Welcome to the ICON Solar House

construction drawings

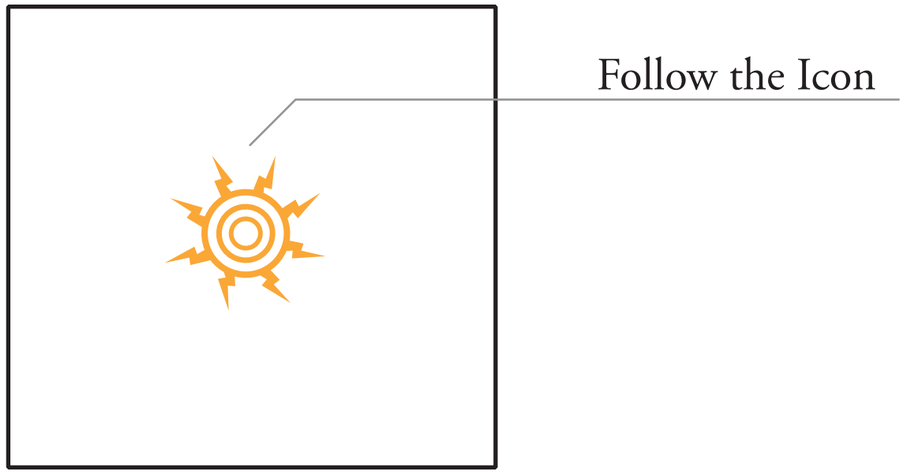
Architecture | Engineering | Market Viability | Lighting Design | Communications

This document is designed to help you learn about the ICON Solar House design and intentions. We have created a naviagation system for you to follow, whether you print this out or read it digitally.

Find the icon associated with the subjective contest you're interested in, and you can follow that icon through this massive document. It'll show you what we think are highlights of each topic.

The number on left of the icon is one page previous in your speci⊠c path, and the number on the right of the icon is the next page in your speci⊠c path. When a page has multiple paths associated with it, all icons are shown. Be sure to stay on your path!

Navigation Scheme



ICON SOLAR HOUSE
UNIVERSITY OF MINNESOTA

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cover

G-000

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System Component Marks: Given the fact that the engineered systems for this project overlap between various trade disciplines all of the components used in the Mechanical, Electrical, and Plumbing drawings are coded with a unique identifier consistent throughout all drawings (schematics, plans, equipment schedules, etc.)

The identifier consists of four parts: AA - # - ## -BBx

The first characters identify the type of equipment or data variable (see lists below). The next identifier is a number which correlates with the system in which the component is included. The third number is a unique identifier to distinguish each element of a particular type within a specific system. The final characters identify, when applicable, the data variable being addressed including a lower case "i" or "o" denoting input or output data.

Example: Switching the second controllable 3-way valve in the solar thermal system would be coded as:

VA -2-02-SWo

Equipment Codes:

B	Blower
F	Fan
P	Pump
VA	Controllable 3-Way Valve
VM	Mixing Valve
WH	Water Heater
TK	Tank
HX	Heat Exchanger
IN	Inverter
MP	Main Service Panel
AD	AC Disconnect
DD	DC Disconnect
CB	Combiner Box
WM	Operable Window Motor
WS	Electrochromic Window
AS	Solar Thermal Array
AP	PV Array
R	Reference
TH	Thermostat
L	Light
HP	Heat Pump
ERV	Energy Recovery Ventilator
CU	Air Cooled Condensing Unit
SR	Supply Air Register
RG	Return Air Grille

Data Variable Codes:

T	Temperature
PR	Pressure
H	Humidity
I	Current
V	Voltage
CN	Conductivity
LL	Liquid Level
SW	Switch
CM	Command
S	Status
TM	Time

System Codes:

1	Controls
2	Solar Thermal Storage, Domestic Hot Water, & Radiant Floor Heating
3	Desiccant
4	Irrigation
5	Air Handling
6	Photovoltaic Electrical
7	Lighting
8	Appliances

Applicable Codes:

- 2007 Minnesota State Residential Code - for intended long term use
- 2007 Minnesota State Building Code - for educational purposes and public tours
- 2006 International Building Code
- 2007 Minnesota Accessibility Code
- 1999 Minnesota State Energy Code - Chapters 7676 & 7678
- 2007 Minnesota State Fire Code
- 2006 International Fire Code
- 2000 Life Safety Code - NFPA 101
- 2008 National Electrical Code
- 2003 Minnesota State Plumbing Code
- 2004 Minnesota State Mechanical Code
- 2000 International Mechanical Code

Occupancy Group: R-2 per the IRC and B per the IBC
Type of Construction: V.B Per IBC Table 601 for both the B and R-2 occupancies
Allowable Height: 40'-0" Per IBC Table 503 for both the B and R-2 occupancies
Actual Height: 40'-0"
Allowable Floor Area: 7000 SF Per IBC Table 503 for R-2 occupancies
Actual Building Area: 622 SF

Allowable Stories: 2 per IBC Table 503
Actual Stories: 1

Fire Resistance Rating Requirements for Construction Type V-B:
IBC Chapter 6, and Tables 601 and 602

Structural frame: 0
Bearing walls: 0
Non-bearing walls: 0
Floor construction: 0
Roof construction: 0
Shaft enclosure: NA

Exterior Walls <= 10'-0" fire separation distance not required to be rated per Group B, and R-2, Table 602.

Fire Protection Systems: Building is not required to be sprinklered per IBC 903 and Minnesota Code.

Exiting Requirements:
Total Project Area: 472 SF
Per Table 1004.1.1 unconcentrated assembly for tours / 15 net = 32 occupants.

Exit Access:
Minimum number of exits: 1 req., 2 actual
See IBC Section 1015.1
Exit access travel distance: 200' req., 28' actual
See IBC Section 1016.1
Common Path of Egress Travel: 30' req., 14' actual
See IBC Section 1025.8

Wall and Ceiling Finish Requirements: Per Table 803.5, non-sprinklered
Class A: Exit passageway.
Class B: Corridors
Class C: Rooms and enclosed spaces (applies to this project)

Per 804.4.1 floor finishes not req. to be classified for other than corridors and passageways.

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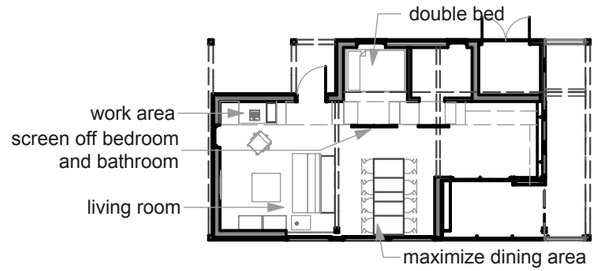
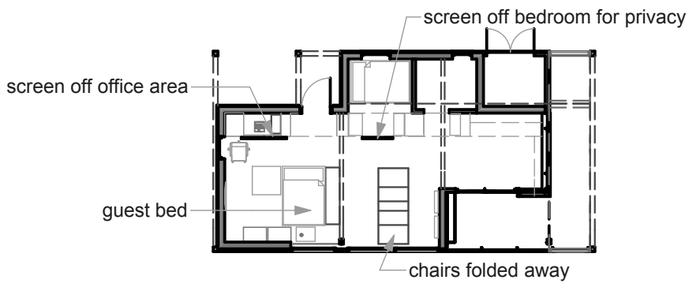
symbols and code

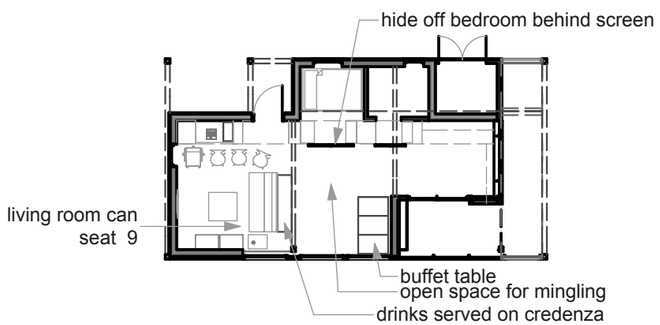
G-002



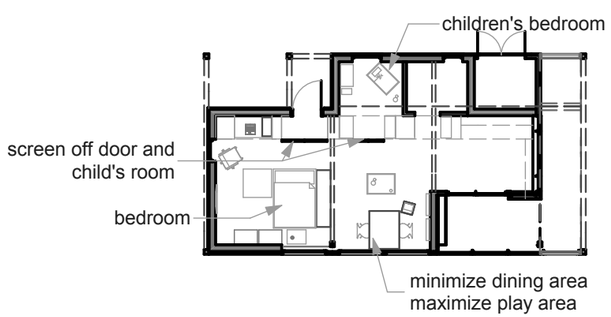
SINGLES / COUPLES
daytime configuration



SINGLES / COUPLES
nighttime configuration



SINGLES / COUPLES
events and large gatherings configuration



SINGLES / COUPLES
visiting child configuration

TARGET MARKET

Occupant Demographic	Eco-Conscious Gen-X Professionals (singles, couples and small families)
Primary Mo?va?ons	Green consciousness Early Adopter Simplicity and Ease Community Living Accessibility to Workplace
Number of Occupants	2
Permanent Site	University of Minnesota Outreach, Research, and Educa?on Park (UMORE), Rosemount, MN
Housing Type	Single Family
Homeowner Annual Income	$177,000
Number of Bedrooms	0 (2 alternate sleeping areas: alcove and sofa bed in living area)
	Cost of House $560,000 (prototype)

Excerpt from Market Viability Report in the Project Manual

The ICON House is a small, yet comfortable and stylish residence for the eco-conscious urban dweller. A number of trends indicate that there is an emerging market for smaller more energy efficient housing in Minnesota. The seven-county Minneapolis area has had steady population growth since the 1990s, which is expected to continue and approximately double by the year 2030 (Sasaki 2006). In fact, household growth has been at a faster rate than population, although the average household size has fallen. Future housing development is expected to be consistent with the current stock in Minnesota that is largely single family, with some shifts toward housing that is oriented to smaller, older households (Sasaki 2006). These trends indicate that the ICON House would be very attractive to our target market: upper income Gen-X professional couples who identify themselves as environmentalists and technological early adopters, with a desire to live simply, but well.

The upper-income Generation X professional, member of a demographic that is known for seeking alternatives to mainstream offerings, is “on the leading edge of home and garden trends” and is often among early adaptors of products offering technology (Tergenza, 2008). This target market segment also tends to favor alternative housing typologies to traditional single-family homes in suburban settings (Asturias, 2008). Style-conscious younger buyers are asking themselves: Of what use is more house if you can’t afford to fill it in style? (Iconoculture, 2005)

The ICON House is also affordable for affluent Gen X professionals with rising incomes, a market segment that is willing to spend for convenience and for environmentally sustainable products. These consumers will continue to focus spending on residential investments and seek to integrate “workable green solutions into daily life” (Tergenza, 2008). Offering immediate enjoyment and future energy savings, the ICON House meets the trends, values and needs of this market (Tergenza, 2008).

At a total cost of $600,000, the owners would need a combined income of $177,000 to finance a 30-year mortgage. A number of dual income professionals would meet this affordability threshold; for example, two lawyers making the Minnesota median income for their profession in 2008 would have a combined income of approximately $200,000 per year (calculations based on data from Minnesota Department of Employment and Economic Development at <http://www.deed.state.mn.us>).

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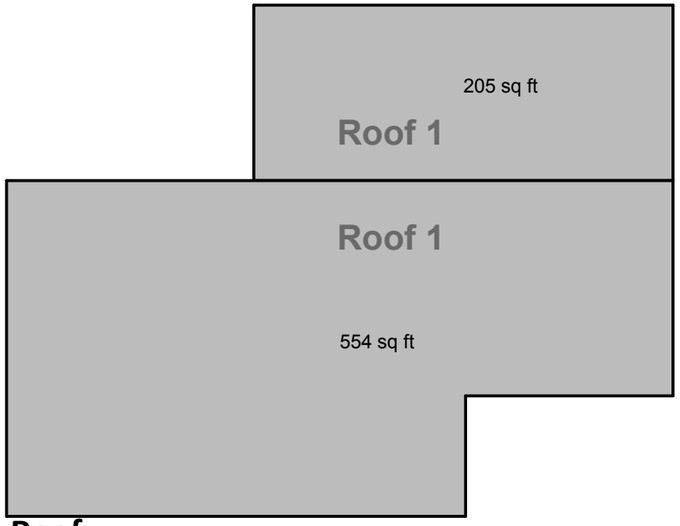
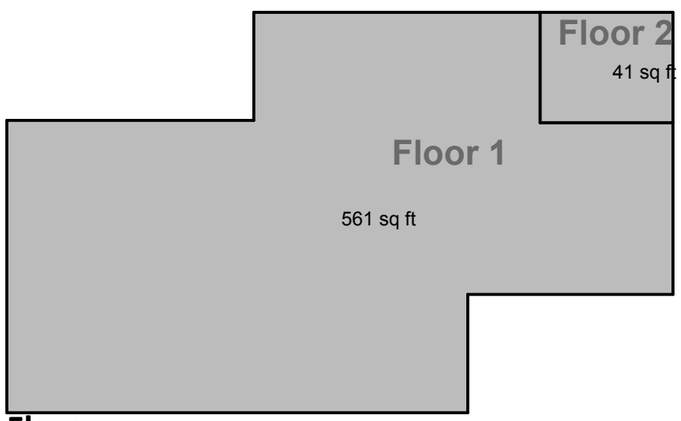
target market

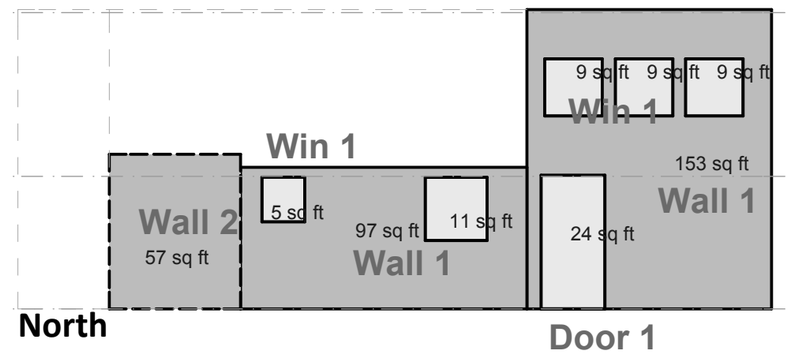
G-101



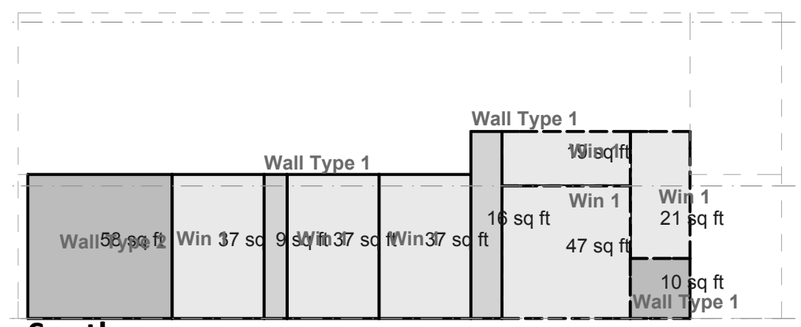
Roof



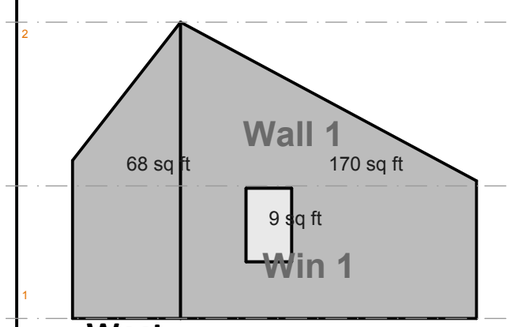
Floor



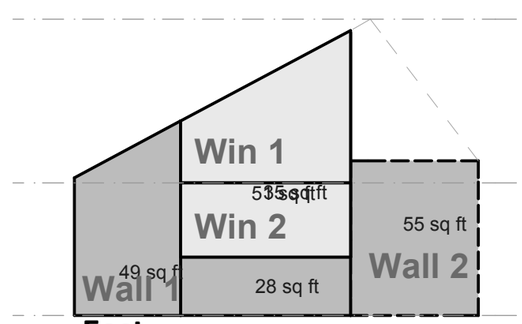
North



South



West



East

Average R-Value by Assembly Type

		Areas	R-Value
Roof			
Roof		759.00	70.12
Floor			
Floor 1		561.00	56.84
Floor 2		41.00	36.43
Walls			
Type 1	West	238.00	52.13
	South	35.00	52.13
	East	77.00	52.13
	North	250.00	52.13
Type 2	West	0.00	52.57
	South	58.00	52.57
	East	55.00	52.57
	North	57.00	52.57
Window 1	West	9.00	4.76
	South	111.00	4.76
	East	51.00	4.76
	North	43.00	4.76
Glazing			
Window 2	South	46.00	3.45
	East	35.00	3.45
Door	South	47.00	2.56
	North	24.00	2.56
Average			**36.76**

* Detailed calculations for code review as an addendum.

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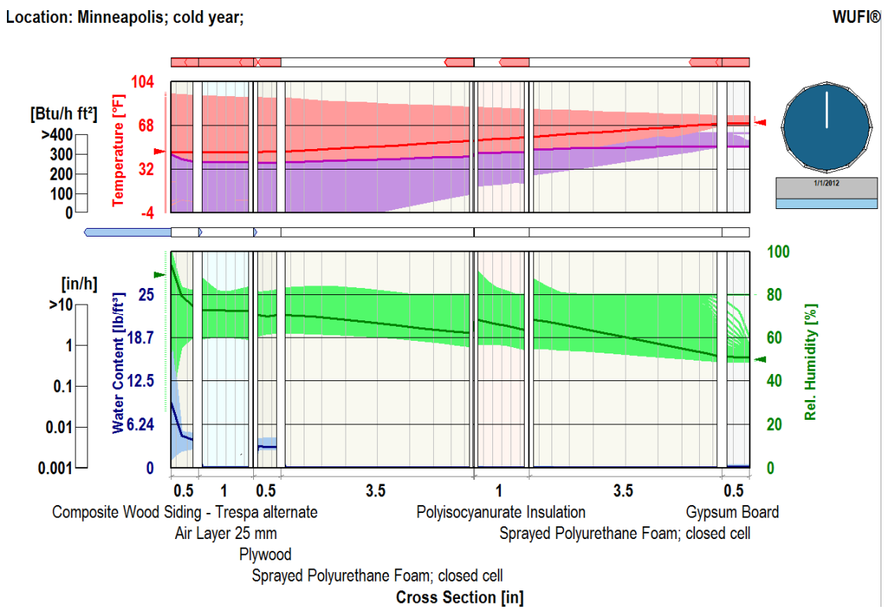
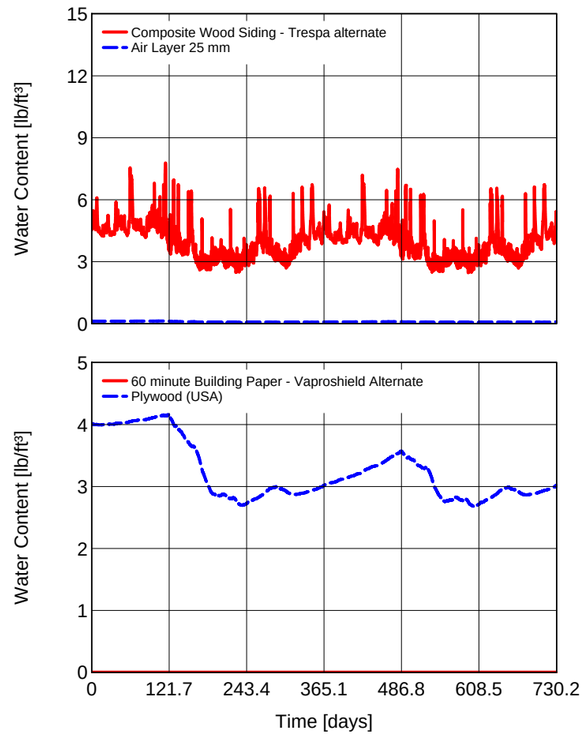
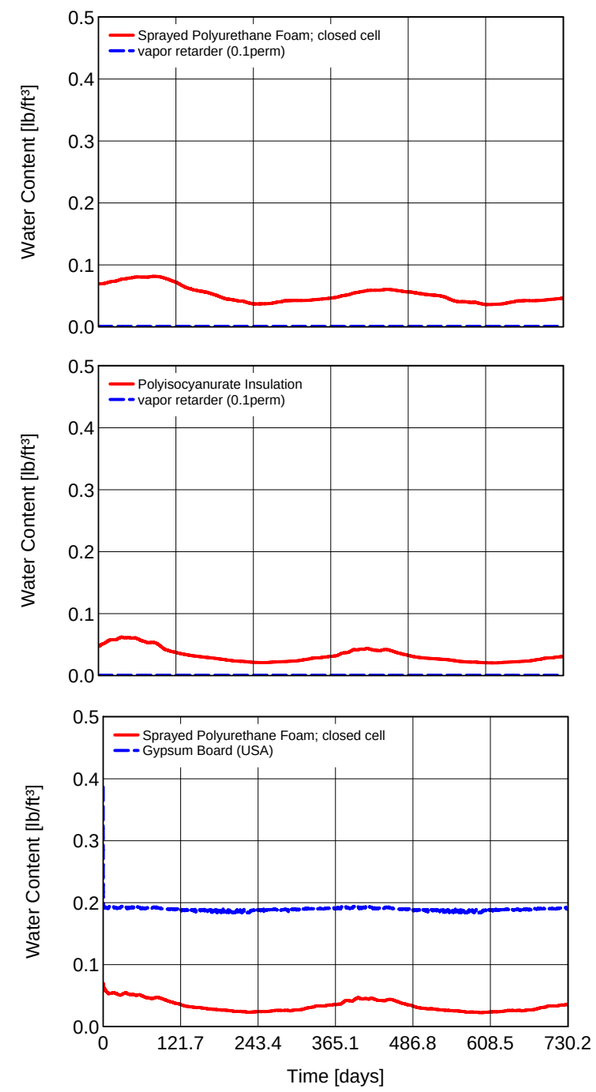
R-values

G-701







Moisture Content and Dew Point

The capabilities of the WUFI model, even with the need to substitute materials that are unable in the database, are expanded from the original dew point calculations for the wall. The simulation tool takes into account seasonal and daily fluctuations in moisture content. Rather than relying on a single dew point temperature, we can now see what the dew point, but more importantly if water may travel into the wall based on individual material properties. Also, we can see if water does make its way into the wall, whether it will dry out on its own, the time frame for drying, or if it could cause potential rotting or mold/mildew growth in the structure.

Figure 2 shows the changes of the dew point through the wall. Various changes in the season and day are shown as trace elements, represented in the lighter purple. The dark purple line indicates the dew point levels at the end of the two year simulation. During the winter simulation, you can see the low dew point range, from -20 degrees F at the exterior wall to 50 degrees F at the interior. During the summer, it ranges from 80 degrees F at the exterior to 55 degrees F at the interior.

Running the WUFI simulation for a two year span, most of the layers do not receive moisture via capillary or other forces except for the exterior cladding and the plywood sheathing (Figure 3). The exterior cladding, as explained in the methodology section, is a substitute material used for the WUFI simulation since the planned phenolic resin composite board was not available int he WUFI database. The simulation tool is unable to simulate the slat construction, or the non-sealed condition of that 1" air layer behind the cladding. As a result of the rainscreen construction, which will allow air movement behind the cladding, this cladding material should dry out without any problems.

The other layer of concern is the plywood. The retention of the water after two years (approximately 4 lbs/ft 2) is most likely a result of the inability to properly model the membrane layer that covers the plywood. The model uses a 60 min. building paper, which has a much lower permeability to vapor (typically 5 perm), whereas the material we specified, Vaproshield, as a perm rating of 50.

In tests by Vaproshield, the drying rate of WrapShield versus a typical 60 min paper show the increased drying potential not captured in our simulation.

Thus our team asserts that the WUFI model for our wall construction, as well as data from Vaproshield, indicates there should not be a moisture retention problem in any of the layers of our wall.

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WUFI model

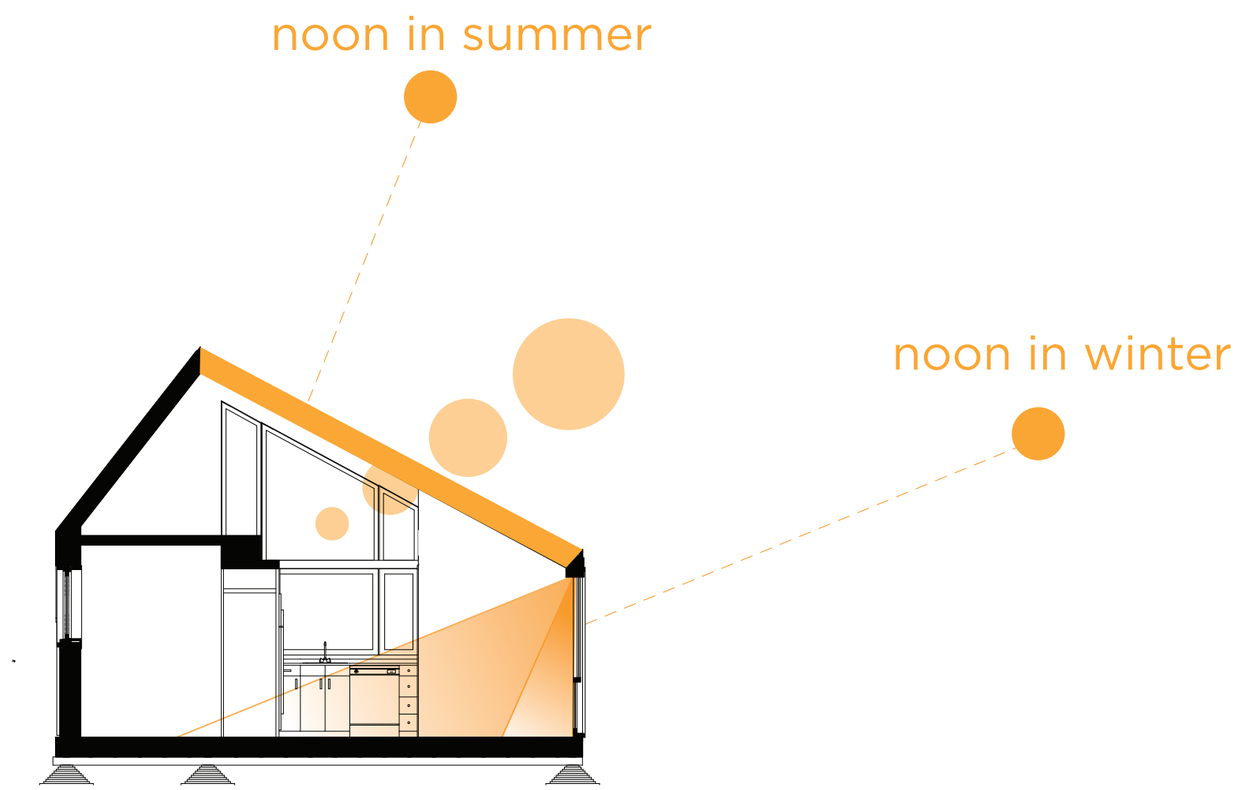
G-702

A4 Southeast Aerrial

ICON - an image, a representation...an important and enduring symbol

SOLAR - of, or relating to, or proceeding frmo the sun

The SOLAR ICON transforms the traditional gable form to maximize south-facing solar collector area.



D1 Solar Gable Roof
NOT TO SCALE

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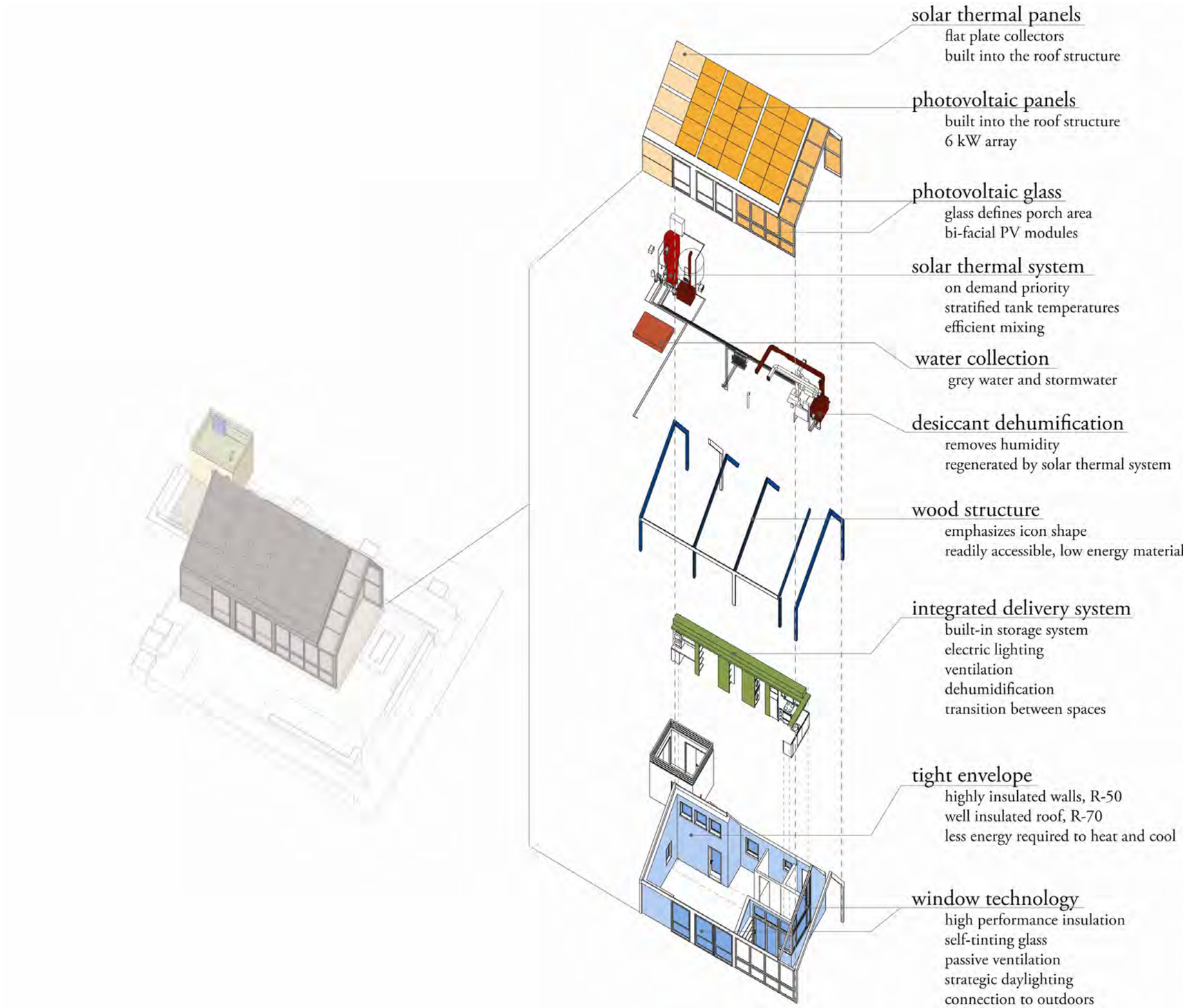
concept

G-901



A1 Main Features of the ICON Solar House

NOT TO SCALE

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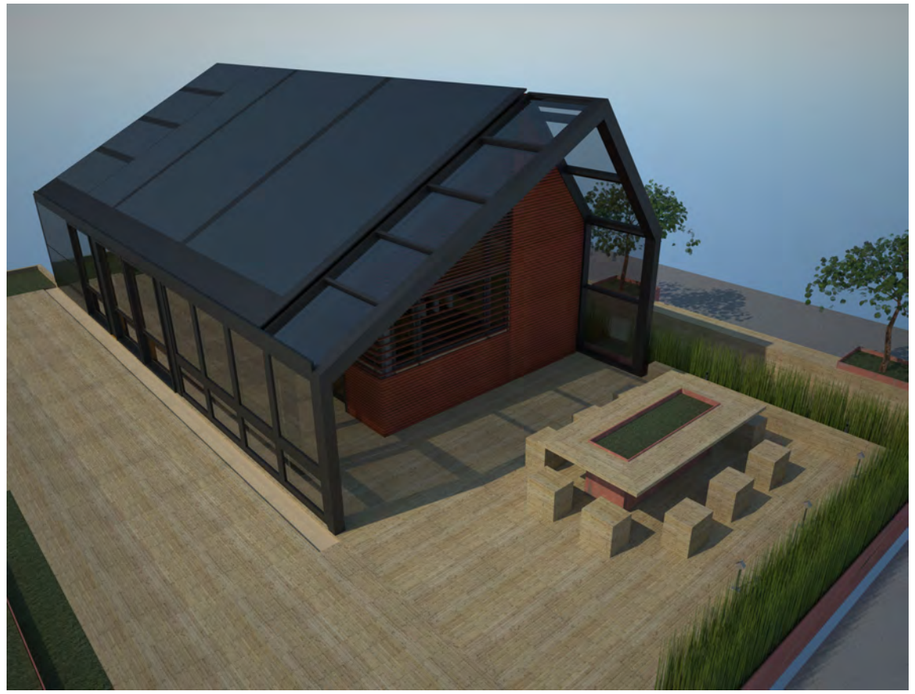
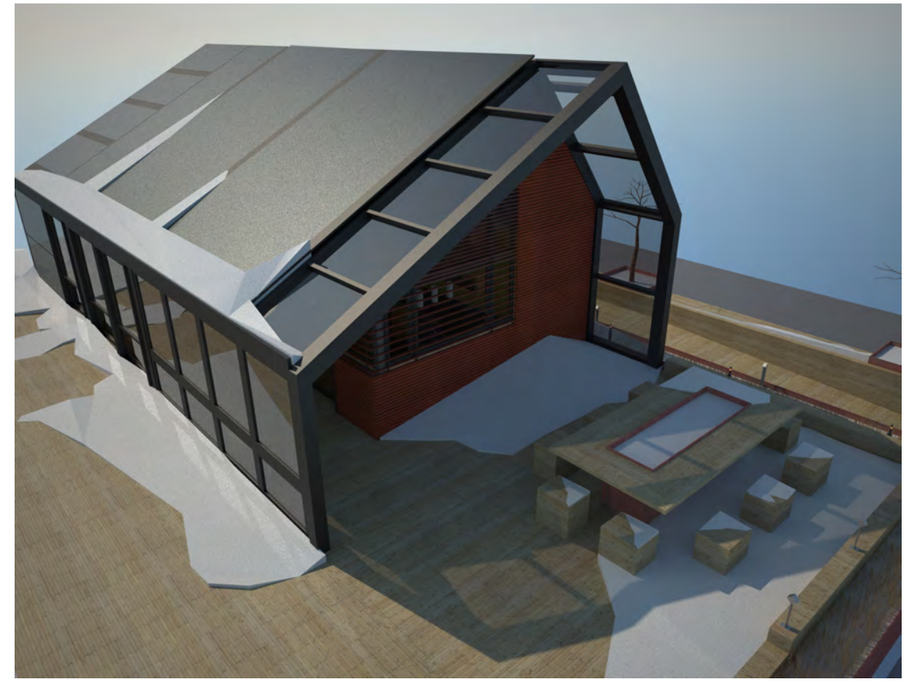
design features

G-902



A4 Summer
NOT TO SCALE



E4 Winter
NOT TO SCALE

A1 Autumn
NOT TO SCALE

The ICON Solar Home is designed to accommedate the seasonal changes of Minnesota. The variety of outdoor spaces and vegetation provide a dynamic backdrop for residents and guests. Along the north entry tall grasses and deciduous trees along the north entry provide a colorful backdrop to the house.

In summer months the east porch can accommedate outdoor meals and entertainment, while the south side offers reading gardensbathed in sunlight with vegetation integrated into the decking.

In the winter, the deck landscape transforms under the cover of snow. The solar collectors are integrated into the roof to accomedate the collection of melting snow while the pannels continue to generate energy. Snow that collects on the south deck re⊠ects additional light into the interior of the living and dining room.

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house Images

G-903

A4 Kitchen
NOT TO SCALE

E4 East Porch
NOT TO SCALE

A1 Living Room
NOT TO SCALE

The living spaces of the ICON Solar Home are arranged under the span of the iconic solar gable. The living room, dining room, and workstation are combined in an open plan that takes full advantage of the tall ceilings above.

In the kitchen work spaces are accommedated beside the large east window. From the kitchen, residents can view out to the east and south, inviting them to enjoy the outdoors.

On the exterior, the iconic form extends out toward the outdoor dining area and east porch. Here a table is surrounded by the landscape to create a sense of privacy, while the south deck extends further arround the house to accommedate additional activities.

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A4 March Daylighting
NOT TO SCALE

Daylighting studies allowed us to anticipate the amount of solar gain we would have through the seasons, effecting heating, cooling, and lighting strategies.

A1 June Daylighthing
NOT TO SCALE

D1 December Daylighting
NOT TO SCALE

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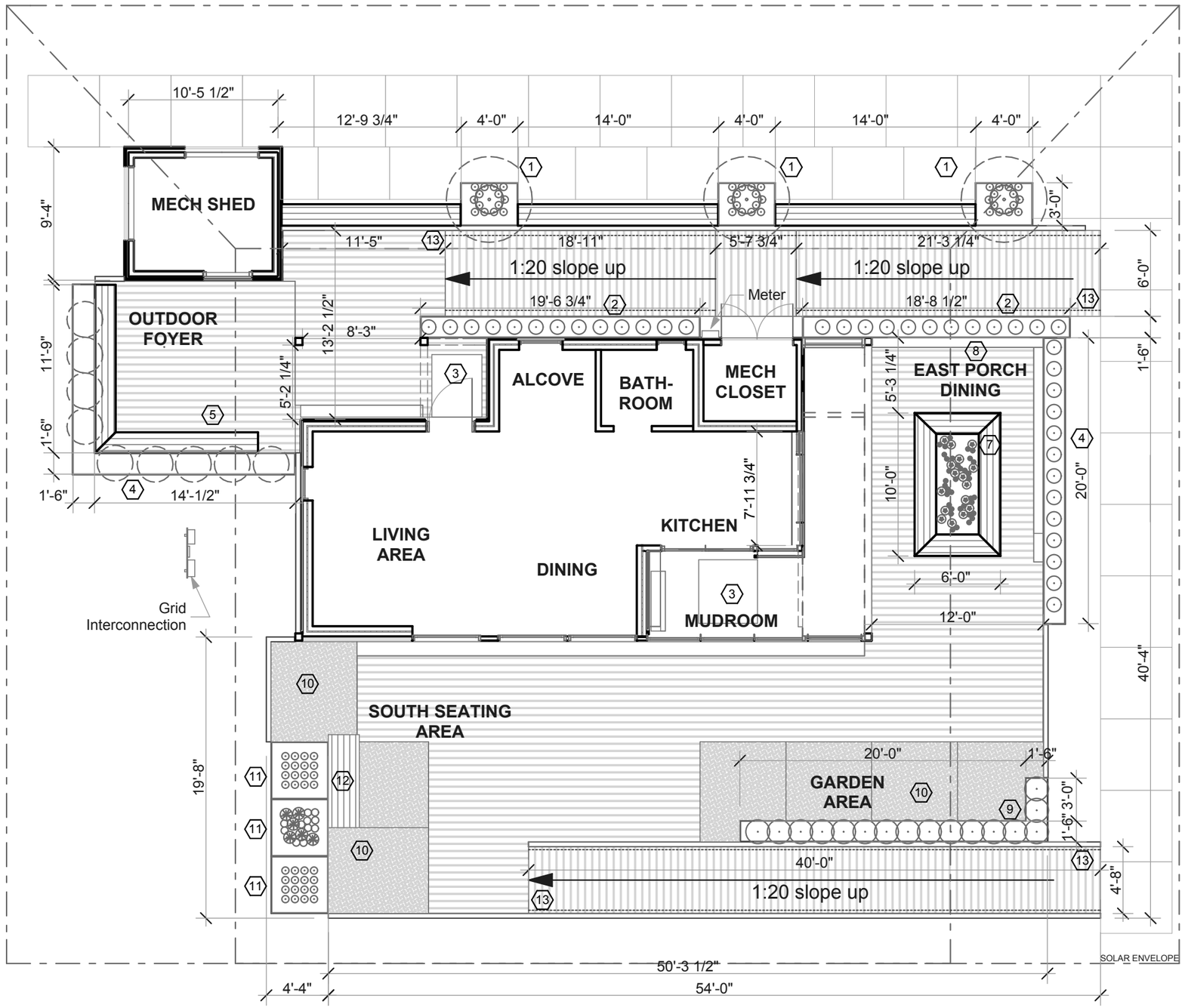

A1 Site Plan
SCALE: 1/8" = 1'-0"

0 4' 8' 16'

PLAN NORTH

GENERAL SHEET NOTES

1 RAMP LENGTH VARIES, MAINTAIN 1:20 SLOPE, MAX.

SHEET KEYNOTES

1 18" H PLANTERS W. APPLE TREES
2 30" H PLANTERS W. SWITCHGRASS; CONDUIT TRACK BELOW.
3 METAL GRATE @ ENTRY.
4 24" H PLANTER
5 18" WOOD BENCH
6 STORAGE BENCH
7 WOOD TABLE CANTILEVERED ON 42" H PLANTER
8 STACKED WOOD BEAMS, 8" H
9 30" H PLANTER
10 CAPILLARY IRRIGATION BOXES BELOW TURF GRASS
11 STL PLANTER BOXES, HEIGHT VARIES
12 WOOD BENCH ATTACHED TO PLANTERS
13 BRUSED ALUMINIUM HANDRAIL, 2" DIA. RAILS, SET AT 3'-0" ABOVE WALKING SURFACE.

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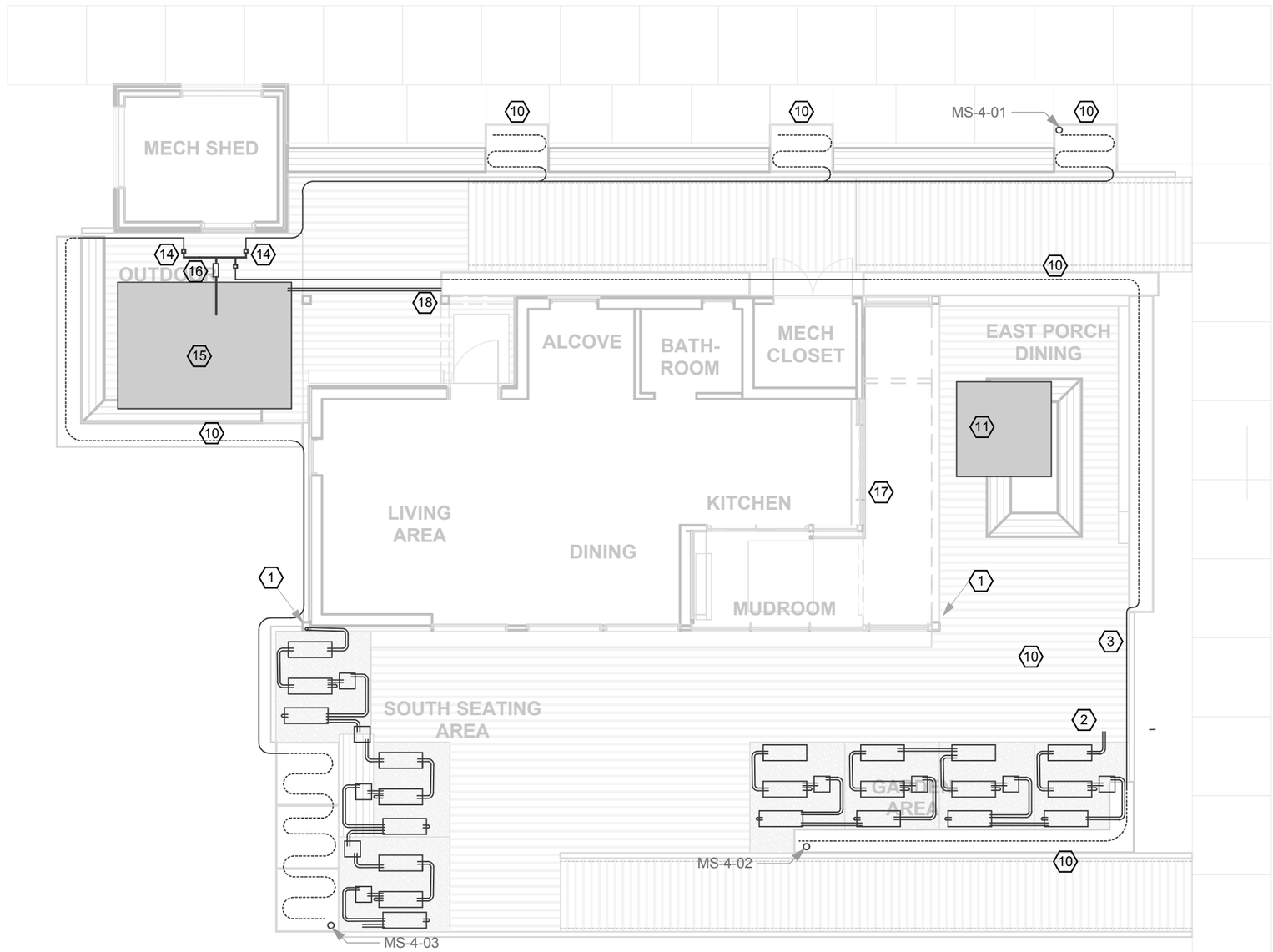
site plan

L-101



GENERAL SHEET NOTES

1 USE FLEXPIPE TO CONNECT BETWEEN EPIC BOXES.
2 COORDINATE UNDER DECK PIPING WITH MECHANICAL DRAWINGS

SHEET KEYNOTES

1 CONNECTION TO HOUSE DOWN SPOUT
2 DECK BOARDS SECUTED TO CONTROL BASIN LID
3 2" PVC FITTINGS
10 16 MM IRRIGATION HOSE BY TORO (BLUE STRIPE SOLID)
11 300 GAL. WATER PILLOW FOR BLACK WATER
14 TORO 700 SERIES ULTRA-FLOW ZONE VALVE
14 FLOJET ON-DEMAND PUMP, 4.9 GPM, 12 VOLT, 3/4" (# 04300143A)
15 1300 GAL. WATER PILLOW FOR GRAYWATER
16 HEADER PIPE TO CONNECT ZONE VALVES
17 FROM DOMESTIC BLACK WATER
18 FROM DOMESTIC GRAY WATER

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irrigation plan

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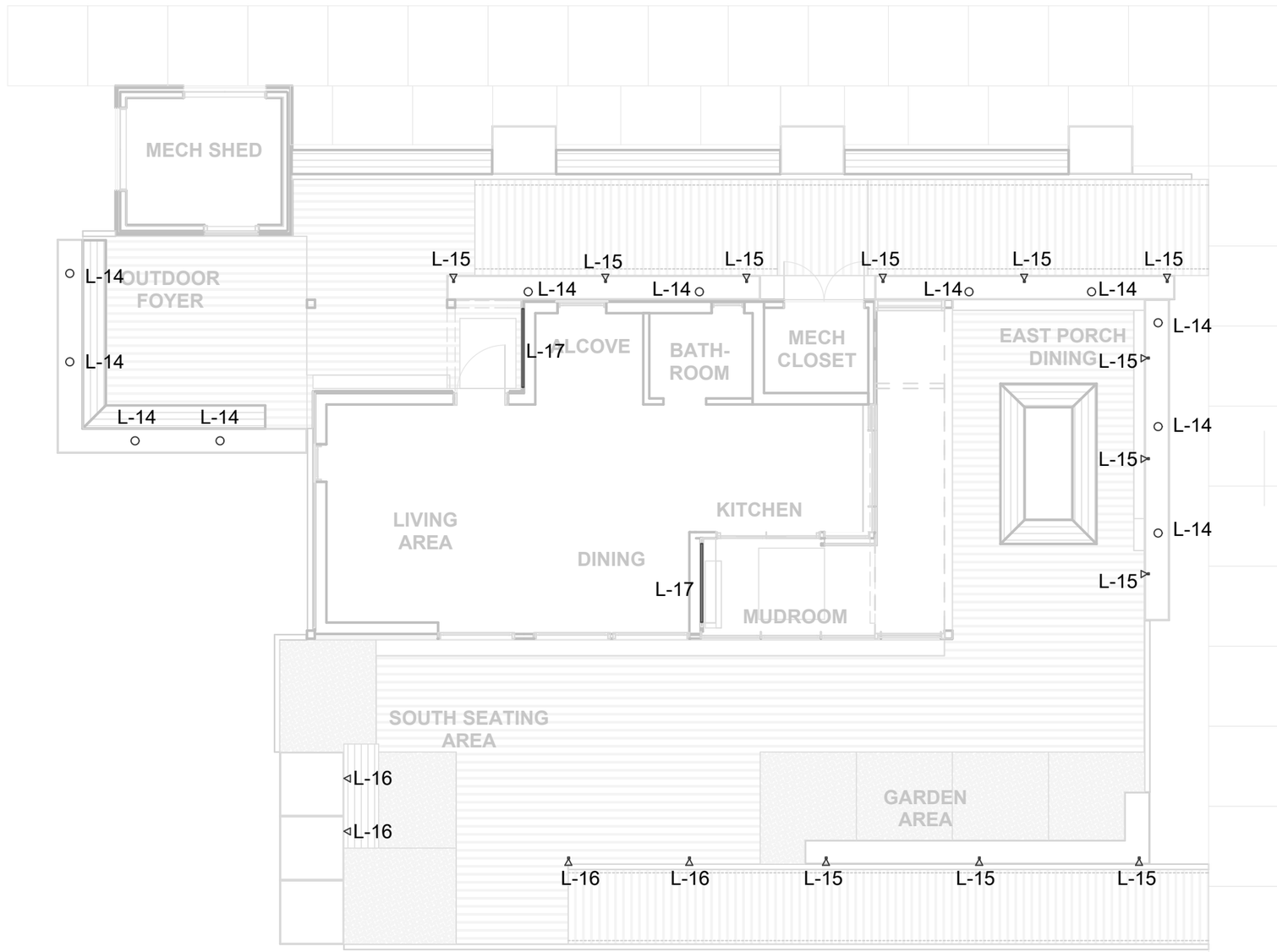
A1 Irrigation Plan
SCALE: 1/8" = 1'-0"

0 4' 8' 16'

PLAN NORTH



A1 Site Lighting Layout

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

0 4' 8' 16'

PLAN NORTH

GENERAL SHEET NOTES

1 SEE I-611 FOR LIGHTING FIXTURE TYPES

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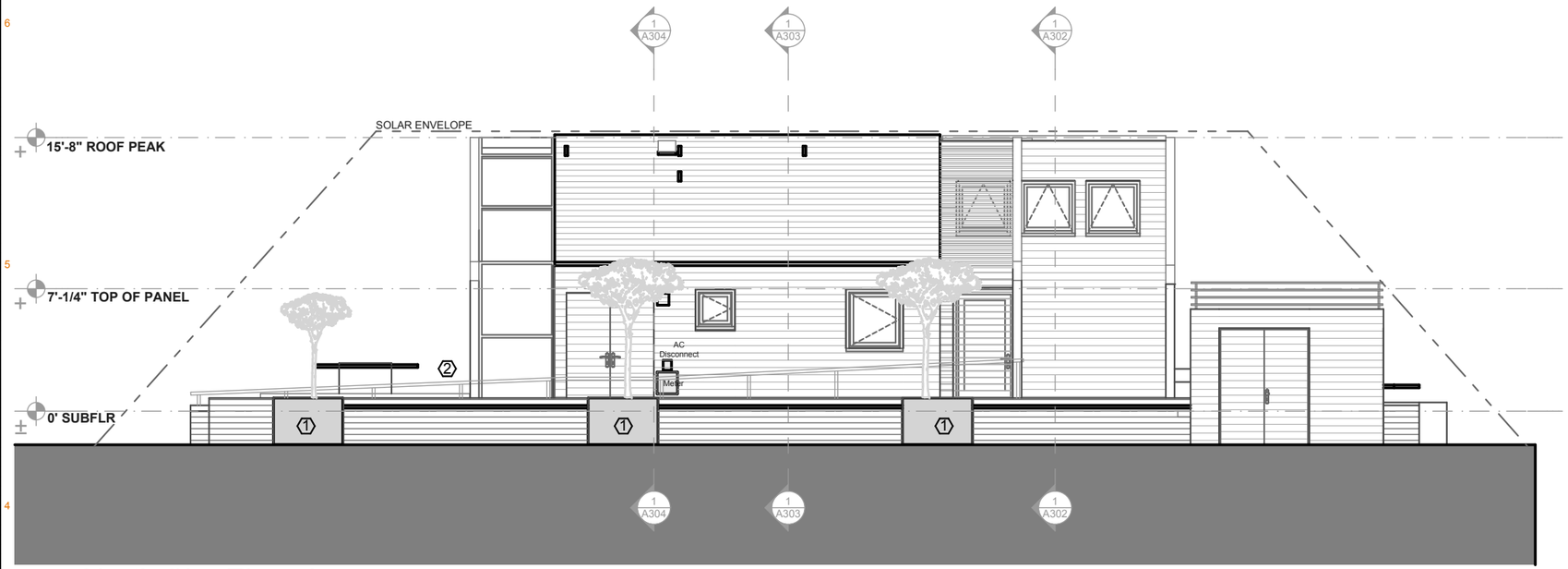
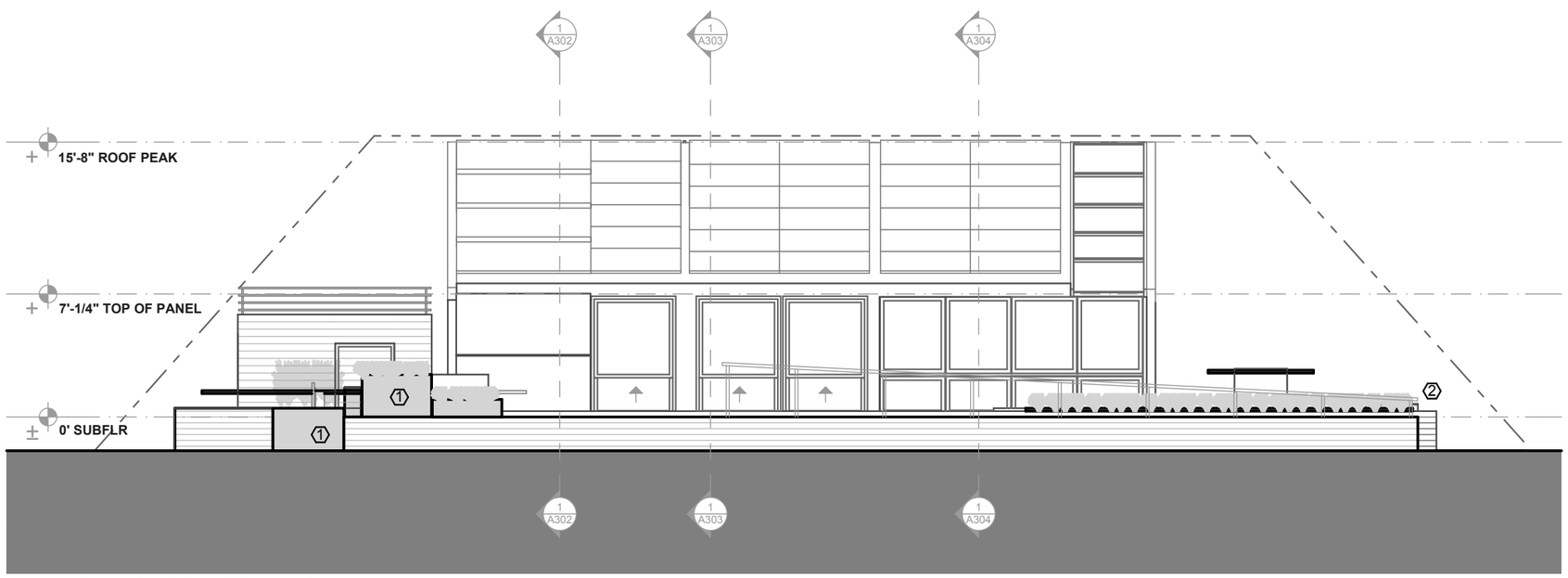
site lighting

L-103



A4 North Site Elevation
SCALE: 1/8" = 1'-0"

0 4' 8' 16'



A1 South Site Elevation
SCALE: 1/8" = 1'-0"

0 4' 8' 16'

SHEET KEYNOTES

1 STEEL PLANTER BOXES, SEE L-101 FOR DIMENSIONS
2 3'-0" TALL HANDRAIL, PER ADA CODE

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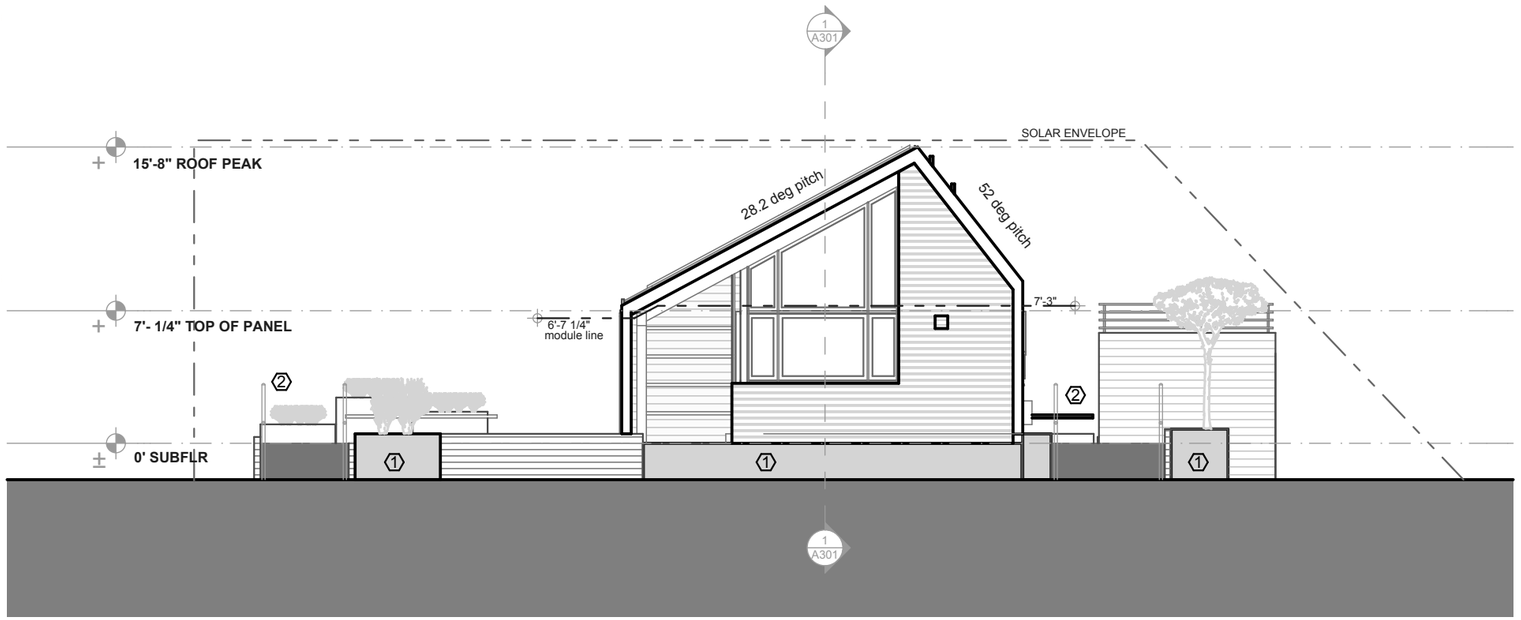
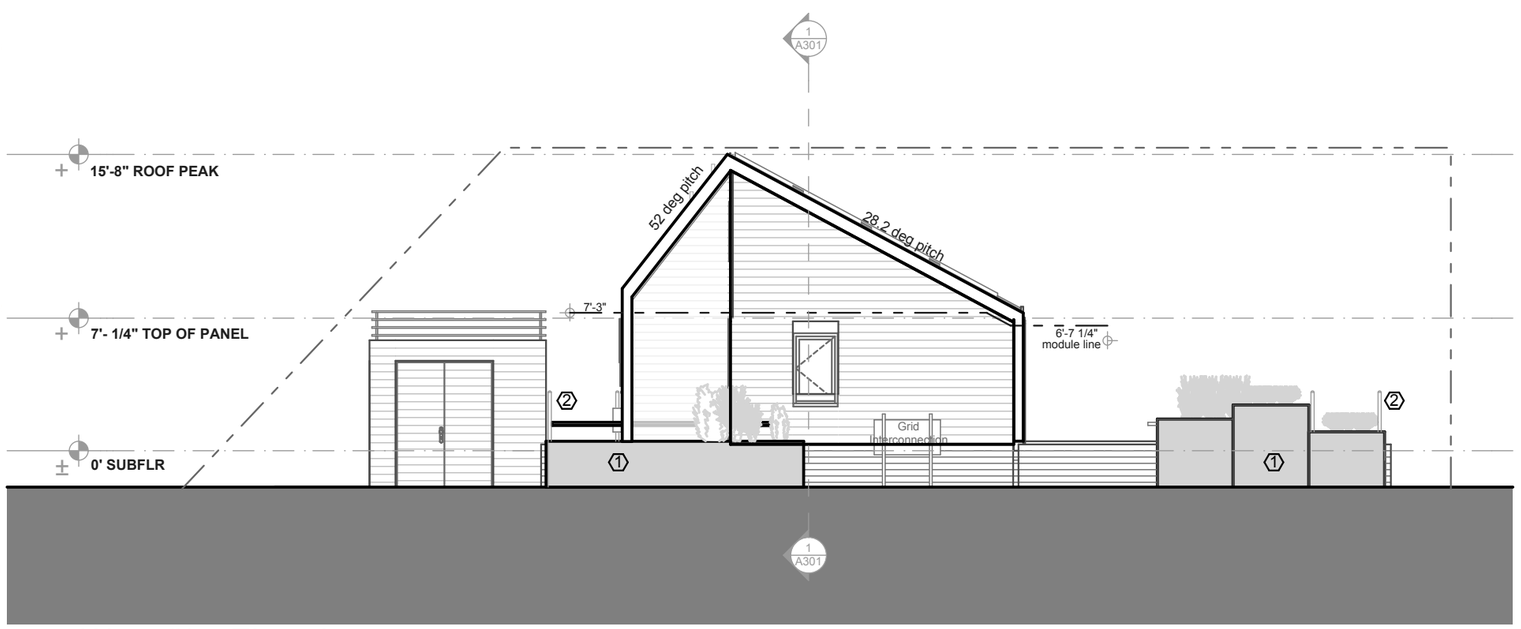
site elevations

L-201



A4 East Site Elevation
SCALE: 1/8" = 1'-0"

0 4' 8' 16'



A1 West Site Elevation
SCALE: 1/8" = 1'-0"

0 4' 8' 16'

SHEET KEYNOTES

1 STEEL PLANTER BOXES, SEE L-101 FOR DIMENSIONS
2 3'-0" TALL HANDRAIL, PER ADA CODE

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site elevations

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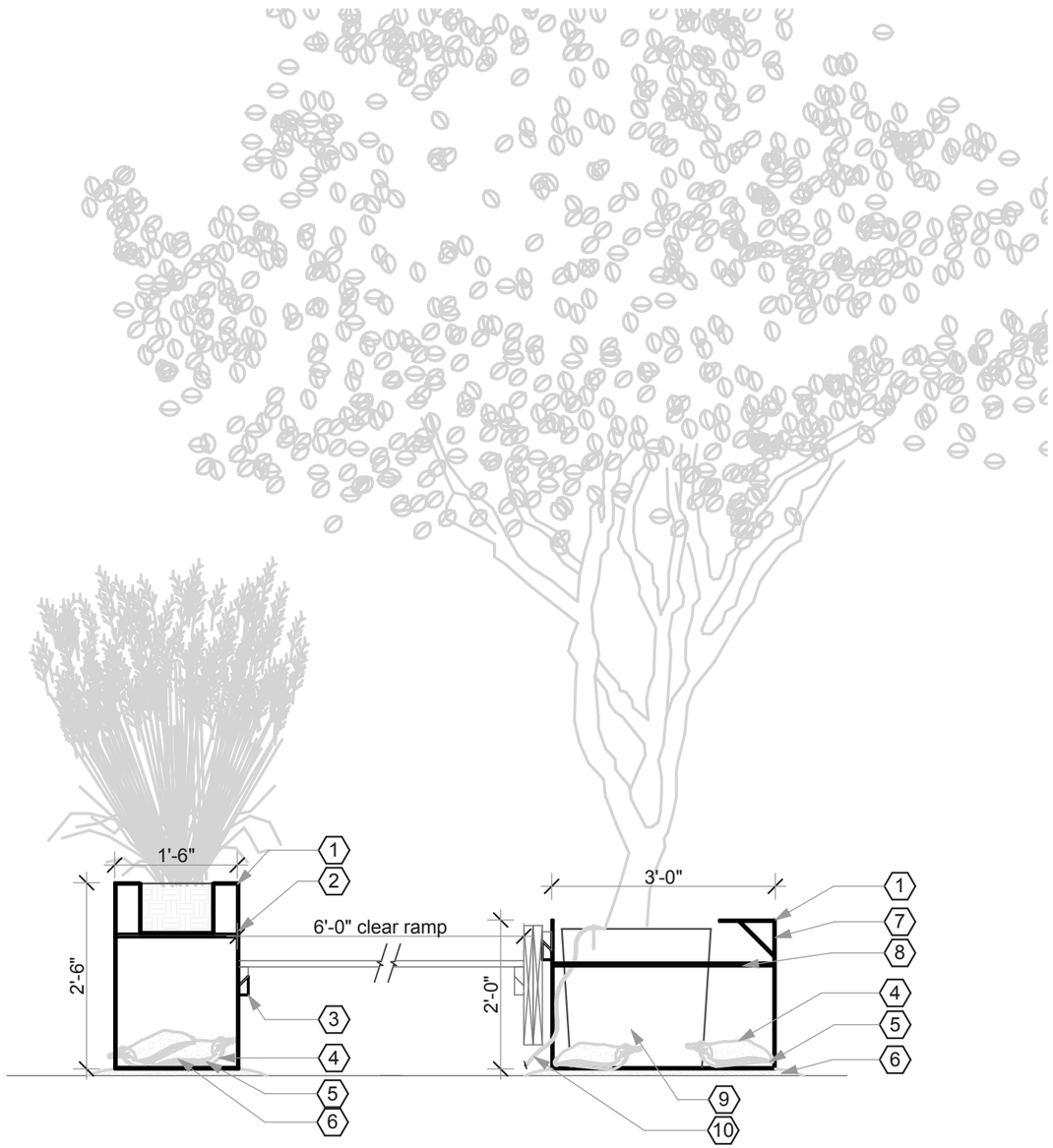
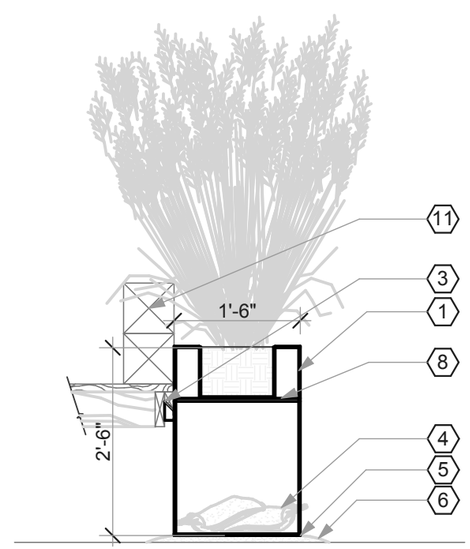


A1 Details
SCALE: 1/2" = 1'-0"

0 1' 2' 4'



E1 Details
SCALE: 1/2" = 1'-0"

0 1' 2' 4'

SHEET KEYNOTES

1 1/4" STEEL EDGE WELDED
2 6" ABOVE FINISHED DECK GRADE
3 SUPPORT CLEAT
4 FILL WITH SANDBAGS
5 LEVELING SAND
6 SHEET POLY (AT MALL GRADE)
7 1/4" THICK STEEL SUPPORT PLATE (3" WIDE)
8 1/2" DIAMETER STEEL DOWEL
9 TREE TO REMAIN IN 2' DIAMETER POT
10 TORO-TURBO-SC PLUS AND TURBO-KEY DRIP IRRIGATION SYSTEM
11 6" X 6" (NOM.) TIMBERS
12 DECK SUPPORT CLEAT

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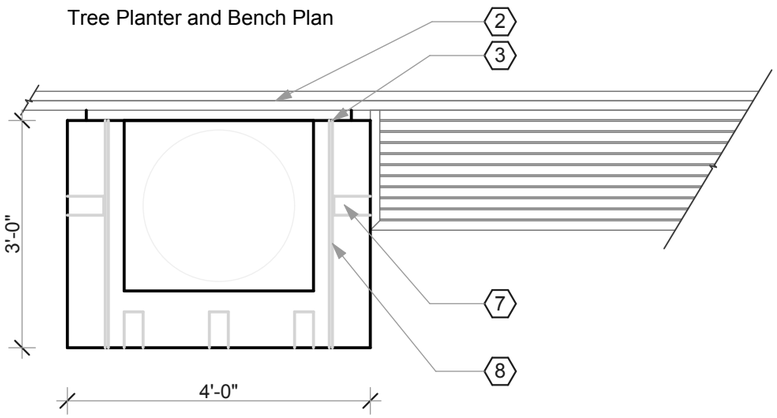
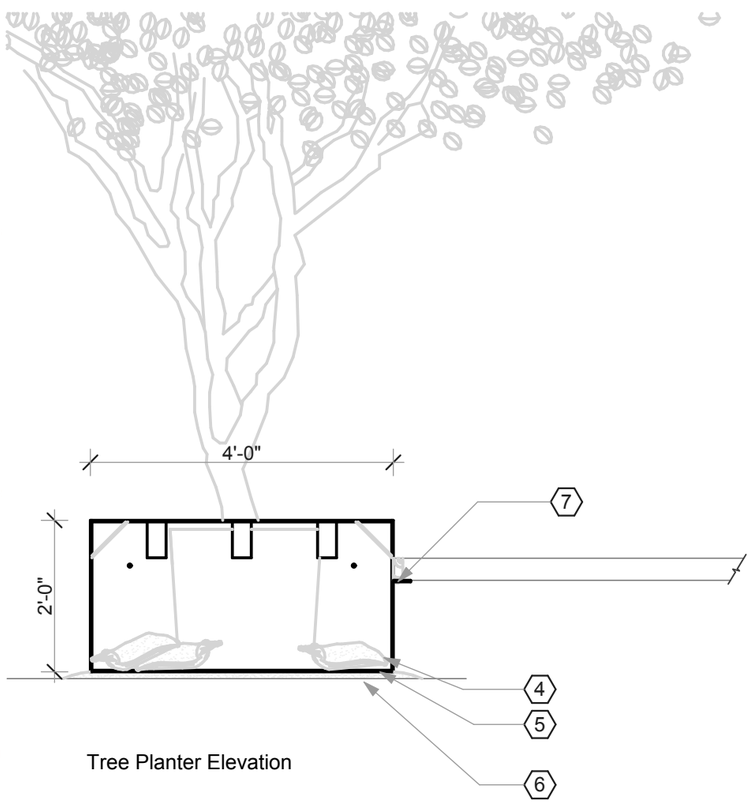
deck details

L-501

Tree Planter and Bench Plan

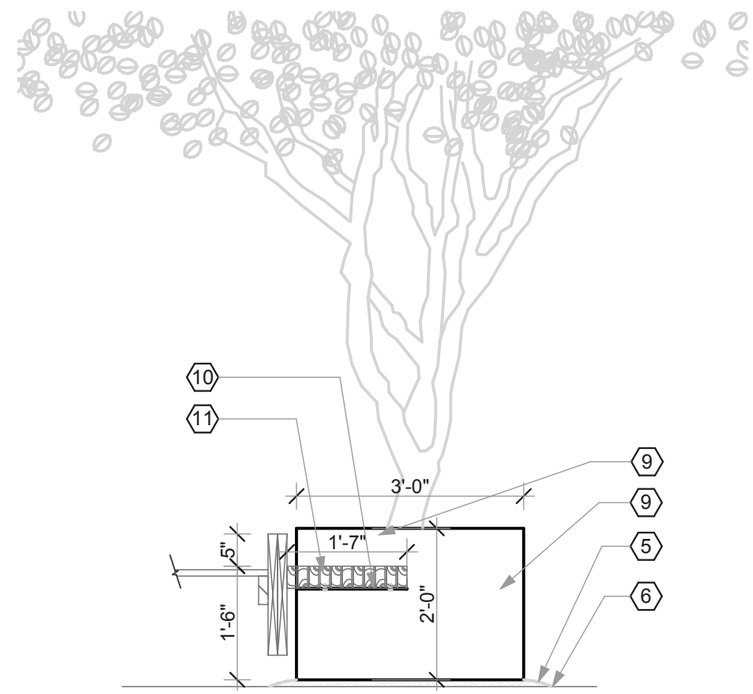


A4 Details
SCALE: 1/2" = 1'-0"



Tree Planter Elevation

A1 Details
SCALE: 1/2" = 1'-0"



Bench and Cheek Wall Section

D1 Details
SCALE: 1/2" = 1'-0"

SHEET KEYNOTES

1 2X4 (NOM.)
2 CHEEK WALL
3 CHEEK WALL SUPPORT CLEAT
4 FILL WITH SANDBAGS
5 LEVELING SAND
6 SHEET POLY (AT MALL GRADE)
7 1/4" THICK STEEL SUPPORT PLATE (3" WIDE)
8 1/2" DIAMETER STEEL DOWEL
9 3" ANGLE IRON EDGE WELDED TO TREE BOX
10 RAMP SUPPORT CLEAT
11 ENTRANCE RAMP

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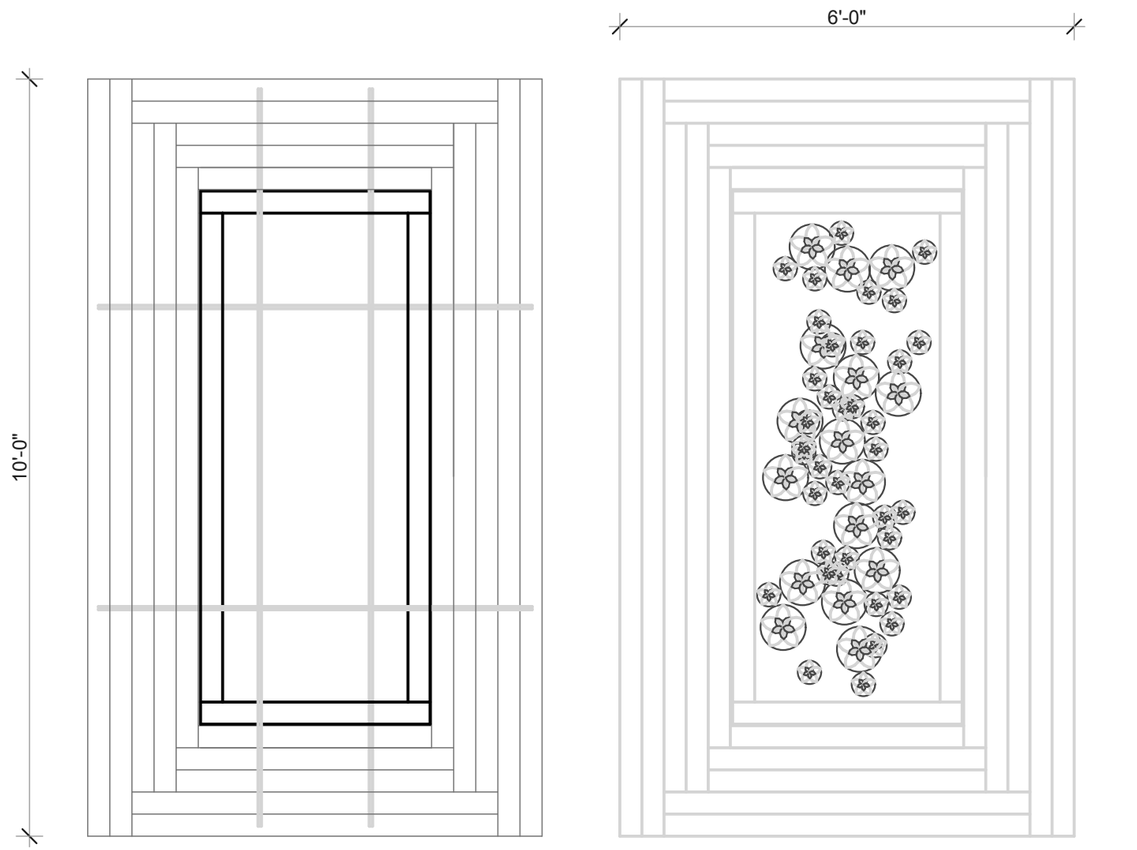
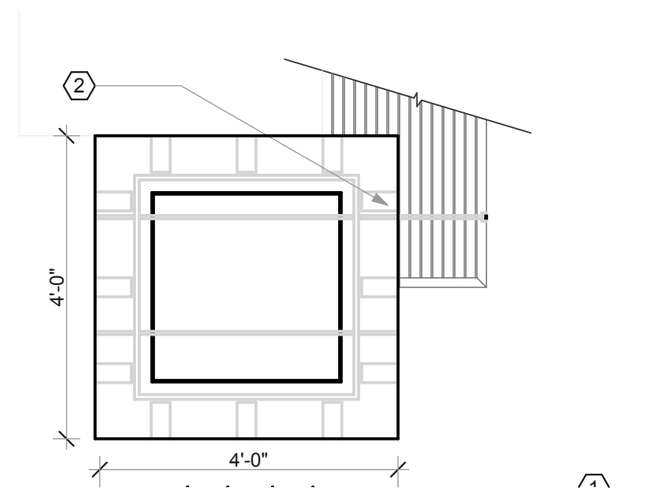
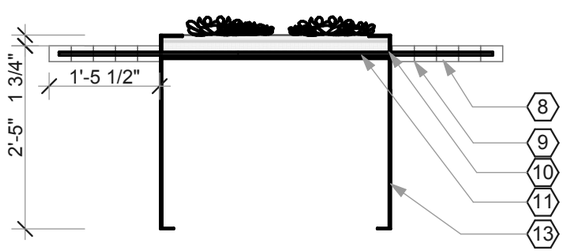


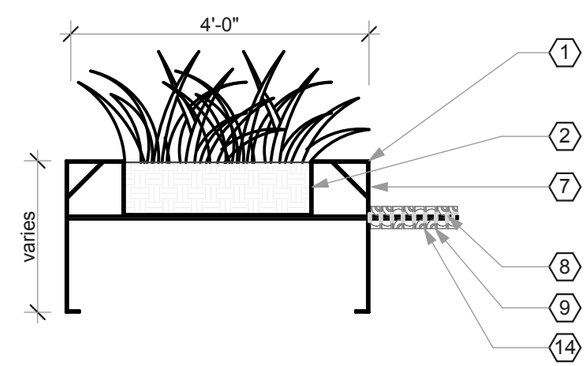
A3 Details
SCALE: 1/2" = 1'-0"



E3 Details
SCALE: 1/2" = 1'-0"



A1 Details
SCALE: 1/2" = 1'-0"



E1 Details
SCALE: 1/2" = 1'-0"

SHEET KEYNOTES

1 1/4" STEEL EDGE WELDED
2 1/4" STEEL EDGE WELDED SEPARATE PLANTER BOX
7 1/4" THICK STEEL SUPPORT PLATE (3" WIDE)
8 1/2" DIAMETER STEEL DOWEL
9 2X4 WESTERN RED CEDAR
10 1" DIAMETER CRUSHED BLACK LAVA ROCK (1" THICK
11 2" THICK SOIL
12 DECK SUPPORT CLEAT
13 1/4" STEEL
14 (2) 1/8" FLAT WASHER SPACERS

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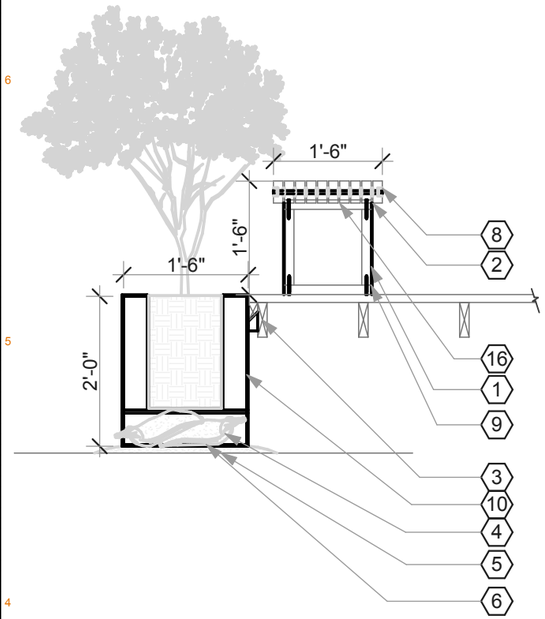
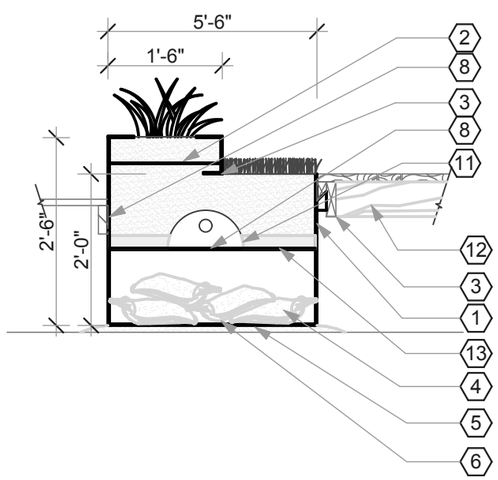


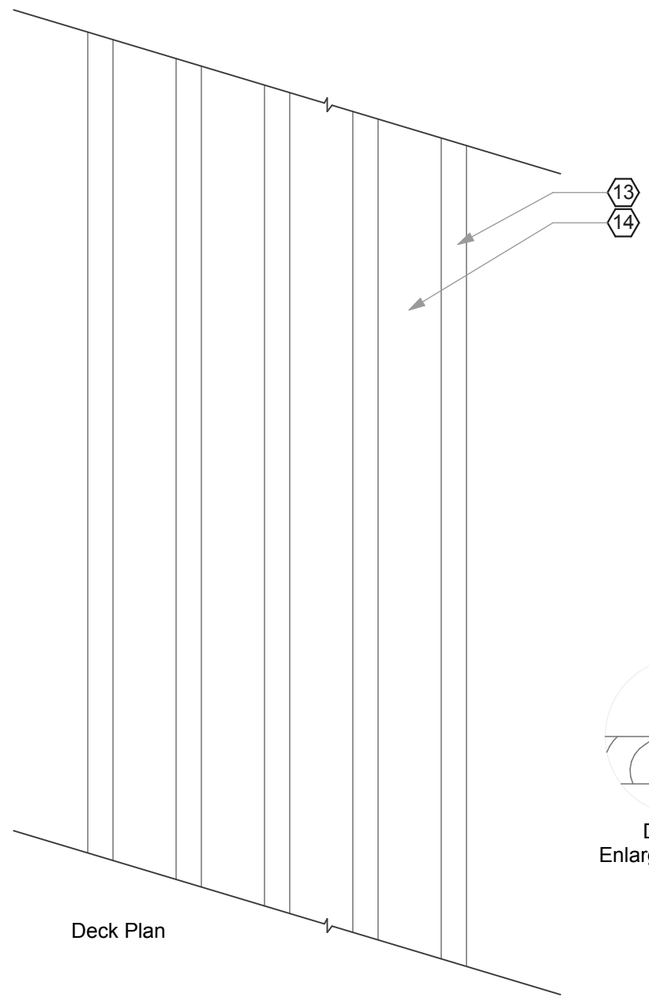
A4 Details
SCALE: 1/2" = 1'-0"

0 1' 2' 4'



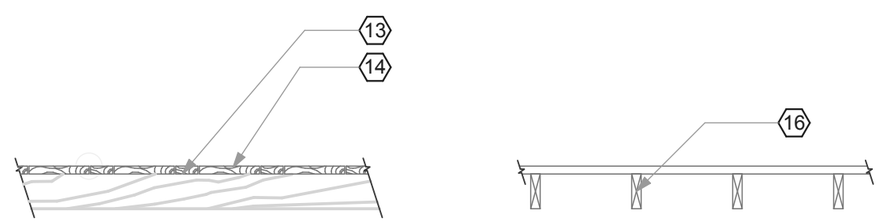
A1 Details
SCALE: 1/2" = 1'-0"

0 1' 2' 4'



Deck Plan

Deck Board
Enlargement (N.T.S.)



D1 Details
SCALE: 1/2" = 1'-0"

0 1' 2' 4'

SHEET KEYNOTES

1 1/8" STEEL EDGE WELDED
2 2X4 WESTERN RED CEDAR
3 DECK SUPPORT CLEAT
4 FILL WITH SANDBAGS
5 LEVELING SAND
6 SHEET POLY (AT MALL GRADE)
7 1/4" THICK STEEL SUPPORT PLATE (3" WIDE)
8 1/2" DIAMETER STEEL DOWEL (THREADED END)
9 2X4 TREATED WOOD FRAME
10 1/4" STEEL EDGE WELDED SEPARATE PLANTER BOX
11 EPIC STORAGE UNIT
12 RECLAIMED WOOD DECKING (CEDAR PREFERRED)
13 2" DEPTH PEA GRAVEL
14 2X4 CEDAR WOOD DECKING
15 2X6 CEDAR WOOD DECKING

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deck details

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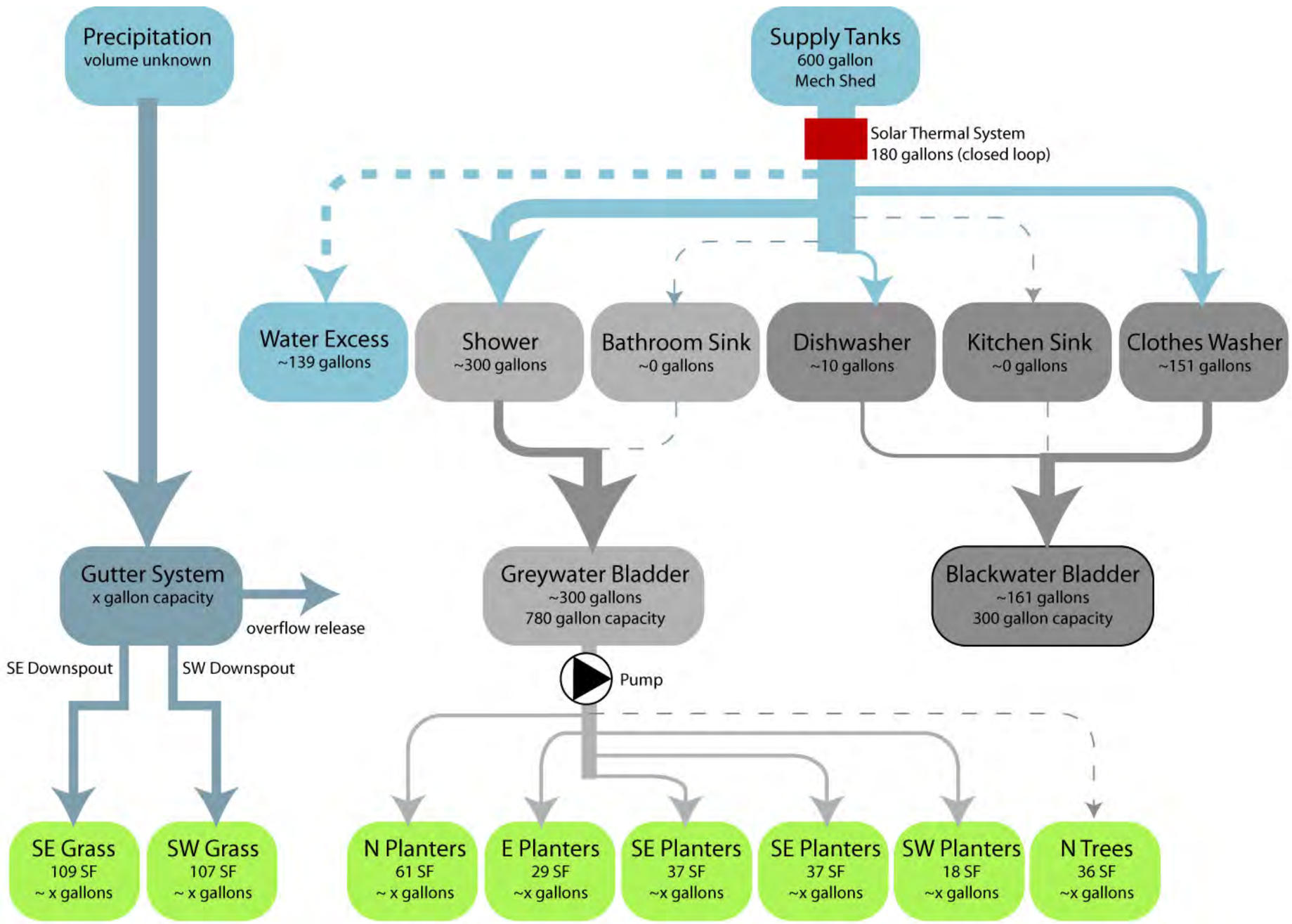

A1 Water Flow Diagram
NOT TO SCALE

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water flow diagram

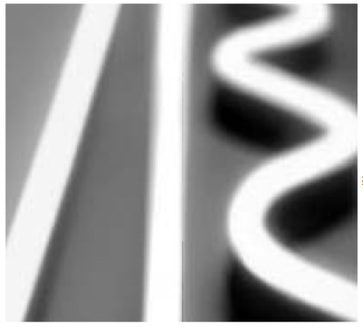
L-601

A1 Electric Lighing Fixtures

NOT TO SCALE

L-15 & L-16 GLIM CUBE
POWER: 1 WATT PER FIXTURE
DESIGN INTENT: THE THIN ANGLED PROFILE OF THESE FIXTURES THROW LIGHT DOWN ACROSS THE RAMP SURFACE ILLUMINATING THE INCLINES AND TRANSITIONS.

L-14 LITESTICK
POWER: 5 WATTS PER FIXTURE
DESIGN INTENT: THESE FIXTURES ARE LOCATED WITHIN THE TALL GRASS PLANTERS TO ILLUMINATE BOTH THE GRASS AND WASH LIGHT ON THE NORTH FACADE OF THE HOUSE.



L-17 PLEXINEON WHITE 2X
POWER: 5 WATTS PER FIXTURE
DESIGN INTENT: THE THIN PROFILE OF THESE FIXTURES FIT BETWEEN THE HORIZONTAL RAINSCREEN SLATS, WHILE WASHING THE WALL WITH LIGHT. THEY ARE LOCATED BY THE ENTRANCES TO PROVIDE EFFECTIVE ILLUMINATION FOR OPENING THE DOOR AT NIGHT.

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exterior lighting

L-901

A1 Electric Lighting Fixtures

NOT TO SCALE

L-9 TETRA-LED
POWER: 5.8 WATTS PER FIXTURE
DESIGN INTENT: THESE FIXTURES SERVE AS EPHEMERIAL OBJECTS OF VISUAL INTEREST IN THE KITCHEN SPACE AT THE EAST END OF THE HOUSE FOR BOTH OCCUPANTS INSIDE AND THE GENERAL PUBLIC OUTSIDE.

L-14 LITESTICK
POWER: 5 WATTS PER FIXTURE
DESIGN INTENT: THESE FIXTURES ARE LOCATED WITHIN THE TALL GRASS PLANTERS TO ILLUMINATE BOTH THE GRASS AND WASH LIGHT ON THE NORTH FACADE OF THE HOUSE.

L-15 GLIM CUBE
POWER: 1 WATT PER FIXTURE
DESIGN INTENT: THESE FIXTURES ILLUMINATE THE SPACE AROUND THE EAST PORCH TABLE.

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exterior lighting

L-902

A1 Landscape Image

NOT TO SCALE

L-17 PLEXINEON WHITE 2X
POWER: 5 WATTS PER FIXTURE
DESIGN INTENT: THE THIN PROFILE OF THESE FIXTURES FIT BETWEEN THE HORIZONTAL RAINSCREEN SLATS, WHILE WASHING THE WALL WITH LIGHT. THEY ARE LOCATED BY THE ENTRANCES TO PROVIDE EFFECTIVE ILLUMINATION FOR OPENING THE DOOR AT NIGHT.

L-15 & L-16 GLIM CUBE
POWER: 1 WATT PER FIXTURE
DESIGN INTENT: THE THIN ANGLED PROFILE OF THESE FIXTURES THROW LIGHT DOWN ACROSS THE RAMP SURFACE ILLUMINATING THE INCLINES AND TRANSITIONS.

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exterior lighting

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A1 Landscape Image

NOT TO SCALE

L-17 PLEXINEON WHITE 2X
POWER: 5 WATTS PER FIXTURE
DESIGN INTENT: THE THIN PROFILE OF THESE FIXTURES FIT BETWEEN THE HORIZONTAL RAINSCREEN SLATS, WHILE WASHING THE WALL WITH LIGHT. THEY ARE LOCATED BY THE ENTRANCES TO PROVIDE EFFECTIVE ILLUMINATION FOR OPENING THE DOOR AT NIGHT.

L-14 LITESTICK
POWER: 5 WATTS PER FIXTURE
DESIGN INTENT: THESE FIXTURES ARE LOCATED WITHIN THE TALL GRASS PLANTERS TO ILLUMINATE BOTH THE GRASS AND WASH LIGHT ON THE NORTH FACADE OF THE HOUSE.

L-15 & L-16 GLIM CUBE
POWER: 1 WATT PER FIXTURE
DESIGN INTENT: THE THIN ANGLED PROFILE OF THESE FIXTURES THROW LIGHT DOWN ACROSS THE RAMP SURFACE ILLUMINATING THE INCLINES AND TRANSITIONS.

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exterior lighting

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STRUCTURAL NOTES

MATERIAL STRENGTHS

Structural Steel

Connection bolts ASTM A325 or F1852, Ft = 44 ksi
Misc. structural steel ASTM A36, Fy = 36 ksi

Structural Lumber

All dimensional lumber - #2 SPF or equal
Laminated Veneer Lumber (LVL)
E = 1,900,000 psi
Fb = 2600 psi
Laminated Strand Lumber (LSL
E = 1,550,000 psi
Fb = 2325 psi
Treated lumber - #2 S. Pine or equal

DESIGN LOADS

Solar Decathlon Building Code (SDBC) and Minnesota State Building Code (MSBC) govern. The more severe criteria used for design.

Roof

Dead Load
20 psf (10 psf roof structure, 10 psf mechanical systems)

Snow Load - SDBC
Roof snow load = 20 psf
Snow Load - MSBC
Roof snow load = 35 psf in accordance with ASCE-07
Unbalanced snow load:
0 psf windward
53 psf leeward
MSBC Governs Design

Floors

Dead load
15 psf

Live loads SDBC
50 psf
Live Loads MSBC
40 psf
SDBC Governs Design

Means of Egress

Live loads
100 psf in accordance with SDBC and MSBC

Railings

Concentrated Load
200 lb applied in any direction at any point at the top of the rail.

Wind

60 mph (3 second gust) in accordance with SDBC
Exposure C, I = 1.0

90 mph (3 second gust) in accordance with MSBC
Exposure C, I = 1.0
MSBC Governs design

EXISTING CONDITIONS

Contractor shall verify all dimensions, elevations, and details of site and existing structure where they affect this construction prior to fabrication. If existing foundation is to be used for post event site, then contractor shall verify that existing structure matches that of the structural drawings.

TEMPORARY BRACING

Contractor is responsible for bracing, without overstressing, all structural elements as required at all stages of construction until completion of this project. Provide temporary lateral support for all walls until walls are adequately braced by floor or roof structure. Temporary bracing and lateral support must also be provided where needed for openings in modules during transportation and construction.

structure. Temporary bracing and lateral support must also be provided where needed for openings in modules during transportation and construction.

FOOTINGS/FOUNDATION

All footings are to be formed. Footings shall be designed so as to not significantly disturb the grass on the national mall. Footings will be designed for complete removal upon completion of the event. Footings shall be designed so as to conform to potential maximum grade change of 18" on site. Tie-downs shall not be placed more than 18" below adjacent grade.

DIMENSION LUMBER

Minimum nailing to be in accordance with Table R602.3(1) of the 2006 IRC unless noted otherwise.
Interior bearing walls to have 2 x 4 studs @ 16" o.c. unless noted otherwise.
Interior non-load bearing walls to have 2 x 4 studs @ 16" o.c. unless noted otherwise.
Typical openings to have a minimum of 2 jack (shoulder) studs and 1 king stud, typical, unless noted otherwise. Wood lintels and headers shall have a minimum 3" of length of bearing at each end and bear the entire length of the jack (shoulder) studs.
Openings not noted to have to have headers comprised of 2-2x6 long side vertical and a stud plate top and bottom long side horizontal.
Wood joist shall bear the full width of supporting members (stud wall, beams, etc.) unless otherwise noted.
All beams and joists not bearing on supporting members shall be framed with "USP" joist hangers or equal.

Wood beams made of 2 or more 2x's shall be thru-bolted together with 3/8" round M.B. at 2'-0" o.c. or nail each ply to adjacent with 12d nails spaced 8" on center each row of nails. Provide 2 rows of nails for members 10" or less in depth, 3 rows for members greater than 10" in depth. For multi-ply members nail each ply as indicated above.

Spacing of bridging for joists shall not exceed 8'-0".
Double all joists under parallel partitions unless shown otherwise.
All plywood and OSB shall be installed per American Plywood Association standards, including using construction adhesive for fastening to floor joists.
All fasteners and hangers in contact with treated lumber shall be G185 hot dipped galvanized or equal.
All lumber shall be of good quality and not have large splits and checks and shall be visually inspected by the contractor at the time of construction.
All beams shall bear on a minimum of 3" along their length and full along their width and have a minimum of (2) typical wall studs supporting them.
Provide blocking between joist spaces below posts comprised of (3) or more studs.

WALL SHEATHING

Wall sheathing shall be 1/2" APA rated panels.
Provide Exterior or Exposure 1 grade. Panels shall be continuous over two or more spans and long dimension of panel shall be either perpendicular or parallel to supports.
Fasten Wall sheathing with 8d nails spaces at 6" o.c. at supported edges and 12"o.c. at intermediate supports. Leave a 1/8" gap at all end and edge joints to allow for expansion. Stagger end joints of panels. Refer to plan and notes for any special shear wall nailing and bolting conditions.

FLOOR SHEATHING

Floor sheathing shall be 3/4" APA rated panels T&G glued and nailed, rated for spacing of supporting members.
Provide Exterior or Exposure 1 grade. Panels shall be continuous over two or more spans and long dimension of panel shall be perpendicular to supports. Fasten sheathing with 8d nails spaced at 6" o.c. at supported edges and 12" o.c. at intermediate supports.

WOOD TRUSSES - Deleted

STRUCTURAL STEEL

All structural steel shall be designed, fabricated, and erected according to the specifications of the American Institute of Steel Construction (A.I.S.C.) Latest Adoption. Structural steel supplier shall supply all cap plates, bearing assemblies, base plates, stiffeners, splices and connections, and shall design same unless noted on drawings. All welding shall be done by the shielded arc process using E70 electrodes in accordance with the rules of the American Welding Society (A.W.S.) Structural Welding Code, Latest Adoption. All welders shall be certified by the rules of the American Welding Society. Provide complete detailed shop drawings to the contractor for review and approval prior to fabrication.

OPENINGS

Verify size and location of all openings with architectural and mechanical drawings. Openings in floor and roof not shown on structural drawings must be placed between structural members. Cutting and notching which exceeds the limits of the diagram provided on the structural drawings must be approved by the structural engineer.

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David H. Macdonald

DATE: 03/24/2009 REG. NO: 14751

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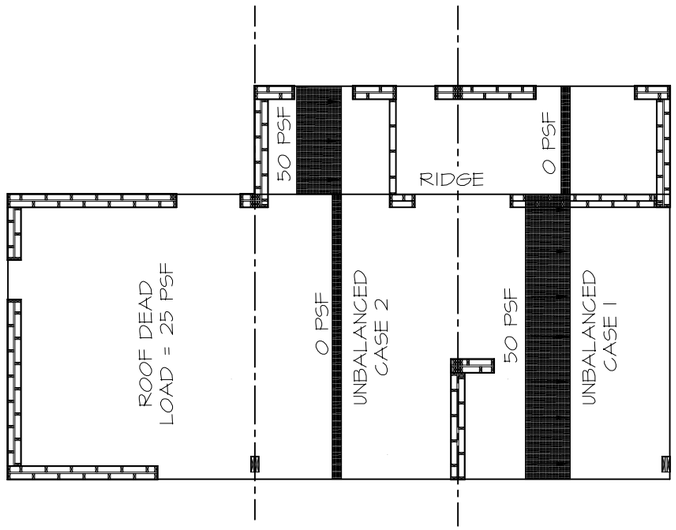
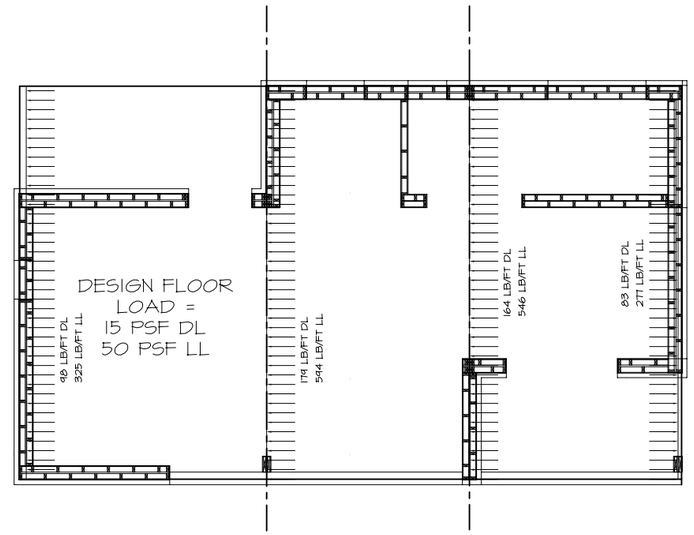
Structural Notes

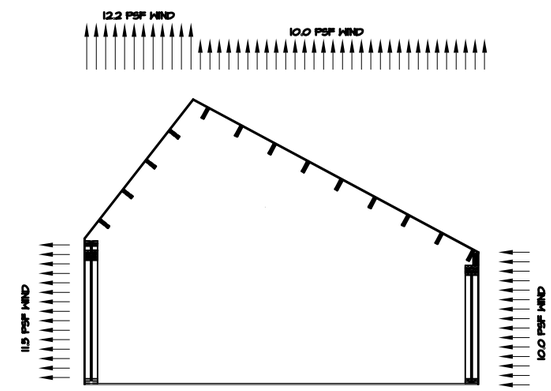
S-001



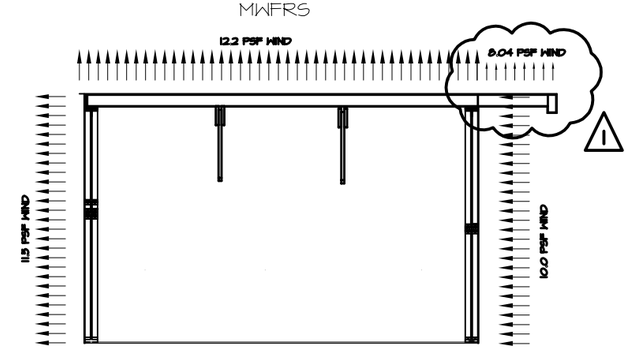
1 S002 ROOF LOADS
UNBALANCED SNOW LOAD
1/8" = 1'-0"



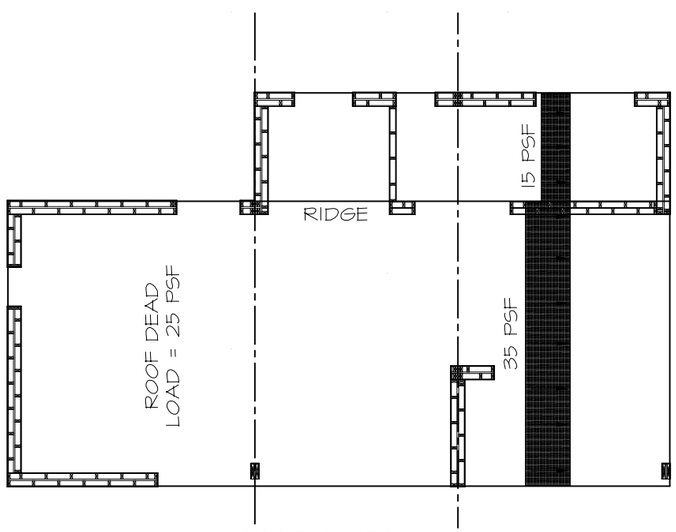
3 S002 DESIGN LOADS
FLOOR LOADING
1/8" = 1'-0"



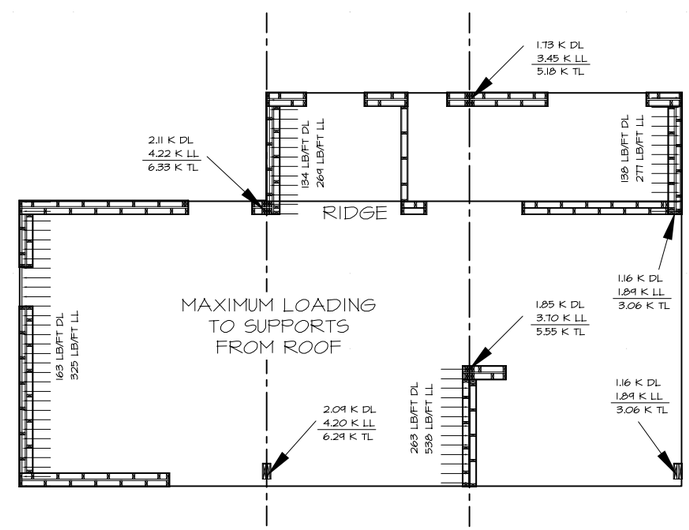
5 S002 DESIGN LOADS
WIND LOADS
MWFRS
NTS



6 S002 DESIGN LOADS
WIND LOADS
MWFRS
NTS



2 S002 ROOF LOADS
BALANCED SNOW LOAD
1/8" = 1'-0"



4 S002 DESIGN LOADS
ROOF LOADS TO SUPPORTS
1/8" = 1'-0"

COMPONENT AND CLADDING LOADS

WALL ELEMENTS: 20.4 PSF MAIN WALL AREA
24.1 PSF @ WALL CORNERS

ROOF ELEMENTS: -18.6 PSF MAIN ROOF AREA
-21.1 PSF @ EDGES SIDES AND RIDGE
-21.1 PSF @ CORNERS
-24.19 PSF @ ROOF OVERHANG

1

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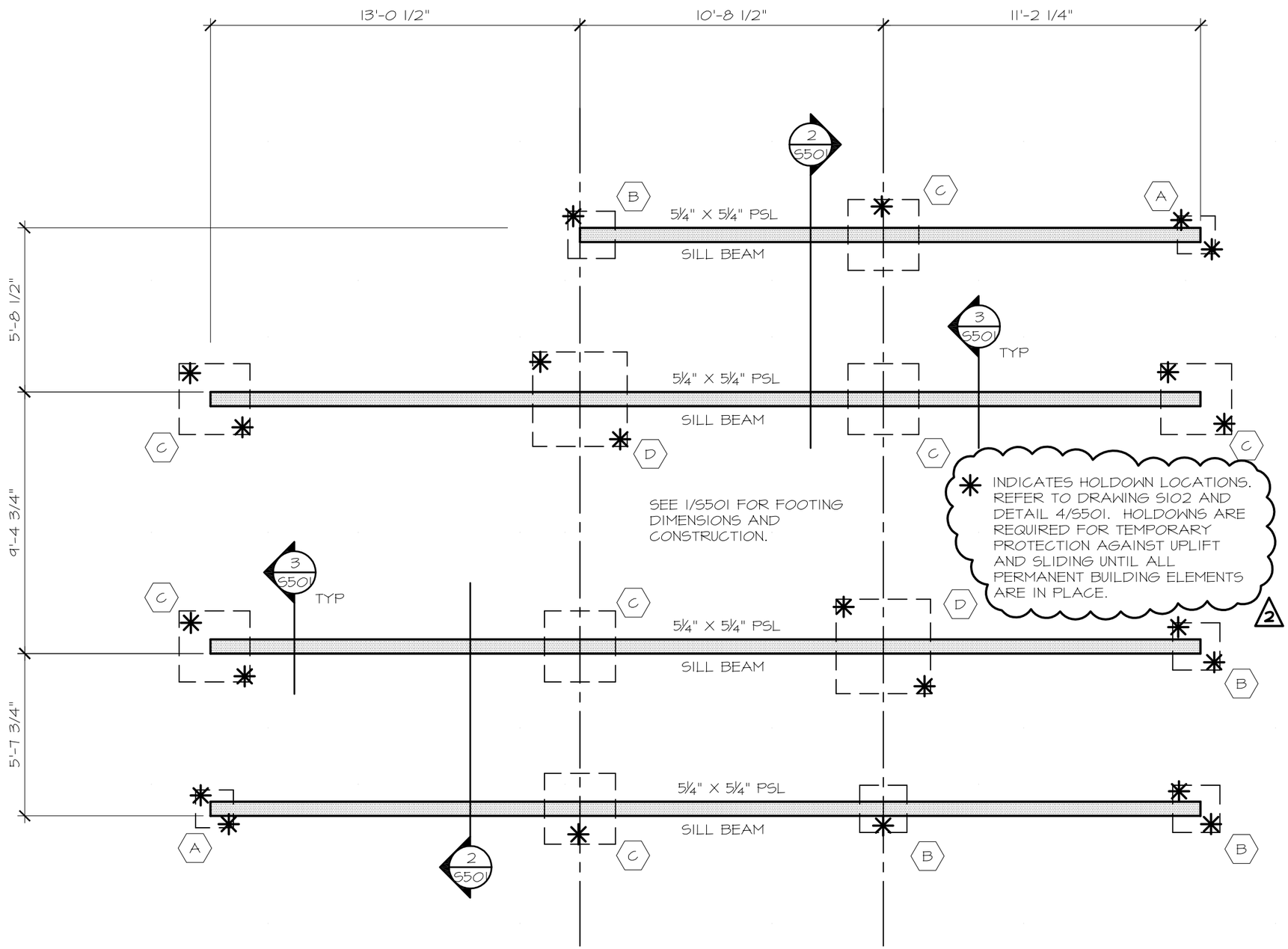
Design Loads

S-002



FOOTING PLAN

1 / S101

1/4" = 1'-0"

ALLOWABLE SOIL BEARING VALUE AT INTENDED SITE = 1500 PSF

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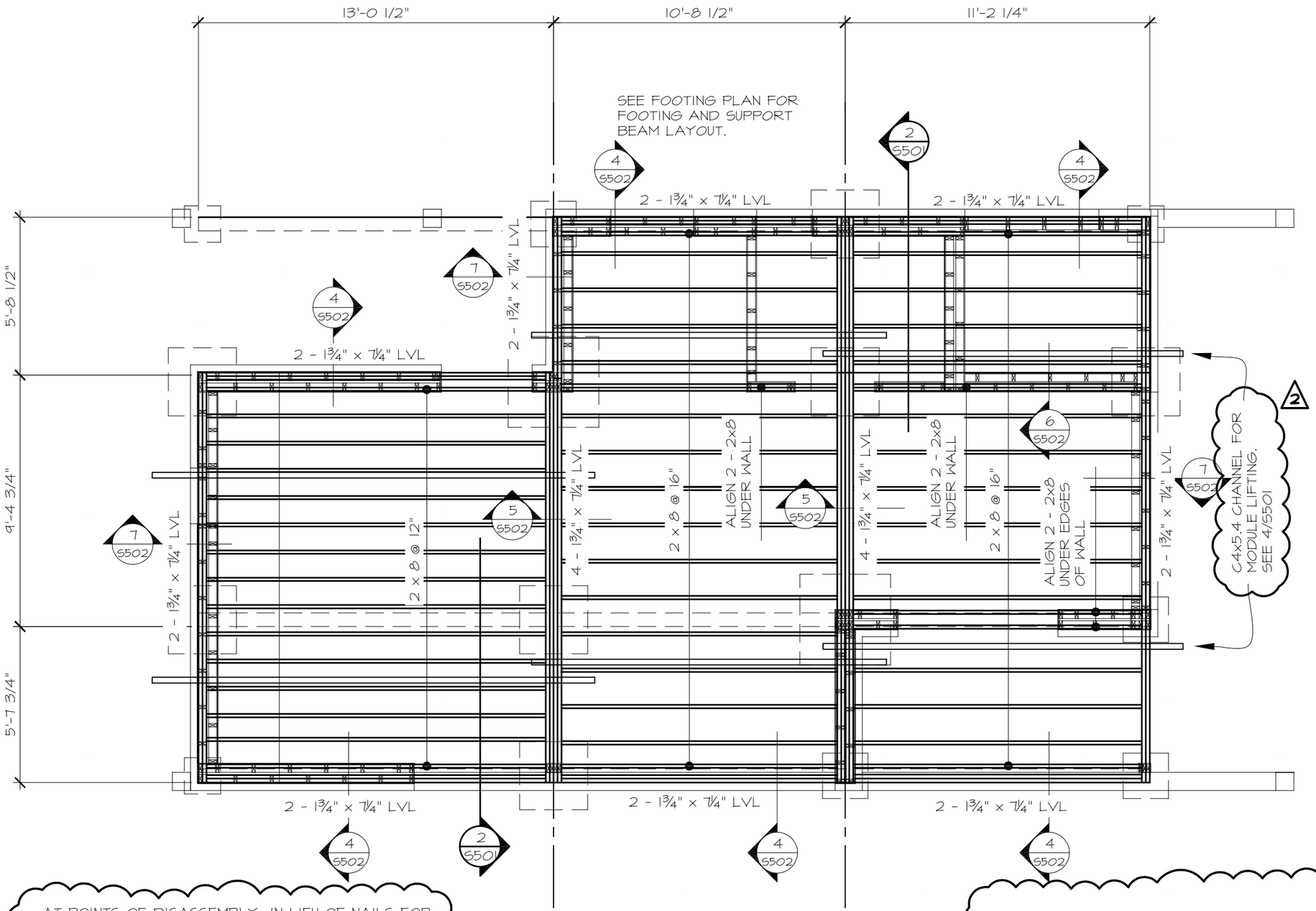
Footing Plan

S-101



AT POINTS OF DISASSEMBLY: IN LIEU OF NAILS FOR THE CONNECTION OF ROOF AND WALL SHEATHING TO THE FRAMING, PROVIDE #10 x 2½" FH SCREWS SPACED AND LOCATED AS INDIACTED FOR NAILING.

1

1 S102 FLOOR FRAMING PLAN

1/4" = 1'-0"

REFER TO DRAWING S101 FOR HOLDOWN ANCHOR LOCATIONS.

2

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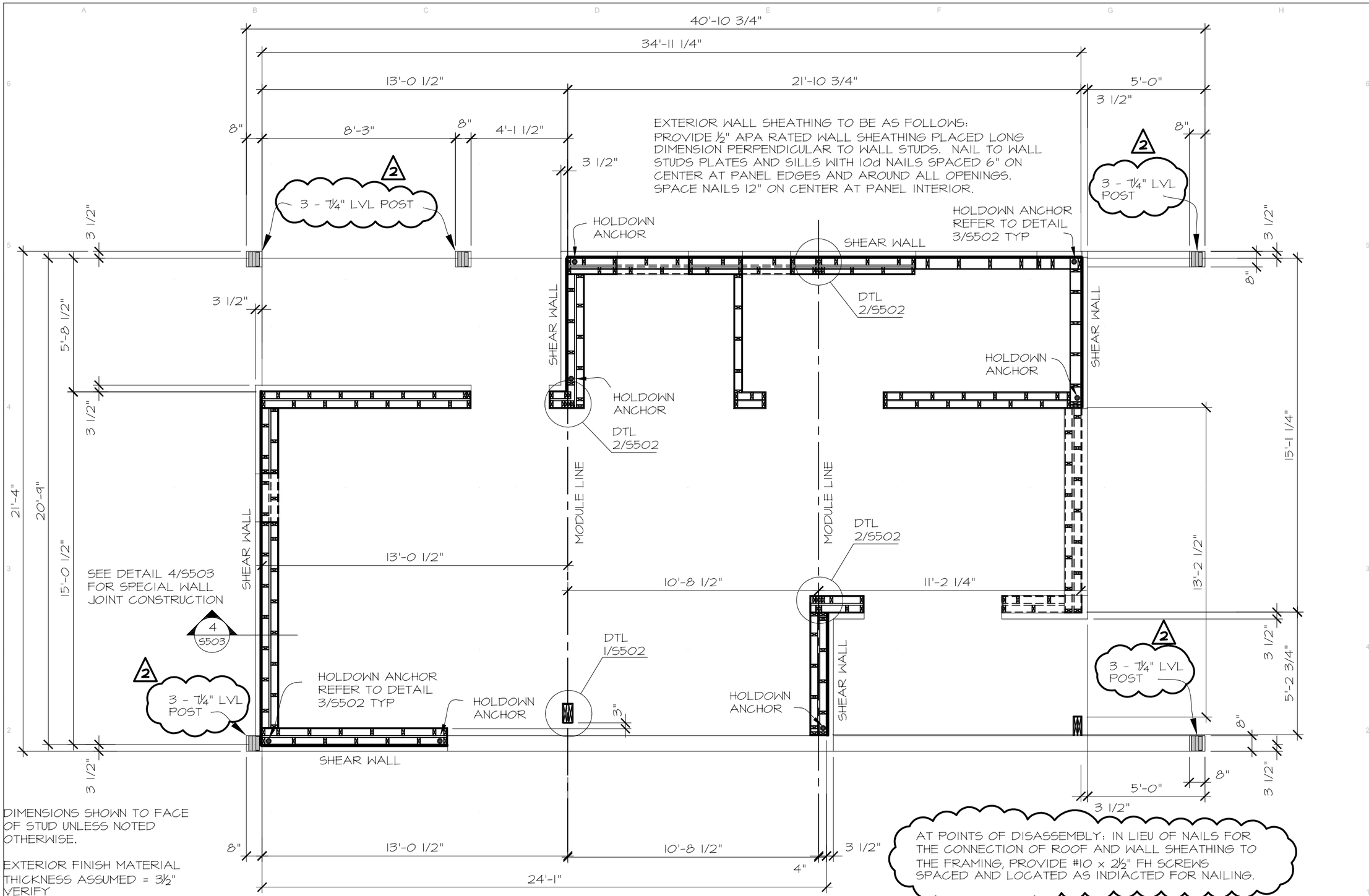
Floor Framing Plan

S-102



DIMENSIONS SHOWN TO FACE OF STUD UNLESS NOTED OTHERWISE.

EXTERIOR FINISH MATERIAL THICKNESS ASSUMED = 3½" VERIFY

AT POINTS OF DISASSEMBLY: IN LIEU OF NAILS FOR THE CONNECTION OF ROOF AND WALL SHEATHING TO THE FRAMING, PROVIDE #10 x 2½" FH SCREWS SPACED AND LOCATED AS INDIACTED FOR NAILING.

1

1 / S103 BUILDING PLAN

1/4" = 1'-0"

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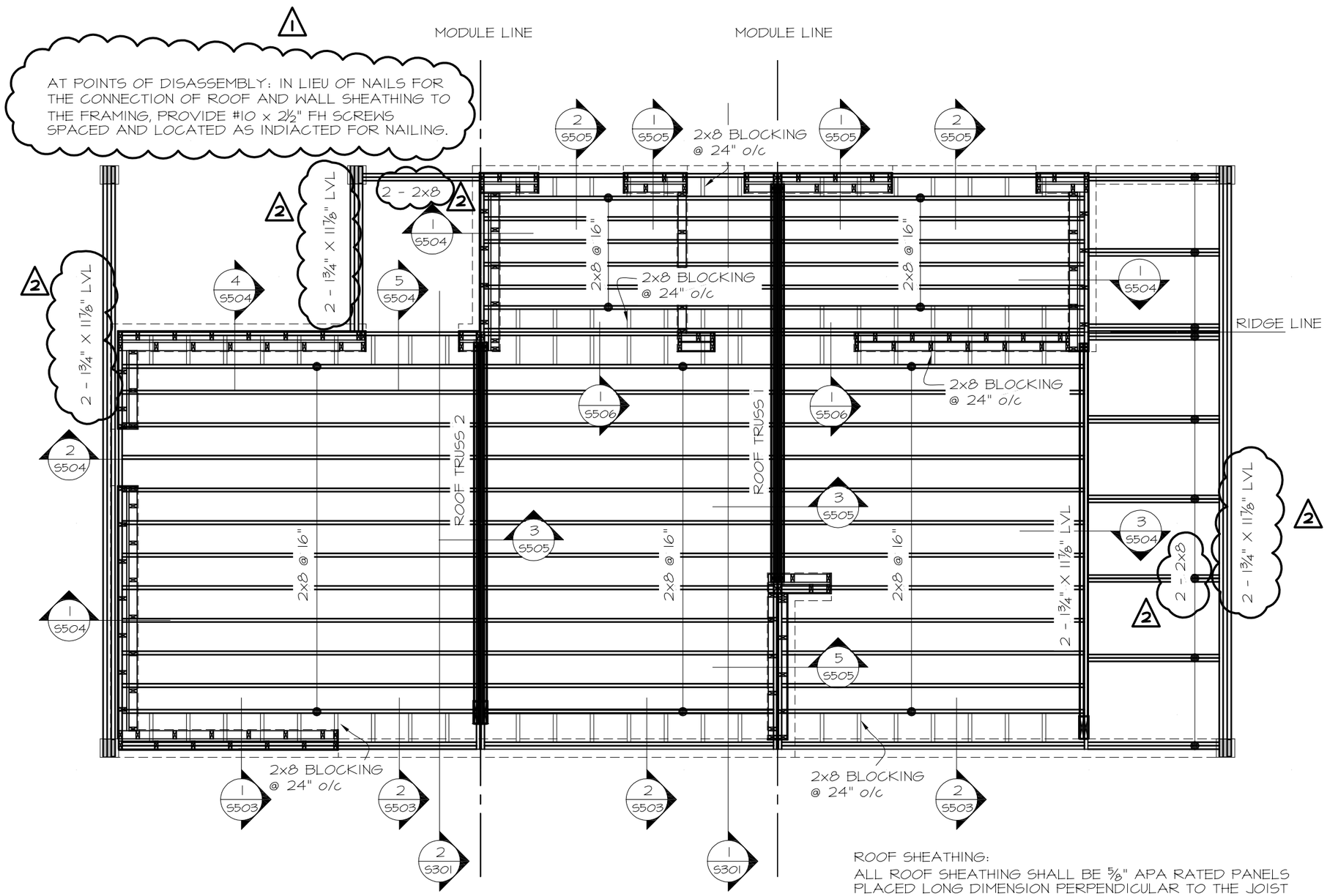
Building Plan

S-103



1 S104 Roof Framing

1/4" = 1'-0"

ROOF SHEATHING:
ALL ROOF SHEATHING SHALL BE ⅝" APA RATED PANELS PLACED LONG DIMENSION PERPENDICULAR TO THE JOIST SPAN. NAIL THE PANELS TO EACH FRAMING MEMBER AS FOLLOWS:
AT 28 DEGREE PITCH ROOF NAIL WITH 10d NAILS SPACED 6" ON CENTER AT PANEL EDGES AND 12" ON CENTER AT PANEL INTERIOR. BLOCKING AT PANEL JOINTS NOT REQUIRED.
AT 52 DEGREE PITCH ROOF NAIL WITH 10d NAILS SPACED 6" ON CENTER AT PANEL EDGES AND AT PANEL INTERIOR. PROVIDE BLOCKING AT PANEL JOINTS.

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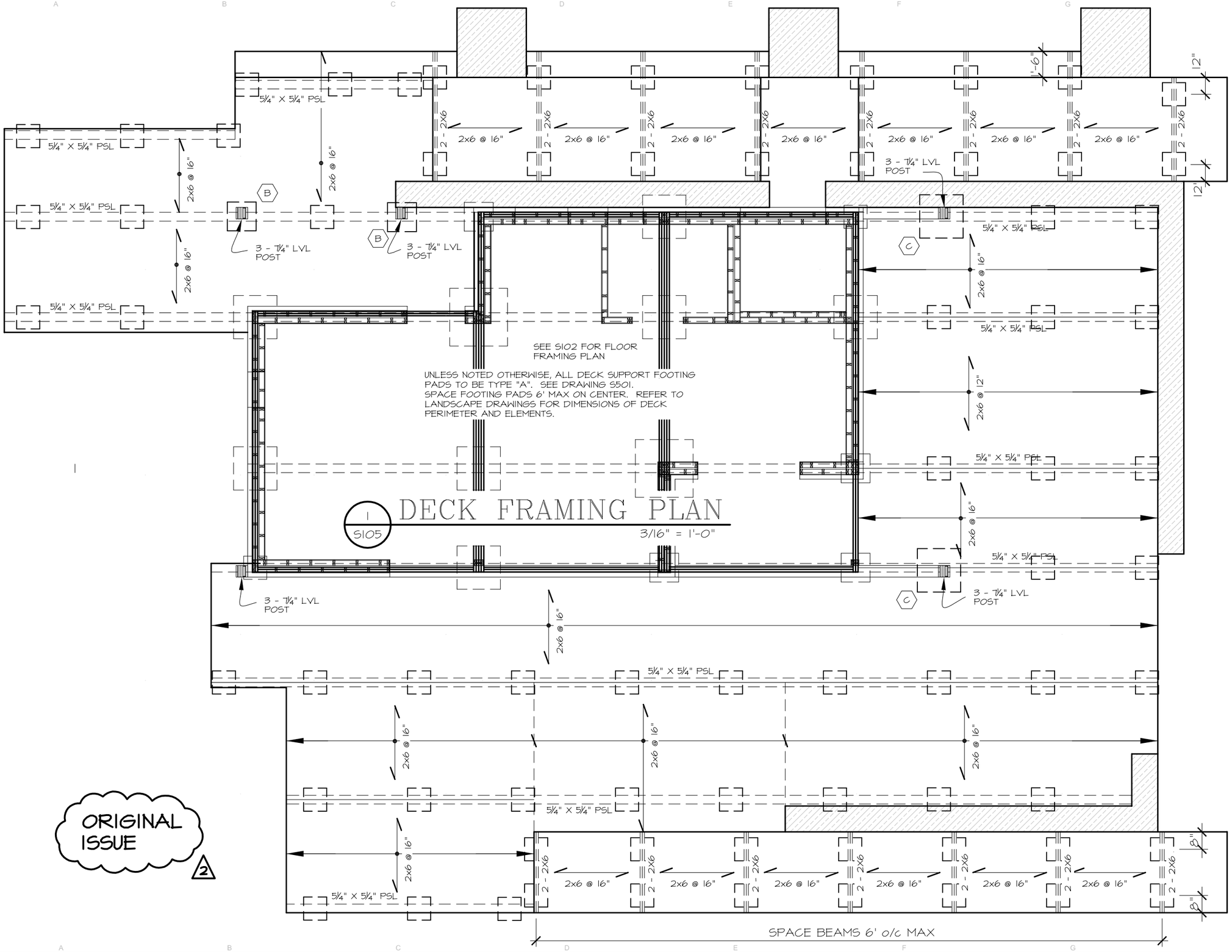
Roof Framing Plan

S-104



ORIGINAL ISSUE 2

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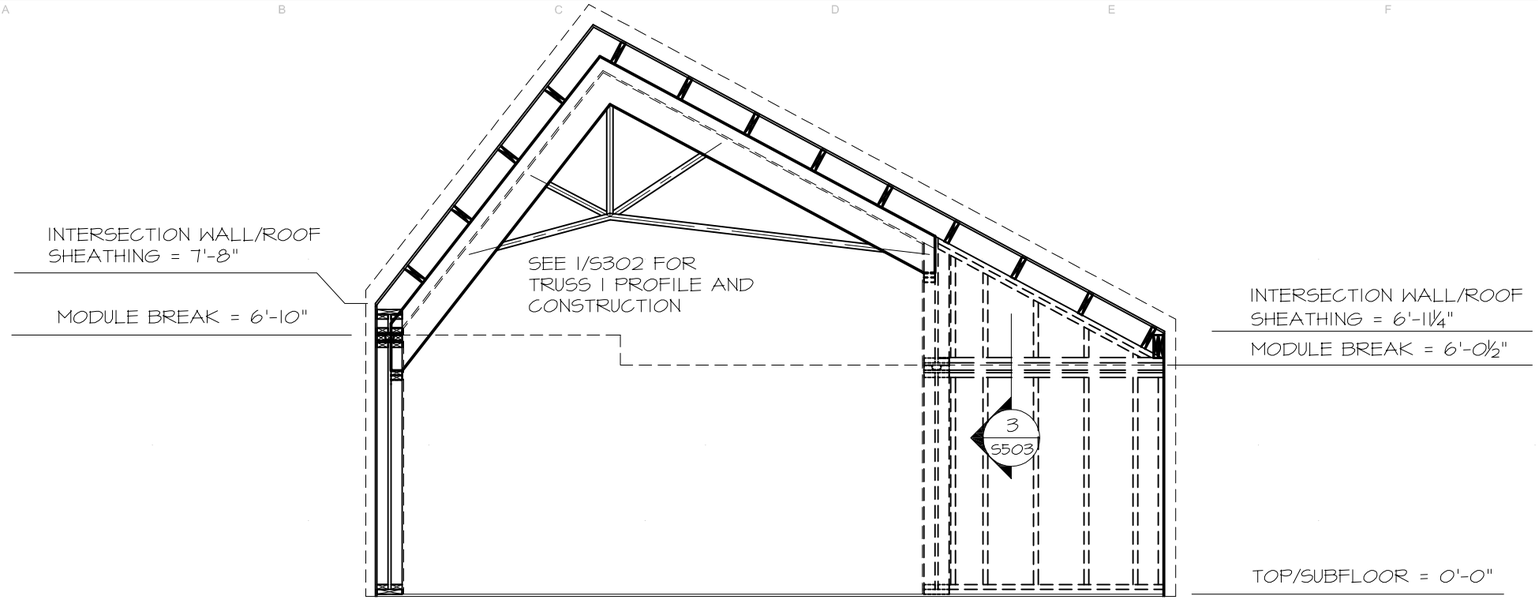
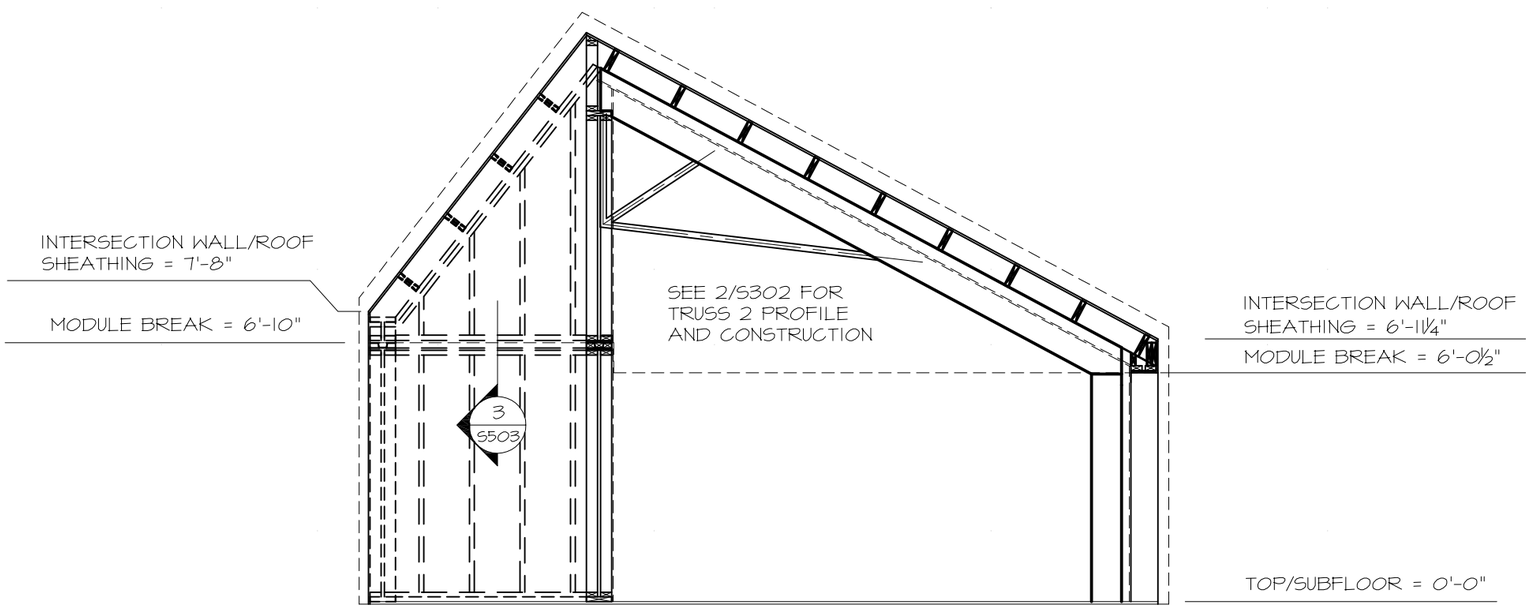
Deck Framing Plan

S-105



1 S301 SECTION @ TRUSS 1

1/4" = 1'-0"



2 S301 SECTION @ TRUSS 2

1/4" = 1'-0"

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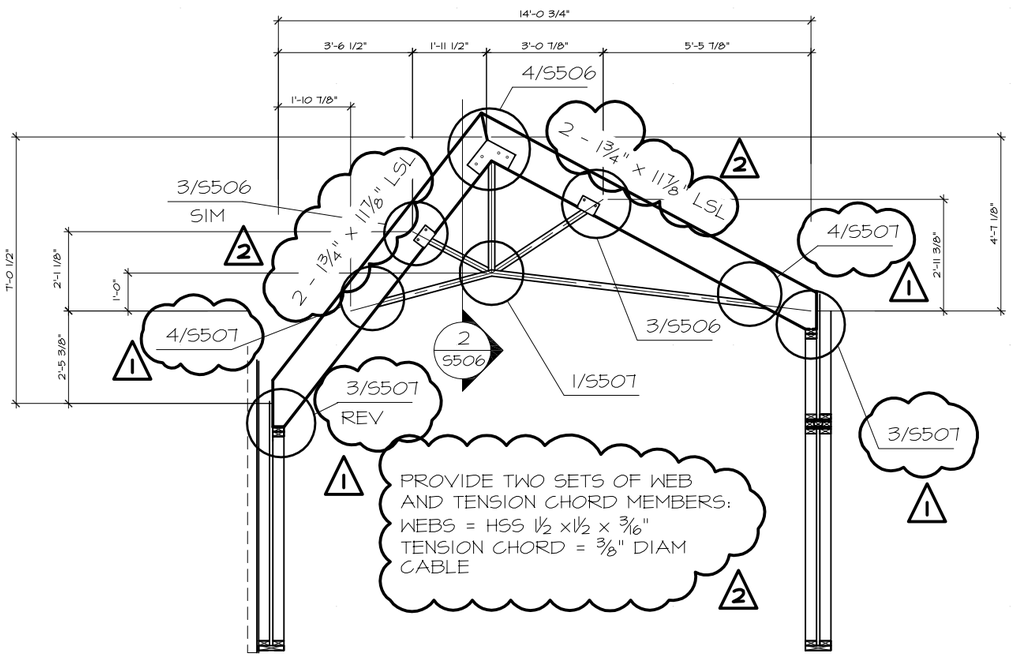
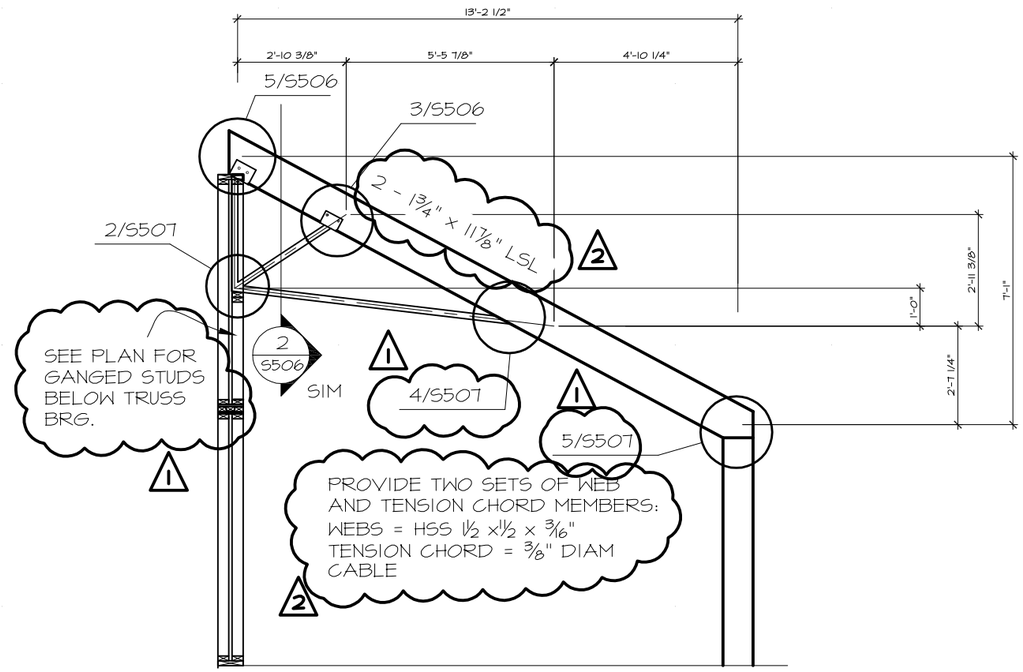
Building Sections

S-301



1 S302 PROFILE @ TRUSS 1

1/4" = 1'-0"



2 S302 PROFILE @ TRUSS 2

1/4" = 1'-0"

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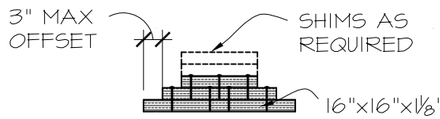
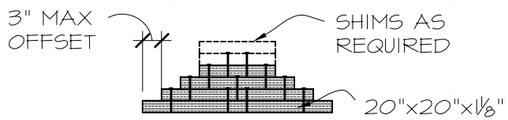
Truss Profiles

S-302



PAD TYPE (A)



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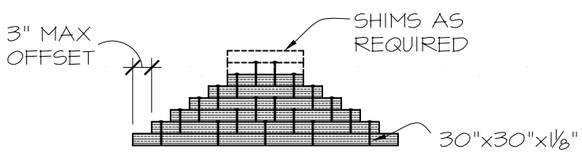

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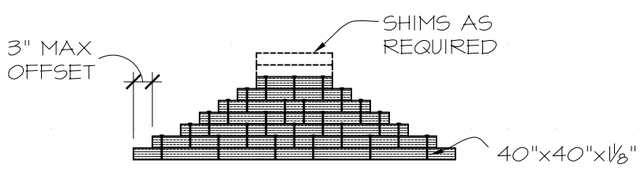
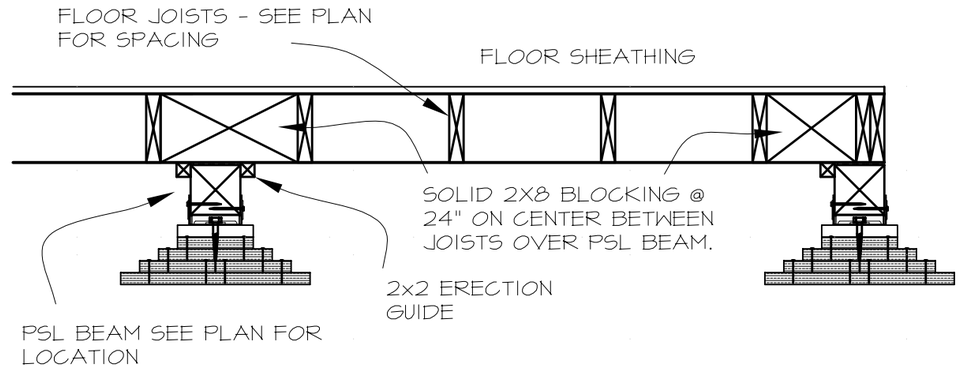


PAD TYPE (D)

FOOTING PADS TO BE CONSTRUCTED FROM 1⅛" - 5 PLY PLYWOOD MATERIAL. NAIL EACH LAMINATION TO UNDERLYING LAYER WITH 8d NAILS SPACED 3" ON CENTER ALONG PERIMETER OF LAYER 1" FROM THE EDGE. NAIL 6" ON CENTER EACH DIRECTION AT INTERIOR OF THE LAYER.

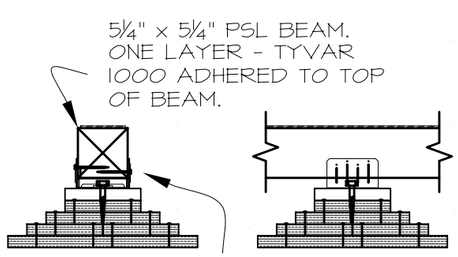
1 / S501 FOOTING DETAILS

3/4" = 1'-0"



2 / S501 SECTION

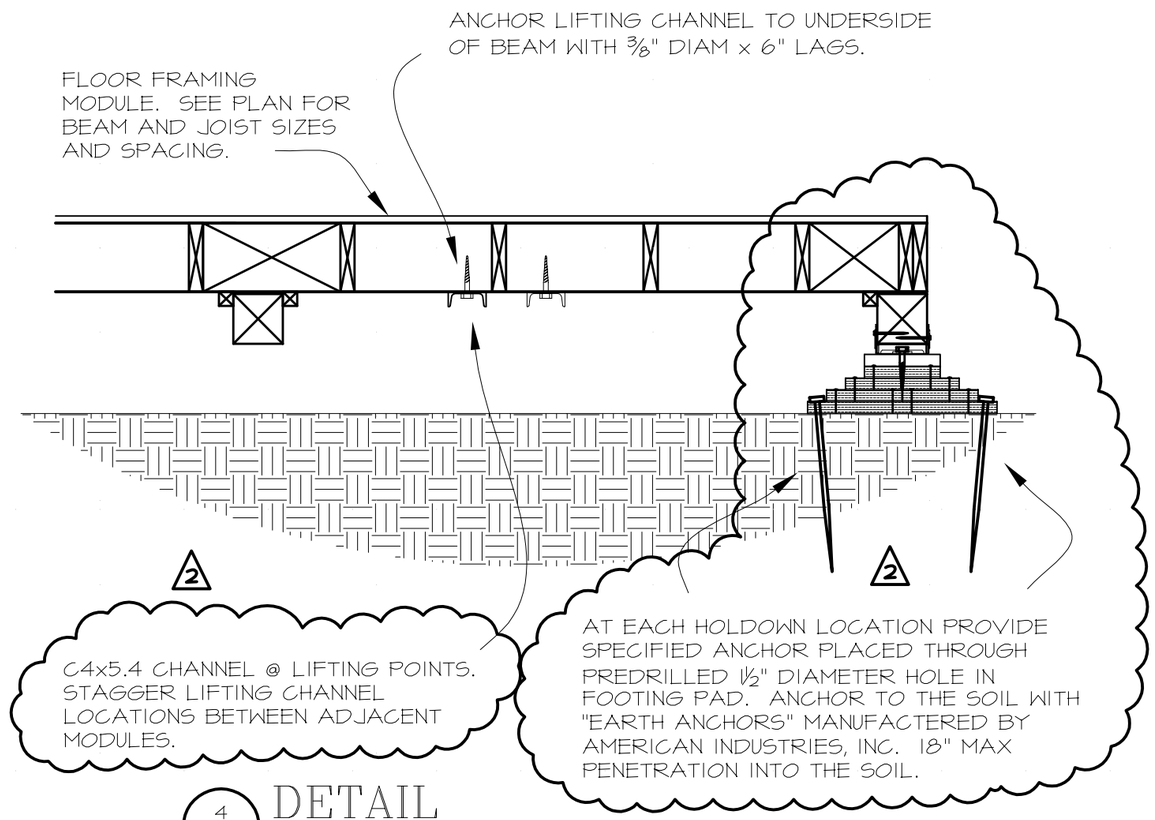
3/4" = 1'-0"



SIMPSON TYPE ABE66 POST BASE.
1 -⅝" DIAM X 4" LAG TO FOOTING PAD. 8 - 16d NAILS TO BEAM.

3 / S501 DETAIL

3/4" = 1'-0"



4 / S501 DETAIL

3/4" = 1'-0"

1

HOLDOWNS TO BE "PENETRATOR" PE-18: 18" LONG HEAT TREATED ALUMINUM, HEX HEAD WITH TIE OFF CABLE, MANUFACTURED BY: "AMERICAN EARTH ANCHORS", 20 GROVE STREET, FRANKLIN, MA 02038

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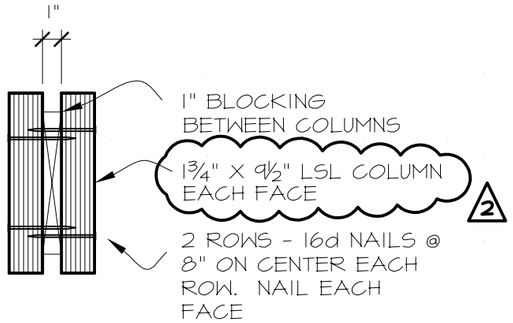
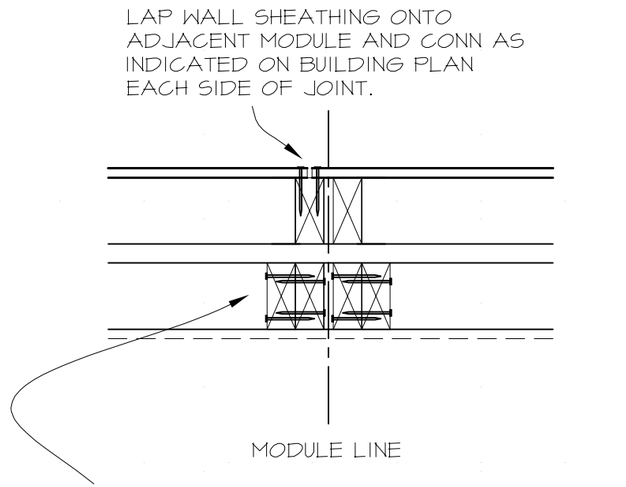
Footing Details

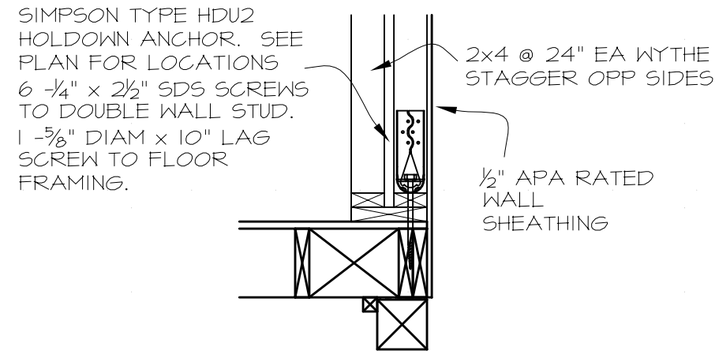
S-501



1 S502 SECTION
1 1/2"=1'-0"



2 S502 SECTION
1 1/2"=1'-0"



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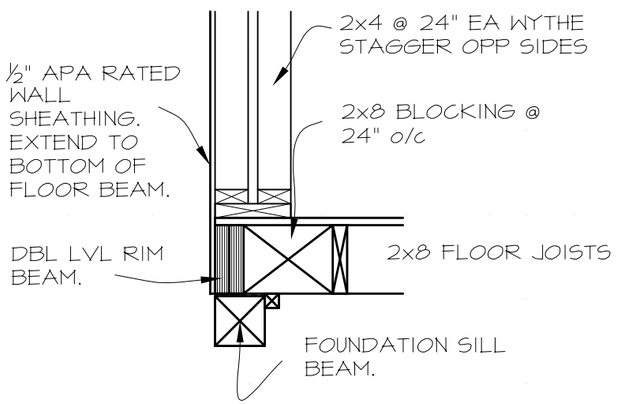
3/4"=1'-0"



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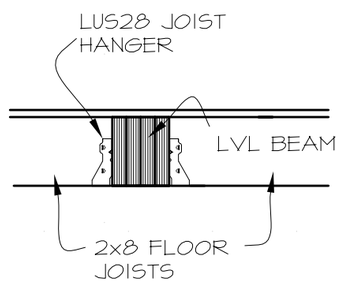

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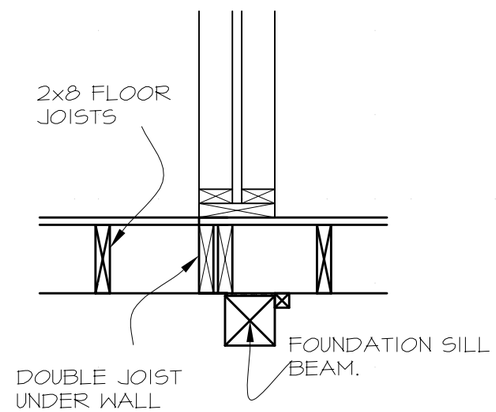

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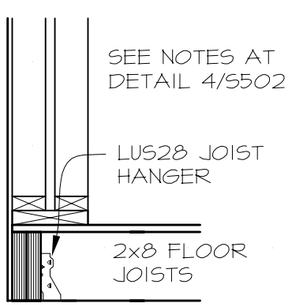

7 S502 SECTION
3/4"=1'-0"

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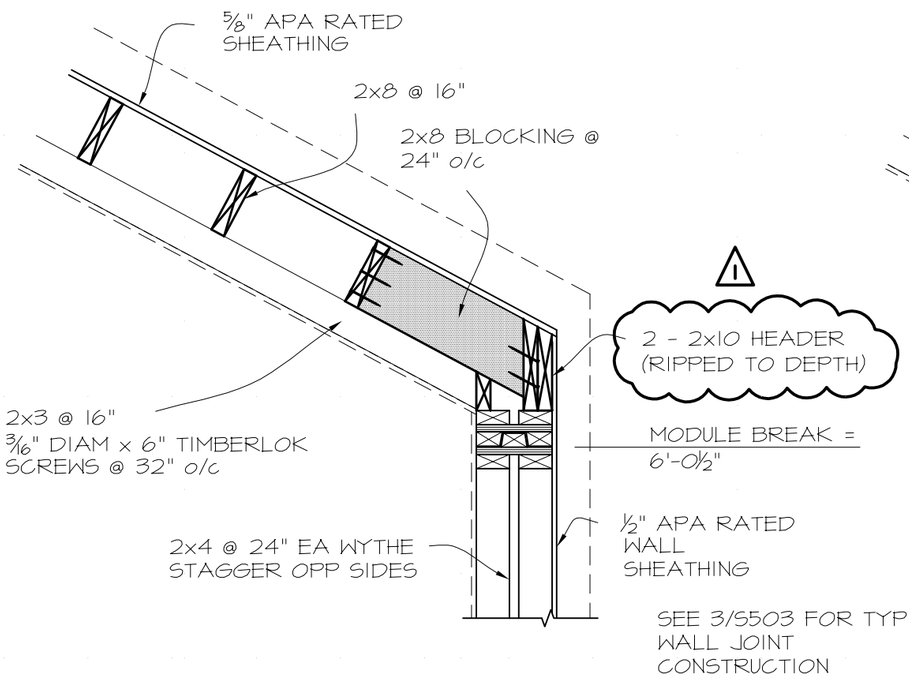
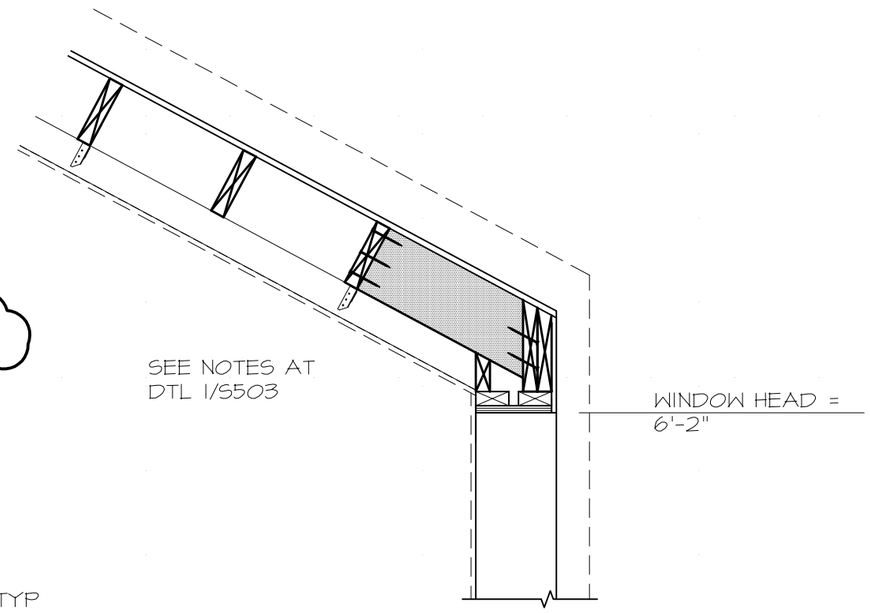
S-502



1 S503 SECTION

3/4"=1'-0"



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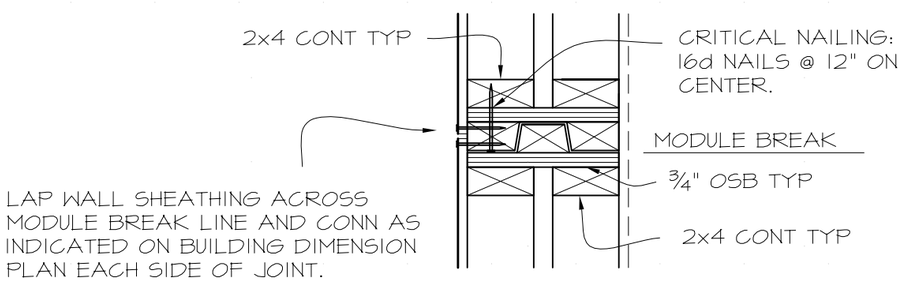
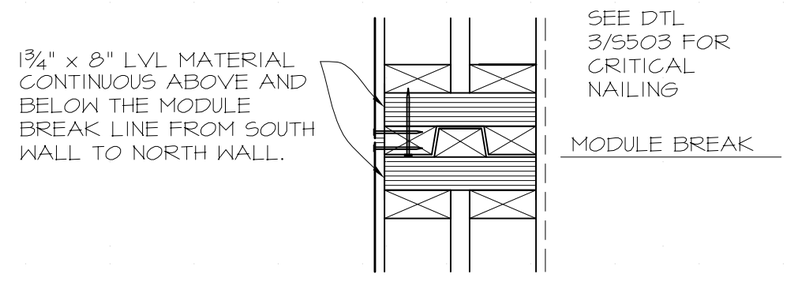


3 S503 TYP WALL JOINT

1 1/2"=1'-0"



JOINT AT WEST WALL

4 S503 SPECIAL JOINT

1 1/2"=1'-0"

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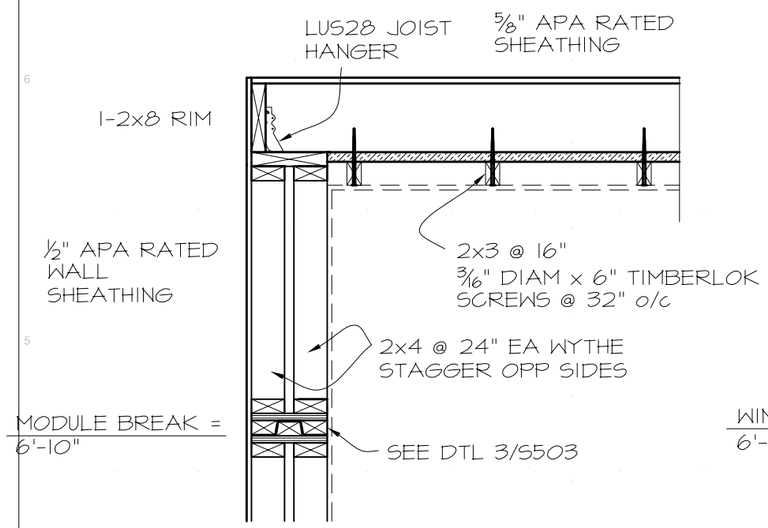
Wall Details

S-503



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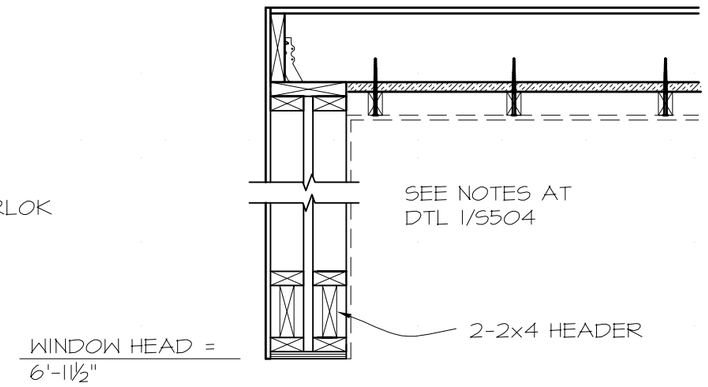

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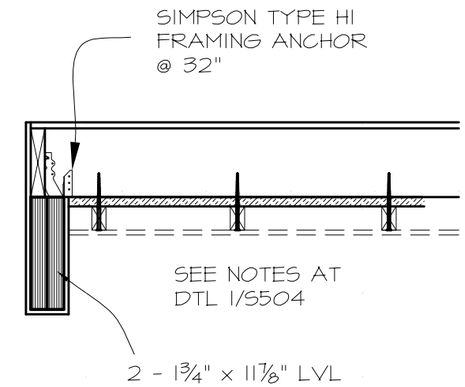

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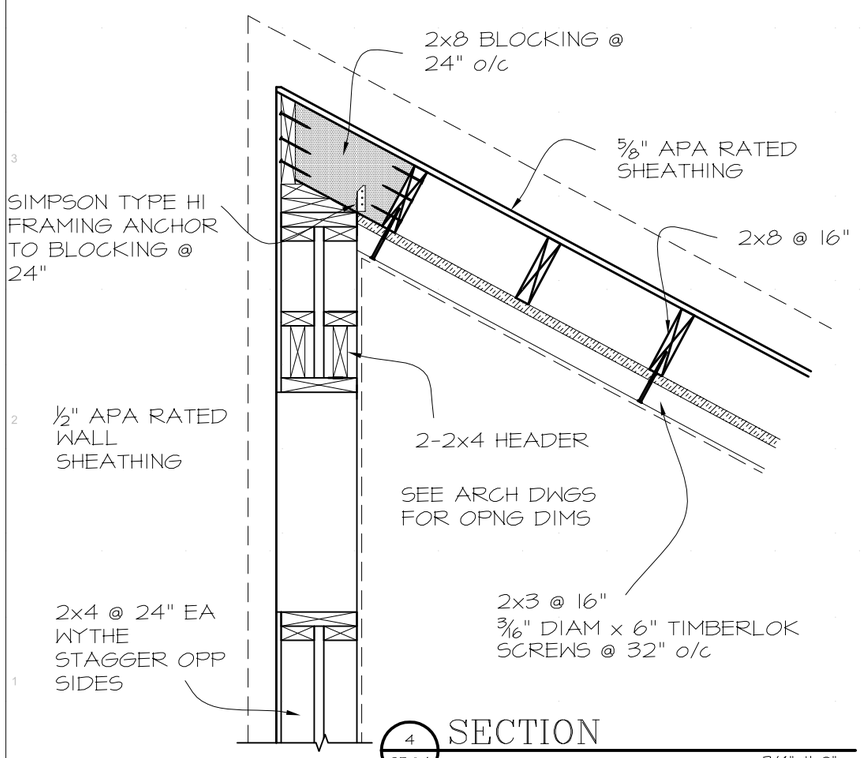

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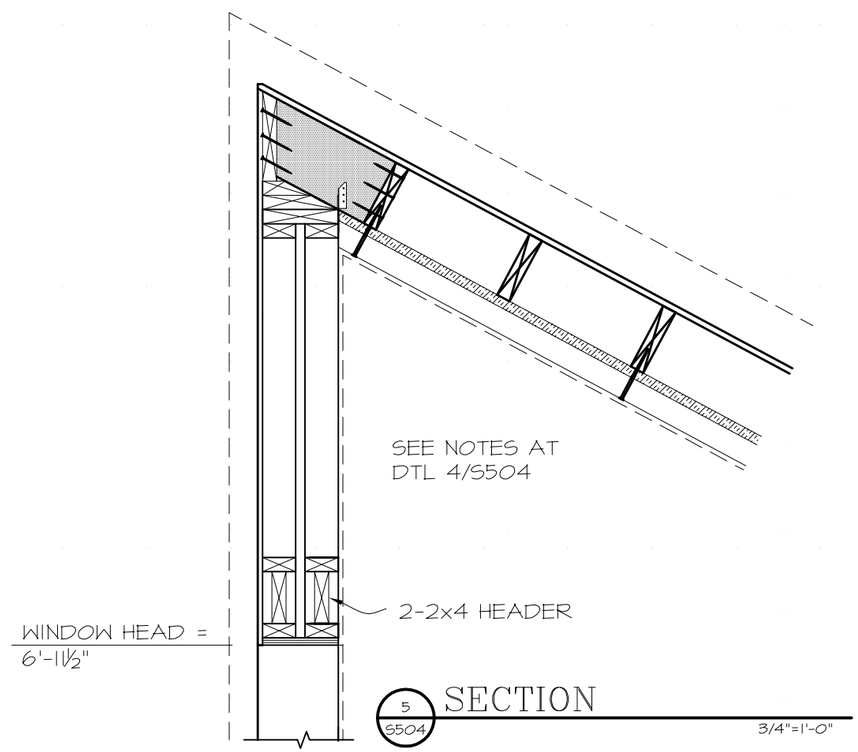

5 S504 SECTION 3/4"=1'-0"

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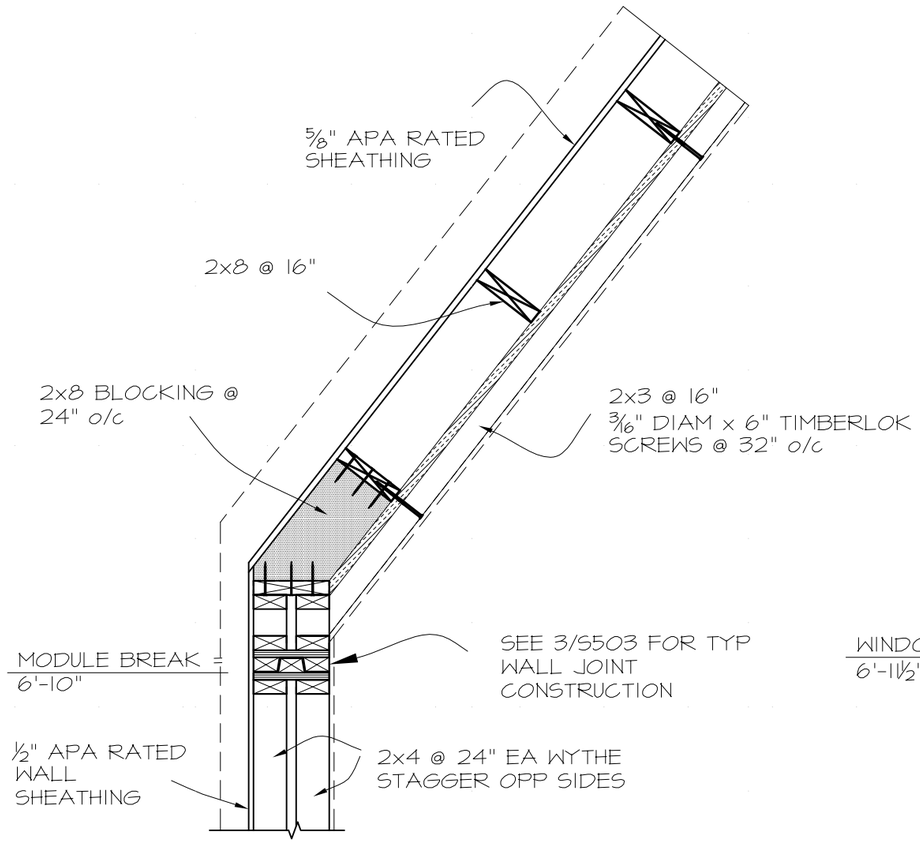

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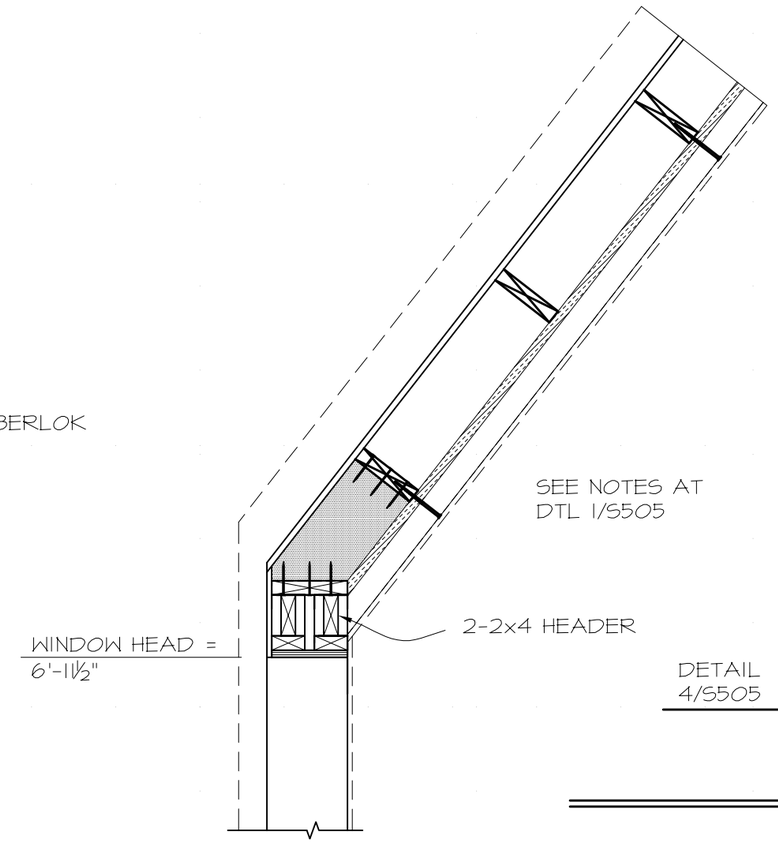

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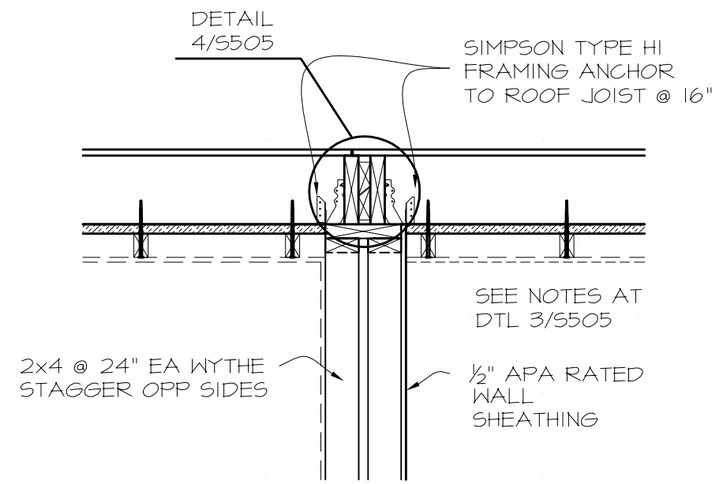

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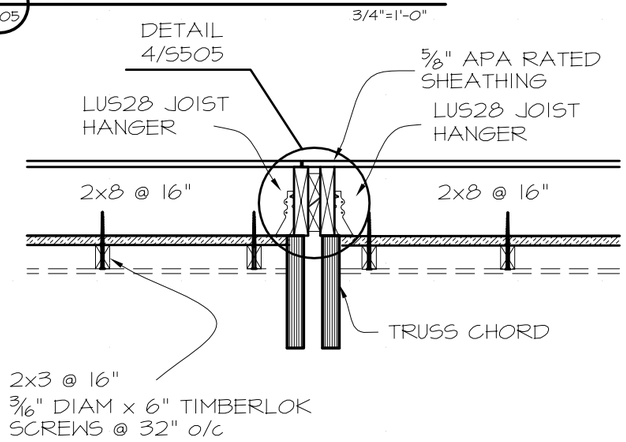

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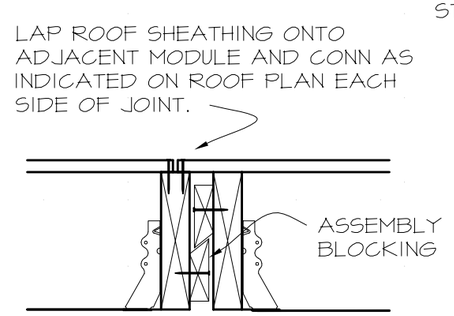

4 S505 SECTION 1 1/2"=1'-0"

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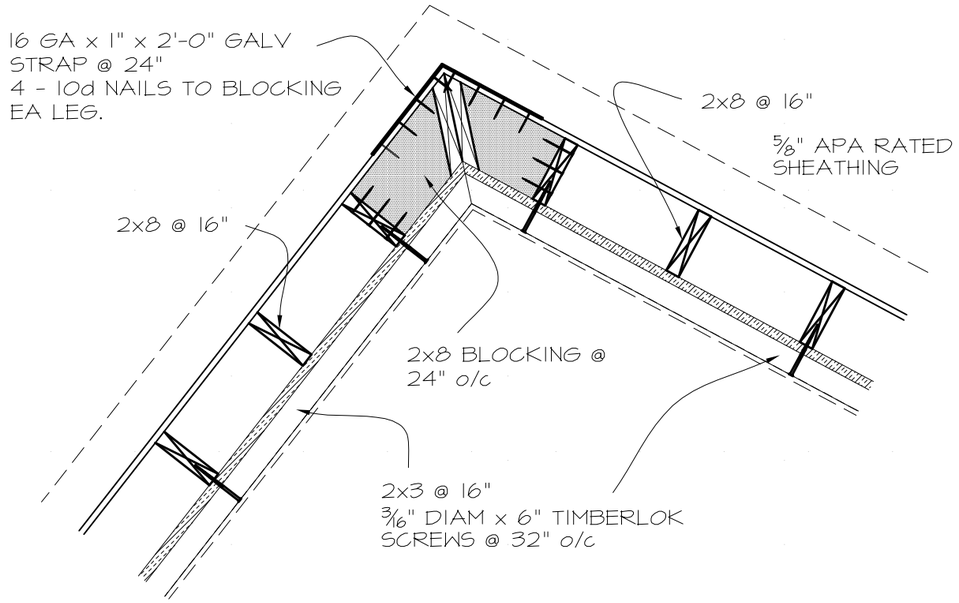

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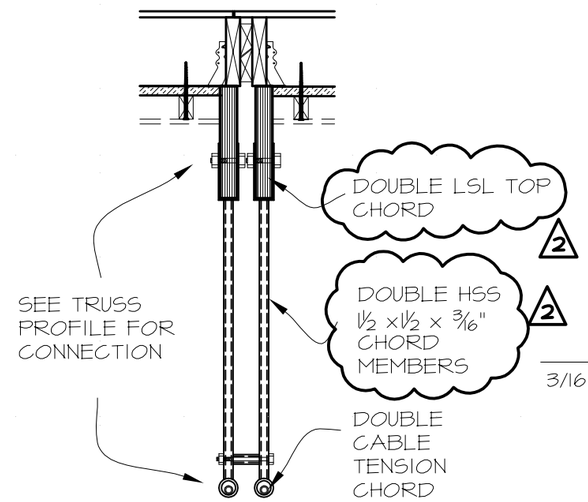

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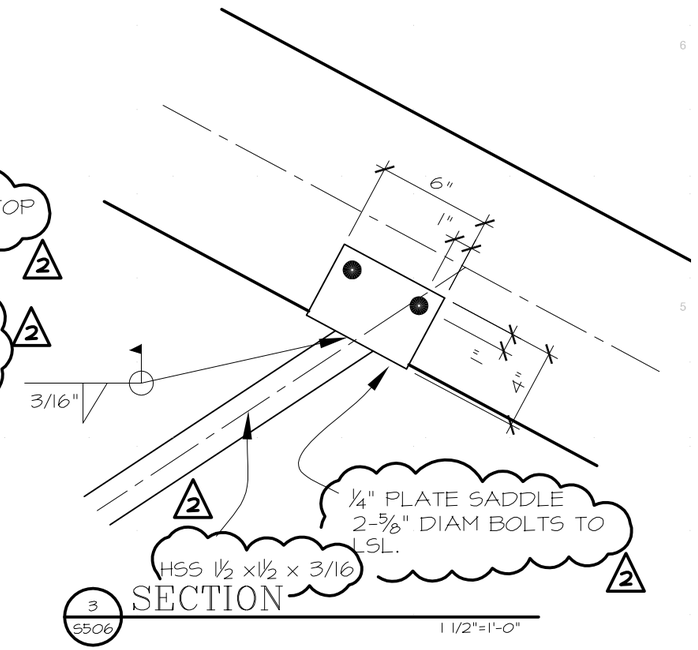

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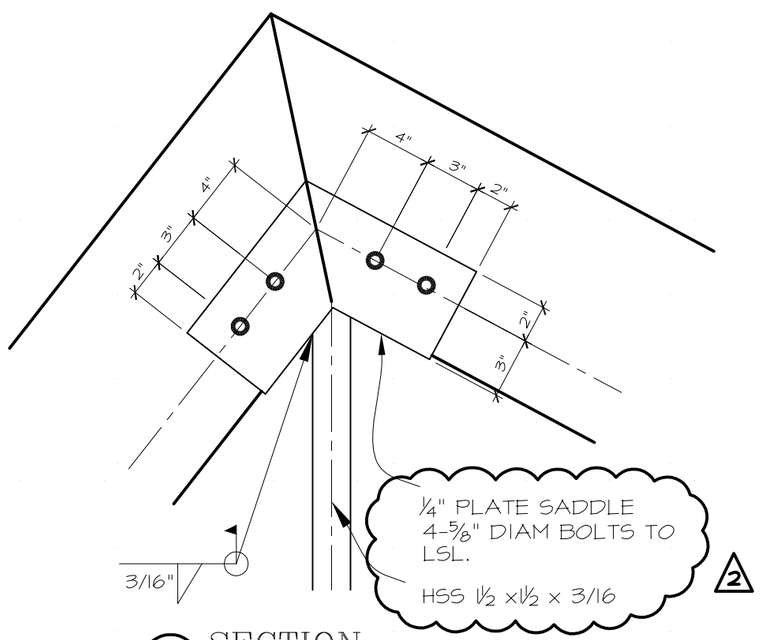

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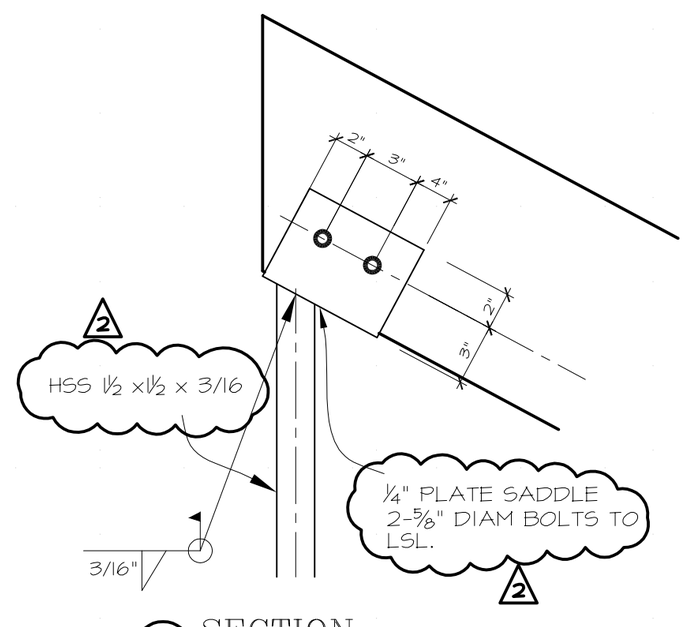

5 S506 SECTION 1 1/2"=1'-0"

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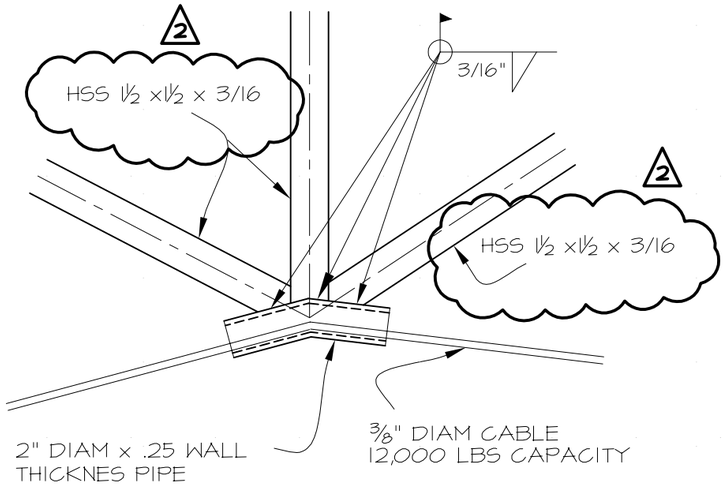

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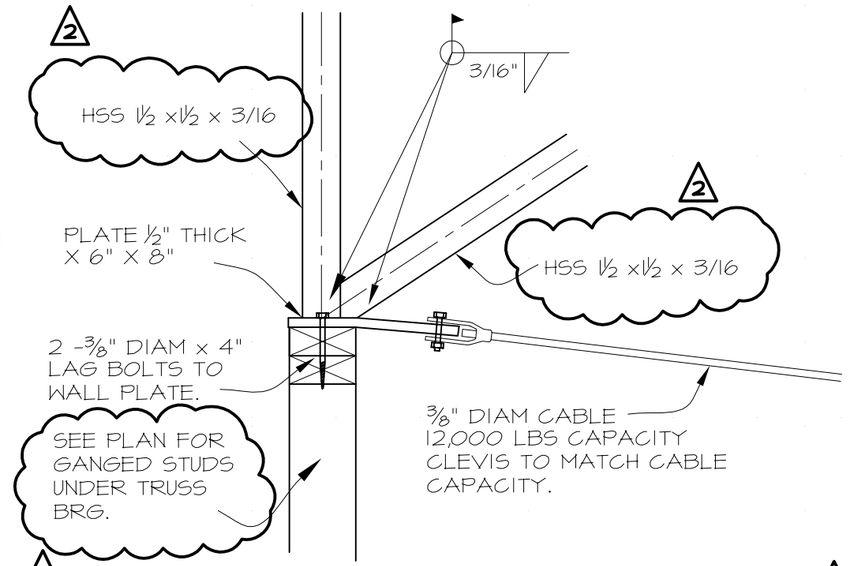

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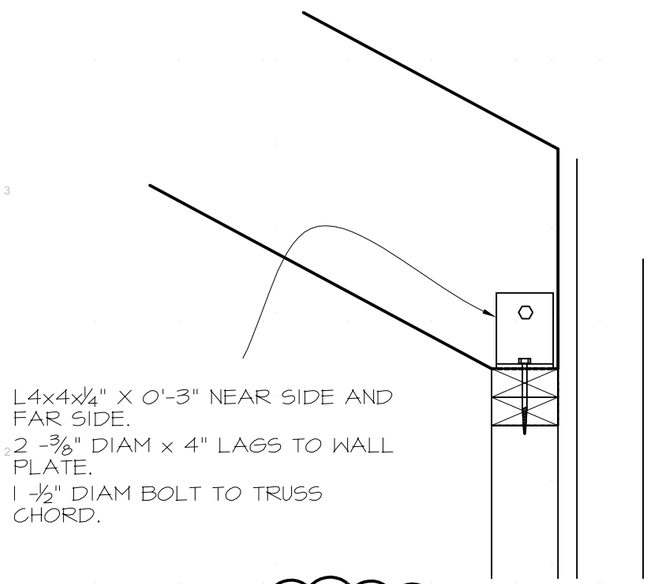

3 S507 SECTION 1 1/2"=1'-0"

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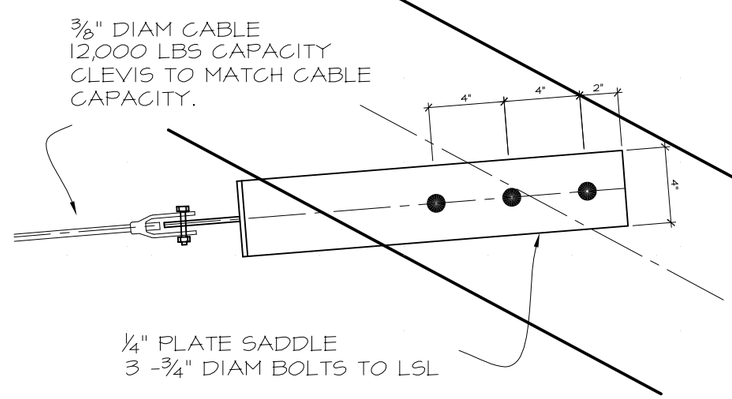

4 S507 SECTION 1 1/2"=1'-0"

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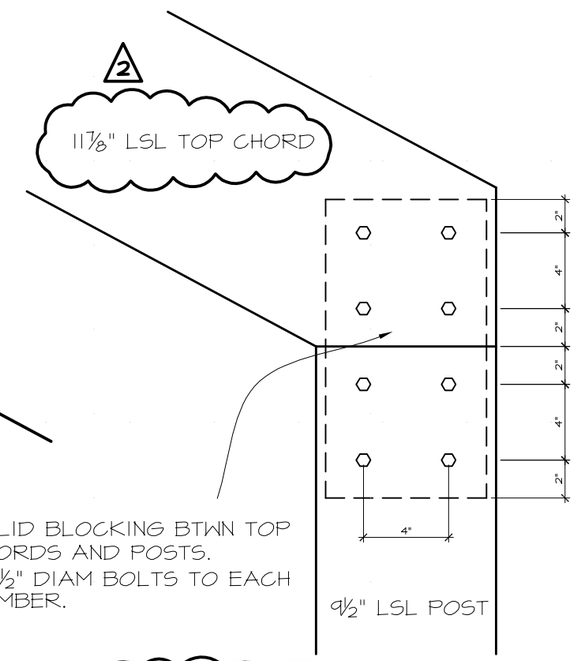

5 S507 SECTION 1 1/2"=1'-0"

1

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Roof Details

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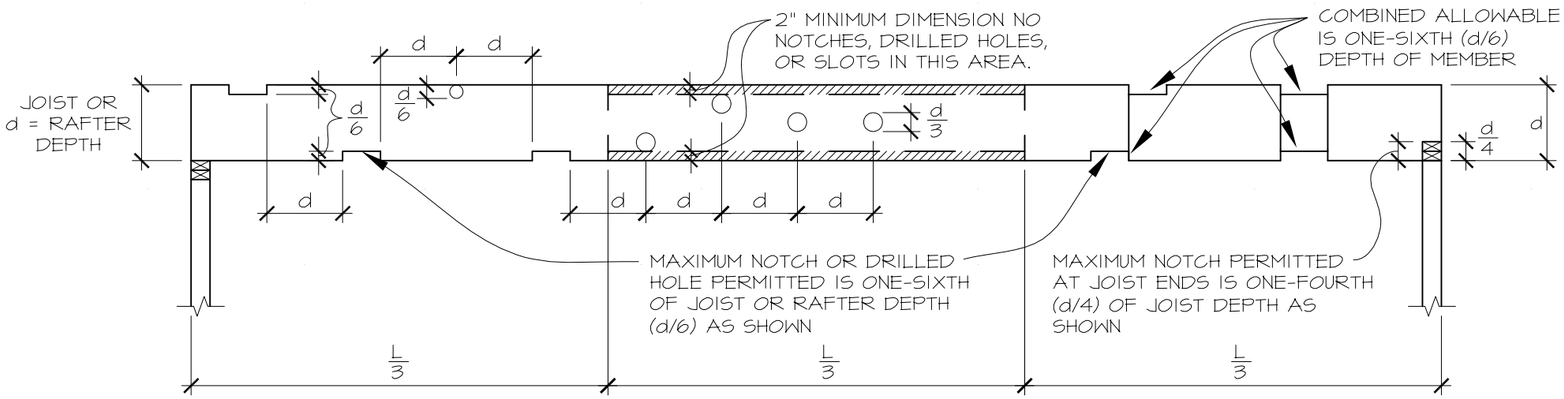
NOTCHING AND HOLE BORING GUIDE

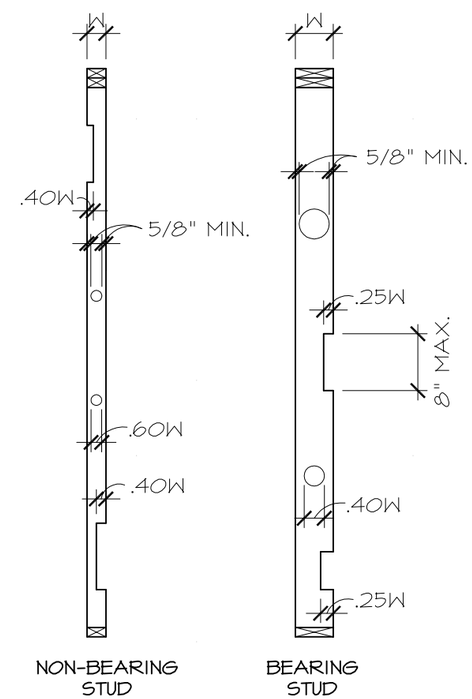
(CHECK STRUCTURAL PLANS FOR OTHER LIMITATIONS)



GENERAL NOTES:

1. HOLES, NOTCHES, AND SLOTS ARE NOT TO BE LOCATED ADJACENT TO UNSOUND OR LOOSE KNOTS.
2. NOT TO BE USED ON MICRO LAM BEAMS.
3. PREFERRED LOCATION OF NOTCH IS AT TOP OF MEMBER.
4. INSTALL PLATE PROTECTION OVER ALL ELECTRICAL AND PLASTIC PIPE NOTCHES OR BORINGS.

ALLOWABLE NOTCH & BORED HOLE DIMENSIONS							
JOIST & RAFTERS					BEARING STUDS		NON-BRG. STUDS
NOMINAL	ACTUAL	d/6	d/4	d/3	.25W	.40W	.60W
4"	3 1/2	5/8	7/8	1 1/8	7/8	1 3/8	2 1/8
6"	5 1/2	7/8	1 3/8	1 7/8	1 3/8	2 1/4	3 1/4
8"	7 1/4	1 1/4	1 7/8	2 3/8	1 7/8	2 7/8	4 3/8
10"	9 1/4	1 1/2	2 3/8	3 1/8			
12"	11 1/4	1 7/8	2 7/8	3 3/4			
14"	13 1/4	2 1/4	3 3/8	4 3/8			



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Notching Guide

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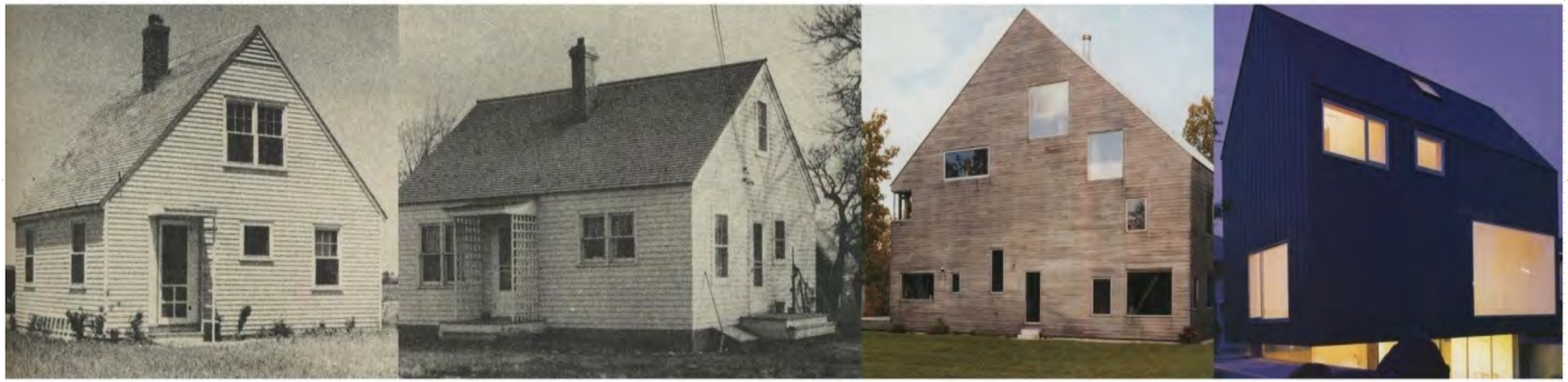

The Solar Icon

Excerpts from the Architectural Design Narrative in the Project Manual

The design concept of the house is based on the idea that a singular form can be the basis for cultural allusion as well as functional performance. The form of the home carries historical and emotional meaning. Whitaker (1996) discusses the symbolic significance behind the stand-alone, single family house as a construct of American independence. Within the language of the American family home, the gabled roof is perhaps the most recognizable and enduring symbol.

The ICON House references the cultural significance of the single family home, classically identified by the gabled roof, and employs this form with modifications for solar technology. Pulling the ridge towards the north expands the surface area, while not lowering the angle to compromise optimal collection. In Minnesota, a range of 35 degrees to 45 degrees is ideal, however, according to initial estimates, lowering the roof to 28 degrees and gaining surface area for collectors actually produces more power. The addition of solar collectors to the south wall, integrated into the glass and wall itself, further increases power production. In particular, solar thermal panels on the roof at 28 degrees and on the south wall at 90 degrees help to achieve higher production under varied weather conditions.

The ICON House design provides the intermediary step towards the fusion of traditional style and new technology, a fusion that is necessary for a more energy-efficient future. Although the original gable roof is not ideal for solar power, our demonstrated incorporation of solar technology into the form of the house provides strong support for the use of building-integrated photovoltaics in the broader context of the American residential neighborhood. Our modifications to the roof line-and the fully integrated livable nature of the ICON House-have created what we hope will become an icon for solar housing that respects both the idea of a house and the need for solar energy.

The ICON House has a particular advantage when incorporating architectural meaning into the technology used. The integrated design team incorporated engineering expertise into the design process at an early stage, resulting in a design that developed with the twin notions of solar collectors as part of the structural system, while creating that iconic shape, at its core.

ICON SOLAR HOUSE
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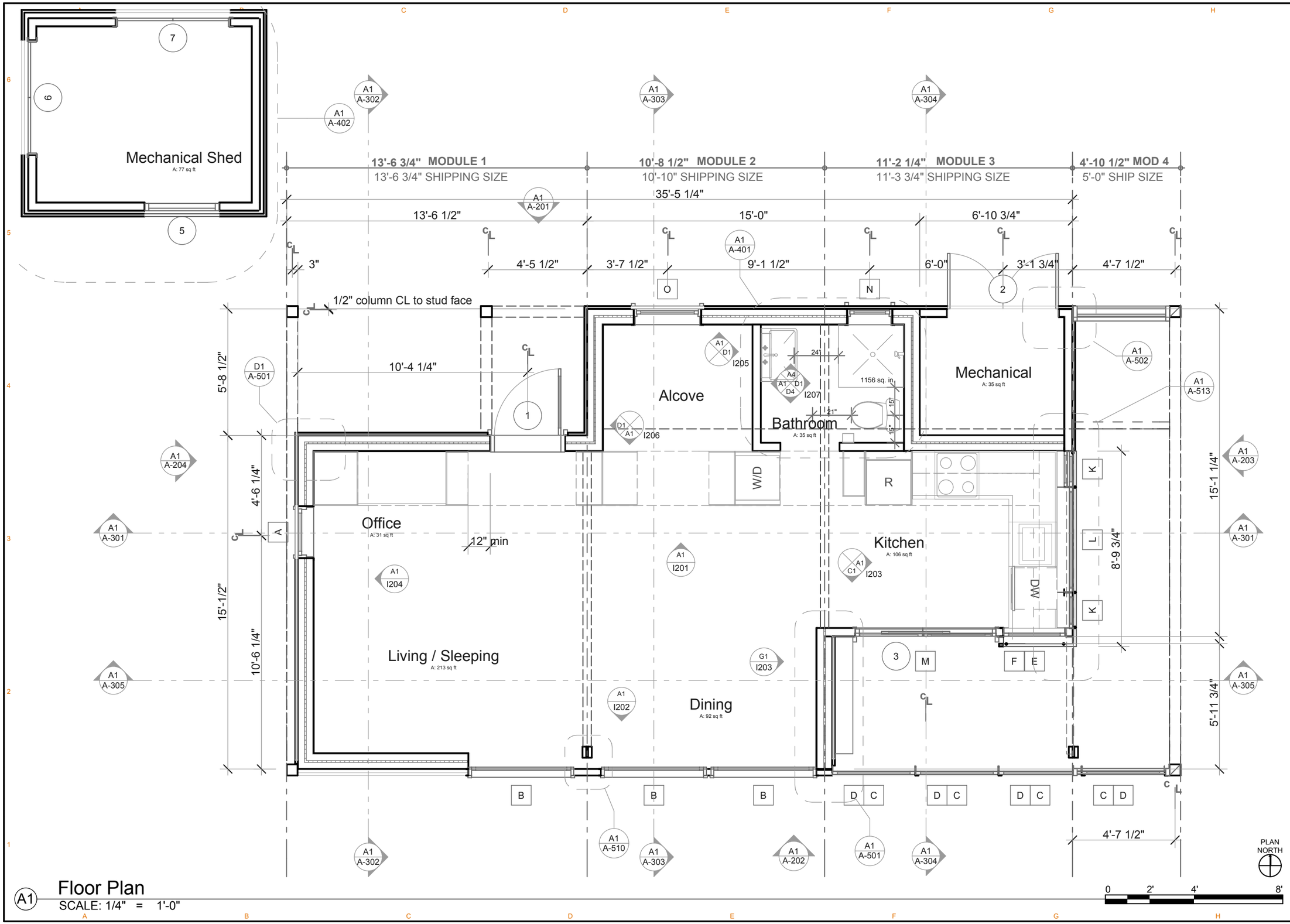
notes

A-001



A1 Floor Plan
SCALE: 1/4" = 1'-0"

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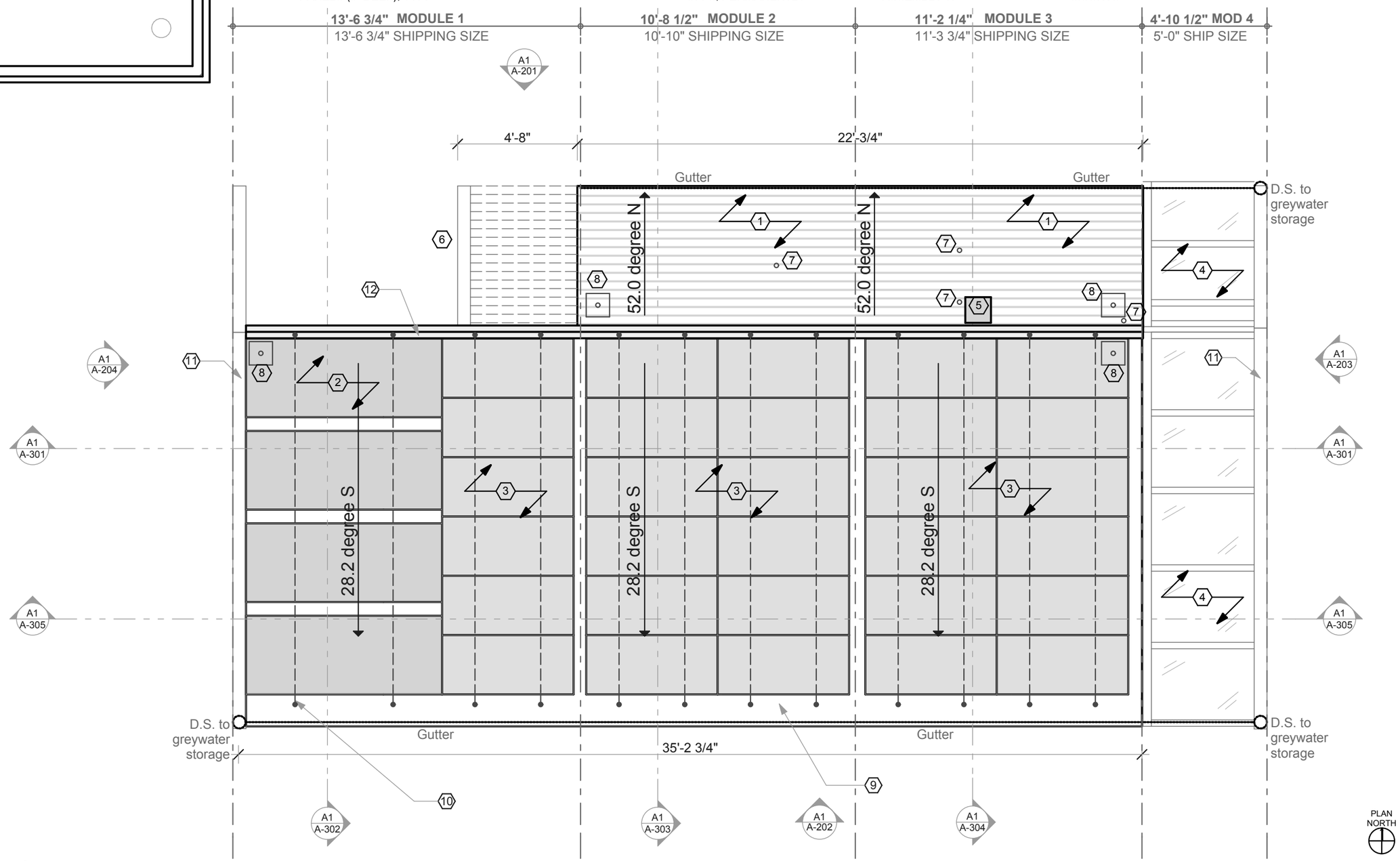
floor plan

A-101

SHEET KEYNOTES

1 TRESPA RAINSCREEN SLATS OVER 60 MIL. ADHERED EPDM, TYP.
2 60 MIL. ADHERED EPDM BELOW SOLAR THERMAL PANELS (3" DEEP), TYP.
3 60 MIL. ADHEREED EPDM BELOW PV PANELS (1.5" DEEP), TYP.
4 PORCH ROOF, PV LAMINATED GLASS W 1.1 MM PVB INTERLAYER, HEAT STRENGTHENED.
5 PV COMBINER BOX.
7 PLUMBING VENT
8 SAFETY HARNESS TIE-OFFS, PERMANENTLY INSTALLATED TO ROOF FRAMING, USE ROOF ANCHORS W FLASHING. PERSONAL HARNESS, 50 FT VERTICAL LIFELINE ASSEMBLY W POSITIONING DEVICE, SHOCK ABSORBER, AND CONNECTING LANYARD.
9 ALUM. FILLER, TYP.
10 STANCHION AND PV RACK MOUNTS
11 ALUM. TRIM
12 ALUM. RIDGE



A1 Roof Plan
SCALE: 1/4" = 1'-0"

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roof plan

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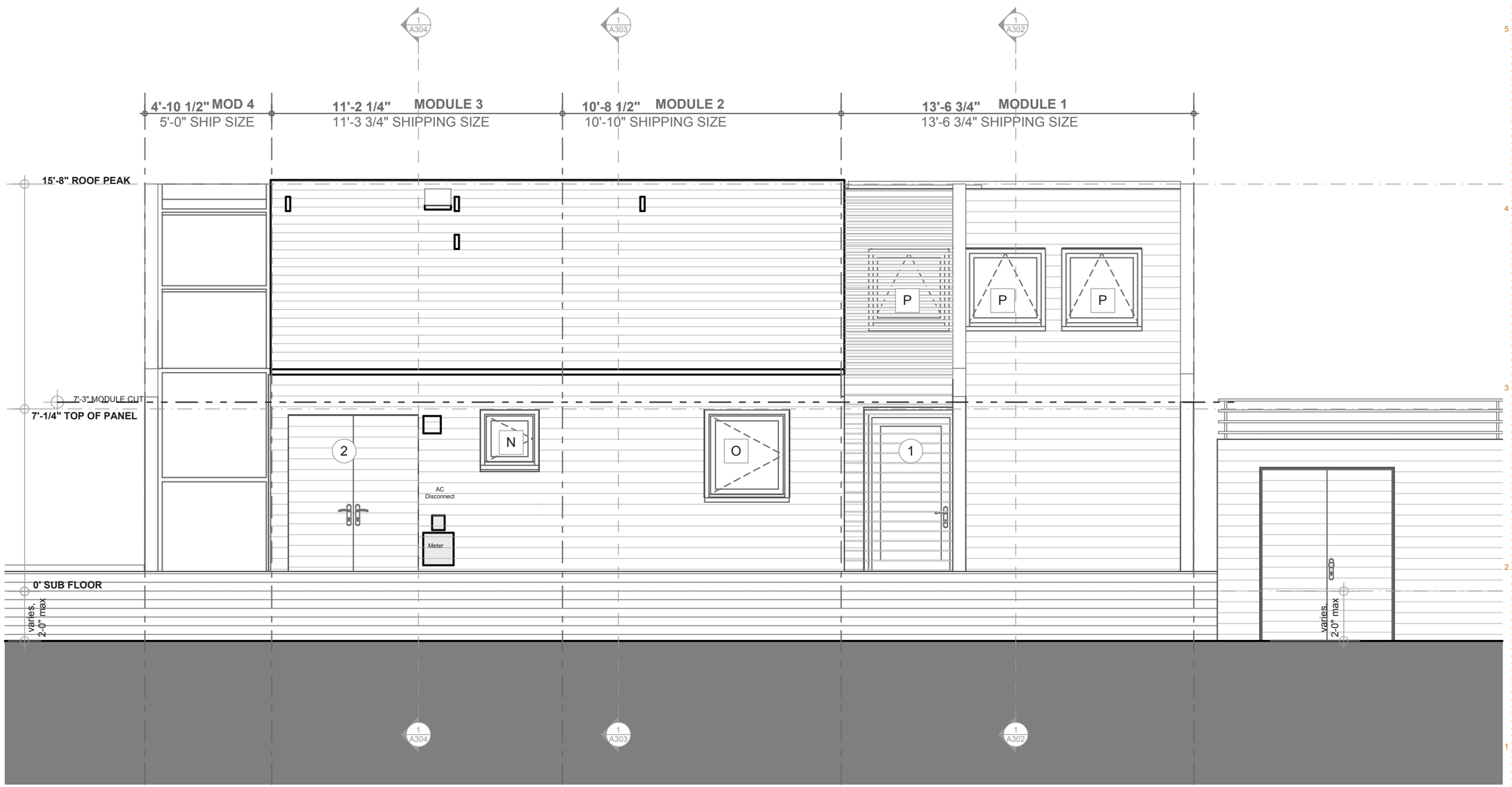

A1 North Elevation

SCALE: 1/4" = 1'-0"

0 2' 4' 8'

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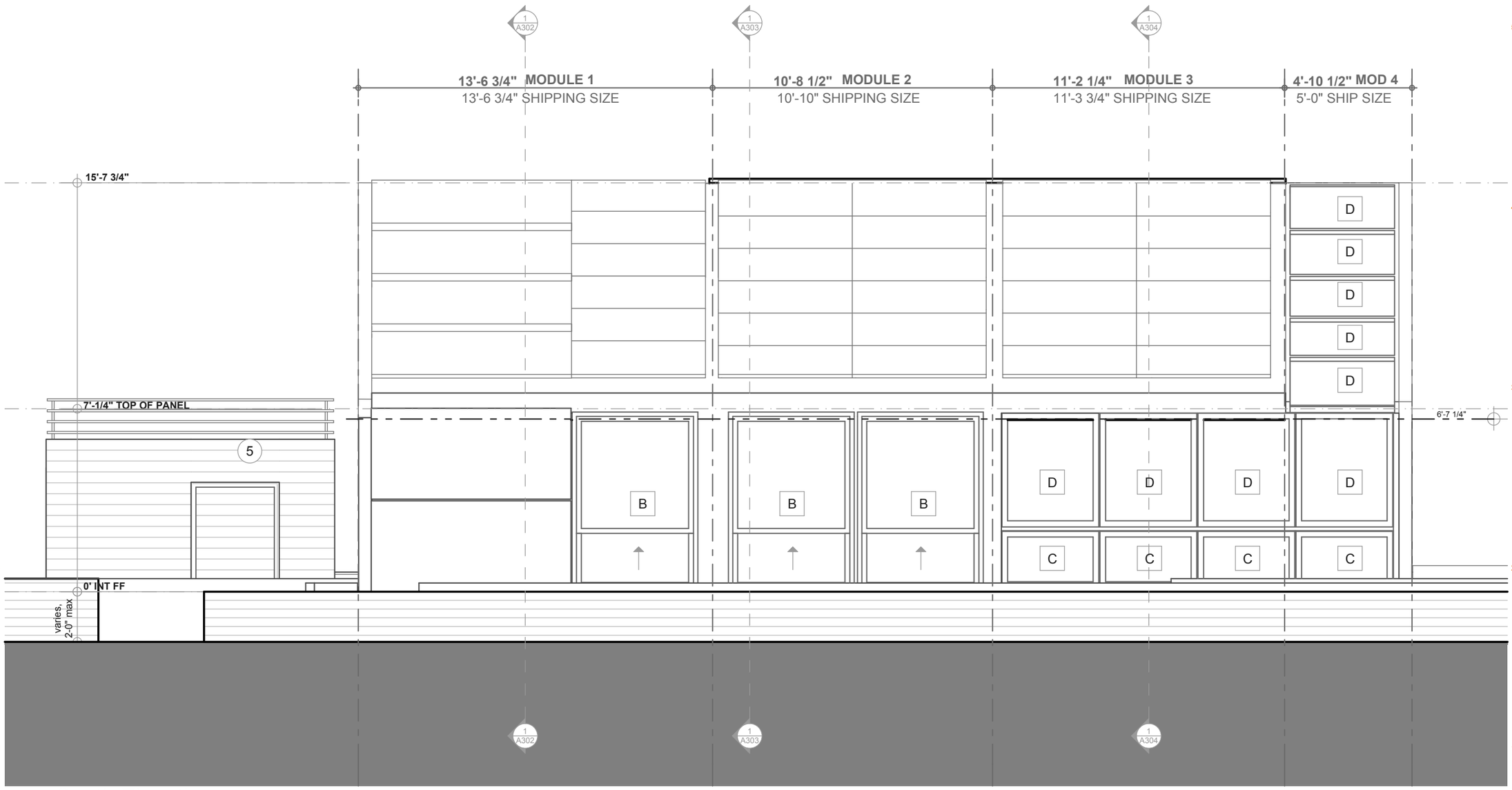
elevation

A-201



A1 South Elevation
SCALE: 1/4" = 1'-0"

0 2' 4' 8'

icon SOLAR HOUSE
UNIVERSITY OF MINNESOTA

REV 1	03/03/2009
REV 2	04/01/2009
REV 3	05/15/2009
REV 4	
REV 5	
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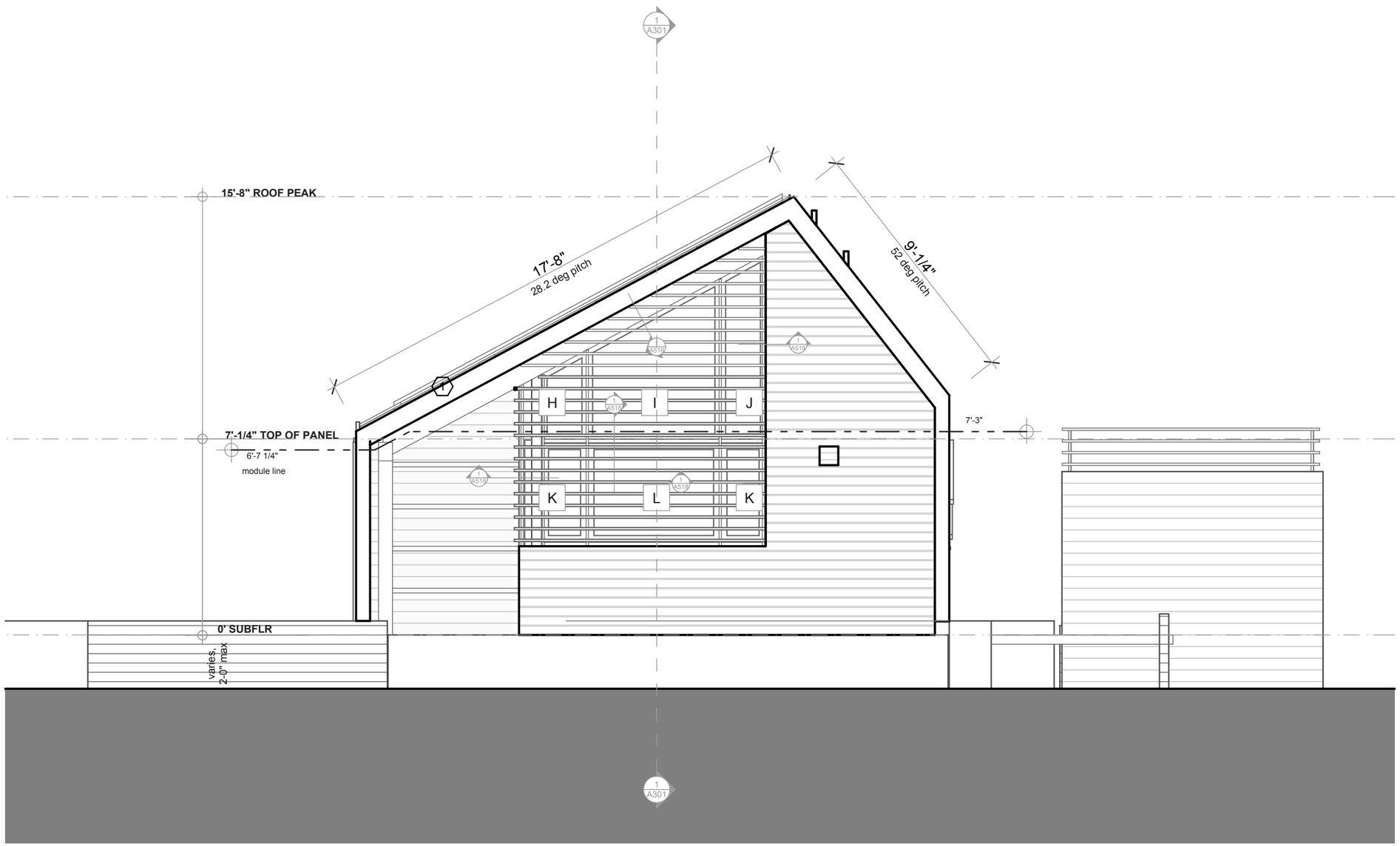
elevation

A-202



A1 East Elevation

SCALE: 1/4" = 1'-0"

0 2' 4' 8'

icon SOLAR HOUSE

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REV 1	03/03/2009
REV 2	04/01/2009
REV 3	05/15/2009
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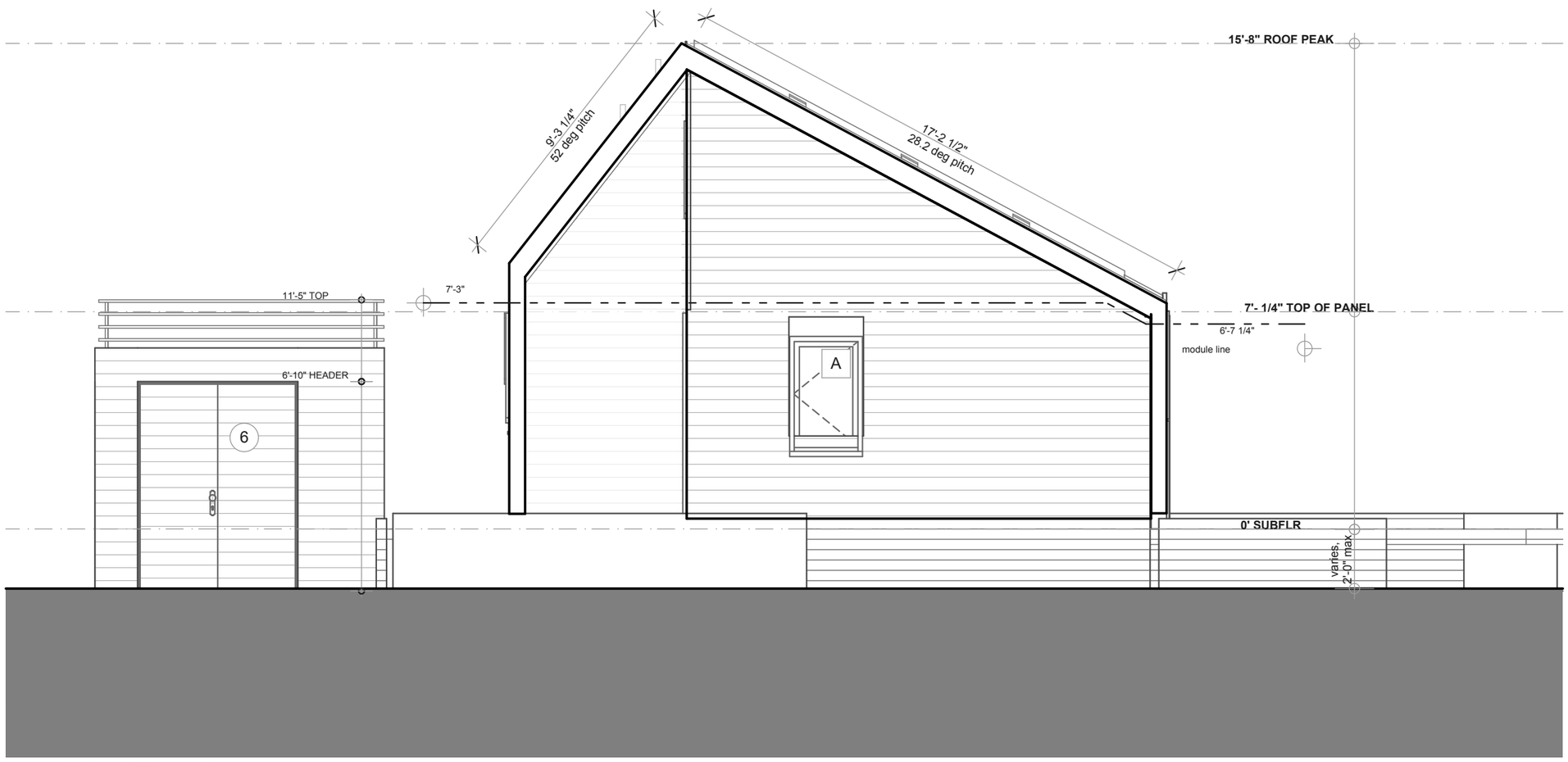
elevation

A-203



A1 West Elevation

SCALE: 1/4" = 1'-0"

0 2' 4' 8'

ICON SOLAR HOUSE

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REV 1	03/03/2009
REV 2	04/01/2009
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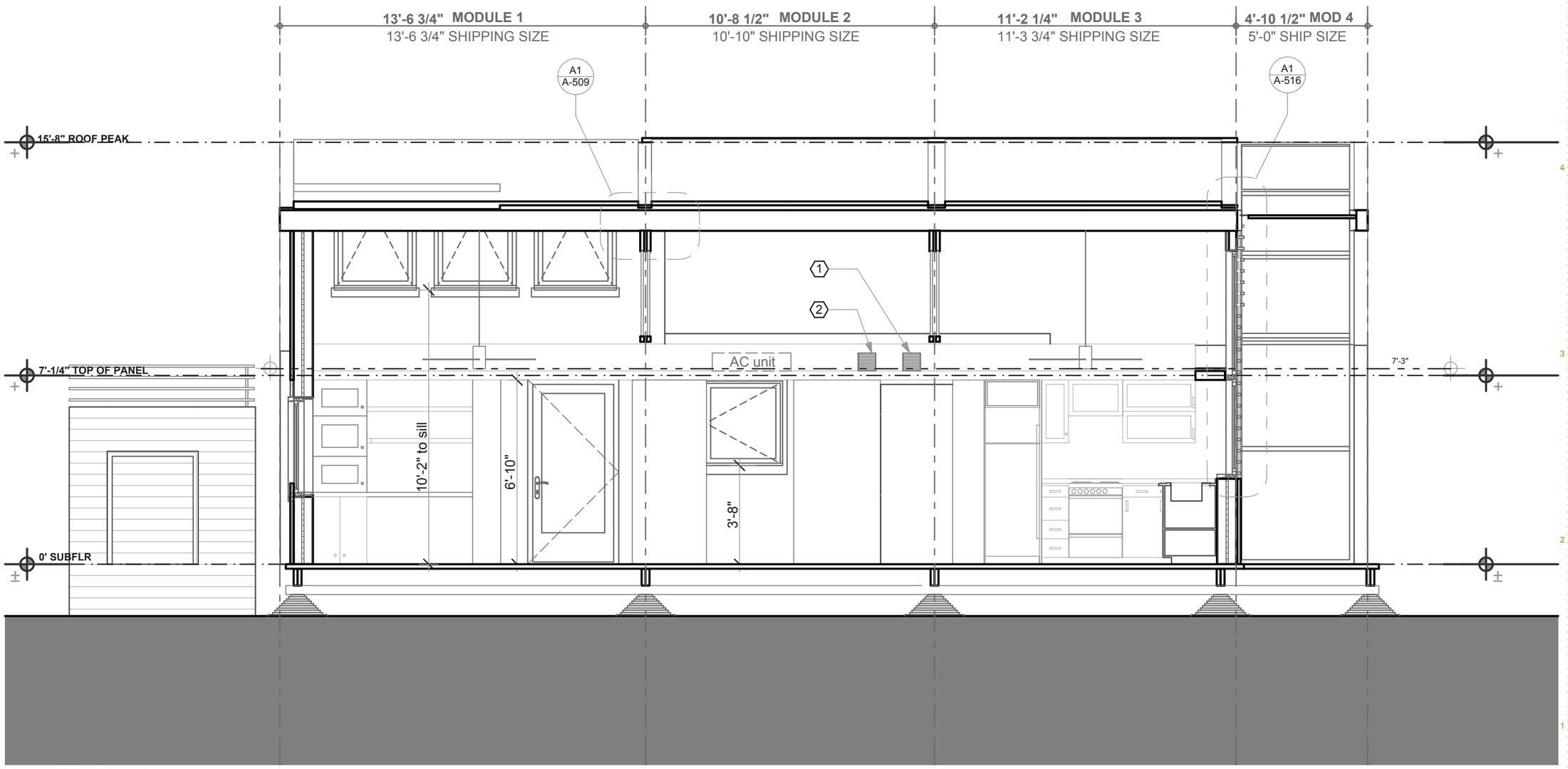
elevation

A-204

SHEET KEYNOTES

1 VENTILATION DELIVERY DIFFUSER
2 DESICCANT DELIVERY DIFUSER



A1 Section 1
SCALE: 1/4" = 1'-0"

0 2' 4' 8'

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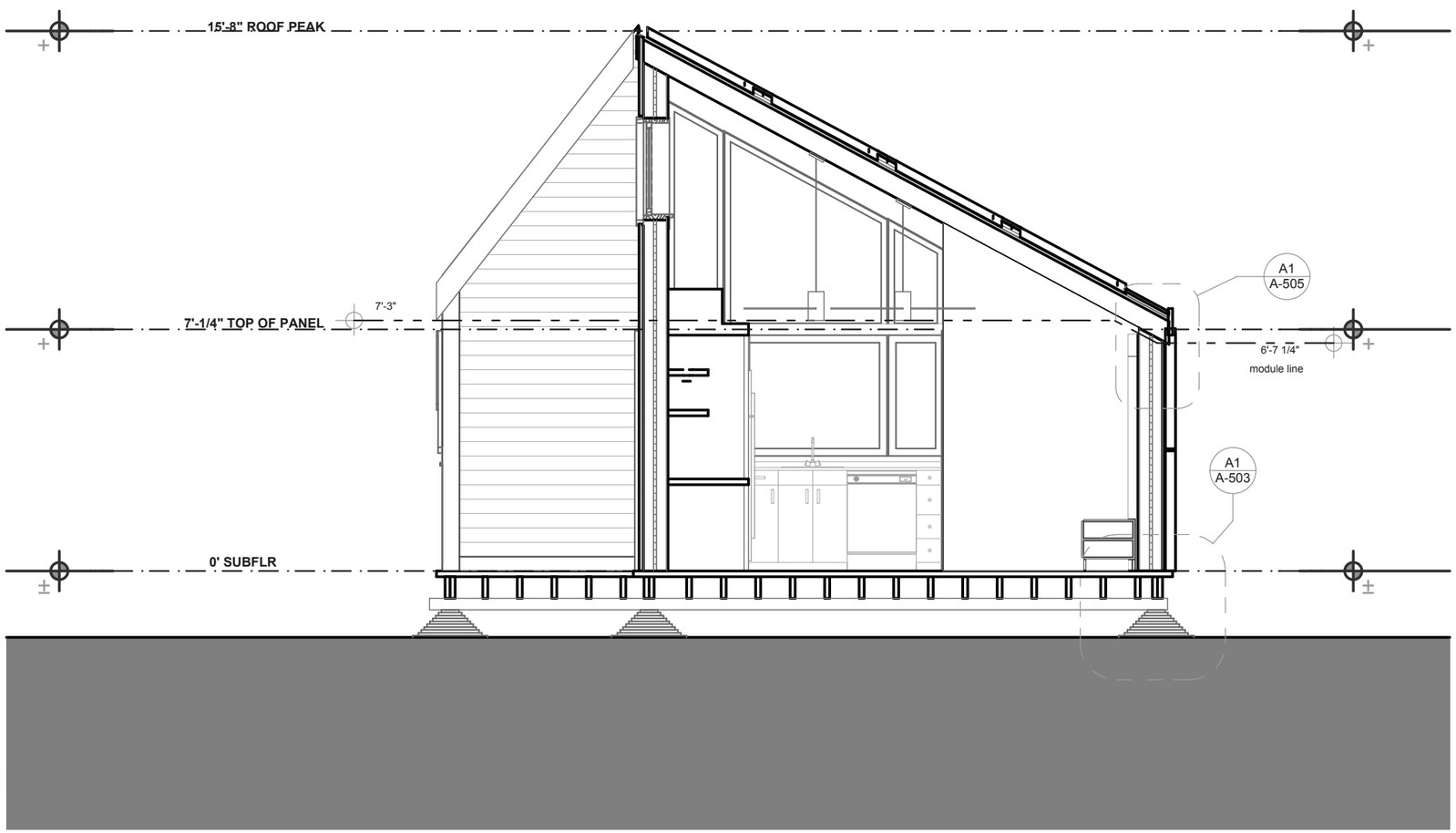
longitudinal section

A-301



A1 Section 2

SCALE: 1/4" = 1'-0"

0 2' 4' 8'

icon SOLAR HOUSE

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REV 2	04/01/2009
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REV 5	
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REV 7	
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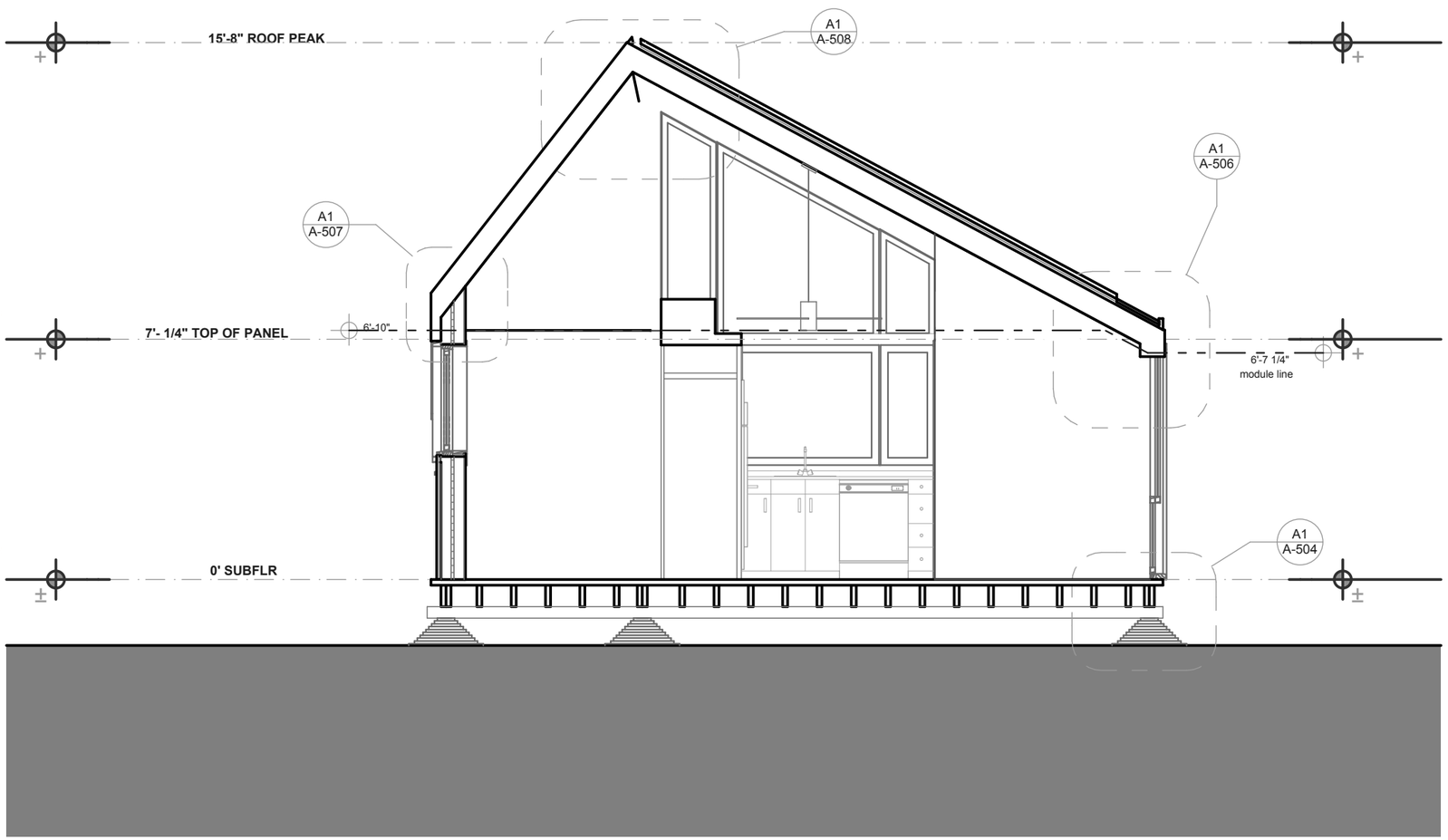
cross-sections

A-302



A1 Section 3

SCALE: 1/4" = 1'-0"

0 2' 4' 8'

icon SOLAR HOUSE

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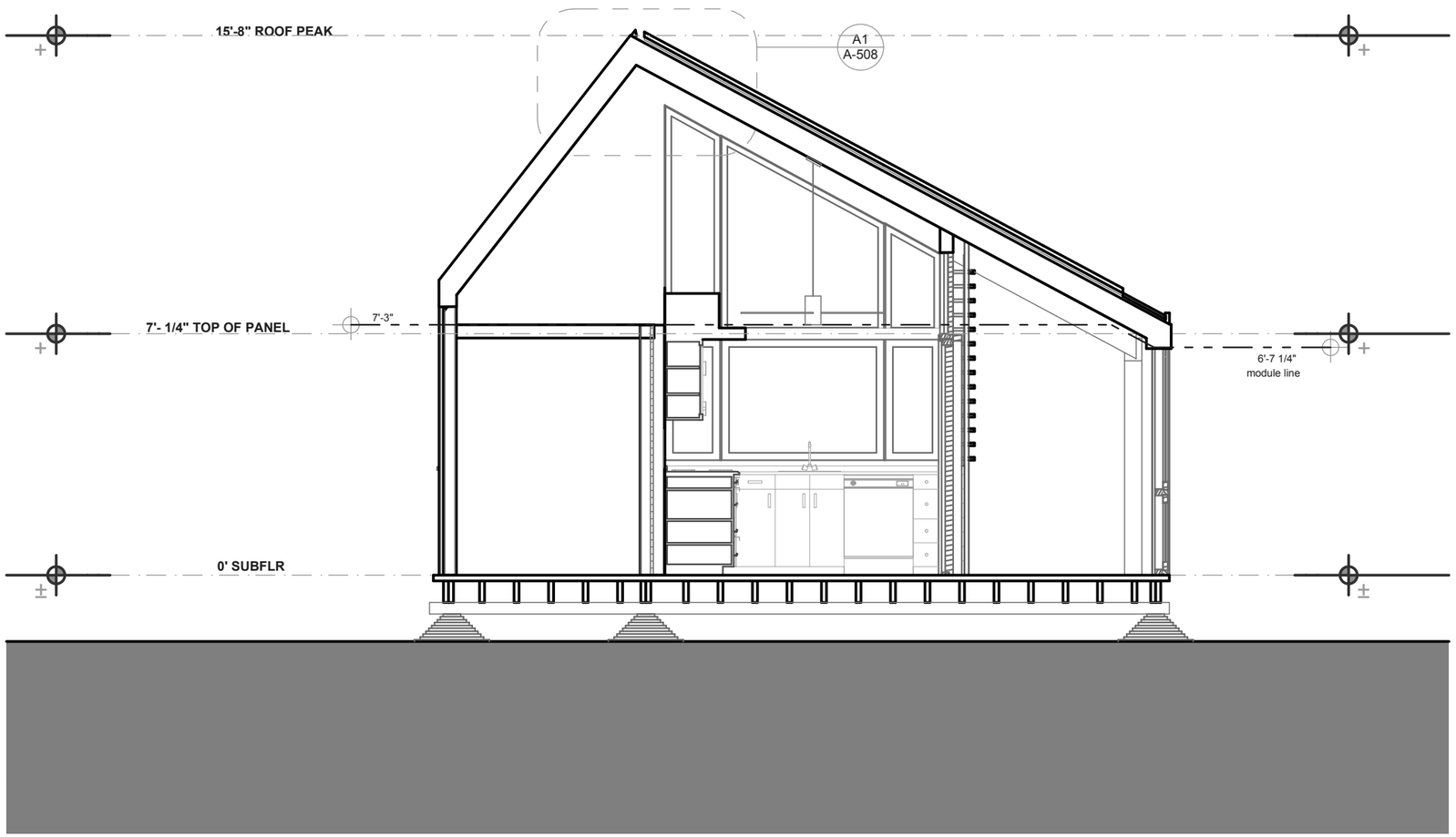
cross-sections

A-303



A1 Secton 4

SCALE: 1/4" = 1'-0"

0 2' 4' 8'

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REV 3	05/15/2009
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REV 5	
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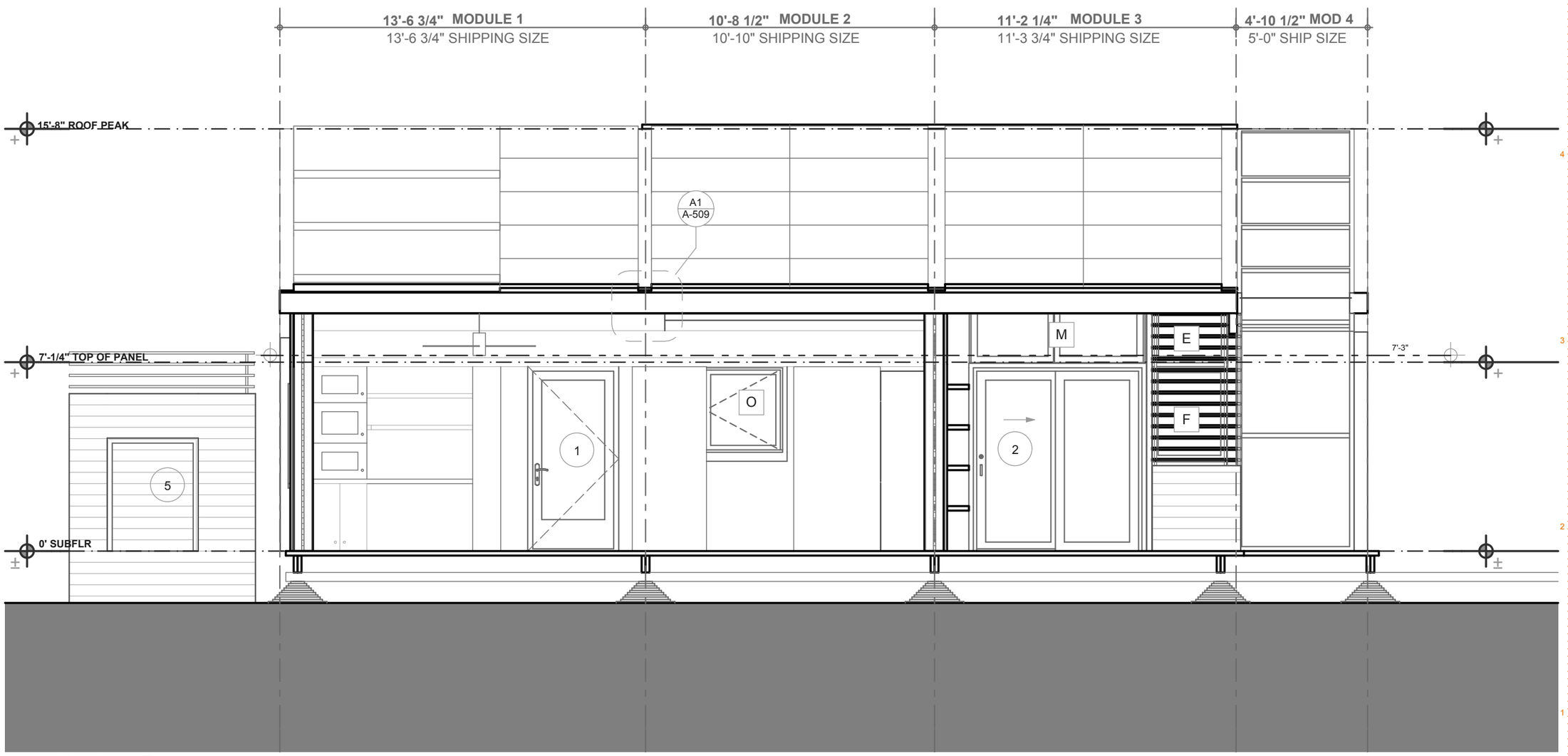
cross-sections

A-304



A1 Section 5

SCALE: 1/4" = 1'-0"

0 2' 4' 8'

ICON SOLAR HOUSE

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REV 3	05/15/2009
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REV 5	
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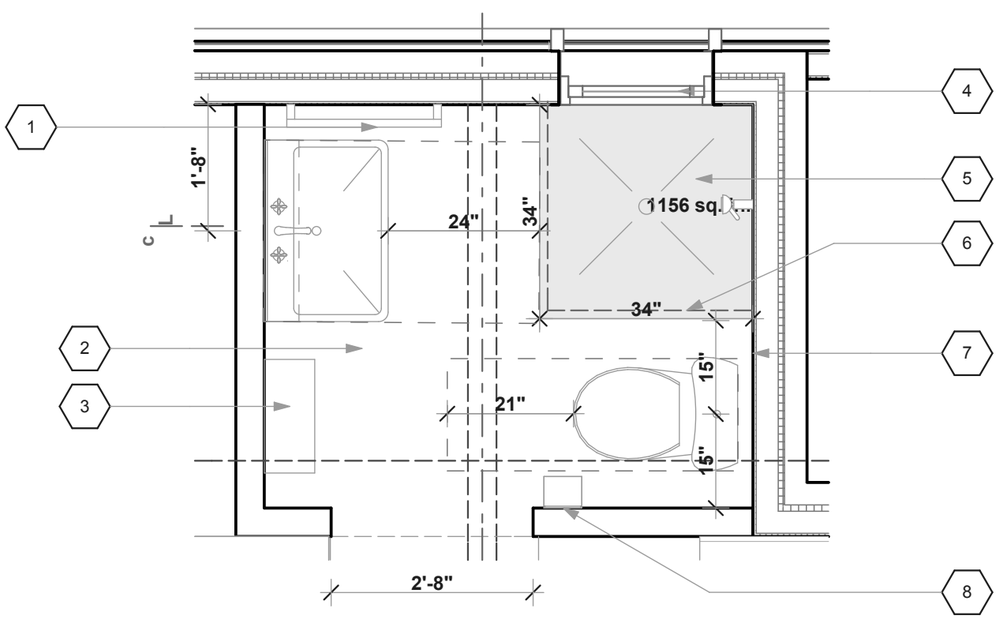
longitudinal section

A-305

SHEET KEYNOTES

1. TOWEL WARMER, VERIFY W. SOLAR THERMAL TEAM
2. TILE FLOOR FINISH, INSTALL GROUT WHEN HOUSE RETURNS TO MINNESOTA
3. RECESSED CABINET
4. MARVIN ULTIMATE TRI-PANE WINDOW, MAHOGANY FRAME
5. PREFORMED SHOWER RECEPTOR, CORNER UNIT (34" X 34") BY FLOOR STONE
6. SHOWER CURTAIN ROD ABOVE
7. USE DUROCK ON ALL WALLS AND CEILING
8. TOILET PAPER HOLDER, LLODY SERIES BY TOTO



A1 Bathroom Plan
SCALE: 1/2" = 1'-0"

0 1' 2' 4'

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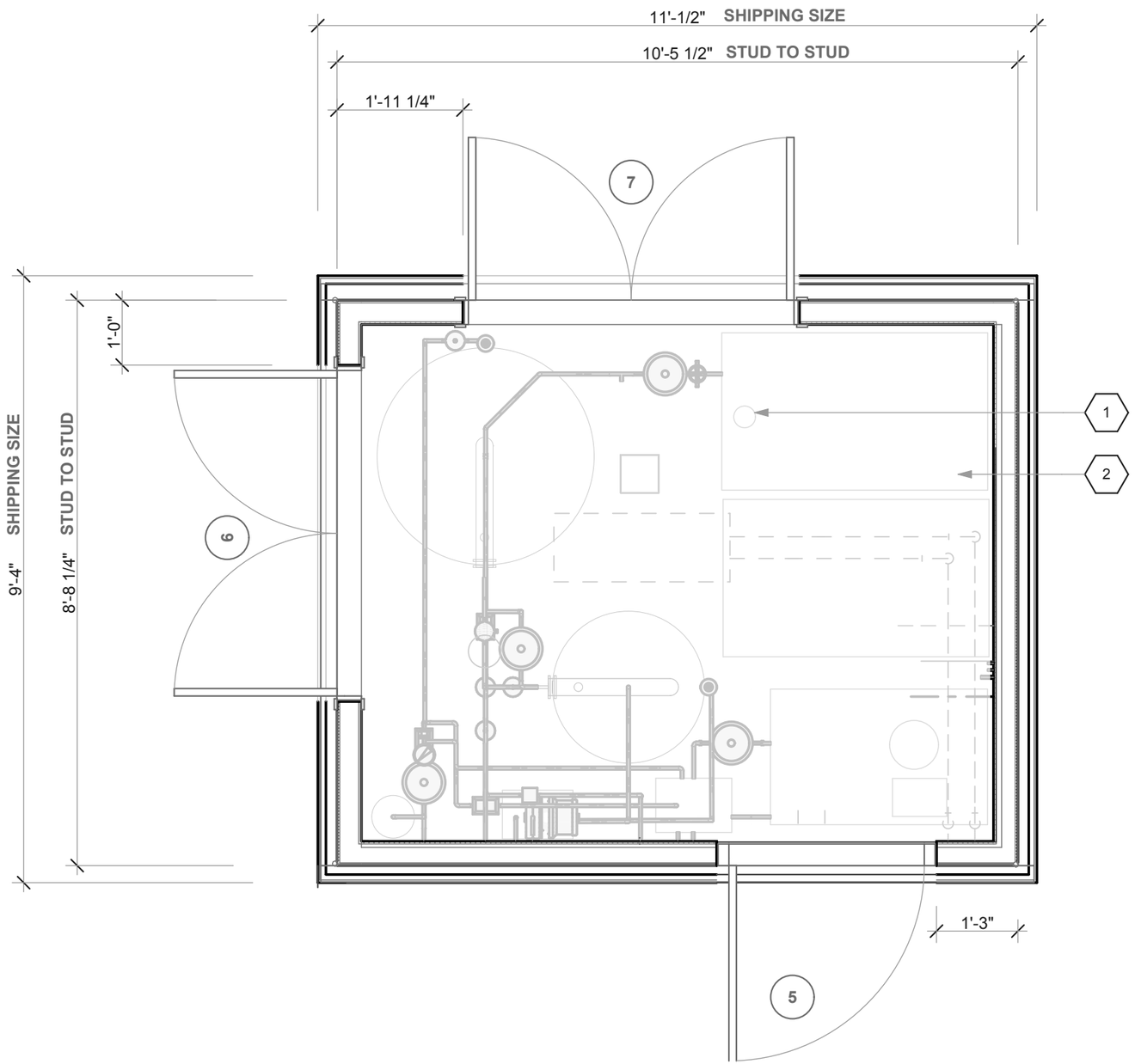
enlarged bathroom

A-401



A1 Mechanical Shed
SCALE: 1/2" = 1'-0"

0 1' 2' 4'

SHEET KEYNOTES

1 4" DIAMETER CONNECTION FOR WATER SUPPLY, PROVIDE 12" CLEAR ABOVE
2 (2) WATER TANKS CONNECTED, TOTAL STORAGE OF 600 GALLONS

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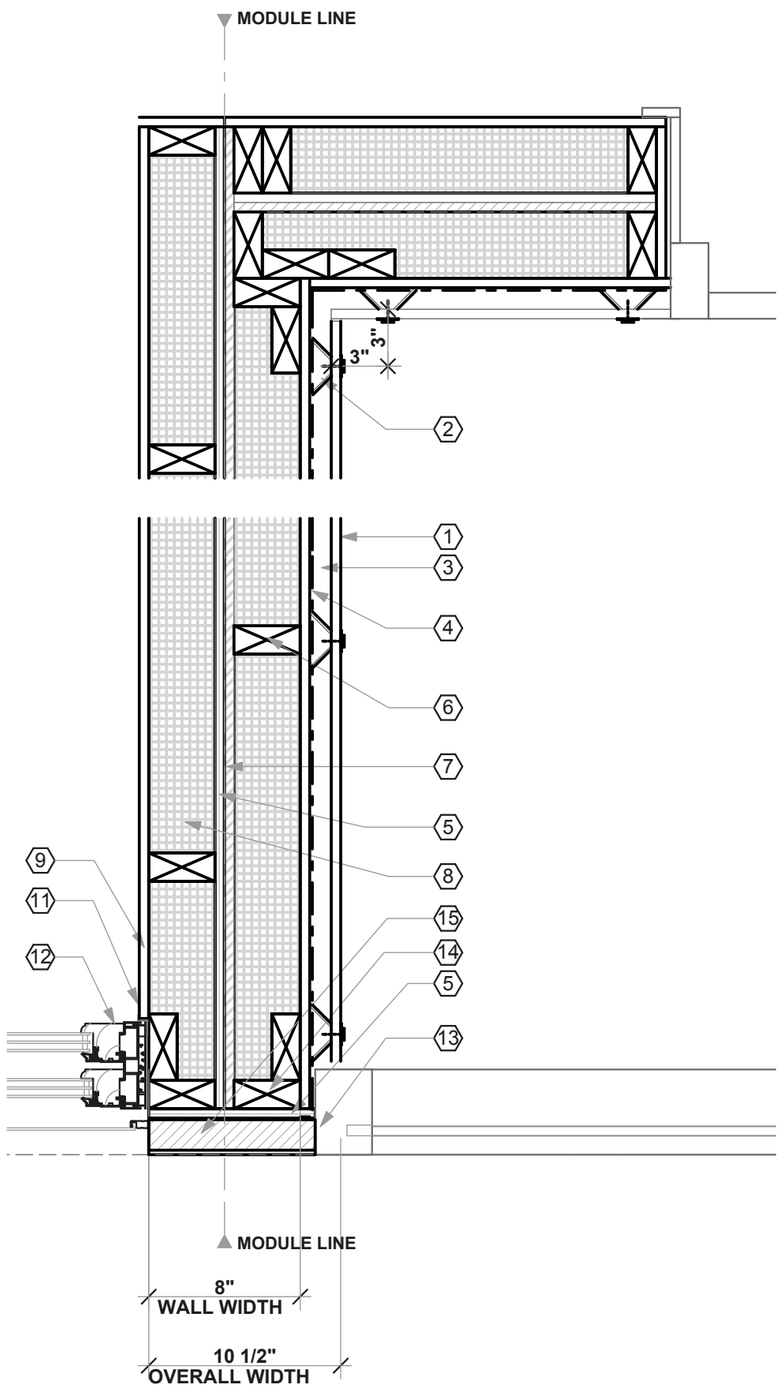
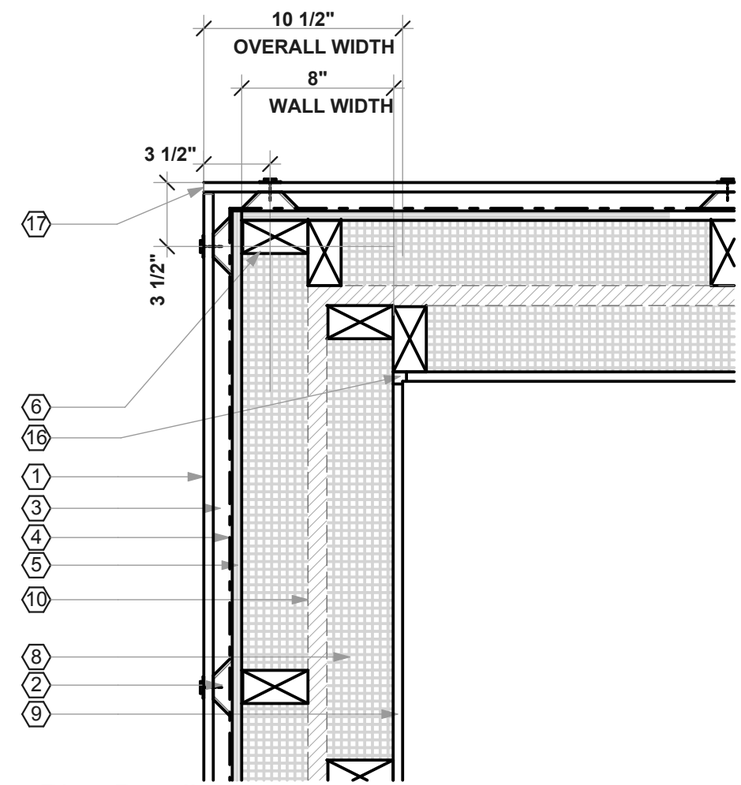
mechanical shed

A-402



A1 Plan Details
SCALE: 1 1/2"= 1'-0"

0 6" 12" 18"



D1 Plan Details
SCALE: 1 1/2"= 1'-0"

0 6" 12" 18"

GENERAL SHEET NOTES

1 USE VAPROSHIELD WRAPSHIELD MEMBRANE, POLYPROPYLENE. MEETS AATCC 127 FOR WATER RESISTANCE, ASTM U-84 CLASS A FLAME SPREAD INDEX, ATM E-1677 TYPE 1 AIR BARRIER, AND ASTM 2178 AIR PERMEANCE OF BUILDING MATERIALS.

2 USE POLYURETHANE, CLOSED CELL SPRAY FOAM INSULATION WITH HONEYWELL BLOWING AGENT (EPA APPROVED). FOAM IS CLASS 1 ASTM E-84 TESTED AT 4", WITH FLAME SPREAD INDEX OF 25. NFPA 286 TESTING DONE AT 8" THICK WALLS, AND 12" THICK CEILINGS (SEE TEST REPORT 3116019-002).

3 USE POLYISOCYANATE INSULATION WITH FOIL FACING ON BOTH SIDES. TAPE ALL SEAMS AND ENSURE EXTERIOR FOIL FACING ACTS AS A CONTINUOUS AIR BARRIER.

SHEET KEYNOTES

1 1/2" TRESPA SLAT RAINSCREEN
2 1" FURRING STRIP
3 1" AIR SPACE
4 WATERRESISTANT MEMBRANE
5 1/2" PLYWOOD SHEATHING
6 2X4 STAGGERED STUD FRAMING
7 1/2" FOIL FACED POLYISO WITH FOIL TAPE ON WARM SIDE
8 FILL WITH CLOSED CELL POLYURETHANE SPRAYFOAM INSULATION
9 1/2" GYP. BOARD
10 1" FOIL FACED POLYISO WITH FOIL TAPE ON WARM SIDE
11 GORDON 300 SERIES REVEAL
12 MARVIN TRI-PANE ULTIMATE MAGNUM DBL HUNG WINDOW
13 4 1/2" ALUM. CURTAINWALL, SINGLE PANE PV LAMINATED GLASS
14 2X4 STUDS
15 PREFINISHED BRAKE METAL COVER OVER RIGID INSULATION BACKER
16 SIMPSON DRYWALL CLIPS
17 ALTERNATE OVERLAP OF TRESPA SLAT ENDS AT CORNER

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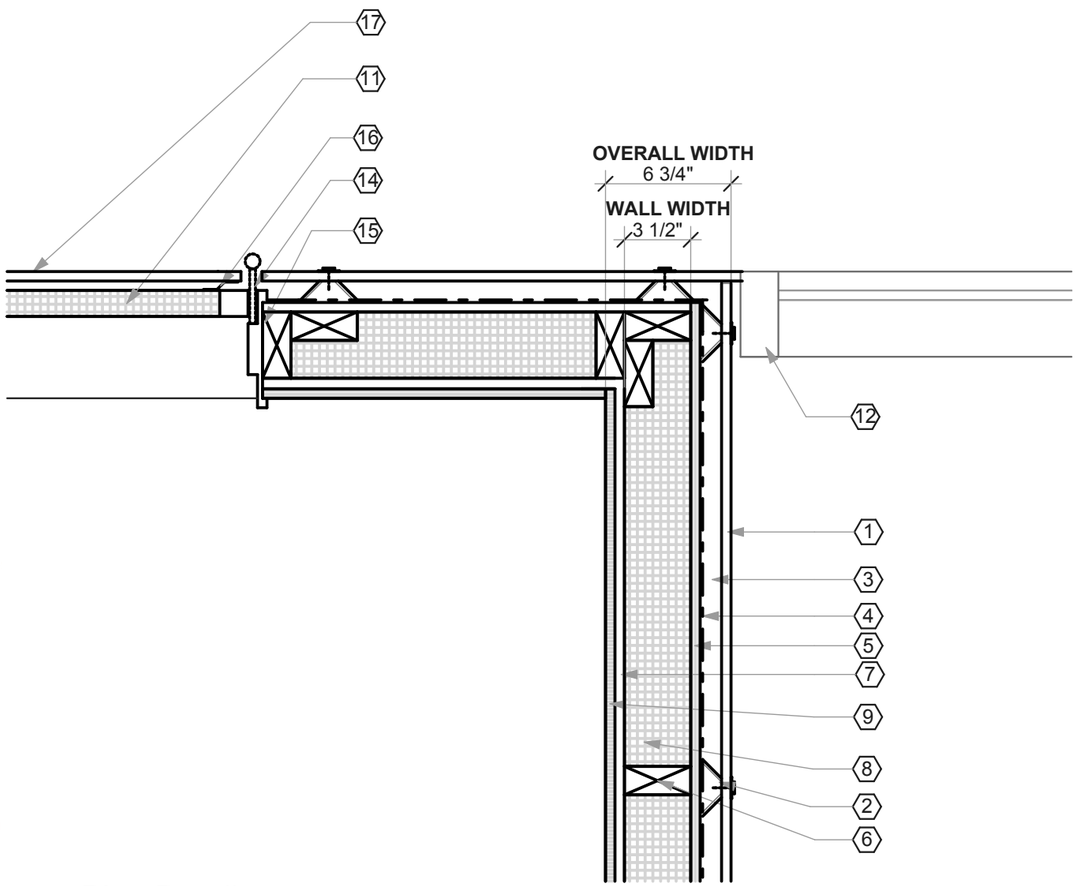
plan details

A-501



A1 Plan Detail
SCALE: 1 1/2"= 1'-0"

GENERAL SHEET NOTES

1 USE VAPROSHIELD WRAPSHIELD MEMBRANE, POLYPROPYLENE. MEETS AATCC 127 FOR WATER RESISTANCE, ASTM U-84 CLASS A FLAME SPREAD INDEX, ATM E-1677 TYPE 1 AIR BARRIER, AND ASTM 2178 AIR PERMEANCE OF BUILDING MATERIALS.

2 USE POLYURETHANE, CLOSED CELL SPRAY FOAM INSULATION WITH HONEYWELL BLOWING AGENT (EPA APPROVED). FOAM IS CLASS 1 ASTM E-84 TESTED AT 4", WITH FLAME SPREAD INDEX OF 25. NFPA 286 TESTING DONE AT 8" THICK WALLS, AND 12" THICK CEILINGS (SEE TEST REPORT 3116019-002).

3 USE POLYISOCYANATE INSULATION WITH FOIL FACING ON BOTH SIDES. TAPE ALL SEAMS AND ENSURE EXTERIOR FOIL FACING ACTS AS A CONTINUOUS AIR BARRIER.

SHEET KEYNOTES

1 1/2" TRESPA SLAT RAINSCREEN
2 1" FURRING STRIP
3 1" AIR SPACE
4 WATER RESISTANT MEMBRANE
5 1/2" PLYWOOD SHEATHING
6 2X4 STUD FRAMING
7 1/2" GYP. BOARD OVER VAPOR BARRIER
8 FILL WITH CLOSED CELL POLYURETHANE SPRAYFOAM INSULATION
9 1/2" PLYWOOD SHEATHING WHERE MOUNTING AREA IS NEEDED
11 INSULATED HOLLOW METAL DOOR
12 4 1/2" ALUM. CURTAINWALL, SINGLE PANE PV LAMINATED GLASS
13 16 GAUGE TABS
14 HINGE WITH EXTENDED LEGS
15 HOLLOW METAL FRAME
16 ALTERNATE OVERLAP OF TRESPA SLAT ENDS AT CORNER
17 CONTINUE TRESPA RAINSCREEN ON DOOR, ALIGN WITH ADJACENT WALL

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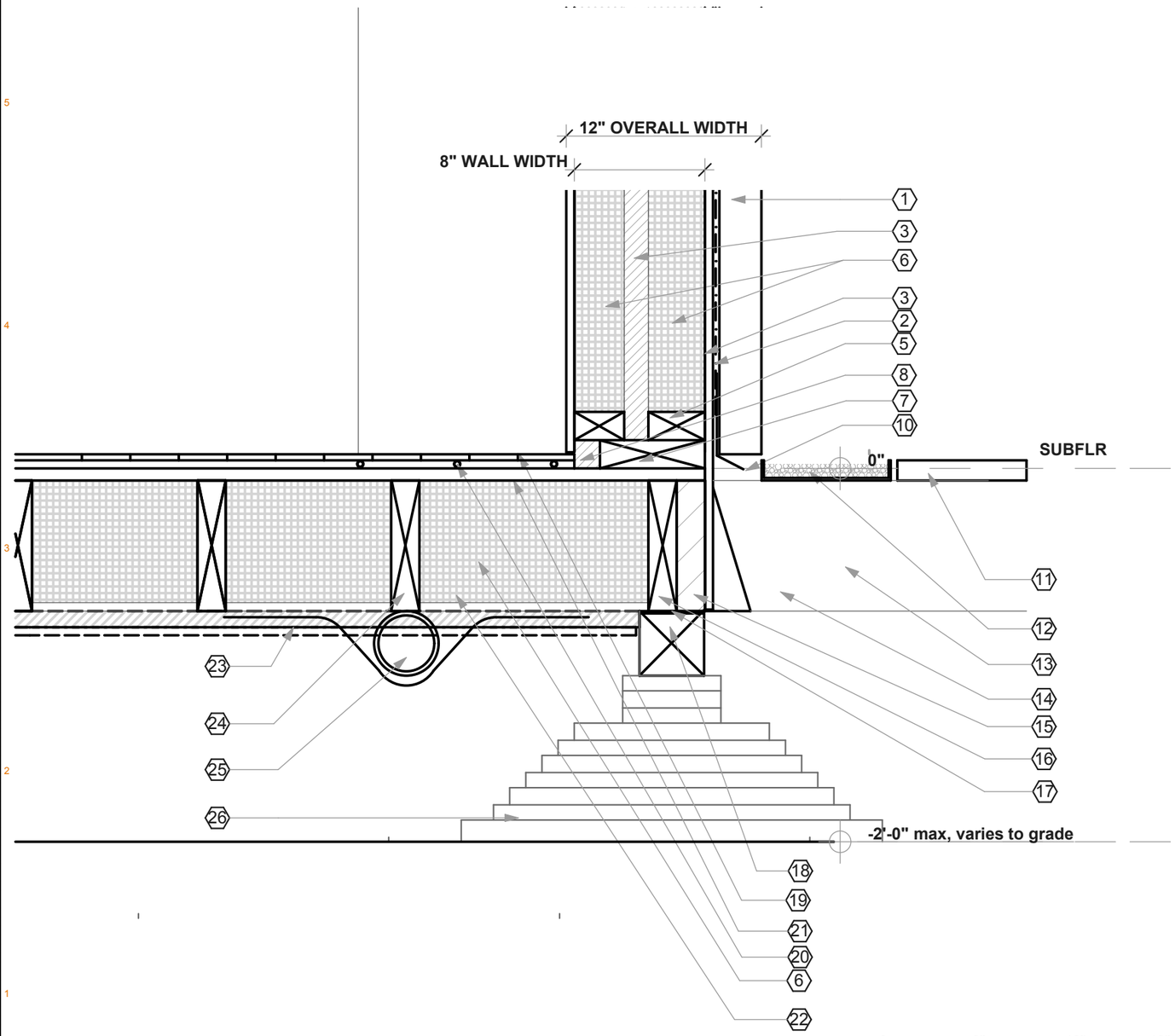
A-502



A1 Foundation Detail
SCALE: 1 1/2"= 1'-0"

GENERAL SHEET NOTES

1 USE VAPROSHIELD WRAPSHIELD MEMBRANE, POLYPROPYLENE. MEETS AATCC 127 FOR WATER RESISTANCE, ASTM U-84 CLASS A FLAME SPREAD INDEX, ATM E-1677 TYPE 1 AIR BARRIER, AND ASTM 2178 AIR PERMEANCE OF BUILDING MATERIALS.

2 USE POLYURETHANE, CLOSED CELL SPRAY FOAM INSULATION WITH HONEYWELL BLOWING AGENT (EPA APPROVED). FOAM IS CLASS 1 ASTM E-84 TESTED AT 4", WITH FLAME SPREAD INDEX OF 25. NFPA 286 TESTING DONE AT 8" THICK WALLS, AND 12" THICK CEILINGS (SEE TEST REPORT 3116019-002).

3 USE POLYISOCYANATE INSULATION WITH FOIL FACING ON BOTH SIDES. TAPE ALL SEAMS AND ENSURE EXTERIOR FOIL FACING ACTS AS A CONTINUOUS AIR BARRIER.

SHEET KEYNOTES

1 SOLAR THERMAL PANEL
2 WATER RESISTANT MEMBRANE
3 1/2" FOIL FACED POLYISO WITH FOIL TAPE ON WARM SIDE
4 1" PLYWOOD SHEATHING
5 2X4 STAGGERED STUD FRAMING
6 FILL WITH CLOSED CELL POLYURETHANE SPRAYFOAM INSULATION
7 1/2" GYP. BOARD
8 RIGID INSULATION
9 2X7 BOTTOM PLATE
10 FLASHING BELOW MEMBRANE, GALVANIZED
11 2X WOOD DECKING
12 MTL TRAY FOR RECYCLED GLASS PERFORATED BASE
13 2X8 TREATED DECK FRAMING
14 GALVANIZED STL JOIST HANGER
15 (1) 2X8 LVLWOOD RIM JOIST
16 (1) 2X8 WOOD RIM JOIST
17 TRIVAR 1000 PLASTIC SKID
18 4X4 RAIL
19 3/4" WOOD FLOORING
20 1/2" RADIANT HEAT SYSTEM
21 1 1/8" OSB SUBFLOOR
22 BLOCKING BETWEEN JOISTS, PER STRUCTURAL FLOOR FRAMING PLAN
23 1"RIGID INSULATION BONDED TO 1/2" OSB (FOR FINAL MN INSTALATION ONLY)
24 2X8 FLOOR FRAMING, PER STRUCTURAL FLOOR FRAMING PLAN
25 4" DIA. PIPE FOR CRANE SUPPORTS
26 ADJUSTABLE STACKED 1 1/8" PLYWOOD, PER STRUCTURAL FOOTING DETAILS

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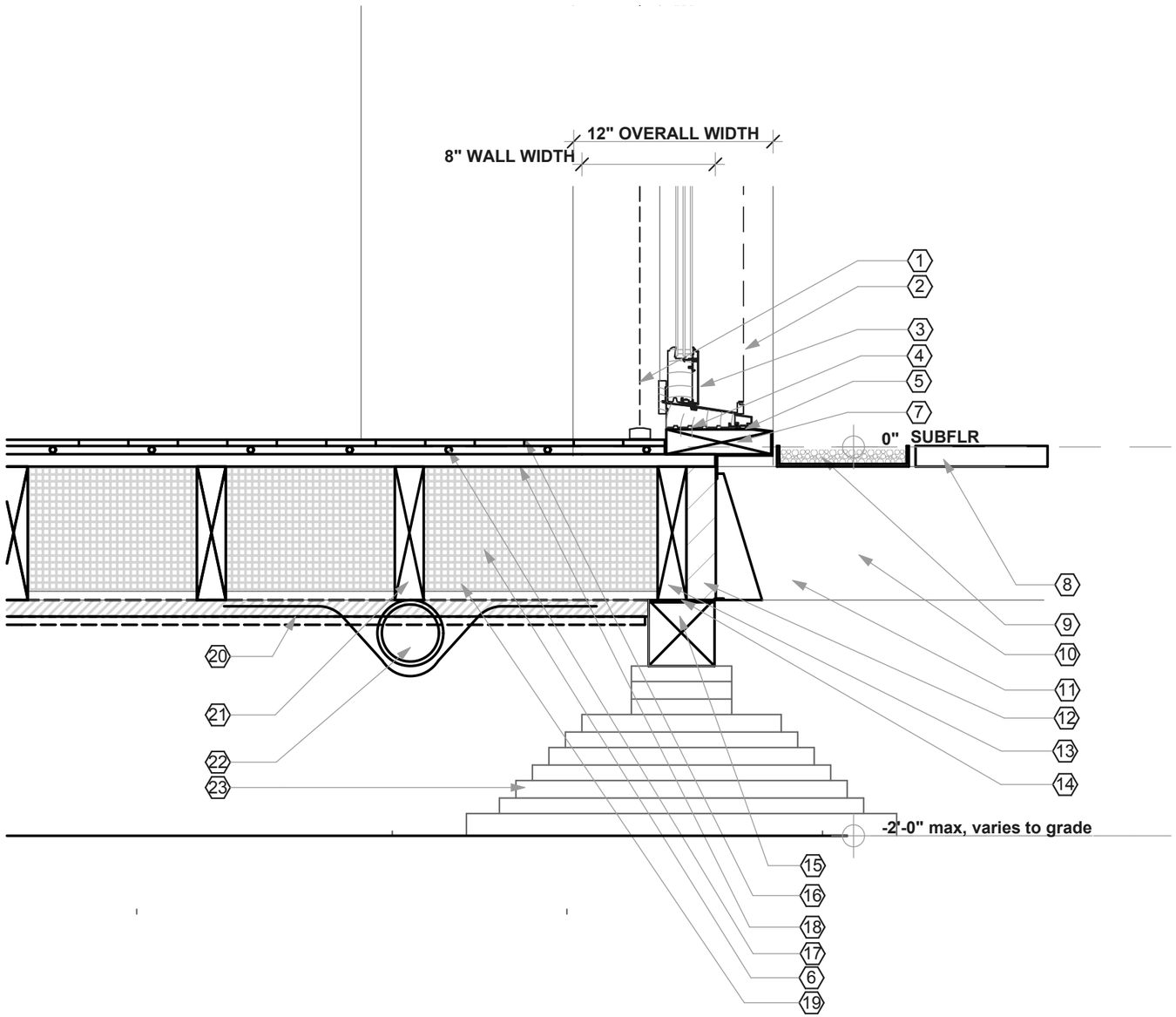
foundation detail

A-503



A1 Foundation Detail

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

0 6" 12" 18"

GENERAL SHEET NOTES

1 USE VAPROSHIELD WRAPSHIELD MEMBRANE, POLYPROPYLENE. MEETS AATCC 127 FOR WATER RESISTANCE, ASTM U-84 CLASS A FLAME SPREAD INDEX, ATM E-1677 TYPE 1 AIR BARRIER, AND ASTM 2178 AIR PERMEANCE OF BUILDING MATERIALS.

2 USE POLYURETHANE, CLOSED CELL SPRAY FOAM INSULATION WITH HONEYWELL BLOWING AGENT (EPA APPROVED). FOAM IS CLASS 1 ASTM E-84 TESTED AT 4", WITH FLAME SPREAD INDEX OF 25. NFPA 286 TESTING DONE AT 8" THICK WALLS, AND 12" THICK CEILINGS (SEE TEST REPORT 3116019-002).

3 USE POLYISOCYANATE INSULATION WITH FOIL FACING ON BOTH SIDES. TAPE ALL SEAMS AND ENSURE EXTERIOR FOIL FACING ACTS AS A CONTINUOUS AIR BARRIER.

SHEET KEYNOTES

1 FABRIC SHADES BY HUNTER DOUGLAS DUETTE ARCHITELLA, PER INTERIORS
2 THIN FILM PV LAMINATED DOUBLE GLAZE IGU, BY SCHOTT
3 TRI PANE MARVIN MAG. ULT. DBL. HUNG WINDOW
4 SHIM SPACE
5 CUSTOM MTL. SILL EXTENSION TO MEET FACE OF SOLAR THERMAL PANELS
6 FILL WITH CLOSED CELL POLYURETHANE SPRAYFOAM INSULATION
7 SHAPED 2X BLOCKING
8 2X WOOD DECKING
9 MTL TRAY FOR RECYCLED GLASS PERFORATED BASE
10 2X8 TREATED DECK FRAMING
11 GALVANIZED STL JOIST HANGER
12 (1) 2X8 LVLWOOD RIM JOIST
13 (1) 2X8 WOOD RIM JOIST
14 TRIVAR 1000 PLASTIC SKID
15 4X4 RAIL
16 3/4" WOOD FLOORING
17 1/2" RADIANT HEAT SYSTEM
18 1 1/8" OSB SUBFLOOR
19 BLOCKING BETWEEN JOISTS, PER STRUCTURAL FLOOR FRAMING PLAN
20 1"RIGID INSULATION BONDED TO 1/2" OSB (FOR FINAL MN INSTALATION ONLY)
21 2X8 FLOOR FRAMING, PER STRUCTURAL FLOOR FRAMING PLAN
22 4" DIA. PIPE FOR CRANE SUPPORTS
23 ADJUSTABLE STACKED 1 1/8" PLYWOOD, PER STRUCTURAL FOOTING DETAILS

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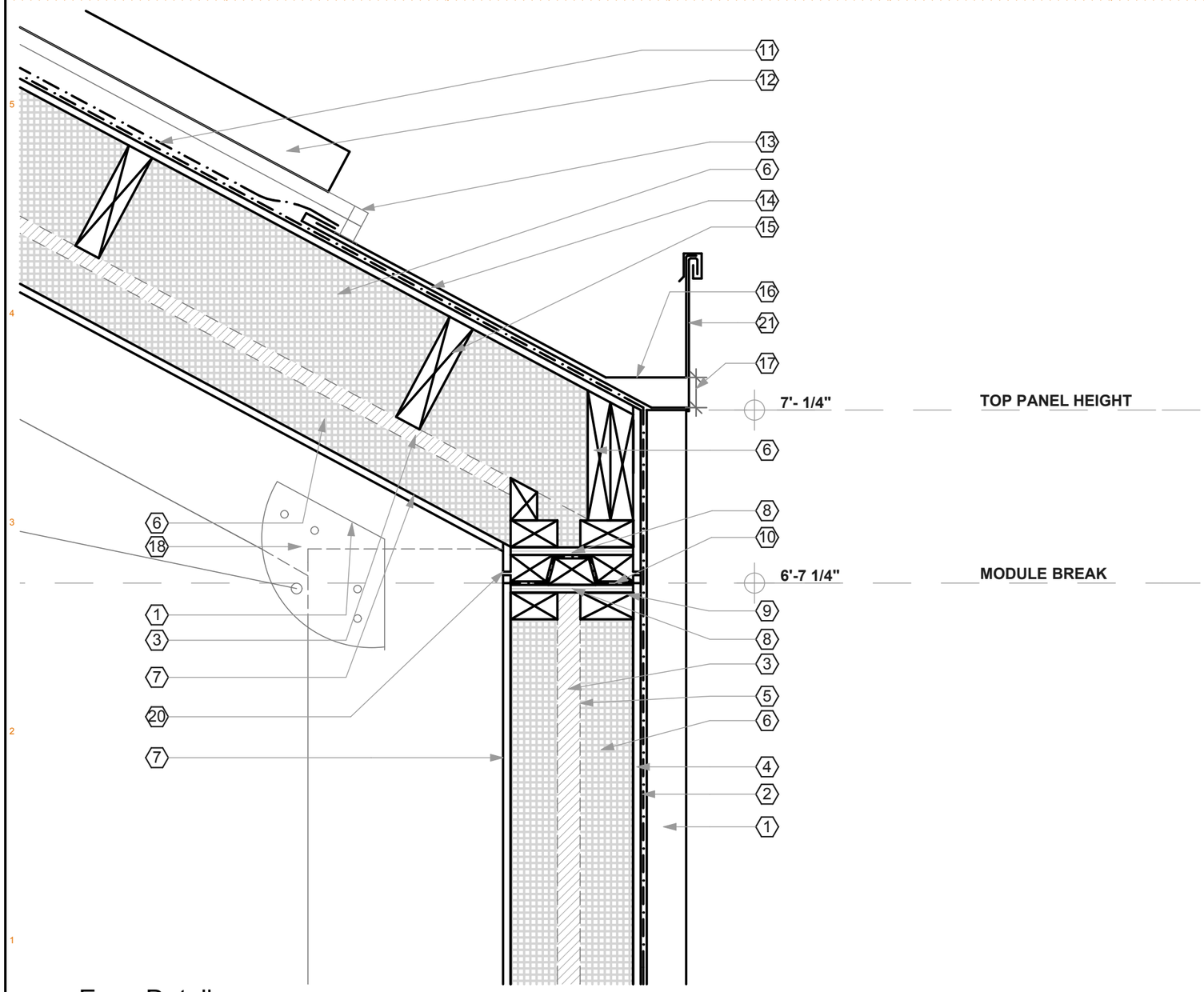
A-504



A1 Eave Detail
SCALE: 1 1/2"= 1'-0"

0 6" 12" 18"

GENERAL SHEET NOTES

1 USE VAPROSHIELD WRAPSHIELD MEMBRANE, POLYPROPYLENE. MEETS AATCC 127 FOR WATER RESISTANCE, ASTM U-84 CLASS A FLAME SPREAD INDEX, ATM E-1677 TYPE 1 AIR BARRIER, AND ASTM 2178 AIR PERMEANCE OF BUILDING MATERIALS.
2 USE POLYURETHANE, CLOSED CELL SPRAY FOAM INSULATION WITH HONEYWELL BLOWING AGENT (EPA APPROVED). FOAM IS CLASS 1 ASTM E-84 TESTED AT 4", WITH FLAME SPREAD INDEX OF 25. NFPA 286 TESTING DONE AT 8" THICK WALLS, AND 12" THICK CEILINGS (SEE TEST REPORT 3116019-002).
3 USE POLYISOCYANATE INSULATION WITH FOIL FACING ON BOTH SIDES. TAPE ALL SEAMS AND ENSURE EXTERIOR FOIL FACING ACTS AS A CONTINUOUS AIR BARRIER.

SHEET KEYNOTES

1 SOLAR THERMAL PANEL
2 WATER RESISTANT MEMBRANE
3 1" FOIL FACED POLYISO WITH FOIL TAPE ON WARM SIDE
4 1/2" PLYWOOD SHEATHING
5 2X4 STAGGERED STUD FRAMING
6 FILL WITH CLOSED CELL POLYURETHANE SPRAYFOAM INSULATION
7 1/2" GYP. BOARD
8 1/2" PLYWOOD
9 INTERLOCKING 2X4 PLATES W. NEOPRENE GASKET
10 SILL SEAL
11 60 MIL. EPDM OVER ROOF SHEATHING
12 SOLAR PANEL ON MTL. TRACK SYSTEM
13 RACK STANCHION W. EPDM BOOT, TYP.
14 LAPPED FLASHING
15 2X8 WOOD PURLINS @ 24" O.C.
16 GALVANIZED PITCHED GUTTER
17 VARIES WITH SLOPE
18 GUSSET PLATE, SEE STRUCTURAL ROOF DETAILS
19 11 7/8" PSL
20 USE ALUM. TRIM AT MODULE CUT, GORDON J EDGE OR LIKE
21 PREFINISHED GUTTER FASCIA

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eave details

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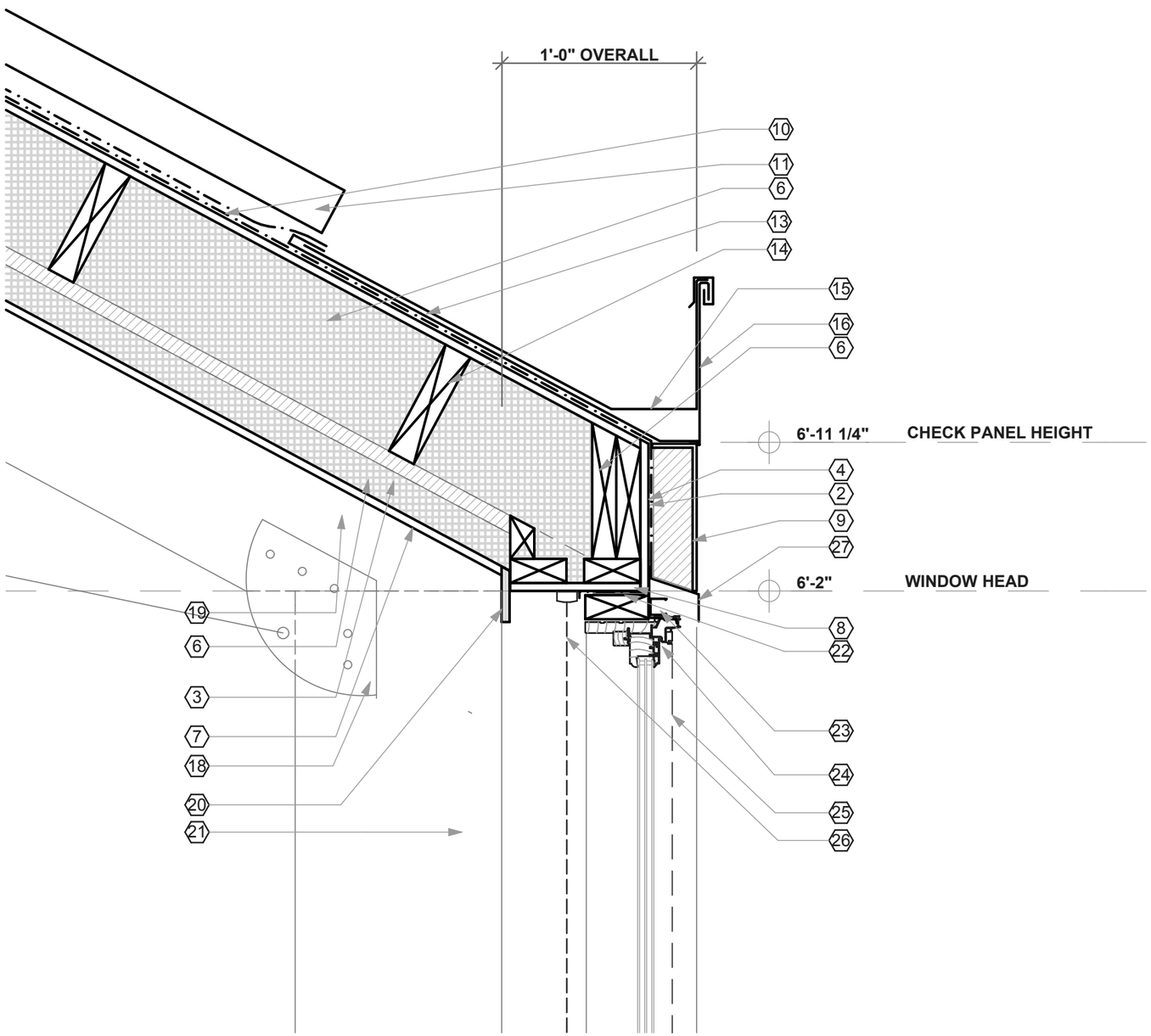

A1 Eave Detail
SCALE: 1 1/2"= 1'-0"

0 6" 12" 18"

GENERAL SHEET NOTES

1 USE VAPROSHIELD WRAPSHIELD MEMBRANE, POLYPROPYLENE. MEETS AATCC 127 FOR WATER RESISTANCE, ASTM U-84 CLASS A FLAME SPREAD INDEX, ATM E-1677 TYPE 1 AIR BARRIER, AND ASTM 2178 AIR PERMEANCE OF BUILDING MATERIALS.

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3 USE POLYISOCYANATE INSULATION WITH FOIL FACING ON BOTH SIDES. TAPE ALL SEAMS AND ENSURE EXTERIOR FOIL FACING ACTS AS A CONTINUOUS AIR BARRIER.

SHEET KEYNOTES

1 PREFINISHED MTL. FLASHING
2 WATER RESISTANT MEMBRANE
3 1" FOIL FACED POLYISO WITH FOIL TAPE ON WARM SIDE
4 1/2" PLYWOOD SHEATHING
5 2X4 STAGGERED STUD FRAMING
6 FILL WITH CLOSED CELL POLYURETHANE SPRAYFOAM INSULATION
7 1/2" GYP. BOARD
8 1/2" PLYWOOD HEAD JAMB
9 MTL. COVER OVER RIGID INSULATION BACKER
10 60 MIL. EPDM OVER ROOF SHEATHING
11 SOLAR PANEL ON MTL. TRACK SYSTEM
12 RACK STANCHION W. EPDM BOOT, TYP.
13 LAPPED FLASHING
14 2X8 WOOD PURLINS @ 24" O.C.
15 GALVANIZED PITCHED GUTTER
16 PREFINISHED GUTTER FASCIA
17 VARIES WITH SLOPE
18 GUSSET PLATE, SEE STRUCTURAL ROOF DETAILS
19 11 7/8" PSL
20 PLYWOOD TRIM
21 PSL COLUMN, SEE STRUCTURAL ROOF DETAILS
22 CAULK AT MODULE LINE
23 PLUG MOLD WIREWAY FOR BIPV WIRING
24 TRI PANE MARVIN MAG. ULT DBL HUNG WINDOW
25 THIN FILM PV LAMINATED, DOUBLE GLAZE IGU, BY SCHOTT
26 FABRIC SHADES BY HUNTER DOUGLAS, DUETTE ARCHITELLA, SEE INTERIORS
27 PREFINISHED MTL FLASHING

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eave details

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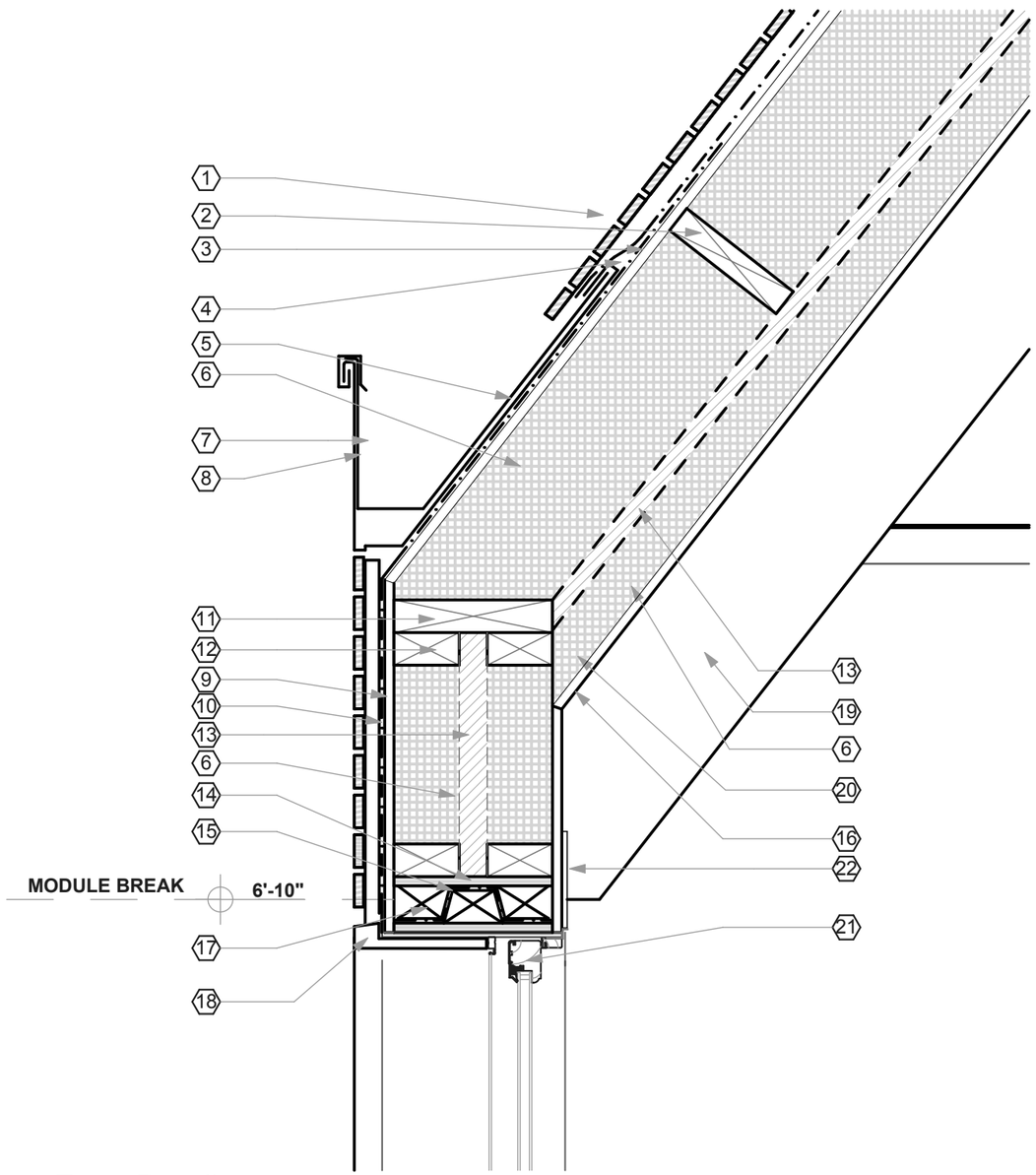

A1 Eave Detail
SCALE: 1 1/2"= 1'-0"

0 6" 12" 18"

GENERAL SHEET NOTES

1 USE VAPROSHIELD WRAPSHIELD MEMBRANE, POLYPROPYLENE. MEETS AATCC 127 FOR WATER RESISTANCE, ASTM U-84 CLASS A FLAME SPREAD INDEX, ATM E-1677 TYPE 1 AIR BARRIER, AND ASTM 2178 AIR PERMEANCE OF BUILDING MATERIALS.

2 USE POLYURETHANE, CLOSED CELL SPRAY FOAM INSULATION WITH HONEYWELL BLOWING AGENT (EPA APPROVED). FOAM IS CLASS 1 ASTM E-84 TESTED AT 4", WITH FLAME SPREAD INDEX OF 25. NFPA 286 TESTING DONE AT 8" THICK WALLS, AND 12" THICK CEILINGS (SEE TEST REPORT 3116019-002).

3 USE POLYISOCYANATE INSULATION WITH FOIL FACING ON BOTH SIDES. TAPE ALL SEAMS AND ENSURE EXTERIOR FOIL FACING ACTS AS A CONTINUOUS AIR BARRIER.

SHEET KEYNOTES

1 TRESPA RAINSCREEN SYSTEM ON WOOD CURBS, WRAP W. EPDM
2 2X8 WOOD PURLINS @ 24" O.C.
3 60 MIL. EPDM OVER ROOF SHEATHING
4 2" AIR GAP
5 LAPPED FLASHING
6 FILL WITH CLOSED CELL POLYURETHANE SPRAYFOAM INSULATION
7 GALVANIZED PITCHED GUTTER
8 PREFINISHED GUTTER FASCIA
9 1/2" PLYWOOD SHEATHING
10 WATER RESISTANT MEMBRANE
11 2X9 TOP PLATE
12 2X4 STAGGERED STUD FRAMING
13 1" FOIL FACED POLYISO WITH FOIL TAPE ON WARM SIDE
14 1/2" PLYWOOD
15 SILL SEAL
16 1/2" GYP. BOARD
17 INTERLOCKING, TAPERED 2X4S
18 FLASHING IN BREAK MTL
19 11 7/8" PSL
20 2X3 FURING
21 TRI PANE MARVIN MAG. ULT DBL HUNG WINDOW
22 STL JOINING PLATE

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eave details

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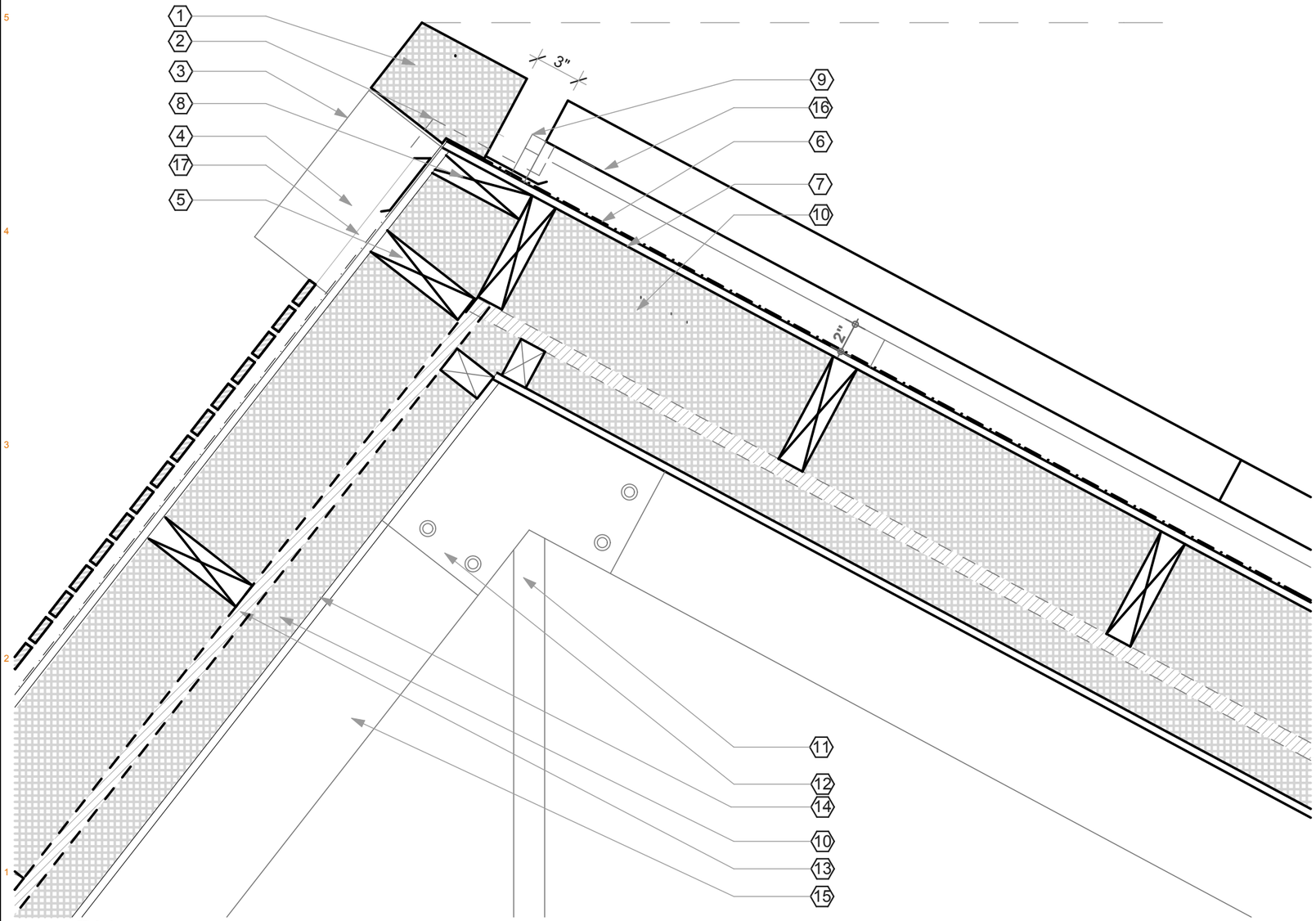

A1 Ridge
SCALE: 1 1/2"= 1'-0"

0 6" 12" 18"

GENERAL SHEET NOTES

1 USE VAPROSHIELD WRAPSHIELD MEMBRANE, POLYPROPYLENE. MEETS AATCC 127 FOR WATER RESISTANCE, ASTM U-84 CLASS A FLAME SPREAD INDEX, ATM E-1677 TYPE 1 AIR BARRIER, AND ASTM 2178 AIR PERMEANCE OF BUILDING MATERIALS.

2 USE POLYURETHANE, CLOSED CELL SPRAY FOAM INSULATION WITH HONEYWELL BLOWING AGENT (EPA APPROVED). FOAM IS CLASS 1 ASTM E-84 TESTED AT 4", WITH FLAME SPREAD INDEX OF 25. NFPA 286 TESTING DONE AT 8" THICK WALLS, AND 12" THICK CEILINGS (SEE TEST REPORT 3116019-002).

3 USE POLYISOCYANATE INSULATION WITH FOIL FACING ON BOTH SIDES. TAPE ALL SEAMS AND ENSURE EXTERIOR FOIL FACING ACTS AS A CONTINUOUS AIR BARRIER.

SHEET KEYNOTES

1 PREFINISHED SHEET METAL CAP
2 WIRES FROM PANELS TO COMBINER BOX
3 COMBINER BOX
4 TRESPA RAINSCREEN SYSTEM ON WOOD CURBS, WRAP W. EPDM
5 2X8 WOOD PURLINS @ 24" O.C.
6 60 MIL. EPDM OVER ROOF SHEATHING
7 1/2" OSB SHEATHING
8 2X8 BLOCKING
9 RACK STANCHLON W. EPDM BOOTS, TYPICAL
10 FILL WITH CLOSED CELL POLYURETHANE SPRAYFOAM INSULATION
11 2" STL. TUBE
12 STL. PLATE TRUSS CONNECTOR, PER STRUCTURAL ROOF DETAILS
13 1" FOIL FACED POLYISO WITH FOIL TAPE ON WARM SIDE
14 1/2" GYP. BOARD
15 11 7/8" PSL
16 SOLAR THERMAL PANEL ON MTL TRACK
17 FURRING STRIP

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ridge detail

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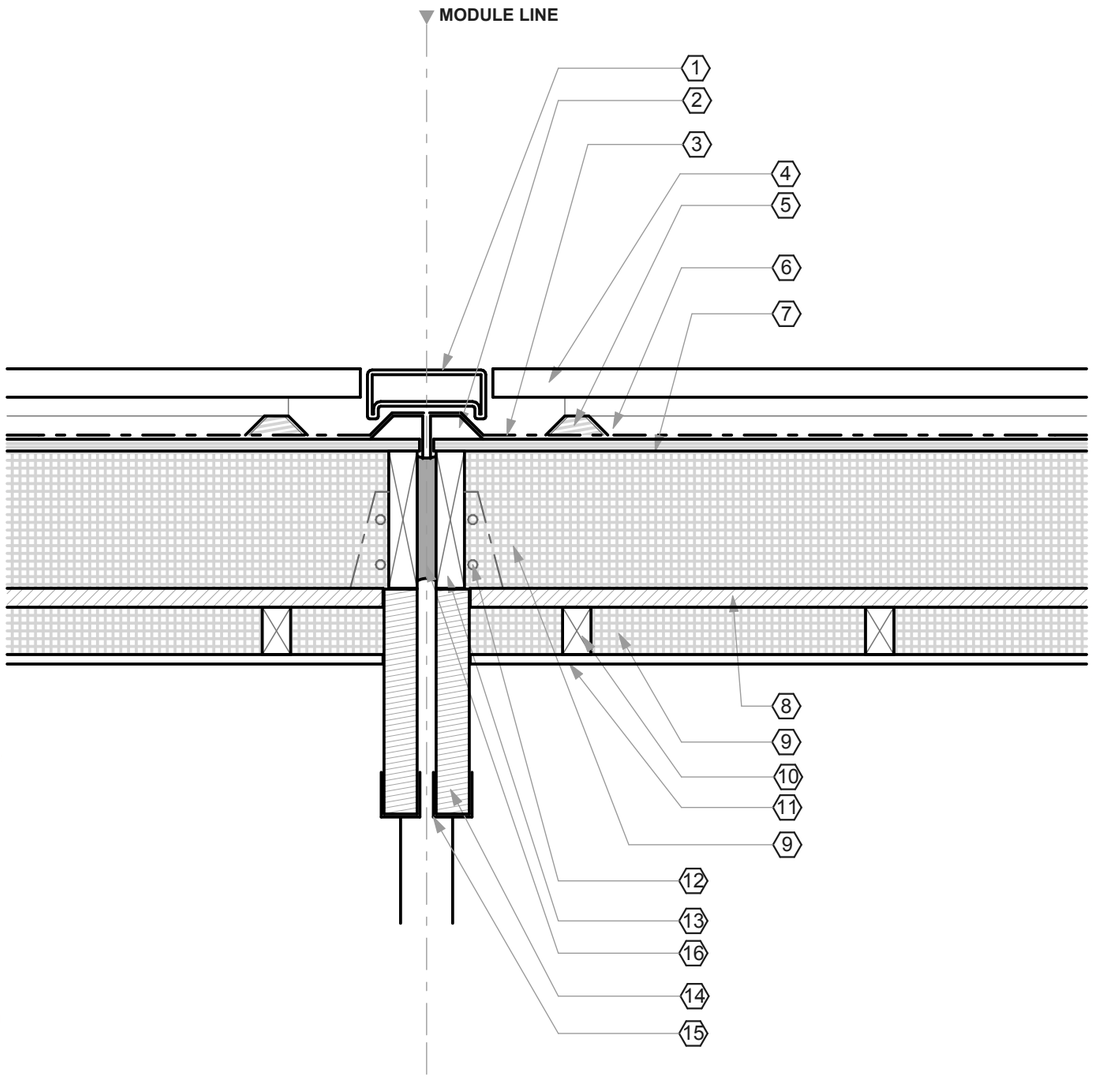

A1 Module Connection Detail

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

0 6" 12" 18"

GENERAL SHEET NOTES

1 USE VAPROSHIELD WRAPSHIELD MEMBRANE, POLYPROPYLENE. MEETS AATCC 127 FOR WATER RESISTANCE, ASTM U-84 CLASS A FLAME SPREAD INDEX, ATM E-1677 TYPE 1 AIR BARRIER, AND ASTM 2178 AIR PERMEANCE OF BUILDING MATERIALS.

2 USE POLYURETHANE, CLOSED CELL SPRAY FOAM INSULATION WITH HONEYWELL BLOWING AGENT (EPA APPROVED). FOAM IS CLASS 1 ASTM E-84 TESTED AT 4", WITH FLAME SPREAD INDEX OF 25. NFPA 286 TESTING DONE AT 8" THICK WALLS, AND 12" THICK CEILINGS (SEE TEST REPORT 3116019-002).

3 USE POLYISOCYANATE INSULATION WITH FOIL FACING ON BOTH SIDES. TAPE ALL SEAMS AND ENSURE EXTERIOR FOIL FACING ACTS AS A CONTINUOUS AIR BARRIER.

SHEET KEYNOTES

1 BREAK METAL FILLER AT MODULE BREAKS
2 CANT STRIPS ON EITHER SIDE OF BREAK
3 60 MIL. EPDM OVER ROOF SHEATHING
4 PV PANELS
5 WOOD STANDOFF WRAPPED W. EPDM
6 PV RACK SYSTEM, UNIRAC OR EQUIVALENT
7 5/8" OSB SHEATHING
8 1" FOIL FACED POLYISO WITH FOIL TAPE ON WARM SIDE
9 FILL WITH CLOSED CELL POLYURETHANE SPRAYFOAM INSULATION
10 2X3 FURRING STRIP @ 16" O.C.
11 1/2" GYP. BOARD
12 JOIST HANGER FOR 2X8 ROOF PURLINS
13 2X8
14 11 7/8" PSL
15 STL. PLATE TRUSS CONNECTOR, PER STRUCTURAL ROOF DETAILS
16 GASKET

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module break

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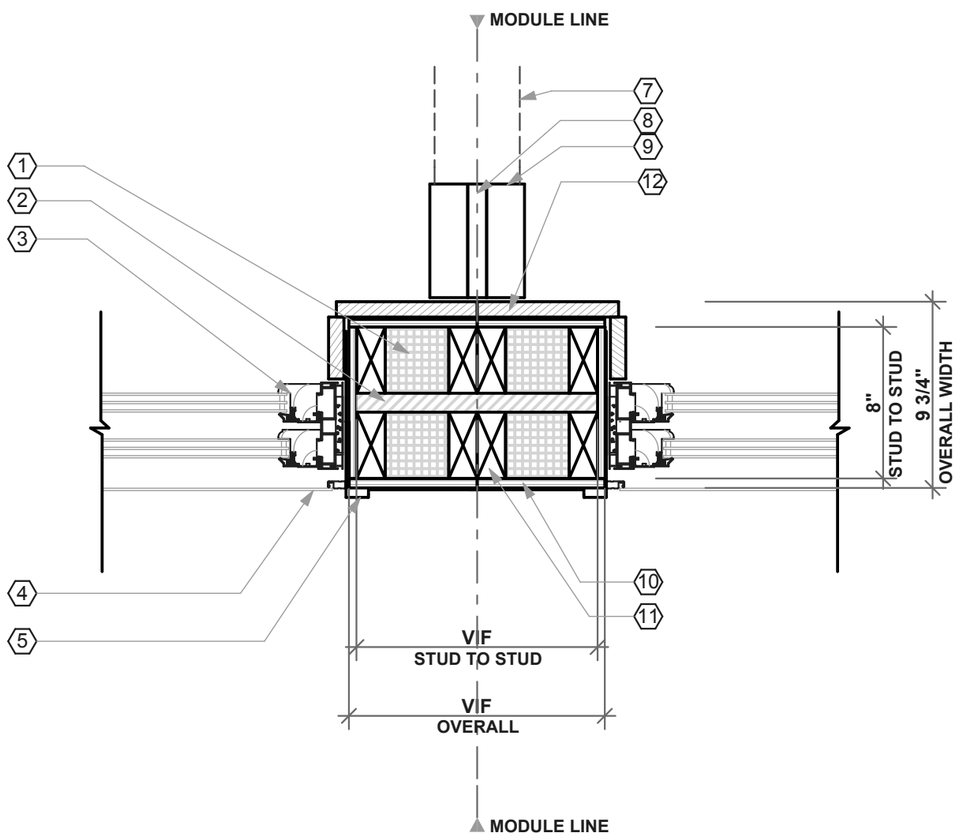

A1 South Window Details

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

0 6" 12" 18"

GENERAL SHEET NOTES

1 USE VAPROSHIELD WRAPSHIELD MEMBRANE, POLYPROPYLENE. MEETS AATCC 127 FOR WATER RESISTANCE, ASTM U-84 CLASS A FLAME SPREAD INDEX, ATM E-1677 TYPE 1 AIR BARRIER, AND ASTM 2178 AIR PERMEANCE OF BUILDING MATERIALS.

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3 USE POLYISOCYANATE INSULATION WITH FOIL FACING ON BOTH SIDES. TAPE ALL SEAMS AND ENSURE EXTERIOR FOIL FACING ACTS AS A CONTINUOUS AIR BARRIER.

SHEET KEYNOTES

1 FILL WITH CLOSED CELL POLYURETHANE SPRAYFOAM INSULATION
2 1" FOIL FACED POLYISO WITH FOIL TAPE ON WARM SIDE
3 TRI PANE MARVIN ULTIMATE MAGNUM DBL. HUNG WINDOW
4 PV LAMINATED GLASS, SCHOTT
5 WRAP WITH MENT MTL.
6 3'-0" KITCHEN COUNTER W. 2" BACKSPLASH
7 LINE OF TRUSS ABOVE
8 1" MTL. PLATE SPACER
9 PSL COLUMN
10 1/2" PLYWOOD
11 2X4 STUDS
12 WOOD TRIM

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module break

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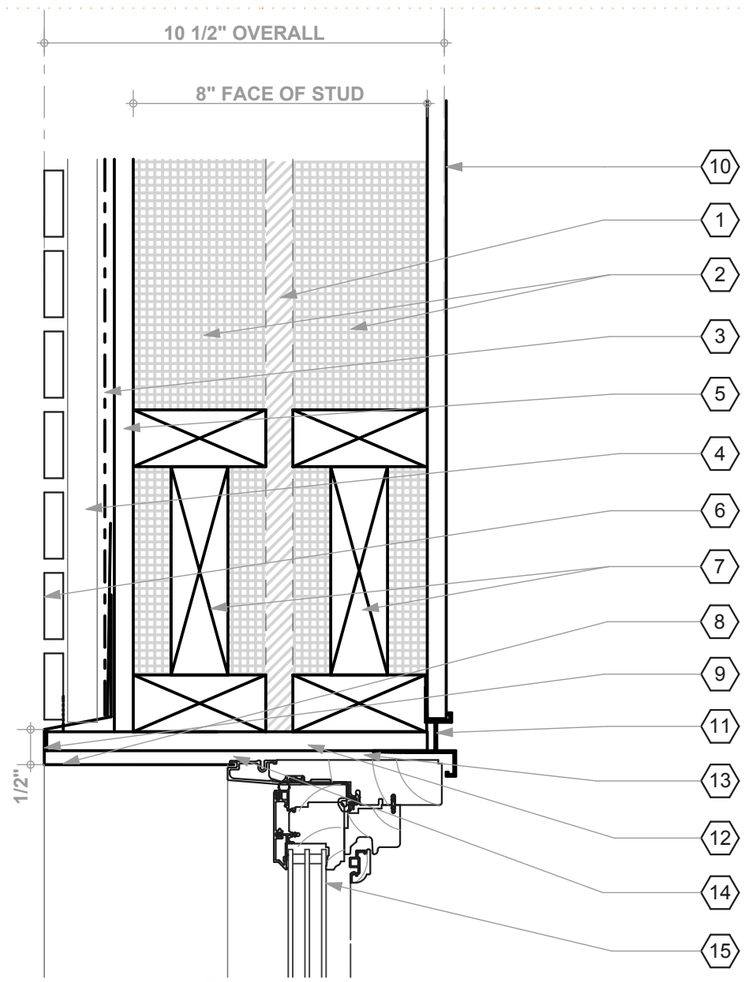
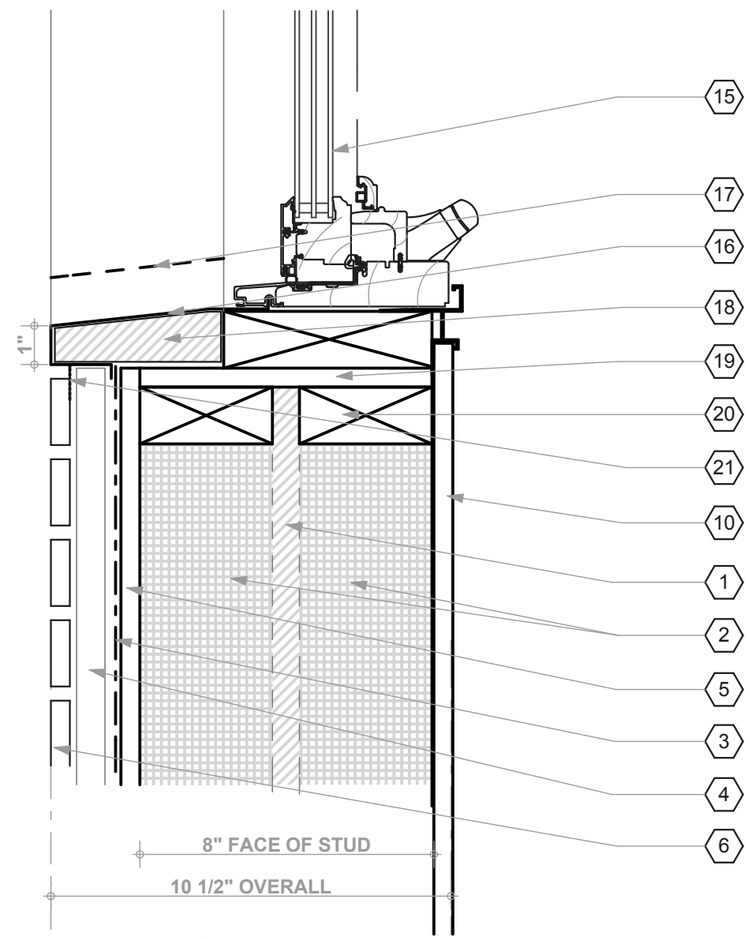


A1 Window Detail
SCALE: 3" = 1'-0"



D1 Window Detail
SCALE: 3" = 1'-0"

GENERAL SHEET NOTES

1. USE VAPROSHIELD WRAPSHIELD MEMBRANE, POLYPROPYLENE. MEETS AATCC 127 FOR WATER RESISTANCE, ASTM U-84 CLASS A FLAME SPREAD INDEX, ATM E-1677 TYPE 1 AIR BARRIER, AND ASTM 2178 AIR PERMEANCE OF BUILDING MATERIALS.
2. USE POLYURETHANE, CLOSED CELL SPRAY FOAM INSULATION WITH HONEYWELL BLOWING AGENT (EPA APPROVED). FOAM IS CLASS 1 ASTM E-84 TESTED AT 4", WITH FLAME SPREAD INDEX OF 25. NFPA 286 TESTING DONE AT 8" THICK WALLS, AND 12" THICK CEILINGS (SEE TEST REPORT 3116019-002).
3. USE POLYISOCYANATE INSULATION WITH FOIL FACING ON BOTH SIDES. TAPE ALL SEAMS AND ENSURE EXTERIOR FOIL FACING ACTS AS A CONTINUOUS AIR BARRIER.

SHEET KEYNOTES

1. 1" FOIL FACED POLYISO WITH FOIL TAPE ON WARM SIDE
2. FILL WITH CLOSED CELL POLYURETHANE SPRAYFOAM INSULATION
3. WATER RESISTANT MEMBRANE
4. 1" FURRING STRIPS
5. 1/2" PLYWOOD SHEATHING
6. 1/2" TRESPA SLAT RAINSCREEN
7. 2X6 HEADERS
8. VENTED CAP
9. PREFINISHED MTL. FLASHING
10. 1/2" GYP. BOARD
11. USE ALUM. GYP. CORNER TRIM, GORDON S SERIES OR EQUIVALENT
12. 1/2" PLYWOOD JAMB HEAD
13. 1/4" SHIM SPACE
14. CAULK
15. TRI PANE MARVIN WINDOW, LOW E WITH ARGON FILL
16. PREFINISHED MTL. SILL
17. MTL SILL WRAPS UP UNDER JAMBS
18. TAPERED, TREATED WOOD BLOCKING
19. 2X6 PLATE
20. 2X4 STAGGERED STUD FRAMING
21. CAP

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window detail

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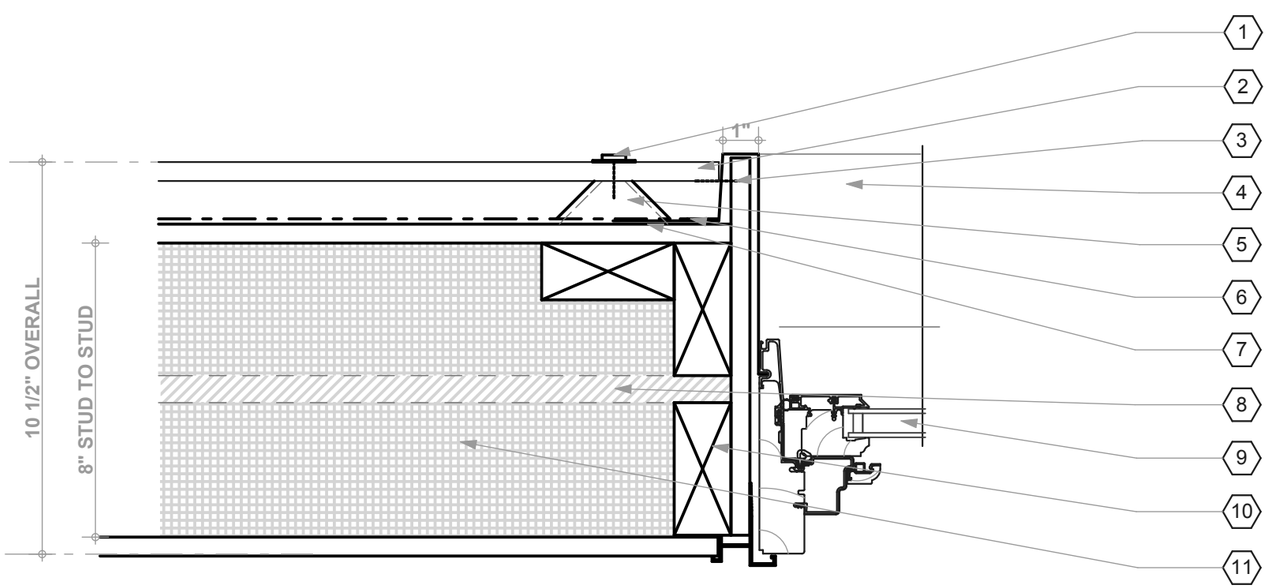

A1 Window Detail
SCALE: 3" = 1'-0"

0 3" 6" 9"

GENERAL SHEET NOTES

1 USE VAPROSHIELD WRAPSHIELD MEMBRANE, POLYPROPYLENE. MEETS AATCC 127 FOR WATER RESISTANCE, ASTM U-84 CLASS A FLAME SPREAD INDEX, ATM E-1677 TYPE 1 AIR BARRIER, AND ASTM 2178 AIR PERMEANCE OF BUILDING MATERIALS.
2 USE POLYURETHANE, CLOSED CELL SPRAY FOAM INSULATION WITH HONEYWELL BLOWING AGENT (EPA APPROVED). FOAM IS CLASS 1 ASTM E-84 TESTED AT 4", WITH FLAME SPREAD INDEX OF 25. NFPA 286 TESTING DONE AT 8" THICK WALLS, AND 12" THICK CEILINGS (SEE TEST REPORT 3116019-002).
3 USE POLYISOCYANATE INSULATION WITH FOIL FACING ON BOTH SIDES. TAPE ALL SEAMS AND ENSURE EXTERIOR FOIL FACING ACTS AS A CONTINUOUS AIR BARRIER.

SHEET KEYNOTES

1 FASTENER W. NEOPRENE WASHER
2 1/2" TRESPA SLAT RAINSCREEN
3 CAP
4 PREFINISHED MTL. FLASHING
5 1" FURRING STRIPS
6 WATER RESISTANT MEMBRANE
7 1/2" PLYWOOD SHEATHING
8 1" FOIL FACED POLYISO WITH FOIL TAPE ON WARM SIDE
9 TRI PANE MARVIN WINDOW, LOW E WITH ARGON FILL
10 2X4 STAGGERED STUD FRAMING
11 FILL WITH CLOSED CELL POLYURETHANE SPRAYFOAM INSULATION

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window detail

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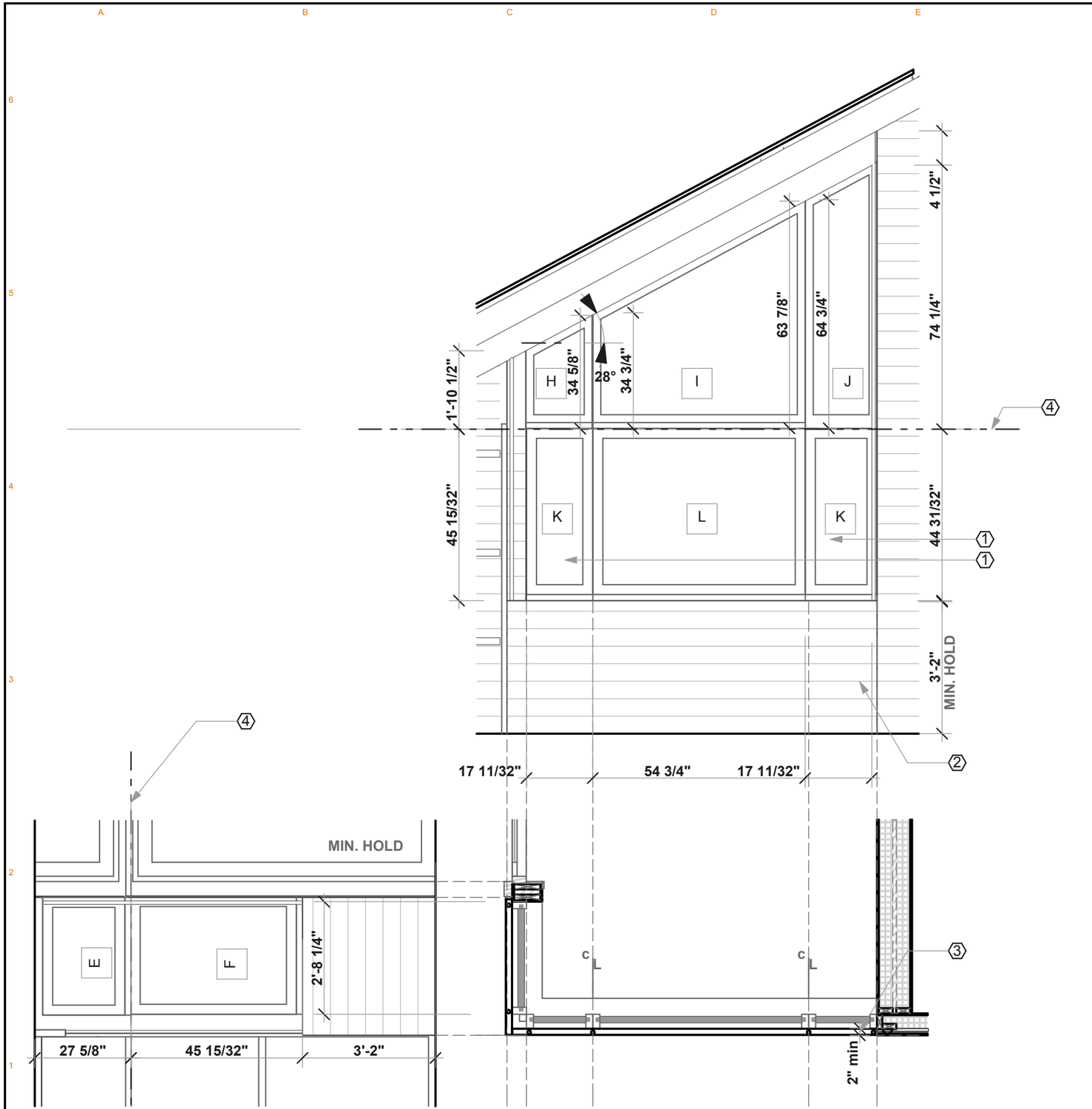

A1 East Curtain Wall

SCALE: 3/8" = 1'-0"

0 2' 4' 6'

SHEET KEYNOTES

1 40.25" X 12.625" X 27.9 MM SAGE IGU
2 TRESPA SLAT RAINSCREEN SYSTEM BELOW WINDOWS
3 SET WINDOWS BACK 2" FROM EDGE FOR LOUVERS
4 7'-3" MODULE CUT

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curtain wall

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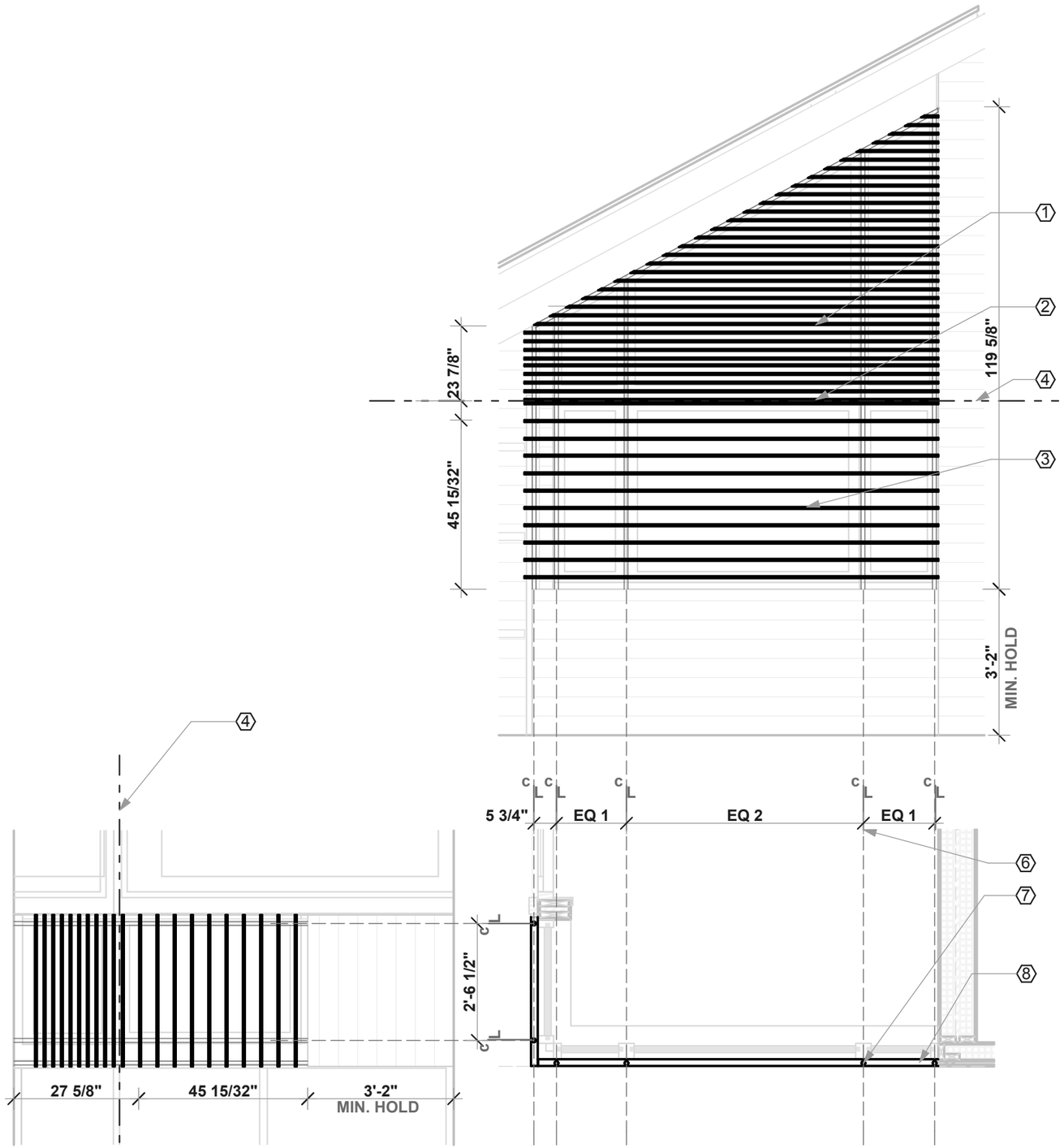

A1 East Curtain Wall
SCALE: 3/8" = 1'-0"

0 2' 4' 6'

SHEET KEYNOTES

1 1/2" H, 1 3/4" D SLATS BY TRESPA @ 2 1/4" O.C.
2 DOUBLE SLAT AT MODULE BREAK
3 1/2" H, 1 3/4" D SLATS BY TRESPA @ 4 1/2" O.C.
4 7'-3" MODULE CUT
5 SKIP
6 ALIGN RODS W. WINDOW FRAMES
7 STL ROD SPACERS OVER THREADED ROD SUPPORT
8 SET WINDOWS BACK 2" FROM EDGE FOR LOUVERS

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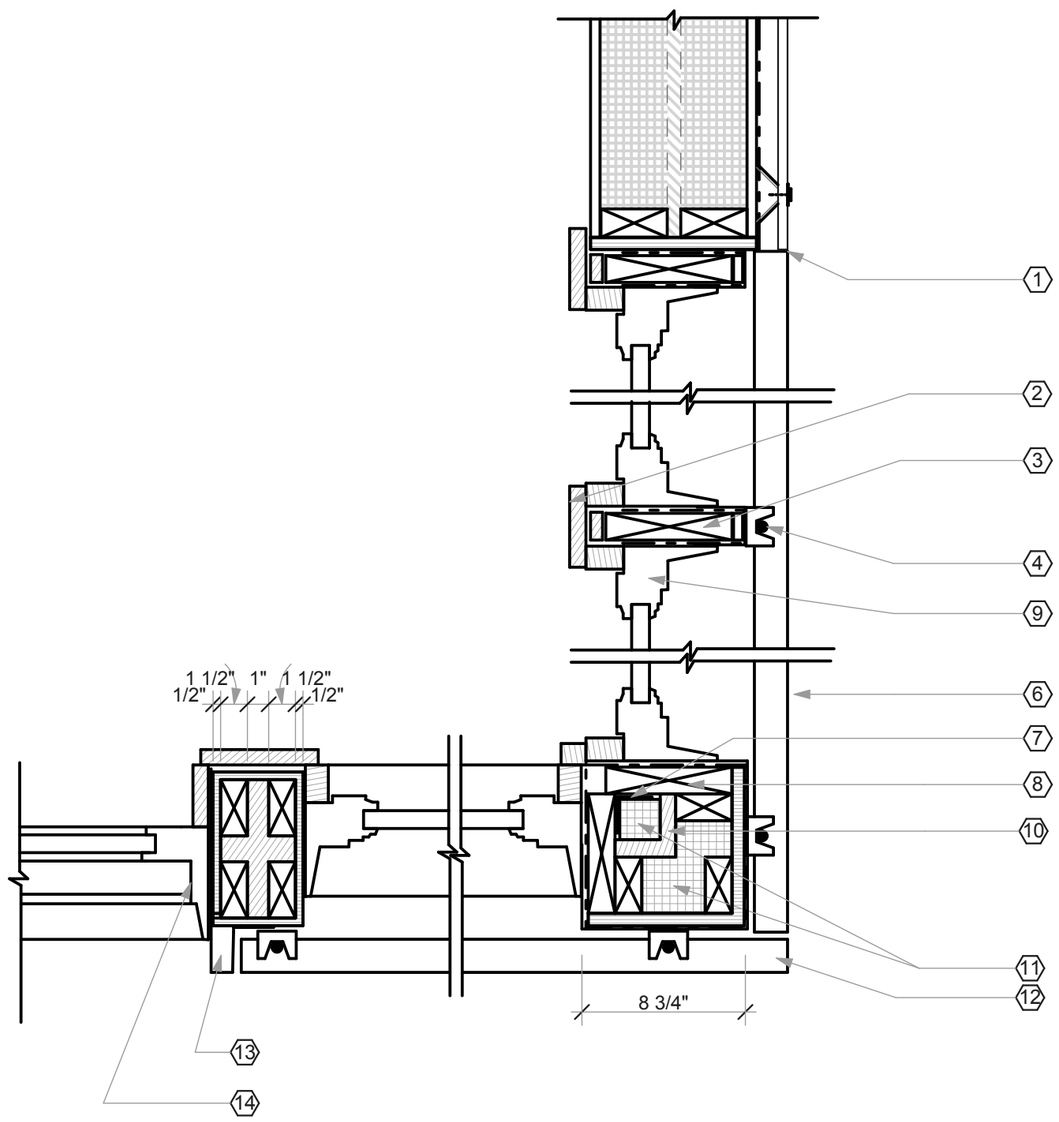

A1 East Curtain Wall Plan Detail

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

0 6" 12" 18"

GENERAL SHEET NOTES

1 USE VAPROSHIELD WRAPSHIELD MEMBRANE, POLYPROPYLENE. MEETS AATCC 127 FOR WATER RESISTANCE, ASTM U-84 CLASS A FLAME SPREAD INDEX, ATM E-1677 TYPE 1 AIR BARRIER, AND ASTM 2178 AIR PERMEANCE OF BUILDING MATERIALS.

2 USE POLYURETHANE, CLOSED CELL SPRAY FOAM INSULATION WITH HONEYWELL BLOWING AGENT (EPA APPROVED). FOAM IS CLASS 1 ASTM E-84 TESTED AT 4", WITH FLAME SPREAD INDEX OF 25. NFPA 286 TESTING DONE AT 8" THICK WALLS, AND 12" THICK CEILINGS (SEE TEST REPORT 3116019-002).

3 USE POLYISOCYANATE INSULATION WITH FOIL FACING ON BOTH SIDES. TAPE ALL SEAMS AND ENSURE EXTERIOR FOIL FACING ACTS AS A CONTINUOUS AIR BARRIER.

SHEET KEYNOTES

1 LOUVERS TO MEET TRESPA RAINSCREEN SLATS
2 WOOD INTERIOR CASING
3 CONTINUOUS STUDS - RIM TO HORIZONTAL MODULE BREAK, TYP.
4 THREADED ROD FOR TRESPA LOUVER SLATS
5 SKIP
6 TRESPA LOUVER SLAT, PER A514
7 STL. ANGLE
8 CONTINUOUS STUD
9 TRI PANE MARVIN WINDOW, LOW E WITH ARGON FILL
10 1" FOIL FACED POLYISO WITH FOIL TAPE ON WARM SIDE
11 FILL WITH CLOSED CELL POLYURETHANE SPRAYFOAM INSULATION
12 ALTERNATE OVERLAP OF TRESPA LOUVER SLAT ENDS AT CORNER
13 MTL JAMB EXTENSION, SEE A511
14 MARVIN SLIDING GLASS DOOR W ADA THRESHOLD

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curtain wall detail

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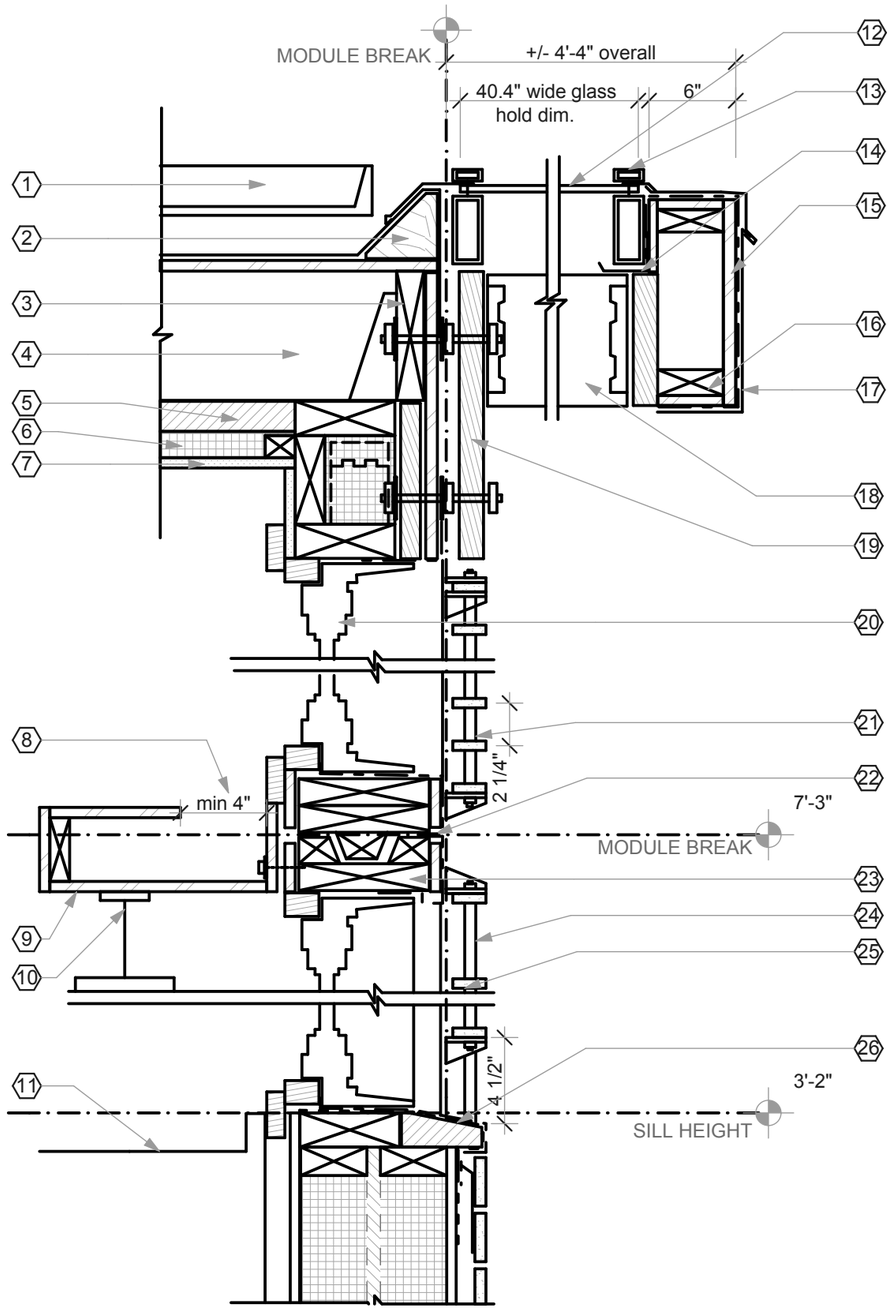
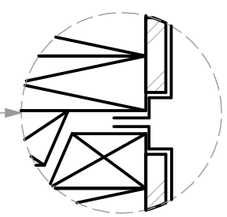


A1 East Curtain Wall Section

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

0 6" 12" 18"



FLASHING DETAIL AT MODULE BREAK

GENERAL SHEET NOTES

1 USE VAPROSHIELD WRAPSHIELD MEMBRANE, POLYPROPYLENE. MEETS AATCC 127 FOR WATER RESISTANCE, ASTM U-84 CLASS A FLAME SPREAD INDEX, ATM E-1677 TYPE 1 AIR BARRIER, AND ASTM 2178 AIR PERMEANCE OF BUILDING MATERIALS.

2 USE POLYURETHANE, CLOSED CELL SPRAY FOAM INSULATION WITH HONEYWELL BLOWING AGENT (EPA APPROVED). FOAM IS CLASS 1 ASTM E-84 TESTED AT 4", WITH FLAME SPREAD INDEX OF 25. NFPA 286 TESTING DONE AT 8" THICK WALLS, AND 12" THICK CEILINGS (SEE TEST REPORT 3116019-002).

3 USE POLYISOCYANATE INSULATION WITH FOIL FACING ON BOTH SIDES. TAPE ALL SEAMS AND ENSURE EXTERIOR FOIL FACING ACTS AS A CONTINUOUS AIR BARRIER.

SHEET KEYNOTES

1 PV PANEL MOUNTED TO ROOF
2 CANT STRIP
3 RIM JOIST
4 2X8 PURLIN
5 1" FOIL FACED POLYISO WITH FOIL TAPE ON WARM SIDE
6 FILL WITH CLOSED CELL POLYURETHANE SPRAYFOAM INSULATION
7 1.2" GYP. BOARD
8 MODULE CONNECTION ACCESS
9 SHELF STRUCTURE
10 LIGHT FIXTURE
11 3'-0" KITCHEN COUNTER W. 2" BACKSPLASH
12 PV LAMINATEG GLASS BY SCHOTT
13 ALUMN. FRAME
14 DRIP PAN
15 6X6 MTL. FRAME
16 2X FRAMING
17 BRAKE MTL. CLADDING
18 LVL CROSS BUCK
19 SPLICED LVL RAFTER W. OSB
20 TRI-PANE MARVIN WINDOW
21 1 3/4" DEEP TRESPA LOUVER SLAT @ 2 1/4" O.C.
22 SEAL AT MODULE BREAK, FLASH AROUND BREAK, SEE ENLARGED DETAIL
23 CONTINUE HORIZONTAL PLATES FROM UPPER AND LOWER MODULES
24 THREATED ROD W. SPACERS
25 1 3/4" DEEP TRESPA LOUVER SLAT @ 4 1/2" O.C.
26 TYPICAL SILL CONDITION, SEE A510

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curtain wall detail

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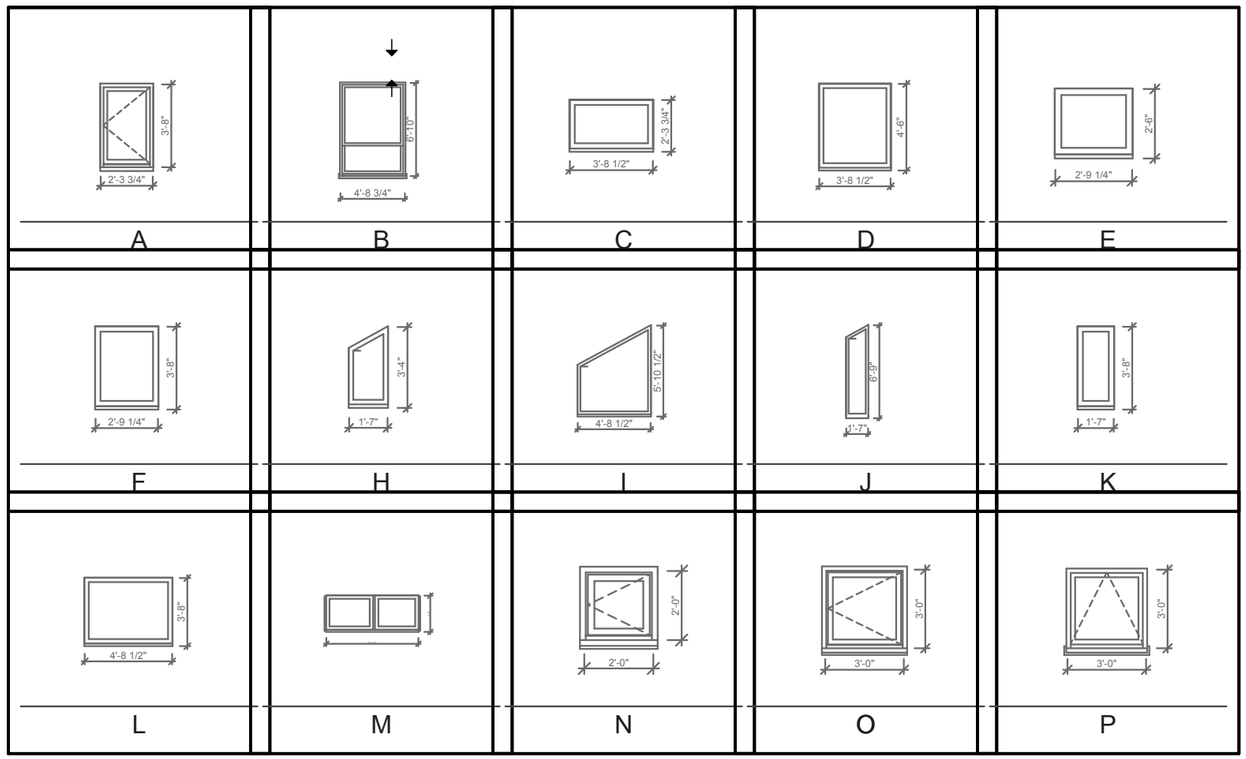
WINDOW SCHEDULE

ID	NO	LOCATION	DIMENSIONS WIDTH	DIMENSIONS HEIGHT	DIMENSIONS THK.	WINDOW TYPE	WINDOW MATERIAL	WINDOW FINISH	WINDOW GLAZING	WINDOW HARDWARE	DETAILS JAMB	DETAILS HEAD	DETAILS SILL	3/27/2009 REMARKS
A	1	Office	27.64"	43.95"	0'-4 9/16"	Casement 1	Douglas fir	Ebony Alumin. Case, Flat	Sage Elctrchrm	Satin Nickel Folding Handle	A-511	A-510	A-510	Verify RO dim for 39.25" x 22.937"x27.9mm IGU
B	3	Living / Dining	4'-9"	6'-10"	0'-4 9/16"	Double Hung 1	Douglas fir	Ebony Alumin. Case, Flat	1" Tripane, Arg., w custom storm BIPV	NA	A-511	A-510	A-510	Verify RO dim for 1027mm x1204mmx 17mm IGU fit into storm window frame
C	4	Exterior Porch	45.13"	29.39"	0'-2 3/16"	Fixed 1	Alumin.	Anod. Black	Schott lam. PV	NA	A-511	A-510	A-510	Verify RO dim for 1027mm x627mmx 17mm IGU
D	13	Exterior Porch	45.13"	52.10"	0'-2 3/16"	Fixed 1	Alumin.	Anod. Black	Schott lam. PV	NA	A-511	A-510	A-510	Verify RO dim for 1027mm x1204mmx 17mm IGU
E	1	Kitchen	2'-9"	2'-6"	0'-4 9/16"	Fixed 2	Douglas fir	Ebony Alumin. Case, Flat	1" Tripane, Arg.	NA	A-513	A-512	A-512	Adj. RO height to line up with Window H
F	1	Kitchen	2'-9"	3'-8"	0'-4 9/16"	Fixed 2	Douglas fir	Ebony Alumin. Case, Flat	1" Tripane, Arg.	NA	A-513	A-512	A-512	Adj. RO height to line up with Window K
H	1	East Wall	1'-7"	3'-4"	0'-4 9/16"	Fixed 2	Douglas fir	Ebony Alumin. Case, Flat	1" Tripane, Arg.	NA	A-513	A-512	A-512	Adj. RO width to line up with Window K, adj. RO height to fit
I	1	East Wall	4'-8"	5'-10"	0'-4 9/16"	Fixed 2	Douglas fir	Ebony Alumin. Case, Flat	1" Tripane, Arg.	NA	A-513	A-512	A-512	Adj. RO width to line up with Window L, adj. RO height to fit
J	1	East Wall	1'-7"	6'-9"	0'-4 9/16"	Fixed 2	Douglas fir	Ebony Alumin. Case, Flat	1" Tripane, Arg.	NA	A-513	A-512	A-512	Adj. RO width to line up with Window K, adj. RO height to fit
K	2	East Wall	1'-7"	3'-8"	0'-4 9/16"	Fixed 3	Douglas fir	Ebony Alumin. Case, Flat	Sage Elctrchrm	NA	A-513	A-512	A-512	Verify RO dim for 40.25" x 12.625"x27.9mm IGU
L	1	East Wall	4'-8"	3'-8"	0'-4 9/16"	Fixed 3	Douglas fir	Ebony Alumin. Case, Flat	Sage Elctrchrm	NA	A-513	A-512	A-512	Adj. dim to fit R.O., order custom Sage IGU
M	1	Kitchen	6'-4"	2'-6"	0'-4 9/16"	Fixed 2	Douglas fir	Ebony Alumin. Case, Flat	1" Tripane, Arg.	NA	A-513	A-512	A-512	
N	1	Bathroom	2'-0"	2'-0"	0'-4 9/16"	Casement 2	Douglas fir	Ebony Alumin. Case, Flat	1" Tripane, Arg. Frosted	Satin Nickel Folding Handle	A-511	A-510	A-510	
O	1	Bed Alcove	3'-0"	3'-0"	0'-4 9/16"	Casement 3	Douglas fir	Ebony Alumin. Case, Flat	1" Tripane, Arg	Satin Nickel Folding Handle	A-511	A-510	A-510	Sill height to be 44" from FF, area = 9 SF to meet egress requirements
P	3	N Clerestory	3'-0"	3'-0"	0'-4 9/16"	Awning 1	Douglas fir	Ebony Alumin. Case, Flat	1" Tripane, Arg.	Motorized	A-511	A-510	A-510	



WINDOW TYPES

Casement 1: Marvin Ultimate Series, Clad Casement

Casement 2: Marvin Ultrex Fiberglass Series, Clad Casement, w Frosted Glass, interior tile finish

Casement 3: Marvin Ultimate Series, Clad Casement, Egress window mounted at 40" to sill

Awning 1: Marvin Ultimate Series, Clad Awning, Motorized operation

Fixed 1: Custom alumin. curtain wall w. Schott laminated PV glaze, by W.L. Hall

Fixed 2: Marvin Ultimate Series, Clad Fixed

Fixed 3: Marvin Utimate Series, No Clad

Double Hung 1: Marvin Ultimate Series, Clad Double Hung, w Schott laminated glass (safety glass) PV mounted as screen combination window

NOTES

1 All window images show views from outside.

2 Get color chips to verify Ebony finish w. Interiors, and Architecture teams.

3 Verify window dimensions of w. Schott and Sage IGU.

4 All screens to be black alumin. wire.

* Elevations viewed from exterior.

A1 Window Legend

SCALE: 1/4" = 1'-0"

0 2' 4' 8'

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window schedules

A-601

GENERAL SHEET NOTES

1. ALL WINDOW IMAGES SHOW VIEWS FROM OUTSIDE.
2. GET COLOR CHIPS TO VERIFY EBONY FINISH W. INTERIORS, AND ARCHITECTURE TEAMS.
3. VERIFY WINDOW DIMENSIONS OF SAGE IGU.

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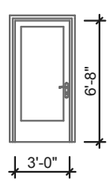
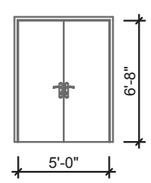
DOOR SCHEDULE

ID	NO	LOCATION	DIMENSIONS				DOOR					DETAILS			5/14/2009
			W.	HT.	TK.	SF.	MAT.	FIN.	GLAZ.	SW.	HW.	JAMB	HEAD	SILL	REM.
1	1	Front Entry	3'-0"	6'-8"	0'-2 1/4"	17.60	Wood		tri-pane, low E, argon fill, obscured	outswing, X R	satin nickel	see Marvin shop drawings	see Marvin shop drawings	see Marvin shop drawings	French Door w ADA threshold
2	1	Mechanical	5'-0"	6'-8"	0'-1 3/4"	20.00	Hollow Mtl	Match rainscreen	none	outswing, XX L	by Manufacturer	A-502			
3	1	Porch Entry	6'-0"	6'-8"	0'-1 3/4"	33.33	Wood		2 pane, low-E, argon fill	OX	satin nickel, inc. ADA threshold	see Marvin shop drawings	see Marvin shop drawings	see Marvin shop drawings	Marvin Sliding Glass door w ADA thrshld
5	1	Mechanical Shed	3'-0"	6'-8"	0'-1 3/4"	20.00	Hollow Mtl	Match rainscreen	none	outswing, X R	by Manufacturer	A-502			
6	1	Mechanical Shed	5'-0"	6'-8"	0'-1 3/4"	33.33	Hollow Mtl	Match rainscreen	none	outswing, XX L	by Manufacturer	A-502			

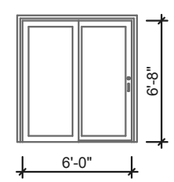


Marvin French Door w. tri-pane, obscured glass; ADA threshold

1

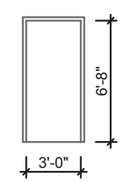


2



Marvin Sliding French doors w. safety glass lites, ADA threshold.

3



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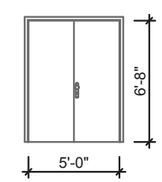

6

A1 Door Legend
SCALE: 1/4" = 1'-0"

0 2' 4' 8'

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door schedule

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Livability

Excerpts from the Market Viability: Livability Report in the Project Manual

Throughout the design of the ICON House, we have created a living environment that is both innovative and familiar by referencing the iconic home and our goals for the integration of technology. The livability of the ICON House is addressed in several ways. Small, but functionally distinct areas for entertainment, dining, cooking, and private activities are open to each other, creating the illusion that the house is bigger than it is, while providing a special place for each activity. Coordinated, natural material finishes in each area creates a harmonious effect.

The prominence of the sheltering ICON roof form, expressed in the interior, provides a cohesive identity to the whole. Traffic patterns are planned for both exhibit and living accessibility. Together, these features create a safe, functional, convenient, and enjoyable space for our target market home owners - upper- income professional couples who identify themselves as environmentalists, and technological early adopters, with a desire to live simply, but well.

Lighting Design

Excerpts from the Lighting Design Narrative, in the Project Manual

Beginning with daylighting, the narrow form of the house allows light penetration into most of the interior spaces. Along this east west axis a variety of daylighting approaches are taken from dramatic to tranquil, creating three zones that reflect the living activities within each zone. Starting in the east, the kitchen is a dynamic space in the house. This dynamism is reflected in the treatment of the large east windows. They allow the morning light to wash into the kitchen, filtered through exterior louvers, interior light shelf, and integrated electrochomic shading devices. These windows also serve to visually connect residents to the exterior east porch dining area. In the middle zone of the house large south windows allow generous amounts of light to fall on the dining room table. Again these large apertures capture direct daylight which changes throughout the day as the sun travels east to west. The details of the window mullions and shading devices are strategically designed to provide views of the south deck for residents seated at the table. In the west most zone, the living room and workstation functions are paired with calm north clerestory windows. This diffuse northern light reflects off the ceiling above, avoiding direct light that would cause glare on work surfaces or video screens. Furthermore windows on the west south walls still maintain views out for residents who are seated on the couch, or working at the desk. The operable low south windows, the sloped ceiling, and the north clerestory windows combine to create passive stacked ventilation across this primary living space.

While the daylighting strategies focus on controlling the way the exterior light sources pass through the exterior shell of the house, the electrical lighting strategies reverse this relationship. The soffit structure of the interior is the main horizontal element, containing integrated lighting, HVAC, and storage. This core element of the house serves as the primary electric light source with several LED fixtures that up light the ceiling reflecting diffuse light back down to the living spaces below. Not only does the soffit lighting highlight the iconic structure of the house above, but also showcases the design details of the spaces below. Passageways through the shelving core are lit with LED recessed down-lighting.

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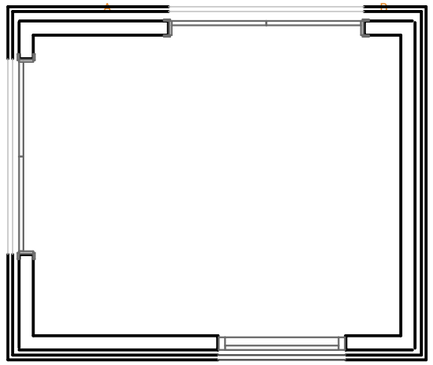
notes

I-001

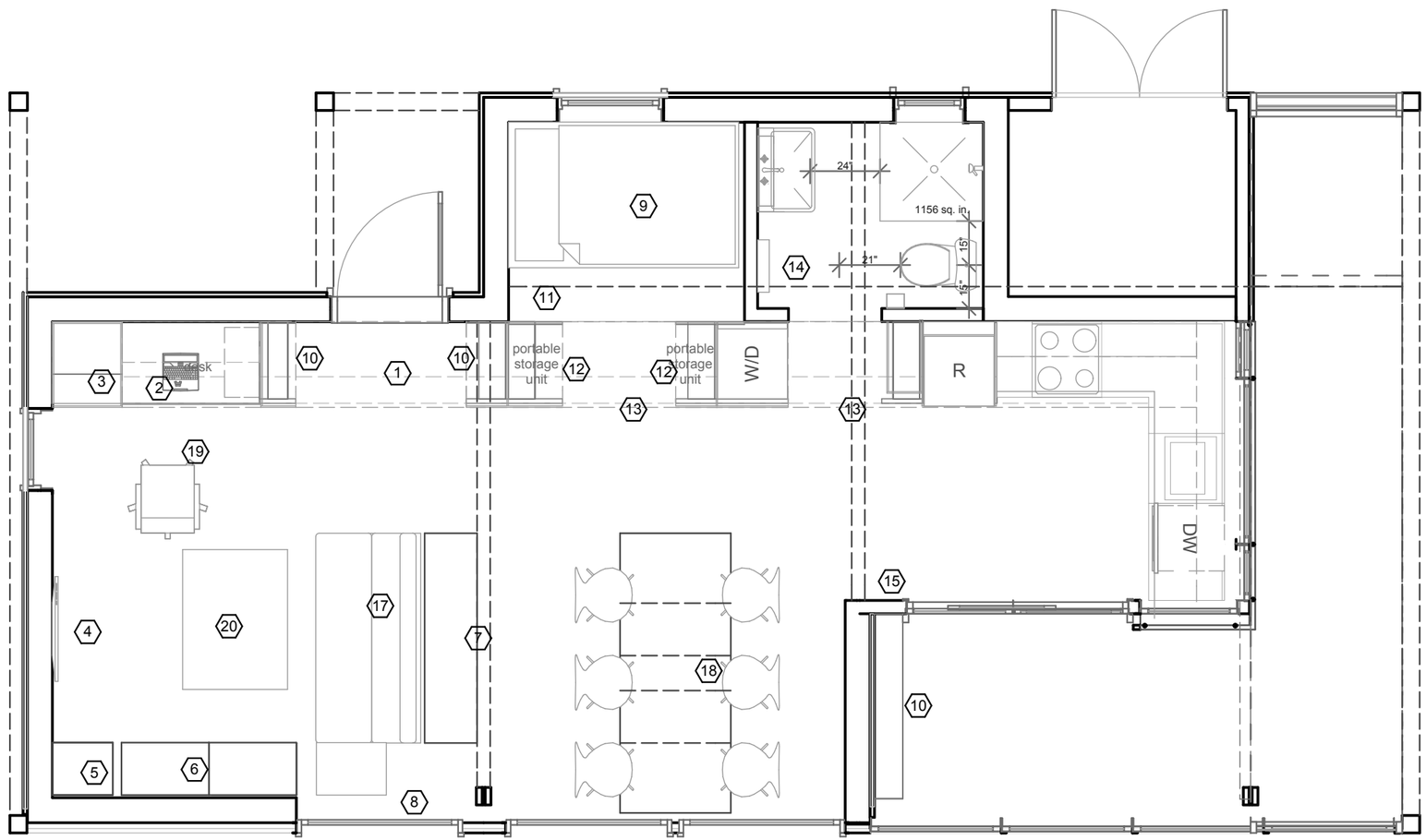


SHEET KEYNOTES

1 SHELVING ON EITHER SIDE OF DOOR
2 WORKSTATION
3 ENTERTAINMENT STORAGE
4 WALL MOUNTED TV
5 CORNER CABINET, 6'8" H6
6 STORAGE BENCH
7 CREDENZA
8 DUAL LAYER WINDOW SHADE
9 ALCOVE AREA

SHEET KEYNOTES

10 SHELVING
11 WALL HUNG TABLE
12 CLOTHING STORAGE
13 SLIDING DOOR PANELS
14 IN WALL MEDICINE CABINET
15 HOME AUTOMATION CONTROL PANEL
16 SKIP
17 CONVERSION QUEEN BED / SOFA
18 STUDENT DESIGNED DINING SET, SEE I-501
19 WORKSTATION CHAIR
20 COFFEE TABLE



PLAN NORTH

0 2' 4' 8'

A1 Furniture Plan
SCALE: 1/4" = 1'-0"

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furniture plan

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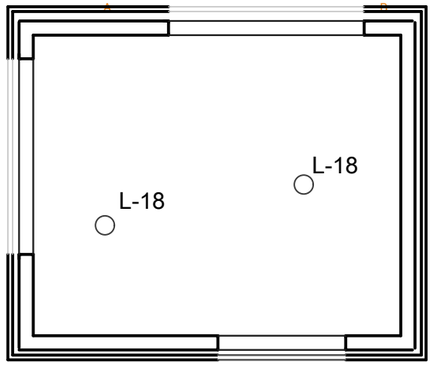
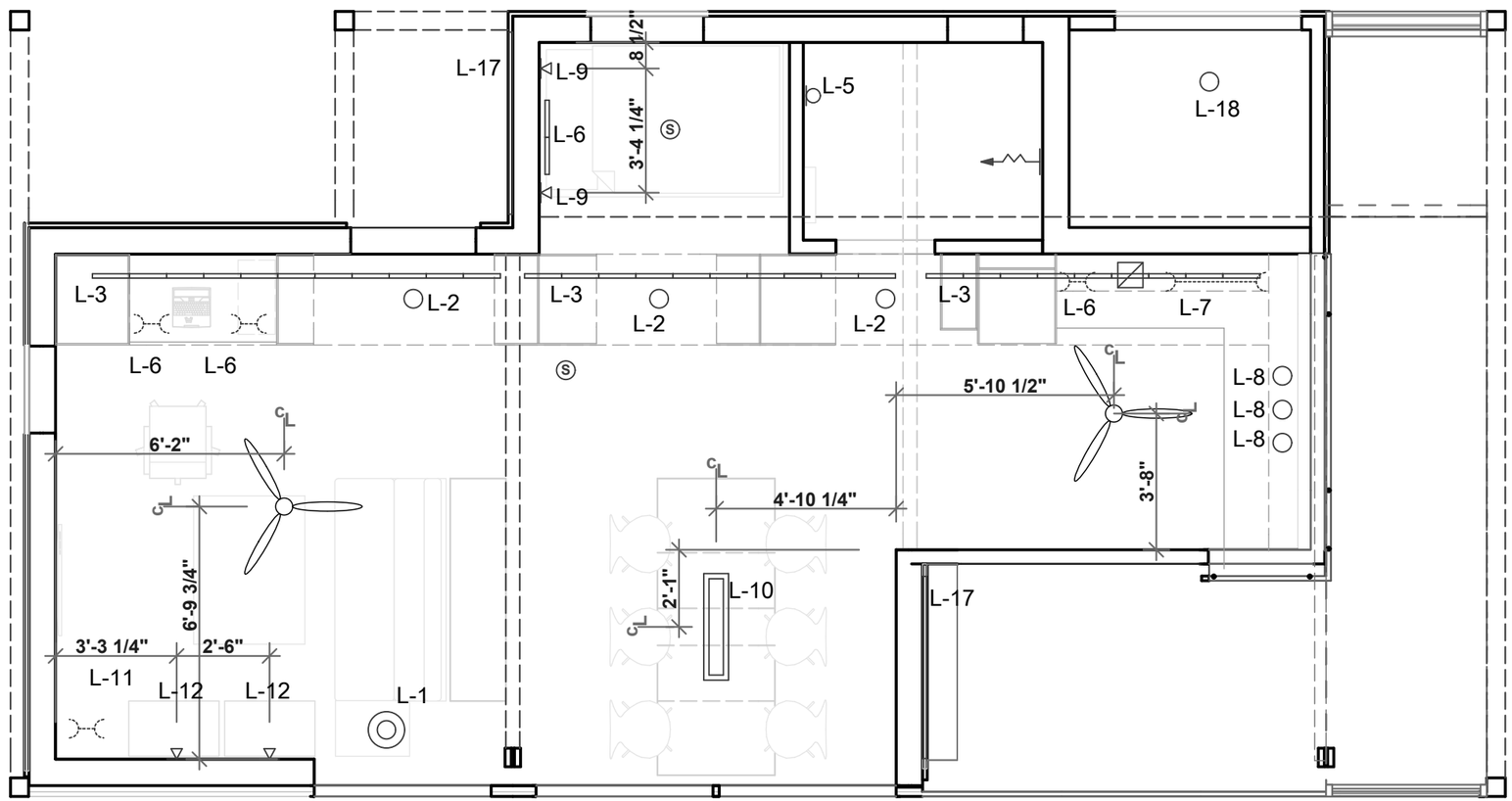


GENERAL SHEET NOTES

1 SEE I-601 FOR FULL LIGHTING FIXTURE SCHEDULE



PLAN NORTH

A1 Reflected Ceiling Plan
SCALE: 1/4" = 1'-0"

0 2' 4' 8'

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reflected ceiling plan

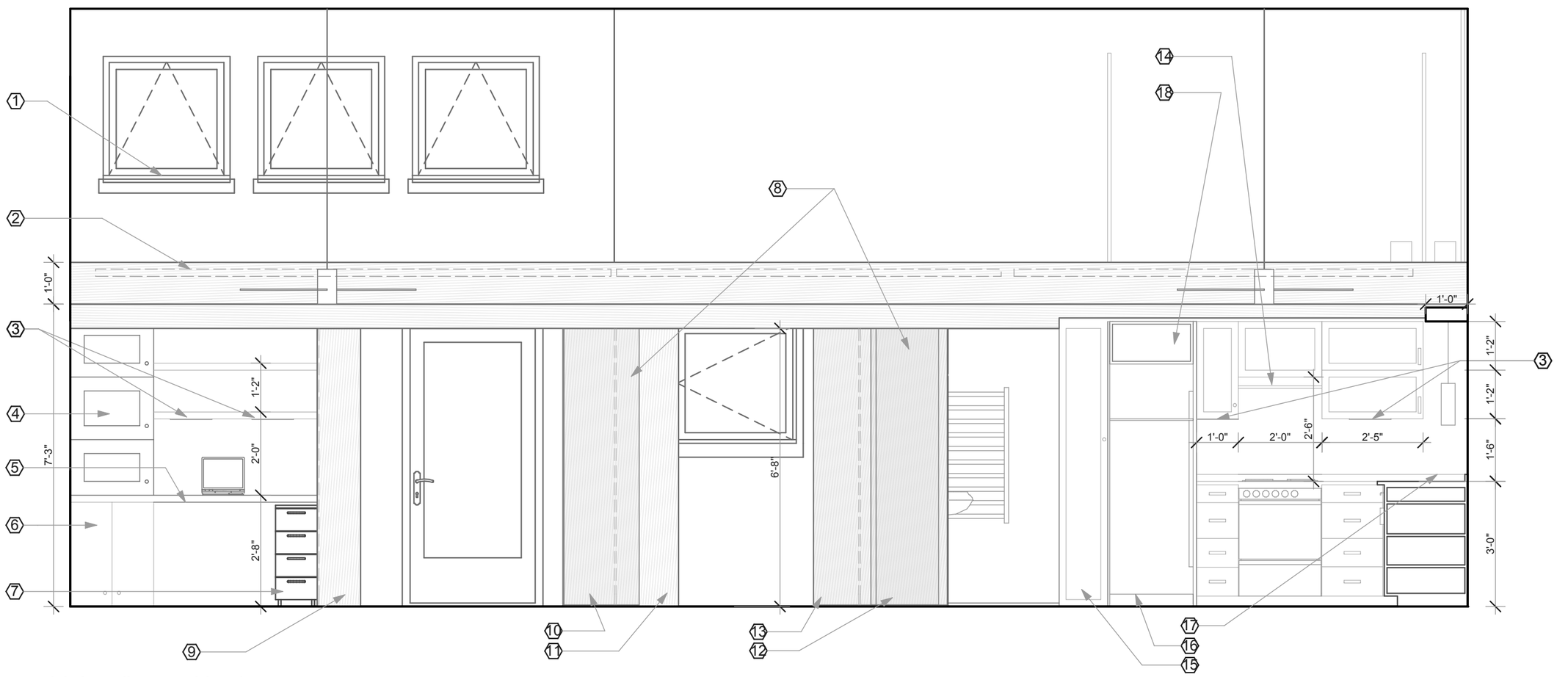
I-102

SHEET KEYNOTES

1 MOTORIZED AWNING CLERESTORY WINDOWS
2 LIGHT FIXTURES BEHIND SHELF FACE
3 LIGHT FIXTURE INSTALLED UNDER SHELF
4 12" DEEP CABINETS
5 24" DEEP WORK SURFACE
6 24" DEEP AV CABINET
7 ROLLING DESK STORAGE
8 (4) SLIDING 3FORM PANELS ON 2 TRACKS
9 12"X25" SHELVES FACING ENTRY
10 14" X 25" SHLEVES FACING ENTRY

SHEET KEYNOTES (CON'T)

11 24" X 25" HANGING CLOTHING STORAGE
12 25" X 25" CLOTHES WASHER AND DRYER ALCOVE
13 12" X 25" CLOTHING SHELVES
14 VENT HOOD
15 12" X 25" SLIDE OUT PANTRY
16 22 3/4" X 25" FRIDGE ALCOVE
17 2" BACKSPLASH
18 OPEN ABOVE FRIDGE



A1 Living Space North
SCALE: 3/8" = 1'-0"

0 2' 4' 6'

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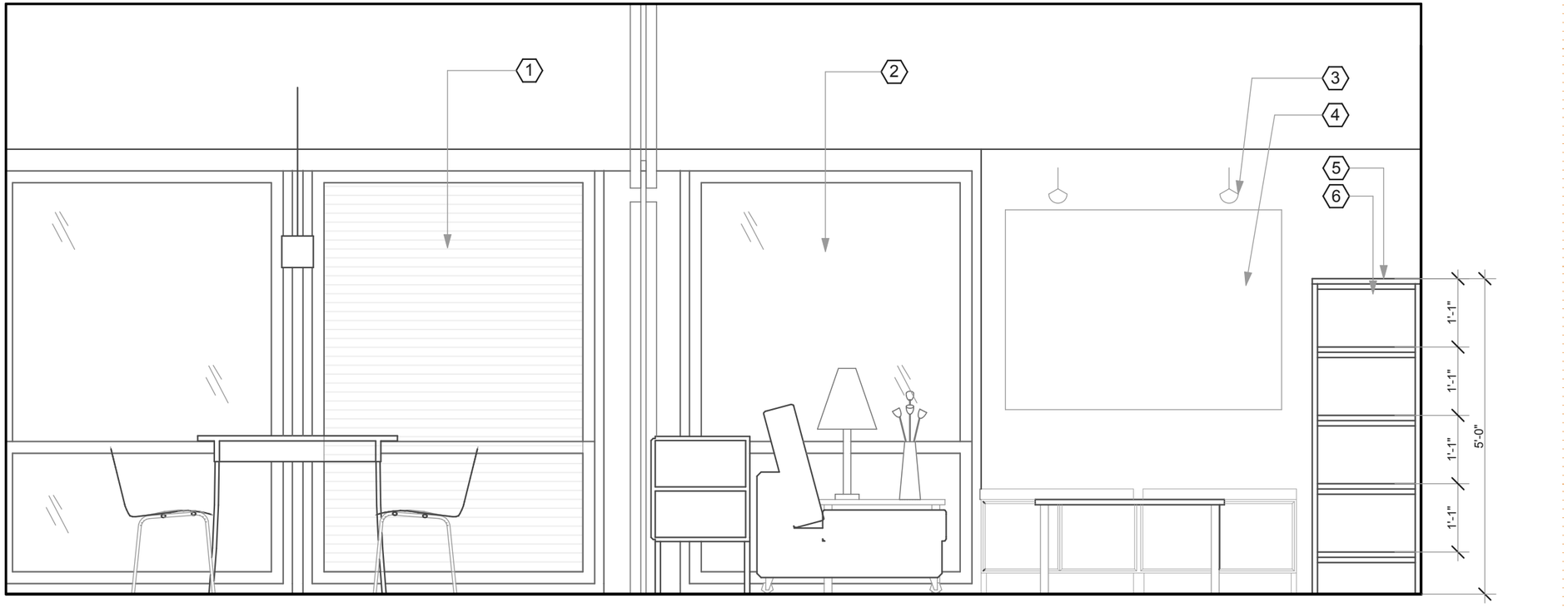
interior elevations

I-201

SHEET KEYNOTES

1. HUNTER DOUGLAS DUO SHADES W. HIGH INSULATION HONEYCOMB FABRIC, TYPICAL FOR ALL SOUTH WINDOWS
2. MARVING WINDOWS WITH SCHOTT PV LAMIATED GLASS BEYOND, TYPICAL FOR ALL SOUTH WINDOWS
3. ART LIGHT FIXTURE
4. ART INSTALLATION, PER CLIENT
5. 18" DEEP SHELF
6. LIGHT FIXTURE INSTALLED UNDER SHELF



A1 Living Space South

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

0 1' 2' 4'

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interior elevations

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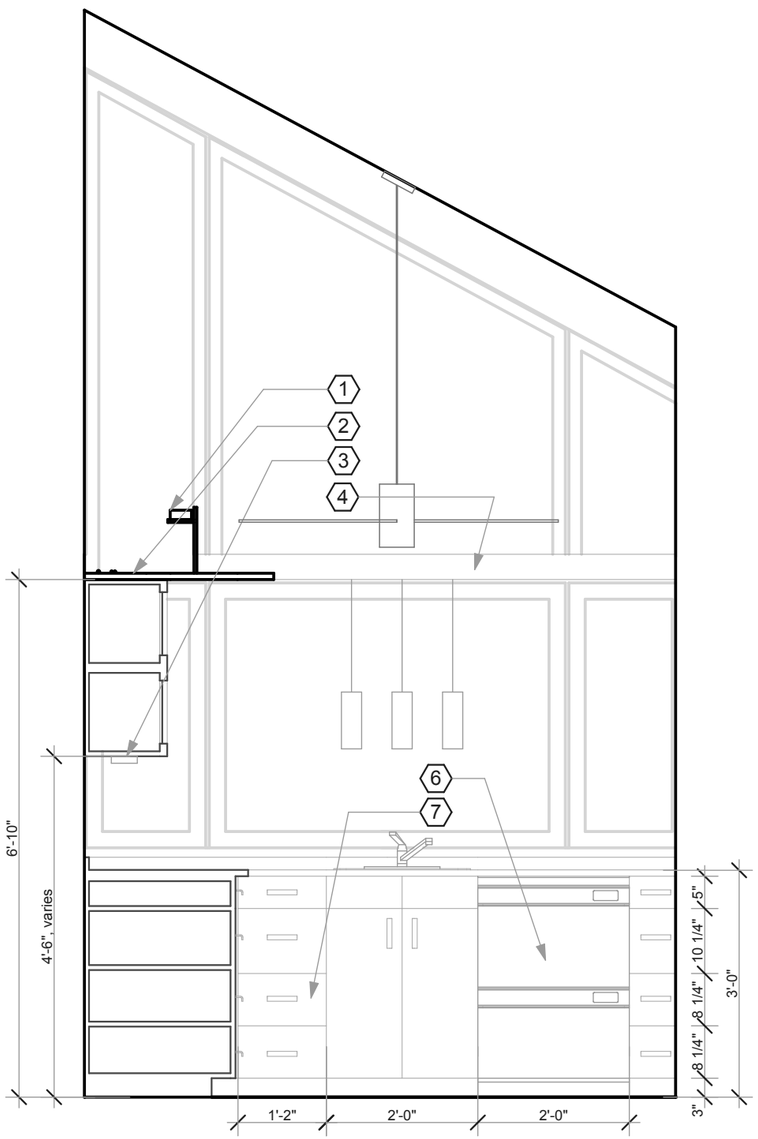
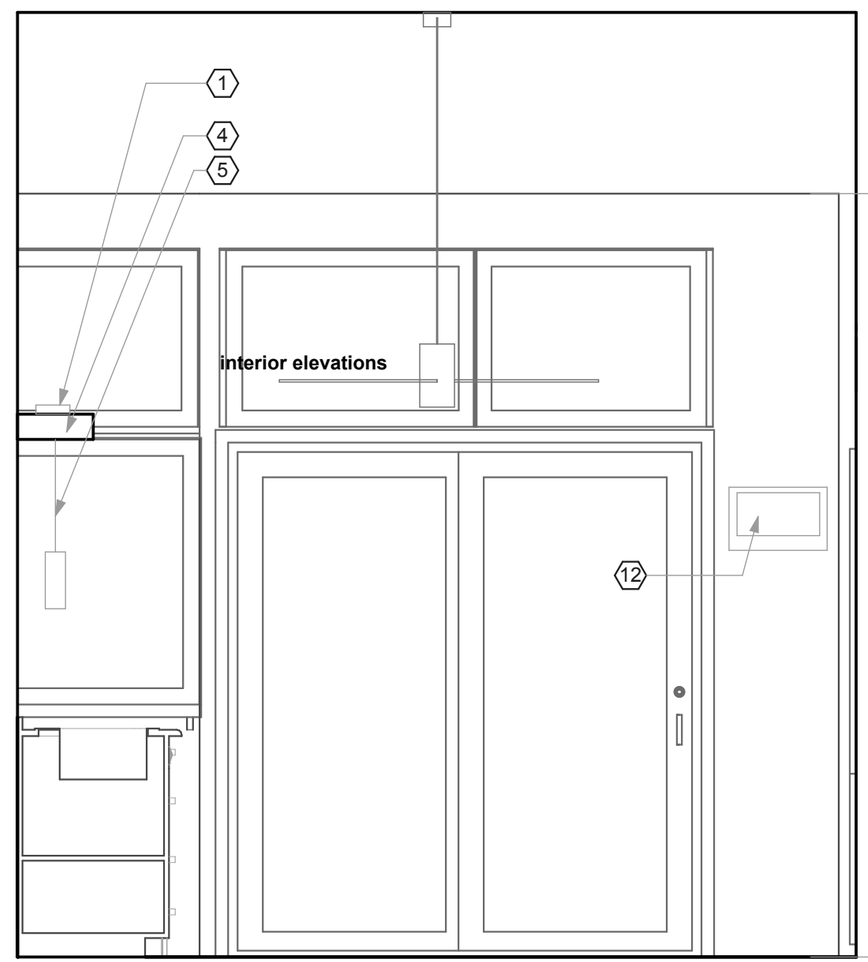
SHEET KEYNOTES

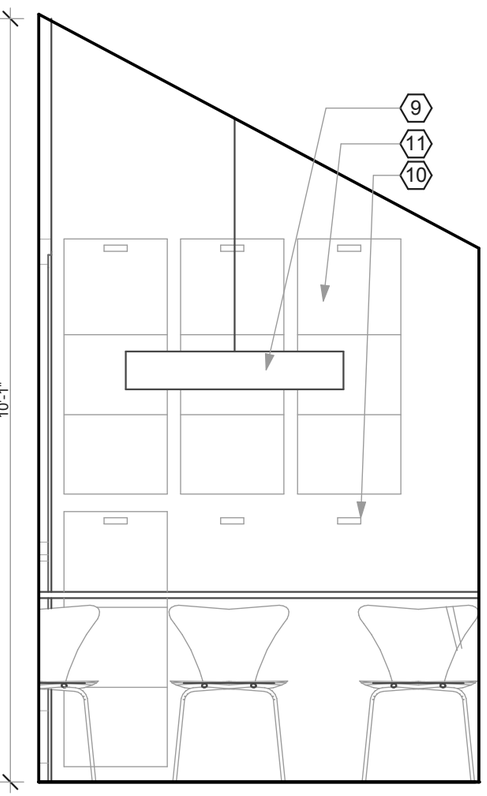
1 LIGHT FIXTURE INSTALLED BEHIND FACE OF SHELF
2 CONTINUOUS WOOD SOFIT
3 LIGHT FIXTURE INSTALLED UNDER CABINET
4 12" DEEP LIGHT SHELF
5 LIGHT FIXTURE INSTALLED UNDER SHELF
6 INTEGRATED DOUBLE DRAWER DISHWASHER
7 CORNER DRAWERS W. BLUM HARDWARE
8 OCCUPANT CONTOL PANEL
9 LIGHT FIXTURE CENTERED OVER TABLE
10 HANGERS FOR FOLDED DINING ROOM CHAIRS
11 FOLDED DINING ROOM CHAIR
12 CONTROL PANEL



A1 Kitchen East
SCALE: 1/2" = 1'-0"



C1 Kitchen South
SCALE: 1/2" = 1'-0"



G1 Dining East
SCALE: 1/2" = 1'-0"

0 1' 2' 4'

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interior elevations

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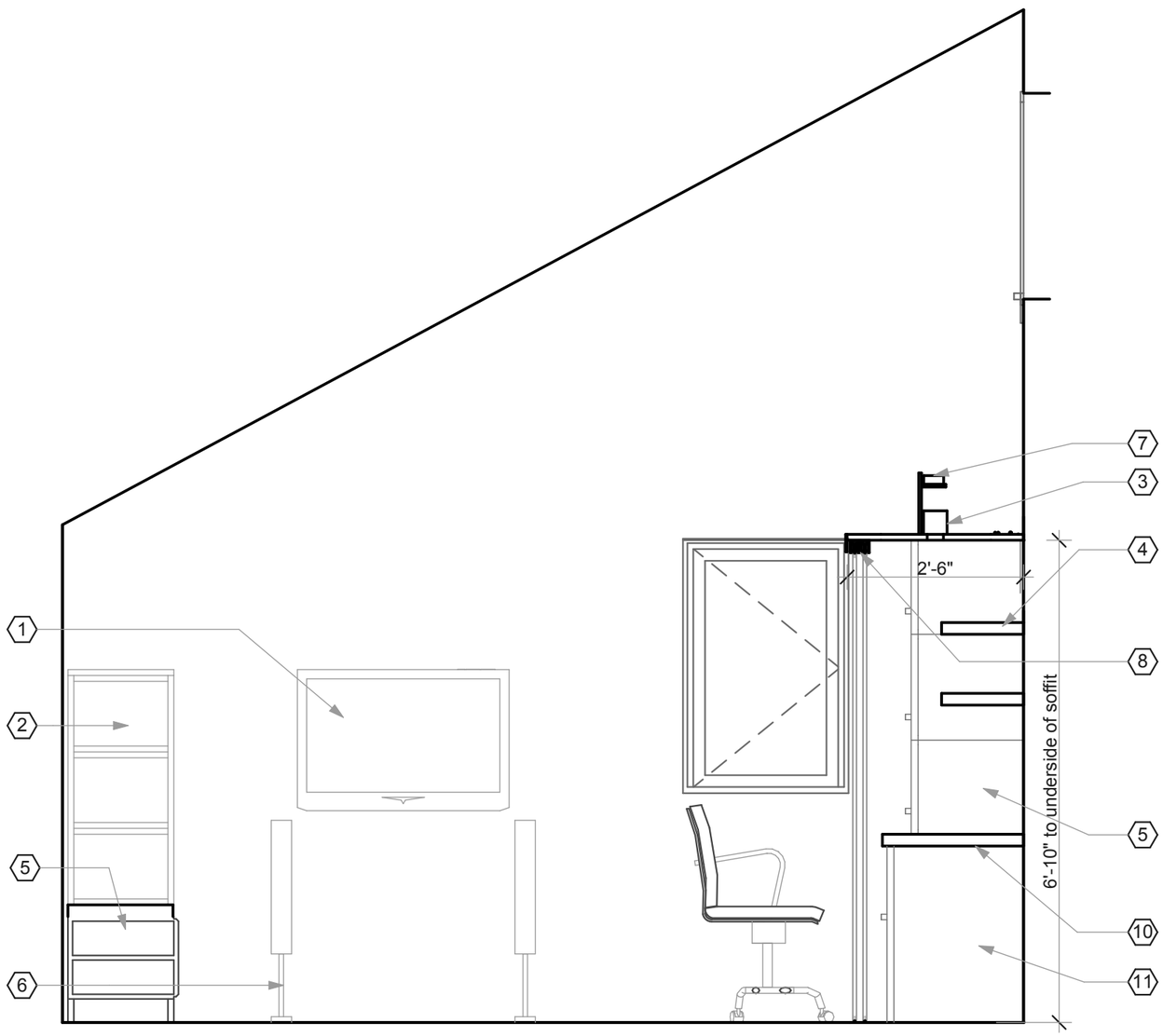

A1 Living Space West

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

0 1' 2' 4'

SHEET KEYNOTES

1 FLAT PANEL LCD TV. WALL MOUNTED
2 18" DEEP SHELVES
3 LIGHT FIXTURE INSTALLED UNDER SHELF
4 12" DEEP SHELF
5 18" BENCH W. STORAGE
6 SPEAKERS W. FLOOR STANDS
7 LIGHT FIXTURE INSTALLED BEHIND FACE OF SHELF
8 (2) 3FORM TRACKS W. VARIA PANELS
9 12" DEEP CABINETS
10 24" DEEP WORKSPACE
11 24" AV CABINET

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interior elevations

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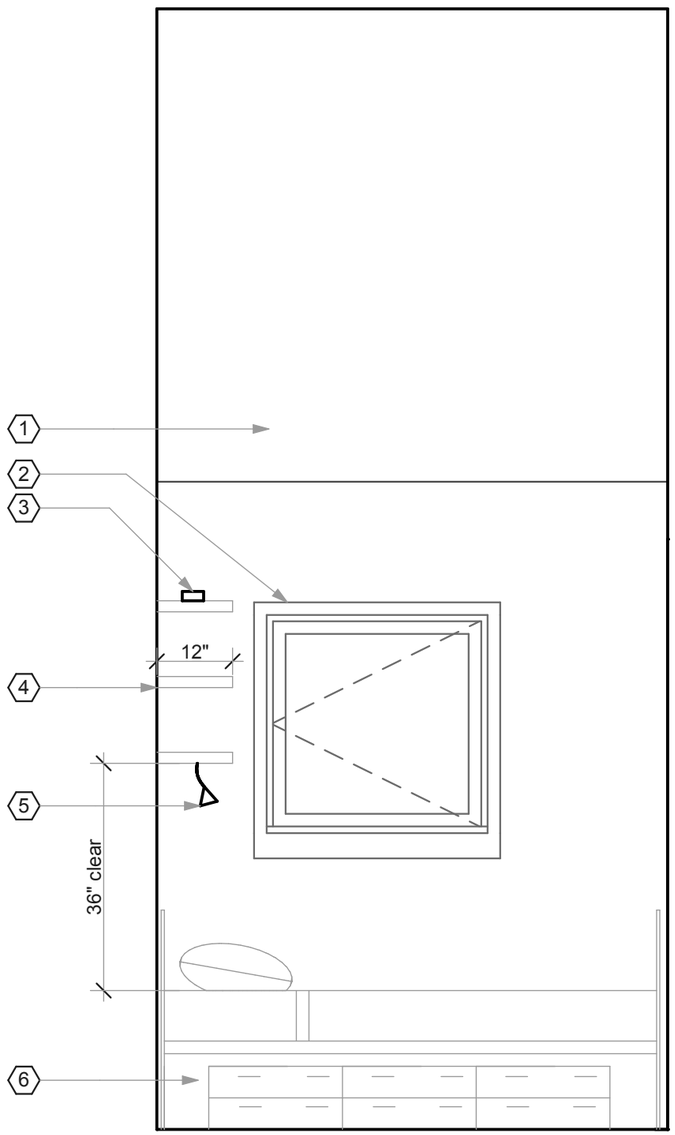
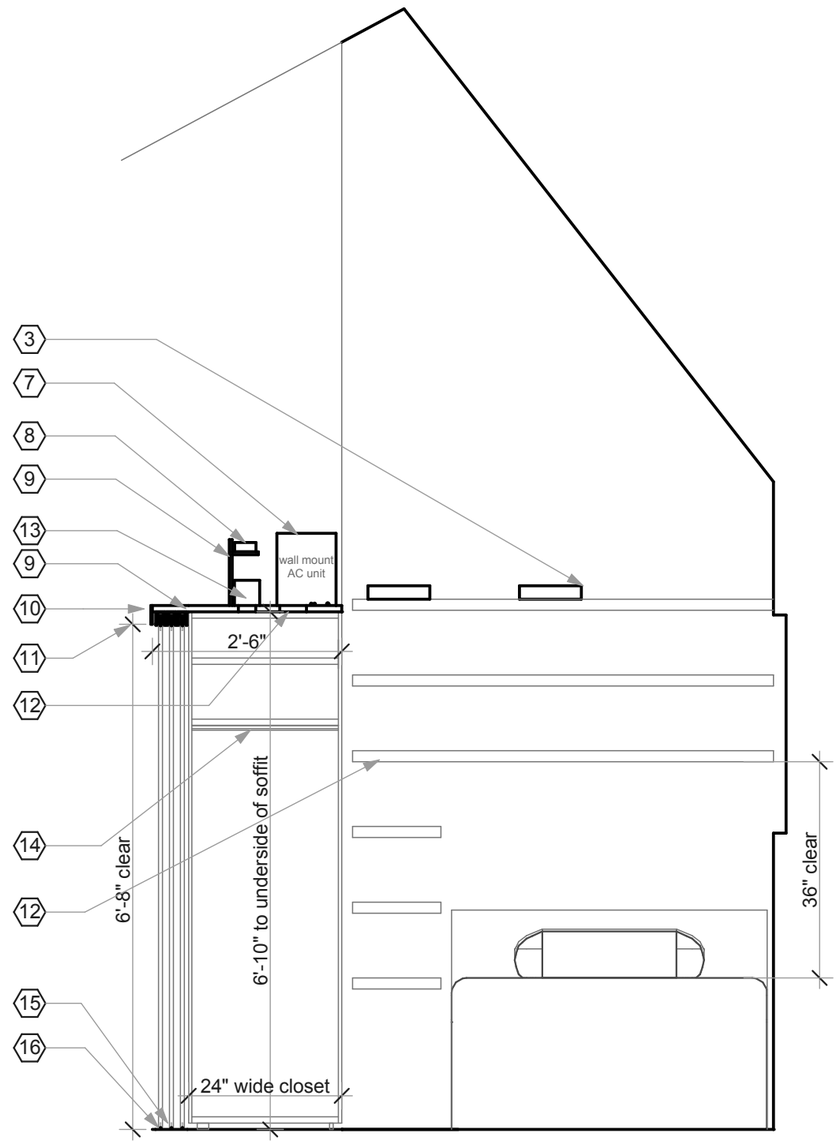


A1 Bedroom North
SCALE: 1/2" = 1'-0"

0 1' 2' 4'



D1 Bedroom East
SCALE: 1/2" = 1'-0"

0 1' 2' 4'

SHEET KEYNOTES

1 SLOPING CEILING
2 INTERIOR CASEING TO ALIGN WITH TOP OF SHELVING
3 LIGHT FIXTURE INSTALLED ON TOP OF SHELF
4 12" DEEP CANTILEVERED SHELF
5 ADJUSTABLE TASK LIGHTING FIXTURE
6 BED BY BLU DOT
7 DAIKIN MINI SPLIT WALL MOUNT UNIT
8 LIGHT FIXTURE INSTALLED BEHIND FACE OF SHELF
9 CONTINUOUS WOOD STRUCTURE FOR LIGHT FIXTURES
10 WOOD OR METAL LIP
11 (2) 3FORM TRACKS W. VARIA PANELS
12 DIFUSER BY TITUS, OR EQUIVALENT
13 12" DEEP CABINETS
14 HANGER ROD
15 MODULAR CLOSET ON CASTERS
16 RECESS GUIDES OR USE ROLLERS ON SLIDING PANELS

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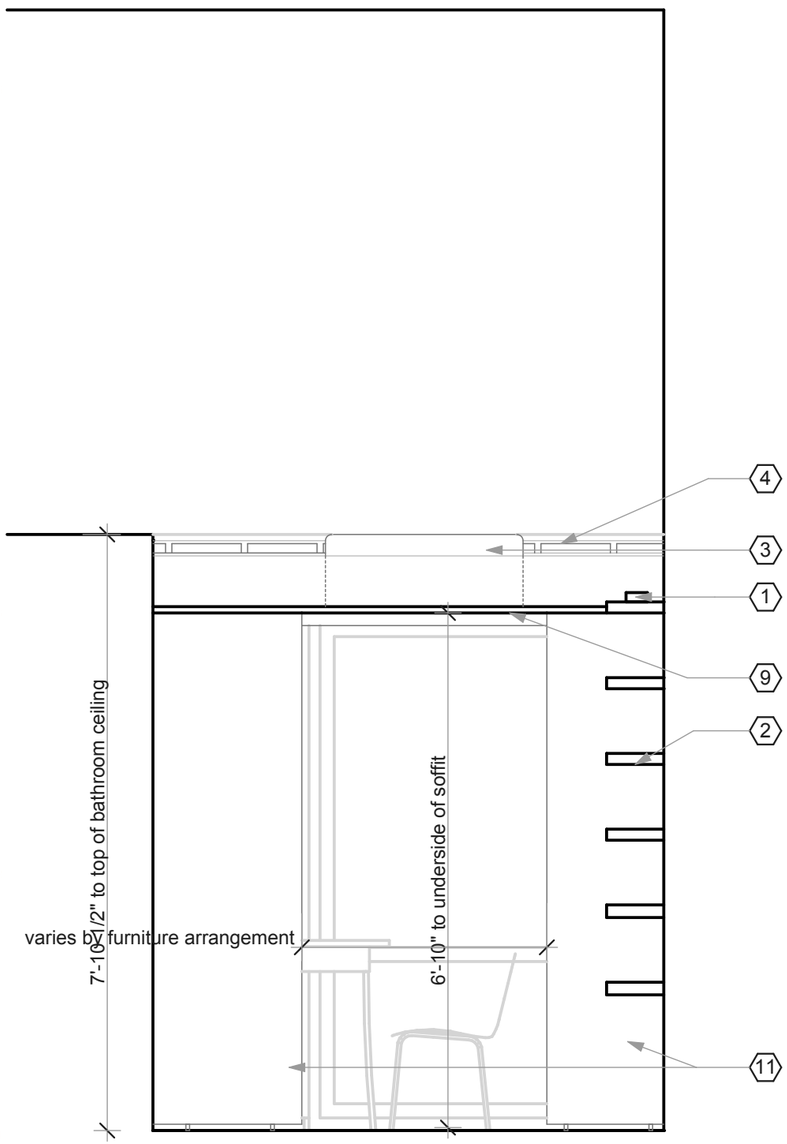
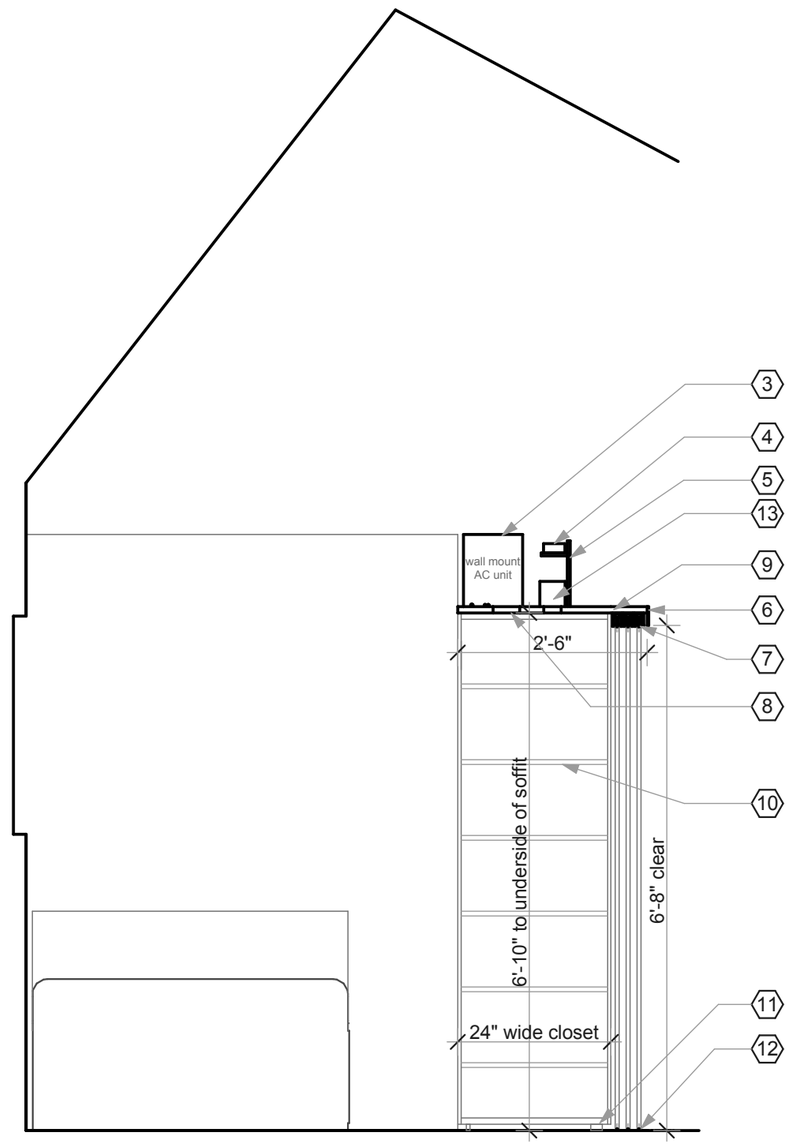


A1 Bedroom South
SCALE: 1/2" = 1'-0"

0 1' 2' 4'



D1 Bedroom West
SCALE: 1/2" = 1'-0"

0 1' 2' 4'

SHEET KEYNOTES

1 LIGHT FIXTURE INSTALLED ON TOP OF SHELF
2 12" DEEP CANTILEVERED SHELF
3 DAIKIN MINI SPLIT WALL MOUNT UNIT
4 LIGHT FIXTURE INSTALLED BEHIND FACE OF SHELF
5 CONTINUOUS WOOD STRUCTURE FOR LIGHT FIXTURES
6 WOOD OR METAL LIP
7 (2) 3FORM TRACKS W. VARIA PANELS
8 DIFUSER BY TITUS, OR EQUIVALENT
9 CONTINUOUS WOOD SOFIT
10 WOOD SHELVES
11 MODULAR CLOSET ON CASTERS
12 RECESS GUIDES OR USE ROLLERS ON SLIDING PANELS
13 RECESSED LIGHT FIXTURE

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interior elevations

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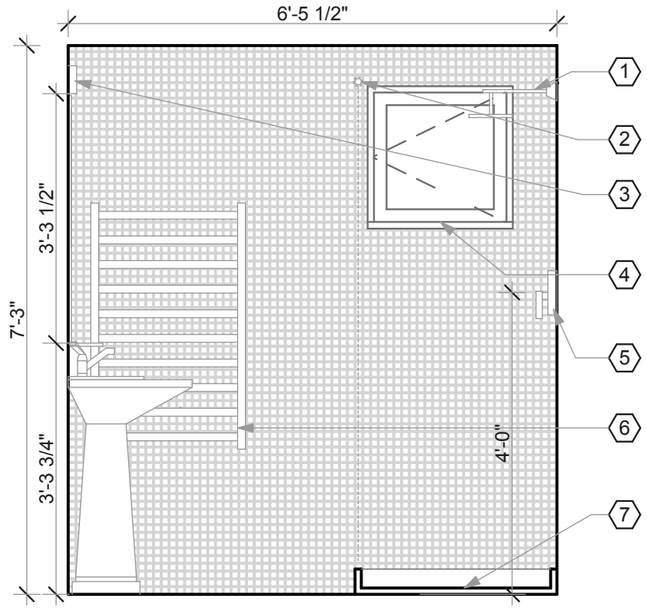
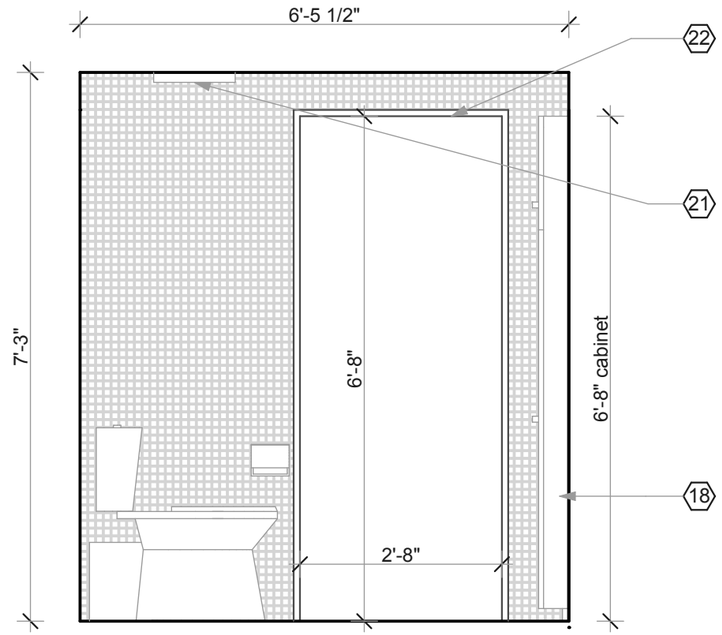
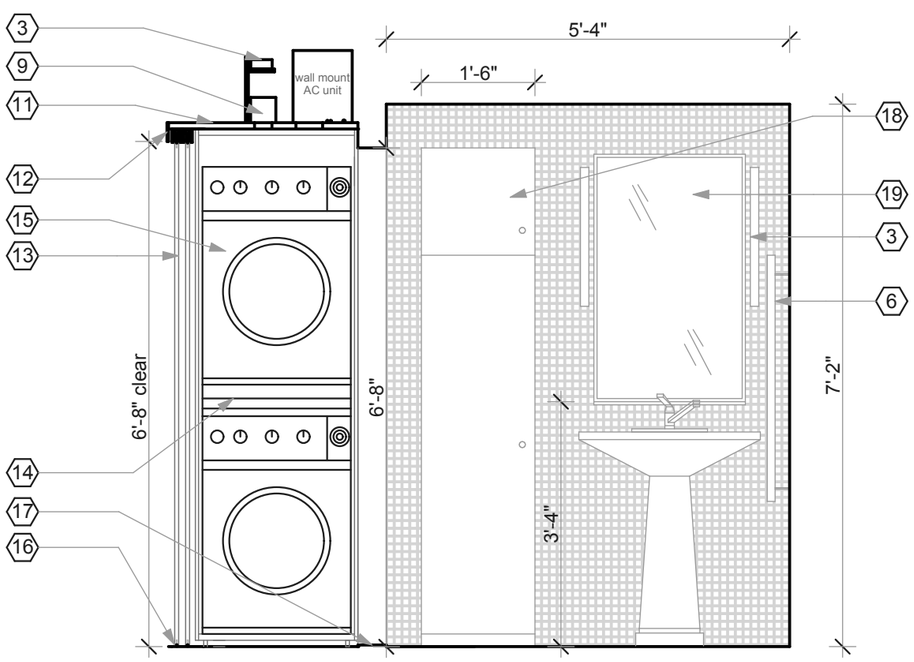


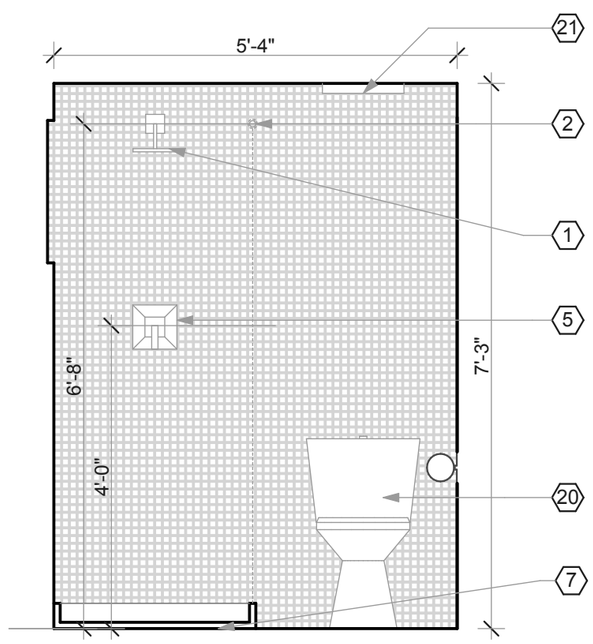
A4 Bathroom North
SCALE: 1/2" = 1'-0"



D4 Bathroom South
SCALE: 1/2" = 1'-0"



A1 Bathroom West
SCALE: 1/2" = 1'-0"



D1 Bathroom East
SCALE: 1/2" = 1'-0"

SHEET KEYNOTES

1 SHOWERHEAD
2 SHOWER CURTAIN ROD W. CLEAR SHOWER CURTAIN
3 LIGHT FIXTURE
4 MAHOGANY WINDOW FRAME, BY MARVIN
5 PRESSURE AND TEMPURATURE VALVE
6 TOWEL DRYING RACK
7 SHOWER PAN W. 4" LIP, FLOOR STONE OR EQUIVALENT
8 LIGHT FIXTURE INSTALLED ON TOP OF SHELF
9 RECESSED LIGHT FIXTURE
10 CONTINUOUS WOOD STRUCTURE FOR LIGHT FIXTURES
11 CONTINUOUS WOOD SOFIT
12 WOOD OR METAL LIP
13 (2) 3FORM TRACKS W. VARIA PANELS
14 ASKO HIDDEN HELPER SHELF FOR STACK MOUNTED WASHER AND DRYER
15 WASHER AND DRYER, PER APPLIANCE SCHEDULE
16 RECESS GUIDES OR USE ROLLERS ON SLIDING PANELS
17 THRESHOLD BETWEEN WOOD AND TILE FLOORING
18 8" DEEP MEDICINE CABINET, RECESS 3" INTO WALL
19 24" X 40" MIRROR
20 TOTO LOW FLOW TOILET W. 12" R.O.
21 EXHAUST FAN TO ERV, PER MECH HVAC PLAN
22 TRIM AROUND OPENING

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interior elevations

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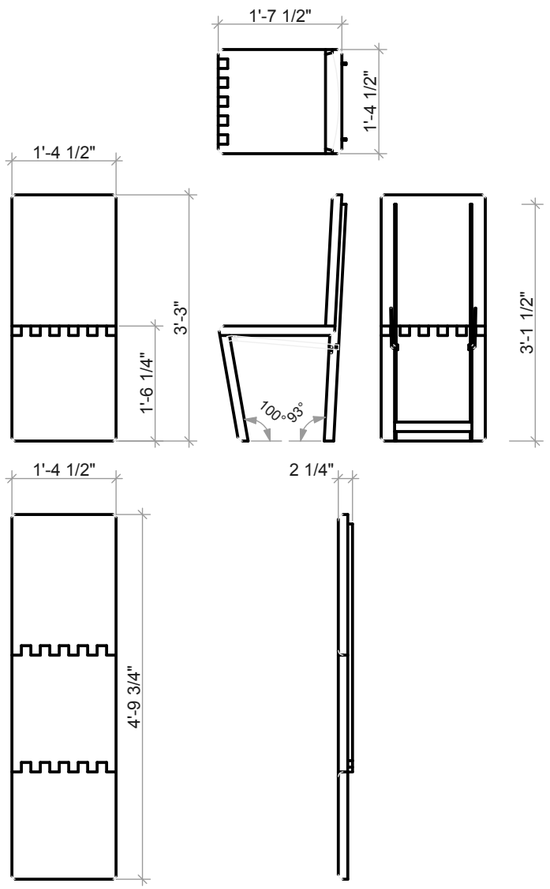
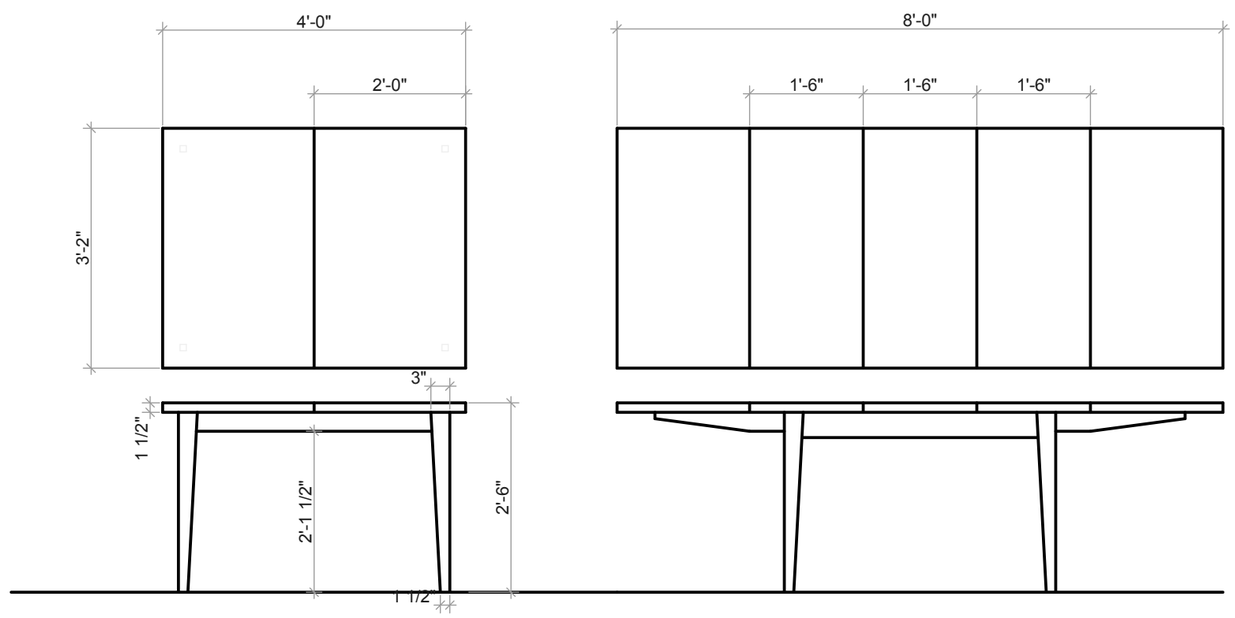
SHEET KEYNOTES

1 WALL ASSEMBLY
SHEATHING
XX





A1 Furniture Details
SCALE: 1/2" = 1'-0"

0 1' 2' 4'

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furniture details

I-501

A1 Shelving Details

SCALE: 1/4" = 1'-0"

0 2' 4' 8'

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shelving details

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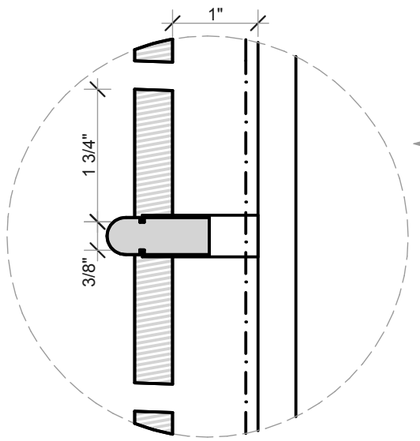
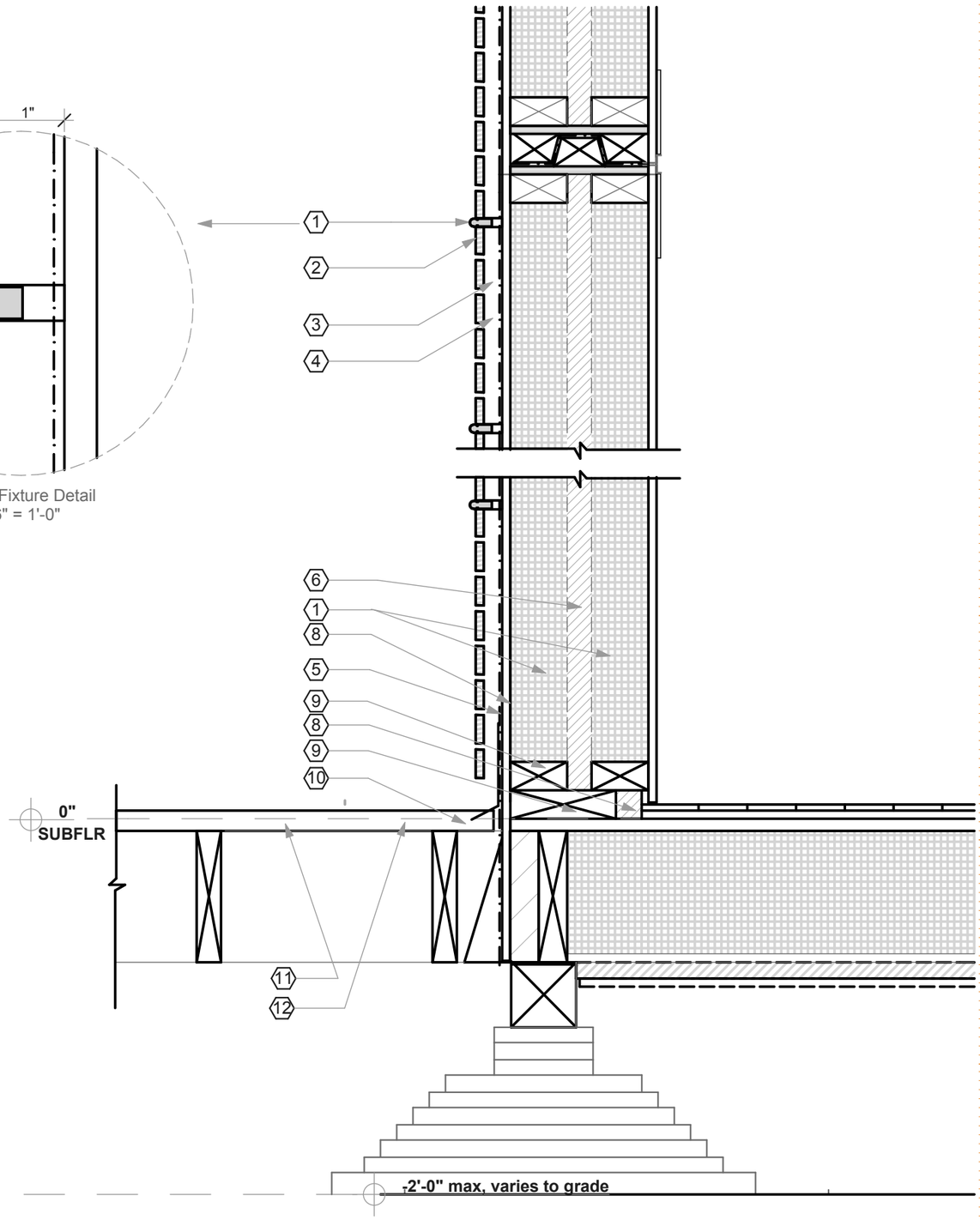


Light Fixture Detail
6" = 1'-0"



A1 Exterior lighting
SCALE: 1 1/2"= 1'-0"

0 6" 12" 18"

GENERAL SHEET NOTES

1 USE 1.25" STANDARD MOUNTING CLIP WITHOUT C CHANNEL.
2 PLEXINEON 1X LIGHT, 2' LONG, 3500 K COLOR TEMPERATURE
3 TRIM TRESPA PANEL TO FIT PLEXINEON FIXTURE

SHEET KEYNOTES

1 2' ILIGHT PLEXINEON WHITE 1X
2 1 3/4" TRESPA METEON RAINSCREEN SLATS
3 BATTEN @ 2'-0", BY VAPROSHIELD
4 1" AIR GAP
5 WATER RESISTANT MEMBRANE
6 1" FOIL FACED POLYISO WITH FOIL TAPE ON WARM SIDE
7 FILL WITH CLOSED CELL POLYURETHANE SPRAYFOAM INSULATION
8 1/2" PLYWOOD SHEATHING
9 2X4 STAGGERED STUD FRAMING
8 RIGID INSULATION
9 2X7 BOTTOM PLATE
10 FLASHING BELOW MEMBRANE, GALVANIZED
11 2X WOOD DECKING
12 TRAY FOR RECYCLED GLASS

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lighting detail

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LIGHTING FIXTURE SCHEDULE

MARK	#	MANUFACTURER	MODEL	MODEL NUMBER	ROOM	LAMPS		DIM	LENS	FINISH	MOUNTING	TRANSFORMER	FIXTURE ENERGY (WATTS)	TRANSFORMER ENERGY (WATTS)	TOTAL ENERGY (WATTS)	VOLTAGE (V)	NOTES
						TYPE	#										
L-1	1	Hampstead Lighting	Nacar Kiwi Table Lamp	32193	Living Room	CFL	1	12" x 22"	NA	Chrome w Kiwi Cover	NA	NA	13		13	120	Table lamp w. CFL bulb
L-2	3	Lightolier	Calculite LED Wall Washer	C410LEDWW	Entry, Bedroom, Bathroom	LED	1	4.5" aperture (6" H x 5.75" DIA)	CC	White Flange	Recessed in soffit	Built-in	10		30	120	
L-3	31	Philips-Color Kinetics	icolor cove QLX, wide beam	QLX	Living, Dining, and Kitchen	LED	30 (10 x R,G,B)	12" L x 1.4" H x 1.25" W	Clear	Standard	Surface, Horizontal	sPDS-60ca 24v	3	3 x 180 watts max	90	120/ 24	10 fixtures / transformer for more flexible control
L-5	1	Hampstead Lighting	Mosaic Wall	15753	Bathroom	T5	1	24"L x 6.8" H x 2.2" D	NA	White	Surface, Vertical	Built-in	39		29	120	
L-6	5	Philips-Color Kinetics	eW Profile Powercore 9.25"	523-000027-18	Office, Kitchen, Bedroom	LED	-	11" L x .88" H x 1.7" D	Clear	White	Under Cabinet	Built-in	5.5		27.5	120	
L-7	1	Philips-Color Kinetics	eW Profile Powercore 19.25"	523-000027-19	Kitchen	LED	-	21" L x.88" H x 1.7" D	Clear	White	Under Cabinet	Built-in	10		10	120	
L-8	3	Tech Lighting	Tetra on 48" Monorail Track	700-MO-TETW S-LED	Kitchen	LED	-	9" H x 3.2" W x 3.2" L	Frosted White	Satin Nickel	Horizon. Surface mounted track	100MOSRT60E S - LED	5.8	60 watt max	17.4	120	3 fixtures / transformer (can have up to 10), need 48" monorail track and standoffs
L-9	2	Edge Lighting	Night Owl	NIGHTOWL-C-SN	Bedroom	LED		18.75" L x 1.4" W x 1" H	NA	Satin Nickel	Surface, horizontal	Built-in	1		2	120	canopy version includes power supply in junction box; built in switch
L-10	1	Hampstead Lighting	Barcode 36" suspension	15632	Dining Room	T5	1	1.8" D x 4.8" H x 36" L	NA	White	Pendant	Built-in	39		39	120	
L-11	4	Lucifer	PUK LED	LPK-ALED-3K-A-HCL-5-FGL5	Living Room	LED	-	1.23" Dia aperature (2.75" Dia .76" D)	HCL-5 (honeycomb)	(A) Clear anodized	Surface mount	PSA-60-12H	3.2	75 watt max	12.8	120	Surface mounted on built-in shelving, w/o fasteners; up to 18 lights per transformer
L-12	2	Tech Lighting	Tele on Wall Monorail Track	700-WMO-TEL-S	Living room	LED Lamina Sol RL-16D1-E0539	1	1.8" x 9.5"-25" length adjust.	Soft Focus	Satin Nickel	wall mounted track	Wang WH-601E2CA-2L	7.8	60 watt max	15.6	120	include soft focus lens /holder,replace bulb to LED type, transformer compatible w 2 bulbs /dimmable
L-13	2	MP Lighting	LED 42	LED42-1-W30H-MA	Entry Doors	LED	1	4 3/4" dia, 8 1/8" H, 7 7/8" D	NA	matte clear anodized	wall-mount, facing down	Built-in	1.2	3 watt	8.4	4V (120 v transformer)	alternate entry light for next-use application
L-14	11	B-K Lighting	Litestick	LT-18-SAP-A18-GS	Exterior Landscape	LED	1	1" dia, 24" H max (adjust)	Frosted	aluminum or brass	landscape w spike	TR-100 Magnetic Low V Transformer	5		25	120/ 12	place in planter beds
L-15	15	iGuzzini	Glim Cube on Spike /120V	BB17	Exterior Ramps	LED	1 (warm white)	2.3" W x 4.4" L x 26.5" H	Elliptic Effect	standard	landscape w spike	Built-in	1		15	120	Monochromatic warm white LED w electronic control (240Vac)
L-16	5	iGuzzini	Glim Cube on Stand /120V	BB21	Exterior Ramps	LED	1 (warm white)	2.3"W x 3.5" L x 14.6" H	Elliptic Effect	Standard	landscape w stand	Use iGuzzini	1		5	120	Monochromatic warm white LED w electronic control (240Vac)
L-17	12	iLight Technologies	Plexineon white 2X series	T-24-X35-S-4F-NC-00	Entry Doors	LED		38" L x .49" W x 1.32" H	standard	silver	horizontal surface	iLight Class 2 24VDC, 100 watts	5	100 watt max	50	120/ 24	use 1.25" straight tab speciality mounting clips (2" from end, @ every 2' oc)

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lighting schedule

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ROOM FINISH SCHEDULE

ROOM NO	ROOM NAME	FLOOR	WALLS												CEILING			
				N			E			S			W					
			MATL	FIN	CLR	MATL	FIN	CLR	MATL	FIN	CLR	MATL	FIN	CLR	MATL	FIN	CLR	HEIGHT
1	Living Room	Wood	N/A	N/A	N/A	N/A	N/A	N/A	A	P	1	A	P	1	A	P	2	Varies, 14' max
2	Office	Wood	A	P	1	N/A	N/A	N/A	N/A	N/A	N/A	A	P	1	A	P	2	Varies, 14' max
3	Dining Room	Wood	N/A	N/A	N/A	A	P	1	B	N/A	N/A	N/A	N/A	N/A	A	P	2	Varies, 14' max
4	Kitchen	Wood	A	P	1	B	N/A	N/A	A	P	1	N/A	N/A	N/A	A	P	2	Varies, 14' max
5	Alcove	Wood	A	P	1	A	P	1	N/A	N/A	N/A	A	P	1	A	P	2	Varies, 14' max
6	Bathroom	Tile	C	T	4	C	T	3	C	T	3	C	T	3	A	P	2	8'-0"
7	Mechanical Room	Unfinished	D	U	N/A	D	U	N/A	D	U	N/A	D	U	N/A	D	U	N/A	8'-0"
8	Mechanical Shed	Unfinished	D	U	N/A	D	U	N/A	D	U	N/A	D	U	N/A	D	U	N/A	9-0"

MATERIAL KEY

A	GYPSUM BOARD
B	GLASS
C	DUROCK
D	TILE
E	PLYWOOD

FINISH KEY

P	BENJAMIN MOORE NATURA PAINT IN EGGSHELL
T	TILE
U	UNFINISHED

COLOR KEY

1	BENJAMIN MOORE AFFINITY COLORS: HONEYMOON
2	BENJAMIN MOORE AFFINITY COLORS: VAPOR
3	MANUFACTURER GREEN
4	CLEAR

APPLIANCE SCHEDULE

DESCRIPTION	MANUFACTURER	MODEL	DIM	POWER (W)
Dishwasher	Fisher & Paykel	DD605I	23-7/16" x 16-1/32" x 22-7/16"	157
Refrigerator/Freezer	Liebherr	HC1011	21-15/16" x 69-3/4" x 21-7/32"	407
Cooktop	Wolf	CT30IU	30" x 21" x 4"	3600
Rangehood	Broan	F40000	30" x 17 1/2" x 6"	444
Oven	Miele	DG 155 Convection Steam Oven	28 1/2"" x 24" x 28 1/4"	3600
Washer	Asko	W6222	23-1/2" x 34" x 24-7/16"	100
Dryer	Asko	T712	23-1/2" x 34-1/2" x 24-7/8"	
TV	Toshiba	22AV600U	2.6" x 21.5" x 14.4"	37.42
DVD Player	Sony	NS710H	8.2" x 16.9" x 1.7"	.076 (standby)
Game Console	Nintendo	Wii	15" x 10" x 4.5"	18.4
Computer	Micro-Star International	GX720	17" screen, 15.5" x 10.9" x 1.3"	.643 (standby)

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schedules

I-602

A1 Living Room Daylighting

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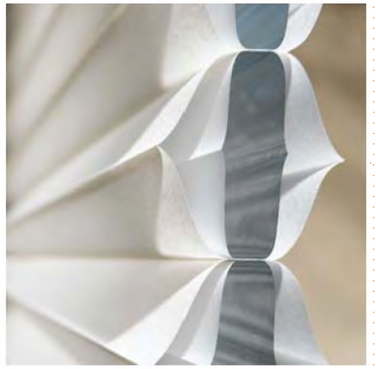

DUETTE ARCHITELLA SHADE
POWER: 0 WATTS
DESIGN INTENT: THESE DUAL LAYERED SHADES INCLUDE A SHEAR SEMI-OPAQUE AND A FULL OPAQUE LAYER. THIS ALLOWS THE HOME OWNER A GREATER RANGE OF CONTROL OVER THE AMOUNT OF DIRECT SOUTHERN LIGHT THAT ENTERS THE HOUSE.

THE SEMI TRANSPARENT LAYER ALLOWS FOR PRIVACY DURING THE DAY WHILE WITHOUT RESTRICTING TOO MUCH LIGHT.

AT NIGHT THE OPAQUE LAYER PROVIDES ATTITIONAL PRIVACY WHILE REFLECTING THE INTERIOR LIGHT BACK INTO THE LIVIING SPACES.

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lighting renderings

I-901

A1 Living Room Electric Lighting

NOT TO SCALE

L-12 TELE
POWER: 8 WATTS PER FIXTURE
DESIGN INTENT: THESE FIXTURES ARE FLEXIBILE EXPANDING FROM 9" TO 25" TO ILLUMINATE A VARIETY OF ART INSTALATIONS ALONG THIS SOUTHERN WALL. THEY USE SOL MR16 GU5.3 LED LAMPS WITH A COLOR RENDERING INDEX OF 74.

L-11 LUCIFER PUKLED
POWER: 3.2 WATTS PER FIXTURE
DESIGN INTENT: THESE SMALL UNDER SHELF FIXTURES ILLUMINATE OBJECTS ON THE SHELVES BELOW.

L-7 NACAR KIWI TABLE LAMP
POWER: 13 WATTS
DESIGN INTENT: IN NON DAYLIT CONDITIONS THIS FIXTURE PROVIDES WARM ILLUMINATION FOR READING ON THE SOFA OR BENCHES.

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lighting renderings

I-902

NORTH CLERESTORY WINDOWS
POWER: 0 WATTS
DESIGN INTENT: THE CLERESTORY WINDOWS ALLOW INDIRECT NORTHERN LIGHT INTO THE LIVING SPACE WHERE IT REFLECTS OFF THE CEILING ILLUMINATING THE LIVING ROOM AND THE DESK WORK AREA

WEST WINDOW
POWER: 0 WATTS
DESIGN INTENT: THIS WESTERN WINDOW PROVIDES ILLUMINATION FOR THE DESK WORKSURFACE AS WELL AS A FRAMED VIEW OF THE EXTERIOR LANDSCAPE FOR INDIVIDUALS WORKING AT THE DESK.

SAGE ELECTROCHROMIC GLASS
POWER: 0.28 WATTS PER SQ FT
DESIGN INTENT: THE WESTERN WINDOW INCORPERATES ELECTROCHROMIC FILM TO REDUCE AFTERNOON AND EVENING HEAT GAIN. THE FILM ALSO REDUCES GLARE ON THE DESK WORK SURFACE.

A1 Dining Room Daylighting
NOT TO SCALE

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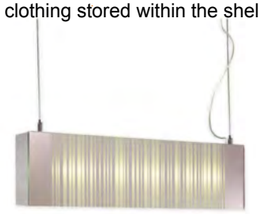
I-903

iColor cove QLX
Power: 3 watts per fixture
Design Intent: These fixtures are located along the full length of the shelving structure. They provide indriect ambient light by illuminating the gabled ceiling above.
Control: These fixtures are grouped into three zones (kitchen, dinning room, living room) with independant color and dimming control to dramatically change the ambient light of any zone.
(see sample colors below)

Lightolier C410LEDWW30KCCLW
Power: 10 watts per fixture
Design Intent: These fixtures are recessed to light each threshold of the shelving structure. Additionally their light also serves to illuminate objects and clothing stored within the shelves.



Barcode 36" suspension
Power: 39 watts
Design Intent: This fixture is located above the dining room table. As an object it floats above dinning guests while its illumination creates a focal point on the table within the space.

eW Profile Powercore 2700K
Power: 6 watts per fixture
Design Intent: These under shelving fixtures illuminate the desk surface below.

A1 Dining Room Electric Lighting
NOT TO SCALE

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lighting renderings

I-904

EXTERIOR LOUVERS
POWER: 0 WATTS
DESIGN INTENT: THESE LOUVERS SHADE THE EAST WINDOW AND BOUNCE EARLY MORNING SUNLIGHT ALONG THE CEILING DURING SUMMER MONTHS WHEN THE EARLY MORNING SUN ILLUMINATES THE EAST SIDE OF THE HOUSE.

INTERIOR LIGHTSHELF
POWER: 0 WATTS
DESIGN INTENT: SIMILAR TO THE EXTERIOR LOUVERS, THIS LIGHTSHELF REFLECTS EARLY MORNING LIGHT UP ALONG THE CEILING.

SAGE ELECTROCHROMIC GLASS
POWER: 0.28 WATTS PER SQ FT
DESIGN INTENT: THESE LOWER WINDOWS INCORPERATE ELECTROCHROMIC FILM TO CONTROL EARLY MORNING HEAT GAIN AND REDUCE GLARE ON THE KITCHEN WORK SURFACES.

A1 Kitchen Daylighting
NOT TO SCALE

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A1 Kitchen Electric Lighting

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SHEET KEYNOTES

1 WALL ASSEMBLY
SHEATHING
XX

iColor cove QLX
Power: 3 watts per fixture
Design Intent: This fixture illuminates the ceiling above providing color controlled indriect ambient light for the kitchen space below.

Tetra-LED
Power: 5.8 watts per fixture
Design Intent: These fixtures serve as ephemerial objects in the kitchen space at the east end of the house for both occupants inside and the general public outside. Additionally they illuminate the work surfaces around the kitchen sink.

eW Profile Powercore 2700K
Power: 6 watts per fixture
Design Intent: These under cabinent fixtures illuminate the kitchen counter top below.

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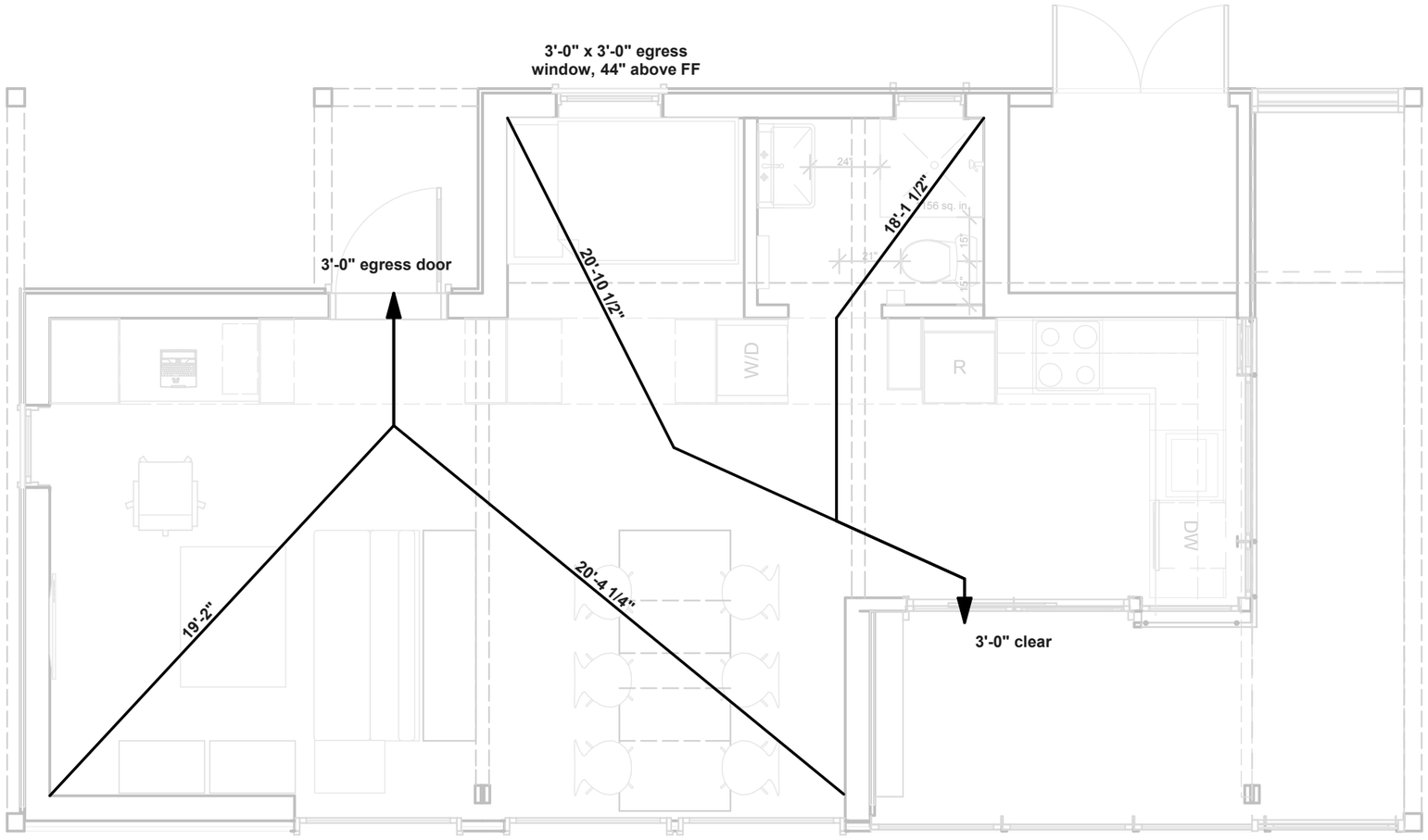
lighting renderings

I-906



PLAN NORTH

0 2' 4' 8'

A1 Egress
SCALE: 1/4" = 1'-0"

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egress plan

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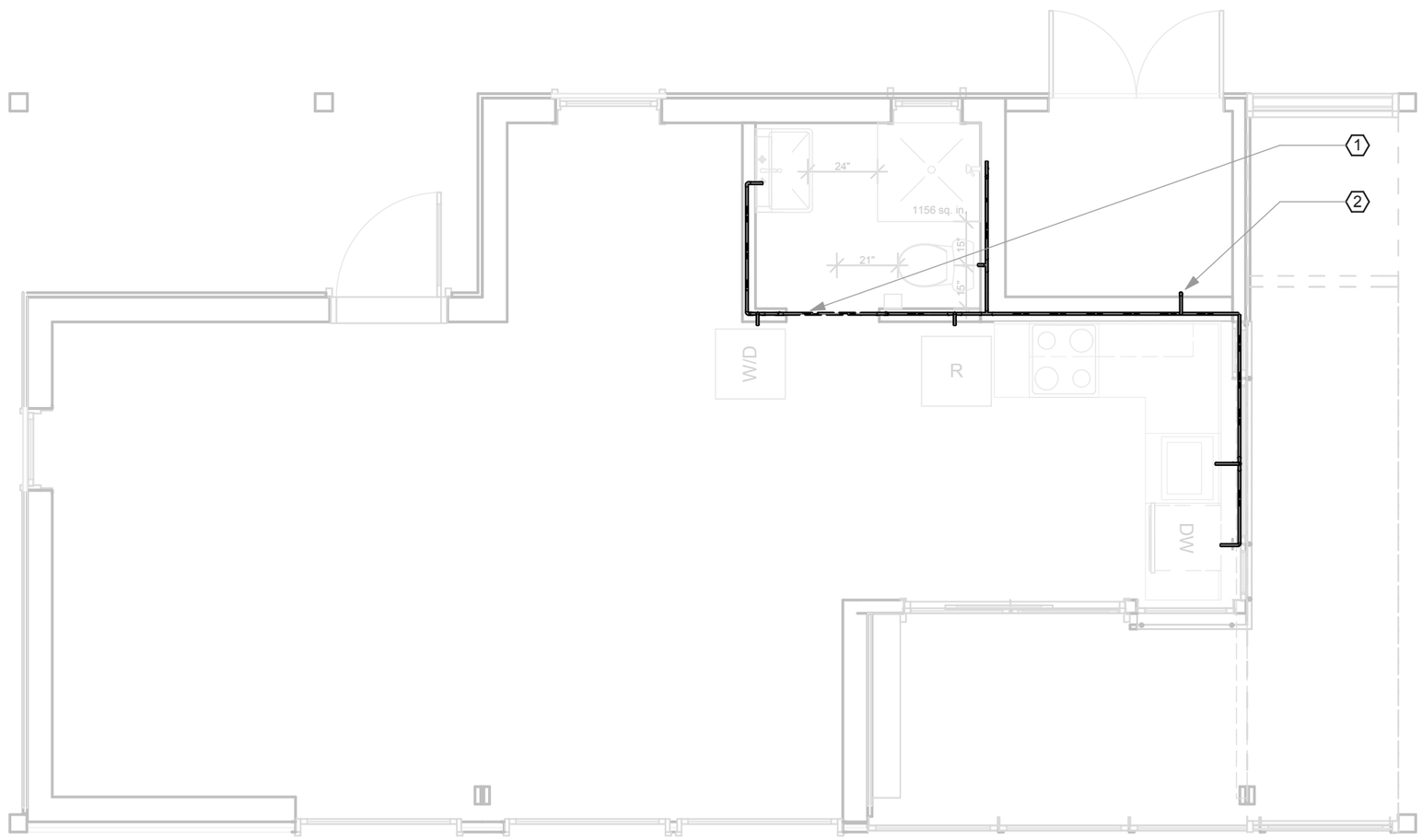
GENERAL SHEET NOTES

1. DOMESTIC COLD WATER PIPING TO BE 1/2" PEX TUBING.
2. BACKFLOW VALVES TO BE BRASS CHECK VALVES
3. BALL VALVES TO BE FNW 1/2" THRD BALL VALVES

SHEET KEYNOTES

1. ACCESS PANEL ABOVE DOORWAY FOR PIPING CONNECTION BETWEEN MODULES
2. CONNECT TO DOMESTIC COLD WATER SUPPLY FROM MECH SHED, PER MECHANICAL SOLAR THERMAL PLAN



PLAN NORTH

0 2' 4' 8'

A1 Domestic Cold Water Plan

SCALE: 1/4" = 1'-0"

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cold water layout

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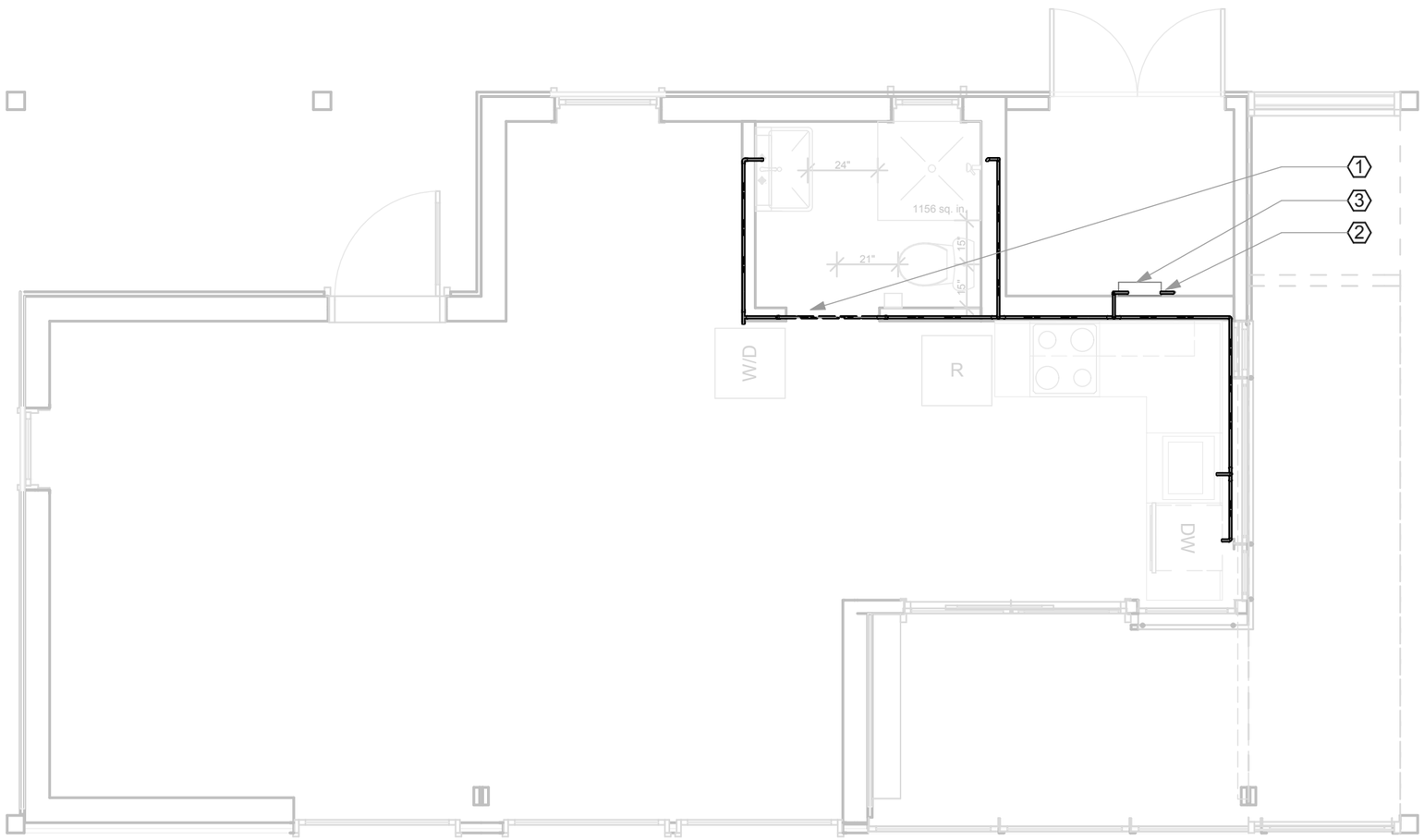
GENERAL SHEET NOTES

1 DOMESTIC HOT WATER PIPING TO BE 1/2" PEX TUBING.
2 BACKFLOW VALVES TO BE BRASS CHECK VALVES
3 BALL VALVES TO BE FNW 1/2" THRD BALL VALVES

SHEET KEYNOTES

1 ACCESS PANEL ABOVE DOORWAY FOR PIPING CONNECTION BETWEEN MODULES
2 CONNECT TO DOMESTIC HOT WATER SUPPLY FROM MECH SHED, PER MECHANICAL SOLAR THERMAL PLAN
3 DOMESTIC HOT WATER INLINE HEATER



PLAN NORTH

0 2' 4' 8'

A1 Domestic Hot Water Plan
SCALE: 1/4" = 1'-0"

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hot water layout

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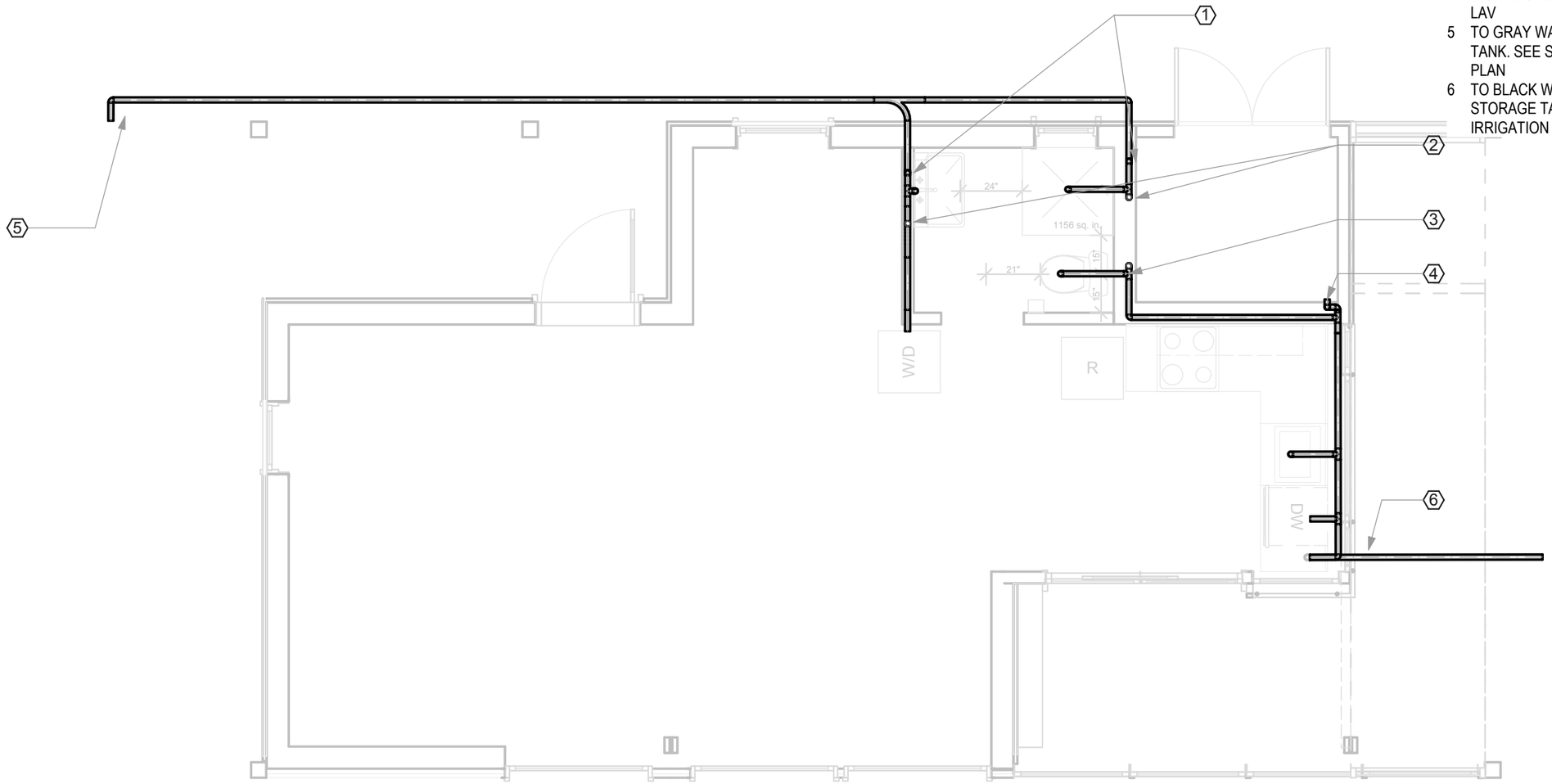
GENERAL SHEET NOTES

1 WASTE PIPING TO BE ABS
2 CONNECTIONS AT CUT JOINTS TO BE MISSION STYLE RUBBER COUPLINGS

SHEET KEYNOTES

1 TURN PIPE DOWN THROUGH FLOOR TO CONNECT TO EXTERIOR PIPE. SEE PLUMBING 3D RISER DIAGRAM
2 2" DIAMETER VENT UP
3 WATER CLOSET WASTE LINE NOT TO BE CONNECTED FOR COMPETITION
4 ISLAND VENT TO DISHWASHER AND KITCHEN LAV
5 TO GRAY WATER STORAGE TANK. SEE SITE IRRIGATION PLAN
6 TO BLACK WATER STORAGE TANK. SEE SITE IRRIGATION PLAN



PLAN NORTH

0 2' 4' 8'

A1 Domestic Sanitary Plan
SCALE: 1/4" = 1'-0"

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sanitary layout

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PLUMBING FIXTURE SCHEDULE (Simple)

MARK	DESCRIPTION	MFR	MODEL	CONNECTIONS				NOTES
				CW	HW	WASTE	VENT	
F-1	Bathroom Lavatory	Toto	Lloyd LF930MCP	-	-	1-1/4" O.D.	x	
F-2	Bathroom Lavatory Faucet	Toto	Axiom TEL5GKCN-10	1/2" I.P.	1/2" I.P.	-	-	12" rough-in
F-3	Bathroom Toilet	Toto	MS853113E	1/2"	-	3"	2-1/8"	10" discharge w thermal mixing
F-4	Showerhead	Kohler	K-997 CP	1/2" - 14 NPT	1/2" - 14 NPT	-	-	1.75 gpm showerhead
F-5	Showerhead Arm	Kohler	K-7397	-	-	-	-	
F-6	Shower Temperature / Presure Valve	Toto	TSPTR	1/2 - 14 NPT	1/2 - 14 NPT	-	-	
F-7	Shower Temperature / Pressure Valve Trim	Toto	Lloyd TS930#CP	-	-	-	-	
F-8	Shower Basin	Floorstone	34"x34" Terrazo	-	-	2" I.P.S	-	5" dia, 2 1/4" deep subfloor recess
F-9	Towel Warmer	Runtal	Neptune NTR-3320	-	1/2" NPT	-	-	Attached to radiant floor manifold
F-10	Kitchen Lavatory	Blanco	513-829	-	-	3-1/2"	-	Undercounter mounting
F-11	Kitchen Faucet	KWC	Ono 10.151.113	3/8"	3/8"	-	-	

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schedule

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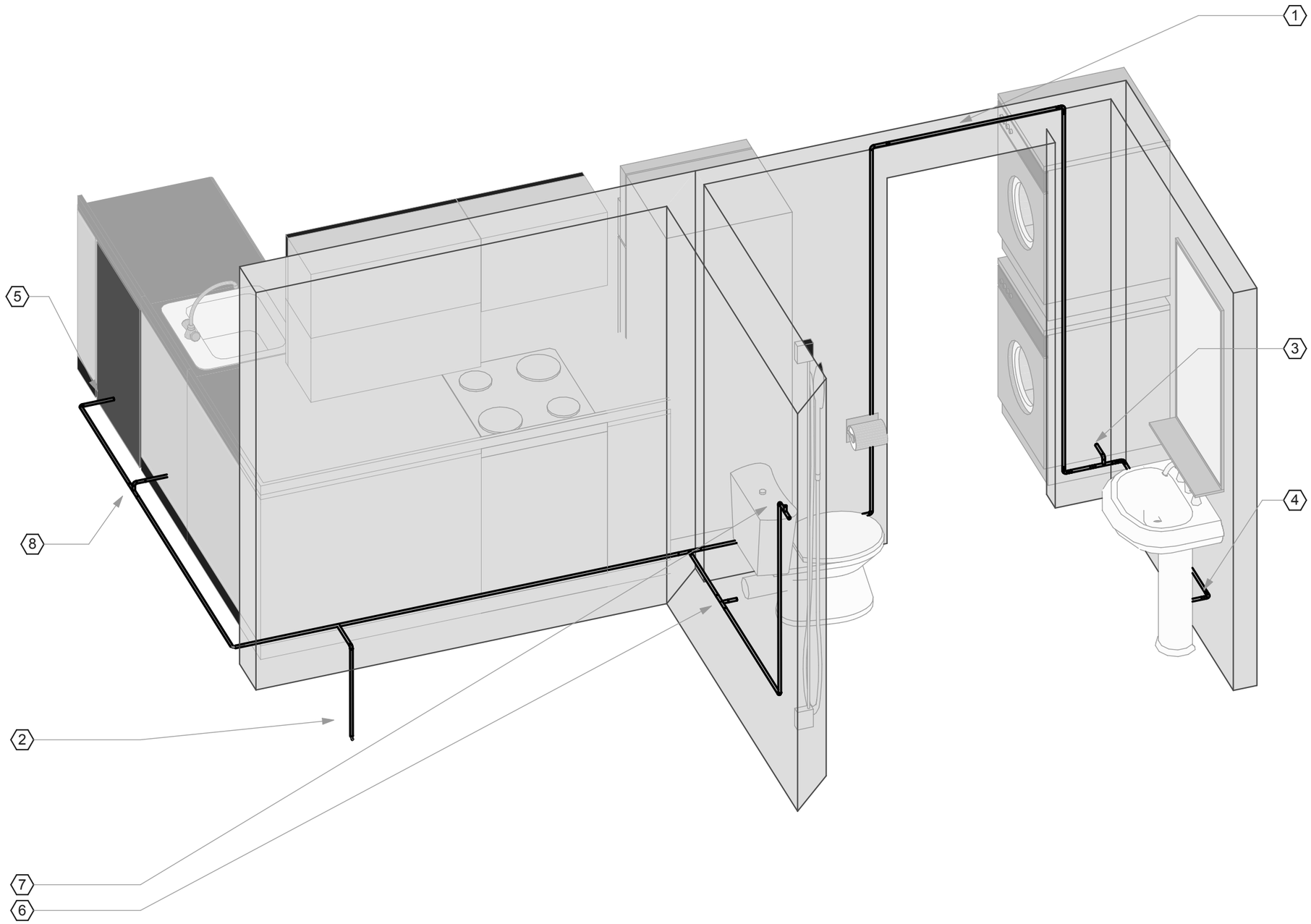

A1 3D DCW Riser Diagram

NOT TO SCALE

SHEET KEYNOTES

1 ACCESS PANEL ABOVE DOORWAY FOR PIPING CONNECTION BETWEEN MODULES
2 CONNECT TO DOMESTIC COLD WATER SUPPLY FROM MECH SHED, PER MECHANICAL SOLAR THERMAL PLAN
3 CONNECT TO CLOTHES WASHING MACHINE
4 CONNECT TO BATHROOM LAVATORY
5 CONNECT TO DISHWASHER
6 CONNECT TO WATER CLOSET
7 CONNECT TO SHOWER
8 CONNECT TO KITCHEN LAVATORY

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plumbing isometrics

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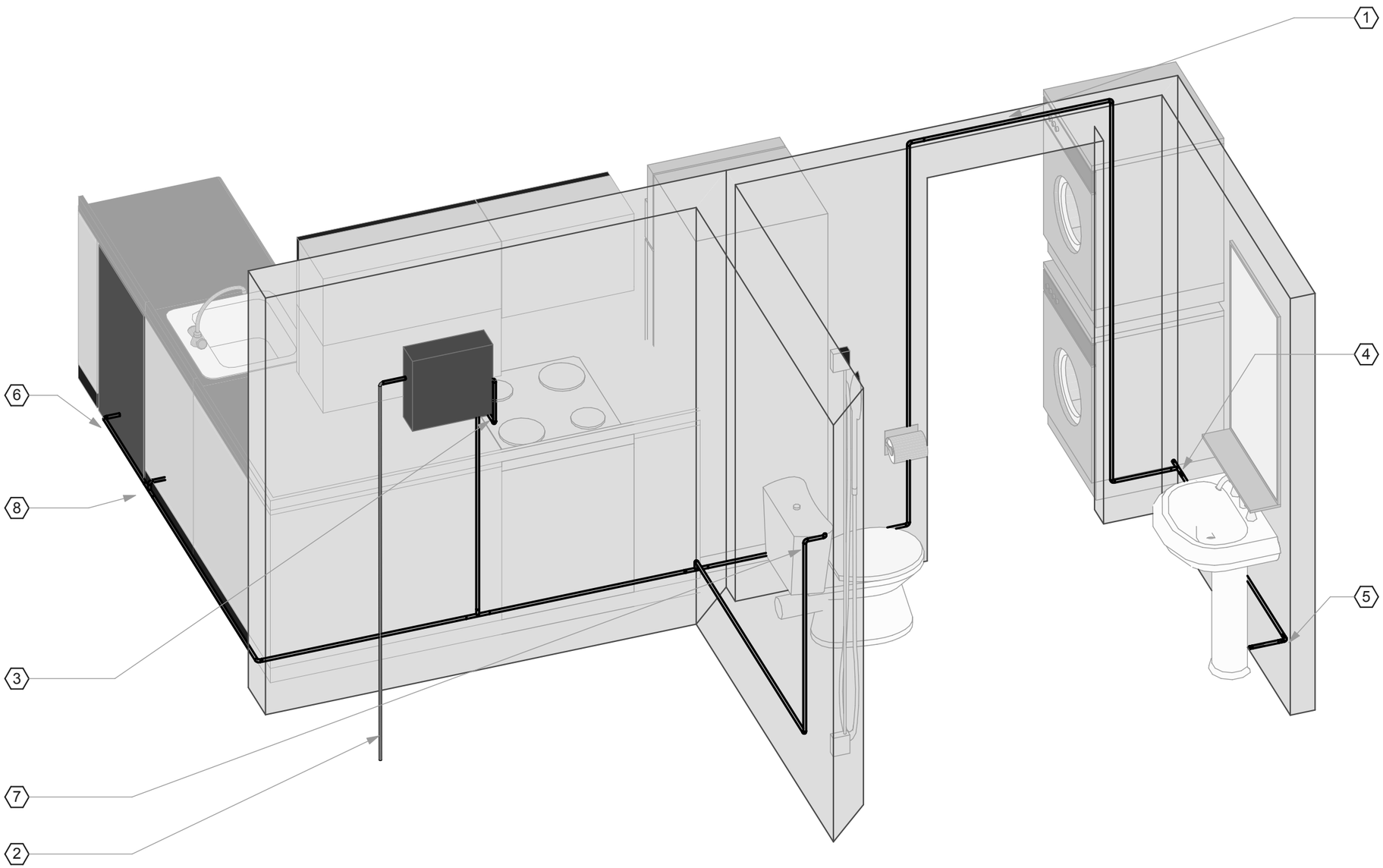

SHEET KEYNOTES

1 ACCESS PANEL ABOVE DOORWAY FOR PIPING CONNECTION BETWEEN MODULES
2 CONNECT TO DOMESTIC HOT WATER SUPPLY FROM MECH SHED, PER MECHANICAL SOLAR THERMAL PLAN
3 DOMESTIC HOT WATER INLINE HEATER
4 CONNECT TO CLOTHES WASHING MACHINE
5 CONNECT TO BATHROOM LAVATORY
6 CONNECT TO DISHWASHER
7 CONNECT TO SHOWER
8 CONNECT TO KITCHEN LAVATORY

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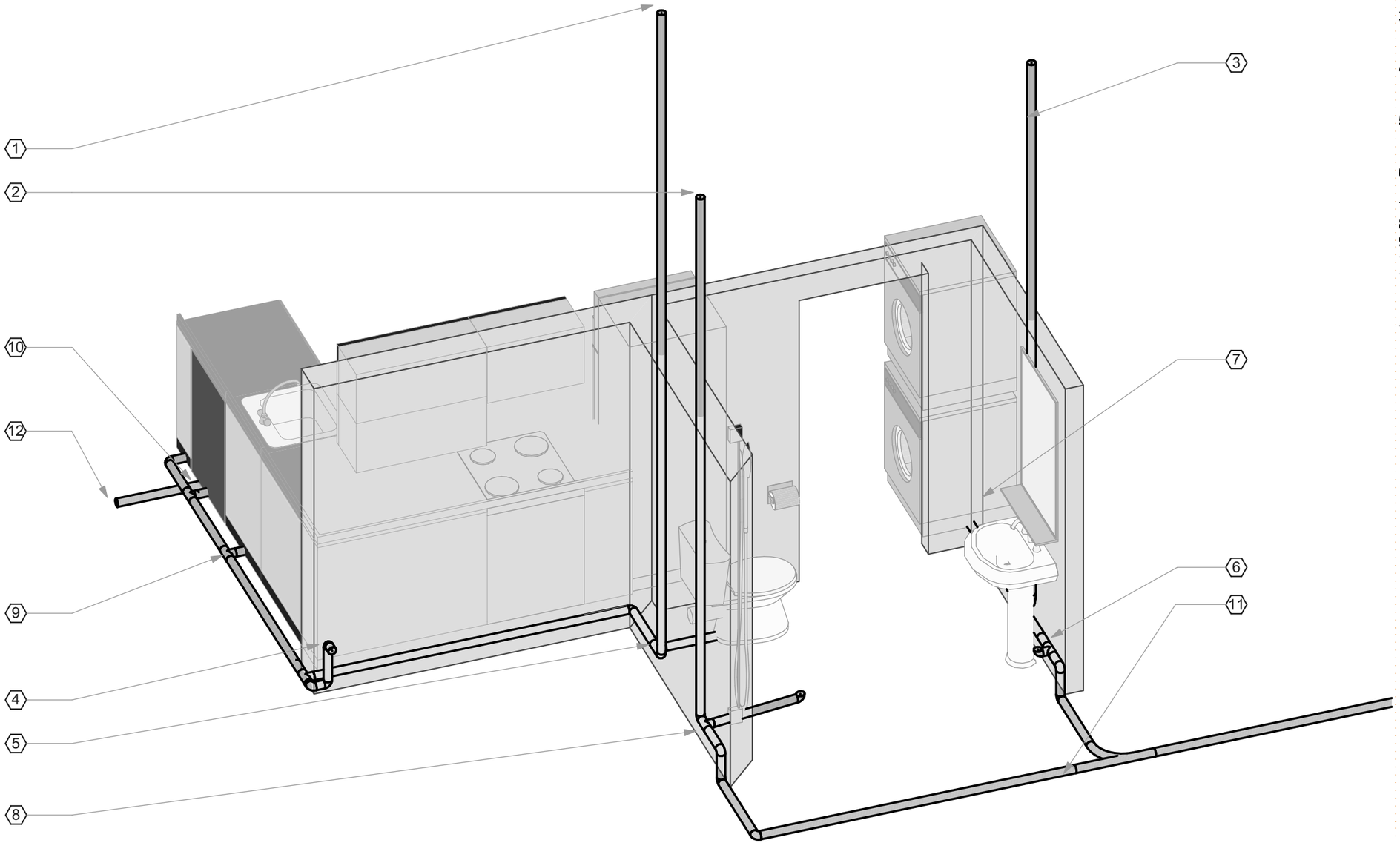
A1 3D DHW Riser Diagram

NOT TO SCALE



A1 Sanitary and Vents 3D Riser Diagram

NOT TO SCALE

SHEET KEYNOTES

1 2" DIAMETER VENT TO TOILET, KITCHEN LAVATORY, DISHWASHER
2 2" DIAMETER VENT TO SHOWER
3 2" DIAMETER VENT TO WASHING MACHINE, BATHROOM LAVATORY
4 ISLAND VENT TO DISHWASHER AND KITCHEN LAVATORY
5 FROM WATER CLOSET. NOT TO BE CONNECTED FOR COMPETITION
6 FROM BATHROOM LAVATORY
7 FROM WASHING MACHINE
8 FROM SHOWER
9 FROM KITCHEN LAVITORY
10 FROM DISHWASHER
11 2" DIAMETER PIPE TO GRAY WATER STORAGE TANK. SEE SITE IRRIGATION PLAN
12 2" DIAMETER PIPE TO BLACK WATER STORAGE TANK. SEE SITE IRRIGATION PLAN

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Thermal Technologies

Brutally cold Minnesota winters lead to very high heating loads—significantly higher than would occur in even the worst case weather during the competition in Washington, DC. This is parallel to a challenge all thermal system designers face: in order to meet winter heating loads, systems must be sized such that a lot of solar thermal energy is wasted during the summer months. To meet this challenge we need to have a thermal system that is both optimally sized for the Solar Decathlon competition and for Minnesota winters. We have designed a system that is as unique as the challenges posed by our cold, northern locale.

Veissmann flat plate solar thermal panels and tanks form the heart of the solar-thermal system's collection and storage. The panels are located on the south roof and wall. The system will use that thermal energy to meet not only domestic hot water loads and heating loads, but also to meet the home's latent cooling loads. During summer months in Minnesota and humid days at the competition, an open-cycle liquid desiccant dehumidification system will use thermal energy to latently cool. Latent cooling is the process of taking humidity out of the air. In essence, we will be using heat to cool. During the winters in Minnesota and cold nights at the competition, the solar-thermal system will supply heat to a radiant floor heating system. In short, the thermal system is flexible enough to be close to optimal during both the summer and the winter, and in locations as different as Washington, DC and Minneapolis, MN.
The liquid desiccant dehumidification system is a custom experimental system. It utilizes the material properties of desiccants to remove the water vapor in the air. A desiccant is a material, usually a solution or a solid, that attracts and holds water, and then releases that water when it is heated. This is how we will use heat to latently cool. The liquid desiccant solution we are using is an aqueous salt solution of Lithium Chloride (LiCl) and Calcium Chloride (CaCl). In order to facilitate the transfer of water vapor to and from the liquid desiccant we are using randomly packed columns with a counter flow arrangement.

The desiccant dehumidification system consists of two main steps: dehumidification and regeneration. For dehumidification, the desiccant solution is sprayed into the packed column and the air from the house is brought in from the bottom. The liquid desiccant draws in water vapor, and the now dehumidified air leaves the top of the column and goes back to the house at a lower relative humidity. The desiccant from the dehumidifier is pumped to a heat exchanger and heated before it enters the regenerator. In the regenerator, the process works in reverse. Outside air goes up through the column and takes water vapor with it. The desiccant, now ready to be used again, is then pumped back to the dehumidifier to complete the cycle.

The sensible cooling is handled by a wall mounted, mini-split heat pump air conditioning (AC) unit while the ventilation of the house is done with a Energy Recovery Ventilator (ERV). In general, the addition of an ERV improves efficiency by transferring energy from conditioned exhaust air to new outside intake air prior to entering the house. By using the ERV and liquid desiccant dehumidification system to remove the latent cooling load, we can improve the efficiency of the AC unit. In a regular home, the AC unit cools the air below the dew point (condensation) and then reheats it to the set temperature. This process requires a significant amount of energy. Also, by choosing a variable-speed modular system, we can accommodate the changing cooling loads expected during the competition and have flexibility throughout the seasons.

Due to the small size of our house and the very open floor plan, the Uponor radiant floor heating system required only a single water loop to meet both the large heating loads of a Minnesota winter and the small heating loads of the cool Washington, DC nights. This level of performance is a testament to the efficiency and flexibility of the radiant floor system, which delivers heat at low temperature by utilizing the superb energy storage capacity of water compared to air. Delivering heat at low temperature, just degrees above the desired comfort zone temperature, means that the radiant floor system heats the house using less energy. To further compliment this efficiency, we have selected the Baunach RendeMIX for mixing down the temperature of the hot water from the storage tank to the operating temperature of the radiant floor. This innovative mixer selectively draws water from the middle or top of the storage tank in order to maintain stratification in the tank, which improves the efficiency of the solar thermal system as a whole.

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notes

M-001

SYMBOLS

MARK	DESCRIPTION
	Pump
	Check Valve
	Shut off Valve
	Mixing Valve
	Pressure Release VIV
	Controllable 3-Way Valve
	In Line Heater
	Pressure Gauge
	Gravity Check
	Flanged Pipe Turn
	Elbow Turned Down
	Elbow Turned Up
	Duct or Column Up
	Blower
	Filter
	Duct Transition
	Flexible Duct
	Volume Damper

SYMBOLS (CONT.)

MARK	DESCRIPTION
	Square to Round Duct Transition
	Supply Grilled Viewed From Above
	Exhaust/Return Air Up
	Exhaust/Return Air Down

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symbols

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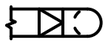
SYMBOLS (CONT.)

MARK (SCHEMATICS)	MARK (2D TOP)	MARK (2D ELEVATION)		DESCRIPTION
				Square to Round Duct Transition
				Supply Grilled Viewed From Above
				Exhaust/Return Air Up
				Exhaust/Return Air Down

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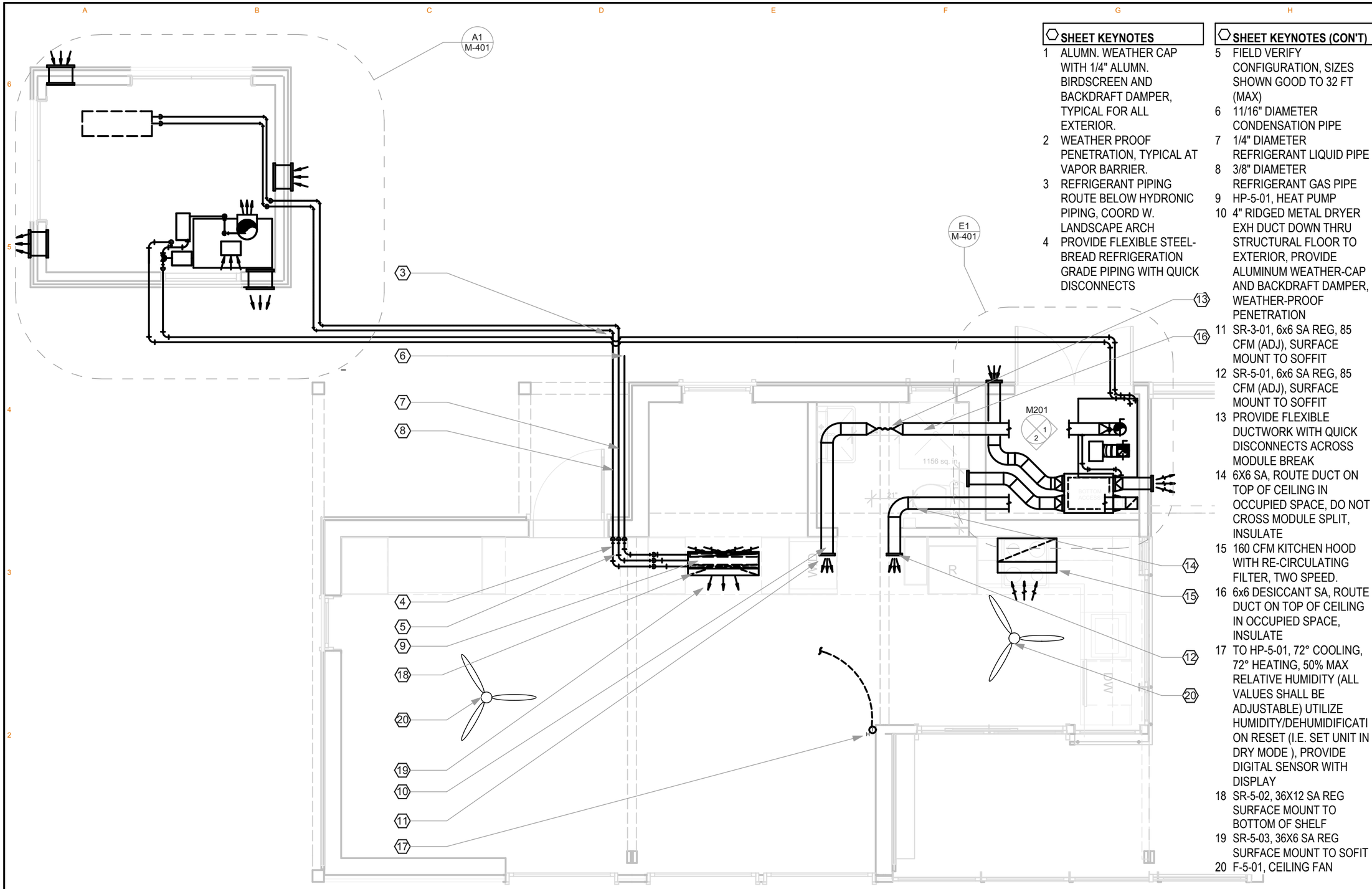

SHEET KEYNOTES

1 ALUMN. WEATHER CAP WITH 1/4" ALUMN. BIRDSCREEN AND BACKDRAFT DAMPER, TYPICAL FOR ALL EXTERIOR.
2 WEATHER PROOF PENETRATION, TYPICAL AT VAPOR BARRIER.
3 REFRIGERANT PIPING ROUTE BELOW HYDRONIC PIPING, COORD W. LANDSCAPE ARCH
4 PROVIDE FLEXIBLE STEEL-BREAD REFRIGERATION GRADE PIPING WITH QUICK DISCONNECTS

SHEET KEYNOTES (CON'T)

5 FIELD VERIFY CONFIGURATION, SIZES SHOWN GOOD TO 32 FT (MAX)
6 11/16" DIAMETER CONDENSATION PIPE
7 1/4" DIAMETER REFRIGERANT LIQUID PIPE
8 3/8" DIAMETER REFRIGERANT GAS PIPE
9 HP-5-01, HEAT PUMP
10 4" RIDGED METAL DRYER EXH DUCT DOWN THRU STRUCTURAL FLOOR TO EXTERIOR, PROVIDE ALUMINUM WEATHER-CAP AND BACKDRAFT DAMPER, WEATHER-PROOF PENETRATION
11 SR-3-01, 6x6 SA REG, 85 CFM (ADJ), SURFACE MOUNT TO SOFFIT
12 SR-5-01, 6x6 SA REG, 85 CFM (ADJ), SURFACE MOUNT TO SOFFIT
13 PROVIDE FLEXIBLE DUCTWORK WITH QUICK DISCONNECTS ACROSS MODULE BREAK
14 6X6 SA, ROUTE DUCT ON TOP OF CEILING IN OCCUPIED SPACE, DO NOT CROSS MODULE SPLIT, INSULATE
15 160 CFM KITCHEN HOOD WITH RE-CIRCULATING FILTER, TWO SPEED.
16 6x6 DESICCANT SA, ROUTE DUCT ON TOP OF CEILING IN OCCUPIED SPACE, INSULATE
17 TO HP-5-01, 72° COOLING, 72° HEATING, 50% MAX RELATIVE HUMIDITY (ALL VALUES SHALL BE ADJUSTABLE) UTILIZE HUMIDITY/DEHUMIDIFICATION RESET (I.E. SET UNIT IN DRY MODE), PROVIDE DIGITAL SENSOR WITH DISPLAY
18 SR-5-02, 36X12 SA REG SURFACE MOUNT TO BOTTOM OF SHELF
19 SR-5-03, 36X6 SA REG SURFACE MOUNT TO SOFIT
20 F-5-01, CEILING FAN

A1 Mechanical - Ventilation + Cooling Plan
SCALE: 1/4" = 1'-0"

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hvac plan

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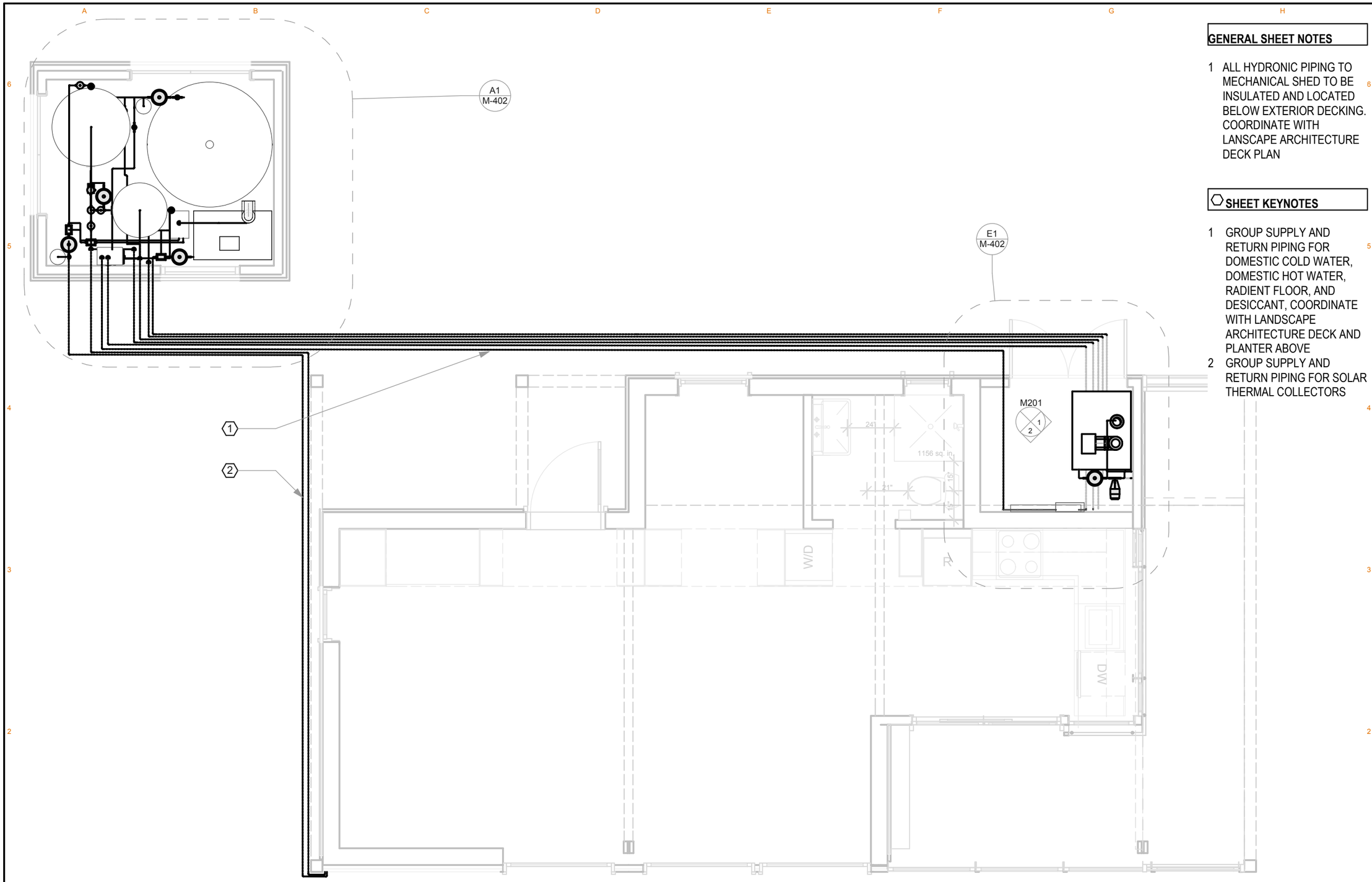

GENERAL SHEET NOTES

1 ALL HYDRONIC PIPING TO MECHANICAL SHED TO BE INSULATED AND LOCATED BELOW EXTERIOR DECKING. COORDINATE WITH LANSCAPE ARCHITECTURE DECK PLAN

SHEET KEYNOTES

1 GROUP SUPPLY AND RETURN PIPING FOR DOMESTIC COLD WATER, DOMESTIC HOT WATER, RADIENT FLOOR, AND DESICCANT, COORDINATE WITH LANDSCAPE ARCHITECTURE DECK AND PLANTER ABOVE

2 GROUP SUPPLY AND RETURN PIPING FOR SOLAR THERMAL COLLECTORS

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Solar Thermal

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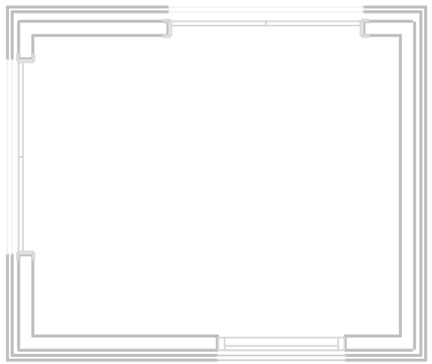
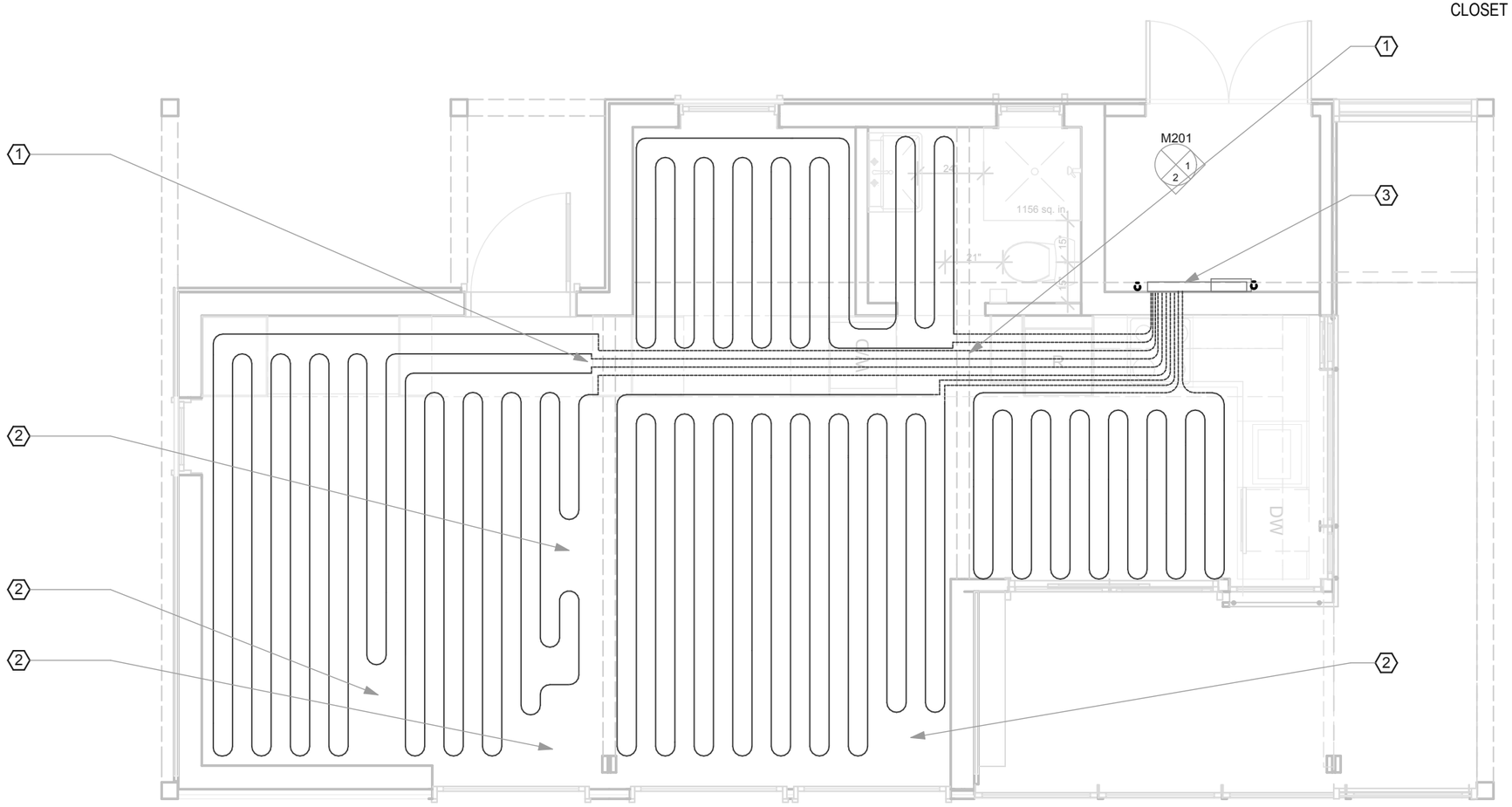
A1 Mechanical - Solar Thermal & Desiccant Plan
SCALE: 1/4" = 1'-0"





GENERAL SHEET NOTES

1 QUIKTRAK SYSTEM BY UPONOR
2 (5) LOOPS TO CENTRAL MAINFOLD

SHEET KEYNOTES

1 ACCESS PANEL IN FLOOR TO CONNECT ACROSS MODULE SPLIT LINE
2 ADJUST LOOP TO ACCOMEDATE IN FLOOR RECEPTICAL AS PER SHEET E-103
3 CONNECT LOOPS TO MANIFOLD IN MECHANICAL CLOSET

PLAN NORTH

A1 Radiant Floor Layout
SCALE: 1/4" = 1'-0"

0 2' 4' 8'

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radiant floor

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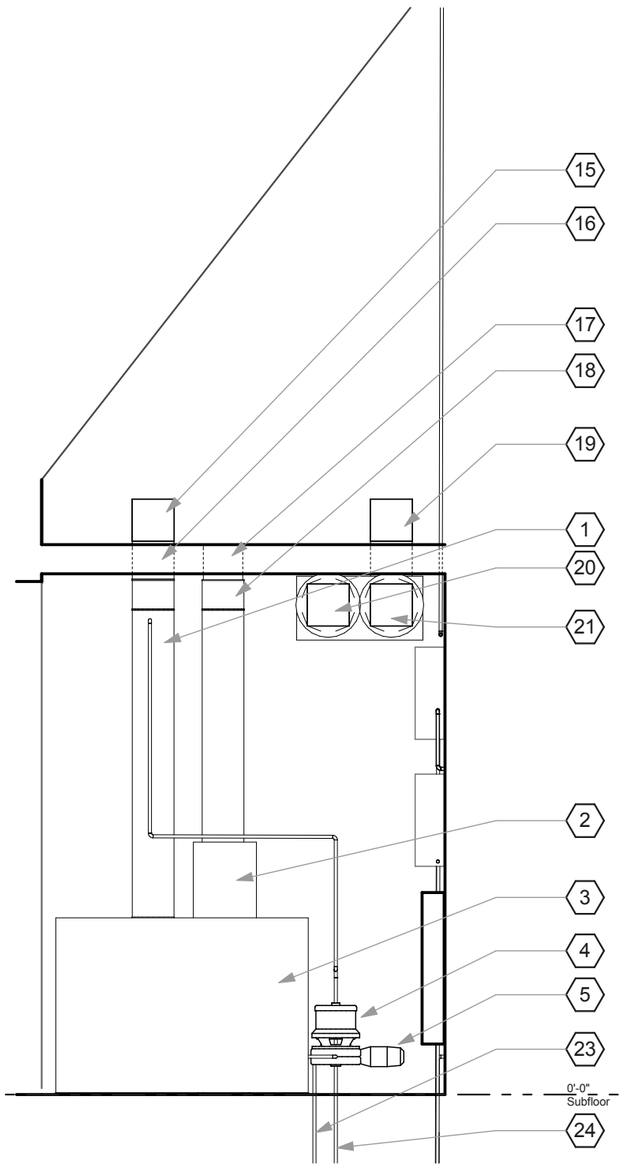
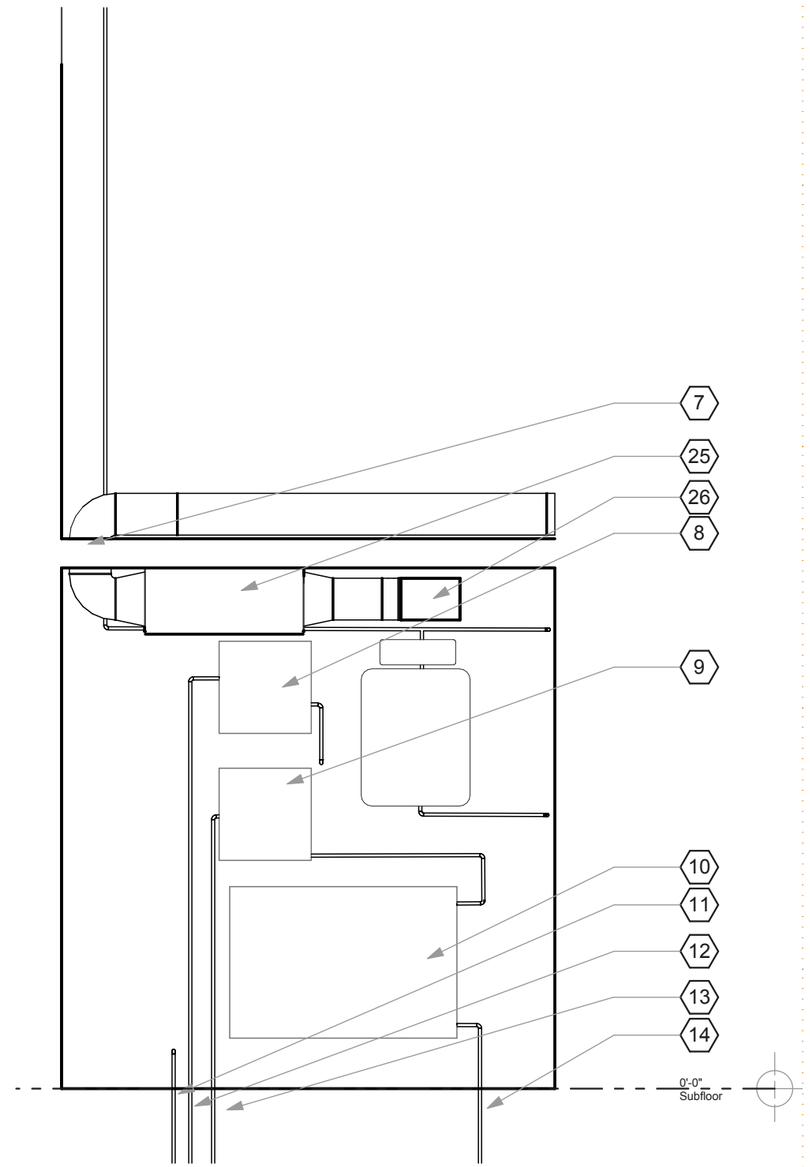


A1 East Elevation

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

0 1' 2' 4'



D1 South Elevation

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

0 1' 2' 4'

GENERAL SHEET NOTES

1 SEE E-201 FOR MIN. CLEARANCE DIMENSIONS AROUND ALL ELECTRICAL EQUIPMENT

SHEET KEYNOTES

1 6" ROUND, RANDOMLY PACKED COLUMN
2 B-3-01, DEHUMIDIFIER BLOWER
3 WEAK STORAGE TANK
4 P-3-01 PUMP
5 VA-3-01, CONTROLLABLE 3 WAY VALVE
6 ELECTRICAL CONDUIT FROM COMBINER BOX ON ROOF
7 ELECTRICAL CONDUIT TO INVERTERS
8 DOMESTIC HOT WATER INLINE ELECTRIC HEATER
9 RADIANT FLOOR INLINE ELECTRIC HEATER
10 RADIANT FLOOR MANIFOLD
11 DOMESTIC COLD WATER SUPPLY CONNECTION
12 DOMESTIC HOT WATER SUPPLY CONNECTION
13 RADIANT FLOOR SUPPLY CONNECTION
14 RADIANT FLOOR RETURN CONNECTION
15 VOLUME DAMPER
16 6" DOWN TO DESICCANT CHAIMBER
17 RG-3-01. 6X6 RA GR, 85 CFM (ADJ USING VOLUME DAMPER), SURFACE MOUNT TO CEILING IN OCCUPIED SPACE
18 TRANSITION FROM 6X6 TO 6" VERTICAL AND CONNECT TO SUCTION SIDE OF DESICCANT BLOWER
19 6X6 DOWN TO ERV, BOTTOM ACCESS
23 SUPPLY TO DESICCANT DEHUMIDIFIER
24 RETURN FROM DESICCANT DEHUMIDIFIER
25 ERV-5-01, ENERGY RECOVERY VENTILATOR
26 6x6 OUTSIDE AIR, INSULATE

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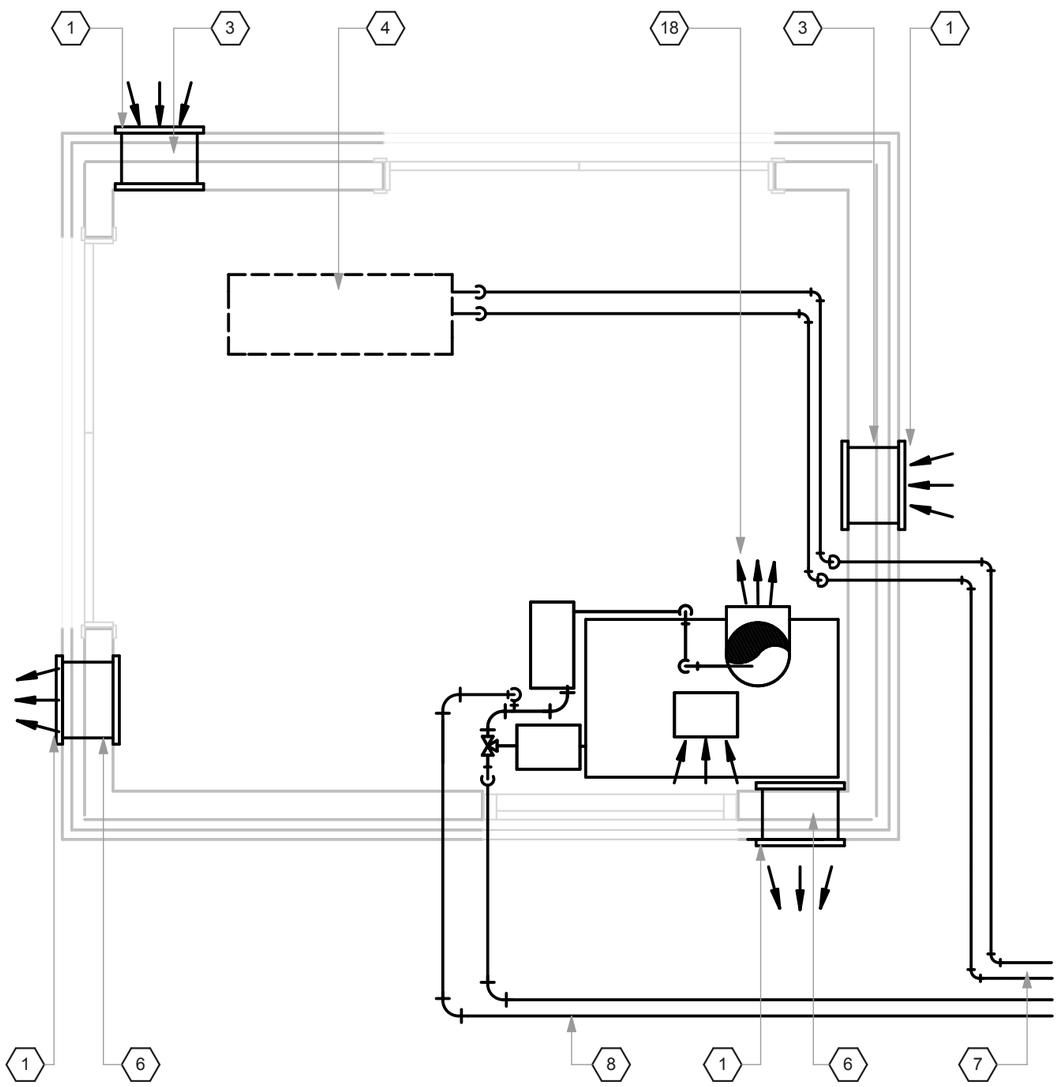
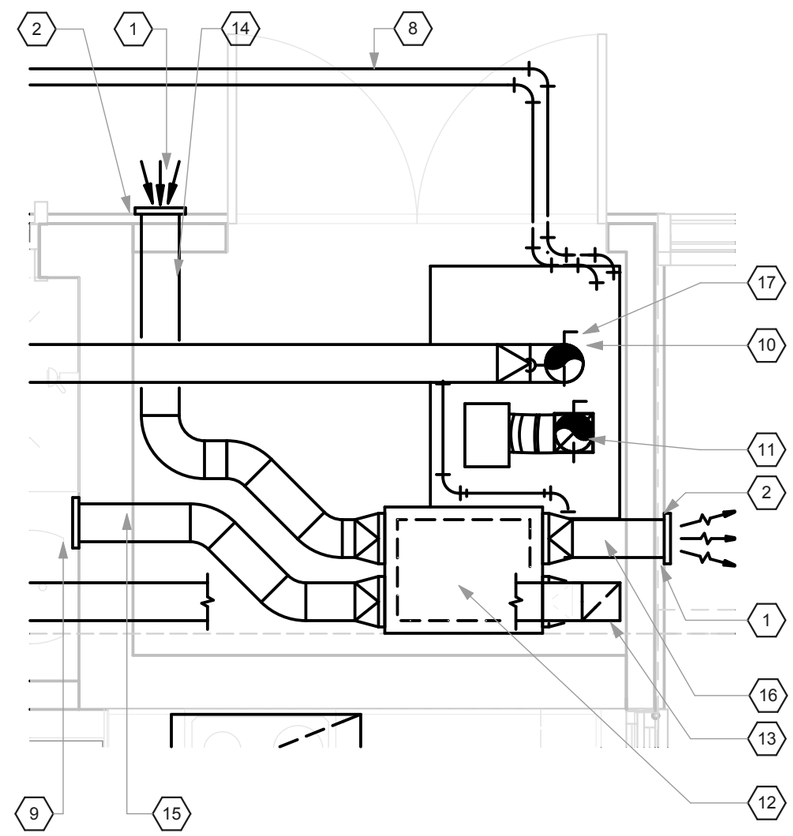
elevations

M-201



A1 Mechanical Shed - HVAC
SCALE: 1/2" = 1'-0"



E1 Mechanical Closet - HVAC
SCALE: 1/2" = 1'-0"

SHEET KEYNOTES

1 ALUMN. WEATHER CAP WITH 1/4" ALUMN. BIRDSCREEN AND BACKDRAFT DAMPER, TYPICAL FOR ALL EXTERIOR.
2 WEATHER PROOF PENETRATION, TYPICAL AT VAPOR BARRIER.
3 RG-5-02, 12x6 PASSIVE VENT, SURFACE MOUNT APPROX 12" AFF, COORDINATE LOCATION WITH MECH SHED EQUIPMENT
4 CU-5-01, ROOF-MOUTED AIR-COOLED CONDENSING UNIT
5 -
6 RG-5-02, 12x6 PASSIVE VENT, SURFACE MOUNT APPROX 60" AFF, COORDINATE LOCATION WITH MECH SHED EQUIPMENT
7 REFRIGERANT PIPING, COORD W/ LANDSCAPE ARCH
8 DESICCANT PIPING, COORD W/ LANDSCAPE ARCH
9 RG-5-01, 6x6 RA GR, 85 CFM, SURFACE MOUNT TO WALL
10 6" DOWN TO DESICCANT CHAMBER DISCHARGE/OUTLET CONNECTION
11 RG-3-01. 6X6 RA GR, 85 CFM (ADJ USING VOLUME DAMPER), TRANSITION FROM 6X6 TO 6" VERTICAL AND CONNECT TO SUCTION SIDE OF DESICCANT BLOWER, SURFACE MOUNT TO CEILING IN OCCUPIED SPACE
12 ERV-5-01 ENERGY RECOVERY VENTILATOR, BOTTOM ACCESS
13 6X6 DOWN TO ERV
14 6x6 OUTSIDE AIR, INSULATE
15 6x6 RA, INSULATE
16 6x6 EA, INSULATE
17 VOLUME DAMPER
18 6" ROUND DUCTING FROM TOP OF DESICCANT COLUMN THROUGH SHED ROOF, EXHAUST HORIZONTAL AWAY FROM HOUSE W. EXHAUST GRILLE

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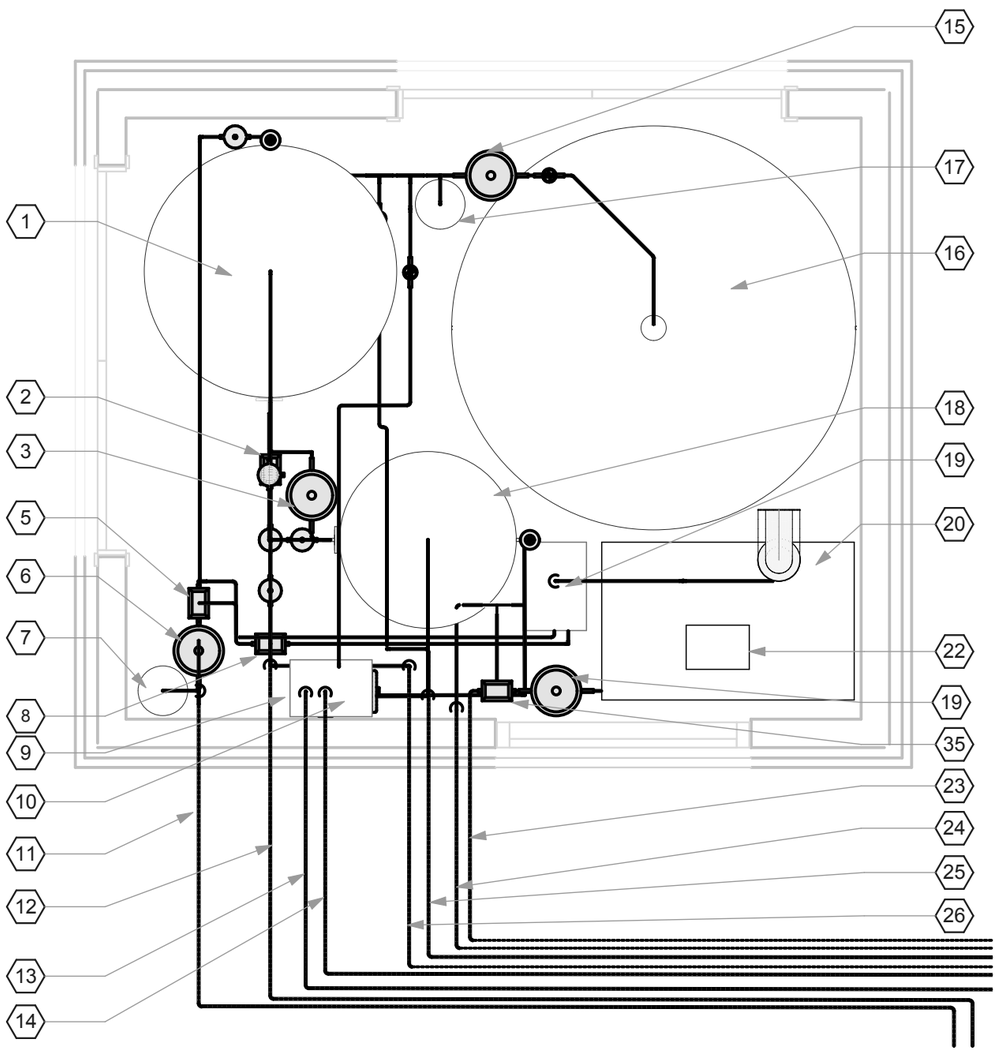
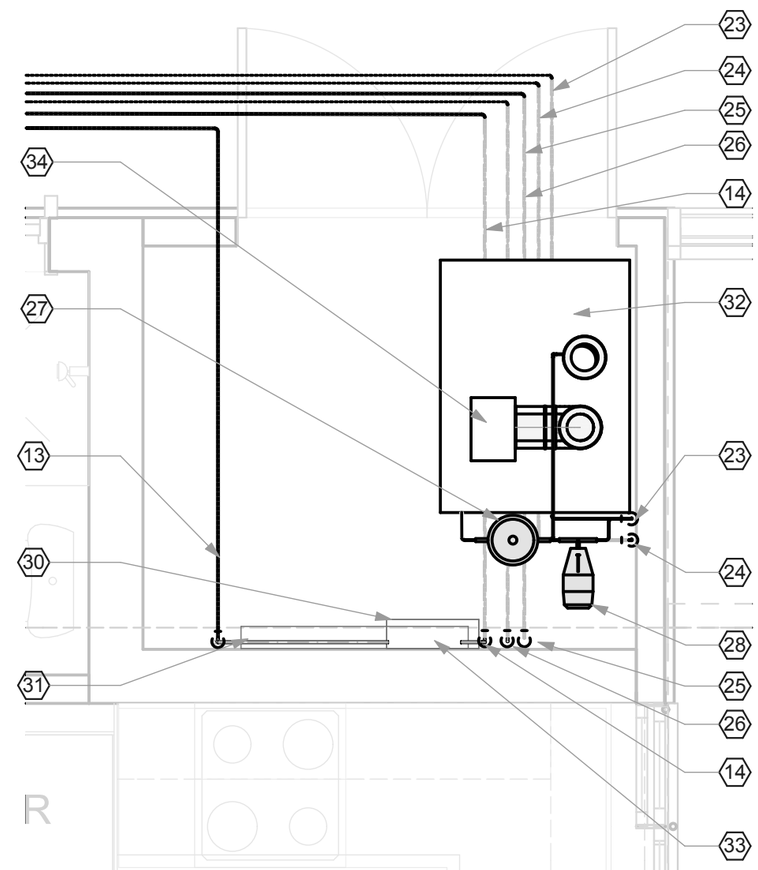


A1 Mechanical Shed - Thermal
SCALE: 1/2" = 1'-0"



E1 Mechanical Closet - Thermal
SCALE: 1/2" = 1'-0"

SHEET KEYNOTES

1 TK-2-01 DOMESTIC HOT WATER HEAT EXCHANGE TANK
2 VA-2-03 CONTROLLABLE 3-WAY VALVE
3 P-2-03 PUMP
5 VA-2-01 CONTROLLABLE 3-WAY VALVE
6 P-2-01 PUMP
7 TK-2-08 EXPANSION TANK
8 VA-2-02 CONTROLLABLE 3-WAY VALVE
9 P-2-04 PUMP (BELOW)
10 BAUNACH RENDERMIX VALVE
11 RETURN FROM SOLAR THERMAL COLLECTOR PANELS

SHEET KEYNOTES (CONT.)

12 SUPPLY TO SOLAR THERMAL COLLECTOR PANELS
13 RETURN FROM RADIANT FLOOR
14 SUPPLY TO RADIANT FLOOR
15 P-2-02 DOMESTIC WATER PRESURE PUMP
16 TK-2-04 PRIMARY DOMESTIC WATER SUPPLY TANK WITH 4" DIAMETER HOSE CONNECTION ON TOP
17 TK-2-06, EXPANSION TANK
18 TK-2-02 SPACE HEATING TANK
19 P-3-02 REGENERATOR PUMP
20 STRONG STORAGE
21 HX-3-01 HEAT EXCHANGER
22 B-3-02, OUTSIDE AIR BLOWER W. FILTER
23 SUPPLY TO DESICCANT DEHUMIDIFIER
24 RETURN FROM DESICCANT DEHUMIDIFIER
25 SUPPLY TO DOMESTIC COLD WATER
26 SUPPLY TO DOMESTIC HOT WATER
27 P-3-01, DEHUMIDIFIER PUMP
28 VA-3-01 AUTOMATIC 3 WAY VALVE
29 VM-2-05
30 RADIANT FLOOR INLINE ELECTRIC HEATER (BELOW)
31 RADIANT FLOOR MANIFOLD (BELOW)
32 WEAK STORAGE
33 DOMESTIC HOT WATER INLINE ELECTRIC HEATER
34 B-3-01, DEHUMIDIFIER INTERIOR AIR CIRCULATION BLOWER

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solar thermal

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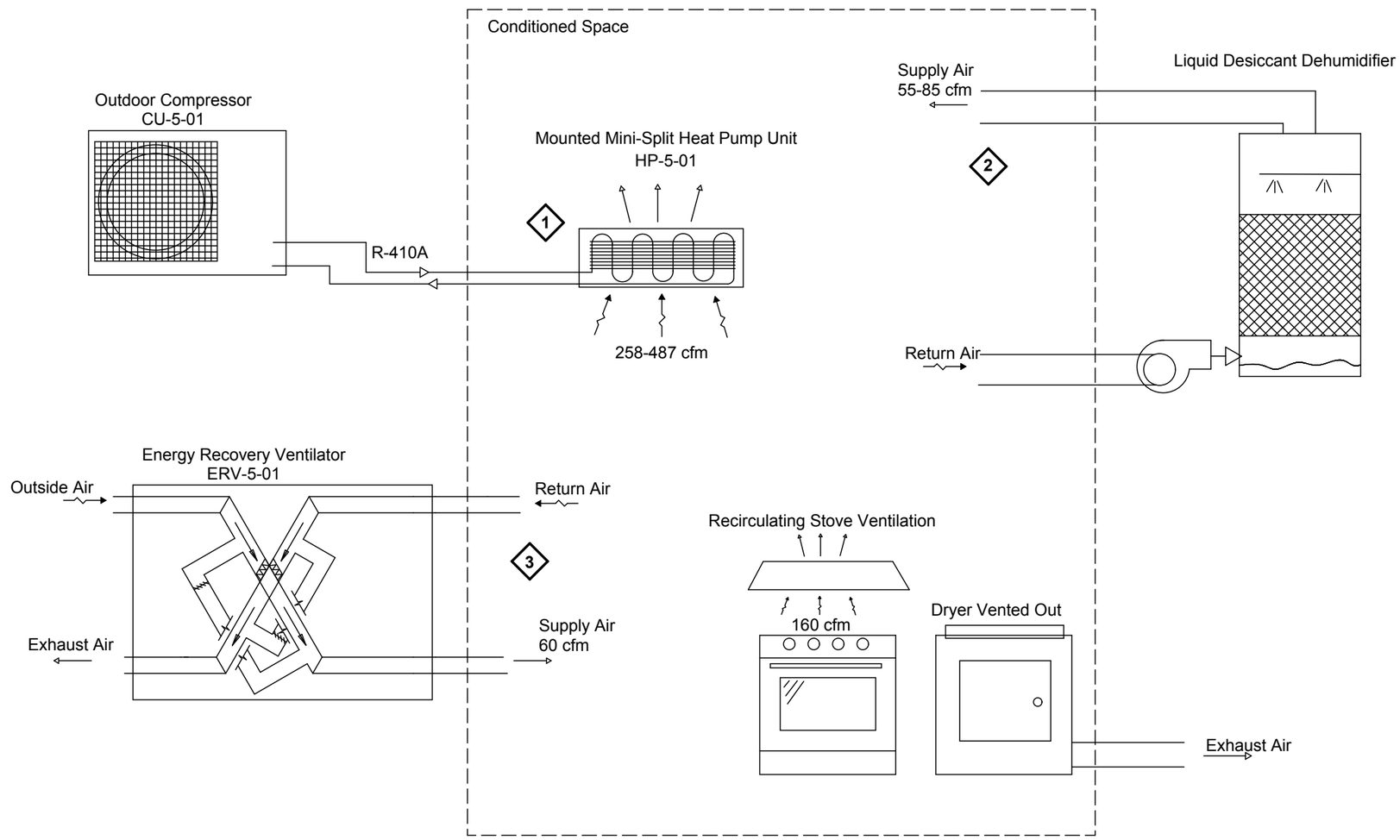

A1 HVAC SCHEMATIC

NOT TO SCALE

OPERATIONS KEY

MARK	DESCRIPTION
1	SENSIBLE COOLING IS DONE WITH A MINI-SPLIT HEAT PUMP UNIT THAT IS MOUNTED W/IN THE INTEGRATED DELIVERY SHELVING. IT ALSO SERVES AS A BACKUP TO REMOVE HUMIDITY IN THE SUMMER AND HEAT IN THE WINTER.
2	AN OPEN-CYCLE LIQUID DESICCANT DEHUMIDIFICATION SYSTEM REMOVES EXCESS HUMIDITY IN THE SPACE. SEE DRAWING M-603 FOR SYSTEM SCHEMATIC.
3	THE ENERGY RECOVERY VENTILATOR SUPPLIES FRESH AIR TO THE SPACE. THE OUTSIDE AIR IS PARTIALLY CONDITIONED BY THE RETURN AIR, SAVING ENERGY.

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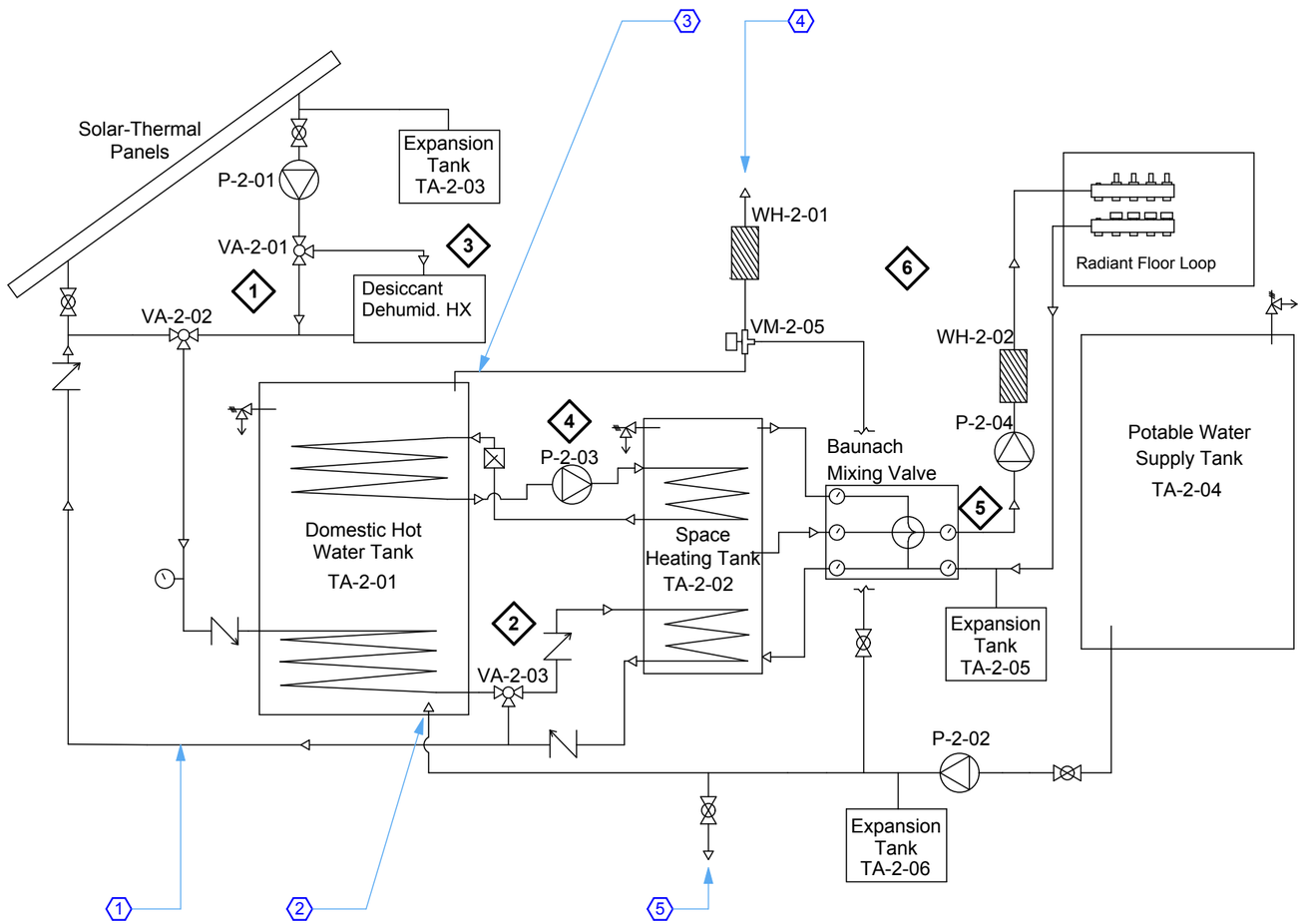

A1 Solar Thermal Schematic

NOT TO SCALE

OPERATIONS KEY

MARK	DESCRIPTION
1	AN AUTOMATIC THREE-WAY VALVE (VA-2-01) DIRECTS THE SOLAR LOOP FLOW EITHER ACROSS THE DESICCANT HEAT EXCHANGER (AS NECESSARY) OR STRAIGHT TO THE DOMESTIC HOT WATER TANK. IF THE SOLAR LOOP FLUID AFTER CHARGING THE DESICCANT SYSTEM IS COOLER THAN THE TEMPERATURES AT THE BOTTOM OF THE DOMESTIC HOT WATER TANK, VALVE VA-2-02 DIRECTS THE FLOW BACK TO THE SOLAR THERMAL PANELS. OTHERWISE, THE DESICCANT HEAT EXCHANGER AND DOMESTIC HOT WATER TANK HEAT EXCHANGER RUN IN SERIES.
2	IF THE TEMPERATURE OF THE SOLAR LOOP FLUID EXITS THE DOMESTIC HOT WATER TANK HEAT EXCHANGER COOLER THAN THE WATER IN THE BOTTOM OF THE SPACE HEATING TANK, VALVE VA-2-03 DIRECTS THE SOLAR LOOP FLOW BACK TO THE SOLAR THERMAL PANELS. OTHERWISE, THE HEAT EXCHANGERS IN THE DOMESTIC HOT WATER TANK AND SPACE HEATING TANK ARE RUN IN SERIES.
3	AN OPEN-CYCLE LIQUID DESICCANT DEHUMIDIFICATION SYSTEM REMOVES EXCESS HUMIDITY IN THE SPACE. SEE DRAWING M-603 FOR SYSTEM SCHEMATIC.
4	THE UPPER HEAT EXCHANGERS IN THE DOMESTIC HOT WATER AND SPACE HEATING TANKS ARE CONNECTED IN A LOOP TO ALLOW FOR THE TRANSFER OF HEAT FROM ONE TANK TO THE OTHER AS NECESSARY.
5	THE RADIANT FLOOR SYSTEM PULLS ENERGY FROM THE SPACE HEATING TANK USING A BAUNACH RENDEMIX TO MIX DOWN THE TEMPERATURE OF THE HOT WATER FROM THE STORAGE TANK TO THE OPERATING TEMPERATURE OF THE RADIANT FLOOR. THIS INNOVATIVE MIXER SELECTIVELY DRAWS WATER FROM THE MIDDLE OR TOP OF THE STORAGE TANK IN ORDER TO MAINTAIN STRATIFICATION IN THE TANK, IMPROVING THE EFFICIENCY OF THE SOLAR THERMAL SYSTEM AS A WHOLE.
6	TO AUXILIARY INLINE ELECTRIC HEATERS (ONE EACH FOR THE DOMESTIC HOT WATER SYSTEM AND SPACE HEATING SYSTEM) PROVIDE ADDITIONAL HEAT AS NECESSARY, TO ENSURE THE SPACE HEATING AND DOMESTIC HOT WATER SYSTEMS FUNCTION PROPERLY AT ALL TIMES.

SHEET KEYNOTES

1. WATER-GLYCOL MIX, 10% PROPYLENE GLYCOL
2. DOMESTIC HOT WATER IN
3. DOMESTIC HOT WATER OUT
4. TO DOMESTIC HOT WATER LOAD
5. TO DOMESTIC COLD WATER LOAD

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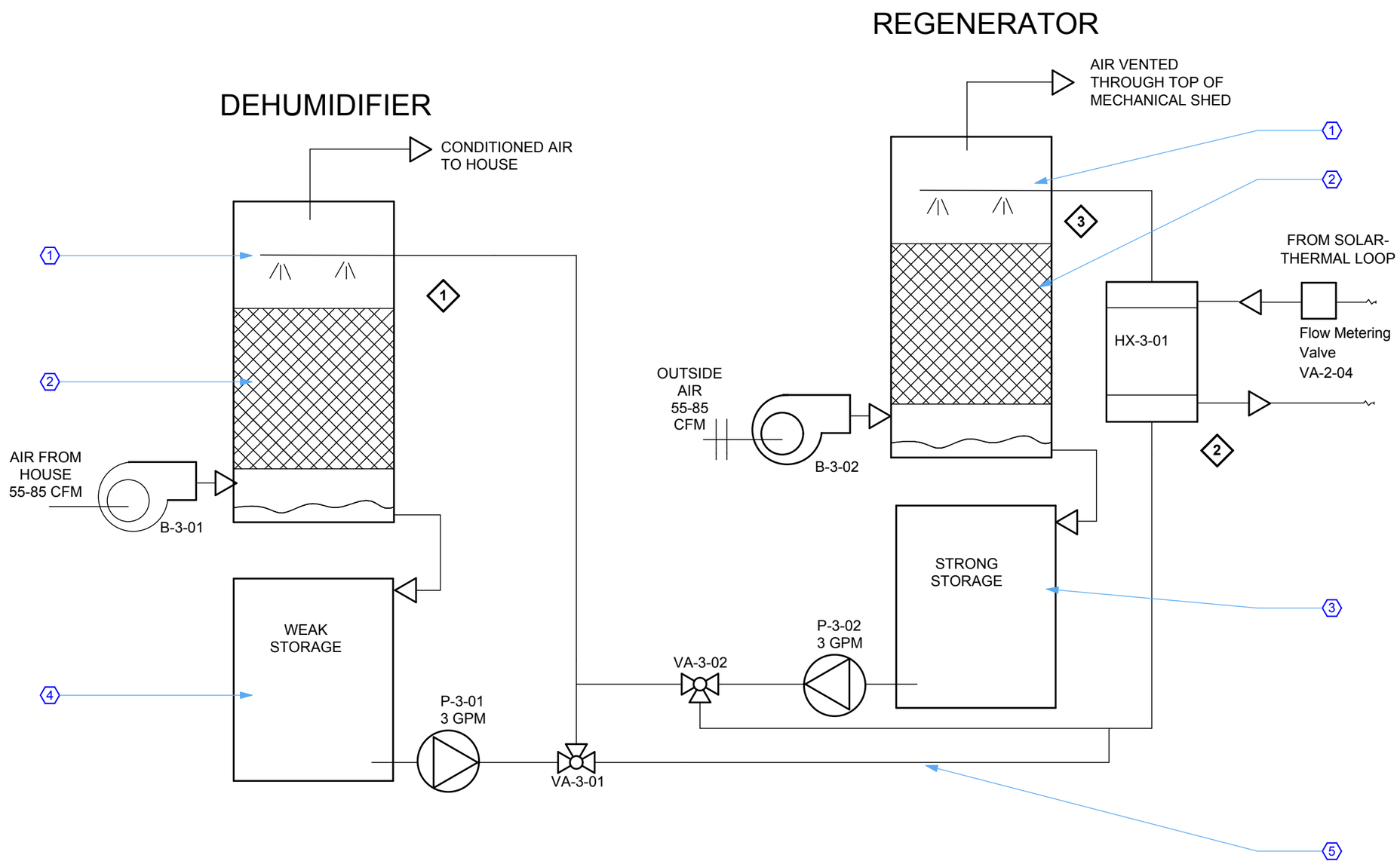

A1 Desiccant Schematic

NOT TO SCALE

SHEET KEYNOTES

1. (2) NOZZLES ΔP = 6.5 PSI
2. RANDOM PACKING ΔP=1.5 PSI
3. STRONG STORAGE: LICL AND CACL AQ. SOLUTION STORAGE TANK, 100 GAL
4. WEAK STORAGE: LICL AND CACL AQ. SOLUTION STORAGE TANK, 100 GAL
5. 1/2" ID PFA TUBING

OPERATIONS KEY	
MARK	DESCRIPTION
1	AN AQUEOUS SOLUTION OF LICL AND CACL AT .4 MASS CONCENTRATION IS SPRAYED INTO THE RANDOMLY PACKED COLUMN. THE LIQUID DESICCANT DRAWS IN WATER VAPOR, AND IS THEN STORED IN THE WEAK STORAGE TANK.
2	THE DESICCANT FROM THE DEHUMIDIFIER IS PUMPED TO THE HEAT EXCHANGER. THE HEAT EXCHANGER IS CONNECTED TO THE SOLAR-THERMAL ARRAY OPERATING AT 60°– 80° C.
3	IN THE REGENERATOR, THE PROCESS WORKS IN REVERSE. OUTSIDE AIR GOES UP THROUGH THE COLUMN AND TAKES WATER VAPOR WITH IT. THE DESICCANT SOLUTION, NOW WITH MUCH LESS WATER IN IT, IS THEN PUMPED TO A TANK WHICH IS RESERVE FOR THE DEHUMIDIFIER.

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desiccant

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HEAT PUMP SCHEDULE

MARK	MFR	MODEL	SIZE, HxWxD mm (INCH)	WEIGHT, kg (Lbs)	COOLING		HEATING		ELECTRICAL				SOUND, dBA, COOLING, 3-SPEED	NOTES
					m^3/s (CFM)	W (kBtu/hr)	m^3/s (CFM)	W (kBtu/hr)	MOTOR OUTPUT, W (hp)	RUNNING CURRENT, AMPS, COOL/HEAT	POWER CONSUMPTION, W, COOL/HEAT	POWER FACTOR, %, COOL/HEAT		
HP-5-01	DAIKIN	FTXG15HVJU	305x891x210 (12x35x8.25)	17 (38)	.230 (487)	4396 (15.0)	.233 (494)	5275 (18.0)	57 (.08)	0.15/0.16	33/35	95.7/95.1	45/37/29	1, 2,3

NOTES:
1. AIR FILTER = REMOVABLE/WASHABLE/MILDEW PROOF
2. CORRESPONDING OUTDOOR AIR-COOLED CONDENSING UNIT = DAIKIN RXG15HVJU
3. COOLING AND HEATING CAPACITY ARE THE NOMINAL CAPACITY

ENERGY RECOVERY VENTILATOR SCHEDULE

MARK	MFR	MODEL	TYPE	SUPPLY AIR				EXHAUST AIR				MOTOR				EFFICIENCY, %	NOTES
				m3/s (CFM)	SUMMER ENTERING/ LEAVING TEMP, DB(WB) °F	WINTER ENTERING/ LEAVING TEMP, DB(WB) °F	STATIC PRESSURE DROP, IN H2O	m3/s (CFM)	SUMMER ENTERING/ LEAVING TEMP, DB °F	WINTER ENTERING/ LEAVING TEMP, DB °F	STATIC PRESSURE DROP, IN H2O	W (HP)	FLA	VOLTS	PHASE		
ERV-5-01	RENEWAIRE	EV70	FABRIC PLATE	.04 (85)	93(75)/78.1(69.2)	-22(-20)/45.2(39.2)	0.22	.04 (85)	72/86.9	72/4.8	0.2	94 (0.13)	1	120	1	71	1

NOTE:
1. PROVIDE OPTIONAL DEFROST ACCESSSOORY PACKAGE

AIR COOLED CONDENSING UNIT SCHEDULE

MARK	MODEL (MFR)	TYPE	REFRIG	SIZE, HxWxD mm (INCH)	WEIGHT, kg (Lbs)	AIR		CONDENSER		ELECTRICAL									SOUND, dBA	NOTES
						COOLING AMBIENT TEMP DB/WB, F	HEATING AMBIENT TEMP DB/WB, F	m^3/s (CFM)	W (kBtu/hr)	COMPRESSOR MOTOR OUTPUT, W	FAN MOTOR OUTPUT, W	RUNNING CURRENT, AMPS, COOL/HEAT	POWER CONSUMPTION, W, COOL/HEAT	POWER FACTOR, %, COOL/HEAT	MCA	VOLTS	PHASE	EFFICIENCY, SEER		
CU-5-01	RXG15HVJU (DAIKIN)	HERMETICALLY SEALED SWING	R-410A	568x795x286 (22x31x14.25)	47 (104)	95/75	47/43	.233 (494)	5275 (18.0)	1100	60	5.49/6.2	1127/1285	89.3/90.1	14.5	208-230	1	21	50	1

NOTES:
1. WINTER OPERATING RANGE FROM -4F TO 75F, SUMMER 14F TO 109F

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DIFFUSER, REGISTER, AND GRILLE SCHEDULE

MARK	MFR	MODEL	PANEL SIZE	NECK SIZE	USE	NOTES
SR-5-01	TITUS	301FL	7.75"x7.75"	6"x6"	ENERGY RECOVERY SUPPLY AIR	SURFACE MOUNT W/OUT DAMPER
SR-5-02	TITUS	301FL	36.75" x 12.75"	36"x12"	CONDITIONED SUPPLY AIR	SURFACE MOUNT W/OUT DAMPER
SR-5-03	TITUS	301FL	36.75"x6.75"	36"x6"	CONDITIONED SUPPLY AIR	SURFACE MOUNT W/OUT DAMPER
SR-3-01	TITUS	301FL	7.75"x7.75"	6"x6"	DESICCANT SUPPLY AIR RETURN AIR	SURFACE MOUNT W/OUT DAMPER 35 DEGREE DEFLECTION
RG-5-01	TITUS	350FL	6.75"x6.75"	6"x6"	ENERGY RECOVERY	SURFACE MOUNT W/OUT DAMPER,
RG-5-02	TITUS	350FL	12.75"x6.75"	12"x6"	PASSIVE VENT	SURFACE MOUNT W/OUT DAMPER, 35 DEGREE DEFLECTION
RG-3-01	TITUS	350FL	6.75"x6.75"	6"x6"	DESICCANT RETURN AIR	SURFACE MOUNT W/OUT DAMPER, 35 DEGREE DEFLECTION

FAN SCHEDULE

MARK	MFR	MODEL	TYPE	m^3/s (CFM)	RPM	EXT	WHEEL		DRIVE	ZONES	MOTOR			NOTES
						ST PR	TYPE	MIN DIA			W (HP)	VOLTS	PHASE	
B-3-01	FASCO	414	CENTRIFUGAL BLOWER	.026-.04 (55-85)	1800/2800				1		10 (.014)	115	SINGLE	-
B-3-02	FASCO	414	CENTRIFUGAL BLOWER	.026-.04 (55-85)	1800/2800				1		10 (.014)	115	SINGLE	-

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PUMP SCHEDULE

MARK	TYPE	SIZE L/s (GPM)	TOTAL HEAD m (ft)	PUMP rpm	MIN % EFF	MIN MOTOR W (hp)	VOLTS	SUCTION PRESSURE	NOTES
P-2-01	CIRCULATION PUMP	1.0 (16)	6.3 (20.7)				115		-
P-2-02	SHALLOW WELL JET PUMP	.56 (8.8)	7.6 (25)	3500		373 (.5)	115/230		-
P-2-03	CIRCULATION PUMP		4.9 (16)				115		-
P-2-04	CIRCULATION PUMP		4.9 (16)				115		-
P-3-01	DIAPHRAGM	.19 (3)		2190		48 (.06)	12 DC		-
P-3-02	DIAPHRAGM	.19 (3)		2190		48 (.06)	12 DC		-
P-4-01	CENTRIFUGAL	.31 (4.9)				168 (.23)	12 DC		-

TANK SCHEDULE

MARK	TYPE	FLUID	SIZE, L (GAL)	MAX PRESSURE kPa (PSI)	MAX TEMPERATURE °C (°F)	MATERIAL	NOTES
TK-2-01	THERMAL STORAGE	H2O	500 (132)	1000 (145)	95 (203)	METAL - SS	-
TK-2-02	THERMAL STORAGE	H20	300 (80)	1000 (145)	95 (203)	METAL - SS	-
TK-2-03	EXPANSION TANK	H2O/GLYCOL	50 (13.2)	600 (87)			-
TK-2-04	DOMESTIC COLD WATER STORAGE	H2O	2271 (600)			POLY - PE	-
TK-2-05	EXPANSION TANK	H2O					-
TK-2-06	EXPANSION TANK	H2O					-

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WATER HEATER SCHEDULE

MARK	MFR	MODEL	VOLTS	PHASE	kW	RECOVERY @ 21°C (70°F) RISE	NOTES
WH-2-01	STIEBEL ELTRON	TEMPRA 20	208	1	14.4		-
WH-2-02	STIEBEL ELTRON	TEMPRA 20	208	1	9		-

HYDRONIC CONTROL VALVE SCHEDULE

MARK	MFR	TYPE	FLUID FLOW RATE L/s (GPM)	WORKING FLUID	PRESS. DROP kPa (PSI)	CONNECTION SIZE cm (in)	NOTES
VA-2-01	HONEYWELL	3-WAY AUTOMATIC	.01-.41 (.2-6.5)	H2O-GLYCOL MIX		2.54 (1.0)	-
VA-2-02	HONEYWELL	3-WAY AUTOMATIC	.01-.41 (.2-6.5)	H2O-GLYCOL MIX		2.54 (1.0)	-
VA-2-03	HONEYWELL	3-WAY AUTOMATIC	.01-.41 (.2-6.5)	H2O-GLYCOL MIX		2.54 (1.0)	-
VA-2-04	FLOWCON	TEMP. CONTROL, DYNAMIC BALANCING	.01-.41 (.2-6.5)	H2O-GLYCOL MIX	30-400 (4.4-58)	1.9 (3/4)	-
VM-2-01	HONEYWELL	TEMP. CONTROL, MIXING VALVE	.03-.13 (.5-2.0)	H2O		1.9 (3/4)	-
VA-3-01	BELIMO	3-WAY AUTOMATIC	.19 (3.0)	LiCl + CaCl AQUEOUS SOLUTION		1.27 (1/2)	-
VA-3-02	BELIMO	3-WAY AUTOMATIC	.19 (3.0)	LiCl + CaCl AQUEOUS SOLUTION		1.27 (1/2)	-

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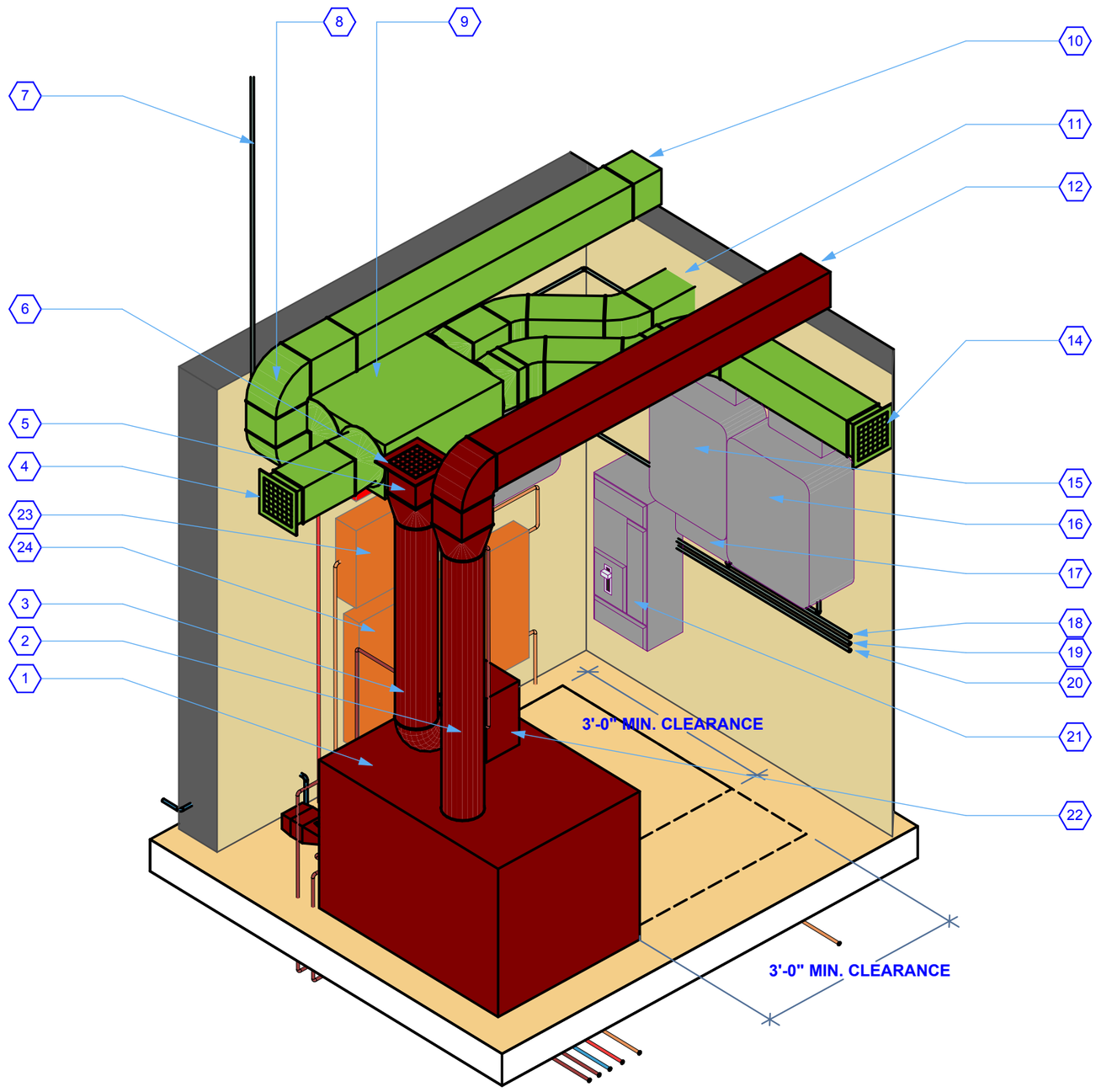

A1 NORTH EAST MECH CLOSET - TOP

NOT TO SCALE

SHEET KEYNOTES (CON'T)

1 WEAK STORAGE
2 6" ROUND, RANDOMLY PACKED COLUMN
3 CONNECT TO SUCTION SIDE OF DESICCANT BLOWER
4 6x6 EA, INSULATE
5 TRANSITION FROM 6X6 TO 6" VERTICAL
6 RG-3-01. 6X6 RA GR, 85 CFM (ADJ USING VOLUME DAMPER), SURFACE MOUNT TO CEILING IN OCCUPIED SPACE
7 CONDUIT UP TO COMBINER BOX
8 6X6 DOWN TO ERV
9 ERV-5-01 ENERGY RECOVERY VENTILATOR, BOTTOM ACCESS
10 6X6 SA, ROUTE DUCT ON TOP OF CEILING IN OCCUPIED SPACE, DO NOT CROSS MODULE SPLIT, INSULATE
11 6x6 RA, INSULATE
12 6x6 DESICCANT SA, ROUTE DUCT ON TOP OF CEILING IN OCCUPIED SPACE, INSULATE

14 6x6 OUTSIDE AIR, INSULATE
15 PVP1100 EVR INVERTER
16 SUNNYBOY SB-6000US INVERTER
17 PV SUB PANEL
18 CONDUIT TO AC DISCONNECT FOR PV
19 FROM AC DISCONNECT FOR PV
20 FROM METER AND SERVICE DROP
21 CIRCUIT BREAKER PANEL
22 B-3-01, DEHUMIDIFIER INTERIOR AIR CIRCULATION BLOWER
23 RADIANT FLOOR INLINE ELECTRIC HEATER (BEYOND)
24 RADIANT FLOOR MANIFOLD (BEYOND)

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mechanical closet

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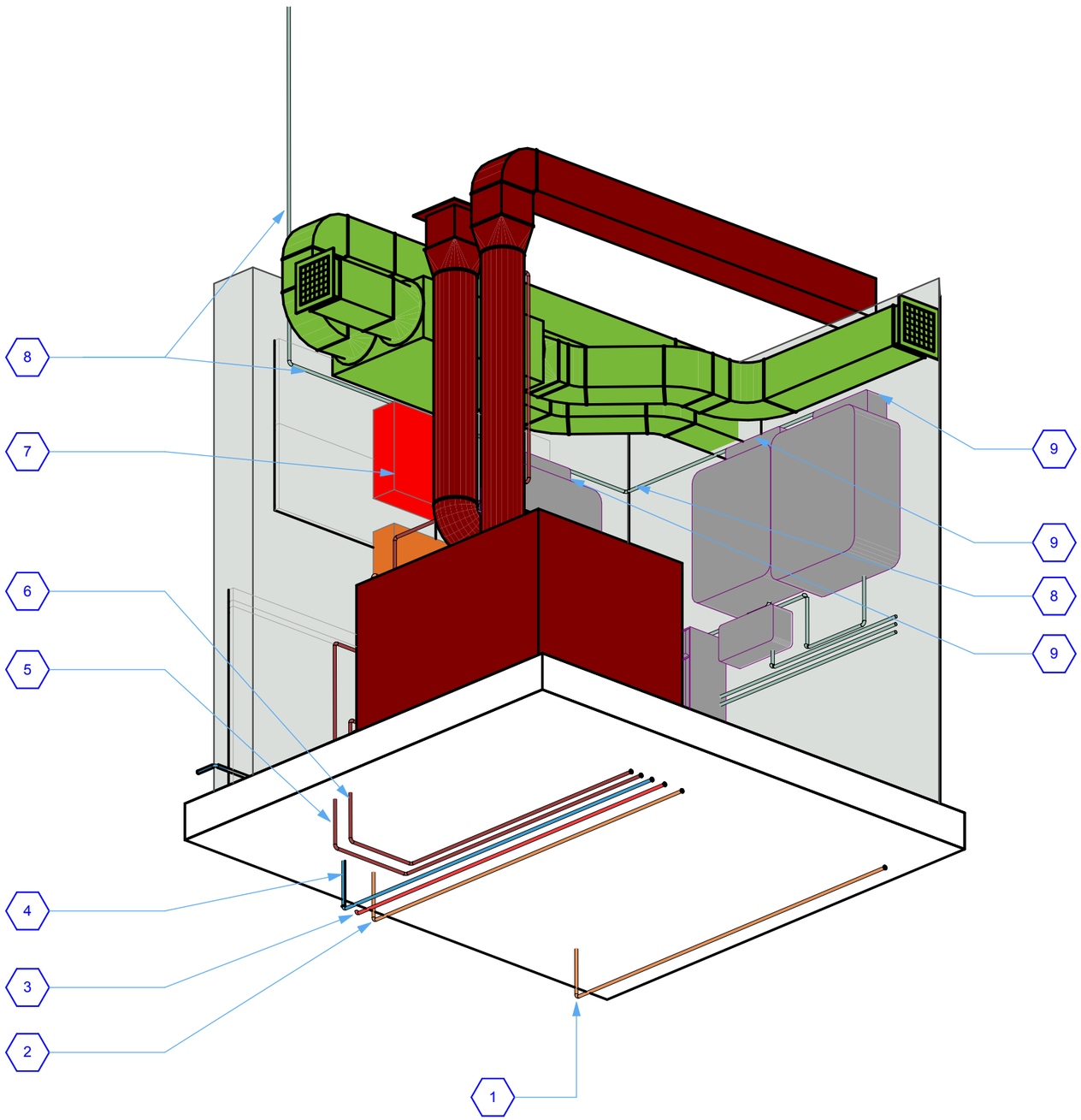

A1 NORTH EAST MECH CLOSET - UNDERSIDE

NOT TO SCALE

SHEET KEYNOTES (CON'T)

1 RADIANT FLOOR RETURN CONNECTION
2 RADIANT FLOOR SUPPLY CONNECTION
3 DOMESTIC HOT WATER SUPPLY CONNECTION
4 DOMESTIC COLD WATER SUPPLY CONNECTION
5 RETURN FROM DESICCANT DEHUMIDIFIER
6 SUPPLY TO DESICCANT DEHUMIDIFIER
7 DOMESTIC HOT WATER INLINE ELECTRIC HEATER (BEYOND)
8 CONDUIT UP TO COMBINER BOX
9 SQUARE D 600V DC DISCONNECT

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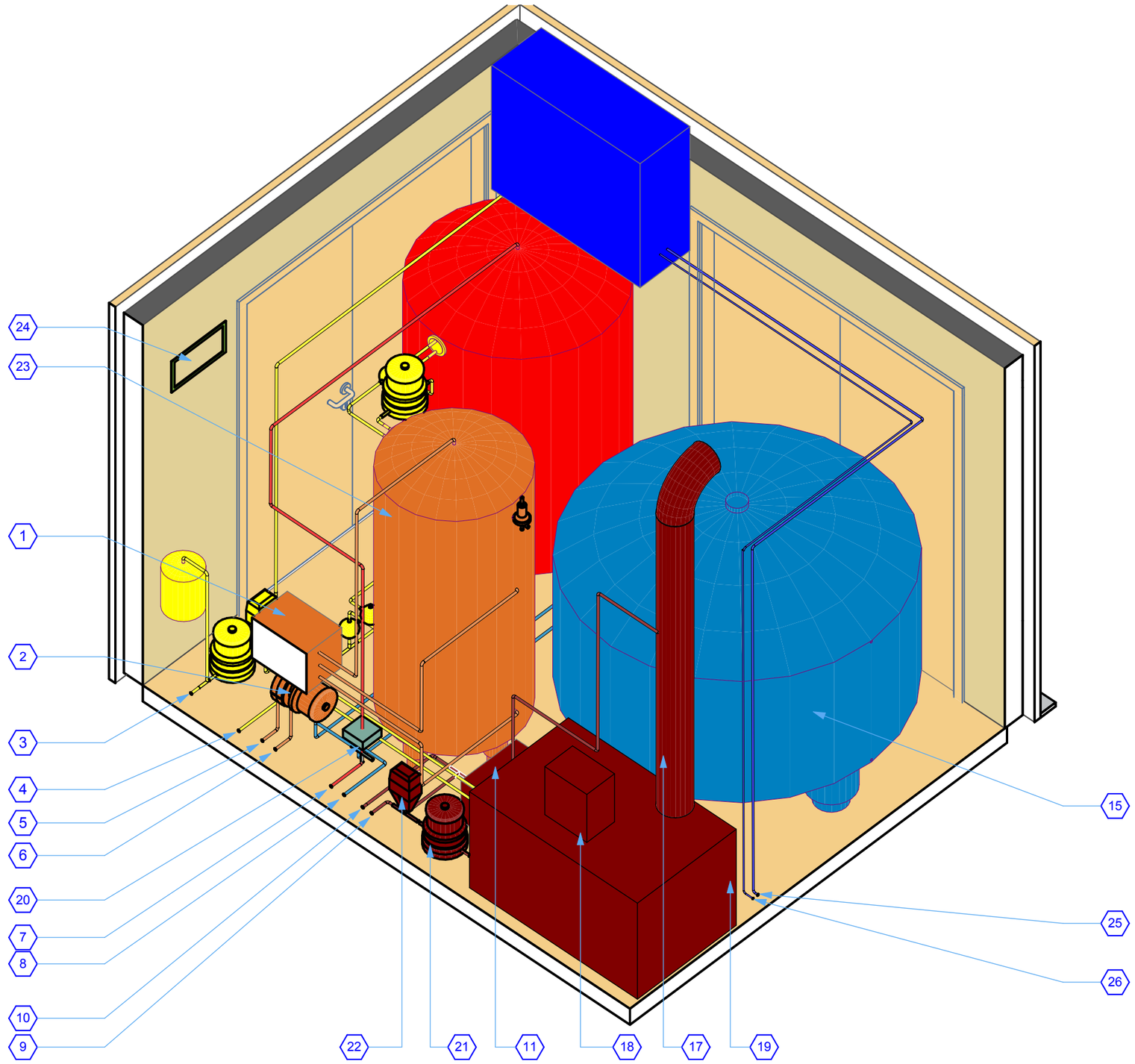
mechanical closet

M-902



A1 SOUTH EAST MECH SHED

NOT TO SCALE

SHEET KEYNOTES

1 BAUNACH RENDERMIX VALVE
2 P-2-04 PUMP
3 RETURN FROM SOLAR THERMAL COLLECTOR PANELS
4 SUPPLY TO SOLAR THERMAL COLLECTOR PANELS
5 RETURN FROM RADIANT FLOOR MANIFOLD
6 SUPPLY TO RADIANT FLOOR MANIFOLD
7 SUPPLY TO DOMESTIC HOT WATER
8 SUPPLY TO DOMESTIC COLD WATER
9 SUPPLY TO DESICCANT DEHUMIDIFIER
10 RETURN FROM DESICCANT DEHUMIDIFIER
11 HX-3-01 DESICCANT HEAT EXCHANGER
12 REFRIDGERANT RETURN FROM FAN COIL UNIT
13 REFRIGERANT SUPPLY TO FAN COIL UNIT
14 CONDENSING UNIT MOUNTED ON ROOF
15 TK-2-04 DOMESTIC WATER SUPPLY TANK WITH 4" DIAMETER HOSE CONNECTION ON TOP

17 RANDOMLY PACKED COLUMN
18 B-3-02 DESICANT REGENERATOR FAN
19 STRONG STORAGE TANK
20 VM-2-01, TEMP. BASED MIXING VALVE
21 P-3-02, REGENERATOR PUMP
22 VA-3-02, REGENERATOR CONTROLLABLE VALVE
23 TK-2-02, SPACE HEATING TANK
24 RG-5-02, 12x6 PASSIVE VENT, SURFACE MOUNT APPROX 60" AFF, COORDINATE LOCATION WITH MECH SHED EQUIPMENT
25 1/4" DIAMETER REFRIGERANT LIQUID PIPE
26 3/8" DIAMETER REFRIGERANT GAS PIPE

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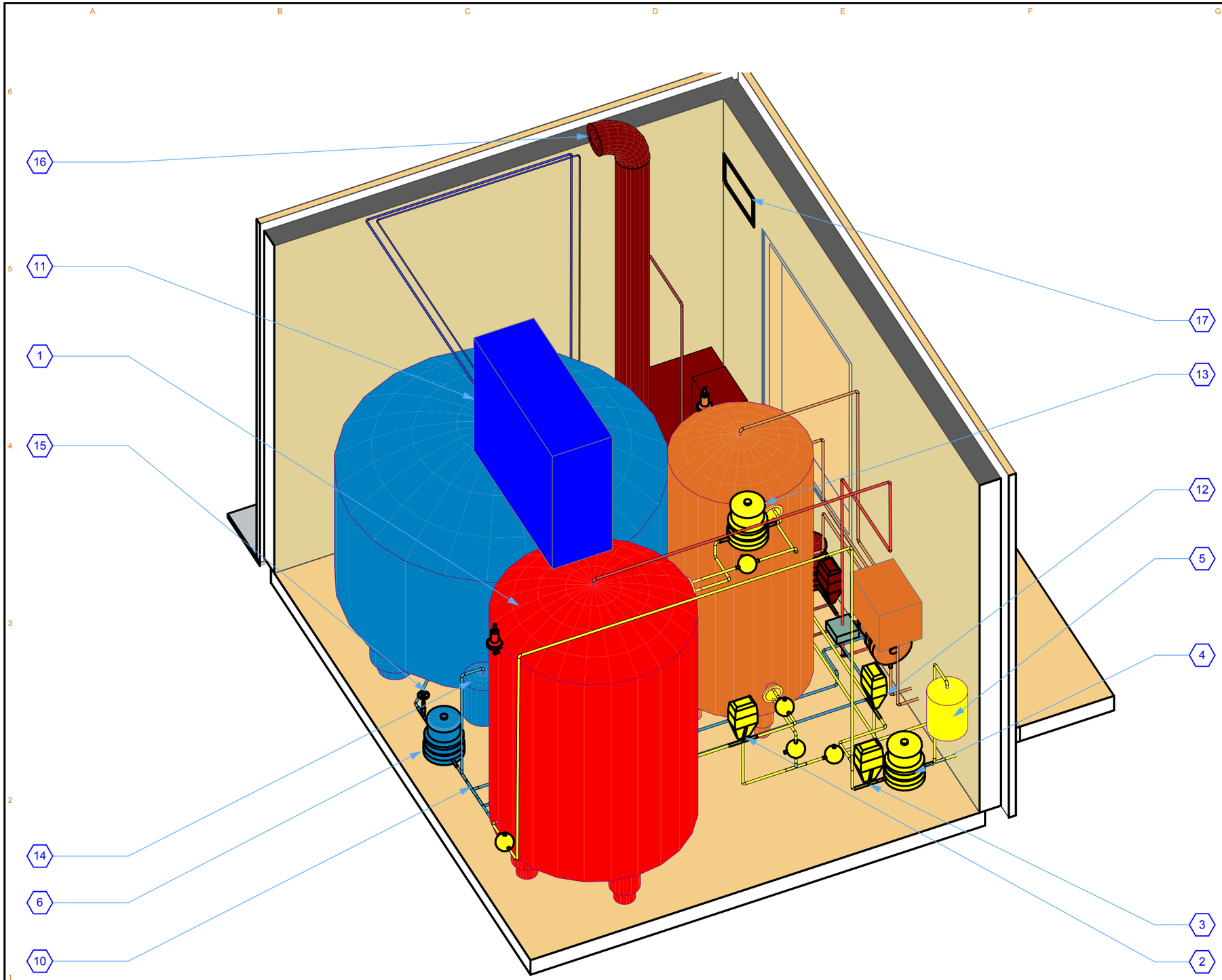
mechanical shed

M-903



A1 NORTH WEST MECH SHED

NOT TO SCALE

GENERAL SHEET NOTES

1

SHEET KEYNOTES

1 TK-2-01 DOMESTIC HOT WATER TANK
2 VA-2-03 AUTOMATIC 3 WAY VALVE
3 VA-2-01 AUTOMATIC 3 WAY VALVE
4 P-2-01 PUMP
5 TK-2-08 EXPANSION TANK
6 P-2-02 DOMESTIC WATER PRESURE PUMP

10 BRANCH TO DOMESTIC COLD WATER
11 CU-5-01, ROOF-MOUNTED AIR-COOLED CONDENSING UNIT
12 VA-2-02, CONTROLLABLE 3-WAY VALVE
13 P-2-03, PUMP FOR HEAT ECHANGE LOOP BETWEN DOMESTIC HOT WATER AND SPACE HEATING TANKS
14 TK-2-06, EXPANSION TANK (BEYOND)
15 STOP VALVE
16 6" ROUND DUCTING FROM TOP OF DESICCANT COLUMN THROUGH SHED ROOF, EXHAUST HORIZONTAL AWAY FROM HOUSE W. EXHAUST GRILLE
17 RG-5-02, 12x6 PASSIVE VENT, SURFACE MOUNT APPROX 60" AFF, COORDINATE LOCATION WITH MECH SHED EQUIPMENT

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M-904

Photovoltaic System Background

The photovoltaic system in this construction document set focuses on building integration as a key goal. Our challenge is to use highly integrated collection systems while maintaining the high efficiency level needed to place well in the energy balance competition.

A key element of our Building Integrated Photovoltaic (BIPV) strategy is to partner with Green Circuit. Green Circuit has an extraordinary amount of experience with installing PV and thermal collection systems.

Photovoltaic System Narrative

The photovoltaic system will consist of three distinct arrays:

- The main array, composed of thirty BP SX3195 PV panels, will yield the majority of the home's electrical power generation. The panels are arranged in two strings with each string consisting of fifteen panels each. The main array will employ one SMA SB-6000US inverter with a total power rating of 5850W.
- The south wall array, composed of one string of six Sanyo HIT Double 195 photovoltaic modules, will be a striking featured of our building-integrated photovoltaic system (BIPV). The panels will be integrated into the south wall porch area of the home and will make a strong statement about PV technology. The array will employ one PV Powered PVP2000EVR inverter with a total power rating of 1170W.
- The secondary roof array, composed of one string of five Sanyo HIT Double 195 photovoltaic modules, will be another distinguishing feature of the BIPV photovoltaic system. The panels will be integrated into the east porch roof area of the home and will nicely complement the south wall array. The array will employ one PV Powered PVP2000EVR inverter with a total power rating of 975W.

The Sanyo modules on the roof and south wall allow passage of some light for natural illumination of the home while also converting some light energy to electricity. The Sanyo HIT module is a bifacial photovoltaic module and is semi-transparent. The bifacial capability of the module increases the power generation potential by converting light energy from ambient light on the back of the panel to electrical energy. For our house, the Sanyo panels will be approximately 15% transparent. Aesthetics, lighting, and technical considerations dictate those parameters. While the PVP2000EVR may seem to be over sized for the respective arrays, these were chosen to provide convenient load balancing to the main service panel.

Since the PV panels will serve as roof cladding, all wiring after the combiner boxes will be internal to the house. Each string will be individually fused in the combiner boxes and the wiring method will change over to #8 THWN-2 in 3/4" EMT conduit to the DC disconnect, inverters, and PV subpanel. From the PV subpanel it will transition to #6 THWN-2 in 3/4" EMT conduit to the utility AC disconnect and finally to the main service panel. Further calculations of the system are detailed in the following description.

The maximum system voltage of each string was computed according to NEC 690.7(A). Since the open-circuit voltage temperature coefficients are supplied in the instructions for the listed PV modules, the corrections were made as followed. The choice was made to design the system for Minnesota temperatures. The record low temperature for Minnesota was recorded to be -40 °C. This will be the lowest expected temperature used for calculating the maximum photovoltaic system voltage as described by NEC 690.7(A):

- For the main array, Voc,max = 568.73 V (= -111mv/°C * (25°C - (-40°C)) + 30.7Voc/module * 15 modules per string). This is less than inverter maximum input voltage of 600V and wire maximum voltage of 600V.
- For the south wall array, Voc,max = 479.28 V (= -172mv/°C * (25°C - (-40°C)) + 68.7Voc/module * 6 modules per string). This is less than inverter maximum input voltage of 500V and the wire maximum voltage of 600V.
- For the secondary roof array, Voc,max = 399.4 V (= -172mv/°C * (25°C - (-40°C)) + 68.7Voc/module * 5 modules per string). This is less than inverter maximum input voltage of 500V and the wire maximum voltage of 600V.

Maximum current and ampacity were calculated according to NEC 2008 requirements. According to 690.8(A)(1) and 690.8(B)(1), the maximum current shall be the sum of parallel module rated short-circuit currents multiplied by 125% and the circuit conductors and overcurrent devices shall be sized to carry not less than 125% of the maximum currents as calculated in 690.8(A). Thus, the resulting multiplication factor is 156%. The maximum temperature recorded in Minnesota is 42°C and for Washington D.C. is 41°C. For safety, we will use Minnesota's recorded high temperature. The conductors will not be in conduit exposed to sunlight on or above rooftops so Table 310.15(B)(2)(c) does not apply. However, for an added safety factor, we add 17°C to our expected ambient temperature for a total expected maximum ambient temperature of 59°C. According to Table 310.16 for 59°C and using the 75°C column, the correction factor is .58 for our exterior wiring. These calculations were applied as follows:

- Main array before combiner box (exterior/on roof conductors in free air behind modules), temperature corrected Imax = 23.14 A per string (= 8.6 Isc * 1.56 / .58). This would indicate the use of #12AWG (25 A). We have elected to use #10 (30A) for an added safety factor.
- Main array after combiner box (interior in conduit, two current carrying conductors per conduit) through to inverter, corrected Imax = 26.83 A for combined circuit (= 2 *8.6 Isc * 1.56). This would indicate the use of # 10AWG (30A). We have elected to use #8 for an added safety factor.
- South wall array before combiner box (exterior/on roof conductors in free air behind modules), temperature corrected Imax = 10.03 A (= 3.73 Isc * 1.56 / .58). This would indicate the use of #14AWG (20 A). We have elected to use #10 for an added safety factor.
- South wall array after combiner box (interior in conduit, two current carrying conductors per conduit) through to inverter, temperature corrected Imax = 5.82A (= 3.73 Isc * 1.56). This would indicate the use of # 14AWG (20 A). We have elected to use #8 for an added safety factor.
- Secondary roof array before combiner box (exterior/on roof conductors in free air behind modules), temperature corrected Imax = 10.03 A (= 3.73 Isc * 1.56 / .58). This would indicate the use of #14AWG (20 A). We have elected to use #10 for an added safety factor.
- Secondary roof array after combiner box (interior in conduit, two current carrying conductors per conduit) through to inverter, temperature corrected Imax = 5.82A (= 3.73 Isc * 1.56). This would indicate the use of # 14AWG (20 A). We have elected to use #8 for an added safety factor.

To size the conductors for the inverter outputs, 690.8(A)(3) and 690.8(B)(1) were referenced to determine maximum current and Table 310.16 was referenced for proper conductor size. For the inverter output circuit current, the maximum current shall be the inverter continuous output current rating (690.8(A)(3)). Since photovoltaic systems shall be considered to be continuous, the circuit conductors and overcurrent devices shall be sized to carry not less than 125% of the maximum currents as calculated in 690.8(A) (690.8(B)(1)).

- For main array (interior in conduit), SB6000US continuous output current at 240V is 25A. Imax = 31.25 A (= 25A * 1.25). This would indicate the use of #10AWG (35A). We have elected to use #8 for an added safety factor.
- For south wall array (interior in conduit), PVP2000EVR continuous output current at 240V is 9A. Imax = 11.25 A (= 9A * 1.25). This would indicate the use of #10AWG (35A). We have elected to use #8 for an added safety factor.
- For secondary roof array (interior in conduit), PVP2000EVR continuous output current at 240V is 9A. Imax = 11.25 A (= 9A * 1.25). This would indicate the use of #10AWG (35A). We have elected to use #8 for an added safety factor.
- After the PV subpanel, Imax = 53.75 A (= 11.25A + 11.25A + 31.25A). This would indicate #6AWG (60A).

Conduit will be 3/4" electrical metallic tubing (EMT), unless specified otherwise. Conduit fill is limited in accordance with NEC 2008 Annex C Table C.1. For #8 THWN-2 conductors, 3/4" EMT is limited to 6 conductors. We will have no more than 4 conductors per conduit with 3 current carrying conductors and 1 ground. For #6 THN-2 conductors, 3/4" EMT is limited to 4 conductors per conduit. We will have no more than 4 conductors per conduit with 3 current carrying conductors and 1 ground.

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notes

E-001

Module Specifications		
Physical Dimensions	**BP SX3195**	**Sanyo HIT Double 195**
Length	66.14 in	53.2 in
Width	32.95 in	35.35 in
V_{oc}	30.7 V	68.7 V
I_{sc}	8.6 A	3.73 A
$V_{sys\ max}$	600 V	600 V
P_{max}	195 W	195 W
V_{Pmax}	24.4 V	55.8 V
I_{Pmax}	7.96 A	3.5 A
Temp Coefficients		
Power	-.5 % / deg C	-.2 %/deg C
Voltage	-111 mV/ deg C	-172 mV/deg C
Current	.065 %/ deg C	.87 mA/deg C
Series Fuse Rating	15 A	15 A
Peak Power per Unit Area	12.7 W/ft^2	14.9 W/ft^2
CEC PTC Rating	207.1 W	

Array Specifications	Rooftop BP Array	South Wall Sanyo	Roof Top Sanyo
Module Count	30	6	5
Modules per string	15	6	5
Strings	2	1	1
Operating Voltage	366 V	334.8 V	279 V
Operating Current	7.96 A	3.5 A	3.5 A
Power at STC (P_{max})	5850 W	1170 W	975 W
Voltage Correction Factor (NEC 2008 table 690.7)	1.25	1.25	1.25
Max Sys Voc	568.73 V	479.28 V	399.4 V
Max Isc	8.6 A	3.73 A	3.73 A
NEC 690.8(A) (1)	1.25	1.25	1.25
NEC 690.8(B) (1)	1.25	1.25	1.25
Ambient Temp. (°C) Correction Factor (NEC Table 310.16)	.58	.58	.58
Max Sys Current	26.83 A	5.82 A	5.82 A

Conductor Sizes (AWG)			
System Section	BP SX3190	South Wall Sanyo	Roof Top Sanyo
PV Source Circuits	10	10	10
PV Output Circuits	8	8	8
Inverter Output Circuits	8	8	8

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calculations

E-002

SYMBOLS

MARK	DESCRIPTION
F	Ceiling Fan
C / C	Air exchanger
	Blower
AC	Condenser Unit
	Desiccant tank
	Air Filter
	Heat Exchanger
	Check Valve
	3-way Valve
	Water Supply Tank
	Electric in-line water heater
+	Photovoltaic Array

SYMBOLS (CONT.)

MARK	DESCRIPTION
	Light array
	Desk Lamp
	Window Shade
	Power Window
WP	Exterior Light
	Timer
	Pressure tank
	Radiant Floor Array
Inverter	Photovoltaic Inverter
	Pump

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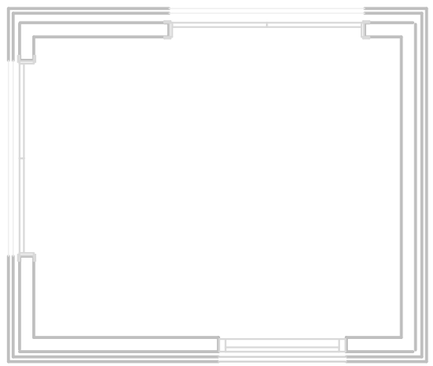
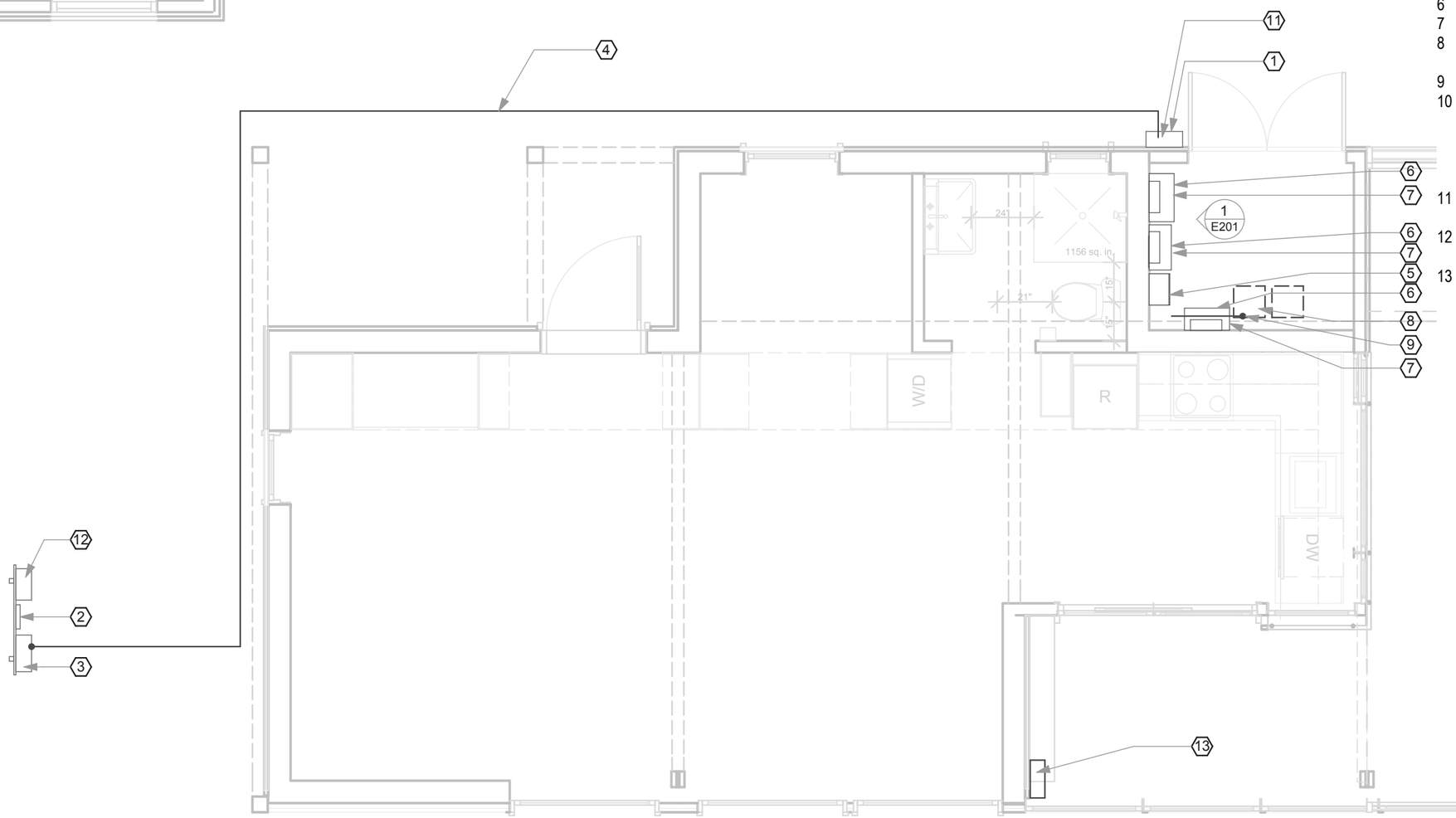
controls symbols

E-003





GENERAL SHEET NOTES

1 GRID CONNECTION JUNCTION BOX TO BE PROVIDED BY SOLAR DECATHLON ORGANIZERS

SHEET KEYNOTES

1 METER HOUSING
2 120V RECEPTICALS (FOR ORGANIZERS)
3 TERMINAL BOX
4 ORGANIZER PROVIDED POWER CABLE
5 CIRCUIT BREAKER PANEL
6 DC DISCONNECT
7 INVERTER
8 COMBINER BOXES ON ROOF
9 CONDUIT UP TO ROOF
10 METAL EMT CONDUIT TO ROOF PV'S, ENSURE CONDUIT FOR ALL CONDUCTOR LOCATED WITHIN HOUSE
11 AC DISCONNECT (PV SYSTEM)
12 SERVICE DISCONNECT PER NEC 230.70 (A)(1)
13 COMBINER BOX MOUNTED ON SURFACE OF WALL, @ 18" ABOVE DECK, HIDE CONDUCTOR RUN TO MECHANICAL CLOSET

PLAN NORTH

0 2' 4' 8'

A1 Electrical Layout
SCALE: 1/4" = 1'-0"

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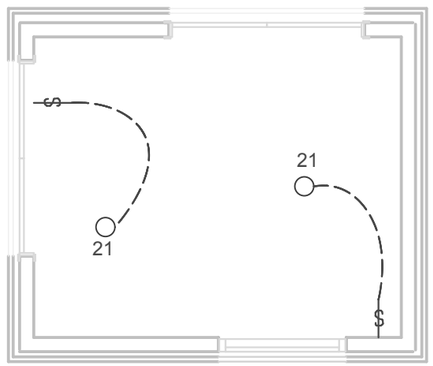
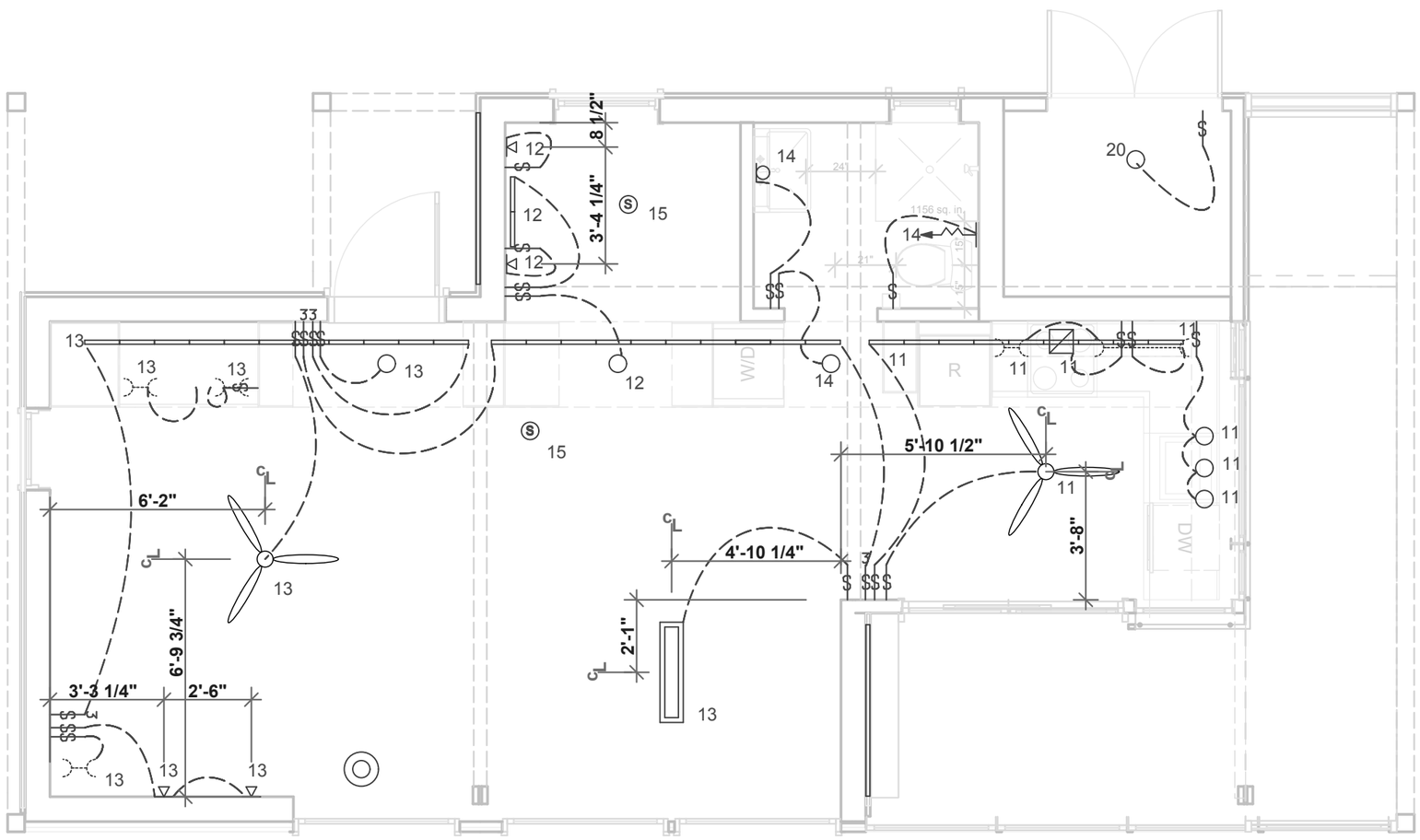
electrical system

E-101





A1 Wiring Layout
SCALE: 1/4" = 1'-0"

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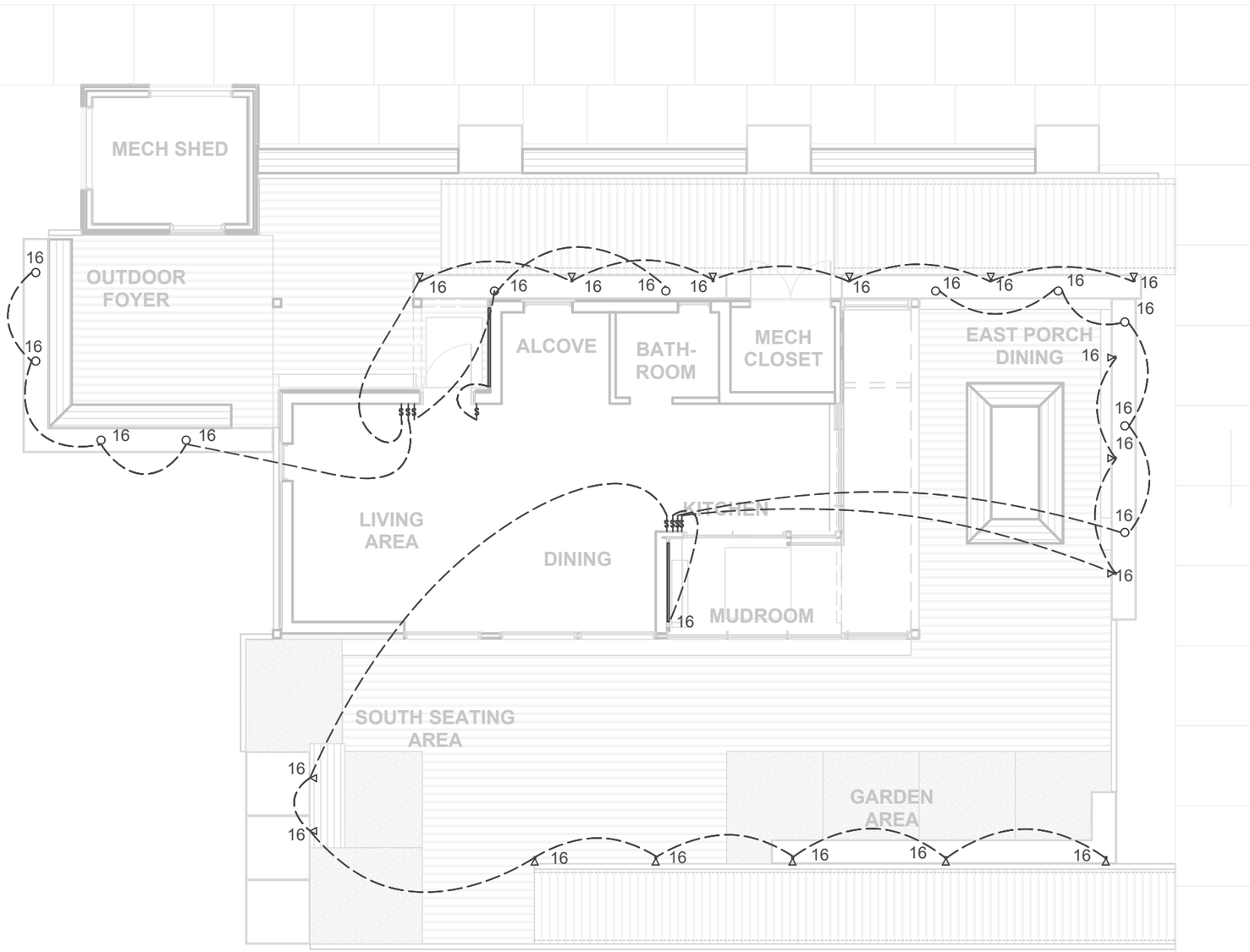
wiring plan

E-102



A1 Site Wiring Layout
SCALE: 1/8" = 1'-0"

0 4' 8' 16'

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site wiring plan

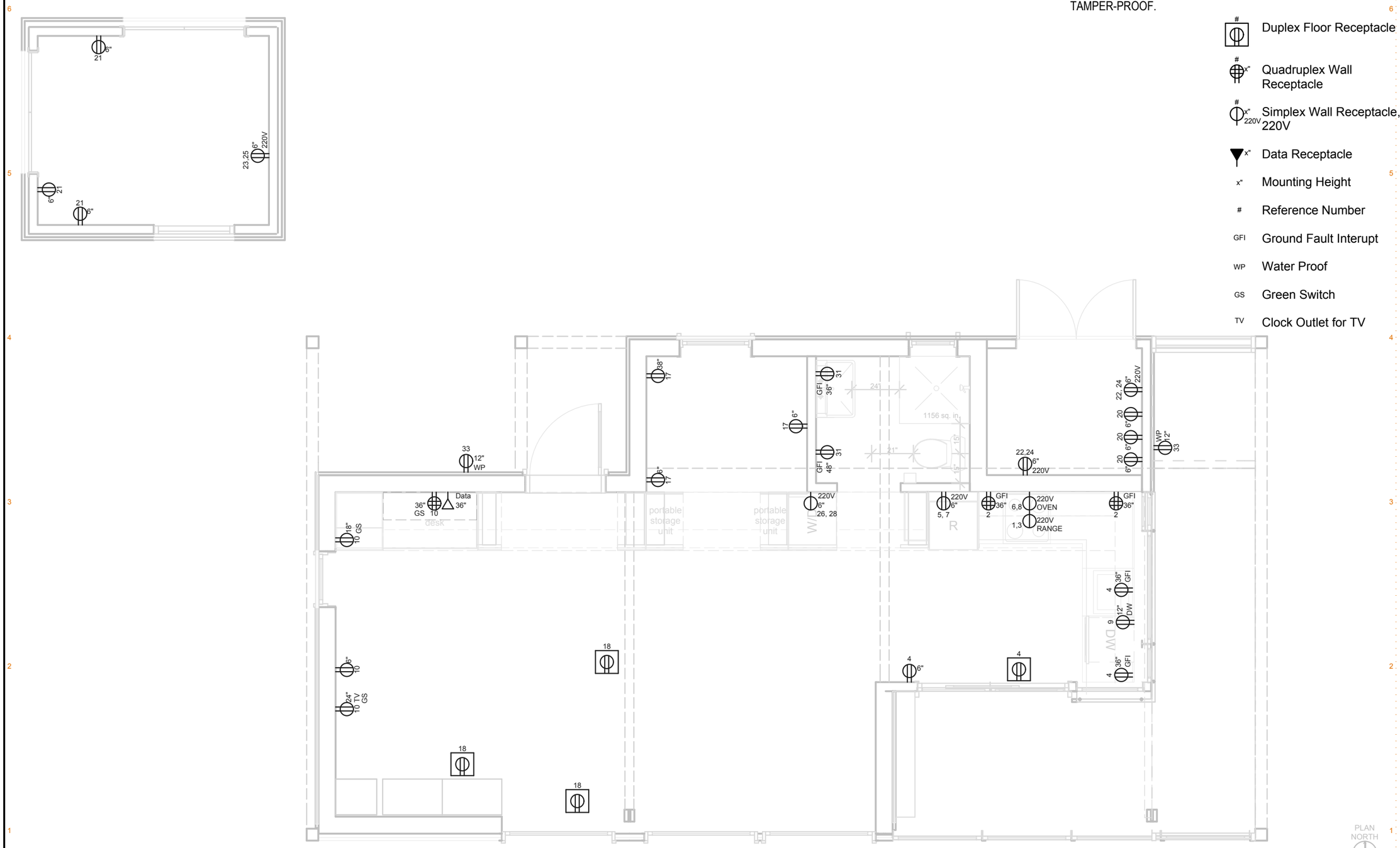
E-103

GENERAL SHEET NOTES

1 ALL RECEPTACLES TO BE TAMPER-PROOF.

SHEET SYMBOLS

- # x" Duplex Wall Receptacle
- # Duplex Floor Receptacle
- # x" Quadruplex Wall Receptacle
- # x" 220V Simplex Wall Receptacle, 220V
- x" Data Receptacle
- x" Mounting Height
- # Reference Number
- GFI Ground Fault Interupt
- WP Water Proof
- GS Green Switch
- TV Clock Outlet for TV



A1 Receptacle Plan
SCALE: 1/4" = 1'-0"

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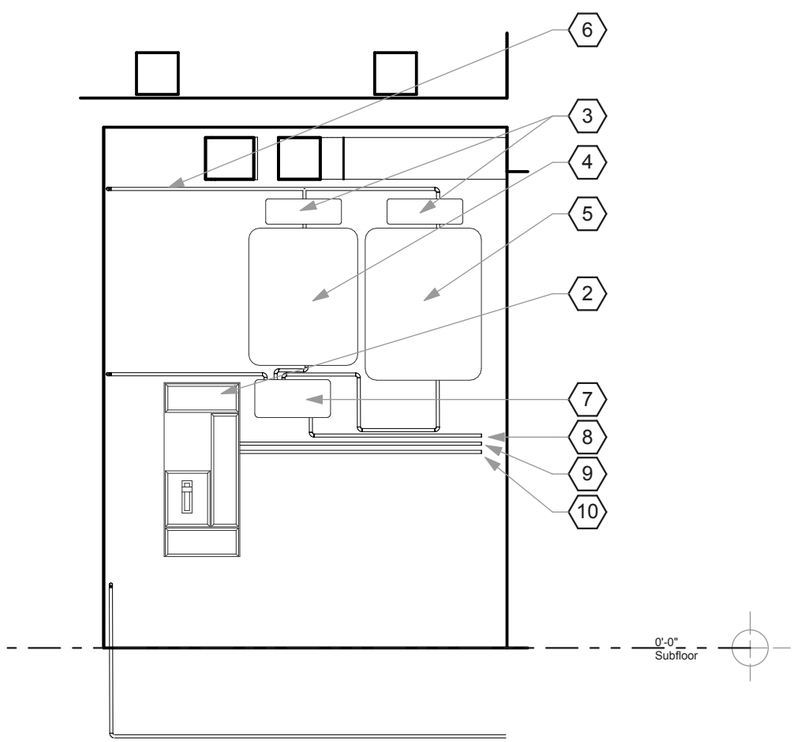
receptacle plan

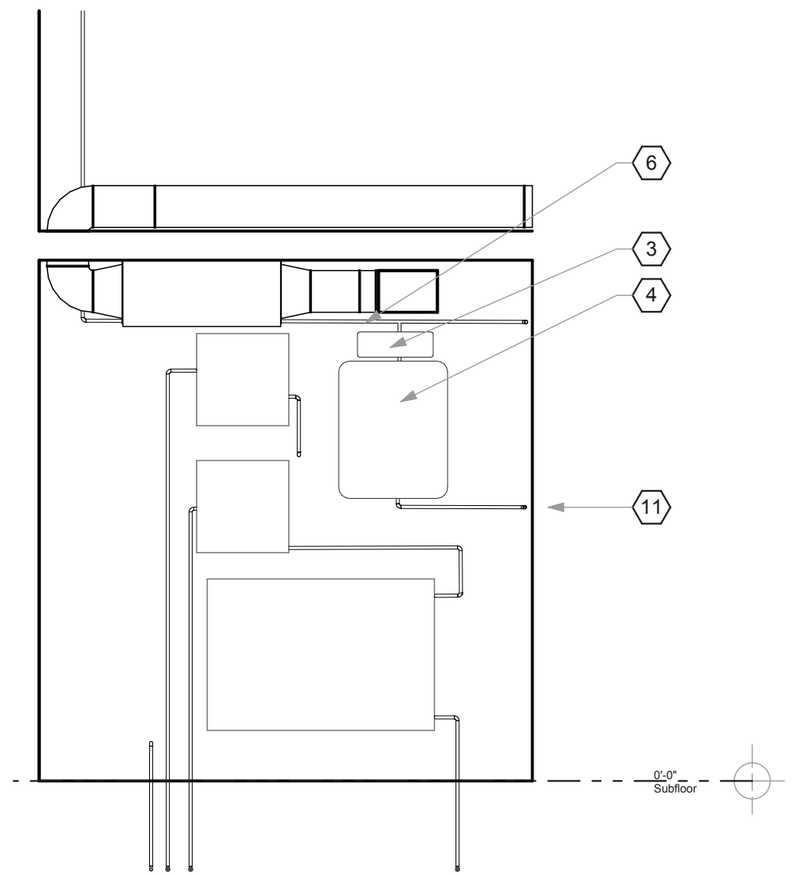
E-104

SHEET KEYNOTES

1 METER HOUSING
2 CIRCUIT BREAKER PANEL
3 SQUARE D 600V DC DISCONNECT
4 PVP1100 EVR INVERTER
5 SUNNYBOY SB-6000US INVERTER
6 CONDUIT UP TO COMBINER BOX
7 PV SUBPANEL
8 CONDUIT TO AC DISCONNECT FOR PV
9 FROM AC DISCONNECT FOR PV
10 FROM METER AND SERVICE DROP
11 TO PV SUBPANEL



A1 West Elevation
SCALE: 1/2" = 1'-0"
0 1' 2' 4'



D1 South Elevation
SCALE: 1/2" = 1'-0"
0 1' 2' 4'

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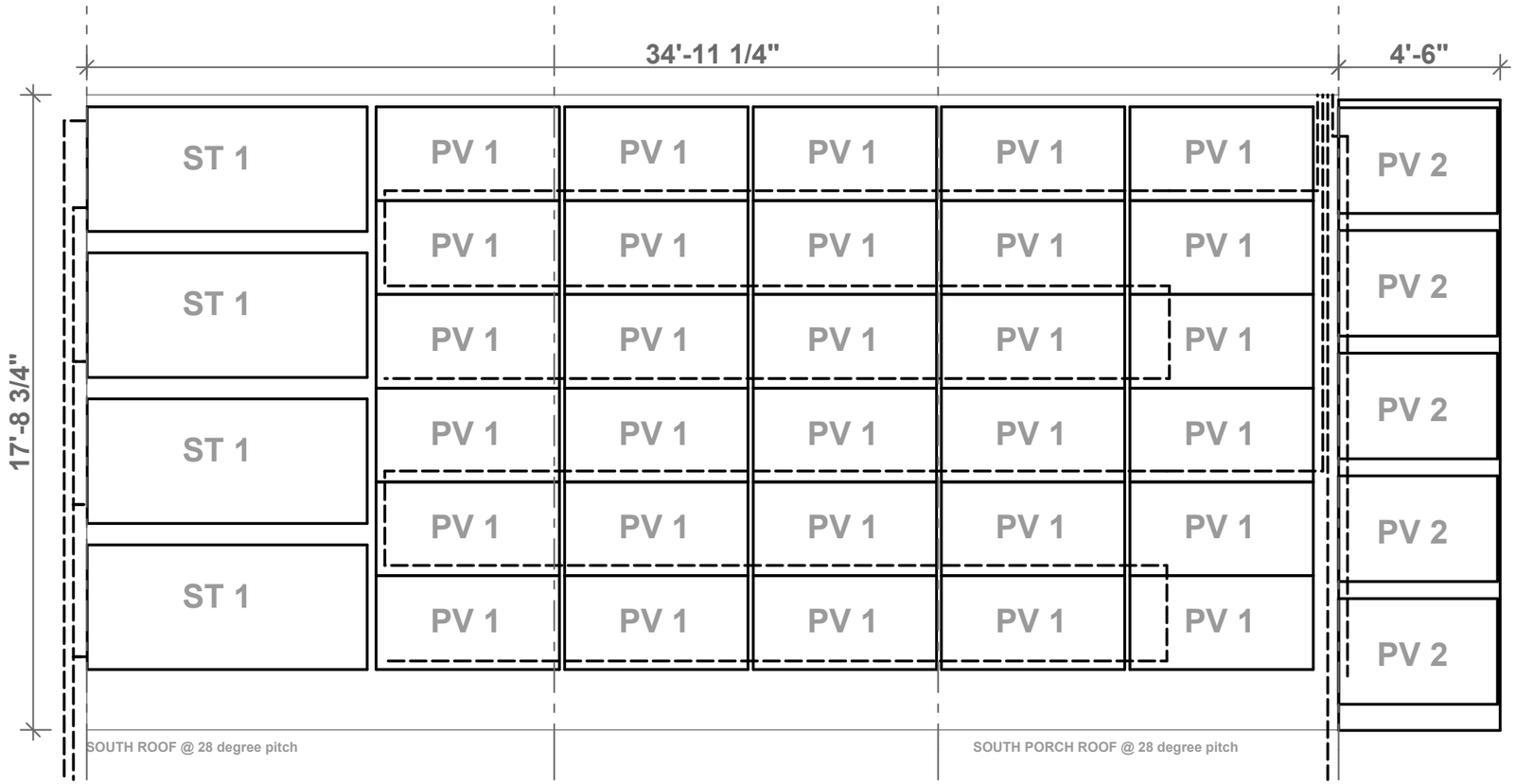
mechanical closet

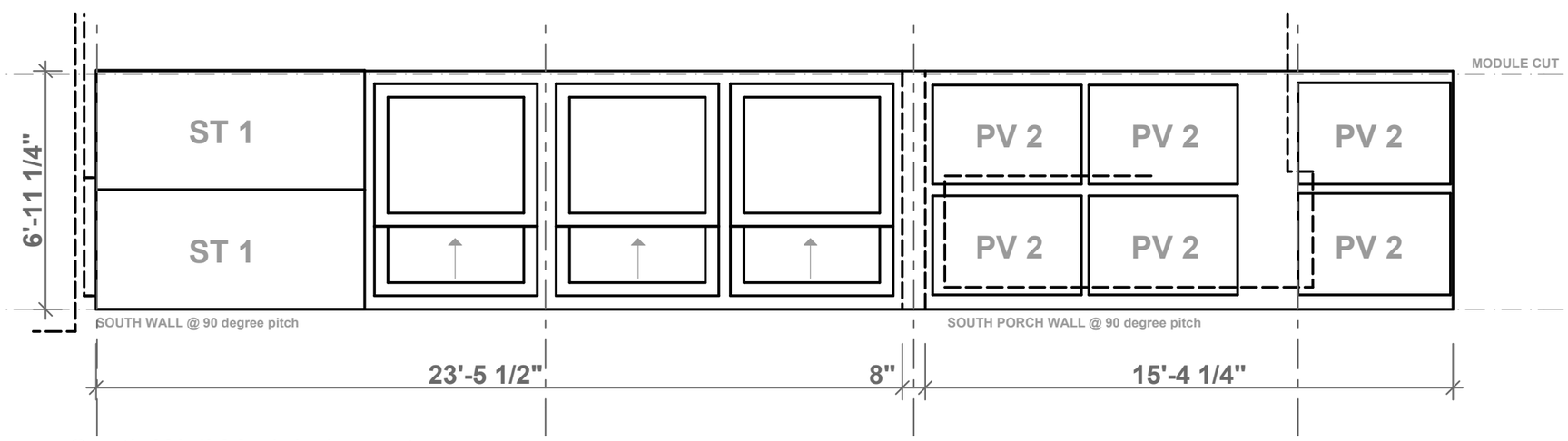
E-201



A3 Roof Module Layout

SCALE: 1/4" = 1'-0"

0 2' 4' 8'



A1 South Wall Module Layout

SCALE: 1/4" = 1'-0"

0 2' 4' 8'

GENERAL SHEET NOTES

1 ST 1 - VIESSMANN VITOSOL 200F, SH2 (93 3/4" x 41 3/4" x 3 1/2")

2 PV 1 - PV PANELS BY BP, SX3195

3 PV 2 - GLASS PV LAMINATED PANELS BY SANYO, HIT DOUBLE BIFACIAL

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PV layout

E-501

Main Service Panel Schedule

Location: Mechanical Room
Characteristics: 120/240V 1 Phase, 3 Wire, 200 A Main Breaker
Mounting: Surface

AWG	VA	Load	C/B		A	B		C/B	Load	VA	AWG
8		Range	2P/ 40A	1			2	1P/ 20A	Kitchen Appliances		12
8				3			4	1P/ 20A	Kitchen Appliances		12
8		Refrigerator	2P/ 40A	5			6	2P/ 40A	Oven		8
8				7			8				8
12		Dishwasher	1P/ 20A	9			10	1P/ 20A	Media Center / Work Station		12
12		Kitchen Lighting	1P/ 20A	11			12	1P/ 20A	Bedroom Lighting		12
12		Living Room Lighting	1P/ 20A	13			14	1P/ 20A	Bathroom Lighting		12
12		Smoke Detectors	1P/ 20A	15			16	1P/ 20A	Exterior Lighting		12
12		Bedroom	1P/ 20A	17			18	1P/ 20A	Living Room		12
12		Control System	1P/ 20A	19			20	1P/ 20A	Mechanical Room		12
12		Mechanical Shed	1P/ 20A	21			22	2P/ 40A	Mechanical Room		8
8		Mechanical Shed	2P/ 40A	23			24				8
8				25			26	2P/ 40A	Clothes Washer / Dryer		8
6		PV Array Breaker	2P/ 60A	27			28				8
6				29			30		Permanent Non-Used Space		
12		Bathroom	1P/ 20A	31			32				
12		Exterior Receptacles	1P/ 20A	33			34		Permanent Non-Used Space		

A1 Main Service Panel Schedule
NOT TO SCALE

GENERAL SHEET NOTES

1 ARC-FAULT CIRCUIT INTERRUPTER CIRCUIT BREAKERS REQUIRED FOR ALL 15 AND 20 A CIRCUITS, PER 2008 NEC 210.12 (B).

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main panel schedule

E-601

GENERAL SHEET NOTES

1 ARC-FAULT CIRCUIT INTERRUPTER CIRCUIT BREAKERS REQUIRED FOR ALL 15 AND 20 A CIRCUITS, PER 2008 NEC 210.12 (B).

PV Sub-Panel Schedule

Location: Mechanical Room
Characteristics: 120/240V 1 Phase, 3 Wire, 60A Main Breaker
Mounting: Surface

AWG	VA	Load	C/B		A	B		C/B	Load	VA	AWG
8		Array 1	2P/ 30A	1			2		Permanent Non-Used Space		
8				3			4				
8		Array 2	2P/ 15A	5			6		Permanent Non-Used Space		
8				7			8				
8		Array 3	2P/ 15A	9			10		Permanent Non-Used Space		
8				11			12				
		Permanent Non-Used Space		13			14		Permanent Non-Used Space		
				15			16				
		Permanent Non-Used Space		17			18		Permanent Non-Used Space		
				19			20				

A1 PV Sub-Panel Schedule
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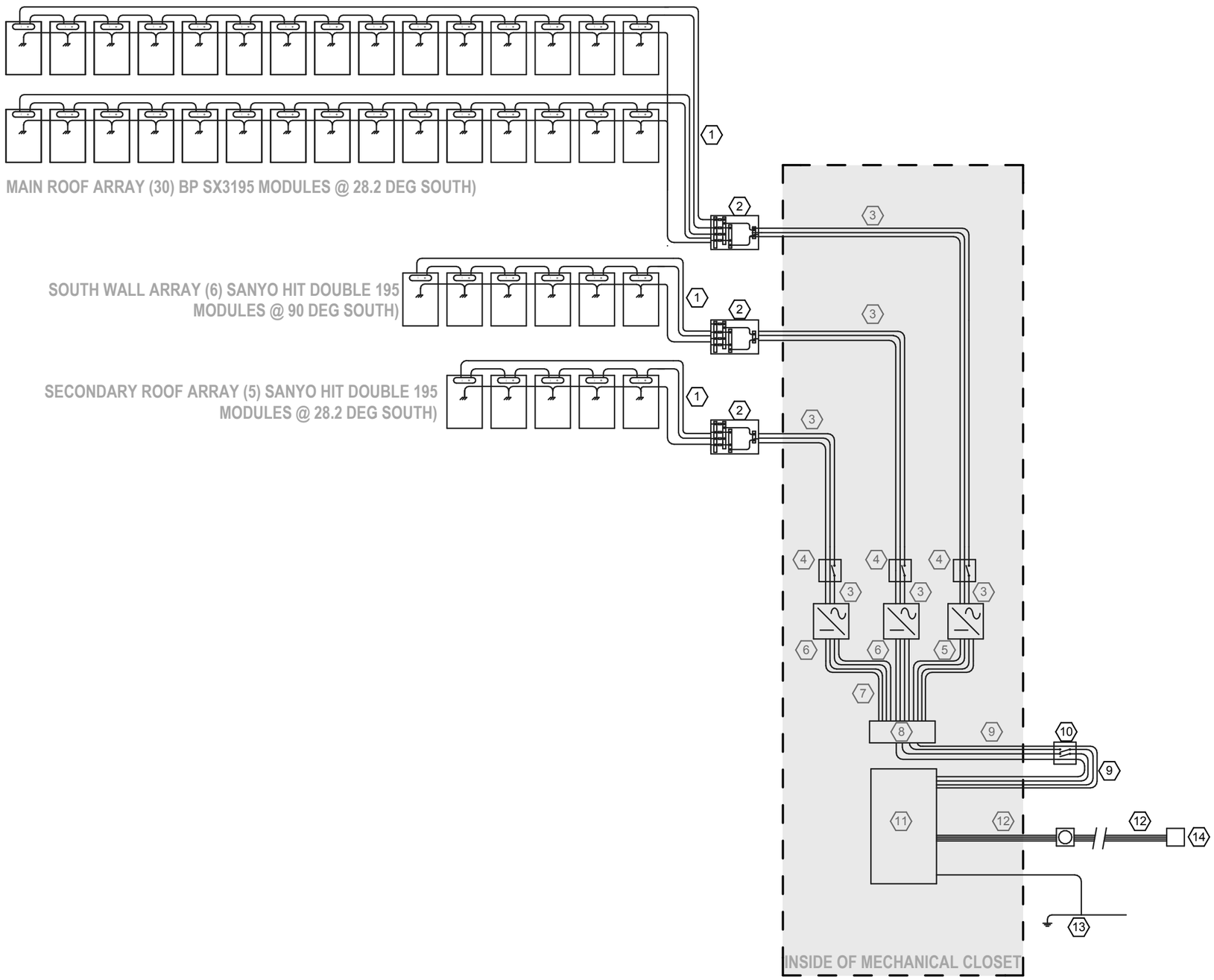
PV sub-panel

E-602



A1 PV System Three-Line Schematic

NOT TO SCALE

SHEET KEYNOTES

1 TYP #10 USE-2 WIRES W/MC4 CONNECTORS, 3 WIRES + / - / GND
2 FUSED COMBINER BOX ACME ACE-2
3 TYP #8 THWN-2, 3 CONDUCTORS IN 3/4" EMT CONDUIT, 3 WIRES +/-/GND
4 30A 2P DC DISCONNECT
5 SUNNYBOY SB-6000 INVERTER
6 PVP 2000 EVR INVERTER
7 TYP #8 THWN-2, 4 CONDUCTORS IN 3/4" EMT CONDUIT, 4 WIRES +/-/N/GND
8 PV SUBPANEL 60A, SINGLE Ø, 240V, SEE PV SUB-PANEL SCHEDULE
9 TYP #6 THWN-2, 4 CONDUCTORS IN 3/4" EMT CONDUIT, 4 WIRES +/-/N/GND
10 PV SYSTEM AC DISCONNECT
11 MAIN PANEL 200A SINGLE Ø, 240V, SEE MAIN PANEL SCHEDULE
12 (4) 3/0 THWN-2 CONDUCTORS, PHASE A, PHASE B, NEUTRAL, GROUND
12 AC UTILITY METER
13 GROUND ROD
14 ORGANIZER PROVIDED TERMINAL BOX FOR UTILITY FEED

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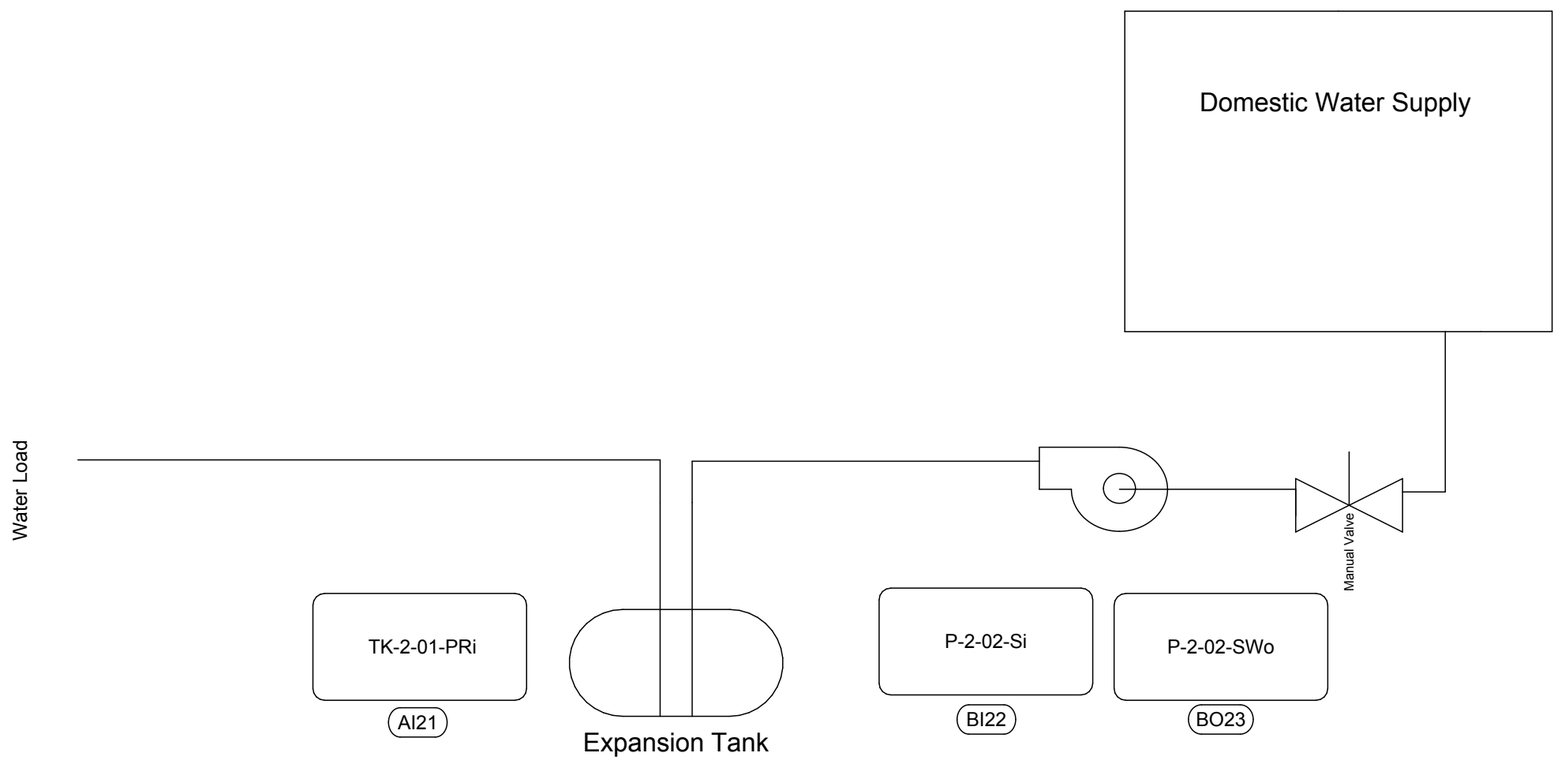
PV schematic

E-603

SYSTEM DATA POINTS SCHEDULE

I/O NUMBER	MARK	POINT DESCRIPTOR	POINT TYPE	I/O TAG	SYSTEM
21	TK-2-01-Pri	pressure tank pressure	AI	AI21	2-SUP
22	P-2-02-Si	Supply Pump Status	BI	BI22	2-SUP
23	P-2-02-SWo	supply pump switch	BO	BO23	2-SUP



A1 Domestic Water Supply Controls

NOT TO SCALE

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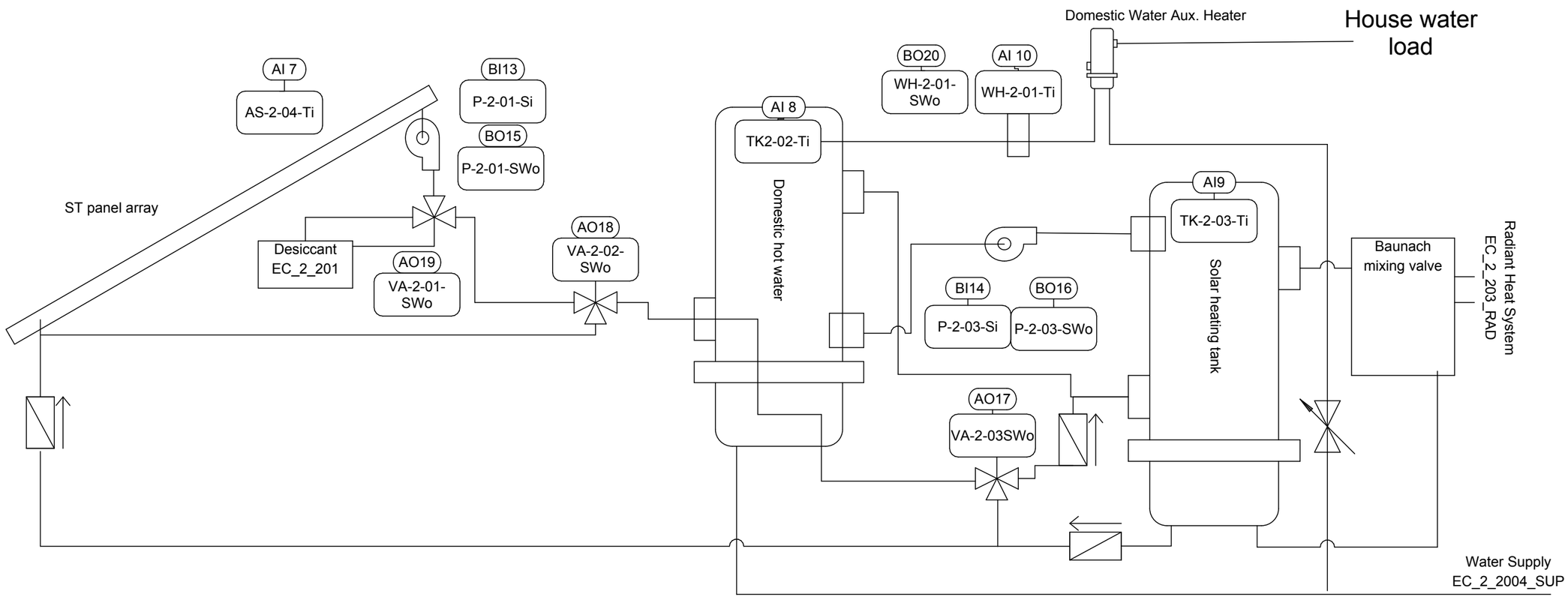
controls schematics

E-604

SYSTEM DATA POINTS SCHEDULE

I/O NUMBER	MARK	POINT DESCRIPTOR	POINT TYPE	I/O TAG	SYSTEM
7	AS-2-04-Ti	Solar Thermal Array Temp	AI	AI7	2-ST
8	TK-2-02-Ti	Domestic Supply Tank Temp	AI	AI8	2-ST
9	TK-2-03-Ti	Radiant Floor Supply Tank Temp	AI	AI9	2-ST
10	WH-2-01-Ti	Domestic Hot Water Electric Heater Temp	AI	AI10	2-ST
13	P-2-01-Si	Domestic Water Supply Pump Status	BI	BI13	2-ST
14	P-2-03-Si	return tank pump status	BI	BI14	2-ST
15	P-2-01-SWo	domestic supply pump switch	BO	BO15	2-ST
16	P-2-03-SWo	return pump switch	BO	BO16	2-ST
17	VA-2-03-SWo	return valve switch	BO	BO17	2-ST
18	VA-2-02-SWo	domestic supply valve switch	BO	BO18	2-ST
19	VA-2-01-SWo	dessicant supply valve switch	BO	BO19	2-ST
20	WH-2-01-SWo	Domestic water aux. Heater switch	BO	BO20	2-ST



A1 SSolar Thermal Controls

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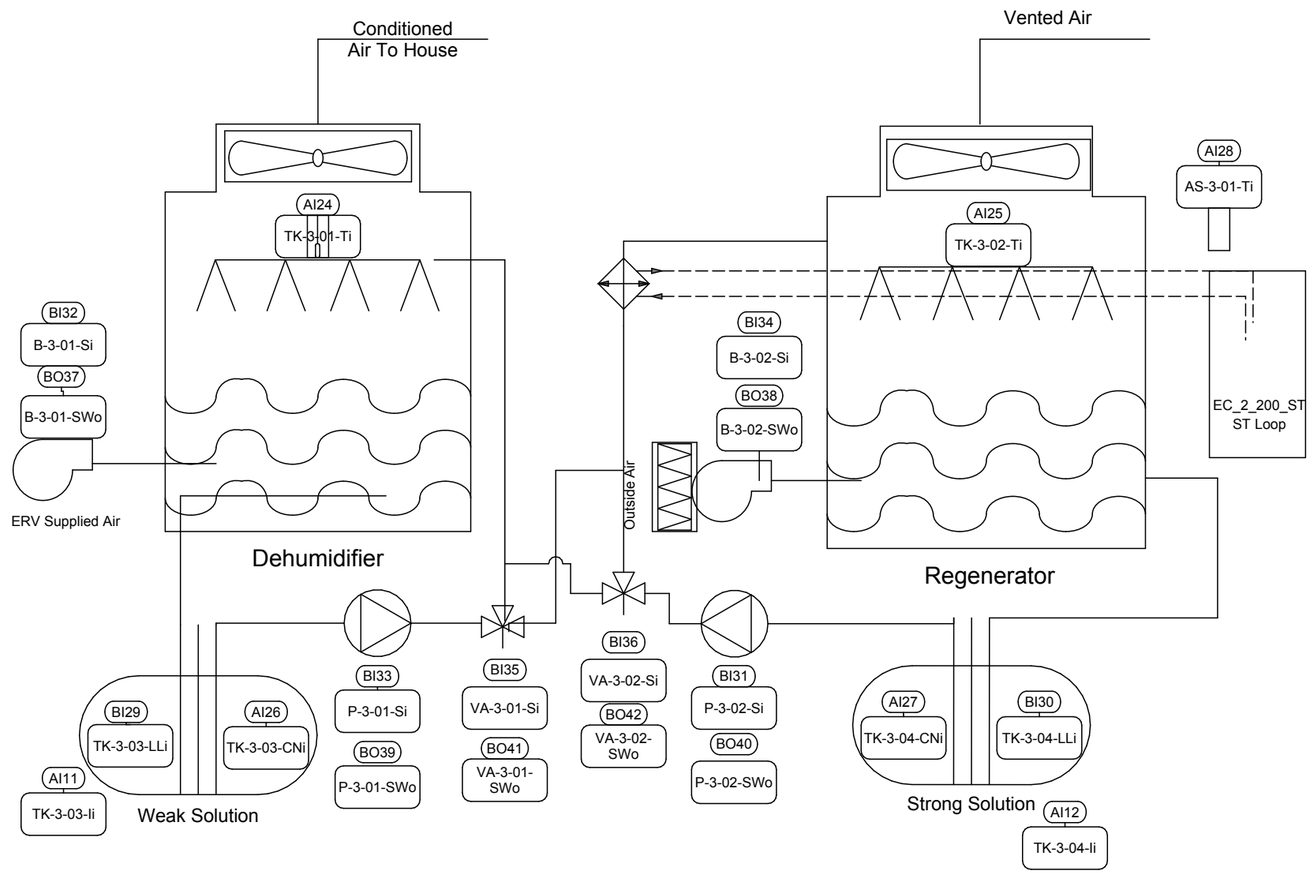

A1 Desiccant System Controls

NOT TO SCALE

SYSTEM DATA POINTS SCHEDULE

I/O NUMBER	MARK	POINT DESCRIPTOR	POINT TYPE	I/O TAG	SYSTEM
11	TK-3-03-Ii	Weak solution electrical current	AI	AI11	3-DS
12	TK-3-04-Ii	Strong solution electrical current	AI	AI12	3-DS
24	TK-3-01-Ti	Dehumidifier Temp	AI	AI24	3-DS
25	TK-3-02-Ti	Regenerator Temp	AI	AI25	3-DS
26	TK-3-03-Cni	Weak Solution Concentration	AI	AI26	3-DS
27	TK-3-04-Cni	Strong Solution Concentration	AI	AI27	3-DS
28	AS-3-01-Ti	Solar Thermal Loop Temp	AI	AI28	3-DS
29	TK-3-03-LLi	Weak Solution Level	BI	BI29	3-DS
30	TK-3-04-Lli	Strong Solution Level	BI	BI30	3-DS
31	P-3-02-Si	Regenerator Pump Status	BI	BI31	3-DS
32	B-3-01-Si	Dehumidifier Blower Status	BI	BI32	3-DS
33	P-3-01-Si	Dehumidifier Pump Status	BI	BI33	3-DS
34	B-3-02-Si	Regenerator Blower Status	BI	BI34	3-DS
35	VA-3-01-Si	Loop 1 swap valve	BI	BI35	3-DS
36	VA-3-02-Si	Loop 2 Swap valve	BI	BI36	3-DS
37	B-3-01-Swo	Dehumidifier Blower switch	BO	BO37	3-DS
38	B-3-02-Swo	Regenerator Blower switch	BO	BO38	3-DS
39	P-3-01-Swo	Dehumidifier Pump switch	BO	BO39	3-DS
40	P-3-02-Swo	Regenerator Pump switch	BO	BO40	3-DS
41	VA-3-01-Swo	Loop 1 switch for recharging solution	BO	BO41	3-DS
42	VA-3-02-Swo	valve switch for recharging solution	BO	BO42	3-DS

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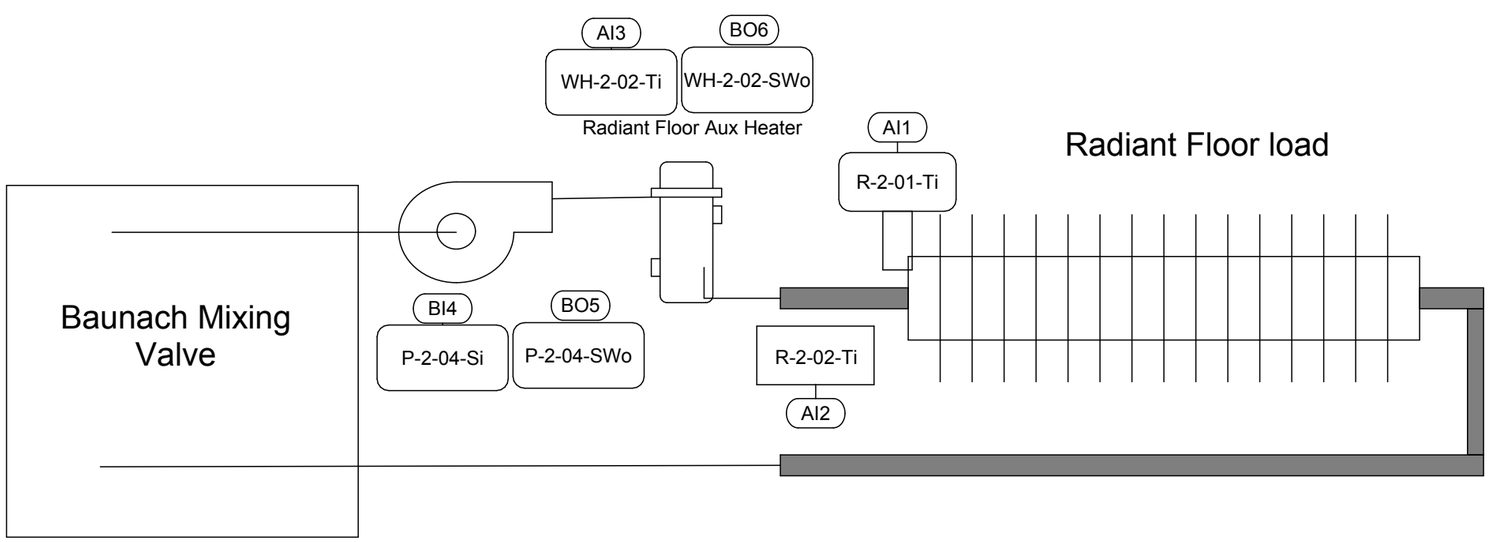
controls schematics

E-606

SYSTEM DATA POINTS SCHEDULE

I/O NUMBER	MARK	POINT DESCRIPTOR	POINT TYPE	I/O TAG	SYSTEM
1	R-2-01-Ti	Radiant floor temp ZONE 1	AI	AI1	2-RAD
2	R-2-02-Ti	Radiant floor temp ZONE 2	AI	AI2	2-RAD
3	WH-2-02-Ti	Radiant floor aux. heater temp	AI	AI3	2-RAD
4	P-2-04-Si	Radiant pump status	BI	BI4	2-RAD
5	P-2-04-SWo	radiant pump switch	BO	BO5	2-RAD
6	WH-2-02-SWo	Radiant floor aux. heater switch	BO	BO6	2-RAD



A1 Radiant Floor Controls
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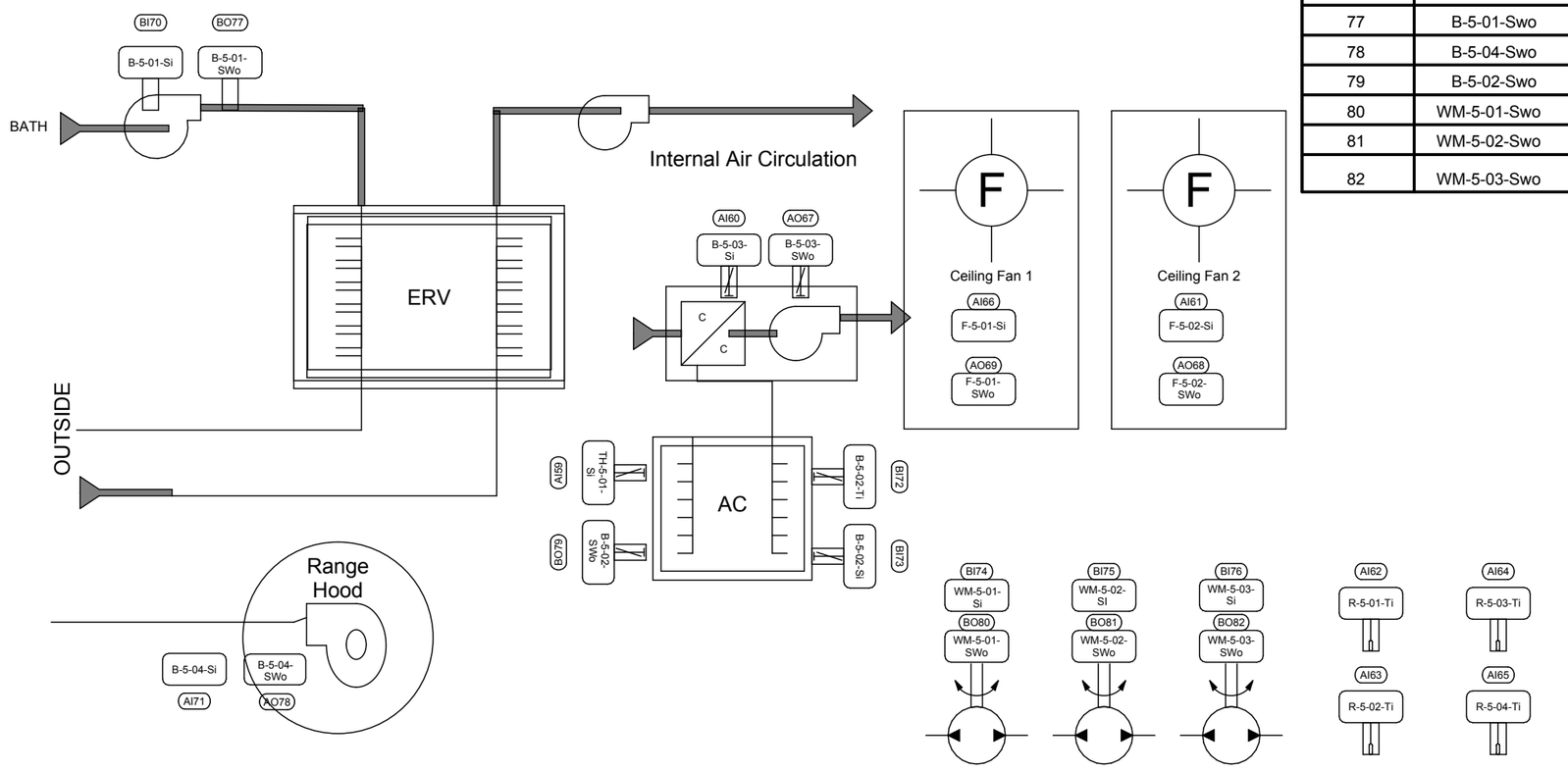
E-607



A1 HVAC Controls

NOT TO SCALE

SYSTEM DATA POINTS SCHEDULE

I/O NUMBER	MARK	POINT DESCRIPTOR	POINT TYPE	I/O TAG	SYSTEM
59	TH-5-01-Si	AC thermostat	AI	AI59	5-HVAC
60	B-5-03-Si	Compressor Status	AI	AI60	5-HVAC
61	F-5-02-Si	Ceiling Fan 2 status	AI	AI61	5-HVAC
62	R-5-01-Ti	ambiant temp ZONE1	AI	AI62	5-HVAC
63	R-5-02-Ti	ambiant temp ZONE2	AI	AI63	5-HVAC
64	R-5-03-Ti	ambiant temp ZONE3	AI	AI64	5-HVAC
65	R-5-04-Ti	ambiant temp ZONE4	AI	AI65	5-HVAC
66	F-5-01-Si	Ceiling Fan 1 status	AI	AI66	5-HVAC
67	B-5-03-Swo	Compressor switch	AO	AO67	5-HVAC
68	F-5-02-Swo	ceiling fan 2 switch	AO	AO68	5-HVAC
69	F-5-01-Swo	Ceiling Fan 1 switch	AO	AO69	5-HVAC
70	B-5-01-Si	Bath Blower status	BI	BI70	5-HVAC
71	B-5-04-Si	range hood status	AI	AI71	5-HVAC
72	B-5-02-Ti	AC temp	BI	BI72	5-HVAC
73	B-5-02 Si	AC status	BI	BI73	5-HVAC
74	WM-5-01-Si	North Window 1 Status	BI	BI74	5-HVAC
75	WM-5-02-Si	North Window 2 Status	BI	BI75	5-HVAC
76	WM-5-03-Si	North Window 3 Status	BI	BI76	5-HVAC
77	B-5-01-Swo	Bath Blower switch	BO	BO77	5-HVAC
78	B-5-04-Swo	range hood switch	AO	AO78	5-HVAC
79	B-5-02-Swo	AC fan switch	BO	BO79	5-HVAC
80	WM-5-01-Swo	North Window 1 control	BO	BO80	5-HVAC
81	WM-5-02-Swo	North Window 2 control	BO	BO81	5-HVAC
82	WM-5-03-Swo	North Window 3 control	BO	BO82	5-HVAC

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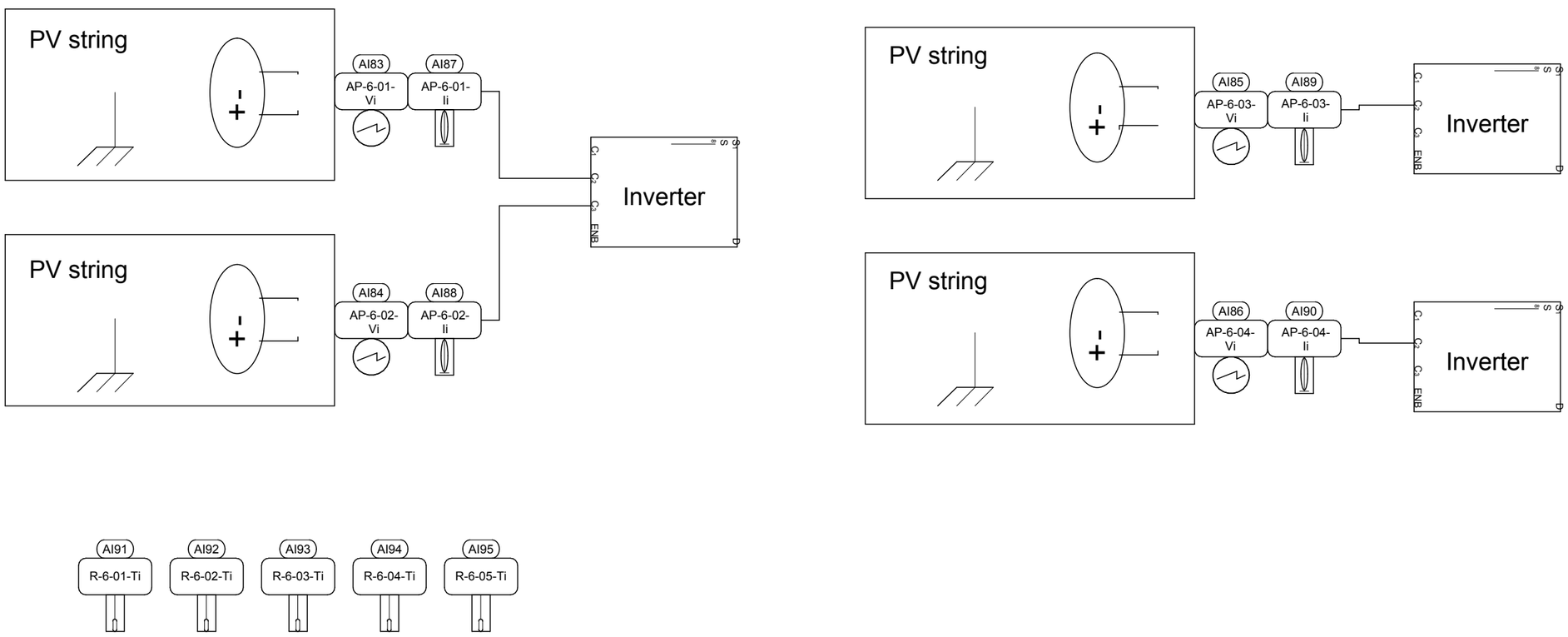
E-608

SYSTEM DATA POINTS SCHEDULE

I/O NUMBER	MARK	POINT DESCRIPTOR	POINT TYPE	I/O TAG	SYSTEM
83	AP-6-01-Vi	PV array 1 voltage	AI	AI83	6-PV
84	AP-6-02-Vi	PV array 2 voltage	AI	AI84	6-PV
85	AP-6-03-Vi	PV array 3 voltage	AI	AI85	6-PV
86	AP-6-04-Vi	PV array 4 voltage	AI	AI86	6-PV
87	AP-6-01-Ii	PV array 1 current	AI	AI87	6-PV
88	AP-6-02-Ii	PV array 2 current	AI	AI88	6-PV
89	AP-6-03-Ii	PV array 3 current	AI	AI89	6-PV
90	AP-6-04-Ii	PV array 4 current	AI	AI90	6-PV
91	R-6-01-Ti	PV NW Temp	AI	AI91	6-PV
92	R-6-02-Ti	PV NE Temp	AI	AI92	6-PV
93	R-6-03-Ti	PV SW Temp	AI	AI93	6-PV
94	R-6-04-Ti	PV SE Temp	AI	AI94	6-PV
95	R-6-05-Ti	PV center Temp	AI	AI95	6-PV



A1 PV Controls

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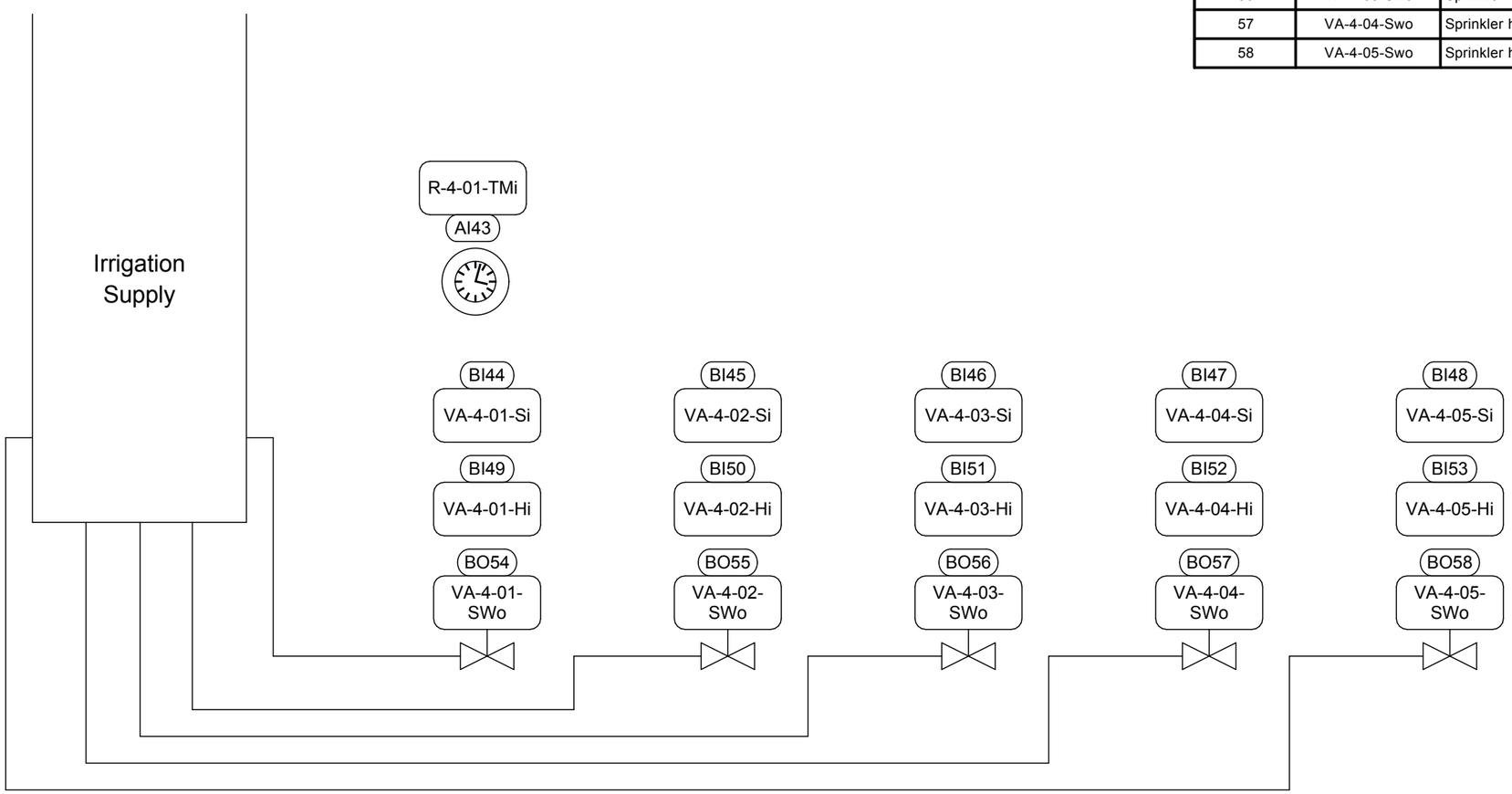
E-609

SYSTEM DATA POINTS SCHEDULE

I/O NUMBER	MARK	POINT DESCRIPTOR	POINT TYPE	I/O TAG	SYSTEM
43	R-4-01-Tmi	Time reference for irrigation system	AI	AI43	4-IRG
44	VA-4-01-Si	Sprinkler head status	BI	BI44	4-IRG
45	VA-4-02-Si	Sprinkler head status	BI	BI45	4-IRG
46	VA-4-03-Si	Sprinkler head status	BI	BI46	4-IRG
47	VA-4-04-Si	Sprinkler head status	BI	BI47	4-IRG
48	VA-4-05-Si	Sprinkler head status	BI	BI48	4-IRG
49	VA-4-01-Hi	Sprinkler Humidity Sensor	BI	BI49	4-IRG
50	VA-4-02-Hi	Sprinkler Humidity Sensor	BI	BI50	4-IRG
51	VA-4-03-Hi	Sprinkler Humidity Sensor	BI	BI51	4-IRG
52	VA-4-04-Hi	Sprinkler Humidity Sensor	BI	BI52	4-IRG
53	VA-4-05-Hi	Sprinkler Humidity Sensor	BI	BI53	4-IRG
54	VA-4-01-Swo	Sprinkler head switch	BO	BO54	4-IRG
55	VA-4-02-Swo	Sprinkler head switch	BO	BO55	4-IRG
56	VA-4-03-Swo	Sprinkler head switch	BO	BO56	4-IRG
57	VA-4-04-Swo	Sprinkler head switch	BO	BO57	4-IRG
58	VA-4-05-Swo	Sprinkler head switch	BO	BO58	4-IRG



A1 Irrigation Controls
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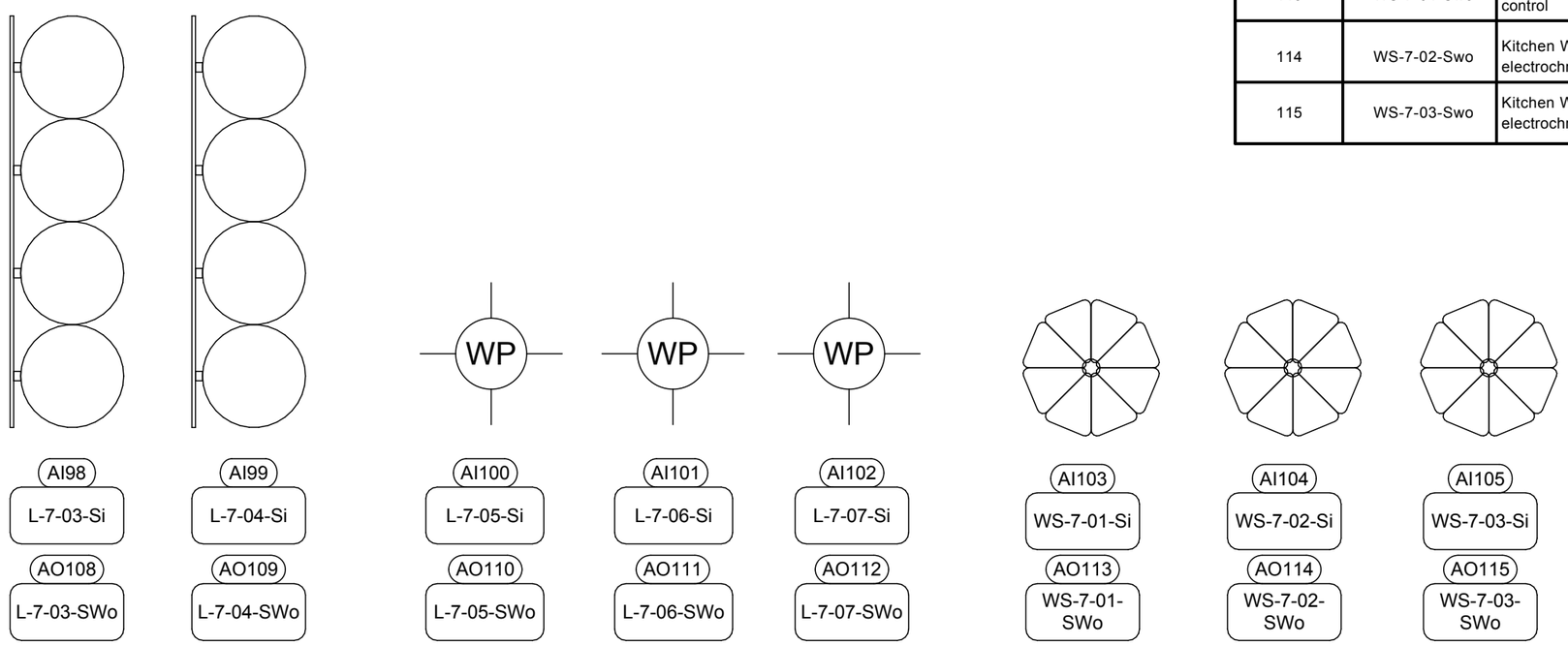
E-610

SYSTEM DATA POINTS SCHEDULE

I/O NUMBER	MARK	POINT DESCRIPTOR	POINT TYPE	I/O TAG	SYSTEM
96	L-7-01-Si	Desk Light Status	AI	AI96	7-Light
97	L-7-02-Si	ZONE1 Light Status	AI	AI97	7-Light
98	L-7-03-Si	ZONE2 Light Status	AI	AI98	7-Light
99	L-7-04-Si	ZONE3 Light Status	AI	AI99	7-Light
100	L-7-05-Si	NE Ext Light Status	AI	AI100	7-Light
101	L-7-06-Si	NW Ext Light Status	AI	AI101	7-Light
102	L-7-07-Si	SE Ext Light Status	AI	AI102	7-Light
103	WS-7-01-Si	Office Window A electrochromatic status	AI	AI103	7-Light
104	WS-7-02-Si	Kitchen Window K electrochromatic status	AI	AI104	7-Light
105	WS-7-03-Si	Kitchen Window L electrochromatic status	AI	AI105	7-Light
106	L-7-01-Swo	Desk Light Control	AO	AO106	7-Light
107	L-7-02-Swo	ZONE1 Light CMD	AO	AO107	7-Light
108	L-7-03-Swo	ZONE2 Light CMD	AO	AO108	7-Light
109	L-7-04-Swo	ZONE3 Light CMD	AO	AO109	7-Light
110	L-7-05-Swo	NE Ext Light CMD	AO	AO110	7-Light
111	L-7-06-Swo	NW Ext Light CMD	AO	AO111	7-Light
112	L-7-07-Swo	SE Ext Light CMD	AO	AO112	7-Light
113	WS-7-01-Swo	Office Window A electrochromatic control	AO	AO113	7-Light
114	WS-7-02-Swo	Kitchen Window K electrochromatic control	AO	AO114	7-Light
115	WS-7-03-Swo	Kitchen Window L electrochromatic control	AO	AO115	7-Light



A1 Lighting Controls
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E-611

Communications Plan

Excerpts from the Communications Plan

Key Messages

- Solar can be beautiful. It can also coexist with present technologies, aesthetics, and buildings.
- The technologies, installers, financial assistance, and sunlight for solar energy are all presently available in Minnesota. (And PV is actually more efficient in the cold!)
- Innovative means of both energy savings (reducing demand) and generation (increasing production) are reasonable investments.
- The easily-adaptable components of our house allow the user to change the structure as needs or notions arise.
- Life Cycle Assessment (LCA) provides a means of helping to quantify greater impacts of creating the technologies that support our own lives, and a means for deciding what is appropriate, and it provides a way of identifying the benefits of next-use through reuse, recycling, or biodegradation.

Communications Objectives

Materials produced by the Communications Team serve two purposes:

- To increase awareness about the ICON House and solar energy in Minnesota before the competition
- To create a unique experience during the competition for visitors in D.C.

Visitors should be able to complete the following after visiting the ICON House:

- Recognize the ICON House brand
- Communicate the equal importance of reducing energy consumption as well as increasing energy production
- Learn about the various types of solar collectors that can be implemented into existing houses
- Recognize passive and active energy strategies for heat and light
- Understand the concept of Life Cycle Assessment (LCA)

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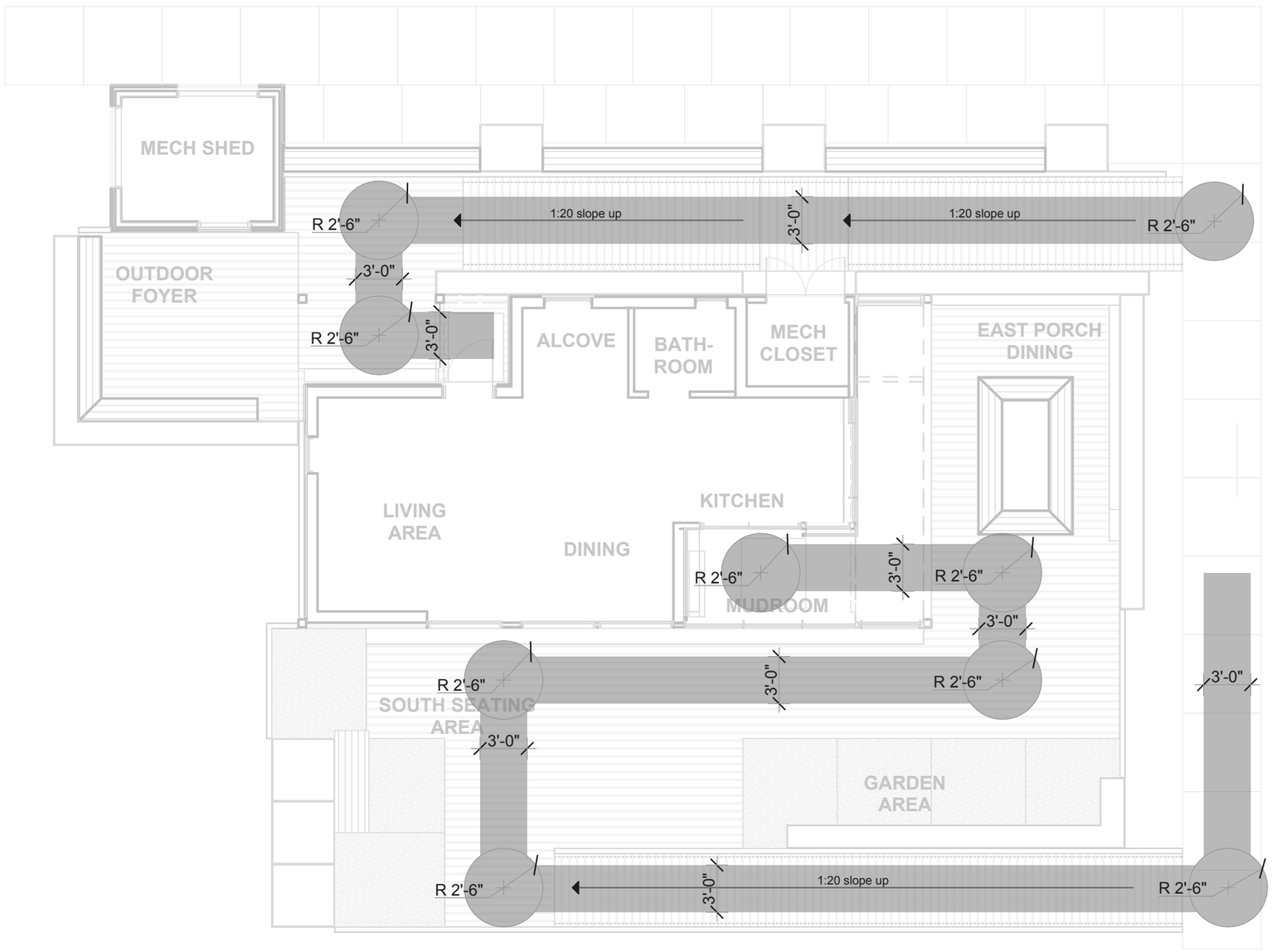

GENERAL SHEET NOTES

1. RAMP SLOPES NOT TO EXCEED 1:20.
2. RAMPS MUST INCLUDE 4" HIGH LIP ON EITHER SIDE.
3. ALL WOOD DECKING ALONG RAMPS SHOULD BE PERPENDICULAR TO THE PATH OF TRAVEL.
4. NO ENTRY THRESHOLDS TO EXCEED 1/4" HEIGHT CHANGE.

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ADA site plan

X-101

PLAN NORTH

A1 ADA exterior
SCALE: 1/8" = 1'-0"

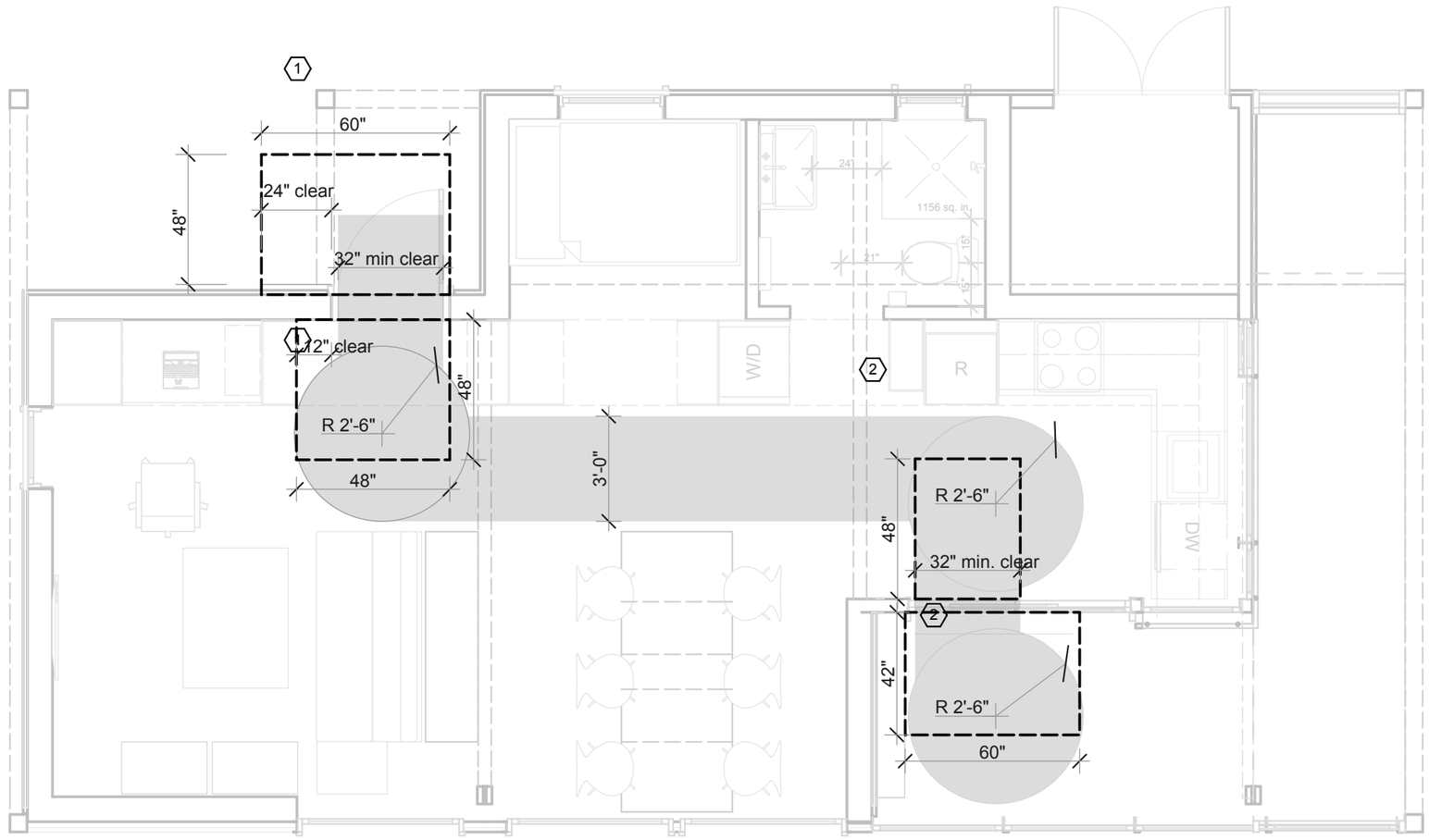
0 4' 8' 16'

GENERAL SHEET NOTES

1 NO ENTRY THRESHOLDS TO EXCEED 1/4" HEIGHT CHANGE.

SHEET KEYNOTES

1 PER ANSI 404.2.3.1
2 PER ANSI 404.2.3.2



PLAN NORTH

0 2' 4' 8'

A1 ADA interior
SCALE: 1/4" = 1'-0"

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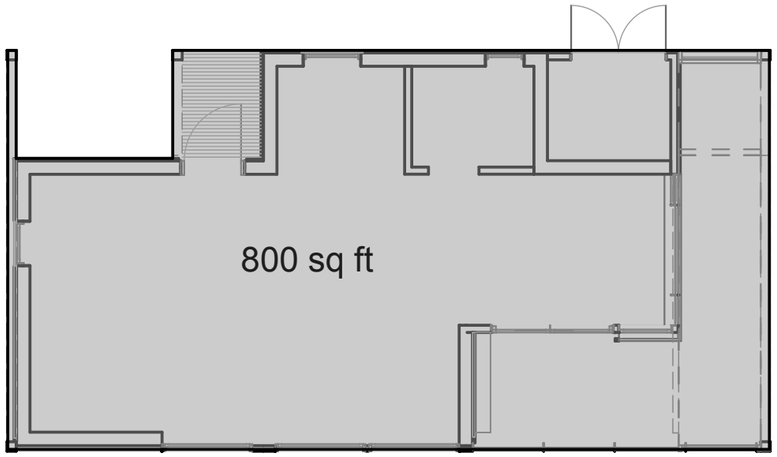
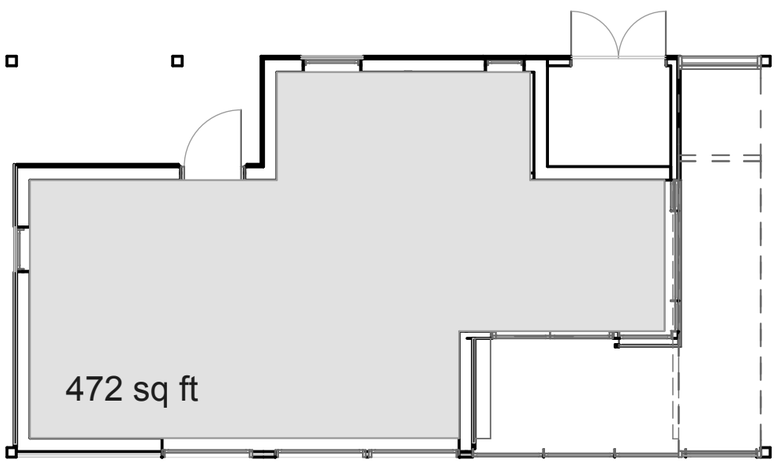
ADA floor plan

X-102



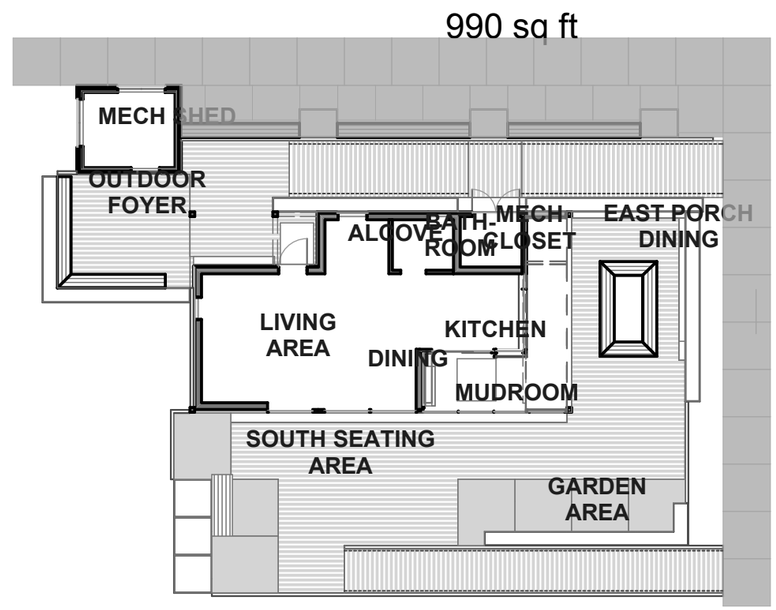
A4 Total Footprint
SCALE: 1/8" = 1'-0"

0 4' 8' 16'



A1 Total Conditioned
SCALE: 1/8" = 1'-0"

0 4' 8' 16'



E1 Matts
SCALE: 1/16" = 1'-0"

0 8' 16' 32'

PLAN NORTH

icon SOLAR HOUSE
UNIVERSITY OF MINNESOTA

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areas

X-103

Signage Placement

A1 - Architect Narrative 1
A2 - Architect 2
A3 Architect 3

S1 - Shell intro - circulation?
S2 - Windows desc. (on table)

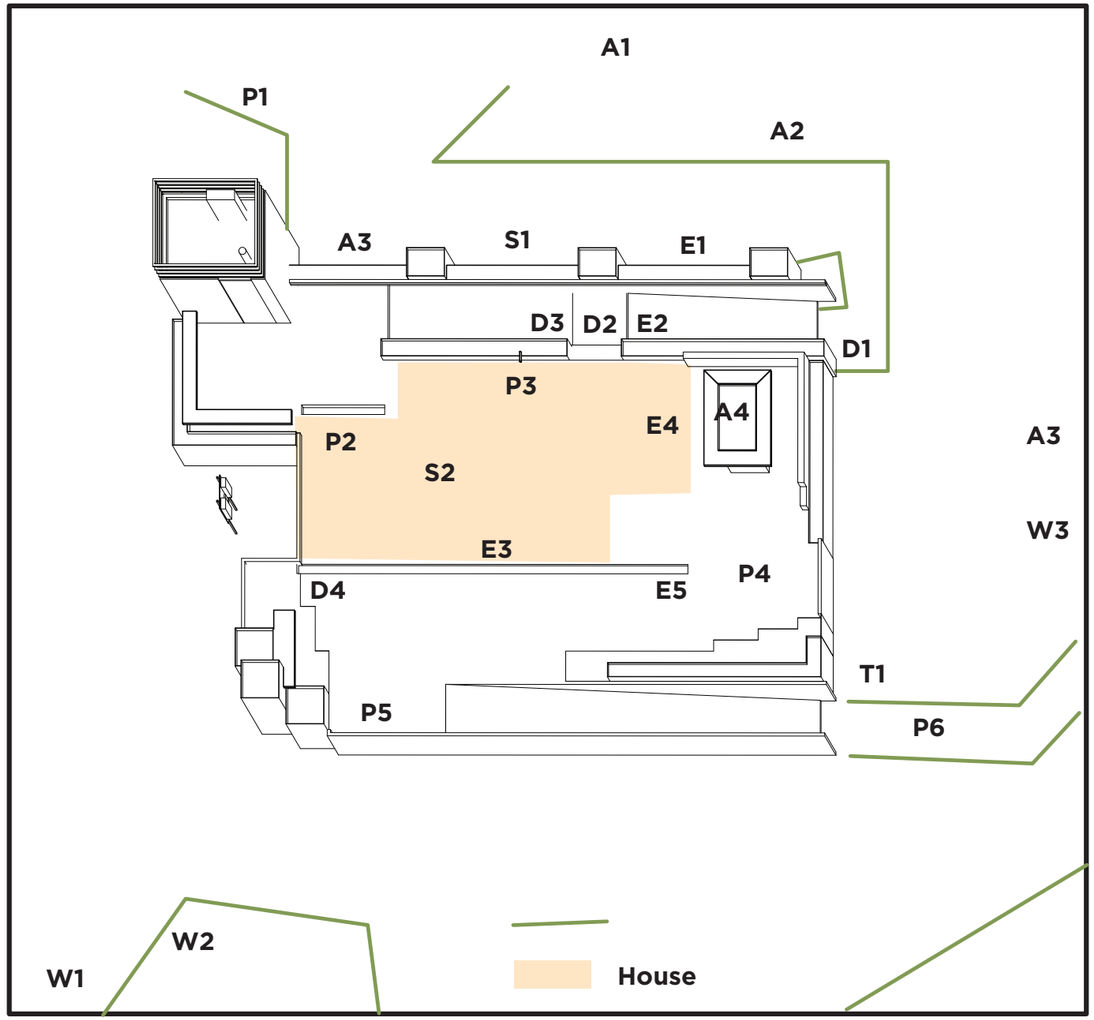
E1 - Electric / PV intro
E2 - Mech Closet Labeling (Electrical)
E3 - BIPV windows description
E4 - Sage Windows
E5 - PV narrative

D1 - Desiccant Intro
D1a - Desiccant electrical schematic [Handheld]
D2 - Mech Closet Labeling (S. Thermal schematic)
D3 - Systems of the Mech Closet Explained
D4 - ST Narrative

W1 - Wayfinding sign
W2 - Photo Op
W3 - Wayfinding Sign

P1 - Welcome Person - whiteboard handout
P2 - Jean Person - controls narative/q's
P3 - Pajama Person - radiant floor/q's
P4 - Deck welcoming Person
P5 - Thankyou Person - collect whiteboard
P6 - Runner/ misc. Person

T1 - Thank you to SD, DOE, NREL



Panels - This signage stands in open spaces to grab attention. It has a lot of pictures and very little prose. Aimed at large groups of people to be read at a distance up to 50 feet. (A1)
PhotoOp - This is a interactive piece that invites attendees to take a picture. The sign itself acts as an informational piece that the users create. This piece is printed on fabric for each or transportation and assembly. (W2)
Plaquards - This signage is meant to be read at 2-4 feet, allowing a small group of people to read at the same time. (D2)
Handhelds - These information pieces are small and are meant to be picked up and held. They contain information that is more advanced than any of the other signage. It's meant to be read at 1-3 feet by one or two people. Aimed at people working within the topic field. (D3a)

PLAN NORTH

A1 Signage Placement
NOT TO SCALE

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UNIVERSITY OF MINNESOTA

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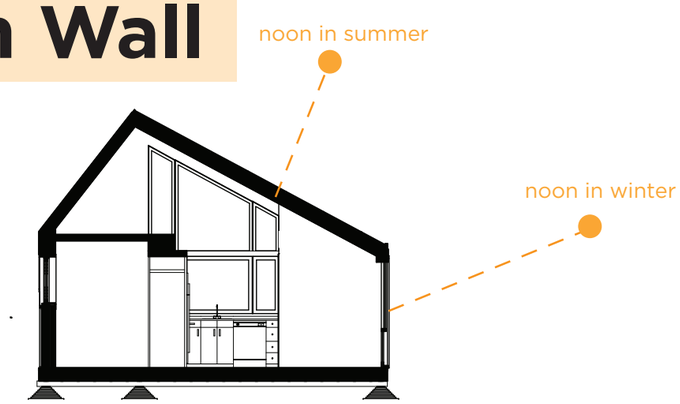
signage placement

X-901

Minnesotan South Wall

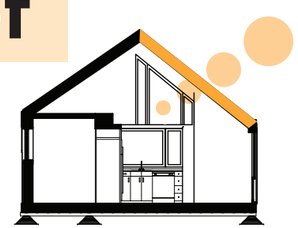
Our south wall has a thin film that is essentially a see-through solar panel. It converts sun energy to electricity, especially well during winter months, when the sun stays low in the Minnesotan sky.



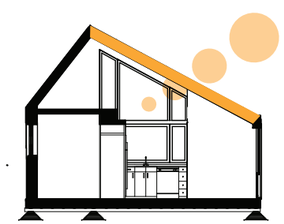
Solar Gable Roof

Our love for using what already exists has lead us to take the concept of a gable roof and 'solarize' it!

The increased surface area is perfect place to put our solar panels.



Traditional Gable Roof



Solar Gable Roof

A1 Educational Signage Samples

NOT TO SCALE

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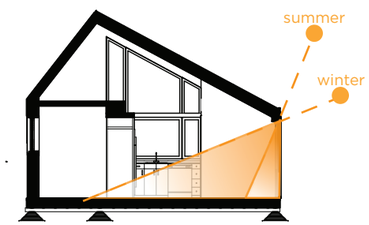
signage samples

X-902

Winter Zenith

The lower sun angle is able to passivley heat our house better in winter, when we want the heat to stay. The sun's angle is called a Zenith.



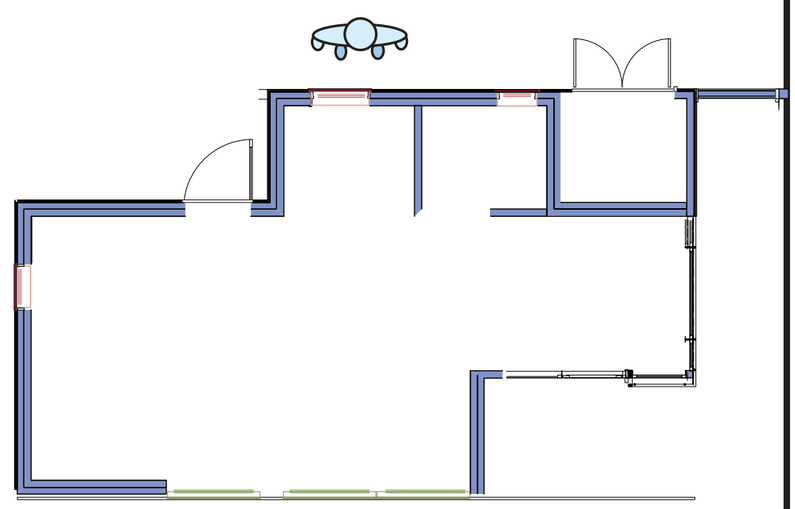
Our R-Value

R-50 Closed Cell Insulated Wall

R-22 Triple Pane Window

R-? Sliding Door

You



A1 Educational Signage Samples

NOT TO SCALE

ICON SOLAR HOUSE
UNIVERSITY OF MINNESOTA

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REV 3
REV 4
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A Dry House is a Cooler House

Latent Cooling is the process of taking humidity out of the air. You can find an example of latent cooling in show stores. The white packets with little balls of silica gel draws humidity out of the air to keep your shoes fresh – it's latent cooling at it's finest!

The ability to draw humidity out of air is called a desiccant property. The silica gel in your new shoes are desiccant materials. The ICON solar house uses the same desiccant properties to latently cool during the summer. Desiccant materials are reusable. When heat is applied, the water that the material is holding is released. When cooled, the cycle starts over absorbing humidity again.

A commercial usage of desiccants

A larger sign posted at D1. Supplemental material accompanies for those interested in our specific system details. This supplement is a handheld piece. (See D1a)

A1 Educational Signage Sample

SCALE: 1' = 1'-0"

0 1/2" 1" 2"

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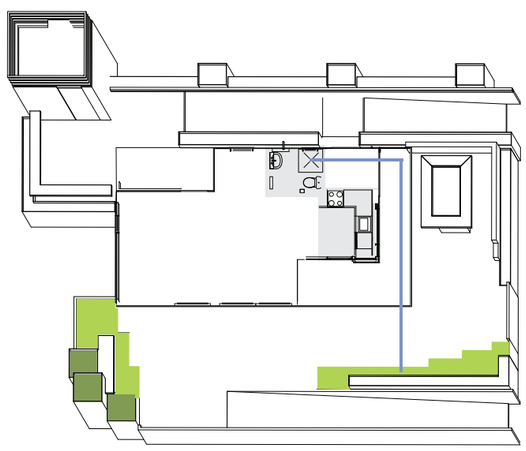
signage samples

X-904

Gray Water

Waste water from bathing and washing dishes is safe enough to water our plants outside. This type of waste water is called gray water, and typically comprises 50-80% of used household water.

Toro's™ water irrigation system takes our gray water from our shower and uses it to keep our deck plants nicely hydrated.



U.S. DEPARTMENT OF ENERGY

SOLAR DECATHLON

A1 Team Sponsor Recognition In Educational Material

NOT TO SCALE

GENERAL SHEET NOTES

1 SAMPLE TEAM SPONSOR RECOGNITION SIGNAGE

2 TEAM ONLY USES SPONSOR LOGOS / TEXT IN THE BODY OF EDUCATIONAL MATERIAL TO REFERENCE A PARTICULAR PRODUCT / ITEM

ICON SOLAR HOUSE

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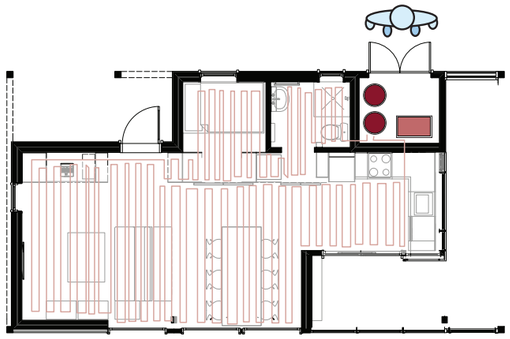
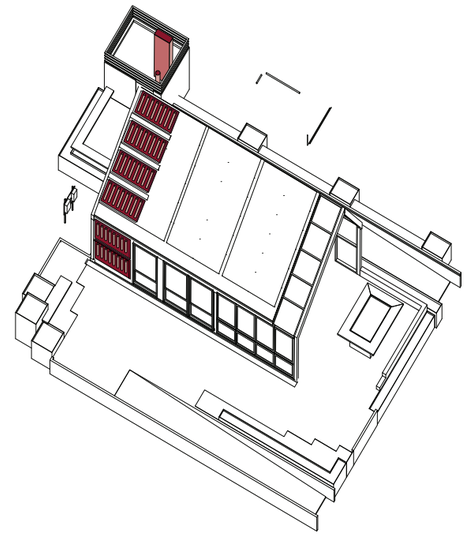
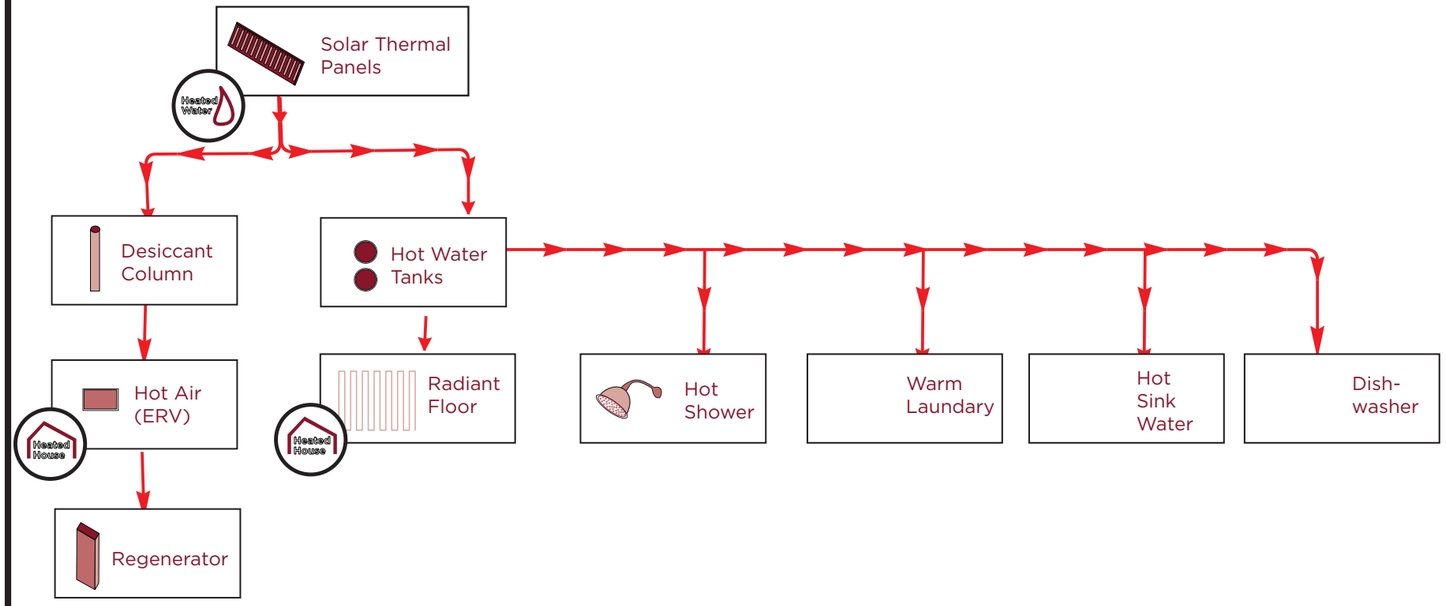
signage samples

X-905

Solar Thermal System







A1 Educational Signage Sample

NOT TO SCALE

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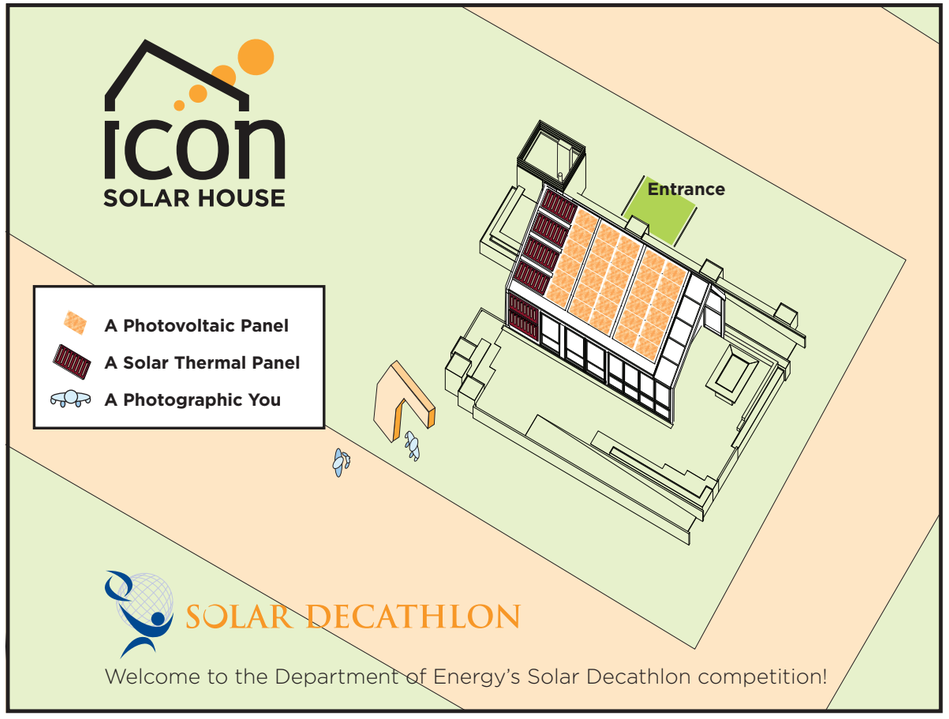
signage samples

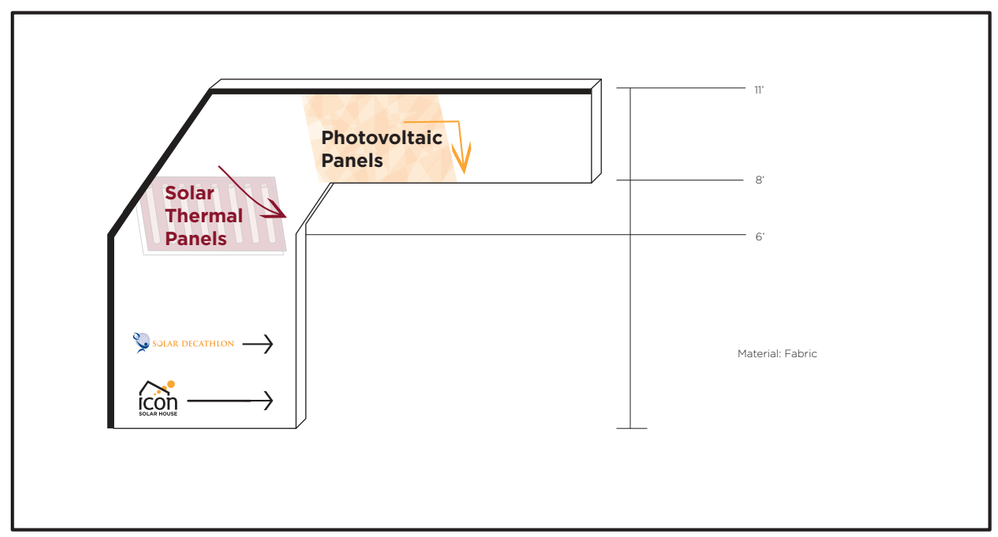
X-906

GENERAL SHEET NOTES

1 REFER TO COMMUNICATIONS PLAN FOR EXPLANATION OF THE PHOTO-OPS STRATEGICALLY CALLED OUT AROUND OUR HOUSE.



A1 Photo Op Signage
SCALE: 1' = 1'-0"



D1 Photo Op Signage
SCALE: 1' = 1'-0"

ICON SOLAR HOUSE
UNIVERSITY OF MINNESOTA

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REV 2
REV 3
REV 4
REV 5
REV 6
REV 7

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Thank You

A big thank you to our event sponsors.

SOLAR DECATHLON

U.S. DEPARTMENT OF ENERGY

NREL

GENERAL SHEET NOTES

1 SEE X-901 FOR EVENT RECOGNITION SIGNAGE PLACEMENT

2 SIGN INCLUDES SPACE FOR EXPANDED EVENT SPONSORS, AS DIRECTED BY THE EVENT SPONSORS

ICON SOLAR HOUSE

UNIVERSITY OF MINNESOTA

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A1 Event Sponsor Recognition

SCALE: 1' = 1'-0"

0 1/2" 1" 2"

One hundred years ago, gable roof houses were powered by coal. The ICON Solar House has a solar-gable roof powered by the sun. We're taking the familiar and iconic form of a gable roof house, and integrating technology to provide the change needed to live sustainably in modern times.

ICON SOLAR HOUSE
UNIVERSITY OF MINNESOTA

A4 Postcard front
NOT TO SCALE

From October 1 to 21, the ICON Solar House will be temporarily relocated to the **National Mall in Washington, DC** for the Solar Decathlon competition. Twenty teams will receive points in ten contests, as well as open their homes to the public. Follow our progress in Washington, DC:
www.solardecathlon.umn.edu

A1 Postcard Back
NOT TO SCALE

Postcard

Brief Summary of Icon Houes and Decathlon

Used for various events in Minnesota

Target Audience: General Public

Possible handout on National Mall

Shown to scale

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UNIVERSITY OF MINNESOTA

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handout sample

X-909

Technical Brochure

Condensed amount of technical information

Used for various events in Minnesota

Target Audience: students and professionals

Only used in Minnesota

(actual size 8.5" x 3.25")

Photovoltaic System Because of the advanced passive technology in the ICON House, the energy requirements for active space conditioning are significantly reduced. The active systems that meet this reduced load run on solar thermal and electrical energy, collected from solar thermal and photovoltaic (PV) technologies. The PV system will be hooked up to the electrical grid, so if it cannot meet the electrical load, the grid will. If the PV array has excess energy, it will feed it back to the grid and the house will then generate power. Traditional solar panels serve as roof cladding for most of the south roof while Building Integrated Photovoltaic (BIPV) glazing is located on the south wall and roof.

Electrical System Highlighted

Solar Thermal Solar thermal energy is used to heat potable water and to meet the heating load via a radiant floor system. It is stored locally in two tanks, one for domestic hot water and one for radiant floor heating. Enough solar thermal storage is available to provide approximately 1-3 days of hot potable water and 0-5 days of radiant floor heating.

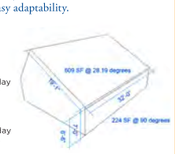
Electrochromc Windows The ICON House features electrochromic window tinting, which uses a small amount of electricity to create a chemical reaction between two panes of glass, effectively dimming the windows.

Radiant Flooring Radiant floors are a flexible and efficient solution to meet heating loads in Minnesota. A single loop of piped hot water delivers heat at low temperature by utilizing the superb energy storage capacity of water compared to air. Delivering heat at low temperature, just degrees above the desired comfort zone temperature, means that the radiant floor system heats the house using less energy.

Gable Roof The gable roof is 28.2 degrees, which allows us to fit within size restrictions, achieve our iconic shape, and produce the maximum amount of power. Moreover, many current houses have roofs at 30 degrees, allowing easy adaptability.

DC
PV = 64.9 MJ/day
Thermal = 227.4 MJ/day
Total = 292.3 MJ/day

MPLS
PV = 74.2 MJ/day
Thermal = 259.7 MJ/day
Total = 334.0 MJ/day



Desiccant Dehumidification System
The desiccant system is an experimental system custom to the ICON House. It utilizes desiccants to remove the water vapor in the air. A desiccant is a material, usually a solution or a solid, that attracts and holds water, and then releases that water when it is heated. This is how we will use heat to latently cool. We are using an aqueous salt solution of Lithium Chloride (LiCl) and Calcium Chloride (CaCl) at 0.4 mass concentration before dehumidification.

Thermal System Highlighted

Rigid Closed Cell Insulation The ICON House is further structurally stabilized by rigid closed cell insulation. This type of spray foam insulation in a staggered stud wall allows to minimize paths that heat can escape, creating a very effective barrier. This barrier holds a R-50 rating, which is very high compared to a typical house. The higher the R-value, the less heat escapes in the winter, and the less hot air enters the house in the summer. The primary passive technology is the high performance building envelope which minimizes the space conditioning energy loads.

A1 Inside of Trifold

NOT TO SCALE

The ICON House is designed with Minnesota in mind. This multi-disciplined solution integrates solar-thermal panels and multiple photovoltaic technologies into the architecture to create a high performance house whole still maintaining a traditional aesthetic. We use the sun's heat energy to heat water loads (showers, sinks, etc.) heat the house during brutally cold Minnesota winters, and in addition, latently cool during humid summer months. Minnesota's heating needs in winter are so high, in fact, that most thermal system designers face the challenge of wasting the extra energy during the summer.

Our Goals

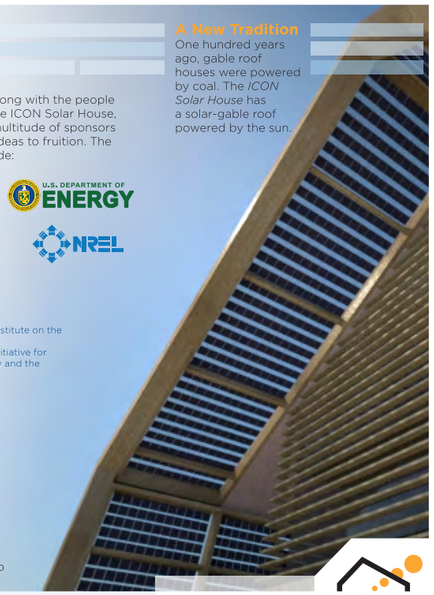
- **Build: a zero - energy** house
- **Integration:** to demonstrate advancements in building integrated photovoltaic technology as defined by the U.S. Department Of Energy.
- **Innovative sustainability:** to demonstrate life-cycle focused sustainability.
- **Market transformation:** to bridge the gap to widespread acceptance of solar integrated, sustainable housing by 2015.
- **Regionalism:** to demonstrate regionally appropriate approaches to sustainable design that differentiates the house.
- **Learning:** to provide opportunities for hands on interdisciplinary learning among project participants.

Our Sponsors Along with the people working directly on the ICON Solar House, our team relies on a multitude of sponsors in order to bring our ideas to fruition. The team's sponsors include:

3M
Ted and Linda Johnson
Marvin Windows & Doors
Raptor Tools
SaberPack
Uponor
Valspar
WL Hall
The Weidt Group
University of Minnesota's Institute on the Environment
University of Minnesota's Initiative for Renewable Energy and the Environment

Visit our website to track of our progress as we make our way to Washington, D.C.

www.solardecathlon.umn.edu



A New Tradition
One hundred years ago, gable roof houses were powered by coal. The *ICON Solar House* has a solar-gable roof powered by the sun.

TECHNICAL GUIDE

ICON SOLAR HOUSE
University of Minnesota

E1 Outside of Trifold

NOT TO SCALE

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handout sample

X-910

P0

P1

P2

There will be 6 uniforms, colored white. The 6 different shirts denote our team by the similiar styling, but each shirt is different, depending on which role the wearer has.

The colored shirt represents a teammate who is present, but not one of the 6 onduty members.

The teammate has his or her own choice of long leggings: slacks, nice jeans, or a long skirt.

A4 Shirt P0
SCALE: 1' = 1'-0 (0, 1/2", 1", 2")

C4 Shirt P1
SCALE: 1' = 1'-0 (0, 1/2", 1", 2")

E4 Shirt P2
SCALE: 1' = 1'-0 (0, 1/2", 1", 2")

P3

P4

P6

A1 Shirt P3
SCALE: 1' = 1'-0 (0, 1/2", 1", 2")

C1 Shirt P4
SCALE: 1' = 1'-0 (0, 1/2", 1", 2")

E1 Shirt P6
SCALE: 1' = 1'-0 (0, 1/2", 1", 2")

ICON SOLAR HOUSE
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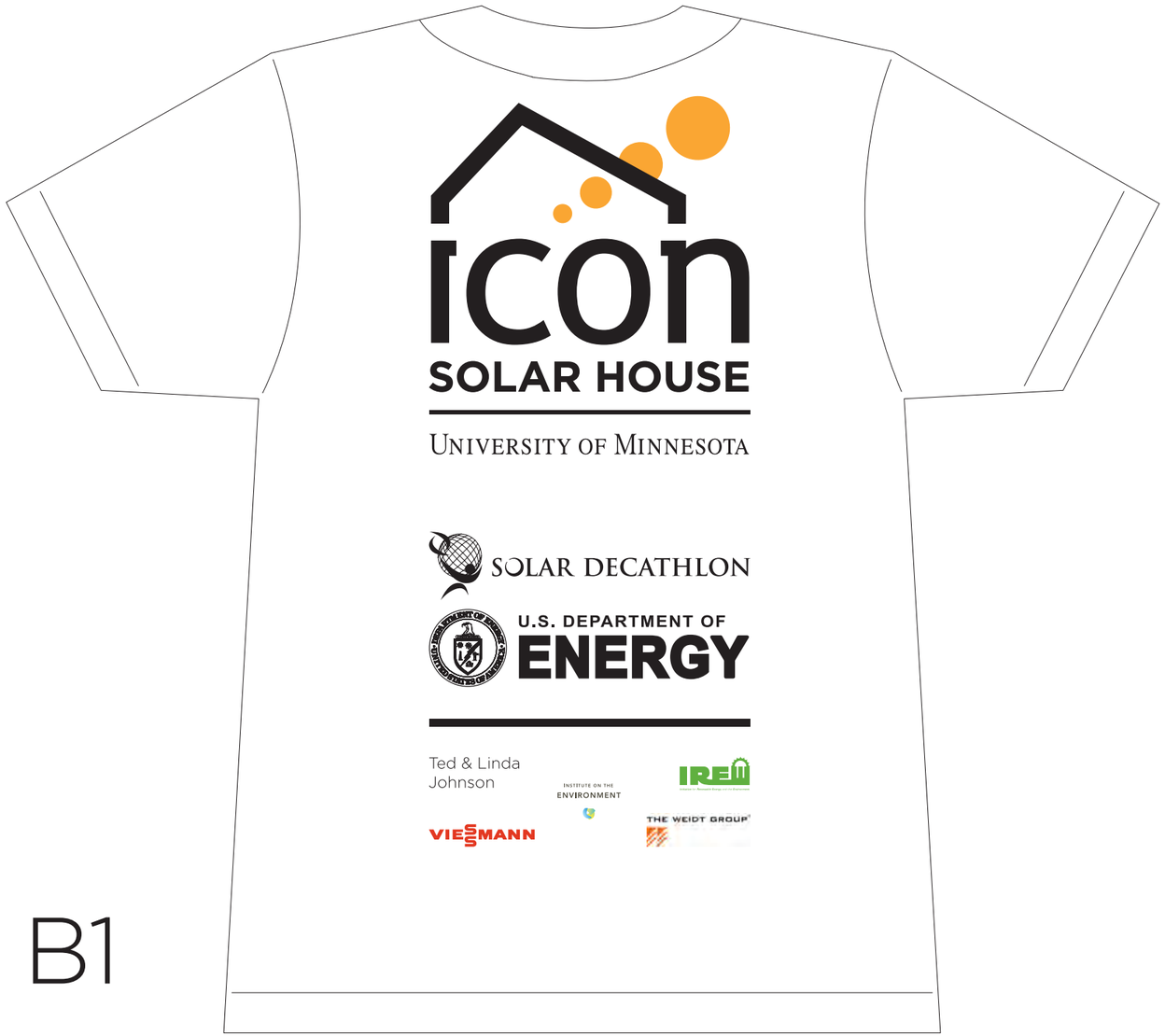
uniforms

X-911

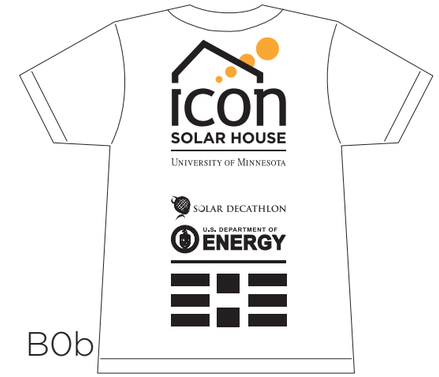


B1

A1 Team Sponsor Recognition on T Shirts

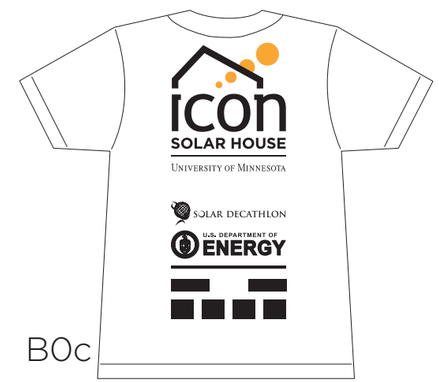
SCALE: 1' = 1'-0"

0 1/2" 1" 2"



B0b

F5 Shirt B0b



B0c

F3 Shirt B0c

B0a

F1 Shirt B0a

Each t-shirt will have a different set of 5-8 logos on its back. Their size is set by the in figures B0a, B0b, and B0c, depending on logo orientations. B1 is one example of a shirt with logos already placed on it. Each of our sponsors will be represented on one shirt at all times during the competition.

The logos on each shirt will be group by similar areas of industry. For example, the PV-GUY shirt will have sponsors who are in the PV field of work.

icon
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UNIVERSITY OF MINNESOTA

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				Vechile Info				Weight			
Task #	# Ppl	Time		Vec. Type	Vehicle	Equip.	lbs/unit	# units	Total	Dims	Notes
1	2	20	min			Forklift			0		Clear space for truck in construction area
2	4	60	min			Dolly			0		Remove furniture and pack for transport
3	1	30	min						0		Disconnect EPIC system; drain hoses and tanks
4	4	120	min	28” x 96” Dry	Trailer 4	Crane			0		Remove planters, table and landscaping troughs and load on truck
5	2	15	min	28” x 96” Dry	Trailer 4				0		Remove EPIC water storage tanks and load on truck
6	4	60	min	Flat bed 48' x 102"	Trailer 1, 2	Forklift			0		Remove deck in sections and load for transport
7	8	240	min	Flat bed 48' x 102"	Trailer 3	Forklift			0		Remove PV panels and wrap for transport; pack PV into custom traveling rig
8	2	60	min	28” x 96” Dry	Trailer 4				0		Remove and pack weather barrier
9	2	15	min						0		Secure loose furniture or appliances/appurtenances in house for transport
10	4	60	min	28” x 96” Dry	Trailer 4	Forklift			0		Load crates with materials that will not transport inside house
11	2	30	min						0		Disconnect and drain plumbing and desiccant systems
12	2	30	min								Disconnect electrical system
13	2	30	min								Disconnect HVAC systems
14	8	60	min								Disconnect Roof Modules
15	8	30	min	28” x 96” Dry	Trailer 4	Crane			0		Disconnect Panels and crate for transport
16	8	60	min								Disconnect modules
17	8	10	min			Forklift					Separate modules, install temporary bracing, and move to loading positions
18	4	60	min								Pack modules with all materials that will transport inside house
19	2	15	min								Secure movable parts, including doors and windows
20	2	45	min								Shrink wrap modules for transport
21	8	60	min	Flat bed 48' x 102"	Trailer 1, 2, 3	Crane					Load house modules, roof sections and panels on truck
22	4	15	min								Remove temporary footings and cribbing
23	4	15	min	28” x 96” Dry	Trailer 4						Pack cribbing and footings
24	4	15	min	28” x 96” Dry	Trailer 4						Remove soil anchors and pack for transport
25	8	120	min								Clean up ReUse construction space
26	2	120	min								Pack all tools in toolboxes
27	2	30	min	28” x 96” Dry	Trailer 4						Load toolboxes and ready for transport
28	4	5	days								Move house to Washington DC

icon SOLAR HOUSE
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REV 7	
PROJECT NO	297-09-1655
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departure plan

O-001

ID	Task Name	Work	Duration	Start	Finish	Predecess	Resource Names
1	**Solar Decathlon - Site Assembly**	**7,506 mins**	**145 hrs**	**Thu 10/1/09**	**Wed 10/7/09**		
2	**Site Preparations**	**276 mins**	**4.5 hrs**	**Thu 10/1/09**	**Thu 10/1/09**		
3	Safety Meeting	30 mins	0.5 hrs	Thu 10/1/09	Thu 10/1/09		All Student Workers
4	Empty Truck 1- Setup Lights, tool shed, te	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09	3	Site Team
5	Water Plants	6 mins	0.1 hrs	Thu 10/1/09	Thu 10/1/09	3	Site Team
6	Survey Ground (Laser & Rod	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09	4	Site Team
7	Place plastic/sand	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09	6	Site Team
8	Place Foundation Blocks	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09	7	Site Team
9	**Footing**	**120 mins**	**2 hrs**	**Thu 10/1/09**	**Thu 10/1/09**	**8**	
10	1	30 mins	0.5 hrs	Thu 10/1/09	Thu 10/1/09	8	Site Team
11	2	30 mins	0.5 hrs	Thu 10/1/09	Thu 10/1/09	10	Site Team
12	3	30 mins	0.5 hrs	Thu 10/1/09	Thu 10/1/09	11	Site Team
13	4	30 mins	0.5 hrs	Thu 10/1/09	Thu 10/1/09	12	Site Team
14	Protective ground pads for crane arrival	30 mins	0.5 hrs	Thu 10/1/09	Thu 10/1/09	13	Site Team[50%],Vendor[50%
15	Crane Setup	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09	14	Vendor
16	**Module Placement**	**195 mins**	**3.25 hrs**	**Thu 10/1/09**	**Thu 10/1/09**	**15**	
17	Flat Bed 1 to site	15 mins	0.25 hrs	Thu 10/1/09	Thu 10/1/09	15	Site Operations Team
18	Place East Module	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09	17	Module Team
19	Place East Roof	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09	18	Module Team
20	Check Connections	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09	19	Module Team
21	**Module Placement**	**225 mins**	**3.75 hrs**	**Thu 10/1/09**	**Thu 10/1/09**	**16**	
22	Flat Bed 2 to site	15 mins	0.25 hrs	Thu 10/1/09	Thu 10/1/09	20	Site Operations Team
23	Place Middle Module	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09	22	Module Team
24	Place Middle Roof	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09	23	Module Team
25	Check Connections	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09	24	Module Team
26	Remove Bracing (inside East Module)	30 mins	0.5 hrs	Thu 10/1/09	Thu 10/1/09	25	Module Team
27	**Module Placement**	**255 mins**	**3.75 hrs**	**Thu 10/1/09**	**Thu 10/1/09**	**21**	
28	Flat Bed 3 to site	15 mins	0.25 hrs	Thu 10/1/09	Thu 10/1/09	25	Site Operations Team
29	Place West Module	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09	28	Module Team
30	Place West Roof	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09	29	Module Team
31	Check Connections	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09	30	Module Team
32	Remove Bracing (Inside middle module	30 mins	0.5 hrs	Thu 10/1/09	Thu 10/1/09	31	Module Team
33	Remove Bracing (Inside West Module)	30 mins	0.5 hrs	Thu 10/1/09	Thu 10/1/09	31	Module Team
34	Pick & install Porch Module w/ Crane	60 mins	0.5 hrs	Thu 10/1/09	Thu 10/1/09	27,108	Module Team,Vendor
35	Finish Rain Screen at Connections/ joints of M	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09	34	Exterior Team
36	Dissassembly of Crane/Equipment/Pads	60 mins	0.5 hrs	Thu 10/1/09	Thu 10/1/09	35	Vendor,Site Operations Team
37	Install Weather Barrier on Roof	120 mins	2 hrs	Thu 10/1/09	Thu 10/1/09	34	Exterior Team
38	**Windows**	**150 mins**	**2.5 hrs**	**Thu 10/1/09**	**Fri 10/2/09**	**34**	
39	Install East H	30 mins	0.5 hrs	Thu 10/1/09	Thu 10/1/09	34	Exterior Team
40	Install East I	30 mins	0.5 hrs	Thu 10/1/09	Thu 10/1/09	39	Exterior Team
41	Install East J	30 mins	0.5 hrs	Thu 10/1/09	Thu 10/1/09	40	Exterior Team
42	Install East K (2)	30 mins	0.5 hrs	Thu 10/1/09	Thu 10/1/09	41	Exterior Team
43	Install East L	30 mins	0.5 hrs	Thu 10/1/09	Fri 10/2/09	42	Exterior Team
44	South Curtain Wall placement	120 mins	2 hrs	Fri 10/2/09	Fri 10/2/09	43	Exterior Team
45	**Solar Thermal Panels**	**390 mins**	**6.5 hrs**	**Thu 10/1/09**	**Fri 10/2/09**	**37SS**	
46	Install ST1 - A	45 mins	0.75 hrs	Thu 10/1/09	Thu 10/1/09		PV/Solar Thermal Team
47	Install ST1 - B	45 mins	0.75 hrs	Thu 10/1/09	Thu 10/1/09	46	PV/Solar Thermal Team
48	Install ST1 - C	45 mins	0.75 hrs	Thu 10/1/09	Thu 10/1/09	47	PV/Solar Thermal Team
49	Install ST1 - D	45 mins	0.75 hrs	Thu 10/1/09	Fri 10/2/09	48	PV/Solar Thermal Team
50	Install ST1 - E	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	49	PV/Solar Thermal Team
51	Install ST1 - F	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	50	PV/Solar Thermal Team
52	Secure all connections	120 mins	2 hrs	Fri 10/2/09	Fri 10/2/09	51	PV/Solar Thermal Team
53	**PV Panels**	**2,280 mins**	**38 hrs**	**Thu 10/1/09**	**Sat 10/3/09**	**37SS**	
54	Install PV1 - A	45 mins	0.75 hrs	Thu 10/1/09	Thu 10/1/09		PV/Solar Thermal Team
55	Install PV1 - B	45 mins	0.75 hrs	Thu 10/1/09	Thu 10/1/09	54	PV/Solar Thermal Team
56	Install PV1 - C	45 mins	0.75 hrs	Thu 10/1/09	Thu 10/1/09	55	PV/Solar Thermal Team
57	Install PV1 - D	45 mins	0.75 hrs	Thu 10/1/09	Fri 10/2/09	56	PV/Solar Thermal Team
58	Install PV1 -E	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	57	PV/Solar Thermal Team
59	Install PV1 - F	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	58	PV/Solar Thermal Team
60	Install PV1 - G	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	59	PV/Solar Thermal Team
61	Install PV1 - H	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	60	PV/Solar Thermal Team
62	Install PV1 - I	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	61	PV/Solar Thermal Team
63	Install PV1 - J	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	62	PV/Solar Thermal Team
64	Install PV1 - K	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	63	PV/Solar Thermal Team
65	Install PV1 - L	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	64	PV/Solar Thermal Team
66	Install PV1 - M	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	65	PV/Solar Thermal Team
67	Install PV1 - N	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	66	PV/Solar Thermal Team
68	Install PV1 - O	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	67	PV/Solar Thermal Team
69	Install PV1 - P	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	68	PV/Solar Thermal Team
70	Install PV1 - Q	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	69	PV/Solar Thermal Team
71	Install PV1 - R	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	70	PV/Solar Thermal Team
72	Install PV1 - S	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	71	PV/Solar Thermal Team
73	Install PV1 - T	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	72	PV/Solar Thermal Team
74	Install PV1 - U	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	73	PV/Solar Thermal Team
75	Install PV1 - V	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	74	PV/Solar Thermal Team
76	Install PV1 - W	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	75	PV/Solar Thermal Team
77	Install PV1 - X	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	76	PV/Solar Thermal Team
78	Install PV1 - Y	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	77	PV/Solar Thermal Team
79	Install PV1 - Z	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	78	PV/Solar Thermal Team
80	Install PV1 - AA	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	79	PV/Solar Thermal Team

ID	Task Name	Work	Duration	Start	Finish	Predecess	Resource Names
81	Install PV1 - AB	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	80	PV/Solar Thermal Team
82	Install PV1 - AC	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	81	PV/Solar Thermal Team
83	Install PV 2c - A	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	82	PV/Solar Thermal Team
84	Install PV 2c - B	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	83	PV/Solar Thermal Team
85	Install PV 2c - D	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	84	PV/Solar Thermal Team
86	Install PV 2c - E	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	85	PV/Solar Thermal Team
87	Install PV 2c - F	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	86	PV/Solar Thermal Team
88	Install PV 2c - G	45 mins	0.75 hrs	Fri 10/2/09	Fri 10/2/09	87	PV/Solar Thermal Team
89	Install PV 2c - H	45 mins	0.75 hrs	Fri 10/2/09	Sat 10/3/09	88	PV/Solar Thermal Team
90	Install PV 2c - I	45 mins	0.75 hrs	Sat 10/3/09	Sat 10/3/09	89	PV/Solar Thermal Team
91	Install PV 2c - J	45 mins	0.75 hrs	Sat 10/3/09	Sat 10/3/09	90	PV/Solar Thermal Team
92	Install PV 2c - K	45 mins	0.75 hrs	Sat 10/3/09	Sat 10/3/09	91	PV/Solar Thermal Team
93	Install PV 2c - L	45 mins	0.75 hrs	Sat 10/3/09	Sat 10/3/09	92	PV/Solar Thermal Team
94	Install PV 2c - M	45 mins	0.75 hrs	Sat 10/3/09	Sat 10/3/09	93	PV/Solar Thermal Team
95	Install PV 2c - N	45 mins	0.75 hrs	Sat 10/3/09	Sat 10/3/09	94	PV/Solar Thermal Team
96	Install PV 2c - O	45 mins	0.75 hrs	Sat 10/3/09	Sat 10/3/09	95	PV/Solar Thermal Team
97	Install PV 2c - P	45 mins	0.75 hrs	Sat 10/3/09	Sat 10/3/09	96	PV/Solar Thermal Team
98	Install PV 2a - A	45 mins	0.75 hrs	Sat 10/3/09	Sat 10/3/09	97	PV/Solar Thermal Team
99	Install PV 2a - B	45 mins	0.75 hrs	Sat 10/3/09	Sat 10/3/09	98	PV/Solar Thermal Team
100	Install PV 2a - C	45 mins	0.75 hrs	Sat 10/3/09	Sat 10/3/09	99	PV/Solar Thermal Team
101	Install PV 2a - D	45 mins	0.75 hrs	Sat 10/3/09	Sat 10/3/09	100	PV/Solar Thermal Team
102	Secure all Connections	120 mins	2 hrs	Sat 10/3/09	Sat 10/3/09	101	PV/Solar Thermal Team
103	Flat Bed 4 - Deck Arrival	15 mins	0.13 hrs	Thu 10/1/09	Thu 10/1/09	27	Vendor,Site Operations Team
104	Deck Layout & Set up	90 mins	1.5 hrs	Thu 10/1/09	Thu 10/1/09	103	Landscape Team
105	**Deck & Planters Installation**	**537 mins**	**4.45 hrs**	**Thu 10/1/09**	**Fri 10/2/09**	**104**	
106	Deck J	15 mins	0.25 hrs	Thu 10/1/09	Thu 10/1/09	104	Landscape Team
107	Deck I	15 mins	0.25 hrs	Thu 10/1/09	Thu 10/1/09	106	Landscape Team
108	Deck H	15 mins	0.25 hrs	Thu 10/1/09	Thu 10/1/09	107	Landscape Team
109	Planter 1 (Stacked wood beams)	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	108,34	Landscape Team
110	Planter 2 (24" H)	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	108,34	Landscape Team
111	Planter (TABLE)	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	108,34	Landscape Team
112	Deck G	15 mins	0.25 hrs	Thu 10/1/09	Thu 10/1/09	34	Landscape Team
113	Deck F	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	112	Landscape Team
114	Deck E	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	113	Landscape Team
115	Install 300 gal Water Bladder	15 mins	0.25 hrs	Thu 10/1/09	Thu 10/1/09	114	Connection Team
116	Install and connect Water Level Basin to	15 mins	0.25 hrs	Thu 10/1/09	Thu 10/1/09	114	Connection Team
117	Planter3 (Capillary Irrigation boxes below	15 mins	0.25 hrs	Thu 10/1/09	Thu 10/1/09	114	Landscape Team
118	Planter 4 (30" H)	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	114	Landscape Team
119	Deck B	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	114	Landscape Team
120	Deck C	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	119	Landscape Team
121	Deck A	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	120	Landscape Team
122	Install 1300 gal Water Bladder	15 mins	0.25 hrs	Thu 10/1/09	Thu 10/1/09	121	Connection Team
123	Planter 5	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	121	Landscape Team
124	Planter 6	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	121	Landscape Team
125	Planter 7	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	121	Landscape Team
126	Planter 8	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	121	Landscape Team
127	Deck D	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	121	Landscape Team
128	Install EPIC BOX	15 mins	0.25 hrs	Thu 10/1/09	Thu 10/1/09	127	Connection Team
129	Install and connect Water Level Basin to	15 mins	0.25 hrs	Thu 10/1/09	Thu 10/1/09	127	Connection Team
130	Deck Q	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	127	Landscape Team
131	Deck R	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	130	Landscape Team
132	Deck S	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	131	Landscape Team
133	Deck T	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	132	Landscape Team
134	Deck U	12 mins	0.2 hrs	Thu 10/1/09	Fri 10/2/09	133	Landscape Team
135	Deck L	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	127	Landscape Team
136	Deck K	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	135	Landscape Team
137	Planter 10	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	136	Landscape Team
138	Planter 9	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	136	Landscape Team
139	Deck M	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	137,138	Landscape Team
140	Deck N	15 mins	0.25 hrs	Thu 10/1/09	Fri 10/2/09	139	Landscape Team
141	Deck O	15 mins	0.25 hrs	Fri 10/2/09	Fri 10/2/09	140	Landscape Team
142	Deck P	15 mins	0.25 hrs	Fri 10/2/09	Fri 10/2/09	141	Landscape Team
143	Planter 11	12 mins	0.2 hrs	Fri 10/2/09	Fri 10/2/09	142	Landscape Team
144	Planter 12	12 mins	0.2 hrs	Fri 10/2/09	Fri 10/2/09	142	Landscape Team
145	Planter Connections (Drip Line) around I	30 mins	0.5 hrs	Thu 10/1/09	Thu 10/1/09	104SS	Connection Team
146	Install Mechanical Shed	60 mins	1 hr	Fri 10/2/09	Fri 10/2/09	105	Site Team
147	Remove Bracing/tied down cabinets/furniture	120 mins	2 hrs	Fri 10/2/09	Fri 10/2/09	44	Interior Team
148	Label/Tape Faucets & toilets to prevent use	30 mins	0.5 hrs	Fri 10/2/09	Fri 10/2/09	147	Interior Team
149	**Appliances**	**24 mins**	**0.4 hrs**	**Thu 10/1/09**	**Thu 10/1/09**	**36**	
150	TV	6 mins	0.1 hrs	Thu 10/1/09	Thu 10/1/09	36	Interior Team
151	Game Console	6 mins	0.1 hrs	Thu 10/1/09	Thu 10/1/09	150	Interior Team
152	Computer for work station	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09	151	Interior Team
153	**Furniture**	**84 mins**	**0.2 hrs**	**Thu 10/1/09**	**Thu 10/1/09**	**36**	
154	Wall Mounted TV	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09		Interior Team
155	Credenza	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09		Interior Team
156	Banquet Seating	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09		Interior Team
157	Sofa	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09		Interior Team
158	Dining Set	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09		Interior Team
159	Workstation Chair	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09		Interior Team
160	Coffee Table	12 mins	0.2 hrs	Thu 10/1/09	Thu 10/1/09		Interior Team

ICON SOLAR HOUSE
UNIVERSITY OF MINNESOTA

REV 1	03/03/2009
REV 2	04/01/2009
REV 3	05/15/2009
REV 4	
REV 5	
REV 6	
REV 7	
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arrival plan

O-002

ID	Task Name	Work	Duration	Start	Finish	Predecess	Resource Names
161	Lighting (Install)	120 mins	2 hrs	Thu 10/1/09	Fri 10/2/09	153	Interior Team
162	**Doors**	**60 mins**	**1 hr**	**Thu 10/1/09**	**Fri 10/2/09**	**153,149**	
163	Front Door	30 mins	0.5 hrs	Thu 10/1/09	Fri 10/2/09	153,149	Interior Team
164	Mechanical Room Doors 2x	30 mins	0.5 hrs	Fri 10/2/09	Fri 10/2/09	163	Interior Team
165	Grid Connection junction Box	60 mins	1 hr	Sat 10/3/09	Sat 10/3/09	53	Commission Team
166	Place plants into Planters	45 mins	0.75 hrs	Sat 10/3/09	Sat 10/3/09	52,102	Landscape Team
167	**Check Connections**	**300 mins**	**1 hr**	**Sat 10/3/09**	**Sat 10/3/09**	**166**	**Connection Team**
168	Plumbing	60 mins	1 hr	Sat 10/3/09	Sat 10/3/09	166	Connection Team
169	HVAC	60 mins	1 hr	Sat 10/3/09	Sat 10/3/09	166	Connection Team
170	Electrical	60 mins	1 hr	Sat 10/3/09	Sat 10/3/09	166	Connection Team
171	Solar Thermal/ PV	60 mins	1 hr	Sat 10/3/09	Sat 10/3/09	166	Connection Team
172							
173							
174	**Building Inspection**	**600 mins**	**72 hrs**	**Thu 10/1/09**	**Sun 10/4/09**		
175	Foundation Set & Anchor	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
176	Exterior Building Structures	60 mins	1 hr	Thu 10/1/09	Fri 10/2/09		Commission Team
177	Stair/Ramp: Rails & Guards	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
178	Glazing	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
179	Interior Finishes	60 mins	1 hr	Sat 10/3/09	Sun 10/4/09		Commission Team
180	Interior Accessible Route	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
181	General Code Compliance	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
182	Fire Protection Equipment	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
183	Emergency Evac. Plan	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
184	Final Building	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
185	**Electrical Inspection**	**300 mins**	**1 hr**	**Thu 10/1/09**	**Thu 10/1/09**		
186	DC Electrical Rough	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
187	AC Electrical Rough	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
188	Utility Connection	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
189	Final DC Electrical	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
190	Final Electrical	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
191	**Plumbing Inspection**	**240 mins**	**1 hr**	**Thu 10/1/09**	**Thu 10/1/09**		
192	Water Storage / Service	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
193	Water Closet Isolation	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
194	Plumbing	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
195	Final Plumbing	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
196	**Mechanical Inpsection**	**240 mins**	**1 hr**	**Thu 10/1/09**	**Thu 10/1/09**		
197	Mechanical	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
198	Solar Mechanical	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
199	Hydronic Pressure	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
200	Final Mechanical	60 mins	1 hr	Thu 10/1/09	Thu 10/1/09		Commission Team
201	**Event Inspection**	**180 mins**	**25 hrs**	**Tue 10/6/09**	**Wed 10/7/09**		

GENERAL SHEET NOTES

1 Use Vaproshield WrapShield membrane, polypropylene. Meets AATCC 127 for water resistance, ASTM U-84 Class A Flame Spread Index, ATM E-1677 Type 1 air barrier, and ASTM 2178 air permeance of building materials.
2 Use polyurethane, closed cell spray foam insulation w Honeywell blowing agent (EPA approved). Foam is Class 1 ASTM E-84 tested at 4", with Flame Spread Index of 25. NFPA 286 testing done at 8" thick walls, and 12" thick ceilings (see Test Report 3116019-002).
3 Use polyisocyanate insulation with foil facing on both sides. Tape all seams and ensure exterior foil facing acts as a continuous air barrier.

SHEET KEYNOTES

1 WALL ASSEMBLY
SHEATHING
XX

ICON SOLAR HOUSE
UNIVERSITY OF MINNESOTA

REV 1	03/03/2009
REV 2	04/01/2009
REV 3	05/15/2009
REV 4	
REV 5	
REV 6	
REV 7	
PROJECT NO	297-09-1655
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arrival plan

O-003

DEPARTURE PLAN FROM DC TO MN

1. remove and package furniture

2. remove and package windows, photovoltaic panels, solar thermal panels, and rain screen

3. begin to disassemble decking and finish loading non-module trucks place crane.

5. call in flatbed truck one and place west module, corresponding roof module, mechanical shed, and eastern porch module

6. call in flatbed truck two and place middle module and corresponding roof module

7. call in flatbed truck three and place east module and corresponding roof module

8. remove foundation and load along with tool shed and remaining equipment

GENERAL SHEET NOTES

1 Use Vaproshield WrapShield membrane, polypropylene. Meets AATCC 127 for water resistance, ASTM U-84 Class A Flame Spread Index, ATM E-1677 Type 1 air barrier, and ASTM 2178 air permeance of building materials.
2 Use polyurethane, closed cell spray foam insulation w Honeywell blowing agent (EPA approved). Foam is Class 1 ASTM E-84 tested at 4", with Flame Spread Index of 25. NFPA 286 testing done at 8" thick walls, and 12" thick ceilings (see Test Report 3116019-002).
3 Use polyisocyanate insulation with foil facing on both sides. Tape all seams and ensure exterior foil facing acts as a continuous air barrier.

SHEET KEYNOTES

1 WALL ASSEMBLY
SHEATHING
XX

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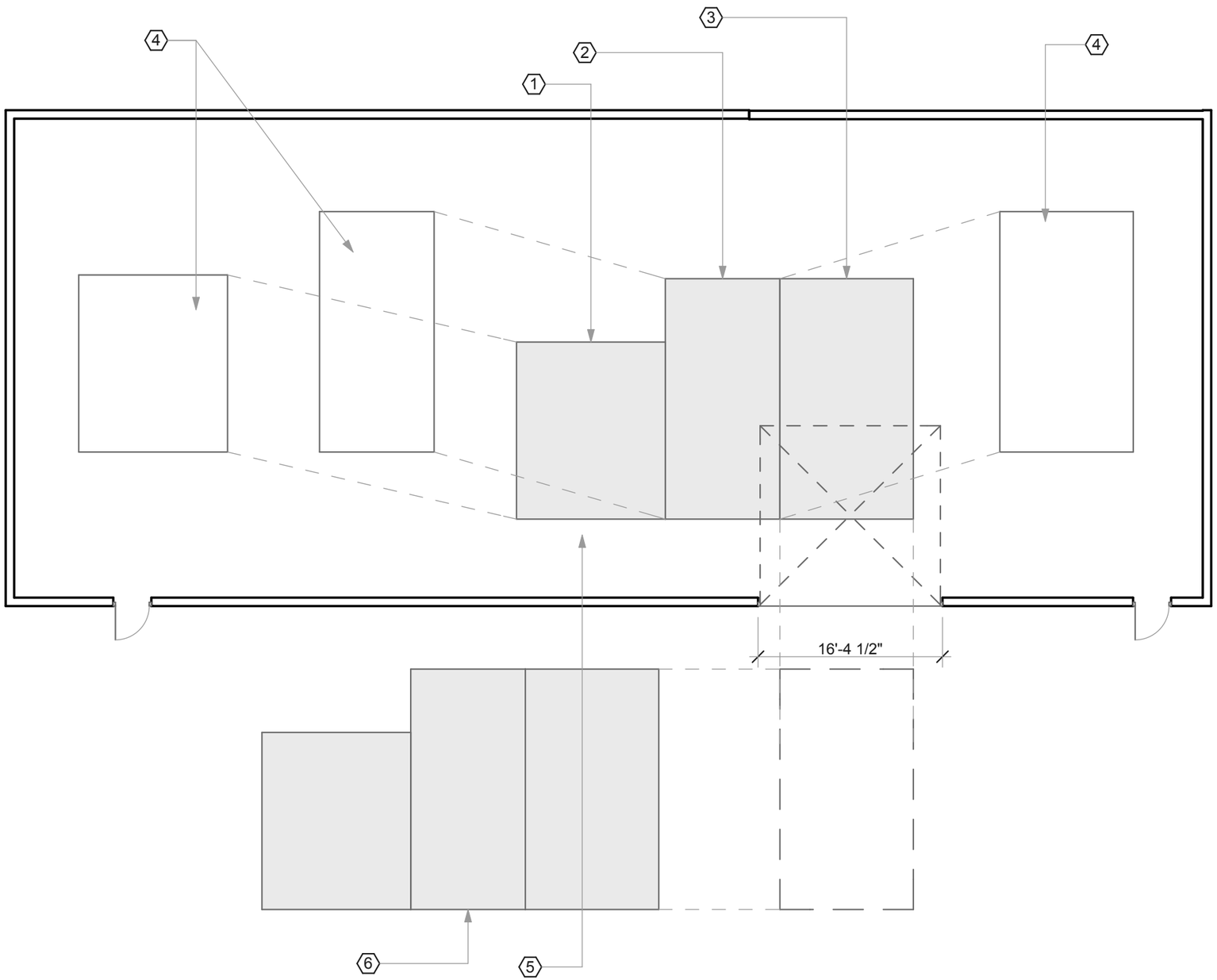
departure plan

O-004



A1 Departure Plan
SCALE: 3/32" = 1'-0"

0 8' 16' 24'

PLAN NORTH

GENERAL SHEET NOTES

1 ROOF MODULES TO BE REINFORCED AT BASE WITH TEMPORARY BRACING.
2 BASE MODULES TO BE COVERED WITH TEMPORARY PLYWOOD COVER.
3 WINDOW SASHES / GLASS ASSEMBLIES REMOVED, INSERT PLYWOOD PLACEHOLDER IN WINDOW FRAMES
4 WRAP AND PROTECT SOLAR PANELS
5 WRAP AND PROTECT SASH UNITS
6 ALL MODULES BUILT ON CASTER WHEELS TO ENABLE FLECIBLE SLIDING AND ALIGNMENT CHECKS
7 ROOF MODULES ARE TO BE BUILT ON TOP OF BASE MODULES AND REMOVED FOR PRACTICE ASSEMBLY OUTSIDE THE REUSE CENTER

SHEET KEYNOTES

1 MODULE 1
2 MODULE 2
3 MODULE 3
4 TEMPORATY LOCATION FOR CONSTRUCTION ACTIVITES ON INDIVIDUAL MODULES
5 PRACTICE ASSEMBLY LOCATION IN REUSE CENTER
6 PRACTICE ASSEMBLY LOCATION ON EXTERIOR LAWN

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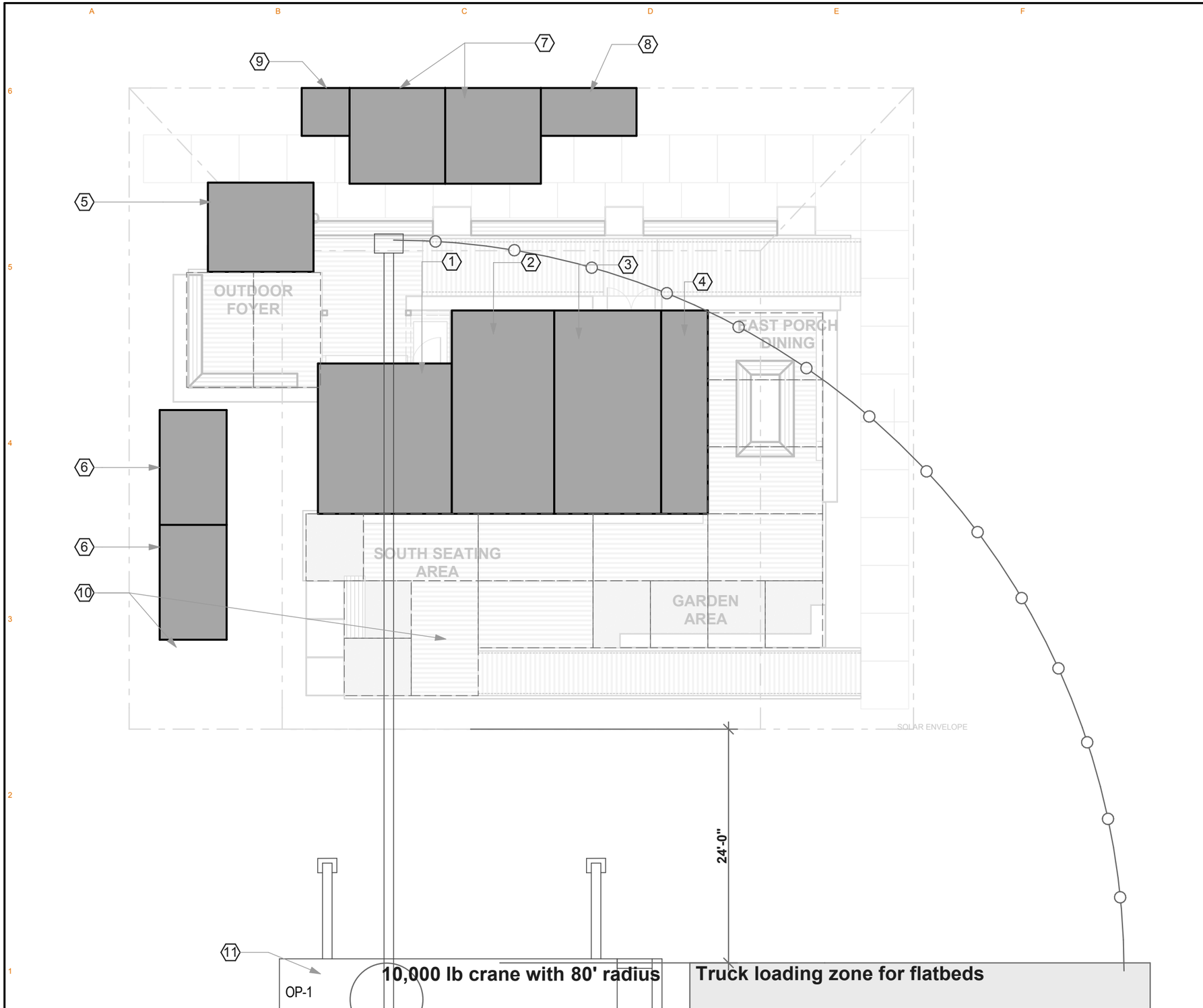
departure plan

O-101



A1 Arrival Plan
SCALE: 3/32" = 1'-0"

GENERAL SHEET NOTES

1 SECURE THE FOLLOWING EQUIPMENT FOR THE DC SITE
- 70 TON CRANE WITH 70' BOOM & 14' SPREADER BEAM – 30 MIN SET UP.
- COME-ALONG
- FORK TRUCK (YALE GP030VX)
- GENERATOR (NORTHSTAR TRIFUEL 6600 WATT # 165938) USED ONLY FOR DISASSEMBLY AND ASSEMBLY
- COMPRESSOR (INGERSOLL RAND DD2T2
- JOHN DEERE CX UTILITY VEHICLE

2 SPILL CONTAINMENT TRAYS IN MECHANICAL SHED TO BE PERMANENTLY PLACED BENEATH DESICCANT UNIT.

3 SPILL CONTAINMENT TRAY TEMPORARILY LOCATED ADJACENT TO TOOL SHED. LOCATE GASOLINE STORAGE (FOR GENERATOR) AND GYCOL STORAGE (FOR SOLAR THERMAL)IN TRAY.

4 CONSTRUCT RAMPS ON SITE.

SHEET KEYNOTES

1 MODULE 1, 13'-6 3/4" SHIPPING SIZE
2 MODULE 2, 10'-10" SHIPPING SIZE
3 MODULE 3, 11'-3 3/4" SHIPPING SIZE
4 MODULE 4, 5'-0" SHIPPING SIZE
5 MODULE 5, 9'-4" SHIPPING SIZE
6 TEMPORARY SPACE FOR DECK
7 TEMPORARY TENT, 10' X 10'
8 TEMPORARY TOOL SHED
9 SPILL CONTAINMENT
10 TEMPORARY LAWN PROTECTION MATS
11 10,000 LB CRANE

PLAN NORTH

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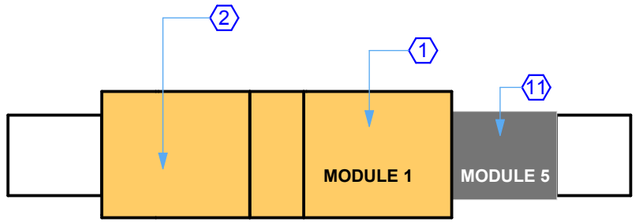
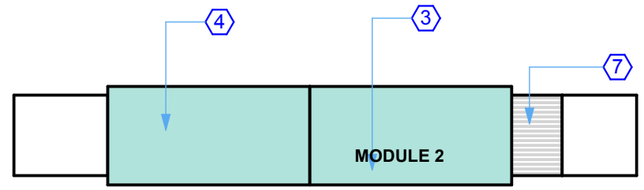
arrival plan

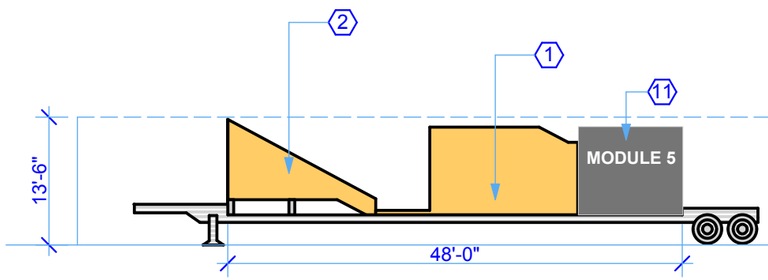
O-102

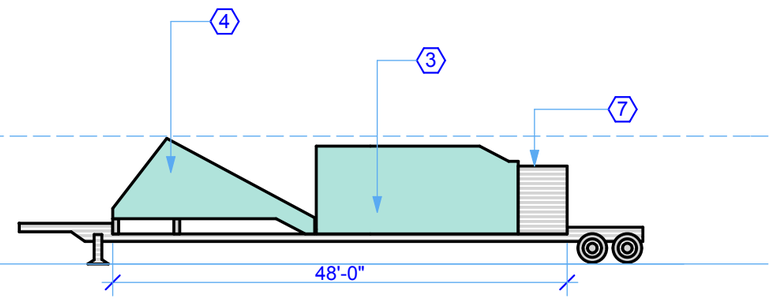


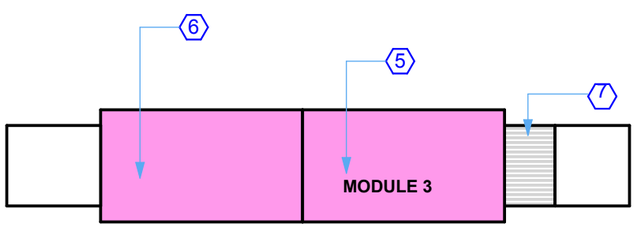
Flatbed 1



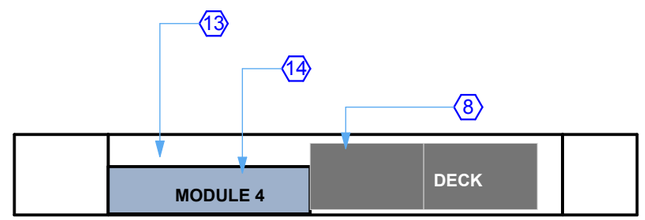
Flatbed 2







Flatbed 3



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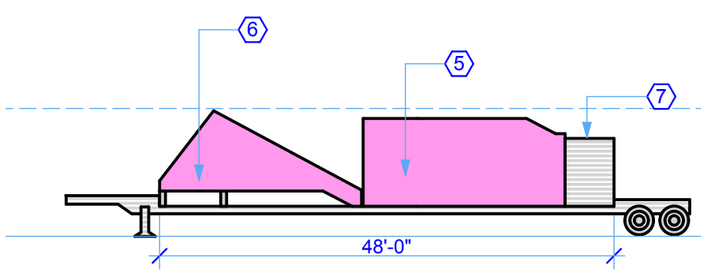

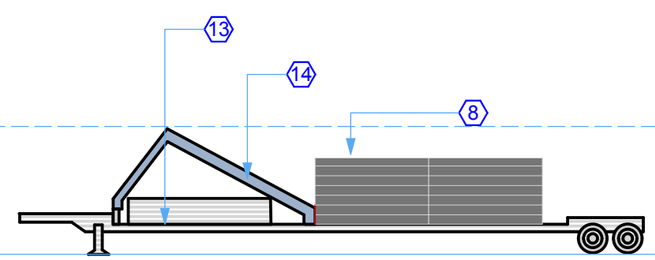

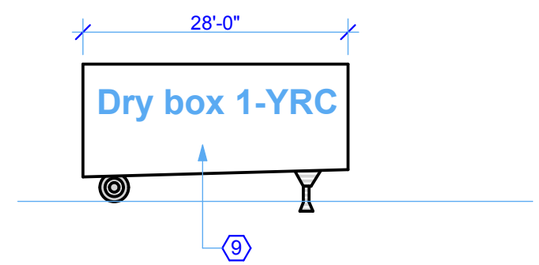

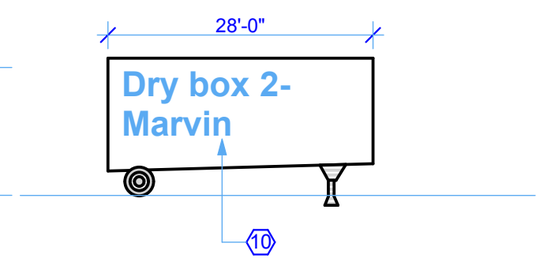

A1 Truck Elevations

SCALE: 1/16" = 1'-0"

0 8' 16' 32'

GENERAL SHEET NOTES

1 (3) 48' X 102" FLATBED TRUCKS
2 (2) 28' CUBE DRY BOX TRAILERS
3 DESIRED ORDER: DRYBOX 1, FLATBED 1, FLATBED 2, FLATBED 3, FLATBED 4.DRYBOX 2

SHEET KEYNOTES

1 MODULE 1 - BASE
2 MODULE 1 - ROOF
3 MODULE 2 - BASE
4 MODULE 2 - ROOF
5 MODULE 3 - BASE
6 MODULE 3 - ROOF
7 PV PANELS
8 12'X7' DECK PANELS
9 TOOL SHED, TENTS, FOUNDATION, PADS
10 INTERIOR FURNISHINGS, RAIN SCREEN, LANDSCAPING
11 MODULE 4 - MECHANICAL SHED
12 SKIP
13 MODULE 4 - BASE PANELS
14 MODULE 4 - ROOF

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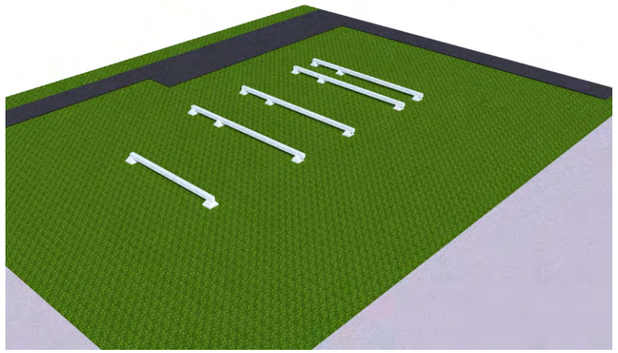
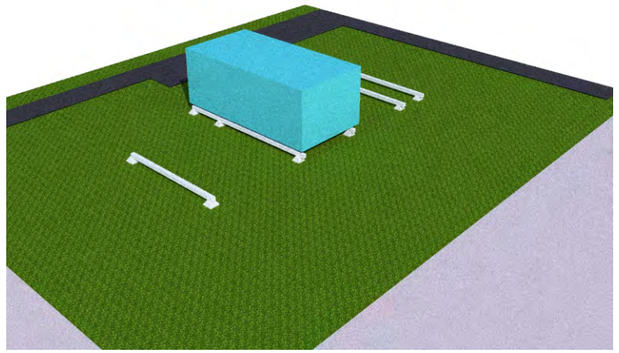
truck layouts

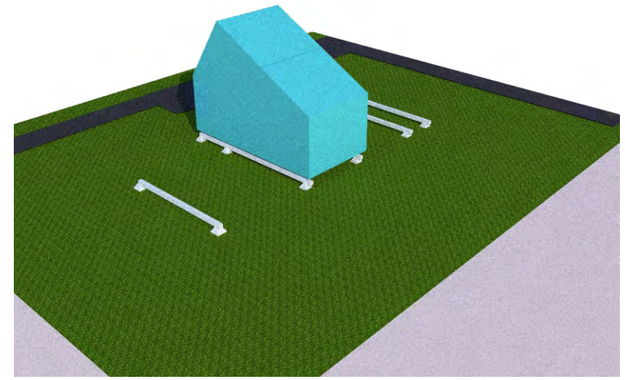
O-501



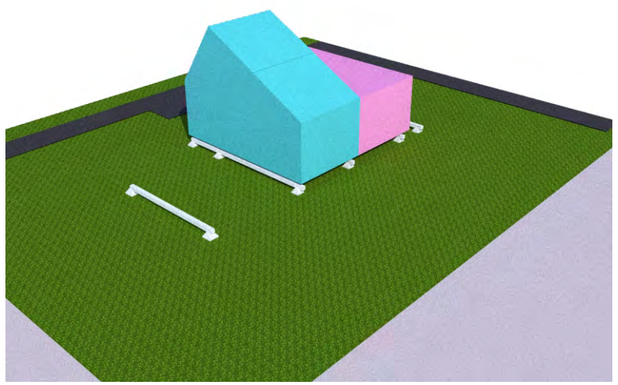
A5 Site Preparation



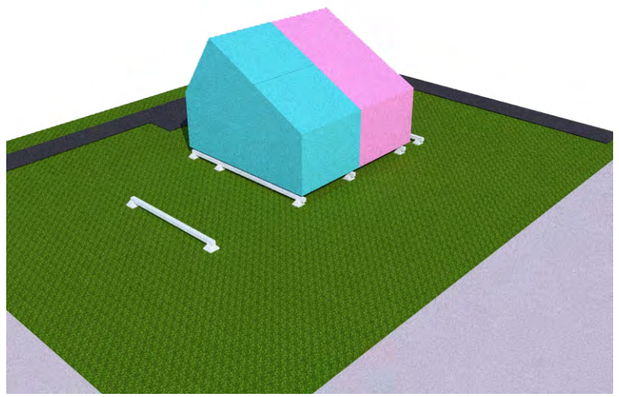
C5 Middle Module



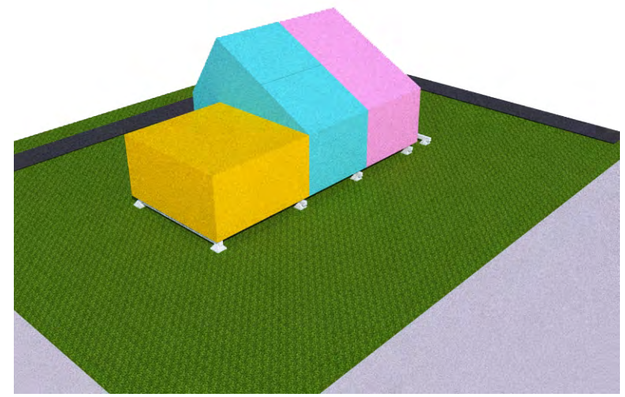
E5 Middle Module Roof



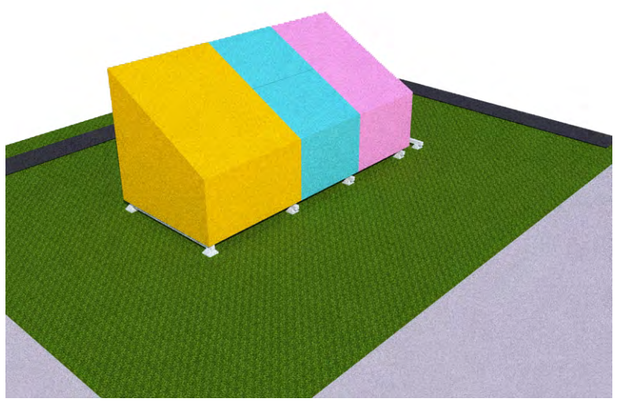
A3 East Module



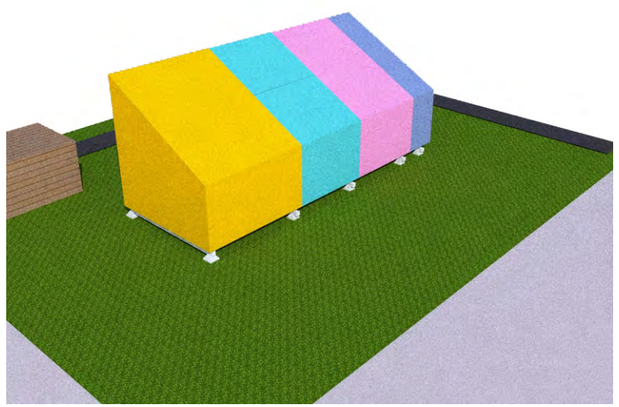
C3 East Module Roof



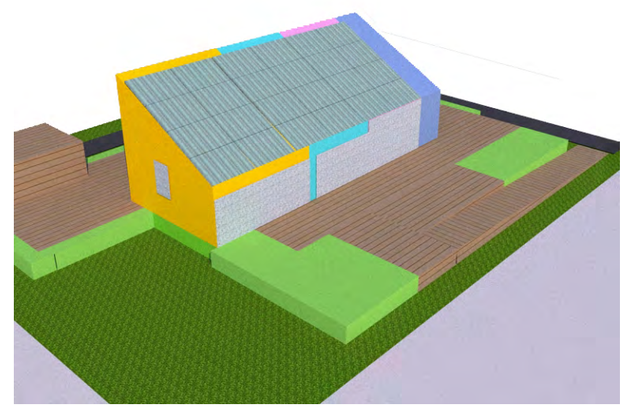
E3 West Module



A1 West Module Roof



C1 Small Module Install



E1 House Panel and Site Install

GENERAL SHEET NOTES

1 SITE PREPARATION:
PROTECTIVE PADS
FOUNDATION FOOTINGS
LEVEL FOUNDATION
2 MIDDLE MODULE:
PLACE WITH CRANE
3 MIDDLE ROOF MODULE:
PLACE WITH CRANE
4 EAST MODULE:
PLACE WITH CRANE
5 EAST ROOF MODULE:
PLACE WITH CRANE
6 WEST MODULE:
PLACE WITH CRANE
7 WEST ROOF MODULE:
PLACE WITH CRANE
8 SMALL MODULE INSTALL:
EAST PORCH
MECHANICAL SHED
USE LULL
9 HOUSE PANEL INSTALL:
WINDOW SASHES
PV AND SOLAR THERMAL
IN CONJUNCTION WITH
SITE INSTALL
10 SITE INSTALL:
DECKING
LANDSCAPING
IN CONJUNCTION WITH
HOUSE PANEL INSTALL

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assembly diagrams

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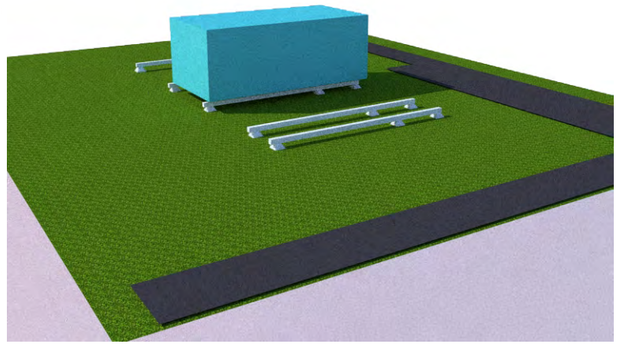
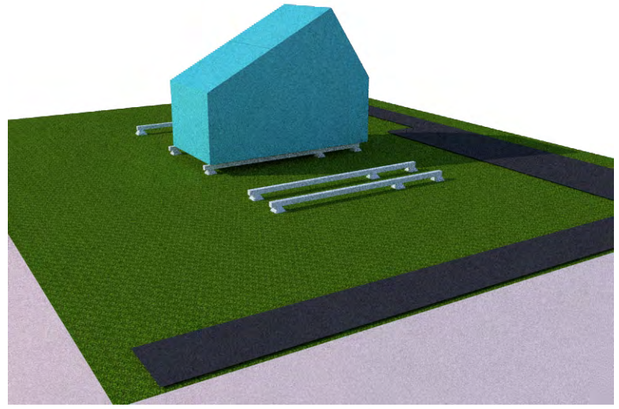
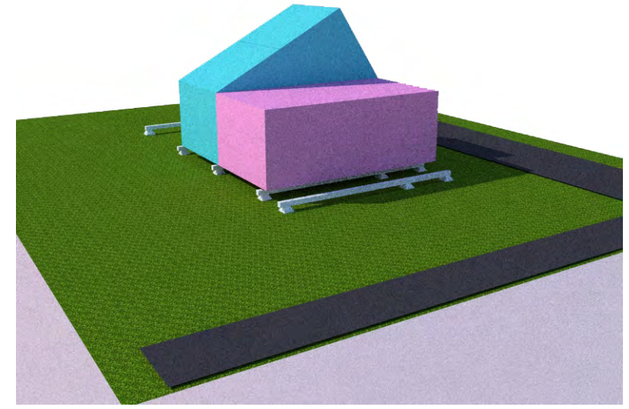


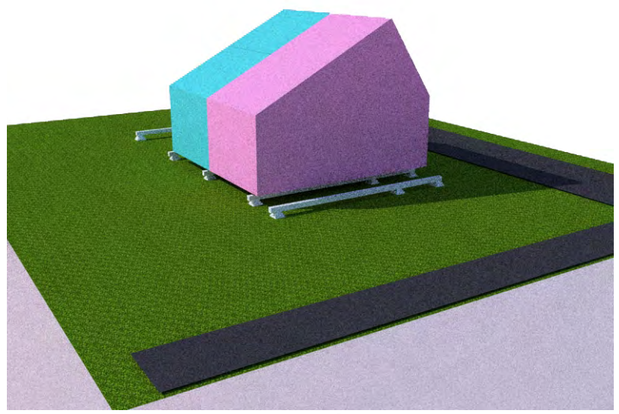
A5 Middle Module



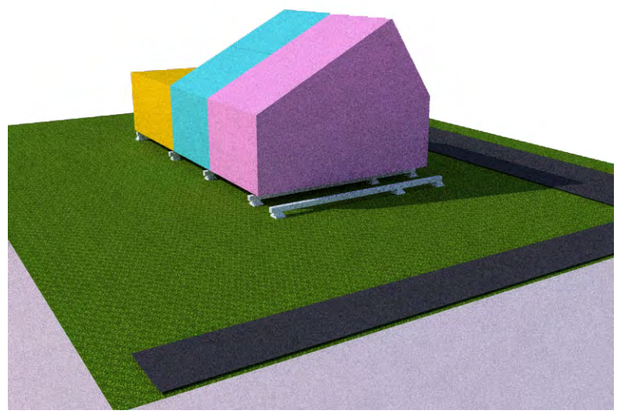
C5 Middle Module Roof



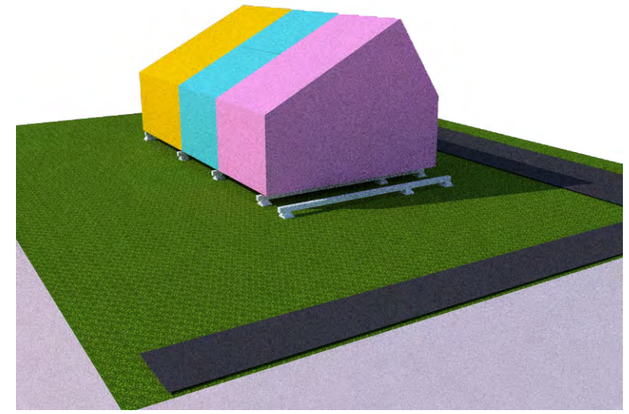
E5 East Module



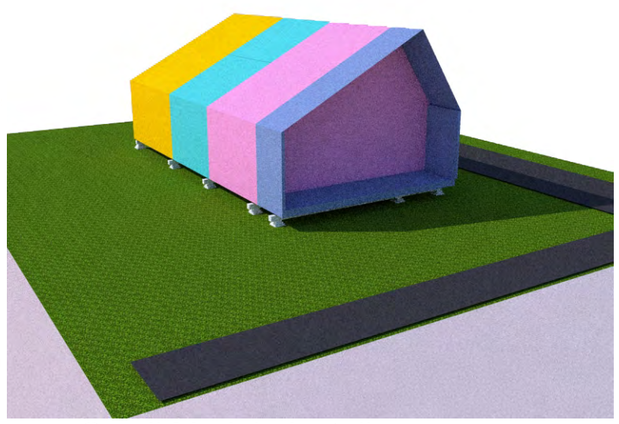
A3 East Module Roof



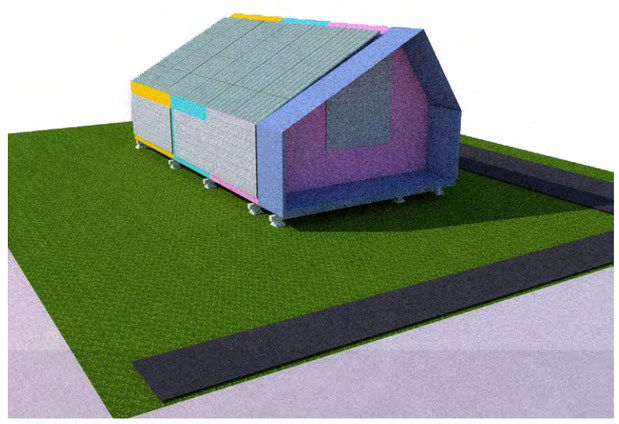
C3 West Module



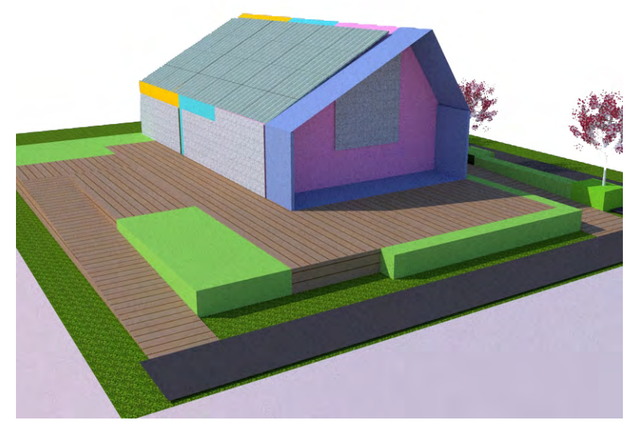
E3 West Module Roof



A1 Small Module Install



C1 House Panel Install



E1 Site Install

GENERAL SHEET NOTES

1 SITE PREPARATION:
PROTECTIVE PADS
FOUNDATION FOOTINGS
LEVEL FOUNDATION
2 MIDDLE MODULE:
PLACE WITH CRANE
3 MIDDLE ROOF MODULE:
PLACE WITH CRANE
4 EAST MODULE:
PLACE WITH CRANE
5 EAST ROOF MODULE:
PLACE WITH CRANE
6 WEST MODULE:
PLACE WITH CRANE
7 WEST ROOF MODULE:
PLACE WITH CRANE
8 SMALL MODULE INSTALL:
EAST PORCH
MECHANICAL SHED
USE LULL
9 HOUSE PANEL INSTALL:
WINDOW SASHES
PV AND SOLAR THERMAL
IN CONJUNCTION WITH
SITE INSTALL
10 SITE INSTALL:
DECKING
LANDSCAPING
IN CONJUNCTION WITH
HOUSE PANEL INSTALL

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assembly diagrams

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EQUIPMENT SCHEDULE (Simple)

MARK	MANUFACTURER	DESCRIPTION	NOTES
OP-1		10,000 lb crane, w 80' radius boom	
OP-2		14' spreader beam for craning	
OP-3		come-along	borrowed from Tim Lyons
OP-4	Yale GP030VX	Fork Truck	
OP-5	ingersoll rand DD2T2	compressor	
OP-6	Northstar Trifuel #165938	generator	6600 watt
OP-7	John Deere CX	utility vechicle	
OP-8			

GENERAL SHEET NOTES

1 EQUIPMENT SCHEDULE DOESN'T INCLUDE TOOL INVENTORY OF TOOL SHED

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equipment schedule

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