PENNSTATE

1855

SOLAR DECATHLON 2009

L andscape

S tructure

A rchitecture

P lumbing

M echanical

E lectrical

X other disciplines

O perations

NATURAL FUSION

DO NOT REPRODUCE RENDERING WITHOUT PERMISSION FROM THE NATURAL FUSION TEAM.

G-001	DRAWING INDEX
L	LANDSCAPE
L-101	SOLAR ENVELOPE PLAN
L-102	LANDSCAPE SITE PLAN
L-103	PLANTING PLAN
L-104	PLANTER PLAN
L-105	ADA FLOW PLAN
L-106	GREEN ROOF PLAN
L-201	NORTH & SOUTH ELEVATIONS
L-202	EAST & WEST ELEVATIONS
L-501	LIVING WALLS DETAIL
L-502	RAILING DETAIL
L-503	PLANTER SCHEDULE
L-504	OUTDOOR TABLE DETAIL
L-505	PLANTER DETAILS
L-506	TREE PLANTER
L-507	SCUPPER DETAIL
L-601	ROOF & WALL PLANT SCHEDULE
L-602	XERISCAPE PLANT SCHEDULE
L-603	BIO-INTEN. PLANT SCHEDULE
L-604	S. GARDEN PLANT SCHEDULE
L-605	WILDLIFE PLANT SCHEDULE
S	STRUCTURE
S-101	DECK FRAMING PLAN
S-102	DECK SUPPORT PLAN
S-103	FOUNDATION PLAN
S-104	FLOOR FRAMING PLAN
S-105	ROOF FRAMING PLAN
S-201	FRAME ELEVATION
S-501	DECK FRAMING DETAILS
A	ARCHITECTURE
A-101	FLOOR PLAN
A-102	FINISH FLOOR PLAN
A-103	SECTION FLOOR PLAN
A-104	ROOF PLAN
A-105	ROOF PLAN WITH PVS
A-106	APPLIANCE PLAN
A-201	SOUTH ELEVATION
A-202	EAST ELEVATION
A-203	NORTH ELEVATION
A-204	NORTH ELEV. NEXUS OPENING
A-205	WEST ELEVATION
A-301	LIVING ROOM SECTION
A-302	KITCHEN SECTION
A-303	BATHROOM SECTION
A-304	BEDROOM EAST SECTION
A-305	LONG. SECTION NORTH
A-306	LONG. HALL SECTION NORTH
A-307	TYP. AND COL. WALL SECTION

A-308	S. N. WINDOW WALL SECTION
A-309	LIFEWELL/NEXUS WALL SECTION
A-401	N. INT. ELEV. LIVINGROOM
A-402	W. INT. ELEV. LIVINGROOM
A-403	E. INT. ELEV. KITCHEN
A-404	N. INT. ELEV. KITCHEN
A-405	W. INT. ELEV. KITCHEN
A-406	S. W. INT. ELEV. BATHROOM
A-407	N. E. INT. ELEV. BATHROOM
A-408	W. INT. ELEV BEDROOM
A-409	N. INT. ELEV. BEDROOM
A-410	E. INT. ELEV. BEDROOM
A-411	SOUTH INTERIOR ELEVATION
A-501	SOUTH WALL DETAILS
A-502	NORTH WALL DETAILS
A-503	FLOOR CONNECTION DETAILS
A-504	CLERESTORY DETAILS
A-505	LIFEWELL WALL SECTION DETAIL
A-506	TABLE CONFIGURATIONS
A-601	DOOR & WINDOW SCHEDULE
A-602	APPLIANCE SCHEDULE
A-901	SHADOW STUDY
P	PLUMBING
P-101	PLUMBING SITE PLAN
P-102	PLUMBING SUPPLY PLAN
P-103	WASTEWATER PLAN
P-601	FIXTURE DEMAND SCHEDULE
P-602	PLUMBING SCHEDULES
P-901	ISOMETRIC
M	MECHANICAL
M-001	SYMBOL LEGEND
M-101	MECHANICAL SITE PLAN
M-102	CONDITIONED AREA
M-103	SENSOR LOCATION PLAN
M-104	MECHANICAL PLAN
M-105	BLADDER AREA PLAN
M-106	ROOF PLAN
M-201	NEXUS ELEVATIONS
M-301	SOLAR LOOP SECTION
M-501	BLADDER DETAIL
M-601	SOLAR LOOP SCHEMATIC
M-602	DHW SCHEMATIC
M-603	AIRSIDE SCHEMATIC
M-604	MECHANICAL SCHEDULE
M-605	MECHANICAL SCHEDULE
M-901	DUCTWORK ISOMETRIC
E	ELECTRICAL
E-001	SYMBOL LEGEND
E-101	POWER PLAN

E-102	LIGHTING FLOOR PLAN
E-103	LIGHTING RCP
E-104	FIRE PROTECTION PLAN
E-105	ELECTRICAL SITE PLAN
E-106	LIGHTING SITE PLAN
E-201	UTILITY ELEVATION
E-202	NEXUS ELEVATION
E-401	UTILITY AND GROUNDING PLAN
E-501	ELECTRICAL SYSTEM DETAILS
E-601	PV SYSTEM ONE-LINE DIAGRAM
E-602	PV SYSTEM WIRING DIAGRAM
E-603	LUMINAIRE SCHEDULE
E-604	LUMINAIRE SCHEDULE
E-605	PANEL BOARD SCHEDULE
E-606	ELECTRICAL SCHEDULE
E-701	SERVICE ENTRANCE CALCS
E-702	BRANCH CKT CALCULATIONS
E-703	ELECTRICAL CALCULATIONS
X	OTHER DISCIPLINES
X-101	TOUR ROUTE
X-102	INTERIOR/EXTERIOR SIGNAGE
X-103	EVACUATION PLAN
X-104	PATHWAY TO THE FUTURE
X-501	SIGNS A & B DETAILS
X-502	SIGN C & D DETAILS
X-503	SIGN F DETAILS
X-504	SHIRT DETAILS
X-505	SPONSORSHIP FORM
X-506	FUNDRAISING PACKET P. 1, 2
X-507	FUNDRAISING PACKET P. 3, 4
X-508	FUNDRAISING PACKET P. 5, 6
X-509	FUNDRAISING PACKET P. 7, 8
X-510	MILESTONES
X-511	TOUR HANDOUT
O	OPERATIONS
O-701	MALL ASSEMBLY
O-702	MALL ASSEMBLY
O-703	MALL ASSEMBLY

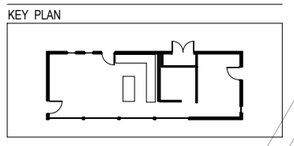
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
	06/02/2009	

KEY PLAN



SCALE

DRAWN BY
DJS

CHECKED BY
KPM

DRAWING STATUS
CD SET

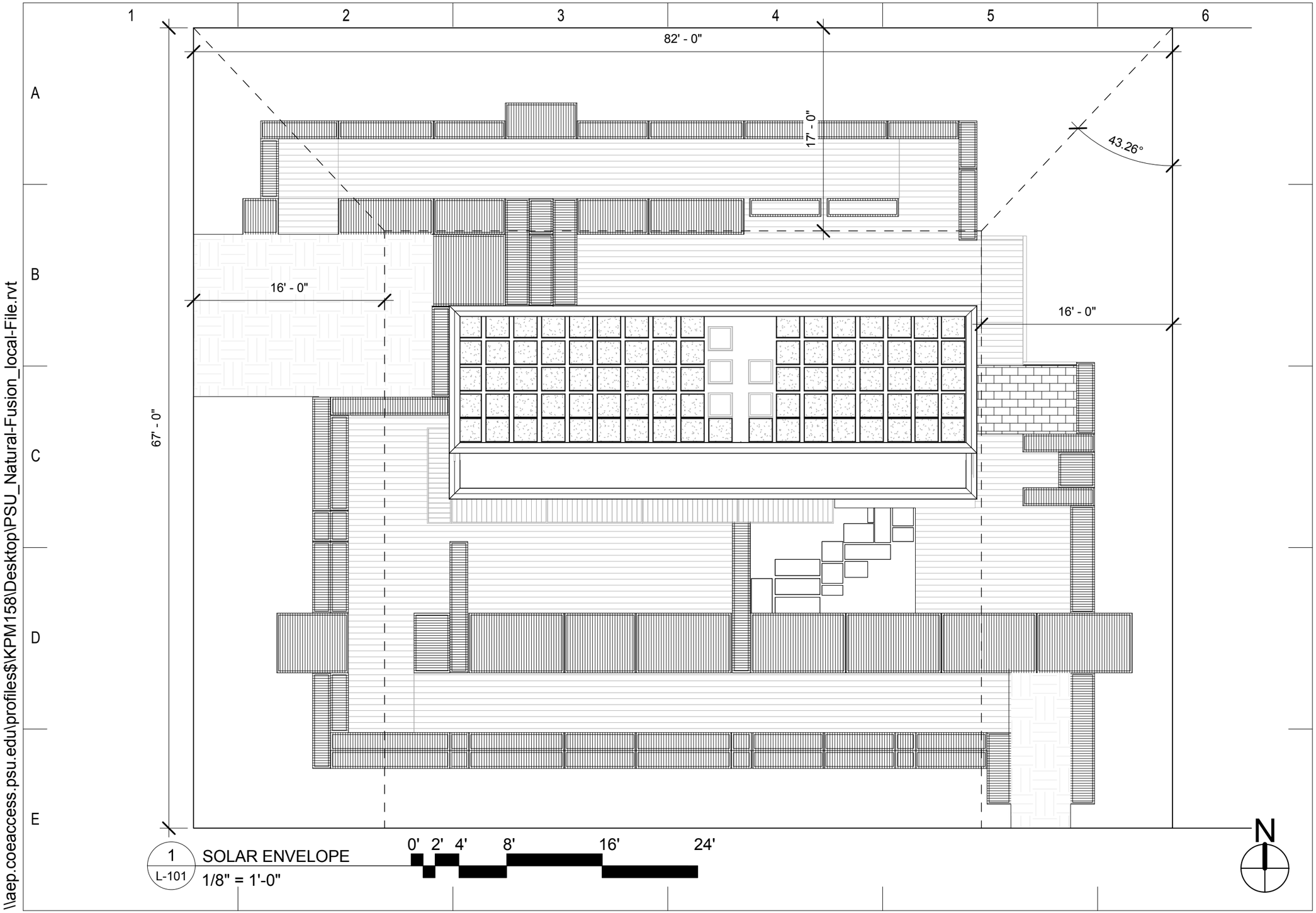
NATURAL FUSION

DRAWING INDEX

G-001

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE



1 L-101 SOLAR ENVELOPE
1/8" = 1'-0"

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt

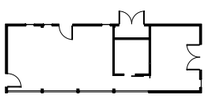
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/8" = 1'-0"

DRAWN BY	CHECKED BY
SDG	KPM

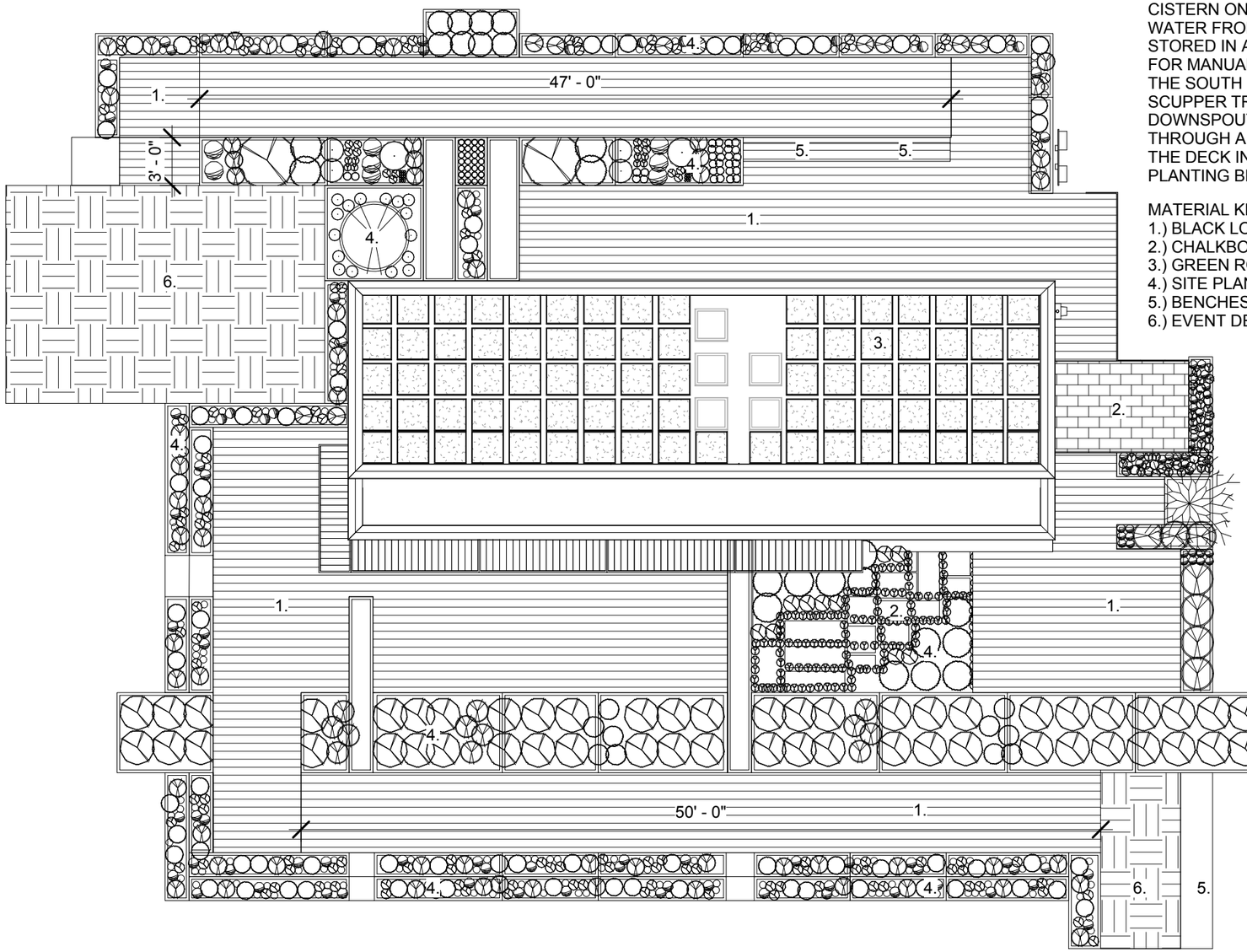
DRAWING STATUS
CD SET

NATURAL FUSION

SOLAR ENVELOPE PLAN

L-101

PENNSTATE
1855



GENERAL NOTE: WATER FROM ROOF FLOWS OFF THROUGH SCUPPERS AND IS CONVEYED TO DRAINAGE POINTS ON THE SOUTH DECK AND A STORAGE CISTERN ON THE NORTH DECK. WATER FROM THE NORTH ROOF IS STORED IN A RAIN CISTERN AND USED FOR MANUAL IRRIGATION. WATER ON THE SOUTH ROOF EXITS THROUGH THE SCUPPER TRAYS OR COLUMN DOWNSPOUT AND GRAVITY FEEDS THROUGH A RUNNEL LOCATED UNDER THE DECK INTO THE XERISCAPE PLANTING BED.

MATERIAL KEY
1.) BLACK LOCUST DECKING
2.) CHALKBOARD SLATE
3.) GREEN ROOF
4.) SITE PLANTS
5.) BENCHES
6.) EVENT DECKING

1 / L-102 PLANTER PLAN
1/8" = 1'-0"

0' 2' 4' 8' 16' 24'

N

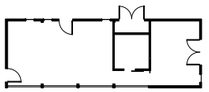
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/8" = 1'-0"

SDG | KPM
DRAWN BY | CHECKED BY

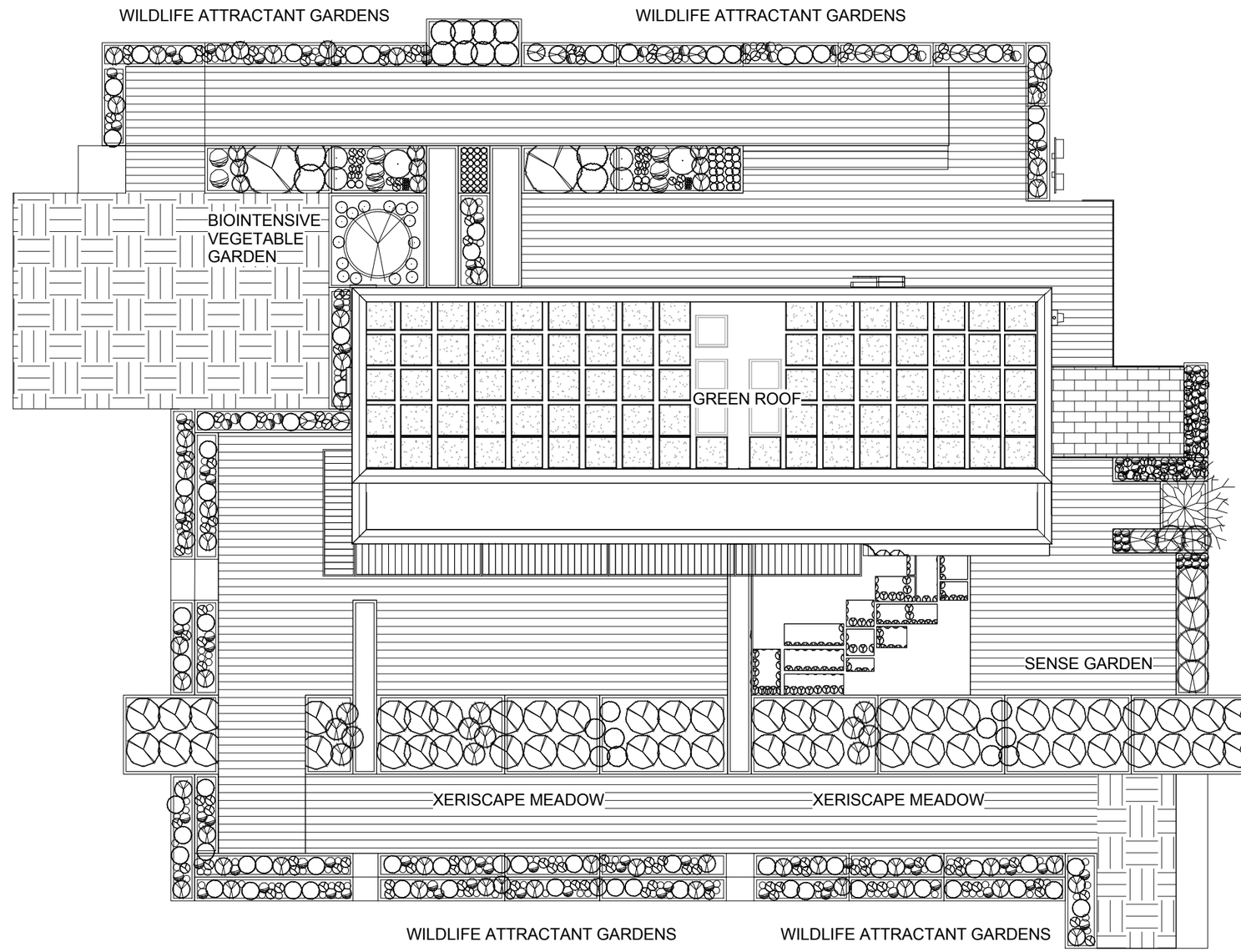
DRAWING STATUS
CD SET

NATURAL FUSION

L-102 LANDSCAPE SITE PLAN

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt

PENNSTATE



1 / L-103 Copy of PLANTER PLAN
1/8" = 1'-0"

0' 2' 4' 8' 16' 24'

N

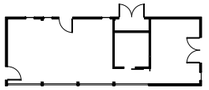
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/8" = 1'-0"

SDG
DRAWN BY
KPM
CHECKED BY

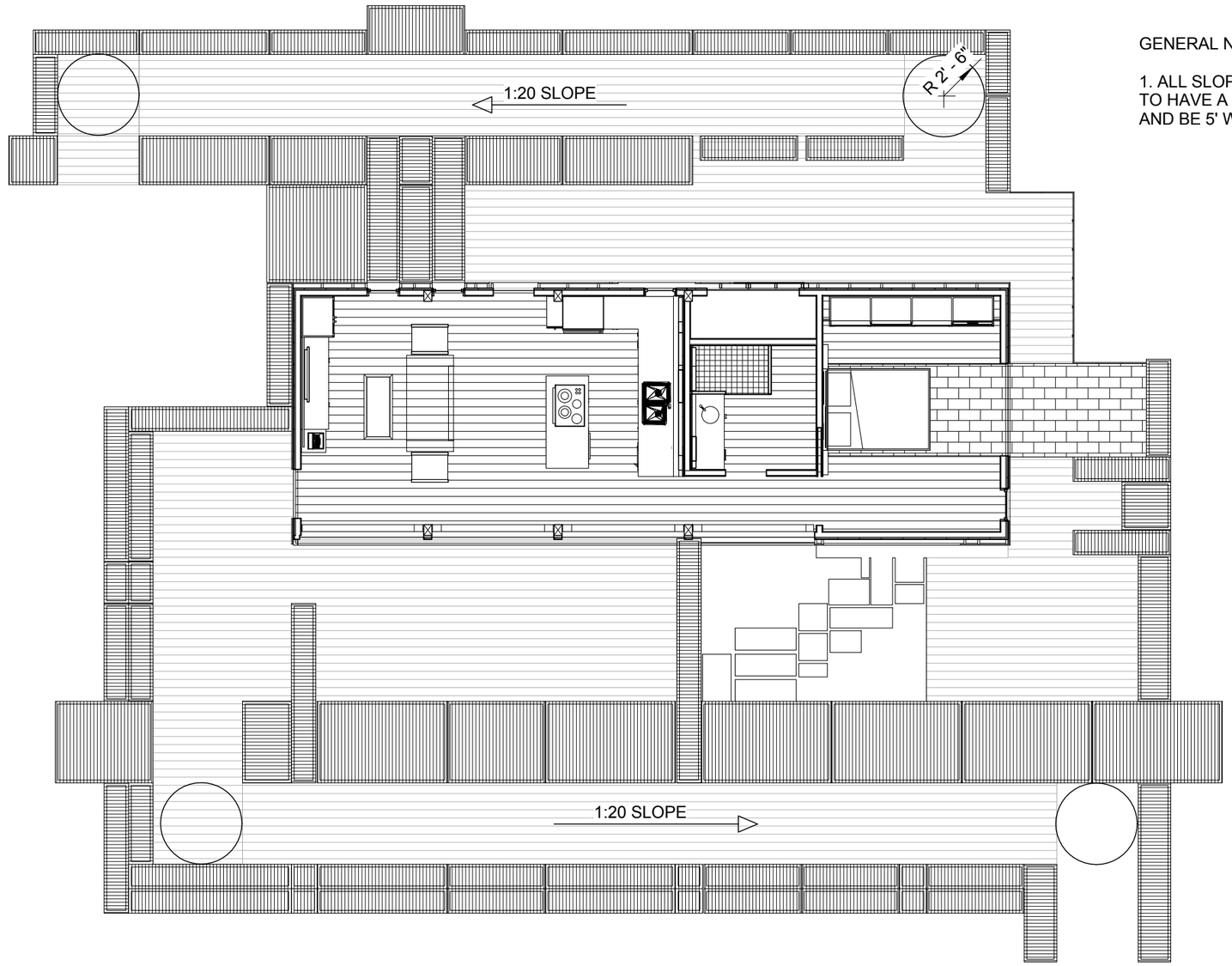
DRAWING STATUS
CD SET

NATURAL FUSION

L-103 PLANTING PLAN

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt

PENNSTATE



GENERAL NOTES:

1. ALL SLOPED WALKWAY TO HAVE A SLOPE OF 1:20 AND BE 5' WIDE

1 / L-105 ADA FLOW PLAN
1/8" = 1'-0"

0' 2' 4' 8' 16' 24'

N

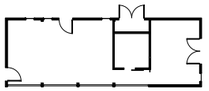
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/8" = 1'-0"

SDG DRAWN BY
KPM CHECKED BY

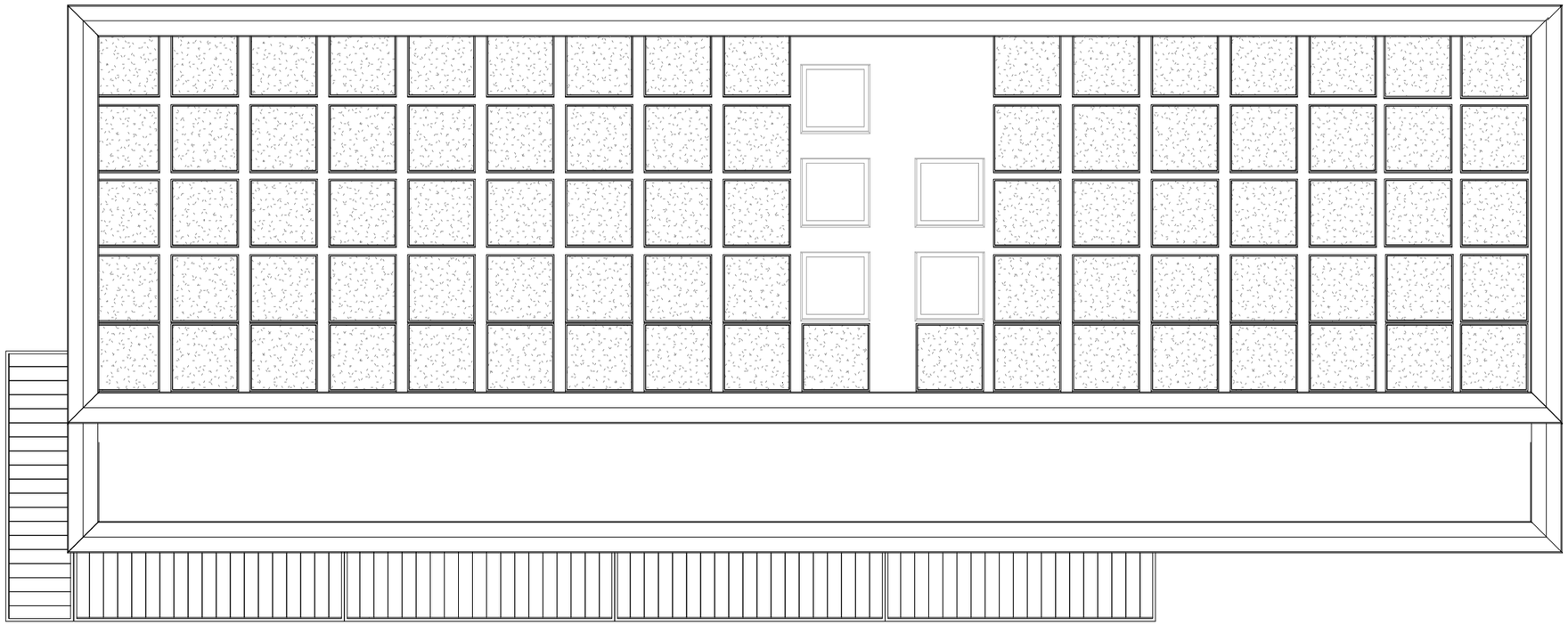
DRAWING STATUS
CD SET

NATURAL FUSION

L-105 ADA FLOW PLAN

PENNSTATE

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt



1 L-105 GREEN ROOF
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

GENERAL NOTES

1. WHITE GRAVEL MULCHING LAYER FOR ALBEDO
2. ROOFLITE EXTENSIVE MC FILL
3. 2'x2'4" CARLISLE SYNTEC GREEN ROOF TRAYS

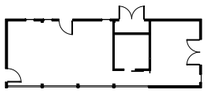
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

SDG DRAWN BY
KPM CHECKED BY

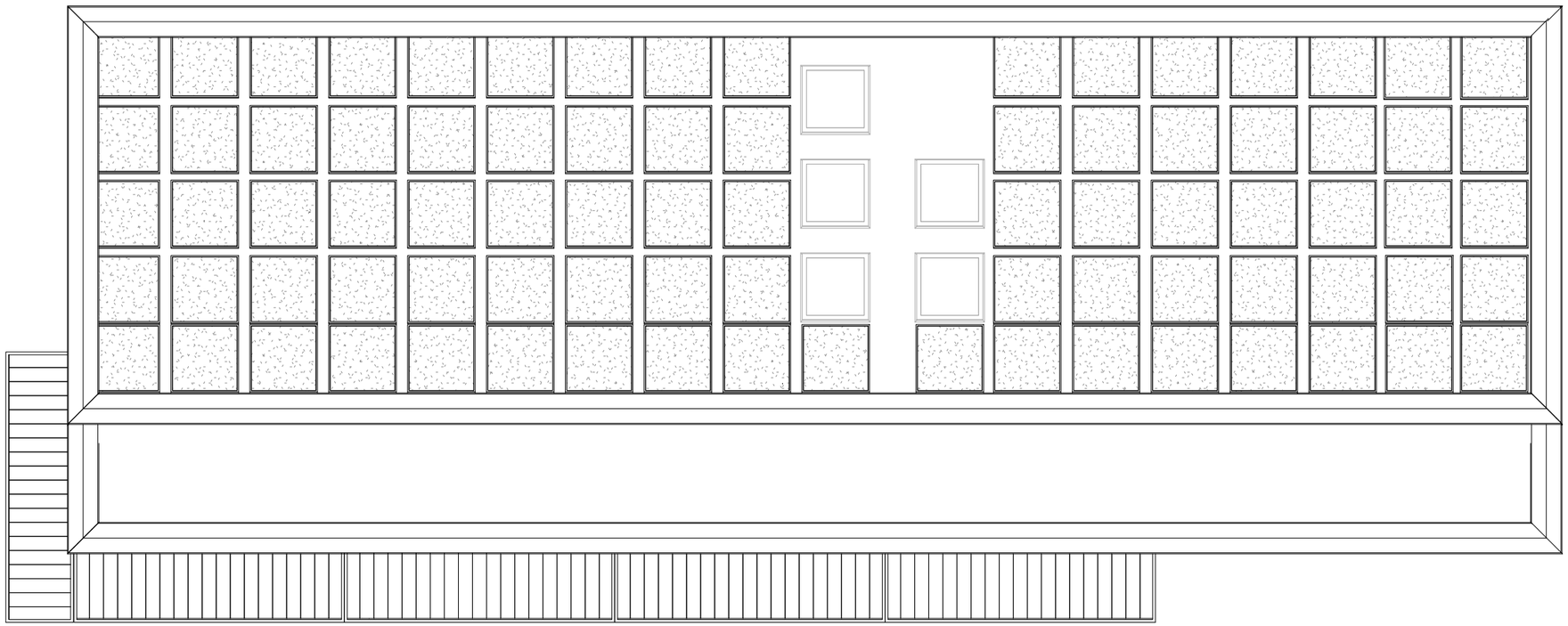
DRAWING STATUS
CD SET

NATURAL FUSION

L-105 GREEN ROOF PLAN

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855



1 L-106 GREEN ROOF
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

GENERAL NOTES

1. WHITE GRAVEL MULCHING LAYER FOR ALBEDO
2. ROOFLITE EXTENSIVE MC FILL
3. 2'x2'4" CARLISLE SYNTEC GREEN ROOF TRAYS

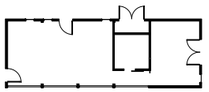
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

SDG — DRAWN BY
KPM — CHECKED BY

DRAWING STATUS
CD SET

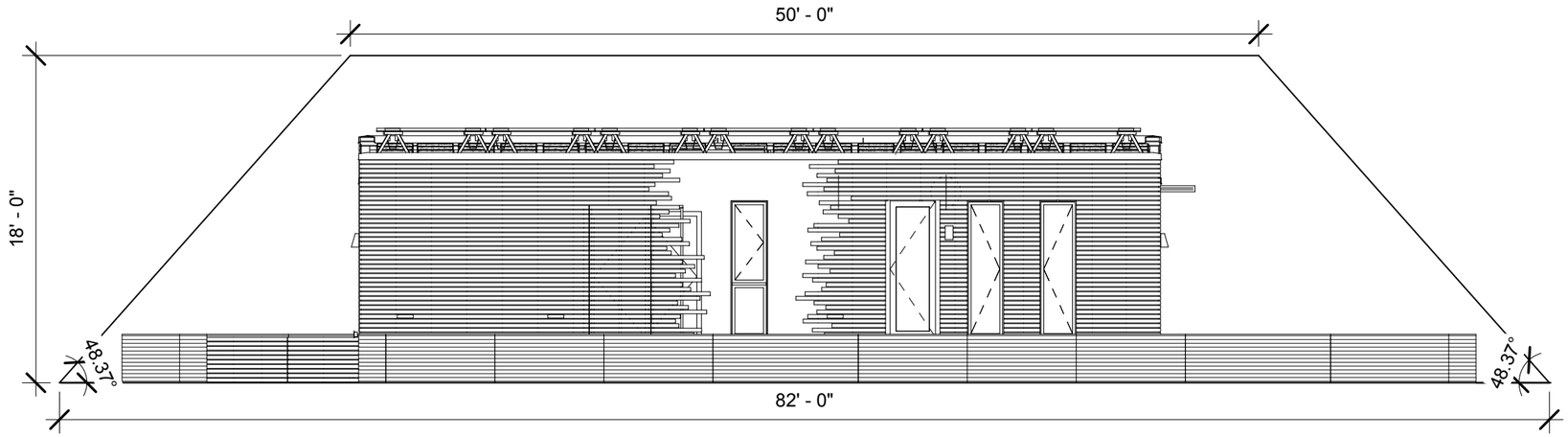
NATURAL FUSION

L-106 GREEN ROOF PLAN

PENNSTATE

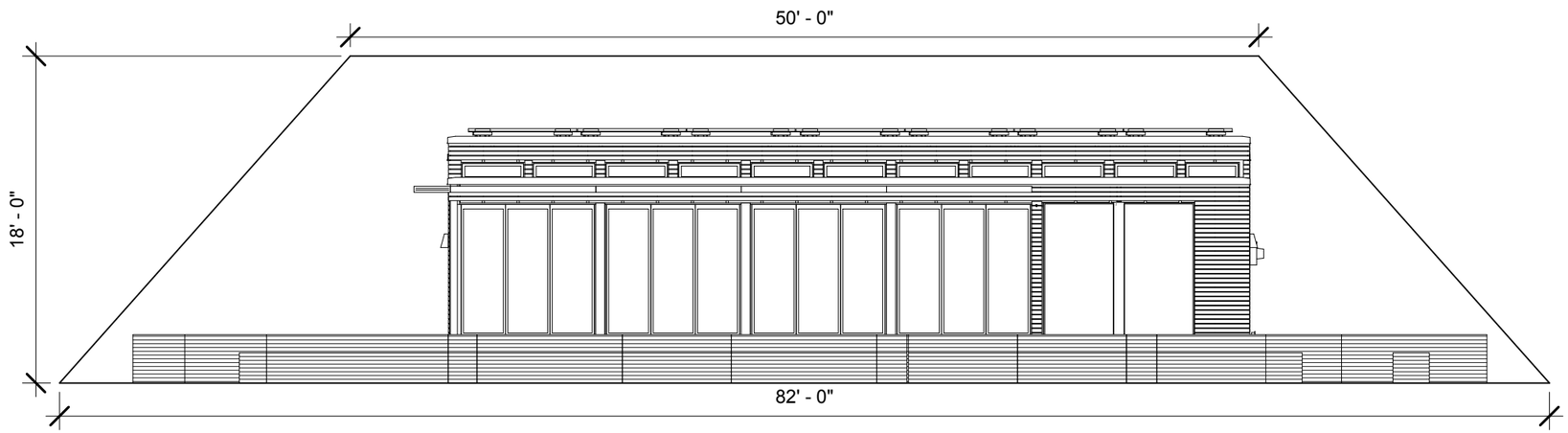
1855

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt



1 L-201 NORTH SITE ELEVATION
1/8" = 1'-0"

0' 2' 4' 8' 16' 24'



2 L-201 SOUTH SITE ELEVATION
1/8" = 1'-0"

0' 2' 4' 8' 16' 24'

GENERAL NOTE:

1. ALL PLANTS STAY WITHIN LIMITS OF THE SOLAR ENVELOPE

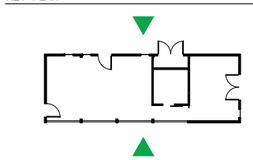
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/8" = 1'-0"

SDG KPM
DRAWN BY CHECKED BY

DRAWING STATUS
CD SET

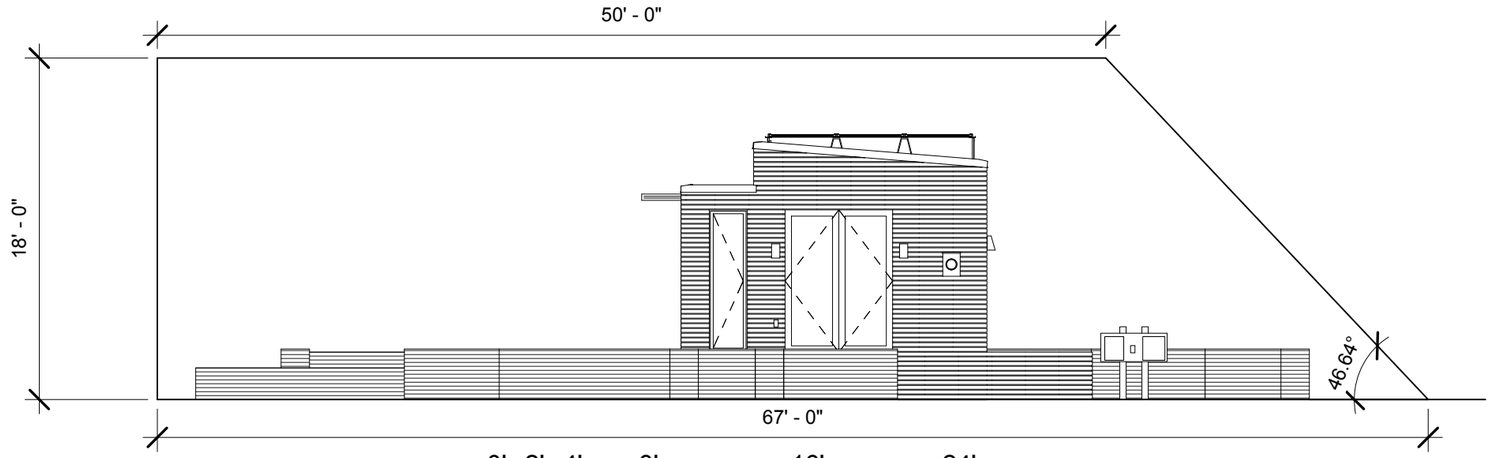
NATURAL FUSION

NORTH & SOUTH ELEVATIONS

L-201

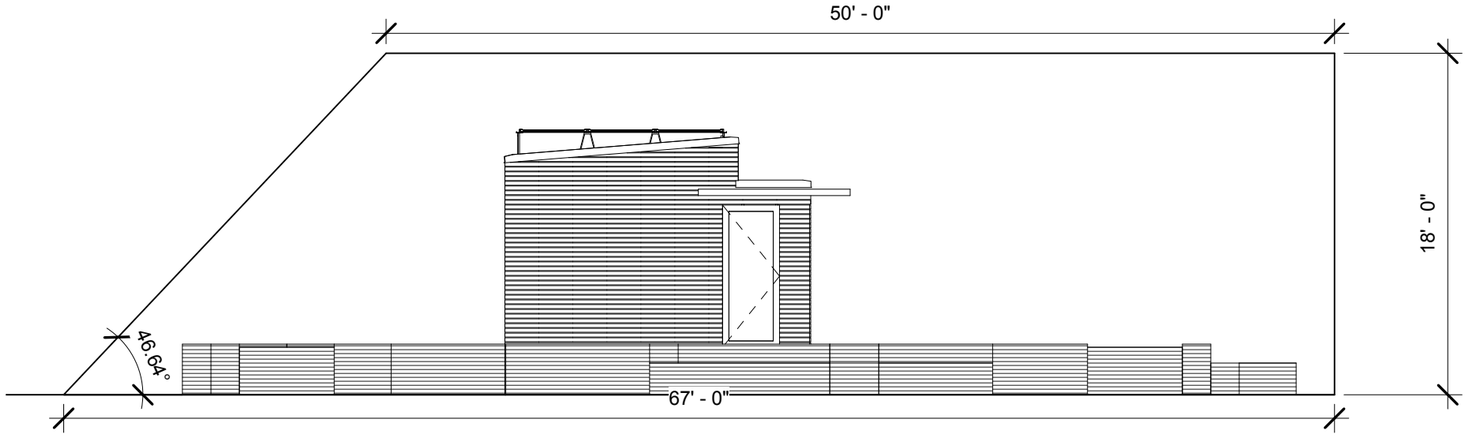
PENNSTATE

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt



1 L-202 EAST SITE ELEVATION
1/8" = 1'-0"

0' 2' 4' 8' 16' 24'



2 L-202 WEST SITE ELEVATION
1/8" = 1'-0"

0' 2' 4' 8' 16' 24'

GENERAL NOTE:

1. ALL PLANTS STAY WITHIN LIMITS OF THE SOLAR ENVELOPE

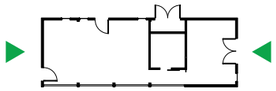
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/8" = 1'-0"

DRAWN BY	CHECKED BY
SDG	KPM

DRAWING STATUS
CD SET

NATURAL FUSION

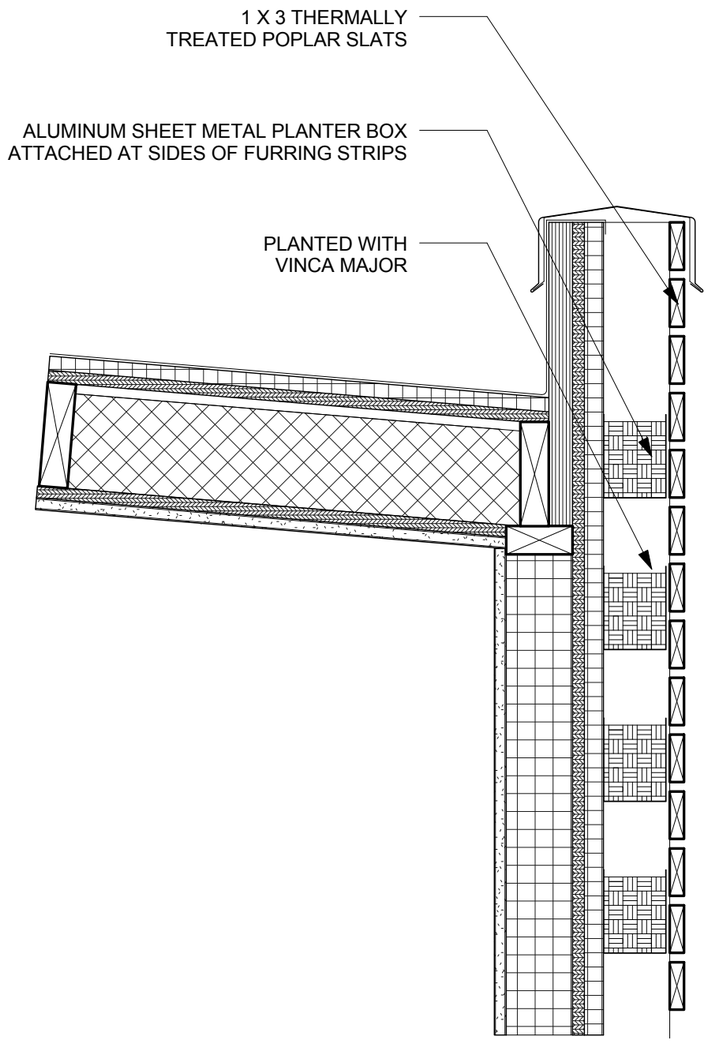
EAST & WEST ELEVATIONS

L-202

PENNSTATE

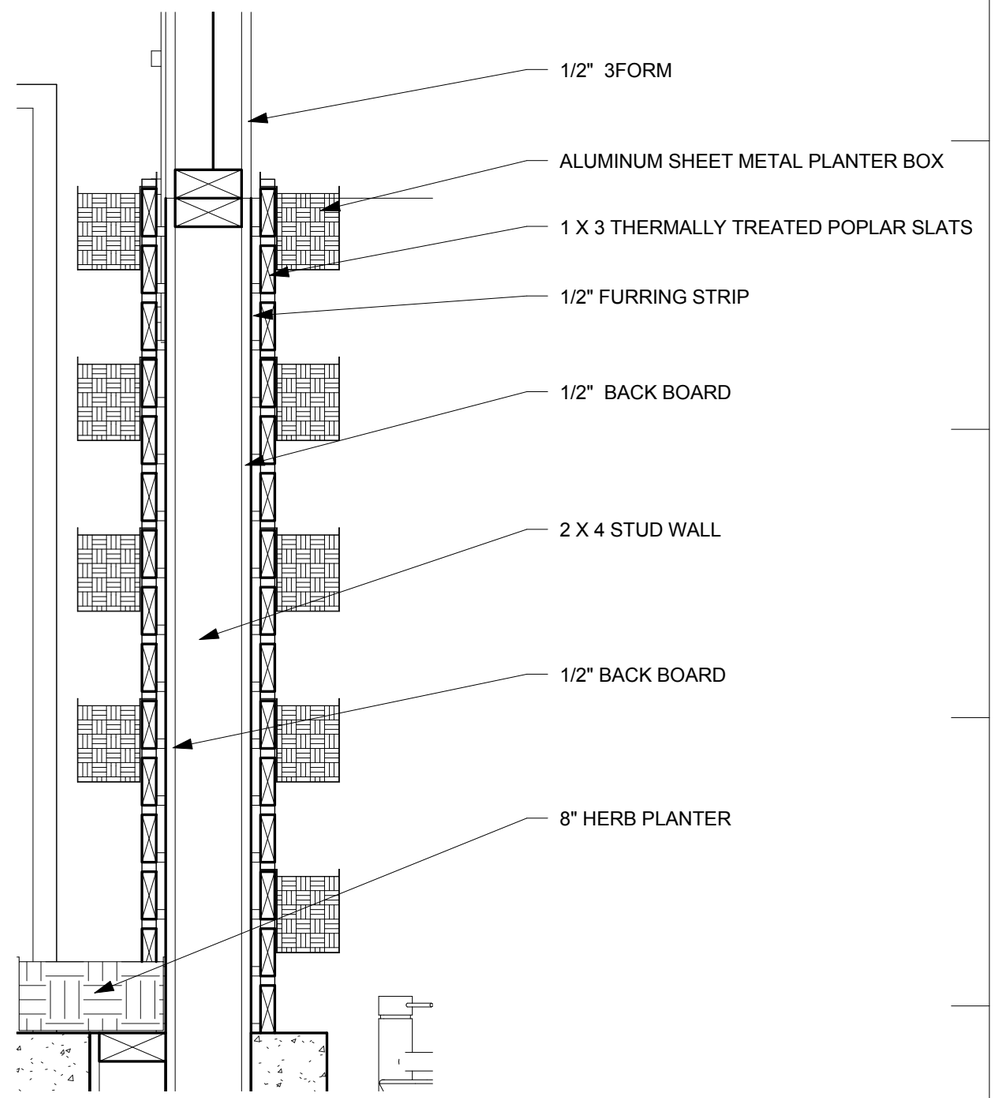
1855

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt



2 L-501 NORTH BIO SECTION
1 1/2" = 1'-0"

0' 1.5" 3" 6" 1'



1 L-501 ENLARGED LIFEWELL
SECTION DETAIL
1 1/2" = 1'-0"

0' 1.5" 3" 6" 1'

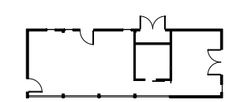
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



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

DRAWN BY	CHECKED BY
SDG	KPM

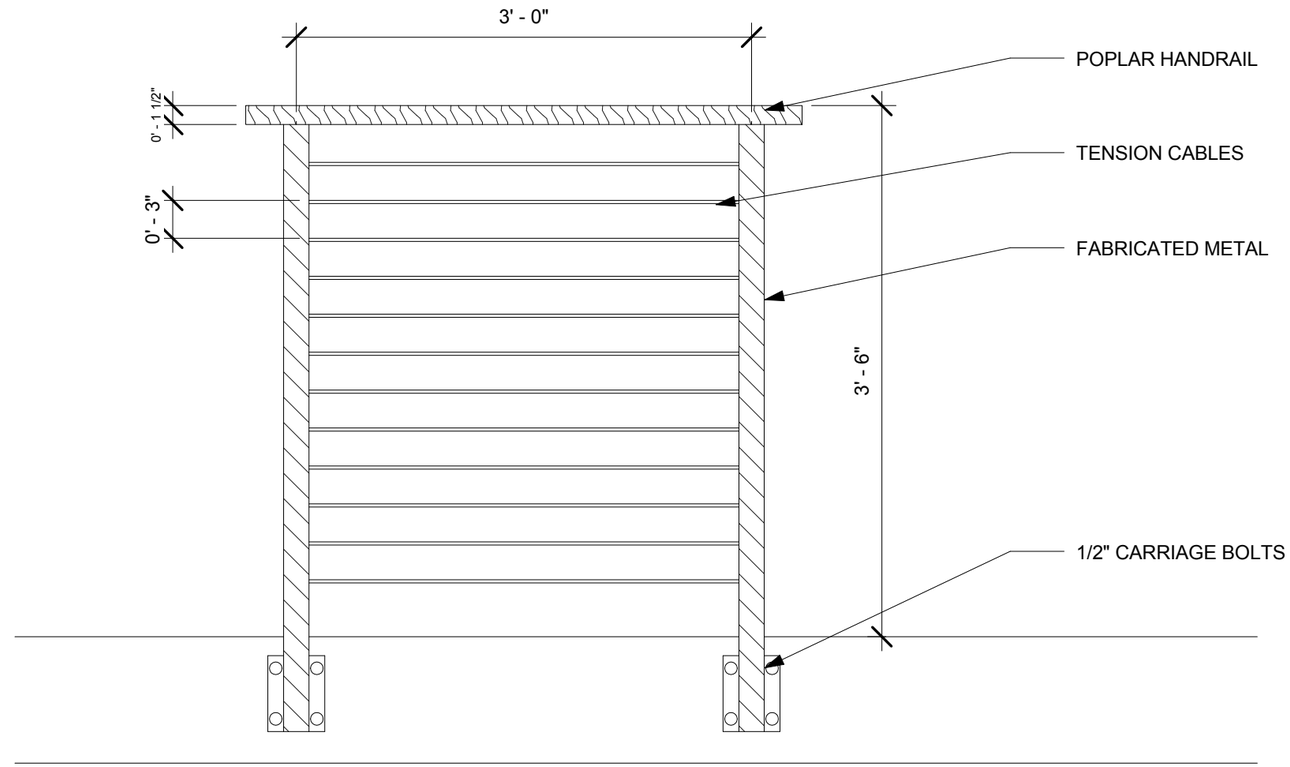
DRAWING STATUS
CD SET

NATURAL FUSION

L-501 LIVING WALLS DETAIL

PENNSTATE

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt



1 / L-502 RAILING DETAIL
1" = 1'-0"

0' 1/2' 1' 2' 3'

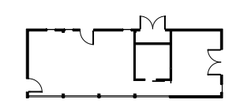
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1" = 1'-0"

SDG | KPM
DRAWN BY | CHECKED BY

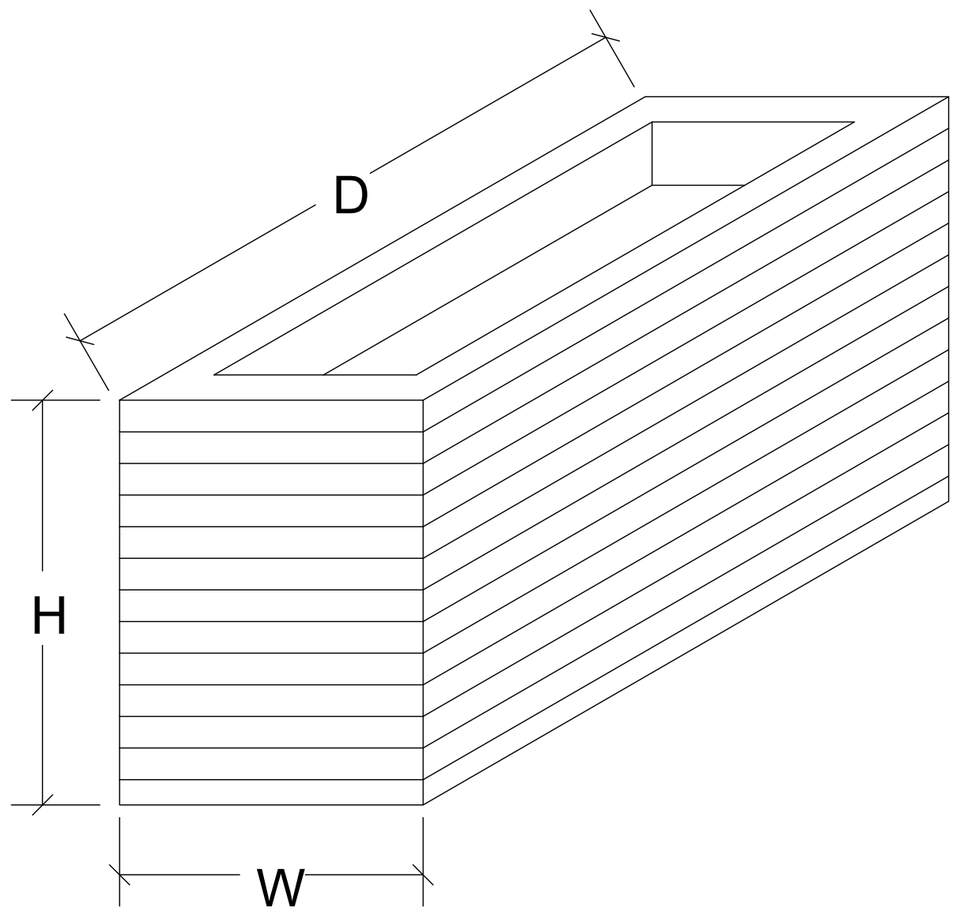
DRAWING STATUS
CD SET

NATURAL FUSION

L-502 RAILING DETAIL

PENNSTATE

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt



1 / L-503 PLANTER BOX ISOMETRIC
1" = 1'-0"

0' 1/2' 1' 2' 3'

Planter Schedule

Module Number	Height	Width	Length	Facing Material
W1	20"	18"	6'	Poplar
W2	20"	18"	8'	Poplar
W3	20"	18"	9'6"	Poplar
W4	20"	18"	10'	Poplar
S1	20"	2'	6'	Poplar
R1	30"	18"	11'	Poplar
R2	30"	18"	15'	Poplar
R3	30"	2'	9'	Poplar
WH1	32"	18"	4'	Poplar
WH2	32"	18"	5'	Poplar
WH3	32"	18"	6'	Poplar
WH4	32"	18"	7'7"	Poplar
WH5	32"	18"	8'	Poplar
WH6	32"	18"	10'	Poplar
S1	32"	2'	6'	Poplar
S3	32"	2'	9'	Poplar
WH7	32"	6'	6'2"	Poplar
B1	32"	3'	2'	Black Locust
B2	32"	3'	3'	Black Locust
B3	32"	3'	6'	Black Locust
B4	32"	3'	8'	Black Locust
M1	32"	5'	3'	Black Locust
M2	32"	5'	6'	Black Locust
M3	32"	5'	8'	Black Locust

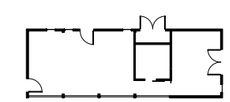
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1" = 1'-0"

SDG DRAWN BY
KPM CHECKED BY

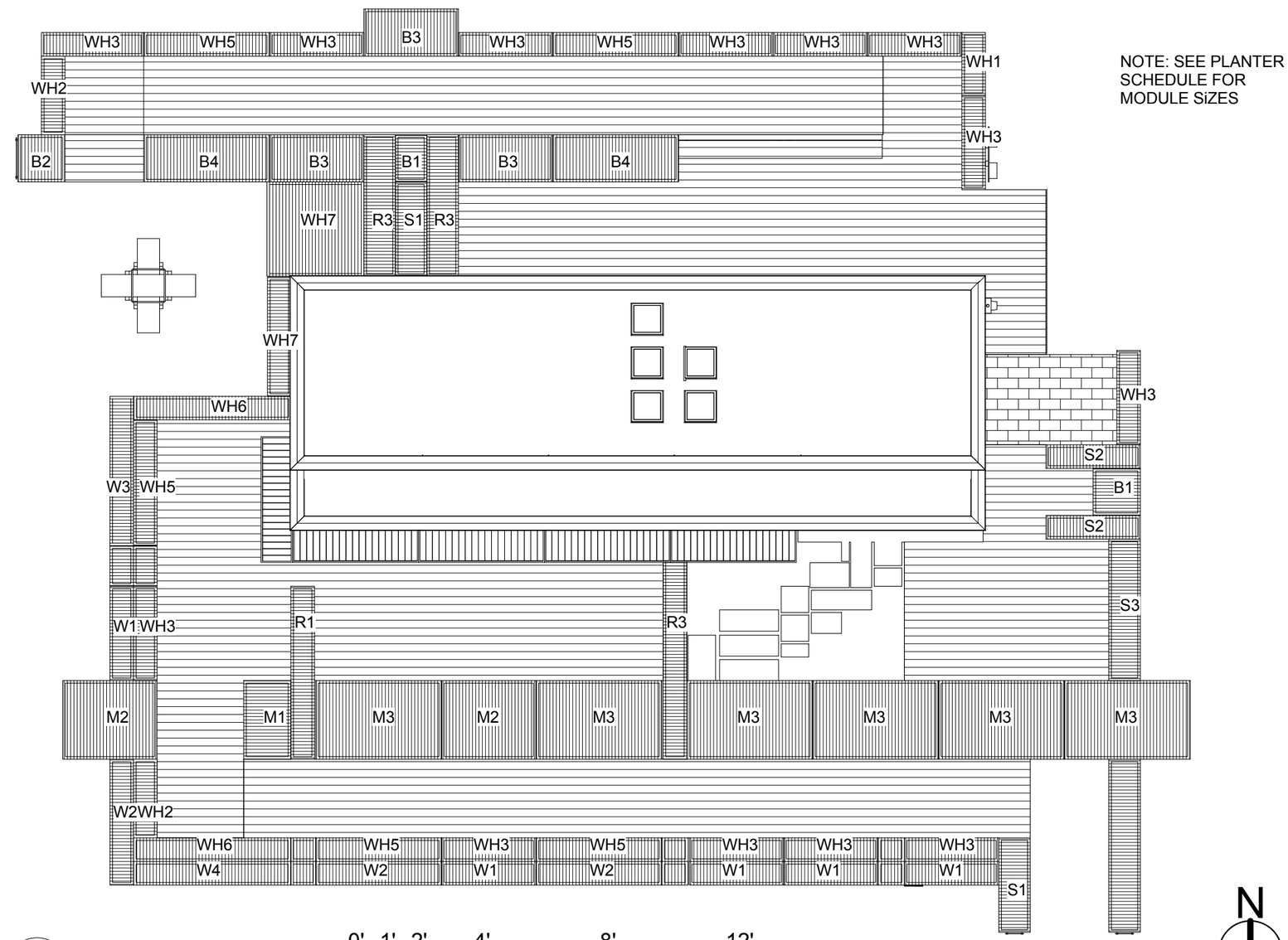
DRAWING STATUS
CD SET

NATURAL FUSION

L-503 PLANTER SCHEDULE

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt

PENNSTATE
1855



NOTE: SEE PLANTER SCHEDULE FOR MODULE SIZES

1 L-104 PLANTER BOX PLAN
1/8" = 1'-0"

0' 1' 2' 4' 8' 12'

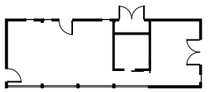
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/8" = 1'-0"

SDG | KPM
DRAWN BY | CHECKED BY

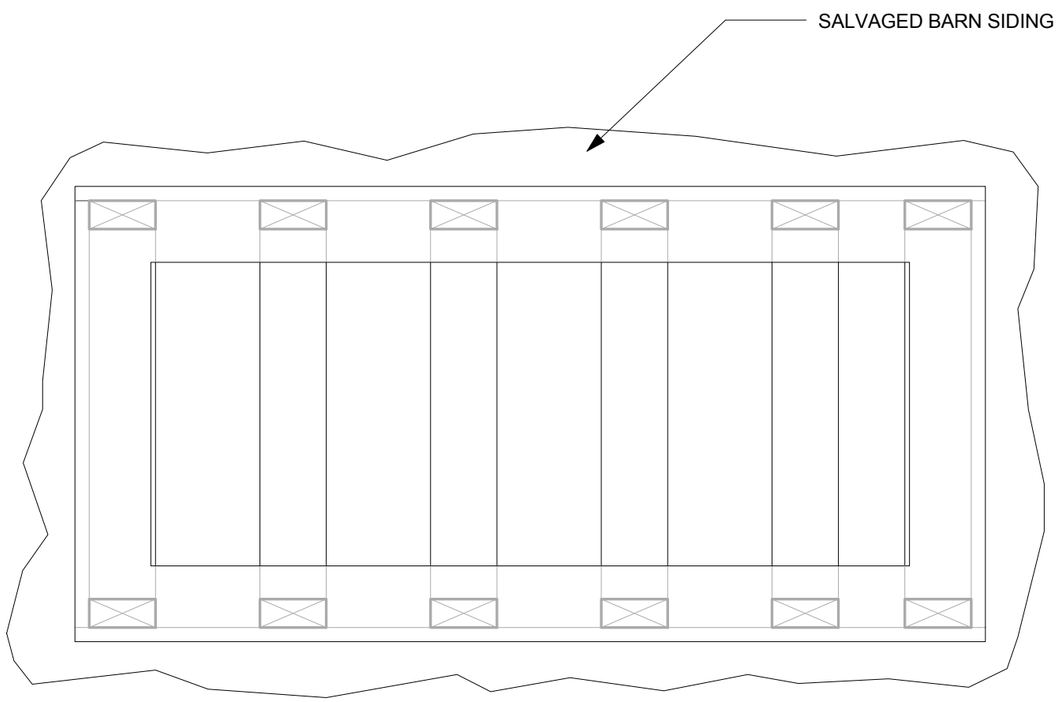
DRAWING STATUS
CD SET

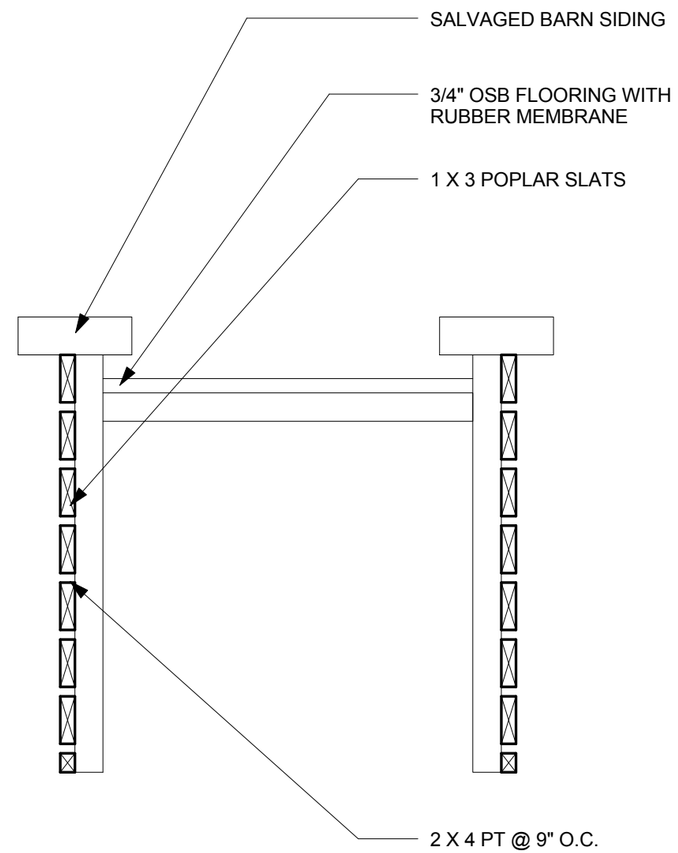
NATURAL FUSION

L-104 PLANTER PLAN

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt

PENNSTATE
1855





1 L-504 Outdoor Table
1 1/2" = 1'-0"

0' 1.5" 3" 6" 1'

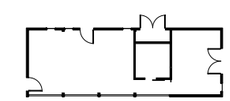
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



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

SDG DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

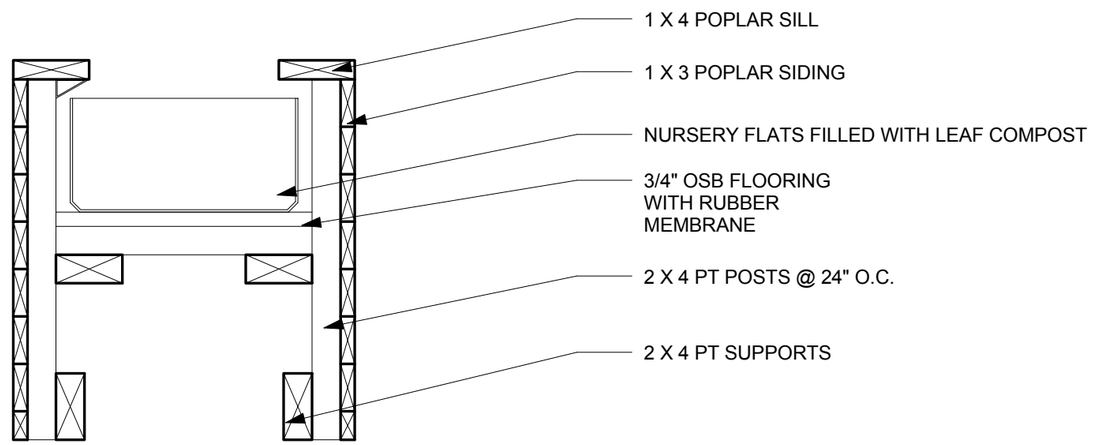
NATURAL FUSION

OUTDOOR TABLE DETAIL

L-504

PENNSTATE

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt



2 L-505 PLANTER BOX SECTION
1 1/2" = 1'-0"

0' 1/2' 1' 2' 3'

1 L-505 PLANTER BOX DETAILS
1 1/2" = 1'-0"

0' 1.5" 3" 6" 1'

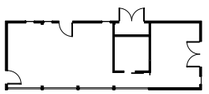
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



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

SDG DRAWN BY
KPM CHECKED BY

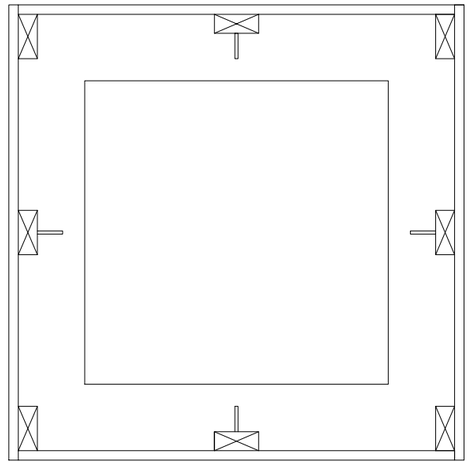
DRAWING STATUS
CD SET

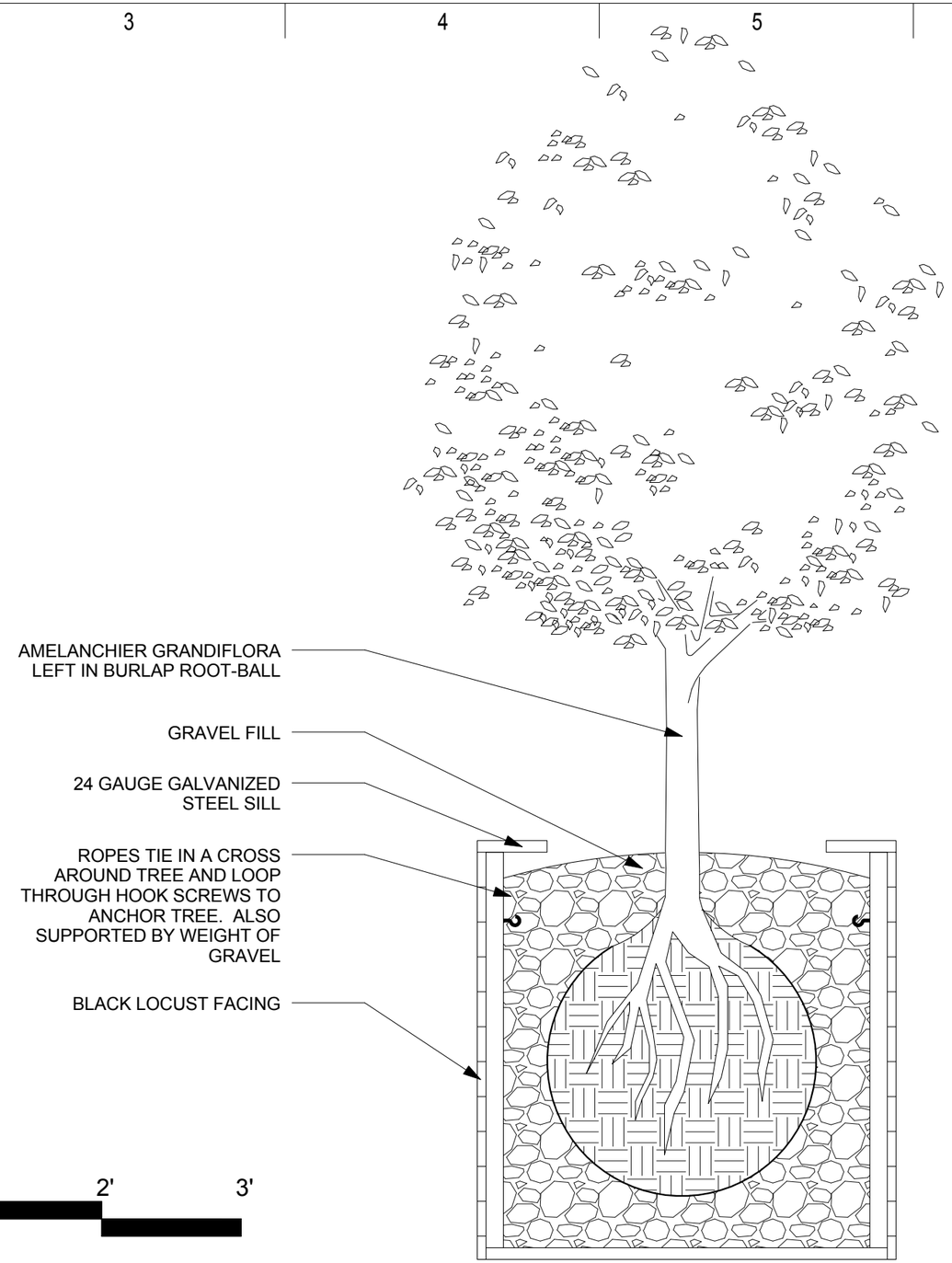
NATURAL FUSION

L-505 PLANTER DETAILS

PENNSTATE

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt





1 / L-506 TREE PLANTER
1" = 1'-0"

0' 1/2' 1' 2' 3'

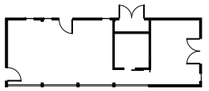
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1" = 1'-0"

DRAWN BY	CHECKED BY
SDG	KPM

DRAWING STATUS
CD SET

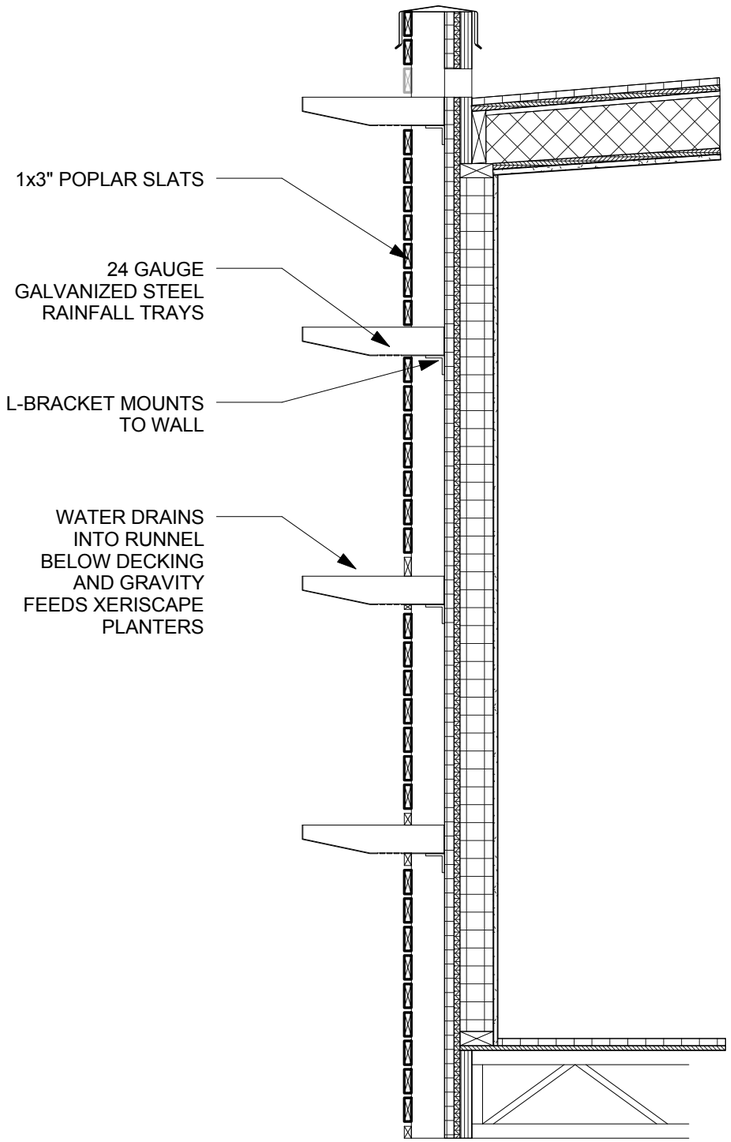
NATURAL FUSION

TREE PLANTER

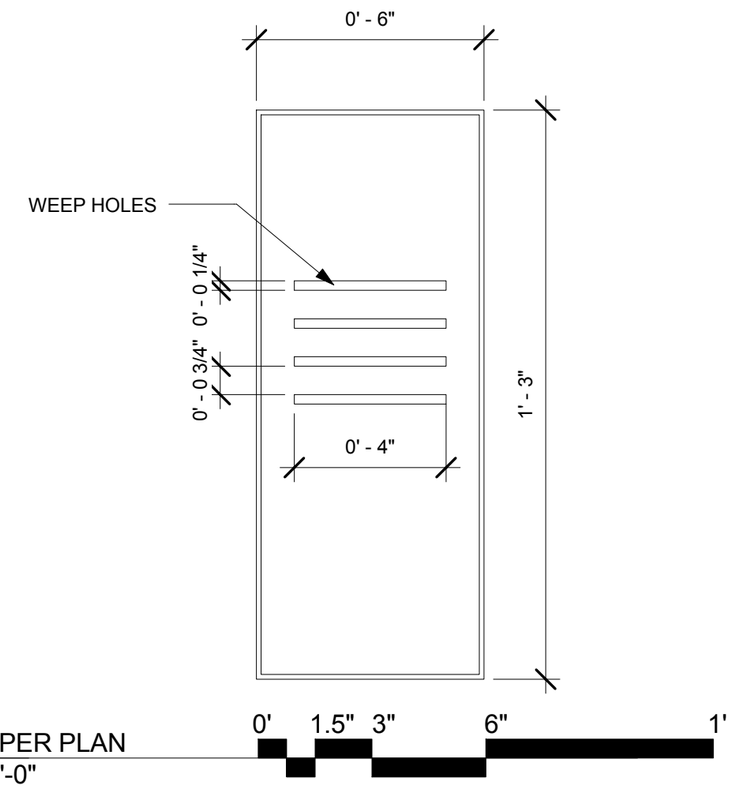
L-506

PENNSTATE

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt



1 L-507 Scupper
3/4" = 1'-0"



2 L-507 SCUPPER PLAN
3" = 1'-0"

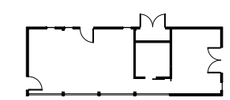
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
As indicated

DRAWN BY	CHECKED BY
SDG	KPM

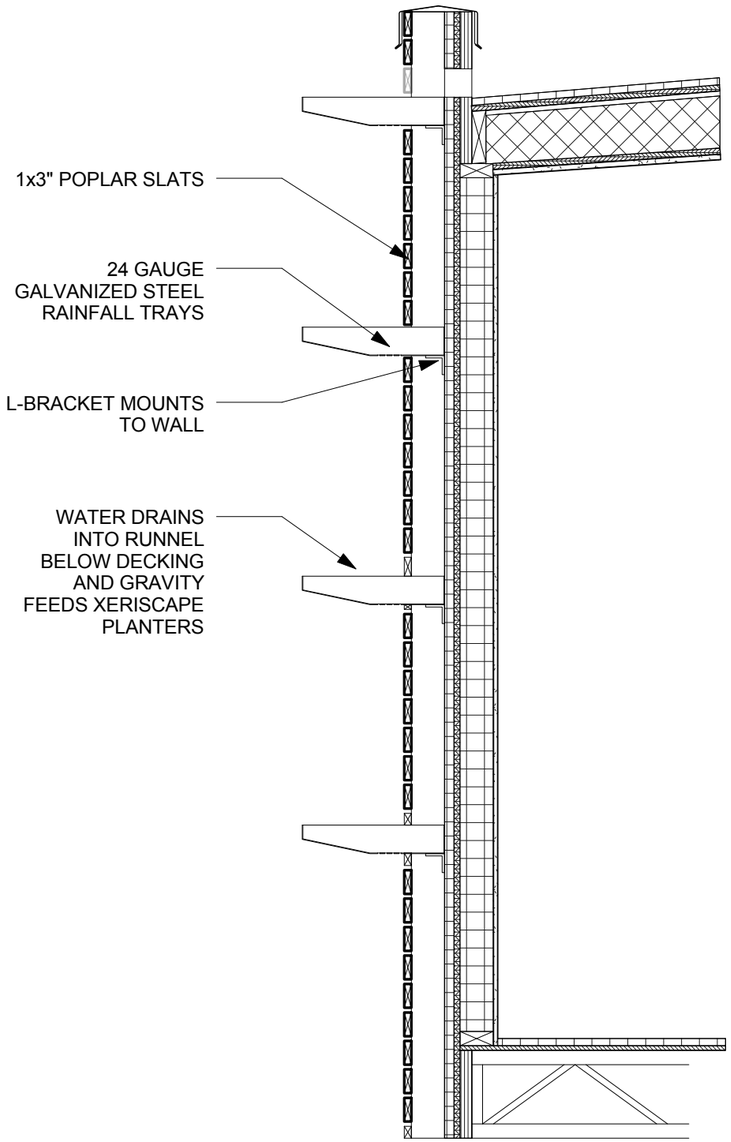
DRAWING STATUS
CD SET

NATURAL FUSION

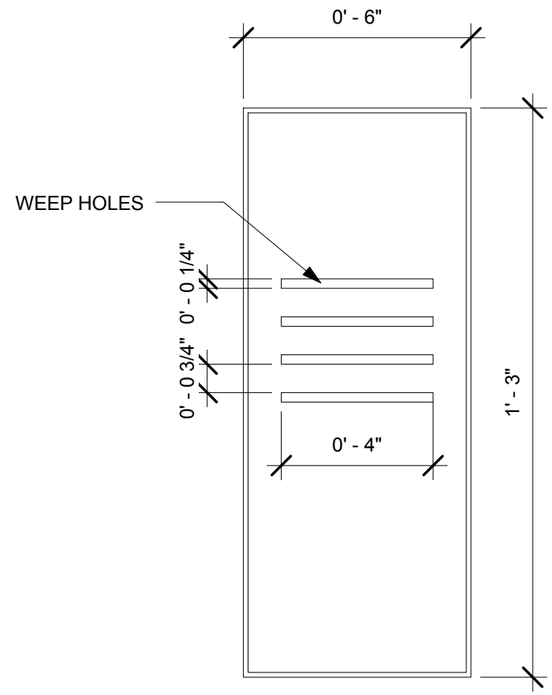
L-507 SCUPPER DETAIL

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt

PENNSTATE



1 L-508 Scupper
3/4" = 1'-0"



2 L-508 SCUPPER PLAN
3" = 1'-0"

0' 1.5" 3" 6" 1'

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

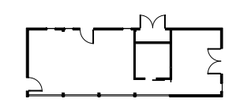
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
As indicated

SDG DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

L-508 SCUPPER DETAIL

PENNSTATE
1855

Species Name	Common Name	Quantity	Height	Bloom/Folliage Color
Living Walls				
Vinca major	Large Myrtle	480	4-6"	Blue
Lavandula angustifolia	Lavender	15	1'	Lavender
Green Roof				
Sedum album	Coral Carpet	500	4-8"	Red
Sedum oreganum	Oregon Stonecrop	500	4-8"	Yellow
Sedum ternatum	Woodland Stonecrop	500	4-8"	White
Sedum lanceolatum	Spearleaf Stonecrop	500	4-8"	White
Talinum calycinum	Large Flowered Rock Pink	500	4-8"	Pink
Cymbalaria muralis	Kenilworth Ivy	500	4-8"	Light Purple

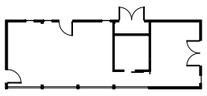
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

SDG DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

ROOF & WALL PLANT SCHEDULE

L-601

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE

Species Name	Common Name	Quantity	Height	Bloom/Folliage Color
Xeric Limestone Meadow				
Schizachyrium scoparium	Little Bluestem	84	3-4'	Orange Fall Color
Asclepias tuberosa	Butterfly Weed	8	2'	Red
Aster novea angliae	New England Aster	24	1-2'	Light Purple
Heuchera americana	American Alumroot	40	1'	None
Bouteloua curtipendula	Side Oats Gamma	15	2-3'	None
Monarda fistulosa	Wild Bergamot	75	2'	Pink
Campanula rotundifolia	Harebell	50	1'	Light Blue

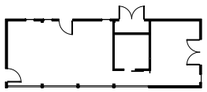
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

SDG DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

XERISCAPE PLANT SCHEDULE

L-602

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE

Species Name	Common Name	Quantity	Height	Bloom/Folliage Color
Bio-Intensive Garden				
Cucurbita pepo	Acorn Squash	3	0-1'	None
Allium sativum	Garlic	8	0-1'	None
Solanum tuberosum	Potato	5	0-1'	None
Beta vulgaris	Beets	10	0-1'	None
Allium cepa	White Onion	10	0-1'	None
Zea mays	Corn	5	0-1'	None
Raphanus sativus	Plum Purple Radish	8	0-1'	None
Brassica oleracea	Cabbage	8	0-1'	None
Daucus carota	Carrot	3	0-1'	None
Phaseolus vulgaris	Dragon's Tongue Snap Bean	8	0-1'	None
Capscium annuum	Bell Pepper	3	0-1'	None
Ocimum basilicum crispum	Basil	3	0-1'	None
Apium graveolens	Celery	2	0-1'	None
Lycopersicon esculentum	Roma VF Tomato	5	0-1'	None
Vaccinium corymbosum	Highbush Blueberry	1	3-4'	White
Lactuca sativa	Leaf Lettuce	8	0-1'	None
Beta vulgaris flavescens	Swiss Chard	3	0-1'	None

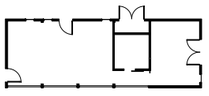
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

SDG DRAWN BY | KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

BIO-INTEN. PLANT SCHEDULE

L-603

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855

Species Name	Common Name	Quantity	Height	Bloom/Folliage Color
Sense Garden				
Andropogon gerardii	Big Bluestem	20	4'	Orange Fall Color
Asarum canadense	Wild Ginger	12	6"	Brownish Purple
Sorghastrum nutans	Indian Grass	9	3-4'	Golden Brown Fall Color
Asclepias tuberosa	Butterfly Weed	2	2'	Red/Orange
Aster ericoides	Heath Aster	35	2-4'	White
Symphyotrichum oblongifolium	American Aster	12	2'	Light Blue
Adiantum pedatum	Maidenhair Fern	8	1-2'	None
Campanula rotundifolia	Harebell	15	1-2'	Light Blue
Thymus vulgaris	Thyme	90	3"	White
Lavandula angustifolia	Lavender	20	1-2'	Lavender
Origanum vulgare	Oregano	10	0-1'	None
Mentha spicata	Spearmint	10	1'	None
Ocimum basilicum crispum	Basil	8	6"	None
Amelanchier x grandiflora	Autumn Brilliance Serviceberry	1	7-8'	White Blooms, Orange Fall Foliage

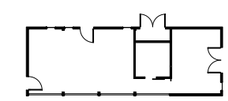
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

SDG DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

S. GARDEN PLANT SCHEDULE

L-604

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE

Species Name	Common Name	Quantity	Height	Bloom/Folliage Color
Wildlife Attractant Gardens				
Aronia melanocarpa	Black Chokeberry	1	3.5'	White Blooms, Red Fall Foliage
Echinacea purpurea	Eastern Purple Coneflower	60	1-2'	Light Purple
Callirhoe involucrata	Wine Cups	35	1'	Deep Pink
Liatris pilosa	Blazing Star	30	1.5'	Light Purple
Oenothera perennis	Sundrops	60	1-2'	Yellow
Gaillardia pulchella	Blanket Flower	75	1-2'	Red/Orange
Iris cristata	Crested Iris	100	1'	Blue

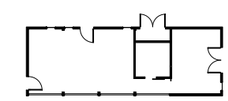
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

SDG DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

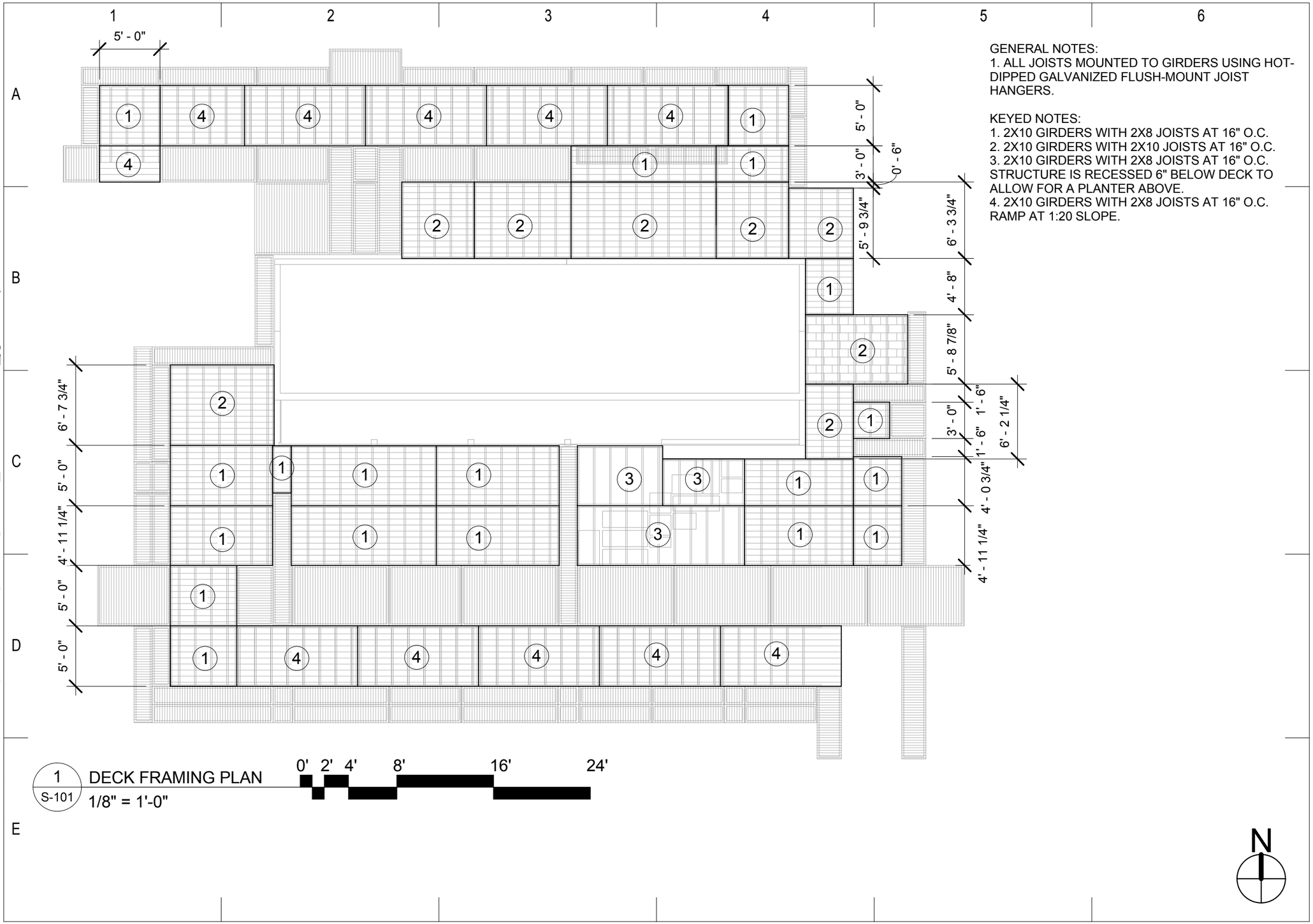
NATURAL FUSION

WILDLIFE PLANT SCHEDULE

L-605

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE



1 / S-101 DECK FRAMING PLAN
1/8" = 1'-0"

GENERAL NOTES:
1. ALL JOISTS MOUNTED TO GIRDERS USING HOT-DIPPED GALVANIZED FLUSH-MOUNT JOIST HANGERS.

KEYED NOTES:
1. 2X10 GIRDERS WITH 2X8 JOISTS AT 16" O.C.
2. 2X10 GIRDERS WITH 2X10 JOISTS AT 16" O.C.
3. 2X10 GIRDERS WITH 2X8 JOISTS AT 16" O.C. STRUCTURE IS RECESSED 6" BELOW DECK TO ALLOW FOR A PLANTER ABOVE.
4. 2X10 GIRDERS WITH 2X8 JOISTS AT 16" O.C. RAMP AT 1:20 SLOPE.

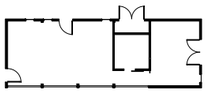
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/8" = 1'-0"

DRAWN BY JNG
CHECKED BY KPM

DRAWING STATUS
CD SET

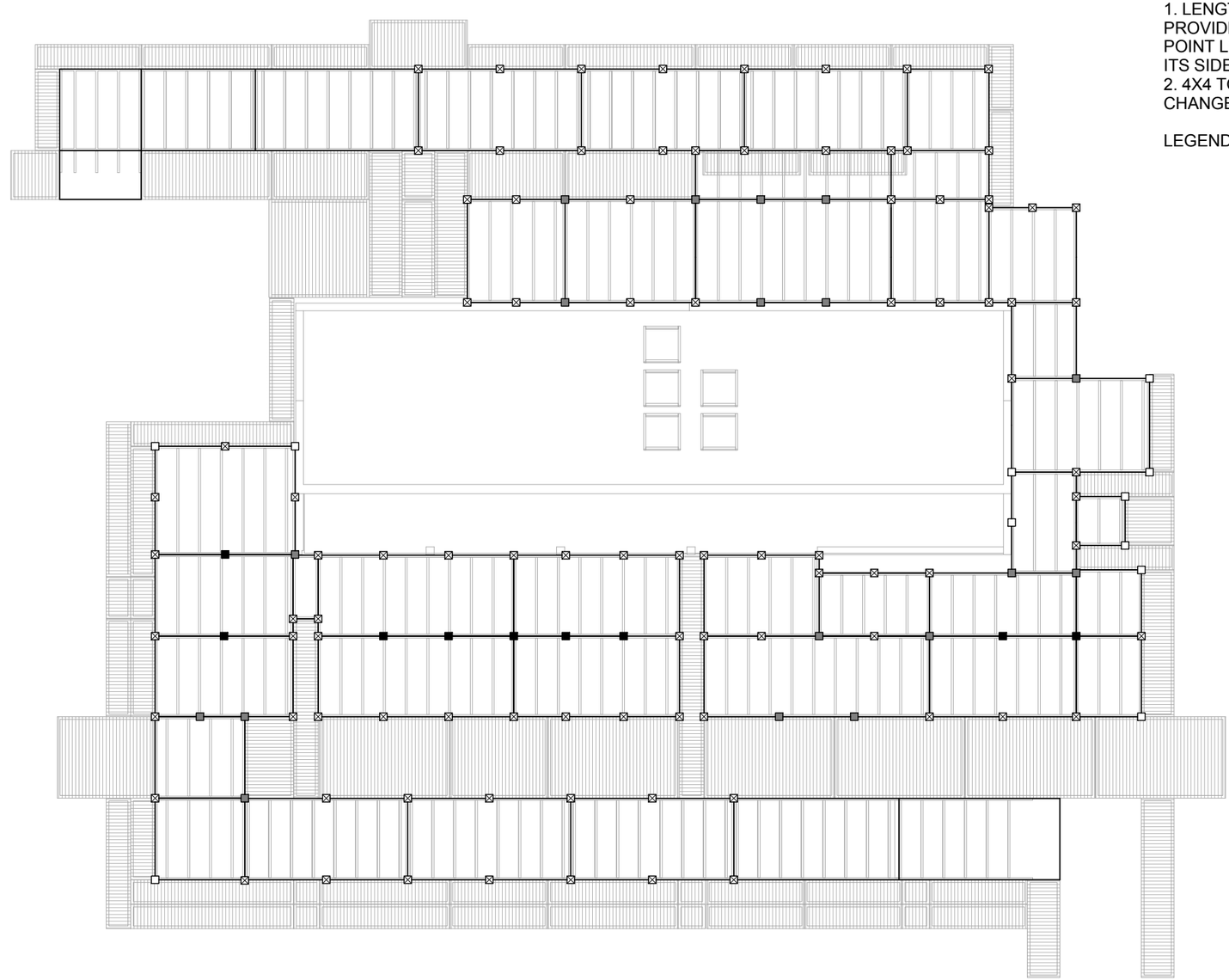
NATURAL FUSION

S-101 DECK FRAMING PLAN

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_Local-File.rvt



GENERAL NOTES:
1. LENGTHS OF 6X6 LUMBER SHOULD BE CUT TO PROVIDE PROPER AREA REQUIRED TO SUPPORT POINT LOADS ON THE MALL. 6X6 TO BE PLACED ON ITS SIDE UNDER THE 4X4 DECK SUPPORT.
2. 4X4 TO BE CUT ON SITE ACCORDING TO GRADE CHANGES.

LEGEND:
- 252 SQUARE INCHES (9)
- 162 SQUARE INCHES (18)
- 126 SQUARE INCHES (102)
- 63 SQUARE INCHES (11)

1 / S-102 DECK SUPPORT PLAN
1/8" = 1'-0"

0' 2' 4' 8' 16' 24'

N

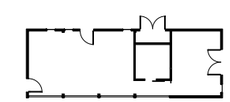
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/8" = 1'-0"

JNG DRAWN BY
KPM CHECKED BY

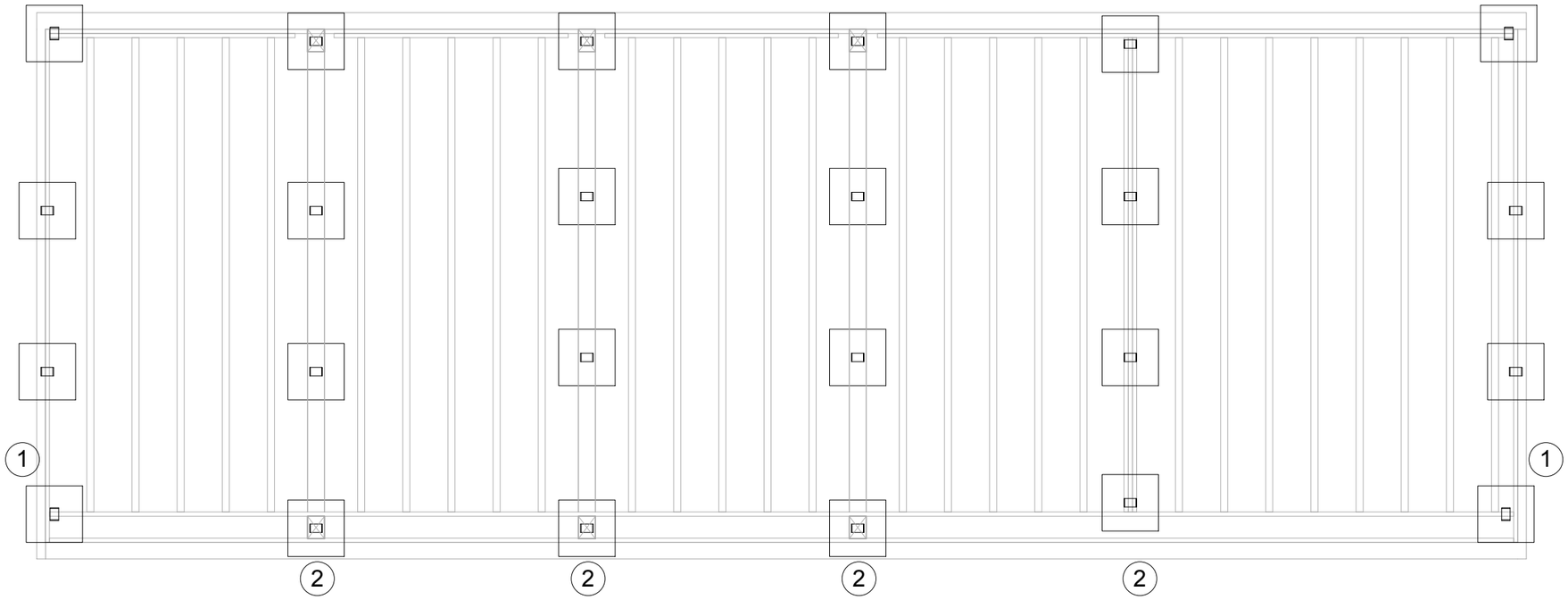
DRAWING STATUS
CD SET

NATURAL FUSION

S-102 DECK SUPPORT PLAN

PENNSTATE
1855

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt



1 / S-103 FOUNDATION PLAN
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

GENERAL NOTES:
1.JACKS ARE ADJUSTABLE TO ACCOMMODATE CHANGE IN ELEVATION WITHOUT SACRIFICING STRUCTURE.

KEYED NOTES:
1.JACKS TO BE LOCATED UNDER THE LVL'S ON THE EAST AND WEST SIDES OF THE HOUSE.
2. JACKS TO BE LOCATED UNDER THE COLUMNS, AND BEAMS OF EACH FRAME.

N

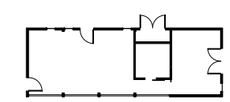
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

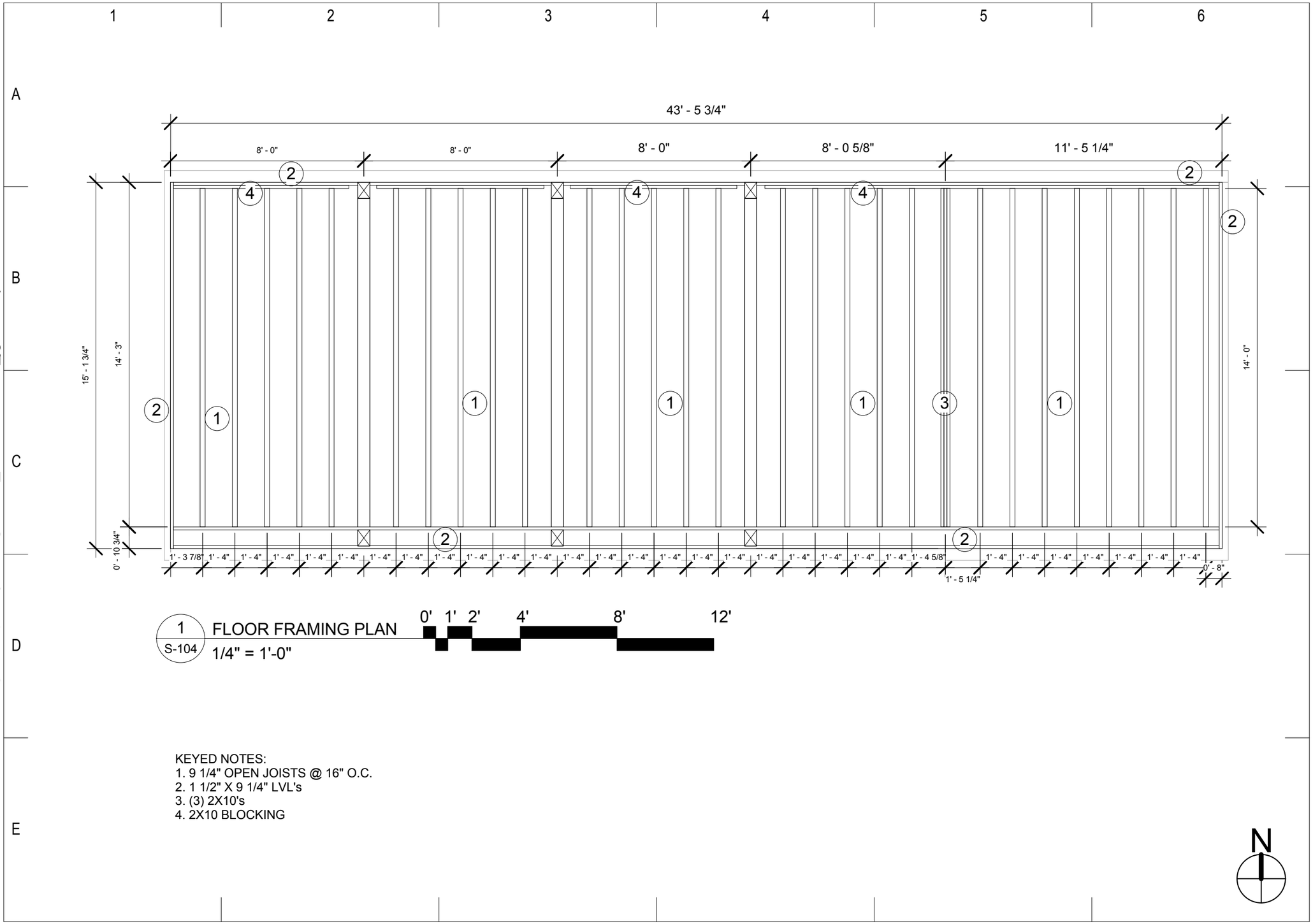
JNG DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

S-103 FOUNDATION PLAN

PENNSTATE
1855



1 / S-104 FLOOR FRAMING PLAN
1/4" = 1'-0"

KEYED NOTES:
1. 9 1/4" OPEN JOISTS @ 16" O.C.
2. 1 1/2" X 9 1/4" LVL's
3. (3) 2X10's
4. 2X10 BLOCKING

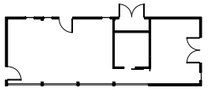
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

DRAWN BY	CHECKED BY
JNG	KPM

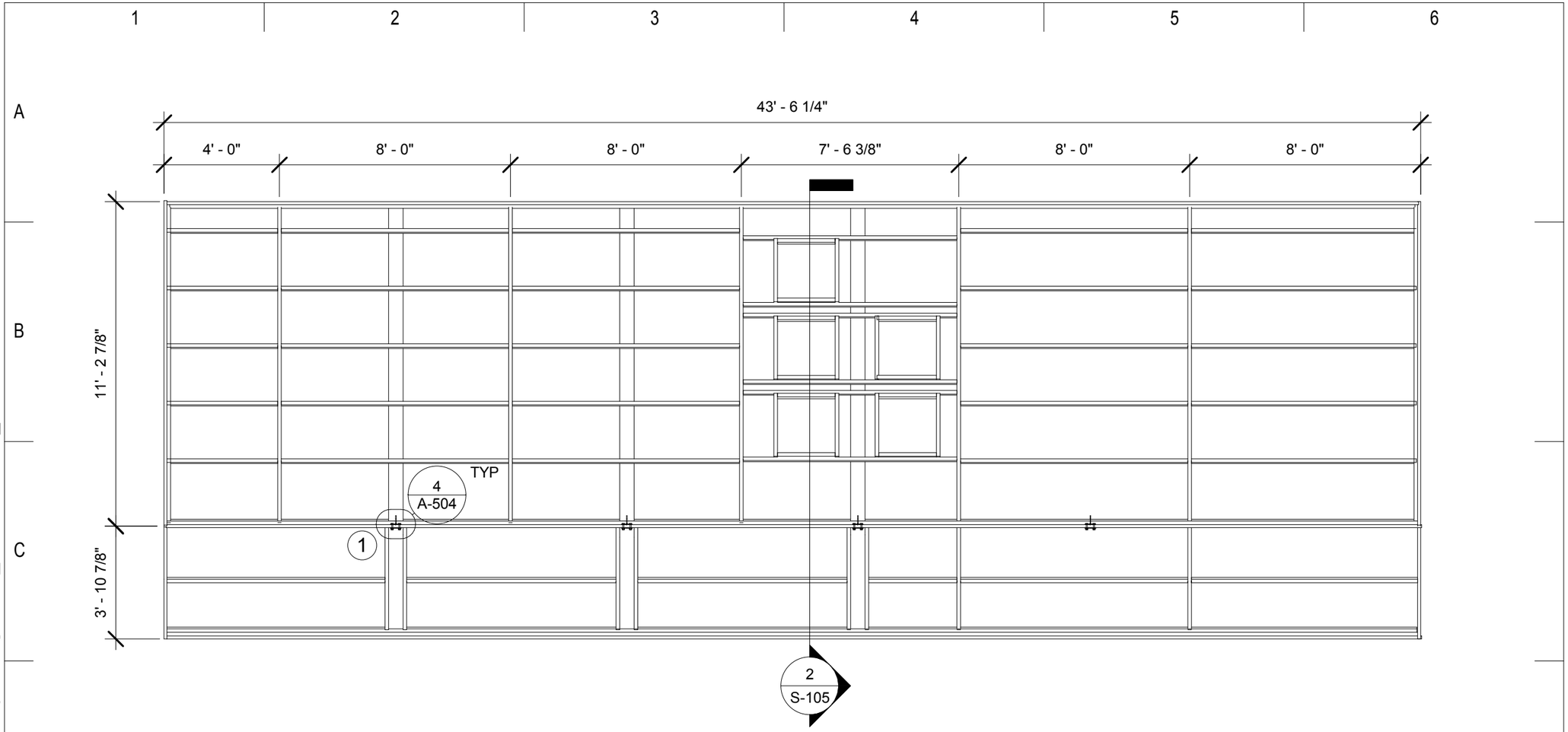
DRAWING STATUS
CD SET

NATURAL FUSION

S-104 FLOOR FRAMING PLAN

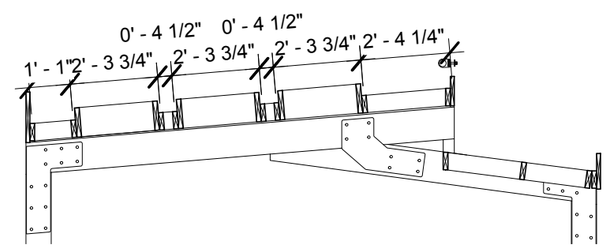
C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855



1 S-105 ROOF FRAMING PLAN
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'



GENERAL NOTES:
1. ALL ROOF FRAMING 2X6 AT 24" O.C.

KEYED NOTES:
1. D-RING FOR SAFETY HARNESS

2 S-105 ROOF FRAMING SECTION
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

N

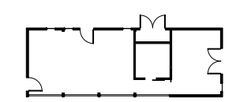
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

DRAWN BY	CHECKED BY
JNG	KPM

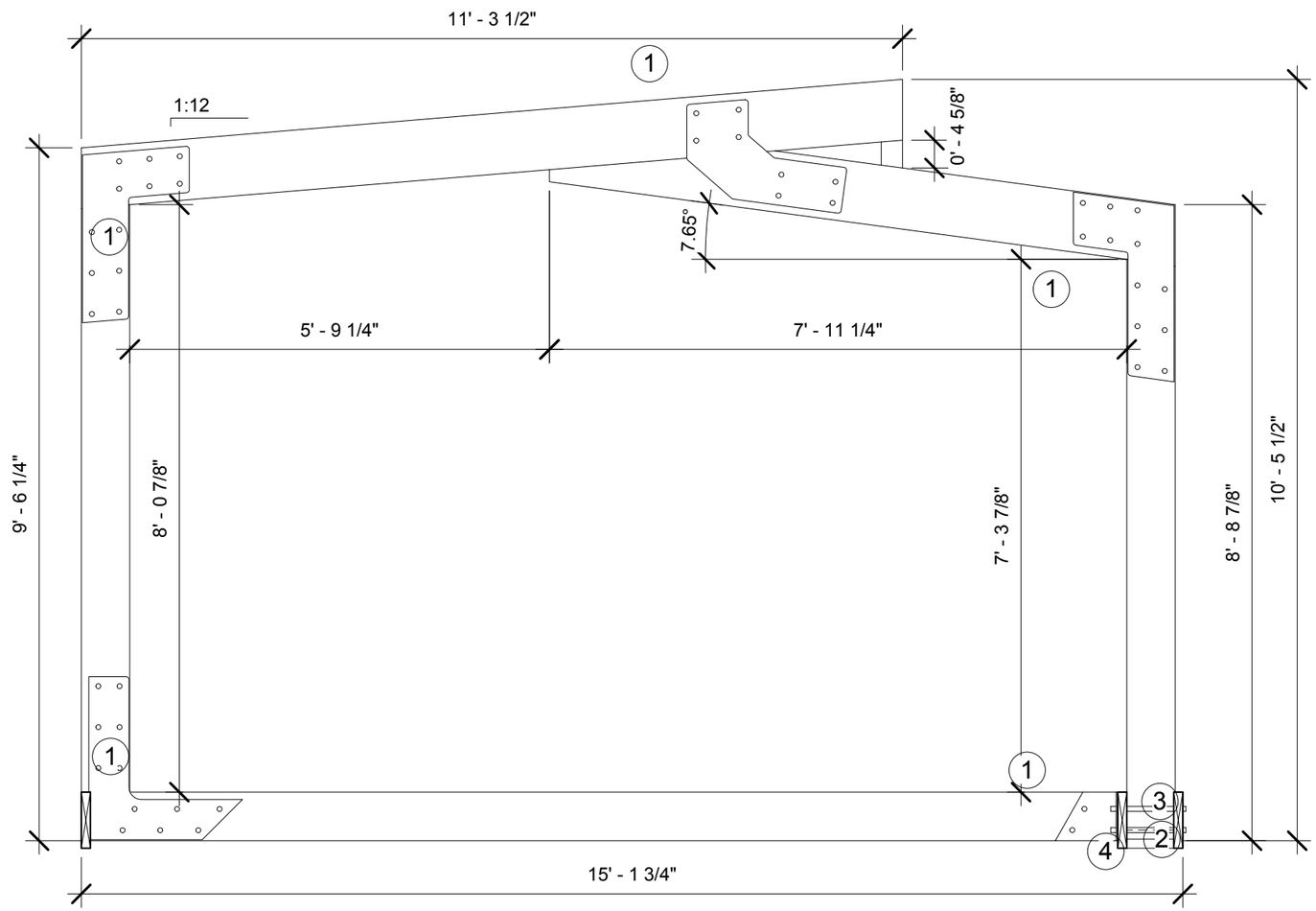
DRAWING STATUS
CD SET

NATURAL FUSION

S-105 ROOF FRAMING PLAN

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_Local-File.rvt

PENNSTATE
1855



1 / S-201 FRAME ELEVATION

1/2" = 1'-0"

0' 1' 2' 4' 6'

KEYED NOTES:
1. 3/4" BOLT 7 1/2" LONG
2. 3/4" BOLT 12" LONG WITH WASHERS WHERE THERE IS NO PLATE
3. (2) 1/2" LAG BOLTS 8" LONG THROUGH FRONT OF LVL INTO COLUMN
4. (2) 2X6 BLOCKING UNDER COLUMNS

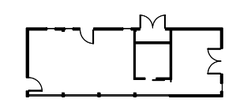
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENNSTATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

JNG DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

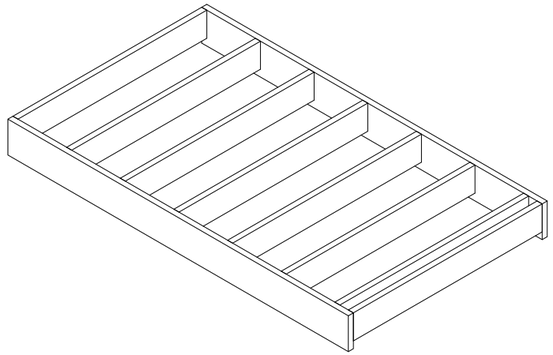
NATURAL FUSION

FRAME ELEVATION

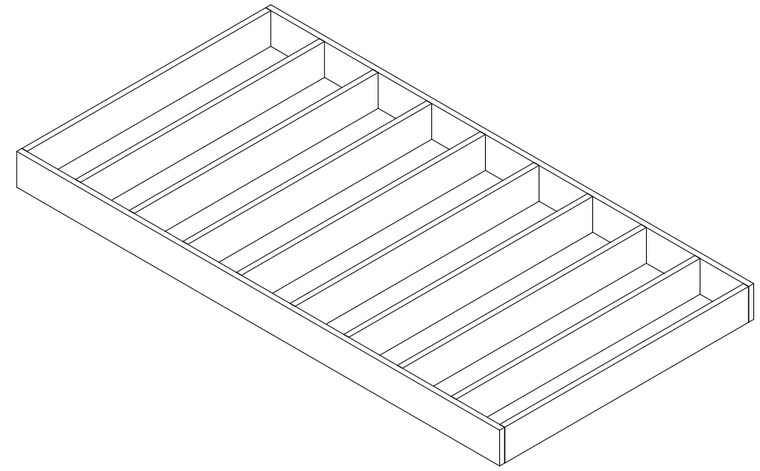
S-201

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_Local-File.rvt

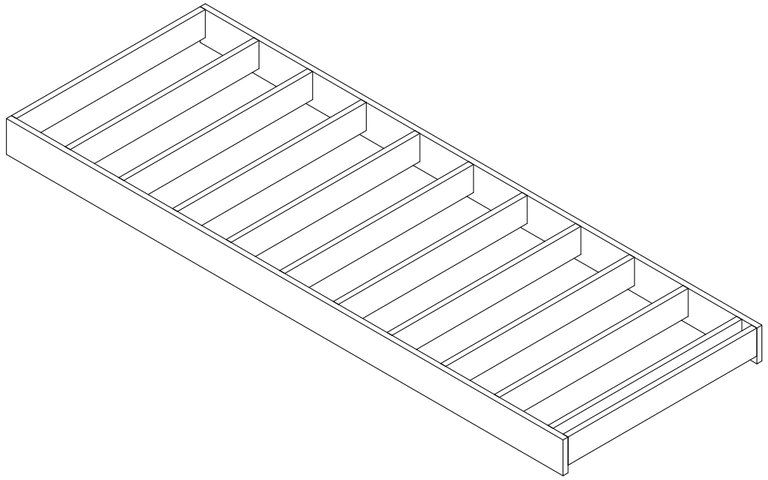
PENNSTATE
1855



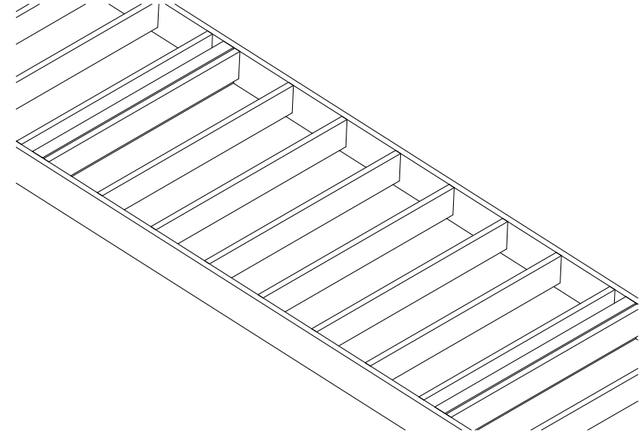
1 S-501 SITE STRUCTURE TYPE 1
NTS



2 S-501 SITE STRUCTURE TYPE 2
NTS



3 S-501 SITE STRUCTURE TYPE 3
NTS



4 S-501 SITE STRUCTURE TYPE 4
NTS

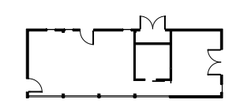
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

DRAWN BY	CHECKED BY
JNG	KPM

DRAWING STATUS
CD SET

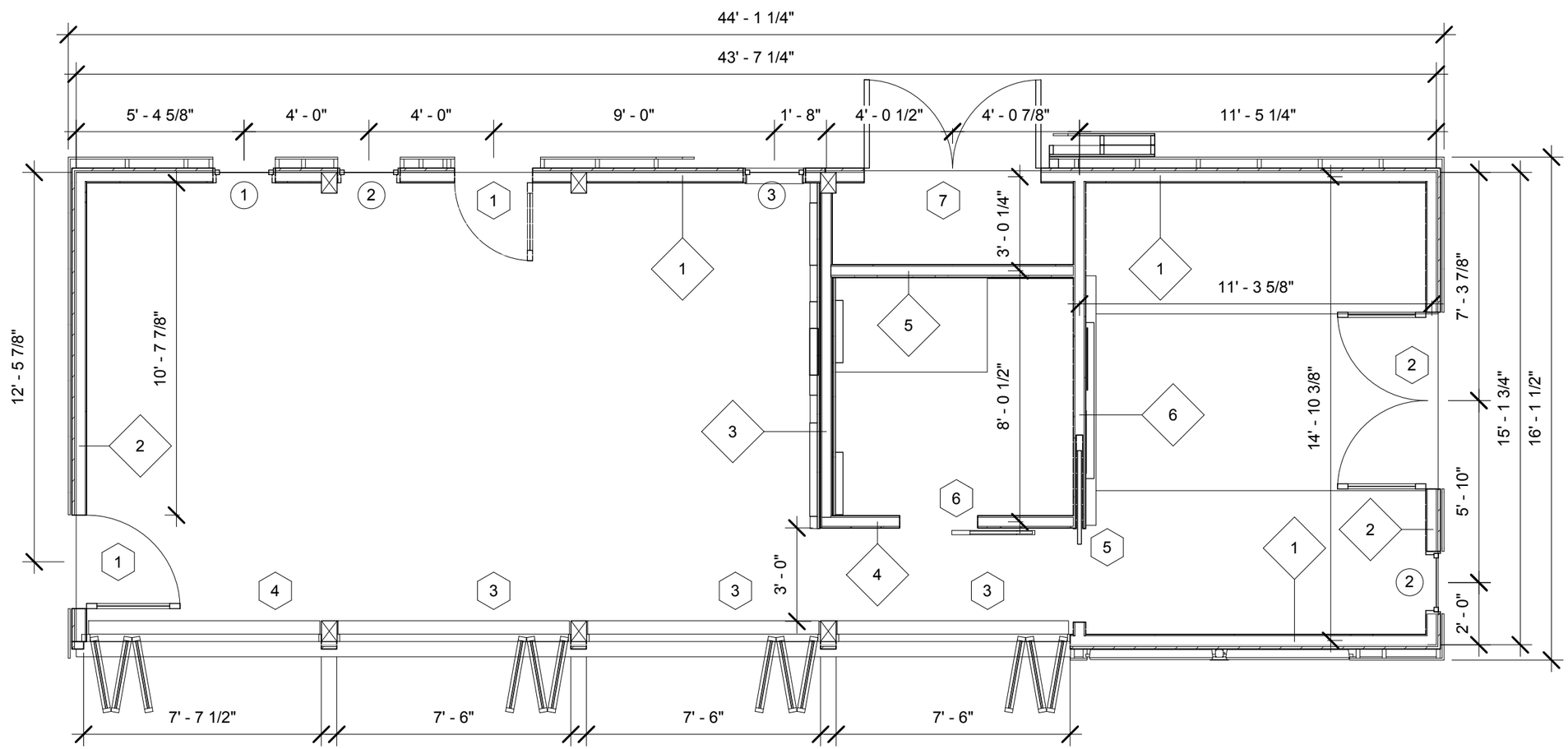
NATURAL FUSION

DECK FRAMING DETAILS

S-501

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855



1 A-101 FLOOR PLAN
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

WALL TYPES:
1. 2 X 4 @ 24" O.C. EXTERIOR WALL 3-1/2" FURR STRIP
2. 2 X 4 @ 24" O.C. EXTERIOR WALL 3/4" FURR STRIP
3. 2 X 4 @ 24" O.C. INTERIOR WALL (SUPPORTS LIFEWELL)
4. 2 X 4 @ 24" O.C. INTERIOR WALL (FINISH BOTH SIDES)
5. 2 X 4 @ 24" O.C. INTERIOR WALL (FINISH BATHROOM SIDE)
6. 2 X 4 @ 16" O.C. INTERIOR WALL

N

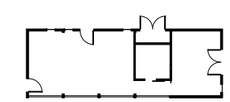
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

DJS — DRAWN BY
KPM — CHECKED BY

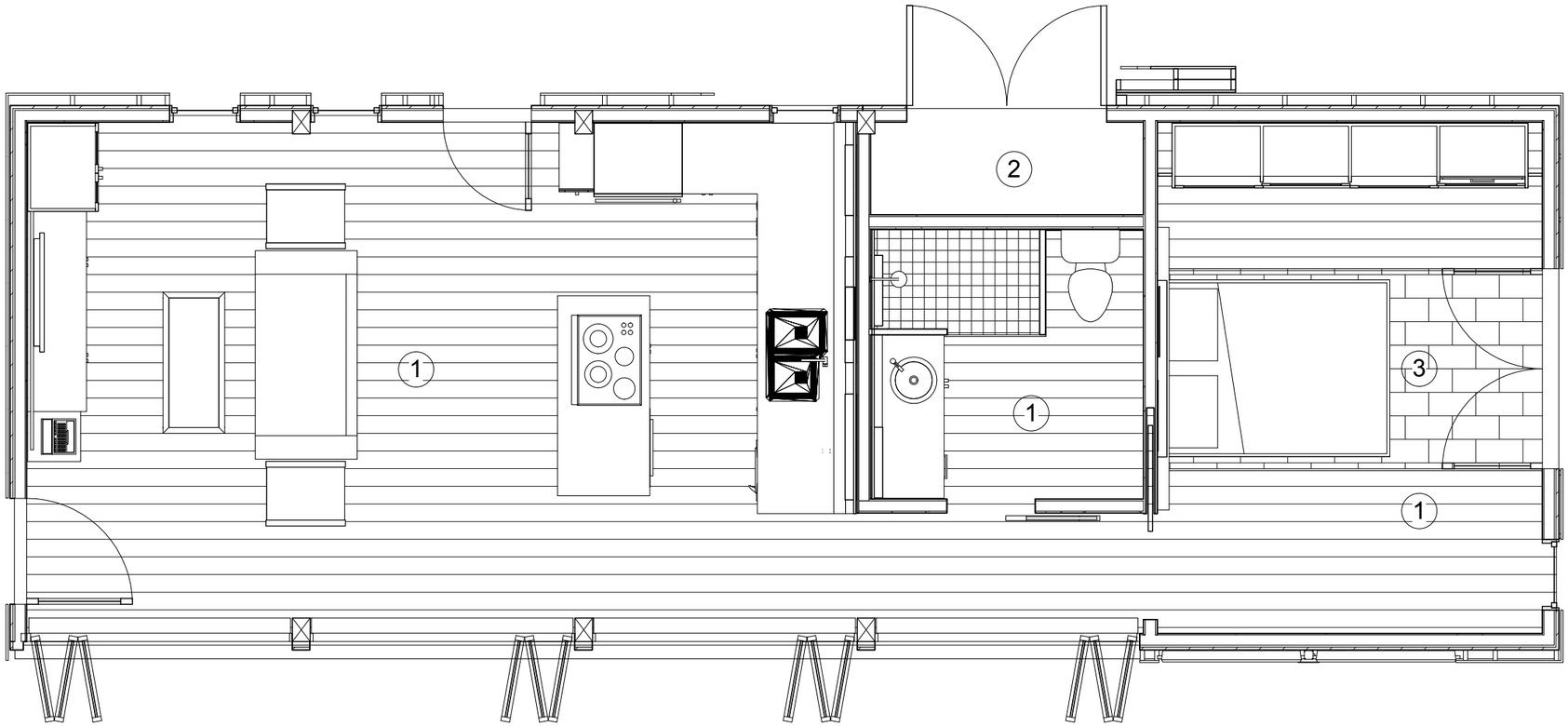
DRAWING STATUS
CD SET

NATURAL FUSION

A-101 FLOOR PLAN

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE
1855



1 / A-102 FINISH FLOOR PLAN
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

FINISH FLOOR TYPE KEYED NOTES:
1. HARDWOOD
2. EPDM
3. CHALKBOARD SLATE TILES

N

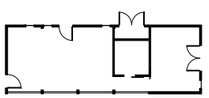
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

DJS DRAWN BY
KPM CHECKED BY

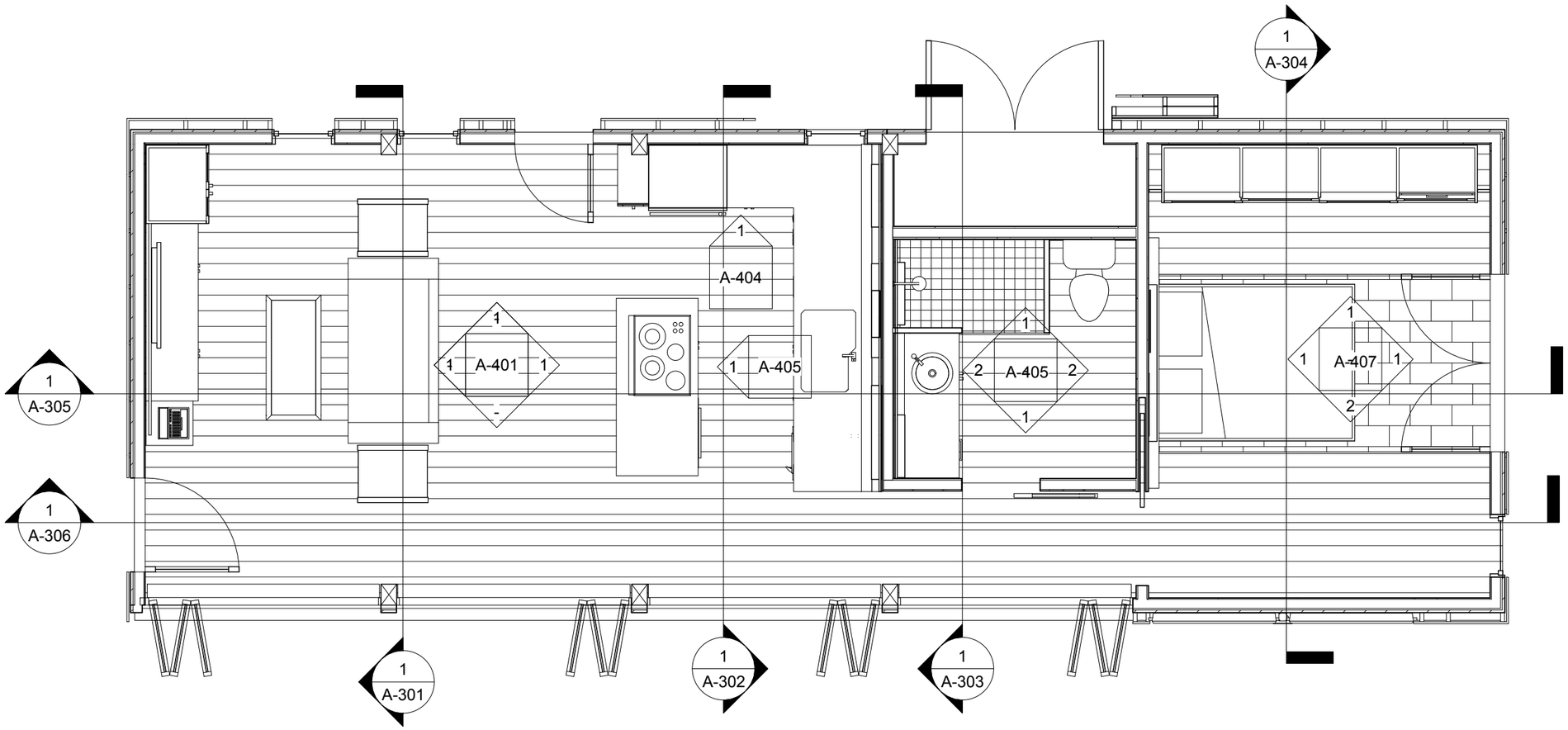
DRAWING STATUS
CD SET

NATURAL FUSION

A-102 FINISH FLOOR PLAN

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE



1 A-103 SECTION FLOOR PLAN
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE

1855

DESIGN TEAM
NATURAL FUSION

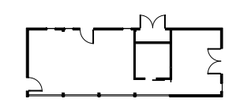
CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

NATURAL FUSION

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN

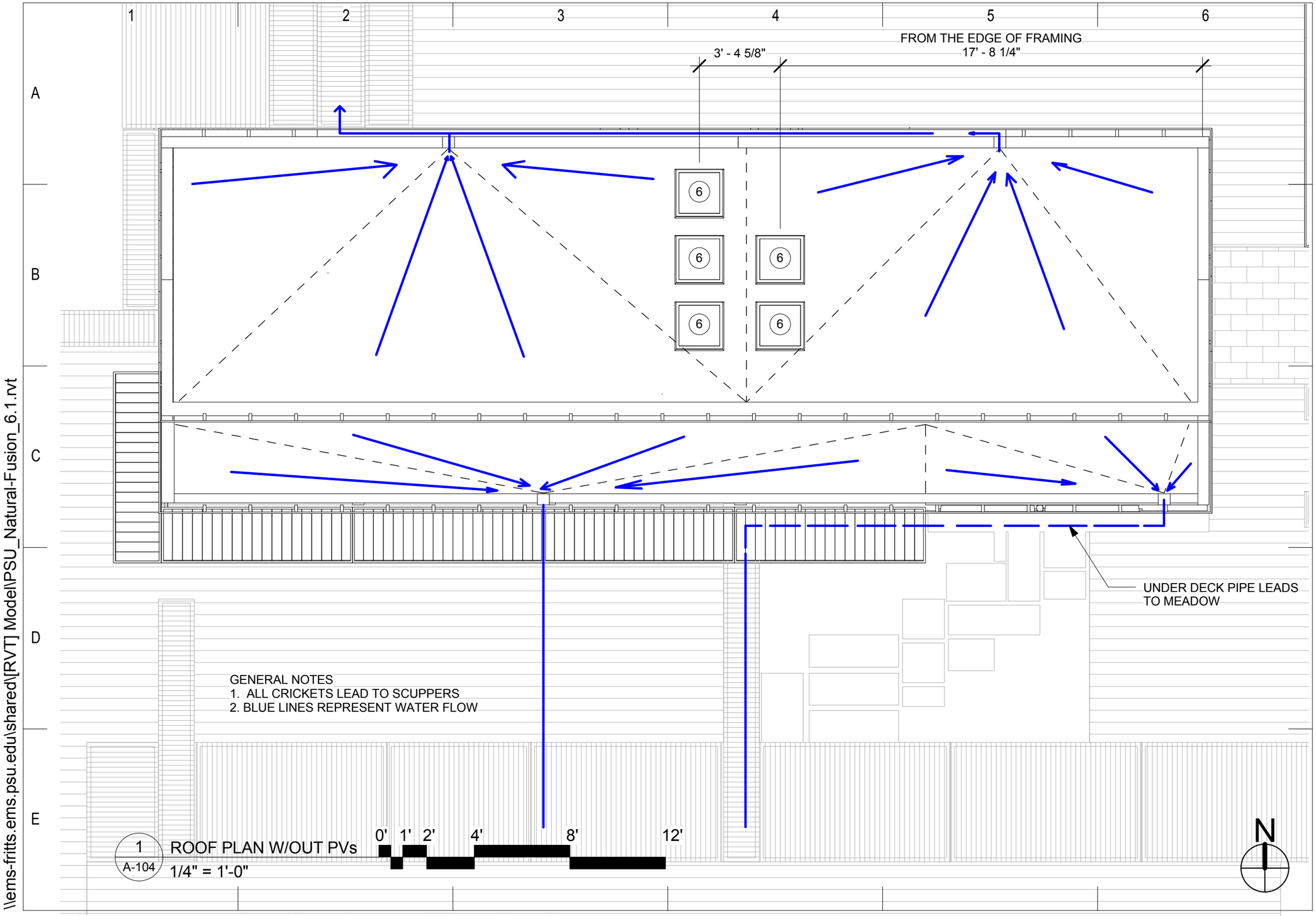


SCALE
1/4" = 1'-0"

DJS — DRAWN BY
KPM — CHECKED BY

DRAWING STATUS
CD SET

A-103 SECTION FLOOR PLAN



1 A-104 ROOF PLAN W/OUT PVs
1/4" = 1'-0"

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE

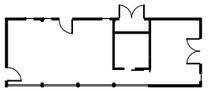
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



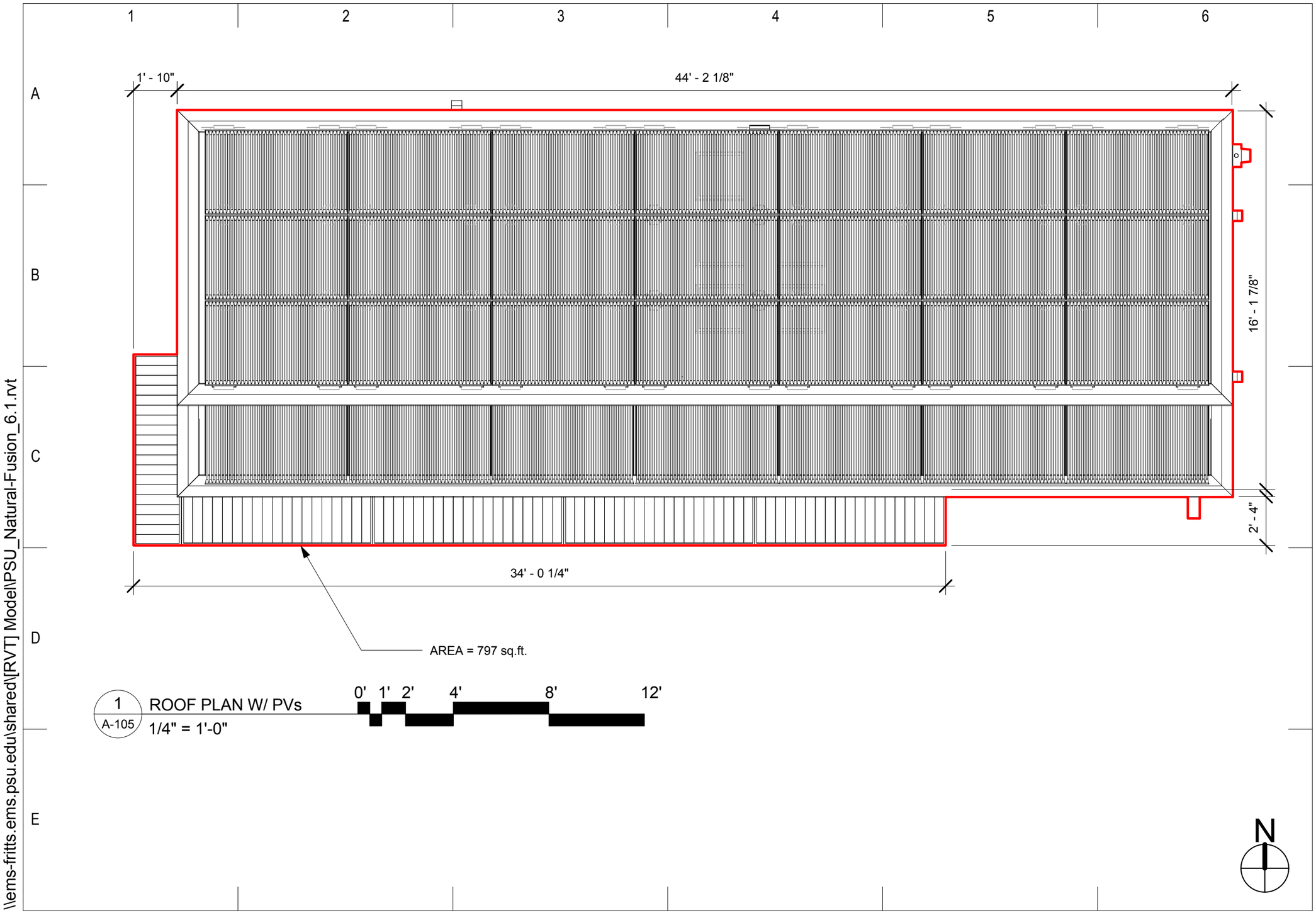
SCALE
1/4" = 1'-0"

DJS DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

A-104 ROOF PLAN



1 A-105 ROOF PLAN W/ PVs
1/4" = 1'-0"

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE

1855

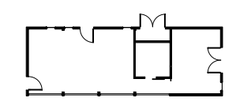
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



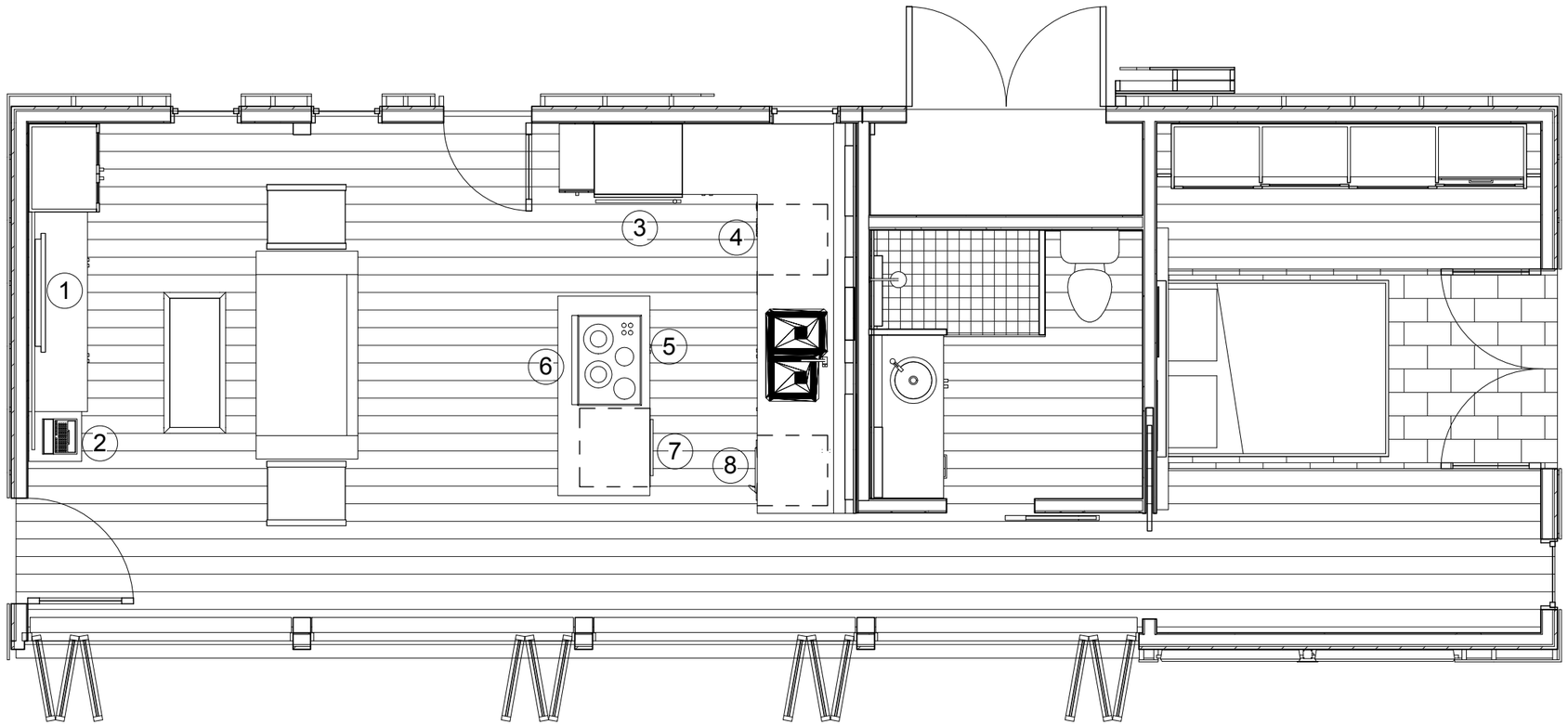
SCALE
1/4" = 1'-0"

DRAWN BY DJS
CHECKED BY KPM

DRAWING STATUS
CD SET

NATURAL FUSION

A-105 ROOF PLAN WITH PVS



1 A-106 APPLIANCE PLAN

1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

1. SAMSUNG 40" LED HDTV
2. APPLE 17" MACBOOK PRO
3. LIEBHERR REFRIGERATOR
4. BOSCH DISHWASHER
5. ELECTROLUX INDUCTION COOKTOP
6. BROAN RANGE HOOD
7. GE ADVANTIUM OVEN
8. LG WASHER/ DRYER

DESIGN TEAM

NATURAL FUSION

CLIENT

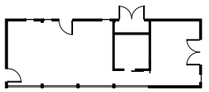
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS

PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

1/4" = 1'-0"

DRAWN BY	CHECKED BY
DJS	KPM

DRAWING STATUS

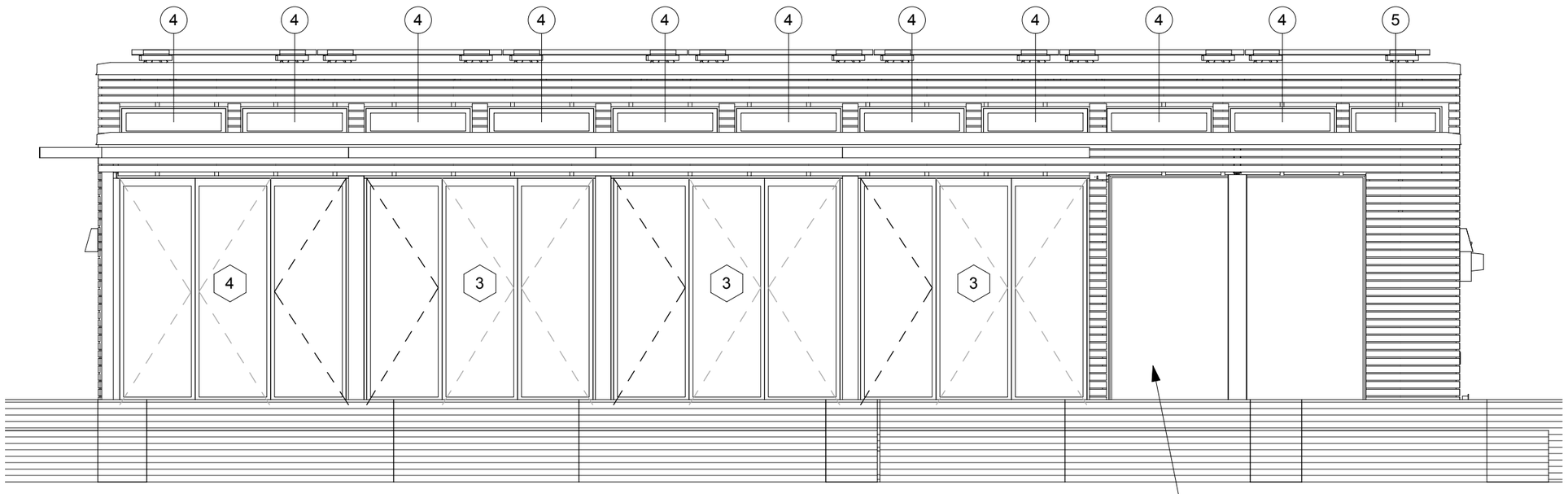
CD SET

NATURAL FUSION

A-106 APPLIANCE PLAN

PENNSTATE

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt



1 / A-201 SOUTH ELEVATION
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE

1855

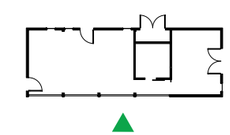
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

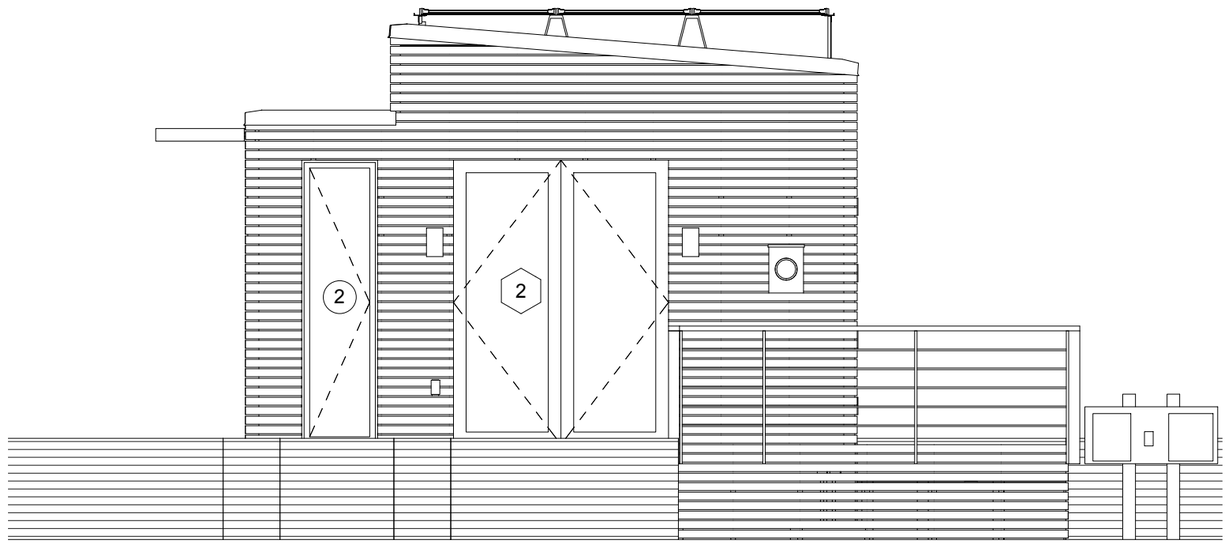
DJS — DRAWN BY
KPM — CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

SOUTH ELEVATION

A-201



1 / A-202 EAST ELEVATION
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

DESIGN TEAM
NATURAL FUSION

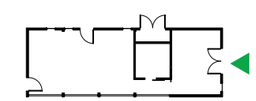
CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

NATURAL FUSION

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

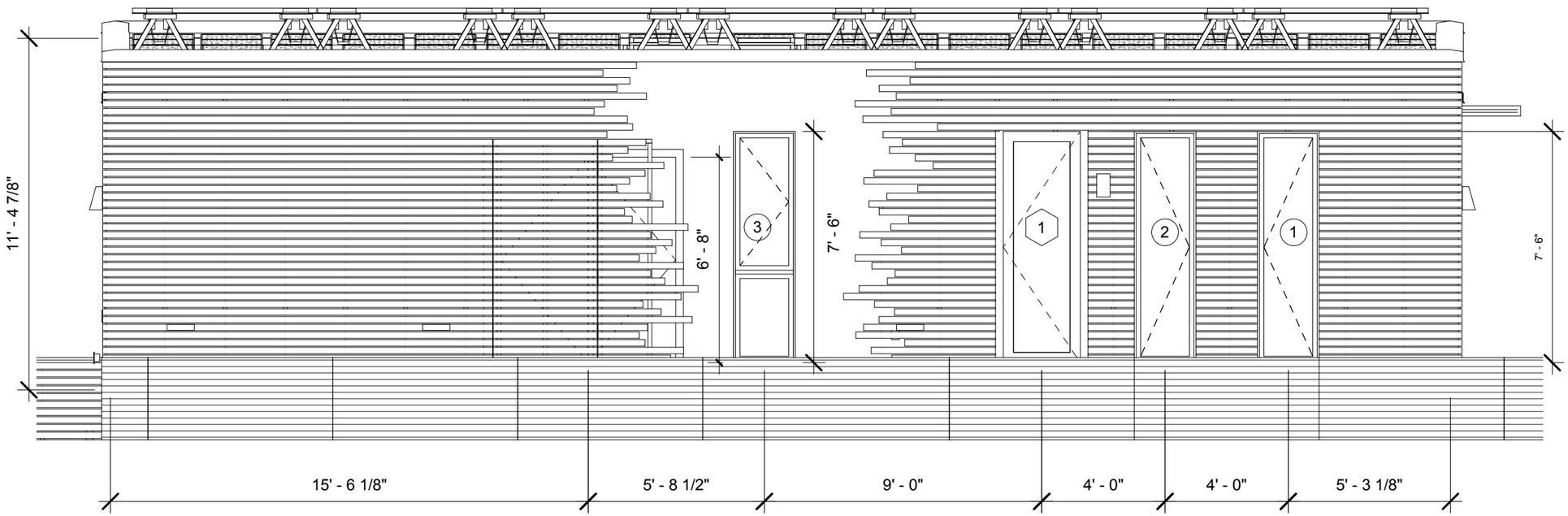
DJS DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

A-202 EAST ELEVATION

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE
1855



1 / A-203 NORTH ELEVATION
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

GENERAL NOTES
1. DIMENSION TO OUTSIDE OF LVL. RAINSCREEN TO BE INSTALLED AT PSU

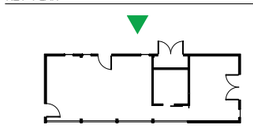
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

DJS DRAWN BY
KPM CHECKED BY

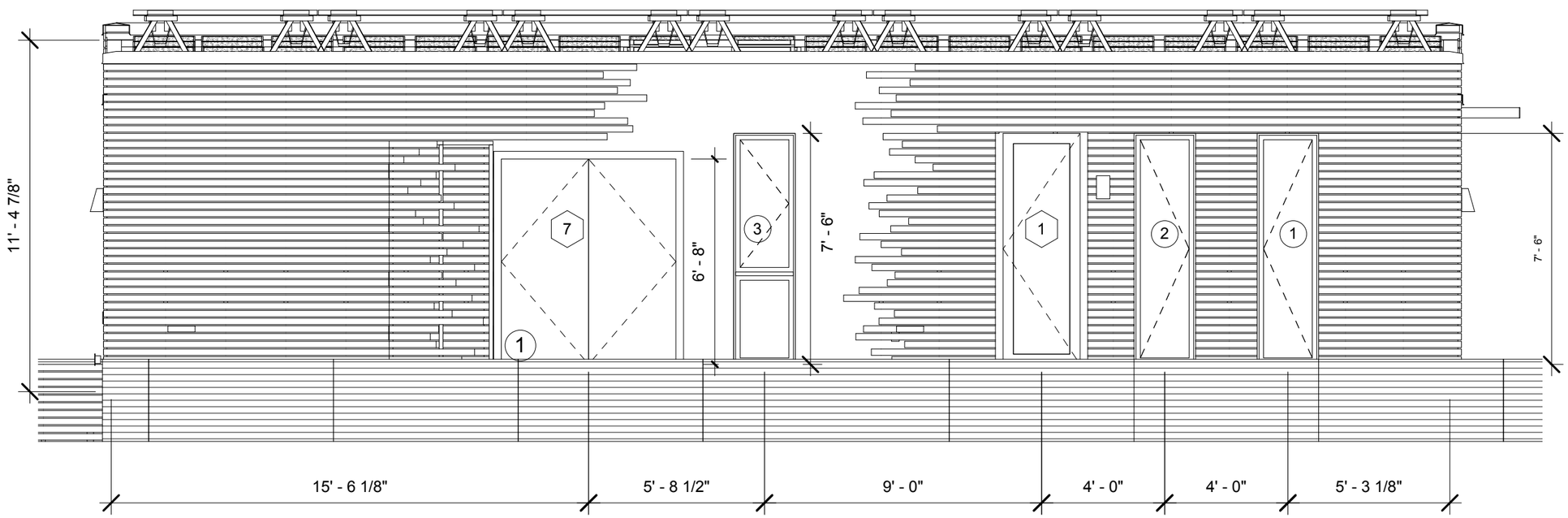
DRAWING STATUS
CD SET

NATURAL FUSION

A-203 NORTH ELEVATION

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855



1
A-204
NORTH ELEVATION DOOR
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

KEYED NOTES:
1. NEXUS RAINSCREEN DOOR FOLDS TO THE SIDE TO ALLOW ACCESS TO THE NEXUS. TYPICALLY LOCATED IN THE CLOSED LOCATION.

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE

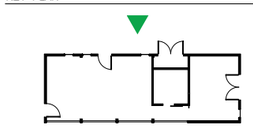
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

DJS DRAWN BY
KPM CHECKED BY

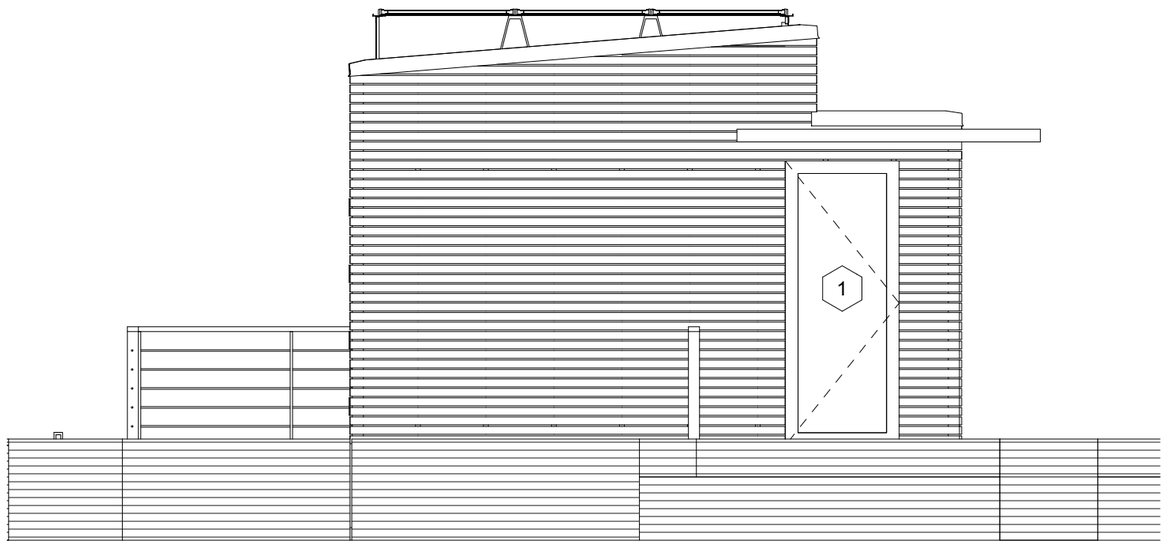
DRAWING STATUS
CD SET

NATURAL FUSION

NORTH ELEV. NEXUS OPENING

A-204

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt



1 / A-205 WEST ELEVATION

1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

DESIGN TEAM

NATURAL FUSION

CLIENT

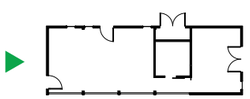
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS

PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

1/4" = 1'-0"

DRAWN BY: DJS

CHECKED BY: KPM

DRAWING STATUS

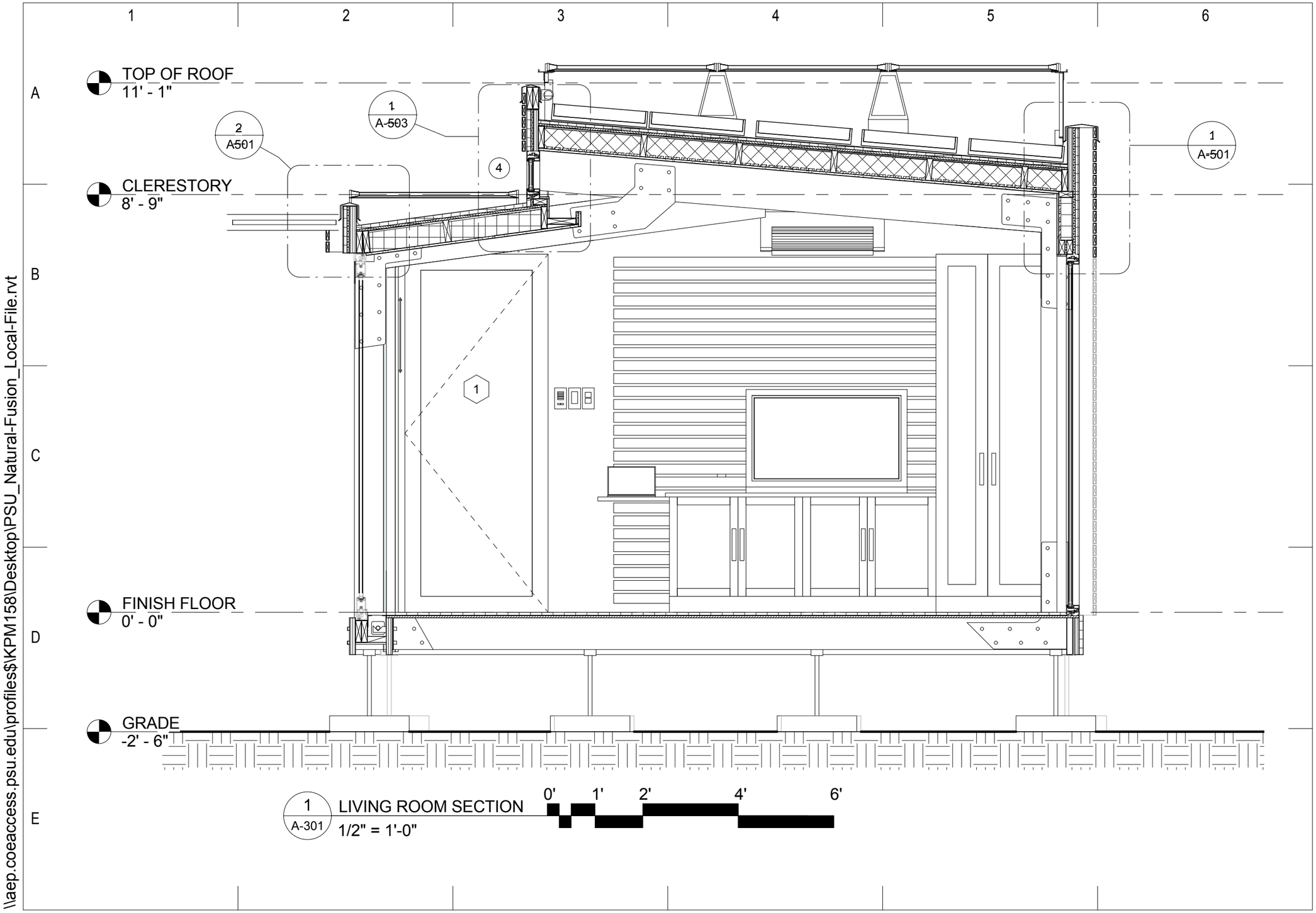
CD SET

NATURAL FUSION

A-205 WEST ELEVATION

PENNSTATE

1855



\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_Local-File.rvt

PENNSTATE

1855

DESIGN TEAM

NATURAL FUSION

CLIENT

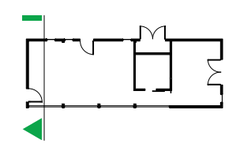
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS

PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

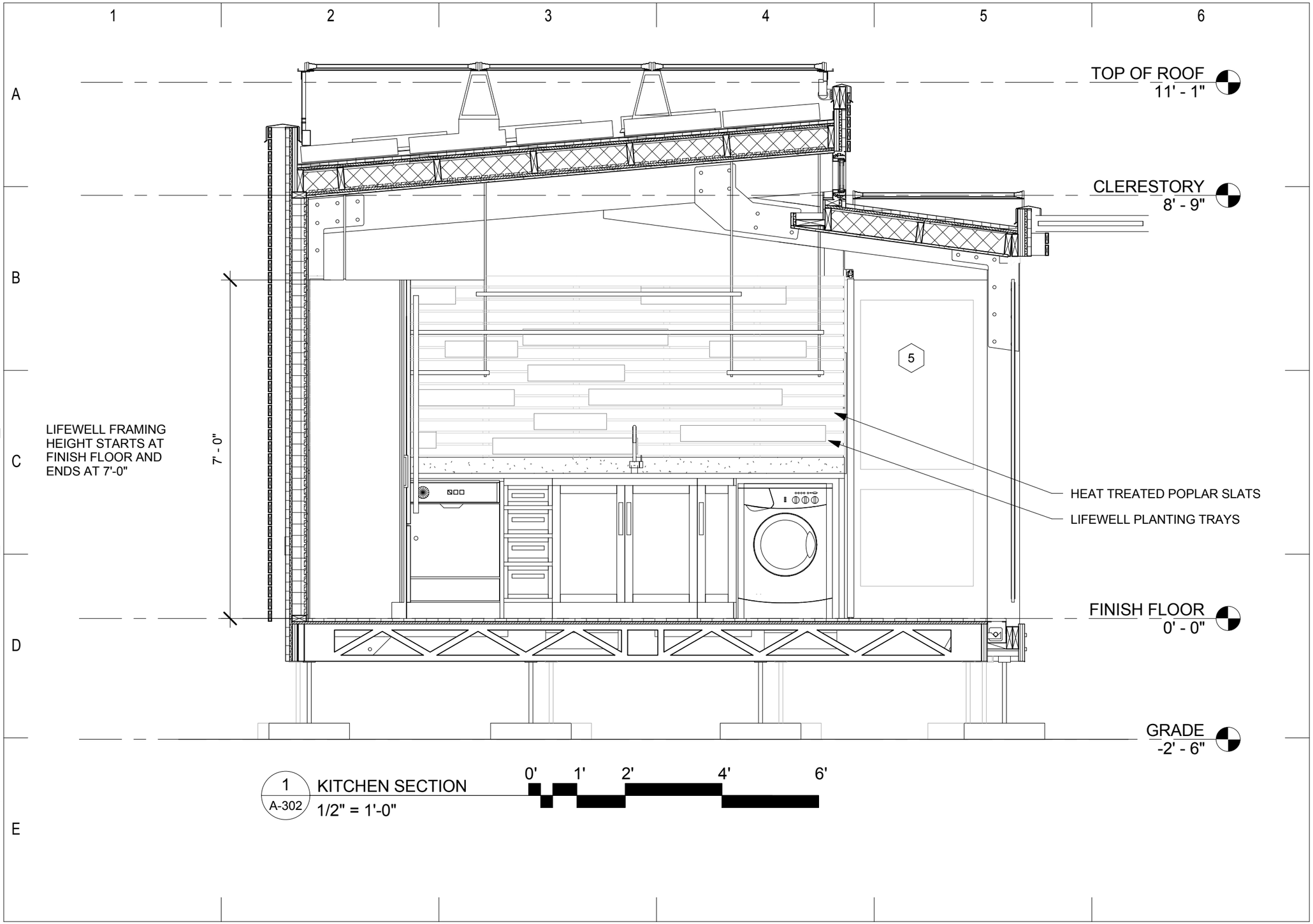
DRAWN BY	CHECKED BY
DJS	KPM

DRAWING STATUS
CD SET

NATURAL FUSION

LIVING ROOM SECTION

A-301



1 A-302 KITCHEN SECTION
1/2" = 1'-0"

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

DESIGN TEAM
NATURAL FUSION

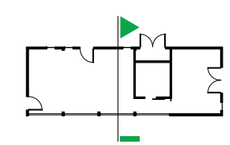
CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

NATURAL FUSION

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



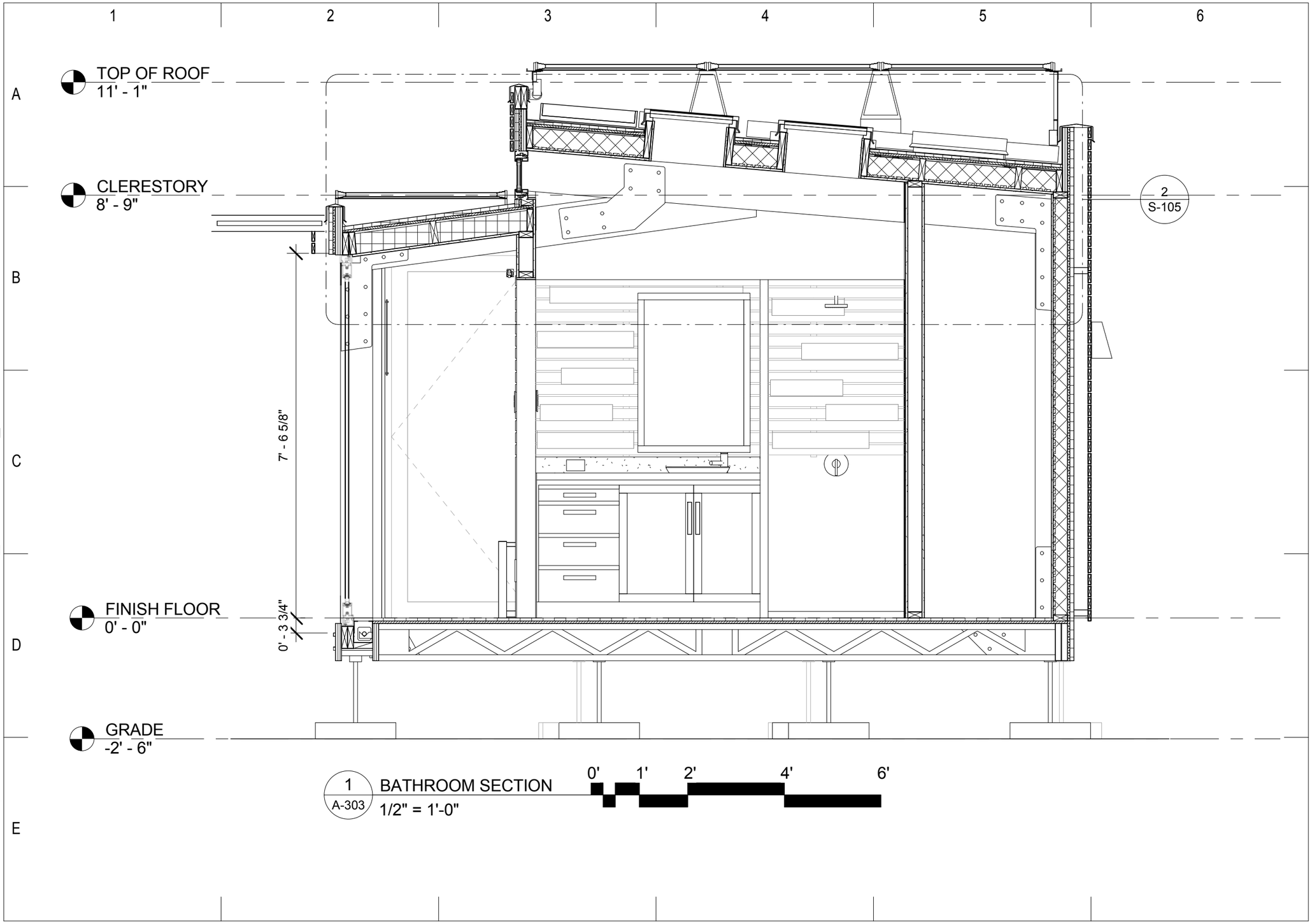
SCALE
1/2" = 1'-0"

DJS DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

A-302 KITCHEN SECTION

PENNSTATE
1855



\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE

1855

DESIGN TEAM

NATURAL FUSION

CLIENT

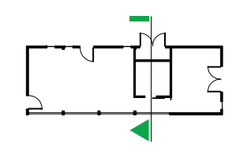
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS

PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



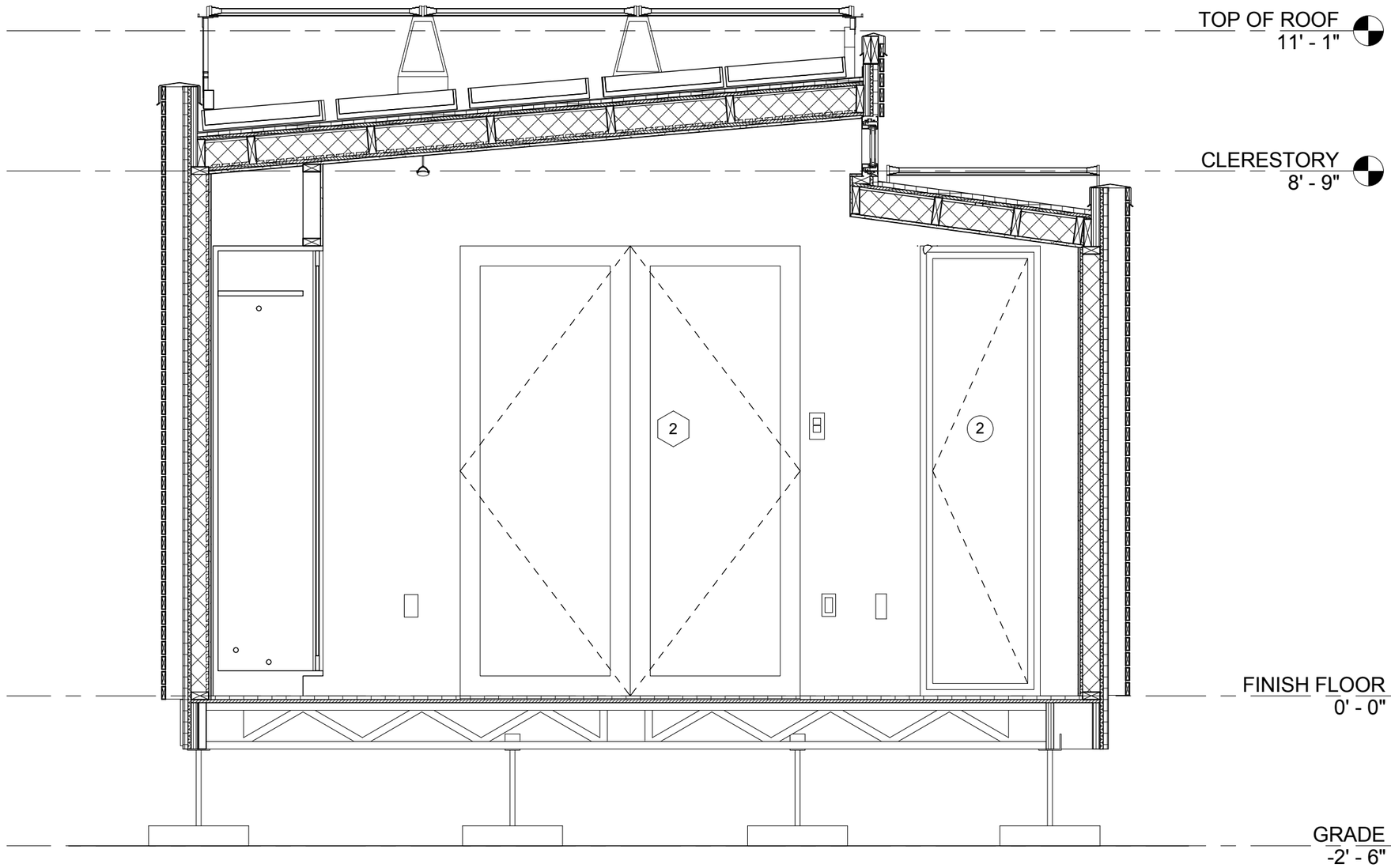
SCALE
1/2" = 1'-0"

DRAWN BY DJS
CHECKED BY KPM

DRAWING STATUS
CD SET

NATURAL FUSION

A-303 BATHROOM SECTION



1 / A-304 BEDROOM SECTION EAST
1/2" = 1'-0"

0' 1' 2' 4' 6'

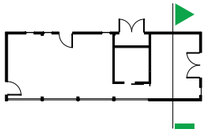
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

DJS DRAWN BY
KPM CHECKED BY

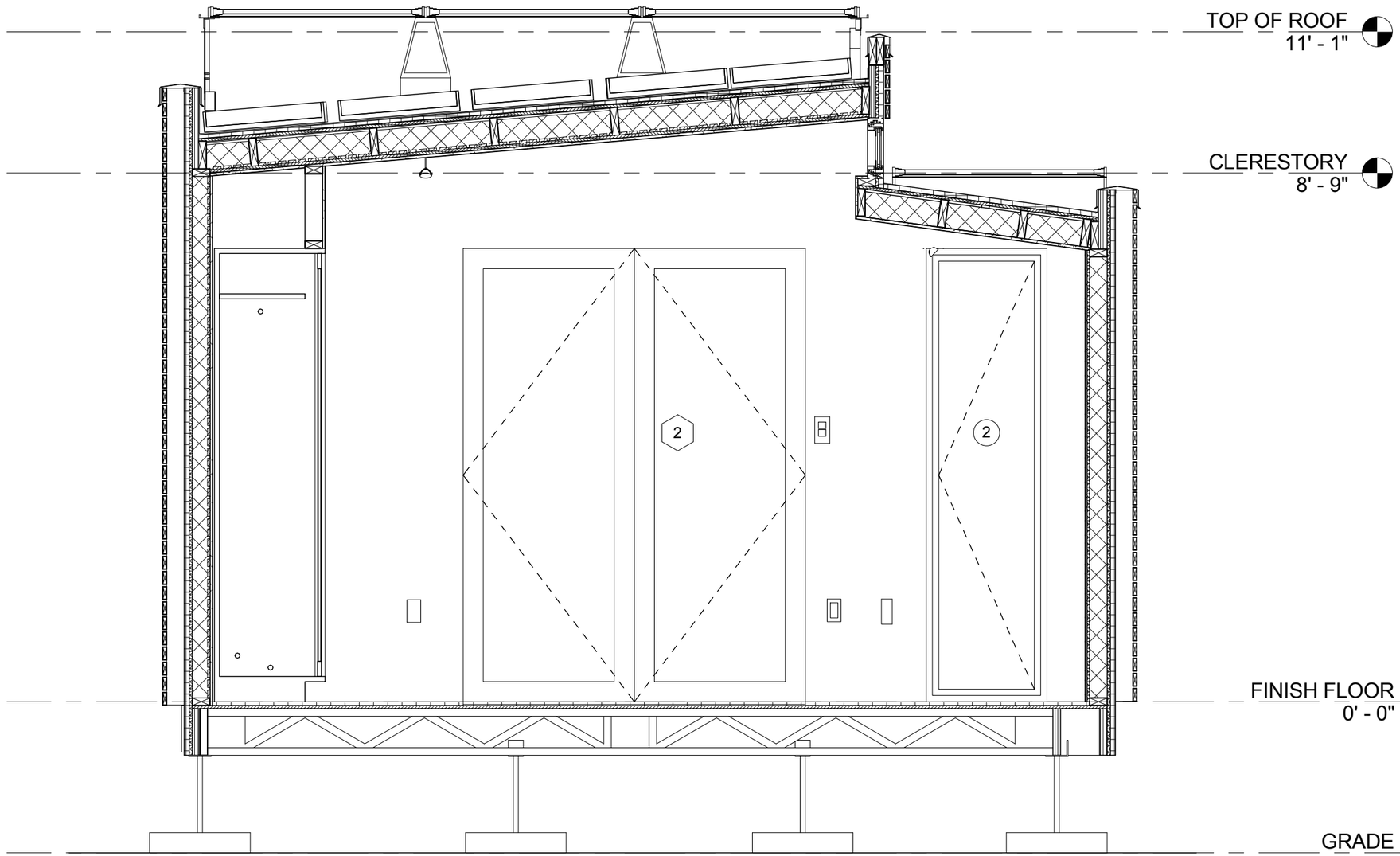
DRAWING STATUS
CD SET

NATURAL FUSION

A-304 BEDROOM EAST SECTION

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855



1 / A-304 BEDROOM SECTION EAST
1/2" = 1'-0"

0' 1' 2' 4' 6'

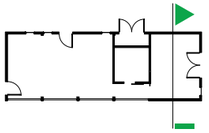
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

DJS — DRAWN BY
KPM — CHECKED BY

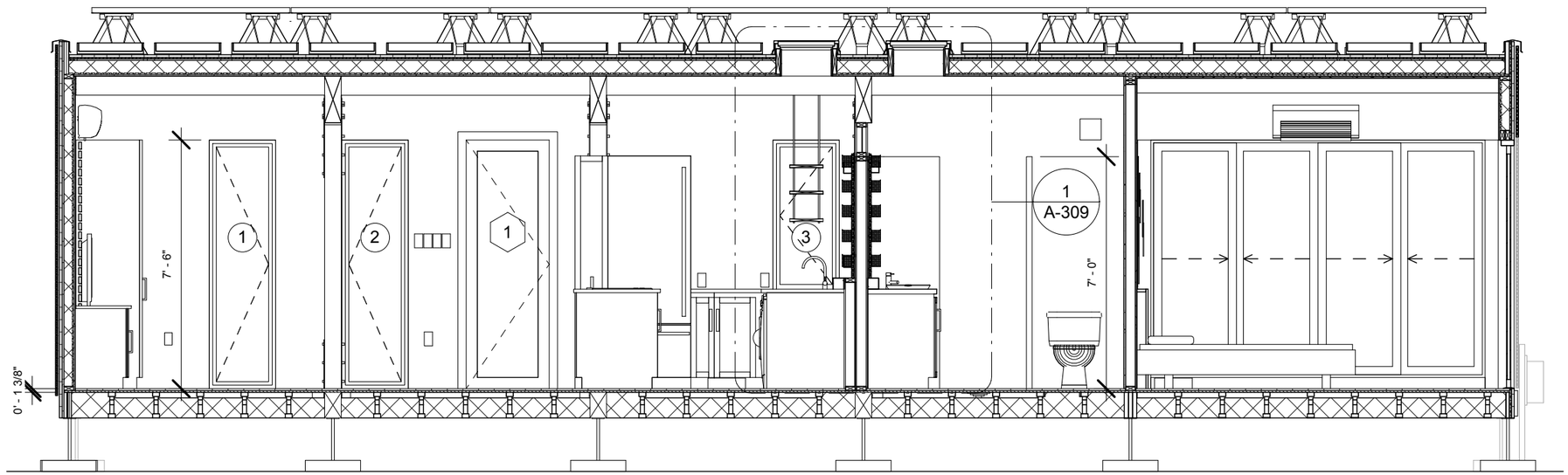
DRAWING STATUS
CD SET

NATURAL FUSION

A-304 BEDROOM EAST SECTION

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE
1855



1
A-305

LONGITUDINAL SECTION
FACING NORTH
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE

1855

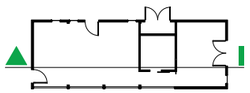
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



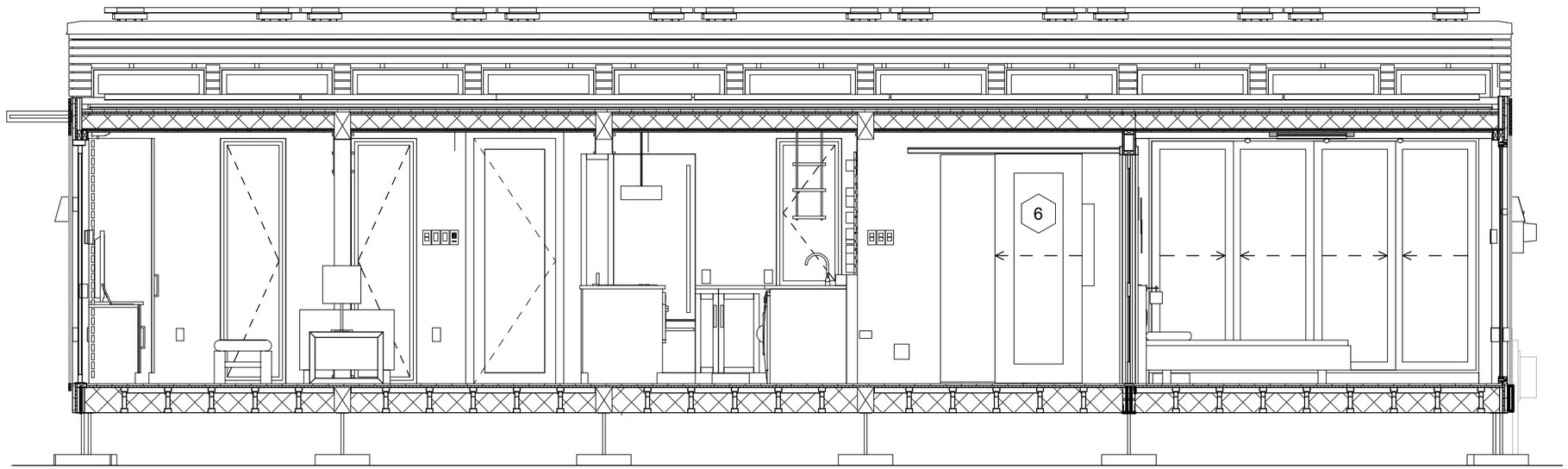
SCALE
1/4" = 1'-0"

DJS DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

A-305 LONG. SECTION NORTH



1
A-306
LONGITUDINAL SECTION
THROUGH HALLWAY
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

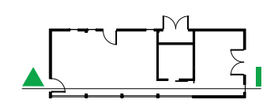
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

DJS DRAWN BY
KPM CHECKED BY

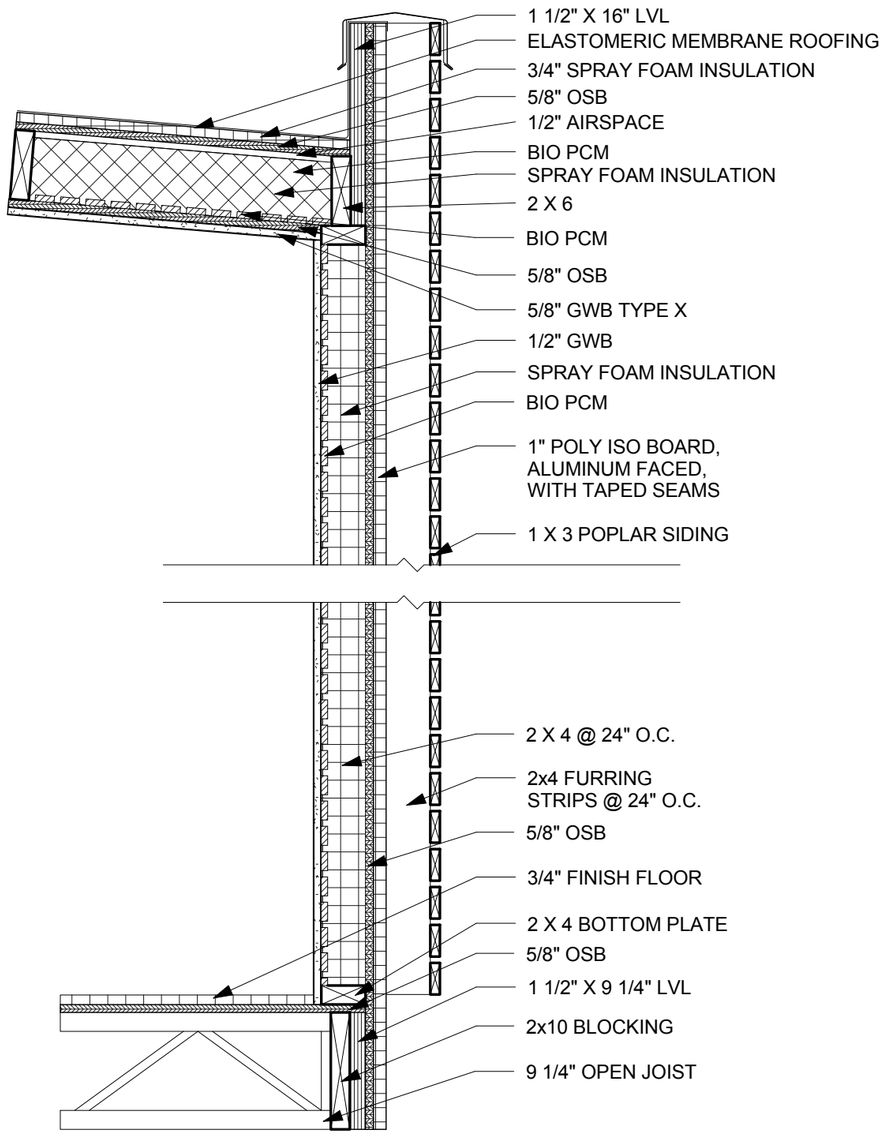
DRAWING STATUS
CD SET

NATURAL FUSION

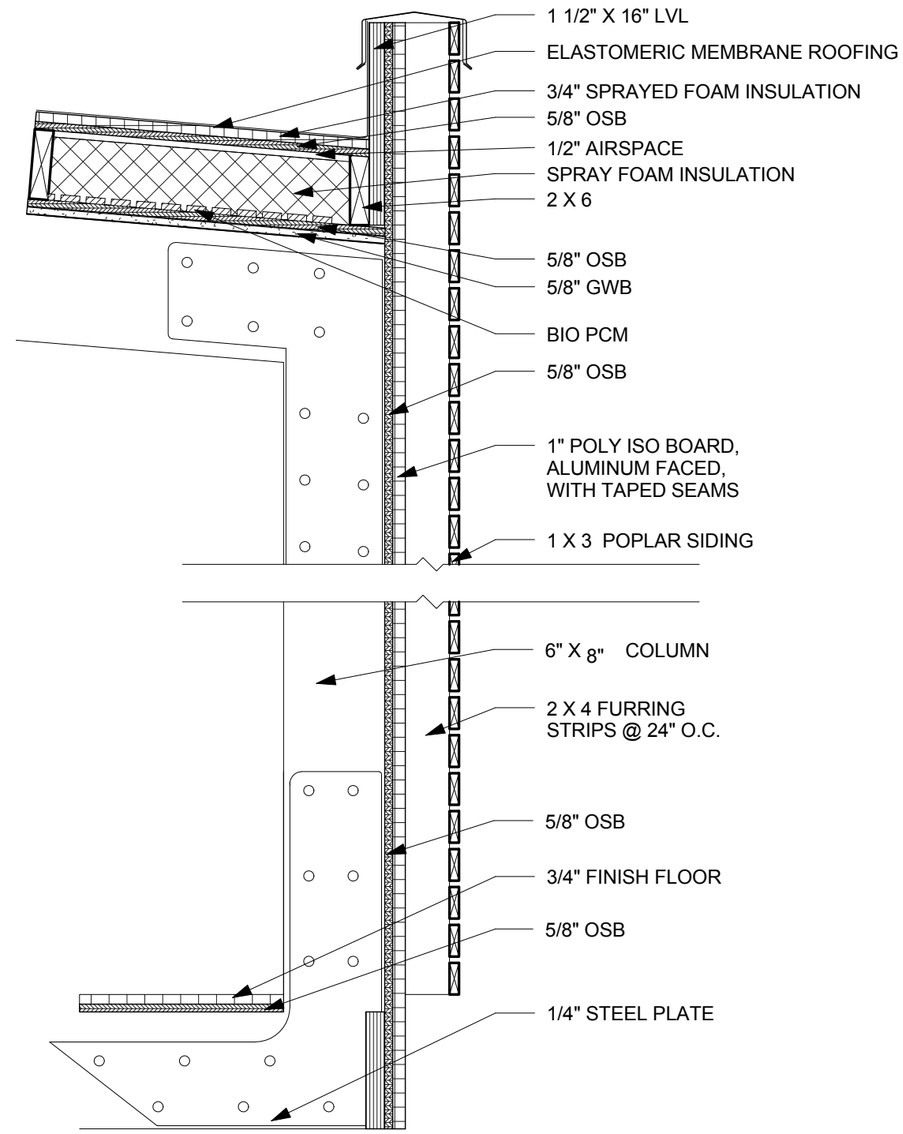
A-306 LONG. HALL SECTION NORTH

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE
1855



1 / A-307 TYPICAL WALL SECTION
1" = 1'-0"



2 / A-307 WALL COLUMN SECTION
1" = 1'-0"

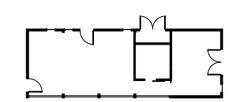
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1" = 1'-0"

DRAWN BY DJS
CHECKED BY KPM

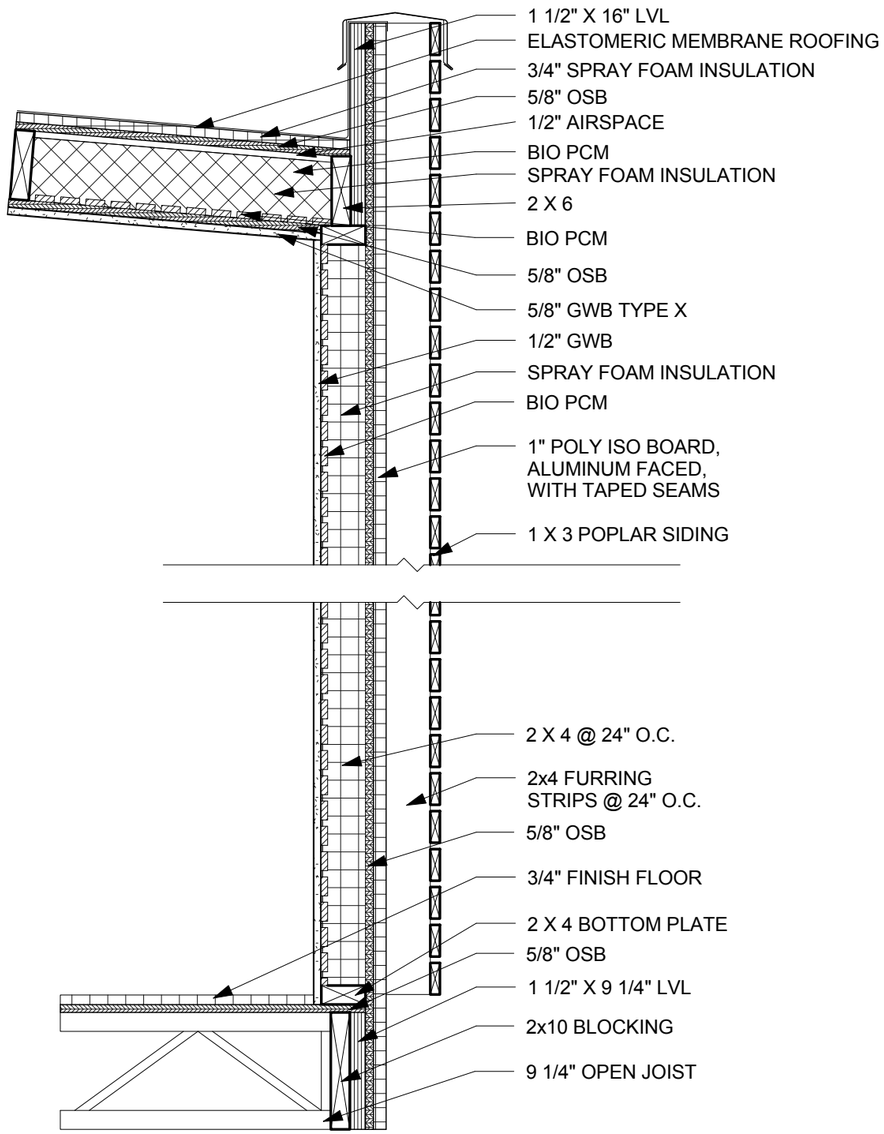
DRAWING STATUS
CD SET

NATURAL FUSION

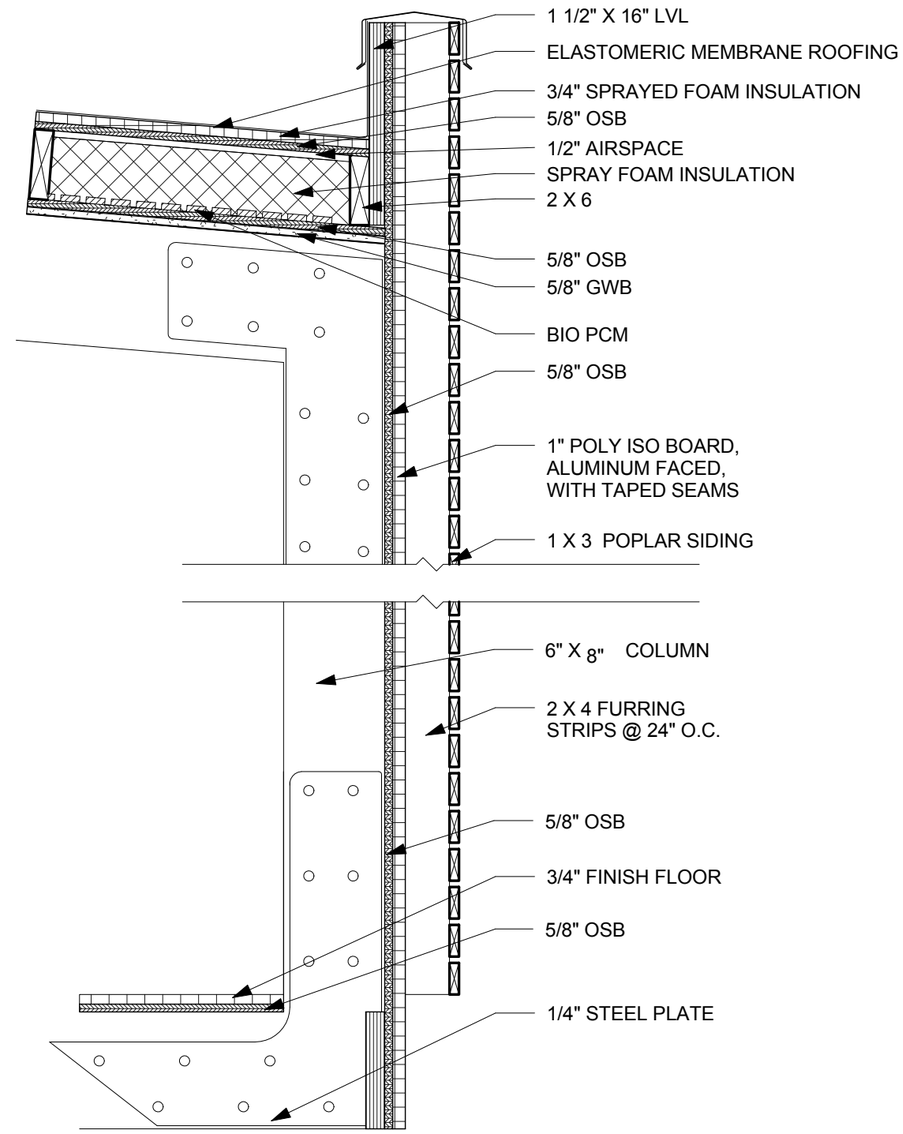
A-307 TYP. AND COL. WALL SECTION

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE



1 / A-307 TYPICAL WALL SECTION
1" = 1'-0"



2 / A-307 WALL COLUMN SECTION
1" = 1'-0"

0' 1/2' 1' 2' 3'

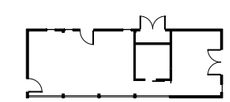
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1" = 1'-0"

DRAWN BY DJS
CHECKED BY KPM

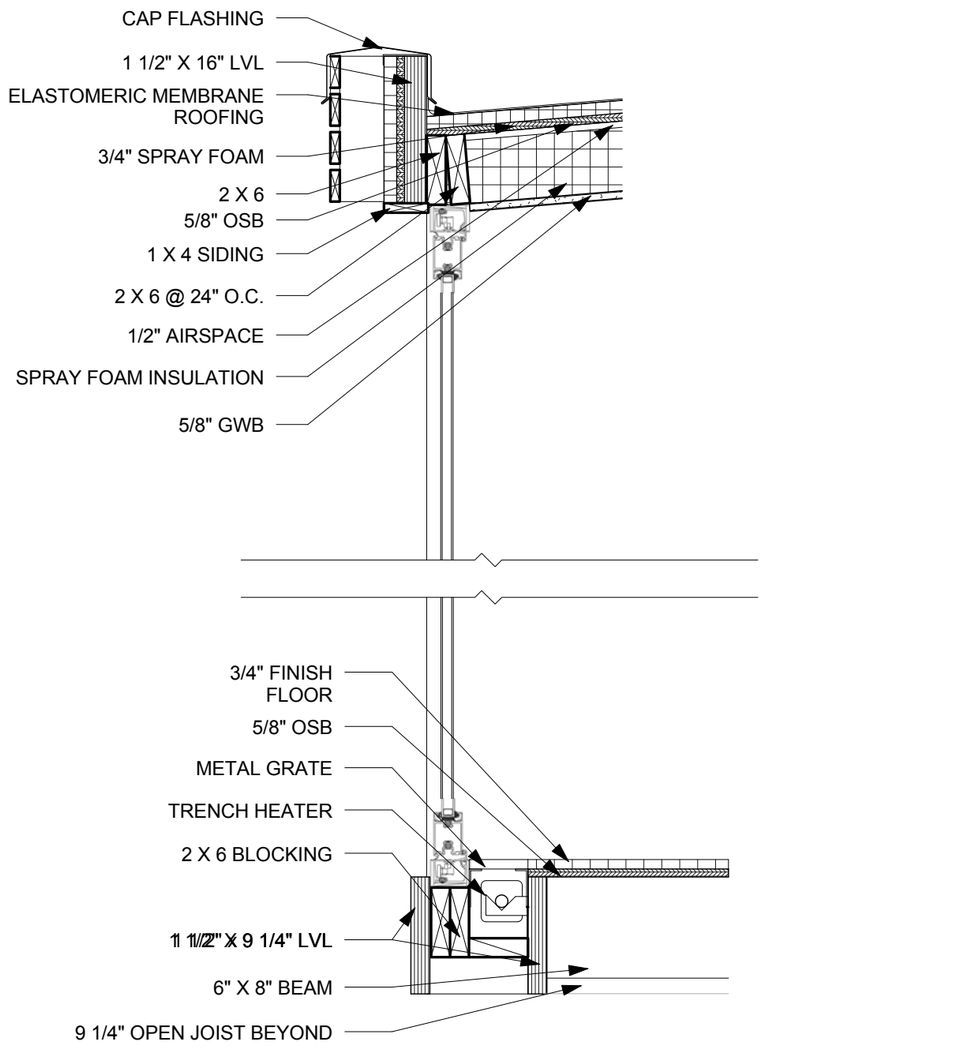
DRAWING STATUS
CD SET

NATURAL FUSION

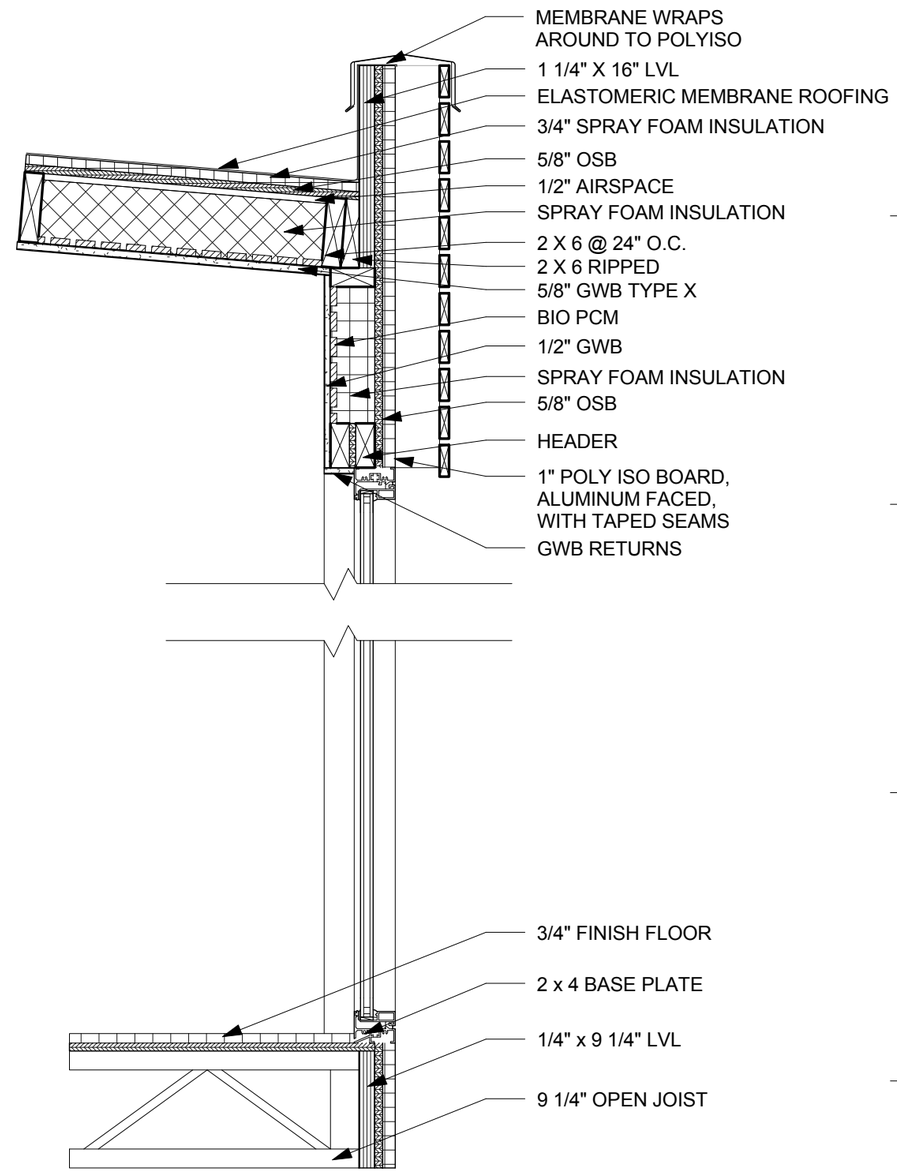
A-307 TYP. AND COL. WALL SECTION

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE
1855



1 A-308 SOUTH WINDOW WALL SECTION
1" = 1' -0"



2 A-308 DETAILED WINDOW SECTION
1" = 1' -0"

0' 1/2' 1' 2' 3'

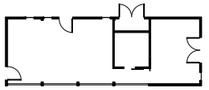
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1" = 1'-0"

DJS DRAWN BY
KPM CHECKED BY

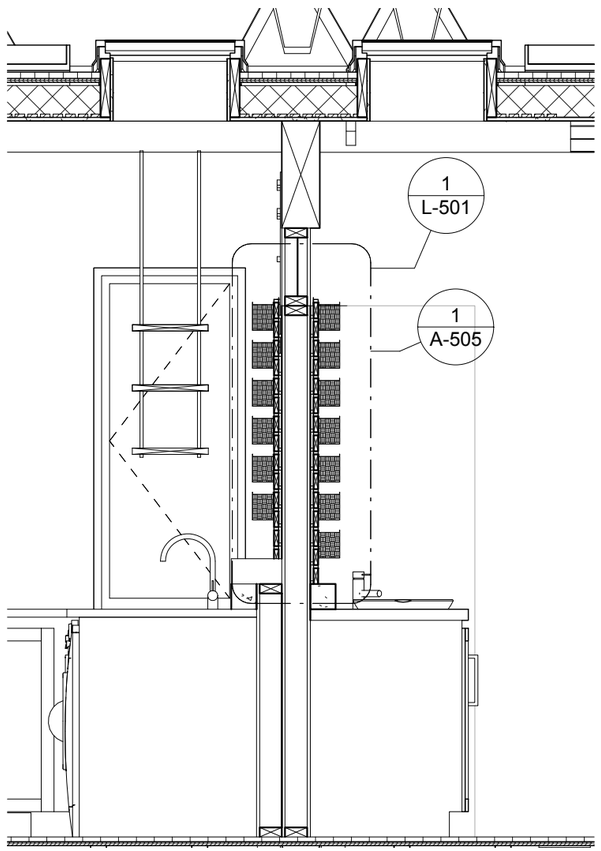
DRAWING STATUS
CD SET

NATURAL FUSION

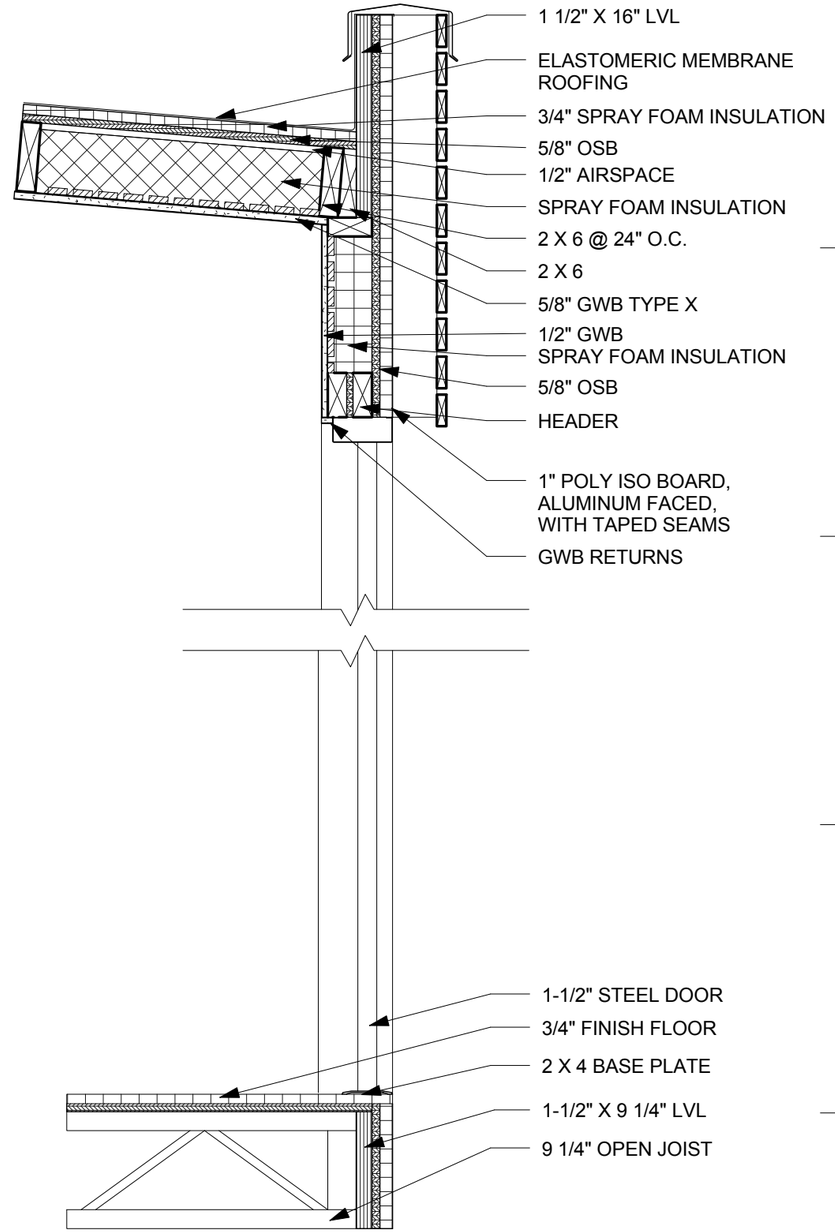
A-308 S. N. WINDOW WALL SECTION

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE
1855



1 / A-309 LIFEWELL WALL SECTION
1/2" = 1'-0"



2 / A-309 NEXUS DOOR SECTION
1" = 1'-0"

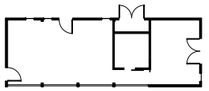
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
As indicated

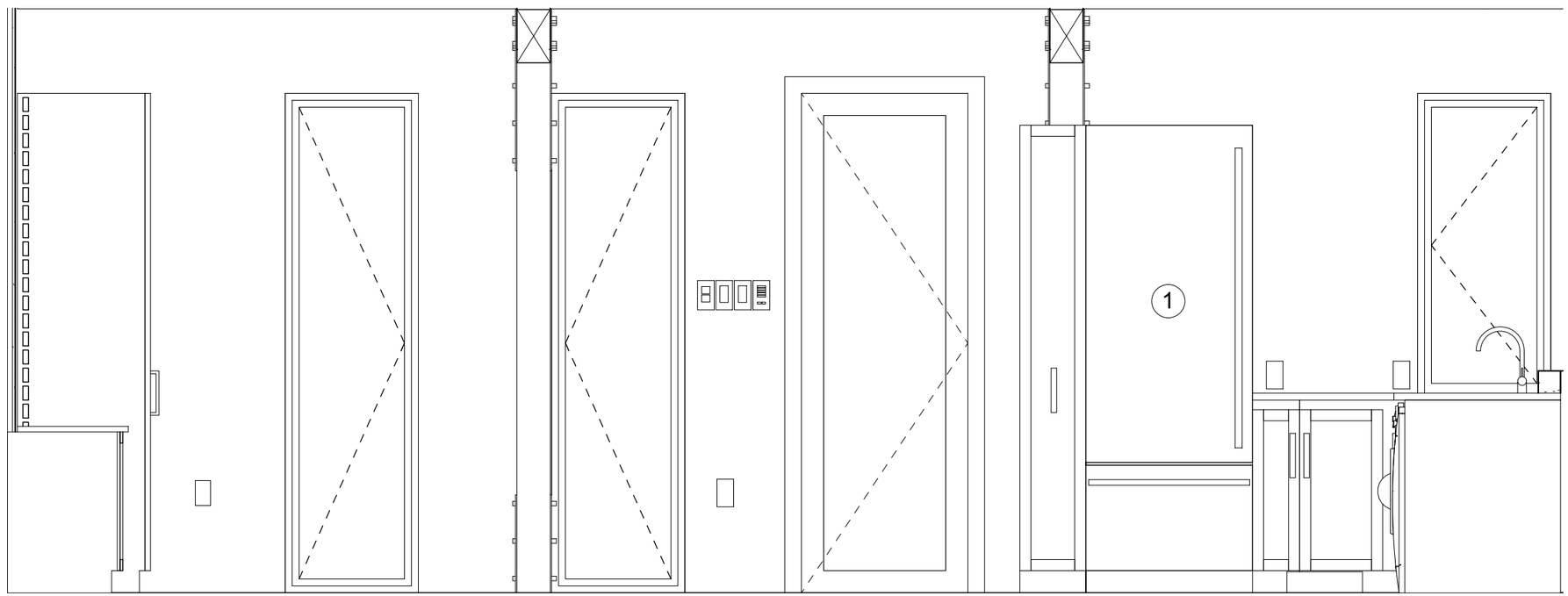
DJS — DRAWN BY
KPM — CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION
LIFEWELL/NEXUS WALL SECTION
A-309

PENNSTATE

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt



1 / A-401 LIVING ROOM NORTH
1/2" = 1'-0"

0' 1' 2' 4' 6'

1. LIEBHERR REFRIGERATOR

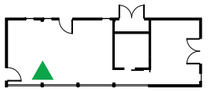
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

DJS DRAWN BY
KPM CHECKED BY

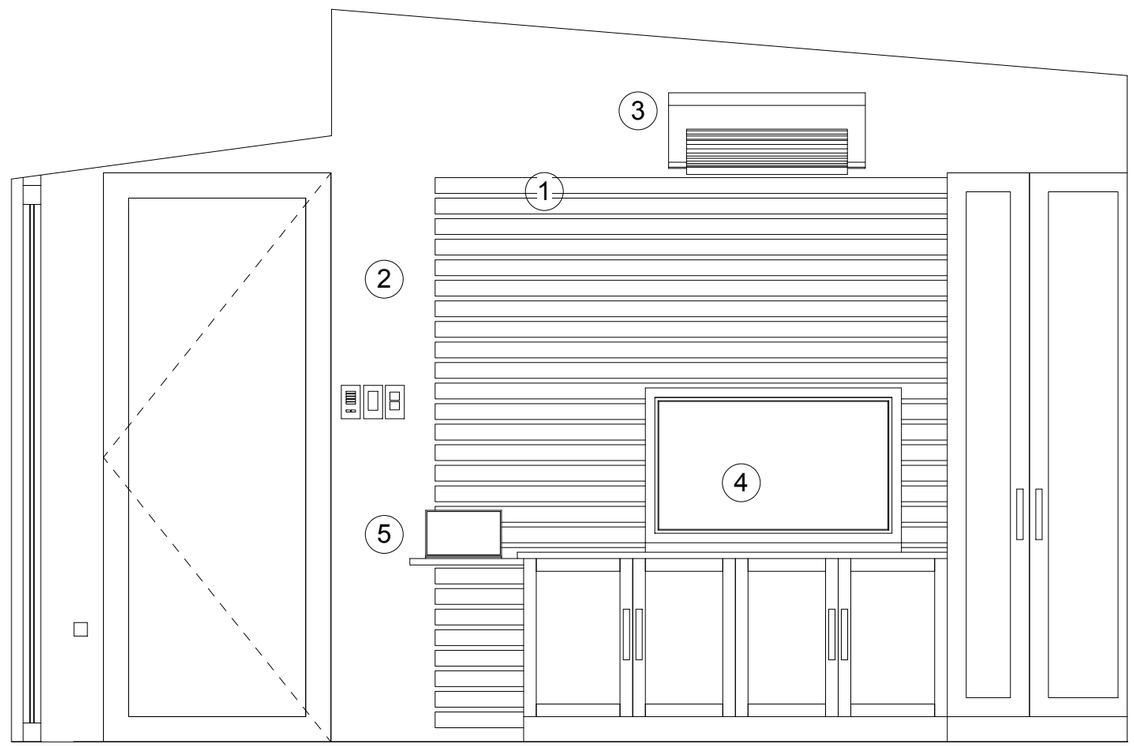
DRAWING STATUS
CD SET

NATURAL FUSION

A-401 N. INT. ELEV. LIVINGROOM

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE
1855



1 / A-402 LIVING ROOM WEST
1/2" = 1'-0"

0' 1' 2' 4' 6'

1. HEAT TREATED POPLAR SIDING
2. PAINTED WALL SURFACE
3. FUJITSU MINI SPLIT
4. SAMSUNG LED TELEVISION
5. PULL OUT DESK W/ 17" MAC BOOK PRO

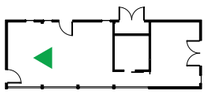
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

DRAWN BY DJS
CHECKED BY KPM

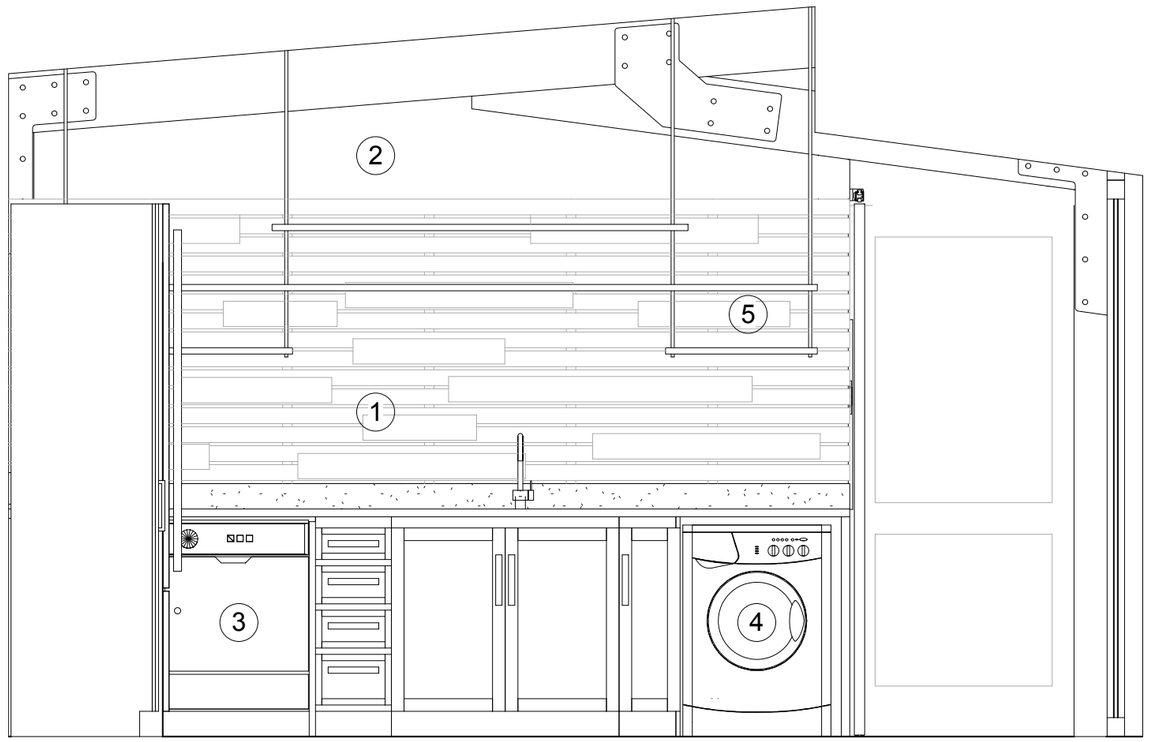
DRAWING STATUS
CD SET

NATURAL FUSION

A-402 W. INT. ELEV. LIVINGROOM

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE



1 A-403 KITCHEN EAST
1/2" = 1'-0"

0' 1' 2' 4' 6'

1. HEAT TREATED POPLAR SIDING WITH PLANTER BOXES
2. 3FORM PANEL
3. BOSCH DISHWASHER
4. LG WASHER/ DRYER
5. SUSPENDED SHELVING

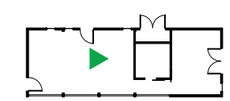
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

DJS DRAWN BY
KPM CHECKED BY

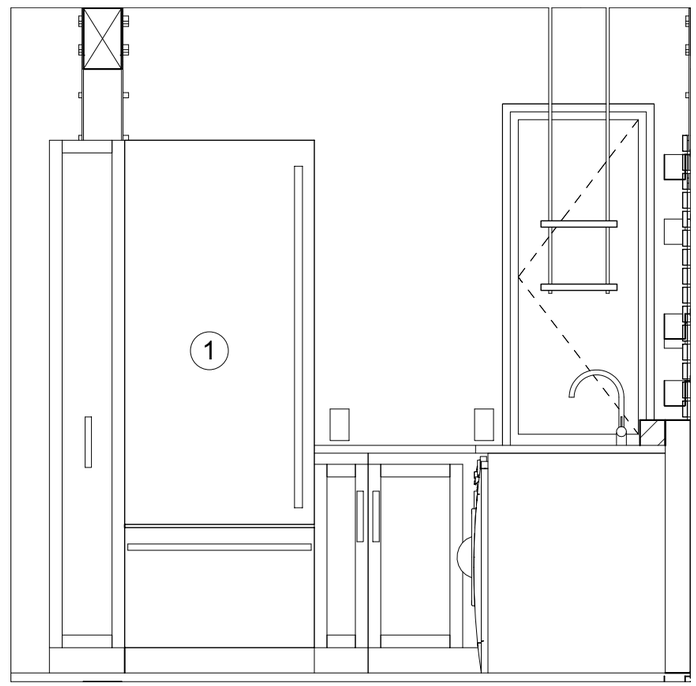
DRAWING STATUS
CD SET

NATURAL FUSION

A-403 E. INT. ELEV. KITCHEN

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE
1855



1 / A-404 KITCHEN NORTH
1/2" = 1'-0"

0' 1' 2' 4' 6'

1. LIEBHERR REFRIGERATOR

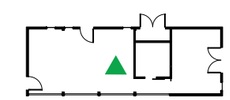
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

DRAWN BY DJS
CHECKED BY KPM

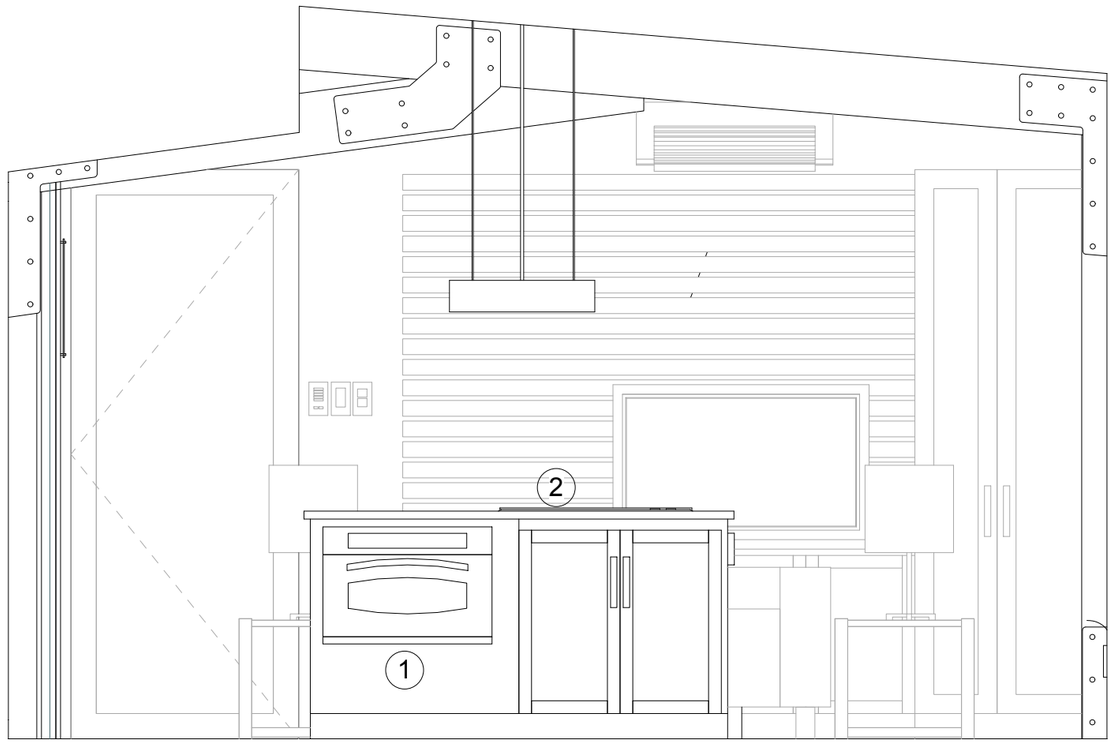
DRAWING STATUS
CD SET

NATURAL FUSION

A-404 N. INT. ELEV. KITCHEN

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE



1 A-405 ISLAND ELEVATION WEST
1/2" = 1'-0"

0' 1' 2' 4' 8' 12'

KEY NOTES
1. GE ADVANTIUM OVEN
2. ELECTROLUX INDUCTION COOKTOP

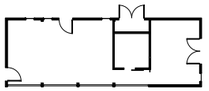
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

DJS DRAWN BY
KPM CHECKED BY

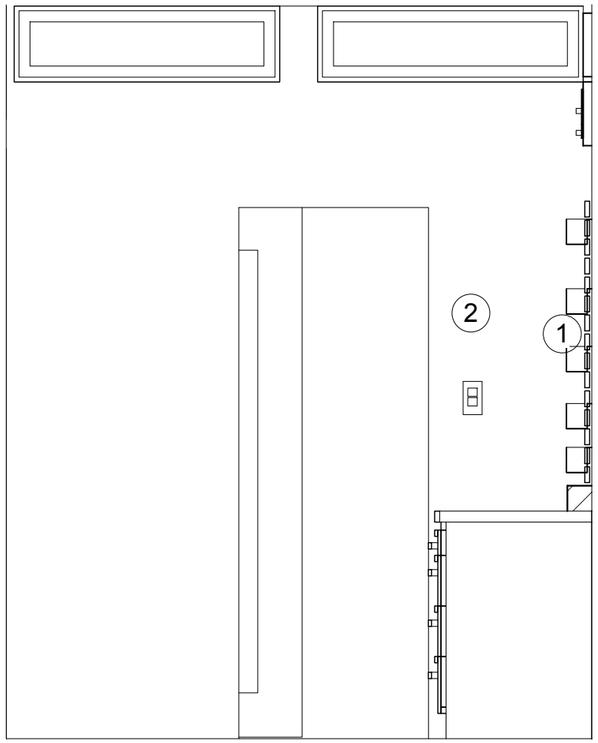
DRAWING STATUS
CD SET

NATURAL FUSION

A-405 W. INT. ELEV. KITCHEN

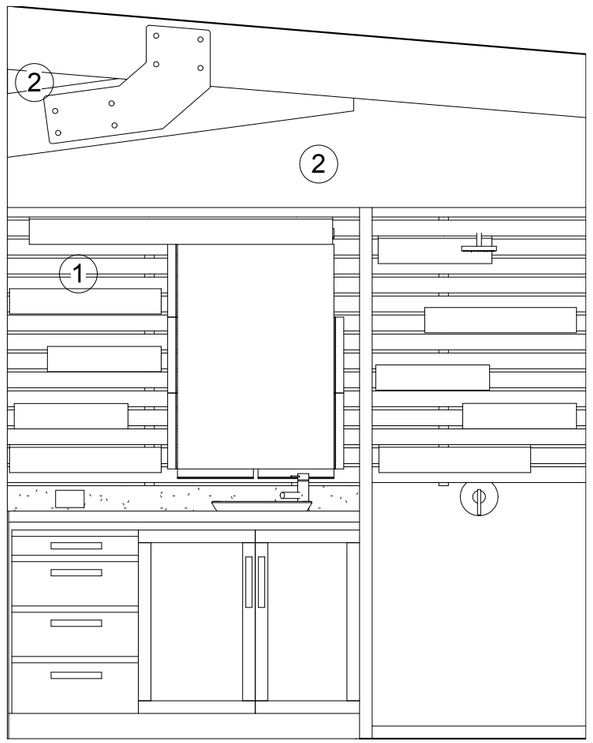
\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE
1855



1 A-406 BATHROOM SOUTH
1/2" = 1'-0"

0' 1' 2' 4' 6'



2 A-406 BATHROOM WEST
1/2" = 1'-0"

0' 1' 2' 4' 6'

1. HEAT TREATED POPLAR SIDING WITH PLANTER BOXES
2. PAINTED WALL SURFACE

1. HEAT TREATED POPLAR SIDING WITH PLANTER BOXES
2. 3FORM PANEL

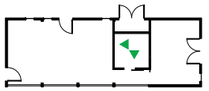
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

DRAWN BY	CHECKED BY
DJS	KPM

DRAWING STATUS
CD SET

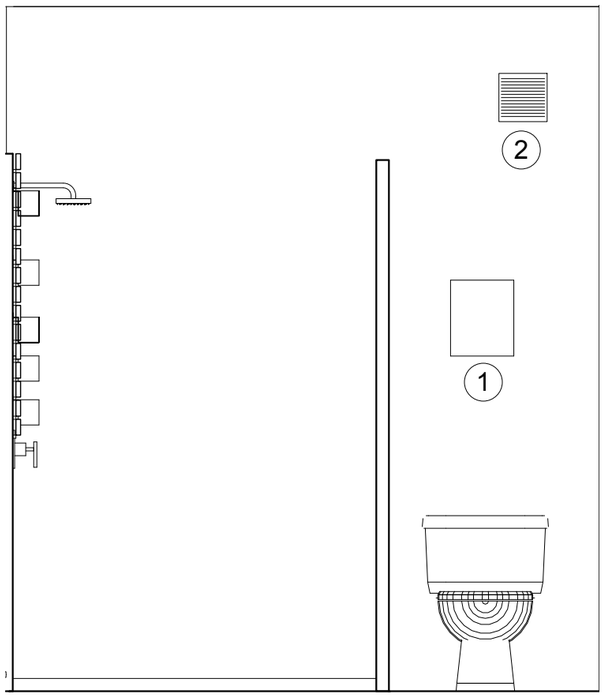
NATURAL FUSION

S. W. INT. ELEV. BATHROOM

A-406

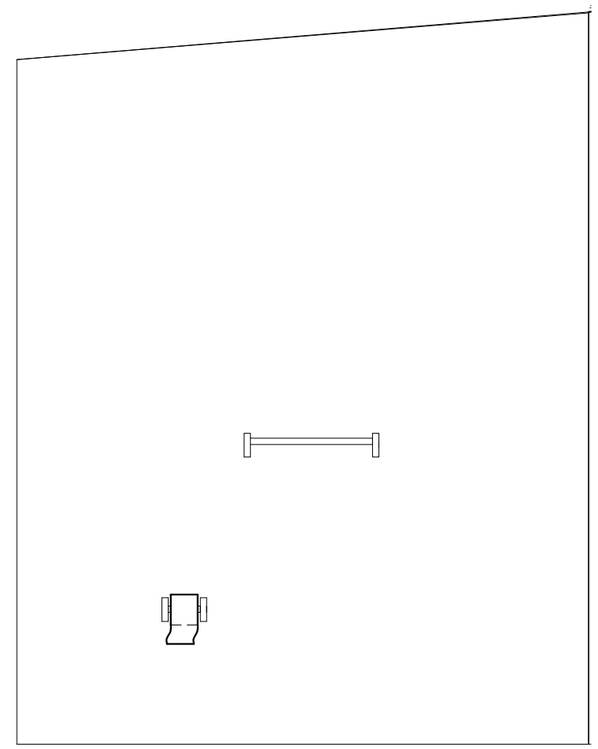
PENNSTATE

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt



1 A-407 BATHROOM NORTH
1/2" = 1'-0"

0' 1' 2' 4' 6'



2 A-407 BATHROOM EAST
1/2" = 1'-0"

0' 1' 2' 4' 6'

1. WALL SCONCE
2. EXHAUST AIR DIFFUSOR

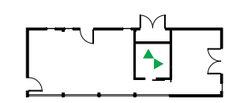
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

DRAWN BY DJS
CHECKED BY KPM

DRAWING STATUS
CD SET

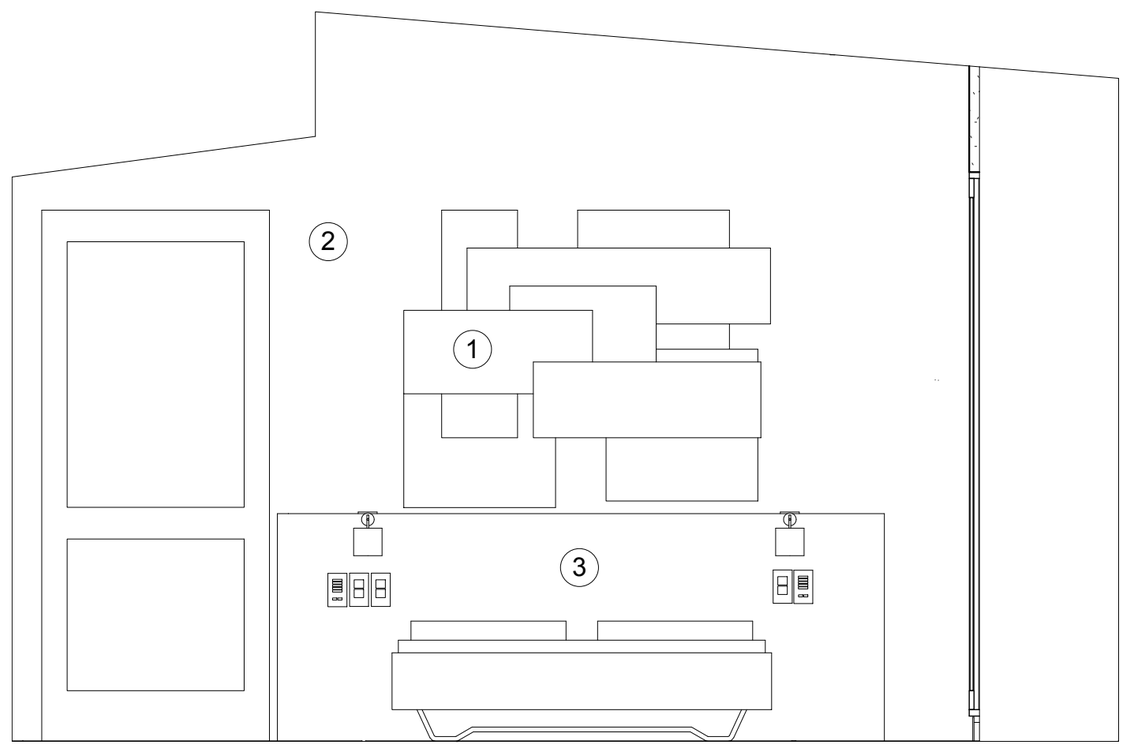
NATURAL FUSION

N. E. INT. ELEV. BATHROOM

A-407

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE



1 A-408 BEDROOM WEST
1/2" = 1'-0"

0' 1' 2' 4' 6'

1. RECLAIMED CHALKBOARD SLATE
2. PAINTED WALL SURFACE
3. BUILT OUT HEADBOARD

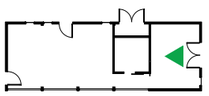
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

DJS DRAWN BY
KPM CHECKED BY

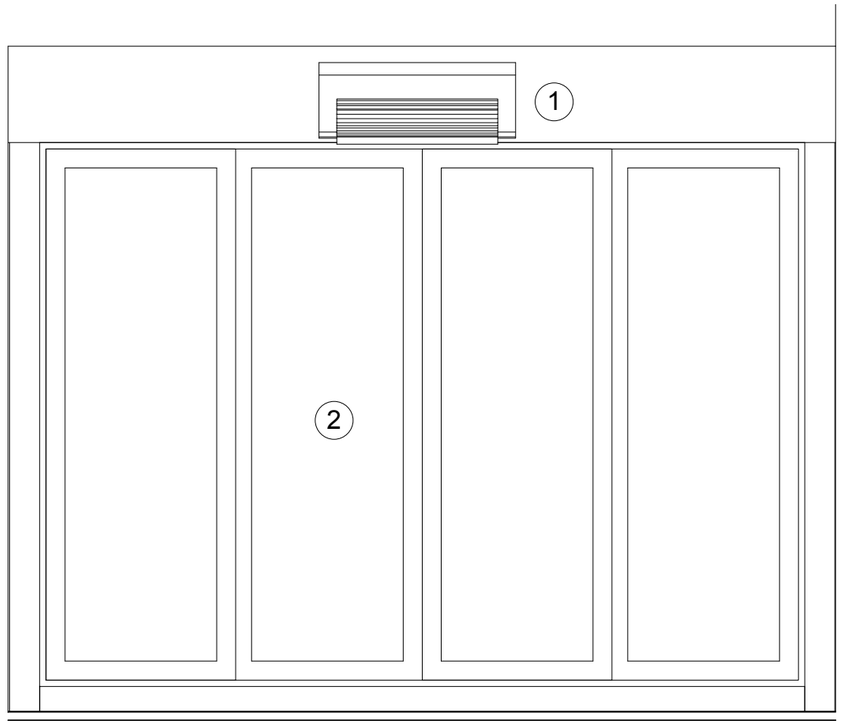
DRAWING STATUS
CD SET

NATURAL FUSION

A-408 W. INT. ELEV BEDROOM

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855



1 A-409 BEDROOM NORTH
1/2" = 1'-0"

0' 1' 2' 4' 6'

2 A-409 BEDROOM SOUTH
1/2" = 1'-0"

0' 1' 2' 4' 6'

1. FUJITSU MINI SPLIT
2. 3FORM DOORS

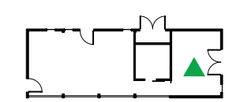
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

DJS DRAWN BY
KPM CHECKED BY

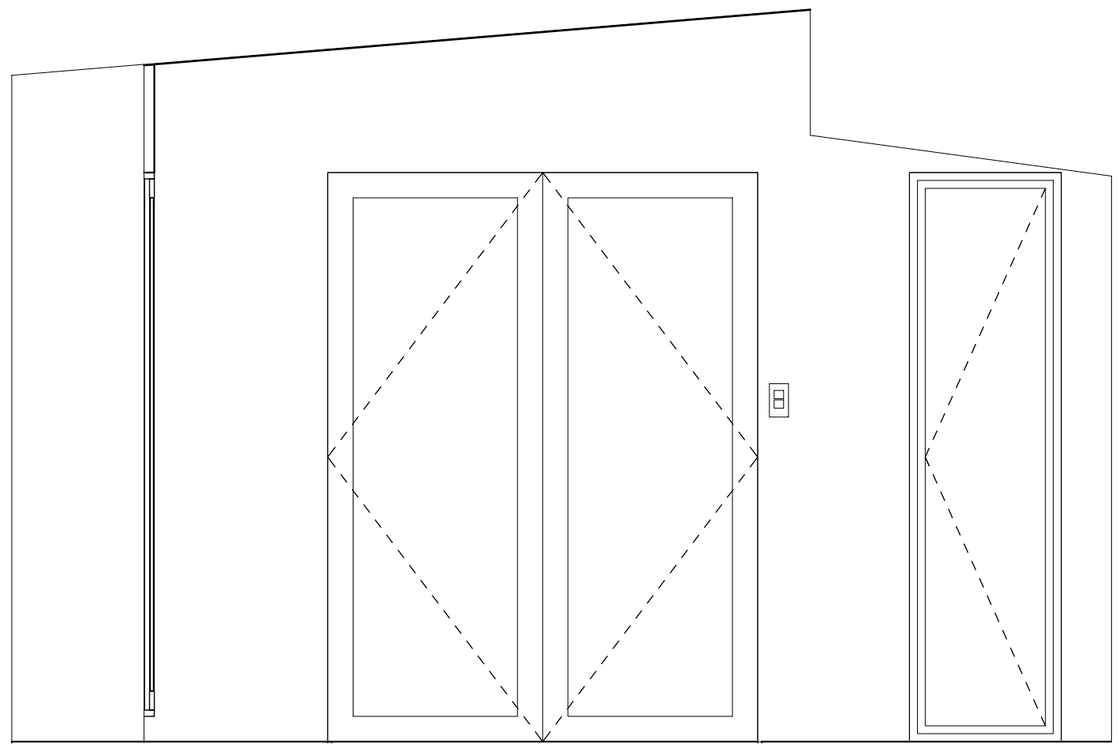
DRAWING STATUS
CD SET

NATURAL FUSION

A-409 N. INT. ELEV. BEDROOM

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855



1 A-410 BEDROOM EAST
1/2" = 1'-0"

0' 1' 2' 4' 6'

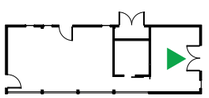
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

DJS DRAWN BY
KPM CHECKED BY

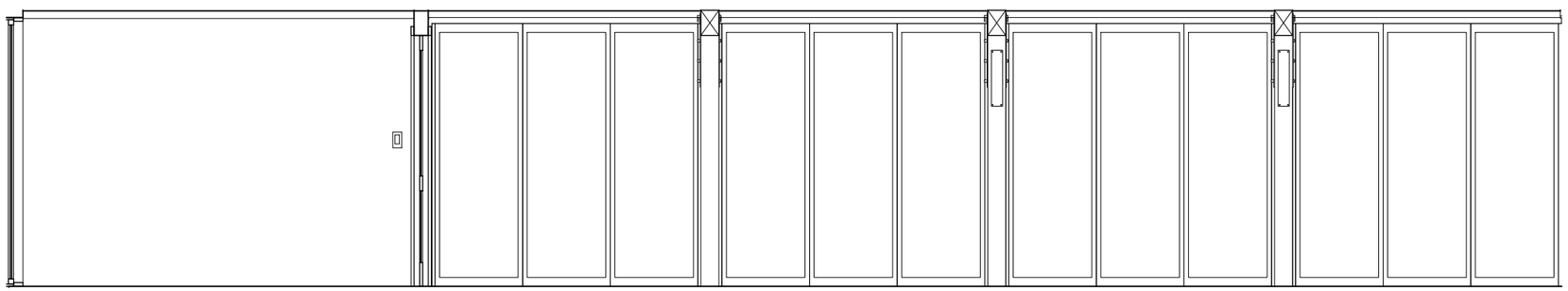
DRAWING STATUS
CD SET

NATURAL FUSION

A-410 E. INT. ELEV. BEDROOM

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855



1 / A-411 LONGITUDINAL HALLWAY ELEVATION
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

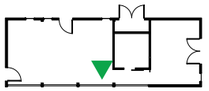
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

DJS DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

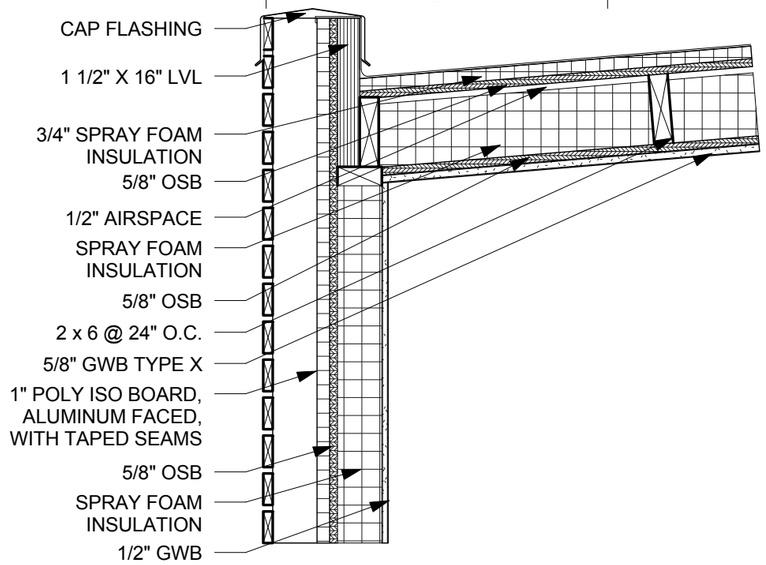
NATURAL FUSION

SOUTH INTERIOR ELEVATION

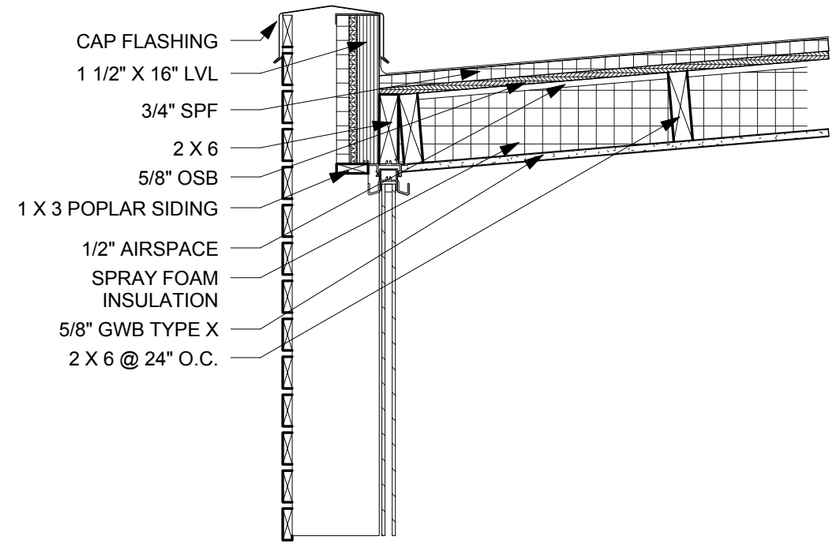
A-411

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

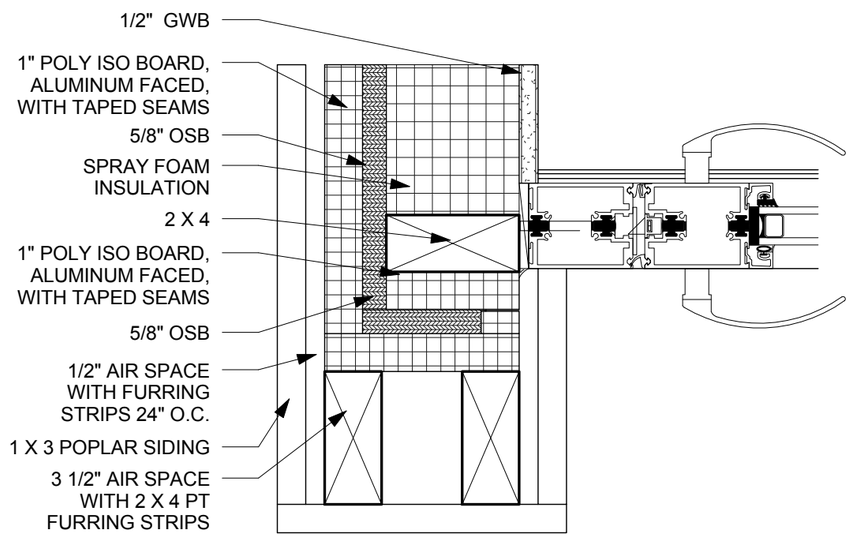
PENNSTATE
1855



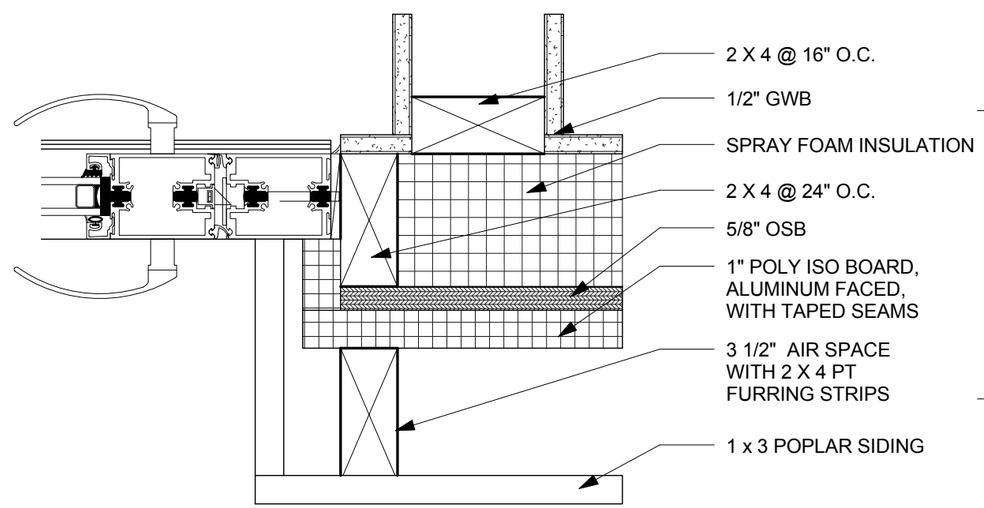
1 A-501 SOUTH PARAPET WALL CONNECTION-BEDROOM
1" = 1'-0"



2 A-501 SOUTH PARAPET WALL
1" = 1'-0"



3 A-501 SOUTH DOOR WALL CONNECTION - WEST
NTS



4 A-501 SOUTH DOOR WALL CONNECTION - EAST
NTS

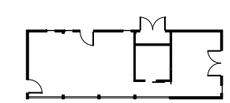
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
As indicated

DJS DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

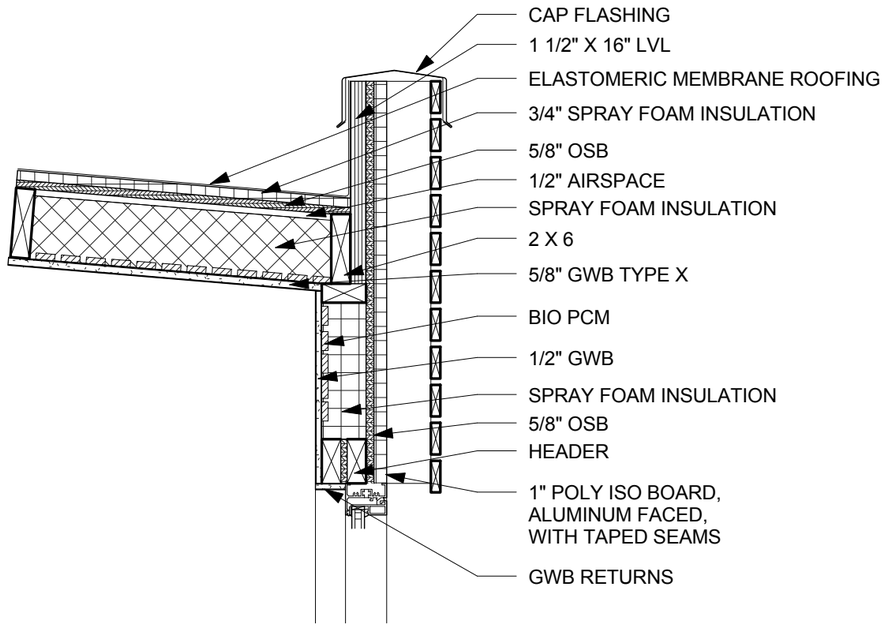
NATURAL FUSION

SOUTH WALL DETAILS

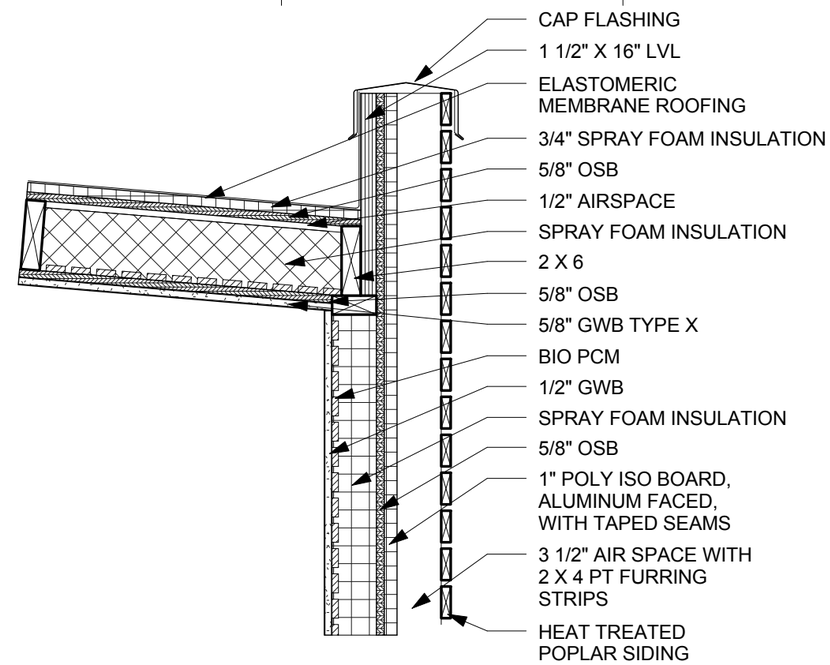
A-501

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

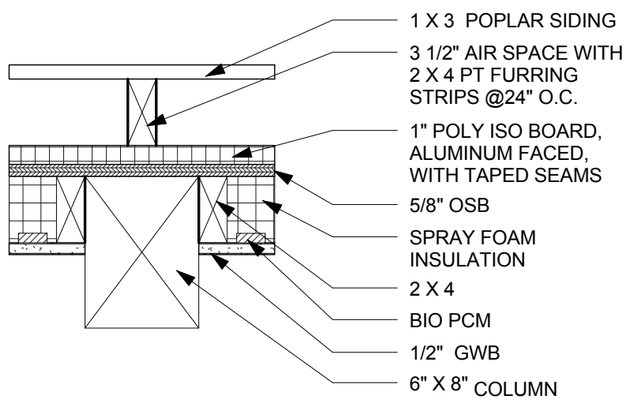
PENNSTATE
1855



1 A-502 NORTH WALL PARAPET CONNECTION
1" = 1'-0"



2 A-502 NORTH WALL PARAPET CONNECTION-BEDROOM
1" = 1'-0"



3 A-502 COLUMN CONNECTION
1 1/2" = 1'-0"

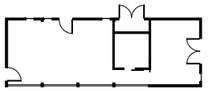
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
As indicated

DJS DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

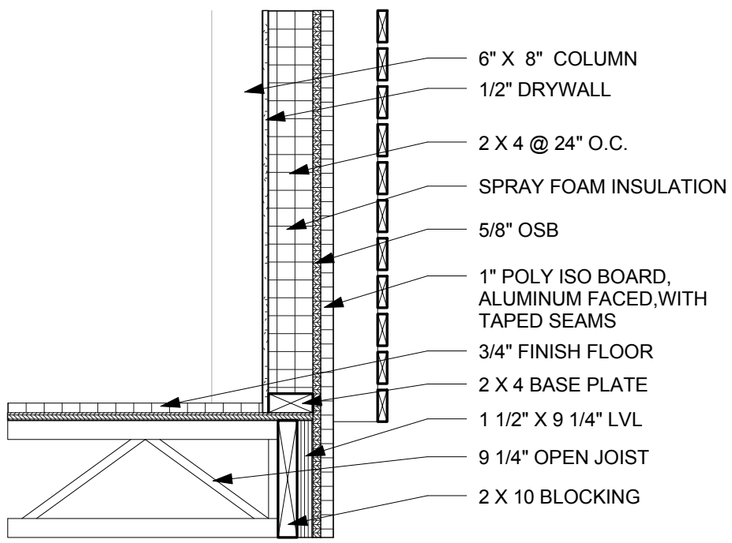
NATURAL FUSION

NORTH WALL DETAILS

A-502

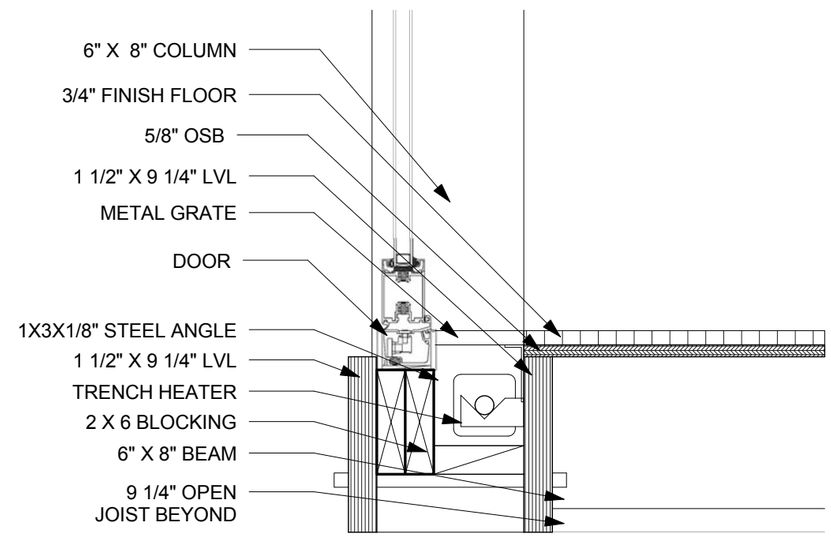
C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE



1 A-503 NORTH WALL CONNECTION
1" = 1'-0"

0' 1/2' 1' 2' 3'



2 A-503 SOUTH WALL FLOOR CONNECTION
1 1/2" = 1'-0"

0' 1.5" 3" 6" 1'

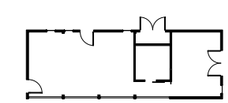
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
As indicated

DRAWN BY: DJS
CHECKED BY: KPM

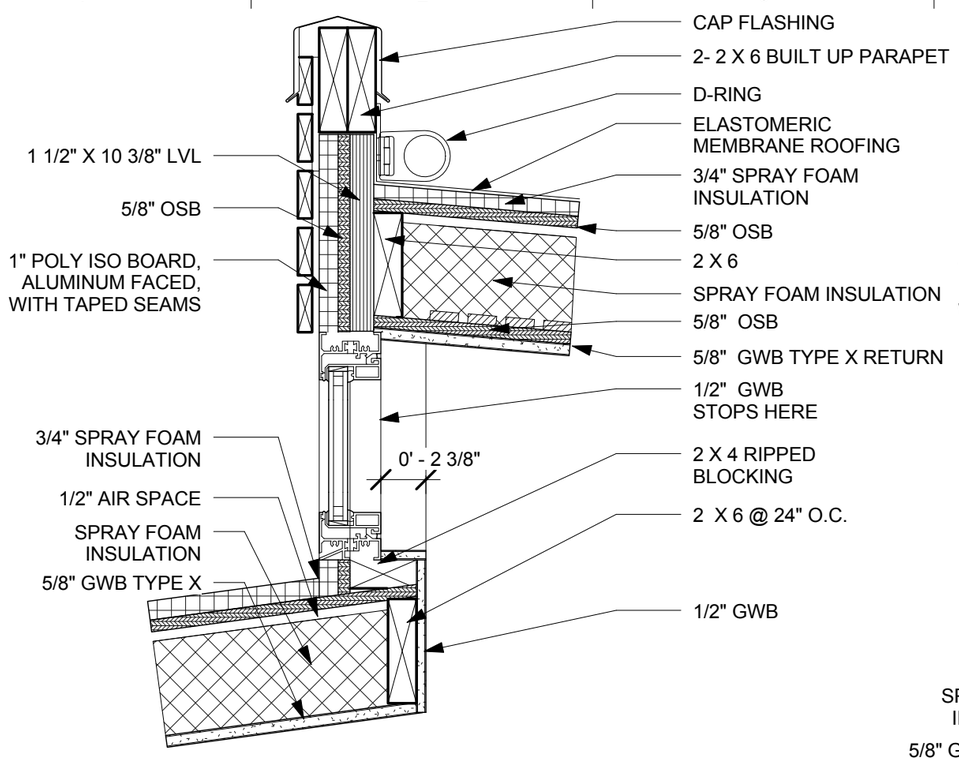
DRAWING STATUS
CD SET

NATURAL FUSION

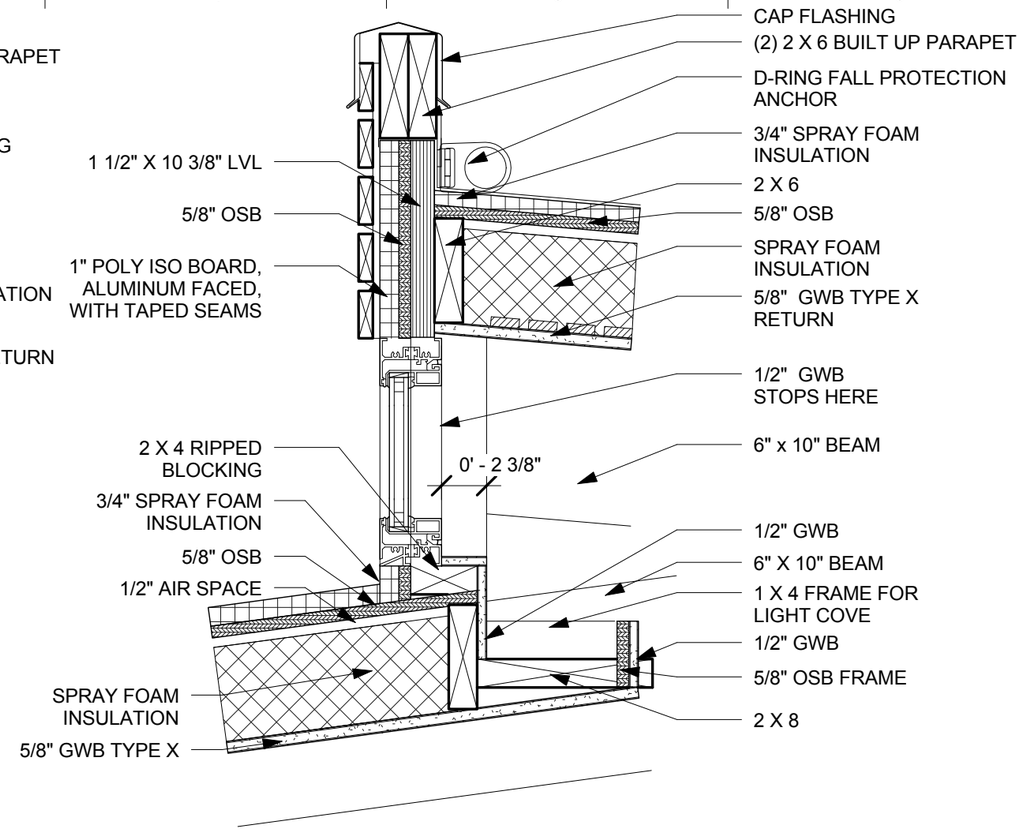
A-503 FLOOR CONNECTION DETAILS

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

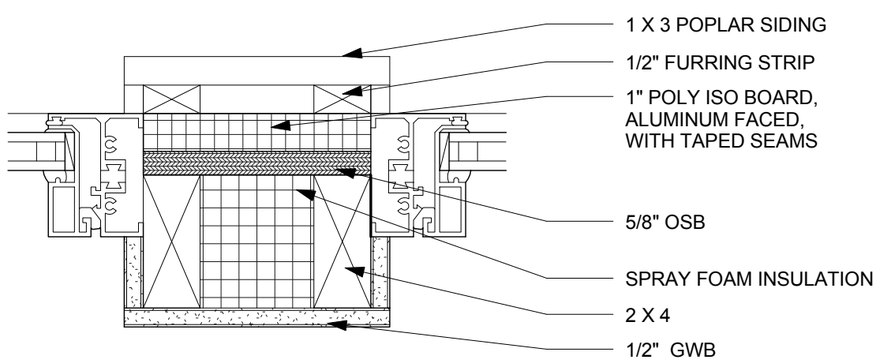
PENNSTATE



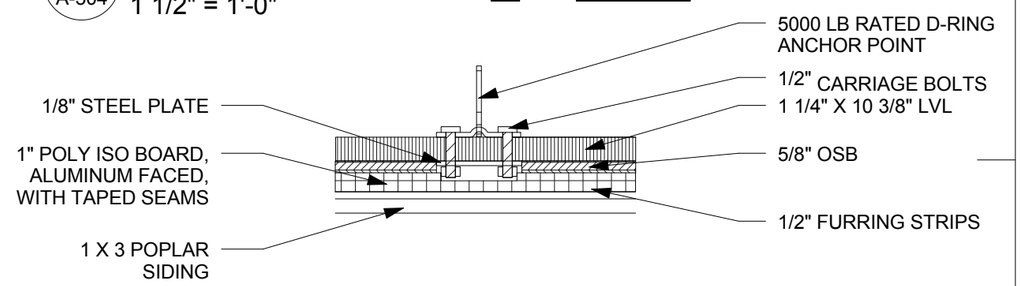
1 A-504 CLERESTORY DETAIL - BEDROOM
1 1/2" = 1'-0"



2 A-504 CLERESTORY DETAIL- LIVING ROOM
1 1/2" = 1'-0"



3 A-504 CLERESTORY PLAN DETAIL
NTS



4 A-504 FALL ARREST ANCHORS
NTS

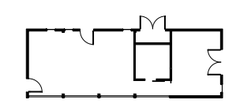
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
As indicated

DJS — DRAWN BY
KPM — CHECKED BY

DRAWING STATUS
CD SET

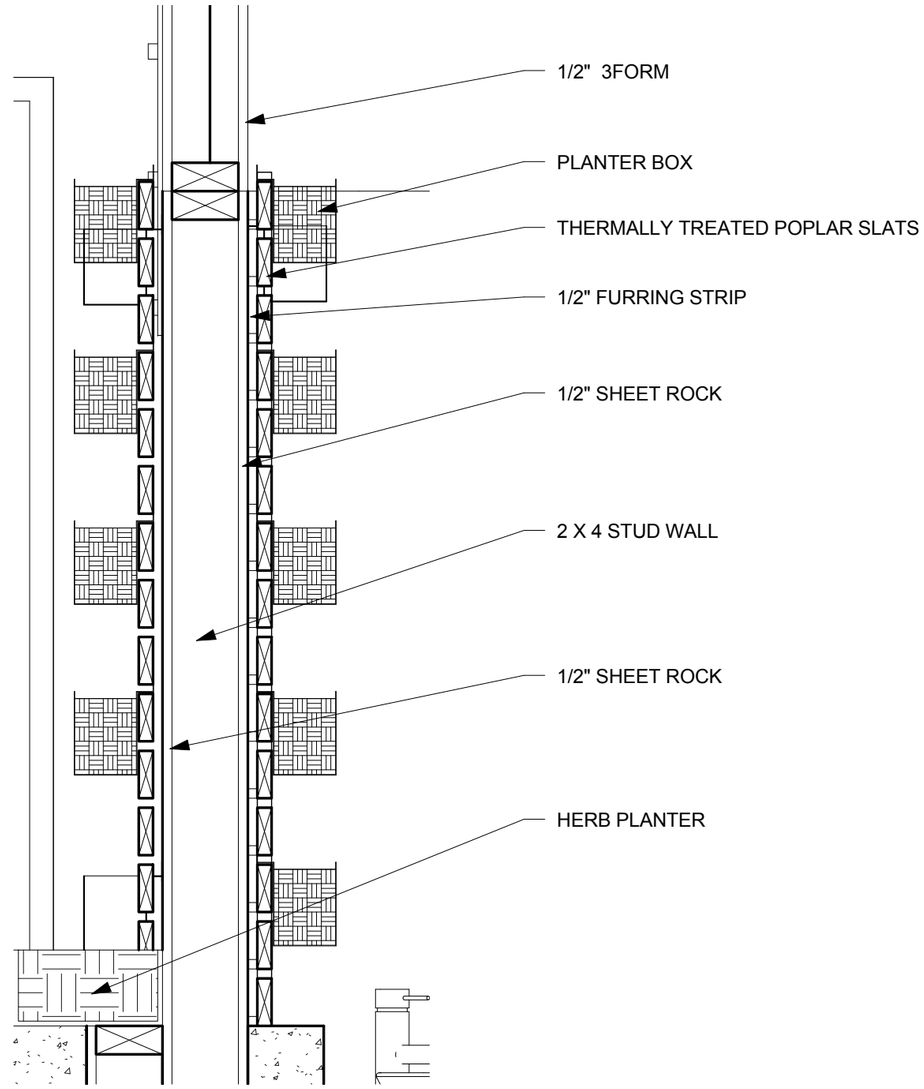
NATURAL FUSION

CLERESTORY DETAILS

A-504

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855



1 / A-505 LIFEWELL WALL SECTION DETAIL
1 1/2" = 1'-0"

0' 1.5" 3" 6" 1'

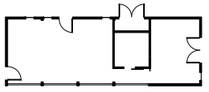
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



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

DRAWN BY DJS
CHECKED BY KPM

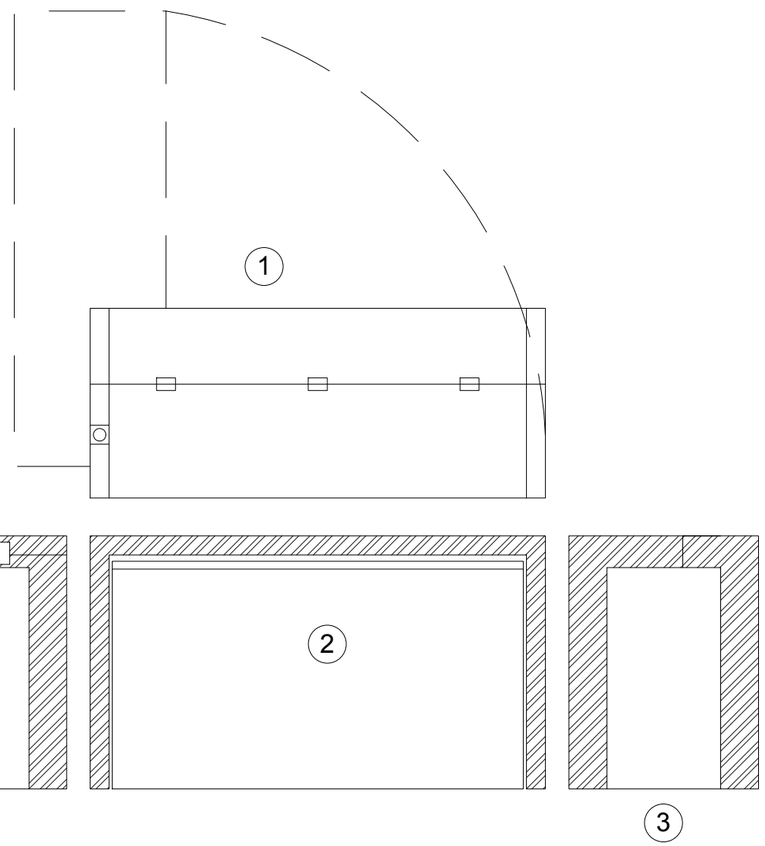
DRAWING STATUS
CD SET

NATURAL FUSION

A-505 LIFEWELL WALL SECTION DETAIL

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855



1 / A-506 TABLE CONFIGURATIONS
1/2" = 1'-0"

0' 1' 2' 4' 8' 12'

KEYED NOTES
1. PLAN
2. ELEVATION
3. SIDE ELEVATION

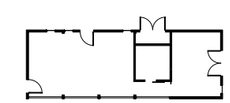
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

DJS — DRAWN BY
KPM — CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION
TABLE CONFIGURATIONS
A-506

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855

DOOR SCHEDULE (1)

DOOR NUMBER	DOOR DESCRIPTION	R.O. WIDTH	R.O. HEIGHT	QUANTITY
1	GLASS ENTRY DOOR	3'-0"	7'-6"	2
2	GLASS FRENCH DOORS	5'-8"	7'-6"	1
3	FOLDING GLASS WALL, LEFT HINGE	7'-4"	7'-6"	3
4	FOLDING GLASS WALL, RIGHT HINGE	7'-4"	7'-6"	1
5	WOODEN POCKET DOOR	3'-0"	7'-0"	1
6	WOODEN / 3FORM SLIDING DOOR	3'-0"	7'-0"	1
7	STEEL DOUBLE DOOR	5'-8"	6'-8"	1

WINDOW SCHEDULE (1)

WINDOW NUMBER	WINDOW DESCRIPTION	R.O. WIDTH	R.O. HEIGHT	QUANTITY
1	CASEMENT, LEFT HINGE	2'-0"	7'-6"	1
2	CASEMENT, RIGHT HINGE	2'-0"	7'-6"	2
3	CASEMENT SPLIT	2'-0"	7'-6"	1
4	CLERESTORY, FIXED	3'-6"	1'-0"	10
5	CLERESTORY, FIXED	3'-0"	1'-0"	1
6	FIXED SKYLIGHT	22.5"	22.5"	5

1. CASEMENT SPLIT - 0"-36" FROSTED GLASS, 36"-96" CASEMENT WINDOW

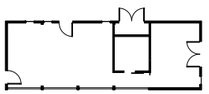
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
As indicated

DJS — DRAWN BY
KPM — CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

DOOR & WINDOW SCHEDULE

A-601

PENNSTATE 1855

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

APPLIANCE SCHEDULE									
DESIGNATION	MFTR'S NAME & MODEL NO.	LOCATION	FINISH	CAP	ELECTRICAL FS [AMPS]	ELECTRICAL VAC/PH/HZ	DIMENSIONS W × H × D [IN]	WGT [LBS]	REMARKS
REFRIG	LIEBHERR FREESTANDING CS1601	KITCHEN	SS	11.3 CF (FRIDGE) 4.2 CF (FREEZER)	20	115/1/60	29½ × 81½ × 24¾	324	1,2
W/D	LG VENTLESS WASHER/DRYER COMBO WH3431HS	KITCHEN	TITANIUM	2.44 CF	20	120/1/60	23½ × 33¼ × 23¾	147 (DRY) 163 (WET)	1,3
DW	BOSCH EVOLUTION 800 SERIES SHE98M05UC	KITCHEN	SS	10 PLACE SETTINGS	15	120/1/60	23½ × 34 × 22½	112	1
OVEN	GE PROFILE ADVANTIUM PSB1001NSS	KITCHEN	SS	1.6 CF	20	120/1/60	26¾ × 19 × 21½	91	--
INDUCT	ELECTROLUX INDUCTION HYBRID COOKTOP EW30CC55GS	KITCHEN	SS	N/A	40	240/1/60	30¾ × 6 × 21¾	54	4
	BROAN ECLIPSE DOWNDRAFT 273003	KITCHEN	SS	500 CFM	15	120/1/60	30½ × 29½ × 7	80	5

1. ENERGY STAR RATED
2. SECURE W/ TIPPING BRACKETS TO STUDS TO PREVENT TIPPING WHEN OPEN W/ FULL DOOR
3. LEAVE MIN 1 IN GAP ON ALL SIDES OF UNIT TO LIMIT NOISE TRANSFER
4. POSITION DEFLECTOR IN UPRIGHT POSITION DURING INSTALLATION IN ISLAND
5. TRANSITION TO 6 IN DIAM DUCT AND EXHAUST TO NORTH SIDE OF HOUSE

ELECTRONIC EQUIPMENT SCHEDULE							
DESIGNATION	MFTR'S NAME & MODEL NO.	LOCATION	FINISH	ELECTRICAL VAC/PH/HZ	DIMENSIONS W × H × D [IN]	WGT [LBS]	REMARKS
TV	SAMSUNG SERIES 6 LED TV UN40B6000	LIVING RM	BLACK	120/1/60	38¾ × 27 × 1¼	32.4	1, 2
THEATER SYS	PHILIPS HOME THEATER SYSTEM HTS3544	LIVING RM	BLACK	120/1/60	N/A	9	1.3
COMPUTER	APPLE MACBOOK PRO 17 IN	LIVING RM	ALUMIN	120/1/60	15½ × 1 × 10½	6.6	1

1. ENERGY STAR RATED
2. REMOVE STAND AND PROVIDE WALL MOUNTING KIT
3. BUILT-IN DVD PLAYER

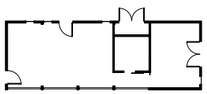
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

DJS DRAWN BY
KPM CHECKED BY

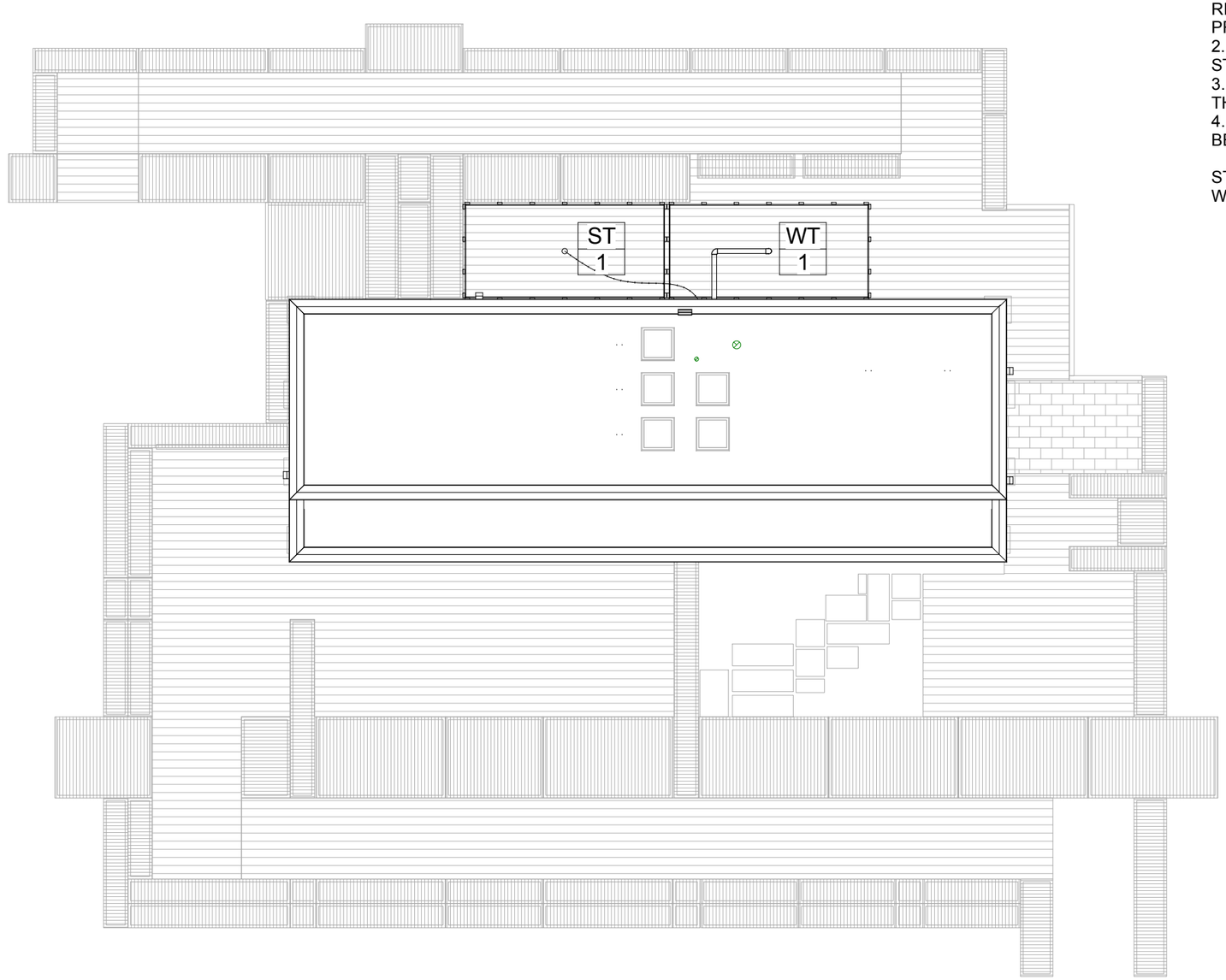
DRAWING STATUS
CD SET

NATURAL FUSION

A-602 APPLIANCE SCHEDULE

PENNSTATE

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt



GENERAL NOTES:
1. WATER TANKS ARE PILLOW TYPE ENCASED IN A RIGID BOX CONSTRUCTED OF 2X4S AND OSB TO PROVIDE SUPPORT FOR THE TANK.
2. TANK STRUCTURE IS NOT TO IMPACT THE STRUCTURE OF THE DECK SUPPORT SYSTEM.
3. CAPACITY OF THE TANKS IS 800 GALLONS PER THE WATER BUDGET IN THE PROJECT MANUAL.
4. WATER TANKS WILL BE INSTALLED AND FILLED BEFORE DECK ABOVE IS PUT INTO PLACE.

ST = SUPPLY WATER TANK
WT = WASTEWATER TANK

1 / P-101 PLUMBING SITE PLAN
1/8" = 1'-0"

0' 2' 4' 8' 16' 24'

N

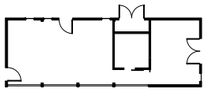
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/8" = 1'-0"

JNG DRAWN BY
KPM CHECKED BY

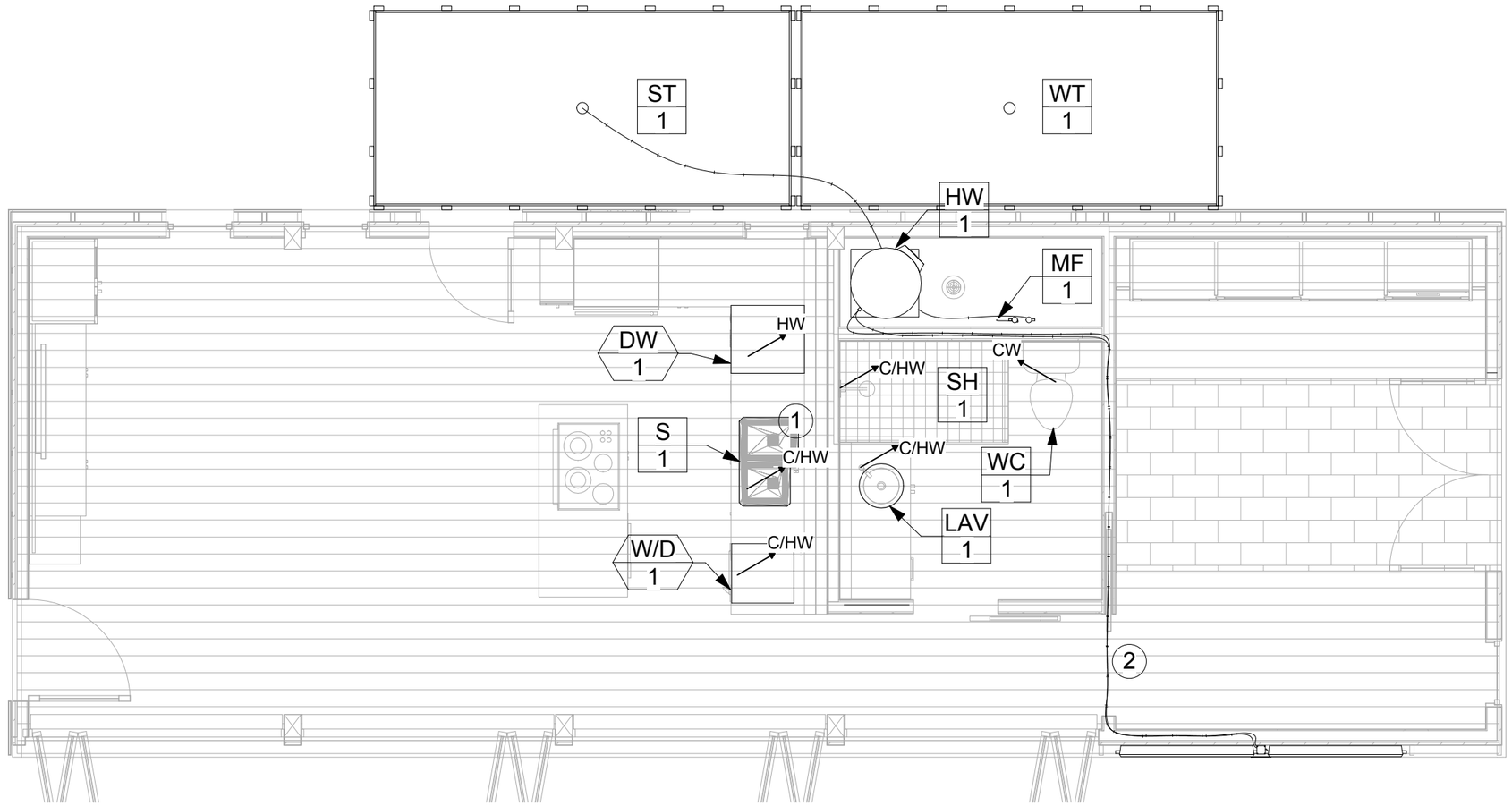
DRAWING STATUS
CD SET

NATURAL FUSION

P-101 PLUMBING SITE PLAN

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE
1855



1 / P-102 PLUMBING SUPPLY PLAN

1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

KEYED NOTES:
1. PEX PIPING IN WALL IS HOME RUN SYSTEM.
2. 3/4" PEX LINES MUST BE SLOPED UPWARD TO THE SUNNOVATIONS PUMP UNIT.

HW = HOT WATER CONNECTION
C/HW = HOT AND COLD WATER CONNECTIONS

N

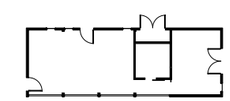
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

JNG DRAWN BY | KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

P-102 PLUMBING SUPPLY PLAN

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE

1 / P-103 WASTEWATER PLAN
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

N

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

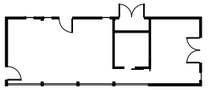
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

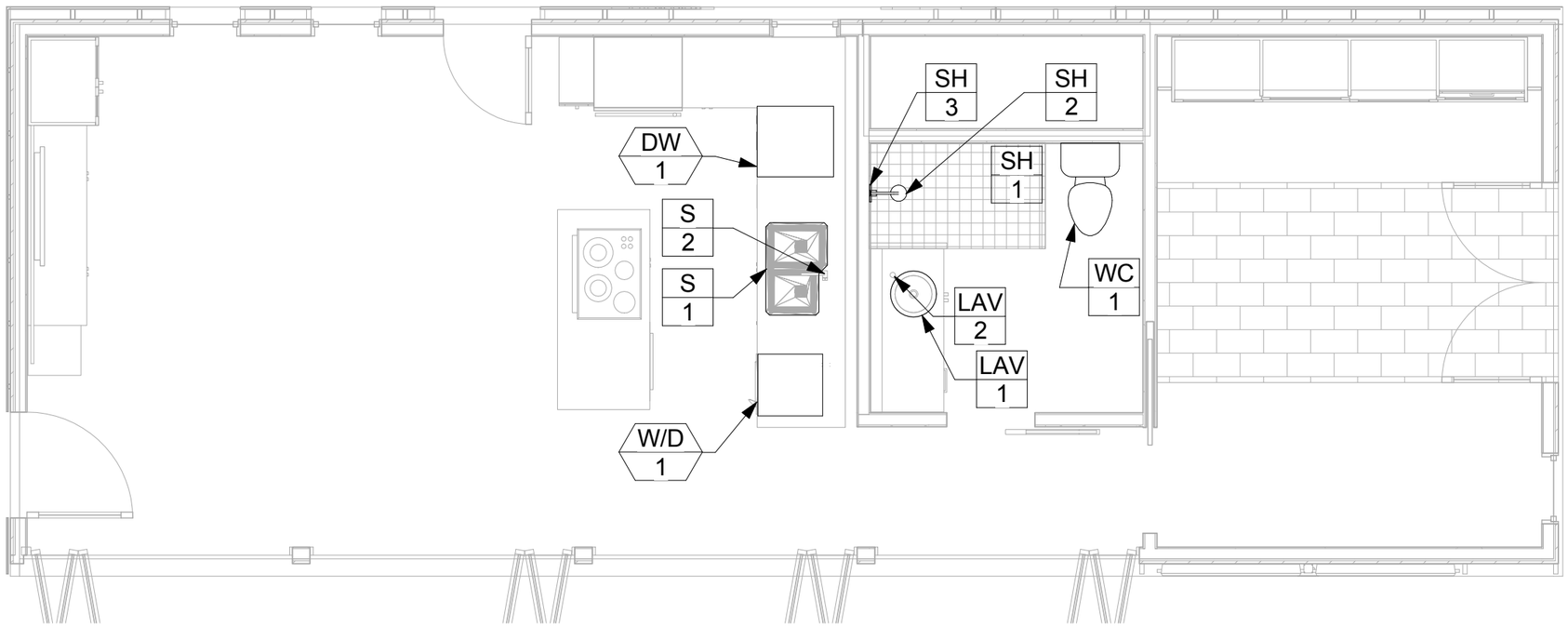
JNG DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

P-103 WASTEWATER PLAN

PENNSTATE
1855



1
P-601
PLUMBING FIXTURE PLAN
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE

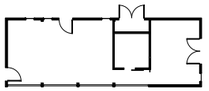
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

DRAWN BY JNG
CHECKED BY KPM

DRAWING STATUS
CD SET

NATURAL FUSION

FIXTURE DEMAND SCHEDULE

P-601

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

STORAGE TANK SCHEDULE

DESIGNATION	MFTR'S NAME & MODEL NO.	LOCATION	SERVICE	TYPE	CAP [GAL]	CONNECTION FILL [IN]	CONNECTION DISCH [IN]	MATERIAL	MAX DIMENSIONS L × W × H [IN]	WGT [LBS]	REMARKS	LINK
T-1	FOL-DA-TANK PW1340	SUB-DECK	POTABLE WATER STORAGE	CLOSED PILLOW TANK	MAX 1340	4	1½	POLYESTER	168 × 84 × 24	64 (DRY)	1, 2	[1]
T-2	FOL-DA-TANK GW1340	SUB-DECK	GREY WATER STORAGE	CLOSED PILLOW TANK	MAX 1340	4	1½	POLYESTER	168 × 84 × 24	64 (DRY)	2	[2]

1. COMPLIES WITH ANSI STANDARD 61 DRINKING WATER SYSTEM COMPONENTS -- HEALTH EFFECTS
2. TANK SUPPORTED BY 2-BY-4 LUMBER JOISTS OVERLAYED W/ ½ IN OSB

[1] http://www.tank-depot.com/product.aspx?id=866
[2] http://www.tank-depot.com/product.aspx?id=865

FIXTURE SCHEDULE

DESIGNATION	MFTR'S NAME & MODEL NO.	DESCRIPTION	LOCATION	FINISH	FLOWRATE	REMARKS
WC-1	AMERICAN STANDARD FLOWISE (2480.16)	DUAL FLUSH TOILET	BATHROOM	WHITE	1.6 GAL/FLUSH (FULL) 0.8 GAL/FLUSH (PART)	--
LAV-1	CUSTOM WOOD LAVATORY VESSEL, 16 IN DIAM	BATHROOM SINK	BATHROOM	WOOD	N/A	--
LAV-2	KOHLER FAIRFAX TALL (K-12183-CP)	BATHROOM SINK FAUCET	BATHROOM	POLISHED CHROME	1.5 GPM (MAX)	1
SH-1	STERLING ENSEMBLE SERIES 7214 (72141100-0)	SHOWER RECEPTICLE	BATHROOM	WHITE	N/A	--
SH-2	KOHLER PURIST SHOWER HEAD (K-997-CP)	SHOWER HEAD	BATHROOM	POLISHED CHROME	1.75 GPM (MAX)	--
SH-3	DELTA ARZO MONITOR (T14086)	SHOWER FAUCET	BATHROOM	CHROME	N/A	2
S-1	KOHLER UNDERTONE LARGE/MEDIUM SINK (K-3150)	KITCHEN SINK	KITCHEN	SS	N/A	--
S-2	DELTA GRAIL PULL DOWN FAUCET (985)	KITCHEN SINK FAUCET	KITCHEN	CHROME	2.5 GPM (MAX)	--
HB-1	HOSE BIBB	OUTDOOR SERVICE	NORTH FAÇADE	BRASS	2.5 GPM	3

1. DRAIN W/ POP-UP TAILPIECE INCLUDED
2. ADD ROUGH VALVE ACCESSORY
3. PROVIDE STOP-AND-WASTE VALVE INSIDE MECH RM FOR DRAINAGE

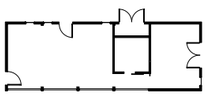
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

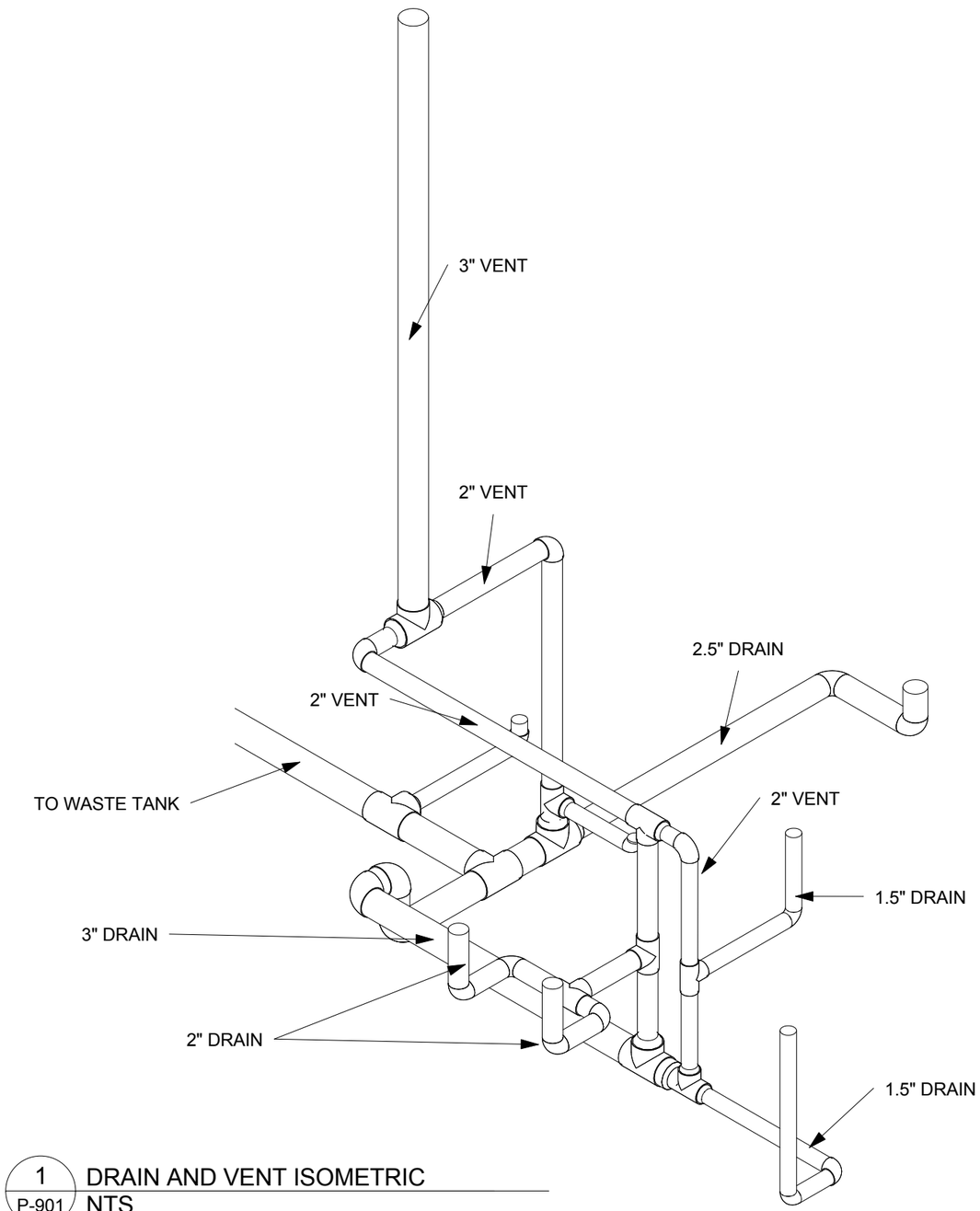
DRAWN BY JNG
CHECKED BY KPM

DRAWING STATUS
CD SET

NATURAL FUSION

P-602 PLUMBING SCHEDULES

PENNSTATE
1855



1 / P-901 DRAIN AND VENT ISOMETRIC
NTS

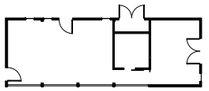
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

DRAWN BY	CHECKED BY
JNG	KPM

DRAWING STATUS
CD SET

NATURAL FUSION

P-901 ISOMETRIC

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855

POWERED EQUIPMENT TAG

ERV
1

EQUIPMENT DESIGNATION

EQUIPMENT NUMBER

UN-POWERED EQUIPMENT TAG

FTR
1

EQUIPMENT DESIGNATION

EQUIPMENT NUMBER

EQUIPMENT ABBREVIATIONS:

C/HW	COLD AND HOT WATER CONNECTION
DSI	DUCT-LESS SPLIT INDOOR UNIT
DSO	DUCT-LESS SPLIT OUTDOOR UNIT
DW	DISHWASHER
EA	EXHAUST AIR
ERV	ENERGY RECOVERY VENTILATOR
FD	FLOOR DRAIN
FPC	FLAT PLATE COLLECTOR
FTR	FINNED TUBE RADIATOR
	TRENCH HEATER
HW	HOT WATER TANK
	HOT WATER CONNECTION
LAV	LAVATORY
MF	MANIFOLD
OTP	OVER TEMP/PRESSURE DEVICE
RH	RANGE HOOD
S	KITCHEN SINK
SD	SUPPLY DIFFUSER
SH	SHOWER
ST	SUPPLY TANK
TWH	TANKLESS WATER HEATER
W/D	CLOTHES WASHER DRYER
WC	WATER CLOSET
WT	WASTE TANK

OTHER ABBREVIATIONS:

D	DIAMETER
DHW	DOMESTIC HOT WATER
EA	EXHAUST AIR
EER	ENERGY EFFICIENCY RATIO
H	HEIGHT
L	LENGTH
MECH	MECHANICAL
MFTR	MANUFACTURER
OA	OUTDOOR AIR
RM	ROOM
SA	SUPPLY AIR
SEER	SEASONAL ENERGY EFFICIENCY RATIO
SUPP	SUPPLEMENTAL
W	WIDTH

SYMBOLS:

	CHECK VALVE
T	THERMOSTAT
	VALVE
	PUMP
D	DRAIN
C/HW	PLUMBING SUPPLY

DESIGN TEAM
NATURAL FUSION

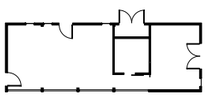
CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

NATURAL FUSION

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/8" = 1'-0"

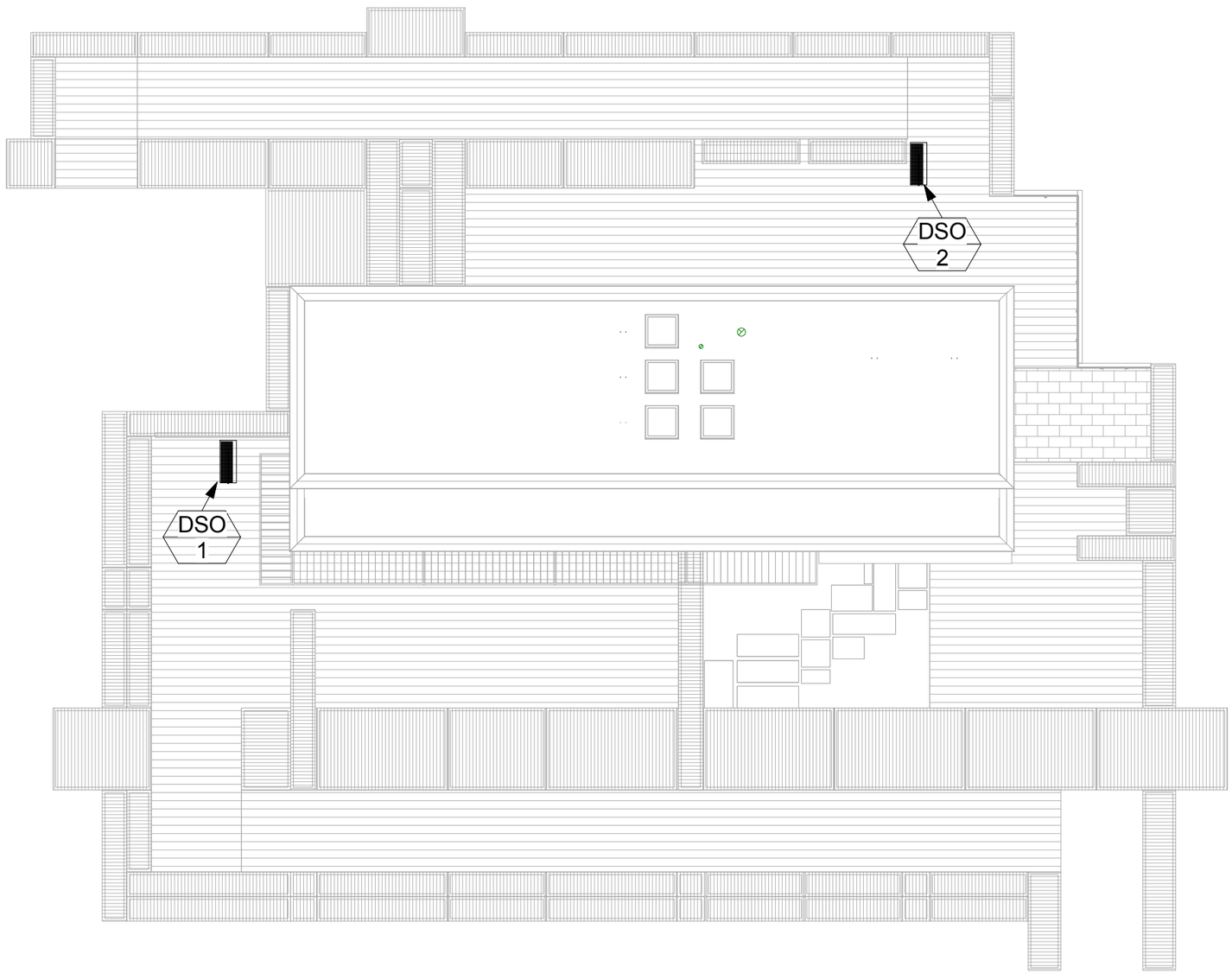
JNG DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

M-001 SYMBOL LEGEND

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE
1855



1 / M-101 MECHANICAL SITE PLAN
1/8" = 1'-0"

0' 2' 4' 8' 16' 24'

N

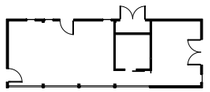
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/8" = 1'-0"

DRAWN BY JNG
CHECKED BY KPM

DRAWING STATUS
CD SET

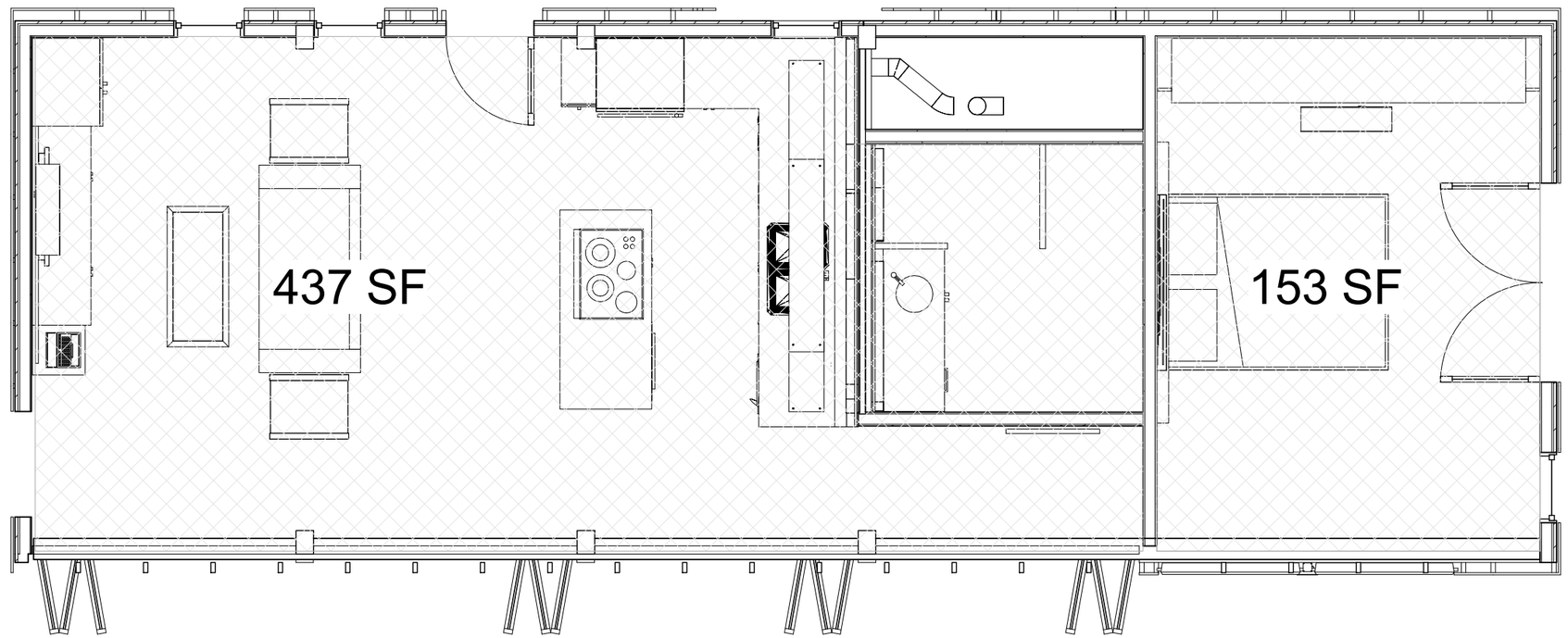
NATURAL FUSION

MECHANICAL SITE PLAN

M-101

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE



1 / M-102 CONDITIONED AREA
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

GENERAL NOTES:
1. SQUARE FOOTAGES ARE LOCATED IN PLAN.

TOTAL CONDITIONED AREA: 590 SF

N

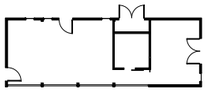
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

JNG — DRAWN BY
KPM — CHECKED BY

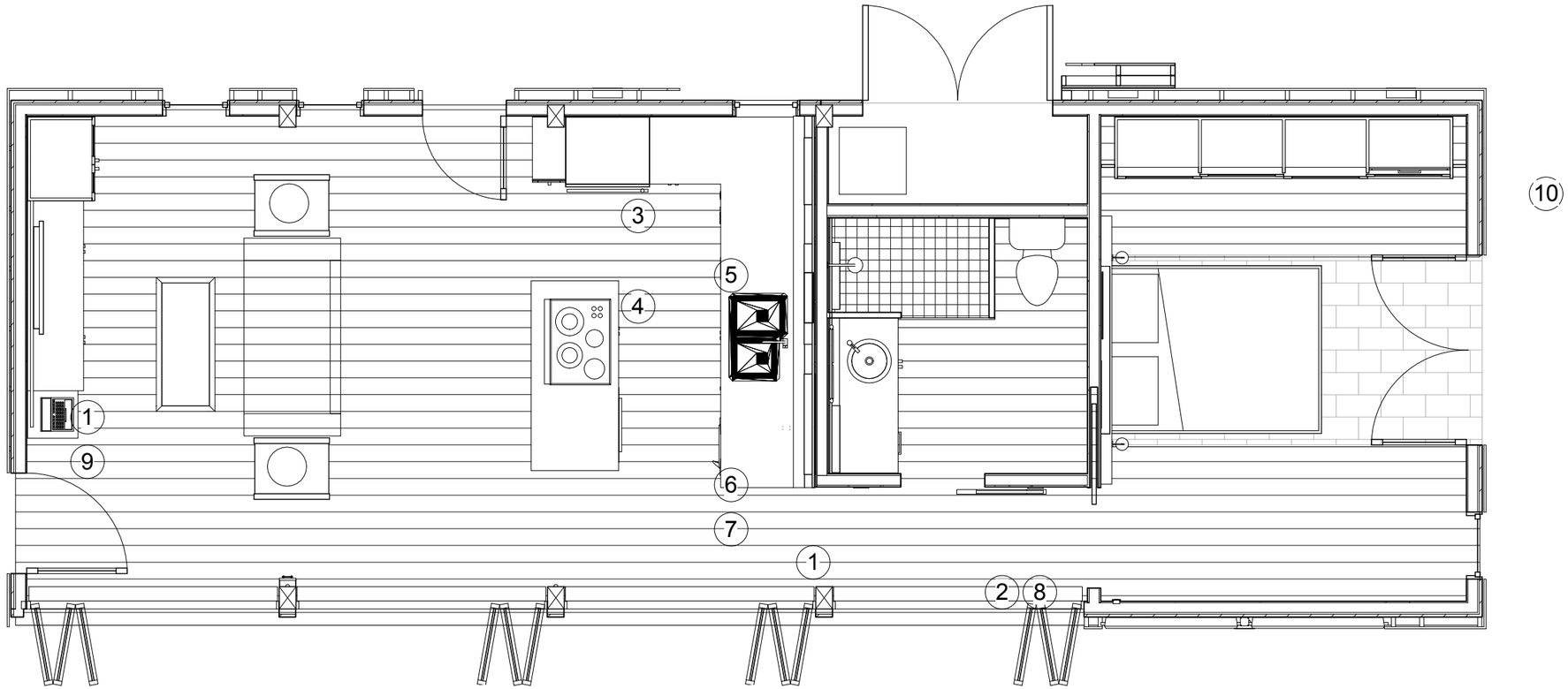
DRAWING STATUS
CD SET

NATURAL FUSION

M-102 CONDITIONED AREA

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE
1855



1 / M-103 SENSOR PLAN
1/4" = 1'-0"

GENERAL NOTES:
1. SENSORS TO BE MOUNTED 46" FROM FLOOR, UNLESS NOTED OTHERWISE.
2. TEMPERATURE AND RH SENSOR TO BE LOCATED IN THE HALLWAY IN FRONT OF THE BATHROOM.
3. ILLUMINANCE METER TO BE PLACED ON THE SURFACE OF THE DESK.
4. CONDUIT WILL BE PROVIDED PENETRATING THE FLOOR TO CONNECT TO NREL DATALOGGERS ON THE NATIONAL MALL.

KEYED NOTES:
1. FLOOR PENETRATION FOR SENSOR WIRE CONNECTIONS.
2. TEMPERATURE INSIDE HOME.
3. REFRIGERATOR SENSOR.
4. FREEZER TEMPERATURE
5. DISHWASHER TEMPERATURE SENSOR.
6. WASHING MACHINE SENSOR.
7. DRYER SENSOR.
8. RELATIVE HUMIDITY SENSOR.
9. ILLUMINANCE METER ON DESK
10. DATALOGGER

N

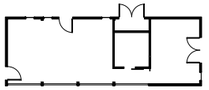
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

JNG DRAWN BY
KPM CHECKED BY

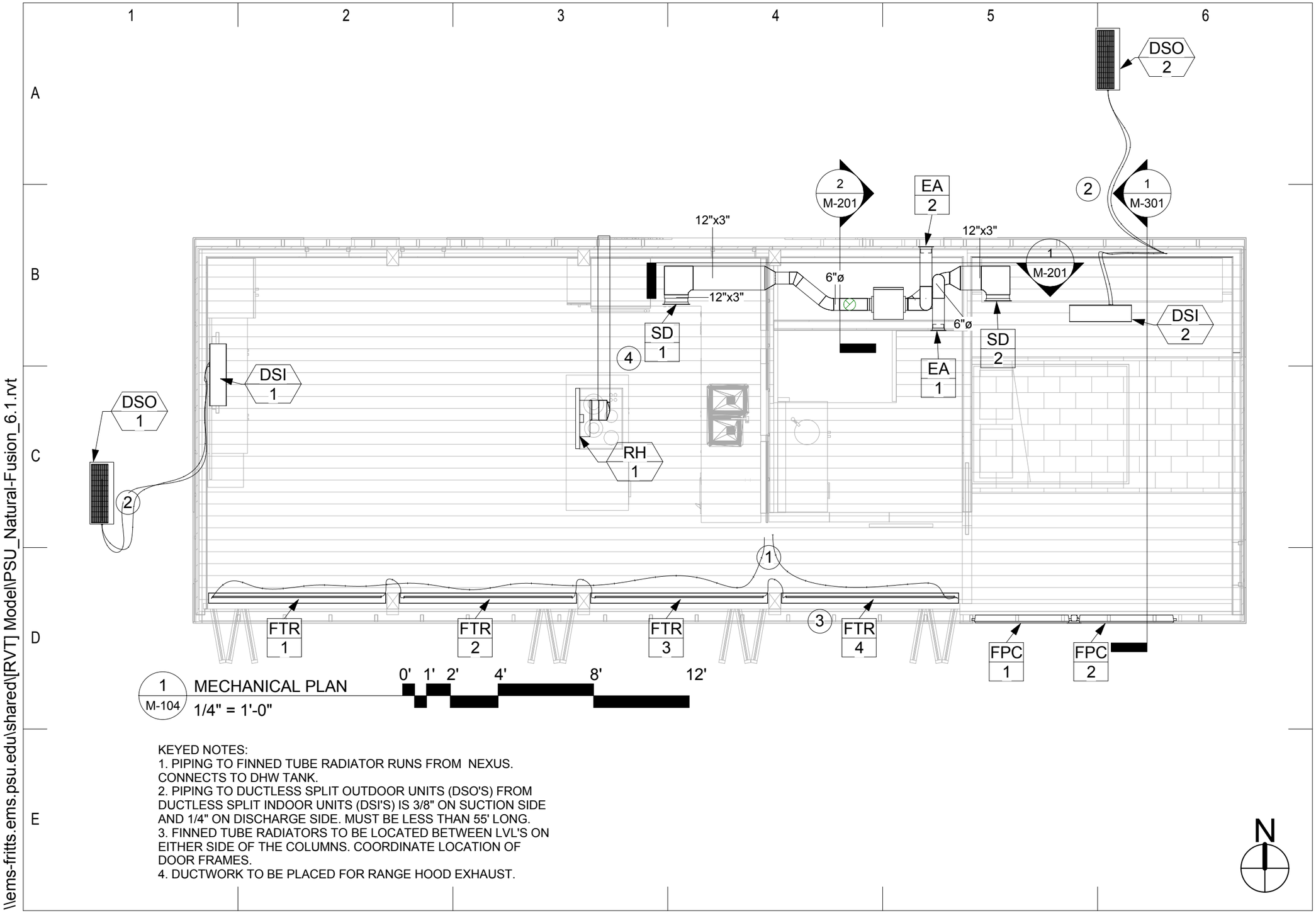
DRAWING STATUS
CD SET

NATURAL FUSION

M-103 SENSOR LOCATION PLAN

PENNSTATE

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt



1 / M-104 MECHANICAL PLAN

1/4" = 1'-0"

KEYED NOTES:
1. PIPING TO FINNED TUBE RADIATOR RUNS FROM NEXUS. CONNECTS TO DHW TANK.
2. PIPING TO DUCTLESS SPLIT OUTDOOR UNITS (DSO'S) FROM DUCTLESS SPLIT INDOOR UNITS (DSI'S) IS 3/8" ON SUCTION SIDE AND 1/4" ON DISCHARGE SIDE. MUST BE LESS THAN 55' LONG.
3. FINNED TUBE RADIATORS TO BE LOCATED BETWEEN LVL'S ON EITHER SIDE OF THE COLUMNS. COORDINATE LOCATION OF DOOR FRAMES.
4. DUCTWORK TO BE PLACED FOR RANGE HOOD EXHAUST.

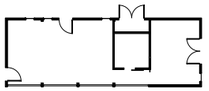
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

JNG DRAWN BY
KPM CHECKED BY

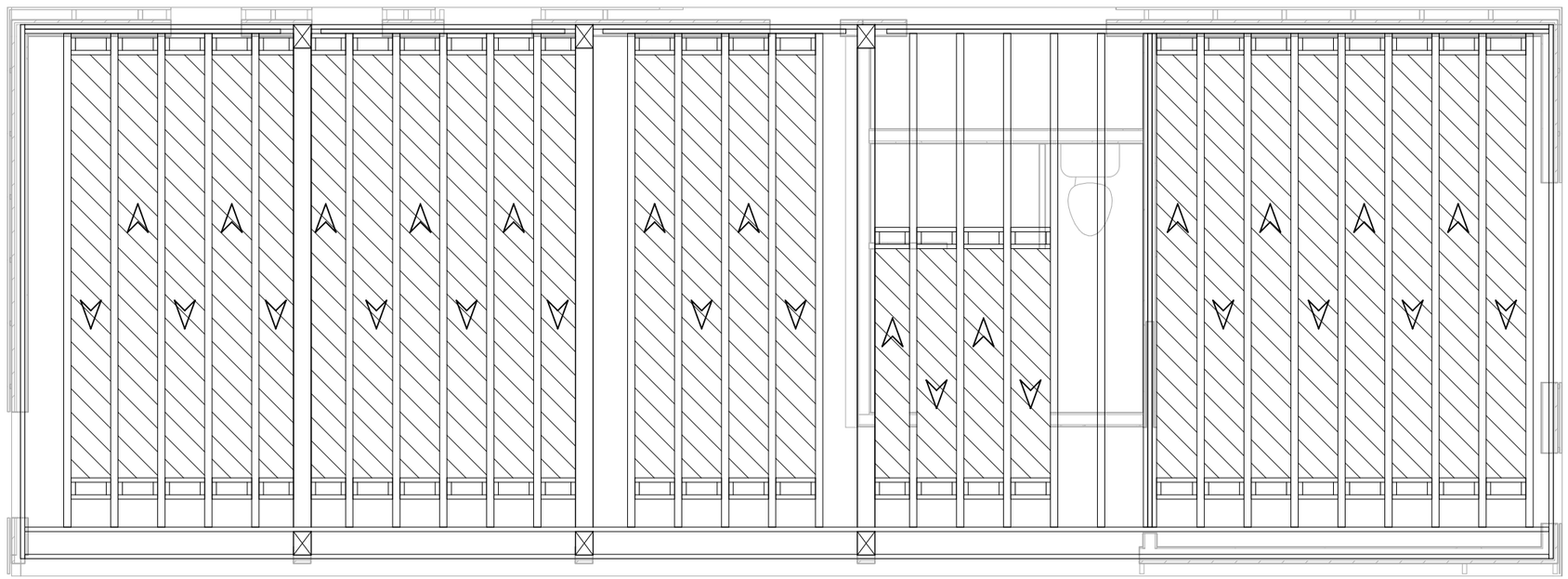
DRAWING STATUS
CD SET

NATURAL FUSION

M-104 MECHANICAL PLAN

PENNSTATE

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt



1 M-105 BLADDER LAYOUT PLAN
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

GENERAL NOTES:
1. SPACING OF THE STRUCTURE IS 16" O.C.
2. ALL BLADDERS SHALL BE LINKED FOLLOWING DETAILS SHOWN ON M-500
3. WATER IN BLADDERS WILL BE SEALED FOR THE COMPETITION ONCE THE BLADDERS HAVE BEEN FILLED.
4. BLADDERS TO BE INSTALLED FROM BELOW THE HOUSE BEFORE SPF INSULATION IS APPLIED.

Bladder Type	Quantity	Length (ft)	Width (in)	Depth (in)	Volume of Water (cf)	TPU (sf)
A	19	12	13.5	2	2.3	426
B	3	12	11.75	2	2.0	377
C	3	6.5	13.5	2	1.2	256
D	1	6.5	11.75	2	1.1	226
					53.3	10217

N

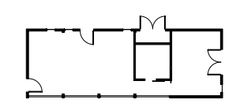
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

JNG DRAWN BY
KPM CHECKED BY

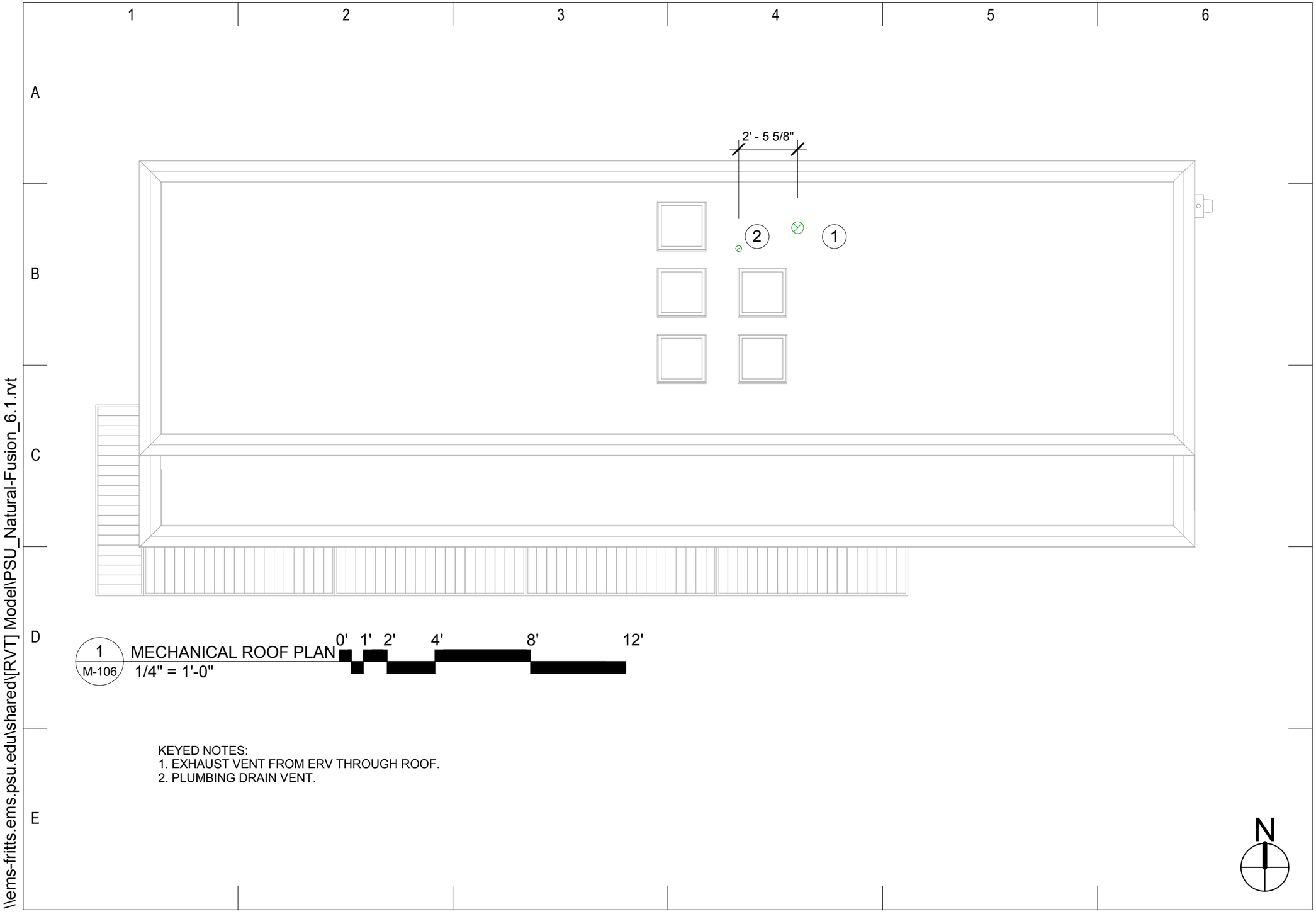
DRAWING STATUS
CD SET

NATURAL FUSION

M-105 BLADDER AREA PLAN

PENNSTATE

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt



1 / M-106 MECHANICAL ROOF PLAN
1/4" = 1'-0"

KEYED NOTES:
1. EXHAUST VENT FROM ERV THROUGH ROOF.
2. PLUMBING DRAIN VENT.

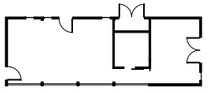
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

DRAWN BY: JNG
CHECKED BY: KPM

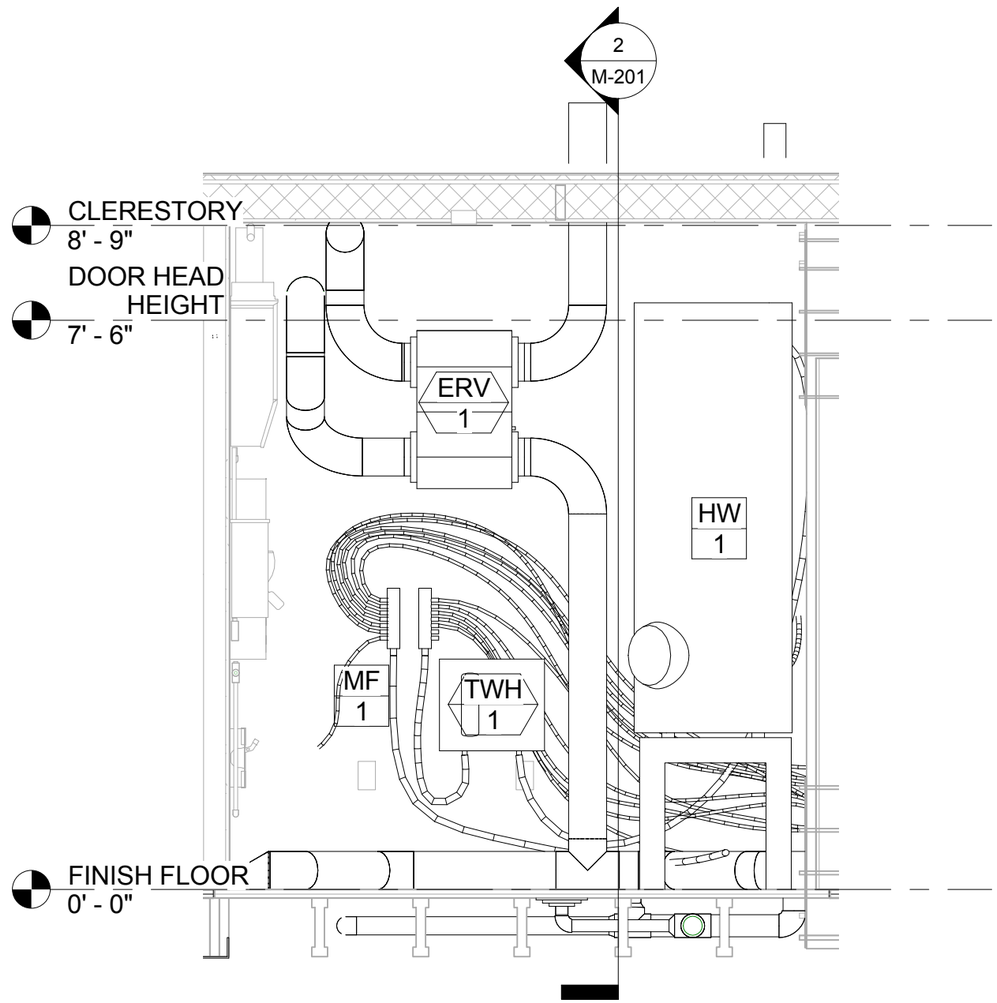
DRAWING STATUS
CD SET

NATURAL FUSION

M-106 ROOF PLAN

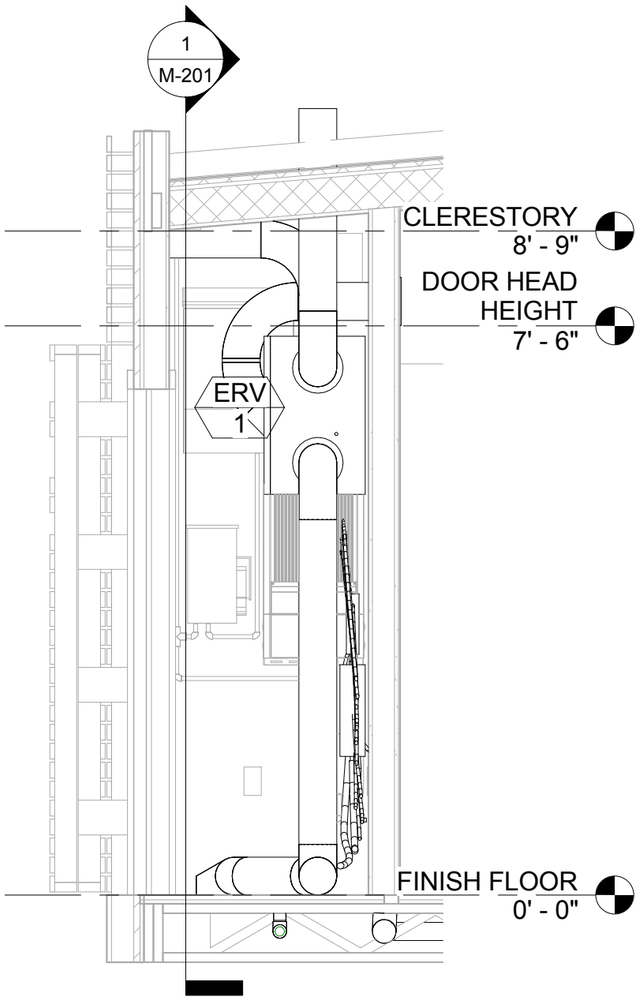
\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE
1855



1 M-201 NEXUS NORTH ELEV.
1/2" = 1'-0"

0' 1' 2' 4' 6'



2 M-201 NEXUS EAST ELEV.
1/2" = 1'-0"

0' 1' 2' 4' 6'

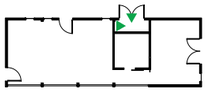
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

DRAWN BY	CHECKED BY
JNG	KPM

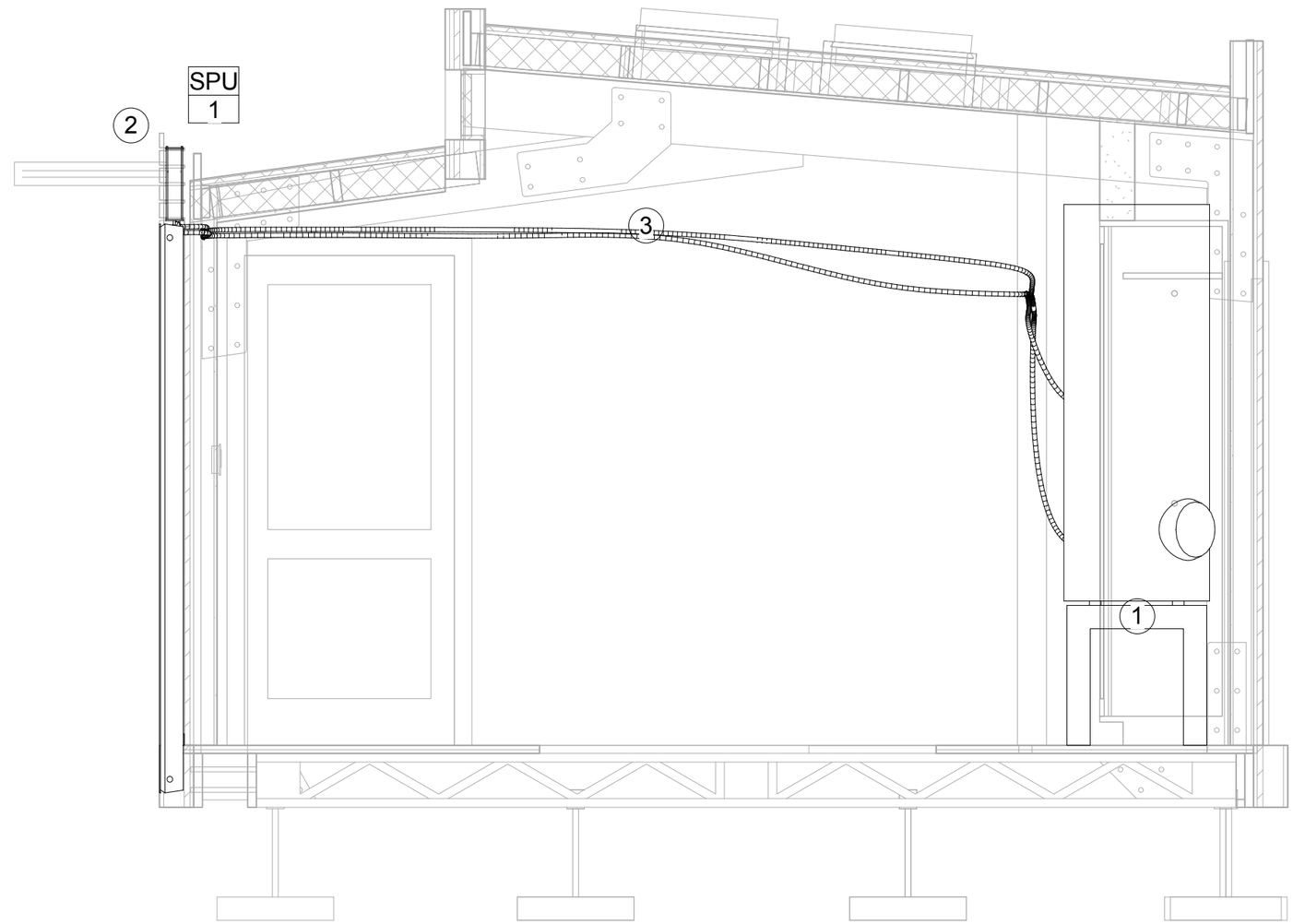
DRAWING STATUS
CD SET

NATURAL FUSION

M-201 NEXUS ELEVATIONS

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE



1 M-301 SOLAR LOOP SECTION
1/2" = 1'-0"

0' 1' 2' 4' 6'

KEYED NOTES:
1. DHW TANK IS ELEVATED TO ALLOW DUCTWORK INTO THE KITCHEN.
2. KEEP ALL PIPING BELOW THE SUNNOVATIONS PUMP UNIT WITH THE PUMP UNIT BEING AT THE HIGHEST POINT IN THE SYSTEM.
3. THE PEX LOOP SHALL BE PRESSURE TESTED TO 100 PSI FOR 15 MINUTES TO DETERMINE THAT CONNECTIONS ARE PROPERLY MADE. PEX LINES SHALL BE SLANTED TOWARD THE DHW TANK TO MINIMIZE RISK OF VAPOR LOCK.

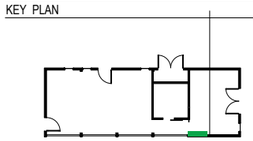
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

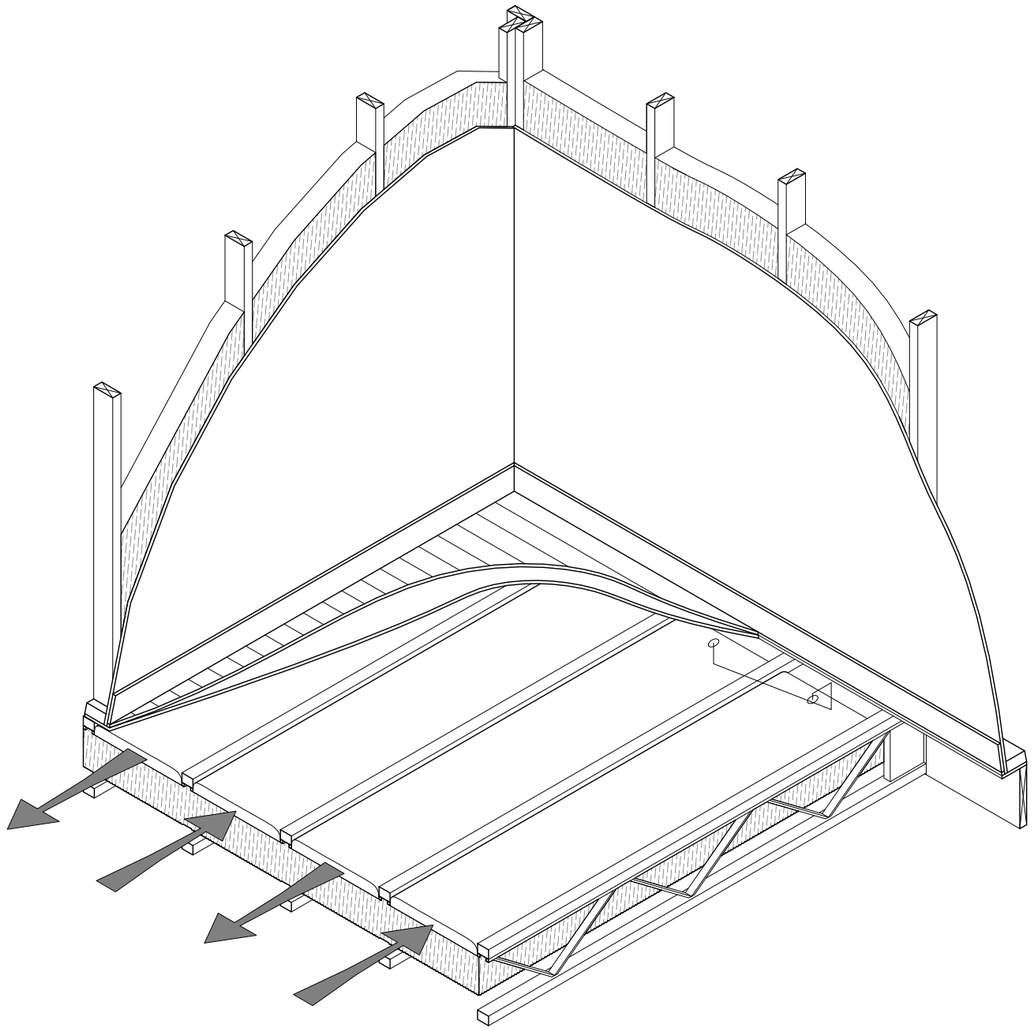
JNG DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION
SOLAR LOOP SECTION
M-301

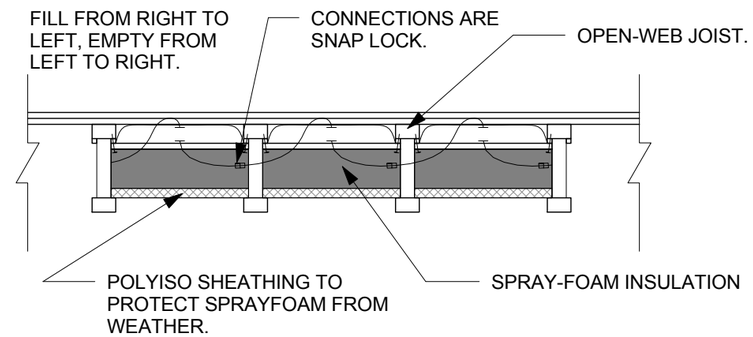
\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE
1855

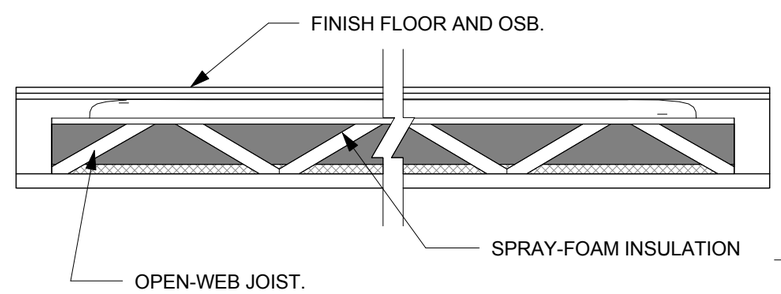


1 M-501 BLADDER ISOMETRIC
NTS

GENERAL NOTES:
1. BLADDERS SHALL BE FILLED SUCH THAT THE FLOW IN EACH INDIVIDUAL BLADDER IS FROM BOTTOM TO TOP.
2. EMPTYING OF THE BLADDER SYSTEM WILL TAKE PLACE IN THE OPPOSITE DIRECTION AND WILL BE ACHIEVED USING PRESSURIZED AIR.



2 M-501 BLADDER CROSS-SECTION
NTS



3 M-501 BLADDER ELEVATION
NTS

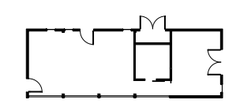
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
As indicated

JNG — DRAWN BY
KPM — CHECKED BY

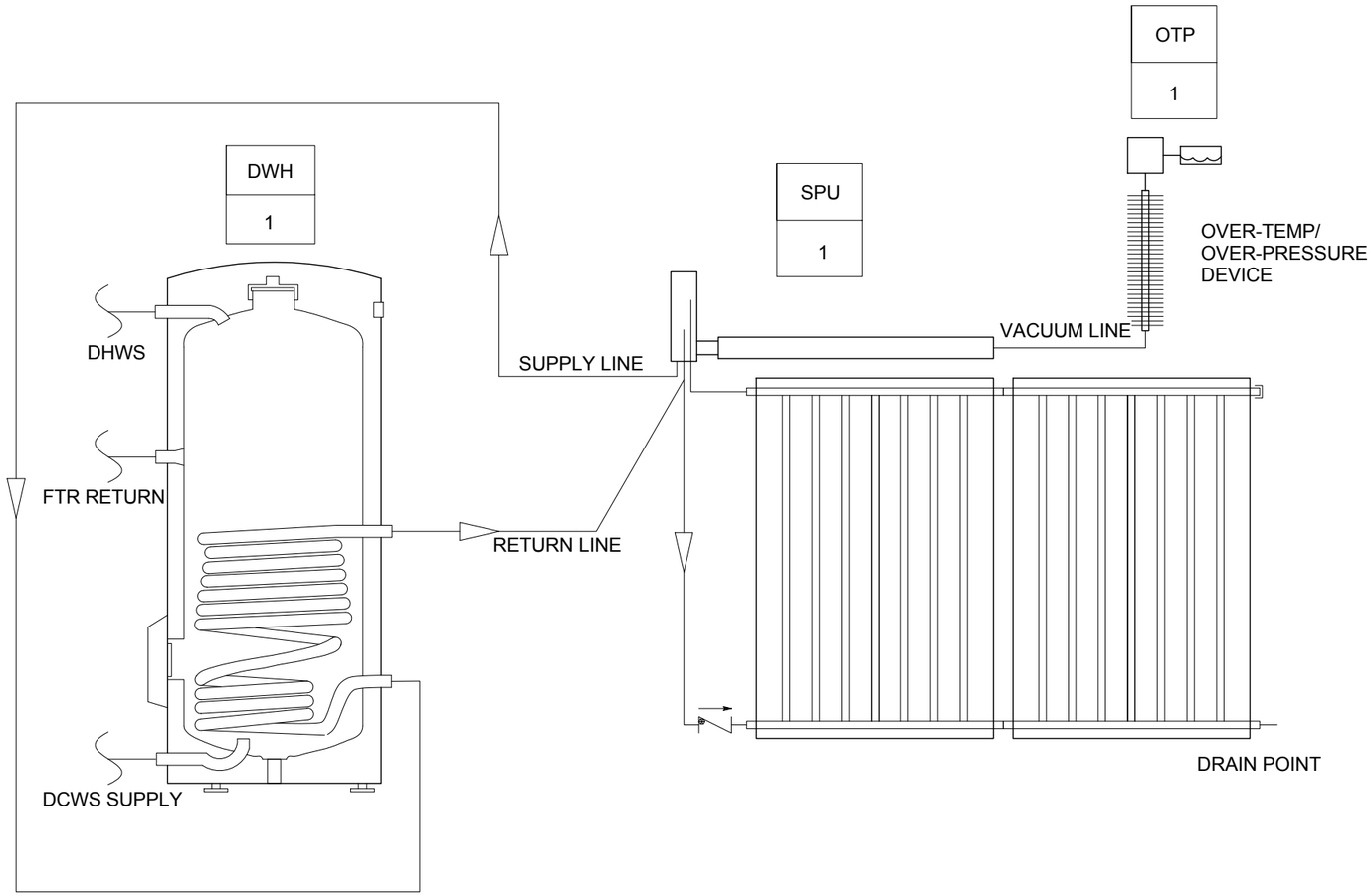
DRAWING STATUS
CD SET

NATURAL FUSION

M-501 BLADDER DETAIL

PENNSTATE 1855

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt



1 / M-601 SOLAR LOOP SCHEMATIC
NTS

KEYED NOTES:
1. FLUID IN SOLAR THERMAL LOOP IS A MIXTURE OF WATER AND ETHANOL.
2. SOLAR LOOP OPERATES AT LESS THAN ATMOSPHERIC PRESSURE.
3. TANKLESS WATER HEATER TO BE USED TO MAINTAIN SUPPLY TEMPERATURE AT 110 DEGREES F.

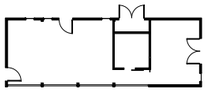
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
3/16" = 1'-0"

JNG DRAWN BY
KPM CHECKED BY

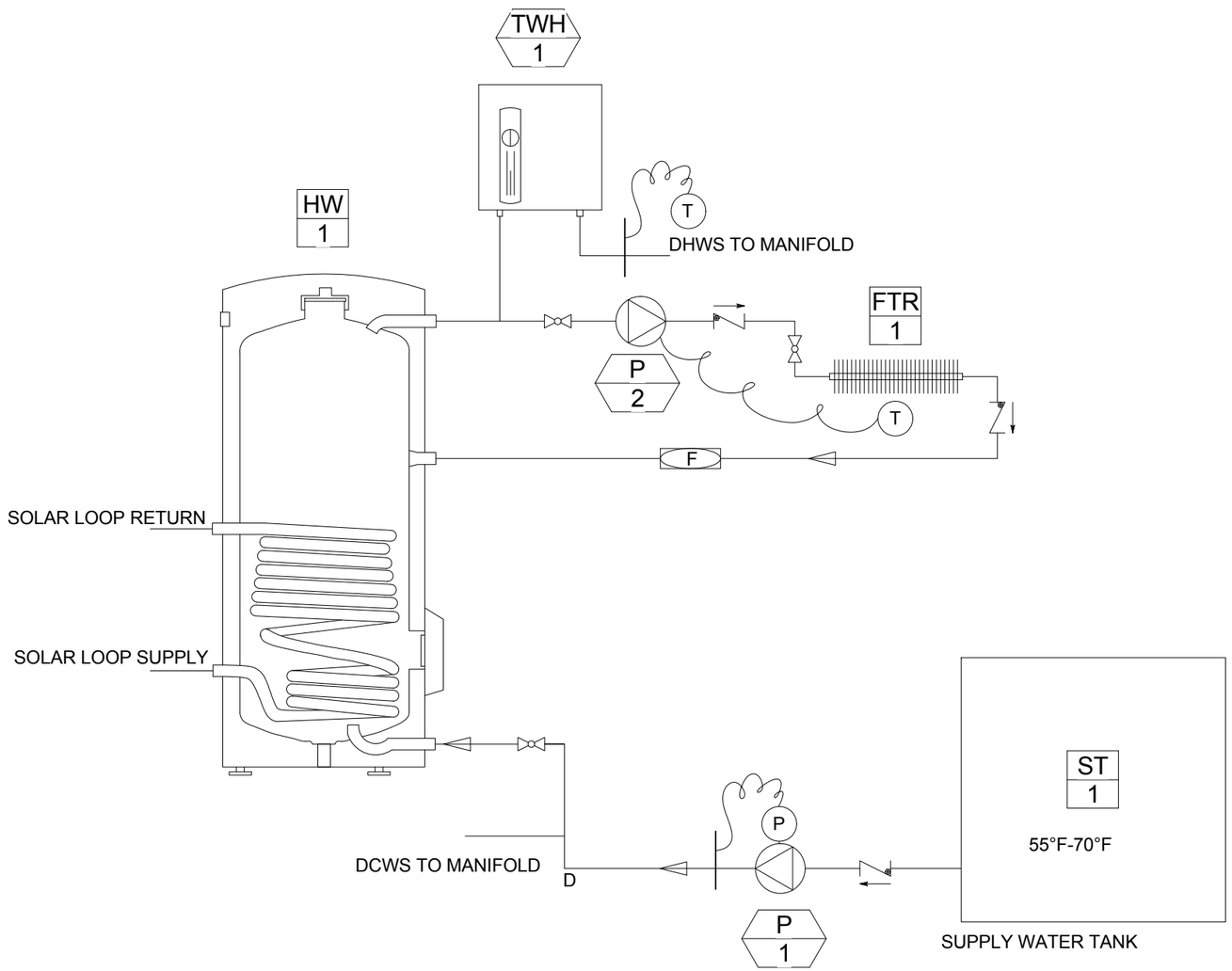
DRAWING STATUS
CD SET

NATURAL FUSION

M-601 SOLAR LOOP SCHEMATIC

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE
1855



1 / M-602 DHW SCHEMATIC
NTS

DESIGN TEAM
NATURAL FUSION

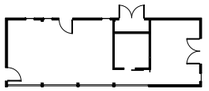
CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

NATURAL FUSION

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
3/16" = 1'-0"

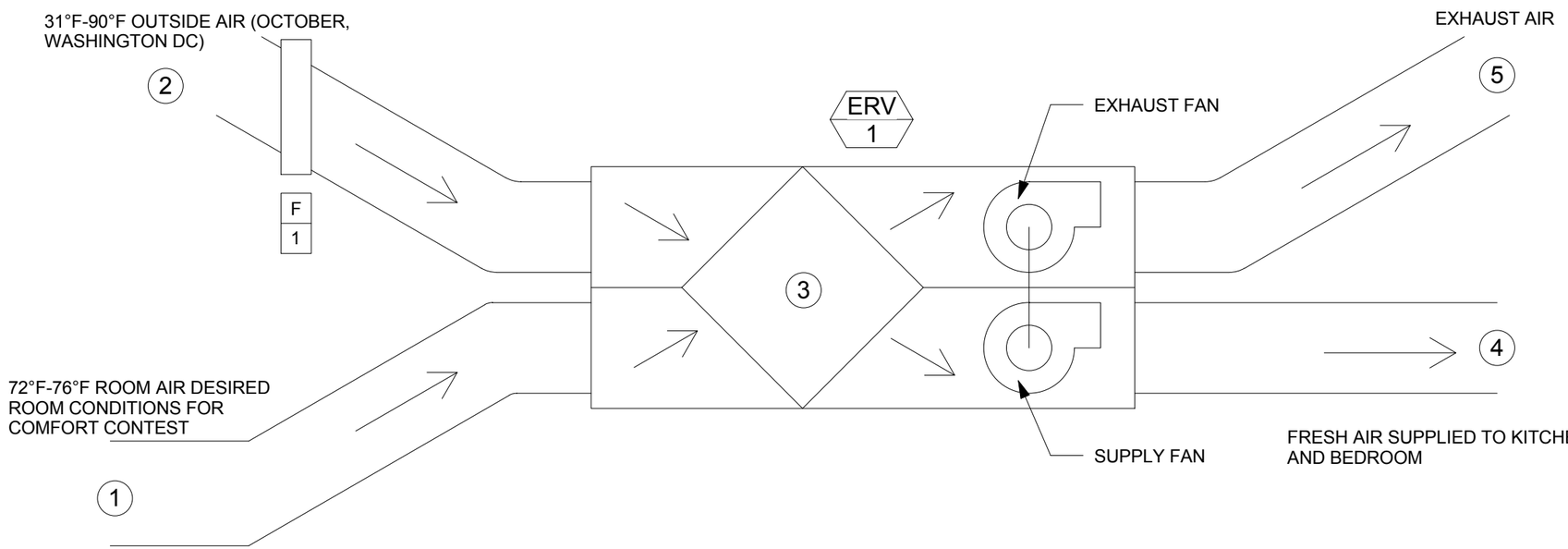
JNG DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

M-602 DHW SCHEMATIC

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE
1855



GENERAL NOTES:
1. EXHAUST AND SUPPLY AIRSTREAMS DO NOT MIX.

KEYED NOTES:
1. AIR IS EXHAUSTED FROM THE BATHROOM ABOVE THE TOILET.
2. FRESH AIR IS BROUGHT IN FROM THE OUTSIDE OF THE HOME.
3. HEAT TRANSFER OCCURS IN PLATE EXCHANGER CONFIGURATION. PLATE MEDIUM ALLOWS BOTH LATENT AND SENSIBLE HEAT TRANSFER.
4. FRESH AIR ENTERS THE KITCHEN AND THE BEDROOM.
5. AIR IS RELEASED TO EXTERIOR OF HOME THROUGH VENT IN ROOF.

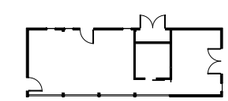
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

DRAWN BY	CHECKED BY
JNG	KPM

DRAWING STATUS
CD SET

NATURAL FUSION

M-603 AIRSIDE SCHEMATIC

PENNSTATE

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

1 | 2 | 3 | 4 | 5 | 6

A

DUCTLESS SPLIT INDOOR UNIT SCHEDULE

DESIGNATION	MFTR'S NAME & MODEL NO.	LOCATION	SERVICE	RL	CLG & HTG CAP NOM [BTUH]	CLG & HTG CAP MIN [BTUH]	CLG & HTG CAP MAX [BTUH]	PERFORMANCE RATINGS SEER [BTUH/W]	PERFORMANCE RATINGS EER	PERFORMANCE RATINGS HSPF [BTUH/W]	CONNECTION INLET [IN]	CONNECTION OUTLET [IN]	ELECTRICAL FS [AMPS]	ELECTRICAL VAC/PH/HZ	DIMENSIONS L × H × D [IN]	WGT [LBS]	REMARKS
DSI-1 DSI-2	FUJITSU HALYCON IAU9RL	LIVING RM & BEDROOM	AIR HTG & CLG	410A	9000 (CLG) 12000 (HTG)	3600 (CLG) 3000 (HTG)	12000 (CLG) 22000 (HTG)	26	17.3 (CLG) 15 (HTG)	12	1/4 FLARE	3/8 FLARE	15	120/1/60	31¼ × 11½ × 9½	24	1

DUCTLESS SPLIT OUTDOOR UNIT SCHEDULE

DESIGNATION	MFTR'S NAME & MODEL NO.	LOCATION	SERVICE	CONNECTION SUCT [IN]	CONNECTION DISCH [IN]	CONNECTION MAX DIST [FT]	ELECTRICAL FAN SPEED [RPM]	ELECTRICAL NOISE LEVEL [DBA]	ELECTRICAL MAX CURRENT	ELECTRICAL FS [AMPS]	ELECTRICAL VAC/PH/HZ	DIMENSIONS L × H × D [IN]	WGT [LBS]	REMARKS
DSO-1 DSO-2	FUJITSU HALYCON OAU9RL	SUB DECK	AIR HTG & CLG	3/8 FLARE	1/4 FLARE	49 (VERT) 66 (COMB)	810 (CLG) 780 (HTG)	MAX 49	2.6 (CLG) 3.7 (HTG)	15	230/1/60	33¾ × 24½ × 11¾	88	1

B

EXHAUST FAN SCHEDULE

DESIGNATION	MFTR'S NAME & MODEL NO.	LOCATION	SERVICE	MAX FLOW [CFM]	LOUDNESS [SONES]	DIMENSIONS L × W × H [IN]	MOTOR VAC/PH/HZ	MAX CURRENT [A]	WGT [LBS]	REMARKS
EF-1	BROAN QTXE079	MECH RM	MECH RM	80	0.3	10.5" × 11.5" × 7.5"	115/1/60	0.4	12	

SOLAR THERMAL FLAT PLATE COLLECTOR SCHEDULE

DESIGNATION	MFTR'S NAME & MODEL NO.	LOCATION	SERVICE	MAX PRESS [PSIG]	CAP [GAL]	ABSORBER MATERIAL	DIMENSIONS L × W × D [IN]	WGT [LBS]	REMARKS
FPC-1 FPC-2	SOLARHOT PLATINUM S-SC-126P32	SOUTH FAÇADE	DHW & FTR	80	1.1	SUNSELECT TINOX ON COPPER FINS	96 × 47.2 × 3.7	121 (DRY) 130 (WET)	1,2

1. PRESSURE TESTED TO 232 PSI
2. SRCC CERTIFIED AND RATED IN A THROUGH E CATEGORIES

C

SOLAR THERMAL FLAT PLATE COLLECTOR SCHEDULE

DESIGNATION	MFTR'S NAME & MODEL NO.	LOCATION	SERVICE	MAX PRESS [PSIG]	CAP [GAL]	ABSORBER MATERIAL	DIMENSIONS L × W × D [IN]	WGT [LBS]	REMARKS
FPC-1 FPC-2	SOLARHOT PLATINUM S-SC-126P32	SOUTH FAÇADE	DHW & FTR	80	1.1	SUNSELECT TINOX ON COPPER FINS	96 × 47.2 × 3.7	121 (DRY) 130 (WET)	1,2

1. PRESSURE TESTED TO 232 PSI
2. SRCC CERTIFIED AND RATED IN A THROUGH E CATEGORIES

D

SOLAR THERMAL ARRAY PASSIVE PUMP SCHEDULE

DESIGNATION	MFTR'S NAME & MODEL NO.	LOCATION	SERVICE	TYPE	FLUID	MAX OPERATING PRESS [PSIG]	CONNECTIONS SUCT [IN]	CONNECTIONS DISCH [IN]	REMARKS
SPU-1	SUNNOVATIONS SOLARSAVE	SOUTH FAÇADE	SOLAR THERMAL ARRAY	PASSIVE	WATER & ETHANOL	0	3/4 SWEAT	3/4 SWEAT	1,2,3

1. OVER-TEMPERATURE & OVER-PRESSURE DEVICE INCORPORATED INTO PUMP
2. SYSTEM VENTS TO ATMOSPHERE IF PRESSURE INCREASES ABOVE ATMOSPHERIC
3. LOCATE PUMP AT HIGHEST POINT IN SOLAR THERMAL ARRAY LOOP

E

TANKLESS WATER HEATER SCHEDULE

DESIGNATION	MFTR'S NAME & MODEL NO.	LOCATION	SERVICE	FLOW [GPM] MAX	FLOW [GPM] MIN TO START	HEATING ELEMENTS NO.	HEATING ELEMENTS VAC/PH/HZ	HEATING ELEMENTS POWER [KW]	WIRING MATERIAL	WIRING GAGE	WIRING CB [AMPS]	CAP [GAL]	CONNECTIONS INLET [IN]	CONNECTIONS OUTLET [IN]	DIMENSIONS L × W × H [IN]	WGT [LBS]	REMARKS
TWH-1	STIEBEL ELTRON TEMPRA 20 PLUS 224198	MECH RM	DHW	4.5	0.58	2	240/1/60	MAX 19.2	COPPER	2 × 8	2 × 40	0.26	3/4 NPT	3/4 NPT	16.6 × 14.5 × 5	15.4	

SOLAR HEAT STORAGE TANK SCHEDULE

DESIGNATION	MFTR'S NAME & MODEL NO.	LOCATION	SERVICE	TYPE	CAP [GAL]	R-FACTOR	HX TYPE	HX MATERIAL	HX CAP [GAL]	HX LENGTH [FT]	HX TUBE ID [IN]	HX ΔP [PSIG]	CONNECTION DIAM [IN]	DIMENSIONS H × DIAM [IN]	WGT [LBS]	REMARKS
WH-1	RHEEM SOLARAIDE HE 81V80HE-1	MECH RM	DHW & FTR	SOLAR HX W/ ELEC BACKUP	80	R-17.3	DBL WALL, VENTED	COPPER	2.2	120	3/8	1.3 AT 1 GPM	¾ NPT	58¾ × 24½	222 (DRY) 890 (WET)	1

1. TEMPERATURE AND PRESSURE RELIEF VALVE INCLUDED

PENNSTATE

1855

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

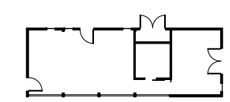
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

JNG DRAWN BY | KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

M-604 MECHANICAL SCHEDULE

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

1 2 3 4 5 6

A

Energy Recovery Ventilator Schedule

Designation	Manufacturer's Name and Model No.	Location	Service	Max. Flow [SCFM]	Sensible Efficiency	Latent Efficiency	Dimensions W × H × D [in]	Voltage/Phase/Freq [V/#/Hz]	Max. Power [W]	Weight [lbs]	Remarks
ERV-1	ConsERV H75i	Mech Room	Ventilation/Make-up Air	95	72%	61%	20.75" × 7.5" × 23"	120/1/60	90	27	

B

Over-Pressure / Over-Temperature Relief System Schedule

Designation	Manufacturer's Name and Model No.	Location	Service	Dimensions H × W [in]	Max. Pressure Setting [psig]	Remarks
OTP-1	Viessmann Solar Divicon 7134-799	Mech Room	Solar Thermal System	21" × 9"	87	

Exhaust Fan Schedule

Designation	Manufacturer's Name and Model No.	Location	Service	Max. Flow [SCFM]	Loudness [sones]	Dimensions L × W × H [in]	Voltage/Phase/Freq [V/#/Hz]	Current [A]	Weight [lbs]	Remarks
EF-1	Broan QTXE079	Mech Room	Mechanical Room	80	0.3	10.5" × 11.5" × 7.5"	115/1/60	0.4	12	
EF-2	Broan QTXE080	Mech Room	Bathroom	80	0.3	10.5" × 11.5" × 7.5"	115/1/60	0.4	12	
EF-3	Broan Allure QT230SS	Kitchen	Kitchen	220	4.5	30" × 17.5" × 6"	115/1/60	1.7	18	

C

D

E

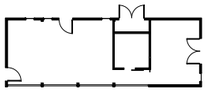
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

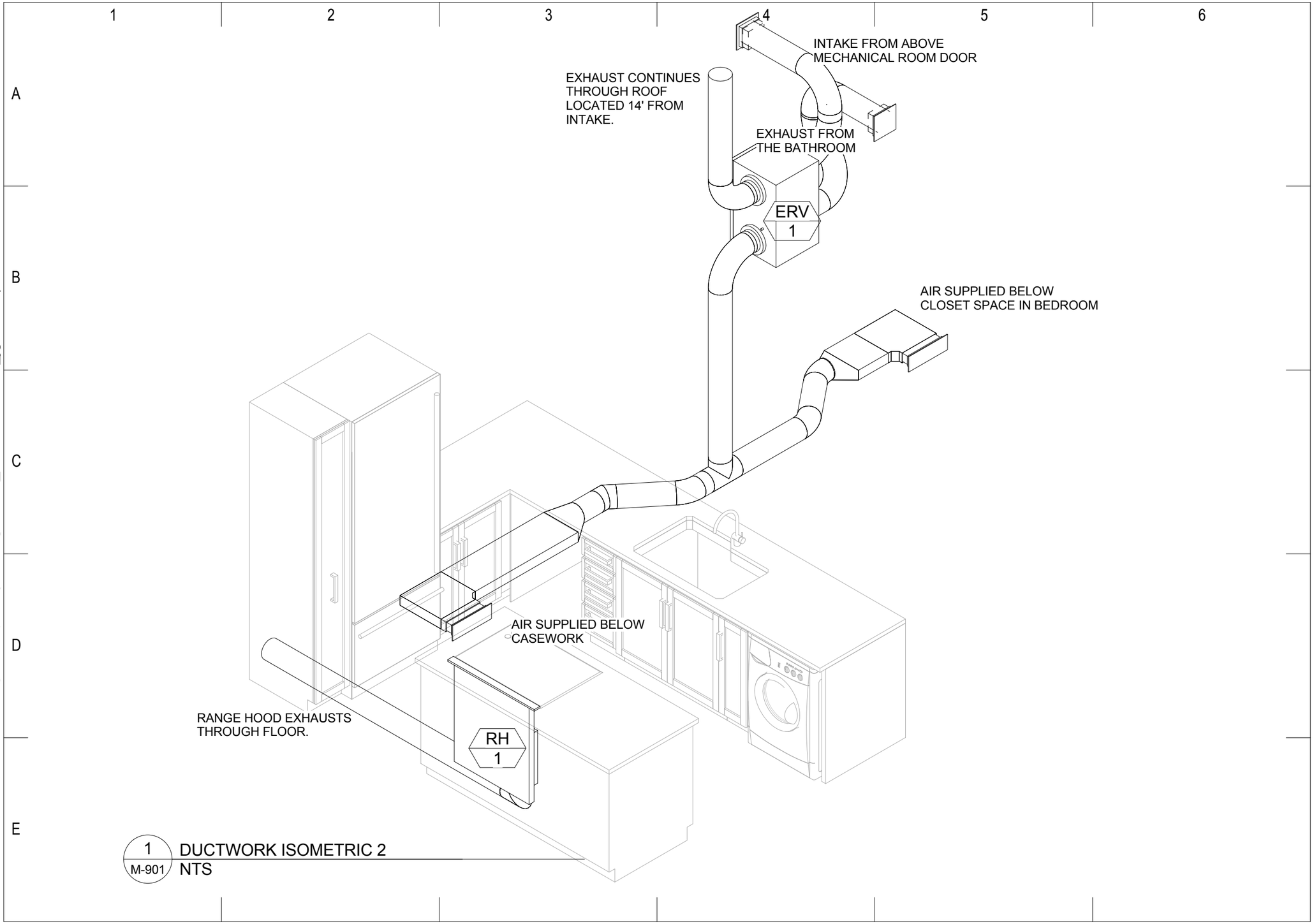
JNG DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

M-605 MECHANICAL SCHEDULE

PENNSTATE
1855



1 / M-901 DUCTWORK ISOMETRIC 2
NTS

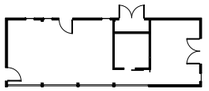
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

DRAWN BY	CHECKED BY
JNG	KPM

DRAWING STATUS
CD SET

NATURAL FUSION

M-901 DUCTWORK ISOMETRIC

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855

Electrical Legend

Symbol	Description
	DUPLEX RECEPTACLE
GFCI	GROUND FAULT PROTECTED RECEPTACLE
AFCI	ARC FAULT PROTECTED RECEPTACLE
	WALL MOUNTED RECEPTACLE
	JUNCTION BOX
MC	MASTER CONTROL LIGHTING SWITCH
S	LIGHT SWITCH
D	DIMMER SWITCH
	HOME RUN W/ CKT NO.
	PANELBOARD
	ELECTRICAL METER
	LIGHTING TRANSFORMER
SD	SMOKE DETECTOR
F	FIRE EXTINGUISHER

Lighting Legend

Symbol	Description
	F1
	F2
	F3
	F4
	F5
	F6
	F7
	F8
	F9

Lighting Legend

Symbol	Description
	F10
	F11
	F12
	F13
	F14
	F15

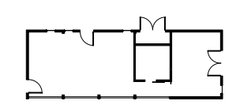
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

DRAWN BY JER
CHECKED BY KPM

DRAWING STATUS
CD SET

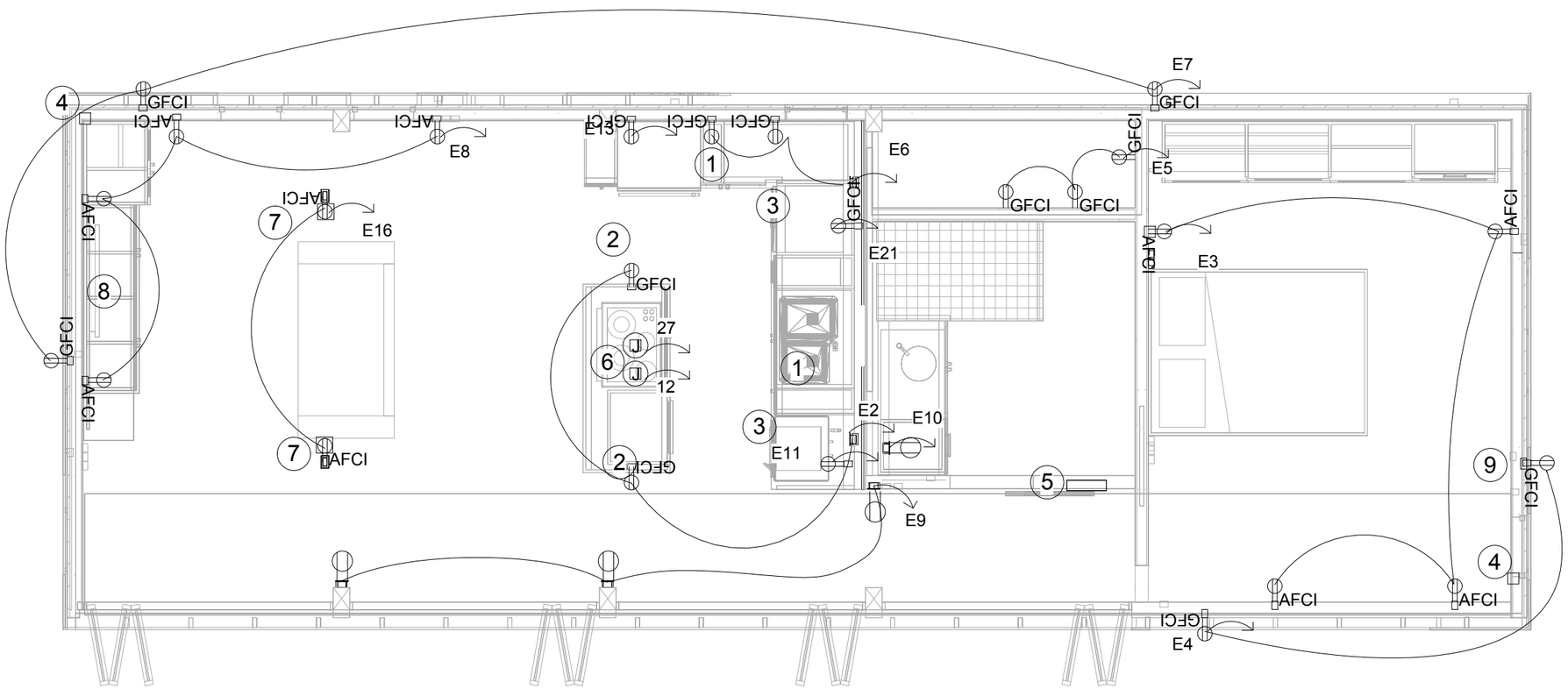
NATURAL FUSION

SYMBOL LEGEND

E-001

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE



1 POWER PLAN
E-101
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

KEYED NOTES:
1. RECEPTACLES MOUNTED AT 3' 3"
2. RECEPTACLES MOUNTED AT 2' 6"
3. RECEPTACLES MOUNTED AT 0' 10"
4. OPEN TO BOTTOM FOR EXTERIOR POWER
5. AC PANELBOARD SEE E-604 FOR SCHEDULE
6. HARD WIRED APPLIANCES
7. FLOOR MOUNTED RECEPTACLES
8. COAXIAL CABLE JACK AT 32" AFF
9. TELEPHONE JACK AT 18" AFF

GENERAL NOTES:
1. ALL RECEPTACLES SHALL BE TAMPER PROOF
2. FOR CIRCUIT WIRE SIZES SEE E-605
3. RECEPTACLES MOUNTED AT 1' 6" UNLESS NOTED OTHERWISE
4. CIRCUITS LABELED AFCI USE STANDARD OUTLETS AND USE AFCI BREAKERS.

N

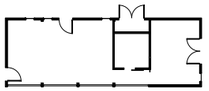
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

JER — DRAWN BY
KPM — CHECKED BY

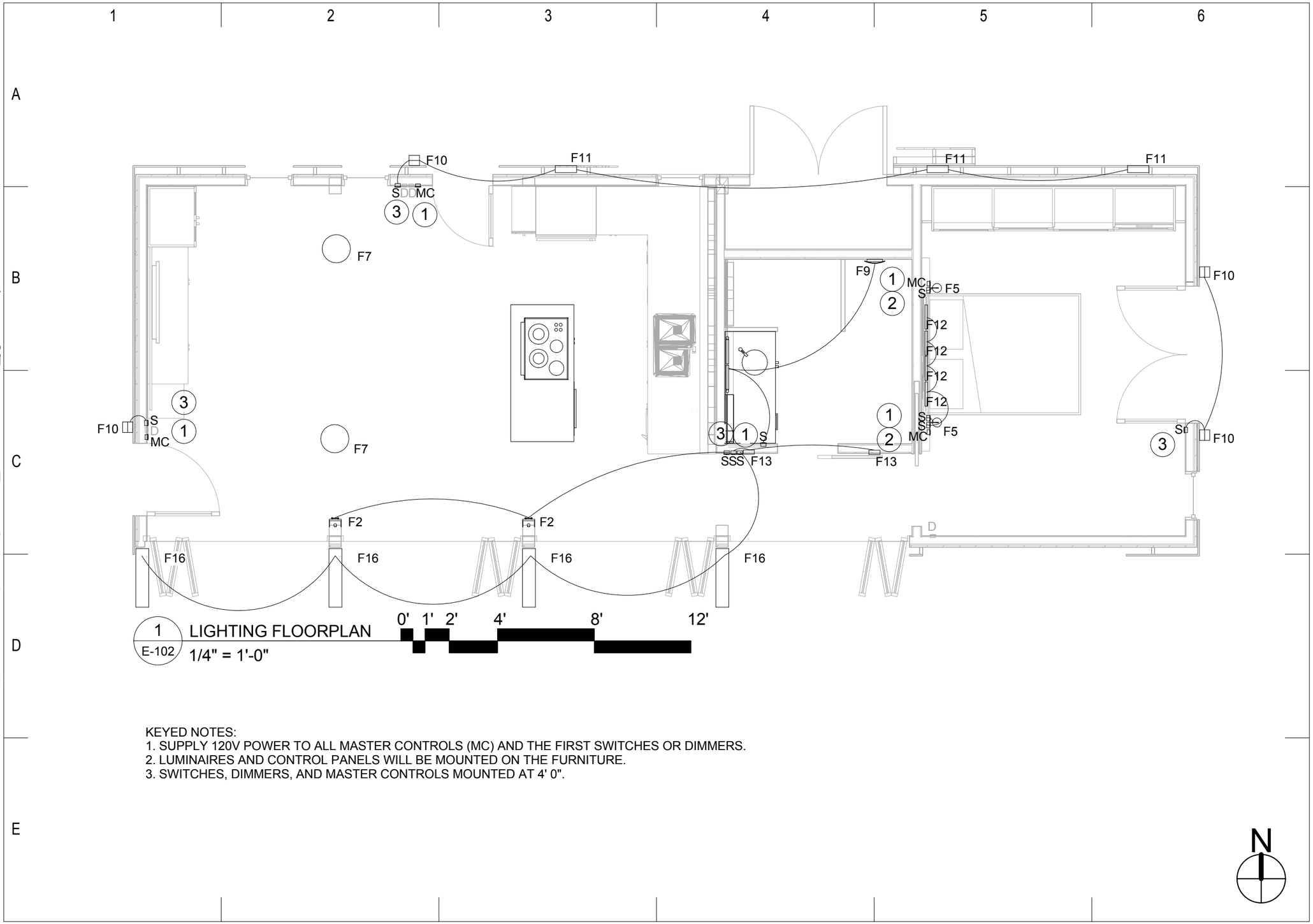
DRAWING STATUS
CD SET

NATURAL FUSION

E-101 POWER PLAN

PENNSTATE

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt



1 E-102 LIGHTING FLOORPLAN
1/4" = 1'-0"

KEYED NOTES:
1. SUPPLY 120V POWER TO ALL MASTER CONTROLS (MC) AND THE FIRST SWITCHES OR DIMMERS.
2. LUMINAIRES AND CONTROL PANELS WILL BE MOUNTED ON THE FURNITURE.
3. SWITCHES, DIMMERS, AND MASTER CONTROLS MOUNTED AT 4' 0".

DESIGN TEAM
NATURAL FUSION

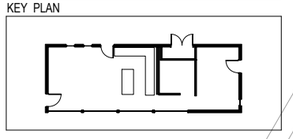
CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

NATURAL FUSION

Issue	Date	Description
	02/20/09	

KEY PLAN



SCALE
1/4" = 1'-0"

DRAWN BY
KG

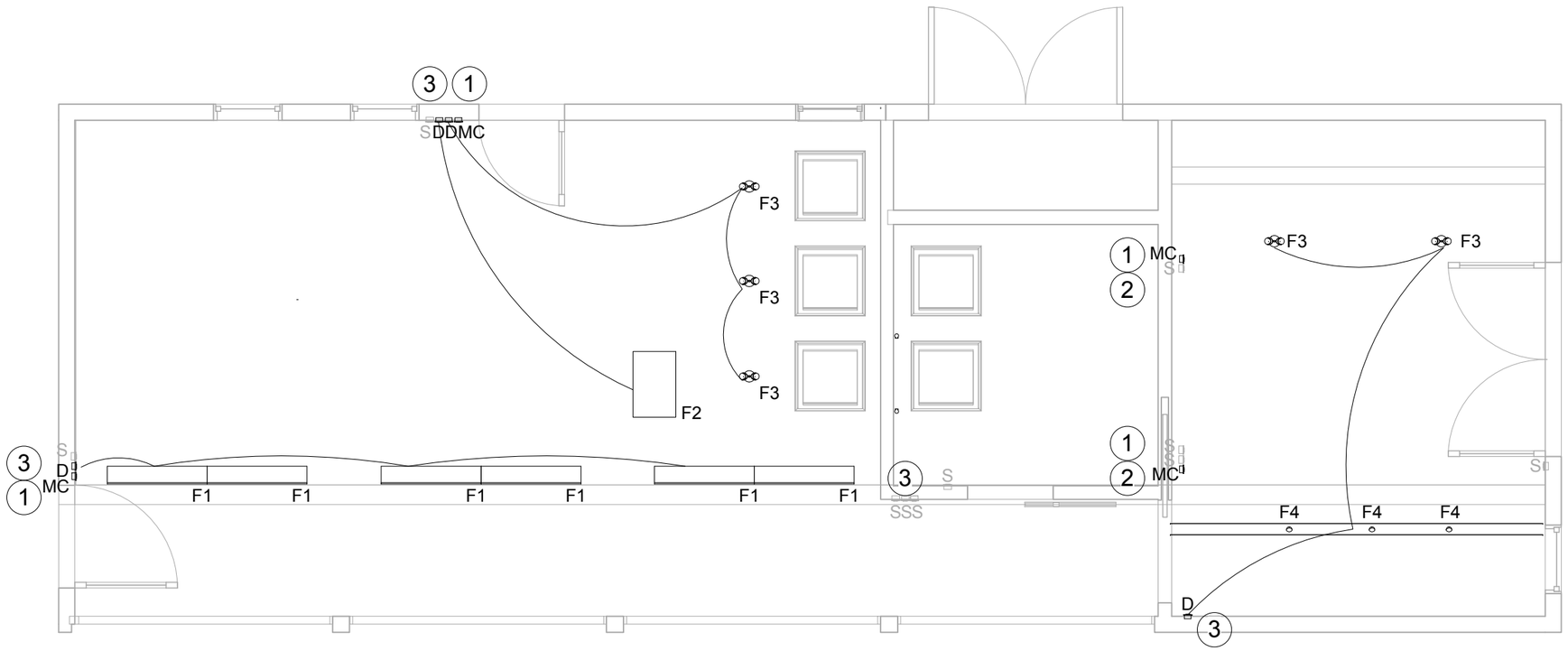
CHECKED BY
Checker

DRAWING STATUS
CD SET

E-102 LIGHTING FLOOR PLAN

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855



1 / E-103 RCP-LIGHTING

1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

KEYED NOTES:
1. SUPPLY 120V POWER TO ALL MASTER CONTROLS (MC) AND THE FIRST SWITCHES OR DIMMERS.
2. LUMINAIRES AND CONTROL PANELS WILL BE MOUNTED ON THE FURNITURE.
3. ALL SWITCHES, DIMMERS, AND MASTER CONTROLS MOUNTED AT 4' 0".

N

DESIGN TEAM
NATURAL FUSION

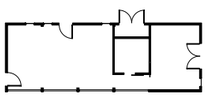
CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

NATURAL FUSION

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

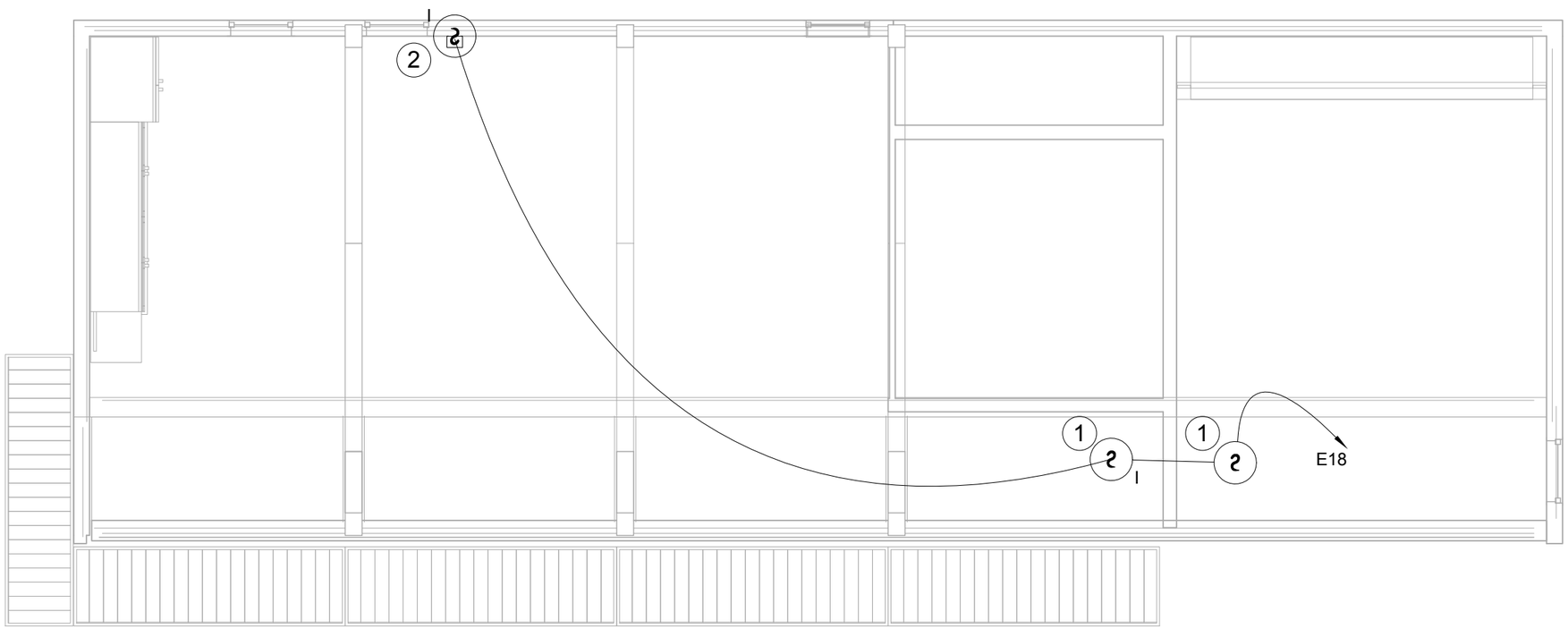
JER DRAWN BY | KPM CHECKED BY

DRAWING STATUS
CD SET

E-103 LIGHTING RCP

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855



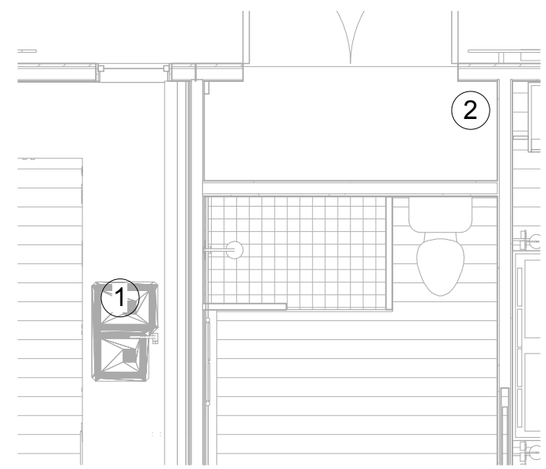
1 E-104 FIRE ALARM PLAN
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

KEYED NOTES 1:
1. CEILING MOUNTED FIRE ALARMS
2. WALL MOUNTED FIRE ALARMS AT 7' 8"

KEYED NOTES 2:
1. 3-A:40-B:C EXTINGUISHER MOUNTED UNDER SINK
2. A:10-B:C EXTINGUISHER WALL MOUNTED AT 18'

GENERAL NOTES:
1. SMOKE ALARMS WILL BE AC WITH A BATTERY BACKUP
2. FIRE EXTINGUISHERS WILL BE RATED A MINIMUM OF 2A-10BC



2 E-104 FIRE EXTINGUISHER PLAN
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

N

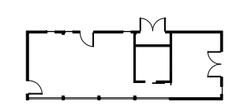
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

JER DRAWN BY
KPM CHECKED BY

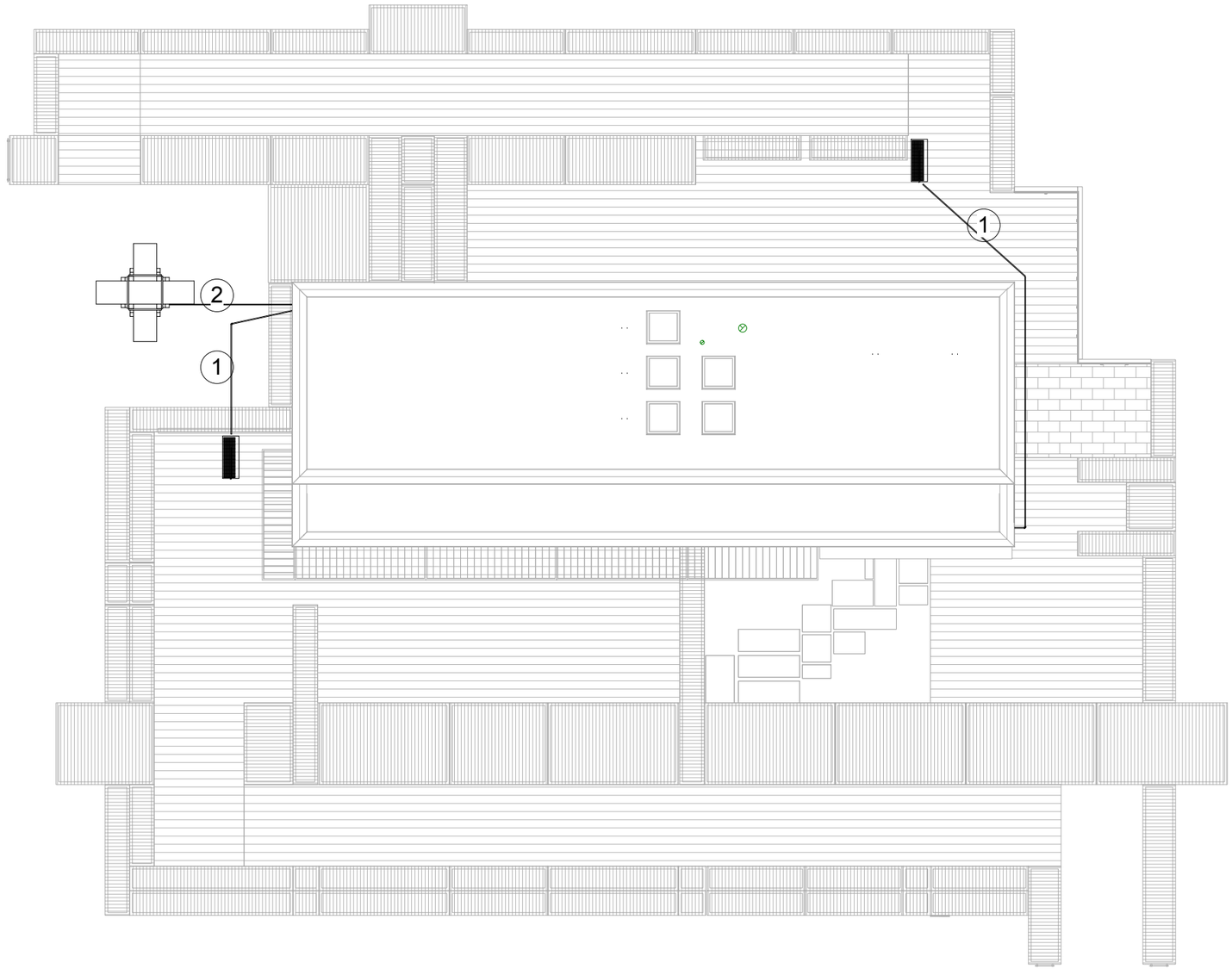
DRAWING STATUS
CD SET

NATURAL FUSION

E-104 FIRE PROTECTION PLAN

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855



GENERAL NOTES:
1. EXTERIOR ELECTRICAL CIRCUITS RUN THROUGH JUNCTION BOXES OPEN TO BOTTOM IN FLOORING

KEYED NOTES:
1. 240V CKT RUN IN FLEXIBLE METALLIC CONDUIT
2. 120V CKT RUN IN RIGID METALLIC CONDUIT

1 / E-105 ELECTRICAL SITE PLAN
1/8" = 1'-0"

0' 2' 4' 8' 16' 24'

DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

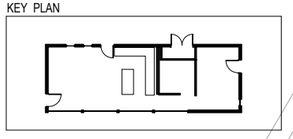
DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

NATURAL FUSION

06/01/09

Issue	Date	Description

KEY PLAN



SCALE
1/8" = 1'-0"

DRAWN BY
Author

CHECKED BY
Checker

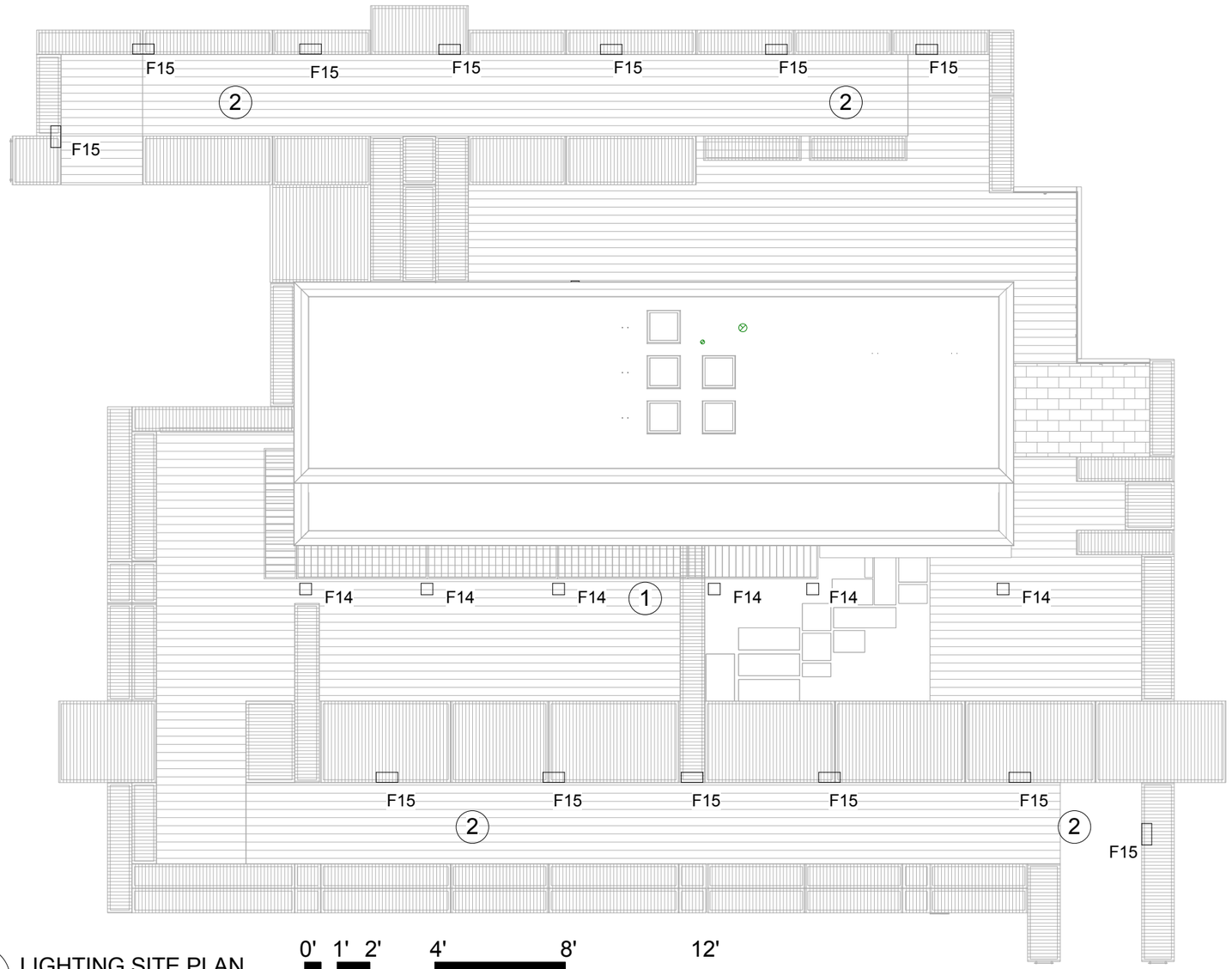
DRAWING STATUS
CD SET

ELECTRICAL SITE PLAN

E-105

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855



1 E-106 LIGHTING SITE PLAN
1/8" = 1'-0"

0' 1' 2' 4' 8' 12'

GENERAL NOTES:
1. ALL SITE LIGHTING POWERED BY INDIVIDUAL STAND ALONE PHOTOVOLTAIC DEVICES

KEYED NOTES:
1. F14 MOUNTED IN THE DECKING, FLOOR MOUNTED FLUSH
2. F15 FLUSH MOUNTED IN THE PLANTERS

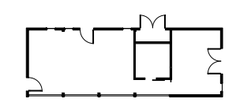
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/8" = 1'-0"

JER — DRAWN BY
KPM — CHECKED BY

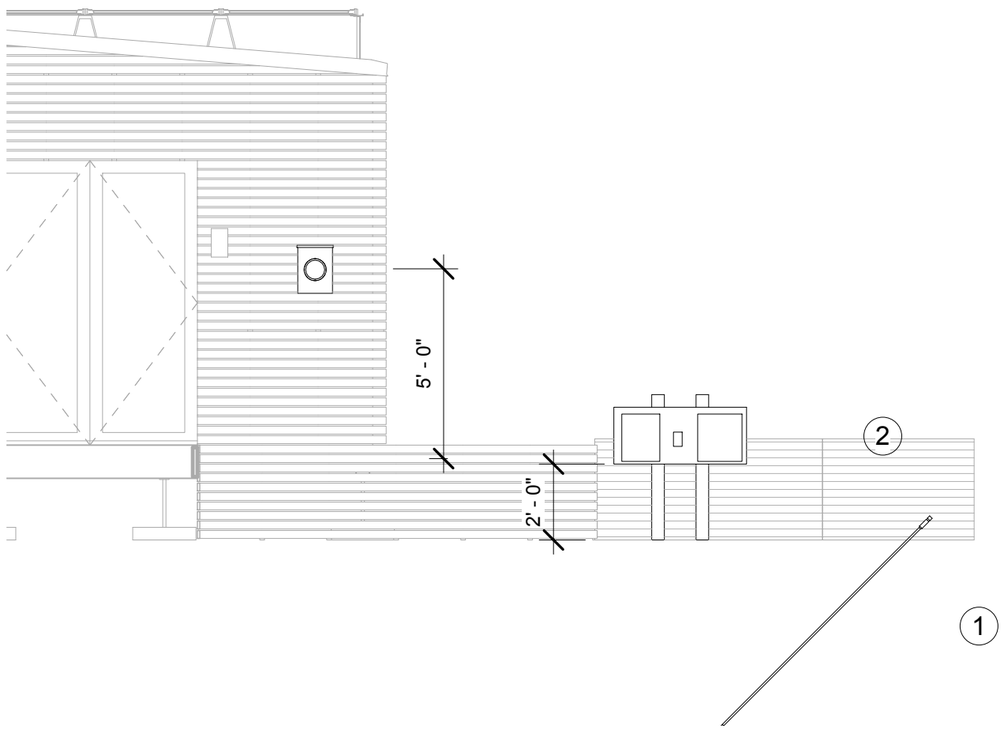
DRAWING STATUS
CD SET

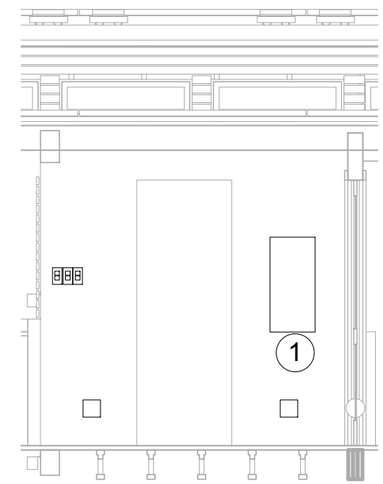
NATURAL FUSION

E-106 LIGHTING SITE PLAN

PENNSTATE

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt





1 / E-201 EAST ELECTRICAL
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

2 / E-201 PANELBOARD SECTION
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

KEYED NOTES 1:
1. GROUNDING ROD SHALL BE 8' LONG DRIVEN AT 45 DEGREE ANGLE
2. TERMINAL BOX MOUNTING PANEL 42"x18"x3/4" PLYWOOD

GENERAL NOTES:
1. SEE E-401 FOR UTILITY AND GROUNDING PLAN
2. SEE E-501 FOR GROUNDING DETAILS
3. SEE E-605 FOR PANELBOARD SCHEDULE

KEYED NOTES 2:
1. SERVICE FROM BOTTOM MAINS ON PANELBOARD

DESIGN TEAM
NATURAL FUSION

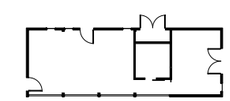
CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

NATURAL FUSION

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

JER — DRAWN BY
KPM — CHECKED BY

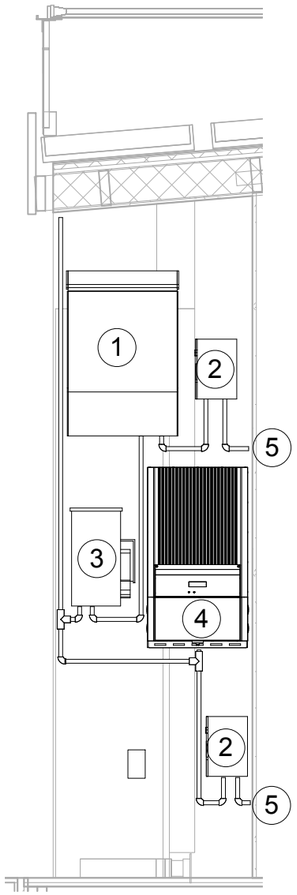
DRAWING STATUS
CD SET

UTILITY ELEVATION

E-201

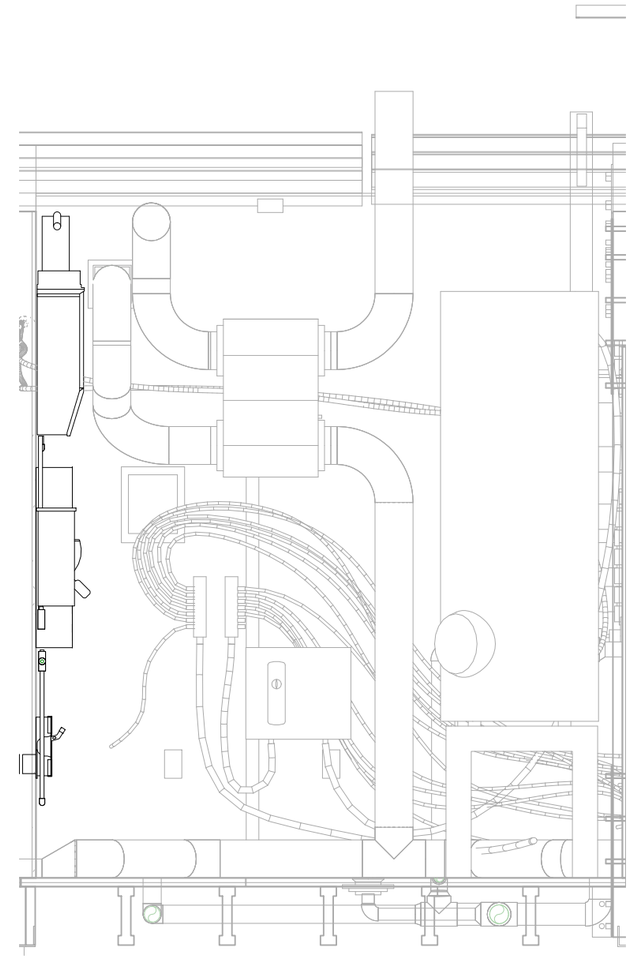
PENNSTATE

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt



GENERAL NOTES:
1. ALL DEVICES MOUNTED WITHIN DEVICE PARAMETERS AND CLEARANCES
2. CONDUIT LOCATIONS ARE AN APPROXIMATION

KEYED NOTES:
1. INV-2
2. ACD-1
3. DCD-1
4. INV-1
5. RETURN TO MAIN PANELBOARD



1 E-202 NEXUS ELECTRICAL EAST
1/2" = 1'-0"

0' 1' 2' 4' 6'

2 E-202 NEXUS ELECTRICAL S.
1/2" = 1'-0"

0' 1' 2' 4' 6'

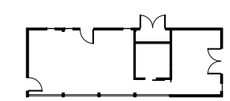
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

JER | KPM
DRAWN BY | CHECKED BY

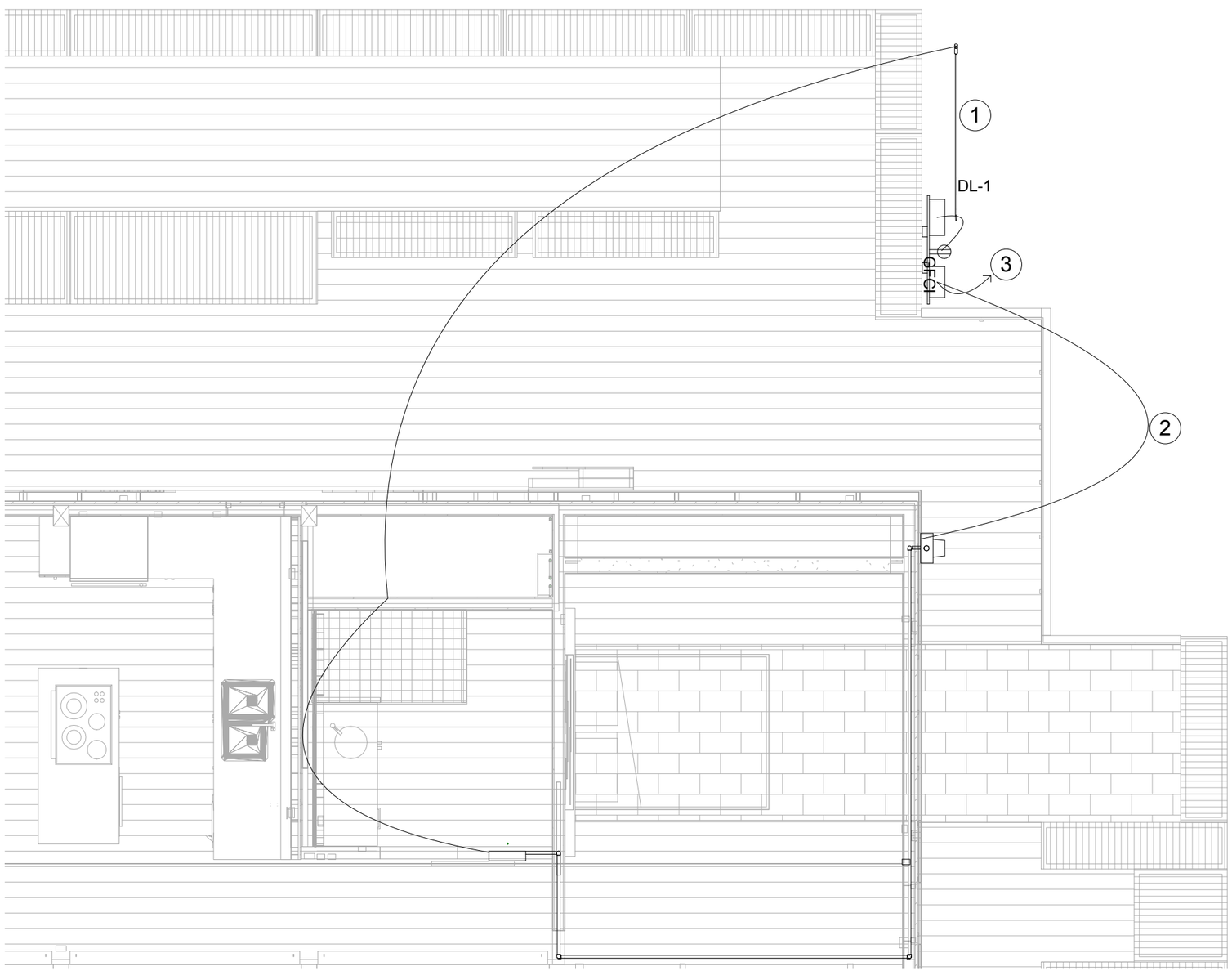
DRAWING STATUS
CD SET

NATURAL FUSION

E-202 NEXUS ELEVATION

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt

PENNSTATE



1 / E-401 UTILITY/GROUND PLAN
1/4" = 1'-0"

0' 1' 2' 4' 8' 12'

N

GENERAL NOTES:
1. ORGANIZER SUPPLIED FEEDER DISCONNECT WILL SUPPLY 240/120V, SINGLE PHASE, L1,L2,NEURAL ELECTRICAL FEED

KEYED NOTES:
1. GROUNDING ROD SHALL BE 8' LONG DRIVEN AT 45 DEGREE ANGLE
2. TEAM SUPPLIED 3-WIRE IN CONDUIT 240/120V, SINGLE PHASE L1,L2,NEUTRAL
3. ORGANIZER SUPPLIED 3-WIRE IN CONDUIT 240/120V, SINGLE PHASE L1,L2,NEUTRAL

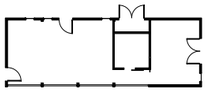
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/4" = 1'-0"

JER DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

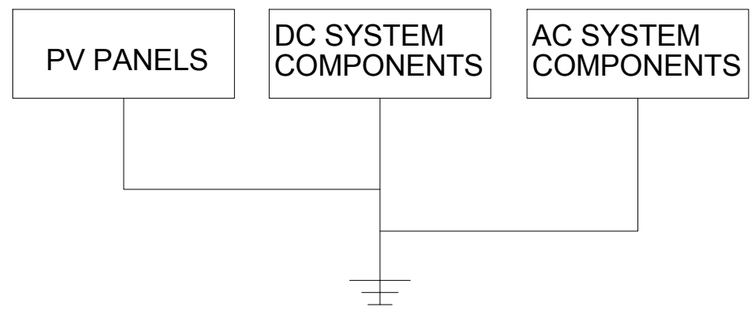
UTILITY AND GROUNDING PLAN

E-401

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

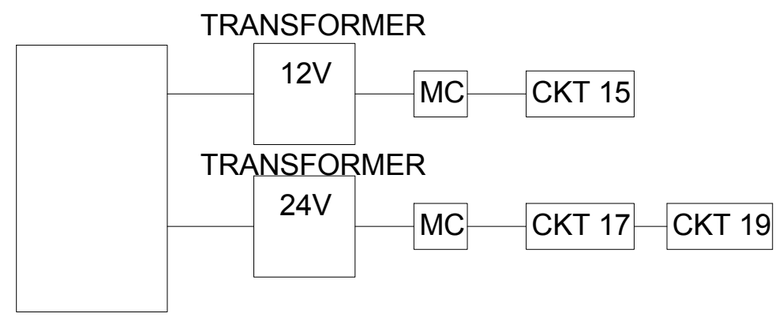
PENNSTATE
1855

SYSTEM GROUNDING



GENERAL NOTES:
1. GROUNDING ELECTRODE WILL BE A GROUNDING ROD IN ACCORDANCE WITH NEC 250.52(5)(A) SEE E-401 FOR LOCATION
2. AC GROUNDING MAIN BONDING JUMPER WILL BE ON NEUTRAL BUS IN ACPB-1 TO ENSURE LESS THAN 150V TO GROUND WITH 4 AWG COPPER GROUNDING ELECTRODE CONDUCTOR (NEC TABLE 250.66)
3. AC AND DC SYSTEM COMPONENTS GROUNDED TO BONDING JUMPERS WITH 10 AWG COPPER WIRE (NEC 250.122 AND NEC 690.47(C))

LIGHTING TRANSFORMERS



GENERAL NOTES:
1. 12V TRANSFORMER TO SERVICE MASTER CONTROL AND 12VDC LIGHTING
2.24V TRANSFORMER TO SERVICE MASTER CONTROL AND 24VDC LIGHTING

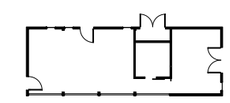
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

JER DRAWN BY | KPM CHECKED BY

DRAWING STATUS
CD SET

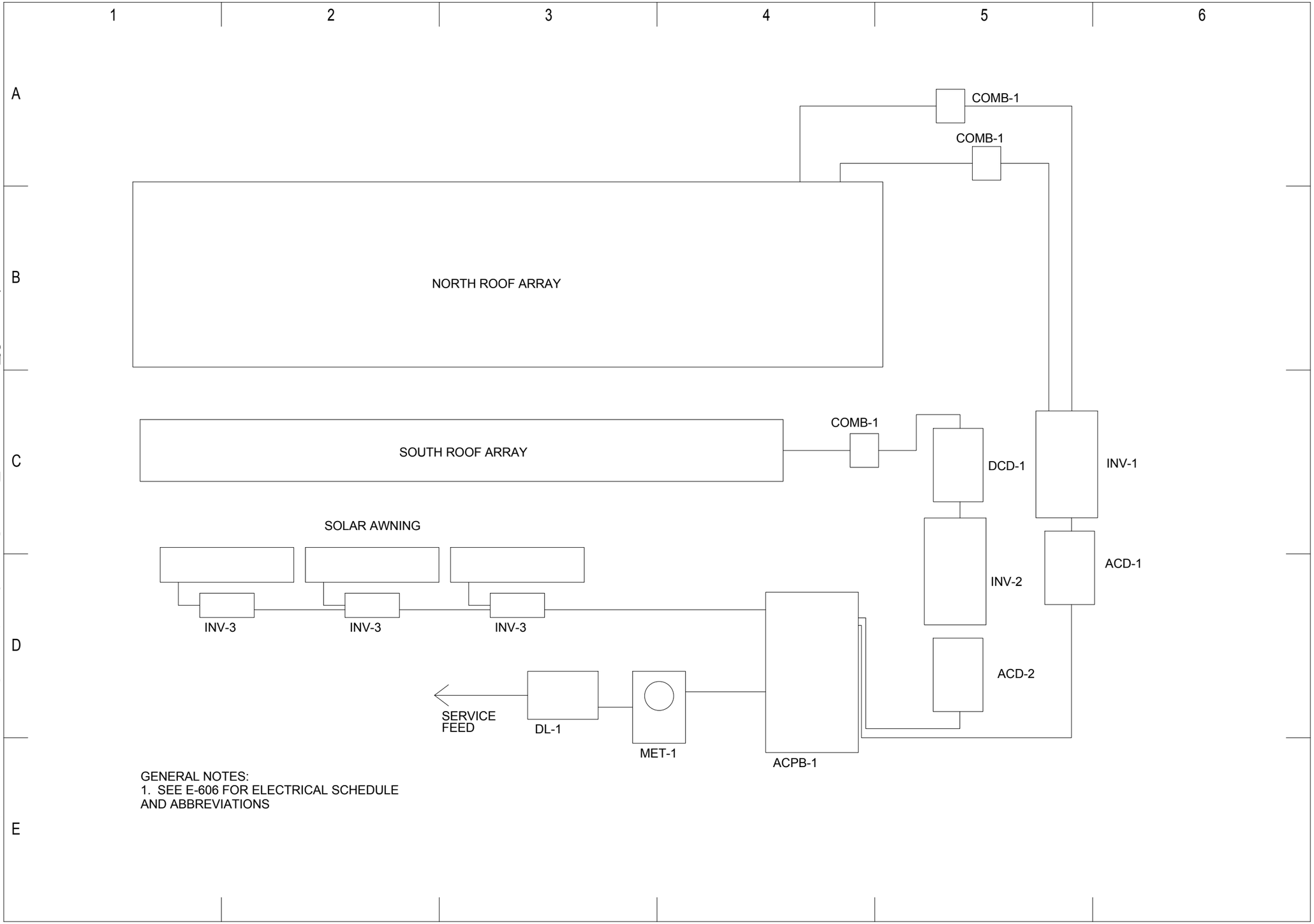
NATURAL FUSION

ELECTRICAL SYSTEM DETAILS

E-501

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE



GENERAL NOTES:
1. SEE E-606 FOR ELECTRICAL SCHEDULE AND ABBREVIATIONS

DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN

SCALE

DRAWN BY JER
CHECKED BY KPM

DRAWING STATUS
CD SET

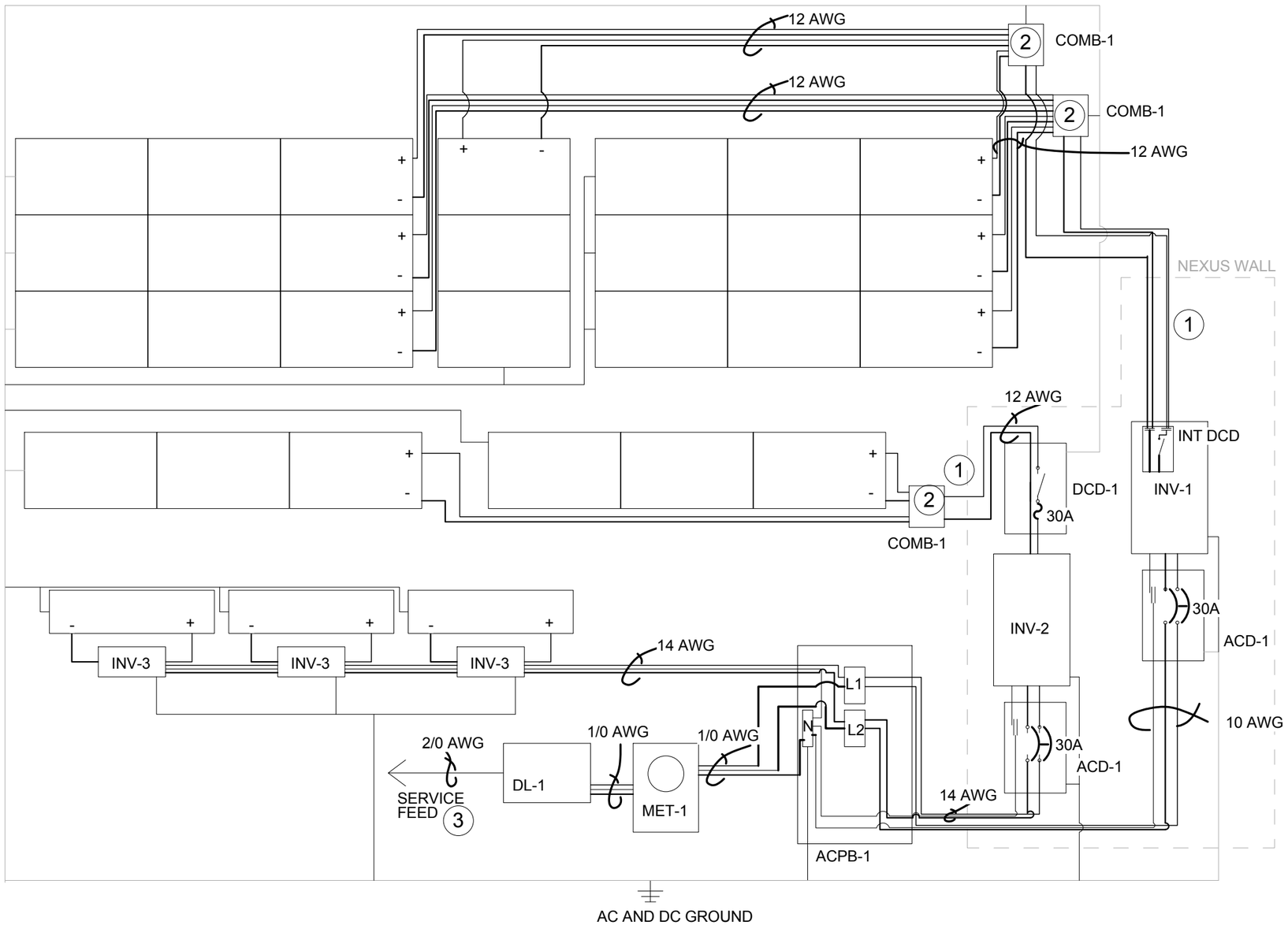
NATURAL FUSION

PV SYSTEM ONE-LINE DIAGRAM

E-601

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855



GENERAL NOTES:
1. SEE E-501 FOR GROUNDING DETAILS
2. SEE E-605 FOR PANELBOARD SCHEDULE AND BREAKER SIZES
3. SEE E-606 FOR ELECTRICAL SCHEDULE
4. SEE E-701 FOR SERVICE CALCULATIONS
5. SEE E-702 AND E-703 FOR WIRE, FUSE AND BREAKER SIZING CALCULATIONS

KEYED NOTES:
1. WIRES RUN IN 1 IN. CONDUIT PENETRATING THROUGH CEILING OF THE NEXUS DIRECTLY TO DISCONNECT/INVERTER
2. COMBINER BOXES WITH BUILT-IN 20A FUSES
3. ORGANIZER SUPPLIED SERVICE FEED WILL SUPPLY 240/120V, SINGLE PHASE, L1,L2,NEURAL, 150A ELECTRICAL FEED

DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN

SCALE

DRAWN BY: JER
CHECKED BY: KPM

DRAWING STATUS
CD SET

NATURAL FUSION

PV SYSTEM WIRING DIAGRAM

E-602

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855

Type	Fixture Description	Mounting	Manufacturer	Catalog Number	Lamp(s)	Watts	Volt	Location/ Remarks
F1	T5 linear fluorescent cove with two parabolic reflector sections drive light across the ceiling from one edge. An elliptical section shields the lamp from normal viewing angles and redirects its light to a parabola. Glare is minimized and asymmetry of the beam is maximized resulting in high beam efficiency and superior surface uniformity.	Surface Mounted	Elliptipar	F305-T221	FP21/830/ECO lamp by Osram Sylvania	52	120	Lighting/Dining/Kitchen
	a 2-Lamp Dimming Ballast	Integral	Lutron	Lutron Eco-10™ E 3 T521 C 120 2			120	Provide
F2	Suspended luminaire with color changing LEDs and three directional low voltage MR-16. Frosted acrylic diffuser. Extruded aluminum with clear etched anodized finish. Aircraft cable suspension with adjustable cable locking fasteners. MR16 lamps mount into solid aluminum double gimbals. Gimbal adjustment does not require tools. Can accept optical accessories.	Surface Mounted	3G Lighting	3G-SPL316-20w MR16-LEDCC-NG-120-OA- 3'5" and 3'4"	(3) 20MR16/IR/WFL60/C lamp by Osram Sylvania	60	120	Dining/Kitchen
	a 3G 24V LED controller		3G Lighting	3G-24LED25				
	b Optical Accessory - Honey comb louver		3G Lighting	OA				Provide
F3	Geometrically shaped Form, Round or Square, 2-Head Fast Jack fixture head features compact 3" (7.6cm), 6" (15.2cm), 12" (30.5cm), 24" (61cm), 36" (91.4cm) or 48" (122cm) stem and rotates 360°, tilts 180°. Holds one accessory lens or louver (sold separately). Also available in single-head Round or Square	Surface Mounted	Edge Lighting	M-FOR-2SQ-3-PN	(2) 20MR16/IR/WFL60/C lamp by Osram Sylvania	40	120	Kitchen / Bedroom
	a Sloped Ceiling Power Feed Canopies		Edge Lighting	MP-4RD-SL0-PN				Provide
	b 150W/12V Magnetic Remote Transformer		Edge Lighting	T-150-12				
F4	Highly adjustable head tilts between cables and rotates 140° within its ring. Integral louver lens holder can hold glass lens or eggcrate louver. Satin aluminum finish.	Surface Mounted	Tech Lighting	700KHELLO-MR16	20MR16/IR/FL35/C lamp by Osram Sylvania	20	120	Bedroom
	a Hexcell louver cuts glare for lamp		Tech Lighting	A02-BK				Provide
	b Remote magnetic transformer		Tech Lighting	700AT150-T				
	c #10 gauge insulated cable (24ft)		Tech Lighting	700KLAINSCL-24FT				
	d Center power feed		Tech Lighting	700KPCEN-SINGLE-S				
	e Slimline turnbuckles		Tech Lighting	700PRTT1-S				
	f Slimline anchors		Tech Lighting	700PRTT0-S				
F5	Hotel wall with a swing arm features a White methacrylate difusser and a satin nickel finish. General light distribution. ETL listed. 9.5" diameter shade x 6.75" high x 12.25" min/19.5" max arm extension	Surface Mounted	design by Jordi Mallorqui & Jordi Aymerich	0503 WA-HOTELSW-010-WH-GY	CF14EL/A19/830/BL lamp by Osram Sylvania	14	120	Bedroom
F5 ALT	Wall mounted luminaire for direct and diffused lighting. Wall support, joints, canopy and arm in polished aluminum. Diffuser with aluminum frame available in parchment paper or pale grey satin and polycarbonate fiber blend. Adjusts to full downward and maximum 30° upward positions. Mounting to standard junction box.	Surface Mounted	Artemide	ART-TOL-7-10-W model# TOL64007PA	CF13EL/MICRO/C lamp by Osram Sylvania	13	120	Bedroom
	a Parchment / 7 in shade		Artemide	TOL64007PA				
F6	The eLum™ Cove RGB is a LED - RGB color-changing, light strip with unique triad LED placement for even an consistent color mixing. The eLum™ Cove RGB creates 16.5 million deep and very bright colors.	Surface Mounted	Nexxus Lighting	ALS-ELUM-16-115	RGB LED	4.9 / 16 inch	120	Column
	a eLum RGB Controller	Surface	Nexxus Lighting	ELUM-RGB-CTRL-1				
	d 120VAC/24DC Transformer for RGB Controller	Surface	TBD	TBD				
	b SAVI Key Pad DMX Controller	Surface	Nexxus Lighting	SAVI KEY PAD-L				
	e 30' Power Cable		Nexxus Lighting	ALS-ELUM-RGB-PCC-30				
F7	The Melampo is a true chameleon: it masquerades as a standard table light with a regular shade, but the shade can be pivoted about the bulb assembly, to change its look and the lighting effect. Both models can be positioned with the shade pointing downward and 34 degree upward	Free Standing	Artemide	0315 010A	Dimmable CFL Marathon 14646-4 lamp by Philips	20	120	Livingroom
F7 ALT	Table standing luminaire for diffused lighting. Diffuser in molded, ribbed, sanded white glass. Base and socket cover in polished aluminum. Stem and diffuser supports in chrome plated steel. On/off pull cord switch. In-line dimmer switch on clear cord.	Free Standing	Artemide	R730100	Dimmable CFL Marathon 14646-4 lamp by Philips	20	120	Livingroom

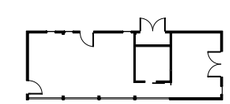
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
3" = 1'-0"

JER | KPM
DRAWN BY | CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

E-603 LUMINAIRE SCHEDULE

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE

F8	Mirror that radiates light from all sides. Designed to highlight the color of the wall upon which it hangs, frosted glass frames the polished-edge mirror to imbue an illustrious presence.	Surface Mounted	Electri Mirror	30"x30" Sihouette	(4) FP24/830/HO/ECO lamp by Osram Sylvania	104	120	Bathroom
F8 ALT	Twin Slim surface mounted rectangular mirror features vertical integral fluorescent lamps set behind frosted panels on each side, which project an even glow of light. Fluorescents(F1 and F1D) each include two 24 watt 3000K 82 CRI T5 high-output fluorescent lamps and electronic ballast. Fluorescent (F1D) is dimmable with a standard incandescent dimmer. General light distribution. ADA compliant.	Surface Mounted	Edge Lighting	TWINSLIM-20-F1	(2) FP24/830/HO/ECO lamp by Osram Sylvania	52	120	Bathroom
F9	Compact flourescent wall sconce framed within a brushed nickel structure, a triangular form of pleated fabric cascades soft light throughout	Surface Mounted	B.Lux	GLB-BLX-SOR-ADA	CF13DS/827/RP/ECO lamp by Osram Sylvania	15	120	Bathroom
F9 ALT1	Wall lamp with asymmetrical design for ambient illumination. Transparent glass with satin finish. Stainless steel construction	Surface Mounted	I Tre	ITR-ROCKETTE58	FP24/830/HO/ECO lamp by Osram Sylvania	26	120	Bathroom
F9 ALT2	ADA compliant wall sconce. Soft glow around luminaire creates perception of a floating luminous diffuser.	Surface Mounted	Focal Point	FMEC-2-1T5HO-1C-WM-L830-TS	FP24/830/HO/ECO lamp by Osram Sylvania	26	120	Bathroom
F10	Housing and wall plate: corrosionresistant cast aluminium, NoRinse surface treatment. Double powdercoated. Optimised surface for reduced accumulation of dirt. Electronic control gear. 2 cable entries. Throughwiring possible. 3pole terminal block. Reflector: aluminium, silver, satinmatt anodised. Spread lens as safety glass. Protection mode IP65: dustproof	Surface Mounted	ERCO	33519	MC20TF/U/GU5.5/830 lamp by Osram Sylvania	24	120	Exterior
F10 ALT	Wall luminaires with directed light. One piece die-cast aluminum supplied with universal mounting bracket for direct attachment to 3½" or 4" octagonal wiring box. One piece die-cast aluminum cover frame, secured by captive socket head, stainless steel screws threaded into stainless steel inserts. Interior of lamp compartment painted gloss white. Stippled tempered clear glass. Fully gasketed for weather tight operation using a molded silicone rubber O-ring gasket.	Surface Mounted	BEGA	2493P-BLK	CF13DS/827/RP/ECO lamp by Osram Sylvania	13	120	Exterior
F11	Recessed wall luminaire. Housing: Constructed of die cast and extruded aluminum with integral wiring compartment. Mounting tabs provided. Enclosure: One piece die cast aluminum faceplate, 1/8" thick. Clear tempered glass with translucent white ceramic coating. Faceplate is secured by two (2) socket head, stainless steel, captive screws threaded into stainless steel inserts in the housing casting. Continuous high temperature O-ring gasket for weather tight operation.	Wall Recessed	BEGA	2288LED-BLK	3300K white LED	6.8	120	Exterior
F11 ALT	Axis walklight with LED. corrosionresistant cast aluminium, NoRinse surface treatment. Graphit m, double powdercoated. Fixing element: plastic. Clamp extension 720mm. 2 cable entries. Throughwiring possible. 3pole terminal block. Asymmetric reflector lens system: aluminium, silver anodised. Optimised screening for the LEDs ensures no direct light emission. Replaceable LED module. Cover frame with Softec lens: corrosionresistant cast aluminium, graphite double powdercoated. Protection mode IP65: dustproof and water jetproof.	Wall Recessed	ERCO	33733	3500K white LED	1.7	120	Exterior
F12	eW® Cove Powercore is a dimmable, linear LED fixture that provides an energy-efficient, low-maintenance alternative to traditional cove lighting in applications requiring white or solidcolor light. With its low profile, rotating housing, flexible end-to-end locking power connectors, and range of colors and color temperatures, eW Cove Powercore is the perfect choice for a wide range of interior retail, exhibit, hospitality, and architectural settings. Patented Powercore, which powers eW Cove Powercore fixtures directly from line voltage, supports long runs of fixtures on a single circuit while offering improved operational efficiency and costeffective installation and operation.	Surface Mounted	Philips Color Kinetics	523-000004-00	2800K white LED	4.5	120	Bedroom
F13	A 3 inch wide aperture step light with a concealed optic. Eight LED colors are available in high output con gurations. Integral non-dimming drivers available for 90-250V AC and 12V AC. Recessed surfaces always have matte black nish to reduce glare. Face plates in natural metal nishes, except stainless steel, have protective clear top coat.	Wall Recessed	Winona Lighting	LED-STEP03-3-001/HO-ND120V-BSS-X-STD	3000K LED	6	120	Walkway
F14	Square solar LED paver light	Floor Recessed	Meteor	170C	White LED	N/A	N/A	South Deck
F15	Rectangular solar LED paver light	Wall Recessed	Meteor	180C	White LED	N/A	N/A	Exterior Ramp

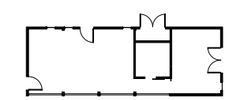
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
3" = 1'-0"

JER | KPM
DRAWN BY | CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

E-604 LUMINAIRE SCHEDULE

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855

PANELBOARD

LOAD NAME	TRIP	CKT #	WIRE SIZE (AWG)	LOAD (VA)	LOAD (VA)	WIRE SIZE (AWG)	CKT #	TRIP	LOAD NAME
COVE LGHTING	15 A	1	14	156	540	12	2	20 A GFCI	KITCHEN REC. S
BEDROOM REC.	15 A AFCI	3	14	720	360	14	4	15A GFCI	EXTERIOR REC. S
NEXUS REC.	20 A GFCI	5	12	360	540	12	6	20 A GFCI	KITCHEN REC. N
EXTERIOR REC. N.	15 A GFCI	7	14	360	720	14	8	15 A AFCI	LIVING SPACE REC.
COLUMN REC. LIVING SPACE	15 A AFCI	9	14	540	240	14	10	15 A GFCI	BATHROOM REC+LIGHTING
WASHER/DRYER	20 A GFCI	11	12	1200	8100	12	12	40 A	INDUCTION RANGE
REFRIGERATOR	20 A	13	12	1250		12	14		
12 V DC LGHTING XFORMER	20 A	15	12	300	360	14	16	15 A AFCI	FLOOR REC. LIVING SPACE
24 V DC LIGHTING XFORMER	20 A	17	12	300	170	14	18	15 A	SMOKE DETECTOR
BEDROOM CEILING LGHT	15 A	19	14	120	700	14	20	15 A	DUCTLESS MINISPLIT 9RLS
DISH WASHER	15 A	21	14	1400	100	14	22	15 A	ERV
DUCTLESS MINISPLIT 9RLS	15 A	23	14	700	120	14	24	15 A	TRENCH HEAT PUMP
TANKLESS WATER HEATER (2)	50 A	25	8	9600	120	14	26	15 A	SUPPLY WATER PUMP
		27	8	9600	200	14	28	15 A	NORTH LIGHTS
EXTERIOR FAN COIL	15 A	29	14	250	200	14	30	15 A	SOUTHER EXTERIOR LIGHTS
EXTERIOR FAN COIL	15 A	31	14	250			32		EXTRA
SITE LIGHTING	15 A	33	14	200			34		
EXTRA		35			SOURCE (1)	14	36	15 A	ENPHASE INVERTERS
XANTREX GT5.0 (1)	30 A	37	8				38		
		39		SOURCE	SOURCE (1)	14	40	15 A	PVP 2000
SUBTOTAL				27306	12470				
					VOLTAGE		120/240 V		
					MAINS		200 A		
					MAIN CKT BKR		150 A		

GENERAL NOTES:
1. SEE E606 FOR BREAKER TYPES AND SPECIFICATIONS

KEYED NOTES:
1. BACKFED BREAKERS
2. INSTANTANEOUS WATER HEATER, NEVER RUN OVER 50% MAX LOAD

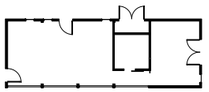
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

JER DRAWN BY | KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

PANEL BOARD SCHEDULE

E-605

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE

DESIGNATIONS	PRODUCT NAME	CATALOG NUMBER	QTY.	LOCATION	MANUFACTURER
ACD-1	30A AC DISCONNECT	D221N Int.(DN221N)	2	NEXUS	SQUARE D
DCD-1	600VDC DISCONNECT	H361RB Int.(HN361F1)	1	NEXUS	SQUARE D
COMB-1	5-IN COMBINER BOX	SOLARLOK	3	ROOF	TYCO ELECTRONICS
INV-1	5.0KW INVERTER w/ internal DC disconnect	GT5.0	1	NEXUS	XANTREX
INV-2	2.0KW INVERTER	PVP2000	1	NEXUS	PV POWERED
INV-3	MICRO-INVERTER 240V	M190-72-240-S11	4	SOUTH ROOF	ENPHASE
ACPB-1	AC PANEL BOARD	QO140M200C	1	HALLWAY	SQUARE D
MET-1	200A METER HOUSING	URTRS213B	1	E. FAÇADE	SQUARE D
DL-1	DATA LOGGER		1	SITE	NREL
	GFCI RECEPTICLE 15 A TAMPER RESISTANT	125V NTR-15-GFCI-WH	9	DISPERSED	LUTRON
	GFCI RECEPTICLE 20 A TAMPER RESISTANT	125V NTR-20-GFCI-WH	7	DISPERSED	LUTRON
	DUPLEX RECEPTICLE 15A TAMPER RESISTANT	125V NTR-15-WH	13	DISPERSED	LUTRON
	DUPLEX RECEPTICLE 20A TAMPER RESISTANT	125V NTR-20-WH	8	DISPERSED	LUTRON
	COAXIAL CABLE JACK	NT-CJ-WH	1	BED/LIVING	LUTRON
	Arc fault Breaker 15A	QO115AFI	4	ACPB-1	SQUARE D
	Ground fault Breaker 15A	QO115GFI	5	ACPB-1	SQUARE D
	Ground fault Breaker 20A	QO120GFI	4	ACPB-1	SQUARE D
	15A Breaker	QO115	13	ACPB-1	SQUARE D
	20A Breaker	QO120	3	ACPB-1	SQUARE D
	20A Breaker	Q0220	2	ACPB-1	SQUARE D
	30A-2 pole breaker	QO230	1	ACPB-1	SQUARE D
	40A-2 pole breaker	QO240	1	ACPB-1	SQUARE D
	50A-2 pole breaker	QO250	1	ACPB-1	SQUARE D

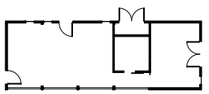
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

JER DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

E-606 ELECTRICAL SCHEDULE

PENNSTATE

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

Service Entrance Calculations

Line 1	General Lighting	800 ft^2	x3VA/ft^2	2400 VA
Line 2	Small Appliance Load	3 ckts	x1500VA ea.	4500 VA
Line 3	Laundry Ckt			1500 VA
Line 4	Range			8100 VA
Line 5			**Line 1-4 Total**	**16500 VA**
Line 6	Additional Fixed Loads	Tankless DHW Heater	19200	
		Pumps	1000	
		Oven	1250	
		Dishwasher	1400	
		Refrigerator	1250	
		Line 6 Total	**24100 VA**	
Line 7			**Line 5-6 Total**	**40600 VA**
Line 8	HVAC	Ductless System	1400	
		Heat Pump	120	
		Trench Heaters	750	
		Exterior Fan Coilx2	500	
		ERV	100	
		Line 8 Total	**2870 VA**	
Line 9	NEC 220.83 (B)	First 8000VA of line 7@ 100%		8000 VA
		Remainder @ 40%		13040 VA
		HVAC Load		2870 VA
			Line 9 Total	**23910 VA**
Line 10	Min Ampacity for Service			
		Line 9/240v		**99.63 Amps**

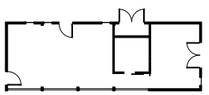
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

JER DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

SERVICE ENTRANCE CALCS

E-701

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE

BRANCH CIRCUIT LENGTHS

LOAD DESCRIPTION	CKT 37/39		
MAX LENGTH	25		
WIRE SIZE	10 AWG	10380 CMILS	
LOAD AMPS	21		
VOLTAGE	240		
CONNECTION TYPE	4		
# PARALLEL SETS	1		
CONDUCTOR TYPE	THHN COPPER		
VD =	1.2138728 OR,		0.51%

LOAD DESCRIPTION	CKT 15		
MAX LENGTH	50		
WIRE SIZE	12	6530 CMILS	
LOAD AMPS	20		
VOLTAGE	120		
CONNECTION TYPE	4		
# PARALLEL SETS	1		
CONDUCTOR TYPE	THHN COPPER		
VD =	3.6753446 OR,		1.53%

LOAD DESCRIPTION	CKT 8		
MAX LENGTH	60		
WIRE SIZE	14	4110 CMILS	
LOAD AMPS	15		
VOLTAGE	120		
CONNECTION TYPE	4		
# PARALLEL SETS	1		
CONDUCTOR TYPE	THHN COPPER		
VD =	5.2554745 OR,		2.19%

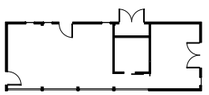
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

JER DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

BRANCH CKT CALCULATIONS

E-702

PENNSTATE

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

FUSE CALCULATIONS

COMPONENT	MAX CURRENT	ADJUSTMENT FACTOR	MIN REQUIRED FUSE SIZE	SIZED FUSE
COMB-1	8.25	156%	12.87	20 A
COMB-1 (2)	11	156%	17.16	20 A
COMB-1 (3)	5.5	156%	8.58	20 A
DCD-1	5.5	100%	5.5	30 A
ACD-1	30	100%	30	30 A

DC WIRE SIZING

PATH DECRIPTION	DIST (FT)	VOLTAGE	CURRENT	CORRECTION FACTOR	VDI	WIRE SIZE
PV 3 SERIES PANEL BRANCH	15	313.5	2.75	156%	0.1027961	12
POST NORTH ROOF COMB 1	15	313.5	11	156%	0.4111842	12
POST NORTH ROOF COMB 2	15	313.5	8.25	156%	0.3083882	12
POST SOUTH ROOF COMB	30	313.5	5.5	156%	0.4111842	12

BACKFED BREAKER CALCULATIONS

COMPONENT	MAX CTS AC CURRENT	ADJUSTMENT FACTOR	VOLTAGE	MINIMUM BREAKER SIZE	SIZED BREAKER
GT5.0	30	100%	240	30 A	30 A
PVP2000	9	100%	240	15 A	15 A
M190-72-240-s01	0.92	300%	240	5 A	15 A

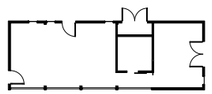
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

JER DRAWN BY
KPM CHECKED BY

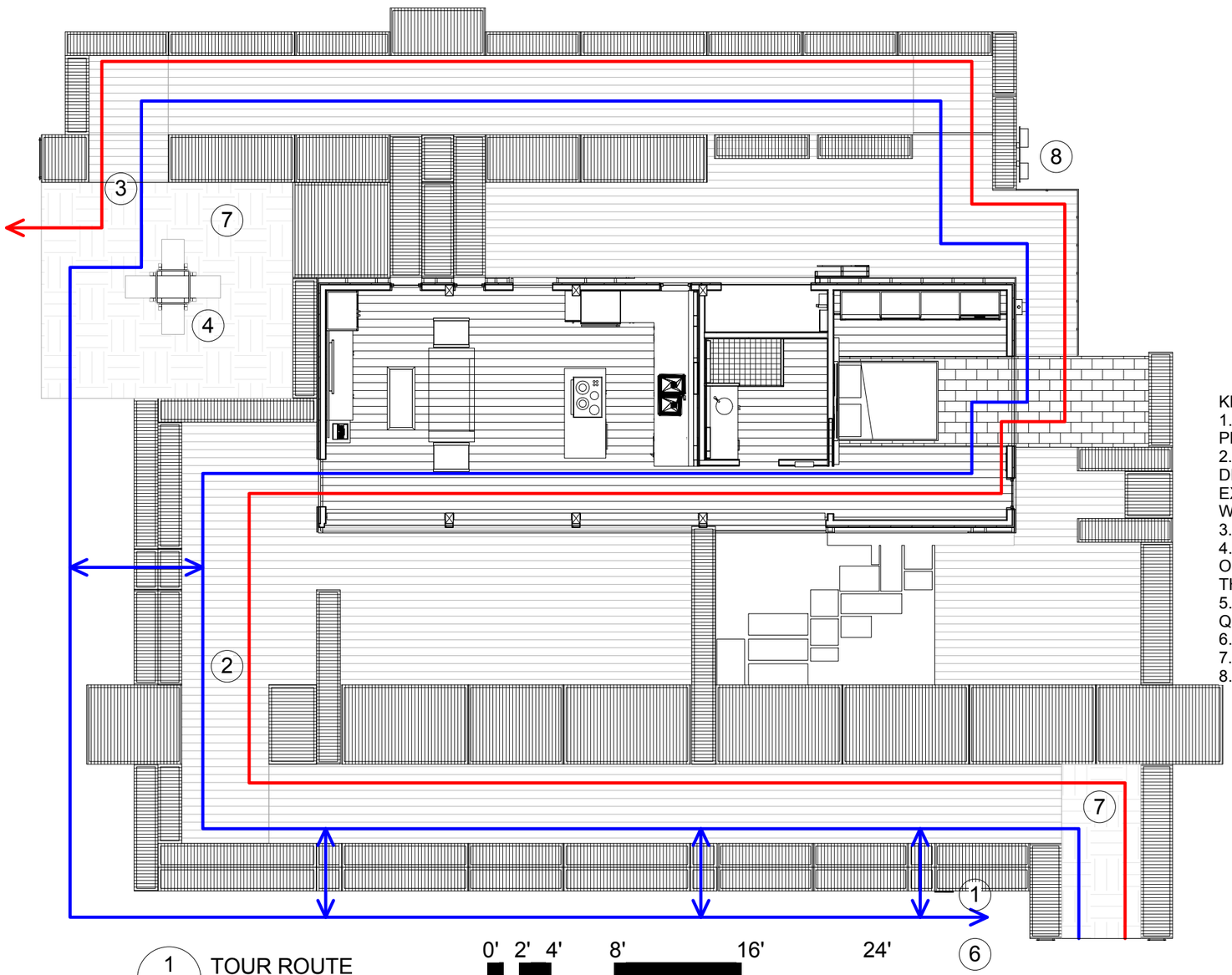
DRAWING STATUS
CD SET

NATURAL FUSION

E-703 ELECTRICAL CALCULATIONS

PENNSTATE 1855

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt



1 / X-101 TOUR ROUTE
1/8" = 1'-0"

KEYED NOTES:
1. TEAM TOUR GUIDE GREETS VISITORS AND PROVIDES THEM WITH THE HANDOUT.
2. DECISION POINT: VISITORS TOURING THE HOUSE DETERMINE WHETHER THEY WOULD LIKE TO EXPERIENCE THE HOUSE THROUGH A QUICK WALKTHROUGH OR A GUIDED TOUR.
3. END OF TOUR.
4. GR2O DISPLAY IS OPTIONAL AFTER COMPLETION OF THE TOUR, AND NOT INCLUDED IN THE TOUR OF THE HOUSE.
5. GUIDE ACCESS POINTS TO THE VISITOR QUEUE.
6. VISITORS WILL QUEUE LEFT IF LINE IS FULL.
7. EVENT DECK - 279sqft.
8. TERMINAL BOX

VISITOR PATH

TOUR GUIDE PATH

N

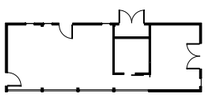
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/8" = 1'-0"

DRAWN BY JNG
CHECKED BY KPM

DRAWING STATUS
CD SET

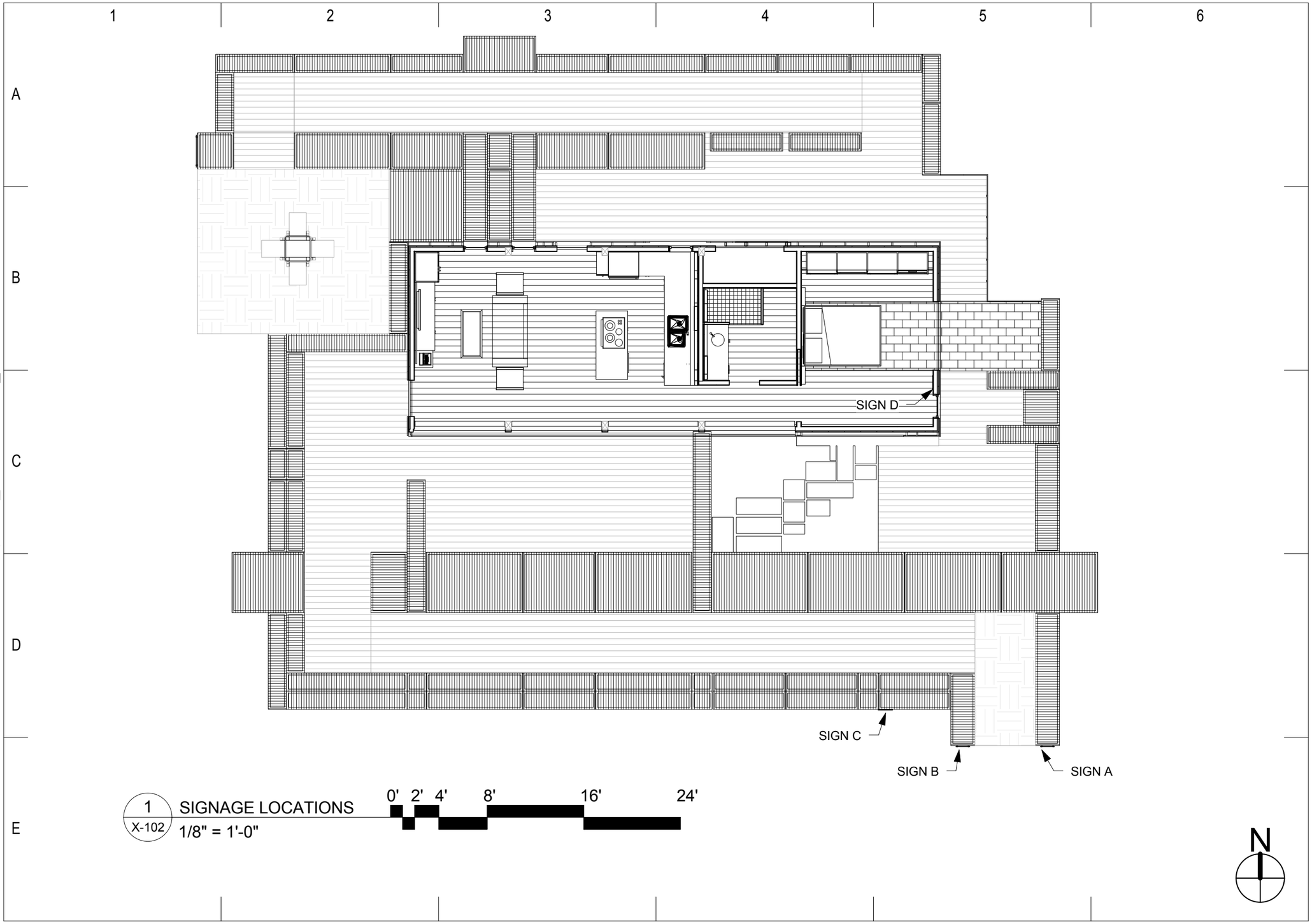
NATURAL FUSION

X-101 TOUR ROUTE

PENNSTATE

1855

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt



1 X-102 SIGNAGE LOCATIONS
1/8" = 1'-0"

\\aep.coeaccess.psu.edu\profiles$\KPM158\Desktop\PSU_Natural-Fusion_local-File.rvt

PENNSTATE

1855

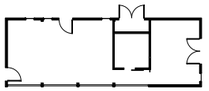
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/8" = 1'-0"

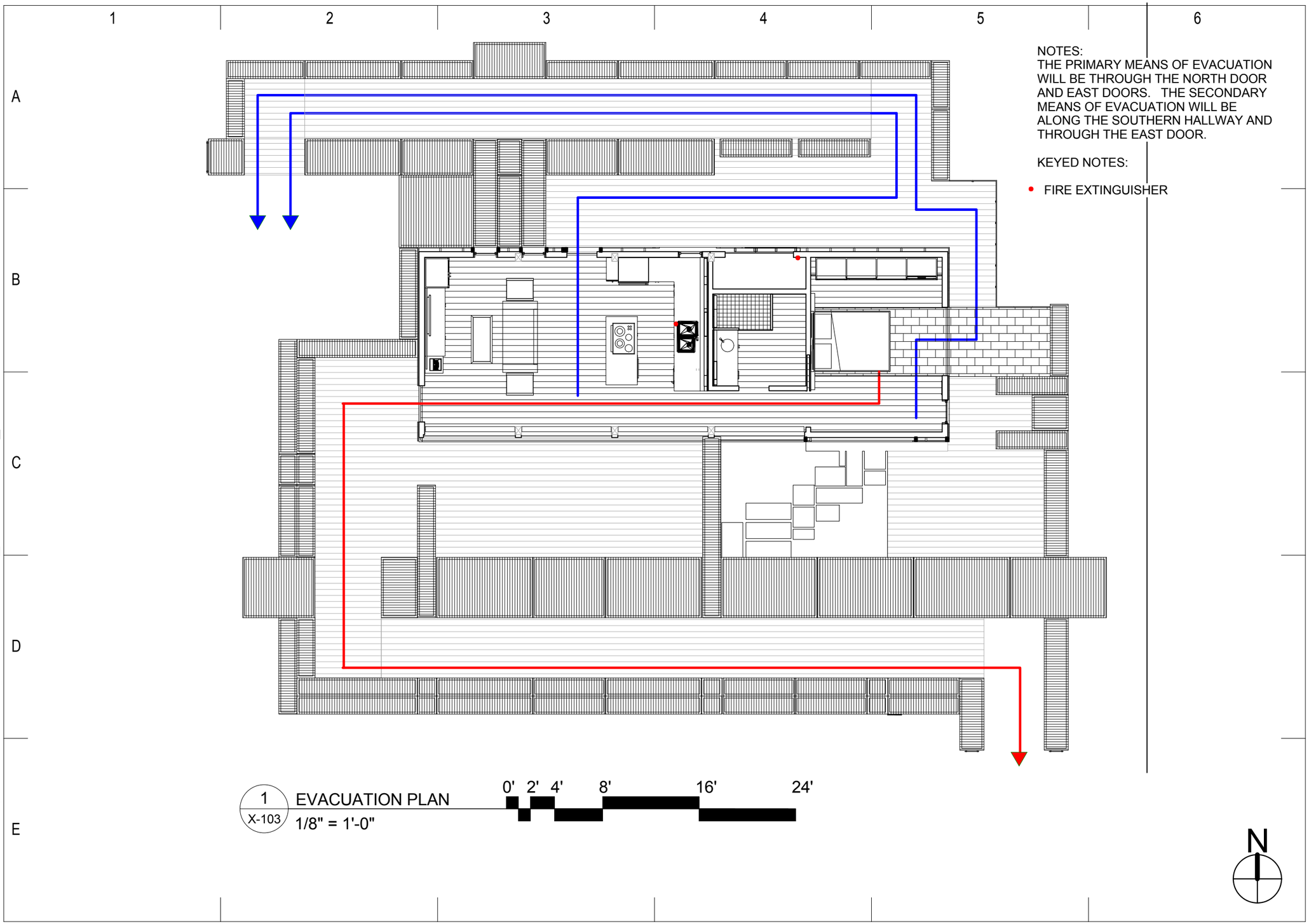
DRAWN BY	CHECKED BY
JNG	KPM

DRAWING STATUS
CD SET

NATURAL FUSION

INTERIOR/EXTERIOR SIGNAGE

X-102



NOTES:
THE PRIMARY MEANS OF EVACUATION WILL BE THROUGH THE NORTH DOOR AND EAST DOORS. THE SECONDARY MEANS OF EVACUATION WILL BE ALONG THE SOUTHERN HALLWAY AND THROUGH THE EAST DOOR.

KEYED NOTES:

- FIRE EXTINGUISHER

1 / X-103 EVACUATION PLAN
1/8" = 1'-0"

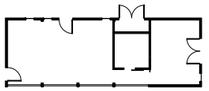
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/8" = 1'-0"

DRAWN BY	CHECKED BY
JNG	KPM

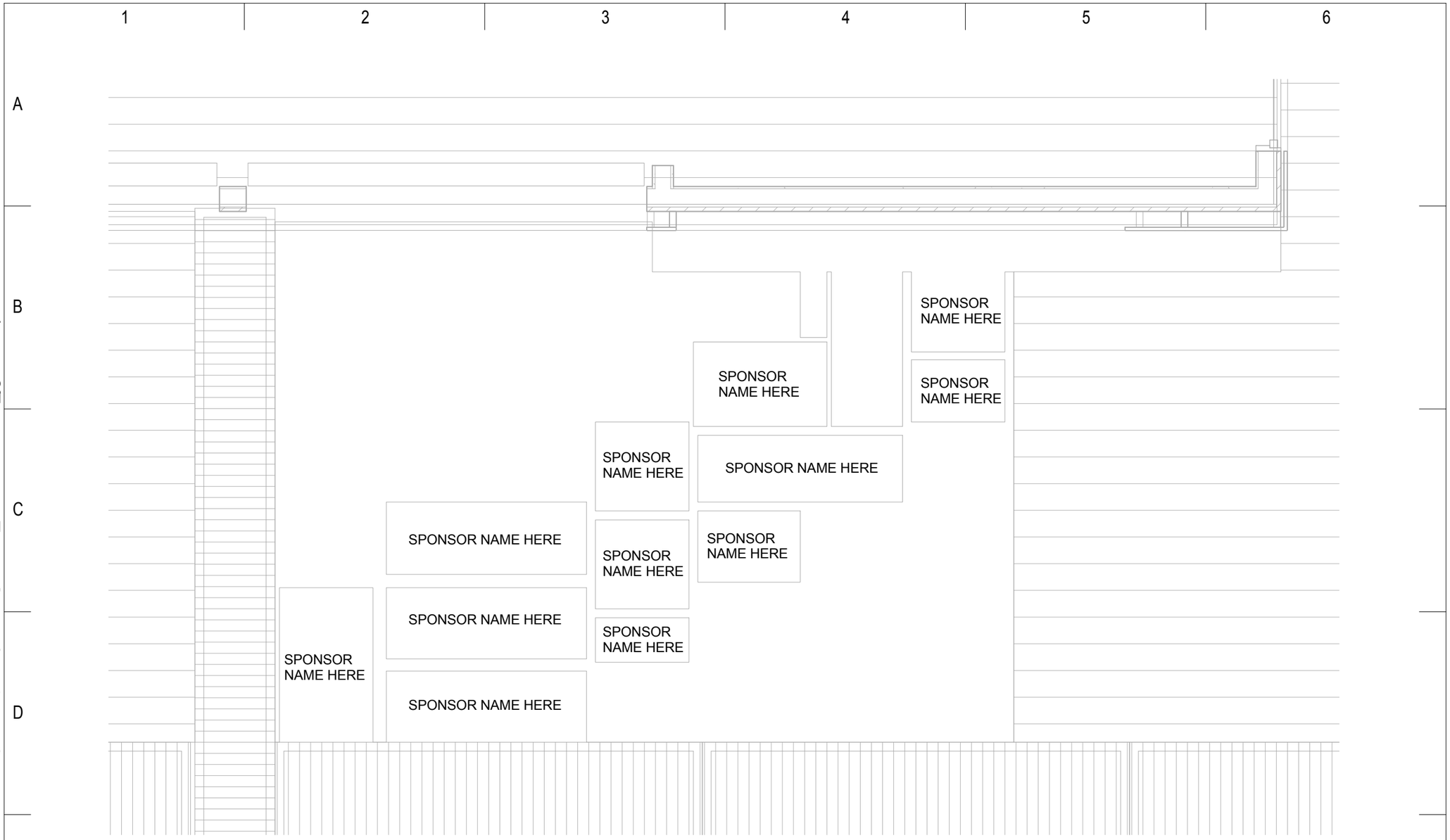
DRAWING STATUS
CD SET

NATURAL FUSION

X-103 EVACUATION PLAN

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE
1855



1 / X-104 PATHWAY TO THE FUTURE
NTS

GENERAL NOTES:
1. SPONSOR NAMES WILL NOT BE LOCATED IN THE PATHWAY WHILE THE HOUSE IS ON THE MALL.
2. SPONSORS TO BE SHOWN WILL HAVE DONATED $5,000 OR MORE.

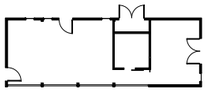
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

DRAWN BY JNG
CHECKED BY KPM

DRAWING STATUS
CD SET

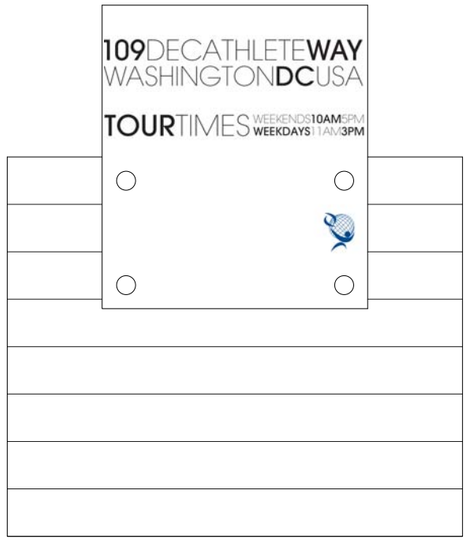
NATURAL FUSION

PATHWAY TO THE FUTURE

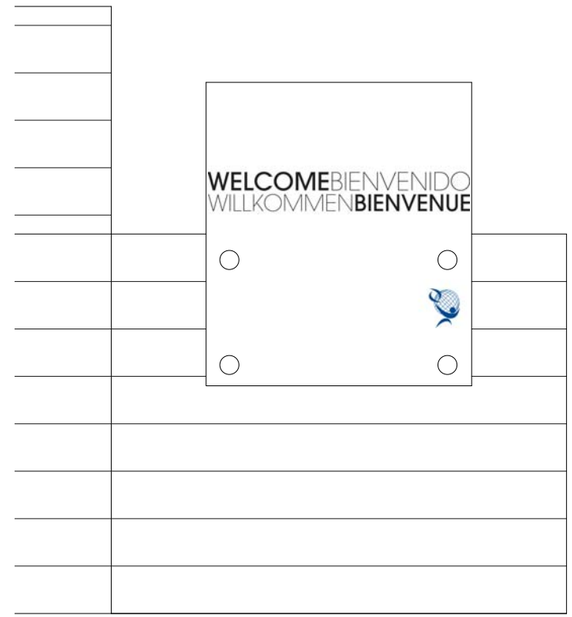
X-104

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

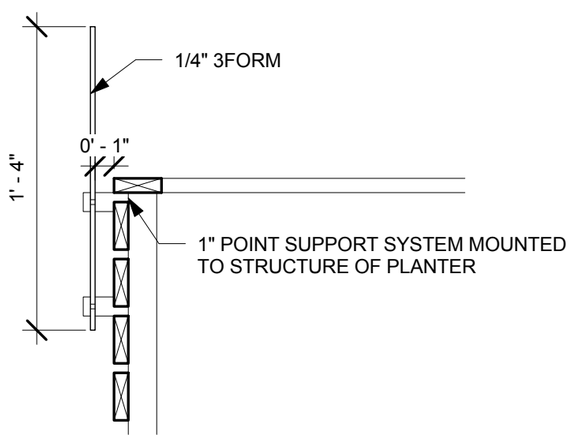
PENNSTATE
1855



1 X-501 SIGN A ELEVATION
1 1/2" = 1'-0"



3 X-501 SIGN B ELEVATION
1 1/2" = 1'-0"



2 X-501 SIGN A & B SECTION
1 1/2" = 1'-0"

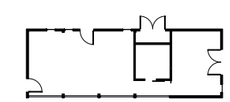
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



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

JNG DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

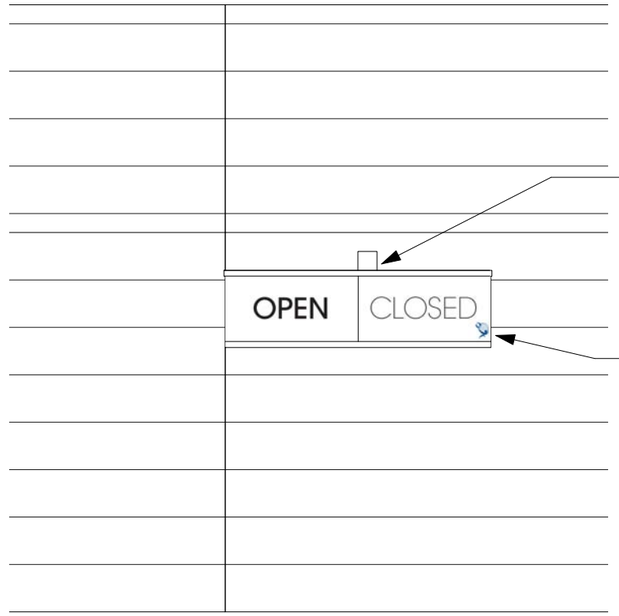
NATURAL FUSION

SIGNS A & B DETAILS

X-501

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855

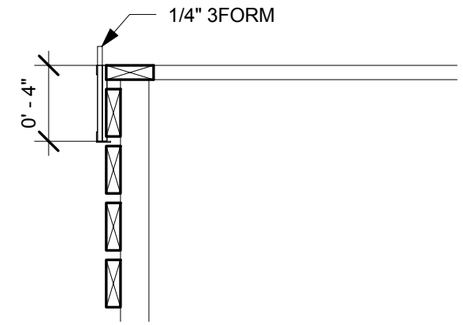


SLIDER IS MADE OF 3FORM, REVEALS TOUR STATUS OF HOUSE

SOLAR DECATHLON LOGO IS ON SLIDER TO REMAIN VISIBLE REGARDLESS OF TOUR STATUS

1 X-502 SIGN C ELEVATION
1 1/2" = 1'-0"

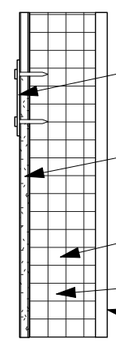
0' 1.5" 3" 6" 1'



2 X-502 SIGN C SECTION
1 1/2" = 1'-0"

0' 1.5" 3" 6" 1'

RECLAIMEDCHALKBOARDS
FROM MOSAIC OF RECYCLED MATERIALS FORMS THE HEADBOARD FOR THE MASTER BED



4 X-502 SIGN D SECTION
1 1/2" = 1'-0"

0' 1.5" 3" 6" 1'

3 X-502 SIGN D ELEVATION
3" = 1'-0"

0' 1.5" 3" 6" 1'

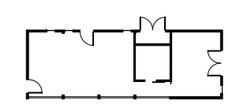
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
As indicated

DRAWN BY JNG
CHECKED BY KPM

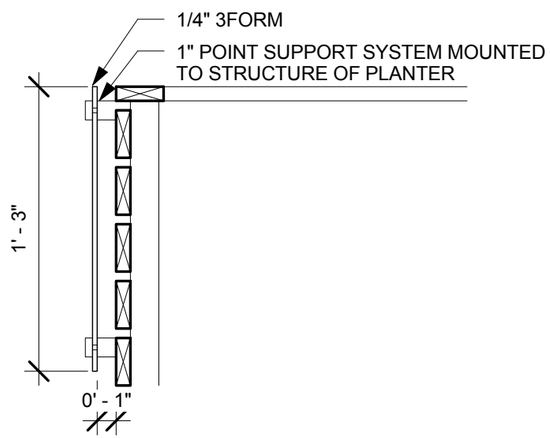
DRAWING STATUS
CD SET

NATURAL FUSION

X-502 SIGN C & D DETAILS

PENNSTATE 1855

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt



1 X-503 SIGN E SECTION
1 1/2" = 1'-0"

0' 1.5" 3" 6" 1'

2 X-503 SIGN E ELEVATION
1 1/2" = 1'-0"

0' 1.5" 3" 6" 1'

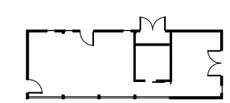
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



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

JNG DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

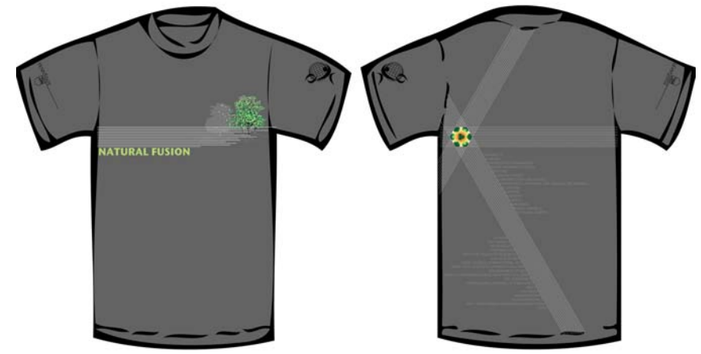
X-503 SIGN F DETAILS

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855

MEN'S FRONT WOMEN'S FRONT BACK

1 X-504 SHIRT DETAILS
NTS



FRONT BACK

2 X-504 T-SHIRT DETAILS
NTS

JACKET FRONT JACKET BACK

3 X-504 JACKET DETAILS
NTS

DESIGN TEAM
NATURAL FUSION

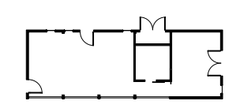
CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

NATURAL FUSION

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1/2" = 1'-0"

JNG DRAWN BY
KPM CHECKED BY

DRAWING STATUS
CD SET

X-504 SHIRT DETAILS

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855

PENNSTATE

Natural Fusion Sponsorship Form

Our 2009 success depends on you!

Mountain Laurel	$100,000	Potential Naming Rights of Systems & Rooms
Eastern Hemlock	$50,000	Exclusive D.C. Media Events at the Decathlon
Red Oak	$25,000	Team Photo Album
Witch-hazel	$10,000	Your Name/Logo on our Official T-Shirt
Aster	$5,000	Name on Brick in the "Pathway to the Future"
Iris	$1,000	Thank You Gift
Black-Eyed Susan	$500	Official Team Photo
Love Fern	$100	Name Listed on Web Site

*All levels of sponsorship also receive the gifts of subsequent levels.

Questions?
Jeffrey Brownson, Faculty Director
814.865.8473
nanomech@psu.edu

Mailing Address
Penn State Solar Decathlon 2009
212 Hosler Building
University Park, PA 16802

Thank You For Your Support!

All contribution are tax deductible – PSU Tax ID #24-6000376.

Please Provide the Following

Contact Name _____
Address _____
City _____ State _____ Zip _____
Email Address _____

I/We would like to make a gift of $_____ (see above for levels and description)
_____Please provide an invoice for the amount above
_____My company's matching gift form is enclosed. For information on companies that match employee gifts, please visit this site: www.matching.psu.edu

Give by Check
Make Check Payable to "PENN STATE" enclosed with "Solar Decathlon--XCMSX" in the *Memo*

Give by Credit Card
Make your gift online, by going to www.GiveNow.PSU.edu. Be sure to select *Other* and type "Solar Decathlon--XCMSX" in the *Additional Information* line.

Penn State is committed to affirmative action, equal opportunity, and the diversity of its workforce. U.Ed. EMS 09-92

NOTES:
1. WRITTEN IN COOPERATION WITH CORPORATE AND FOUNDATION RELATIONS

PENNSTATE

DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN

SCALE

DRAWN BY JNG
CHECKED BY KPM

DRAWING STATUS
CD SET

NATURAL FUSION

X-505 SPONSORSHIP FORM

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

Penn State Solar Decathlon
2009 Team

NATURAL FUSION

PENNSTATE

SOLAR DECATHLON

Let's Make a Difference with the Sun

The Solar Decathlon is a biannual international competition for university students and faculty to design, build, and operate a home powered by the sun. The event is sponsored by the United States Dept. of Energy and will culminate in October of 2009. Unlike other solar events, all materials and technologies used will be commercially available, and the public is invited to explore the potential of solar power, energy efficiency, and integrative design.

10 Contests: Architecture, Market Viability, Engineering, Lighting, Communications, Comfort Zone, Hot Water, Appliances, Home Entertainment, and Net-Metering.

Brighter & Better: Penn State's 2nd Decathlon

Previously in 2007, MorningStar Pennsylvania was Penn State's Solar Decathlon debut and took 4th place! Our success has established a great foundation for the new 2009 challenge.

PVNews: Editors Choice - Nov. 2007

"The competition's official winner was ... Technische Universität Darmstadt ... Visiting all the homes however, the team favored by *PVNews* was the one from Penn State ... While performing very well across all of the technical categories, *there was still something less tangible but very special about being in the Penn State home."*

For 2009, the Natural Fusion project will expand on this compliment and present another breathtaking experience.

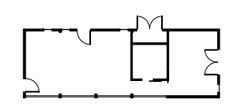
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

DRAWN BY: JNG
CHECKED BY: KPM

DRAWING STATUS
CD SET

NATURAL FUSION

FUNDRAISING PACKET P. 1, 2

X-506

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855

Natural Fusion

the holistic integration of elements

Solar Powered Home

Shelter is a basic need for people, and the design of a living space involves more than four walls and a roof. Our home will receive all electricity, heat, and light from the Sun. The home will be connected to a beautiful landscape environment, establishing a balance of livability and adaptability within form.

"Last time, we attracted so many birds and butterflies [in our gardens], that people actually asked us if we hired them."
- Sarah Klinetob, Market Viability & Outreach

The Sun for a Sustainable Home

The Sun is our closest star and a major driving force for life and technology on Earth. The Sun provides thousands of terawatts of power to the Earth's surface. No other resource in the world can provide this much power. We view humanity's interaction with the Sun as a natural fusion of elements. Applying human innovation to create a welcoming home is a part of that fusion.

Integrative Elements

Natural Fusion unites design and engineering, and energy demands are balanced against our solar resource. Other elements are needed within a house to provide functionality. Green materials and technologies are used to help sustain the balance between the environment and human interaction, forming an ecologically restorative home that is economically feasible for the average consumer.

We Are... Natural Fusion

Penn State Solar Decathlon 2009

Project development is occurring in a multidisciplinary environment, with students and faculty participating from every college in the University. Our team uses *integrative design* to achieve a net-zero energy balance, and to optimize our system design. Natural Fusion has an equal number of males and females, as well as undergraduate, graduate, and faculty contributing to the dynamics of the team. We develop ideas from different perspectives and meet weekly.

Our diverse team partners with industry mentors and a modular housing manufacturer. In keeping with sustainability, modular housing methods provides economical homes, minimizes waste and energy use, and allow new technologies to be deployed.

As a community of 'worker bees', we aspire to provide a sustainable future.

- Agricultural Sciences
- Arts & Architecture
- Business
- Communications
- Earth & Mineral Sciences
- Education
- Engineering
- Health & Human Development
- Information Sciences & Technology
- Liberal Arts
- Science
- The Graduate School

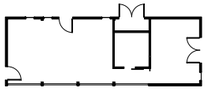
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

DRAWN BY	CHECKED BY
JNG	KPM

DRAWING STATUS
CD SET

NATURAL FUSION
FUNDRAISING PACKET P. 3, 4
X-507

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

PENNSTATE
1855

Experience Integrative Design

All members are encouraged to engage in multiple facets of the project to widen their horizons.

"I became an engineer under the illusion that I would avoid writing. Now I'm in charge of Communications, composing all the time (and I love it)."
- Gretchen Miller, Communications & PR

Advantages of Participation:

The Solar Decathlon is *not an academic experiment*. We are working with faculty and mentors to address a contemporary problem that is important to researchers, society, and industry.

Team Members are gaining practical knowledge of integrated design for future problem solving with innovative solutions.

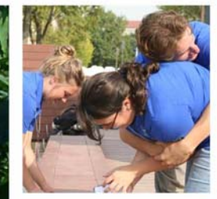
We all grow through our errors. When mistakes are made, progress continues for each of us, both personally and professionally.

Members are constantly being pushed beyond their comfort levels to become better ambassadors for Penn State, the Solar Decathlon, and most of all, for *solar power*.

Many of our efforts will expand into future courses and collaborative research projects beyond the competition.

In Good Company
The 2009 Decathletes:

Boston Architectural College & Tufts University
Cornell University
Iowa State University of Science and Technology
Missouri University of Science and Technology
The Ohio State University
The Pennsylvania State University
Rice University
Santa Clara University & California College of the Arts
Technische Universität Darmstadt
Universidad de Puerto Rico
Universidad Politécnica de Madrid
The University of Arizona
University of Calgary, SAIT Polytechnic, & Mount Royal College
University of Illinois at Urbana-Champaign
University of Kentucky
University of Louisiana at Lafayette
University of Minnesota
University of Waterloo & Ryerson University & Simon Fraser University
University of Wisconsin-Milwaukee
Virginia Polytechnic Institute and State University



Please Sponsor Us:
Our 2009 success depends on you!

The impact of the Solar Decathlon and product visibility has *grown* throughout the World:

2007: 200,000 visitors, with exposure to more than 650 Million
2009: 500,000 visitors are expected, with anticipated exposure to more than 1 Billion

Through your sponsorship, we will have the opportunity to discover new and innovative approaches to spur both the modern energy markets and residential construction. Together, we will exhibit our home to millions of people.
Your support shows a dedication to developing solutions to energy challenges and a sustainable lifestyle for us all.

If you want to become a sponsor, please send the following information to the address below.

Contact/Company Name
Address, City, State, Zip Code
Phone Number & Email Address
Sponsorship Amount

Contact:

Jeffrey R. S. Brownson
Faculty Director
212 Hosler Building
University Park, PA 16802
814.865.8473
nanomech@psu.edu

Checks Payable to:

Pennsylvania State University

Please Use the Memo:
Solar Decathlon--XCMSX

Help us take the Solar Decathlon one step further.

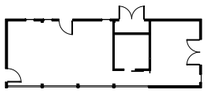
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

DRAWN BY: JNG
CHECKED BY: KPM

DRAWING STATUS
CD SET

NATURAL FUSION
FUNDRAISING PACKET P. 5, 6
X-508

PENNSTATE

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

Levels of Partnership

Mountain Laurel	$100,000	Potential Naming Rights of Systems & Rooms
Eastern Hemlock	$50,000	Exclusive D.C. Media Events at the Decathlon
Red Oak	$25,000	Team Photo Album
Witch-hazel	$10,000	Your Name/Logo on our Official T-Shirt
Aster	$5,000	Name on Brick in the "Pathway to the Future"
Iris	$1,000	Thank You Gift
Black-Eyed Susan	$500	Official Team Photo
Love Fern	$100	Name Listed on Web Site

*All levels of sponsorship also receive the gifts of subsequent levels.

"Pathway to the Future"

For a donation of $5,000 or more, your name will be engraved on a brick in the "Pathway to the Future." This pathway will lead up to the Natural Fusion house when it is placed in its final location.

Thank You For Your Support!

All contribution are tax deductible – PSU Tax ID #24-6000376.

Penn State is committed to affirmative action, equal opportunity, and the diversity of its workforce.
U.Ed. EMS 09-91

NATURAL FUSION

Penn State Solar Decathlon
2009 Team
212 Hosler Building
University Park, PA 16802

solar.psu.edu

DEPARTMENT OF ENERGY · UNITED STATES OF AMERICA

NREL

PENNSTATE 1855

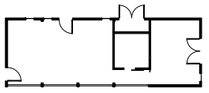
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

DRAWN BY	CHECKED BY
JNG	KPM

DRAWING STATUS
CD SET

NATURAL FUSION

X-509 FUNDRAISING PACKET P. 7, 8

PENNSTATE

SOLAR DECATHLON 2009

NATURAL FUSION

Project Milestone Schedule

Spring

PBS Constructs House Module

Inaugural Construction Celebration
April 18

Construction
Facade
MEP Components Install
Fit-Out Module

Summer

Construction
Pre-Assembly
Commissioning
Detailed Competition Assembly Planning
Dis-Assembly

Testing & Balancing

Fall

Transport to Washington, D.C.

Competition
Construction - October 1-7
Opening Ceremony & VIP Tours - October 8
Public Tours - October 9-13 & 15-18
Awards Ceremony - October 16
Dis-Assembly - October 18-21

Dis-Assemble & Transport to Site

Any questions or concerns, contact Brian Goodykoontz via telephone: **585.269.9551** or e-mail: **bwg5000@psu.edu**.

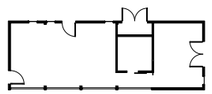
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE

DRAWN BY: JNG
CHECKED BY: KPM

DRAWING STATUS
CD SET

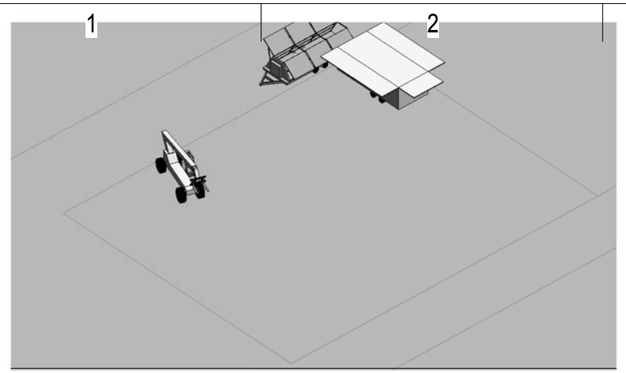
NATURAL FUSION

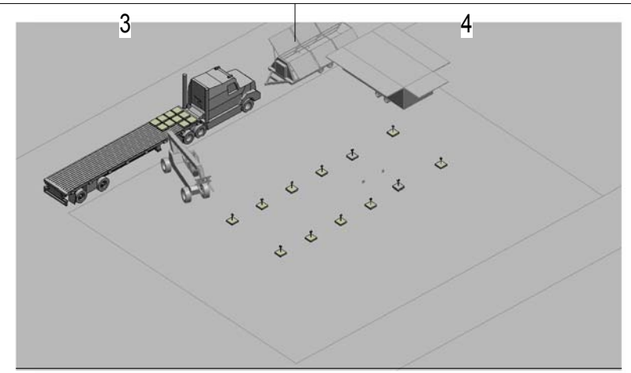
X-510 MILESTONES

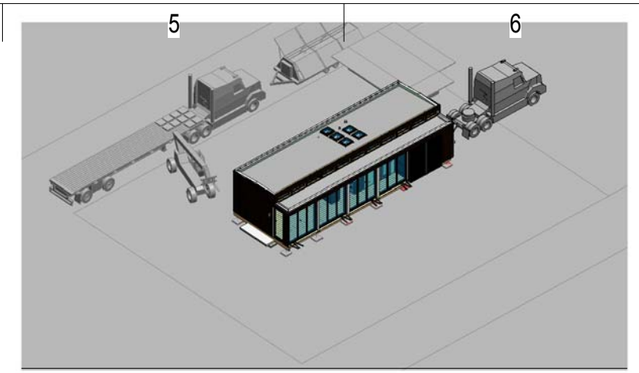
C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_jgawthrop-File.rvt

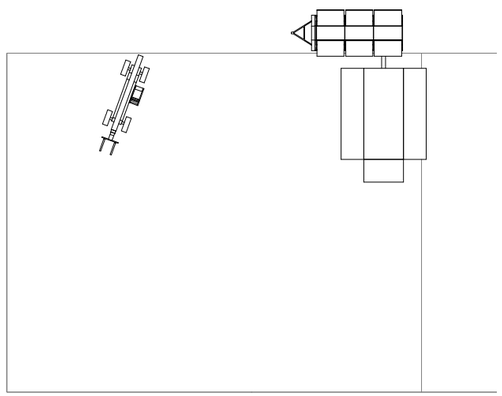
PENNSTATE

C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_Local-File.rvt

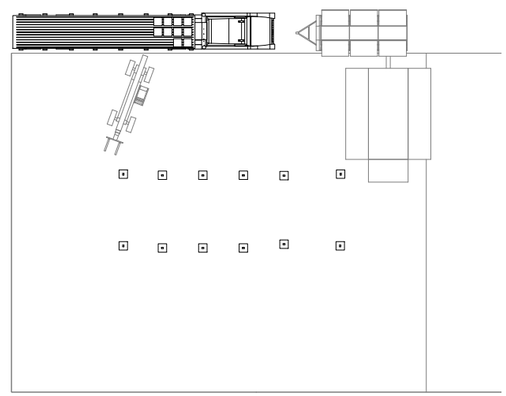




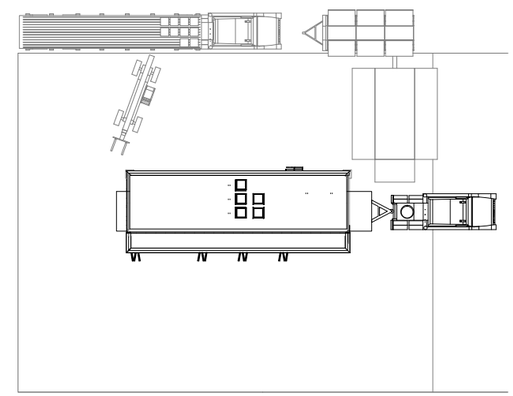




1B STEP 1 - PLAN
1" = 30'-0"

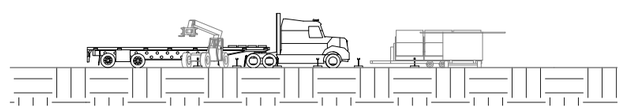


1 STEP 2 - PLAN
1" = 30'-0"

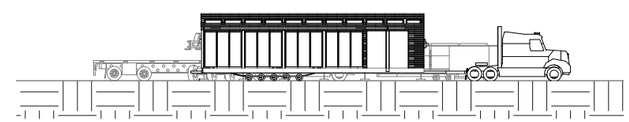


2 STEP 3 - PLAN
1" = 30'-0"

1C STEP 1 - ELEVATION
1" = 30'-0"



5 STEP 2 - ELEVATION
1" = 30'-0"



3 STEP 3 - ELEVATION
1" = 30'-0"

STEP 1: MOBILIZATION
- TOOL TRAILER ARRIVES
- TELESCOPING FORKLIFT ARRIVES

STEP 2: FOUNDATION SYSTEM
- LAYOUT FOUNDATION PAD LOCATIONS
- FLATBED TRUCK 1 ARRIVES
- UNLOAD AND SET FOUNDATION PADS
- SET EXTERIOR JACKS

STEP 3: HOUSE MODULE SET
- ARRIVAL OF SET CREW
- PBS LOWBOY ARRIVES
- GROUND MATS PLACED
- JACK HOUSE UP AND PULL CARRIER OUT
- PBS LOWBOY DEPARTS
- PLACE INTERIOR JACKS AND PADS, LOWER, & LEVEL HOUSE
- BOLT ALL CONNECTIONS

N

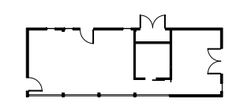
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1" = 30'-0"

BWG | KPM
DRAWN BY | CHECKED BY

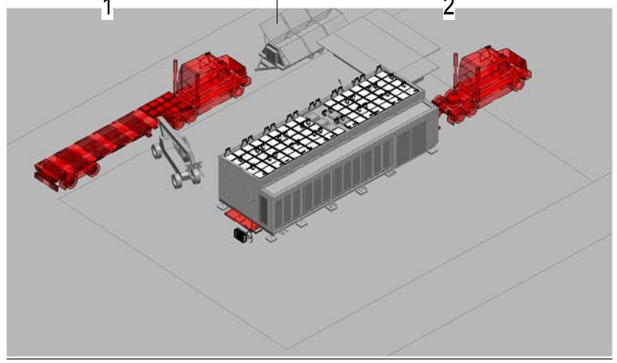
DRAWING STATUS
CD SET

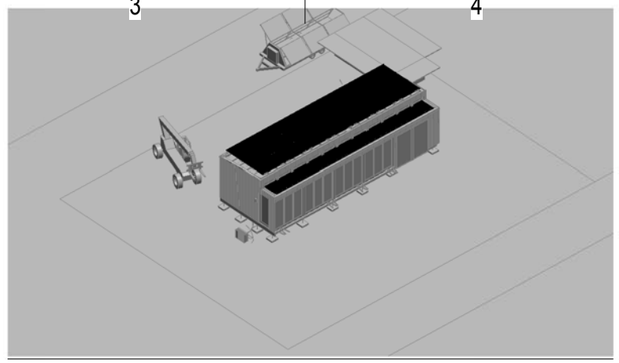
NATURAL FUSION

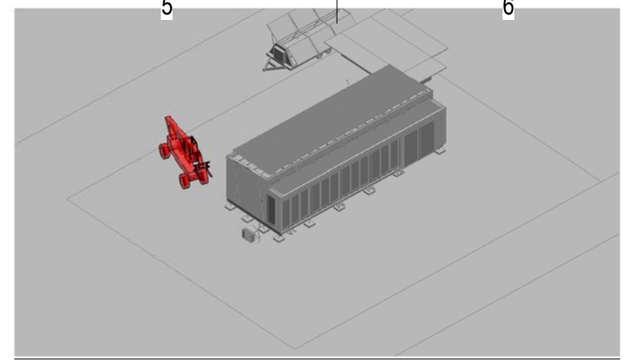
MALL ASSEMBLY

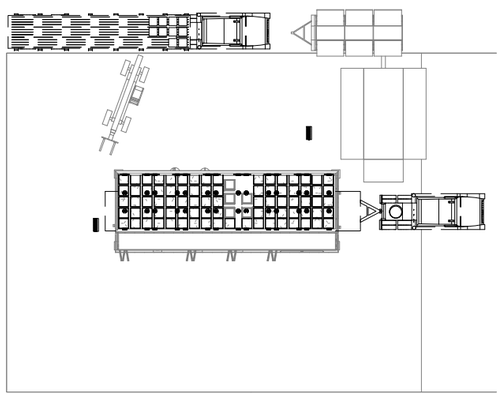
O-701

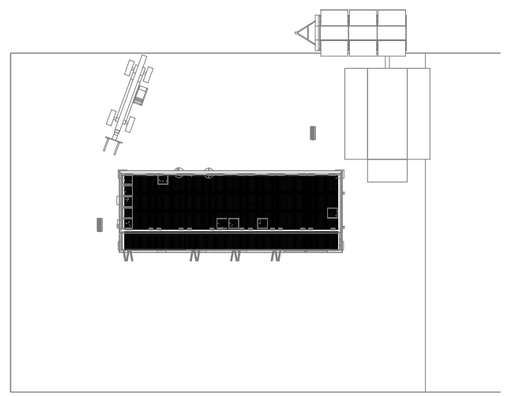
PENNSTATE
1855

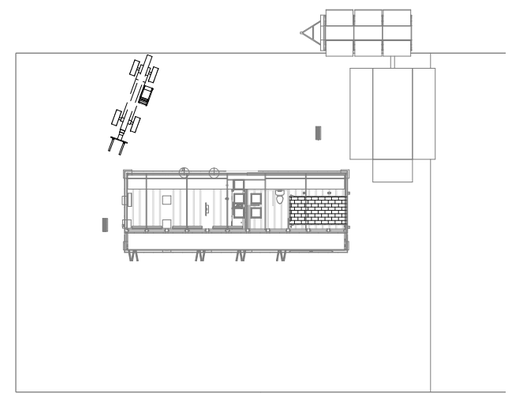








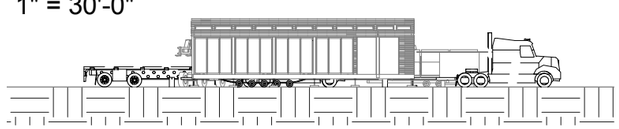


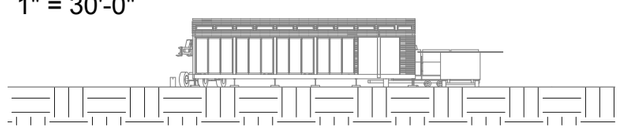


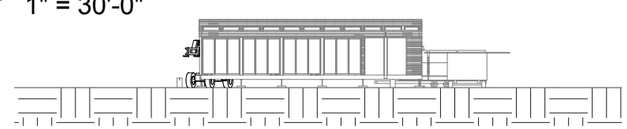
4 STEP 4 - PLAN
1" = 30'-0"

5 STEP 4.1 - PLAN
1" = 30'-0"

6 STEP 5 - PLAN
1" = 30'-0"







1 STEP 4 - ELEVATION
1" = 30'-0"

STEP 4: INSTALL GREEN ROOF AND MEP
- BOX TRUCK 1 ARRIVES
- INSTALL GREEN ROOF W/FORKLIFT
- INSTALL ROOF PVS

2 STEP 4.1 - ELEVATION
1" = 30'-0"

STEP 4.1: INSTALL ME COMPONENTS
- INSTALL ROOF PVS
- INSTALL FAN COIL UNITS

3 STEP 5 - ELEVATION
1" = 30'-0"

STEP 5: INSTALL WATER TANKS
- FLATBED 2 ARRIVES
- SET WATER TANKS
- INSTALL PIPING

N

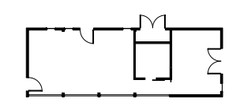
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1" = 30'-0"

BWG | KPM
DRAWN BY | CHECKED BY

DRAWING STATUS
CD SET

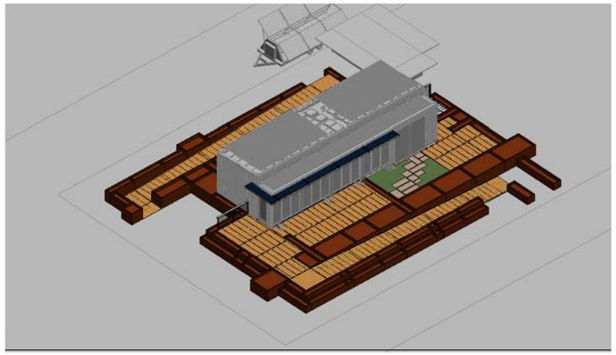
NATURAL FUSION

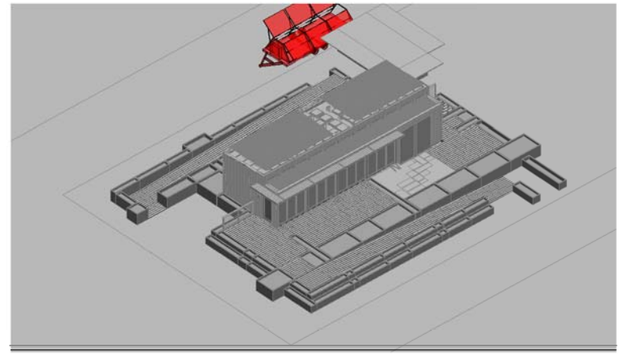
MALL ASSEMBLY

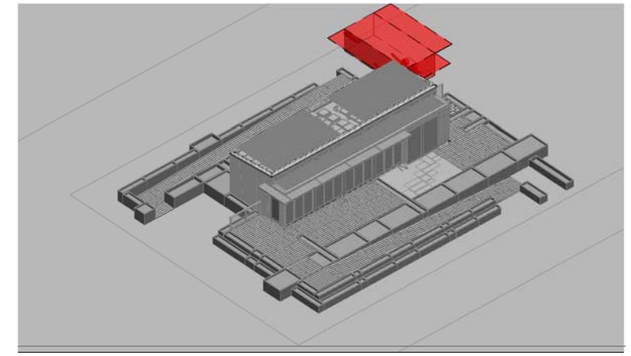
O-702

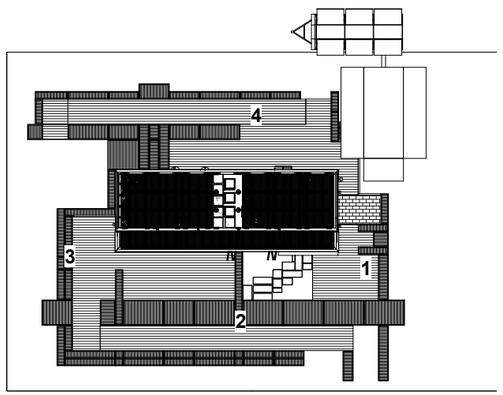
C:\Users\Temporary Local Storage\Temporary Storage\PSU_Natural-Fusion_Local-File.rvt

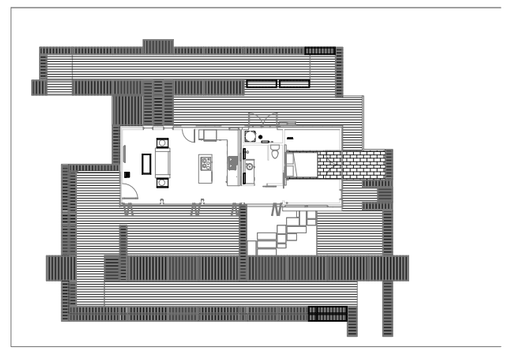
PENNSTATE

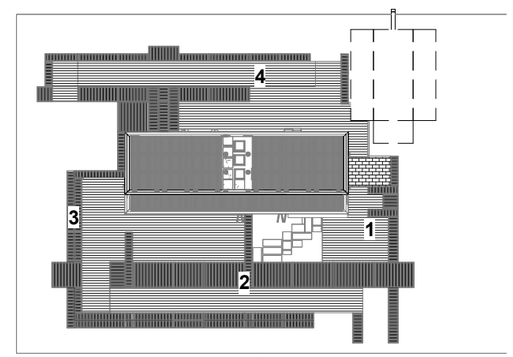








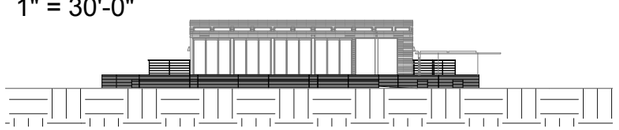


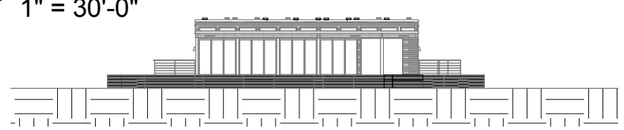


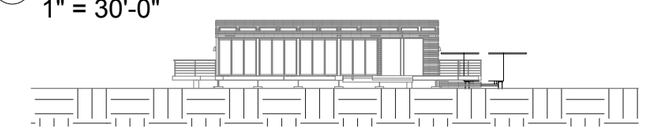
4 STEP 5.1 - PLAN
1" = 30'-0"

5 STEP 6 - PLAN
1" = 30'-0"

6 STEP 7 - PLAN
1" = 30'-0"







1 STEP 5.1 - ELEVATION
1" = 30'-0"
STEP 5: INSTALL HARDSCAPE ELEMENTS
- INSTALL DECKING AND PLANTER BOXES
- INSTALL AWNING
- FORKLIFT DEPARTS

2 STEP 6 - ELEVATION
1" = 30'-0"
STEP 6: INTERIOR ELEMENTS
- BOX TRUCK 3 ARRIVAL
- UNLOAD & PLACE FURNITURE
- UNLOAD AND PLACE ELECTRONICS
- UNLOAD AND PLACE KITCHENWARE

3 STEP 7 - ELEVATION
1" = 30'-0"
STEP 7: LANDSCAPING ELEMENTS
- LANDSCAPING TRUCKS ARRIVE
- 1 - SCENSE GARDEN INSTALLED
- 2 - XERISCAPE MEADOW AND BIO-COLUMN
- 3 - WILDLIFE GARDEN INSTALLED
- 4 - BIO-INTENSIVE GARDEN INSTALLED
- LANDSCAPING TRUCKS DEPART

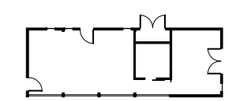
DESIGN TEAM
NATURAL FUSION

CLIENT
SOLAR DECATHLON 2009
DEPT. OF ENERGY, NREL

DEVELOPERS
PENN STATE
UNIVERSITY PARK, PA

Issue	Date	Description
3RD	06.02.2009	FINAL CD SUBMISSION

KEY PLAN



SCALE
1" = 30'-0"

BWG	KPM
DRAWN BY	CHECKED BY

DRAWING STATUS
CD SET

NATURAL FUSION

O-703 MALL ASSEMBLY

\\ems-fritts.ems.psu.edu\shared\[RVT] Model\PSU_Natural-Fusion_6.1.rvt

PENNSTATE