

Seaside Rehabilitation and Health Care Center
Portland, Maine

SECTION 05 41 00 - PRE-ENGINEERED, PRE-FABRICATED/ LIGHT GAUGE STEEL
ROOF TRUSSES

PART 1 PART I - GENERAL

1.01 RELATED DOCUMENTS

- A. The drawings and general conditions of the contract including General and Supplementary Conditions and other Division 1 Specification sections apply to work of this section.
- B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK

- A. Work included in this Section includes pre-engineered, prefabricated light gauge cold formed steel roof trusses, anchorage, bracing and bridging, and the engineering thereof.

1.03 RELATED WORK:

- A. Rough Carpentry – Section 06 10 00
- B. Structural Steel – Section 05 12 00
- C. Thermal & Moisture Protection – Division 7
- D. Finishes – Division 9

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1.04 QUALITY ASSURANCE

- A. Codes and Standards: Comply with the provisions of the latest edition of the following except where more stringent requirements are shown or specified:
 - 1. ASTM A653/A653M-94 "Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvalume) by the Hot Dip Process."
 - 2. ASTM A780-93A "Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings."
 - 3. AWS D1.1 "Structural Welding Code - Structural Steel"
 - 4. AWS D1.3 "Structural Welding Code - Sheet Steel."
- B. Fabricator Qualifications: Fabrication shall be performed by a cold formed steel truss fabricator with experience designing and fabricating cold-formed steel truss systems equal in material, design, and extent to the systems required for this Project.
- C. Erector Qualifications: Cold Formed steel truss system installation shall be performed by an experienced installer approved by the steel truss system fabricator.
- D. Welding Standards:
 - 1. Comply with applicable provisions of AWS D1.1 "Structural Welding Code-Steel" and AWS D1.3 -"Structural Welding Code--Sheet Steel".
 - 2. Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure".

1.05 SUBMITTALS

- A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with this section and Division 1.
- B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner's Notice to Proceed.
- C. All submittals shall be reviewed and returned to the Architect within 10 working

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days.

D. INCOMPLETE SUBMITTALS WILL NOT BE REVIEWED.

- E. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in Division 1 have been complied with.
- F. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.
- G. Hardcopy Submittals: Submit three prints. Prints will be reviewed by the Engineer, and then the Architect. One marked print will be returned to Contractor for printing and distribution. Multiple copies will not be marked by the Engineer.
- H. Electronic Submittals:

1. Contractor shall include in the submittal schedule an indication of submittals that are intended to be submitted electronically. Upon receipt of the submittal schedule, the Engineer reserves the right to indicate submittals that will not be accepted electronically. Paper copies of such submittals shall be furnished as referenced in this specification.
2. The Engineer reserves the right to require paper copies of submittals that are received electronically. Provide Engineer one (1) paper copies in addition to the electronic submittal. Paper copy will be retained and electronic copy will be returned. Review cycle for such submittals shall not commence until such time that the paper copies are received.
3. Electronic Submittals shall be submitted in Protected Document Format (PDF) compatible with Adobe Acrobat Professional version 7.0 or later. Electronic files shall not be broken into smaller individual files. File sizes too large to process email or within a file transfer protocol (FTP) site shall be provided on a CD.
4. The submission of submittals electronically does not relieve the contractor of their responsibility to review the submittal prior to transmission to the Engineer. Electronic Submittals shall include contractor comments, and a

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statement and/or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Division 1 have been complied with. Electronic submittals without the Contractor's approval will be rejected and returned.

5. The Engineer assumes no responsibility for the printed reproduction of submittals reviewed electronically, transmission errors or returned electronic submittals that become corrupted or are otherwise not accessible by the Contractor's or Subcontractor's computer hardware and/or software.
- F. Truss design calculations without the appropriate signature and seal indicated below will be rejected and returned without review.
- G. Product Data: Submit fabricator's technical data covering lumber, metal plates, hardware, fabrication process, treatment (if any), handling and erection.
1. Submit certificate, signed by an officer of fabricating firm, indicating that trusses to be supplied for project comply with indicated requirements.
 2. Submit written description of Fabricator's in-house quality assurance program and procedures.
- H. Shop Drawings: Submit shop drawings, showing species, sizes and stress grade of steel to be used; pitch, span, camber, configuration and spacing for each type of truss required; type size, material, finish, design value and location of metal connector plates; and bearing and anchorage details.
- I. Review of the shop drawings will be made for the size and arrangement of trusses and truss members. Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer's review in no way relieves the General Contractor of this responsibility. Submit three prints. Prints will be reviewed by the Engineer, and then the Architect. One marked print will be returned to Contractor for printing and distribution. Multiple copies will not be marked by the Engineer.
- J. Truss Placement Plan: Provide drawings indicating truss layout.
- K. Include all trusses and components, including girder trusses, uplift anchors, piggyback trusses, and hangers.
- L. Provided dimensions for layout, including bearing locations & widths, and truss

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spacing

- M. Design: Performance design shall be in accordance with the applicable provisions of the latest edition of the AISI's "Specification for the Design of Cold-Formed Steel Structural Members", and all applicable legal requirements. Submit the following information in the calculation submittal for each truss or truss component. Calculations are to be prepared under the direct supervision of a Professional Engineer Registered in the State of Maine. Calculations shall be signed and sealed by a Professional Engineer Registered in the State of Maine. Truss designer is responsible for the design of the entire truss assembly, including permanent lateral bracing. Lateral loads shall be resolved into the building lateral load resisting system.
1. Loading: Include all loadings applied to the truss, including uniform, concentrated loads and locations. Include effects of mechanical equipment, drifted and unbalanced snow. Indicate distribution of loads to top and bottom chords. The calculations shall clearly show these loads and their application to the trusses.
 2. Wind & Seismic Loading Criteria: Include all appropriate information wind & seismic loading criteria. Including design code, wind speed and exposure. Design code and wind speed shall be as indicated in the drawings.
 - a. Provide uplift calculations as appropriate. Provide calculations for attachment accessories required to resist uplift.
 - b. Design gable end trusses for wind and seismic loads. Vertical members in gable end trusses shall be at 16" o.c. maximum. End wall deflections shall not exceed $L/240$. Provide ganged trusses, strong backed studs or adequate bracing as required to provide a complete end wall system.

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3. Load Combinations: The calculations shall list all load combinations including all factors that apply.
 4. Adjustments to stresses and metal connector plate design values for conditions of use.
 5. Truss-to-Truss Connections: Provide hanger designs where applicable. Provide design of connectors in multi-ply trusses. Provide connection design for piggyback trusses.
 6. Stress and Deflection calculations: Provide member stresses and joint displacement for each load and load combination, and displacement to span ratio. Indicate camber independently from displacement calculations. Provide bearing stresses at supports.
 7. Reaction: Provide minimum and maximum reactions, including uplift as applicable. Indicate the load combination that produces these reactions.
 8. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 120 deg F (67 deg C).
- N. Truss Assembly Drawings: Provide drawings depicting how each truss is to be constructed. Provide all geometry, including length, height, joint locations, slope, camber, overhangs, and connectors.
- O. Permanent Member Bracing: The truss manufacturer shall specify all permanent bracing required for lateral support of tension and compression members, both webs and chords. Gable end wall bracing shall also be specified. Permanent bracing loads shall be resolved to the building lateral load resisting system.
- P. Field built trusses: To the greatest extent possible, trusses are to be prefabricated. Truss field fabrication is subject to the approval of the Structural Engineer. Additional design, quality assurance and quality control procedures may be necessary based on the requirements of the Structural Engineer.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's unopened containers or bundles, fully identified by name, brand, type, grade or piece mark. Exercise care to avoid

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damage during unloading, storing and erection.

- B. Store trusses on blocking, pallets, platforms or other supports off the ground and in an upright position sufficiently braced to avoid damage from excessive bending.
- C. Protect trusses and accessories from corrosion, deformation, damage and deterioration when stored at job site. Keep trusses free of dirt and other foreign matter.

1.07 PROJECT CONDITIONS

- A. During construction, adequately distribute all loads applied to trusses so as not to exceed the carrying capacity of any one joist, truss or other component.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer: Ultra-Span® Truss Manufacturer
- B. Alternate Manufacturers: Equivalent Truss manufactures may be considered but are subject to approval by the Architect.

2.02 COMPONENTS

- A. System components: MiTek Industries, Inc. ULTRA-SPAN® and P051-STRUT® light gauge steel floor truss and roof truss components.
- B. Provide manufacturer's standard steel truss members, bracing, bridging, blocking, reinforcements, fasteners and accessories with each type of steel framing required, as recommended by the manufacturer for the applications indicated and as needed to provide a complete light gauge cold formed steel truss system.

2.03 MATERIALS

- A. Materials:
 - 1. Fabricate components of structural quality steel sheet per ASTM A653 with a minimum yield strength of 40,000 psi.
 - 2. Fabricate bracing, bridging and blocking member components of

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commercial quality steel sheet per ASTM A653 with a minimum yield strength of 33,000 psi.

3. Ultra-Span steel truss components shall be provide in the gages indicated.
 - a. Design Uncoated-Steel Thickness: 20 ga., 0.0350 inch
 - b. Design Uncoated-Steel Thickness: 18 ga., 0.0460 inch
 - c. Design Uncoated-Steel Thickness: 16 ga., 0.0570 inch
 - d. Design Uncoated-Steel Thickness: 14 ga., 0.0730 inch
- B. Finish: Provide components with protective zinc coating complying with ASTM A653, minimum G60 coating.
- C. Fastenings:
 1. Manufacturer recommended self-drilling, self-tapping screws with corrosion-resistant plated finish. Fasteners shall be of sufficient size and number to ensure the strength of the connection.
- D. Welding: Comply with AWS D1.1 when applicable and AWS D1.3 for welding base metals less than 18 gage thickness.
- E. Other fasteners as accepted by truss engineer.

2.04 FABRICATION

- A. Factory fabricate cold formed steel trusses plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.
- B. Fabricate truss assemblies in jig templates.
- C. Cut truss members by sawing or shearing or plasma cutting.
- D. Fasten cold-formed steel truss members by welding or screw fastening, or other methods as standard with fabricator. Wire tying of framing members is not permitted.
- E. Comply with AWS requirements and procedures for welding, appearance and

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quality of welds, and methods used in correcting welding work.

- F. Locate mechanical fasteners and install according to cold formed steel truss component manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.
- G. Care shall be taken during handling, delivery and erection. Brace, block, or reinforce truss as necessary to minimize member and connection stresses.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine structure, substrates and installation conditions. Do not proceed with cold formed steel truss installation until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION - GENERAL

- A. General:
 - 1. Erection of trusses, including proper handling, safety precautions, temporary bracing and other safeguards or procedures are the responsibility of the Contractor and Contractor's installer.
 - 2. Exercise care and provide erection bracing required to prevent toppling of trusses during erection.
- B. Install, bridge, and brace trusses according to manufacturer's recommendations and requirements of industry literature.
- C. Space trusses as follows: Maximum spacing: 24 inches. Provide closer spacing if required by truss design stresses or connection requirements.
- D. Erect trusses with plane of truss webs vertical and parallel to each other, accurately located at design spacing indicated.
- E. Provide proper lifting equipment suited to sizes and types of trusses required,

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applied at lift points recommended by truss fabricator. Exercise care to avoid damage to truss members during erection and to keep horizontal bending of the trusses to a minimum.

- F. Provide framing anchors as indicated or accepted on the engineering design drawing or erection drawings. Anchor trusses securely at bearing points.
- G. Install roof framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations.
 - 1. DO NOT cut truss members without prior approval of truss engineer.
 - 2. Fasten cold-formed steel roof framing by welding or screw fastening, as standard with fabricator. Wire tying of roof framing is not permitted.
 - a. Comply with AWS 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 cold-formed roof framing Manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.
 - c. Install roof framing in one-piece lengths, unless splice connections are indicated.
 - d. Provide temporary bracing and leave in place until trusses are permanently stabilized.

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- H. Erection Tolerances: Install trusses to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Space individual trusses no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements
 - I. Do not alter, cut, or remove truss members or connections of truss members.
 - J. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacing indicated.
 - K. Erect trusses without damaging truss members or connections.
 - L. Align truss bottom chords with load-bearing studs or continuously reinforce track to transfer loads to structure. Anchor trusses securely at all bearing points.
 - M. Install continuous bridging and permanent truss bracing per truss design requirements.
 - N. Install necessary roof cross and diagonal bracing per design professional's recommendations.
- 3.03 REPAIRS AND PROTECTION
- 3.04 Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanizing repair paint according to ASTM A780 and the manufacturer's instructions.

END OF SECTION