



## Construction Specifications

### Structure & Systems

**NOTE: These specifications are a DRAFT document. When finalized, this note will be removed.**

**Latest Update – 12/16/05**

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## **NOTICE**

All specifications contained in this document shall be included in, or shall be referenced in, or shall be assumed to be included in and referenced in, any contracts, statements of work, memorandum of agreement, or any other type of document or agreement, whether written or verbal, which shall be executed between SUPPLIERS, CONTRACTORS and OWNERS.

# CONSTRUCTION SPECIFICATIONS

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# DIVISION 1 - GENERAL REQUIREMENTS

**1.1 Square Footage** - Interior finished square footage figures represent heated and cooled floor area only and do not include garage, workshop, mechanical room, decks, porches or any other unfinished or semi-finished areas. These dimensions are generally measured from the outside face of the stud.

<b>2,050 sf</b>	<b>Finished Interior</b>
<b>2,038 sf</b>	<b>Garage / Workshop</b>
<b>50 sf</b>	<b>Rear Deck</b>
<b>175 sf</b>	<b>Front Porch</b>
<b>4,313 sf</b>	<b>Total</b>

**1.2 Codes** - Construction shall comply with all applicable national, state and local building codes applicable to Los Animas County, in the State of Colorado. It is the responsibility of the SUPPLIER or CONTRACTOR to insure compliance with said codes and modify the SUPPLIER or CONTRACTOR specifications, practices, processes, and procedures as needed to comply with such codes.

**1.3 Contradiction of Documents** - Any contradiction or discrepancy between this specification document, and any contract, construction drawing, or any other specification document, shall be reported to the architect and general contractor for resolution. **No work shall be performed until the architect and general contractor resolve any such contradiction or discrepancy, and appropriate document corrections are issued and received.**

## Division 2 - Site Work

**02230 – Site Clearing** - Clear and grub the construction site. Existing trees to remain shall be marked prior to clearing and protected to prevent damage. Any damaged vegetation or terrain that is indicated to be protected, or is more than eight feet from the edge of any construction, shall be repaired or replaced.

**02540 - Septic Systems** – Excavate area for septic tank as shown on construction documents, and as required by the local Health Department. Install pre-cast concrete rectangular septic tank with adjoining infiltrator field a minimum of 2'-0" below ground surface at a level which will properly intercept pre-placed DWV from structure. See manufacturer's specifications for drain field requirements and additional installation guidelines.

**02621 – Structure Drainage System** – Install a minimum 4" slotted drain pipe with a positive outflow around exterior structure eaves, imbedded in loose fill gravel, minimum 12" deep, and located 12" below finished grade at eave line. Slotted drainpipe should be wrapped with an appropriate geo-technical fabric or sleeve to prevent silt buildup.

**02700 - Final Grading** - Keep exterior finished grade a minimum of 6 1/2" below finished sill elevation (see construction documents for exact locations) by backfilling or excavating appropriate soils. Provide positive outfall and slope grade away from building at a 1/20 ft ratio to allow water to drain away from the building foundation.

**02752 - Concrete Pads, Walks, and Patio** – All exterior walkways, patios, and porches shall consist of a 4" thick slab on sub-grade compacted to 98 percent density with 3000-PSI concrete. Provide faux-crete design and color finish and texture for all exterior walkways, patios, and porches slabs in accordance with contract documents and schedules. Consult appropriate construction documents and schedules for additional information and locations. Expansion joints shall be installed as in standard concrete practices for faux-crete installations. Control joints shall be installed as in standard concrete practices for faux-crete installations, at pre-determined locations no later than 12 hours after installation. Slope all exterior slab away from building one quarter-inch (1/4") of drop per one (1) foot of run. At garage slab, taper lip at garage door.

# Division 3 - Concrete

## 3.1 A General:

1. Standards – all concrete work shall be in conformance with the following standards:
  - a. ACI 117 - "Specifications for Tolerances for Concrete Construction and Materials"
  - b. ACI 301 - "Specification for Structural Concrete for Buildings."
  - c. ACI 304 - "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete".
  - d. ACI 305 - "Hot Weather Concreting."
  - e. ACI 306 - "Cold Weather Concreting."
  - f. ACI 315 - "Manual of Standard Practice for Detailing Reinforced Concrete Structures."
  - g. ACI 318 - "Standard Building Code Requirements for Reinforced Concrete."
  - h. ACI 347 - "Recommended Practice for Concrete formwork."

## 3.1 B Products:

1. Reinforcing rods – ASTM A305 and ASTM A615, grade 60
2. Wire Fabric – ASTM A185
3. Portland Cement – type I, ASTM C150
4. Aggregate – 3/4 inch Stone, ASTM C303, clean sharp sand free of clay, silt, loam or organic materials.
5. Water – clean, potable
6. Grout – Premixed, non-shrink type.
7. All concrete shall be 3000psi minimum compressive strength at 28 days.

## 3.1 C Execution:

1. Concrete Mix – (**NOTE: Contractor shall state whether they will use OPTION 1 (site mix) or OPTION 2 (plant mix) for concrete placement**)
  - a. **OPTION 1** - All concrete shall be site mixed in conformance with ASTM C-94 OR **OPTION 2** - All concrete shall be plant mixed in conformance with ASTM C-94.
  - b. No salts or additives shall be added to the mix once it enters the on-site mixer, or leaves the plant.
  - c. All plant mixed concrete shall be certified, and each delivery ticket shall state: strength of concrete; percent of air entrainment; additives included; and time of departure from plant.
  - d. Random slump test(s) shall be performed at the CONTRACTORS discretion.
  - e. Two core tests (for OPTION 1 site mixed concrete) or one core test per plant mixed truckload (for OPTION 2 plant mixed concrete) shall be submitted after 28-day curing cycle (location of test(s) to be determined by CONTRACTOR)
2. Placing Concrete –
  - a. Assure that excavations and formwork are completed and that no ice or water is present.
  - b. Convey concrete from mixer to final position by method that will prevent separation of material. Deposit in continuous operation until entire pour is complete.

**03300 – Monolithic Footer / Foundation (Turned Down Slab) Concrete Pour** – The base of all footer/foundation wall pours shall rest on undisturbed virgin soil, or rock, with minimum soil, or rock, bearing allowable of 2500 PSI, tested for 95 percent compaction, or 3/4" stone compacted in 12" lifts to 95 percent density if fill is required.

Footings/foundation wall pours at building perimeter shall be 6-inches below frost line, constructed of 3000 PSI concrete. Frost line is defined as 32" below final grade surface. Underneath load-bearing walls and interior or exterior column footings, thicken slabs within a 1' radius to 12" thick.

Provide reinforcing steel in accordance with the construction drawings.

Provide reinforcing steel extrusion(s) in accordance with construction drawings for connection to the building electrical grounding system.

**03300 – Concrete Slab (As part of monolithic pour)** – All concrete slab areas shall be constructed of 3000 PSI concrete, 4" thick reinforced with nurlon synthetic crack control fibers with a density minimum of 1.5%.

Place slabs over well-compacted granular fill compacted in 12-inch lifts to 95 percent density per AASHTO T-180 Proctor. Granular fill shall be leveled 6-inches below finished concrete elevation grade.

Construction or control joints shall be provided in slabs on grade so that the maximum area between joints shall be 400 sq. ft. and the length of that area is not more than twice the width. Provide smooth steel trowel finish for all slab areas and surfaces not designated to receive faux-crete treatment.

**04200 - Foundation Walls** – All exterior load-bearing walls, shear walls, pilasters, pillars, stem walls, lintels, retaining walls, etc. will be poured using Insulating Concrete Forms (ICF). All ICF shall have interior and exterior furring strips integral to the form. All construction shall be in accordance with ICF manufacturer specifications. Walls shall be constructed of 3000-PSI concrete. Aggregate, sand and water content shall be in accordance with ICF manufacturer specifications. Provide ICF manufacturer recommended waterproofing system on exterior surfaces in accordance with ICF manufacturer specifications. Install drainage as specified by this document.

# Division 4 - Masonry

**03010 - Stucco System** – All exterior wall surfaces not covered by Stone Veneer (See Section 04860) shall consist of 2-color, 2-coat stucco. Install one layer of Dupont Tyvek® StuccoWrap per manufactures specifications, using Dupont Tyvek® Contractor Tape in accordance with manufacturer specifications to seal all seams. Apply metal lath with appropriate nails. Install the base coat, and finish coats as specified by manufacturer. See construction documents and schedules for details such as keystones, quoins, horizontal bands, colors, etc.

**04860 - Stone Veneers** - Install one layer of Dupont Tyvek® StuccoWrap per manufacturers' specifications, using Dupont Tyvek® Contractor Tape in accordance with manufacturer specifications to seal all seams. Apply metal lath with appropriate nails per veneer manufacturers' specifications. Install exterior stone veneer per manufacturers' specifications. See construction documents for location and detailing of stone veneer.

# Division 6 - Carpentry

**06100 - Rough Carpentry** - Lumber shall be of live, sound stock and properly dried. Pressure treated lumber shall be used where any lumber shall come into contact with concrete, masonry block or soil and when using as support members for decks, porches or balconies. Lumber for use at exterior shall have a maximum of 9 percent moisture content. Provide adequate bracing and shoring during the construction process. Studs and joists cut to install plumbing and/or wiring shall be reinforced by adding metal or wood structural reinforcing to strengthen member back to original capacity and maintain structural integrity. Holes bored shall not be larger than 1/3 the depth and not closer than 2" to the top or bottom of the joist.

## **Floor Joists**

All floor joists shall be Engineered Lumber I-Joist System. Space floor joists 16" on center (OC). Joists shall rest on a minimum 1 1/2" of bearing wood or 3" of masonry. If joists are lapped over girder, the minimum amount of lap is 4" and maximum overhang is 12". Do not lap at wood I-beams. Joists shall be installed in accordance with manufacturer specifications. Joists shall be installed so that the end of the sub-floor sheets fall directly on the center of the floor joists. Total allowable deflection is 1/500 for all floor joists.

## **06122 - Wood Sub-floors**

3/4" tongue and groove CDX plywood sub-floor shall be installed with both nails and approved sub-floor adhesive. Stagger joints a minimum 2 stud spaces.

## **Exterior Walls**

**Main Building** - All exterior walls shall be constructed with a combination of Structural Insulated Panel (SIP) system and timber-frame load bearing frame. All timber-frame design and installation shall be in accordance with manufacturers' specifications. All SIP design and installation shall be in accordance with manufacturers specifications.

**Garage/Workshop** - All exterior walls shall be constructed with a combination of Structural Insulated Panel (SIP) system and construction grade stud construction. All SIP design and installation shall be in accordance with manufacturers specifications. All stud construction shall be in accordance with construction documents and schedules.

## **Fascia and Soffit**

Provide and install aluminum fascia and soffit. See construction documents for complete architectural and material details.

## **Interior Walls**

All interior walls shall be 2"x 4", 2"x6", or 2"x8" wood studs at 16" o.c., with single bottom plates and double top plates throughout. Provide solid blocking at mid-height of all walls which exceed 9'-0" in height. See construction documents for size specifications per location.

## **Roof Framing**

**Main Structure:** All roof framing shall be timber-frame support. All design and installation shall be in accordance with manufacturers' specifications.

**Garage, Workshop, Mechanical Room Structure:** The size of joists shall be determined by span, load and the kind and grade of lumber. Check appropriate spanning charts with local building officials. At openings in roof, double joists for structural rigidity. For ridges, hips and valleys; install 2"x 8"s, 2"x 10"s. Use laminated veneer lumber when ridge, hip or valley spans are greater than 28'-0". Provide Simpson H2.5 anchors at all rafters or trusses to plates and at

alternate studs.

### **Roof Decking**

**Main Structure:** Roof decking for the main structure shall be comprised of a Structural Insulated Panel (SIP) system. Roof SIP panels will be clad on the interior side with gypsum board. Exterior cladding will be OSB per manufacturers' specifications. All design and installation shall be in accordance with manufacturers' specifications.

**Garage, Workshop, Mechanical Room Structure:** Provide and install exterior sheathing of APA rated and code certified Oriented Strand Board (OSB). Sheathing shall be installed with the face grain running across the rafters, vertical joints shall be staggered a minimum of 2 (two) rafter spaces. Nails shall be 6d or 8d common smooth, ring-shank or spiral thread nails spaced 6" apart on the ends and 12" apart inside. Install with plywood "H" clips between each piece of decking, every 48". Install one layer of moisture barrier 30# felt, overlapped a minimum of 6".

**Wood Decks, Porches, and Balconies** – Exterior grade lumber shall be used for exterior decks, porches or balconies. Provide and install galvanized joist hangers to connect 2"x 10" floor joists to the main structure every 16" on center (OC). All handrails shall be constructed so as to prevent passage of a 4" sphere. Provide handrail and detailing as shown in construction documents.

**Finish Woodwork** – All architectural trim and woodwork shall be No. 1 grade material suitable for appropriate finishes. Wood that will be stained shall be clear of knots with concealed joints

**06400 - Interior Trim** - Moisture content for interior woodwork shall be 8-10 percent to reduce excess shrinking. Provide and install interior wood trim as shown in construction documents.

**Custom or Pre-fabricated Woodwork** - Provide and install custom woodwork as described on construction documents.

### **Flooring and Floor Covering**

**06460 - Stairs** - Heights of treads, lengths of risers and overall width of stairs shall comply with applicable building codes. Stair treads shall be constructed of 5/4" thick lumber, risers shall be constructed of 3/4" finish grade lumber, structural stair stringers shall be constructed of 2"x12"s. OWNER shall specify wood species. Glue and nail stair assembly together. Provide and install detailing as shown in construction documents.

**06550 – Flooring Materials** – Flooring materials shall be as follows:

Great Room – Stained/etched faux-crete

Entry – Tile with Hardwood Accents

Kitchen – Stained/etched faux-crete

Guest Bathroom and Bedroom – Hardwood

Laundry Room and Lower Level Hallway – Stained/etched faux-crete

Loft and Master Bedroom Area – Hardwood

Master Bathroom – Tile

Install all floor coverings per construction documents and schedules. Install vapor barrier and/or combination vapor barrier/squeak reduction foam sheeting between sub-floor decking and all hardwood flooring.



# Division 7 - Thermal & Moisture Protection

**07100 - Waterproofing & Damp proofing** - All joints and penetrations in walls, floors, and roofs shall be made watertight using approved methods and materials. Waterproofing and damp proofing recommendations contained herein are minimum, check with local code officials for additional requirements. All exterior wall penetrations required for doors and windows shall be lined using one layer of Dupont Tyvek® FlexWrap™ which shall be installed per manufactures specifications.

**07200 - Insulation** - Effective R values shall be in accordance with local and state energy codes. Wall and ceiling insulation shall be incorporated in SIP construction for main structure. Wall insulation shall be incorporated in SIP construction for garage, workshop, and mechanical room structure. Ceiling insulation shall consist of batt insulation for garage, workshop, and mechanical room structure. All plumbing chases in interior and exterior walls shall be insulated with batt insulation for sound attenuation.

**Exterior Walls** - Wall insulation shall be incorporated in SIP construction with an R-value equal to, or greater than, R28.

**Interior Walls** - Install 3 1/2", R11 batt insulation around baths, laundry rooms and as otherwise specified in the construction documents for sound attenuation.

**Floors** – Insulation under flooring systems shall be placed in accordance with manufacturer specifications for radiant floor heating as detailed in construction documents.

**Ceilings – MAIN STRUCTURE:** Wall insulation shall be incorporated in SIP construction with an R-value equal to, or greater than, R38.

**07320 - Roofing** - Provide and install raised rib metal roof system in accordance with all applicable building codes and manufacturers' guidelines.

**07610 - Metal Roofing** - Install 50 year warranty raised rib metal roof system with concealed fasteners as shown on construction documents. Install a layer of fire-retardant paper between roof deck structure and metal.

**07250 - Felt** - On all roof surfaces install 30 lb. asphalt impregnated roofing felt. For roofs that are steeper than a 6:12 pitch use a single layer of felt. For roofs with less than a 6:12 pitch install a double layer of felt and overlap a minimum of 18". Overlap felt a minimum of 4" vertically and 12" horizontally. Continue felt 6" up all vertical surfaces and 4" over gutter and valley metal. Fasten all edges with large headed galvanized nails on 6" centers.

**07620 - Flashing and Sheet Metal** - Install appropriate flashing at all joints of chimneys, dormers, walls, vent pipes and other connection points to prevent the infiltration of water. Flashing shall be assembled of 26 gauge minimum galvanized, corrosion resistant sheet metal. Valleys shall be wrapped with 20" wide galvanized flashing and extend 10" in each direction from centerline of valley. Use 4"wide x 4"high x 10'long galvanized flashing between wall siding and roof surfaces and step flashing between masonry and roof surfaces.

**07720 - Roof Accessories**

**Vents** - Check ventilation requirements with roof system manufacturer.

**07920 - Caulking and Sealants** - Use 50 year warranty silicon based caulk at high expansion/compression areas, such as around chimneys, tile, ceramic, and around enamel and pre-fabricated tubs and showers. For exterior windows, doorframes, interior trim, woodwork and other paintable surfaces use Latex based caulk.

# Division 8 - Doors and Windows

## 08000 - Doors

**Exterior Doors** - All exterior doors shall be solid core, insulated and swing inside with weather-tight thresholds. Install weather-stripping around all doors in accordance with construction documents. Install pre-hung door units in accordance with construction documents.

**All Exterior Entrance, Garage, and Deck Doors** – See construction details for specification.

**08390 - Storm Doors** - Metal frame with fiberglass wire mesh. Install removable tempered glass in an aluminum frame. Provide necessary hardware per door schedule below.

**08360 - Garage Door** - Install Overhead 8'-0" wide x 8'-0" high, insulated metal garage doors with electric openers and dual remote control units. Install weather-stripping around each door opening in accordance with construction documents.

**Screens** - Exterior frames shall be a painted green metal finish with joints welded and sanded smooth. Wire mesh shall be fiberglass. Screens will be installed in accordance with manufacturer's guidelines.

**08210 - Interior Doors** - Interior doors shall be pre-hung split-jamb units, including casing on both sides of the door. Casing shall be WM 445, 11/16" x 3 1/4" clear/concealed joint.

**08370 - Thresholds** - Provide and install brushed aluminum, thresholds and appropriate door sweeps at exterior doors.

**08710 - Door Hardware** - Finish hardware shall include keyed deadbolt locksets at all exterior doors. Interior doors shall be a combination of privacy and passage locks. Hardware shall be as per allowance. All exterior locksets shall be keyed the same.

**08500 - 08630 – Windows** – All window openings shall be metal clad wood insulated windows. Window types and sizes shall be in accordance with construction documents and schedules. Confirm that openings are compliant with all applicable building codes concerning egress, lighting and ventilation requirements. Temper all glass located within 2'-0" from exterior doors, all glass in doors and above tub enclosures. Provide and install necessary windows and appropriate hardware to operate and lock windows. Bedroom windows shall comply with Code requirements for emergency escape with appropriate egress hardware. Minimum net clear opening shall be 5.7 sq. ft., minimum net clear width shall be 20", minimum net clear height shall be 24" and sill height shall not exceed 24" above floor.

**08900 - Other Glazing** - Sheet glazing (glass, lexan, or fiberglass) to be installed in the cupola / dormer over the workshop shall be certified to be "RF Transparent" to the frequency band of 30 KHz – 30GHz inclusive. Install glazing as specified on construction documents and per manufacturers' specifications.

# Division 9 - Finishes

**09250 - Gypsum Wallboard** - Gypsum board must be held firmly against the framing or SIP panel while fastening to avoid later movement of gypsum board on the shank of the nails or screws.

**Interior Walls:** Sheath walls with 1/2" gypsum wallboard, horizontally with long edges at right angles to framing members or SIP panel joints. Apply one layer of 1/2"x 4'x 8', 9', 10' or 12' foot lengths to all wall surfaces. Offset joints between layers at least 10".

**Fire-Rated Gypsum Wallboard:** In garages, around gas appliances, and as required by applicable building codes, install 5/8" Type "X" fire-rated gypsum wallboard. Nails shall be 1 3/4" long, spaced a maximum of 4" on center (OC) around perimeter and 8" on center (OC) in the field of the board.

**Water Resistant Gypsum Wallboard:** Around showers, tubs, whirlpools, or as required by applicable building codes, install 1/2" concrete-fiber backer-board.

**09300 - 09400 - Tile, Marble, Slate** – Tile, Marble, Slate shall be appropriate grade and finish in accordance with applicable building codes and owner requirements as stated in construction documents and schedules. All surfaces to be covered shall be properly cleaned. Ceramic tile areas in bathrooms and kitchen shall be installed using 1/2 inch concrete-fiber backer board as underlayment. Slate flooring tile shall have underlayment installed per manufacturer recommendations. Installation should be carried out with a slow setting cement adhesive, well mixed per manufacturer recommendations. Grouting of control joints can be executed either with cement-based grout or with resin based organic materials.

**Counter-Tops:** Stone counter tops shall be provided and installed per construction documents and finish schedules. Counter surfaces shall be glued onto 3/4" plywood or appropriate substrate as recommended by manufacturer. Edges shall be installed per construction documents and finish schedules. Provide minimum 4" backsplash between counter and wall. See tile section for further specifications pertaining to ceramic or stone counter-tops.

**09545 - Ceiling Finishes:** Main structure roofing SIP panels will have interior cladding of 1/2 inch gypsum board factory installed. All other ceiling areas will have 1/2 inch gypsum board installed between exposed timber framing. See construction documents for location and specification details.

**09900 - Paints and Coating:** Prepare each surface to receive scheduled work as set forth below. If mildew is evident, the mildew must be removed and surface treated to inhibit further mildew growth.

**Interior Walls:** All nail heads shall be set below the surface and finished smooth. Joints should be taped and covered with a suitable drywall joint compound. Sand the spackled nail heads and joint compound smooth and dust well before priming. Interior walls shall receive a primer coat and finish coat(s) as specified in construction documents.

**Interior Wood:** Wood surfaces shall be sanded smooth before finish is applied. Putty areas with a wood based filler where nails or other defects appear in the surface. **Paint:** Prime wood

surfaces including faces, edges and ends before installation. After installation, apply at least one coat of wood primer and two coats of finish paint.

**Exterior Wood:** Pre-prime the backside, edges and ends of lumber and siding prior to construction. When staining, pre-prime with the same product as specified for the final coat. Sand and putty wood surface smooth before finish is applied.

**09950 - Wall Finishes:** Walls shall be clean and free of defects such as cracks or unfinished joints prior to installation of wall finishes. If mildew is evident, mildew must be removed and surface properly treated to inhibit further mildew growth.

# Division 10 - Specialties

**10800 - Bathroom Accessories** – Install bathroom accessories in accordance with construction details in all baths.

**10916 - Closet Specialties** – There shall be no shelving or rods installed in any closet or pantry.

## **Fireplace**

**10300 - Prefabricated Fireplace** - Pre-fabricated fireplaces shall be U.L. approved and installed per manufacturer's specifications.

**Chimney and Flue** – Top of Chimney shall be located 2'-0" taller in elevation than any point within 10'-0". Flues shall be U.L. approved and installed as per manufacturers' instructions. If multiple flues are used in the same chimney chase, an unequal projection or height of flue above the stack shall be used to safeguard against smoke exiting one flue and entering another.

**10300 - Prefabricated Chimney** – Chimneys for prefabricated fireplace units shall be lined with 10" diameter insulated metal flue as specified by manufacturer. Exterior finish and chimney details shall be as noted in construction documents.

# Division 11 - Equipment

**11452 - Appliances** - Install electrical appliances as shown on construction documents, including all venting and supply requirements per manufacturers' recommendations. Appliances included shall be according to construction documents and schedules. See electrical specifications for wiring information.

**11455 – Interior Cabinetry** - Install cabinetry as specified in construction documents and schedules. Dimensions of base cabinets shall be: 24"deep x 36"high. Dimensions of overhead cabinets shall be: 12"deep x 42"high. Provide concealed or decorative hinges and cabinet hardware as specified in finish schedules.

# Division 15 - Plumbing

**15100 - Plumbing** - Plumbing shall be a fully operational system of hot and cold water, incorporating multi-source water heating, hot water re-circulation system, single source water supply system, waste water disposal system. Provide and install all piping, vents, drains, sewage removal and water supply systems to connect with appropriate water and sewage systems. All hot water supply piping shall be covered with split foam insulation from the heat source to each faucet or hot water connection. Hot water piping will be arranged to minimize number of back-haul segments for hot water recirculation system. All permits and inspections are to be obtained by contractor as required by local building codes and the Uniform Plumbing Code.

**15440 - Plumbing Fixtures** - Provide necessary piping, water and drains for plumbing fixtures as shown on the construction documents and appropriate schedules. Fixtures allowances are listed in Contract Documents and appropriate schedules.

**Water Heater** – Hot water storage tank will be installed per construction plans and specifications. Follow manufacturer recommendations and building code requirements for installation and use.

**15500 - Heating, Ventilation, and Air Conditioning** - HVAC shall be a fully operational engineered system designed to meet local weather conditions and building requirements. See construction documents and schedules for details.

**Primary heat source** – A high efficiency (greater than 90 AFUE) propane boiler will supply water for the radiant heat system and domestic hot water. An outdoor, wood-fired boiler will perform as a backup heat source.

**Primary cooling source** – An integrated water-cooling condenser/chiller will be utilized as the primary cooling source. No backup-cooling source will be utilized.

**Energy Recovery Ventilator** – ERV shall be sized to provide air exchange of no less than 0.5 air-changes-per-hour, and other ventilation standards set by the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE). All ducting, electrical connections, and mounting shall be according to construction documents and schedules.

**Radiant Floor Heating System** – Radiant floor heating system shall be designed as a closed system, zoned heating according to construction documents and schedules. System shall utilize a liquid propane fired, on-demand boiler for a heating source. All piping, controls, valves, zones shall be in accordance with construction documents and schedules.

**Second-Stage Heating and Cooling** – High-temperature radiant baseboard heating units and integrated fan air-handlers will be deployed throughout the structure for rapid gain or loss heating and cooling. Installation locations and specifications shall be in accordance with construction documents and schedules.

# Division 16 - Electrical

**16100 - Electrical** - From electrical supply transformer, install below ground wiring to building. Raceways to be buried shall be PVC #2 Plastic Electrical conduit. Where permitted by code, non-metallic sheathed cable may be used. Type THW or THWN 600 volt insulation conductors shall be used; minimum wire size shall be #0000 stranded copper or equivalent current carrying capacity. Wiring shall connect into main electrical disconnect panel, as shown on construction documents. Electrical service entrance shall be rated at 200 amps. Wiring from the outside meter box shall be SE cable.

**16500 - Light Fixtures** - Provide necessary circuits and wiring for light fixtures as listed in construction details. All lighting shall be switched as noted on construction documents. For exact locations of fixtures, see construction documents and finish schedules. Fixture allowances are listed in Contract Documents.

# Division 21 - Life Safety & Facility Protection

In development

**21150 System Monitoring and Control (Systems Included)**

**21200 – Security Access and Surveillance**

**21400 Fire Suppression Systems**

**21500 Detection and Alarm**

**21720 Lightning Protections**

# Division 25 - Communications

**25100 – Cable Plant**

**25200 – Data Systems & LANs**

**25300 – Telephone/Voice Systems**

**25400 – Integrated Audio video systems**

**25500 – WAN and Dial Tones**

**25700 – Intra-Building Communications**