



REFRACT HOUSE
TEAM CALIFORNIA

CONSTRUCTION DRAWINGS

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1234567

CONSULTANT

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OF THE ARTS

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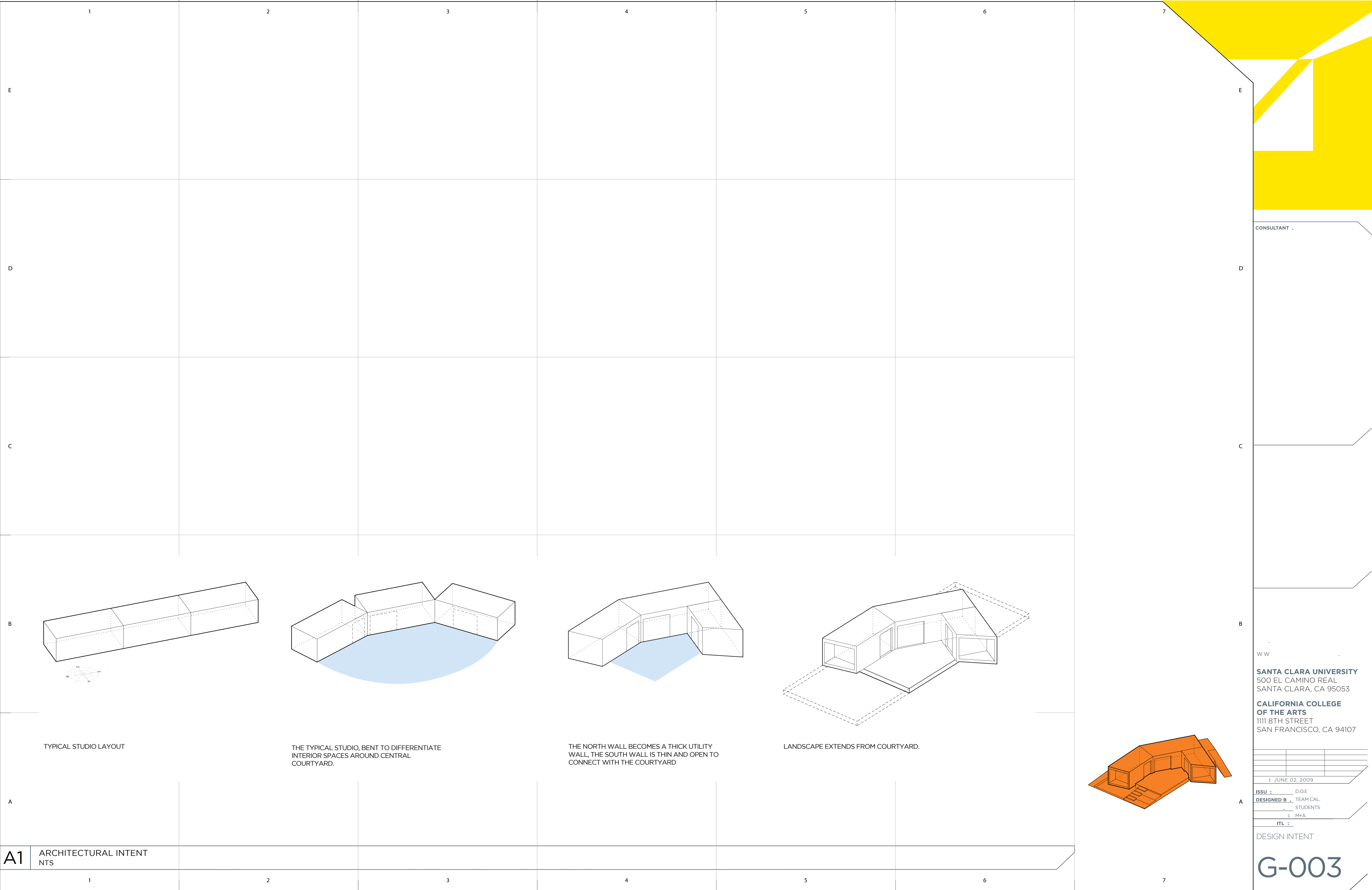
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	STUDENTS	
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GENERAL		

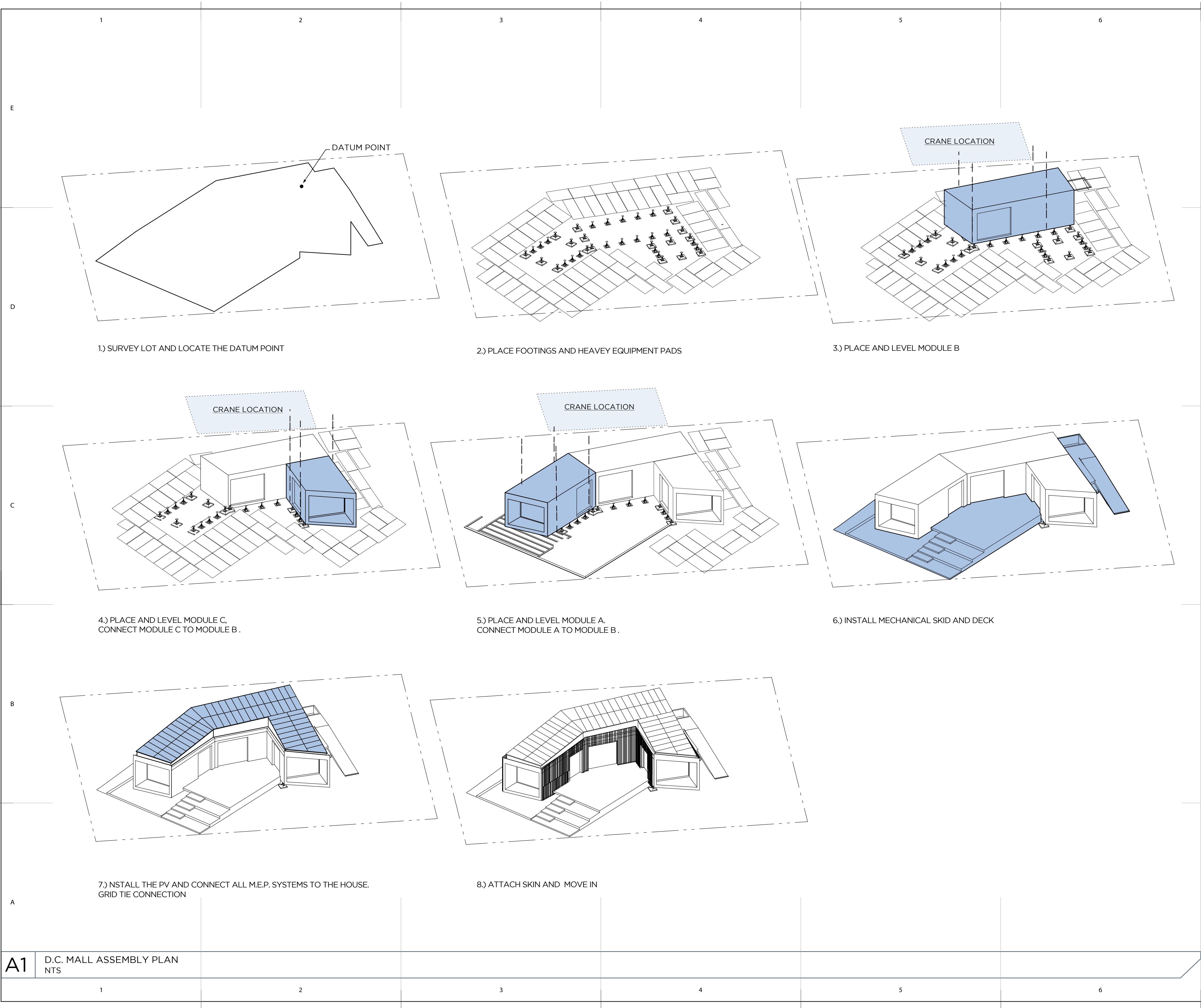


GENERAL

SOLAR DECATHLON

CONSTRUCTION DRAWINGS

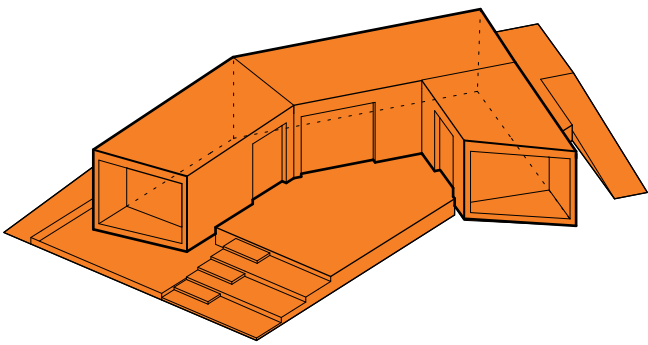




Assembly Narrative:

The assembly plan of Refract House has been strategically designed to not only quickly and accurately reassemble the house after its cross-country journey, but also to allow for the most efficient use of the builder's time and resources. To achieve this, we have outlined the following steps:

- 1.) Survey the lot and locate the datum point detailed on S-101 Foundation Plan which will serve as the reference point for all of the footings.
- 2.) Using the datum point, place all footings in their respective positions and place heavy equipment pads to limit the impact of the fork-lift and other equipment on turf.
- 3.) Using the mobile crane, lift Module B off of the trailer by attaching straps to the specified crane pick points on the steel angle. Drop Module B onto the footings and adjust the footing heights to level the module and to accommodate for grade variability. Module B will then be used as the reference for the other two modules.
- 4.) Using the mobile crane, lift Module C with similar crane pick points over Module B and carefully maneuver it such that no more than 1/4" separates the two modules. The roofs' of Module B and C shall be connected through the structural parapet and floors shall be connected with thru-bolts in the mating floor joists.
- 5.) Module A is lifted and connected to Module B similar to that of Module C in the previous steps.
- 6.) During the module connection process the mechanical skid and the deck modules are installed.
- 7.) After all of the structural connections have been made and the deck assembly has been completed, the solar panel racking system shall be installed and the PV placed on the roof. The mechanical and plumbing systems shall be connected to the house and after all inspections pass, the house can then connect to the electrical grid.
- 8.) The skin assemblies are installed and the connection seems shall be waterproofed and sealed. It is then safe for furniture and other home furnishings to be brought into the house.



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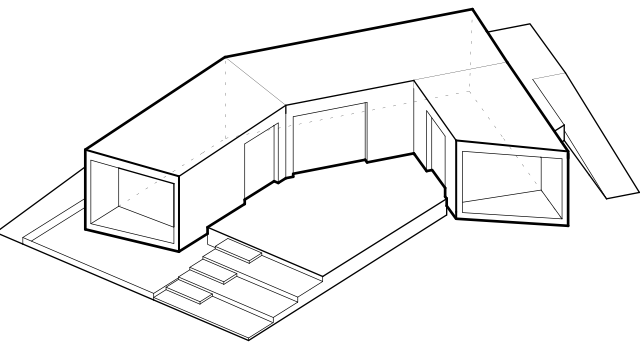
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SHEET TITLE:

D.C. ASSEMBLY PLAN

G-004





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RENDERINGS

G-902



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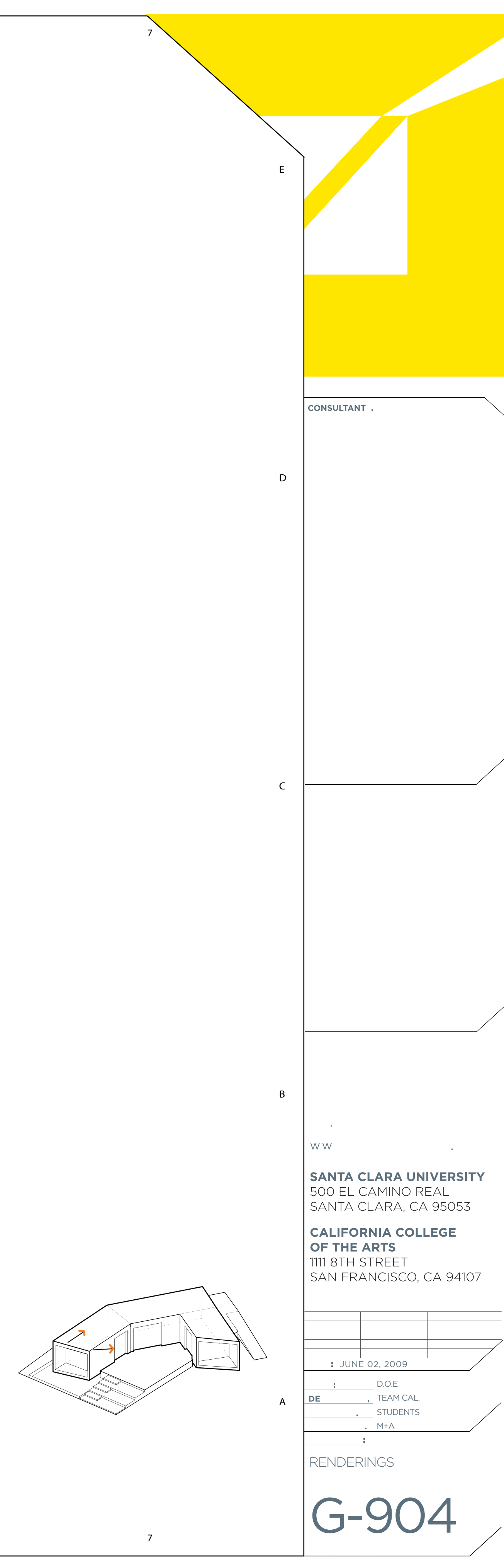
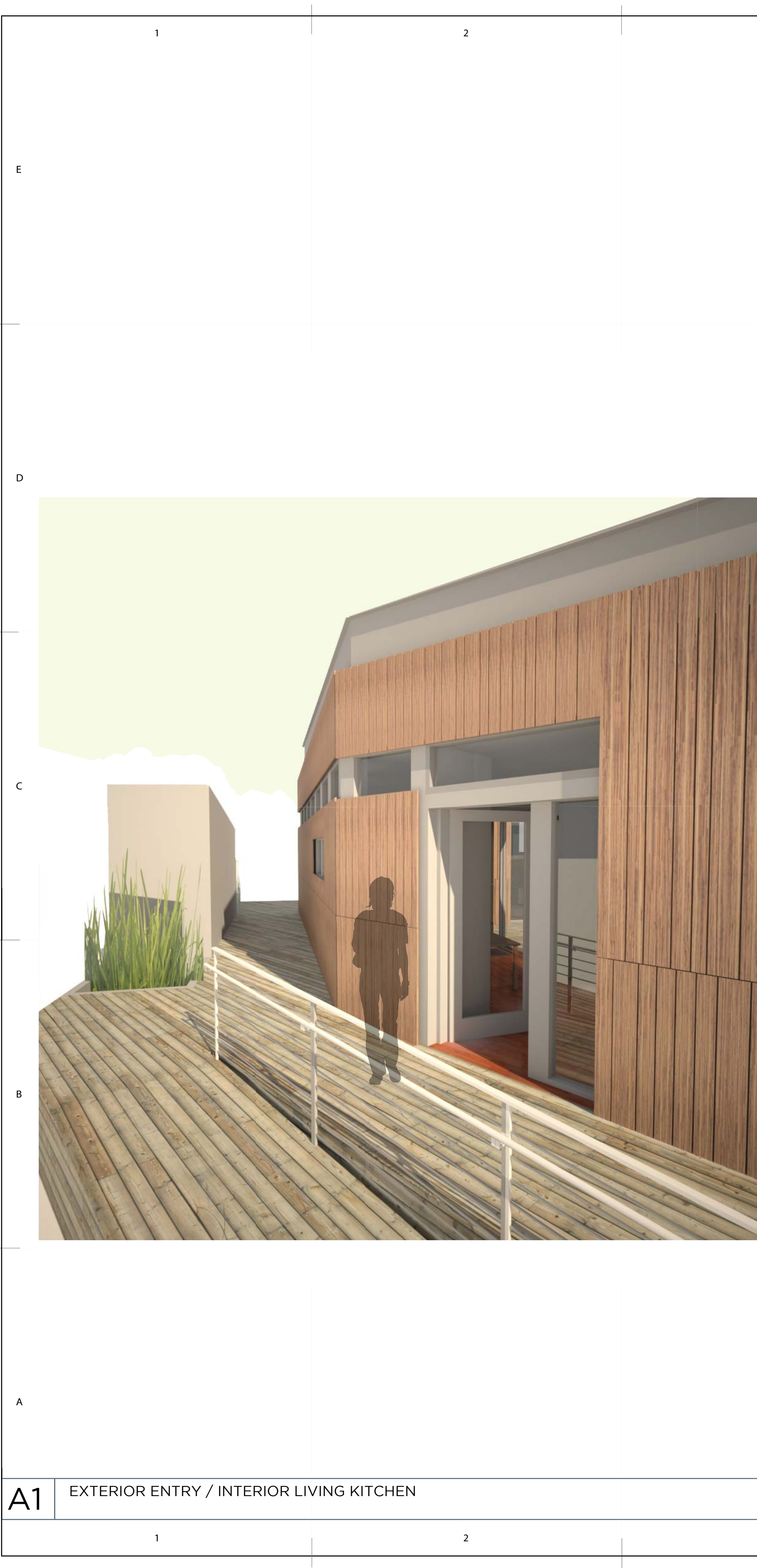
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RENDERINGS

G-903



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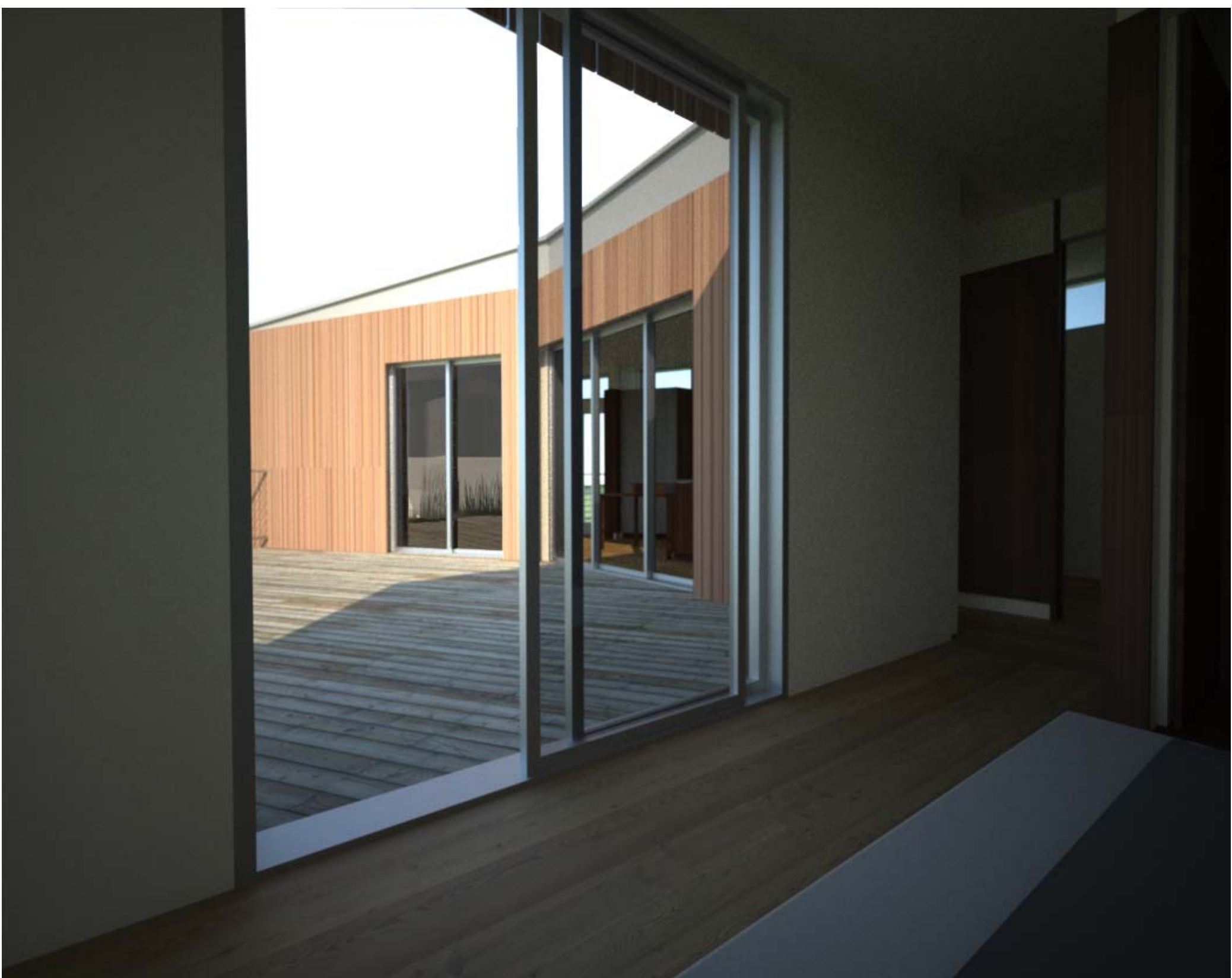
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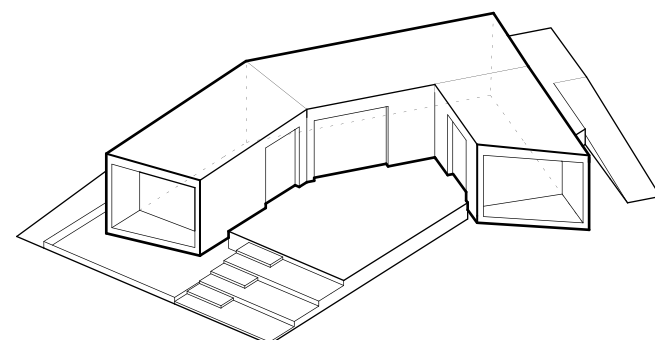
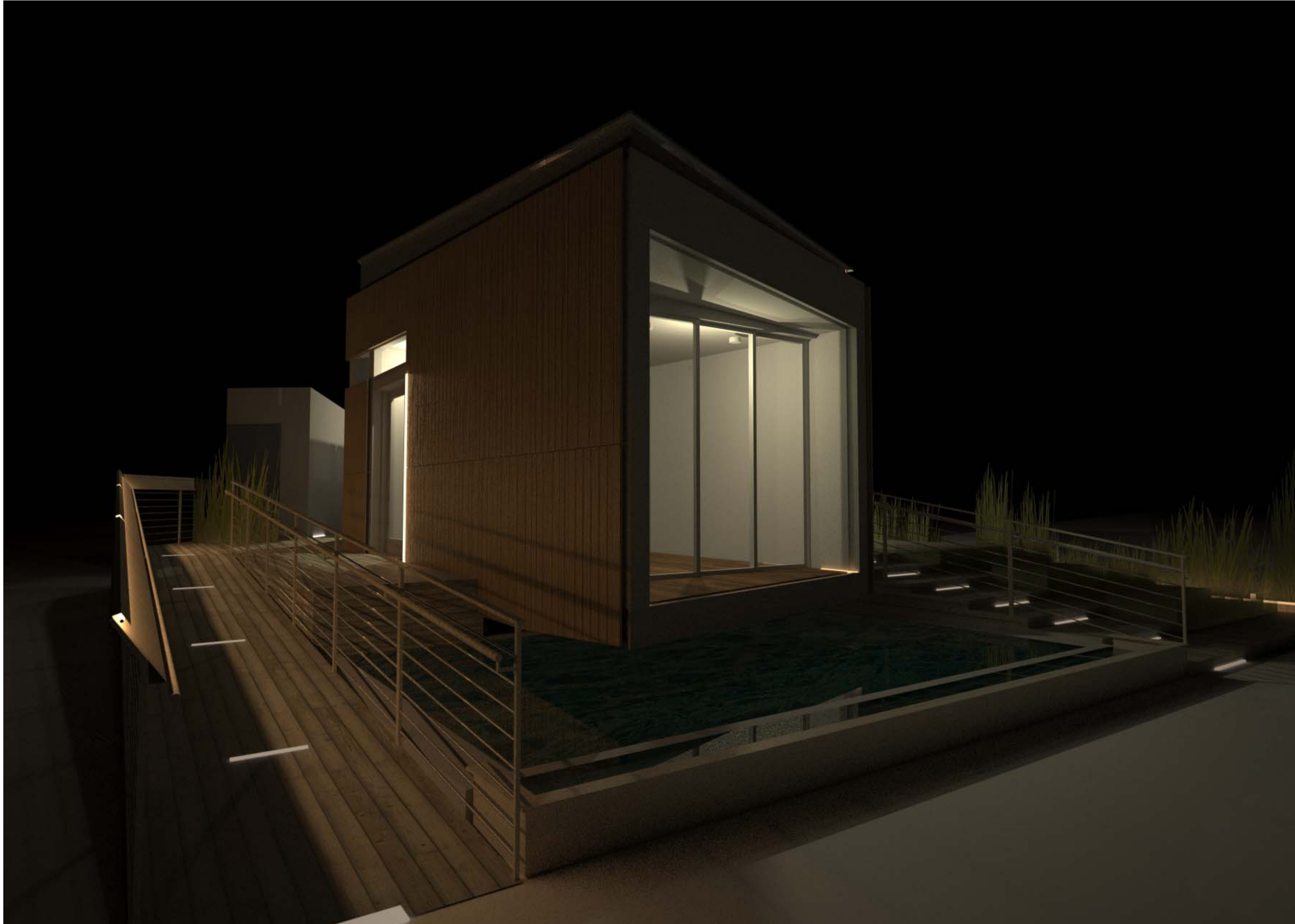
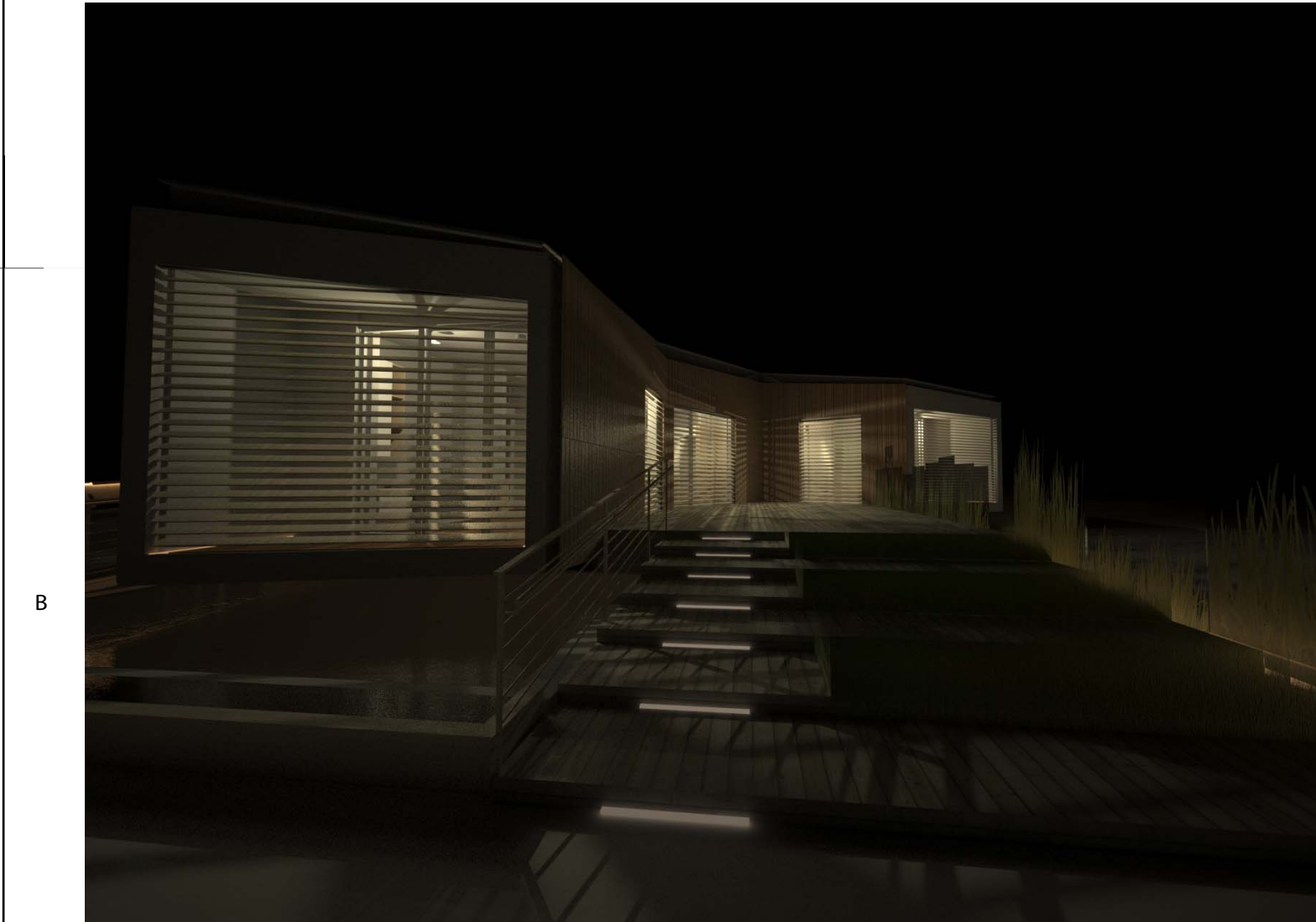
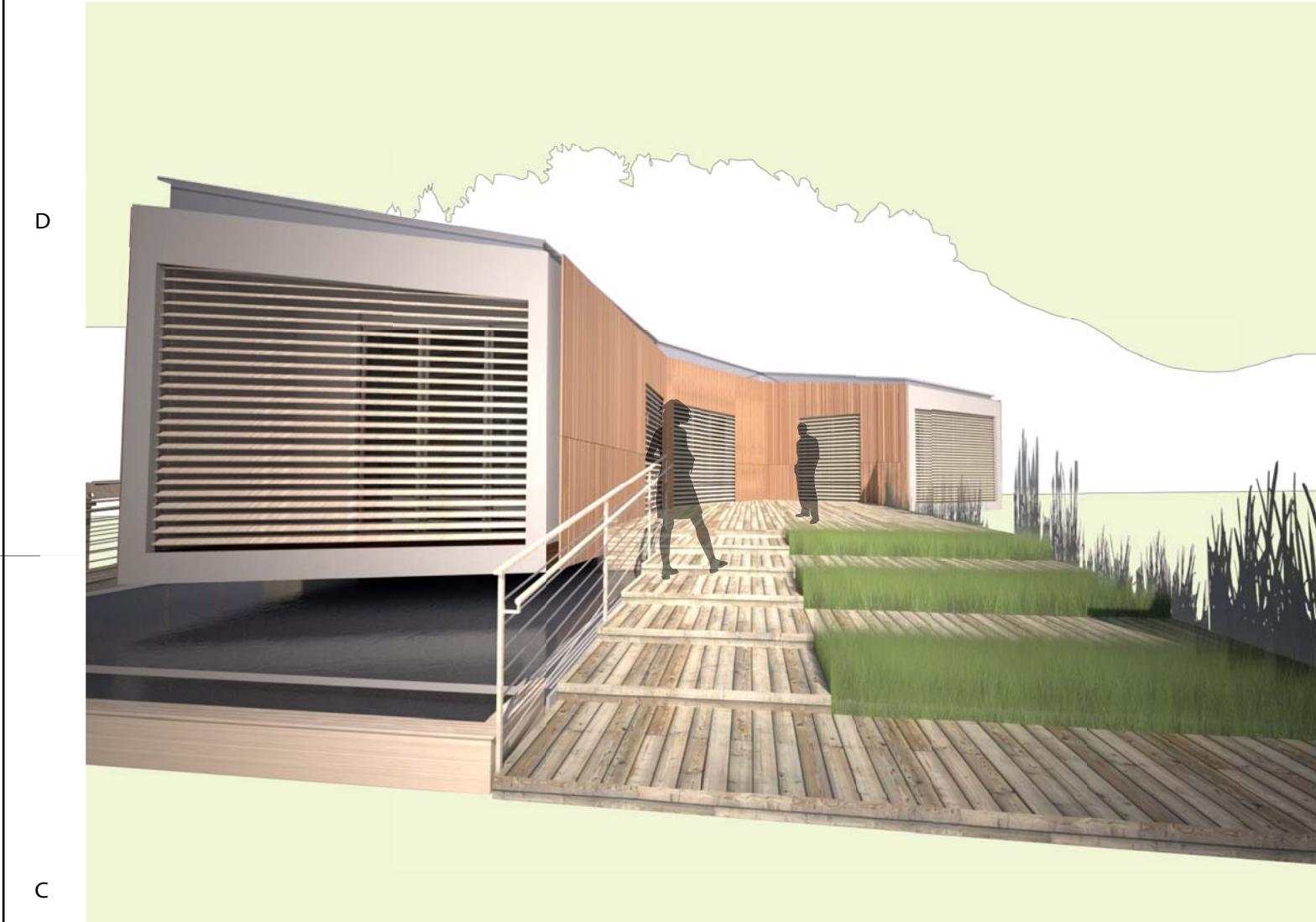
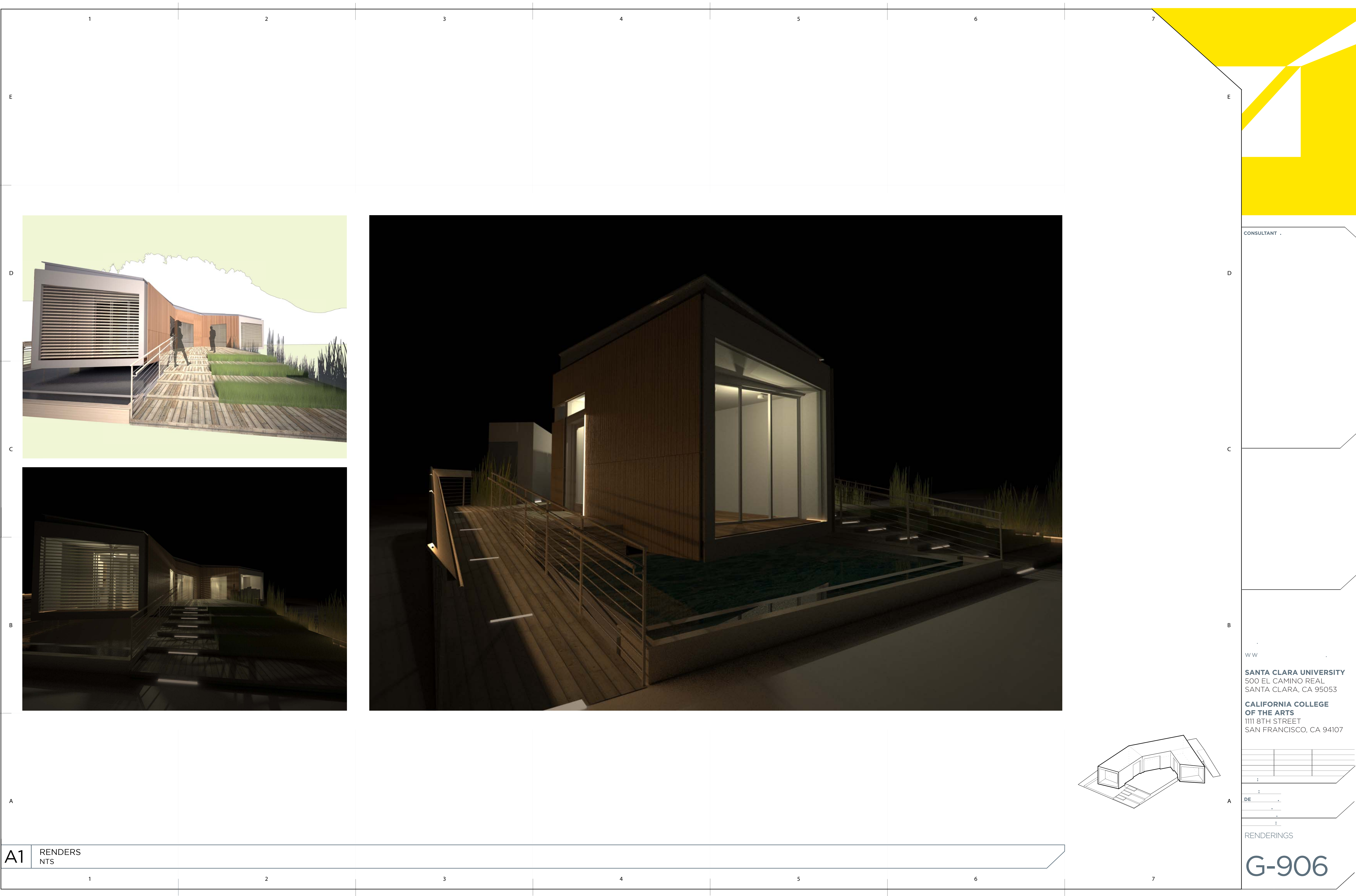
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A1	
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G-904







A1 NIGHT NTS

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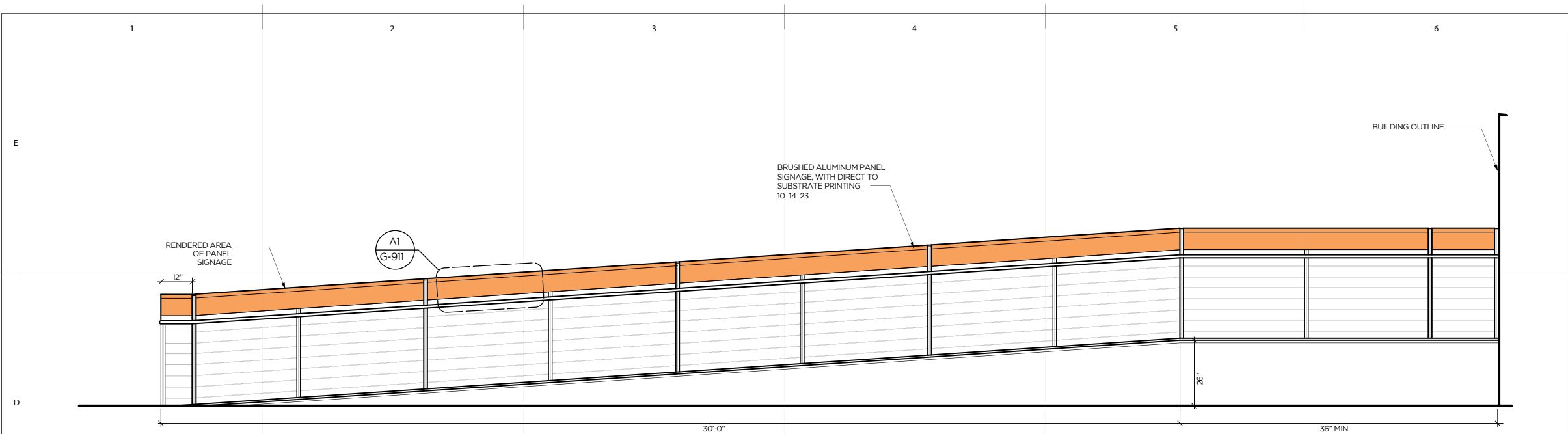
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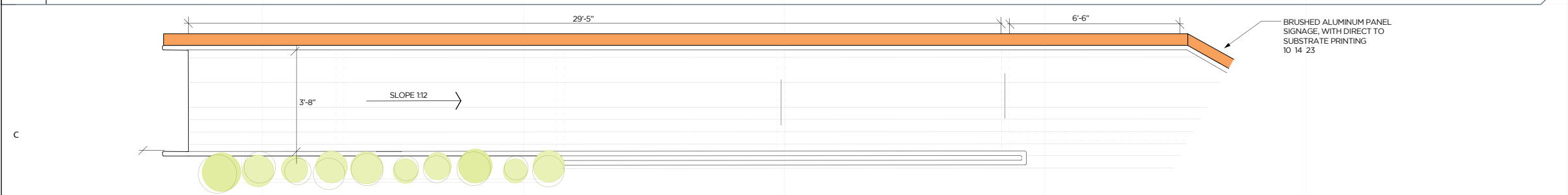
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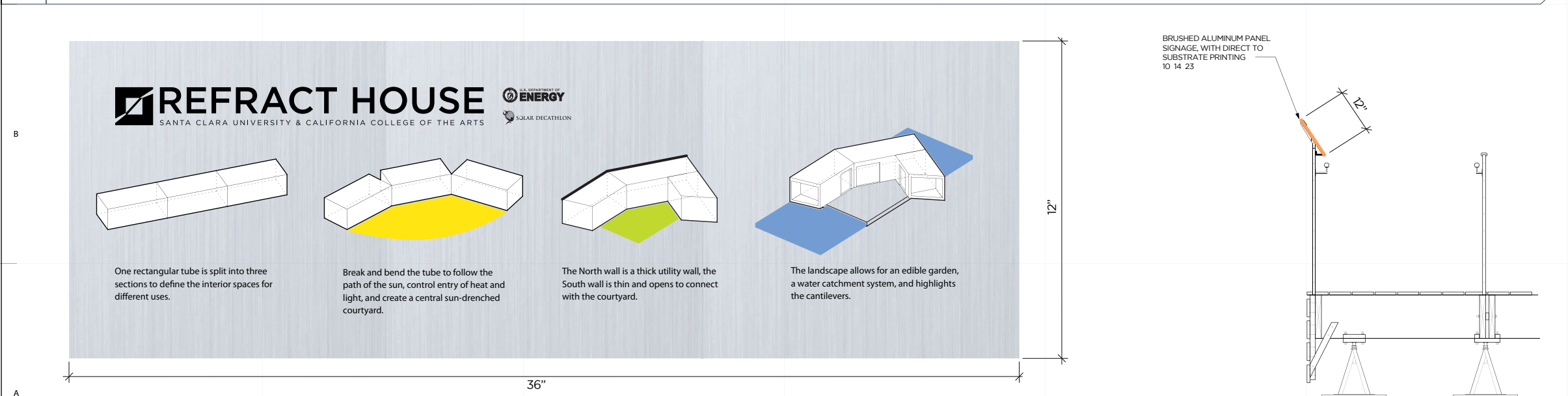
G-907



D1 SIGNAGE (ELEVATION) TYP.
NTS



C1 SIGNAGE (PLAN) TYP.
NTS



A1 SIGNAGE TYP.
NTS

A5 SECTION THROUGH RAILING
NTS

GENERAL NOTES:

1. ALL COMMUNICATIONS MATERIALS SHALL COMPLY WITH 2009 SOLAR DECATHLON RULES SECTIONS 10-2 AND 10-3. COMPETITION EXHIBIT HANDOUTS AND/OR BROCHURES DO NOT INCLUDE RECOGNITION OF PROJECT
2. PRELIMINARY DESIGN DRAFTS SPONSOR ONLY. FINAL VERSIONS SHALL COMPLY WITH ALL RELEVANT SOLAR DECATHLON RULES
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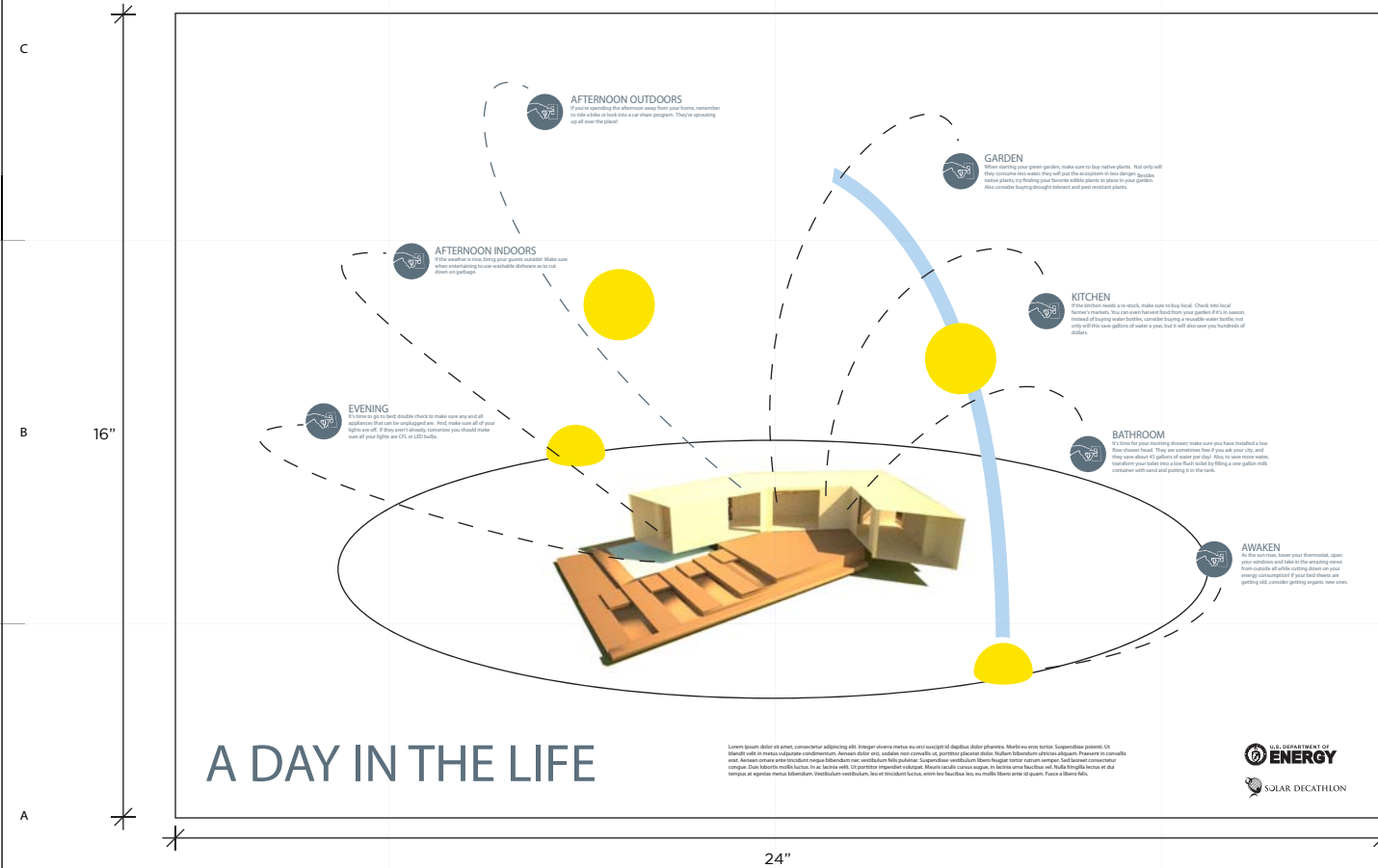
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SHEET TITLE:

COMMUNICATION PROOFS

G-911



A1	FOLDABLE HANDOUT FOR COMPETITION NTS
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C5	MENU FRONT NTS
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A5 UNIFORMS
NTS

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Team California shows that green living is not a compromise through all the delicious food on the menu tonight. All of the food served is from a raw or live diet. A diet consisting of unprocessed vegan foods without heating. A live food diet consists of unprocessed vegan foods that have been heated to 118° Fahrenheit. Heating above 118° kills the natural enzymes that raw foods contain; enzymes that are needed to assist in digestion and absorption of nutrients. The food is 50% instead of the 25% in enzymes in your body leaving their current task to help with digestion, the enzymes from the food can help you digest. The enzymes from the food can stay focused on the task at hand.

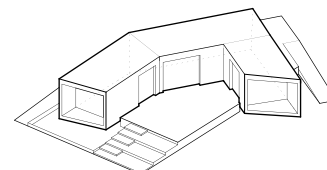
Veganism is a popular diet for health benefits as well as environmental concerns. The choice to be vegan increases the amount of grain available to feed the people, saves vast amounts of land, decreases pollution, and ceases contribution to the clearing of forests.



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COMMUNICATION PROOFS

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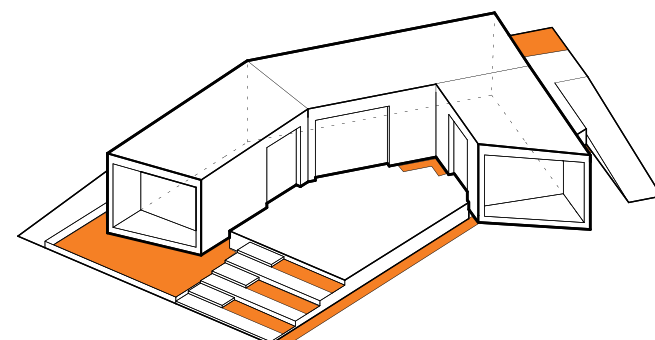
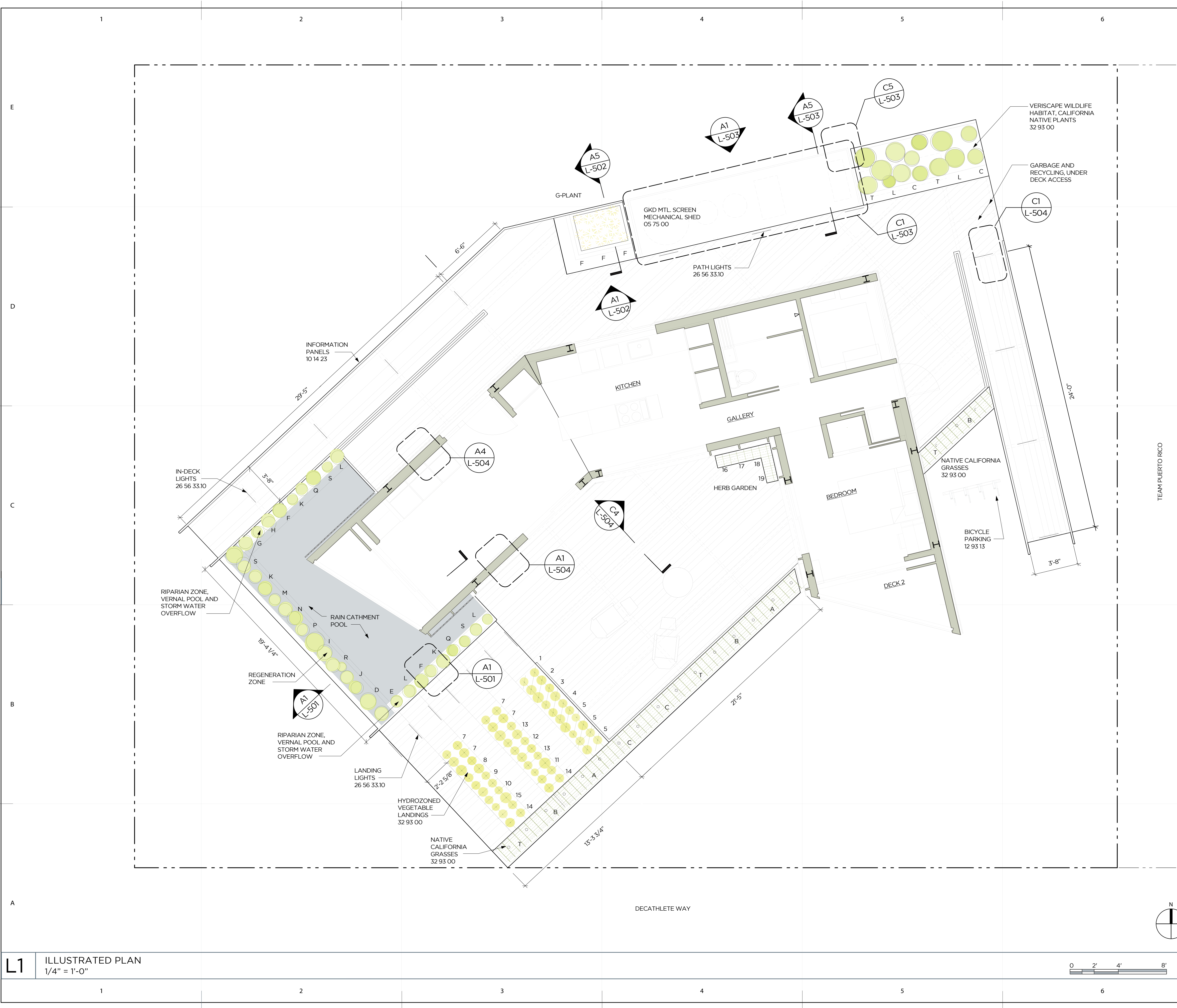
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LANDSCAPE		



LANDSCAPE

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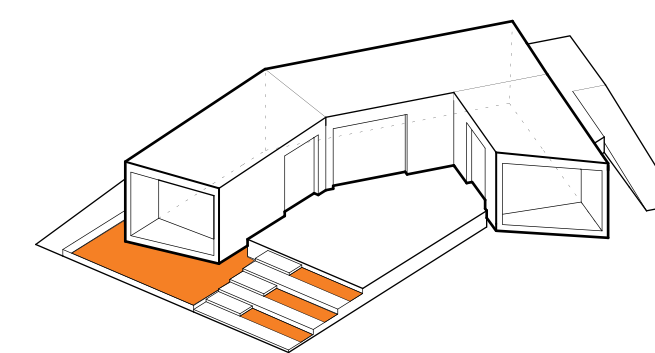
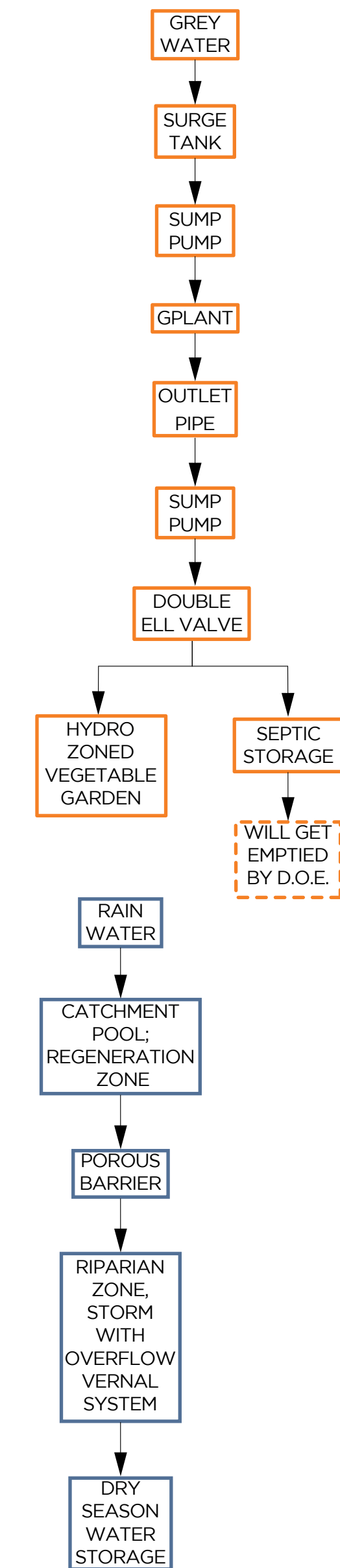
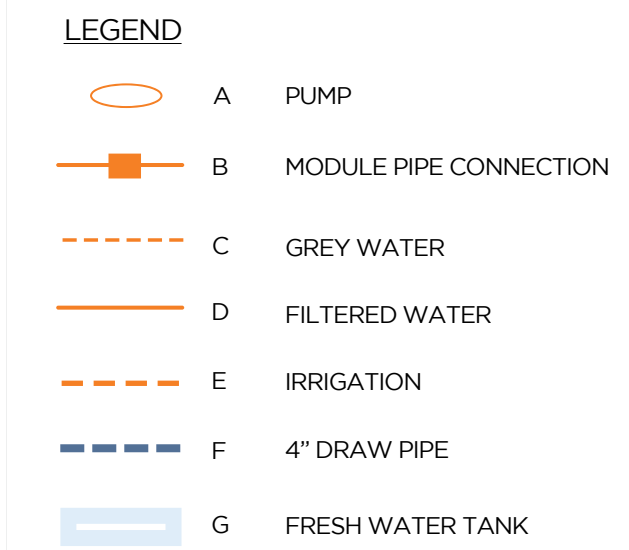
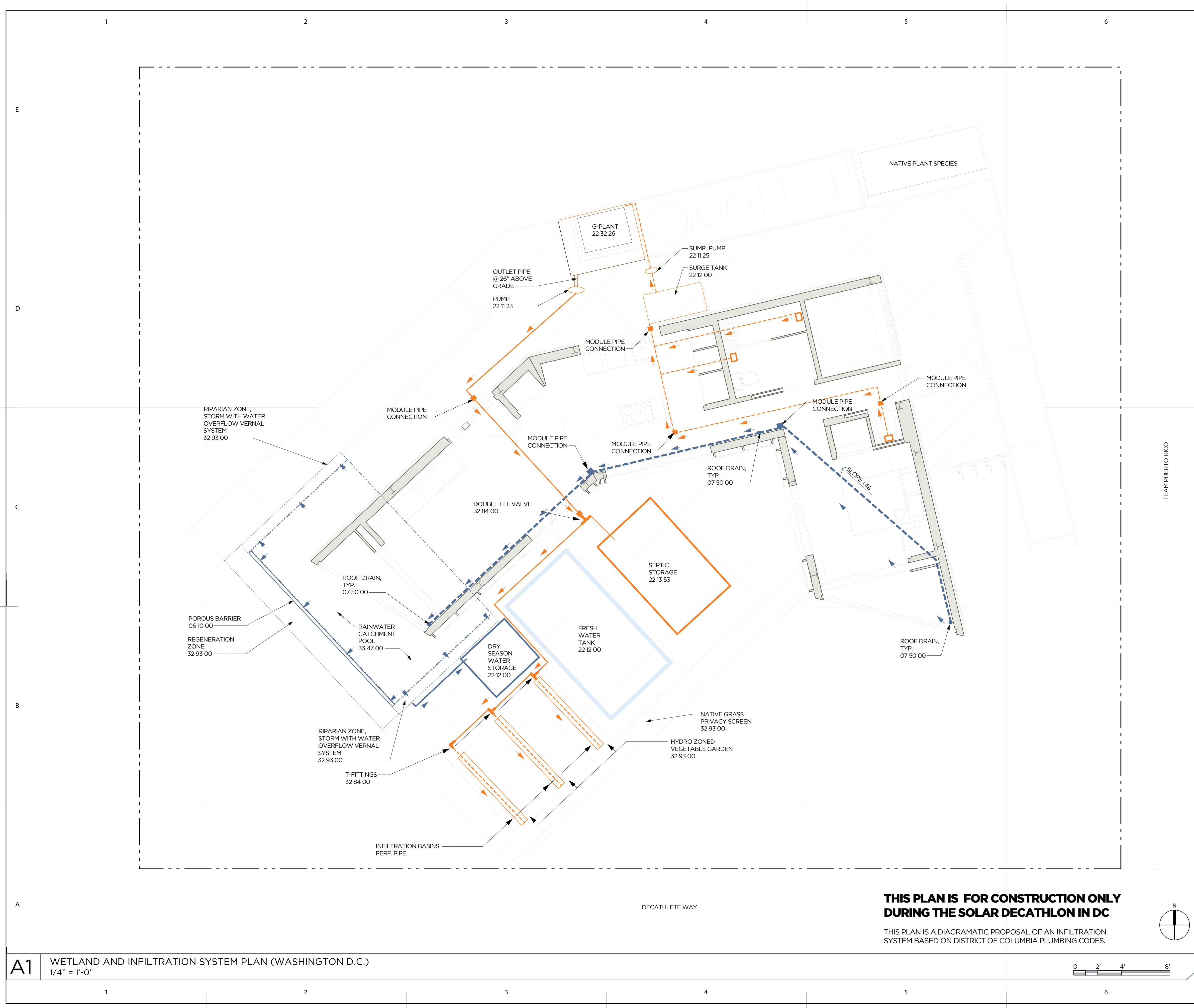
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ILLUSTRATED PLAN

L-101



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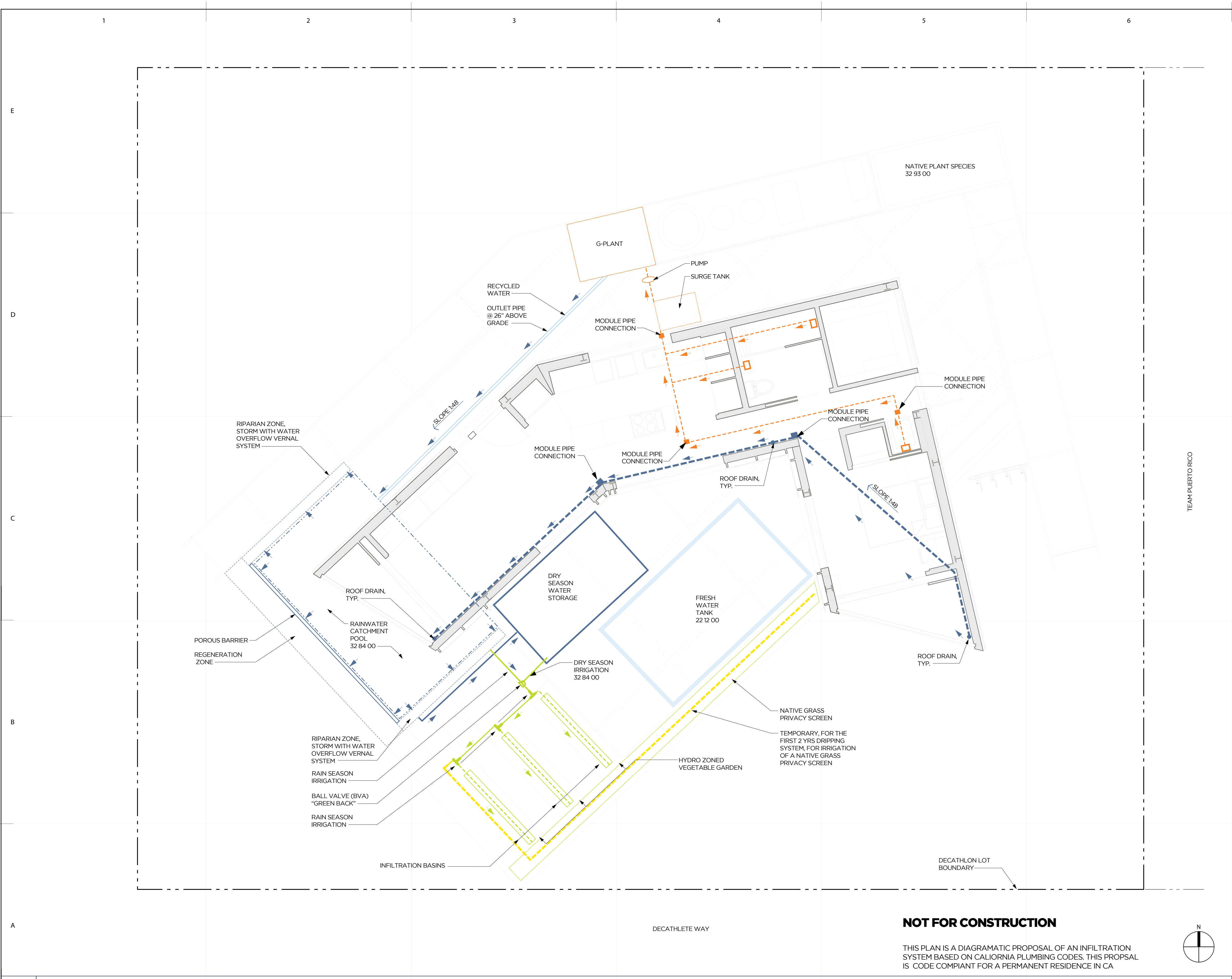
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GREYWATER INFILTRATION SYSTEM

L-102



LEGEND

- A PUMP
- B MODULE PIPE CONNECTION
- C GREY WATER
- D RECYCLED WATER
- E IRRIGATION
- F 4" DRAW PIPE
- G TEMPORARY, FOR THE FIRST 2 YRS DRIPPING SYSTEM, FOR IRRIGATION OF A NATIVE GRASS PRIVACY SCREEN
- E FRESH WATER TANK

CONSULTANTS:

GREY WATER

RAIN WATER

RECYCLED WATER

RAIN SEASON

DRY SEASON

OVERFLOW IS RELEASED TO LOCAL AQUIFER

EDIBLE GARDEN

DRY SEASON WATER STORAGE

POROUS BARRIER

CATCHMENT POOL; REGENERATION ZONE

RIPARIAN ZONE, STORM WITH OVERFLOW VERNAL SYSTEM

REGENERATION ZONE

DRY SEASON IRRIGATION

RAIN SEASON IRRIGATION

BALL VALVE (BVA) "GREEN BACK"

INFILTRATION BASINS

HYDRO ZONED VEGETABLE GARDEN

NATIVE GRASS PRIVACY SCREEN

TEMPORARY, FOR THE FIRST 2 YRS DRIPPING SYSTEM, FOR IRRIGATION OF A NATIVE GRASS PRIVACY SCREEN

DECATHLON LOT BOUNDARY

DECATHLETE WAY

TEAM PUERTO RICO

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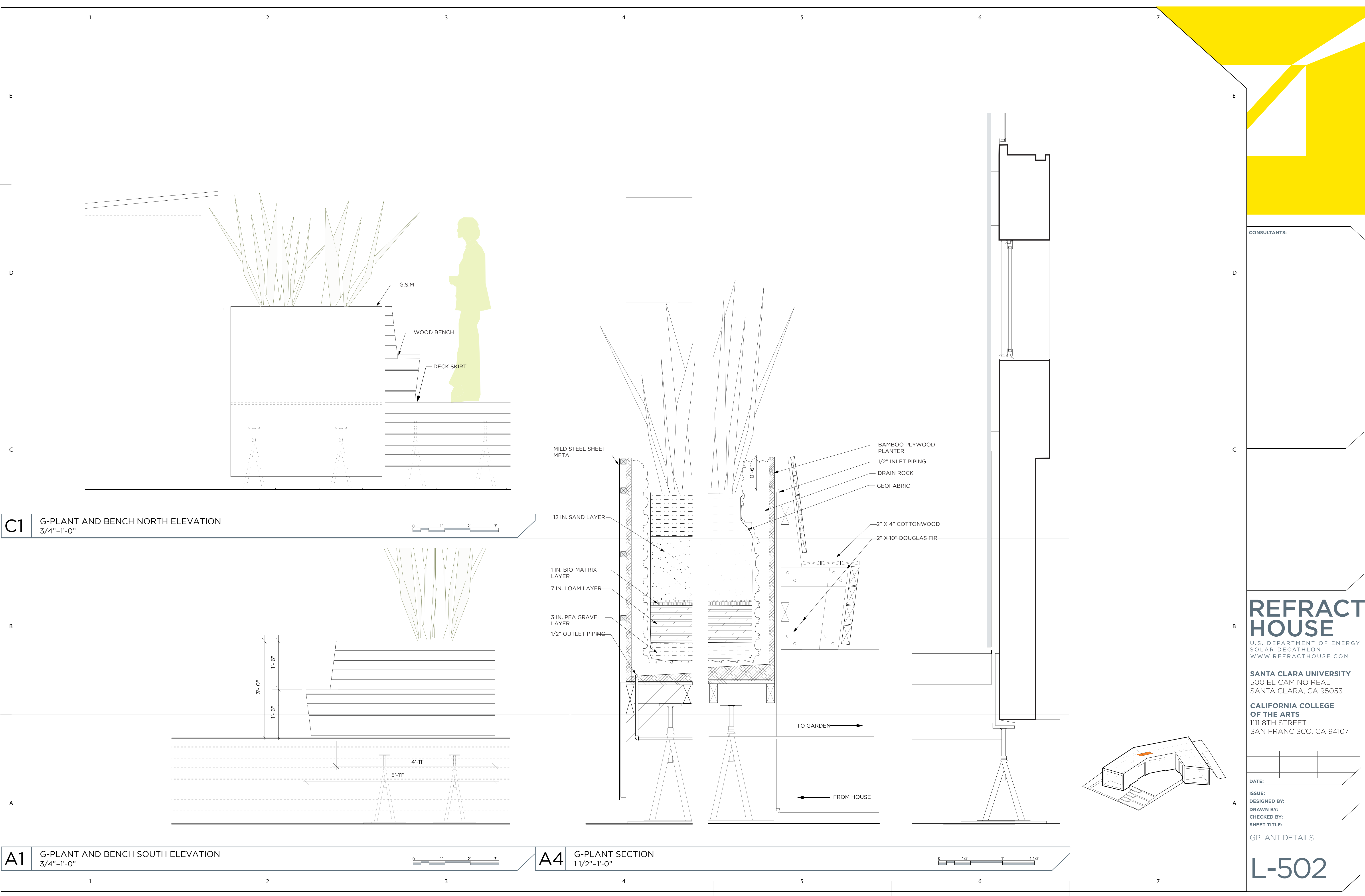
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GREYWATER INFILTRATION SYSTEM

L-103



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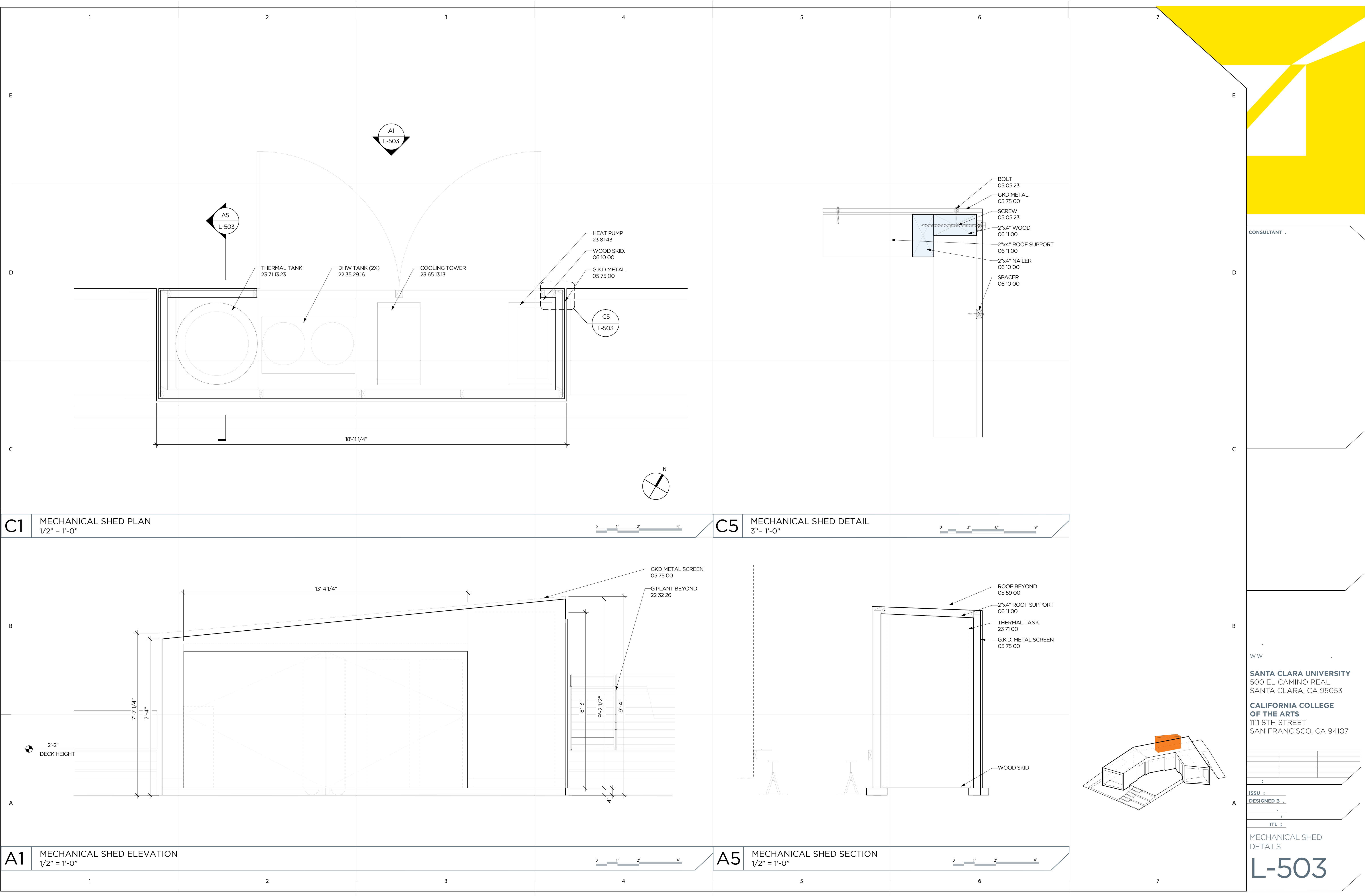
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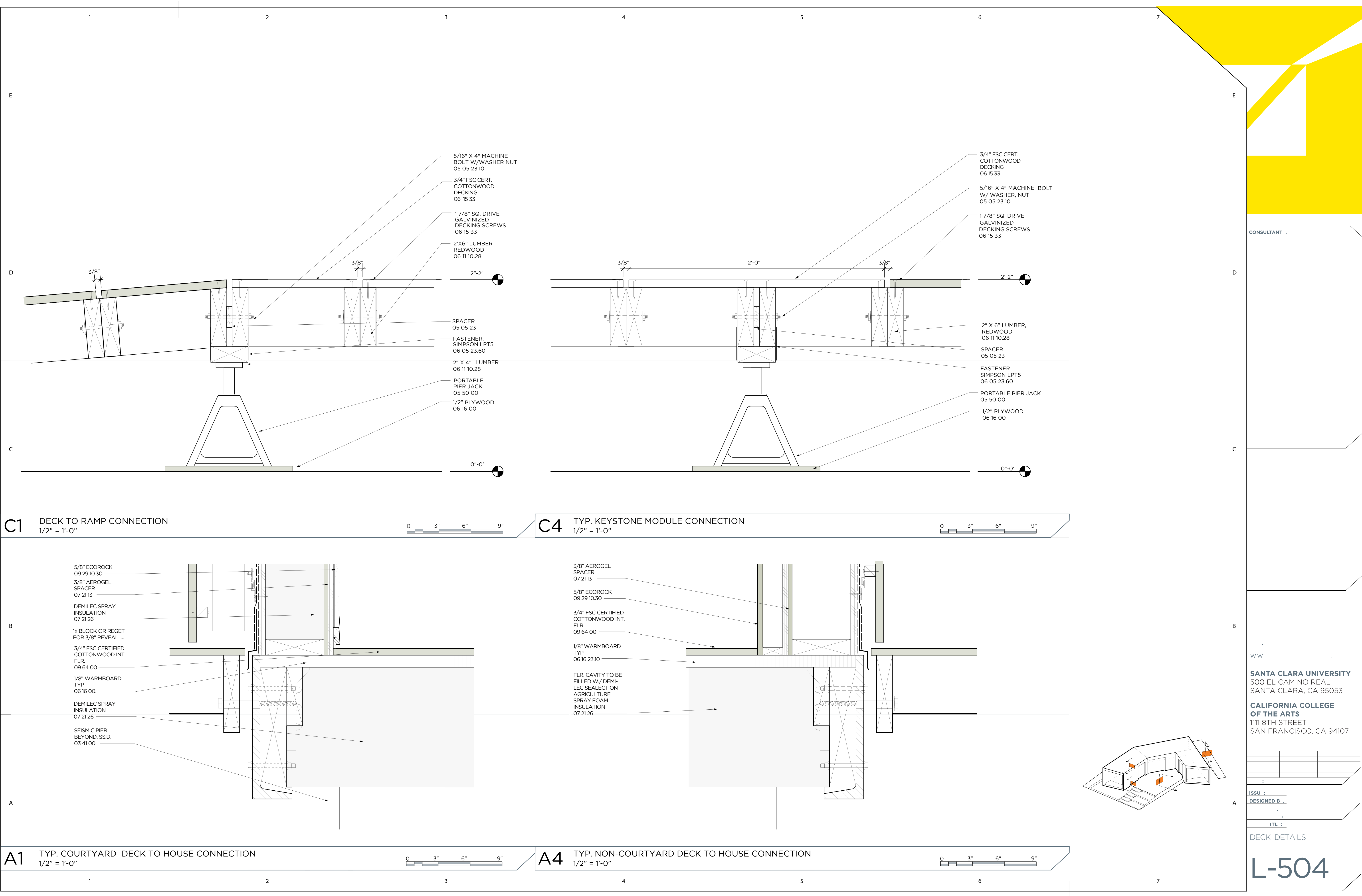
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GPLANT DETAILS
L-502





Native Plant Schedule					
Mark	Communities	Scientific Name	Common Name	Description	Notes
A	Valley Grassland, Foothill Woodland	Thysanocarpus radians	SHOWY FRINGE POD	TINY WHITE FLOWERS WITH WHEEL-SHAPED SEED PODS. EARLY SPRING.	
B	CALIFORNIA EXCEPT SIERRA NEVADAS & DESERT	Chlorogalum pomeridianum	SOAPROOT	FRAGRANT, 6 PETALED WHITE FLOWERS. NATIVE LILY. EDIBLE INNER CORE. USABLE AS FIELD SOAP.	
C	COASTAL, WOODLANDS	Eremocarpus setigerus	TURKEY MULLIEN	WEED-LIKE LOOKING PLANT. TOXIC LEAVES. EDIBLE SEEDS. FAVORS DISTURBED AREAS.	
D	FRESH-WATER WETLANDS, RIPARIAN	Bidens cernua	NODDING BEGGARTICK	GRASSY PLANT WITH SMALL YELLOW FLOWERS AND COARSE PURPLE SEEDS. SPRING, SUMMER, FALL.	
E	FOREST, WOODLANDS, CHAPARRAL, WETLANDS	Rumex salicifolius	WILLOW DOCK	MINUTE CLUSTERED GREEN FLOWERS. SUMMER.	
F	WOODLANDS, SALT MARSH, WETLANDS, RIPARIAN	Sidalcea calycosa	POINT REYES CHECKERBLOOM	BLOOMS ALONGSIDE WHITE-TIPPED CLOVER AT EDGES OF VERNAL POOLS. EARLY SPRING.	
G	FOREST, WOODLANDS, CHAPARRAL, WETLANDS, RIPARIAN	Trifolium wormskioldii	WHITE-TIPPED CLOVER	PURPLE FLOWER, WHITE TIPS. SWEET NECTAR. HONEY PRODUCED IS BEST TASTING OF ALL. EARLY SPRING.	
H	WETLAND, RIPARIAN	Eleocharis macrostachya	PALE SPIKERUSH	SHRUB WITH MINUTE CLUSTERED BROWN FLOWERS. SUMMER.	
I	WETLANDS, RIPARIAN	Downingia ornatissima var. ornatissima	FOLDED CALICO-FLOWER	ALSO KNOWN AS 'SKYBLUES', FLOWERS APPEAR IN MASS SYNCHRONY LIKE SKY REFLECTED BY WATER.	
J	FRESHWATER WETLANDS, RIPARIAN	Typha angustifolia	NARROW-LEAVED CATTAIL	NAKED STALK, BETWEEN STAMINATE AND PISTILLATE. SUMMER.	
K	FORESTS, CHAPARRAL, GRASSLANDS, WETLANDS, RIPARIAN	Deschampsia elongata	SLENDER HAIRGRASS	FIRE RESISTANT. GRASS SPIKELET. FAST GROWING.	
L	FOREST, SAGEBRUSH, GRASSLAND, WETLAND, RIPARIAN	Alisma plantago-aquatica	WATER PLANTAIN	FOUND IN STREAMBANKS. WHITE FLOWERS WITH YELLOW FRUIT. SPRING, FALL.	
M	SAGEBRUSH, FORESTS, WETLAND, RIPARIAN	Navarretia leucocephala ssp. Minima	WHITE NAVARRETIA	MINUTE PLANT WITH WHITE FLOWERS. ENDEMIC TO VERNAL POOLS OF CENTRAL VALLEY. SPRING.	
N	GRASSLANDS, EVERGREEN FOREST, WETLAND, RIPARIAN	Trifolium depauperatum var. depauperatum	DWARF SACK CLOVER	INDIVIDUAL FLOWERS INFLATE, RESEMBLING SMALL SACKS. HIGHLY NUTRITIOUS.	
O	FOOTHILL WOODLAND, GRASSLAND, RIPARIAN	Ranunculus bonariensis var. trisepalus	VERNAL POOL BUTTERCUP	GERMINATES EARLY. WHEN POOL IS FULL OF WATER IT PRODUCES LEAVES WITH LONG STEMS, TINY PETALS.	
P	WETLAND, RIPARIAN	Lasthenia fremontii	VERNAL POOL GOLDFIELD	PRODUCES LARGE QUANTITIES OF NUTRITIOUS SEEDS. POLLINATED BY SOLITARY BEES. LATE SPRING.	
Q	WETLANDS, RIPARIAN	Castilleja campestris ssp. Campestris	FIELD OWL'S CLOVER	PRODUCES OWN NUTRITION THROUGH PHOTOSYNTHESIS, UNLIKE OTHER OWL'S CLOVER SPECIES.	
R	ASSOCIATED WITH WETLANDS, RIPARIAN	Psilocarphus brevissimus var. brevissimus	WOOLLY MARBLES	IN LATE SEASON, BRACTS ENCLOSE THE FRUITS. EARLY SUMMER.	
S	FORESTS, WOODLAND, GRASSLANDS, WETLANDS, RIPARIAN	Clematis ligusticifolia var. California	ROPEVINE	CLIMBING, MULTI-STEMMED, GREEN VINE WITH WHITE FLOWERS AND WHITE FRUIT. SPRING. SUMMER.	
T	GRASSLANDS	Carex praegracilis	FIELD SEDGE	LONG NARROW-LEAVED GRASS, LIKE A TUFTED MEADOW. LATE SPRING.	
U	FOREST, WOODLAND, CHAPARRAL, GRASSLAND, WETLAND	Cornus glabrata	BROWN DOGWOOD	ESTABLISHES QUICKLY IN WELL-WATERED HABITATS. DECIDUOUS, SMOOTH FOLIAGE.	

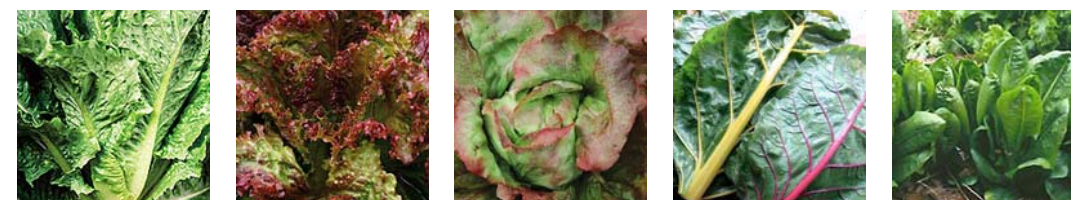


(A) (B) (C) (D) (E) (F) (G) (H) (I) (J) (K)



(L) (M) (N) (O) (P) (Q) (R) (S) (T) (U)

EDIBLE PLANT SCHEDULE			
MARK	BOTANICAL NAME	COMMON NAME	NOTES
1	Lactuca sativa	COSMO SAVOY LETTUCE	
2	Lactuca sativa	RED FIRE LETTUCE	
3	Lactuca sativa	SANGRIA LETTUCE	
4	Beta vulgaris	CHARD	
5	Cichorium endivia var. crispā)	FRISÉE	
6	Brassica juncea	OSAKA PURPLE MUSTARD	
7	Chrysanthemum coronarum	SHUNGIKU CHRYSANTHEMUM	
8	Brassica oleracea	PURPLE SPROUTING BROCCOLI	
9	Brassica oleracea	RED SCARLET O'HARA CABBAGE	
10	Brassica oleracea	BLUE CURLY VENDURA KALE	
11	Allium cepa	WHITE BUNCHING ONIONS	
12	Pisum sativum	PETIT POIS FRENCH BABY PEAS	
13	Allium schoenoprasum	CHIVES	
14	Coriandrum sativum	CILANTRO	
15	Rumex scutatus	FRENCH SORREL	
16	Petroselinum neapolitanum	ITALIAN PARSLEY	
17	Origanum vulgare	OREGANO	
18	Origanum majorana, Lamiaceae	MARJORAM	
19	Thymus vulgaris	THYME	



① ② ③ ④ ⑤



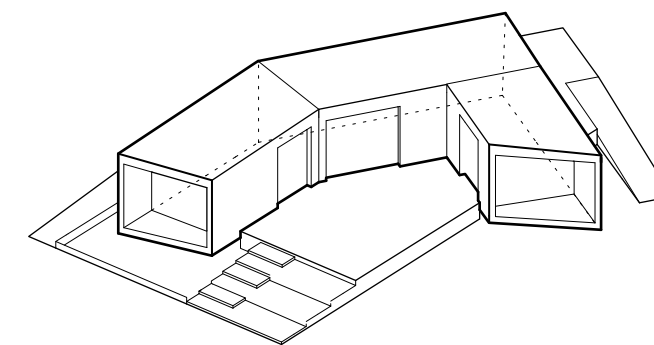
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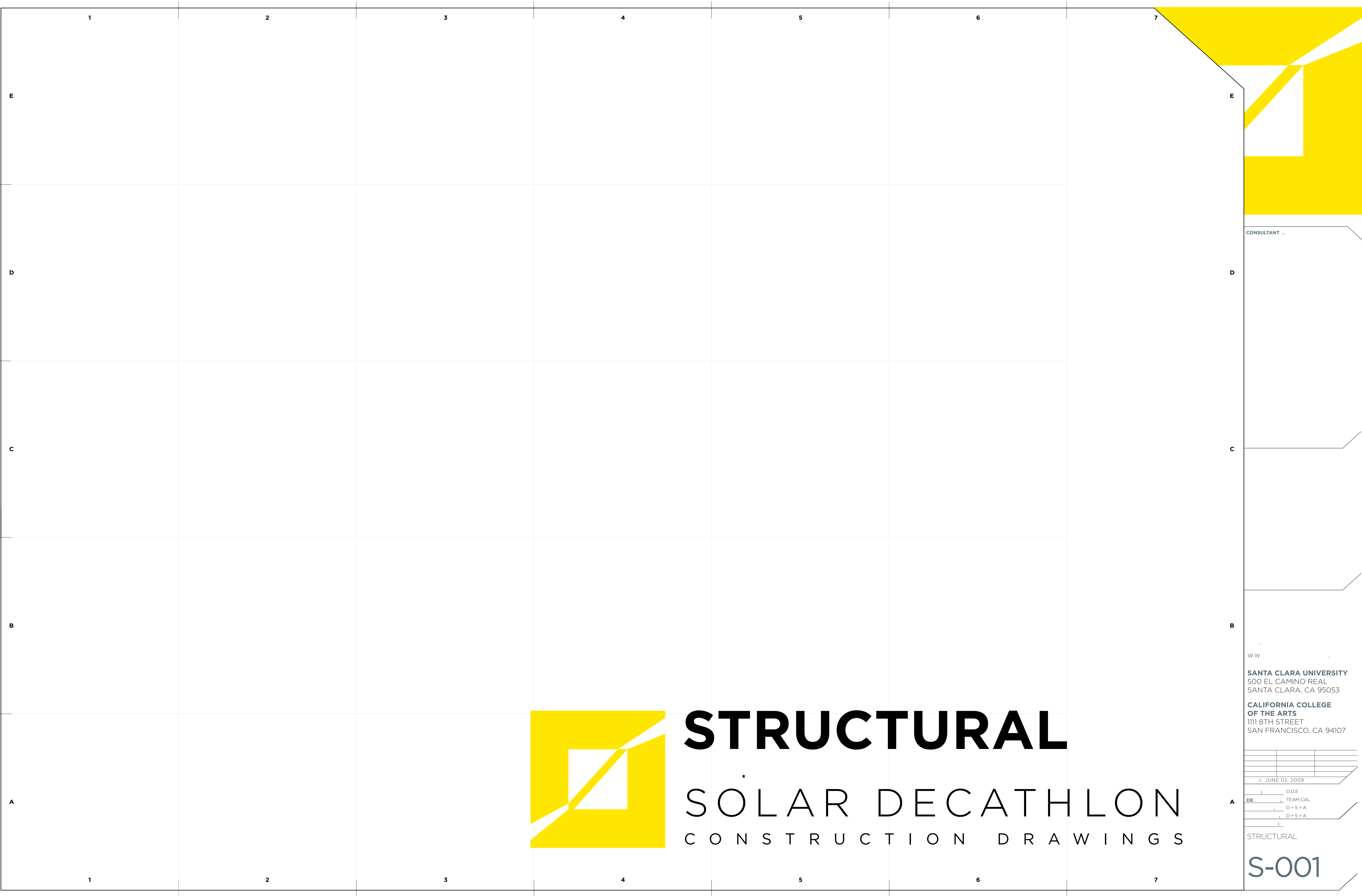
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PLANT SCHEDULE

L-601



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STRUCTURAL

S-001

[illegible]

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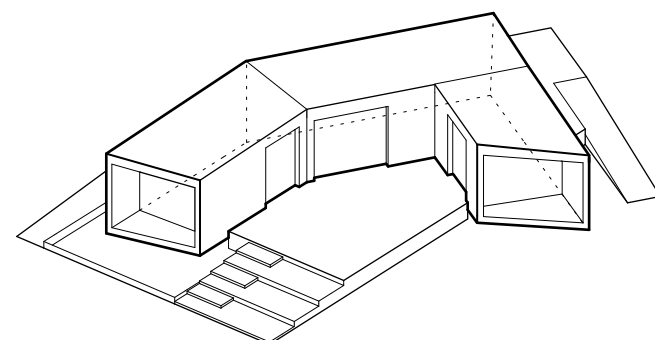
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SHEET TITLE:	

SHEET INDEX & SYMBOLS

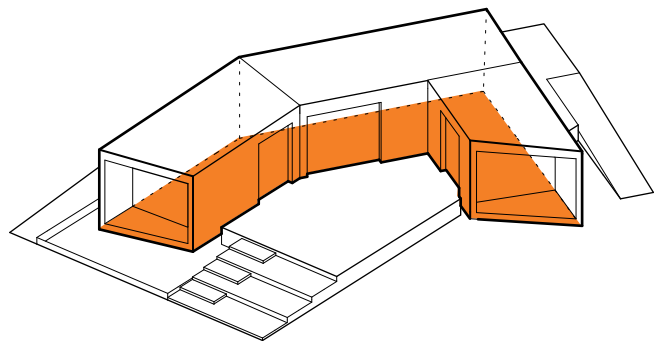
S-0003





SHEET NOTES

1. REFER TO GENERAL STRUCTURAL NOTES & DETAILS FOR GENERAL REQUIREMENTS OF CONSTRUCTION, MATERIALS, SHOP DRAWINGS AND REQUIREMENTS OF CONSTRUCTION OBSERVATIONS.
2. S.A.D. FOR ALL DIMENSIONS AND FINISH ELEVATIONS NOT NOTED.
3. S.A.D. FOR ALL FINISHES, FIRE PROTECTION, THERMAL AND MOISTURE PROTECTION, WATERPROOFING, AND ACOUSTICAL REQUIREMENTS FOR ALL CEILINGS, WALLS, FLOORS, ROOF DECKS AND TERRACES.
4. DATUM POINT FOR LAYING ALL FOUNDATIONS SHALL ORIGINATE AT:
5. FOOTINGS ARE SHOWN AS: SEE A5/S-601 FOR FOOTING SCHEDULE.
6. PREPARE A LEVEL SURFACE AT THE LOCATION OF EACH PIER TO INSURE A FULL CONTACT FOR THE FOOTING PAD.
7. CONTRACTOR TO SELECT APPROPRIATELY SIZED PIERS BY DETERMINING THE PIER HEIGHT AT EACH SUPPORT LOCATION. MEASURE TO THE TOP OF THE PAD TO THE STEEL ANGLE TO INSURE THAT HEIGHT IS NO GREATER THAN 36".
8. FOUNDATION PIERS ARE TO SIT ON TOP OF LOAD RATED ABS PAD. SEE B5/S-501 FOR TYPICAL STANDARD PIER DETAIL.
9. THE MAXIMUM ADJUSTMENT ON THE THREADED ROD ADJUSTER FOR THE STANDARD PIER IS 2" AND THE MAXIMUM ADJUSTMENT OF THE SEISMIC PIER IS 11". WHEN MORE HEIGHT IS NEEDED USE THE NEXT TALLER SIZE PIER SUPPORT.
10. FOR STANDARD PIERS TIGHTEN ROD ADJUSTER AGAINST BOTTOM OF STEEL ANGLE UNTIL SNUG PLUS 1/2 TURN.
11. ALL SEISMIC PIERS ARE TO HAVE A STEEL PLATE 6"x6" WELDED ON THE TOP OF THE BASE TO ACCOMADATE FOR HOLES IN THE STRUCTURAL STEEL FRAMING.
12. ELEVATIONS OF ALL PIERS MUST ACCOMADATE A VERTICAL CLEARANCE OF 18" BETWEEN THE FLOOR JOISTS AND THE GROUND.
13. ALL FOOTINGS FOR DECK SHALL BE SPACED NO FARTHER THEN 8 FEET APART. ALL GIRDERS SHALL HAVE FOOTINGS AT BOTH ENDS.
14. THE HEIGHT OF THE FOUNDATION PIERS ARE ONLY TO BE ADJUSTED 2". IF THE PIER NEEDS TO BE ADJUSTED ANY MORE, THEN A DIFFERENT TYPE OF PIER IS NEEDED.
15. THE HEIGHT OF THE SEISMIC PIERS ARE ONLY TO BE ADJUSTED 11". IF THE PIER NEEDS TO BE ADJUSTED ANY MORE, THEN A DIFFERENT TYPE OF PIER IS NEEDED.
16. GIVEN A GRADE VARIABILITY OF 18", CONTRACTOR TO SUPPLY APPROPRIATELY SIZED STANDARD PIERS FOR VERTCIAL ELEVATION SHIMMING.



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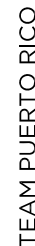
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SHEET TITLE:

FOUNDATION PLAN

S-101



1. REFER TO GENERAL STRUCTURAL NOTES & DETAILS FOR GENERAL REQUIREMENTS OF CONSTRUCTION, MATERIALS, SHOP DRAWINGS AND REQUIREMENTS OF CONSTRUCTION OBSERVATIONS.
2. S.A.D. FOR ALL DIMENSIONS AND FINISH ELEVATIONS NOT NOTED.
3. S.A.D. FOR ALL FINISHES, FIRE PROTECTION, THERMAL AND MOISTURE PROTECTION, WATERPROOFING, AND ACOUSTICAL REQUIREMENTS FOR ALL CEILINGS, WALLS, FLOORS, ROOF DECKS AND TERRACES.
4. MOMENT FRAMES ARE SHOWN AS: X SE C/S-601 FOR MOMENT FRAME SCHEDULE.
5. MOMENT FRAMES TO BE PLACED AND TORQUE ON SEISMIC PIER PRIOR TO STEEL ANGLE CONNECTION.
6. EACH MODULE IS STRUCTURALLY INDEPENDENT OF THE OTHER MODULES. THERE IS NO INTERMODULAR STEEL CONNECTION AT THE SEAMS.
7. IT IS CONTRACTORS RESPONSIBILITY TO PROPERLY PLACE TEMPORARY BRACES FOR STRUCTURAL BLOCK.
8. WOOD CRIBBING BLOCKS ARE REQUIRED TO ACT AS TEMPORARY SUPPORTS TO ENSURE SAFE STEEL ERECTION.
9. CONTRACTOR TO ERECT STEEL GIVEN DATUM POINT IN A1/S-101.

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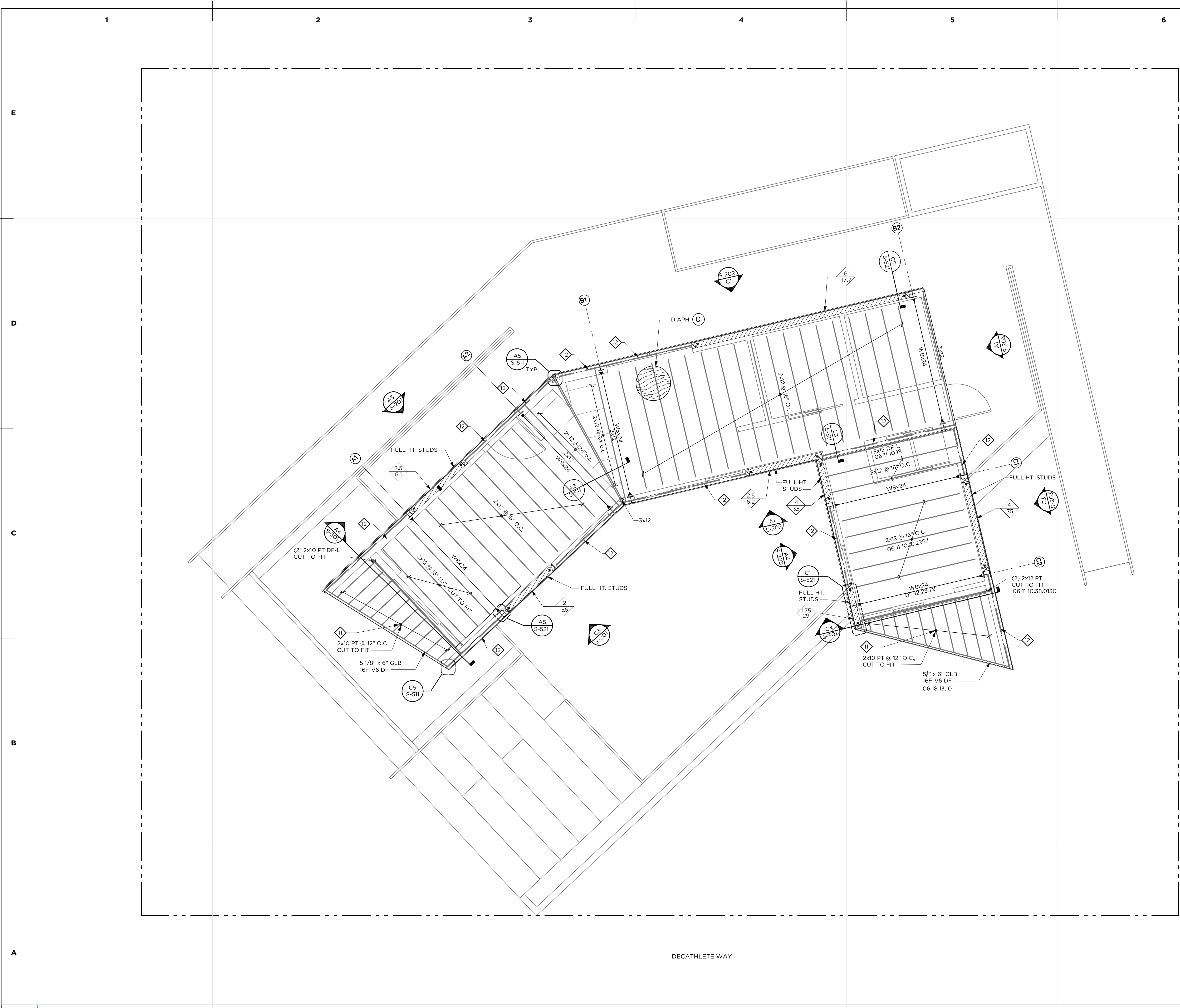
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
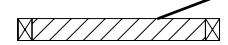






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SHEET TITLE:	

STRUCTURAL STEEL FRAMING PLAN

S-102



SHEET NOTES

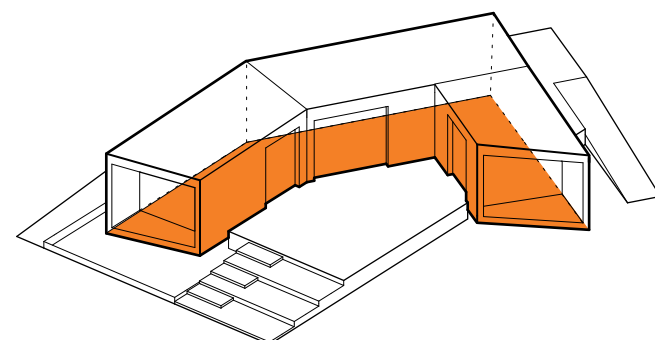
- REFER TO GENERAL STRUCTURAL NOTES & DETAILS FOR GENERAL REQUIREMENTS OF CONSTRUCTION, MATERIALS, SHOP DRAWINGS AND REQUIREMENTS OF CONSTRUCTION OBSERVATIONS.
- SEE DET. A1/S-601 FOR JOIST HANGER SCHEDULE.
- WOOD POSTS ARE SHOWN AS: , AND ARE 4x6 DF-L No. 1, U.O.N.
- SHEAR WALLS ARE SHOWN AS: 
TOP NUMBER INDICATES SHEAR WALL EDGE NAILING PER C3/S-601. BOTTOM NUMBER INDICATES MINIMUM WALL LENGTH IN FEET.
- HOLDOWNS ARE SHOWN AS: , ALL HOLDOWNS ARE HDU2-SDS2.5, U.O.N.
- PLYWOOD SUBFLOOR IS SHOWN AS: , SEE DIAPHRAGM NAILING SCHEDULE ON DET. C5/S-601
- STEEL SEISMIC MOMENT CONNECTIONS ARE SHOWN AS: 
- ALL WOOD POSTS THAT CONNECT TO HEADER TO BE 4x6 DF-L No.1.
- RIM JOIST IS SHOWN AS: , AND SHALL BE 3x12 DF-L.
- DBL 2x10 FLOOR JOISTS WILL BE LOCATED ALONG CANTILEVER FRAMING U.O.N.
-  FULLY BLOCK ALL JOISTS AT 12" O.C. WITH PRESSURE TREATED LUMBER.
-  3x12 RIM JOIST SHALL RUN CONTINUOUSLY ON STEEL ANGLE.

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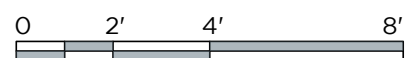
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SHEET TITLE:

FLOOR FRAMING PLAN

S-111

A1 FLOOR FRAMING PLAN
1/4" = 1'-0"

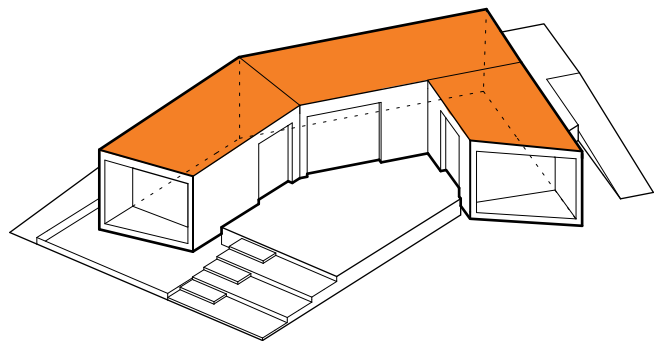




A

A1 ROOF FRAMING PLAN
1/4" = 1'-0"

1 2 3 4 5 6



- SHEET NOTES**
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 - SEE DET. 2/S-601 FOR JOIST HANGER SCHEDULE.
 - HEADERS AND RIM JOISTS ARE SHOWN AS:
 - PLYWOOD SHEATHING ARE SHOWN AS: . SEE DIAPHRAGM NAILING SCHEDULE ON DET. 1/S-601
 - PROVIDE FULL DEPTH 2x10 BLOCKING BETWEEN JOISTS AT 4'-0" O.C. WHEN PARTITION WALL OCCURS, PROVIDE 2x10 AT 2'-0" O.C.
 - ALL EXTERIOR STUD WALLS ARE 2x6 @ 24" O.C.

HDR

C

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SHEET TITLE:

ROOF FRAMING PLAN

S-112



SHEET NOTES

1. REFER TO GENERAL STRUCTURAL NOTES & DETAILS FOR GENERAL REQUIREMENTS OF CONSTRUCTION, MATERIALS, AND REQUIREMENTS OF CONSTRUCTION OBSERVATIONS.
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4. SEE A5/S-601 FOR FOOTING SCHEDULE.
5. BEARING CAPACITY AND FOOTING DESIGN BASED ON GOVERNING CASE OF GRAVITY AND LATERAL FORCES.
6. MAXIMUM BEARING CAPACITY FOR ALL FOOTINGS TO BE 1500 PSF.
7. ALL FOOTINGS SUPPORTING THE DECK WILL HAVE A BEARING PRESSURE OF 533 PSF.
8. BEARING PRESSURE OF POND TO BE DISPLACED BY 2x4 REDWOOD SLATS SPACED @ 12" O.C.
9. THE BEARING PRESSURE FOR THE MECHANICAL SKID INCLUDED BOTH THE TANKS AND THE STRUCTURE OF THE SKID. SEE M-101 FOR MECHANICAL SKID AND TANKS.
10. SEE P-103 FOR FLUID CONTAINMENT PLAN.

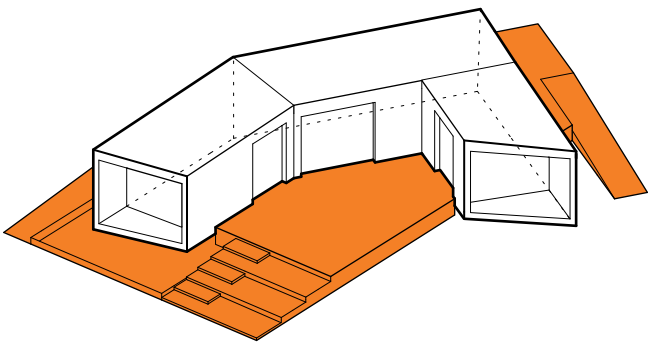
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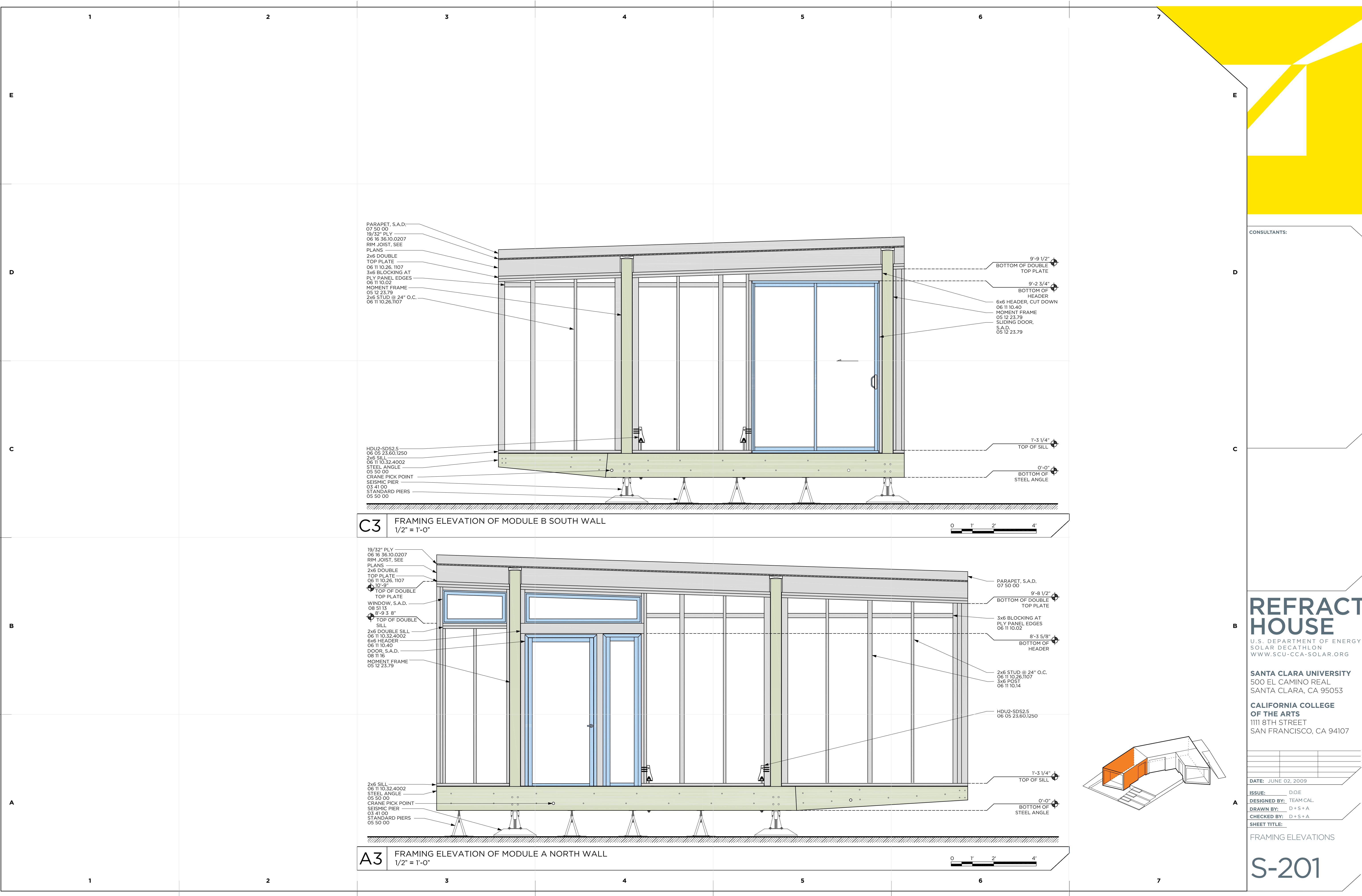
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SHEET TITLE:

BEARING PRESSURE PLAN

S-121



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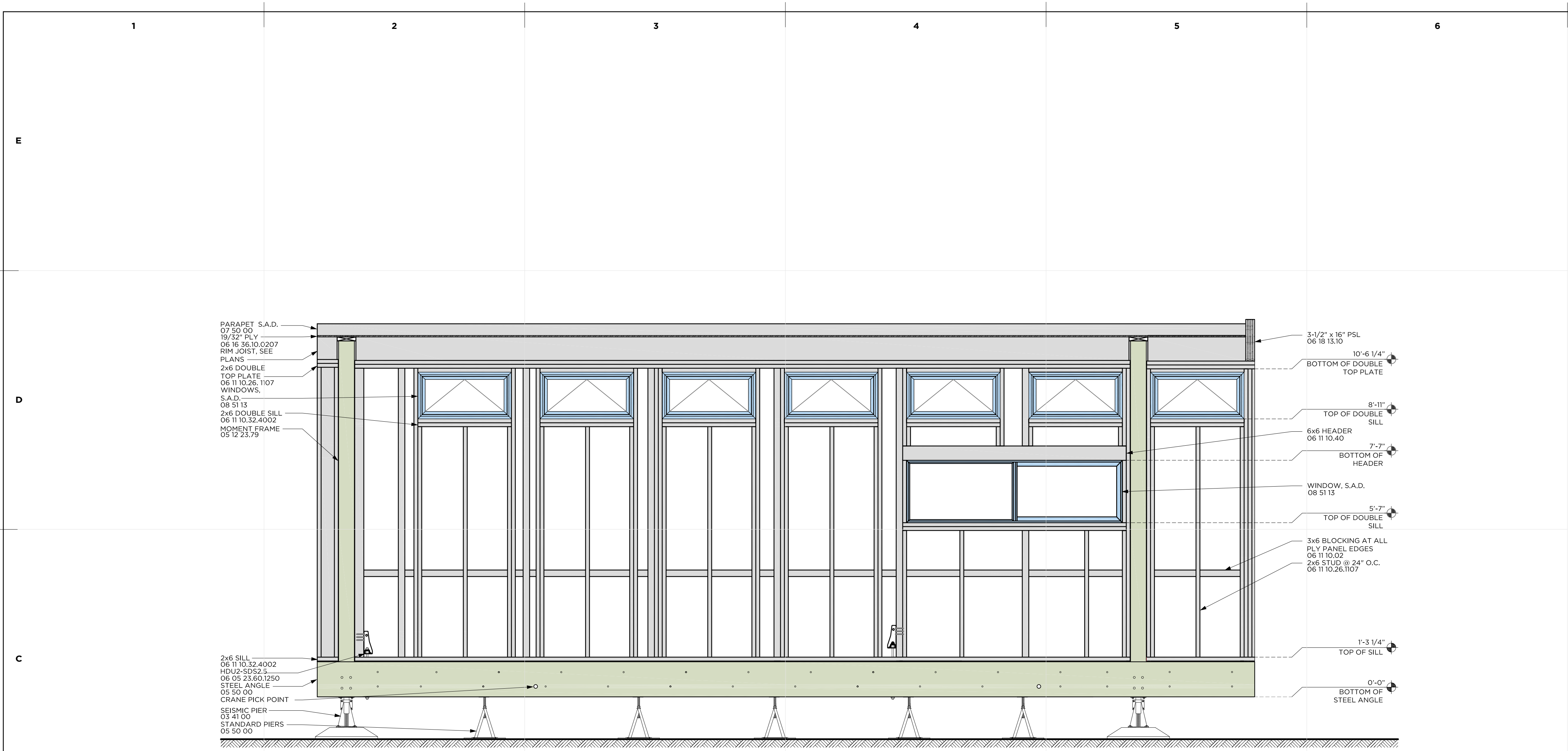
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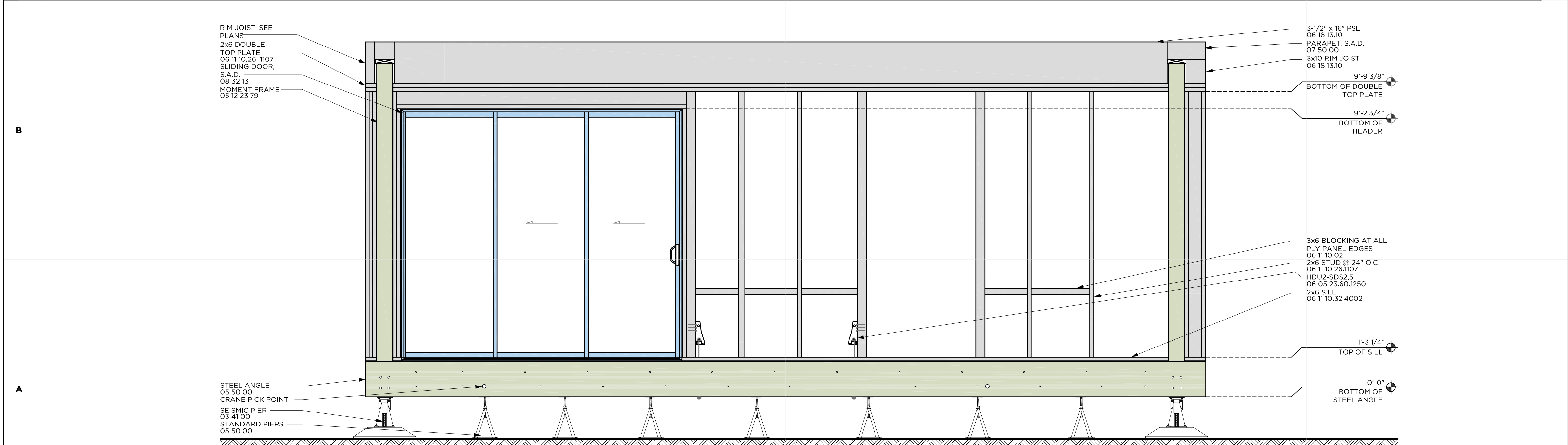
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FRAMING ELEVATIONS

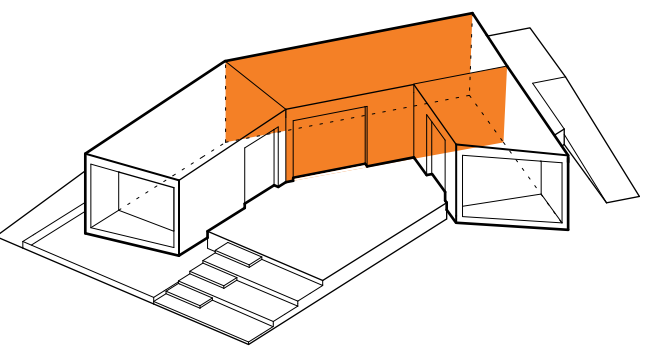
S-201



C1 FRAMING ELEVATION OF MODULE B NORTH WALL
1/2" = 1'-0"



A1 FRAMING ELEVATION OF MODULE B SOUTH WALL
1/2" = 1'-0"



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SHEET TITLE:

FRAMING ELEVATIONS

S-202



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SHEET TITLE:

FRAMING ELEVATIONS

S-203



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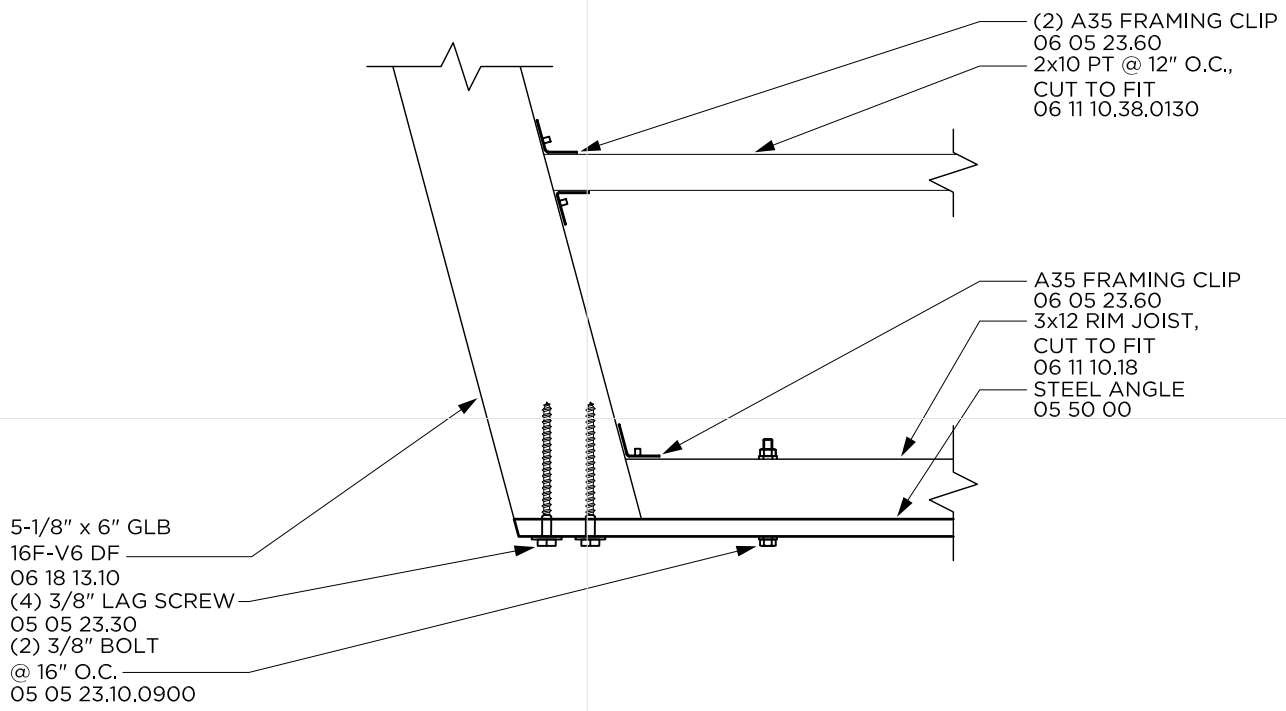
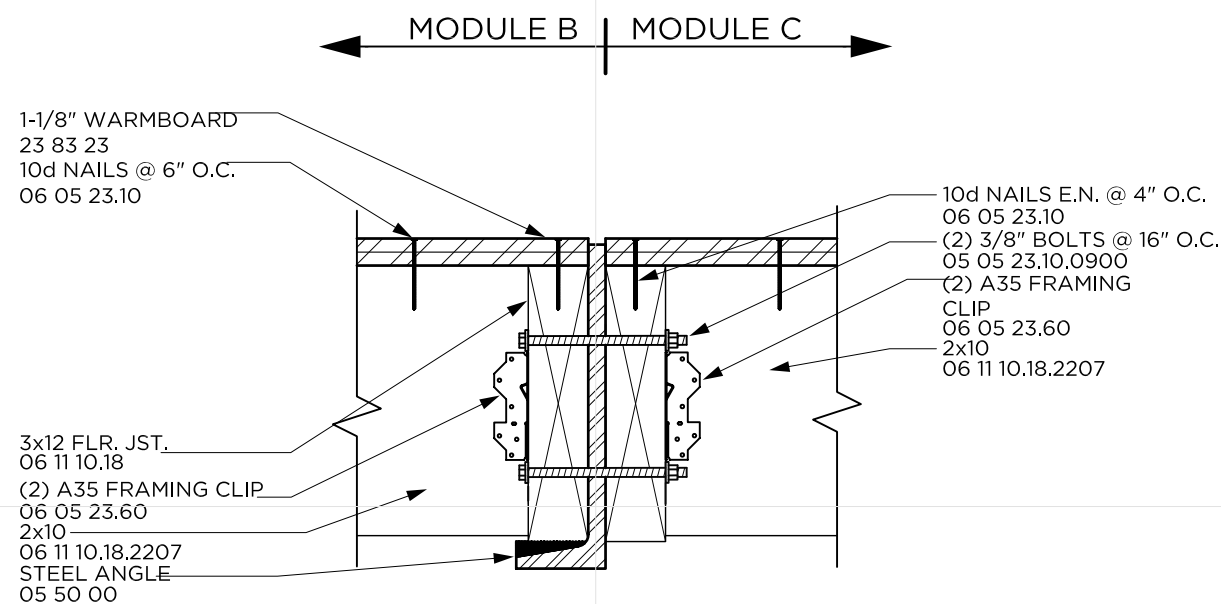
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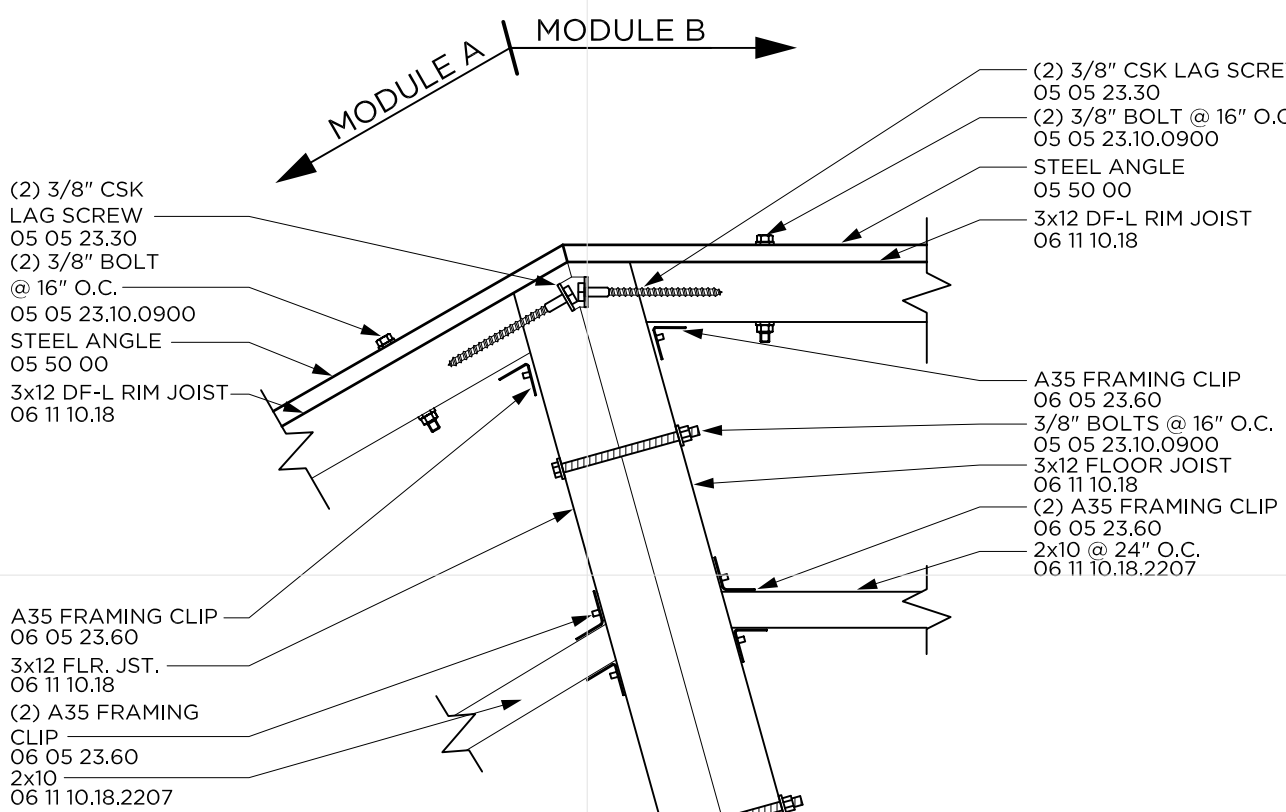
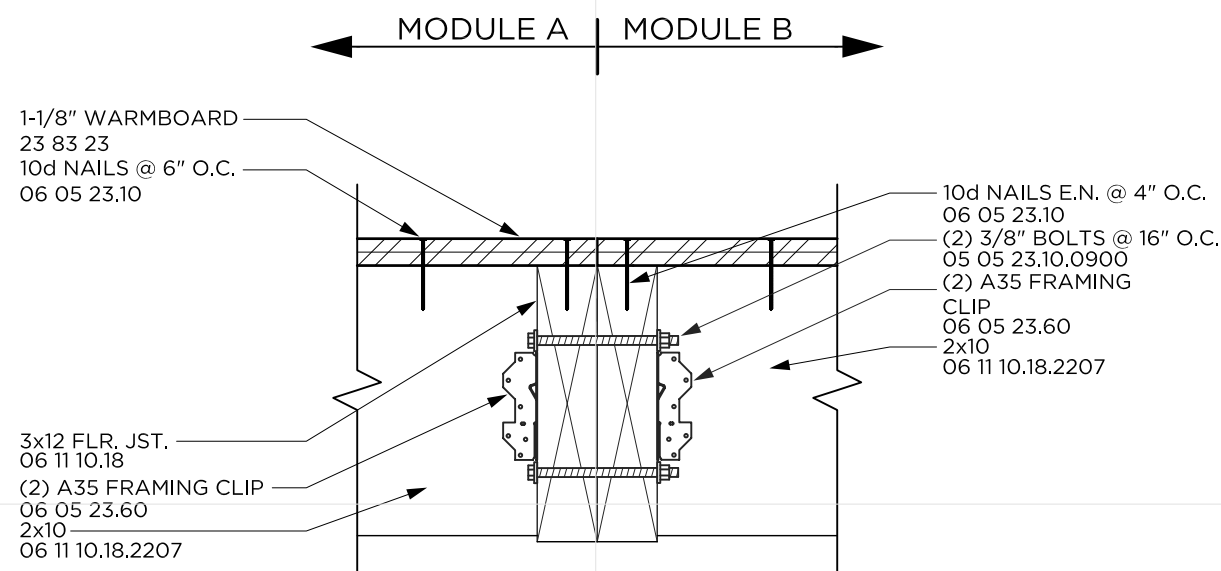
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SHEET TITLE:

FRAMING SECTIONS
S-301



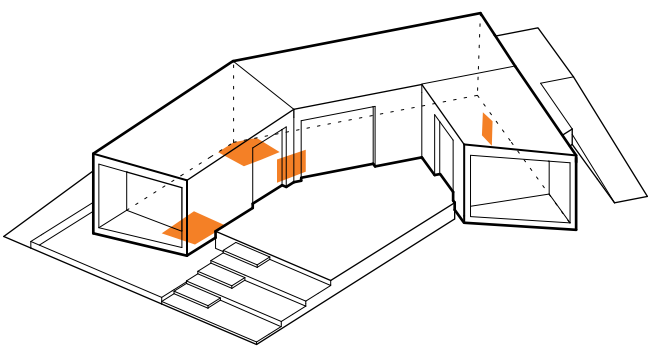
C3 MODULE B TO C CONNECTION
1 1/2" = 1'-0"

C5 CANTILEVER DETAIL
1 1/2" = 1'-0"



A3 MODULE A TO B CONNECTION
1 1/2" = 1'-0"

A5 MODULE A TO B CONNECTION DETAIL
1 1/2" = 1'-0"



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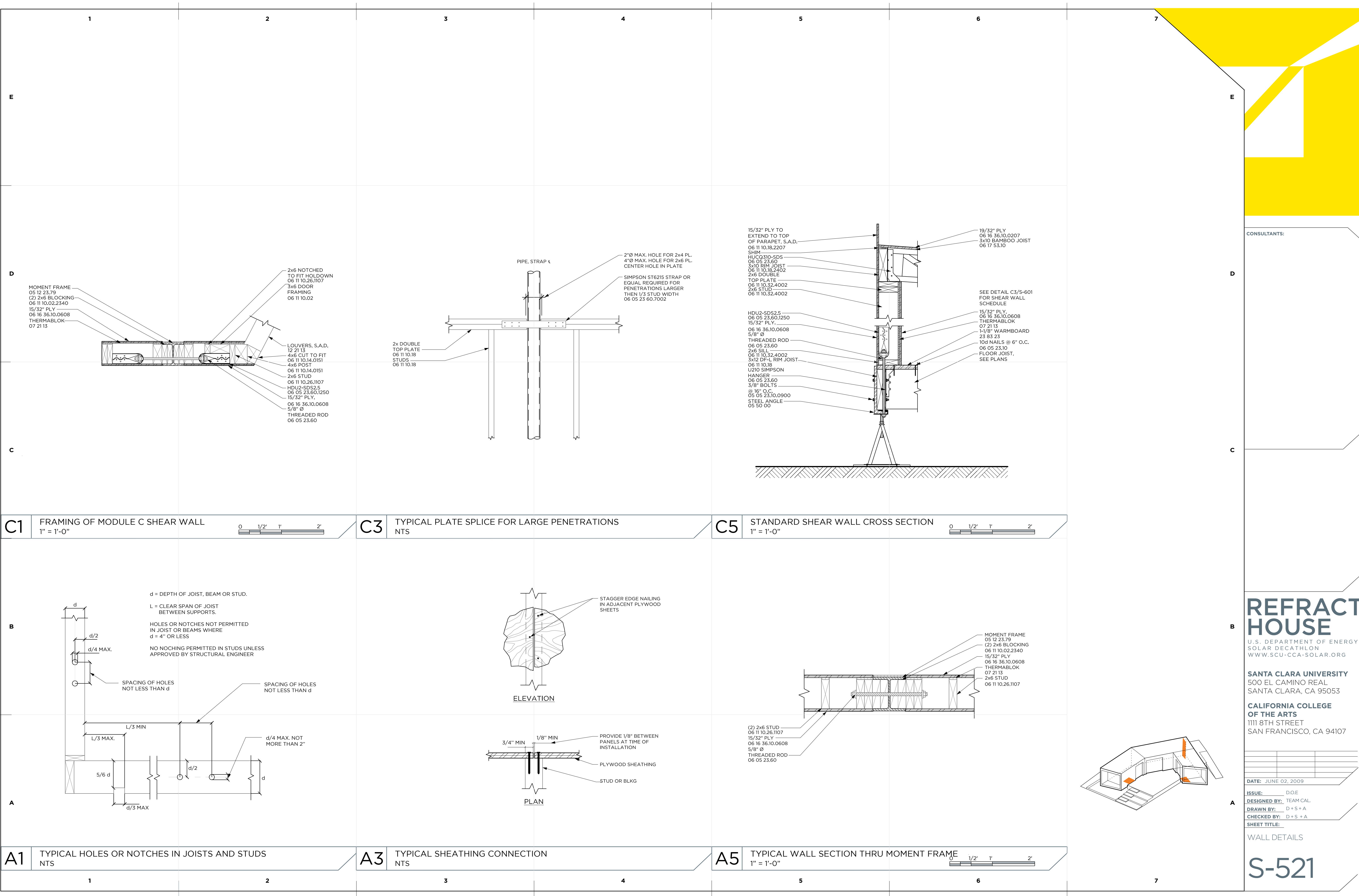
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SHEET TITLE:

FLOOR DETAILS

S-511



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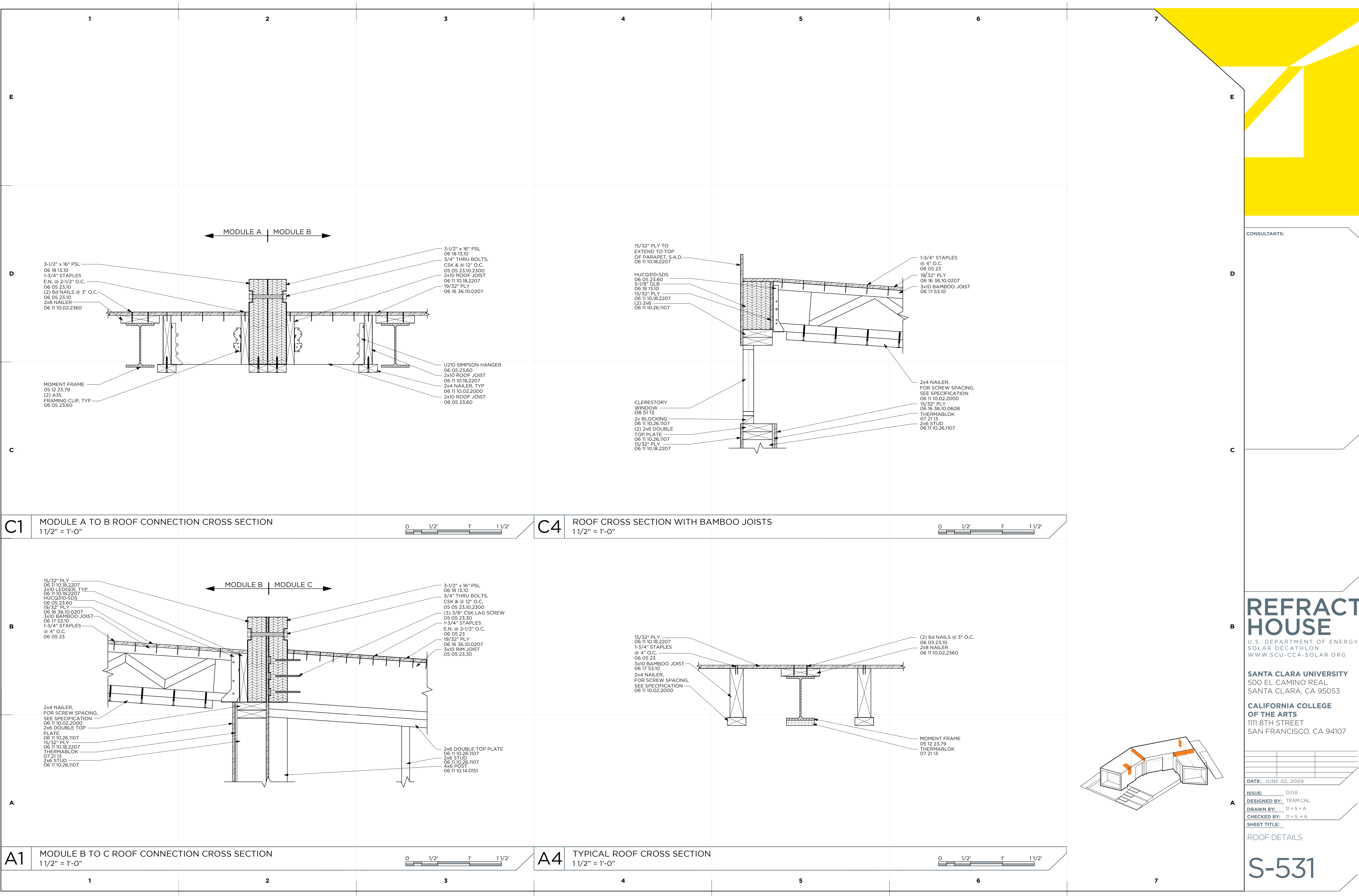
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SHEET TITLE:

WALL DETAILS

S-521



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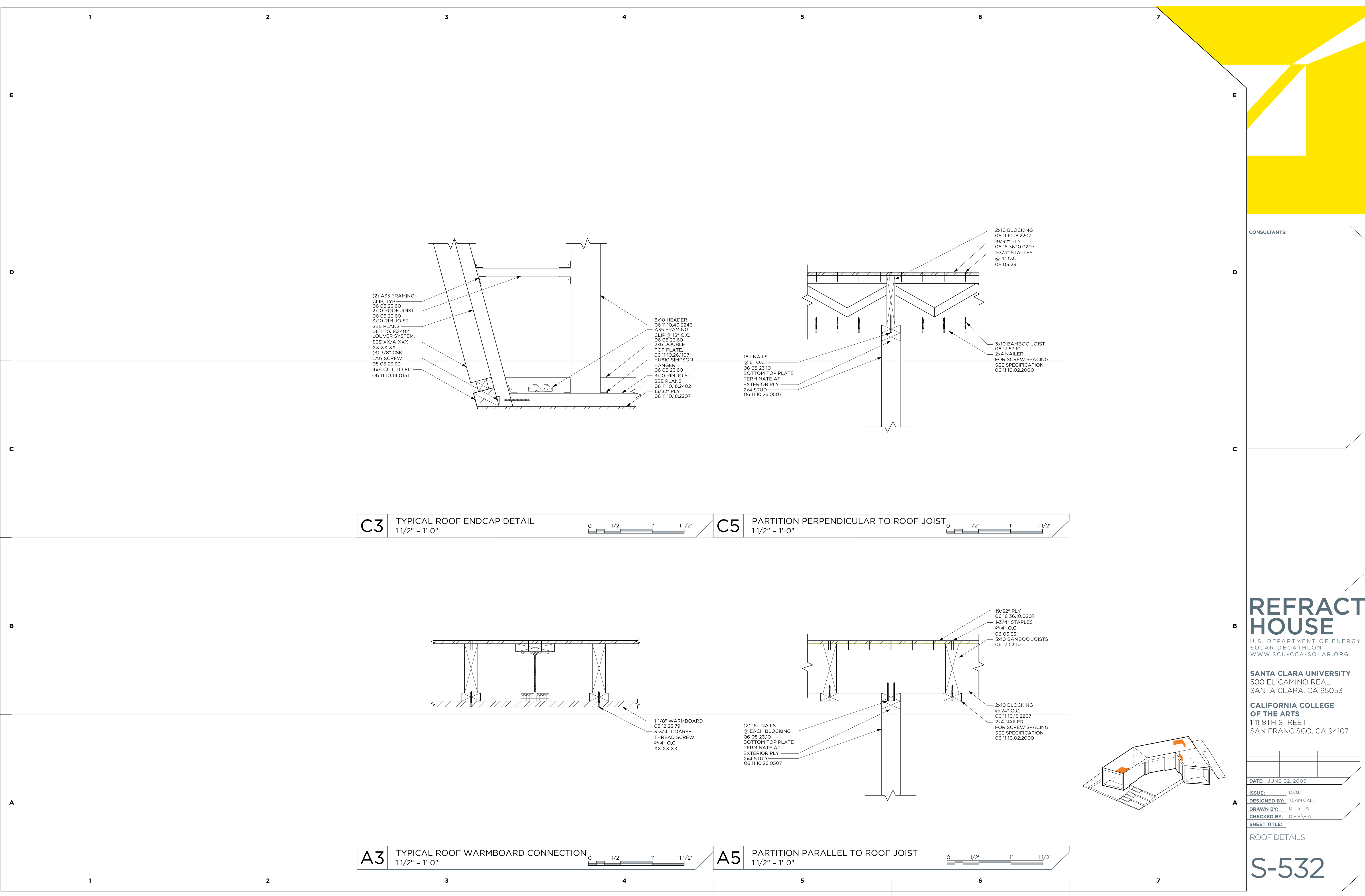
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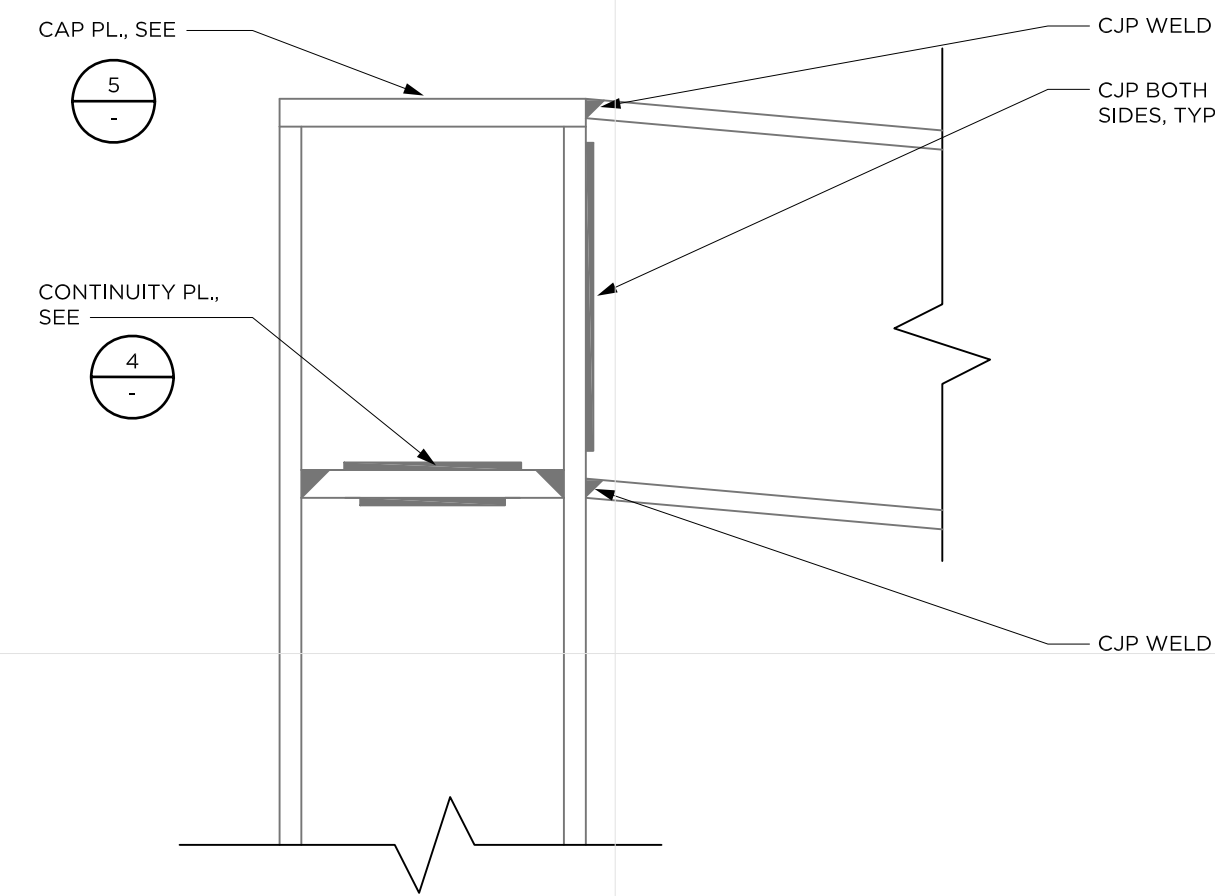
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ROOF DETAILS

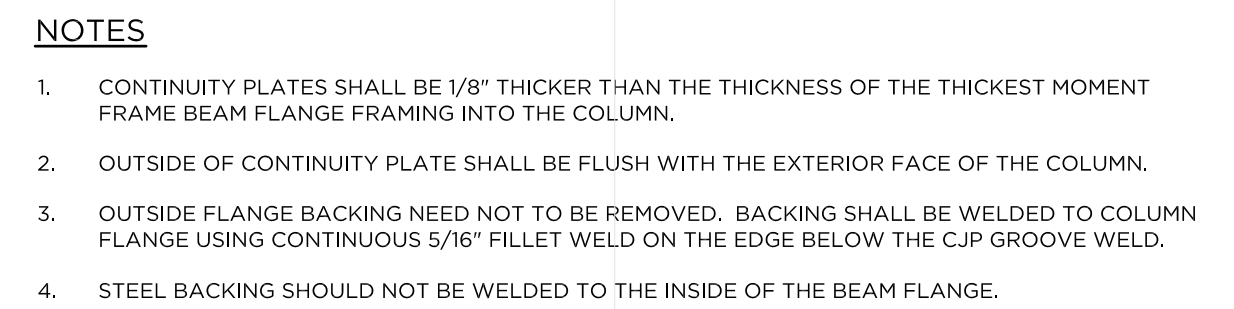
S-531



S-601



1. ALL WELDS SHALL BE MADE USING EITHER SHIELDED METAL ARC WELDING (SMAW) OR FLUX CORE ARC WELDING (FCAW) WITH GAS SHIELDING, EXCEPT THAT SUBMERGED ARC (SAW) MAY BE USED FOR SHOP WELDING.
2. NO "WELD DAMS" ARE ALLOWED.
3. COMPLETE PENETRATION WELDS:
 - A. ALL COMPLETE PENETRATION WELDS SHALL BE STARTED AND COMPLETED ON RUN-OFF TABS PER AWS D11.
 - B. STRICT ADHERENCE TO MINIMUM PREHEAT AND INTERPASS TEMPERATURE REQUIREMENTS OF AWS D11 SHALL BE MADE AT ALL TIMES.
 - C. THE WELDS SHALL BE GROUND SMOOTH AND THE WELD ROOT INSPECTED AND TESTED FOR IMPERFECTIONS IN ACCORDANCE WITH AWS D11, SECTION 9.25. IMPERFECTIONS EXCEEDING THE ACCEPTANCE CRITERIA OF SECTION 9.25 SHALL BE REMOVED BY BACK GOUGING OR GRINDING TO SOUND MATERIAL AND THE AREA REWELDED.
 - D. COMPLETED PENETRATION WELDS SHALL BE 100% ULTRASONICALLY TESTED IN ACCORDANCE WITH AWS D11. WELDS SHALL BE TESTED BOTH FROM ABOVE AND BELOW. ACCEPTANCE CRITERIA SHALL BE PER AWS D11, SECTION 9.25.
4. CONTRACTOR SHALL SUBMIT A WRITTEN WELDING PROCEDURE TO THE STRUCTURAL ENGINEER FOR APPROVAL PRIOR TO FABRICATION.

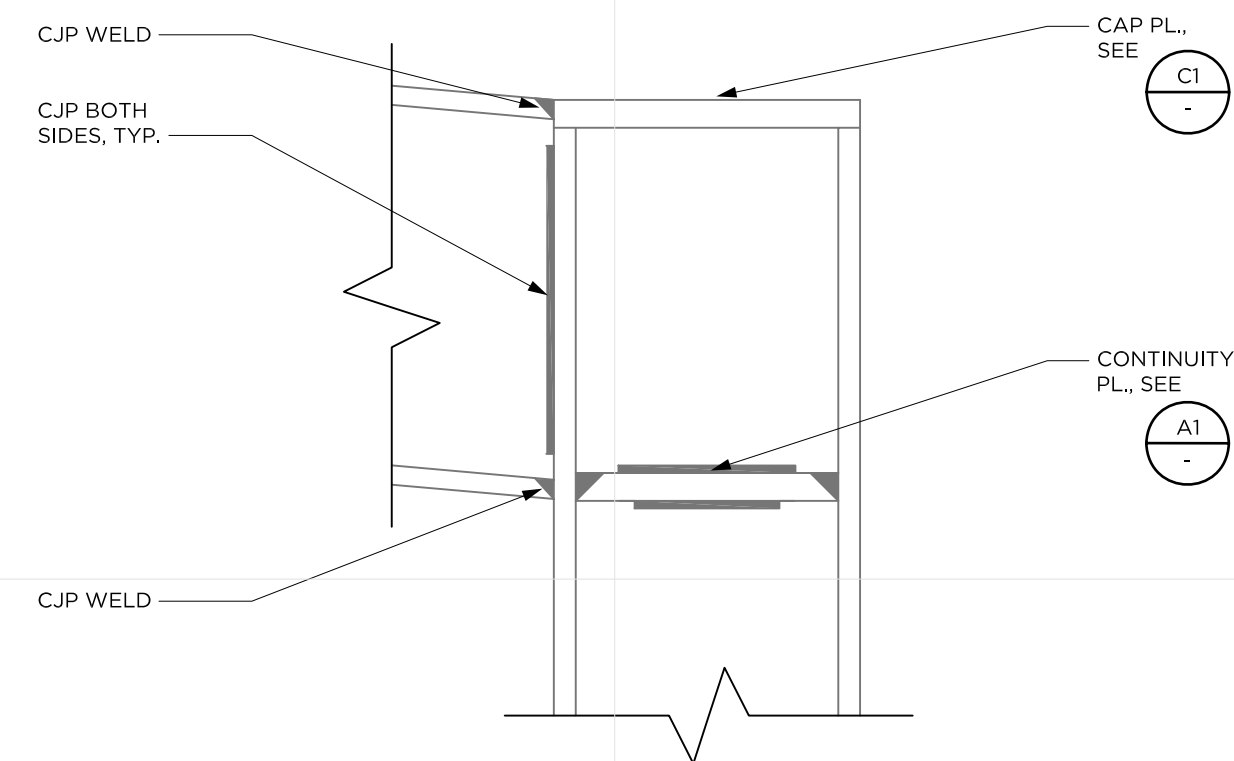


NOTES

1. CONTINUITY PLATES SHALL BE 1/8" THICKER THAN THE THICKNESS OF THE THICKEST MOMENT FRAME BEAM FLANGE FRAMING INTO THE COLUMN.
2. TOP FLANGE BACKING NEED NOT TO BE REMOVED. BACKING SHALL BE WELDED TO COLUMN FLANGE USING A CONTINUOUS 5/16" FILLET WELD ON THE EDGE BELOW THE CJP GROOVE WELD.
3. STEEL BACKING SHOULD NOT BE WELDED TO THE UNDERSIDE OF THE BEAM FLANGE.

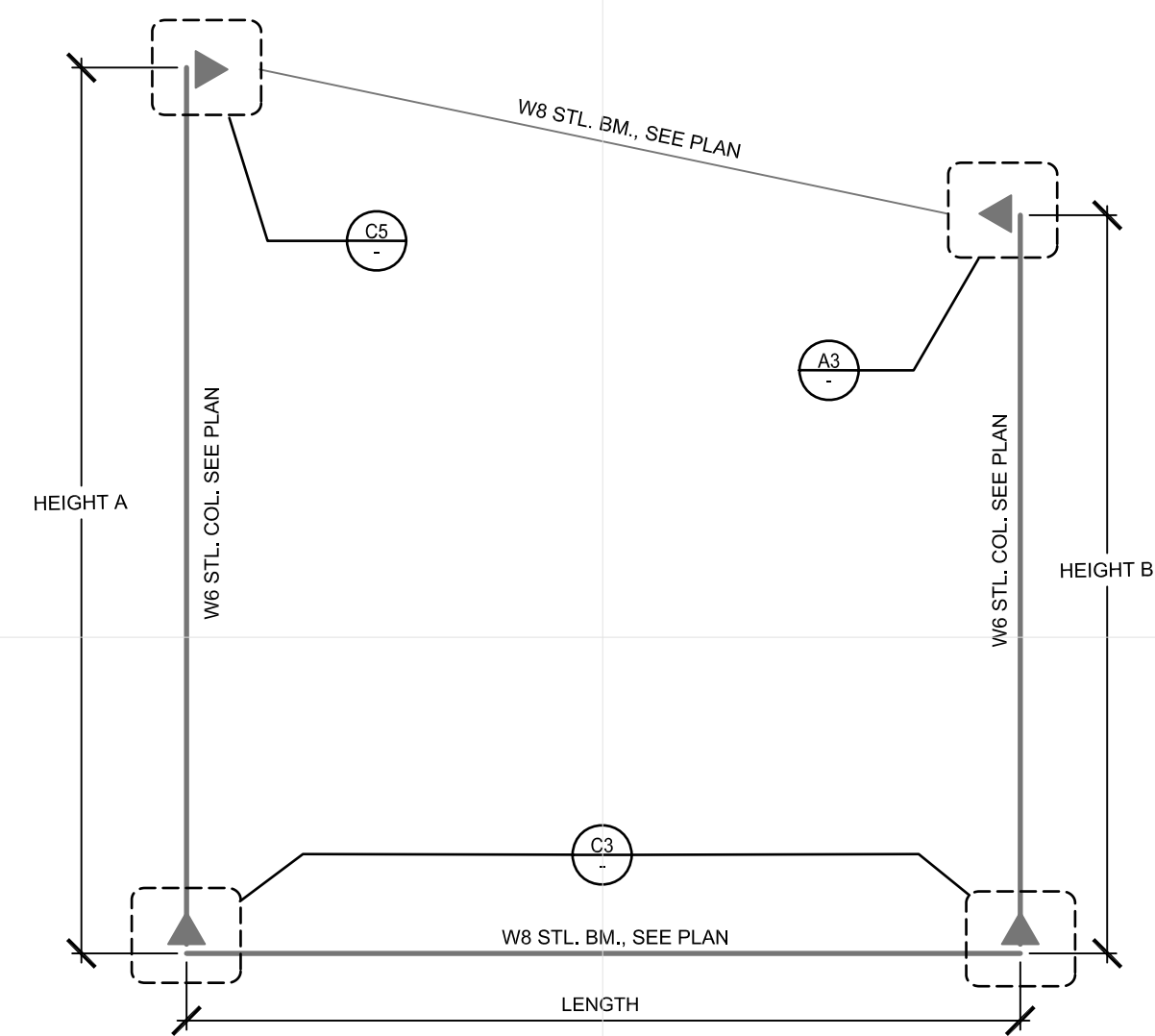
C3 BEAM-COLUMN CONNECTION DETAIL
3" = 1'-0"

C5	BEAM-COLUMN CONNECTION DETAIL 3" = 1'-0"	
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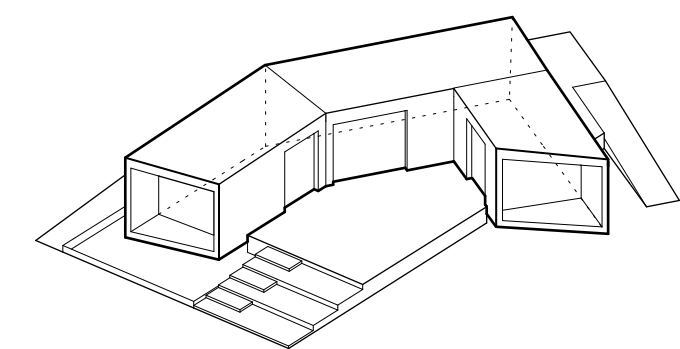
1. CONTINUITY PLATES SHALL BE 1/8" THICKER THAN THE THICKNESS OF THE THICKEST MOMENT FRAME BEAM FLANGE FRAMING INTO THE COLUMN
2. STEEL BACKING AT CONTINUITY PLATE NEED NOT BE REMOVED. AT COLUMN FLANGES, BACKING LEFT IN PLACE SHALL BE WELDED TO COLUMN FLANGE USING A CJP GROOVE WELD.

1. CONTINUITY PLATES SHALL BE 1/8" THICKER THAN THE THICKNESS OF THE THICKEST MOMENT FRAME BEAM FLANGE FRAMING INTO THE COLUMN.
2. TOP FLANGE BACKING NEED NOT BE REMOVED. BACKING SHALL BE WELDED TO COLUMN FLANGE USING A CONTINUOUS 5/16" FILLET WELD ON THE EDGE BELOW THE CJP GROOVE WELD.
3. STEEL BACKING SHOULD NOT BE WELDED TO THE UNDERSIDE OF THE BEAM FLANGE.



A3 BEAM-COLUMN CONNECTION DETAIL

A5	MOMENT FRAME SCHEMATIC NTS	
----	-------------------------------	--



S-701

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D

C

B

A

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:	STUDENTS	
:	MrA	
:		
ARCHITECTURE		

ARC I

CONSTRUCTION DRAWINGS

	1	2	3	4	5	6	7
E	<u>DESIGN NARRATIVE</u>			<u>PROJECT DIRECTORY & INFORMATION:</u>	INDEX OF DRAWINGS:	A-232 CASEWORK DIAGRAMS A-233 CASEWORK DIAGRAMS A-234 CASEWORK DIAGRAMS A-311 BUILDING SECT. MODULE A AND B A-312 BUILDING SECT. MODULE C A-313 ARCHITECTURE COMP. AXON A-314 CLEARSTORY AXON. A-315 COURTYARD WALL AXON.	E
	REFRACT HOUSE DEMONSTRATES THAT CONTEMPORARY DESIGN AND RIGOROUS ENGINEERING CAN BE UNITED TO CREATE A BEAUTIFUL, COMFORTABLE AND SUSTAINABLE HOME. TEAM CALIFORNIA HAS EMBRACED THE "CALIFORNIA LIFESTYLE" OF INDOOR/OUTDOOR LIVING. THE INTERIOR SPACES FUNCTION AS MUCH TO FRAME THE OUTDOORS AS TO SHELTER THE INTERIORS.			Refract House Design Team: Santa Clara University 500 El Camino Real Santa Clara, CA 95053 California College of the Arts 111 8th Street San Francisco, CA 94107	A-001 ARCHITECTURE A-002 SHEET INDEX & SYMBOLS A-003 ACCESSIBILITY DIAGRAMS A-101 SHIPPING ROUTE A-102 MALL PLAN A-103 D.C. MALL ASSEMBLY		
D	THE SOUTHERLY ORIENTATION OF REFRACT HOUSE ALONG WITH ITS LARGE EXPANSES OF GLAZING HAS INFORMED OUR ORGANIZATION OF INTERIOR ZONES. LIGHT FILLS A ROOM WHEN PEOPLE ARE MOST LIKELY TO BE USING IT. OCCUPANTS WILL WAKE TO THE SUN WARMING THE EASTERLY BEDROOM. AS THE SUN MOVES ACROSS THE SKY, LIGHT WILL FILL THE KITCHEN AND THE FOURTH EXTERIOR ROOM, THE COURTYARD. LATER IN THE DAY, PEOPLE WILL MOVE INTO THE KITCHEN FOR COOKING, SOCIALIZING AND DINING AND TO THE COURTYARD AND GARDEN FOR WORKING AND PLAYING. IN THE EVENING WHEN THE OCCUPANTS OF OUR HOUSE GATHER TO RELAX AND ENTERTAIN THEY CAN WATCH AS THE SUN SINKS TO THE WEST AND FILLS THE LIVING ROOM WITH COLOR. REFRACT OCCUPANTS WILL UNDERSTAND SPACES IN A LANGUAGE OF LIGHT; COLOR, SHADOW, DEPTH, AND SHADOW ANGLES IN DYNAlC DAILY AND YEARLY RHYTHMS.			<u>Architectural Project Managers</u> Annessa Mattson Meez (Michael) Perkins Date: June 02, 2009	A-104 NEIGHBORHOOD PLAN A-105 TOUR ROUTE A-106 SITE PLAN A-107 SOLAR PLAN A-108 ROOF PLAN A-111 FLOOR PLAN MODULE A A-112 FLOOR PLAN MODULE B A-113 FLOOR PLAN MODULE C A-114 ELECTRICAL PLAN A-115 ACCESSIBILITY PLAN A-116 FIRE EGRESS PLAN A-117 COND./UNCOND. SPACE	A-321 WALL SECTIONS A-322 WALL SECTIONS A-323 WALL SECTIONS A-501 PLAN DETAILS A-502 PLAN DETAILS A-503 PLAN DETAILS A-504 PLAN DETAILS A-505 WALL DETAILS A-506 WALL DETAILS A-507 WALL DETAILS A-508 WALL DETAILS A-509 RAINSCREEN DETAILS	D
	TWO PRIMARY STRATEGIES INCREASE THE SPACIOUSNESS AND ENJOYMENT OF OUR SMALL HOME. BY ELONGATING AND BENDING THE FLOOR PLAN, PROGRAMMATIC SPACES ARE DIFFERENTIATED AND CAN TAKE ON AN INDIVIDUAL IDENTITY. THE CAREFUL USE OF LIGHT AND OPENINGS CREATES A STRONG VISUAL AND FUNCTIONAL CONNECTION TO THE SURROUNDING ENVIRONMENT THAT MAKES THE SPACE FEEL LARGER THAN IT ACTUALLY IS. THE COURTYARD BECOMES THE CENTERPIECE OF THE HOUSE, A FOURTH ROOM. ALL OTHER SPACES ARE CONNECTED TO THE COURTYARD BOTH PHYSICALLY AND VISUALLY.			Proposed Project: Refract House Site Description: Washington Mall Washington DC Occupancy: R-Residential Construction Type: Type V-B Building Description: New Single Story Module Dwelling Max Building Ht.: 12'-8" Code Used: See #1 General Notes	A-118 SHADOW STUDIES A-201 NORTH & SOUTH ELEVATIONS A-202 EAST & WEST ELEVATIONS A-211 EXTERIOR ELEVATIONS MODULE A A-212 EXTERIOR ELEVATIONS MODULE B A-213 EXTERIOR ELEVATIONS MODULE C A-221 INTERIOR ELEVATIONS A-222 INTERIOR ELEVATIONS A-223 INTERIOR ELEVATIONS A-224 INTERIOR ELEVATIONS A-231 CASEWORK DIAGRAMS	A-510 RAINSCREEN DETAILS A-511 ACCESSIBILITY DETAILS A-601 WINDOW SCHEDULE A-602 DOOR SCHEDULE A-603 FIXTURE SCHEDULE	
C	ABBREVIATIONS			<u>GRAPHIC SYMBOLS:</u>			C
B	ADJ. ADJUSTABLE ALUM. ALUMINUM ARCH. ARCHITECT BLDG. BUILDING BOT. BOTTOM CAB. CABINET CEM. CEMENT CLG. CEILING REF. COL. COLUMN EQ. CONC. CONCRETE EQUIP. CONN. CONNECTION COORD. COORDINATE	PNL. PANEL RAD. RADIUS P.C.P. REFLECTED RD. ROOF DRAIN REFERENCE EQUAL EQUIPMENT EXTERIOR FINISH FL. FLOOR FLASH. FLASHING FT. FOOT OR FEET	EA. EACH EL. ELEVATION LT. LIGHT MANUF. MANUFACTURER MATL. MATERIAL MAX. MAXIMUM NT. MECH. MECHANICAL MTL. METAL MTD. MOUNTED N. NEW NTS. NOT TO SCALE O/ OVER	INCH INSUL. INSULATION INTERIOR KIT. KITCHEN R.W.L. RAIN WATER LEADER RM. ROOM R.O. ROUGH OPENING SCHED. SCHEDULE SECT. SECTION SQUARE FOOT (FEET) S.S.D. SEE STRUCTURAL DRAWINGS STEEL	Exterior Elevation Indicator Section Indicator Interior Elevation Indicator Detail Indicator	Elevation Indicator Window Type Identifier Module Seam Identifier Door Type Identifier Casework Axons	B
A	CTR. CENTER DTL. DETAIL DIM. DIMENSION DN. DOWN FTG. DR. DOOR DRN. DRAIN DS. DOWNSPOUT DWG. DRAWING	FOOTING FURN.FURNITURE GALV.GALVANIZED GLASS GND. GROUND GYP. BR. GYPSUM D HD. HEAD HT. HEIGHT	OA.OVERALL S.F. O.C ON CENTER T OPNG. OPENINGSTL. OPP. OPPOSITE PL. PLYWOOD P. LAM PLASTIC LAMINATE	STOR.STORAGE EMP. TEMPERED VERIFY IN FIELD W/ WITH WD. WOOD WP. WATER PROOF			A
	1	2	3	4	5	6	7

CONSULTANTS:

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U.S. DEPARTMENT OF ENERGY
SOLAR DECATHLON
WWW.REFRACTHOUSE.COM

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DATE:

ISSUE:

DESIGNED BY:

DRAWN BY:

CHECKED BY:

SHEET TITLE:

SHEET INDEX & SYMBOLS

A-002



TRAVEL TIME:
60+ HOURS / 8 DAYS

TRAVEL DISTANCE:
2946 MILES

TRAVEL FLEET:
4 SEMI-TRUCKS
1 FLAT BED

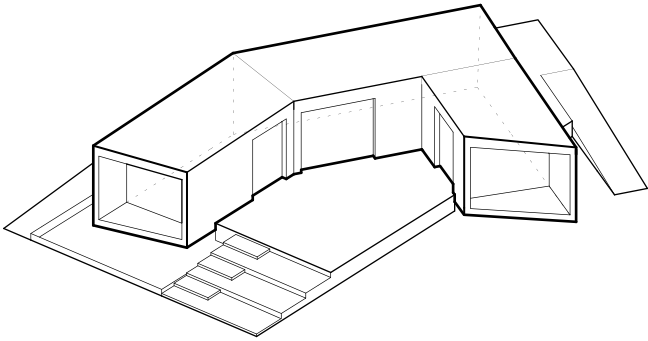
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DRAWN BY: STUDENTS

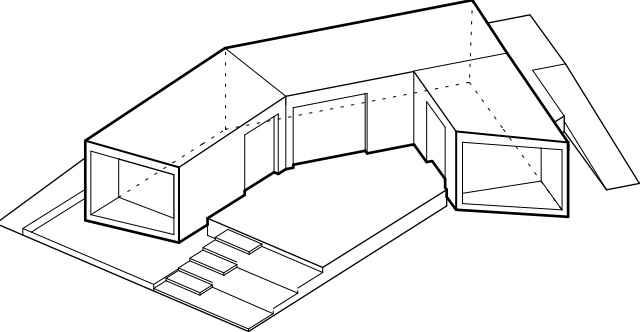
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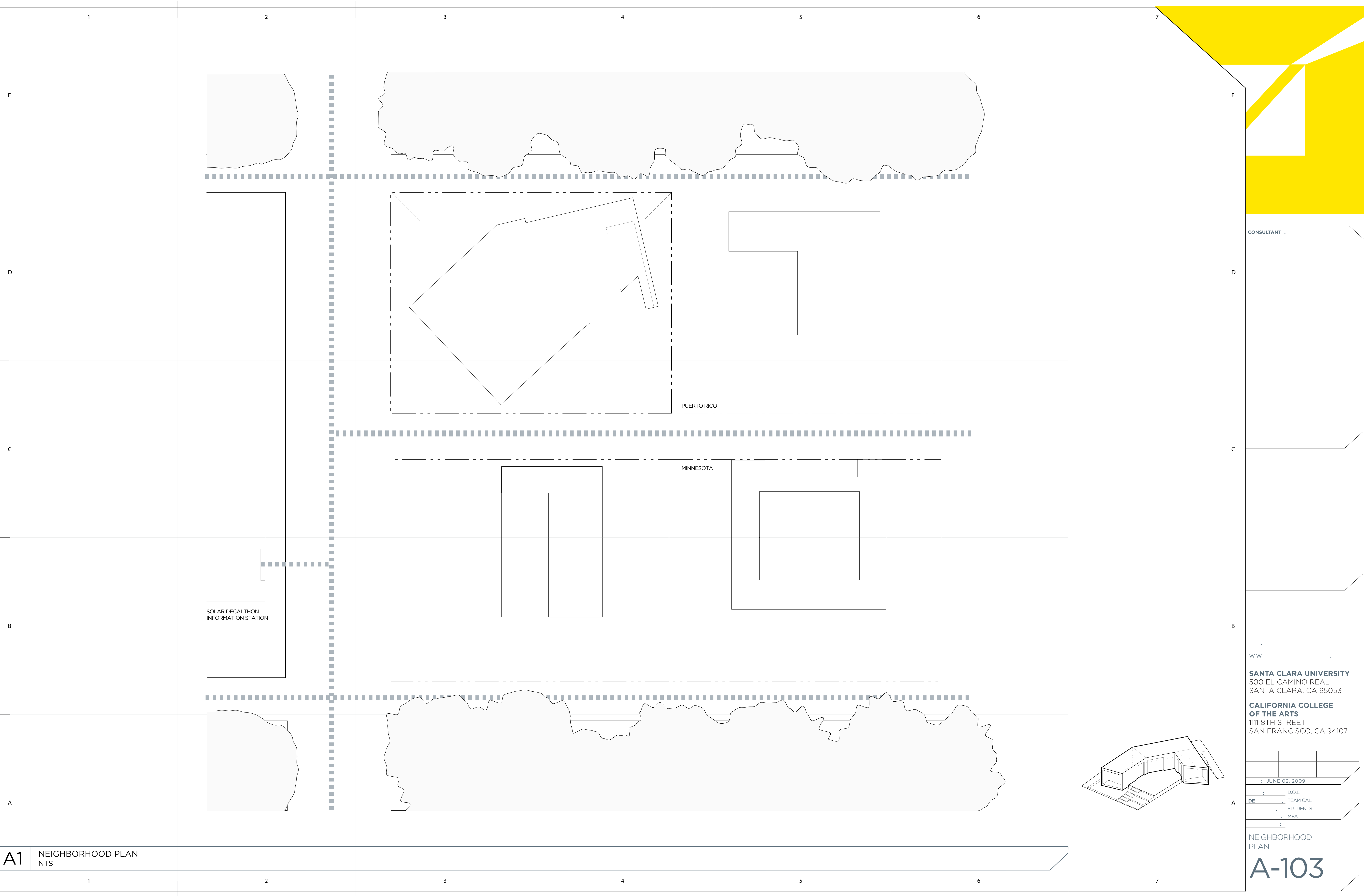
SHEET TITLE:

SHIPPING ROUTE

A1 SHIPPING ROUTE
NTS

A-101







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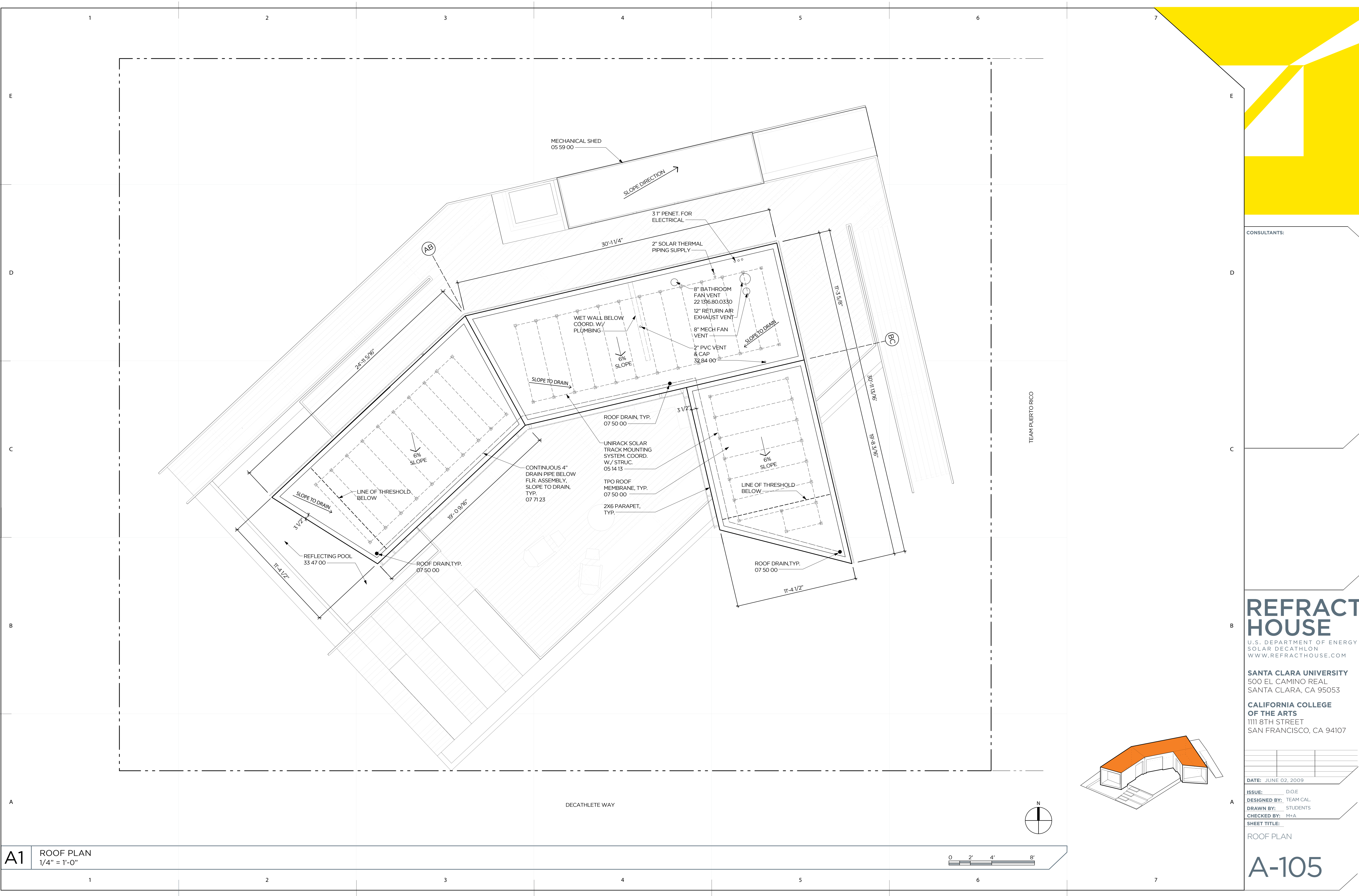
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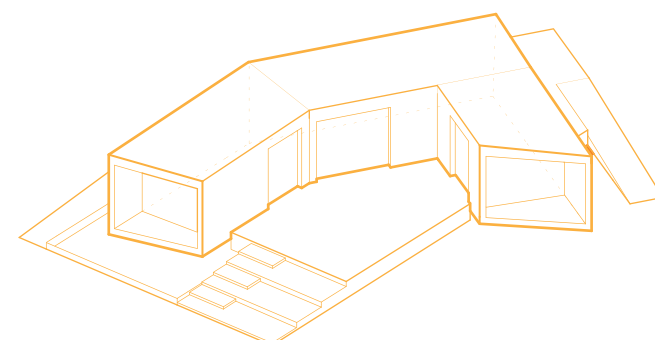
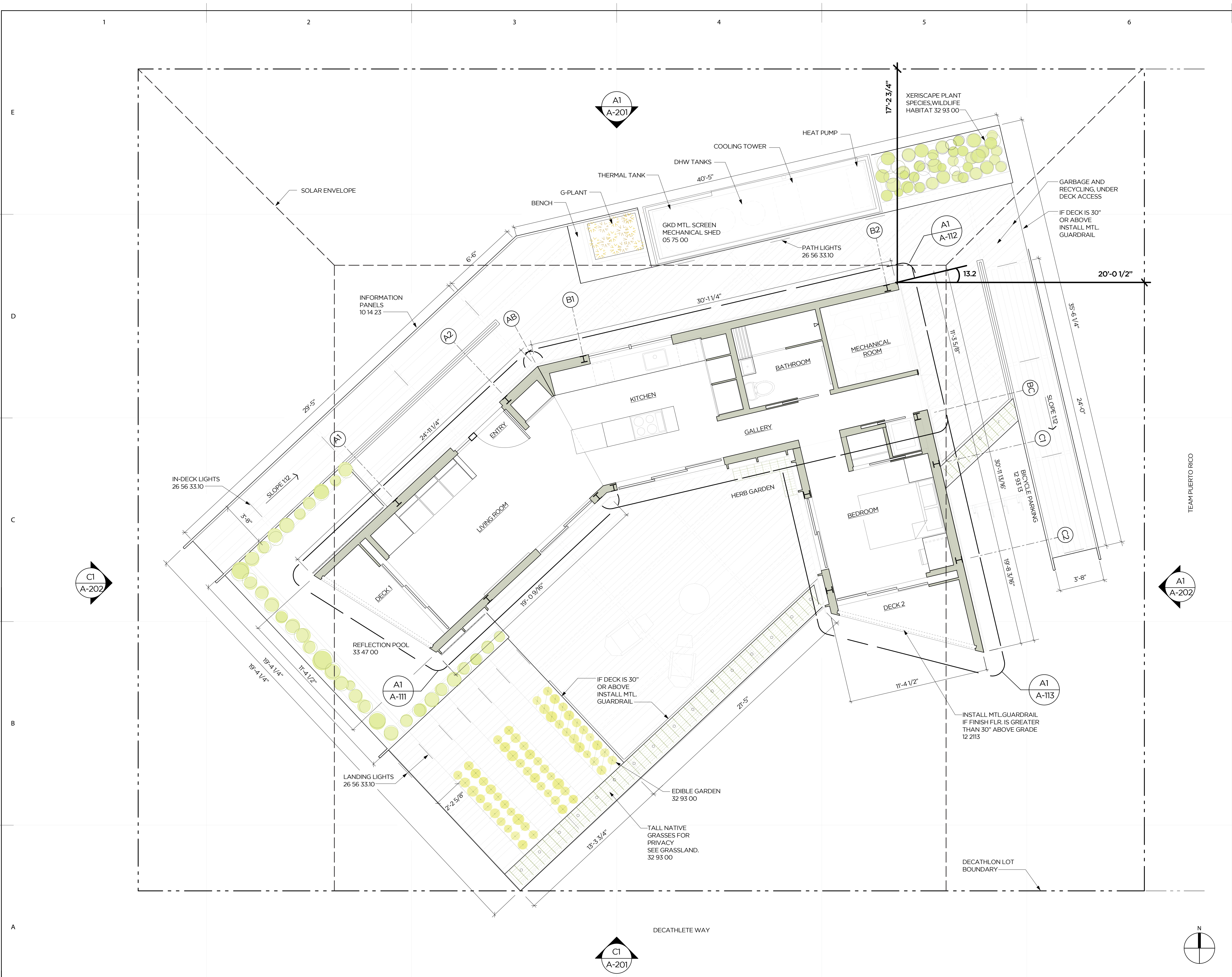
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SHEET TITLE:

SOLAR PLAN

A-104





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SHEET TITLE:	SITE PLAN

A-106



GENERAL NOTES:
TOTAL STANDALONE LIGHTING BATTERY CAPACITY IS AS FOLLOWS:
1. 18 METEOR SH-180C-A LAMPS EACH WITH A 0.54 WH CAPACITY
2. 31 SH-200C-W LAMPS EACH WITH A 0.39 WH CAPACITY
3. 16 SH-200C-B LAMPS EACH WITH A 0.26 WH CAPACITY, FOR A TOTAL OF 26 WH.
THIS IS UNDER THE LIMIT OF 100 WH PER RULE 8-4.

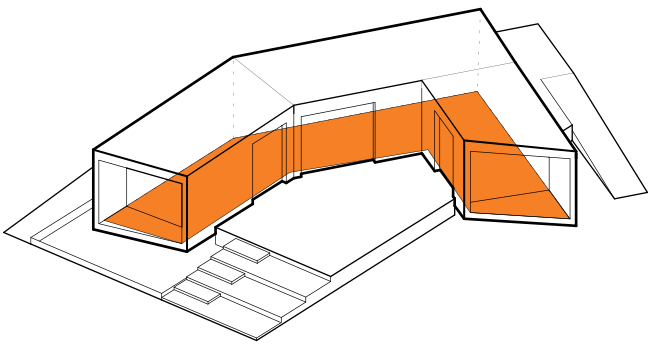
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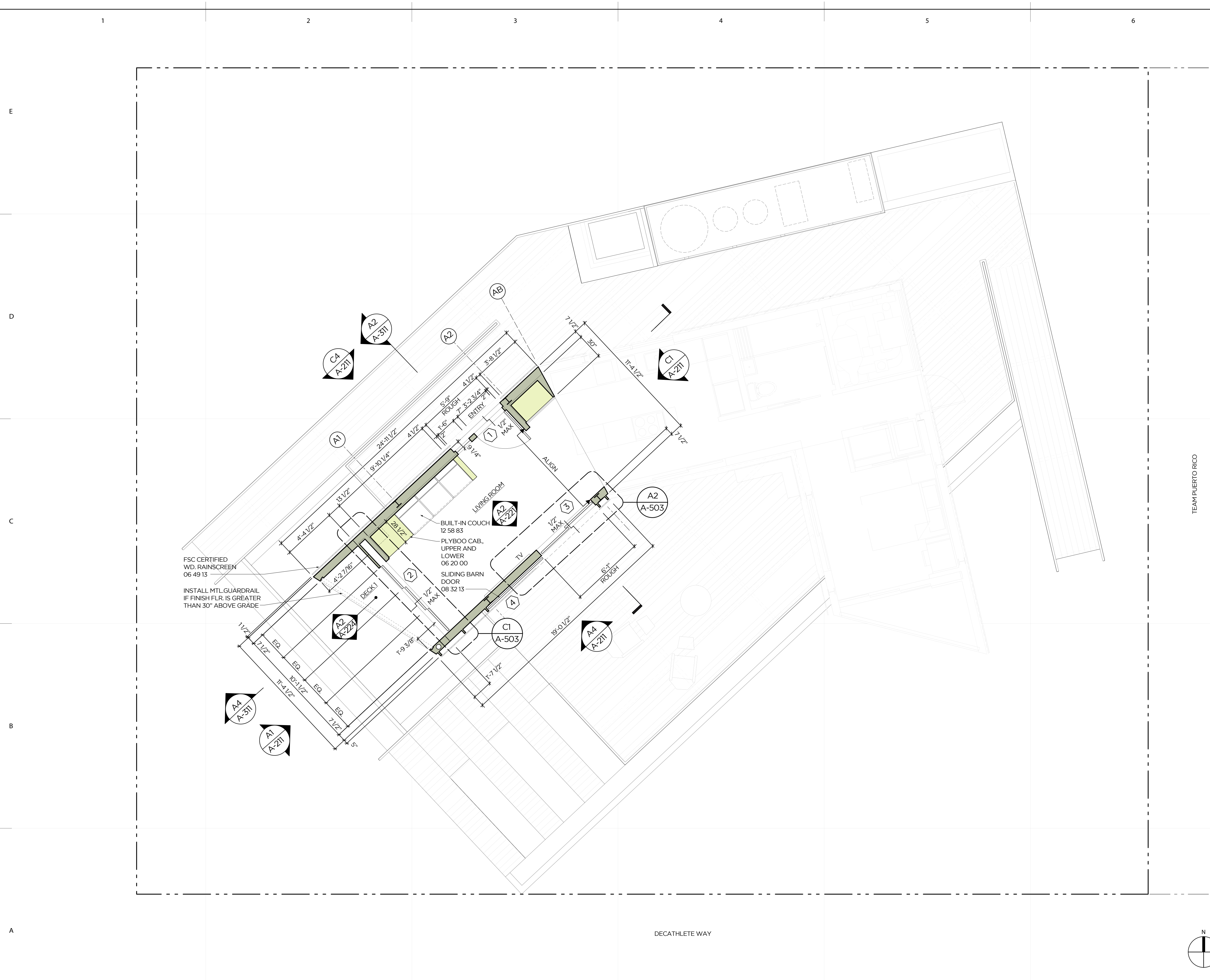
DRAWN BY: STUDENTS

CHECKED BY: M+A

SHEET TITLE:

TOUR ROUTE

A-107



GENERAL NOTES

1. All accessible decks and building elements 30" or greater from top of grade have been designed to include guardrails. SEE A-003 for guardrail details.
2. SEE A-509 and A-510 for Rainscreen details.

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ISSUE: D.O.E.
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DRAWN BY: STUDENTS
CHECKED BY: M+A
SHEET TITLE:

FLOOR PLAN
MODULE A

A-111



GENERAL NOTES

1. All accessible decks and building elements 30" or greater from top of grade have been designed to include guardrails. SEE A-003 for guardrail details.
2. SEE A-509 and A-510 for Rainscreen details.

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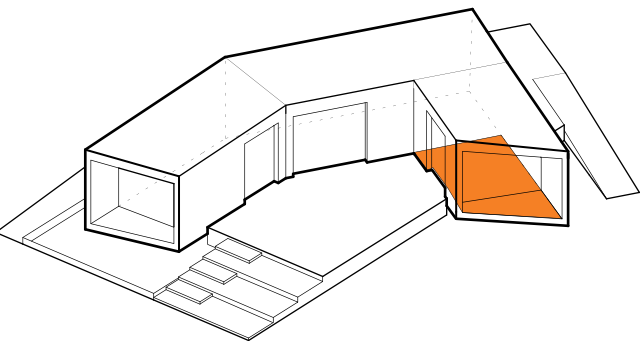
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SHEET TITLE:

FLOOR PLAN
MODULE B

A-112



2. SEE A-509 and A-510 for Rainscreen details.

CONSULTANTS:

Δ-113

A horizontal bar divided into four segments labeled 0, 2', 4', and 8'.



ELECTRICAL LEGEND

- A COVE LIGHT - DANALITE TYPE A 26 55 59.10
- B JUNO - LED RECESSED LIGHT
- C WET LOCATION RECESSED LIGHT - WILLIAMS COMPACT TYPE C 26 51 13.50
- D WALL MOUNTED - ET2 TYPE D 26 51 13.10
- E PHOTO VOLTAIC IN-GROUND PATH LIGHTS - METEOR SH-180C TYPE E 26 56 33.10
- F CORNER MOUNTED FIXTURE - WILLIAMS TYPE F WITH LED LAMP 26 51 13.50
- G DESK LIGHT 12 43 13.13
- H GUARD RAIL EXTERIOR ROPE LIGHT
- J CUSTOM LED FIXTURE BY CCA 26 55 59.10
- L END CAP EXTERIOR UPLIGHTING LIGHTING SCIENCE-FLEXILUME
- M PHOTO VOLTAIC LED LIGHTS FOR PLANTING ACCENTS - METEOR SH-220C TYPE M 26 56 33.10
- N LED LIGHTS FOR POOL ACCENTS- METEOR SH-200C 26 56 26.20
- ELECTRICAL PANEL BOX
- GROUND FAULT CIRCUIT INTERRUPTER OUTLET GFCI 26 27 26.20
- TOUCH PADS 26 09 43.13
- TOUCH PANEL 26 09 43.13

GENERAL NOTES:

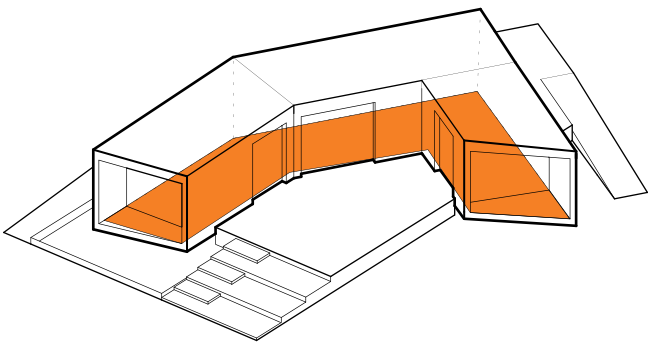
TOTAL STANDALONE LIGHTING BATTERY CAPACITY IS AS FOLLOWS:

1. 18 METEOR SH-180C-A LAMPS EACH WITH A 0.54 WH CAPACITY

2. 31 SH-200C-W LAMPS EACH WITH A 0.39 WH CAPACITY

3. 16 SH-200C-B LAMPS EACH WITH A 0.26 WH CAPACITY, FOR A TOTAL OF 26 WH.

THIS IS UNDER THE LIMIT OF 100 WH PER RULE 8-4.



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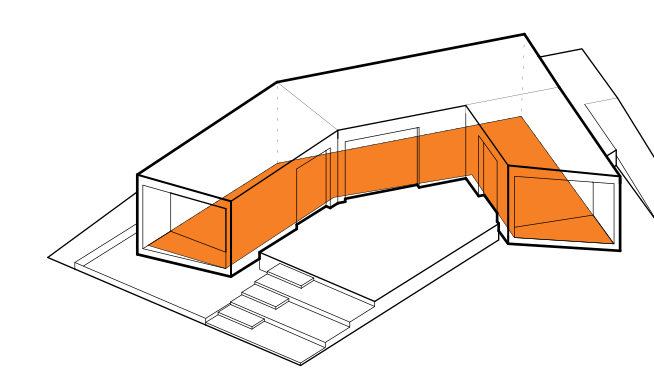
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ELECTRICAL PLAN

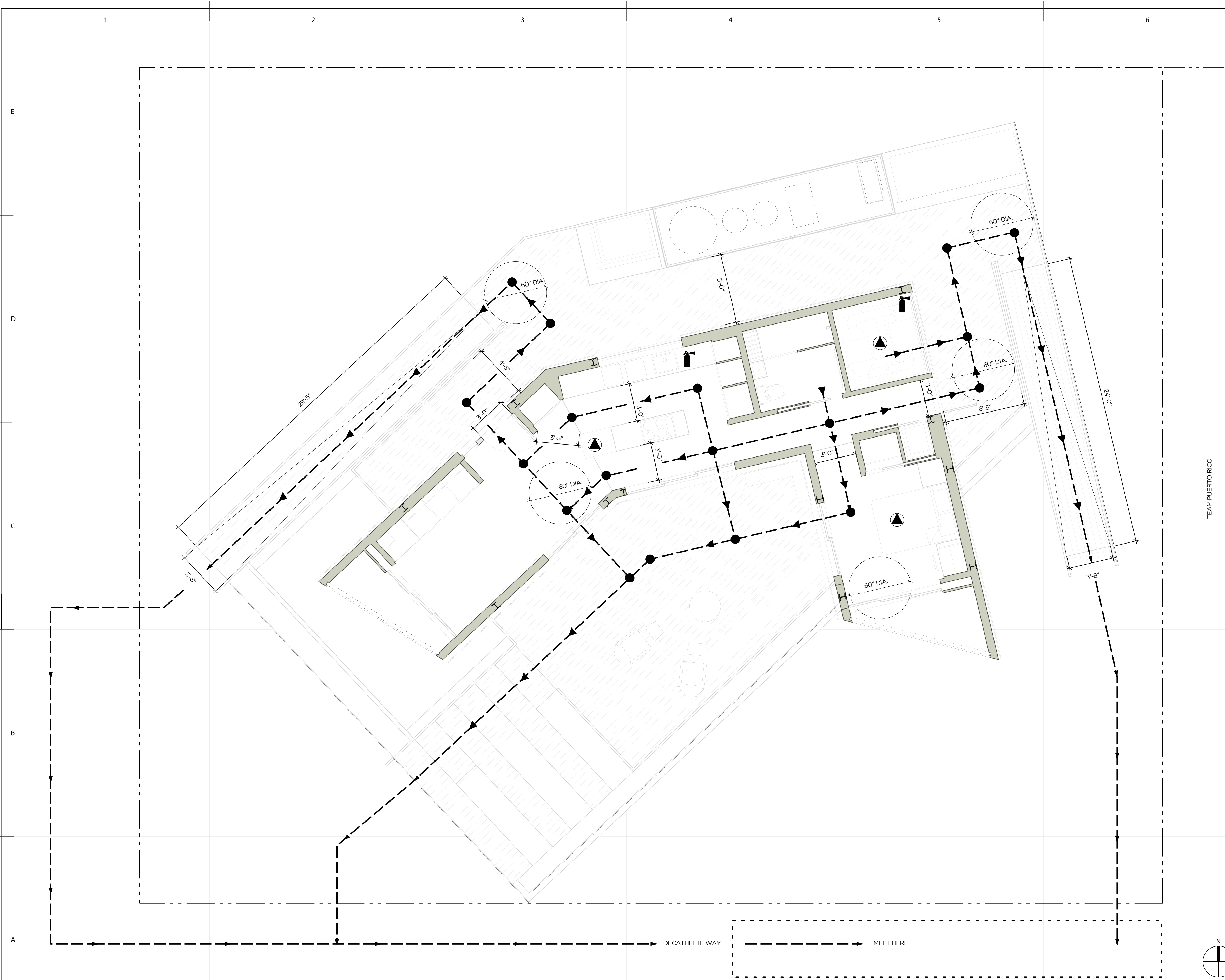
A-114

A1 ELECTRICAL PLAN
1/4" = 1'-0"





A-115



FIRE PROTECTION NOTES:

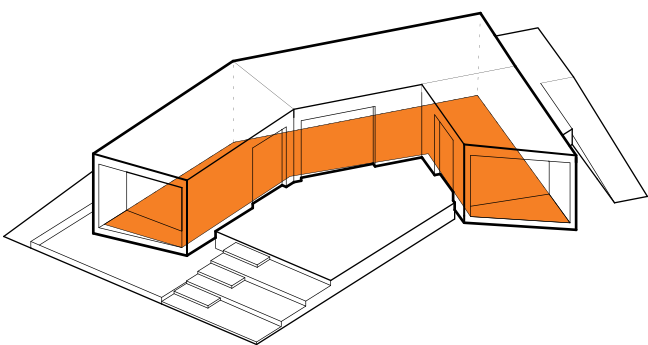
1. UNLESS OTHERWISE NOTED, FIRE EXTINGUISHERS SHALL HAVE A MINIMUM U. L. RATING OF 2A-10BC.
2. FIRE EXTINGUISHER U. L. CLASS 60 MARINE TYPE U.S.C.G. TYPE B-C SIZE II APP # 162.028 EX 1909 QUICK AID DRY CHEMICAL FIRE EXTINGUISHER GP 10F 10 44 16

NOTE: REFER TO WINDOW & DOOR SCHEDULES FOR ALL GLAZING NOTES AND DETAILS

SYMBOLS:

- SMOKE DETECTIVE ALARM 28 31 43
- CHANGE IN DIRECTION
- FIRE EXTINGUISHERS 10 44 16
- EGREES PATH
- MEETING ZONE

TEAM PUERTO RICO



A1 FIRE EGRESS PLAN
1/4" = 1'-0"

CONSULTANTS:

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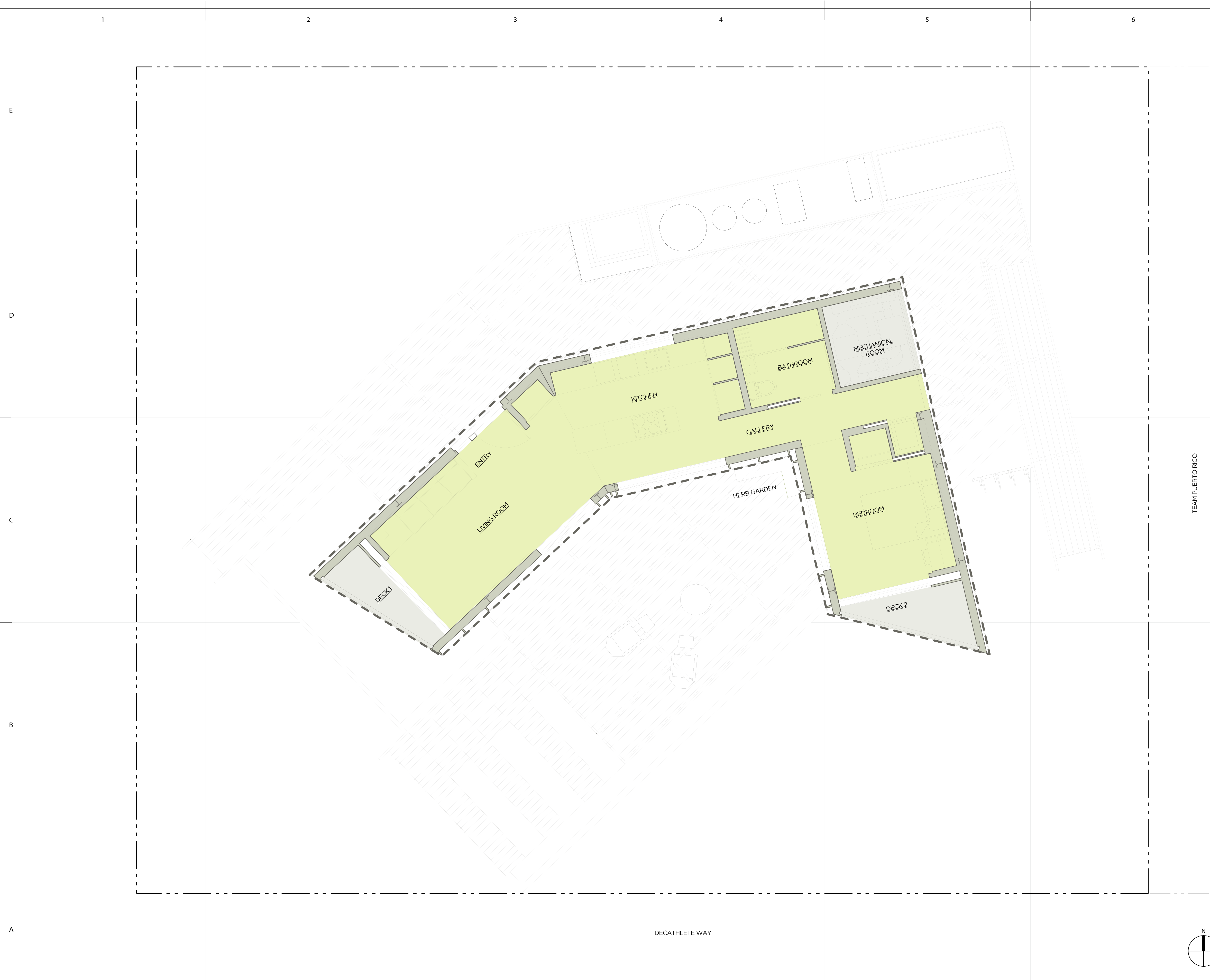
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SHEET TITLE:

FIRE EGRESS PLAN

A-116



LEGEND

CONDITIONED SPACE

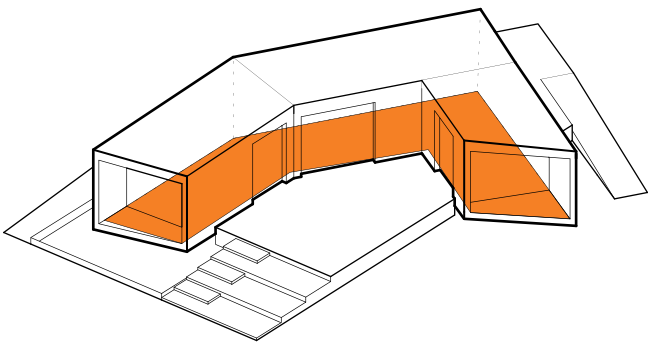
UNCONDITIONED SPACE

ARCHITECTURAL FOOTPRINT

SQAURE FOOAGE

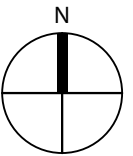
Architectural Footprint Including Rainscreen	796 sq. ft.
Conditioned Space	543 sq. ft.
Unconditioned Space	108 sq. ft.

TEAM PUERTO RICO



A1

CONDITIONED SPACE
1/4" = 1'-0"



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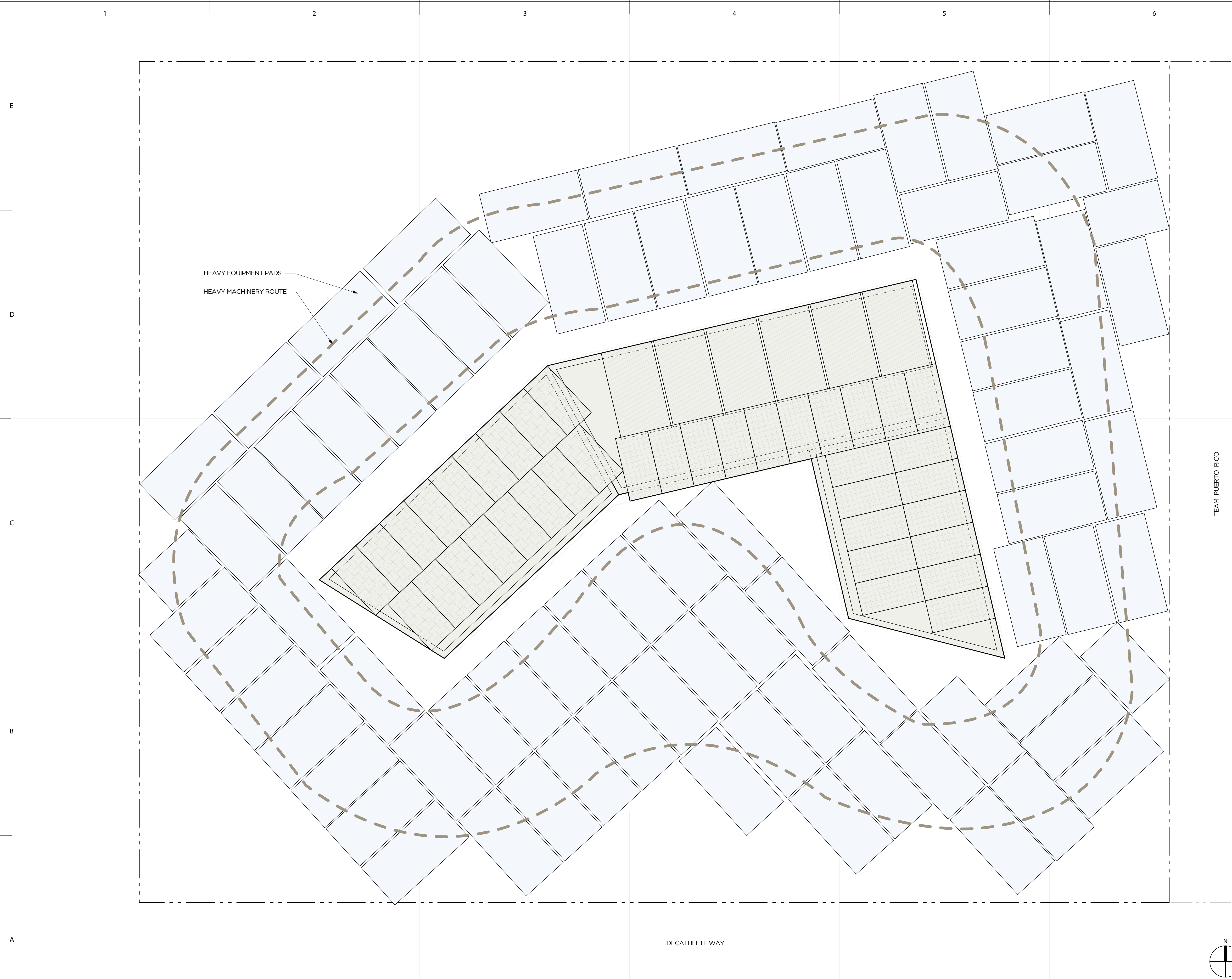
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DATE: JUNE 02, 2009

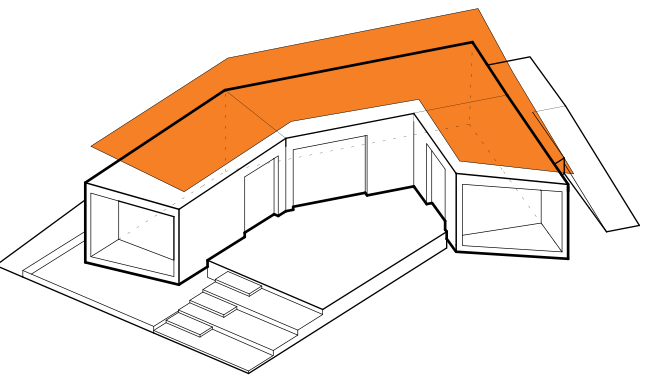
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DESIGNED BY: TEAM CAL.
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CHECKED BY: M+A
SHEET TITLE:

CONDITIONED /
UNCONDITIONED SPACE

A-117



A1 HEAVY MACHINERY PLAN
1/4" = 1'-0"



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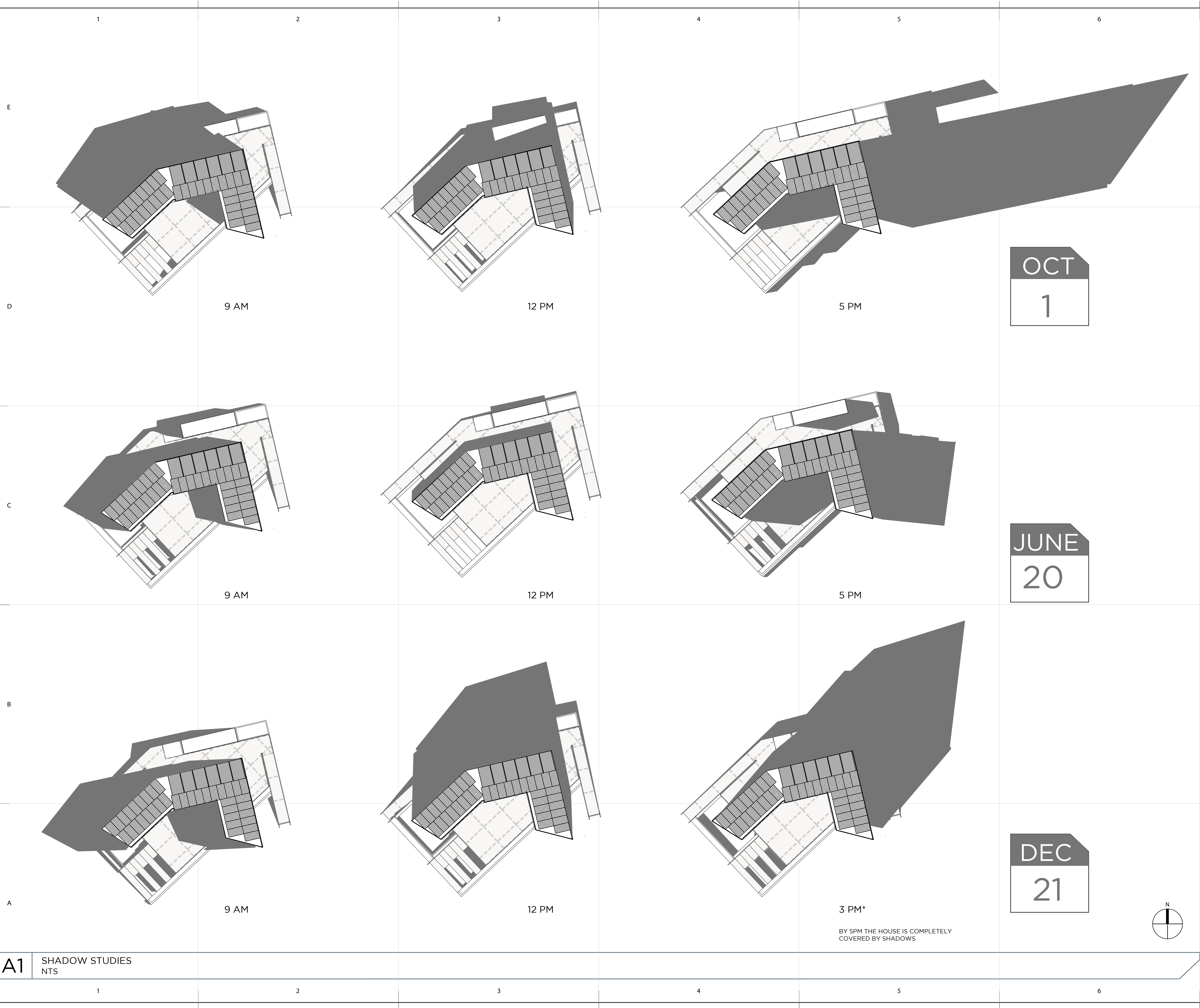
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SHEET TITLE:

HEAVY MACHINERY
PLAN

A-118



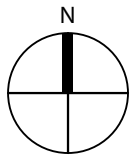
GENERAL NOTES

1. Shadows are rendered for Washington D.C. (Lat. 38.89) but are comparable to Palo Alto, CA (Lat. 37.43).

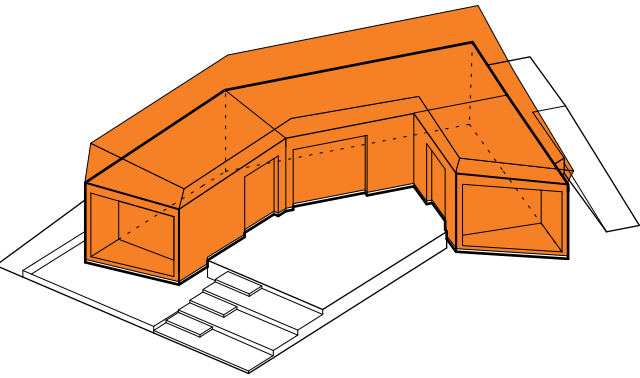
OCT
1

JUNE
20

DEC
21



BY 5PM THE HOUSE IS COMPLETELY COVERED BY SHADOWS



A1 SHADOW STUDIES
NTS

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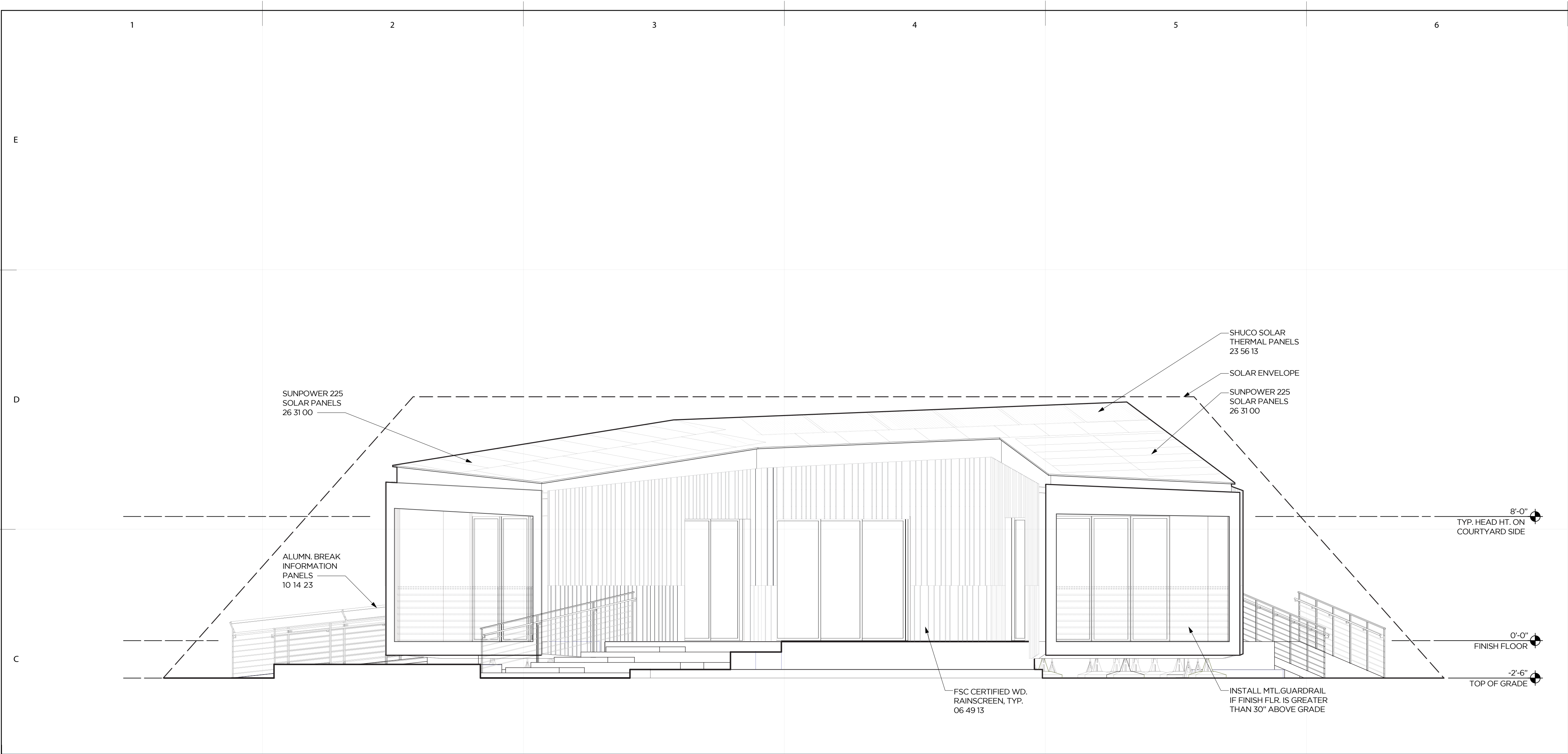
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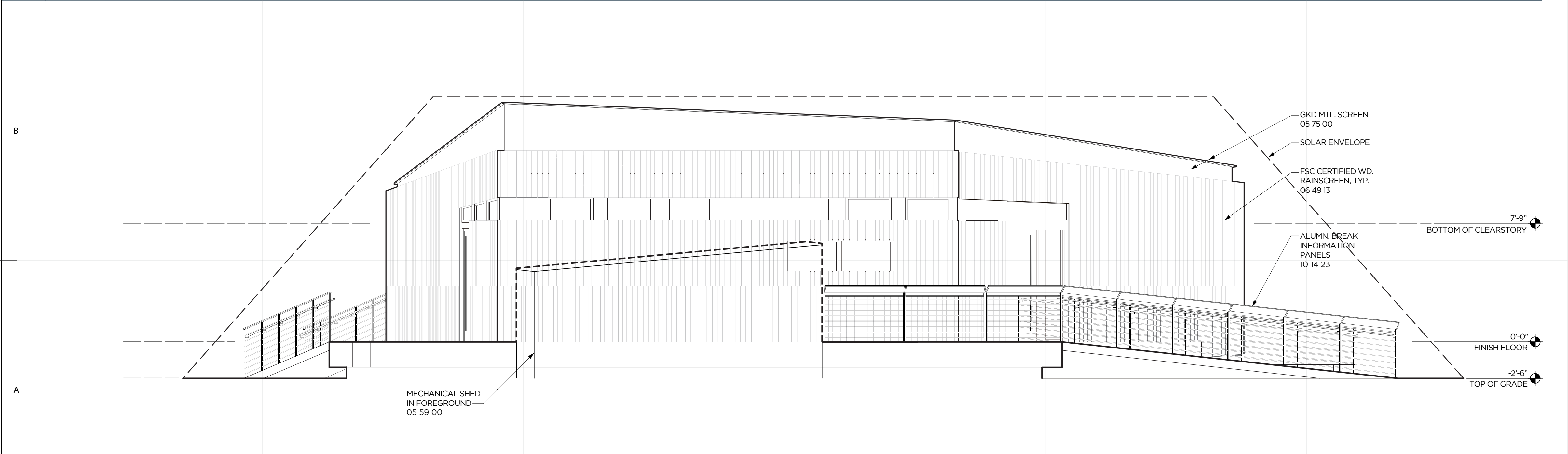
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SHEET TITLE:

SHADOW STUDIES

A-119



C1 COURTYARD ELEVATION
1/4" = 1'-0"



A1 NORTH ELEVATION
1/4" = 1'-0"

GENERAL NOTES

1. All accessible decks and building elements 30" or greater from top of grade have been designed to include guardrails. SEE A-003 for guardrail details.
2. SEE A-509 and A-510 for Rainscreen details.

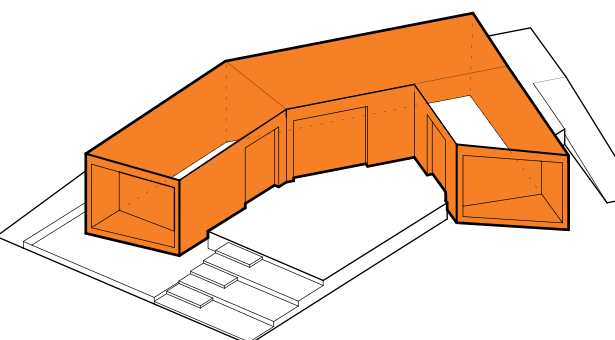
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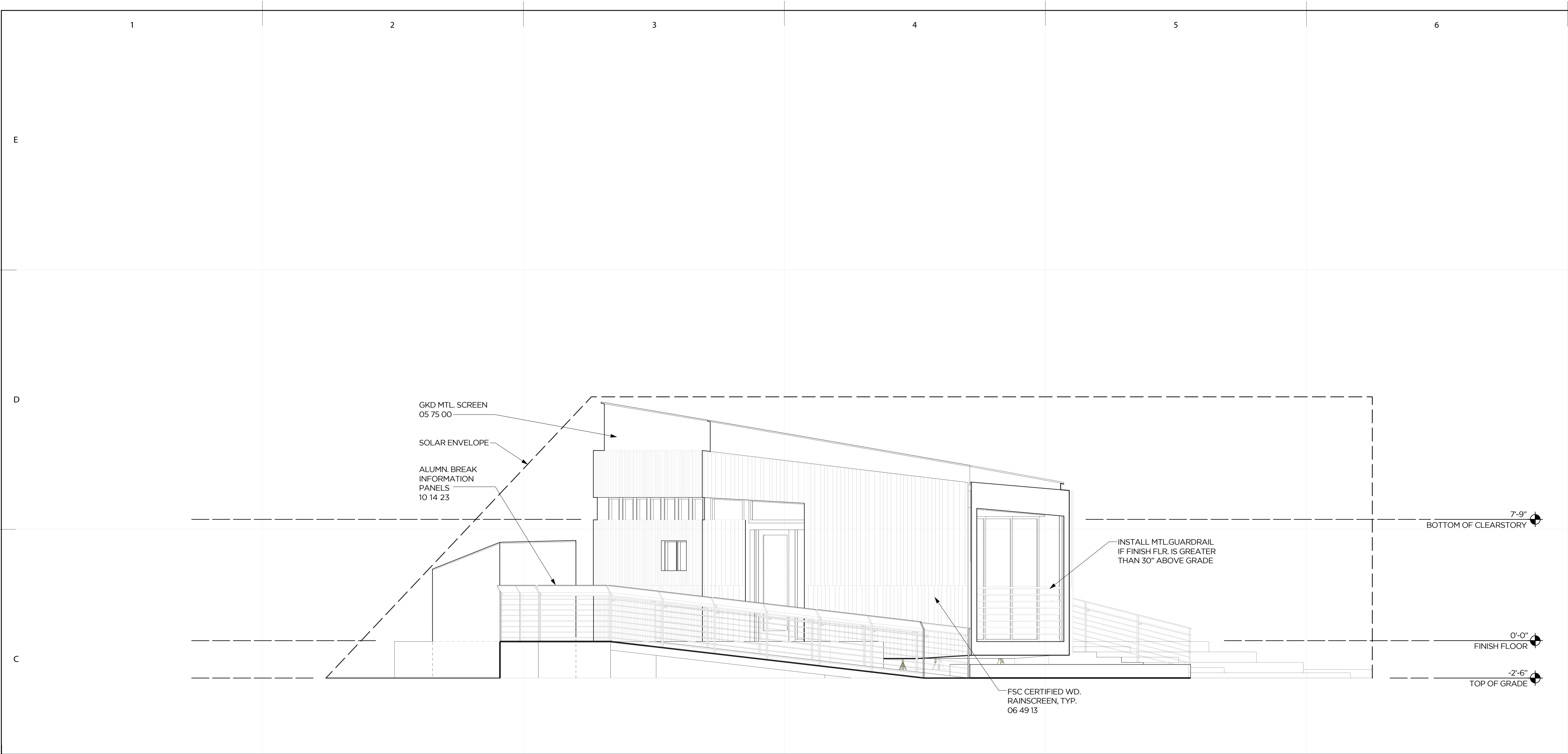


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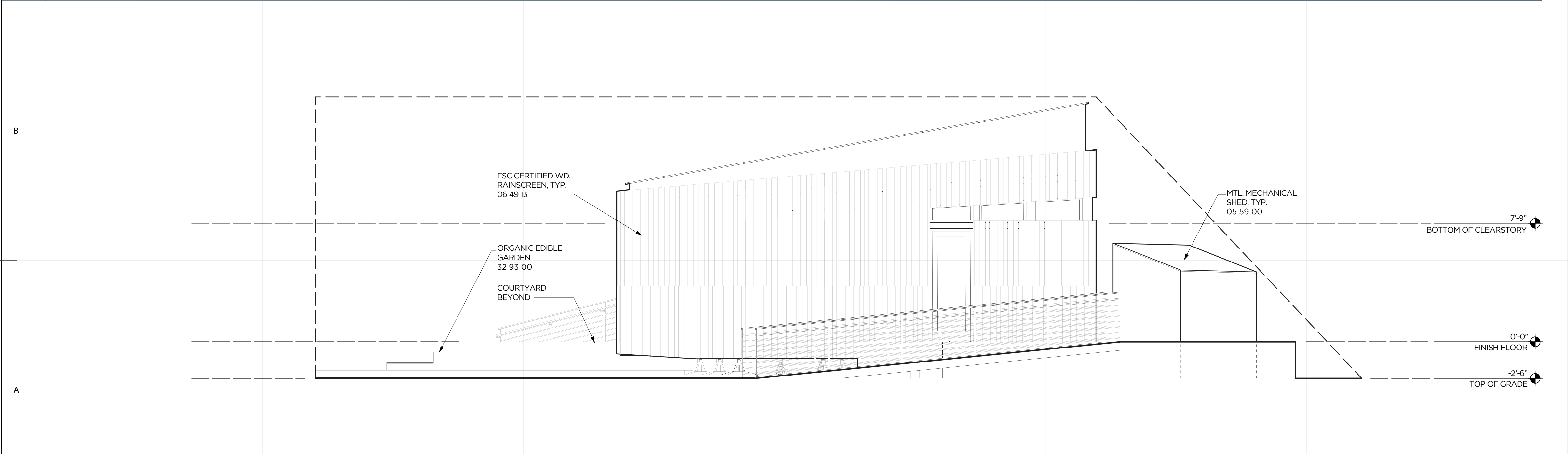
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DRAWN BY: STUDENTS
CHECKED BY: M+A
SHEET TITLE:

EXTERIOR ELEVATIONS

A-201



C1 ENTRY ELEVATION
1/4" = 1'-0"



A1 EAST ELEVATION
1/4" = 1'-0"

GENERAL NOTES

1. All accessible decks and building elements 30" or greater from top of grade have been designed to include guardrails. SEE A-003 for guardrail details.
2. SEE A-509 and A-510 for Rainscreen details.

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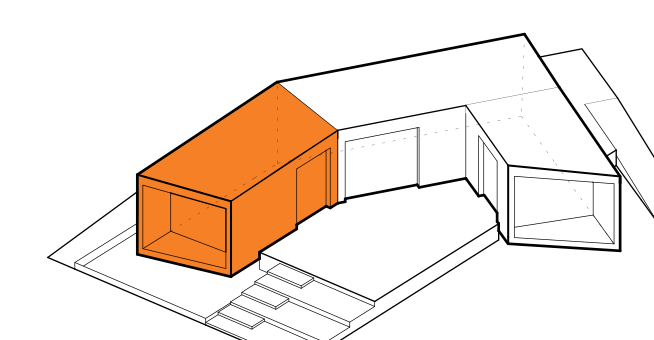
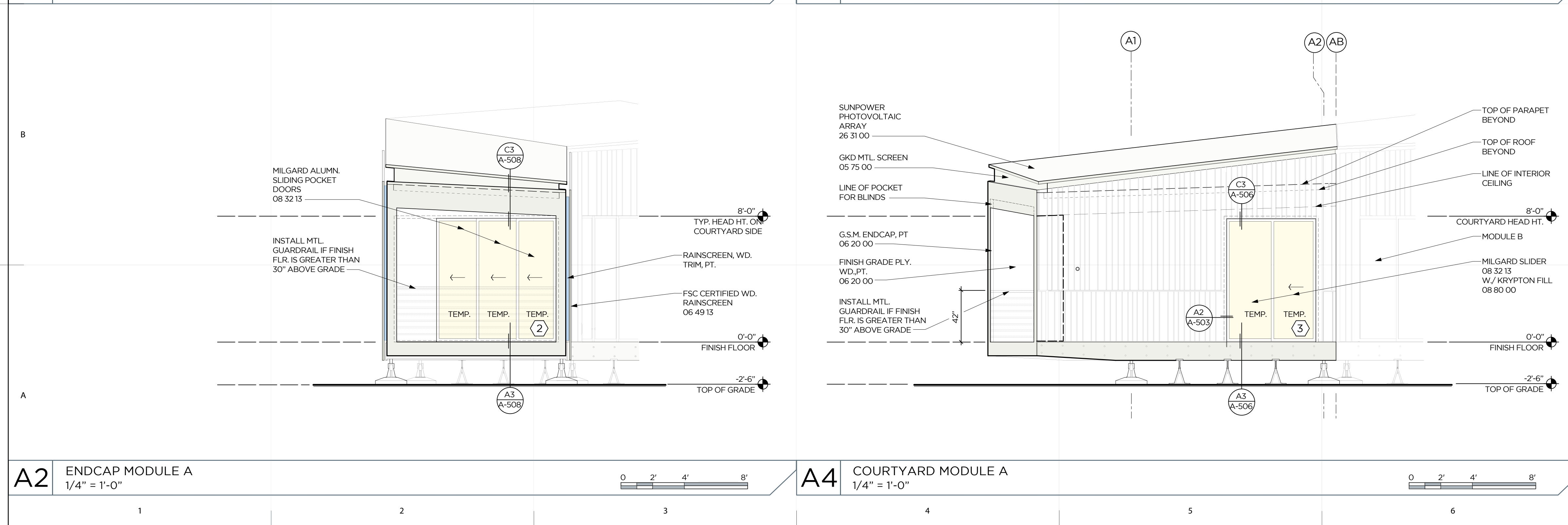
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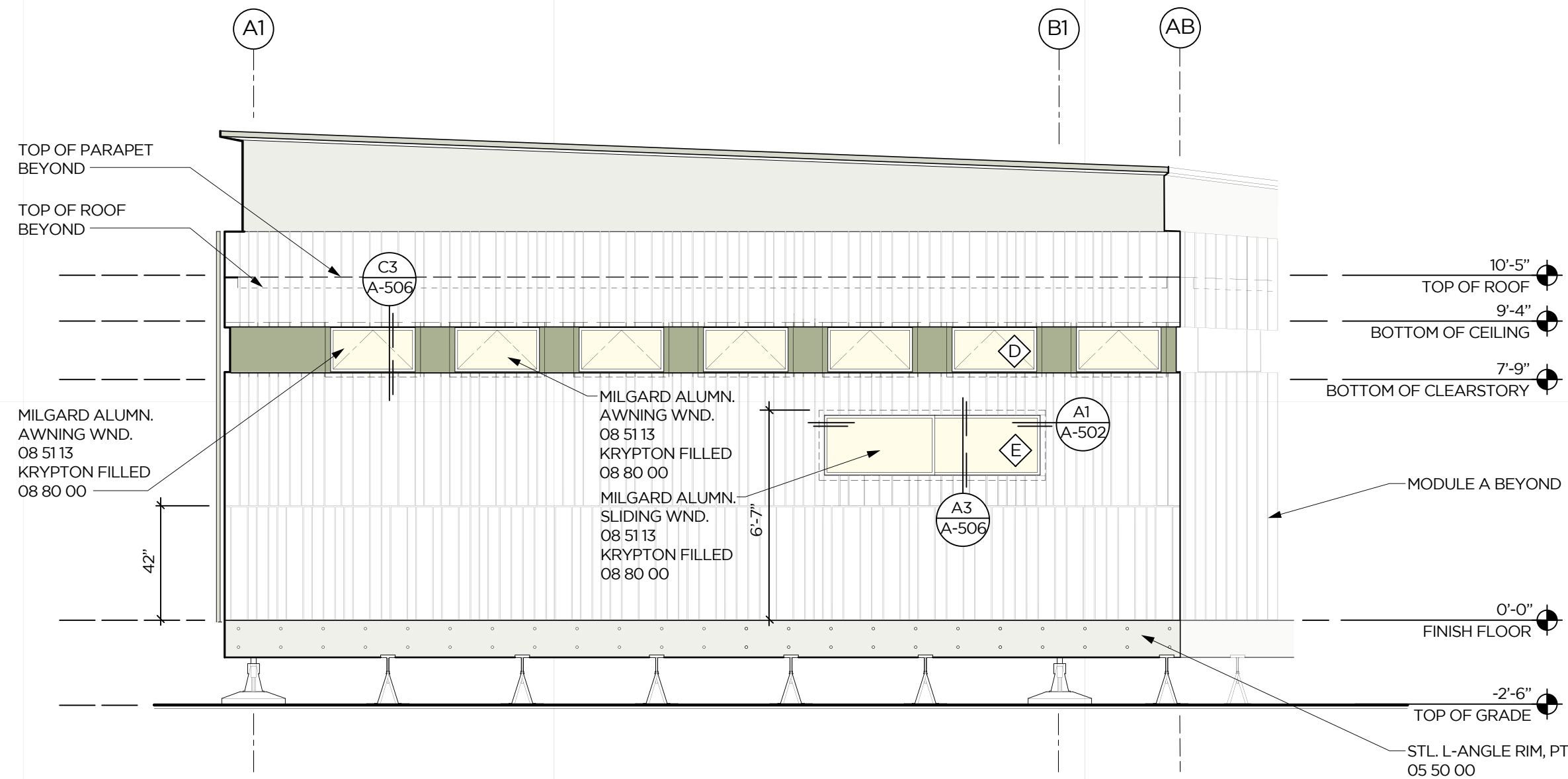
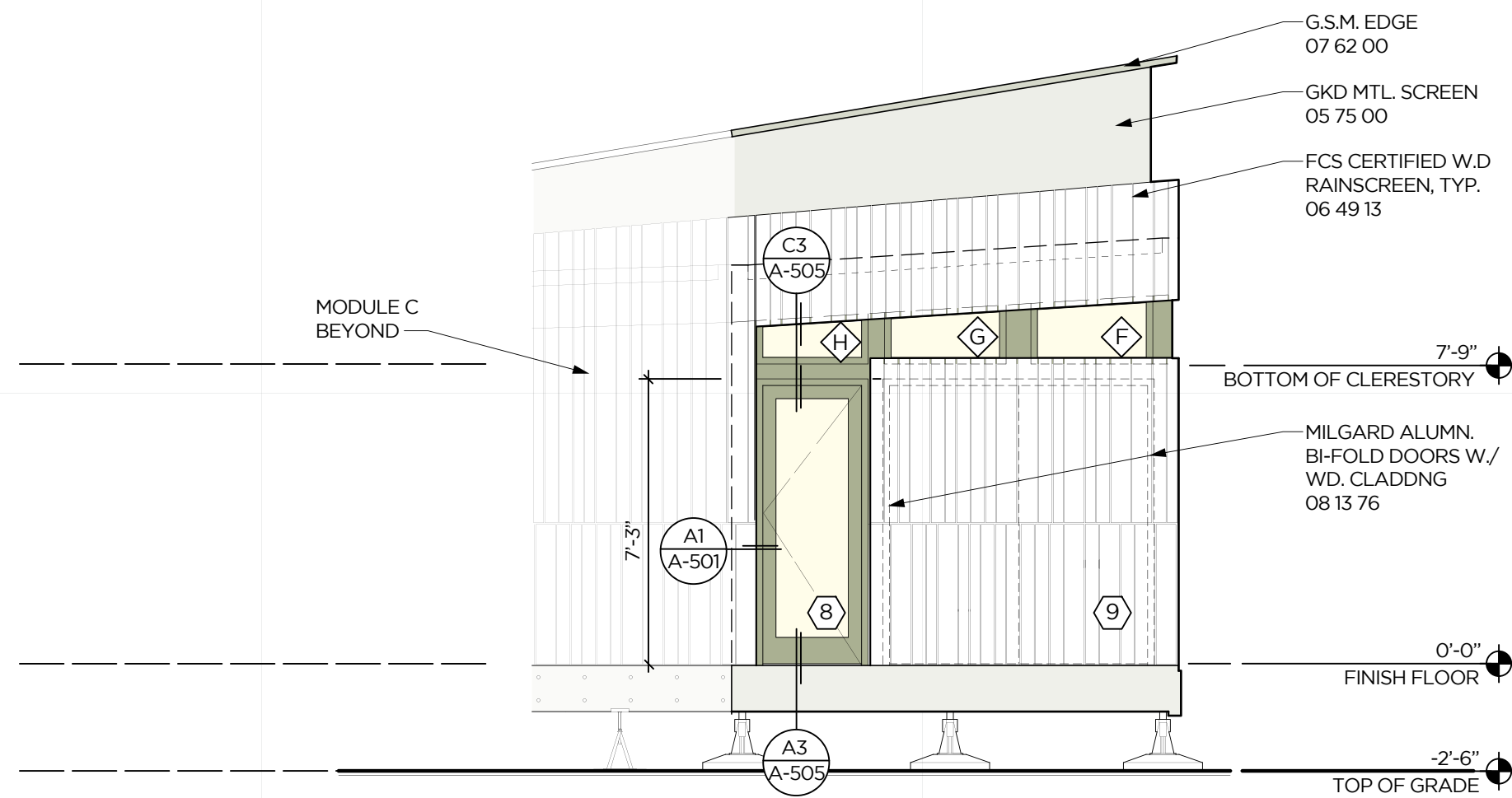
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EXTERIOR ELEVATIONS

A-202

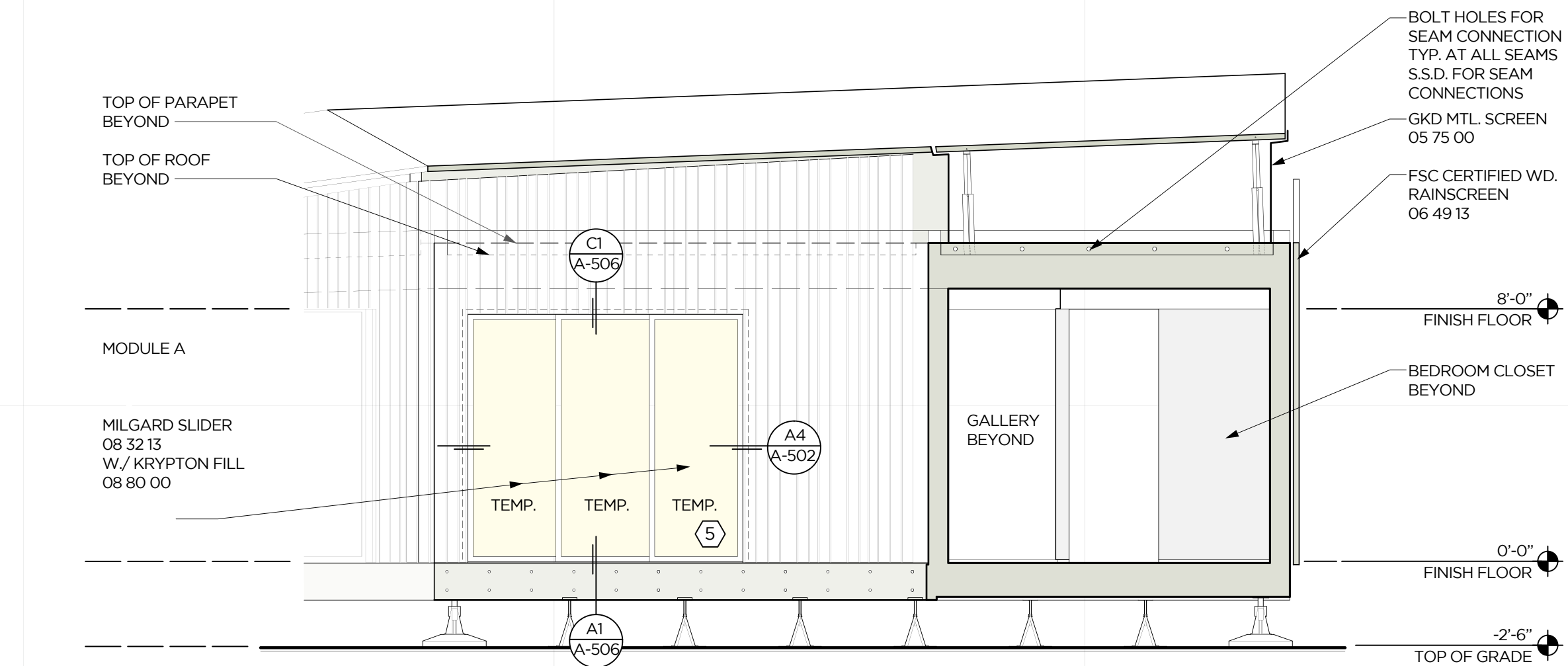
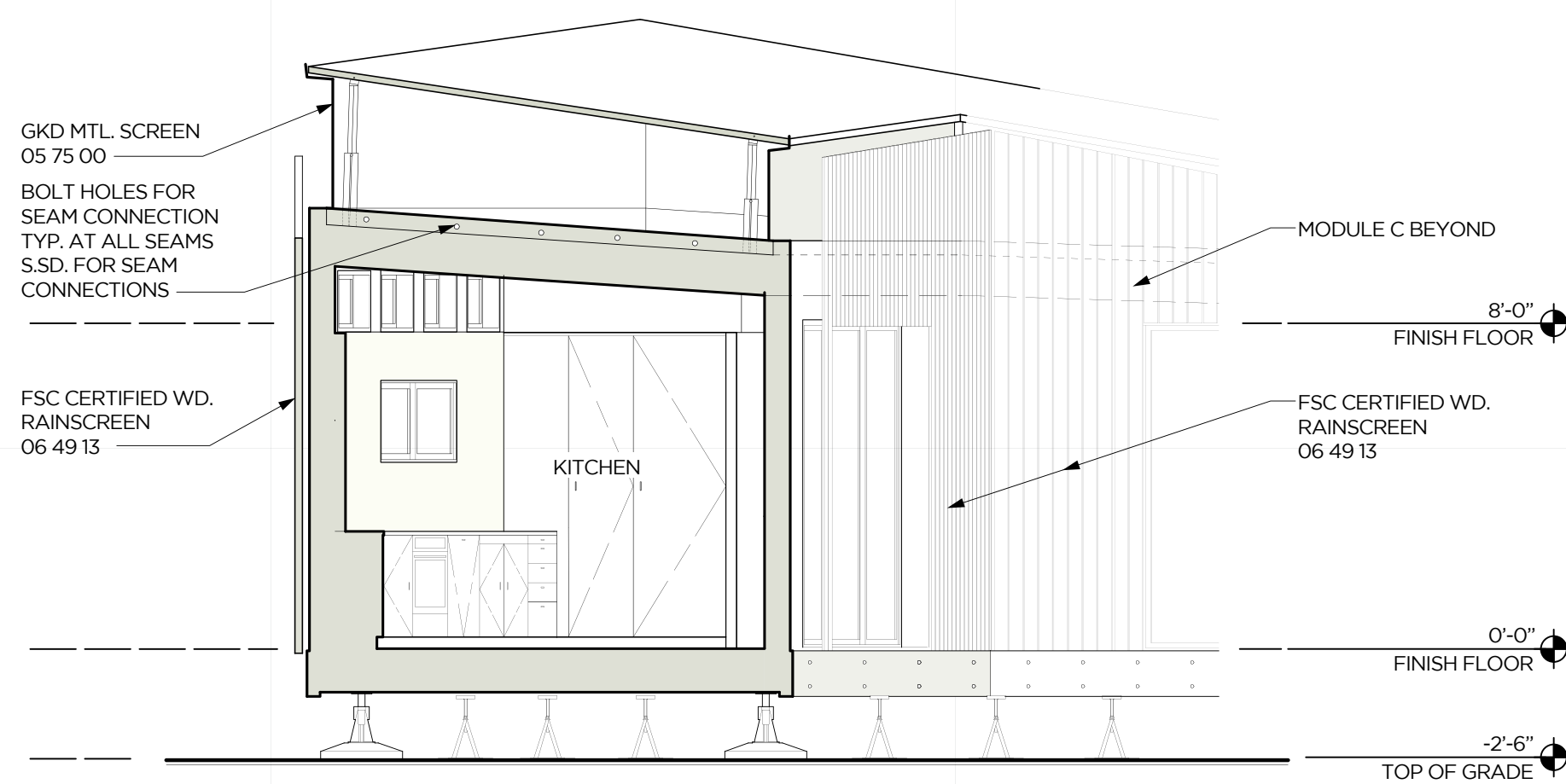


A-211



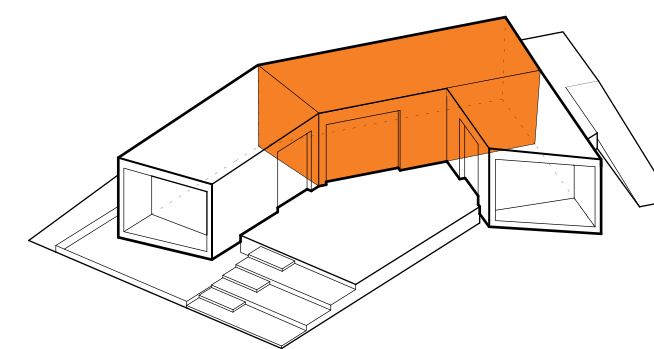
C1 EAST MODULE B
1/4" = 1'-0"

C4 NORTH MODULE B
1/4" = 1'-0"



A1 SEAM MODULE B
1/4" = 1'-0"

A4 COURTYARD MODULE B
1/4" = 1'-0"



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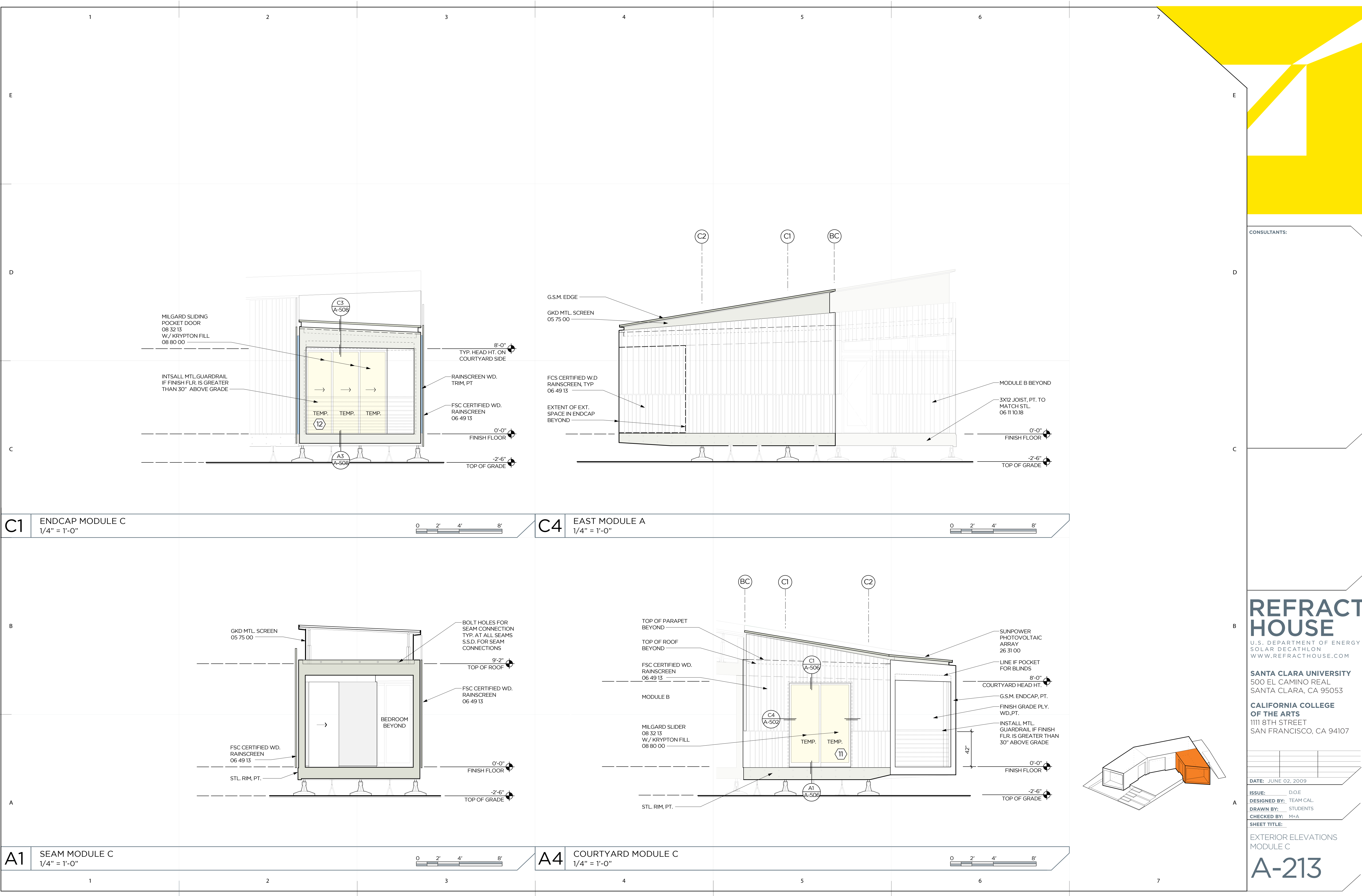
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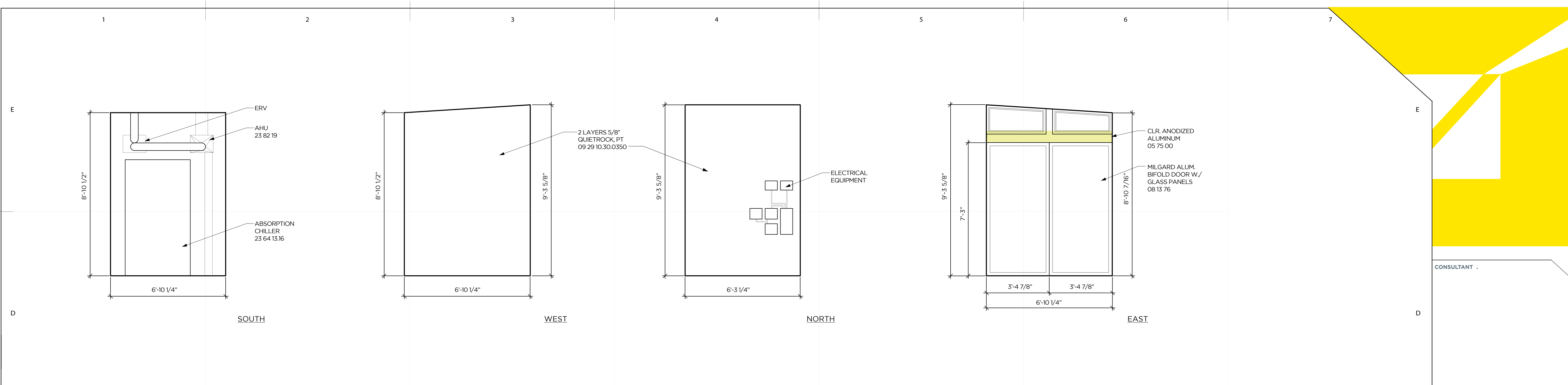
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DRAWN BY: STUDENTS
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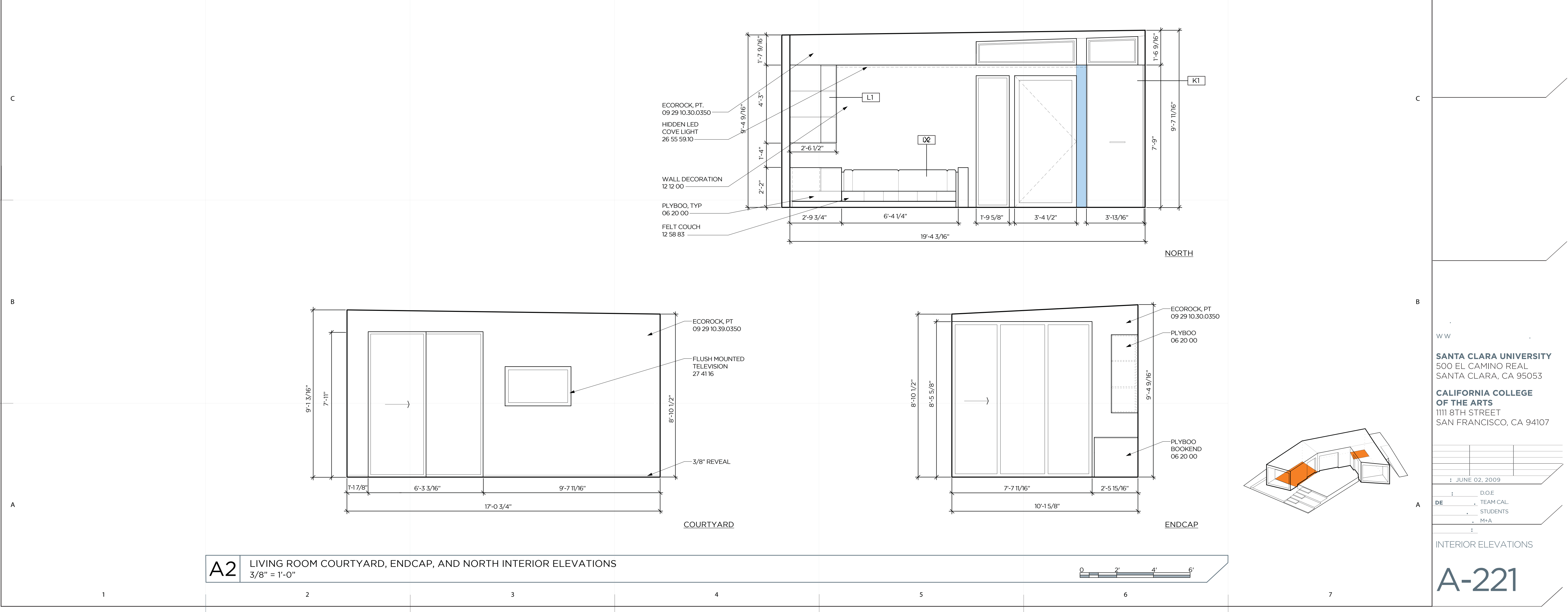
EXTERIOR ELEVATIONS
MODULE B

A-212

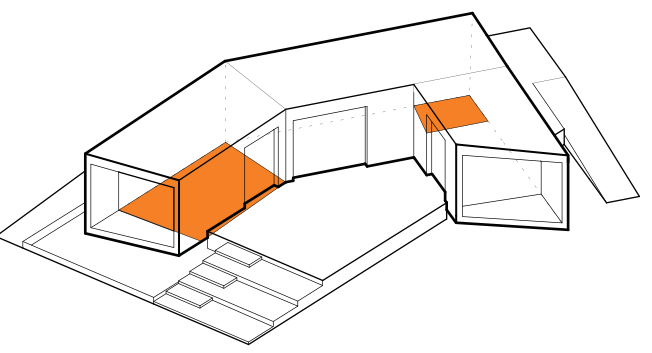




D1 MECHANICAL ROOM SOUTH, WEST, NORTH, AND EAST INTERIOR ELEVATIONS



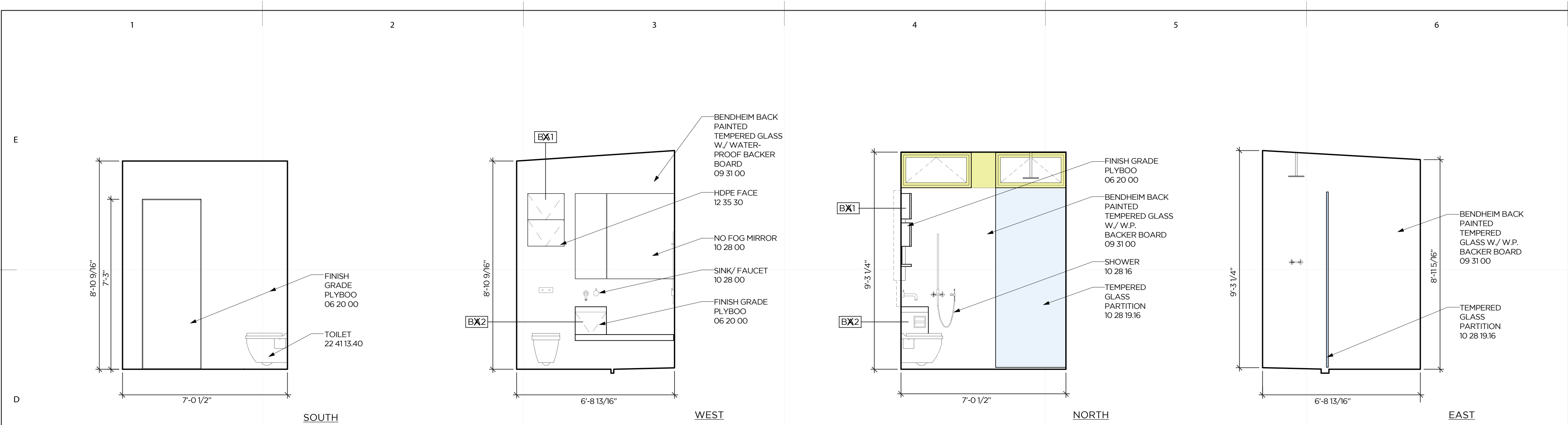
A2 LIVING ROOM COURTYARD, ENDCAP, AND NORTH INTERIOR ELEVATIONS



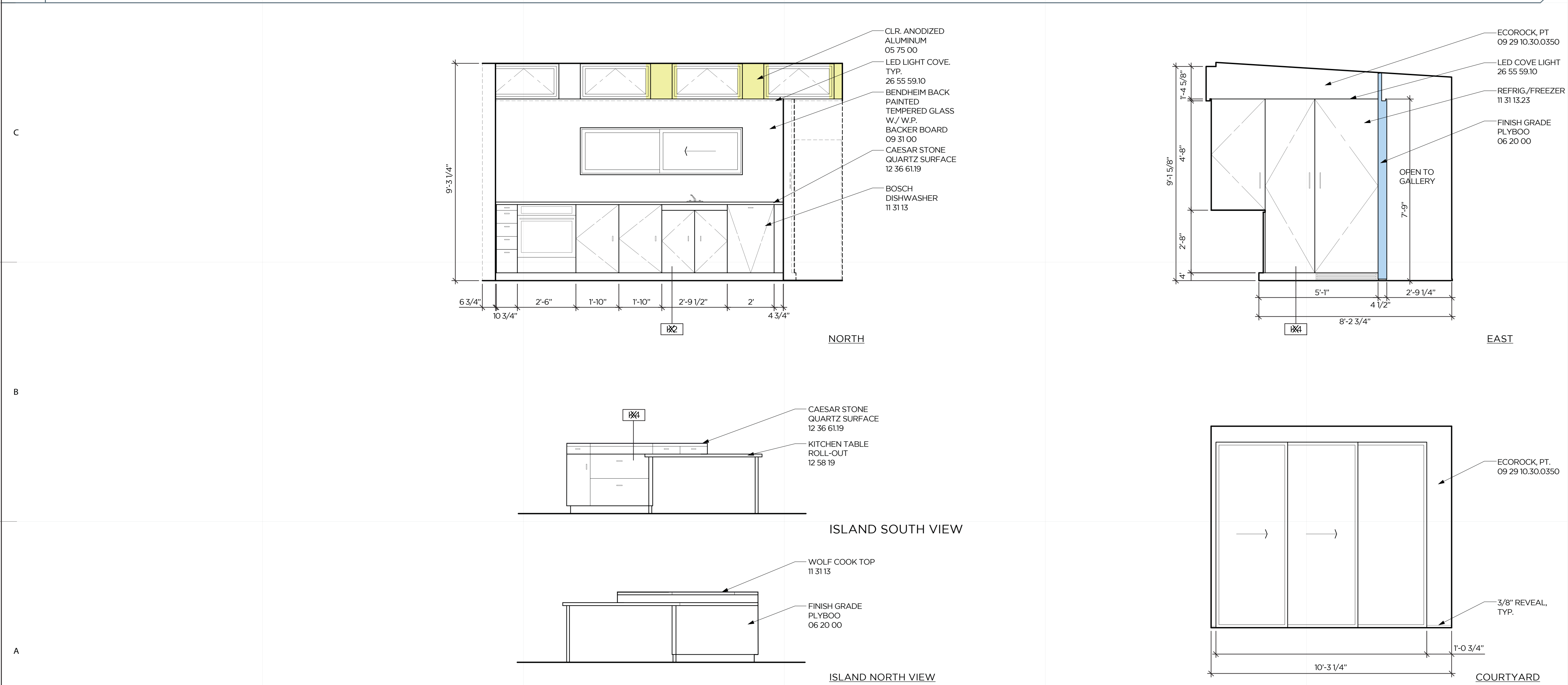
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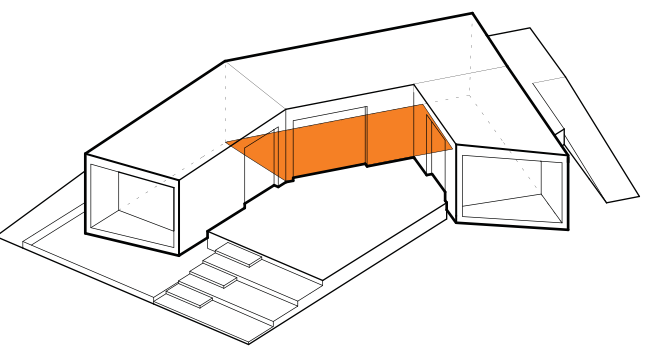
INTERIOR ELEVATIONS



D1 BATHROOM SOUTH, WEST, NORTH, AND EAST INTERIOR ELEVATIONS
3/8" = 1'-0"



A2 KITCHEN NORTH, EAST, ISLAND, AND COURTYARD INTERIOR ELEVATIONS
3/8" = 1'-0"



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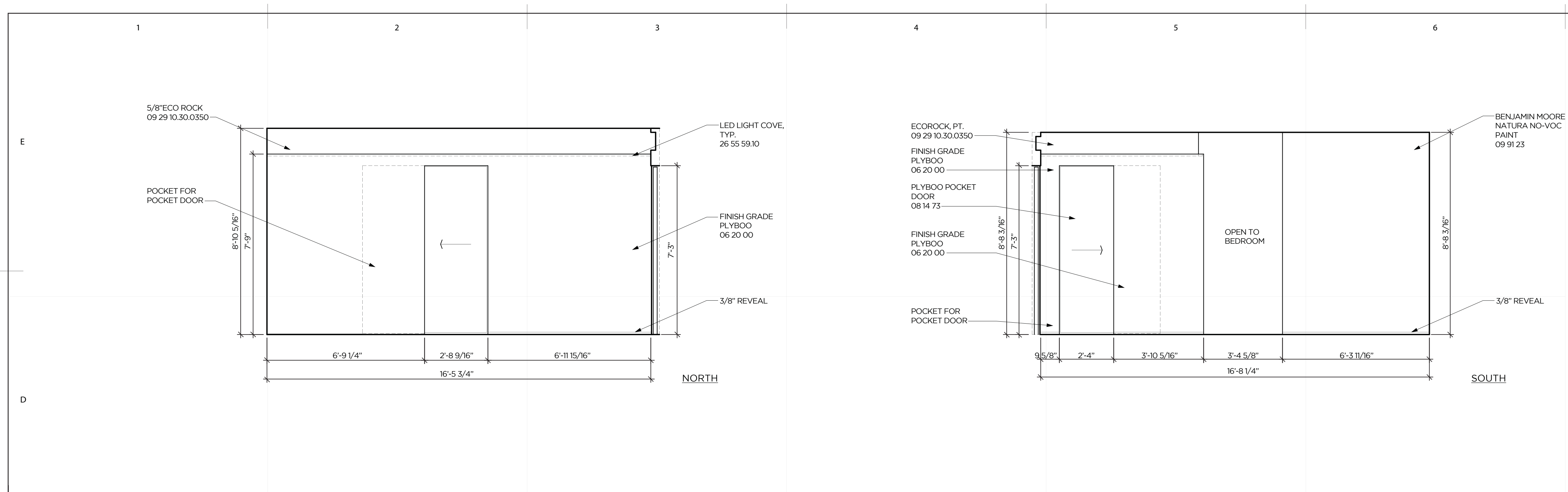
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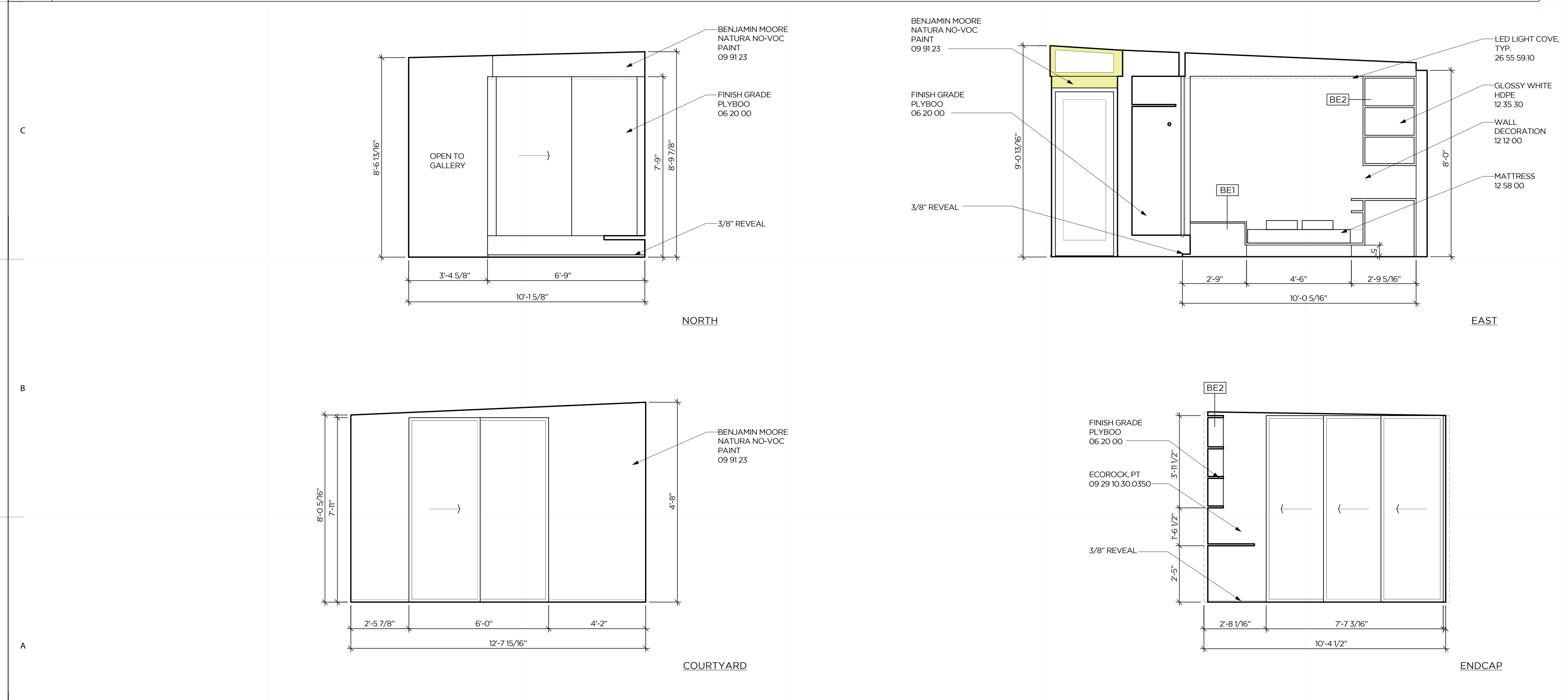
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STUDENTS
M+A

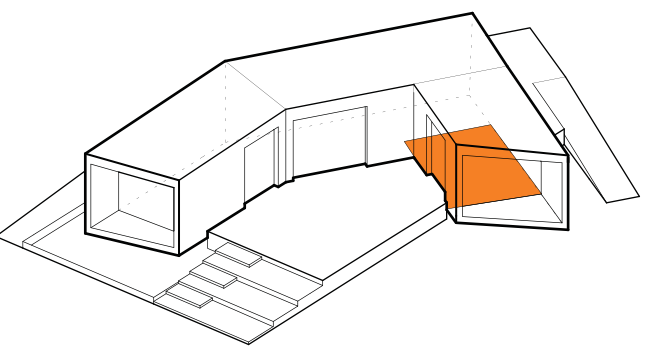
INTERIOR ELEVATIONS



D1	GALLERY NORTH AND SOUTH INTERIOR ELEVATIONS $\frac{3}{8}'' = 1'-0''$	
----	---	---



A1	BEDROOM NORTH, EAST, COURTYARD, AND ENDCAP INTERIOR ELEVATIONS $\frac{3}{8}'' = 1'-0''$	
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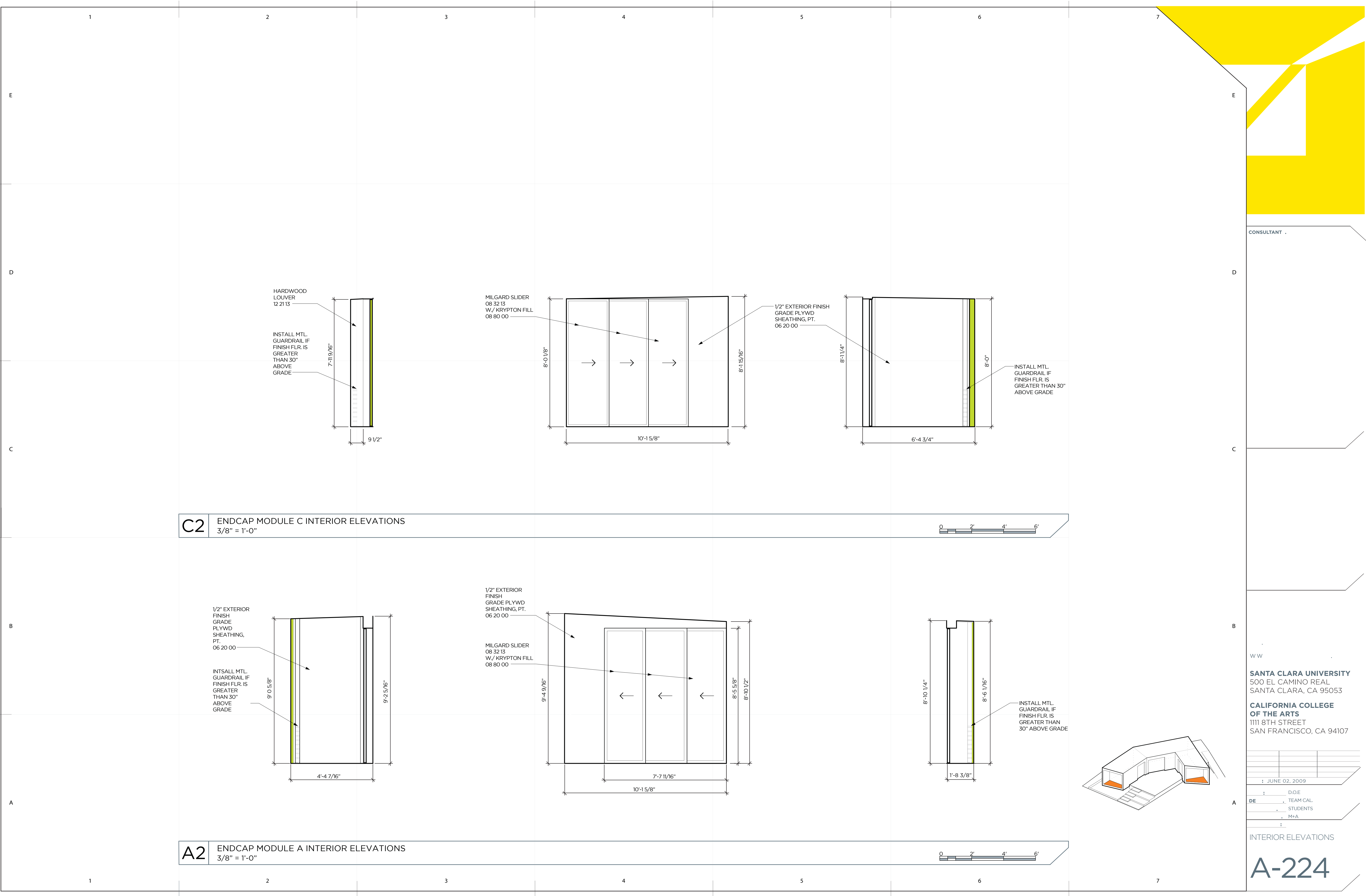
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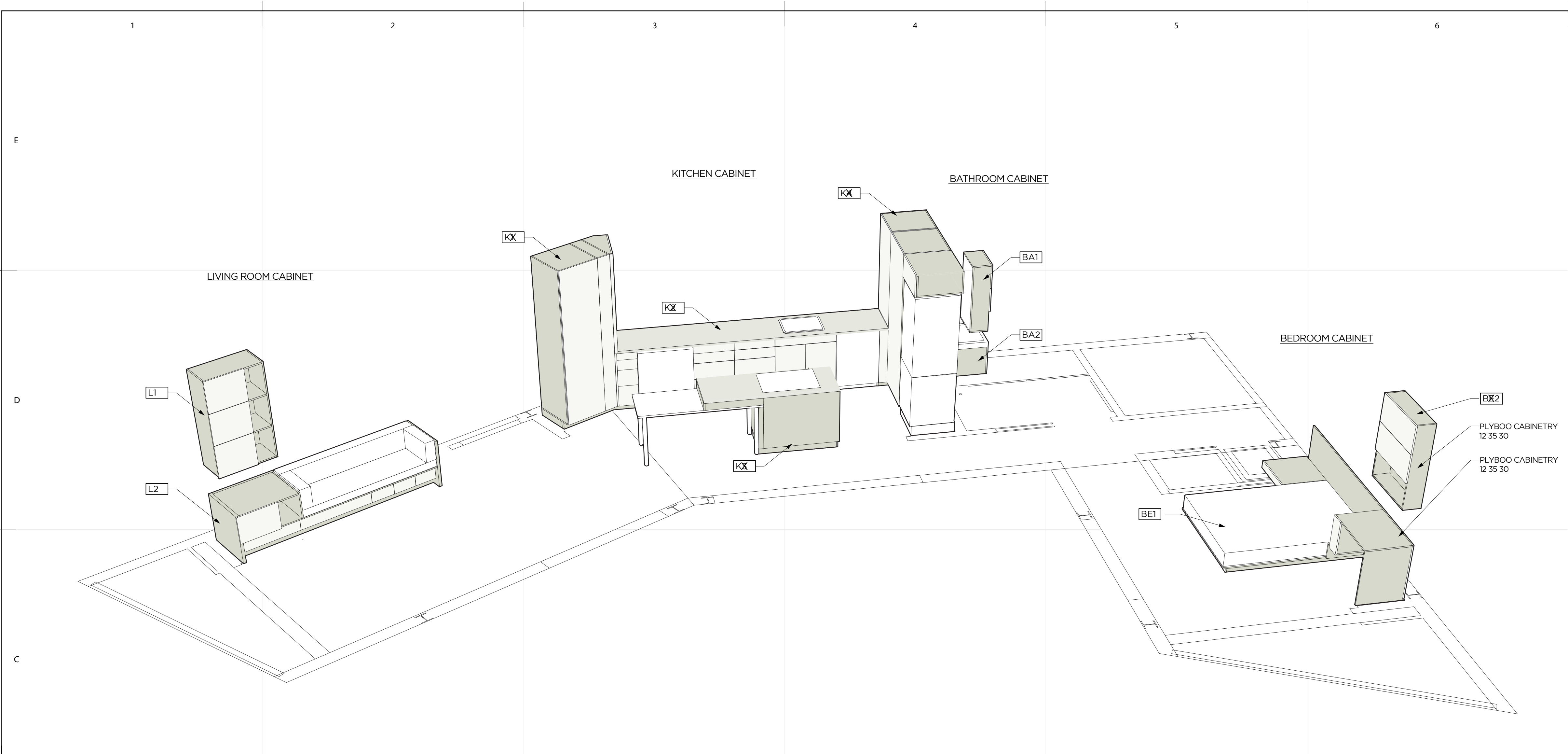
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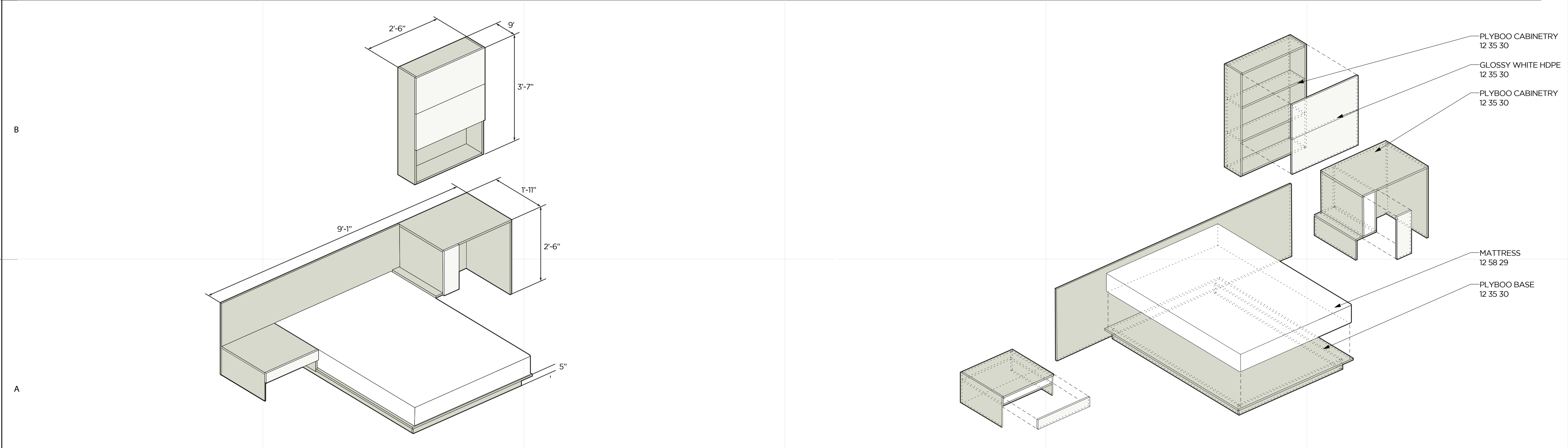
INTERIOR ELEVATIONS

A-223





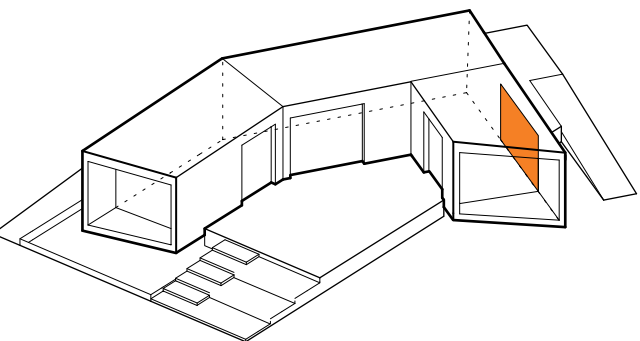
C1 OVERALL BUILT-IN CASEWORK CONCEPT
NTS



A1 BEDROOM CASEWORK BE 1 & BE 2 DIMENSIONS
NTS

A4 BEDROOM CASEWORK BE 1 & BE 2 SPECS
NTS

- KEY
- LX SEE A1/A4/A-234
 - LX SEE A1/A4/A-234
 - KX SEE C1/C4/A-234
 - KX SEE C1/C4/A-233
 - KX SEE A1/A4/A-233
 - KX SEE A1/A4/A-232
 - BX1 SEE C1/C4/A-232
 - BX2 SEE A1/A4/A-232
 - BX1 SEE A1/A4/A-231
 - BX2 SEE A1/A4/A-231



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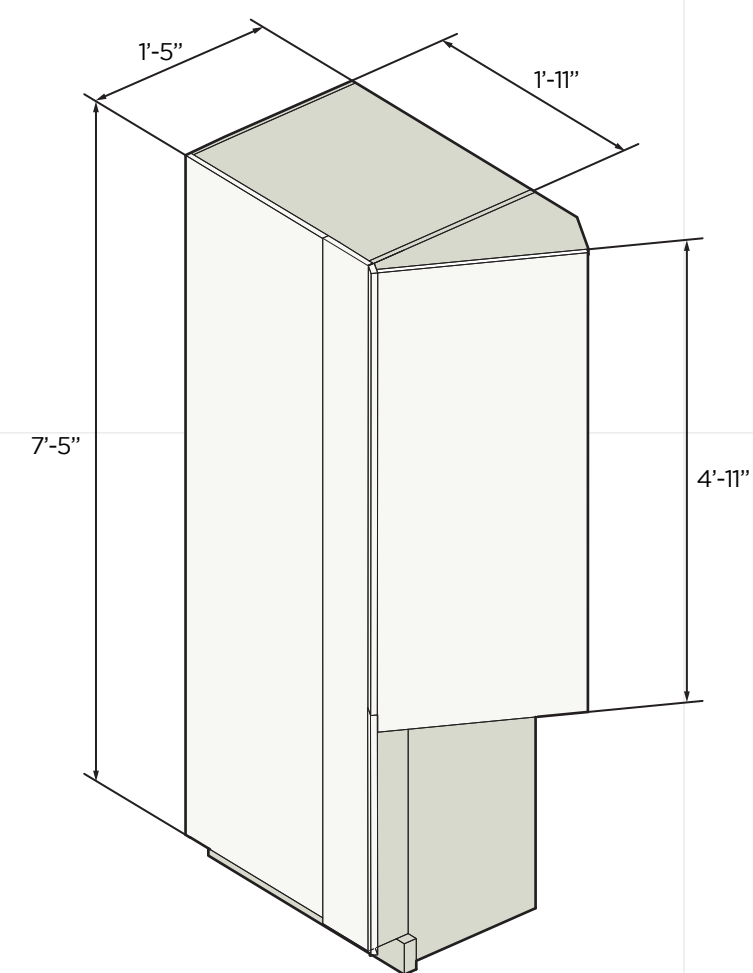
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ISSU :
DESIGNED B .

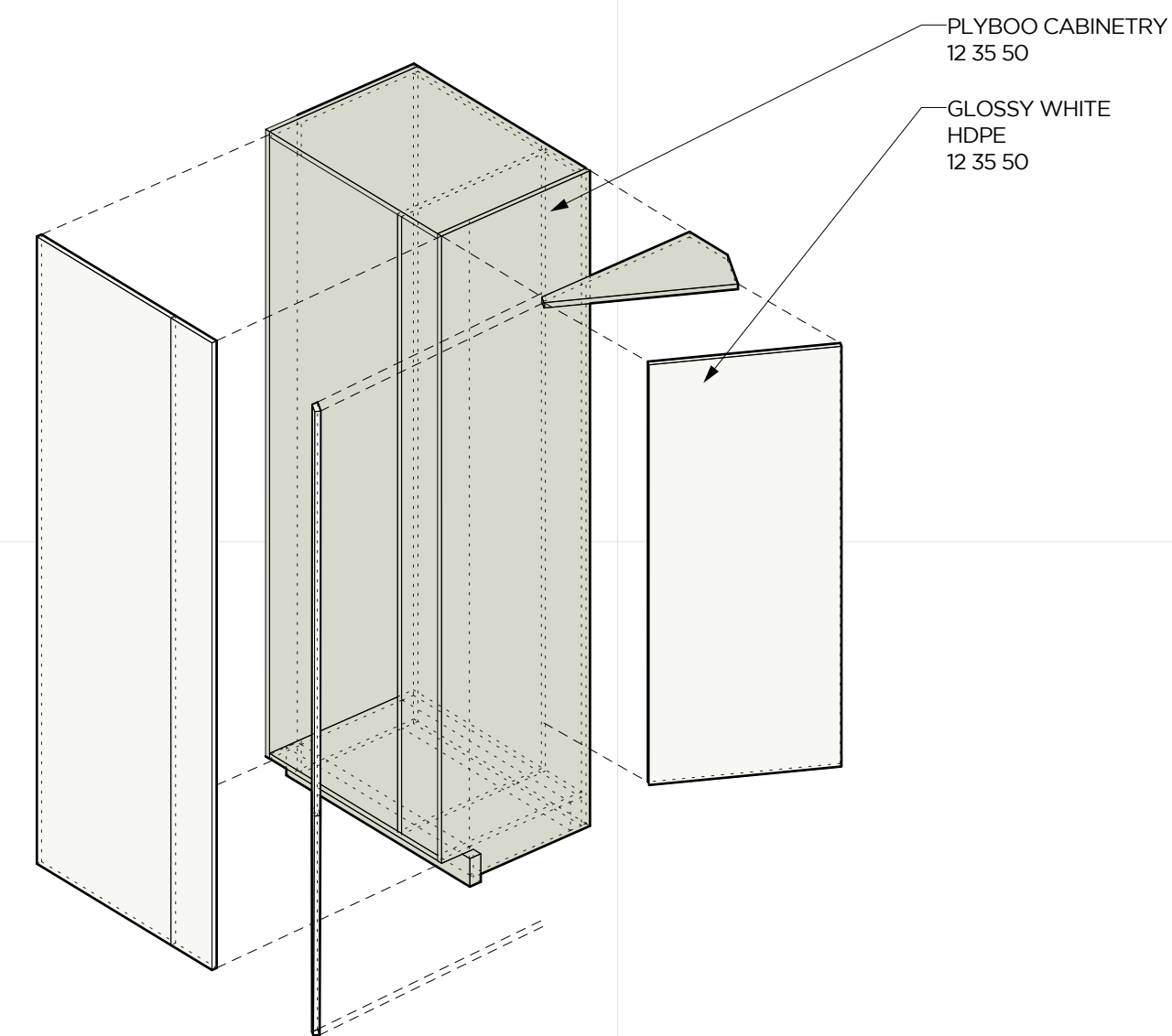
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CASEWORK DIAGRAMS

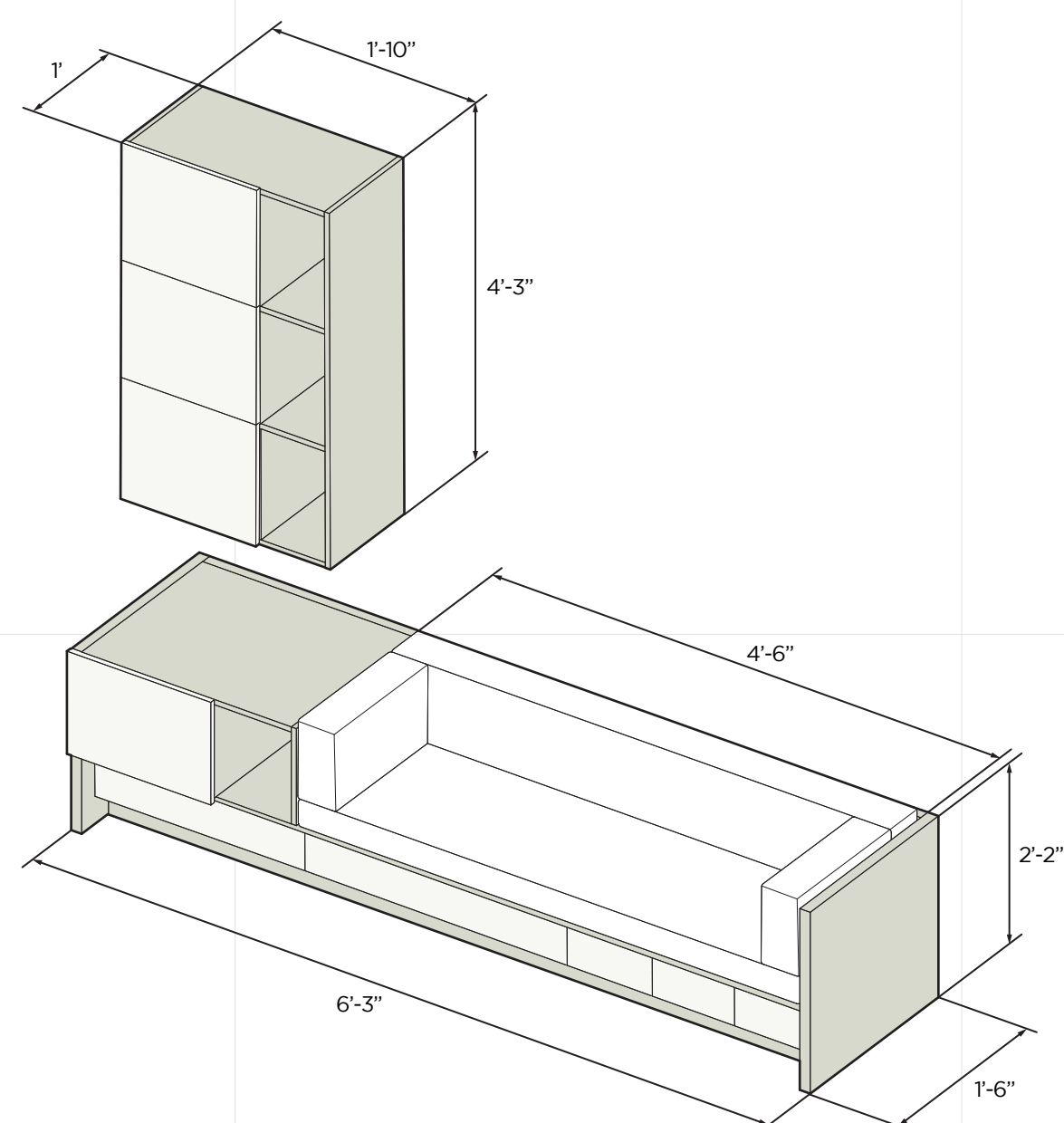
A-231



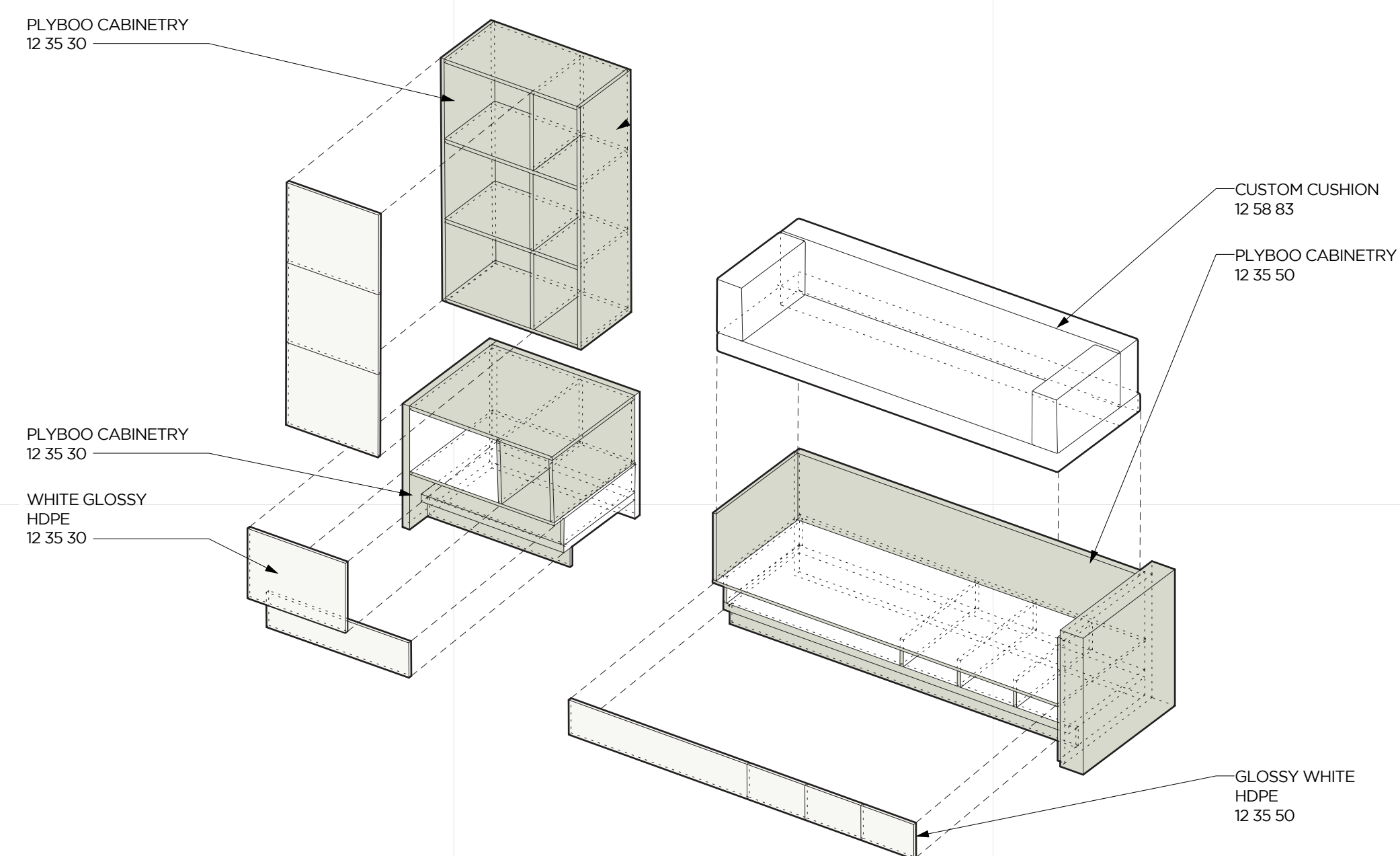
C1	KITCHEN CABINET K1 DIMENSIONS
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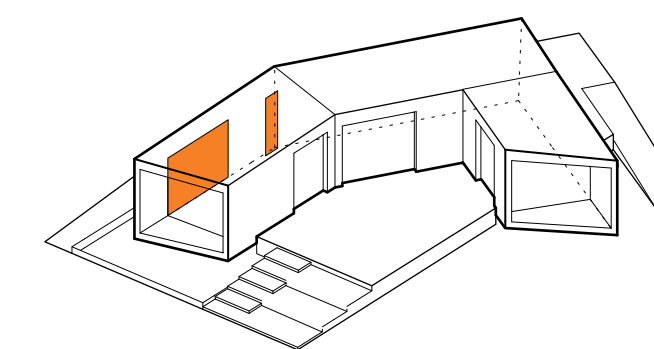
C4	KITCHEN CABINET K1 SPECS
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A1	LIVING ROOM CABINET L1 & L2 DIMENSIONS
----	--



A4	LIVING ROOM L1 & L2 SPECS
----	---------------------------



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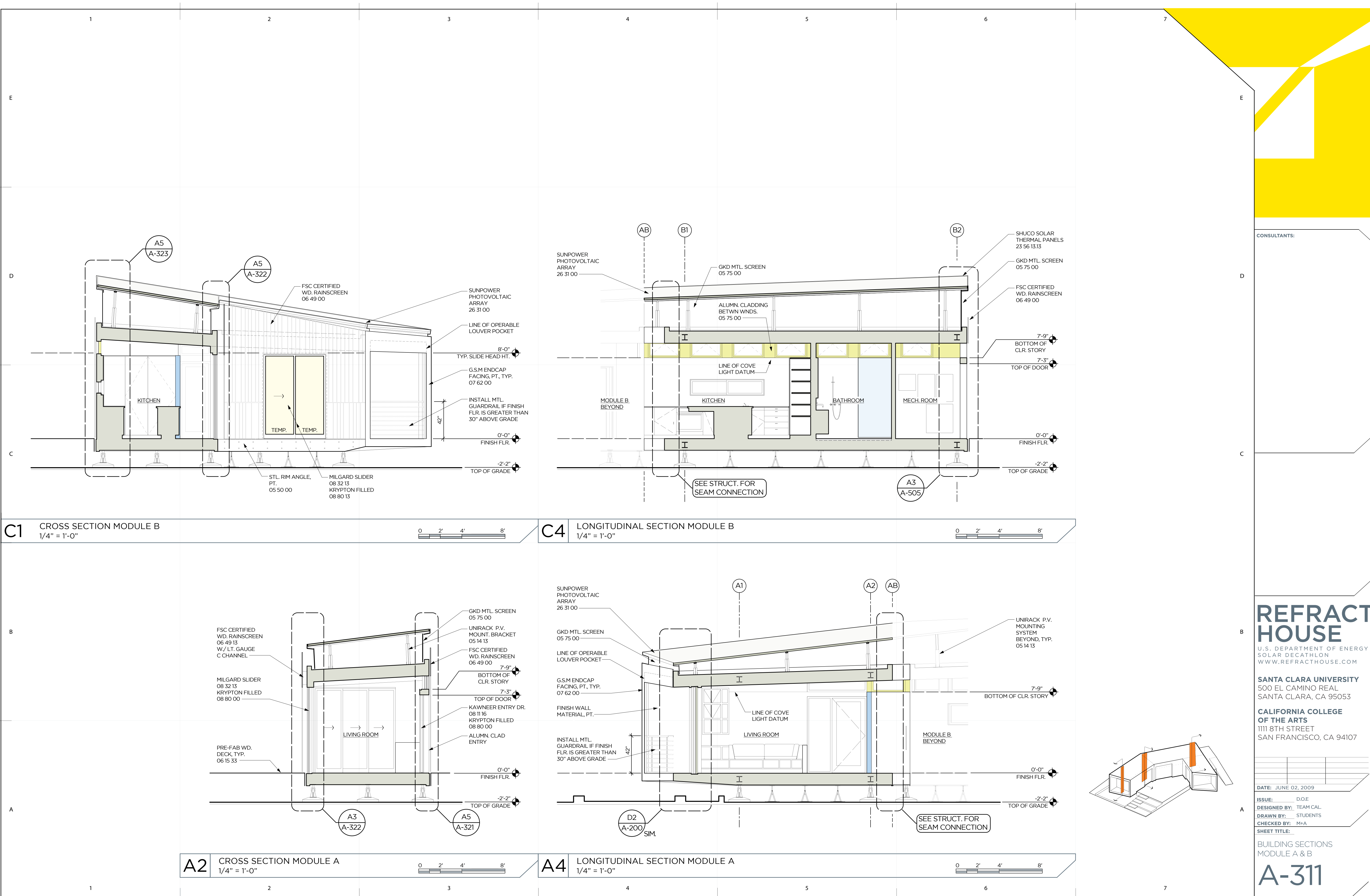
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ITL :

CASEWORK DIAGRAMS

A-234



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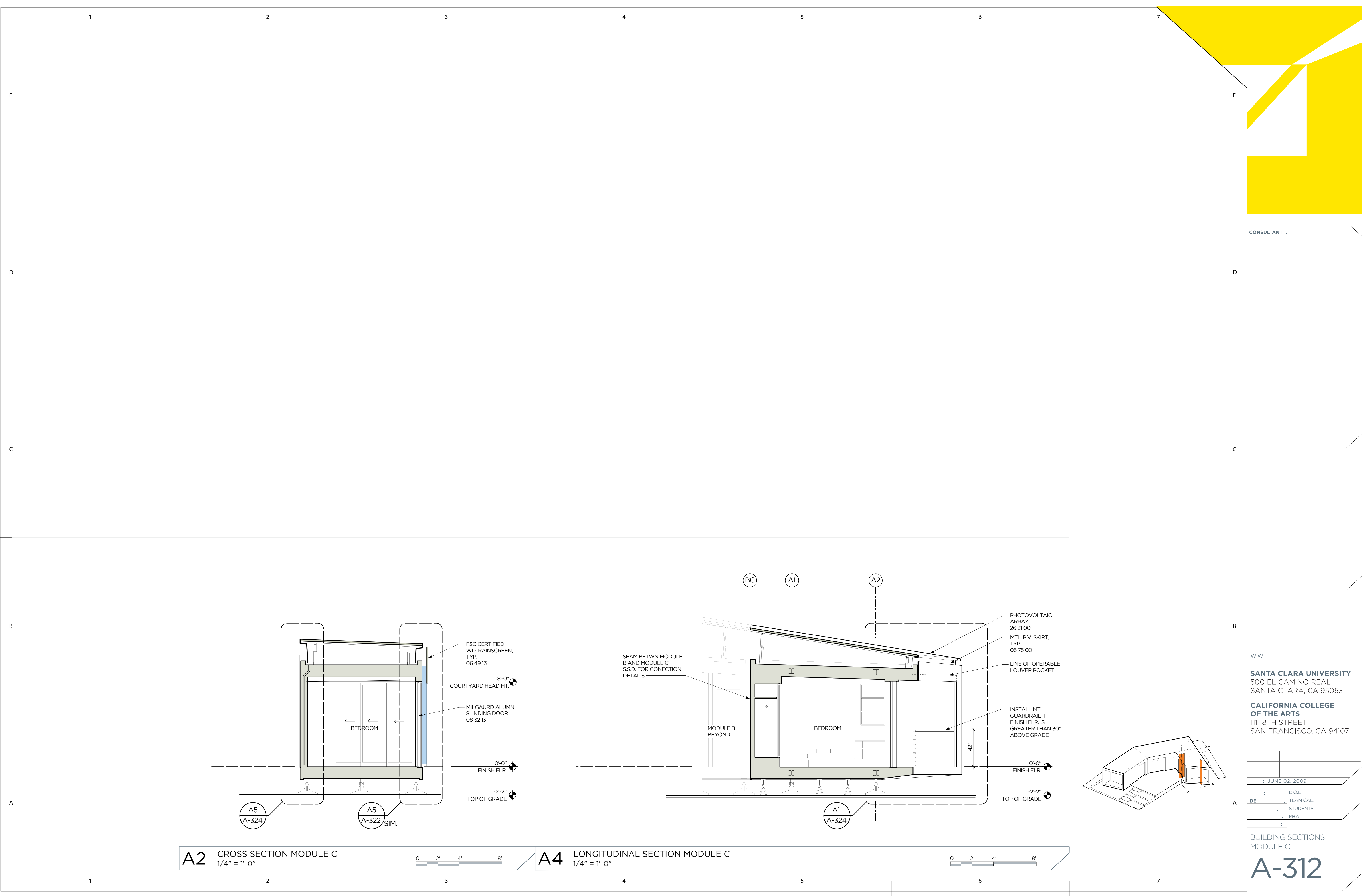
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BUILDING SECTIONS
MODULE A & B

A-311



A2 CROSS SECTION MODULE C
1/4" = 1'-0"



A4 LONGITUDINAL SECTION MODULE C
1/4" = 1'-0"



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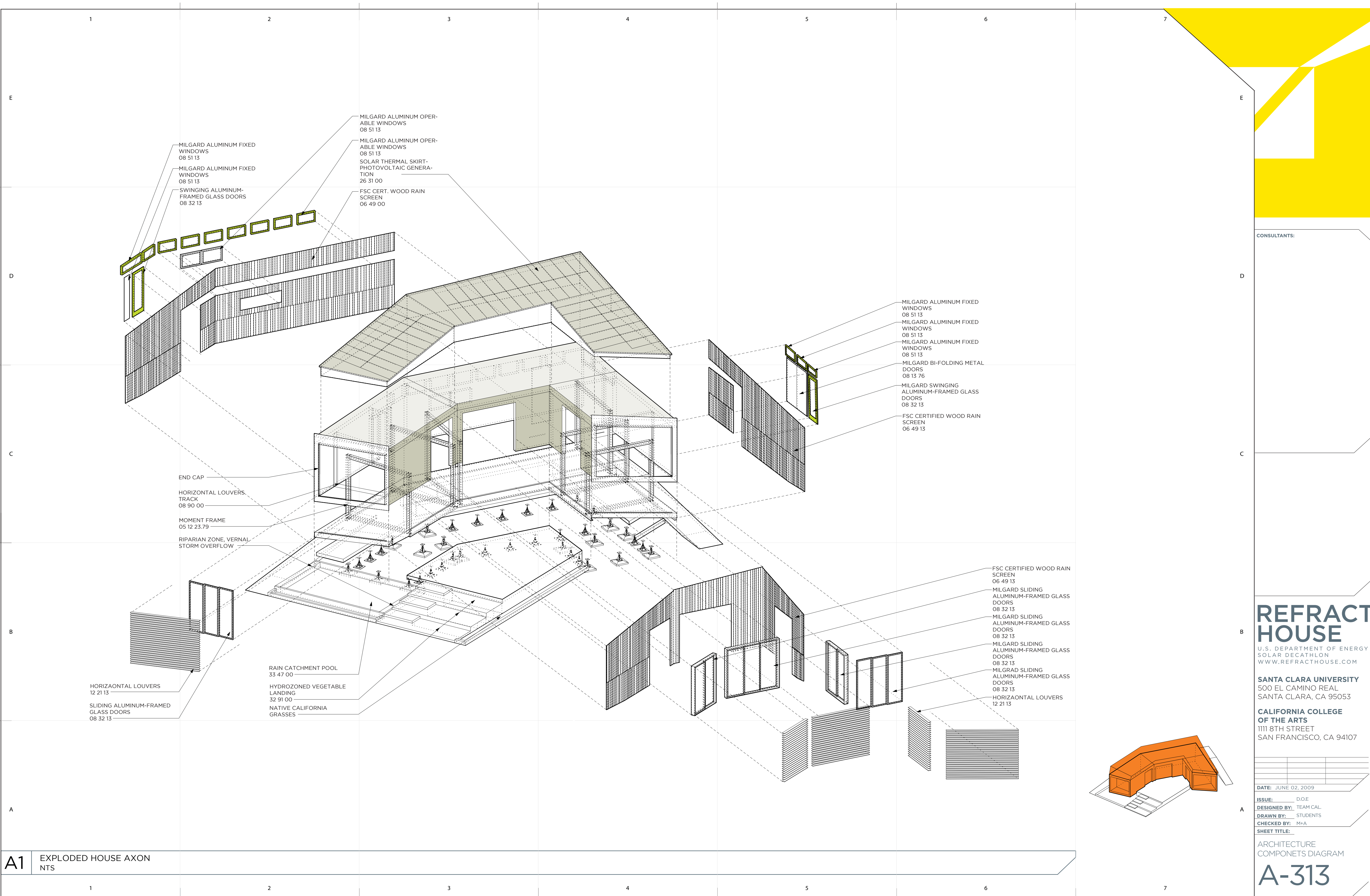
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BUILDING SECTIONS
MODULE C

A-312



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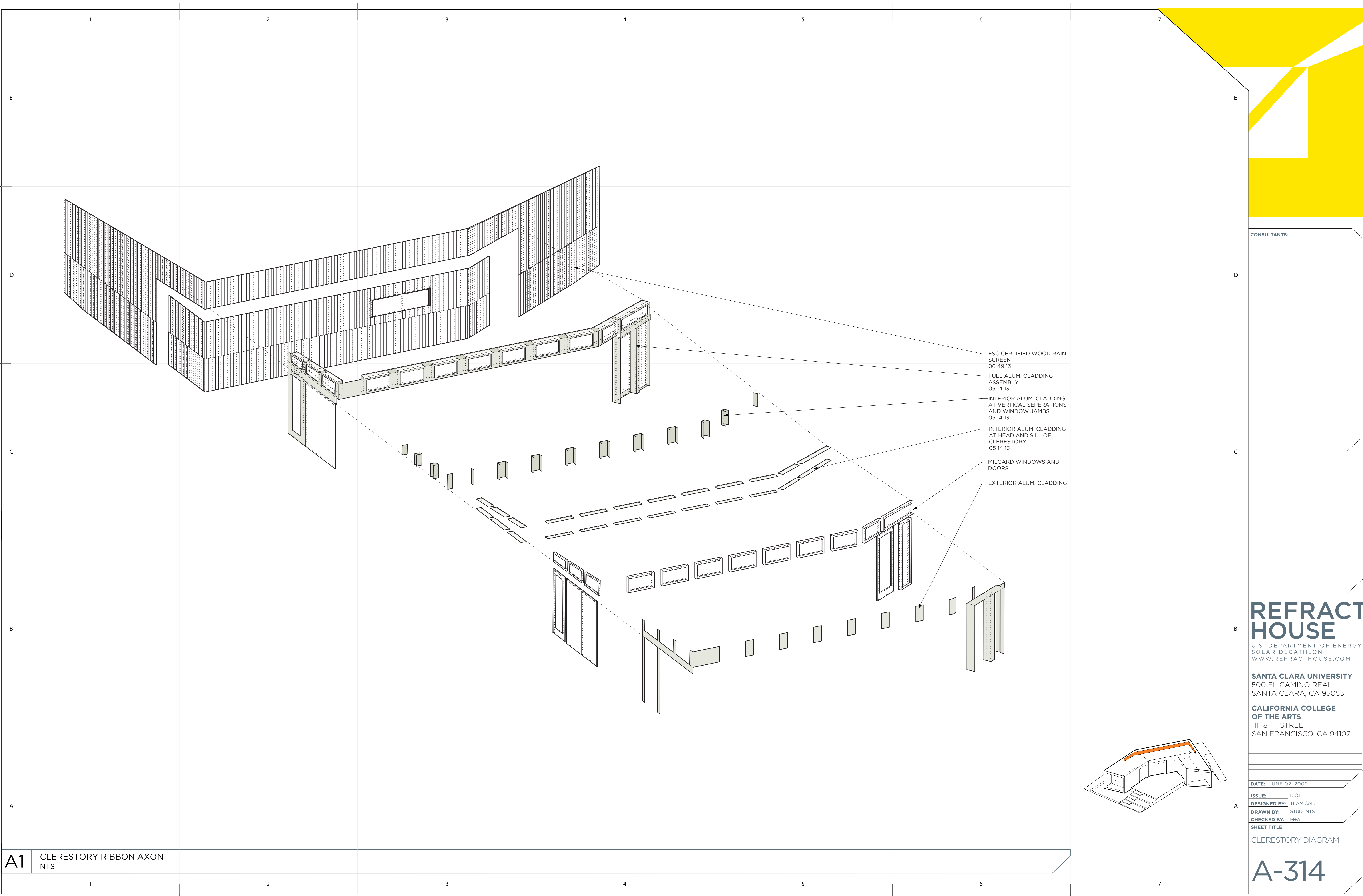
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SHEET TITLE:

ARCHITECTURE
COMPONENTS DIAGRAM

A-313



A1 CLERESTORY RIBBON AXON
NTS

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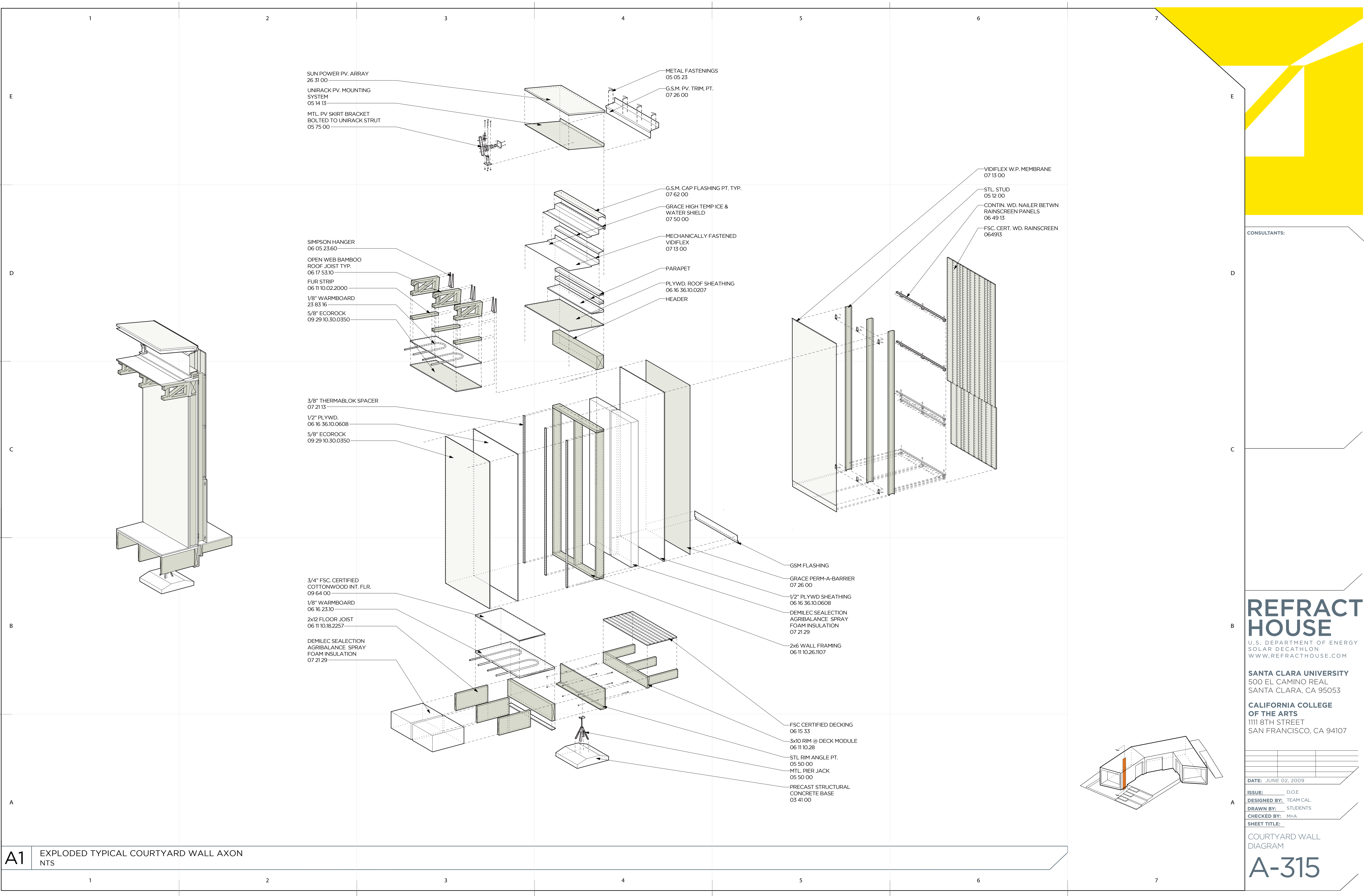
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SHEET TITLE:

CLERESTORY DIAGRAM

A-314



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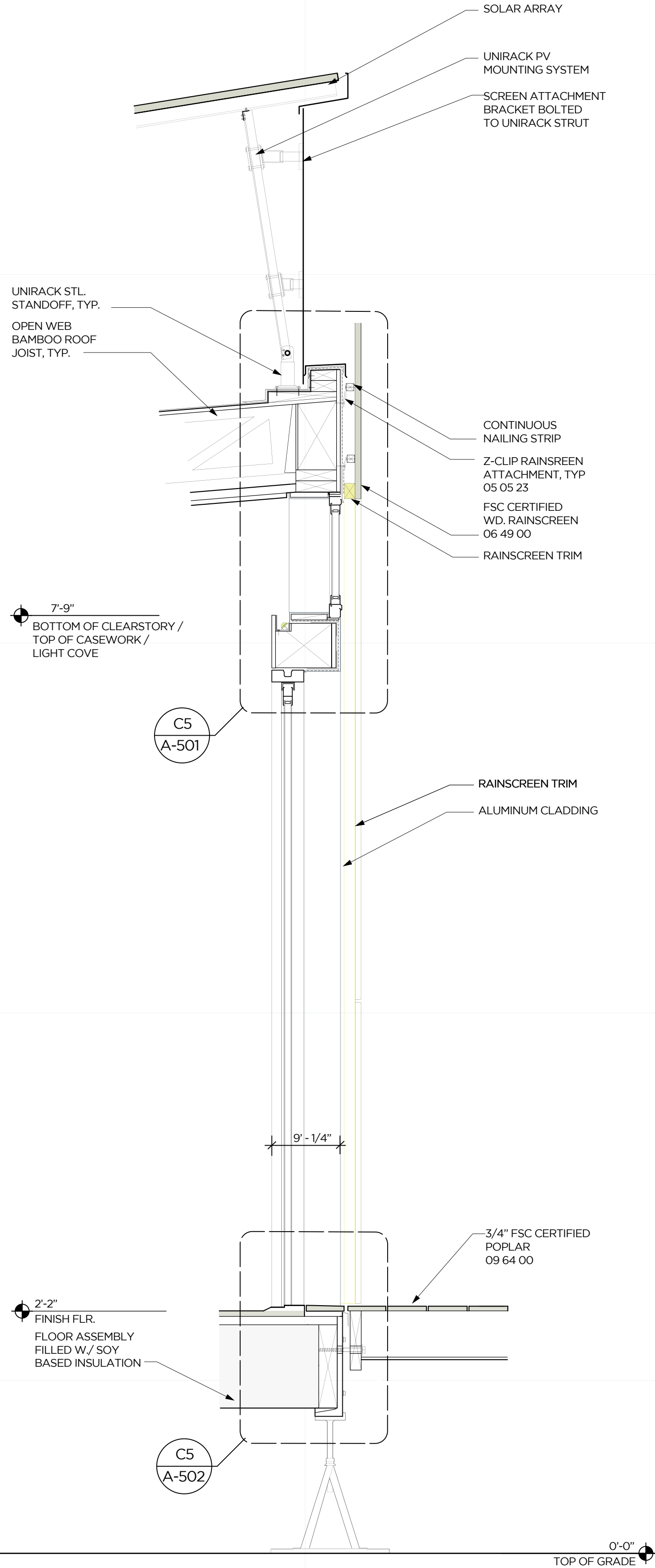
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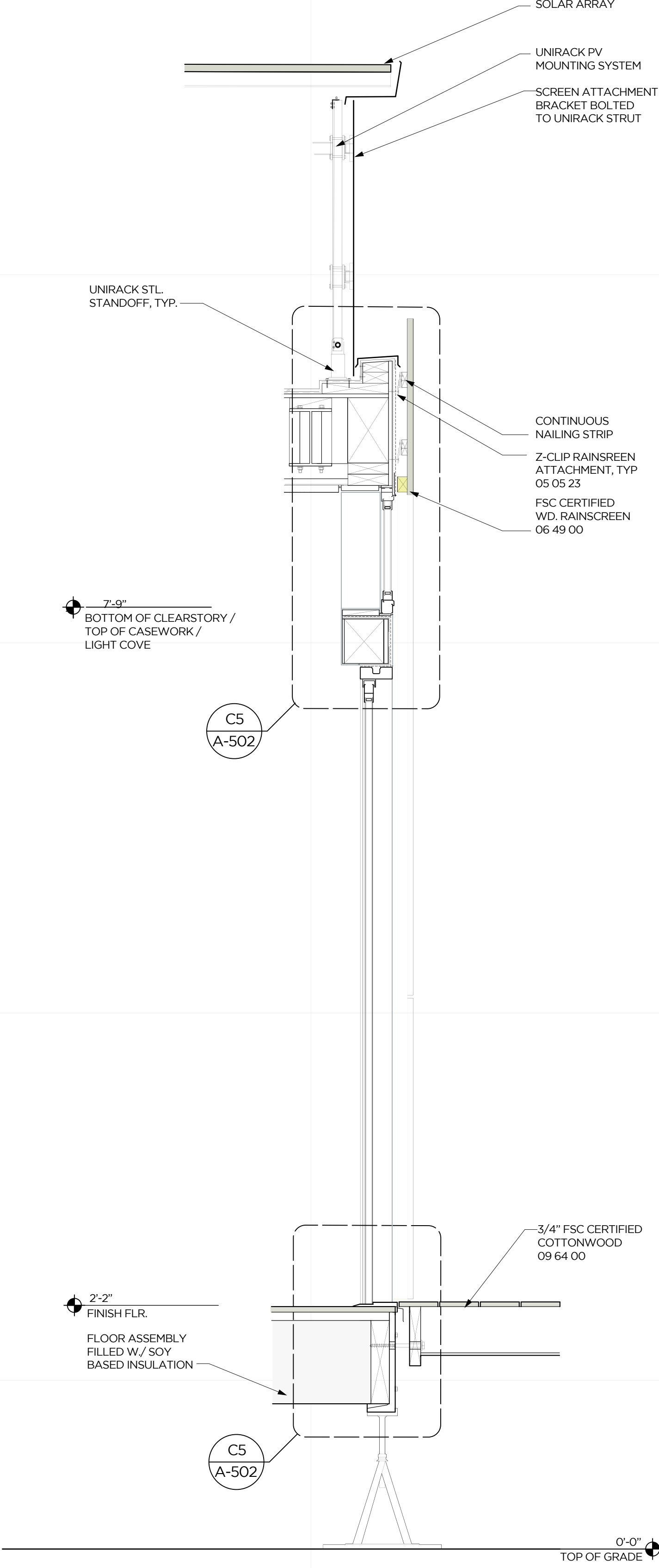
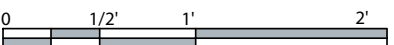
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SHEET TITLE:

COURTYARD WALL
DIAGRAM

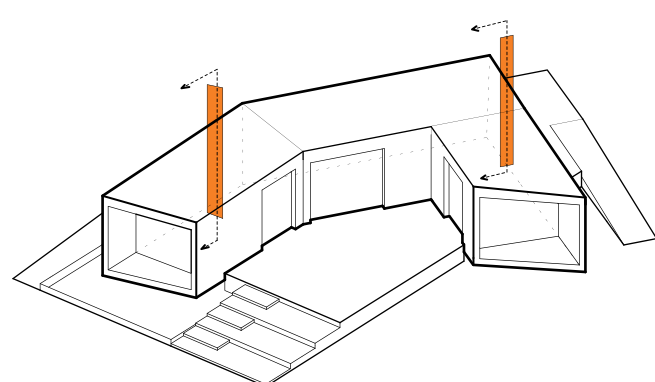
A-315



A1 ENTRY, MOMENT OF TRUTH
1" = 1'-0"



A3 EXIT
1" = 1'-0"



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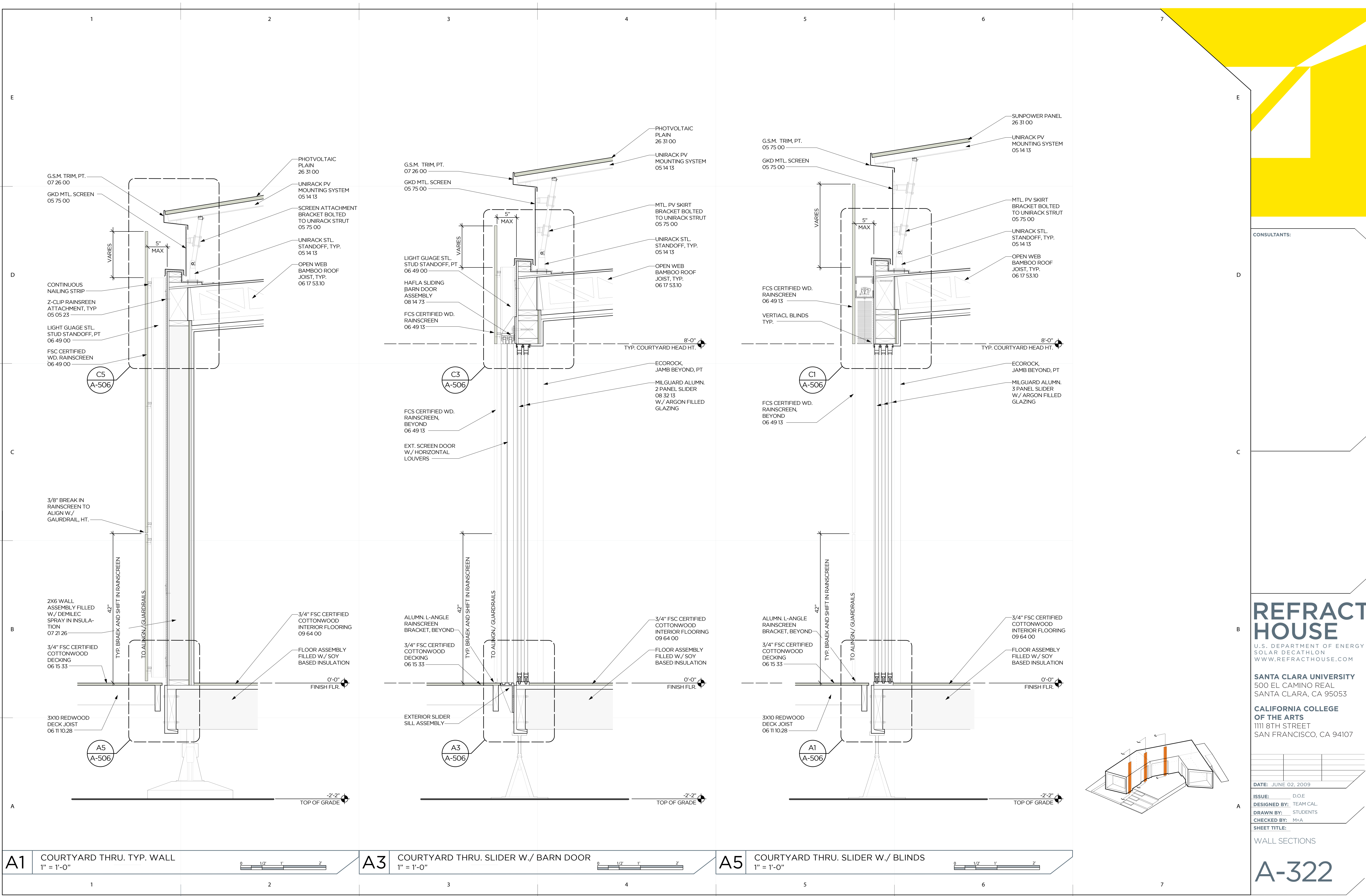
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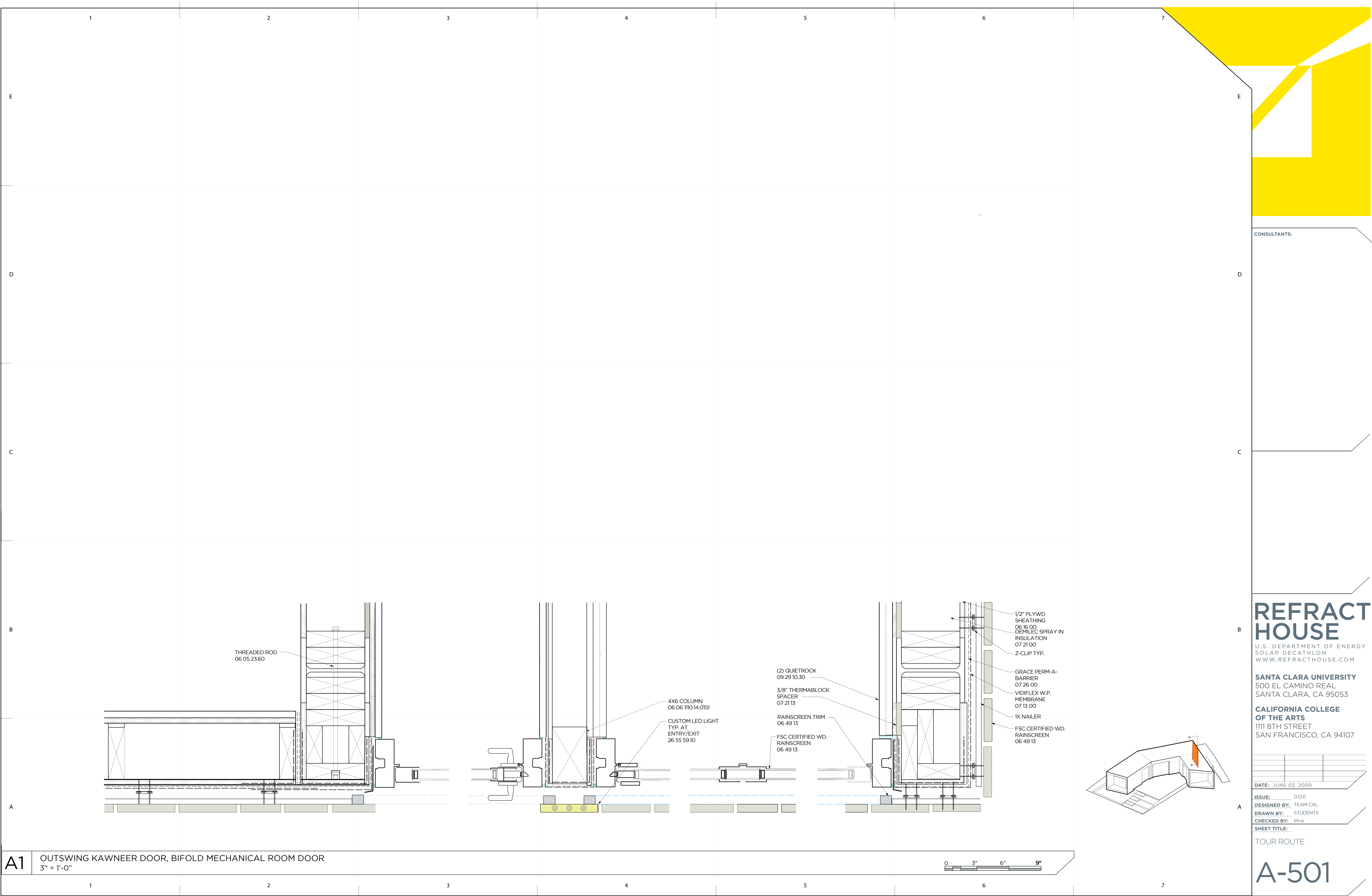
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ISSU :
DESIGNED B :
ITL :

WALL SECTIONS

A-321





A1 OUTSWING KAWNEER DOOR, BIFOLD MECHANICAL ROOM DOOR
3" = 1'-0"

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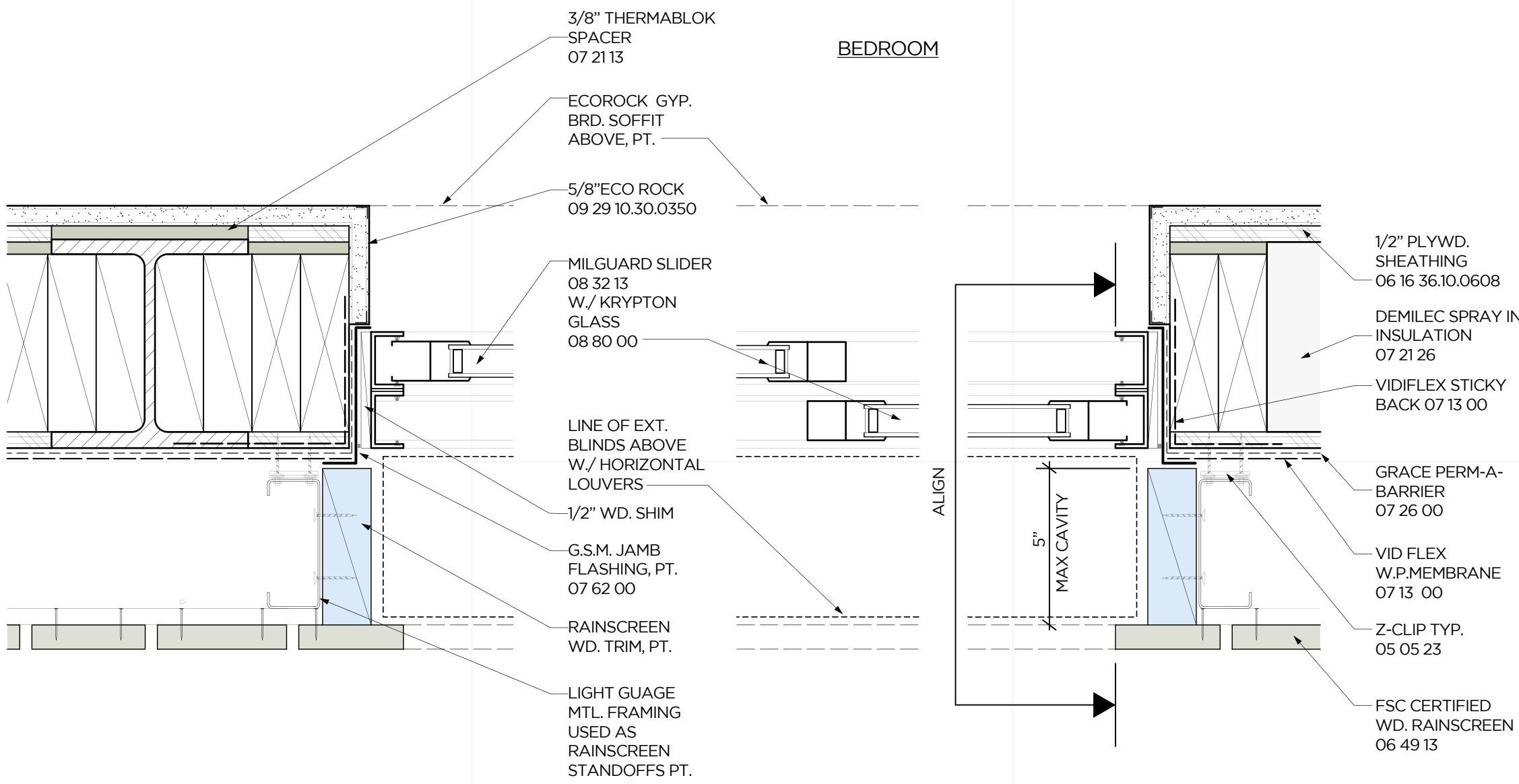
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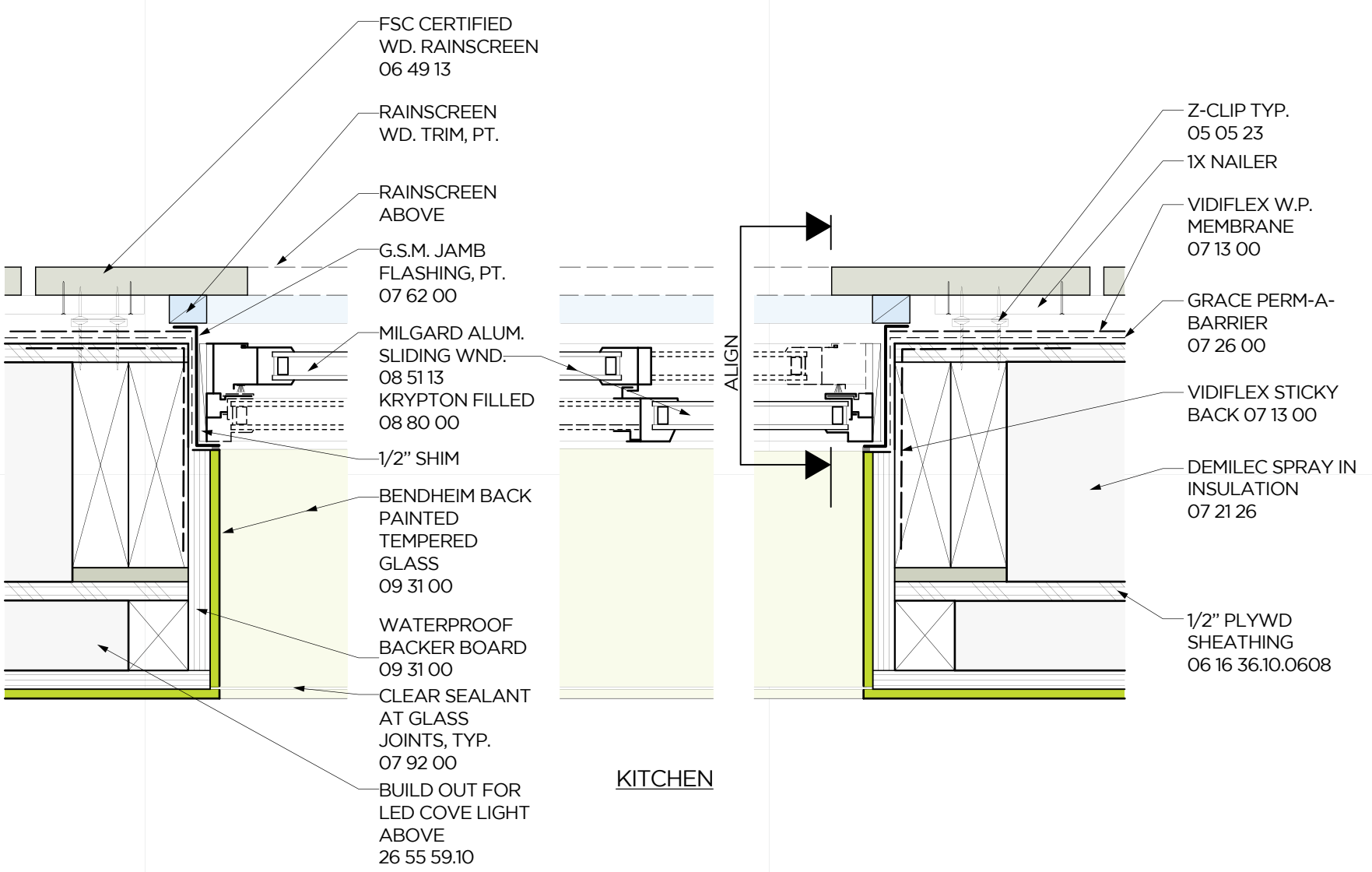
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TOUR ROUTE

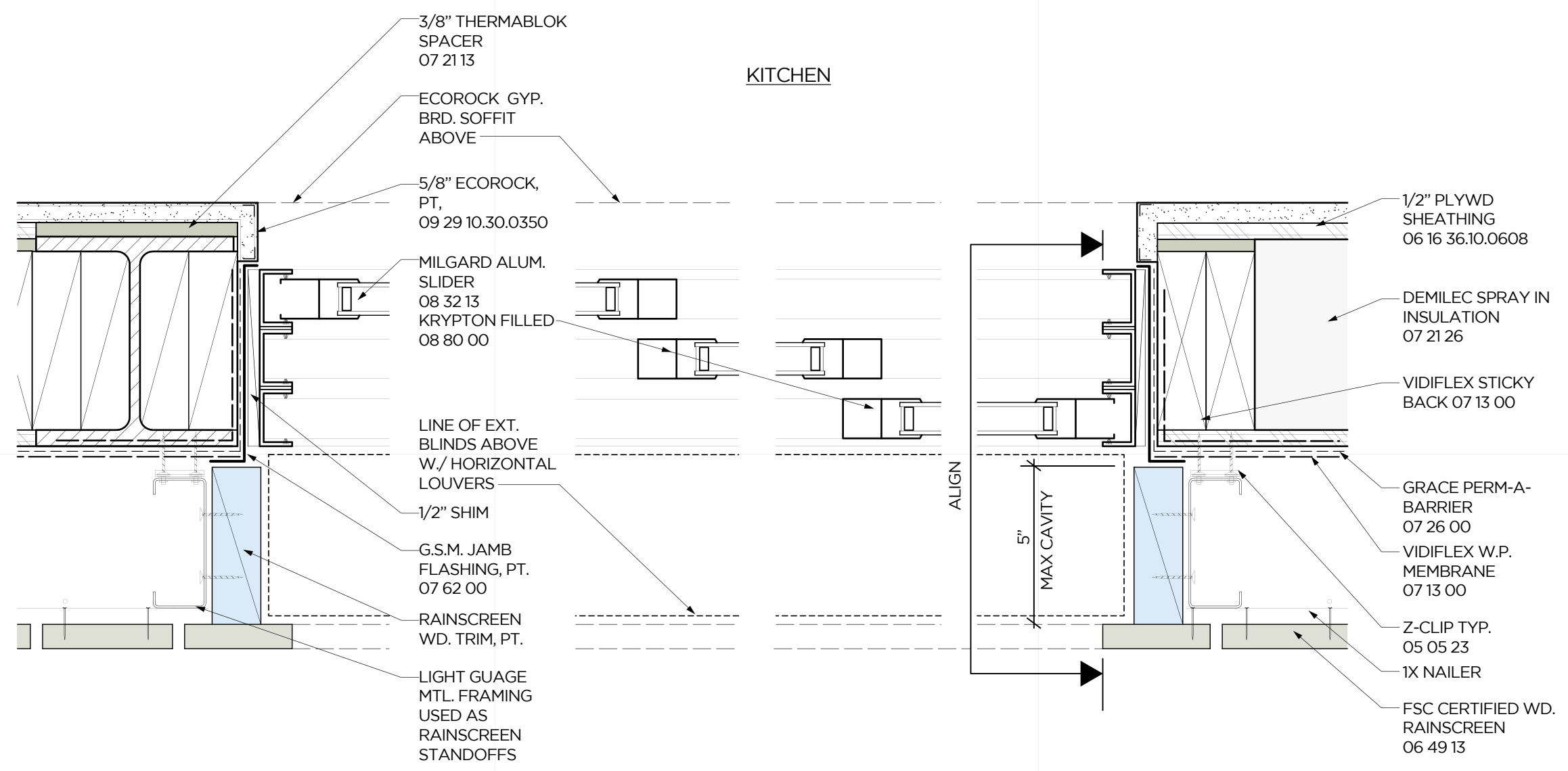
A-501



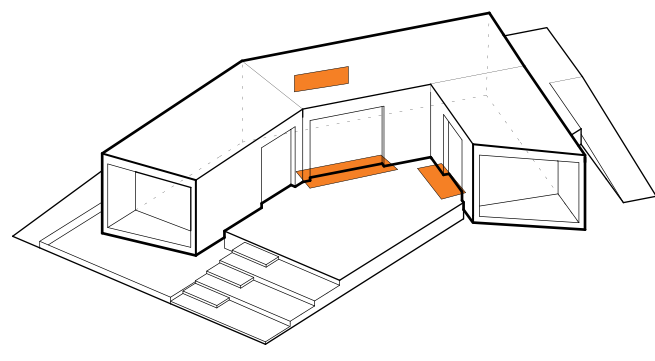
C4 2 PANNEL MILGUARD ALUMN. SLIDER W./ EXTERIOR HORIZONTAL LOUVERS
3" = 1'-0"



A1 MILGUARD ALUMN. HORIZONTAL SLIDER
3" = 1'-0"



A4 3 PANNEL MILGUARD ALUMN. SLIDER W./ EXTERIOR HORIZONTAL LOUVERS
3" = 1'-0"



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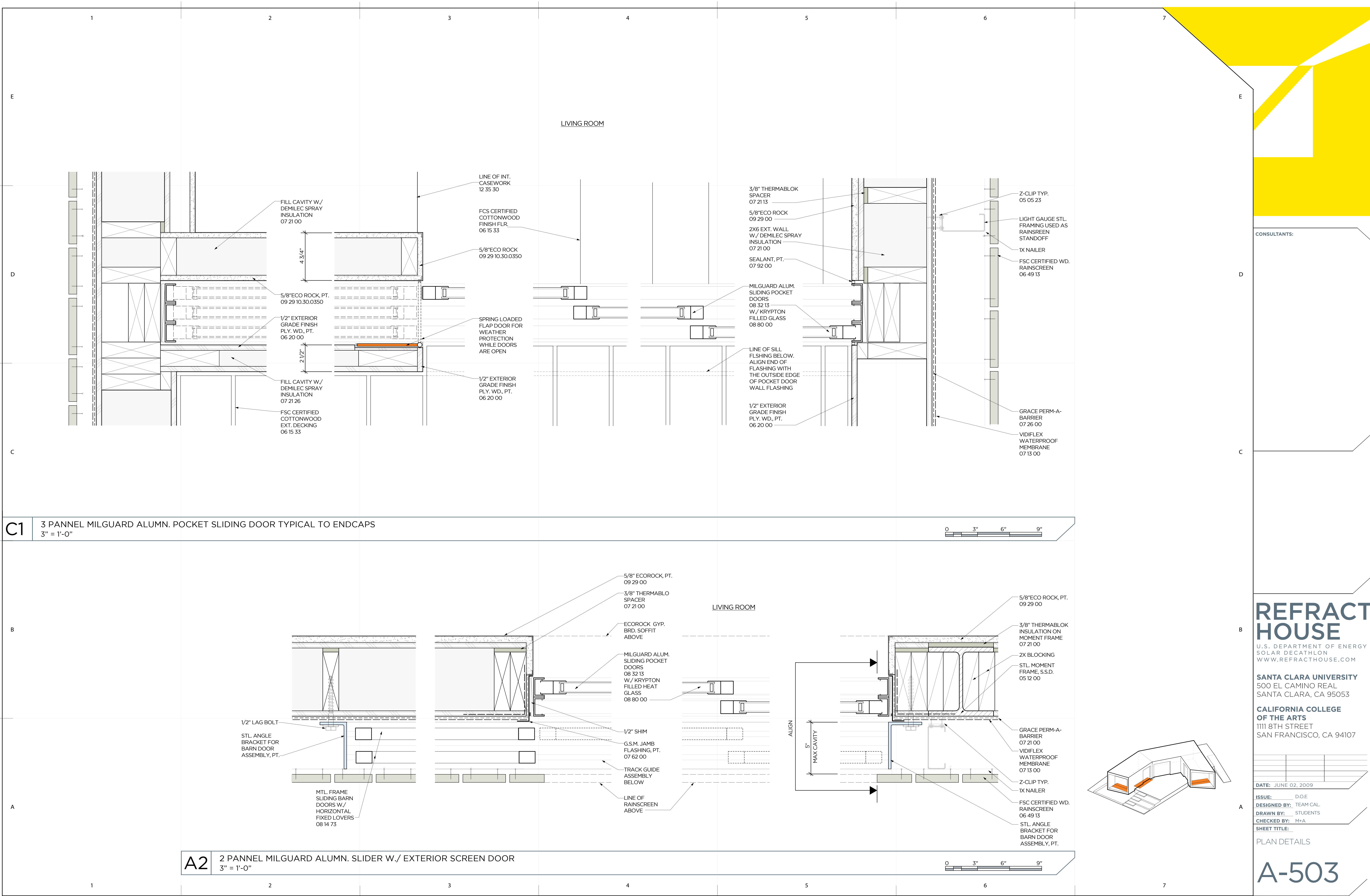
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PLAN DETAILS

A-502



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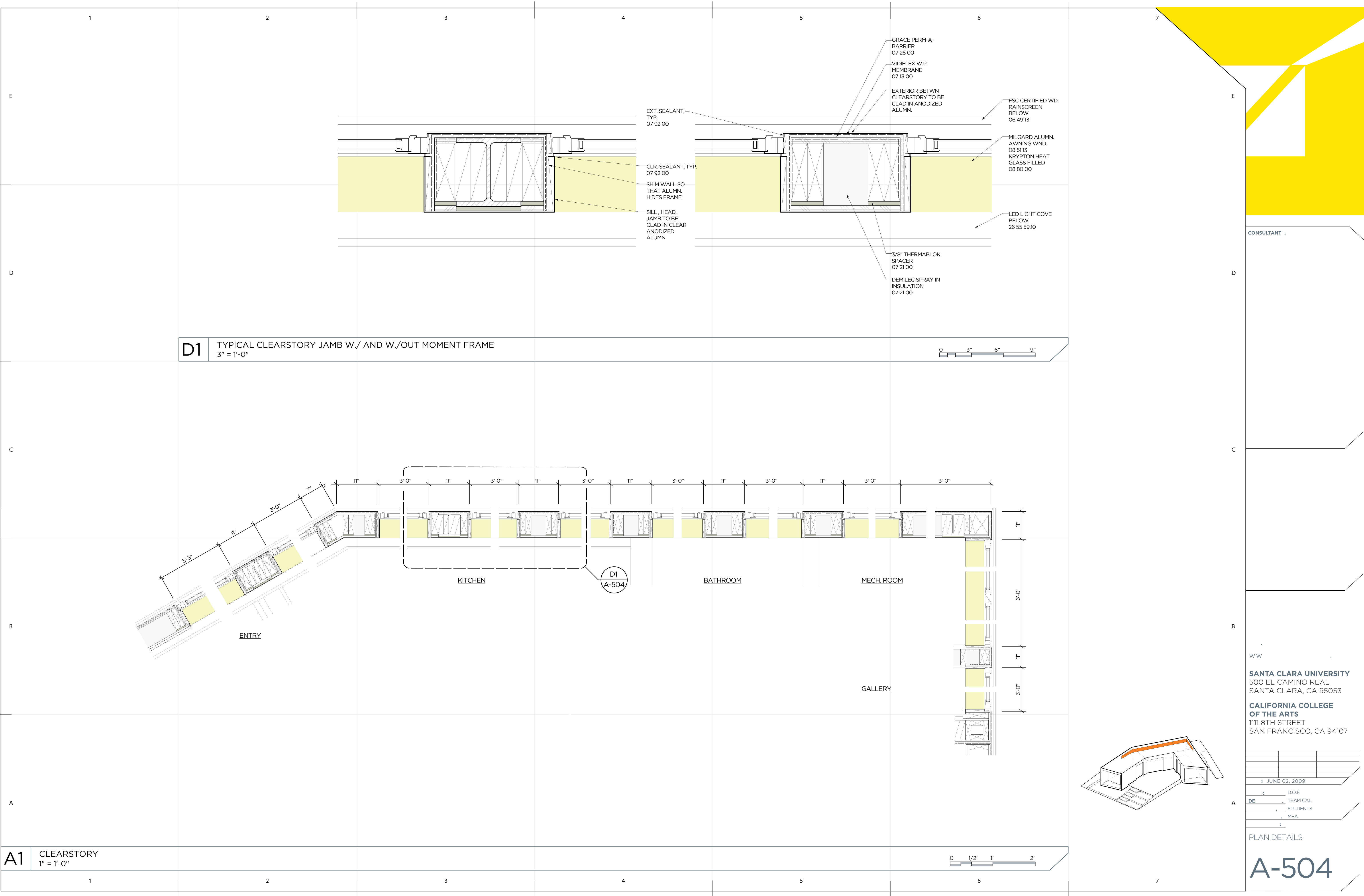
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A-503



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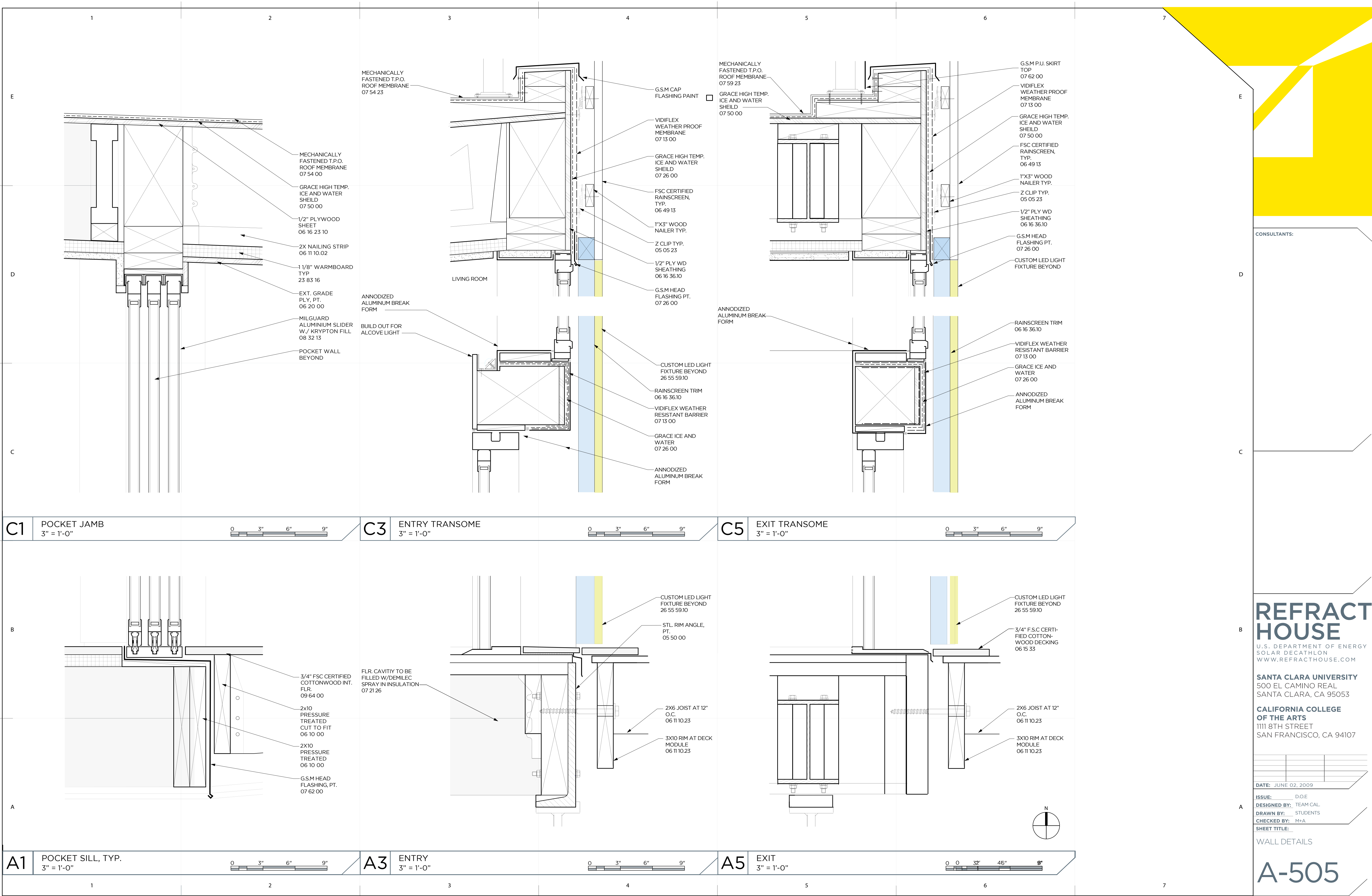
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PLAN DETAILS

A-504



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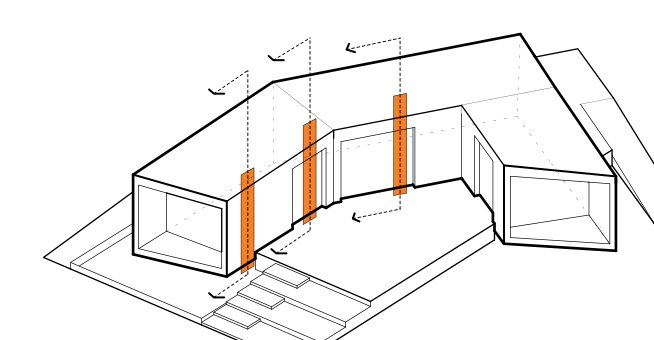
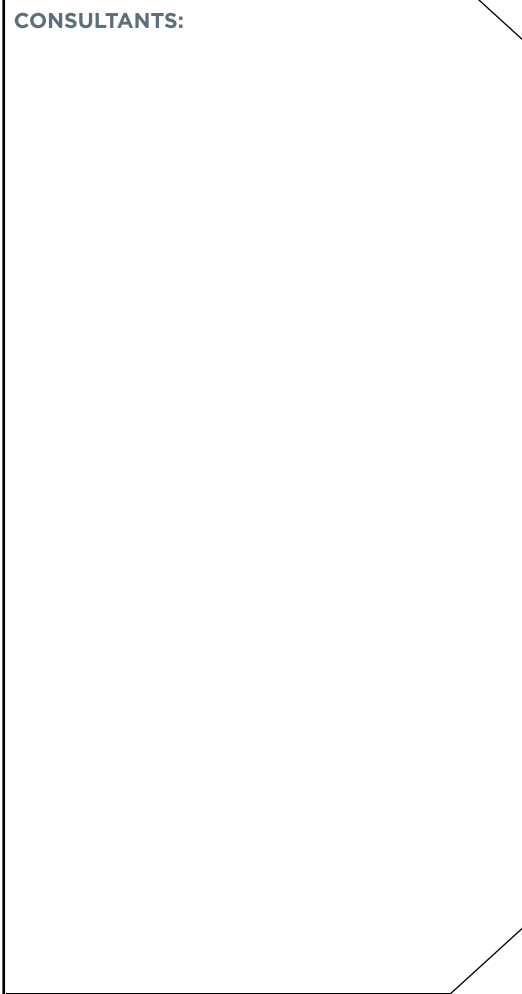
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SHEET TITLE:

WALL DETAILS

A-505

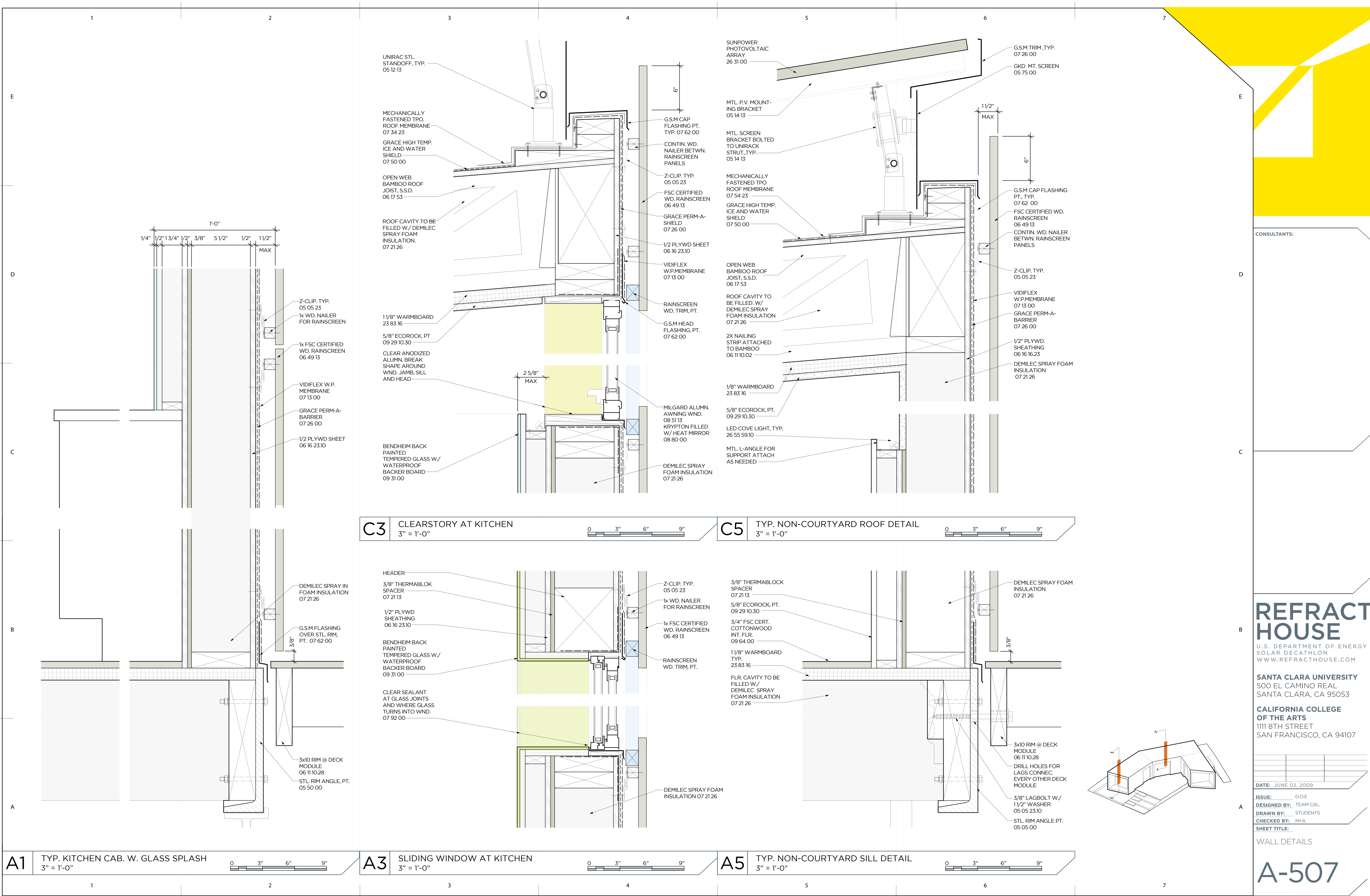


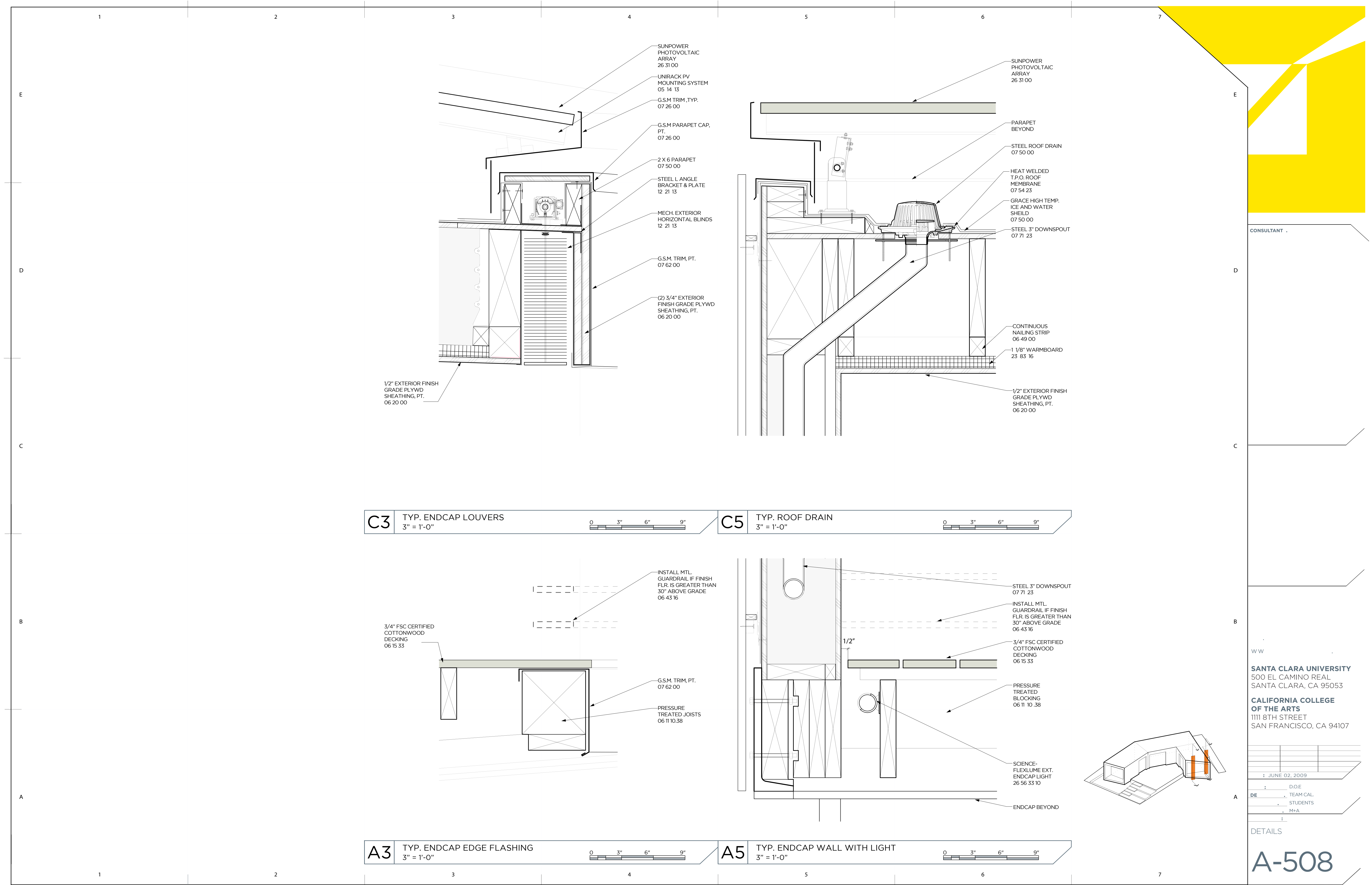
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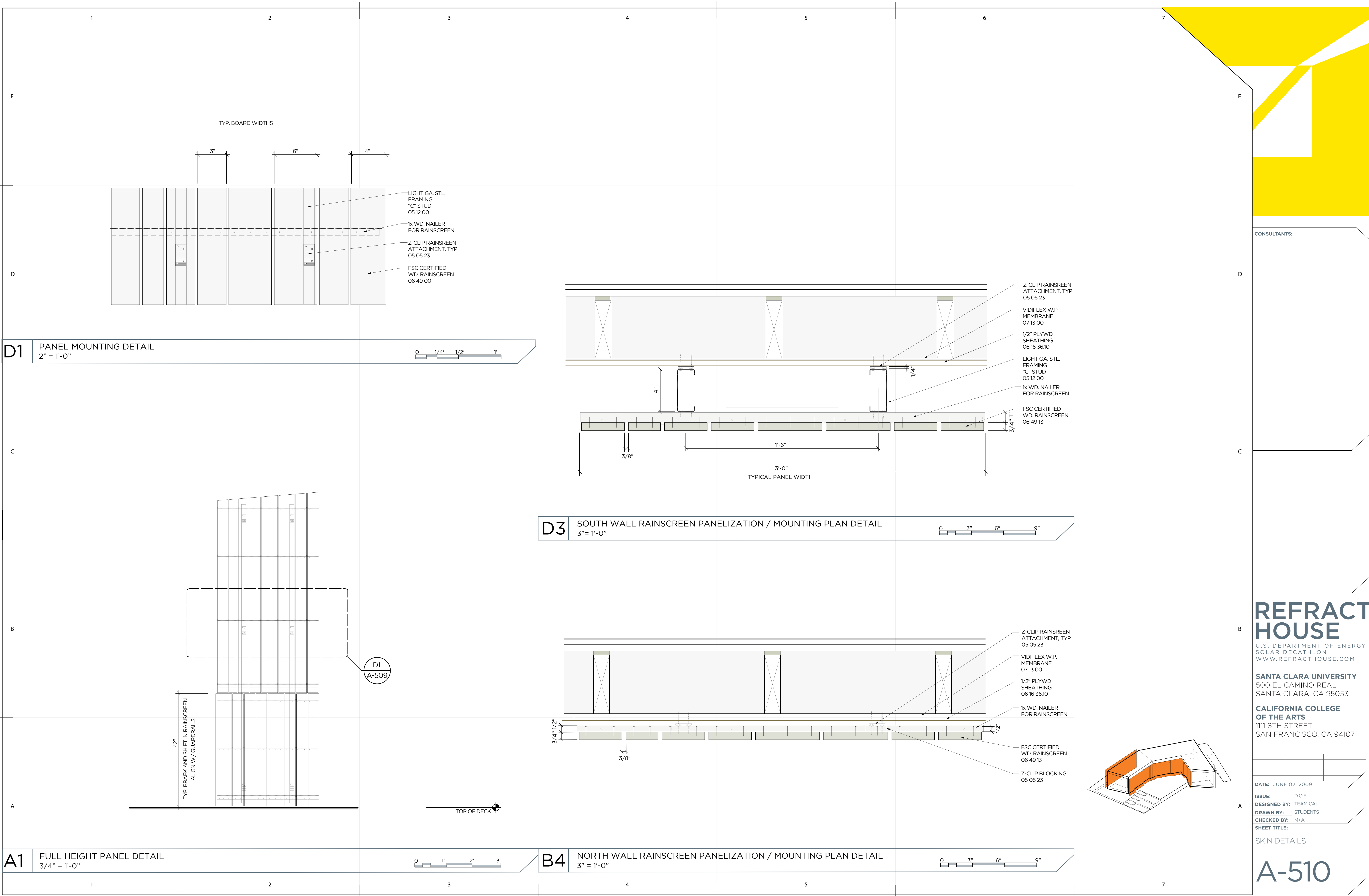
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DETAILS

A-506







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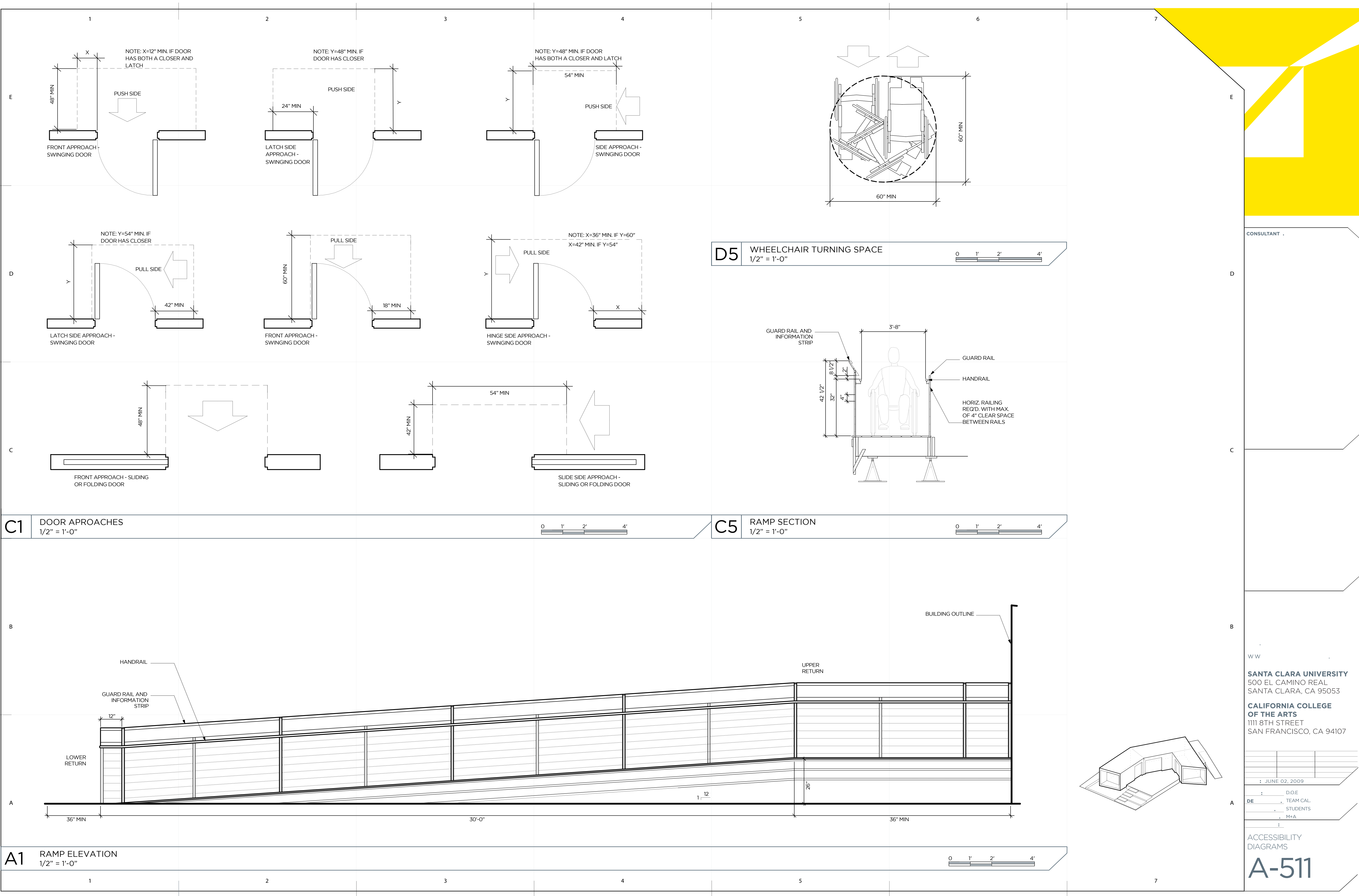
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SKIN DETAILS

A-510



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:
ACCESSIBILITY
DIAGRAMS

A-511

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WINDOW SCHEDULE

MARK	SIZE		TYPE	MANUFACTURER/SERIES	MATL	COLOR	GLAZING	FIRE	DETAIL			NOTES
	W	HT							HEAD	JAMB	SILL	
A	1'-9 5/8"	6'-11 9/16"	FIXED	MILGARD 921 PW	ALUMINUM	CLR. ANODIZED	CARDINAL 366/ HEAT MIRROR		A1/A-602			
B	5'-5 5/8"	1'-5 3/8" x 1'-3 1/4"	FIXED	MILGARD 921 PW	ALUMINUM	CLR. ANODIZED	CARDINAL 366/ HEAT MIRROR					
C	3'-0"	1'-6" x 1'-5 5/8"	FIXED	MILGARD 921 PW	ALUMINUM	CLR. ANODIZED	CARDINAL 366/ HEAT MIRROR					
D	3'-0"	1'-6"	OPERABLE	MILGARD 921 AWN	ALUMINUM	CLR. ANODIZED	CARDINAL 366/ HEAT MIRROR					
D	3'-0"	1'-6"	OPERABLE	MILGARD 921 AWN	ALUMINUM	CLR. ANODIZED	CARDINAL 366/ HEAT MIRROR					
D	3'-0"	1'-6"	OPERABLE	MILGARD 921 AWN	ALUMINUM	CLR. ANODIZED	CARDINAL 366/ HEAT MIRROR					
D	3'-0"	1'-6"	OPERABLE	MILGARD 921 AWN	ALUMINUM	CLR. ANODIZED	CARDINAL 366/ HEAT MIRROR					
D	3'-0"	1'-6"	OPERABLE	MILGARD 921 AWN	ALUMINUM	CLR. ANODIZED	CARDINAL 366/ HEAT MIRROR					
D	3'-0"	1'-6"	OPERABLE	MILGARD 921 AWN	ALUMINUM	CLR. ANODIZED	CARDINAL 366/ HEAT MIRROR					
D	3'-0"	1'-6"	OPERABLE	MILGARD 921 AWN	ALUMINUM	CLR. ANODIZED	CARDINAL 366/ HEAT MIRROR					
E	6'-11"	2'-0"	OPERABLE	MILGARD 1120 HS	ALUMINUM	CLR. ANODIZED	CARDINAL 366/ HEAT MIRROR					
F	3'-4 3/8"	1'-3 5/8" x 1'-6 1/8"	FIXED	MILGARD 921 PW	ALUMINUM	CLR. ANODIZED	CARDINAL 366/ HEAT MIRROR					
G	3'-4 3/8"	1'-1" x 1'-3 5/8"	FIXED	MILGARD 921 PW	ALUMINUM	CLR. ANODIZED	CARDINAL 366/ HEAT MIRROR					
H	2'-10"	10 5/8" x 1'-0 3/4"	FIXED	MILGARD 921 PW	ALUMINUM	CLR. ANODIZED	CARDINAL 366/ HEAT MIRROR					

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2'

4'

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CONSULTANT .

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B

A

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ISSU :

D.O.E

DESIGNED B. :

TEAM CAL.

STUDENTS

M+A

ITL :

WINDOW SCHEDULE

A-601

A3 WINDOW SCHEDULE
 $\frac{3}{8}" = 1'-0"$



ww

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ISSU :	D.O.E
DESIGNED B .	TEAM CAL
.	STUDENTS
.	M.A

FIXTURE SCHEDULE

A-603

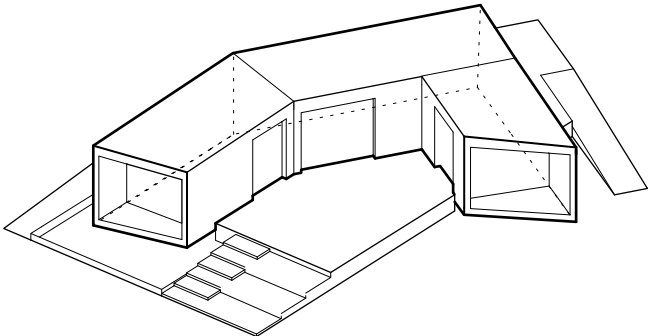
LIVING ROOM FURNISHINGS			
QUANTITY	BRIEF DESCRIPTION	DETAILED DESCRIPTION	MASTER FORMAT CODE
2	SITE SEATING	ADIRONDACK CHAIR	12 93 43.13
2	SITE TABLE	PATIO OTTOMAN	12 93 43.53
1	BICYCLE RACKS		12 93 13
1	SITE TABLES	URBAN C-TABLE	12 93 43.53

BATHROOM FURNISHINGS			
QUANTITY	BRIEF DESCRIPTION	DETAILED DESCRIPTION	MASTER FORMAT CODE
1	BATH ACCESSORIES	SOAP DISPENSER	10 28 16.13
1	BATH ACCESSORIES	TOOTHBRUSH RAZOR CUP	10 28 16.13
1	BATH ACCESSORIES	WASTE RECEPTACLE	10 28 16.13
1	BATH ACCESSORIES	SOAP DISH	10 28 16.13
1	BATH MAT		12 44 13.13
2	BATH TOWELS	WASHCLOTH	12 44 00
4	BATH FURNISHINGS	BAMBOO HAND TOWEL	12 44 00

LIVING ROOM FURNISHINGS			
QUANTITY	BRIEF DESCRIPTION	DETAILED DESCRIPTION	MASTER FORMAT CODE
1	COFFEE TABLE	GIULIO BENCH: LIVING ROOM	12 58 23
2	PILLOWS	THROW PILLOWS	12 46 15
4	FURNISHINGS: ART	SQUARE FLOAT FRAMES	12 12 16
5	CUSTOM RESIDENTIAL FURNITURE	SOFA CUSHIONS FOR BUILT-IN-COUCH	12 45 16
1	RESIDENTIAL FURNITURE	METROPOLITAN CHAIR	12 58 00
1	DATA COMMUNICATIONS DESKTOPS	MAC MINI	27 22 23
1	DATA COMMUNICATIONS HANDHELDS	iPOD TOUCH 8GB	27 22 29
1	DATA COMMUNICATIONS ROUTERS	KYOCERA KR1 MOBILE ROUTER	27 21 16
1	INTEGRATED AUDIO-VIDEO SYSTEMS AND EQUIPMENT	40" LED HDTV	27 41 16
1	INTEGRATED AUDIO VIDEO SYSTEMS AND EQUIPMENT	A/V RECEIVER	27 41 16
1	INTEGRATED AUDIO VIDEO SYSTEMS AND EQUIPMENT	BLU-RAY DISC PLAYER	27 41 16
3	SMOKE DETECTORS	120 VOLT BATTERY BACKUP SMOKE DETECTOR	28 31 46.50.5200

BEDROOM FURNISHINGS			
QUANTITY	BRIEF DESCRIPTION	DETAILED DESCRIPTION	MASTER FORMAT CODE
1	FULL SIZED BED	54" x 75" KEETSA MATTRESS	12 58 29
1	CHAIR	BEDROOM DESK CHAIR	12 58 16
4	PILLOWS	ALLERGY LUXE DOWN JUMBO PILLOWS	12 45 16
1	BED LINENS	COMFORTER/DUVET	12 45 13
1	DESK LAMP	BEDROOM DESK LAMP	12 43 13.13
1	WASTE RECEPTACLES	BEDROOM WASTE CAN	12 46 00
1	BED LINENS	FULL SIZE DUVET COVER	12 45 13
1	BED LINENS	PERACLE SHEET SET	12 45 13
2	BED LINENS	STANDARD SHAMS	12 45 13
1	BED LINENS	LOGAN THROW	12 45 13
4	FURNISHINGS: ART	RECTANGULAR FLOAT FRAMES	12 12 19
2	BED LINENS	STANDARD WHITE PILLOW CASES	12 45 13
1	COMPUTER	17" MACBOOK LAPTOP PRO	27 22 00

KITCHEN FURNISHINGS			
QUANTITY	BRIEF DESCRIPTION	DETAILED DESCRIPTION	MASTER FORMAT CODE
1	FOOD SERVICE EQUIPMENT	10-PIECE COOKWARE SET OF POTS & PANS	11 40 00
1	FOOD SERVICE EQUIPMENT	PROFESSIONAL 14-PIECE KNIFE BLOCK SET	11 40 00
1	FOOD SERVICE EQUIPMENT	NON-SLIP BAMBOO CUTTING BOARDS	11 40 00
8	SILVERWARE	4 PIECE SILVERWARE SET	12 42 16.13
8	HOLLOWWARE	SHALLOW SALAD BOWLS	12 42 19
10	GLASSWARE	DRINKING GLASSES	12 42 23
8	TABLE ACCESSORIES: CERAMICS	DINING PLATES	12 42 13
6	DINING CHAIRS	AXEL STOOLS FOR DINING GUESTS	12 58 19
10	TABLE ACCESSORIES	PLACE MATS	12 42 00
1	WASTE RECEPTACLES	KITCHEN UNDER-THE-COUNTER 7 GALLON TRASH CAN	12 46 00
1	WASTE RECEPTACLES	KITCHEN RECYCLING BIN	12 46 00
1	DINING TABLE	ISLAND KITCHEN TABLE	12 58 19
4	KITCHEN FURNISHINGS	WHITE BAMBOO KITCHEN TOWELS	12 44 00
2	FIRE EXTINGUISHER	FIRE EXTINGUISHER	10 44 16.13



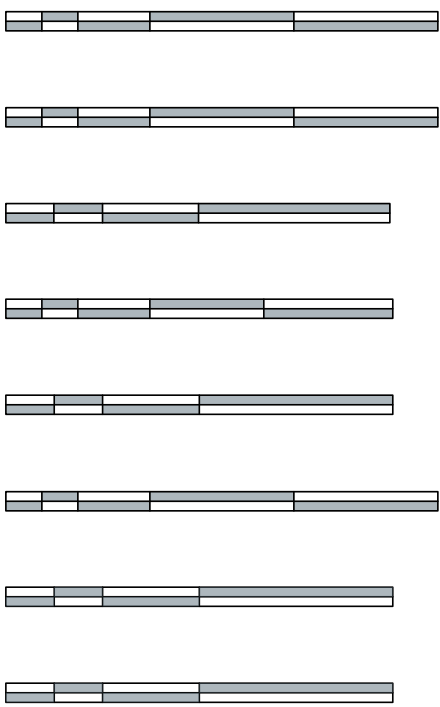
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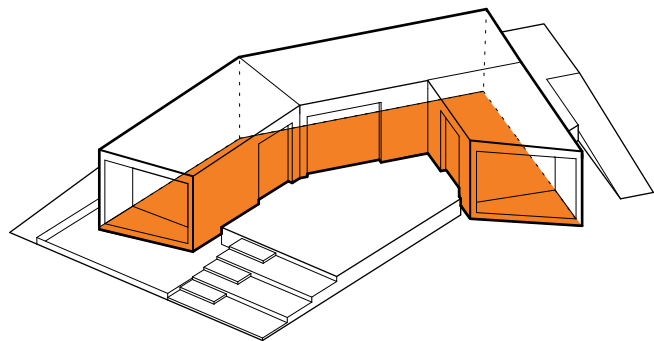
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SHEET INDEX & SYMBOLS

JUNE 02, 2009
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TEAM CAL.
P + E
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SHEET INDEX &
SYMBOLS

P-002



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DRAWN BY: P + E

CHECKED BY: S.J.

SHEET TITLE:

DOMESTIC SUPPLY

P-101



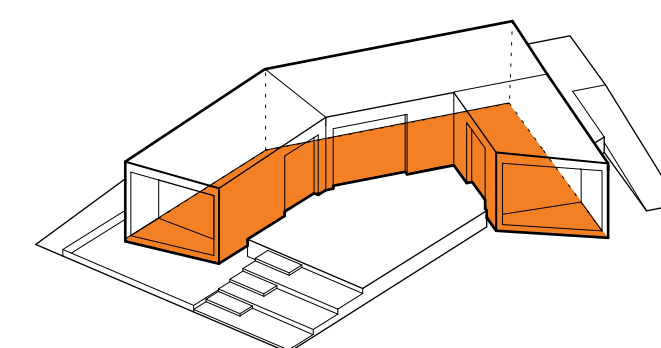
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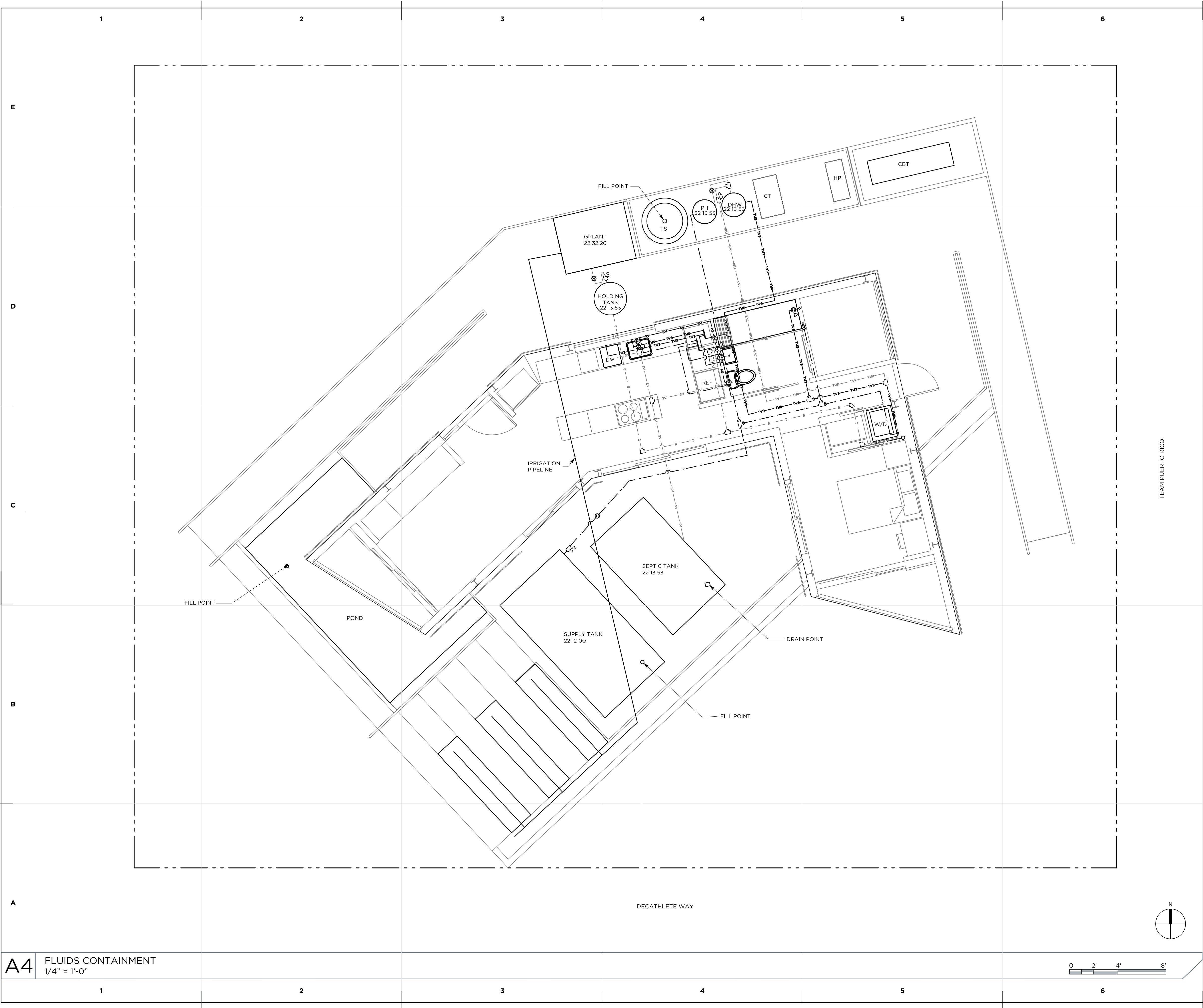
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CHECKED BY:	S.I.
SHEET TITLE:	

P-102



SHEET NOTES

1. ALL HYDRONIC PIPING FOR MECHANICAL SYSTEM IS BASED ON WEST WALL OF MECHANICAL ROOM. ALL PUMPS, VALVES, AND MANIFOLDS ARE LOCATED HERE. CIRCUITS RUN FROM HERE TO MECHANICAL SKID, CHILLED WATER BUFFER TANK, AND ROOF-MOUNTED SOLAR THERMAL ARRAY. CONNECTIONS TO MECHANICAL SKID AND CHILLED WATER BUFFER TANK RUN IN SPACE UNDERNEATH DECK. DETAILED PIPING LAYOUT TO BE DETERMINED IN FIELD DUE TO COMPLEXITY AND SPACE CONSTRAINTS. REFER TO M-101 FOR MECHANICAL EQUIPMENT LOCATIONS, AND M-201 FOR MECHANICAL ROOM DETAILS.
2. HEAT TRANSFER FLUID IS WATER/GLYCOL FOR ALL CIRCUITS, NOT TO EXCEED 20% GLYCOL, AS REQUIRED BY OPERATING LOCATION AND CLIMATE.
3. HEAT PUMP REFRIGERANT IS R-407C
4. WARMBOARD CIRCULATES GLYCOL/WATER FLUID THROUGH CEILING AND FLOOR. REFER TO DRAWINGS M-102 FOR TUBING LAYOUT. LEADERS RUN BACK FROM PANELS TO MANIFOLD LOCATED ON MECHANICAL ROOM WEST WALL.
5. FOR GPLANT AND IRRIGATION DETAILS REFER TO A-XXX
6. ALL VALVES AND UNIONS TO BE SAME SIZE AS LINE UNLESS OTHERWISE INDICATED BY DRAWING. REFER TO SPECIFICATION 22.11.16

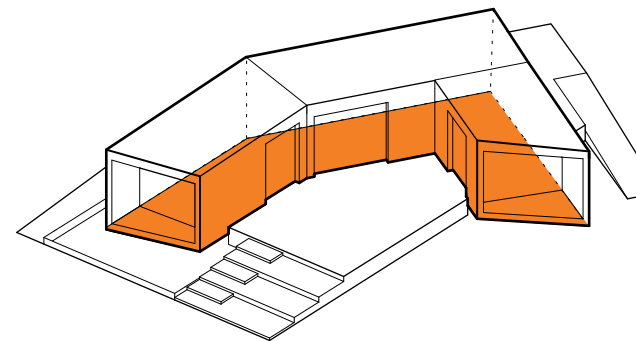
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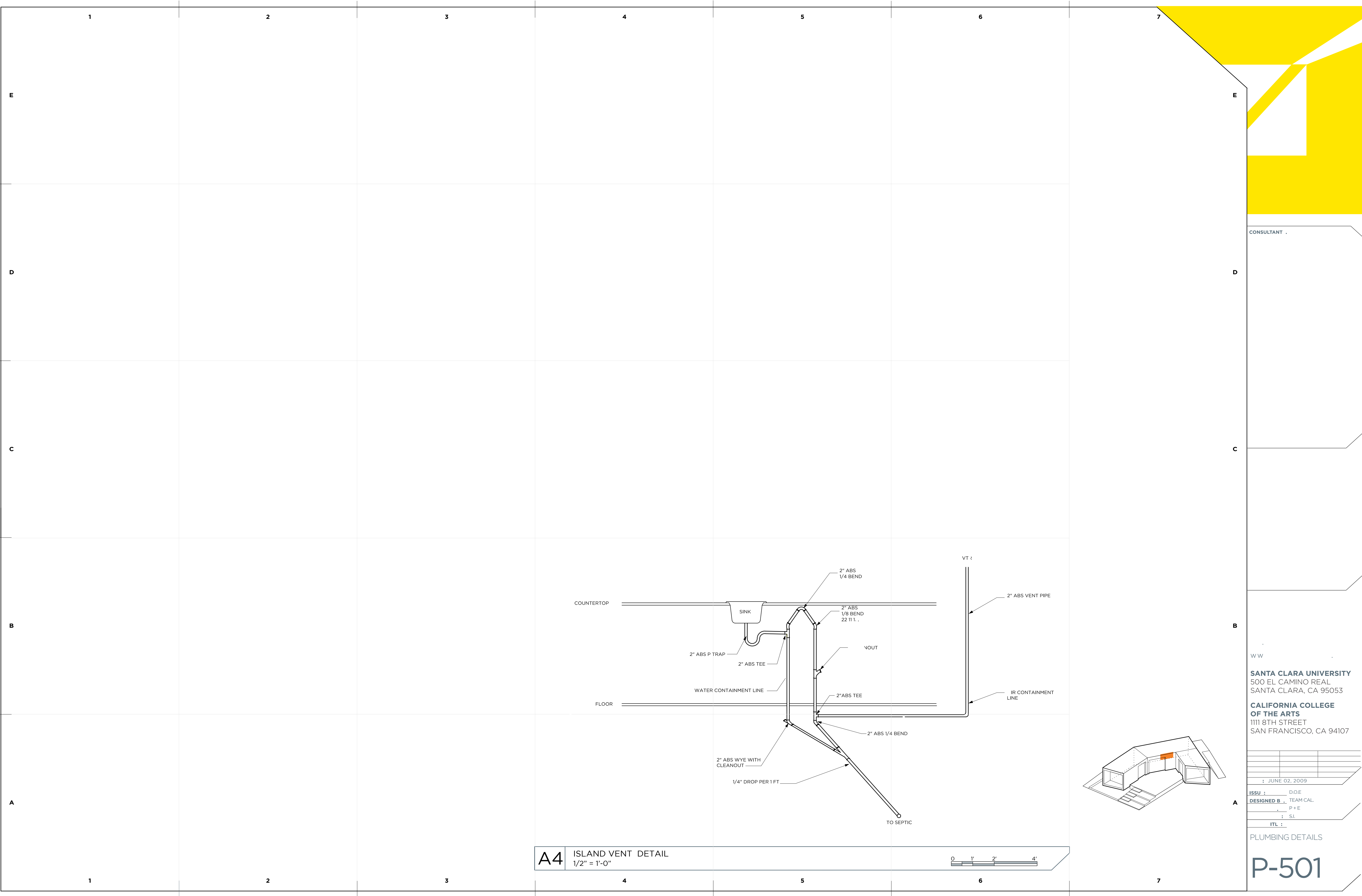
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C4	FLOW METER SCHEDULE NO SCALE
----	---------------------------------

C4	FLOW METER SCHEDULE NO SCALE
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A4 TANK SCHEDULE
NO SCALE



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SCHEDULES

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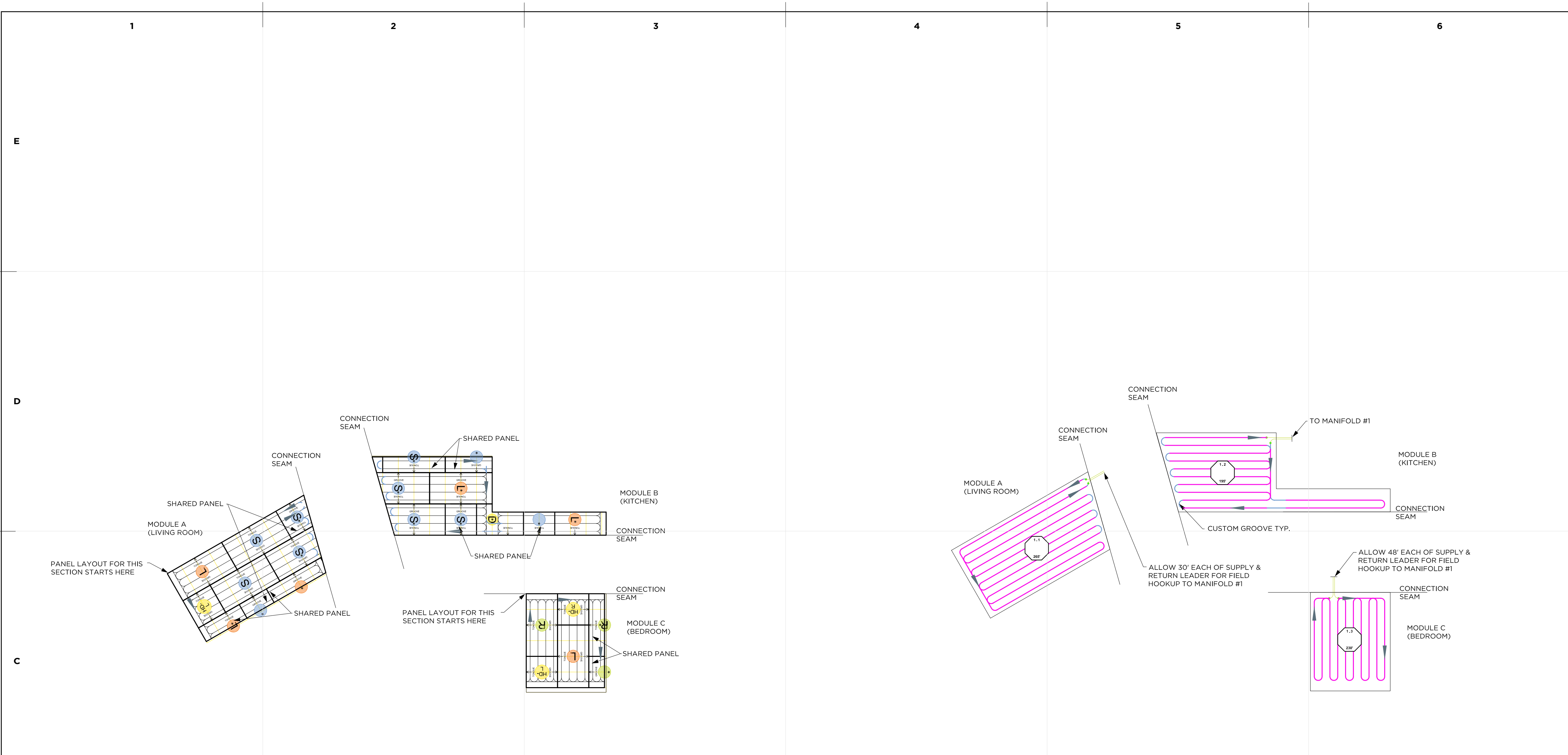
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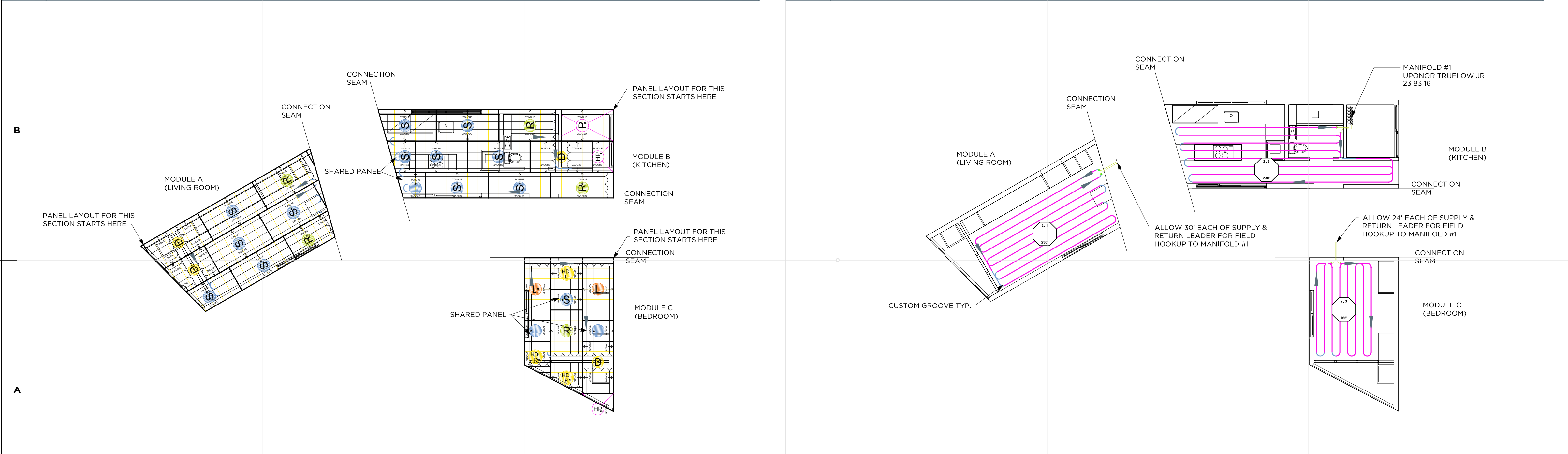
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CONSTRUCTION DRAWINGS

M-101



C1 RADIANT PANEL FLOOR LAYOUT
1/8" = 1'-0"

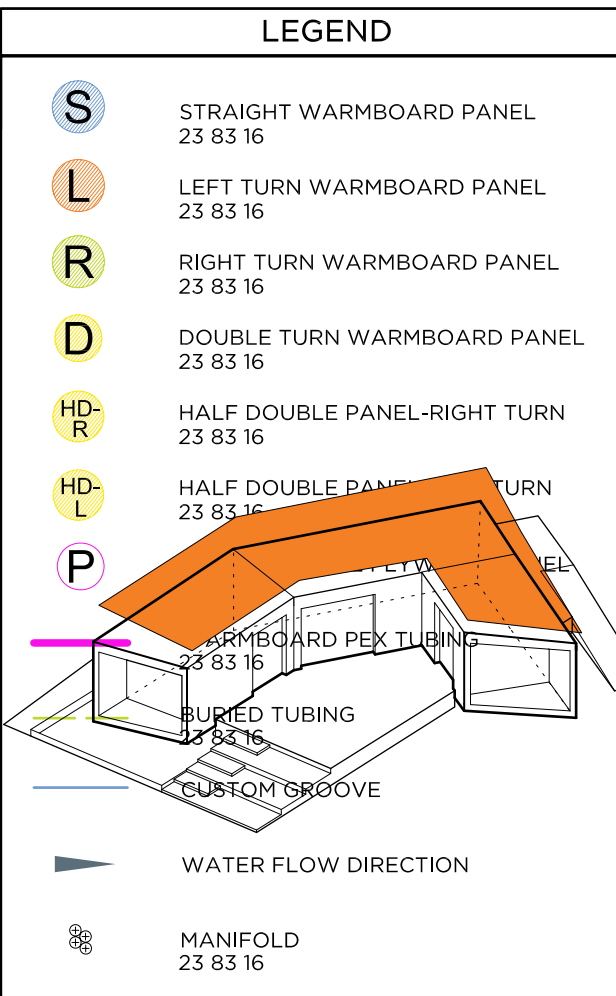


A1 RADIANT PANEL FLOOR LAYOUT
1/8" = 1'-0"

A4 RADIANT TUBING FLOOR LAYOUT
1/8" = 1'-0"

SHEET NOTES

1. WARMBOARD SUBFLOOR IS TO BE INSTALLED PER INSTALLATION MANUAL ONCE STEEL FRAME IS ERECTED, RIM JOISTS ARE BOLTED, AND JOISTS ARE HUNG.
2. CEILING PANELS ARE TO BE INSTALLED TO NAILERS HUNG FROM BAMBOO JOISTS. SEE STRUCTURAL PLANS.
3. TUBING FOR FLOOR PANELS MUST BE INSTALLED BEFORE FLOOR INSULATION IS BLOWN IN.
4. CEILING TUBING IS TO BE INTALLED ONCE WARMBOARD IS HUNG. AFTER CEILING INSULATION IS COMPLETED, BUT RUNNER CHANNELS FOR LEADERS MUST BE PRE-RUN BEFORE INSULATION. LEADERS FOR CEILING RUN UP THROUGH FLOOR, INTO THE WALL, AND INTO THE CEILING SPACE.
5. ALL TUBING LEADERS TERMINATE WITH SHARKBITE CONNECTION TYPE PEX/PEX FIELD CONNECTION POINTS (CSI NUMBER 23 83 16.10) BELOW THE BURY POINT IN BETWEEN JOISTS. LEADERS FROM EACH ZONE ARE RUN BACK TO MANIFOLD DURING ASSEMBLY. LEADERS RUN TO MANIFOLD LOCATED IN MECHROOM THROUGH THE MECHROOM FLOOR.
6. ALL SUPPLY AND RETURN TUBING BELOW SUBFLOOR IN UNCONDITIONED SPACE SHALL BE INSULATED WITH FLEXTHERM WHITE TUBULAR INSULATION OF 1" THICKNESS. MINIMUM R-5.0, CSI NUMBER 23 07 19.
7. RADIANT TUBING SHALL BE 1/2" ID PEX-AL-PEX, MULTILAYER COMPOSITE TUBING BY UPONOR, CSI NUMBER 23 83 16.10.
8. INSTALLING CONTRACTOR IS RESPONSIBLE TO VERIFY ALL MEASUREMENTS PRIOR TO ANY WARMBOARD INSTALLATION.
9. USE ONLY WARMBOARD APPROVED TUBING.
10. PROVIDE BLOCKING WHERE TONGUE AND GROOVE DO NOT MEET. ALWAYS END PANELS ON JOISTS.
11. FILL MISSING SECTIONS OF PLAN WITH SCRAPS OF REGULAR PLY AND/OR WARMBOARD PANELS.
12. USE AN APPROPRIATELY WEIGHTED ROLLER TO PRESS TUBING INTO CHANNELS.
13. INSULATION BELOW WARMBOARD IS MANDATORY FOR PROPER PERFORMANCE.
14. CUSTOM GROOVES SHALL BE ROUTED AS INDICATED ON THE PLANE USING SUPPLIED ROUTER TEMPLATES, A PROPERLY SIZED ROUTER EQUIPPED WITH A TEMPLATE GUIDE AND THE SUPPLIED 5/8" CORE BOX ROUTER BIT.
15. ALIGNMENT PINS SHALL BE USED FOR PROPER ALIGNMENT OF PANELS.
16. ANY EXCESS ADHESIVE THAT MAY INTERFERE WITH TUBING INSTALLATION SHALL BE REMOVED.
17. ALL BURRS LEFT BY CUSTOM ROUTING AND ON ANGLE HOLES SHALL BE REMOVED.
18. HOLES FOR ROUTING BELOW SUBFLOOR SHALL BE DRILLED USING AN 11/16" BIT SO THAT THE END OF THE TUBE CAN BE PASSED FROM THE GROOVE TO UNDER THE FLOOR AREA IN THE RIGHT DIRECTION, LEADING TO THE APPROPRIATE MANIFOLD LOCATION.
19. ALL GROOVES SHALL BE INSPECTED AND CLEANED OF ANY DEBRIS PRIOR TO TUBING INSTALLATION.
20. TUBING SHALL BE AND REMAIN PRESSURIZED IMMEDIATELY FOLLOWING INSTALLATION INTO THE PANEL DIAPHRAGM FOR THE DURATION OF ALL CONSTRUCTION.
21. INSTALLER TO RECORD LENGTH OF EVERY PIPE AND PHOTOGRAPH COMPLETED INSTALLATION.
22. PANEL LAYOUT AND INITIAL DRAWINGS DONE BY WARMBOARD.



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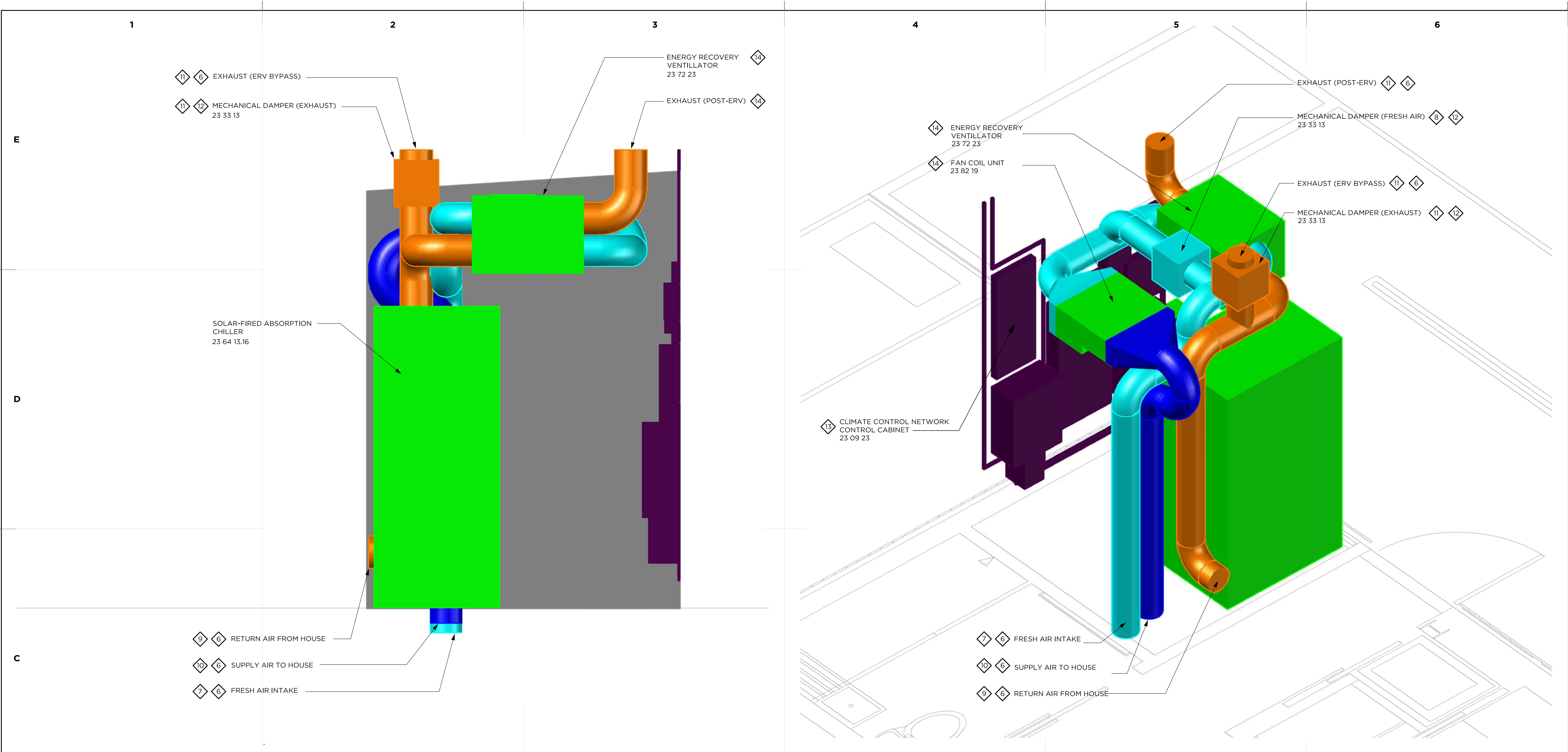
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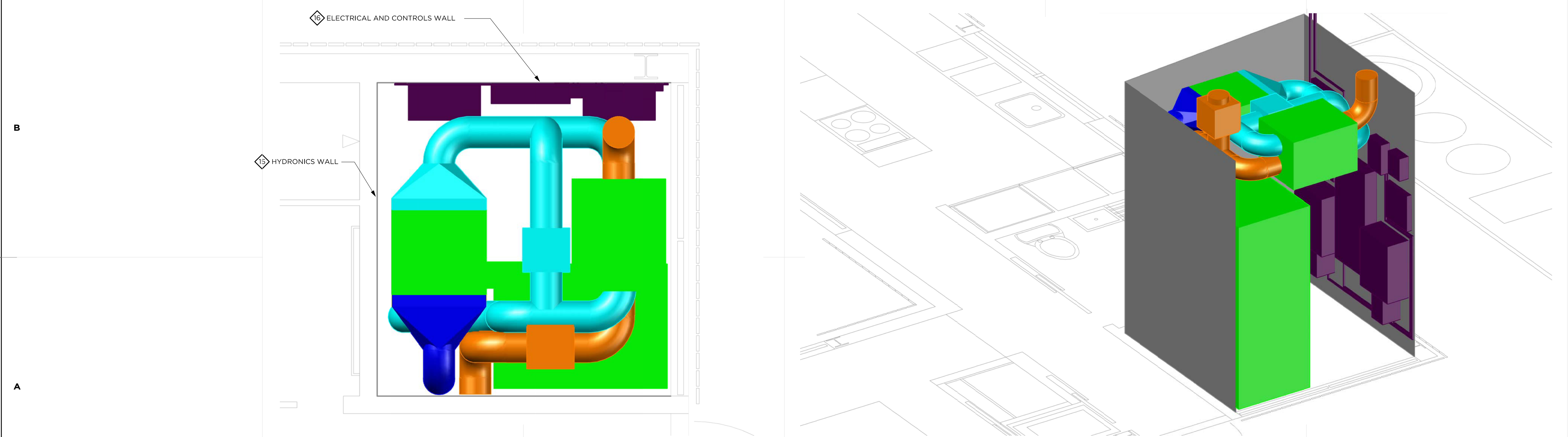
RADIANT LAYOUT

M-102



C1 MECHANICAL ROOM WEST ELEVATION
3/4" = 1'-0"

C4 ISOMETRIC VIEW OF MECHANICAL ROOM DUCTWORK
NO SCALE



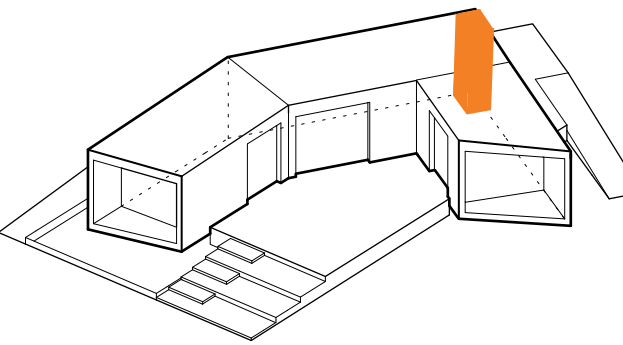
A2 MECHANICAL ROOM PLANVIEW
3/4" = 1'-0"

A4 MECHANICAL ROOM OVERVIEW
NO SCALE

SHEET NOTES

- SEE SCHEMATIC DIAGRAMS M-601
- SEE EQUIPMENT SCHEDULE M-602
- ALL SYSTEM PIPING OTHER THAN RADIANT LOOPS IS COPPER, CSI NUMBER 22 11 13. PUMPS, VALVES, AND ALL CONTROLS LOCATED IN MECHANICAL ROOM. PIPING RUNS TO MECHANICAL SKID AND ROOF-MOUNTED SOLAR THERMAL ARRAY ARE INSULATED AND MODULARLY CONSTRUCTED USING SHARKBITE UNIONS CSI NUMBER 23 83 16.10. INSULATION TO BE FLEXTHERM WHITE TUBULAR INSULATION 1" THICKNESS, MINIMUM R-5.0. CSI NUMBER 23 07 19
- FOR DETAILS ON RADIANT PIPING SEE M-102.
- CONSULT CONSTRUCTION SPECIFICATIONS AND DESIGNER FOR ALL QUESTIONS AND RFIS.
- CUSTOM FABRICATED SHEET METAL DUCTWORK DETERMINED IN-FIELD DUE TO SPACE CONSTRAINTS. CSI INDEX 23 31 13
- FRESH AIR INTAKE IS DUCTED THROUGH FLOOR OF MECHROOM BETWEEN JOISTS TO OPEN SPACE BELOW HOUSE. AIR IS TAKEN FROM BELOW HOUSE. INTAKE FITTED WITH CUSTOM SHIELD CONSISTING OF A 1/4" GRILL IN FRONT OF A FINE SCREEN.
- FRESH AIR DELIVERED TO EITHER FCU OR ERV DEPENDING ON OPERATION MODE. SEE M-601 FOR OPERATION DIAGRAM. MECHANICAL DAMPER CONTROLS AIRFLOW DIRECTION.
- RETURN AIR GRILLE IS WALL MOUNTED IN HALL, DUCTED TO MECHROOM THROUGH WALL TO GRILLE SPECIFIED IN MECHANICAL SCHEDULES ON M-602.
- SUPPLY AIR IS DUCTED THROUGH MECHROOM FLOOR TO CUSTOM DISTRIBUTION BOX LOCATED IN SPACE UNDER THE HOUSE. BOX IS FIELD-INSTALLED DURING ASSEMBLY TO DUCTWORK LOCATED BETWEEN JOISTS. BOX IS STRAPPED TO JOISTS.
- EXHAUST IS VENTED EITHER BEFORE OR AFTER THE ERV DEPENDING ON DAMPER POSITION. SEE M-602 FOR OPERATION DIAGRAM. EXHAUST IS VENTED UP THROUGH JOISTS OUT TO ROOF TO VENT. GRAVITY VENT SPECIFIED IN SCHEDULES M-602.
- MECHANICAL DAMPERS ARE RETROFIT VAV BOXES. SEE MECHANICAL SCHEDULE FOR DETAILS.
- ALL CONTROLS ARE UPONOR CLIMATE CONTROL NETWORK DDC. MAIN CONTROLLER UNITS LOCATED IN NETWORK CONTROLS CABINET. REFER TO SCHEDULES M-602 FOR COMPLETE LISTING OF CONTROLS EQUIPMENT.
- FAN COIL UNIT AND ERV ARE CEILING-MOUNTED.
- WEST WALL OF MECHANICAL ROOM IS CENTRAL HUB OF THE HYDRONIC SYSTEM. ALL PIPING LOOPS ON M-601 ARE PLUMBED PRIMARILY ON THIS WALL, AND ALL PUMPS, CONTROL VALVES, ETC ARE LOCATED HERE. DETAILED LOCATIONS OF PIPING AND COMPONENTS TO BE DETERMINED IN FIELD BY INSTALLER, DUE TO SPACE CONSTRAINTS.
- NORTH WALL OF MECHANICAL ROOM IS ELECTRICAL AND CONTROLS WALL. NETWORK CABINET IS LOCATED HERE, AS WELL AS ALL THE DC AND AC ELECTRICAL JUNCTIONS, INVERTERS, ETC. SEE E-201 FOR ELECTRICAL EQUIPMENT LAYOUT; HOUSE DATA LOGGING AND NETWORK EQUIPMENT ALSO LOCATED HERE. SEE T-SERIES.

LEGEND	
	SUPPLY AIR DUCT
	FRESH AIR DUCT
	EXHAUST AIR DUCT
	MECHANICAL EQUIPMENT/TANKS
	ELECTRICAL EQUIPMENT



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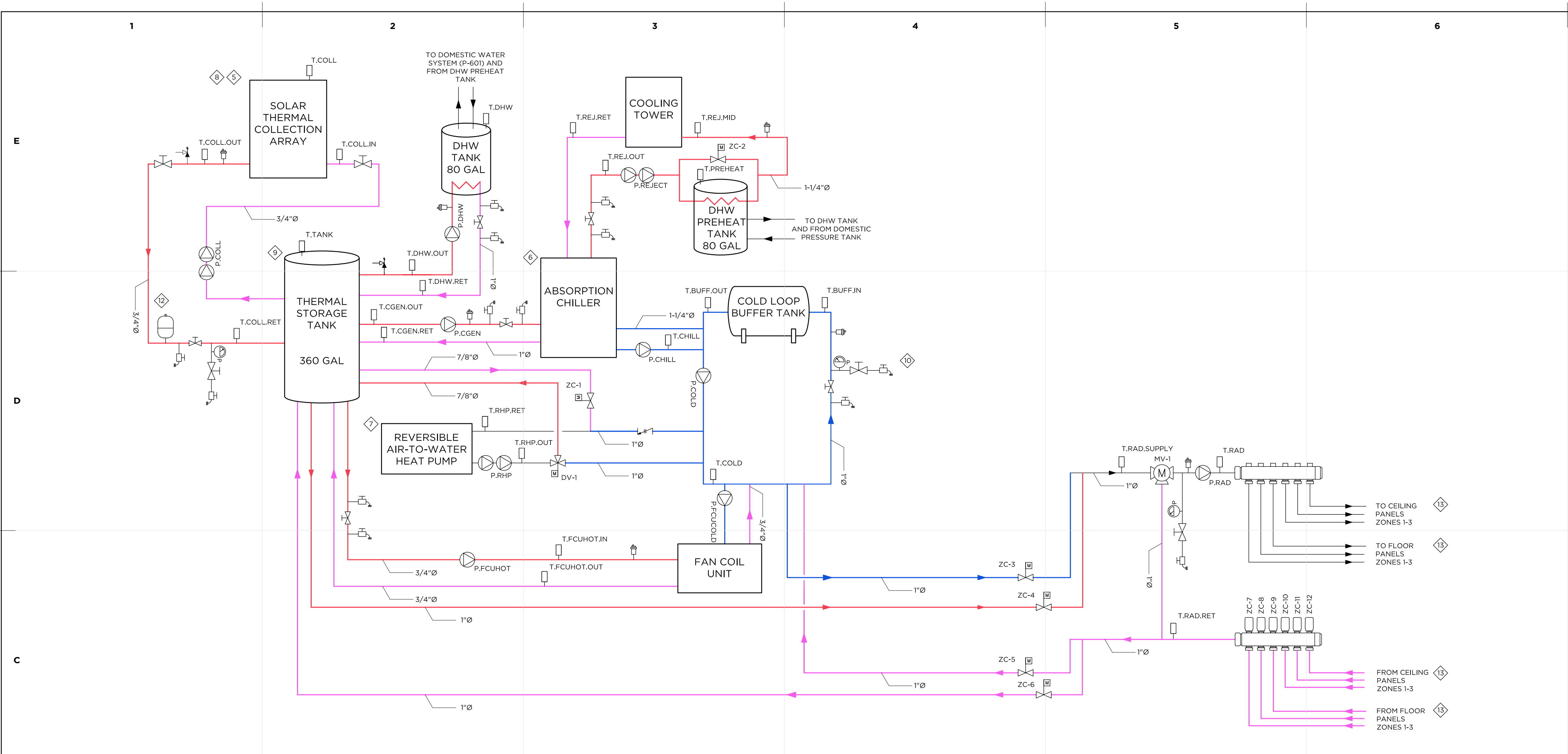
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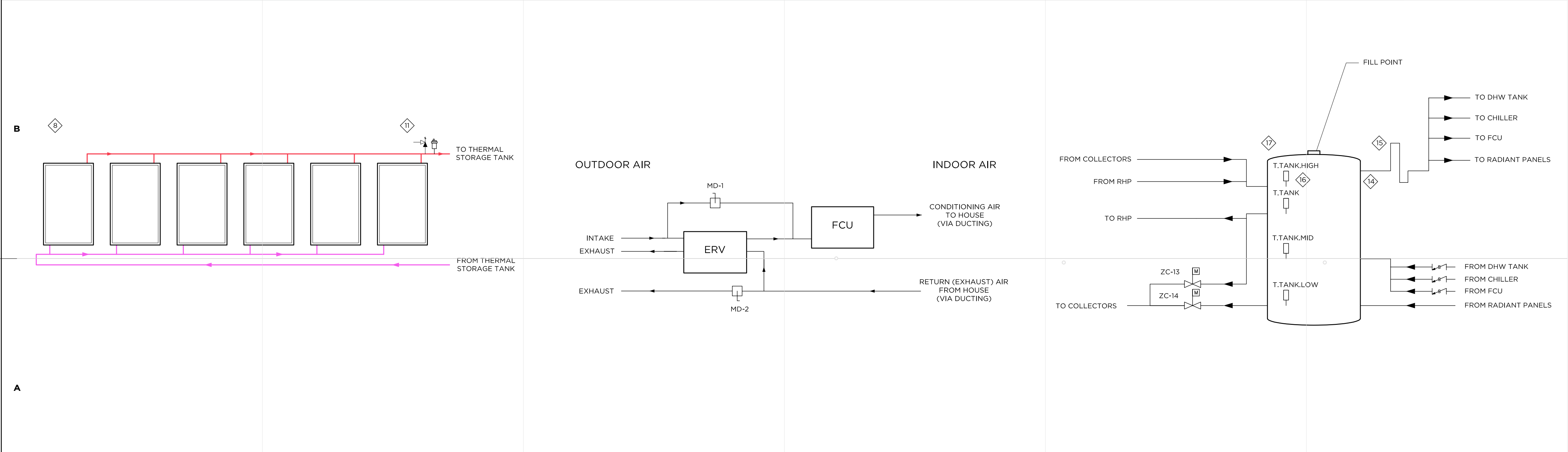
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MECHANICAL ROOM

M-201



C1 MECHANICAL SYSTEM SCHEMATIC
NO SCALE



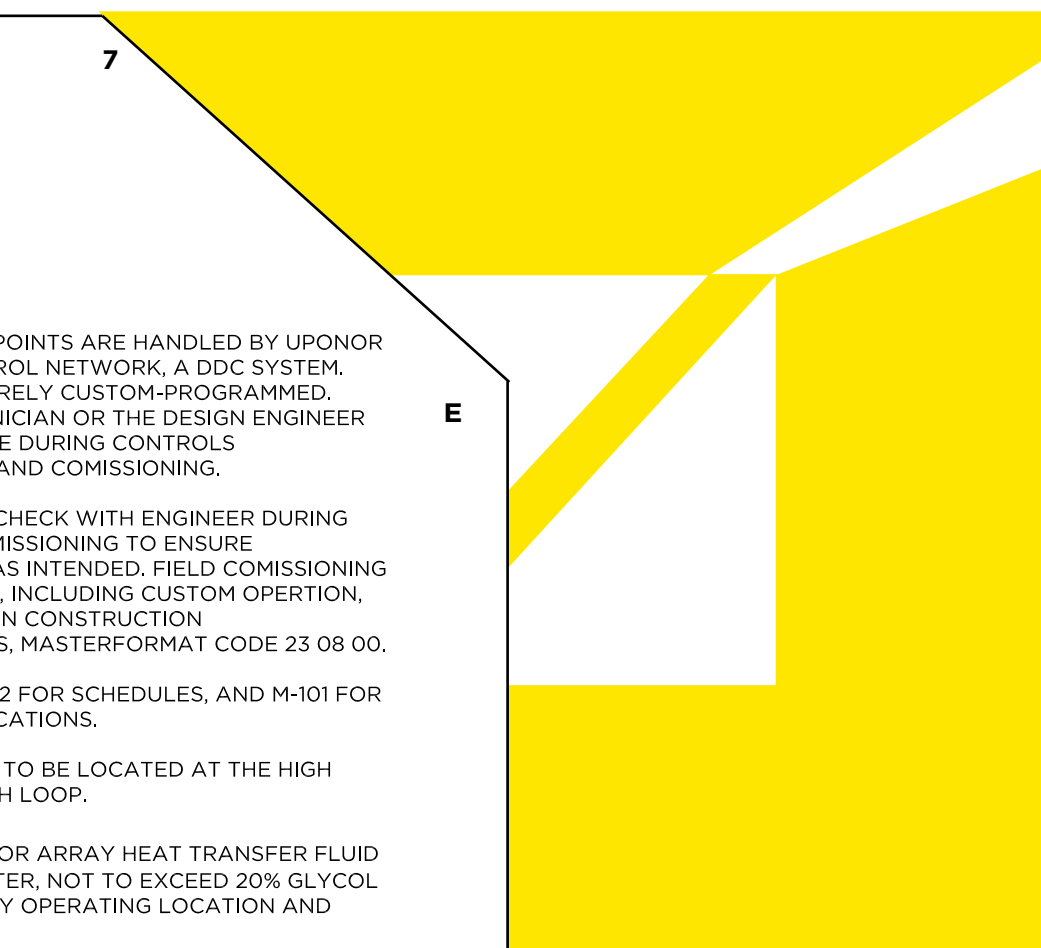
A1 SOLAR ARRY SCHEMATIC
NO SCALE

A3 THERMAL STORAGE TANK DETAIL SCHEMATIC
NO SCALE

A5 THERMAL STORAGE TANK DETAIL SCHEMATIC
NO SCALE

SHEET NOTES

- ALL CONTROL POINTS ARE HANDLED BY UPONOR CLIMATE CONTROL NETWORK, A DDC SYSTEM. SYSTEM IS ENTIRELY CUSTOM-PROGRAMMED. UPONOR TECHNICIAN OR THE DESIGN ENGINEER IS TO BE ON SITE DURING CONTROLS INSTALLATION AND COMISSIONING.
- INSTALLER TO CHECK WITH ENGINEER DURING EXTENSIVE COMISSIONING TO ENSURE OPEARATION IS AS INTENDED. FIELD COMISSIONING REQUIREMENTS, INCLUDING CUSTOM OPEARTION, ARE DETAILED IN CONSTRUCTION SPECIFICATIONS, MASTERFORMAT CODE 23 08 00.
- REFER TO M-602 FOR SCHEDULES, AND M-101 FOR EQUIPMENT LOCATIONS.
- AIR VENTS ARE TO BE LOCATED AT THE HIGH POINTS OF EACH LOOP.
- SOLAR COLLCTOR ARRAY HEAT TRANSFER FLUID IS GLYCOL/WATER, NOT TO EXCEED 20% GLYCOL AS REQUIRED BY OPERATING LOCATION AND SEASON.
- CHILLER REFRIGERANT IS WATER, DESSICANT IS LiBr
- HEAT PUMP REFRIGERANT IS R-407C, FACTORY SEALED
- SOLAR COLLECTOR ARRAY IS ROOF MOUNTED. SEE ARCHITECTURAL SHEETS FOR LAYOUT AND RACKING DETAILS
- TANK CONNECTIONS SHOWN DIAGRAMATICALLY. REFER TO DETAIL A5/- FOR ACTUAL CONNECTION LOCATIONS
- PER CONTEST REGULATIONS, ALL CLOSED LOOPS MUST BE TESTED AT 100PSI FOR 15 MINUTES TO CHECK FOR LEAKS. THIS IS THAT REQUIRED ASSEMBLY.
- PTR VALVE WILL BE LOCATED TO MAKE IT IMPOSSIBLE TO ISOLATE, BUT MUST BE REMOVABLE FOR PRESSURE TESTING. PTR VALVE WILL BE DRAINED PROPERLY TO A SMALL CONTAINER ON THE TANK SKID.
- EXPANSION TANK IS LOCATED UNDER THE DECK. AS PART OF THE THE PIPING RUN FROM THE THERMAL STORAGE TANK TO THE COLLECTOR PUMP IN THE MECHANICAL ROOM. IT SITS ON BLOCKING ON THE GROUND BETWEEN THE DECK MODULE JOISTS. SEE ARCHITECTURAL SHEETS FOR DECK PLAN AND PLACE ACCORDINGLY.
- RADIANT PANELS ARE WARMBOARD. SEE M-102 FOR PANEL AND TUBING LAYOUTS.
- ALL TANK FITTINGS ARE 2" NPT, EXCEPT FILL FITTING WHICH IS 4" NPT
- HEAT TRAP PREVENTS THERMOSIPHON. OTHER CIRCUITS PROTECTED BY SWING-TYPE CHECK VALVES OR NORMALLY-CLOSED ZONE VALVES
- TANK TEMPERATURE SENSORS ARE 3/4" NPT FITTINGS ON THE TANK WALL AT SAME HEIGHTS AS ASSOCIATED INLETS AND EXITS.
- TANK IS CUSTOM 36" DIAMETER ASME PRESSURE VESSEL. MASTERFORMAT CODE 23 71 13.23, SEE M-602 FOR SCHEDULE.



CONSULTANTS:

LEGEND

	ZONE CONTROL VALVE 23 09 13.33
	THREEWAY ZONE CONTROL VALVE 23 09 13.33
	MIXING VALVE 23 09 13.33
	MANUAL GATE VALVE 23 05 23
	CHECK VALVE 23 05 23
	PUMP 23 21 23.13
	THERMOMETER 23 09 13.23
	MECHANICAL DAMPER 23 33 13
	EXPANSION TANK 23 05 16
	PTR VALVE 23 05 23
	PRESSURE GAUGE 23 05 19
	HOSE BIB/DRAIN CONNECTIONS 23 05 23
	MANIFOLD WITH ZONE CONTROL VALVES 23 09 13.33
	MANIFOLD WITHOUT ZONE CONTROL VALVES 23 09 13.33
	HOT WATER (COPPER PIPE) 22 11 13
	CHILLED WATER (COPPER PIPE) 22 11 13
	RETURN WATER (COPPER PIPE) 22 11 13
	COPPER PIPE 22 11 13

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DATE: JUNE 02, 2009

ISSUE: D.O.E

DESIGNED BY: TEAM CAL.

DRAWN BY: TS

CHECKED BY: TS

SHEET TITLE:

SCHEMATIC DIAGRAMS

M-601

1		2			3			4			5			6			7																												
E	CONTROL VALVES AND DAMPER ACTUATORS																																												
	NAME	TYPE	MAKE	MODEL	MASTER FORMAT CODE																																								
	ZC-1	2-WAY ZONE CONTROL VALVE	BELIMO	2-WAY ELECTRONIC ZONE CONTROL VALVE, 1" SWEAT	23 09 13.33																																								
	ZC-2	2-WAY ZONE CONTROL VALVE	BELIMO	2-WAY ELECTRONIC ZONE CONTROL VALVE, 1.25" SWEAT	23 09 13.33																																								
	ZC-3	2-WAY ZONE CONTROL VALVE	BELIMO	2-WAY ELECTRONIC ZONE CONTROL VALVE, 1" SWEAT	23 09 13.33																																								
	ZC-4	2-WAY ZONE CONTROL VALVE	BELIMO	2-WAY ELECTRONIC ZONE CONTROL VALVE, 1" SWEAT	23 09 13.33																																								
	ZC-5	2-WAY ZONE CONTROL VALVE	BELIMO	2-WAY ELECTRONIC ZONE CONTROL VALVE, 1" SWEAT	23 09 13.33																																								
	ZC-6	2-WAY ZONE CONTROL VALVE	BELIMO	2-WAY ELECTRONIC ZONE CONTROL VALVE, 1" SWEAT	23 09 13.33																																								
	ZC-7	MANIFOLD ZONE CONTROL VALVE	UPONOR	THERMAL ACTUATOR FOR TRUFLOW MANIFOLD	23 09 13.33																																								
	ZC-8	MANIFOLD ZONE CONTROL VALVE	UPONOR	THERMAL ACTUATOR FOR TRUFLOW MANIFOLD	23 09 13.33																																								
	ZC-9	MANIFOLD ZONE CONTROL VALVE	UPONOR	THERMAL ACTUATOR FOR TRUFLOW MANIFOLD	23 09 13.33																																								
	ZC-10	MANIFOLD ZONE CONTROL VALVE	UPONOR	THERMAL ACTUATOR FOR TRUFLOW MANIFOLD	23 09 13.33																																								
	ZC-11	MANIFOLD ZONE CONTROL VALVE	UPONOR	THERMAL ACTUATOR FOR TRUFLOW MANIFOLD	23 09 13.33																																								
	ZC-12	MANIFOLD ZONE CONTROL VALVE	UPONOR	THERMAL ACTUATOR FOR TRUFLOW MANIFOLD	23 09 13.33																																								
D	ZC-13	2-WAY ZONE CONTROL VALVE	BELIMO	2-WAY ELECTRONIC ZONE CONTROL VALVE, 1" SWEAT	23 09 13.33																																								
	ZC-14	2-WAY ZONE CONTROL VALVE	BELIMO	2-WAY ELECTRONIC ZONE CONTROL VALVE, 1" SWEAT	23 09 13.33																																								
	MV-1	3-WAY MODULATING VALVE	UPONOR	3-WAY MODULATING VALVE, 1 " SWEAT CONNECTION	23 09 13.33																																								
	DV-1	3-WAY DIVERTING VALVE	BELIMO	2-WAY ELECTRONIC ZONE CONTROL VALVE, 1.25" SWEAT	23 09 13.33																																								
	MD-1	MECHANICAL DAMPER ACTUATOR	BELIMO	DIRECT COUPLED ACTUATOR LMB24-SR	23 09 13.43																																								
	MD-2	MECHANICAL DAMPER ACTUATOR	BELIMO	DIRECT COUPLED ACTUATOR LMB24-SR	23 09 13.43																																								
	C1		CONTROL VALVE AND DAMPER ACTUATOR SCHEDULE NO SCALE													C2		AIR HANDLING EQUIPMENT SCHEDULE NO SCALE													C5		HEAT PUMP AND CHILLER PLANT SCHEDULE NO SCALE												
	B	DDC CONTROL EQUIPMENT																																											
		NAME	COUNT	LOCATION	MAKE	MASTER FORMAT CODE																																							
		TEMP SENSOR (OUTDOOR)	1	ON ROOF ABOVE MECHROOM	UPONOR	23 09 13.23																																							
		TEMP SENSOR (SLAB)	6	IN-FLOOR AT BEGINNING OF RADIANT TUBING RUNS	UPONOR	23 09 13.23																																							
		WALL TEMP SENSOR (NO DISPLAY)	3	AS SPECIFIED ON M-101	UPONOR	23 09 13.23																																							
		THERMOSTAT (WALL DISPLAY)	1	AS SPECIFIED ON M-101	UPONOR	23 09 13																																							
		ROUTER MAIN CONTROLLER	1	IN NETWORK CONTROLS CABINET (M-201)	UPONOR	23 09 00																																							
PRIMARY EQUIPMENT CONTROLLER		1	IN NETWORK CONTROLS CABINET (M-201)	UPONOR	23 09 00																																								
SUPPLY WATER TEMP CONTROLLER		1	IN NETWORK CONTROLS CABINET (M-201)	UPONOR	23 09 00																																								
CONTROL CABINET, 4 POSITION			ON CONTROLS WALL (M-201)	UPONOR	23 09 00																																								
FURNACE/AC CONTROL BOARD		1	ON FCU (M-201)	UPONOR	23 09 00																																								
HRV CONTROL BOARD		1	ON ERV (M-201)	UPONOR	23 09 00																																								
ZONE VALVE AND DAMPER CONTROL BOARD		2	ON HYDRONICS WALL (M-201)	UPONOR	23 09 00																																								
GENERIC I/O CONTROL MODULE		1	IN NETWORK CONTROLS CABINET (M-201)	UPONOR	23 09 00																																								
A	BOILER RELAY BOX	1	ON HYDRONICS WALL (M-201)	UPONOR	23 09 00																																								
	PUMP RELAY BOX	13	ON PUMPS ON HYDRONICS WALL	UPONOR	23 09 00																																								
	TRANSFORMER (50 VA)	4	WITH ASSOCIATED EQUIPMENT	UPONOR	23 09 00																																								
	A1		DDC CONTROL EQUIPMENT SCHEDULE NO SCALE													A3		TEMPERATURE SENSOR SCHEDULE NO SCALE													A5		PUMP SCHEDULE NO SCALE												
	1		2			3			4			5			6			7																											

SOLAR THERMAL COLLECTORS							
MAKE	MODEL	TYPE	AREA	DIMENSIONS (GROSS)	EFFICIENCY (ASHRAE)	HEAT LOSS COEFFICIENT (ASHRAE)	MASTER FORMAT CODE
SCHUCO	SCHUCOSOL DG	FLAT PLATE, DOUBLE GLAZED	29 SQ. FT	84.5" X 59.5" X 4.5"	.79	3.9 W/M²K	23 56 13.13

TANKS							
MAKE	FUNCTION	TYPE	SIZE	DIAMETER	HEIGHT OR LENGTH	INSULATION	MASTER FORMAT CODE
NILES	THERMAL STORAGE	PRESSURIZED BUFFER TANK	360 GAL	36"	7'-10"	BLOWN CLOSED-CELL FOAM, R-20	23 71 13.23
SUPERSTOR	DHW	INDIRECT DHW	80 GAL	24"	6'-0"	FACTORY JACKED	22 35 29.16
SUPERSTOR	DHW PREHEAT	INDIRECT DHW	80 GAL	24"	6'-0"	FACTORY JACKETED	22 35 29.16
NILES	CHILLED WATER BUFFER	PRESSURIZED HORIZONTAL BUFFER TANK	130 GAL	2'-0"	7'-6"	BLOWN CLOSED-CELL FOAM, R-15	23 71 16

AIR HANDLING EQUIPMENT							
TYPE	UNIT	CORE	AIR FLOW	POWER	MASTER FORMAT CODE		
FAN COIL UNIT	RITTLING FCHP-04	4 ROW COOL, 1 ROW HEAT	150-250	90W	23 82 19		
ENERGY RECOVERY VENTILATOR	RENEWAIRE EV200	ENTHALPY PLATE	100-200	137W	23 72 23		

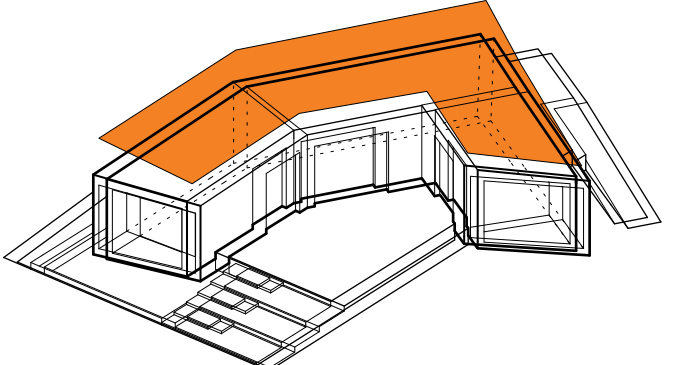
HEAT PUMPS AND CHILLER PLANTS								
TYPE	MAKE AND MODEL	POWER	VOLTAGE	WEIGHT	REFRIGERANT TYPE	EFF	ELECTRIC POWER	MASTER FORMAT CODE
REVERSIBLE HEAT PUMP	MULTIAQUA MAC-036	36,000 BTU/HR	208/230 - 60 HZ	310 LBS	R-407C	13.0 EER	3300 W	23 81 43
ABSORPTION CHILLER	SONNENKLIMA SUNINVERSE 10KW	34,100 BTU/HR	230 V - 1 PH 50 HZ	1200 LBS	LIBR AND WATER	0.79 COP	120 W	23 64 13.16
COOLING TOWER	SONNENKLIMA WCT23KW	80,000 BTU/HR	230 V - 1 PH 50 HZ	330 LBS	WATER	N/A	350 W	23 65 13.13

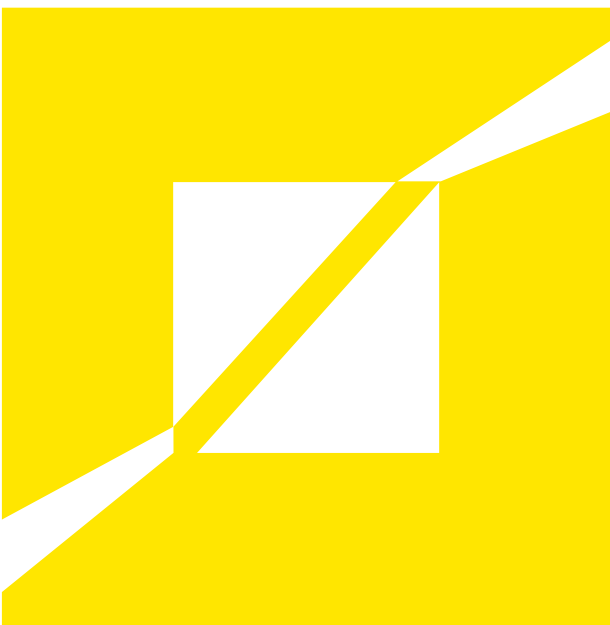
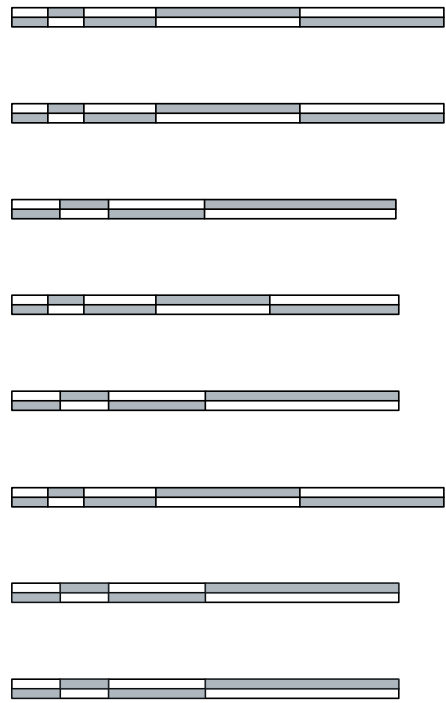
REGISTER AND VENT SCHEDULE							
TYPE	LOCATION	FLOW RATE	MAKE	MODEL	SIZE	MASTER FORMAT CODE	
SUPPLY DIFFUSER LINEAR BAR FLOOR TYPE	BEDROOM	75 CFM	TITUS	CT-480	3" X 12"	23 37 13.10	
SUPPLY DIFFUSER LINEAR BAR FLOOR TYPE	KITCHEN	75 CFM	TITUS	CT-480	3" X 12"	23 37 13.10	
SUPPLY DIFFUSER LINEAR BAR FLOOR TYPE	LIVING ROOM	50 CFM	TITUS	CT-480	3" X 12"	23 37 13.10	
SUPPLY DIFFUSER LINEAR BAR FLOOR TYPE	LIVING ROOM	50 CFM	TITUS	CT-480	3" X 12"	23 37 13.10	
RETURN GRILLE WALL TYPE	HALLWAY NEAR MECHROOM	250 CFM	TITUS	AEROBLADE GRILL 56-FL	18" X 24"	23 37 13.30	
GRAVITY VENT	ROOF EXHAUST	250 CFM	GREENHECK	GRSR-10	10"	23 37 13	

MECHANICAL DAMPERS							
APPLICATION	MAKE	MODEL	MASTERFORMAT CODE				
EXHAUST OPERATION	TITUS	VAV RETROFIT TERMINAL DECV 8"	23 33 13				
INTAKE OPERATION	TITUS	VAV RETROFIT TERMINAL DECV 8"	23 33 13				

CONSULTANTS:							
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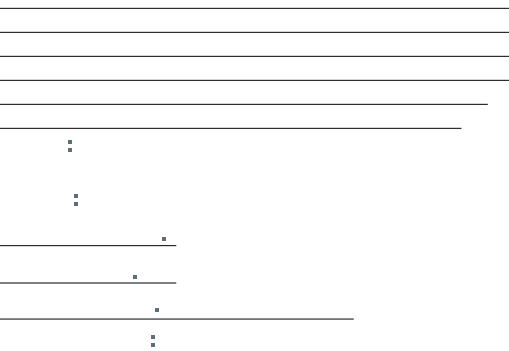
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M-602							

							
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ELECT I

SOLAR DECATHLON
CONSTRUCTION DRAWINGS



[illegible]

ELECTRICAL DESIGN SUMMARY

THE ENERGY OF THE HOUSE IS PRIMARILY POWERED THROUGH THE PHOTOVOLTAIC ARRAY. WITH THE ARRAY THAT IS CURRENTLY SETUP, WE CAN EXPECT TO BE PROVIDING ENERGY TO THE GRID RATHER THAN US DEPENDING ON THE ENERGY FROM THE GRID.

FROM THE PHOTOVOLTAIC ARRAY, THE DC ENERGY IS BROUGHT TO THE INVERTERS WHERE THE ENERGY IS CONVERTED TO USABLE AC HOUSE ENERGY. BEFORE MAKING IT TO THE MAIN CIRCUIT BREAKER PANEL, THE ENERGY COMES TO A LOAD CENTER.

THE MAIN CIRCUIT BREAKER THAT WE ARE UTILIZING HAS THE ABILITY TO CONTROL AND MONITOR THE ENERGY THAT IS BEING DISTRIBUTED THROUGHOUT THE HOUSE.

THE MAIN ELECTRICAL SYSTEM IS BEING CONTROLLED BY SQUARE D'S POWERLINK G3 3000 LIGHTING CONTROL SYSTEM. THE LIGHTING CONTROL SYSTEM IS CONTROLLED BY CLIPSAL RELAYS THAT WILL BE MONITORED BY THE OBVIUS MONITORING SYSTEM.

ELECTRICAL CONTACT

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RNAVARRO@SCU.EDU
(951) 533-1215

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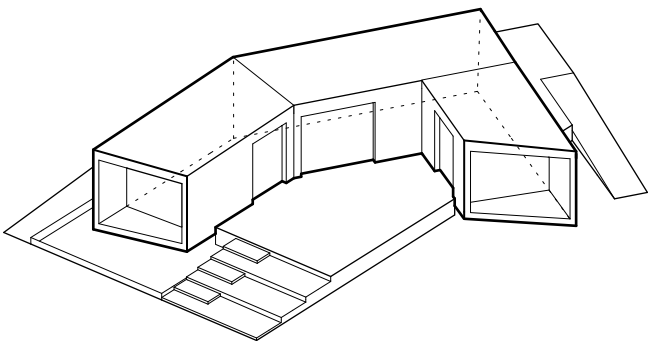
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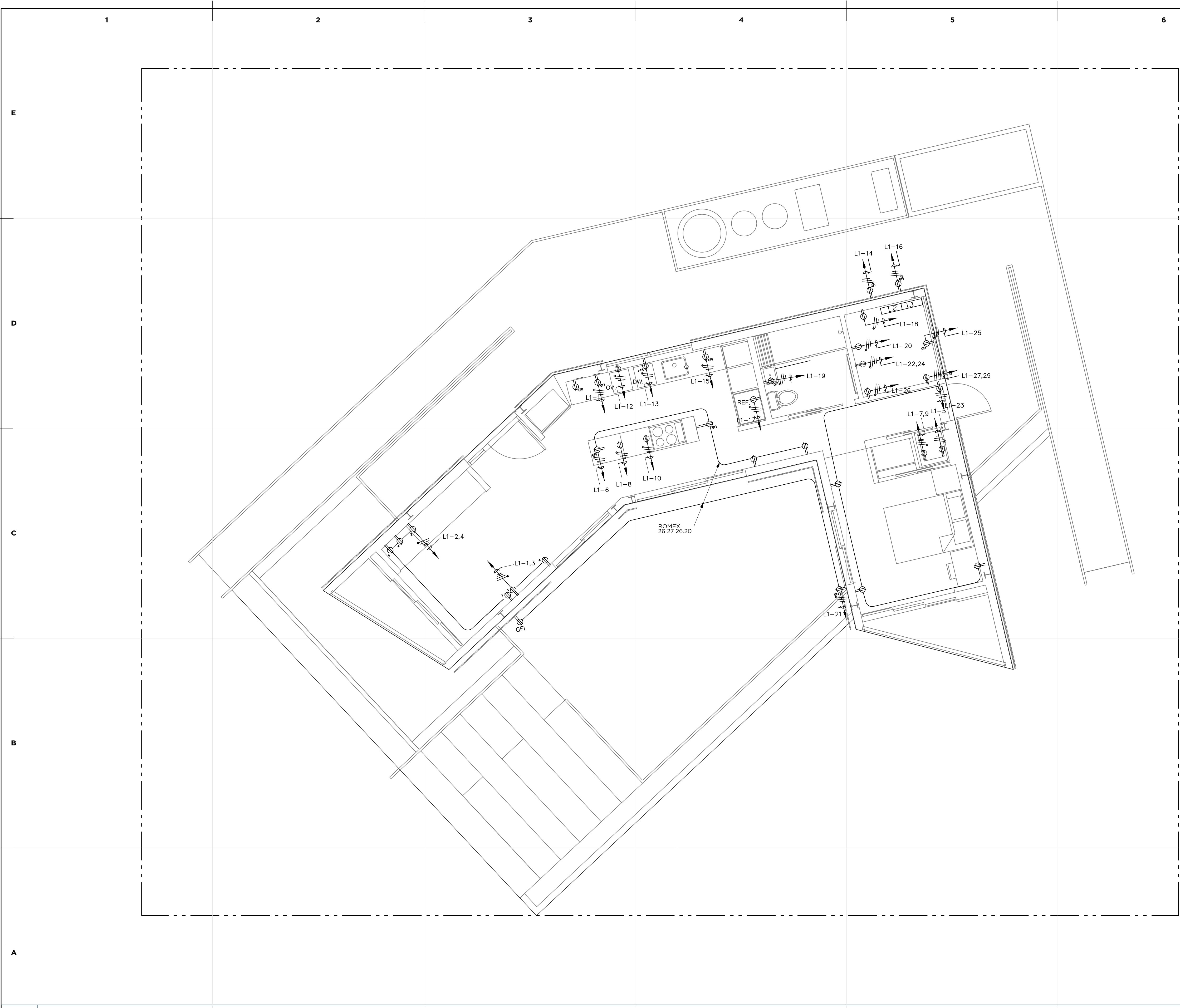
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SHEET INDEX & SYMBOLS




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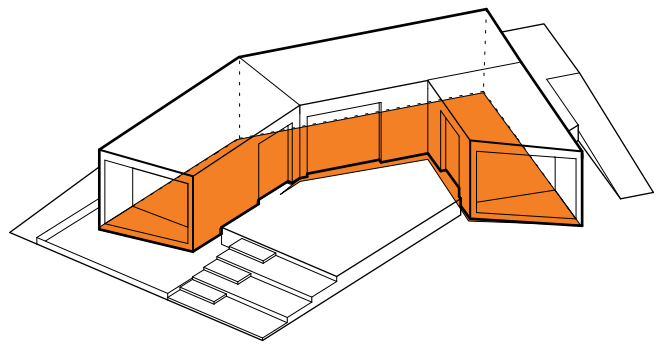
E-002	SHEET INDEX & SYMBOLS
E-101	ELECTRICAL PLAN
E-104	LIGHTING PLAN
E-201	EQUIPMENT
E-601	THREE LINE DIAGRAM
E-602	ELECTRICAL SCHEDULES





- SHEET NOTES**
- CONSTRUCTION DOCUMENTS ARE CONSIDERED WORKING DRAFTS FOR REFERENCE ONLY UNTIL PROJECT IS COMPLETE
 - REFER TO E-602 PANEL SCHEDULES, FOR INDIVIDUAL CIRCUIT SCHEDULE
 - ALL LINES ARE DISTRIBUTED AND CONTROLLED BY THE SQUARE D POWERLINK G3 3000 PANELBOARD
 - FOR ANY LINE THAT CONTAINS MORE THAN ONE CIRCUIT, REFERENCE NUMBER NEXT TO OUTLET SYMBOL
 - UNLESS OTHERWISE NOTED ALL DUPLEX RECEPTACLES ARE 120V DUPLEX RECEPTACLES
 - ALL ELECTRIC WIRING TO THE OUTLETS NOTED IN THE DRAWING ARE ROMEX.
 - REFER TO GENERAL NOTES FOR ELECTRICAL SYMBOLS NOT LISTED IN LEGEND
 - REFER TO MASTER FORMAT CODE FOR EQUIPMENT USED

LEGEND	
	120V DUPLEX RECEPTACLE 26 27 26.20
	240V SINGLE RECEPTACLE 26 27 26.20
	120V DOUBLE RECEPTACLE GFCI PROTECTED 26 27 26.20



A1 ELECTRICAL FLOOR PLAN
1/4" = 1'-0"

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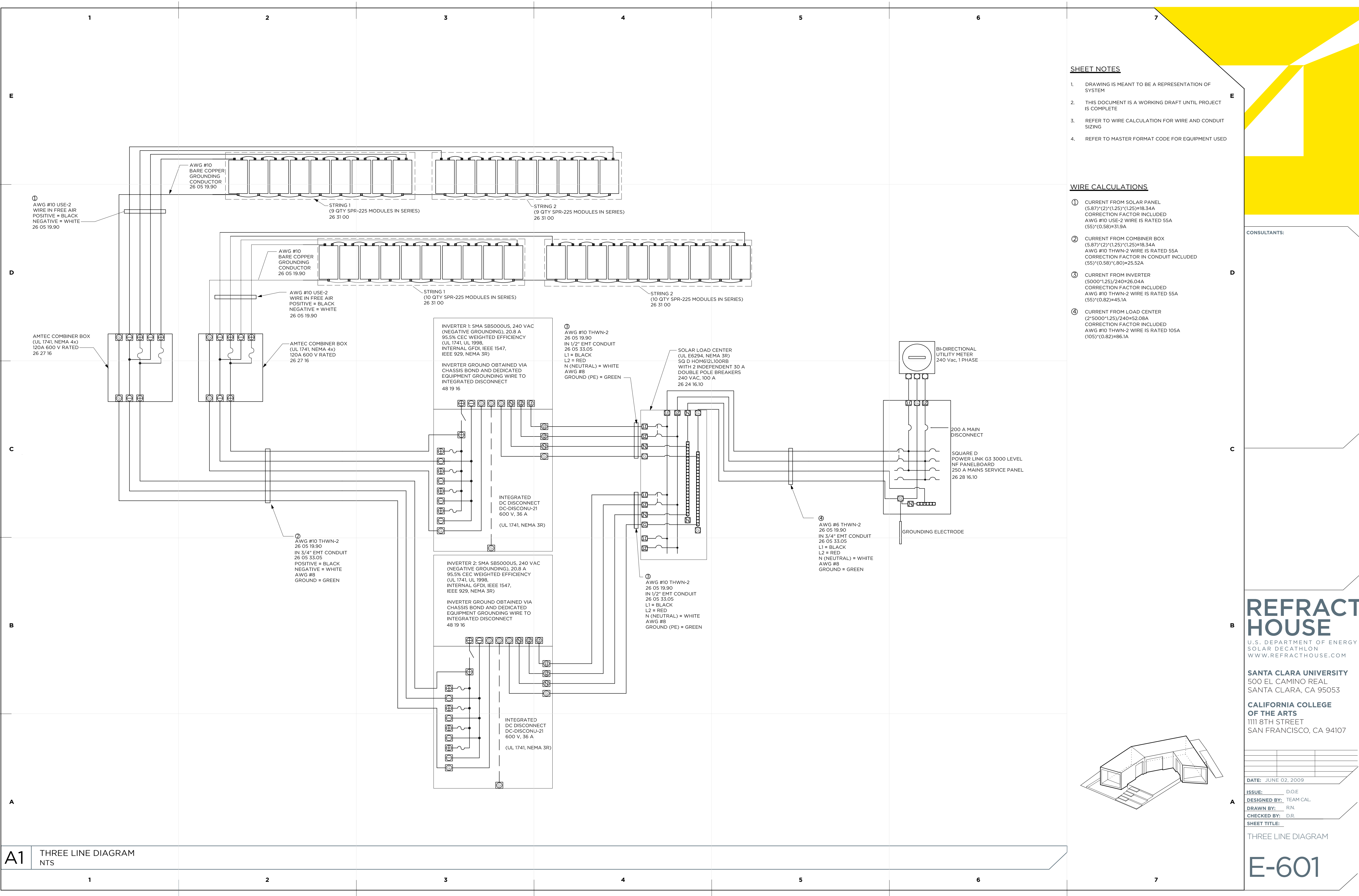
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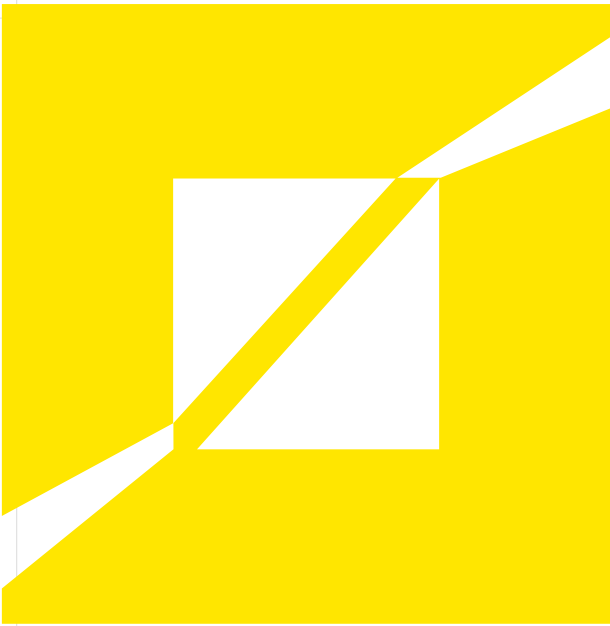
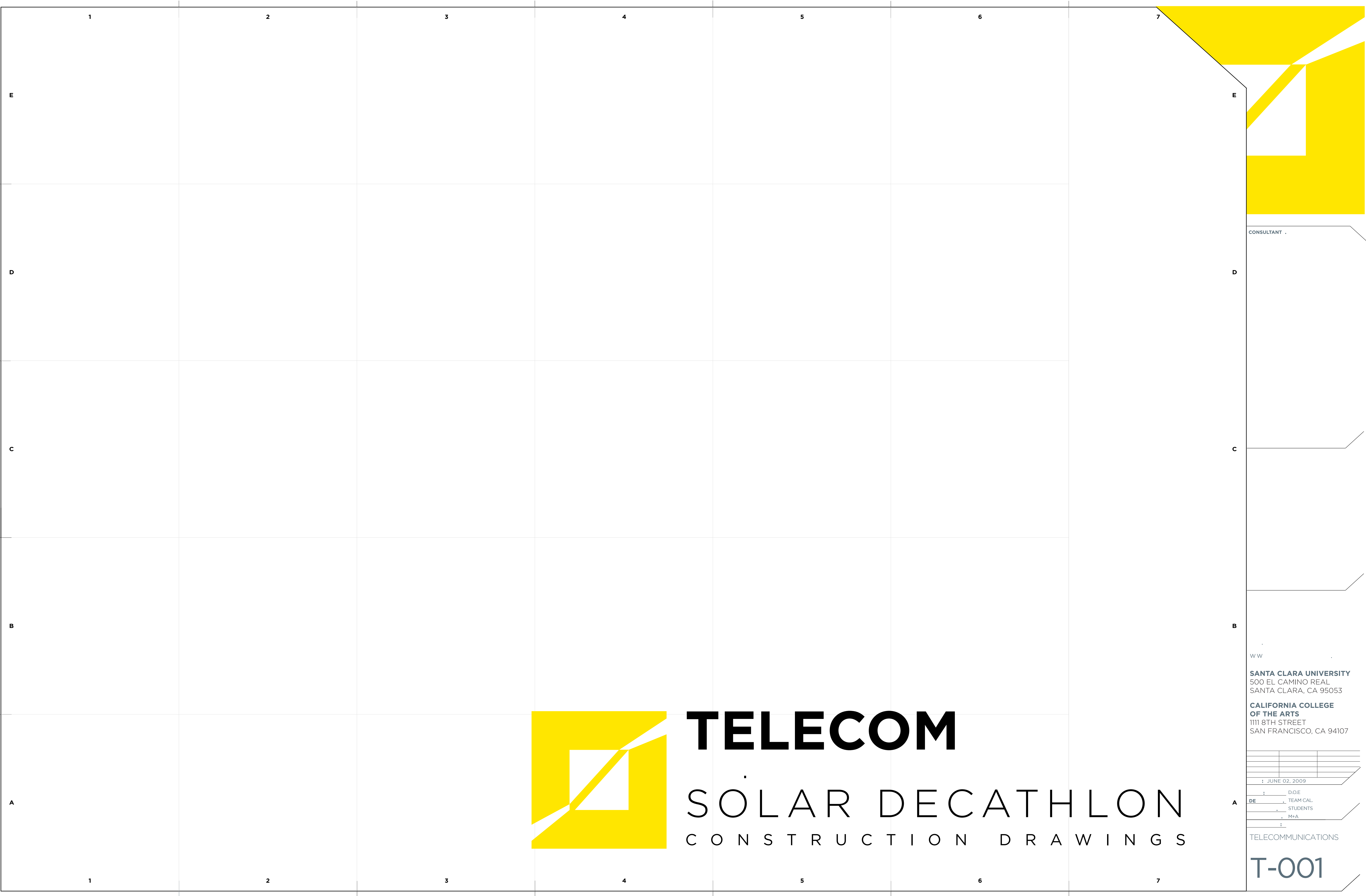
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ELECTRICAL PLAN

E-101





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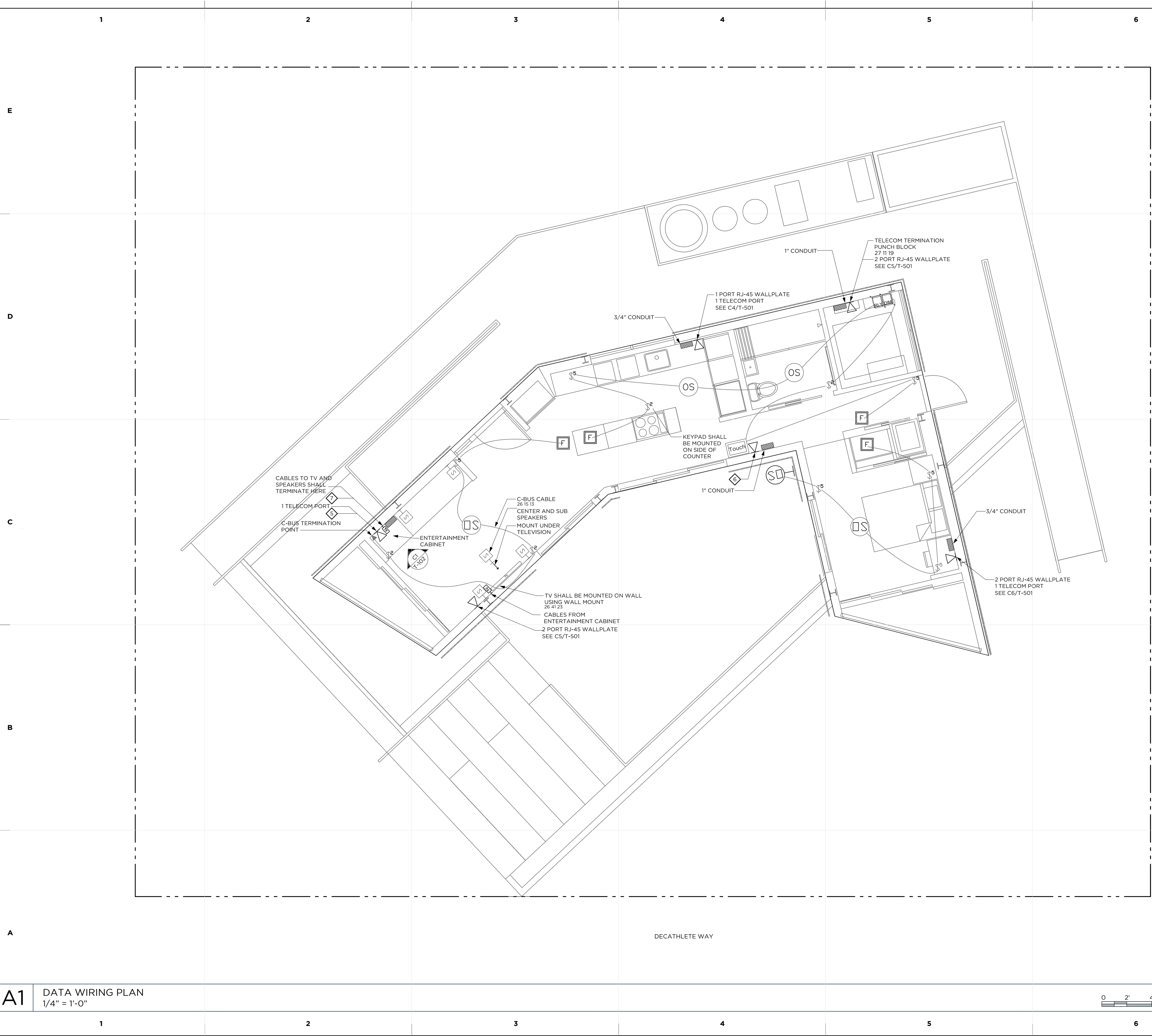
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DE TEAM CAL.
STUDENTS
M+A

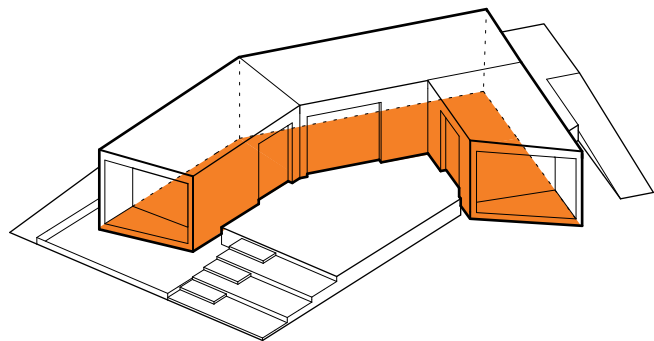
TELECOMMUNICATIONS

T-001



- SHEET NOTES**
1. ALL CABLES IN DRAWING SHALL BE LOW VOLTAGE CABLES.
 2. FUTURE EXPANSION CONDUIT SHALL BE LOCATED AT THE LOWEST HEIGHT POSSIBLE WHILE STILL BEING EASILY ACCESSIBLE AND MAINTAINING REASONABLE CLEARANCE ON ALL SIDES.
 3. FUTURE EXPANSION CONDUIT SHALL BE WIRED THROUGH FLOOR.
 4. RJ-45, C-BUS, AND TELECOM CABLE SHALL NOT BE RUN THROUGH ANY CONDUIT.
- ⬡ ALL RJ-45 CABLE FROM BUILDING SHALL TERMINATE AS SEEN IN DRAWING A1/T-102.
- ⬡ RJ-45 CABLE SHALL TERMINATE WITH MALE CONNECTOR BEHIND TOUCH PANEL.
- ⬡ CABLES RUN TO TV SHALL INCLUDE AN HDMI CABLE, DVI CABLE, TWO PAIRS OF FIVE WIRE COMPONENT CABLE WITH STEREO AUDIO, ONE THREE WIRE COMPOSITE CABLE WITH STEREO AUDIO, ONE 3.5 MM STEREO CABLE, SPEAKER WIRE, AND CAT5e UTP CABLE.
8. ALL CABLES FROM ENTERTAINMENT CABINET TO TV SHALL TERMINATE WITH MALE CONNECTORS AT BOTH ENDS.

LEGEND	
	DATA/PHONE WALL PLATE
	FUTURE EXPANSION CONDUIT
	FLUSH MOUNTED SPEAKER 27 41 16
	TELEVISION 27 41 23
	2-BUTTON KEY PAD 26 09 43
	5-BUTTON KEY PAD 26 09 43
	TOUCH PANEL 26 09 43
	INDOOR OCCUPANCY SENSOR 26 09 23
	OUTDOOR OCCUPANCY SENSOR 26 09 23
	DIMMER 26 09 43
	RELAY 26 09 43
	UNDER HOUSE JUNCTION BOX
	C-BUS WIRE TERMINATION POINT



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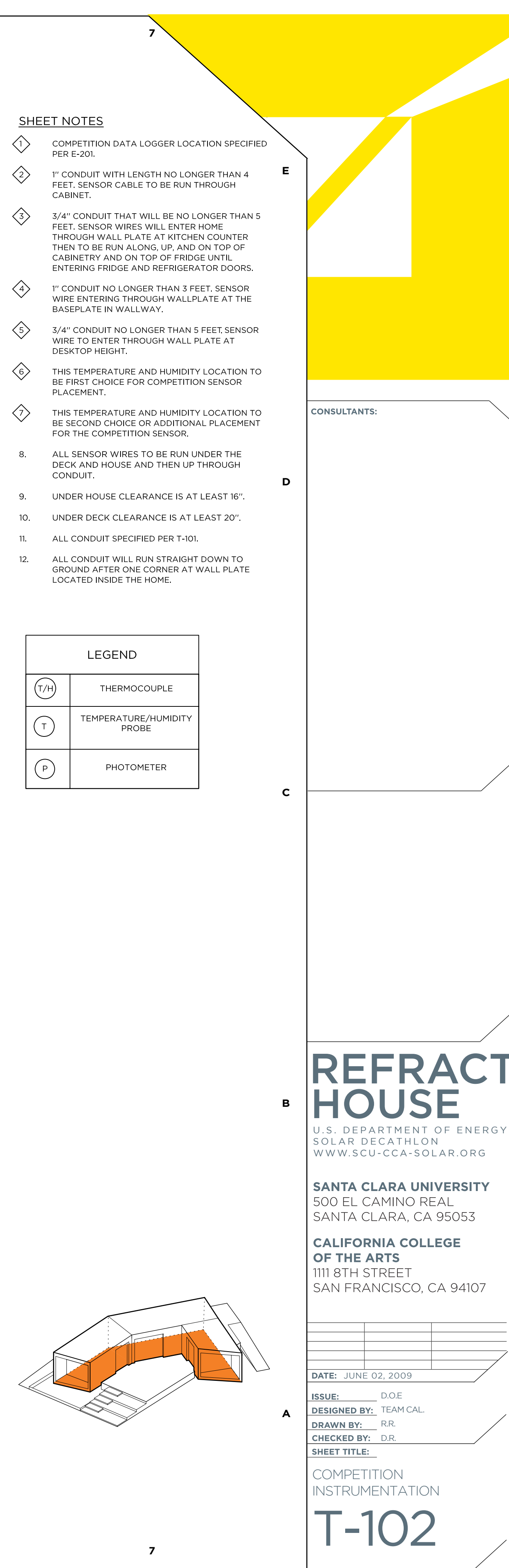
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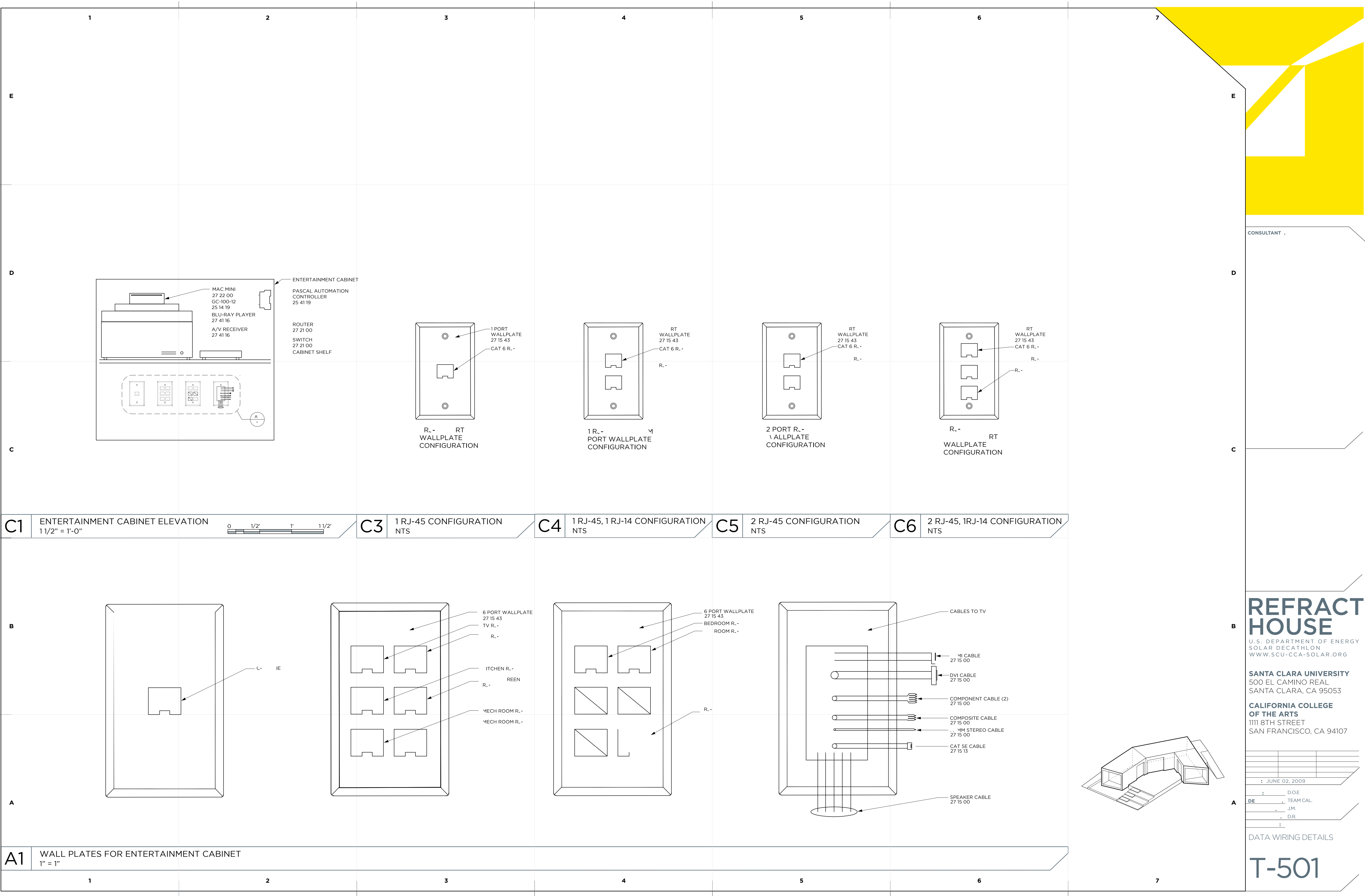
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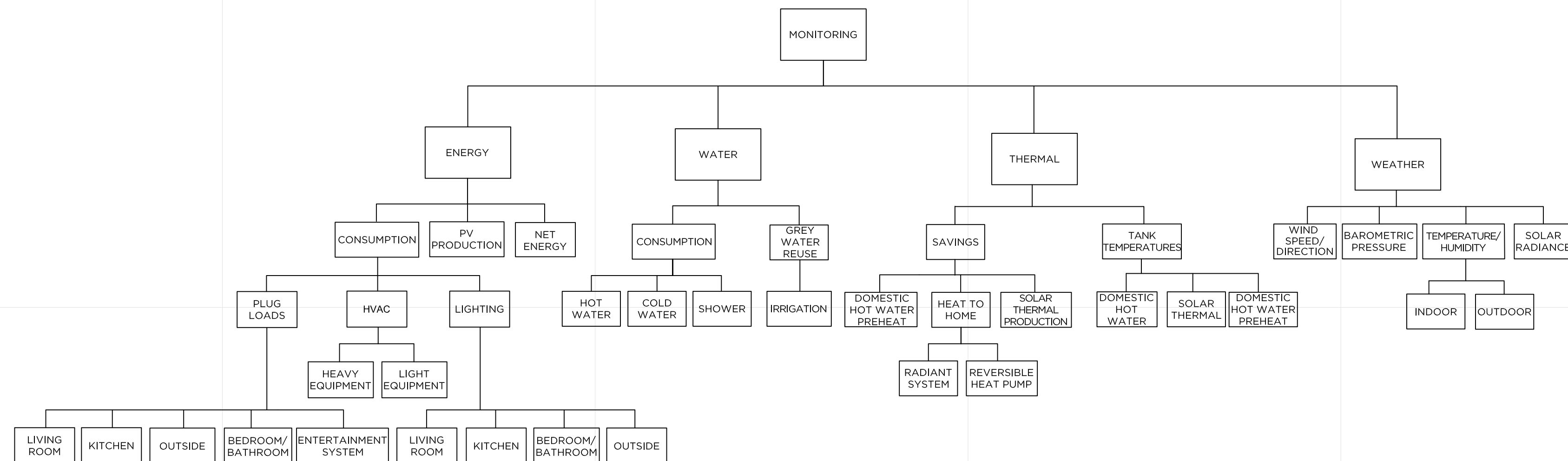
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SHEET TITLE:

DATA WIRING PLAN

T-101



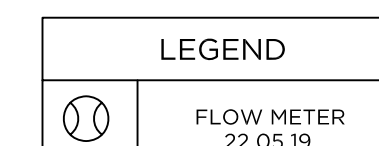




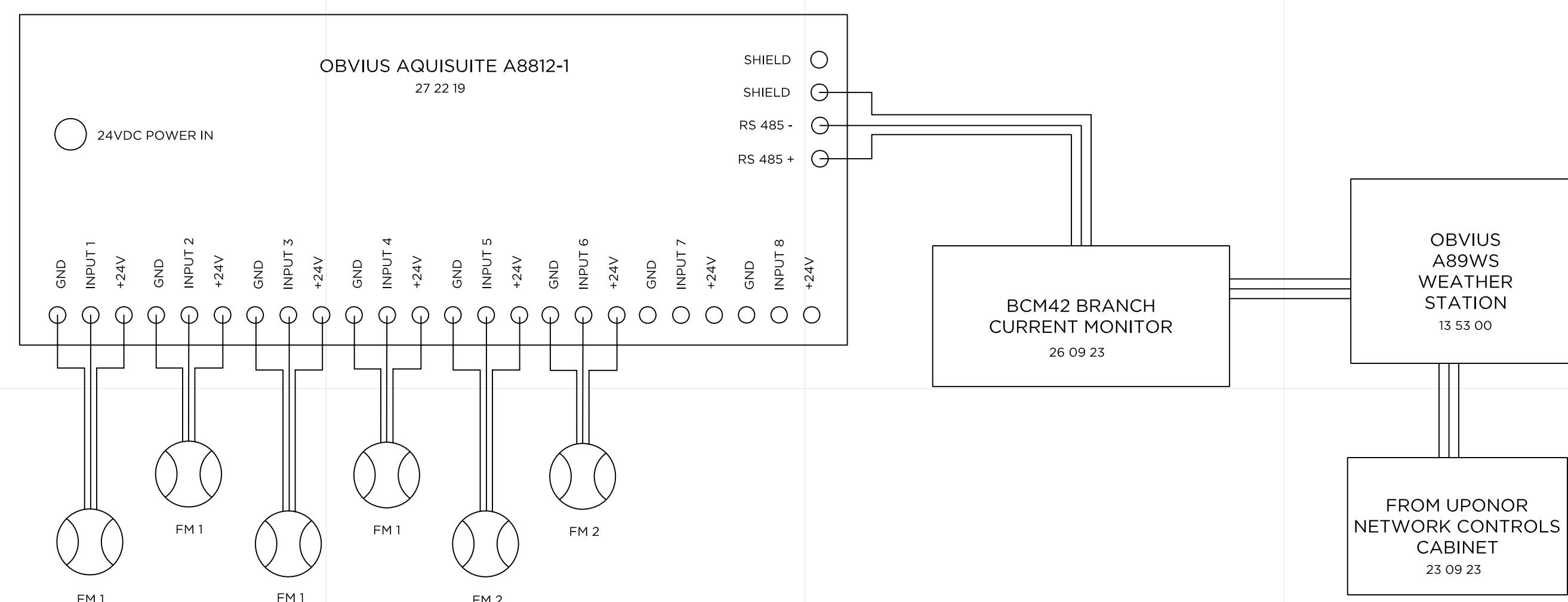
SHEET NOTES

1. MONITORING DATA POINTS FLOW CHART DETAILS THE BREAK DOWN OF THE MONITORING SYSTEM AND THE SPECIFIC MONITORING POINTS.
2. DATA LOGGER WIRING SCHEMATIC DETAILS THE WIRING OF THE OBVIOUS ACQUISITE DATA LOGGER NECESSARY FOR THE MONITORING SYSTEM.
3. OBVIOUS ACQUISITE DATA LOGGER LOCATION SPECIFIED PER E-201.
4. BCM42 BRANCH CURRENT MONITOR LOCATED IN CIRCUIT BREAKER SPECIFIED PER E-602.
5. OBVIOUS AB9W5 WEATHER STATION LOCATION TO BE DETERMINED AFTER COMPLETED CONSTRUCTION BASED UPON WEATHER CONDITIONS AND PRODUCT MANUAL.
6. DATA FROM UPONOR SYSTEM RECEIVED FROM UPONOR NETWORK CONTROLS CABINET SPECIFIED IN E-201 VIA MODBUS PROTOCOL.
7. ALL FLOW METER SENSOR WIRES TO BE 3 CONDUCTOR WIRE RUN NO LONGER THAN 500 FT.

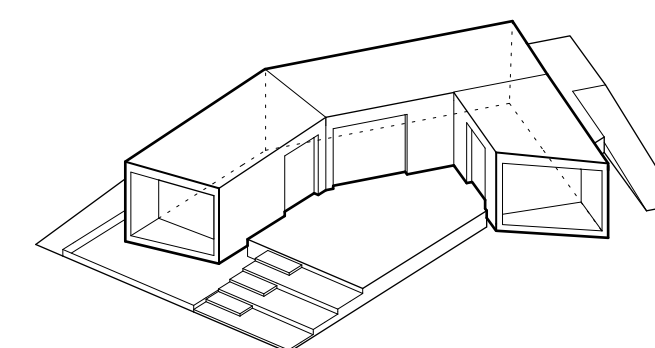
CONSULTANTS:



C2	MONITORING DATA POINTS FLOW CHARTS NO SCALE
----	--



FLOW METERS				
TYPE	MANUFACTURER	MODEL	FLOW RANGE	PORT SIZE
FM 1	OMEGA ENGINEERING	FTB4605	.15 - 20 GPM	3/4"
FM 2	OMEGA ENGINEERING	FTB4607	.15 - 20 GPM	1/2"



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SAN FRANCISCO, CA 94107

DATE: JUNE 02, 2009

ISSUE: D.O.E

DESIGNED BY: TEAM CAL

CHECKED BY: D.R.

SHEET TITLE:

MONITORING DIAGRAMS

T-601

A1	DATA LOGGER WIRING SCHEMATIC NO SCALE
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A5	FLOW METERS NO SCALE
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1234567

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B

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1234567

CONSULTANT

D

C

B

A

WW

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: JUNE 02, 2009		
:	D.O.E	
DE	TEAM CAL.	
:	STUDENTS	
:	M+A	
:		

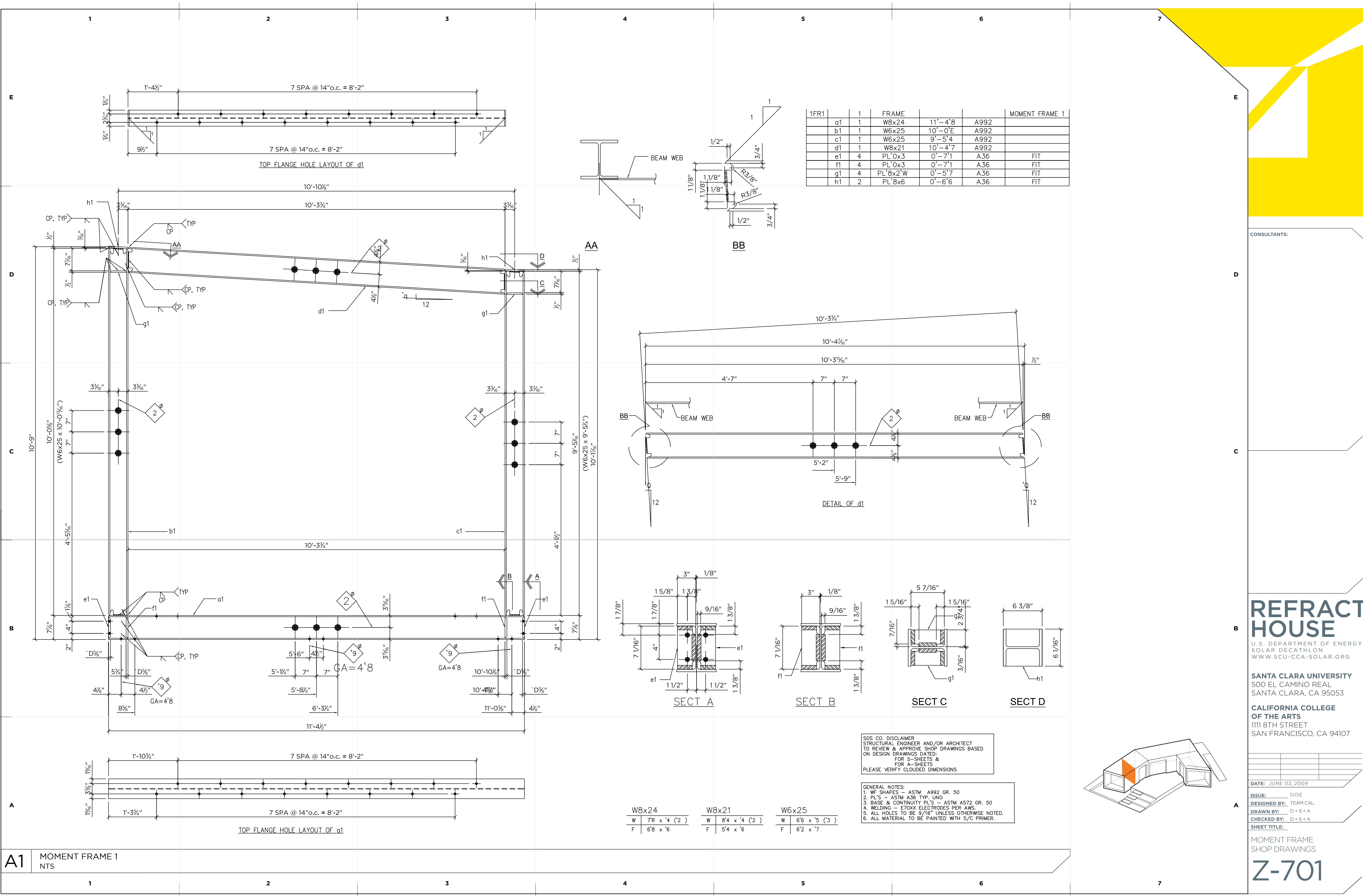
SHOP DRAWINGS

Z-001

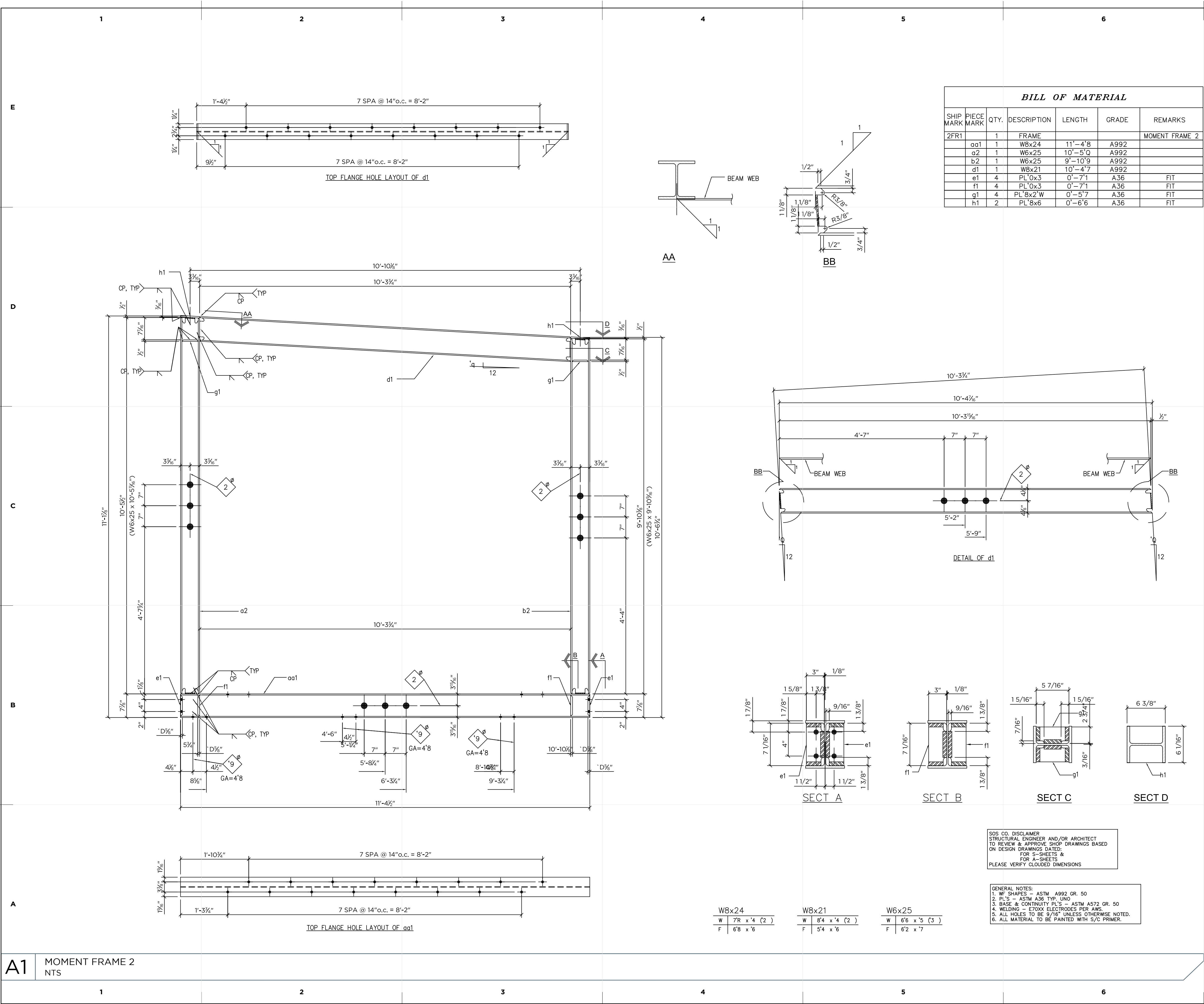
SHOP DRA I

SOLAR DECATHLON

CONSTRUCTION DRAWINGS



A1 MOMENT FRAME 1 NTS



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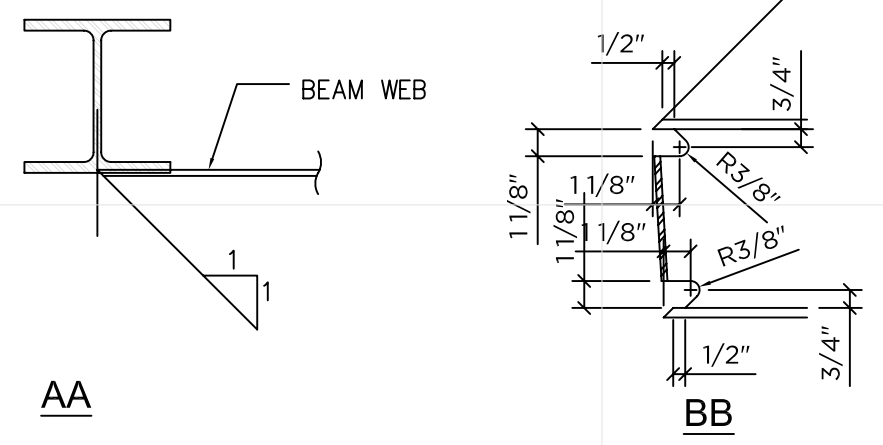
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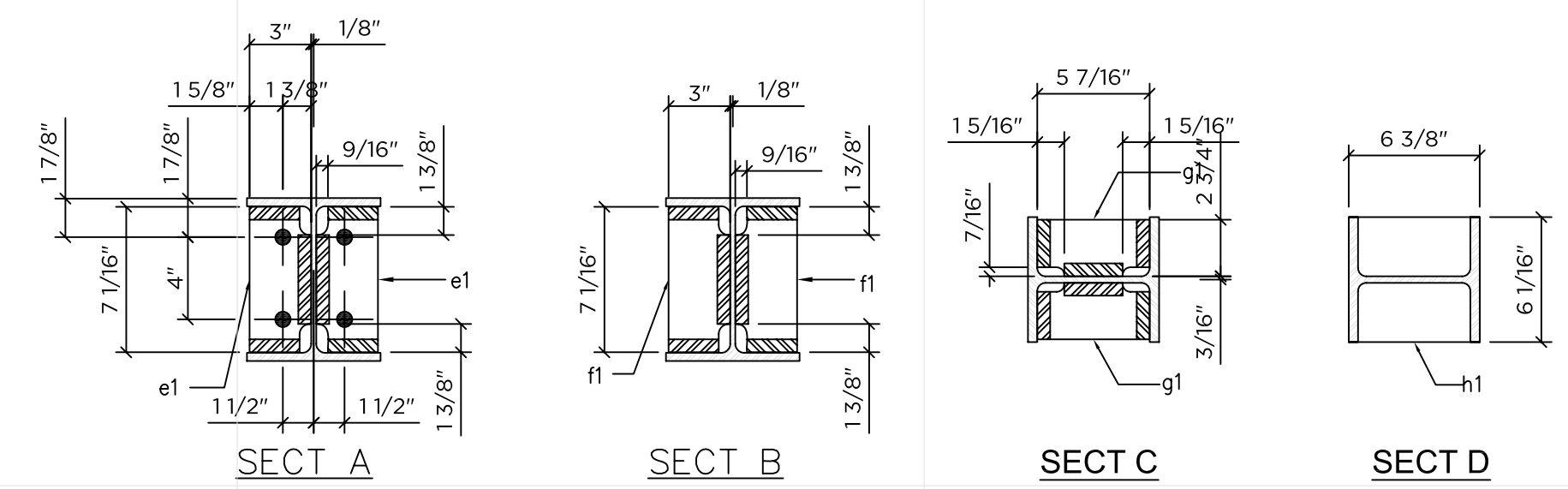
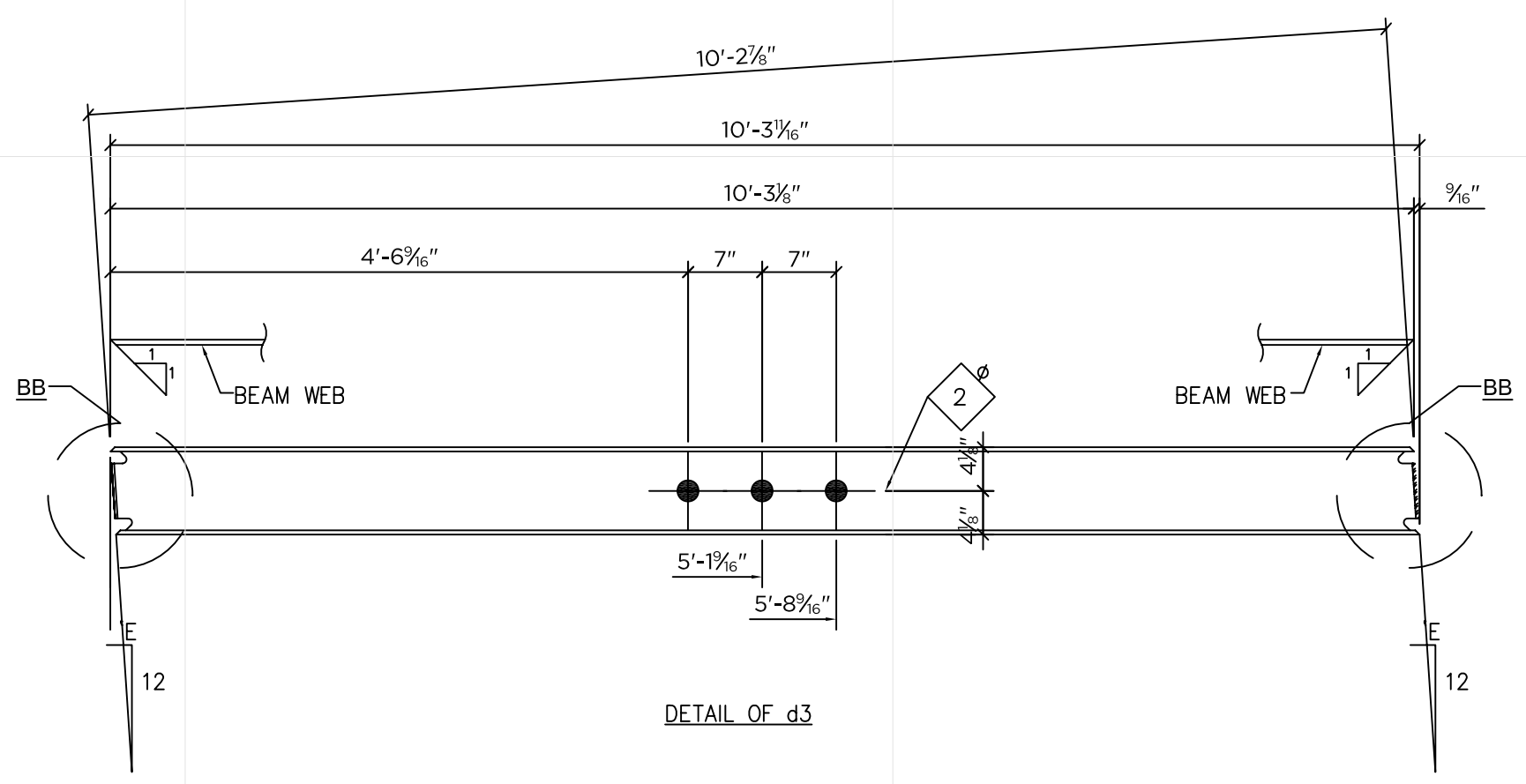
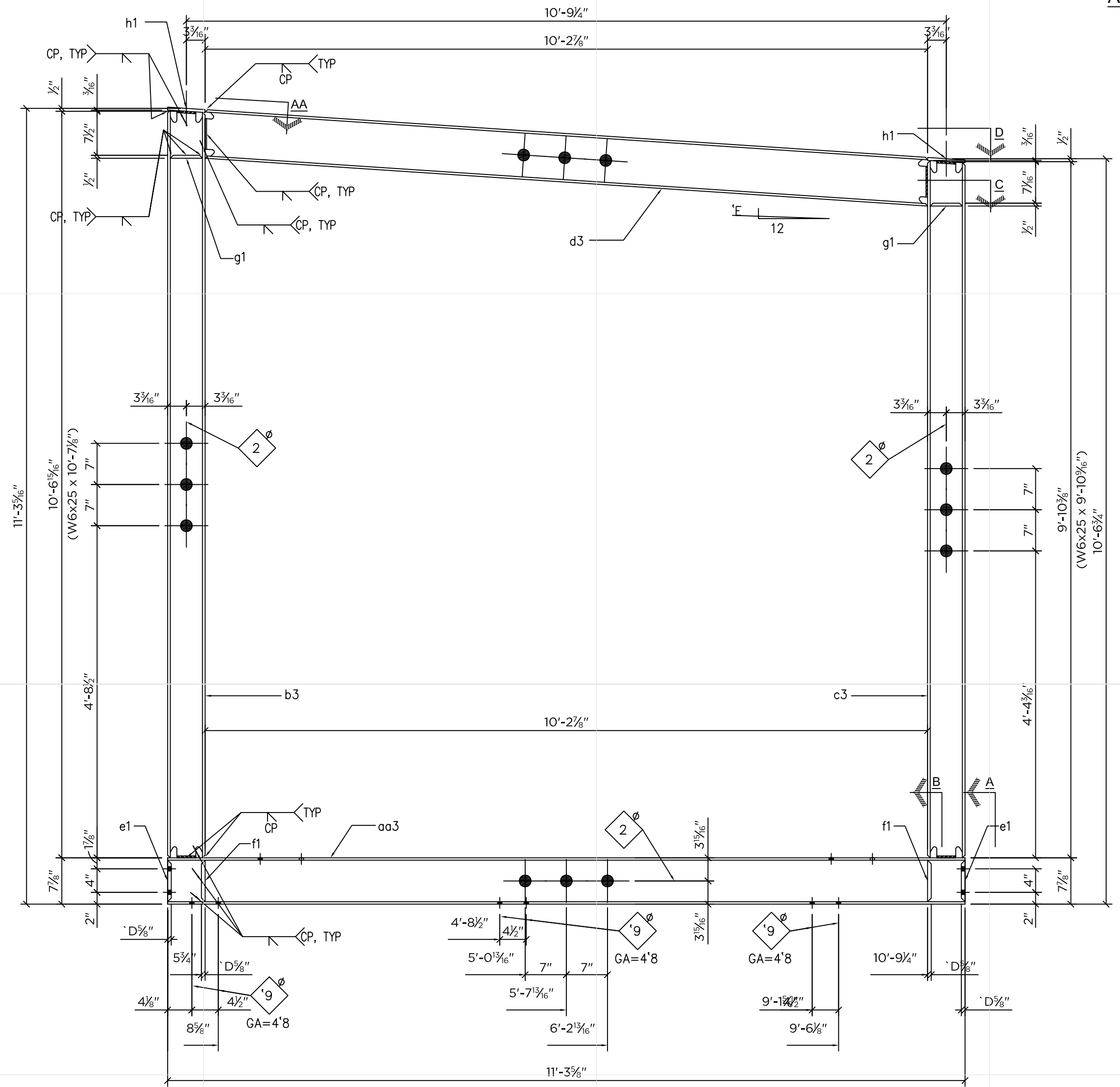
SHEET TITLE:

MOMENT FRAME
SHOP DRAWINGS

Z-702



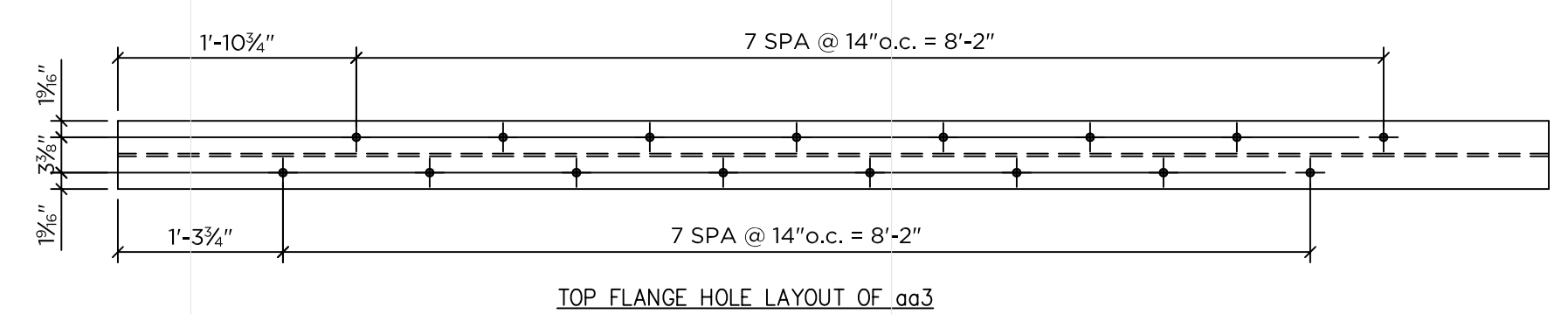
		BILL OF MATERIAL				
SHIP MARK	PIECE MARK	QTY.	DESCRIPTION	LENGTH	GRADE	REMARKS
3FR1		1	FRAME			MOMENT FRAME 3
	oa3	1	W8x24	11'-3'0"	A992	
	b3	1	W6x25	10'-7'2"	A992	
	c3	1	W6x25	9'-10'9"	A992	
	d3	1	W8x21	10'-3'0"	A992	
	e1	4	PL'0x3	0'-7'1"	A36	FIT
	f1	4	PL'0x3	0'-7'1"	A36	FIT
	g1	4	PL'8x2'W	0'-5'7"	A36	FIT
	h1	2	PL'8x6	0'-6'6"	A36	FIT



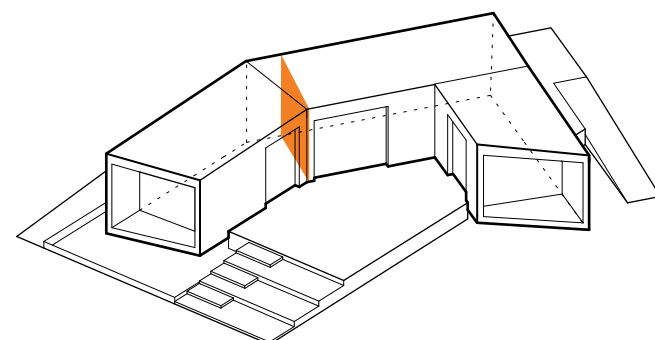
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ON DESIGN DRAWINGS DATED:
FOR S-SHEETS &
FOR A-SHEETS
PLEASE VERIFY CLOUDED DIMENSIONS

GENERAL NOTES:

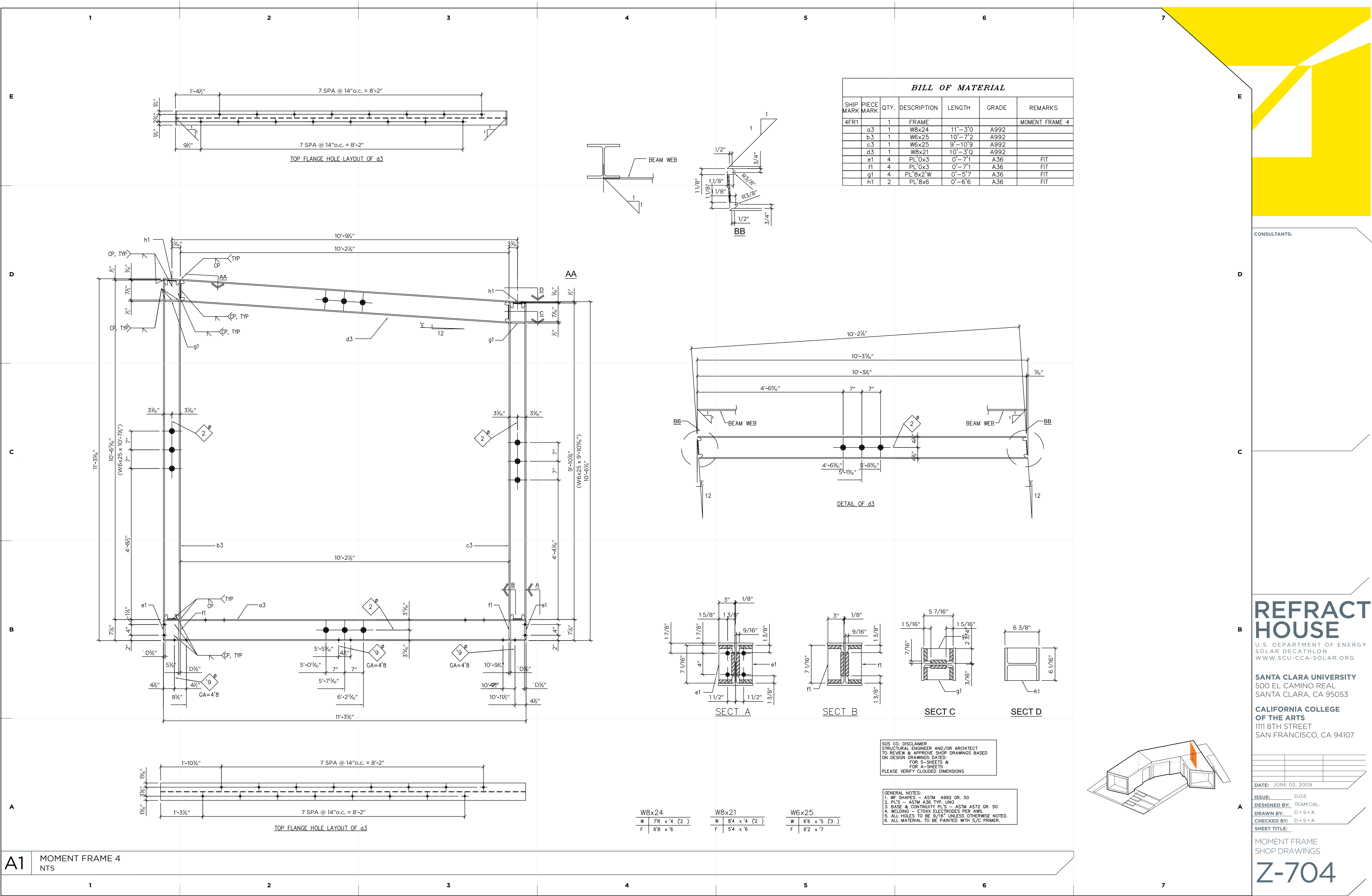
1. WF SHAPES - ASTM A992 GR. 50
2. PL'S - ASTM A36 TYP. UNO
3. BASE & CONTINUITY PL'S - ASTM A572 GR. 50
4. WELDING - E70XX ELECTRODES PER AWS.
5. ALL HOLES TO BE 9/16" UNLESS OTHERWISE NOTED.
6. ALL MATERIAL TO BE PAINTED WITH S/C PRIMER.

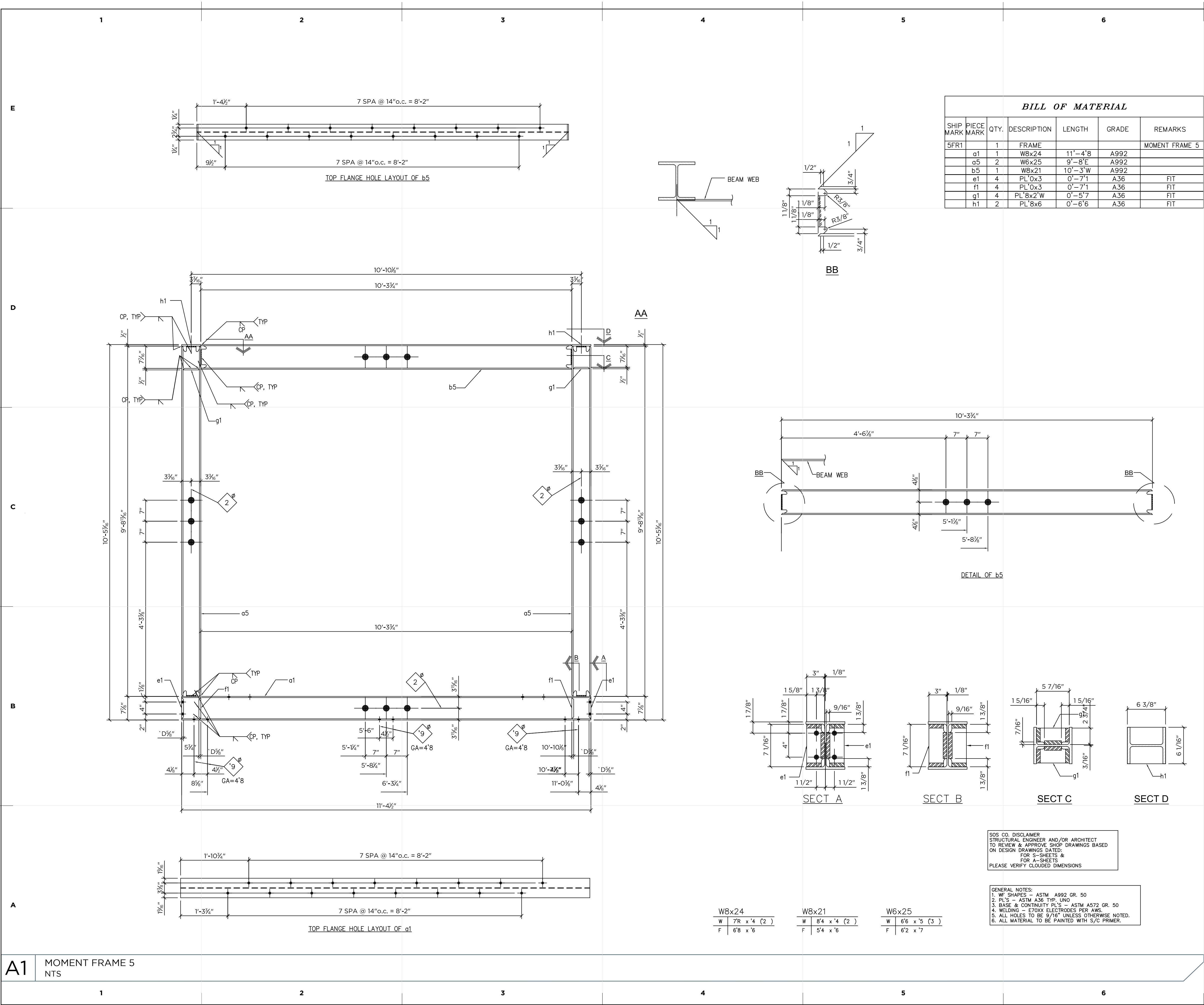


W8x24				W8x21				W6x25			
W	7'8"	x'4"	(2")	W	8'4"	x'4"	(2")	W	6'6"	x'5"	(3")
F	6'8"	x'6"		F	5'4"	x'6"		F	6'2"	x'7"	



Z-703



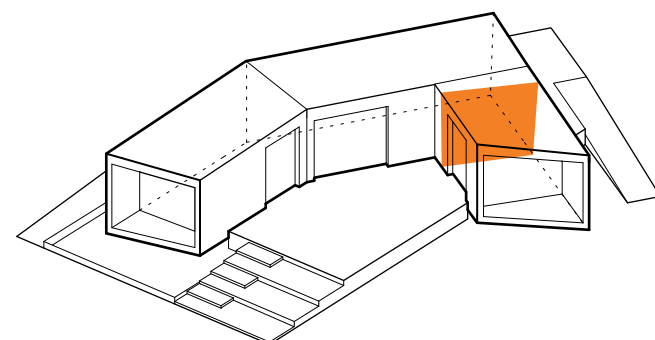


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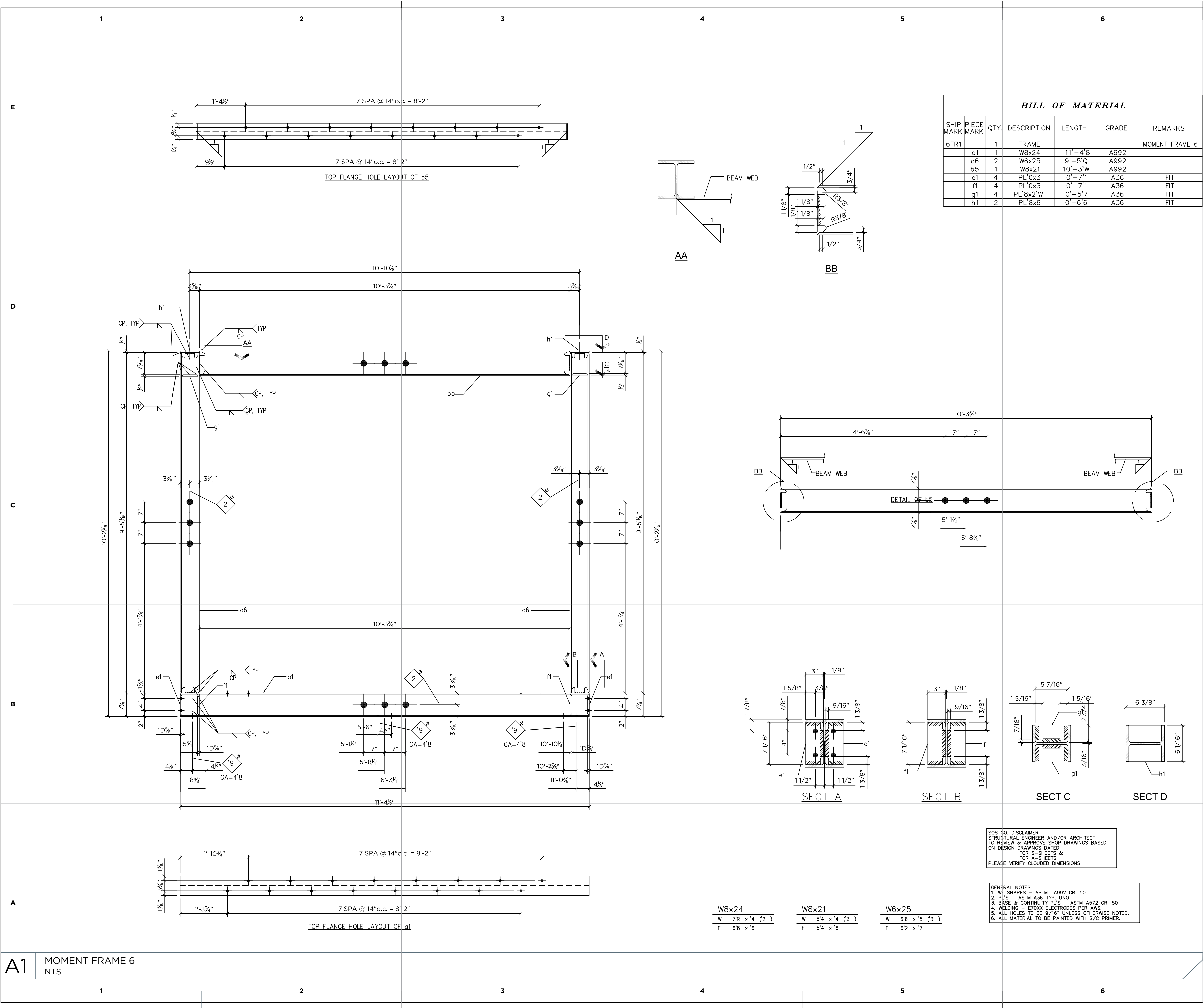
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SHEET TITLE:

MOMENT FRAME
SHOP DRAWINGS

Z-705

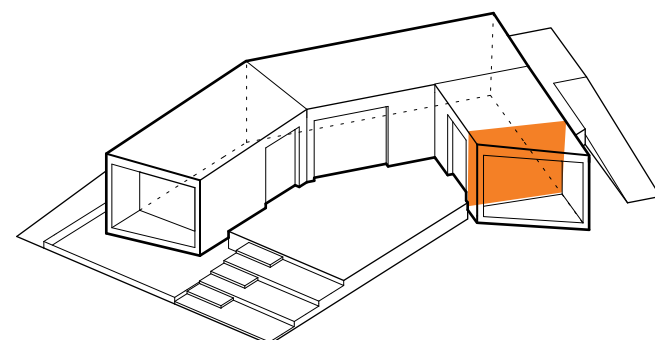


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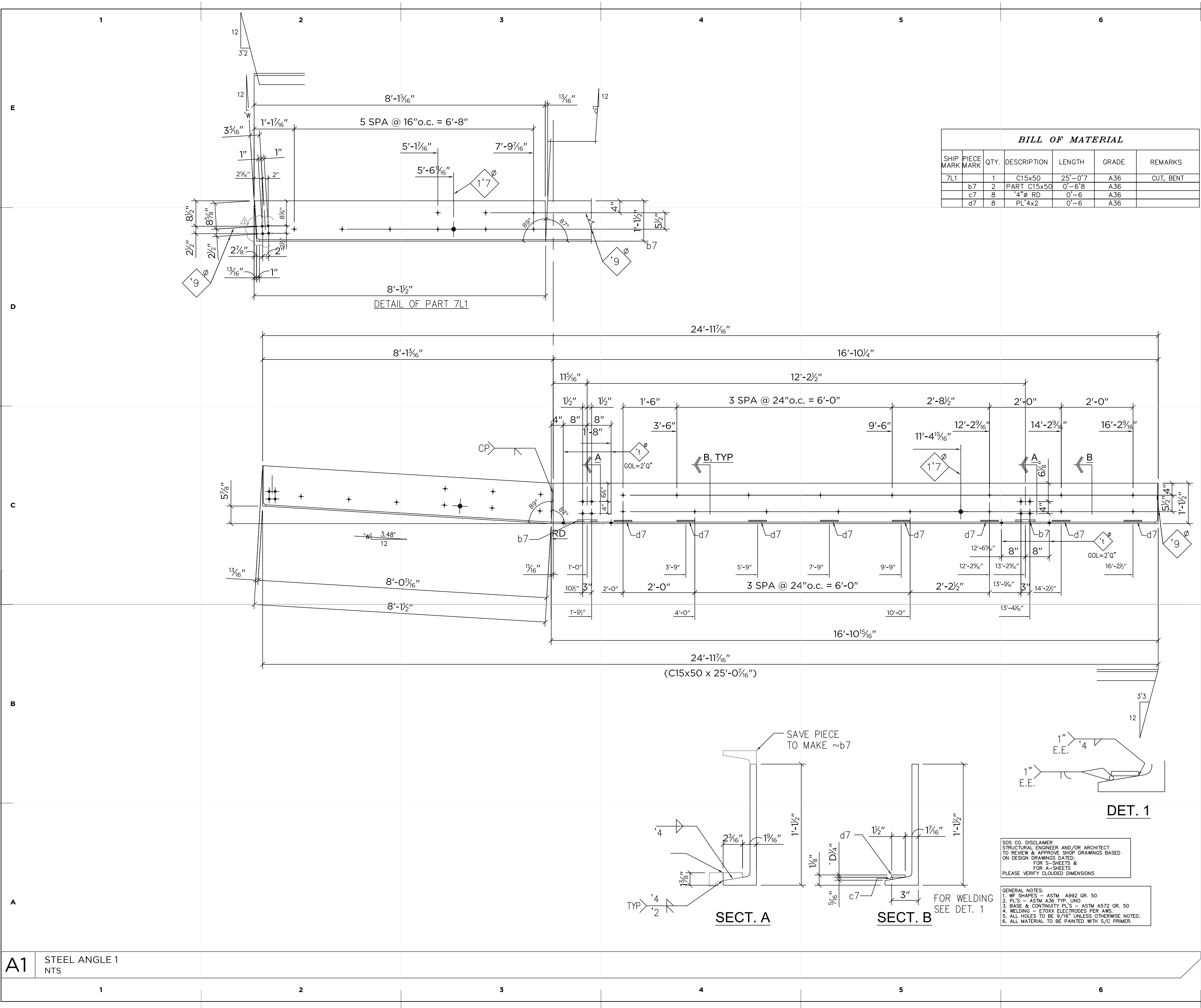
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SHEET TITLE:

MOMENT FRAME
SHOP DRAWINGS

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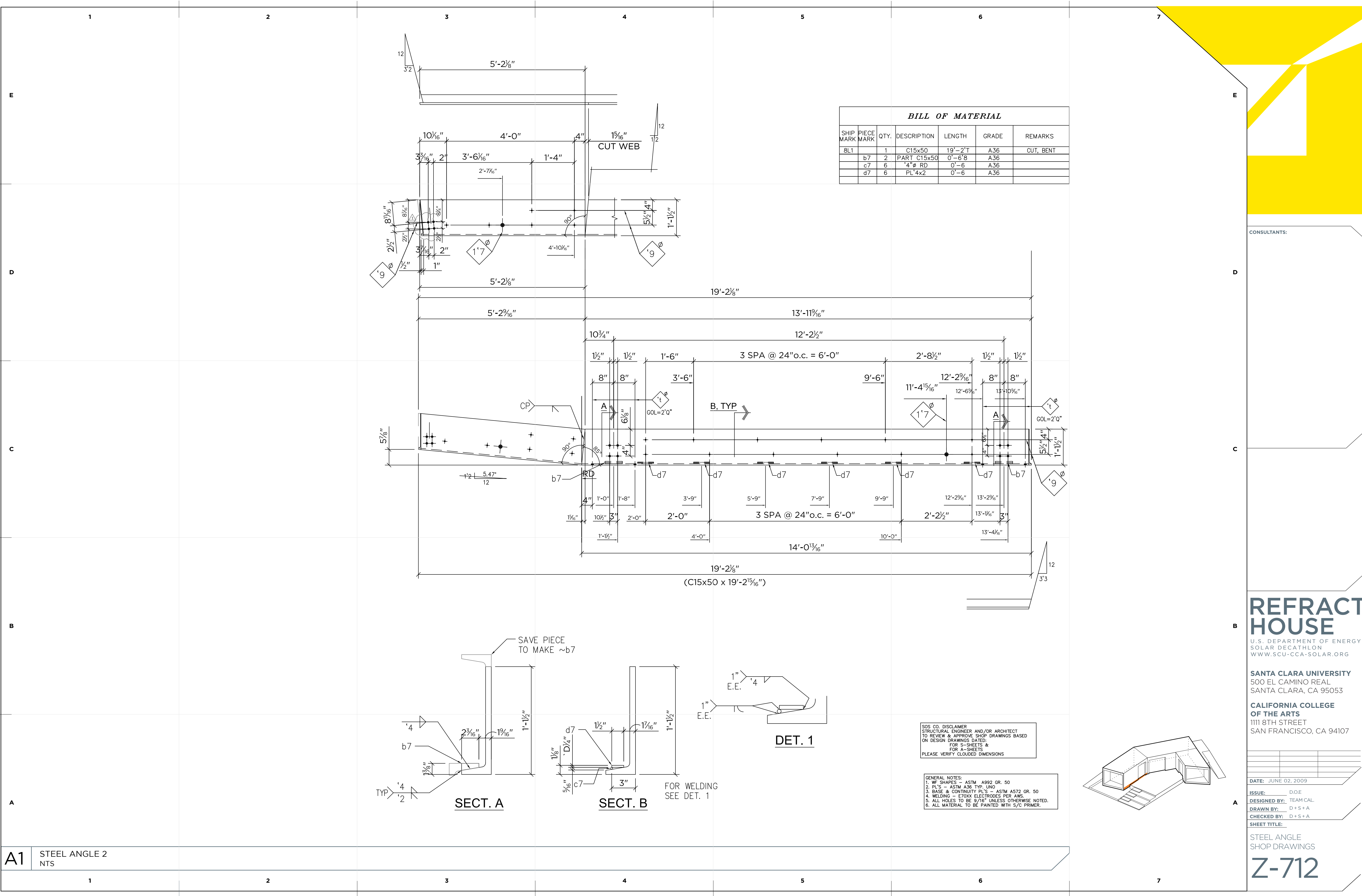
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SHEET TITLE:

STEEL ANGLE
SHOP DRAWINGS

Z-711



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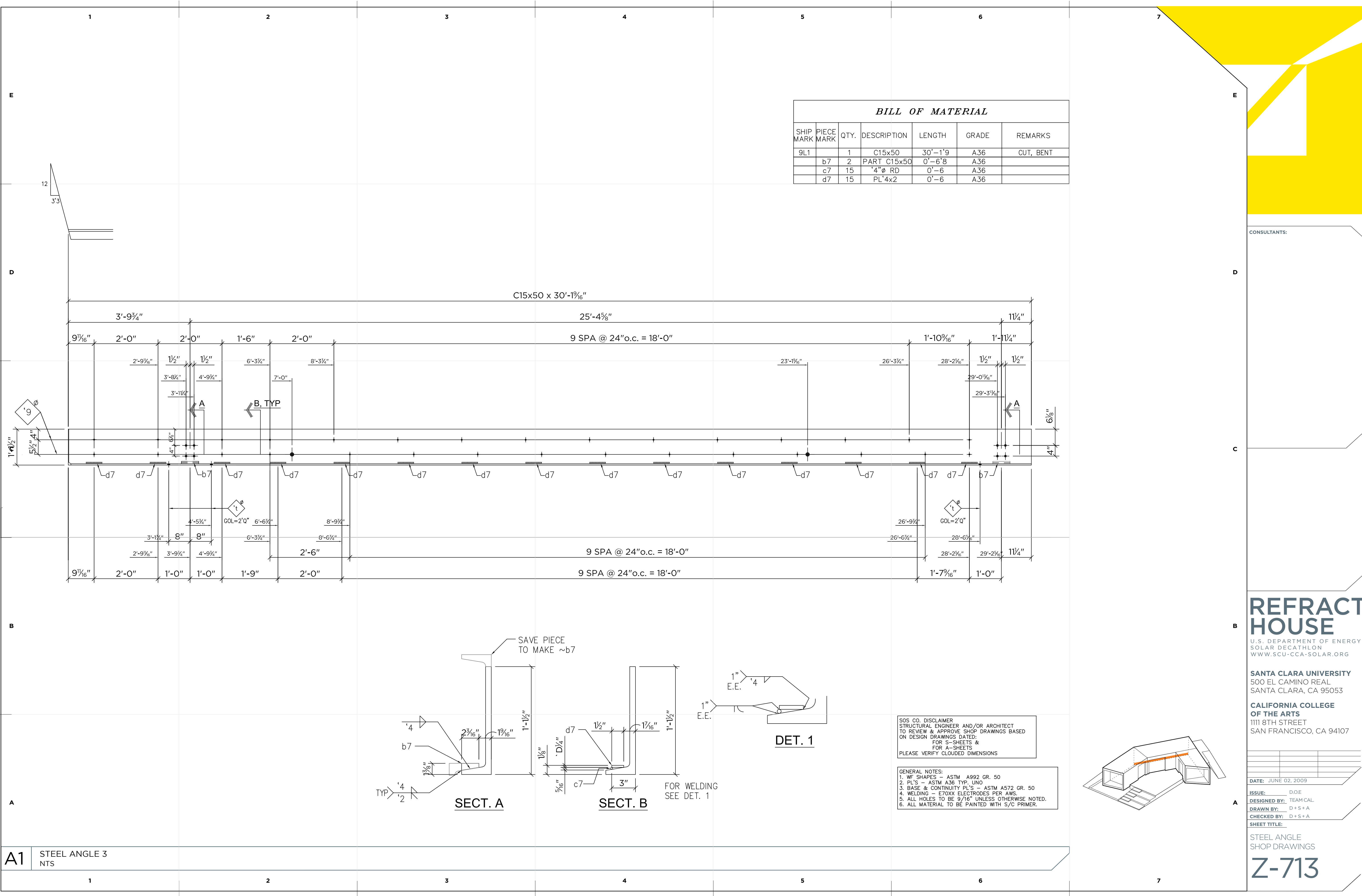
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SHEET TITLE:

STEEL ANGLE
SHOP DRAWINGS
Z-712



BILL OF MATERIAL						
SHIP MARK	PIECE MARK	QTY.	DESCRIPTION	LENGTH	GRADE	REMARKS
9L1		1	C15x50	30'-1'9"	A36	CUT, BENT
	b7	2	PART C15x50	0'-6'8"	A36	
	c7	15	4"Ø RD	0'-6"	A36	
	d7	15	PL 4x2	0'-6"	A36	

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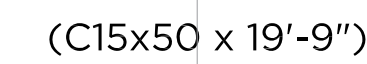
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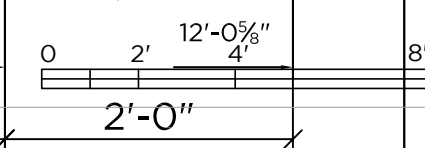
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SHEET TITLE:

STEEL ANGLE
SHOP DRAWINGS

Z-713

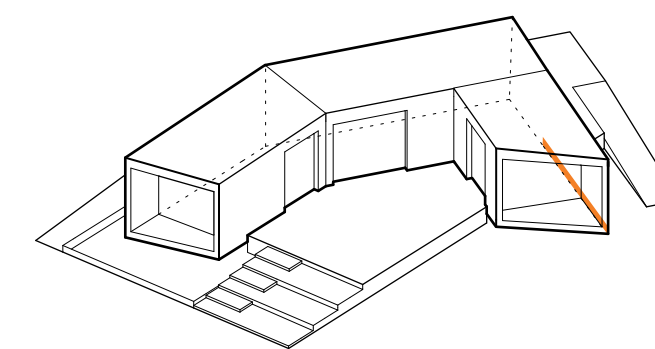


		BILL OF MATERIAL				
SHIP MARK	PIECE MARK	QTY.	DESCRIPTION	LENGTH	GRADE	REMARKS
12L1		1	C15x50	19'-9"	A36	CUT, BENT
	b7	2	PART C15x50	0'-6" - 8"	A36	
	c7	6	4" Ø RD	0'-6"	A36	
	d7	6	PL 4"x2"	0'-6"	A36	



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GENERAL NOTES:
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2. PL'S - ASTM A36 TYP. UNO
3. BASE & CONTINUITY PL'S - ASTM A572 GR. 50
4. WELDING - E70XX ELECTRODES PER AWS.
5. ALL HOLES TO BE 9/16" UNLESS OTHERWISE NOTED
6. ALL MATERIAL TO BE PAINTED WITH S/C PRIMER.



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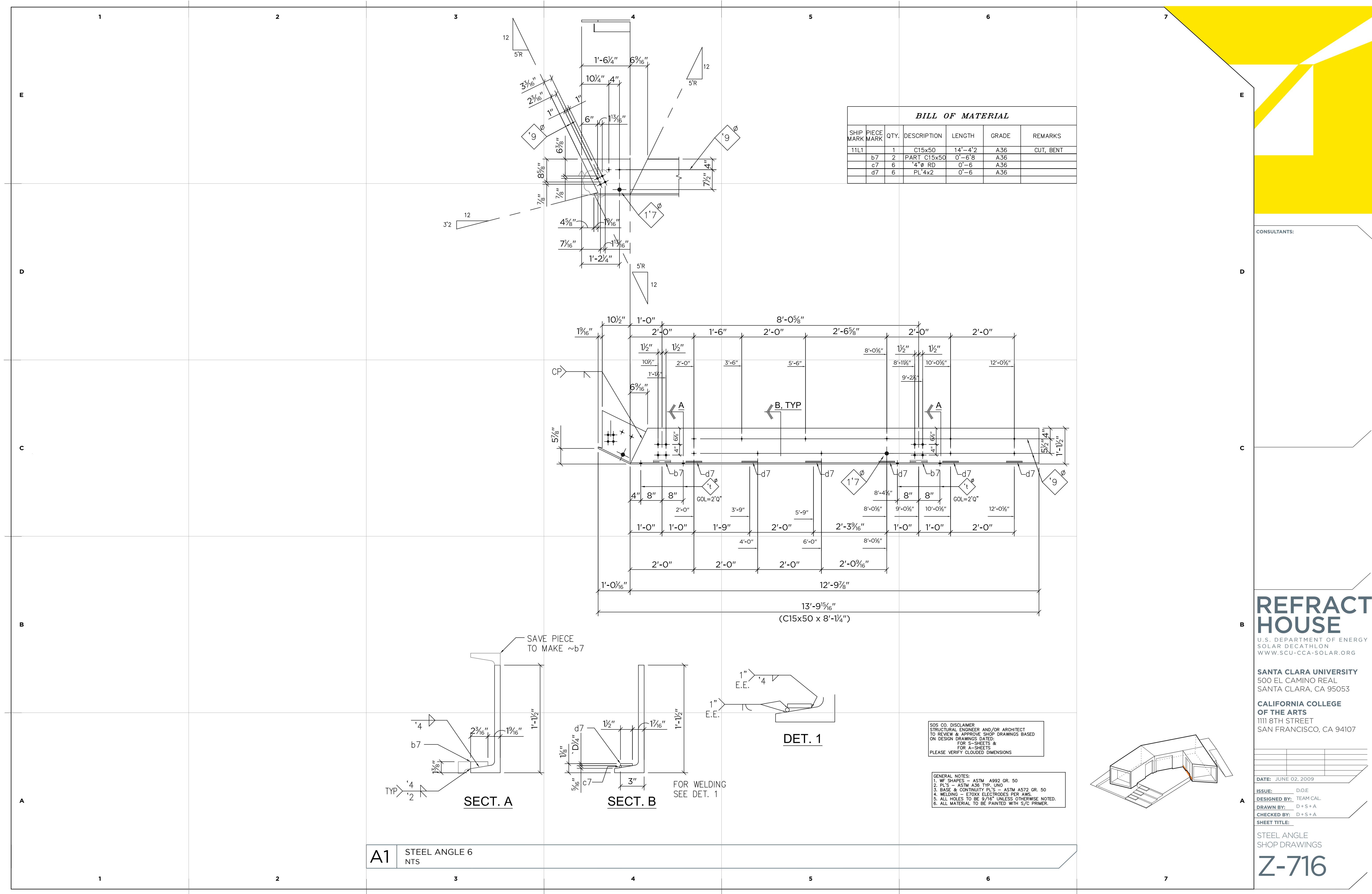
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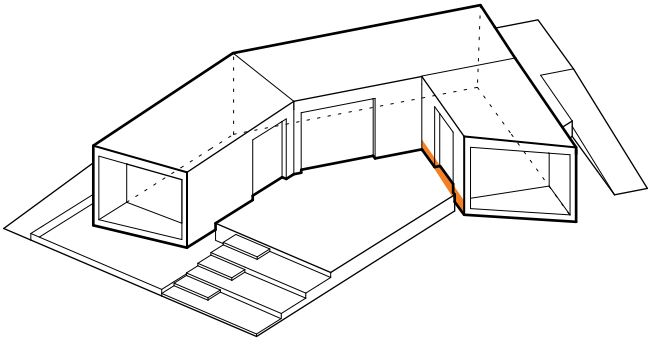
Z-715



BILL OF MATERIAL					
SHIP MARK	PIECE MARK	QTY.	DESCRIPTION	LENGTH	GRADE
11L1		1	C15x50	14'-4 1/2"	A36
	b7	2	PART C15x50	0'-6 1/8"	A36
	c7	6	4"Ø RD	0'-6"	A36
	d7	6	PL 4x2	0'-6"	A36
REMARKS					
CUT, BENT					

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