

Project Manual

Cover Page

U.S. DEPARTMENT OF ENERGY SOLAR DECATHLON 2015

Team Massachusetts and Central America

EASI House



WESTERN NEW ENGLAND
UNIVERSITY **WNE**



Primary Contact:

Kenneth Lee, Ph.D., PE

Professor and Chair

WNEU

Civil and Environmental Engineering

Sleith 216

kenneth.lee@wne.edu

(413) 782-1739

Construction Documentation Phase Project Manual

July 31, 2015

Table of Contents

Cover Page	1
Table of Contents	2
Summary of Changes.....	3
[INSERT DATE] Revision	3
[INSERT DATE 2] Revision	3
[INSERT DATE 3] Revision	3
Rules Compliance Checklist	4
Structural Calculations	7
Detailed Water Budget.....	8
Summary of Unlisted Electrical Components	9
Summary of Reconfigurable Features.....	10
Interconnection Application Form	11
Quantity Takeoff of Competition Prototype House	12
Construction Specifications	15
Division 01 - General Requirements.....	15
Division 05 – Metals	25
Division 06 – Wood, Plastics, and Composites	28
Division 07 – Thermal and Moisture Protection	30
Division 08 – Openings	31
Division 09 – Finishes	35
Division 11 – Equipment	38
Division 12 – Furnishings	39
Division 21 – Fire Suppression.....	41
Division 22 – Plumbing.....	43
Division 23 – Heating, Ventilating, and Air-Conditioning (HVAC)	45
Division 26 – Electrical.....	46
Division 48 – Electrical Power Generation	58

Summary of Changes

Significant changes to the project manual that have occurred between submissions have been outlined below. The Construction Drawings should also be reviewed for relevant revisions.

[INSERT DATE] Revision

The Project Manual has been updated from the previous issue. Revisions include:

- Revision 1
- Revision 2
- Revision 3
- Revision 4
- Revision 5
- Revision 6

[INSERT DATE 2] Revision

The Project Manual has been updated from the previous issue. Revisions include:

- Revision 1
- Revision 2
- Revision 3
- Revision 4
- Revision 5
- Revision 6

[INSERT DATE 3] Revision

The Project Manual has been updated from the previous issue. Revisions include:

- Revision 1
- Revision 2
- Revision 3
- Revision 4
- Revision 5
- Revision 6

Rules Compliance Checklist

RULE	RULE DESCRIPTION	LOCATION DESCRIPTION	LOCATION
Rule 4-2	Construction Equipment	Drawing(s) showing the assembly and disassembly sequences and the movement of heavy machinery on the competition site	O-101, O-102
Rule 4-2	Construction Equipment	Specifications for heavy machinery	01 54 19
Rule 4-3	Ground Penetration	Drawing(s) showing the locations and depths of all ground penetrations on the competition site	C-101
Rule 4-4	Impact within the Solar Envelope	Drawing(s) showing the location, contact area, and bearing pressure of every component resting directly within the solar envelope	A-114-117, Structural Calculations
Rule 4-5	Generators	Specifications for generators (including sound rating)	N/A
Rule 4-6	Spill Containment	Drawing(s) showing the locations of all equipment, containers, and pipes that will contain liquids at any point during the event	P-SERIES
Rule 4-6	Spill Containment	Specifications for all equipment, containers, and pipes that will contain fluids at any point during the event	P-102
Rule 4-7	Lot Conditions	Calculations showing that the structural design remains compliant even if 18 in. (45.7 cm) of vertical elevation change exists	L-103, Structural Calculations
Rule 4-7	Lot Conditions	Drawing(s) showing shimming methods and materials to be used if 18 in. (45.7 cm) of vertical elevation change exists on the lot	S-505, L-103
Rule 5-2	Solar Envelope Dimensions	Drawing(s) showing the location of all house and site components relative to the solar envelope	A-114-117
Rule 5-2	Solar Envelope Dimensions	List of solar envelope exemption requests accompanied by justifications and drawing references	N/A
Rule 6-1	Structural Design Approval	List of, or marking on, all drawing and project manual sheets that will be stamped by the qualified, licensed design professional in the stamped structural submission; the stamped submission shall consist entirely of sheets that also appear in the drawings and project manual	S-SERIES, Structural Calculations
Rule 6-2	Finished Square Footage	Drawing(s) showing all information needed by the rules officials to measure the finished square footage electronically	G-101, A-111, A-112
Rule 6-2	Finished Square Footage	Drawing(s) showing all movable components that may increase the finished square footage if operated during contest week	N/A
Rule 6-3	Entrance and Exit Routes	Drawing(s) showing the accessible public tour route	G-103

Rule 7-1	Placement	Drawing(s) showing the location of all vegetation and, if applicable, the movement of vegetation designed as part of an integrated mobile system	L-101, L-401
Rule 7-2	Watering Restrictions	Drawing(s) showing the layout and operation of greywater irrigation systems	N/A
Rule 8-1	PV Technology Limitations	Specifications for photovoltaic components	48 10 00
Rule 8-3	Batteries	Drawing(s) showing the location(s) and quantity of all primary and secondary batteries and stand-alone, PV-powered devices	N/A
Rule 8-3	Batteries	Specifications for all primary and secondary batteries and stand-alone, PV-powered devices	N/A
Rule 8-4	Desiccant Systems	Drawing(s) describing the operation of the desiccant system	N/A
Rule 8-4	Desiccant Systems	Specifications for desiccant system components	N/A
Rule 8-5	Village Grid	Completed interconnection application form	PM 12
Rule 8-5	Village Grid	Drawing(s) showing the locations of the photovoltaics, inverter(s), terminal box, meter housing, service equipment, and grounding means	E-SERIES
Rule 8-5	Village Grid	Specifications for the photovoltaics, inverter(s), terminal box, meter housing, service equipment, and grounding means	48 10 00
Rule 8-5	Village Grid	One-line electrical diagram	E-602
Rule 8-5	Village Grid	Calculation of service/feeder net computed load per NEC 220	
Rule 8-5	Village Grid	Site plan showing the house, decks, ramps, tour paths, and terminal box	A-110, G-102, L-101, E-101
Rule 8-5	Village Grid	Elevation(s) showing the meter housing, main utility disconnect, and other service equipment	A-114-117
Rule 9-1	Container Locations	Drawing(s) showing the location of all liquid containers relative to the finished square footage	P-101, O-109
Rule 9-1	Container Locations	Drawing(s) demonstrating that the primary supply water tank(s) is fully shaded from direct solar radiation between 9 a.m. and 5 p.m. PDT or between 8 a.m. and 4 p.m. solar time on October 1	A-114-117
Rule 9-2	Team-Provided Liquids	Quantity, specifications, and delivery date(s) of all team-provided liquids for irrigation, thermal mass, hydronic system pressure testing, and thermodynamic system operation	N/A
Rule 9-3	Greywater Reuse	Drawing(s) showing the layout and operation of greywater reuse systems	N/A
Rule 9-4	Rainwater Collection	Drawing(s) showing the layout and operation of rainwater collection systems	N/A

Rule 9-6	Thermal Mass	Drawing(s) showing the locations of liquid-based thermal mass systems	N/A
Rule 9-6	Thermal Mass	Specifications for components of liquid-based thermal mass systems	N/A
Rule 9-7	Greywater Heat Recovery	Drawing(s) showing the layout and operation of greywater heat recovery systems	N/A
Rule 9-8	Water Delivery	Drawing(s) showing the complete sequence of water delivery and distribution events	P-102, P-601, O-109
Rule 9-8	Water Delivery	Specifications for the containers to which water will be delivered	P-102
Rule 9-9	Water Removal	Drawing(s) showing the complete sequence of water consolidation and removal events	O-109
Rule 9-9	Water Removal	Specifications for the containers from which water will be removed	P-102
Rule 11-4	Public Exhibit	Interior and exterior plans showing entire accessible tour route	G-102, G-103

Structural Calculations

Insert all structural calculations.

Detailed Water Budget

FUNCTION	WATER USE (GALLONS)	CALCULATIONS		NOTES
		GAL	EVENTS	
Hot Water Draws	240	15	16	
Water Vaporization	3.75	0.625	6	
Dishwasher	50	10	5	
Clothes Washer	160	20	8	
Vegetation	0			
Fire Protection	25	25	1	
Thermal Storage Tanks	0			
Testing	0			
Initial Systems Fill	0			
Solar Thermal Collectors	0			
Aesthetic Purpose	0			
Radiant Flooring	0			
Safety Factor	47.875			
WATER REQUIRED	526.625	gallons		

Summary of Unlisted Electrical Components

No unlisted electrical components.

Summary of Reconfigurable Features

Auxiliary bedroom features a bed that may be reconfigured into a couch.

Interconnection Application Form

Team Name and Lot Number

PV Systems

Module Manufacturer	Short Description of Array	DC Rating of Array (sum of the DC ratings)
Renogy	(2) 250W Monocrystalline Panel, mounted on tracks on roof	5000

Total DC power of all arrays is 5.000 kW (in tenths)

INVERTERS

Inverter Manufacturer	Model Number	Voltage	Rating (kVA or KW)	Quantity
Emphase	M215	45VDC max	0.26 kW	20

Total AC power of all inverters is 5.2 kW kVA or kW (in whole numbers)

REQUIRED INFORMATION

The following information must be included in the project manual or construction documents. If located in the construction documents, list the drawing locations in this section of the project manual. (Example: B3/E-201)

	Location
One-Line Electrical Schematic	E-602
Calculations of service/feeder net computed load and neutral load (NEC 220)	
Plan view of the lot showing the house, decks, ramps, tour paths, the service point, and the distribution panel or load center	A-110, G-102, L-101, E-101

Provide the Team's "Electrical Engineer" contact in the "Team Officer Contact Info" database on the Yahoo Group as required per Rule 3-2.

Quantity Takeoff of Competition Prototype House

Specification Number	Brief Description	Detailed Description
Division 01 General Requirements		
01 10 00	IRC - International Residential Code	
01 10 00	National Electric Code	
01 10 00	"State Adopted and Published Codes" as Required	
01 10 00	Category III Approved for VA/FHA/FMHA	
01 10 00	State Approved, Third Party Inspections and Approvals (PFS Corporation)	
01 10 00	Continuous On-Line Quality Control Inspections	
Division 07 Thermal and Moisture Protection		
07 25 00	Siding	Vinyl siding, available in double 4" or Dutch Lap (double 5") over 7/16" OSB exterior wall sheathing.
07 25 00	Fascia	Aluminum fascia and vented vinyl soffit.
07 25 00	Truss Roof	7/12 STD truss roof 24" OC.
07 25 00	Roof Sheathing	1/2" OSB roof sheathing 30 year architectural shingles installed over roof paper underlayment and aluminum drip edge.
07 25 00	Shingles	
07 25 00	Barriers	ice and water barrier - 3'
07 25 00	Ceiling Insulation	R-30 fiberglass ceiling insulation
07 25 00	Joists	Double 2x12 S.P.F. perimeter joists and 2x6 S.P.F. ceiling joists, 16" OC (1st story on two-story models)
07 25 00	Ridge Vent	Shingle over rolled ridge vent
07 25 00	Eave Overhangs	10" Eave overhangs with aluminum fascia and vinyl vented soffit (24' and 25' wide have fixed eaves only, 27'6" and 31'6" wide have folding eaves).
07 25 00	Gable Overhangs	1 1/2" Gable overhangs with aluminum fascia.
07 25 00	Exterior Walls	2x6 S.P.F. Studs, 16" OC exterior wall construction with a single bottom plate, double top plate for all load bearing walls including R-19 fiberglass insulation.
07 25 00	Exterior Walls	Double 2x4 S.P.F. marriage wall, 16" OC
07 25 00	Exterior Wall Sheathing	7/16" OSB exterior wall Sheathing
07 25 00	House Wrap	House Wrap
Division 08 Openings		
08 10 00	Front & Rear Door	Fiberglass insulated six-panel front door and fiberglass insulated rear door with half glass (with keyed alike satin nickel lock sets), or vinyl patio door (floor plan dictates)
08 50 00	Windows & Screens	White vinyl tilt, single hung windows with stools and screens (Low E specs).
08 10 00	Interior Doors	Six panel white hollow-core colonial doors, pre-hung on wood jambs with matching colonial moldings pre-finished white.
Division 09 Finishes		

09 60 00	Carpet	25 Ounce Textured FHA approved carpet with 7/16" x 6 pound FHA approved re-bond pad
09 60 00	Kitchen/Bath Floor	Vinyl floor covering installed in kitchen, baths and utility rooms.
09 90 00	Casing/Base	2 1/4" Colonial pine casing and 3 1/4" colonial pine base pre-finished white.
09 90 00	Kitchen Moldings	Crown molding over wall cabinets
09 20 00	Interior Wall Studs/Wall partitions/Plates	2x4 S.P.F. studs, 24" OC interior wall partitions with a single bottom plate and a single top plate.
09 20 00	Interior Wall Drywall	1/2" drywall interior finished with two (2) coats of Primer Paint
09 20 00	Interior Wall Ceiling Height	8' Ceiling Height
09 90 00	Kitchen countertop	Laminate self-edge countertop with backsplash
09 60 00	Floor System	24', 25' wide units - 16" OSB 2x8 floor joists with solid wood bridging, double 2x8 S.P.F. perimeter joists glued and nailed under load bearing walls and double 2x8 S.Y.P. perimeter joists in each box under marriage wall.
09 60 00	Floor System	26', 27'6" and 31' 6" wide units - 16" OC 2x10 S.P.F. floor joists with solid wood bridging and double 2x10 S.P.F. perimeter joists glued and nailed under load bearing walls.
09 60 00	Floor System	3/4" Tongue and groove OSB subfloor glued and nailed.

Division 11 Equipment

11 40 00	Exhaust Hood	30" Vented range hood with light in white or biscuit.
11 40 00	Dishwasher:	dishwasher hookup.

Division 12 Furnishings

12 50 00	Kitchen Cabinetry	Merillat Essentials Cabinetry with matching toekick - Oak door in Milbridge recessed panel or Pemberton raised panel design
12 50 00	Bathroom Cabinetry	Vanity cabinets to match kitch cabinets
12 50 00	Bathroom Cabinetry	Medicine cabinet with light.
12 50 00	Pantry/Closet Shelves	Vented pantry and closet shelves with clothes bar.

Division 22 Plumbing

22 30 00	Faucets	Washerless faucets
22 30 00	Fresh Water	Pex fresh water supply lines stubbed through floor.
22 40 00	Valves	Shut-off valves on each fixture.
22 40 00	Bathroom Valves	Tub/shower valves with integral stops
22 40 00	PVC System	PVC schedule 40 drain, waste and vent system.
22 40 00	KITCHEN SINK	Double bowl 8" deep stainless steel sink with single-lever faucet assembly and sprayer.
22 40 00	Shower/Tub	60" one piece fiber glass tub/shower combination. Fiberglass shower stall (floor plan dictates)
22 40 00	Shower Valves	Anti-scald valves in tubs and showers.
22 40 00	Water Closet	Elongated 1.6 gallon low flow water closet
22 40 00	Lavatory Faucet	Cultured marble swirl top with integral oval bowl and single lever faucet

Division 23 Heating, Ventilating, and Air-Conditioning

23 00 00	Bathroom Ventilation	Combination fan/light ventilation unit
----------	----------------------	--

Electric baseboard heat with individual wall mounted thermostats in each room - 90 degrees max (except 75 degrees in NY per code) or hot water baseboard heating elements (optional charge for hot water baseboard for second floor of two story units). Heat plant for hot water baseboard supplied by builder.

23 00 00 Baseboard heat

Division 26 Electrical

26 00 00 Wiring

Wired per National Electric Code

26 00 00 Panel Box

200 AMP, 40 space main service panel box with main breaker, individual circuit breakers and cover

26 00 00 Receptacles

Two exterior weatherproof receptacles with G.F.I. protection (front and rear). G.F.I. protection on receptacles at kitchen countertop and at lavatories.

26 00 00 Toggle Switch

White toggle switches and receptacles throughout.

26 60 00 Smoke Detectors

AC/DC smoke detectors - one per floor and one each bedroom

26 50 00 Ceiling Lights

Ceiling lights in kitchen, dining room, hall, foyer, stairwells and above kitchen sink in brushed nickel.

26 50 00 Fan/light

Fan/light combination and medicine cabinet light in all baths

26 00 00 3 Way Switch

3 Way switch, wire and J-box for on-site basement light. Switch, wire and J-box for attic light (Attic Truss Only).

26 00 00 STD

STD location for thermostat wires will be on the living room marriage wall for 1st floor, and on hall wall for second floor unless called out otherwise by builder.

26 60 00 CO2 Detector

1 CO2 Detector per floor

26 00 00 Fault Protection

NEC Arc fault protection in bedroom locations.

SECTION 01 10 00

SUMMARY

PART 1 - GENERAL

1.01 PROJECT INFORMATION

A. Project: EASI House

1. Project Location: 1215 Wilbraham Road, Springfield, MA 01119

B. Owner: Western New England University

C. Architect: Western New England University

D. Contractor:

E. Design-Builder: Excel Homes

F. The work consists of design, construction, transportation, and assembly of a 601.4 sq.ft. house.

G. Work by Owner: Installation of foundation footings and placement of furnishings.

H. Owner-Furnished Items: The following products will be furnished by Owner and shall be installed by Contractor as part of the Work:

1. None.

1.02 WORK RESTRICTIONS

A. Contractor's Use of Premises: During construction, Contractor will have use of area indicated. Contractor's use of premises is limited only by Owner's right to perform work or employ other contractors on portions of Project.

1. Owner will occupy premises during construction. Perform construction only during normal working hours 8 AM to 5 PM Monday thru Friday, (other than holidays), unless otherwise agreed to in advance by Owner. Cleanup work areas and return to usable condition at the end of each work period.

2. Limits: Limit site disturbance, including earthwork and clearing of vegetation, to 40 feet (12.2 m) beyond building perimeter; 10 feet (3 m) beyond surface walkways, patios, surface parking, and utilities less than 12 inches (300 mm) in diameter; 15

feet (4.5 m) beyond primary roadway curbs and main utility branch trenches; and 25 feet (7.6 m) beyond constructed areas with permeable surfaces (such as pervious paving areas, storm water detention facilities, and playing fields) that require additional staging areas to limit compaction in the constructed area.

3. Driveways, Walkways, and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

- B. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor-air intakes.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 33 26

SOURCE QUALITY CONTROL REPORTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification section, apply to work of this section.

1.02 SECTION INCLUDES

- A. Quality assurance and control of installation.
- B. References.
- C. Field samples
- D. Inspection and testing laboratory services.
- E. Manufacturer's field services and reports.

1.03 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.
- B. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- C. Comply fully with manufacturer's instructions, including each step in sequence.
- D. Should manufacturer's instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- E. Comply with specific standards as a minimum quality for the Work except when more stringent tolerance, codes, or specified requirements indicate higher standards of more precise workmanship.
- F. Perform work by persons qualified to produce workmanship of specified quality.
- G. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.04 REFERENCES

- A. Conform to reference standard by date of issue current on date of Contract Documents.
- B. Obtain copies of standards when required by Contract Documents.

- C. Should specified reference standards conflict with Contract Documents, request clarification for Architect/Engineer before proceeding.
- D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.05 FIELD SAMPLES

- A. Install field samples at the site as required by individual specifications Sections for review.
- B. Acceptable samples represent a quality level for the Work.
- C. Where field sample is specified in individual Sections to be removed, clear area after field sample has been accepted by Architect/Engineer.

1.06 INSPECTION AND TESTING LABORATORY SERVICES

- A. General Contractor will appoint, employ, and pay for services of an independent firm to perform inspection and testing.
- B. Qualification for Services Agencies: Inspection and testing service agencies, including independent testing laboratories shall be prequalified as complying with "Recommended Requirements for Independent Laboratory Qualifications" by the American Council of Independent Laboratories and specialize in the types of inspections and test to be performed.
- C. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.
- D. The independent firm will perform inspections, tests, and other services specified in individual specification Sections and as required by the Architect.
- E. The agency shall notify the Architect and Contractor within 3 hours of irregularities or deficiencies observed in the Work during performance of its services.
- F. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents of approve or accept any portion of the Work.
- G. The agency shall not perform any duties of the Contractor.
- H. Reports will be submitted by the independent firm to the Architect, Owner, Contractor, and Consultant when required, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
- I. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, and assistance as requested.

1. The Contractor is responsible for scheduling of all tests. Notify Architect/Engineer and independent firm 24 hours prior to expected time for operations requiring services.
 - .2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
 3. The Contractor shall bear all extra costs due to work not being ready at scheduled time.
 4. The Contractor shall bear all costs for tests indicating non conformance with specified requirements.
- J. Retesting required because of non conformance to specified requirements shall be performed by the same independent firm on instructions by the Architect/Engineer.

1.07 MANUFACTURER'S FIELD SERVICES AND REPORTS

- A. When specified in individual specification Sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installations, quality of workmanship, start-up of equipment, test, adjust, and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplementary or contrary to manufacturer's written instructions.
- C. Submit report in duplicate within 30 days of observation to Architect/Engineer for review.

PART 2 - EXECUTION

3.01 REPAIR AND PROTECTION

- A. Repair damaged construction and restore work upon completion of inspection, testing, and similar services.
- B. Repair and protect is Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

END OF SECTION 013326

SECTION 01 51 00

TEMPORARY UTILITIES

1.01 DESCRIPTION

- A. Furnish, install, and maintain temporary onsite office, fencing, barricades, and utilities required for construction, and remove such on completion of Work.
- B. Related Work: Documents affecting Work of the Section include, but are not necessarily limited to, General Conditions, Special Conditions, and Sections in Divisions 1 through 16 of these Specifications.

1.02 REQUIREMENTS OR REGULATORY AGENCIES

- A. Comply with National Electric Code.
- B. Comply with Federal, State, and local codes and regulations and with utility company requirements.

1.03 MATERIALS

- A. Materials may be new or used, but must be adequate in capacity for required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

1.04 TEMPORARY ELECTRICITY AND LIGHTING

- A. Electricity required for construction may be taken from Owner's existing system without separate meter, if available. Contractor is responsible for verification of available supply.
- B. Install circuit and branch wiring, with area distributed boxes located so that power and lighting is available throughout the construction by the use of construction-type power cords. Provide ground-fault circuit interrupters as required by National Electric Code for temporary wiring or extension cords.
- C. Provide adequate artificial lighting for all areas of work when natural light is not adequate for work, and for areas accessible to the public in accordance with OSHA.

1.05 TEMPORARY HEAT AND VENTILATION

- A. Provide temporary heat and ventilation as required to maintain adequate environmental conditions to facilitate progress of Work, to meet specified minimum conditions for installation of materials, and to protect materials and finishes from damage due to temperature or humidity.

- B. Provide adequate forced ventilation of enclosed areas for curing of installed materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases.
- C. Portable heaters shall be standard approved units complete with controls.
- D. Pay all costs of installation, maintenance, operation and removal, and for fuel consumed.

1.06 TEMPORARY TELEPHONE SERVICE

- A. Arrange with local telephone service company, provide direct line telephone and fax service at construction site for use of personnel and employees. The construction superintendent must carry a cellular phone at all times.
- B. Pay all cost for installation, maintenance and removal, and service charges for all calls.

1.07 TEMPORARY WATER

- A. If available, water required for construction may be taken from Owner's existing system without separate meter. If not available, it shall be the Contractor's responsibility to provide temporary water.
- B. Install branch piping with taps located so that water is available throughout construction by use of hoses. Protect piping and fittings against freezing.
- C. The use of the facilities water source shall not impair normal business activities.

1.08 TEMPORARY SANITARY FACILITIES

- A. Provide sanitary facilities in compliance with laws and regulations.
- B. Service, clean, and maintain facilities and enclosures.

1.09 JOBSITE OFFICE, FENCING, BARRICADES

- A. Configuration and condition to be in accordance with the Owner's standards.
- B. Obtain Owner consent to location, prior to installation.

1.10 GENERAL

- A. Comply with applicable requirements specified in Division 15 - Mechanical, and in Division 16 - Electrical.
- B. Maintain and operate systems to assure continuous service.
- C. Modify and extend systems as work progress requires.

1.11 REMOVAL

- A. Completely remove temporary materials and equipment when their use is no longer required.
- B. Clean and repair damage caused by temporary installations or use of temporary facilities.

END OF SECTION 015100

SECTION 01 54 19

TEMPORARY CRANES

PART 1 - GENERAL

1.01 SUMMARY

- A. Structural Performance: Temporary cranes will withstand structural loads and lifts incurred in lifting, placing, and handling of all modular components.
- B. Submittal: Product Data, and structural analysis data signed and sealed by a qualified professional engineer registered in the state where the project is located.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers

- 1. To Be Determined

2.02 TEMPORARY CRANES

- A. TBD

- 1. Boom Extension: XX-XXX ft
- 5. Operational Weight: XX,XXX kg
- 6. Total Counterweight: XX ton

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Prepare ground by cleaning, removing projections, clearing obstructions, and cordoning off safe working zone, and as otherwise recommended in temporary crane manufacturer's written instructions.
- B. Ground crane securely in place, per operational specifications.
- C. Allow only licensed operators to operate machinery, manage lifts, and issue signals and commands.
- D. Ensure placement of modular components complies with foundational spacing and load requirements.

- E. Coordinate operations with structural requirements per specifications of structural engineer and crane operator.
- F. Correct deficiencies in or remove and reinstall temporary cranes that do not comply with requirements.

END OF SECTION 01 54 19

SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Miscellaneous metal required for this Work is indicated on the Drawings and includes metal items not described in other Sections of these Specifications, such as, but not limited to, prefabricated and field constructed steel stairs and railings, brick ledges, and other steel items not covered under structural steel work. The General Contractor, shall assume the overall responsibility for the provision of all miscellaneous metal and structural steel items. All exterior steel items shall be galvanized.

1.02 WORK INCLUDED

- A. This section includes, but is in no way limited to, Steel Stair, Railings, Bollards, brick ledges, slab angles, support frames, and related items.

1.03 QUALITY ASSURANCE

- A. Code for fabrication and erection: conform to applicable requirements of latest edition of A.I.S.C. Specifications for Design, Fabrication and Erection of Structural Steel for Buildings, A.I.S.C. Code of Standard Practice for Steel Buildings and Bridges, Code of Arc and Gas Welding in Building Construction of American Welding Society, and AISI Specifications for Design of Cold-Formed Steel Structural Members.

1.04 SUBMITTALS

- A. Submit shop drawings for miscellaneous metal items in accord with requirements stated in General Conditions.

1.05 PRODUCT HANDLING

- A. All miscellaneous metal items shall be stored off the ground and protected from damage. All damaged materials shall be repaired or replaced immediately with no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Steel shapes: Conform to ASTM A36, Specifications.

- B. Steel plates: Conform to ASTM A283, Specifications.
- C. Arc welding electrodes: AWS A5.1.
- D. Hot dip galvanizing: Appropriate ASTM American Hot Dip Galvanizers Association, Inc. Specifications.
- E. Tiger Brand Super S 1 ft Jack Post.

PART 3 - EXECUTION

3.01 FABRICATION

- A. Verify measurements in field, as required for work fabricated to fit job conditions. Insofar as possible, shop assemble and fit, ready for erection. Make structural steel connections, part and accessories, where applicable, conform to A.I.S.C. governing code. Execute work with sharply defined profiles, true and in proper plane with finished (exposed) surfaces and edges smooth and free from defects. Jointing and intersections of metal precision fitted with adequate fastenings. Conceal fastenings where possible.
- B. Provide holes as required for work of other trades. Paint dissimilar metals which are in contact with coat of bitumastic paint. All welding to conform to requirements of governing code and all welders to be licensed operators. When weld type not noted, provide continuous fillet weld. After welding, butt and grind welds smooth where exposed in finished work.

3.02 SHOP PAINTING

- A. After inspection, approval and before steel work leaves shop, clean off rust, mill scale, slag or flux deposit and foreign matter by means of steel scrapers, wire brushes or by other means elected by fabricator. Remove oil and grease with solvent.
- B. Paint one coat shop paint thoroughly and evenly to dry surfaces by brush, pressure spray, roller coating, flow coating at election of fabricator. Air spray equipment not allowed. Apply shop coat in accordance with good painting practice, following manufacturer's instructions for thinning. Do not paint when steel surface temperature is below dew point of atmosphere. Dry film thickness: not less than 2.0 mils.

3.03 GALVANIZING

- A. Hot dip galvanize ferrous metal for all exterior work, and other items indicated.
- B. Galvanizing: Hot dip galvanized after fabrication as per appropriate ASTM, American Hot Dip Galvanizers Association, Inc. Specifications. Galvanizing weight in accord with ASTM A90, minimum 2 oz per sq. ft.

3.04 FASTENING DEVICES

- A. Provide required devices for complete installation of work, including bolts, screws, nuts, inserts, clip angles, expansion bolts, etc. Devices for exterior ferrous metal work: galvanized.
- B. Install anchorage devices as required in concrete as that work progresses. Erect work plumb, straight, true, accurately fitted with tight joints, securely anchored.

END OF SECTION 05 50 00

SECTION 06 00 00

WOOD, PLASTICS, COMPOSITES (STRUCTURAL WOOD)

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Structural woodwork for the framing and decking of the Project.

1.02 REFERENCES

A. Materials shall be American Society for Testing and Materials (ASTM) compliant.

1.03 SUBMITTALS

A. Product Data: Submit product data for specified products.

B. Calculations: Provide structural calculations by a registered architect or professional engineer qualified to perform such work.

PART 2 - PRODUCTS

2.01 MATERIAL

A. Dimensions

1. 2" x 4" nominal, 1-1/2" x 3-1/2" actual
2. 2" x 6" nominal, 1-1/2" x 5-1/2" actual
3. 2" x 8" nominal, 1-1/2" x 7-1/4" actual
4. 2" x 10" nominal, 1-1/2" x 9-1/4" actual
5. 2" x 12" nominal, 1-1/2" x 11-1/4" actual

B. Lumber shall be of the Douglas Fir species.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. The materials shall be inspected prior to use and shall be used in construction only if they are found to be of suitable quality and dimensions. Materials found to be unsuitable in either quality or dimension are not to be used for the Work.

3.02 INSTALLATION

- A. Framing of the floors, walls, and roofs shall be assembled by a competent person(s) qualified in this type of construction work.
- B. All framing shall be assembled to national and local codes.

END OF SECTION 06 60 00

SECTION 07 25 00

WEATHER BARRIERS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section specifies the installation of vinyl siding, sealants, and insulation.

1.02 INSTALLATION REQUIREMENTS

- A. The siding and insulation shall be installed according to manufacturer's specifications by person(s) capable of performing the Work at sufficient quality.

1.03 SUBMITTALS

- A. Product Data: Submit product data for specified products.

PART 2 - PRODUCTS

2.01 VINYL SIDING

- A. Vinyl siding shall be obtained and installed by contractor as per manufacturer's specifications.

2.02 SEALANT

- A. Airtight and waterproof sealant of contractor's preferred type shall be used to waterproof and insulate the exterior from weather.

2.03 INSULATION

- A. Insulation of contractor's preferred type shall be used in all walls and roofs as per code requirements.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Contractor shall install all materials as per their respective manufacturer's specifications.
- B. Any material found unsuitable for protection from weather shall not be used for Work and replacement material shall be obtained.

END OF SECTION 07 25 00

SECTION 08 10 00

DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Engineered sliding/folding wood and glass door system, including wood/aluminum frame, threshold, wood panels, sliding/folding and locking hardware, splines, weather stripping, glass and glazing; with sizes and configurations as shown on drawings and specified herein.

1.02 SUBMITTALS

- A. Detail Drawings: Indicate dimensioning, direction of swing, configuration, swing panels, typical head jamb, side jambs and sill details, type of glazing material, and handle height.
- B. Product Data: Manufacturer's specifications for all products included.

1.03 QUALITY ASSURANCE

- A. Manufacturer: Provide complete, precision built, engineered, pre-fitted unit by a single source manufacturer with at least 25 years experience in providing folding/sliding door systems for large openings in the North American market.
- B. Performance Requirements: Provide from manufacturer that has independently tested typical units. Testing results to include air infiltration in accordance with ASTM E 283, water penetration in accordance with ASTM E 547, structural loading in accordance with ASTM E 330, and forced entry in accordance with AAMA 1303.5 and CAWM 300-96.

1.04 WARRANTY

- A. Provide manufacturer's standard warranty against defects in materials and workmanship.
- B. Warranty Period: Ten years for rollers and for seal failure of insulated glass supplied. For all other components, one year (two years if unit is installed by manufacturer's certified trained installer) from date of delivery by manufacturer.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Doors of size and type specified in the drawings shall be obtained by contractor from desired manufacturer for installation in the Project.

- B. External doors are to be provided by manufacturer Menck Windows for contractor to install.

PART 3 - EXECUTION

3.01 INSPECTION

- A. All products shall be inspected before installation for any structural or visual defects.
- B. Any products not meeting minimum standards shall not be installed and shall be replaced.

3.02 INSTALLATION

- A. All products shall be installed by contractor as per manufacturer's specifications.

END OF SECTION 08 10 00

SECTION 08 50 00

WINDOWS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Engineered sliding/folding wood and glass windows system, including wood/aluminum frame, threshold, wood panels, sliding/folding and locking hardware, splines, weather stripping, glass and glazing; with sizes and configurations as shown on drawings and specified herein.

1.02 SUBMITTALS

- A. Detail Drawings: Indicate dimensioning, direction of swing, configuration, swing panels, typical head jamb, side jambs and sill details, and type of glazing material.
- B. Product Data: Manufacturer's specifications for all products included.

1.03 QUALITY ASSURANCE

- A. Manufacturer: Provide complete, precision built, engineered, pre-fitted unit by a single source manufacturer with at least 25 years experience in providing folding/sliding window systems for large openings in the North American market.
- B. Performance Requirements: Provide from manufacturer that has independently tested typical units. Testing results to include air infiltration in accordance with ASTM E 283, water penetration in accordance with ASTM E 547, structural loading in accordance with ASTM E 330, and forced entry in accordance with AAMA 1303.5 and CAWM 300-96.

1.04 WARRANTY

- A. Provide manufacturer's standard warranty against defects in materials and workmanship.
- B. Warranty Period: Ten years for rollers and for seal failure of insulated glass supplied. For all other components, one year (two years if unit is installed by manufacturer's certified trained installer) from date of delivery by manufacturer.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All windows are to be provided by manufacturer Menck Windows for contractor to install.

PART 3 - EXECUTION

3.01 INSPECTION

- A. All products shall be inspected before installation for any structural or visual defects.
- B. Any products not meeting minimum standards shall not be installed and shall be replaced.

3.02 INSTALLATION

- A. All products shall be installed by contractor as per manufacturer's specifications.

END OF SECTION 08 50 00

SECTION 09 20 00

PLASTER AND GYPSUM BOARD

PART 1 - GENERAL

1.01 SUMMARY

- A. Sections includes all plaster and gypsum board (drywall) products and their installation.

1.02 SUBMITTALS

- A. Product Data: All manufacturer's product data sheets for all relevant products.

PART 2 - PRODUCTS

2.01 DRYWALL

- A. Drywall material is to be obtained by contractor for the inclusion in the Work.
- B. All materials must be of sufficient quality to be used in the Project.

PART 3 - EXECUTION

3.01 INSPECTION

- A. All materials are to be inspected for defects before being used for the Work. If any materials are found to be unsuitable for inclusion then they are not to be used, and replacement materials must be obtained.

3.02 INSTALLATION

- A. The products are to be installed according to the manufacturer's specifications or the standard practices of the contractor, whichever is more stringent.

END OF SECTION 09 20 00

SECTION 09 60 00

FLOORING

PART 1 - GENERAL

1.01 SUMMARY

- A. Sections includes the tiling and carpeting to be installed as part of the Work.

1.02 SUBMITTALS

- A. Product Data: All manufacturer's product data for all products use in this section.

PART 2 - PRODUCTS

2.01 CARPETING

- A. Contractor provided carpeting shall be installed in the two bedrooms and living areas as described in the drawings.

2.02 TILING

- A. Contractor provided tiling shall be installed in the kitchen and bathroom areas as described in the drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Flooring shall be installed according to manufacturer's specifications or contractor's standard practice, whichever is more stringent.

3.02 INSPECTION

- A. Flooring shall be inspected for any visual defects or walking impediments. If sufficient visual defects or any movement impediments are found those sections shall be redone to ensure proper quality of the Project.

END OF SECTION 09 60 00

SECTION 09 90 00

PAINTING AND COATING

PART 1 - GENERAL

1.01 SUMMARY

- A. Sections includes details of interior wall coverings.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's data on any products used.

PART 2 - PRODUCTS

2.01 PAINT

- A. A paint of contractor's choosing of a color predetermined by contractor and owner to be rolled on.

PART 3 - EXECUTION

3.01 APPLICATION

- A. All interior walls are to be painted with roller and brushes to completely cover all visible portions of wall.
- B. OSHA regulations must be followed in regards to keeping paint fumes from accumulating and/or possibly igniting.

3.02 INSPECTION

- A. All walls shall be inspected for a full and even application of paint. Any significant defects shall either be redone, or left for repainting by owner, at owner's discretion.

END OF SECTION 09 90 00

SECTION 11 40 00

KITCHEN EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes kitchen equipment including but not limited to dishwasher, refrigerator, and freezer.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's data sheets for all products.

PART 2 - PRODUCTS

2.01 DISHWASHER

- A. Frigidaire 24" Built-In Dishwasher

1. Manufacturer: Frigidaire
2. Product Number: FFBD2411NB
3. Dimensions: 24" x 25" x 35"

2.02 REFRIGERATOR-FREEZER

- A. LG 10.1-cu. ft. Bottom-Freezer Refrigerator

1. Manufacturer: LG
2. Product Number: LBN10551SW
3. Dimensions: 68 1/5" x 23 3/8" x 25 3/8"

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Products shall be installed as per manufacturer's specifications.

END OF SECTION 11 40 00

SECTION 12 50 00

FURNITURE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes all furniture being used in finalizing the Project.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's data on all included furnishings.

PART 2 - PRODUCTS

2.01 BEDS

A. Master Bed

- 1. Manufacturer: Resource Furniture
- 2. Product Number: Maori

B. Auxiliary Bed/Sofa

- 1. Manufacturer: Resource Furniture
- 2. Product Number: Nuoviola '10 2896

2.02 CHAIRS

A. Lounge Chair

- 1. Manufacturer: Resource Furniture
- 2. Product Number: Flip Chair in Green

B. Kitchen Chairs

- 1. Manufacturer: Resource Furniture
- 2. Product Number: Pocket Chair S5 W1

2.03 TABLES

A. Kitchen Table

1. Manufacturer: Resource Furniture
2. Product Number: Goliath L061

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All furniture shall be installed as prescribed in the manufacturer's instructions.

END OF SECTION 12 50 00

Division 21 - Fire Suppression

SECTION 21 10 00

WATER-BASED FIRE SUPPRESSION SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes the water based fire suppression system to be installed.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's data sheet pertaining to products.
- B. Compliance with national fire codes.

PART 2 - PRODUCTS

2.01 FIRE SUPPRESSION SYSTEM

- A. Contractor constructed and installed water based fire protection system.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. System shall be installed as per manufacturer/contractor's specifications.

3.02 INSPECTION

- A. System shall be tested and verified to work under expected conditions.

END OF SECTION 21 10 00

SECTION 21 40 00

FIRE SUPPRESSION WATER STORAGE

PART 1 - GENERAL

1.01 SUMMARY

- A. Sections includes tanks used for storing of water for fire suppression system.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's product data for all included products.

PART 2 - PRODUCTS

2.01 WATER TANKS

- A. Two 200 gallon tanks are to be used for holding the Project's supply of domestic water, which shall be used for fire suppression purposes in the event of emergency.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Tanks shall be installed in a relatively shaded area according to the drawings in a manner according to the manufacturer's specifications.

END OF SECTION 21 40 00

SECTION 22 30 00

PLUMBING EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Sections includes the plumbing equipment used in Project.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's data sheet for all products.

PART 2 - PRODUCTS

2.01 WATER HEATER

- A. 11 kW 2.14 GPM Self-Modulating Electric Tankless Water Heater

- 1. Manufacturer: EcoSmart
- 2. Product Number: 203316215

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Product to be installed in main water line by contractor according to the manufacturer's specifications.

END OF SECTION 22 30 00

SECTION 22 40 00
PLUMBING FIXTURES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes details on plumbing fixtures such as toilets, bathtubs, and sinks.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on all products.

PART 2 - PRODUCTS

2.01 SINKS

- A. Kitchen sink is one chosen from contractor's standard options to be installed by contractor.
- B. Bathroom sink is one chosen from contractor's standard options to be installed by contractor.

2.02 BATHTUB/SHOWER

- A. The bathtub/shower combination is chosen from contractor's standard options to be installed by contractor.

2.03 TOILET

- A. The toilet is chosen from contractor's standard options to be installed by contractor.

PART 3 - EXECUTION

3.01

- A. All products are to be installed according to the contractor's standard procedures.
- B. Products are to be inspected for damages and if any are found they are to be replaced.

END OF SECTION 22 40 00

Division 23 - Heating, Ventilating, and Air-Conditioning (HVAC)

SECTION 23 00 00

HVAC

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes heating, ventilation, and air-conditioning equipment.

1.02 SUBMITTALS

- A. Product Data: All manufacturer product data sheet for the included products.

PART 2 - PRODUCTS

2.01 HVAC

- A. High Efficiency 9,000 BTU Ductless Mini Split Conditioner
- B. Product Number: 203536865

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Product is to be installed at manufacturer's specifications by contractor as part of the Work.

END OF SECTION 23 00 00

SECTION 26 00 00

ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF WORK

- A. Drawings: Refer to the E-series drawings for graphic representations, schedule, and notations showing electrical work.
- B. Specifications: Refer to the Division 26 sections for the primary technical specifications of electrical work.
- C. This work includes furnishing and installing all electrical material, accessories, supports, conduit, wire, connections, grounding, excavating, and all other labor and materials indication on the drawings of specified herein and required by codes. This includes all electrical materials and connections required for operation of all items of equipment furnished under other sections of these specifications. For clarity some items may be noted as "BY ELECTRICAL CONTRACTOR" or "IN THIS CONTRACT."
- D. Work Included:
 - 1. The work under this section is not limited to, but shall include:
 - 2. Electric service conduits and cables and utility company service charges.
 - 3. Coordinate with electrical utility company and provide metering facilities to comply with utility company requirements.
 - 4. Coordinate with Telephone Company and provide telephone service conduits to comply with telephone company installation requirements.
 - 5. Main metering switchboard, panelboards, and feeders for a complete power and lighting distribution system.
 - 6. Lighting fixtures, lamps, outlet boxes, conduit, wiring devices, control components, buck-boost transformers, power supplies for low-voltage lighting fixtures, and accessories.
 - 7. Conduit and wire for low voltage controls. Final connections by electrical contractor.

8. Permit, plan check, and inspection fees.
 9. Starters and disconnects for all fan motors. These shall include all components to make shunting under hoods fully operational.
 10. Any fees or assessments required by local authorities are a part of the electrical contract.
 11. Installation of ceiling fans by electrical contractor.
 12. Motors.
 13. Connection of low voltage wiring to air conditioning controls.
- E. Equipment provided under other sections, but connected under this section.
1. Mechanical and plumbing.

1.03 BIDDING

- A. All electrical equipment shall be new unless specified otherwise in the specifications or on the drawings.

1.04 COORDINATION OF ELECTRICAL WORK

- A. General: Refer to the Division 1 sections for general coordination requirements applicable to the entire work. It is recognized the the contract documents are diagrammatic in showing physical relationships, which must be established within the electrical work, and in its interface with other work including utilities and mechanical work, and that such establishment is the exclusive responsibility of the Electrical Subcontractor.
- B. Arrange electrical work in a neat, well organized manner with conduit and similar services running parallel with primary lines of the building construction, and with a minimum of 8' overhead clearance where possible.
- C. The electrical plans are diagrammatic, but shall be followed as closely as actual construction and the work of other trades will allow. Such minor changes as are necessary to make the electrical work conform to the work of other trades and to the building shall be made without cost to the Owner.
- D. The Electrical Contractor shall not combine circuits not shown to be combined. Furthermore, this electrical contractor shall not extend circuit, shown on the drawings as routed in the floor, overhead; nor extend circuits, shown on the drawings as routed overhead, in the floor, without first obtaining approval from the Engineer. This electrical contractor shall not prepare and/or use electrical contractor prepared rough-in drawings without first obtaining approval from the Engineer.

- E. Where unauthorized design changes are found, the work shall be disapproved and the contractor shall remove the work and extend it as shown on the Drawings.
- F. The Electrical Contractor shall coordinate the installation of electrical conduits with any cable tray to maintain required clearances.

1.05 QUALITY ASSURANCE AND STANDARDS

- A. General: Refer to Division 1 for general administrative/procedural requirements related to compliance with codes and standards. Specifically, for the electrical work (in addition to standards specified in individual work sections), the following standards are imposed, as applicable to the work in each instance.
 - 1. ANSI C 2, National Electrical Safety Code.
 - 2. NECA standards standards for installation.
 - 3. NEMA standards for materials and products.

1.06 LAW, CODES, AND ORDINANCES

- A. All work and material shall conform to the requirement of OSHA and all national and state Laws and ordinances having jurisdiction at the job site. The (NEC) National Electric Code, 2014 Edition, or latest edition being enforced, shall be strictly adhered to. NEC requirements are considered "minimum requirements." Where requirements of the contract documents exceed NEC, the contract documents govern.
- B. Secure permits and pay permit and inspection fee as required by local authorities.
- C. Upon completion of the work, furnish to the Owner a certificate of final inspection and approval from the electrical inspection bureau having jurisdiction.
- D. All electrical systems shall be grounded in strict accordance with the requirements of the National Electrical Code.

1.07 INDUSTRY PUBLICATION STANDARDS

- A. The publications and standards of the latest issue at the time of bid, of the following organizations, where referenced in these specifications or on the drawings, shall apply:
 - 1. ANSI-American National Standards Institute.
 - 2. ASTM-American Society of Testing and Materials.
 - 3. CBM-Certified Ballast Manufacturers Association.
 - 4. IEEE-Institute of Electrical and Electronic Engineers.

5. IPCEA-Insulated Power Cable Engineers Association.
6. NEC-National Electric Code.
7. NECA-National Electrical Contractors Association.
8. NEMA-National Electrical Manufacturers Association.
9. NESC-National Electrical Safety Code.
10. NFPA-National Fire Protection Association.
11. UL-Underwriters Laboratory.
12. IESNA-Illuminating Engineering Society of North America

1.08 EXISTING UTILITIES

- A. The drawings indicate the locations, type, and sizes of various utilities within the site where known. These utilities are indicated as accurately as possible. If the Contractor encounters any utilities or differing conditions during construction, which are not shown on the drawings, they shall request in writing for written instructions from the Architect and/or Engineer. Any relocation or remodeling required will then be directed by a change order. This Contractor shall assume all responsibility for protection of all utilities, shown or not, and for repair required by this construction.
- B. Contractor shall verify location, size, elevation, and any other pertinent data of the existing utilities. The Contractor shall provide a written report with drawings indicating this existing utilities information, such as utility locations information. Additional costs incurred due to failure to verify such data and to coordinate associated work with respective utility providers shall not be the Owner's responsibility but shall be borne by the Contractor.
- C. All costs associated with providing utilities including, but not limited to, connection fees, meters, boring under roads, etc., shall be included in the Contractor or charged by the utility company.
- D. Submission of a bid by the Contractor shall be considered an acknowledgement by the contractor of his compliance with this section.
- E. The Contractor shall coordinate with Owner, Architect, and this Engineer's office any work that has the potential to hinder electrical services to areas outside this contract. All shut downs or tie-ins relating to these systems shall be scheduled and submitted in writing to be approved by the Owner, Architect, and this Engineer's office. Contractor shall submit in writing a schedule of construction phasing that indicates areas of first priority during each phase and anticipated completion times. Schedules shall be submitted a minimum of 7 days prior to commencing work. Owner, Architect, and this Engineer's office shall

review these schedules and notify the contractor of acceptance prior to commencement of work.

1.09 SUBMITTALS

- A. General: Refer to Division 1 for general requirements concerning work related and administrative submittals. All descriptive and technical data and shop drawings shall bear signed certification by the Electrical Subcontractor to the effect that they have been carefully examined and found to be correct with respect to dimension, space available, non-interference with other trades and that the equipment complies with all the requirements of these specifications. Submittals will be rejected if signed certification is not included. Where catalog data are submitted, the proposed items shall be clearly "flagged" or otherwise identified, so that no confusion exists. Site lighting substitutions shall meet performance specifications indicated on lighting plan. Substitute interior specialty lighting fixtures shall be approved by the engineer and owner 10 days prior to bid date.

1.10 DRAWING AND DRAWING CONFLICTS

- A. Contract drawings are diagrammatic only and are not intended to be scaled for dimensions. All dimensions shall be taken from Architectural drawings, certified equipment drawings and from the structure itself before fabricating and work. All space requirements shall be verified, coordinated with other trades, as it is the various Contractors' responsibility to install the systems complete in the space provided without extra charges to the Owner.
- B. It is intended that anything, including labor and materials, which is usually furnished as part of any equipment specified and which is necessary for operation shall be furnished as part of the Contract without additional cost, whether or not shown or described.
- C. All piping in finished areas of the building shall be concealed except where otherwise noted on the drawings.
- D. All equipment shall be installed in accordance with manufacturer's recommendations, unless approval is given in writing by the Consulting Electrical Engineer for deviation prior to commencement of work.
- E. In the event of a conflict or inconsistency between items indicated on the drawings and in the specifications or conflicts with code requirements applying to the same item, that drawing indication, note, specification or code which prescribes and establishes the higher standard, provides for a better grade of material or provides a more complete job shall take precedence. The Contractor shall notify Engineer and Architect to obtain a clarification.
- F. All materials not approved by Engineer and Architect and all material not properly installed, shall be promptly removed from the premises by the Contractor, whether or not it has been incorporated into the work. The Contractor shall then promptly replace and reconnect all work in accordance with the drawings and specifications, at his own

expense, and shall also bear the expense of restoring all work of other trades damaged or dislocated by such removal or replacement.

- G. Should the Contractor refuse to remove and replace unsatisfactory materials and installation, and restore work of other trades after having been notified by Engineer and Architect, the Engineer/Architect and owner shall have the right to enter upon the work and procure such materials and labor required to remove and replace all unsatisfactory work and restore work of other trades, in order to complete the project. All costs incurred by Owner/Engineer/Architect for such corrective work shall be borne by the Contractor.
- H. Submittals shall indicate minimum access and service clearances for the submitted equipment.

1.11 STRUCTURAL CONDITIONS - SPECIAL NOTE

- A. Where conduits, sleeves, inserts, supports, cabinets, fixtures and other material are to be attached to, pass through, or interfere with, any structural member, or where notching, boring or cutting of any structural member is necessary, or where special openings are required through floors, footings, foundations, walls, roofs, or other structural elements to accommodate the electrical work, this Contractor shall obtain the approval of Owner/Engineer/Architect and shall coordinate all such work with the General Contractor, and other trades. The Electrical Contractor shall perform all such work and shall patch and repaint all members and surfaces damaged or soiled in performing the electrical installation, unless specifically instructed otherwise.
- B. Where conduits pass through walls or foundations, seal around conduits to make the work watertight. Where conduits pass through roofs, provide galvanized metal flashing and seal with a suitable compound, intended for the purpose to make the work watertight.
- C. See schematics and plans for conduits through roof on Architectural and M/E/P drawings.

1.12 WARRANTY

- A. All materials and equipment shall be new unless otherwise specified.
- B. Guarantee all workmanship, material and equipment and replace any found defective without cost to the Owner, for ONE year after final acceptance, as defined in General Conditions.
- C. Each warranty for longer than one year as described above (that comes with equipment used on the job) shall be passed into the Owner in the Operation and Maintenance Manual, along with the dates of start and end of warranty.
- D. Refer to General Conditions for additional information regarding specific warranty requirements.

1.13 PROJECT RECORD DOCUMENTS

- A. Before final payment, provide the Architect with one clean set of drawings and specifications corrected up-to-date as job progress. These documents shall reflect the As-Built conditions. Refer to General Conditions for additional information.

1.14 SUBSTITUTED PRODUCTS

- A. It shall be the Contractor's responsibility to verify that submitted substitute equipment will fit in space available. The contractor's submittal for acceptance of the substitute shall include a written statement of whether or not such acceptance would require any subsequent or associated changes to the drawings or specifications. Any such changes shall be described in writing, briefly but complete.
- B. The Contractor shall be responsible for the costs of any such modifications due to substitution of materials or equipment for that which was specified or scheduled.
- C. The Engineer may request detailed shop drawing or plan layouts of electrical rooms or systems of the substituted equipment.

1.15 SAFETY

- A. General: Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the work, and Contractor shall comply with all laws governing safety, specifically the "Occupational Safety and Health Standards" and the "Safety and Health Regulations for Construction", state and federal.
- B. According to OSHA, a hazardous chemical is any chemical, which is a physical hazard or a health hazard. This may include items such as paints, solvents, adhesives, sealants, cleaners, etc. If a contractor produces, uses, or stores hazardous chemicals at the workplace, then contractor shall develop, implement, and maintain a hazard communication program in compliance with the latest OSHA requirements. In projects with multiple tenants in which the building is partially occupied during all or part of the project, Contractor shall inform the building manager or Owner, according to OSHA guidelines, of any hazardous chemicals being produced, stored, or used in the building so that other tenants may be notified. Contractor shall employ required methods of training, information, handling, ventilation, labeling, storing, disposal, and removal of hazardous chemicals.

1.16 LABELING

- A. Each device for which an independent testing authority has established a standard shall have affixed a label indicating its compliance and listing. Refer to General Conditions for list of such independent testing authorities.

1.17 SITE VISIT REPORTS

- A. During the course of the job, the Engineer will make site visits to observe work in progress and will subsequently prepare a written site visit report, which will be sent to the Contractor and to whomever else the Engineer desires. The Contractor shall prepare a

written and typed response within seven (7) calendar days of his receiving the site visit report. The General Contractor shall include in his response the following information.

1. Date of site visit by the Engineer.
2. Date of receipt of the site visit report.
3. Name and title of the preparer of the response.
4. An item number referenced in the site report.
5. A brief three or four word description of the item.
6. The Contractor or Subcontractor affected.
7. The proposed course of action, and
8. An expected time of completion of that action.

1.18 CUTTING AND PATCHING

- A. No joists, beams, girders, columns, slabs, or other structural elements shall be cut, drilled, or altered in any way by the Contractor without first obtaining written permission and instructions from the Engineer and Architect.
- B. Where it is necessary to cut through any non-structural elements of walls, floors, or ceilings to permit the installation of any work under this contract, or to repair any defects that may appear up to expiration of the guarantee, such cutting shall be done by the Contractor with as little damage as reasonably possible to the element being cut or to adjacent elements.
- C. After the necessary work has been completed, the damage shall be repaired by the respective Contractor, who shall pay all costs of such cutting, repairs and patching. All patching or sealing of cuts and penetrations, including final appearance of same, shall be done to the approval of the Engineer and Architect.

1.19 INSURANCE

- A. The Contractor shall have required insurance. Required insurance shall be provided by this Contractor for protection against public liability and property damage for the duration of work.

1.20 CONFLICTS AND CORRECTION OF WORK

- A. Promptly correct work rejected or failing to conform to the requirements of the Contract, whether observed before or after substantial completion and whether or not fabricated, installed or completed. The Contractor shall bear cost of correcting such rejected and nonconforming work

including additional testing and inspections and including compensation for observing mechanical and electrical engineering firm's services and expenses made necessary thereby.

- B. If a conflict occurs on the bid documents, the Contractor shall contact the Architect's and Engineer's offices with a written request for clarification. If the conflict is unresolvable at the time of bid, the most expensive interpretation of the conflict shall be bid so the conflict can be resolved in a deductive manner at a later time if necessary.
- C. If a conflict is discovered during construction, the Contractor shall stop work and that portion of the project and contact the appropriate party for clarification. The request for clarification shall be in written form. The Contractor shall bear the burden of replacing work that has been installed incorrectly as a result of a conflict on the drawings where he has not sought the Architect's and/or Engineer's guidance for clarification.

1.21 COMMISSIONING

- A. Coordinate all work with the commissioning agent and the commissioning specifications.

1.22 COORDINATION

- A. In a timely manner, and coordinated with all work involved, prepare and submit a trade composite work plan to be integrated into the Commissioning Plan for the following areas:
 - 1. Where new work of three or more trades or subcontractors is installed.
 - 2. Where lead times are critical to the project schedule.
 - 3. Provide construction grade drawing as needed to acquire approval of work plan.
 - 4. Access or service spaces required for Electrical equipment.
- B. Provide final coordination plan to be integrated into the Commissioning Plan to account for:
 - 1. Matching the work to the final selection of equipment; incorporating manufacturer's published instructions into the design;
 - 2. Changes in equipment arrangement, and associated changes in equipment piping, ducting, and electrical work different from what is shown or specified;
 - 3. Changes by manufacturer between date of design and date of delivery of equipment;
 - 4. Relocations resulting from more than one trade being shown or specified in these drawings and specifications in the same location;
 - 5. Addition of minor structural, mechanical, and electrical work for a complete system;

6. And similar circumstances as described above;
7. Work shall not be installed prior to written reply acknowledging that coordination drawing submittals have accomplished the specified intent of coordination. Relocations of work installed prior to coordination drawing acknowledgment, if subsequently required to avoid interference, shall be made.

END OF SECTION 26 00 00

SECTION 26 50 00

LIGHTING

PART 1 - GENERAL

1.01 SUMMARY

A. This section included all forms of internal and external electrical illumination.

1.02 SUBMITTALS

A. Product Data: Manufacturer's data sheets for all products used.

PART 2 - PRODUCTS

2.01 LIGHTING FIXTURES

A. All lighting fixtures needed as indicated on the drawings shall be acquired and installed by contractor as part of the Work.

B. All lighting fixtures shall be new unless otherwise specified by Owner.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Fixtures are to be inspected for defects and tested to work properly. Any products not meeting the minimum qualifications are not to be used and replacements are to be obtained.

B. All fixtures are to be installed according to manufacturer's specifications.

END OF SECTION 26 50 00

SECTION 26 60 00

FIRE ALARM

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes fire alarms to be used in the Project.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets.
- B. Compliance with NFPA codes.

PART 2 - PRODUCTS

2.01 FIRE ALARM

- A. One AC/DC fire alarm per floor and one per room shall be installed by contractor as per regulations.
- B. Fire alarms may be obtained by contractor so long as they are compliant with all required codes and meet quality minimums.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Products shall be inspected for any defects and tested to ensure working order. Products not meeting the minimum qualifications are not to be used in the Work and replacements must be obtained.
- B. Products shall be installed according to manufacturer's specifications by contractor.

END OF SECTION 26 60 00

SECTION 48 10 00

ELECTRICAL POWER GENERATION EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Sections includes photovoltaic panels and their inverters.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's data sheets for all products.

1.03 QUALITY

- A. Products shall comply with NFPA 7, "National Electric Code."
- B. Products shall comply with FCC part 15-B.
- C. Each photovoltaic panel and microinverter shall be inspected for any defects and shall be tested to perform at manufacturer specifications. Products failing to meet the minimum requirements shall not be used in the Work and replacement parts shall be obtained.

PART 2 - PRODUCTS

2.01 PHOTOVOLTAIC PANELS

- A. Twenty photovoltaic panels rated at 250 Watts are to be used as the power source for the Project.
- B. Two rows of ten panels shall be connected in series according to the drawings.

2.02 MICROINVERTERS

- A. Each photovoltaic panel shall have a rated input of at least 250 Watts and convert power from DC to AC.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Measure the AC voltage of the service entrance conductors.
- B. Ground the microinverters

3.02 INSTALLATION

- A. Install the AC branch circuit junction box.
- B. Connect the AC interconnect cable to the junction box.
- C. Mark the approximate center of each photovoltaic solar module on the racking system.
- D. Attach microinverters using the manufacturer's racking hardware.
- E. Connect microinverters to the AC interconnect cable.
- F. Attach included protective end cap onto the unused connection of the last microinverter.
- G. Connect the ground conductor to each microinverter in the location marked "Grounding Electrode Terminal."
- H. Torque the ground clamp screw to 20 inch pounds.

END OF SECTION 48 10 00