University of Colorado Boulder
U.S. Department of Energy Solar Decathlon 2020 Build Challenge

DESIGN CONTRIBUTORS
M3 Property Services
Ascent Group
PCD Engineering

PANEL CONSTRUCTION
SUPPORT
Simple Homes
HALF OF UPPER ROOF AREA:
278.69 SF

LOWER ROOF AREA:
488.27 SF

SLOPE DOWN

Scale: 1/2" = 1'-0"
1. WALL VENTS INSTALLED ABOVE TOP OF ATTIC INSULATION, SIZED TO MEET 1:300 FREE AREA TO ATTIC AREA, WITH CONTINUOUS AIR BARRIER AT T.O. PLATES
2. WALL VENT STYLE TO BE DETERMINED AND MAY INCLUDE WALL VENTS AND SOFFIT VENTS
1. WALL VENTS INSTALLED ABOVE TOP OF ATTIC INSULATION, SIZED TO MEET 1:300 FREE AREA TO ATTIC AREA, WITH CONTINUOUS AIR BARRIER AT T.O. PLATES
2. WALL VENT STYLE TO BE DETERMINED AND MAY INCLUDE WALL VENTS AND SOFFIT VENTS
1 1/2" METAL FLASHING LOCKING STANDARD BEAD METAL ROOF
ROOF UNDERLayment (HTS SOLUCES OR WITH DENCE ICE AND WATER SHIELD PROMOTES)
5/8" PLYWOOD SHEATHING
ROOF TRUSSES WITH 1 1/2" BATT INSULATION (INNOVATIVE SOLEIL WITH A BUMPER AROUND FOR VENTILATION)
AIR BARRIER (HTS INTELLO PLUS)
2" CONTINUOUS INSULATION (COMFORTBOARD RS)
1 1/2" GYPSUM WALL BOARD
METAL TRIM AND CLEAN FINISHED POES SUFFIX DETAIL

HORIZONTAL SHIPLAP SIDING WITH PINE TAR FINISH
2" CONTINUOUS INSULATION (COMFORTBOARD RS)
WEATHER RESISTIVE BARRIER
2" x 8 FRAMING 24" O.C. WITH BATT INSULATION
AIR BARRIER (HTS INTELLO PLUS)
1 1/2" BATT INSULATION (HAVELOCK WOOL)
BETWEEN 2" x 2" FURRING
1/2" GYPSUM

2' x 8 BOTTOM PLATE
3/4" PLYWOOD SHEATHING
8 1/2" X JOISTS

2" x 8 FRAMING
3/4" PLYWOOD SHEATHING

METAL WAINSCOT AT 2' ABOVE GRADE
2X4 BOTTOM PLATE
3/4" PLYWOOD SHEATHING
FOUNDATION WALL

1 1/2" METAL FLASHING CONNECTING WOOD CLADDING AND STANDING SEAM METAL OVER WEATHER BARRIER ON PLYWOOD. FILL GAP WITH RIGID INSULATION

SECTION 307a - TYP EXT WALL LAYERING @ NORTH EXT. WALL from SECTION 305
2X4
2X6
2X8
2X8 LSL (1.75"
2X4
2X6
2X8

1/2" GYPSUM
3/4" PLYWOOD SHEATHING
2" x 8 FRAMING 24" O.C. WITH BATT INSULATION
2" x 2 FURRING
1/2" GYPSUM

SECTION 307b PARTITION WALL LAYERING from SECTION 305
2X4 BOTTOM PLATE
3/4" PLYWOOD SHEATHING
2" x 2 FURRING
2" x 4 FRAMING 24" O.C. WITH BATT INSULATION
2" x 2 FURRING
1/2" GYPSUM

3/4" PLYWOOD SHEATHING
2" x 6 FRAMING
2" x 4 Bottom Plate
2" x 6 FRAMING 24" O.C. WITH BATT INSULATION
2" x 4 Bottom Plate
2" x 6 FRAMING

SECTION 307a - TYP EXT WALL LAYERING @ NORTH EXT. WALL from SECTION 305

SECTION 307b PARTITION WALL LAYERING from SECTION 305
MINIMUM STAIR HEAD HEIGHT COMPLIANCE WAS FOUND TO BE 6'-0".
A402

As indicated

ENLARGED BATHROOM PLAN AND ELEVATIONS

University of Colorado Boulder
U.S. Department of Energy Solar Decathlon 2020 Build Challenge

Scale Date Team Lead Checked by

1' = 3 3/4"
0' = 10 3/8"
3' = 0"
1' = 2 11/16"
1' = 3"

4' = 6"
0' = 4 1/2"
1' = 10 17/32"
1' = 3"
1' = 3 3/16"
4' = 6 3/16"
2' = 6"
1' = 0"
1' = 3 3/4"
0' = 10 3/8"
3' = 0"
7' = 2 3/4"
TOILET STACK GOES INTO POCKET DOOR WALL. VENT GOES TO TUB AND UP.
### Window Schedule

<table>
<thead>
<tr>
<th>Mark</th>
<th>Type</th>
<th>Width</th>
<th>Height</th>
<th>Description</th>
<th>Operation</th>
<th>Product</th>
<th>U-Factor (BTU/h-ft²-F)</th>
<th>SHGC</th>
<th>Sill Height</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>111</td>
<td>3' - 0&quot;</td>
<td>7' - 0&quot;</td>
<td>MU bedroom</td>
<td>Awning</td>
<td>925 Series Fiberglass (ZR-9)</td>
<td>0.15</td>
<td>0.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>112</td>
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### Door Schedule

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<tbody>
<tr>
<td>D</td>
<td>111</td>
<td>3' - 0&quot;</td>
<td>7' - 0&quot;</td>
<td>No door at demising wall</td>
<td>ProVia/Alpen</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>112</td>
<td>3' - 0&quot;</td>
<td>7' - 0&quot;</td>
<td>No door at demising wall</td>
<td>ProVia/Alpen</td>
<td></td>
</tr>
</tbody>
</table>
I. SLOPE THE EXTERIOR GRADE AWAY FROM THE STRUCTURE.

H. HOT WEATHER CONCRETING: PLACE AND CURE CONCRETE IN ACCORDANCE WITH ACI 305. COOL INGREDIENTS BEFORE

D. FOUNDATION WALLS AND GRADE BEAMS HAVING EARTH PLACED ON BOTH SIDES SHALL HAVE BOTH SIDES FILLED

D. WHERE PERIODIC OR CONTINUOUS INSPECTIONS AND / OR TESTING ARE REQUIRED BY THESE DOCUMENTS, GOVERNING

B. GENERAL CONTRACTOR IS RESPONSIBLE FOR PROTECTION OF PERSONS AND PROPERTY EITHER ON OR ADJACENT TO

C. GENERAL CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING ALL EXISTING CONDITIONS PRIOR TO ORDERING

A. THE STRUCTURAL DOCUMENTS ILLUSTRATE THE COMPLETED STRUCTURE WITH ELEMENTS IN THEIR FINAL POSITIONS,

T. PROVIDE SLIP JOINT MATERIAL SEPARATING THE FLOOR SLAB FROM THE PIPE COLUMNS AND PLUMBING PENETRATIONS

MIXING TO MAINTAIN CONCRETE SLUMP AT TIME OF PLACEMENT BELOW 90 DEGREES F.

REQUIREMENTS WITH ENGINEER. ALL REINFORCING STEEL SHALL BE CONTINUOUS THROUGH CONSTRUCTION JOINTS.

MATERIALS OR PROCEEDING WITH WORK AFFECTED BY AREAS WITH EXISTING CONDITIONS. REPORT ANY SIGNIFICANT

UNLESS NOTED. WHILE DRAWING SCALE IS BELIEVED TO BE RELIABLE, THE ACCURACY AND COMPLETENESS IS NOT

BELOW THE BOTTOM OF THE BASEMENT SLAB. EXTEND THE PERIMETER DRAIN TO A SUMP OR TO DAYLIGHT.

COMPRESSIVE STRENGTH AS FOLLOWS:

b. FLOOR:                                40 psf
b. RISK CATEGORY:   II

a. DESIGN CATEGORY: B

d. SOIL SITE CLASS: D

a. 2x STUDS, < 8'-0" HEM FIR, STUD GRADE  (Fb=675 psi, Fc= 800 psi, E=1,200,000psi)

b. 4x STUDS, < 8'-0" HEM FIR, STUD GRADE  (Fb=675 psi, Fc= 800 psi, E=1,200,000psi)

b. CONCRETE PLACEMENT INCLUDING REINFORCING STEEL AND POST-TENSIONING STRANDS, EXCEPT NON

b. OTHER ROLLED SHAPES (ANGLES, PLATES AND BARS): ASTM A36 (FY=36 KSI).

c. THREADED RODS (EXCEPT FOR ANCHORING TO FOUNDATION): ASTM A307 GR A (FU=60KSI)

D. BOLTS AND THREADED RODS:

D. POSTS AND TIMBERS (5x5 AND LARGER): DOUGLAS FIR, NO.1 (Fb=1200psi, Fc=1000 psi, E=1,600,000psi)

a. 2x STUDS, < 8'-0" HEM FIR, STUD GRADE  (Fb=675 psi, Fc= 800 psi, E=1,200,000psi)

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a. PREPARATION OF FOUNDATION SUBGRADE INCLUDING FILLING AND COMPACTION.

b. FLOOR:                                40 psf
b. RISK CATEGORY:   II

a. DESIGN CATEGORY: B

d. SOIL SITE CLASS: D

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STANDARD AISC SHEAR CONNECTION, V = BOXED VALUE

JOIST BEARING
POST BELOW (2) 2x4 OR (2) 2x6 MIN. POSTS TO MATCH WALL STUD SIZE U.N.O.

Garage Foundation Plan

CONNECT TO FOUNDATION PER: 

FEILD VERIFY GRADE WITH TOP OF WALL AND WALL STEPS AND COORDINATE WITH ENGINEER.

NOTE: VERIFY ALL DIMENSION WITH MODULAR

STEP B.O.W

T.O.W. =

B.O.W. =

T.O.W. =

STEP B.O.W

T.O.W. =

99' - 8"

P1

13' - 7 3/4"

4' - 0"

149'

S0.1

T.O.W. =

8" 16" NOT LABELED. TYPICAL UNLESS LABELED OTHERWISE. PROVIDE HOOKED GRADE w/ #4 BARS

Concrete Footing Schedule

<table>
<thead>
<tr>
<th>FOOTING</th>
<th>WIDE</th>
<th>DEPTH</th>
<th>LENGTH</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>12&quot;</td>
<td>60&quot;</td>
<td>60&quot;</td>
<td>PROVIDE (6)-#4s EACH WAY PLACED 3&quot; FROM BOTTOM.</td>
</tr>
<tr>
<td>P2</td>
<td>12&quot;</td>
<td>60&quot;</td>
<td>60&quot;</td>
<td>PROVIDE (6)-#4s EACH WAY PLACED 3&quot; FROM BOTTOM.</td>
</tr>
</tbody>
</table>

94' - 0"

BETWEEN BEAM AND TOP OF WALL PROVIDE STEEL SHIMS IN

P2

4' - 8"

11" 3/4"

27' - 8 3/4"

8" 16"

11 3/4"
**GENERAL STRUCTURAL NOTES**

- A. All dimensional lumber and timber used for structural framing shall be at a moisture content of 19% or less by the building code or the governing building official, engineer or an independent inspection and/or testing.

- B. Where field connections requiring Oil Testing are required in the building code or other code provisions, all field welds shall be tested by Oil Testing as required by the building code or other code provisions.

- C. PREFABRICATED JOISTS: Unless noted otherwise, prefabric "I" Series Joists shall be TJI 210 as manufactured by Weyerhaeuser or approved equal. Do not birdsmouth or otherwise notch the flange material in any way.

- D. PROVIDE PRESSURE TREATED LUMBER OR ICC APPROVED BARRIER AT LOCATIONS WHERE MEMBER IS TO BE IN CONTACT WITH SOIL OR OTHER CORROSIVE MATERIAL. PROVIDE WEAVERHAUEUSER OR APPROVED EQUAL IN LIEU OF CORROSIVE ACQ TREATED LUMBER.

- E. PROVIDE PRESSURE TREATED LUMBER OR ICC APPROVED BARRIER AT LOCATIONS WHERE MEMBER IS TO BE IN CONTACT WITH SOIL OR OTHER CORROSIVE MATERIAL. PROVIDE WEAVERHAUEUSER OR APPROVED EQUAL IN LIEU OF CORROSIVE ACQ TREATED LUMBER.

- F. All connections shall be made in accordance with the shop or field drawings and the shop fabrication instructions. The structural shop shall be designed by a licensed structural engineer approved by the building code official and shall be fabricated in accordance with the shop drawings and specifications.

- G. ALL STRUCTURAL MEMBERS SHALL BE CUT, NOTCHED OR OTHERWISE PENETRATED UNLESS ALLOWED BY THE MANUFACTURER, SPECIFICALLY SHOWN ON THESE DOCUMENTS OR APPROVED BY THE ENGINEER IN ADVANCE.

- H. PROVIDE PRESSURE TREATED LUMBER OR ICC APPROVED BARRIER AT LOCATIONS WHERE MEMBER IS TO BE IN CONTACT WITH SOIL OR OTHER CORROSIVE MATERIAL. PROVIDE WEAVERHAUEUSER OR APPROVED EQUAL IN LIEU OF CORROSIVE ACQ TREATED LUMBER.

- I. THESE CONSTRUCTION DOCUMENTS ARE BASED ON THE WORK BEING COMPLETED IN A WORKMAN LIKE MANNER BY A QUALIFIED CONTRACTOR.

- J. PROVIDE PRESSURE TREATED LUMBER OR ICC APPROVED BARRIER AT LOCATIONS WHERE MEMBER IS TO BE IN CONTACT WITH SOIL OR OTHER CORROSIVE MATERIAL. PROVIDE WEAVERHAUEUSER OR APPROVED EQUAL IN LIEU OF CORROSIVE ACQ TREATED LUMBER.

- K. PROVIDE PRESSURE TREATED LUMBER OR ICC APPROVED BARRIER AT LOCATIONS WHERE MEMBER IS TO BE IN CONTACT WITH SOIL OR OTHER CORROSIVE MATERIAL. PROVIDE WEAVERHAUEUSER OR APPROVED EQUAL IN LIEU OF CORROSIVE ACQ TREATED LUMBER.

- L. PROVIDE PRESSURE TREATED LUMBER OR ICC APPROVED BARRIER AT LOCATIONS WHERE MEMBER IS TO BE IN CONTACT WITH SOIL OR OTHER CORROSIVE MATERIAL. PROVIDE WEAVERHAUEUSER OR APPROVED EQUAL IN LIEU OF CORROSIVE ACQ TREATED LUMBER.

- M. PROVIDE PRESSURE TREATED LUMBER OR ICC APPROVED BARRIER AT LOCATIONS WHERE MEMBER IS TO BE IN CONTACT WITH SOIL OR OTHER CORROSIVE MATERIAL. PROVIDE WEAVERHAUEUSER OR APPROVED EQUAL IN LIEU OF CORROSIVE ACQ TREATED LUMBER.

- N. PROVIDE PRESSURE TREATED LUMBER OR ICC APPROVED BARRIER AT LOCATIONS WHERE MEMBER IS TO BE IN CONTACT WITH SOIL OR OTHER CORROSIVE MATERIAL. PROVIDE WEAVERHAUEUSER OR APPROVED EQUAL IN LIEU OF CORROSIVE ACQ TREATED LUMBER.

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**ELECTRICAL SPECIFICATION NOTES**

- **Equipment and Materials**: All electrical materials and equipment shall be specified and installed in accordance with the requirements of the drawings and specifications. Approval of the owner/Architect must be obtained before any substitutions or changes are made. All electrical work shall be done in accordance with the National Electrical Code (NEC) and other applicable codes and standards.

- **Support Conductors**: Support conductors shall be of the following types:
  - **Conduits**: Use rigid, semi-rigid, or flexible metal conduit, depending on the location and requirements. Conduit shall be of Type AC or Type MC, or equivalent approved by the owner/Architect.
  - **Piping**: Where required by code or the owner/Architect, provide pipe that is rated for the intended use.
  - **Cable Trays**: Use cable trays in accordance with the manufacturer's recommendations. Trays shall be of the appropriate size and type for the cables to be contained.

- **Cable Assemblies**: Cable assemblies shall be installed in accordance with the NEC and other applicable codes.

- **Provisional System of Conductors and Protection**: Conductors shall be protected against damage and interference with other systems. Use appropriate methods of protection, such as conduit, raceways, or cable trays.

- **Grounding System**: Provide a complete grounding system per NEC, Section 250. Grounding conductors shall be copper, stranded for No. 8 AWG and larger, with the following insulation:
  - **Solid Insulation**: Use solid insulation for single conductors where required by code.
  - **Stranded Insulation**: Use stranded insulation for multi-conductor cables. Insulation shall be copper or aluminum, with the appropriate wire gauge for the current ratings.

- **Fireproofing**: Fireproofing shall be provided as required by the NEC and other applicable codes. Use intumescent paint or other fireproofing materials as specified by the owner/Architect.

- **Flexible Conduit**: Use flexible metal conduit for all branch circuits and other locations where flexibility is required. Flexible conduit shall be of Type AC or Type MC, or equivalent approved by the owner/Architect.

- **Type and Size of Conductors**: Use conductors of the appropriate type and size for the load and circuit requirements.

- **Color Coding**: Use color coding as specified by the owner/Architect for all circuits and systems.

- **Marking of Conductors**: Mark conductors with appropriate labels and markings to indicate the type, purpose, and location. Use symbols and abbreviations as specified by the owner/Architect.

- **Testing and Inspection**: All electrical work shall be tested and inspected in accordance with the NEC and other applicable codes. Test equipment shall be calibrated and used in accordance with manufacturer's instructions.

**ELECTRICAL GENERAL NOTES**

- **Electrical Contractor**: The electrical contractor shall verify that all electrical items to remain or be relocated and reused are in good working order and meet the specifications.

- **Electrical Devices**: All electrical devices shall be of the appropriate type and size for the load and circuit requirements. Devices shall be UL listed and cUL approved. Use devices that meet the requirements of the NEC and other applicable codes.

- **Electrical Wires**: Use copper wires for all branch circuits and other locations where flexibility is required. Copper wires shall be of the appropriate type and size for the load and circuit requirements.

- **Electrical Conduit**: Use electrical conduit in accordance with the NEC and other applicable codes. Conduit shall be of the appropriate type and size for the load and circuit requirements.

- **Electrical Panels**: Use electrical panels in accordance with the NEC and other applicable codes. Panels shall be of the appropriate size and type for the load and circuit requirements.

- **Electrical Grounding**: Provide grounding as required by the NEC and other applicable codes. Grounding conductors shall be of the appropriate type and size for the load and circuit requirements.

- **Electrical Testing**: All electrical work shall be tested and inspected in accordance with the NEC and other applicable codes. Test equipment shall be calibrated and used in accordance with manufacturer's instructions.

- **Electrical Drawings**: Electrical drawings are diagrammatic only. Exact location of all systems and equipment shall be field verified and reviewed for correctness. Any incorrect wiring or devices installed by the electrical contractor without proper coordination shall be corrected at the contractor's expense.

- **Electrical Specifications**: All electrical specifications shall be in accordance with the NEC and other applicable codes. Specifications shall be clear and concise, and shall meet the requirements of the owner/Architect.

- **Electrical Approval**: The electrical contractor shall approve all electrical work in accordance with the NEC and other applicable codes. Approval shall be obtained before any electrical work is performed.

- **Electrical Permit**: The electrical contractor shall obtain all necessary permits for the electrical work in accordance with the NEC and other applicable codes. Permits shall be obtained before any electrical work is performed.

- **Electrical Coordination**: The electrical contractor shall coordinate with other trades and systems to ensure proper coordination of electrical work. Coordination shall be done in accordance with the NEC and other applicable codes.

- **Electrical Safety**: The electrical contractor shall ensure that all electrical work is performed in a safe manner. Safety shall be a top priority, and all electrical work shall be performed in accordance with the NEC and other applicable codes.

- **Electrical Warranty**: The electrical contractor shall provide a warranty for all electrical work in accordance with the NEC and other applicable codes. Warranty terms and conditions shall be specified in the contract document.
**Panel View**

**Fault Current Calculations**

**Work Notes:**
1. Refer to PV system drawings for more details.
2. Refer to system diagrams for more details.
GENERAL NOTES:

A. CONFIRM MOUNTING HEIGHTS OF ALL OUTLETS AND DEVICES WITH ELECTRICAL DESIGNER AND/OR OWNER PRIOR TO ROUGH-IN.

B. ALL 120V OUTLETS IN KITCHEN AND BATHROOM AREAS SHALL BE GFCI PROTECTED.

C. PROVIDE WATERPROOF COVERS ON ALL EXTERIOR OUTLETS.

D. ONLY MECHANICAL EQUIPMENT CIRCUITS ARE SHOWN. ALL OTHER EQUIPMENT AND GENERAL LIGHTING AND RECEPTACLE CIRCUITS SHALL REFER TO PANEL SCHEDULES FOR DETAILS.

WORK NOTES:

1. POWER SUPPLIED BY HEAT PUMP, REFER TO MANUFACTURER INSTALLATION INSTRUCTIONS FOR DETAILS.
GENERAL NOTES:
A. CONFIRM MOUNTING HEIGHTS OF ALL OUTLETS AND DEVICES WITH ELECTRICAL DESIGNER AND/OR OWNER PRIOR TO ROUGH-IN.
B. ALL 120V OUTLETS IN KITCHEN AND BATHROOM AREAS SHALL BE GFCI PROTECTED.
C. PROVIDE WATERPROOF COVERS ON ALL EXTERIOR OUTLETS.
D. ONLY MECHANICAL EQUIPMENT CIRCUITS ARE SHOWN. ALL OTHER EQUIPMENT AND GENERAL LIGHTING AND RECEPTACLE CIRCUITS SHALL REFER TO PANEL SCHEDULE FOR DETAILS.

WORK NOTES:
1. POWER SUPPLIED BY HEAT PUMP, REFER TO MANUFACTURER INSTALLATION INSTRUCTIONS FOR DETAILS.
GENERAL NOTES:
1. Confirm mounting heights of all light fixtures and devices with the lighting designer and/or owner prior to rough-in.
2. Coordinate all light switching and controls with the lighting designer and owner.
3. Only mechanical equipment circuits are shown. All other equipment and general lighting and receptacle circuits shall refer to panel schedule for details.

WORK NOTES:
1. Light controlled via door jamb switch kit; on when door is open.
2. LED reading light with integral on/off switch.
3. Light switch shown offset for graphic purposes, mounted to wall below light fixture T2.
4. Extend circuit to L1 fixture at top of stairway.
GENERAL NOTES:
A. Confirm mounting heights of all light fixtures & devices with lighting designer and/or owner prior to rough-in.
B. Coordinate all light switching and controls with lighting designer and owner.
C. Only mechanical equipment circuits are shown. All other equipment and general lighting and receptacle circuits shall refer to panel schedule for details.

WORK NOTES:
1. Light controlled via door jamb switch kit; on when door is open.
2. LED reading light with integral on/off switch.
3. Extend circuit to A2 fixture at first floor landing.
4. EC to confirm if fixture can be mounted above door. Coordinate final location with architect.
### Project Description

The project involves the construction of a new residence in Fraser, Colorado. The building is designed with a modular design utilizing prefabricated structural insulated panels. It includes a one-story guest suite with a total square footage of 1200 square feet.

### Mechanical Legend

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<tr>
<th>Symbol</th>
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<td>SAN</td>
<td>Sanitary Waste</td>
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<td>MA</td>
<td>Medical Air</td>
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<tr>
<td>SM</td>
<td>Grease Waste</td>
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<td>SN</td>
<td>Snow Melt Return</td>
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<td>SMR</td>
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<td>RS</td>
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### Mechanical General Notes

1. **General:** The contract conditions and general requirements for information that applies to all mechanical systems.
2. **The Work Performed:** General requirements and instructions for the contractor.
3. **Product Approval:** Instructions for product approval and sample submittals.
4. **Emergency Services:** Instructions for emergency services.

### Mechanical Drawing Index

- **Plan Number:** M0.1
- **Drawing Title:** University of Colorado Boulder
- **Project Number:** 07/14/2020 - PERMIT SET

### Mechanical Legend & Notes

- **Drawing Symbols:** Symbols used in the mechanical drawings.
- **Notes:** Detailed notes for the mechanical systems.

### Building Code Data

- **Building Code Data:** Details regarding building code compliance.
- **Mechanical Codes:** Codes applicable to mechanical systems.

### Specification General Notes

- **General Information:** General information and requirements for mechanical specifications.
- **Product Approval:** Instructions for product approval and sample submittals.
- **Emergency Services:** Instructions for emergency services.
- **Product Approval:** Instructions for product approval and sample submittals.
- **Emergency Services:** Instructions for emergency services.

### Project Endnotes

- **Project Endnotes:** Endnotes related to the project.
- **Contractor Responsibilities:** Responsibilities of the contractor.

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*University of Colorado Boulder*

*U.S. Department of Energy Solar Decathlon 2020 Build Challenge*
**TEMPERATURE CONTROLS**

1. MAKEUP AIR UNIT SYSTEM OPERATION SHALL BE INTERLOCKED WITH KITCHEN HOOD EXHAUST.
2. ELECTRIC DUCT HEATER SHALL PROVIDE 70 DEGREES FAHRENHEIT (ADJUSTABLE) SUPPLY AIR.
3. CONTRACTOR SHALL SECURE SYSTEM TO MAINTAIN OCCUPIED TEMPERATURES NOT FALLING OUTSIDE THE RANGE OF 68 TO 75 DEGREES FAHRENHEIT.
4. KITCHEN HOOD FAN SHALL BE ENERGIZED BY AN INTEGRAL BUTTON. INTERLOCK WITH MAKE-UP AIR UNIT.
5. THERMOSTATS SHALL HAVE 1 STAGE OF COOLING AND 2 STAGES OF HEATING.
6. CONTROL ROOMS (MECHANICAL) SHALL USE PROGRAMMABLE THERMOSTATS WITH ADJUSTABLE HEATING AND COOLING SETPOINTS.
7. ELECTRIC HEATER OPERATION SHALL BE STAGE 2 HEAT IN KITCHEN/LIVING AREAS AND BEDROOMS. SHALL ONLY OPERATE WHEN STAGE 1 HEAT (VRF SYSTEM) CANNOT MAINTAIN SPACE TEMPERATURE.
8. WHEN TOILET ROOM EXHAUST FAN(S) ARE ACTIVATED, ERV SHALL INCREASE AIRFLOW TO HIGHER CFM LISTED SHOWN ON THESE PLANS.
9. ELECTRIC HEATERS:
   - HEATING: 68 DEGREES FAHRENHEIT (ADJUSTABLE).
   - COOLING: 75 DEGREES FAHRENHEIT (ADJUSTABLE).
10. MAKEUP AIR UNIT:
    - THE HVAC SYSTEM CONTROLS ARE TO BE FULLY AUTOMATIC UNLESS OTHERWISE LISTED BELOW.

**HVAC GENERAL NOTES**

1. MAKEUP AIR SYSTEM, DUCTWORK, AND CONTROLS.
2. CONTRACTOR SHALL SECURE THE SERVICES OF AN INDEPENDENT TEST, ADJUST, AND BALANCE CONTRACTOR WHO IS A MEMBER OF THE NEBB OR EQUIVALENT. FOLLOWING ALL TAB WORK, SUBMIT TEST RESULTS IN A BOUND MANUAL.
3. PROJECT DESIGN CONDITIONS:
   - LOCATION: FRASER, COLORADO, GRAND COUNTY.
   - SITE ELEVATION: 8560 FEET.
   - OUTSIDE AIR DUCTS TO HAVE R-8 1-1/2" THICK AND 1-1/2 LB/CF DENSITY UL 181 CLASS ONE FIBERGLASS DUCT WRAP.
   - MECHANICAL ROOMS / CRAWLSPACE:
     - OCCUPIED (DAY TIME):
       - HEATING: 55 DEGREES FAHRENHEIT (ADJUSTABLE).
       - COOLING: 85 DEGREES FAHRENHEIT (ADJUSTABLE).
     - UNOCCUPIED (NIGHT TIME):
       - HEATING: 52 DEGREES FAHRENHEIT (ADJUSTABLE).
       - COOLING: 82 DEGREES FAHRENHEIT (ADJUSTABLE).
   - KITCHEN HOOD FAN:
     - ENERGIZED BY AN INTEGRAL BUTTON. INTERLOCK WITH MAKE-UP AIR UNIT.
   - CONTRACTOR SHALL PROGRAM THERMOSTATS FOR OCCUPIED/UNOCCUPIED PERIODS BASED ON A SCHEDULE PROVIDED BY OWNER.
   - PROVIDE 2-HOUR MINIMUM OCCUPIED OVERRIDE.
   - CONTROLS SHALL HAVE A 5 DEGREE F. DEAD-BAND FOR AUTO-CHANGEOVER SYSTEMS, WITH OVERLAP PROGRAMMABLE THERMOSTAT WITH ADJUSTABLE HEATING AND COOLING SETPOINTS.
   - CONTROLS SHALL HAVE 1 STAGE OF COOLING AND 2 STAGES OF HEATING.
   - SYSTEM SHALL HAVE A MINIMUM OF A 7-DAY PROGRAM.
   - CONTROLS SHALL BE BY A FACTORY AUTO-CHANGEOVER SYSTEM (TERMA). OVERLAP PROGRAMMABLE THERMOSTAT WITH ADJUSTABLE HEATING AND COOLING SETPOINTS.

**MECHANICAL CONTROLS & NOTES**

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<tr>
<td>M0.2</td>
<td>University of Colorado Boulder U.S. Department of Energy Solar Decathlon 2020 Build Challenge</td>
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### VRP System Schedule

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<th>SPECIFICATIONS</th>
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### Energy Recovery Ventilator Schedule

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### Electric Heater Schedule

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**Notes:**
- Ensure all specifications and performance levels are consistent with UCB-approved designs.
- See product cut sheets for detailed information.
1. If crawl space has slab flooring, all concrete slabs that come in contact with the ground shall be laid over a gas permeable material made up of either a gas permeable fabric or gravel. Minimum thickness is 4 inches.

2. All floor joists and structural beams are detailed and constructed in accordance with local building codes. See structural drawings for all requirements.

3. All opening, cutouts, and offsets in the floor and non-structural beams for the unit(s) of the above detail(s) should be detailed and constructed in accordance with local building codes. See structural drawings for all requirements.

4. All openings, cutouts, and offsets in the floor and non-structural beams for the unit(s) of the above detail(s) should be detailed and constructed in accordance with local building codes. See structural drawings for all requirements.

5. Circuit to be a minimum 15 amp, 115 volt. J-box for future fan to be installed on unit-strut stand or on wall 24” above roof, within 6 feet of vent pipe. See electrical drawings.

6. Outlets to be 12” minimum above roof, 2” minimum above all surfaces, wall or parapet within 10 feet, and 10 feet horizontally from or 24” above openings into conditioned spaces of the building. If roof is an occupied area, outlet shall terminate a minimum of 10 feet above roof level. If outlet is over 24” above roof, provide awareness of cutouts or openings or approved method to support the pipe.
GENERAL NOTES:
1. COORDINATE EXACT EQUIPMENT INSTALLATION LOCATIONS WITH OWNER PRIOR TO INSTALL.
2. PROVIDE ACCESS PANELS AND SERVICE CLEARANCES FOR ALL EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS.

WORK NOTES:
1. 8"Ø SA UP TO FLOOR DIFFUSER ABOVE.

---

MECHANICAL CRAWLSPACE PLAN

SCALE 1/2" = 1'-0" 1/8" = 1"

NORTH
GENERAL NOTES:
1. COORDINATE EXACT EQUIPMENT INSTALLATION LOCATIONS AND MOUNTING HEIGHTS WITH OWNER PRIOR TO INSTALL AND PER MANUFACTURER'S INSTALLATION RECOMMENDATIONS.
2. PROVIDE ACCESS PANELS AND SERVICE CLEARANCES FOR ALL EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS.
3. THERMOSTATS SHOWN ON PLAN TO CONTROL ALL MECHANICAL EQUIPMENT IN THE ROOM. FIRST STAGE COOLING/HEATING PROVIDED BY VRF SYSTEM, SECOND STAGE HEATING PROVIDED BY ELECTRIC HEATERS.
4. PROVIDE 1" DOOR UNDERCUTS AT ALL BATHROOMS.

WORK NOTES:
1. OA ROUTED FROM WALL VENT WITH 1/2" BIRDSCREEN MINIMUM 24" AFG.
2. 6"Ø EA ROUTED FROM MICROWAVE HOOD TO OUTDOORS. PROVIDE RECTANGULAR TO ROUND TRANSITION ADAPTER AT MICROWAVE OUTLET. MAXIMUM EQUIVALENT DUCT LENGTH OF 120 FEET, PER MANUFACTURER'S INSTALLATION REQUIREMENTS.
3. 4"Ø RADON MITIGATION VENT PIPE DN/UP. REFER TO DETAIL ON M0.4.
4. ENERGY RECOVERY VENTILATOR INSTALLED HIGH IN MECHANICAL CLOSET. ALL DUCT CONNECTIONS TO BE FLEXIBLE DUCT CONNECTORS.
5. LEVEL 6" CONCRETE PAD BY GC. INSTALL HEAT PUMP AWAY FROM ROOF EDGE TO AVOID WATER LINE FROM ABOVE.
GENERAL NOTES:
1. COORDINATE EXACT EQUIPMENT INSTALLATION LOCATIONS AND MOUNTING HEIGHTS WITH OWNER PRIOR TO INSTALL AND PER MANUFACTURER'S INSTALLATION RECOMMENDATIONS.
2. PROVIDE ACCESS PANELS AND SERVICE CLEARANCES FOR ALL EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS.
3. THERMOSTATS SHOWN ON PLAN TO CONTROL ALL MECHANICAL EQUIPMENT IN THE ROOM. FIRST STAGE COOLING/HEATING PROVIDED BY VRF SYSTEM, SECOND STAGE HEATING PROVIDED BY ELECTRIC HEATERS.
4. PROVIDE 1" DOOR UNDERCUTS AT ALL BATHROOMS.

WORK NOTES:
1. VENTLESS DRYER IN THIS AREA. REFER TO ARCHITECTURAL PLANS FOR DETAILS.
2. 4" Ø RADON MITIGATION VENT PIPE DN / UP THRU ROOF. REFER TO DETAIL ON M0.4.
3. PROVIDE WALL CAP WITH BACKDRAFT DAMPER AT EACH OUTSIDE TERMINATION. MAINTAIN MINIMUM 3 FEET CLEARANCE FROM OPERABLE OPENINGS INTO BUILDING. COORDINATE EXACT ELEVATION INSTALLATION LOCATION WITH OWNER.
2. All materials shall be new and shall comply with the specifications on drawings.

3. Contractor shall obtain and pay for all local fees, permits, and services of inspection authorities required by the work of the project. The contractor shall arrange for final commissioning of all systems, verifying the operation of all systems per code requirements, and providing a final commissioning report. Submit to engineer for review. Final commissioning report shall be provided to the engineer of record. The contractor shall demonstrate the proper operation and calibration of all systems.

4. The contract set of these drawings at the site, with all changes or deviations specified. The engineer will determine the acceptability of the proposed substitution.

5. The contractor shall not bid, reproduce, or copy for use on any other project without written permission.

6. This contract is subject to the conditions and general requirements for information that the contractor is responsible for verifying the acceptability of the proposed substitution.

7. The contractor shall provide all equipment and premises required for testing of all systems.

8. The contractor shall provide all systems and equipment for all systems. The contractor shall provide all necessary materials and equipment for all systems. The contractor shall also provide all necessary materials and equipment for all systems.

9. The contractor shall provide all equipment and premises required for testing of all systems. The contractor shall also provide all necessary materials and equipment for all systems. The contractor shall also provide all necessary materials and equipment for all systems.

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12. All work performed shall comply with the requirements of the listed codes, regulations, and standards. The contractor shall be responsible for verifying the acceptability of the proposed substitution. The contractor shall verify the acceptability of the proposed substitution. The contractor shall verify the acceptability of the proposed substitution.

13. The contractor shall provide all necessary materials and equipment for all systems. The contractor shall provide all necessary materials and equipment for all systems. The contractor shall provide all necessary materials and equipment for all systems.
PLUMBING CONTROLS

1. All plumbing systems shall be designed and provided by the plumbing contractor.
2. All control systems shall be designed and provided by the plumbing contractor.
3. Contractors are prohibited from changing the temperature, flow, pressure, or water valves.
4. All control systems shall be designed and provided by the plumbing contractor.
5. Solar-assisted electric water heaters shall be designed and provided by the plumbing contractor.

PLUMBING GENERAL NOTES

1. The plumbing system controls are to be fully automatic unless otherwise listed below.
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108. The plumbing system controls are to be fully automatic unless otherwise listed below.
### Domestic Solar Hybrid Electric Water Heater Schedule

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Model</th>
<th>Capacity</th>
<th>Voltage</th>
<th>kW</th>
<th>Type of Heating</th>
<th>Fuel Type</th>
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### Plumbing Fixture Schedule

#### Plumbing Fixture Connection Schedule

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<tr>
<th>No.</th>
<th>Fixture</th>
<th>Type</th>
<th>Material</th>
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#### Master Thermostatic Mixing Valve Schedule

<table>
<thead>
<tr>
<th>No.</th>
<th>Model</th>
<th>Mounting</th>
<th>Tank VOLUME</th>
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### Expansion Tank Schedule

<table>
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</tbody>
</table>

### Notes:

- PROVIDE (2) 4.5KW GRID ELEMENTS AND (2) 3.0KW MICRO-GRID ELEMENTS. REFER TO ELECTRICAL PLANS FOR MICRO-GRID SPECIFICATIONS.
- PROVIDE ACCESSIBLE SHUTOFF VALVES. REFER TO ARCHITECTURAL PLANS FOR APPLIANCE DETAILS.
- PROVIDE INDIVIDUAL BALL VALVE AT EACH HYDRANT OR HOSE BIBB.
- PROVIDE SUITABLE REINFORCEMENTS FOR WALL HANGERS & SUPPORTS.
- REVIEW ALL PLUMBING FIXTURES WITH OWNER PRIOR TO ORDER.

### Notes:

- Maximum 12.3 psi/100 ft pressure drop.
- Maximum 8 fpm velocity (inside).
- Maximum 10 fpm velocity (underground).
- PROVIDE STRAINER WITH CAPPED HOSE END INTO 2" STACK.
- PROVIDE FIELD TESTABLE BACKFLOW PREVENTER.
- PROVIDE REDUCED PRESSURE BACKFLOW PREVENTOR.
- PROVIDE GCO GRADE CLEAN-OUT.
- PROVIDE GALLONS PER MINUTE (GPM) - HOSE BIBB - 3/4 HB-1 - C
- PROVIDE CARTON OF GRAY 2" 17 GA. C.P. P-TRAP WITH CLEAN OUT AND OFFSET GRID STRAINER.
- PROVIDE TRAP-GUARD MODEL TG33ZURN.
- PROVIDE POWER, WATTS.
- PROVIDE SHOWER PAN = DREAMLINE MODEL DLT-1136540 SLIMLINE, 54"x36", WHITE.
- PROVIDE 4.5 KW OR 9.0 KW POWER, WATTS.
- PROVIDE MOEN MODEL T6125 KINGSLEY, TWO HANDLE, 4" RIMMING, RECTANGULAR, THREE HOLE, WITH OVERFLOW.
- PROVIDE AMERICA STANDARD MODEL 1203001.02. LAVATORY, COUNTERTOP, 54"x72", FRAMELESS.
- PROVIDE MOEN MODEL T5503 WYNFORD, LESS SUPPLIES = LOOSE KEY 1/4-TURN ANGLE STOP VALVES WITH SUPPLIES.
- PROVIDE MOEN MODEL T3810 MAKAYA, CHROME FINISH, 0.5 GPM AERATOR OUTLET.
- PROVIDE MOEN MODEL T4385 PIVOT, 1.74 GPM, DIVERTER VALVE, CHROME FINISH.
- PROVIDE INSINKERATOR MODEL EVOLUTION ESSENTIAL, 3/4 HP, 120 VOLT, WITH STAINLESS STEEL GRID CHAMBER AND TRAP-GUARD MODEL TG33ZURN.
- PROVIDE ZURN MODEL Z415B.
- PROVIDE BRASSCRAFT, CS&B, DEARBORN.
- PROVIDE THERMOSTATIC MIXING VALVE = WATTS MODEL USG-B.  SET AT 105°F RISE.
- PROVIDE VALENTINE MODEL VSPC 6720008.60.2MP, 1/2" P-TRAP, 90°F RISE.
- PROVIDE ZURN MODEL ZN-1400-BZ.
- PROVIDE INTEGRAL POLISHED NICKEL BRONZE TOP, ASME 112.3..
GENERAL NOTES:
1. SLOPE ALL HORIZONTAL SAN PIPING (3" AND GREATER) AND ALL CONDENSATE PIPING AT 1/8" PER 1'-0" (1%).
2. SLOPE ALL HORIZONTAL SAN PIPING ON 2'-0" OR LESS AT 3/16" PER 1'-0" (2%).
3. SLOPE ALL SANITARY VENT PIPING AT MINIMUM 1/16" PER 1'-0" TOWARDS TRAP(S) SERVED.

WORK NOTES:
1. 4" SAN, I.E. = -3'-0" BFG. REFER TO CIVIL DRAWINGS FOR CONTINUATION.
2. SANITARY UP TO FIXTURE ABOVE.
3. 1"CW COPPER PIPE ROUTED BELOW GRADE FROM WATER METER INTO CRAWLSPACE. BURY PIPE MINIMUM 6'-0" BFG. REFER TO DETAIL ON P.3.
4. SHIFT SANITARY MAIN AS NEEDED TO AVOID STRUCTURAL BEAMS/FOOTINGS IN CRAWLSPACE.
GENERAL NOTES:
1. SLOPE ALL HORIZONTAL SAN PIPING (3" AND GREATER) AND ALL CONDENSATE PIPING AT 1/8" PER 1'-0" (1%).
2. SLOPE ALL HORIZONTAL SAN PIPING (2-1/2" AND LESS) AT 1/4" PER 1'-0" (2%).
3. SLOPE ALL SANITARY VENT PIPING AT MINIMUM 1/16" PER 1'-0" TOWARD TRAP(S) SERVED.

WORK NOTES:
1. SANITARY AND VENT PIPING FROM FIXTURE ROUTED TO INTERIOR WALL.
2. SANITARY UP TO FIXTURE ABOVE.
3. ROUTE PUMPED CONDENSATE FROM FAN COIL UNIT ABOVE CEILING AND OVER TO SINK TAILPIECE CONNECTION.
4. KITCHEN SINK DISPOSAL INSTALLED BY PC, SWITCH INSTALLED AND WIRED BY EC.
GENERAL NOTES:
1. SLOPE ALL HORIZONTAL SAN PIPING (3" AND GREATER) AND ALL CONDENSATE PIPING AT 1/8" PER 1'-0" (1%).
2. SLOPE ALL HOIRXONTAL SAN PIPING (2-1/2" AND LESS) AT 1/4" PER 1'-0" (2%).
3. SLOPE ALL SANITARY VENT PIPING AT MINIMUM 1/16" PER 1'-0" TOWARD TRAP(S) SERVED.

WORK NOTES:
1. FUTURE HYDROPONIC SYSTEM IN THIS AREA TO BE BUILT BY CU STUDENTS.
2. 2" VENT THRU WALL. INSTALL ARMALFEX INSULATION WITH ALUMINUM JACKET THROUGH 16 GAUGE GALVANIZED WALL SLEEVE. SEAL ALL OPENINGS WITH SILICONE SEALANT.
3. ROUTE PUMPED CONDENSATE FROM FAN COIL UNIT ABOVE CEILING AND OVER TO SINK TAILPIECE CONNECTION.
GENERAL NOTES:
1. DOMESTIC SUPPLY MANIFOLDS AND INDIVIDUAL PEX BRANCHES NOT SHOWN ON PLANS. LAYOUT AND INSTALLATION BY PC. AVOID ROUTING IN EXTERIOR WALLS AND SECOND FLOOR CEILING.

WORK NOTES:
1. TRANSITION TO PEX PIPING DOWNSTREAM OF BACKFLOW PREVENTER. 1-1/4"CW/HW ROUTED TO/FROM WATER HEATER.
2. ROUTE 1-1/4"CW/HW TO MANIFOLDS WITH PEX PIPING TO EACH INDIVIDUAL FIXTURE FROM SEPARATE VALVED BRANCHES. REFER TO PLUMBING FIXTURE CONNECTION SCHEDULE ON P0.3.
3. PROVIDE ACCESSIBLE SHUTOFF VALVE FOR HOSE BIBB. INSTALL FIXTURE AT 18" AFG.
4. REFER TO ARCHITECTURAL PLANS FOR DISHWASHER SPECIFICATIONS. PROVIDED GC, INSTALLED BY PC.
GENERAL NOTES:
1. DOMESTIC SUPPLY MANIFOLDS AND INDIVIDUAL PEX BRANCHES NOT SHOWN ON PLANS. LAYOUT AND INSTALLATION BY PC. AVOID ROUTING IN EXTERIOR WALLS AND SECOND FLOOR CEILING.

WORK NOTES:
1. FUTURE HYDROPONIC SYSTEM IN THIS AREA TO BE PROVIDED AND BUILT BY CU STUDENTS.

PLUMBING SUPPLY SECOND FLOOR PLAN

University of Colorado Boulder
U.S. Department of Energy Solar Decathlon 2020 Build Challenge

03/02/21

No.
P2.2

Description
PLUMBING SUPPLY SECOND FLOOR PLAN

Scale Date Team Lead Checked by