Heads in Beds: the Colby College Hyper-Speed Dormitory Project

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Curated by Lauren Baumann and Nat May

Northeast Sustainable Energy Association (NESEA)
March 29, 2023
Heads in Beds
Colby College
Hyper-speed Dormitories

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Portland, ME
Consigli Construction Co., Inc.
Beautiful
Sustainable
Attainable
A Better Way to a Better Home
Project Beginnings
- TRADITIONAL CONSTRUCTION
- HEAVY FRAME CONSTRUCTION
  - SLOW

- MODULAR CONSTRUCTION
- LIGHT STUD CONSTRUCTION
  - FAST
SITE SELECTION
SCHEMATIC DESIGN
CONSTRUCTION DOCUMENTS
CONSTRUCTION DOCUMENTS
C. F. HATHAWAY
The man in the Hathaway shirt

American men are beginning to realize that a shirt is as important as a coat, and those who wear shirts of fine material are more and more prominent. The shirts are the height of fashion, and the best men's clothing stores are not afraid to show them off. The men in these shirts are not only fashionable, but also comfortable. They are well made, and the materials are of the highest quality. The Hathaway shirt is a fine example of this style.
SCHEMATIC DESIGN
CONSTRUCTION DOCUMENTS
CONSTRUCTION DOCUMENTS
CONSTRUCTION DOCUMENTS
Field vs. Factory
TWO BOXES WIDE

SCHEMATIC DESIGN
TWO BOXES WIDE with stick framed corridor

CONSTRUCTION DOCUMENTS
BOX 1

BOX 2

BOX 3

BOX 4

STICK FRAMED

PRECAST FOUNDATION
FACTORY - FIELD COORDINATION
STEP 1: FACTORY

AIR & WATER BARRIER INSTALL

EXTERIOR
1. INSTALL EXTERIOR FULL ADHERED WRB
2. INSTALL BACK DAM, 5 1/2" DEEP
3. INSTALL SLOPING CLAPBOARD SILL
4. WATERPROOF WITH FLEXIBLE FLASHING UP OVER SLOPING SILL & OVER BACK DAM 2" MIN

INTERIOR
1. INSTALL INTERIOR VAPOR RETARDER MEMBRANE
STEP 2: FACTORY

WINDOW & WINDOW FLASHING INSTALL

1. INSTALL TEMPORARY 2X6 SETTING BLOCKS @ INTERIOR FACE OF FRAMING
2. SET WINDOW SETTING SHIMS
3. INSTALL WINDOW TIGHT AGAINST SETTING BLOCKS WITH MASONRY METAL CLIPS
4. REMOVE TEMPORARY WINDOW SETTING BLOCKS
5. INSTALL EXTERIOR FLASHING TAPE 3 SIDES
   HEAD & JAMBS ONLY, NO SILL TAPING ON EXTERIOR
6. INSTALL LOW EXPANSION SPRAY FOAM IN WINDOW RO
7. INSTALL INTERIOR FLASHING TAPE ALL FOUR SIDES
   ENSURE TAPE EDGE WILL BE CONCEALED BY INTERIOR FINISHES
STEP 3: FIELD
How does air barrier work like this?

1) Can Mastell 5 wrap top of wall, and then be taped w/ 3m BOST tape at exit point? Line to seal ceiling?
6” STUD POCKET.

NEED DETAIL FOR GABLE RAKE OVERHANG.

OPTIONAL PHOTOVOLTAIC PANEL ARRAYS.

STANDING SEAM METAL ROOF.

SNOW GUARDS.

METAL GUTTER.

ARCH FLOOR.

SIDING TYPE A.

METAL DOWNSPOUT.

VERTICAL DELIMITED RAIL.

BRAKE METAL TRIM.

BASE SCREENING MATERIAL.

BASEMENT TYPE A.

ALL ON-SITE BY G.C.

"MUST BE TAGGED AS SUCH."

WHAT DOES KBS NEED TO DO TO PREP FOR PORCH ROOF?
Schedule & Supply Chain
What                     Who                        How
<table>
<thead>
<tr>
<th>Date</th>
<th>Weather Barrier: Siga Majest 500 SA (ILO STD)</th>
<th>Tyvek joints and overlaps secured on site <strong>By Set Crew</strong></th>
</tr>
</thead>
</table>

**Flashing System:**

- **Windows:** Siga Wigluv sill pans and Pre Flashing with Siga Fentrim Flashing applied at sides and top
- **Doors:** Jamsill Guard sill pans with Siga Fentrim Flashing applied at sides and top
- **Penetrations:** Siga Fentrim Flashing applied at all penetrations through the wall
- **Seams:** N/A

All Box to Box overlaps/seams to be completed by the Set Crew in the field

**Sheetrock:**

**Walls:**

- 5/8" Thick Sheetrock Throughout
- Resilient Channel for Corridor Walls
- Double Layer 5/8" Sheetrock at Stairwell Locations
- Sheetrock infill at the stairwells is to be installed on site **By General Contractor**

**Ceilings:**

- 5/8" Thick Type "C" Sheetrock at Ceilings
- 5/8" Thick Type "C" Moisture Resistant Sheetrock at Ceilings in Bathrooms
- 2 Layers of 5/8" Sheetrock at Corridor Ceilings
- Corridor Ceiling Sheetrock Infill at Box Connections to be supplied, installed and Fire Taped **By General Contractor**
- 1st and 2nd Layer Marriage Wall Seam completion at Corridor Ceiling to be completed on site **By General Contractor**

### Suspended Ceilings

To be installed in Stairwells, Corridors and Common Areas **By General Contractor**

**Finish:**

**Level 3 Finish from Factory**

- Primer: Sherwin Williams "Builders Solution" Interior Latex
- Wall and Ceiling Paint: Sherwin Williams "Promar 400" Interior Latex Flat
- All seams and screws taped and mudded with two coats
- Repair all stress cracks due to shipping and set **By General Contractor**
- Repair all plumbing and electrical access holes at walls and/or ceilings **By General Contractor**
- Additional access holes required/created by on site subs to be made and completed **By General Contractor**
- All walls and ceilings are primer only (may see paint flashing)
- Prime coat all areas repaired **By General Contractor** (may see paint flashing)
- Finish coat of paint for **All Areas** supplied and installed on site **By General Contractor**

**Color:** White

**Dover White**
<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 14th</td>
<td>1st Box Online 6 months after request for fully accessible buildings</td>
</tr>
<tr>
<td>April 25th</td>
<td>1st Building Fully Online</td>
</tr>
<tr>
<td>May 6th</td>
<td>1st Building Offline 3 Weeks After</td>
</tr>
<tr>
<td>May 19th</td>
<td>2nd Building Offline 5 Weeks After Start of Production</td>
</tr>
<tr>
<td>Activity</td>
<td>Scheduled Completion</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>#1 Elevator PDI/ADM/Entr.</td>
<td>6/29</td>
</tr>
<tr>
<td>#1 Basement MEP Rough (Plumb, Elec, Controls)</td>
<td>6/21, 7/15, 7/17</td>
</tr>
<tr>
<td>#1 movable ceiling 100% – Full Building</td>
<td>7/15</td>
</tr>
<tr>
<td>#1 Ceilings, Floors, Complete</td>
<td>7/15</td>
</tr>
<tr>
<td>#1 Bathrooms, Tile Complete</td>
<td>7/29</td>
</tr>
<tr>
<td>#2 Elevator, Stair Ready for Stays</td>
<td>6/24</td>
</tr>
<tr>
<td>#2 Basement MEP (Elec, Plumbing)</td>
<td>7/15</td>
</tr>
<tr>
<td>#2 Basement Drywall, Paint, Complete</td>
<td>8/11</td>
</tr>
<tr>
<td>#4 Precast Complete</td>
<td>7/12</td>
</tr>
</tbody>
</table>

HEADS IN BEDS !!!!!!
Tuesday
8.16 Top 5
- Transformer Install
- Finish lobby tile Blq1
- Pre-Punch Rooms in Bldg2
- Flood Ceilings in Bldg2
- Pre-Punch Bldg1 Common Spaces
* FINAL CLEAN - D-DAY

Wednesday
8.17 Top 5
- Final Paint Bldg1 Stair
- Complete install of all Ext. WAP/Camera etc
- Complete all door thresholds
- Final Paint Bldg2
- Complete fine grading
* All of Bldg 1 must be punched
Pre-Fabricated Foundations
SPRING 2022
1. PC-1A(1) - PLAN @ B1 / B3
   3/8" = 1'-0"

2. PC-1A(1) - ELEVATION @ B1 / B3
   3/8" = 1'-0"

<table>
<thead>
<tr>
<th>TYPE</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
<th>SYMBOL</th>
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</thead>
<tbody>
<tr>
<td>Concrete Finish</td>
<td>Indicates Board Formed Finish</td>
<td></td>
<td>BF</td>
</tr>
<tr>
<td>Lifting Pin - Edge</td>
<td>UAMT13380</td>
<td></td>
<td>LP-1</td>
</tr>
<tr>
<td>Lifting Pin - Edge</td>
<td>UAMT13530</td>
<td></td>
<td>LP-2</td>
</tr>
<tr>
<td>Lifting Pin - Face</td>
<td>UAMT3340</td>
<td></td>
<td>LP-3</td>
</tr>
<tr>
<td>Simpson Strap</td>
<td>STRHD10N Strip Tie Holdtens</td>
<td></td>
<td>SS</td>
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<tr>
<td>Anchor Bolt</td>
<td>5/8&quot; x 4&quot; A-B @ 2&quot; OC</td>
<td></td>
<td>AB</td>
</tr>
<tr>
<td>Embedment Plate</td>
<td>P31/2&quot; x 1/2&quot; @ 0&quot; OC</td>
<td></td>
<td>EP</td>
</tr>
</tbody>
</table>

Project Information

- Project number: #854
- Date: 01/01/22
- Drawn by: TSG / TD
- Checked by: TSG / TD
Modular Time
UPPER ROOF AND EAVE O-HANGS SHIPPED LOOSE

10

SHIPPING WIDTH/HEIGHT (NARROW BOX)

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

12'-10" WIDE ROOF BOXES "1 & 6"

PROJECTED SHIPPING INFO:
W @ Eaves (S/L) = +/- 15'-8"
W @ Road = +/- 13'-2"
H w/ UF S/L = +/- 14'-6"
H w/ UF ON = N/A

11

SHIPPING WIDTH/HEIGHT (WIDE BOX)

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

15'-11" WIDE ROOF BOXES "3, 4, 8 & 9"

PROJECTED SHIPPING INFO:
W @ Eaves (S/L) = +/- 16'-3"
W @ Road = +/- 16'-3"
H w/ UF S/L = +/- 14'-6"
H w/ UF ON = N/A
Mechanical Systems
### PASSIVE HOUSE MODELING

#### PASSIVEHOUSE REQUIREMENTS

<table>
<thead>
<tr>
<th>Certificate criteria:</th>
<th>PHIUS+ 2018</th>
</tr>
</thead>
</table>

#### Heating demand

- Specific: 6.83 kBtu/ft²yr
- Target: 6.9 kBtu/ft²yr
- Total: 79,118.86 kBtu/yr

#### Cooling demand

- Sensible: 2.32 kBtu/ft²yr
- Latent: 0.03 kBtu/ft²yr
- Specific: 2.35 kBtu/ft²yr
- Target: 4.5 kBtu/ft²yr
- Total: 27,164.13 kBtu/yr

#### Heating load

- Specific: 6.03 Btu/hr ft²
- Target: 6.3 Btu/hr ft²
- Total: 69,875.72 Btu/hr

#### Cooling load

- Specific: 1.96 Btu/hr ft²
- Target: 2 Btu/hr ft²
- Total: 22,733.8 Btu/hr
WINTER ENERGY BALANCE
CORRIDOR ERV SYSTEMS
TANKLESS GAS HOT WATER
ELECTRIC BASEBOARD HEAT
### Passive House Requirements

**Certificate criteria:** PHIUS+ 2018

#### Heating Demand
- **Specific Demand:**
  - Target: 6.83 kBTu/ft² yr
  - Total: 79,118.86 kBTu/yr

#### Cooling Demand
- **Sensible Demand:**
  - Target: 2.32 kBTu/ft² yr
  - Total: 27,164.13 kBTu/yr
- **Latent Demand:**
  - Target: 0.03 kBTu/ft² yr
  - Total: 0.09 kBTu/yr
- **Specific Demand:**
  - Target: 2.35 kBTu/ft² yr
  - Total: 27,164.13 kBTu/yr

#### Heating Load
- **Specific Load:**
  - Target: 6.03 Btu/hr ft²
  - Total: 69,875.72 Btu/hr

#### Cooling Load
- **Specific Load:**
  - Target: 1.96 Btu/hr ft²
  - Total: 22,733.8 Btu/hr

All requirements are met.
**Source energy**

- total: 237,197.35 kWh/yr
- specific: 3,953 kWh/Person yr
- target: 3,840 kWh/Person yr
- total: 809,271.06 kBtu/yr
- specific: 69.86 kBtu/ft² yr

**Site energy**

- total: 370,340.73 kBtu/yr
- specific: 31.97 kBtu/ft² yr
- total: 108,546.87 kWh/yr
- specific: 9.37 kWh/ft²

**Air tightness**

- ACH50: 0.86 1/hr
- CFM50 per envelope area: 0.06 cfm/ft²
- target: 0.86 1/hr
- target CFM50: 0.06 cfm/ft²

**NOT VERIFIED**
Heads in Beds