm).
21. Web Depth: 400 depth, 4 inch (102 mm).
22. Web Depth: 550 depth, 5-1/2 inch (140 mm).
23. Web Depth: 600 depth, 6 inch (152.4 mm).

24. Web Depth: 725 depth, 7-1/4 inch (184 mm).
25. Web Depth: 800 depth, 8 inch (203 mm).
26. Web Depth: 925 depth, 9-1/4 inch (235 mm).
27. Web Depth: 1000 depth, 10 inch (254 mm).
28. Web Depth: 1150 depth, 11-1/2 inch (292 mm).
29. Web Depth: 1200 depth, 12 inch (305 mm).
30. Web Depth: 1350 depth, 13-1/2 inch (342.9 mm).
31. Web Depth: 1400 depth, 14 inch (355.6 mm).
32. Web Depth: As indicated on Drawings.
33. Section Properties: As indicated on Drawings.

B. Steel Track, Basis of Design: Steel Track; as manufactured by Telling Industries, LLC.
1. Description: U-shaped steel track, of web depths indicated, unpunched, with straight flanges.
2. Type: Standard.
3. Type: As indicated on Drawings.
4. Minimum Base Metal Thickness: 20 gauge, 0.0329 inch (0.84 mm).
5. Minimum Base Metal Thickness: 18 gauge, 0.0428 inch (1.09 mm).
6. Minimum Base Metal Thickness: 16 gauge, 0.0538 inch (1.37 mm).
7. Minimum Base Metal Thickness: 14 gauge, 0.0677 inch (1.72 mm).
8. Minimum Base Metal Thickness: 12 gauge, 0.0966 inch (2.45 mm).
9. Minimum Base Metal Thickness: 10 gauge, 0.1180 inch (2.997 mm).
10. Minimum Base Metal Thickness: As indicated on Drawings.
11. Flange Width: 1-1/4 inches (32 mm), unless otherwise indicated.
12. Flange Width: As indicated on Drawings.
13. Web Depth: 250 depth, 2-1/2 inch (64 mm).
14. Web Depth: 350 depth, 3-1/2 inch (89 mm).
15. Web Depth: 362 depth, 3-5/8 inch (92 mm).
16. Web Depth: 400 depth, 4 inch (102 mm).
17. Web Depth: 550 depth, 5-1/2 inch (140 mm).
18. Web Depth: 600 depth, 6 inch (152.4 mm).
19. Web Depth: 725 depth, 7-1/4 inch (184 mm).
20. Web Depth: 800 depth, 8 inch (203 mm).
21. Web Depth: 925 depth, 9-1/4 inch (235 mm).
22. Web Depth: 1000 depth, 10 inch (254 mm).
23. Web Depth: 1150 depth, 11-1/2 inch (292 mm).
24. Web Depth: 1200 depth, 12 inch (305 mm).
25. Web Depth: 1350 depth, 13-1/2 inch (342.9 mm).
26. Web Depth: 1400 depth, 14 inch (355.6 mm).
27. Web Depth: 16 inches (406.4 mm).
28. Web Depth: Match stud web depth.
29. Web Depth: As indicated on Drawings.

C. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web. Anticipated deflection of primary structural elements is indicated on the drawings.

D. Single Deflection Track, Basis of Design: Single Deflection Track; as manufactured by Telling Industries, LLC.
1. Description: Single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure.
2. Minimum Base Metal Thickness: 18 gauge, 0.0428 inch (1.09 mm).
3. Minimum Base Metal Thickness: 16 gauge, 0.0538 inch (1.37 mm).

4. Minimum Base Metal Thickness: 14 gauge, 0.0677 inch (1.72 mm).
5. Minimum Base Metal Thickness: 12 gauge, 0.0966 inch (2.45 mm).
6. Minimum Base Metal Thickness: As indicated on Drawings.
7. Flange Width: 1-1/2 inches (38 mm) plus the design deflection for one-story structures.
8. Flange Width: 1 inch (25 mm) twice the design deflection for other applications.
9. Flange Width: As indicated on Drawings.

E. Double Deflection Track, Basis of Design: Double Deflection Track; as manufactured by Telling Industries, LLC.
   1. Description: Double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
   2. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:
      a. Minimum Base Metal Thickness: 18 gauge, 0.0428 inch (1.09 mm).
      b. Minimum Base Metal Thickness: 16 gauge, 0.0538 inch (1.37 mm).
      c. Minimum Base Metal Thickness: 14 gauge, 0.0677 inch (1.72 mm).
      d. Minimum Base Metal Thickness: 12 gauge, 0.0966 inch (2.45 mm).
      e. Minimum Base Metal Thickness: As indicated on the drawings.
      f. Flange Width: 1-1/2 inches (38 mm) plus the design deflection for one-story structures.
      g. Flange Width: 1 inch (25 mm) twice the design deflection for other applications.
      h. Flange Width: As indicated on Drawings.
   3. Inner Track: Of web depth indicated, and as follows:
      a. Minimum Base Metal Thickness: 18 gauge, 0.0428 inch (1.09 mm).
      b. Minimum Base Metal Thickness: 16 gauge, 0.0538 inch (1.37 mm).
      c. Minimum Base Metal Thickness: 14 gauge, 0.0677 inch (1.72 mm).
      d. Minimum Base Metal Thickness: 12 gauge, 0.0966 inch (2.45 mm).
      e. Minimum Base Metal Thickness: As indicated on the drawings.
      f. Flange Width: Equal to sum of outer deflection track flange width, plus 1 inch (25 mm).

F. Slotted Track, Basis of Design: Slotted Track; as manufactured by Telling Industries, LLC.
   1. Description: U-shaped track with 1-1/2 inch (38 mm) vertical slots spaced at 1 inch (25 mm) along the legs to allow vertical deflection.
   2. Standard Leg: 2-1/2 inches (64 mm).
   3. Standard Vertical Slot: 1-1/2 inches (38 mm).
   4. Minimum Base Metal Thickness: 20 gauge, 0.0329 inch (0.84 mm).
   5. Minimum Base Metal Thickness: 18 gauge, 0.0428 inch (1.09 mm).
   6. Minimum Base Metal Thickness: 16 gauge, 0.0538 inch (1.37 mm).
   7. Minimum Base Metal Thickness: As indicated on the drawings.
   8. Web Depth: 250 depth, 2-1/2 inch (64 mm).
   9. Web Depth: 362 depth, 3-5/8 inch (92 mm).
   10. Web Depth: 400 depth, 4 inch (102 mm).
   11. Web Depth: 600 depth, 6 inch (152.4 mm).
   12. Web Depth: 800 depth, 8 inch (203 mm).
   13. Web Depth: As indicated on Drawings.
   14. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

G. Headers and Jambs, Basis of Design: Titan Header RO; as manufactured by Telling Industries, LLC.
   1. Description: Manufacturer's proprietary shape used to form header beams and jambs, columns or posts of web depths indicated, unpunched, with stiffened flanges.

2. Minimum Base Metal Thickness: 16 gauge, 0.0538 inch (1.37 mm).
3. Minimum Base Metal Thickness: 14 gauge, 0.0677 inch (1.72 mm).
4. Minimum Base Metal Thickness: 12 gauge, 0.0966 inch (2.45 mm).
5. Minimum Base Metal Thickness: As indicated on the drawings.
6. Flange Width: 1-3/8 inches (35 mm).
7. Flange Width: 1-5/8 inches (41 mm).
8. Flange Width: 2 inches (51 mm).
9. Flange Width: 2-1/2 inches (63 mm).
10. Flange Width: 3 inches (76.2 mm).
11. Flange Width: As indicated on Drawings.
12. Web Depth: As indicated on Drawings.

2.5 FLOOR JOIST FRAMING

A. Steel Joists, Basis of Design: Steel Joists; as manufactured by Telling Industries, LLC.
1. Description: Cold-formed steel joists, of web depths indicated.
2. Type: Standard.
3. Type: As indicated on Drawings.
4. Minimum Base Metal Thickness: 20 gauge, 0.0329 inch (0.84 mm).
5. Minimum Base Metal Thickness: 18 gauge, 0.0428 inch (1.09 mm).
6. Minimum Base Metal Thickness: 16 gauge, 0.0538 inch (1.37 mm).
7. Minimum Base Metal Thickness: 14 gauge, 0.0677 inch (1.72 mm).
8. Minimum Base Metal Thickness: 12 gauge, 0.0966 inch (2.45 mm).
9. Minimum Base Metal Thickness: 10 gauge, 0.1180 inch (2.997 mm).
10. Minimum Base Metal Thickness: As indicated on Drawings.
11. Minimum Flange Width: 1-5/8 inches (41 mm).
12. Minimum Flange Width: 2 inches (51 mm).
13. Minimum Flange Width: 2-1/2 inches (63 mm).
14. Minimum Flange Width: 3 inches (76.2 mm).
15. Minimum Flange Width: 3-1/2 inches (88.9 mm).
16. Minimum Flange Width: As indicated on Drawings.
17. Minimum Joist Depth: 9 inch (203) mm).
18. Minimum Joist Depth: 9-1/4 inch (235 mm).
19. Minimum Joist Depth: 10 inch (254 mm).
20. Minimum Joist Depth: 11-1/4 inch (286 mm).
21. Minimum Joist Depth: 12 inch (305 mm).
22. Minimum Joist Depth: 14 inch (355.6 mm).
23. Web Depth: As indicated on Drawings.
24. Section Properties: As indicated on Drawings.

B. Steel Joist Track, Basis of Design: Steel Joist Track; as manufactured by Telling Industries, LLC.
1. Description: Cold-formed steel joist track, of web depths indicated, unpunched, with unstiffened flanges.
2. Type: Standard.
3. Type: As indicated on Drawings.
4. Minimum Base Metal Thickness: 20 gauge, 0.0329 inch (0.84 mm).
5. Minimum Base Metal Thickness: 18 gauge, 0.0428 inch (1.09 mm).
6. Minimum Base Metal Thickness: 16 gauge, 0.0538 inch (1.37 mm).
7. Minimum Base Metal Thickness: 14 gauge, 0.0677 inch (1.72 mm).
8. Minimum Base Metal Thickness: 12 gauge, 0.0966 inch (2.45 mm).
9. Minimum Base Metal Thickness: 10 gauge, 0.1180 inch (2.997 mm).
10. Minimum Base Metal Thickness: Match steel joists.
11. Minimum Base Metal Thickness: As indicated on Drawings.
12. Minimum Flange Width: 1-1/4 inches (32 mm).

2.6 ROOF TRUSSES

A. Roof Trusses, Basis of Design: Roof Trusses; as manufactured by Telling Industries, LLC.
   1. Description: Cold-formed steel trusses, of web depths and truss types indicated, punched, with stiffened flanges.
   2. Type: As indicated on Drawings.
   3. Minimum Base Metal Thickness: 20 gauge, 0.0329 inch (0.84 mm).
   4. Minimum Base Metal Thickness: 18 gauge, 0.0428 inch (1.09 mm).
   5. Minimum Base Metal Thickness: 16 gauge, 0.0538 inch (1.37 mm).
   6. Minimum Base Metal Thickness: 14 gauge, 0.0677 inch (1.72 mm).
   7. Minimum Base Metal Thickness: 12 gauge, 0.0966 inch (2.45 mm).
   8. Minimum Base Metal Thickness: 10 gauge, 0.1180 inch (2.997 mm).
   9. Minimum Base Metal Thickness: Match steel joists.
   10. Minimum Base Metal Thickness: As indicated on Drawings.
   11. Minimum Flange Width: 1-5/8 inches (41 mm).
   12. Minimum Flange Width: 2 inches (51 mm).
   13. Minimum Flange Width: 2-1/2 inches (63 mm).
   14. Minimum Flange Width: 3 inches (76.2 mm).
   15. Minimum Flange Width: 3-1/2 inches (88.9 mm).
   16. Minimum Flange Width: As indicated on Drawings.
   17. Section Properties: As indicated on Drawings.

2.7 ROOF RAFTER FRAMING

A. Steel Rafters, Basis of Design: Steel Rafters; as manufactured by Telling Industries, LLC.
   1. Description: Cold-formed steel joists used as rafters, of web depths indicated.
   2. Type: Standard.
   3. Type: As indicated on Drawings.
   4. Minimum Base Metal Thickness: 20 gauge, 0.0329 inch (0.84 mm).
   5. Minimum Base Metal Thickness: 18 gauge, 0.0428 inch (1.09 mm).
   6. Minimum Base Metal Thickness: 16 gauge, 0.0538 inch (1.37 mm).
   7. Minimum Base Metal Thickness: 14 gauge, 0.0677 inch (1.72 mm).
   8. Minimum Base Metal Thickness: 12 gauge, 0.0966 inch (2.45 mm).
   9. Minimum Base Metal Thickness: 10 gauge, 0.1180 inch (2.997 mm).
   10. Minimum Base Metal Thickness: Match steel joists.
   11. Minimum Base Metal Thickness: As indicated on Drawings.
   12. Minimum Flange Width: 1-5/8 inches (41 mm).
   13. Minimum Flange Width: 2 inches (51 mm).
   14. Minimum Flange Width: 2-1/2 inches (63 mm).
   15. Minimum Flange Width: 3 inches (76.2 mm).
   16. Minimum Flange Width: 3-1/2 inches (88.9 mm).
   17. Minimum Flange Width: As indicated on Drawings.
   18. Section Properties: As indicated on Drawings.

2.8 CEILING JOIST FRAMING

A. Steel Ceiling Joists, Basis of Design: Steel Ceiling Joists; as manufactured by Telling Industries, LLC.
   1. Description: Cold-formed steel joists, of web depths indicated.
   2. Type: Standard.
   3. Type: As indicated on Drawings.
   4. Minimum Base Metal Thickness: 20 gauge, 0.0329 inch (0.84 mm).
   5. Minimum Base Metal Thickness: 18 gauge, 0.0428 inch (1.09 mm).
   6. Minimum Base Metal Thickness: 16 gauge, 0.0538 inch (1.37 mm).
   7. Minimum Base Metal Thickness: 14 gauge, 0.0677 inch (1.72 mm).
   8. Minimum Base Metal Thickness: 12 gauge, 0.0966 inch (2.45 mm).
   9. Minimum Base Metal Thickness: 10 gauge, 0.1180 inch (2.997 mm).

10. Minimum Base Metal Thickness: As indicated on Drawings.
11. Minimum Flange Width: 1-5/8 inches (41 mm).
12. Minimum Flange Width: 2 inches (51 mm).
13. Minimum Flange Width: 2-1/2 inches (63 mm).
14. Minimum Flange Width: 3 inches (76.2 mm).
15. Minimum Flange Width: 3-1/2 inches (88.9 mm).
16. Minimum Flange Width: As indicated on Drawings.
17. Minimum Joist Depth: 9 inch (203) mm).
18. Minimum Joist Depth: 9-1/4 inch (235 mm).
19. Minimum Joist Depth: 10 inch (254 mm).
20. Minimum Joist Depth: 11-1/4 inch (286 mm).
21. Minimum Joist Depth: 12 inch (305 mm).
22. Minimum Joist Depth: 14 inch (355.6 mm).
23. Web Depth: As indicated on Drawings.
24. Section Properties: As indicated on Drawings.

2.9 ACCESSORIES

A. Framing Connectors: Type: Steel-framing accessories fabricated from steel sheet, ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
1. Web stiffeners.
2. Solid blocking.
3. Utility angles.
4. Joist hangers.
5. Gusset plates.
6. Rigid clips.
7. Breakaway clips.

C. Anchors, Clips and Fasteners:
1. Steel Shapes and Clips: ASTM A36/A36M and zinc coated by hot-dip process according to ASTM A123/A123M.
2. Cold-formed Steel Connections: ASTM A653/A653M, zinc coated by hot-dip process according to ASTM A123/A123M.
3. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E488.
4. Powder-actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion- resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E1190 and as indicated on the drawings.
5. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
6. Welding Electrodes: Comply with AWS standards.
7. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.
8. Cement Grout: Portland cement, ASTM C150, Type I; and clean, natural sand, ASTM C404. Mix at ratio of 1 part cement to 2-1/2 parts sand by volume, with minimum water required for placement and hydration.
9. Nonmetallic, Non-Shrink Grout: Premixed noncorrosive, non-staining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C1107, with fluid consistency and 30-minute working time.
10. Shims: Load bearing, high-density multi-monomer plastic, non-leaching.

11. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.10 MATERIALS

A. Steel Sheet: ASTM A1003.
1. Grade and Type: ST33H (ST230H).
2. Grade and Type: ST50H (ST340H).
3. Grade and Type: As required by structural performance.
4. Metallic Coating: G60 (Z180).
5. Metallic Coating: A60 (ZF180).
6. Metallic Coating: AZ50 (AZ150).
7. Metallic Coating: GF30 (ZGF90).
8. Metallic Coating: G90 (Z275).

2.11 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI specifications and standards, manufacturer's written instructions and requirements in this Section.
1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed metal framing members by welds, screw fasteners, clinch fasteners or rivets as standard with fabricator. Do not wire-tie framing members.
a. Comply with AWS D.1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
c. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that conditions of substrates previously installed under other sections or contracts are acceptable for product installation in accordance with manufacturer's instructions prior to wall framing installation.
1. Inform Architect of unacceptable conditions immediately upon discovery.
2. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval from Architect.
3. Proceed with installation only after unacceptable conditions have been remedied.

B. _____.

3.2 PREPARATION

A. Ensure structure or substrate is adequate to support wall framing.

B. Clean surfaces thoroughly prior to installation.

C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

D. Demolition and Removal: _____.

3.3 INSTALLATION

A. General:
1. Coordinate erection of framing with appropriate sections in Division 01.
2. Erect in accordance with ASTM C1007 and manufacturer's installation instructions.
3. Field Welding: Per AWS D.1.3, and the following:
a. Stud-to-Track Connections: 1/2 inch (13 mm) fillet weld, full length of inside flange dimension, inside each flange of stud onto track web.
b. Other Connections: Flat, plug, butt or seam.
c. Minimum Steel Thickness for Welded Connections: 18 gauge.
d. Field Fastening: Minimum of 2 self-tapping metal screws per connection, unless otherwise indicated.

B. Wall Systems:
1. Handle and lift prefabricated panels in a manner so as not to cause distortion in any member.
2. Anchor runner track securely to the supporting structure as shown on erection drawings. Install concrete anchors only after full compressive strength has been achieved. Provide a sill sealer or gasket barrier between all concrete and steel connections.
3. Butt all track joints. Securely anchor abutting pieces of track to a common structural element, or butt-weld or splice together.
4. Align and plumb studs, and securely attach to flanges or webs of both upper and lower tracks, except when vertical movement is specified.
5. Install jack studs or cripples below window sills, above window and door heads, at freestanding stair rails and elsewhere to furnish support. Securely attached to supporting members.
6. Attach wall stud bridging in a manner to prevent stud rotation. Space bridging rows according to manufacturer's recommendations.
7. Frame wall openings to include headers and supporting studs as shown in the drawings.
8. Place studs at maximum 16 inches on center, not more than 2 inches (51 mm) from abutting walls, and at each side of openings. Connect studs to tracks using mechanical fastener method.
9. Construct corners using a minimum of 3 studs. Use double studs, one of which is full length unless indicated otherwise, at wall openings, doors and window jambs.
10. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.
11. Attach cross studs or furring channels to studs for attachment of fixtures anchored to walls.
12. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
13. Touch-up field welds and damaged galvanized and primed surfaces with primer.
14. Provide bridging, horizontal stiffeners, at 4 feet (1219 mm) on center maximum vertical spacing for exterior and load bearing metal stud walls.

C. Steel Joists:
1. Locate joist end bearing directly over load bearing studs or provide load-distributing member to top of stud track.
2. Provide web stiffeners at reaction points where indicated in drawings.
3. Provide joist bridging as shown in drawings.
4. Provide end blocking where joist ends are not otherwise restrained from rotation.
5. Place joists at maximum 12 inches (305 mm) on center and not more than 2 inches (51 mm) from abutting walls. Connect joists to supports using mechanical fastener

method.

6. Touch-up field welds and damaged galvanized surfaces with primer.

D. Repair and Restoration:
   1. Coordinate repair and restoration in accordance with appropriate sections in Division 01.
   2. _____.

3.4 FIELD QUALITY CONTROL

A. Field Tests, Inspection: Coordinate field test with appropriate sections in Division 01.

B. Inspection requirements are indicated on the drawings.

C. If tests indicate Work does not meet specified requirements, remove Work, replace with new material and retest at no cost to Owner.

D. Visually inspect 100 percent of welds for specified length, size, and continuity per AWS D1.3 for metal less than 1/8 inch (3.2 mm) thickness for Work designed as a structural element.

E. Manufacturer Services:
   1. Coordinate manufacturer's services with appropriate sections in Division 01. Have manufacturer review work involved in handling, installation/application, protection and cleaning of products, and submit written reports in acceptable format to verify compliance of work with Contract.
   2. Manufacturer's Field Services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for product installation inspection in accordance with manufacturer's instructions.
   3. Schedule site visits to review work at stages listed:
      a. After delivery and storage of products, and when preparatory work on which work of this Section depends is complete, but before installation begins.
      b. Twice during progress of work at 25 percent and 60 percent completion.
      c. During progress of work at 25 percent completion.
      d. During progress of work at 60 percent completion.
      e. Upon completion of work, after cleaning is performed.
   4. Obtain reports within three days of review and submit immediately to Architect.

3.5 CLEANING AND PROTECTION

A. Clean products in accordance with the manufacturer's recommendations and appropriate sections in Division 01.

B. Upon completion, remove surplus materials, rubbish, tools and equipment.

C. Waste Management:
   1. Coordinate recycling of waste materials with appropriate sections in Division 01.
   2. Collect recyclable waste and dispose of or recycle field generated construction waste created during demolition, construction or final cleaning.
   3. Remove recycling containers and bins from site.
   4. _____.

D. Protect installed product from damage during construction.

E. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 ATTACHMENTS

A. Schedules: _____.

END OF SECTION