

Deliverables June 2nd
Final Construction Drawings

Table of Contents

General

G - 101 - Cover Sheet	-
G -102 - Table of Content	-
G - 103 - Table of Content	-
G - 104 - Table of Content	-
G - 105 - Table of Content	-
G - 201 - Design Concept	-
G - 202 - Strategies Of Energy Use	-
G - 203 - Sustainable Design	-
G - 204 - Symbols And Notes	-
G - 301 - Abbreviations	-
G - 401 - Target Market Description	-
G - 501 - Exterior Rendering - South East	-
G - 502 - Exterior Rendering - South West	-

Civil1:100

C - 201 - Site	
C - 301 - Grading	1:50

Lanscape

L - 111 Symbols and Notes	1:50
L - 211 Grading	
L - 321 Secondary Construction	1:100
L - 322 Planking	
L - 351 Deck Construcion Detail	1:100
L - 411 Lighting Design	1:100
L - 511 Planting	
L - 641 Elevation - North East	1:50
L - 642 Elevation - South West	1:50
L - 711 Schedules - Landscape	-
L - 712 Schedules - Landscape	-
L - 713 Schedules - Landscape	-
L - 714 Schedules - Landscape	-

Structural - General

S -101 - General Notes	-
------------------------	---

S -102 - General Notes	-
S -103 - General Notes	-
S -104 - General Notes	-

Structural - Plans

S - 201 - Roof Framing	1:50
S - 202 - Upper Wall Framing	1:50
S - 203 - 2nd Floor Framing	1:50
S - 204 - Floor Framing	1:50
S - 205 - Platform Framing	1:50
S - 206 - Foundation Plan	1:50

Structural - Sections

S - 301 - Longitudinal Section	1:50
S - 302 - Cross Section	1:50
S - 303 - Cross Section	1:50

Structural - Elevations


S - 401 - Wall Construction North	1:50
S - 402 - Wall Construction East	1:50
S - 403 - Wall Construction South	1:50
S - 404 - Wall Construction West	1:50
S - 405 - Wall Sheathing North	1:50
S - 406 - Wall Sheathing East	1:50
S - 407 - Wall Sheathing South	1:50
S - 408 - Wall Sheathing West	1:50


Structural - VIP


S - 421 - VIP Floor Plan	1:50
S - 422 - VIP Roof Plan	1:50
S - 441 - VIP Plan North	1:50
S - 442 - VIP Plan East	1:50
S - 443 - VIP Plan South	1:50
S - 444 - VIP Plan West	1:50
S - 451 - VIP Structure	1:7
S - 461 - Schedules - VIP	-

Structural - Details

S - 511 - Wall to Roof Connection E-W	1:5
S - 512 - Wall to Roof Connection	1:5
S - 513 - Post to Beam Connection	1:5
S - 521 - Module Connection	1:5
S - 522 - Module Connection S-E Corner	1:5
S - 523 - Module Connection S-W Corner	1:5
S - 524 - Module Connection N-W & N-E Corner	1:5
S - 525 - Built-up Column GL 5 North	1:10
S - 526 - Built-up Column GL 8 North	1:10
S - 527 - Built-up Column GL 12 North	1:10
S - 528 - Built -up Column GL F East	1:10
S - 529 - Built-up Column GL 8 South	1:10
S - 530 - Built-up Column GL 12 South	1:10
S - 531 - Built-up Column GL F West	1:10
S - 532 - Roof to Wall Connection Z-Section	1:10
S - 533 - Module Connectors @ Corner	1:5
S - 534 - Module Connectors @ Corner	1:5
S - 535 - Typ- Module Connectors	1:5
S - 541 - Steel Edge to Wall Connection	1:5
S - 542 - Connection Details of Second Floor	1:5
S - 543 - 2nd Floor Edge Angle to Wood Post Connection	1:5
S - 544 - 2nd Floor Connection @ Split of Building	1:5
S - 545 - 2nd Floor Opening for Mechanical	1:5
S - 546 - L- section 2nd oor North	1:20
S - 547 - L- section 2nd oor South	1:20
S - 548 - 2nd oor to East wall connection South	1:20
S - 549 - 2nd oor to East wall connection center	1:5
S - 550 - 2nd oor to East wall connection North	1:10
S - 551 - 2nd oor to North & South wall connection	1:20
S - 552 - Holdown Anchor SW Corner	1:10
S - 553 - Central Wood Base	1:10
S - 554 - Northern Wood Base	1:10
S - 555 - Holdown Anchor SE Corner	1:5
S - 556 - Holdown anchor SE corner	1:5
S - 557 - Details Holdown Anchor	1:5
S - 561 - Wall to Floor Connection (West)	1:5
S - 562 - Section - Platform Connection	1:5



Project

Constructor

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn CR | SM

Issued 06/01/09

Last index

Component
General

Description
Table of Content

Project #

Scale

dwg #

P 140

G - 102

Table of Contents

S - 563 - Connection of Steel Beam to Wall	1:5
S - 564 - Platform Module Connection	1:5
S - 565 - Temp - Bracing @ Platform Connection	1:5
S - 566 - Steel Beam to Wall Connection GL 11	1:5
S - 567 - Detail - Platform Connection GL 11	1:5
S - 568 - Section - Steel Beam @ Stairs	1:5
S - 569 - Steel Beam @ Ramp	1:5
S - 570 - Post to Steel Beam Connection	1:5
S - 571 - Platform Beam Connection	1.5
S - 572 - HEA 1	1:20
S - 573 - HEA 2	1:20
S - 574 - HEA 3	1:20
S - 575 - HEA 4	1:20
S - 576 - Steel Plate SB2 East & West Wall	1:5
S - 577 - Steel Plate SB1 North & South Wall	1:5
S - 578 - 2nd Floor Temp- Steel Post	1:20

Structural - Transport

S - 611 - Axonometry Lower North Module	1:50
S - 612 - Axonometry Lower South Module	1:50
S - 613 - Axonometry Upper North Module	1:50
S - 614 - Axonometry Upper South Module	1:50
S - 621 - Floor Plan Lower Modules	1:50
S - 622 - Floor Plan Upper Modules	1:50
S - 631 - Longitudinal Section E-W	1:50
S - 632 - Longitudinal Section W-E	1:50
S - 633 - Cross Section N-S	1:50
S - 634 - Cross Section S-N	1:50
S - 651 - Typ- Trans- Brace To Wall Connection	1:5
S - 652 - Trans- Brace To Roof Connection	1:5
S - 653 - Trans- Brace To Platform Connection	1:5
S - 654 - Threaded Rod To Roof Connection	1:10
S - 655 - Cable To Wall Connection	1:5
S - 656 - Becket to Platform Connection West	1:10
S - 657 - Becket to Platform Connection East	1:10
S - 660 - Anchor Overview	1:100
S - 661 - Trans- Brace Manufacturer Spec-	-
S - 662 - Becket Manufacturer Spec-	-
S - 663 - Cable & Tightener Manufacturer Spec-	-

S - 664 - Trans- Brace Platform Anchor West	1:5
S - 665 - Trans- Brace Platform Anchor West Rotated	1:5
S - 666 - Trans- Brace Platform Anchor East	1:5
S - 667 - Trans- Brace Platform Anchor East Rotated	1:5
S - 668 - Trans- Brace East & West Wall Anchor	1:5
S - 669 - Trans- Brace North Wall Anchor	1:5
S - 670 - Trans- Brace Module Bonding Anchor	1:5
S - 671 - Trans- Brace South Wall Anchor#	1:5
S - 672 - Trans- Brace & Cable Anchor West Wall	1:5
S - 673 - Trans- Brace Roof Anchor	1:5
S - 674 - Trans- Brace Roof Anchor Rotated	1:5
S - 675 - Cable East Wall Anchor	1:5
S - 676 - Threaded Rod	1:10
S - 677 - Schedule - Transport	-
S - 678 - Schedule - Transport	-
S - 679 - Schedule - Transport	-

Structural - Traverse

S - 711 - Floor Plan Traverse	1:20
S - 712 - View From Below Traverse	1:20
S - 713 - Exploded Drawing	1:20
S - 714 - Axonometry Traverse	-
S - 715 - Schedules - Temporary Construction	-

Architectural - Plans

A - 221 - Floorplan	1:50
A - 222 - 1stFloor	1:50
A - 223 - Minimum Conditioned Space	1:50
A - 224 - Maximum Architectural Footprint	1:50
A - 225 - Moveable Components Shading Deck	1:100

Architectural - Elevations

A - 311 - Elevation North	1:50
A - 312 - Elevation East	1:50
A - 313 - Elevation South	1:50
A - 314 - Elevation West	1:50

Architectural - Sections


A - 431 - Longitudinal Section - North	1:50
A - 432 - Longitudinal Section - South	1:50
A - 433 - Cross Section - East	1:50
A - 434 - Cross Section - West	1:50

Architectural - Details - Windows


A - 510 - Key Plan Windows	1:100
A - 511 - Key Plan Windows	1:100
A - 520 - Window Elevation North	1:50
A - 521 - Window Elevation East	1:50
A - 522 - Window Elevation South	1:50
A - 523 - Window Elevation West	1:50
A - 540 - Window N1 Overview	1:20
A - 541 - Window N1 Detail 1	1:20
A - 542 - Window N1 Detail 2	1:20
A - 545 - Window N2 Overview	1:20
A - 546 - Window N2 Detail 1	1:20
A - 550 - Window N3 Overview	1:20
A - 551 - Window N3 Detail 1	1:5
A - 552 - Window N3 Detail 2	1:2
A - 553 - Window N3 Lamella	-
A - 580 - Window SW1 Overview	1:20
A - 581 - Window SW1 Detail 1	1:5
A - 582 - Window SW1 Detail 2	1:5
A - 595 - Schedules - Windows	-
A - 596 - Schedules - Opening Sun Control Devices	-

Architectural - Details - PV Mounting


A - 711 - PV Façade Elements	-
A - 712 - Mounting Cramp	1:1
A - 713 - Gusset Plate	1:2
A - 714 - PV-Module	1:5
A - 715 - Acrylic Glass	1:5
A - 716 - Substructure - Components	1:10
A - 721 - Surface	1:100
A - 731 - Detail Façade - Roof	1:2



Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn CR | SM

Issued 06/01/09

Last index

Component

General

Description

Table of Content

Project #

Scale

dwg #

P 140

G - 103

Table of Contents

A - 741 - Detail Connection Façade - Window	1:2
A - 751 - Detail Façade - Deck	1:2
A - 761 - Detail Corner - Substructure	1:5
A - 771 - PV Wiring Type 1	-
A - 772 - PV Wiring Type 2	-
A - 781 - Schedules Façade	-

Architectural - Details - Roof

A - 810 - Key plan roof	1:50
A - 811 - Roof System - general	-
A - 831 - Sections Roof	1:20
A - 841 - Top View PV Modules	1:50
A - 842 - Top View PV Mounting System	1:50
A - 843 - Top View Drainage	1:50
A - 844 - Top View PV cable conduit	1:50
A - 851 - Detail roof system	1:2
A - 852 - Detail PV Mounting System Module Stoa	1:1
A - 853 - Detail PV fascia north-south	1:2
A - 854 - Detail drainage fascia north-south	1:2
A - 855 - Detail fascia east-west	1:2
A - 856 - Detail fall protection	1:5
A - 857 - Detail PV Mounting System section	1:1
A - 860 - Schedule - Roof 1	-
A - 861 - Schedule - Roof 2	-

Architectural - Details - Siding

A - 911 - Key Plan Elevations	1:75
A - 951 - Siding Detail Ceiling Floor	1:5
A - 952 - Siding Detail Cut	1:5
A - 953 - Siding Detail	1:5
A - 954 - Siding Schedules	-

Interiors - Living Space- General

I - 200 - Body - Furniture Interiorrendering	-
I - 201 - Body - Furniture Areas	-
I - 202 - Body - Furniture Structure Scheme	-
I - 203 - Body - Furniture Cabinet Body Materials	-

Interiors - Living Space- Plans

I-210 - Body-Furniture Floor Plan 1st Floor	1:50
I-211 - Body-Furniture Floor Plan 2nd Floor	1:50

Interiors - Living Space- Sections

I-220 - Body-Furniture Longitudinal Section South	1:50
I-221 - Body-Furniture Longitudinal Section North	1:50
I-222 - Detail Longitudinal Section North Storage	1:20
I-223 - Detail Elevation Longitudinal Section South	1:20
Stairs	
I-230 - Detail Body-Furniture Cross-Section Stairs	1:20

Interiors - Living Space- Elevations

I - 240 - Body -Furniture Elevations	1:50
I - 241 - Detail Elevation South Stairs	1:20
I - 242 - Detail Elevation North Storage	1:20

Interiors - Living Space- Staires

I - 270 - Stairs Stairs	1:50
I - 271 - Scheme Stairs Sections	1:20
I - 272 - Overview Handrail 2nd Floor	1:20
I - 273 - Overview Handrail Stairs	1:20
I - 274 - Steelprofile Steelstring Stairs	1:20
I - 275 - Steelprofile Handrail 2nd Floor North	1:5
I - 276 - Steelprofile Handrail 2nd Floor South	1:10
I - 277 - Steelprofile Handrail Stairs	1:10
I - 278 - Detail Steelprofile Handrail 2nd Floor and Stairs	1:2

Interiors - Living Space- Schedules

I - 280 - Schedules - Body Furniture	-
I - 281 - Schedules - Body Furniture	-
I - 282 - Schedules - Body Furniture	-

Interiors - Kitchen

I - 321 - Horizontal Section I	1:10
I - 322 - Horizontal Section II	1:10
I - 323 - Horizontal Section III	1:10
I - 331 - Vertical Section I	1:10
I - 332 - Vertical Section II	1:10
I - 341 - Elevation North	1:10
I - 342 - Elevation South	1:10
I - 351 - Technical Appliances I	1:10
I - 352 - Technical Appliances II	1:10
I - 353 - Schedules - Kitchen	-

Interiors - Bedroom

I - 411 - Concept Bedroom	-
I - 412 - Manual Bed	-
I - 421 - Floor Plan Bed	1:20
I - 431 - Longitudinal Section Bed	1:20
I - 432 - Across Section Bed	1:20
I - 451 - Construction Detail Bed	1:5
I - 452 - Ropes for Opening	1:5

Interiors - Bathroom

I - 510 - Concept	-
I - 521 - Floor Plan	1:20
I - 531 - Elevation North	1:20
I - 532 - Elevation East	1:20
I - 533 - Elevation South	1:20
I - 534 - Elevation West	1:20
I - 541 - Longitudinal Section	1:20
I - 551 - Detail Shower Tray	1:10
I - 561 - Schedules - Bathroom	-

Interiors - Flooring

I - 621 - Floor Plan level 0.5	1:50
I - 622 - Floor Plan level 1.5	1:50
I - 623 - Flooring Cable Conduit	1:50



Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

DrawnCR | SM

Issued06/01/09

Last index

Component
General

Description
Table of Content

Project #P 140

Scale

dwg #G - 104

Table of Contents

Cable Detail Cable Conduit	1:5
I - 652 - Detail Connection Wall / Window - Cable	1:5
I - 653 - Detail Connection Wall Level 0.0 + 1.5	1:5
I - 654 - Section - Stairs	1:5
I - 655 - Section - Ramp	1:5
I - 656 - Section Horizontale Module Cut Level 0.0	1:5
I - 657 - Section Horizontale Module Cut Level 0.5	1:5
I - 660 - Schedules - Flooring	-

Interiors - Renderings

-	-
I - 701 - Rendering	-
I - 702 - Rendering	-
I - 703 - Rendering	-

Fire - Protection

F - 111 - Symbols and Notes	-
F - 211 - Detection and Alarm	-
F - 311 - Suppression	-
F - 411 - Egress	-

Plumbing

P - 111 - Symbols and notes	-
P - 211 - Supply and Removal	-
P - 311 - Schematic Diagram	-
P - 411 - Water Supply	-
P - 421 - Water Supply	1:50
P - 431 - Water Supply	1:50
P - 511 - Waste Water Disposal	-
P - 521 - Waste Water Disposal	1:50
P - 531 - Waste Water Disposal	1:50
P - 541 - Waste Water Disposal	1:10
P - 551 - Waste Water Disposal	1:10
P - 611 - Schedules - Plumbing	-
P - 612 - Schedules - Plumbing	-

Mechanical - Energy Concept

M - 101 - Systems	-
M - 102 - Flow Of Energy	-
M - 103 - PCM System	-
M - 104 - Heat Pump	-
M - 105 - Energy Themes	-
M - 106 - Scheme Summer Day	-
M - 107 - Scheme Summer Night	-
M - 108 - Scheme Winter Day	-
M - 109 - Scheme Winter Night	-
M - 110 - Scheme Spring Day	-
M - 111 - Scheme Spring Night	-
M - 112 - Planning Tools	-
M - 113 - Energy Balance	-

Mechanical - Drawings

Floorplan	-
M - 211 - Heat Pump System Schematic Diagram	-
M - 221 - Heat Pump System And Distribution Floorplan	1:50
M - 222 - Heat Pump System And Distribution Section	1:50
M - 231 - Heat Pump System And Distribution	1:50

M - 271 - Heat Pump System And Distribution Isometric	1:50
M - 321 - Cooling Ceiling Section	1:50
M - 331 - Cooling Ceiling Section	1:50
M - 332 - Cooling Ceiling Section	1:20
M - 351 - Cooling Ceiling Detail	1:20

Mechanical - Schedules

M - 411 - Schedules - Mechanical	-
M - 412 - Schedules - Mechanical	-

Electric

E - 001 - Electrical Appliances And Installations	-
---	---

E - 002 - Building Automation - Utilization Concept	-
E - 121 - Electrical Appliances And Installations	1:50
E - 131 - Electrical Appliances And Installations	1:50
E - 132 - Electrical Appliances And Installations	1:50
E - 133 - Electrical Appliances And Installations	1:50
E - 141 - Placing Of Contest Sensors	1:50
E - 151 - Schedules - Electrical Appliances	-

Electric - Artificial Light


E-211 - Arti cial Lighting Concept	1:100
E-212 - Functional Lighting Plan Upper Level	1:50
E-213 - Functional Lighting Plan Lower Level	1:50
E-214 - Functional Lighting - Sections	1:50
E-215 - Functional Lighting Integration LED strip	-
E-216 - Lighting Renderings	-
E-217 - Accent Lighting Concept	1:50
E-218 - Accent Lighting Concept	-
E-219 - Atmospheric Lighting Concept	1:50
E-220 - Multifunctional Body Illumination	1:1
E-221 - Light Switch Concept	1:50
E-222 - Lighting Schedules	-

Electric- Electrical Cabinet Outside


E - 301 - Electrical Cabinet Outside 1	-
E - 302 - Electrical Cabinet Outside 1	-
E - 303 - Electrical Cabinet Outside 2	-
E - 304 - Electrical Cabinet Outside 2	-
E - 305 - Electrical Cabinet Outside 2	-
E - 306 - Electrical Cabinet PV Inverter Joint	-
E - 307 - Electrical Cabinet PV Inverter Joint	-
E - 308 - Electrical Cabinet PV Inverter Joint	-

Electric - PV Interconnection


E - 309 - PV Interconnection Overview	-
E - 310 - PV Interconnection Overview	-
E - 311 - PV Interconnection Overview	-
E - 312 - Design Of PV Roof	-



Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT
Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn CR | SM
Issued 06/01/09
Last index

Component
General

Description
Table of Content

Project #
P 140

Scale

dwg #
G - 105

Table of Contents

E - 314 - PV Interconnection Overview Façade	-
E - 315 - PV Interconnection Overview Façade	-
E - 316 - PV Interconnection Overview Façade	-
E - 317 - PV Interconnection Overview Façade	-
E - 318 - PV Interconnection Overview Façade	-
E - 319 - PV Interconnection Overview Façade	-
E - 320 - PV Interconnection Overview Façade	-
E - 321 - PV Interconnection Overview Façade	-
E - 322 - PV Interconnection Overview Façade	-
E - 323 - PV Interconnection Overview Façade	-
E - 324 - PV Interconnection Overview Façade	-
E - 325 - PV Interconnection Overview Façade	-
E - 326 - PV Interconnection Overview Façade	-
E - 327 - PV Interconnection Overview Façade	-
E - 328 - Design Of PV Façade	-
E - 329 - Design Of PV Façade	-
E - 330 - Design Of PV Façade	-

Electric - Electrical Cabinet Inside

E - 401 - Electrical Cabinet Inside	-
E - 402 - Electrical Cabinet Inside	-
E - 403 - Electrical Cabinet Inside	-
E - 404 - Electrical Cabinet Inside	-
E - 405 - Electrical Cabinet Inside	-
E - 406 - Electrical Cabinet Inside	-
E - 407 - Electrical Cabinet Inside	-
E - 408 - Electrical Cabinet Inside	-
E - 409 - Electrical Cabinet Inside	-
E - 410 - Electrical Cabinet Inside	-
E - 411 - Electrical Cabinet Inside	-
E - 412 - Electrical Cabinet Inside	-
E - 413 - Electrical Cabinet Inside	-
E - 414 - Electrical Cabinet Inside	-
E - 415 - Electrical Cabinet Inside	-
E - 416 - Electrical Cabinet Inside	-
E - 417 - Electrical Cabinet Inside	-
E - 418 - Electrical Cabinet Inside	-
E - 419 - Electrical Cabinet Inside	-
E - 420 - Room Control Unit	-

E - 421 - Room Control Unit	-
E - 422 - Design And Overcurrent Protection	-

Electric - Load List

E - 501 - Load List	-
E - 502 - Load List	-
E - 503 - Load List	-
E - 504 - Load List	-
E - 505 - KNX Busline Inside	-
E - 506 - Cross Section And Wiring Overview	-
E - 507 - Home Automation Overview	-
E - 508 - Schedule - Load	-
E - 509 - Schedule - Load	-

Other Disciplines


X -111 - Site Accessibility	1:100
X - 211 - Public Exhibit Plan	1:50
X - 212 - Public Exhibit Deck	1:100
X - 213 - Public Exhibit Mock Ups	1:100
X - 311 - Schedule - Public Tour	-

Operations


O - 110 - Transport Germany-Washington	-
O - 120 - Truck Layout	-
O - 130 - Transport Details	-
O - 140 - Modules Layout	-
O - 210 - Site Operations Day 1	-
O - 220 - Site Operations Day 1 and 2	-
O - 310 - Site Operations Day 1-7 and Disassembly	-
O- 500 - Schedules - Operations Equipment	-

Ressources


R-101 - Client Site Elevations	-
R-102 - Client Site Plan	-
R-103 - Client Site Photographs	-



Project



Constructor



Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn CR | SM

Issued 06/01/09

Last index

Component

General

Description

Table of Content

Project #

Scale

dwg #

P 140

G - 106

Design concept

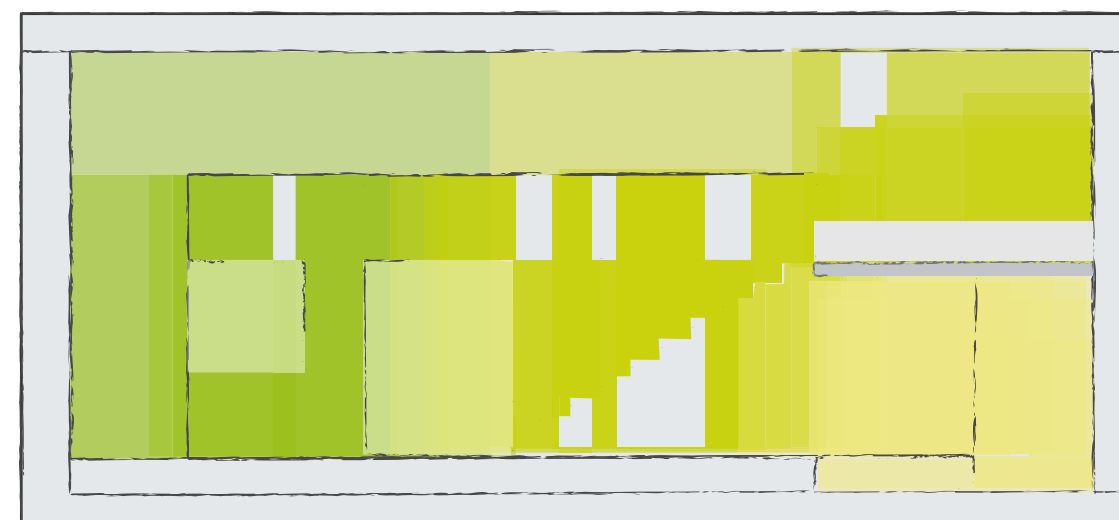
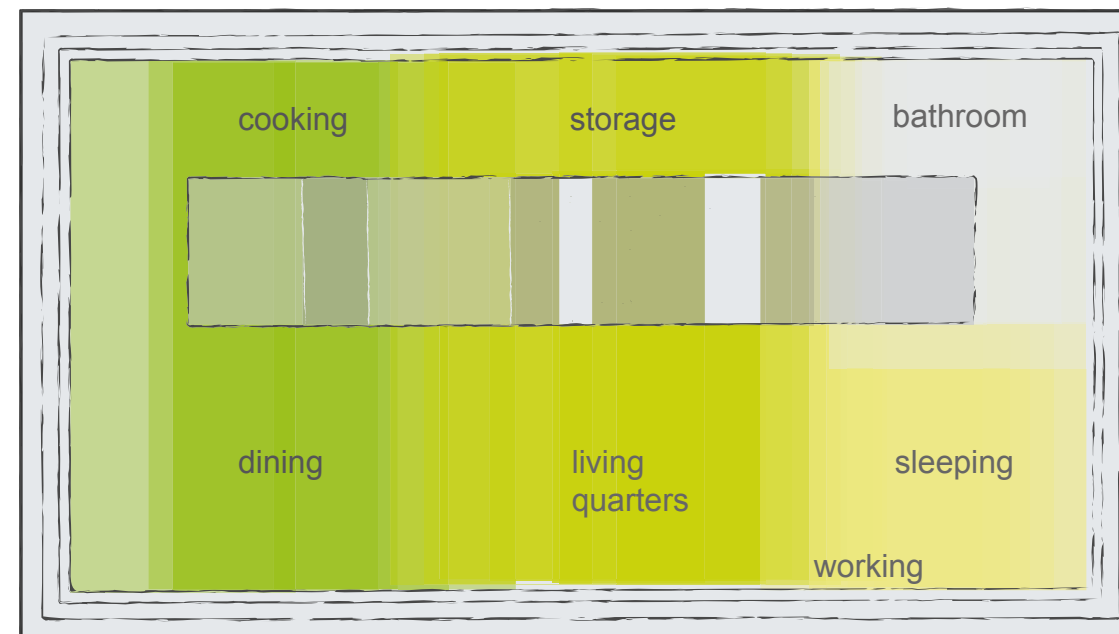
The design of our house aims to create a maximum amount of living space, a maximum energy income and the best possible adaption to the environment.




To achieve these goals, we have placed a multifunctional body within the dimensions of the maximum cubature. The multifunctional body is the heart piece of our design, it accommodates all primary functions, building services and furnishings. According to the user's needs these functions are exposed and utilised.

Due to this feature, we have generated a highly functional and multifaceted one room living space, which is defined into a public and a private area through a topographical design on the ground floor and a gallery on the upper floor.

The façade of the building is also multifunctional and solves all technical requirements. Besides the energy-gaining aspect and architectural claims, it also features constructive moisture protection and technical exhaust ventilation. Furthermore the façade offers a highly effective shading and lightning control system all in one.

The construction is based on the traditional principle of shingles. We picked up this technique and transferred the principle onto a new appearance of modern materials like glass-glass PV-modules and acrylic glass pieces.

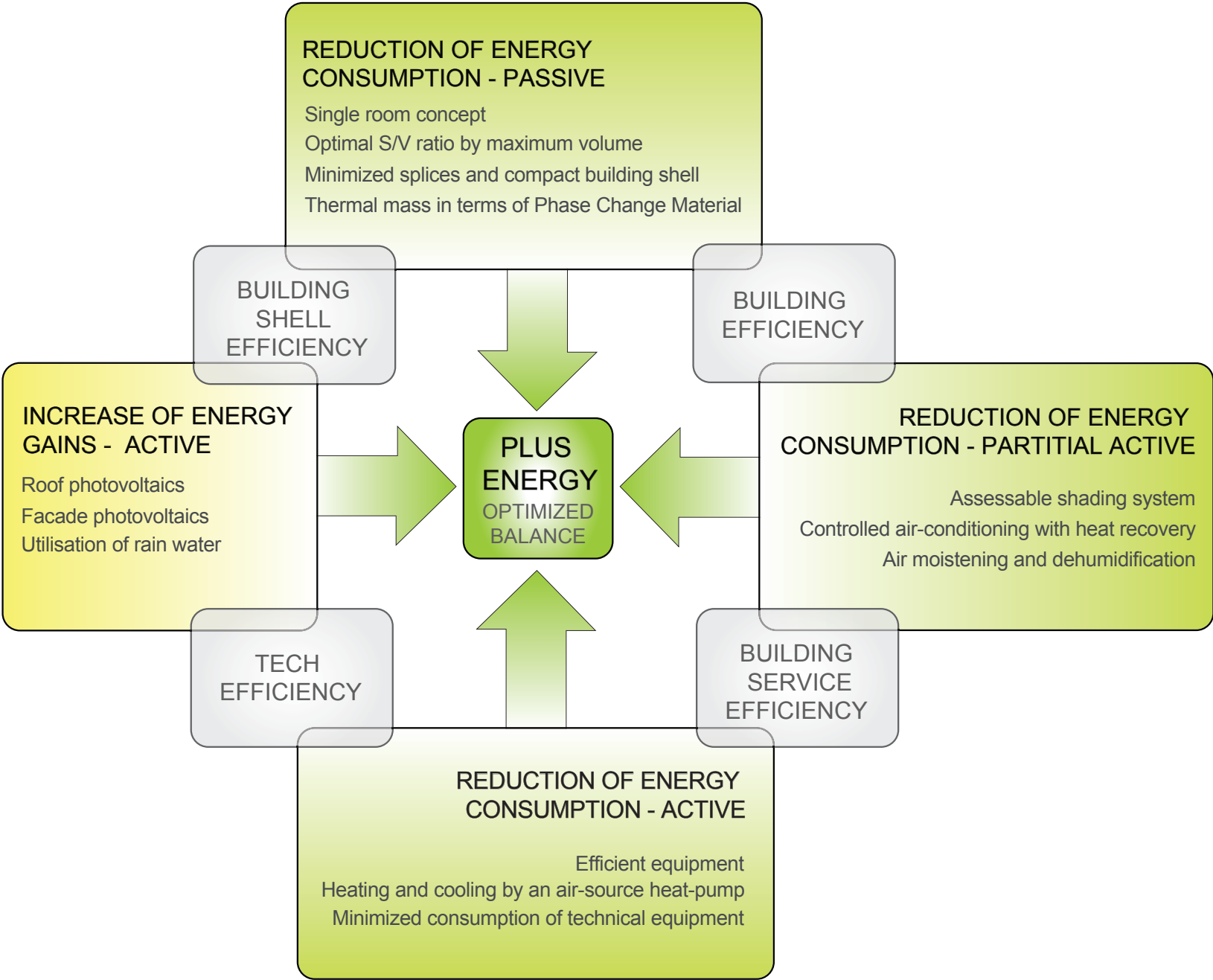


 SOLAR DECATHLON		
Project		
 SOLAR DECATHLON 2009 TEAM GERMANY		
Constructor		
 TECHNISCHE UNIVERSITÄT DARMSTADT		
Department of Architecture Energyefficient Building Design Unit El-Lissitzky-Str. 1 64287 Darmstadt +49 (0) 6151 / 165448 +49 (0) 6151 / 165247 team@solardecathlon2009.de		
Navigation/Legend		

Strategies of Energy Use in SD 2009 Team Germany Building

A popular theory in high energy efficient buildings design is to integrate as much passive systems as possible before running active ones.

A conceptual building analysis of the shown Solar Decathlon buildings and especially of the German contribution in SD 2007 shows that a design cascade from passive to active systems does not necessarily lead to a plus-energy building. Active and passive technologies have to interdigitate. The German contribution for the Solar Decathlon in 2009 tries to do so. Regarding the whole system we searched for ideal combinations of both active and passive systems. We found partial active systems as well which allows us to compose an optimized solution.



Sustainable design

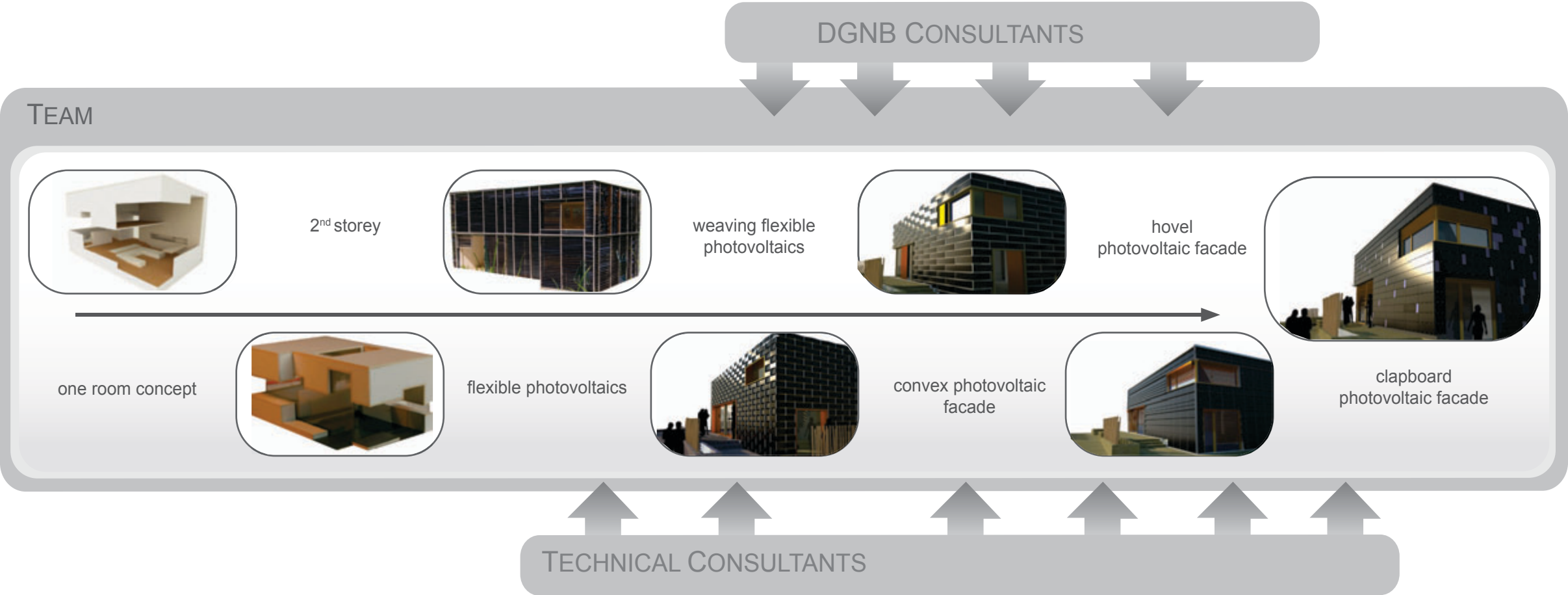
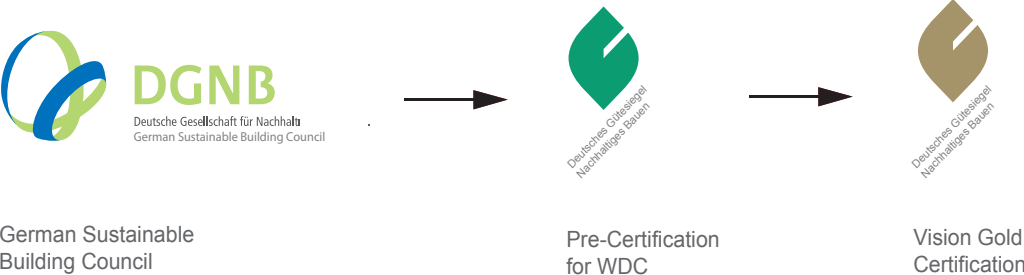
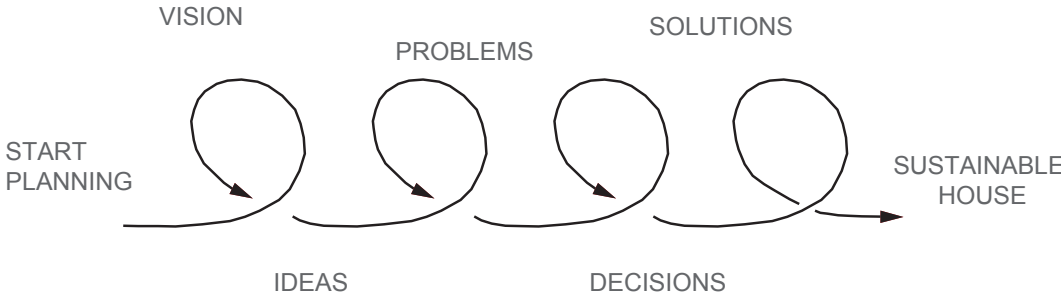
Sustainable architecture does not intend mean to save or to produce as much energy as possible. Ecological, economical and social aspects have to be integrated in design with convenience of the inhabitant in its center. Therefore the aims and ideas in the planning process have to be challenged and verified again and again.

On the one hand, the Solar Decathlon competition offers us specific possibilities not common in usual planning processes. With a prototype home we will be able to contribute to sustainable development by generating new ideas in building related people or showing the livability and beauty of a sustainable house. We believe that sustainable houses are a lifestyle element in the future. On the other hand, the rules and rags of the Solar Decathlon are quite intense and leave only a little space for creative interpretation. Many of the given rules and rags could collide E.g.

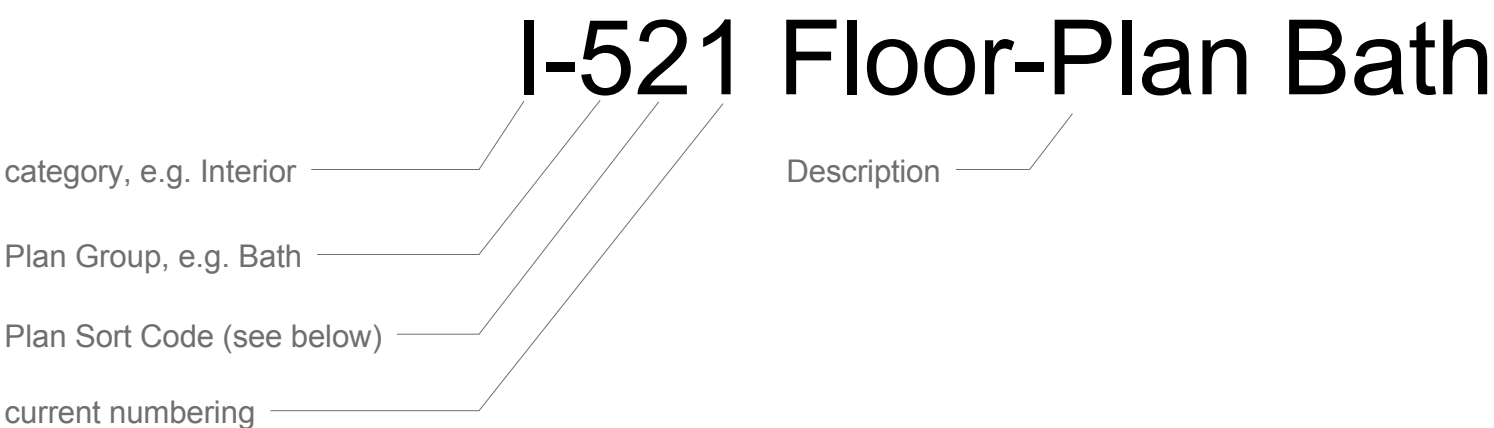
Concerning our roof we would produce more energy if we would have installed the mono-crystalline photovoltaics in an angle of 60°. But our intention was to allow the inhabitant to experience the room from different perspectives and offer different atmospheres inside the house. This is the reason why we decided to build the second floor and using the max. envelope, instead of energy surplus.

To show the worthiness of sustainable design, we would like to certify our building in sustainability reasons.

In cooperation with the DGNB - Deutsche Gesellschaft für Nachhaltiges Bauen (german association of sustainable building) we will certify our building and present a pre-certification on the washington mall in october.






Labeling in the drawings




Plan Sort Code


- I-51... General
- I-52... Floor Plans
- I-53... Sections
- I-54... Elevations
- I-55... Details

 SOLAR DECATHLON		
Project		
 SOLAR DECATHLON 2009 TEAM GERMANY		
Constructor		
 TECHNISCHE UNIVERSITÄT DARMSTADT		
Department of Architecture Energyefficient Building Design Unit El-Lissitzky-Str. 1 64287 Darmstadt +49 (0) 6151 / 165448 +49 (0) 6151 / 165247 team@solardecathlon2009.de		
Navigation/Legend		

OSB	oriented structure shaving board
SFS	description of a screw
WT	description of a screw
FJI - TGI	FinnJoist I
HEA	description of broad flanged beam
BMF	abbreviation for steel angle and steel-beam-shoes
VIP	vacuum isolations panels
PUR	polyurethan
PMMA	Polymethylmethacrylat
IPE	description of broad flanged beam
PV-MODULE	photovoltaic module
RFB	Roh Fußboden – raw floor
BKB	bodenkanal broadway – floor ducts broadway
PCM	phase change material


SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

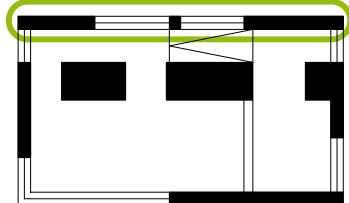
TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



DrawnRR

Issued05/08/09

Last index

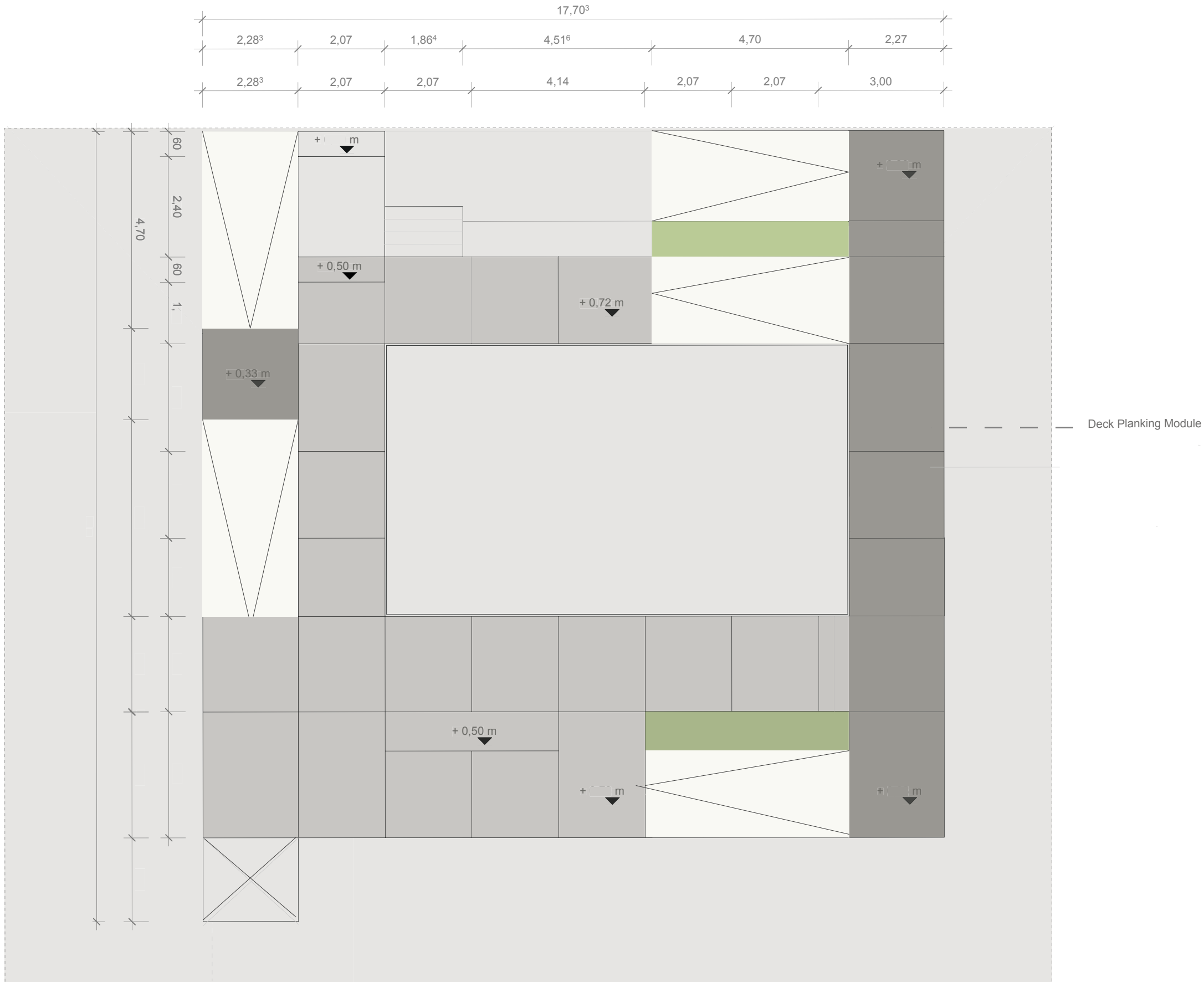
ComponentGeneral

DescriptionAbbreviation

Project #P 140

Scale

dwg #G-301



Target Market Description

Our house is designed to be easily adaptable to different user scenarios; therefore our target market consists of different groups. In particular the audience listed below should be addressed.


- Young and mid-aged couples or singles living and working at home, for e.g. Freelancers, trade’s men and outworkers
- Highly mobile people like foreign affairs officers, IO Workers or academics
- Seniors and so-called “Dinks” (Double income no kids), intending to own and build upon property with a convenient size
- Homeowners, intending to expand and upgrade their personal living and working space
- Owners of flat houses, intending to enlarge and upgrade residential market value of their house and property
- Freeholders, intending to build a weekend house or second home
- House market investors with a focus on office building and business space

Subject to its purpose, our house can be built in a manifold range of locations such as:


- Suburban regions with potentials for higher site densities, through freestanding and terrace houses
- Urban residential areas comprising of flat buildings, suitable for roof “superstruction” or module stockpiling
- Urban and Suburban Commercial districts with clearances for higher site densities
- Rural and suburban regions capable for add-on building to consisting building structures
- Rural recreation areas lacking infrastructure, allowing self sufficient vacation and leisure objects

Adaptable living space is one of the greatest potentials of future housing market; especially as traditional housing concepts no longer fulfil these growing needs. Facing a globalized world, that breeds and requires moving and flexible citizens, it is necessary to push the envelope and encourage new living concepts, in respect to their manifold of ideas and perceptions of living and working spaces.
Please see the Market Viability in the project manual, for further information.




SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

DrawnSM

Issued02/12/09

Last index

ComponentLandscape

DescriptionTarget Market Descripton

Project #Scaledwg #

P 1401:100L - 401

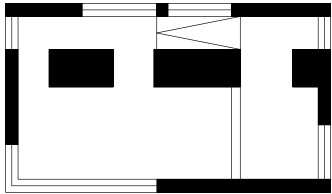


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



Drawn FH
Issued 05/08/09
Last index

Component
General

Description
Exterior rendering -
South east

Project # Scale dwg #
P 140 - G-501



Exterior Rendering - South East

1:50



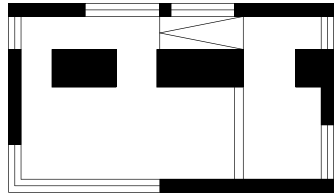


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



Drawn FH
Issued 05/08/09
Last index

Component
General

Description
Exterior rendering -
South West

Project # Scale dwg #
P 140 - G-502



Exterior Rendering - South West

1:50





Team Germanys Position On National Mall

Scale 1:1000



Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn	AG	
Issued	09/05/30	
Last index		
Component	Civil	
Description	Site	
Project #	Scale	dwg #
P140	1:1000	C-201

for information see plan S-301

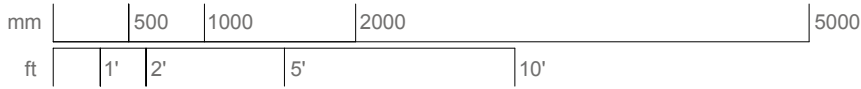
1


C-301

Grading


Scale 1:5 0

1:50




 SOLAR DECATHLON

Project

 SOLAR DECATHLON 2009

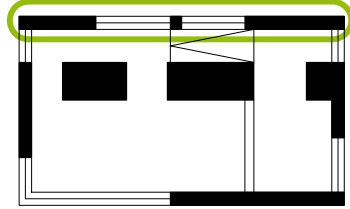
TEAM GERMANY

Constructor

 TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



DrawnAG

Issued05/08/09

Last index

Component

Civil

Description

Grading

Project #

P 140

Scale

1 : 50

dwg #

C-301

Exterior Design

The exterior deck design is characterised by its elevation changes, which coincides with the interior design.

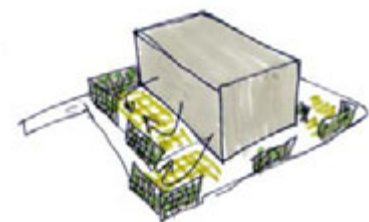
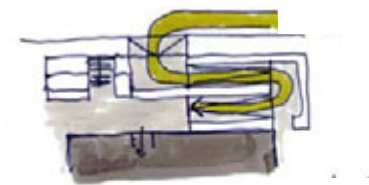
In respect to accessibility and design aspects we have designed the deck to be on even level with all window and door openings.

The elevation changes are connected by both stairways and ramps which comply with the Americans with Disabilities (ADA) accessibility guidelines.

Other aspects such as the public tour played an important role in the design process.

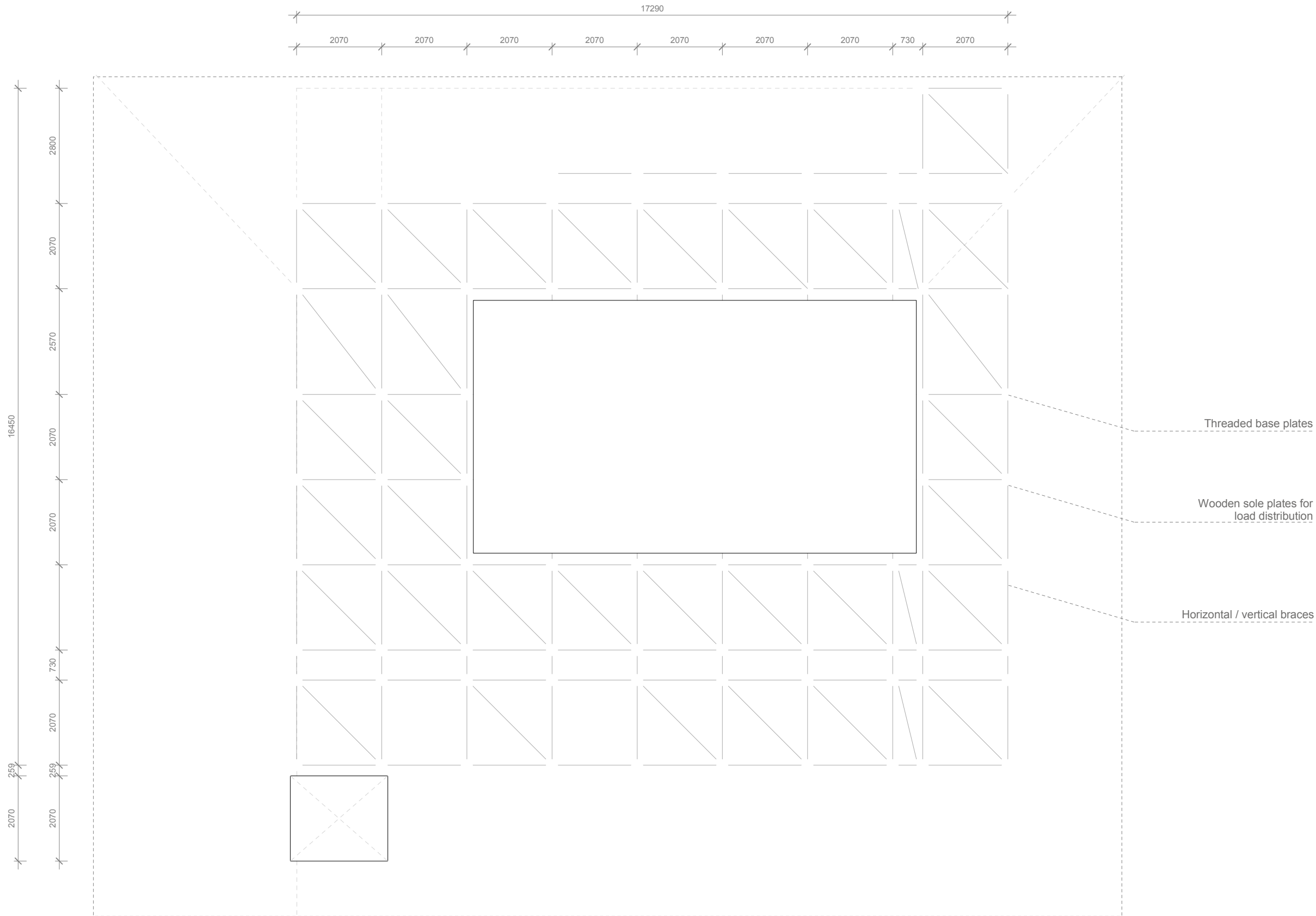
The deck is meant to be an inviting and interesting place. Along the path to our house we will display building material samples and information boards. Benches are also provided where visitors can rest and enjoy the view of our and the other houses.

The primary structure of the deck consists of conventional scaffolding elements, on which the secondary structure will be placed, consisting of wooden beams. The planking consists of oak beams, which are suitable for outdoor use.



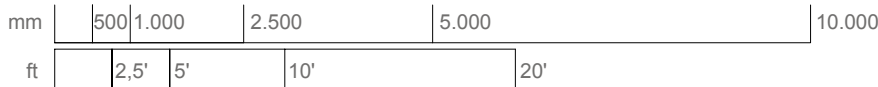
Symbols and Notes





Deck Grading
Scale 1:100

1:100



Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend






- Wooden sole plates 30x30cm
- Threaded base plates
- Horizontal braces
- Solar Envelope

Drawn SM
Issued 05/12/09
Last index

Component
Landscape

Description
Deck Grading

Project # Scale dwg #
P 140 1:100 L-211

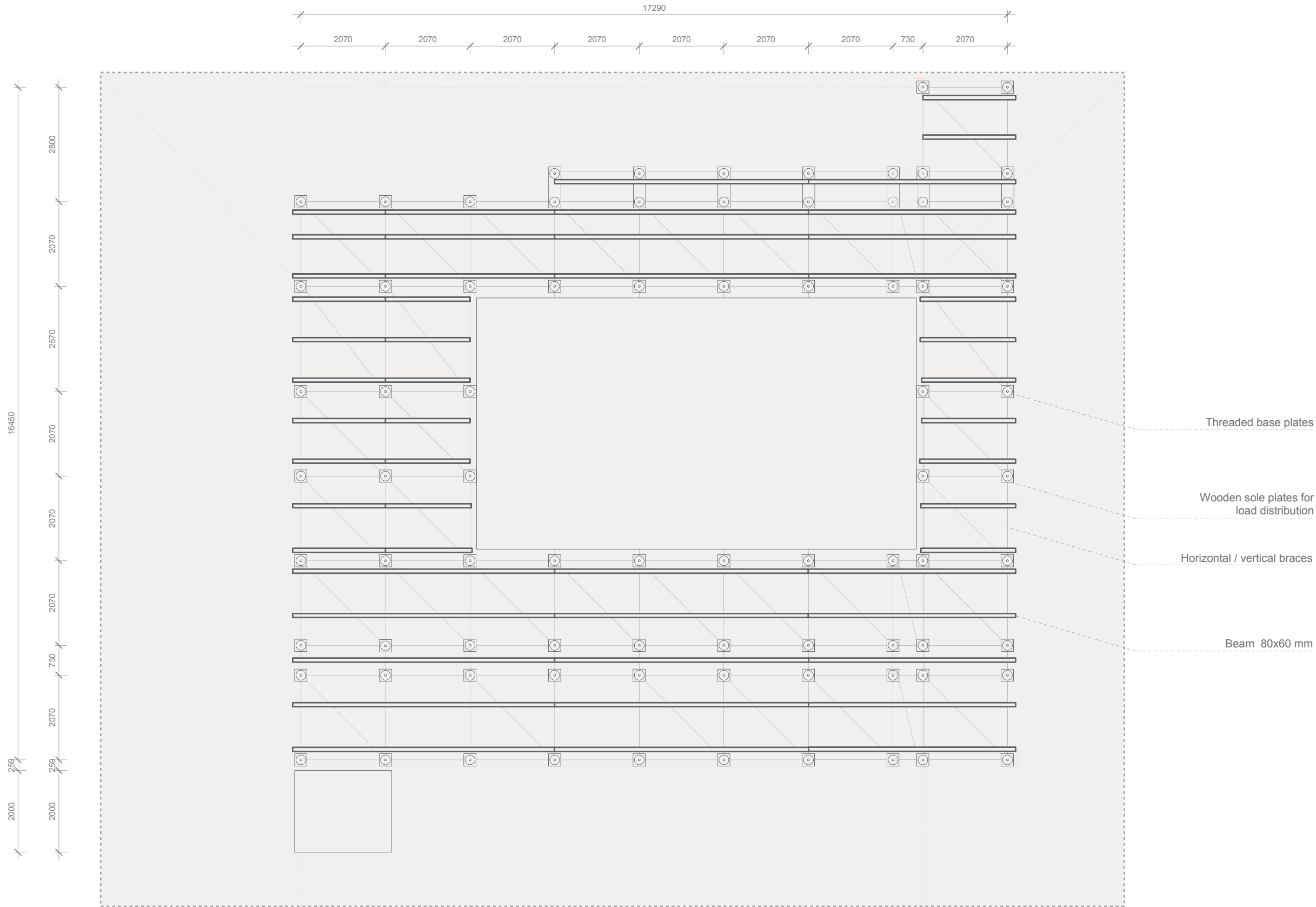
-  Wooden sole plates
300x300 mm
-  Threaded base plates
-  Horizontal / vertical braces
-  Solar Envelope
-  Beam 80x60 mm

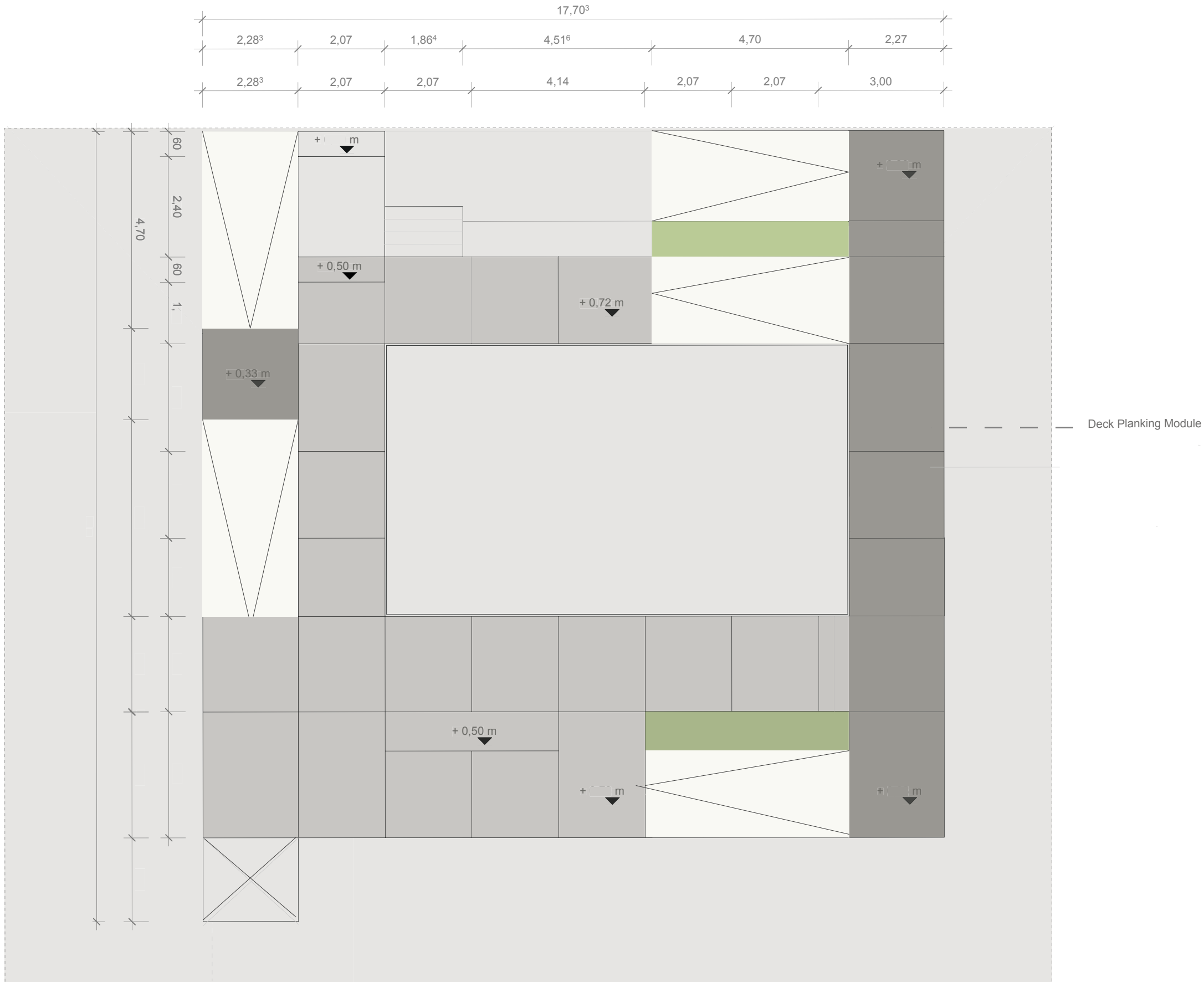
Drawn SM
Issued 02/12/09
Last index

Component
Landscape

Description
Secondary Construction

Project # Scale dwg #
P 140 1:100 L-321



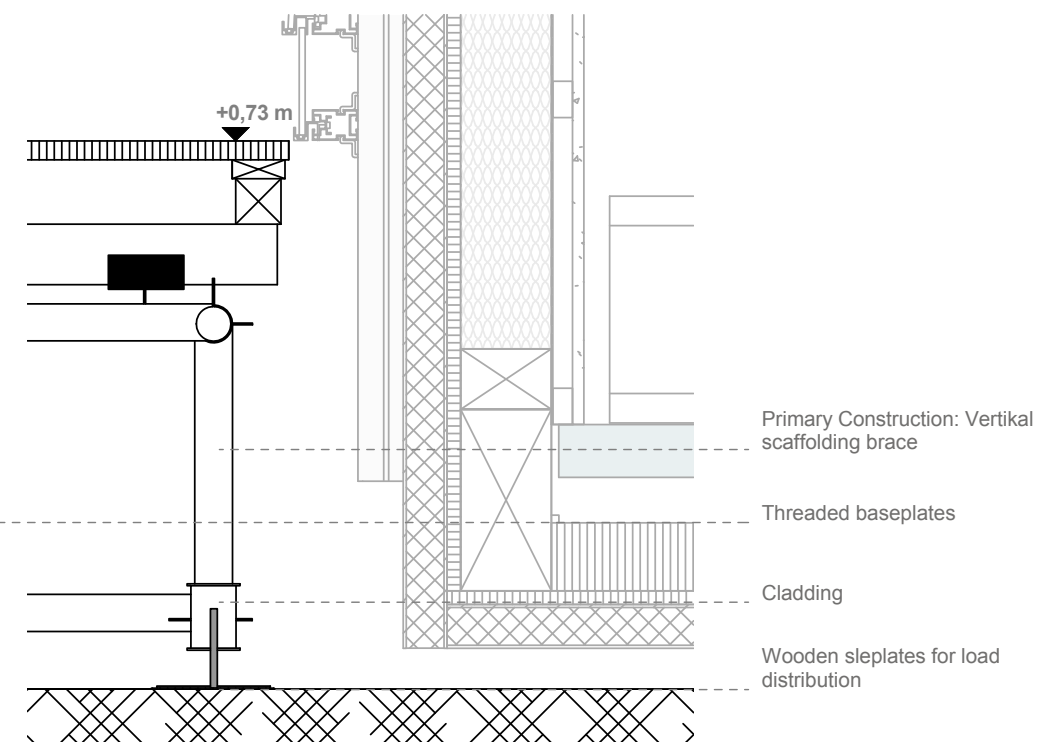
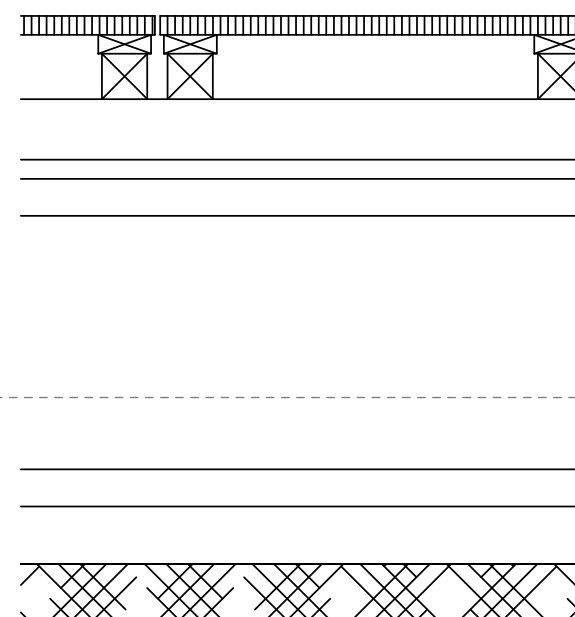
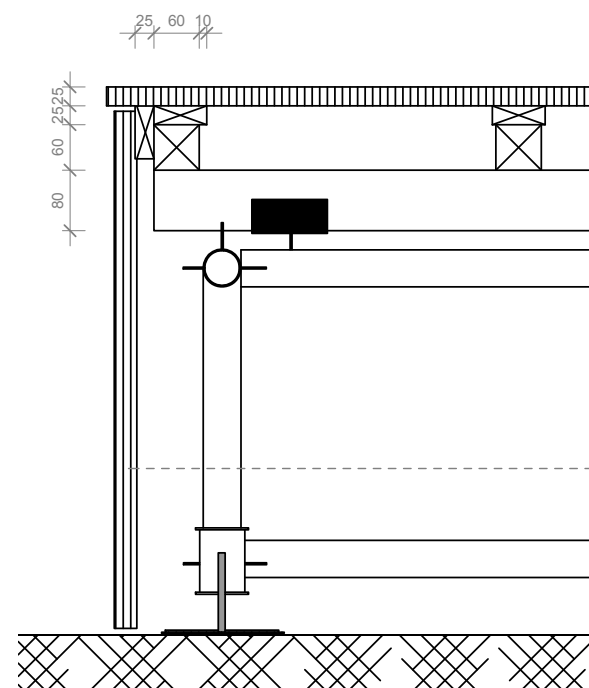


Drawn SM
 Issued 03/19/09
 Last index

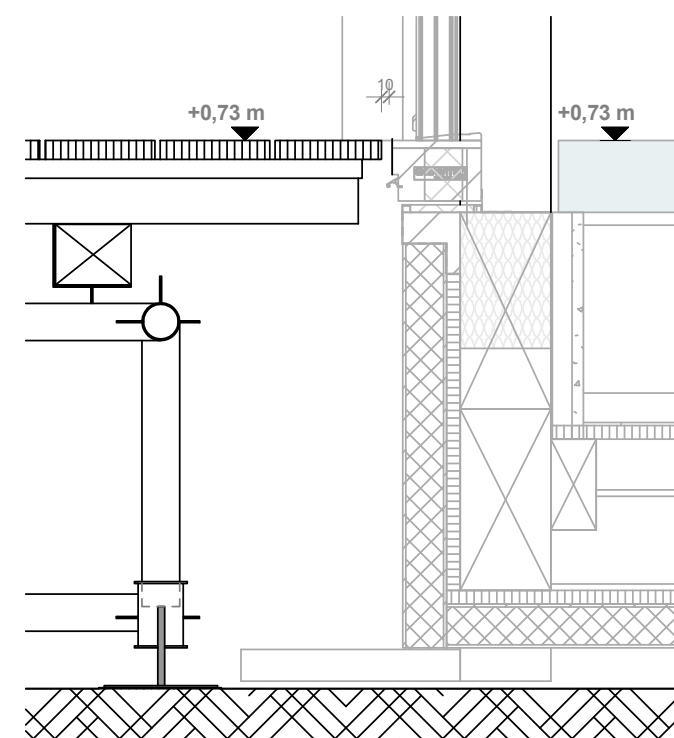
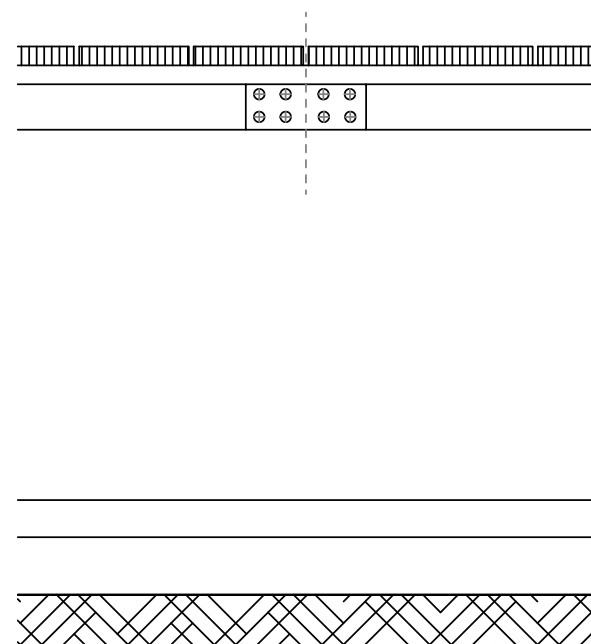
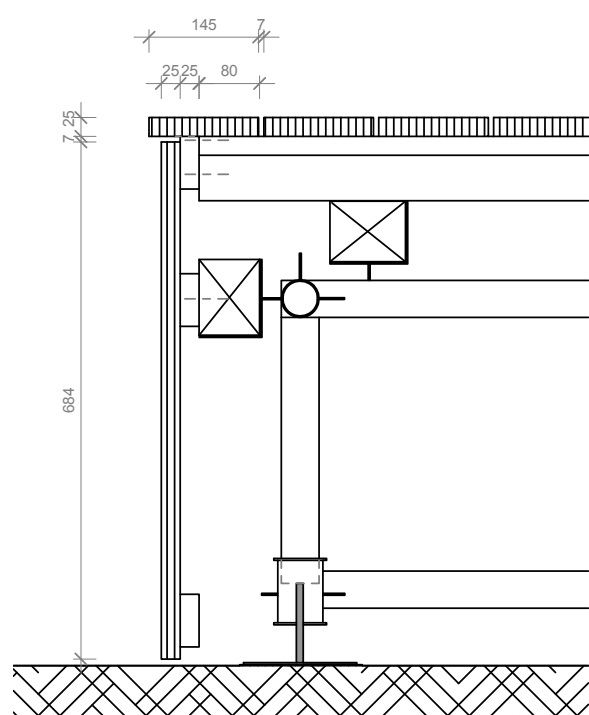
Component
Landscape

Description
**Deck Construction
 Sections**

Project # Scale dwg #
P 140 1 : 10 L-351

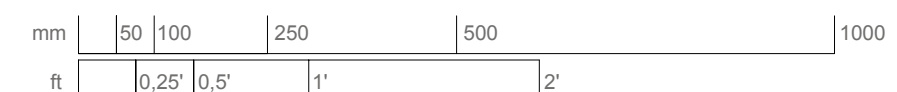





1
 L 351
Deck Longitudinal Section A
 Scale 1:10



2
 L 351
Deck Cross Section B
 Scale 1:10

1:10



-  Solar Envelope
-  Spots
-  Lightning stairs

Drawn **SM**
 Issued **05/12/09**
 Last index

Component
Landscape

Description
Lighting Design

Project # **P 140** Scale **1:100** dwg # **L-411**





Solar envelope



1
L-641

North Elevation
Scale 1:100



2
L -641

East Elevation
Scale 1:100

1:100

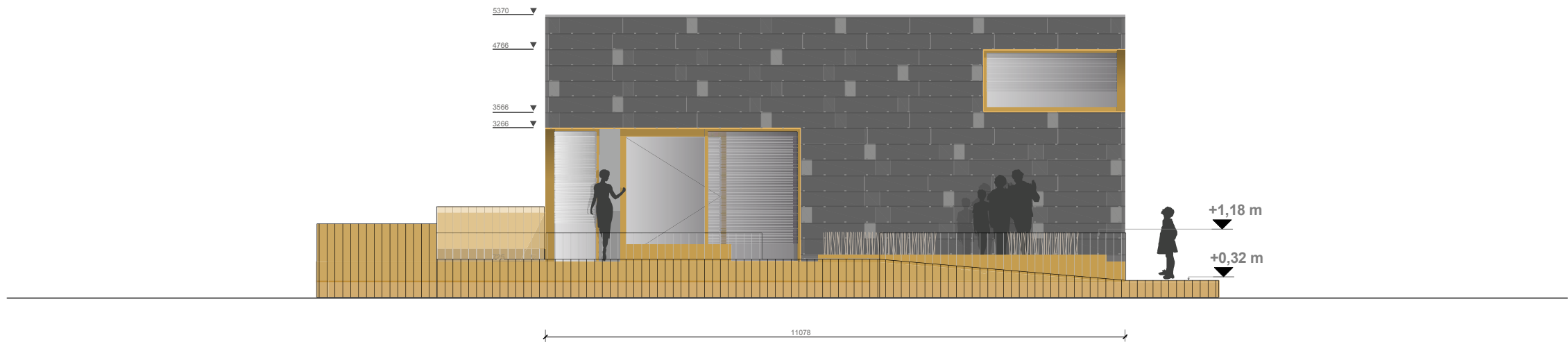
mm	500	1.000	2.500	5.000	10.000
ft	2,5'	5'	10'	20'	

Drawn SM
Issued 05/11/09
Last index

Component
Landscape

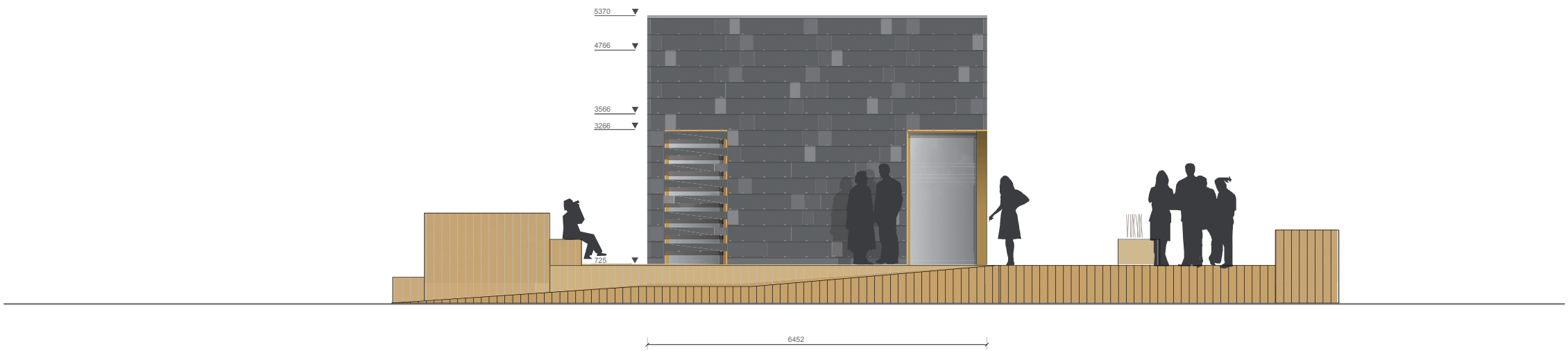
Description
North East Elevation

Project # Scale dwg #
P 140 1:100 L- 641



1
L 642

Elevation South
Scale 1:100



2
L 642

Elevation West
Scale 1:100

1:100



Drawn SM
Issued 05/11/09
Last index

Component
Landscape

Description
South West Elevation

Project # Scale dwg #
P 140 1: 100 L-642

Schedule for Exterior Deck_Framing_Planking_Lighting										
Plan No.	Project Manual Division Master Format	Description	Article Name	Article Manufacturer	Article Number	Size			Quantity	
						L	H	W	Amount	Unit
L - 211	Div. 14	Primary Sub-structure	Wooden plates	Layher		30	30		150	PC
L - 211	Div. 14	Primary Sub-structure	Base plate	Layher		0.20 m	0.20 m		40	PC
L - 211	Div. 14	Primary Sub-structure	Base plate	Layher		0.40 m	0.40 m		60	PC
L - 211	Div. 14	Primary Sub-structure	Collar short	Layher					50	PC
L - 211	Div. 14	Primary Sub-structure	Collar Tower Collar	Layher					50	PC
L - 211	Div. 14	Primary Sub-structure	Diagonal brace	Layher		2.07 m			12	PC
L - 211	Div. 14	Primary Sub-structure	Diagonal brace	Layher		1.57 m			6	PC
L - 211	Div. 14	Primary Sub-structure	Diagonal brace	Layher		1.09 m			2	PC
L - 211	Div. 14	Primary Sub-structure	Diagonal brace	Layher		0.73 m			2	PC
L - 211	Div. 14	Primary Sub-structure	Standard Steel	Layher		1.00 m			30	PC

Schedule for Exterior Deck_Framing_Planking_Lighting										
Plan No.	Project Manual Division Master Format	Description	Article Name	Article Manufacturer	Article Number	Size			Quantity	
						L	H	W	Amount	Unit
L - 211	Div. 14	Primary Sub-structure	Standard Steel	Layher		0.50 m			50	PC
L - 211	Div. 14	Primary Sub-structure	Standard Steel	Layher		0.25 m			50	PC
L - 211	Div. 14	Primary Sub-structure	O- Ledger	Layher		4.14 m			2	PC
L - 211	Div. 14	Primary Sub-structure	O- Ledger	Layher		2.07 m			200	PC
L - 211	Div. 14	Primary Sub-structure	O- Ledger	Layher		1.57 m			20	PC
L - 211	Div. 14	Primary Sub-structure	O- Ledger	Layher		1.09 m			10	PC
L - 211	Div. 14	Primary Sub-structure	O- Ledger	Layher		0.73 m			20	PC
L - 211	Div. 14	Primary Sub-structure	O- Ledger	Layher		0.39 m			20	PC
L - 211	Div. 14	Primary Sub-structure	O - Double ledger	Layher		2.07 m			20	PC
L - 211	Div. 14	Primary Sub-structure	U Double ledger	Layher		2.07 m			30	PC

Schedule for Exterior Deck_Framing_Planking_Lighting										
Plan No.	Project Manual Division Master Format	Description	Article Name	Article Manufacturer	Article Number	Size			Quantity	
						L	H	W	Amount	Unit
L - 211	Div. 14	Primary Sub-structure	O Double ledger	Layher		0.73 m			10	PC
L - 211	Div. 14	Primary Sub-structure	Diagonal brace	Layher		2.07 m			40	PC
L - 211	Div. 14	Primary Sub-structure	Diagonal brace	Layher		1.57 m			15	PC
L - 211	Div. 14	Primary Sub-structure	Pipes	Layher		2.50 m			20	PC
L - 211	Div. 14	Primary Sub-structure	Pipes	Layher		2.20 m			20	PC
L - 211	Div. 14	Primary Sub-structure	Coupler Swivelling head	Layher					100	PC
L - 211	Div. 14	Primary Sub-structure	Coupler Standard	Layher					100	PC
L - 211	Div. 14	Primary Sub-structure	Coupler Small	Layher					100	PC
L - 211	Div. 14	Primary Sub-structure	Coupler Large	Layher					30	PC
L - 211	Div. 14	Primary Sub-structure	Coupler Wedge head coupler, double	Layher					20	PC

Schedule for Exterior Deck_Framing_Planking_Lighting										
Plan No.	Project Manual Division Master Format	Description	Article Name	Article Manufacturer	Article Number	Size			Quantity	
						L	H	W	Amount	Unit
L - 211	Div. 14	Primary Sub-structure	Coupler Rosette	Layher					20	PC
L - 321	Div. 06	Secondary Sub-structure	Structural timber, Larch	Rettenmeier			100mm	80mm	1.44	m³
L - 351	Div. 06	Secondary Sub-structure I	Structural timber, Larch	Rettenmeier			60mm	60mm	4.32	m³
L - 351	Div. 06	Secondary Sub-structure II	Structural timber, Larch	Rettenmeier			70mm	25mm	2.02	m³
L - 322	Div. 06	Planking	Floor Boards, Oak	Rettenmeier			25mm	145mm	275	m²
L - 351	Div. 06	Cladding	Floor Boards, Oak	Rettenmeier			25mm	145mm	100	m²
L - 411	Div. 26	Lighting	LED outdoor recessed luminaires Marker LED						60	PC
L - 511	Div. 26	Planting	To be chosen							

Drawn **SM**
 Issued **02/12/09**
 Last index

Component
Landscape

Description
Schedules

Project # Scale dwg #
P 140 - **L - 714**

General

1. Structural drawings are to be read in conjunction with other related drawings including existing drawings, for dimensions, elevations and presence of openings, inserts, and electrical and mechanical elements.
2. Prior to commencement of work, all related drawings are to be compared. Confirm all dimensions and field measure/confirm all existing conditions. Report any discrepancies to the Architect and Engineer.
3. If discrepancies relating to structural work are found in the various documents, the more stringent provisions shall apply, unless approved by the Engineer. Specifications shall control over these drawings and General Notes only where the specifications provide for more stringent requirements. University staff and students, suppliers and subcontractors are to ensure that they are working with the "Issued for Construction" drawings.
4. Bracing of structure and all components during construction, including any underpinning, shall remain the sole responsibility of the Technische Universität Darmstadt.
5. These drawings show requirements for completed structure only. The design and inspection of falsework, shoring and reshoring is the responsibility of the Technische Universität Darmstadt.
6. All shop drawing reviews by the Engineer constitute review for general concepts only; the detailed design remains the responsibility of the Technische Universität Darmstadt/Fabricator. All components shall be assembled and erected in accordance with final reviewed shop and erection drawings. No fabrication/erection shall proceed until review has been completed by the Engineer.


7. Design Loads

a. Specified uniform loads (u.n.o. on plan)	Live Load	Superimposed dead loads
Roof (snow load based on)	per SDBC 0,958 kPa per German Code 0,75 KPa (Snow Load Zone II Elevation Darmstadt 150m Roof < 30°) Post event condition is governing the design.	0,7KPa
Upper floor	per SDBC: 2,39 KPa 2,39 kPa (SDBC) per German Code: 2,80 KPa	0,3 kPa
Lower floor (including partitions)	2,39 kPa (SDBC) Post event condition is governing the design.	0,5 kPa

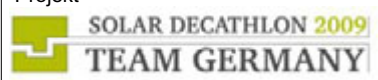
Superimposed dead loads are non-structural dead loads including architectural topping, partitions, roofing material, pavers, ceiling finishes and mechanical/electrical conduits/fixtures.

- b. Seismic and Wind
- Seismic loads not to be considered (no requirements in the Solar Decathlon Building Code).
- Max. wind loads
according to Solar Decathlon Building Code
60 mph = 26,8 m/s
Per German Code
28,3 m/s
Post event condition is governing the design.
8. These drawings show structural work required to meet provisions of the Solar Decathlon Building Code 2009 unless the related German Codes provide for more stringent requirements.
9. Design of Secondary component items including their attachment to the structure is the responsibility of others.
10. All codes and documents referred to in these General Notes are to be the current adopted edition.
11. The Technische Universität Darmstadt is solely responsible to give the Engineer reasonable advance notice of when structural work is ready for reviews by the Engineer. (Min 24 hours prior to concealment) Technische Universität Darmstadt is responsible for reviewing their own work and the work of their subcontractors prior to review by the Engineer.
12. All structural work requires written review by the Engineer, including:

a) Structural Steel (including decking)
b) Wood framing (including sheathing)
13. Material testing shall be directed by the Engineer at the expense of the Owner
14. Additional testing and field review resulting from rejection of more than 5% of work will be at the expense of the Technische Universität Darmstadt.
15. Design of foundation is based on the 2009 Solar Decathlon Building Code of September 30 2008 with an allowable bearing pressure of 71,8 kPa for pad footings. All footings shall bear on soil capable of this pressure without failure or undue settlement. If native soil or fill are found during construction to have a lower allowable bearing pressure, notify the Engineer, and provide revised foundation to the Engineers specifications.
16. All footings shall be centred on columns and walls unless noted otherwise.



Projekt



TEAM GERMANY


Bauherr



TECHNISCHE
UNIVERSITÄT
DARMSTADT

**FG Entwerfen und
Energieeffizientes Bauen**
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation



Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn

SS | MK

Issued

04/25/09

Last index

05/11/09

Component

Structural

Description

General Notes

Project # Scale

P140

dwg #

S-101

Wood Frame

1. Wood framing and heavy timber construction shall conform to German Wood Code DIN 1052: 1988-04 parts 1 & 2.
2. Unless noted otherwise, all concealed framing (joists, built-up beams, stud-framing, top- and bottom plates) shall be fir #2, built-up columns and solid wood posts to be fir #2.
3. Unless noted otherwise, all framing and nailing shall be in accordance with Part 1 of the German Wood Code (DIN 1052), Chapter 11 “Timber Panels”.
4. Unless noted otherwise, built-up columns shall consist of 2 members. Minimum lintel shall be 120 x 140.
5. Laminate studs solid beneath all beam ends and carry through to foundation below. Unless noted, built-up studs shall match number of laminations in built-up member being supported. Fully block all joist spaces below point loads. Take care to ensure beams bear fully on supporting members.
6. Insatll double cripples unless otherwise noted.
7. Joists are minimum 80x200 @ 833 mm o.c. unless otherwise noted.
8. Interior bearing walls – unless otherwise noted:

Minimum stud requirements are as follows:

a. 1st floor60x120 @ 833 mm o.c.

2nd floor 60x120 @ 833 mm o.c.

b. Anchor stud walls to foundation with HTT16 by SIMPSON Strong Tie as indicated on plans.
9. Shear walls and exterior bearing walls – unless otherwise noted on drawings:

Walls shall be constructed with 15mm OSB sheets (1 side) on wood studs. Refer to notes on wall sheathing below for nailing and blocking requirements of OSB. Ensure shear walls are connected to roof with minimum Ø8x200 mm long wood screws @ 500mm o.c. or Ø12mm thru bolts @ 1000mm o.c.

10.Sheathing – unless noted otherwise:

All sheating shall be beech plywood (BFU) exterior grade conforming to DIN EN636 or OSB conforming to DIN EN 300. Place sheets with face grain running perpendicular to supporting members in a staggered joint pattern.

11.Minimum sheathing requirements shall be as follows:


Wall sheathing – 18mm OSB fastened with 1,5 x 50mm long staples type Q @ 50mm o.c. at sheet edges and @ 80mm o.c. at intermediate studs. All unsupported edges shall be blocked with 60mm nominal blocking and nailed as above.

Floor sheathing – 18mm T & G OSB fastened with 1,5 x 50 mm long staples Type Q @ 50mm o.c. at sheet edges and @ 80mm o.c. at intermediate supports.

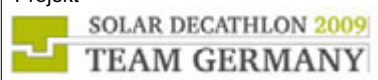
Roof sheathing – 18mm OSB fastened with 1,5x50mm long staples type Q @ 50mm o.c. at sheet edges and @ 80mm o.c. at intermediate supports.

Subsitution of staples with wood screws of 50mm length and 4mm diameter is acceptable.

12.Unless otherwise noted, use galvanized Simpson Strong-Tie connectors or approved equal where required. Use joist hangers (minimum 6KN capacity) for all flush framing. Hot dip galvanize all steel components in timber connections including connectors for exterior applications. Steel hardware to be S235 or better and bolts shall be 4.6.



Projekt


SOLAR DECATHLON 2009
TEAM GERMANY

Bauherr

TECHNISCHE
UNIVERSITÄT
DARMSTADT

FG Entwerfen und
Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation

TRAGWERK
Jochen A. Stahl [Dipl.-Ing., P.Eng.]

Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn

SS | MK

Issued

04/25/09

Last index

05/11/09

Component

Structural

Description

General Notes

Project # Scale dwg #

P140

S-102

Custom heavy timber framing

- 1. Custom heavy timber framing shall conform to German Wood Code DIN 1052: 1988-04 parts 1 & 2.
- 2. University staff and students to check and confirm all dimensions prior to fabrication including coordination with steel shop drawings.
- 3. Submit 2 sets of shop drawings for all heavy timber construction to the Engineer for review prior to fabrication. Shop drawings shall show all connections and details, and indicate all applicable material specifications. Do not proceed with fabrication until shop drawings have been approved by the Engineer.
- 4. Sawn timber to be graded as indicated on drawings. All timbers to be seasoned to 15% +/- 3% moisture content or below before fabrication.
- 5. Heavy timber members to be shaped sawn timber as per drawings and to be free of staining, grade stamps, etc. Store timber under cover and protect from staining at all times with proper drainage.
- 6. All steel members and hardware to be painted in accordance with Architect's specifications or hot-dipped galvanized prior to shipping to site. Unless special precautions are taken to protect steel from rusting, hot-dip galvanize all steel connections and fasteners in contact with timber.
- 7. All work to be architectural quality, including precision cutting and fitting , steel welding, etc. Take precautions to avoid damage and staining of wood during construction.
- 8. Work points are as noted on drawings.
- 9. Where practical, shop fit initially fabricated members early during fabrication on a trial basis. Review with Engineer prior to proceeding further.
- 10.Where light gauge connections are required, use galvanized Simpson Strong-Tie connectors or approved equal.
- 11.Refer to general notes and other drawings for additional requirements.

Prefabricated wood panels

- 1. Prefabricated wood panels shall be deisigned by a Structural Engineer registered in Germany. Design of panels and components shall conform to DIN 1052 to carry the design loads and not to exeed the deflection limits as specified on the drawings.
- 2. Manufacturer is responsible for design and supply of all panel interconnections, accessories and metal connection hardwarees required for stability of the panel assembly. Hot dip galvanize all steel connectors including fasteners, where exposure to rain during or after construction may cause rusting/staining of wood exposed to view.
- 3. Submit 3 sets of shop drawings indicating design loads, panel type and all connection and bracing details to the Engineer prior to fabrication of panels. Do not proceed with fabrication until the drawings have been approved by the Engineer.
- 4. Panels shall be handled, stored and erected in accordance with the Manufacturer's erection drawings.
- 5. Technische Universität Darmstadt is responsible for the temporary stability of the panels during erection.
- 6. Following fabrication and erection of the panels, the manufacturers shall review installation of the panels and submit a letter stating that installation of the same has met all structural requirements.
- 7. Follow manufacturer's guideline regarding detailing of the panels and openings in panels.
- 8. All exposed panel sides shall be architectural quality finished unless otherwise noted.

Prefabricated wood I-joists

- 1. Prefabricated wood I-Joists require a general approval by the Deutsche Institut für Bautechnik (DIBt). Design of I-joists shall conform to DIN 1052 to carry out the design loads and not to exeed the deflection limits as specified on the drawings.
- 2. Joists shall be manufactured with solid wood webs and structural wood chords in a plant approved by DIBt under the supervision of an approved third party inspection agency.
- 3. Manufacturer is responsible for design and supply of all bridging, blocking, web stiffeners, accessories and metal connection hardwarees required for the stability of the joists assembly. Hot dip galvanize all steel connectors including fasteners, where exposure to rain during or after construction may cause rusting/staining of wood exposed to view.
- 4. Joists shall be handled, stored an erected in accordance with the manufacturer's erection drawings. All joists should be plumb and the chords held in a straight line.
- 5. University staff and student are responsible for temporary stability of the joists during erection.
- 6. Follow the manufacturer's guideline regarding openings in web. Drilling or cutting chords are not permitted.



Projekt



Bauherr



**TECHNISCHE
UNIVERSITÄT
DARMSTADT**

**FG Entwerfen und
Energieeffizientes Bauen**
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation



TRAGWERK
Jochen A. Stahl [Dipl.-Ing., P.Eng.]

Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn

SS | MK

Issued

04/24/09

Last index

05/11/09

Component

Structural

Description

General Notes

Project # Scale dwg #

P140 S-103

Structural Steel/Metals

1. All structural steel work shall conform to German Steel Code DIN 18800.

2. All structural steel material shall conform to German Steel DIN 18800 with the following grades:

Rolled and HSS Shapes

Plates and bars

Anchor bolts and miscellaneous hardware

Pipes

Bolts

S 235

S 235

4.6

S 235

4.6

3. Unless otherwise noted, apply one shop coat of primer to all steel work.

4. Where required, all hot dip galvanizing shall conform to European Code DIN EN 13858.

5. Unless noted otherwise, design structural steel connections (designed by the Fabricator's Engineer) for minimum half the shear or compression capacity of the members connected. Bolted connections shall consist of a minimum 2-12mm ø bolts with 10mm connector plate, unless noted otherwise.

6. Provide cap plates at open ends of HSS tubes (seal weld all around). Provide drain hole at base of HSS tube.

7. Submit 2 sets of shop drawings for the above to the Engineer for review prior to fabrication. Shop drawings shall show all details, and indicate all applicable design loads and material specifications and shall be sealed by the Fabricator's Engineer.

8. The Engineer sealing the Fabricators shop drawing is also responsible for all field review of their work.

9. All fabrication and welding exposed to view to be appearance quality to the Architect's satisfaction.

10. See Architectural drawings for miscellaneous steel components. Any steel components not shown on the Structural drawings are considered to be Secondary components (see notes on Secondary components and their attachments).
- Secondary Components and their Attachments
1. Secondary Components include but are not limited to the following: (Refer to all documents for secondary components)

a) Architectural components such as guard and hand rails, flag posts, canopies, ceilings, etc.

b) Site work elements exterior to the base building such as landscaping components, lamp standards, signs, and civil work.

c) Cladding, window mullions, glazing and store fronts.

d) Skylights and glass canopies.

e) Attachments and bracing for electrical and mechanical components.

f) Glass block including attachments.

g) Architectural precast and precast cladding.

h) Window washing equipment and attachments.

i) Interior and exterior light gauge steel stud walls.


j) Roofing material.

2. Design and detailing of above items and their attachments are not the responsibility of the Engineer. They shall be designed by Specialty Structural Engineers, retained by the Technische Universität Darmstadt who will seal all related shop drawings, review the components in the field and provide all required sealed letters to the authorities having jurisdiction.


3. Secondary Components and their attachments shall be designed in accordance with the Solar Decathlon 09 Building Code.

4. Sealed shop drawings of the secondary or non-structural components which may affect the primary structural system shall be submitted to the Engineer only for the review of their effect on the primary structural system.

5. Sub-contractor of these components is responsible for protection of connections of dissimilar metals against galvanic corrosion.


SOLAR DECATHLON

Projekt

SOLAR DECATHLON 2009


TEAM GERMANY

Bauherr

TECHNISCHE UNIVERSITÄT DARMSTADT

FG Entwerfen und Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation

TRAGWERK
Jochen A. Stahl [Dipl.-Ing., P.Eng.]

Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

DrawnSS | MK

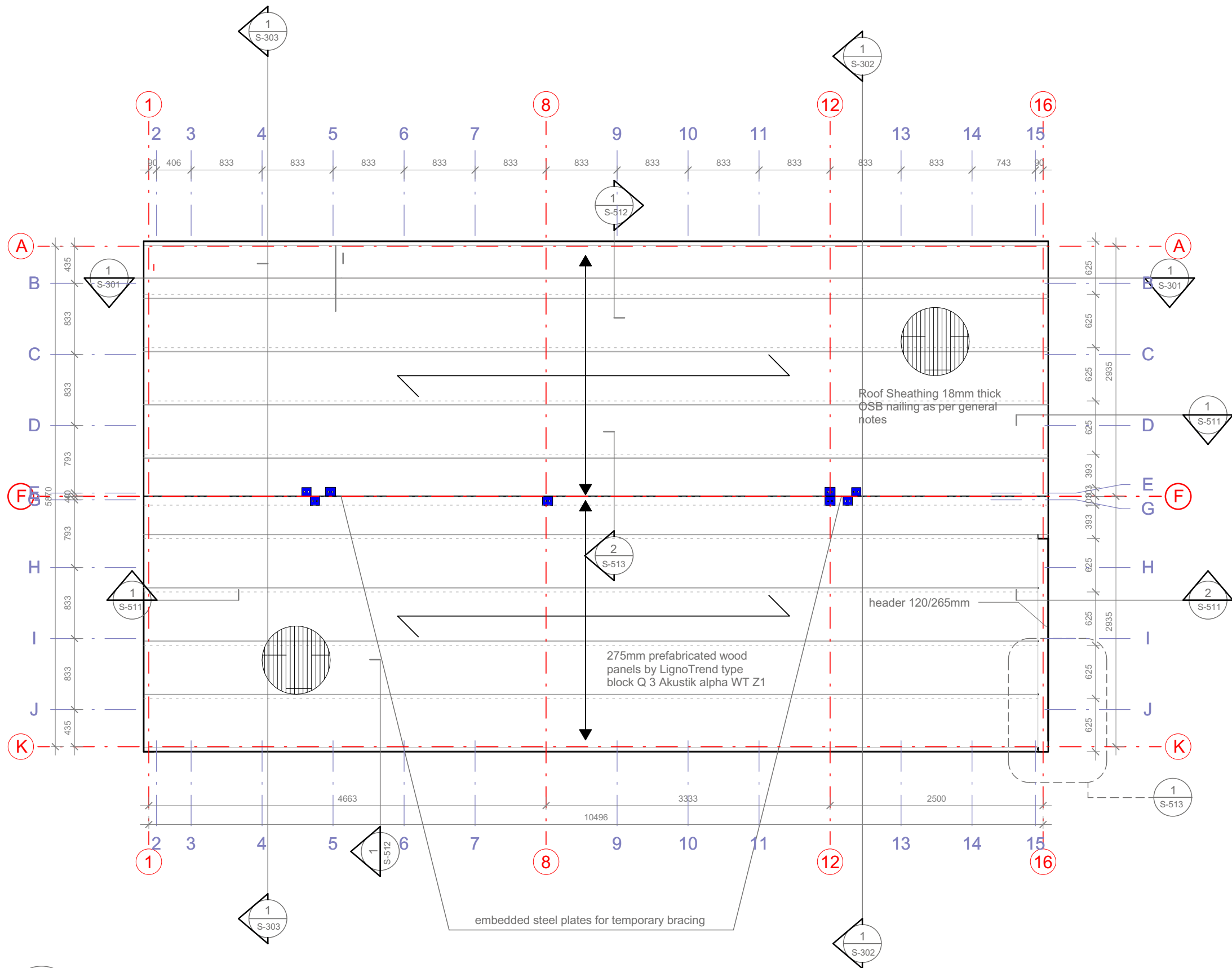
Issued04/24/09

Last index05/11/09

Component
Structural

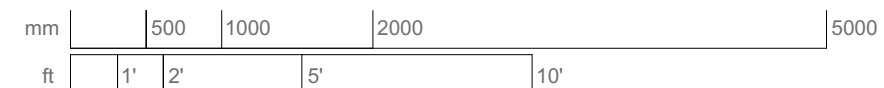
Description
General Notes

Project # Scale dwg #
P140S-104



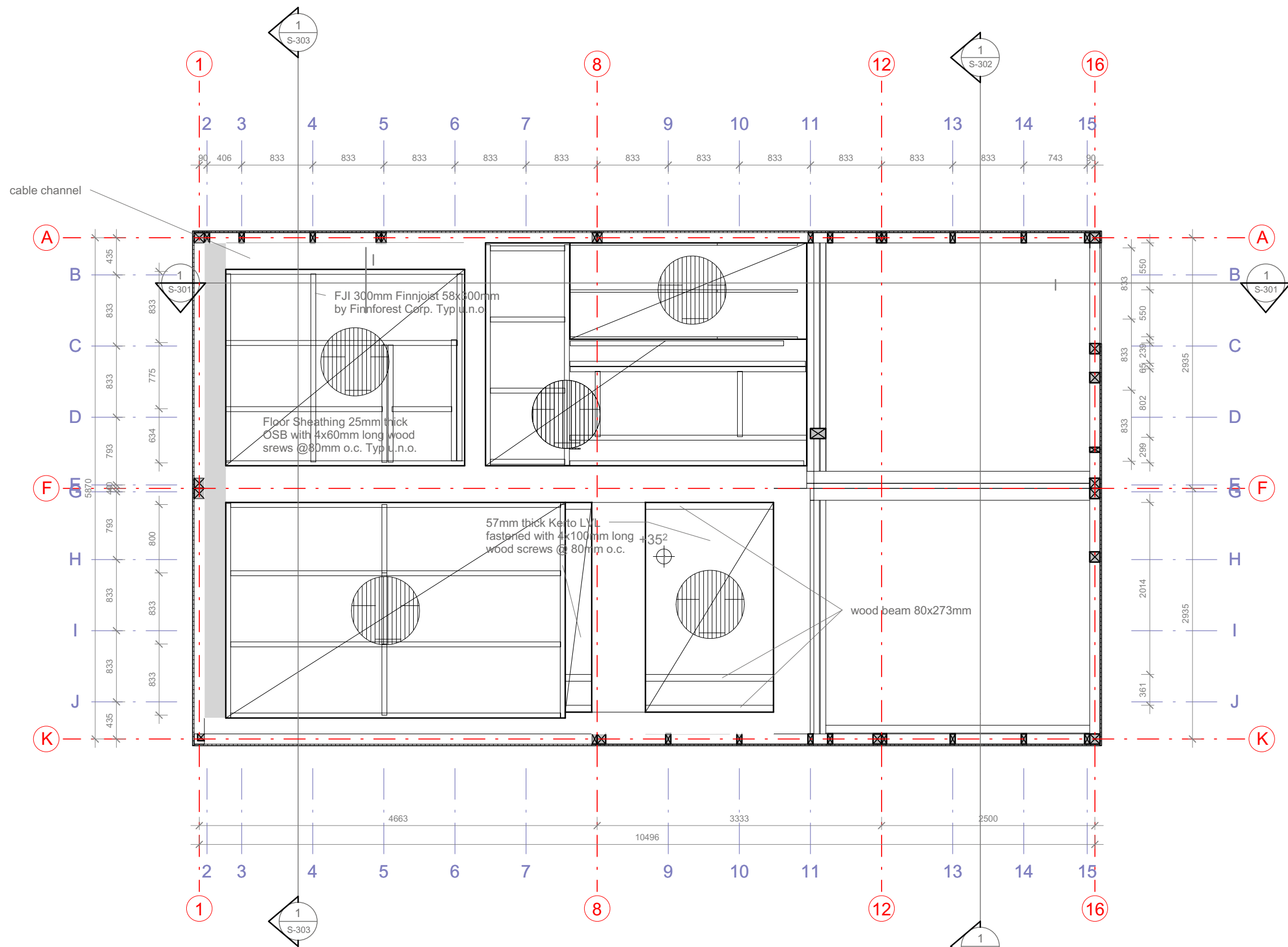
1
S-201
Roof Framing
Scale 1:50

1:50





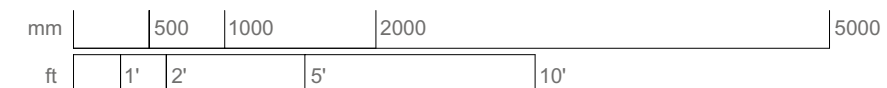




Floor Framing

Scale 1:50

1:50



Projekt

Bauherr

TECHNISCHE UNIVERSITÄT DARMSTADT

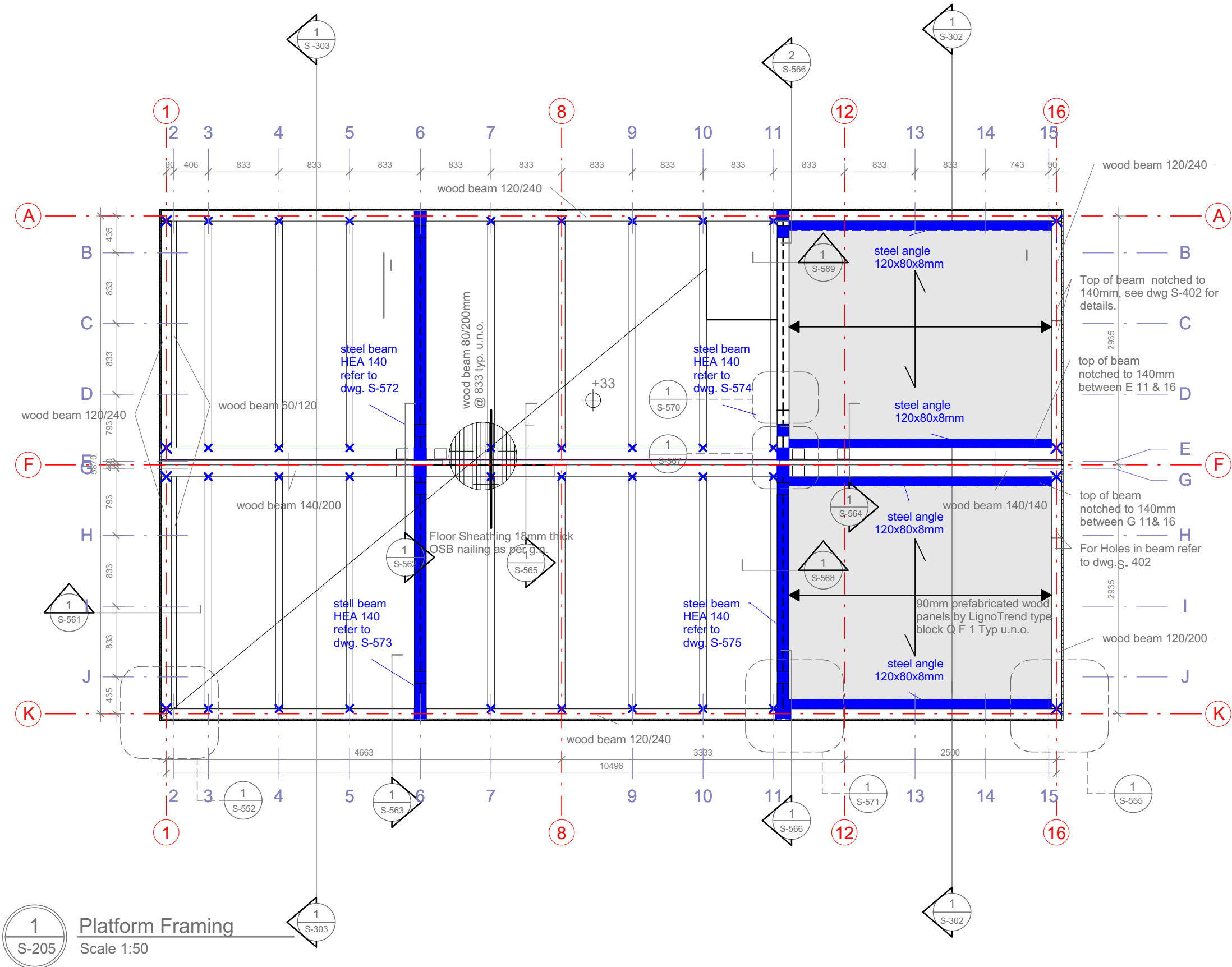
FG Entwerfen und Energieeffizientes Bauen
 El-Lissitzky-Str. 1
 64287 Darmstadt
 +49 (0) 6151 / 165448
 +49 (0) 6151 / 165247
 team@solardecathlon2009.de

Navigation

- OSB, wood board, structural
- wood post
- split of building
- axis of reference
- secondary grid line
- Ligno Trend, glued laminated wood panels
- continuous beam
- continuous beam
- steel element for transportation
- double threaded wood screws by SFS intec
- steel angle
- double-threaded screw, two pairs of SFS WT-T-8,2x300mm
- one pair of SFS WT-T-8,2x245mm
- steel plate















Frankfurter Straße 15
 64331 Weiterstadt
 T +49 (0)6150 / 59 14 92
 F +49 (0)6150 / 59 14 93
 info@tragwerkplus.de
 www.tragwerkplus.de

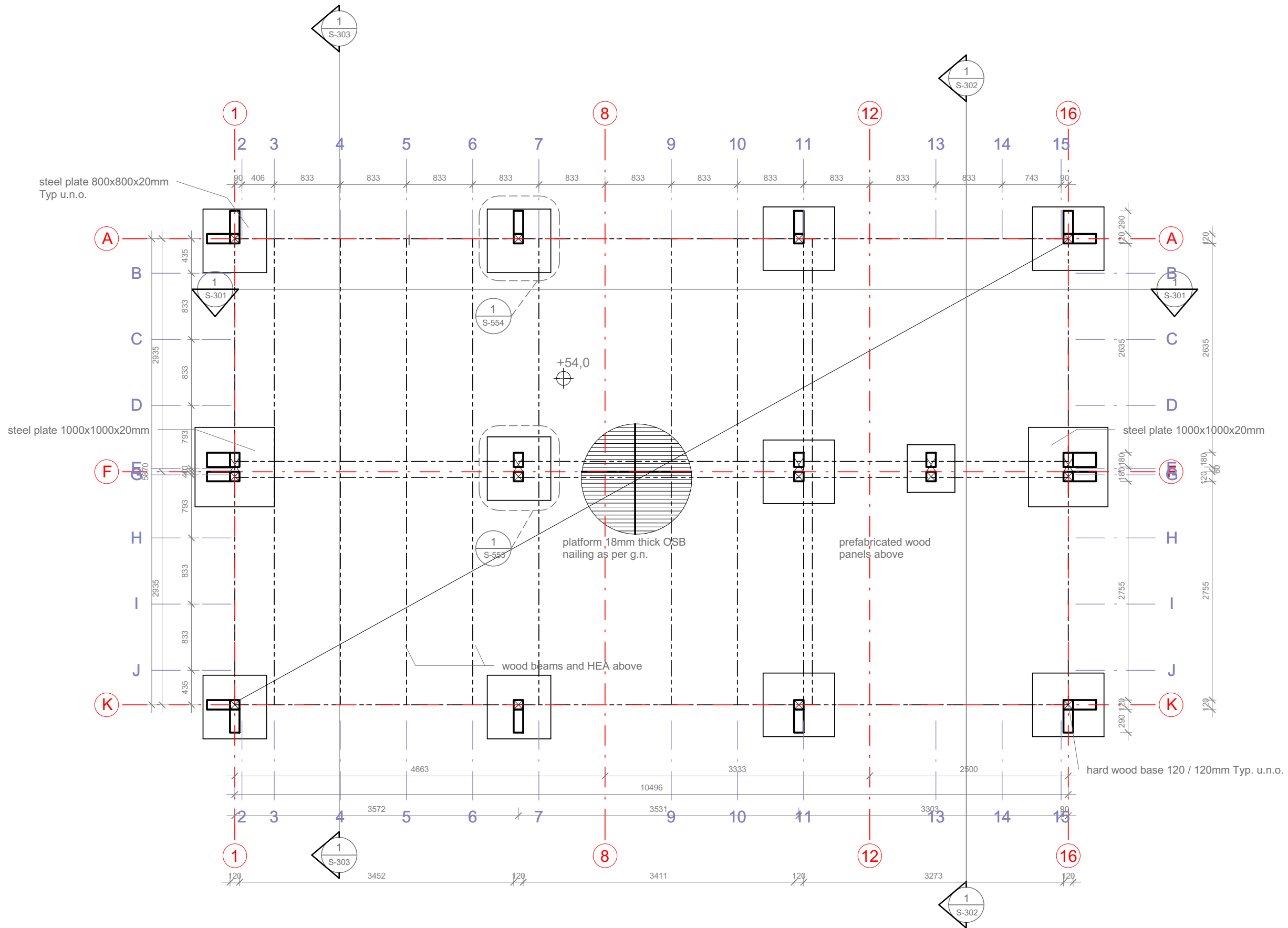
Drawn	SA (MK)
Issued	04/26/09
Last index	05/11/09
Component	Structural
Description	Floor framing
Project #	P140
Scale	1 : 50
dwg #	S-204

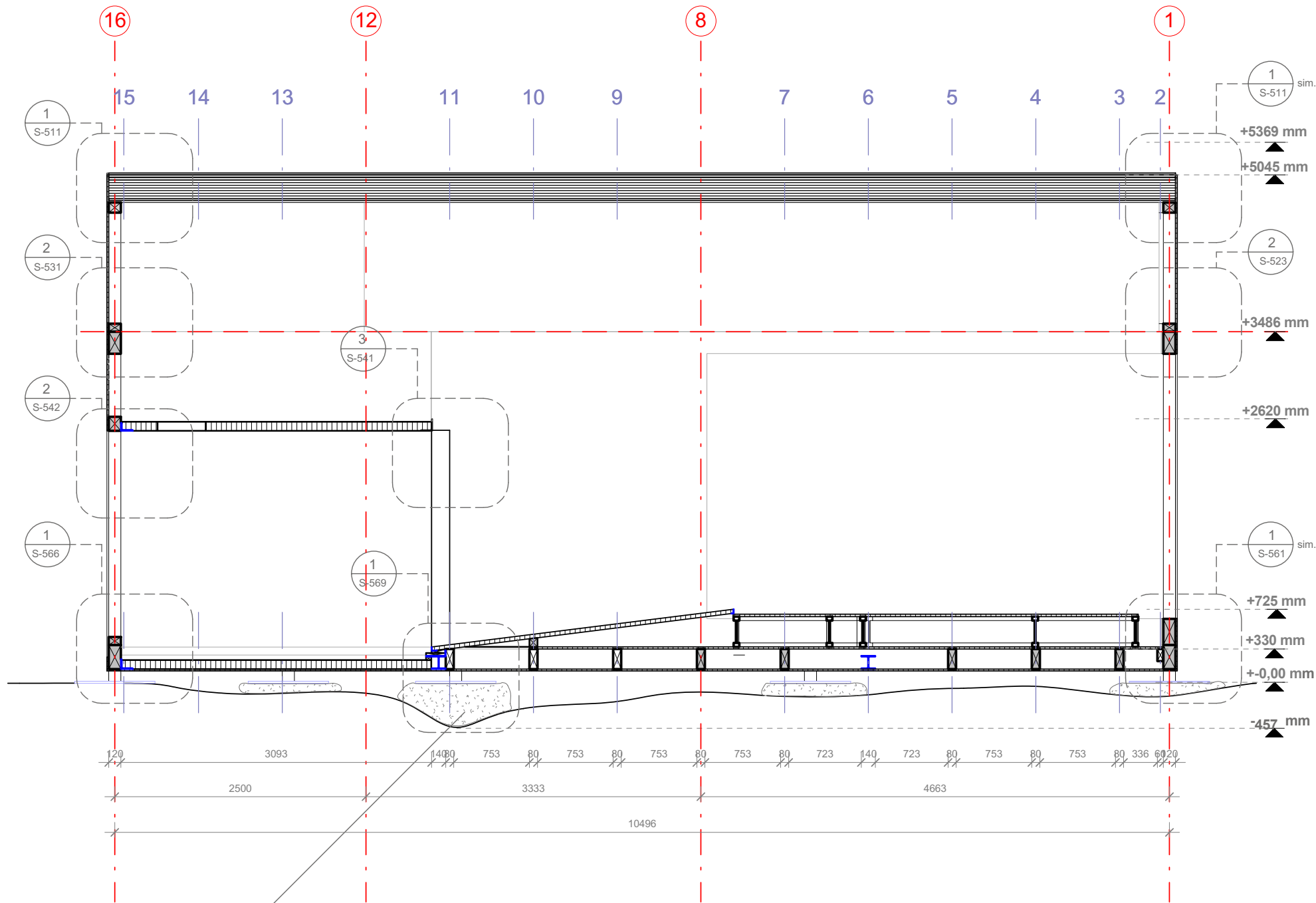


1:50



-  OSB, wood board, structural
-  wood post
-  split of building
-  axis of reference
-  secondary grid line
-  Ligno Trend, glued laminated wood panels
-  continuous beam
-  continuous beam
-  steel element for transportation
-  double threaded wood screws by SFS intec
-  steel angle
-  double-threaded screw, two pairs of SFS WT-T-8,2x300mm
-  one pair of SFS WT-T-8,2x245mm
-  steel plate

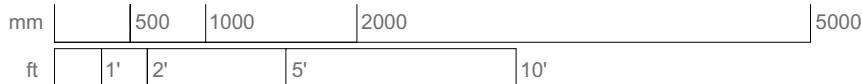


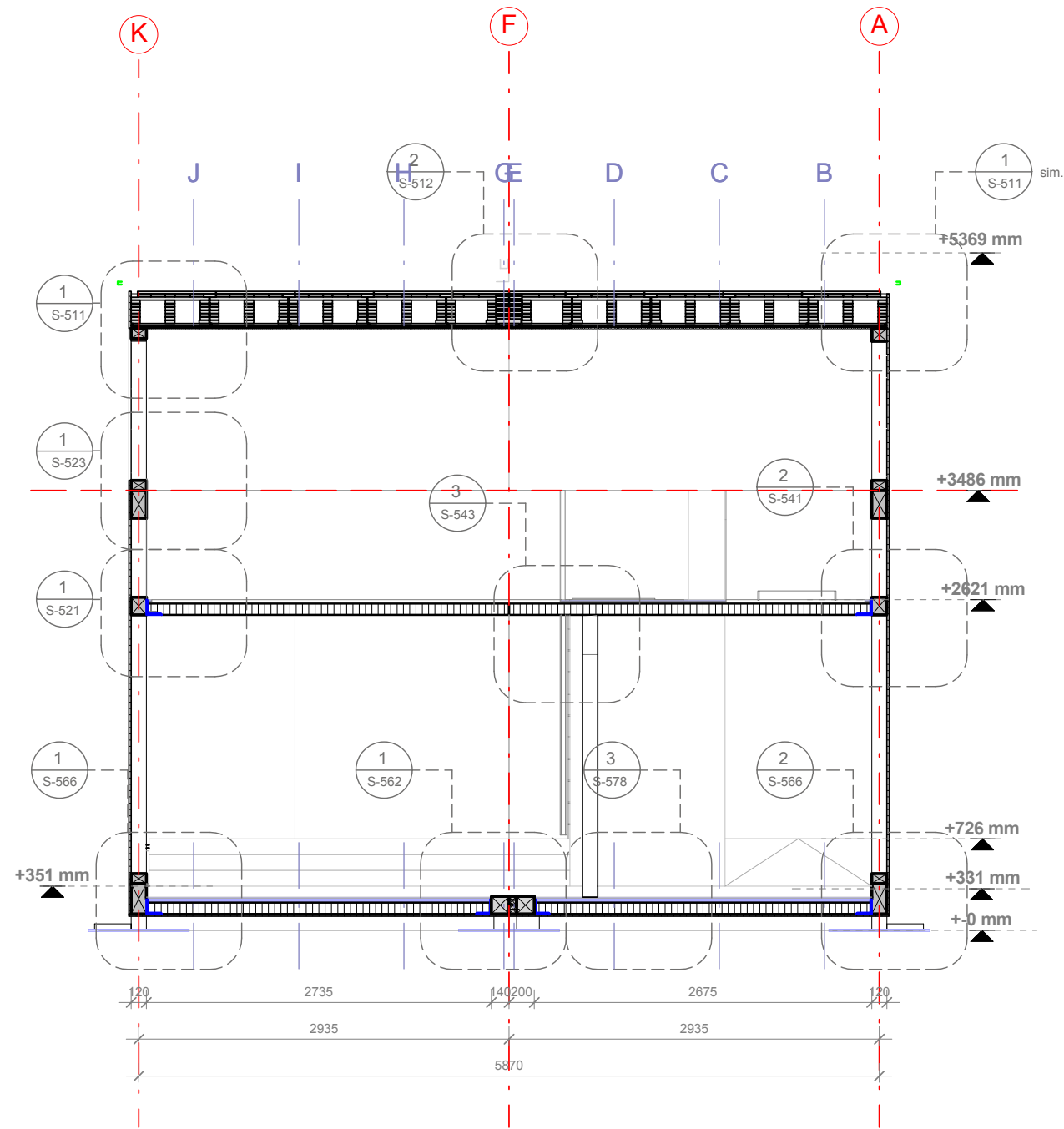


shimming method: geotextile filled with gravel and cement

1
 S-301 **Longitudinal Section**
 Scale 1:50

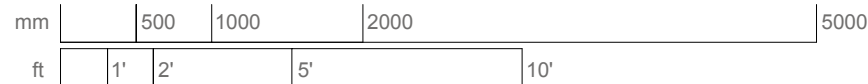
1:50

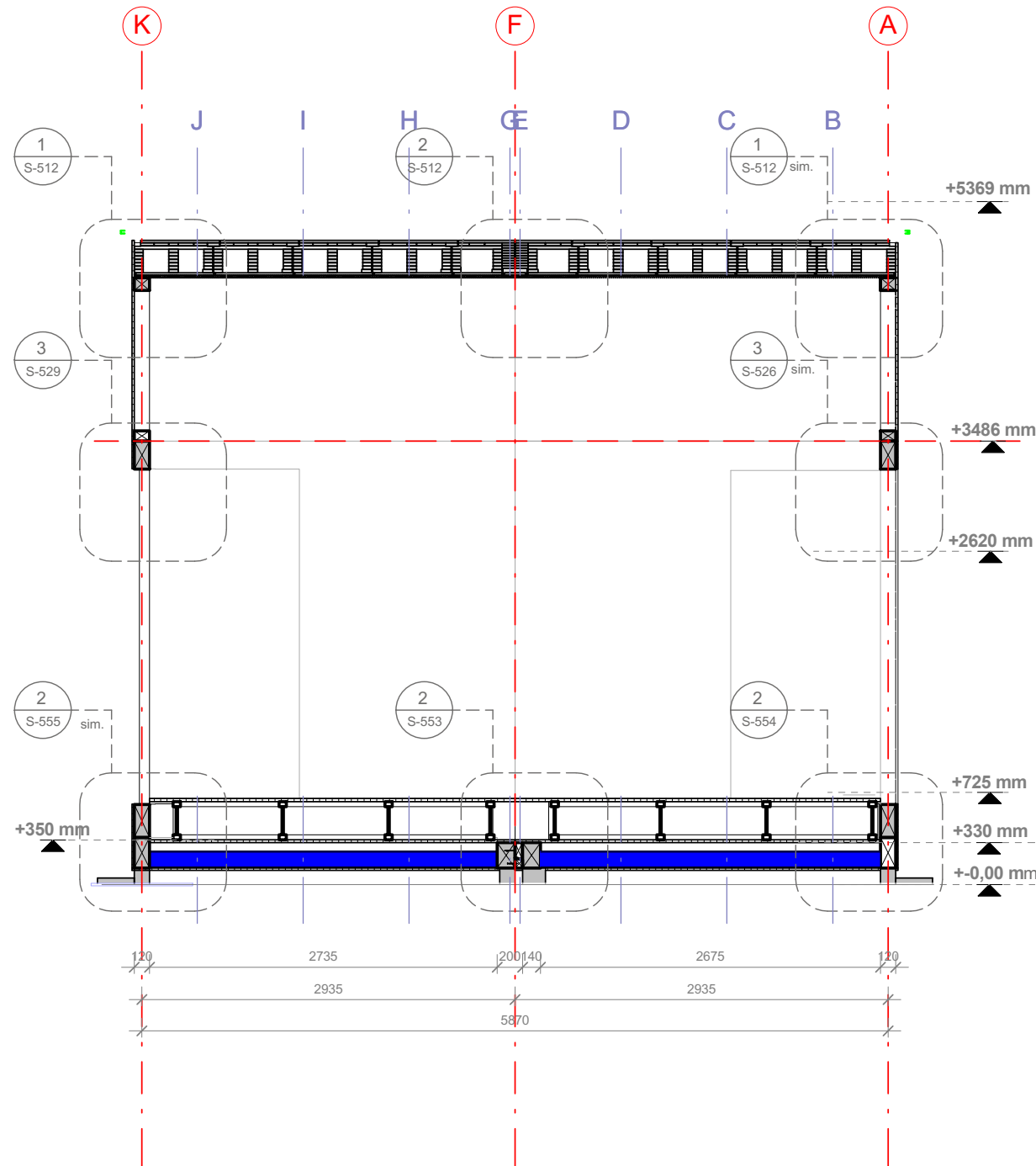




1 Cross Section
S-302 Scale 1:50

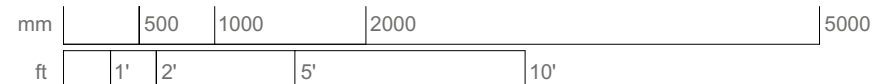
1:50





1
S-303
Cross Section
Scale 1:50

1:50





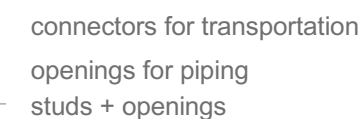
TECHNISCHE
UNIVERSITÄT
DARMSTADT

team@solardecathlon2009.de

TRAGWERK
Jochen A. Stroh Dipl.-Ing., P.Eng.

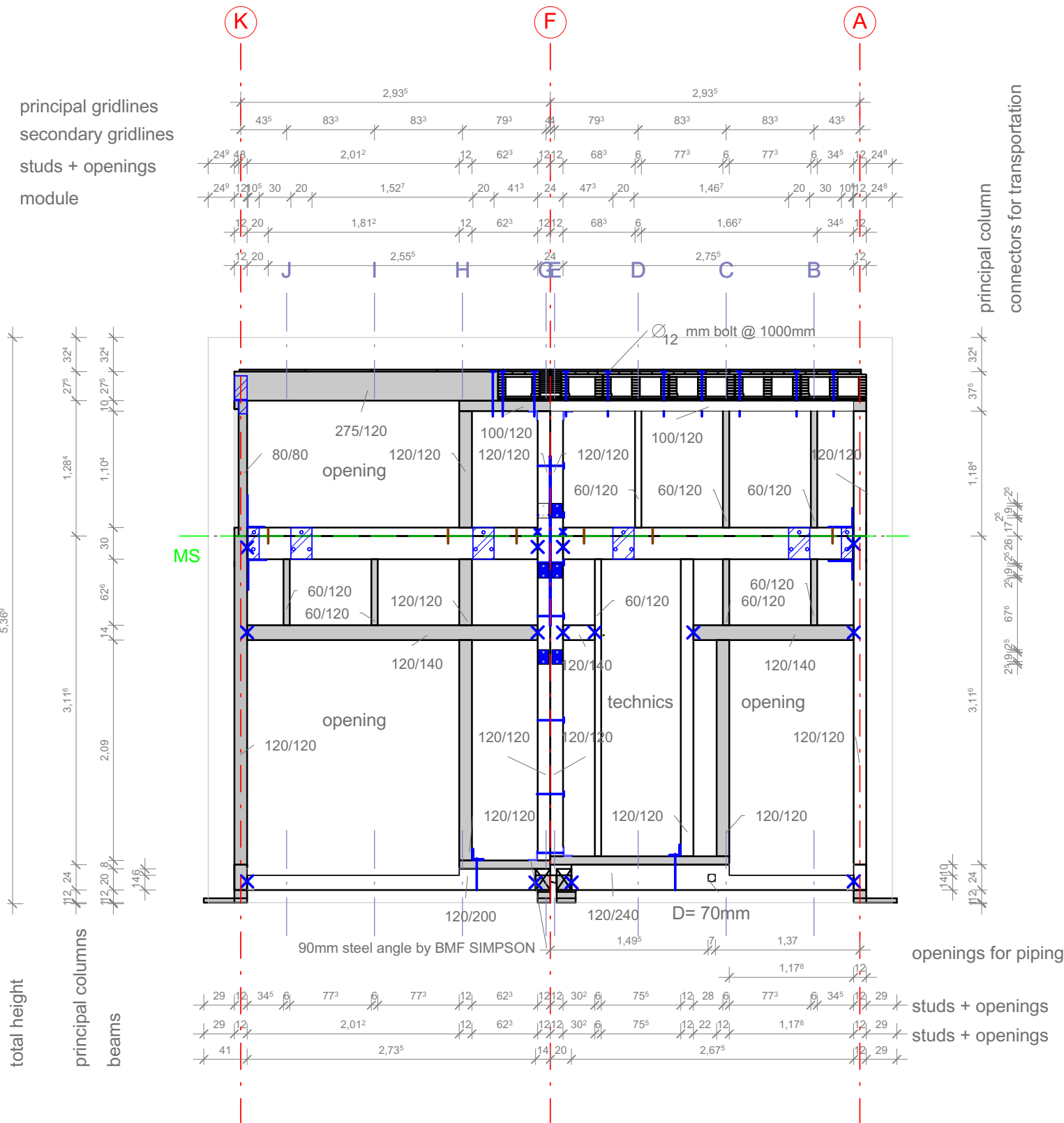
Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

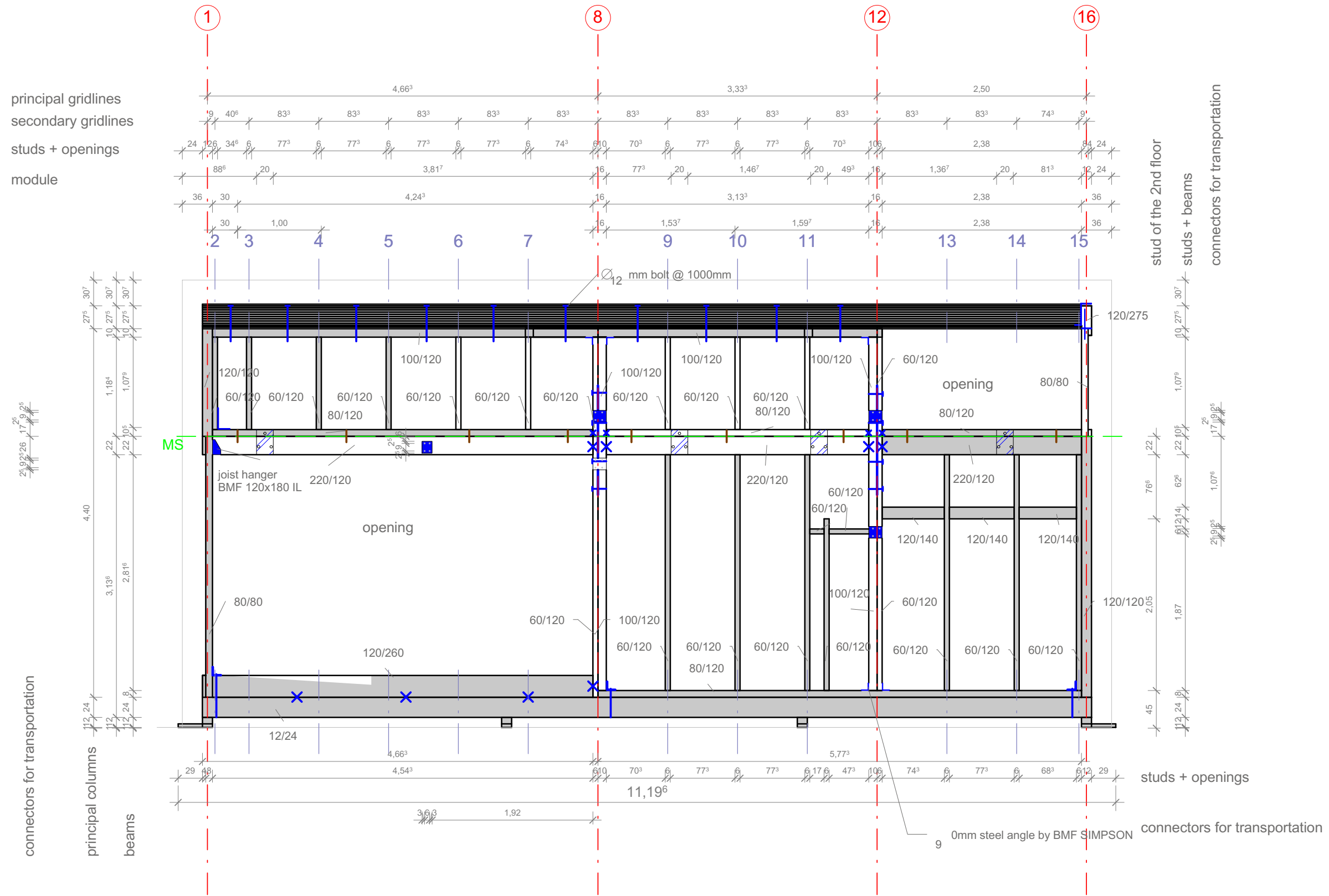
P140 1 : 50 **S-401**



Scale 1:50

mm		500	1000	2000		5000
ft		1'	2'	5'		10'

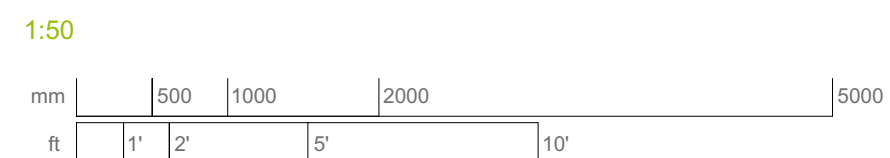




principal gridlines
secondary gridlines
studs + openings
module

connectors for transportation
principal columns
beams

1 Wall Construction South
S-403 Scale 1:50



Projekt
SOLAR DECATHLON 2009
TEAM GERMANY

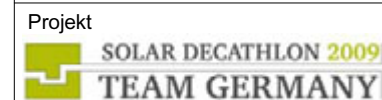
Bauherr
TECHNISCHE UNIVERSITÄT DARMSTADT

FG Entwerfen und Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation
■ wood post or beam
■ hardwood dowel
— split of building
— outer edge of building
— secondary gridline
— principal gridline
└ 90mm steel angle by BMF Simpson
✕ double-threaded screw, two pairs of SFS WT-T-8,2mm
✕ two pairs of SFS WT-T-6,5
└ 12mm bolt
└ steel plate
└ holdown anchor HTT16
■ module connector
■ module connector @ corner
└ Z-section
■ steel plate 140x120
■ opening

TRAGWERK
Jochen A. Stahl [Dipl.-Ing., P.Eng.]
Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn	MK	
Issued	04/25/09	
Last index	05/11/09	
Component	Structural	
Description	Wall Construction South	
Project #	Scale	dwg #
P140	1 : 50	S-403



TECHNISCHE
UNIVERSITÄT
DARMSTADT

team@solardecathlon2009.de

- steel plate
- ...



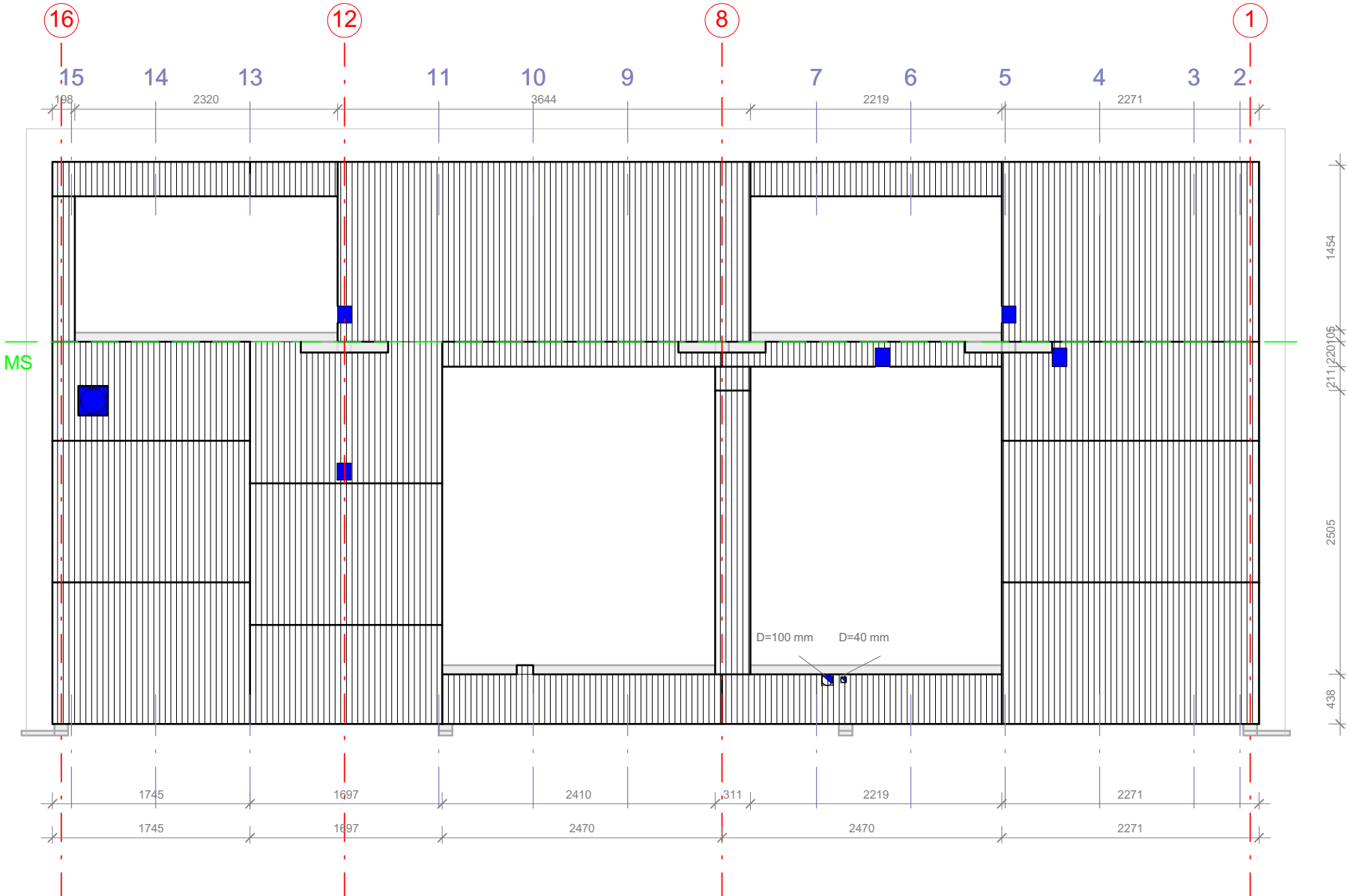
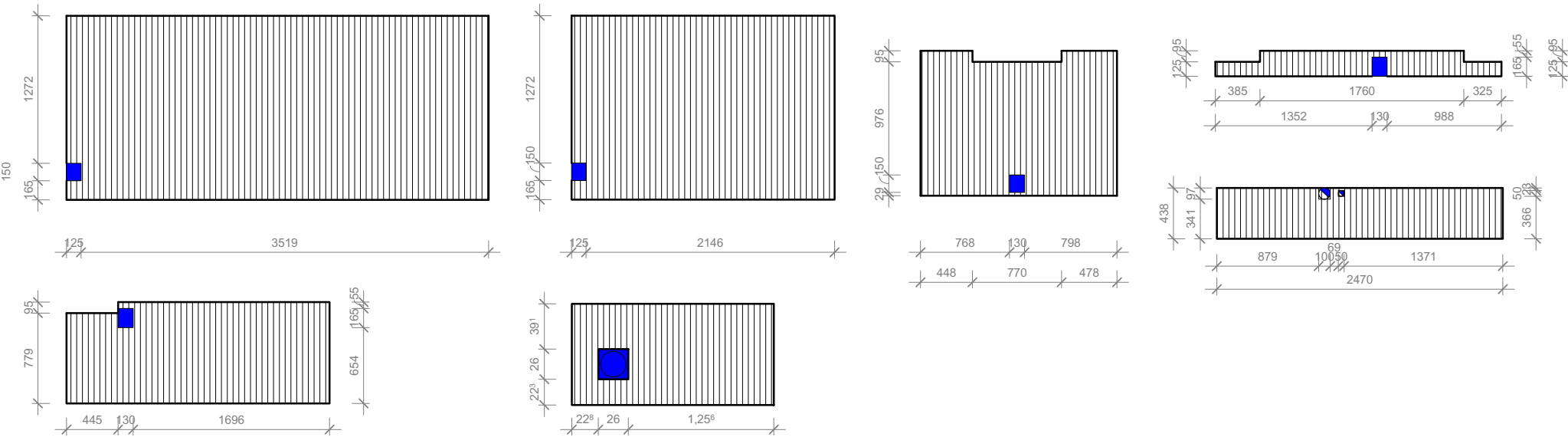
Last index	05/11/09
------------	----------

Structural

Wall Construction West

P140 1:50 **S-404**

OSB dimensions



Fastening:

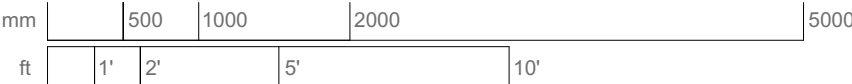
staples:
diameter: 1,5mm
length: 50mm

spacing at OSB panel egde: 50mm
spacing at intermediate studs: 80mm



Wall sheathing North
Scale 1:50

1:50

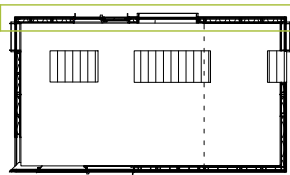


Projekt
SOLAR DECATHLON 2009
TEAM GERMANY

Bauherr
TECHNISCHE UNIVERSITÄT DARMSTADT

FG Entwerfen und Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

- Navigation
- OSB-standard sheets 2500x1250x18mm
 - OSB-standard sheets 5000x2500x18mm
 - wood stud / beam
 - split of building
 - outer edge of building
 - main axis
 - holes
 - openings



Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

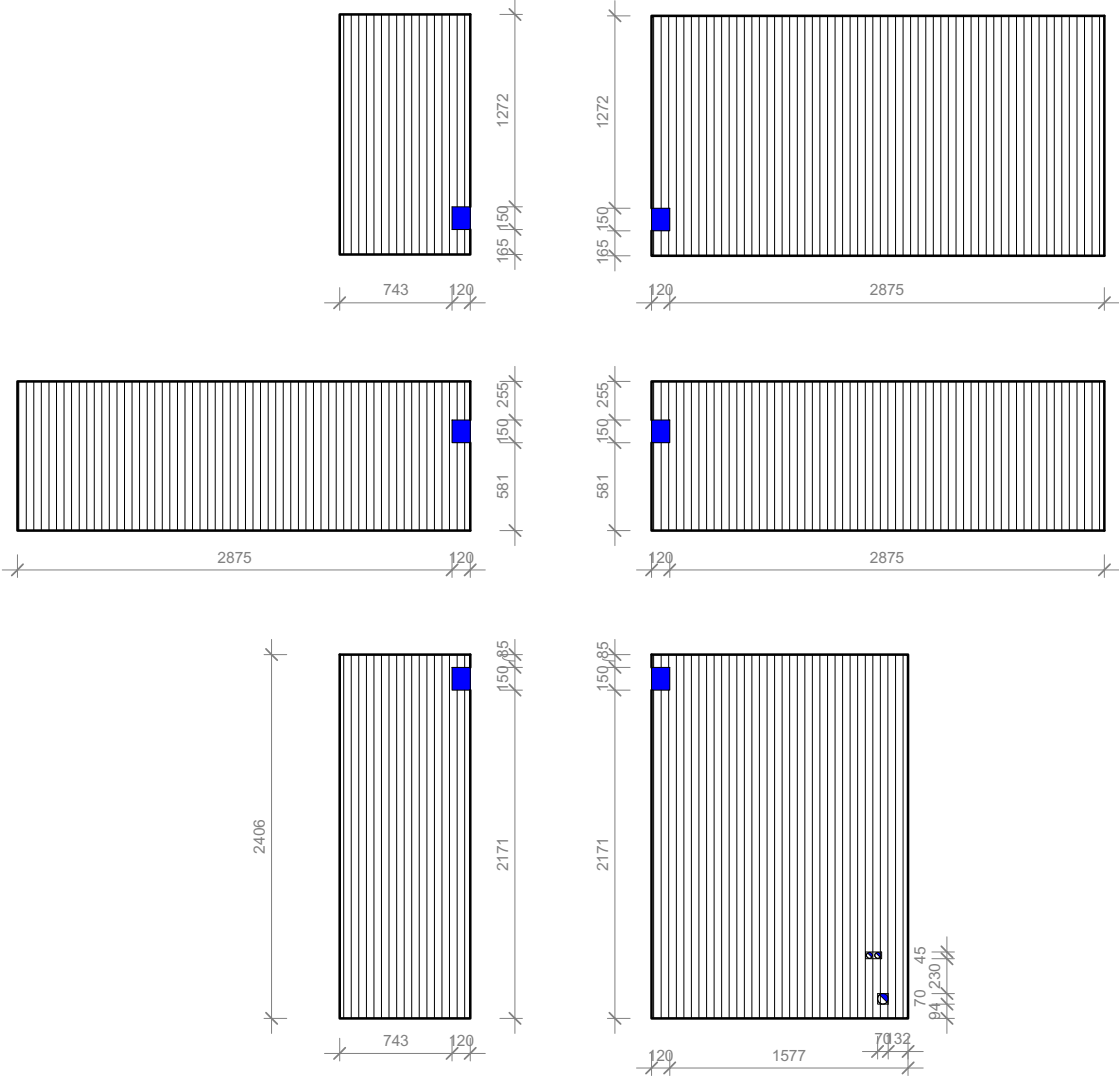
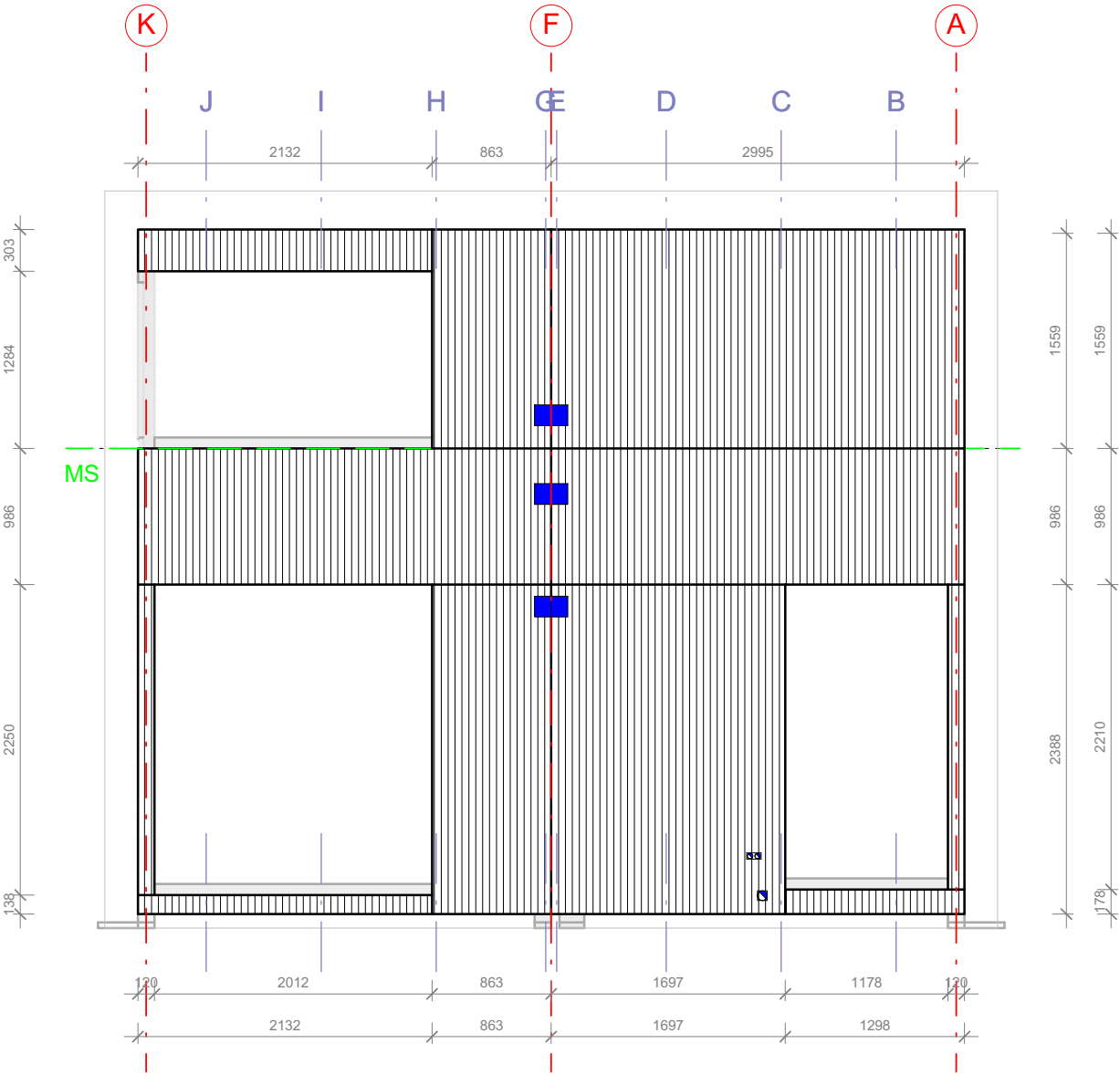
Drawn AO|AG|SS(MK)
Issued 04/25/09
Last index 05/11/09

Component
Structural

Description
Wall Sheathing North

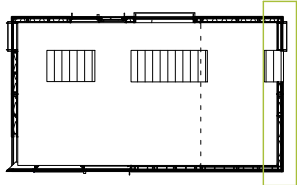
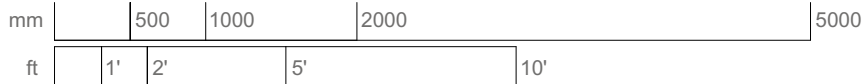
Project # Scale dwg #
P140 1 : 50 **S-405**

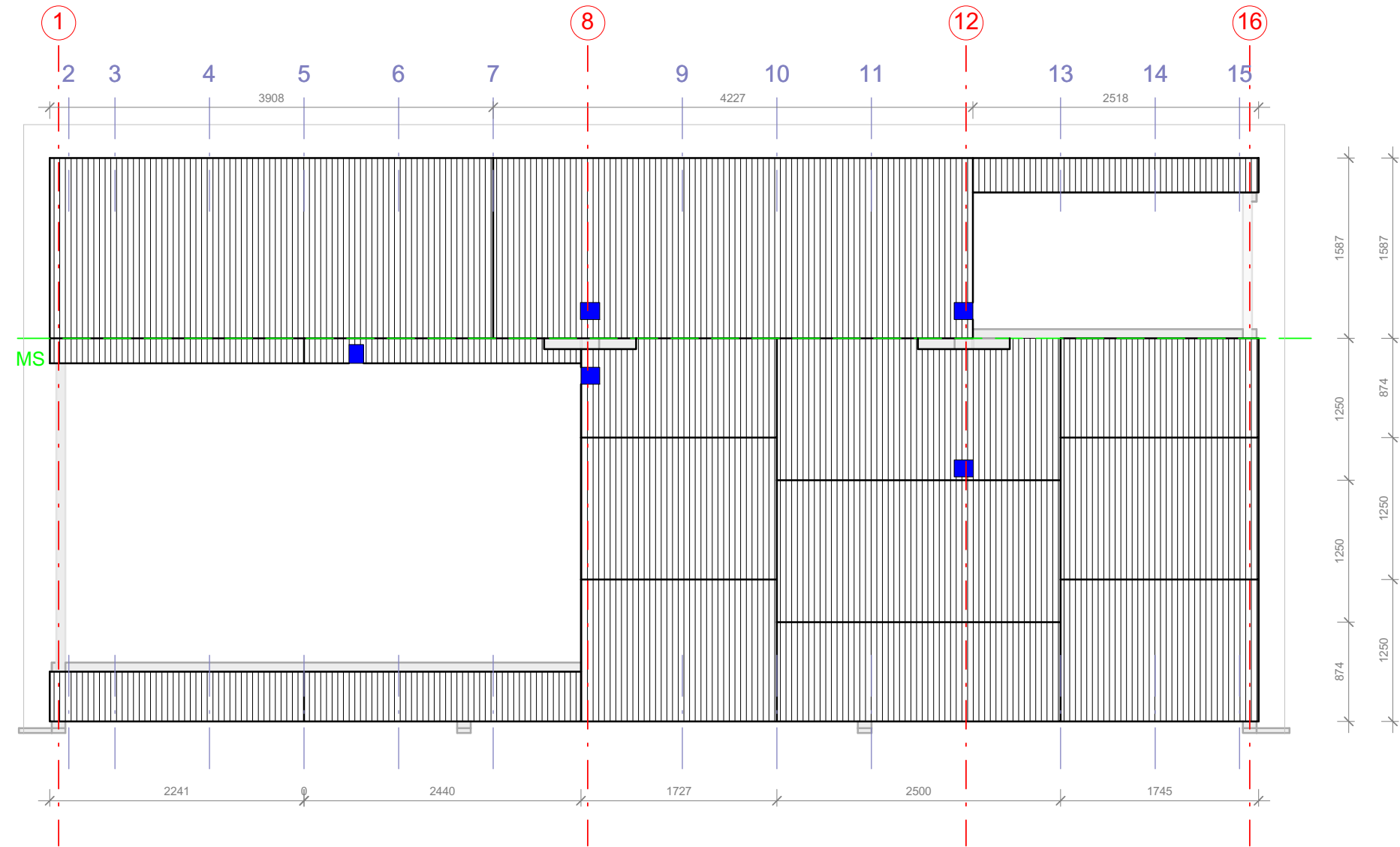
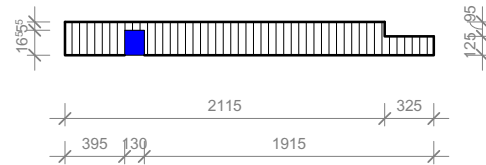
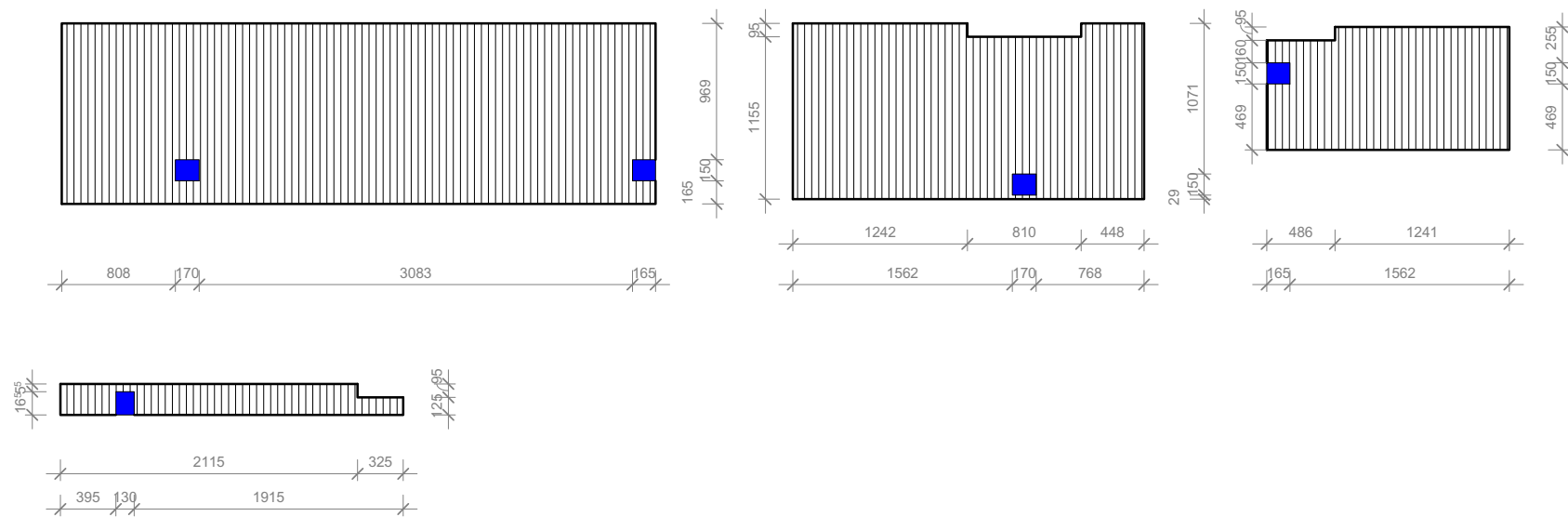
OSB dimensions



Fastening:
staples:
diameter: 1,5mm
length: 50mm
spacing at OSB panel edge: 40mm
spacing @ intermediate studs: 60mm

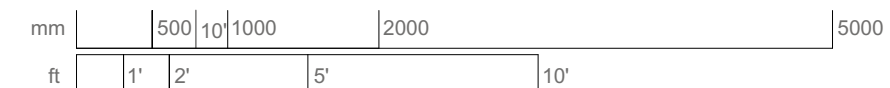
1:50





Wall sheathing South
Scale 1:50

1:50

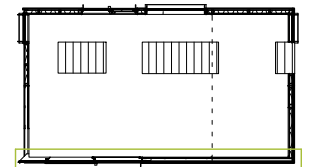


Projekt
SOLAR DECATHLON 2009
TEAM GERMANY

Bauherr
TECHNISCHE UNIVERSITÄT DARMSTADT

FG Entwerfen und Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

- Navigation
- OSB-standard sheets 2500x1250x18mm
 - OSB-standard sheets 5000x2500x18mm
 - wood stud / beam
 - split of building
 - outer edge of building
 - main axis
 - holes
 - openings



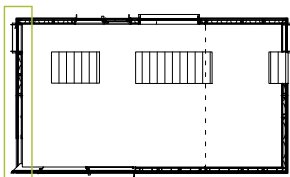
Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn AO|AG|SS|MK
Issued 04/25/09
Last index 05/11/09

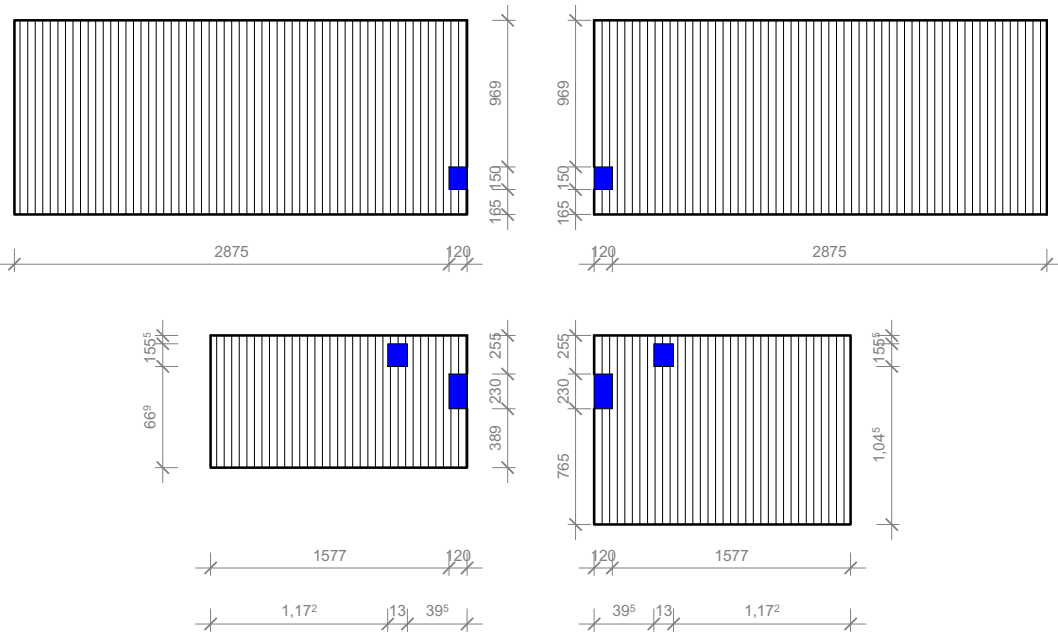
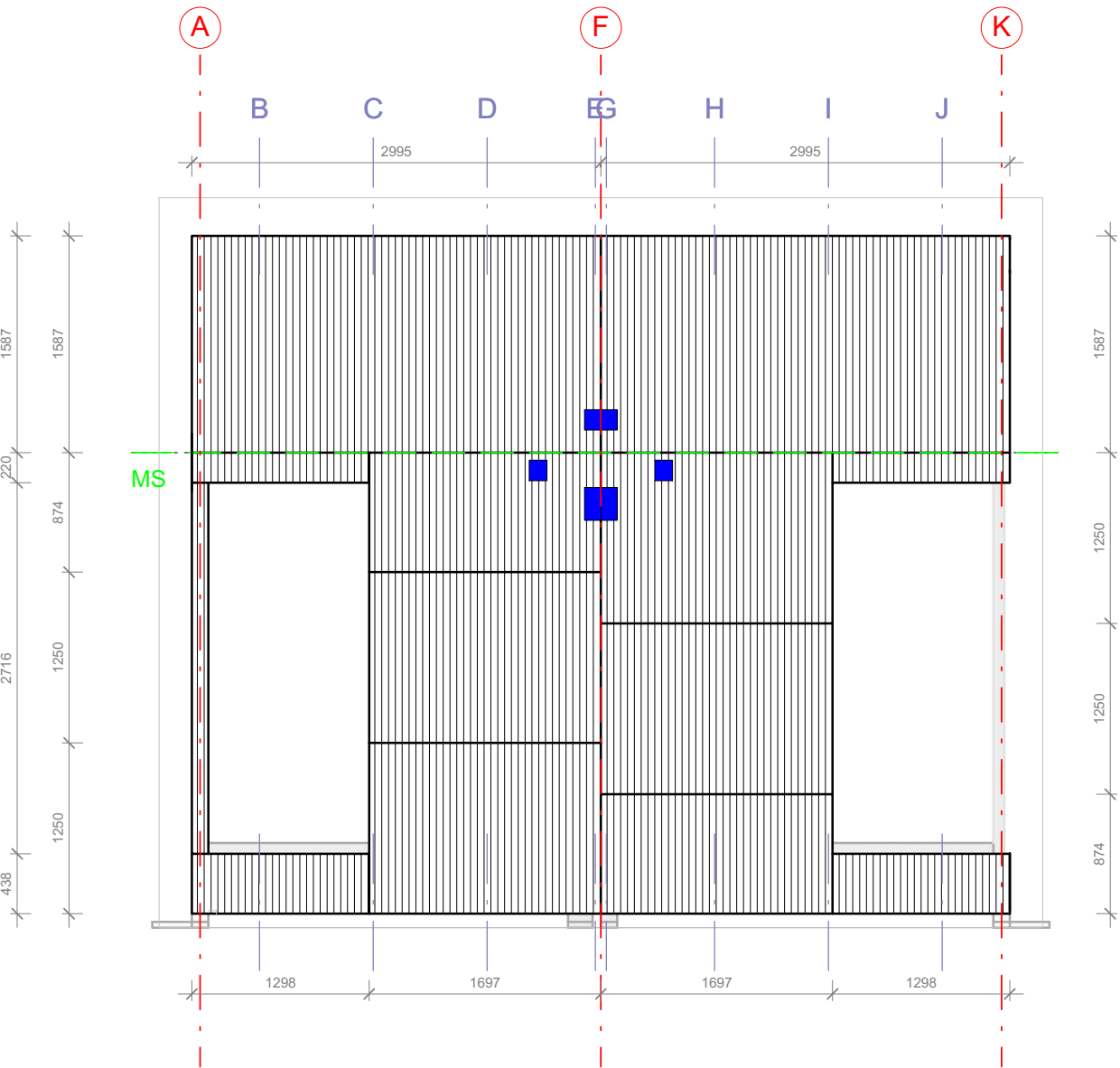
Component
Structural

Description
Wall Sheathing South

Project # Scale dwg #
P140 1 : 50 **S-407**



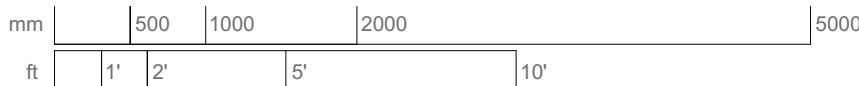
OSB dimensions



Fastening:

staples:
diameter: 1, 5mm
length: 50mm
spacing at OSB panel edge: 40mm
spacing @ intermediate studs: 60mm

1:50

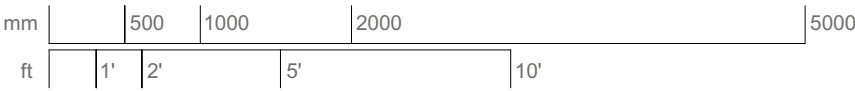
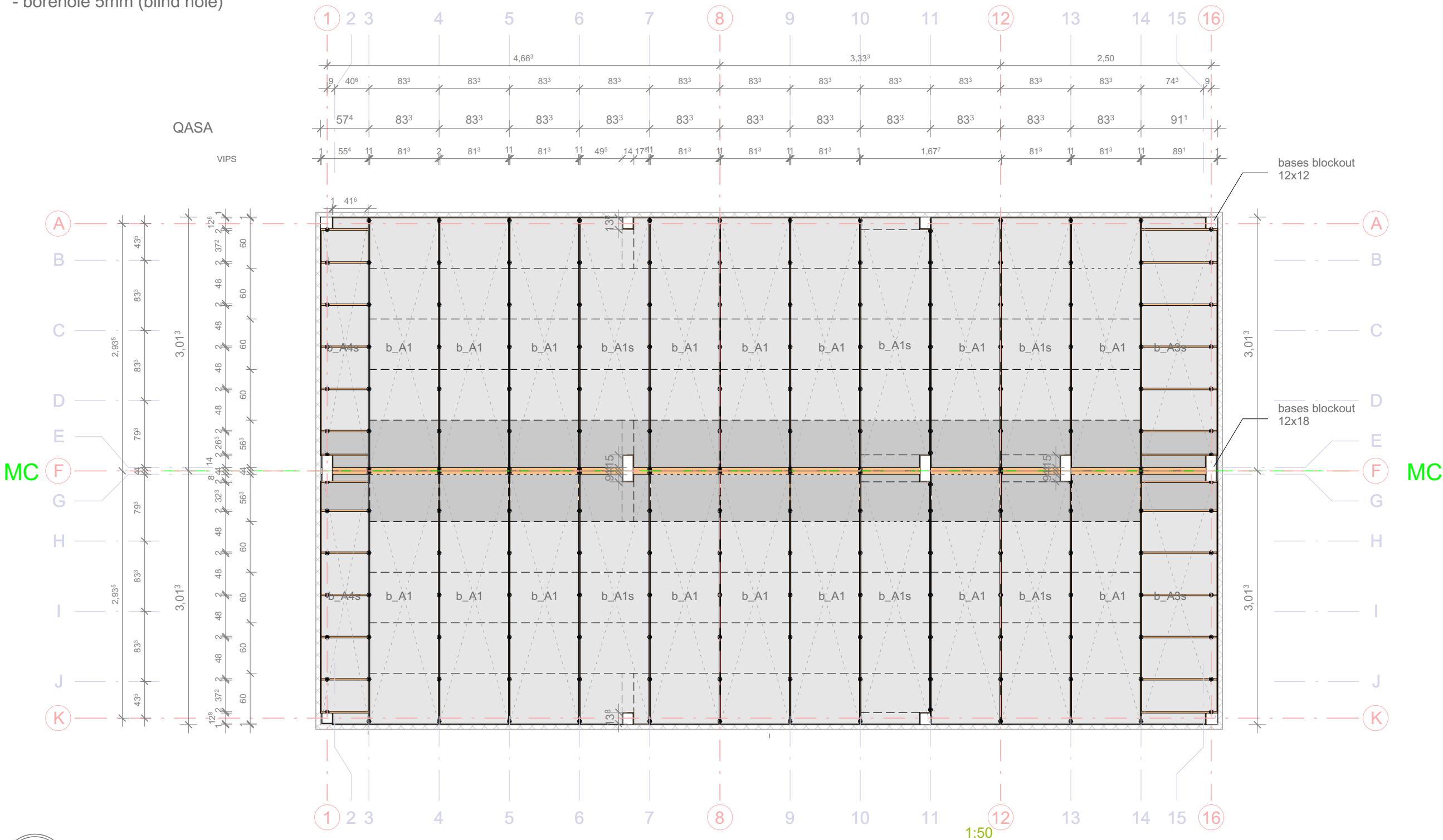


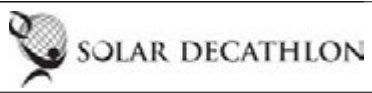
QASA-structure

- 0,2-0,3 mm water-bearing aluminium layer
- 3-4 mm plywood
- 50 mm vacuum insulation panel (VIP)
- 3-4 mm plywood (profile)

arris protection


- polyurethane edge strip
- borehole 5mm (blind hole)






SOLAR DECATHLON

Project



SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

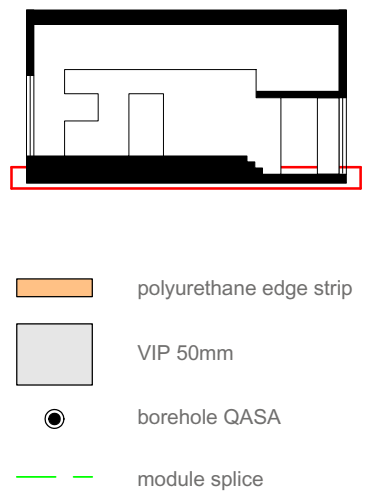


TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit

El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



polyurethane edge strip
VIP 50mm
borehole QASA
module splice

Drawn TH
Issued 05/14/09
Last index

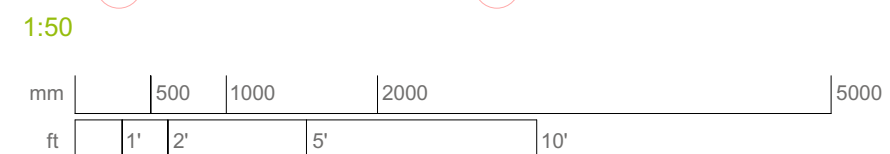
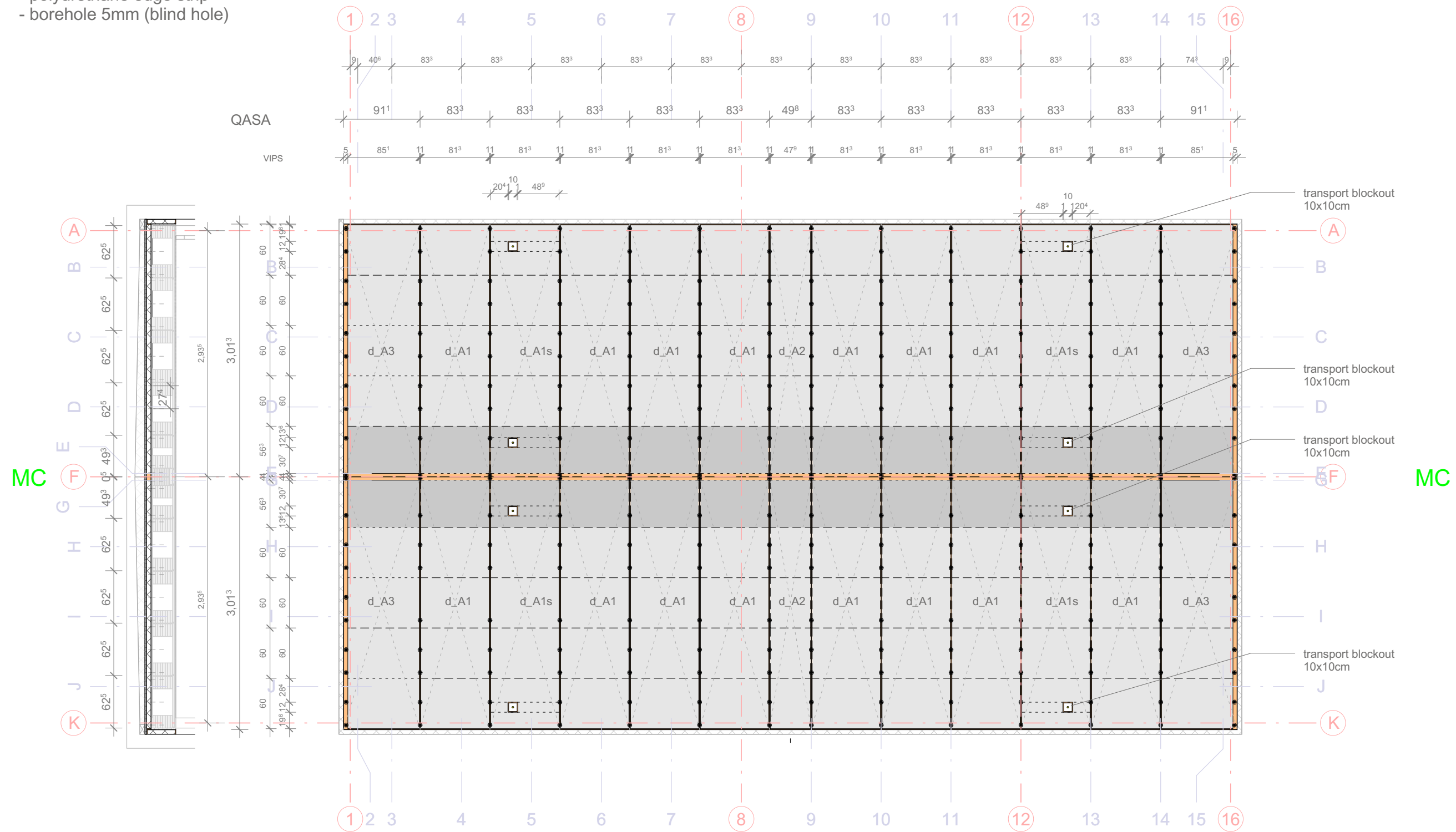
Component
QASA insulation





Description
VIP Floor Plan

Project # P 140
Scale 1:50
dwg # S-421

- 22 mm OSB (profile)
- 3-4 mm plywood
- 50 mm vacuum insulation panel (VIP)
- 3-4 mm plywood

- polyurethane edge strip
- borehole 5mm (blind hole)



- | | |
|---|-------------------------|
|  | polyurethane edge strip |
|  | VIP 50mm |
|  | borehole QASA |
|  | module splice |

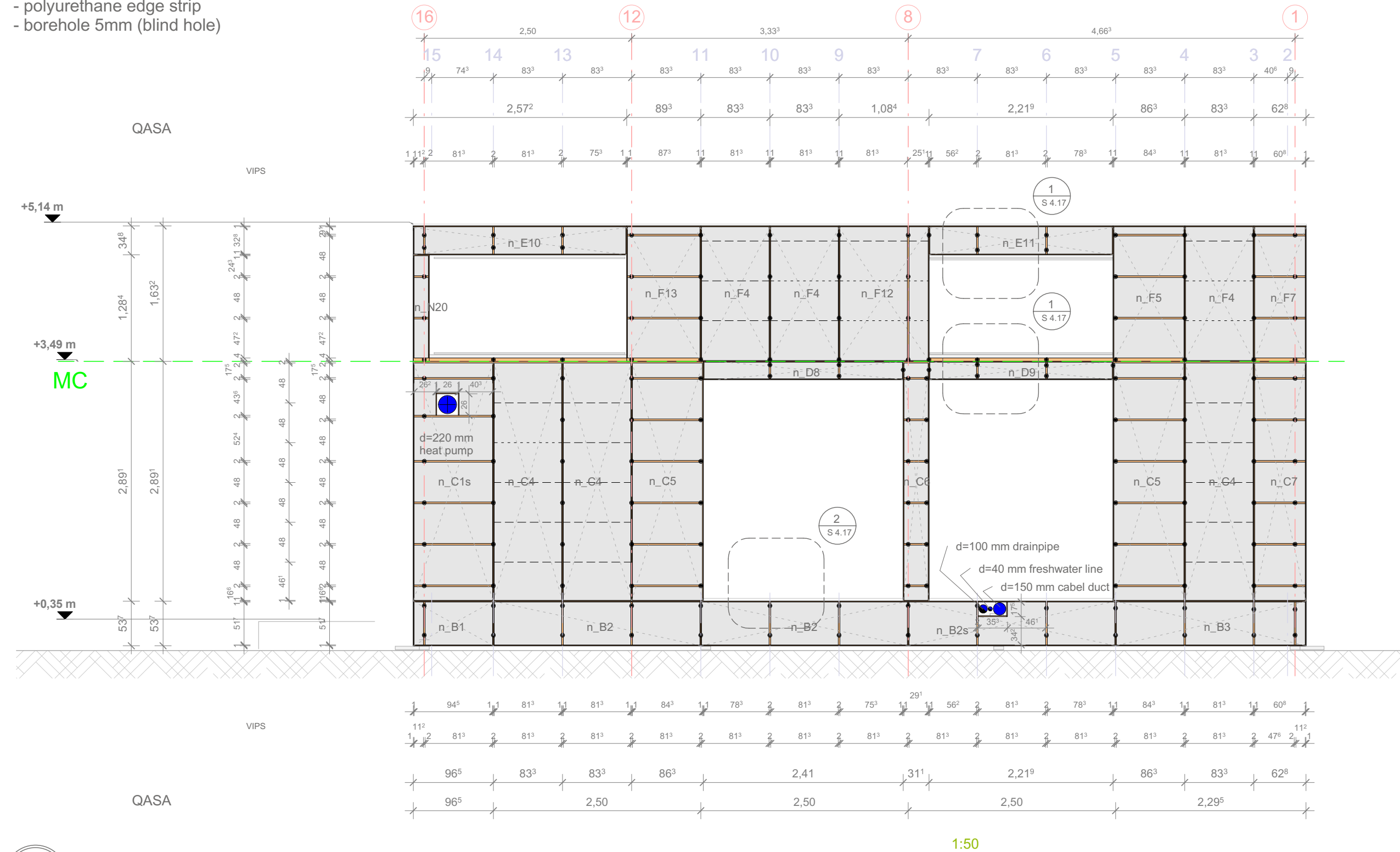
Drawn	TH
Issued	05/14/09
Last index	
Component QASA insulation	
Description VIP Roof Plan	
Project #	Scale
P 140	1:50
	dwg #
	S-422

QASA-structure

- 0,2-0,3 mm water-bearing aluminium layer (profile)
- 3-4 mm plywood
- 50 mm vacuum insulation panel (VIP)
- 3-4 mm plywood

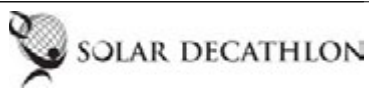
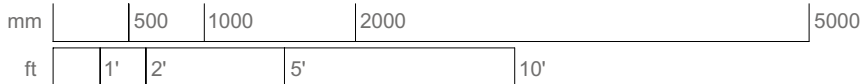
arris protection

- polyurethane edge strip
- borehole 5mm (blind hole)



1 VIP Plan North
S-441 Scale 1:50

1:50

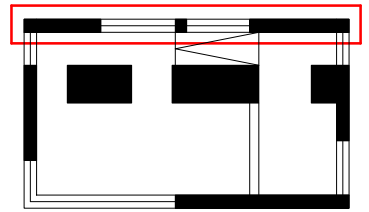


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



- polyurethane edge strip
- VIP 50mm
- borehole QASA
- technical breakthrough
- module splice

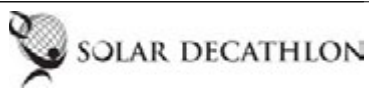
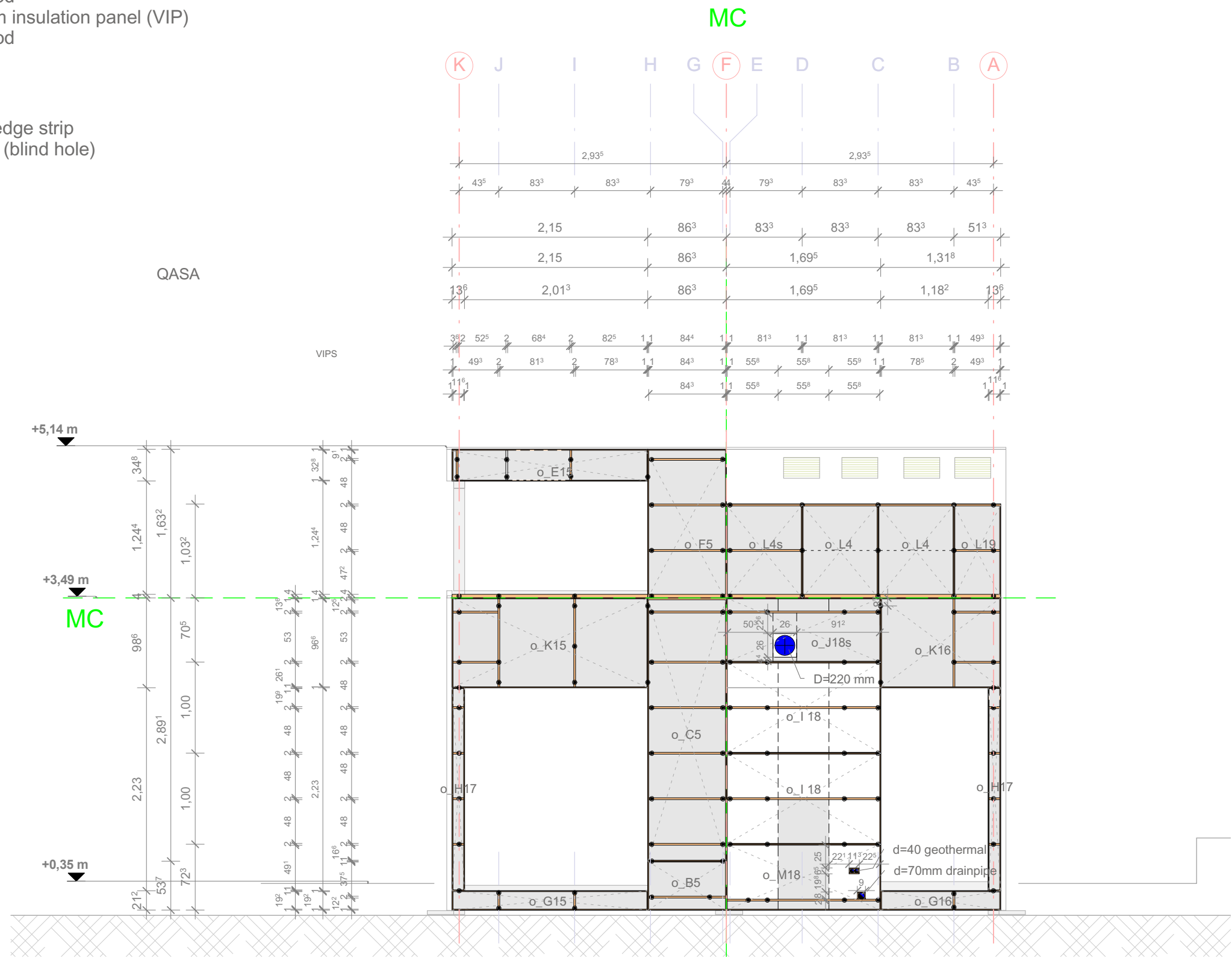
Drawn	TH	
Issued	05/14/09	
Last index		
Component		
QASA insulation		
Description		
VIP Plan North		
Project #	Scale	dwg #
P 140	1:50	S-441

QASA-structure

- 0,2-0,3 mm water-bearing aluminium layer (profile)
- 3-4 mm plywood
- 50 mm vacuum insulation panel (VIP)
- 3-4 mm plywood

arris protection

- polyurethane edge strip
- borehole 5mm (blind hole)

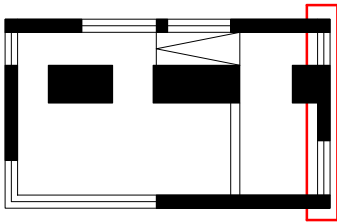


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



- polyurethane edge strip
- VIP 50mm
- borehole QASA
- technical breakthrough
- module splice

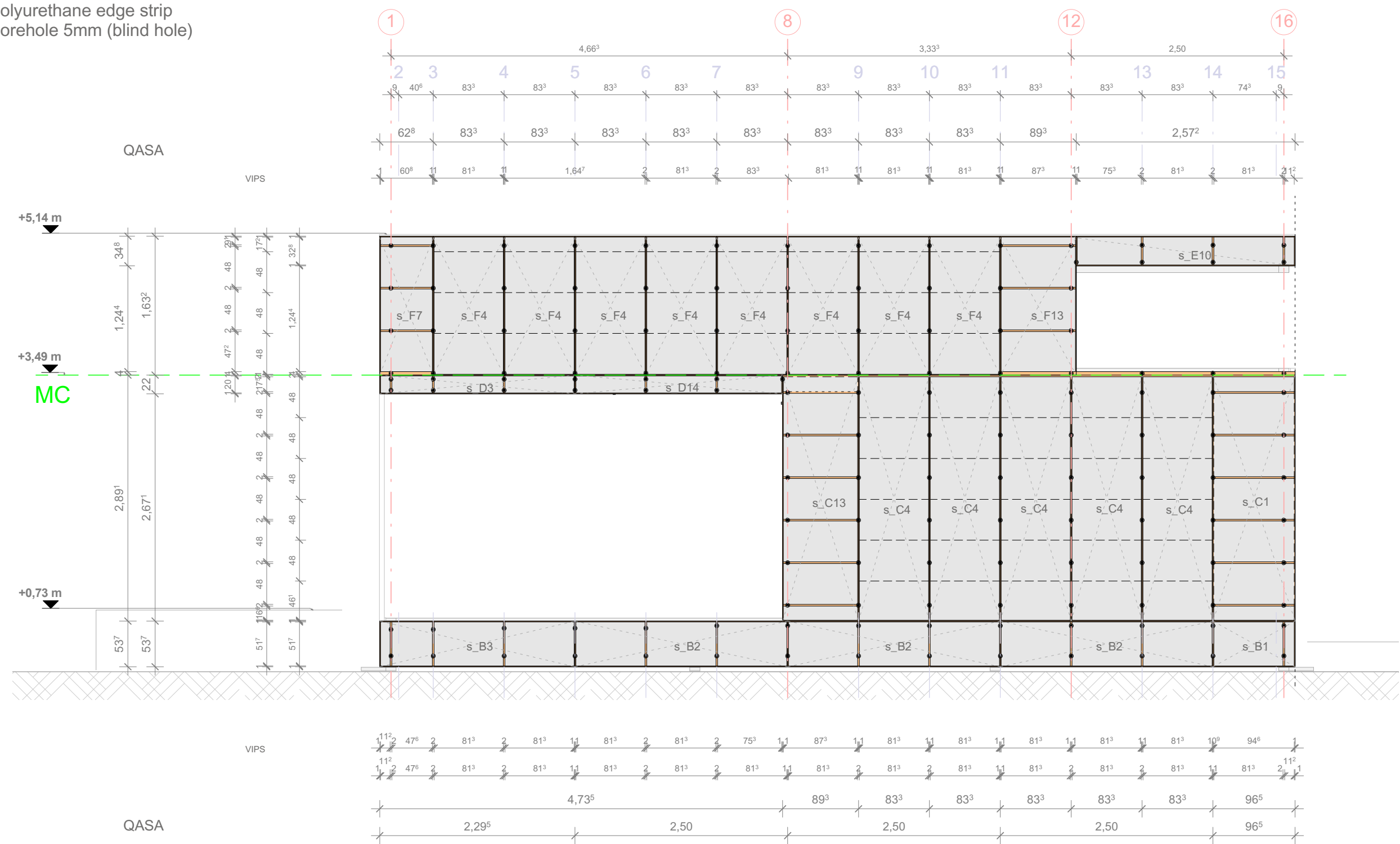
Drawn	TH	
Issued	05/14/09	
Last index		
Component		
QASA insulation		
Description		
VIP Plan East		
Project #	Scale	dwg #
P 140	1:50	S-442

QASA-structure

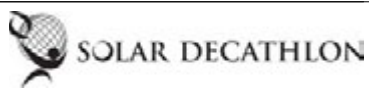
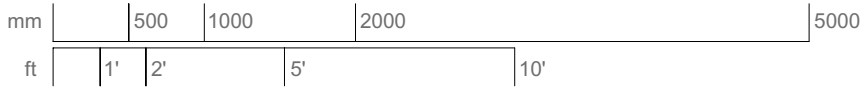
- 0,2-0,3 mm water- bearing aluminium layer (profile)
- 3-4 mm plywood
- 50 mm vacuum insulation panel (VIP)
- 3-4 mm plywood

arris protection

- polyurethane edge strip
- borehole 5mm (blind hole)



1:50

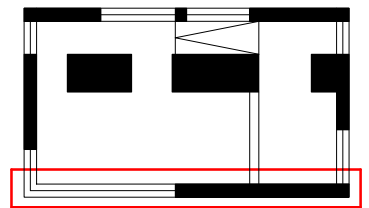


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



- polyurethane edge strip
- VIP 50mm
- borehole QASA
- technical breakthrough
- module splice

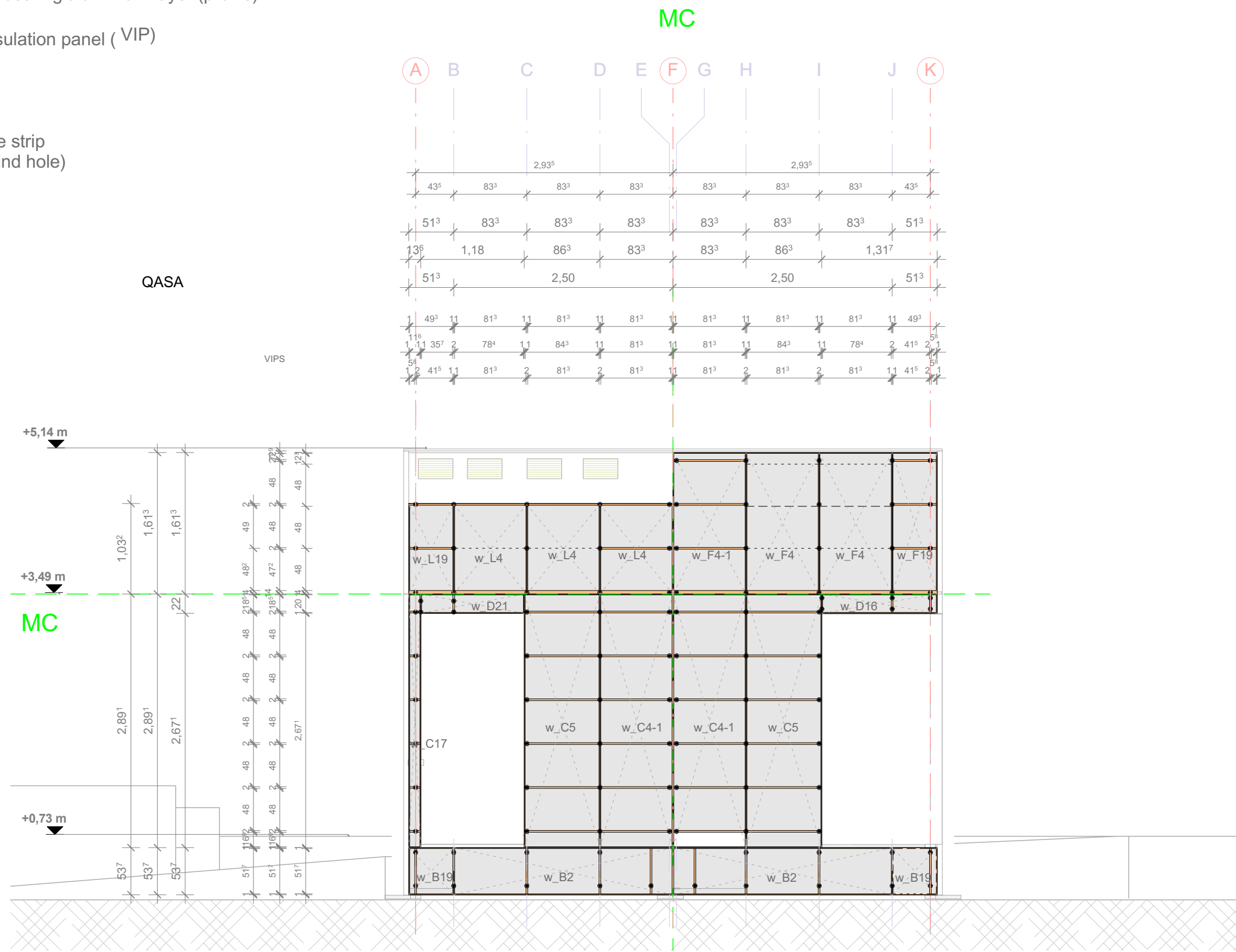
Drawn	TH	
Issued	05/14/09	
Last index		
Component		
QASA insulation		
Description		
VIP Plan South		
Project #	Scale	dwg #
P 140	1:50	S-443

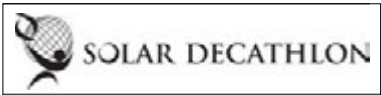
QASA-structure

- 0,2-0,3 mm water- bearing aluminium layer (profile)
- 3-4 mm plywood
- 50 mm vacuum insulation panel (VIP)
- 3-4 mm plywood

arris protection


- polyur ethane edge strip
- borehole 5mm (blind hole)






SOLAR DECATHLON

Project



SOLAR DECATHLON 2009
TEAM GERMANY

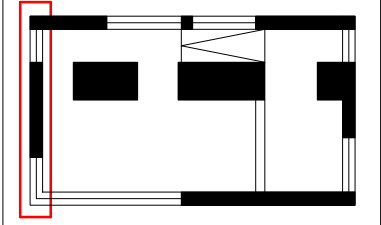
Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



- polyurethane edge strip
- VIP 50mm
- borehole QASA
- technical breakthrough
- module splice

Drawn TH

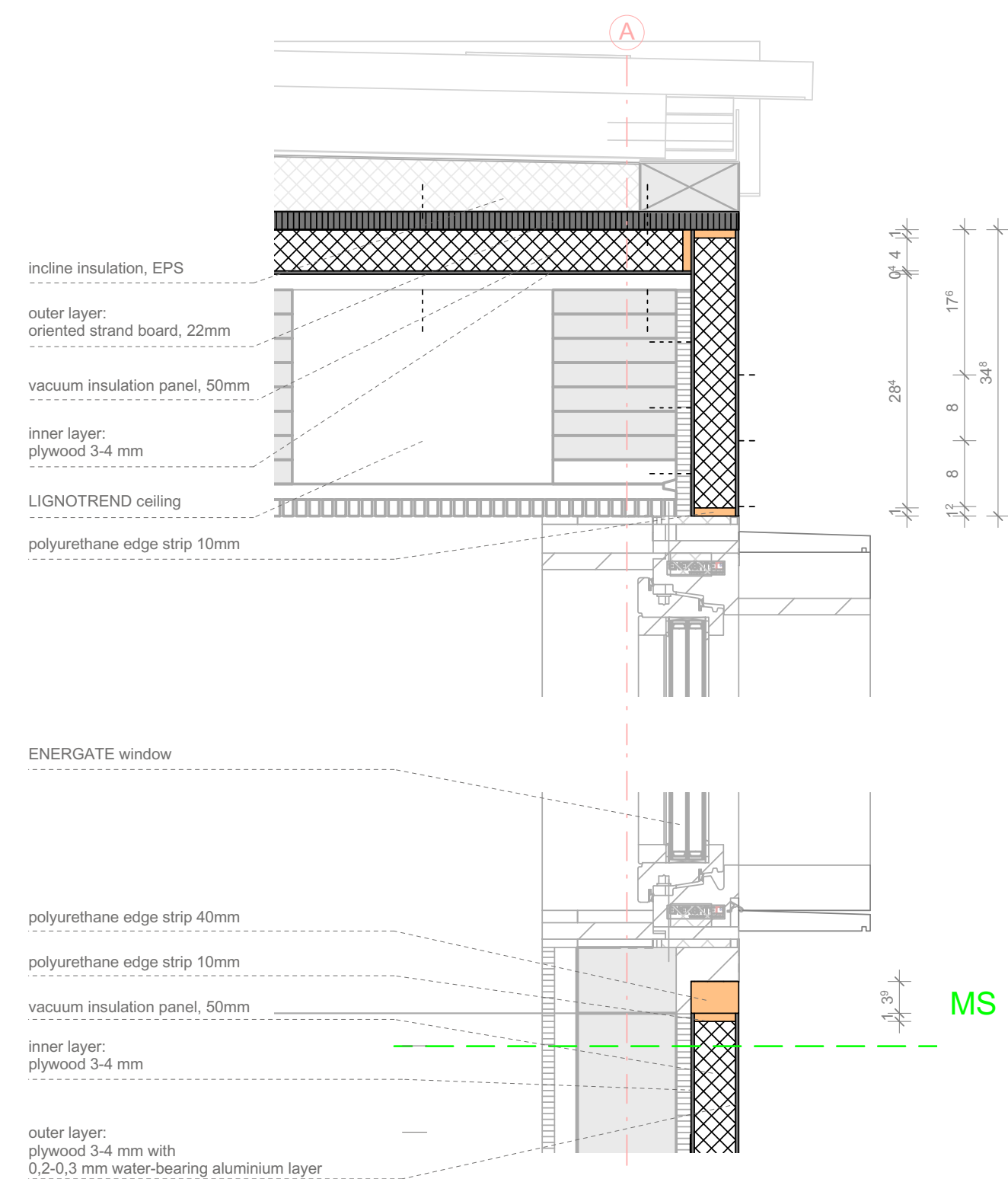
Issued 05/14/09

Last index

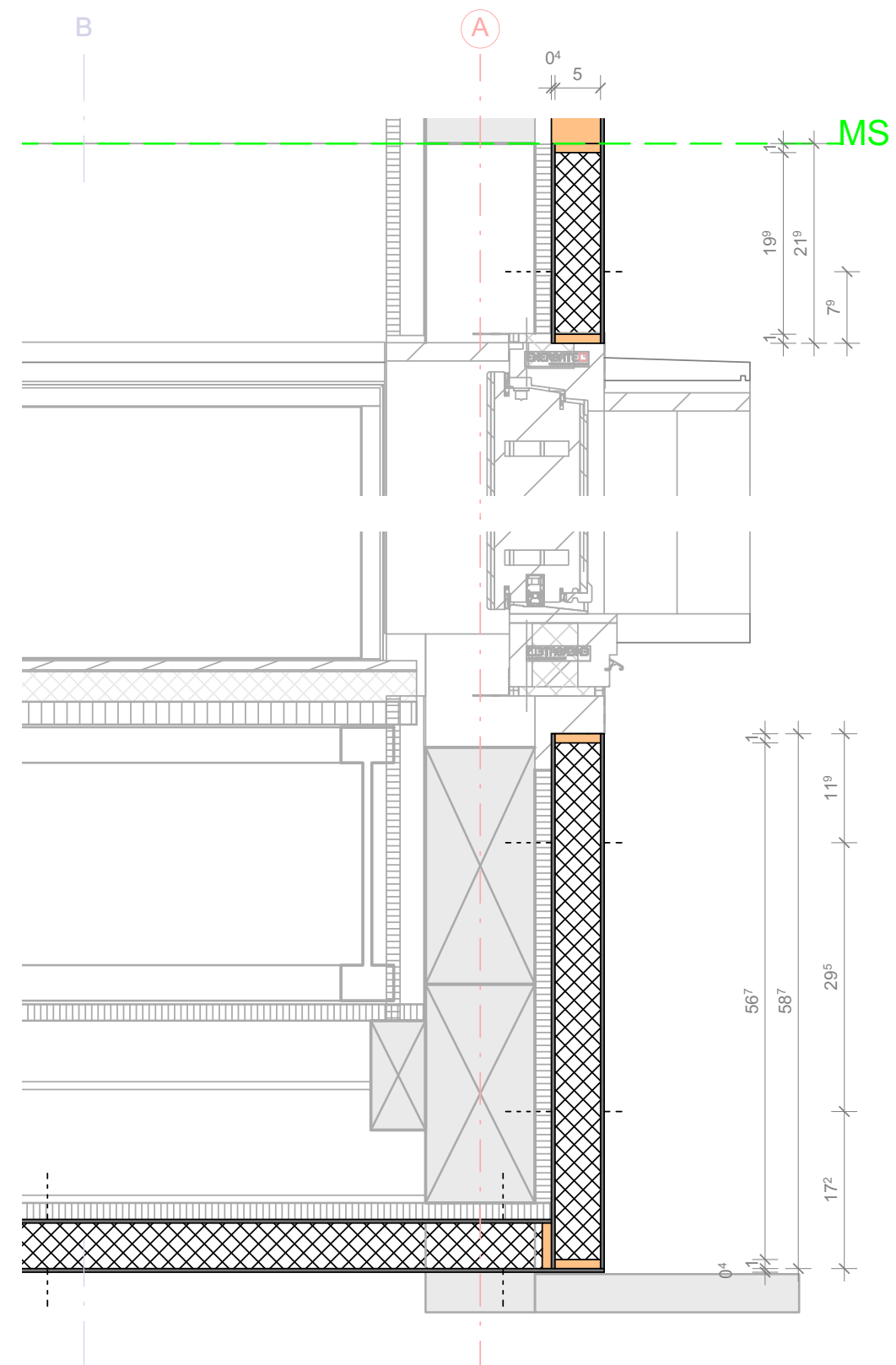
Component
QASA insulation

Description
VIP Plan West

Project #	Scale	dwg #
P 140	1:50	S-444



1 Detail 1 Vertical Section North
S-451 Scale 1:7 ref. drawing: S-441



2 Detail 2 Vertical Section North
S-451 Scale 1:7 ref. drawing: S-441

1:7



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn TH

Issued 09/04/14

Last index

Component

QASA insulation

Description

VIP Structure

Project # P 140

Scale 1 : 7

dwg # S-451

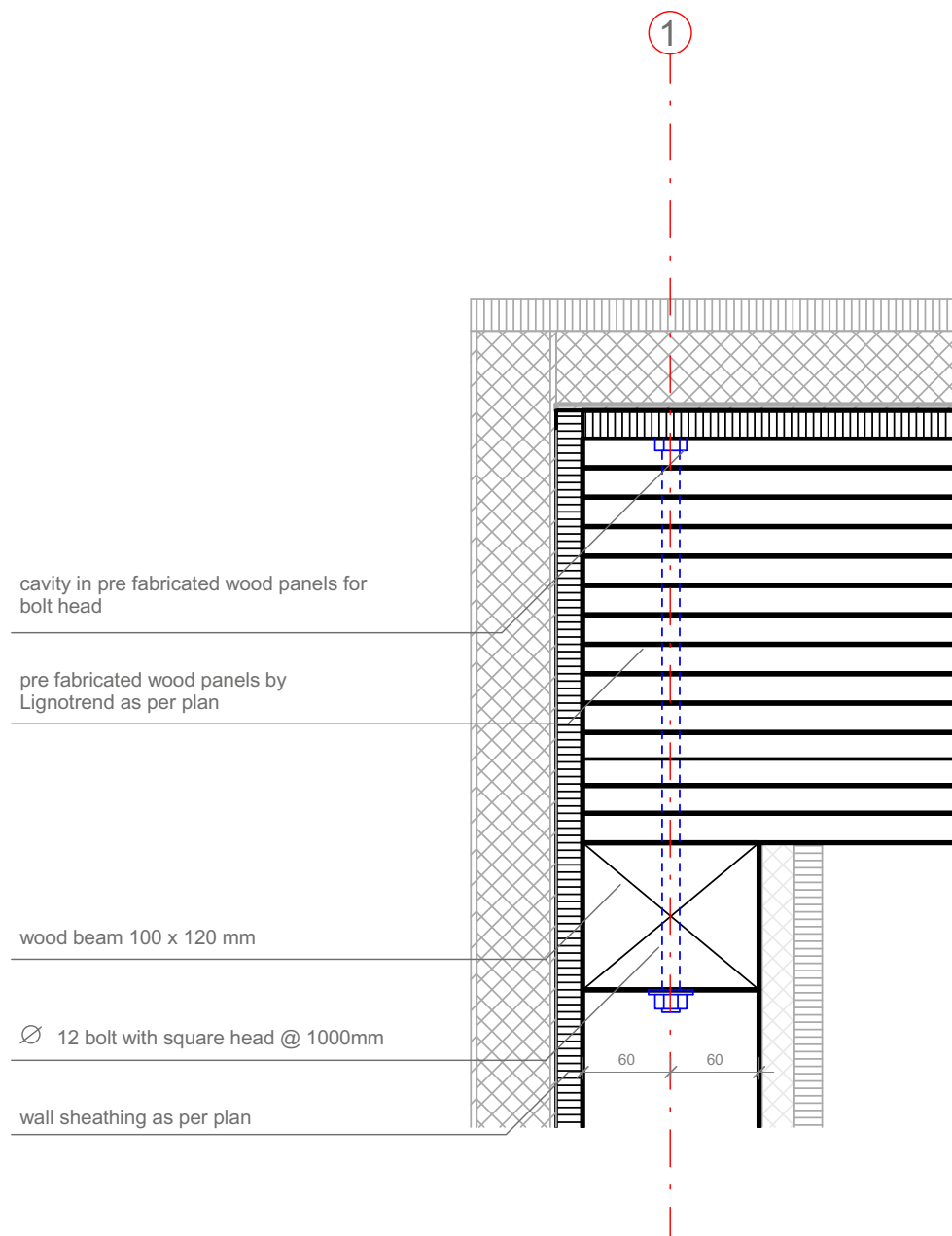
07 06 20 Schedule for Thermal Protection_VIP							
Plan No.	Project Manual Division Master Format	Article Name	Article Manufacturer	Article Number	Quantity		Notes
					Amount	Unit	
S-411	Div. 07	QASA-Vip	Variotec		35,95	m²	material is not drillable for perforation -> prequalify drillpoints
S-412	Div. 07	QASA-Vip	Variotec		18,73	m²	material is not drillable for perforation -> prequalify drillpoints
S-413	Div. 07	QASA-Vip	Variotec		38,28	m²	material is not drillable for perforation -> prequalify drillpoints
S-414	Div. 07	QASA-Vip	Variotec		21,95	m²	material is not drillable for perforation -> prequalify drillpoints
S-415	Div. 07	QASA-Vip	Variotec		54	m²	material is not drillable for perforation -> prequalify drillpoints
S-416	Div. 07	QASA-Vip	Variotec		54	m²	material is not drillable for perforation -> prequalify drillpoints
	Div. 07	NIBOFLOOR PK ELASTIC adhesive	Bostik	J999895	187	l	
	Div. 07	adhesive tape	Trenkschu & Stadler GbR		10.000	m	

Drawn TH
 Issued 05/21/09
 Last index

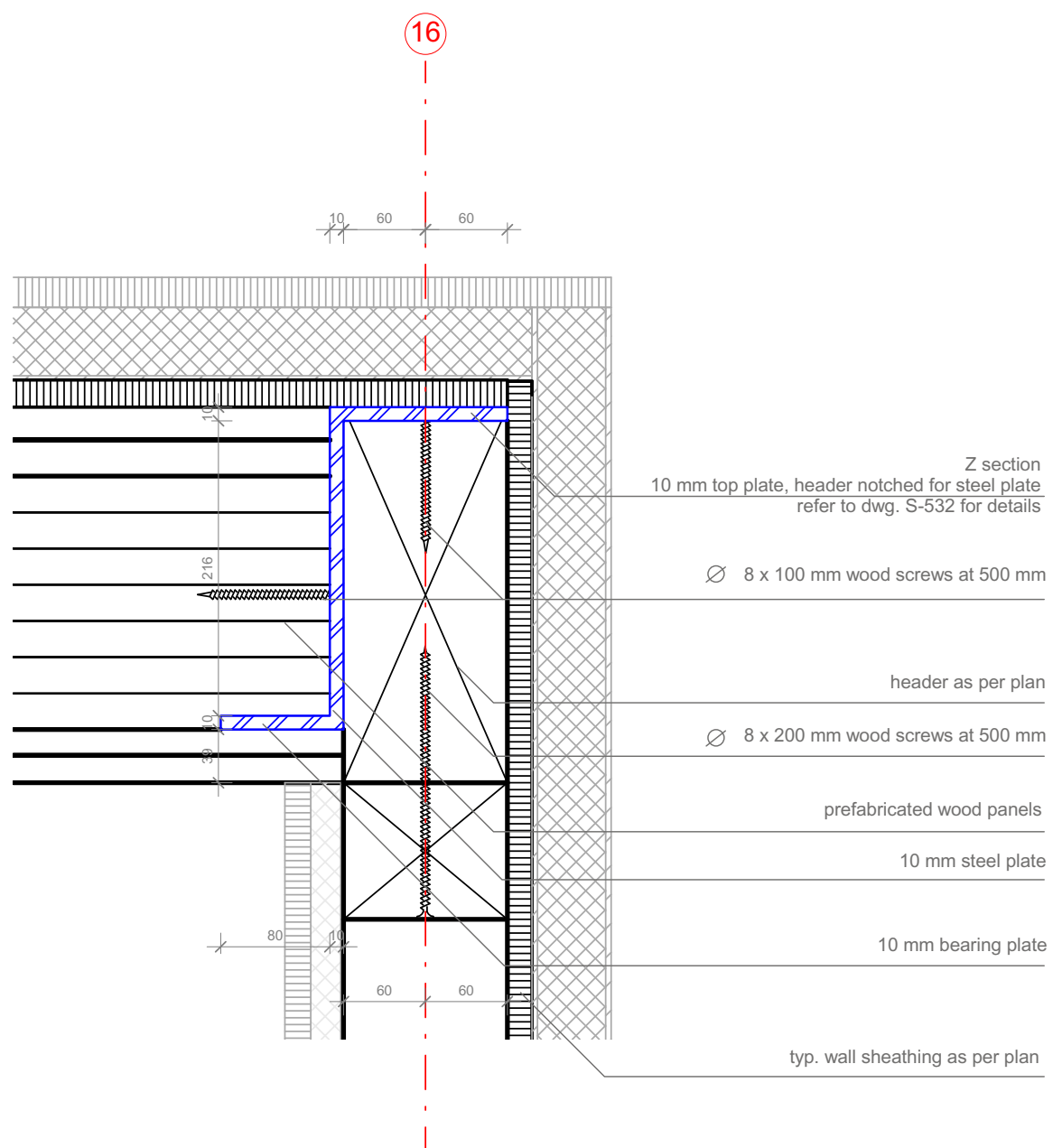
Component
QASA insulation

Description
Schedule Plan

Project # Scale dwg #
 P 140 - S-461



1 section / wall to roof connection @typ. stud wall
S-511 Scale 1:5 ref. drawing: S-201



2 section / wall to roof connection @ window
S-511 Scale 1:5 ref. drawing: S-201

1:5



SOLAR DECATHLON

Projekt

SOLAR DECATHLON 2009

TEAM GERMANY

Bauherr

TECHNISCHE UNIVERSITÄT DARMSTADT

FG Entwerfen und Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation

TRAGWERK
Jochen A. Stahl [Dipl.-Ing., P.Eng.]

Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn	RR (CR)
Issued	04/25/09
Last index	05/11/09

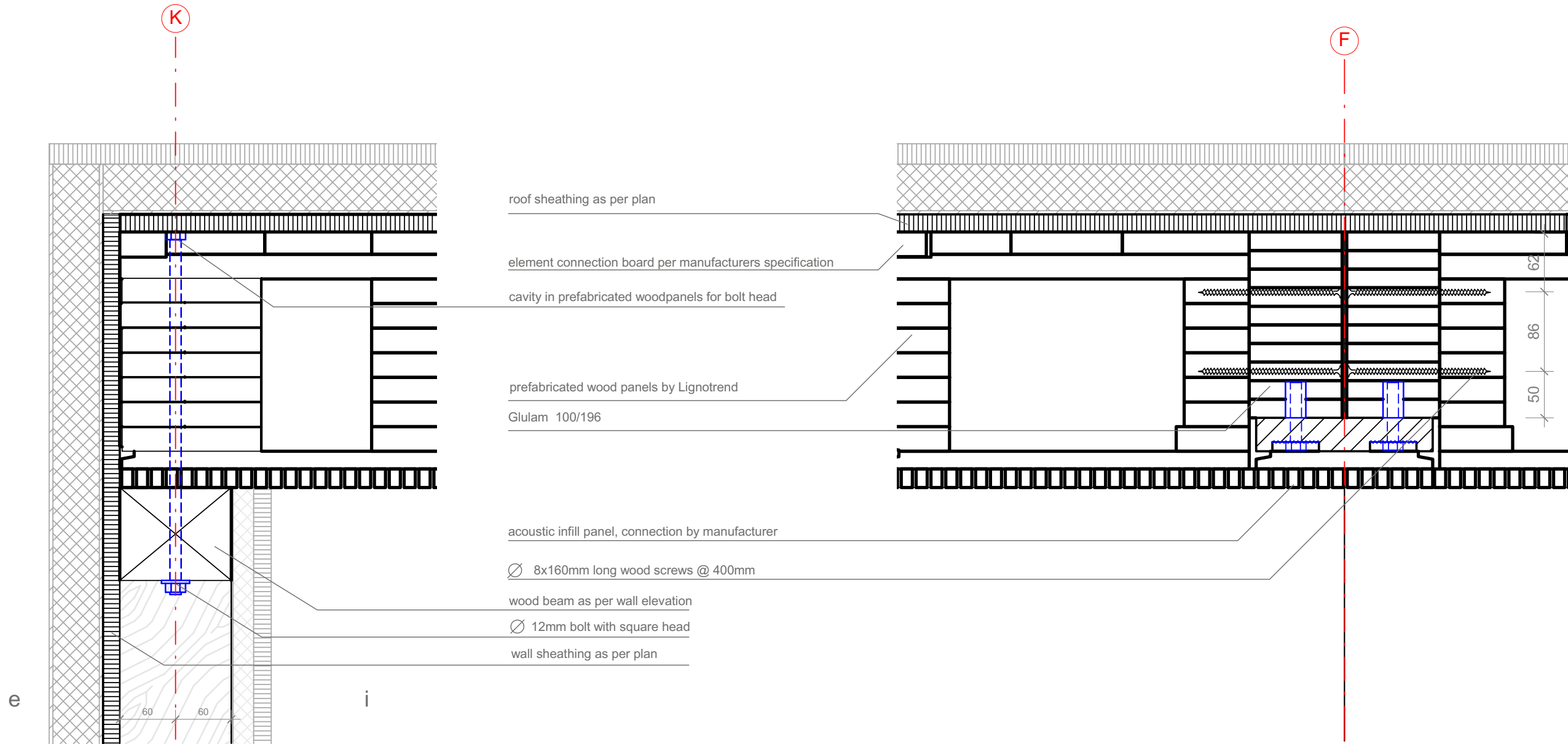
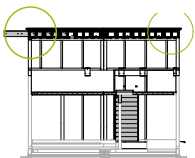
Component

Structural

Description

Wall to Roof Connection E-W

Project #	Scale	dwg #
P140	1 : 5	S-511



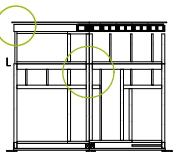
Section / wall to roof connection @ typ. stud wall (N&S)
 Scale 1:5 ref. drawing: S-201



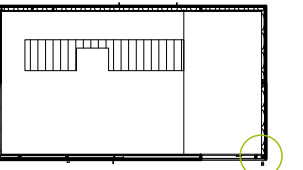
Section / roof panel connection
 Scale 1:5 ref. drawing: S-201

1:5

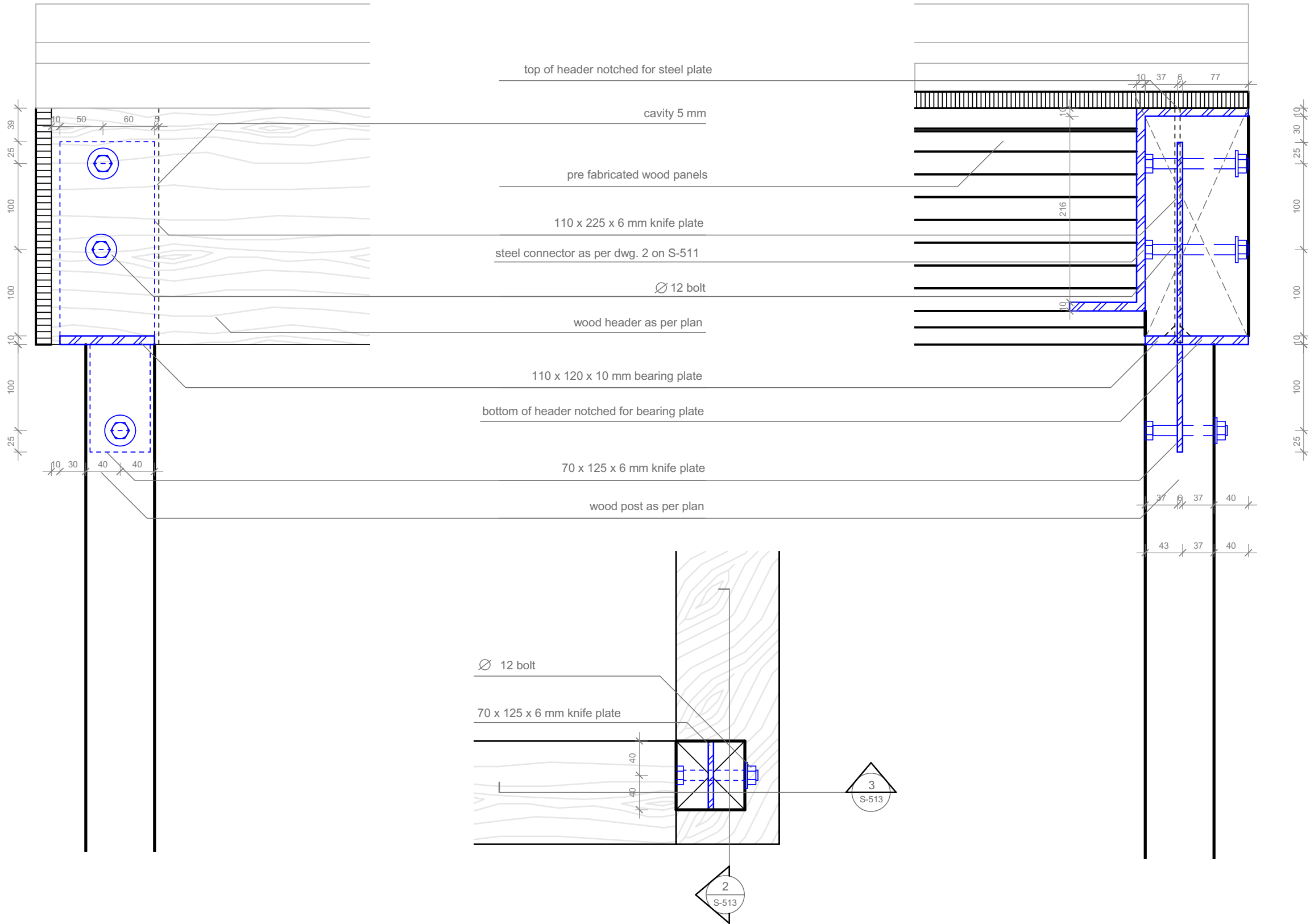




Ost



OG



2
S-513

section upper wall corner / post southeast
 Scale 1:5

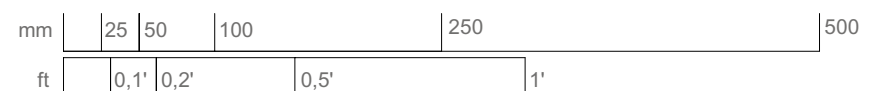
1
S-513

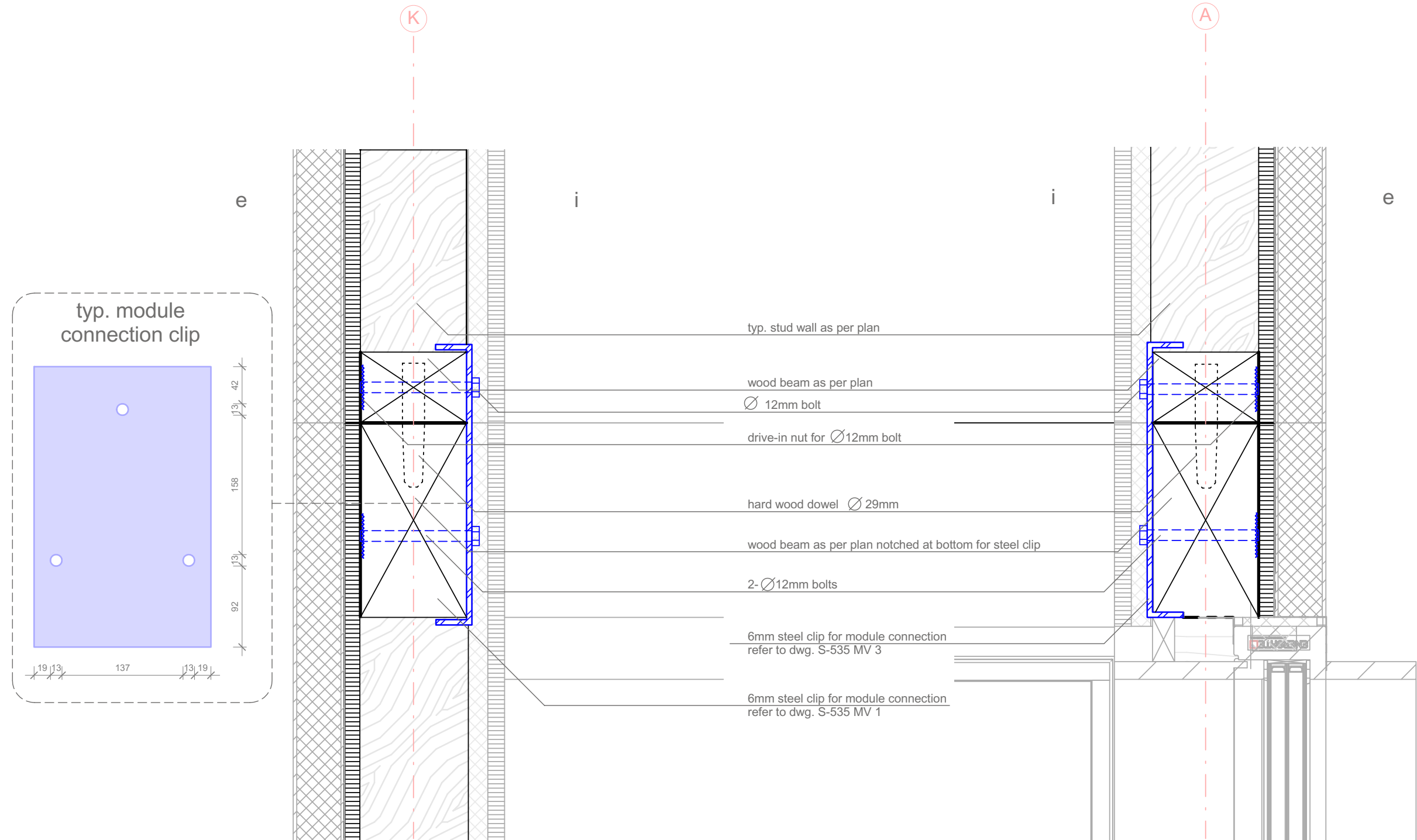
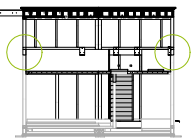
detail / post to header connection
 Scale 1:5 ref. drawing: S-201

3
S-513

section / post to header connection
 Scale 1:5

1:5





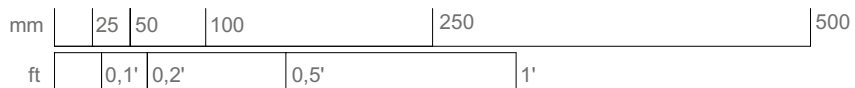
1
 S-521

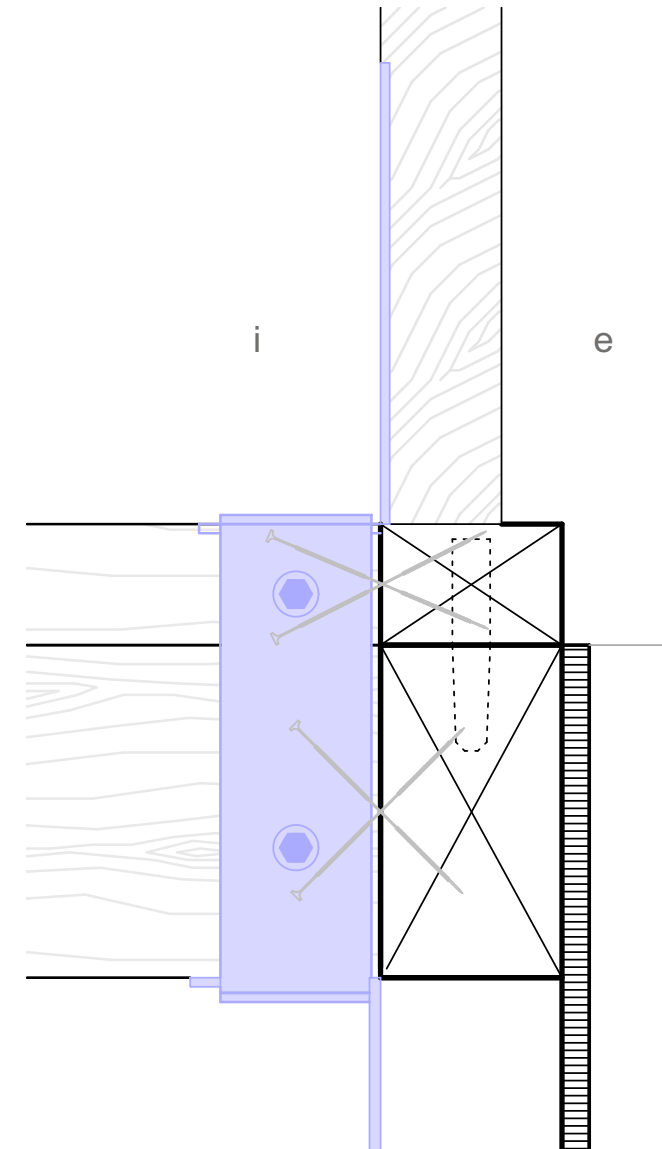
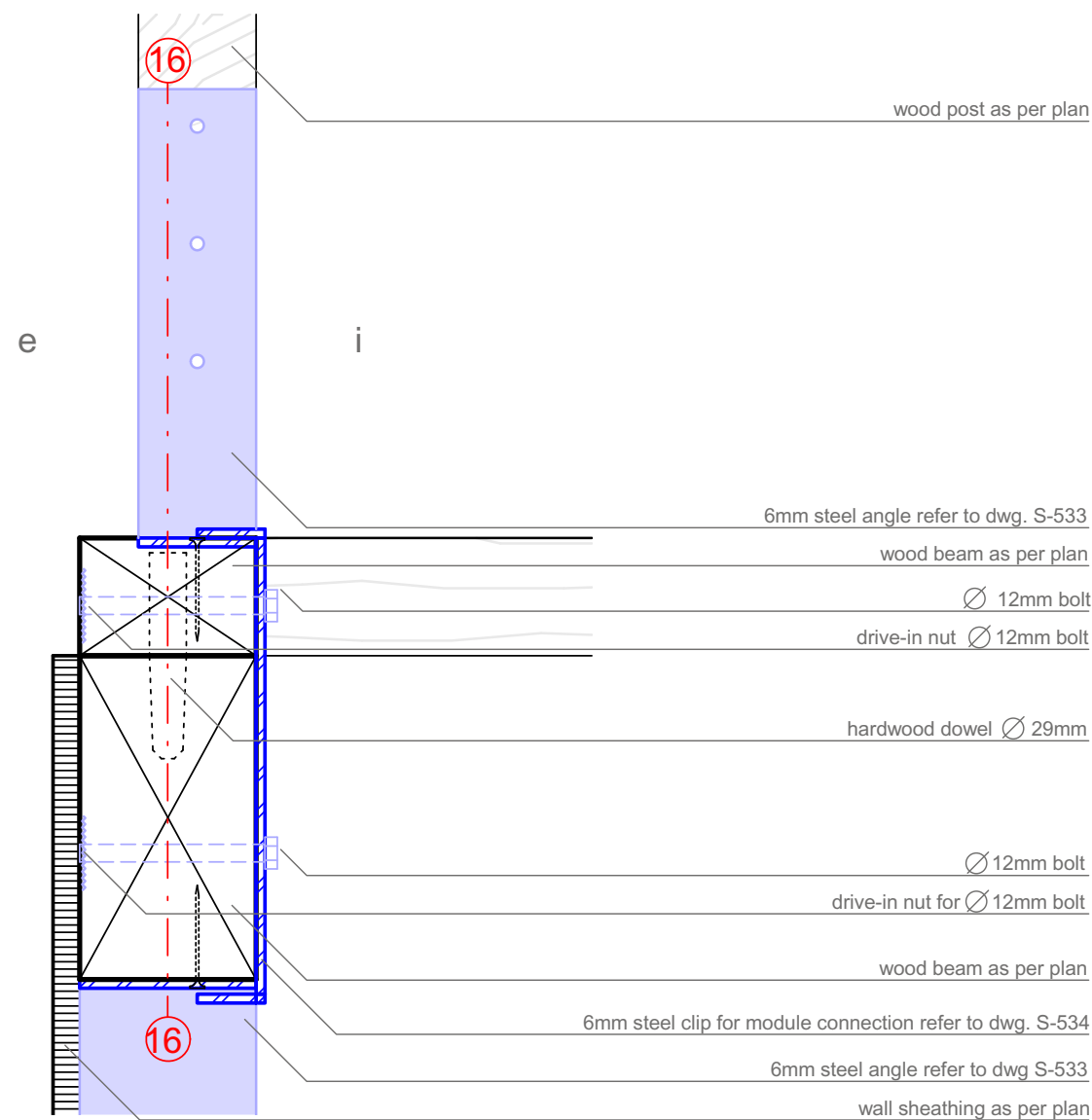
Section / typ. module connection @ stud wall
 Scale 1:5 ref. drawing: S-202

2
 S-521

Section / typ. module connection @ lower window
 Scale 1:5 ref. drawing: S-202

1:5



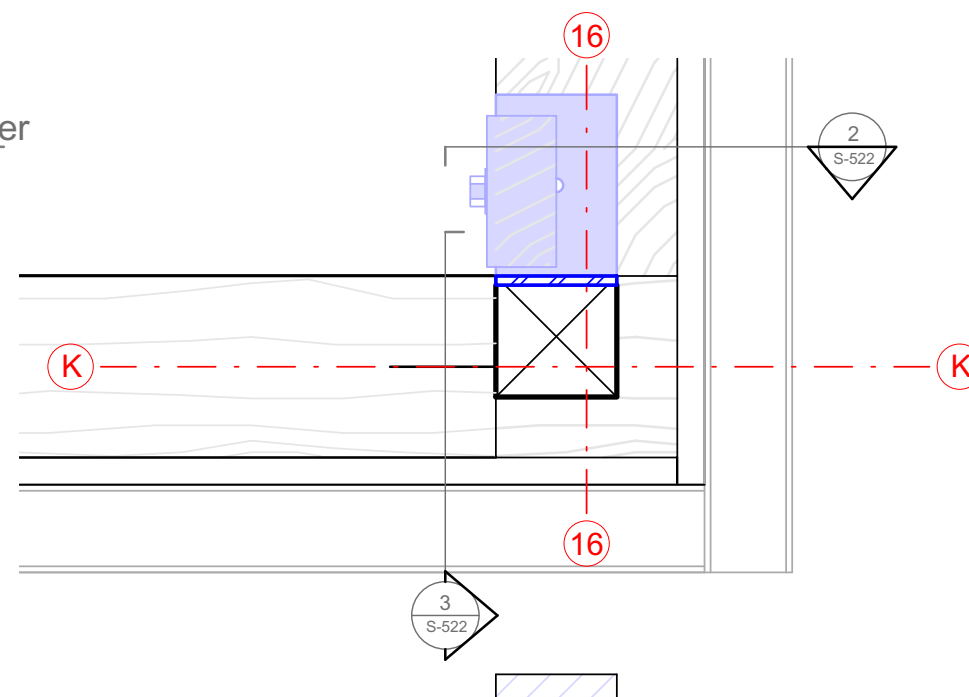


2
S-522

Section/ module connection @ corner
Scale 1:5 ref. drawing: S-522

1
S-522

detail module connection @ corner
Scale 1:5 ref. drawing: S-202 / S-203



3
S-522

Section / module connection @ corner
Scale 1:5 ref. drawing: S-522

1:5



Projekt
SOLAR DECATHLON 2009
TEAM GERMANY

Bauherr
TECHNISCHE UNIVERSITÄT DARMSTADT

FG Entwerfen und Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

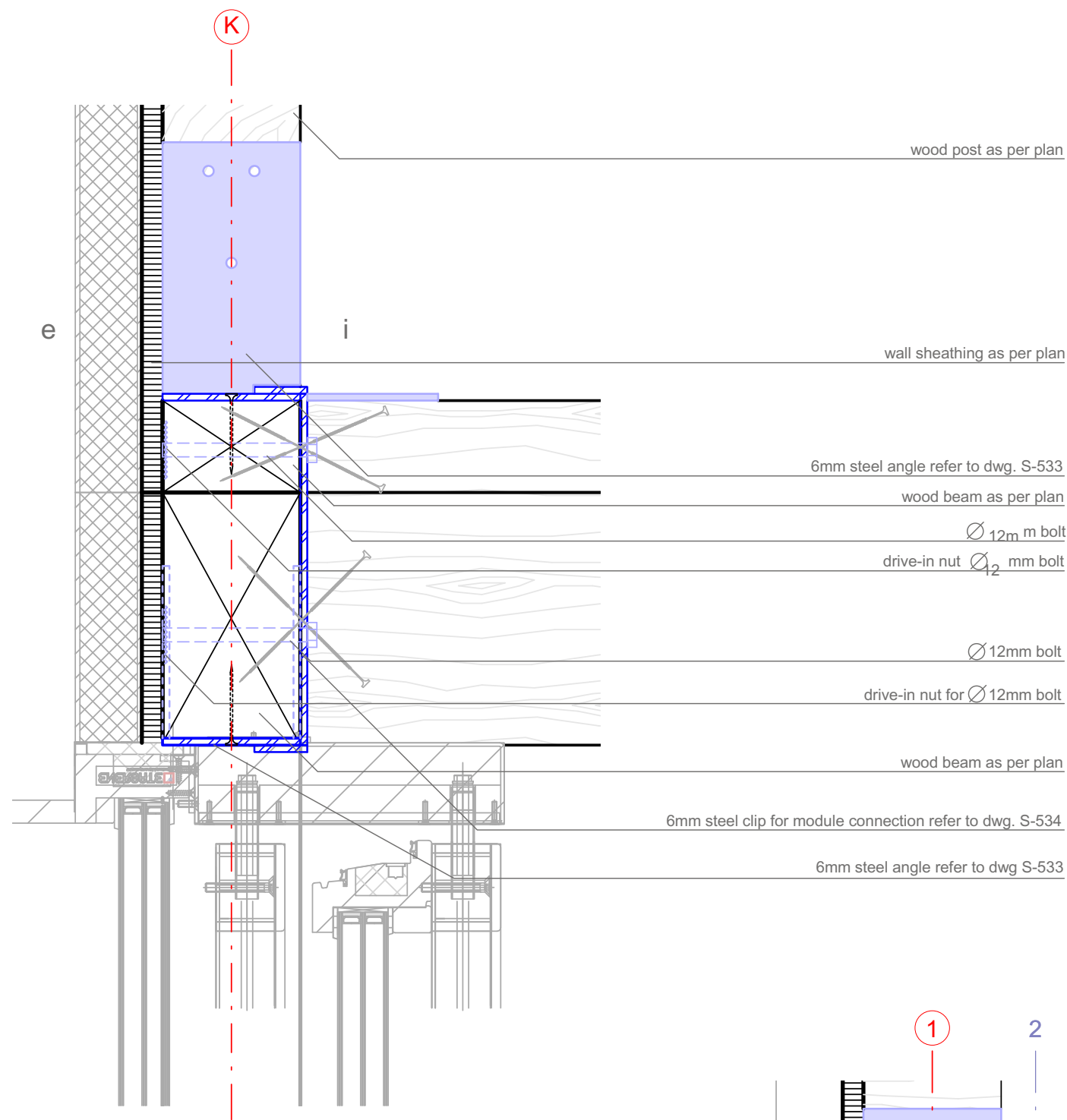
Navigation

Südansicht

Jochen A. Stahl [Dipl.-Ing., P.Eng.]

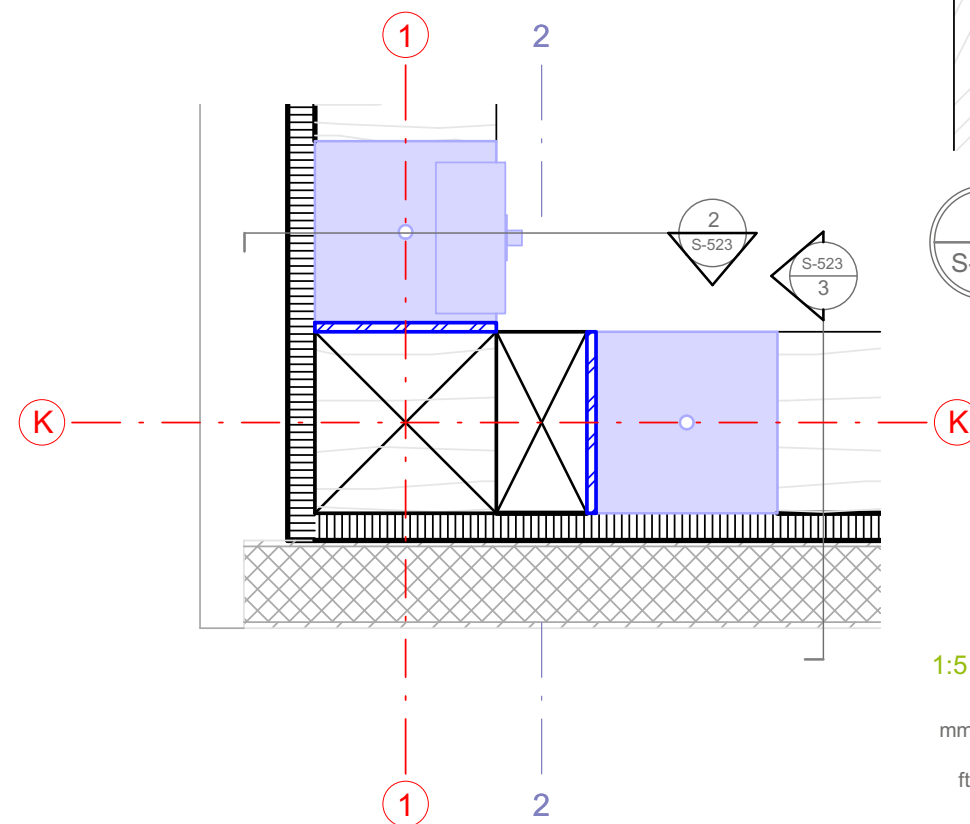
Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn	AG|SS
Issued	(RR|CR|MK) 04/25/09
Last index	05/11/09
Component	Structural
Description	Module Connection S-E Corner
Project #	P140
Scale	1:5
dwg #	S-522



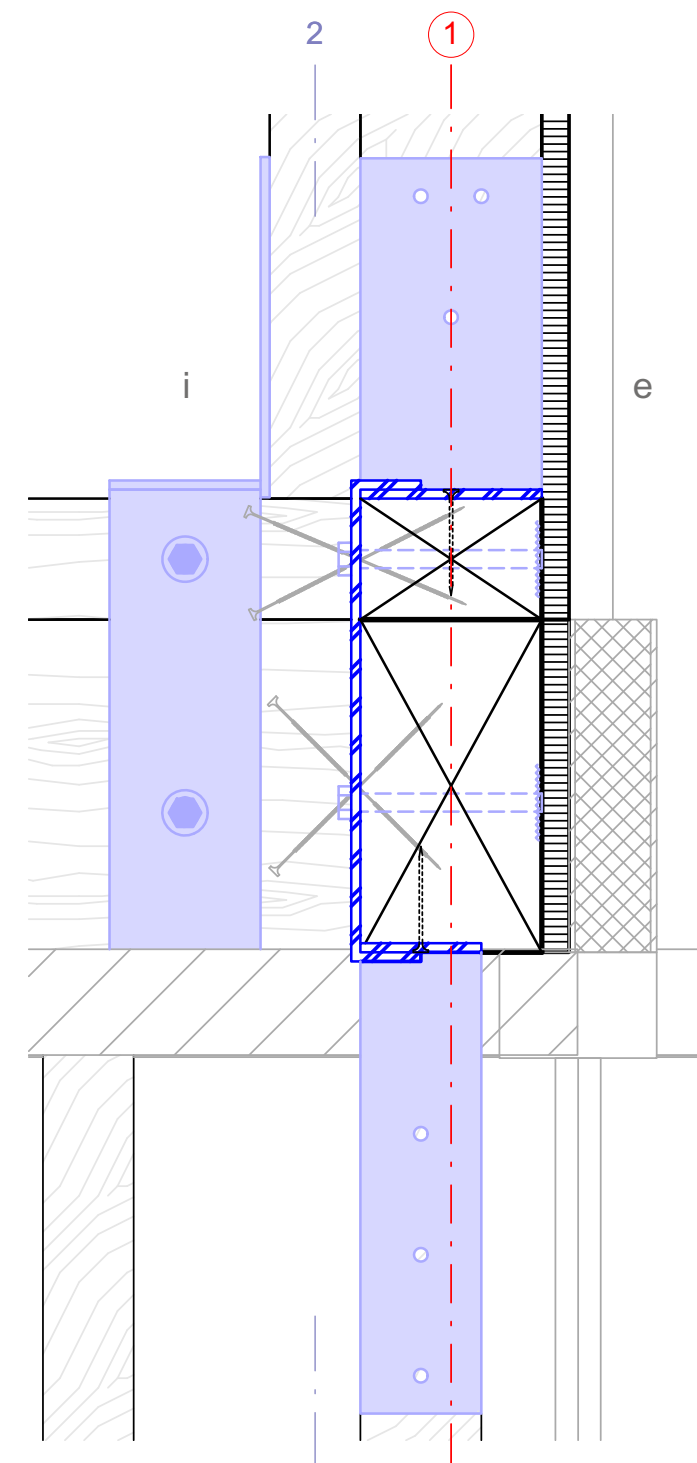
2
S-523

Section/ module connection @ corner
Scale 1:5 ref. drawing: S-523



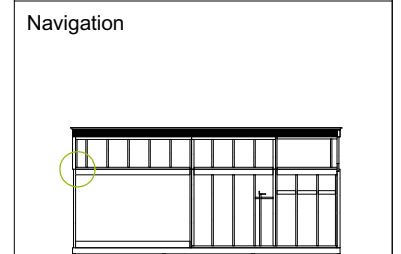
1
S-523

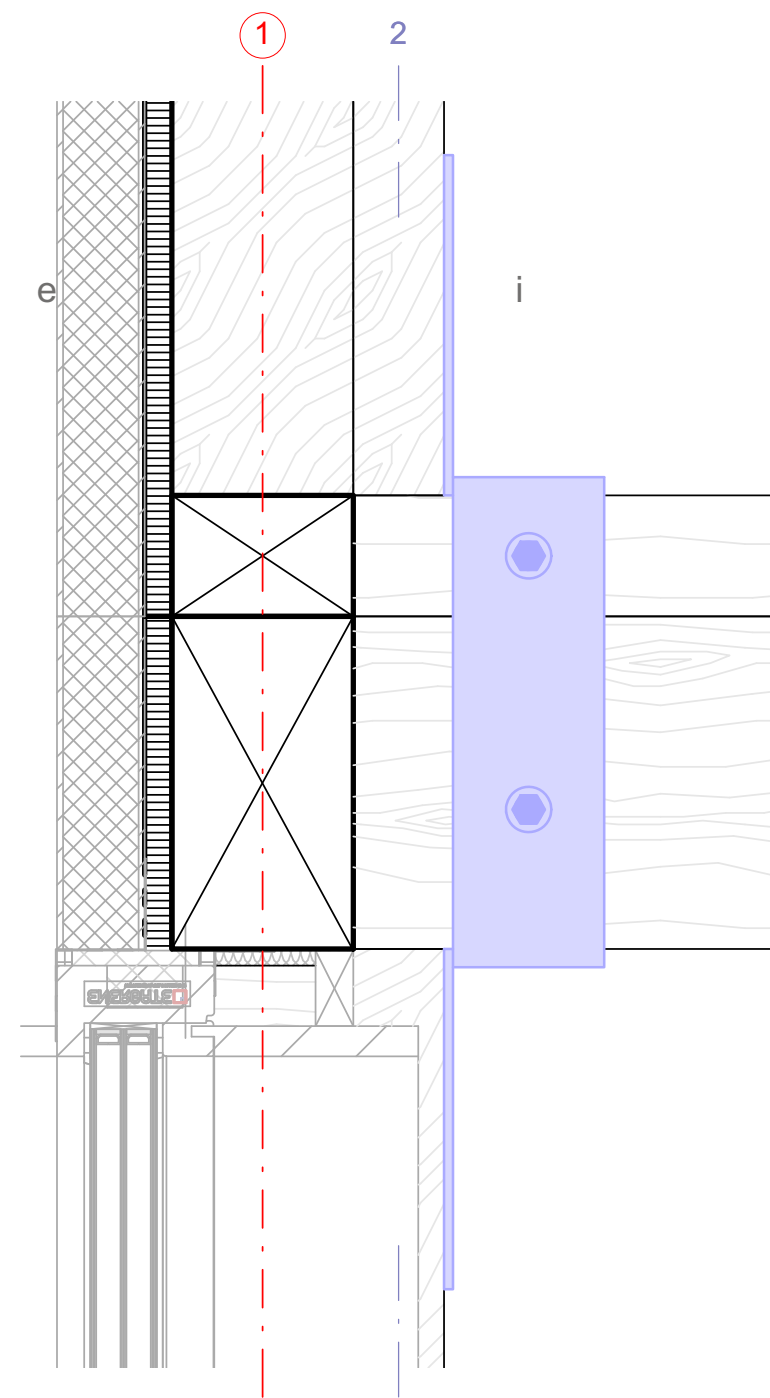
detail module connection @ corner
Scale 1:5 ref. drawing: S-202 / S-203



3
S-523

Section / module connection @ corner
Scale 1:5 ref. drawing: S-523





2
S-524
Section/ module connection @ corner
Scale 1:5 ref. drawing: S-524

1
S-524
detail module connection @ corner
Scale 1:5 ref. drawing: S-202 / S-203

wood post as per plan

6mm steel angle refer to dwg. S-533

wood beam as per plan

12mm bolt

drive-in nut 12 mm bolt

12mm bolt

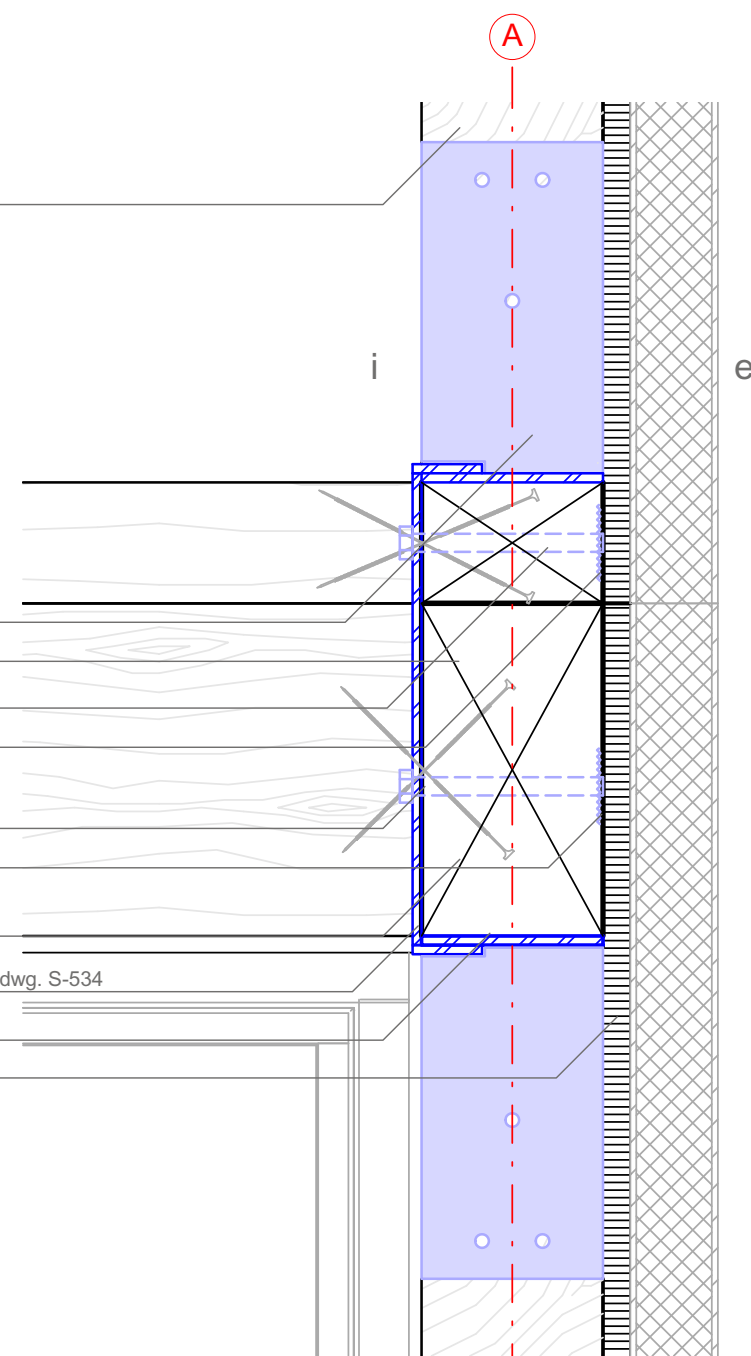
drive-in nut for 12mm bolt

wood beam as per plan

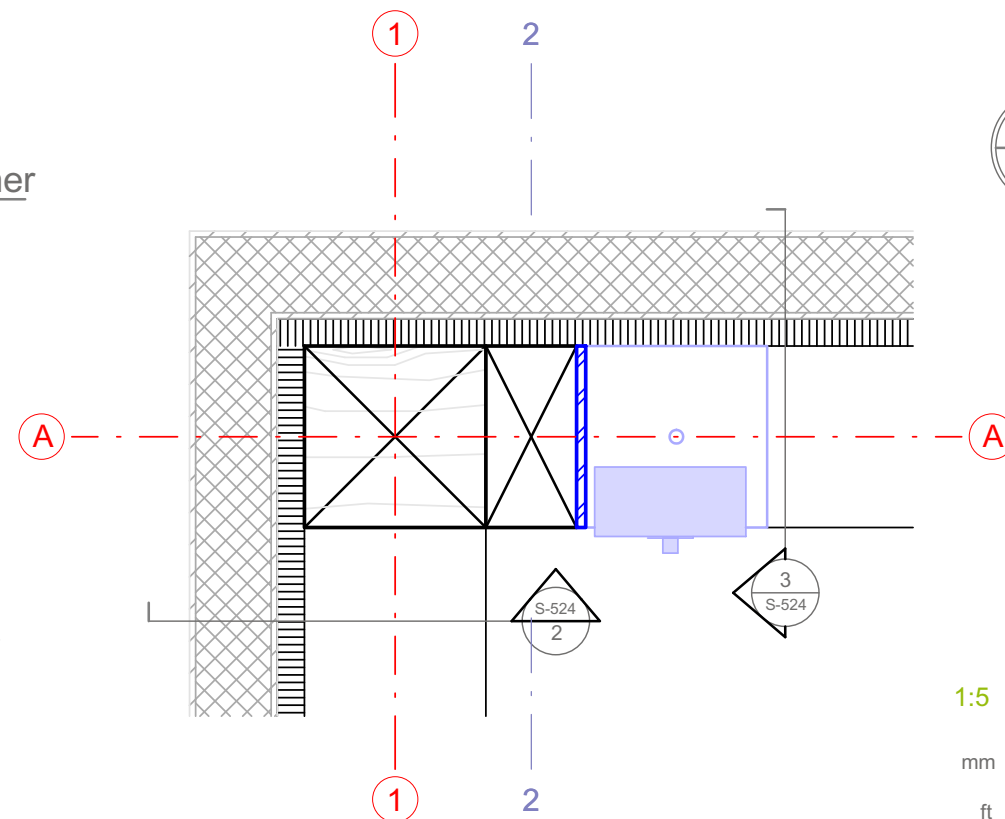
6mm steel clip for module connection refer to dwg. S-534

6mm steel angle refer to dwg S-533

wall sheathing as per plan

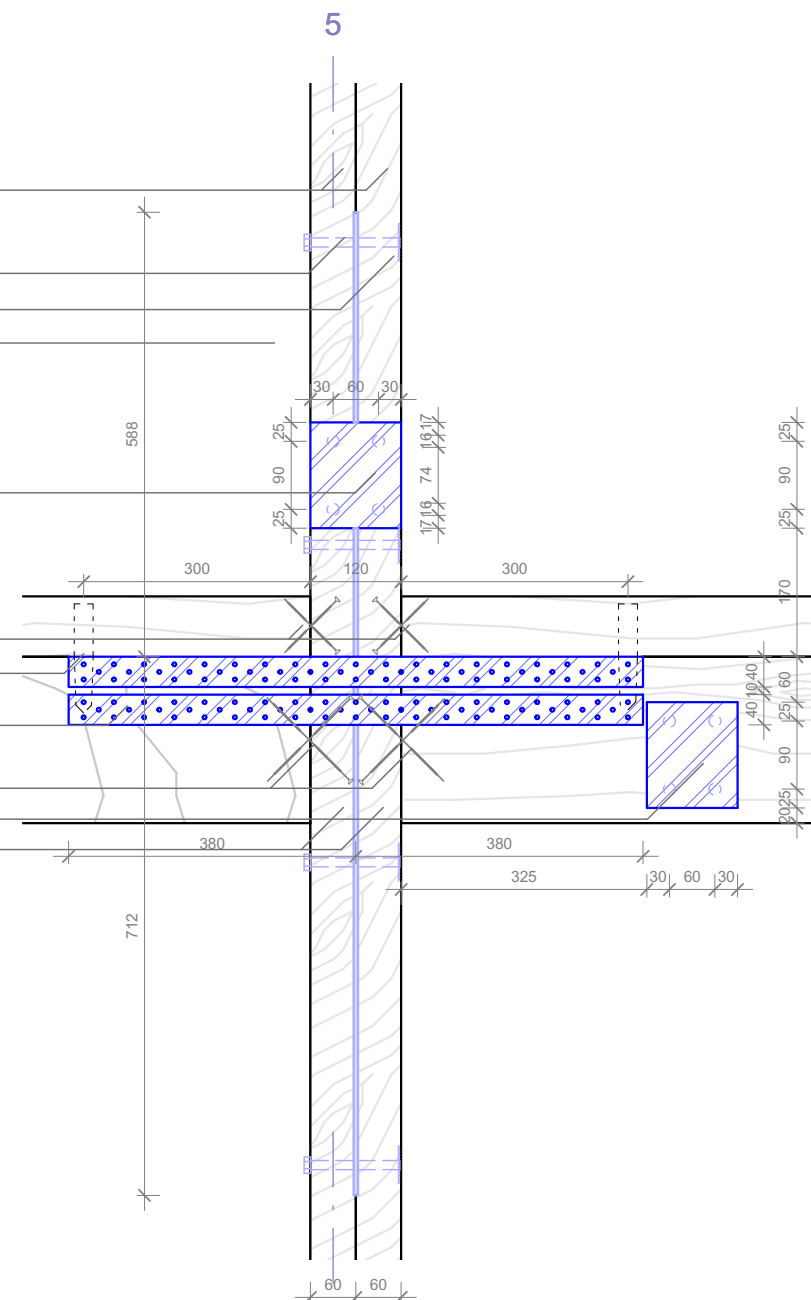
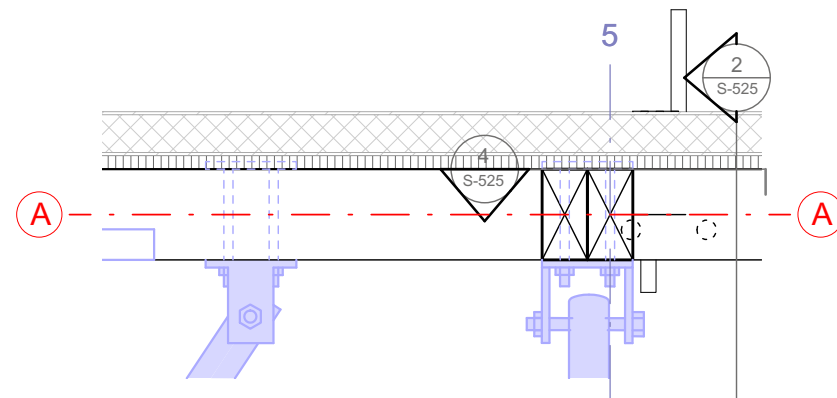
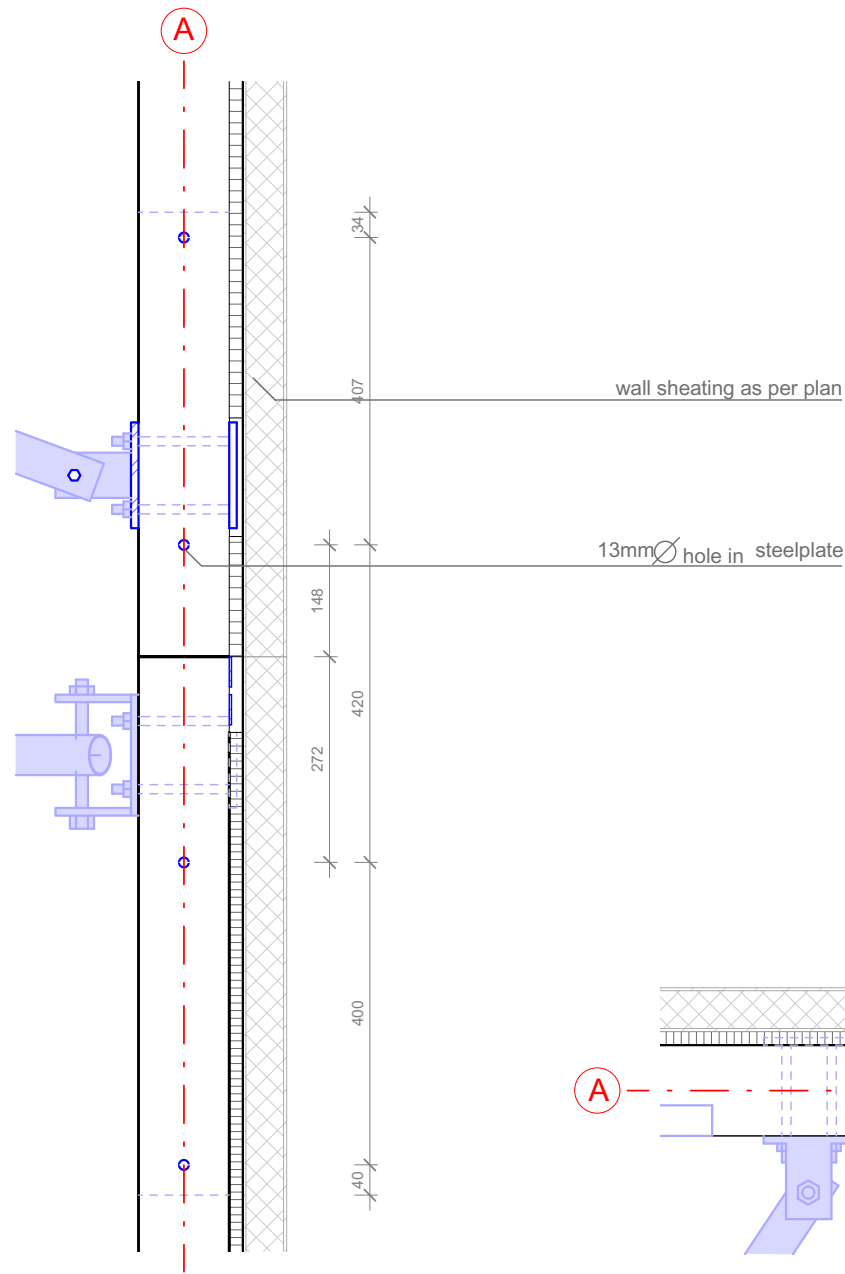
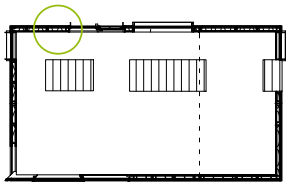


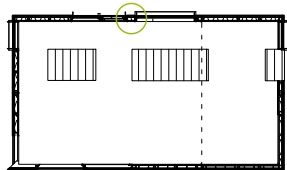
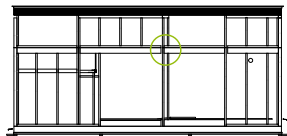
3
S-524
Section / module connection @ corner
Scale 1:5 ref. drawing: S-524



1:5





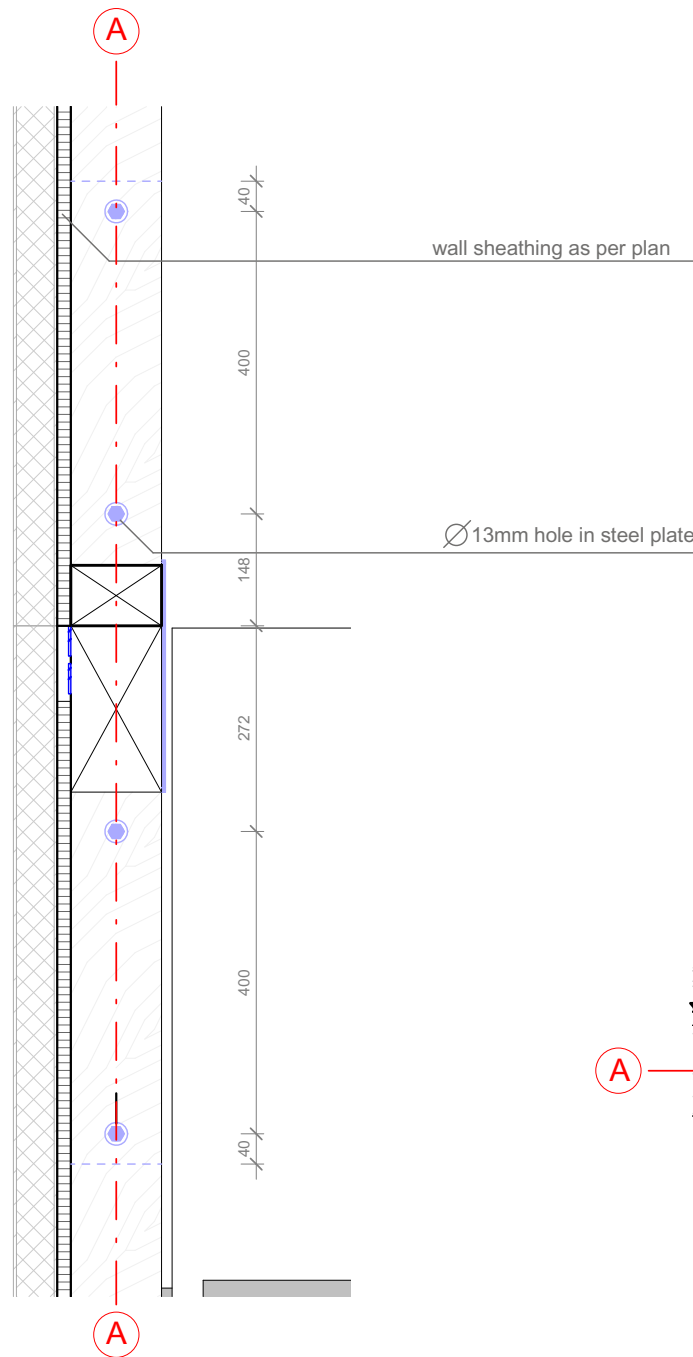


Drawn	MK (MK)
Issued	04/25/09
Last index	05/11/09

Component
Structural

Description
**Built-up Column GL 8
North**

Project # Scale dwg #
P140 1:10 **S-526**



drive-in nut
Ø 12mm bolt

wood column as per plan

6mm steelplate

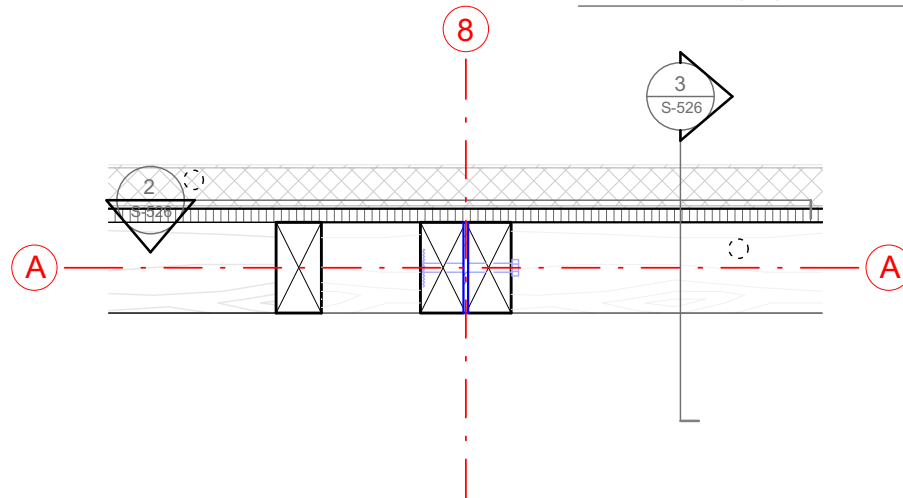
2 Pairs of SFS screws WT-T-6,5x130mm

hardwood dowel

2-steel strap 40x3mm by Simpson Strongtie c/w 20 nails
4,0x40mm @ each end of straps

2 pairs of SFS screws WT-T-8,2x245mm

wood column as per plan



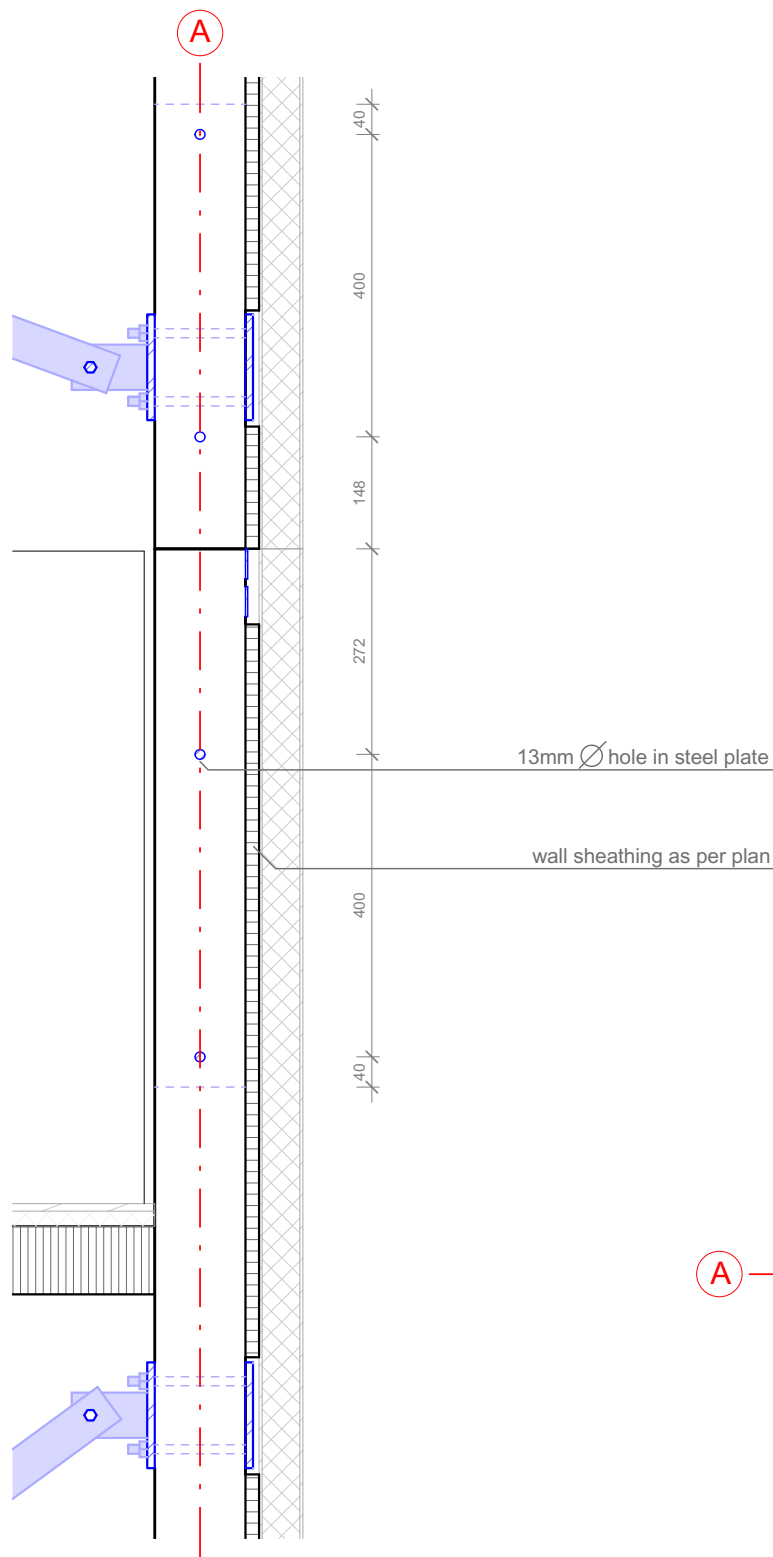
3
S-526
built-up column GL 8 North
Scale 1:10 ref. drawing: S-526

1
S-526
built-up column GL 8 North
Scale 1:10 ref. drawing: S-202

2
S-526
built-up column GL 8 North
Scale 1:10 ref. drawing: S-526

1:10





\varnothing 12mm bolt
drive-in nut
6mm steelplate
wood column as per plan

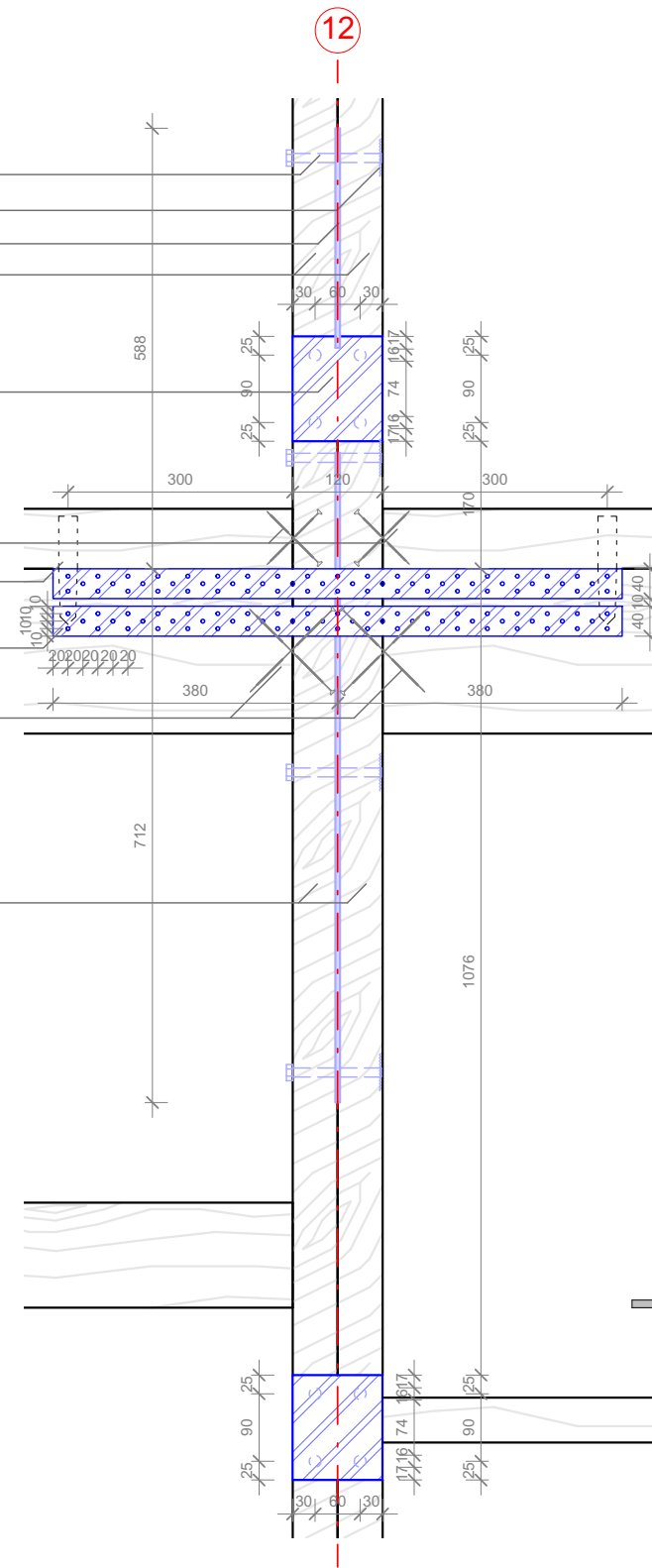
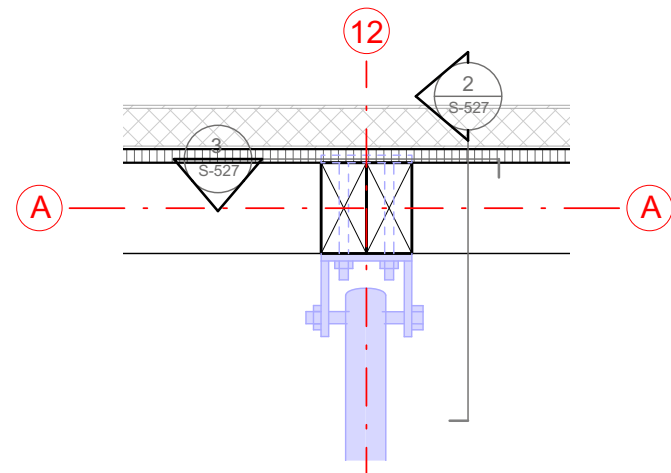
steel conector for temporary bracing

2 pairs of SFS screws WT-T-6,5x245mm
hardwood dowel

2-steel straps 40x3mm by Simpson-Strongtie
c/w 20 nails 4,0x40mm @ each end of strap

2 pairs of SFS screws WT-T-8,2x245mm

wood column as per plan



2
S-527

built-up column GL12 North
Scale 1:10 ref. drawing: S-527

1
S-527

built-up column GL 12 North
Scale 1:10 ref. drawing: S-202

3
S-527

built-up column GL12 North
Scale 1:10 ref. drawing: S-527

1:10

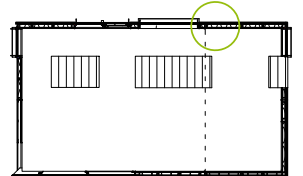


Projekt
SOLAR DECATHLON 2009
TEAM GERMANY

Bauherr
TECHNISCHE UNIVERSITÄT DARMSTADT

FG Entwerfen und Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation



Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn **JW (MK)**
Issued **04/25/09**
Last index **05/11/09**

Component
Structural

Description
Built-up Column GL 12 North

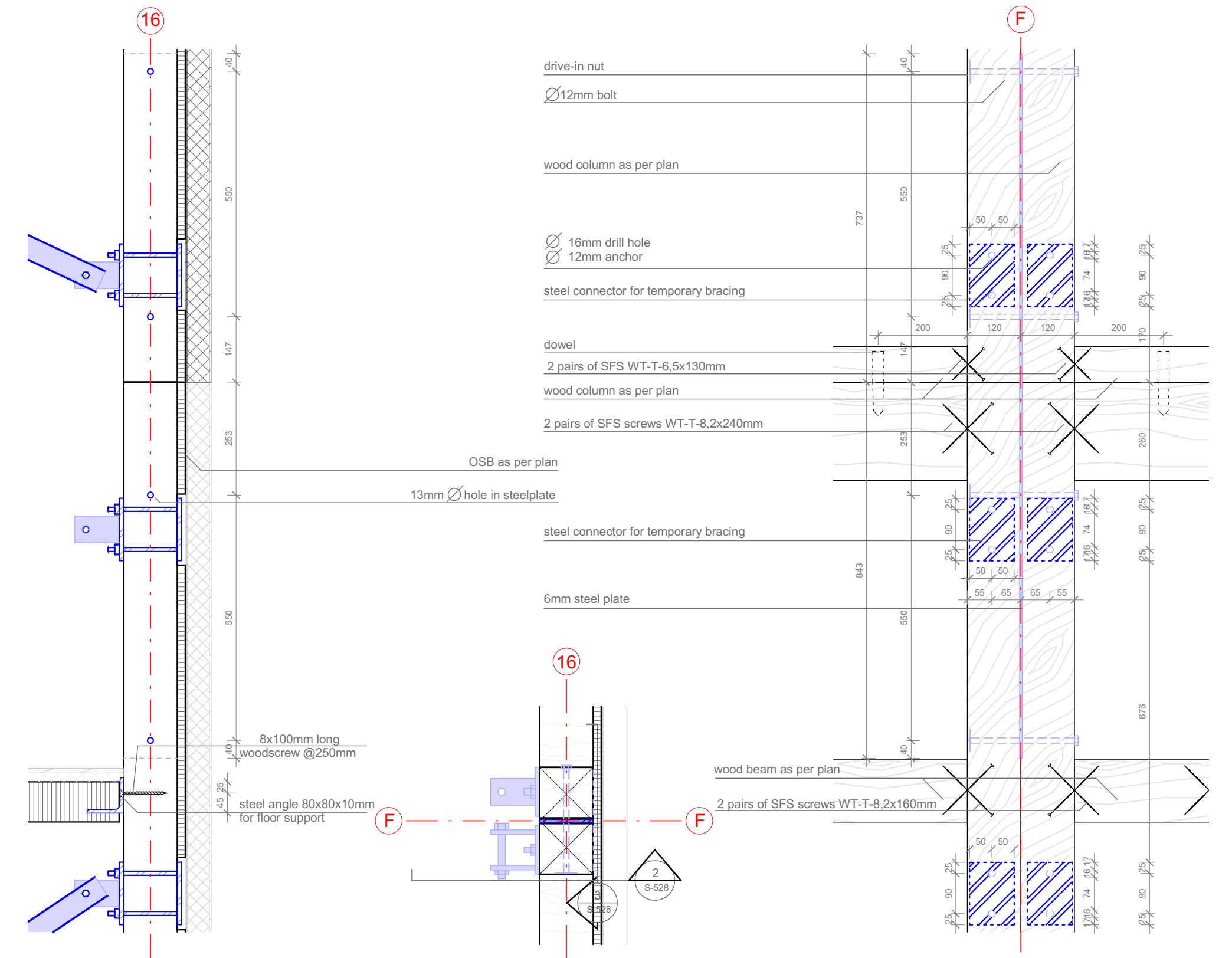
Project # Scale dwg #
P140 1:10 **S-527**

Drawn	JW (MK)
Issued	04/25/09
Last index	05/11/09

Component
Structural

Description
Built -up Column GL F East

Project # Scale dwg #
P140 1:10 **S-528**



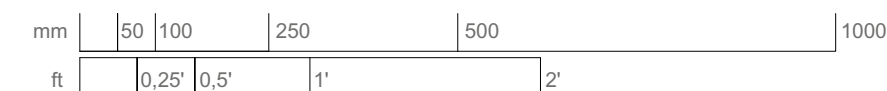
2 built-up column GL F East
S-528 Scale 1:10 ref. drawing: S-528

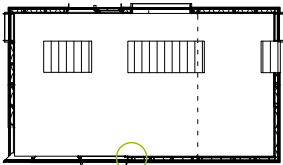
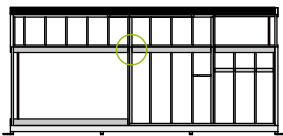
1
S-528

built-up column GL F East
Scale 1:10 ref. drawing: S-202

4 built-up column GL F East
S-528 Scale 1:10 ref. drawing: S-528

1:10



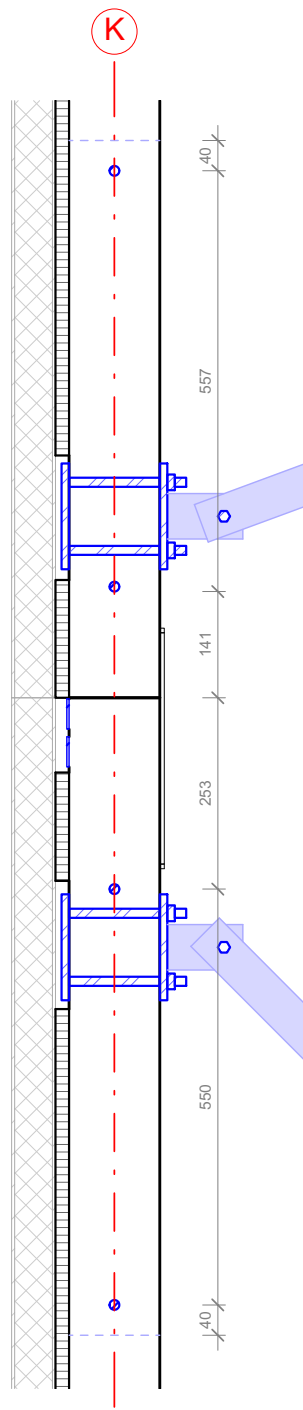


Drawn	JW (MK)
Issued	04/25/09
Last index	05/11/09

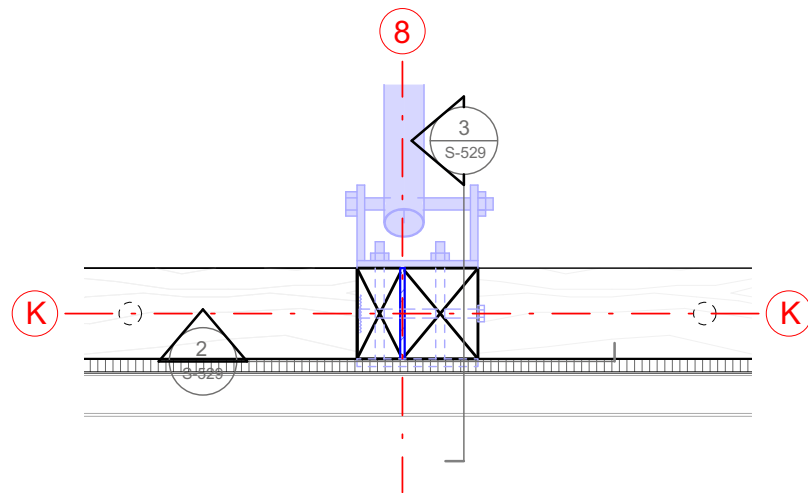
Component
Structural

Description
Built-up Column GL 8 South

Project # Scale dwg #
P140 1:10 **S-529**

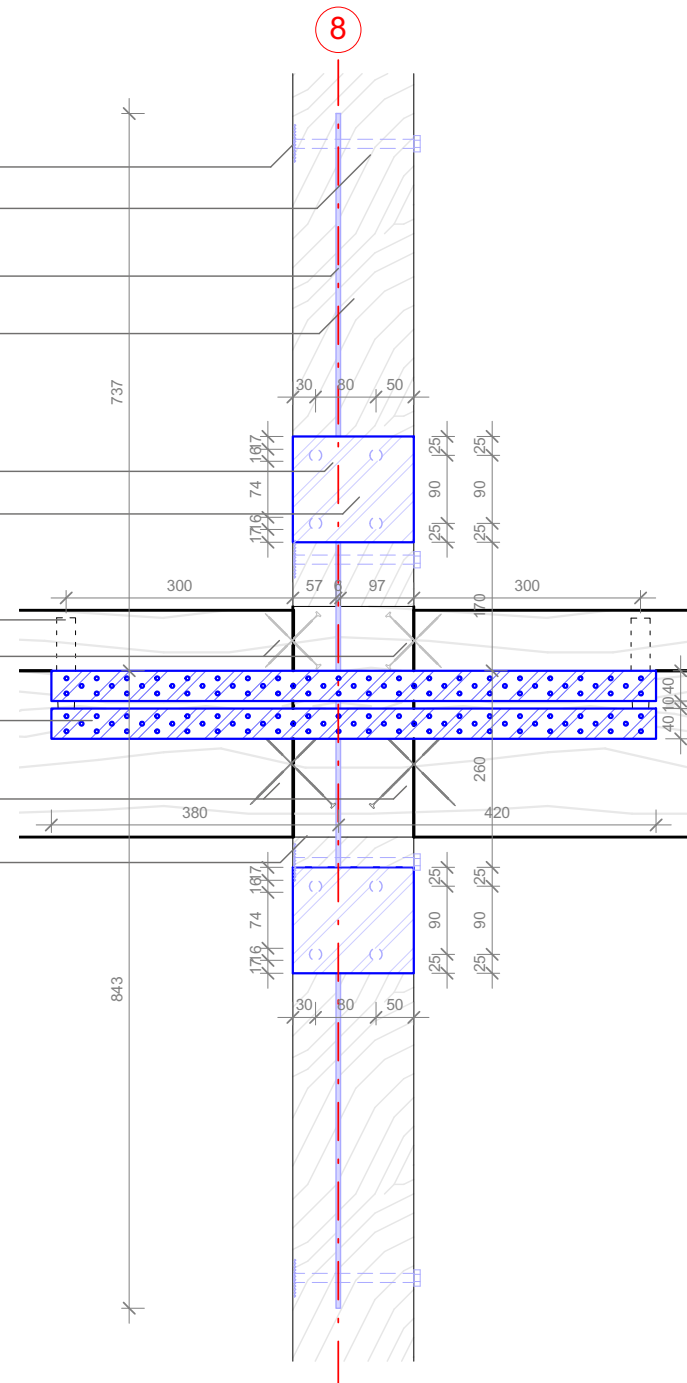


3
S-529 built-up column GL 8 South
Scale 1:10 ref. drawing: S-529



1
S-529 built-up column GL 8 South
Scale 1:10 ref. drawing: S-202

drive-in nut
 Ø 12mm bolt
 6mm steelplate
 wood column as per plan
 Ø 16mm drill hole
 Ø 12mm anchor
 steel connector for temporary bracing
 dowel
 2 pairs of SFS screws WT-T-6,5x130mm
 steel strap 40x3mm
 2 pairs of SFS screws WT-T-8,2x240mm
 wood column as per plan



2
S-529 built-up column GL 8 South
Scale 1:10 ref. drawing: S-529

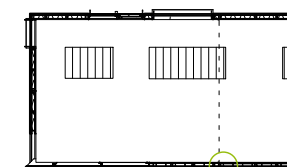
1:10





TECHNISCHE
UNIVERSITÄT
DARMSTADT

+49 (0) 6151 / 165247



Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

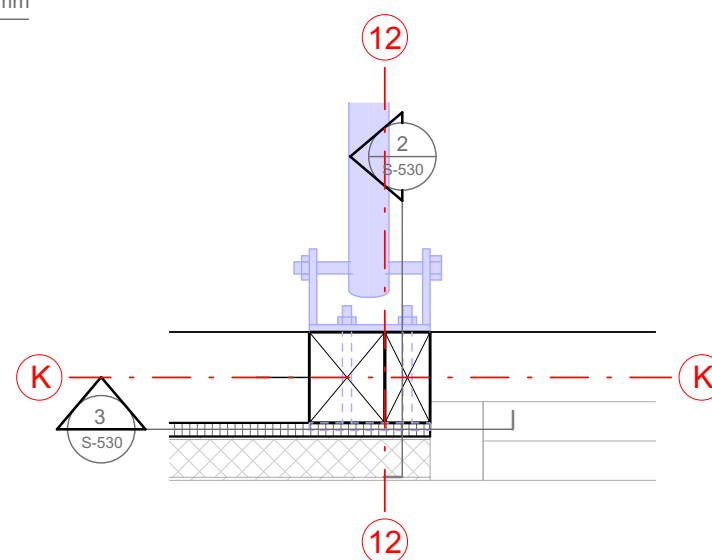
Description
Built-up Column GL 12 South

Project # Scale dwg #
P140 1:10 **S-530**



2
S-530

built-up column GL 12 South
Scale 1:10 ref. drawing: S-530



1 built-up column GL 12 South
S-530 Scale 1:10 ref. drawing: S-202

Ø 12mm bolt
drive-in nut
wood column as per plan

steel connector for temporary bracing

2 Pairs of SFS screws WT-T-6,5x130mm

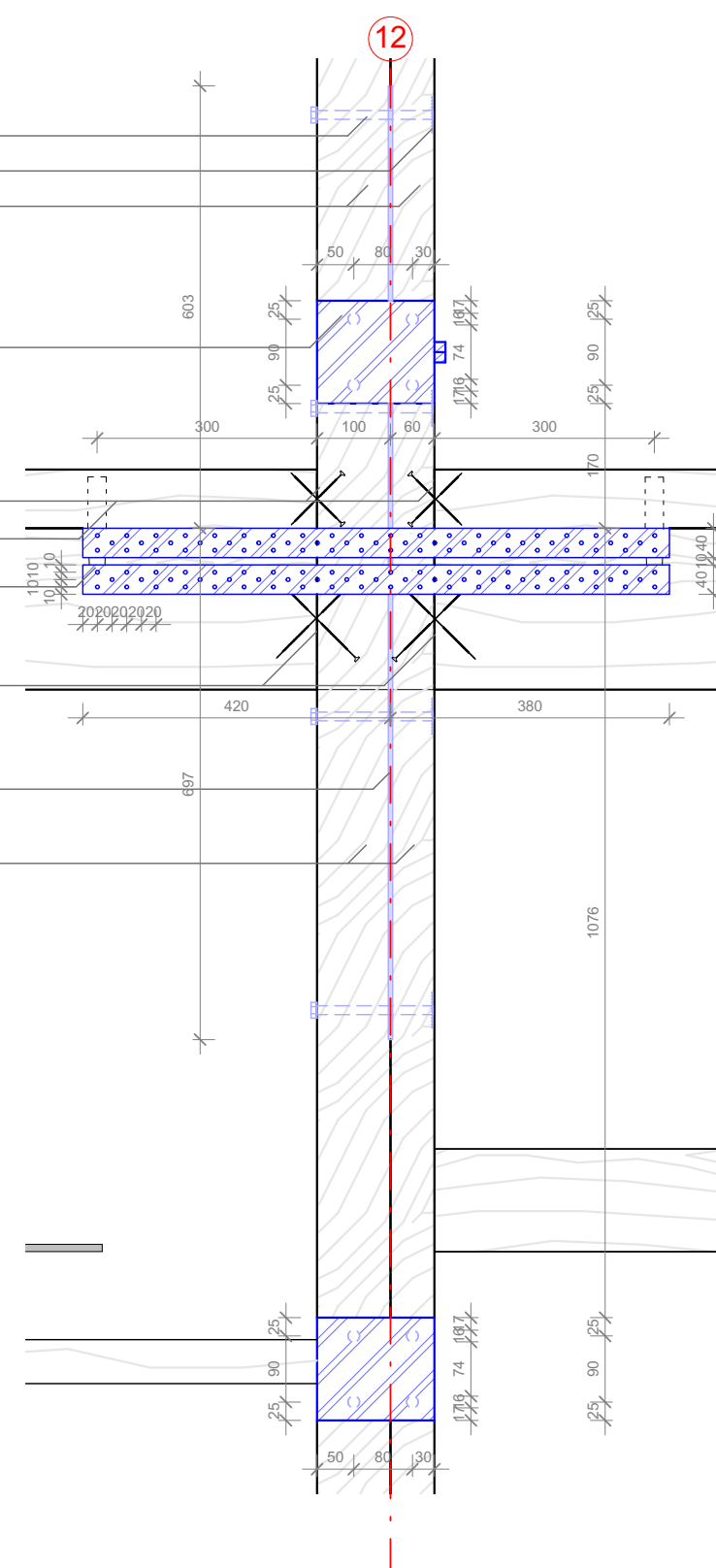
hardwood dowel

2-steel strap 40x3mm by Simpson Strontie c/w 20
nails 4,0x40mm @ each end of straps

2 pairs of SFS screws WT-T-8,2x245mm

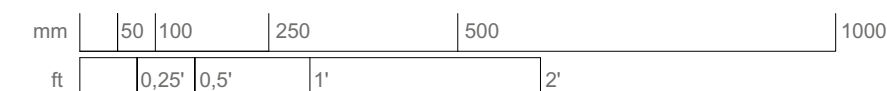
6mm steel plate

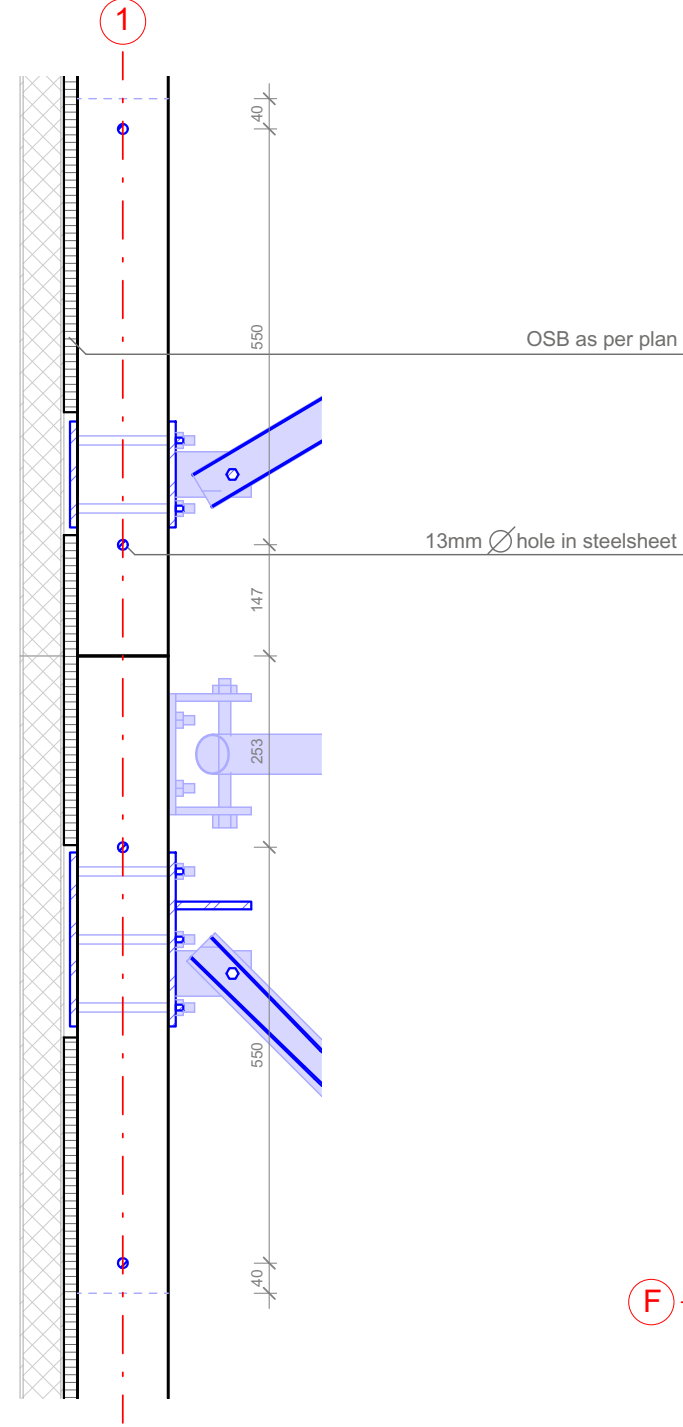
wood column as per plan



3 built-up column GL 12 South
S-530 Scale 1:10 ref. drawing: S-530

1:10



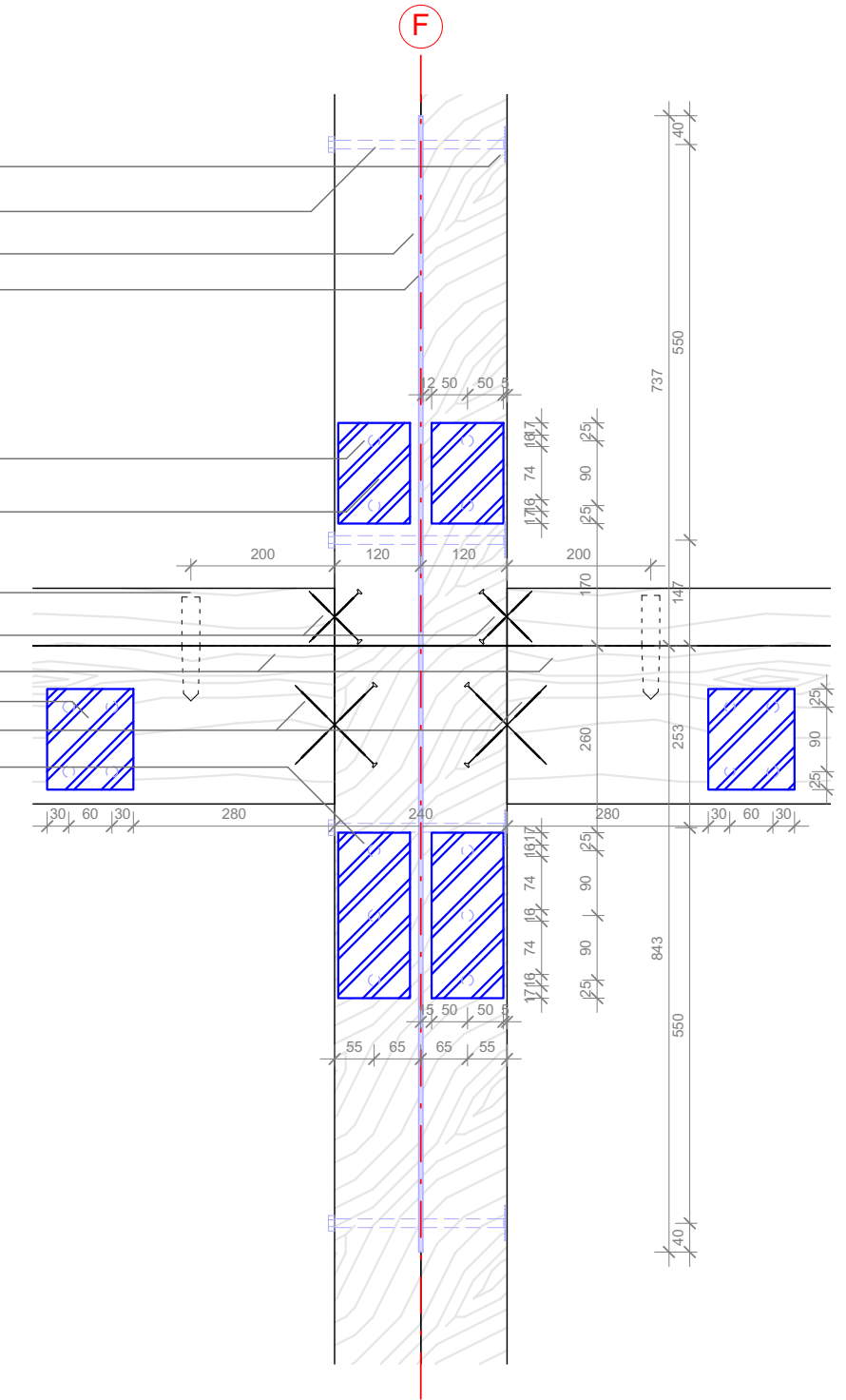
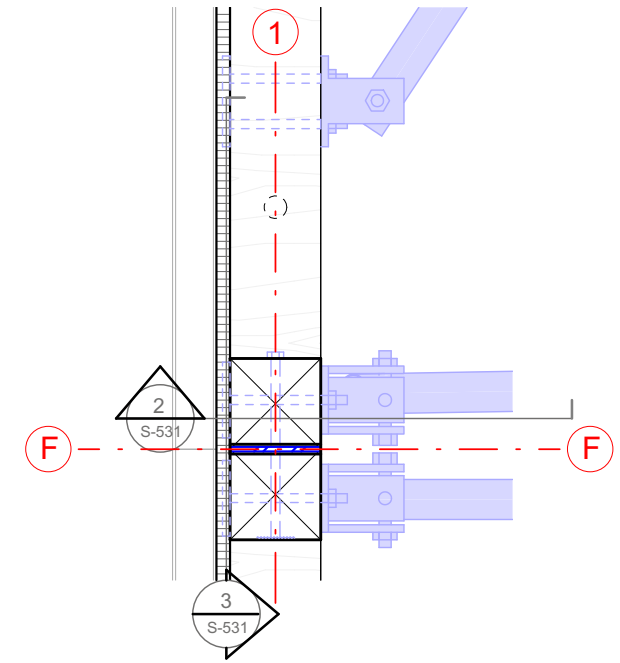


drive-in nut
Ø12mm bolt
6mm steel plate
wood column as per plan

Ø 16mm drill hole
Ø 12mm anchor

steel connector for temporary bracing

hardwood dowel
2 pairs of SFS WT-T-6,5x130mm
wood column as per plan
steel connector for temporary bracing
2 pairs of SFS screws WT-T-8,2x240mm
steel connector for temporary bracing



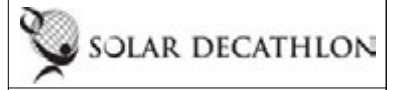
2
S-531
built-up column GL F West
Scale 1:10 ref. drawing: S-531


1
S-531
built-up column GL F West
Scale 1:10 ref. drawing: S-202


3
S-531
built-up column GL F West
Scale 1:10 ref. drawing: S-531

1:10



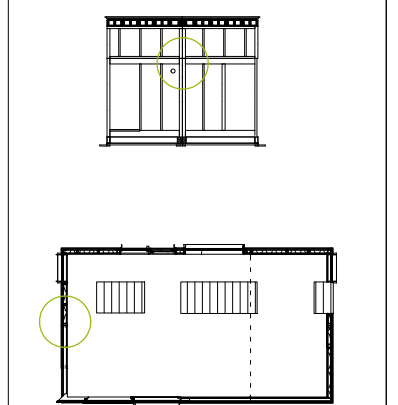



Projekt
 TEAM GERMANY

Bauherr


FG Entwerfen und Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation





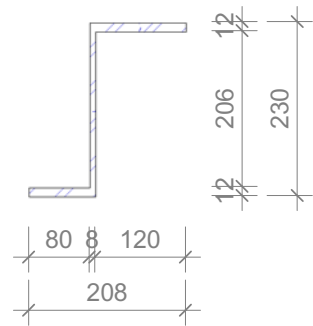
Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn JW(RR|CR|MK)
Issued 04/25/09
Last index 05/11/09

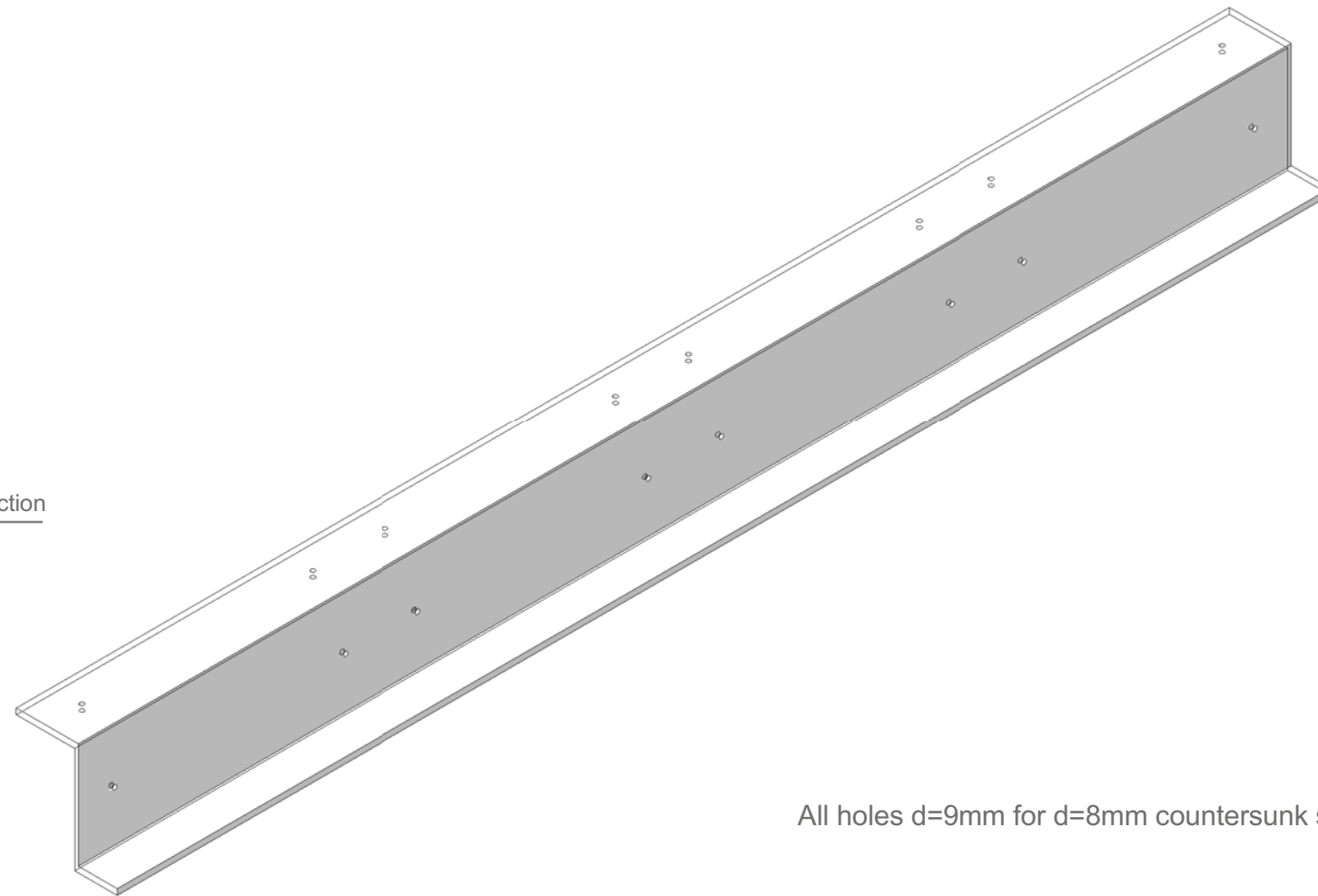
Component
Structural

Description
Built-up Column GL F West

Project # Scale dwg #
P140 1:10 **S-531**

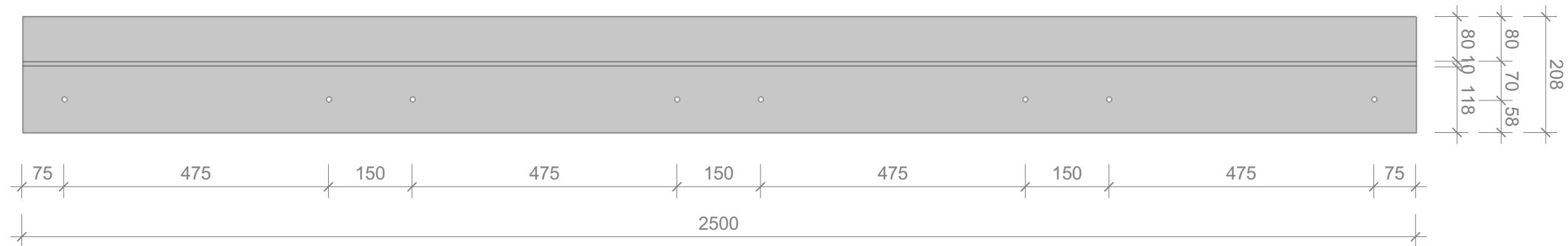


1 cross section / roof to wall connection Z-section
S-532 Scale 1:10

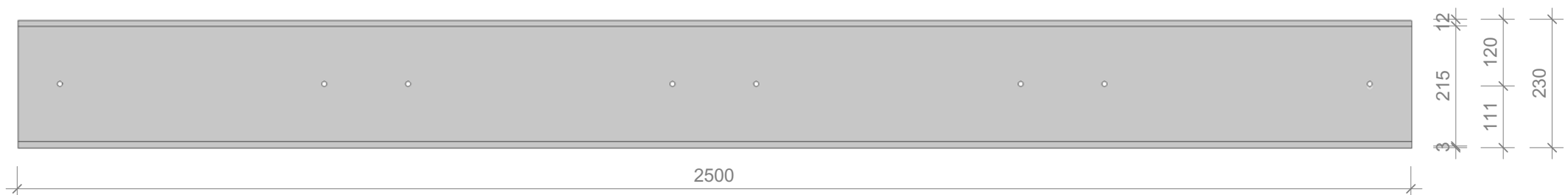


All holes d=9mm for d=8mm countersunk screws

2 roof to wall connection Z-section
S-532 Scale 1:10



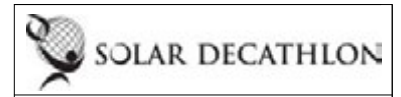
3 plan / roof to wall connection Z-section
S-532 Scale 1:10

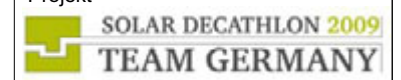



4 elevation / roof to wall connection Z-section
S-532 Scale 1:10

1:10






Projekt**TEAM GERMANY**

Bauherr**TECHNISCHE UNIVERSITÄT DARMSTADT**

FG Entwerfen und Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

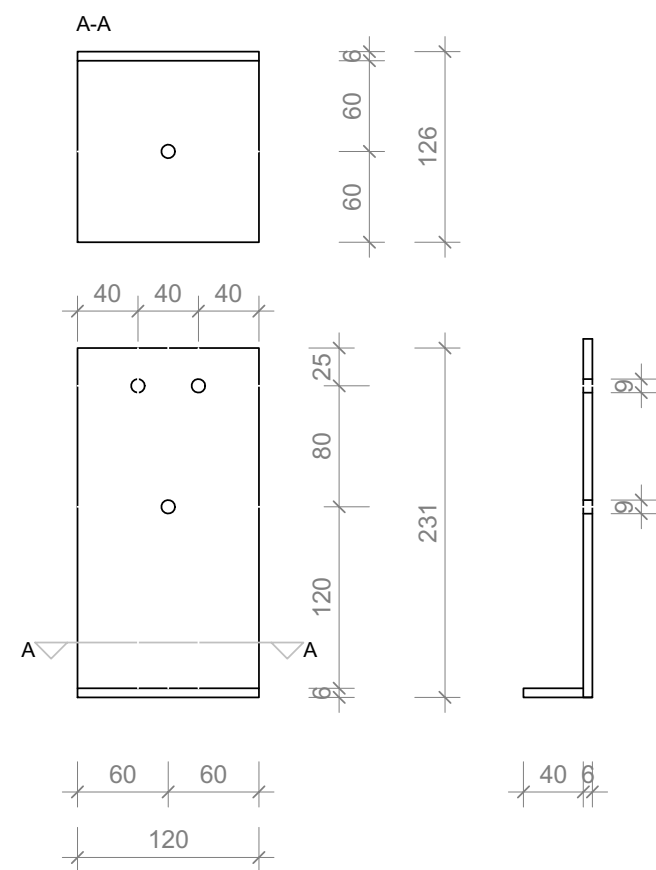
Navigation



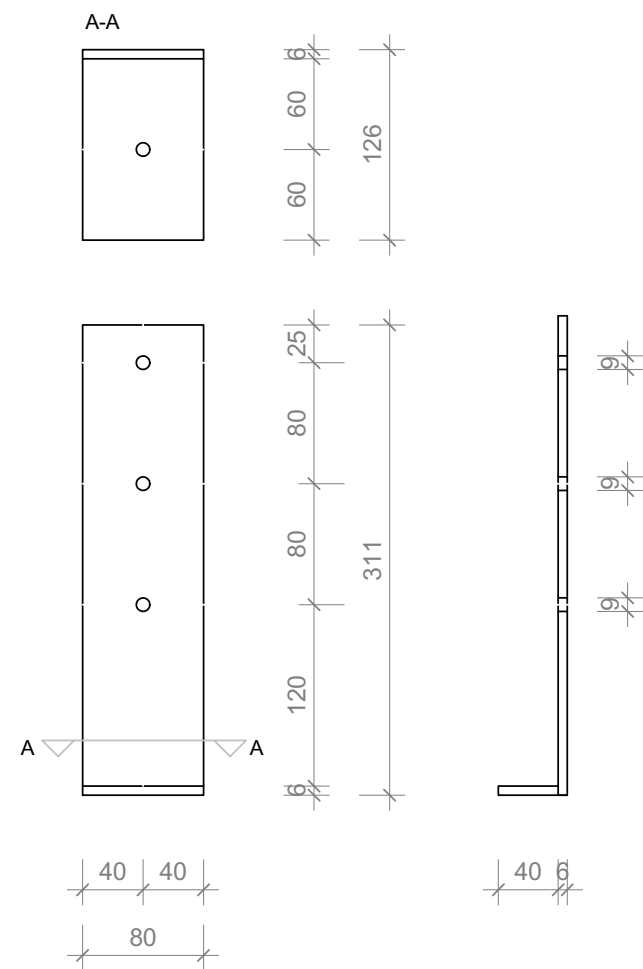
Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn	AO	
Issued	05/08/09	
Last index	05/11/09	
Component	Structural	
Description	Roof to Wall Connection Z-Section	
Project #	Scale	dwg #
P140	1:10	S-532

W3 typ. module connector @ corner



W2 module connector @ corner window



1:5





Projekt



TEAM GERMANY

Bauherr



TECHNISCHE
UNIVERSITÄT
DARMSTADT

FG Entwerfen und
Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation



Jochen A. Stahl [Dipl.-Ing., P.Eng.]

Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

DrawnFR (MK)

Issued03/30/09

Last index05/11/09

Component

Structural

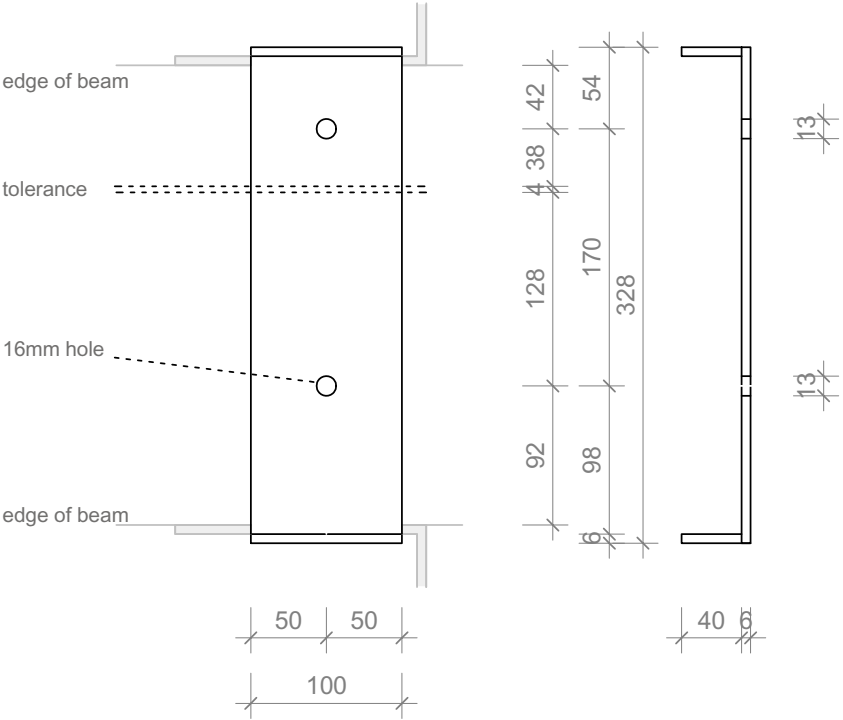
Description

Module Connectors @
Corner

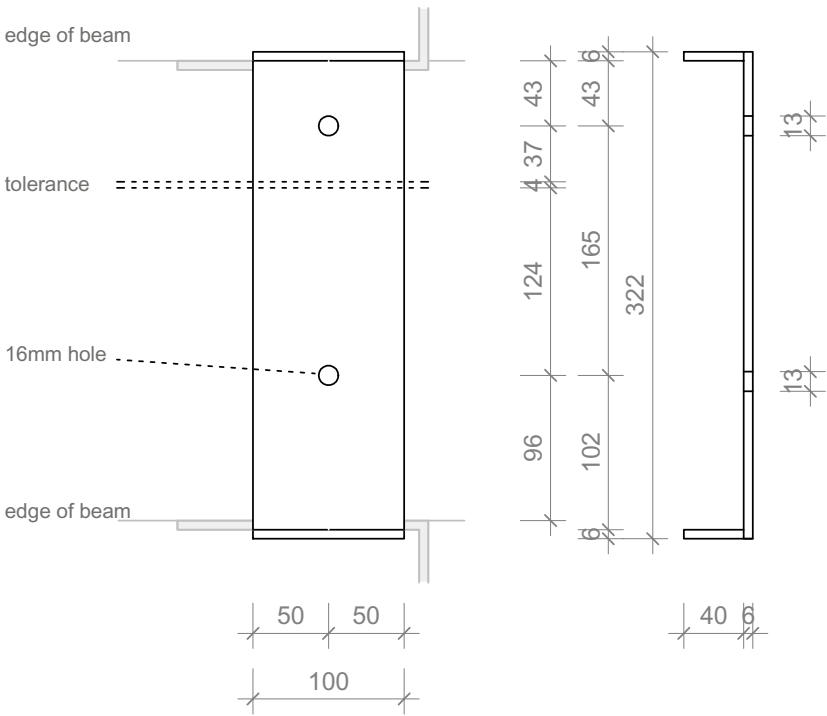
Project #Scaledwg #

P1401 : 5S-533

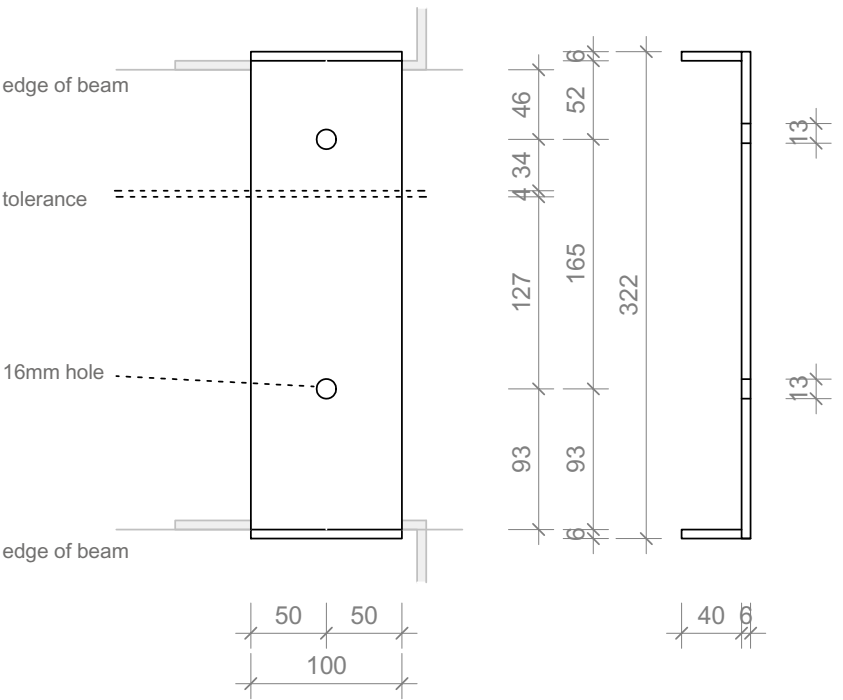
MV4 module connectors @ corner



MV5 module connectors @ corner

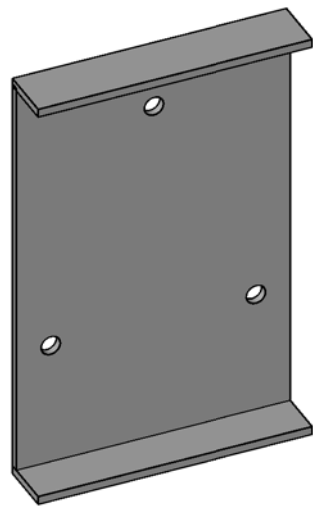


MV6 module connectors @ corner

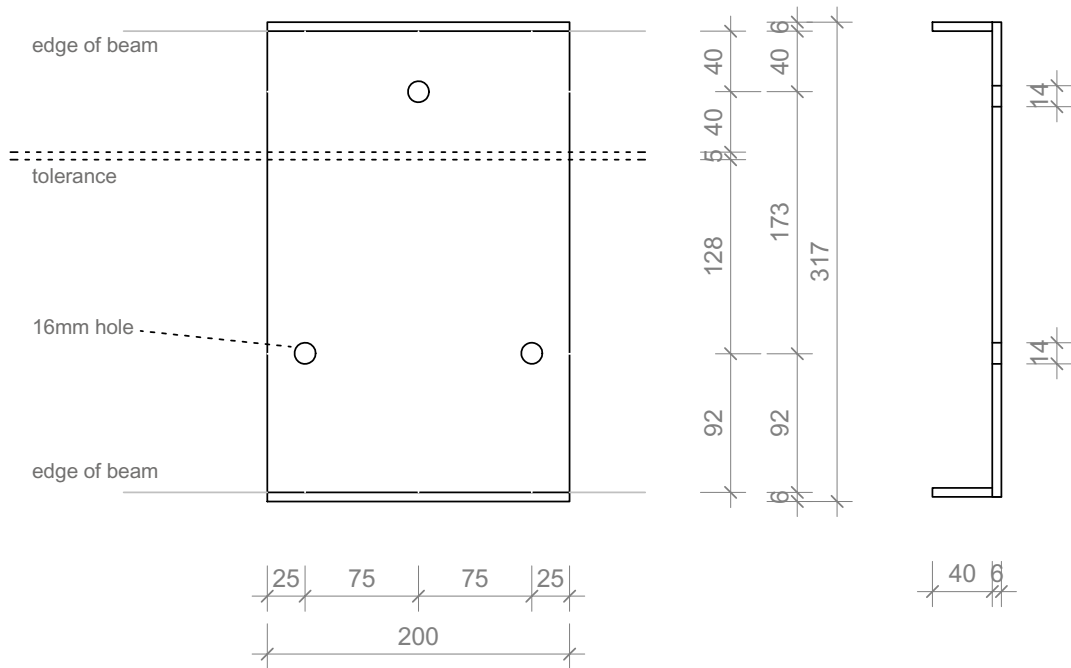


1:5

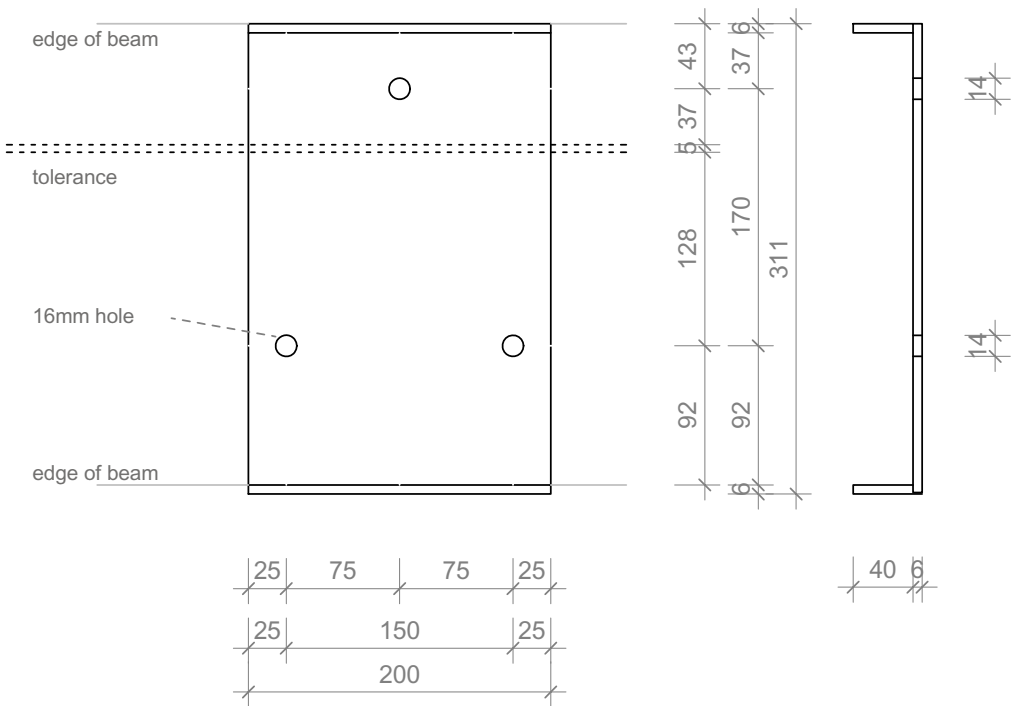




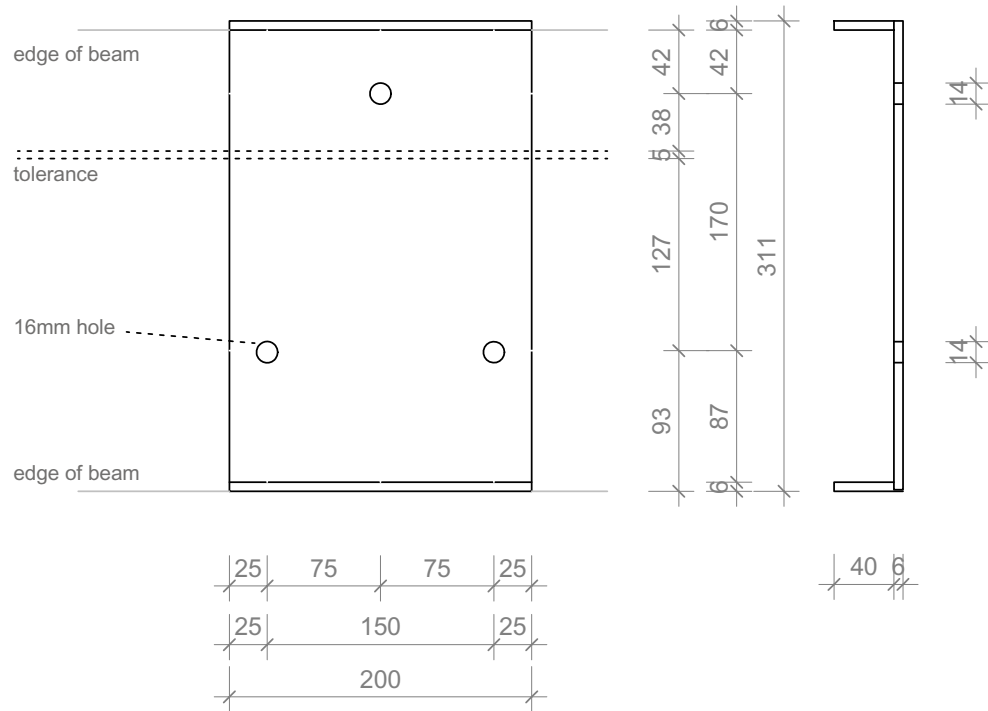
MV1 typ. module connection



MV2 module connection @ upper window



MV3 module connection @ lower window




1:5





Projekt

TEAM GERMANY

Bauherr

TECHNISCHE
UNIVERSITÄT
DARMSTADT

**FG Entwerfen und
Energieeffizientes Bauen**
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation



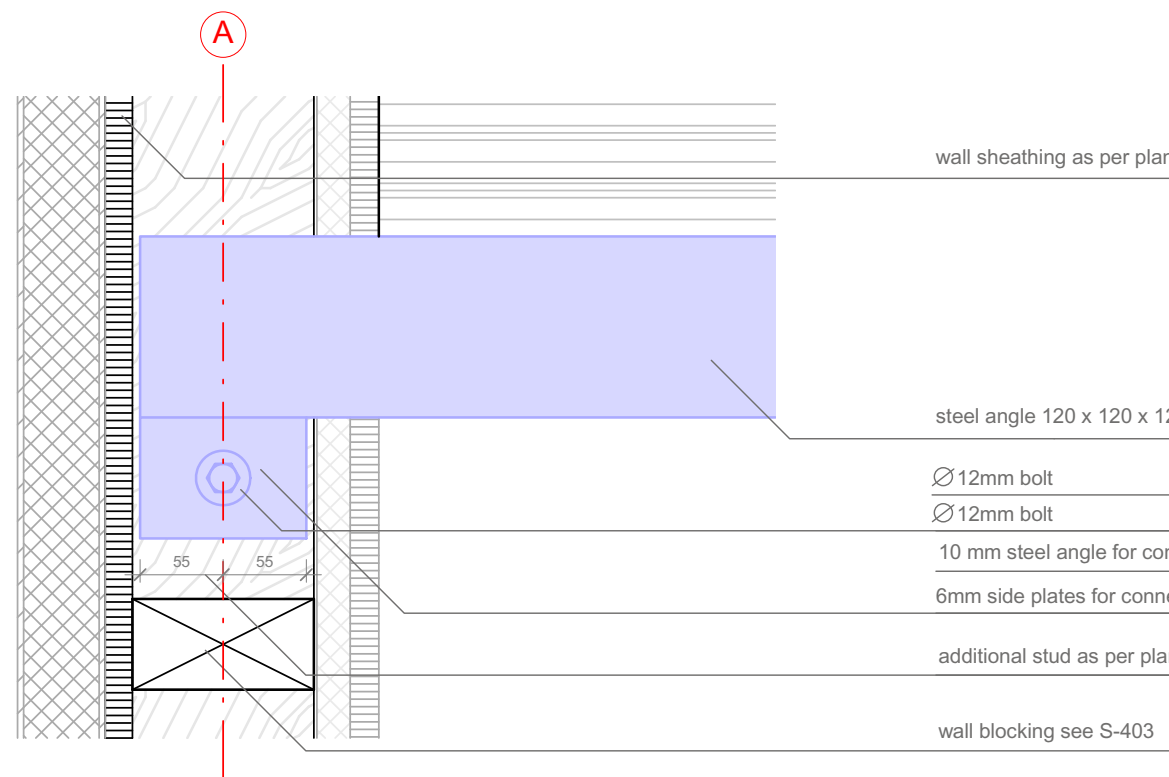
Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn	FR (MK)
Issued	03/30/09
Last index	05/11/09

Component
Structural

Description
**Typ. Module
Connectors**

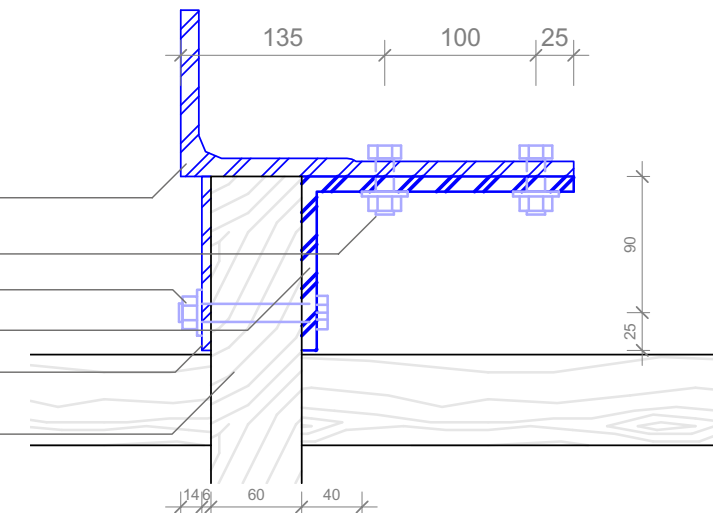
Project #	Scale	dwg #
P140	1 : 5	S-535



2
S-541

section / connection 2nd floor

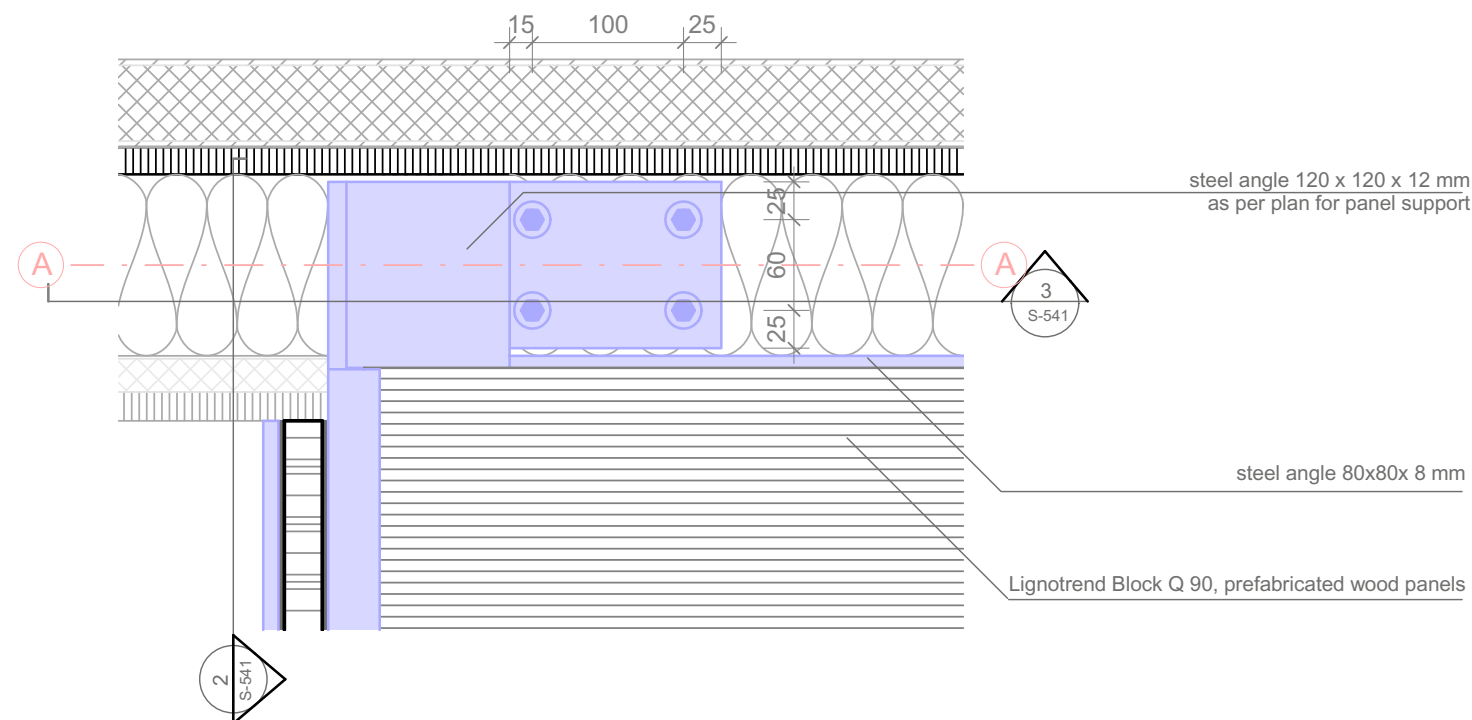
Scale 1:5 ref. drawing: S-541



3
S-541

section / steel angle to wall connection

Scale 1:5 ref. drawing: S-541

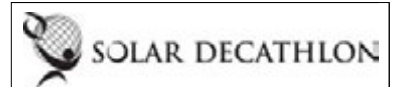


1
S-541

detail / steel edge to wall connection

Scale 1:5 ref. drawing: S-203

1:5

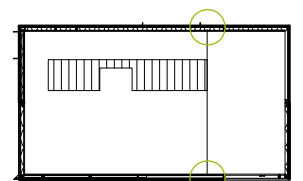


Projekt
SOLAR DECATHLON 2009
TEAM GERMANY

Bauherr
TECHNISCHE
UNIVERSITÄT
DARMSTADT

FG Entwerfen und
Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation



2nd Floor



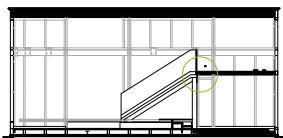
Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn RR (CR)
Issued 04/25/09
Last index 05/11/09

Component
structural

Description
Steel Edge to Wall
Connection

Project # Scale dwg #
P140 1:5 S-541



Drawn AG (RR|CR)

Issued 04/25/09

Last index 05/11/09

Component

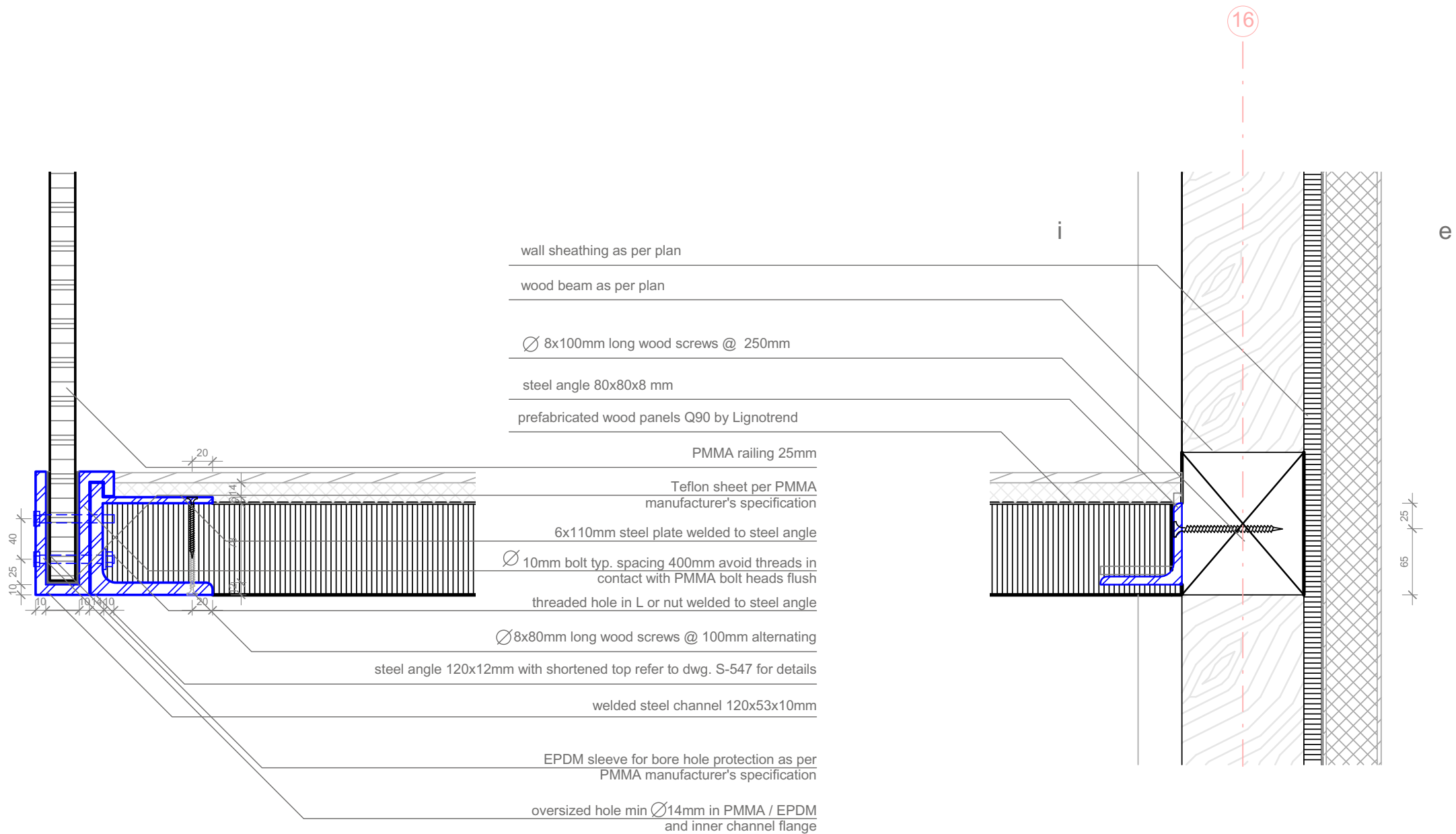
Structural

Description

**Connection Details of
 Second Floor**

Project # Scale dwg #

P140 1:5 **S-542**



1
 S-542

Section / construction of 2nd floor and railing

Scale 1:5 ref. drawing: S-203

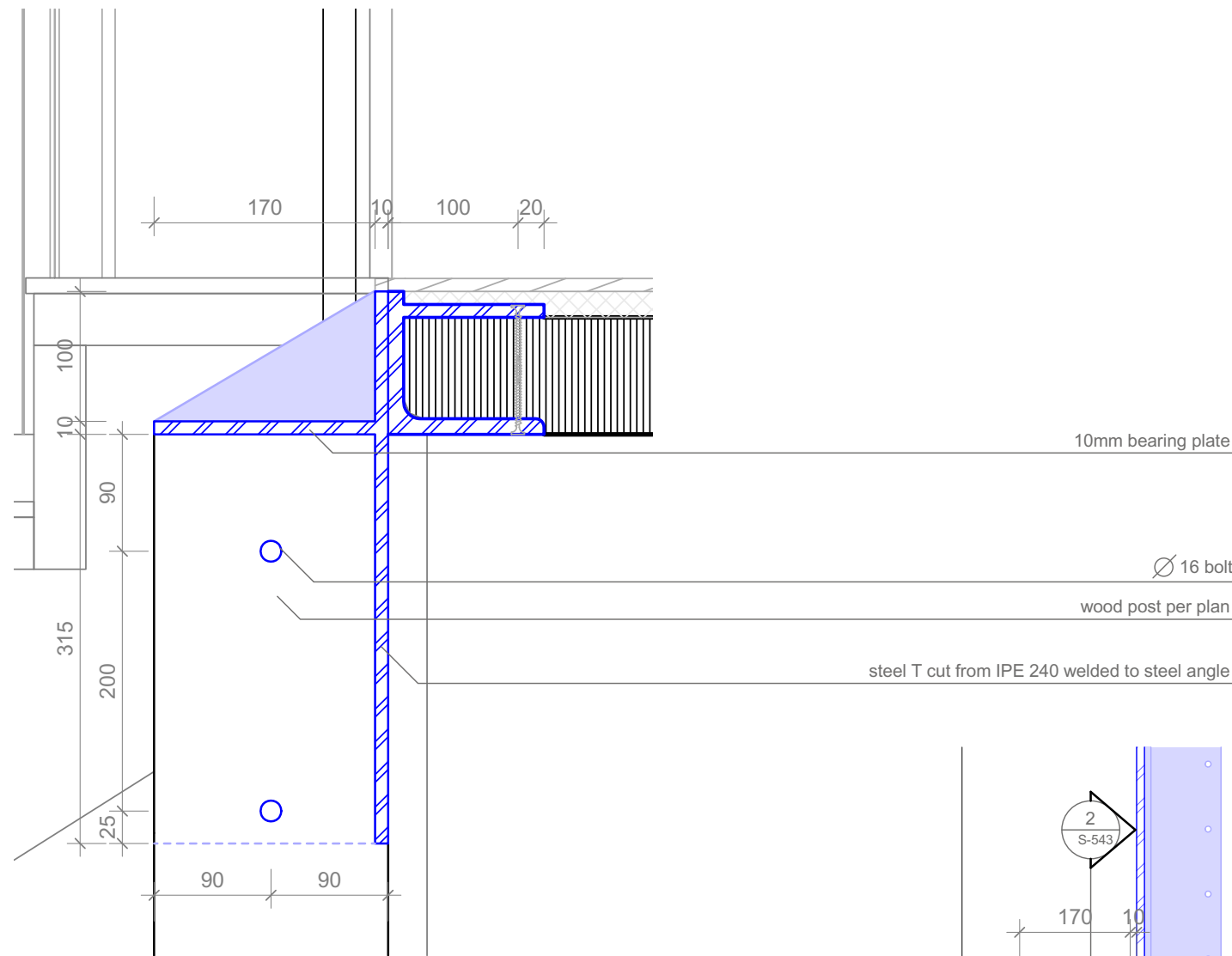
2
 S-542

Section / wall connection of 2nd floor

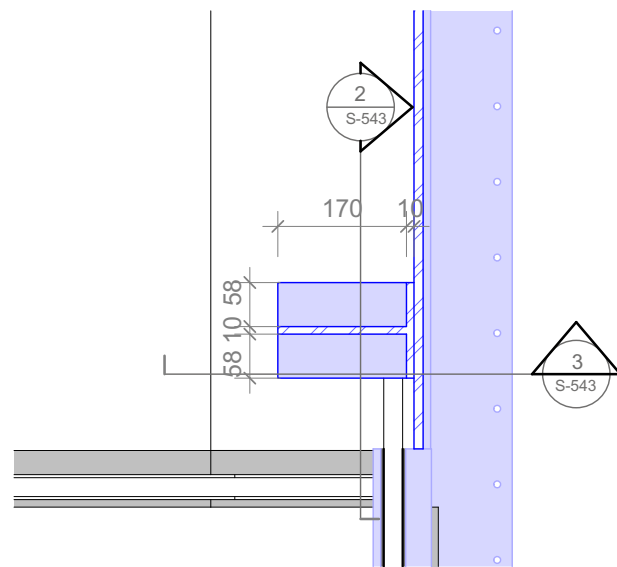
Scale 1:5 ref. drawing: S-203

1:5



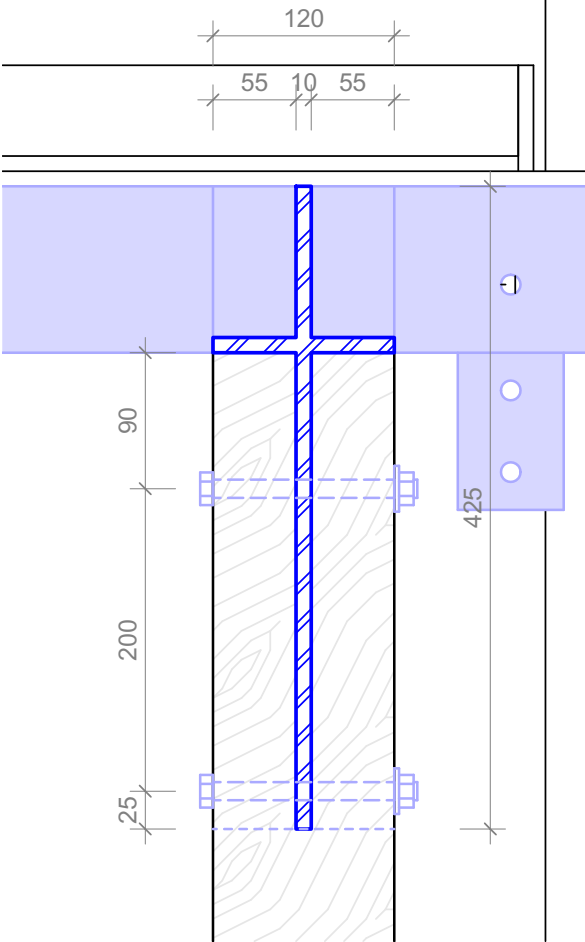


3
S-543
Section / 2nd floor edge angle to wood post connection
Scale 1:5 ref. drawing: S-543

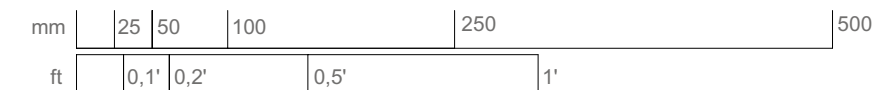


2
S-543
Section / 2nd floor edge angle to wood post connection
Scale 1:5 ref. drawing: S-543

1
S-543
2nd floor edge angle to wood post connection
Scale 1:10 ref. drawing: S-203



1:5



Projekt
SOLAR DECATHLON 2009
TEAM GERMANY

Bauherr
TECHNISCHE UNIVERSITÄT DARMSTADT

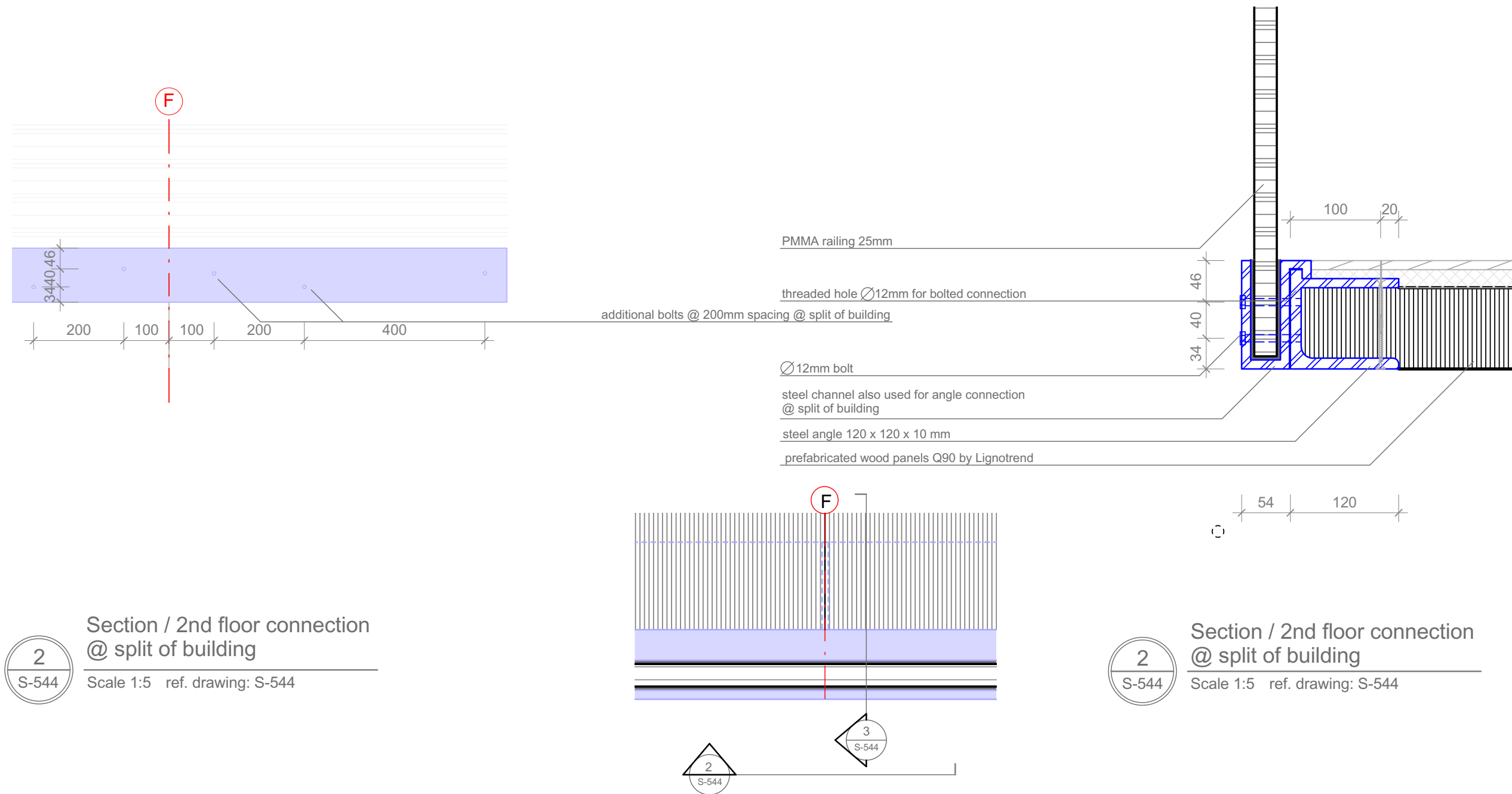
FG Entwerfen und Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation

TRAGWERK
Jochen A. Stahl [Dipl.-Ing., P.Eng.]

Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn	AG(RR|CR|MK)
Issued	04/25/09
Last index	05/11/09
Component	Structural
Description	2nd Floor Edge Angle to Wood Post Conn.
Project #	P140
Scale	1:5
dwg #	S-543



2
S-544

Section / 2nd floor connection
@ split of building

Scale 1:5 ref. drawing: S-544

2
S-544

Section / 2nd floor connection
@ split of building

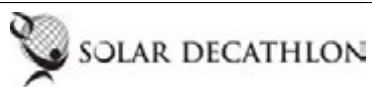
Scale 1:5 ref. drawing: S-544

1
S-544

2nd floor connection @ split of building

Scale 1:5 ref. drawing: S-203

1:5

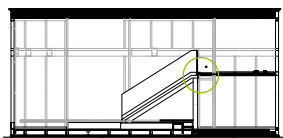


Projekt
SOLAR DECATHLON 2009
TEAM GERMANY

Bauherr
TECHNISCHE
UNIVERSITÄT
DARMSTADT

FG Entwerfen und
Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation



TRAGWERK
Jochen A. Stahl [Dipl.-Ing., P.Eng.]

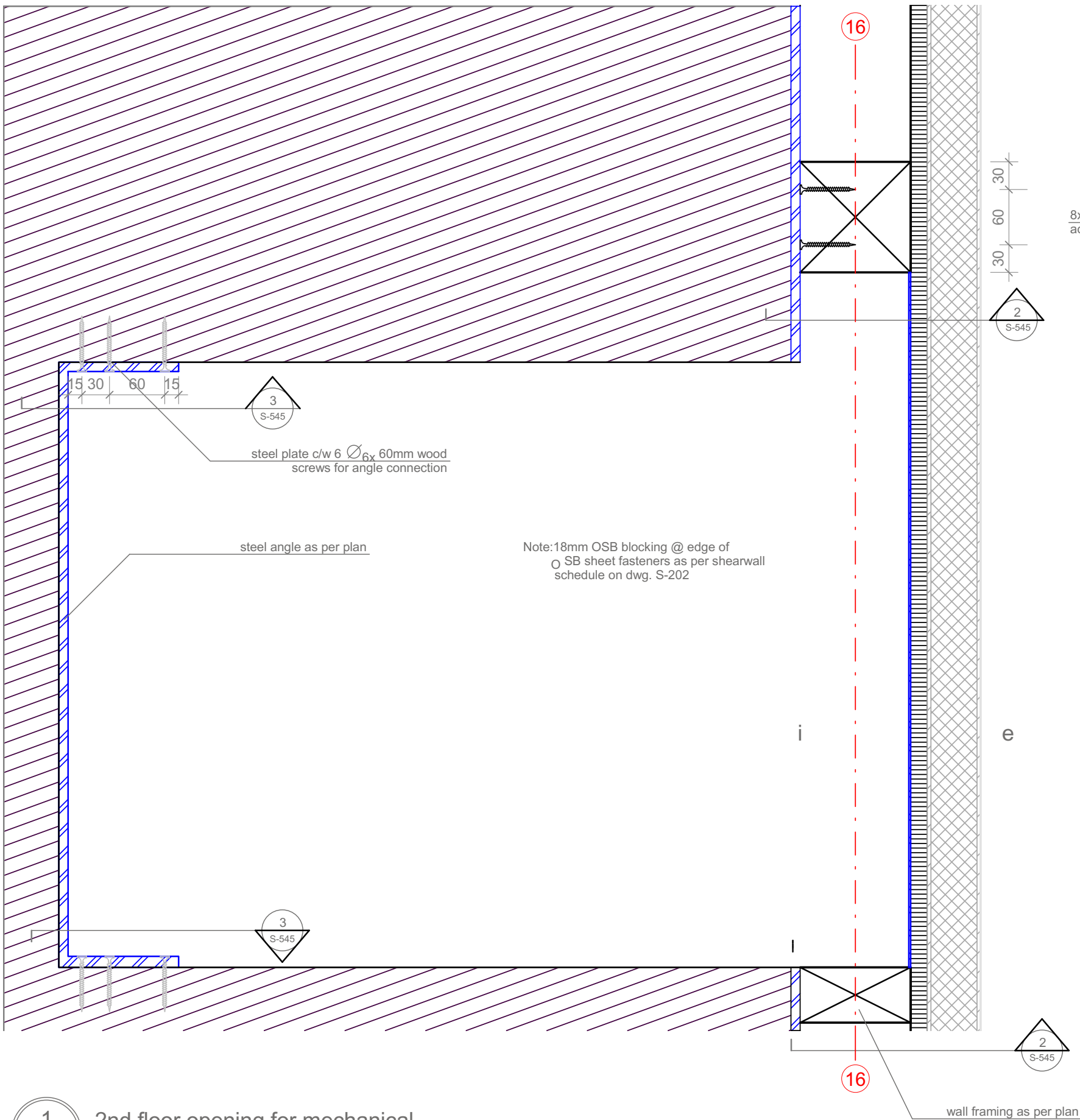
Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn AG (RR|CR)
Issued 04/25/09
Last index 05/11/09

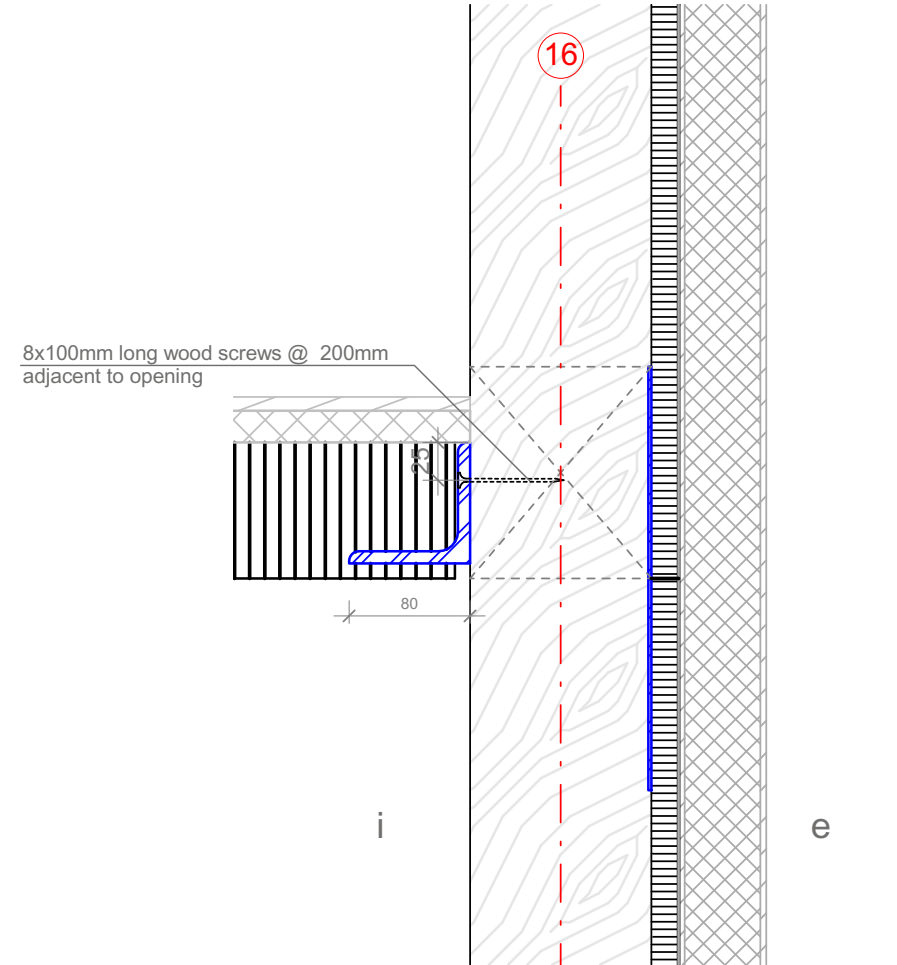
Component
Structural

Description
2nd Floor Connection
@ Split of Building

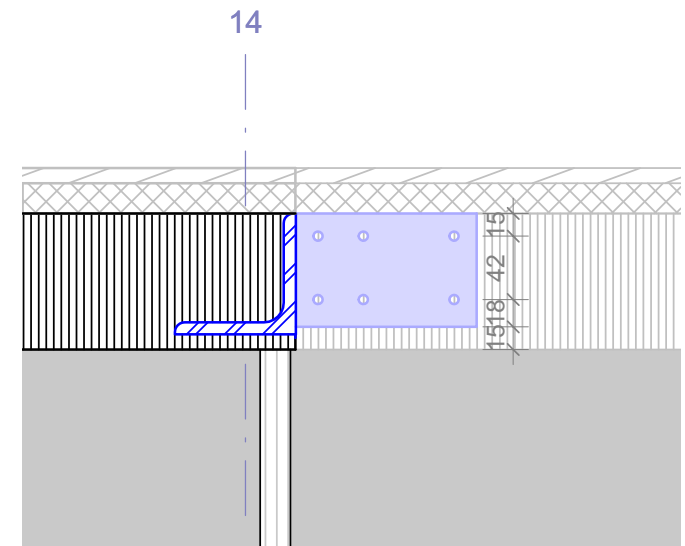
Project # Scale dwg #
P140 1:5 S-544



1 2nd floor opening for mechanical
 S-545 Scale 1:5 ref. drawing: S-203



2 Section / floor opening
 S-545 Scale 1:5 ref. drawing: S-545



3 Section / floor opening
 S-545 Scale 1:5 ref. drawing: S-545

1:5



SOLAR DECATHLON

Projekt

SOLAR DECATHLON 2009
TEAM GERMANY

Bauherr

TECHNISCHE
UNIVERSITÄT
DARMSTADT

**FG Entwerfen und
Energieeffizientes Bauen**
 El-Lissitzky-Str. 1
 64287 Darmstadt
 +49 (0) 6151 / 165448
 +49 (0) 6151 / 165247
 team@solardecathlon2009.de

Navigation

TRAGWERK
 Jochen A. Stahl [Dipl.-Ing., P.E.]

Frankfurter Straße 15
 64331 Weiterstadt
 T +49 (0)6150 / 59 14 92
 F +49 (0)6150 / 59 14 93
 info@tragwerkplus.de
 www.tragwerkplus.de

Drawn AG (RR|CR)

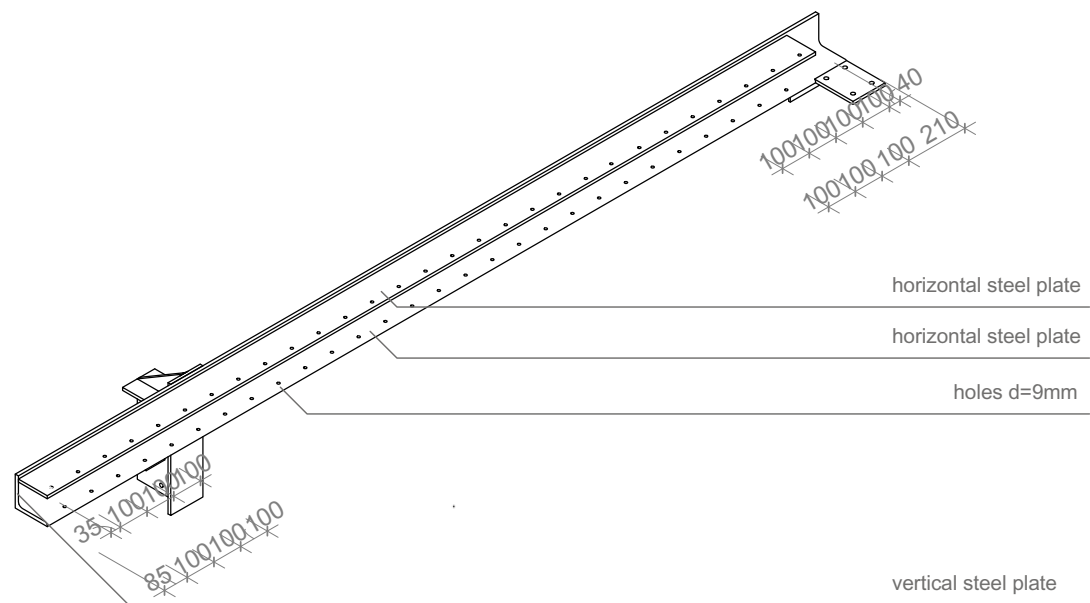
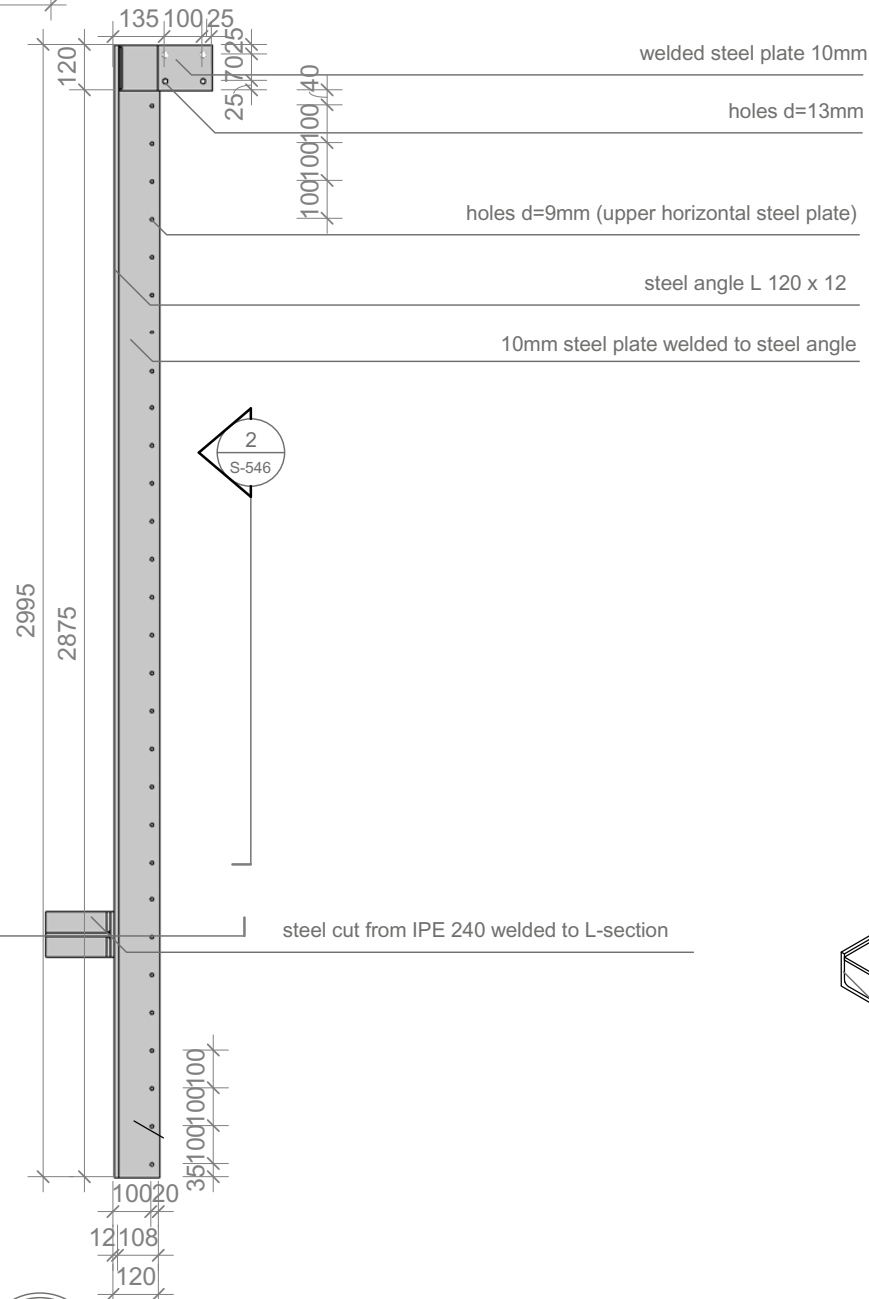
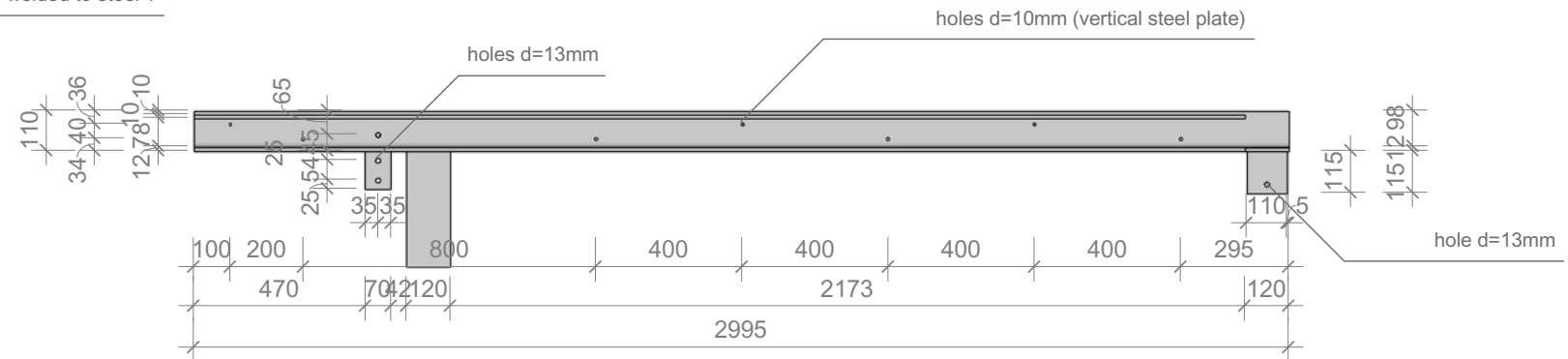
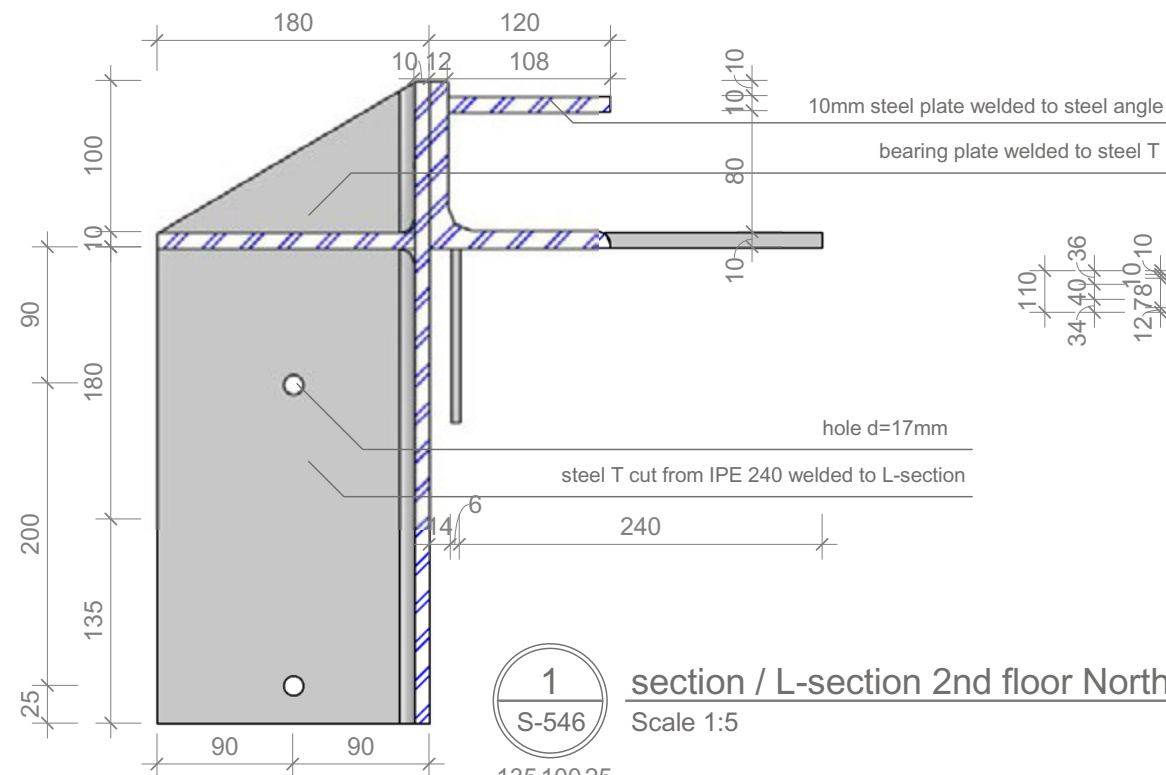
Issued 04/25/09

Last index 05/11/09

Component
Structural

Description
**2nd Floor Opening for
Mechanical**

Project # Scale dwg #
 P140 1:5 **S-545**



Note:
- all wood screws to be countersunk screws with flat heads, provide adequate bore holes in steel plates
- all d=10 mm holes are threaded holes (vertical steel plate)



Projekt
SOLAR DECATHLON 2009
TEAM GERMANY

Bauherr
TECHNISCHE UNIVERSITÄT DARMSTADT

FG Entwerfen und Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation



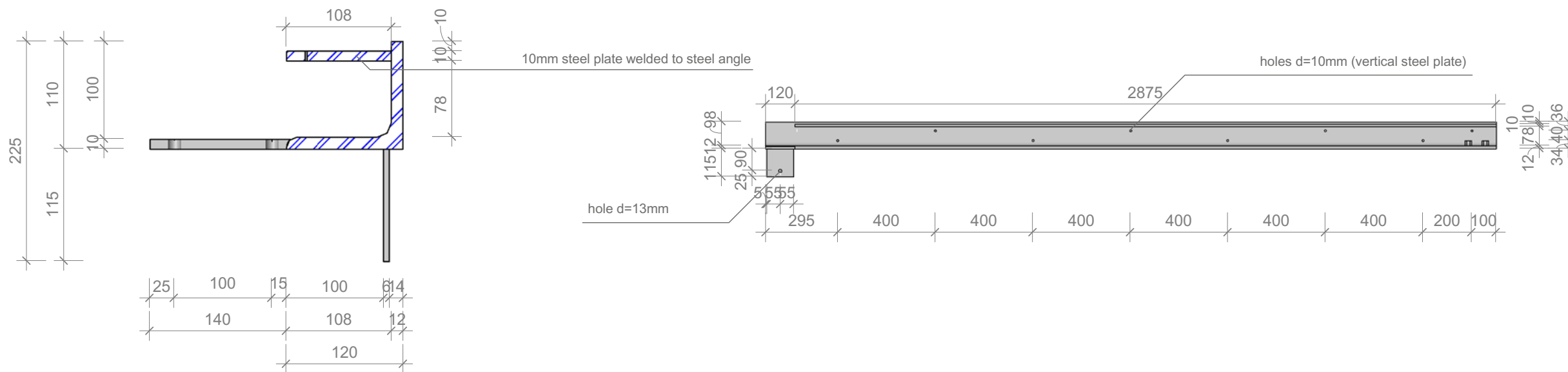
Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn AO
Issued 05/04/09
Last index 05/11/09

Component
Structural

Description
L- section 2nd floor North

Project # Scale dwg #
P140 1:20 **S-546**

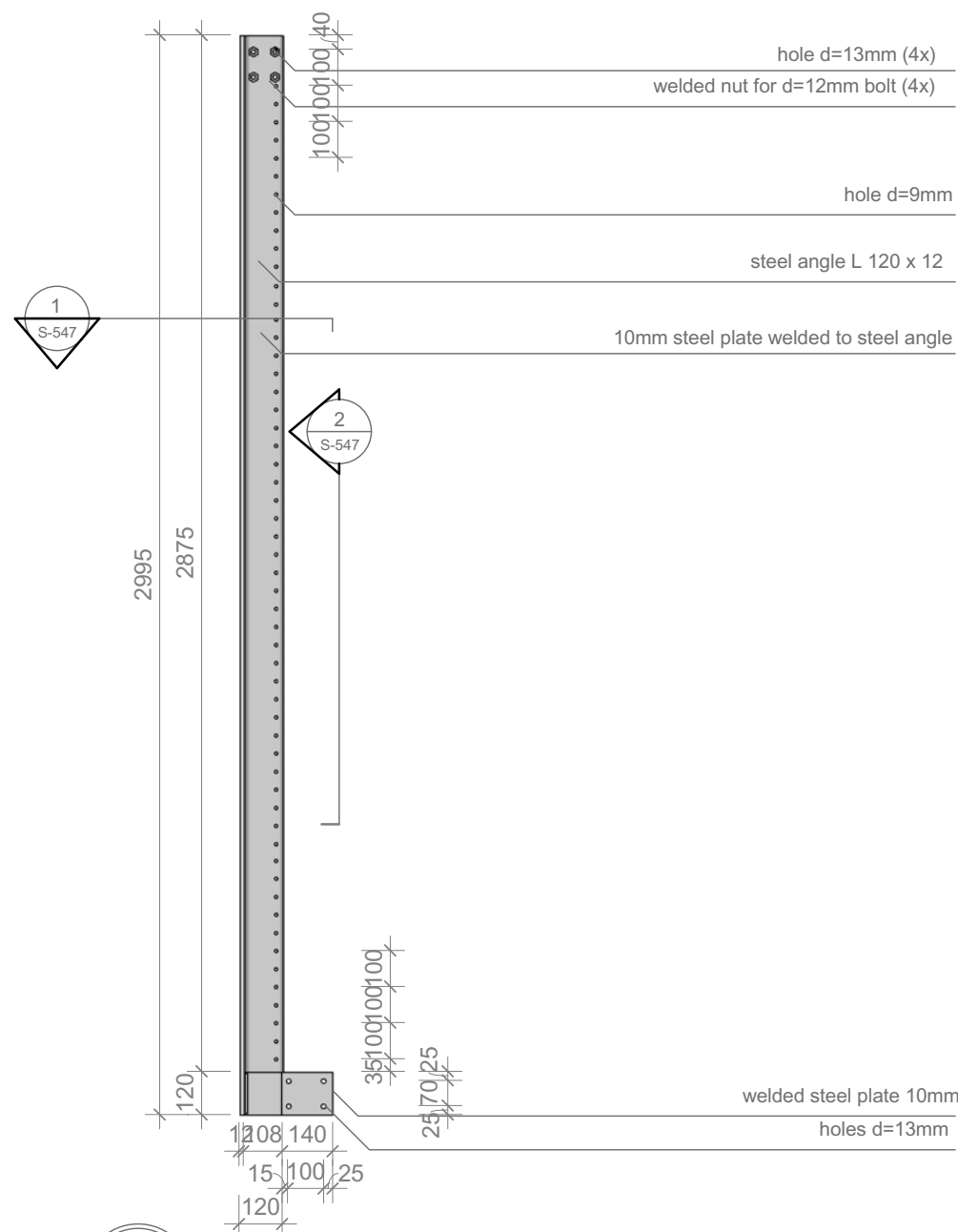


1
S-547

section / L-section 2nd floor South
Scale 1:5

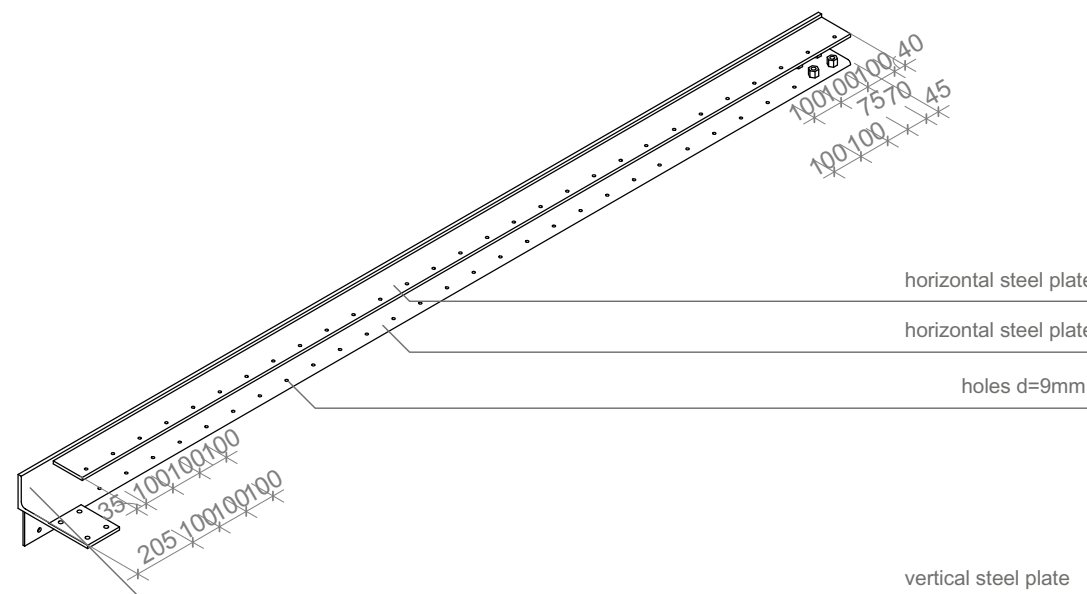
2
S-547

elevation / L-section 2nd floor South
Scale 1:20



3
S-547

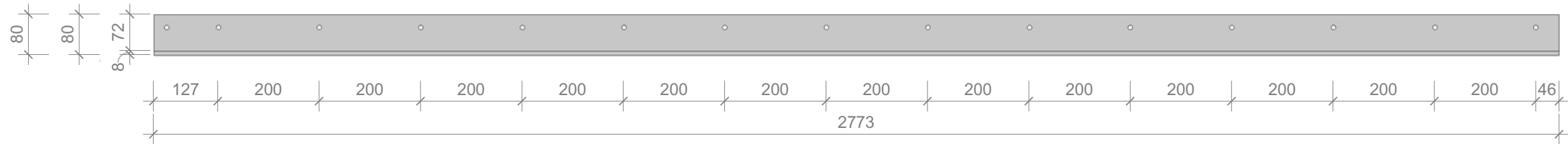
L-section 2nd floor South
Scale 1:20 ref drawing S-542



4
S-547

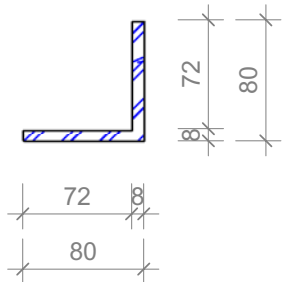
L-section 2nd floor South
Scale 1:20

Note:
- all wood screws to be countersunk screws with flat heads, provide adequate bore holes in steel plates
- all d=10 mm holes are threaded holes (vertical steel plate)

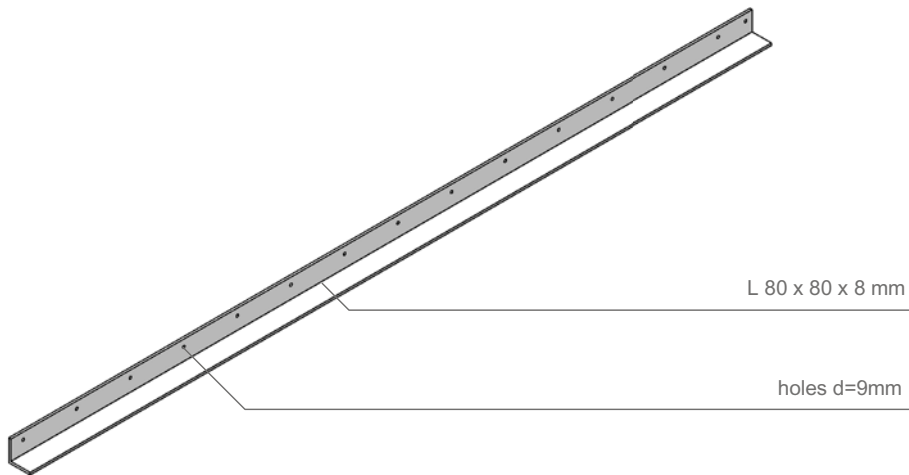


2nd floor to East wall connection South
Scale 1:10

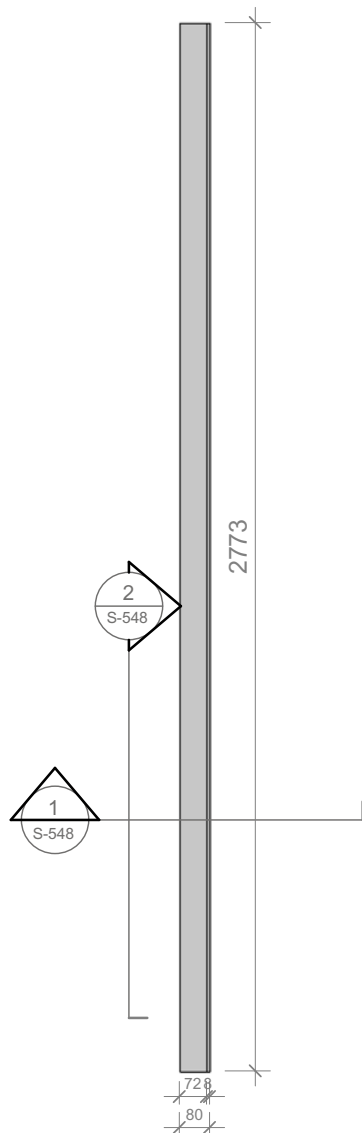
All drill holes d=9mm for d=8mm countersunk screws



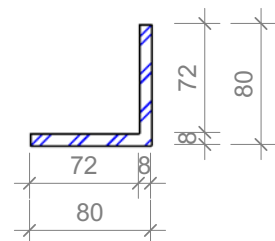
2nd floor to East wall connection South
Scale 1:20



Section / 2nd floor to East wall connection South
Scale 1:5

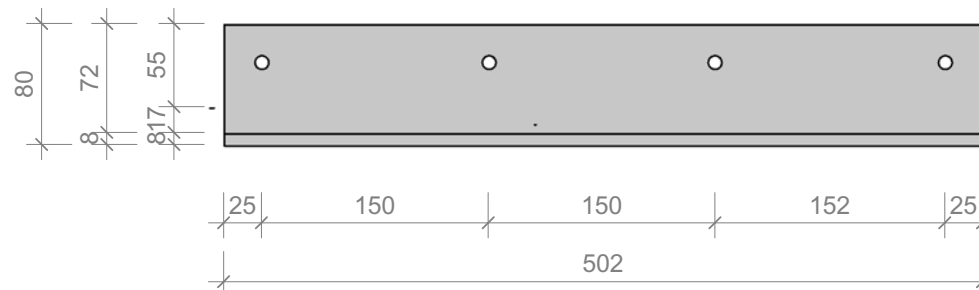


2nd floor to East wall connection South
Scale 1:20 ref. drawing S-203



1
S-549

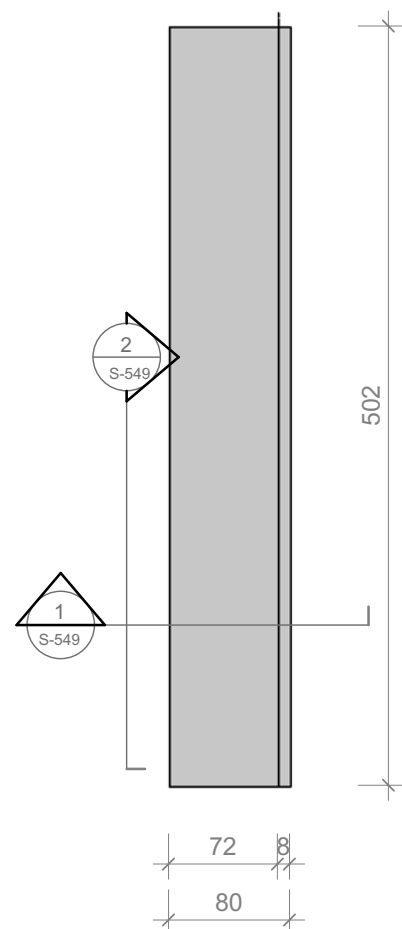
Section / 2nd floor to East wall connection center
Scale 1:5



2
S-549

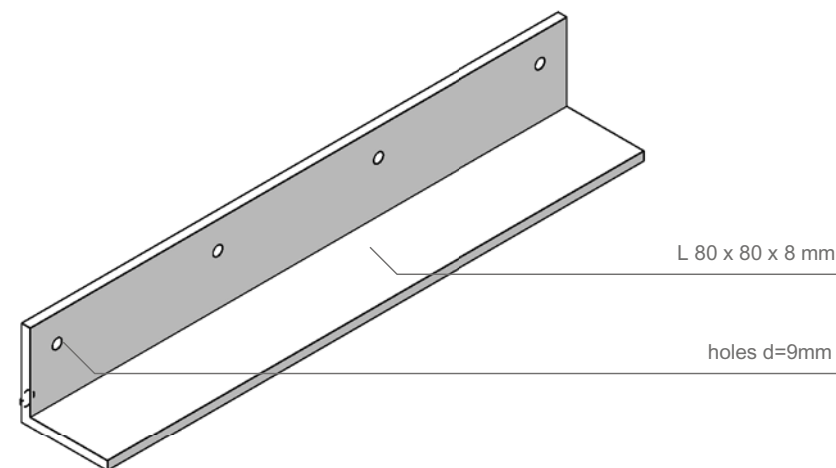
2nd floor to East wall connection center
Scale 1:5

All drill holes d=9mm for d=8mm countersunk screws



3
S-549

2nd floor to East wall connection center
Scale 1:5



4
S-549

2nd floor to East wall connection center
Scale 1:5 ref. drawing S-203

1:5



Projekt

Bauherr
TECHNISCHE UNIVERSITÄT DARMSTADT

FG Entwerfen und Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation

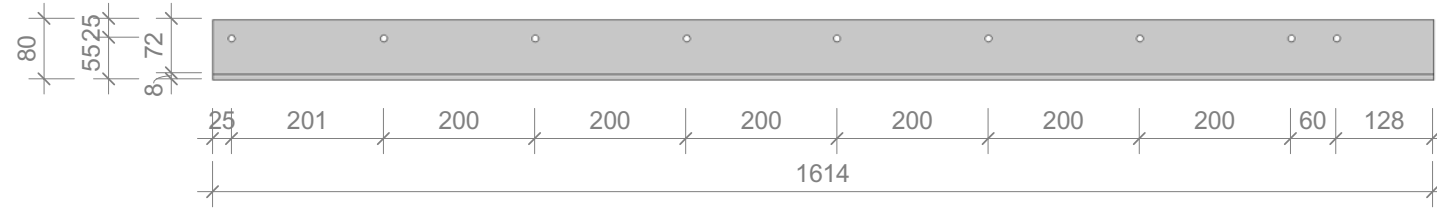
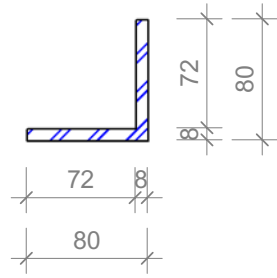
Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn	AO
Issued	05/07/09
Last index	05/11/09

Component
Structural

Description
2nd floor to East wall connection center

Project #	Scale	dwg #
P140	1:5	S-549

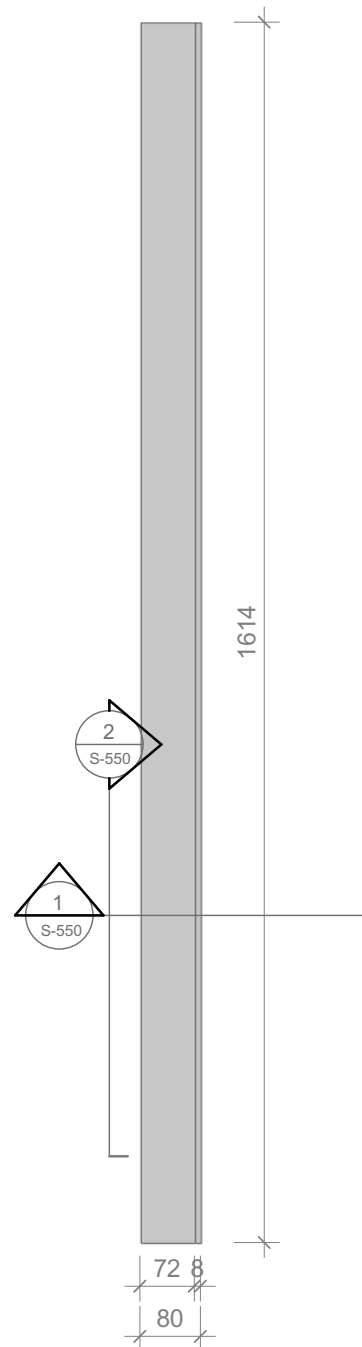


1
S-550

Section / 2nd floor to East wall connection North
Scale 1:5

2
S-550

2nd floor to East wall connection North
Scale 1:10



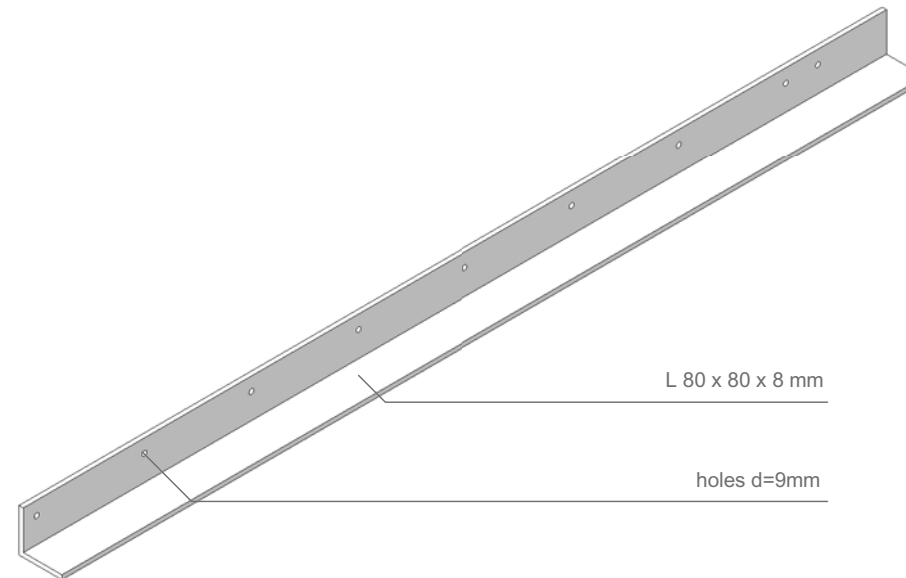
3
S-550

2nd floor to East wall connection North
Scale 1:10

4
S-550

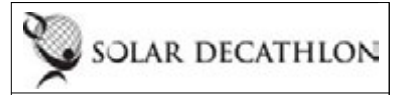
2nd floor to East wall connection North
Scale 1:10 ref. drawing S-203


All drill holes d=9mm for d=8mm countersunk screws




1:10






Projekt


Bauherr


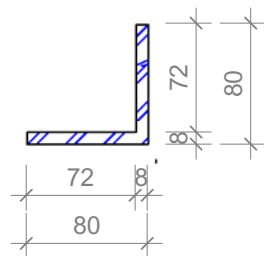
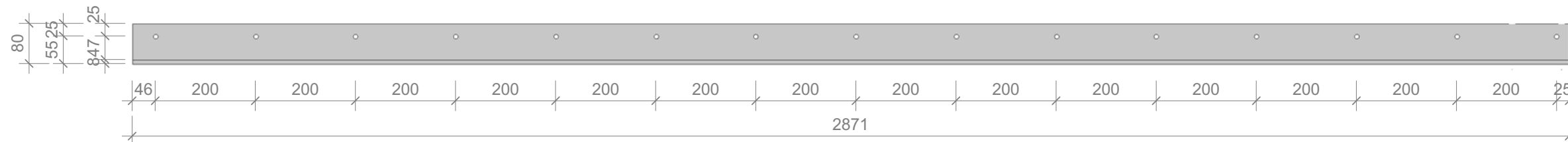
FG Entwerfen und Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation



Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn	AO
Issued	05/07/09
Last index	05/11/09
Component	Structural
Description	2nd floor to East wall connection North
Project #	P140
Scale	1:10
dwg #	S-550



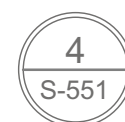
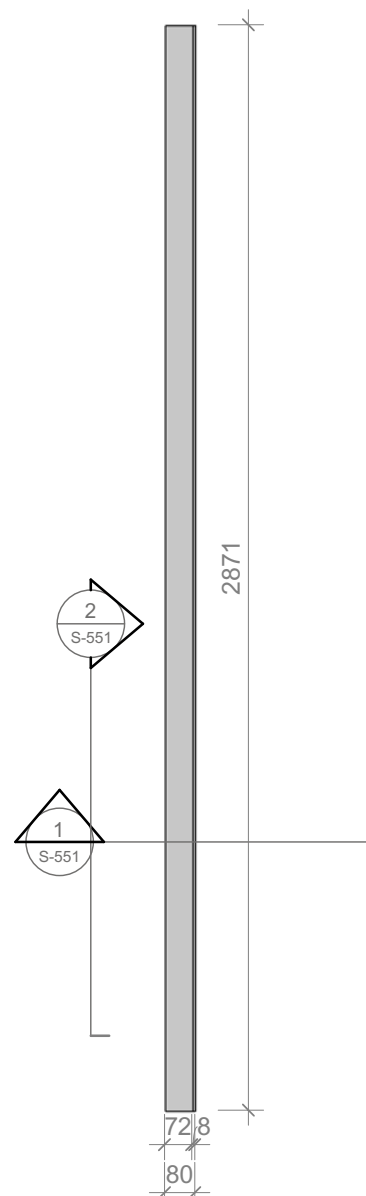
2nd floor to North & South wall connection

Scale 1:10



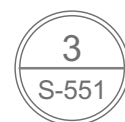
Section / 2nd floor to North & South wall connection

Scale 1:5



2nd floor to North & South wall connection

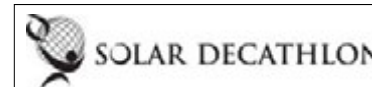
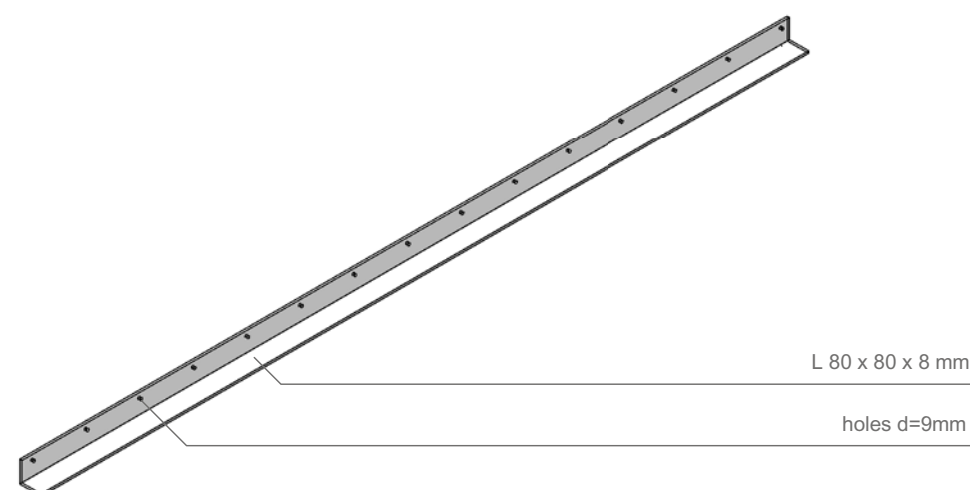
Scale 1:20



2nd floor to North & South wall connection

Scale 1:20 ref. drawing S-203

All drill holes d=9mm for d=8mm countersunk screws



Projekt



Bauherr



**FG Entwerfen und
Energieeffizientes Bauen**

El-Lissitzky-Str. 1

64287 Darmstadt

+49 (0) 6151 / 165448

+49 (0) 6151 / 165247

team@solardecathlon2009.de

Navigation



Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn AO

Issued 05/07/09

Last index 05/11/09

Component

Structural

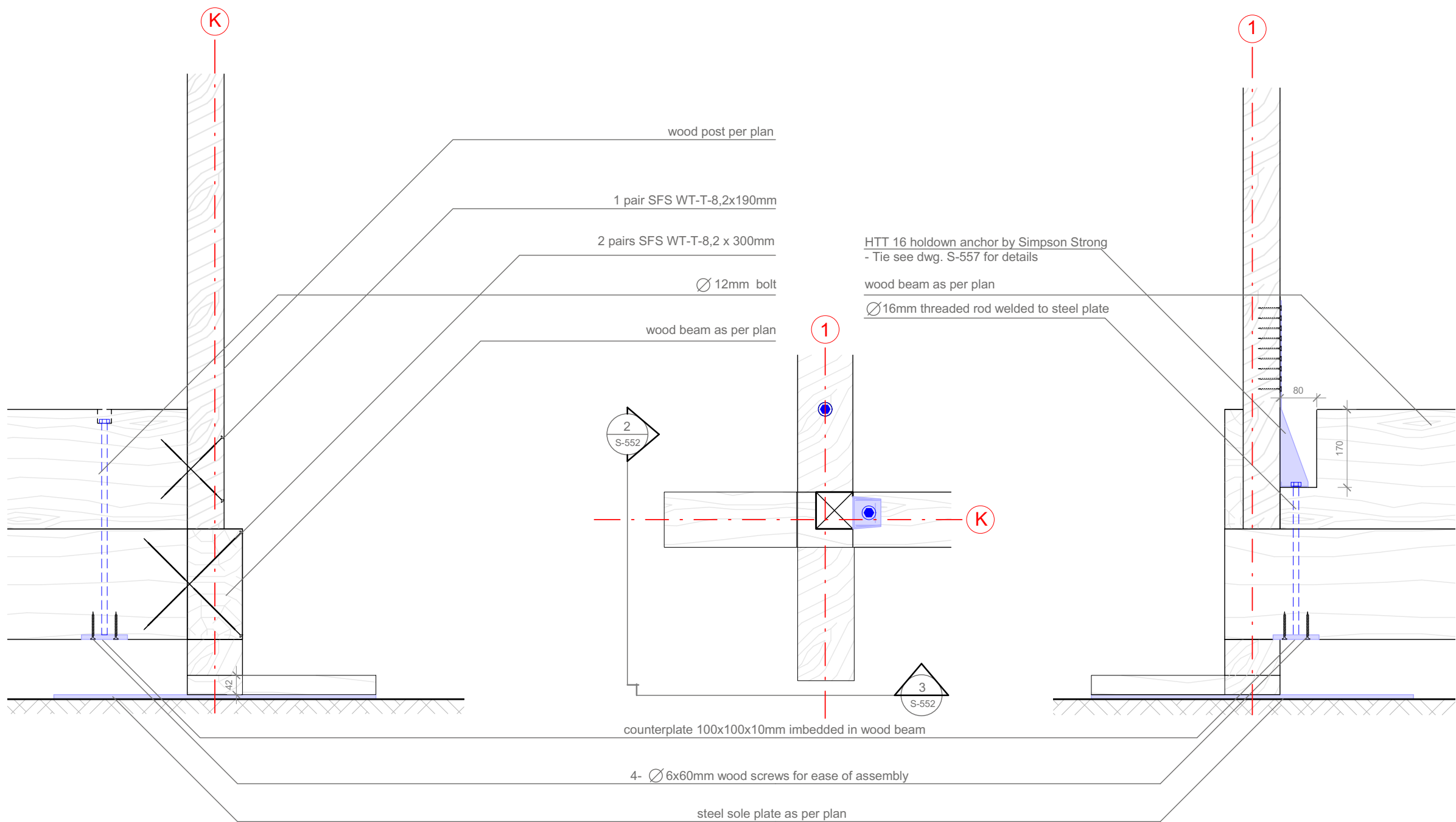
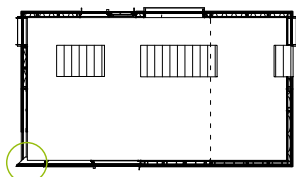
Description

**2nd floor to North &
South wall connection**

Project # Scale dwg #

P140 1:20

S-551



2
S-552

section / holdown anchor
Scale 1:10 ref. drawing: S-552

1
S-552

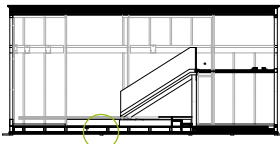
detail / holdown anchor
Scale 1:10 ref. drawing: S-205

3
S-552

section / holdown anchor
Scale 1:10 ref. drawing: S-552

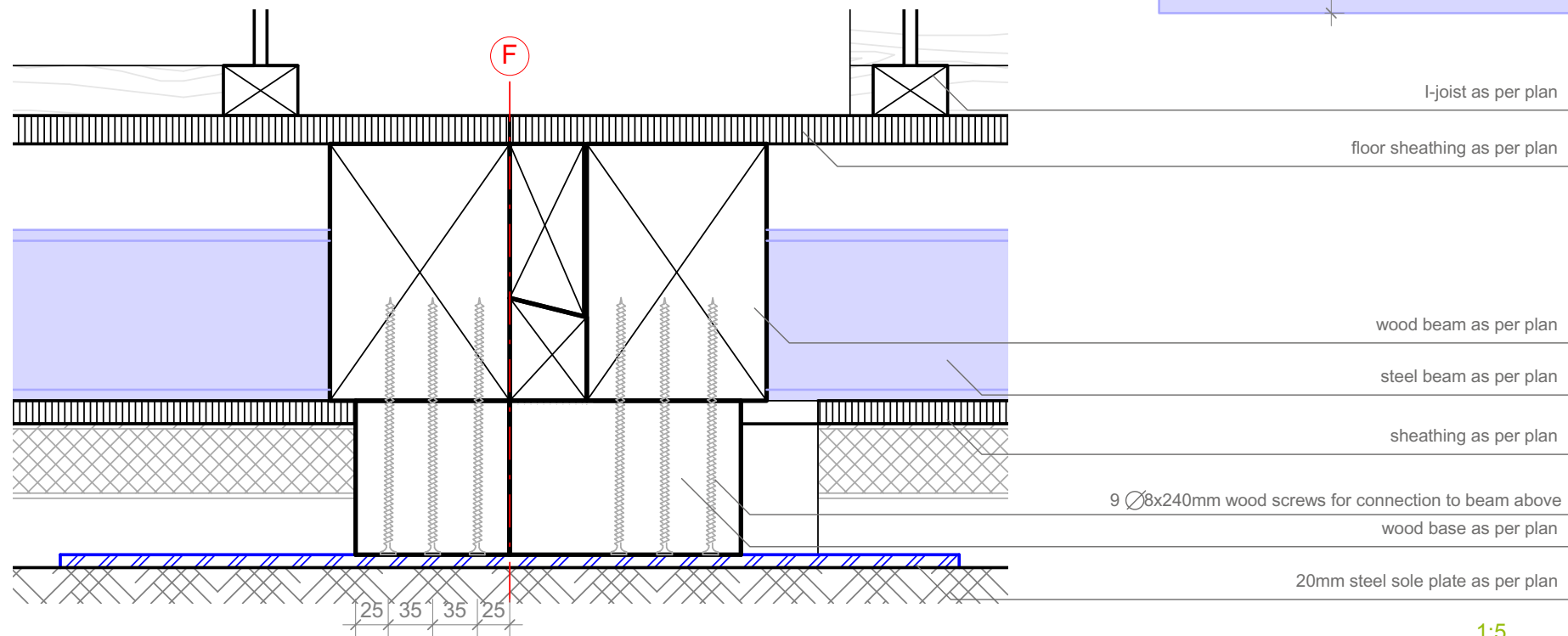
1:10



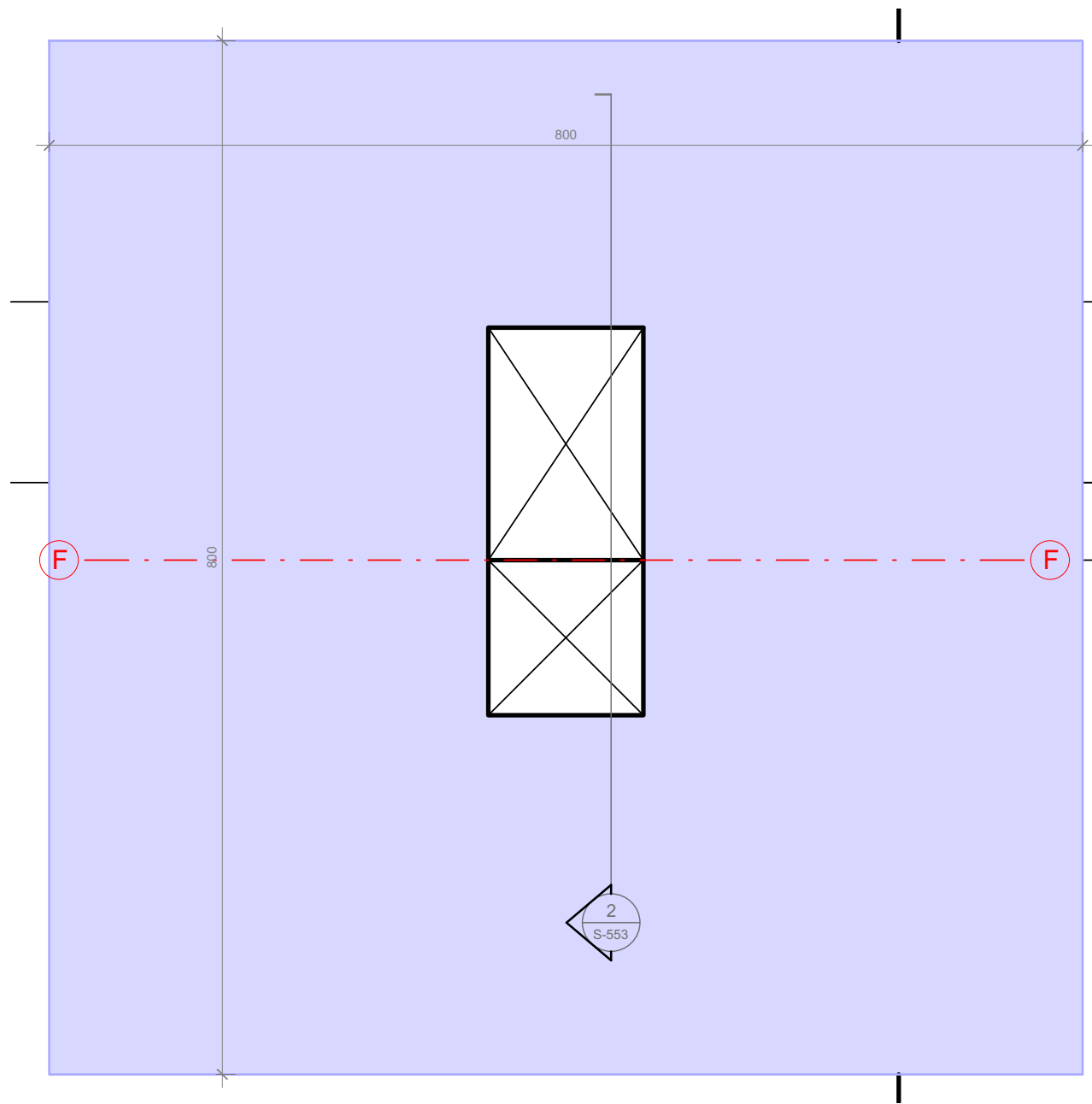


2
S-553

Section / foundation and wood base
Scale 1:5 ref. drawing: S-553



1:5

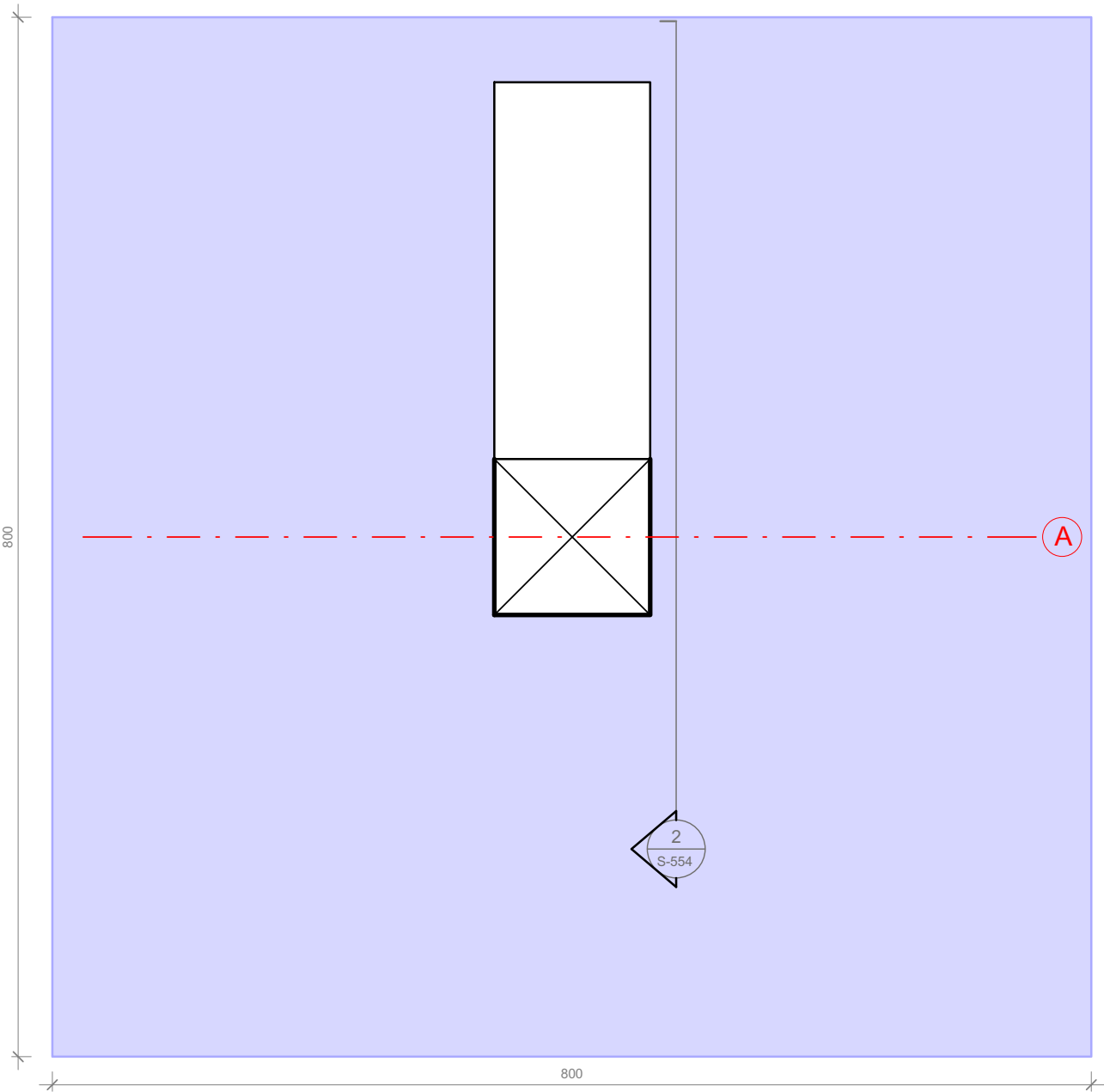
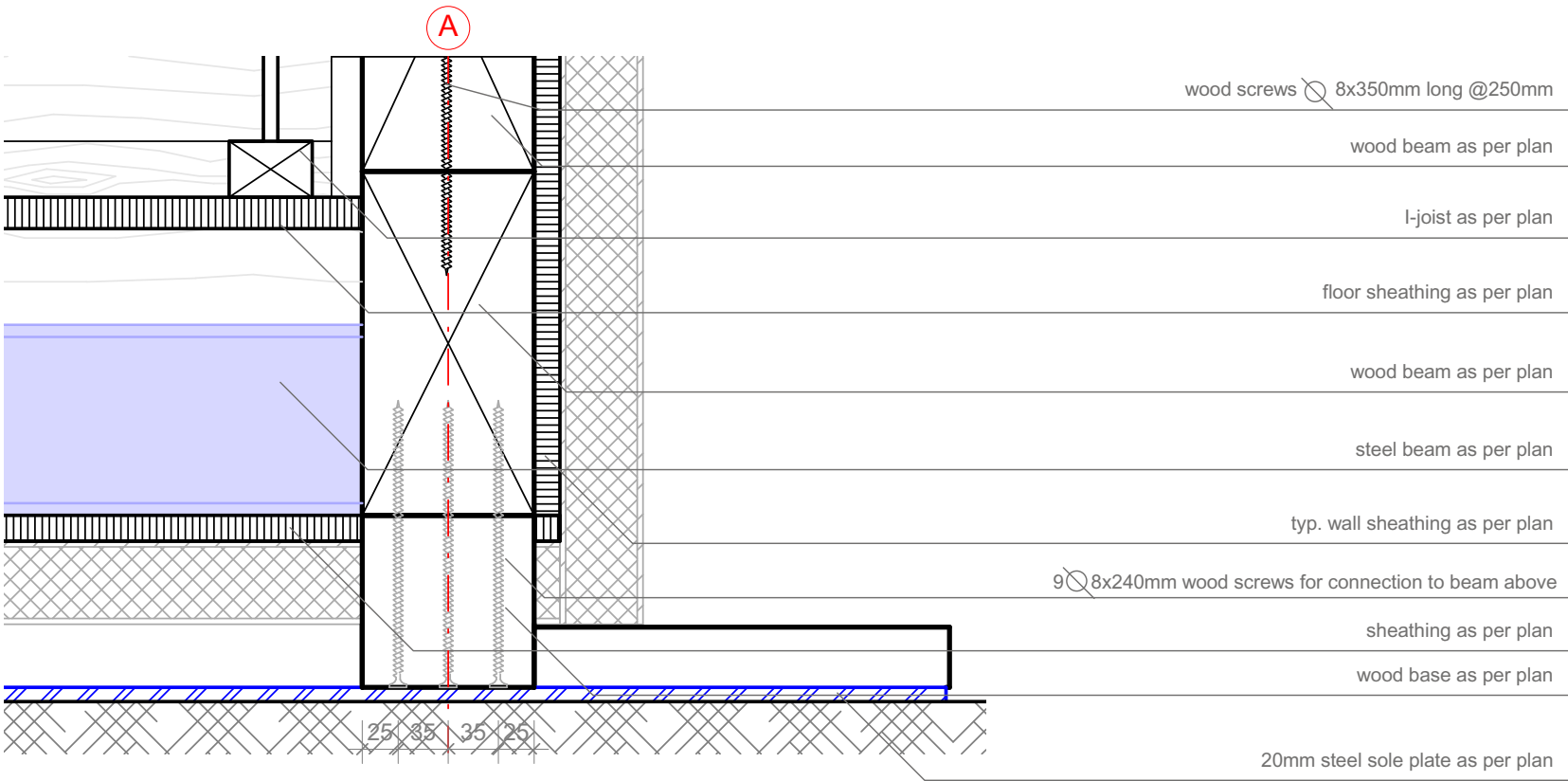


1
S-553

foundation and wood base
Scale 1:10 ref. drawing: S-206



Section / northern wood base
Scale 1:5 ref. drawing: S-554



northern wood base
Scale 1:10 ref. drawing: S-206

1:5



SOLAR DECATHLON

Projekt

SOLAR DECATHLON 2009
TEAM GERMANY

Bauherr

TECHNISCHE
UNIVERSITÄT
DARMSTADT

**FG Entwerfen und
Energieeffizientes Bauen**
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation

TRAGWERK
Jochen A. Stahl [Dipl.-Ing., P.Eng.]

Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn	AG (RR|CR)
Issued	04/25/09
Last index	05/11/09

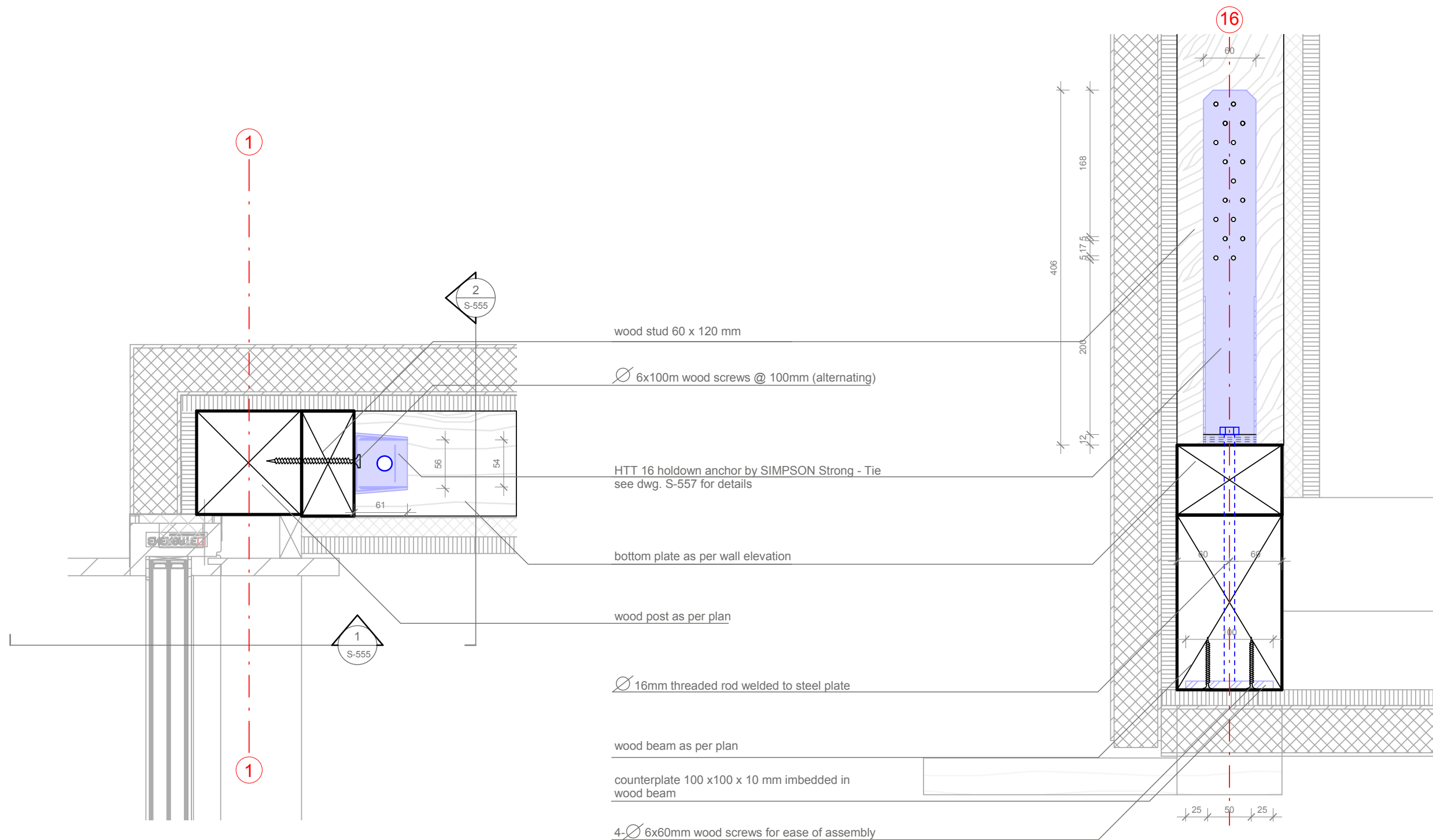
Component

Structural

Description

Northern Wood Base

Project #	Scale	dwg #
P140	1:10	S-554



detail / holdown anchor

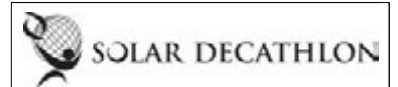
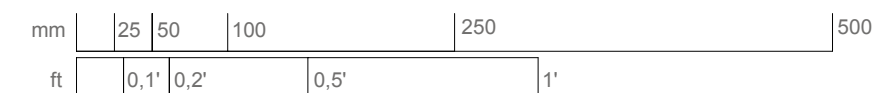
Scale 1:5 ref. drawing: S-205



section / holdown anchor

Scale 1:5 ref. drawing: S-205

1:5



Projekt



Bauherr



**FG Entwerfen und
Energieeffizientes Bauen**

El-Lissitzky-Str. 1

64287 Darmstadt

+49 (0) 6151 / 165448

+49 (0) 6151 / 165247

team@solardecathlon2009.de

Navigation



Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn RR (CRIMK)

Issued 04/25/09

Last index 05/11/09

Component

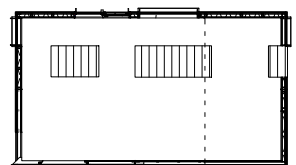
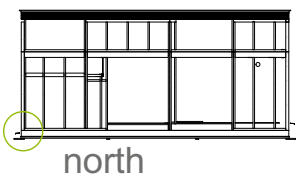
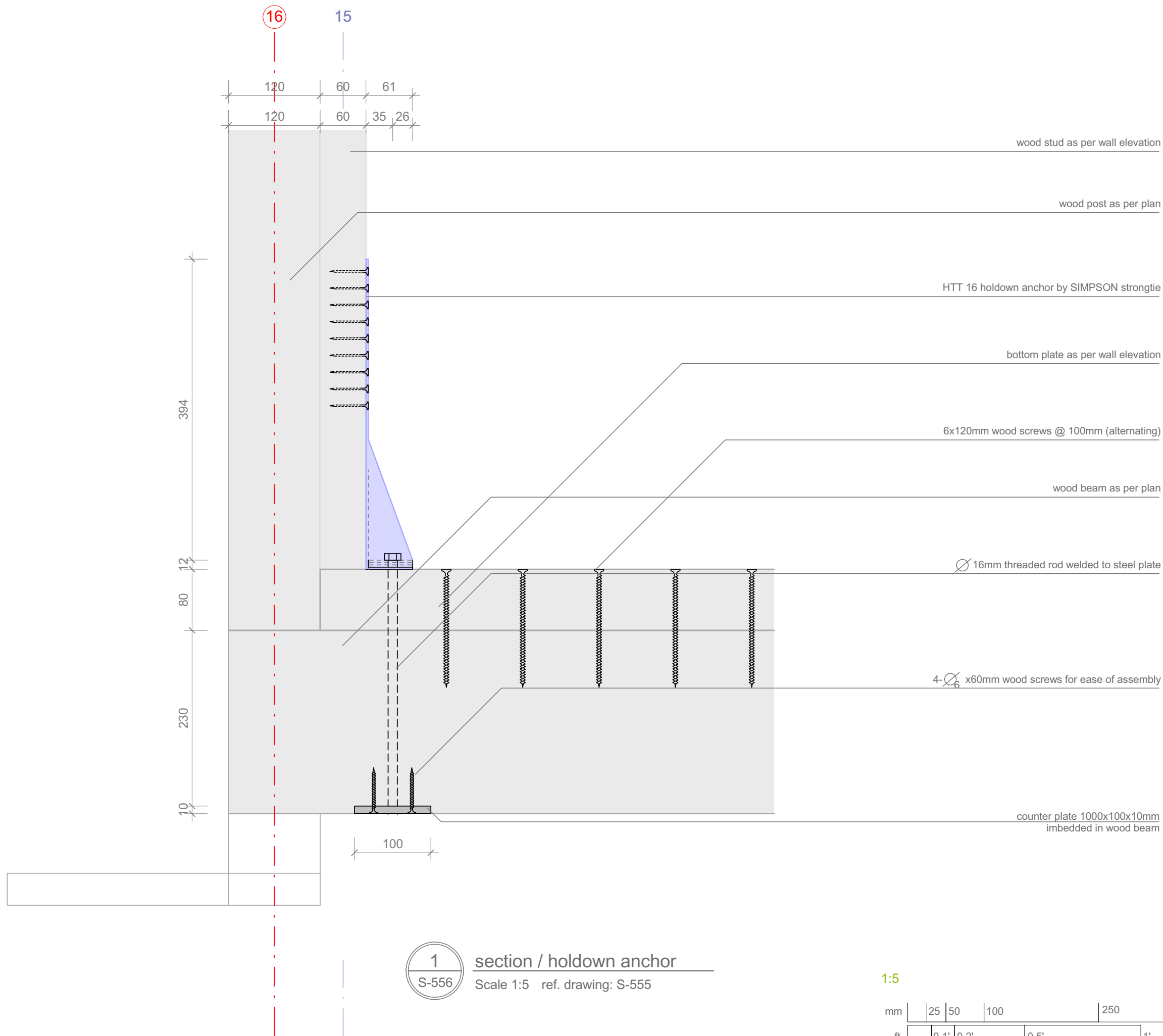
Structural

Description

**Holdown Anchor SE
Corner**

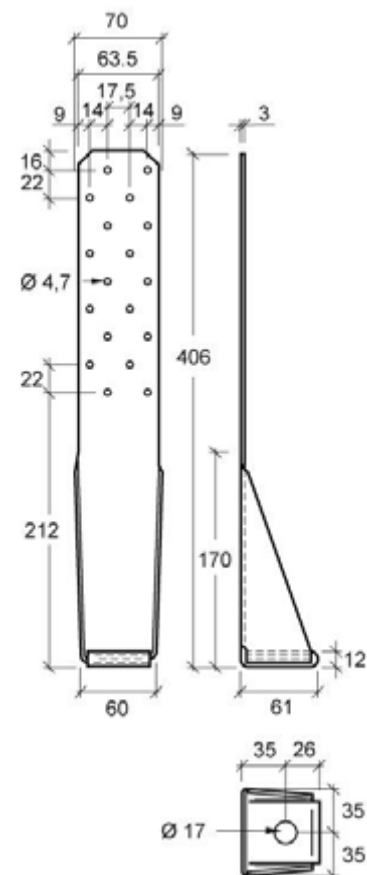
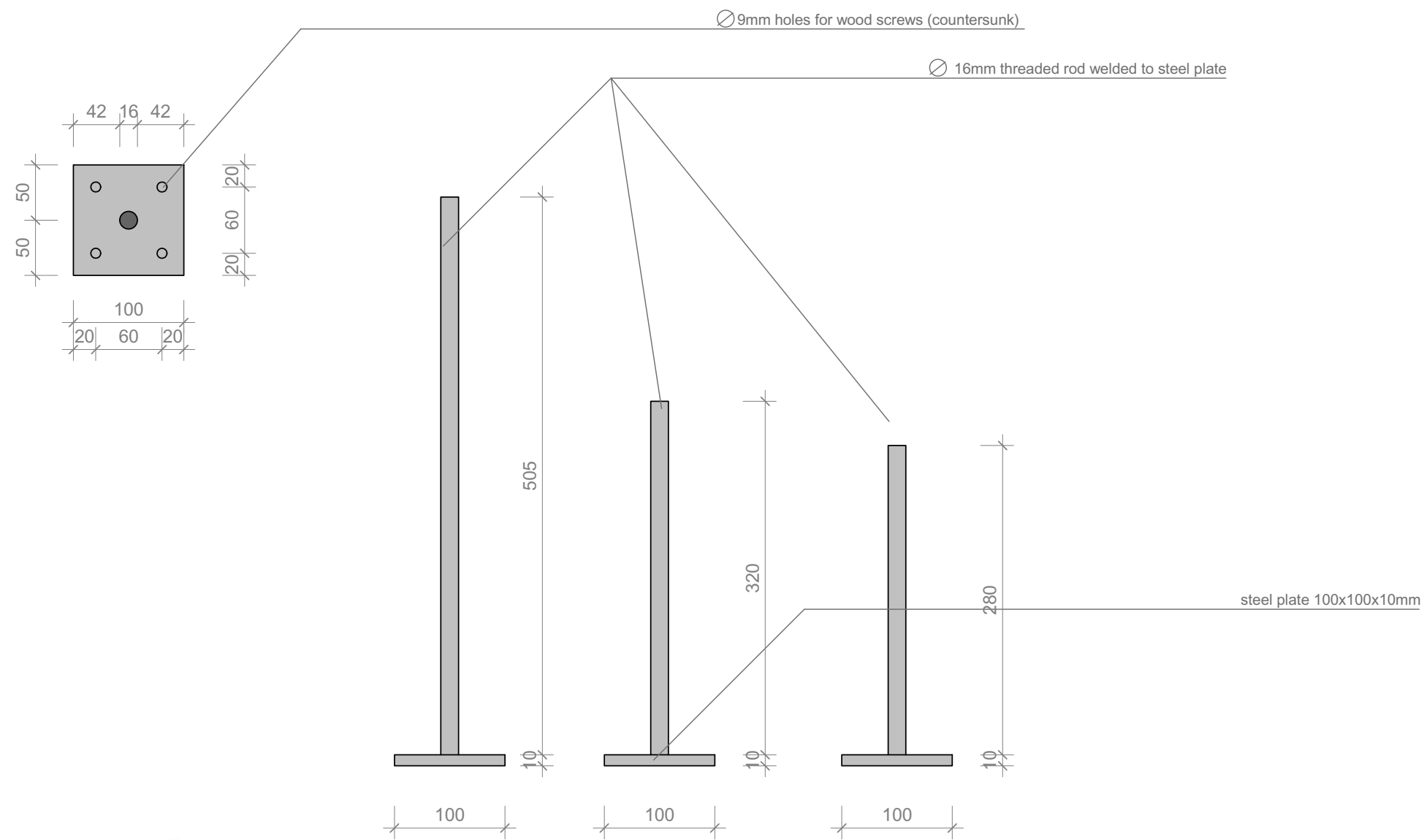
Project # Scale dwg #

P140 1 : 5 **S-555**



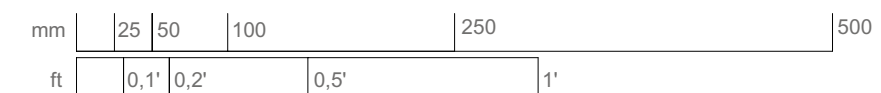
1:5





HTT16

1:5



SOLAR DECATHLON

Projekt

SOLAR DECATHLON 2009
TEAM GERMANY

Bauherr

TECHNISCHE
UNIVERSITÄT
DARMSTADT

**FG Entwerfen und
Energieeffizientes Bauen**
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation

Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn	agss
Issued	03/24/09
Last index	05/11/09

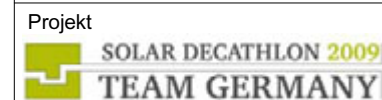
Component

Structural

Description

**Details Holdown
Anchor**

Project #	Scale	dwg #
P140	1:5	S-557



TECHNISCHE
UNIVERSITÄT
DARMSTADT

El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

A technical architectural drawing of a building section. It shows a multi-story structure with a sloped roof on the right side. A green circle highlights a detail on the ground floor level, likely related to the 'Gründungsplatte' (foundation slab) mentioned in the text.



Last index	05/11/09
------------	----------

Structural

Wall to Floor Connection (West)

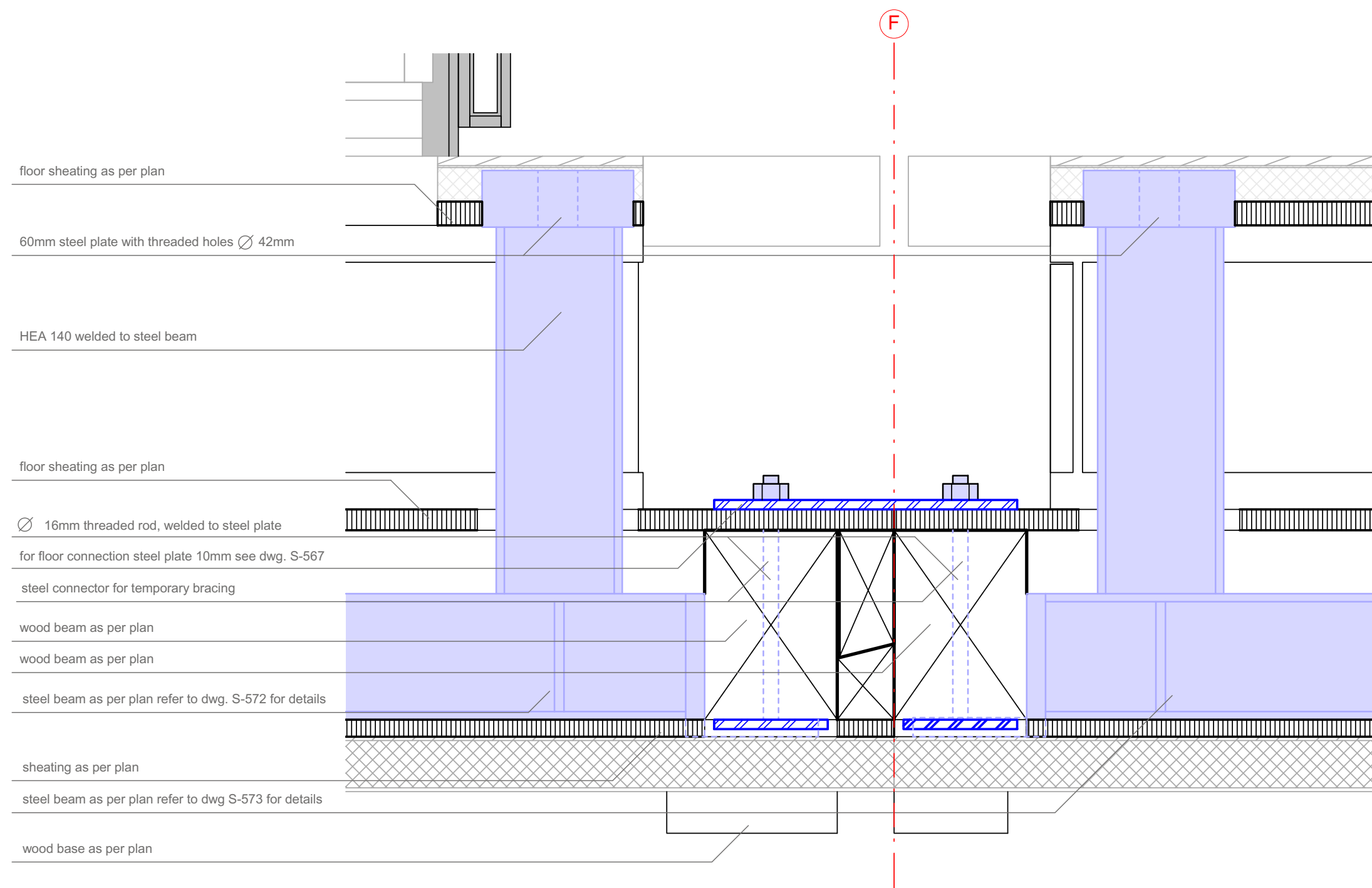
P140 1:5 **S-561**

wood base as per plan



Scale 1:5 ref. drawing: S-205

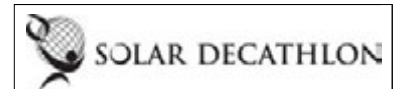
mm	25	50	100	250	500
ft	0,1'	0,2'	0,5'	1'	



section / platform connection @ split of Building

Scale 1:5 ref. drawing: S-205

1:5



Projekt



Bauherr



**FG Entwerfen und
Energieeffizientes Bauen**

El-Lissitzky-Str. 1

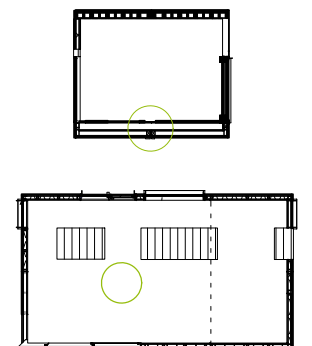
64287 Darmstadt

+49 (0) 6151 / 165448

+49 (0) 6151 / 165247

team@solardecathlon2009.de

Navigation



Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn AO(RR|CR|MK)

Issued 04/25/09

Last index 05/11/09

Component

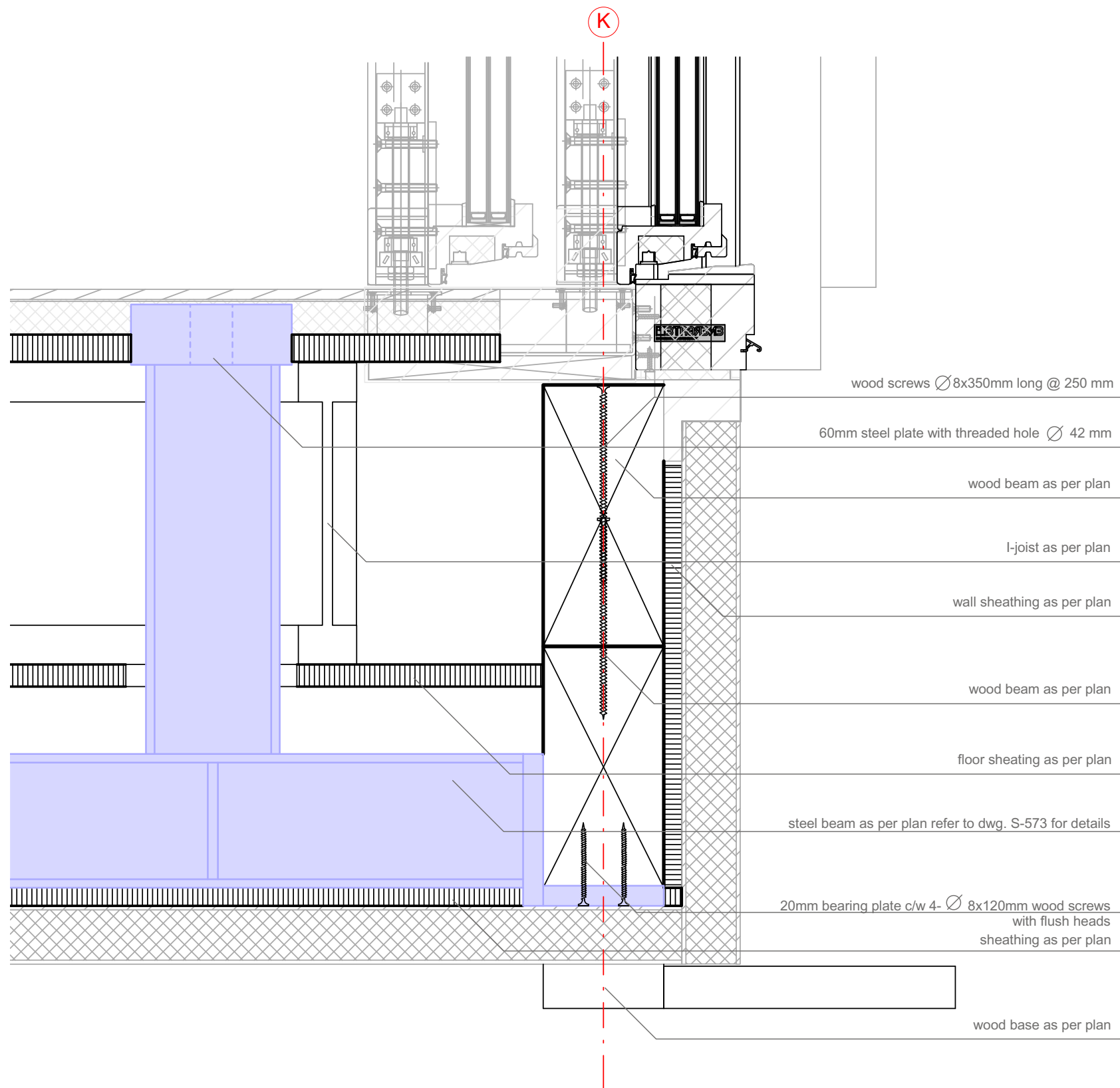
Structural

Description

**Section / Platform
Connection**

Project # Scale dwg #

P140 1:5 **S-562**

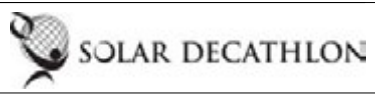



1
S-563


Section / connection of steel beam to wall (South, GL 6)
Scale 1:5

1:5



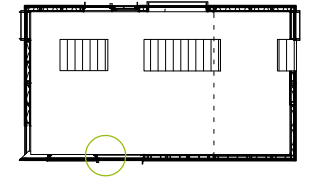
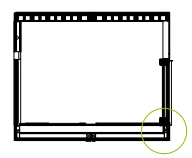



Projekt
 TEAM GERMANY

Bauherr
 TECHNISCHE UNIVERSITÄT DARMSTADT

FG Entwerfen und Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation





Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

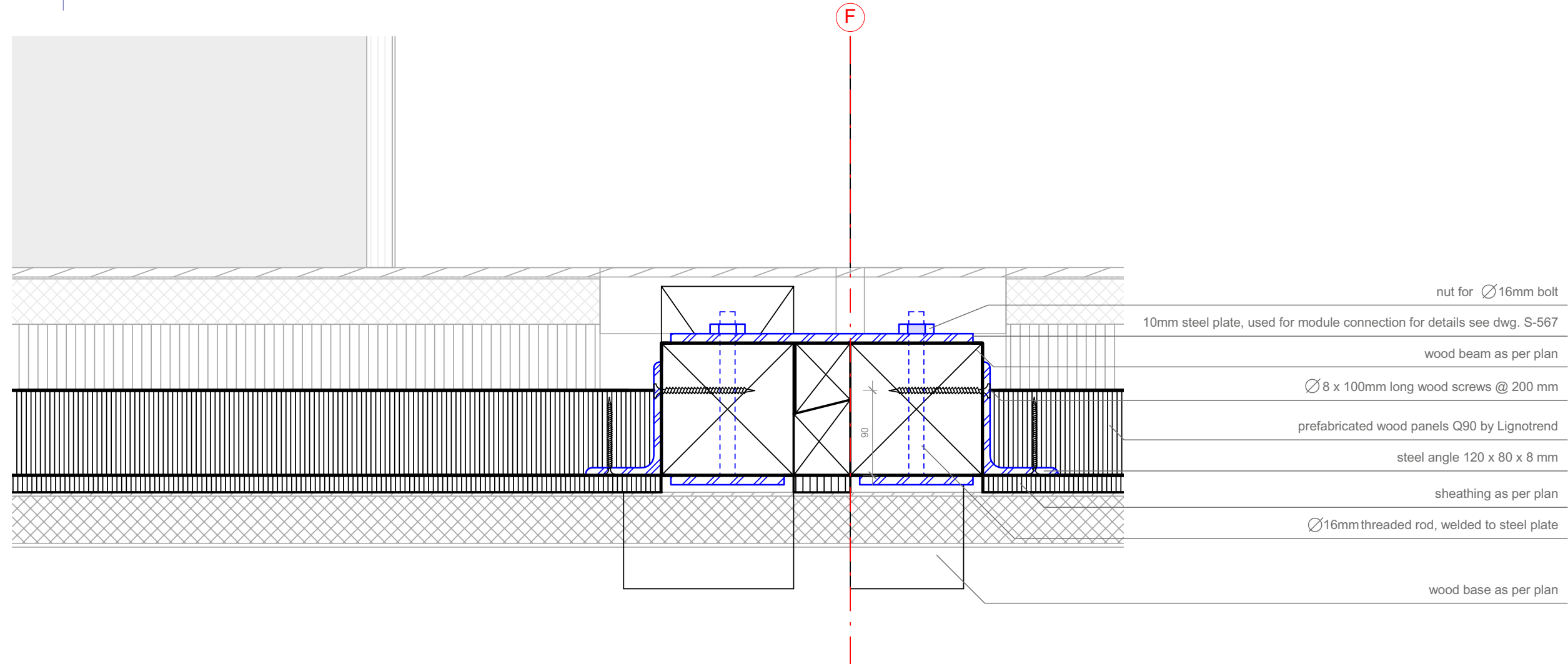
Drawn	AO(RR|CR|MK)
Issued	04/25/09
Last index	05/11/09

Component
Structural

Description
Connection of Steel Beam to Wall

Project #	Scale	dwg #
P140	1:5	S-563

D



1
S-564

Section / platform module connection
Scale 1:5 ref. drawing: S-205

1:5

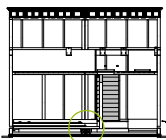


Projekt
SOLAR DECATHLON 2009
TEAM GERMANY

Bauherr
TECHNISCHE
UNIVERSITÄT
DARMSTADT

FG Entwerfen und
Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation



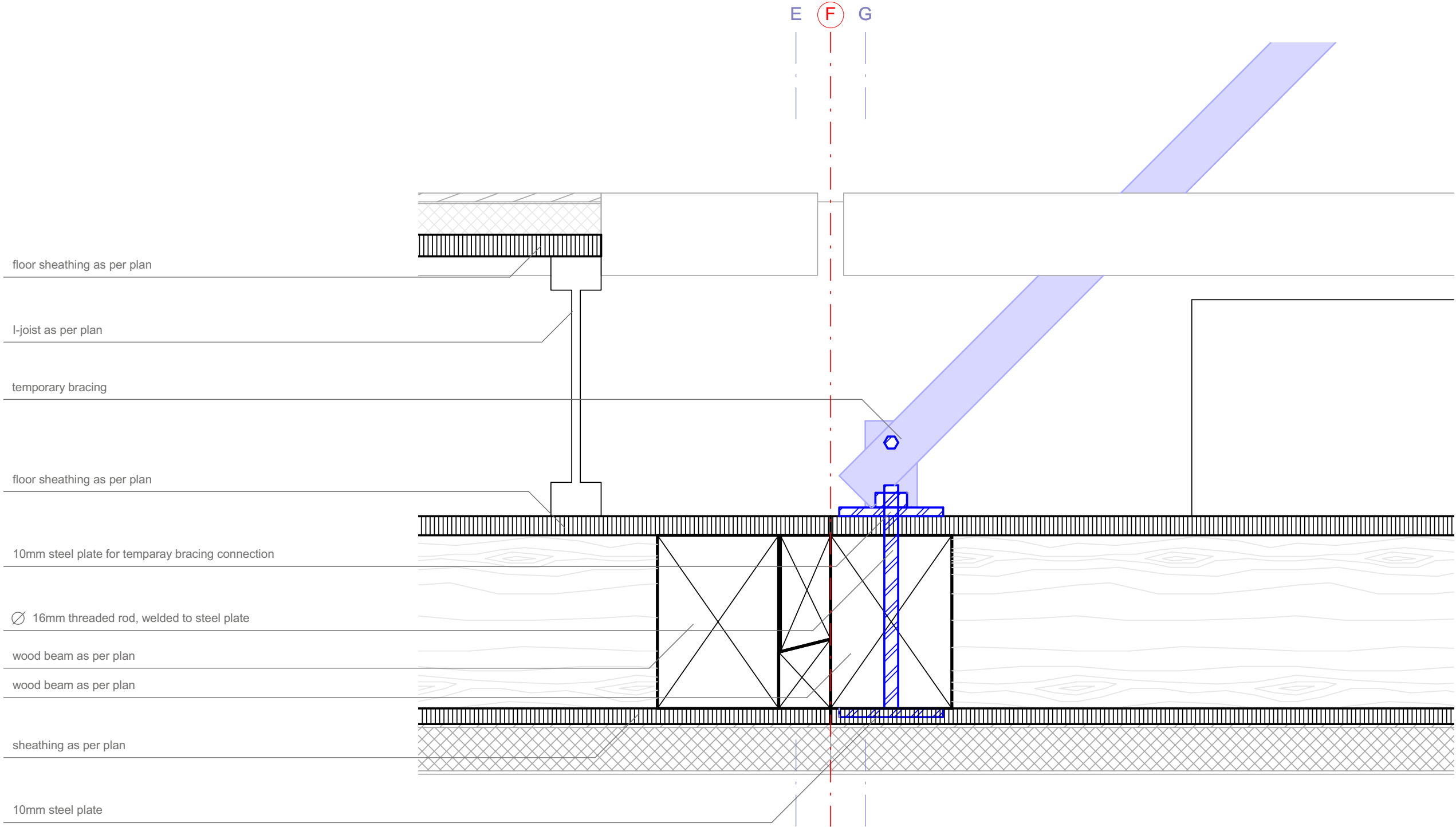
Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn AG(RR|CR|MK)
Issued 04/25/09
Last index 05/11/09

Component
Structural

Description
Platform Module
Connection

Project # Scale dwg #
P140 1:5 S-564



1
S-565

Section / temporary bracing @ platform connection

Scale 1:5 ref. drawing: S-205

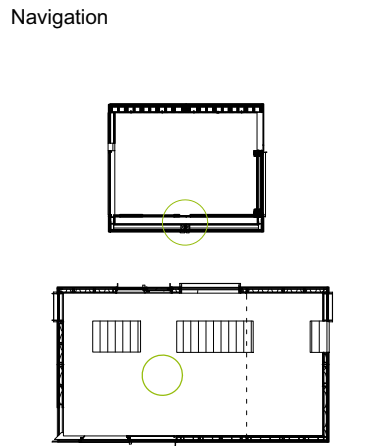
1:5



Projekt
SOLAR DECATHLON 2009
TEAM GERMANY

Bauherr
TECHNISCHE
UNIVERSITÄT
DARMSTADT

FG Entwerfen und
Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de



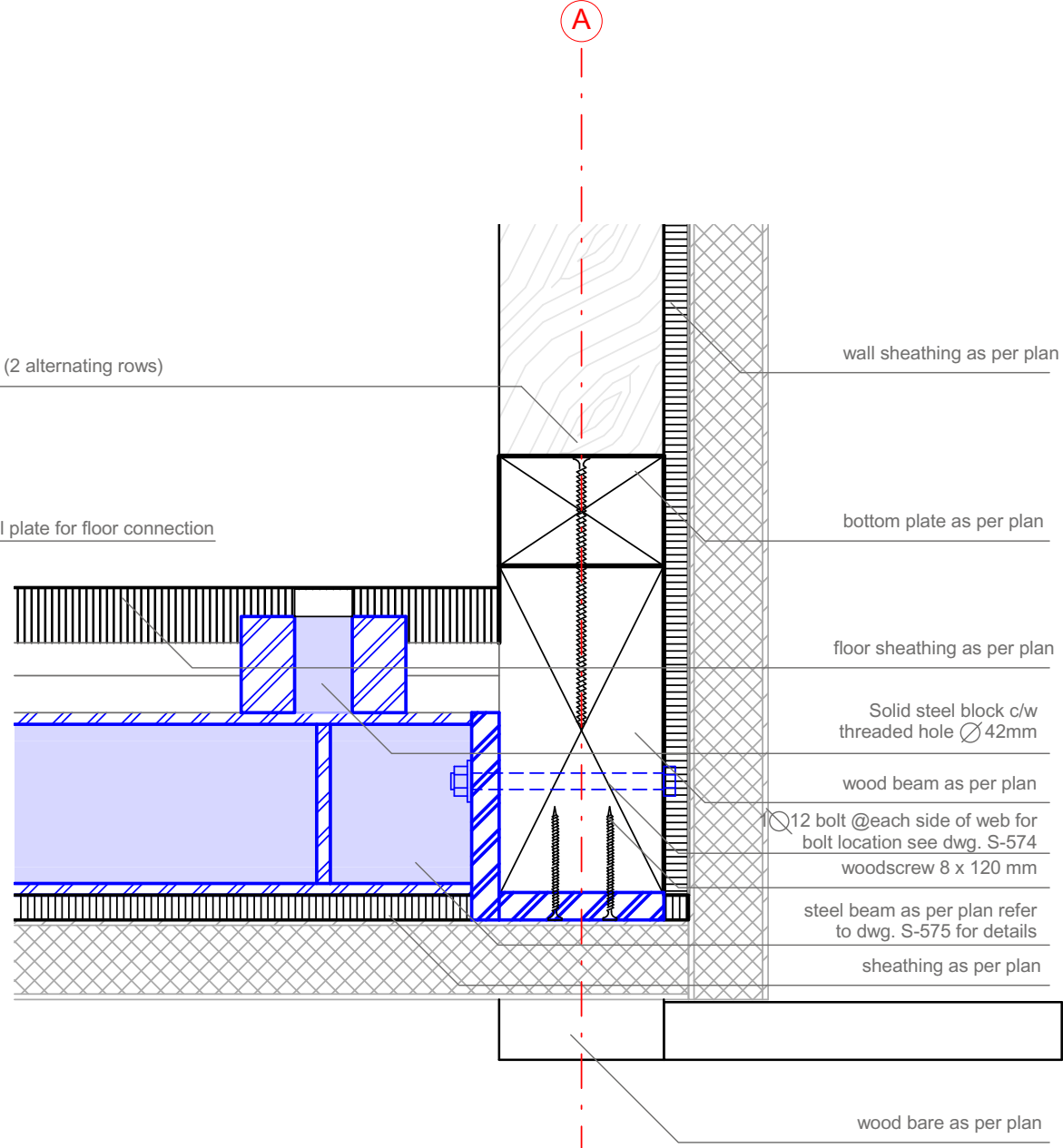
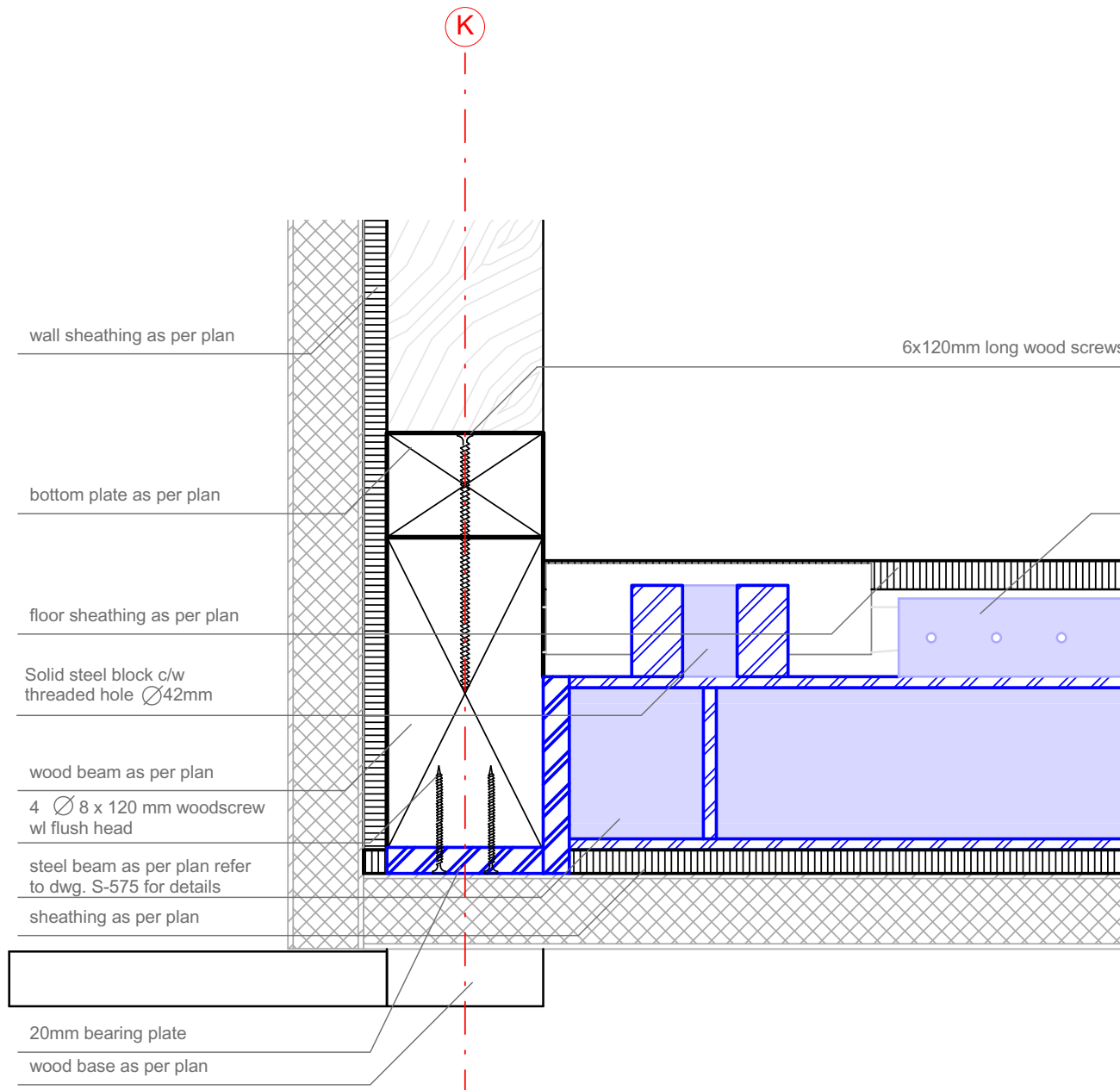
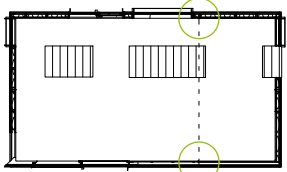
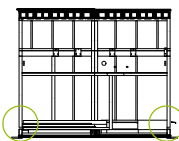
Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn AO(RR|CR|MK)
Issued 04/25/09
Last index 05/11/09

Component
Structural

Description
Temp. Bracing @
Platform Connection

Project # Scale dwg #
P140 1:5 S-565

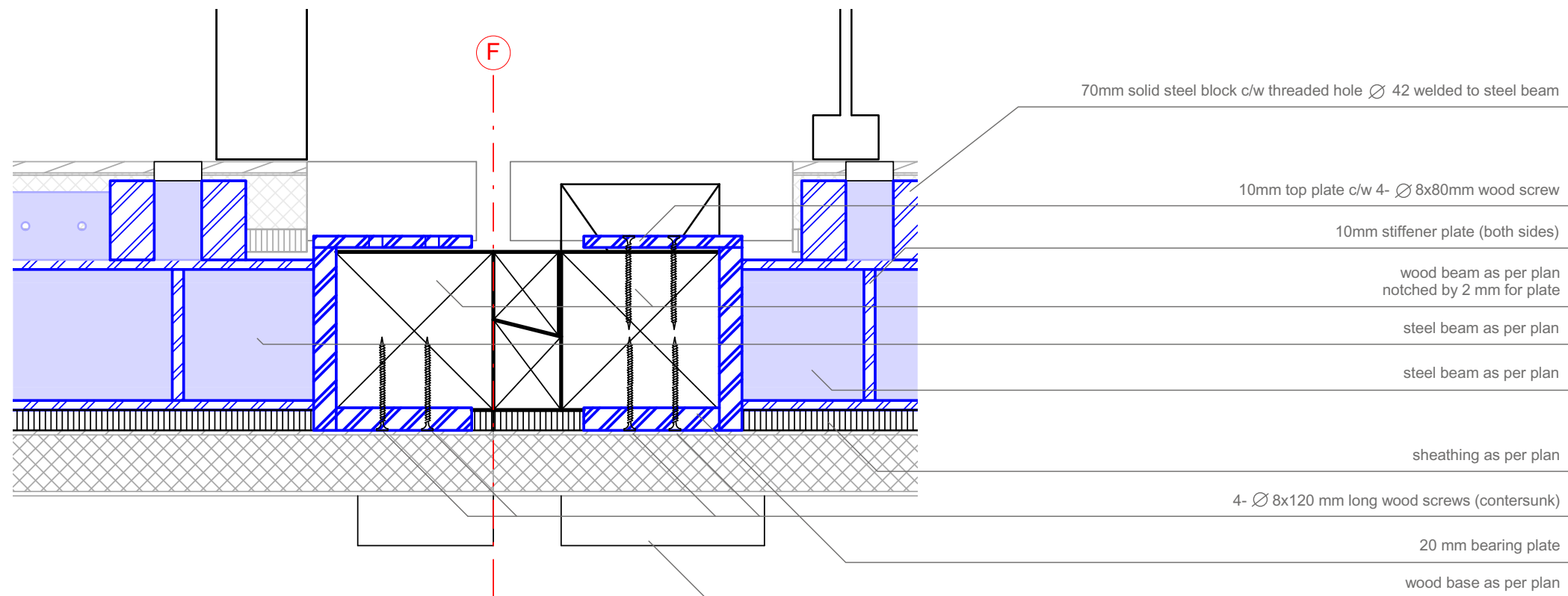


1 section / connection of steel beam to wall (South, GL 11)
 S-566 Scale 1:5 ref. drawing: S-205

2 section / connection of steel beam to wall (North, GL 11)
 S-566 Scale 1:5 ref. drawing: S-205

1:5





2
S-567

section

Scale 1:5 ref. drawing: S-567

steel beam as per plan refer to dwg. S-574 for details

wood beam as per plan

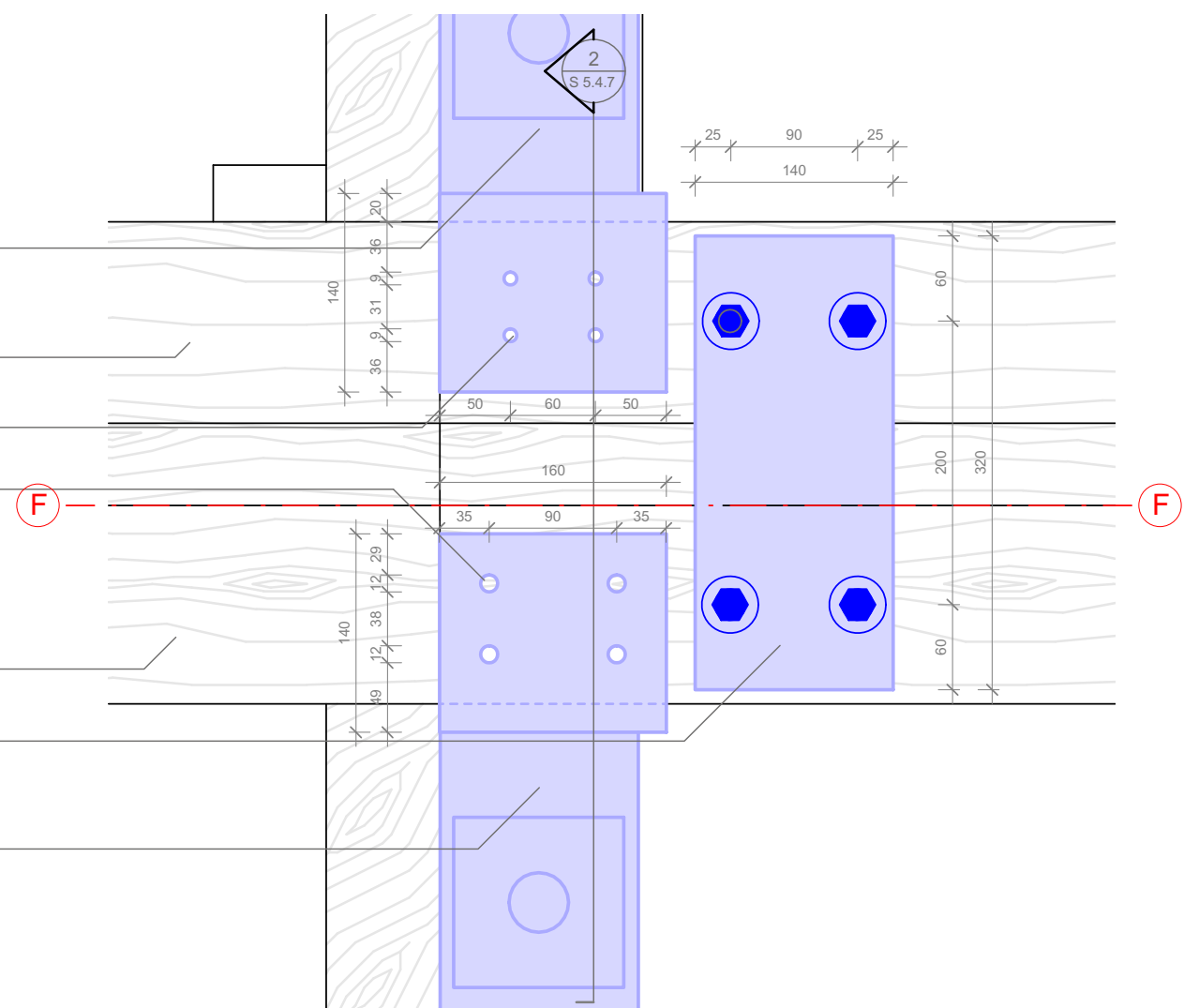
holes d = 9 mm (4x) for countersunk screws

threaded holes Ø 12 mm for temporary steel post

wood beam as per plan

10mm steel plate for floor module connection c/w Ø16mm threaded rod welded to steel plate below

steel beam as per plan refer to dwg. S-575 for details



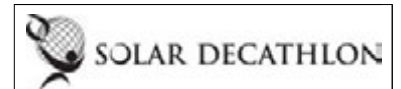
1:5



1
S-567

detail / platform connection @split of building GL 11

Scale 1:5 ref. drawing: S-205



Projekt



Bauherr



**FG Entwerfen und
Energieeffizientes Bauen**

El-Lissitzky-Str. 1

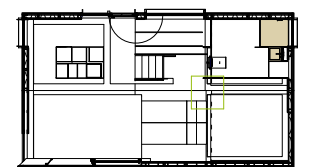
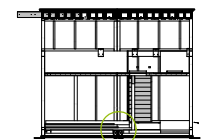
64287 Darmstadt

+49 (0) 6151 / 165448

+49 (0) 6151 / 165247

team@solardecathlon2009.de

Navigation



Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn AO|RR (CR)

Issued 04/25/09

Last index 05/11/09

Component

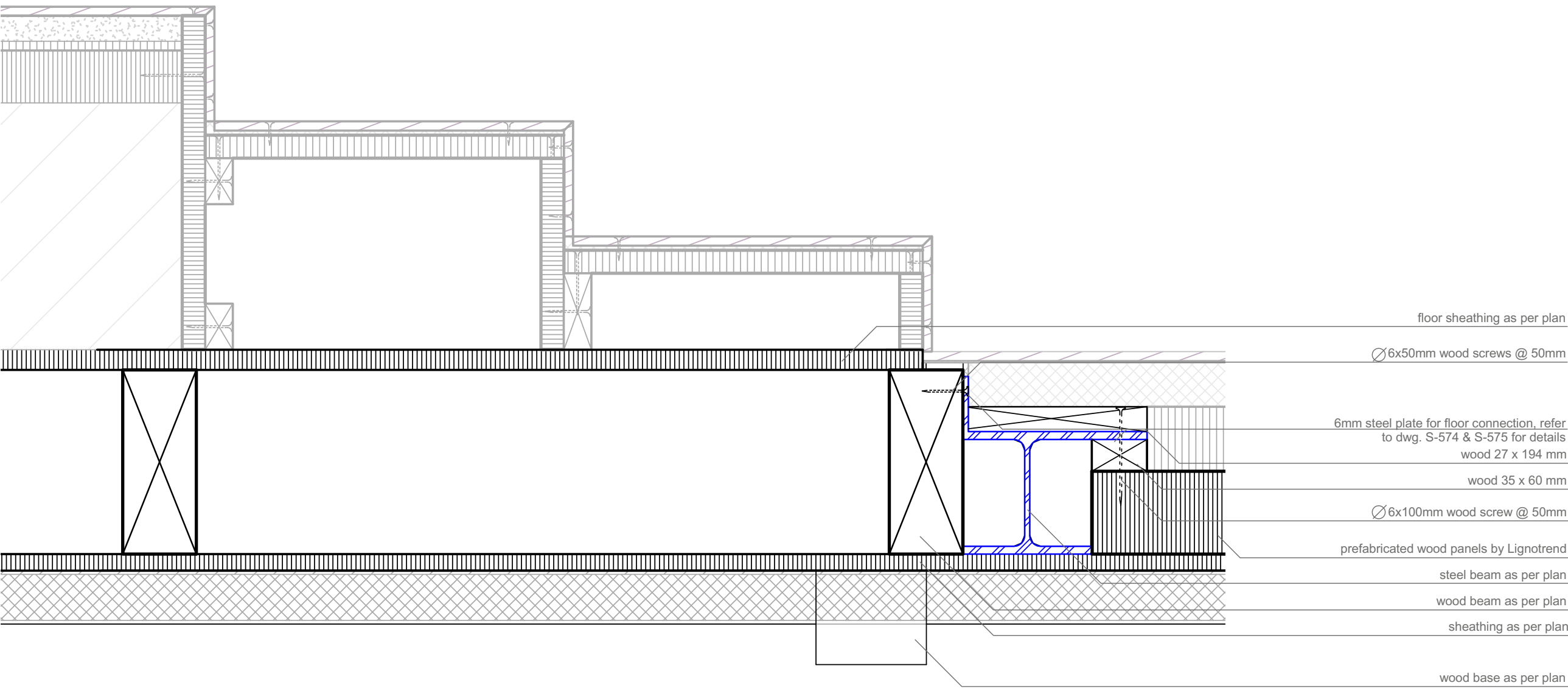
Structural

Description

**Detail / Platform
Connection GL 11**

Project # Scale dwg #

P140 1:5 **S-567**



1 section / steel beam @ stairs
S-568 Scale 1:5 ref. drawing: S-205

1:5

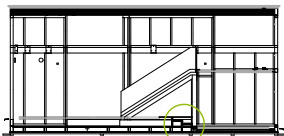


Projekt
SOLAR DECATHLON 2009
TEAM GERMANY

Bauherr
TECHNISCHE
UNIVERSITÄT
DARMSTADT

FG Entwerfen und
Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation



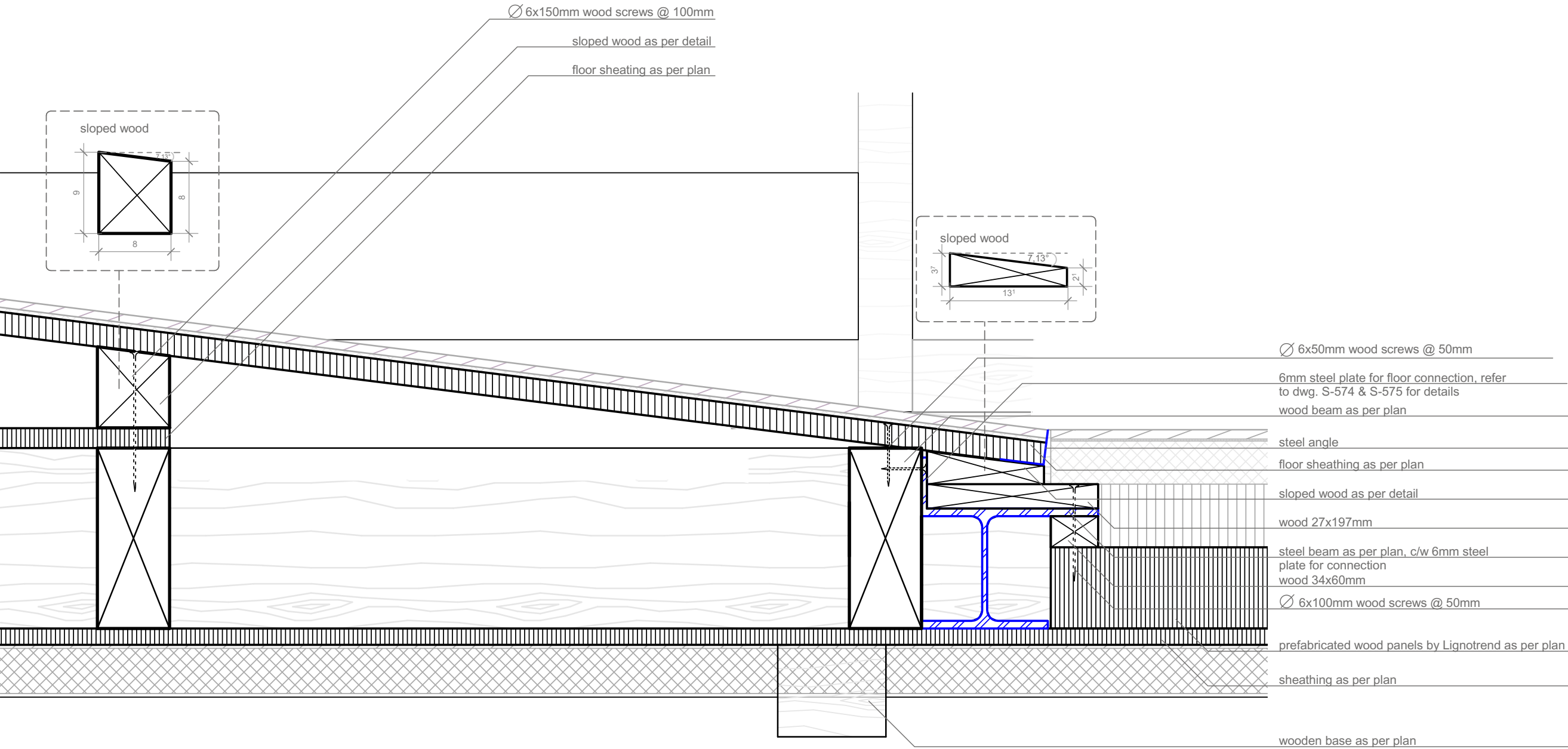
Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn AG(RR|CR|MK)
Issued 04/25/09
Last index 05/11/09

Component
Structural

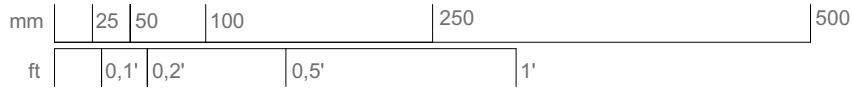
Description
Section / Steel Beam
@ Stairs

Project # Scale dwg #
P140 1:5 S-568

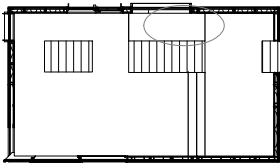


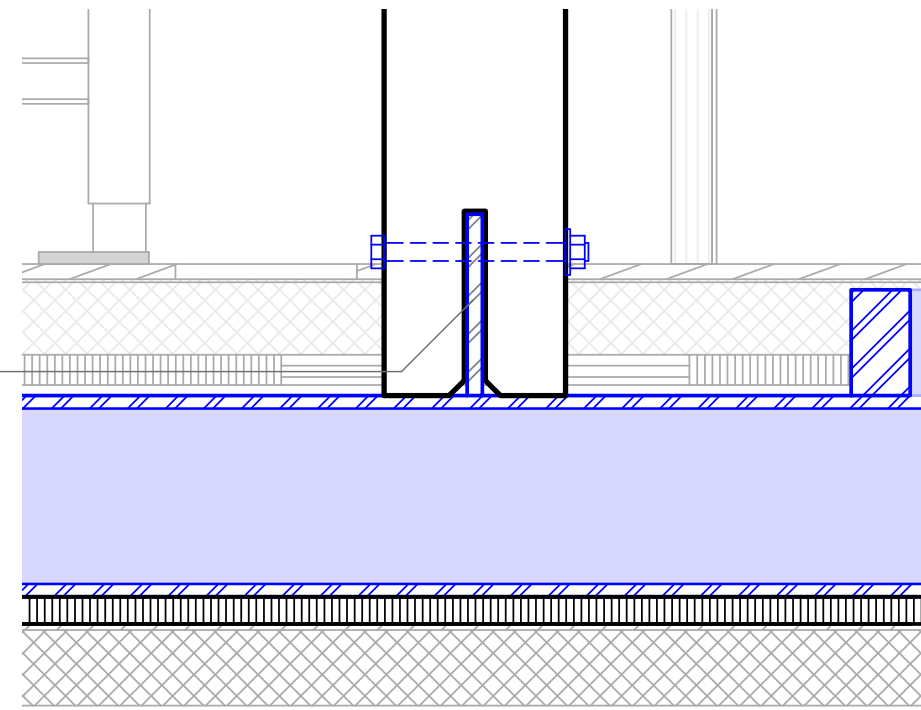
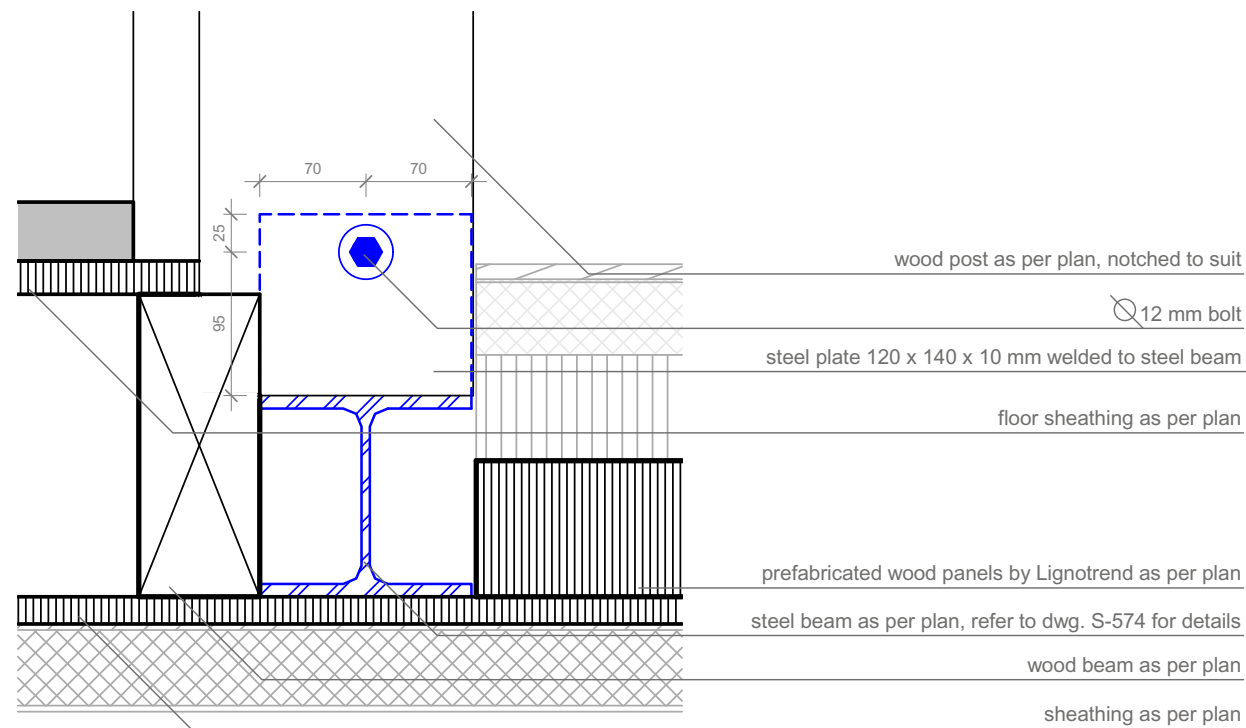
1 steel beam @ ramp
S-569 Scale 1:5 ref. drawing: S-205

1:5



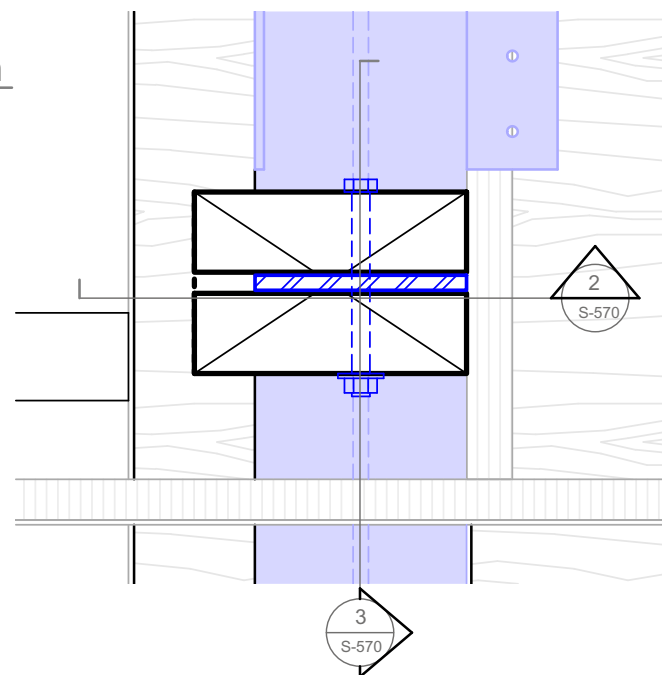
Navigation





2
S-570

Section / post to steel beam connection
Scale 1:5 ref. drawing: S-570



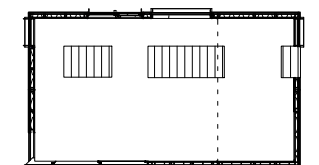
3
S-570

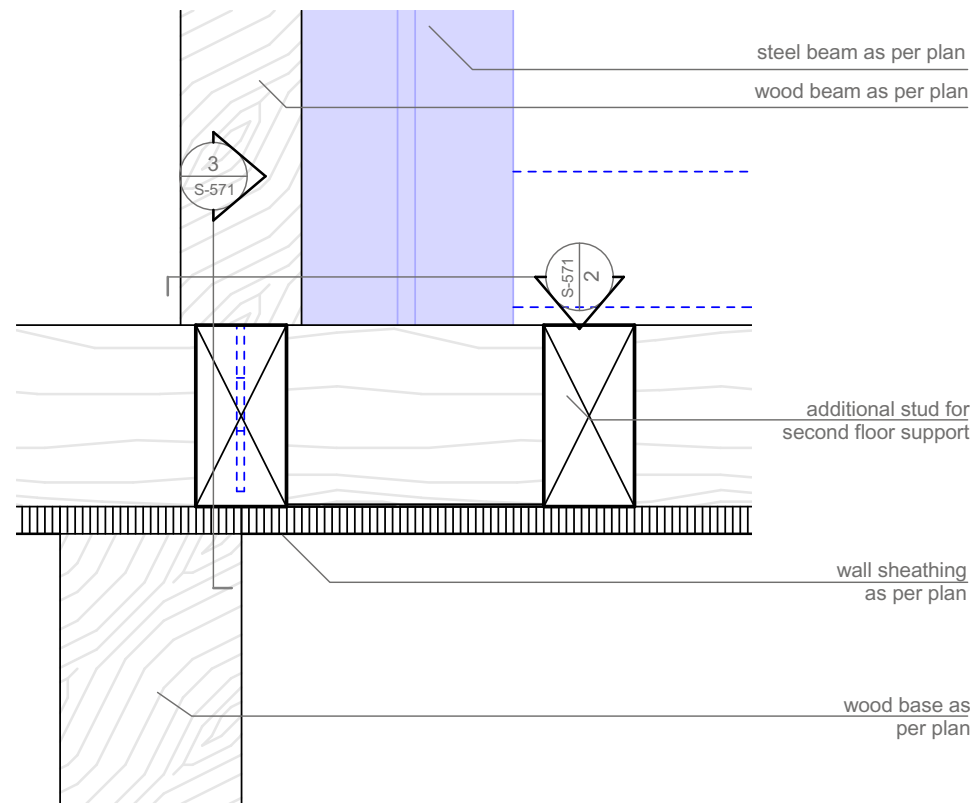
Section / post to steel beam connection
Scale 1:5 ref. drawing: S-570

1
S-570

detail / post to steel beam connection
Scale 1:5 ref. drawing: S-205

1:5





typ. stud wall as per plan

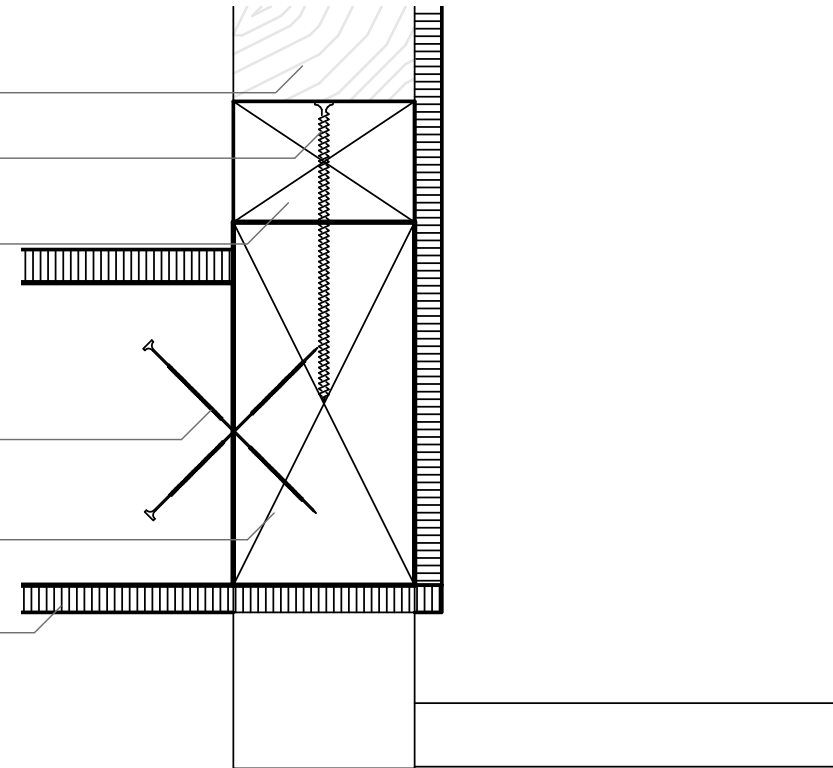
6x120mm wood screws @100mm
(alternating)

bottom plate as per wall elevation

1 pair of double-threaded wood screws
SFS WT-T-8,2x245mm

wood beam as per plan

sheathing as per plan

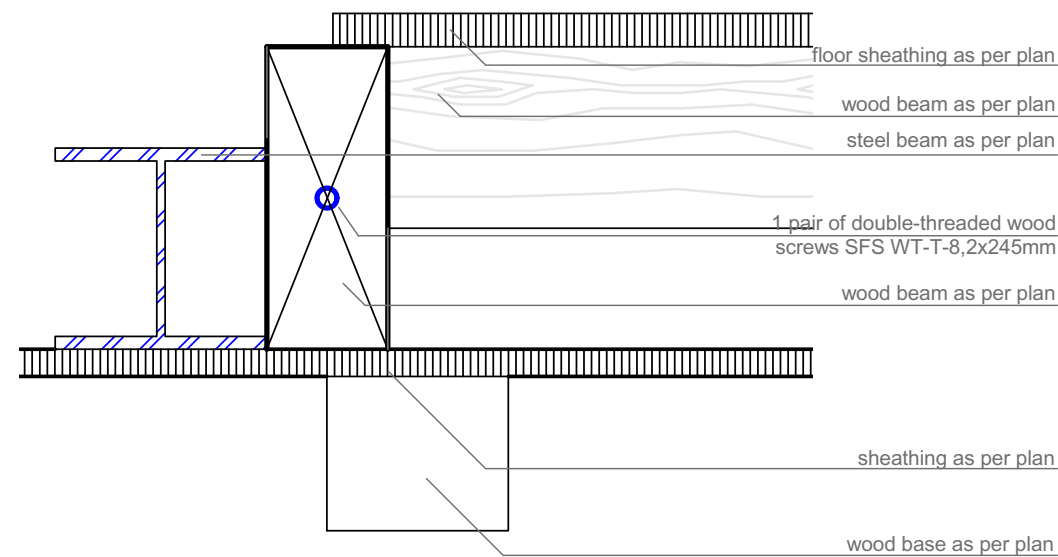


1
S-571

detail / platform beam connection
Scale 1:5 ref. drawing: S-205

3
S-571

section / platform beam connection
Scale 1:5 ref. drawing: S-571



2
S-571

section / platform beam connection
Scale 1:5 ref. drawing: S-571

1:5



Projekt
TEAM GERMANY

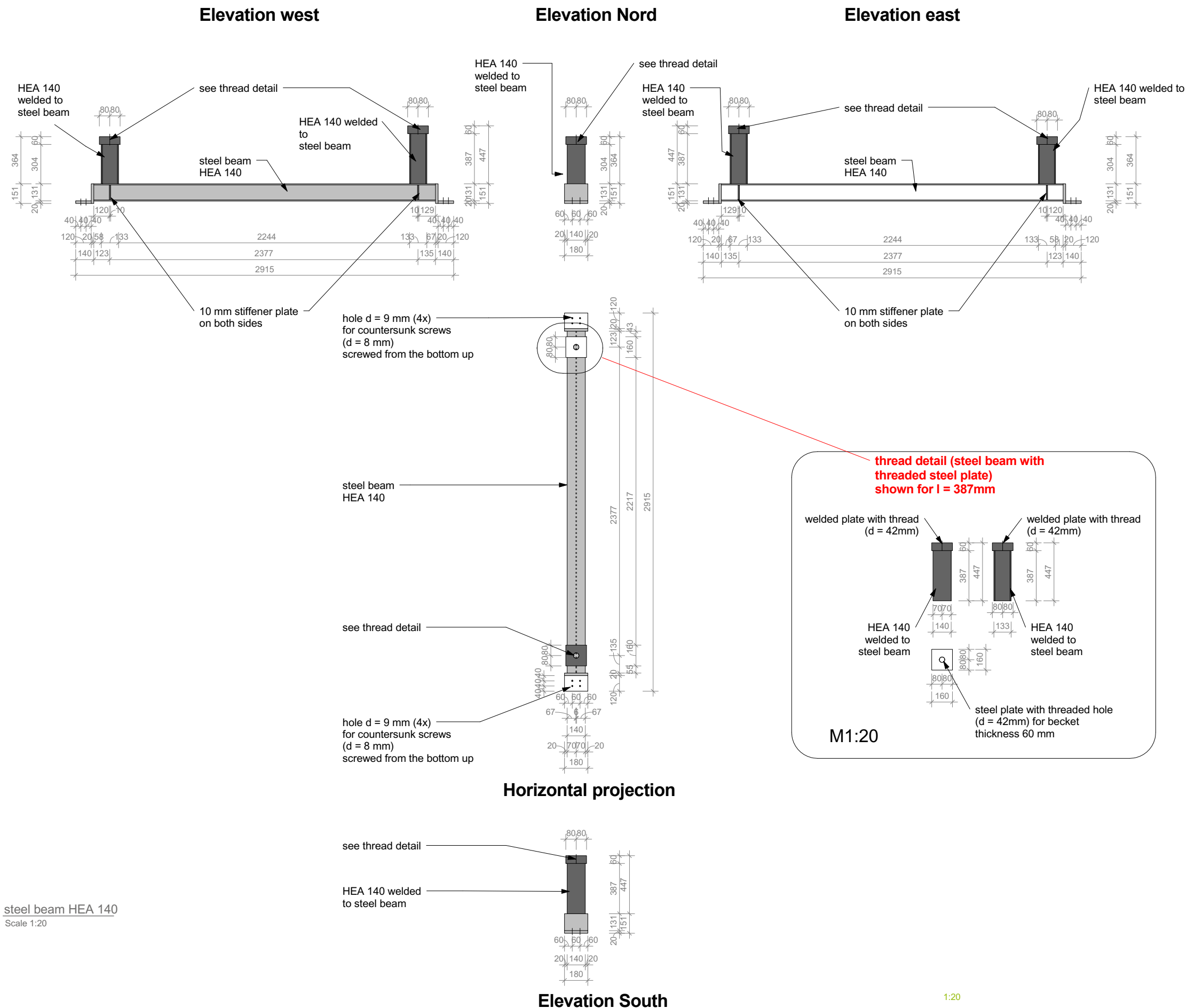
Bauherr
TECHNISCHE UNIVERSITÄT DARMSTADT

FG Entwerfen und Energieeffizientes Bauen
 El-Lissitzky-Str. 1
 64287 Darmstadt
 +49 (0) 6151 / 165448
 +49 (0) 6151 / 165247
 team@solardecathlon2009.de

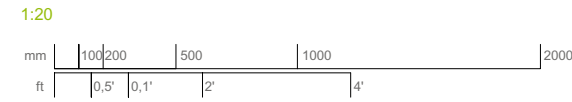
Navigation

Frankfurter Straße 15
 64331 Weiterstadt
 T +49 (0)6150 / 59 14 92
 F +49 (0)6150 / 59 14 93
 info@tragwerkplus.de
 www.tragwerkplus.de

Drawn	CR|RR|MK
Issued	04/25/09
Last index	05/11/09
Component	Structural
Description	Platform Beam Connection
Project #	P140
Scale	1 : 5
dwg #	S-571



1 steel beam HEA 140
S-572 Scale 1:20



Projekt

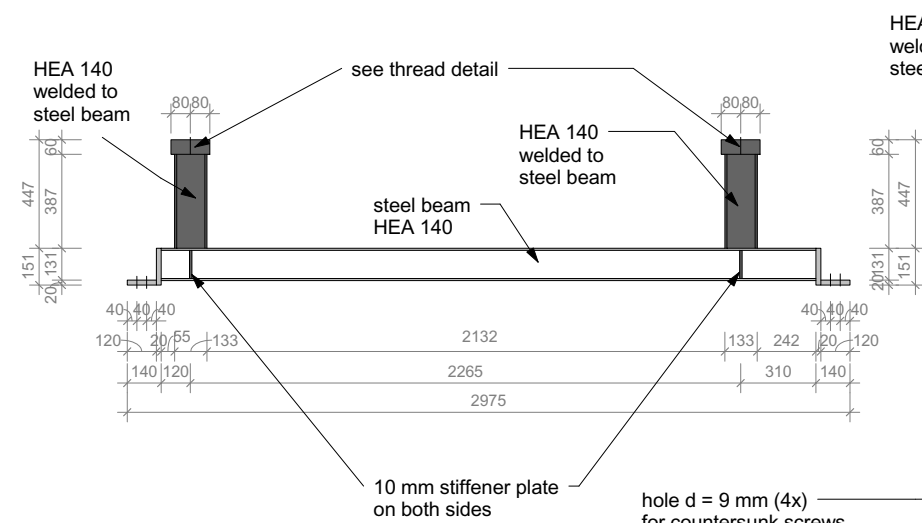
Bauherr

FG Entwerfen und Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de
Navigation

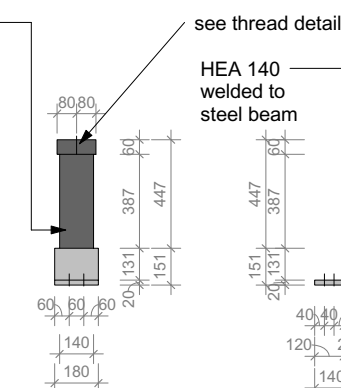
Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn	AO (RR|CR)	
Issued	04/25/09	
Letzter Index	05/11/09	
Component	Structural	
Description	HEA 1	
Project #	Scale	dwg #
P140	1:20	S-572

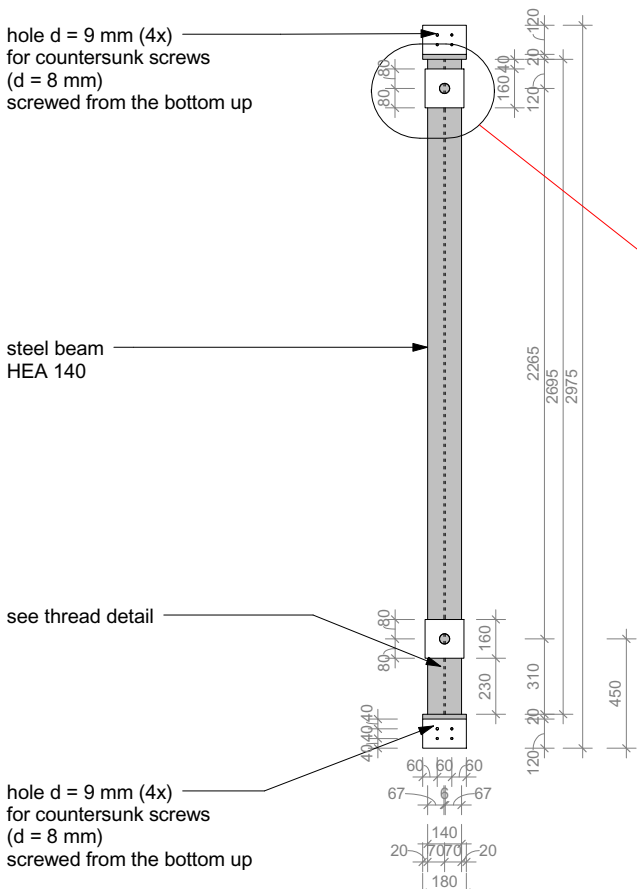
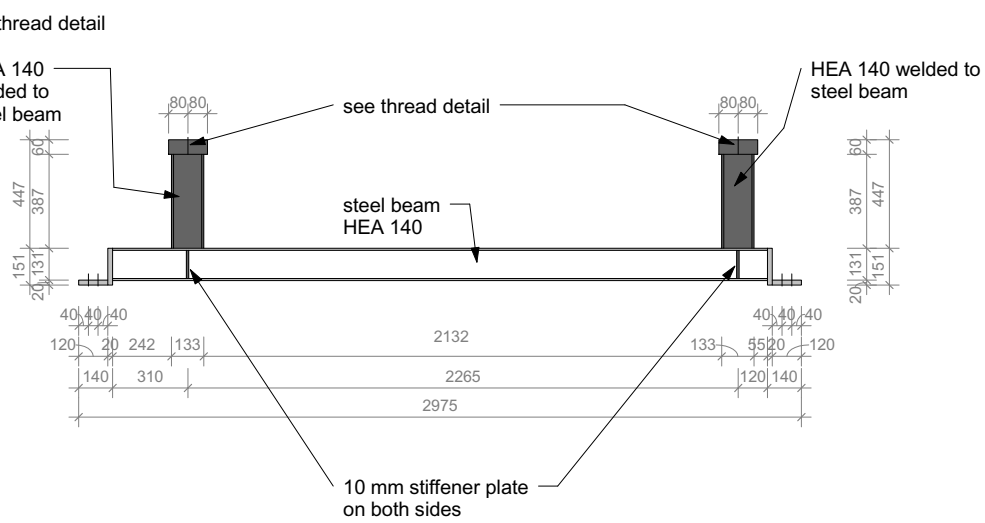
Elevation west



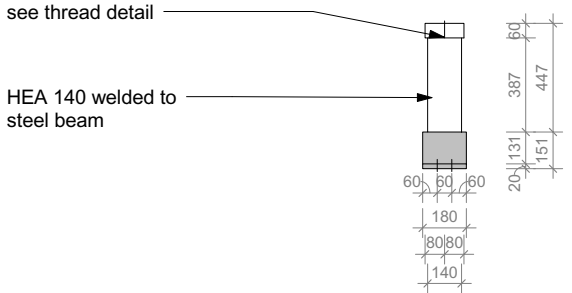
Elevation Nord



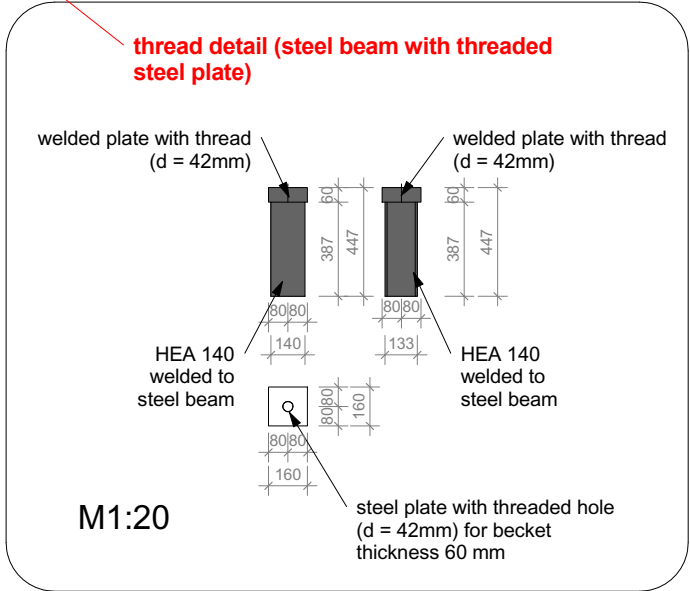
Elevation east



Horizontal projection

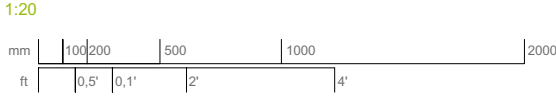


Elevation South



M1:20

1 steel beam HEA 140
S-573 Scale 1:20



Projekt
SOLAR DECATHLON 2009
TEAM GERMANY

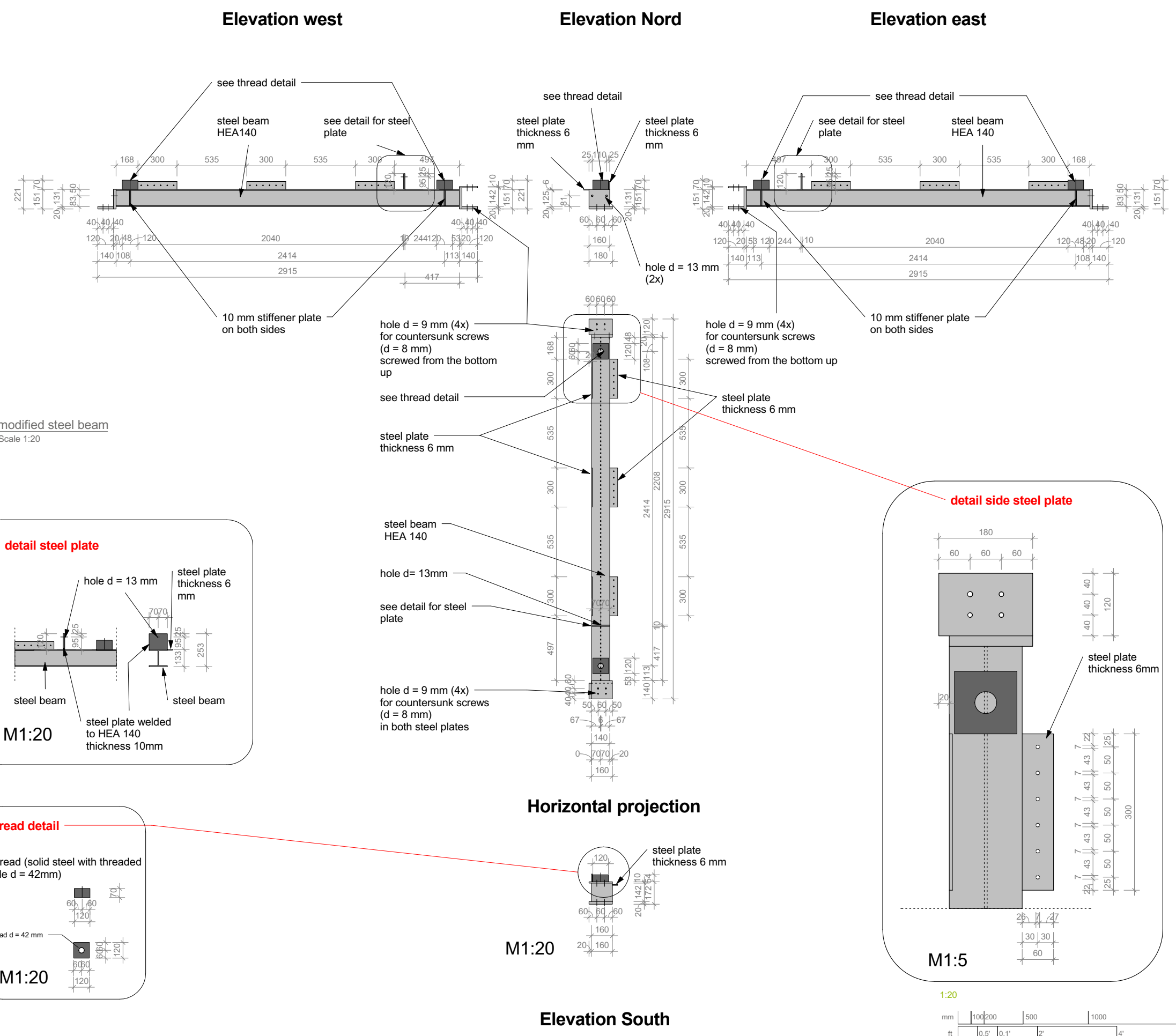
Bauherr
TECHNISCHE UNIVERSITÄT DARMSTADT

FG Entwerfen und Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

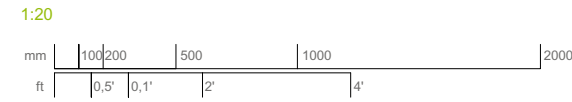
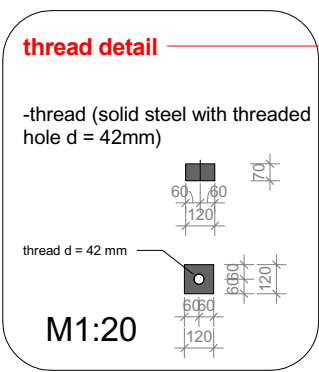
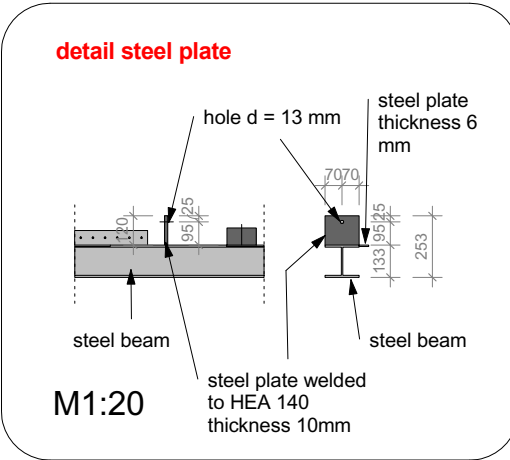
Navigation

Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn	AO (RR|CR)
Issued	04/25/09
Letzter Index	05/11/09
Component	Structural
Description	HEA 2
Project #	P140
Scale	1:20
dwg #	S-573



1 modified steel beam
S-574 Scale 1:20



Projekt
SOLAR DECATHLON 2009
TEAM GERMANY

Bauherr
TECHNISCHE UNIVERSITÄT DARMSTADT

FG Entwerfen und Energieeffizientes Bauen
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

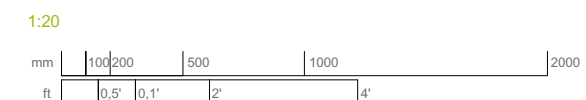
Navigation

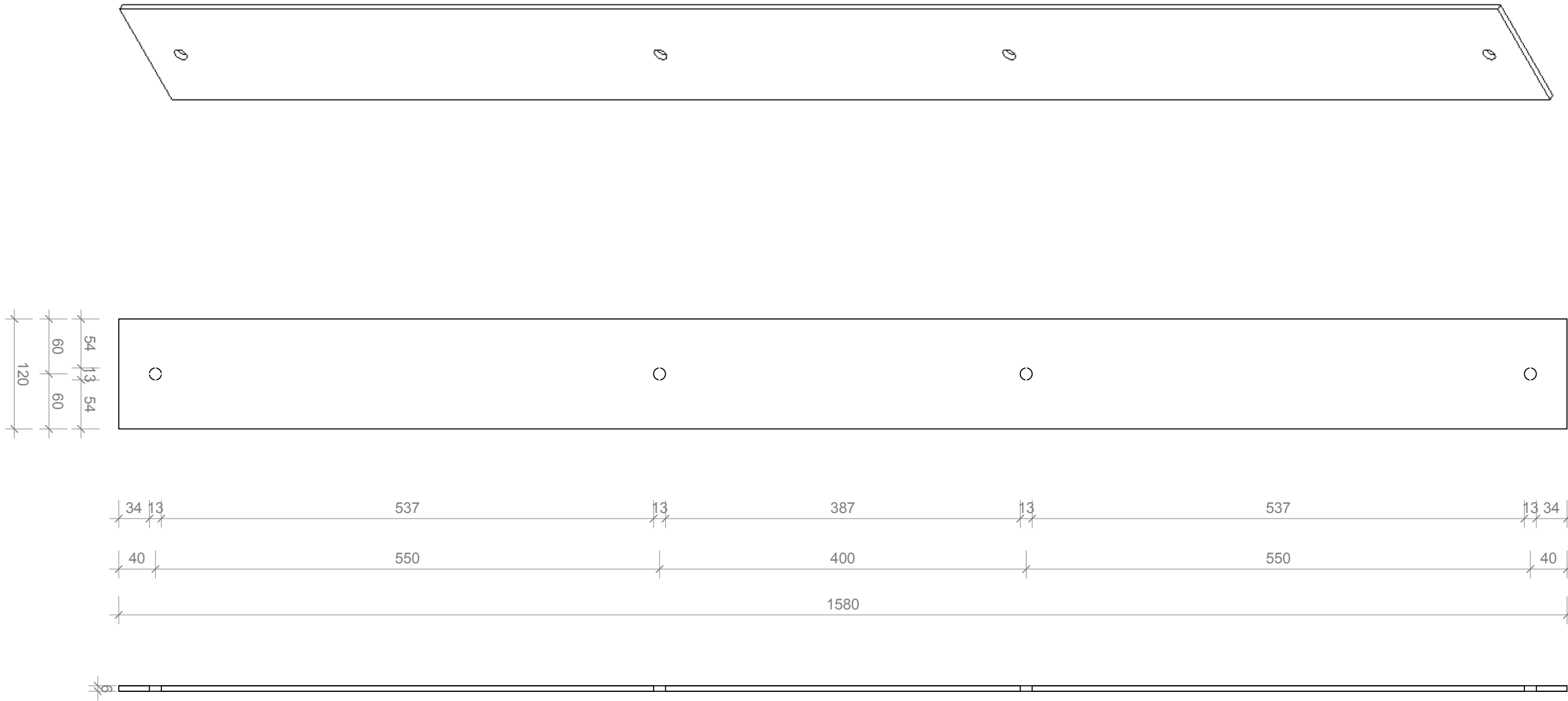
HEA 140_2
Anzahl = 1 Stück

Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

Drawn	AO (RR|CR)
Issued	04/25/09
Letzter Index	05/11/09
Component	Structural
Description	HEA 3
Project #	P140
Scale	1:20
dwg #	S-574

Elevation east





Steel Plate SB2 East & West Wall

Scale 1: 5

1:5





Projekt

Bauherr

TECHNISCHE
UNIVERSITÄT
DARMSTADT

**FG Entwerfen und
Energieeffizientes Bauen**
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation



Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

DrawnSA

Issued03/29/09

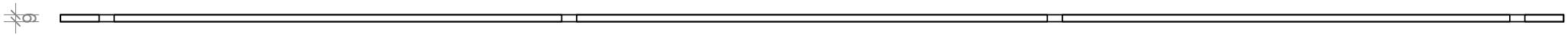
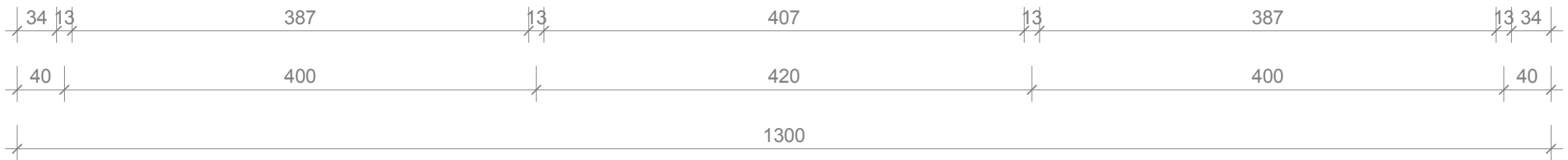
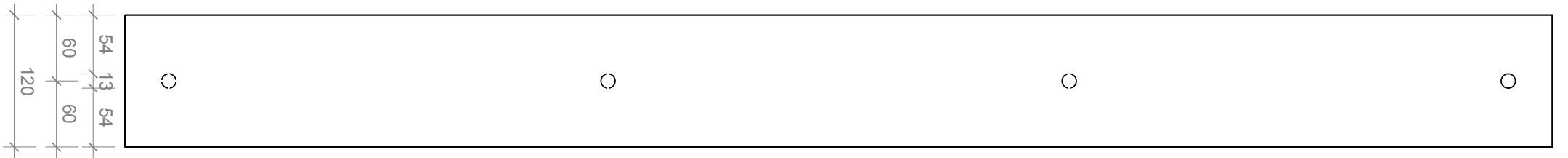
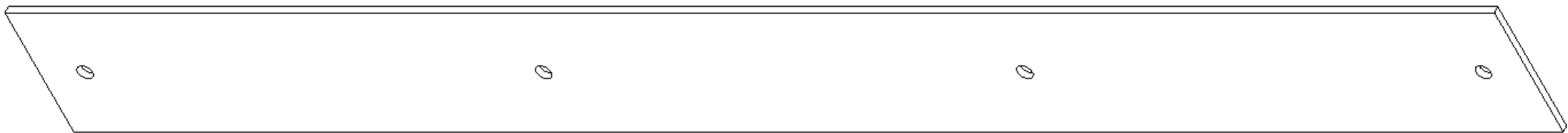
Last index05/11/09

Component
Structural

Description
Steel Plate SB2 East & West Wall

Project #Scaledwg #

P1401 : 5**S-576**




Steel Plate SB1 North & South Wall

Scale 1: 5

1:5





Projekt**TEAM GERMANY**

Bauherr**TECHNISCHE
UNIVERSITÄT
DARMSTADT**

**FG Entwerfen und
Energieeffizientes Bauen**
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation



Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

DrawnSA

Issued03/29/09

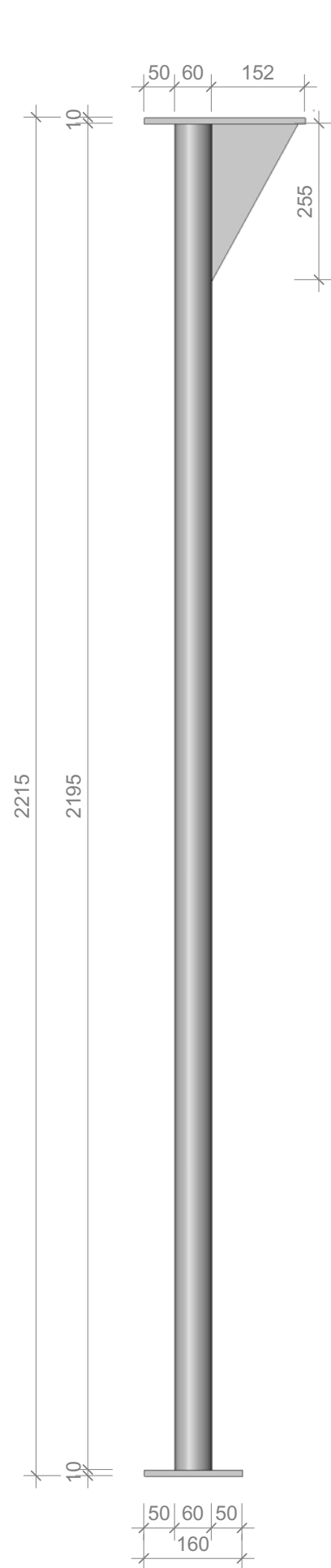
Last index05/11/09

Component
Structural

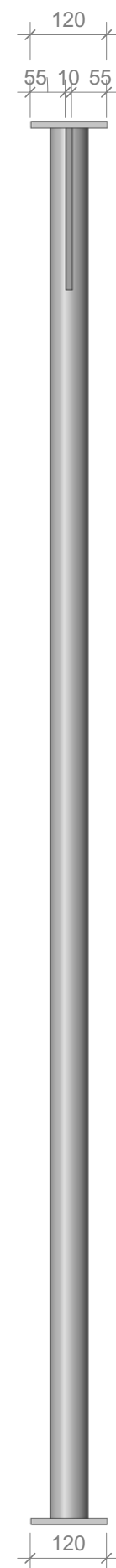
Description
**Steel Plate SB1 North
& South Wall**

Project #Scaledwg #

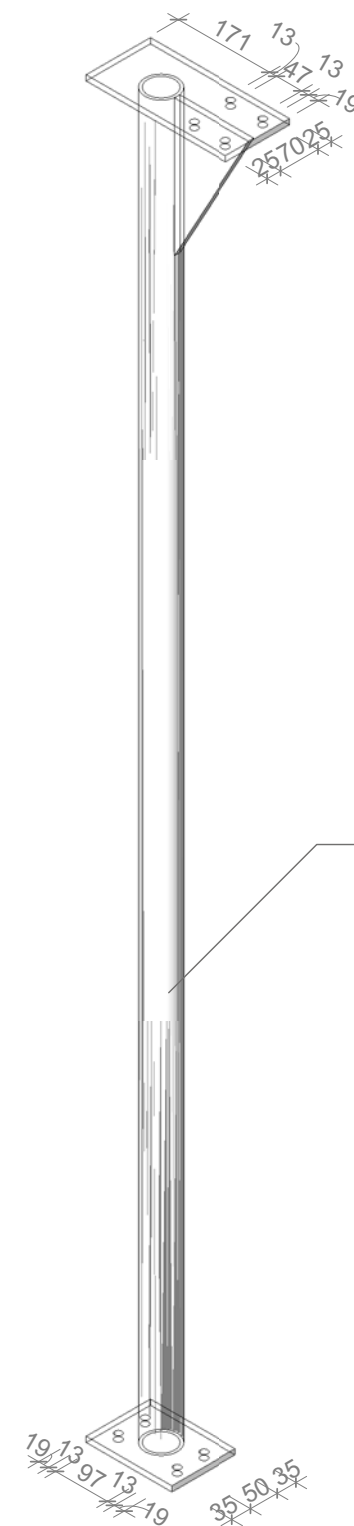
P1401 : 5**S-577**



1 2nd floor temp. steel post
S-578 Scale 1:10



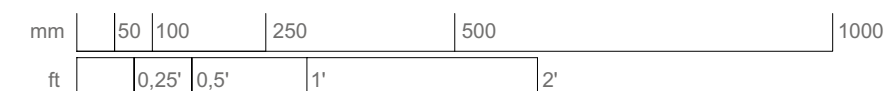
2 2nd floor temp. steel post
S-578 Scale 1:10




3 2nd floor temp. steel post
S-578 Scale 1:10

steel post HSS \varnothing 60x6mm


1:10






SOLAR DECATHLON

Projekt




SOLAR DECATHLON 2009



TEAM GERMANY

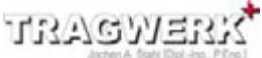
Bauherr



TECHNISCHE
UNIVERSITÄT
DARMSTADT

**FG Entwerfen und
Energieeffizientes Bauen**
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation



TRAGWERK
Jochen A. Stahl [Dipl.-Ing., P.Eng.]

Frankfurter Straße 15
64331 Weiterstadt
T +49 (0)6150 / 59 14 92
F +49 (0)6150 / 59 14 93
info@tragwerkplus.de
www.tragwerkplus.de

DrawnAO

Issued05/05/09

Last index05/11/09

Component

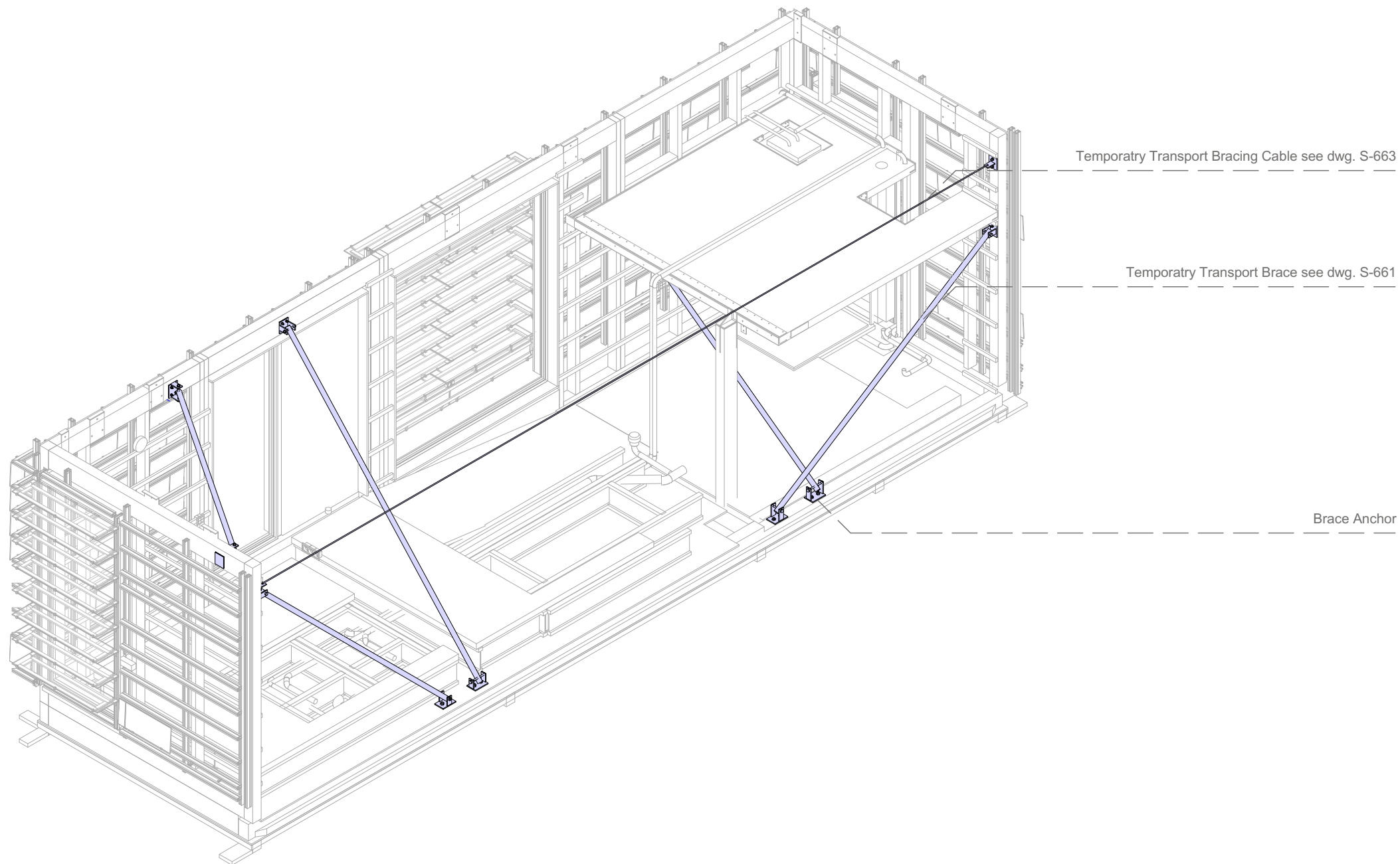
Structural

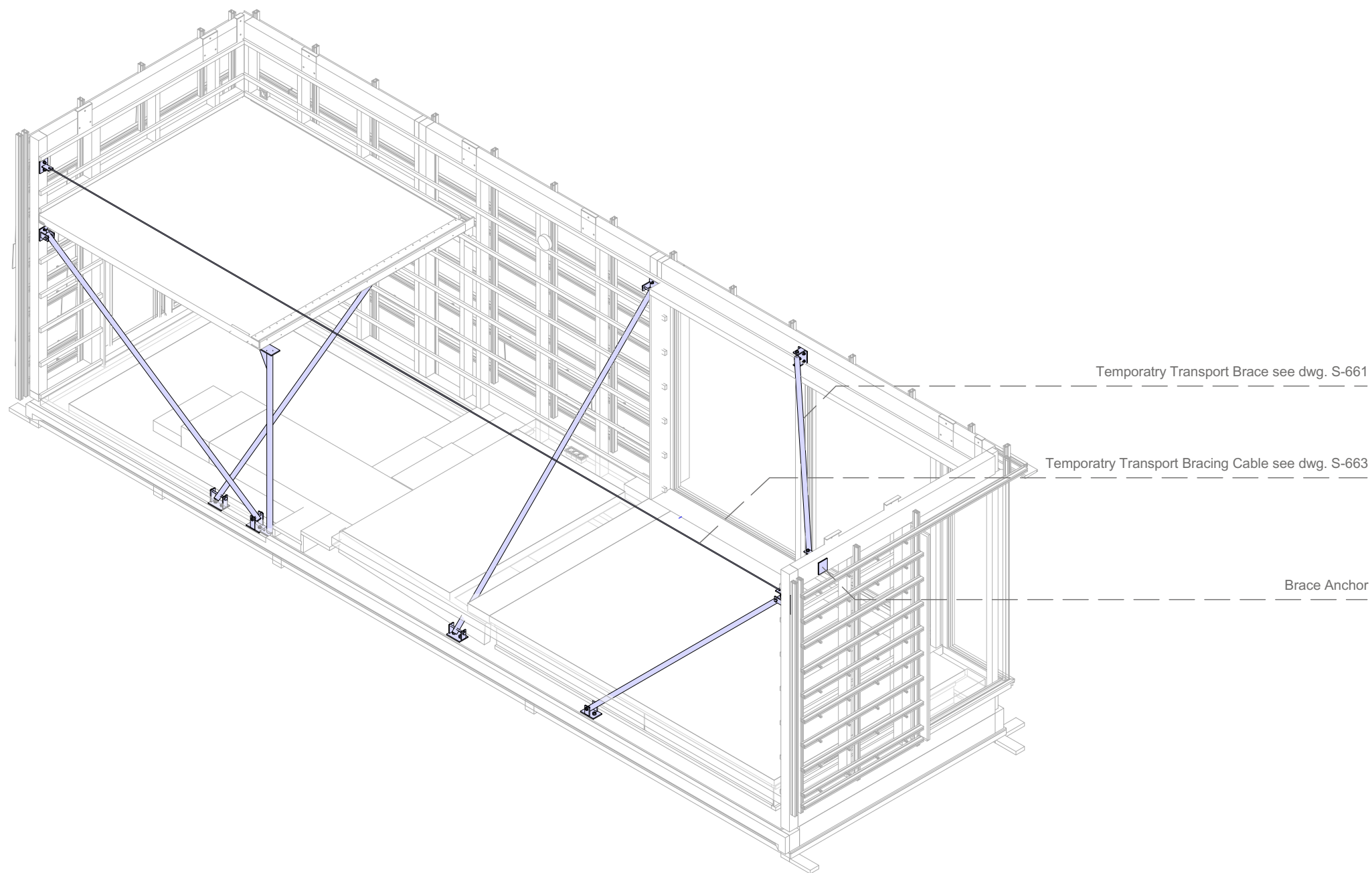
Description

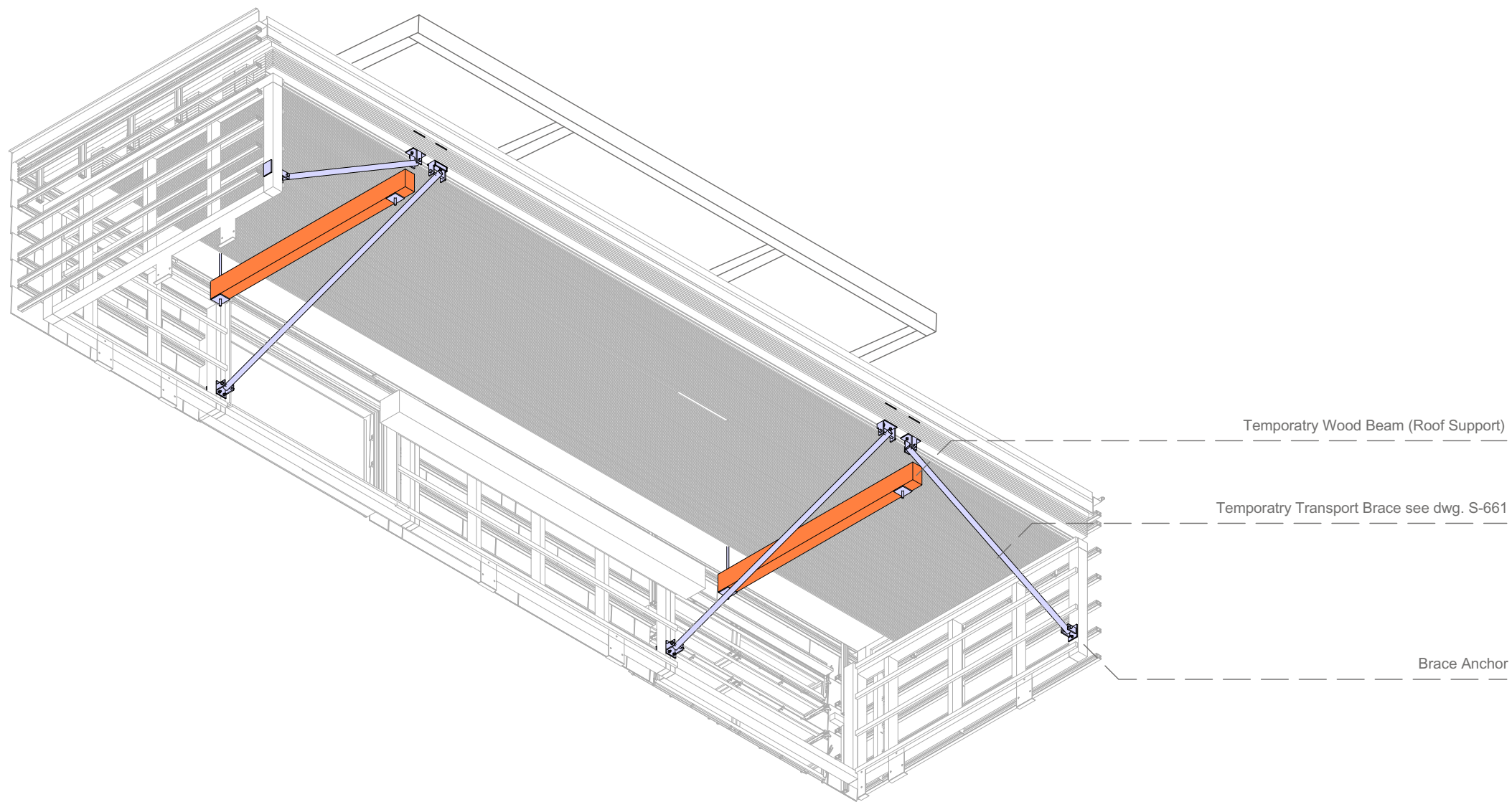
2nd Floor Temp. Steel Post

Project # Scale dwg #

P140 1:10 S-578



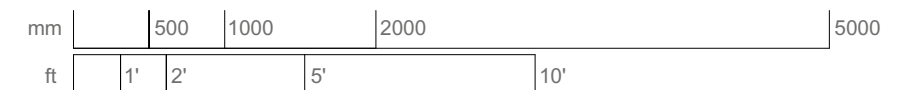





1
S-613


Axonometry Upper North Module
Scale 1:50

1:50




**SOLAR DECATHLON**

Project


**SOLAR DECATHLON 2009**
TEAM GERMANY


Constructor

**TECHNISCHE
UNIVERSITÄT
DARMSTADT**

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

 Temporary Transport
Bracing

 Wood Beam

Drawn AO

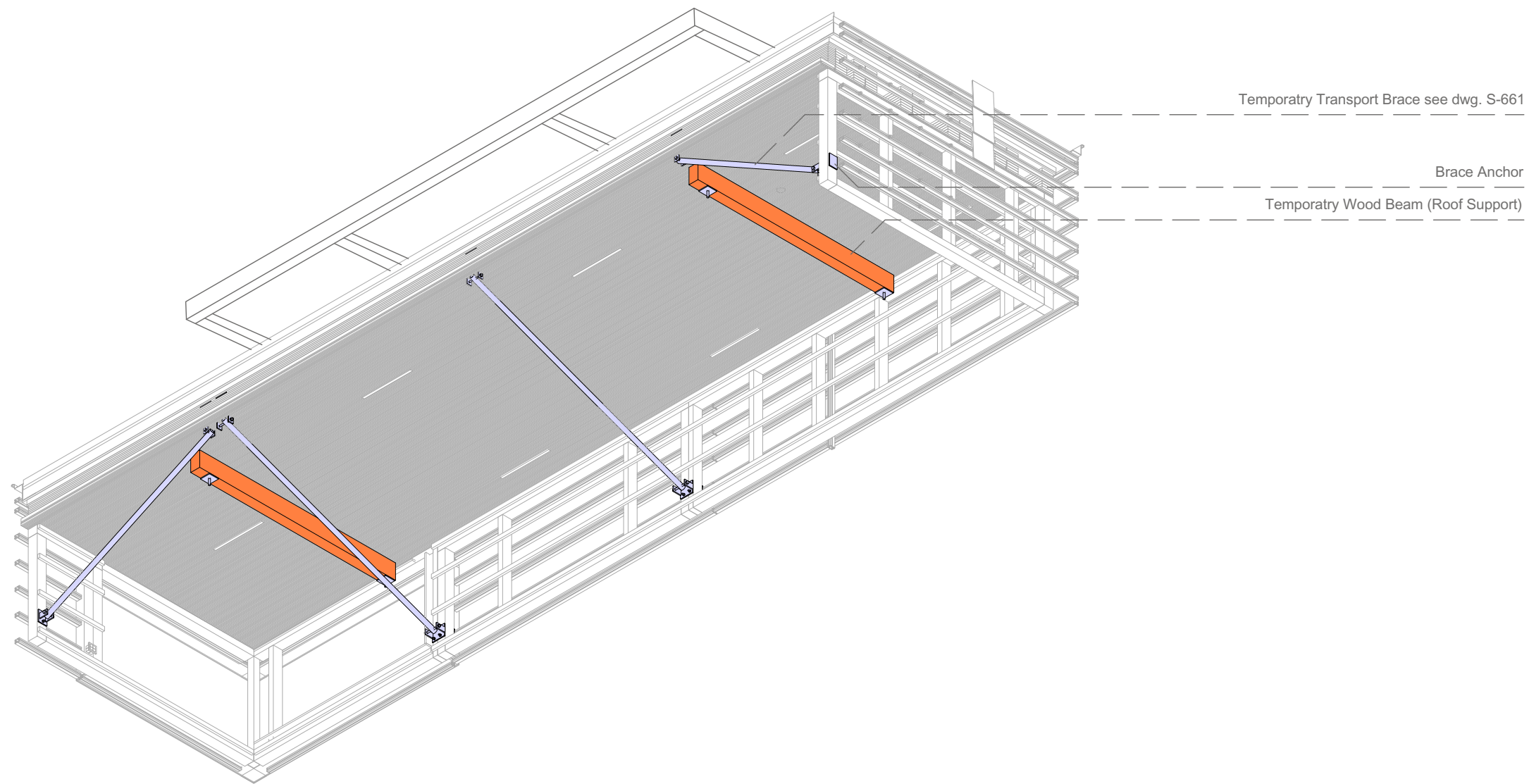
Issued 04/01/09

Last index

Component
Structural

Description
**Axonometry Upper
North Module**

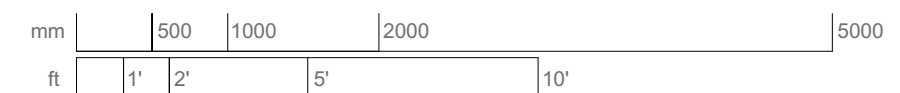
Project # Scale dwg #
P 140 1 : 50 S-613




1
S-614

Axonometry Upper South Module
Scale 1:50


1:50






SOLAR DECATHLON

Project



SOLAR DECATHLON 2009
TEAM GERMANY


Constructor




TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

 Temporary Transport
Bracing

 Wood Beam

Drawn AO

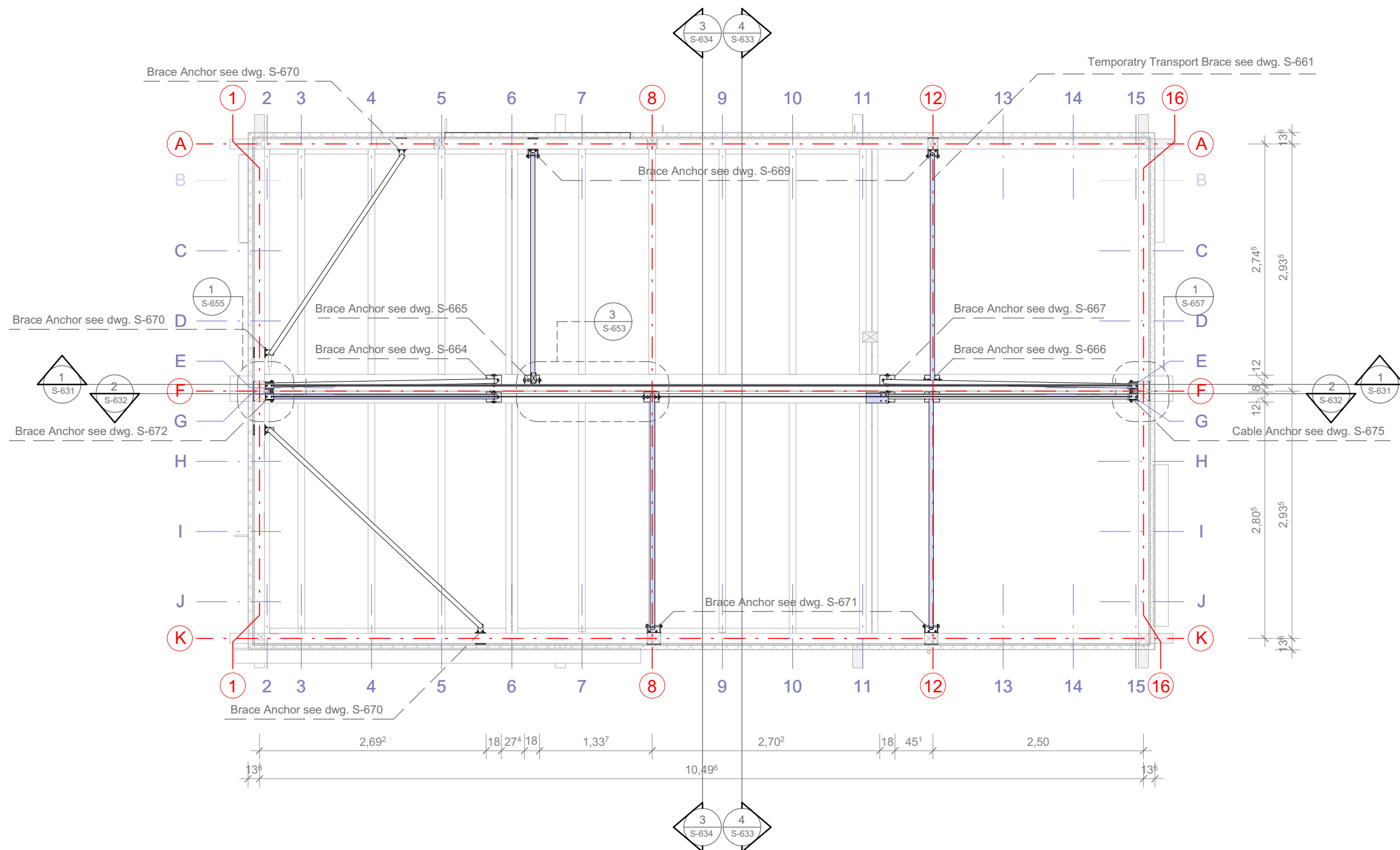
Issued 04/01/09

Last index

Component
Structural

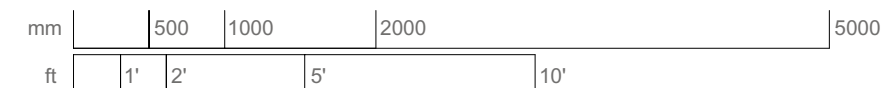
Description
Axonometry Upper
South Module

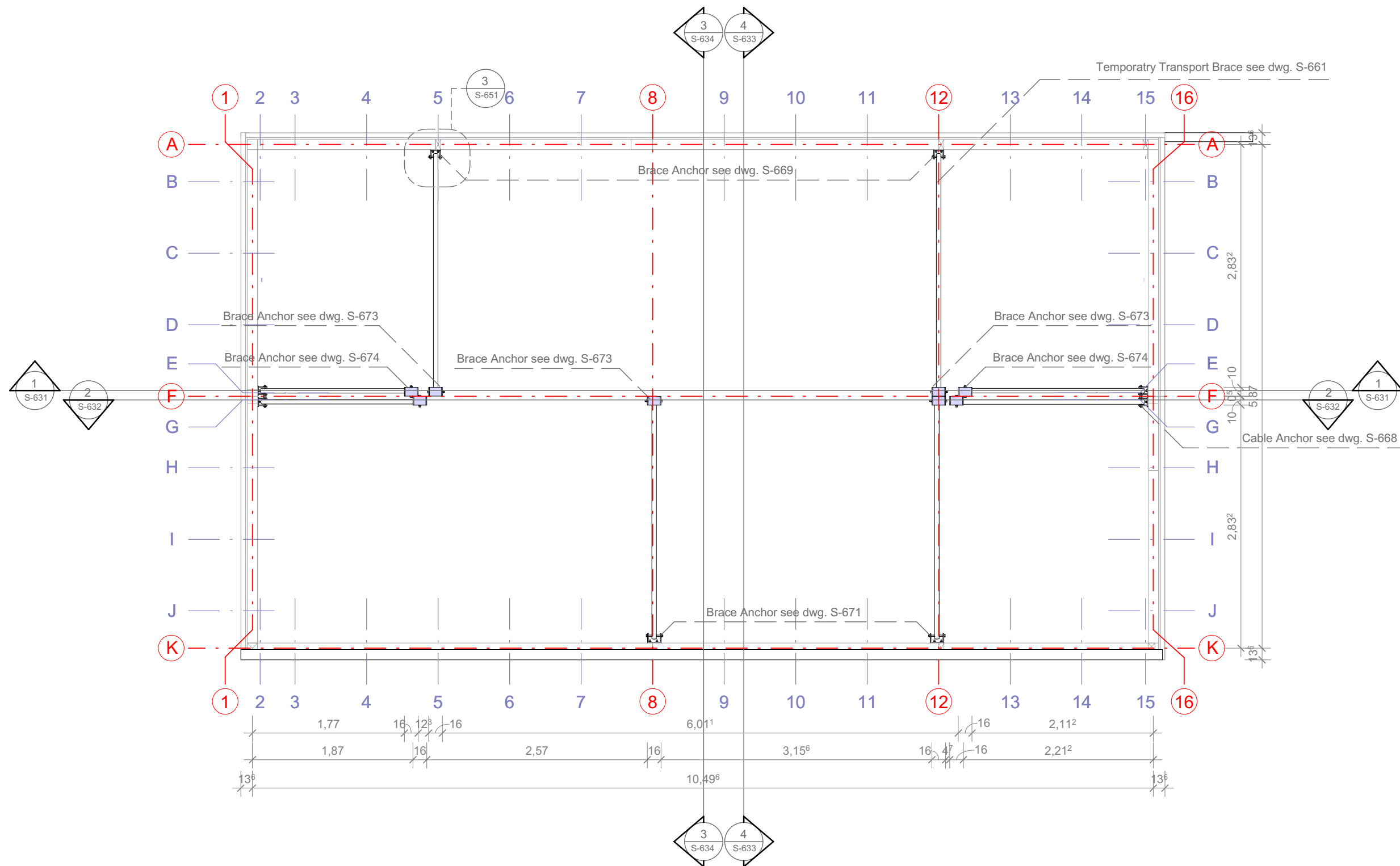
Project # Scale dwg #
P 140 1 : 50 S-614



1
 S-621 **Floor Plan Lower Modules**
 Scale 1:50

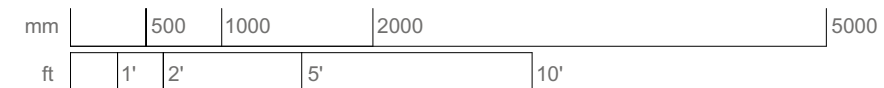
1:50







1
 S-622 **Floor Plan Upper Modules**
 Scale 1:50

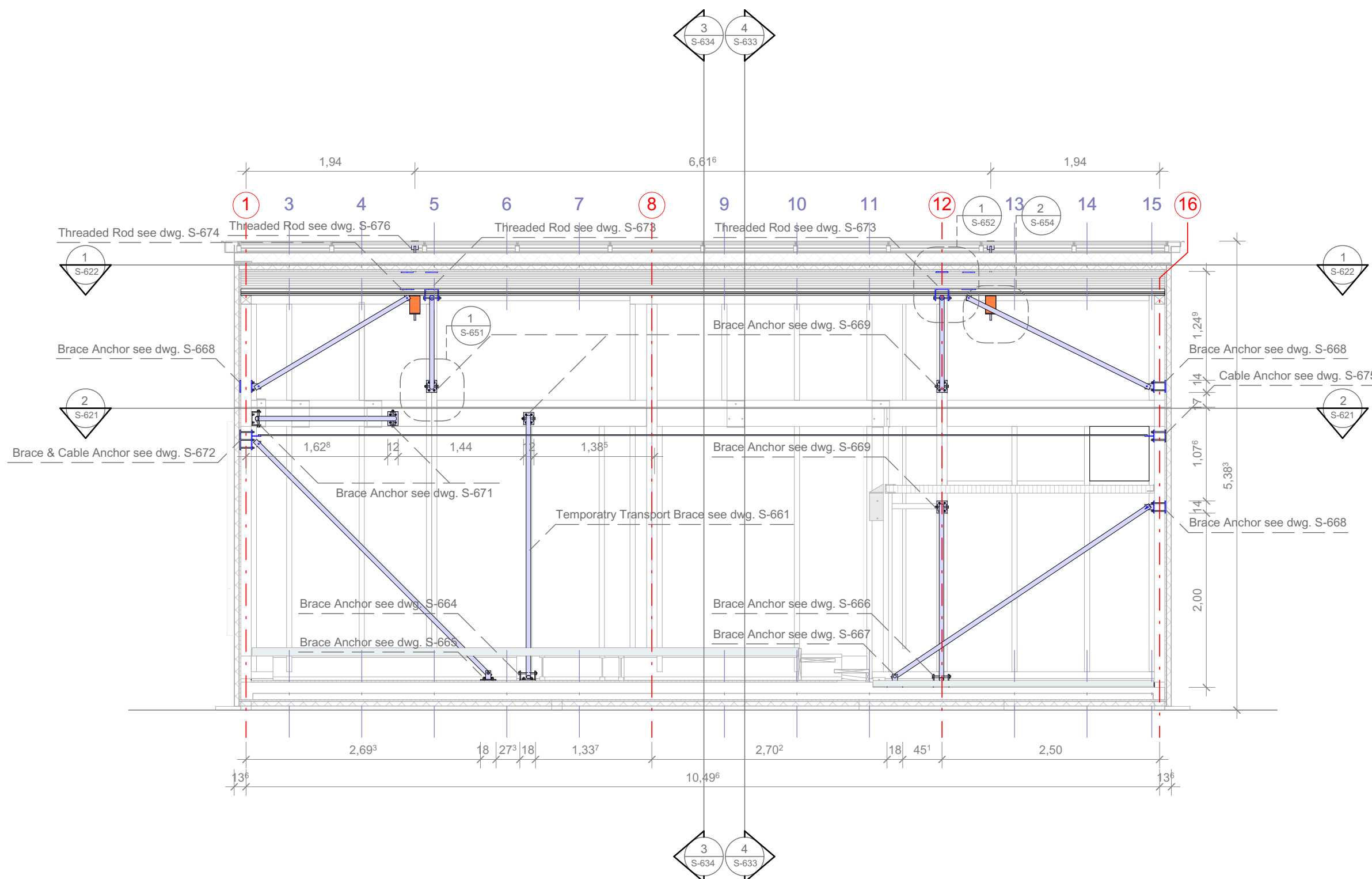
1:50



Drawn	AO	
Issued	04/01/09	
Last index		
Component	Structural	
Description	Floor Plan Upper Modules	
Project #	Scale	dwg #
P 140	1 : 50	S-622

Navigation/Legend

-  Temporary Transport Bracing
-  Wood Beam



1
 S-631
Longitudinal Section E-W
 Scale 1:50

1:50

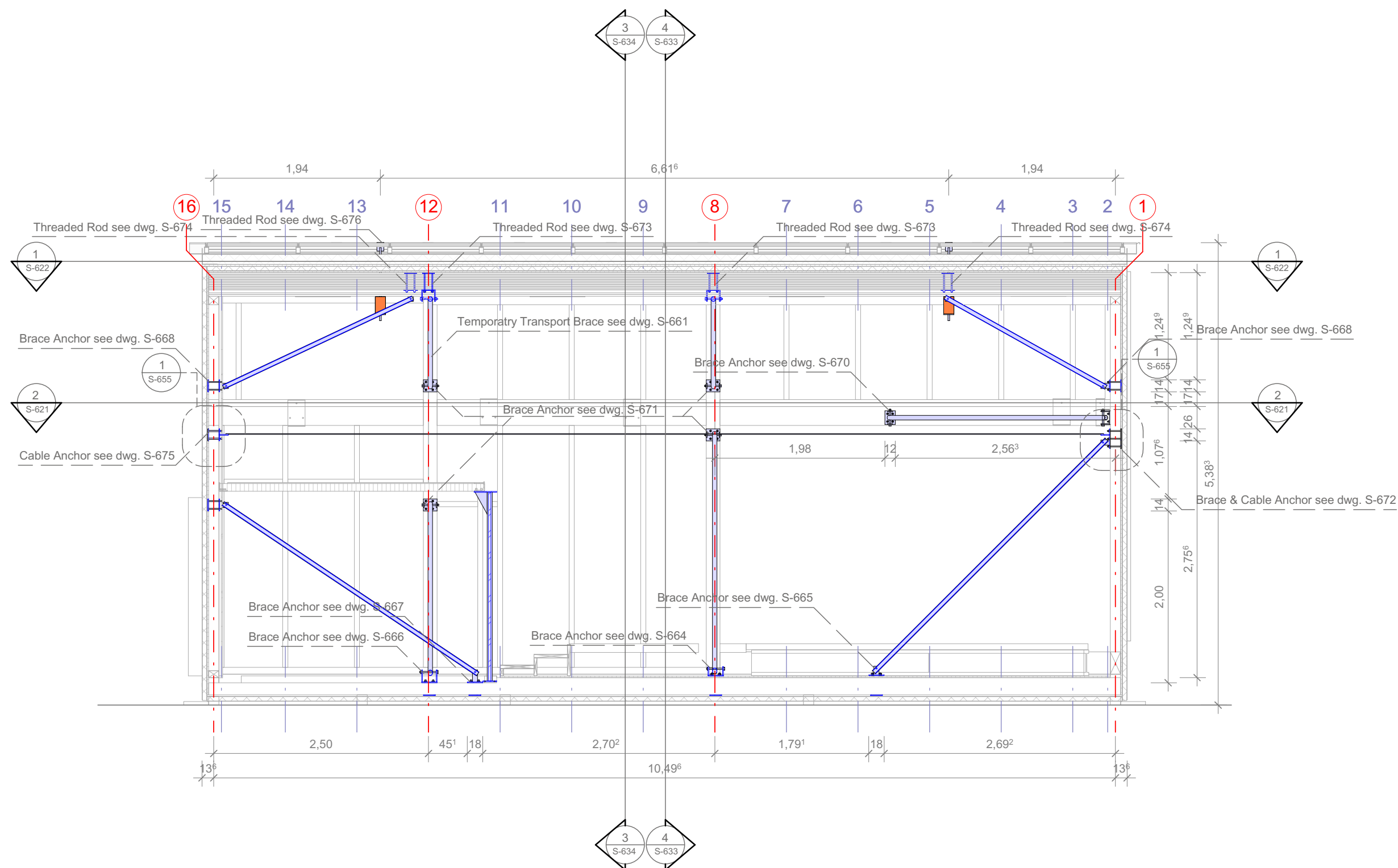


Drawn AO
 Issued 03/19/09
 Last index

Component
Structural

Description
Longitudinal Section E-W

Project # Scale dwg #
 P 140 1 : 50 S-631



1 Longitudinal Section W-E
S-631 Scale 1:50

1:50

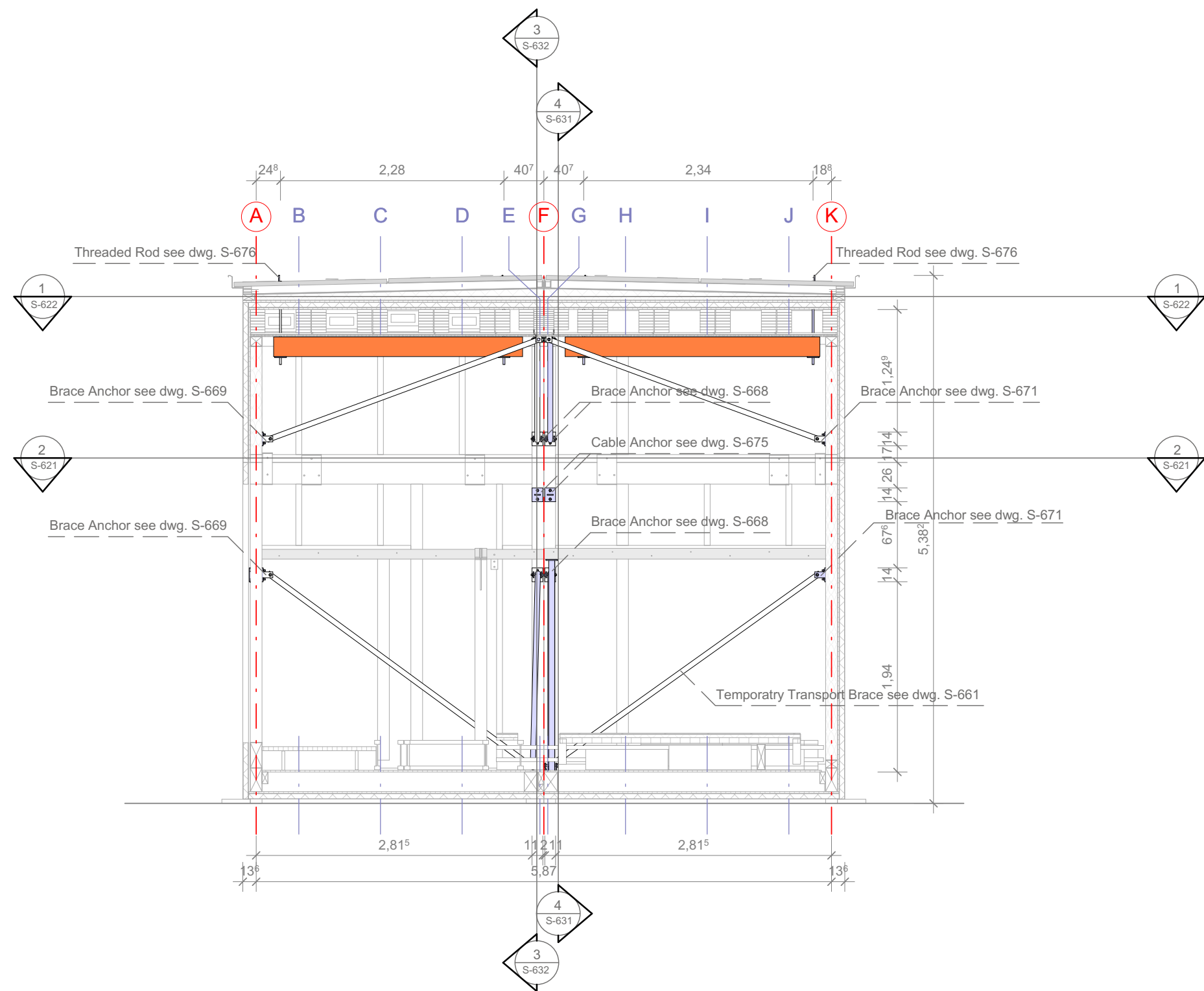


Drawn AO
Issued 03/19/09
Last index

Component
Structural

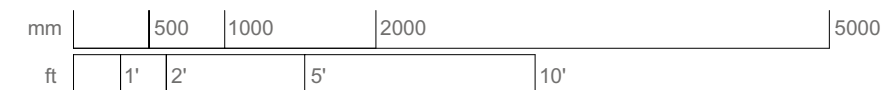
Description
**Longitudinal Section
W-E**

Project # Scale dwg #
P 140 1 : 50 S-632





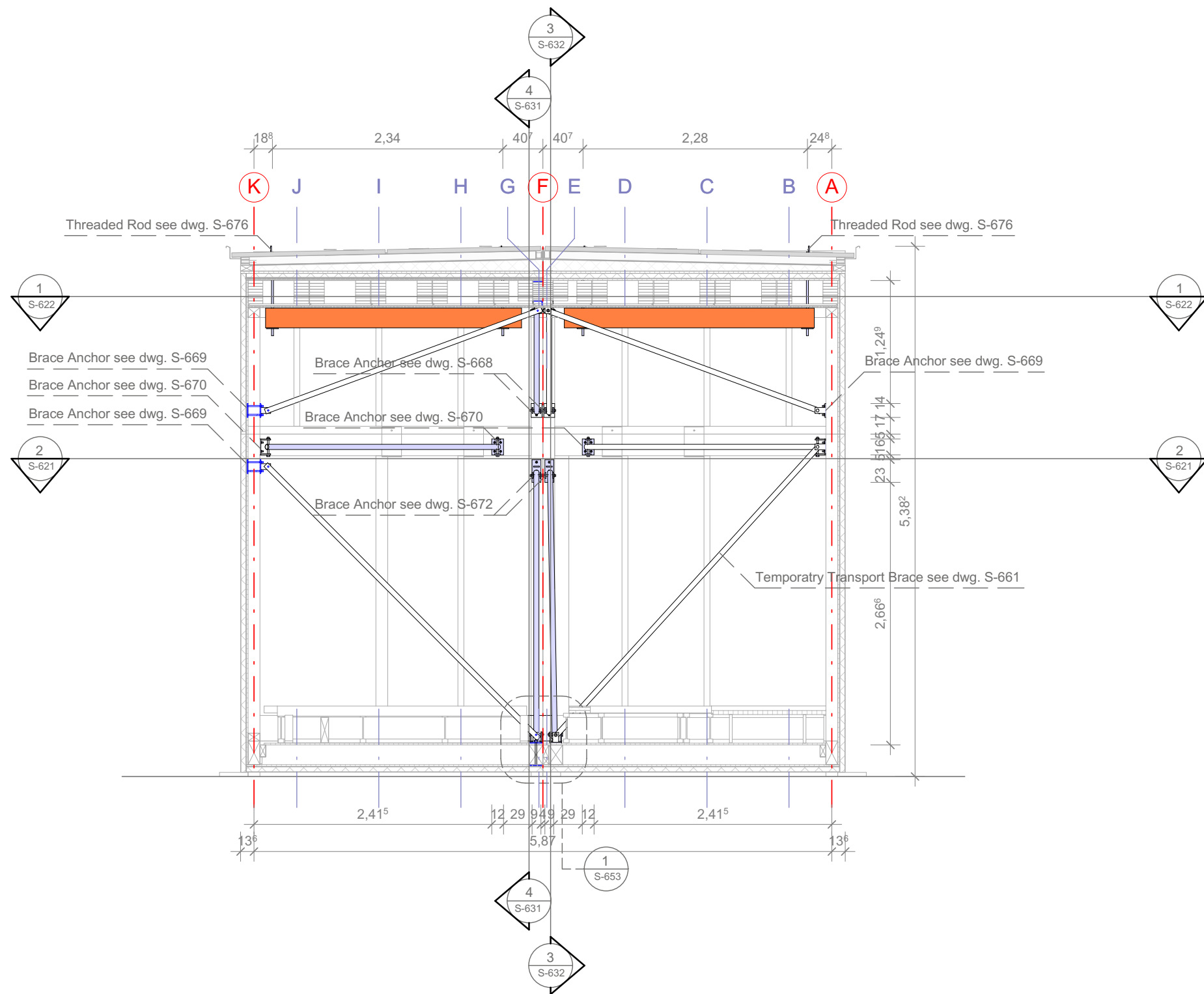
1
S-633
Cross Section N-S
Scale 1:50

1:50



Drawn	AO	
Issued	03/19/09	
Last index		
Component	Structural	
Description	Cross Section N-S	
Project #	Scale	dwg #
P 140	1 : 50	S-633

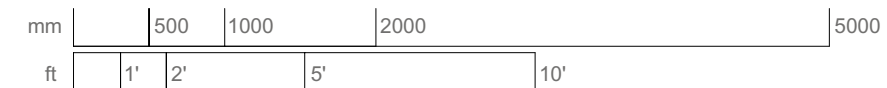
-  Temporary Transport Bracing
-  Wood Beam



1
S-634

Cross Section S-N
Scale 1:50

1:50



Drawn AO

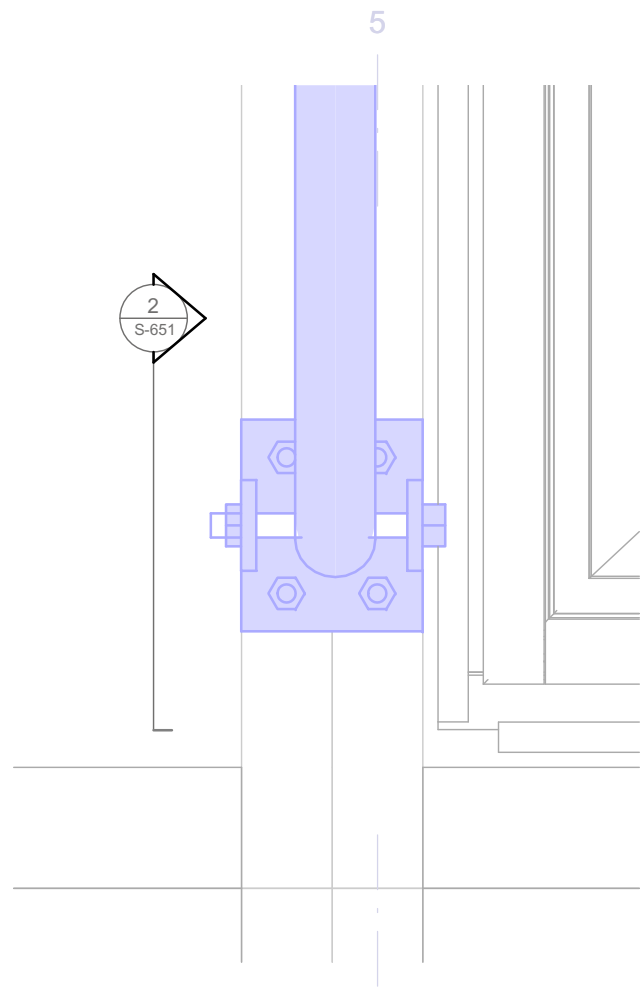
Issued 03/19/09

Last index

Component
Structural

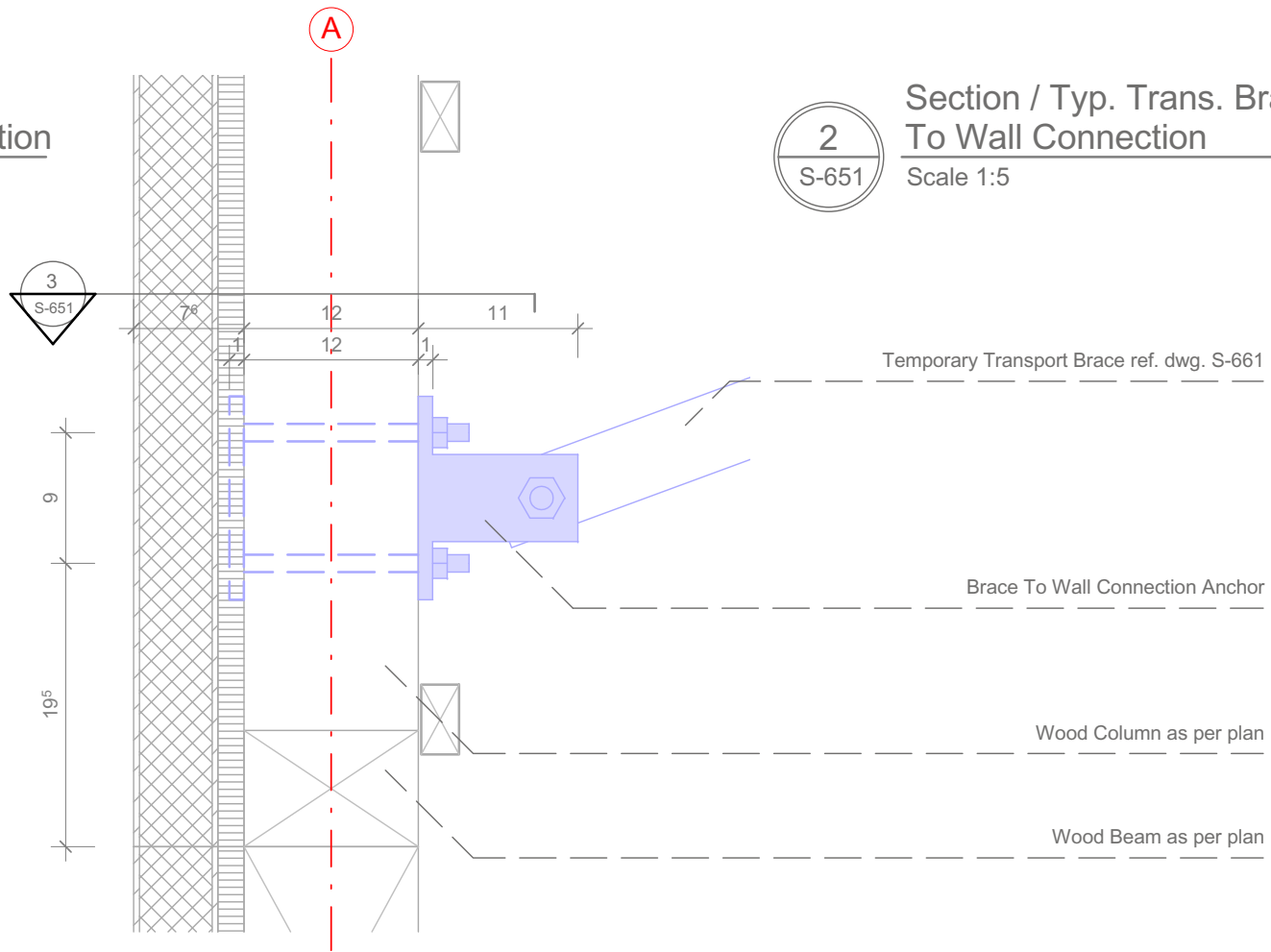
Description
Cross Section S-N

Project # Scale dwg #
P 140 1 : 50 S-634



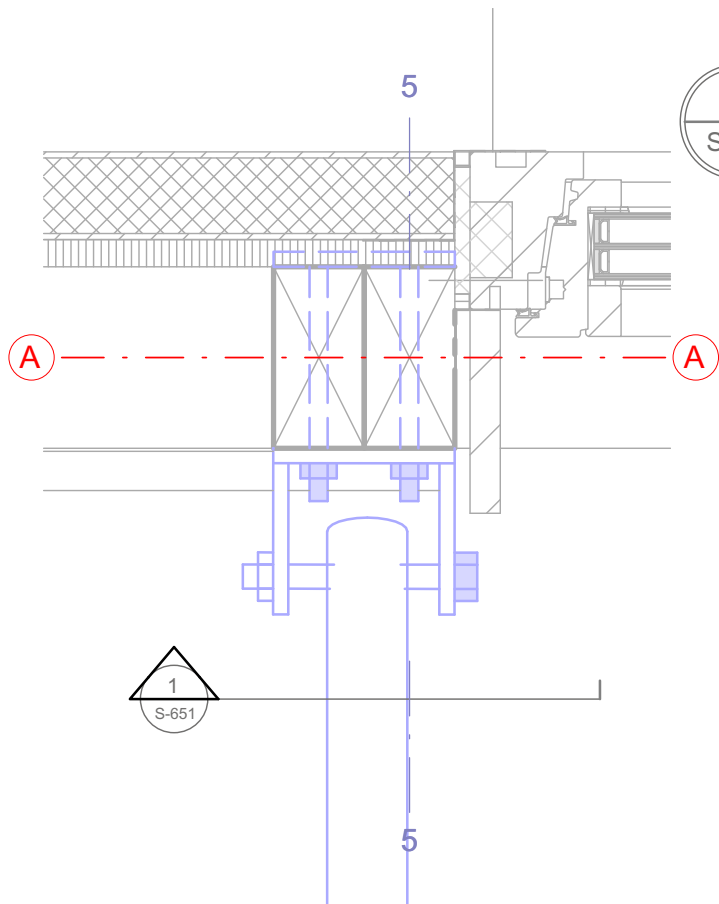
1
S-651

Elevation / Typ. Trans.
Brace To Wall Connection
Scale 1:5 ref. drawing S-631



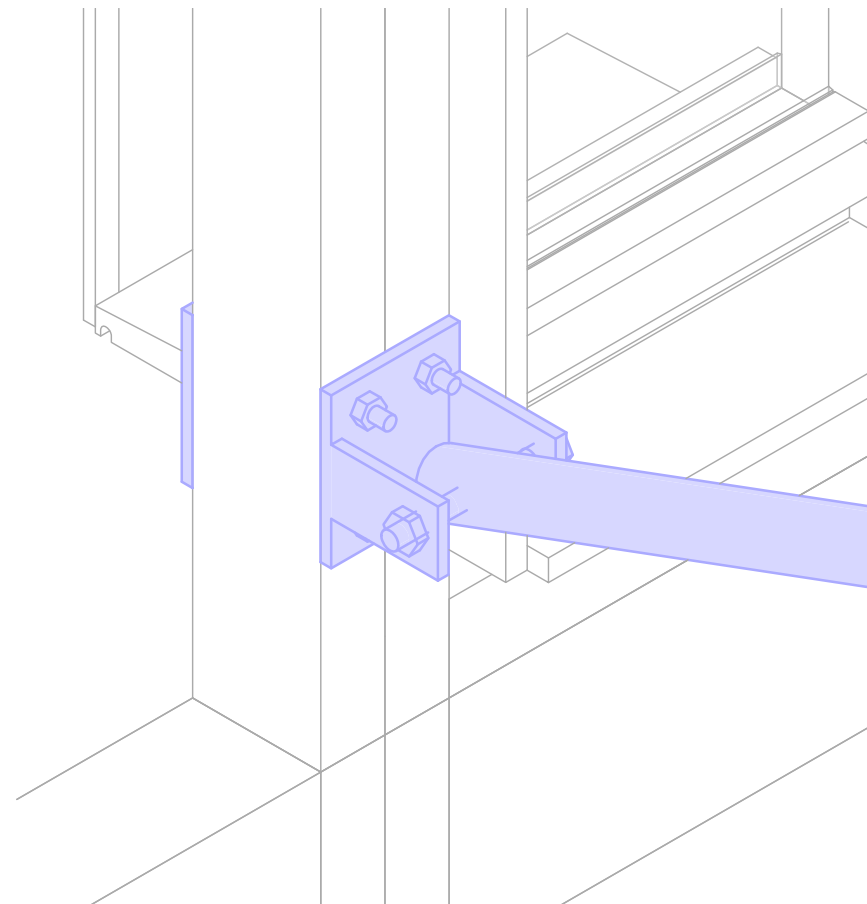
2
S-651

Section / Typ. Trans. Brace
To Wall Connection
Scale 1:5



3
S-651

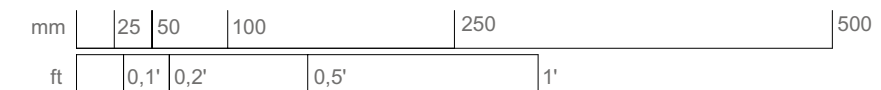
Typ. Trans. Brace To
Wall Connection
Scale 1:5 ref. drawing S-622



4
S-651

Typ. Trans. Brace To Wall
Connection
Scale 1:5

1:5



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

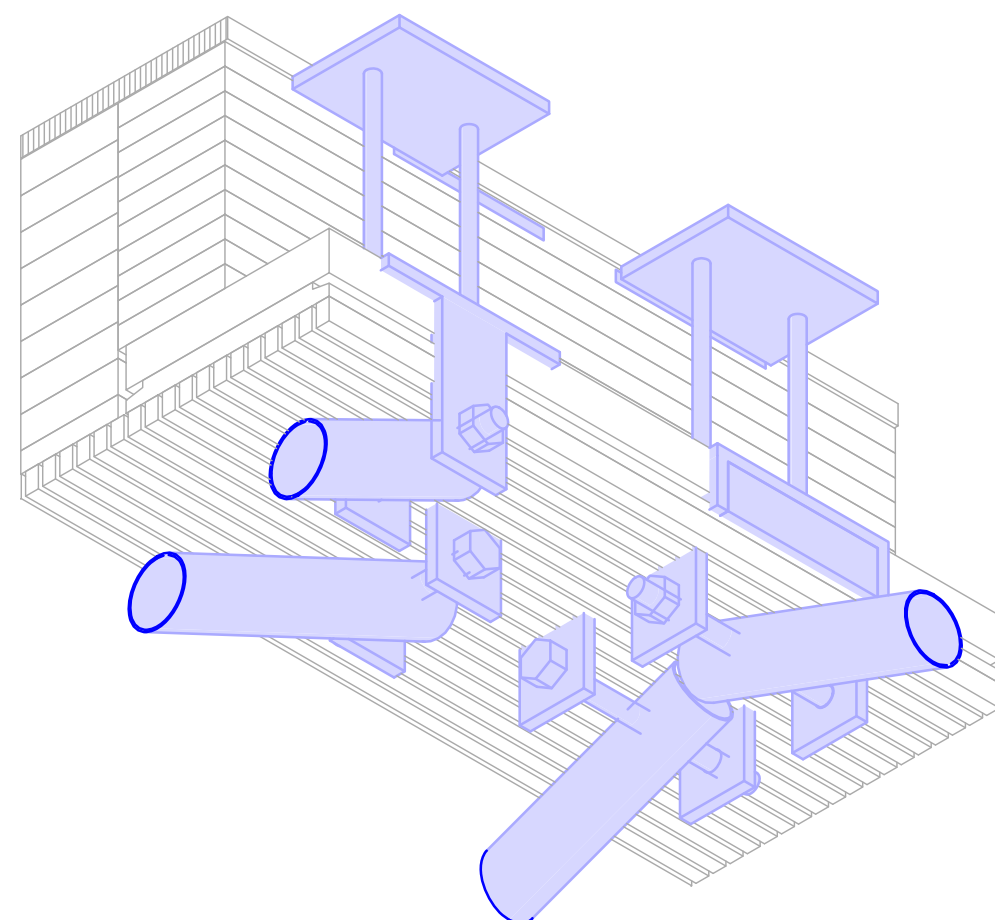
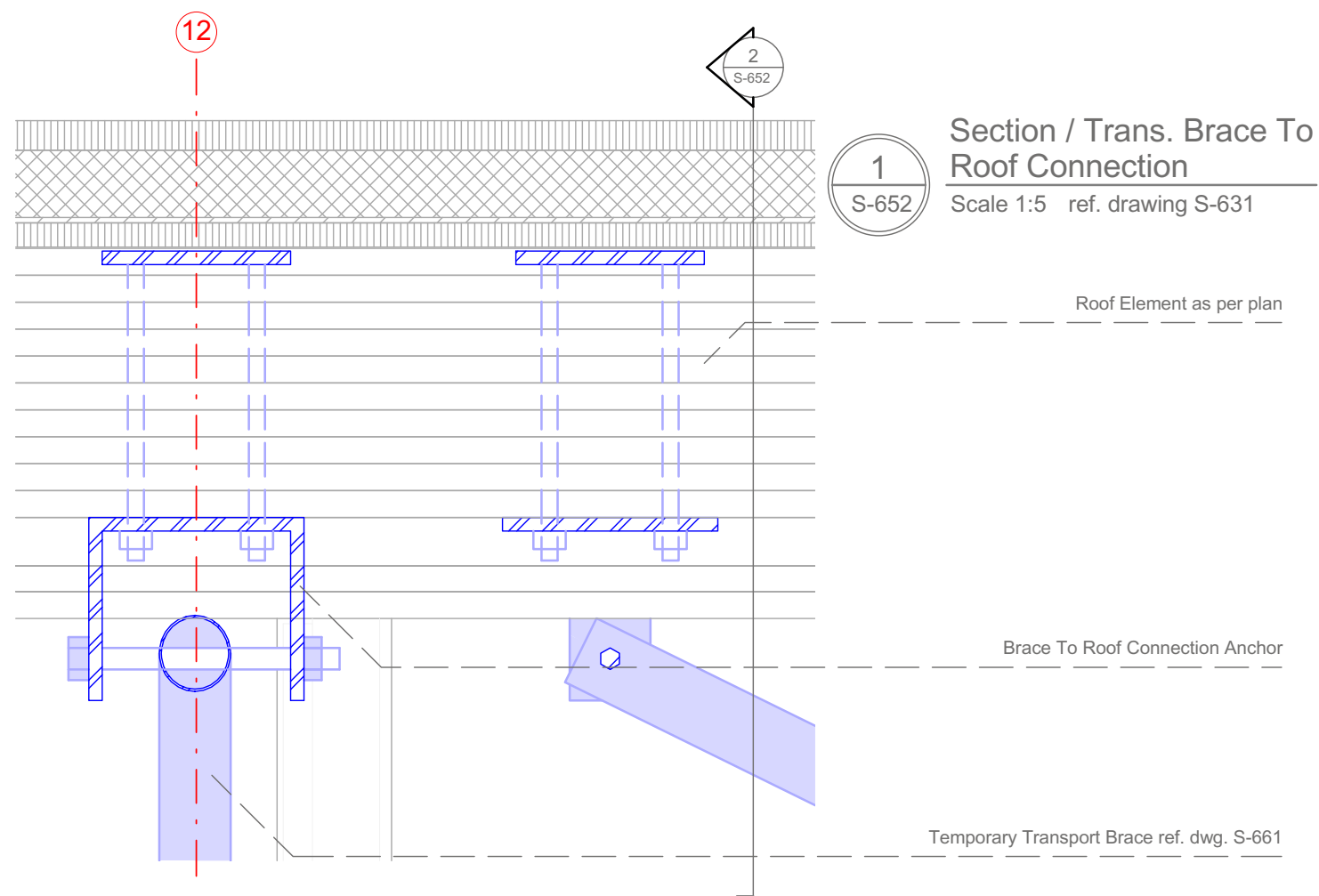
Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

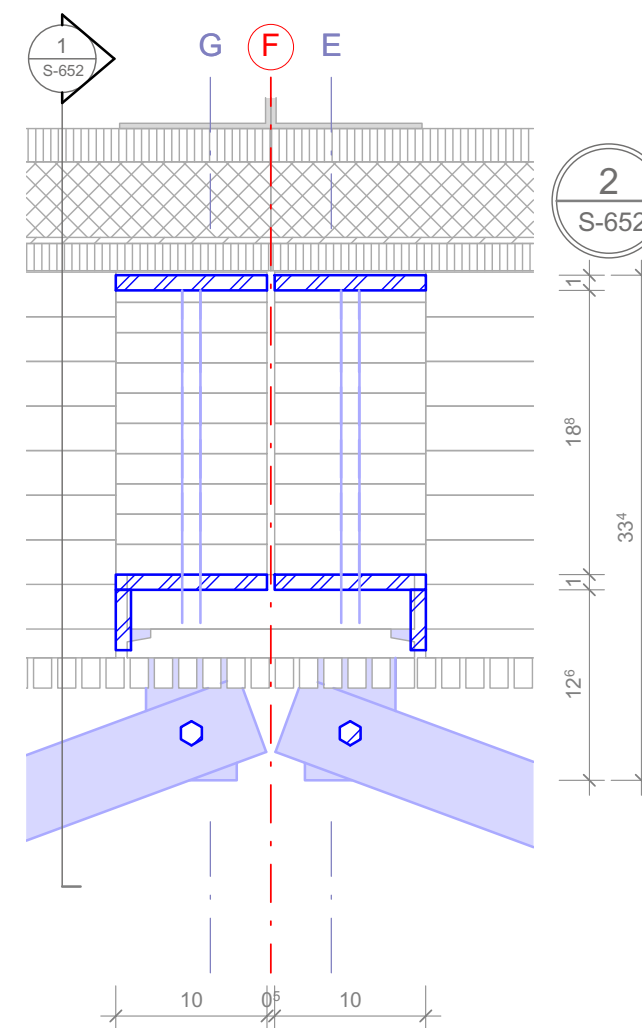
Navigation/Legend

Drawn	AO	
Issued	05/12/09	
Last index		
Component	Structural	
Description	Typ. Trans. Brace To Wall Connection	
Project #	Scale	dwg #
P 140	1 : 5	S-651

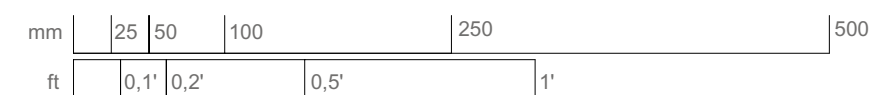


3
S-652

Cross Section / Trans. Brace To Roof Connection
Scale 1:5



1:5



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

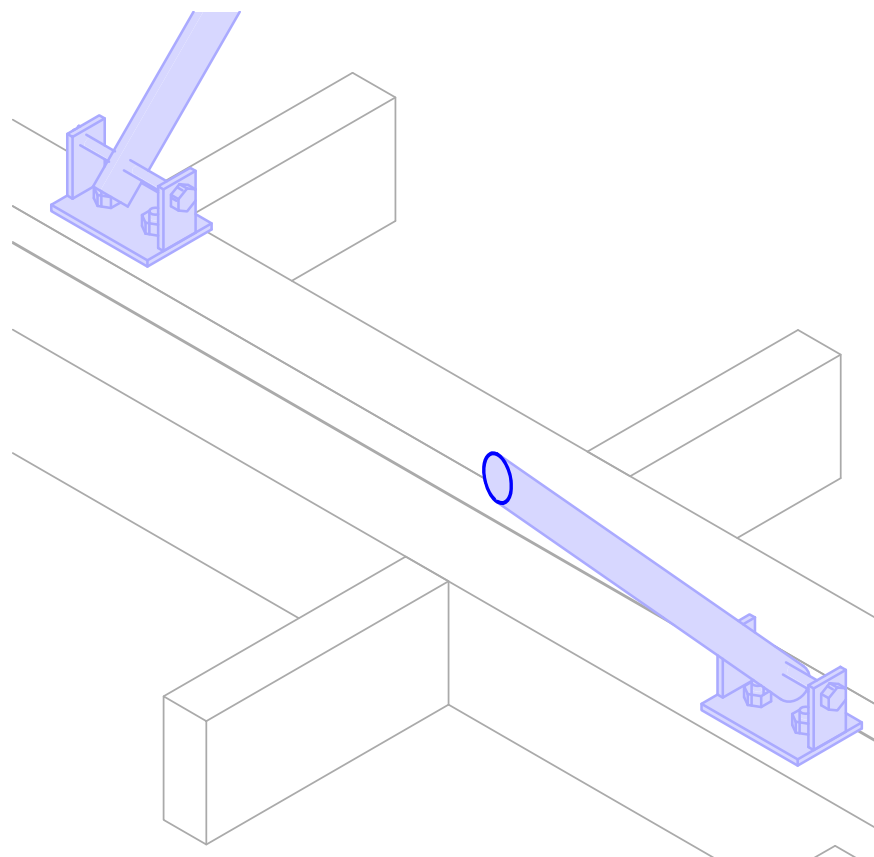
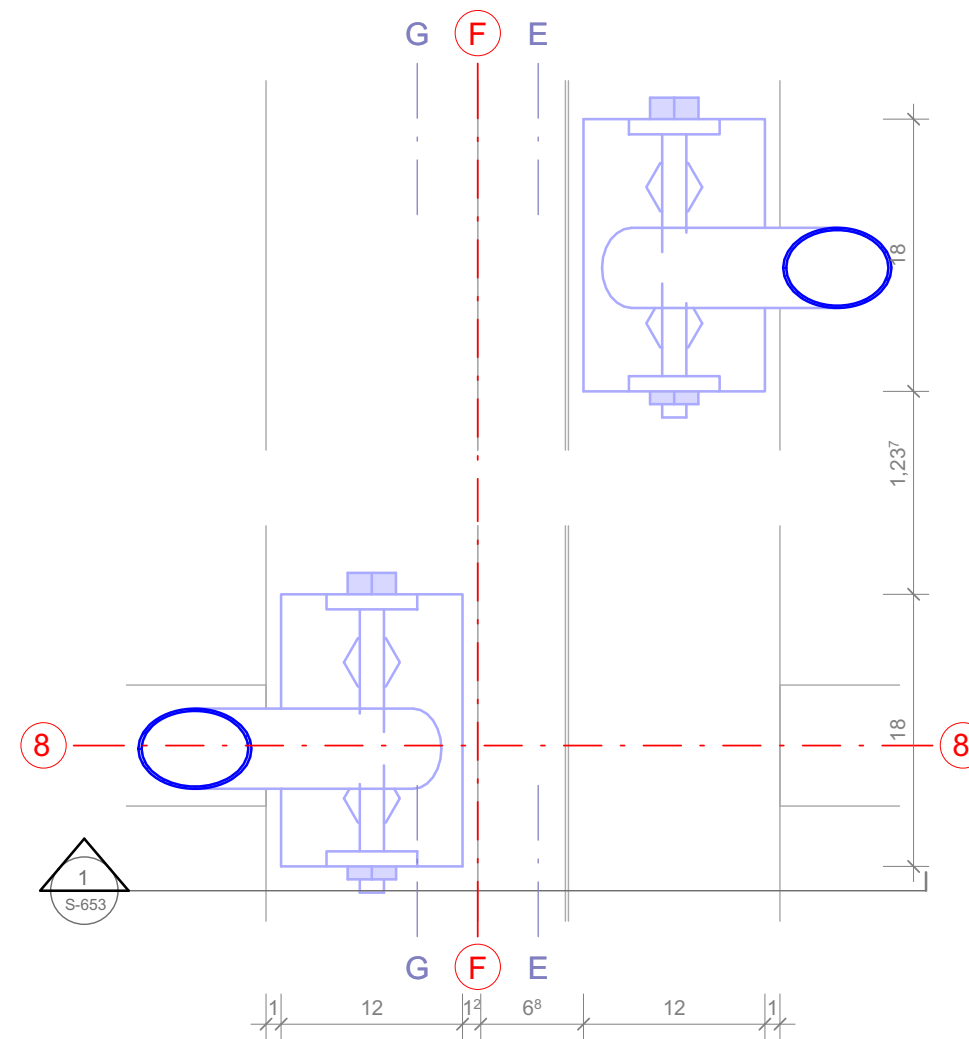
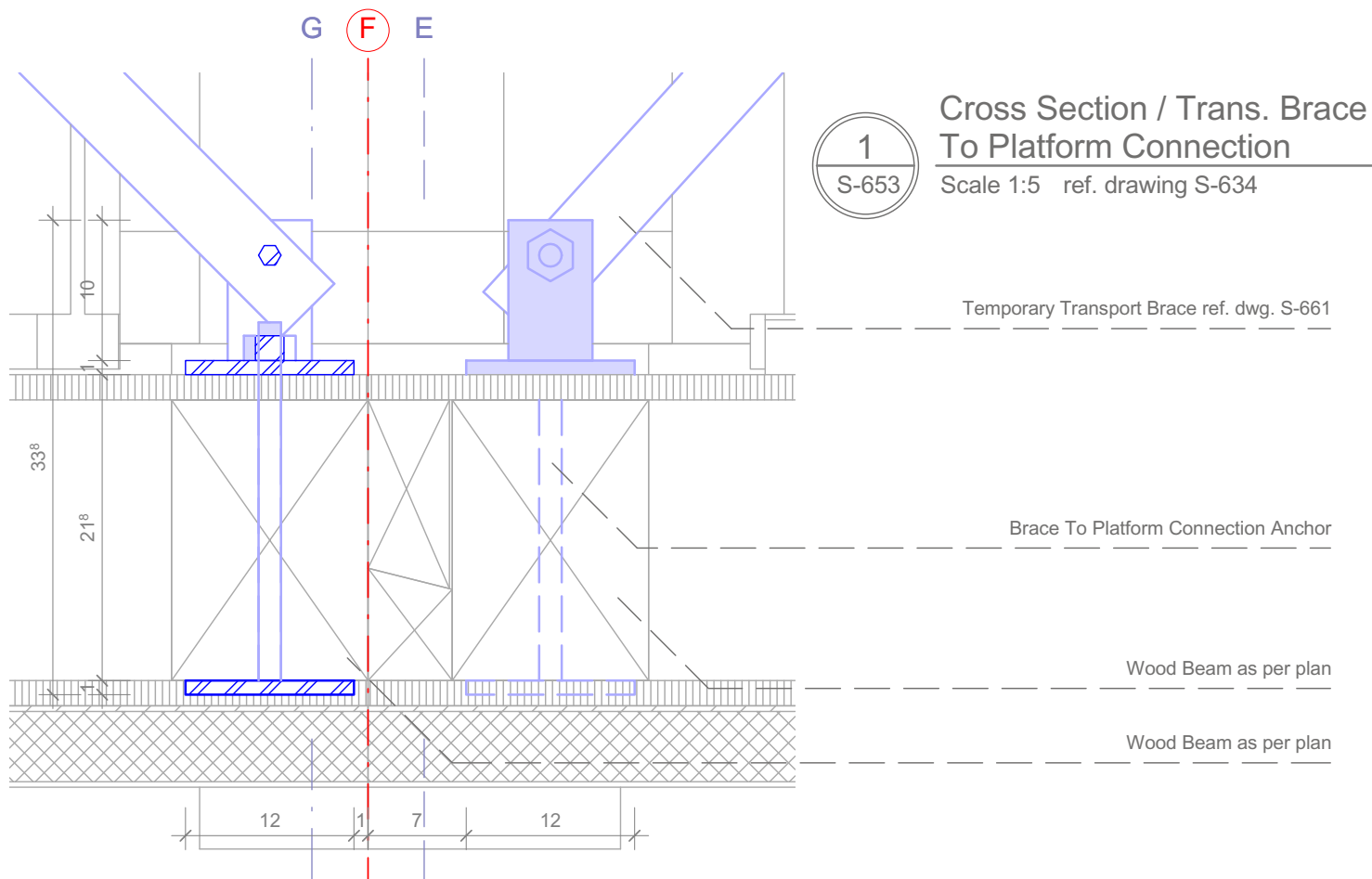
Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

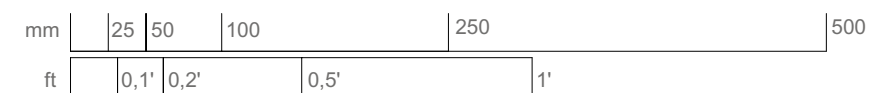
Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn	AO	
Issued	05/12/09	
Last index		
Component	Structural	
Description	Trans. Brace To Roof Connection	
Project #	Scale	dwg #
P 140	1 : 5	S-652



1:5



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

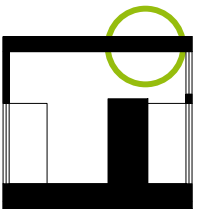
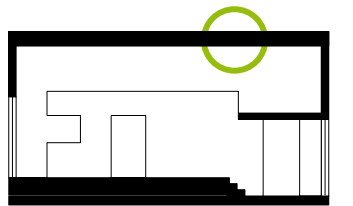
Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn	AO	
Issued	05/12/09	
Last index		
Component	Structural	
Description	Trans. Brace To Platform Connection	
Project #	Scale	dwg #
P 140	1 : 5	S-653

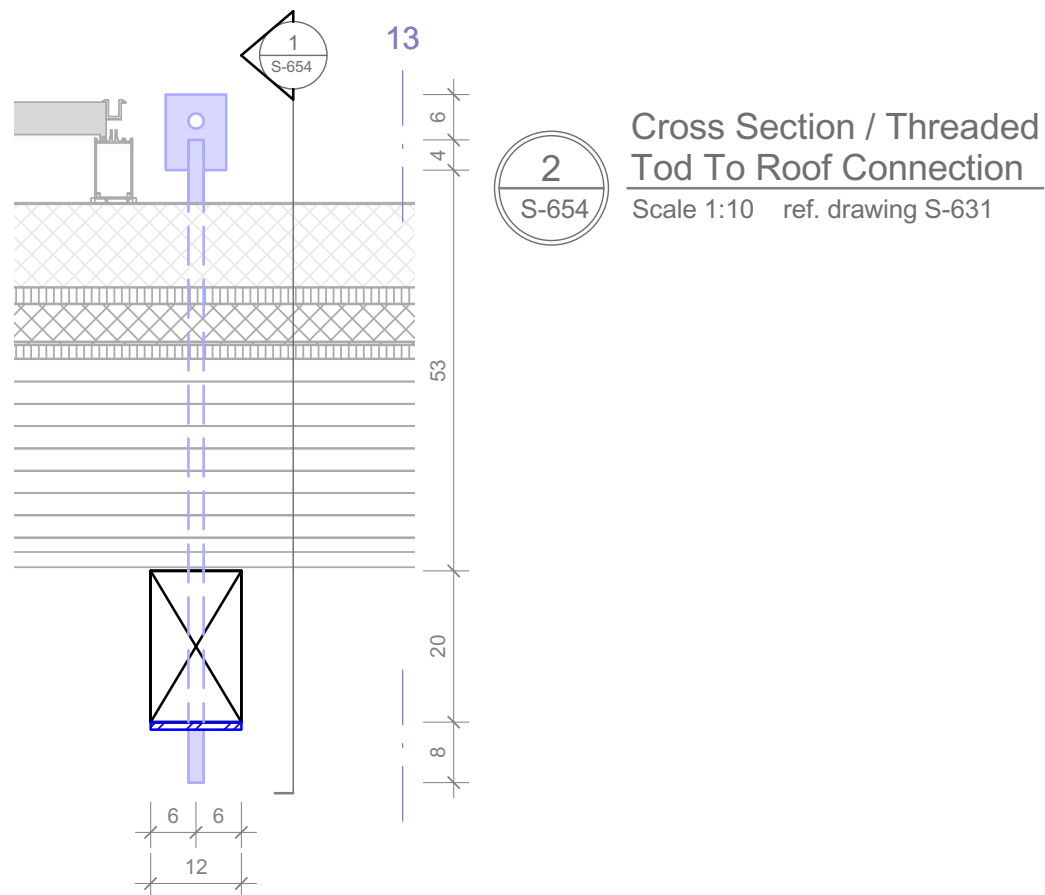
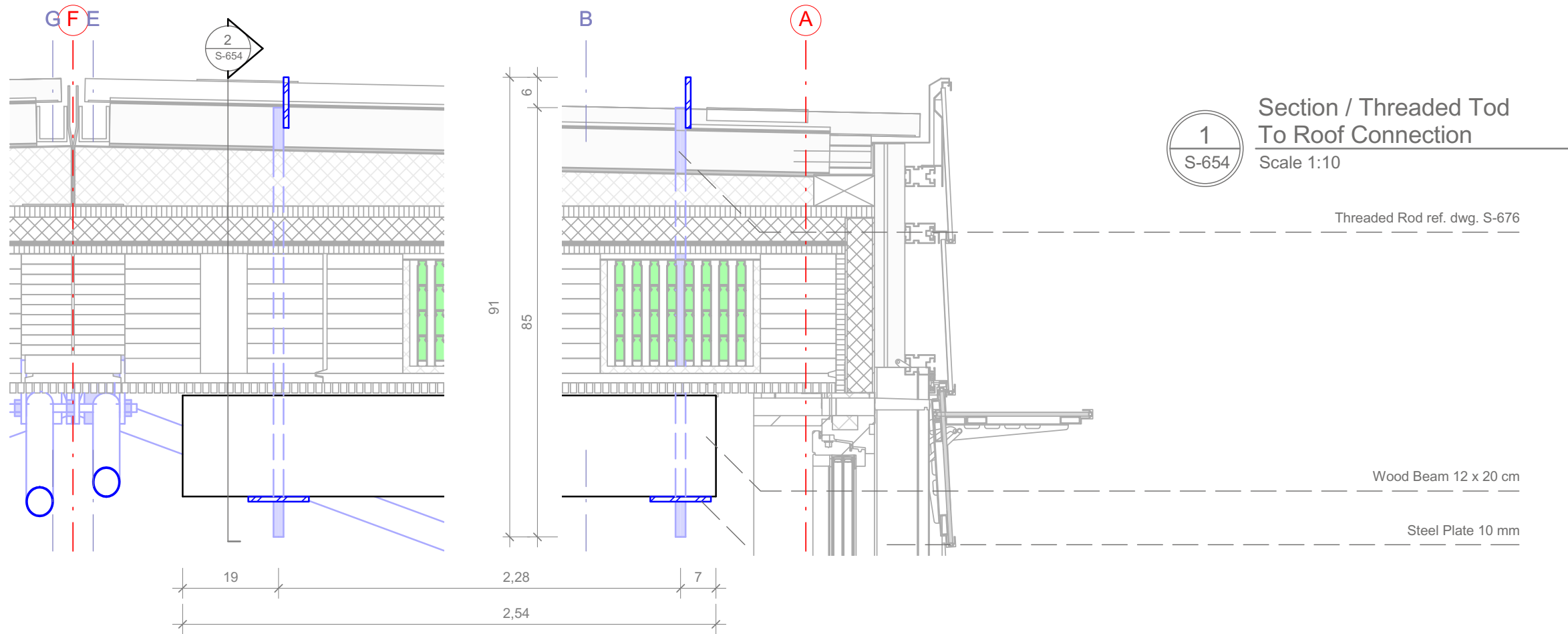


Drawn AO
Issued 05/12/09
Last index

Component
Structural

Description
Threaded Rod To Roof
Connection

Project # Scale dwg #
P 140 1 : 10 S-654



1:10



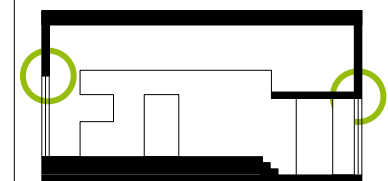
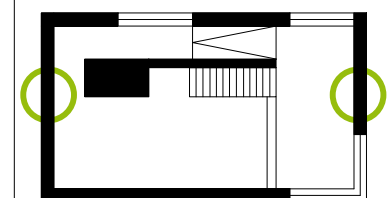


Constructor

 TECHNISCHE
UNIVERSITÄT
DARMSTADT

El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

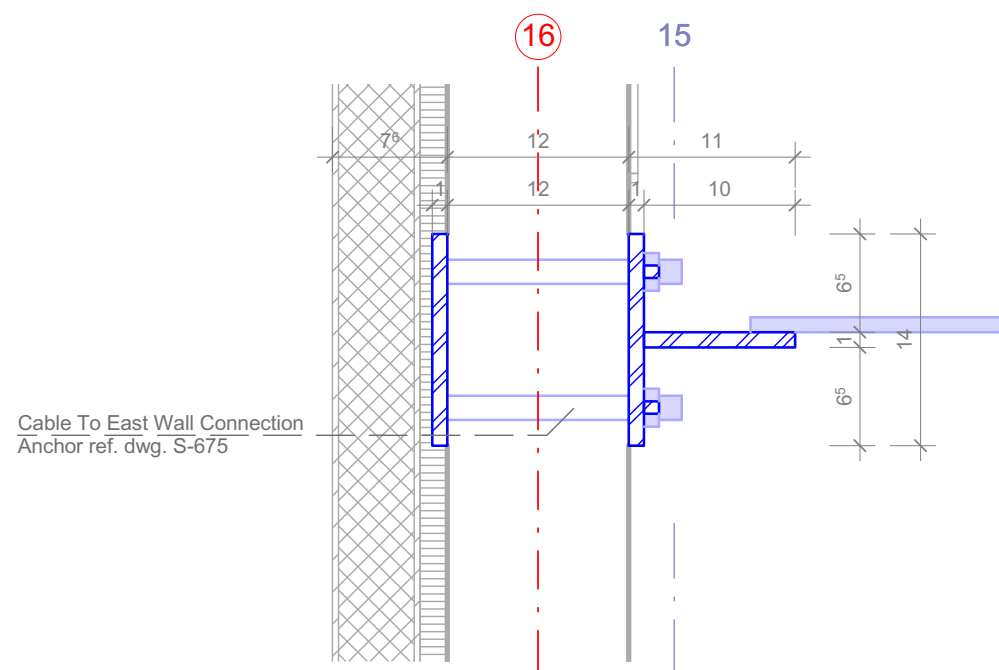


Drawn	AO
Issued	05/12/09
Last index	

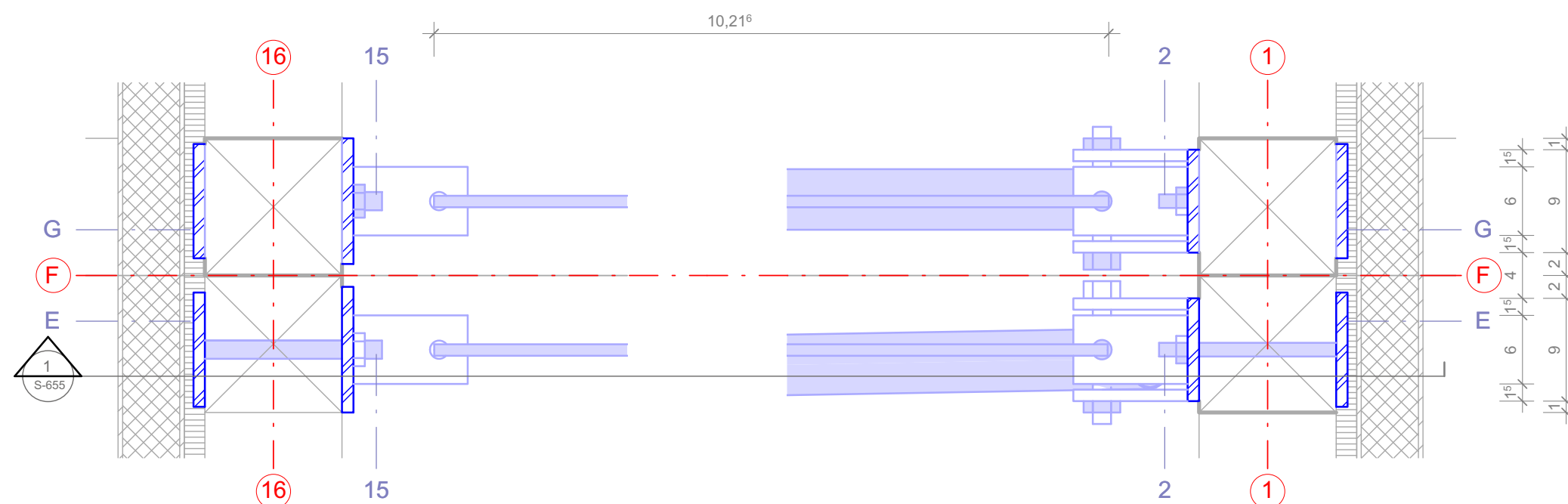
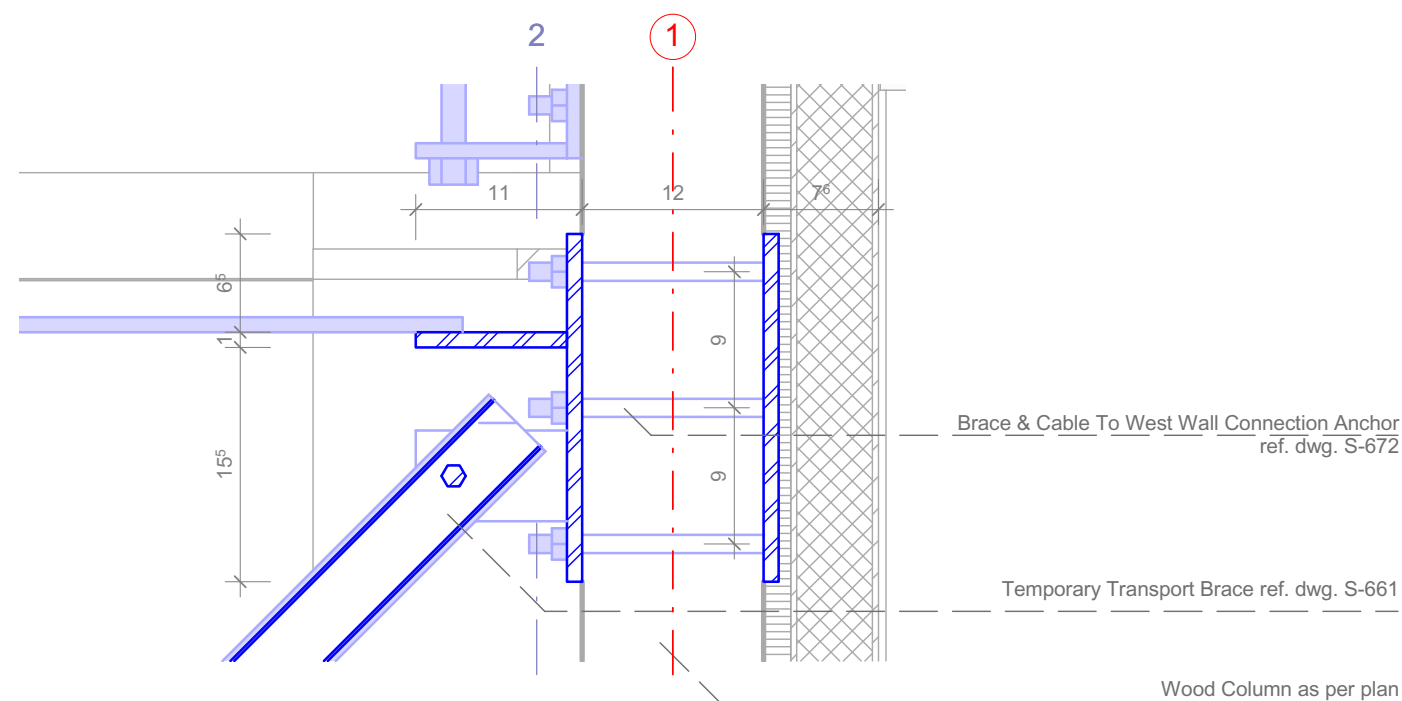
Component	Structural
1. Introduction	1. Introduction
2. Background	2. Background
3. Methodology	3. Methodology
4. Results	4. Results
5. Conclusion	5. Conclusion
6. References	6. References
7. Appendix	7. Appendix
8. Index	8. Index
9. Table of Contents	9. Table of Contents
10. Abstract	10. Abstract
11. Summary	11. Summary
12. References	12. References
13. Appendix	13. Appendix
14. Index	14. Index
15. Table of Contents	15. Table of Contents
16. Abstract	16. Abstract
17. Summary	17. Summary
18. References	18. References
19. Appendix	19. Appendix
20. Index	20. Index
21. Table of Contents	21. Table of Contents
22. Abstract	22. Abstract
23. Summary	23. Summary
24. References	24. References
25. Appendix	25. Appendix
26. Index	26. Index
27. Table of Contents	27. Table of Contents
28. Abstract	28. Abstract
29. Summary	29. Summary
30. References	30. References
31. Appendix	31. Appendix
32. Index	32. Index
33. Table of Contents	33. Table of Contents
34. Abstract	34. Abstract
35. Summary	35. Summary
36. References	36. References
37. Appendix	37. Appendix
38. Index	38. Index
39. Table of Contents	39. Table of Contents
40. Abstract	40. Abstract
41. Summary	41. Summary
42. References	42. References
43. Appendix	43. Appendix
44. Index	44. Index
45. Table of Contents	45. Table of Contents
46. Abstract	46. Abstract
47. Summary	47. Summary
48. References	48. References
49. Appendix	49. Appendix
50. Index	50. Index
51. Table of Contents	51. Table of Contents
52. Abstract	52. Abstract
53. Summary	53. Summary
54. References	54. References
55. Appendix	55. Appendix
56. Index	56. Index
57. Table of Contents	57. Table of Contents
58. Abstract	58. Abstract
59. Summary	59. Summary
60. References	60. References
61. Appendix	61. Appendix
62. Index	62. Index
63. Table of Contents	63. Table of Contents
64. Abstract	64. Abstract
65. Summary	65. Summary
66. References	66. References
67. Appendix	67. Appendix
68. Index	68. Index
69. Table of Contents	69. Table of Contents
70. Abstract	70. Abstract
71. Summary	71. Summary
72. References	72. References
73. Appendix	73. Appendix
74. Index	74. Index
75. Table of Contents	75. Table of Contents
76. Abstract	76. Abstract
77. Summary	77. Summary
78. References	78. References
79. Appendix	79. Appendix
80. Index	80. Index
81. Table of Contents	81. Table of Contents
82. Abstract	82. Abstract
83. Summary	83. Summary
84. References	84. References
85. Appendix	85. Appendix
86. Index	86. Index
87. Table of Contents	87. Table of Contents
88. Abstract	88. Abstract
89. Summary	89. Summary
90. References	90. References
91. Appendix	91. Appendix
92. Index	92. Index
93. Table of Contents	93. Table of Contents
94. Abstract	94. Abstract
95. Summary	95. Summary
96. References	96. References
97. Appendix	97. Appendix
98. Index	98. Index
99. Table of Contents	99. Table of Contents
100. Abstract	100. Abstract
101. Summary	101. Summary
102. References	102. References
103. Appendix	103. Appendix
104. Index	104. Index
105. Table of Contents	105. Table of Contents
106. Abstract	106. Abstract
107. Summary	107. Summary

Description
Cable To Wall Connection

Project #	Scale	dwg #
P 140	1 : 5	S-655



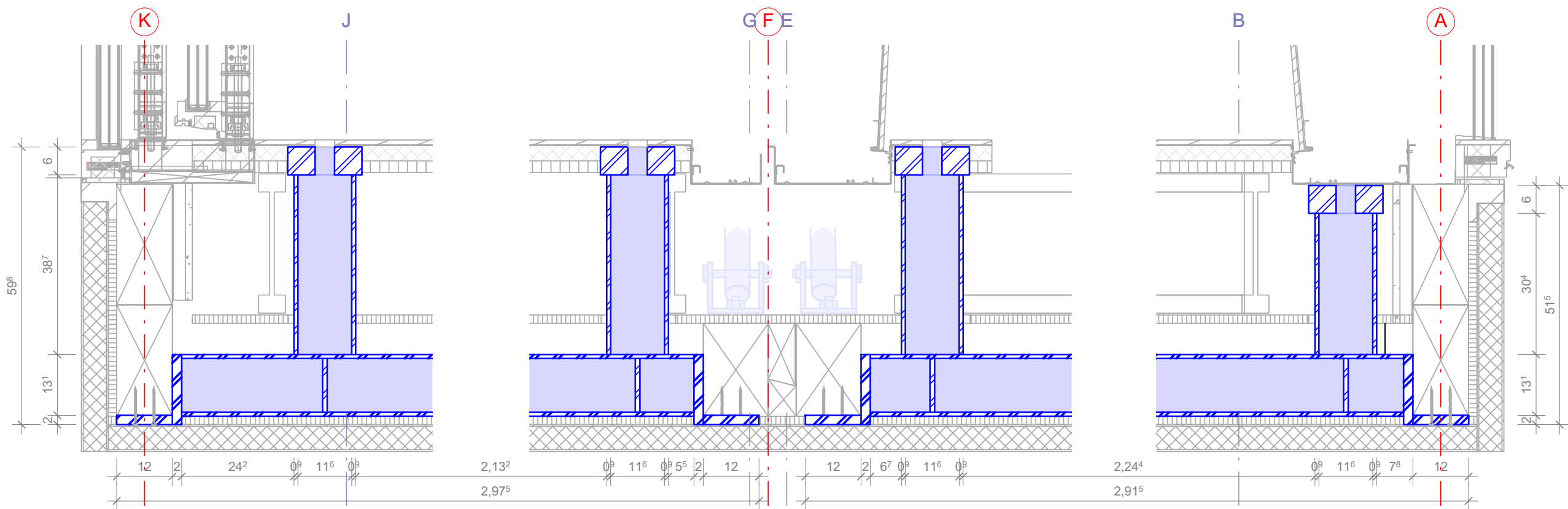
1 Section / Cable To Wall Connection
S-655 Scale 1:5 ref. Drawing S-632



2 Cable To Wall Connection
S-655 Scale 1:5 ref. Drawing S-621

1:5

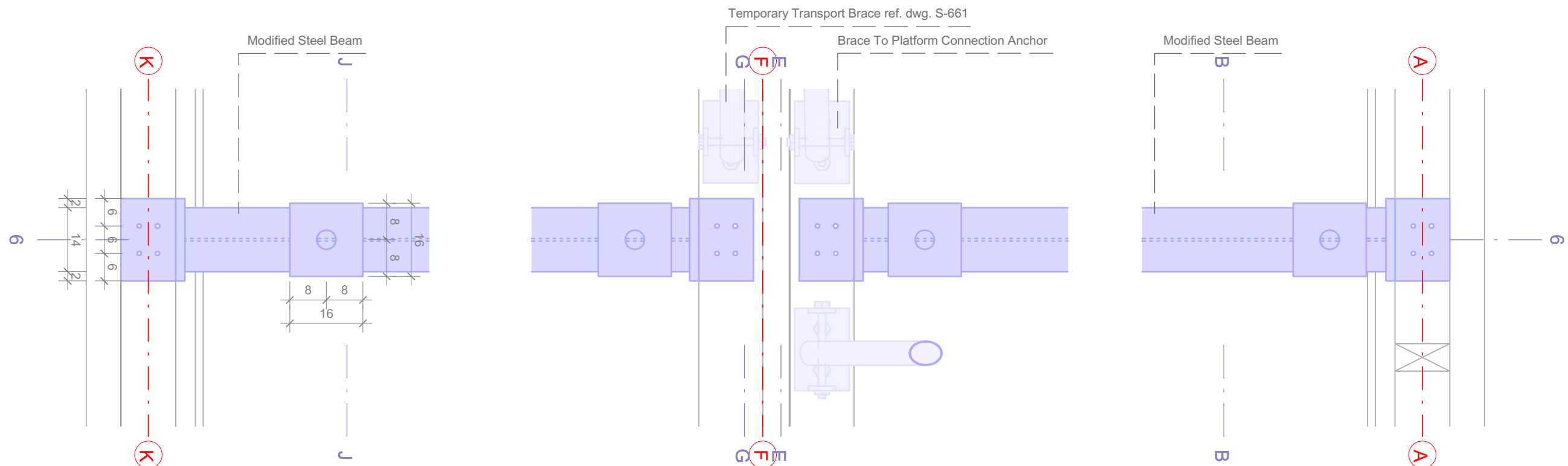




1
S-656

Section / Becket To Platform Connection West

Scale 1:10

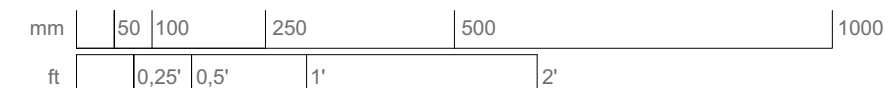


2
S-656

Becket To Platform Connection West

Scale 1:10

1:10



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn AO

Issued 03/29/09

Last index

Component

Structural

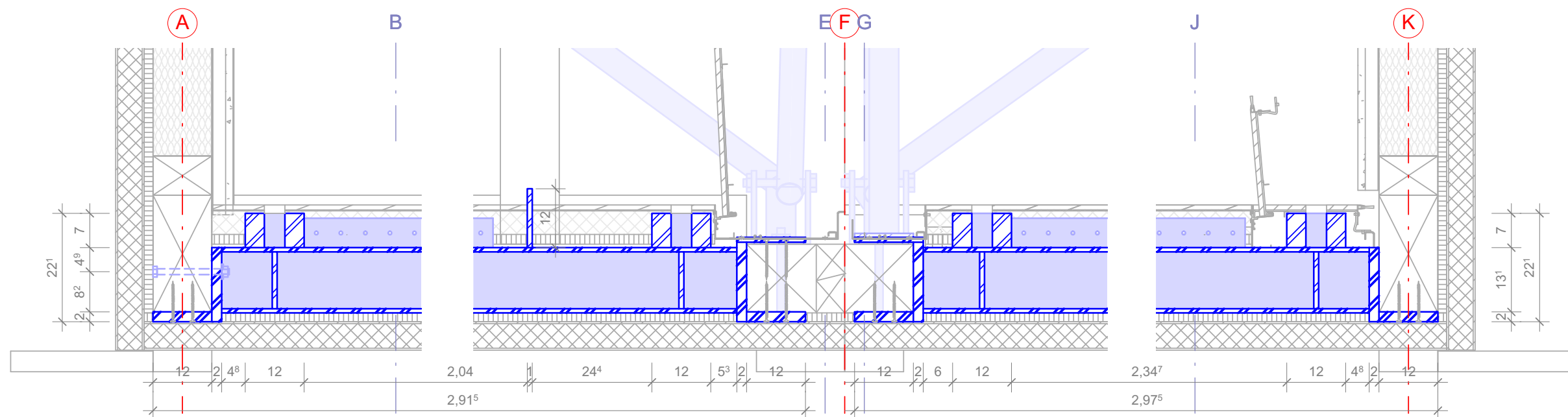
Description

Becket to Platform Connection West

Project # P 140

Scale 1 : 10

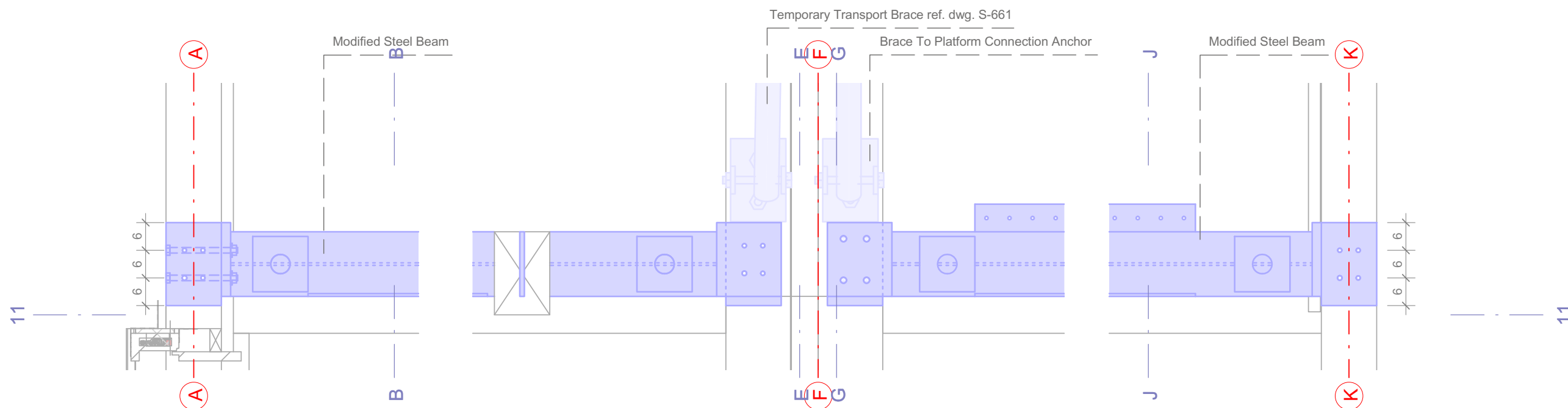
dwg # S-656



1
S-657

Section / Becket To Platform Connection East

Scale 1:10

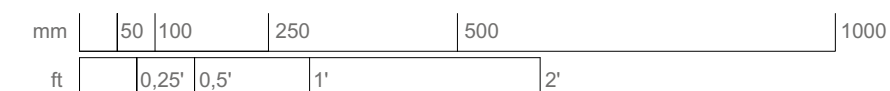


2
S-657

Becket To Platform Connection East

Scale 1:10

1:10



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

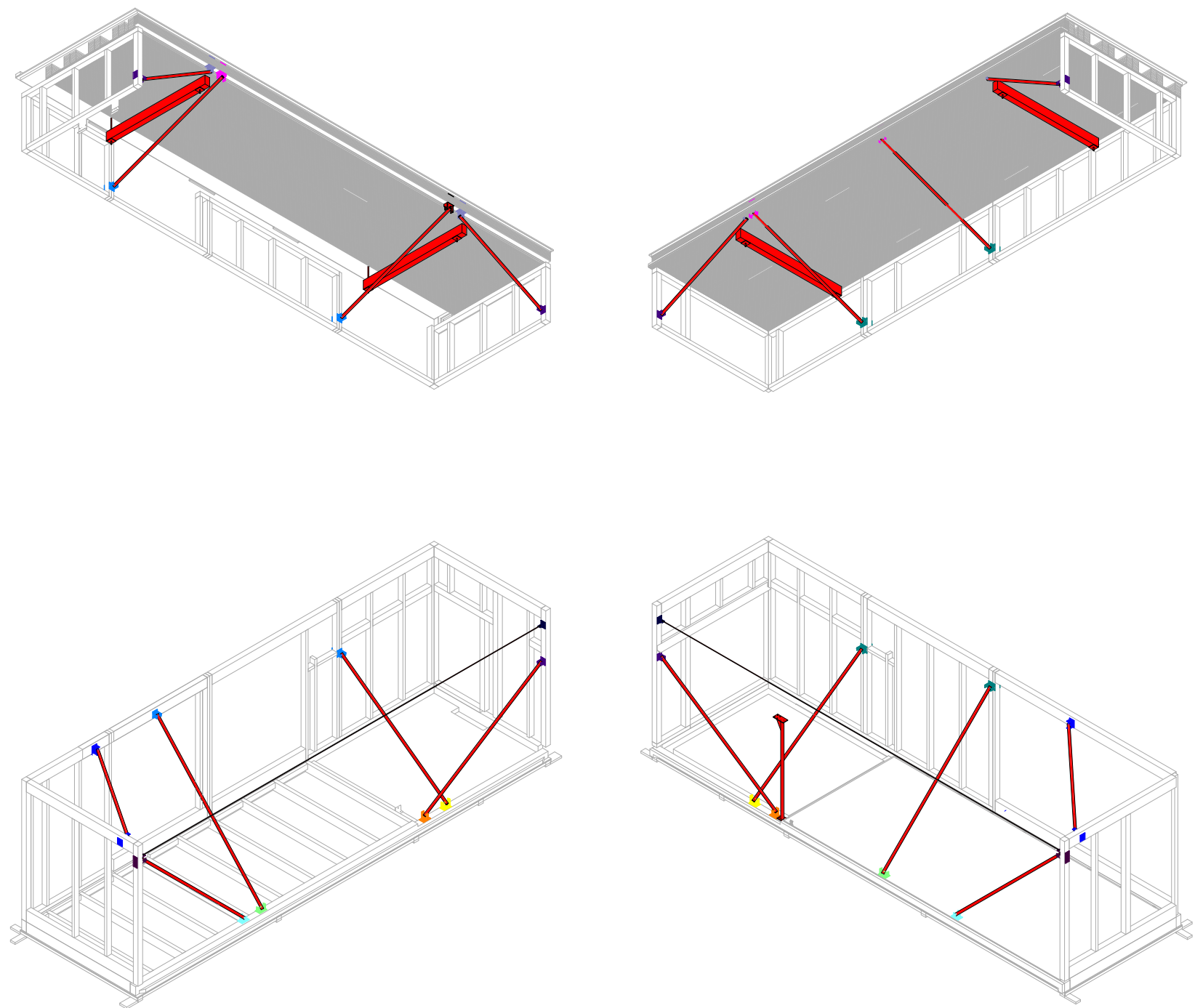
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit

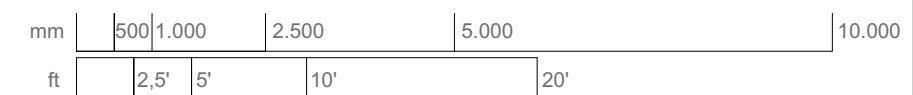
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

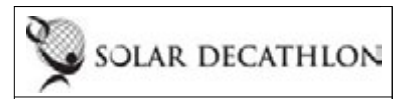
Navigation/Legend

Drawn	AO	
Issued	03/29/09	
Last index		
Component	Structural	
Description	Becket to Platform Connection East	
Project #	Scale	dwg #
P 140	1 : 10	S-657

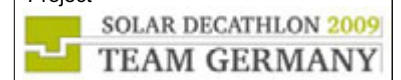



1:100





Project

SOLAR DECATHLON 2009
TEAM GERMANY

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Constructor

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn

AO

Issued

05/13/09

Last index

Component

Structural

Description

Anchor Overview

Project #

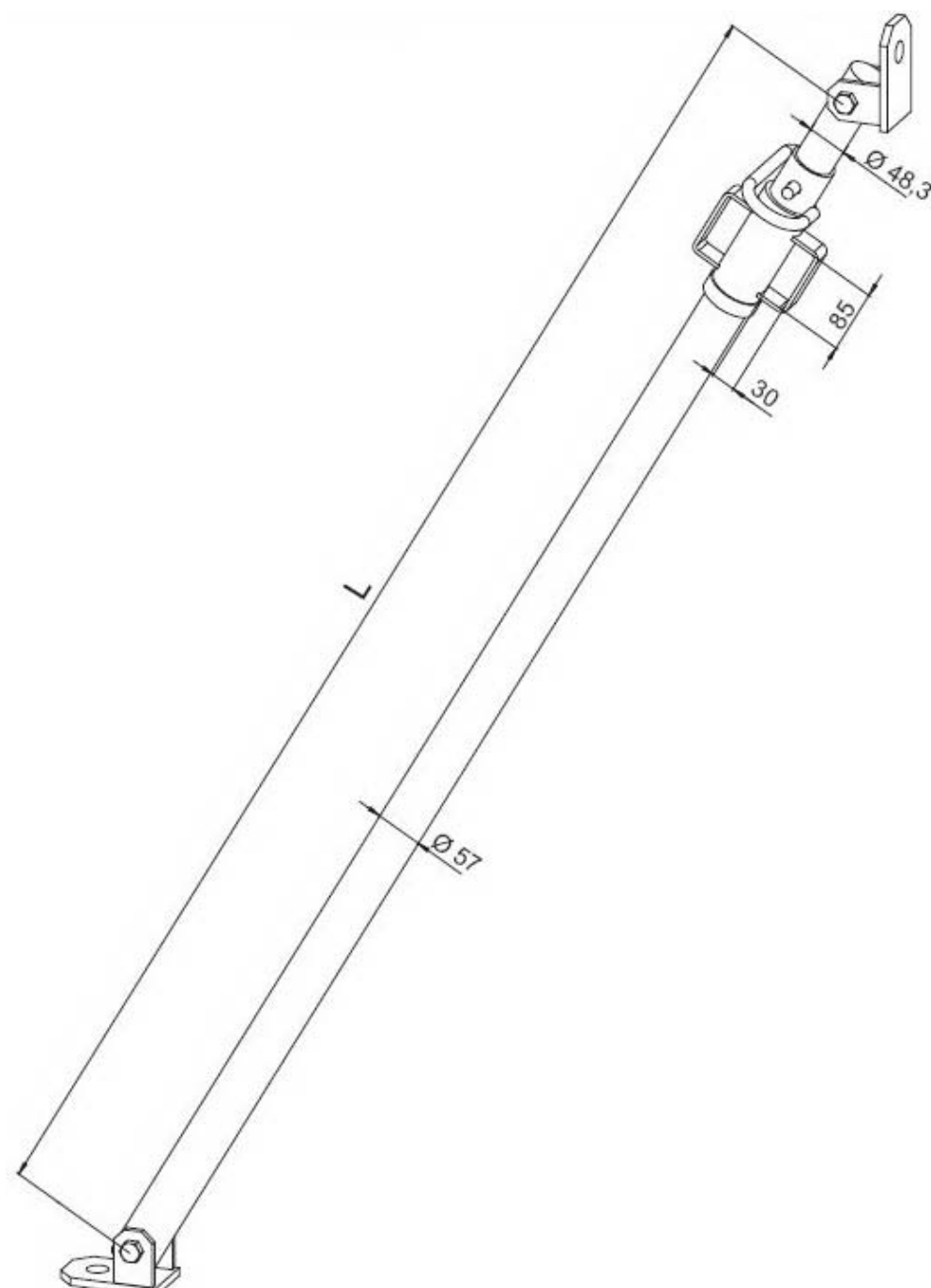
P 140

Scale

1:100

dwg #

S-660



Type	L [m]	Weight [Kg/Part]
I - M	1,74 - 2,94	17,0
III - M	2,44 - 4,24	25,0

Extension Length [m]	Type I - M Support Load [KN]	Type III - M Support Load [KN]
1,80	27,8	
1,90	27,2	
2,00	26,7	
2,10	26,1	
2,20	25,5	
2,30	25,0	
2,40	24,4	
2,50	23,8	23,9
2,60	23,2	23,3
2,70	22,7	22,7
2,80	22,1	22,2
2,90	21,5	21,6
3,00	21,9	21,0
3,10		20,4
3,20		19,8
3,30		19,3
3,40		18,7
3,50		18,1
3,60		17,5
3,70		16,9
3,80		16,4
3,90		15,8
4,00		15,2
4,10		14,6
4,20		14,0
4,30		13,4

Project

TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn
AO

Issued
05/12/09

Last index

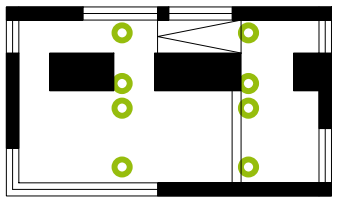
Component
Structural

Description

Trans. Brace
Manufacturer Spec.

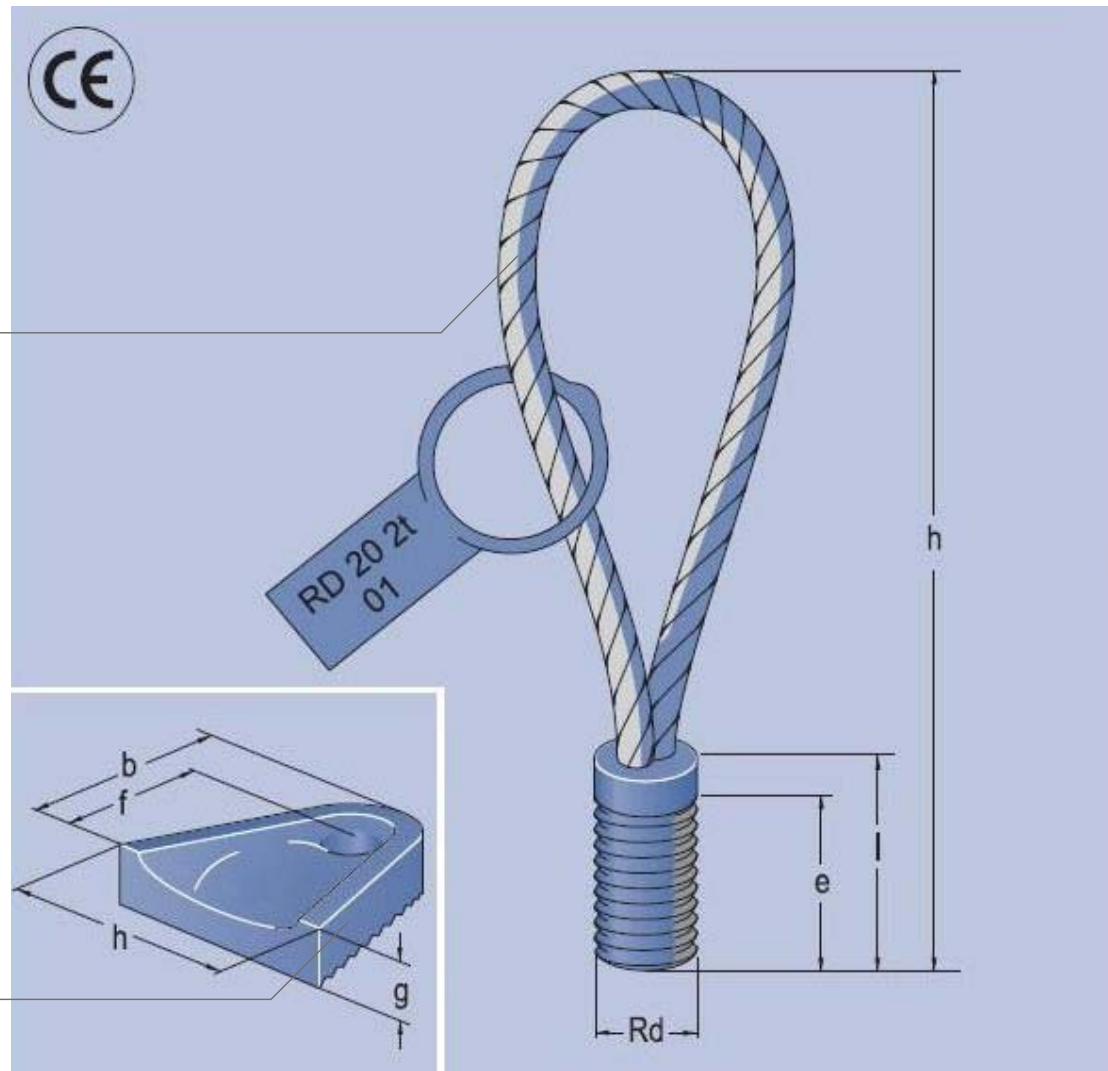
Project #
Scale
dwg #

P 140
S-661



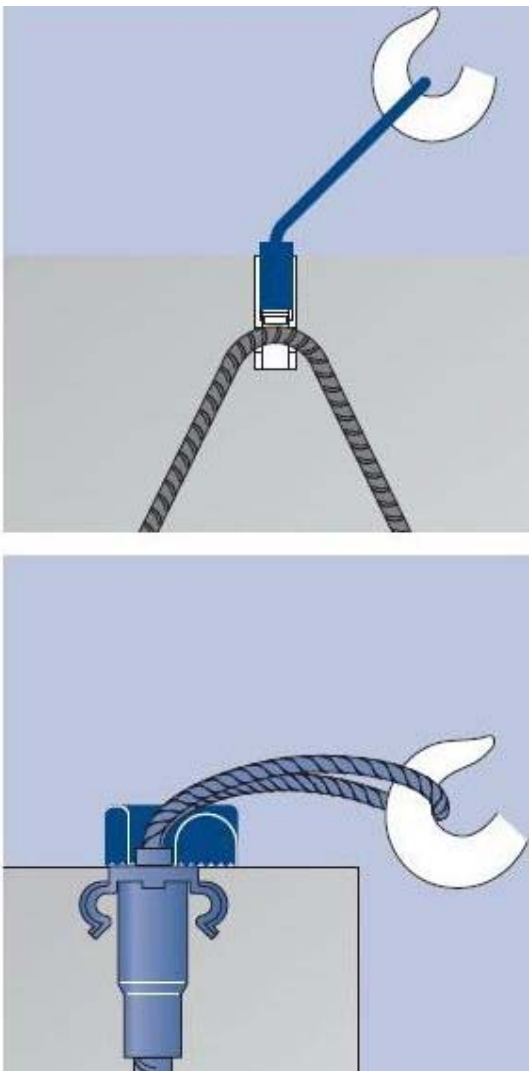
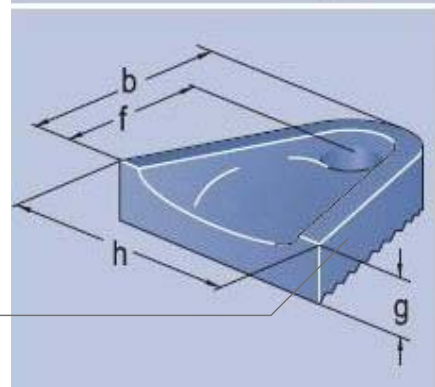
Becket

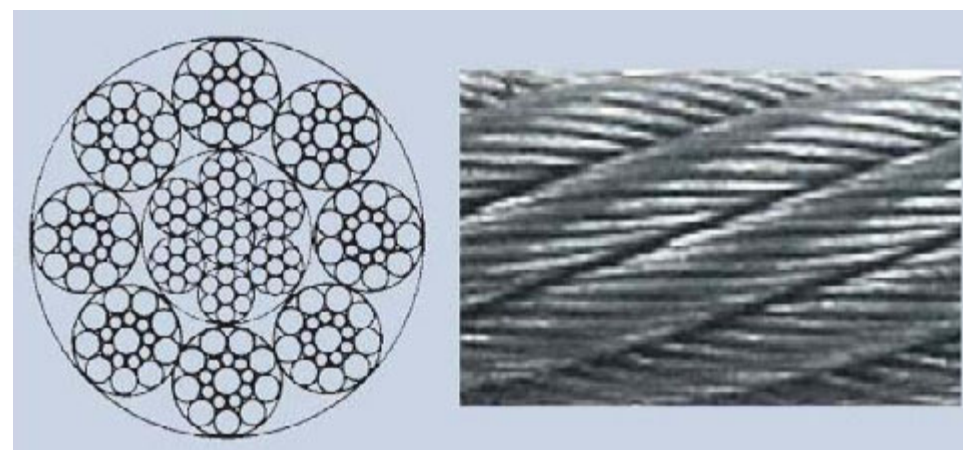
Rd 42 x 4,50 mm
e = 80 mm
l = 95 mm
h = 425 mm



Diverting Ring

b = 164 mm
f = 108 mm
g = 76 mm
h = 190 mm



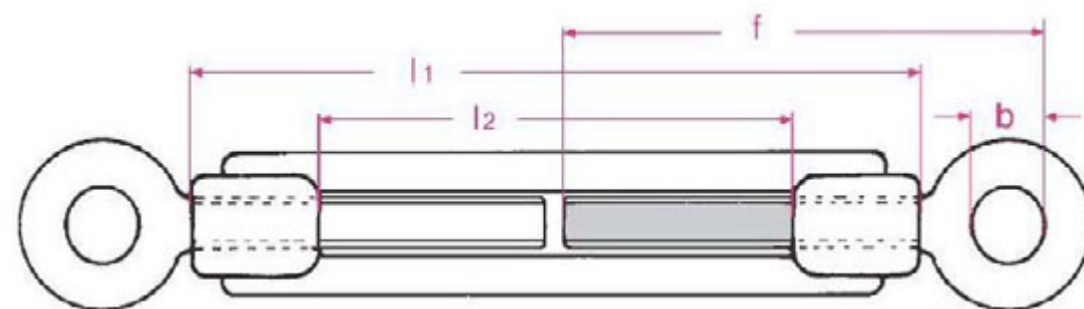


D = 10mm

Minimum Breaking Load = 6,1t



Cable Manufacturer Specifications



l1 = 265 mm
l2 = 165 mm
f = 255 mm
b = 31 mm



Tightener Manufacturer Specifications

Project

TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn

AO

Issued

05/12/09

Last index

Component

Structural

Description

**Cable & Tightener
Manufacturer Spec.**

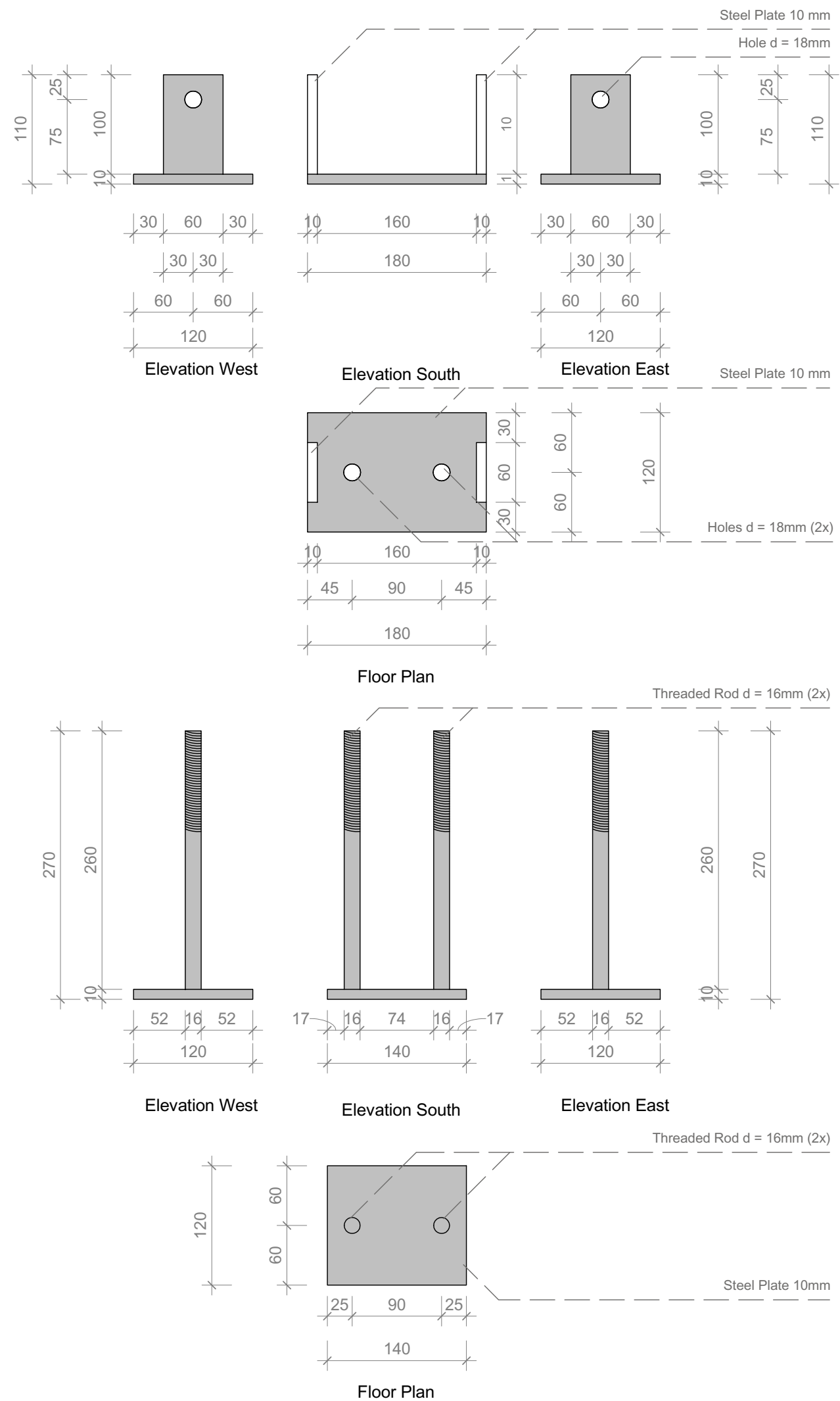
Project #

Scale

dwg #

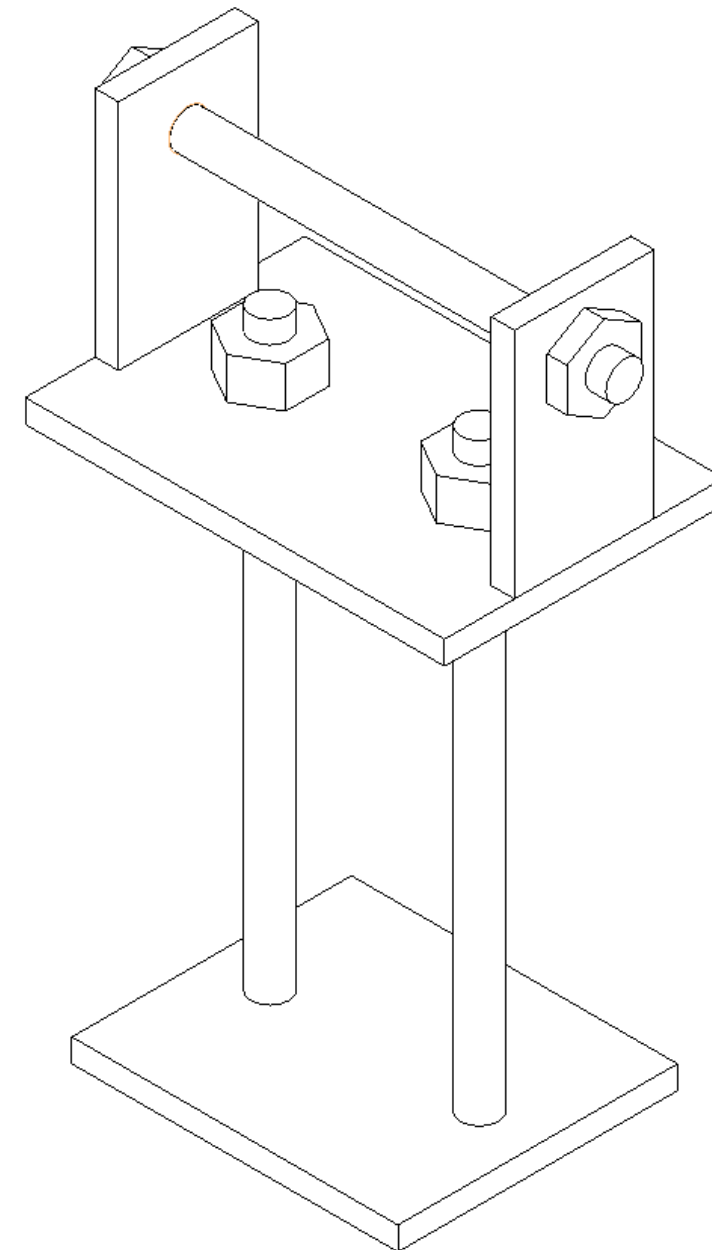
P 140

S-663



1
S-664

Trans. Brace Platform Anchor West
Scale 1:5



1:5



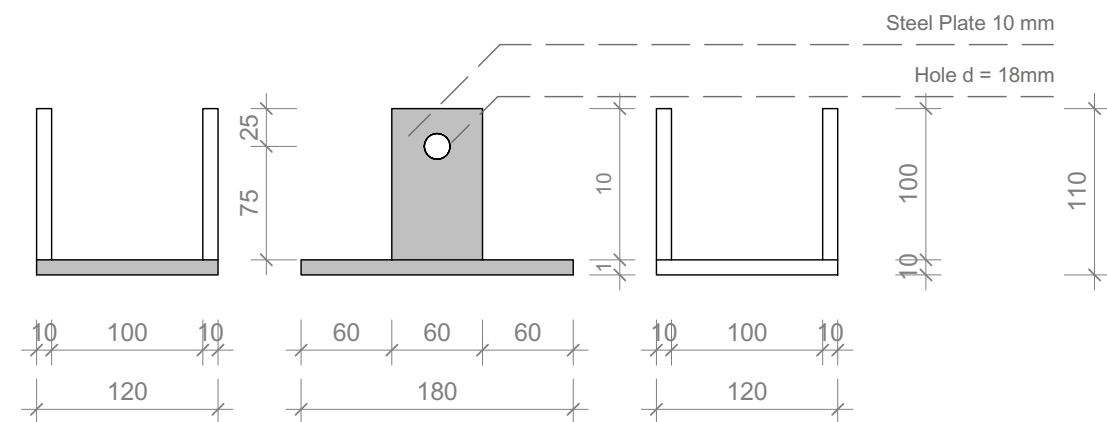
Project

Constructor

Department of Architecture
 Energyefficient Building Design Unit
 El-Lissitzky-Str. 1
 64287 Darmstadt
 +49 (0) 6151 / 165448
 +49 (0) 6151 / 165247
 team@solardecathlon2009.de

Navigation/Legend

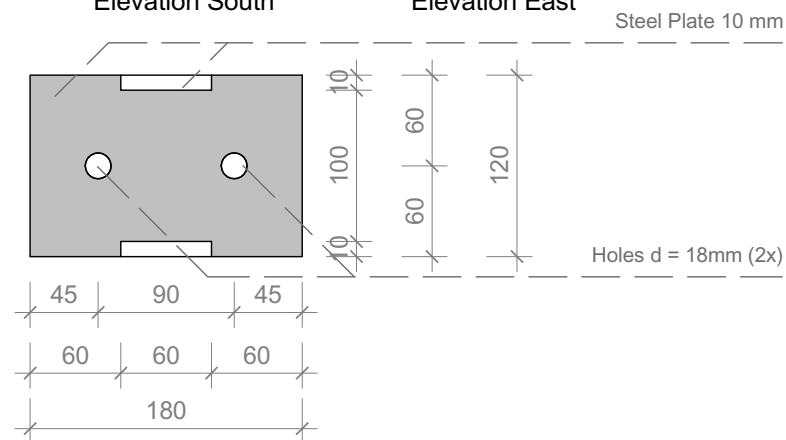
Drawn	AO
Issued	03/21/09
Last index	
Component	Structural
Description	Trans. Brace Platform Anchor West
Project #	P 140
Scale	1 : 5
dwg #	S-664



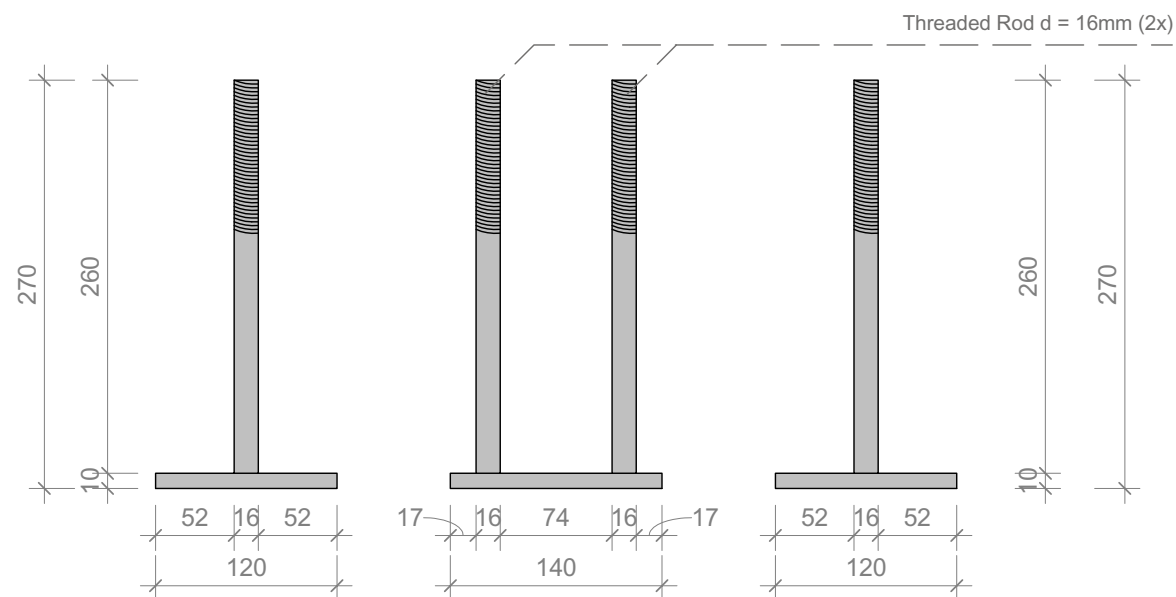
Elevation West

Elevation South

Elevation East



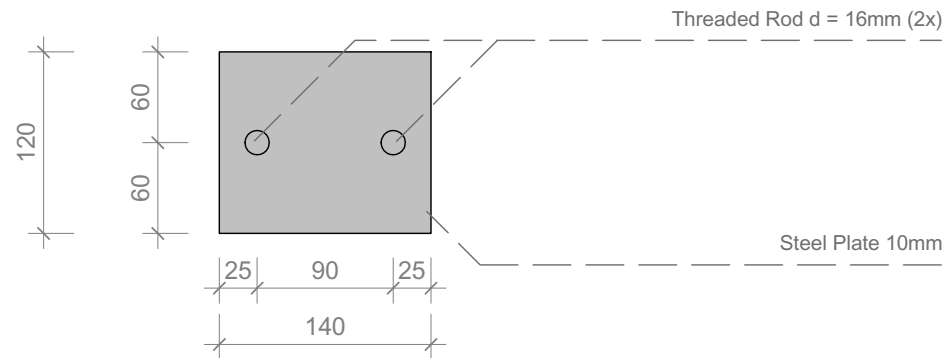
Floor Plan



Elevation West

Elevation South

Elevation East

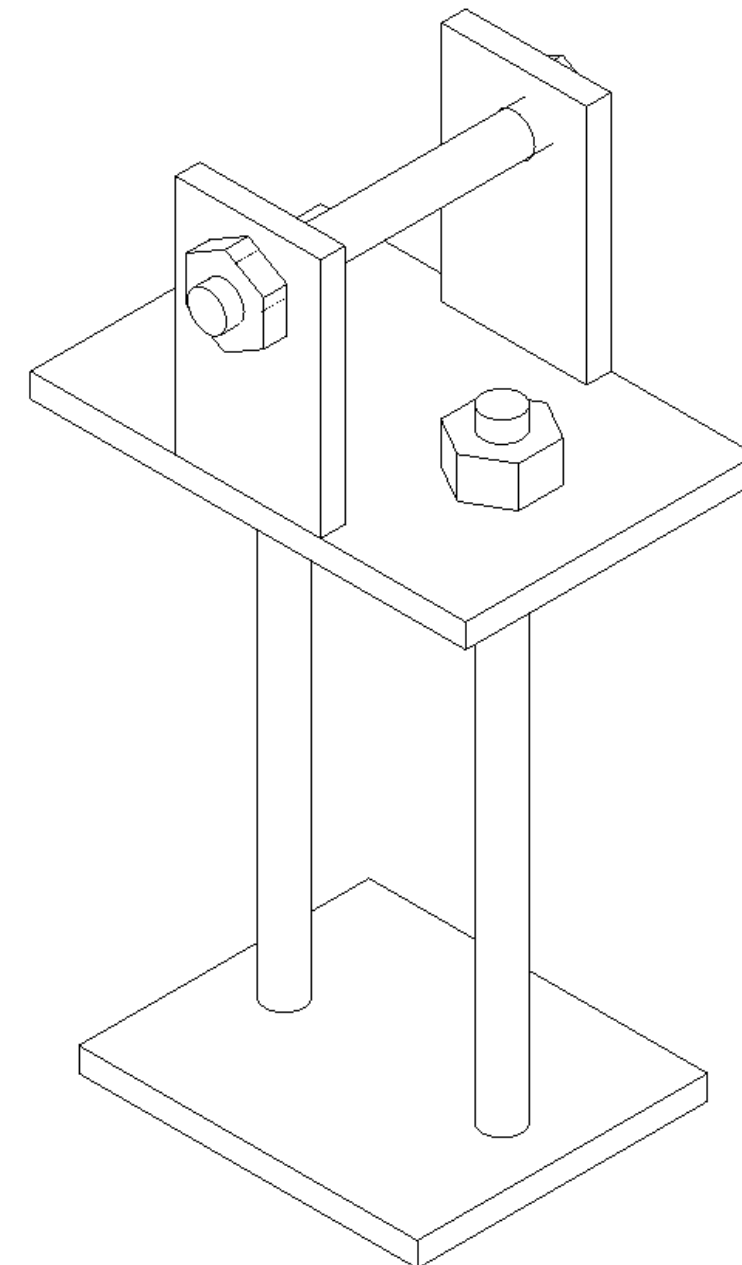


Floor Plan

1
S-665

Trans. Brace Platform Anchor West Rotated

Scale 1:5



1:5



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

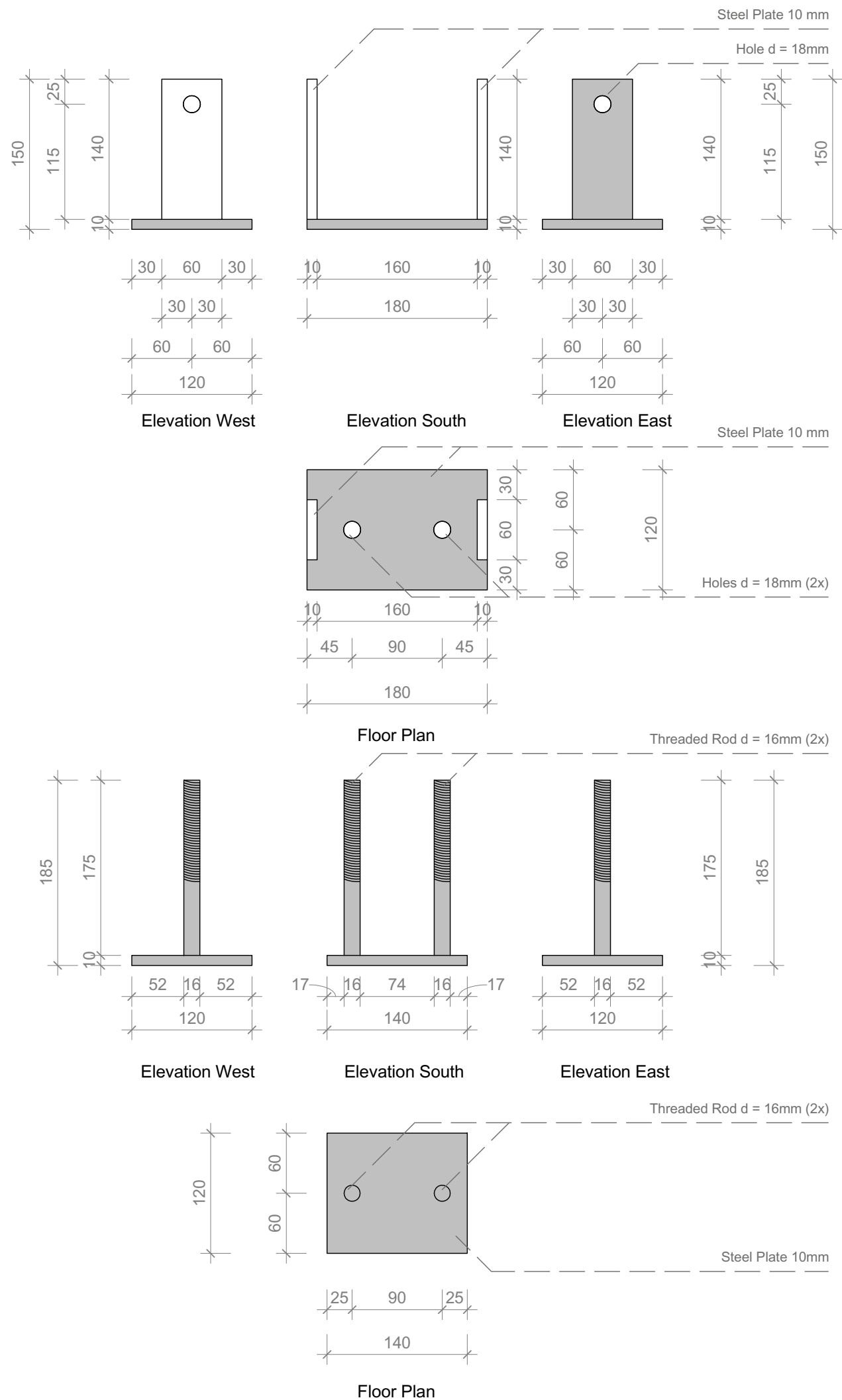
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit

El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

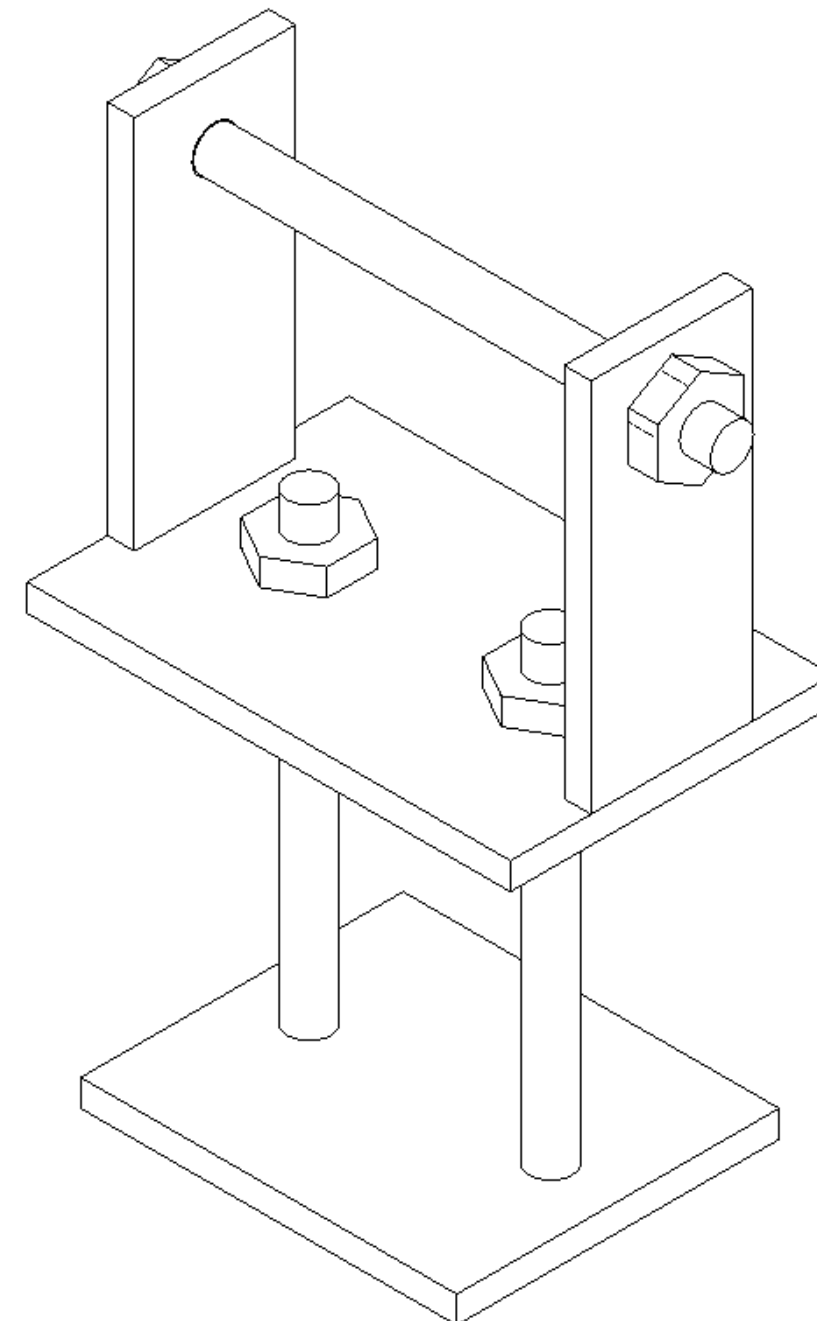
Drawn	AO
Issued	05/03/09
Last index	
Component	Structural
Description	Trans. Brace Platform Anchor West Rotated
Project #	P 140
Scale	1 : 5
dwg #	S-665



1
S-666

Trans. Brace Platform Anchor East

Scale 1:5



1:5



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit

El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn AO

Issued 03/21/09

Last index

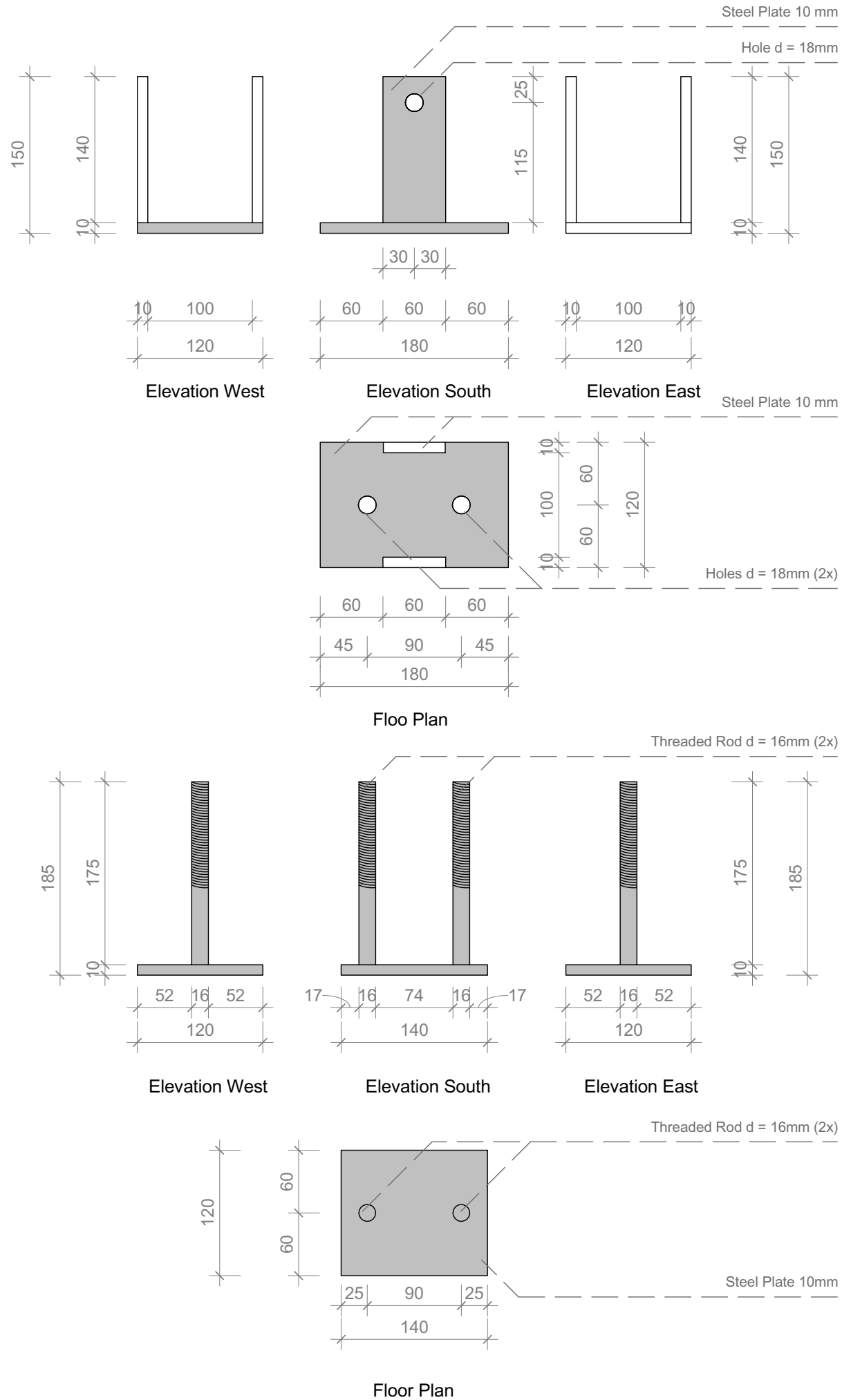
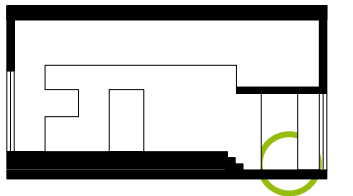
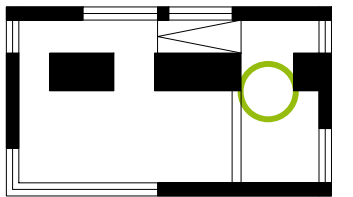
Component
Structural

Description
Trans. Brace Platform
Anchor East

Project # P 140

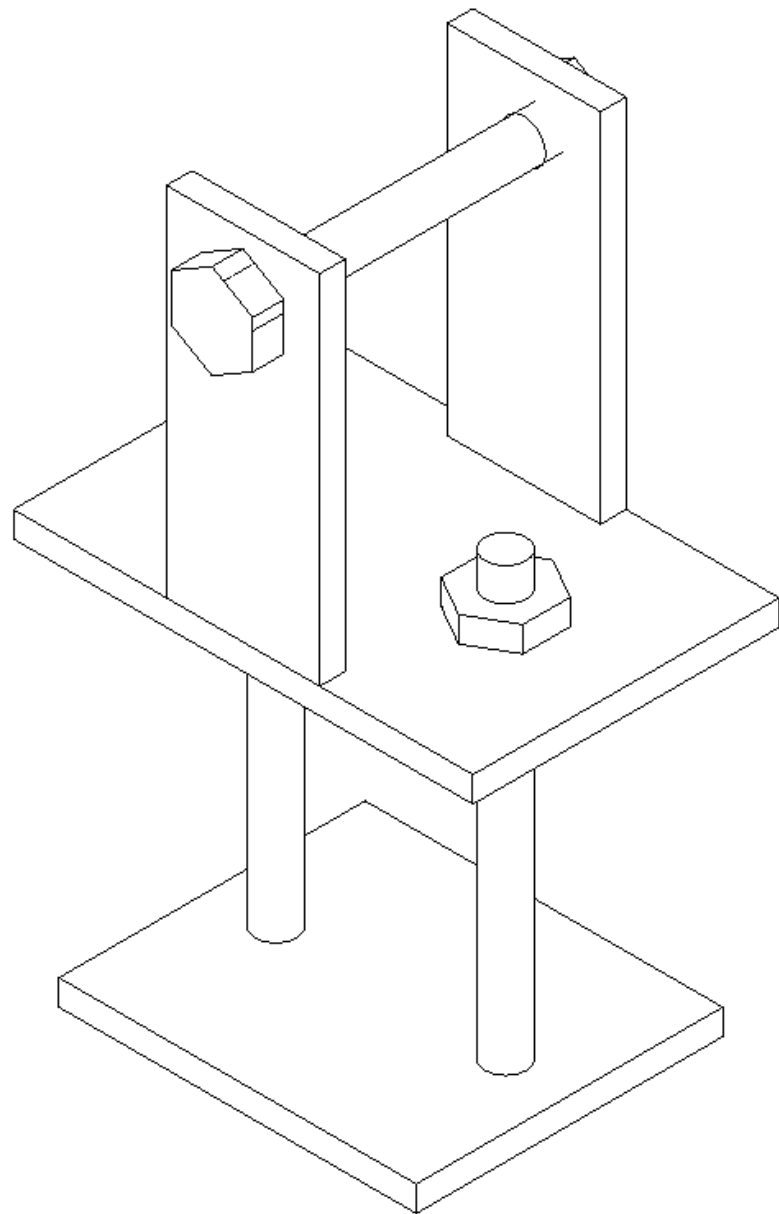
Scale 1 : 5

dwg # S-666

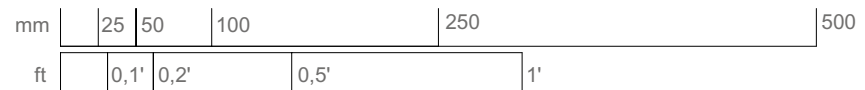


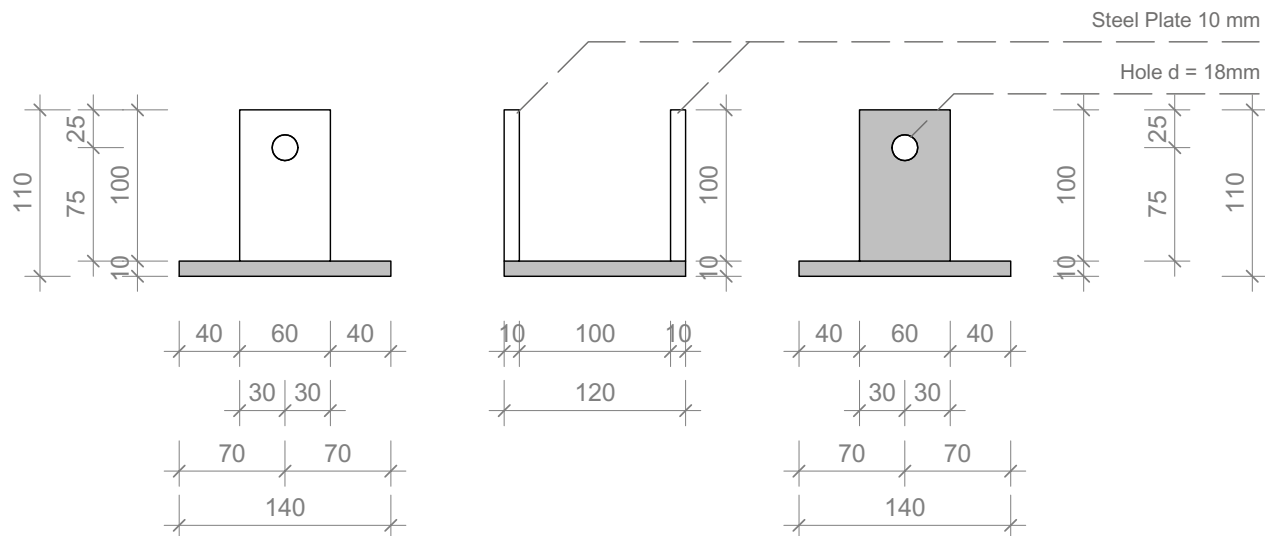
1
S-667

Trans. Brace Platform Anchor East Rotated
 Scale 1:5



1:5

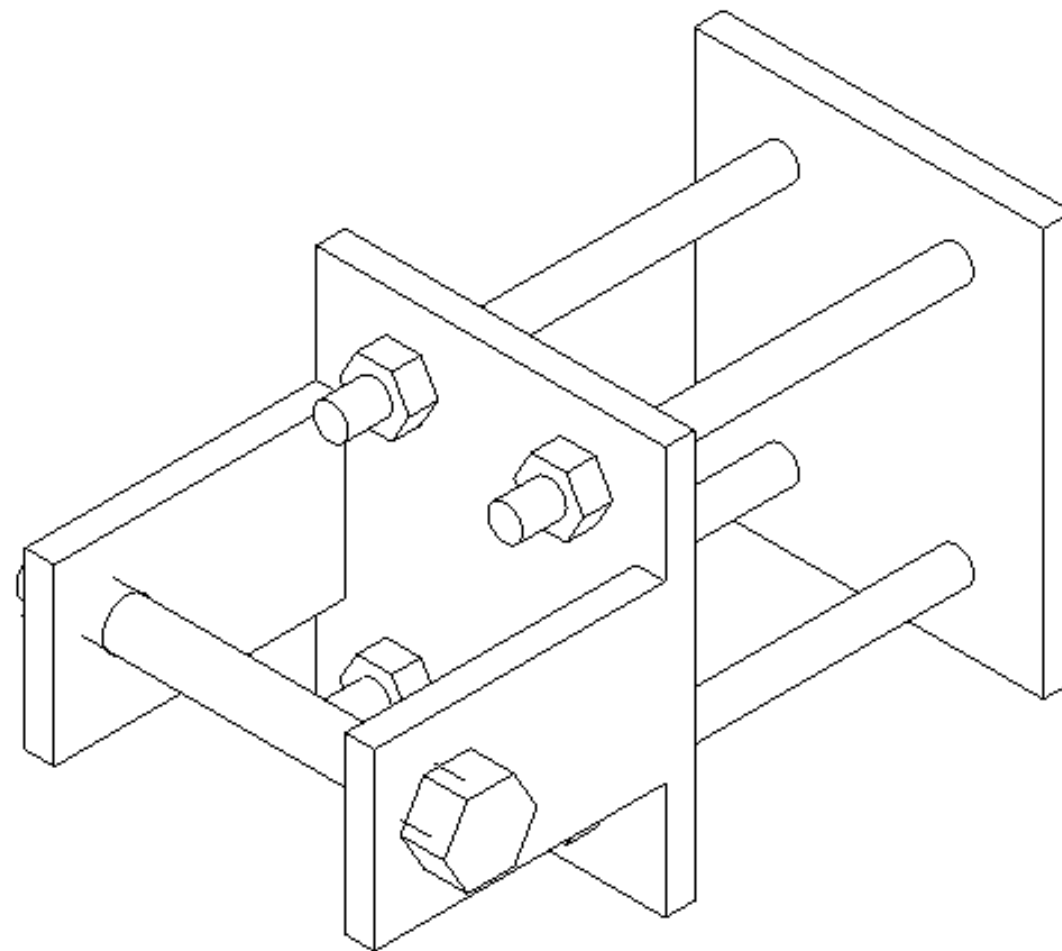
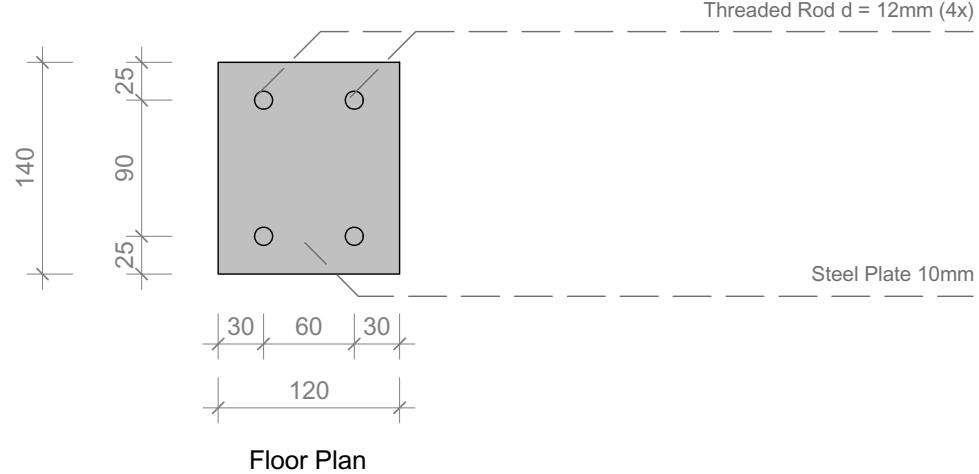
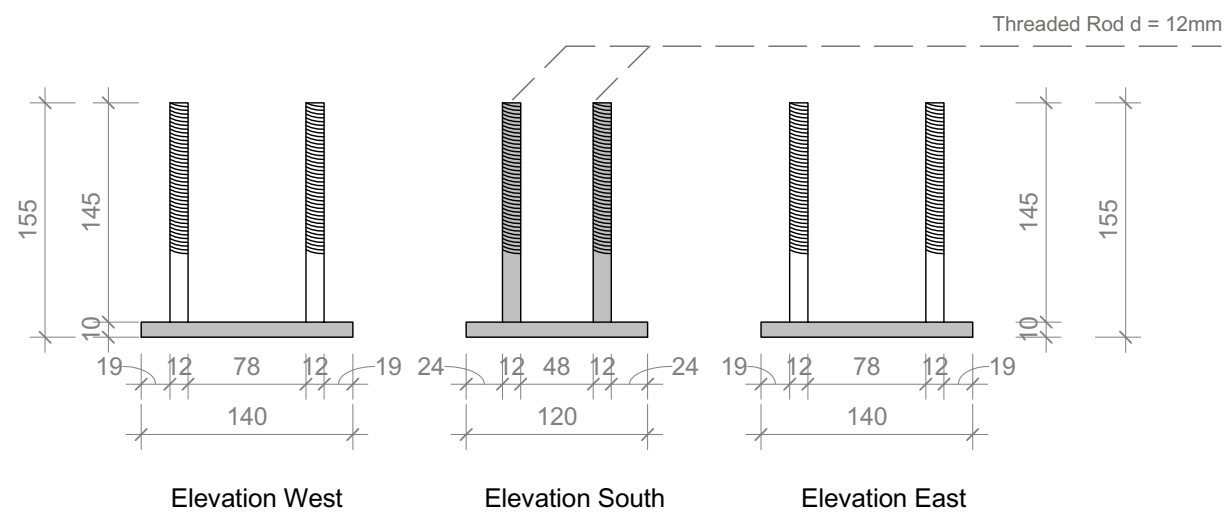
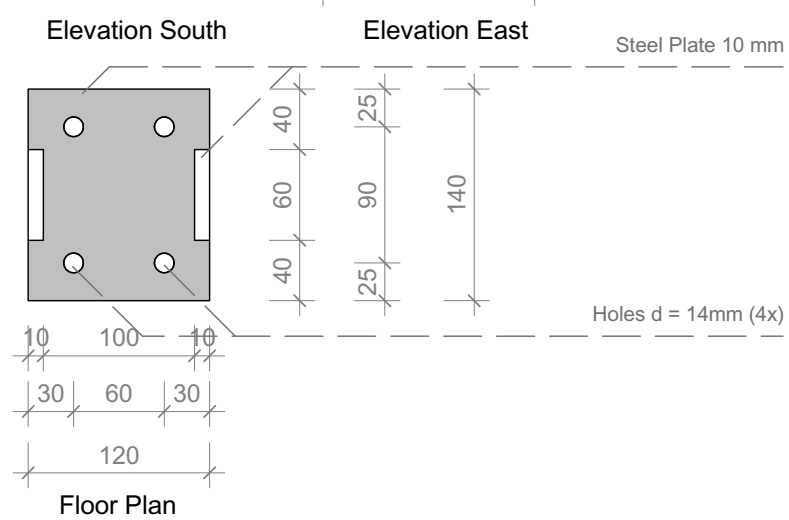




1
S-669

Trans. Brace North Wall Anchor

Scale 1:5



1:5



Project

TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn
AO

Issued
03/22/09

Last index

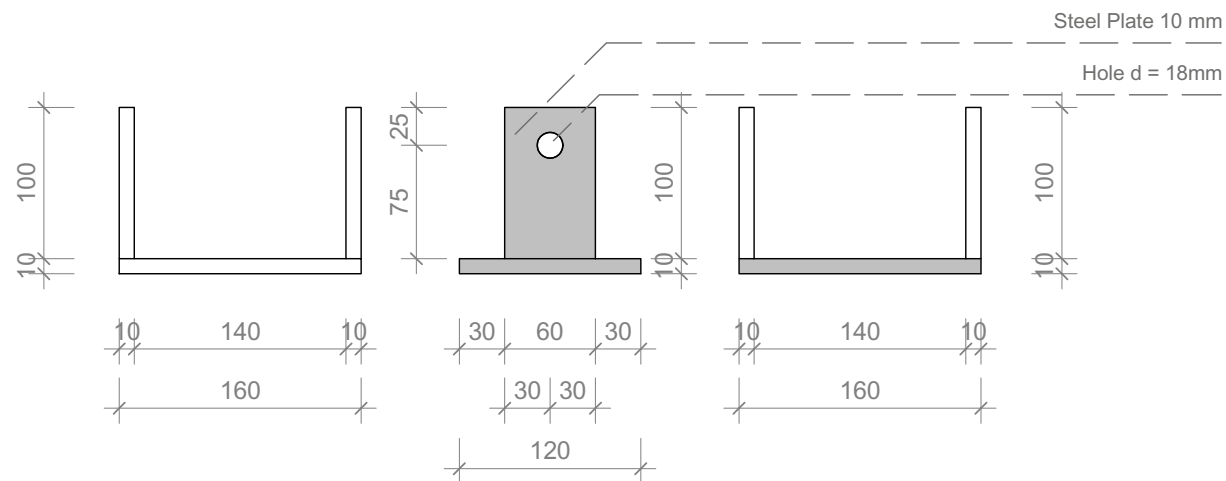
Component
Structural

Description
**Trans. Brace North
Wall Anchor**

Project #
P 140

Scale
1 : 5

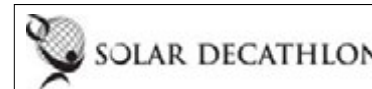
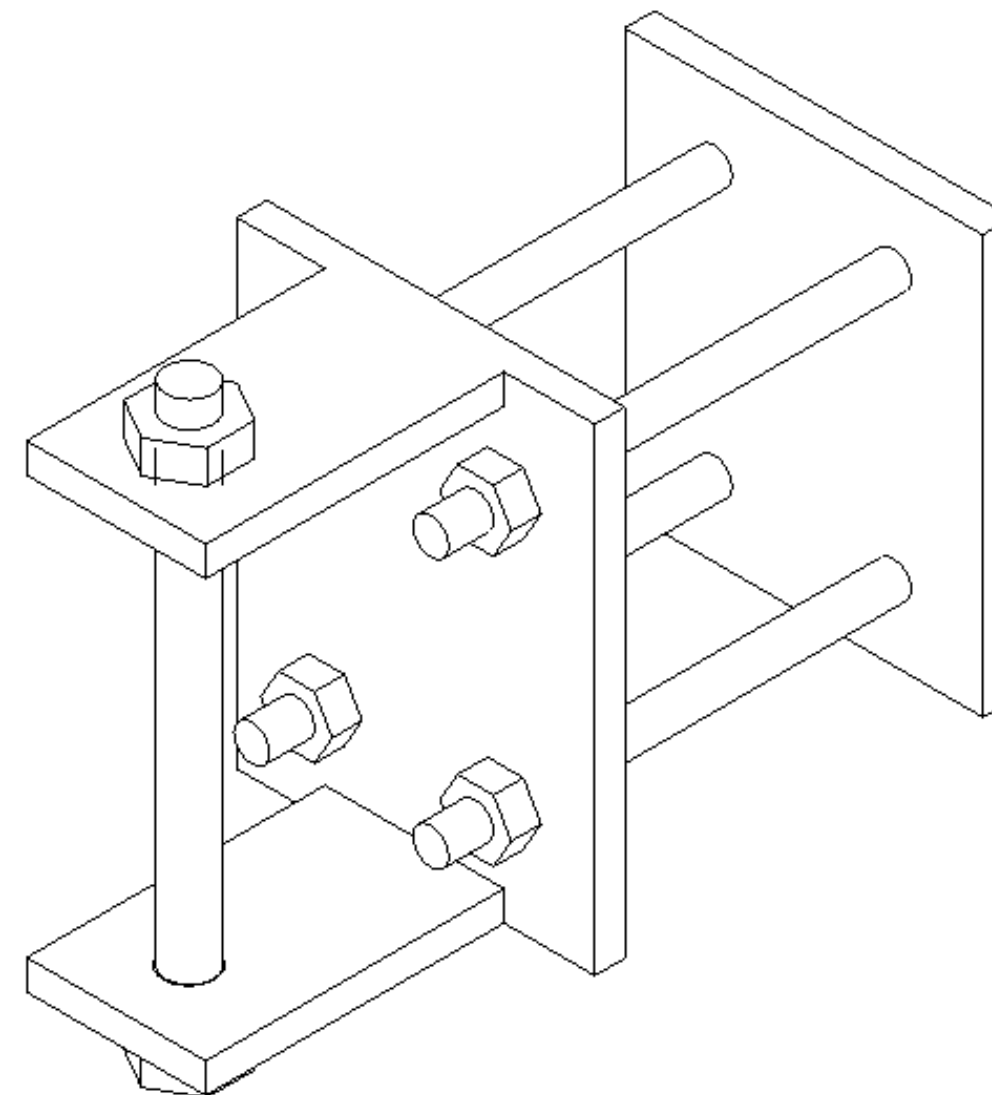
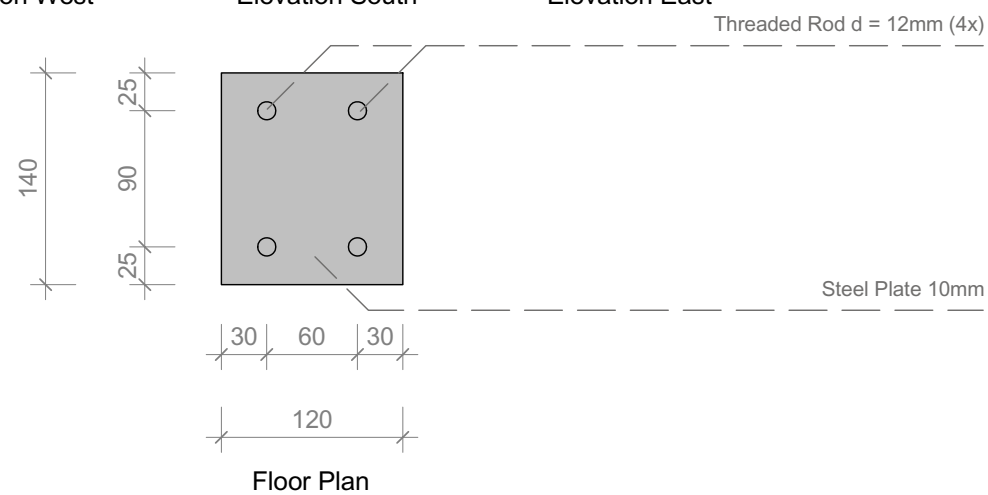
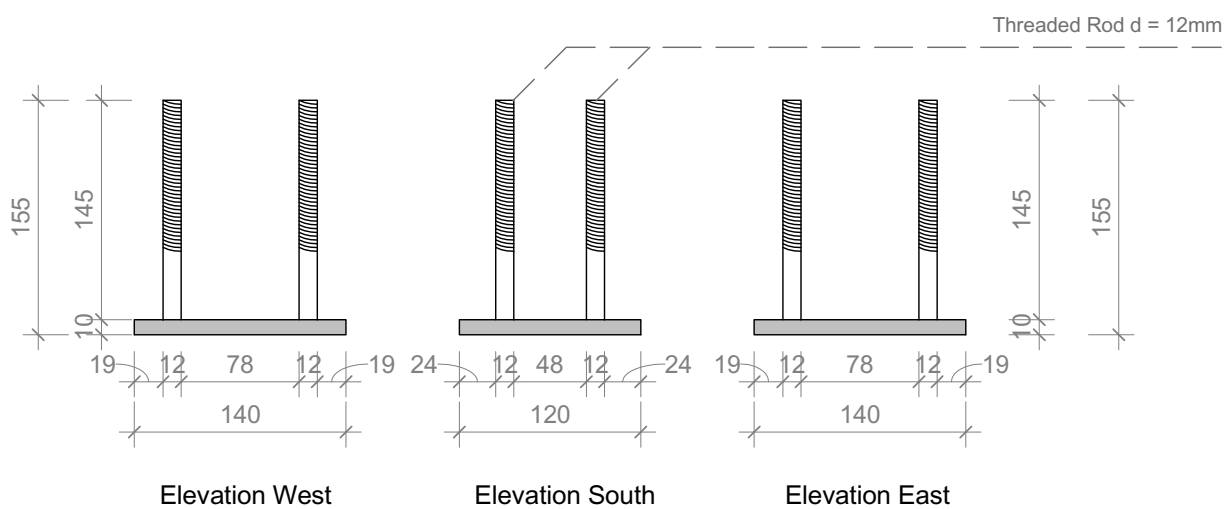
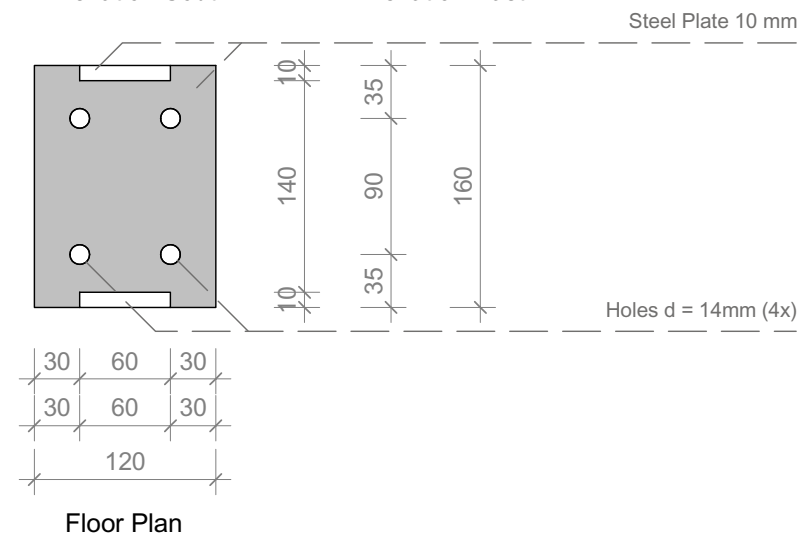
dwg #
S-669



1
S-670

Trans. Brace Module Bonding Anchor

Scale 1:5



Project



Constructor



Department of Architecture
Energyefficient Building Design
Unit

El-Lissitzky-Str. 1

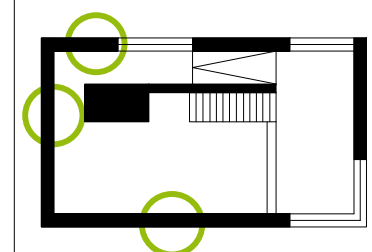
64287 Darmstadt

+49 (0) 6151 / 165448

+49 (0) 6151 / 165247

team@solardecathlon2009.de

Navigation/Legend



Drawn AO

Issued 04/30/09

Last index

Component

Structural

Description

**Trans. Brace Module
Bonding Anchor**

Project #

P 140

Scale

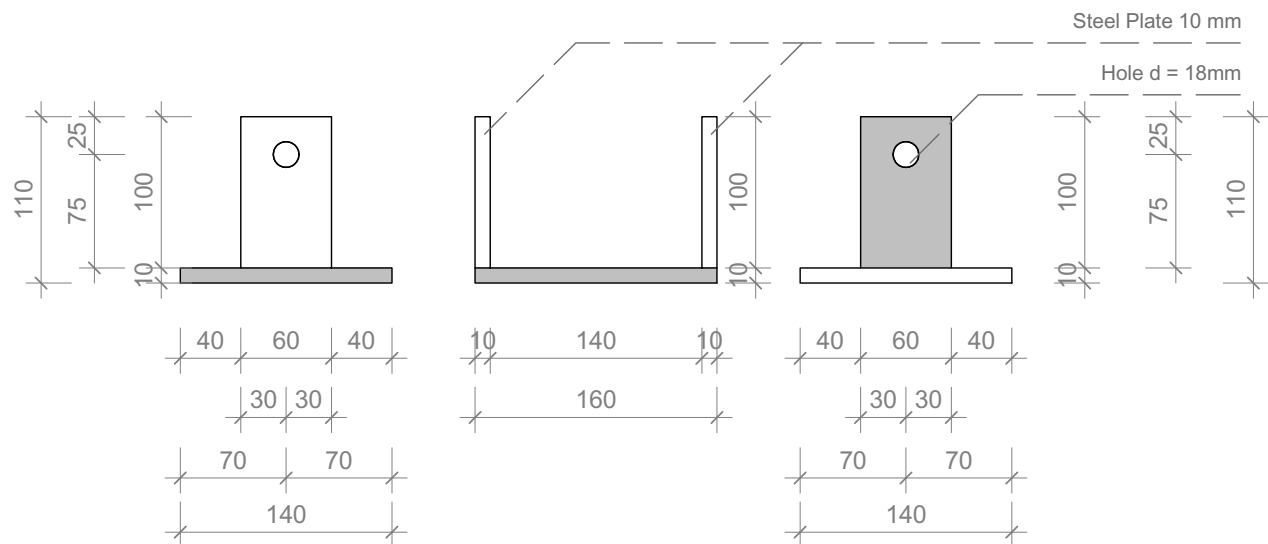
1 : 5

dwg #

S-670

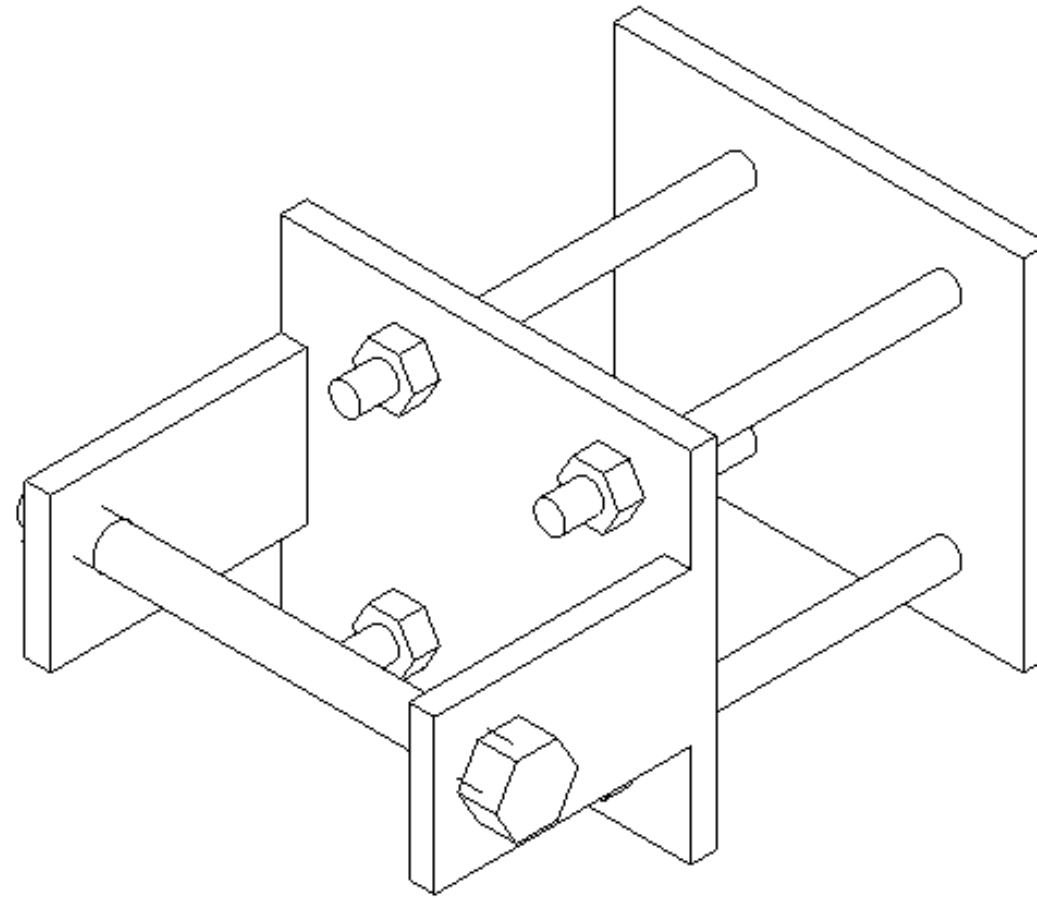
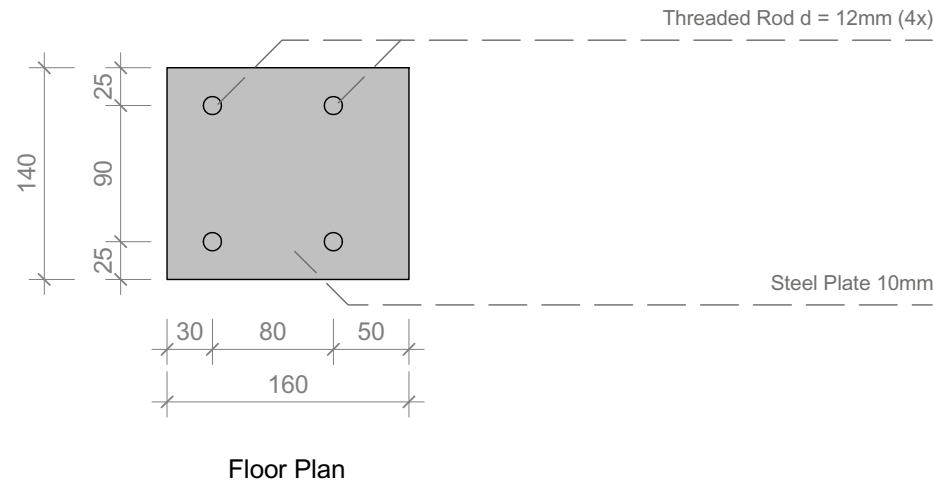
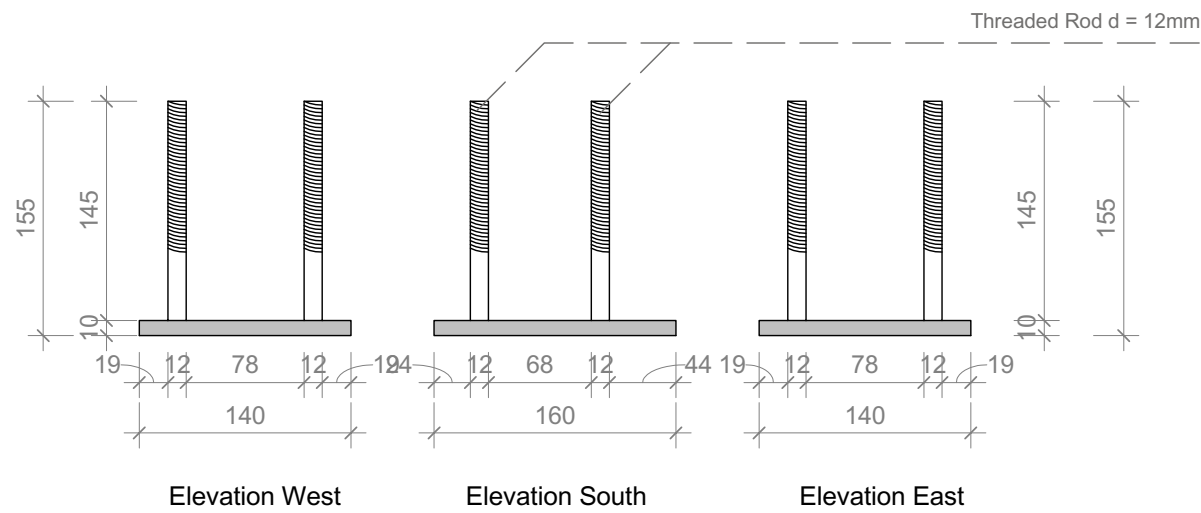
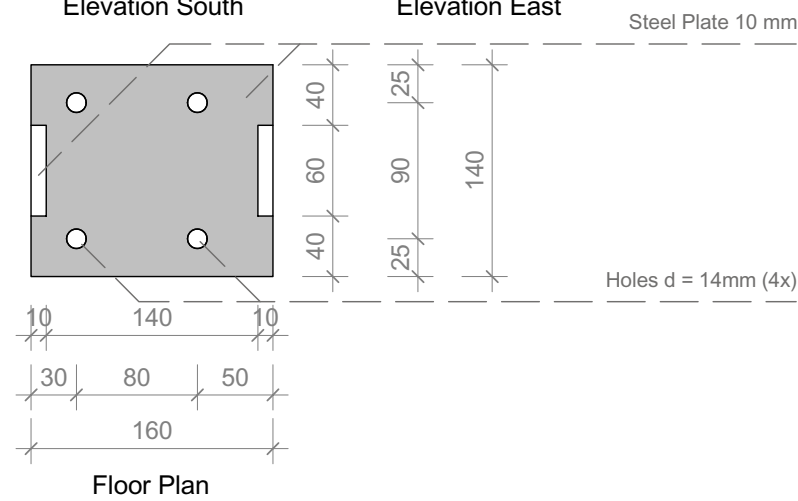
1:5



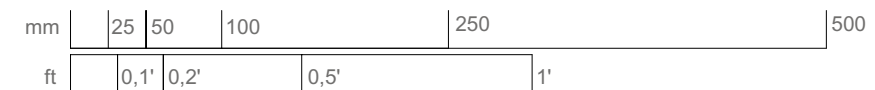


1
S-671

Trans. Brace South Wall Anchor Scale 1:5



1:5



SOLAR DECATHLON

Project

TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit

El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn	AO
Issued	03/22/09
Last index	

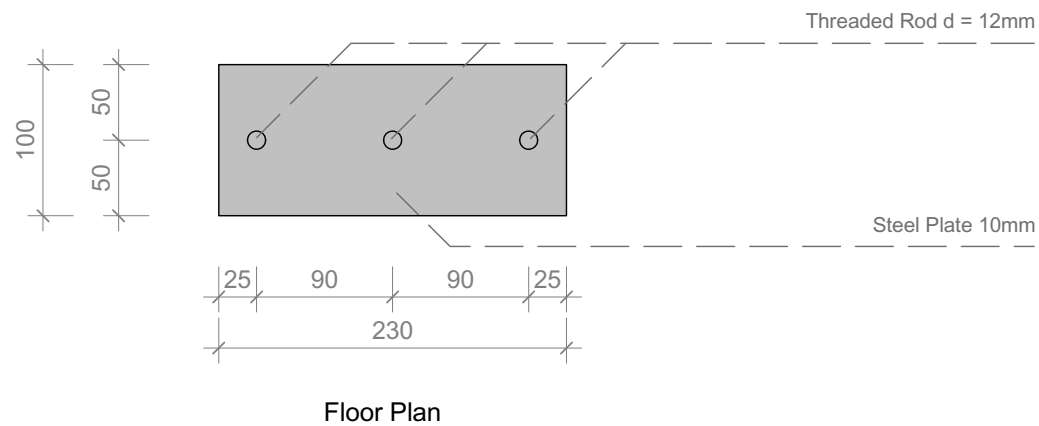
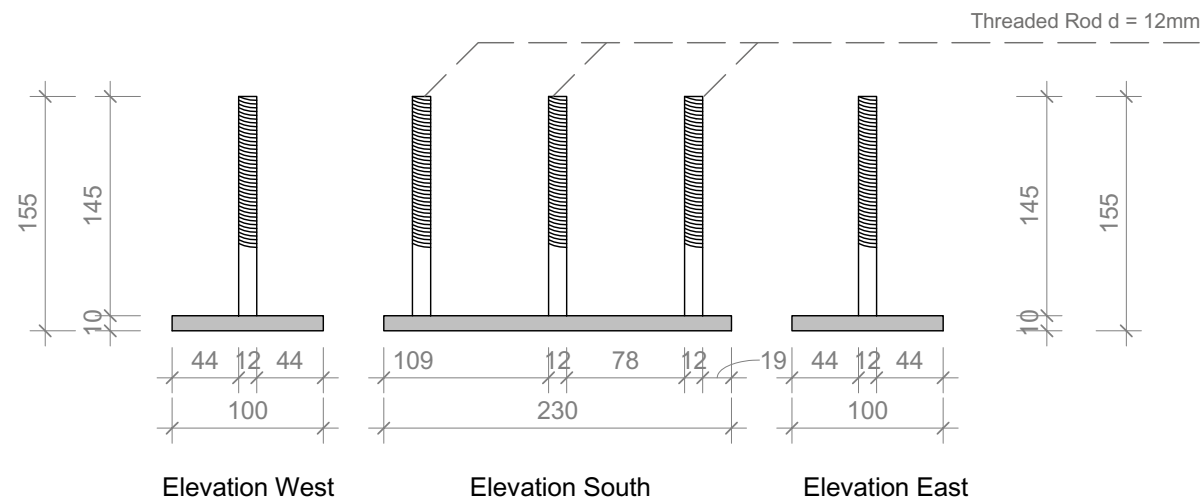
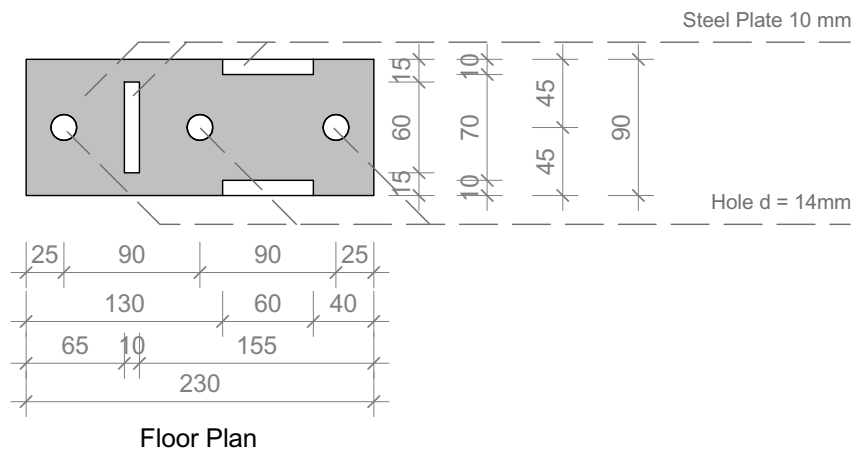
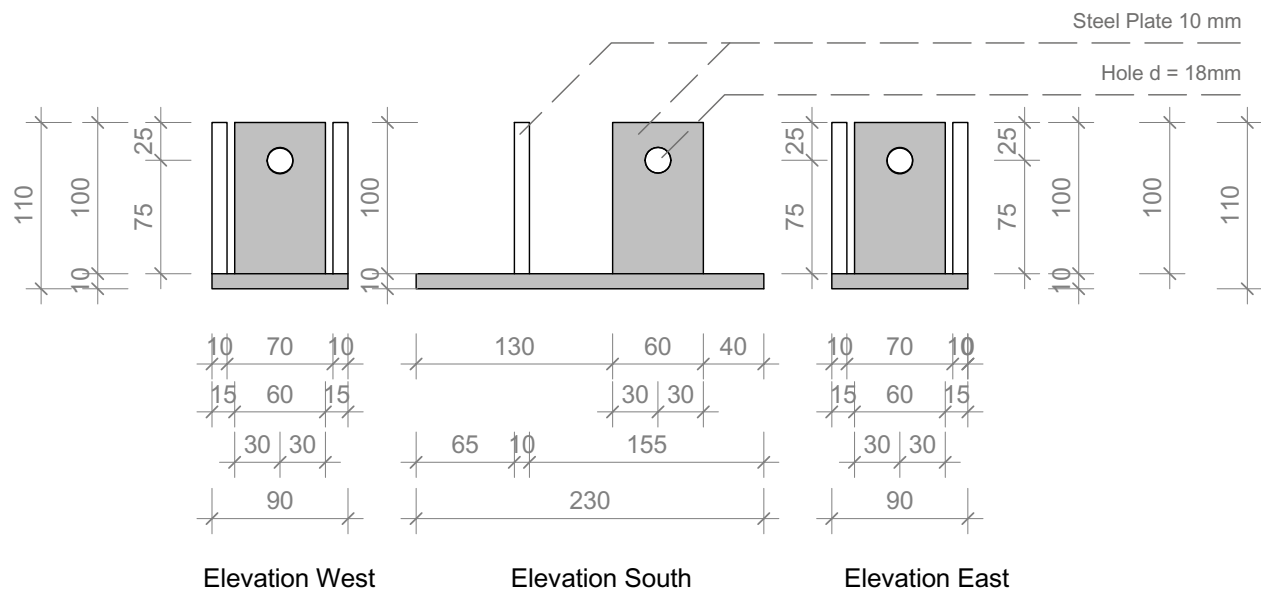
Component

Structural

Description

Trans. Brace South
Wall Anchor

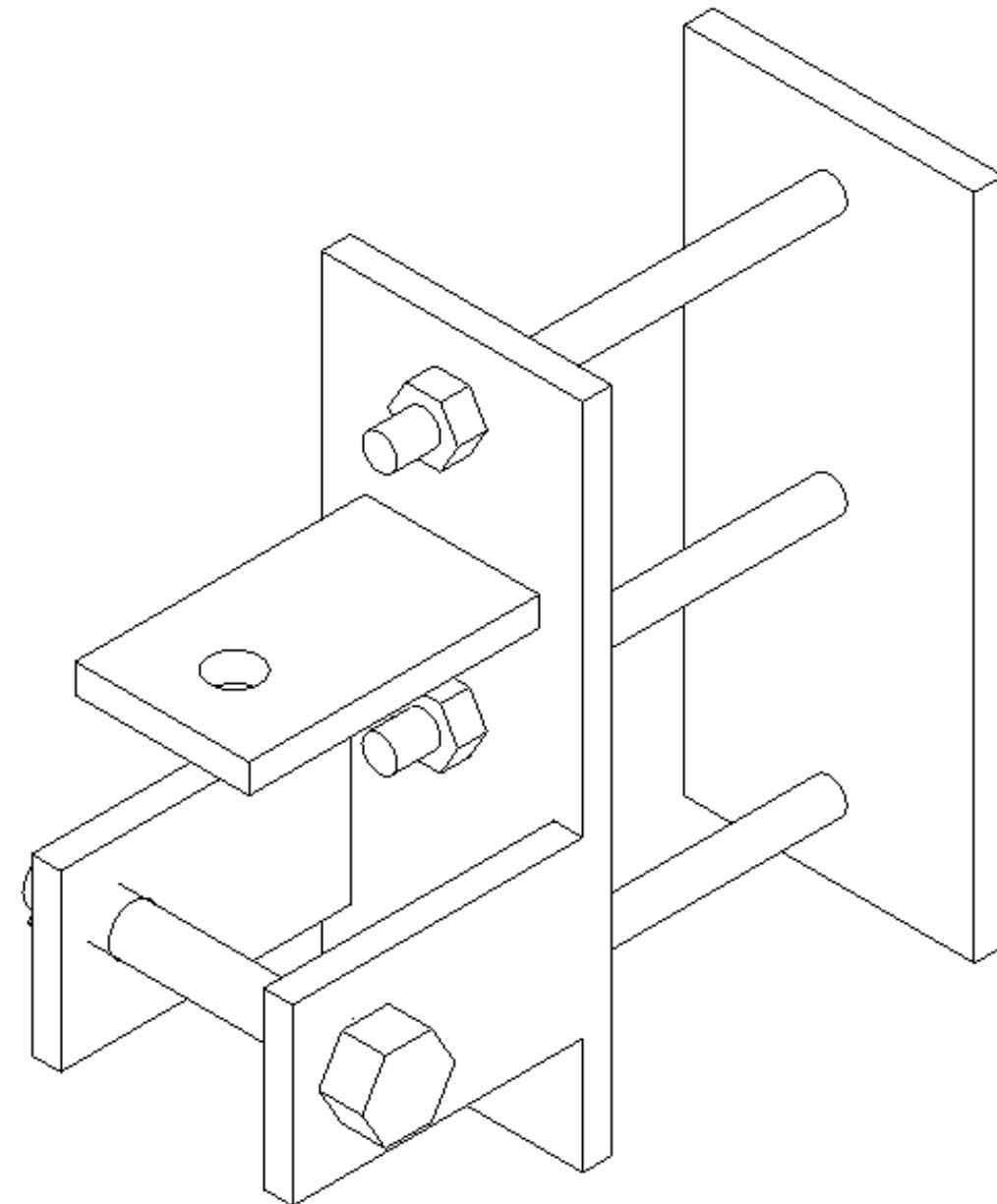
Project #	Scale	dwg #
P 140	1 : 5	S-671



1
S-672

Trans. Brace & Cable Anchor West Wall

Scale 1:5



1:5



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn AO

Issued 03/27/09

Last index

Component

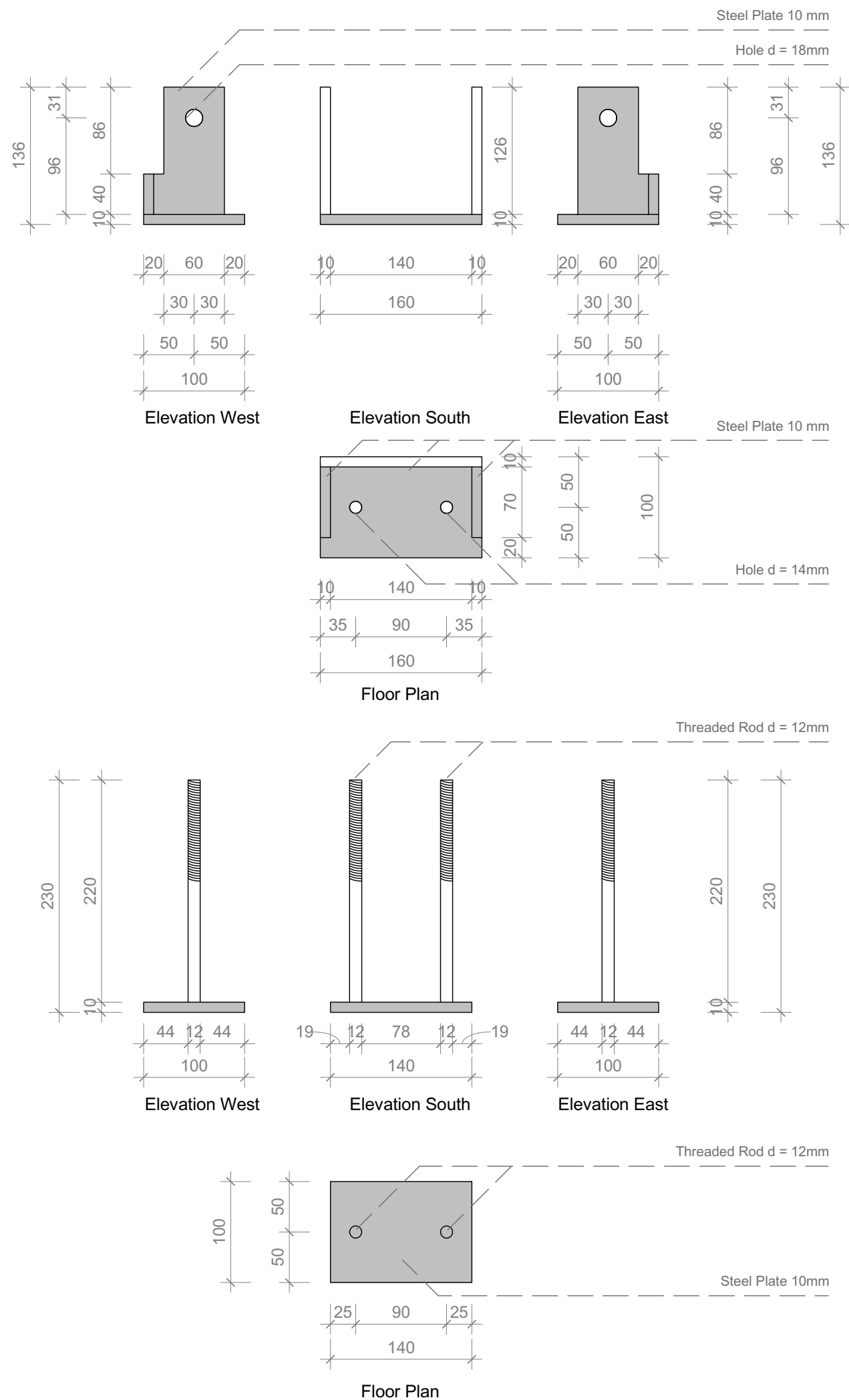
Structural

Description

Trans. Brace & Cable Anchor West Wall

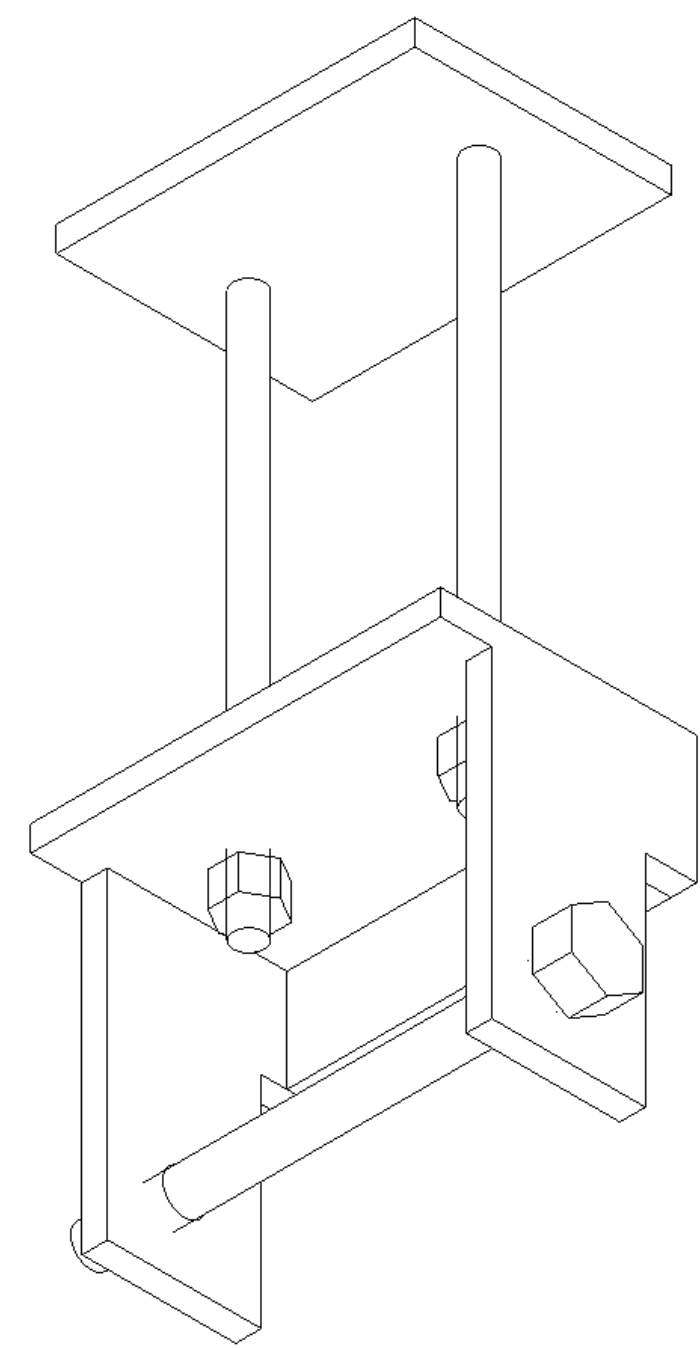
Project # Scale dwg #

P 140 1 : 5 S-672

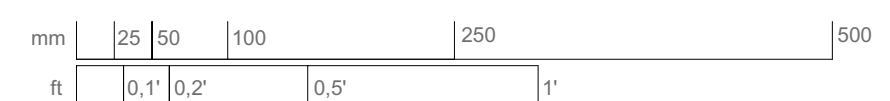


1
S-673

Trans. Brace Roof Anchor
Scale 1:5



1:5



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit

El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn	AO
Issued	03/21/09
Last index	

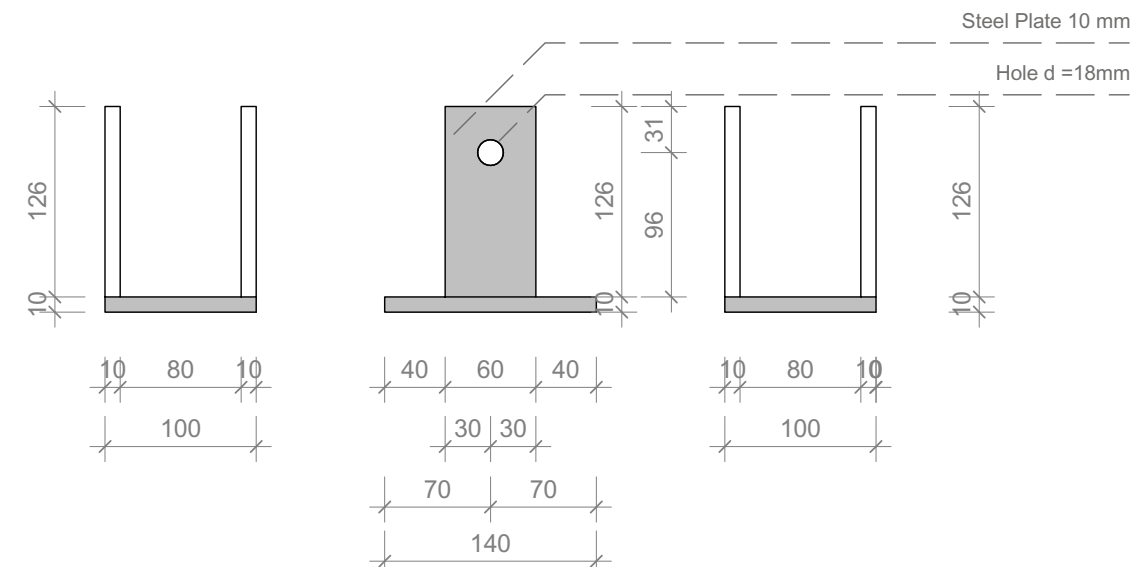
Component

Structural

Description

Trans. Brace Roof
Anchor

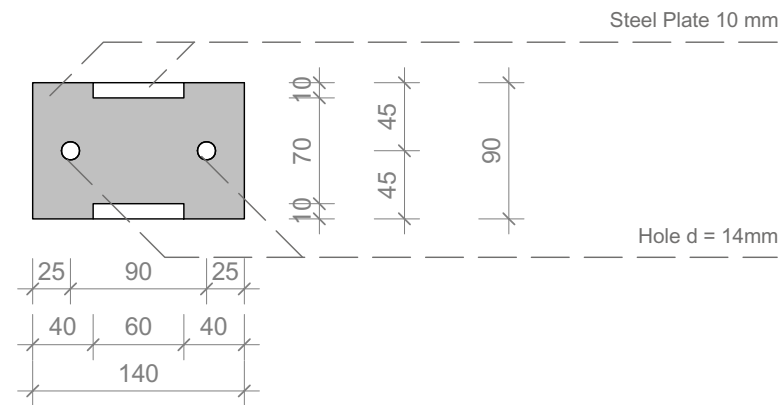
Project #	Scale	dwg #
P 140	1 : 5	S-673



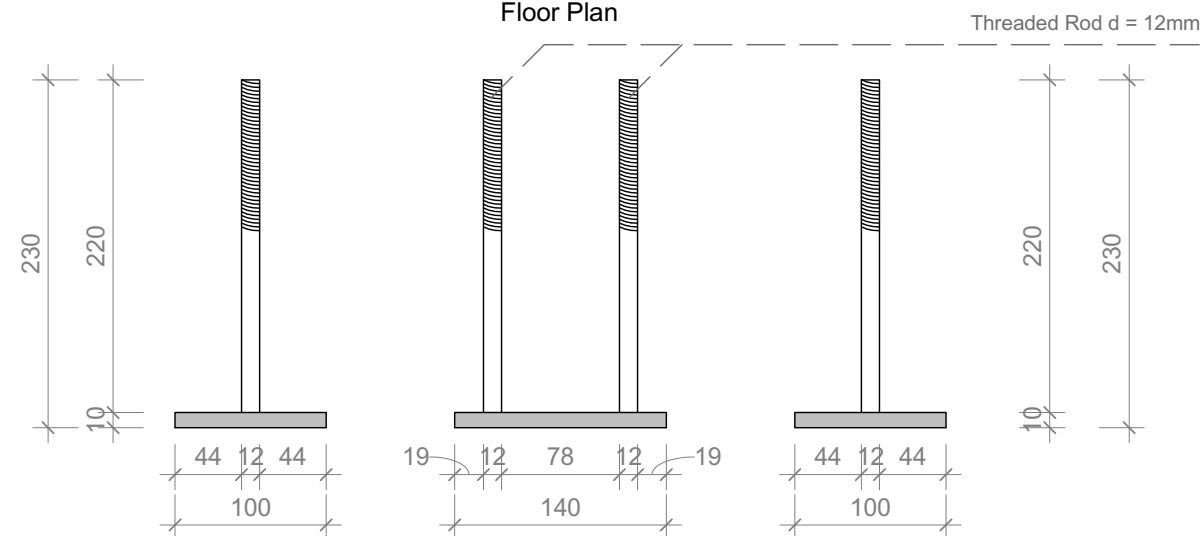
Elevation West

Elevation South

Elevation East



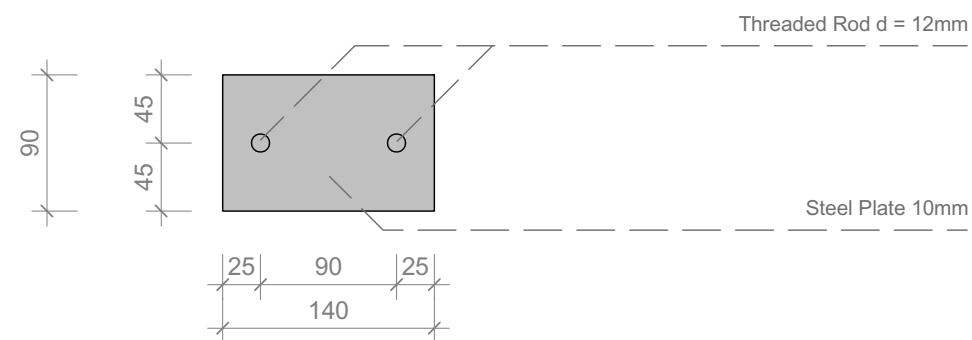
Floor Plan



Elevation West

Elevation South

Elevation East

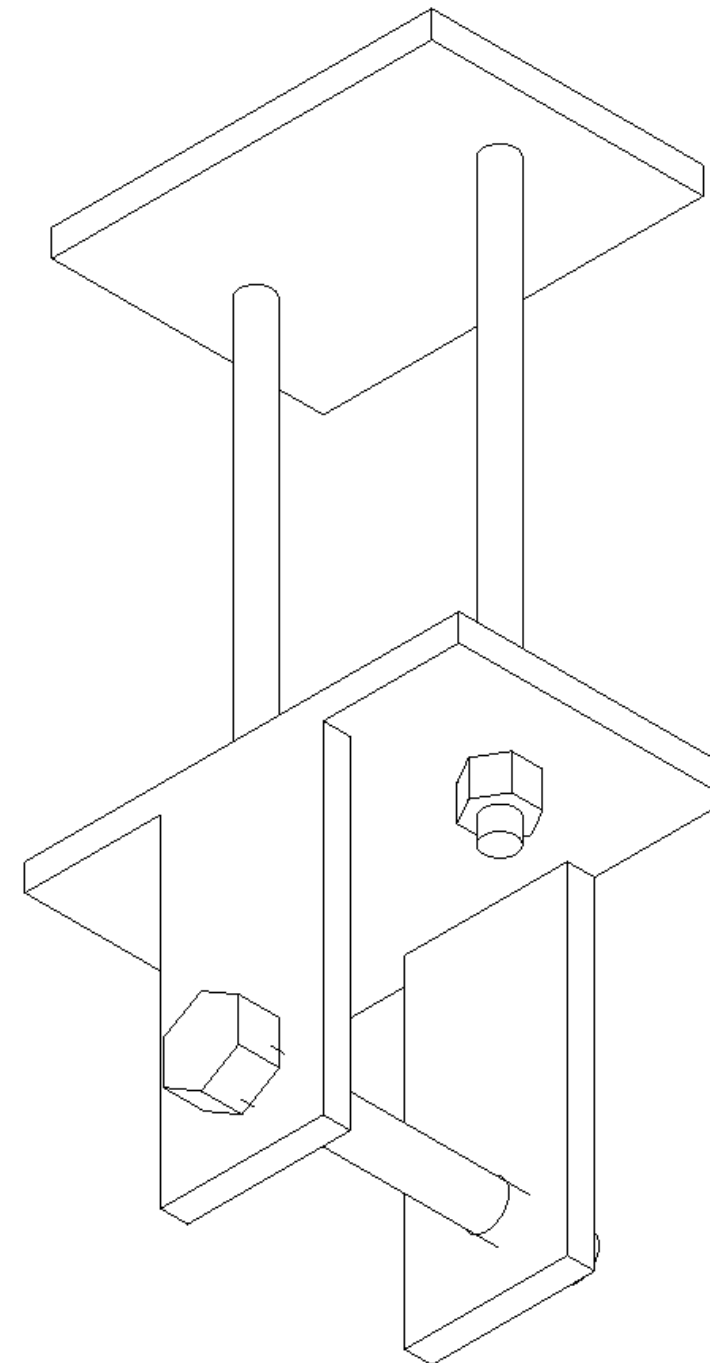


Floor Plan

1
S-674

Trans. Brace Roof Anchor Rotated

Scale 1:5



1:5



Project

TEAM GERMANY

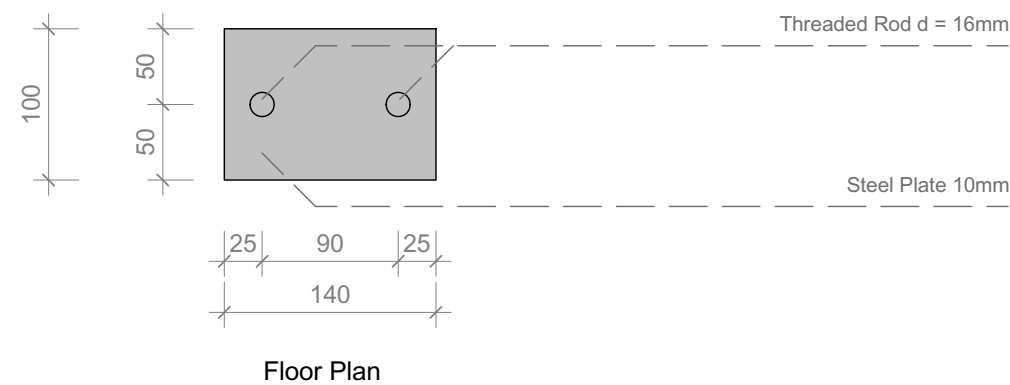
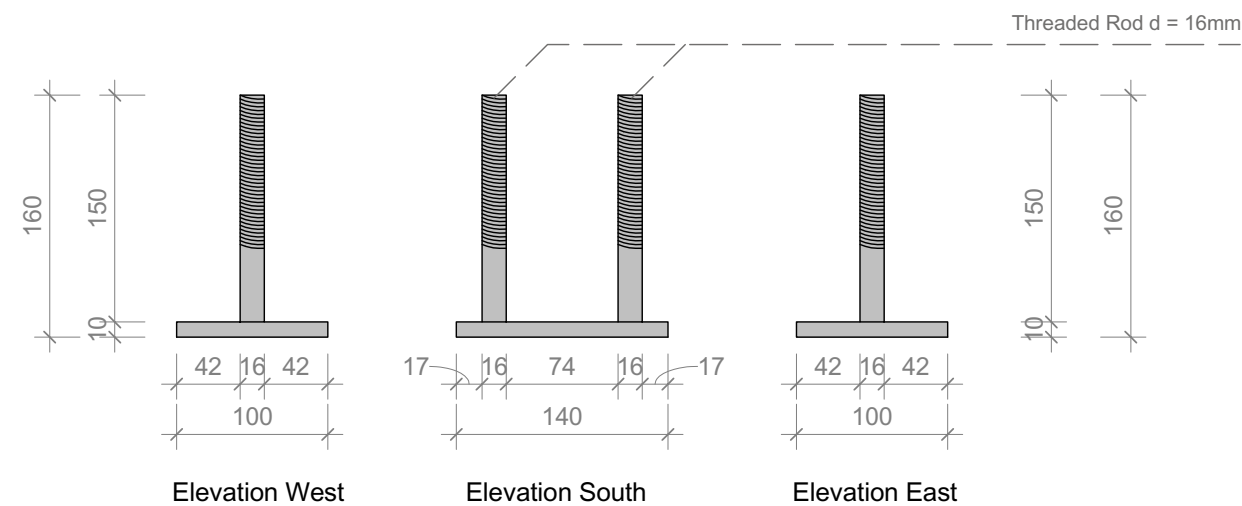
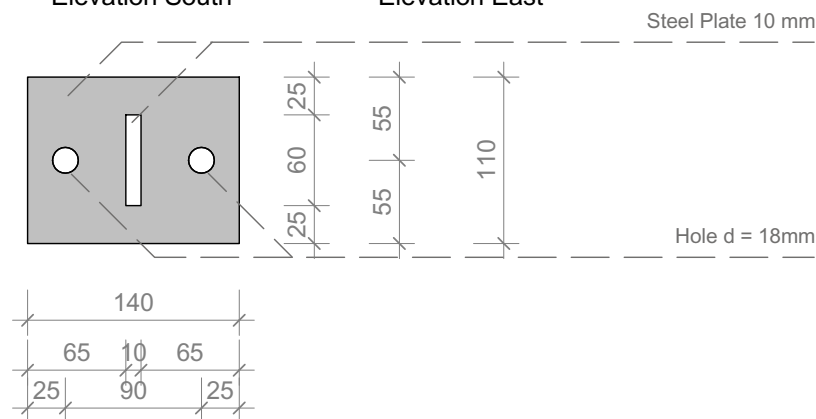
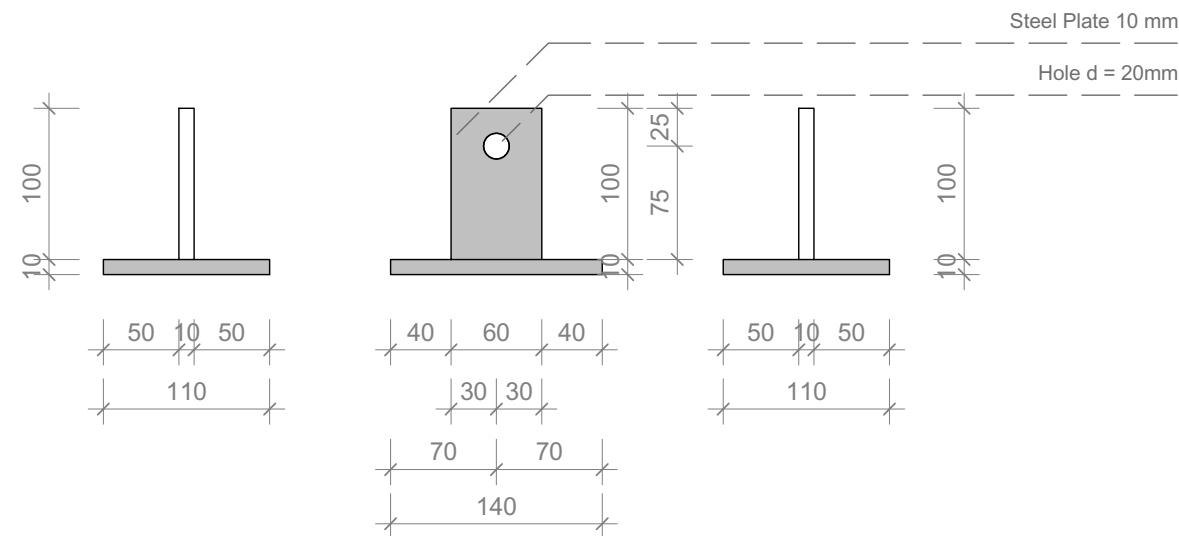
Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

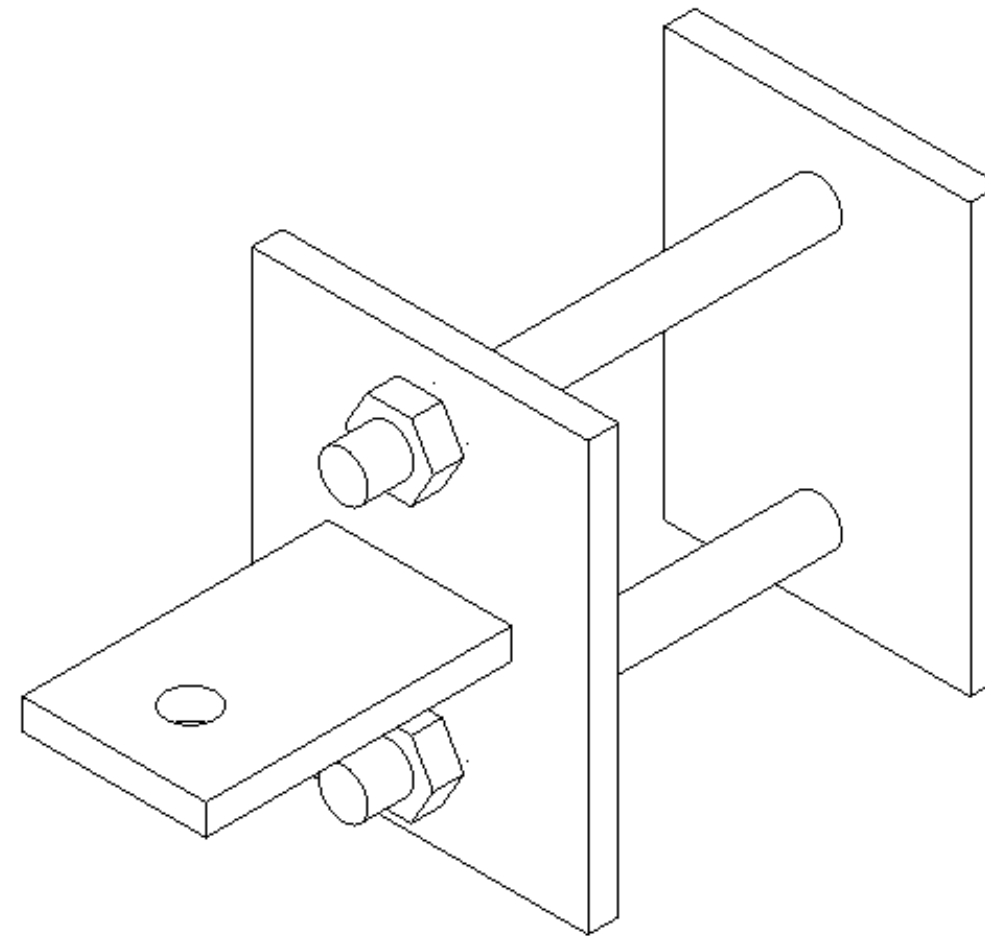
Drawn AO
Issued 03/21/09
Last index
Component
Structural
Description
Trans. Brace Roof
Anchor Rotated
Project # P 140
Scale 1 : 5
dwg # S-674



1
S-675

Cable East Wall Anchor

Scale 1:5



1:5



Project

TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn
AO

Issued
05/03/09

Last index

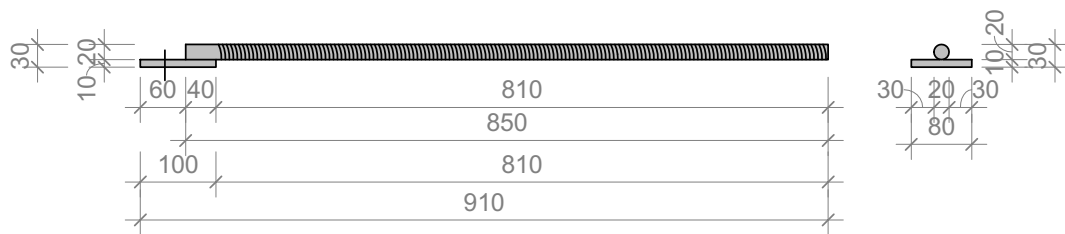
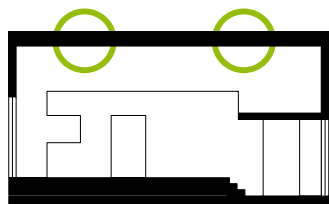
Component
Structural

Description
Cable East Wall
Anchor

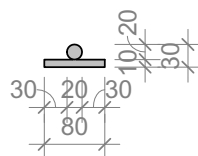
Project #
P 140

Scale
1 : 5

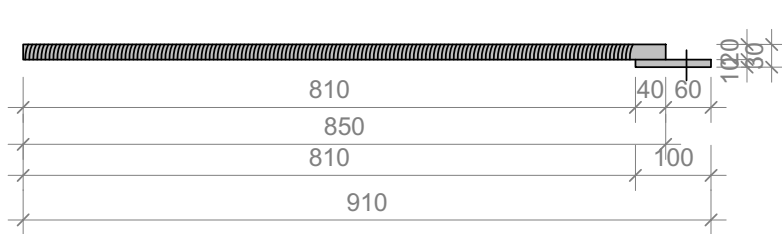
dwg #
S-675



Elevation West



Elevation North

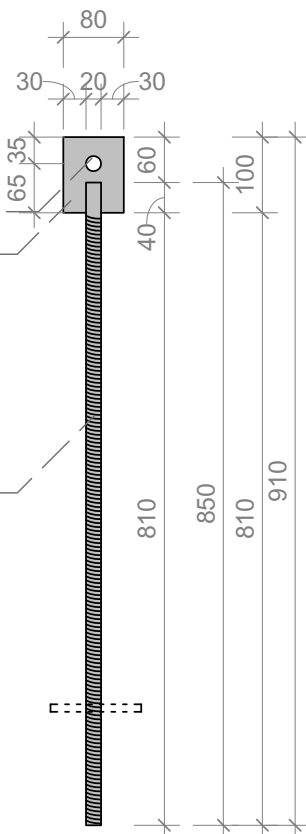


Elevation East

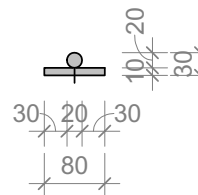
Hole d = 20mm

Steel Plate 10mm

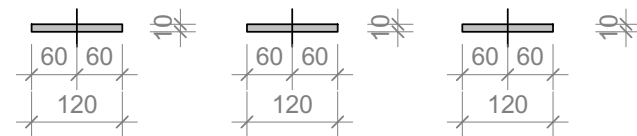
Threaded Rod d = 20mm



Floor Plan



Elevation South



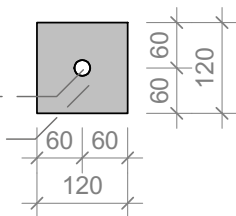
Elevation West

Elevation North

Elevation East

Hole d = 22mm

Steel Plate 10mm



Floor Plan

1:10



Drawn AO

Issued 03/26/09

Last index

Component

Structural

Description

Threaded Rod

Project #
P 140

Scale
1 : 10

dwg #
S-676


06 06 00 Schedules for Wood, Plastics, And Composites_Structural										
Constructural Solid Wood Schedule										
Plan No.	Project Manual Division Master Format	Article Name	Article Manufacturer	Article Number	Size			Quantity		Notes
					L	H	W	Amount	Unit	
S-205, S-401 - S-404	Div. 06	timber construction beam	Rettenmeier	....	...	120 mm	60mm	130000	mm	
S-205, S-401 - S-404	Div. 06	timber construction beam	Rettenmeier	....	...	120 mm	80mm	25000	mm	
S-205, S-401 - S-404	Div. 06	timber construction beam	Rettenmeier	....	...	120 mm	100m m	39000	mm	
S-205, S-401 - S-404	Div. 06	timber construction beam	Rettenmeier	....	...	120 mm	120m m	78000	mm	
S-205, S-401 - S-404	Div. 06	timber construction beam	Rettenmeier	....	...	220 mm	120m m	32500	mm	
S-205, S-401 - S-404	Div. 06	timber construction beam	Rettenmeier	....	...	140 mm	120 mm	13000	mm	
S-205, S-401 - S-404	Div. 06	timber construction beam	Rettenmeier	....	...	240 mm	120 mm	36000	mm	
S-205, S-401 - S-404	Div. 06	timber construction beam	Rettenmeier	....	...	200 mm	120 mm	7000	mm	
S-205, S-401 - S-404	Div. 06	timber construction beam	Rettenmeier	....	...	80 mm	80 mm	10000	mm	
S-205, S-401 - S-404	Div. 06	timber construction beam	Rettenmeier	....	...	200 mm	80 mm	48000	mm	
S-205, S-401 - S-404	Div. 06	timber construction beam	Rettenmeier	....	...	180 mm	120 mm	3000	mm	



Project



Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit

El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

DrawnAG

Issued09/05/31

Last index

Component

Structural

Description

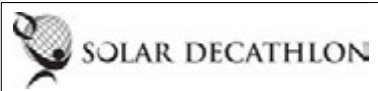
Schedules Structural

Project #P 140

Scale

dwg #S-677

06 06 00 Schedules for Wood, Plastics, And Composites_Structural										
Constructural Solid Wood Schedule										
Plan No.	Project Manual Division Master Format	Article Name	Article Manufacturer	Article Number	Size			Quantity		Notes
					L	H	W	Amount	Unit	
S-205, S-401 - S-404	Div. 06	timber construction beam	Rettenmeier	....	...	260 mm	120 mm	3000	mm	
S-205, S-401 - S-404	Div. 06	timber construction beam	Rettenmeier	....	...	200 mm	140 mm	22000	mm	
S-205, S-401 - S-404	Div. 06	oak cut profil	Rettenmeier	....	...	70 mm	60 mm	6500	mm	
S-205, S-401 - S-404	Div. 06	oak cut profil	Rettenmeier	....	...	100 mm	60 mm	1500	mm	
S-205, S-401 - S-404	Div. 06	oak wooden base	Rettenmeier	....	...	120 mm	40 mm	6660	mm	
S-205, S-401 - S-404	Div. 06	oak dowel	Rettenmeier	....	...	30 mm	30 mm	2640	mm	
S-205, S-401 - S-404	Div. 06	Lignotrend Block Q 90	Lignotrend	....	...	90 mm	625 mm	30000	mm	
S-205, S-401 - S-404	Div. 06	Lignotrend Block Q 90	Lignotrend	....	...	90 mm	625 mm	30000	mm	
S-205, S-401 - S-404	Div. 06	Lignotrend Block Q3 Akustik alpha	Lignotrend	....	...	270 mm	625 mm	106000	mm	
S-405 - S-408, S-205, S-502	Div. 06	OSB 3	Agepan	....	...	18 mm	..	4	m³	



Project

TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

DrawnAG

Issued09/05/31

Last index

Component
Structural


Description
Schedules Structural


Project #P 140


Scale

dwg #S-678

05 06 00 Schedules for Metal Joists, Wood Fastenings_Structural										
Connecting Devices Schedules										
Plan No.	Project Manual Division Master Format	Article Name	Article Manufacturer	Article Number	Size			Quantity		Notes
					L	H	W	Amount	Unit	
S-205, S-401 - S-404	Div. 05	HTT16 Tie	BMF	....	...	...	...	11	PC	
S-205, S-401 - S-404	Div. 05	joist hanger 120x180 IL	BMF	....	...	...	...	1	PC	
S-205, S-401 - S-404	Div. 06	Ø12mm bolt	...	....	80 - 350m m	...	...	129	PC	
S-205, S-401 - S-404	Div. 06	Ø16mm bolt	...	....	340 - 520m m	...	...	12	PC	
S-205, S-401 - S-404	Div. 06	SFS WT-T-82	SFS	....	160- 275m m	...	...	372	PC	
S-205, S-401 - S-404	Div. 06	wood screws	Würth	....	6x80- 8x280 mm	...	...	*		*according to german and american static requirements
S-205, S-401 - S-404	Div. 05	cocking piece	...	....	...	3mm	40mm	16000	mm	
S-205, S-401 - S-404	Div. 05	locksmith stuff	Holzbau Gröber	...	...	...	...	...	kg	HEA 140, div. angles, module connectors, Z-section, L-angles, steel plates, shoring strut of transport


SOLAR DECATHLON

Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT
 Department of Architecture
 Energyefficient Building Design Unit
 El-Lissitzky-Str. 1
 64287 Darmstadt
 +49 (0) 6151 / 165448
 +49 (0) 6151 / 165247
 team@solardecathlon2009.de

Navigation/Legend

Drawn AG
 Issued 09/05/31
 Last index

Component
Structural

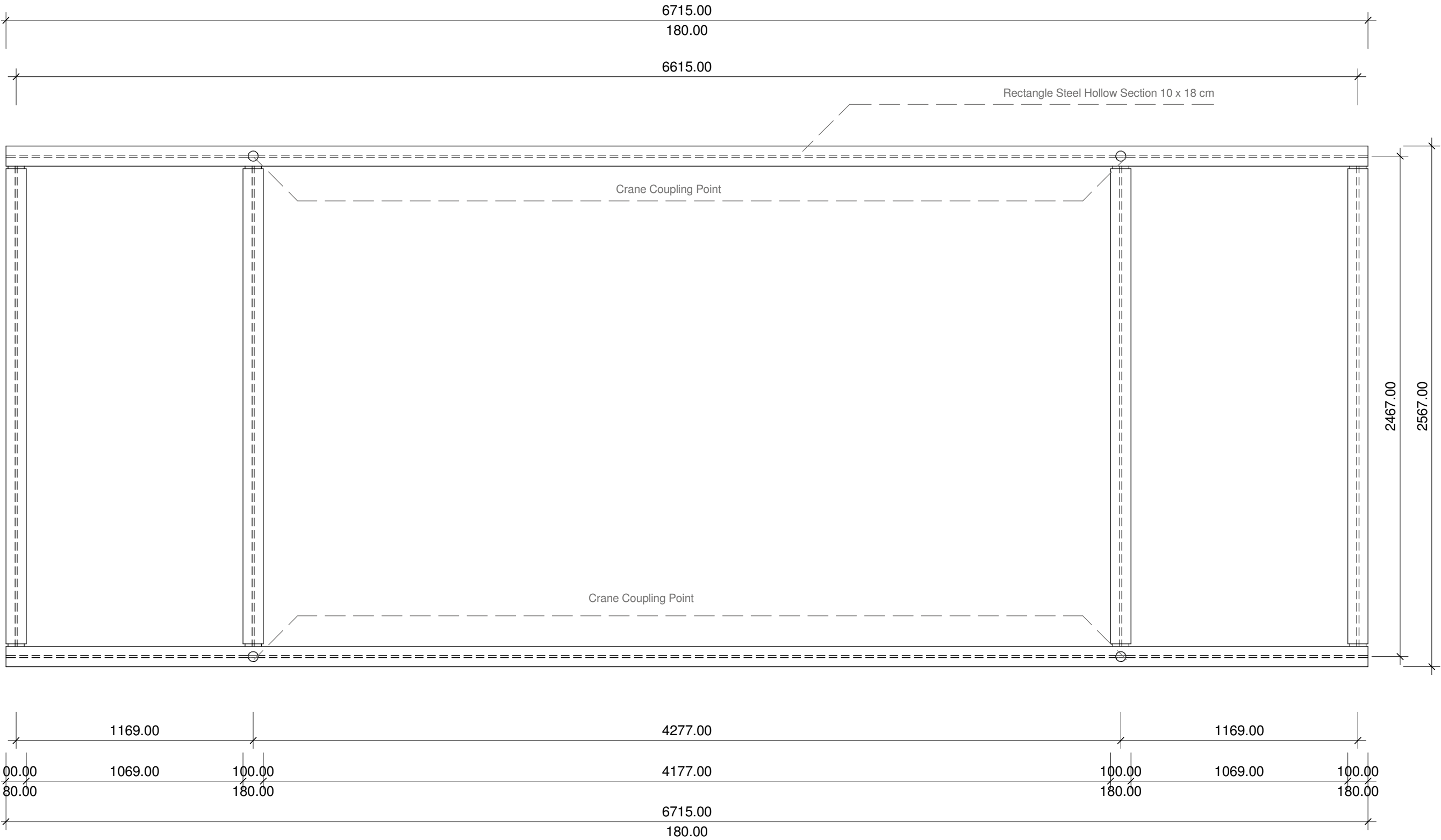
Description
Schedules Structural

Project # Scale dwg #
P 140 **S-679**

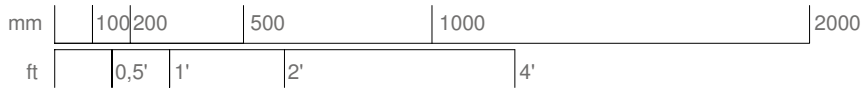


Floor Plan / Traverse

Scale 1:20



1:20



Department of Architecture
Energyefficient Building Design
Unit
El-Lissinsky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn	SA	
Issued	04/21/09	
Last index		
Component	Structural	
Description	Floor Plan Traverse	
Project #	Scale	dwg #
P 140	1 : 20	S-711



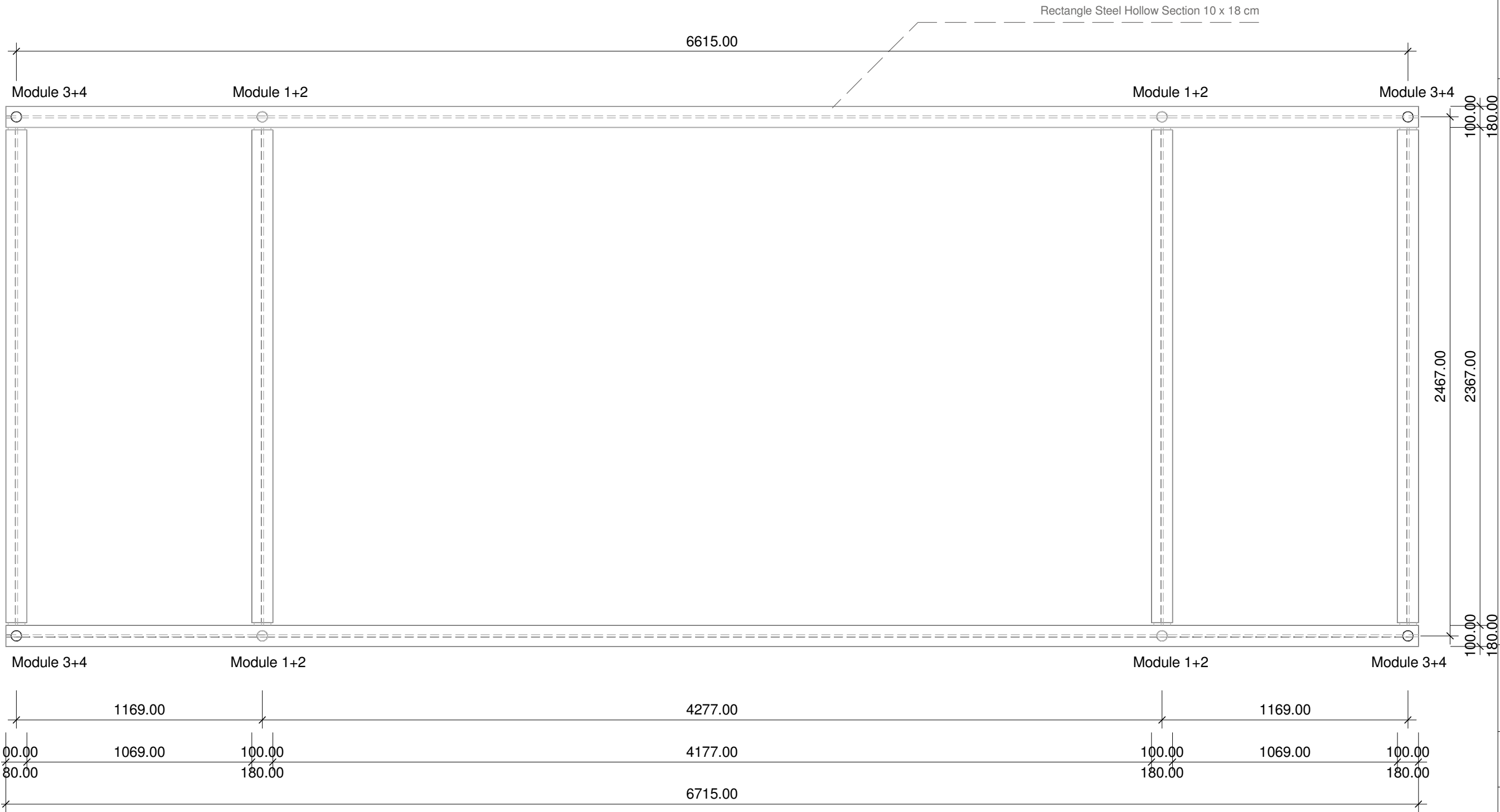
View From Below / Traverse

Scale 1:20

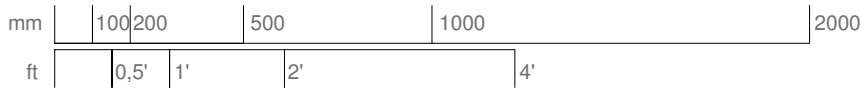


Department of Architecture
Energyefficient Building Design
Unit
El-Lissinsky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

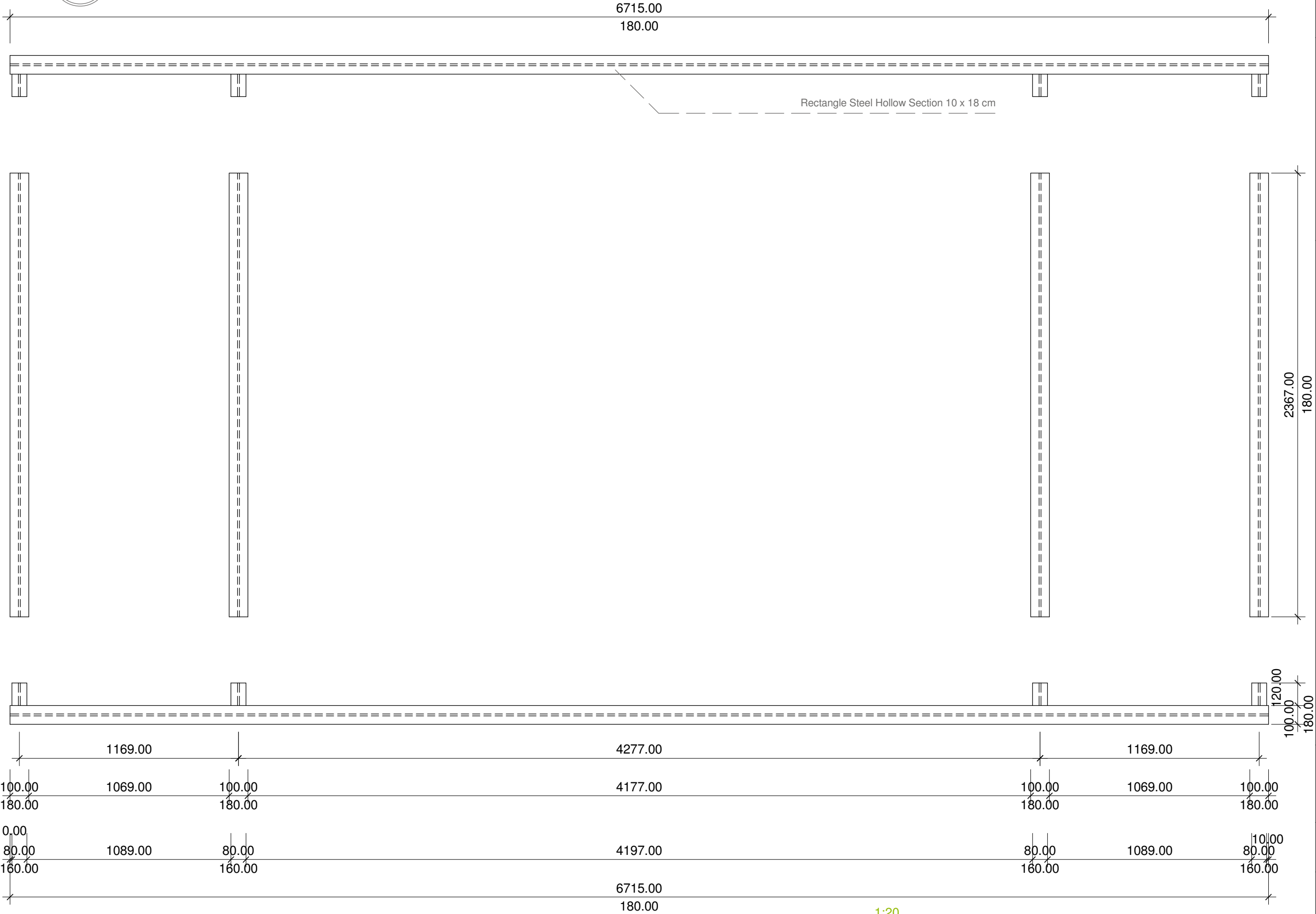
Navigation/Legend




1:20




Drawn	SA
Issued	04/21/09
Last index	
Component	
Structural	
Description	
View From Below Traverse	
Project #	Scale dwg #
P 140	1 : 20 S-712






SOLAR DECATHLON

Project




SOLAR DECATHLON 2009



TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissinsky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

DrawnSA

Issued04/21/09

Last index

Component

Structural

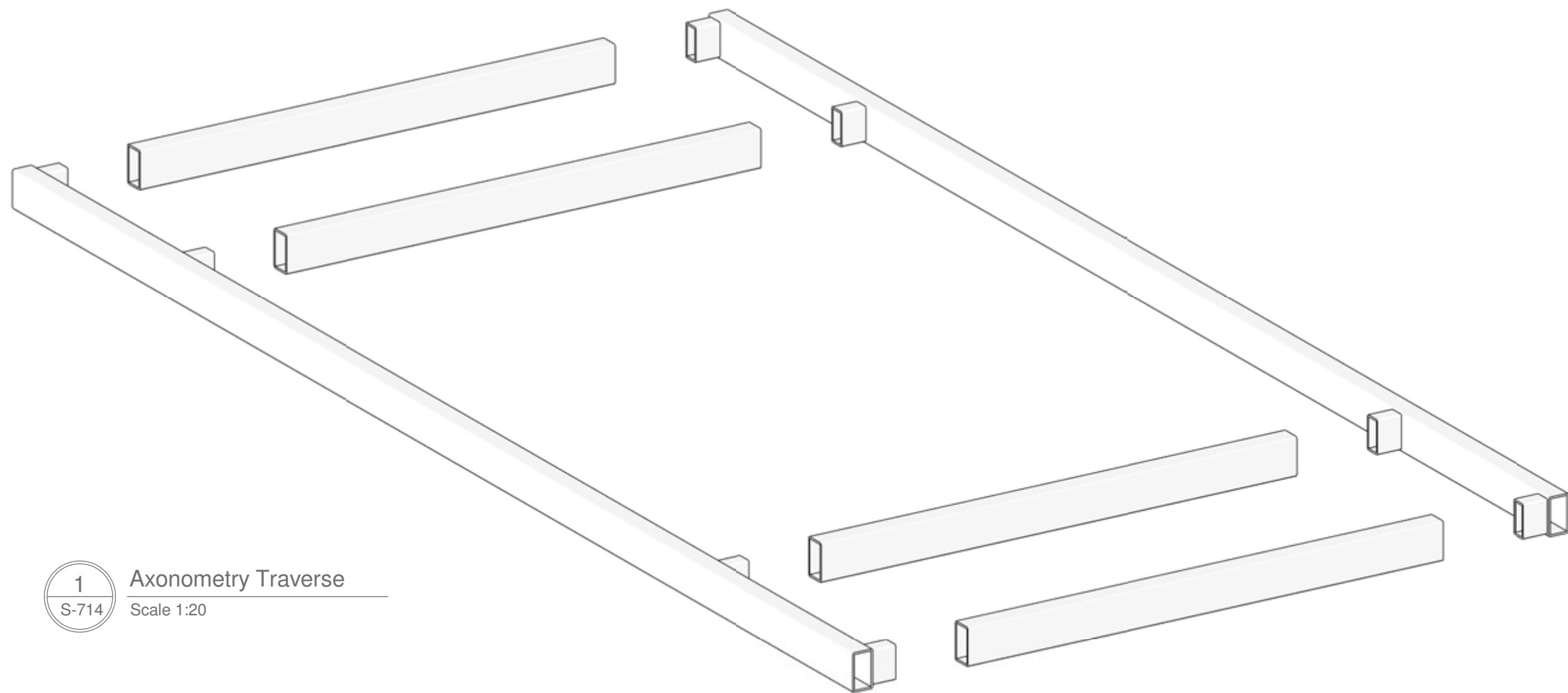
Description

Exploded Drawing

Project #P 140

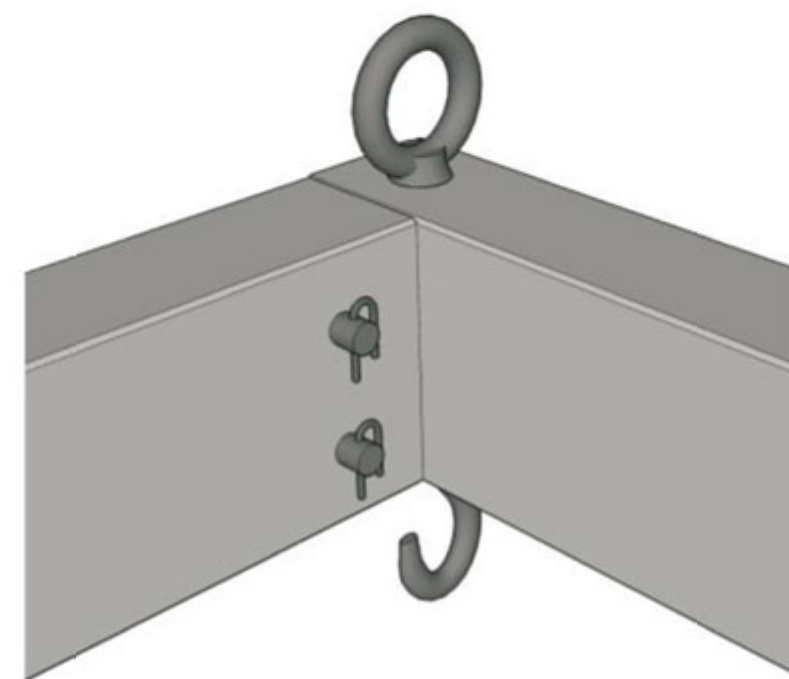
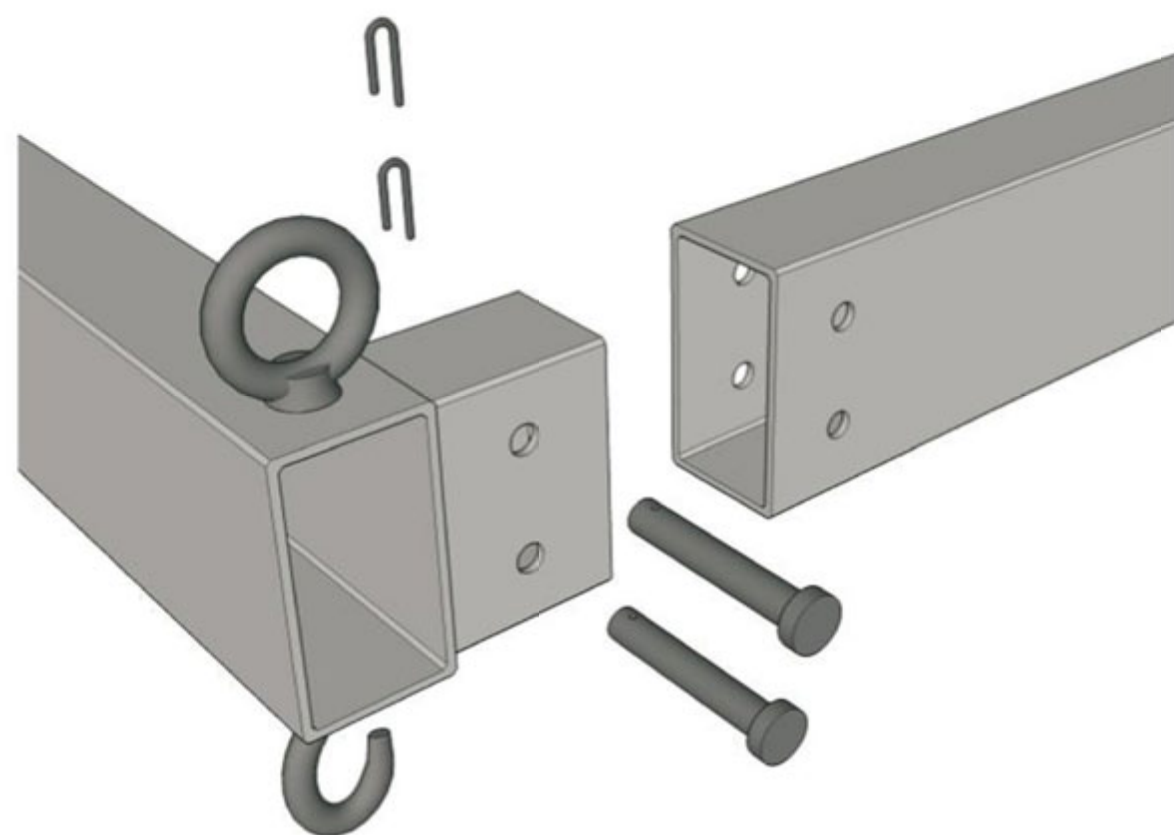
Scale1 : 20

dwg #S-713

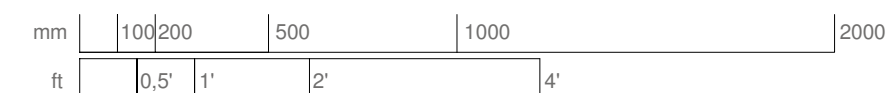


Axonometry Traverse

Scale 1:20



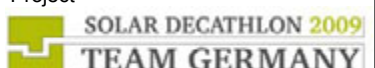
1:20




Schedules for Temporary Construction										
Plan No.	Project Manual Division Master Format	Article Name	Article Manufacturer	Article Number	Size			Quantity		Notes
					L	H	W	Amount	Unit	
S-661	Div. 01	Transport bracing	Robusta Gaukel	610130, 610343				20	PC	
S-662	Div. 01	lifting loops	Pfeifer	05.050.523.				8	PC	
S-662	Div. 01	distribution basins	Pfeifer	05.056.421.				8	PC	
S-663	Div. 01	Cables	CarlStahl	1621.21.00	11 m			1	m	
S-663	Div. 01	Tightener	Carlstahl	5711.00.30				1	PC	
S-664 - S-675	Div. 01	Brace to wall connectors	metal worker					40	PC	
S-676	Div. 01	Threaded Rod	metal worker					8	PC	
S-711 - S-714	Div. 01	Steel traverse	metal worker	-				1	PC	



Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissinsky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn

AO

Issued

05/29/09

Last index

Component

Structural

Description

Schedules Temporary Construction

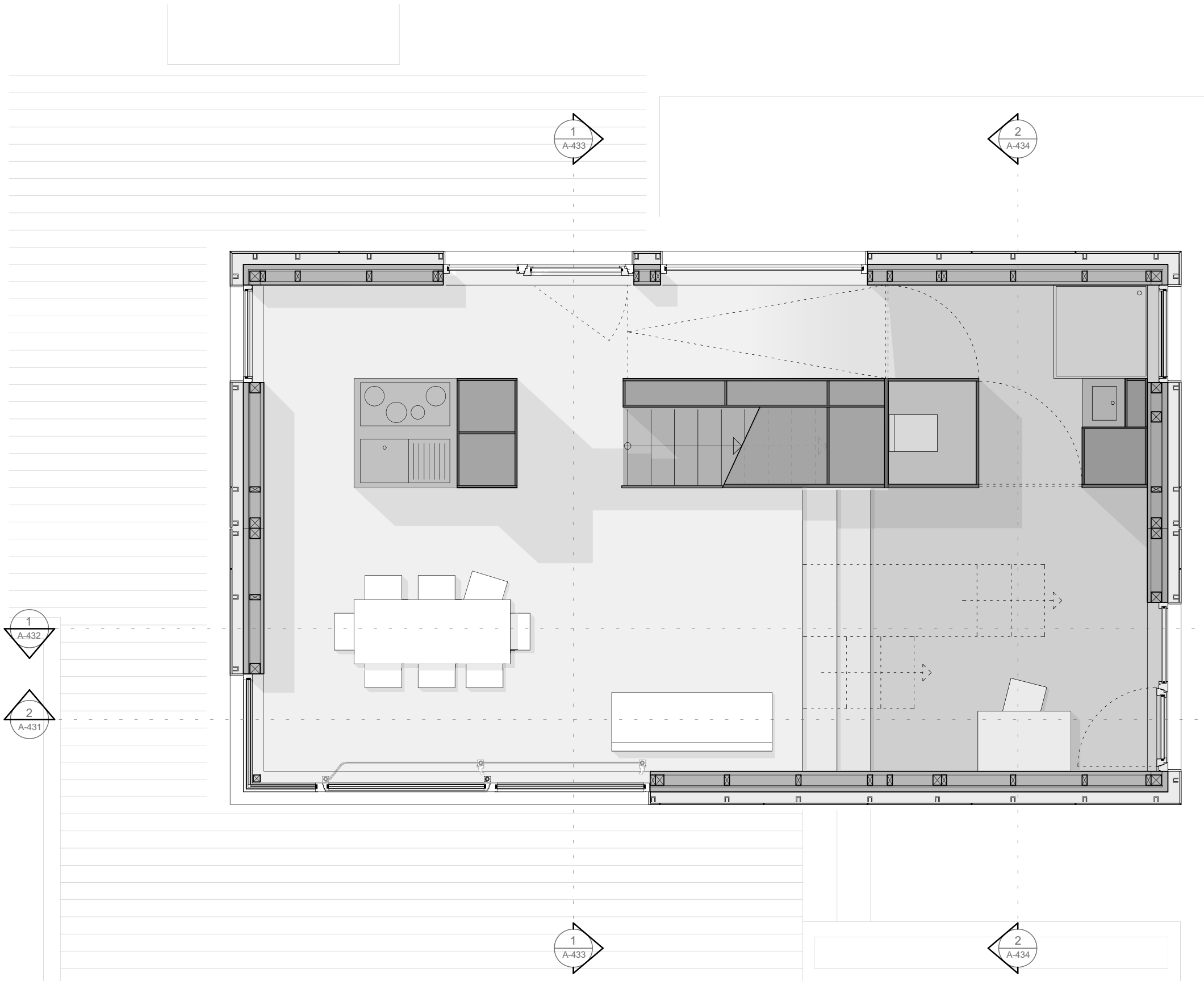
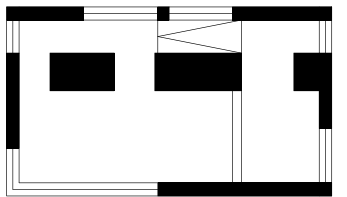
Project #

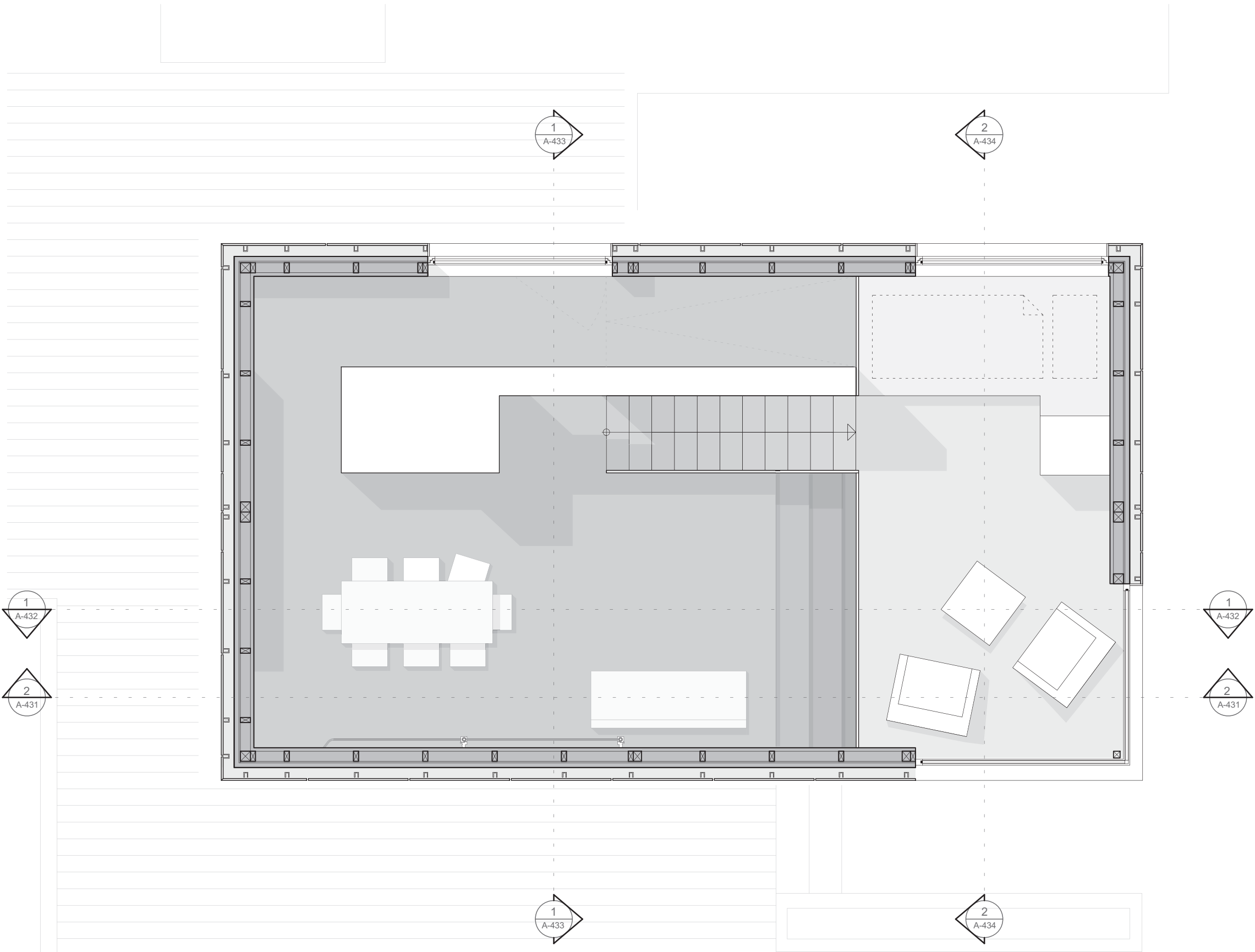
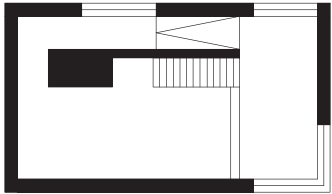
P 140

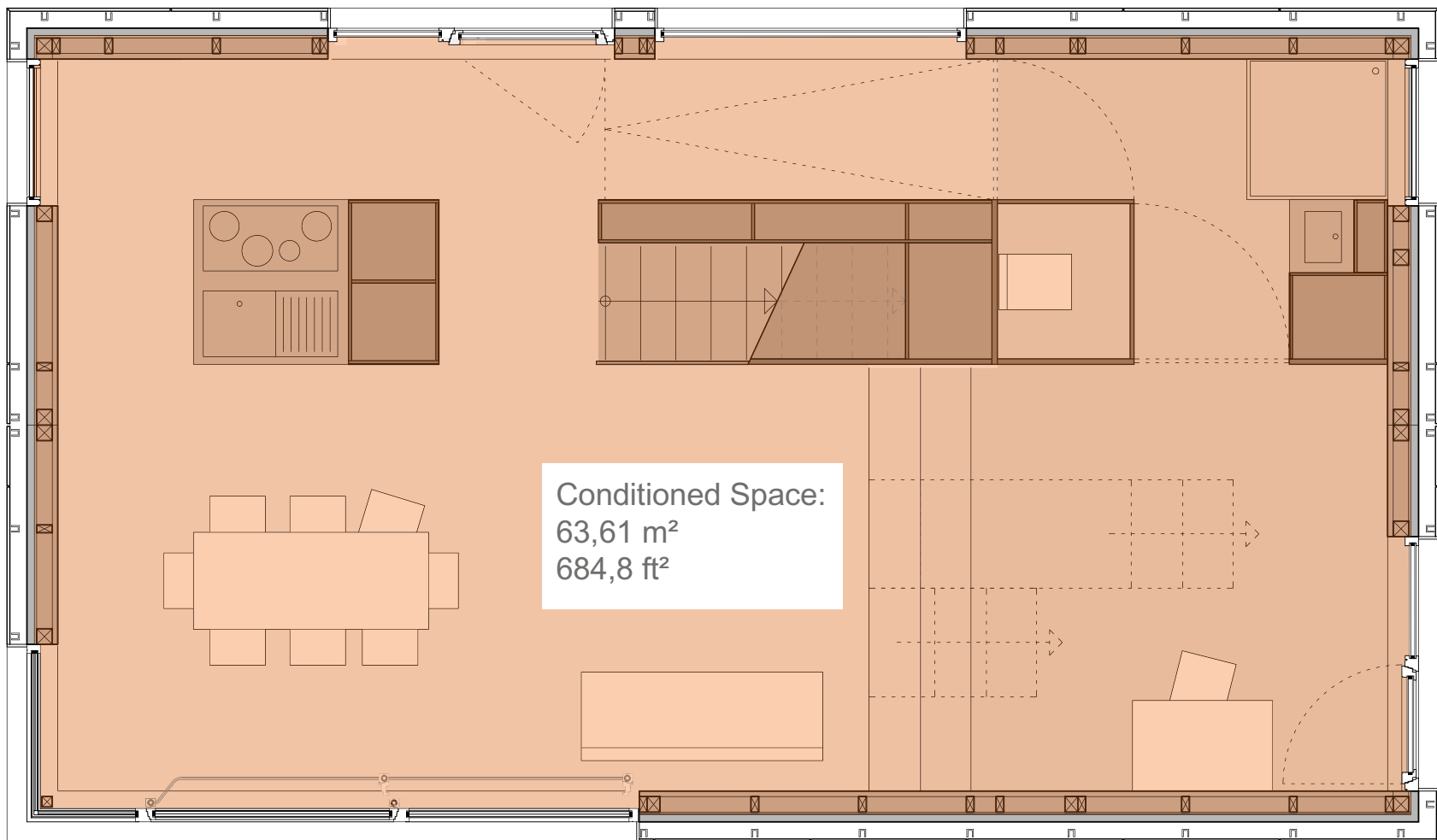
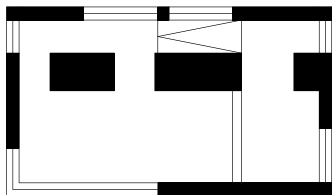
Scale

dwg #

S-715



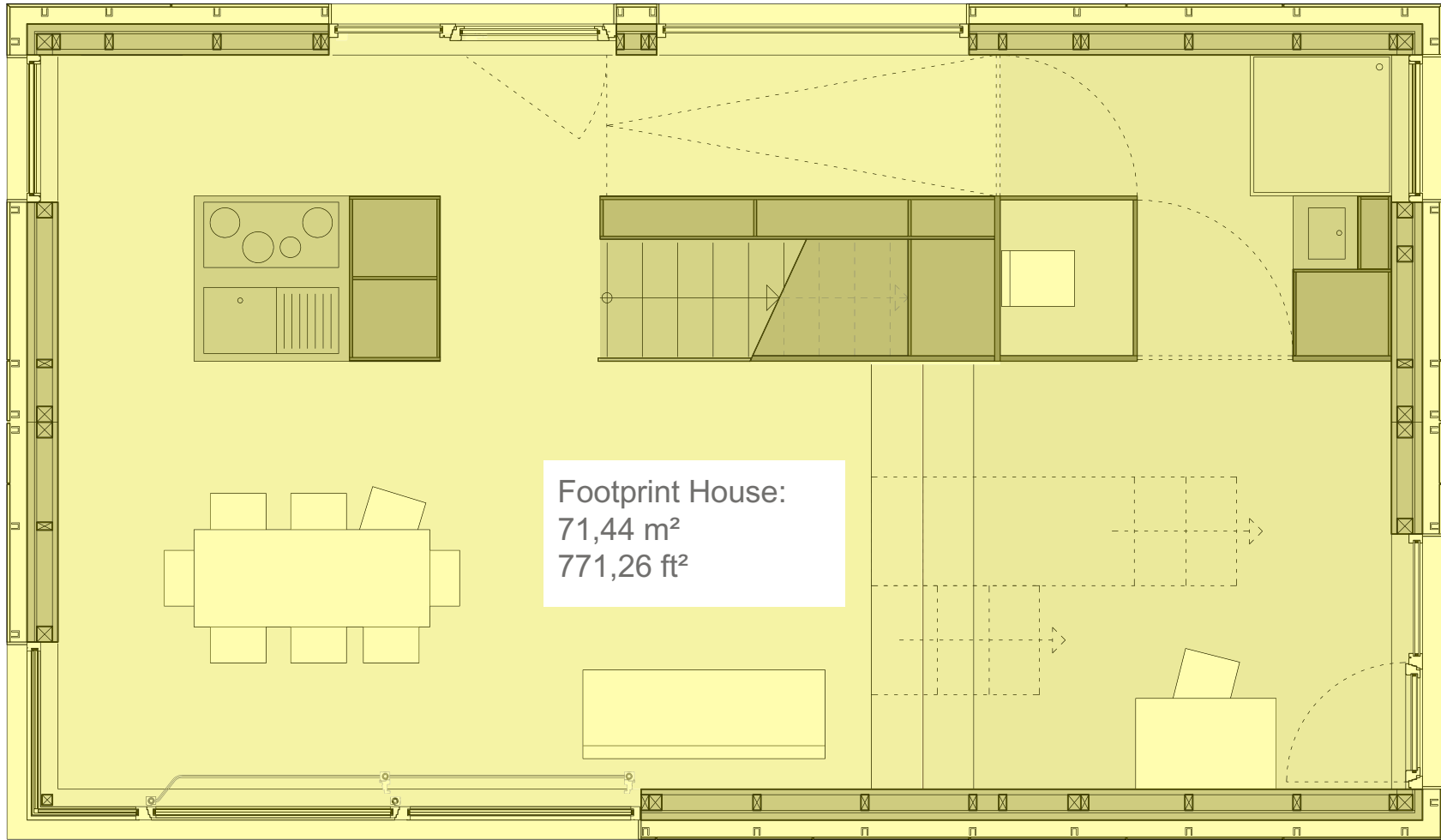
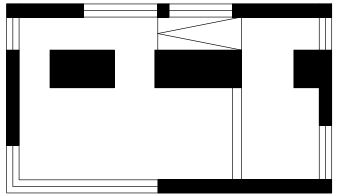












Conditioned Space:
63,61 m²
684,8 ft²

1:50





-  Solar Envelope
-  Footprint House
-  Footprint moveable components
-  1st Oct. 9.00 AM
-  1st Oct. 5.00 PM
-  Space for inverters, Terminal Box, Meter Housing and service equipment
-  Village Grid
-  Space for grounding needs

Drawn CW, KE

Issued 05/12/09

Last index

Component
Architecture

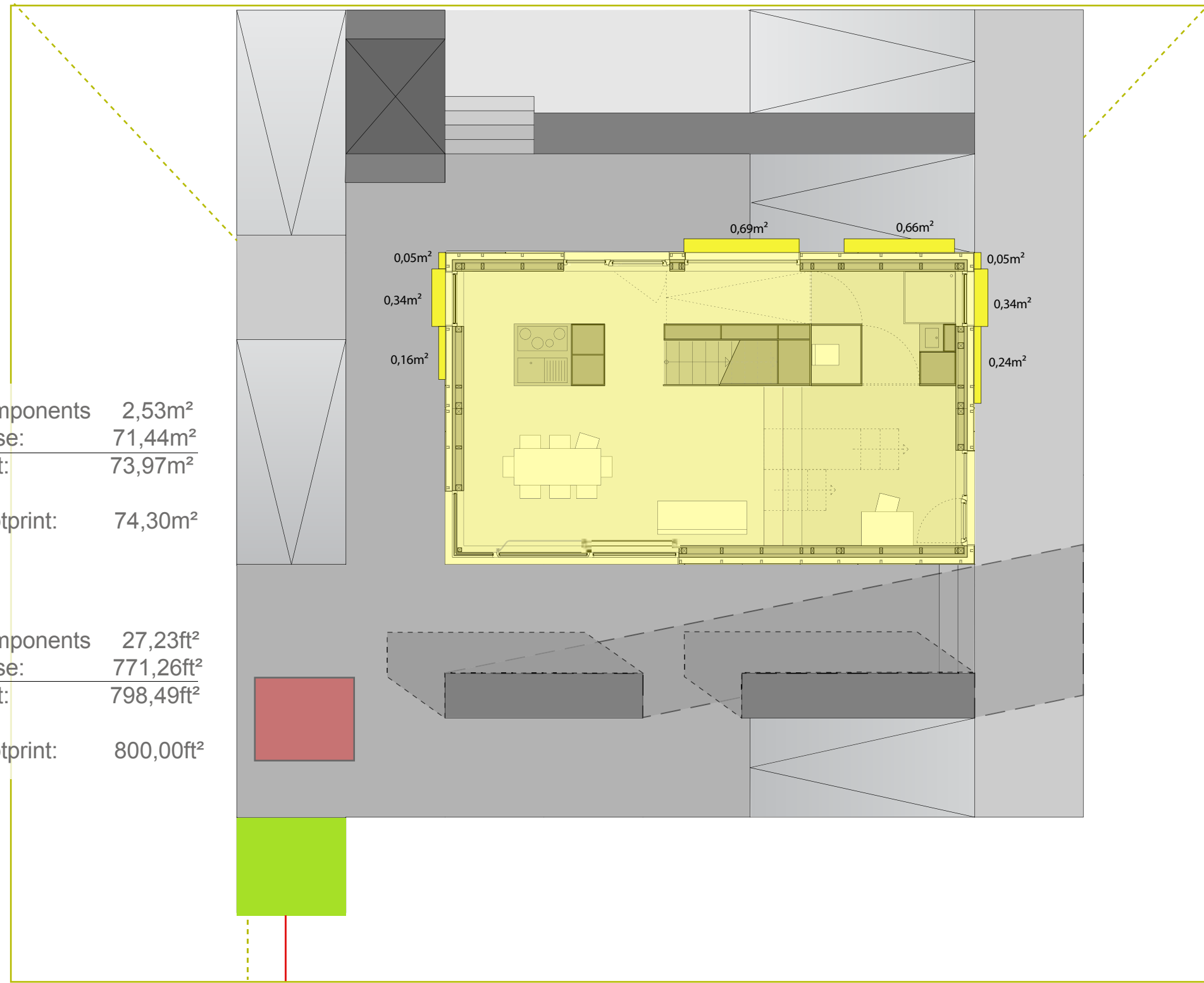
Description
**Moveable Components
Shading Deck**

Project # Scale dwg #
P 140 1:100 A-225

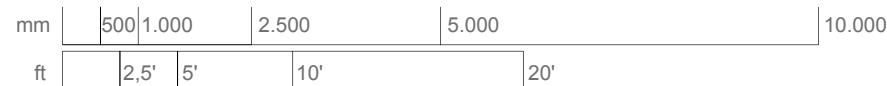
Moveable Components 2,53m²
Footprint House: 71,44m²
Total Footprint: 73,97m²

Maximum Footprint: 74,30m²

Moveable Components 27,23ft²
Footprint House: 771,26ft²
Total Footprint: 798,49ft²

Maximum Footprint: 800,00ft²

Footprint Moveable Components and Shading Calculation Deck
Scale 1:100

1:100

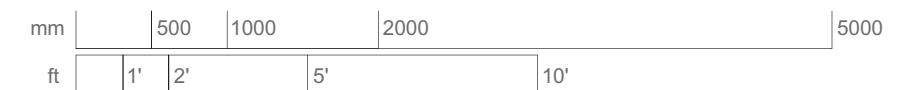




North Elevation

Scale 1:50

1:50



Project



Constructor



Department of Architecture
Energyefficient Building Design
Unit

El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



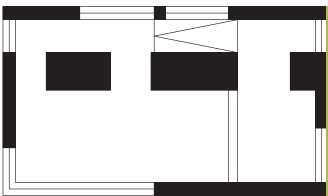
- pv-modul with clamps
- perspex insert gray
- acrylic glas insert colour #3
- acrylic glas insert colour #2
- acrylic glas insert colour #1

Drawn FH
Issued 05/25/09
Last index

Component
Architectual (A)

Description
Elevations

Project # P 140
Scale 1:50
dwg # A-311



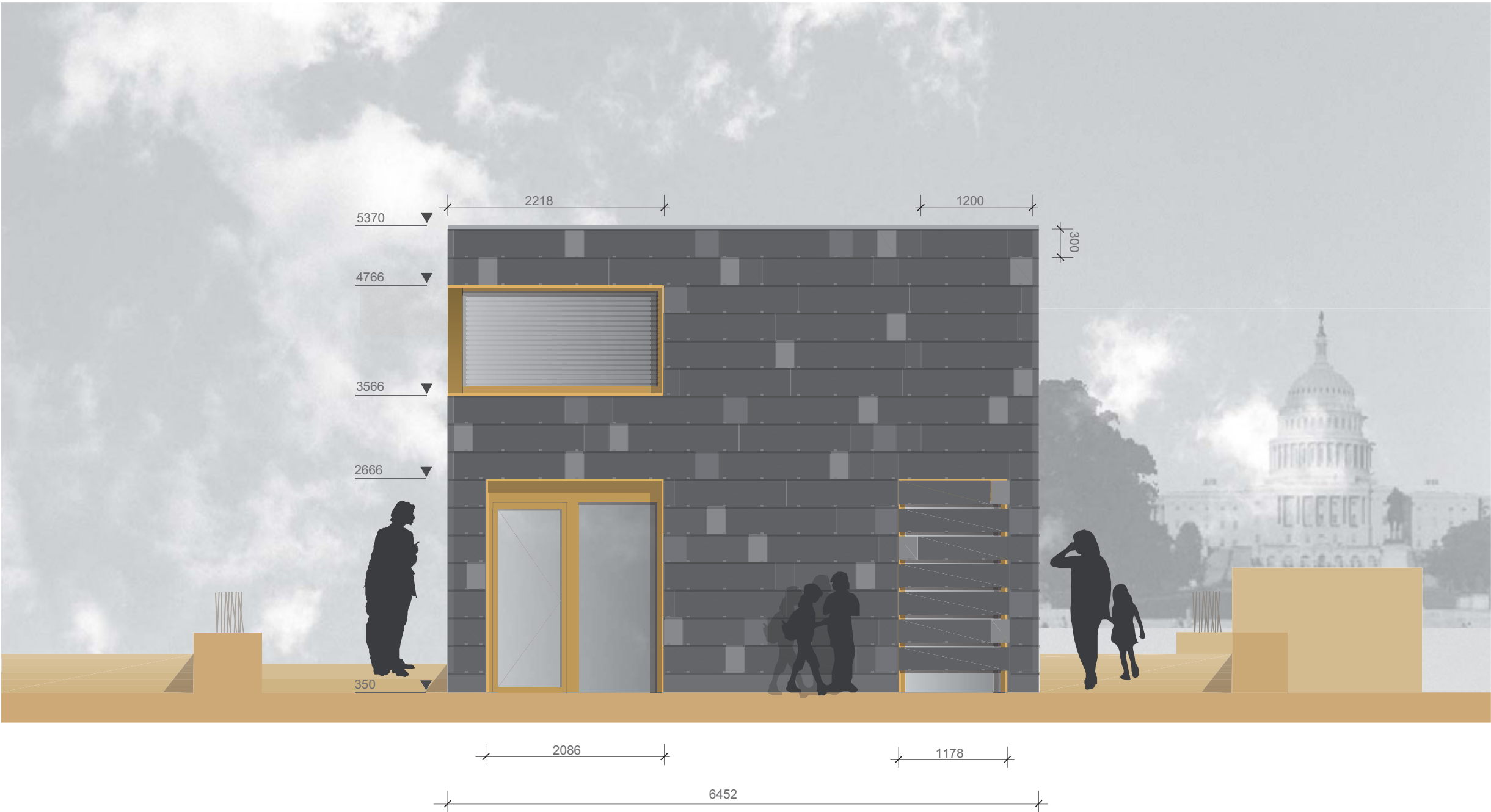
- pv-modul with
clamps
- acrylic glas insert gray
- acrylic glas insert colour #2
- acrylic glas insert colour #1

Drawn FH
Issued 05/25/09
Last index

Component
Architectual (A)

Description
Elevations

Project # Scale dwg #
P 140 1:50 A-312





South Elevation
Scale 1:50

1:50

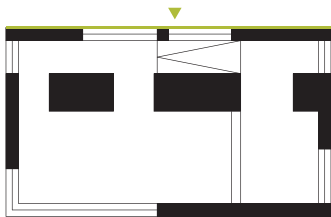


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



pv-modul with
clamps
acrylic glas insert gray
acrylic glas insert colour #1

Drawn FH
Issued 05/24/09
Last index

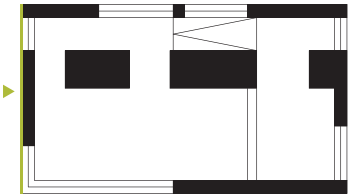
Component
Architectual (A)

Description
Elevations

Project # Scale dwg #
P 140 1:50 A-313



1:50



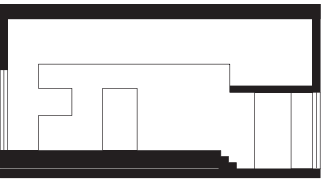
- pv-modul with clamps
- acrylic glas insert gray
- acrylic glas insert colour #2
- acrylic glas insert colour #1

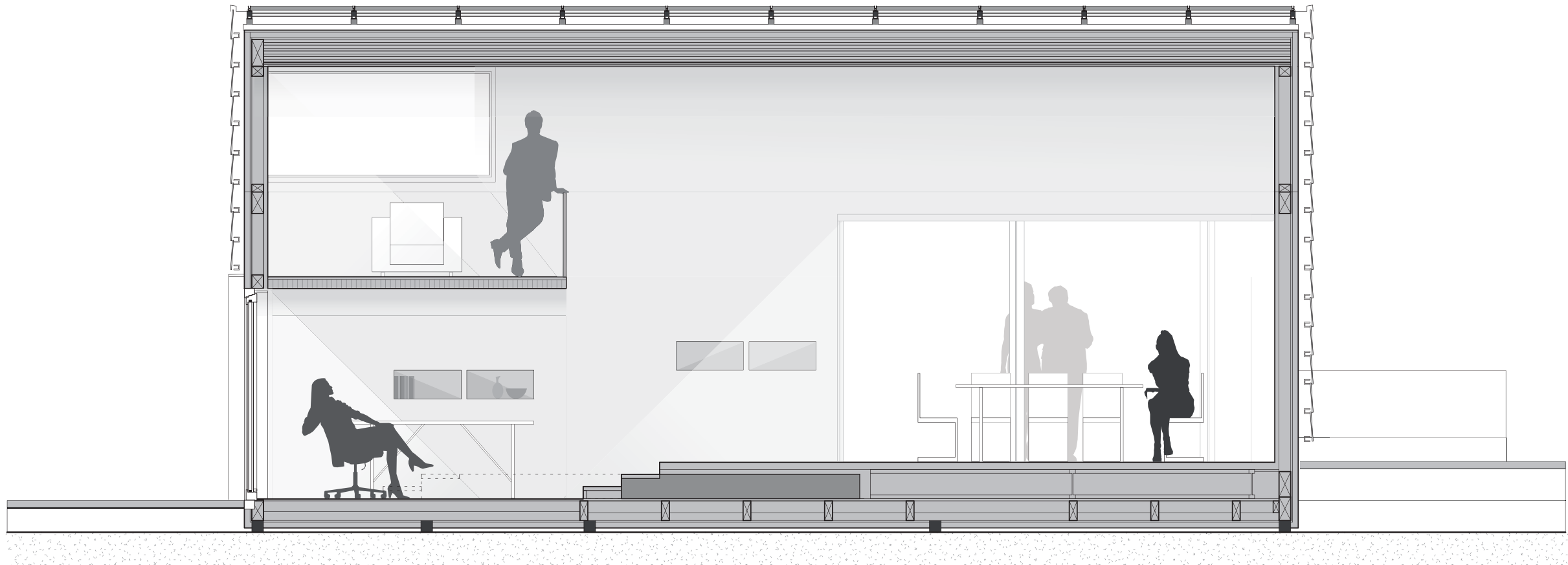
Drawn FH
Issued 05/24/09
Last index

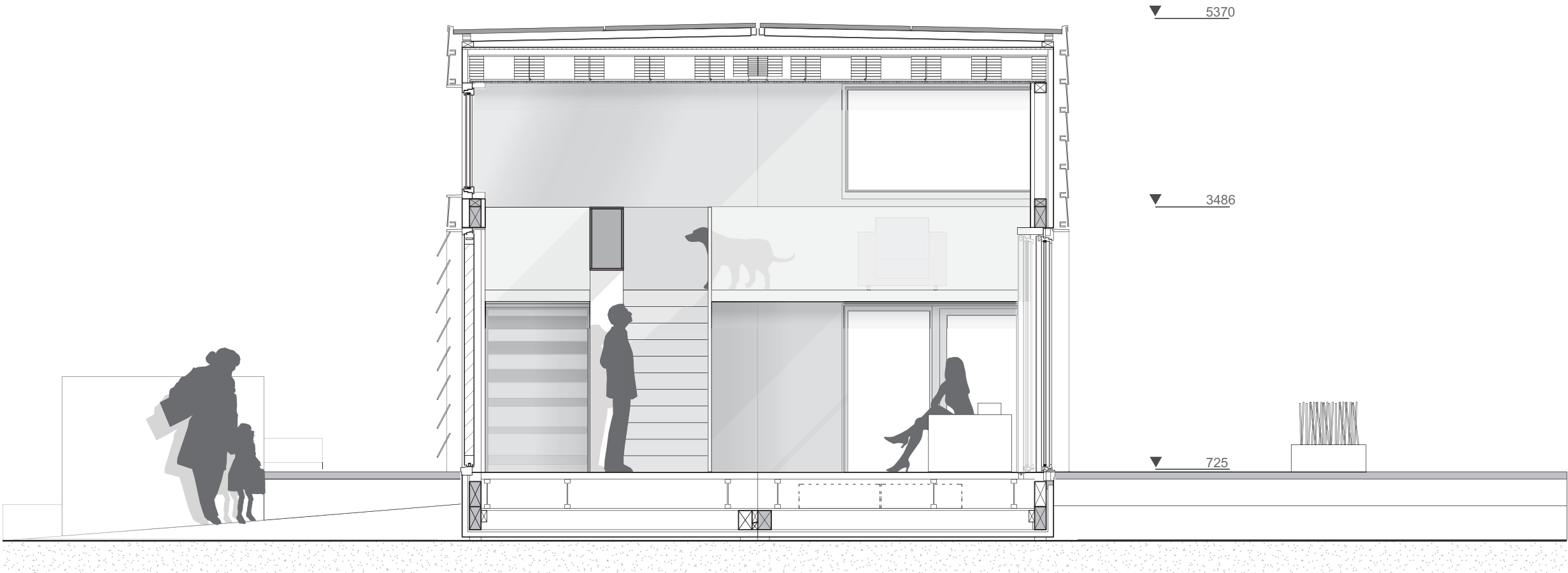
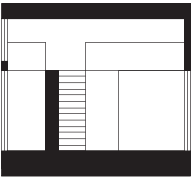
Component
Architectual (A)

Description
Elevations

Project # Scale dwg #
P 140 1:50 A-314

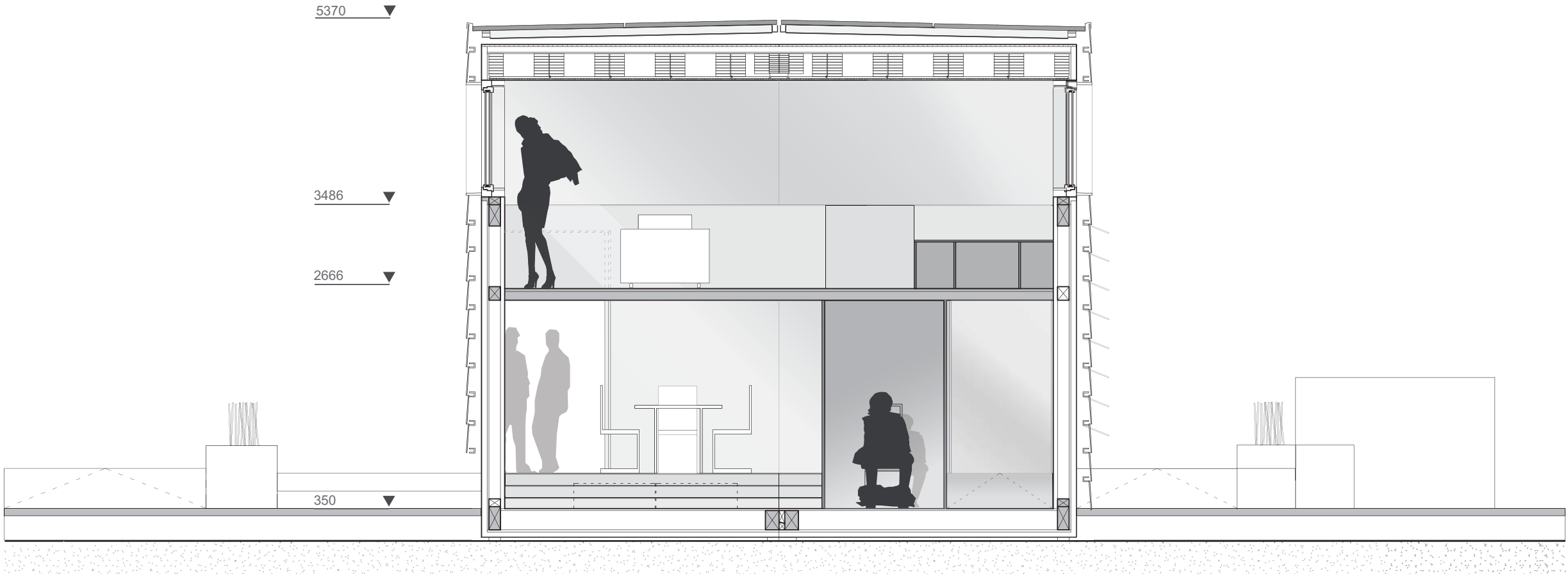
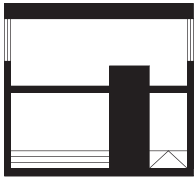






1:50





1 Cross Section View West
A-434 Scale 1:50

1:50



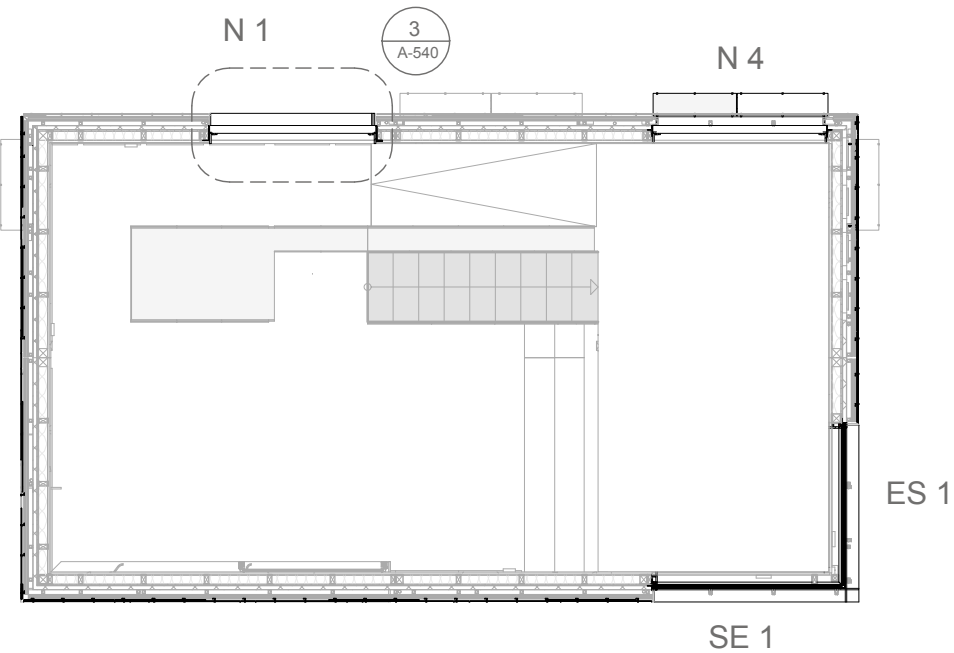
Drawn TH
Issued 05/28/09
Last index

Component
Architectural

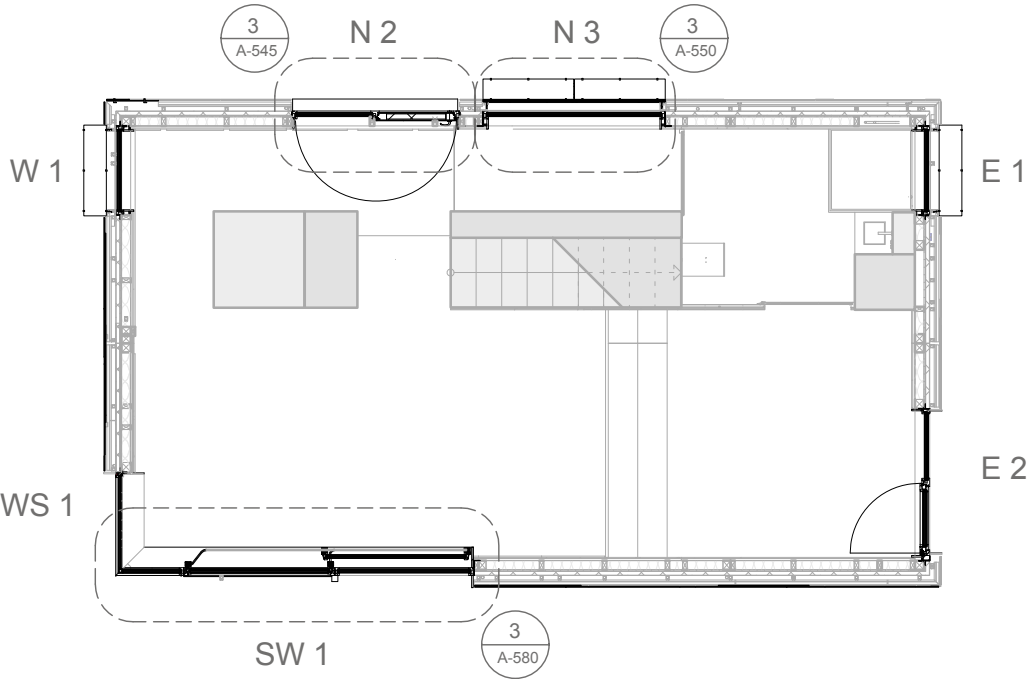
Description
Cross Section

Project # Scale dwg #
P 140 1 : 50 A-434

Key Plan Windows:
Floor plans

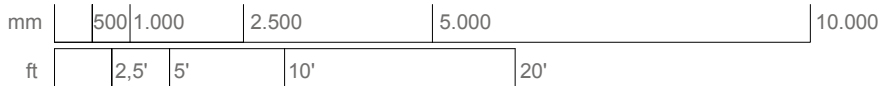


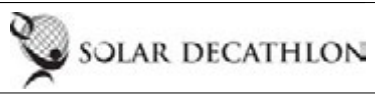
2 First Floor Plan
A-510 Scale 1:100



1 Floor Plan
A-510 Scale 1:100


1:100






SOLAR DECATHLON

Project



SOLAR DECATHLON 2009
TEAM GERMANY

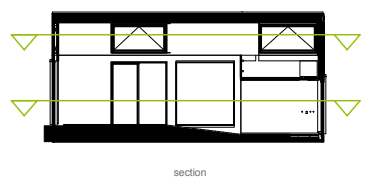
Constructor



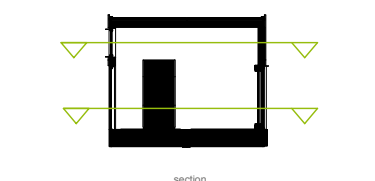
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



section



section

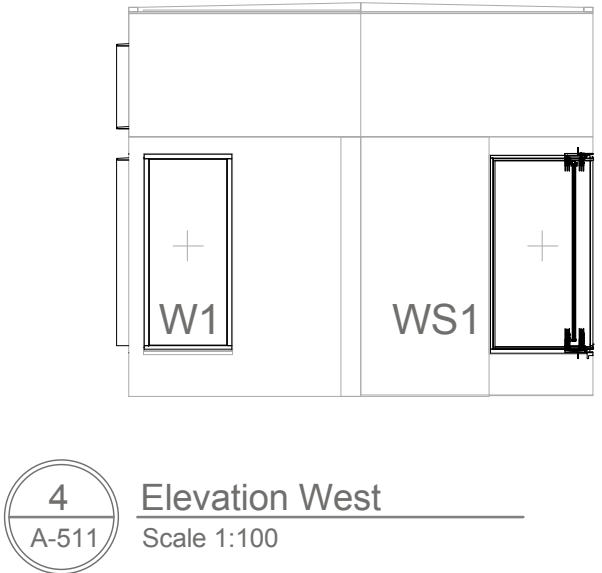
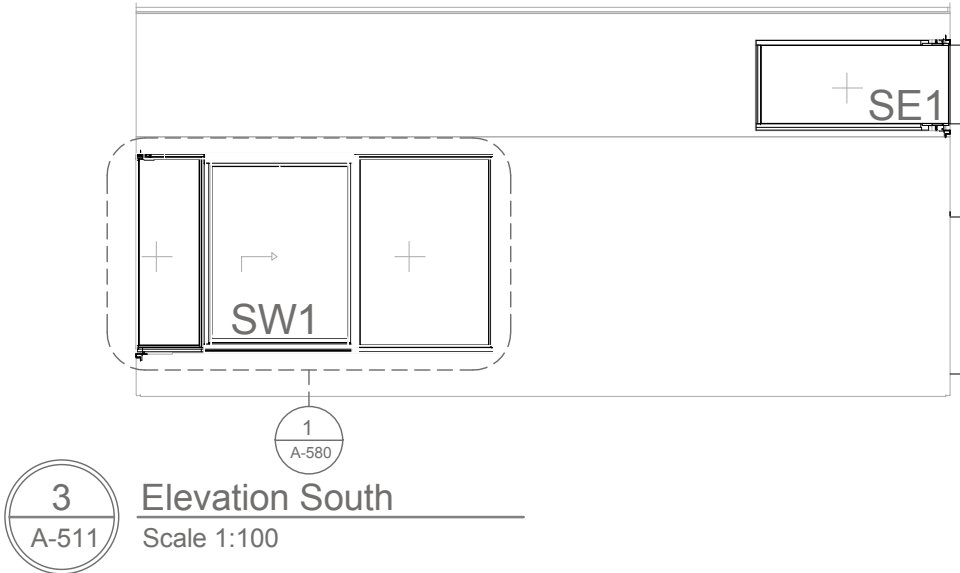
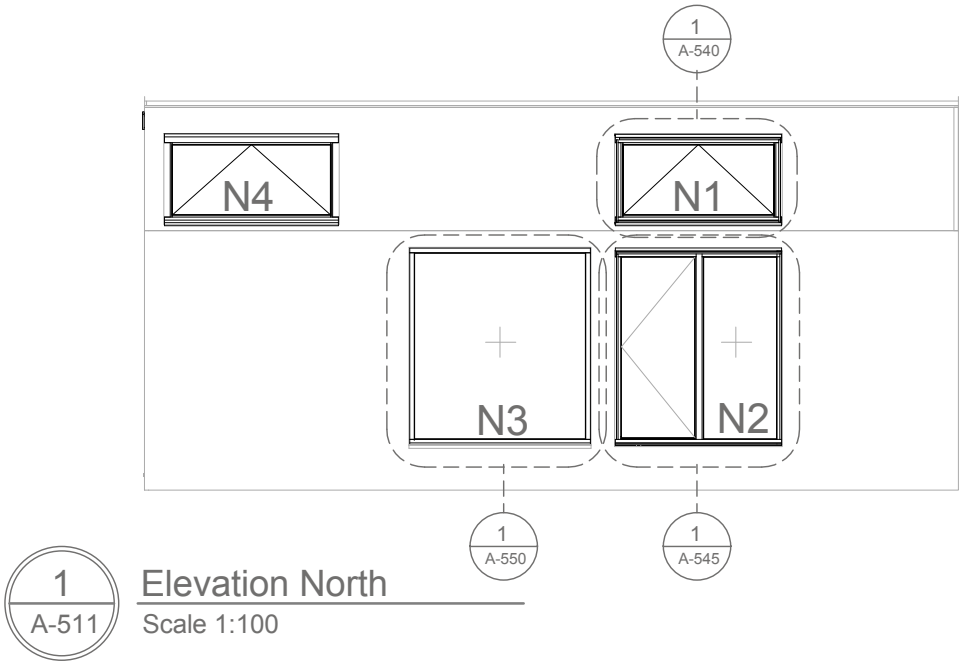
Drawn	ST, CW
Issued	05/12/09
Last index	

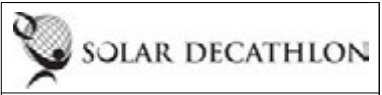
Component
Windows

Description
Key Plan Windows


Project #	Scale	dwg #
P 140	1 : 100	A-510

Key Plan Windows:
Elevations






Project

TEAM GERMANY


Constructor

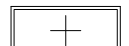


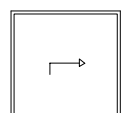
TECHNISCHE
UNIVERSITÄT
DARMSTADT

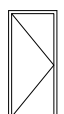
Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Pivot Hung Window

Fixed Glazing

Sliding Door

Door

DrawnST, CW

Issued05/12/09

Last index

Component

Windows

Description

Key Plan Windows

Project #

Scale

dwg #

P 1401 : 100A-511

Project Manual Division Master Format 08 / 11

1:100

mm | 500 | 1.000 | 2.500 | 5.000 | 10.000

ft | 2,5' | 5' | 10' | 20'

Elevation North

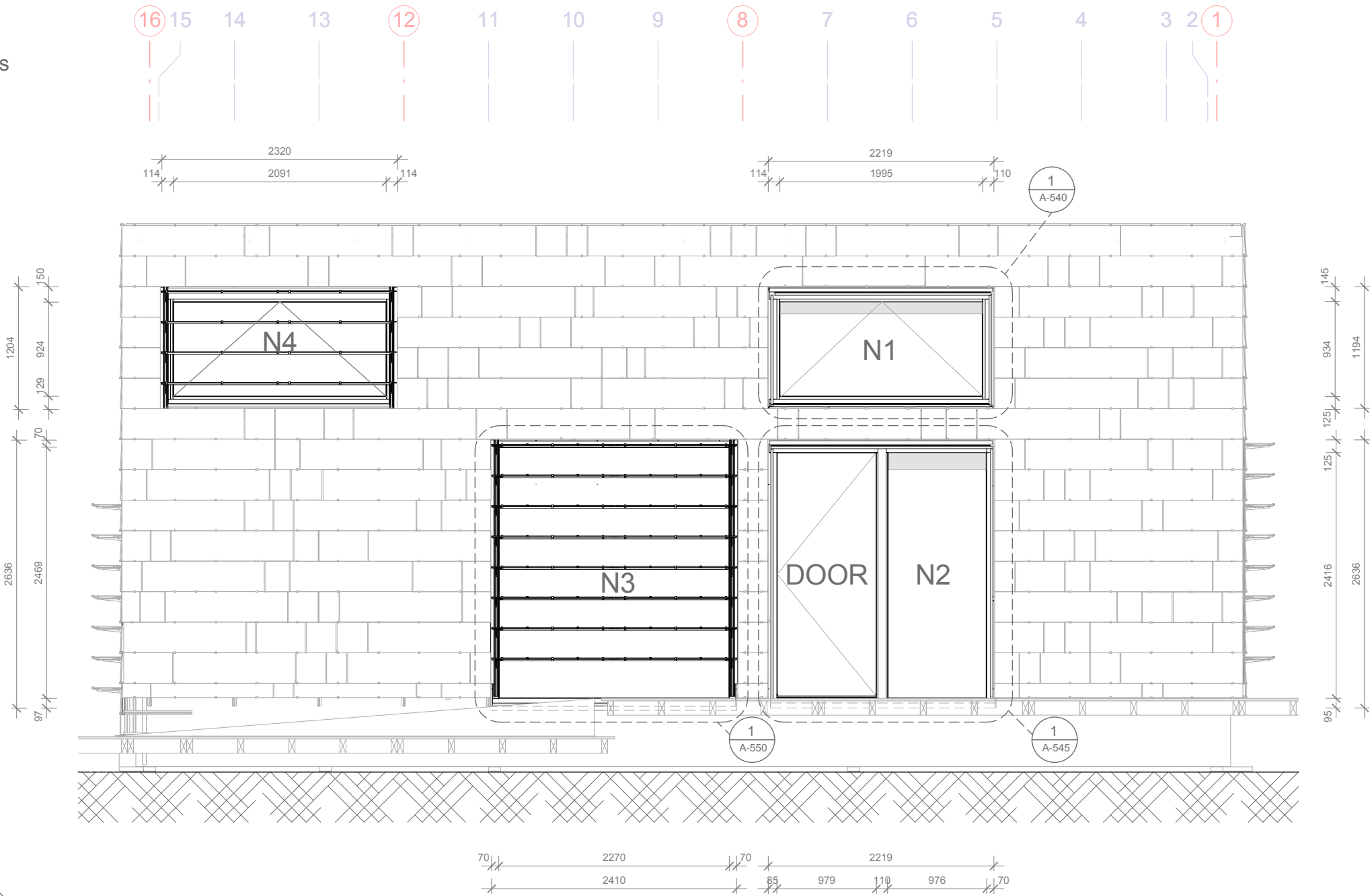
Sun blind

N1
window integrated blinds

N2
window integrated blinds

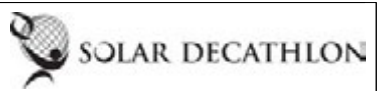
N3
photovoltaic louvers

N4
photovoltaic louvers



Elevation North
Scale 1:50

1:50

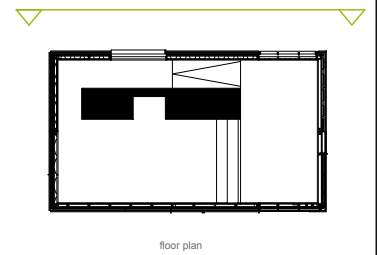
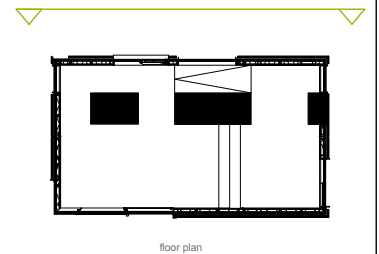


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



Drawn ST, CW
Issued 05/04/09
Last index

Component
Windows

Description
Windows Elevation
North

Project # Scale dwg #
P 140 1 : 50 A-520

Elevation East

Sun blind

ES1
window integrated blinds

E1
photovoltaic louvers

E2
window integrated blinds



1

A-521

Elevation East

Scale 1:50

1:50



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

ConstructorTECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

floor plan

floor plan

DrawnST, CW

Issued05/04/09

Last index

Component

Windows

Description

Windows Elevation East

Project #

Scale

dwg #

P 140

1 : 50

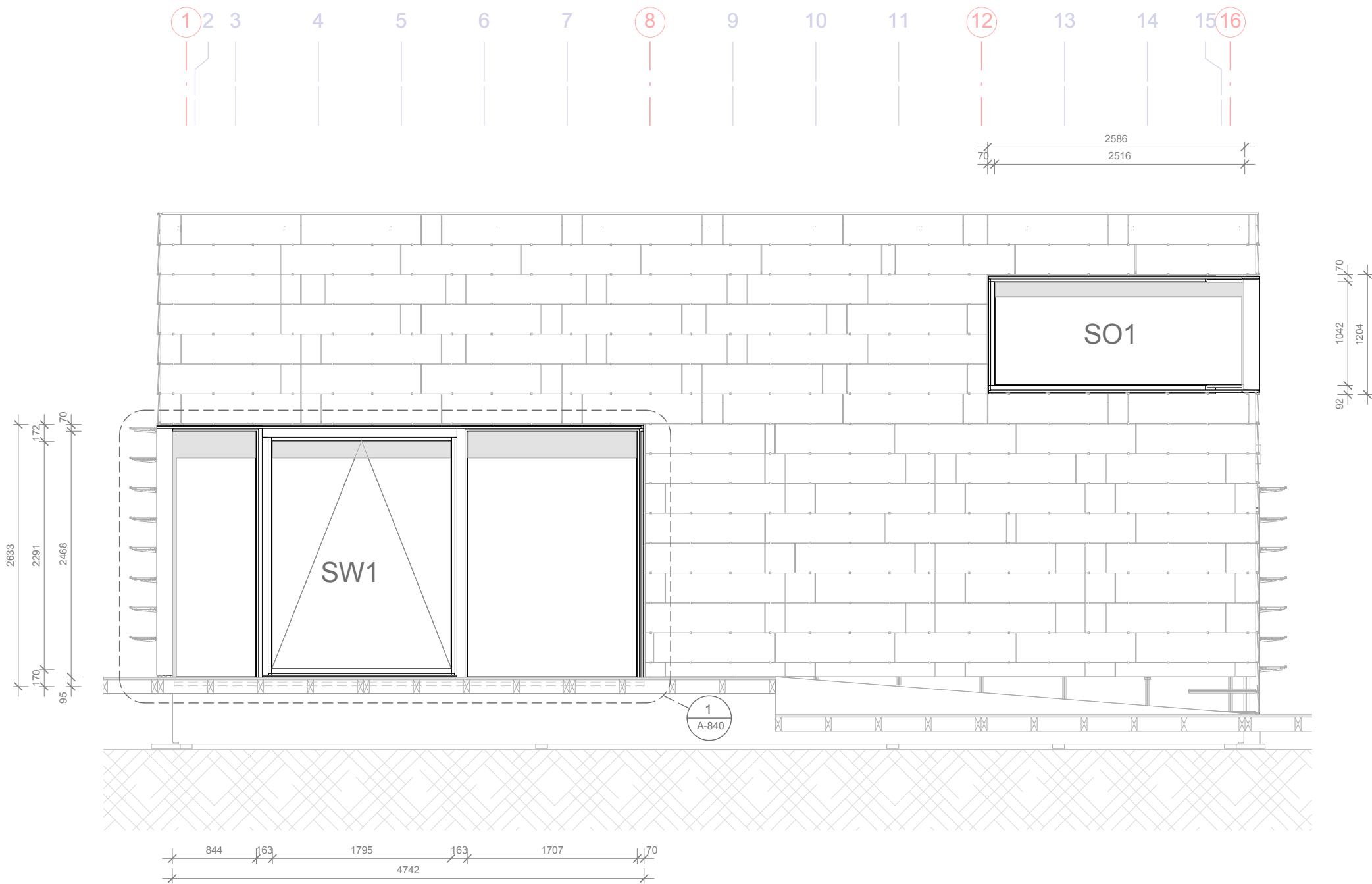
A-521

Elevation South

Sun blind

SO1
window integrated blinds

SW1
window integrated blinds



1 Elevation South
A-522 Scale 1:50



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

floor plan

floor plan

Drawn	ST, CW
Issued	05/04/09
Last index	

Component

Windows

Description

Windows Elevation
South

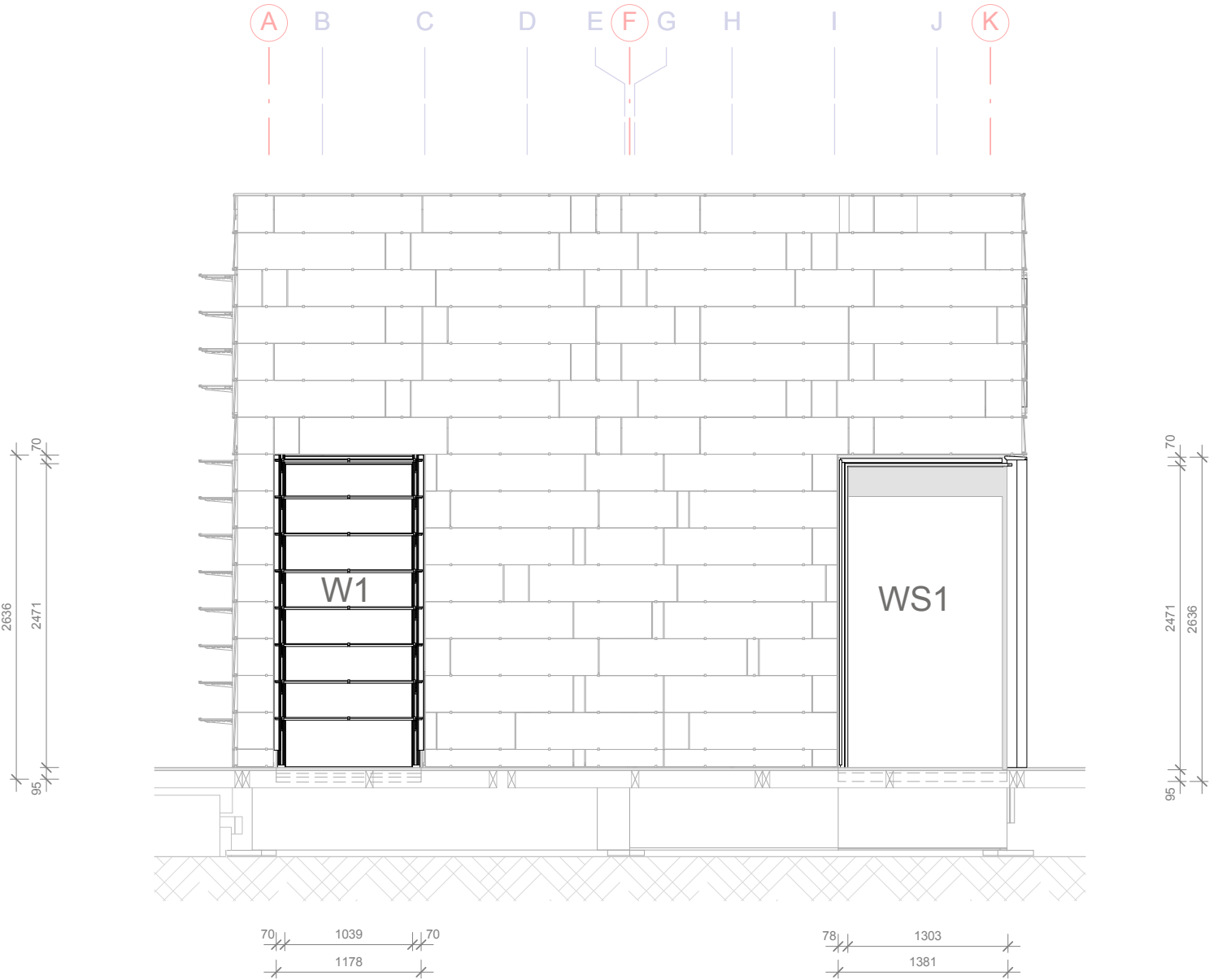
Project #	Scale	dwg #
P 140	1 : 50	A-522

Elevation West

Sun blind

W1
photovoltaic louvers

WS1
window integrated blinds



1
A-523

Elevation West
Scale 1:50

1:50



Project

 TEAM GERMANY

Constructor

 TECHNISCHE
UNIVERSITÄT
DARMSTADT

 Department of Architecture
 Energyefficient Building Design
 Unit
 El-Lissitzky-Str. 1
 64287 Darmstadt
 +49 (0) 6151 / 165448
 +49 (0) 6151 / 165247
 team@solardecathlon2009.de

Navigation/Legend

 floor plan

 floor plan

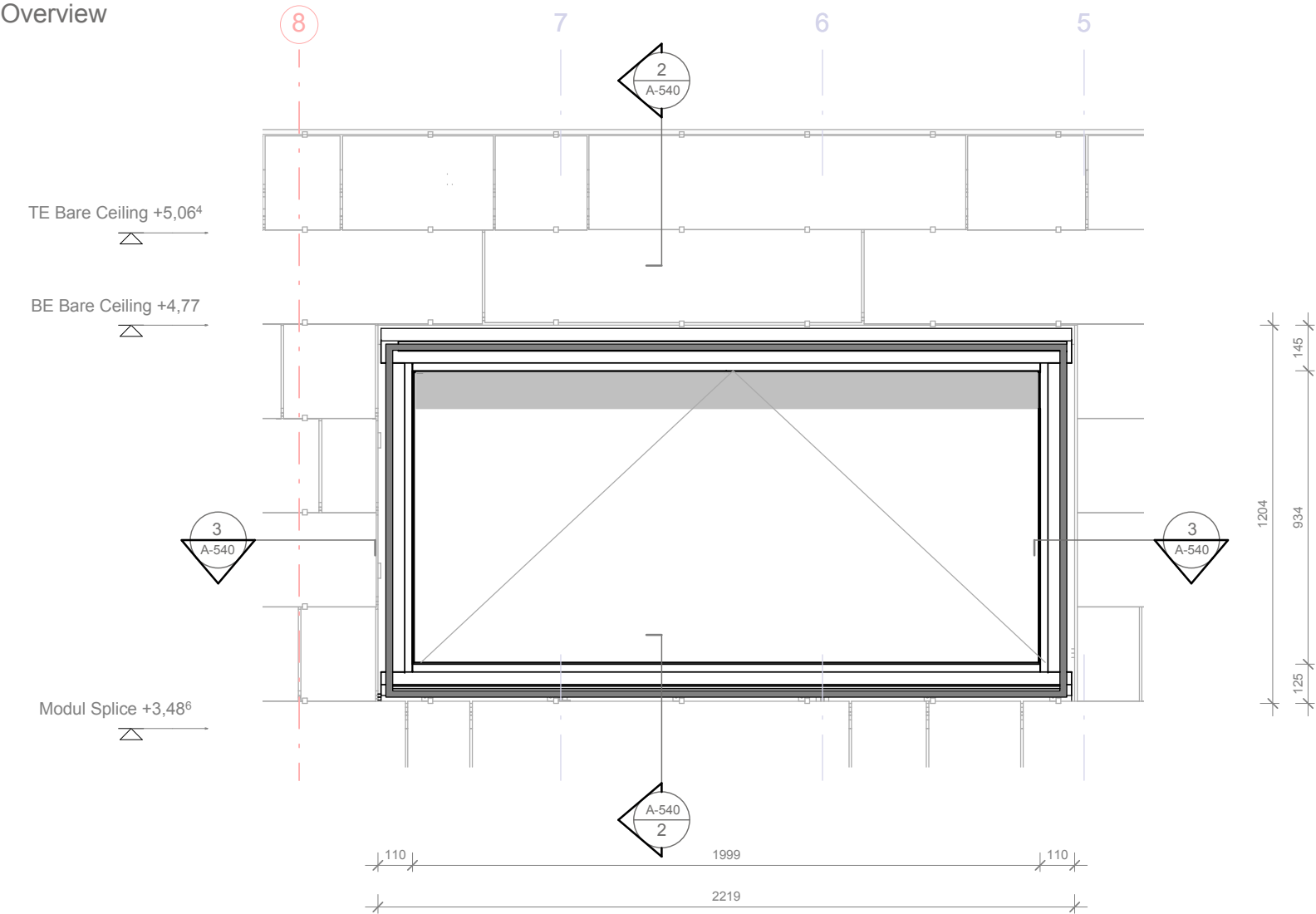
Drawn	ST, CW
Issued	05/04/09
Last index	

Component
 Windows

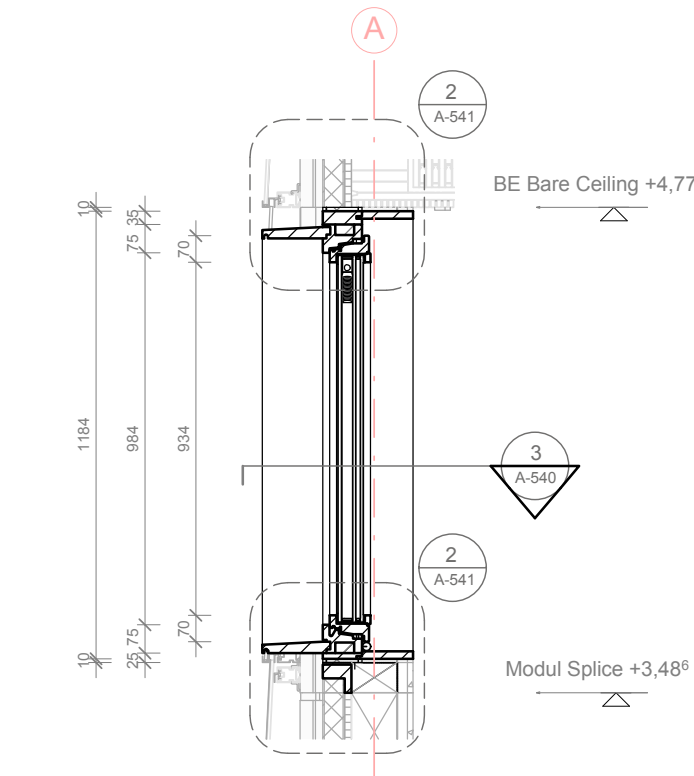
Description
Windows Elevation West

Project #	Scale	dwg #
P 140	1 : 50	A-523

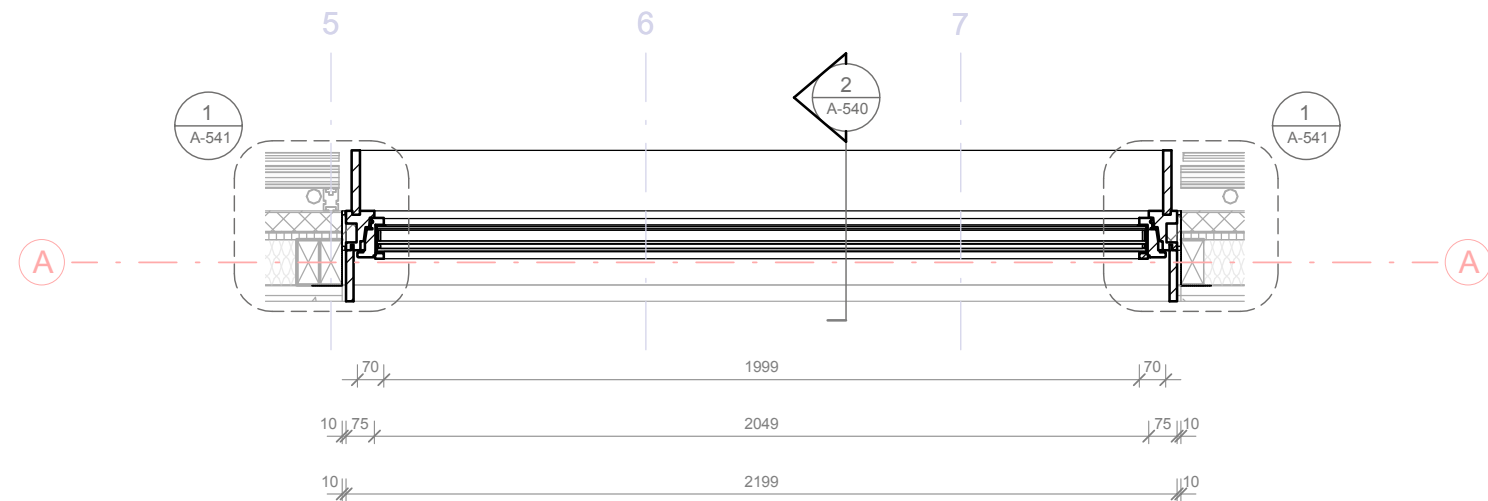
Window N1
Overview



1 N1 Overview Elevation
A-540 Scale 1:20 ref. drawing: A-510 / A-511



2 N1 Overview Vertical Section
A-540 Scale 1:20 ref. drawing: A-510 / A-511



3 N1 Overview Horizontal Section
A-540 Scale 1:20 ref. drawing: A-510 / A-511

SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

NH 1

floor plan

NV 1

section

Steel

Aluminum

Oak

rigid Polyurethane foam

Window foil

toughened safety glass

insulation

Drawn ST, CW

Issued 05/12/09

Last index

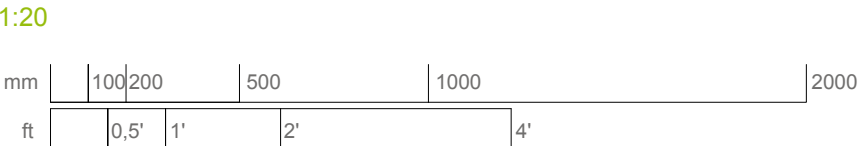
Component

Windows

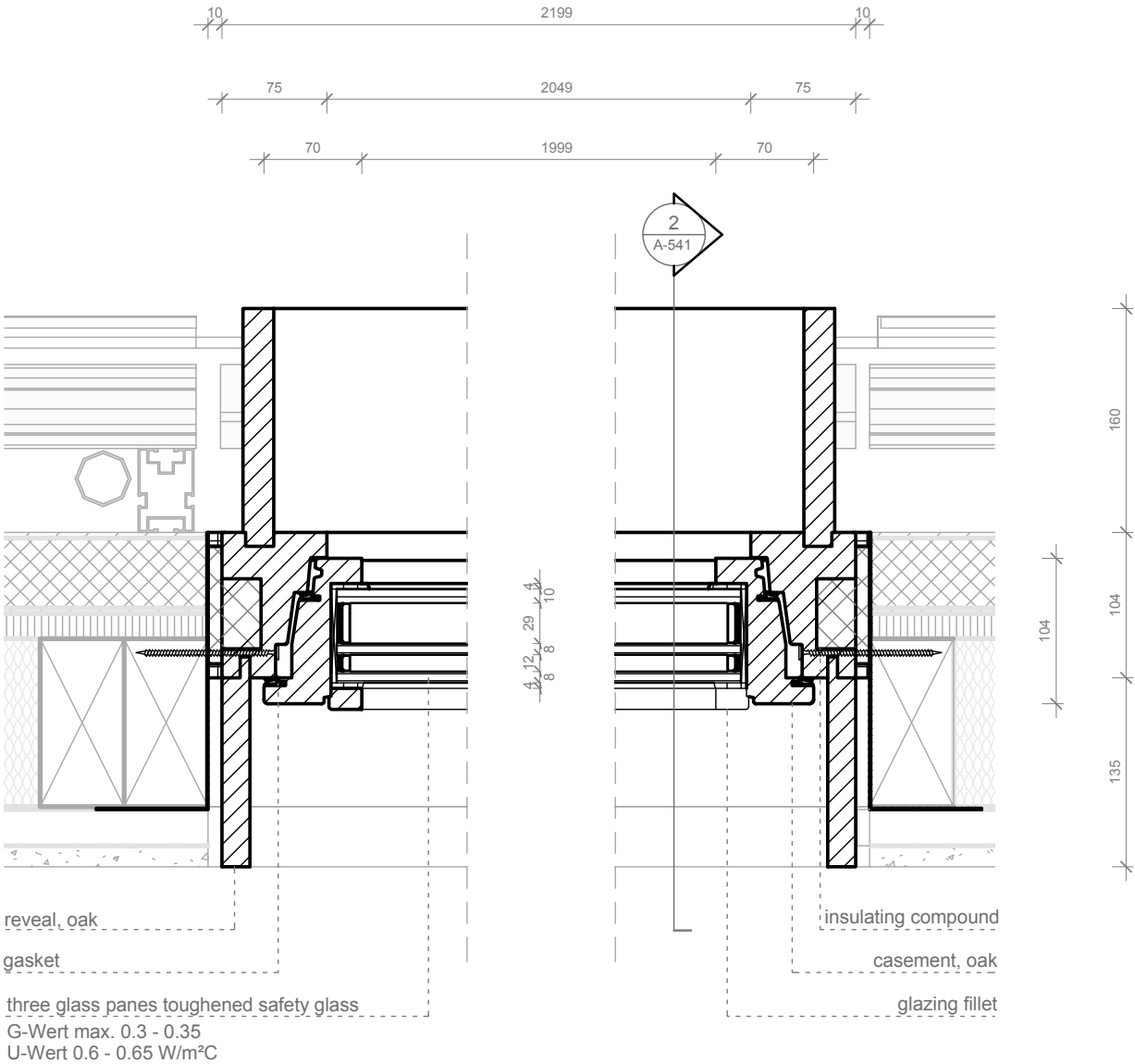
Description

Window N1 Overview

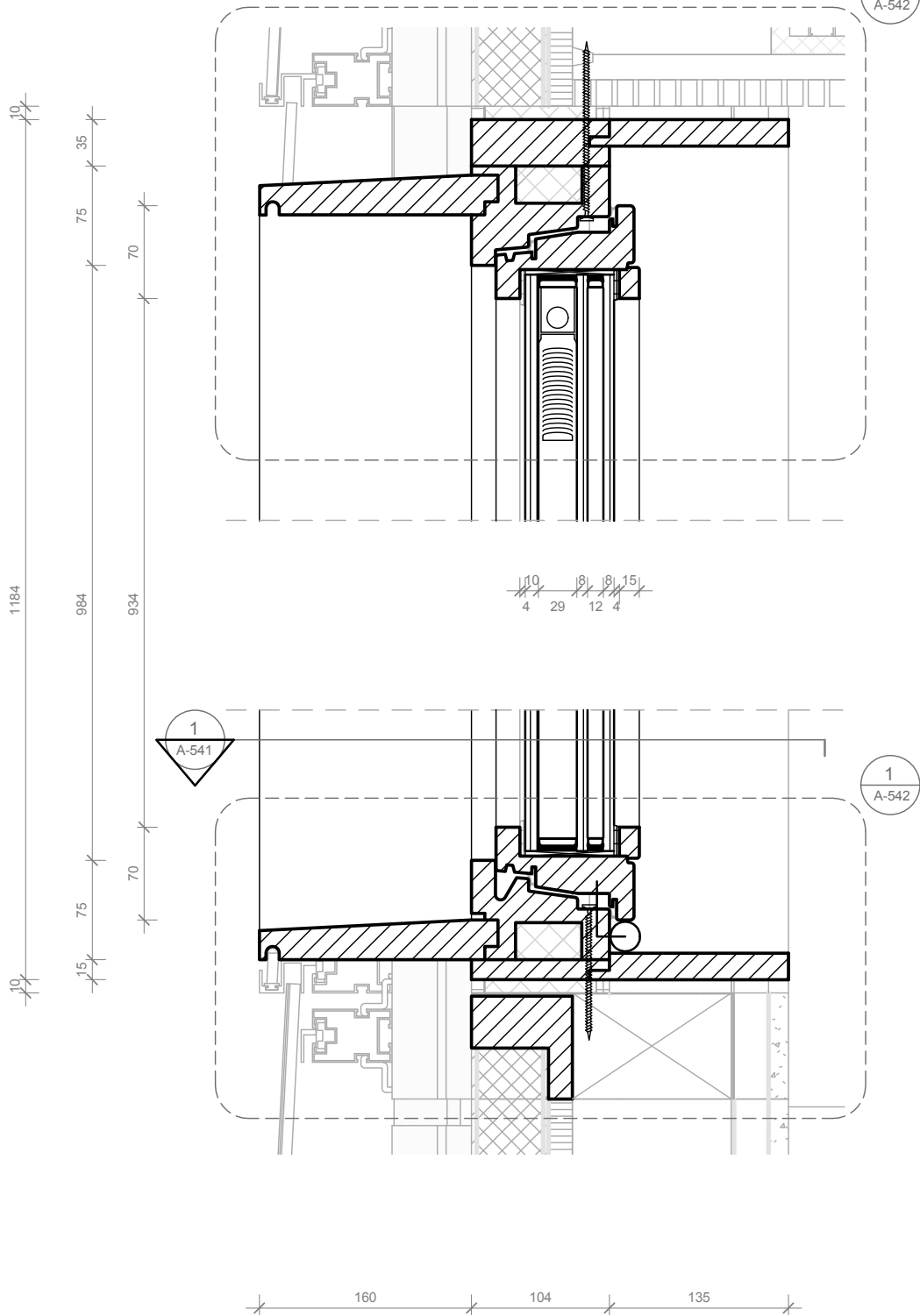
Project #	Scale	dwg #
P 140	1 : 20	A-540



Window N1
Detail 1



1
A-541
N1 Detail 1 Horizontal Section
Scale 1:5 ref. drawing: A-540



2
A-541
N1 Detail 1 Vertical Section
Scale 1:5 ref. drawing: A-540

1:5



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

NH 1

floor plan

NV 1

section

Steel

Aluminum

Oak

rigid Polyurethane foam

Window foil

toughened safety glass

insulation

Drawn ST, CW

Issued 05/12/09

Last index

Component
Windows

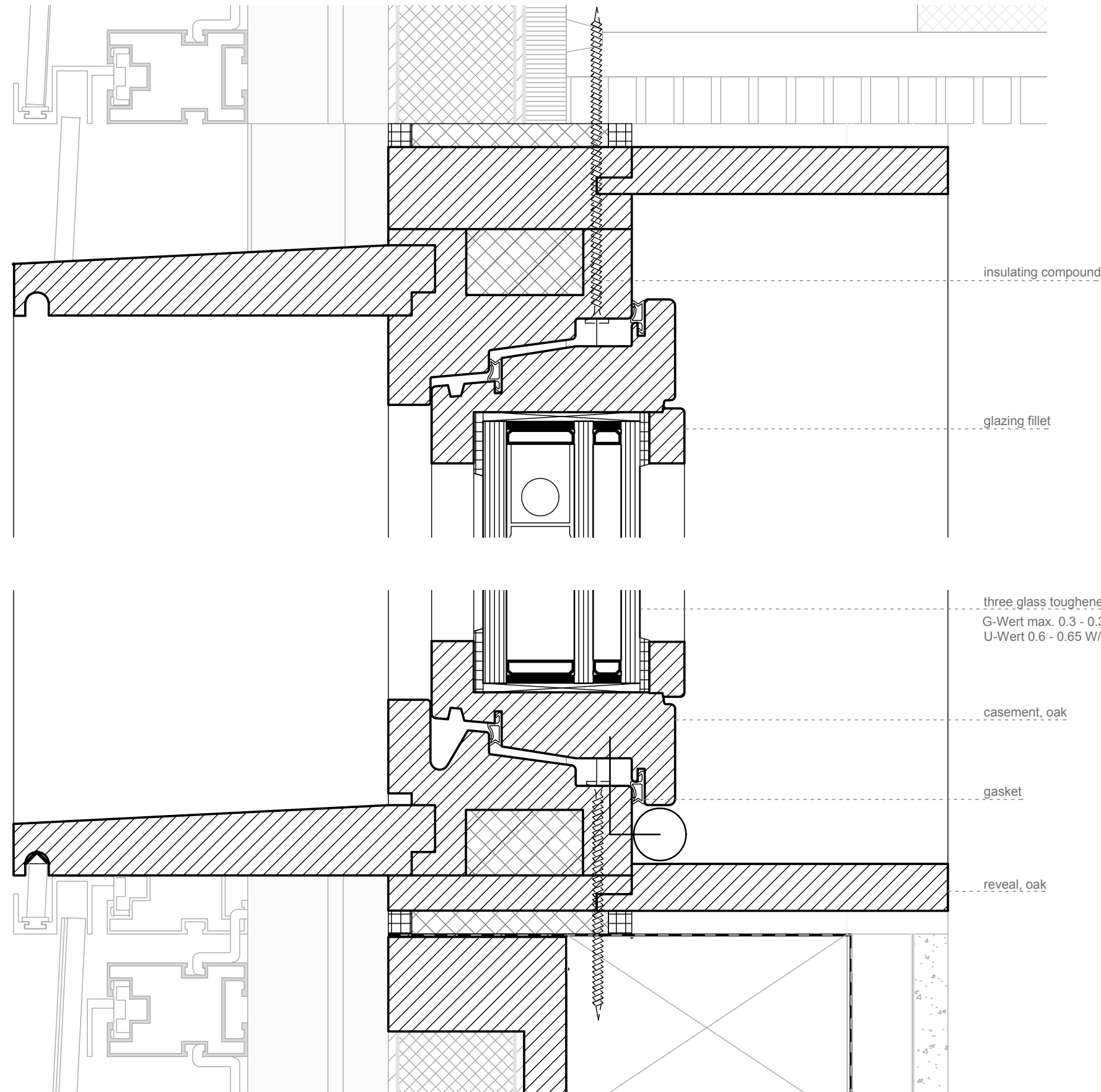
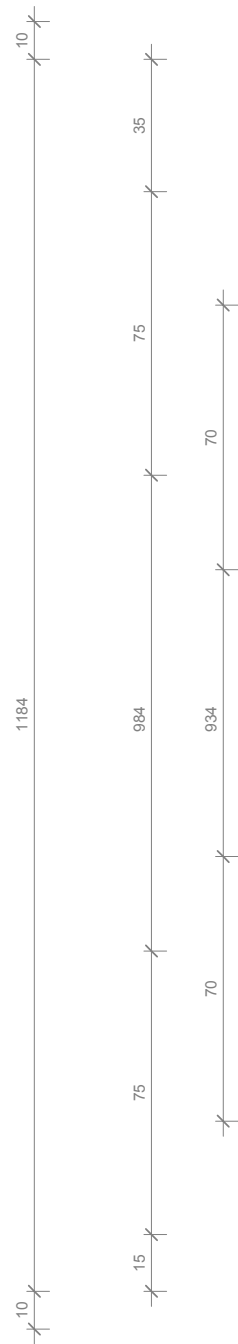
Description
Window N1 Detail 1

Project # P 140

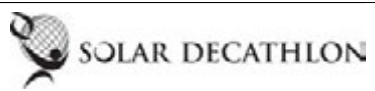
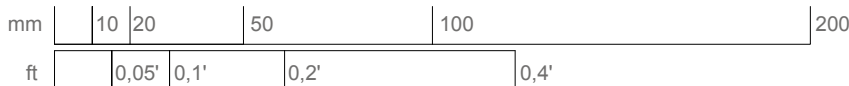
Scale 1 : 5

dwg # A-541

Window N1
Detail 2



1:2

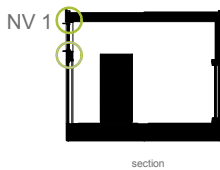
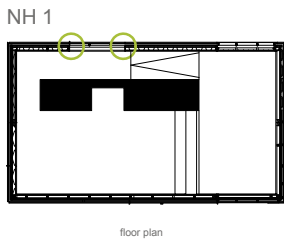


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



- Steel
- Aluminum
- Oak
- rigid Polyurethane foam
- Window foil
- toughened safety glass
- insulation

Drawn ST, CW
Issued 05/12/09
Last index

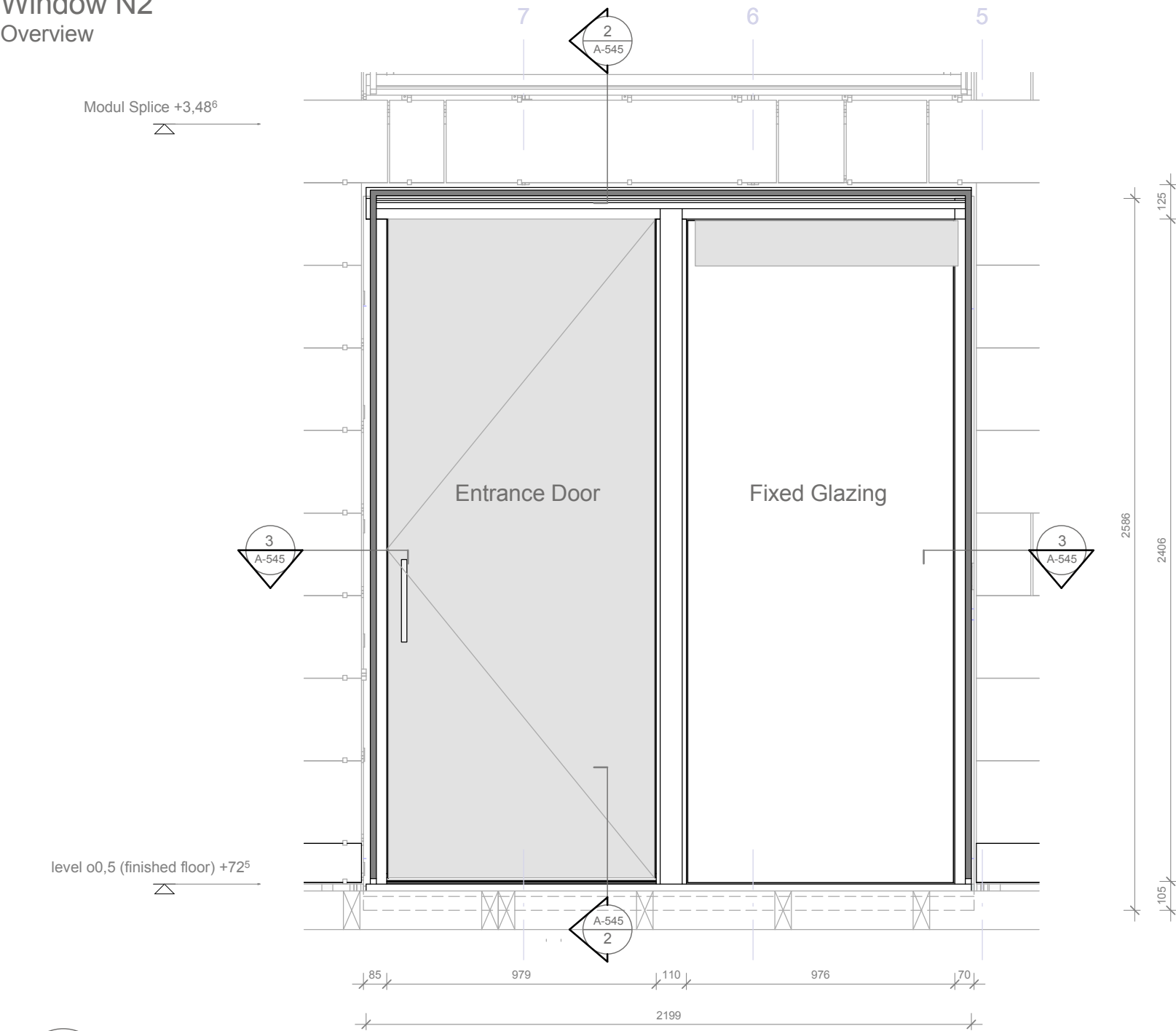
Component
Windows

Description
Window N1 Detail 2

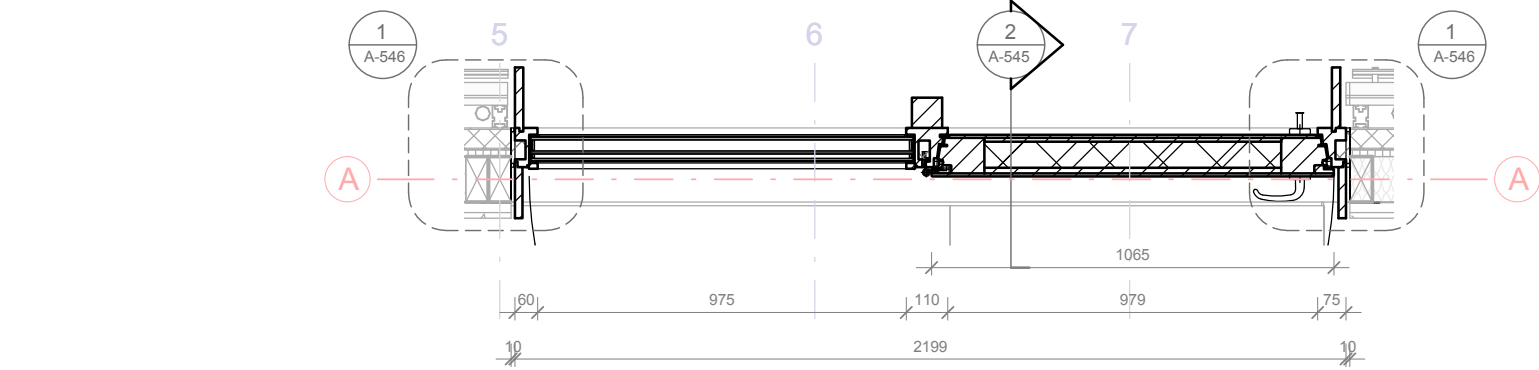
Project # Scale dwg #
P 140 1 : 2 A-542

1
A-542
N1 Detail 2 Vertical Section
Scale 1:2 ref. drawing: A-541

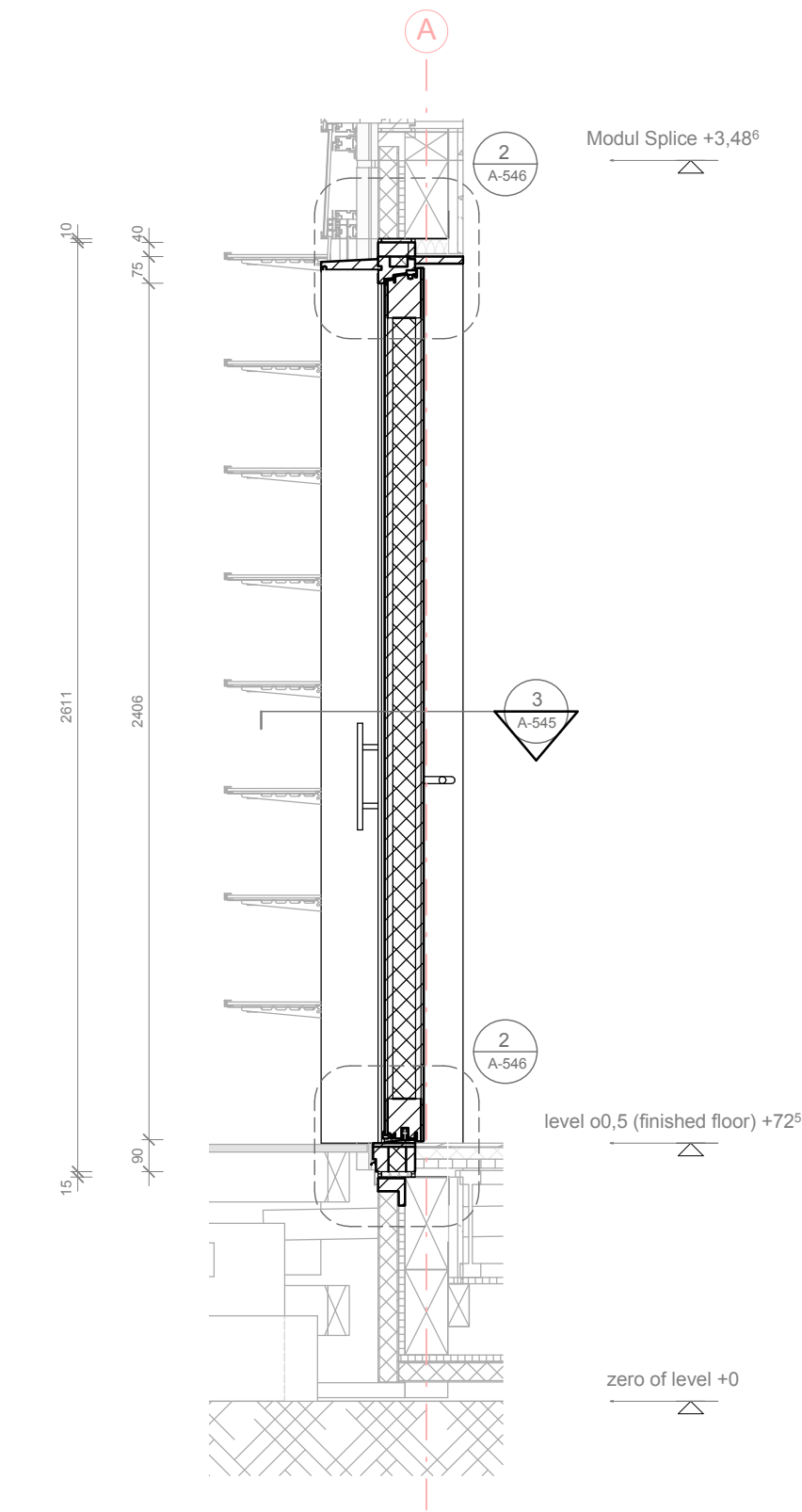
Window N2
Overview



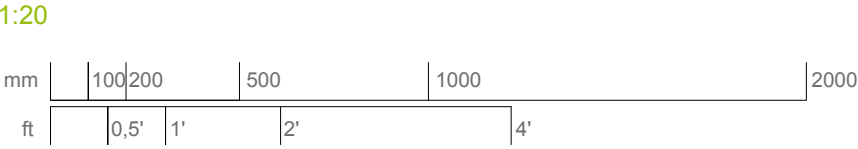
1 N2 Overview Elevation
A-545 Scale 1:20 ref. drawing: A-510 / A-511



3 N2 Overview Horizontal Section
A-545 Scale 1:20 ref. drawing: A-510 / A-511



2 N2 Overview Vertical Section
A-545 Scale 1:20 ref. drawing: A-510 / A-511



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

NH 2

floor plan

NV 2

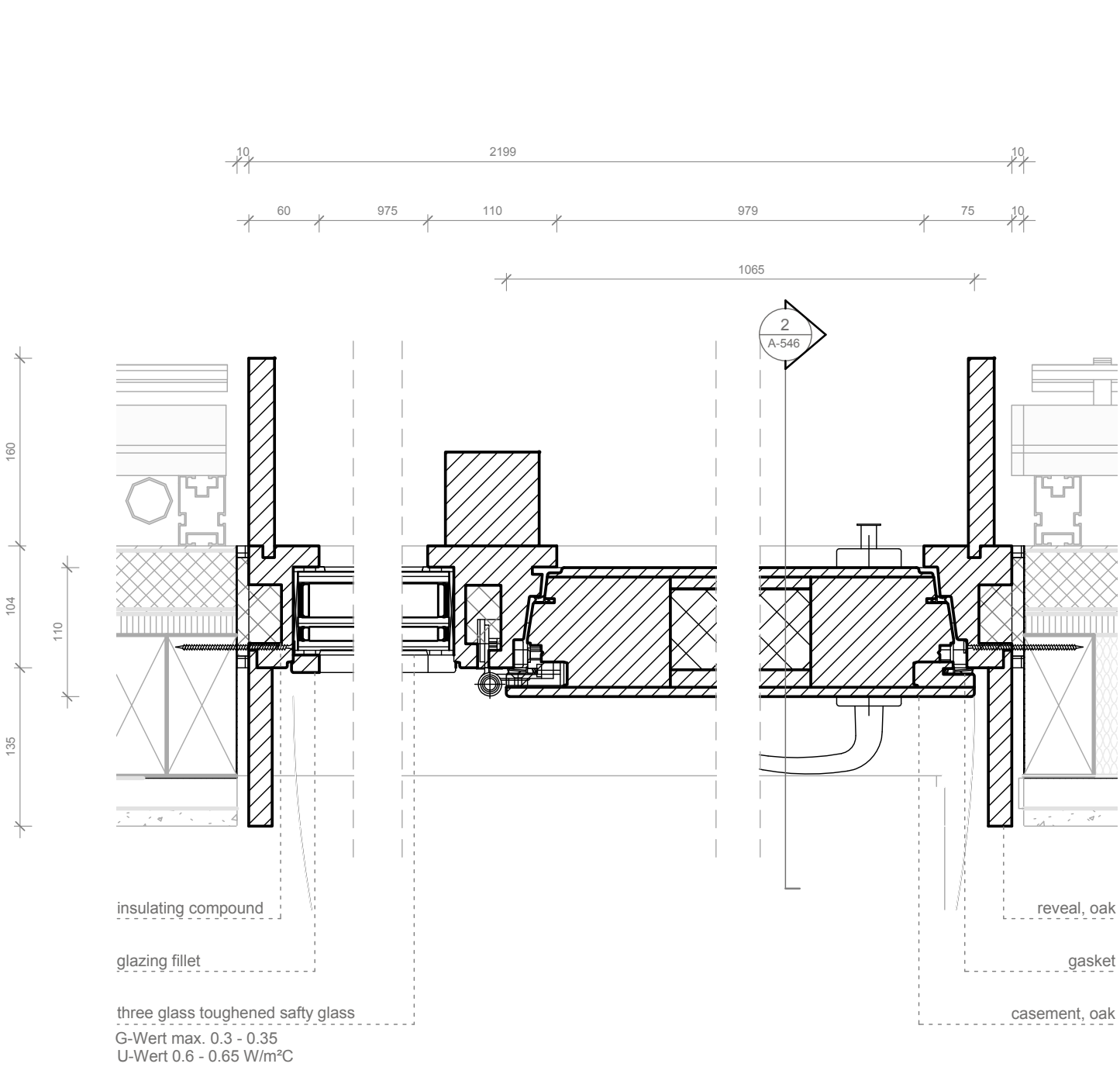
section

	Steel
	Aluminum
	Oak
	rigid Polyurethane foam
	Window foil
	toughened safety glass
	insulation

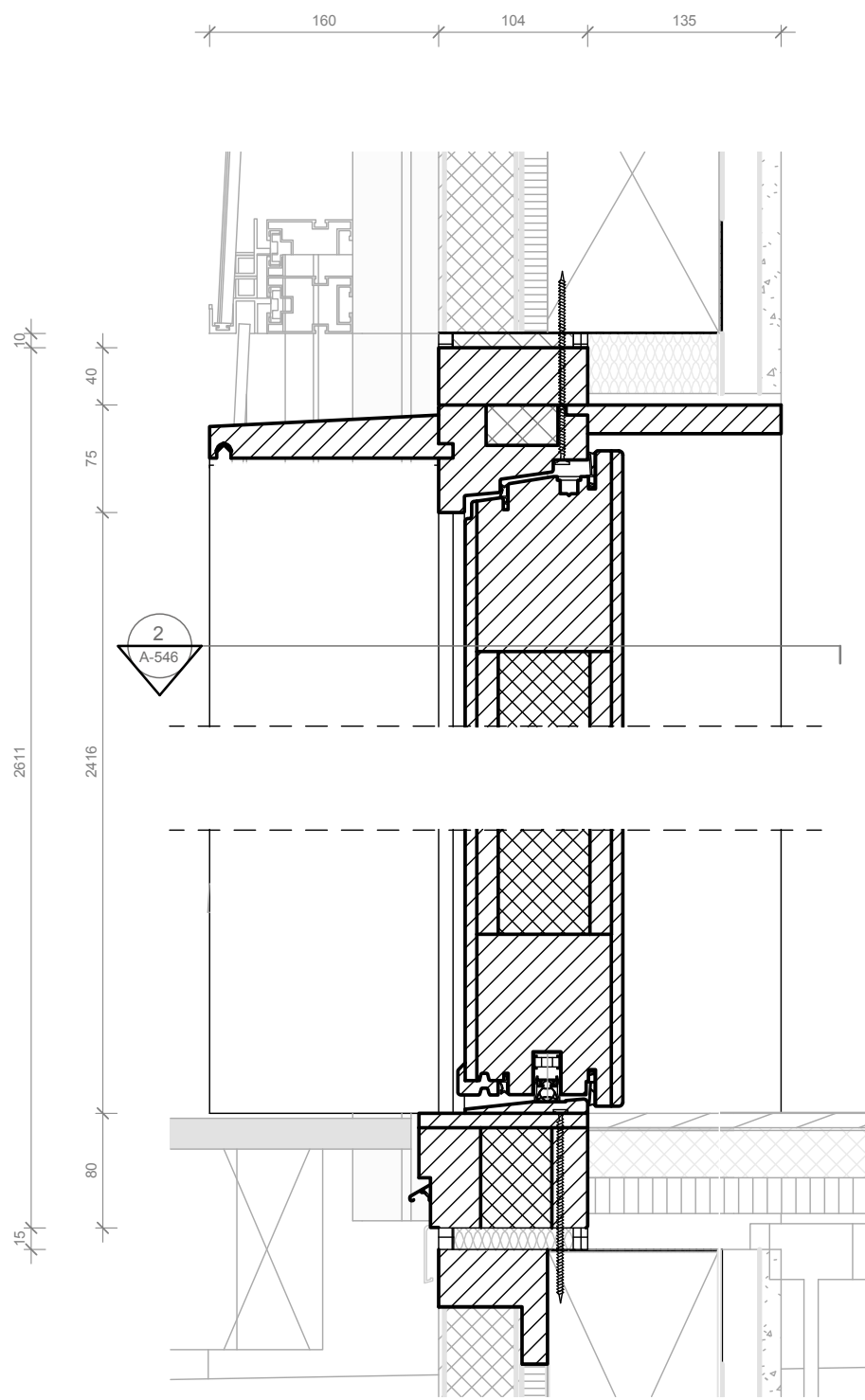
Drawn	ST, CW
Issued	05/12/09
Last index	
Component	Windows
Description	Window N2 Overview

Project #	Scale	dwg #
P 140	1 : 20	A-545

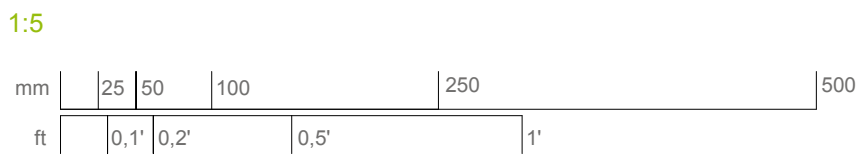
Window N2
Detail 1

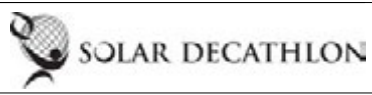


1 N2 Detail 1 Horizontal Section
A-546 Scale 1:5 ref. drawing: A-545




2 N2 Detail 1 Vertical Section
A-546 Scale 1:5 ref. drawing: A-545






SOLAR DECATHLON

Project



SOLAR DECATHLON 2009
TEAM GERMANY

Constructor



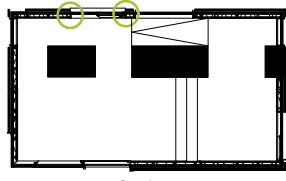
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit

El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

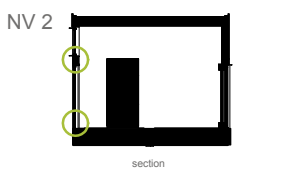
Navigation/Legend

NH 2










floor plan

NV 2

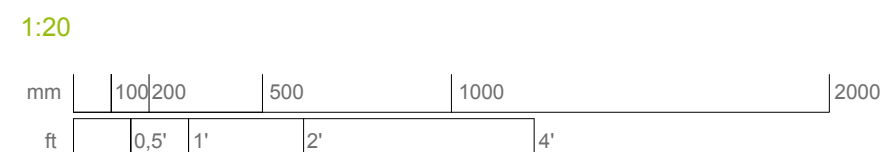
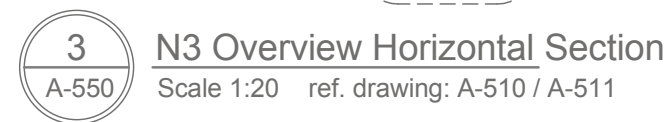


section

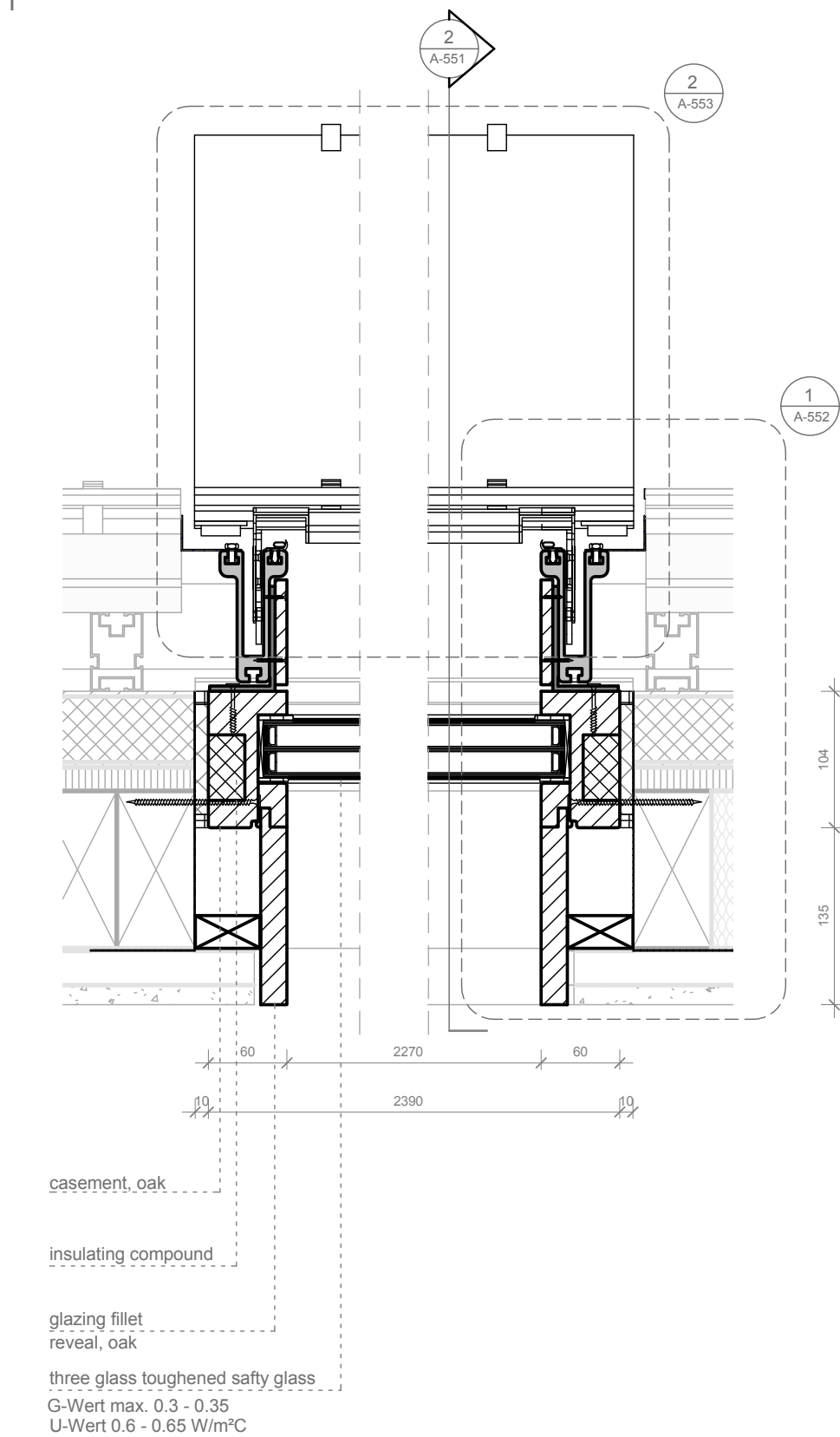
	Steel
	Aluminum
	Oak
	rigid Polyurethane foam
	Window foil
	toughened safety glass
	insulation

Drawn	ST, CW	
Issued	05/12/09	
Last index		
Component	Windows	
Description	Window N2 Detail 1	
Project #	Scale	dwg #
P 140	1 : 5	A-546

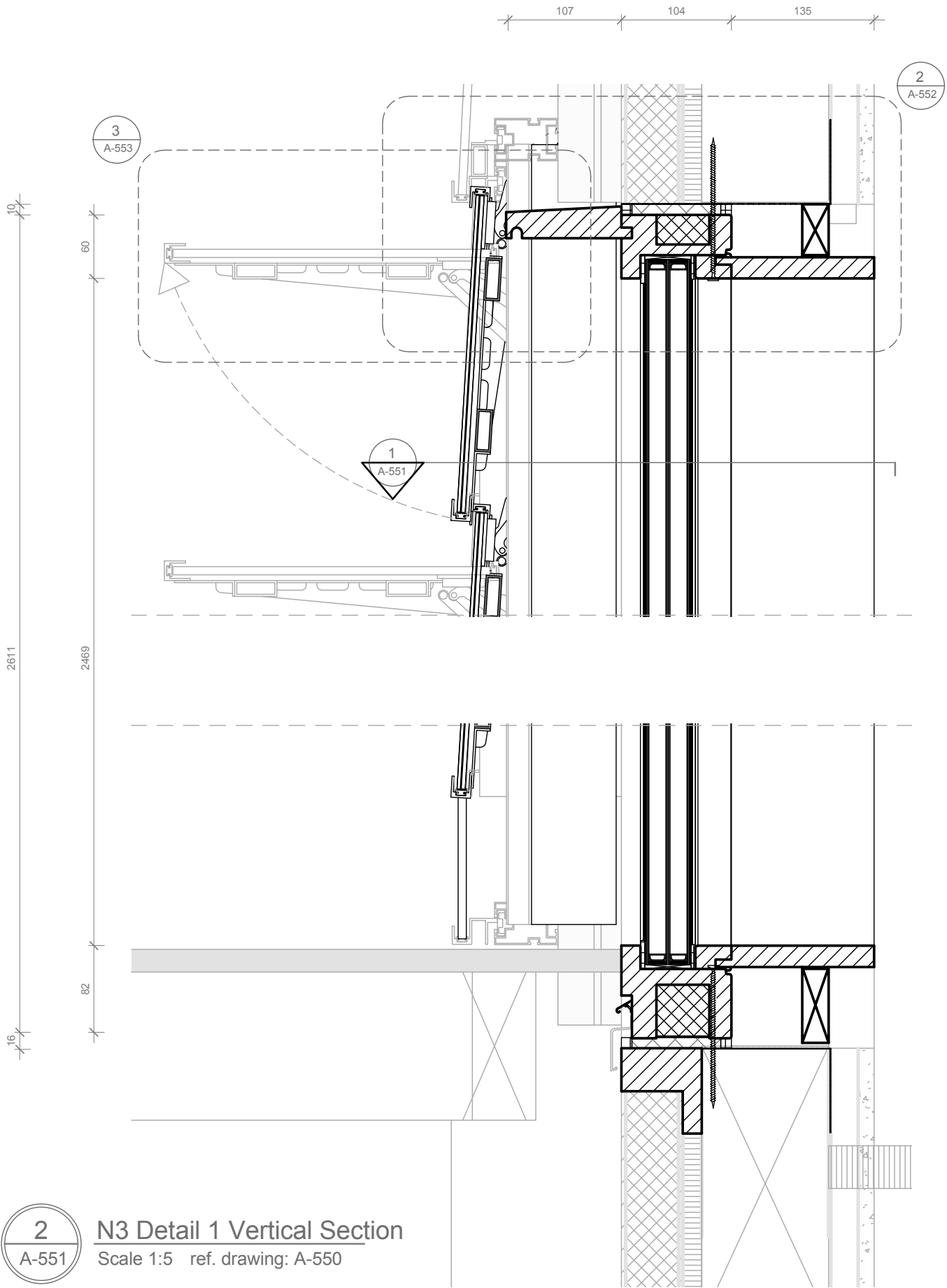
Modul Splice +3,48⁶



Window N3
Detail 1



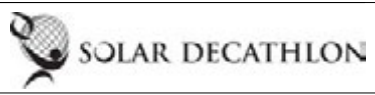
1 N3 Detail 1 Horizontal Section
A-551 Scale 1:5 ref. drawing: A-550




2 N3 Detail 1 Vertical Section
A-551 Scale 1:5 ref. drawing: A-550

1:5






Project

 TEAM GERMANY

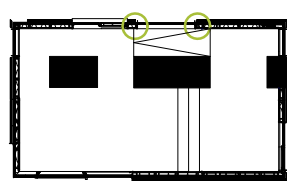
Constructor

 TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

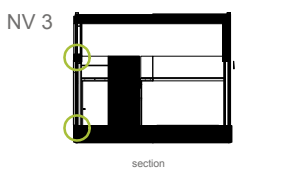
Navigation/Legend

NH 3



floor plan

NV 3



section

Steel

Aluminum

Oak

rigid Polyurethane foam

Window foil

toughened safety glass

insulation

Drawn ST, CW

Issued 05/03/09

Last index

Component Windows

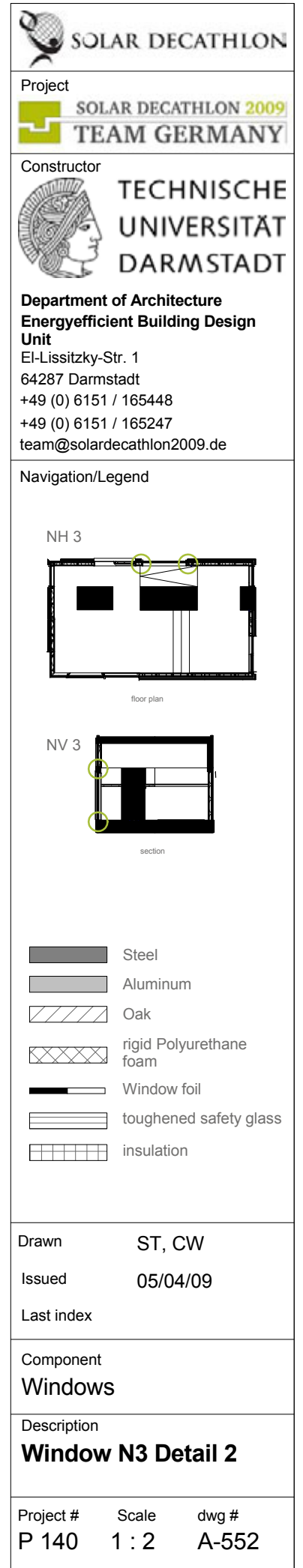
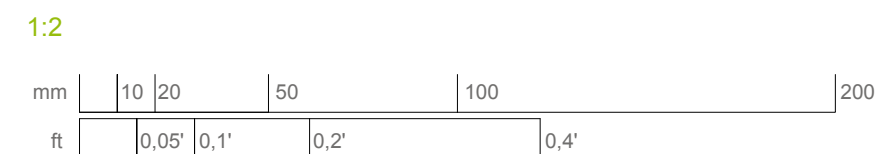
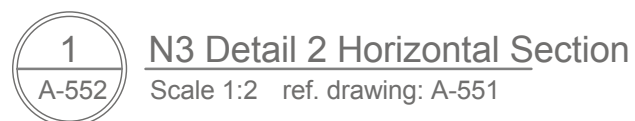
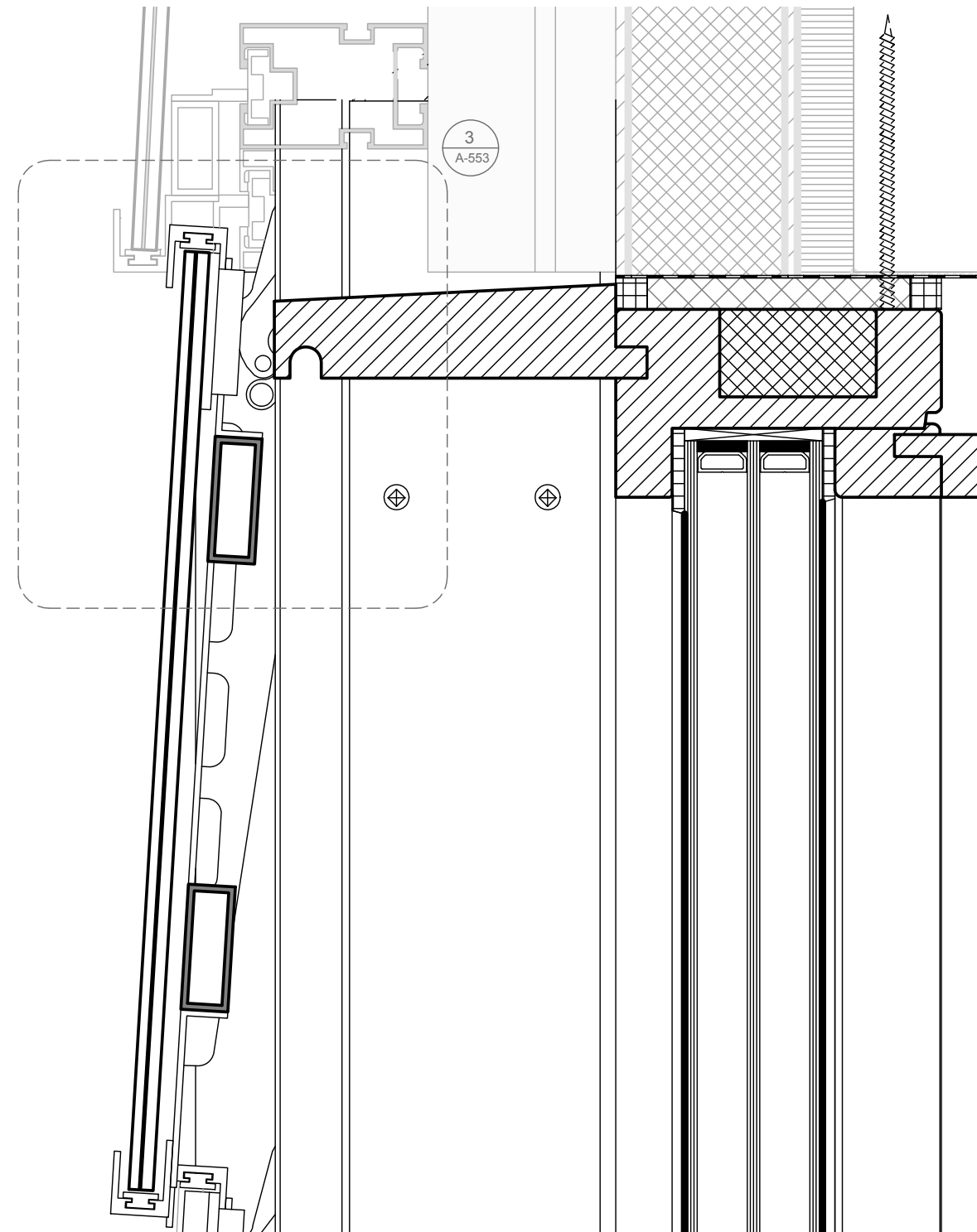
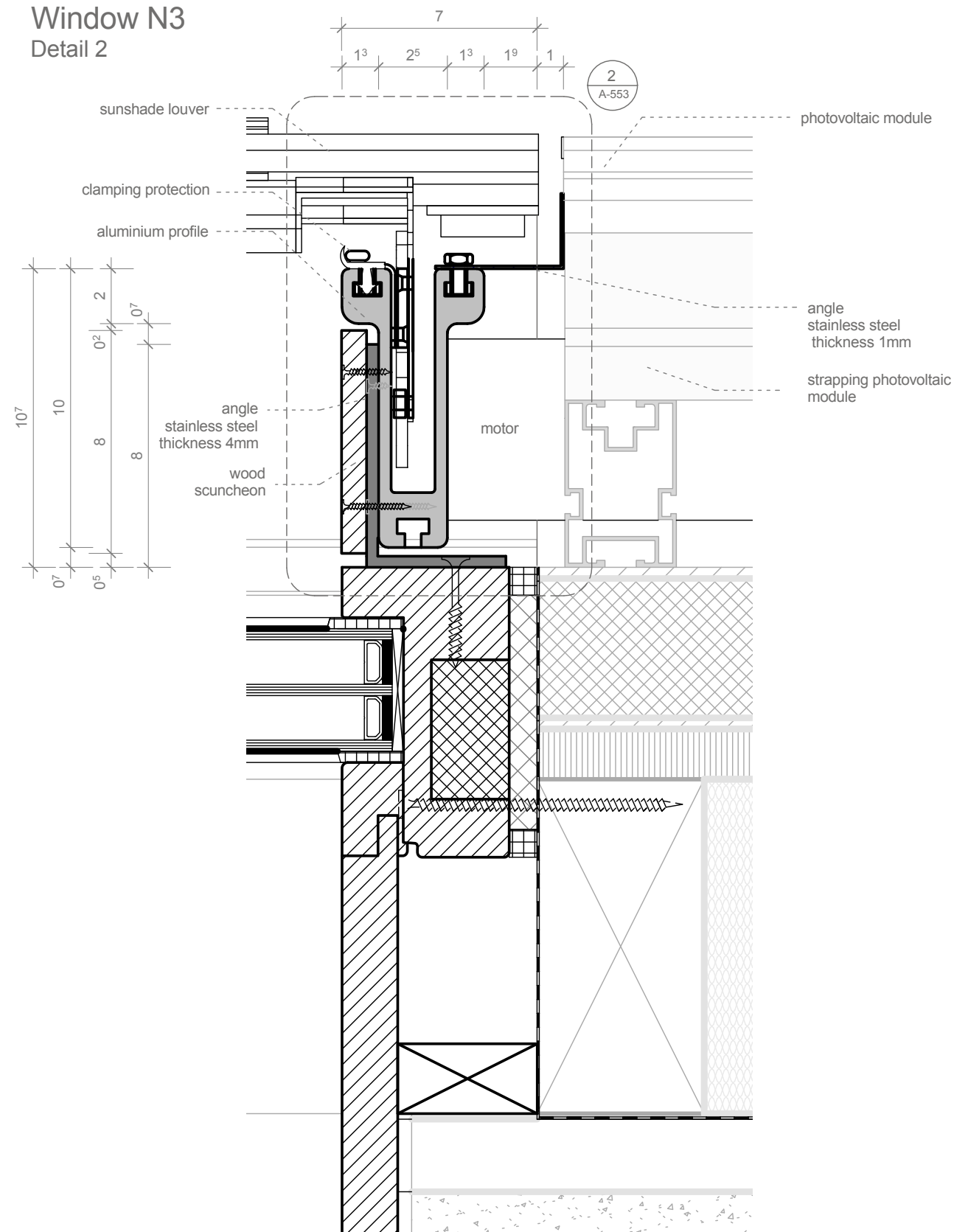
Description

Window N3 Detail 1

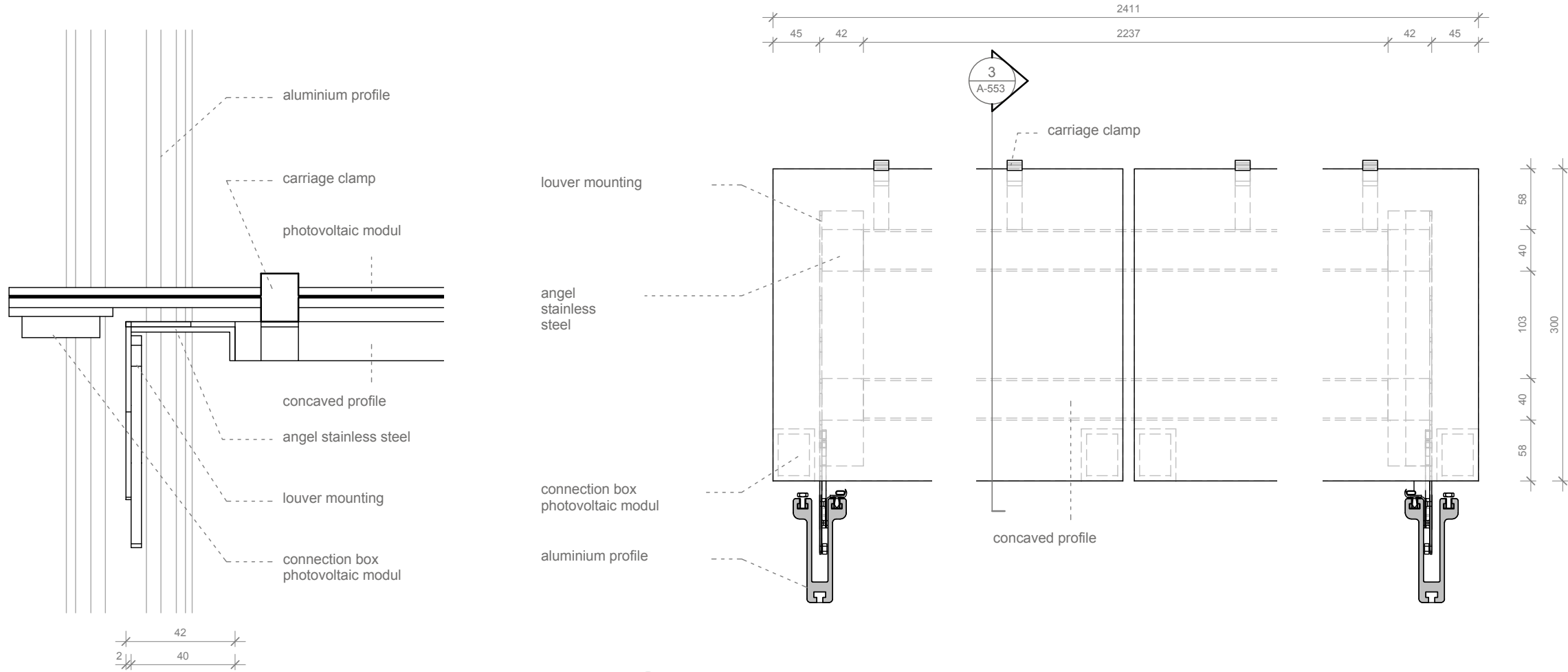
Project # Scale dwg #

P 140 1 : 5 A-551

Window N3 Detail 2

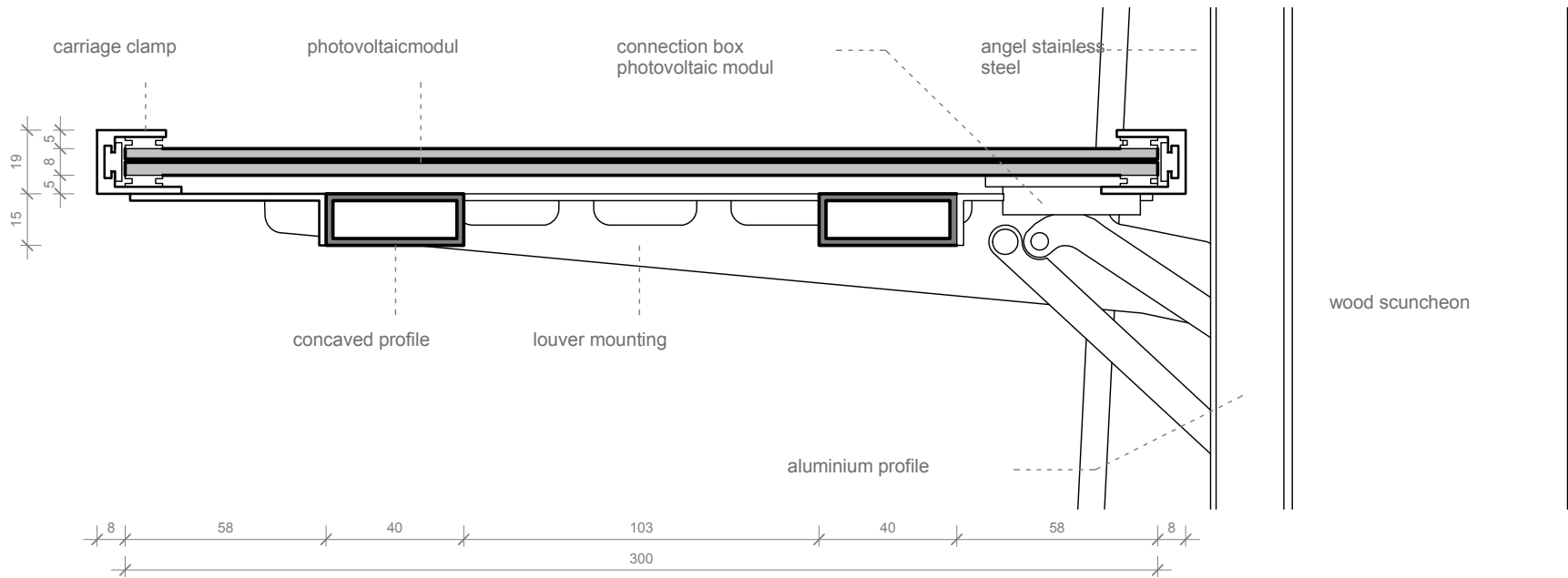


Louvers

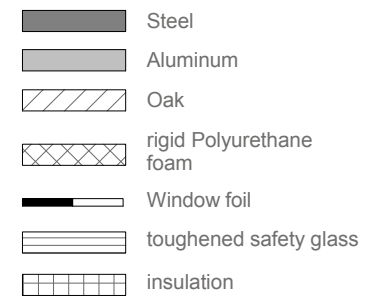
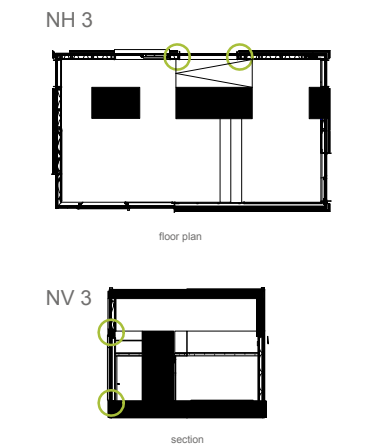


1 Elevation
A-553 Scale 1:2 ref. drawing: A-552

2 Horizontal section
A-553 Scale 1:5 ref. drawing: A-552

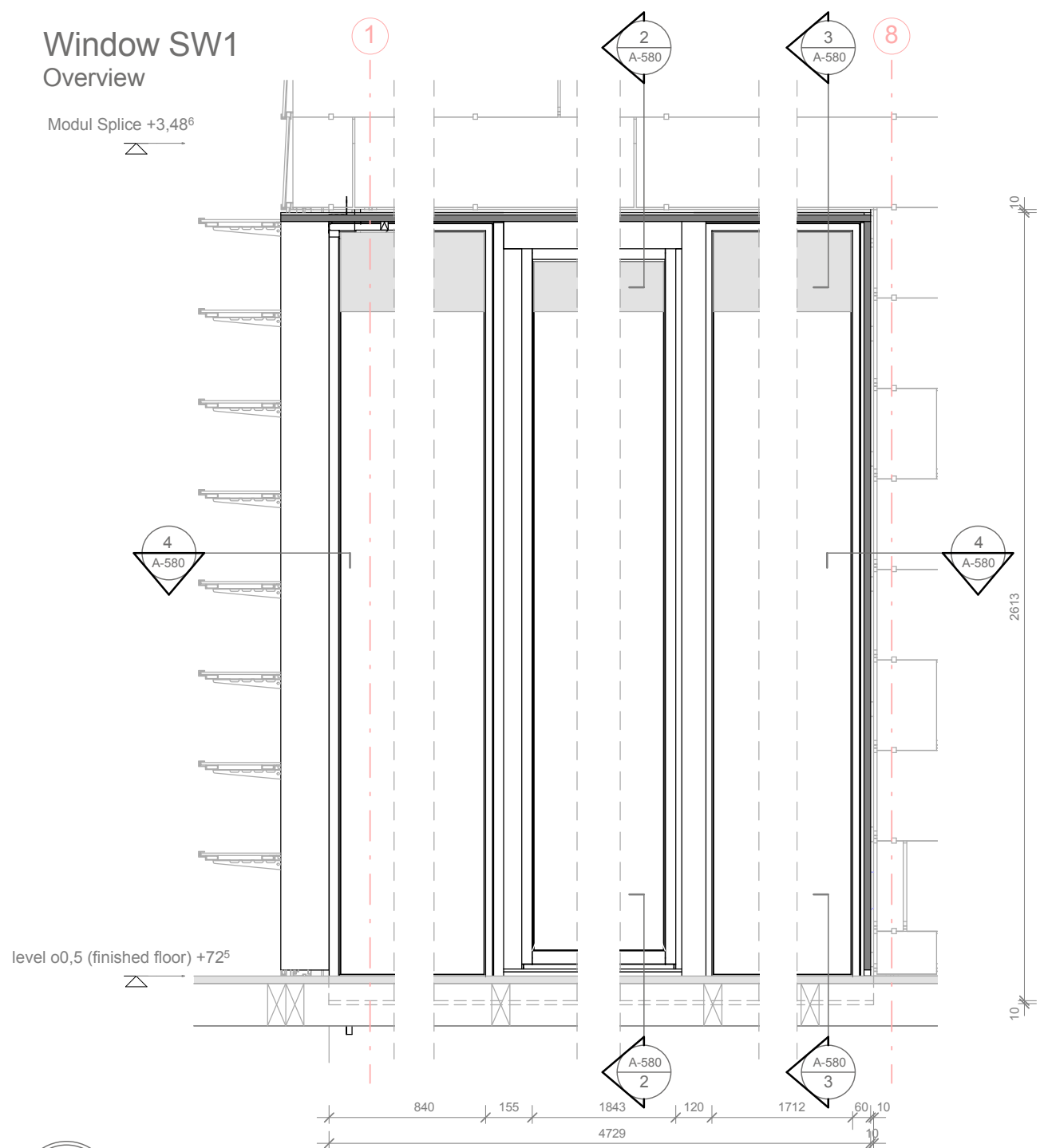


3 Vertical section
A-553 Scale 1:2 ref. drawing: A-552

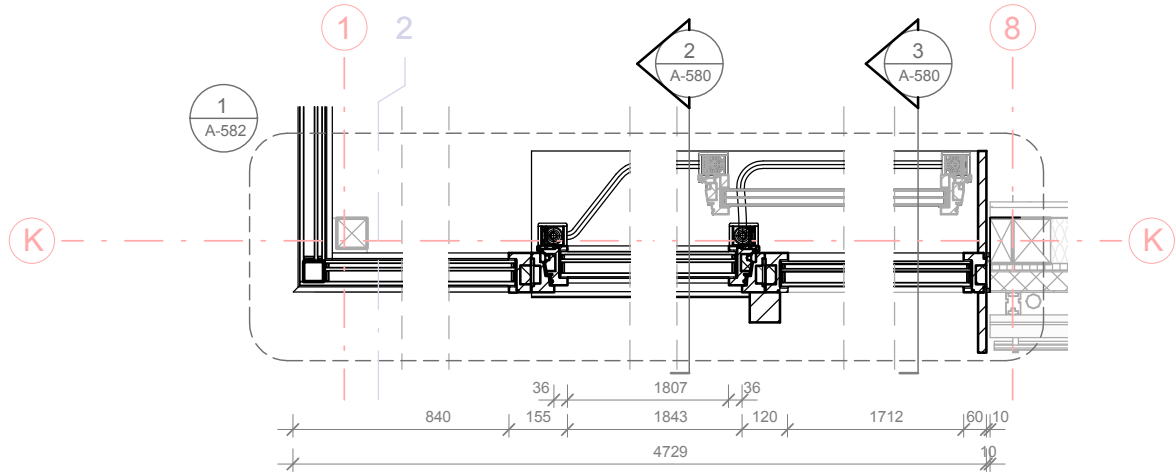


Window SW1 Overview

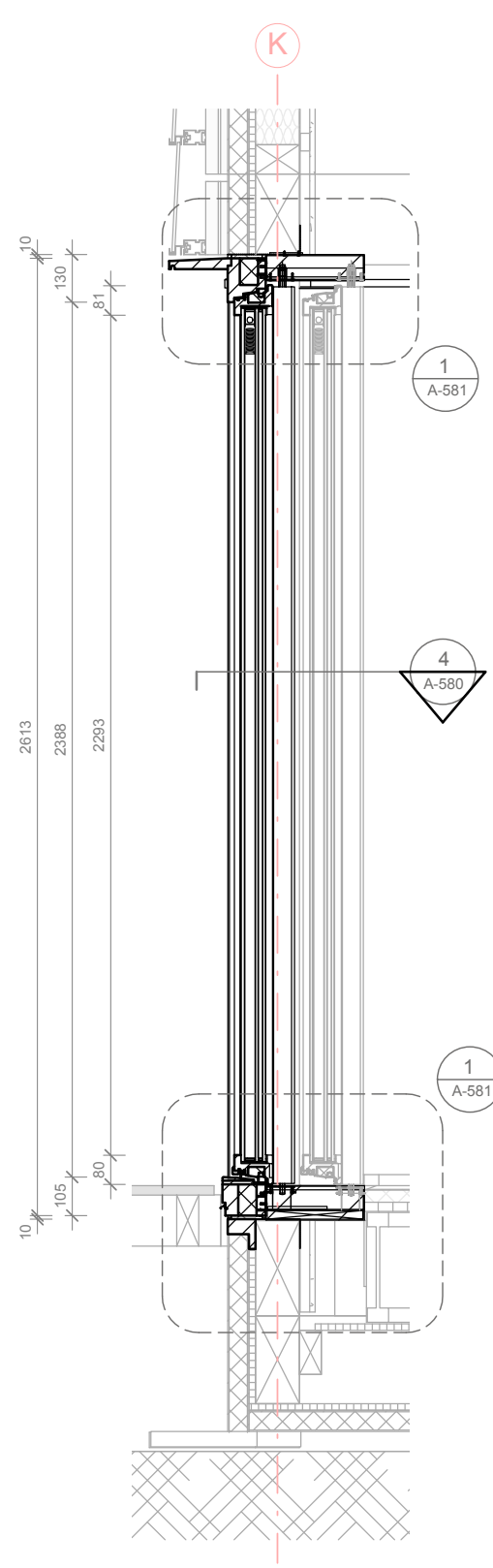
Modul Splice +3,48⁶



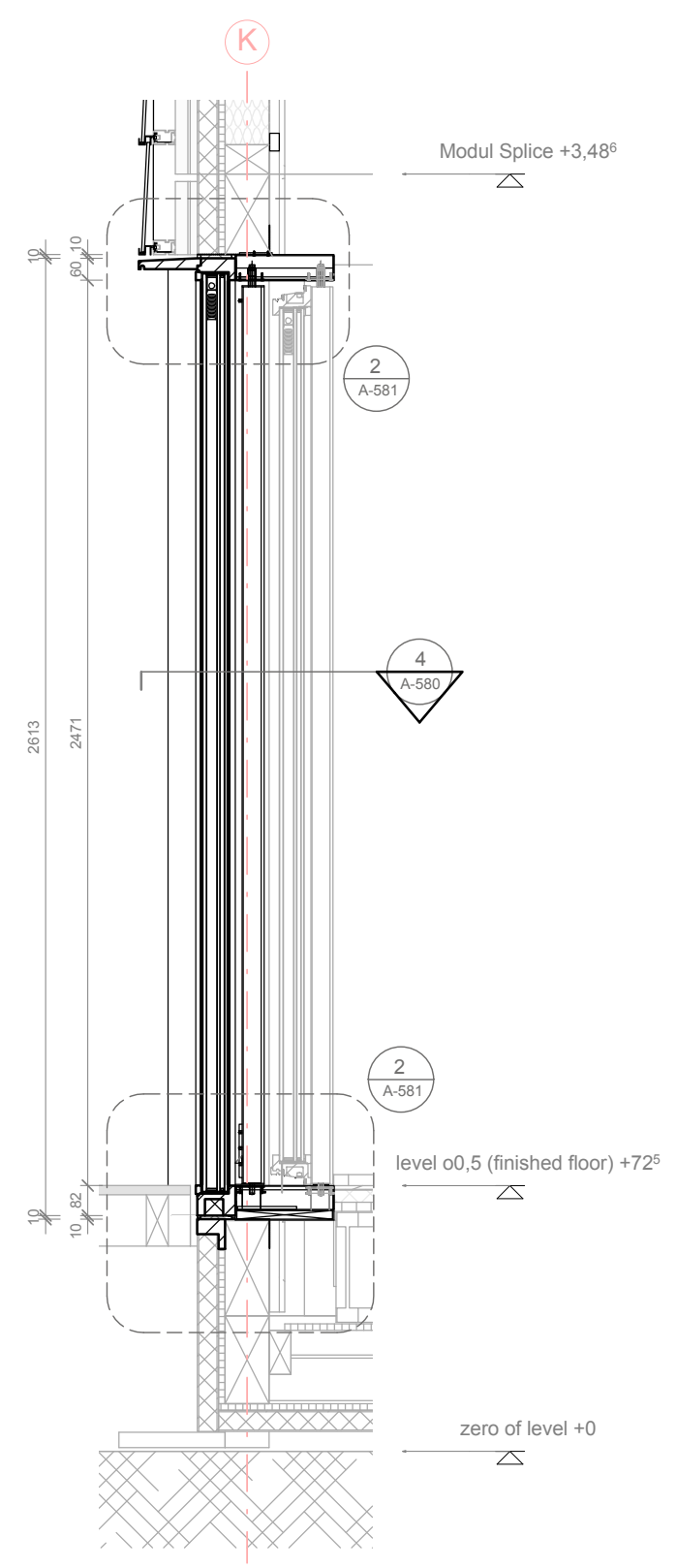
1
A-580
SW1 Overview Elevation
Scale 1:20 ref. drawing: A-510 / A-511



4
A-580
SW1 Overview Horizontal Section
Scale 1:20 ref. drawing: A-510 / A-511

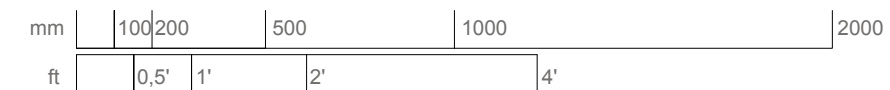


2
A-580
SW1 Overview Vertical Section Sliding Door
Scale 1:20 ref. drawing: A-510 / A-511



3
A-580
SW1 Overview Vertical Section Fixed Glazing
Scale 1:20 ref. drawing: A-510 / A-511

1:20



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

SWH 1 floor plan

SWV 1 section

Steel

Aluminum

Oak

rigid Polyurethane
foam

Window foil

toughened safety glass

insulation

Drawn ST, CW

Issued 05/12/09

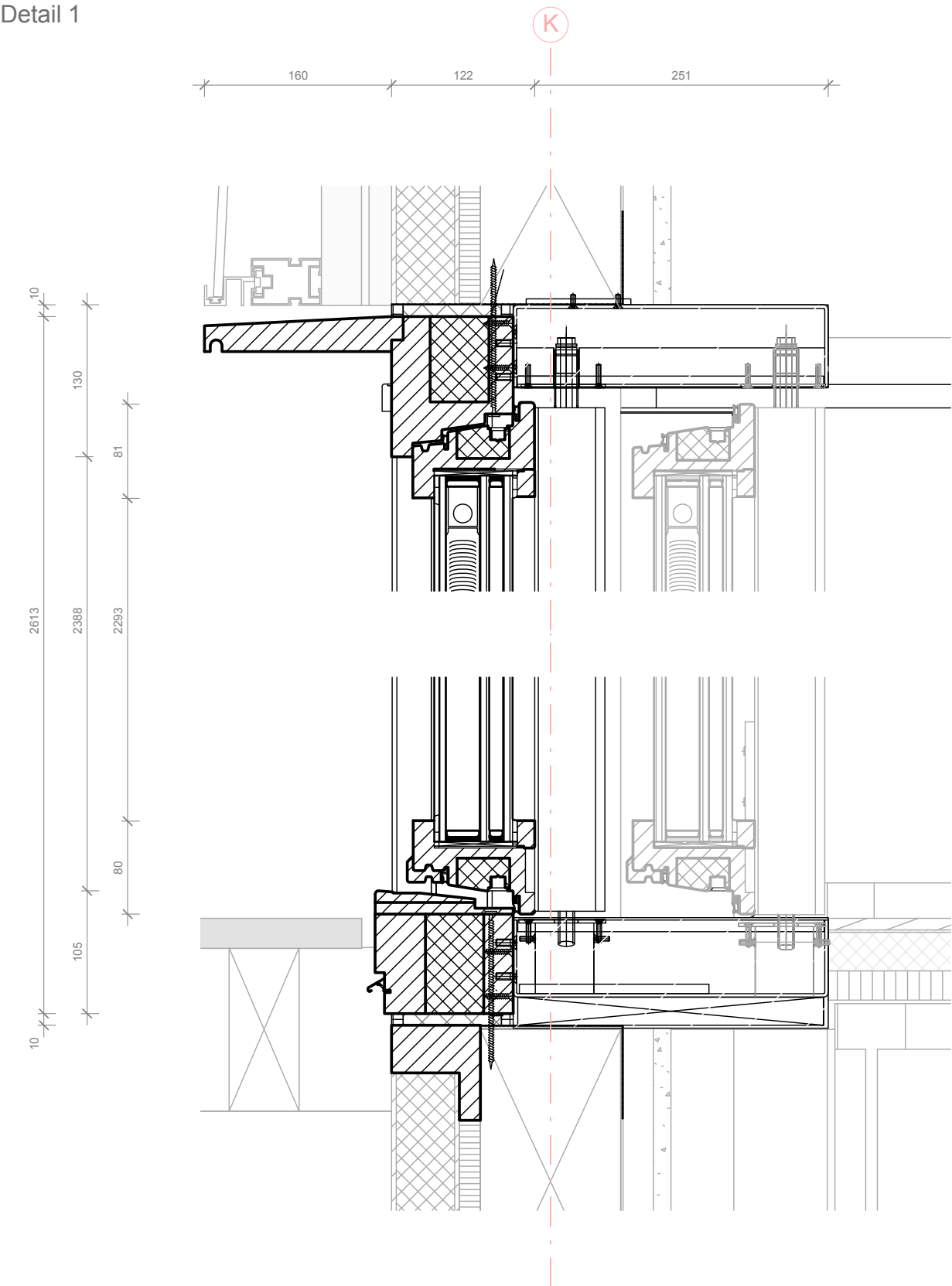
Last index

Component
Windows

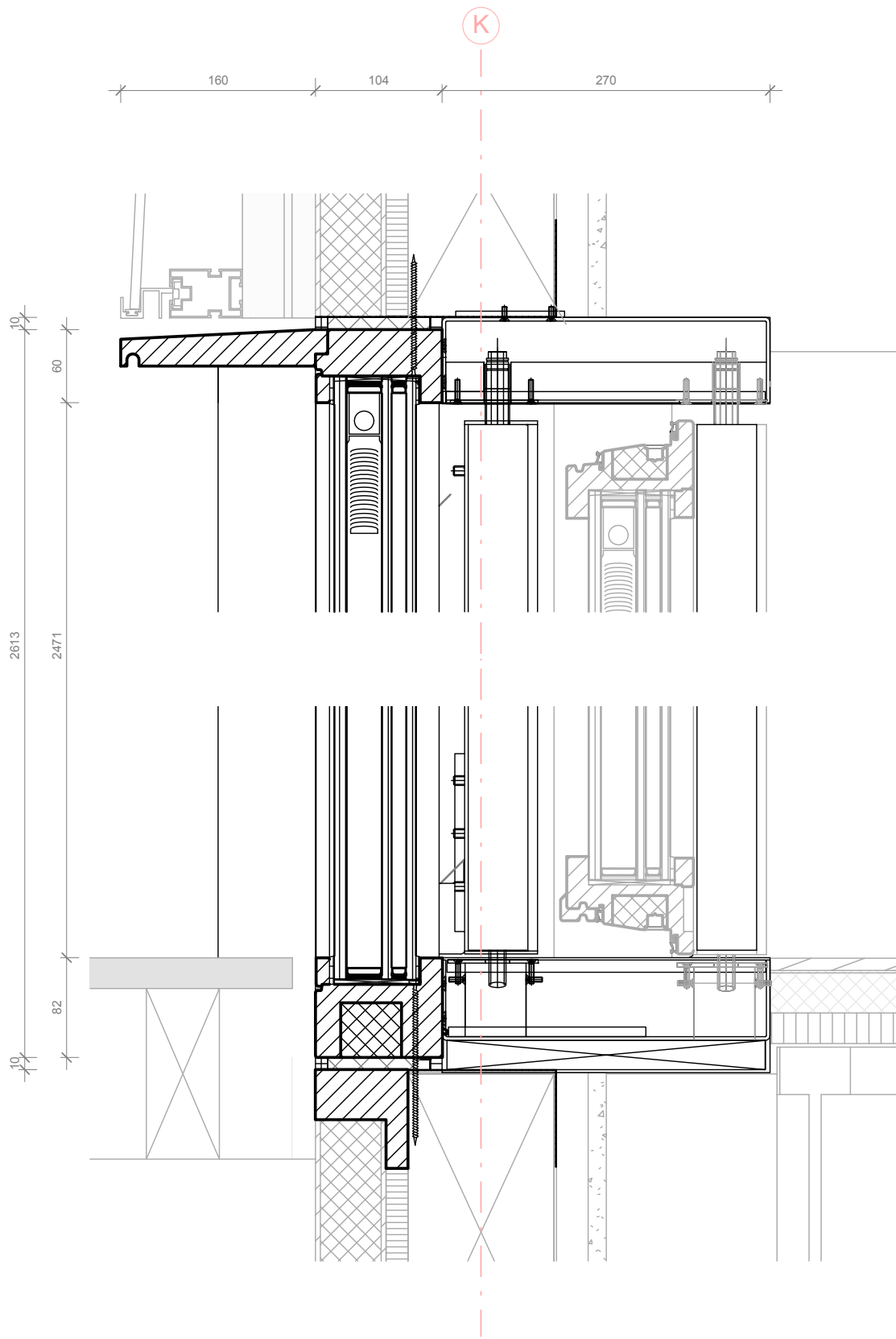
Description
**Window SW1
Overview**

Project #	Scale	dwg #
P 140	1 : 20	A-580

Window SW1
Detail 1




1 SW1 Detail 1 Vertical Section
A-581 Scale 1:20 ref. drawing: A-580



2 SW1 Detail 1 Vertical Section
A-581 Scale 1:5 ref. drawing: A-580


1:5






SOLAR DECATHLON

Project



SOLAR DECATHLON 2009
TEAM GERMANY

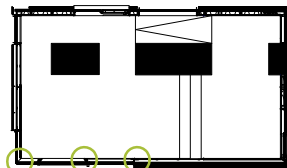
Constructor



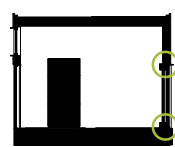
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



SWH 1 floor plan



SWV 1 section

Steel

Aluminum

Oak

rigid Polyurethane foam

Window foil

toughened safety glass

insulation

Drawn ST, CW
Issued 05/12/09
Last index

Component
Windows

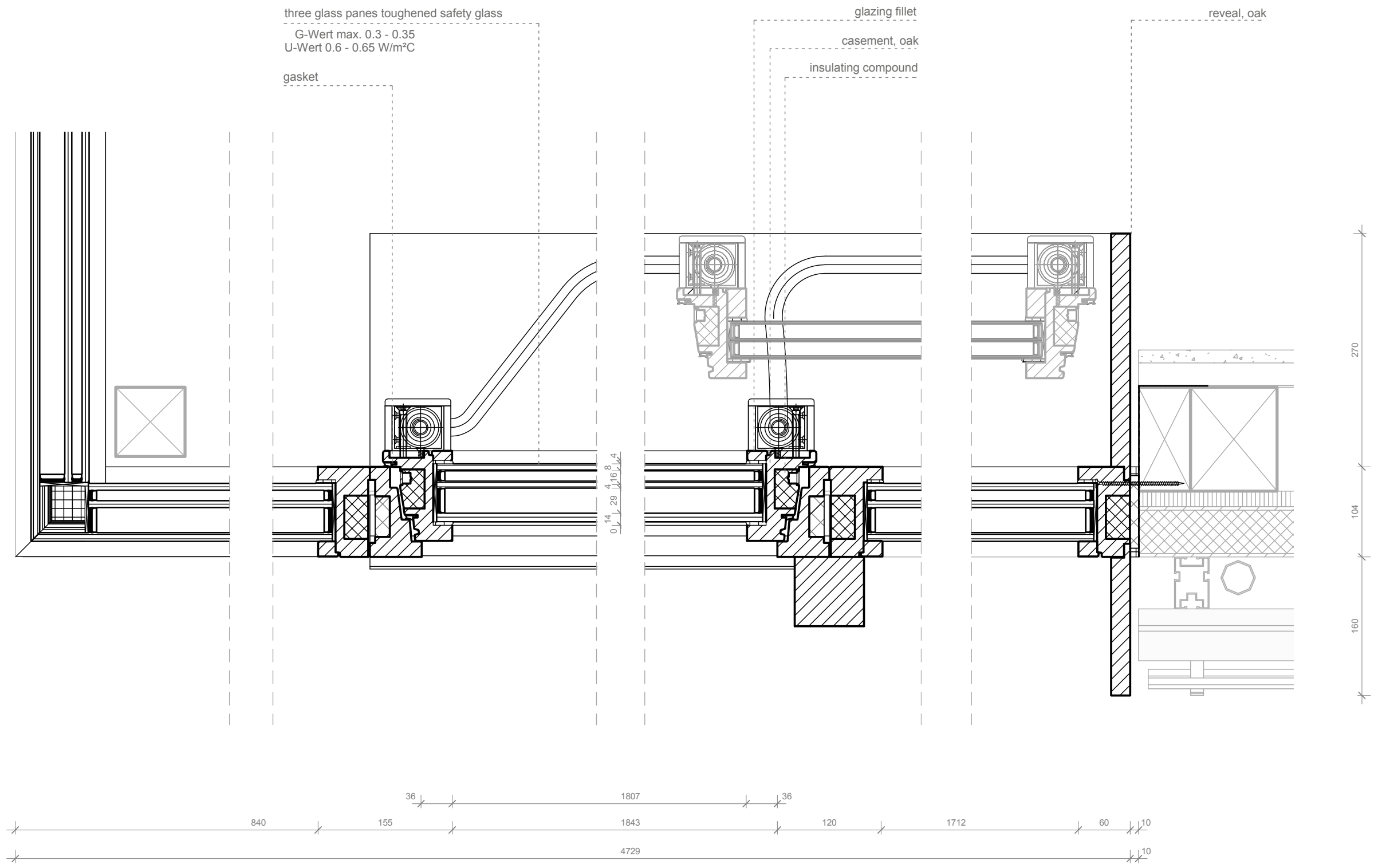
Description
Window SW1 Detail 1

Project #
P 140

Scale
1 : 5

dwg #
A-581

Window SW1
Detail 2



1
A-582

SW1 Detail 2 Horizontal Section
Scale 1:5 ref. drawing: A-580

1:5



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit

El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

SWH 1 floor plan

SWV 1 section

Steel

Aluminum

Oak

rigid Polyurethane foam

Window foil

toughened safety glass

insulation

Drawn ST, CW

Issued 05/12/09

Last index

Component
Windows

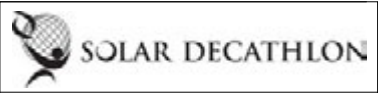
Description
Window SW1 Detail 2

Project # P 140


Scale 1 : 5

dwg # A-582


windows																		
Plan No.	Project Manual Division Master Format	Position	Type	Size mm		Frame	Opening Type	Material	Glazing	mechanical drive	Sections		Uw-Wert W/m²C	G-Wert	solid timber mm	Sunblinds	Manufacturer	Notes
				L	H						Casement	Fixed glazing						
A – 520	Div. 08	N1	horizontal pivot-hung window	2199	1184	R 75 F 70	horizontal pivot-hung window	oak	three glass panes toughened safety glass	Hautau PRIMAT-FL 190	1	0	0.6 - 0.65	0.3 - 0.35	2220	window integrated jalousie s.s.Shading	Häußler GmbH ENERGATE	-
A – 520	Div. 08	N2	solid wood door; fixed glazing	2199	2611	R 75 HAT	solid wood door; fixed glazing	oak	three glass panes toughened safety glass	-	1	1	0.6 - 0.65	0.3 - 0.35	2220	window integrated jalousie s.s.Shading	Häußler GmbH ENERGATE	-
A – 520	Div. 08	N3	fixed glazing	2390	2611	R 60	fixed glazing	oak	three glass panes toughened safety glass	-	0	1	0.6 - 0.65	0.55 - 0.6	2410	photovoltaik lamella s.s.Shading	Häußler GmbH ENERGATE	-
A – 520	Div. 08	N4	horizontal pivot-hung window	2300	1184	R 75 F 70	horizontal pivot-hung window	oak	three glass panes toughened safety glass	Hautau PRIMAT-FL 190	1	0	0.6 - 0.65	0.55 - 0.6	2320	photovoltaik lamella s.s.Shading	Häußler GmbH ENERGATE	-
A – 521	Div. 08	E1	fixed glazing	1158	2210	R 60	fixed glazing	oak	three glass panes toughened safety glass	-	0	1	0.6 - 0.65	0.55 - 0.6	1180	photovoltaik lamella s.s.Shading	Häußler GmbH ENERGATE	-
A – 521	Div. 08	E2	glazed door; fixed glazing	1934	2210	R 75 HAT	glazed door; fixed glazing	oak	three glass panes toughened safety glass	-	1	1	0.6 - 0.65	0.3 - 0.35	2010	window integrated jalousie s.s.Shading	Häußler GmbH ENERGATE	-
A – 521	Div. 08	ES1	fixed glazing	2198	1184	R 60	fixed glazing	oak	three glass panes toughened safety glass	-	0	1	0.6 - 0.65	0.3 - 0.35	2132	window integrated jalousie s.s.Shading	Häußler GmbH ENERGATE	edge glazing
A – 522	Div. 08	SE1	fixed glazing	2566	1184	R 60	fixed glazing	oak	three glass panes toughened safety glass	-	0	1	0.6 - 0.65	0.3 - 0.35	2500	window integrated jalousie s.s.Shading	Häußler GmbH ENERGATE	edge glazing
A – 522	Div. 08	SW1	Sliding-door; fixed glazing	4729	2611	R 60 F80	Sliding-door; fixed glazing	oak	three glass panes toughened safety glass	Hautau PRIMAT-FL 190	1	2	0.6 - 0.65	0.3 - 0.35	4665	window integrated jalousie s.s.Shading	Häußler GmbH ENERGATE	edge glazing
A – 523	Div. 08	WS1	fixed glazing	1364	2611	R 60	fixed glazing	oak	three glass panes toughened safety glass	-	0	1	0.6 - 0.65	0.3 - 0.35	1300	window integrated jalousie s.s.Shading	Häußler GmbH ENERGATE	edge glazing
A – 523	Div. 08	W1	fixed glazing	1158	2611	R 60	fixed glazing	oak	three glass panes toughened safety glass	-	0	1	0.6 - 0.65	0.55 - 0.6	1180	photovoltaik lamella s.s.Shading	Häußler GmbH ENERGATE	-



Project



Constructor



Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

DrawnST

Issued05/26/09

Last index

Component

Windows

Description

Schedules

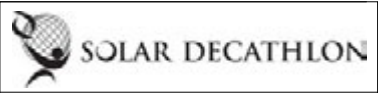
Project #P 140


Scale


dwg #A-595

Schedules:
Opening Sun Control Devices

08 06 00 Schedules for Openings_Sun Control Devices																						
Plan No.	Project Manual Division Master Format		Type	Manufacturer	Article Name	Size		Lamella		Fixing						Electronic						
						L	H	Lamellatype	Amount	Angel (50/80 t=4mm)		Angel (46/27t=1mm)		Aluminium Profile		Motor			Control			Clamping Protection
										Length	Amount	Length	Amount	Length	Amount	A-max22 + HallEnc + GP22A	ASM 44 - SG13	Amount	SMI Card	connected to actuator IF SMI KNX 24VDC (four SMI Cards pro actuator)	activation lamella	
A – 520 A – 540 A – 541 A – 542	Div. 08	N1	blinds integral to window Construction	Glas Hahn GmbH	Ropaco TypF	1,995 m	0,934 m	-	-	-	-	-	-	-	-	X	-	1	X	X	-	-
A – 520 A – 545 A – 546	Div. 08	N2	blinds integral to window Construction	Glas Hahn GmbH	Ropaco TypF	2,416 m	0,976 m	-	-	-	-	-	-	-	-	X	-	1	X	X	-	-
A - 520 A - 536	Div. 10	N3	photovoltaic lamellas	GlasHaus KG	Brillona 100	2,410 m	2,636 m	1	8	2,616 m	2	2,616 m	2	2,671 m	2	-	X	2	-	-	X	X
A – 520 A - 536 A – 550 A – 551 A – 552	Div. 10	N4	photovoltaic lamellas	GlasHaus KG	Brillona 100	2,320 m	1,204 m	2	4	1,184 m	2	1,184 m	2	1,239 m	2	-	X	2	-	-	X	X
A – 521 A – 536	Div. 10	E1	photovoltaic lamellas	GlasHaus KG	Brillona 100	1,178 m	2,403 m	3	7	2,383 m	2	2,383 m	2	2,438 m	2	-	X	2	-	-	X	X
A – 521	Div. 08	E2	blinds integral to window Construction	Glas Hahn GmbH	Ropaco TypF	0,847 m	2,065 m	-	-	-	-	-	-	-	-	X	-	1	X	X	-	-
A – 521	Div. 08	E2	blinds integral to window Construction	Glas Hahn GmbH	Ropaco TypF	0,703 m	1,879 m	-	-	-	-	-	-	-	-	X	-	1	X	X	-	-
A – 521	Div. 08	ES1	blinds integral to window Construction	Glas Hahn GmbH	Ropaco TypF	2,148 m	1,042 m	-	-	-	-	-	-	-	-	X	-	1	X	X	-	-
A – 522	Div. 08	SE1	blinds integral to window Construction	Glas Hahn GmbH	Ropaco TypF	2,516 m	1,042 m	-	-	-	-	-	-	-	-	X	-	1	X	X	-	-
A – 522 A – 580 A – 581 A – 582	Div. 08	SW1	blinds integral to window Construction	Glas Hahn GmbH	Ropaco TypF	1,707 m	2,468 m	-	-	-	-	-	-	-	-	X	-	1	X	X	-	-
A – 522	Div. 08	SW1	blinds integral to window Construction	Glas Hahn GmbH	Ropaco TypF	1,795 m	2,291 m	-	-	-	-	-	-	-	-	X	-	1	X	X	-	-
A – 522	Div. 08	SW1	blinds integral to window Construction	Glas Hahn GmbH	Ropaco TypF	0,844 m	2,468 m	-	-	-	-	-	-	-	-	X	-	1	X	X	-	-
A – 523	Div. 08	WS1	blinds integral to window Construction	Glas Hahn GmbH	Ropaco TypF	1,303 m	2,471 m	-	-	-	-	-	-	-	-	X	-	1	X	X	-	-
A – 523 A – 536	Div. 10	W1	photovoltaic lamellas	GlasHaus KG	Brillona 100	1,178 m	2,636 m	3	8	2,616 m	2	2,616 m	2	2,671 m	2	-	X	2	-	-	X	X



Project

Constructor

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn CW

Issued 05/26/09

Last index

Component
Windows

Description
Schedule

Project #
P 140

Scale

dwg #
A-596

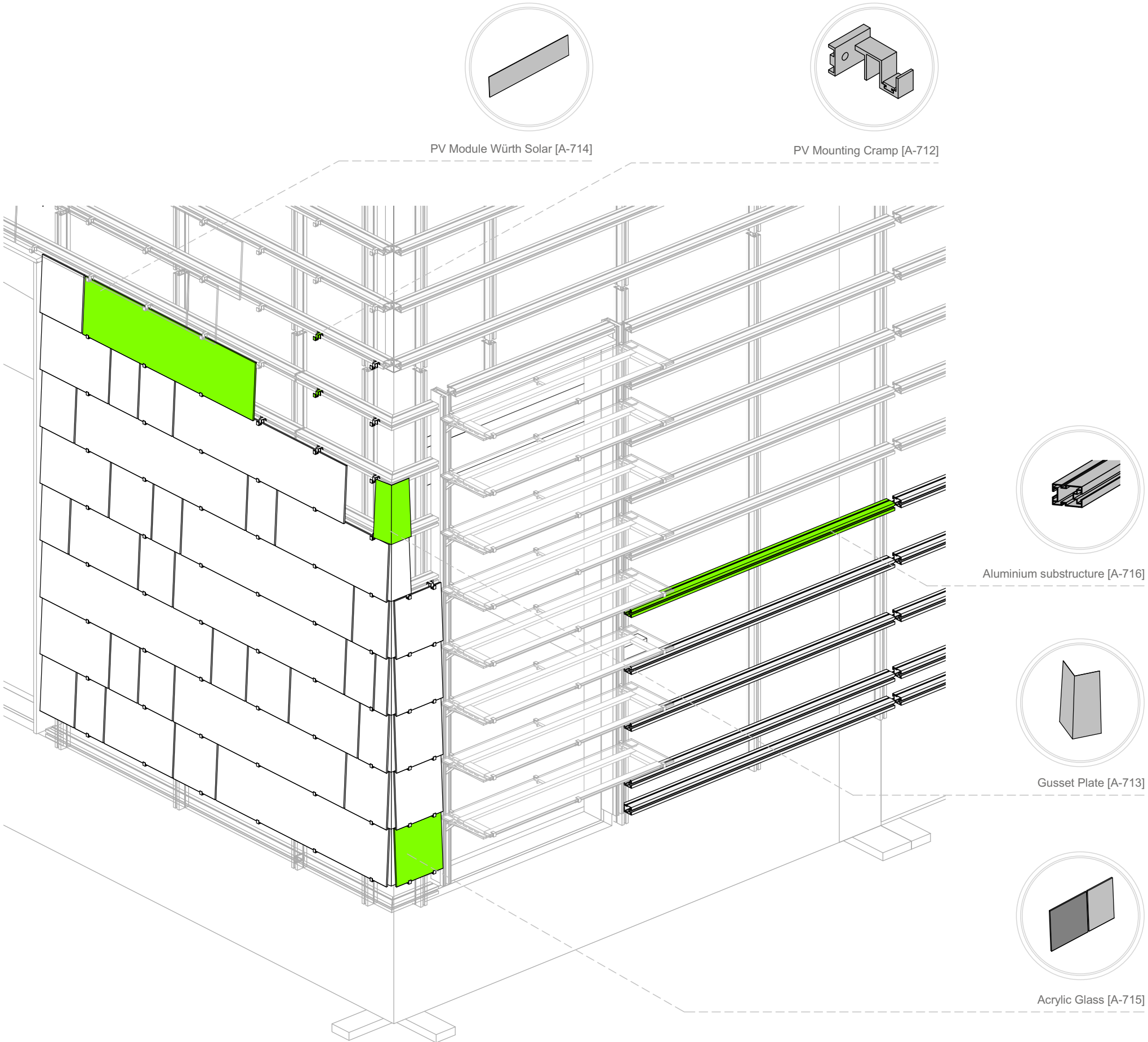
Description of the Façade

During the intensive design and optimization process we achieved a façade-system which is in accordance to all different requirements of building façades. Besides the energy-gaining aspect and architectural claims, it also features constructive moisture protection and technical exhaust ventilation. Furthermore the façade offers a highly effective shading and lightning control system all in one.

The construction of the façade is based on the traditional principle of shingles. We picked up this technique and transferred the principle onto a new appearance of modern materials like glass-glass PV-modules and acrylic glass pieces.

This application of high-tech elements like PV-modules in the façade has some special technical terms, we have to solve. In order to generate a façade, which functions working in all orientations we are forced to use amorph cells with good responding behavior to indirect solar radiation.

The angle of the cells towards the sun is optimized by this construction. For the single cell inside of the photovoltaic modules the best direction is the vertical, due to reasons of self-shading of the modules. The company Würth Solar supports us in the technical development and production and offers us innovative thin-film photovoltaic modules optimized for this façade-system.



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit

El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

PV Module Würth Solar [A-714]

PV Mounting Cramp [A-712]

Aluminium substructure [A-716]

Gusset Plate [A-713]

Acrylic Glass [A-715]

Drawn	FR	
Issued	05/08/09	
Last index		
Component	Architectural - PV Mounting	
Description	PV Façade Elements	
Project #	Scale	dwg #
P 140		A-711

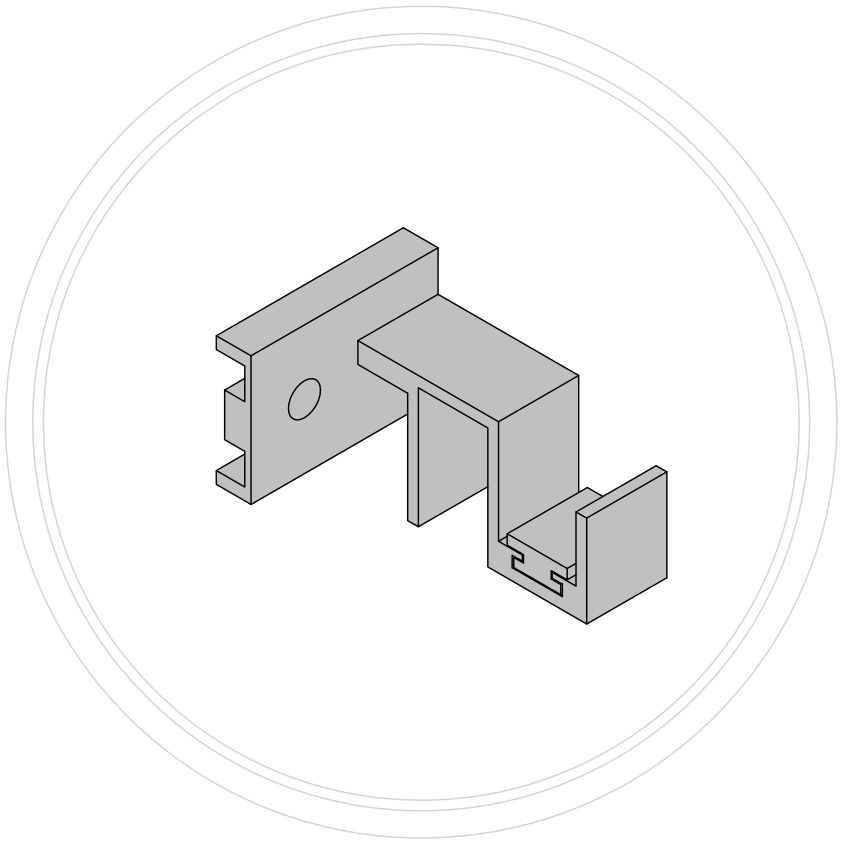
Mounting Cramp - Description

Producer: Heroal - Verl, Germany

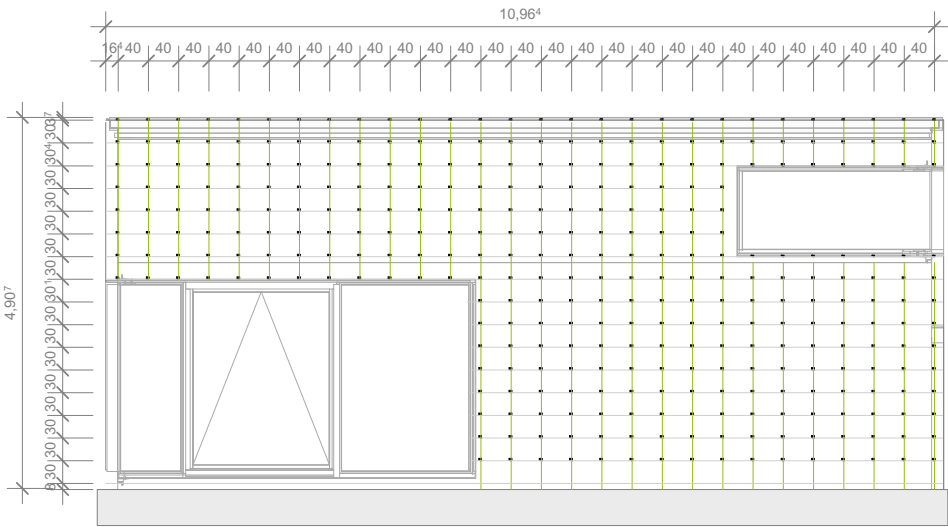
The PV-Mounting System has been designed especially for our project. The intention was to design a building with an integrated PV-skin, which is as well façade, energy-producing shape and water-bearing layer.

In order to get a minimized hanging, Heroal designed a cramp, out of extruded aluminium. It can simply be embedded into the substructure of the façade. The PV-modules can be changed easily.

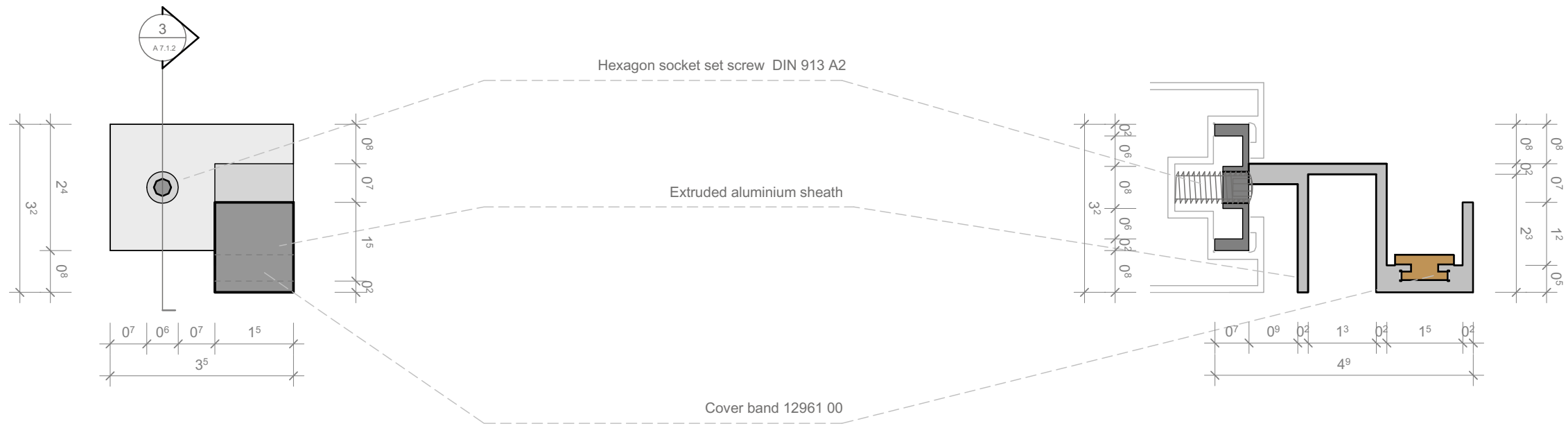
Number of Mounting Cramps: 2.000



1 Axonometry
A-712 Scale 1:1

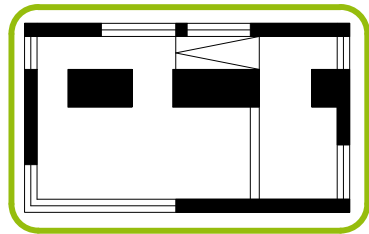
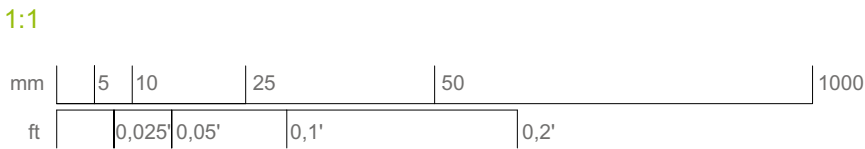


4 Raster
A-712 Scale 1:100



2 Frontview
A-712 Scale 1:1

3 Section A-A
A-712 Scale 1:1



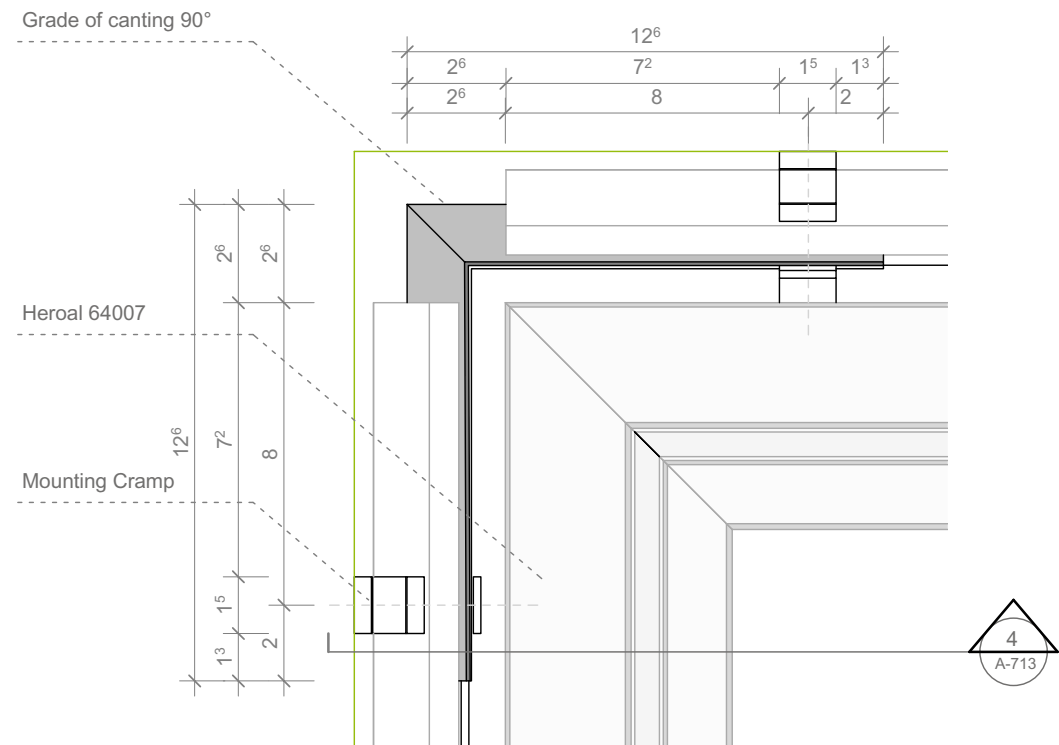
- Aluminium
- Plastics
- Cover band

Drawn FR
Issued 05/08/09
Last index

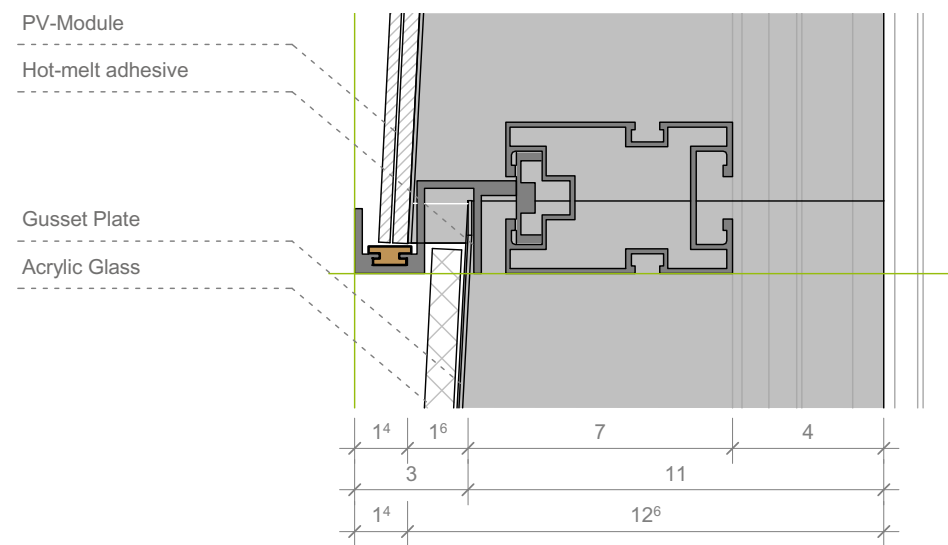
Component
Architectural - PV Mounting

Description
Mounting Cramp

Project # Scale dwg #
P 140 1:1 A-712

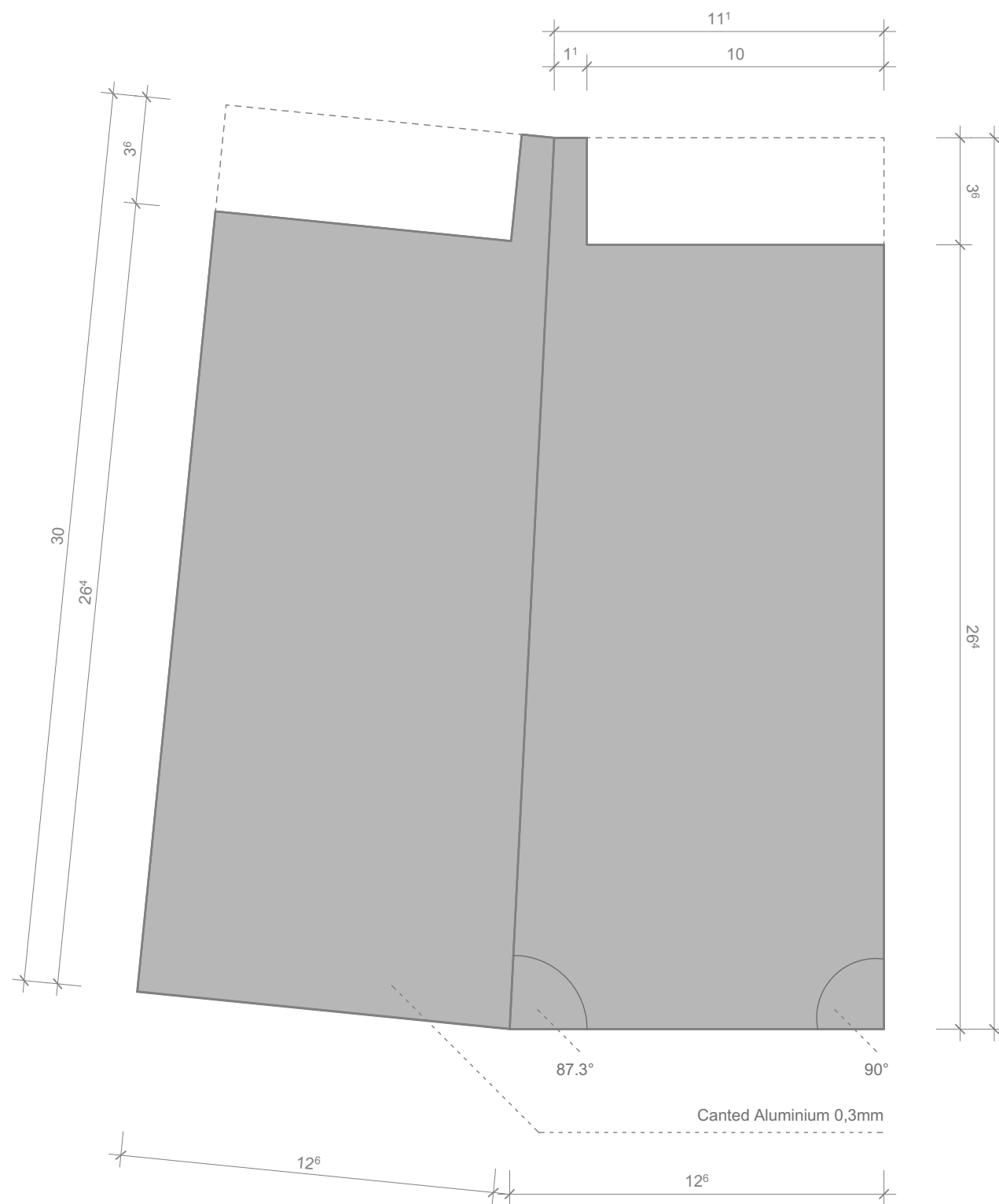
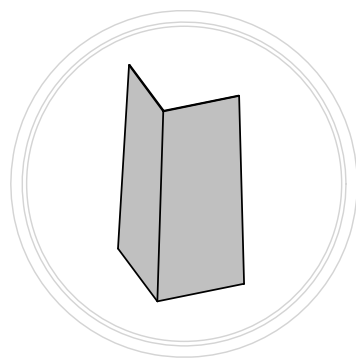


3 Horizontal Section
A-713
Scale 1:5



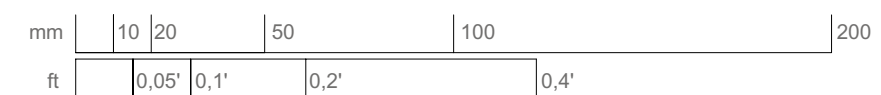
4 Section A-A
A-713
Scale 1:5

1 Gusset Plate - Axonometry
A-713
Scale 1:10



2 Development Drawing
A-713
Scale 1:2

1:2



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Glass
 Acrylic glass
 Aluminium
 Cover band

Drawn	FR
Issued	05/08/09
Last index	

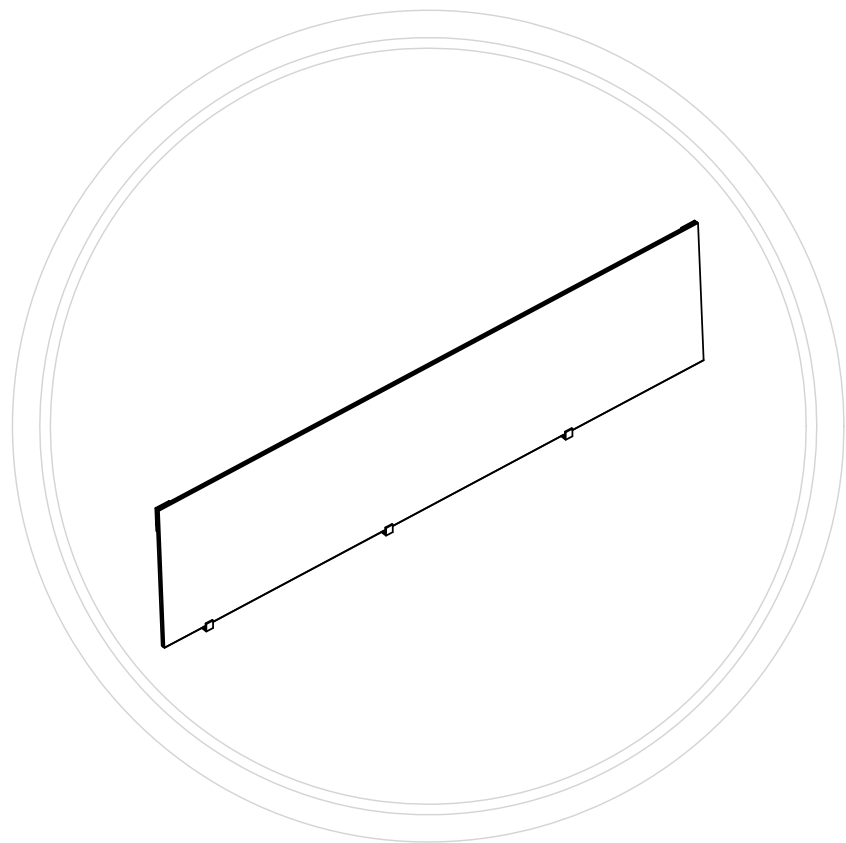
Component

Architectural - PV Mounting

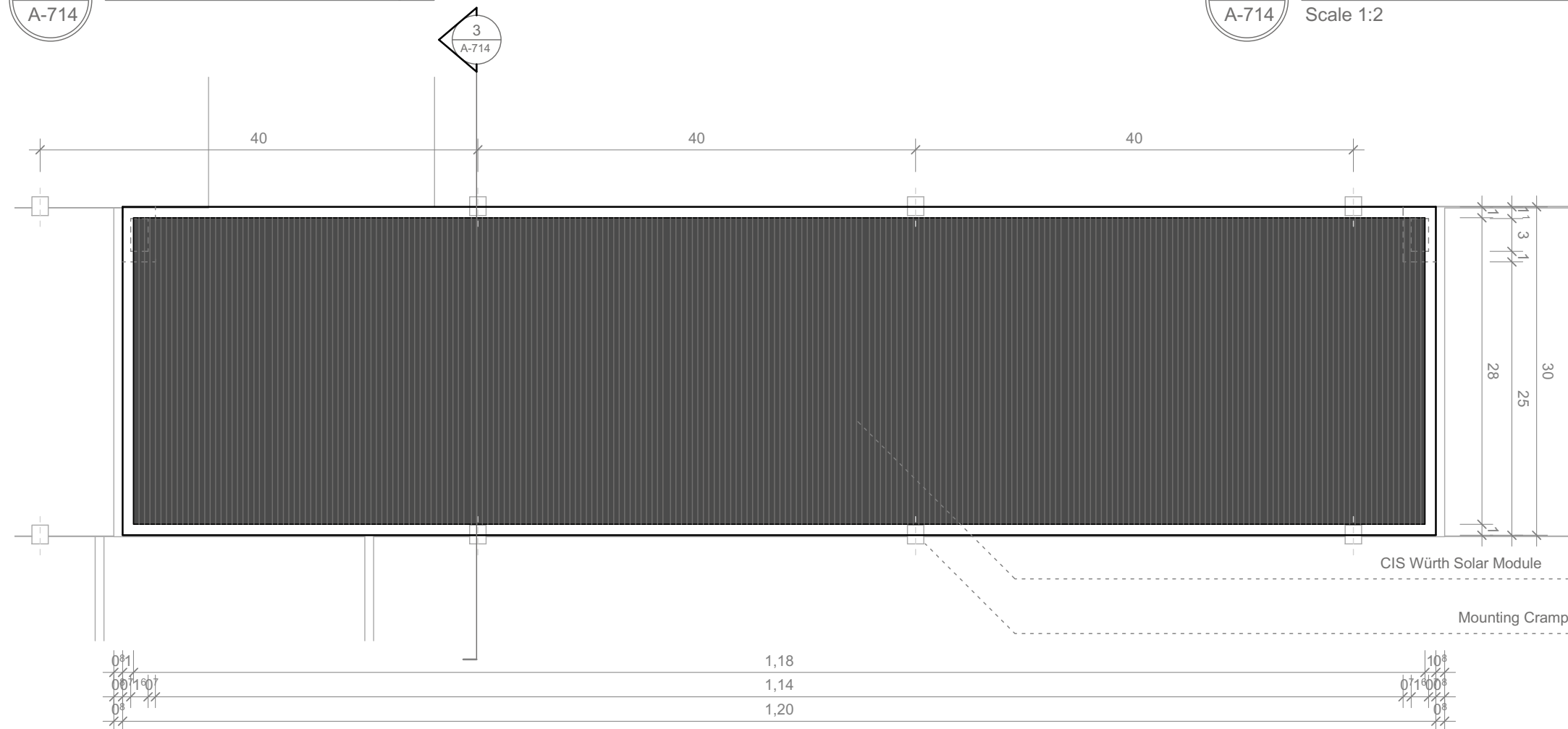
Description

Gusset Plate

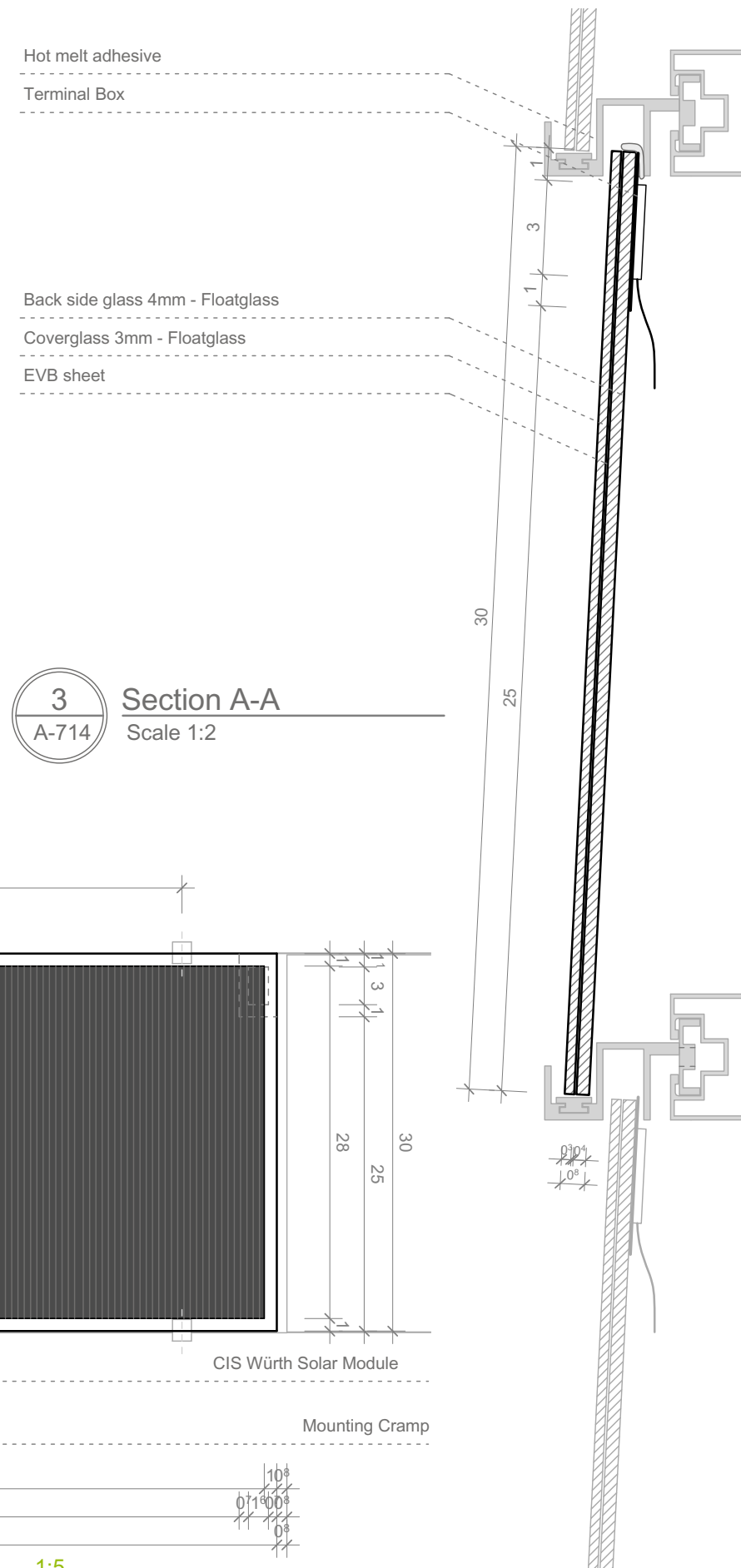
Project #	Scale	dwg #
P 140	1 : 2	A-713



1 PV Module - Axonometry
A-714




2 Frontview
A-714
Scale 1:5





3 Section A-A
A-714
Scale 1:2




**SOLAR DECATHLON**

Project

**SOLAR DECATHLON 2009**

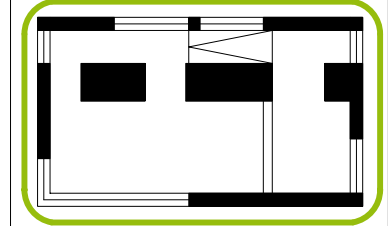
**TEAM GERMANY**

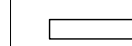
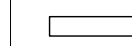
Constructor

**TECHNISCHE UNIVERSITÄT DARMSTADT**

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



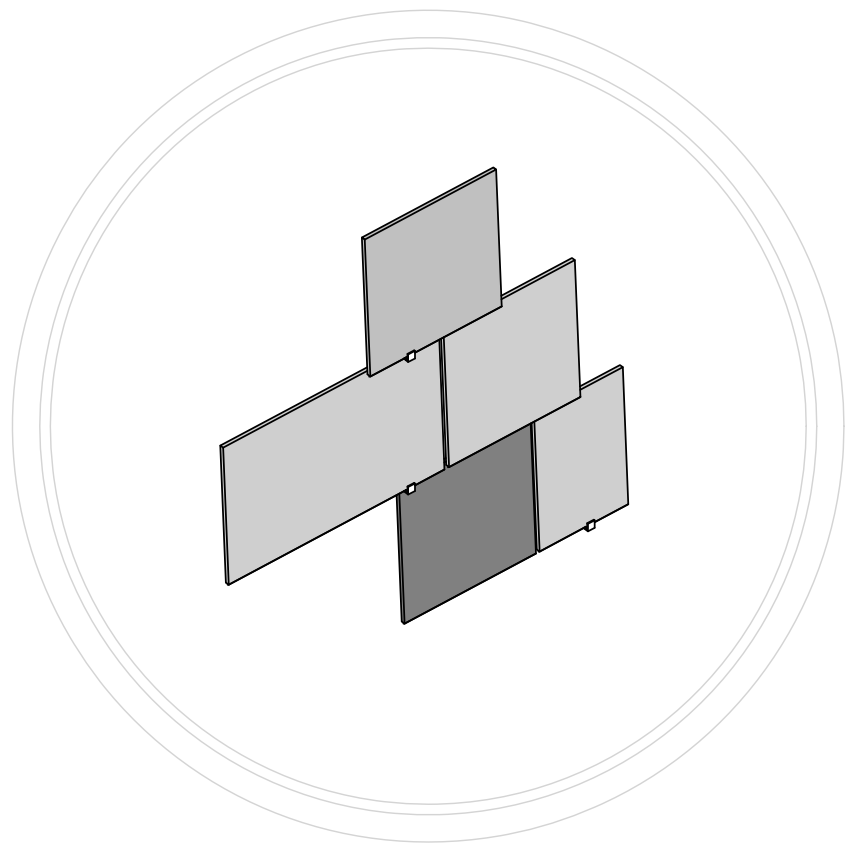
 Glass
 Aluminium

Drawn **FR**
Issued **05/08/09**
Last index

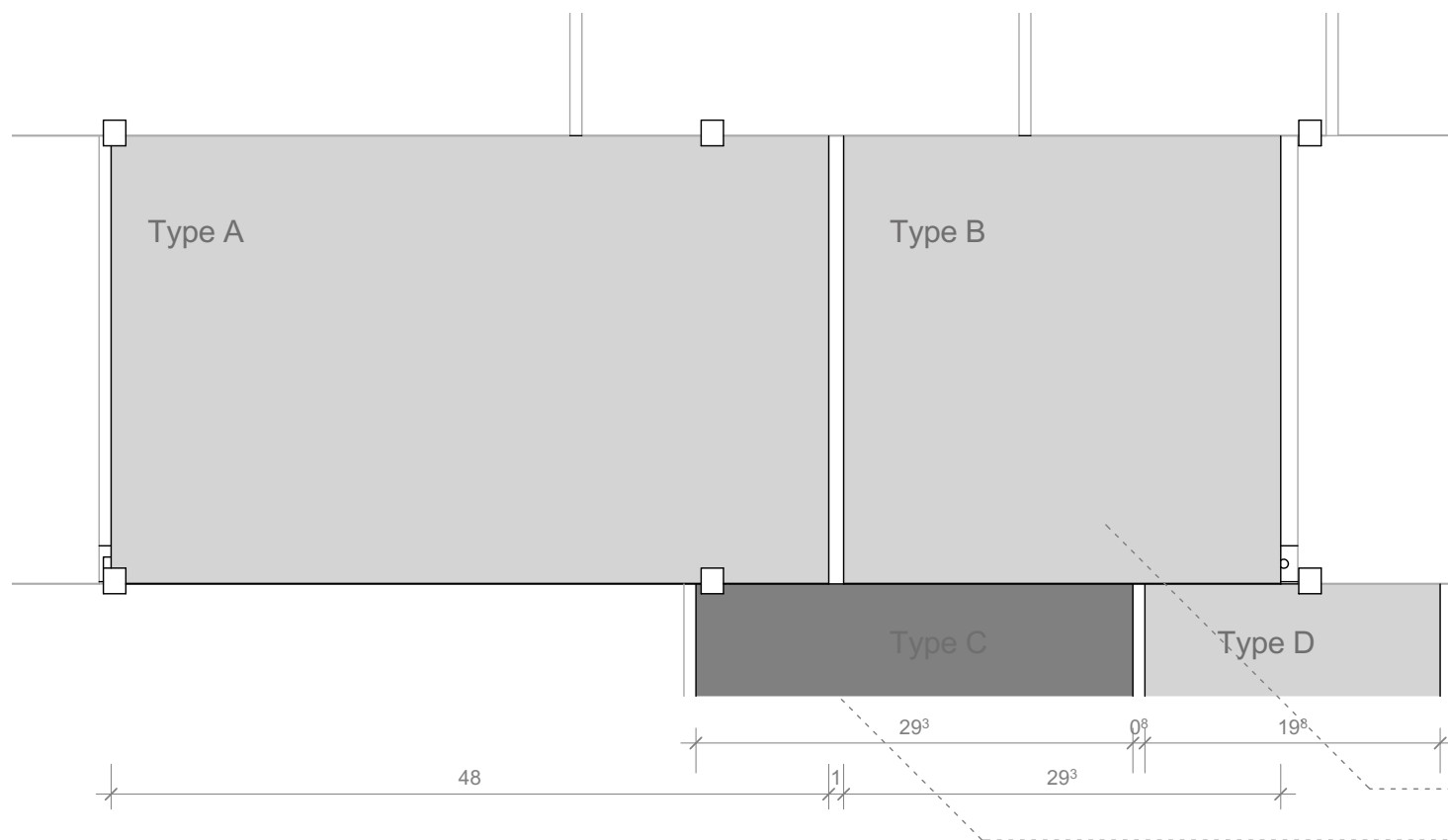
Component
Architectural - PV Mounting

Description
PV Module

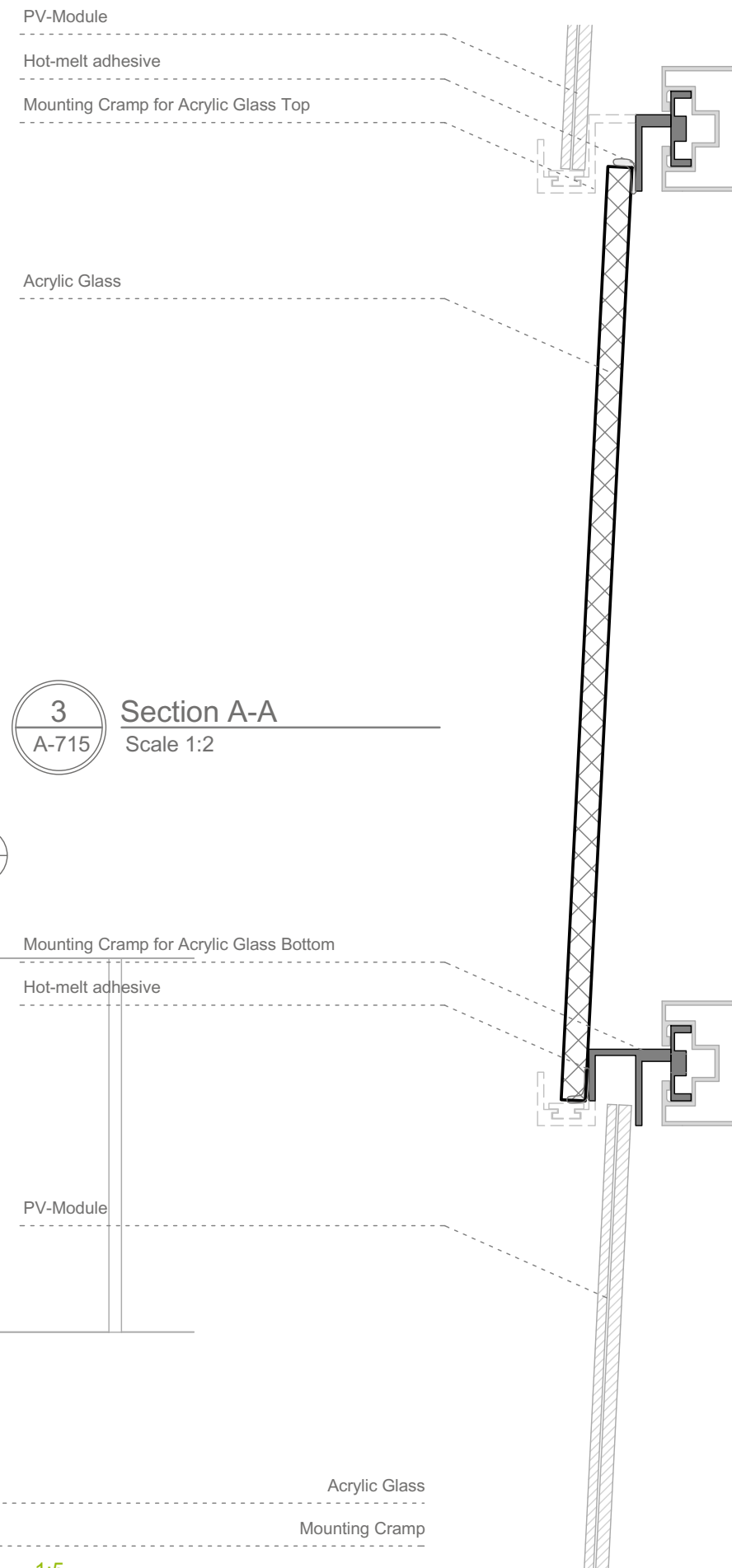
Project # **P 140** Scale **1:5** dwg # **A-714**



1 PV Module - Axonometry
A-715



2 Frontview
A-715 Scale 1:5



3 Section A-A
A-715 Scale 1:2



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Glass
 Acrylic glass
 Aluminium

Drawn FR

Issued 05/08/09

Last index

Component

Architectural - PV Mounting

Description

Acrylic Glass

Project # P 140

Scale 1:5

dwg # A-715

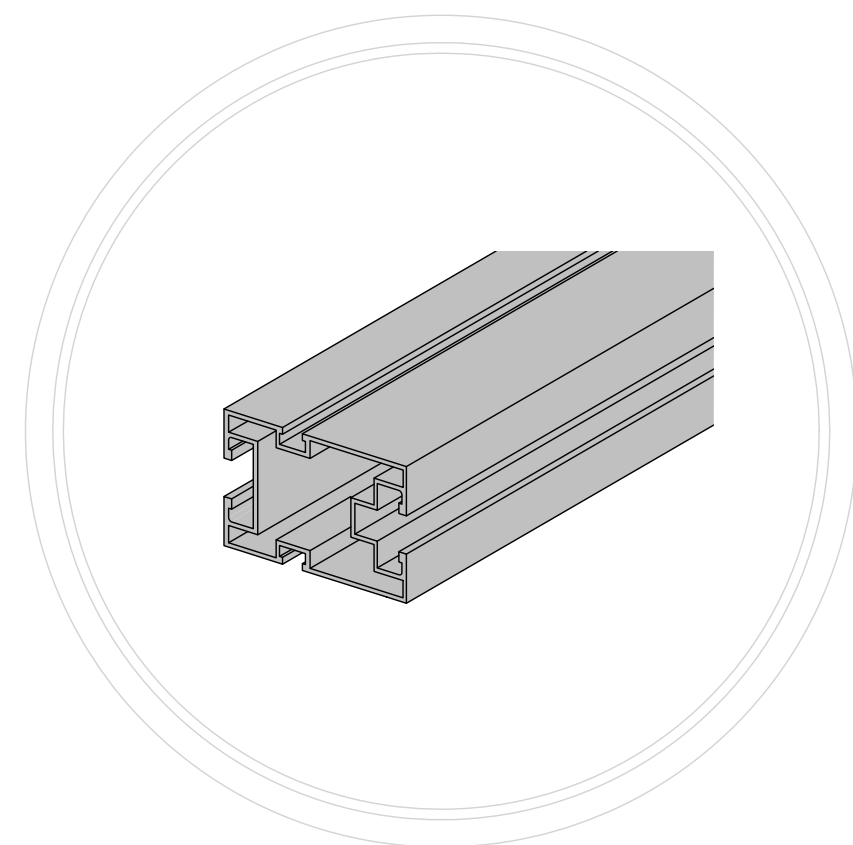
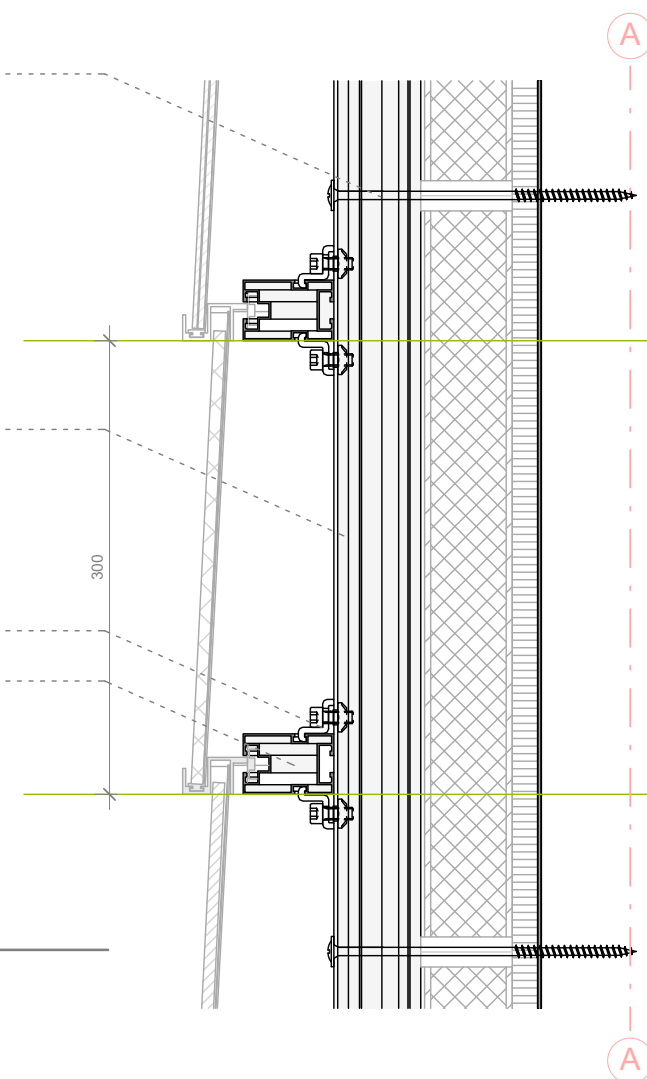
Screw Würth Assy SK,
wheelhead, 200x8mm

Heroal 64007 vertical

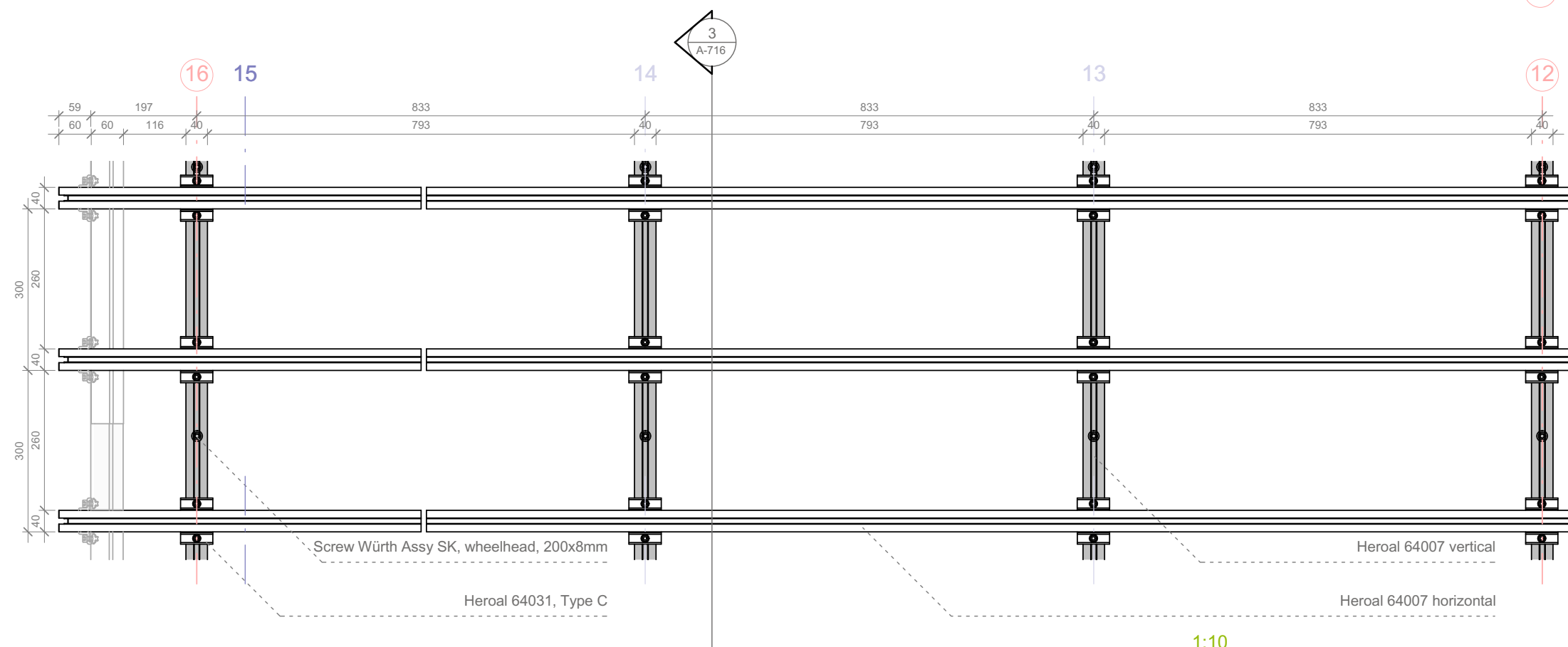
Heroal 64031, Type C

Heroal 64007 horizontal

3 Section A-A
A-716 Scale 1:5



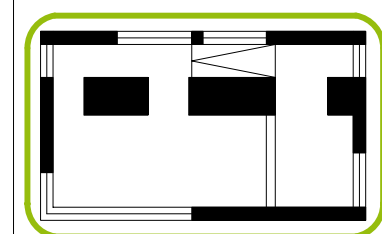
1 Substructure - Axonometry
A-716



2 Substructure - Components
A-716 Scale 1:10

1:10

mm	50	100	250	500	1000
ft	0,25'	0,5'	1'	2'	



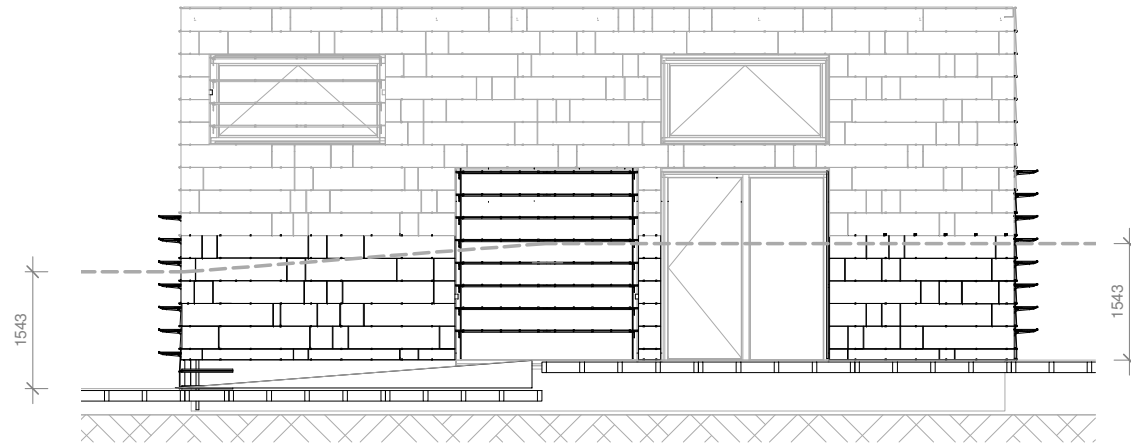
	Glass
	Acrylic glass
	Aluminium
	Thermal insulation, EPS
	Vacuum insulation panel, VIP
	Oriented strand board, osb

Drawn	FR
Issued	05/08/09
Last index	

Component	Architectural - PV Mounting
-----------	-----------------------------

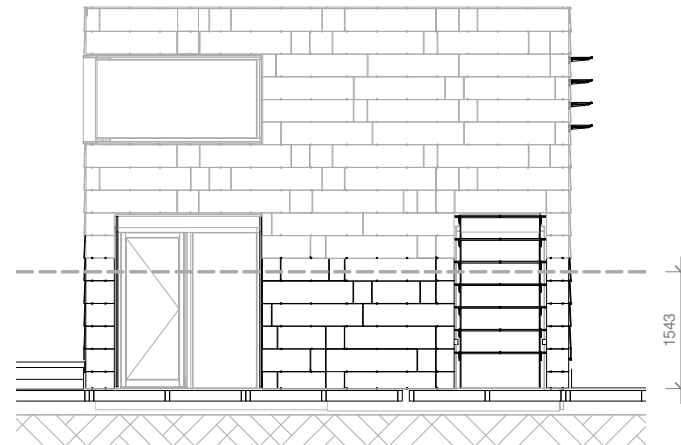
Description	Substructure - Components
-------------	------------------------------

Project #	Scale	dwg #
P 140	1:10	A-716



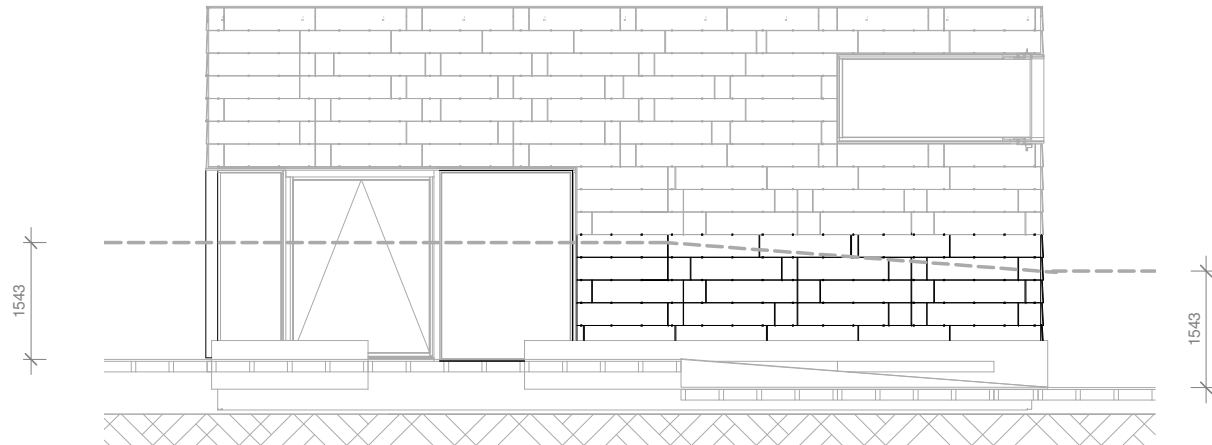
1
A-721

Elevation North
Scale 1:100



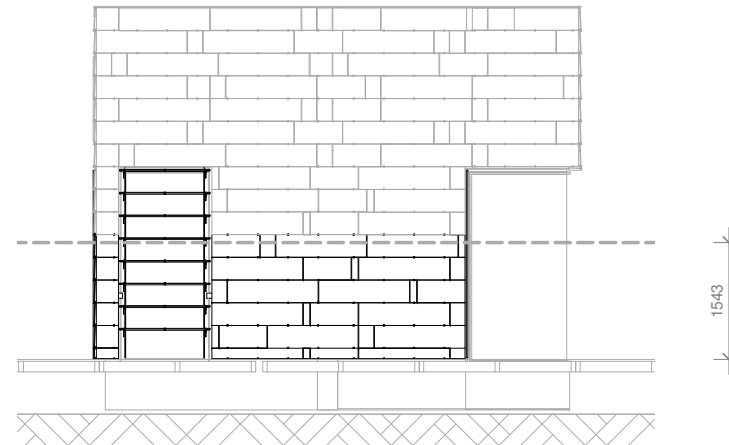
2
A-721

Elevation East
Scale 1:100



3
A-721

Elevation South
Scale 1:100

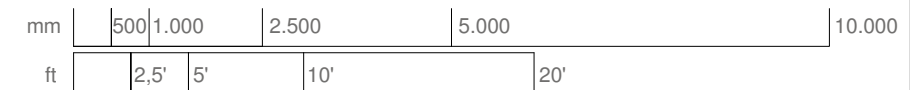


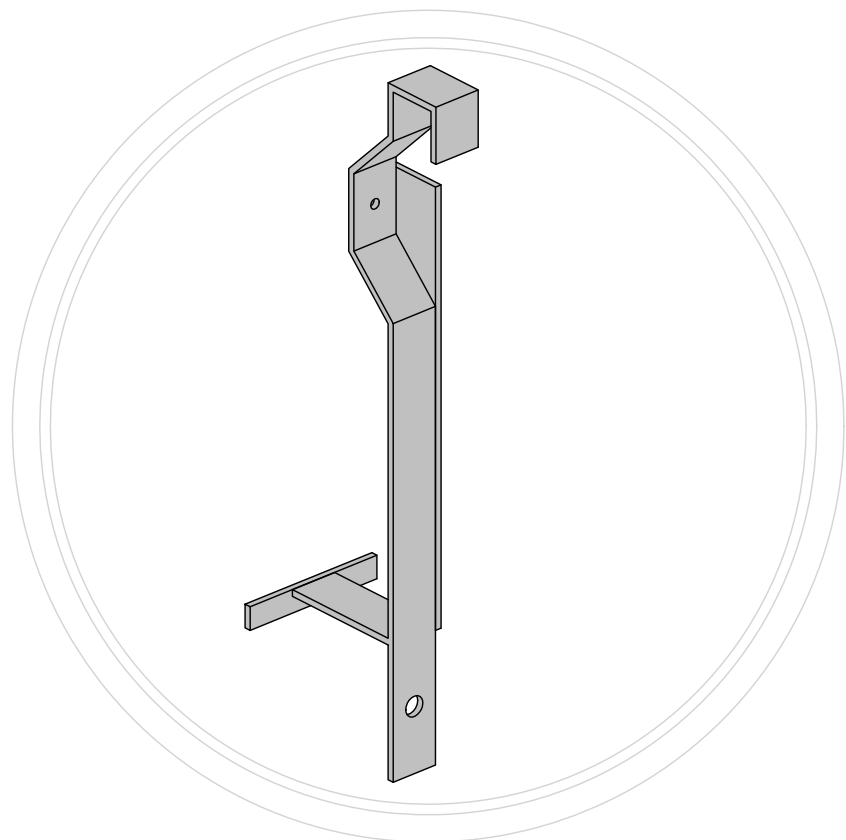
2
A-721

Elevation West
Scale 1:100

Up to a height of 154,3 cm, all façade modules comply with CPSC 16 CFR, Part 1201, Category I

1:100





2
A-731

Roof Cramp - Axonometry

Roof Cramp

Hexagon socket set screw DIN 913 A2

Hot melt adhesive

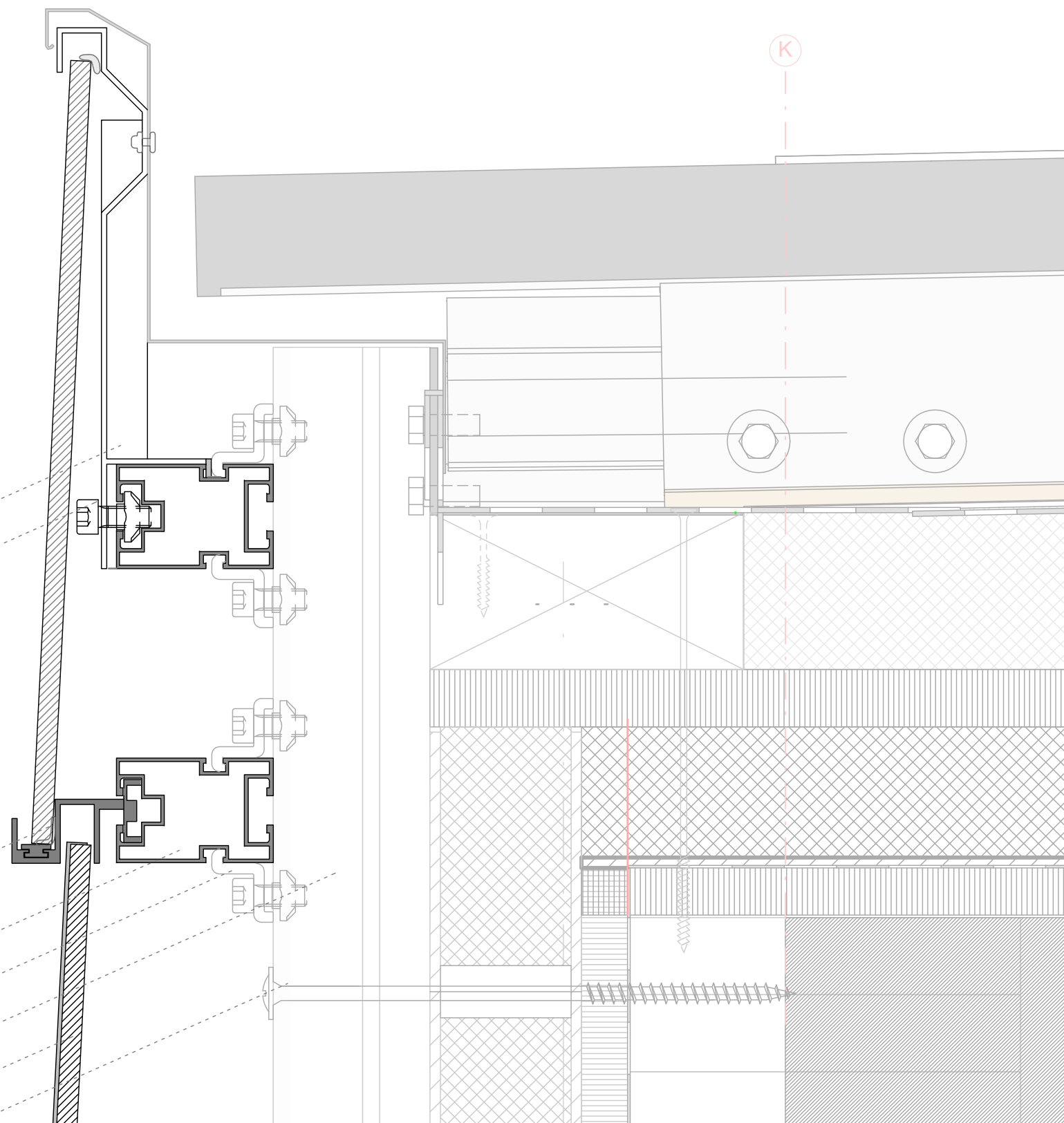
Heroal 64007 horizontal

Heroal 64031, Type C

Heroal 64007 vertical

PV - Module

Screw Würth Assy SK,
wheelhead, 200x8mm

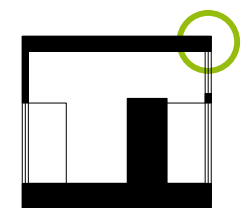
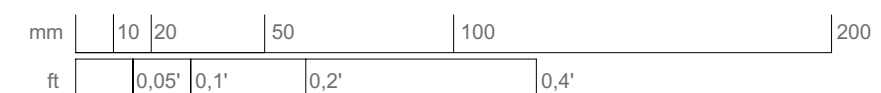


1
A-731

Detail Façade - Roof

Scale 1:2

1:2



Drawn FR

Issued 03/03/09

Last index

Component

Architectural - PV Mounting

Description

Detail Façade - Roof

Project #

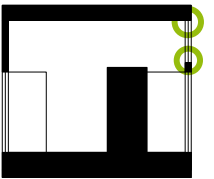
P 140







Scale

1 : 2

dwg #

A-731



-  Glass
-  Acrylic glass
-  Aluminium
-  Thermal insulation, EPS
-  Vacuum insulation panel, VIP
-  Oriented strand board, osb

Drawn FR
Issued 05/08/09
Last index

Component
Architectural - PV Mounting

Description
**Detail Connection
Façade - Window**

Project # Scale dwg #
P 140 1 : 2 A-741

Screw Würth Assy,
flat head screw, 15x2mm

Tee square, 2.5mm

Screw Würth Assy,
flat head screw, 15x2mm

Tee square, 2.5mm

Heroal 64007 vertical

Heroal 64031, Type C

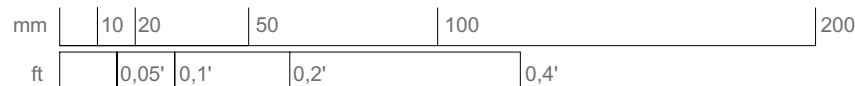
Hot melt adhesive

Mounting Cramp for Acrylic Glass Top

Heroal 64007 horizontal

PV - Module

1:2



Screw Würth Assy SK,
wheelhead, 200x8mm

PV - Module

Mounting Cramp

Hot melt adhesive

Heroal 64031, Type C

Heroal 64007 vertical

Acrylic glass

Hot melt adhesive

Mounting Cramp

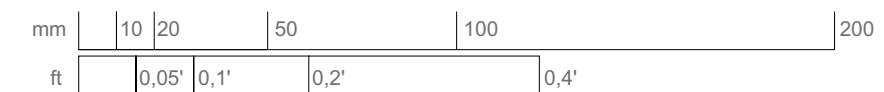
Heroal 64002 horizontal


Deck surface

Deck substructure


Detail Façade - Deck
Scale 1:2


1:2




**SOLAR DECATHLON**

Project

**SOLAR DECATHLON 2009**

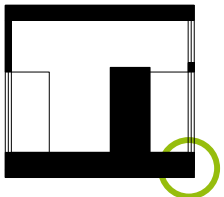
**TEAM GERMANY**


Constructor


**TECHNISCHE UNIVERSITÄT DARMSTADT**


Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de


Navigation/Legend





 Glass

 Acrylic glass

 Aluminium

 Thermal insulation, EPS

 Vacuum insulation panel, VIP

 Oriented strand board, osb

Drawn **FR**

Issued **05/06/09**

Last index

Component
Architectural - PV Mounting

Description
Detail Façade – Deck

Project #
P 140

Scale
1 : 2

dwg #
A-751

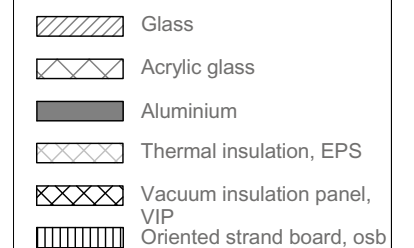
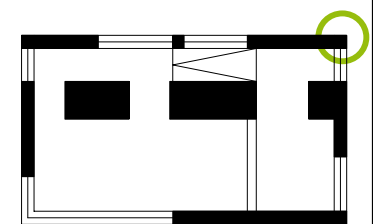
1
A-761

Corner - Axonometry

2
A-761

Section A-A
Scale 1:5

3 A-761 Horizontal Section - Corner Scale 1:5



Drawn	FR
-------	----

Issued	04/30/09
--------	----------

Last index

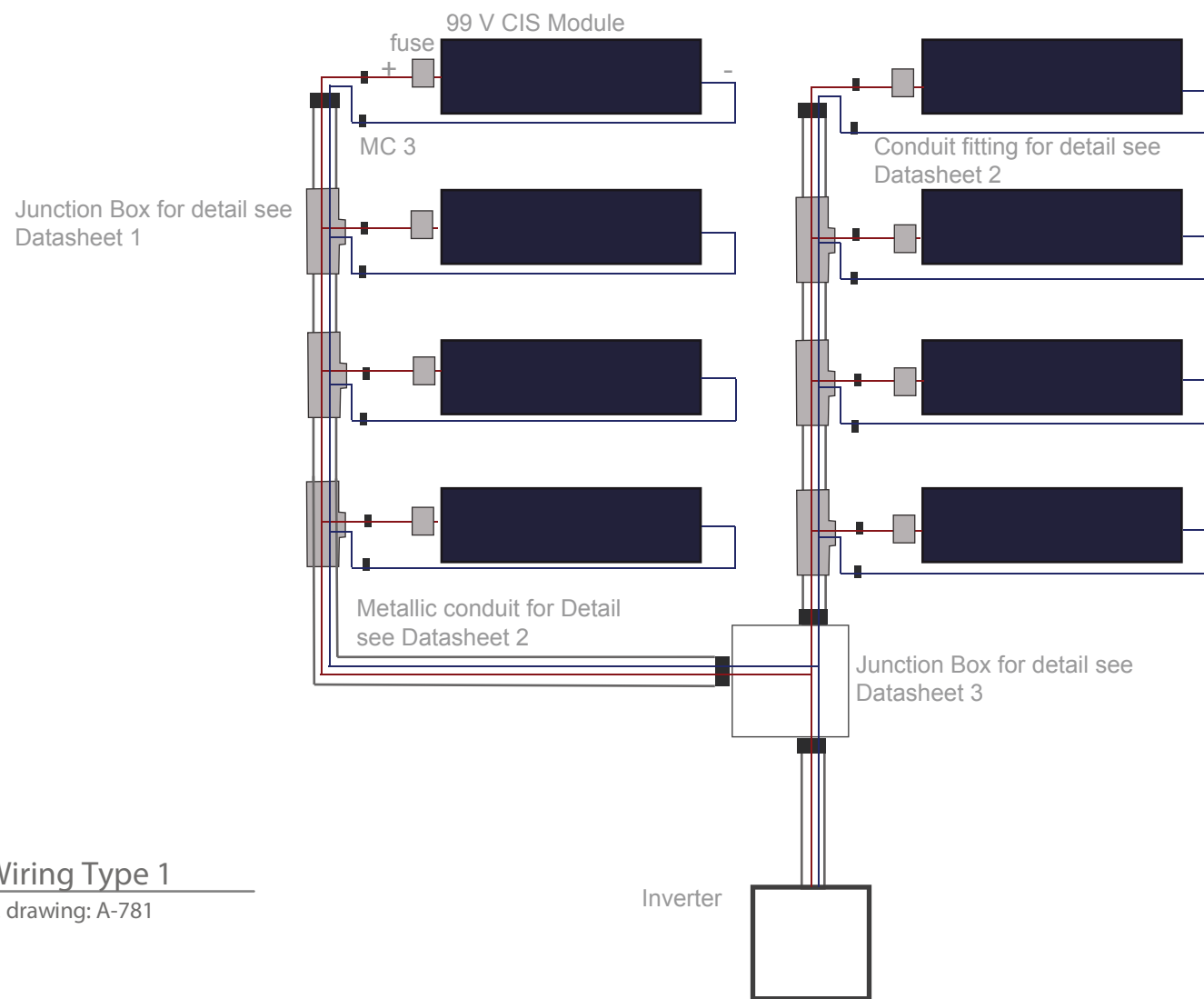
Component	Value
1. Introduction	10%
2. Background	15%
3. Methodology	20%
4. Results	25%
5. Discussion	20%
6. Conclusion	10%

Architectural - PV Mounting

Description

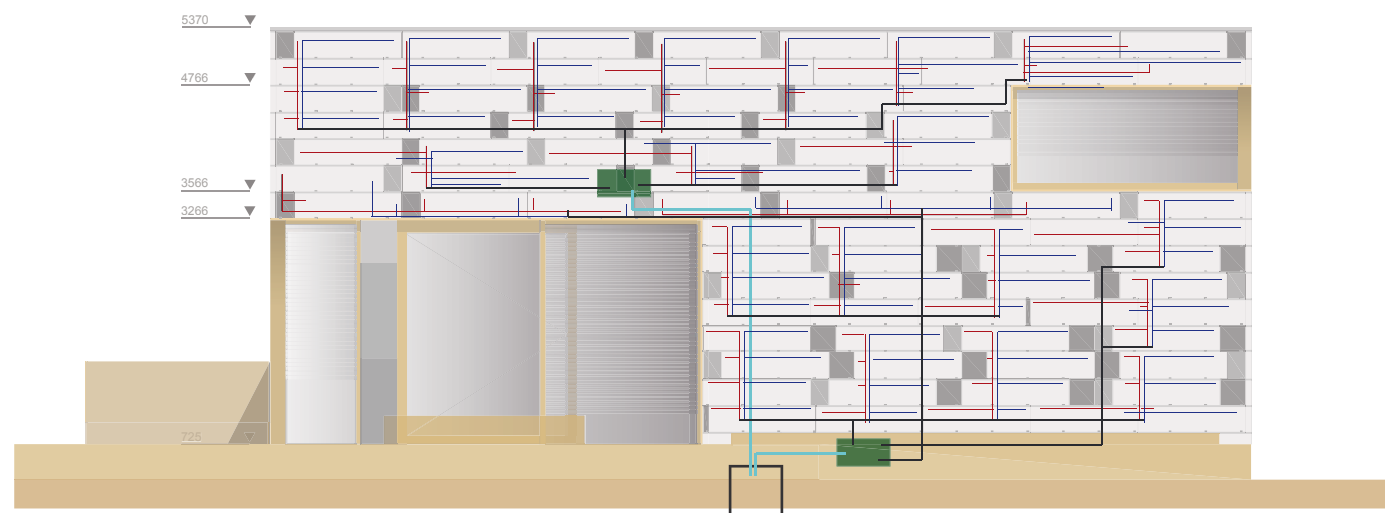
Detail Corner - Substructure

Project #	Scale	dwg #
P 140	1:5	A-761



1
A-771

Facade Wiring Type 1
No Scale ref. drawing: A-781



2
A-771

Facade Wiring Type 1
No Scale ref. drawing: A-781

1:100



Project

TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Department of Electrical
Engineering
Renewable Energies
Landgraf-Georgstraße 4
64283 Darmstadt
+49 (0) 6151 / 162367

Navigation/Legend

Drawn
MK

Issued
05/18/09

Last index
05/30/09

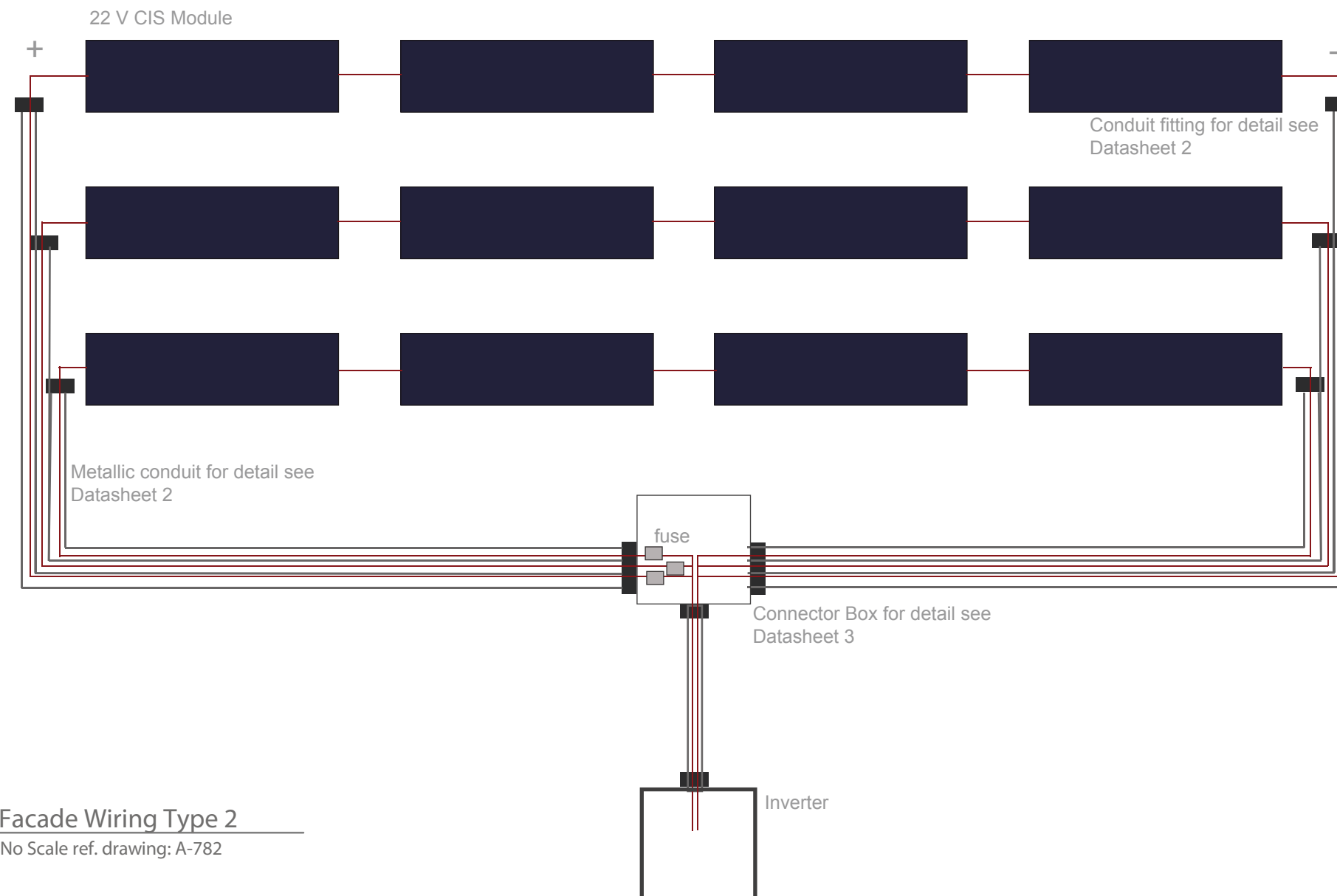
Component
Architectural - PV Mounting

Description
PV Wiring Type 1

Project #
P 140

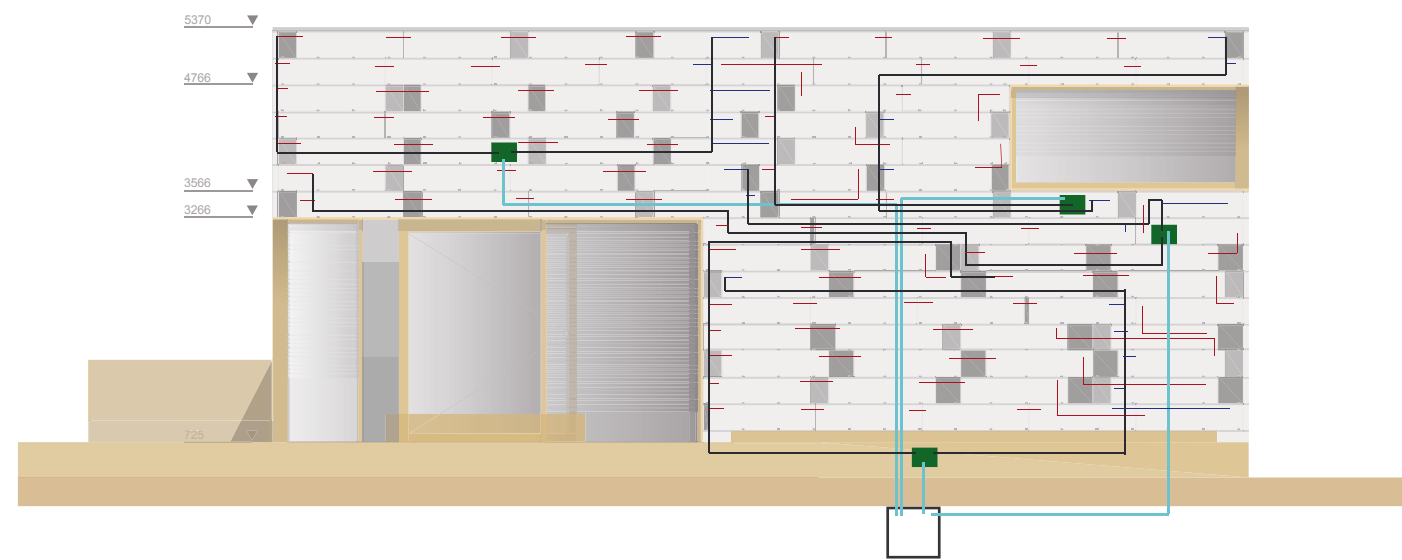
Scale
1 : 50

dwg #
A-771



1
A-772

Facade Wiring Type 2
No Scale ref. drawing: A-782



2
A-772

Facade Wiring Type 2
No Scale ref. drawing: A-782



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Department of Electrical
Engineering
Renewable Energies
Landgraf-Georgstraße 4
64283 Darmstadt
+49 (0) 6151 / 162367

Navigation/Legend

Drawn	MK
Issued	05/18/09
Last index	05/30/09

Component

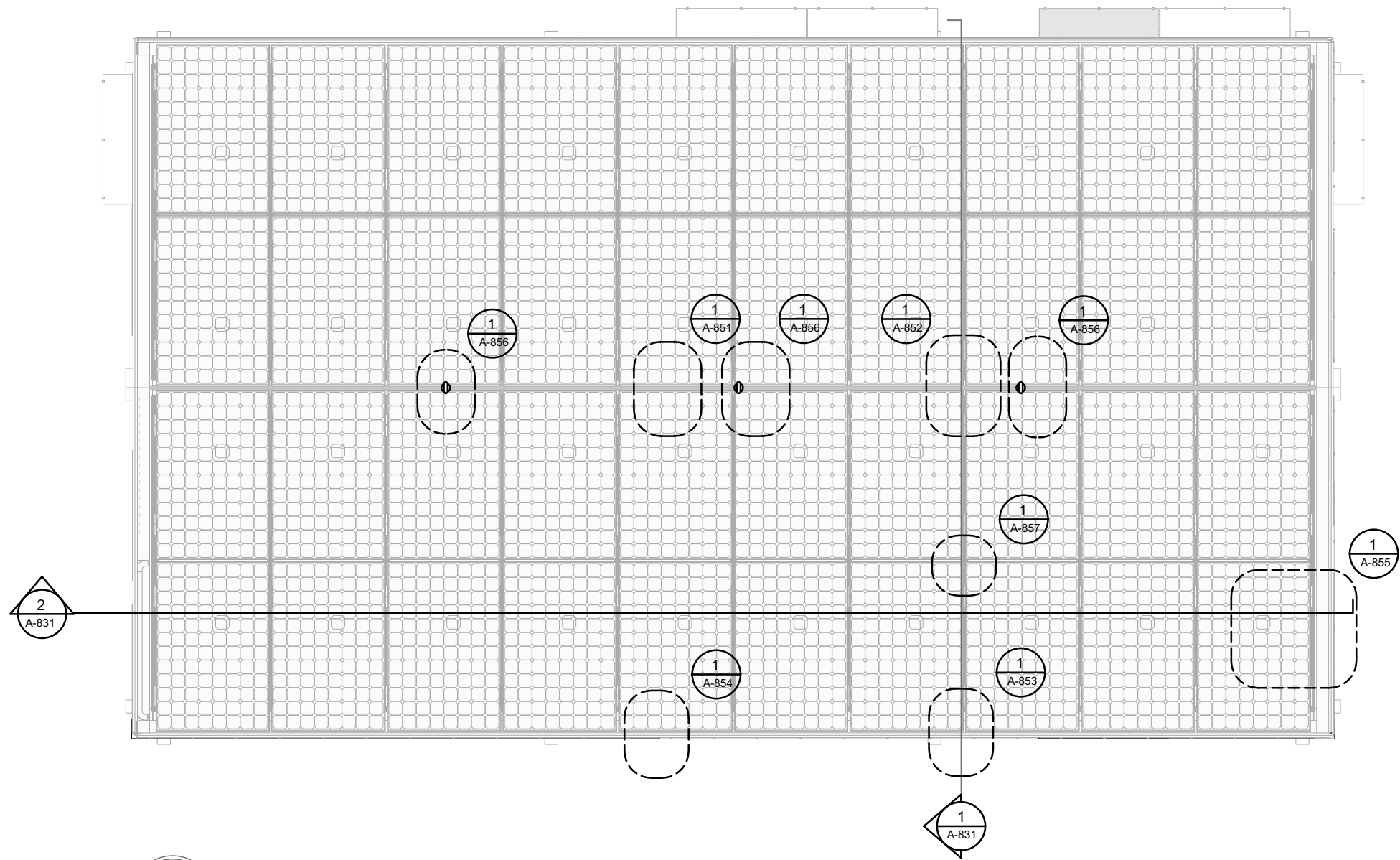
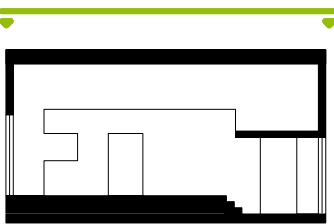
Architectural - PV Mounting

Description

PV Wiring Type 2

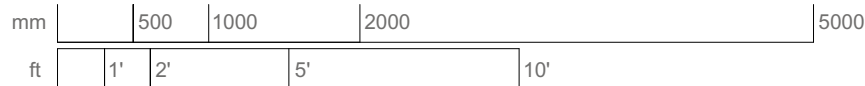
Project #	Scale	dwg #
P 140	1 : 50	A-772

05 06 10 Schedule for Structural Metal Framing and Equipment_PV-MOUNTING										
Plan No.	Project Manual Division Master Format	Component	Description	Specification	Size			Quantity		Notes
					L	H	W	Amount	Unit	
A-714, A-721-24	Div. 26	PV Modules	CIS - Modules	Würth Solar, WSG 0037 E075	1,2	0,3	0,01	248	PC	Connection to building service via MC4 plug, for cabeling & inverter see Electrical schedule
A-715, A-721-24	Div. 06	Acrylic Glass	Acrylic Glass, different colours	Evonik Röhm plexiglas XT		0,3			m	
A – 715, A – 721-24	Div. 12	Acrylic Glass	Acrylic Glass, different colours	Evonik Röhm plexiglas XT		0,21		16	meter	
A-715, A-721-24	Div. 12	Acrylic Glass	Acrylic Glass, different colours	Evonik Röhm plexiglas XT		0,14		3,5	meter	
A-716, A-731-34	Div. 05	Substructure	Aluminium sheath	Heroal 64007	6,5	0,04	0,06	57	PC	
A-716, A-731-34	Div. 05		Aluminium sheath	Heroal 64007	5	0,04	0,06	59	PC	
A-761	Div. 05		Aluminium sheath, welded corner	Heroal 64007	5	0,04	0,06	32	PC	
A-716, A-731-34	Div. 05		Aluminium sheath	Heroal 64002	5	0,04	0,04	55	PC	
A-761	Div. 05		Aluminium sheath, welded corner	Heroal 64002	5	0,04	0,04	7	PC	
A-712	Div. 05	Mounting	Mounting Cramp	Heroal 64015, Type F				2000	PC	Prequalification of Cramps for Acrylic Glass [700 pieces, see A-715]
A-741	Div. 05		Mounting Cramp	Metalworker				88	PC	
A-716	Div. 05		Mounting for horizontal substructure	Heroal 64031, Type C				1450	PC	
A-716	Div. 05		Mounting srew for vertical substructure	Würth ASSY SK wheel head, 200x8mm, Art.No. 0184 608 200				420	PC	
A-716	Div.05		End Cap for Aluminium sheath	Heroal 64082				100	PC	
A-713	Div. 05	Blinding	Aluminium Gusset Plate, 2mm, special designed	Metalworker				50	PC	
A-713, A-715	Div. 41	Fastener	Hot melt adhesive	Hot Sticks transparent						



1
A-810
Key plan, Top View
Scale 1:50

1:50



Drawn	MO	
Issued	05/28/09	
Last index		
Component		
Architectural		
Description		
Key Plan Roof		
Project #	Scale	dwg #
P 140	1 : 50	A-810

Roof System - Description

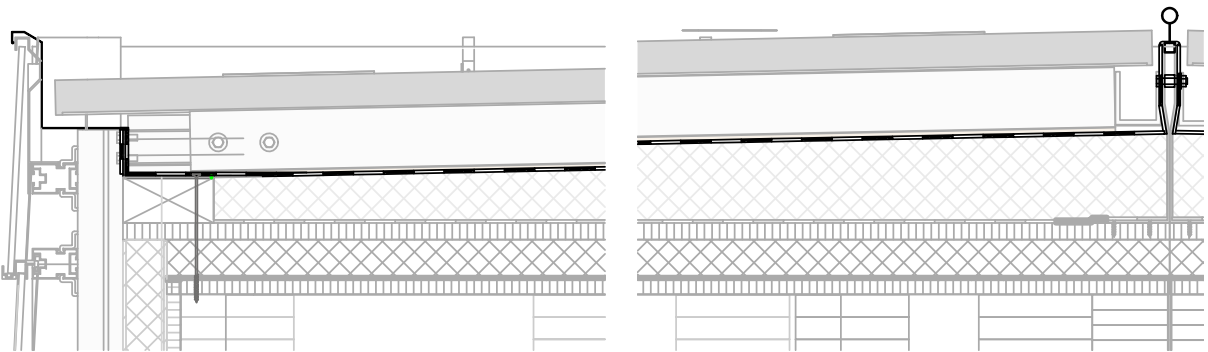
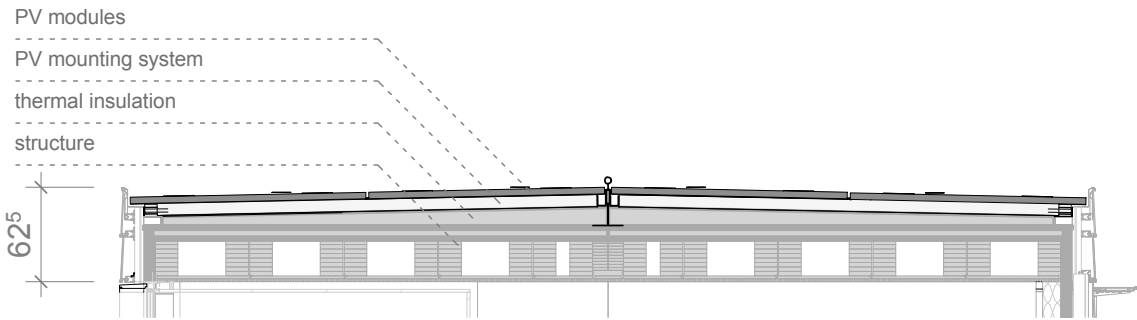
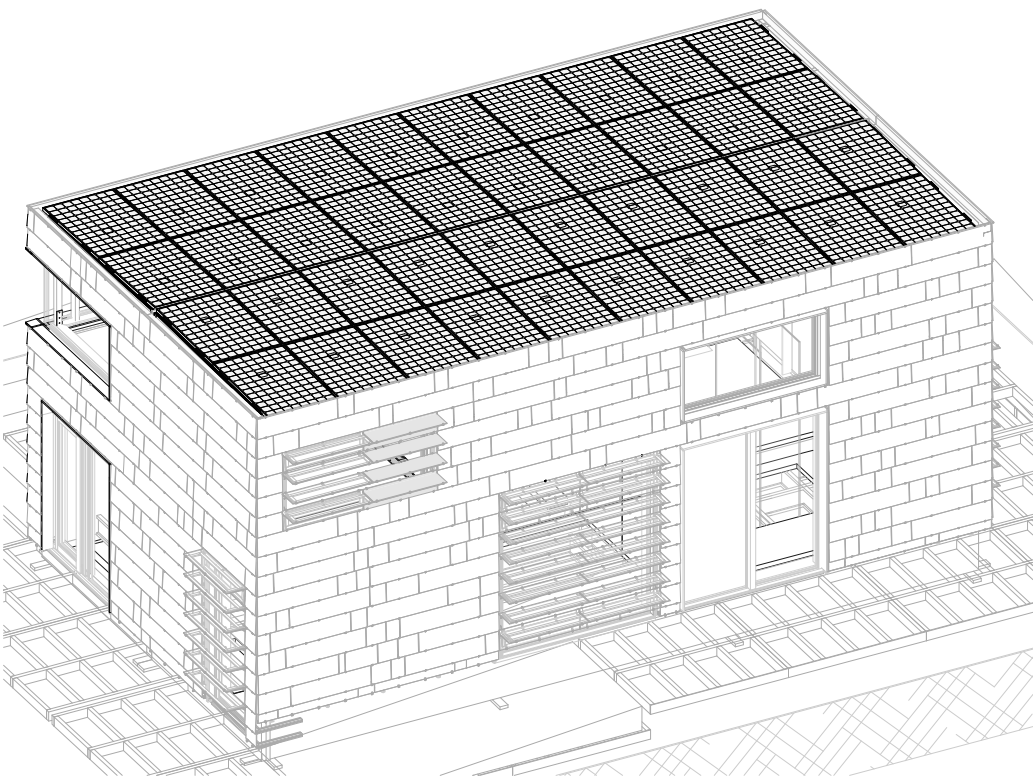
Our roof ist designed as fifth façade of the house. This means, like the façade, it should combine maximum utility with high design quality.


Besides sheltering the house from rain-water and high temperatures at the moisture protection, the function of the roof is to provide the needed electric energy.
It is completely planned with PV-modules. Using 40 high efficient Pv-modules from SunPower (SPR 300), the roof provides an installed capacity of 12kWpeak.

To provide maximum flexibility in energy supply, we renounced to use solarthermal elements - so, we were able to design a very homogen "fifth facade".

To provide maximum space in the interior of the house and enable a second floor inside the building, the roof should be reduced to the minimum thickness. This is why the PV-modules are installed in nearly horizontal position.
By mounting the PV-modules parallel to the roof, the mounting system for the PV is simple and costefficient.


The delicate waterproofing of the roof should beharmed as less as possible. Therefore we fixed the substructure for the PV-system is fixed on the ridge and on the boundary of the roof.






SOLAR DECATHLON

Project




SOLAR DECATHLON 2009



TEAM GERMANY

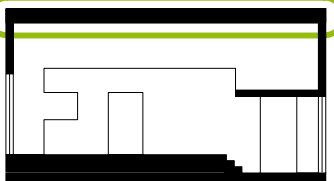
Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



Drawnmo

Issued05/27/09

Last index

Component

Architectural

Description

Roof System - general

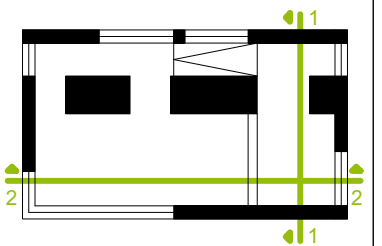
Project #






P 140

Scale

dwg #

A-811



-  PV - modules
-  PV mounting system
-  Waterproofing
-  Thermal insulation, EPS
-  Oriented strand board, osb

Drawn MO

Issued 05/28/09

Last index

Component
Architectural

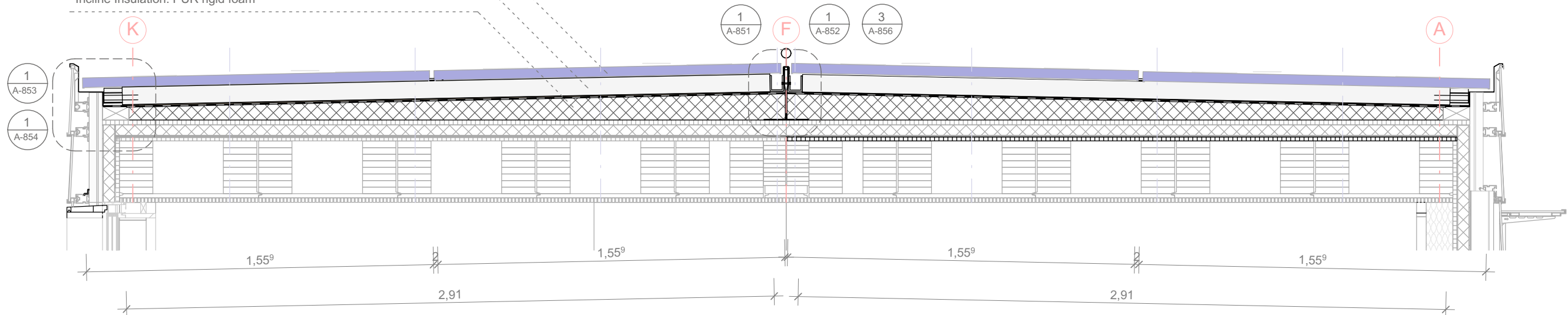
Description
Sections Roof

Project # Scale dwg #
P 140 1 : 20 A-831

PV Modules: Sunpower SPR300

PV mounting system: heroal 18023 aluminium

Incline Insulation: PUR rigid foam

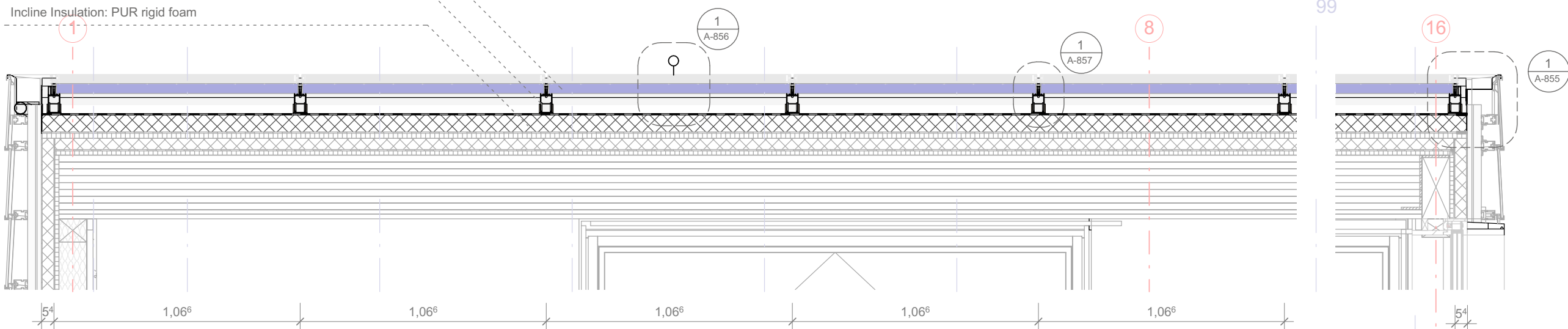


1 Section North-South
A-831 Scale 1:20 ref. drawing: A-843

PV Modules: Sunpower SPR300

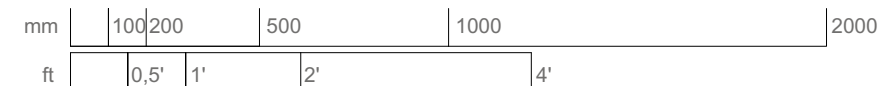
PV mounting system: heroal 18023 aluminium

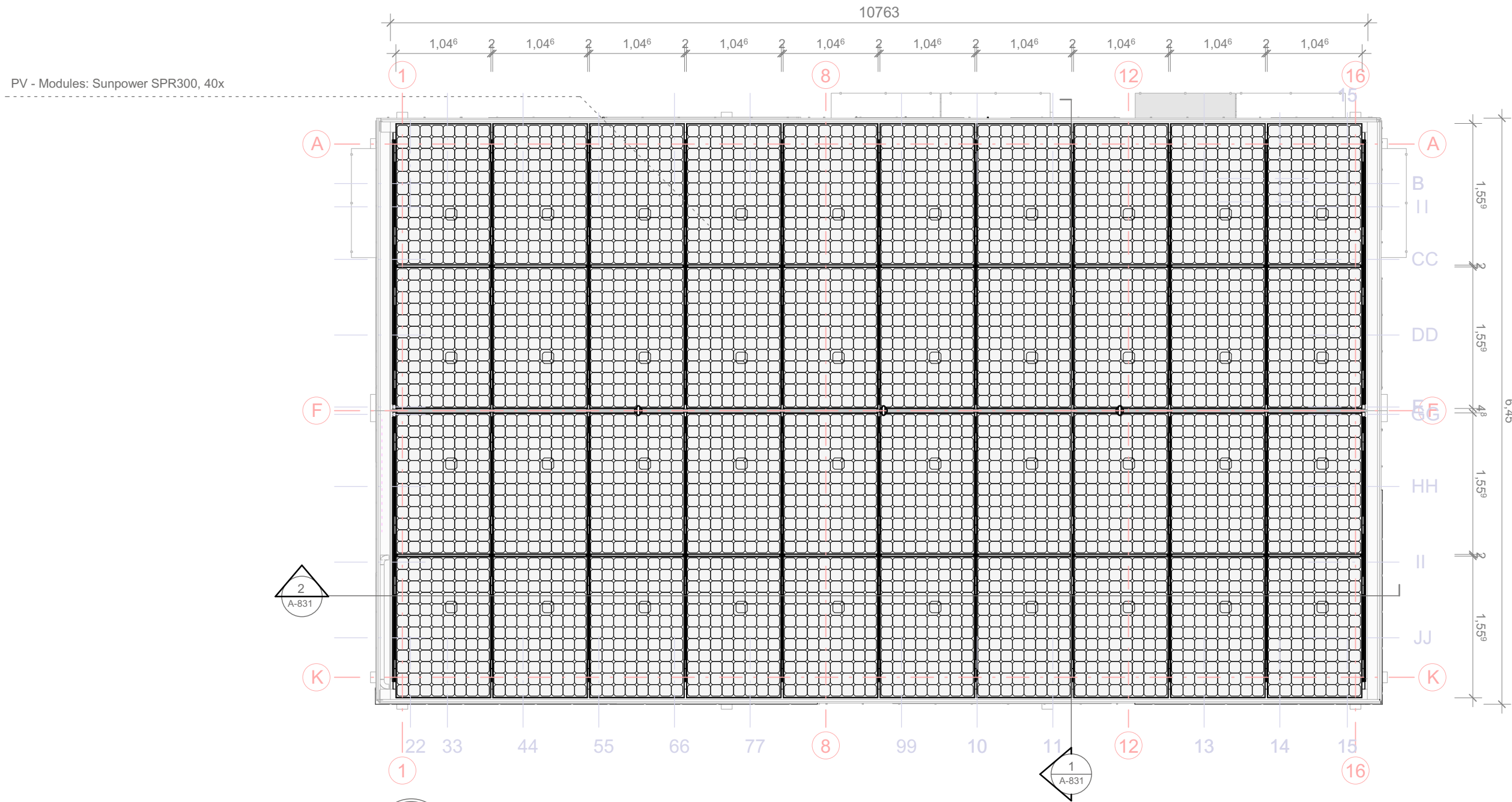
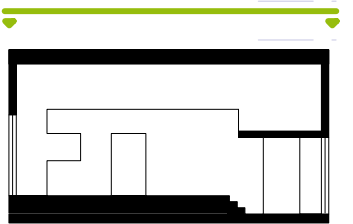
Incline Insulation: PUR rigid foam



2 Section East-West
A-831 Scale 1:20 ref. drawing: A-843

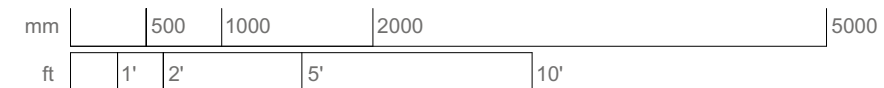
1:20





1 Top View PV - Modules
A-841 Scale 1:50

1:50

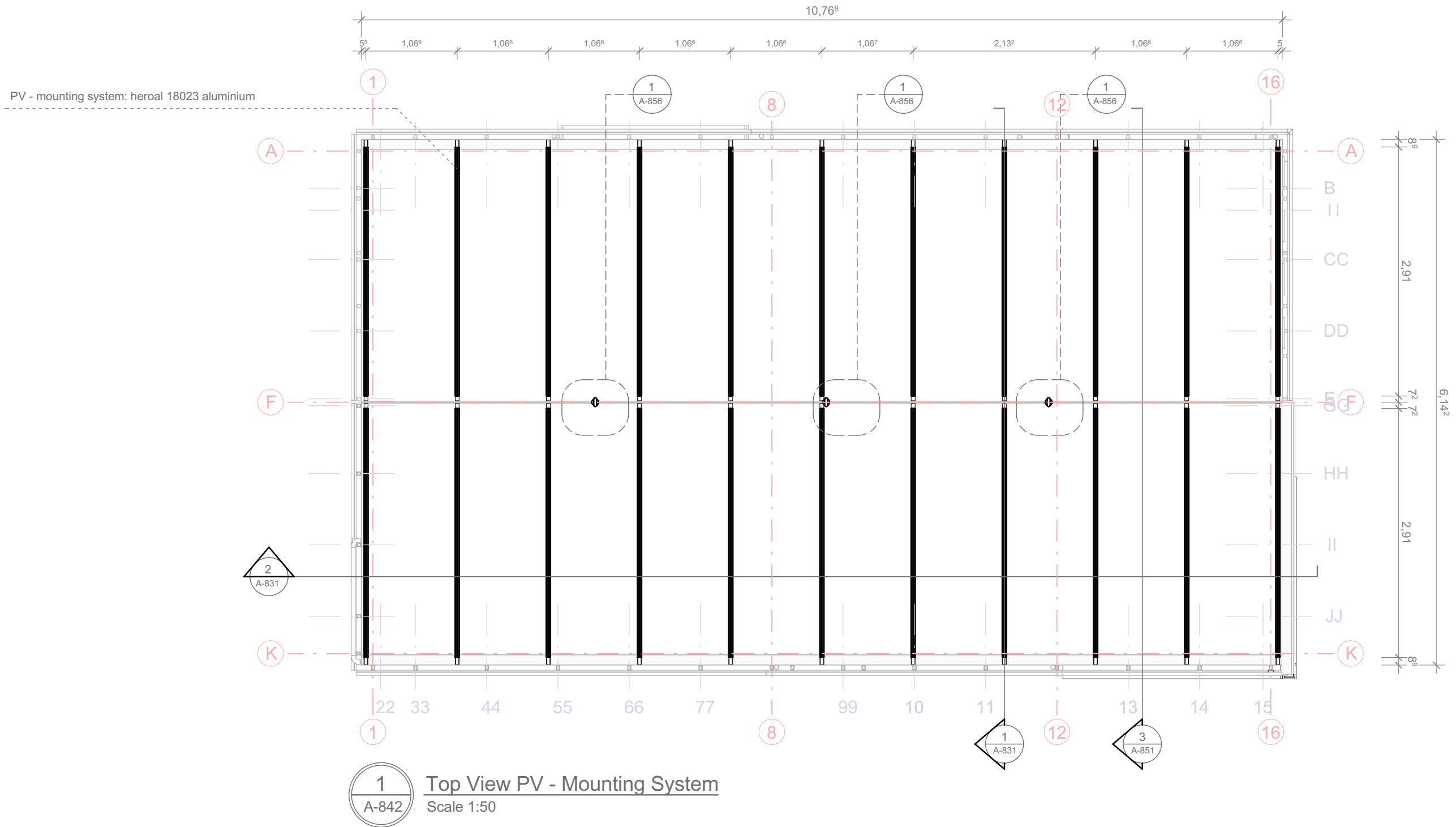
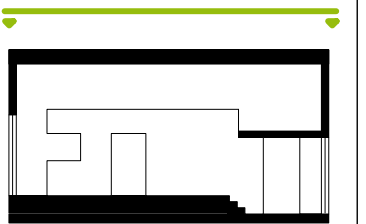


Drawn MO
Issued 05/28/09
Last index

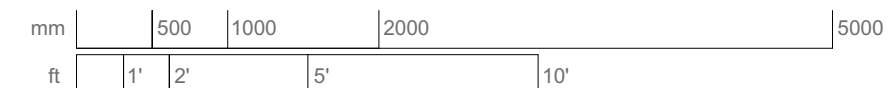
Component
Architectural

Description
Top View PV Modules

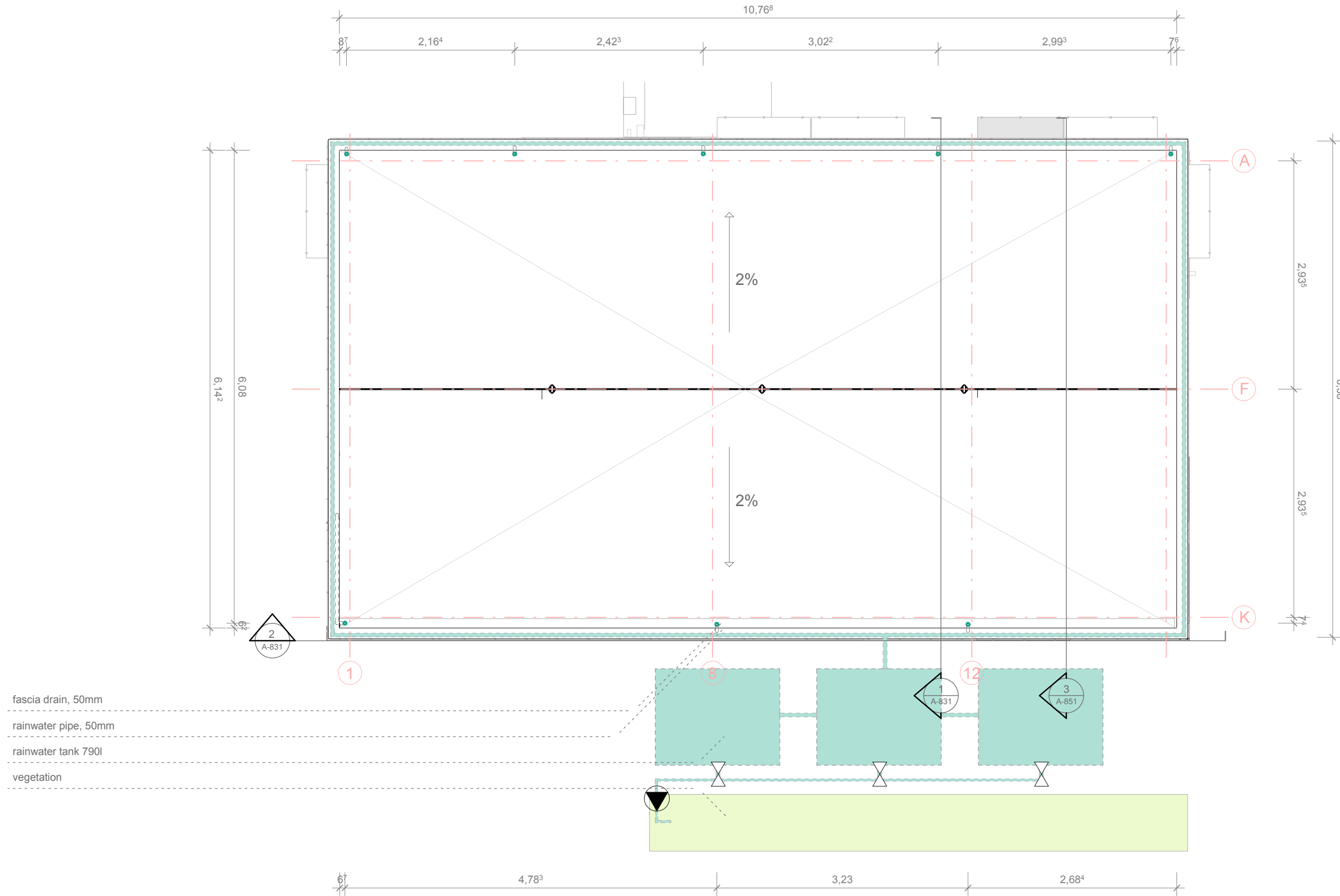
Project # Scale dwg #
P 140 1 : 50 A-841



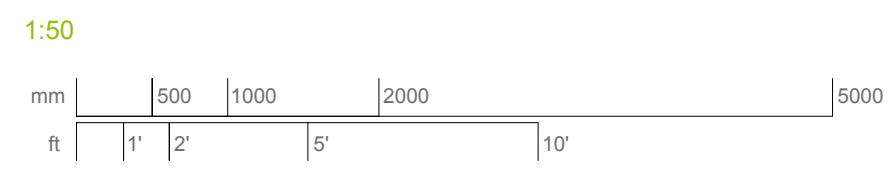
1:50

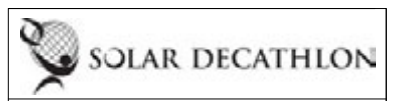


Drawn	MO	
Issued	05/28/09	
Last index		
Component	Architectural	
Description	Top View PV - Mounting System	
Project #	Scale	dwg #
P 140	1 : 50	A-842




1 Top View Drainage
A-843 Scale 1:50






SOLAR DECATHLON

Project

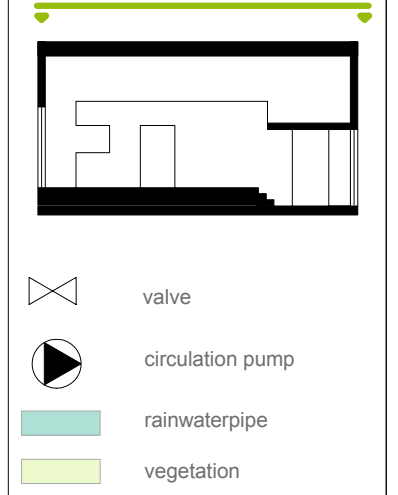
 SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

 TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



valve

circulation pump

rainwaterpipe

vegetation

Drawn mo

Issued 05/19/09

Last index

Component

Architectural

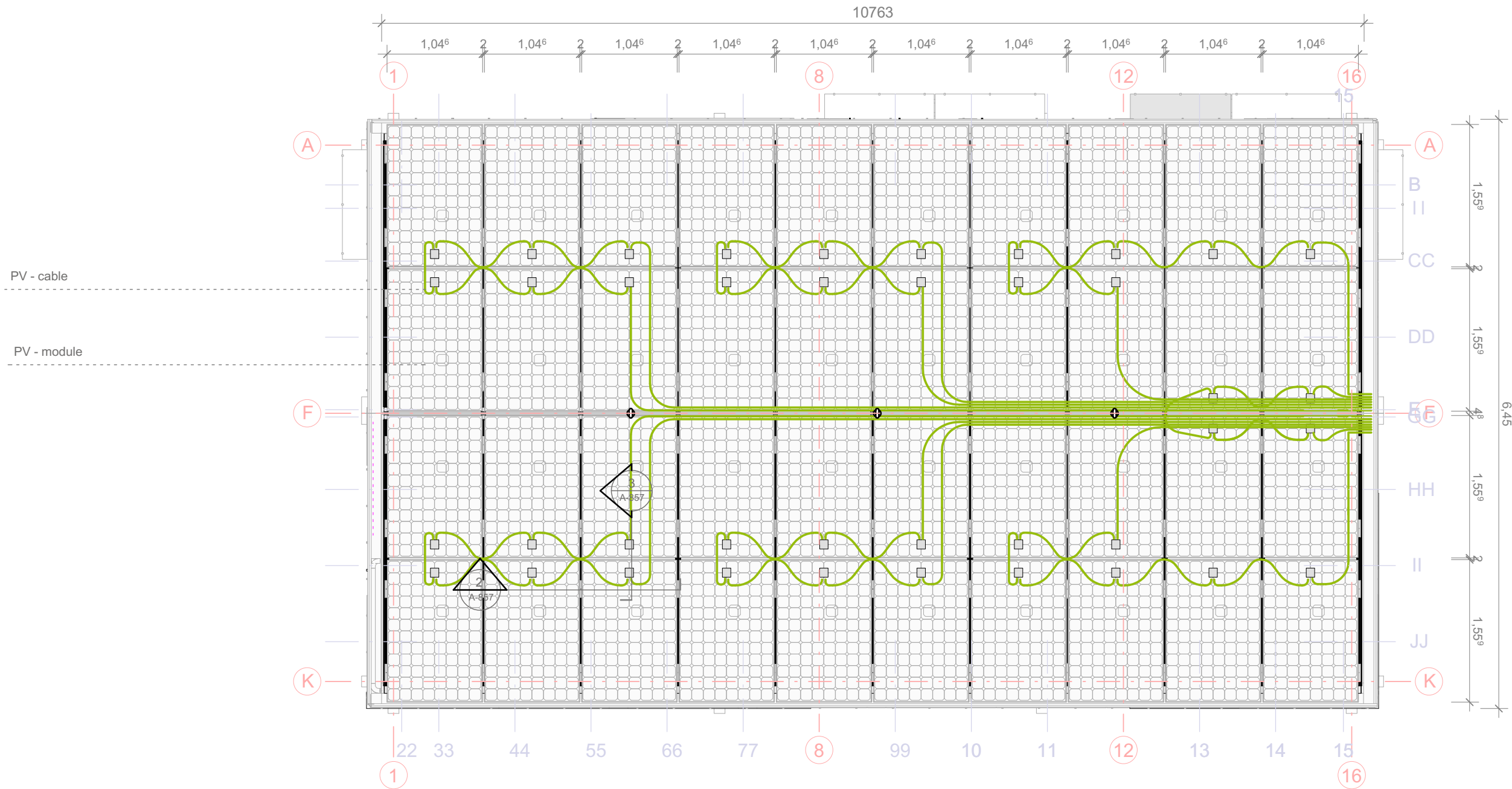
Description

Top View Drainage

Project # P 140

Scale 1 : 50

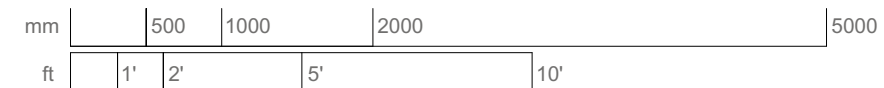
dwg # A-843

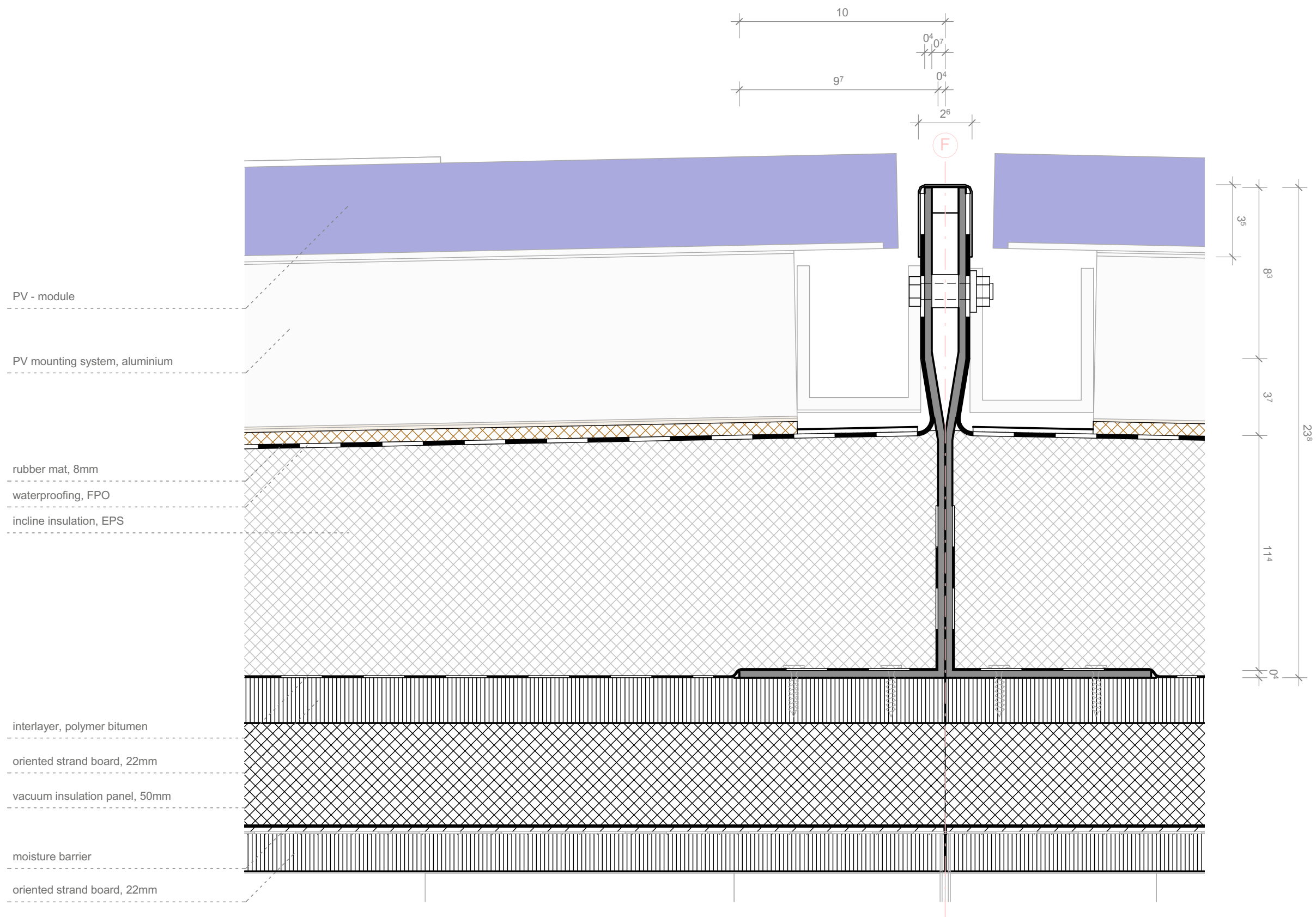


1
A-844

Top View PV Cable Conduit
Scale 1:50

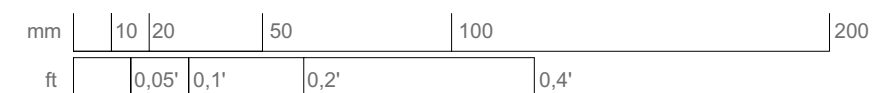
1:50





1 Section / Detail Roof System
A-851 Scale 1:2 ref. drawing: A-831

1:2



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

- PV - module
- Thermal insulation, EPS
- Vacuum insulation panel, VIP
- Oriented strand board, osb
- Aluminium
- Rubber mat
- Waterproofing
- Interlayer
- Moisture barrier

Drawn	MO
Issued	05/28/09
Last index	

Component

Architectural

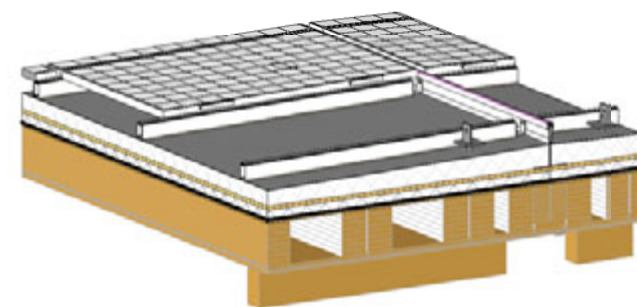
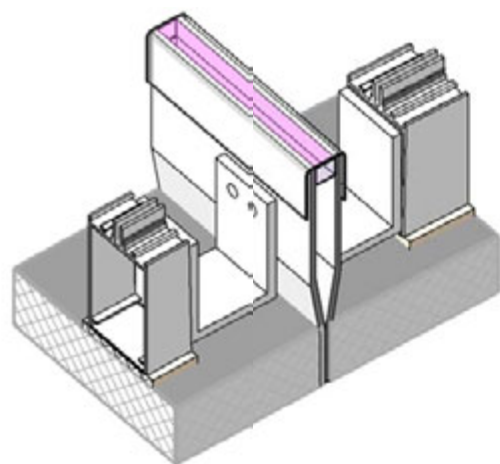
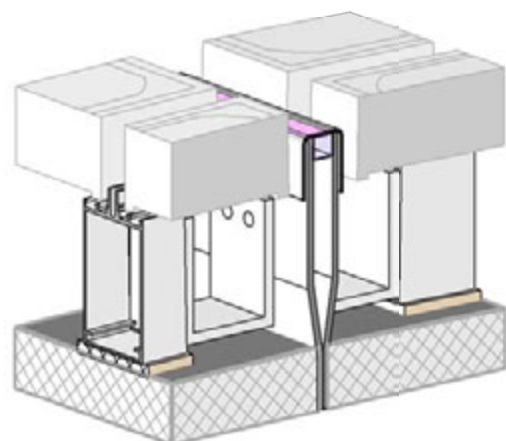
Description

Detail Roof system

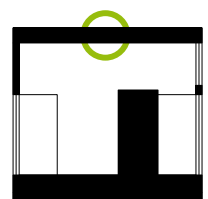
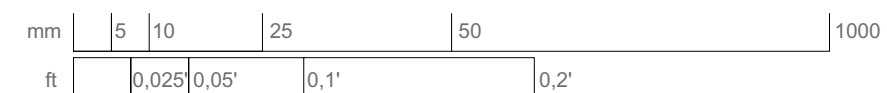
Project #	Scale	dwg #
P 140	1 : 2	A-851










Scale 1:1 ref. drawing: A-831

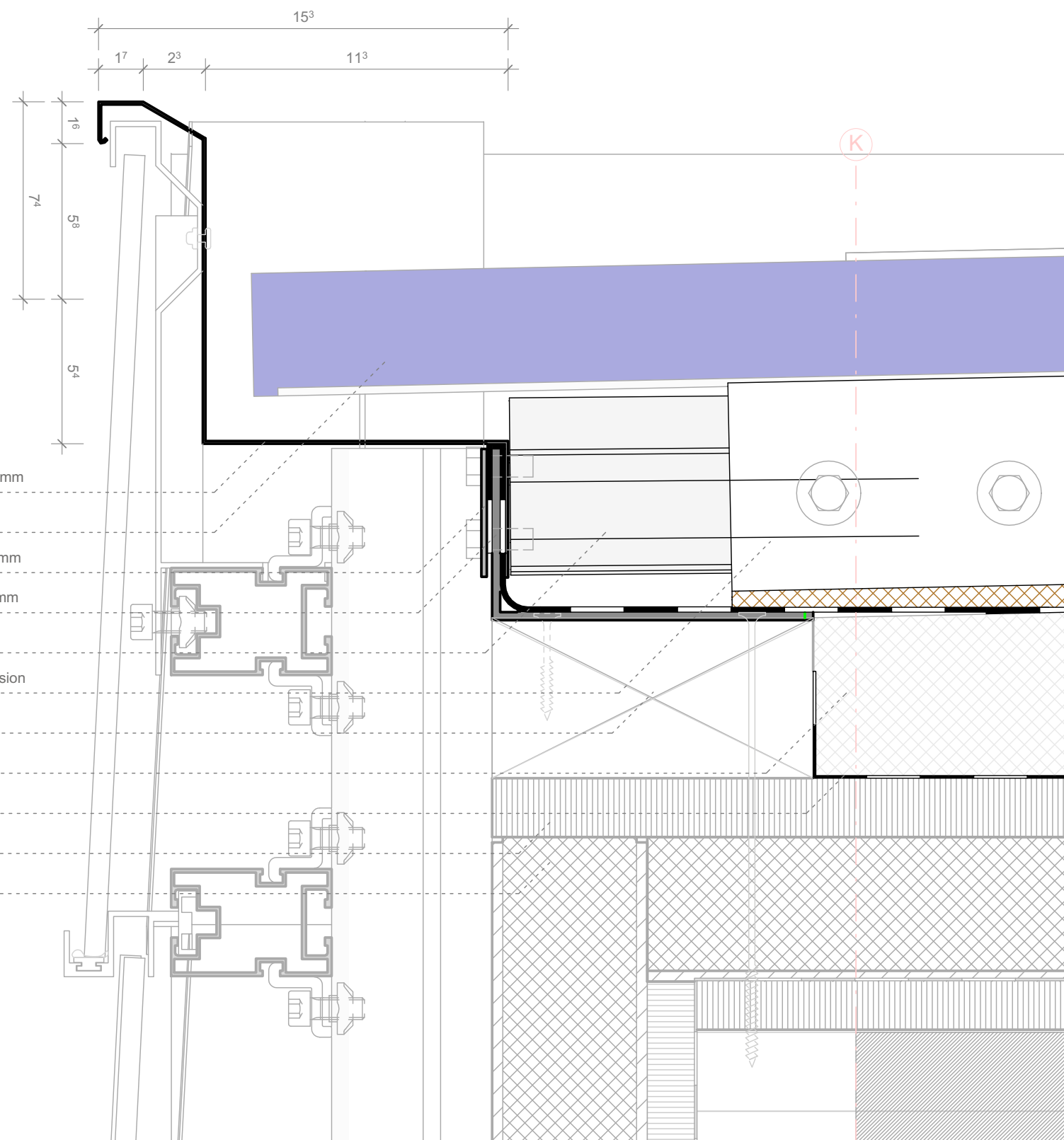


1:1



-  PV module
-  thermal insulation, EPS
-  vacuum insulation panel, VIP
-  oriented strand board, osb
-  aluminium
-  rubber mat
-  waterproofing

Project #	Scale	dwg #
P 140	1:1	A-852

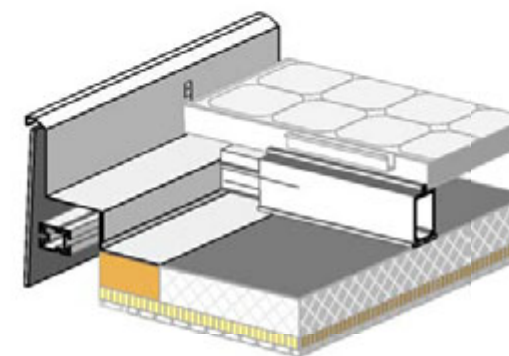
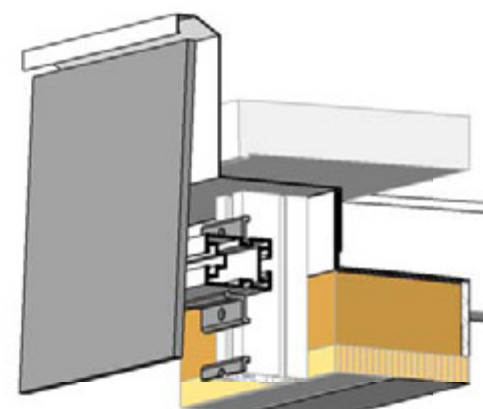
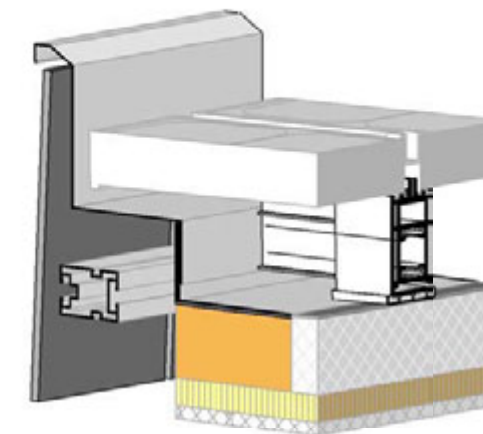
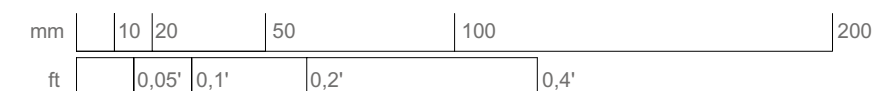


façade closure, aluminium sheet 1mm
 PV - module
 pressure plate, aluminium sheet 2mm
 fascia bracket, aluminium sheet 2mm
 insertion profile with screw hole
 mounting system, aluminium extrusion
 wooden beam, 120x60mm
 incline insulation, EPS
 interlayer, polymer bitumen
 oriented strand board, OSB 22mm
 vaccum insulation panel, 50mm

1
 A-853

Section / Detail PV Fascia
 Scale 1:2 ref. drawing: A-831

1:2



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
 Energyefficient Building Design Unit
 El-Lissitzky-Str. 1
 64287 Darmstadt
 +49 (0) 6151 / 165448
 +49 (0) 6151 / 165247
 team@solardecathlon2009.de

Navigation/Legend

- PV - module
- Thermal insulation, EPS
- Vacuum insulation panel, VIP
- Oriented strand board, osb
- Aluminium
- Rubber mat
- Waterproofing
- Interlayer
- Moisture barrier

Drawn MO

Issued 05/28/09

Last index

Component

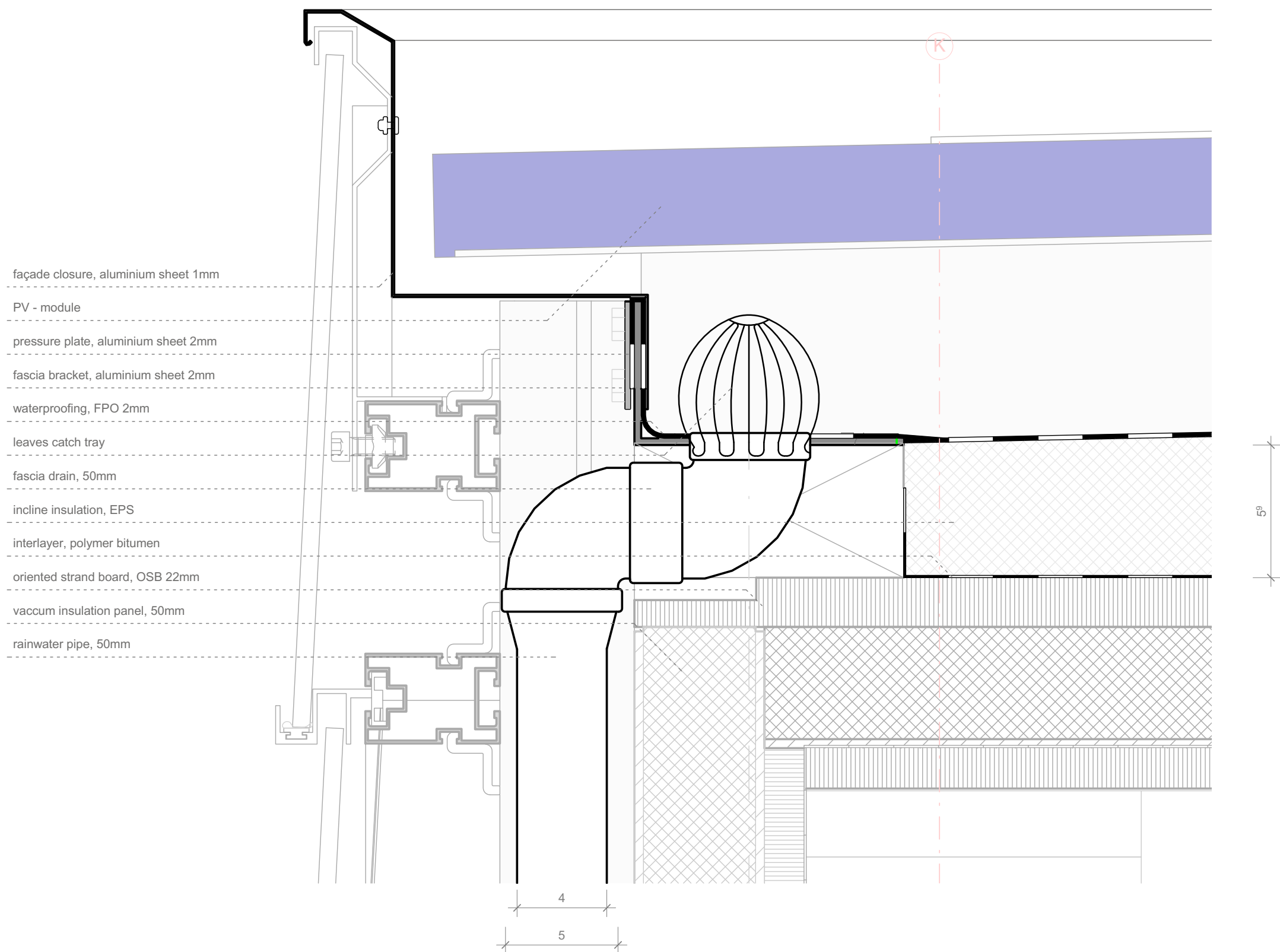
Architectural

Description

Detail PV fascia north/south

Project # Scale dwg #

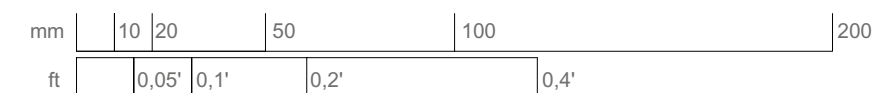
P 140 1 : 2 A-853




Detail Drainage Fascia North/South


Scale 1:2 ref. drawing: A-831


1:2




**SOLAR DECATHLON**

Project

**SOLAR DECATHLON 2009**

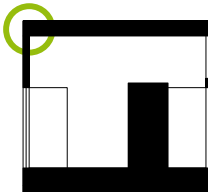
**TEAM GERMANY**


Constructor


**TECHNISCHE UNIVERSITÄT DARMSTADT**


Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de


Navigation/Legend





 PV module


 Thermal insulation, EPS


 Vacuum insulation panel, VIP

 Oriented strand board, osb

 Aluminium

 Waterproofing

 Interlayer

 Moisture barrier

Drawn MO

Issued 05/28/09

Last index

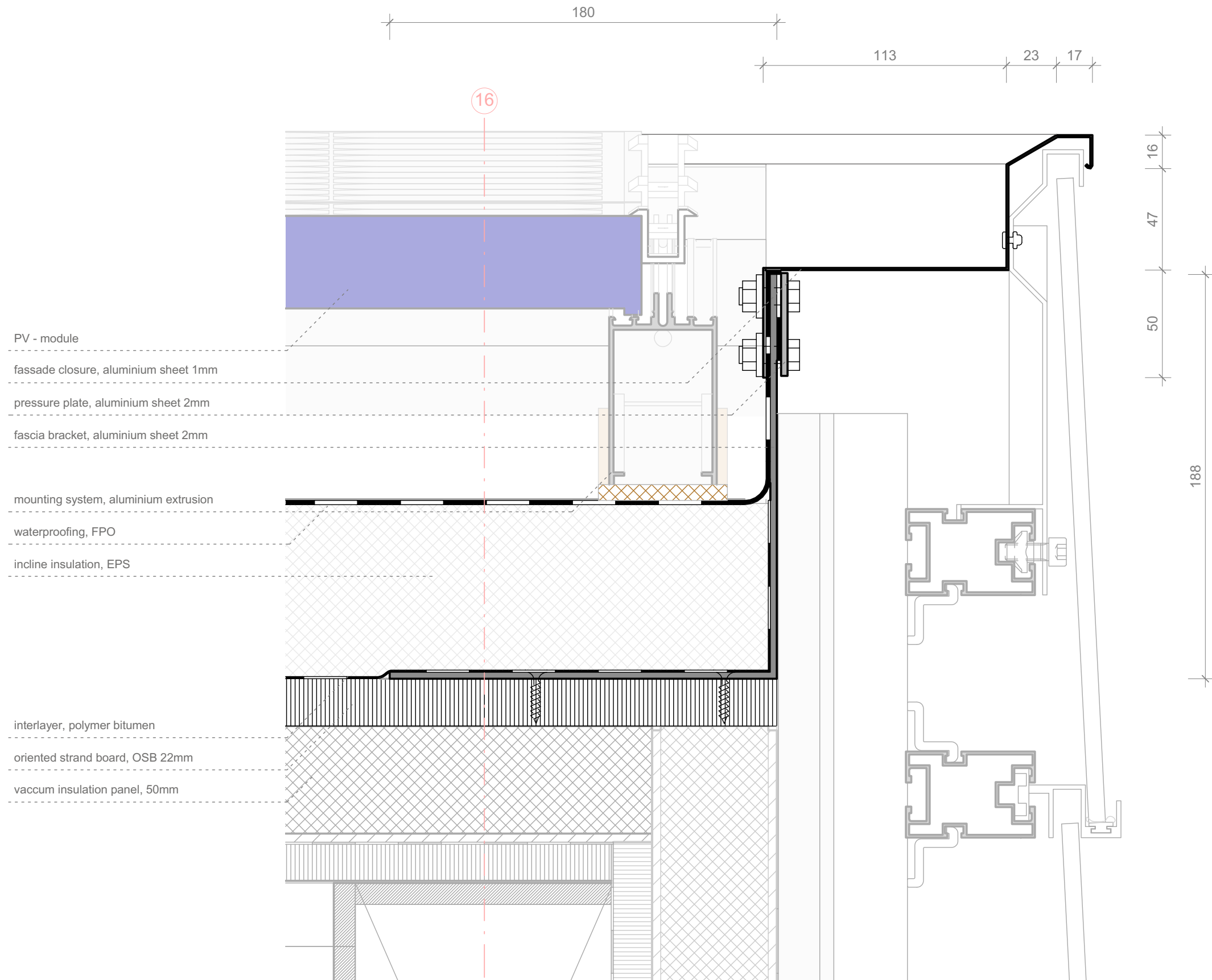
Component
Architectural

Description
Detail drainage fascia north/south

Project # P 140

Scale 1 : 2

dwg # A-854

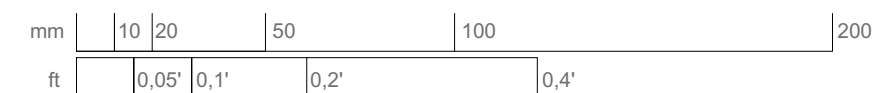



1
A-855

Section / Detail Fascia East/West


Scale 1:2 ref. drawing: A-831


1:2




**SOLAR DECATHLON**

Project

**SOLAR DECATHLON 2009**

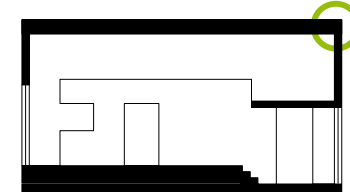
**TEAM GERMANY**


Constructor


**TECHNISCHE UNIVERSITÄT DARMSTADT**


Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de


Navigation/Legend





 PV module


 Thermal insulation, EPS


 Vacuum insulation panel, VIP


 Oriented strand board, osb

 Aluminium

 Rubber mat

 Waterproofing

 Interlayer

 Moisture barrier

DrawnMO

Issued05/28/09

Last index

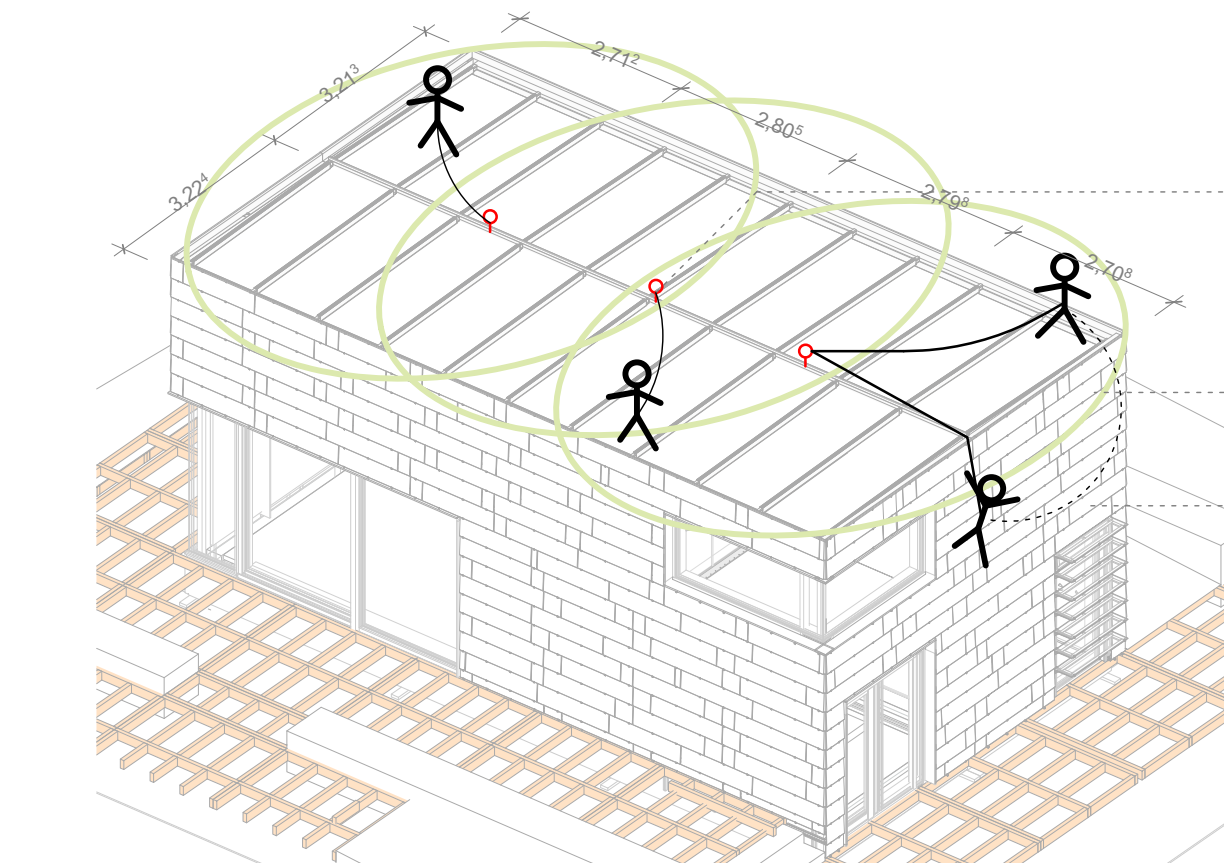
ComponentArchitectural

Description**Detail fascia east/west**

Project #P 140

Scale1 : 2

dwg #A-855

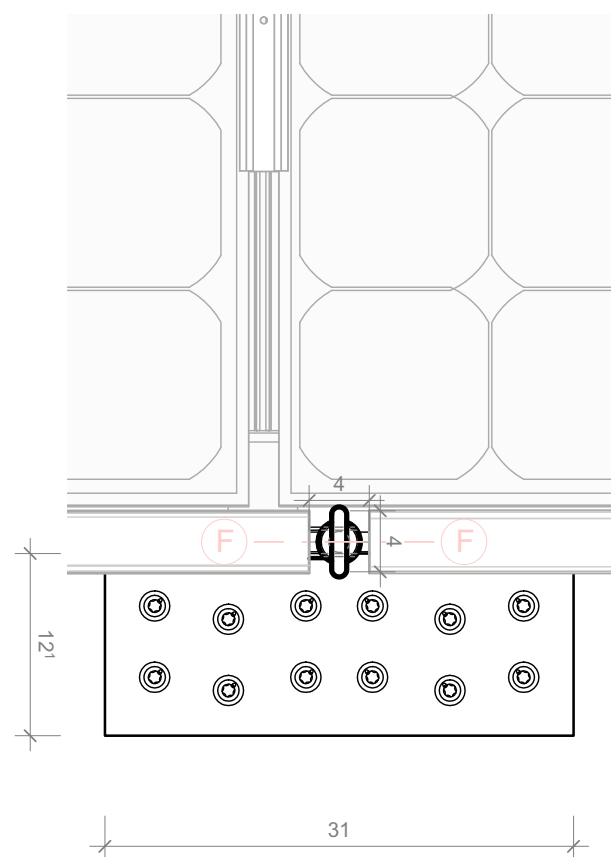


attachment point Lux Top for
fall protection from St-Quadrat,
max. 2 Persons each point

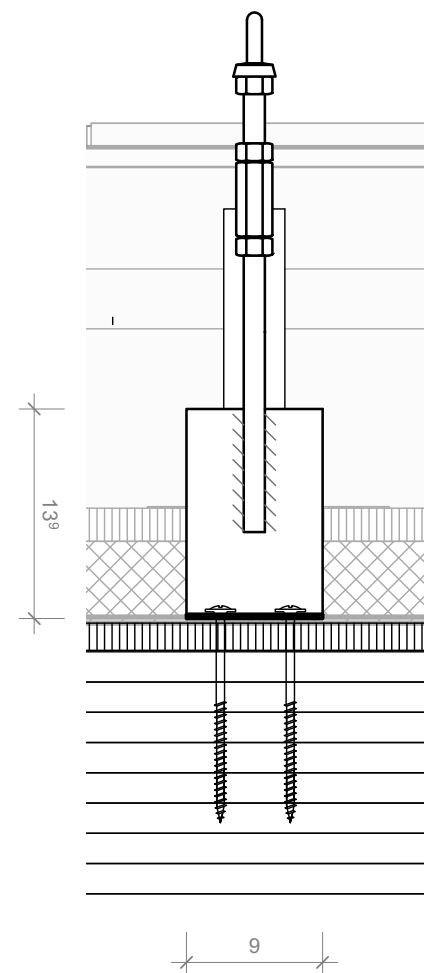
radius for one attachment
point = max. 4 meter

maximum fall = 2 meter

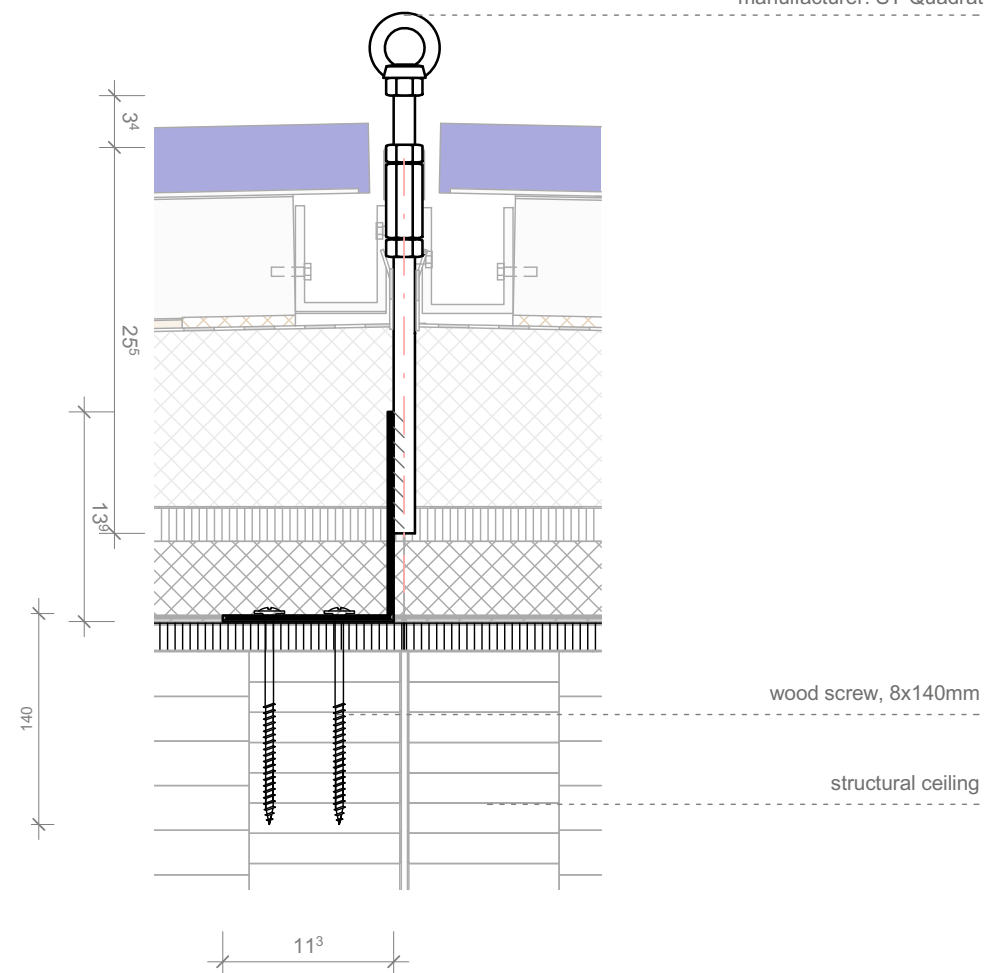
attachment point for fall
protection,
manufacturer: ST-Quadrat



1 Detail Fall Protection, Top View
A-856 Scale 1:5 ref. drawing: A-842



2 Detail Fall Protection, South View
A-856 Scale 1:5 ref. drawing: A-831



3 Detail Fall Protection, South View
A-856 Scale 1:5 ref. drawing: A-831

1:5



Project

TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
Team@solardecathlon2009.de

Navigation/Legend

Drawn
MO

Issued
05/28/09

Last index

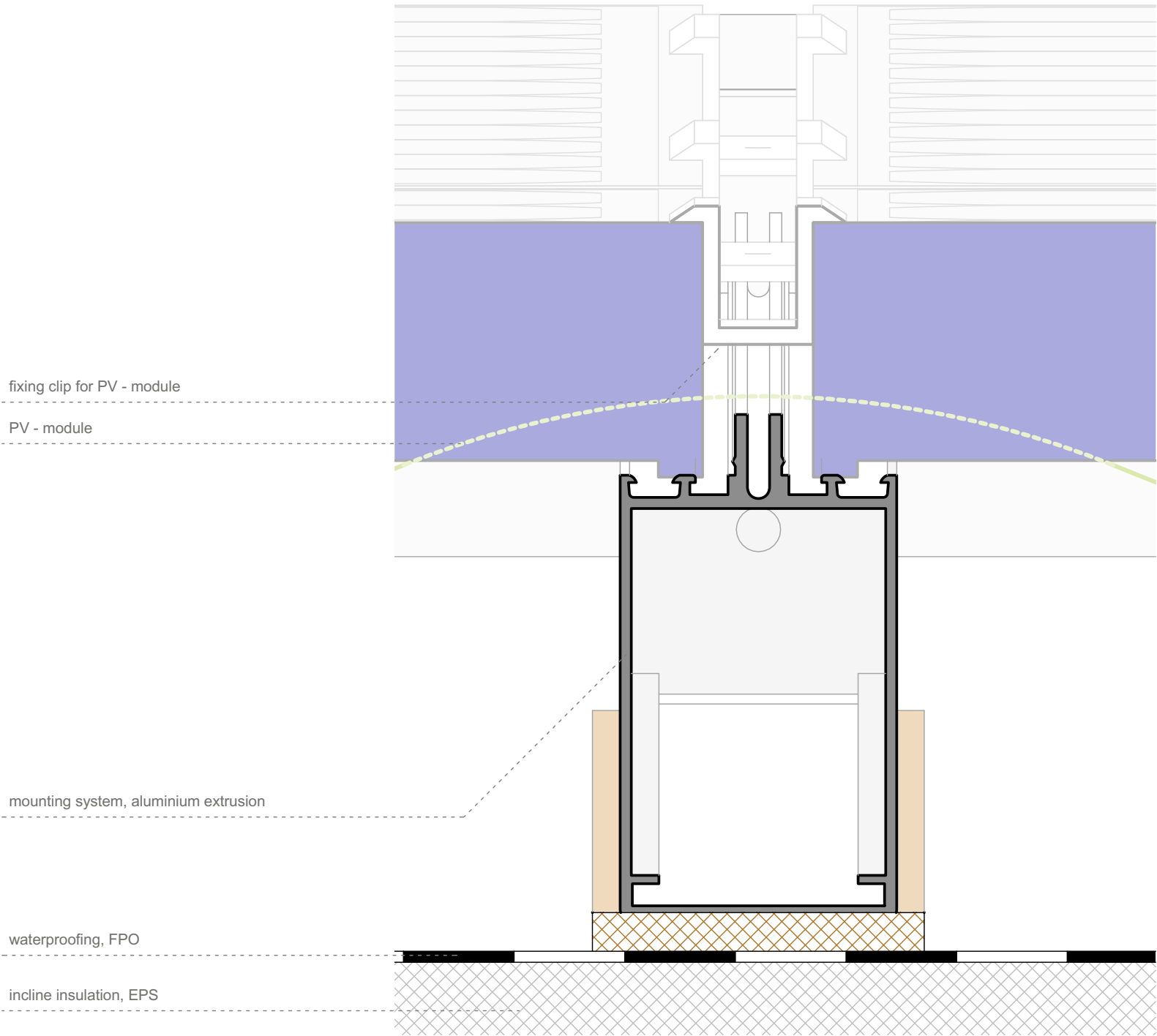
Component
Architectural

Description
Detail fall protection

Project #
P 140

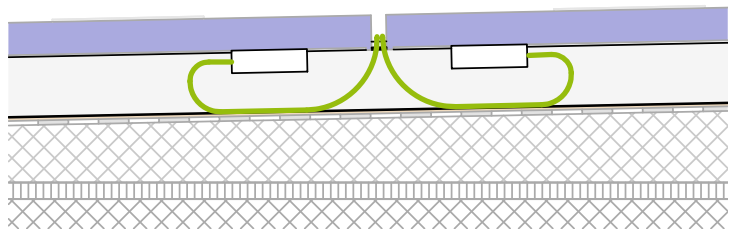
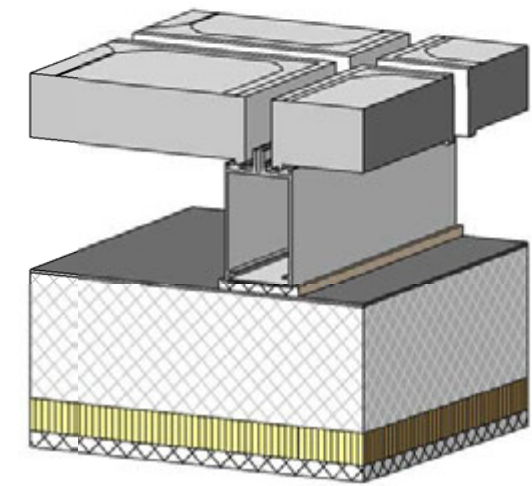
Scale
1:5

dwg #
A-856



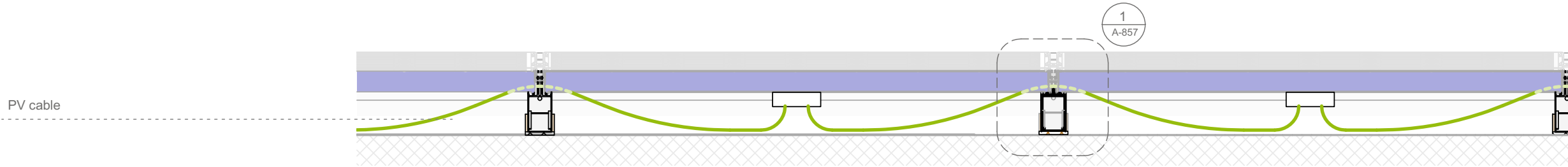
1 Detail PV Beams Section

A-857 Scale 1:1 ref. drawing: A-857



3 PV Cable Conduit, Section North-South

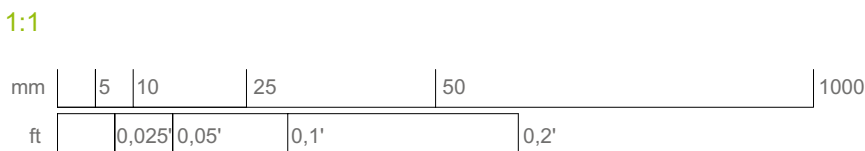
A-857 Scale 1:10 ref. drawing: A-844



2 PV cable Conduit, Section East-West

A-857 Scale 1:10 ref. drawing: A-844

1 A-857



roof										
Plan No.	Project Manual Division Master Format	Article Name	Description	Article Manufacturer	Article Number	Size			Quantity	
						L	H	W	Amount	Unit
A-841	Div.26	Sunpower 300	PV-Module, mono-cristallin, 300W	Sunpower	SPR-300-WHT-I	1559mm	1046mm	46mm	42	pieces
A-857	Div.05	Clip type M	Clip for fixing PV on mounting system	Heroal	64030 21	---			96	pieces
A-857	Div.05	Clip type A46	Clip for fixing PV on mounting system	Heroal	64034 21	---			16	pieces
A-857	Div.05		Mounting System - beams, aluminium-extrusion	Heroal	18023	2,9			63,8	m
A-853	Div.05		Mounting System - insertion profile, aluminium-extrusion	Heroal	18233	0,25			5,5	m
A-852	Div.05	ridge clamp		Heroal	custom-made	0,03	0,07	0,05	22	pieces
A-853	Div.05		screw for insertion profile	Würth		inbus, 8mm			88	pieces
A-857	Div.05		screw for PV-Clips	Würth		---			112	pieces
A-851, A-843, A-831	Div.07	Bauder Thermoplan	waterproofing, FPO, incl. adhesive	Bauder	TSV 15 V	12	0,002	6,3	76	m²
A-851, A-843, A-831	Div.07	TEC Sprint DUO	interlayer, polymer bitumen	Bauder		12	0,001	6,3	76	m²



Project

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawnmo

Issued05/31/09

Last index

Component

Architectural

Description

Schedules Roof

Project #P 140

Scale

dwg #A-860

roof										
Plan No.	Project Manual Division Master Format	Article Name	Description	Article Manufacturer	Article Number	Size			Quantity	
						L	H	W	Amount	Unit
A-851, A-843, A-831	Div.07	Bauder EPS Gefälledämmung	incline insulation, EPS, incl. Adhesive	Bauder	EPS 040 DAA	12	0,12-0,15	6,3	76	m²
A-857, A-831	Div.07	Bauder Faserschutzmatte	building protection, polyester mat	Bauder	FSM 1100	2,9	0,008	0,08	5,1	m²
A-854	Div.07	fascia drain	fascia drain, DN50	Huppers	---	---			8	pieces
A-854	Div.07	leaves catch tray	leave catches tray, galvanized and anticorrosive	Huppers	---	---			8	pieces
A-856	Div.01	Lux-Top / type ASP	attachment point for fall protection	ST Quadrat	---	---			3	pieces
A-851	Div.05	ridge bracket	aluminium sheet, 4mm	Stein & Sohn	custom-made	11			22	m
A-851	Div.05	ridge covering	aluminium sheet, 0,8mm	Stein & Sohn	custom-made	11			22	m
A-855	Div.05	fascia bracket, east/west	aluminium sheet, 4mm	Stein & Sohn	custom-made	3			12	m
A-854	Div.05	fascia bracket, north/south	aluminium sheet, 4mm	Stein & Sohn	custom-made	11			22	m
A-853	Div.05	façade closure	aluminium sheet, 0,8mm	Stein & Sohn	custom-made	11			22	m
A-853	Div.06	spruce	wooden beam	Rettenmeier	---	11	60mm	120mm	22	m
S-422	Div.07	QASA-Vip	vaccuum-insulation sandwich	Variotec	---	0,81m	0,05 m	3,01m	20	pieces
						0,85m	0,05m	3,01m	4	pieces
						0,47m	0,05m	3,01m	2	pieces



Project



Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawnmo

Issued05/31/09

Last index

Component

Architectural

Description

Schedules Roof

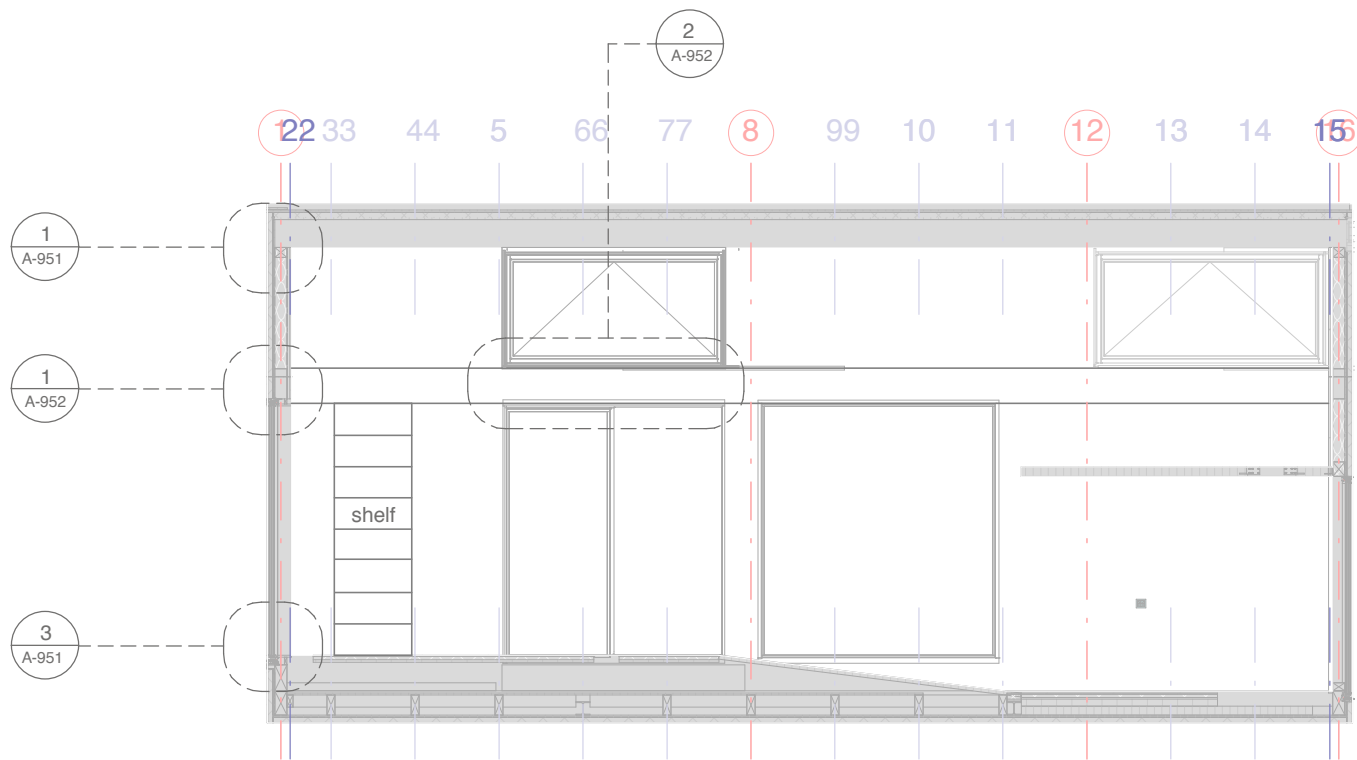
Project #P 140

Scale

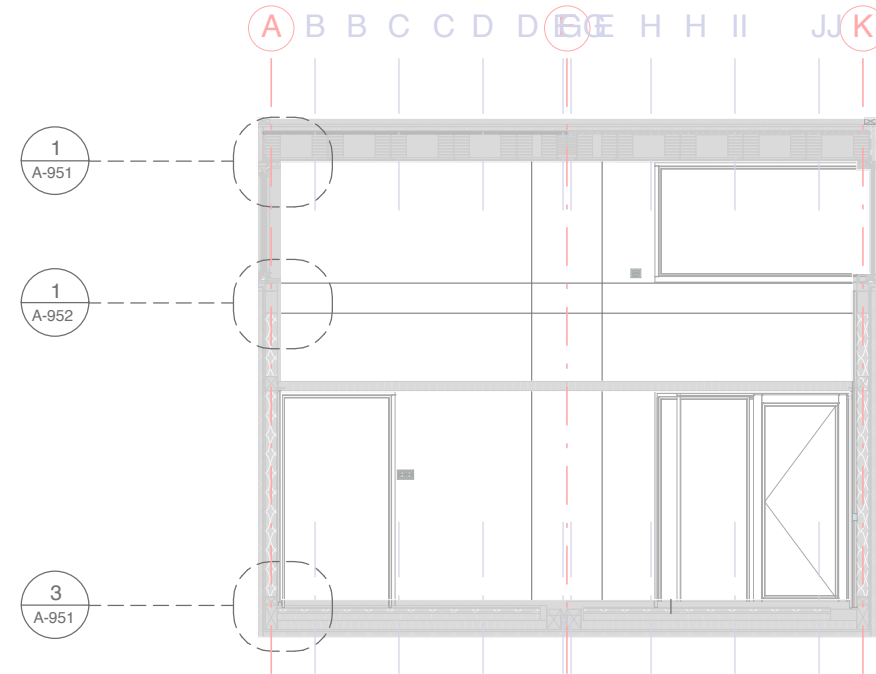
dwg #A-860

roof										
Plan No.	Project Manual Division Master Format	Article Name	Description	Article Manufacturer	Article Number	Size			Quantity	
						L	H	W	Amount	Unit
A-851, A-843, A-831	Div.07	TEC Sprint DUO	interlayer, polymer bitumen	Bauder		12	0,001	6,3	76	m²
A-851, A-843, A-831	Div.07	Bauder EPS Gefälledämmung	incline insulation, EPS, incl. Adhesive	Bauder	EPS 040 DAA	12	0,12-0,15	6,3	76	m²
A-857, A-831	Div.07	Bauder Faserschutzmatte	building protection, polyester mat	Bauder	FSM 1100	2,9	0,008	0,08	5,1	m²
A-854	Div.07	fascia drain	fascia drain, DN50	Huppers	---	---			8	pieces
A-854	Div.07	leaves catch tray	leaves catch tray, galvanized and anticorrosive	Huppers	---	---			8	pieces
A-856	Div.01	Lux-Top / type ASP	attachment point for fall protection	ST Quadrat	---	---			3	pieces
A-851	Div.05	ridge bracket	aluminium sheet, 4mm	Stein & Sohn	custom-made	11			22	m
A-851	Div.05	ridge covering	aluminium sheet, 0,8mm	Stein & Sohn	custom-made	11			22	m
A-855	Div.05	fascia bracket, east/west	aluminium sheet, 4mm	Stein & Sohn	custom-made	3			12	m
A-854	Div.05	fascia bracket, north/south	aluminium sheet, 4mm	Stein & Sohn	custom-made	11			22	m
A-853	Div.05	façade closure	aluminium sheet, 0,8mm	Stein & Sohn	custom-made	11			22	m
A-853	Div.06	spruce	wooden beam	Rettenmeier	---	11	60mm	120mm	22	m

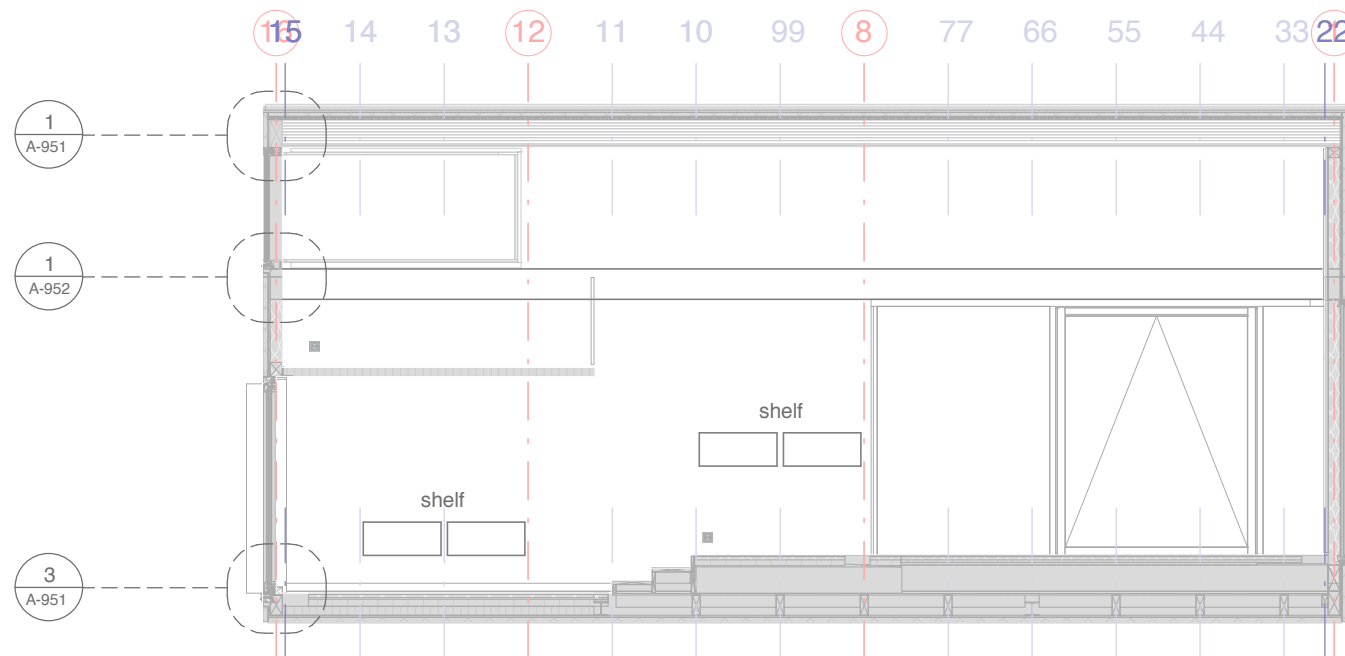
roof										
Plan No.	Project Manual Division Master Format	Article Name	Description	Article Manufacturer	Article Number	Size			Quantity	
						L	H	W	Amount	Unit
S-422	Div. 07	QASA-Vip	vacuum insulation sandwich	Variotec	---	0,81m	0,05	3,01m	20	pieces
						0,85m	0,05	3,01m	4	pieces
						0,47m	0,05	3,01m	2	pieces



1 Elevation North
A-911 Scale 1:75



2 Elevation East
A-911 Scale 1:75

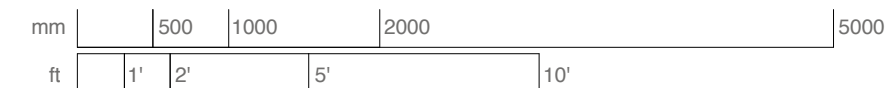


3 Elevation South
A-911 Scale 1:75



4 Elevation West
A-911 Scale 1:75

1:50

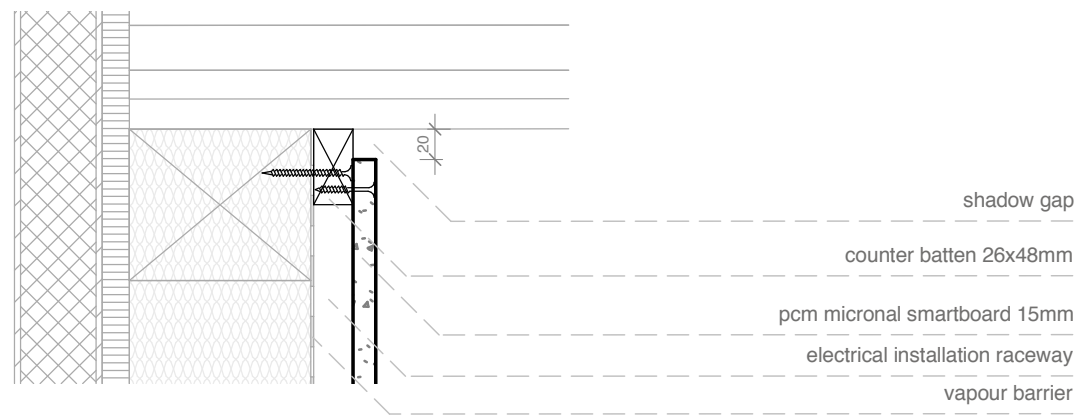


Project
TEAM GERMANY

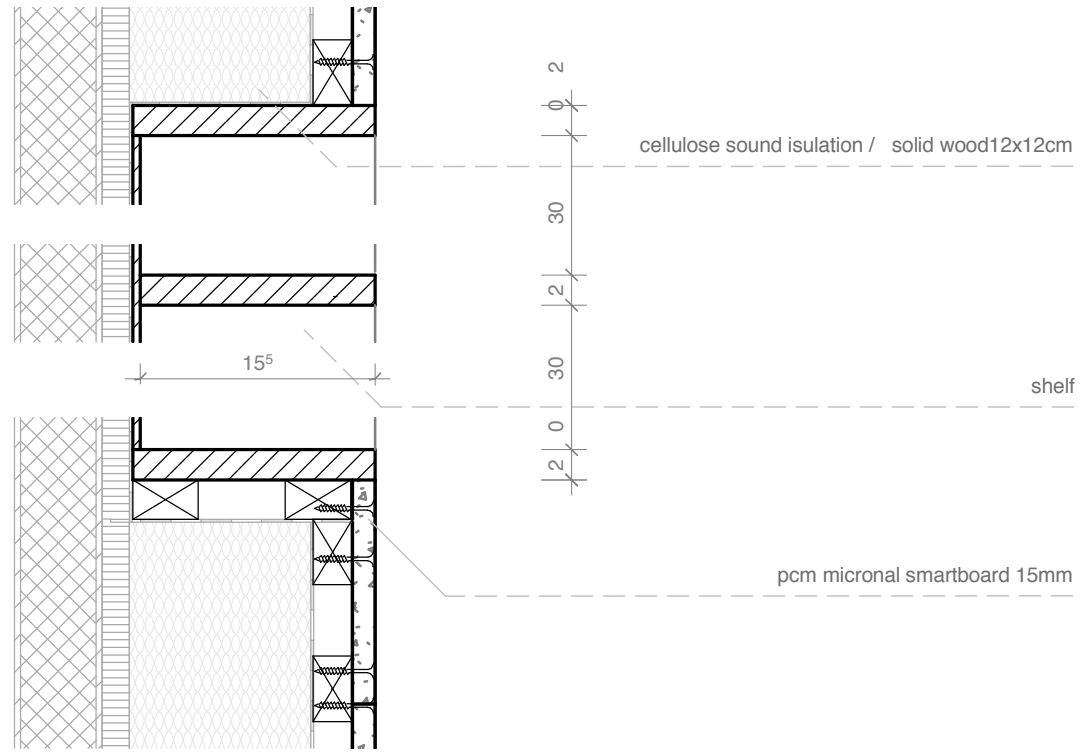
Constructor
TECHNISCHE UNIVERSITÄT DARMSTADT
Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

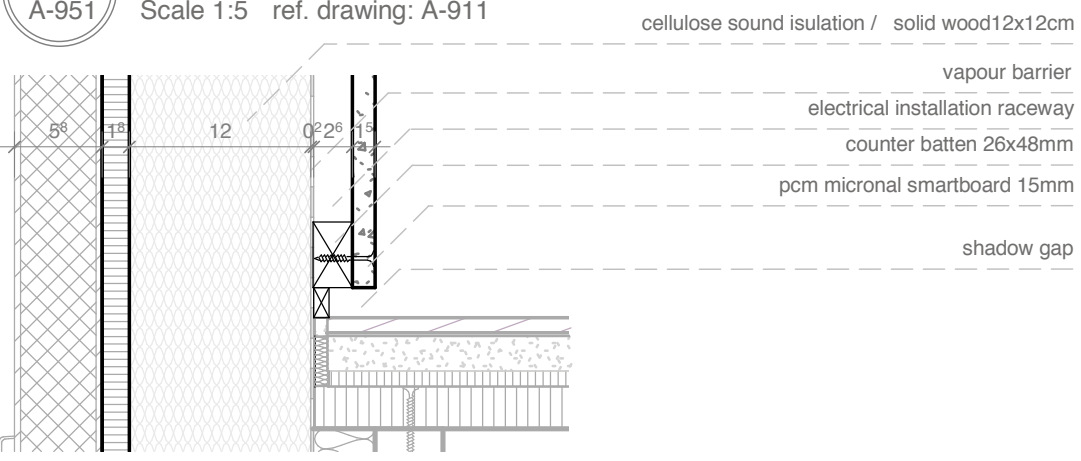
Drawn	KE	
Issued	05/12/09	
Last index		
Component	Architectural Siding	
Description	Key Plan Elevations	
Project #	Scale	dwg #
P 140	1 : 75	A-911



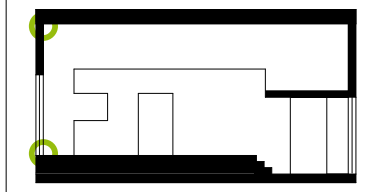
1
A-951 **Detail Siding Ceiling**
Scale 1:5 ref. drawing: A-911









2
A-951 **Detail Shelf**
Scale 1:5 ref. drawing: A-911



3
A-951 **Detail Siding Floor**
Scale 1:5 ref. drawing: A-911



-  insulation
-  oriented strand board
-  cellulose insulation
-  oak wood board
-  plasterboard
-  vapour barrier

Drawn KE
Issued 03/26/09
Last index

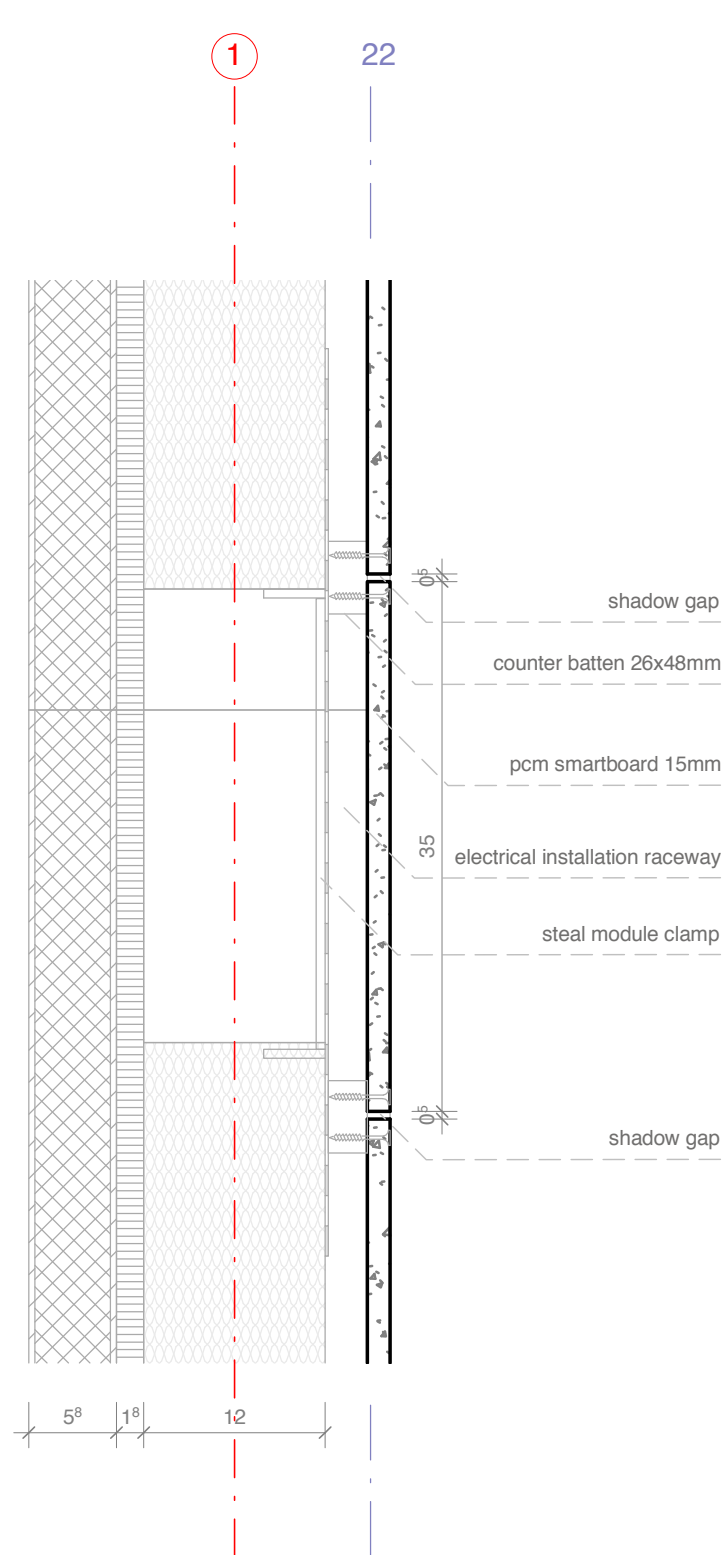
Component
Architectural Siding

Description
Siding Ceiling, Siding Floor

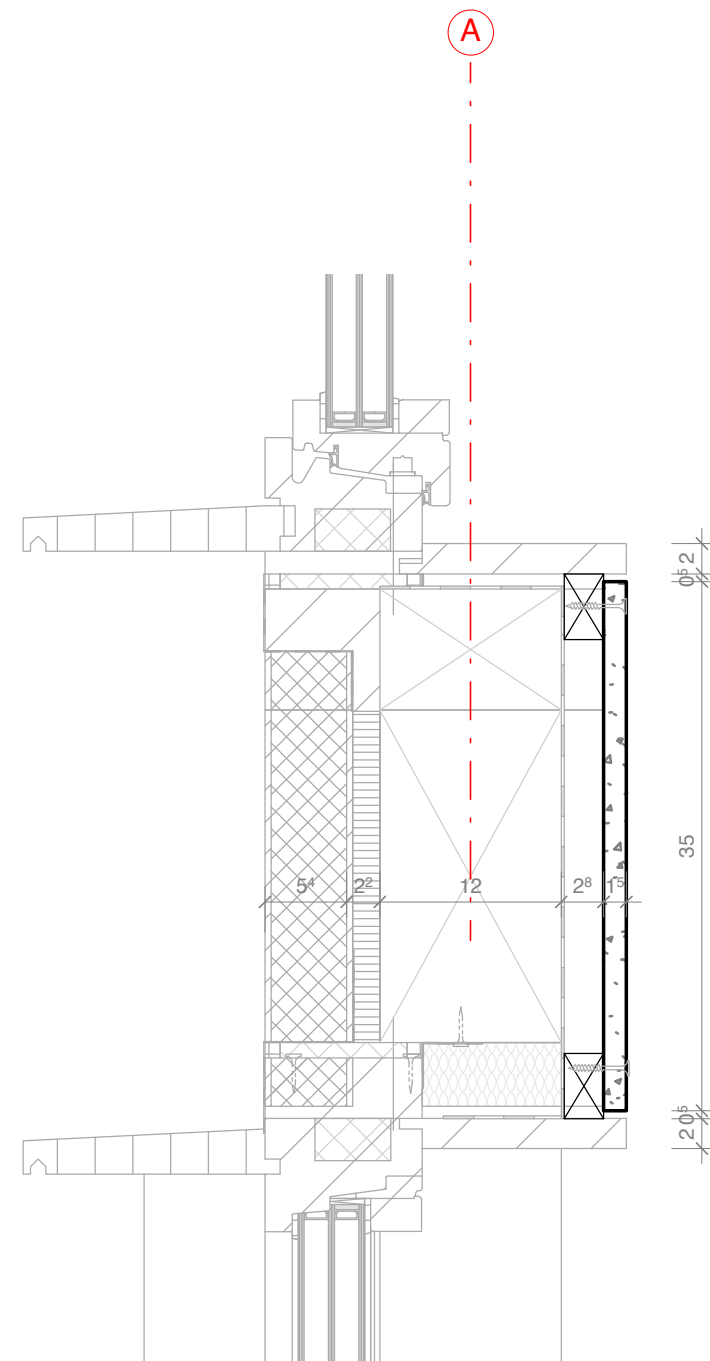
Project # Scale dwg #
P 140 A-951

1:5

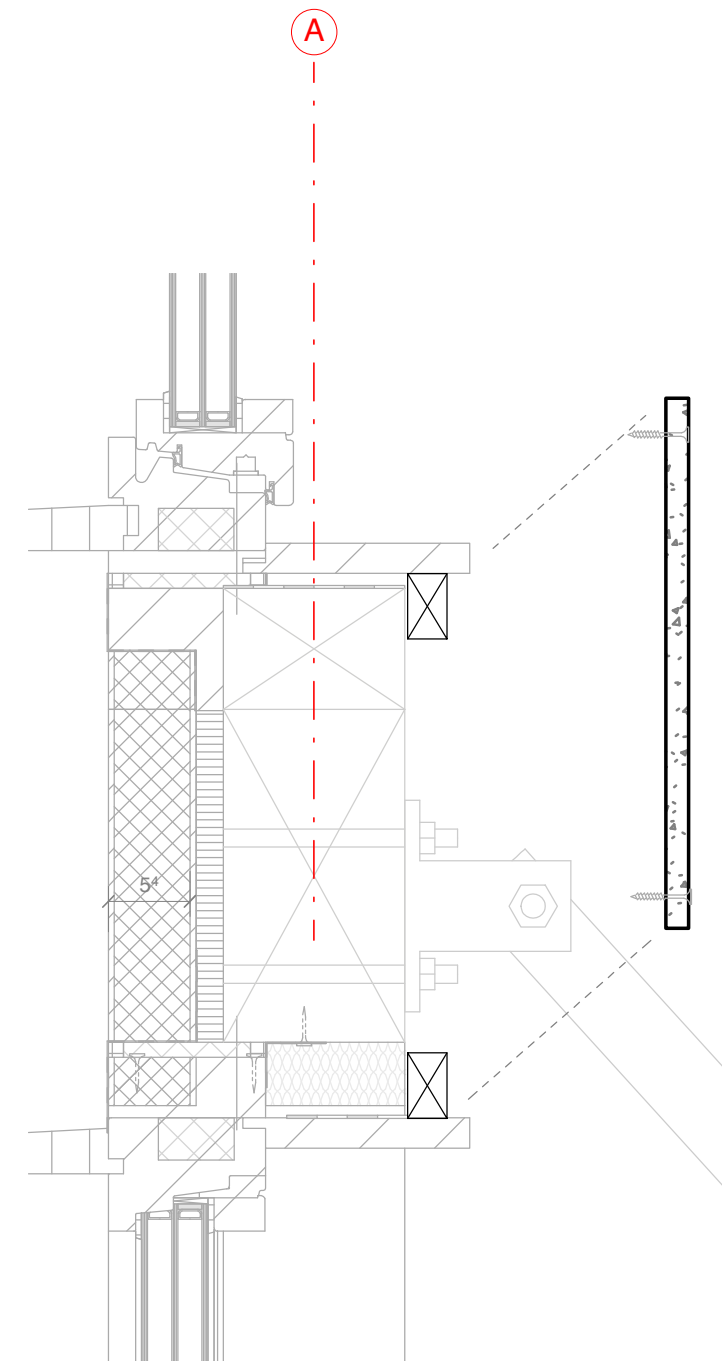




1 Detail Module Cut Normal
A-952 Scale 1:5 ref. drawing: A-911



2 Detail Module Cut Window
A-952 Scale 1:5 ref. drawing: A-911



3 Detail Modul Cut Transportation
A-952 Scale 1:5 ref. drawing: A-911

1:5



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

insulation

oriented strand board

cellulose isolation

oak wood board

plasterboard

vapour barrier

Drawn KE

Issued 04/06/09

Last index

Component

Architectural Siding

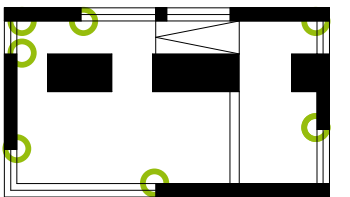
Description







Detail Siding Module Cut

Project # P 140

Scale 1 : 5

dwg # A-952



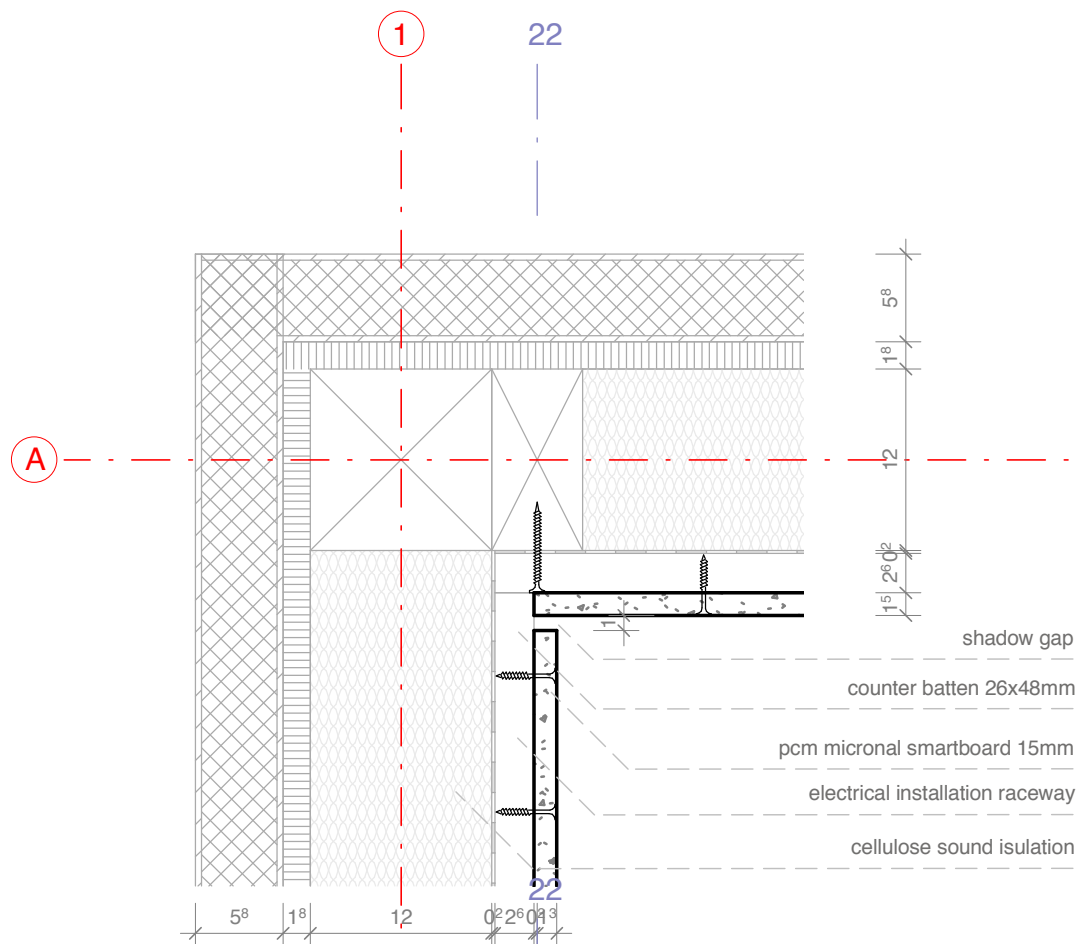
-  insulation
-  oriented strand board
-  cellulose insulation
-  oak wood board
-  plasterboard
-  vapour barrier

Drawn KE
Issued 05/11/09
Last index

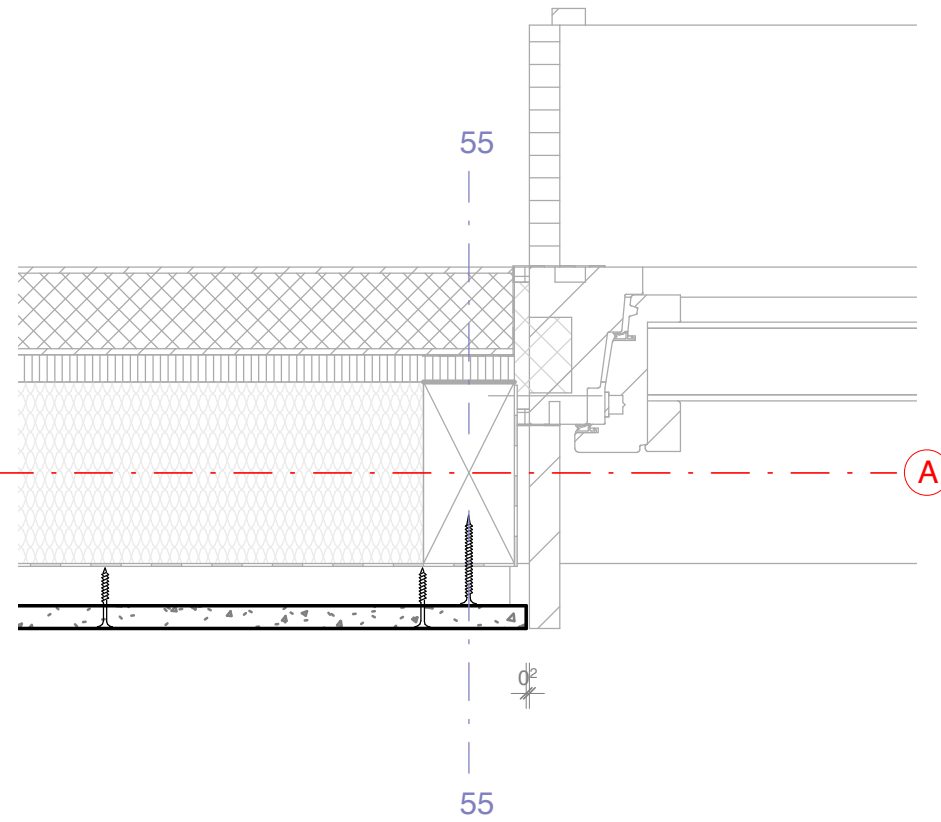
Component
Architectural Siding

Description
Detail Siding

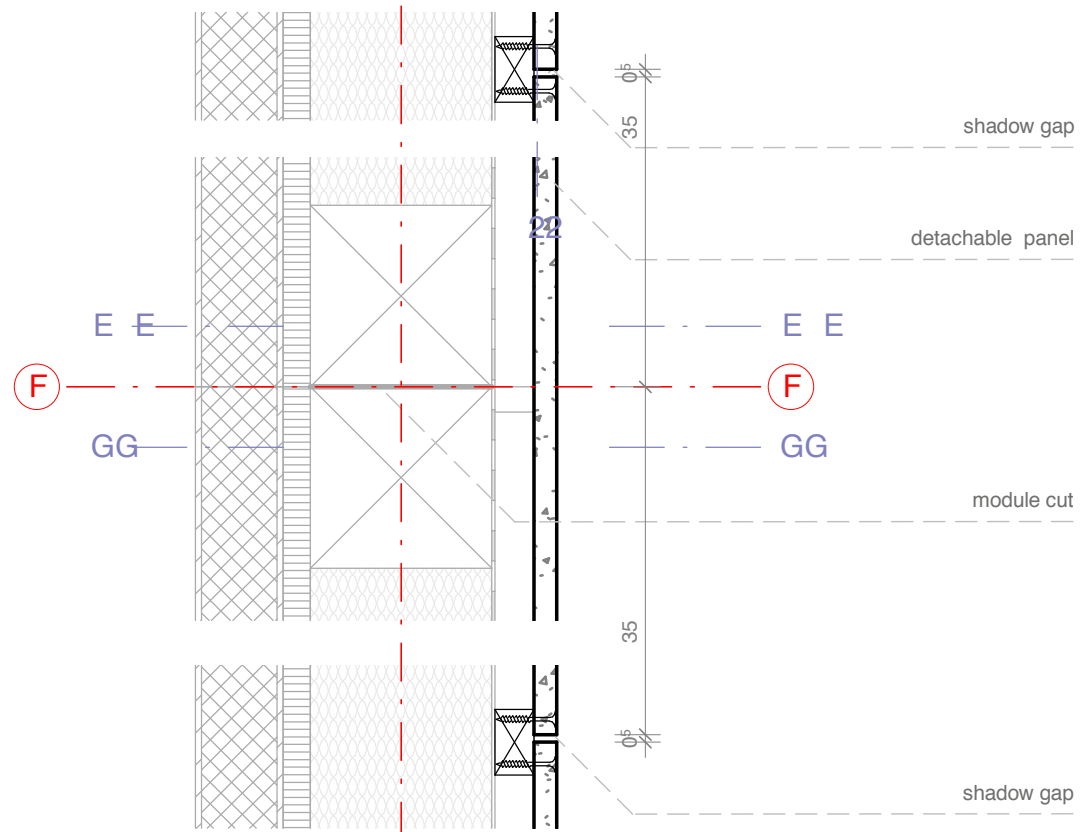
Project # Scale dwg #
P 140 A-953



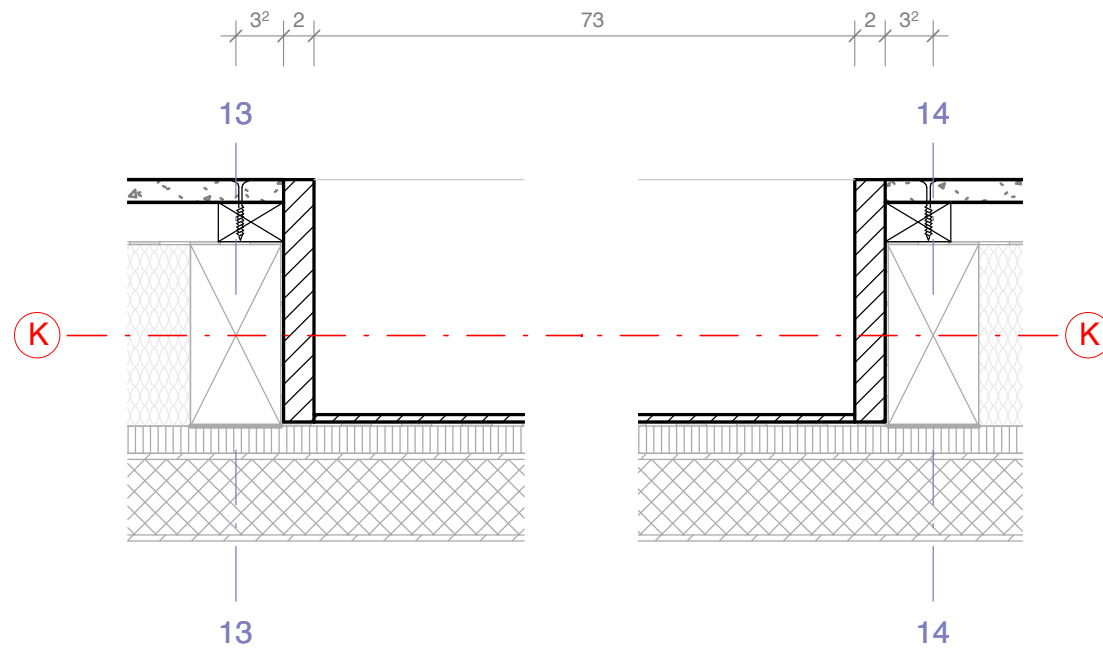
1 Detail Corner
A-953 Scale 1:5



2 Detail Window
A-953 Scale 1:5



3 Detail Module Cut
A-953 Scale 1:5




4 Detail Shelf
A-953 Scale 1:5


1:5




Schedule for Interior Wall Cladding									
Plan No.	Project Manual Division Master Format	Article Name	Article Manufacturer	Article Number	Size			Quantity	
					L	H	W	Amount	Unit
A-911	Div. 09	Gypsum Plaster Board	Knauf	K764 Knauf PCM Smartboard 23/26	1250 mm	2000 mm	15 mm	85	m2
A-951	Div. 09	Gypsum Board Assemblies	Rettenmaier			26 mm	48 mm	255	m
A-951	Div. 09	Gypsum Board	Protektor			20 mm		150	m
A-951	Div. 05	Screw	Würth	8x80mm	80 mm		8 mm	500	Qty.
A-951	Div.07	Cellulose Acoustic Isulation	Agepan / Glunz				12 cm	70	m2
A-951	Div.07	Vapor Retarder	Doerken	Doerken Delta Reflex			2 mm	85	m2
A-951	Div.07	Tape	Siga	Sicrall		60 mm		400	m
A-951	Div.07	Tape	Siga	Rissan		60 mm		75	m



Project



Constructor



Department of Architecture

Energyefficient Building Design Unit

El-Lissitzky-Str. 1

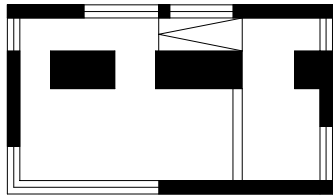
64287 Darmstadt

+49 (0) 6151 / 165448

+49 (0) 6151 / 165247

team@solardecathlon2009.de

Navigation/Legend



Drawn

KE

Issued

05/11/09

Last index

Component

Architectural Siding

Description

Schedules Siding

Project #

Scale

dwg #

P 140

A-954



1 Atmosphere MB
I-200 Without Scale




2 Atmosphere MB
I-200 Without Scale





3 Atmosphere MB
I-200 Without Scale



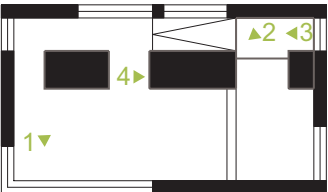

4 Atmosphere MB
I-200 Without Scale


SOLAR DECATHLON

Project

SOLAR DECATHLON 2009
TEAM GERMANY

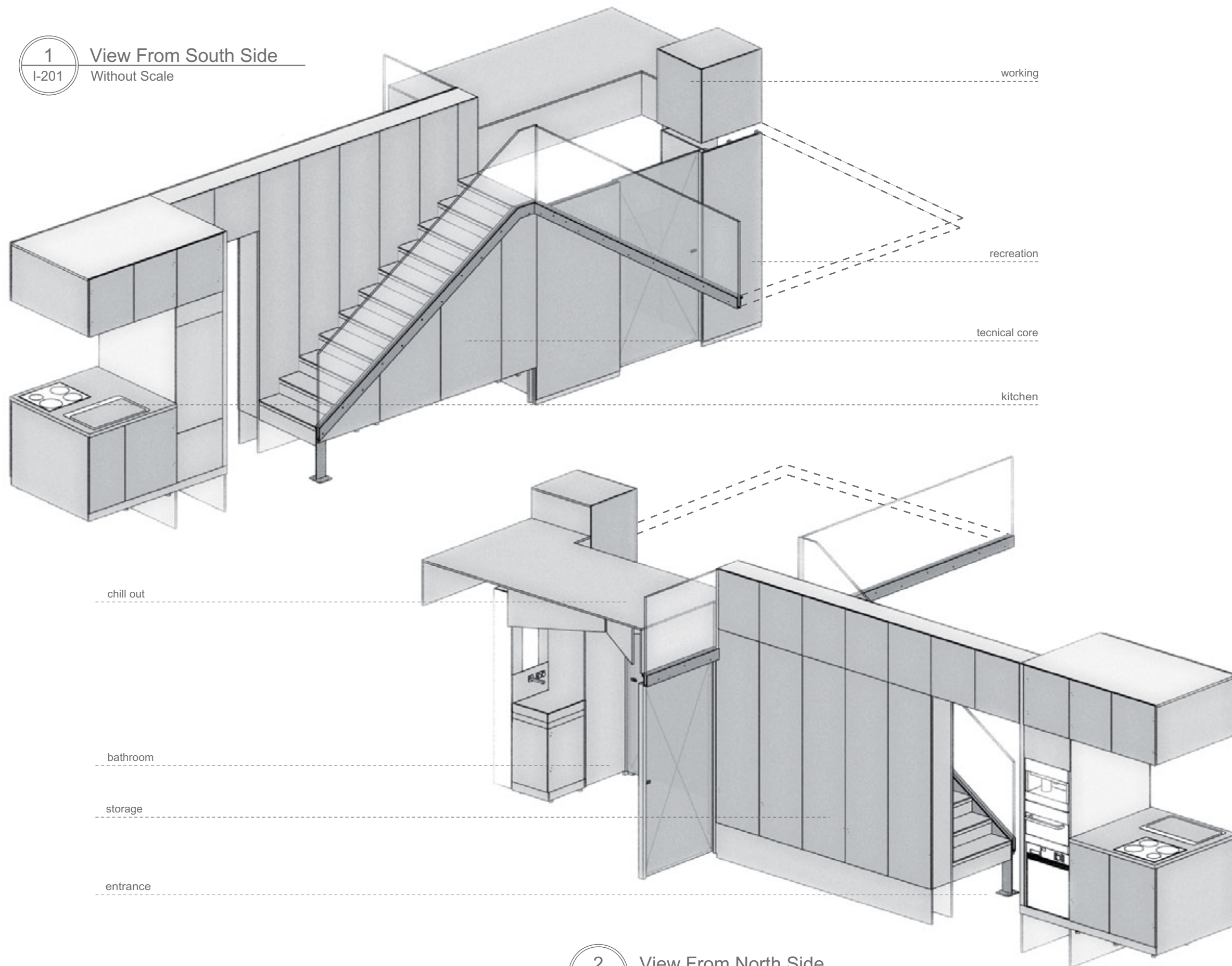
Constructor

**TECHNISCHE
UNIVERSITÄT
DARMSTADT**

Department of Architecture
 Energyefficient Building Design
 Unit
 El-Lissitzky-Str. 1
 64287 Darmstadt
 +49 (0) 6151 / 165448
 +49 (0) 6151 / 165247
 team@solardecathlon2009.de

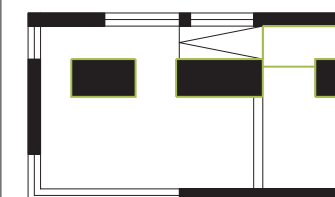
Navigation/Legend




Drawn	AS	
Issued	05/24/09	
Last index		
Component	Interiors (I)	
Description	Multifunctional Body - Interior	
Project #	Scale	dwg #
P 140	-	I-200

1 View From South Side
Without Scale



2 View From North Side
Without Scale



 Main structure
medium density fiberboard

 Supportive structure
veneer plywood

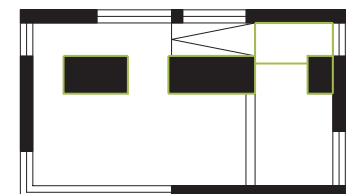
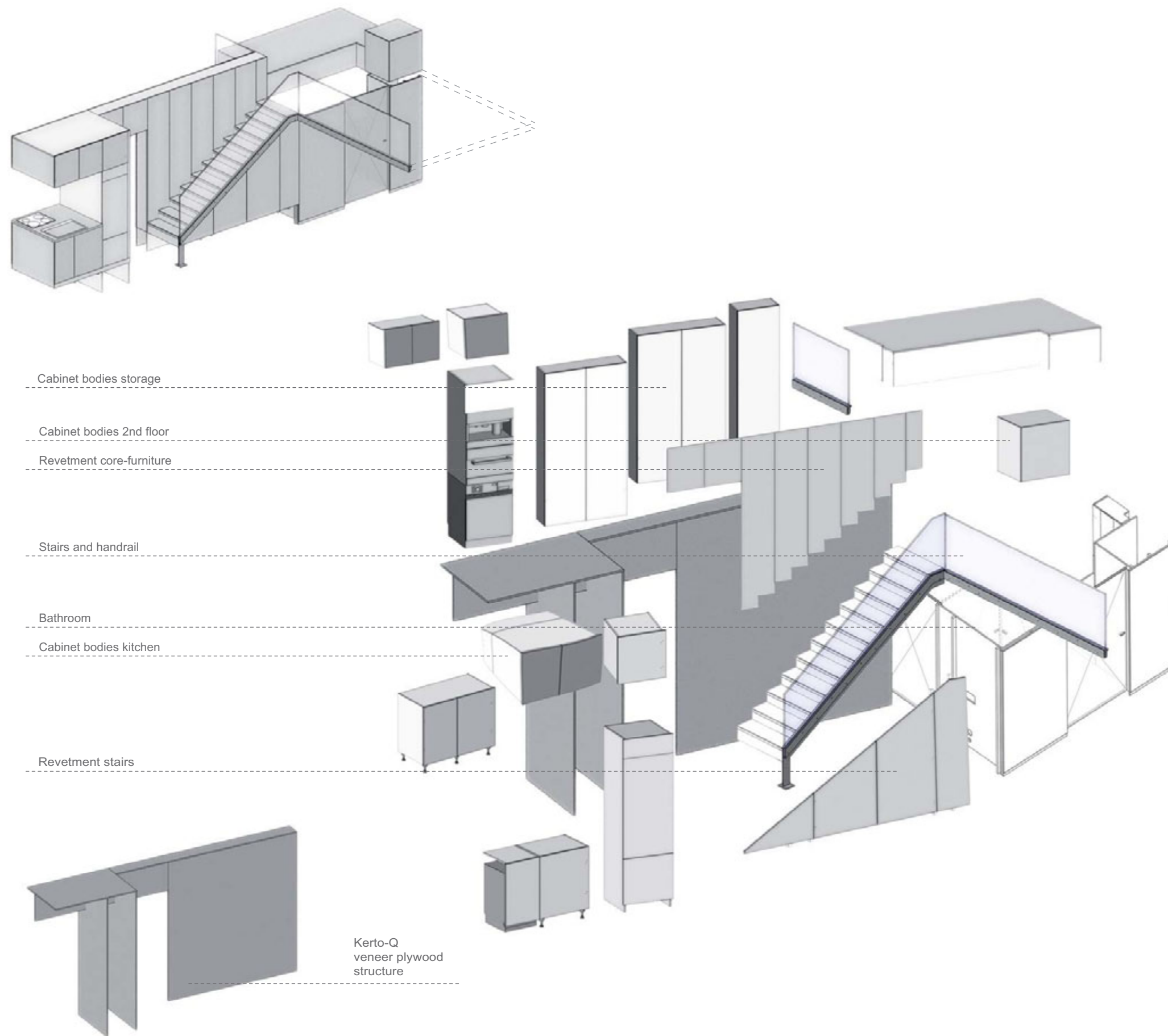
 Technical appliances

Drawn AS
Issued 05/25/09
Last index

Component
Interiors (I)

Description
**Multifunctional Body -
Functional Areas**

Project # Scale dwg #
P 140 I-201



Cabinet bodies fastener_used for all cabinet-body- connections

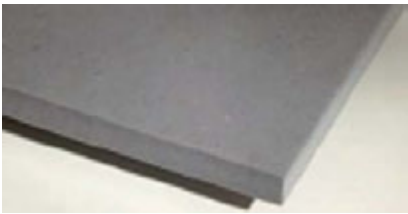
Concealed hinge - door-hinge

Spring hinge for gripp-less door-opening

Furniture foot - used for the kitchen area

Clip - used for the kitchen area base

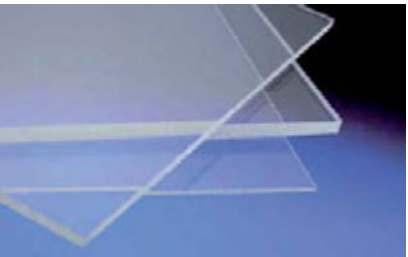
MDF Topan Colour grey_cabinet body



MDF thin back board



Plexiglas Crystal Ice - reventment



Concealed hinge



Cabinet body fastener



Cabinet body

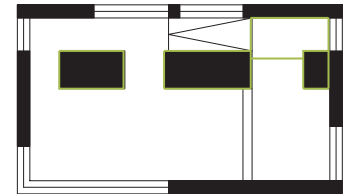
Cabinet body door

Spring hinge

Clip

Furniture foot

Navigation/Legend

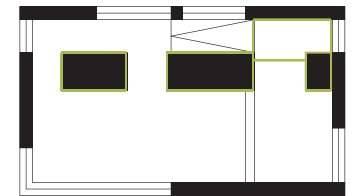





Drawn AS
Issued 05/26/09
Last index

Component
Interiors (I)

Description
**Multifunctional Body -
Cabinet Body_Materials**

Project # Sale dwg #
P 140 - I-203



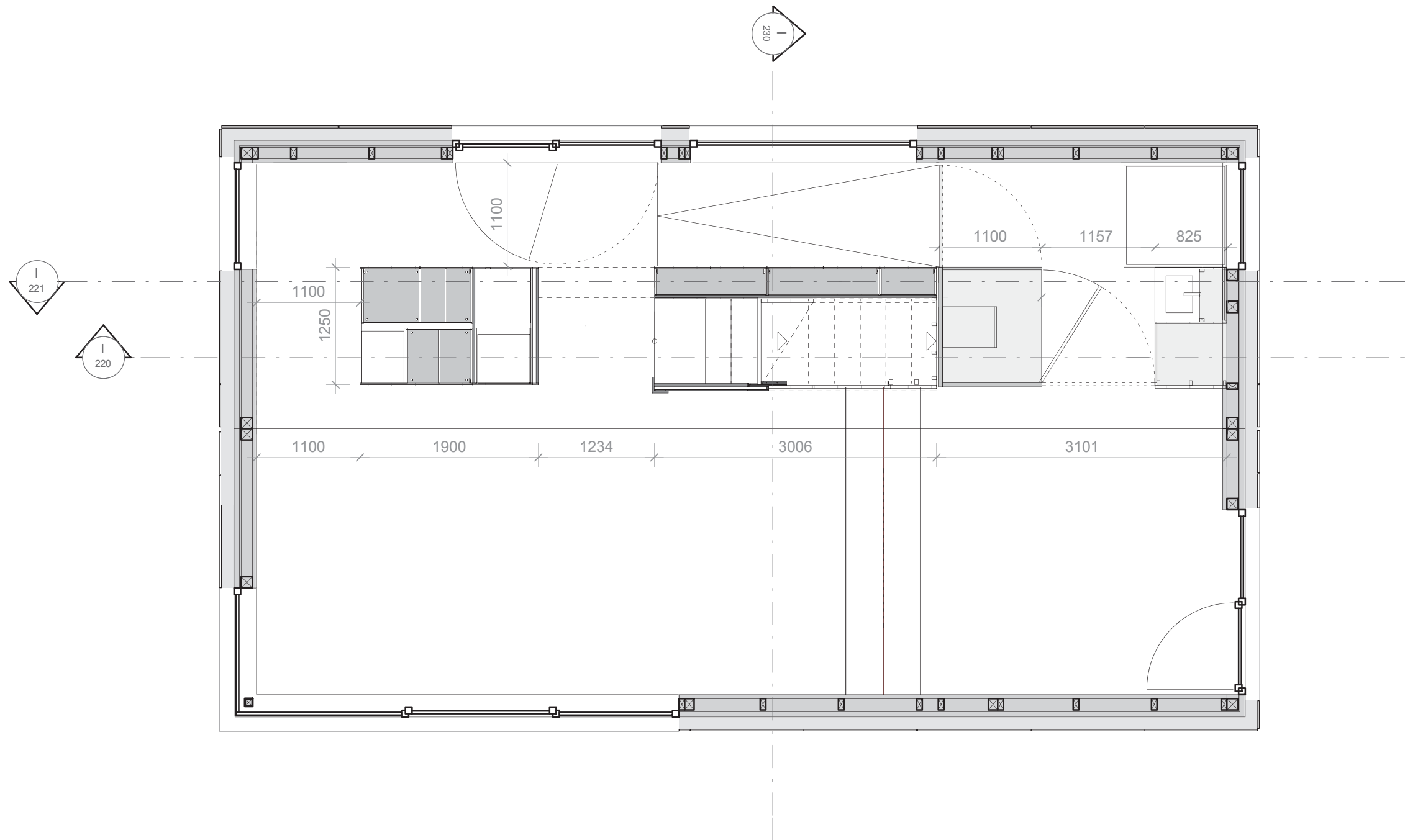
-  Main structure
medium density fiberboard
-  Supportive structure
veneer plywood
-  Technical appliances

Drawn AS
Issued 05/26/09
Last index

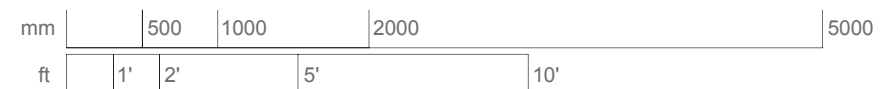
Component
Interiors (I)

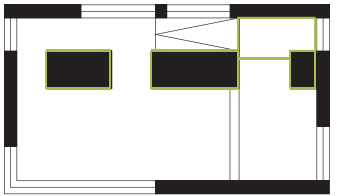
Description
**Multifunctional Body -
1st Floor Plan**




Project # Scale dwg #
P 140 1:50 I-210



1:50





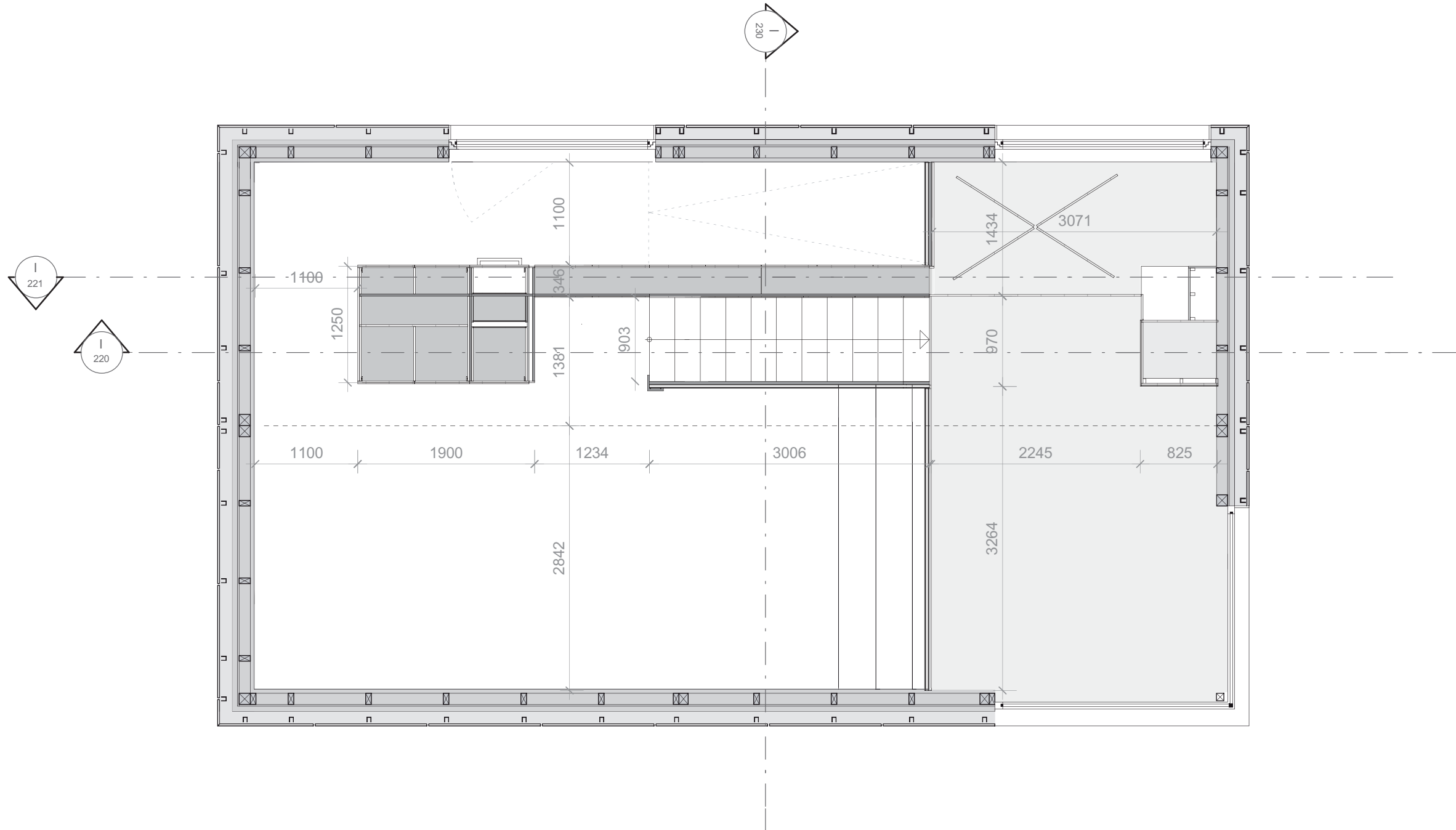
-  Main structure
medium density fiberboard
-  Supportive structure
veneer plywood
-  Technical appliances

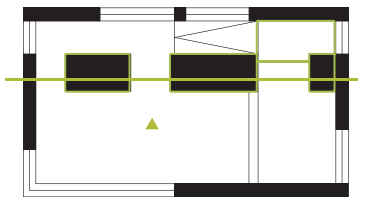
Drawn AS
 Issued 05/26/09
 Last index




Component
 Interiors (I)

Description
**Multifunctional Body -
 Floor Plans_2nd Floor**

Project # Scale dwg #
 P 140 1:50 I-211





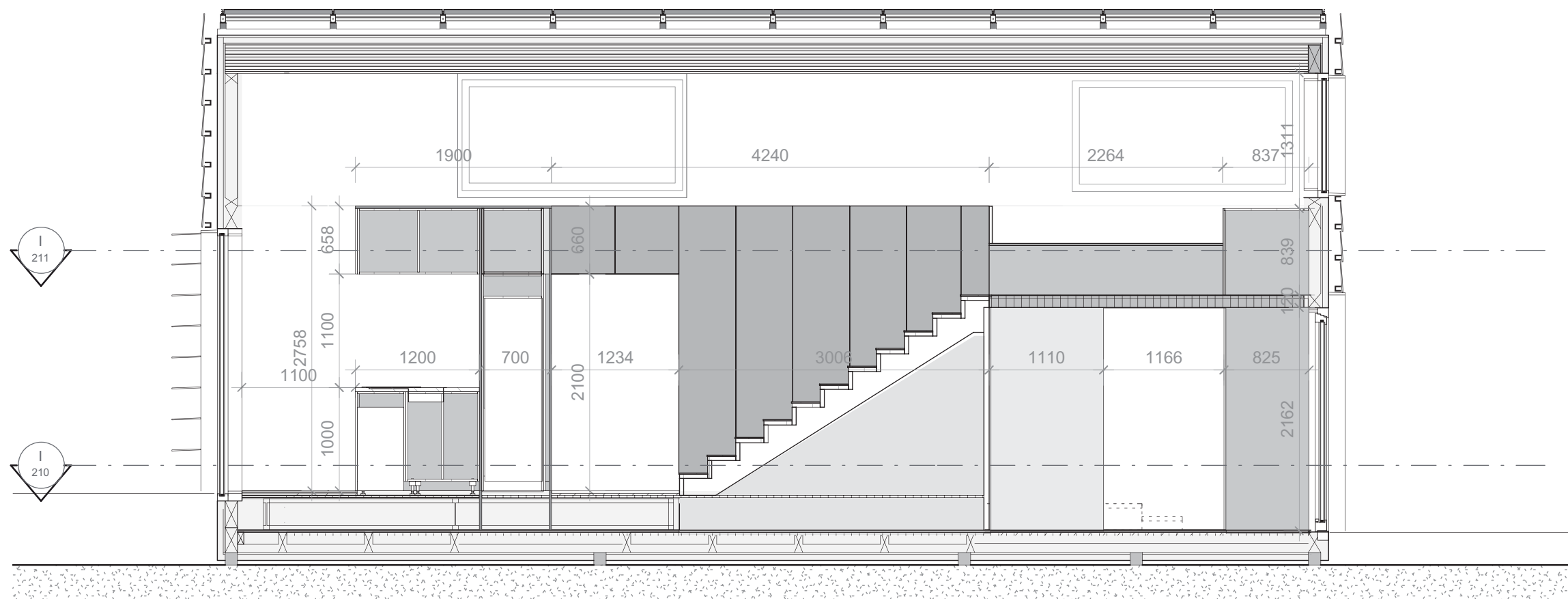
-  Main structure
medium density fiberboard
-  Supportive structure
veneer plywood
-  Technical appliances

Drawn AS
Issued 05/26/09
Last index

Component
Interiors (I)

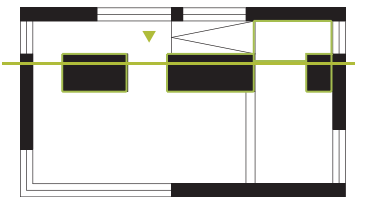
Description
**Multifunctional Body -
Longitudinal Section_S**




Project # Scale dwg #
P 140 1:50 I-220



1:50





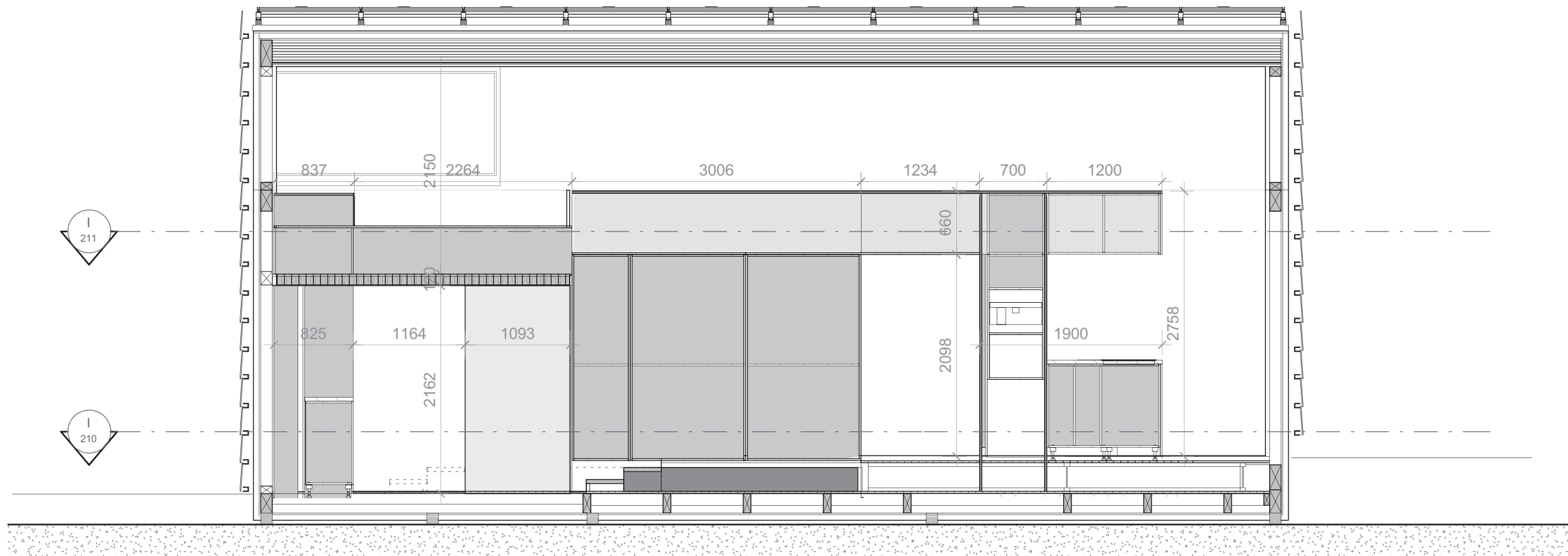
-  Main structure
medium density fiberboard
-  Supportive structure
veneer plywood
-  Technical appliances

Drawn as
Issued 05/26/09
Last index

Component
Interiors (I)

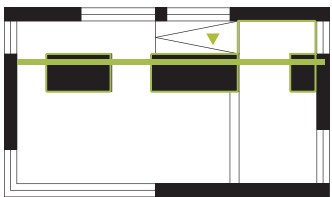
Description
**Multifunctional Body -
Longitudinal Section_N**

Project # Scale dwg #
P 140 1:50 I-221




1:50





 Main structure
medium density fiberboard

 Supportive structure
veneer plywood

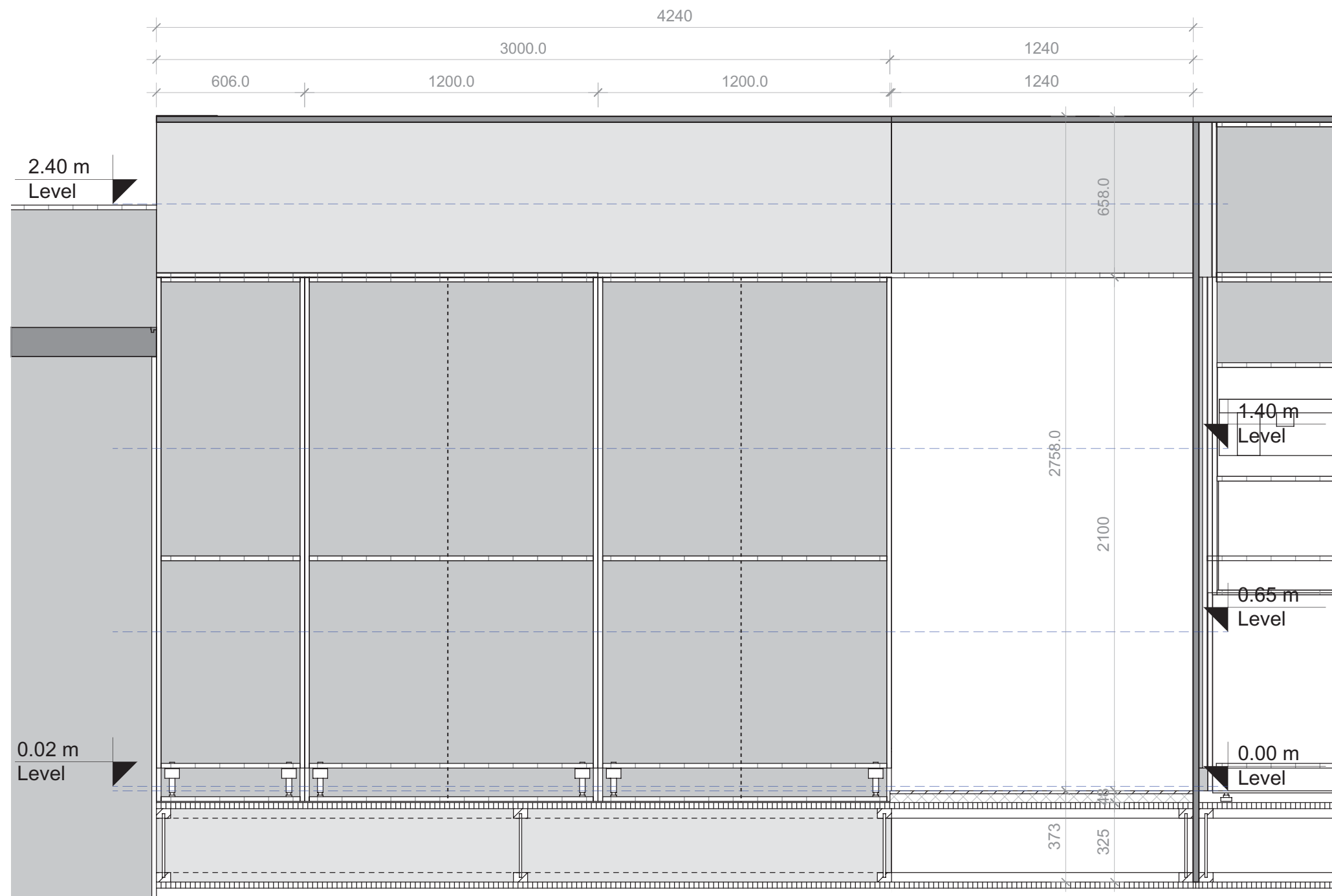
 Technical appliances

Drawn AS
Issued 05/26/09
Last index

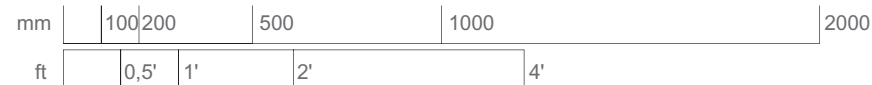
Component
Interiors (I)

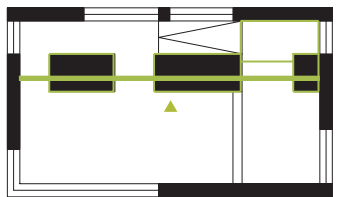
Description
**Detail - Storage -
Longitudinal Section**




Project # Scale dwg #
P 140 1:20 I-222



1:20





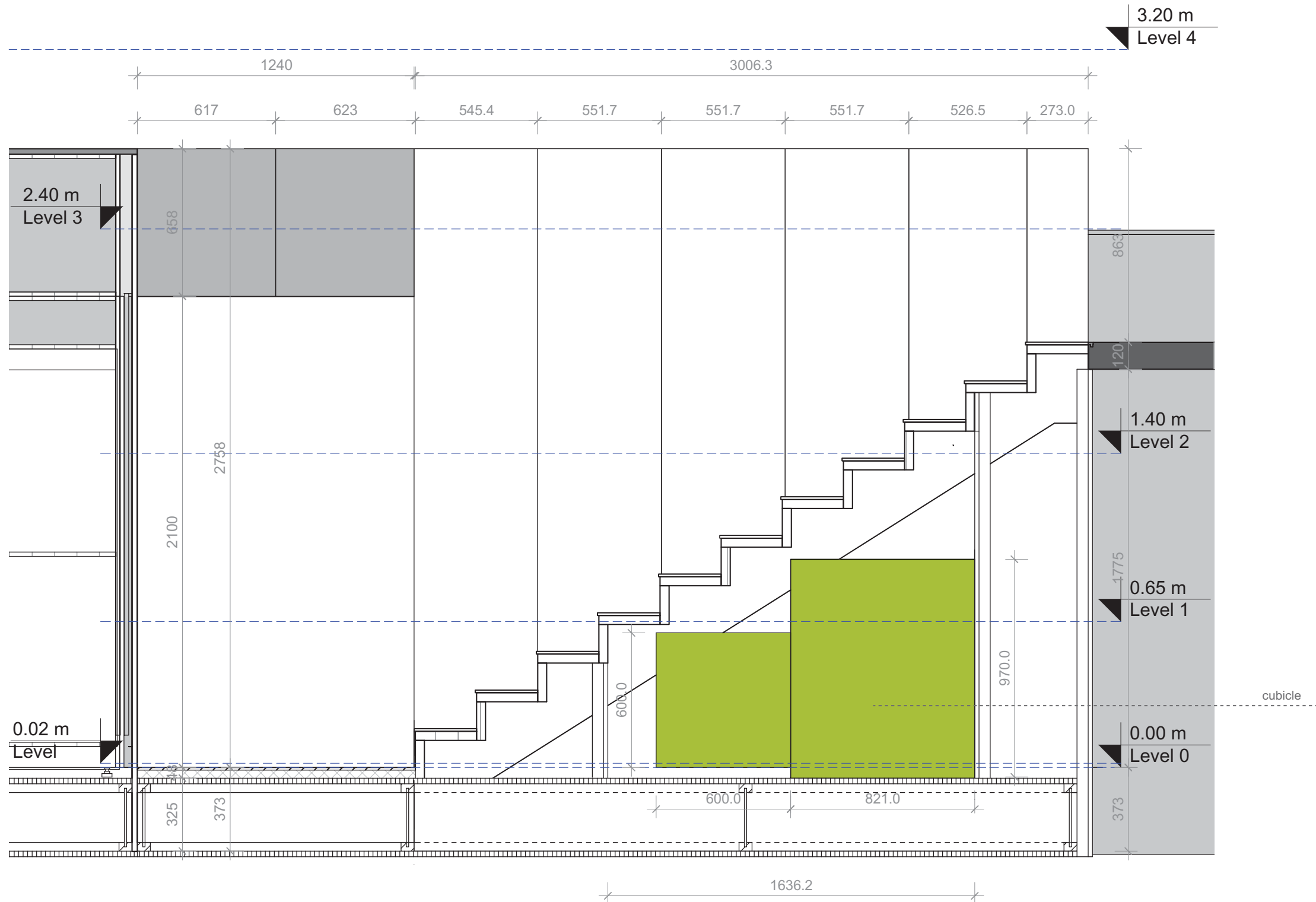
-  Main structure
medium density fiberboard
-  Supportive structure
veneer plywood
-  Technical appliances

Drawn AS
 Issued 05/26/09
 Last index

Component
Interiors (I)

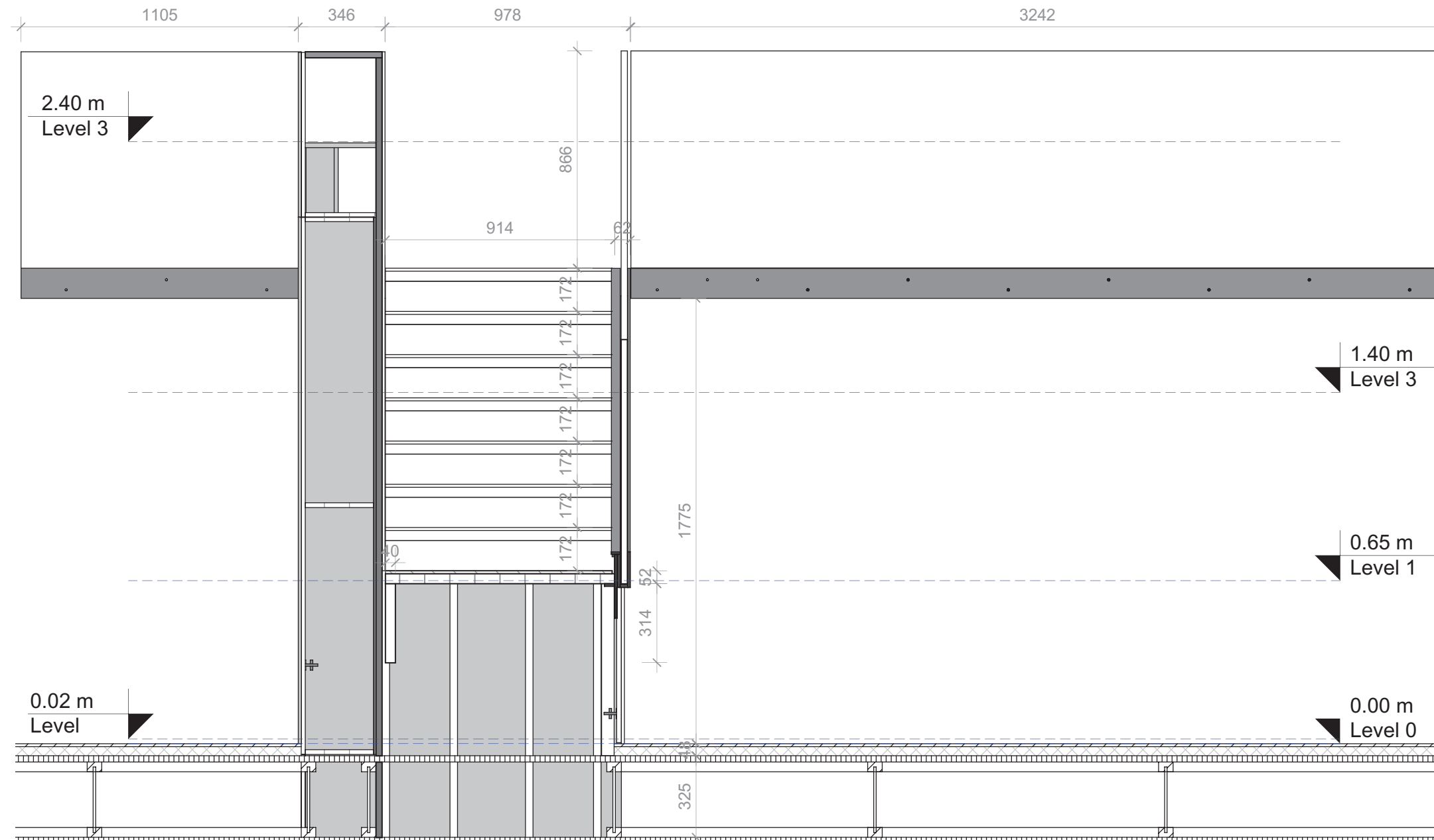
Description
**Detail - Stairs -
Longitudinal Section**

Project # Scale dwg #
 P 140 1:20 I-223



1:20

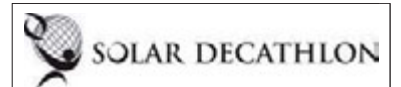




1
I-230

Detail - Cross Section MB - Stairs
Scale 1:20

1:20

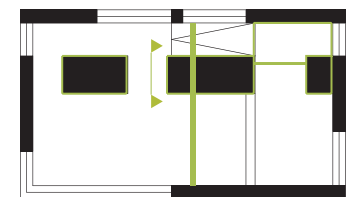


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



- Main structure
medium density fiberboard
- Supportive structure
veneer plywood
- Technical appliances

Drawn AS
Issued 05/26/09
Last index

Component
Interiors (I)

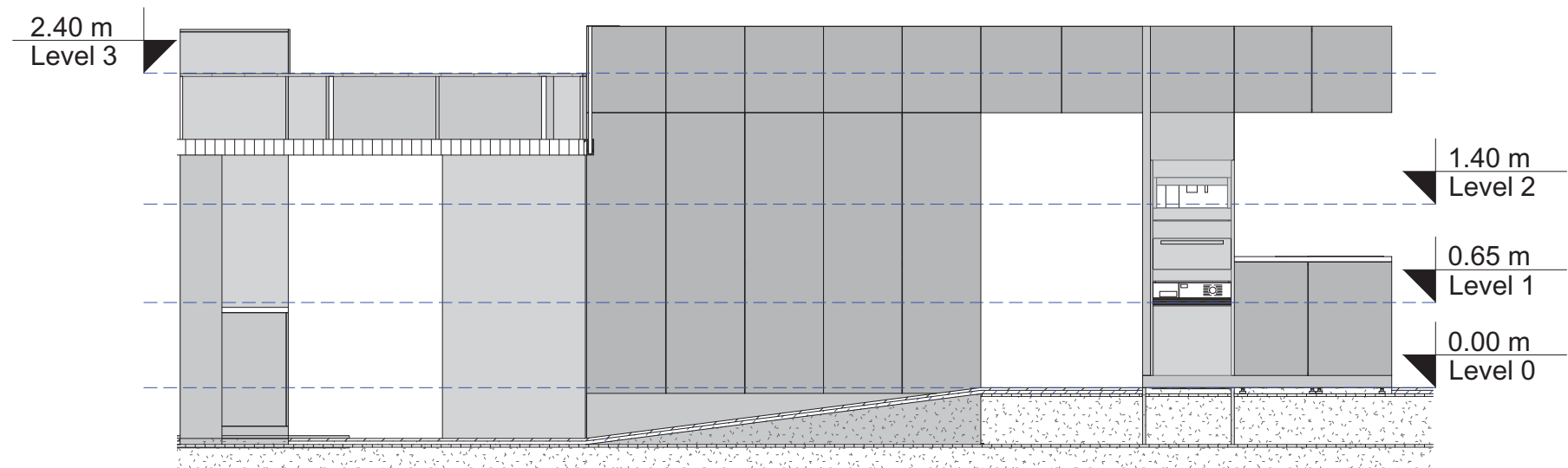
Description
Detail - MB
Cross - Section

Project # Scale dwg #
P 140 1:20 I-230



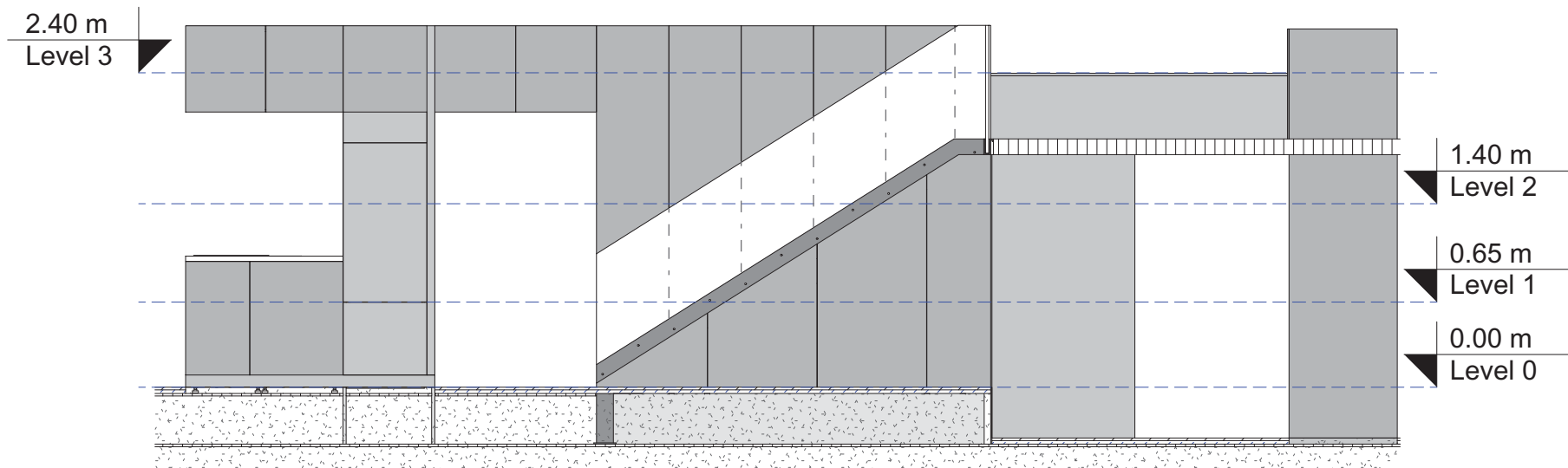
Elevation North

Scale 1:50



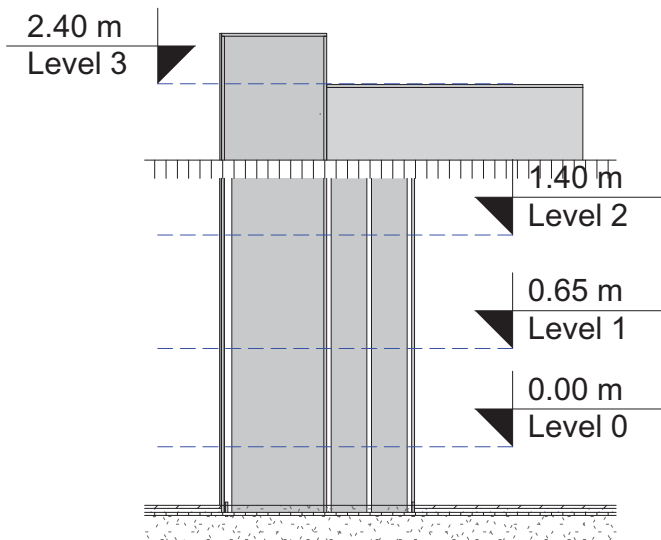
Elevation South

Scale 1:50



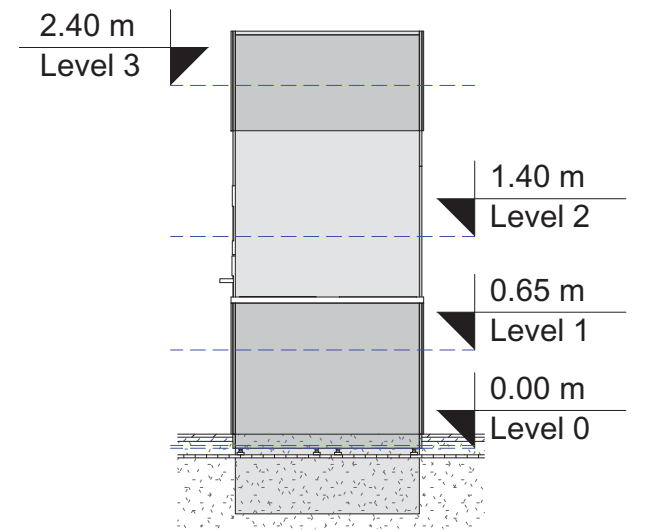
Elevation East

Scale 1:50

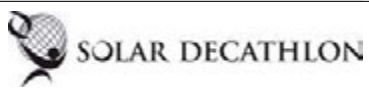


Elevation West

Scale 1:50



1:50

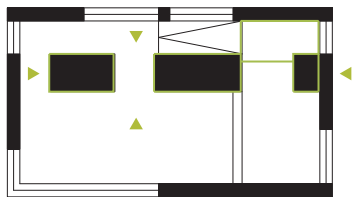


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

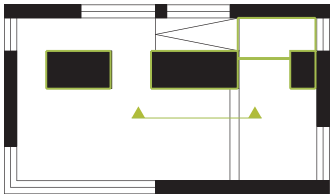


Drawn AS
Issued 05/26/09
Last index

Component
Interiors (I)

Description
Multifunctional Body - Elevations

Project # Scale dwg #
P 140 1:50 I-240

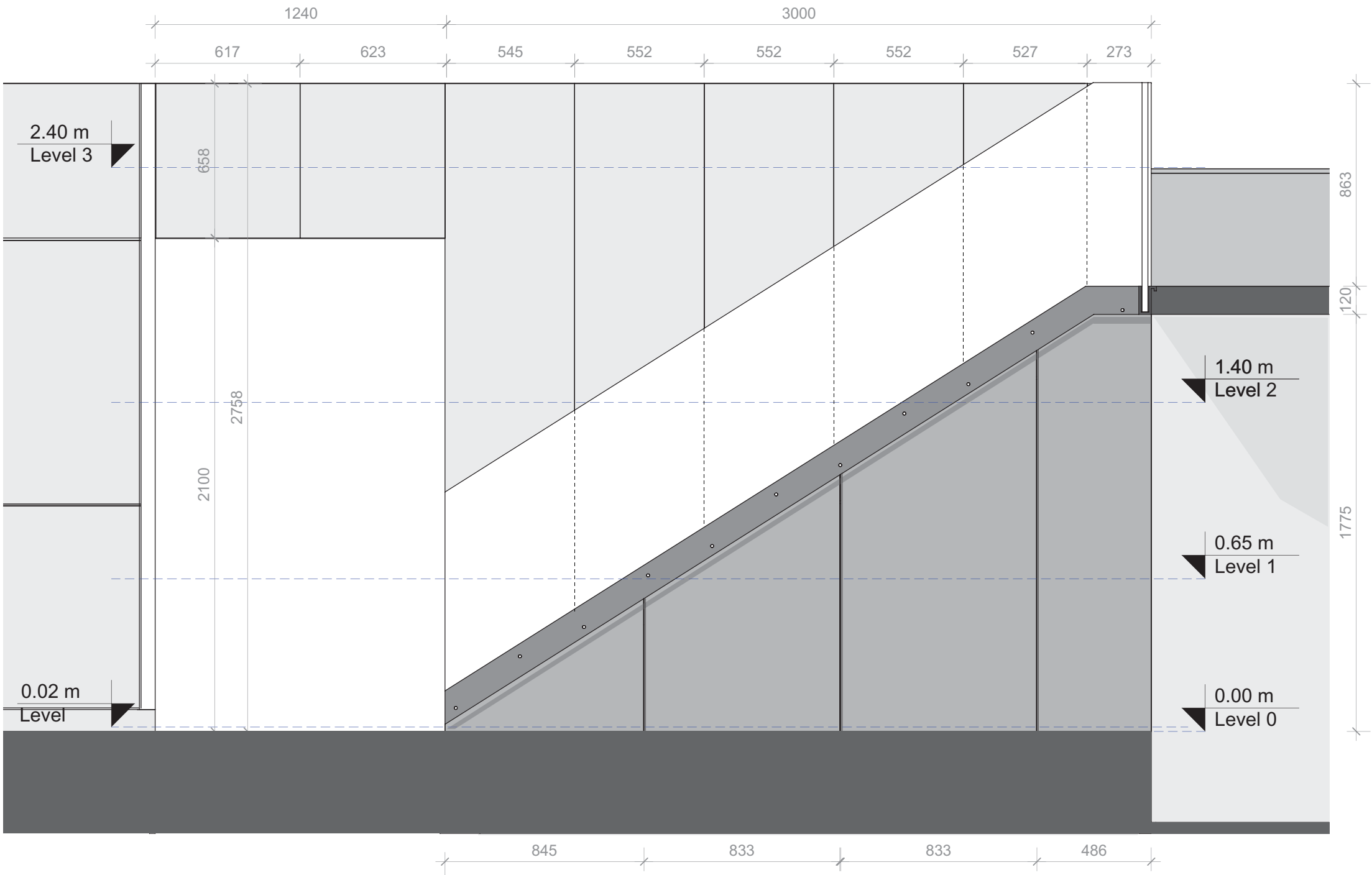


Drawn AS
Issued 05/26/09
Last index

Component
Interiors (I)

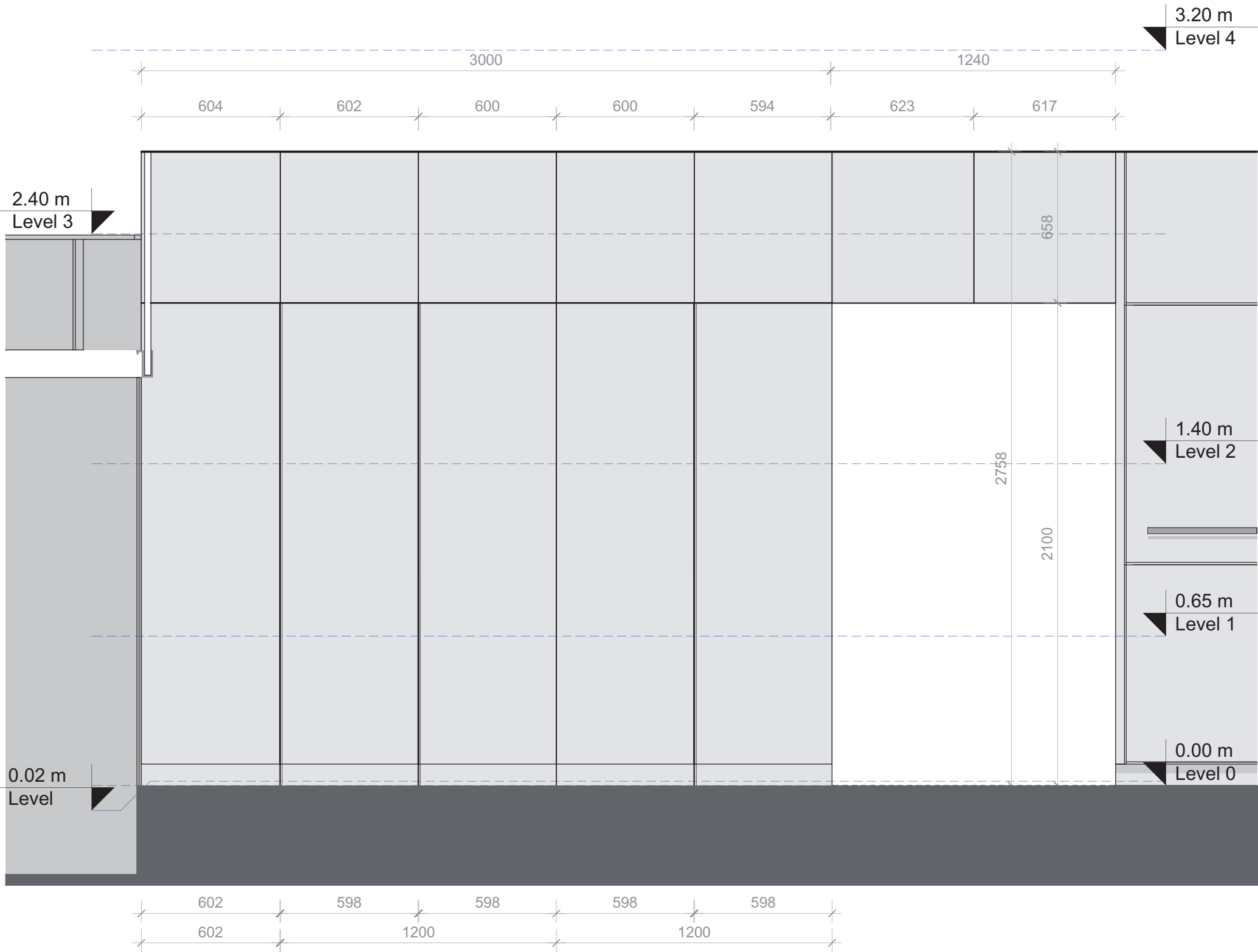
Description
Detail - Elevation -
South - Stairs

Project # Scale dwg #
P 140 1:20 I-241

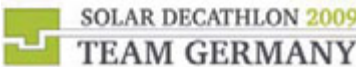


1:20





Project

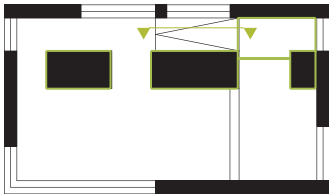


Constructor

Department of Architecture
Energyefficient Building Design
Unit

El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



- Main structure
medium density fiberboard
- Supportive structure
veneer plywood
- Technical appliances

Drawn AS

Issued 05/26/09

Last index

Component

Interiors (I)

Description

**Detail - Elevation -
North - Storage**

Project # Scale dwg #
P 140 1:20 I-242

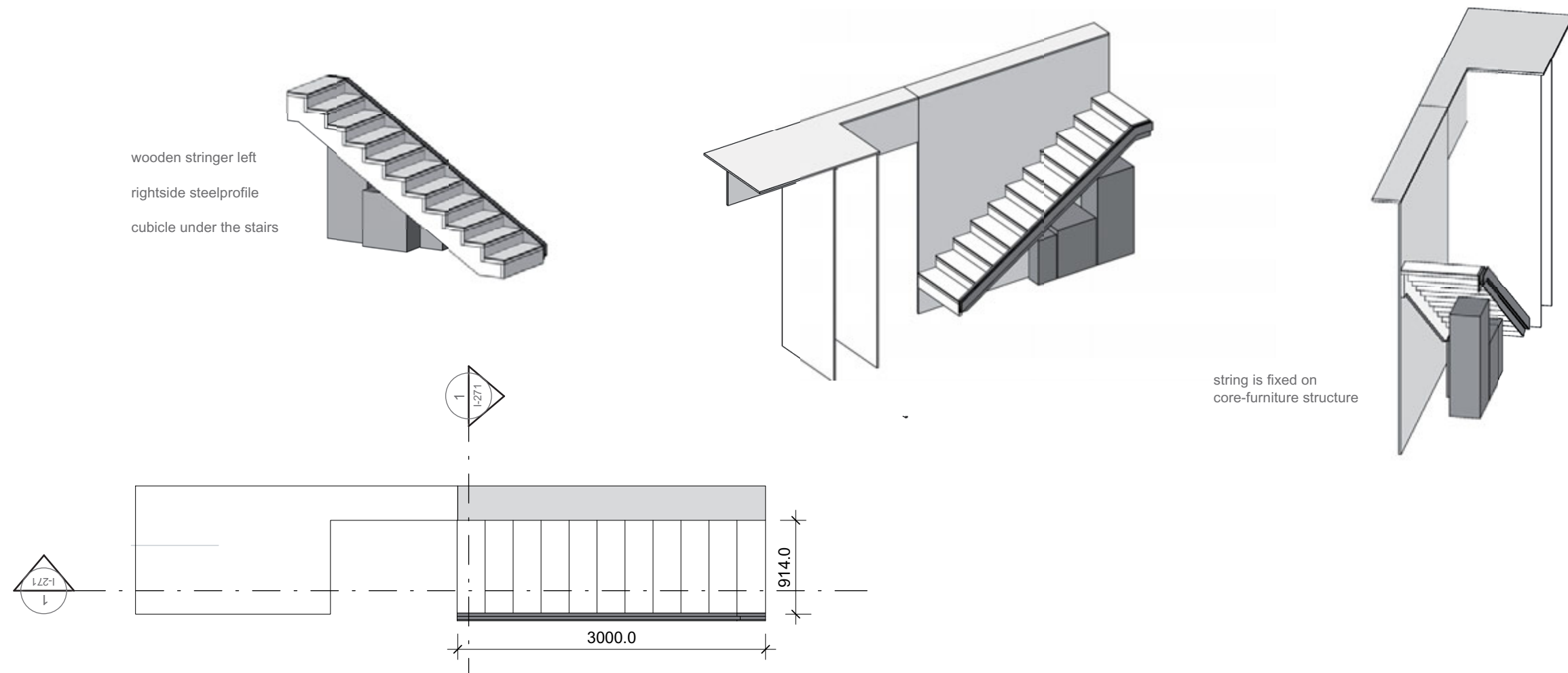


Detail - Elevation MB - North - Storage

Scale 1:20

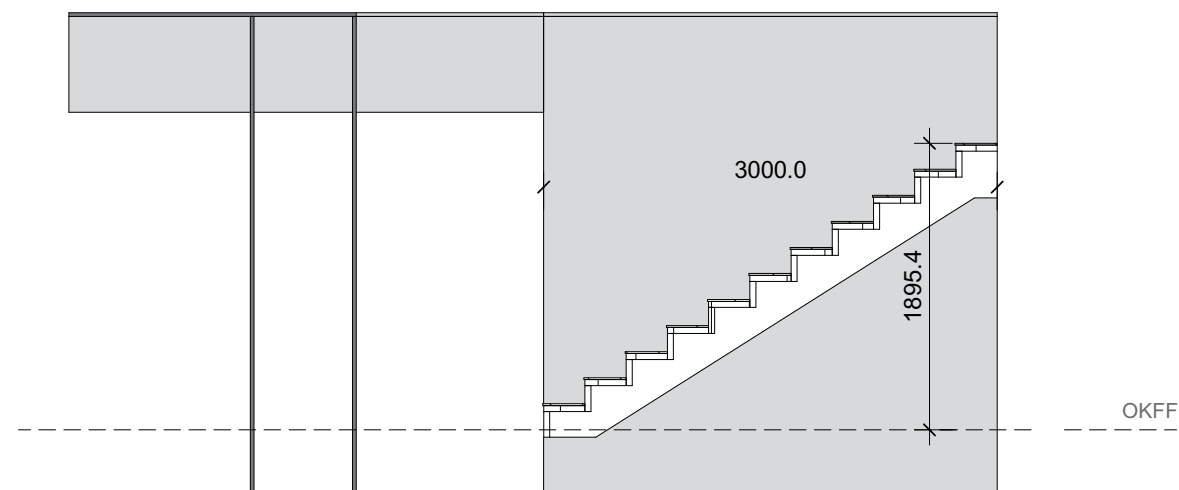
1:20





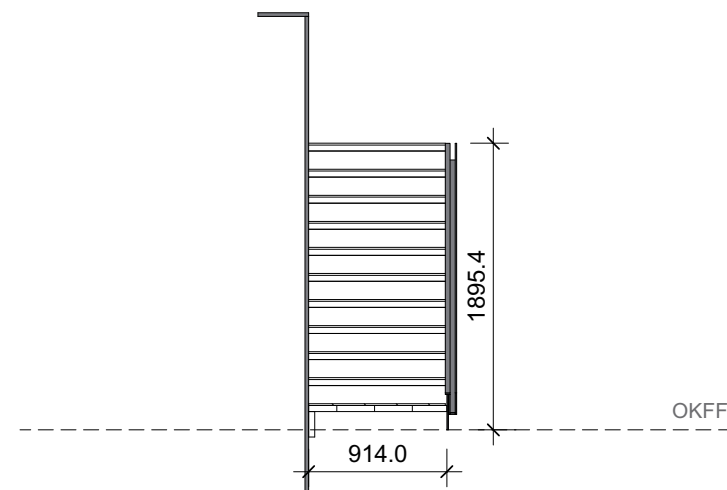
1
 I-270

Floor Plan
 Without Scale



2
 I-270

Longitudinal Section
 Without Scale



3
 I-270

Cross Section
 Without Scale

SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

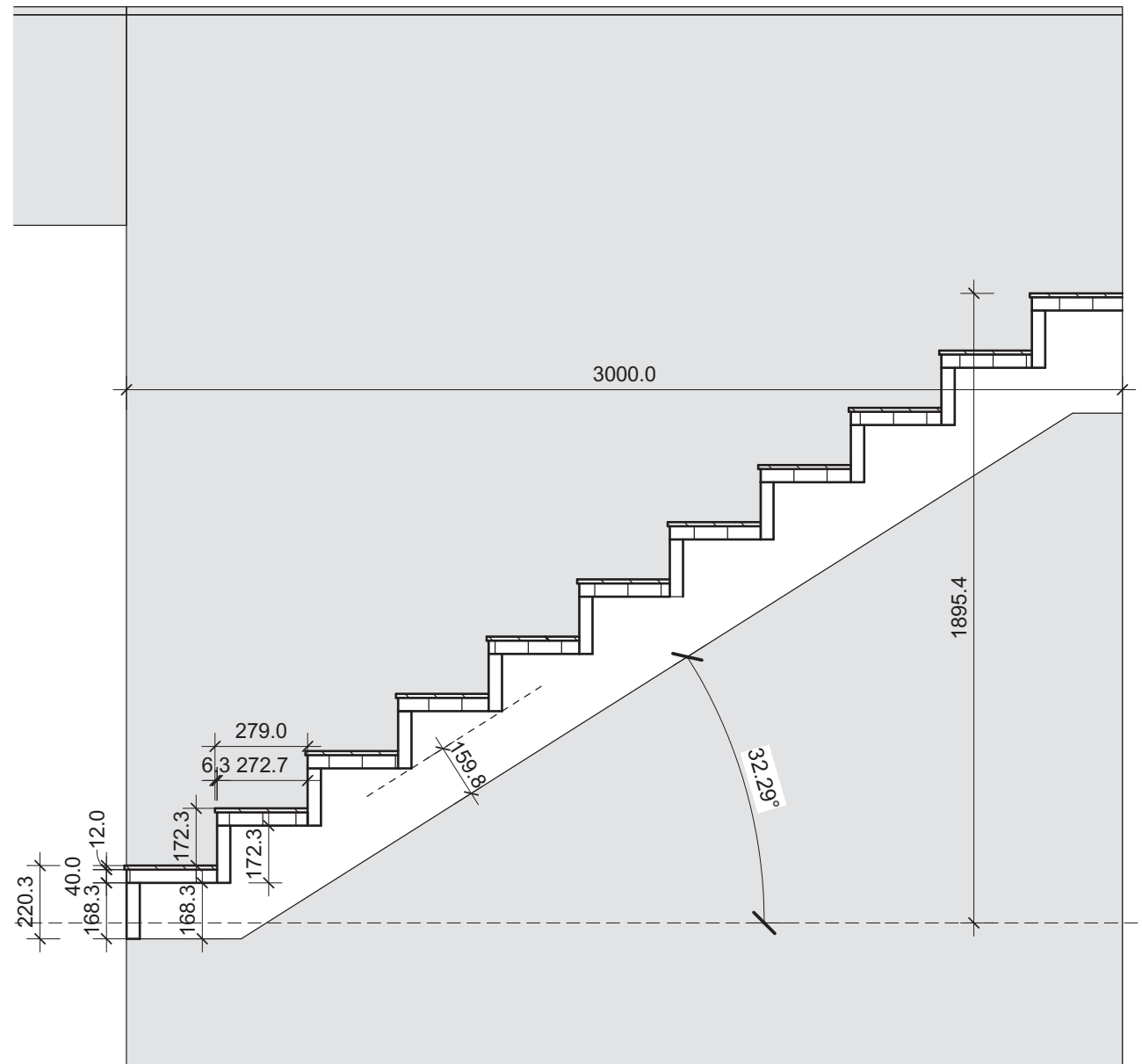
Constructor

**TECHNISCHE
UNIVERSITÄT
DARMSTADT**

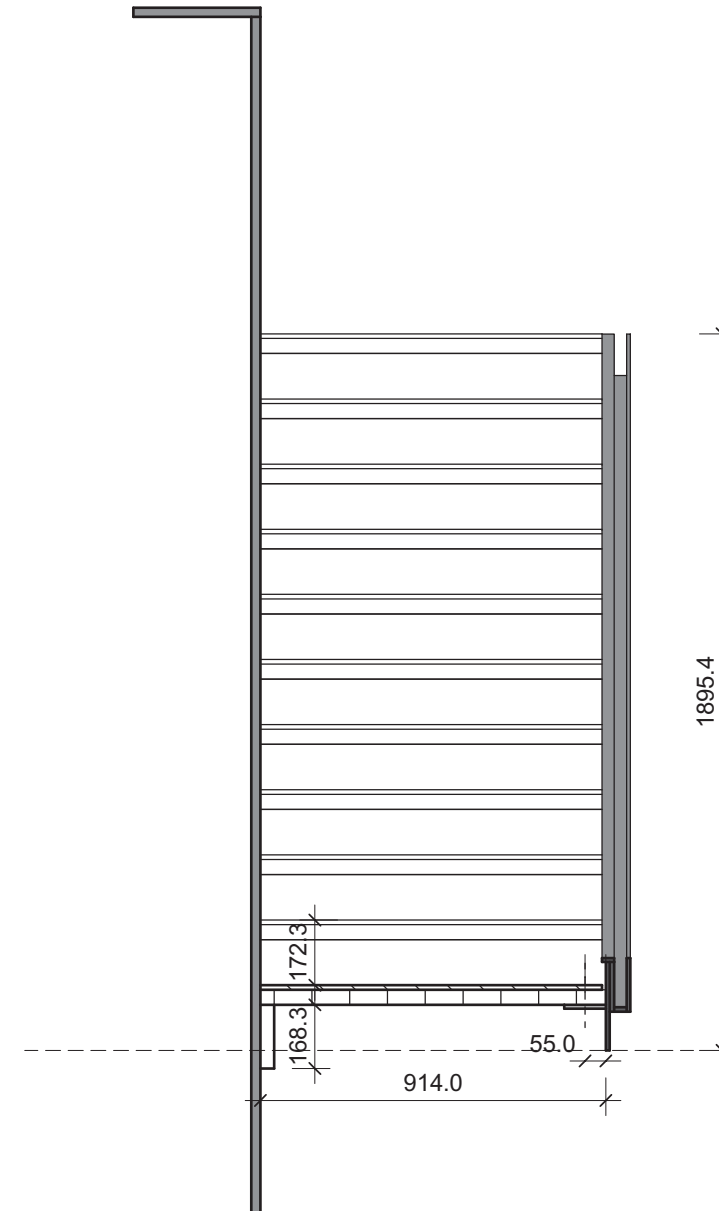
Department of Architecture
 Energyefficient Building Design
 Unit
 El-Lissitzky-Str. 1
 64287 Darmstadt
 +49 (0) 6151 / 165448
 +49 (0) 6151 / 165247
 team@solardecathlon2009.de

Navigation/Legend

Drawn	AS	
Issued	05/25/09	
Last index		
Component	Interiors (I)	
Description	Scheme - Stairs	
Project #	Scale	dwg #
P 140	1:50	I-270

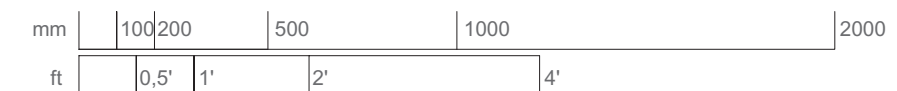


1 Longitudinal Section
I-271 ref. drawing I-270

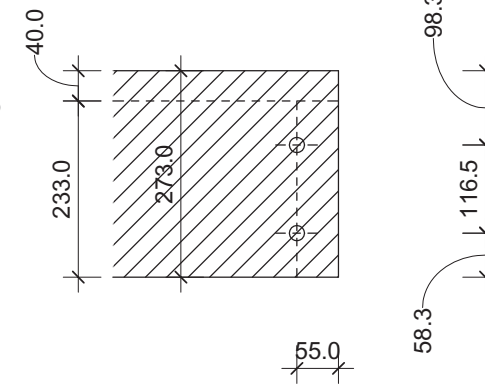


2 Cross Section
I-271 ref. drawing I-270

1:20



wooden stair step
with holes for
stairbearing



Project

TEAM GERMANY

Constructor

**TECHNISCHE
UNIVERSITÄT
DARMSTADT**

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn
AS

Issued
05/26 /09

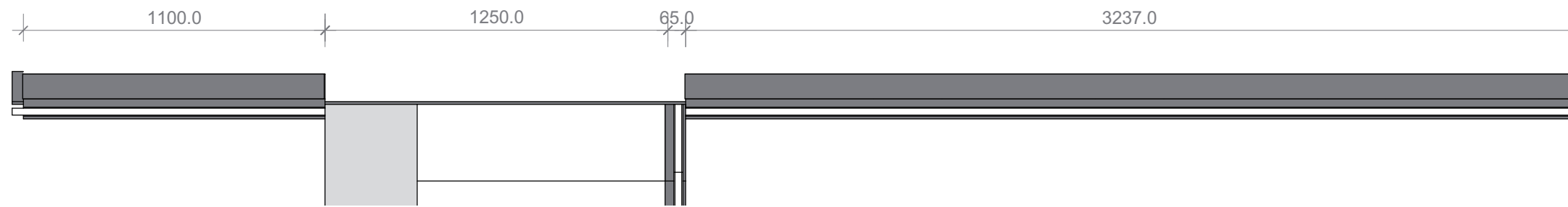
Last index

Component
Interiors (I)

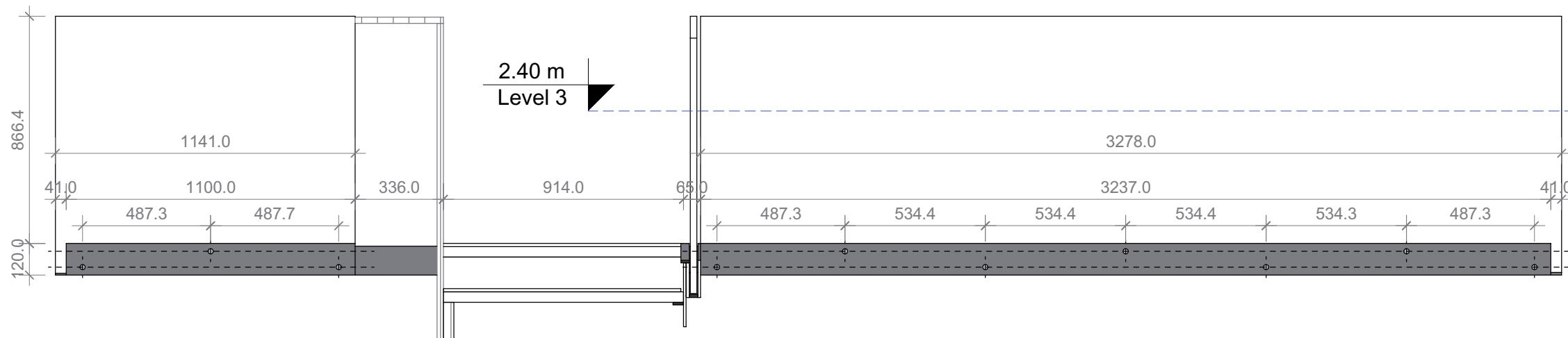
Description
**Scheme_
Stairs Sections**

Project #
Scale
dwg #

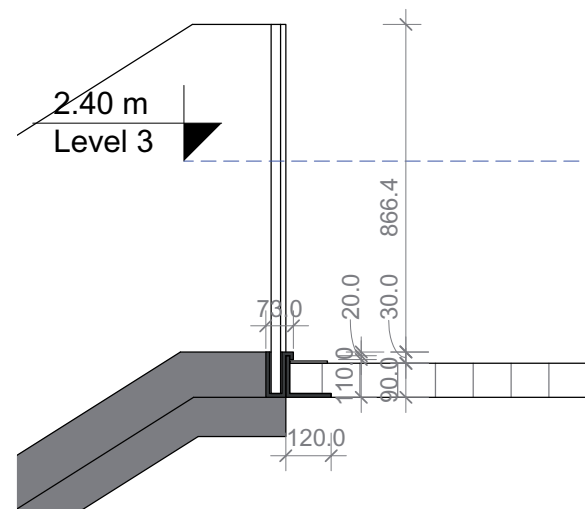
P 140
1:20
I-271



1 Floor Plan Handrail 1st Floor
I-272 Scale 1:20

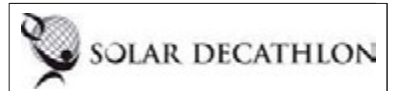
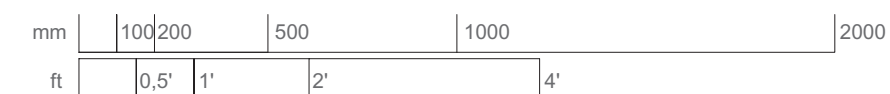


2 Elevation Handrail 1st Floor
I-272 Scale 1:20



3 Cross Section Handrail 1st Floor
I-272 Scale 1:20

1:20

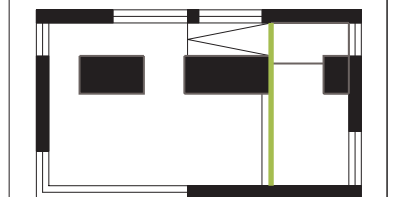


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

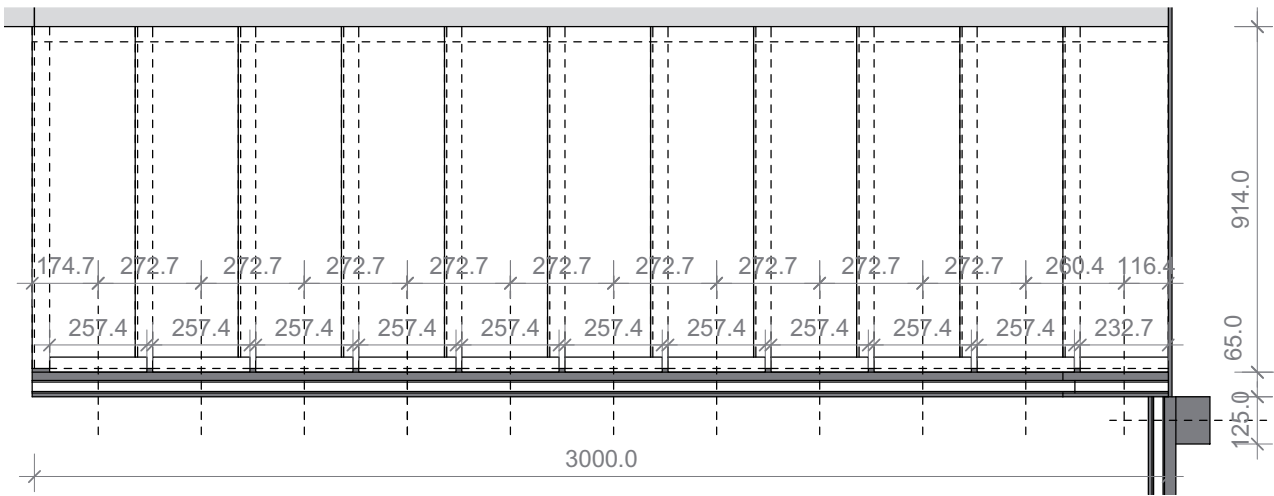


Drawn AS
Issued 05/26 /09
Last index

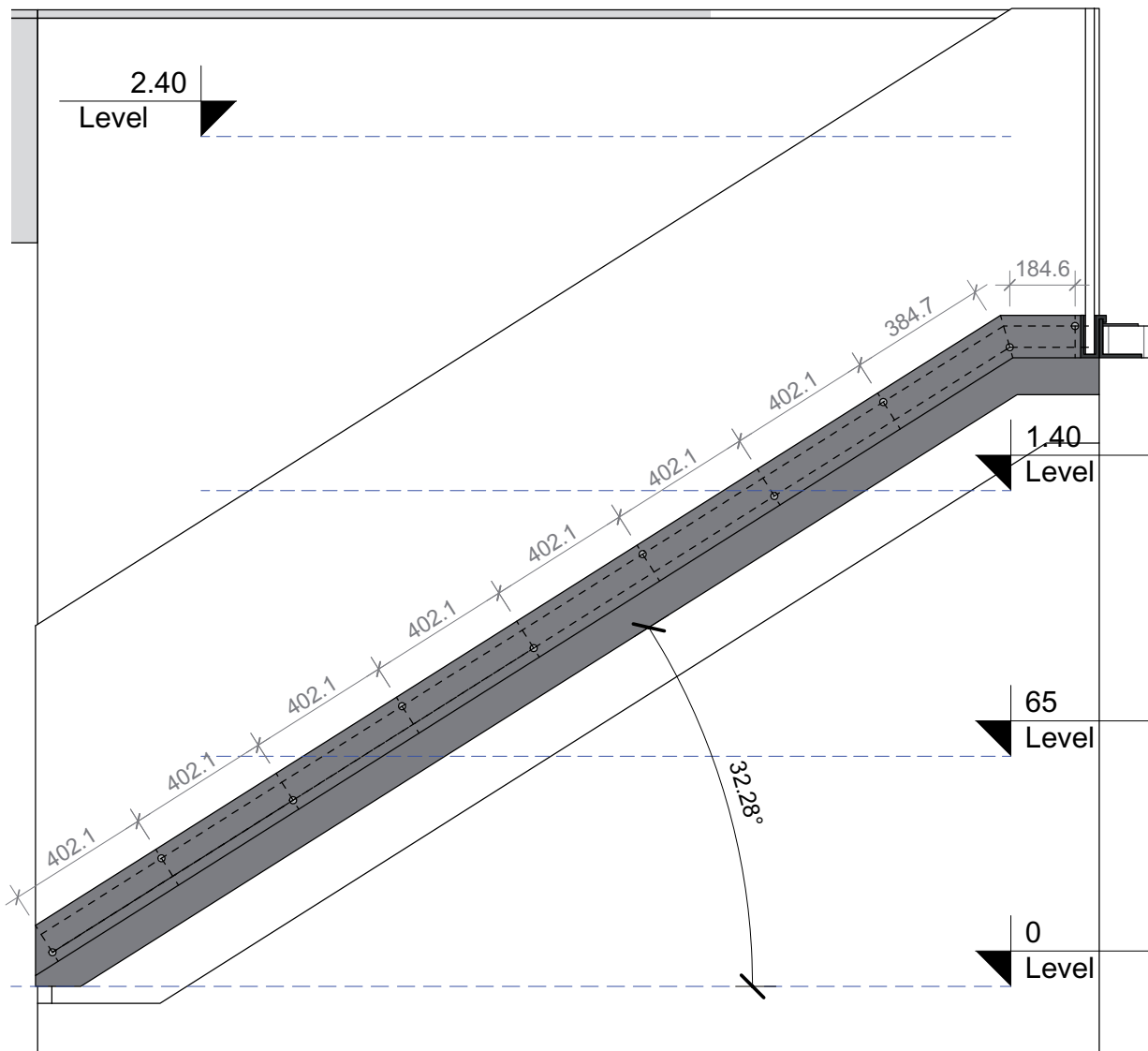
Component
Interiors (I)

Description
Overview - Handrail 1st Floor

Project # Scale dwg #
P 140 1:20 I-272



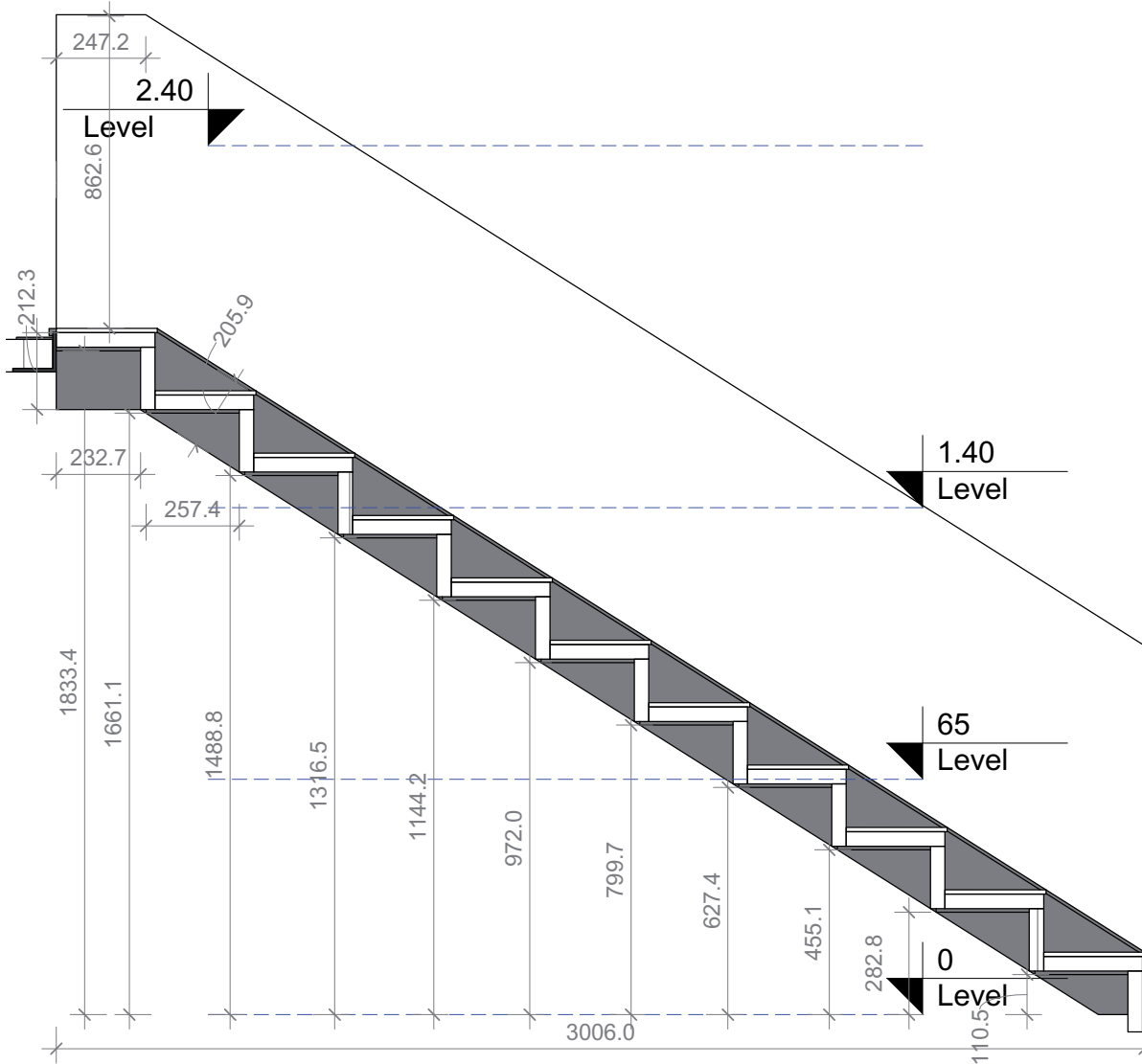
1 Floor Plan Handrail Stairs
I-273 Scale 1:20



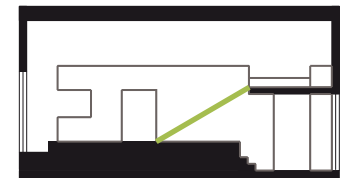
Elevation Stairs from South M 1:20

2 Elevation Stairs from South
I-273 Scale 1:20

3 Longitudinal Section Stairs
I-273 Scale 1:20



1:20

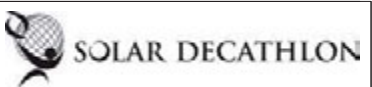
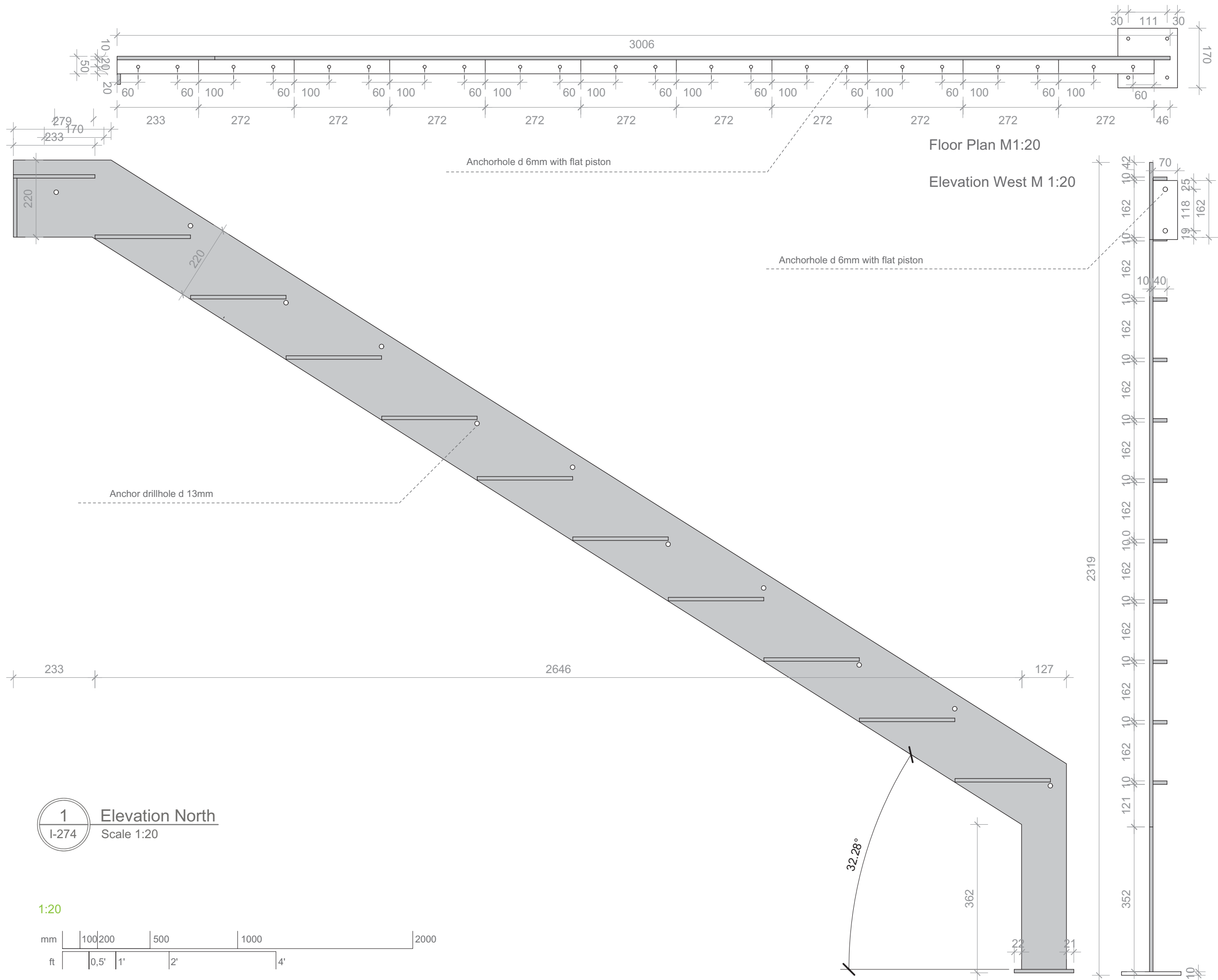


Drawn AS
Issued 05/26 /09
Last index

Component
Interiors (I)

Description
**Overview -
Handrail Stairs**

Project # Scale dwg #
P 140 1:20 I-273



Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

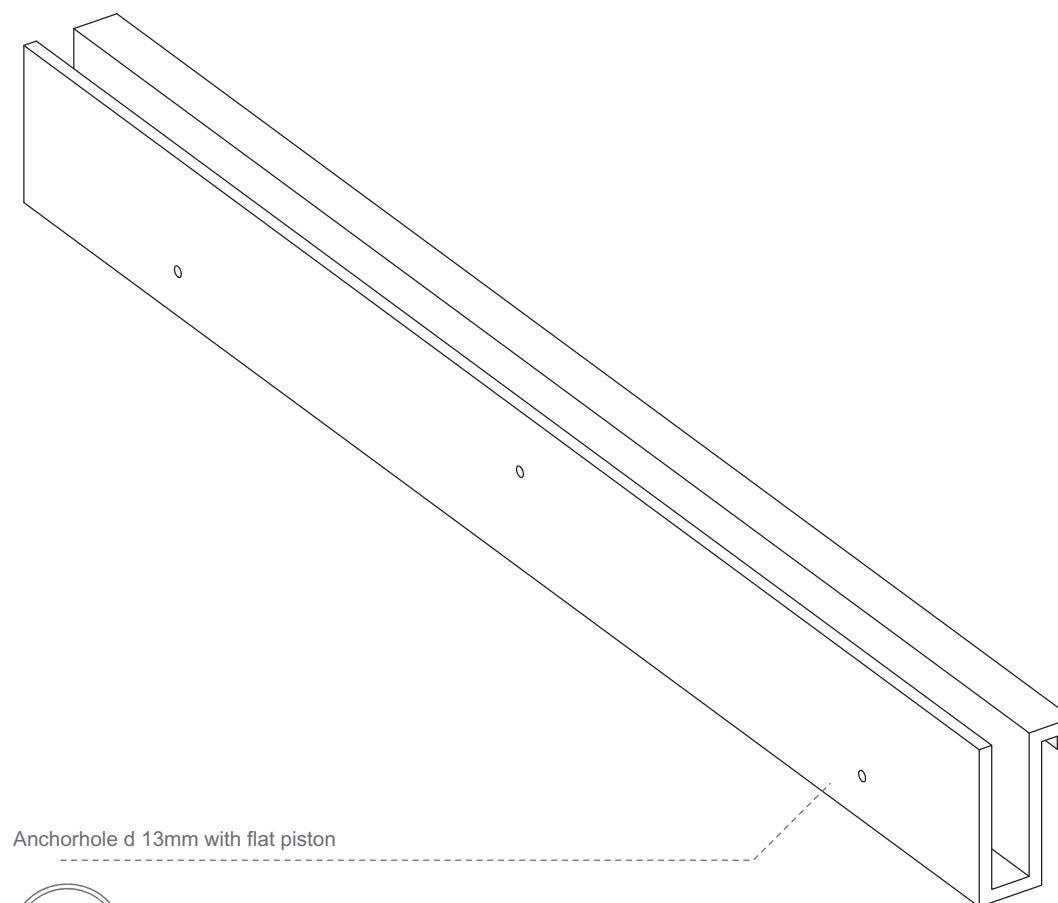
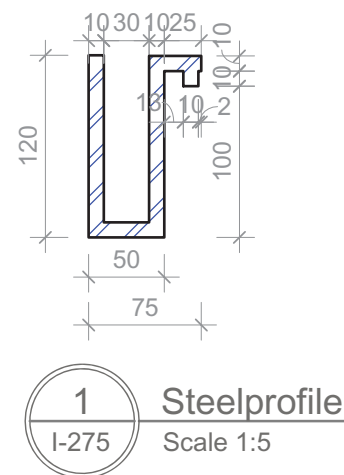


Drawn AS
Issued 05/26 /09
Last index

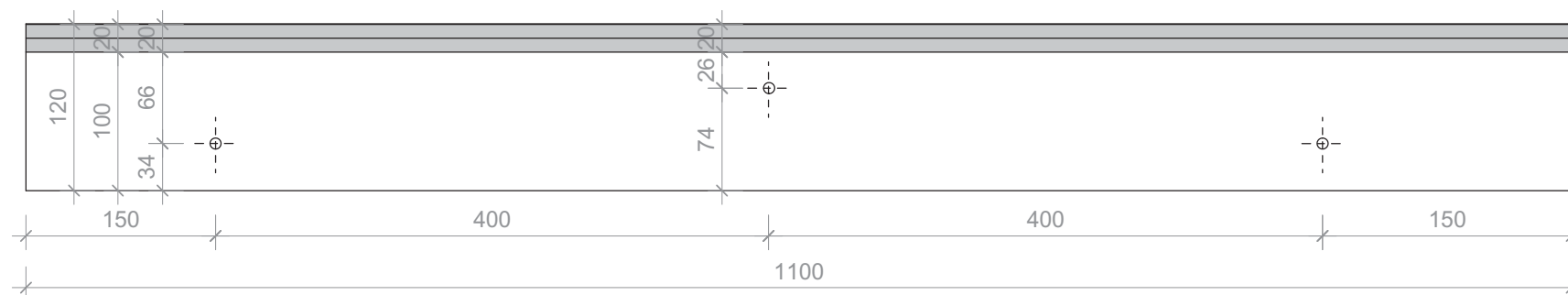
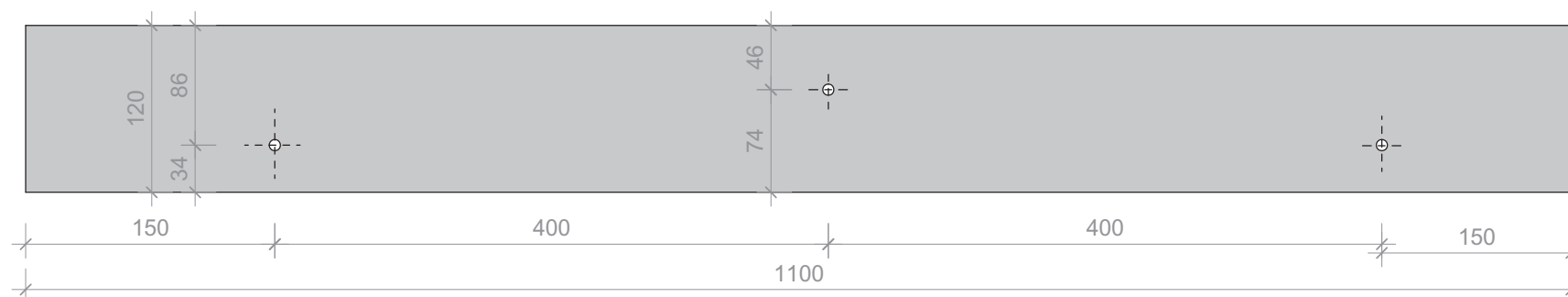
Component
Interiors (I)

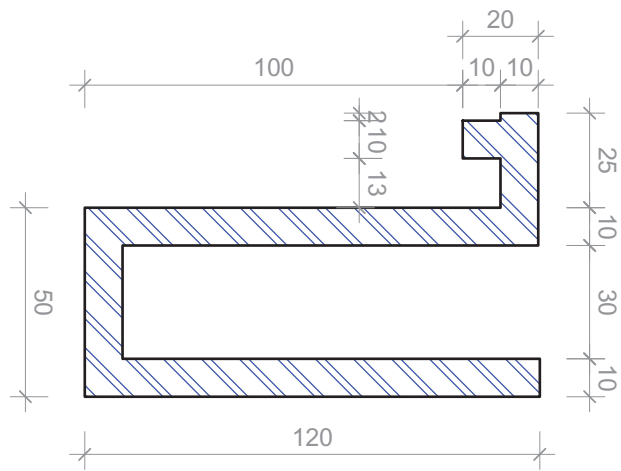
Description
Steelprofile - Steelstring Stairs

Project # Scale dwg #
P 140 1:20 I-274

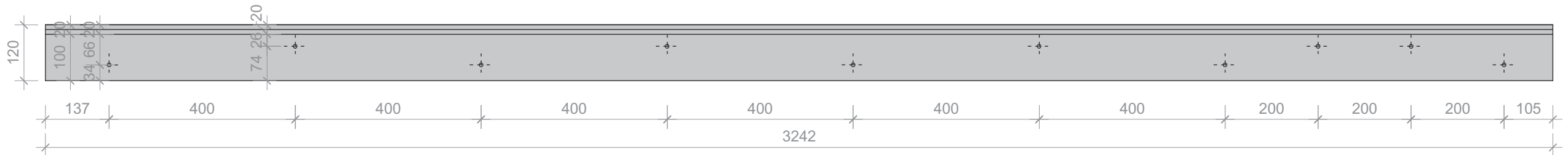


Anchorhole d 13mm with flat piston

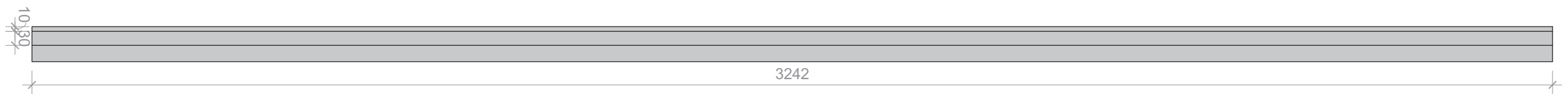




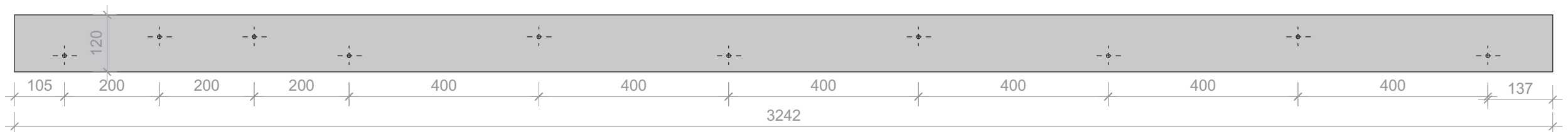
1 Steelprofile
I-276 Scale 1:2



2 Elevation East
I-276 Scale 1:10



3 Floor Plan
I-276 Scale 1:10



4 Elevation West
I-276 Scale 1:10

1:10



Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

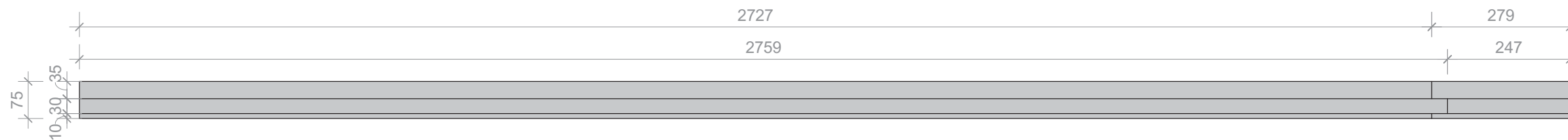


Drawn AS
Issued 05/26 /09
Last index

Component
Interiors (I)

Description
Steelprofile - Handrail
2nd Floor South

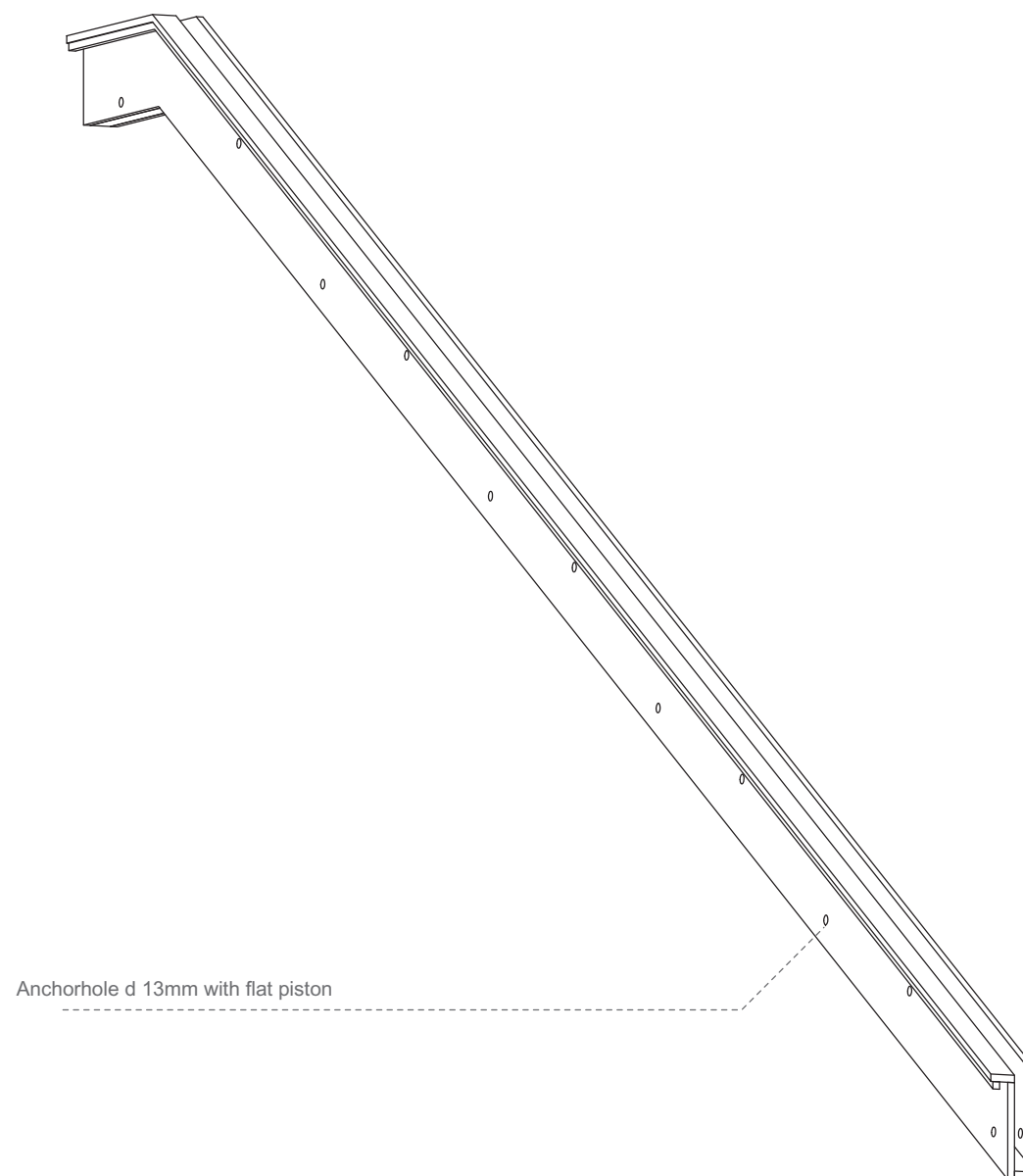
Project # Scale dwg #
P 140 1:10 I-276



Floor Plan
Scale 1:10



Elevation North
Scale 1:10

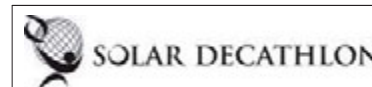


Anchorhole d 13mm with flat piston



Elevation North - West
Scale 1:10

1:10

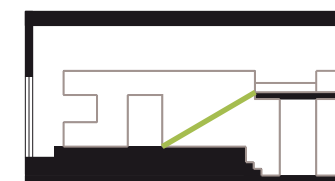


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

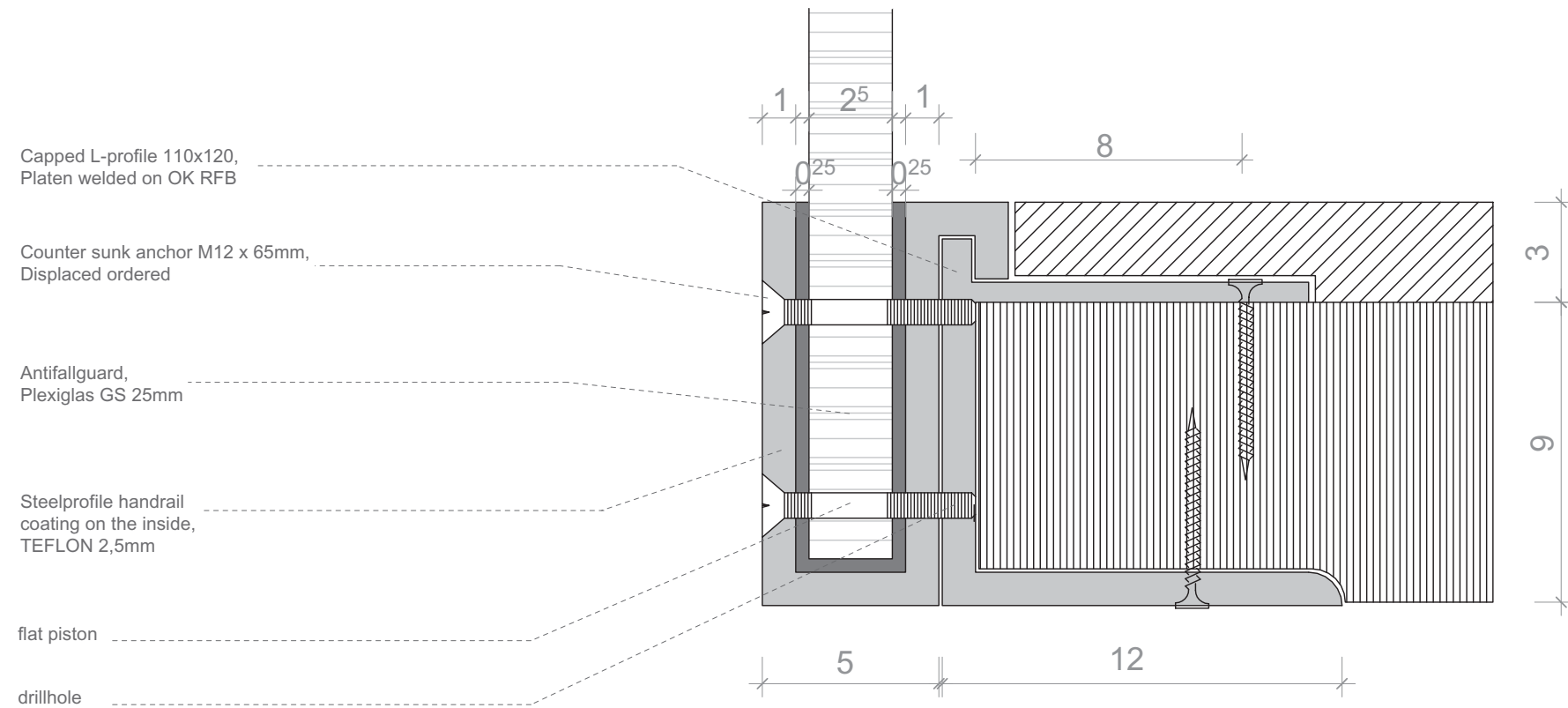


Drawn AS
Issued 05/26 /09
Last index

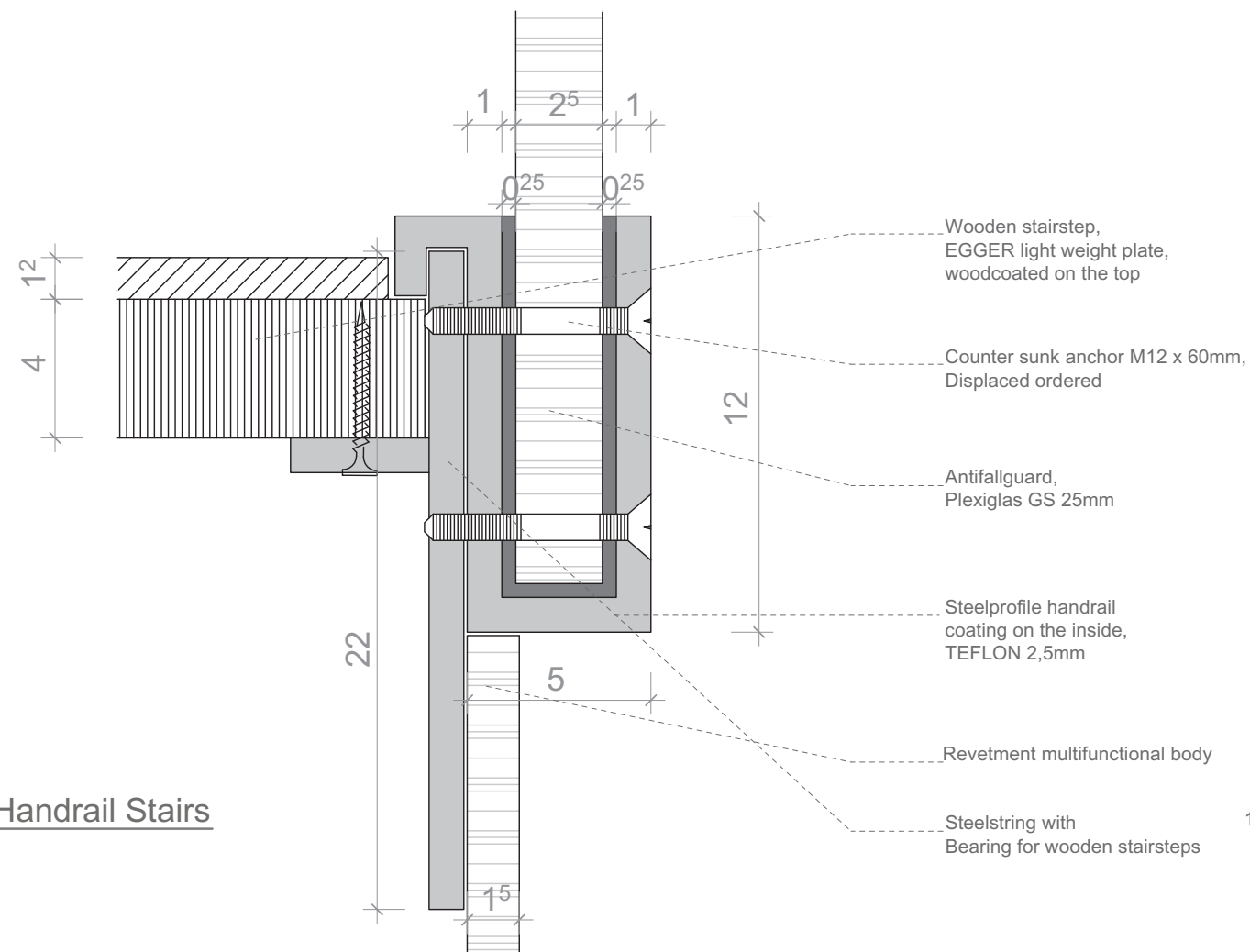
Component
Interiors (I)

Description
Steelprofile -
Handrail Stairs

Project # Scale dwg #
P 140 1:10 I-277



1 Steelprofile Handrail 1st Floor
I-278 Scale 1:2



2 Steelprofile Handrail Stairs
I-278 Scale 1:2



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn	AS
Issued	05/26 /09
Last index	

Component


Interiors (I)

Description


Detail - Handrail Stairs and 1st Floor

Project #	Scale	dwg #
P 140	1:2	I-278


05 06 00 Schedules for Metal Joists, Wood Fastenings_Multifunctional Body										
Plan No.	Project Manual Division Master Format	Article Name	Article Manufacturer	Article Number	Size			Quantity		Notes
					L	H	W	Amount	Unit	
I-202	Div. 06	Kerto-Q	Finnforrest	-	-	24 mm	-	20	m²	structure, veneer plywood
I-203	Div. 06	MDF Topan Colour grey	Agepan	-	-	19 mm	-	41	m²	cabinet body
I-203	Div. 06	MDF Topan Colour grey	Agepan	-	-	16 mm	-	13	m²	cabinet body door
I-203	Div. 06	MDF thin	Agepan	-	-	3 mm	-	10	m²	back board
I-203	Div. 08	conceaed hinge	HÄFELE	329.07.940	-	-	-	41	PC	fastener
I-203	Div. 08	spring hinge	HÄFELE	637.19.906	-	-	-	20	PC	fastener
I-203	Div. 05	furniture foot	HÄFELE	637.19.228	-	-	-	14	PC	fastener
I-203	Div. 05	clip	HÄFELE	637.19.906	-	-	-	14	PC	fastener
I-203	Div. 05	ASSY 3.0 Klavierband-schraube	Würth	0168 130 016	16 mm	3 mm	-	250	PC	fastener
I-203	Div. 05	ASSY 3.0	Würth	0170 140 50	50 mm	4 mm	-	1000	PC	fastener
I-203, E-220	Div. 06	PLEXIGLAS® Crystal Ice	EVONIK	Weiss WM500 DC	-	3 mm	-	23	m²	revetment core furniture, lighting alternative 1


SOLAR DECATHLON

Project


SOLAR DECATHLON 2009
TEAM GERMANY

Constructor


TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn
AS

Issued
05/29/09

Last index

Component
Interiors (I)

Description
Multifunctional Body - Schedules

Project #

Scale

dwg #

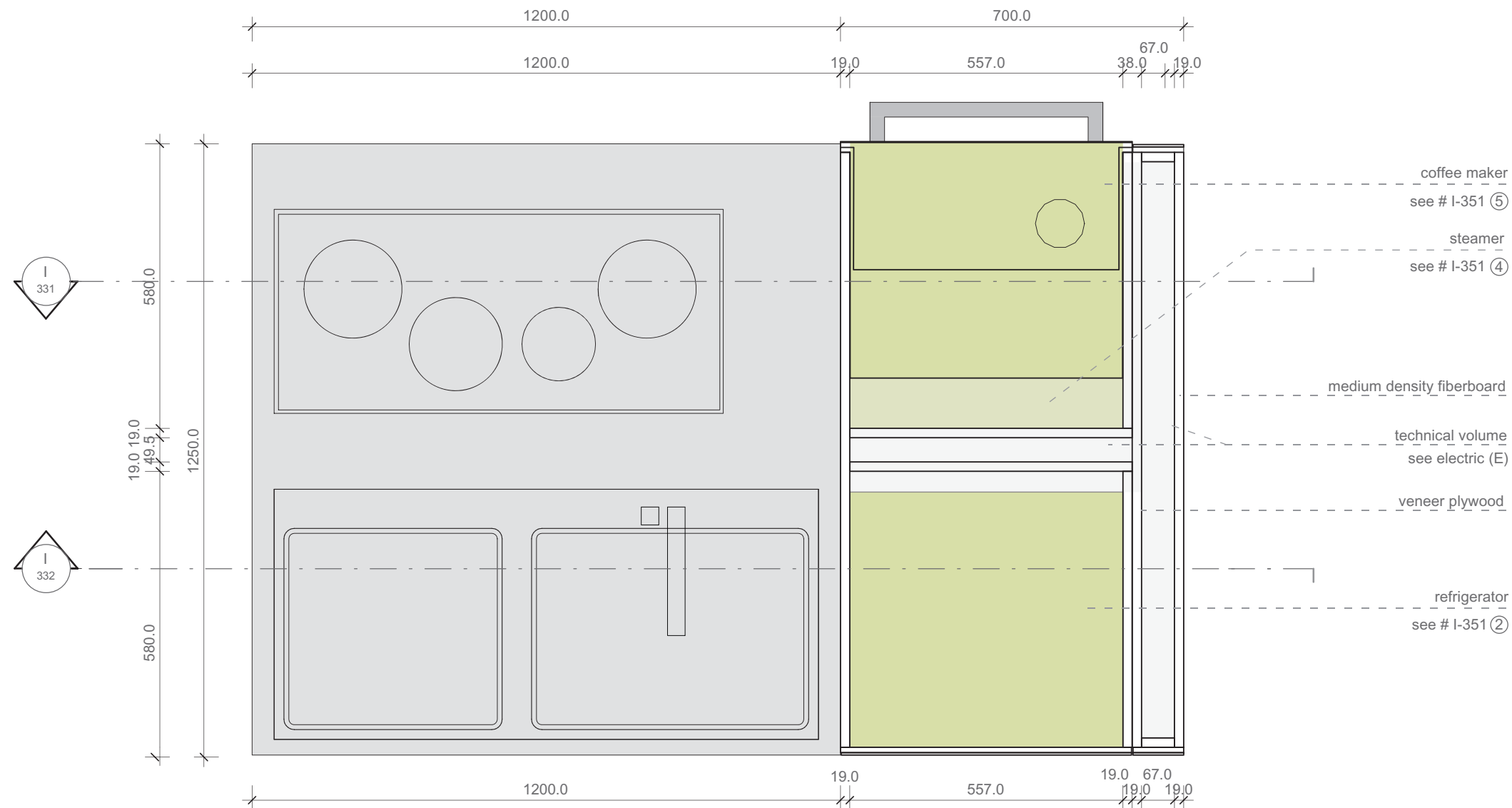
P 140

-

I-280

05 06 00 Schedules for Metal Joists, Wood Fastenings_Multifunctional Body										
Plan No.	Project Manual Division Master Format	Article Name	Article Manufacturer	Article Number	Size			Quantity		Notes
					L	H	W	Amount	Unit	
E-220	Div. 06	PLEXIGLAS® SATINICE	EVONIK	white (snow) WH10 DC	-	6 mm	-	15	m²	revetment core furniture, bathroom, lighting alternative 1
E-220	Div. 06	PLEXIGLAS® EndLighten	EVONIK	transparent 0N002 XL	-	8 mm	-	23	m²	revetment core furniture, lighting alternative 1
E-220	Div. 26	LED RGB Leiste	Lumitronix	-	50 cm	-	-	45	PC	lighting alternative 1
E-220	Div. 26	LED RGB Controller	Lumitronix	-	-	-	-	5	PC	lighting alternative 1
I-203	Div. 06	PLEXIGLAS® Crystal Ice, Platte, Platte	EVONIK	white WM500 DC	-	3 mm	-	11	m²	revetment core furniture, lighting alternative 2
I-533, I-534, I-541	Div. 06	PLEXIGLAS® SATINICE	EVONIK	white (snow) WH10 DC	-	6 mm	-	15	m²	revetment core furniture, bathroom, lighting alternative 2
I-200	Div. 06	Lightpanel LUXolution	KOBEK	-	-	-	-	11	m²	lighting alternative 2
I-270, I-271, I-278	Div. 06	Leichtbau-platte	Würth/ EGGER Eurolight	-	-	-	40 mm	4,5	m²	Stairs
I-270, I-271, I-278	Div. 06	Wood Flooring	Drüsedau	parquet wood strip flooring, oak	-	-	12 mm	4,5	m²	Stairs Coating, altenative possible

05 06 00 Schedules for Metal Joists, Wood Fastenings_Multifunctional Body										
Plan No.	Project Manual Division Master Format	Article Name	Article Manufacturer	Article Number	Size			Quantity		Notes
					L	H	W	Amount	Unit	
I-273, I-277	Div. 05	Steel	IB	-	3600 mm	-	-	1	PC	Handrail Stairs
I-273, I-277	Div. 05	Steel	IB	-	-	-	-	1	PC	Stringer
I-272, I-275	Div. 05	Steel	IB	-	1100 mm	-	-	1	PC	Handrail 2 nd floor, 1
I-272, I-275	Div. 05	Steel	IB	-	3300 mm	-	-	1	PC	Handrail 2 nd floor, 2
I-273, I-278	Div. 06	PLEXIGLAS® GS	EVONIK	Farblos 0F00 GT	3600 mm	900 mm	25 mm	1	PC	Antifallguard Stairs
I-272, I-278	Div. 06	PLEXIGLAS® GS	EVONIK	Farblos 0F00 GT	1200 mm	900 mm	25 mm	1	PC	Antifallguard 2 nd floor, 1
I-272, I-278	Div. 06	PLEXIGLAS® GS	EVONIK	Farblos 0F00 GT	3300 mm	900 mm	25 mm	1	PC	Antifallguard 2 nd floor, 2
I-278	Div. 05	Teflon-adhesive tape	Techflon	Teflon®-Klebeband V25	850 mm	-	25 mm	2	PC	Handrail, Coating on the inside
I-278	Div. 05	counter sunk anchor	Würth	28612 60	60 mm	12 mm	-	2	PC	Handrail Stairs, fastener
I-278	Div. 05	counter sunk anchor	Würth	028612 65	65 mm	12 mm	-	2	PC	Handrail 2 nd floor, fastener



1:10



Project

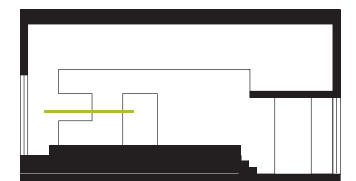


Constructor

Department of Architecture
Energyefficient Building Design
Unit

El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



- main structure
medium density fiberboard
- supportive structure
veneer plywood
- technical appliances

Drawn FH

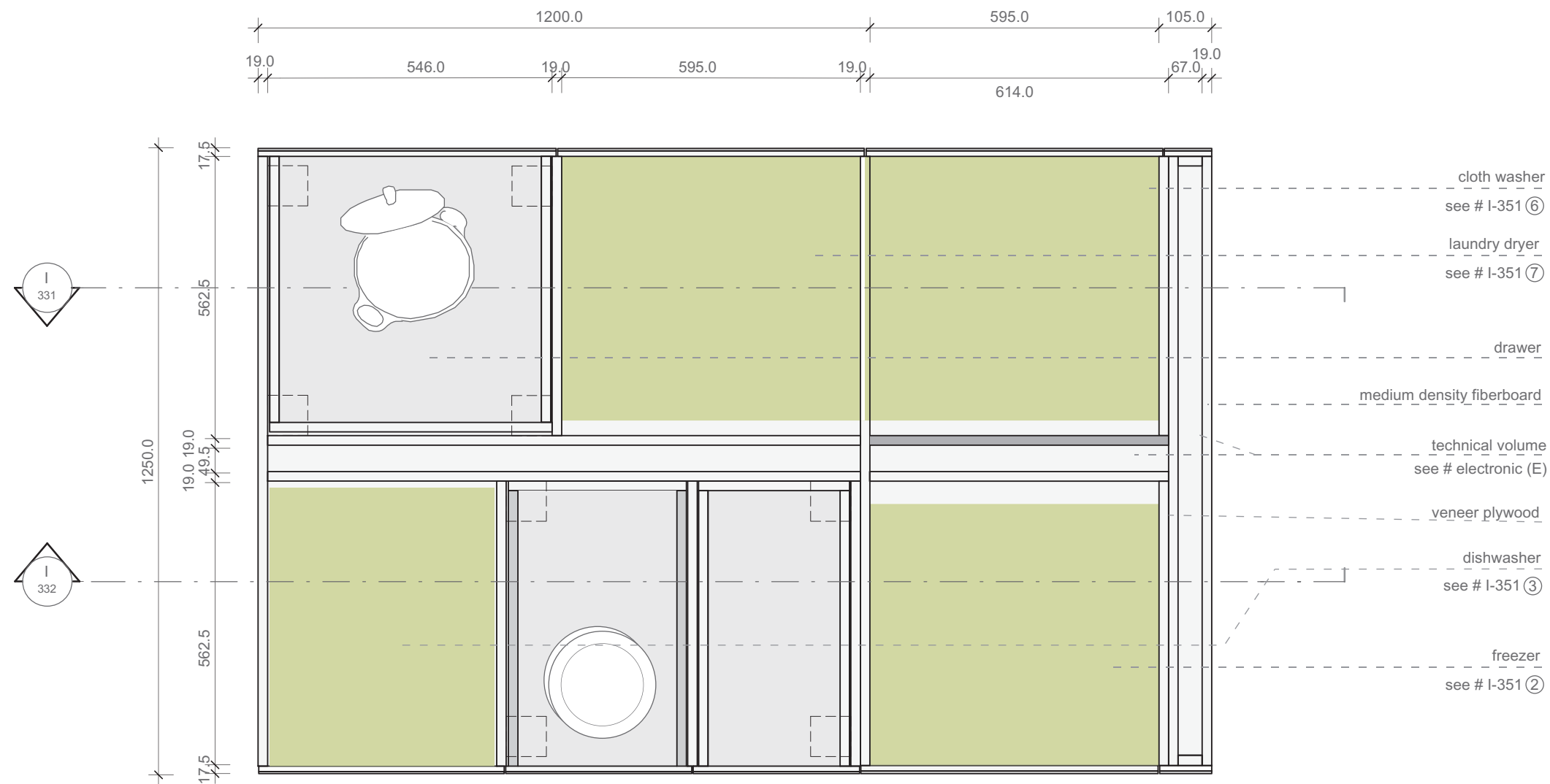
Issued 05/24/09

Last index

Component
Interiors (I)

Description
**Multifunctional Body -
Kitchen**

Project # Scale dwg #
P 140 1:10 I-321



1 lower horizontal section
I-322 Scale 1:10

1:10

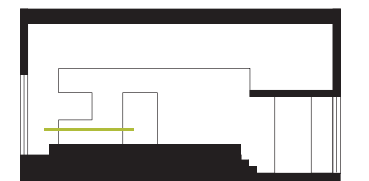
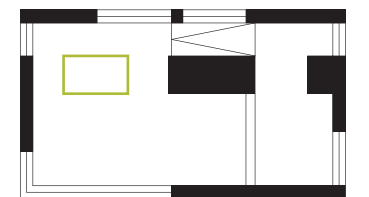


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



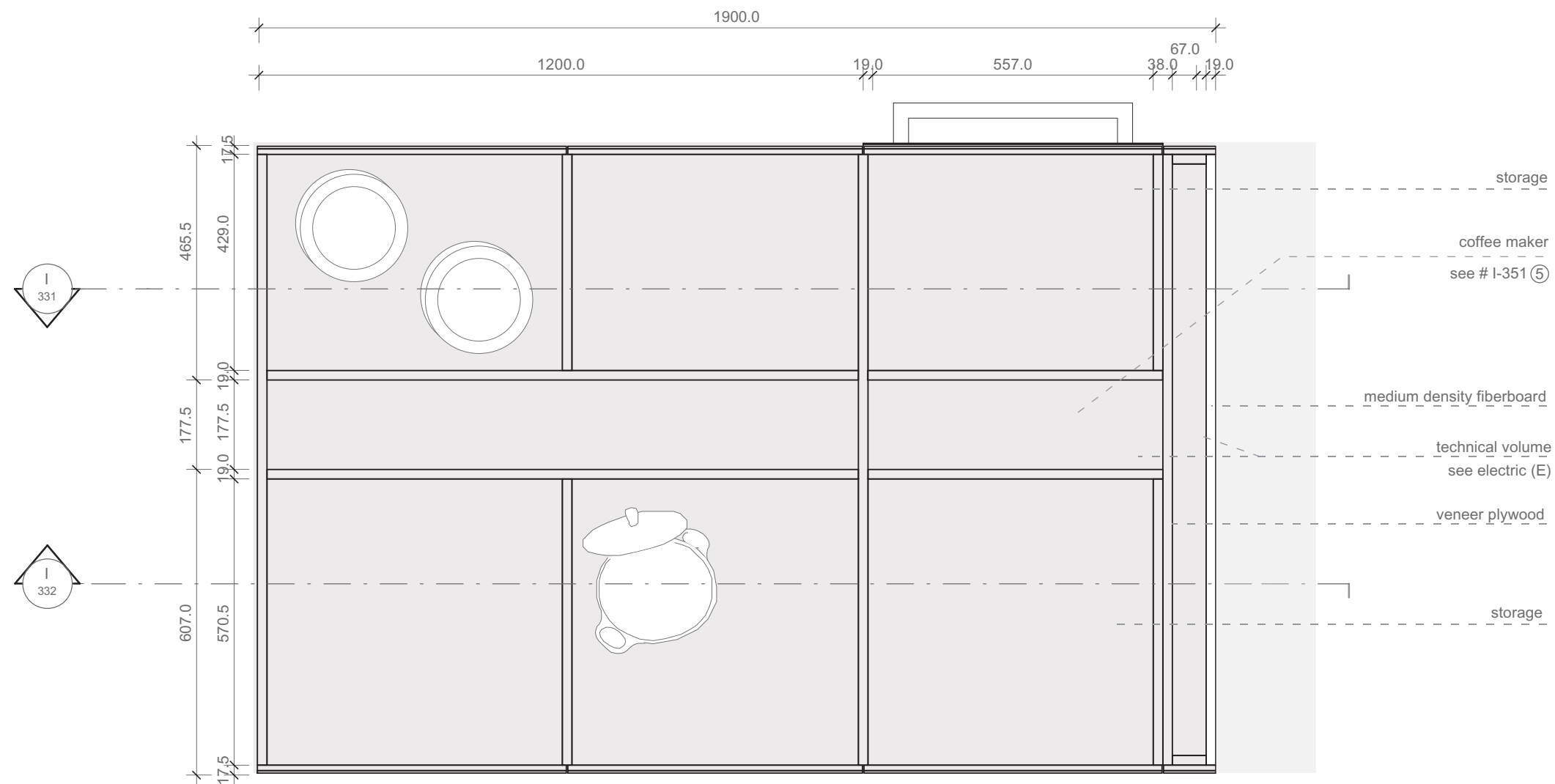
- main structure medium density fiberboard
- supportive structure veneer plywood
- technical appliances

Drawn FH
Issued 05/24/09
Last index

Component
Interiors (I)

Description
Multifunctional Body - Kitchen

Project # Scale dwg #
P 140 1:10 I-322



1 upper horizontal section
I-323 Scale 1:10

1:10

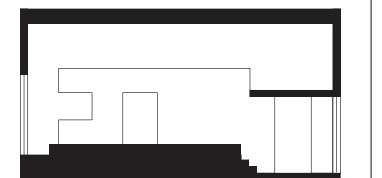


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



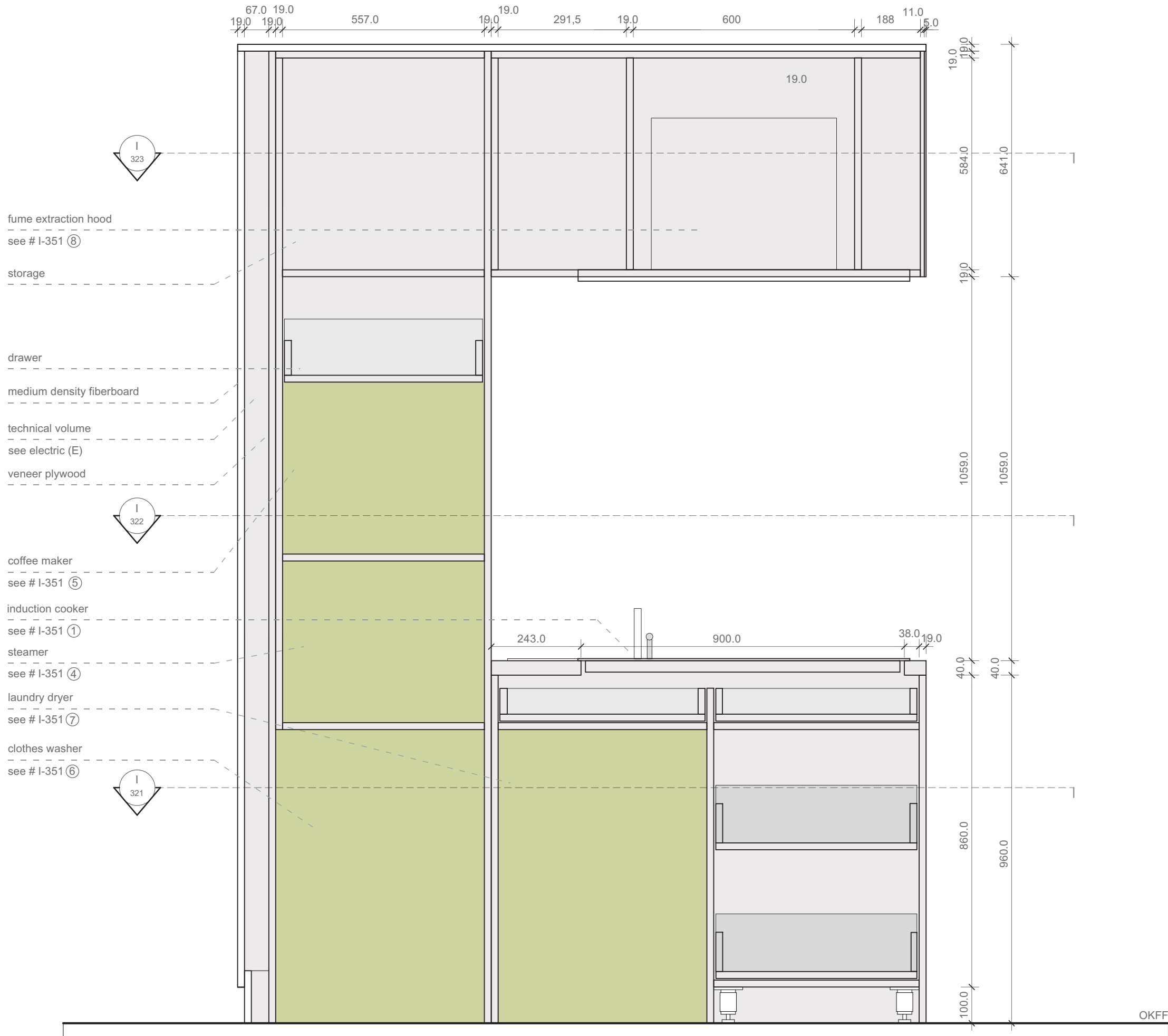
- main structure
medium density fiberboard
- supportive structure
veneer plywood
- technical appliances

Drawn FH
Issued 05/24/09
Last index

Component
Interiors (I)

Description
Multifunctional Body - Kitchen

Project # Scale dwg #
P 140 1:10 I-323



1
I-331

Kitchen First Vertical Section
Scale 1:10

1:10

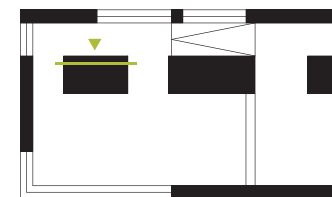


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



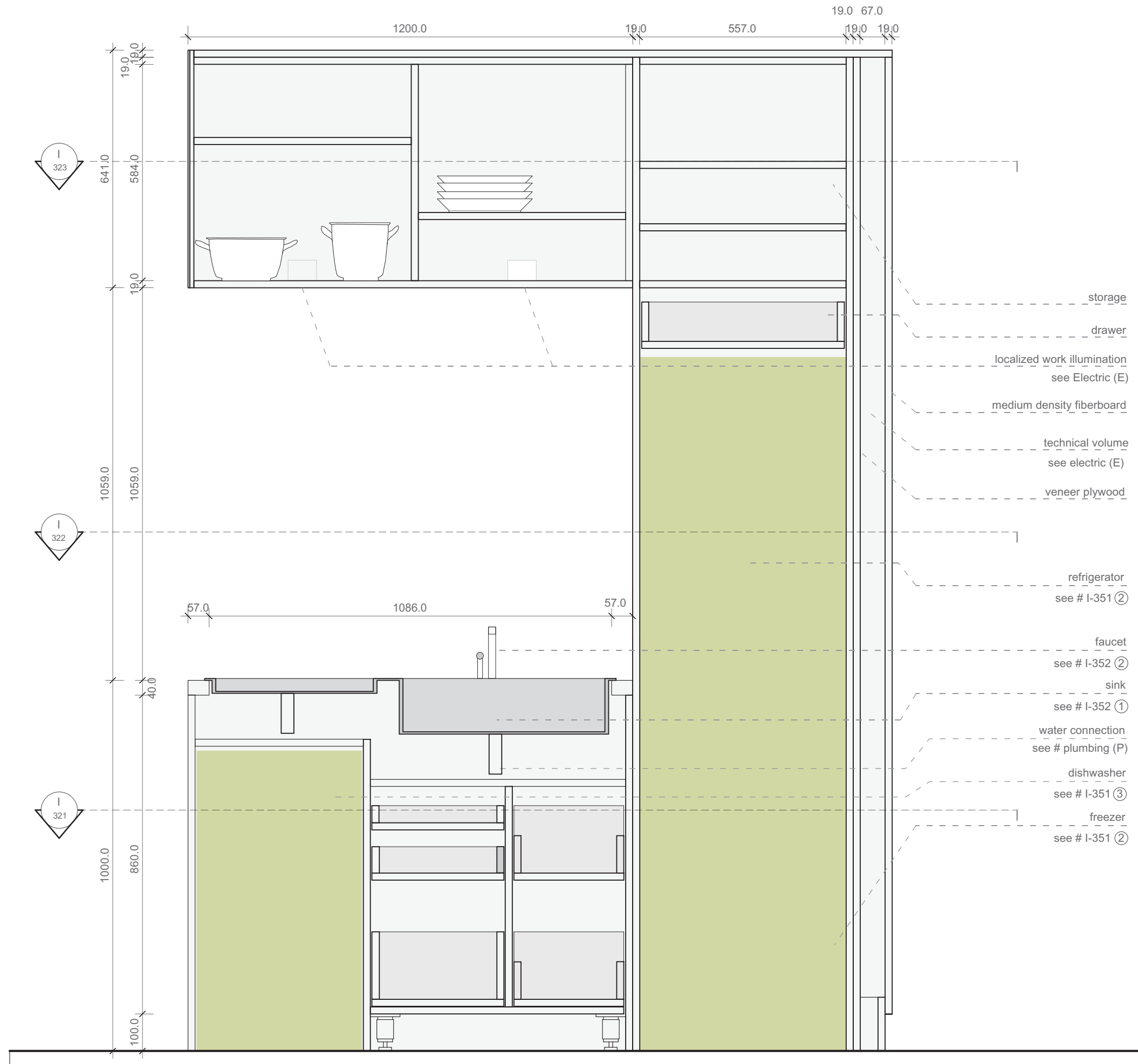
- ☐ main structure
medium density fiberboard
- ☐ supportive structure
veneer plywood
- ☒ technical appliances

Drawn FH
Issued 05/24/09
Last index

Component
Interiors (I)

Description
Multifunctional Body - Kitchen

Project # Scale dwg #
P 140 1:10 I-331



1:10



Project



Constructor

Department of Architecture
Energyefficient Building Design
Unit

El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



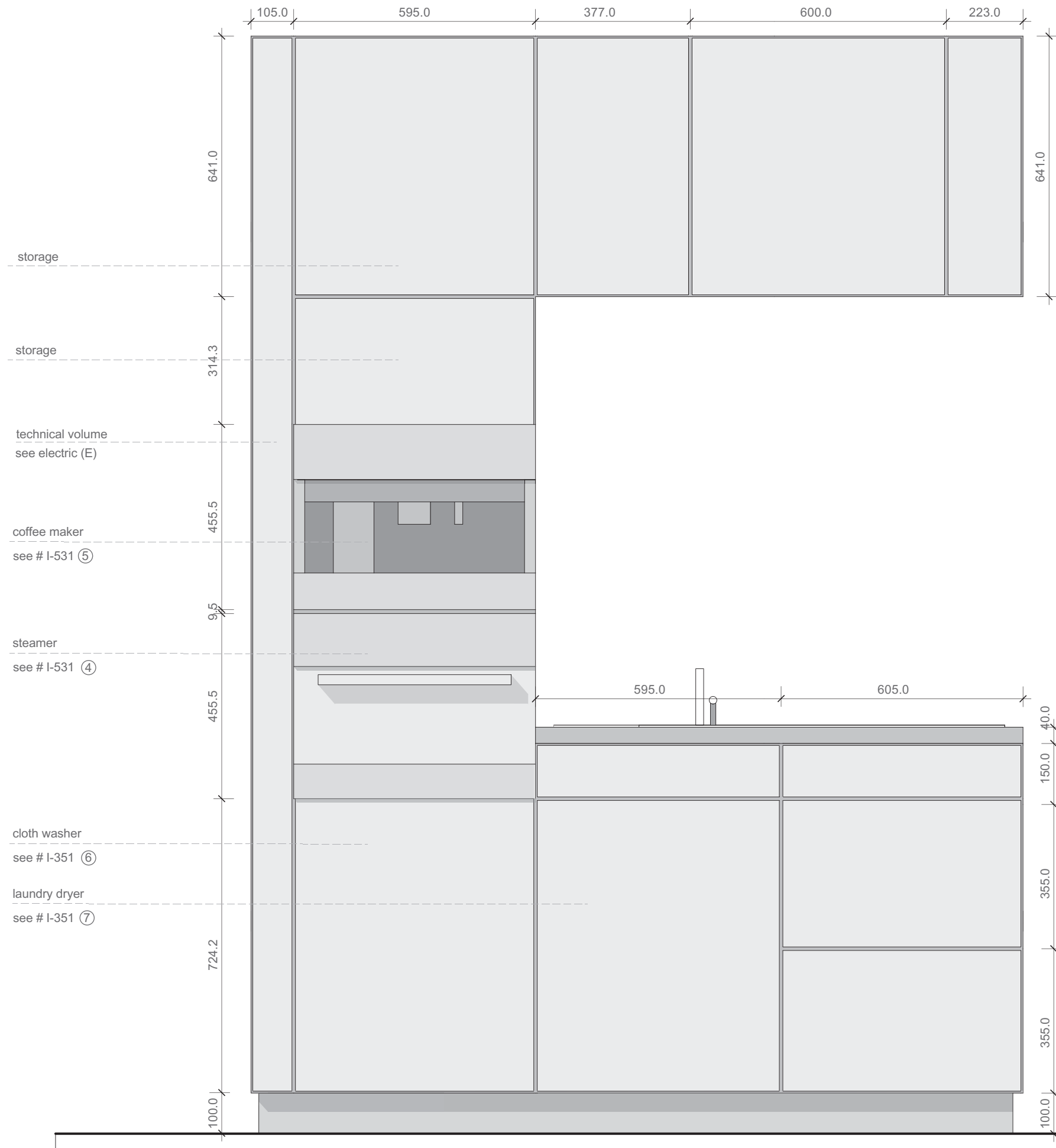
- main structure
medium density fiberboard
- supportive structure
veneer plywood
- technical appliances

Drawn FH
Issued 05/24/09
Last index

Component
Interiors (I)

Description
**Multifunctional Body -
Kitchen**

Project # Scale dwg #
P 140 1:10 I-332



Kitchen Aisle View
Scale 1:10

1:10

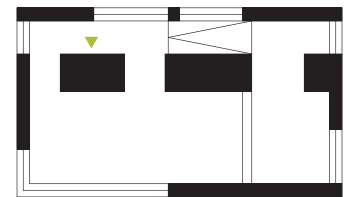


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

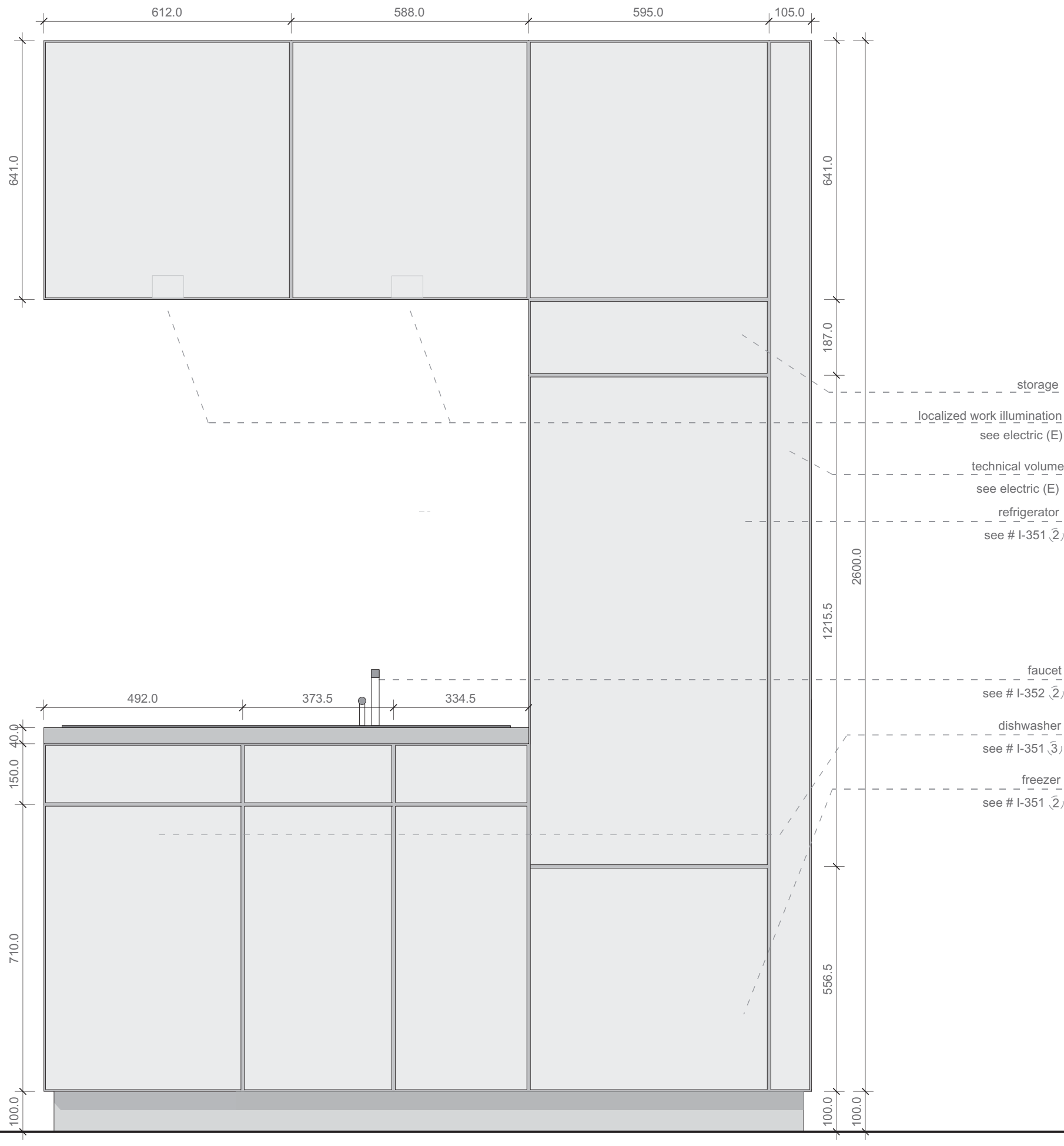


Drawn FH
Issued 05/24/09
Last index

Component
Interiors (I)

Description
Multifunctional Body - Kitchen

Project # Scale dwg #
P 140 1:10 I-341

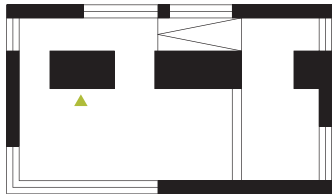


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



Drawn FH
Issued 05/24/09
Last index

Component
Interiors (I)

Description
Multifunctional Body - Kitchen

Project # Scale dwg #
P 140 1:10 I-342

technical appliance				energy efficiency	uptake rage	Miele@home	Yes/ No	choice
①	induction cooker	space efficiency	dimensions	+	7,40kW inst.	+	yes	KM 5975
②	freezer, refrigerator	+	1772x55x550mm / 264l	+	297 kWh/a		no	Kf 9757 id
③	dishwasher	+	805x448x570mm / 9 dishes	+	8l / 0,9 kWh /per use		no	G 1562 scvi
④	steamer	+	455x595x545mm		3,2-3,5 kW inst.	+	yes	Dgc 5080
⑤	coffee maker	+	452x595x480		2,7 kW inst.	+	yes	Cva 5060
⑥	cloth washer		850x595x580	+	1,02 kWh / 47l /per use	+	yes	Softtronic W 3985 WPS Navitronic
⑦	laundry dryer		850x595x580	+	1,8 – 1,55 kWh / heat pump /per use	+	no	T 8626
⑧	fume extraction hood	+	420x895x275	+	280 W inst.	+	no	DA3190



①



②



③



⑧



④



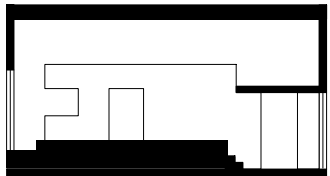
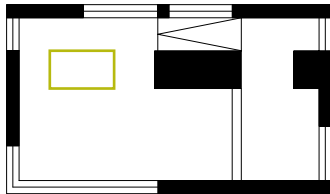
⑤



⑥



⑦





①

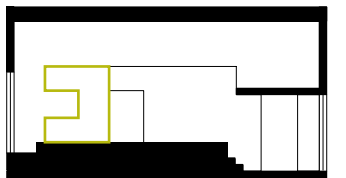
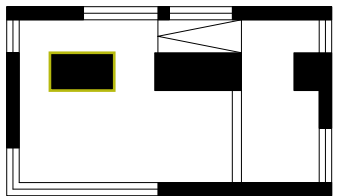


②



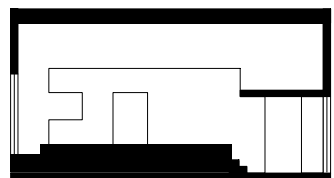
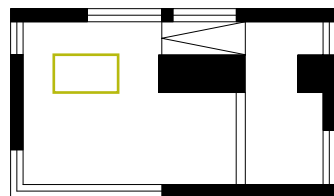
③

- ① sink
- ② faucet
- ③ flow control



11 06 00 Schedule for Residential Kitchen Equipment and Plumbing

Plan No.	Project Manual Division Master Format	Article Name	Article Manufacturer	Article Number	Size			Quantity		Connection				
					L	H	W	Amount	Unit	CW	HW	Waste	Vent	230-240 DC
I-331,I-322, I-351	Div.11	induction cooker	Miele	KM 5975	916 mm	...	416 mm	1	PC					
I-332,I-321, I-322, I-341, I-351	Div.11	refrige-rator, freezer	Miele	Kf 9757 id	1772mm	550 mm	55 mm	1	PC					
I-332,I-321, I- 342,I-351	Div.11	dish washer	Miele	G 1562 scvi	805 mm	570 mm	448 mm	1	PC		x	x		x
I-331,I-322, I- 341,I-351	Div.11	steamer	Miele	Dgc 5080	1772mm	550 mm	55 mm	1	PC	x				
I-331,I-322, I- 341,I-351	Div.11	coffee maker	Miele	Cva 5060	452 mm	480 mm	595 mm	1	PC	x				
I-331,I-321, I- 341,I-351	Div.11	cloth washer	Miele	W 3985 WPS	850 mm	580 mm	595 mm	1	PC	x		x		x
I-331,I-321, I- 341,I-351	Div.11	laundry dryer	Miele	T 3841	850 mm	580 mm	595 mm	1	PC					
I-331,I-351	Div.11	fume extraction hood	Miele	DA 3190	420 mm	275 mm	895 mm	1	PC				x	
I-331,I-332, I- 322,I-351	Div.6	counter top	special fabrication	...	1200mm	40 mm	1250mm	1	PC					
I-332,I-322, I-351	Div.22	sink	Dornbracht	PREP DF 1110	1110mm	150/ 40 mm	510 mm	1	PC			x		
I-332,I-322, I-351	Div.22	faucet	Dornbracht	32800680	235 mm	55 mm	345 mm	1	PC	x	x			



Drawn fh
Issued 05/28/09
Last index

Component
Interiors (I)

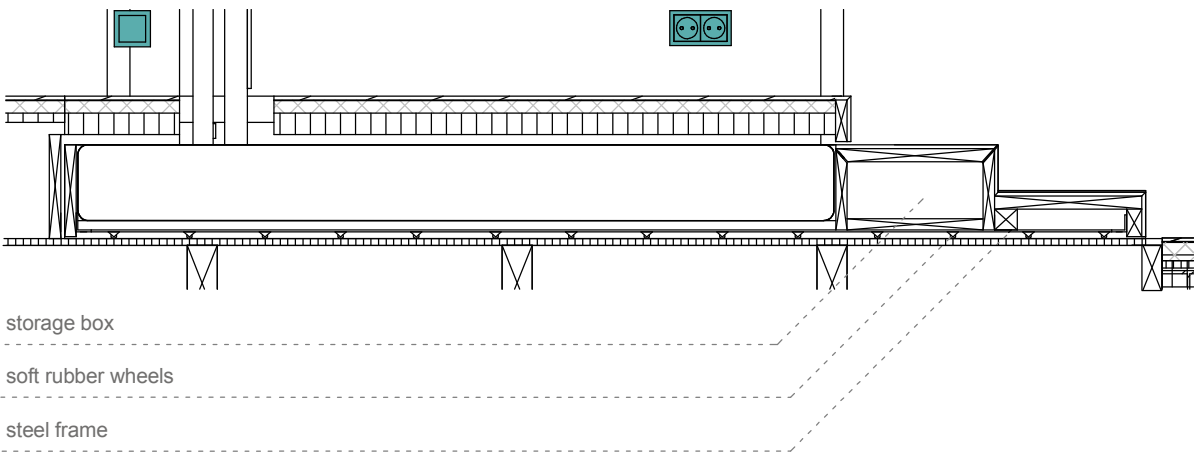
Description
Kitchen

Project # Scale dwg #
P 140 I-353

Bedroom Idea

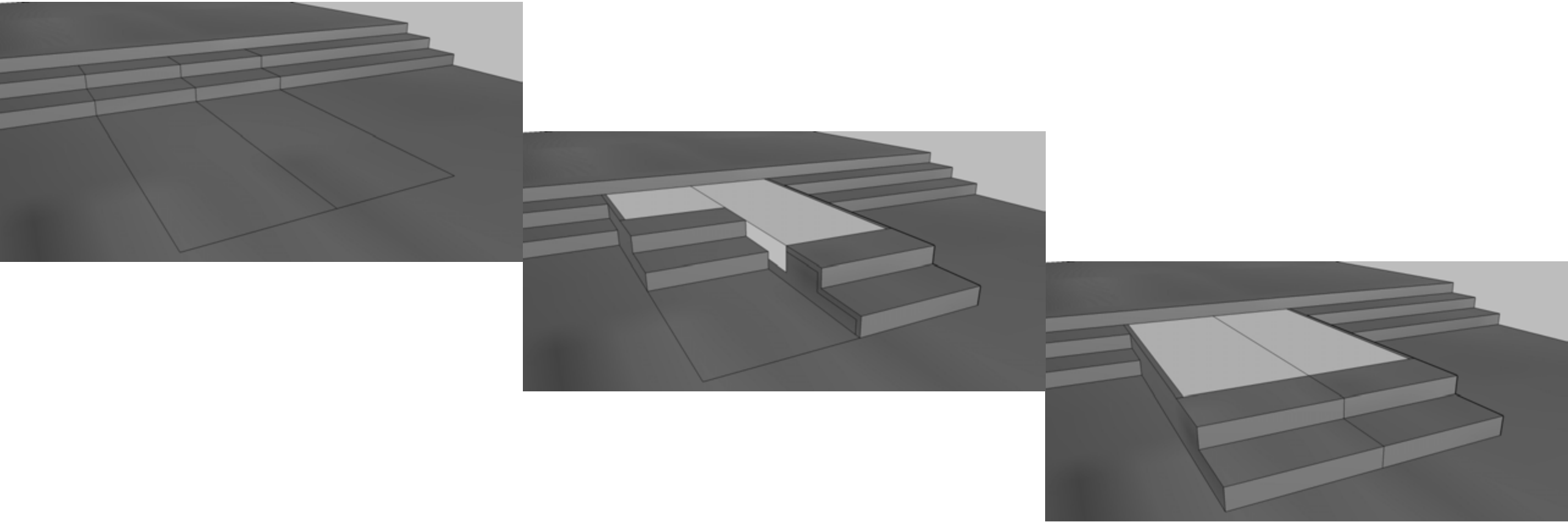
Based on the "single room concept" our bedroom is flexible in it's use like the rest of the house. When not in use the bed will be tucked away into the cavity the floor underneath the living space. The Section to the left shows the integration of the bed into the stairs.

The second step serves as a storage box for pillows and blankets. The bed is attached to soft rubber rolls which allows a gentle movement. The cladding of the bed consist of wooden elements. Straps are mounted onto the cladding, serving as pull straps.




1
I-411

Longitudinal Section
Scale 1:20 ref. drawing: I 431




2
I-411

3D Sight
no Scale


 SOLAR DECATHLON

Project

 SOLAR DECATHLON 2009


TEAM GERMANY


Constructor

 TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend





DrawnMK

Issued05/18/09

Last index05/30/09

Component

Interiors - Bedroom

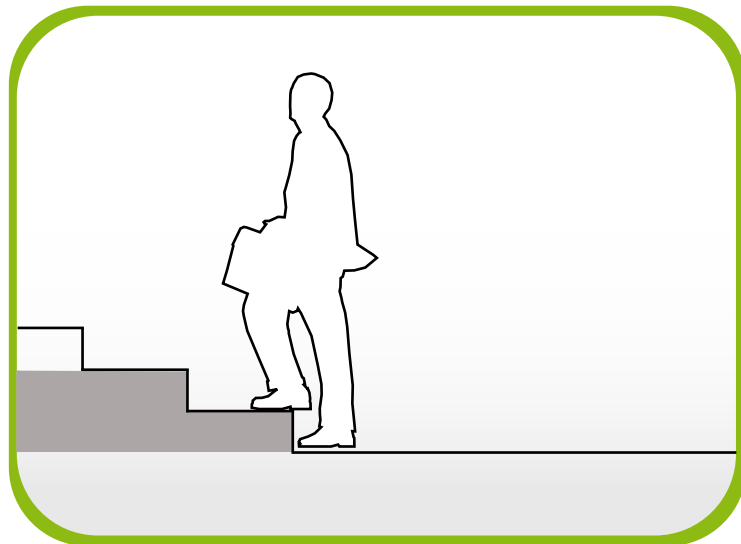
Description

Concept Bedroom

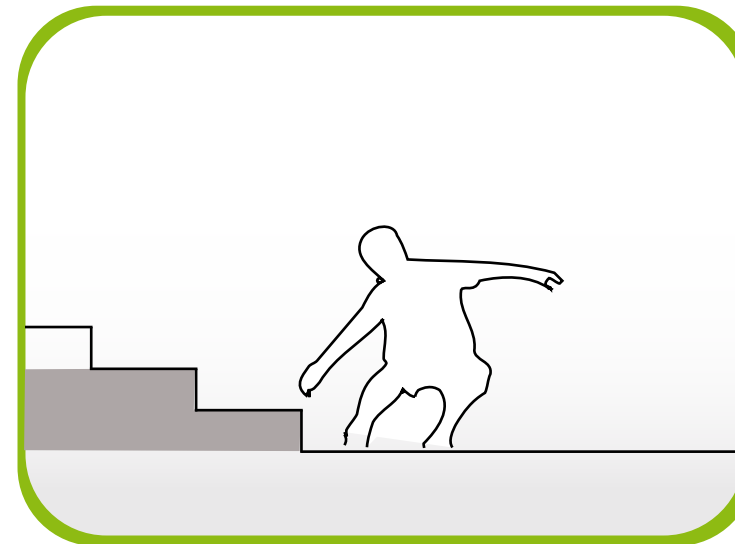
Project #P 140

Scale

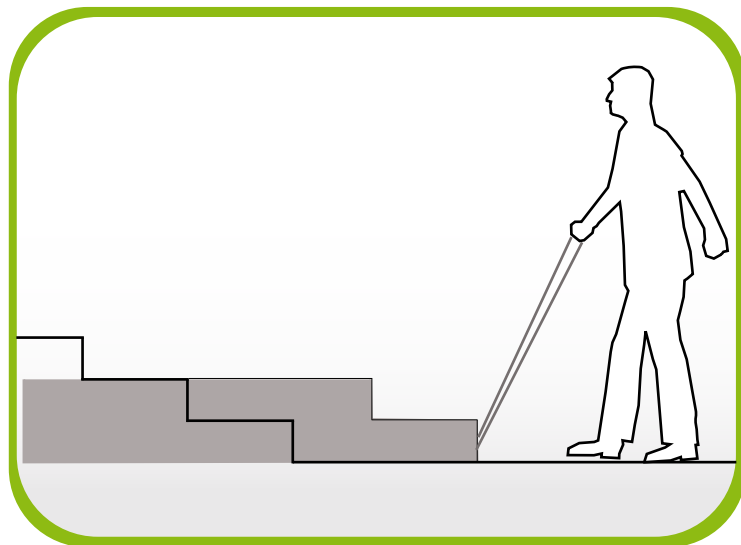
dwg #I-411



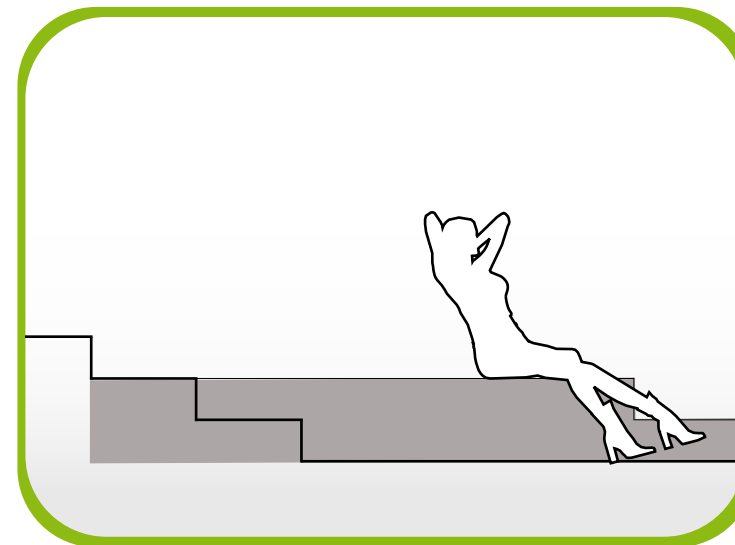
1 Livingroom
I-412 Sketch without scale




2 Take the Ropes ...
I-412 Sketch without scale





3 ...and pull it!
I-412 Sketch without scale



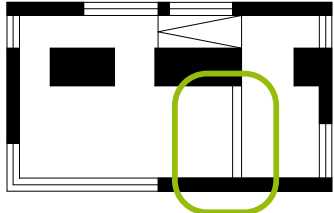

4 Bedroom
I-412 Sketch without scale


SOLAR DECATHLON

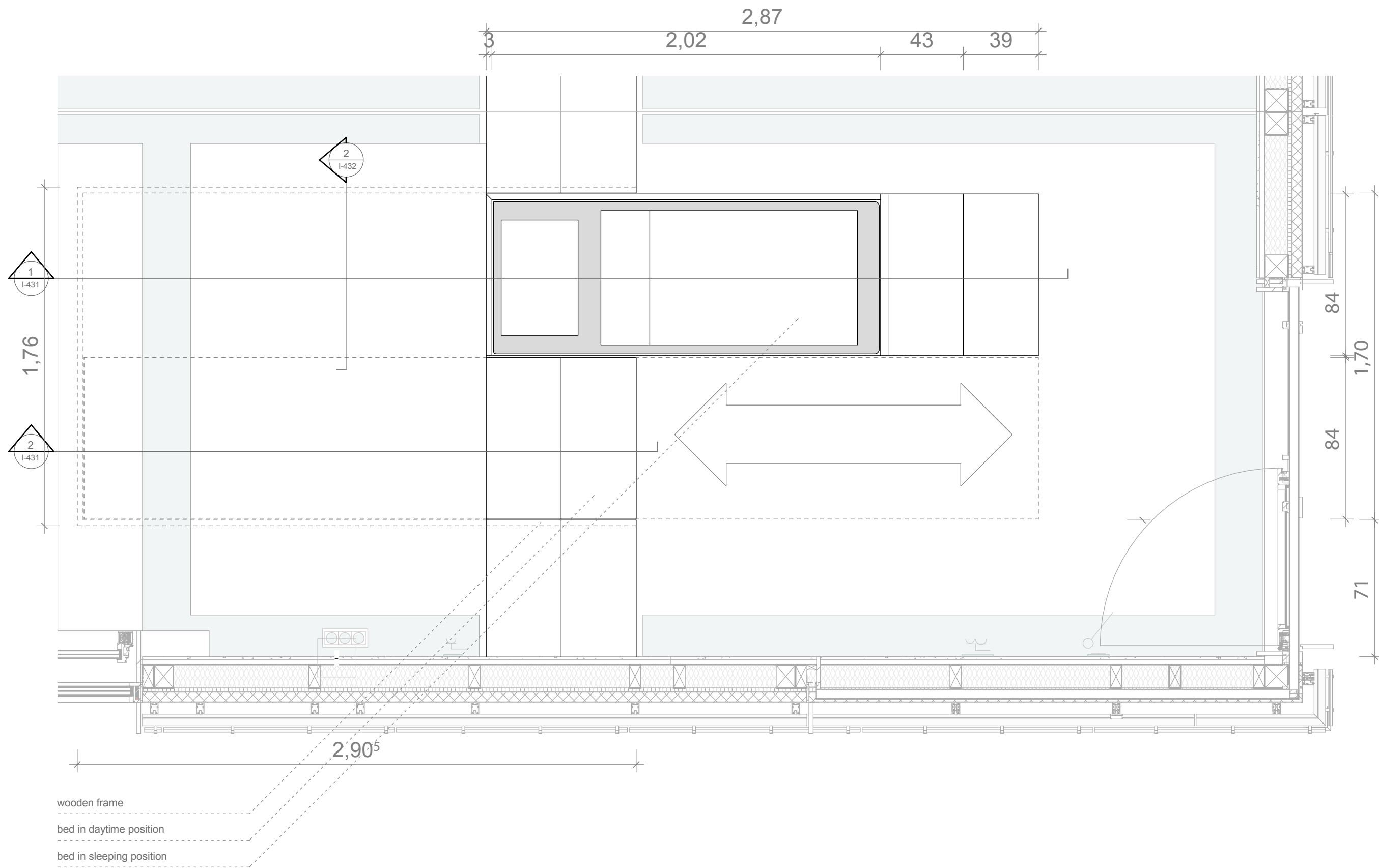
Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

**TECHNISCHE
UNIVERSITÄT
DARMSTADT**

Department of Architecture
 Energyefficient Building Design
 Unit
 El-Lissitzky-Str. 1
 64287 Darmstadt
 +49 (0) 6151 / 165448
 +49 (0) 6151 / 165247
 team@solardecathlon2009.de

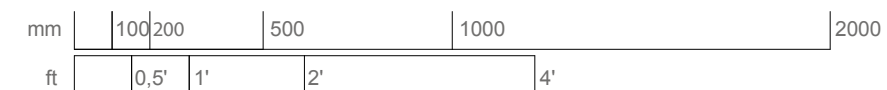
Navigation/Legend




Drawn	MK	
Issued	09/05/30	
Last index	09/05/30	
Component	Interiors - Bedroom	
Description	Manual Bed	
Project #	Scale	dwg #
P 140		I-412




1 Floor Plan Bedroom
I-421 Scale 1:20

1:20




**SOLAR DECATHLON**

Project

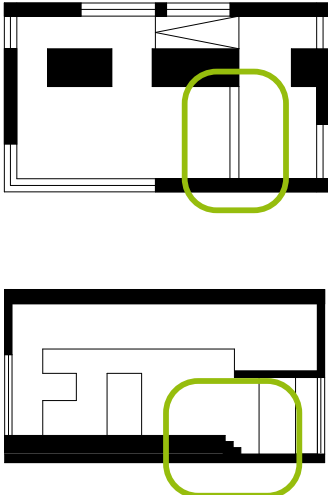
**SOLAR DECATHLON 2009**
TEAM GERMANY

Constructor

**TECHNISCHE UNIVERSITÄT DARMSTADT**

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



Drawn **MK**

Issued **05/18/09**

Last index **05/30/09**

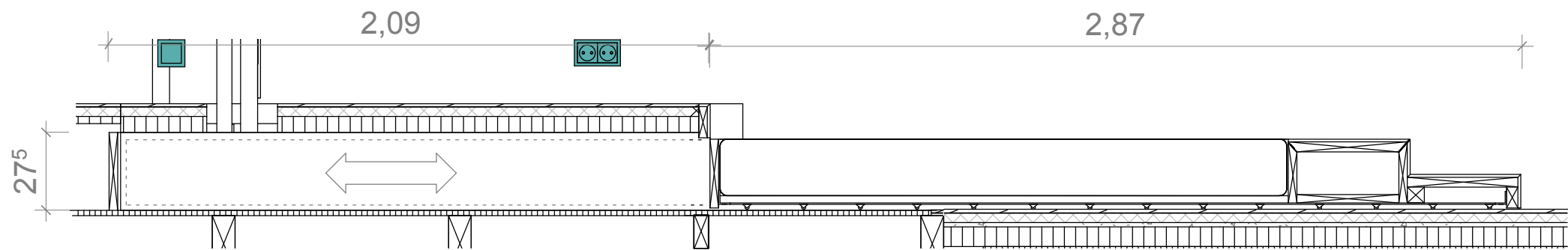
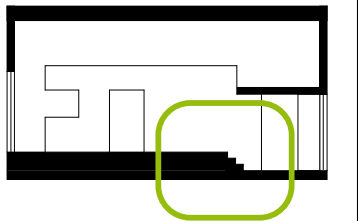
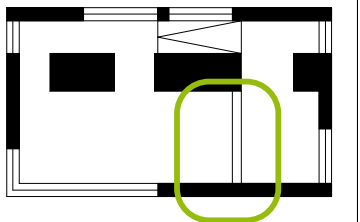
Component
Interiors - Bedroom

Description
Floor Plan Bed

Project #
P 140

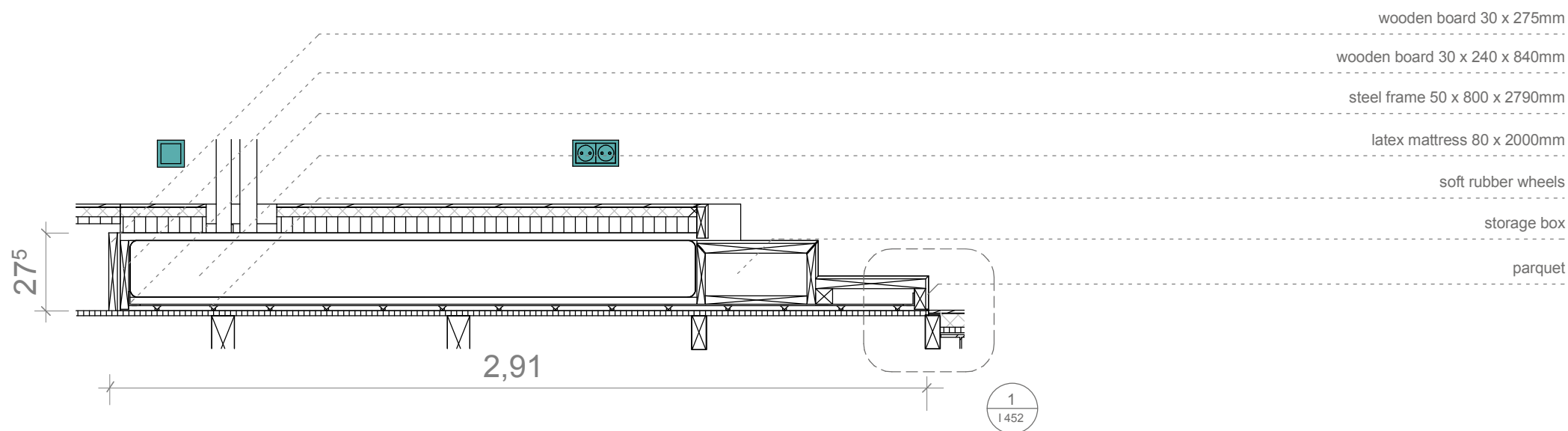
Scale
1 : 20

dwg #
I-421



1
I-431

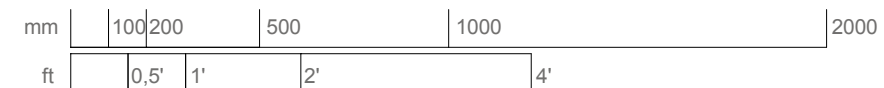
Bed in sleeping position
Scale 1:20 ref. drawing: I-421



2
I-431

Bed in daytime position
Scale 1:20 ref. drawing: I-421

1:20

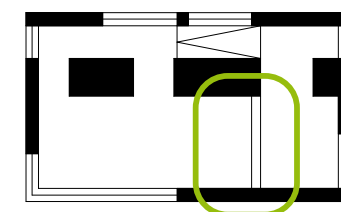


Drawn MK
Issued 05/18/09
Last index 05/30/09

Component
Interiors - Bedroom

Description
**Longitudinal Section
Bed**

Project # Scale dwg #
P 140 1 : 20 I-431

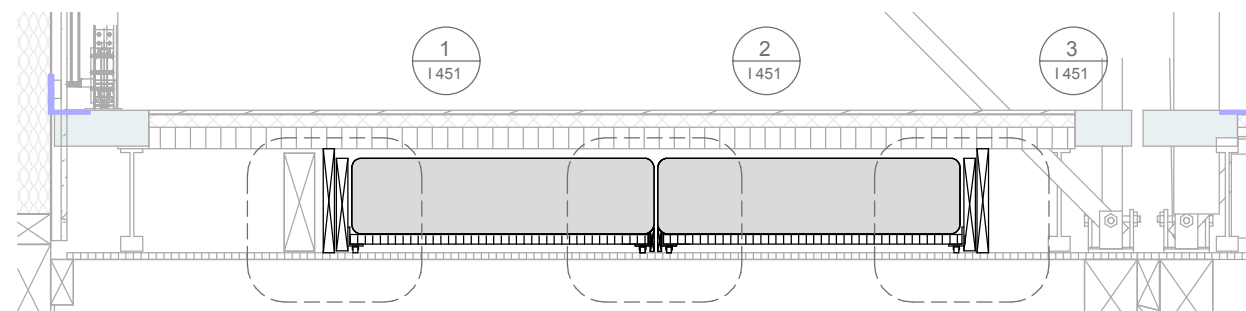


Drawn	MK
Issued	05/18/09
Last index	05/30/09

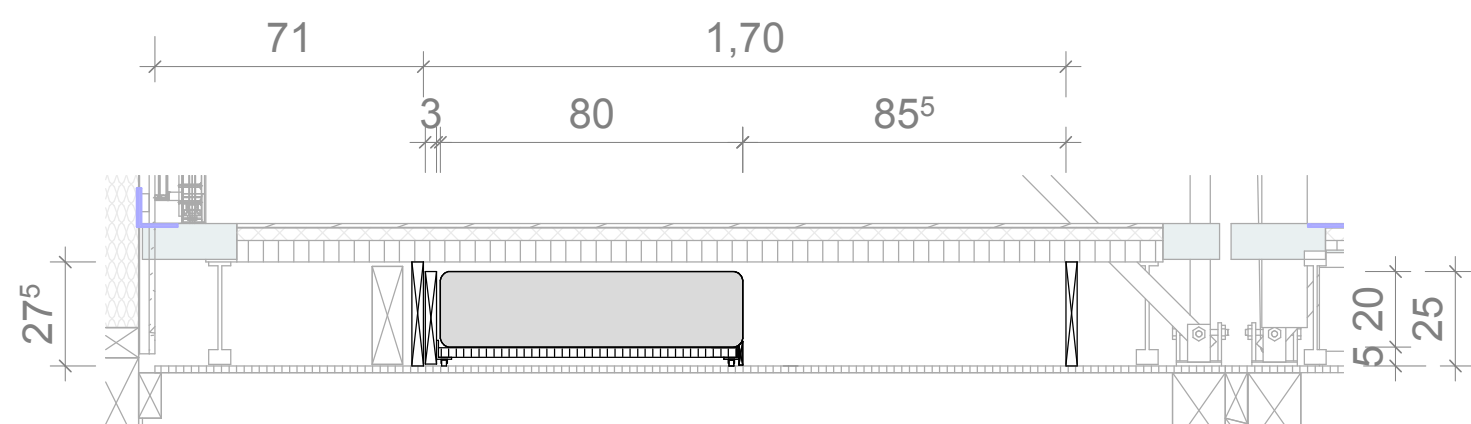
Component	Interiors - Bedroom
-----------	---------------------

Description	Across Section Bed
-------------	--------------------

Project #	Scale	dwg #
P 140	1 : 20	I-432

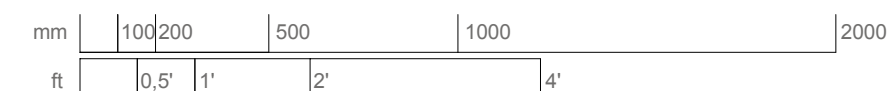


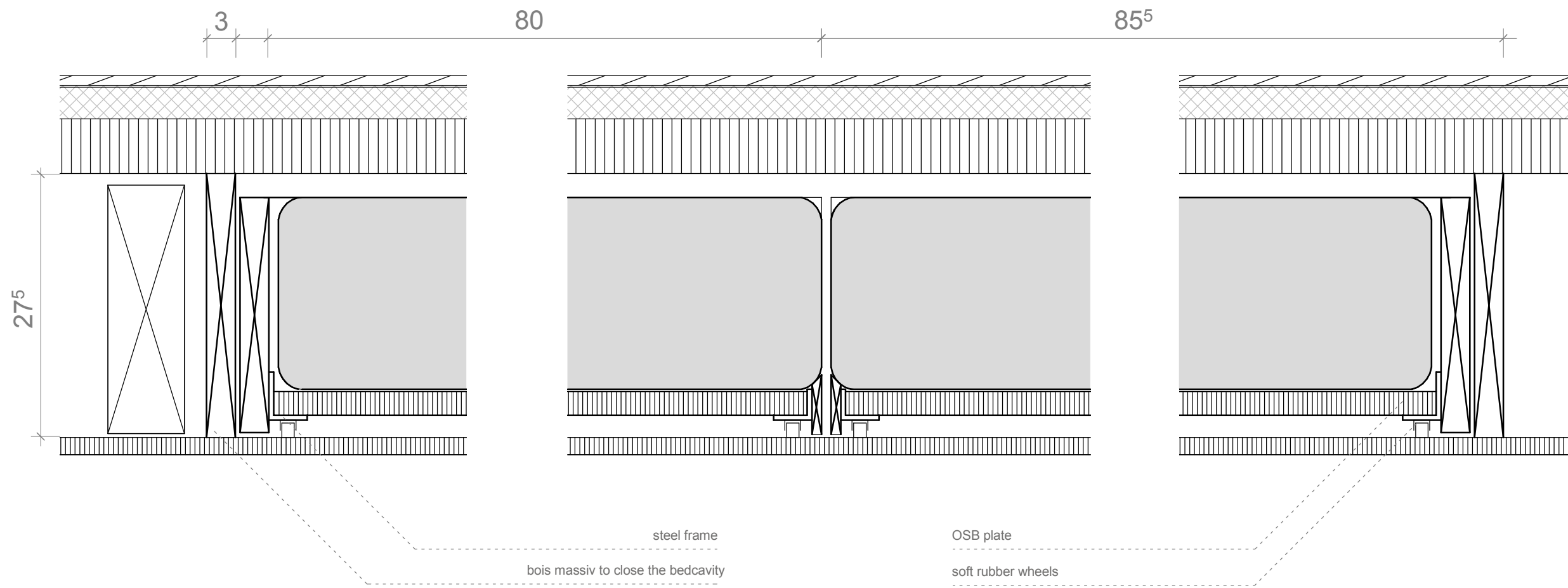
1
I 432
Both Beds in daytime position
Scale 1:20



2
I 432
One Bed in daytime position
Scale 1:20 ref. drawing: I-421

1:20





1 Construction Detail / Side
I-451 Scale 1:5 ref. drawing: I-432

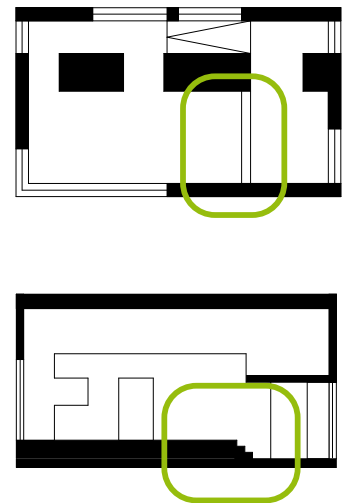
2 Construction Detail / Centre
I-451 Scale 1:5 ref. drawing: I-432

3 Construction Detail / Side
I-451 Scale 1:5 ref. drawing: I-432

1:5



Navigation/Legend

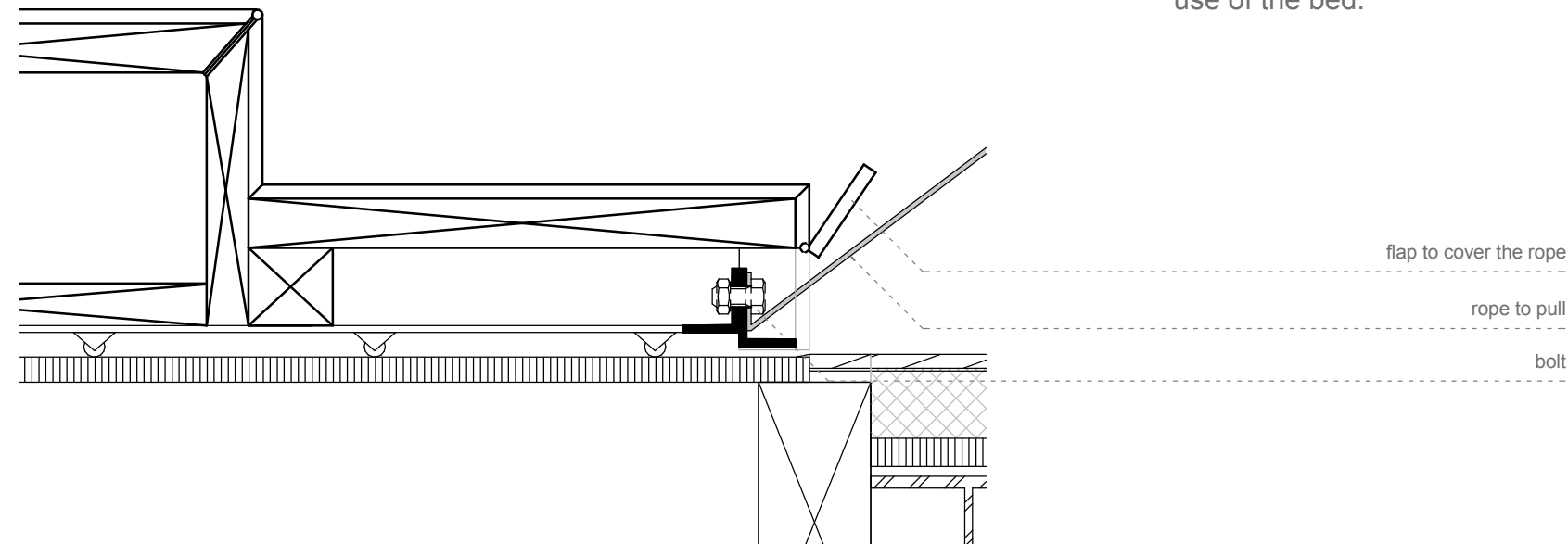


Drawn MK
Issued 05/18/09
Last index 05/30/09

Component
Interiors - Bedroom

Description
Construction Detail
Bed

Project # Scale dwg #
P 140 1 : 5 I-451

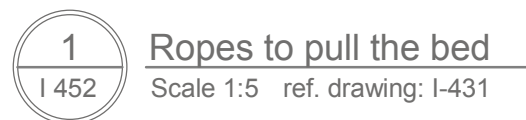


How to bring the bed in sleeping position

If you would like to use the bed, you have to work a little bit. First open the flaps at the bottom of the first step. After this, take out the pull straps and tug them gently. The bed will slide out of its storage space.

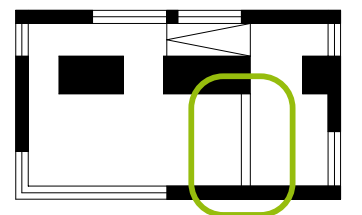
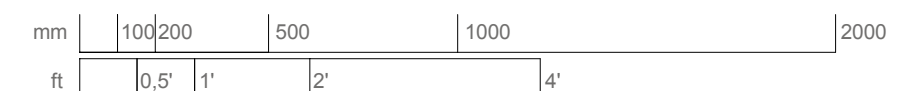
To prevent accidents during the public tours, the bed can be locked at different positions.

If necessary we would integrate a motor for mechanical movement or we would protect the bed with a lock. Thi will assure that there is everytime a guided use of the bed.



Ropes to pull the bed
Scale 1:5 ref. drawing: I-431

1:20



Drawn MK
Issued 05/18/09
Last index 05/30/09

Component
Interiors - Bedroom

Description
Ropes for Opening

Project # Scale dwg #
P 140 1 : 5 I-452

The bathroom is a link between two elements of the house.

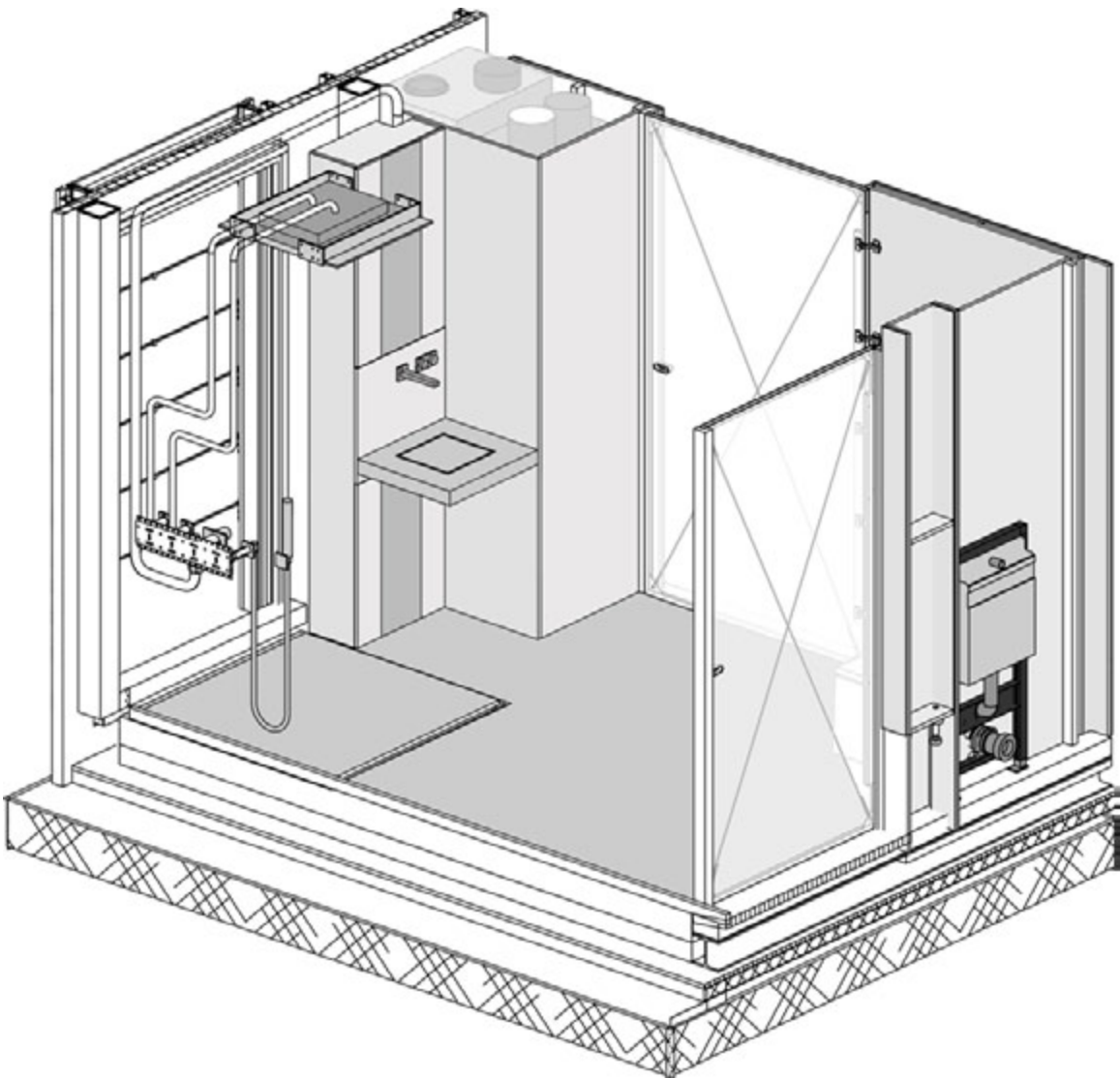
First of all it is a part of the “multi-functional body”. This term comprises bathroom, toilet, kitchen, stairs, but also all the solar energy technology built into the house.

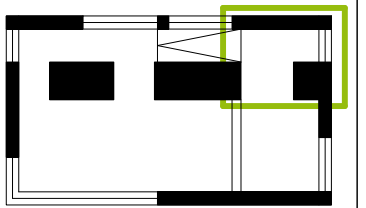
Two large doors allow entrance to the bathroom. When thre doors are closed, they hide the toilet area from the rest of the house. And even if they are open, they separate both, the entrance area and the bedroomarea from the bathroom. Oppo-
site the toilet area there is a further important part of the multifunctional body which includes a small cupboard and the water basin as well as the heat pump.





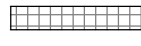

Secondly the bathroom opens the way from the entrance of the house to the bedroom area. The on grade shower basin fits exactly to the wooden flooring and the rain shower integrated into the ceiling can only be recognised if you watch closely.

The window of the bathroom which is inte-
grated into the shower area directly is a special feature. When the bathroom is used, flexible and adjustable louvers protect anybody against views from outside.

As soon as the louvers are opened, they support both the way from the entrance to the bedroom area and the bathroom with daylight. That provides comfortable light conditions.





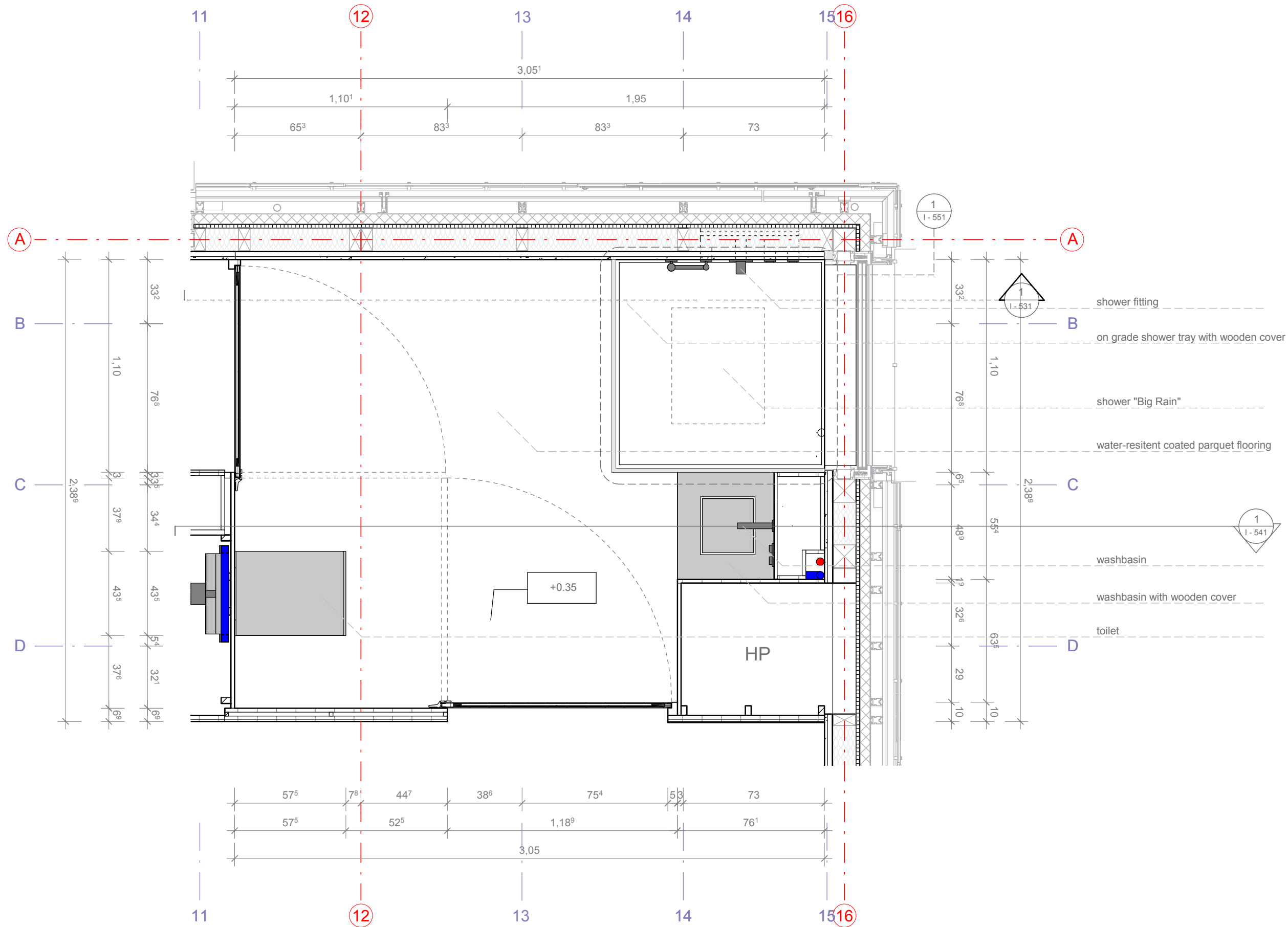
-  fresh water pipe
-  warm water pipe
-  waste water pipe
-  medium density fiberboard
-  shower tray
-  parquet

Drawn CR
Issued 05/05/09
Last index

Component
Interiors - Bathroom

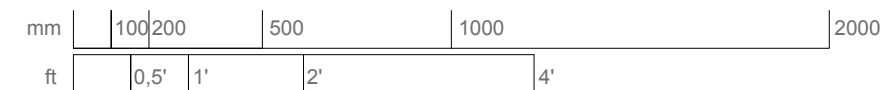
Description
Floor Plan

Project # Scale dwg #
P 140 1 : 20 I - 521





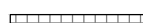



1 Floor Plan Bathroom
Scale 1:20

1:20





-  fresh water pipe
-  warm water pipe
-  waste water pipe
-  medium density fiberboard
-  shower tray
-  parquet

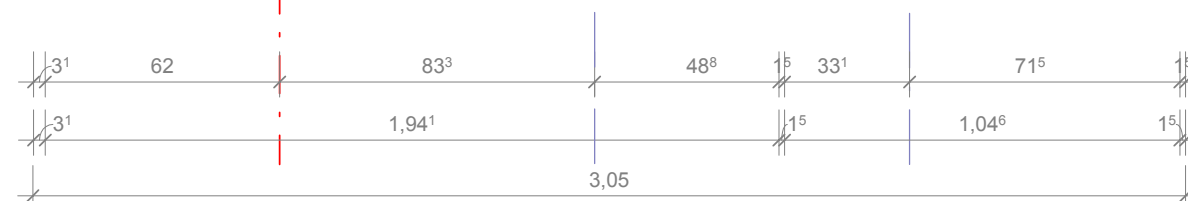
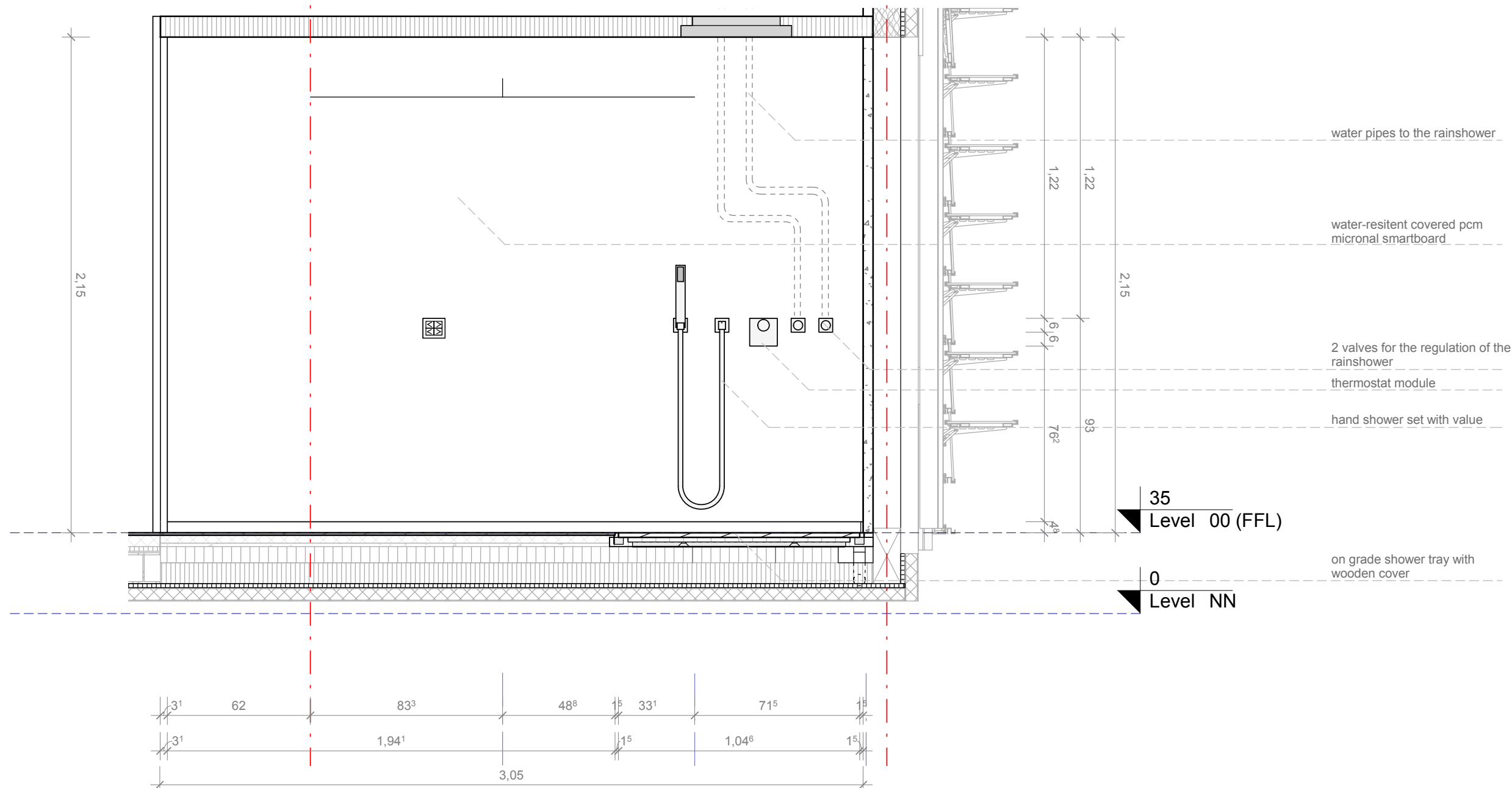
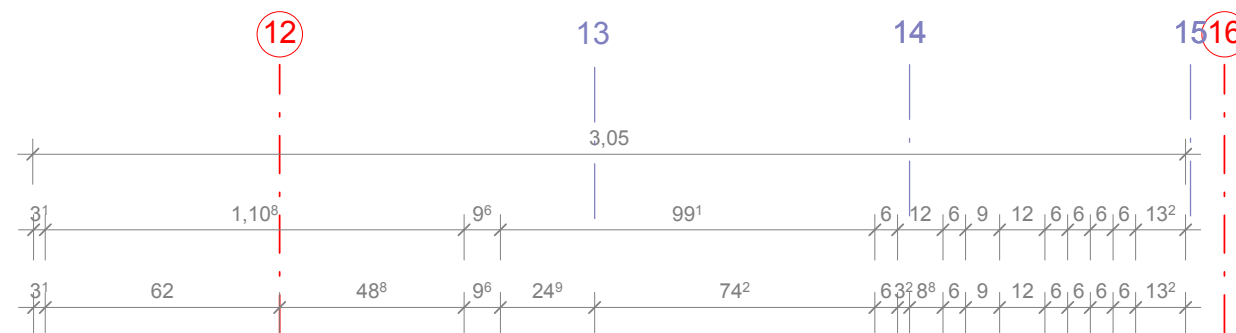
Drawn CR

Issued 05/05/09

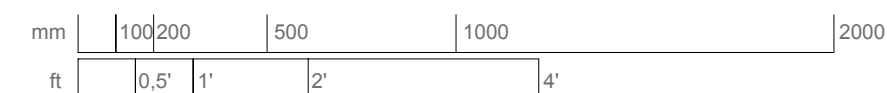
Last index

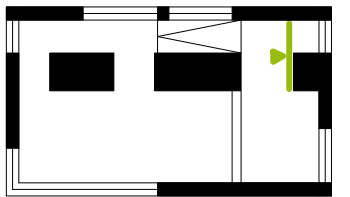
Component
Interiors - Bathroom

Description
Elevation North - Bathroom

Project # Scale dwg #
P 140 1 : 20 I - 531


1:20





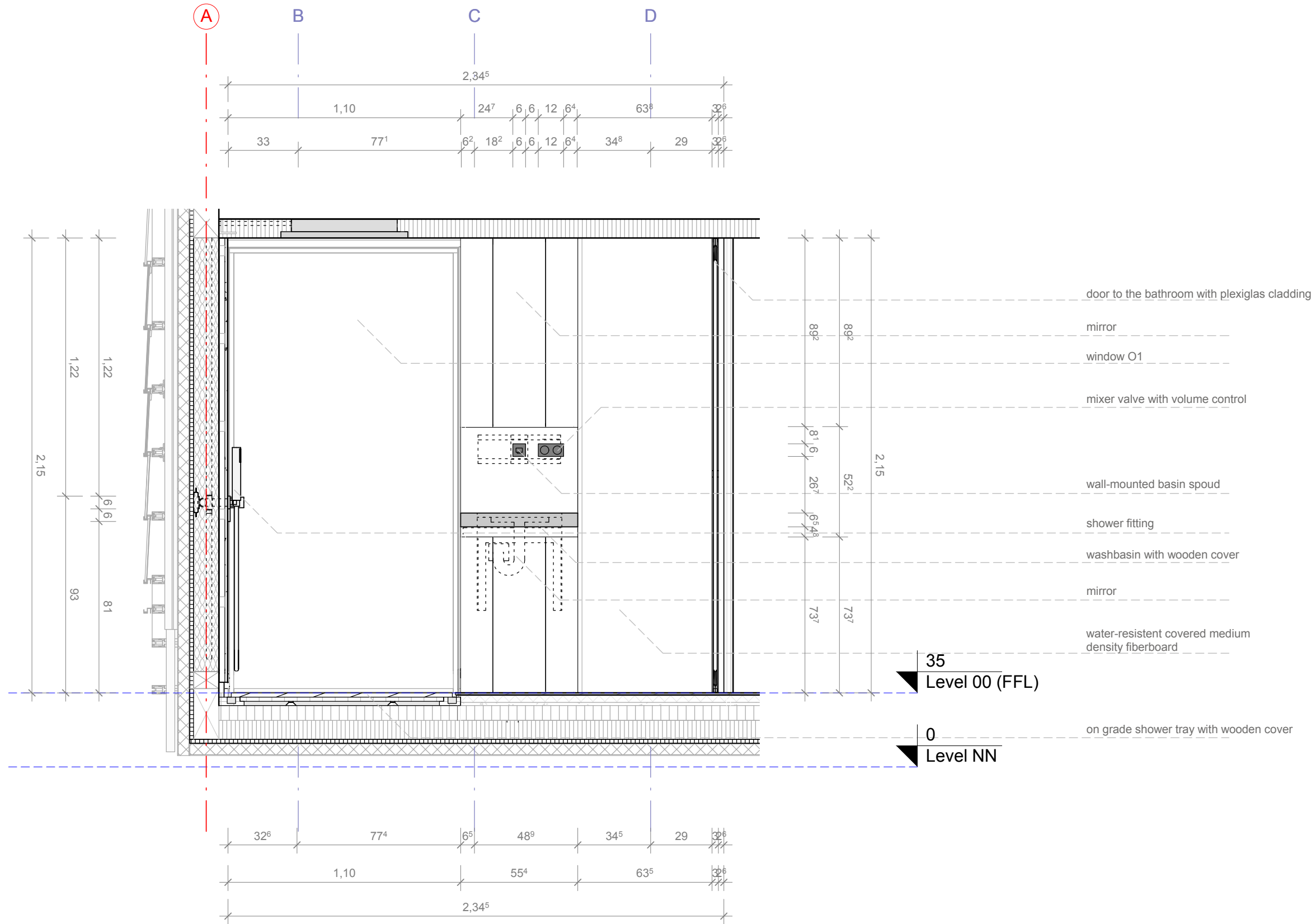
- fresh water pipe
- warm water pipe
- waste water pipe
- medium density fiberboard
- shower tray
- parquet

Drawn CR
Issued 05/05/09
Last index

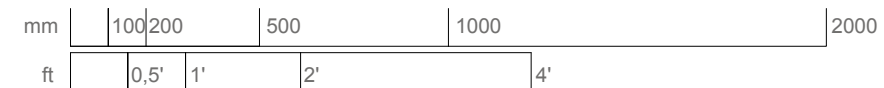
Component
Interiors - Bathroom

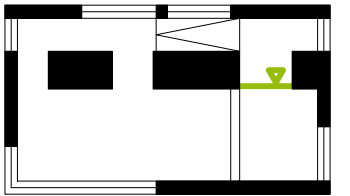
Description
Elevation East - Bathroom

Project # Scale dwg #
P 140 1 : 20 I - 532



1:20





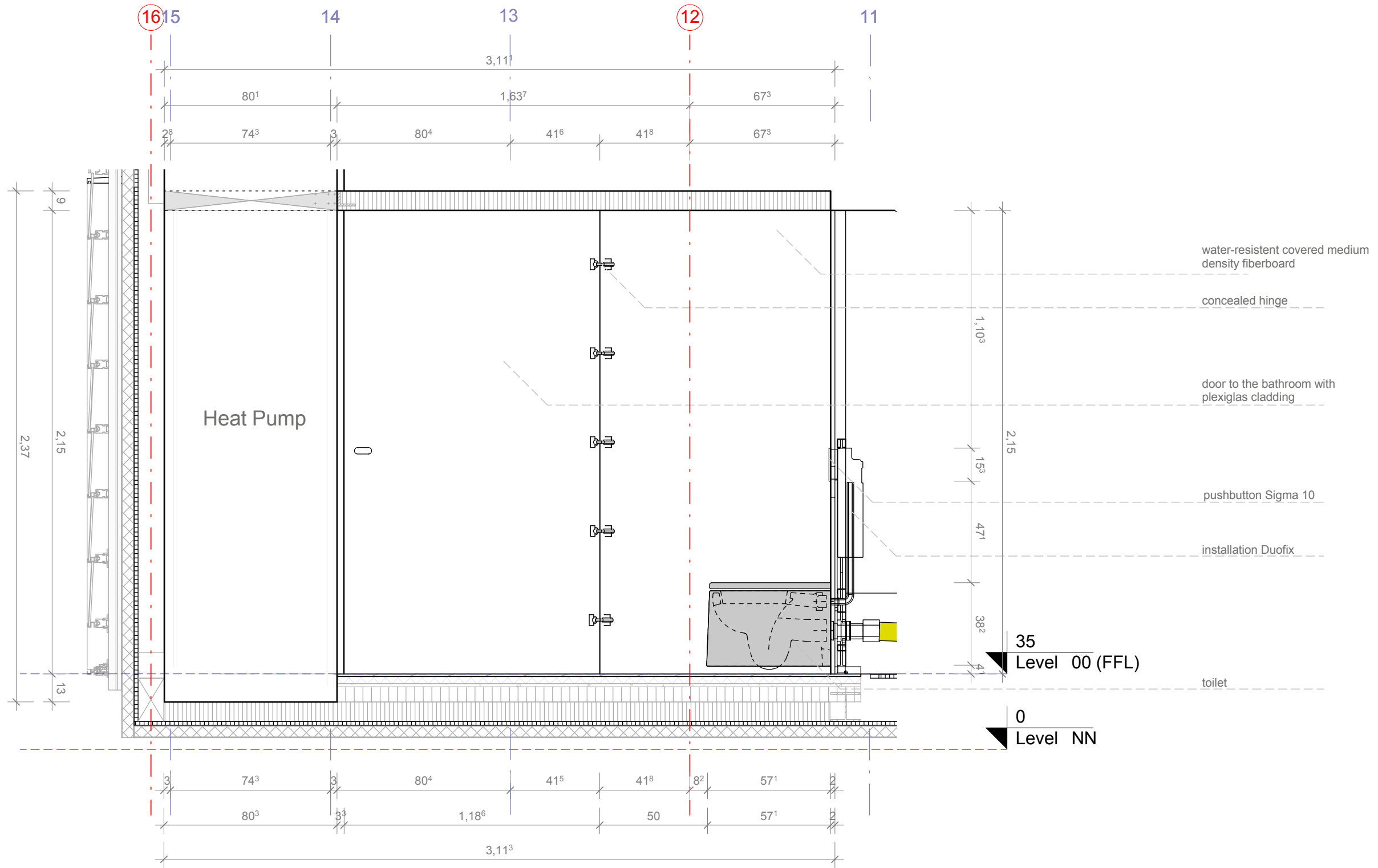
- fresh water pipe
- warm water pipe
- waste water pipe
- medium density fiberboard
- shower tray
- parquet

Drawn CR
Issued 05/05/09
Last index

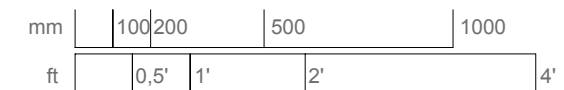
Component
Interiors - Bathroom

Description
Elevation South -
Bathroom

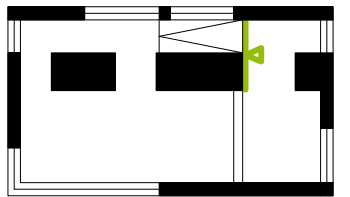
Project # Scale dwg #
P 140 1 : 20 I - 533



1:20



2000



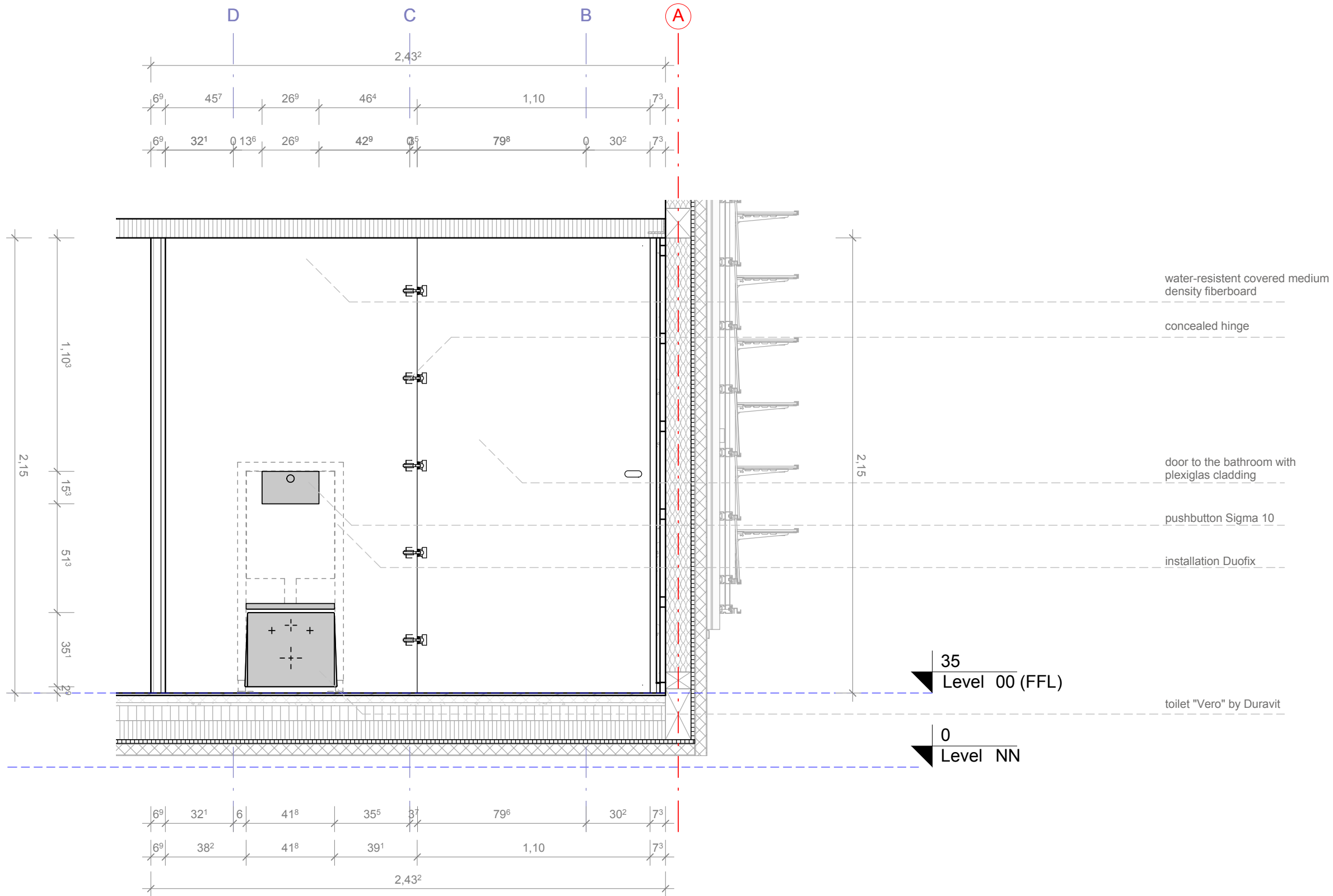
- fresh water pipe
- warm water pipe
- waste water pipe
- medium density fiberboard
- shower tray
- parquet

Drawn CR
Issued 05/05/09
Last index

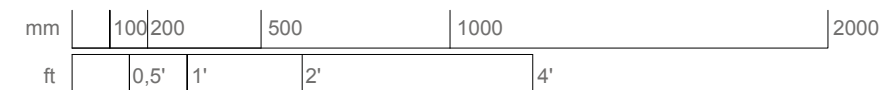
Component
Interiors - Bathroom

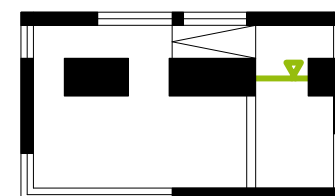
Description
Elevation West - Bathroom







Project # Scale dwg #
P 140 1 : 20 I - 534



1:20





-  fresh water pipe
-  warm water pipe
-  waste water pipe
-  medium density fiberboard
-  shower tray
-  parquet

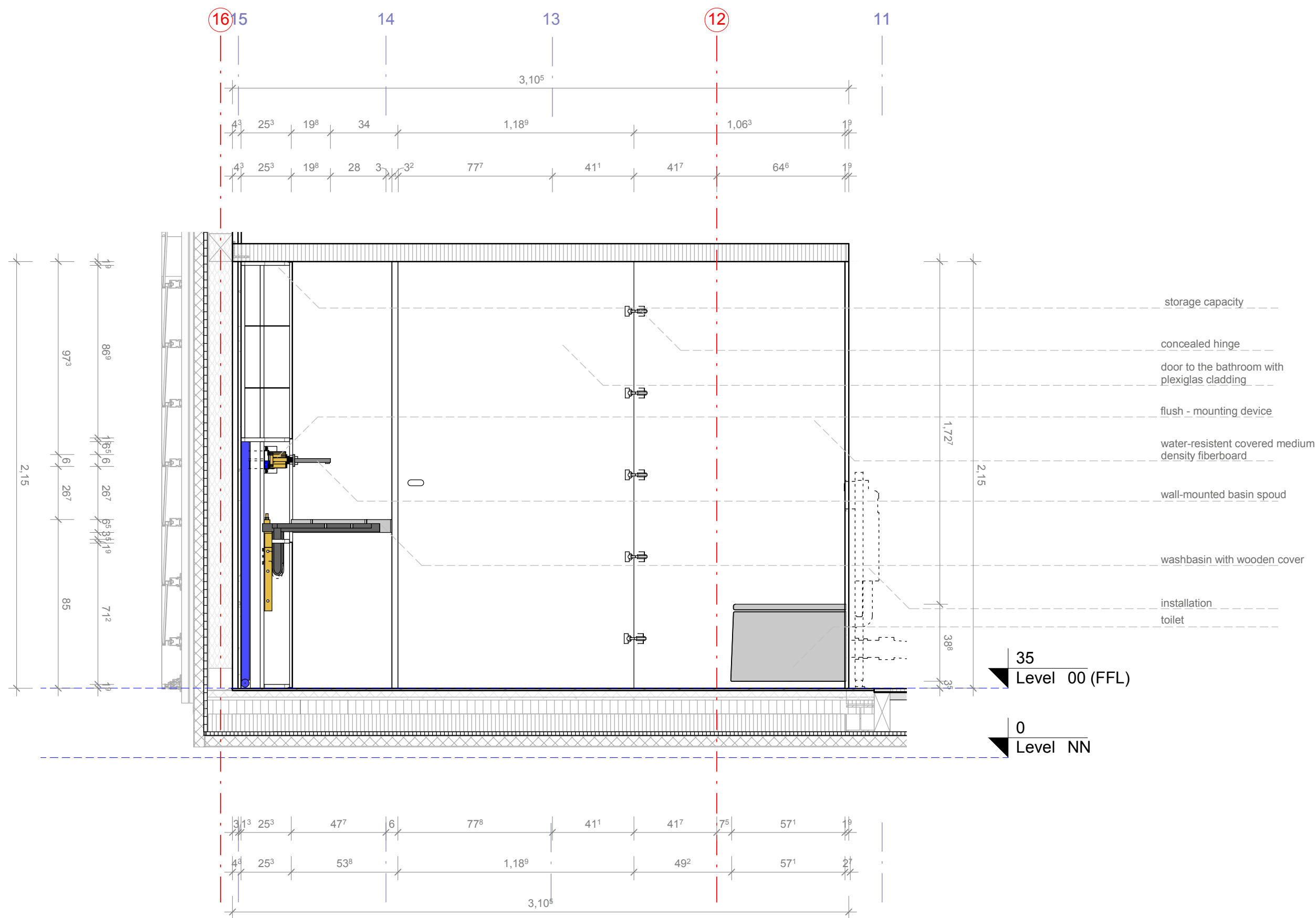
Drawn CR

Issued 05/05/09

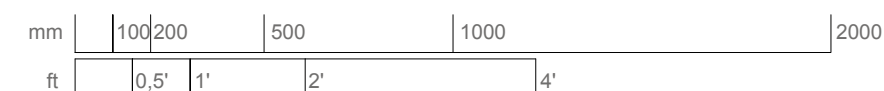
Last index

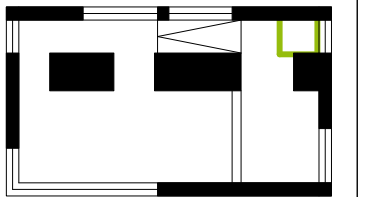
Component
Interiors - Bathroom



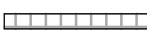

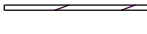
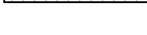




Description
**Longitudinal Section -
Bathroom**

Project # Scale dwg #
P 140 1 : 20 I - 541


1:20





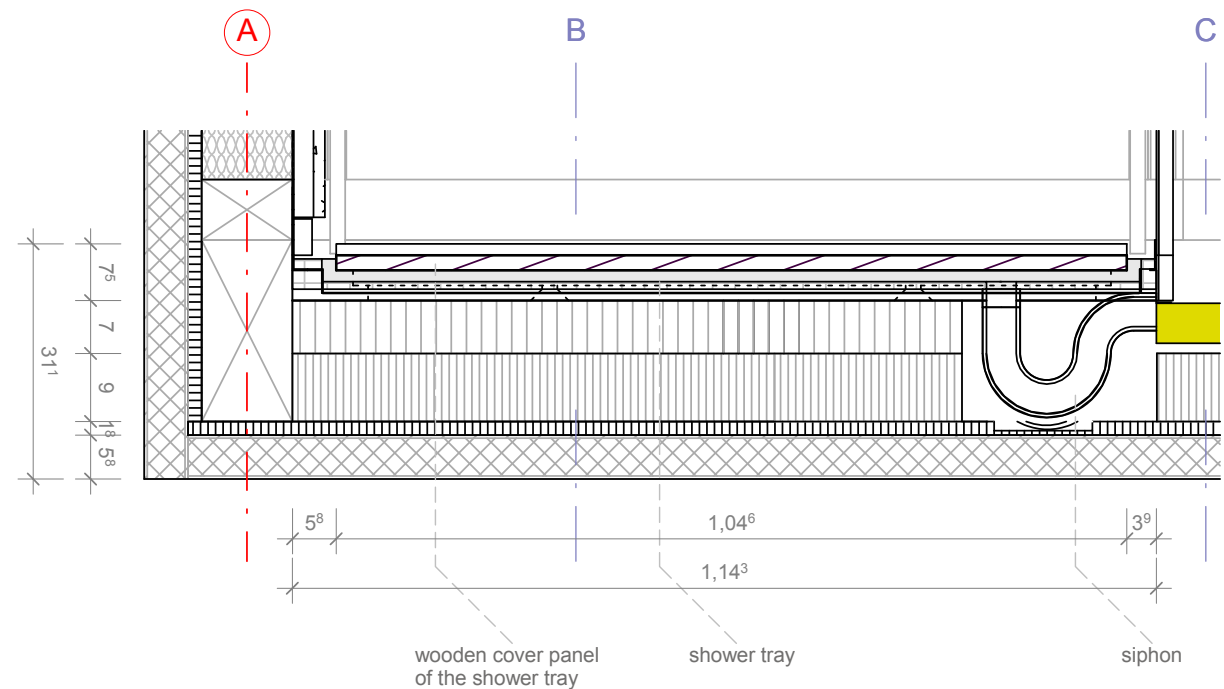
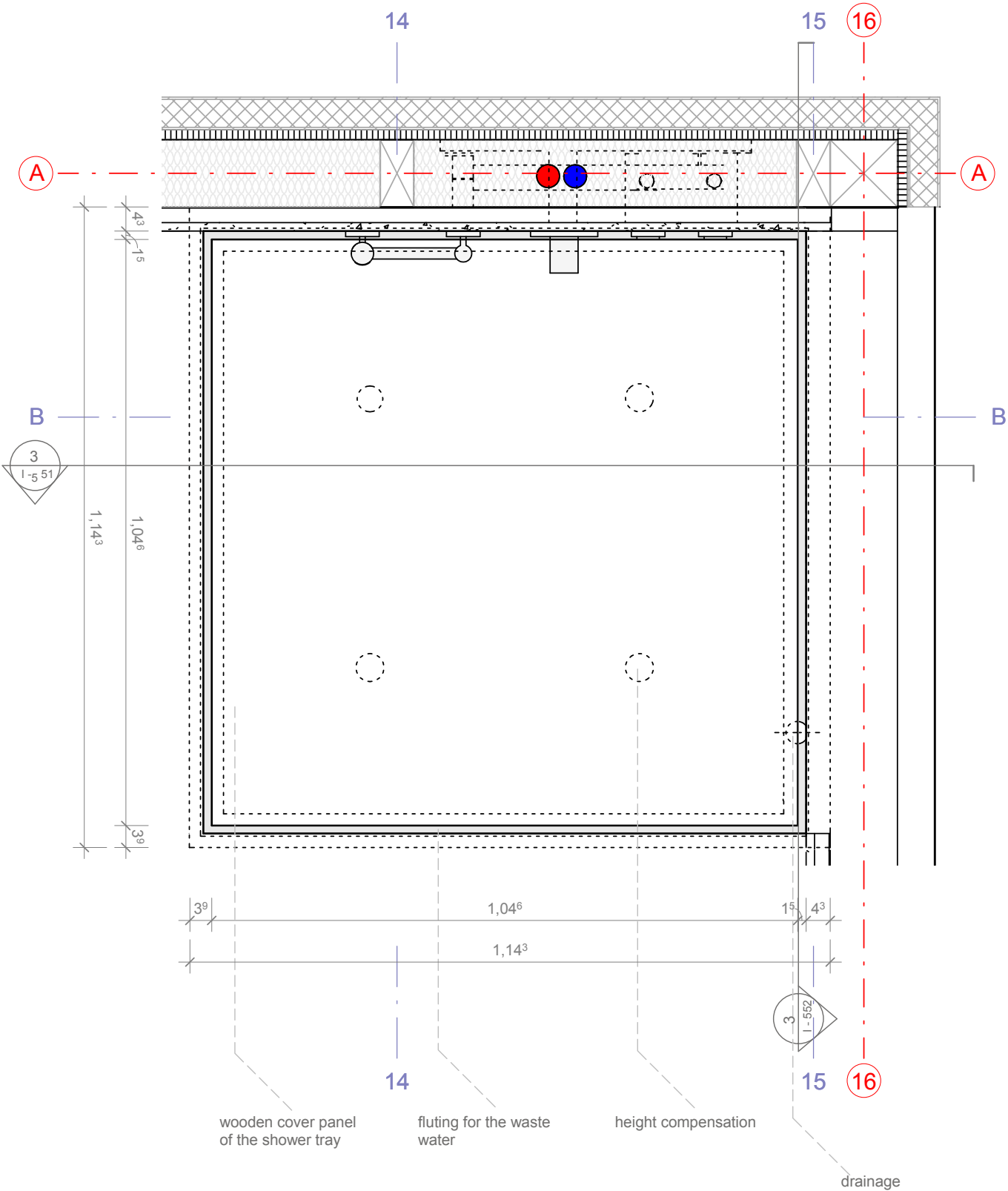
-  waste water pipe
-  wooden cover
-  cut:
pmma (showertray)
-  elevation:
pmma (showertray)
-  parquet
-  insulation
-  styrofoam
-  OSB
-  prefabricated
wood panels
-  plasterboard

Drawn **CR | JW**
Issued **05/12/09**
Last index

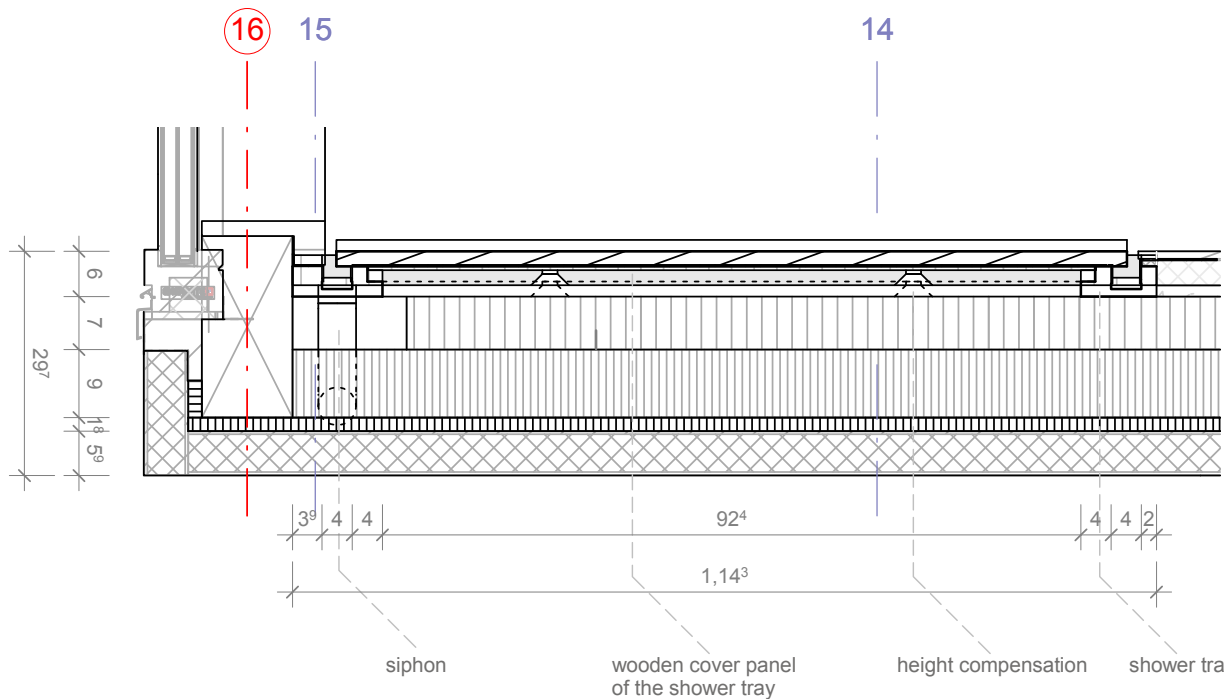
Component
Interiors - Bathroom

Description
Detail Shower Tray

Project # **P 140** Scale **1:10** dwg # **I - 551**



2
I - 551
Cross Section Shower Tray
Scale 1:10 ref. drawing: I - 551





3
I - 551
Longitudinal Section Shower Tray
Scale 1:10 ref. drawing: I - 551


1:10

mm	50	100	250	500	1000
ft	0,25'	0,5'	1'	2'	

BATHROOM SCHEDULE											
PlanNo.	Project Manual Division Master Format	Article Name	Article Manufacturer	Article Number	L	H	W	Quantity	cw	hw	wast
I - 521	Div.22	toilet	Duravit	221709	0,54 m	0,34m	0,34m	1	x	-	x
I - 521	Div.22	toilet seat	Duravit	006769	0,54 m	0,34m	0,03m	1	-	-	-
I - 521	Div.22	washbasin	KleinDesign	specialmodel	0,50m	0,50m	0,10m	1	-	-	x
I - 521	Div.22	showerbasin	KleinDesign	specialmodel	1,14m	1,14m	0,08m	1	-	-	x
I - 521	Div.22	showerdisposer	Dornbracht	41400979	0,60m	0,60m	0,08m	1	x	x	-
I - 531	Div.22	showerdisposer sprinkler	Dornbracht	27809980	0,24 m	0,15m	0,07m	1	x	x	-
I - 531	Div.22	flush - mounting thermostat	Dornbracht	36416780	0,12m	0,12m	0,07m	1	x	x	-
I - 531	Div.22	flush - mounting device	Dornbracht	36310980	0,06m	0,06m	0,04m	2	-	-	-
I - 531	Div.22	mixing valve	Dornbracht	3552897090	0,36m	0,15m	0,12m	1	x	x	-
I - 521	Div.22	guiderail	Dornbracht	1231097090	0,51m	0,15m	0,03m	2	-	-	-
I - 521	Div.22	wall bracker	Dornbracht	3508597090	0,08m	0,15m	0,12m	2	x	x	-
I - 521	Div.22	faucet	Dornbracht	13800980	0,06m	0,06m	0,18m	1	x	x	-
I - 521	Div.22	flush - mounting device	Dornbracht	3569097090	0,12m	0,15m	0,12m	1	x	x	-
I - 552	Div.22	mixing valve	Dornbracht	36320980	0.12	0,06 m	0,04m	1	-	-	-
I - 552	Div.22	installation	Geberit	458.103.00.1	1,12 m	0,50m	0,12m	1	x	-	x
I - 552	Div.22	push-button	Geberit	115.770.xx.1	0,24m	0,16m	0,02m	1	-	-	-


SOLAR DECATHLON

Project

**SOLAR DECATHLON 2009
TEAM GERMANY**

Constructor

**TECHNISCHE
UNIVERSITÄT
DARMSTADT**

**Department of Architecture
Energyefficient Building Design
Unit**
 El-Lissitzky-Str. 1
 64287 Darmstadt
 +49 (0) 6151 / 165448
 +49 (0) 6151 / 165247
 team@solardecathlon2009.de

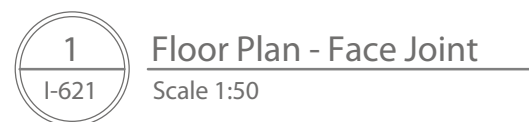
Navigation/Legend

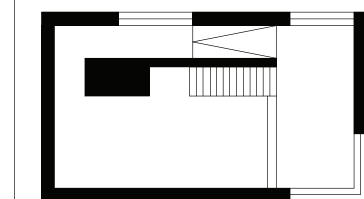
Drawn CR
 Issued 05/27/09
 Last index

Component
Interiors - Bathroom

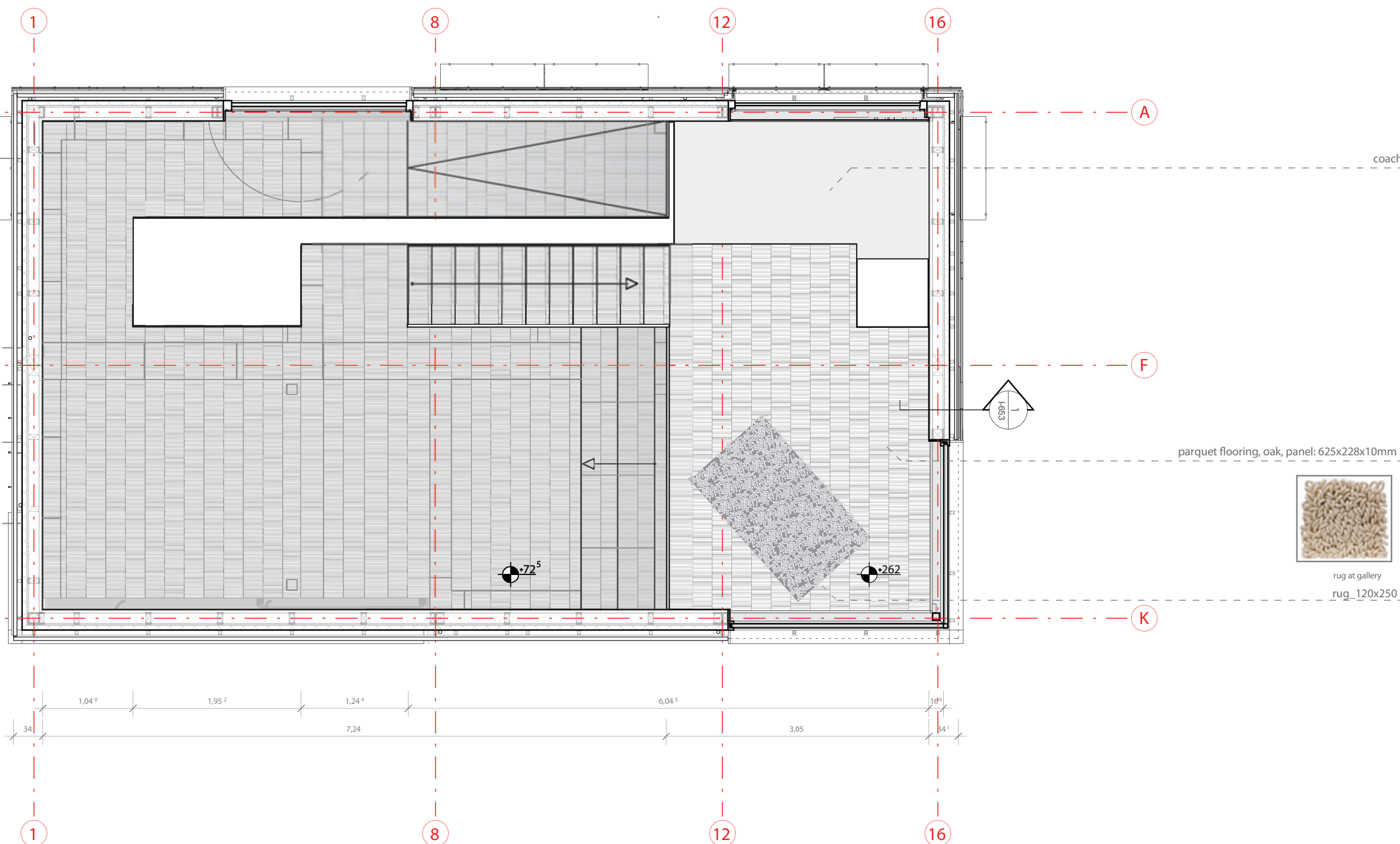
Description
Schedules - Bathroom

Project # Scale dwg #
P 140 I - 561





rug at gallery
rug_120x250



1 Floor Plan - level 1.5
Scale 1:50

1:50



Drawn JW
Issued 05/30/09
Last index

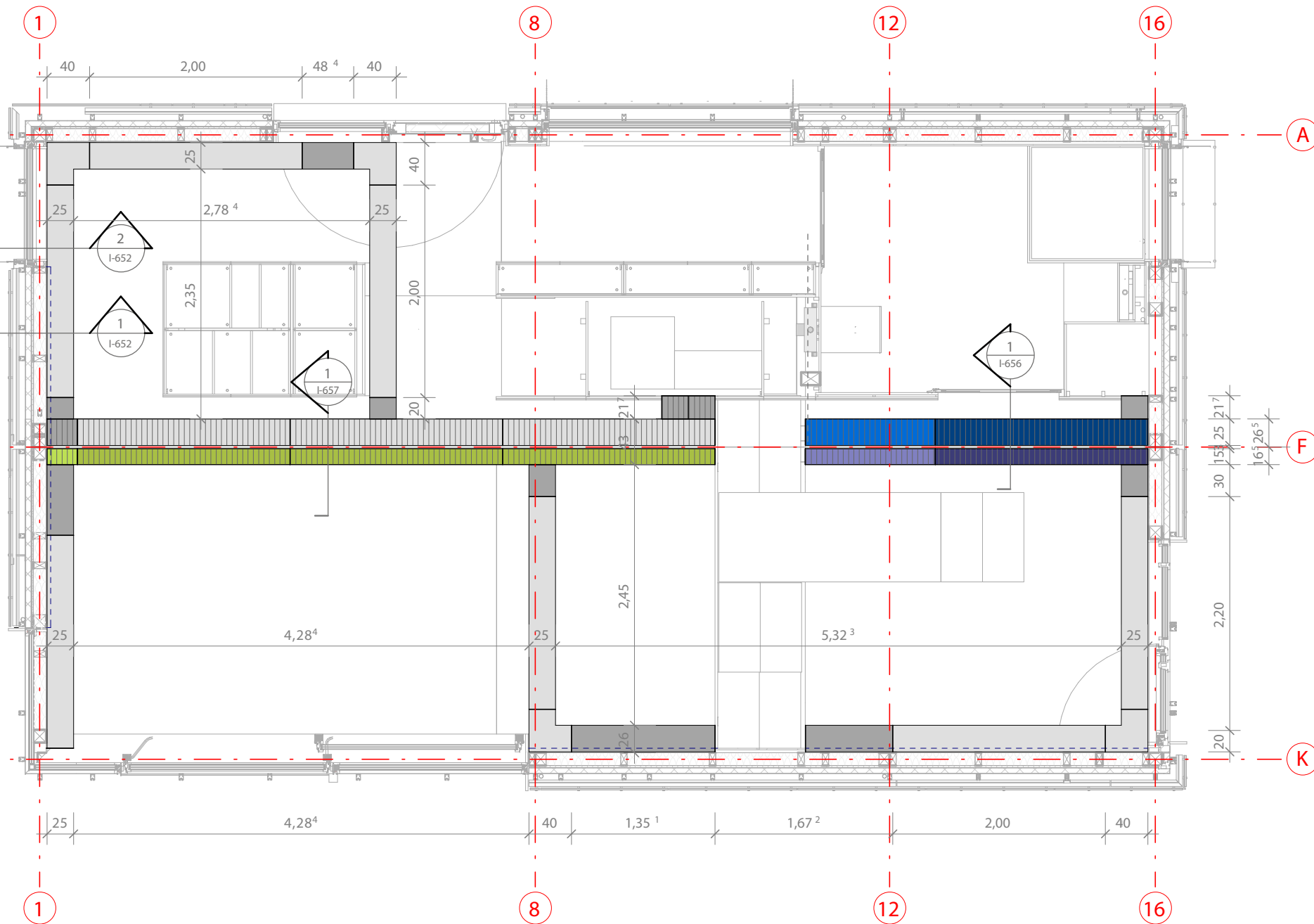
Component
Interiors - Flooring

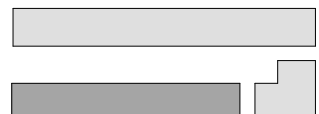
Description
Flooring Level 1.5


Project # Scale dwg #
P 140 1 : 50 I-622

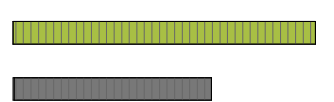


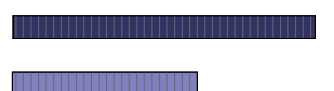
----- BKB cable conduit cover with brushes

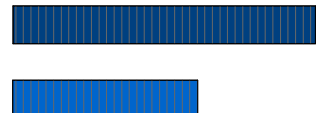



A - Ae

 BKB standard cable conduit
 width: 250mm depth: 85mm

B

 BKB by Tehalit
 standart cable conduit
 width: 250mm depth: 85mm
 + cover width: 430mm

C

 BKB by Tehalit
 special cable conduit
 width: 150mm depth: 85mm
 + cover width: 430mm

E

 BKB by Tehalit
 special cable conduit
 width: 150mm depth: 60mm
 + cover width 430mm

D

 BKB by Tehalit
 special cable conduit
 width: 250mm depth 60mm
 + cover width 430mm

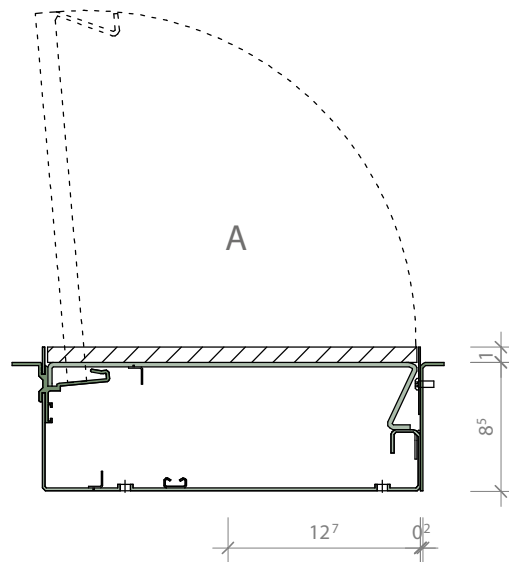
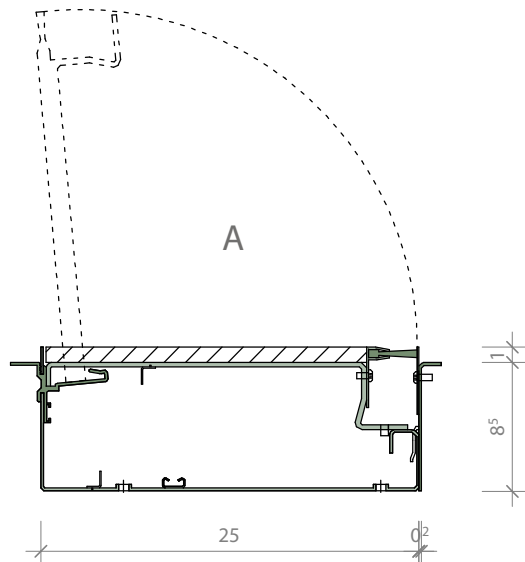
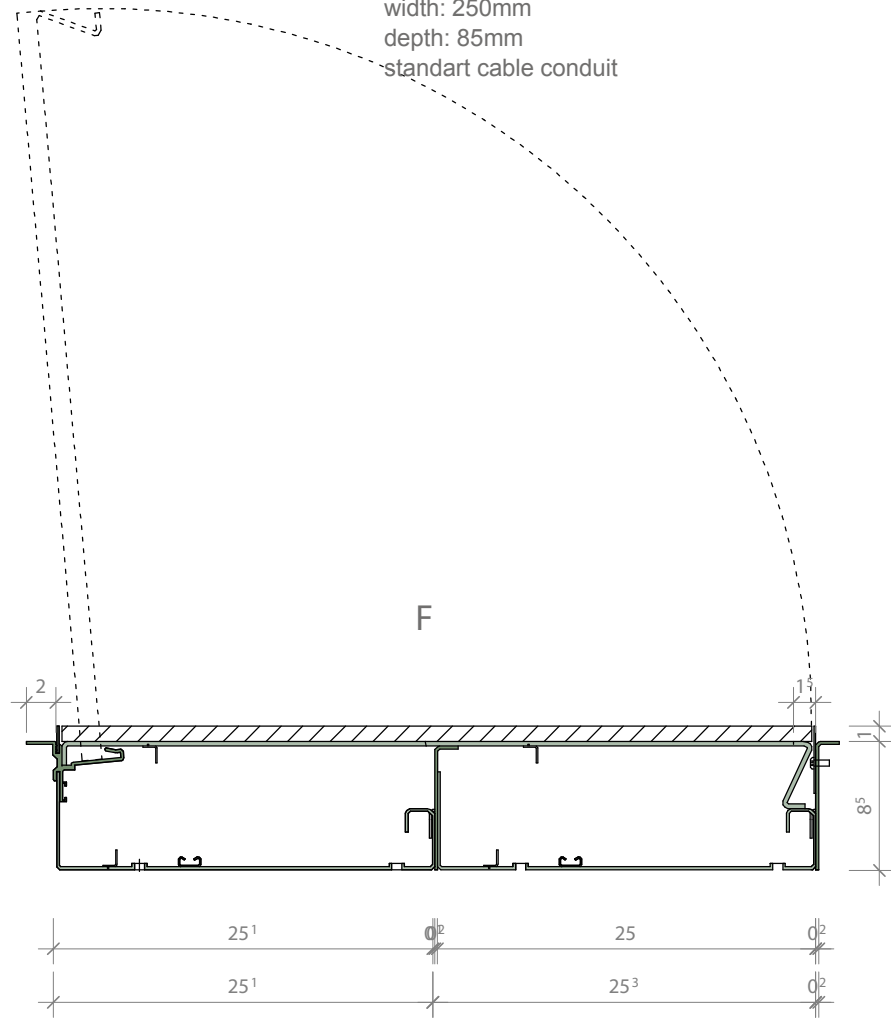
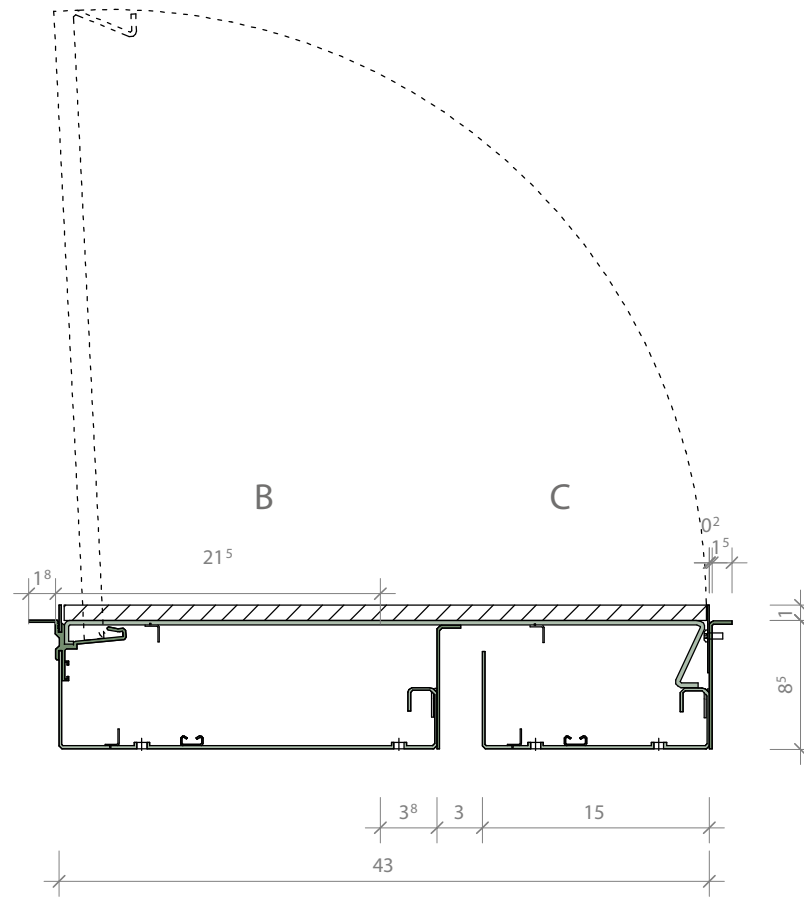
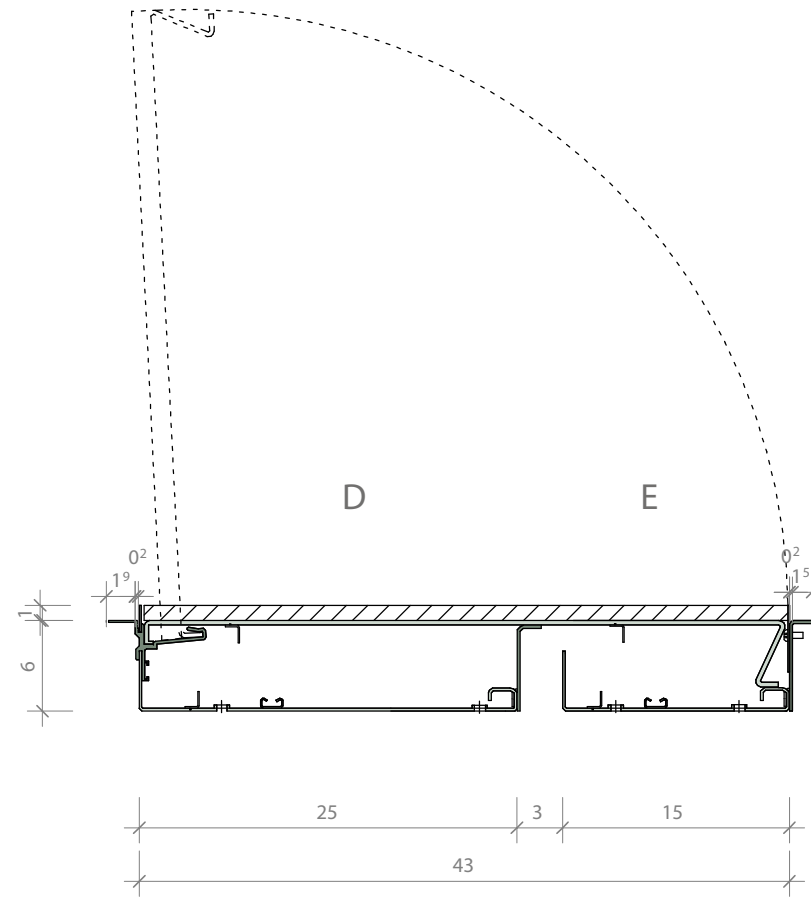
F

 BKB by Tehalit
 standart cable conduit
 width: 250mm depth: 85mm
 + cover width: 502mm

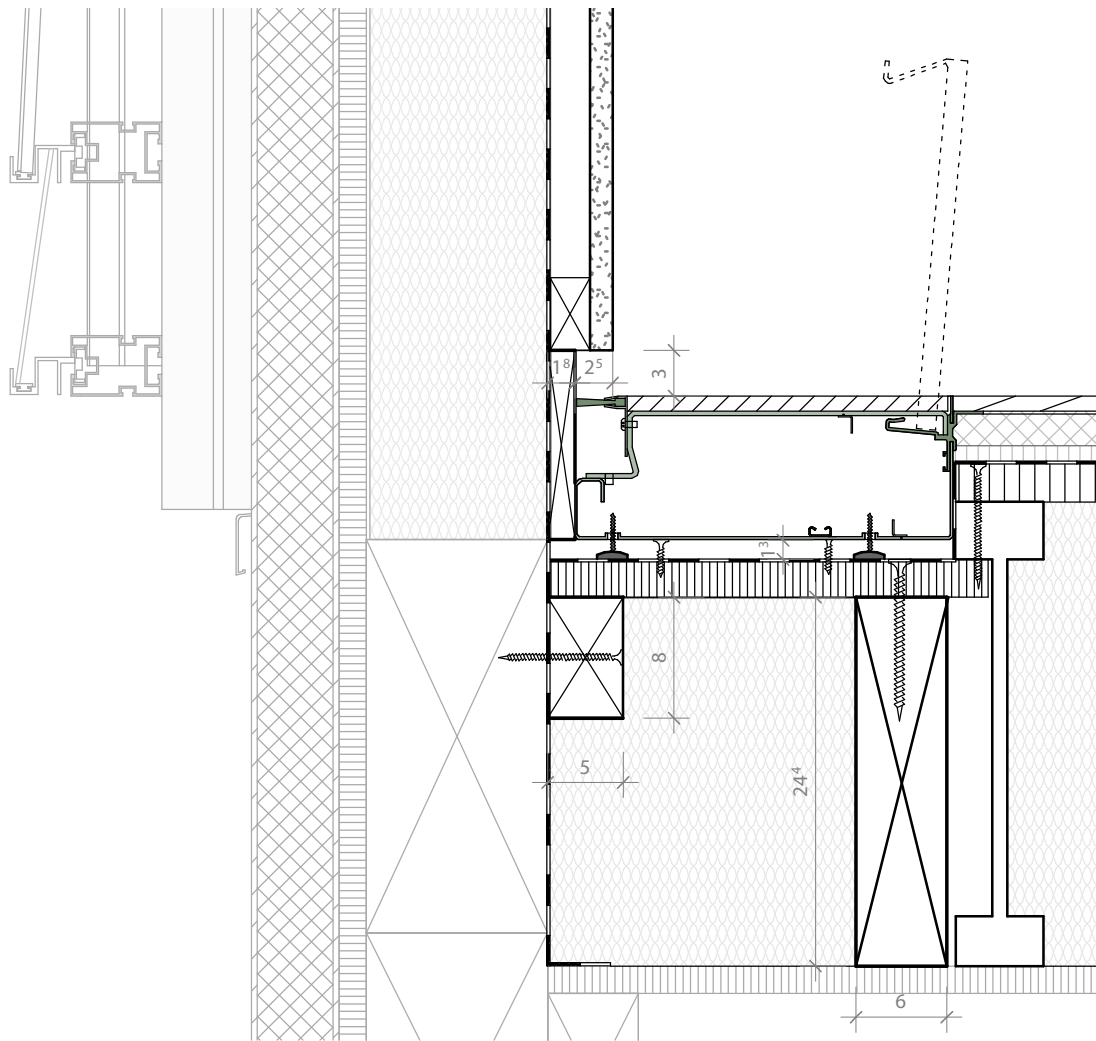
1 Floor Plan - Cable Conduit
 I-623 Scale 1:50

1:50



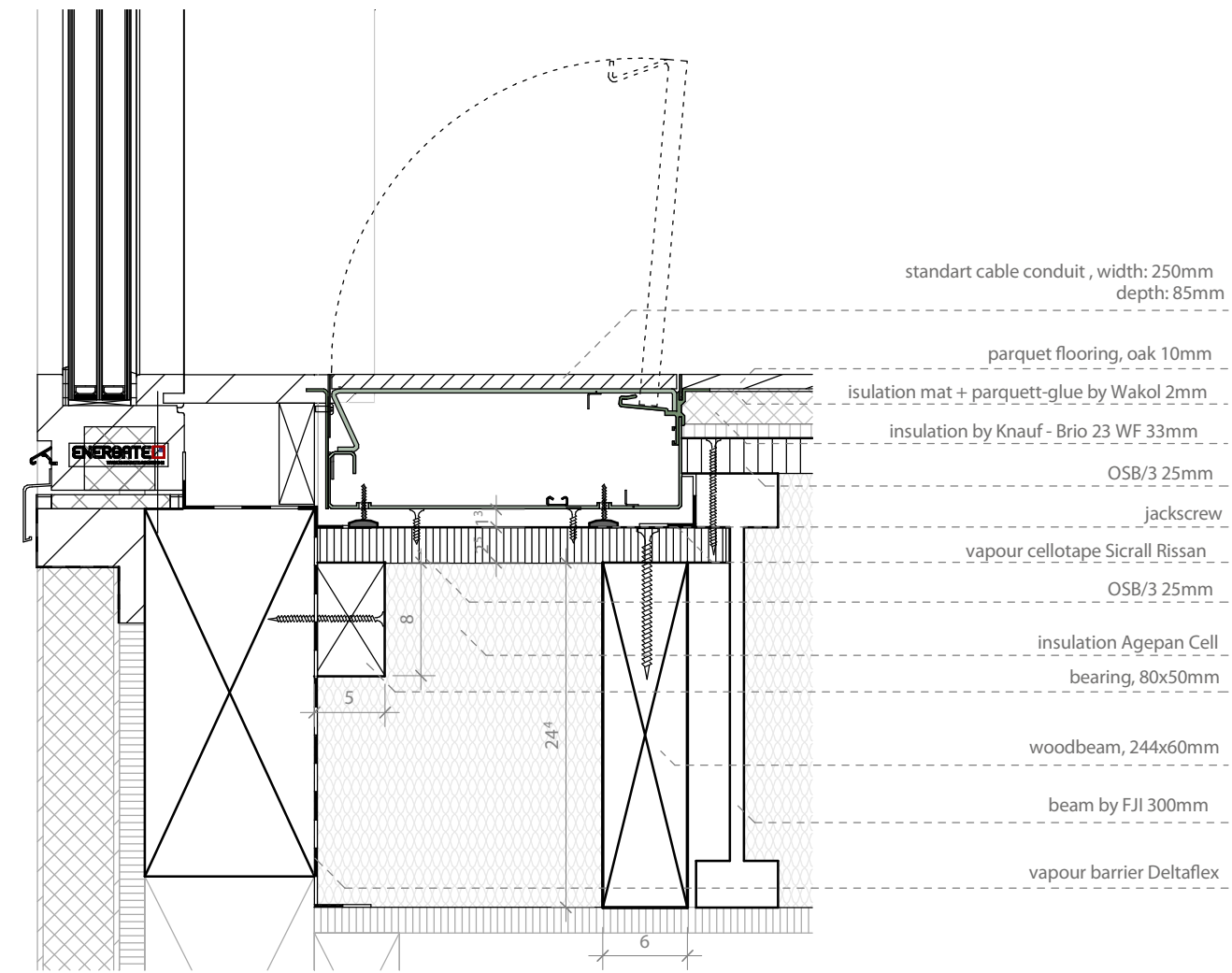
Drawn	HB	
Issued	30/05/09	
Last index		
Component	Interiors - Flooring	
Description	Flooring Cable Conduit	
Project #	Scale	dwg #
P 140	1 : 50	I-623


width: 250mm
depth: 85mm
standart cable conduit

width: 250mm
depth: 85mm
standart cable conduit with
brushes

with: 250mm + 250mm
depth 85mm
cable conduit connection
with expanded cover

width: 250mm + 150mm
depth: 85mm
cable conduit connection with
expanded cover

width: 250mm + 150mm
depth: 60mm
cable conduit connection with
expanded cover



1
I-652

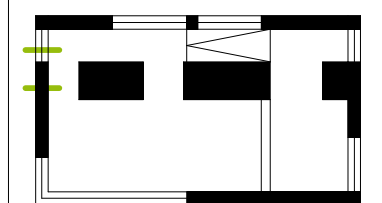
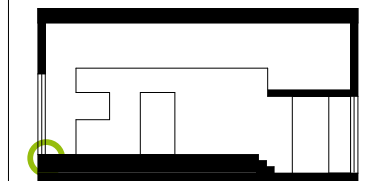
Section - Connection Wall - Cable Conduit
Scale 1:5







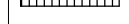
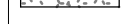


2
I-652

Section - Connection Window - Cable Conduit
Scale 1:5

1:5



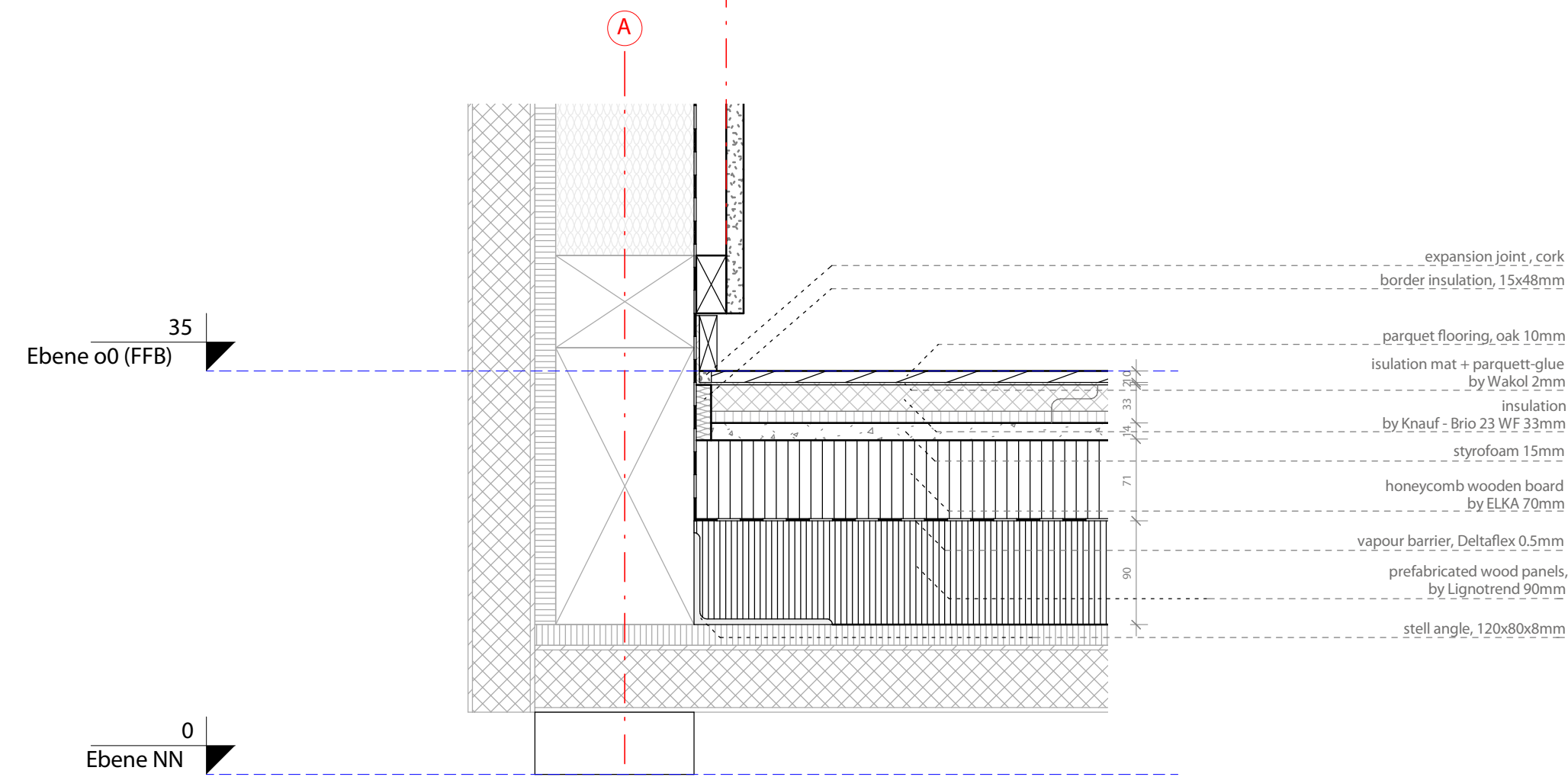
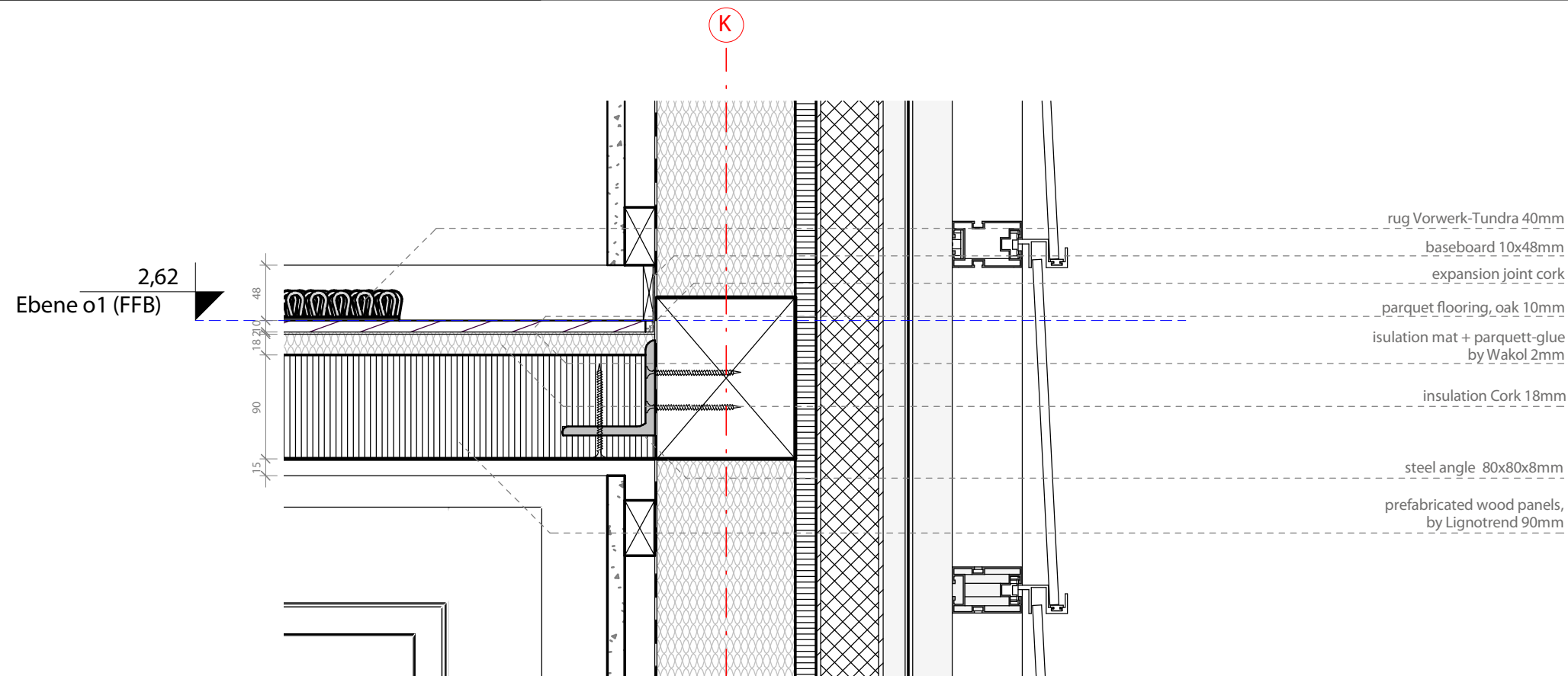
-  parquet
-  isulation mat + glue
-  insulation
-  styrofoam
-  oriented strand board
-  prefabricated wood panels
-  plasterboard
-  vapour barrier

Drawn HB | JW
Issued 04/09/09
Last index

Component
Interiors - Flooring

Description
**Detail Connection -
Wall / Windwow**

Project # Scale dwg #
P 140 1 : 5 I-652

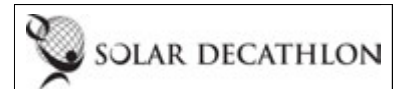


0
Ebene NN



Detail Connection Wall Level 0.0 + 1.5
Scale 1:5

1:5

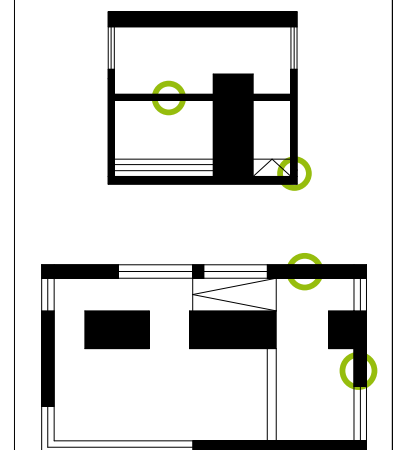


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



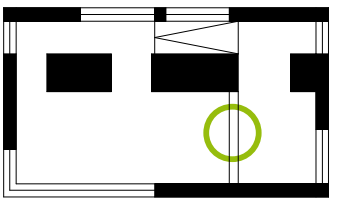
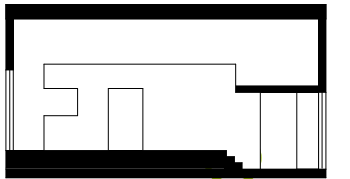
- parquet
- insulation mat + glue
- insulation
- styrofoam
- oriented strand board
- prefabricated wood panels
- plasterboard
- vapour barrier









Drawn JW
Issued 30/05/09
Last index

Component
Interiors - Flooring

Description
Detail Connection Wall
Level 0.0 + 1.5

Project # Scale dwg #
P 140 1 : 5 I-653



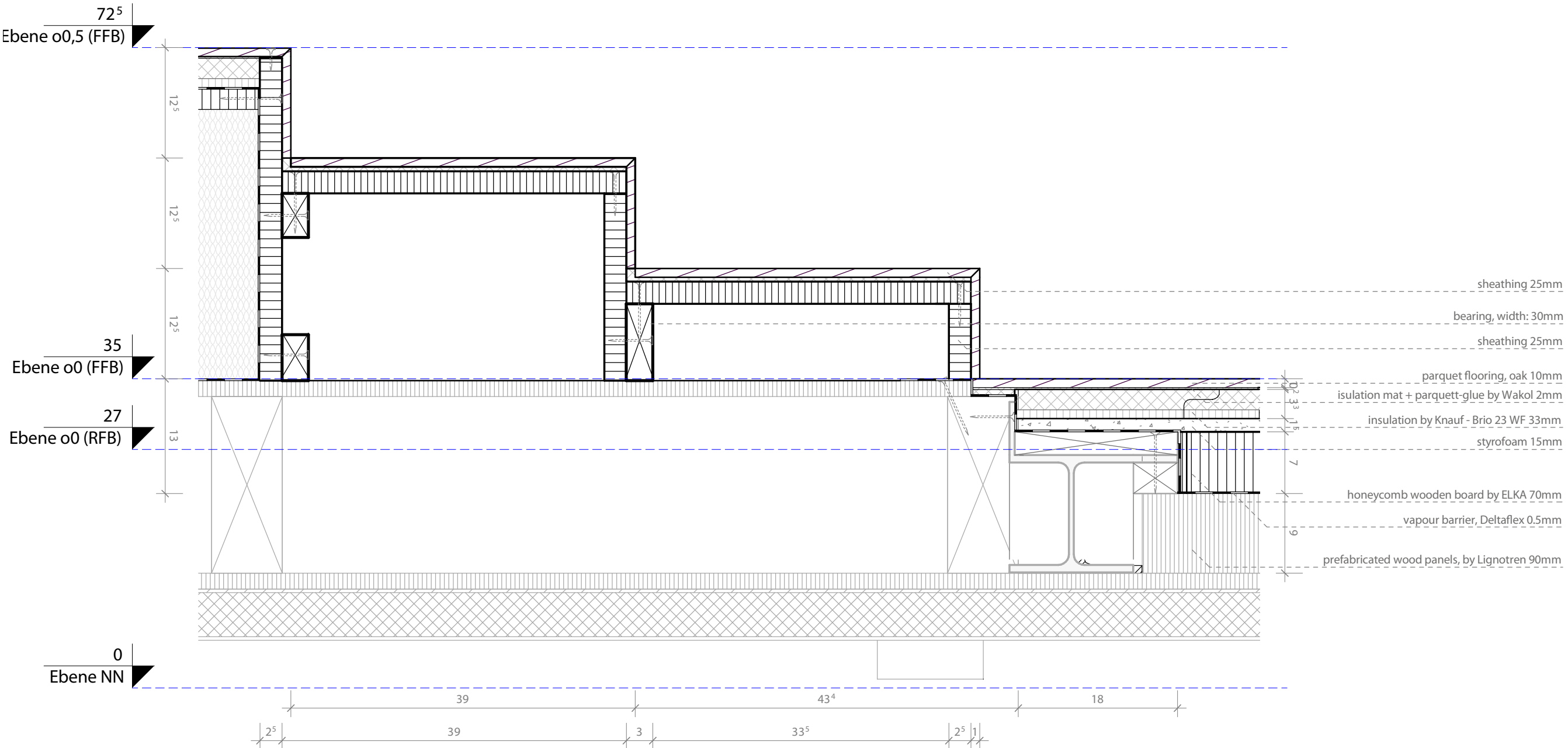
-  parquet
-  insulation mat + glue
-  insulation
-  styrofoam
-  oriented strand board
-  prefabricated wood panels
-  plasterboard
-  vapour barrier

Drawn JW
Issued 30/05/09
Last index

Component
Interiors - Flooring

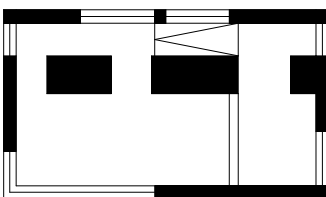
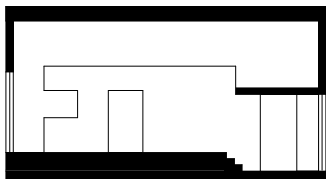
Description
Section - Stairs

Project # Scale dwg #
P 140 1/5 I-654



1
I-654
Section - Stairs
Scale 1:5





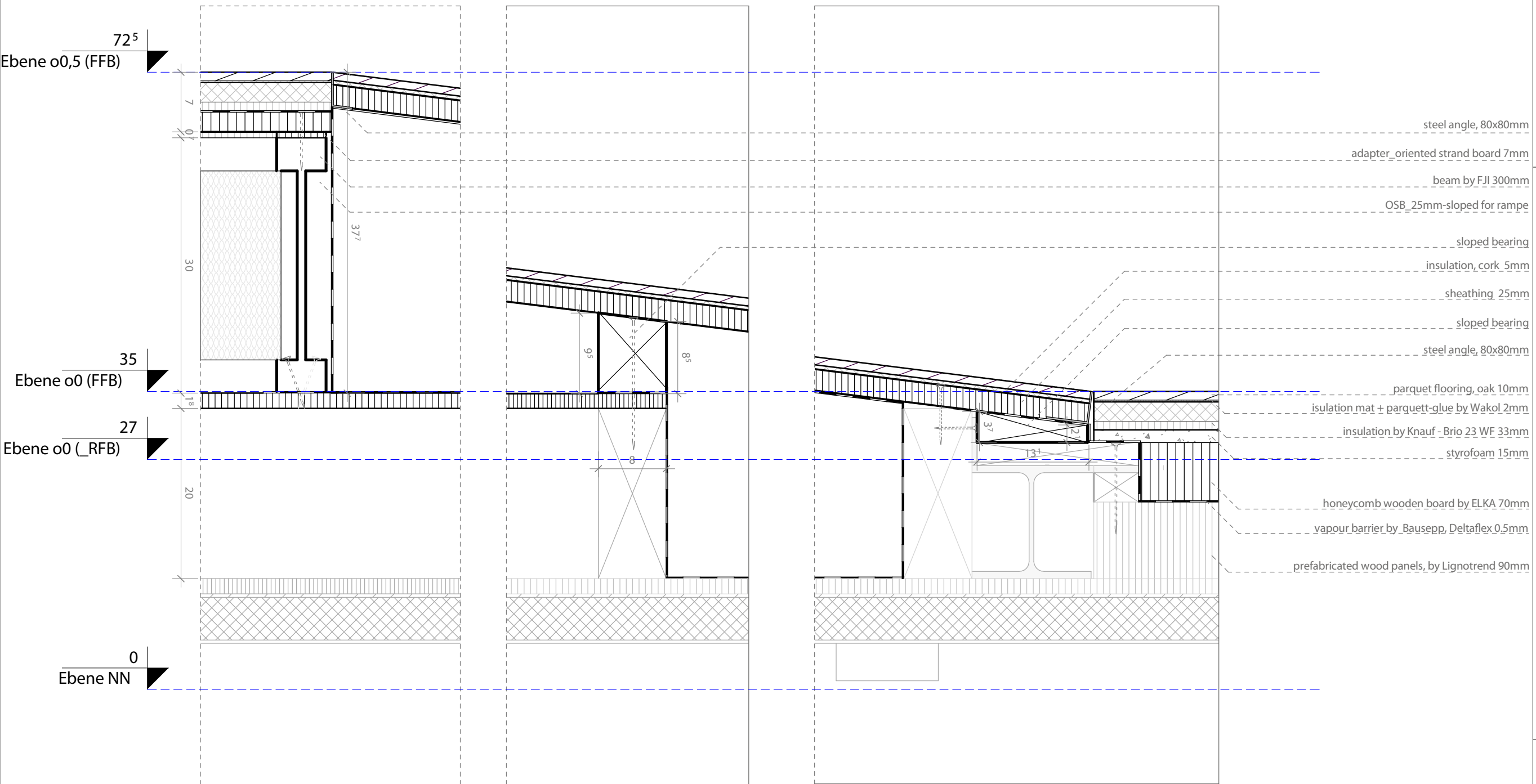
- parquet
- isulation mat + glue
- insulation
- styrofoam
- oriented strand board
- prefabricated wood panels
- plasterboard
- vapour barrier

Drawn JW
Issued 30/05/09
Last index

Component
Interiors - Flooring

Description
Section - Ramp

Project # Scale dwg #
P 140 1 : 5 I-655



1
I-655
Section Ramp
Scale 1:5


1:5









Schedule for Flooring and Equipment									
Plan No.	Project Manual Division Master Format	Component	Description	Material		Specification		Manufactures	Notes
				Material	Finish	Amount	Unit		
I-621 - I-657	09	Flooring	Parquet (wood strip flooring)	Oak	Oiled	72,44	m2	Drüsedau	alternative possible
I-621, I-653	09		Expansion Joint, 15mm stripe	Cork		80	m		
I-621, I-652- I-655	09		Isulation mat	polyester fleece		71,15	m2	Wakol EM 140	alternative possible
I-621, I-652- I-655	09		Parquet glue	based on polymer		72,44	m2	Wakol MS 260	alternative possible
I-621, I-652- I-655	09		Insulation - subsonic noise, 33mm	wood fiber and gypsum fibre		48,29	m2	Brio 23 WF	
I-621, I-652- I-655	07		Border Insulation, 15mm stripe	cellulose		50	m2	Agepan Cell	
I-621, I-652- I-655	06		Interlayer, 15mm	styropor		16,29	m2	Swisspor	
I-621, I-652- I-655	06		Interlayer,70mm	honeycomp wooden board		16,29	m2	ELKA	alternative possible
I-621, I-652- I-655	07		Vapour Barrier, 0,3mm	polyester interlayer		50	m2	Dörken Delta Reflex	
I-621, I-652- I-655	07		Vapour Tape, 0,3mm	polyester interlayer		100	m	Siga Sicrall	
I-622	09		rug for galery 70mm	Cotton		10	m2	Vorwerk-"Tundra"	alternative possible
I-622	09		Insulation - subsonic noise, for galery, 10 mm	Cork		14	m2	Kork-Store Potsdam	alternative possible
I-621, I-652- I-655	09		Insulation - subsonic noise for rampe, stairs and revisioning openings 5mm	Cork		8	m2	Kork-Store Potsdam	alternative possible
I-655	05		Border of parquet at ramp, 40x40x1mm	Steel angle		2,2	m		
I-623, I-651, I-652	26		Standart cable conduit, width: 250mm - depth: 85mm	extruded steel		10,21	m	Tehalit	
I-623, I-651, I-652	26		Standart cable conduit with brushes, width: 250mm - depth: 85mm	extruded steel		10,52	m	Tehalit	
I-623, I-651, I-652	26		Cable conduit connection with expandet cover width: 250+250 mm depth: 85mm	extruded steel		0,22	m	Tehalit	
I-623, I-651, I-657	26		Cable conduit connection with expandet cover width: 250+150 mm depth: 85mm	extruded steel		6,28	m	Tehalit	
I-623, I-651, I-656	26		Cable conduit connection with expandet cover width: 250+150 mm depth: 60mm	extruded steel		3,22	m	Tehalit	
I-623, I-652, I-656, I-657	05		Jackscrewes	steel + plastic		50	m2	Tehalit	


SOLAR DECATHLON

Project


Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
 El-Lissitzky-Str. 1
 64287 Darmstadt
 +49 (0) 6151 / 165448
 +49 (0) 6151 / 165247
 team@solardecathlon2009.de

 Department of Electrical Engineering
 Renewable Energies
 Landgraf-Georgstraße 4
 64283 Darmstadt
 +49 (0) 6151 / 162367

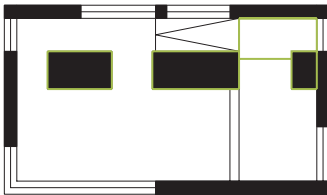
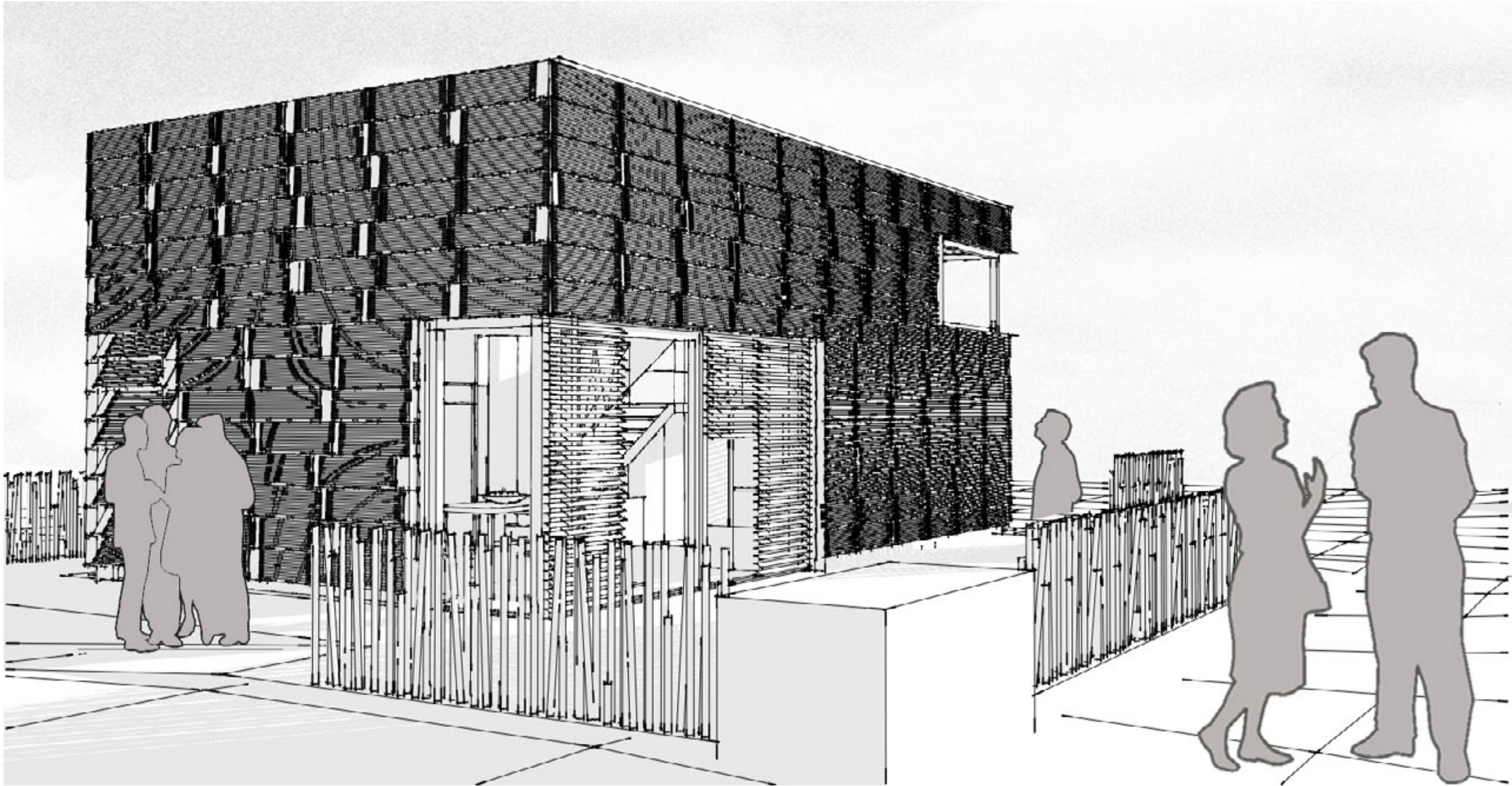
Navigation/Legend

Drawn **JW**
 Issued **05/30/09**
 Last index

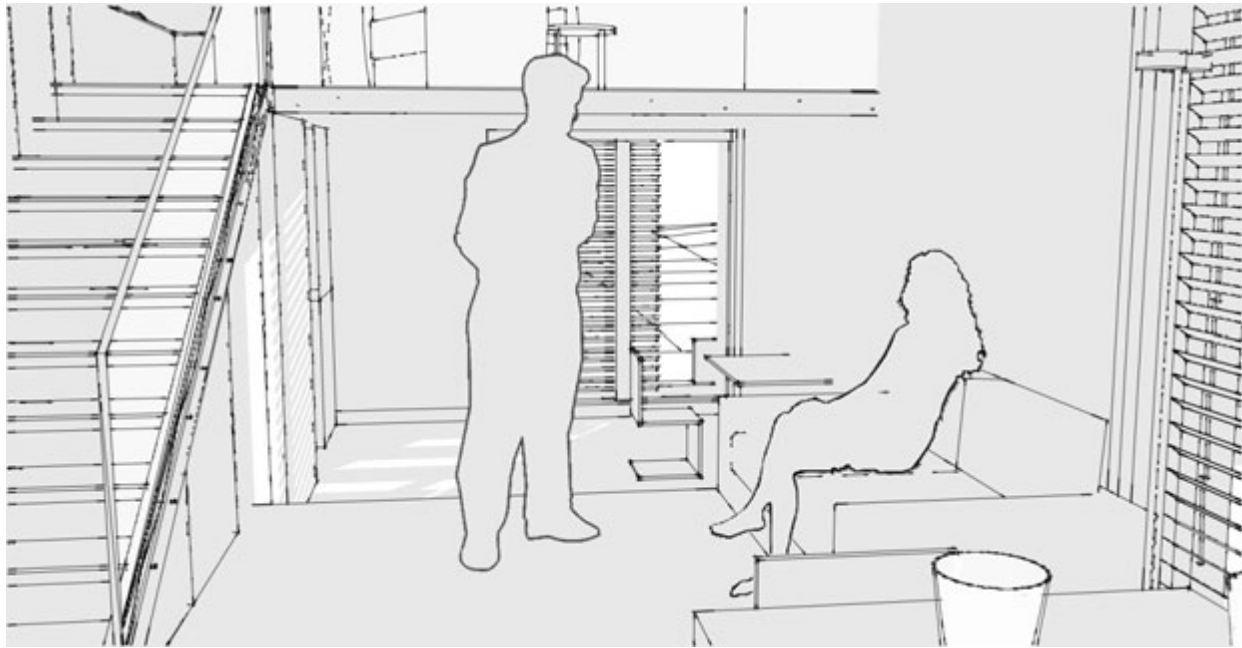
Component
Interiors - Flooring

Description
Schedule

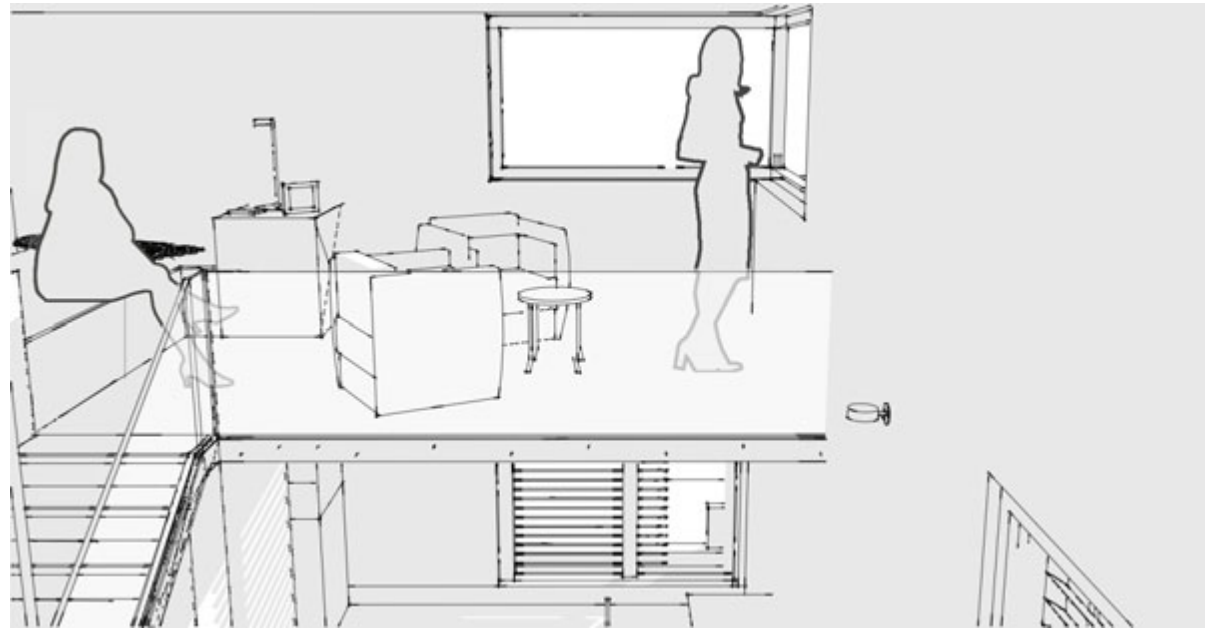
Project # **P 140** Scale dwg # **I-660**



Drawn	RR	
Issued	09/05/30	
Last index		
Component	Interiors (I)	
Description	Exteroir Rendering	
Project #	Scale	dwg #
P 140		I-701



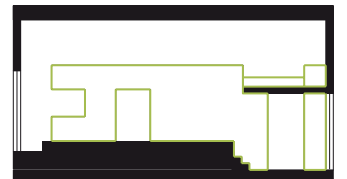
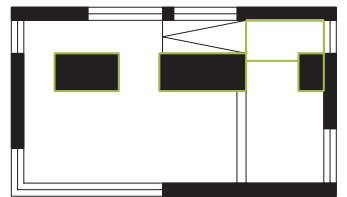
1
I-702 Living Area



2
I-702 Upper Level



3
I-702 Back Side Of The Multifunctional Body



Drawn RR
Issued 30/5/09
Last index

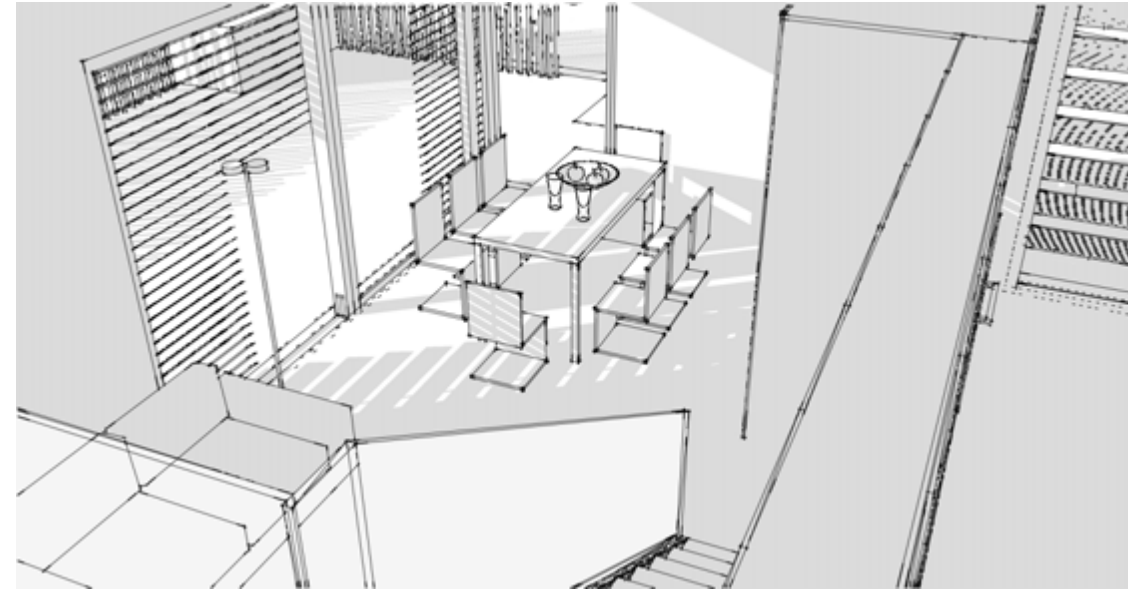
Component
Interiors (I)

Description
Interior Renderings

Project # Scale dwg #
P 140 I-702



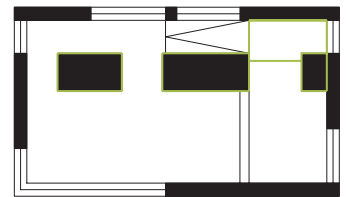
1 Dining Area South West Corner
I-703



2 Living Space From Upper Level
I-703



3 Dining Area
I-703



Drawn RR
Issued 30/5/09
Last index

Component
Interiors (I)

Description
Interior Renderings

Project # Scale dwg #
P 140 I-703

Fire Protection

Germany has 16 federal states, each state complies to its respective Building Code. Therefore we are have to comply to the Hessian Building (HBO).

The HBO arrange buildings in classes,our building class is No.1. Buildingclass No. 1 has very limited fire Resistance requirements.

The combustibility of a building material plays a key role in the outbreak and spread of a fire. DIN 4102 - 1 allocates building materials to specific classes according to their behaviour in fire. The Building materials in class A are incombustible. Building materials of class A 1 must be made entirely of incombustible materials, where as those of class A 2 may contain small amounts of combustible constituents. Class B is for combustible materials and is further subdivided into not readily flammable (B1), flammable (B2) and highly flammable (B3) building materials.

In buildingclass 1 most materials has to be class B2. As you can see in dwg. F - 311 we fullfilled all german norms.

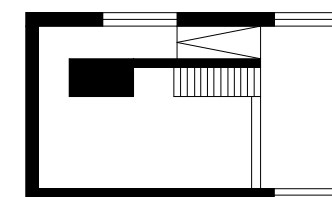
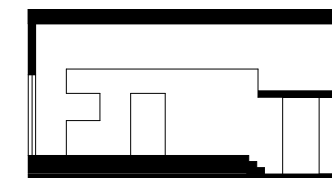
Apart from the fire protection measures, we have also planned and executed further active elements to protect the inhabitants.

We have installed fire detectors onto the ceiling. These are coupled to the house monitoring system. In case of a fire emergency, the louvre flaps of the PCM cooling ceiling, shall automatically be closed, to cut off the extra air supply, as to avoidn kindling a fire. Furthermore the window louvres, will be shut and the sunblinds will retreat, clearing all emergency exits.



Structural Fire Protection

Component	German Norm		American Norm			
	Din 4102	HBO	R 312	R 313	R 314	R 315
Smoke Alarms	X	There has to be one in the Bedroom		There has to be one in each room		
Guards	X	has to be 900 mm	has to be 914 mm			
Foam Plastic	X	X			we do not use Foam Plastic	
Wall and Ceiling Finishes	X	B2				built with OSB

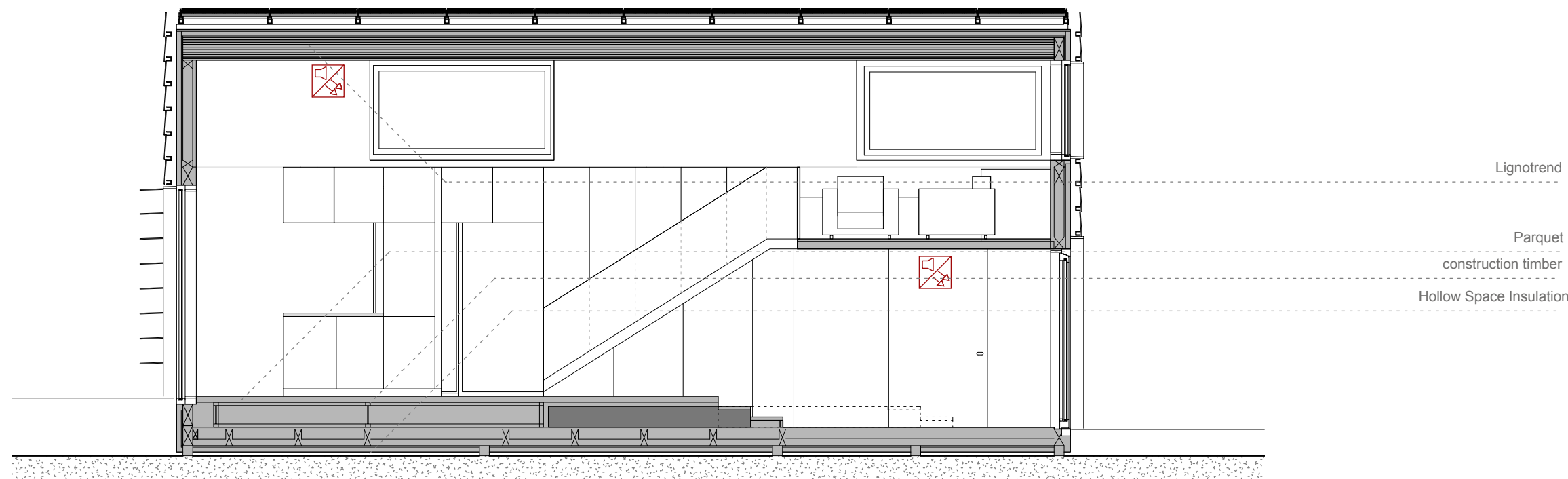


Drawn **MK**
 Issued **05/11/09**
 Last index **05/30/09**

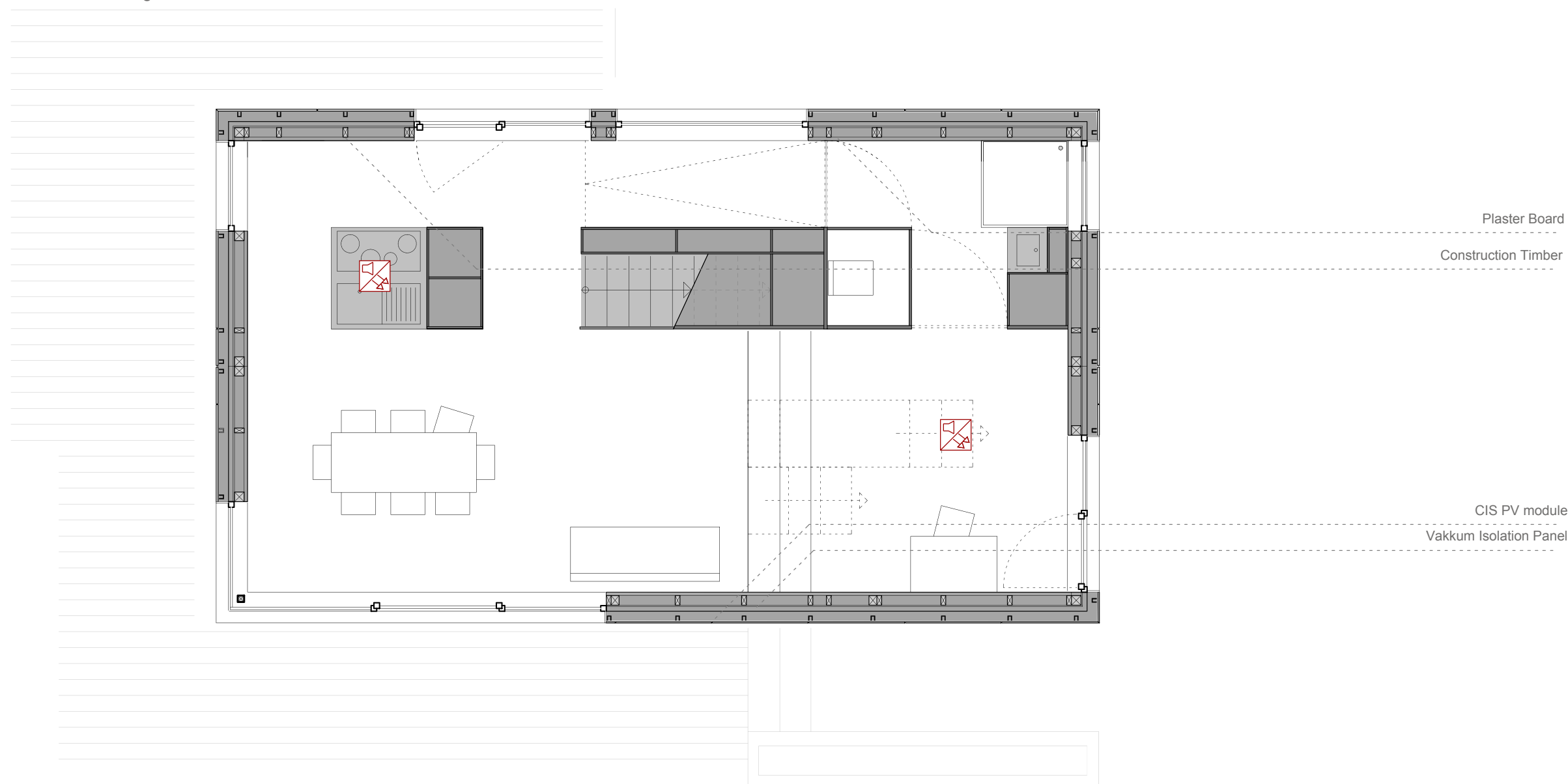
Component
Fire Protection

Description
Detection and Alarm

Project # **P 140** Scale **1:50** dwg # **F-211**




1
 F-211
Detection & Alarm / Section
 Without scale ref.drawing F - 311




2
 F-211
Detection & Alarm / Floor Plan
 Without scale ref.drawing F - 311

Place	Component	Material / Construction	Din 4102	HBO	
			classified	requierd	fulfilled
Floor	parquet	wood 10 mm	B2	no requirement	yes
	flooring including	38 mm	A1	no requirement	yes
	impact sound insulation			no requirement	yes
	fj's	wood Bar 1 cm	B2	no requirement	yes
	hollow space insulation	flange 5,8 cm x 3,8 cm celluosemats		no requirement	yes
Interior wall	Rigips ®	12,5 mm	A2	no requirement	yes
Wall Construction	construction timber	wood 12 cm x 16 cm	B2	B2	yes
	rafter	wood 6 cm x 12 cm	B2	B2	yes
	OSB board	OSB 1,8 cm	B2	B2	yes
	Vakkum Isolation Panel	plywood cladding 4 mm	B2	B2	yes
Lignotrend ®	PCM in the void	salthydrate covered in			
Ceiling	Lignotrend ®	polycarbonate	B1	no requirement	yes
		plywood	B2 F30	B2	yes
Cable Interior	cable channel	aluminium	A1	no requirement	yes
	cable			no requirement	yes
	outlet			no requirement	yes
	switch			no Requirement	yes
Furniture	substructure	MDF - board	B2	B2	yes
	lightpanel	LED parts		no requirement	yes
	Plexiglas ®	plexi Crystallice® 3-5 mm	B2	no requirement	yes
	Guard	Plexiglas 25 mm	B2	no requirement	yes
Stairs	parquet	wood 20 mm	B2	no requirement	yes
	construction	lightweight building board 40 mm	B2	B2	yes
Bath	surface material			no requirement	yes
	sanitary facilities	ceramic	A1	no requirement	yes
Kitchen	countertop	Corian®	B1	no requirement	yes
	substructure	MDF - Board	B2	no requirement	yes
	cladding	Plexi Crystall Ice® 3-5 mm	B2	no requirement	yes
PV Facade	PV cells	glas glas module	A1	no requirement	yes
	construction	aluminium	A2	no requirement	yes
	downpipe	zinc	A2	no requirement	yes
Roof	down - grad insulation	Styrodur ®		no requirement	yes
	PV cells	Sunpower	B1	no requirement	yes
	tar paper		B2	no requirement	yes
	subconstruction PV cells	aluminium	A1	no requirement	yes
				no requirement	yes
Cable Exterior	cable channel facade	zinked steel in	B2	no requirement	yes
	cable channel deck	PVC - hose	B2	no requirement	yes




SOLAR DECATHLON

Project




SOLAR DECATHLON 2009



TEAM GERMANY

Constructor



TECHNISCHE

UNIVERSITÄT

DARMSTADT

Department of Architecture

Energyefficient Building Design

Unit

El-Lissitzky-Str. 1

64287 Darmstadt

+49 (0) 6151 / 165448

+49 (0) 6151 / 165247

team@solardecathlon2009.de

Navigation/Legend

Drawn

MK

Issued

05/11/09

Last index

05/30/09

Component

Fire Protection

Description

Suppression

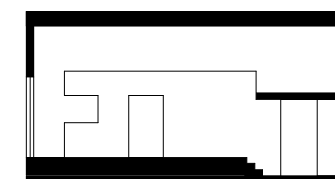
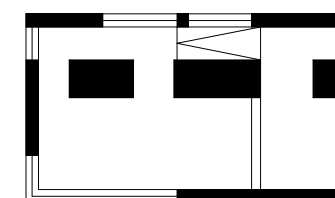
Project #

Scale

dwg #

P 140

F-311



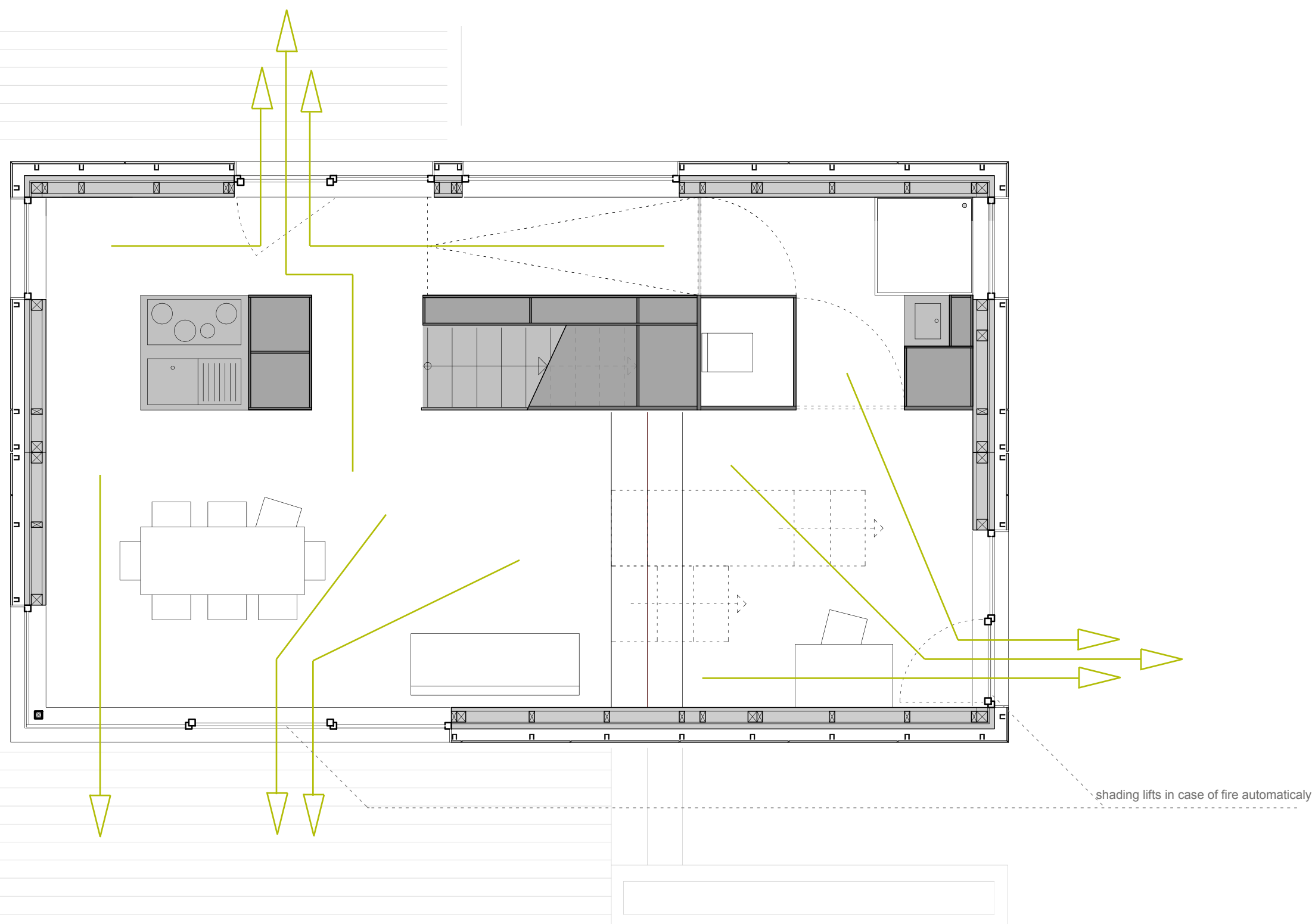
 emergency exit

Drawn MK
 Issued 05/11/09
 Last index 05/30/09

Component
Fire Protection

Description
Egress

Project # Scale dwg #
P 140 F-411



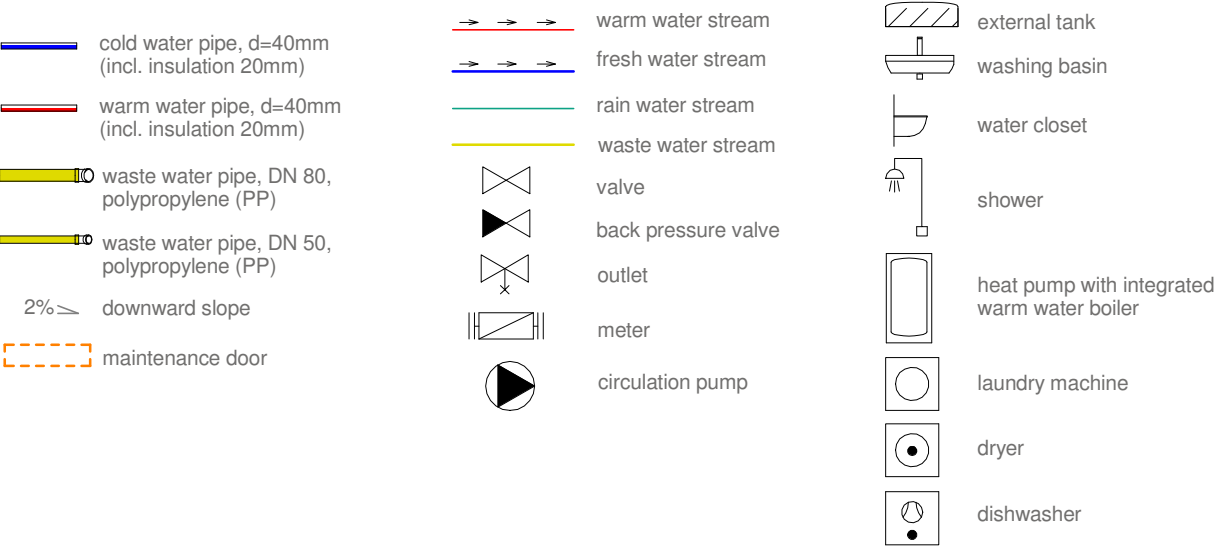
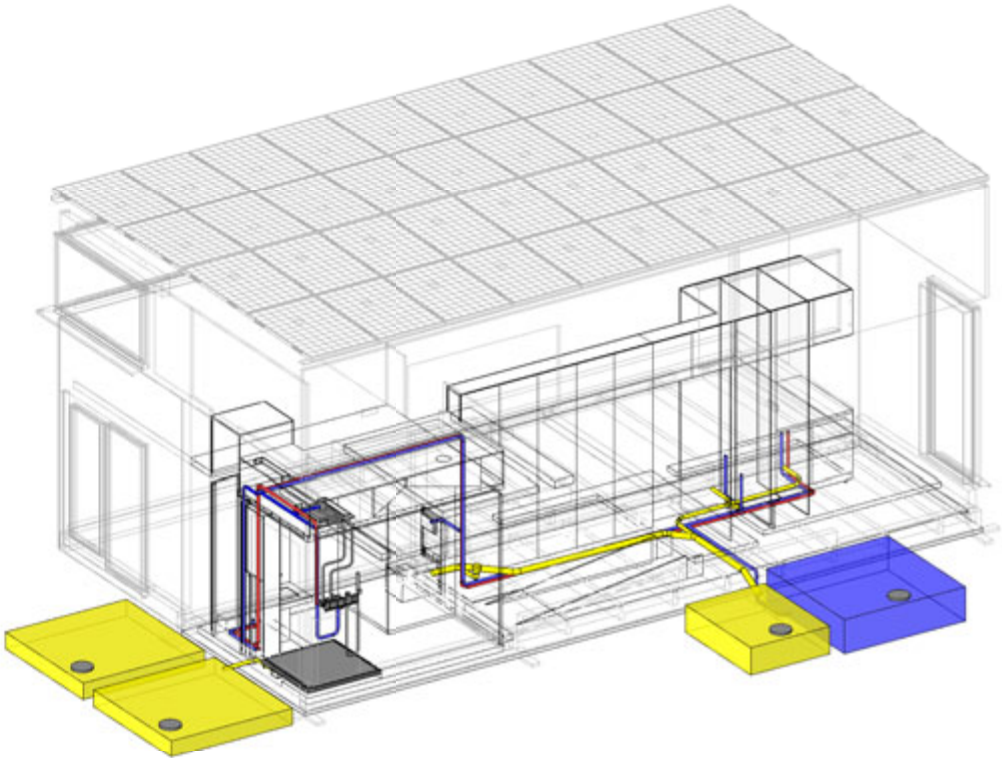
Team Germany’s water supply is getting along with the overall sustainability concept.

To provide this idea we integrate intelligent appliances of high water efficiency in our building automation system. For this we install european products that are classified in high quality standards.We also use recyclable materials as for the piping and the technical equipment.

The fresh and waste water tanks are situated below the deck in the north and the east. Filling and discharging the tanks will be done via maintenance doors in the deck. The water pipe system is integrated in the lower northern building-module. This avoids connection points inbetween the building-modules.The fresh water supply below the northern deck is linked to the building by a water pump and leads into the entrance area. There it splits to the kitchen and to the bathroom in the back where the heat pump with its integrated warm water boiler is located. From there the warm water is provided along east west orientation. The heat pump uses the heat-energy of exhausted air and appliances to heat up the water to an average of 55 °C. Now and then, the boiler warms up to 90 °C automatically for germ protection.

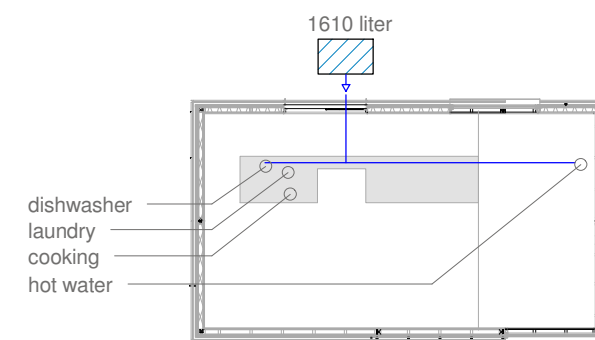
For the waste water disposal there are two outlets.One in the north and one the east. This is because of the limited footprint on the national mall.

After the competition the house will benefit of the heat pump linkability to geothermal probes.



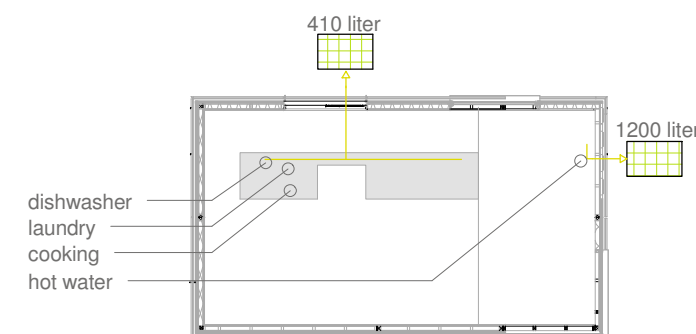
	dishwasher *	laundry *	dryer *	cooking *	hot water *	waterusage/day
Day 1						
Day 2						
Day 3						
Day 4						
Day 5						
Day 6						
Day 7						
Day 8	1	1	1	1	2	196 liter
Day 9		1	1		3	227 liter
Day 10	1			1	2	149 liter
Day 11					3	180 liter
Day 12		1	1	1	2	187 liter
Day 13	1	1	1		3	236 liter
Day 14	1	1	1	1	2	196 liter
Day 15	1	1	1		3	236 liter
Day 16						
Day 17						
Day 18						

Total Volume 1607 liter



specific consumption of appliances

dishwasher *	9 liter/use
laundry machine *	47 liter/use
cooking *	20 liter/use
hot water *	60 liter/use



dishwasher	45 liter	} via north
laundry machine	252 liter	
cooking	80 liter	
hot water	1200 liter	— via east

The waste water disposal will be into two directions.

One northwards, supports the disposal of the kitchen appliances as for the water closet. The other one is going east and removes the waste water of the shower and the washing basin in the bathroom.

During the competition on the mall the water closet will be sealed, to prevent visitors in the house to use it. So it is not necessary to calculate the usage of the flush within our water tanks capacitys.

SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture

Energyefficient Building Design Unit

El-Lissitzky-Str. 1

64287 Darmstadt

+49 (0) 6151 / 165448

+49 (0) 6151 / 165247

team@solardecathlon2009.de

Navigation/Legend

Drawn

PT

Issued

05/26/09

Last index

Component

Plumbing

Description

Supply and Removal

Project #

Scale

dwg #

P 140

P-211

1

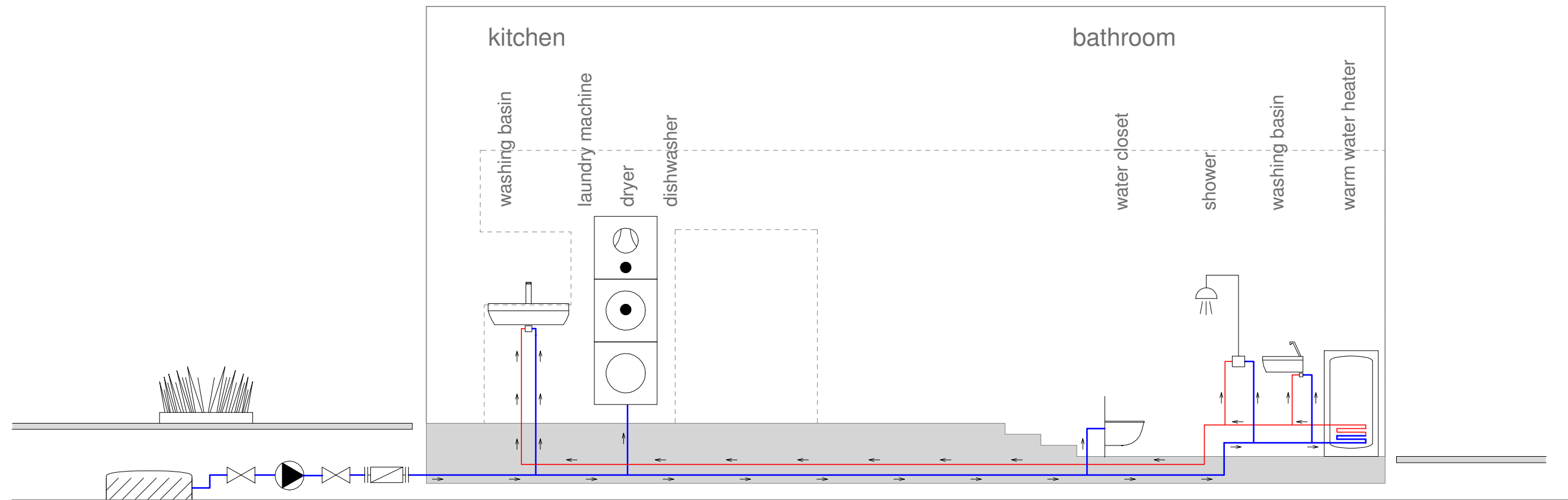
P-211

Fresh Water Calculation

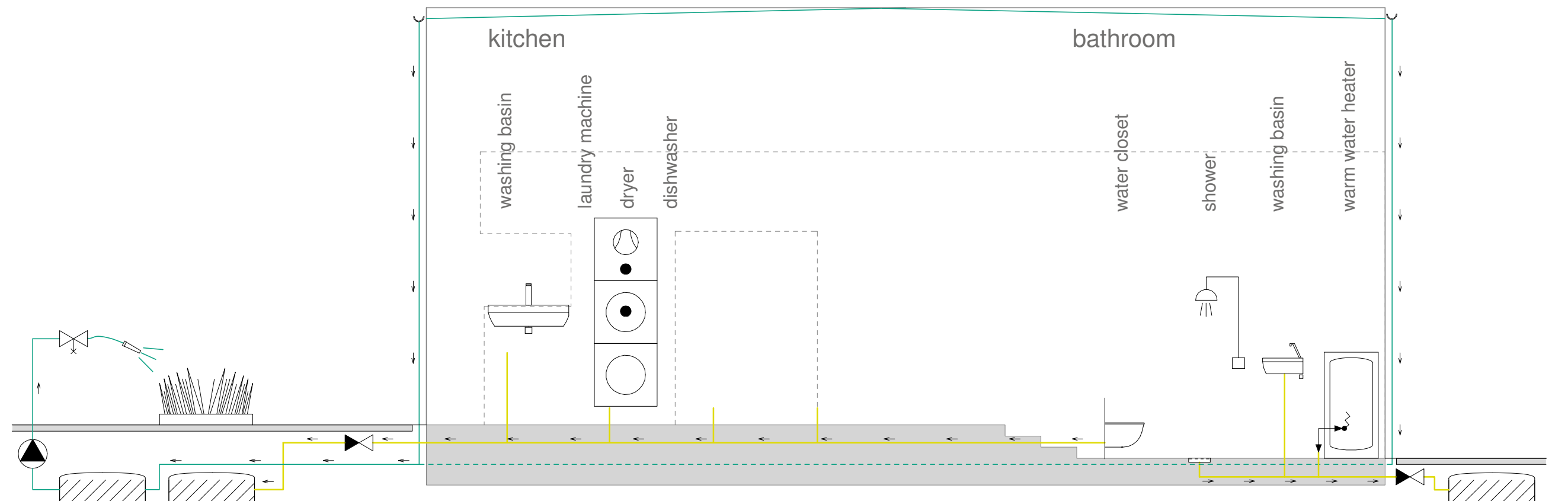
2

P-211

Waste Water Calculation



1
P-311
Water Supply
without scale



2
P-311
Waste Water Disposal
without scale

SOLAR DECATHLON

Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

→ → → warm water stream
→ → → fresh water stream
— rain water stream
— waste water stream

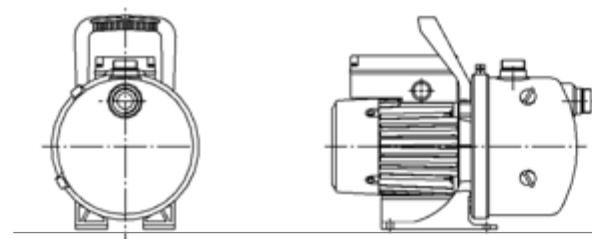
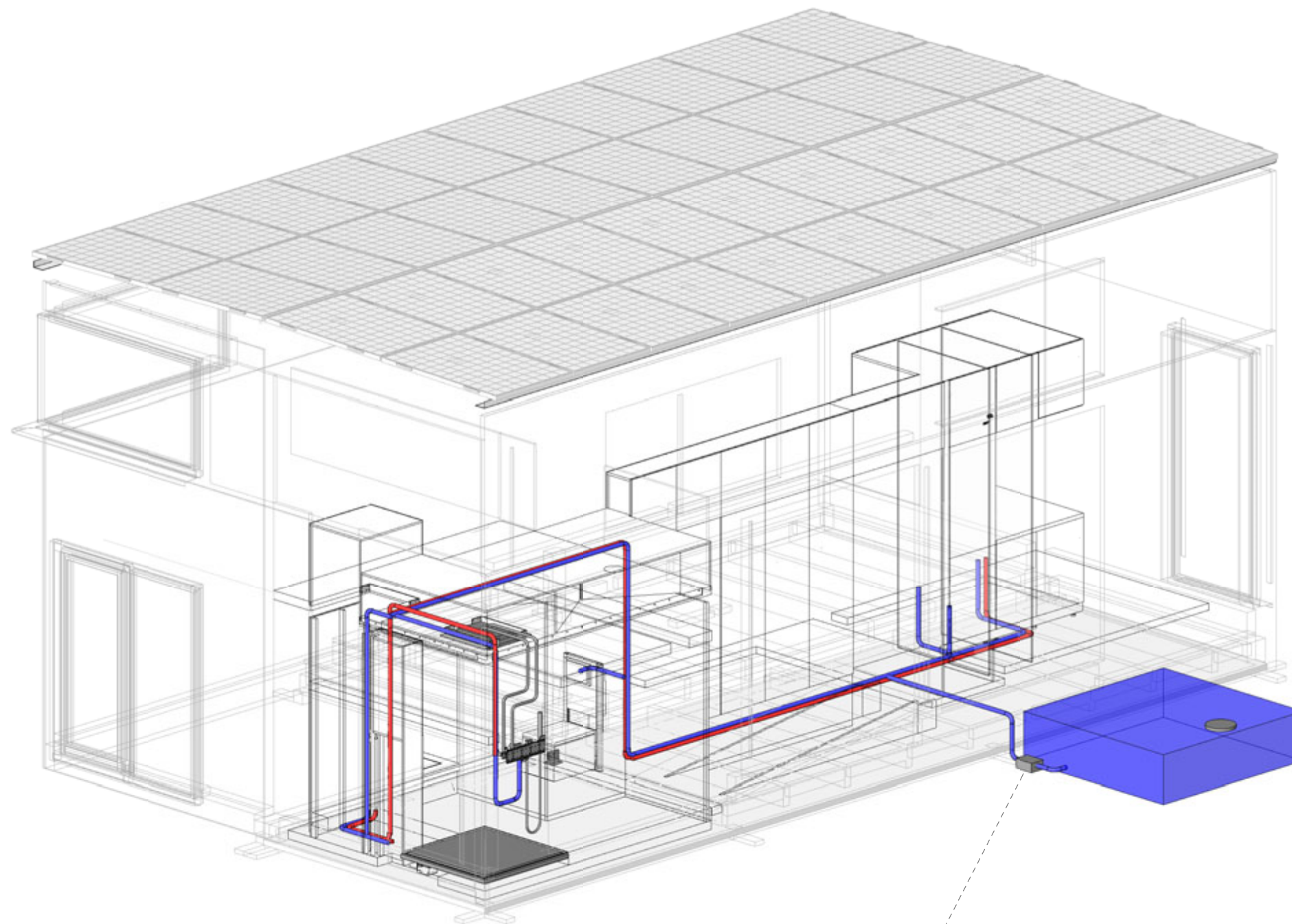
valve
 back pressure valve
 outlet
 meter
 circulation pump
 external tank
 washing basin
 water closet
 shower
 warm water boiler
 laundry machine
 dryer
 dishwasher

Drawn **PT**
Issued **09/05/30**
Last index

Component
Plumbing

Description
Schematic Diagram







Project # **P 140** Scale **-** dwg # **P-311**



Supporting pressure pump:
Grundfos JP5

1:50



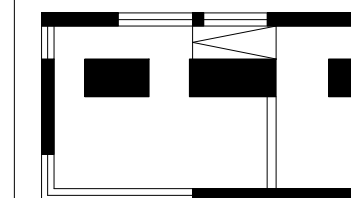
Navigation/Legend	
	cold water pipe, d=40mm (incl. insulation 20mm)
	warm water pipe, d=40mm (incl. insulation 20mm)
	waste water pipe, DN 80, polypropylene (PP)
	waste water pipe, DN 50, polypropylene (PP)
	2% downward slope
	maintenance door







Drawn	PT
Issued	05/26/09
Last index	

Component	Plumbing
-----------	----------

Description	Water Supply
-------------	--------------

Project #	Scale	dwg #
P 140	1:50	P-411



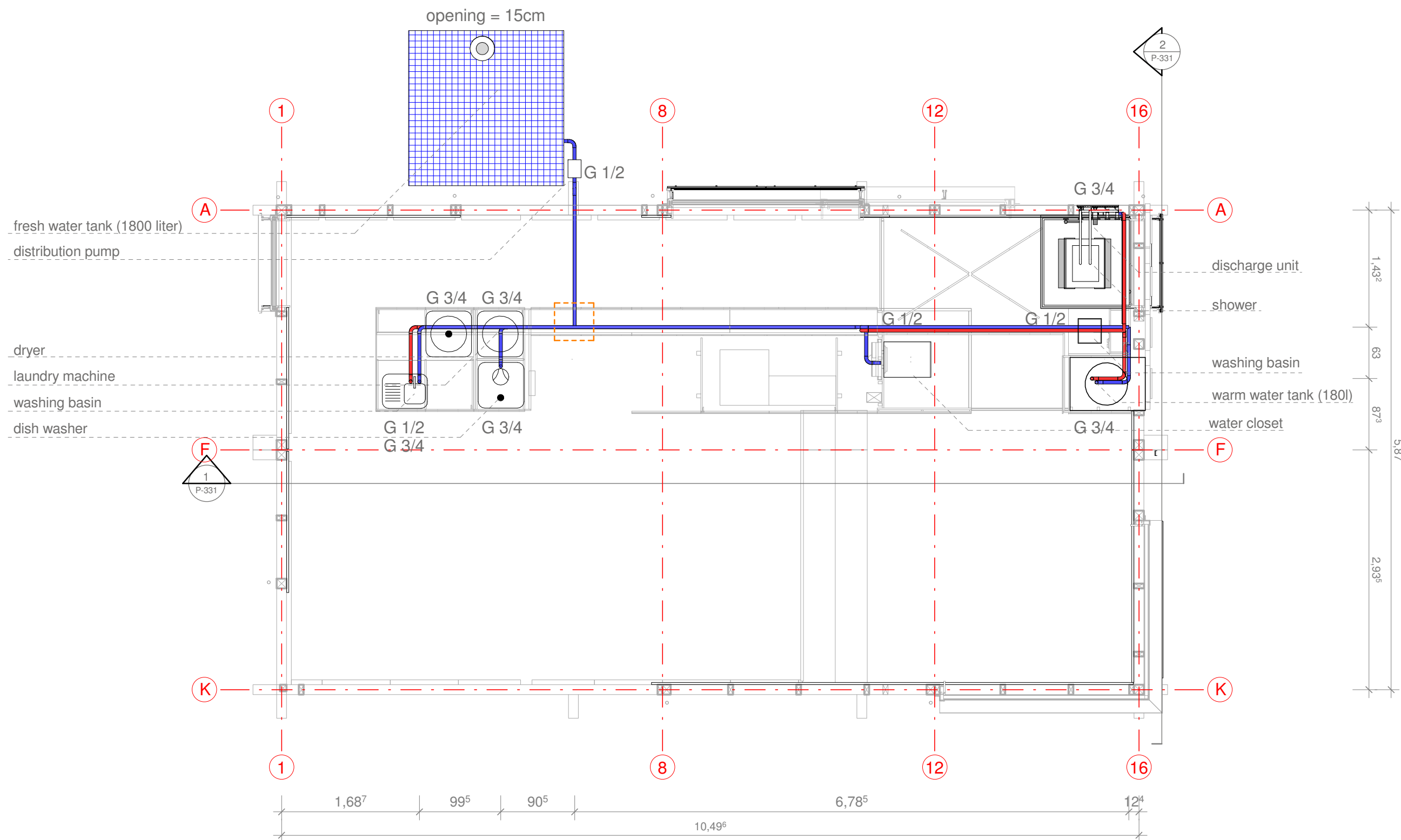
-  cold water pipe, d=40mm
(incl. insulation 20mm)
-  warm water pipe, d=40mm
(incl. insulation 20mm)
-  waste water pipe, DN 80,
polypropylene (PP)
-  waste water pipe, DN 50,
polypropylene (PP)
-  2% downward slope
-  maintenance door

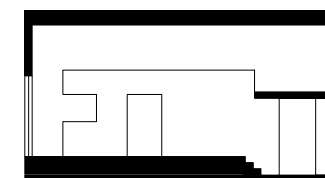
Drawn PT
Issued 09/05/30
Last index







Component
Plumbing

Description
Water Supply

Project # Scale dwg #
P 140 1 : 50 P-421





-  cold water pipe, d=40mm
(incl. insulation 20mm)
-  warm water pipe, d=40mm
(incl. insulation 20mm)
-  waste water pipe, DN 80,
polypropylene (PP)
-  waste water pipe, DN 50,
polypropylene (PP)
-  2% downward slope
-  maintenance door

Drawn PT

Issued 05/26/09

Last index

Component

Plumbing

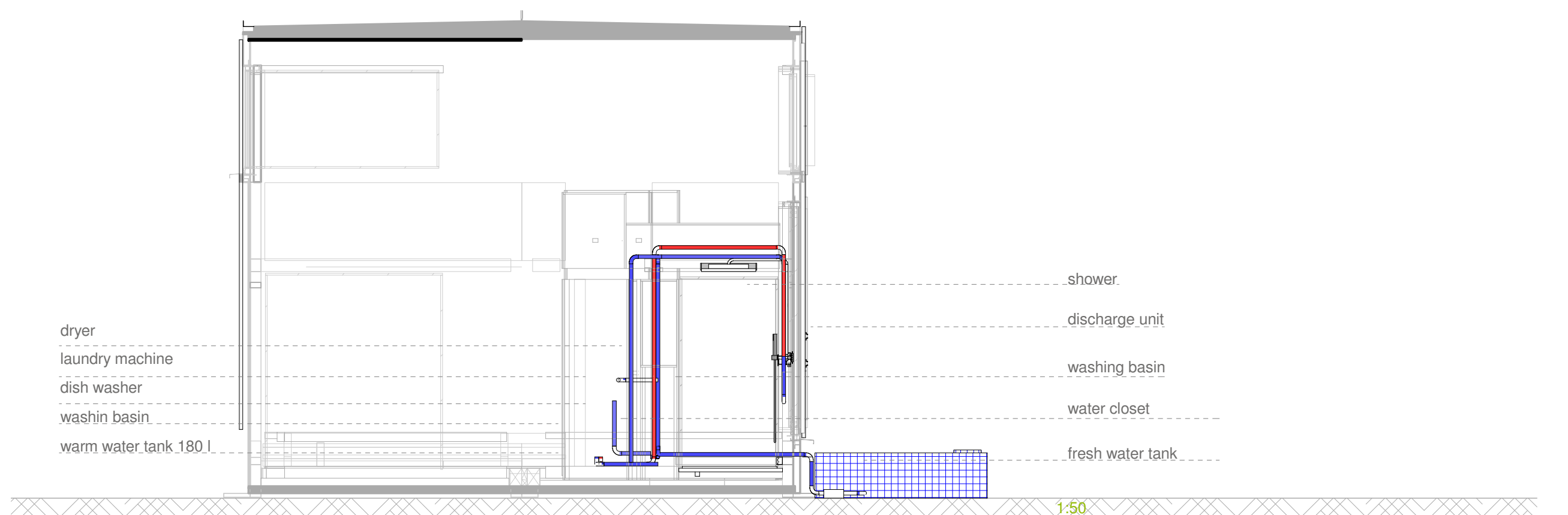
Description

Water Supply

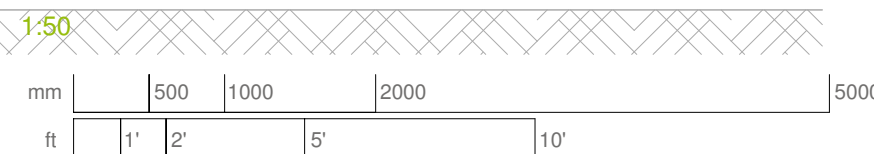
Project #	Scale	dwg #
P 140	1 : 50	P-431

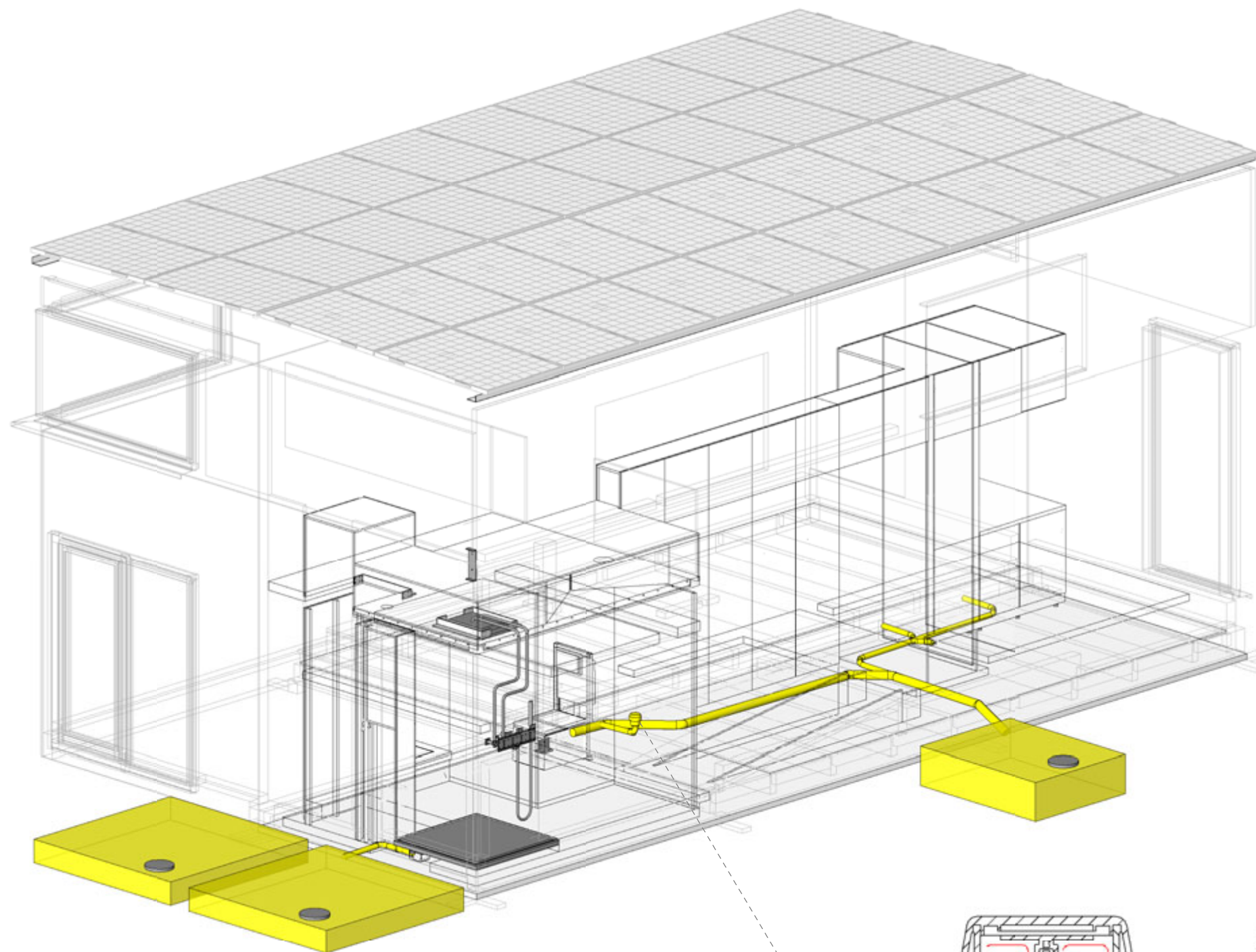


1
P-431
Fresh Water Supply Section 1
Scale 1:50









2
P-431
Fresh Water Supply Section 2
Scale 1:50





Navigation/Legend

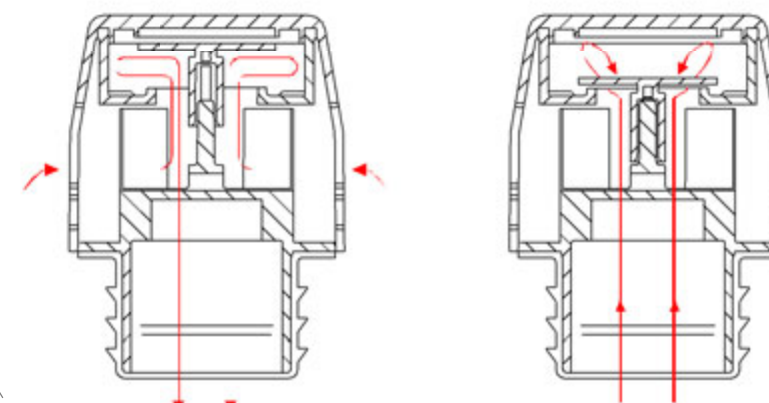
-  cold water pipe, d=40mm
(incl. insulation 20mm)
-  warm water pipe, d=40mm
(incl. insulation 20mm)
-  waste water pipe, DN 80,
polypropylene (PP)
-  waste water pipe, DN 50,
polypropylene (PP)
-  2% downward slope
-  maintenance door

Drawn PT
Issued 09/05/30
Last index

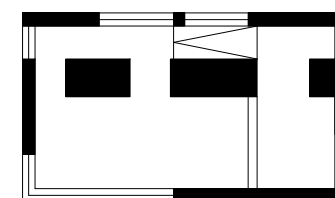
Component
Plumbing







Description
Waste Water Disposal

Project # Scale dwg #
P 140 1:50 P-511



Vacuum ventilation to prevent
piercing points throughout the roof.



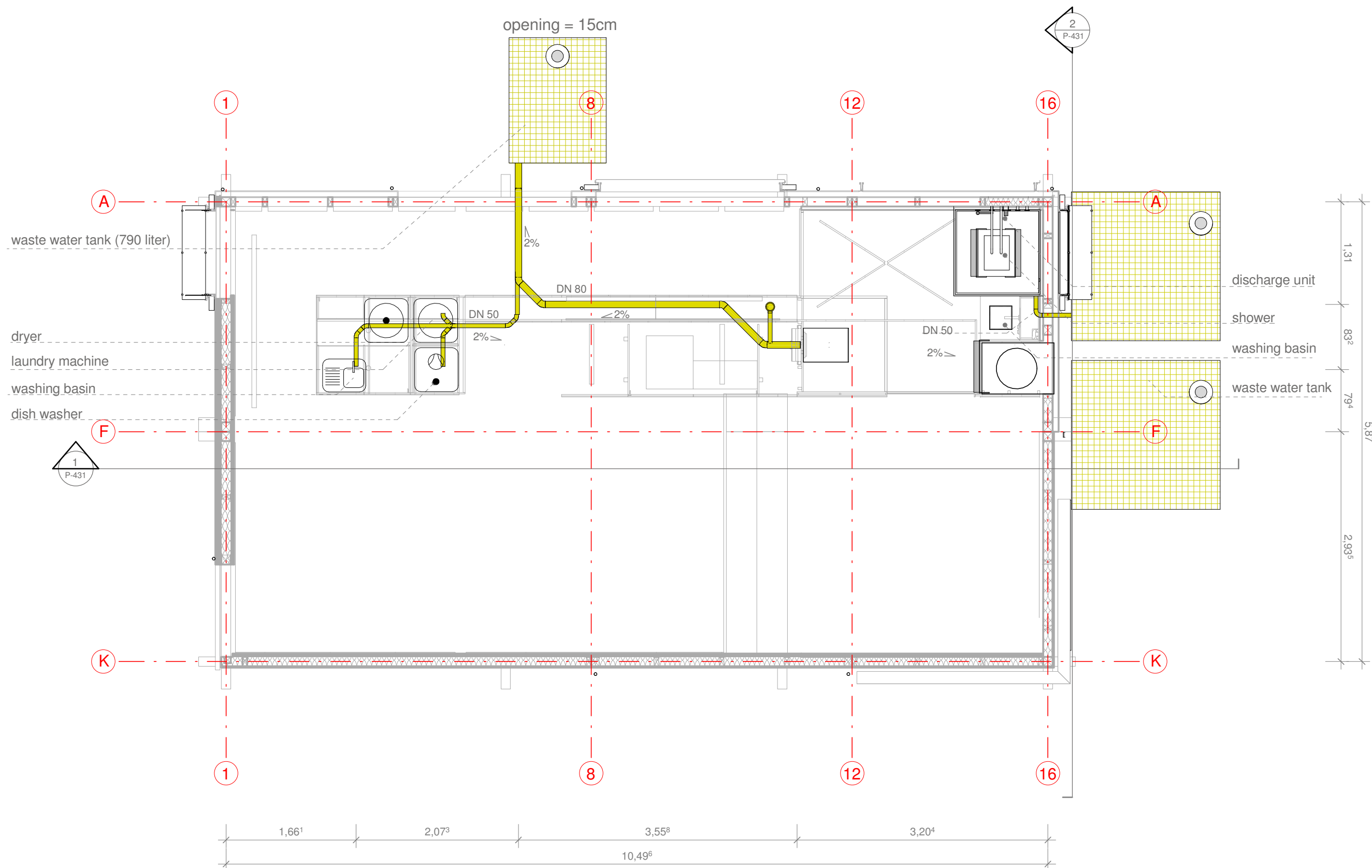
-  cold water pipe, d=40mm
(incl. insulation 20mm)
-  warm water pipe, d=40mm
(incl. insulation 20mm)
-  waste water pipe, DN 80,
polypropylene (PP)
-  waste water pipe, DN 50,
polypropylene (PP)
-  2% downward slope
-  maintenance door

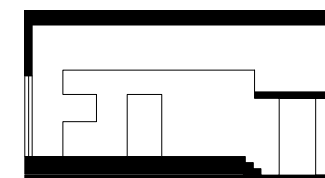
Drawn PT
Issued 09/05/30
Last index


Component
Plumbing

Description
Waste Water Disposal

Project # Scale dwg #
P 140 1 : 50 P-521





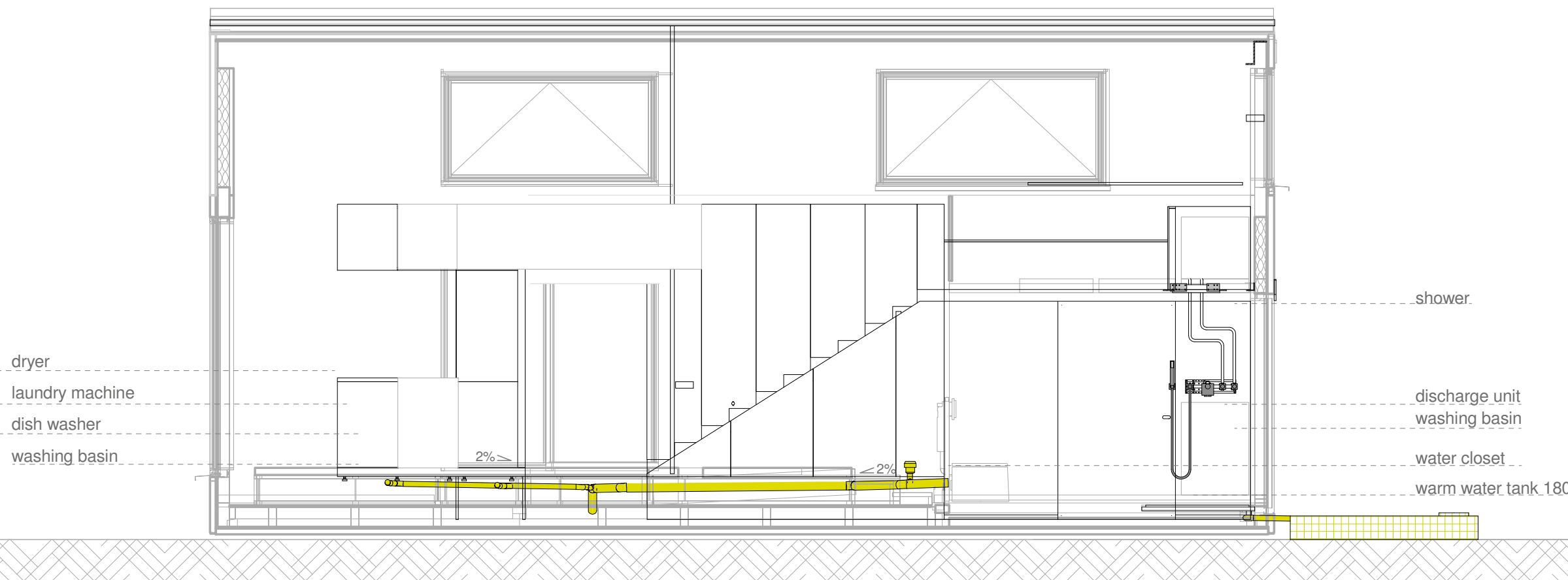
- cold water pipe, d=40mm
(incl. insulation 20mm)
- warm water pipe, d=40mm
(incl. insulation 20mm)
- waste water pipe, DN 80,
polypropylene (PP)
- waste water pipe, DN 50,
polypropylene (PP)
- 2%  downward slope
- maintenance door

Drawn PT
Issued 09/05/30
Last index

Component
Plumbing

Description
Waste Water Disposal

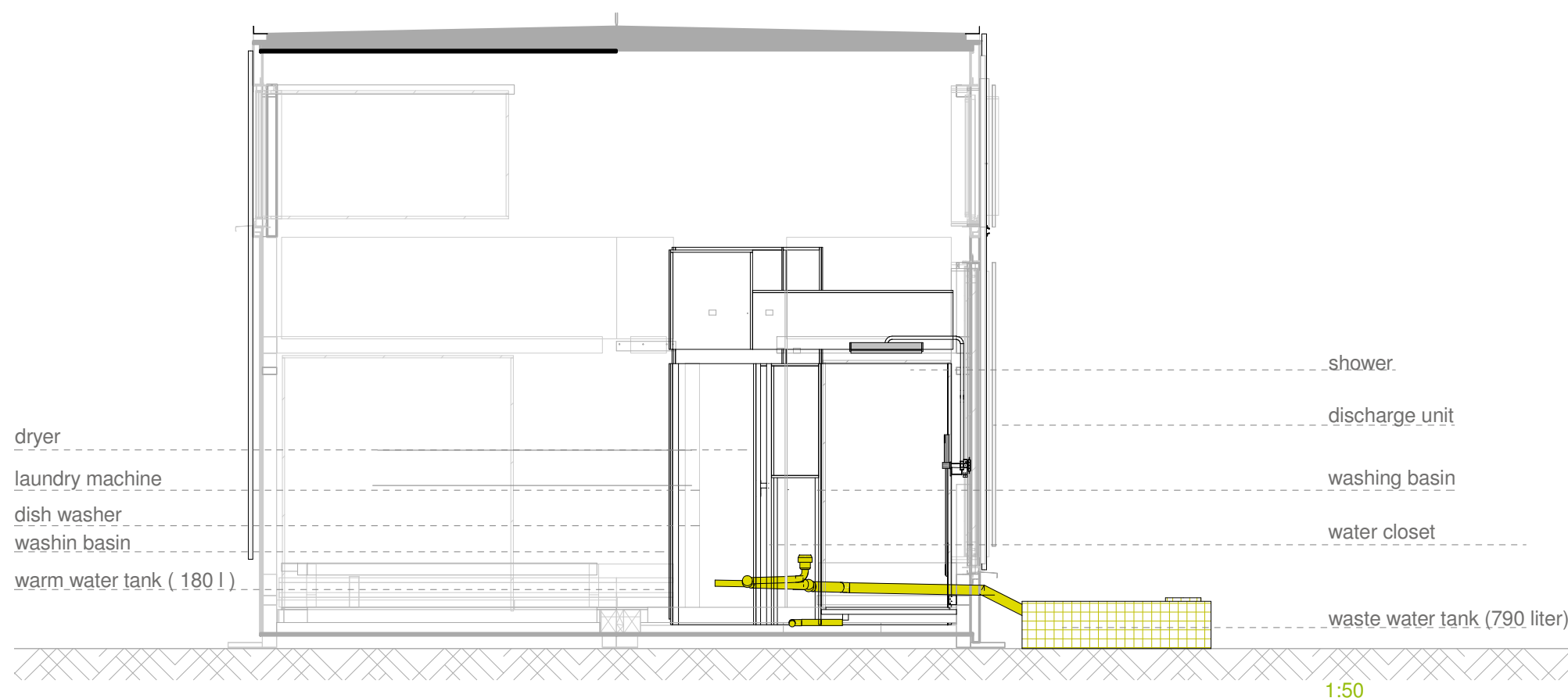
Project # Scale dwg #
P 140 1 : 50 P-531



1
P-531

Waste Water Disposal, Section 1

Scale 1:50



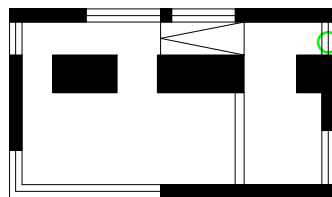
2
P 531







Waste Water Supply, Section 2

Scale 1:50

1:50





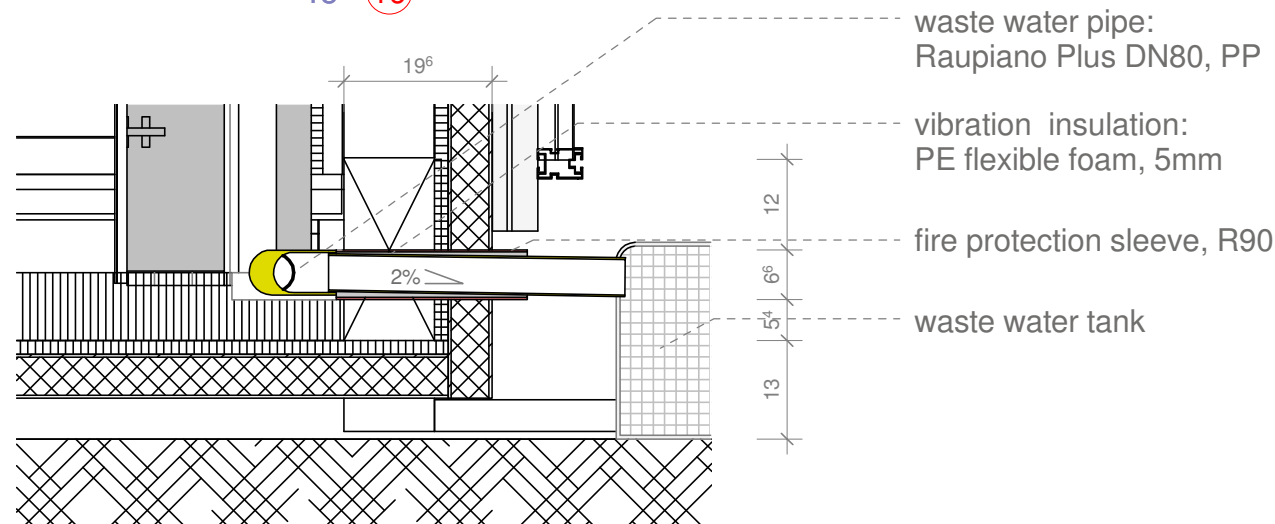
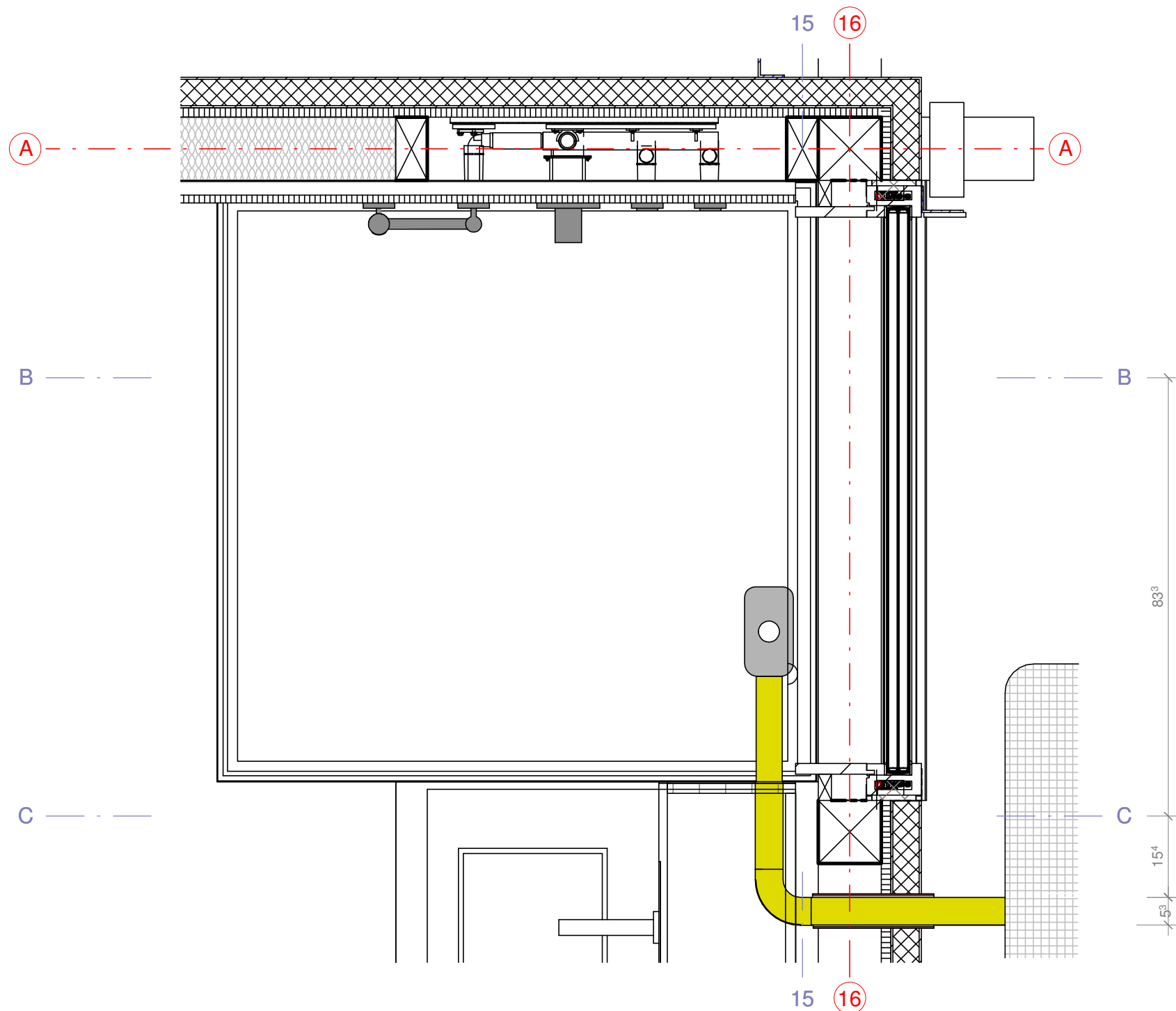
-  cold water pipe, d=40mm
(incl. insulation 20mm)
-  warm water pipe, d=40mm
(incl. insulation 20mm)
-  waste water pipe, DN 80,
polypropylene (PP)
-  waste water pipe, DN 50,
polypropylene (PP)
-  2% downward slope
-  maintenance door

Drawn PT
Issued 09/05/30
Last index

Component
Plumbing

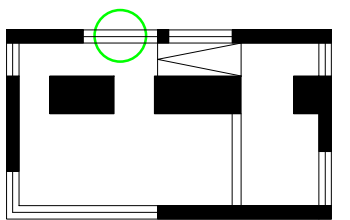
Description
Waste Water Disposal







Project # Scale dwg #
P 140 1:10 P-541



1:10

mm	50	100	250	500	1000
ft	0,25'	0,5'	1'	2'	



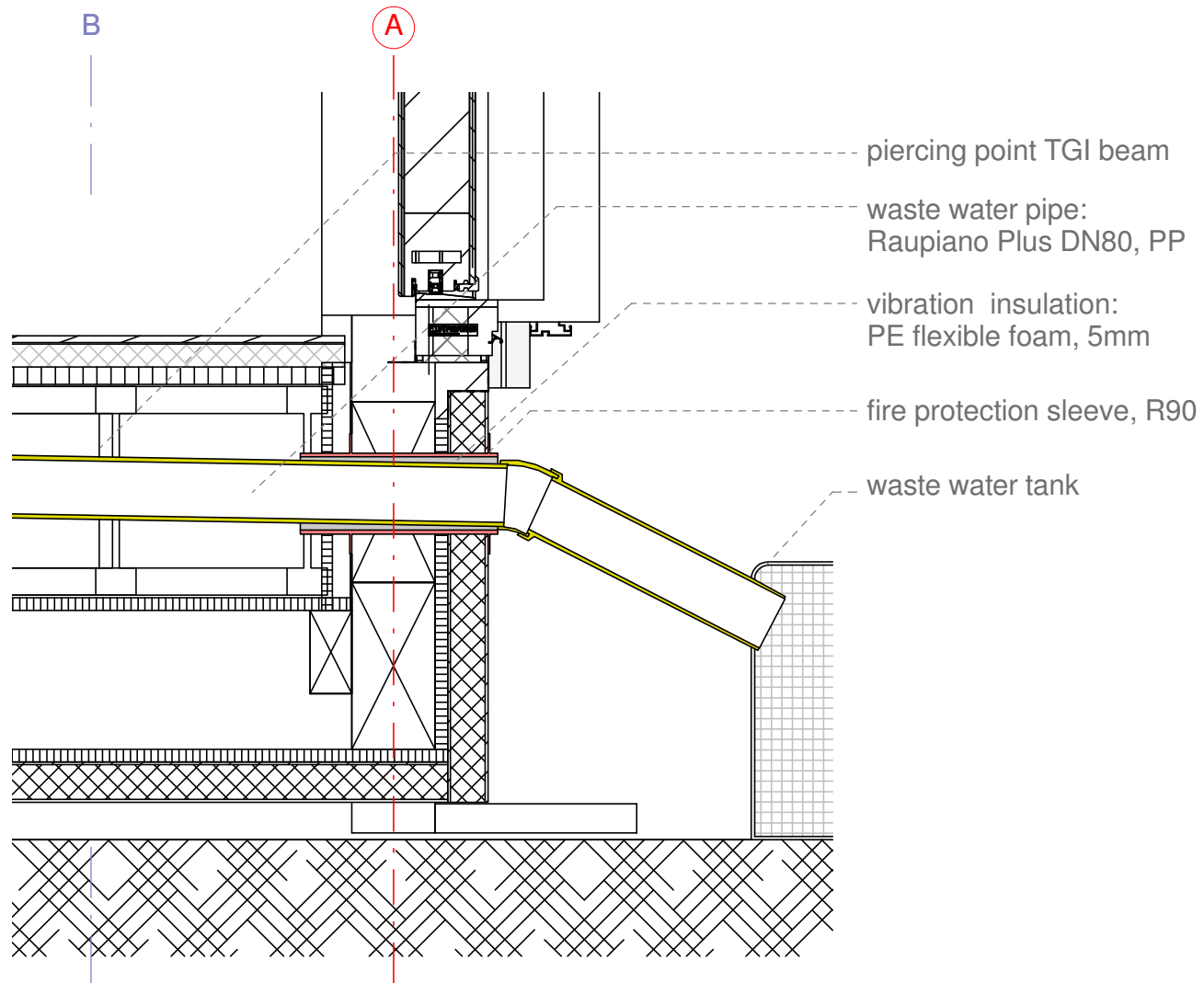
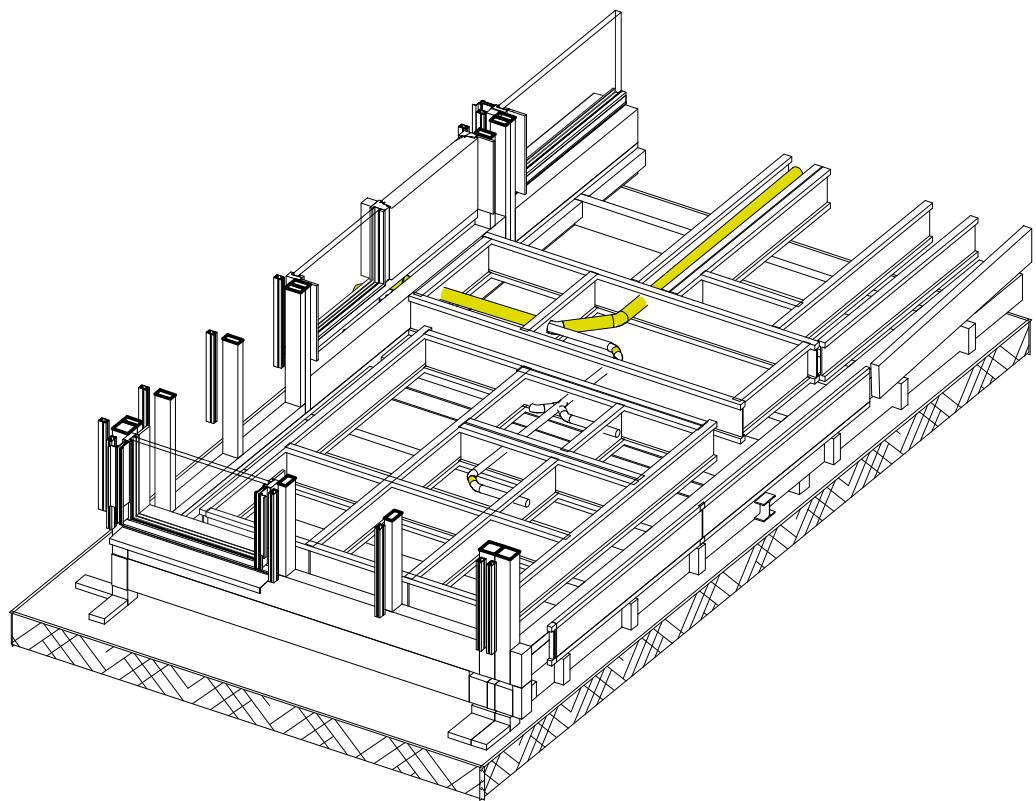
-  cold water pipe, d=40mm
(incl. insulation 20mm)
-  warm water pipe, d=40mm
(incl. insulation 20mm)
-  waste water pipe, DN 80,
polypropylene (PP)
-  waste water pipe, DN 50,
polypropylene (PP)
-  2% downward slope
-  maintenance door

Drawn PT
 Issued 09/05/30
 Last index

Component
Plumbing

Description
Waste Water Disposal

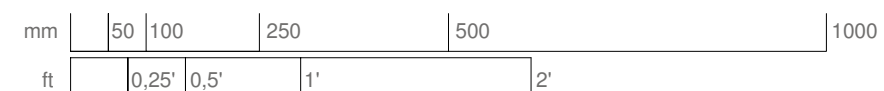
Project # Scale dwg #
P 140 1:10 P-551




1
 P-551 **Piercing Point North Overview**
 Scale 1:50

2
 P-551 **Piercing Point North Detail**
 Scale 1:10


1:10




Schedule for Plumbing Fixture								
Plan No.	Project Manual Division Master Format	Component	Article Manufacturer	Article Number	Connections			Notes
					CW	WW	Waste	
P - 311-331	Div. 22	versital pipe - Rautitan Flex	Rehau	130490-050	25,3 m	23,5 m	...	diameter = 20 mm, + 2,8mm preinsulation
P - 311-331	Div. 22	sliding sleeve - Rautitan PX	Rehau	160002-001	...	...	...	diameter = 20 mm
P - 311-331	Div. 22	Clip Element	Rehau	138043-001	2 pcs.	2 pcs.	...	diameter = 20 mm
P - 311-331	Div. 22	T-Piece, Rautitan PX	Rehau	160032-001	3pcs.	2 pcs.	...	diameter = 20 mm, equal
P - 311-331	Div. 22	Fitting, Rautitan PX	Rehau	160011-001	...	...	...	diameter = 20 mm, equal
P - 311-331	Div. 22	Bridge - Rautitan MX	Rehau	139561-002	4 pcs.	4 pcs.	...	20-G 1/2, with screwcap
P - 311-331	Div. 22	Bridge Angle, Rautitan MX	Rehau	137134-001	2 pcs.	2 pcs.	...	20 - Rp 3/4, with internal thread
P - 311-331	Div. 22	Bridge - Rautitan MX	Rehau	139571-002	2 pcs.	2 pcs.	...	20-G 3/4, with screwcap
P - 311-331	Div. 22	Angle - Rautitan PX, 90°	Rehau	160022-001	6 pcs.	6 pcs.	...	20-90°
P - 311-331	Div. 22	Installation Angle - Rautitan MX	Rehau	138491-405	1 pcs.	1 pcs.	...	20-R 1/2, with external thread
P - 411-451	Div. 22	Disposal Pipe, Raupaino Plus	Rehau	12104-004	...	...	3,6 m	DN 50
P - 411-451	Div. 22	Disposal Pipe, Raupaino Plus	Rehau	12184-004	...	...	5,2 m	DN 75
P - 411-451	Div. 22	Arc 45°, Raupiano Plus	Rehau	121114-001	...	...	10 pcs.	DN 50
P - 411-451	Div. 22	Arc 45°, Raupiano Plus	Rehau	121164-001	...	...	6 pcs.	DN 75
P - 411-451	Div. 22	Single Branch, Raupiano Plus	Rehau	121264-001	...	...	1 pc.	75/50
P - 411-451	Div. 22	Maintenance Pipe	Rehau	121524-002	...	...	1 pc.	DN 75
P - 411-451	Div. 22	Pipe Ventilair	Abu	760099			2 pcs.	DN 50, volume flow 5 l/s
P - 411-451	Div. 22	Pipe Ventilair	Abu	760399			1 pc.	DN 80, volume flow 19 l/s


SOLAR DECATHLON

Project


SOLAR DECATHLON 2009
TEAM GERMANY

Constructor


TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn
PT

Issued
05/28/09

Last index

Component
Plumbing

Description
Schedules for Plumbing

Project #
Scale
dwg #

P 140
P-611

Schedule for Plumbing Pump														
Plan No.	Project Manual Division Master Format	Component	Mark	Article Manufacturer	Article Number	Dimensions			GPM	Pump rpm	Total Head	MIN MOTOR W(hp)	Suction Lift	notes
						H	W	L						
P-311, P-511	Div. 22	Water Pressure Pump	Jet Pump JP 5	Grundfos	130490-050	300 mm	206 mm	364 mm	5,5 m³/hour	2830	36 m	775	8 m	
P-311, P-511	Div. 22	Pump Add-on	"Pressure Control"	Grundfos	...	...	...	...	...	...	...	...	...	pump module, w.a. automatic-stop-funktion to save energy

Water Tank Schedule											
Plan No.	Project Manual Division Master	amount	Component	Article Manufacture	Article Number	Dimensions (cm)				Material	notes
						H	W	I	content		
P-311 - P-611	Div. 22	2	Waste Water Tank	DL Kunststofftechnik	custom product	20	190	190	720 liter	polythene (PF-HD)	food safe, odorless, durable against acids, benzoil, water etc.
P-311 - P-611	Div. 22	1	Fresh Water Tank	DL Kunststofftechnik	custom product	50	190	190	1800 liter	polythene (PF-HD)	food safe, odorless, durable against acids, benzoil, water etc.
A-483	Div. 22	3	Irrigation Tank	DL Kunststofftechnik	custom product	40	124	160	790 liter	polythene (PF-HD)	food safe, odorless, durable against acids, benzoil, water etc.

Systems

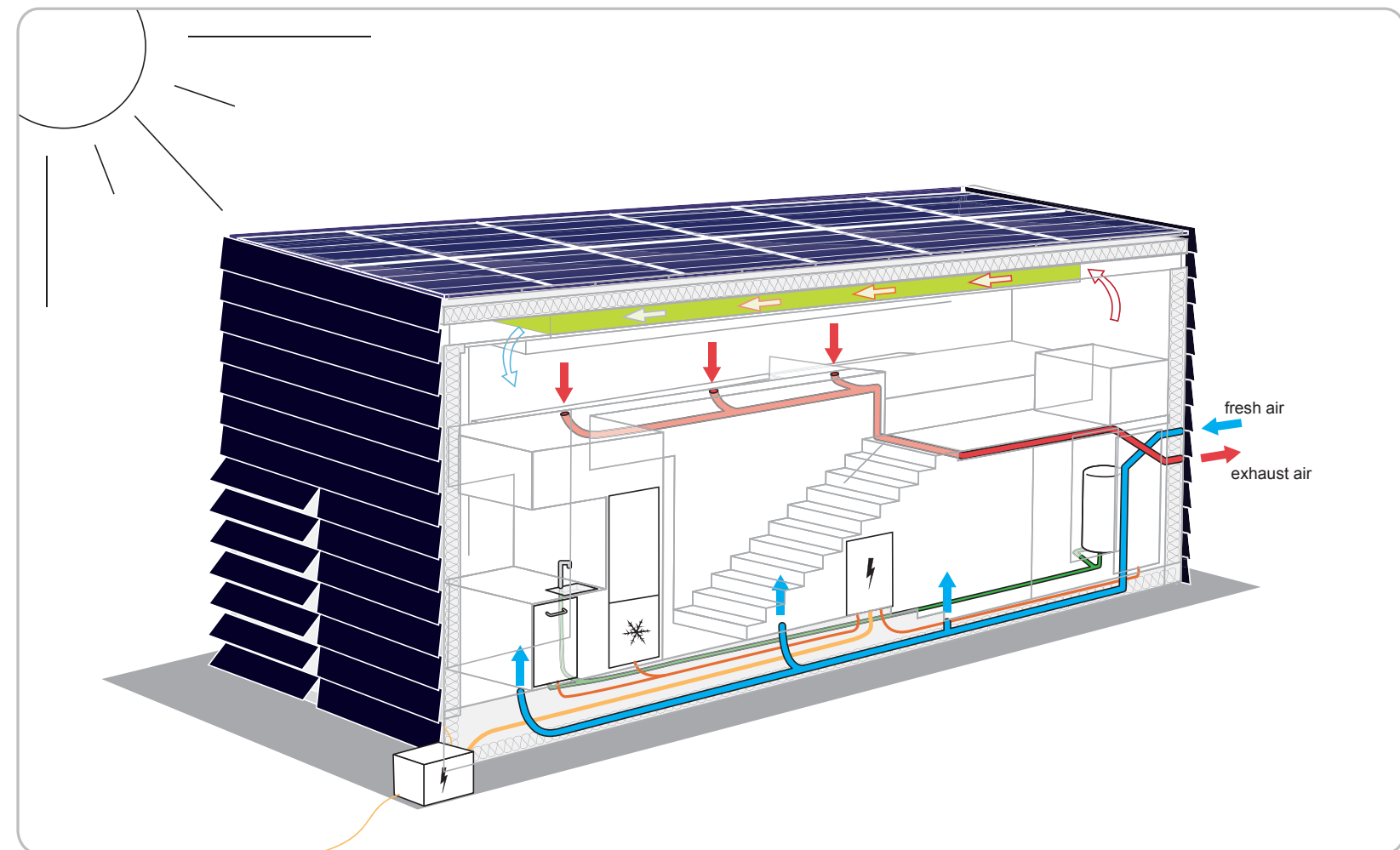
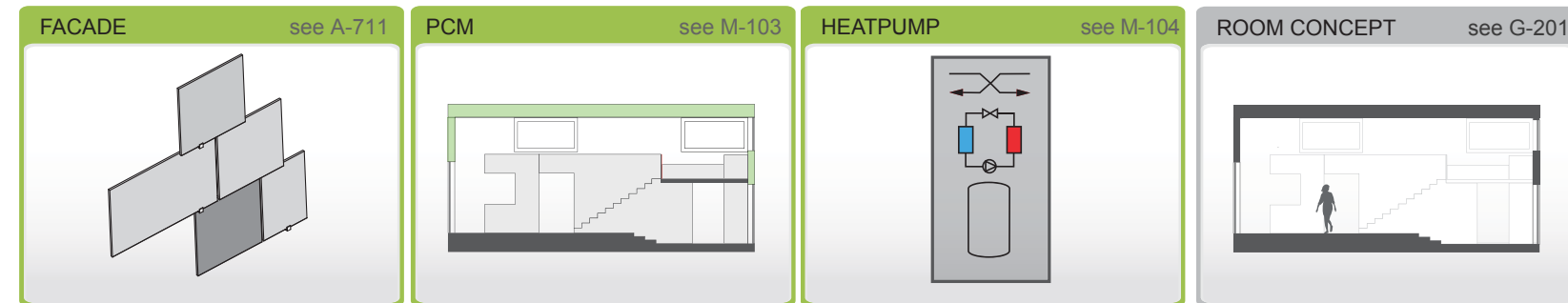
The energetic concept of our house combines a high level of comfort with intuitive building control, energy saving and energy producing systems and above all, aesthetic pleasure. The technical systems applied are integrated in a coherent design to reach a complete integration of all functions. Each system could work on its own and can be adapted for other buildings.

Due to the special conditions of this competition the concept has to face both, the climatic conditions of Washington, D.C. and of Darmstadt.

For the reduction of energy demand, the building envelope consists of highly insulated and airtight components; additionally it is, of course, equipped with controlled ventilation and heat recovery. Optimal climate control is achieved by a heat pump, which takes energy from the surrounding air. Controlled air ventilation is necessary, so technical components like radiators are superseded by air conditioning. By this the heat transfer is easily possible.

The building envelope is optimized for energy production, using different kinds of photovoltaic technologies: on the roof high efficient monocrystalline PV is installed, while CIS PV is applied on the facade. These cells provide extraordinary possibilities of architectural integration, which is one important aim of the energy concept. The facade regulates daylight, solar gains (heating) and cooling demands. It also includes blinds and visors.

Technical



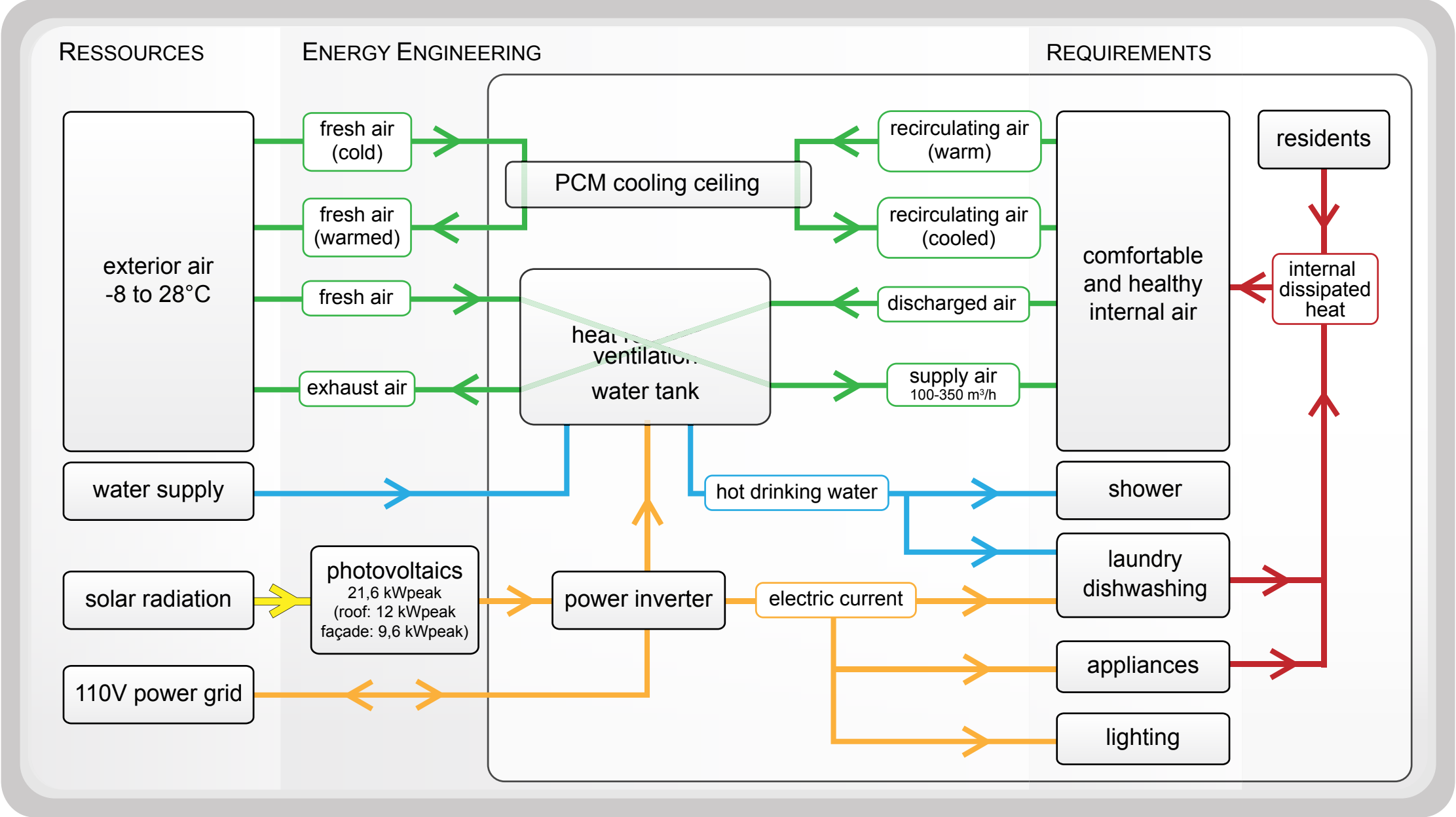
Drawn SL SK
Issued 09/05/30
Last index

Component
Energy Concept

Description
Systems

Project # P140
Scale
dwg # M-101

Flow of Energy



PCM-System

Every material is capable to accumulate thermal energy and to deliver it again.

A phase change material (PCM) is a substance with a high heat of fusion. Thermal energy is absorbed or released when the material changes from solid to liquid and vice versa; thus, PCMs are classified as latent heat storage units.

Water for example is solid below 0°C (Ice), fluid between 0°C and 100°C and gaseous above 100°C. At the point of phase transition extra energy is needed. Water requires the same amount of energy to transform from a solid state to liquid, as to heat it up from 0°C to 80°C.

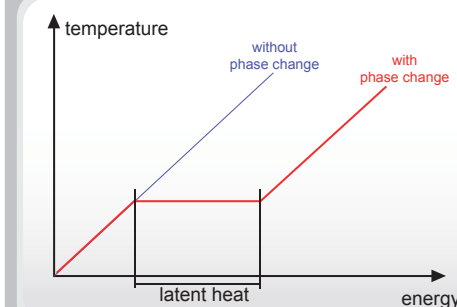
We are using phase change materials in our interior walls (paraffins) and in the cooling ceiling (salt-hydrate). They have their fusing point at a temperature of 23°C, therefore we can store much heat during daytime in little mass. The thermal mass will be discharged at night. The capacity is equivalent to the energy needed for one day of cooling.

The PCM in the internal wall is not controllable because it is the surface of the interior room with it's thermal sources. It is a passive system.

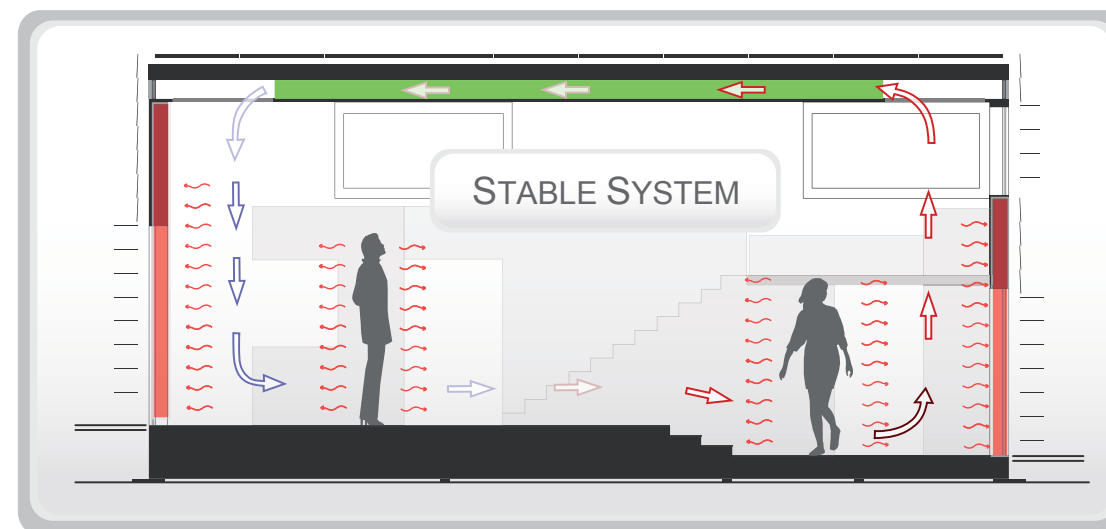
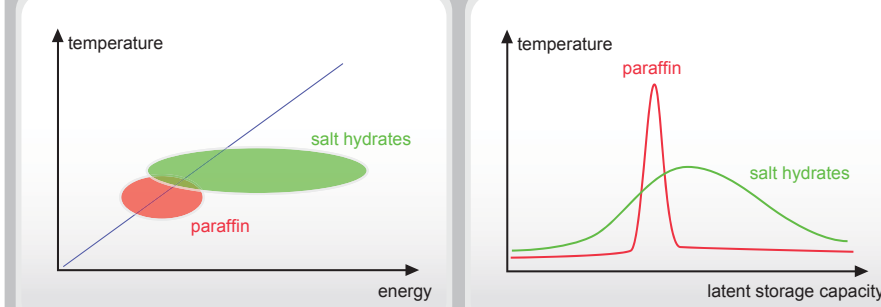
The PCM in the ceiling is a partial active system, as a result of being separated from the interior room and controllable by the built in fans with the ability to regulate the air speed in the ceiling, we can increase cooling load whenever needed.

We calculated the coefficient of performance between 9 to 15 regarding the ambient temperature.

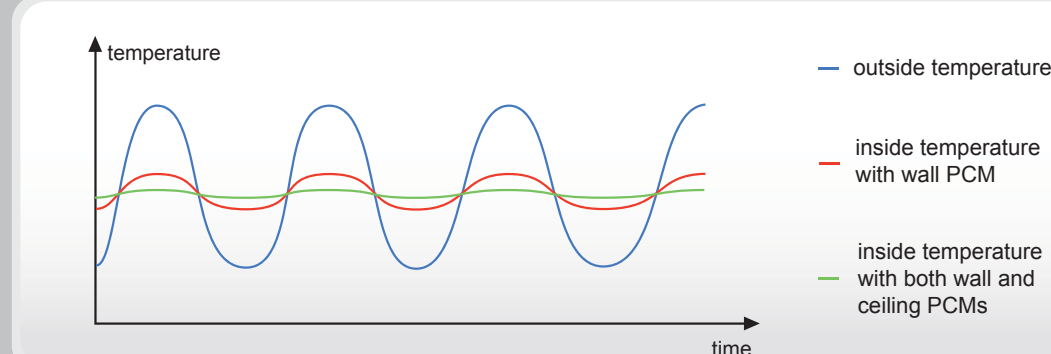
WHAT IS PCM ?



WHAT TYPES ARE AVAILABLE ?



WHAT IS THE RESULT ?

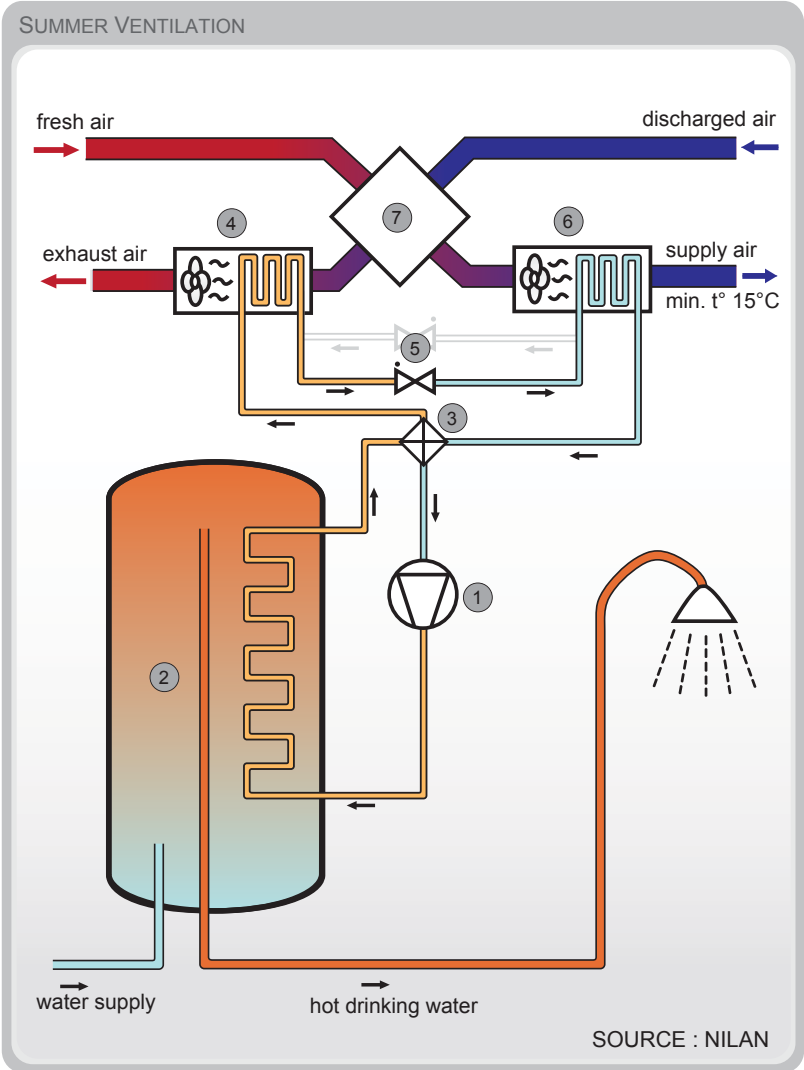
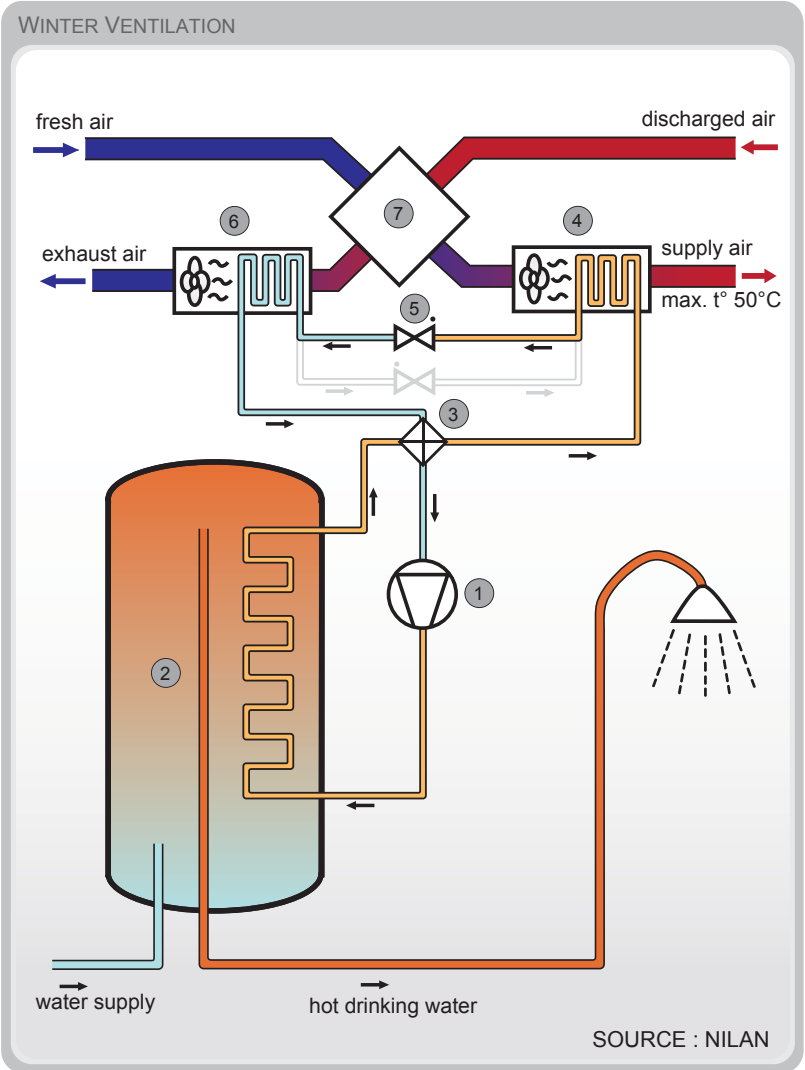


- ① compressor (1,5 kW)
- ② water tank (180 L)
with heat exchanger
- ③ 4-way
reversing valve
- ④ condensor
(heat exchanger)
- ⑤ expansion valve
- ⑥ evaporator
(heat exchanger)
- ⑦ heat exchanger
(80% yield)

Drawn	SL SK
Issued	09/05/30
Las index	
Component	Energy Concept
Desc ip ion	Heat Pump
Pr #	Scale
P140	dwg # M-104

Heatpump with Heat Recovery and Watertank

Due to the german "Passivhaus" -standard and the resulting small loads, we decided to condition our house by air only.
The centre of our active system is an air source heat pump.
It also integrates a ventiation compliance, a heat recovery with a coefficient of 80% and a two layer hot water tank with 180l.
In case of air cooling the emerging heat goes into the hot water tank if needed. Otherwise it's going to be blown of.
The tank also has an electrical immersion heater, whether the capacity of the heat pump is not high enough.



LEGEND

P
PASSIVE SYSTEM

PA
PASSIVE SYSTEM

A
ACTIVE SYSTEM

Energy Themes

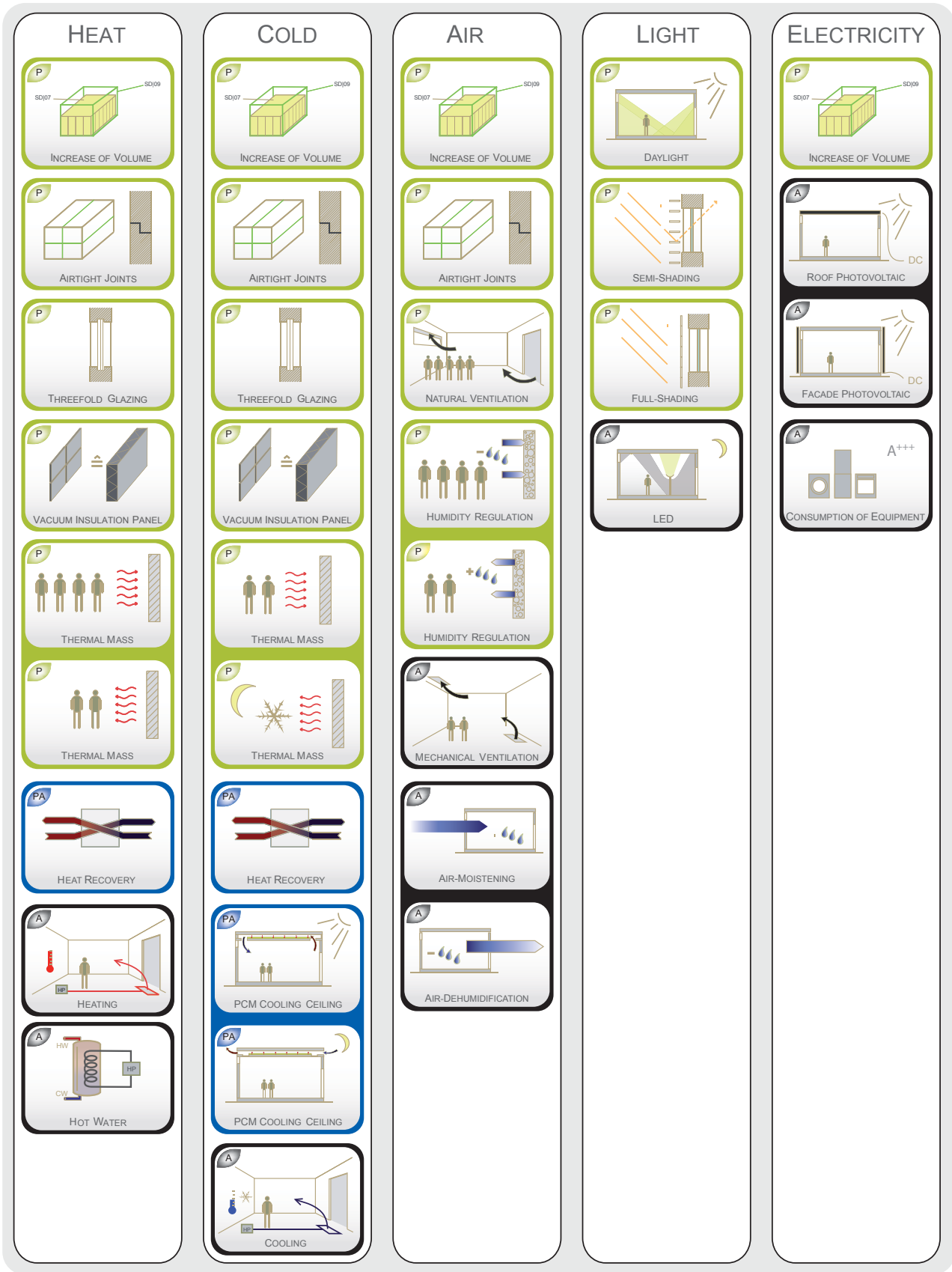
The use of efficient and innovative technologies is an essential base of our work. Thus we have combined five energy themes in our house: heating, cooling, air-condition, lighting and electricity. In order to get an energy gaining building, we have applied passive, active and a combination of both strategies.

As example for passive technologies and in order to reduce the energy consumption, we have tried to create an airtight building shell, which also complies with the German "Passivhaus"-standard. Other elements are thermal mass in form of Phase Change Materials, natural ventilation during the night, to cool down the PCM, and sensible openings for daylight.

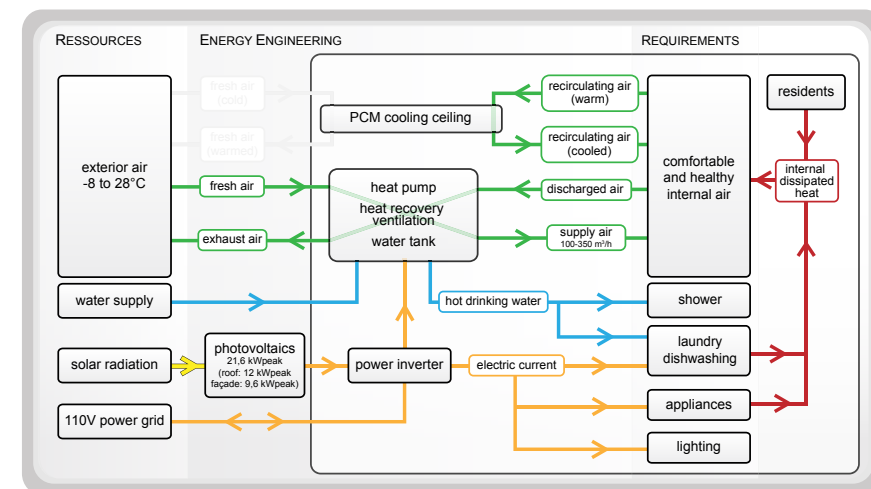
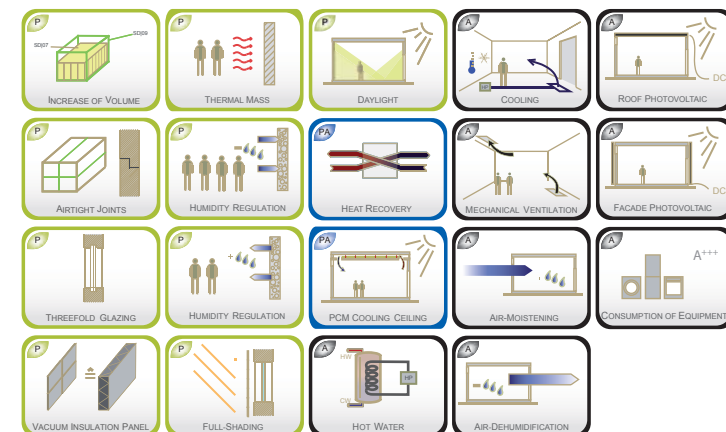
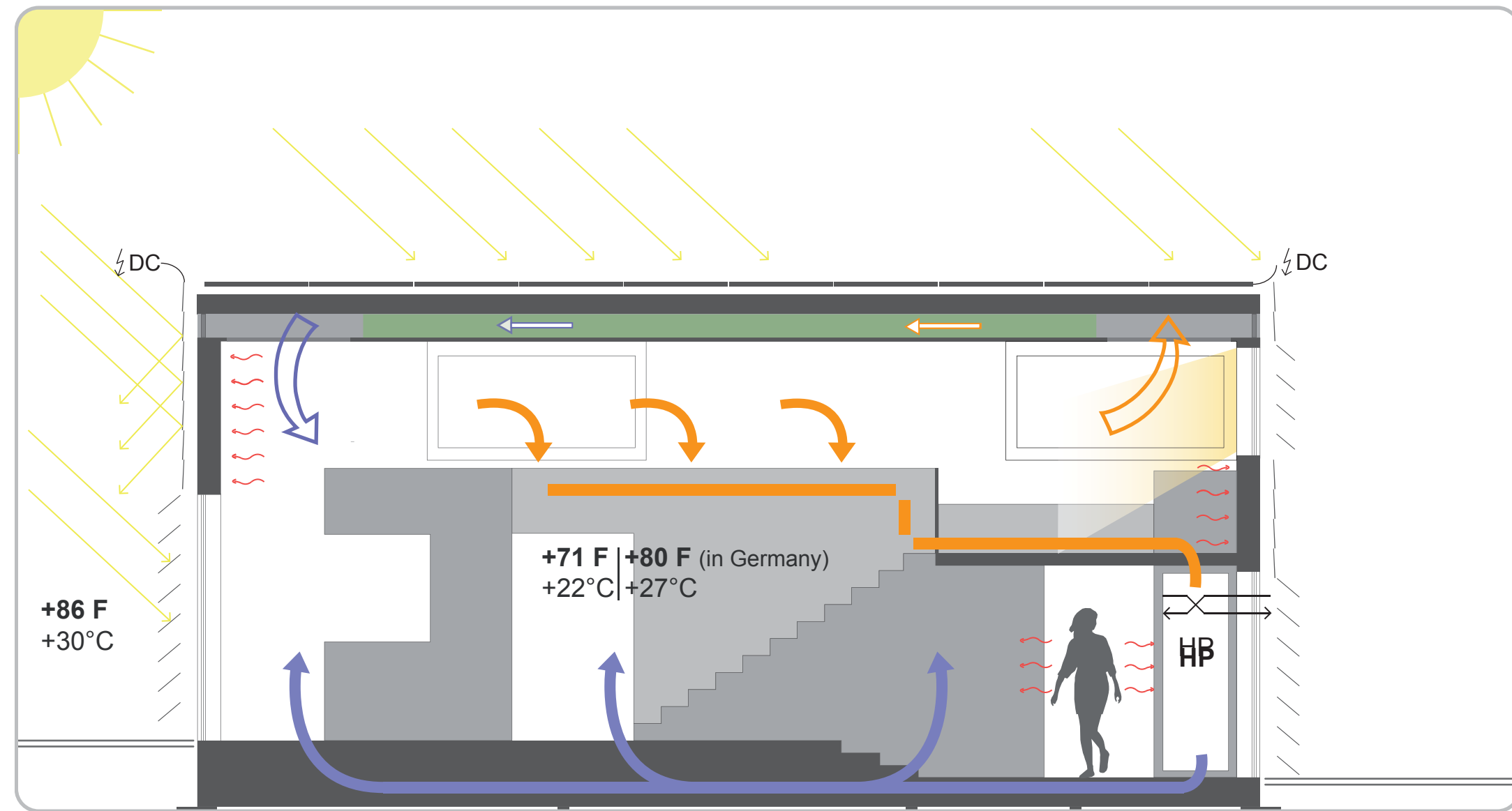
Examples for partial active systems are our cooling ceiling and the shading system that allows a semi- or full-shading.

The centre of our active system is an air-source heat-pump with a hot water tank. It is used for conditioning the air in the house.

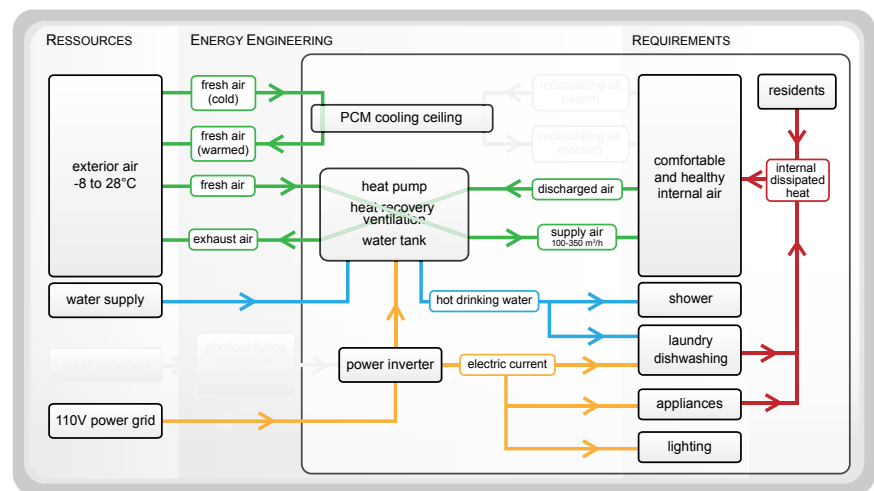
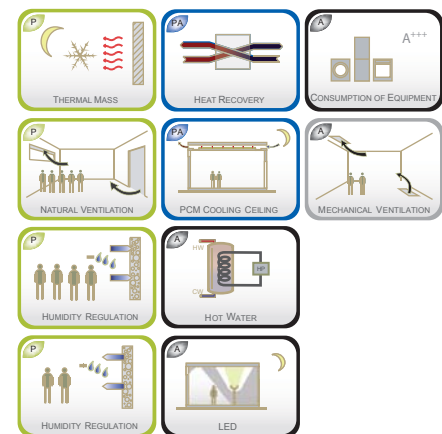
To gain as much energy as possible, we have monocrystalline photovoltaic cells on the roof, and amorphous cells on the facade.



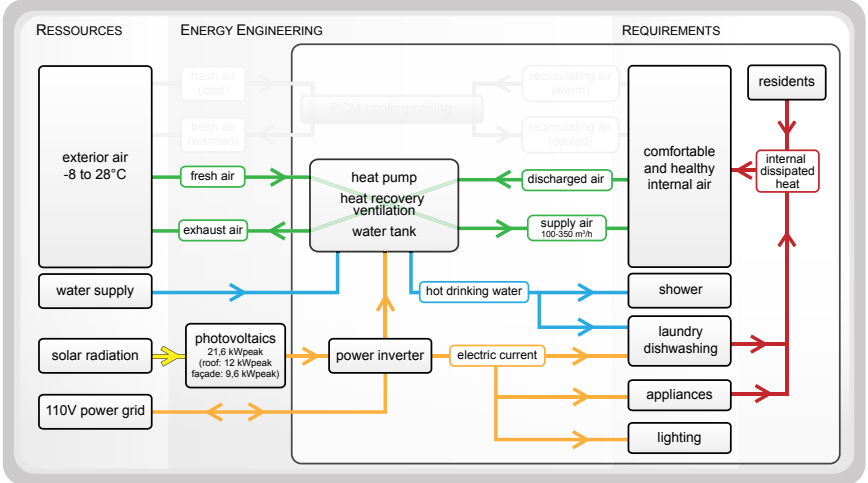
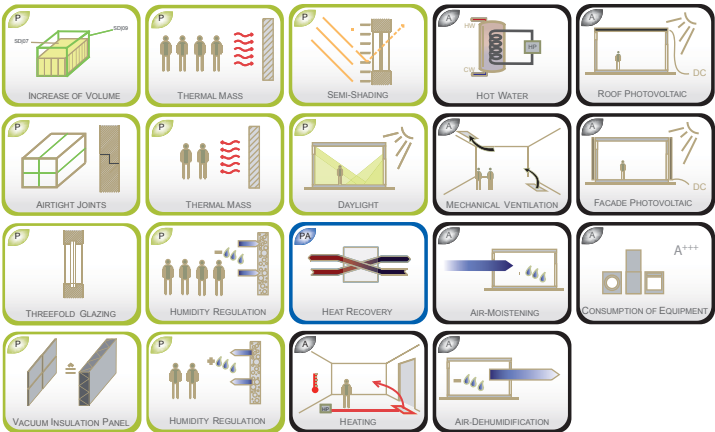
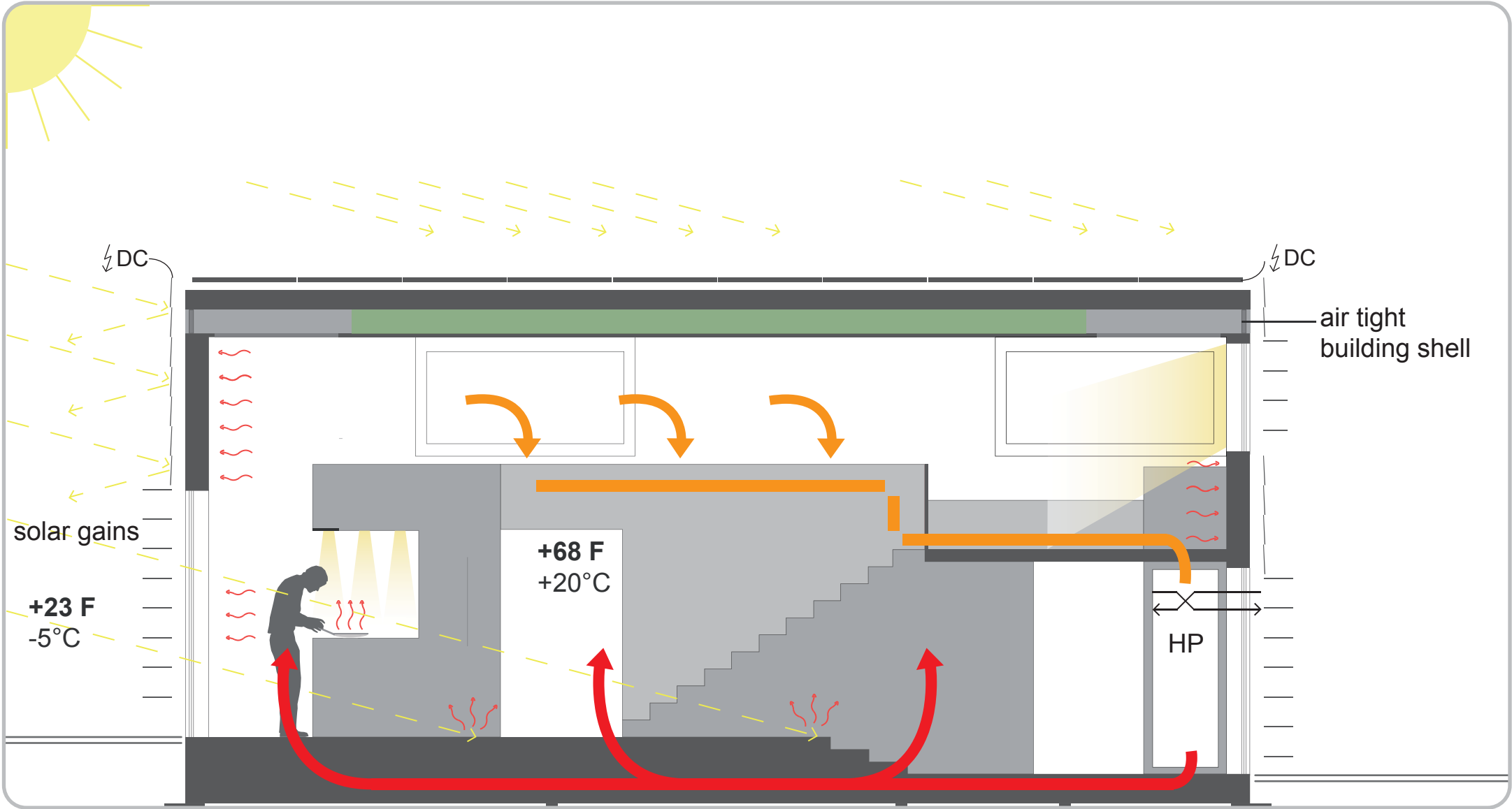
Scheme Summer Day



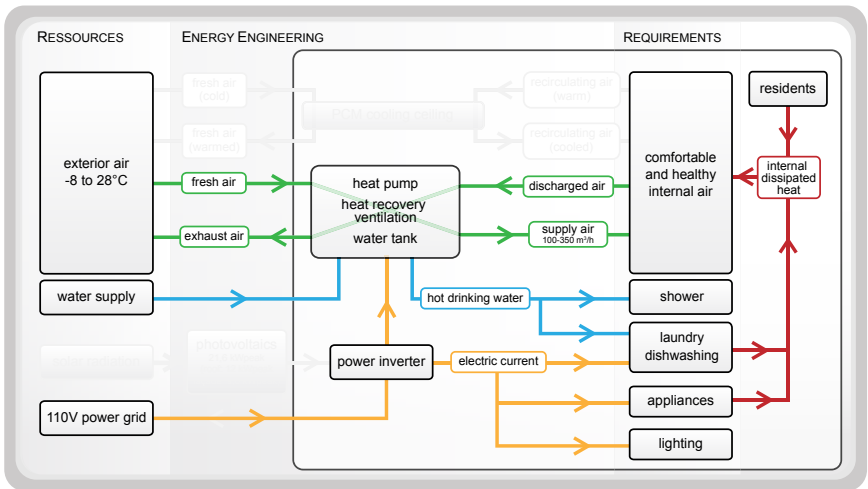
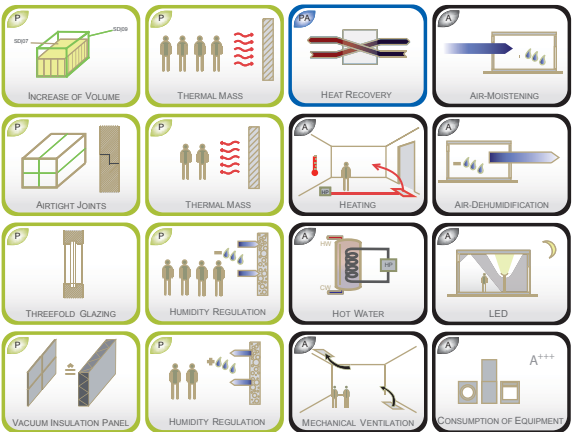
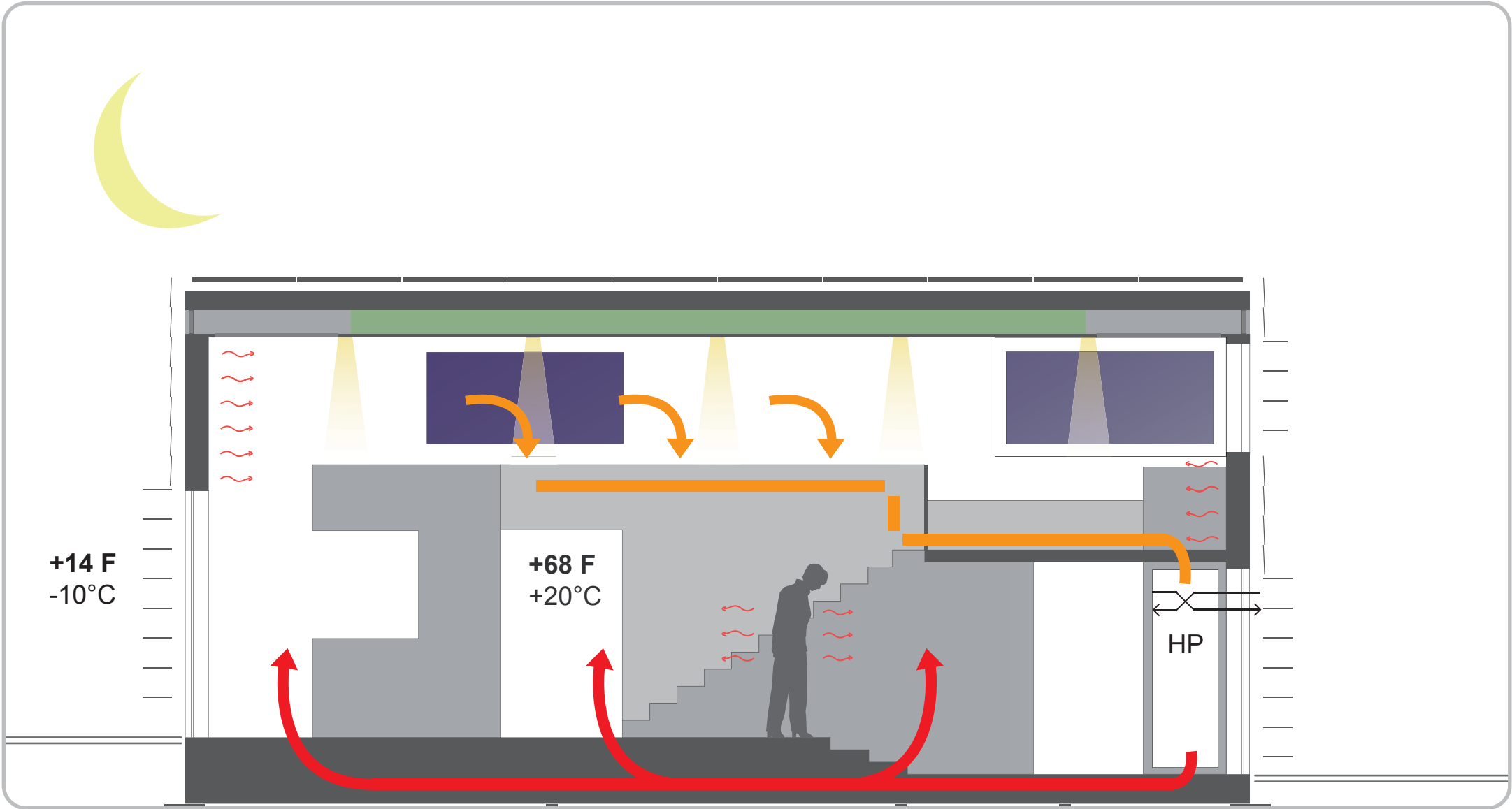
Scheme Summer Night



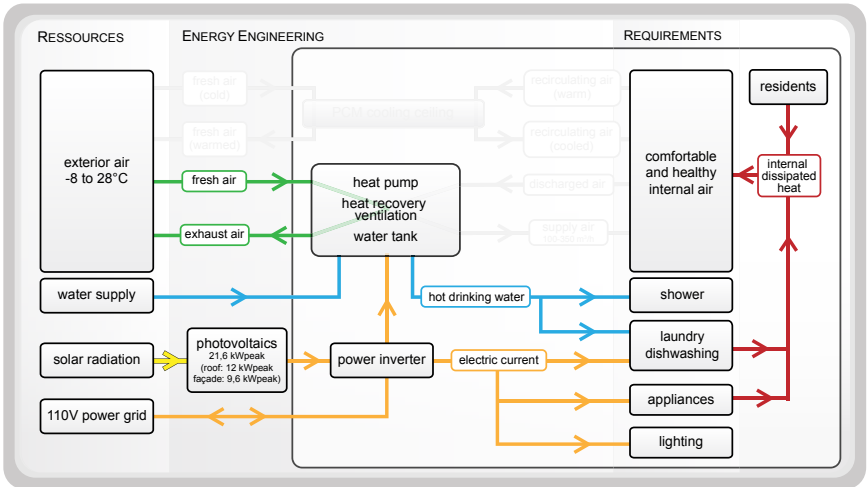
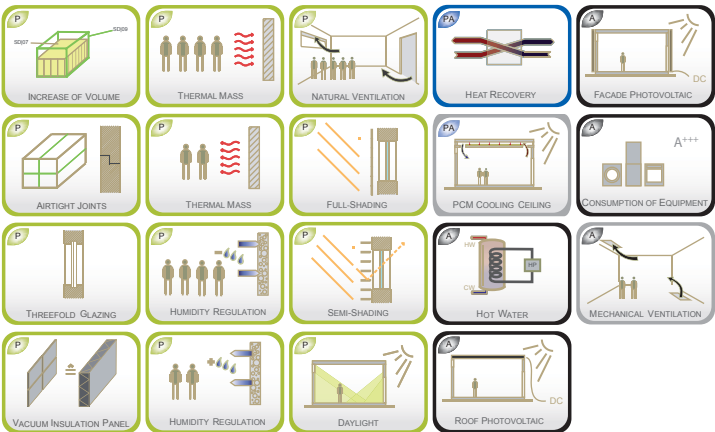
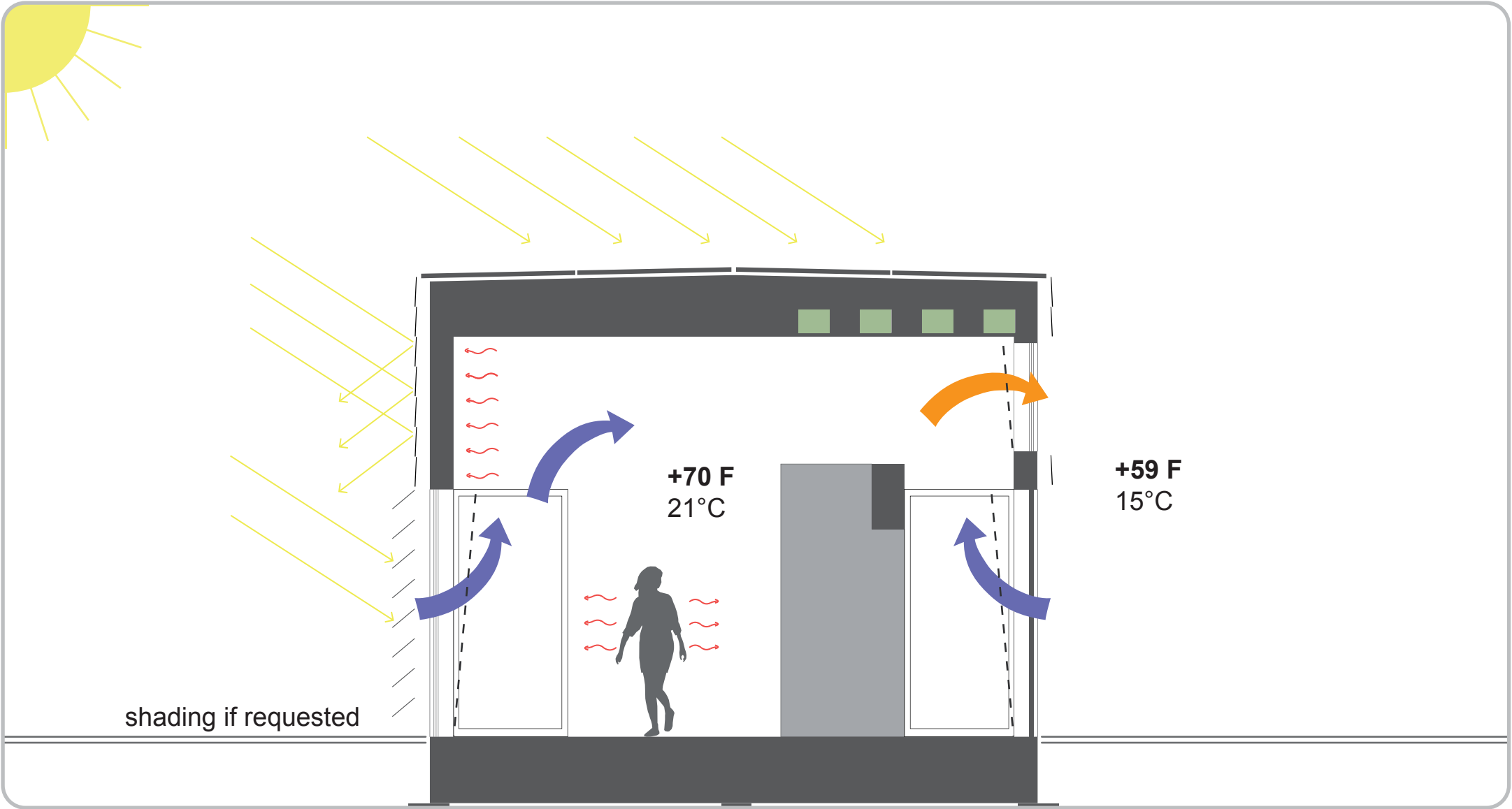
Scheme Winter Day



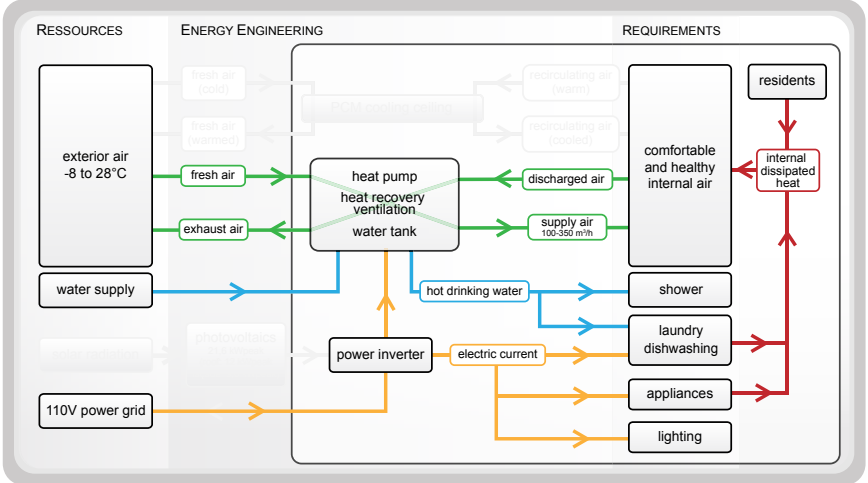
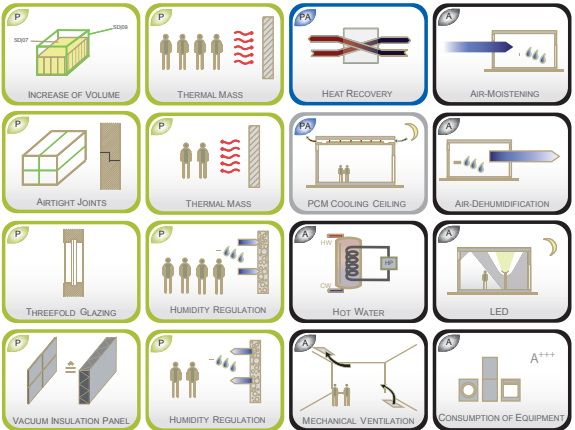
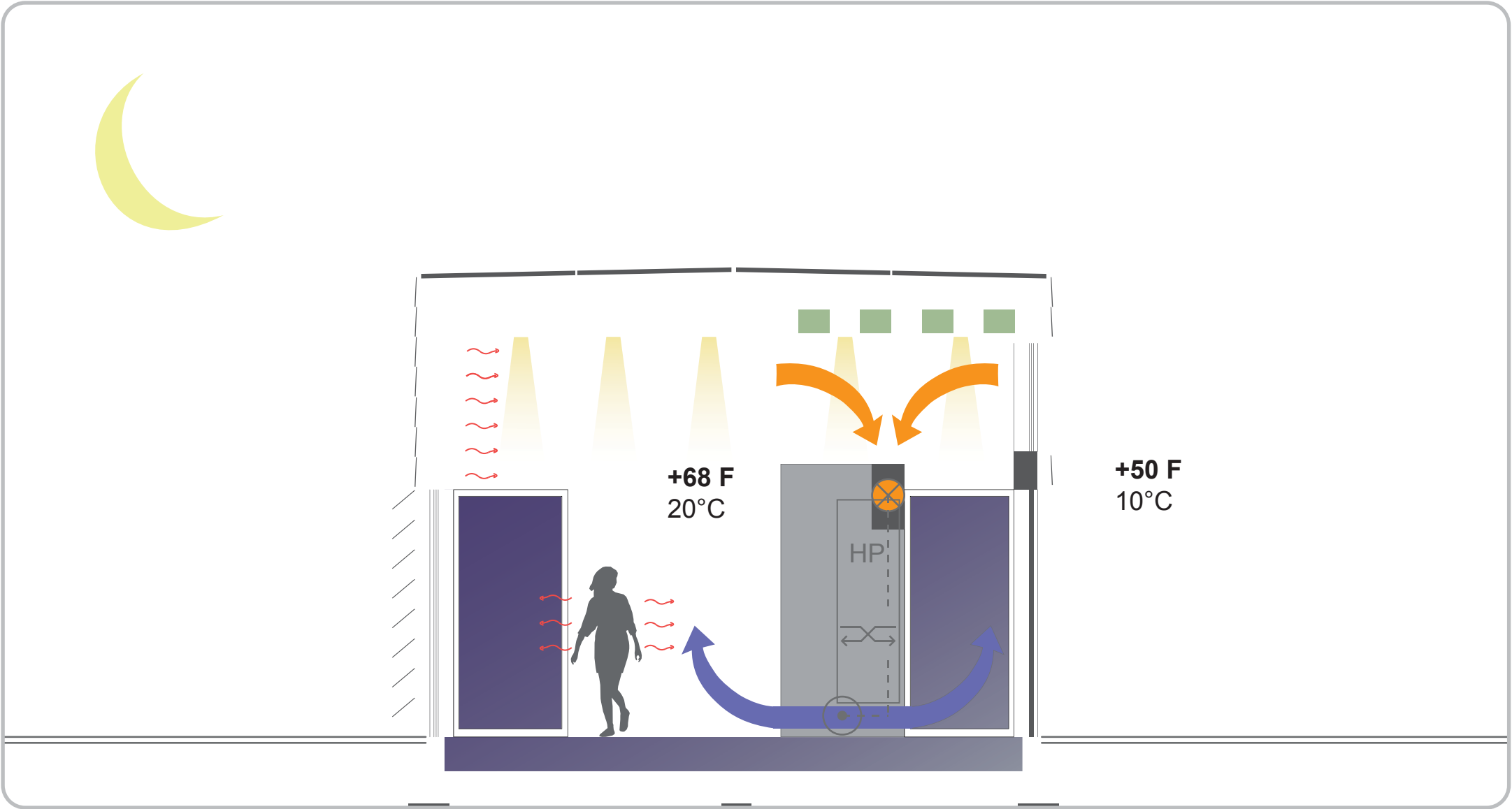
Scheme Winter Night



Scheme Spring Day (Autumn Day)



Scheme Spring Night (Autumn Night)



Planning Tools

During the whole design process we had to check our building frequently times with multiple analysing tools to assure that it develops into the right energetic direction until it has an optimized balance.

We used several analysing programs, each for a differenet problem to solve.

At the beginning we took simple schedules to get a quick impression of parameters and a first rating.

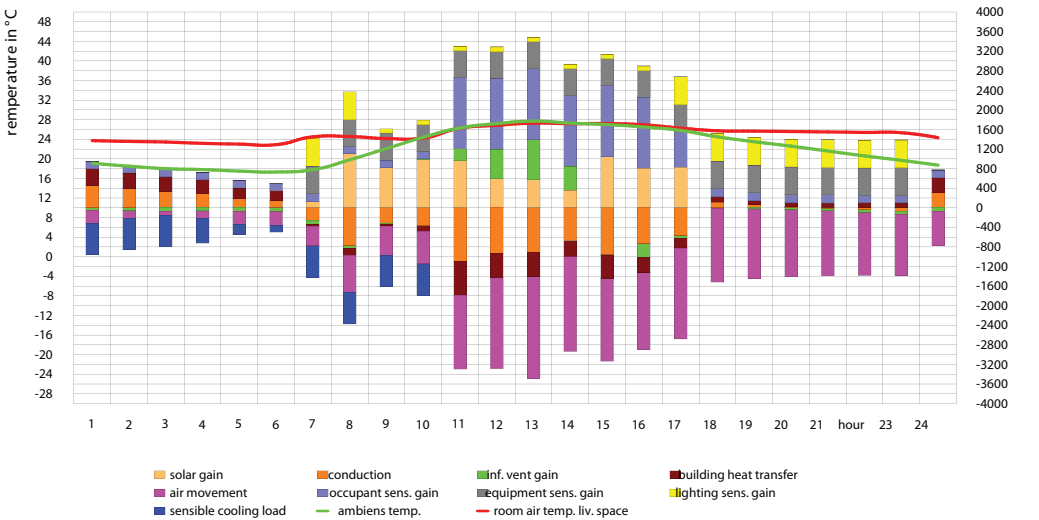
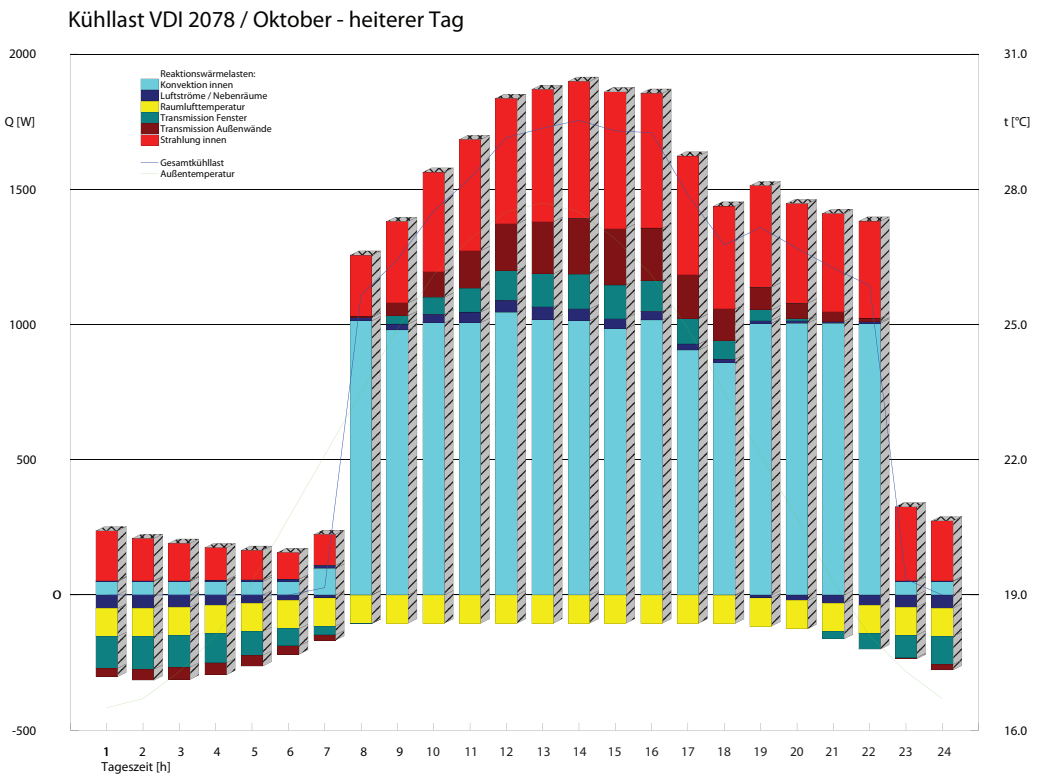
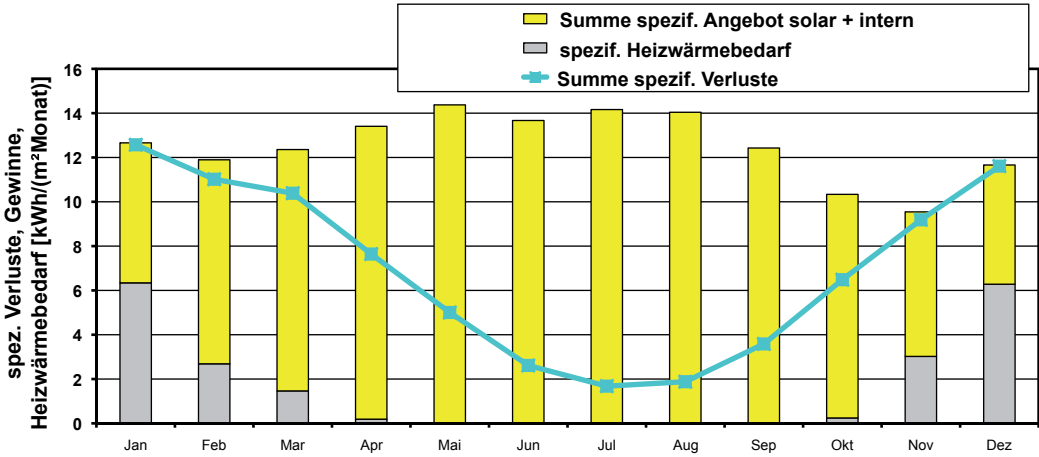
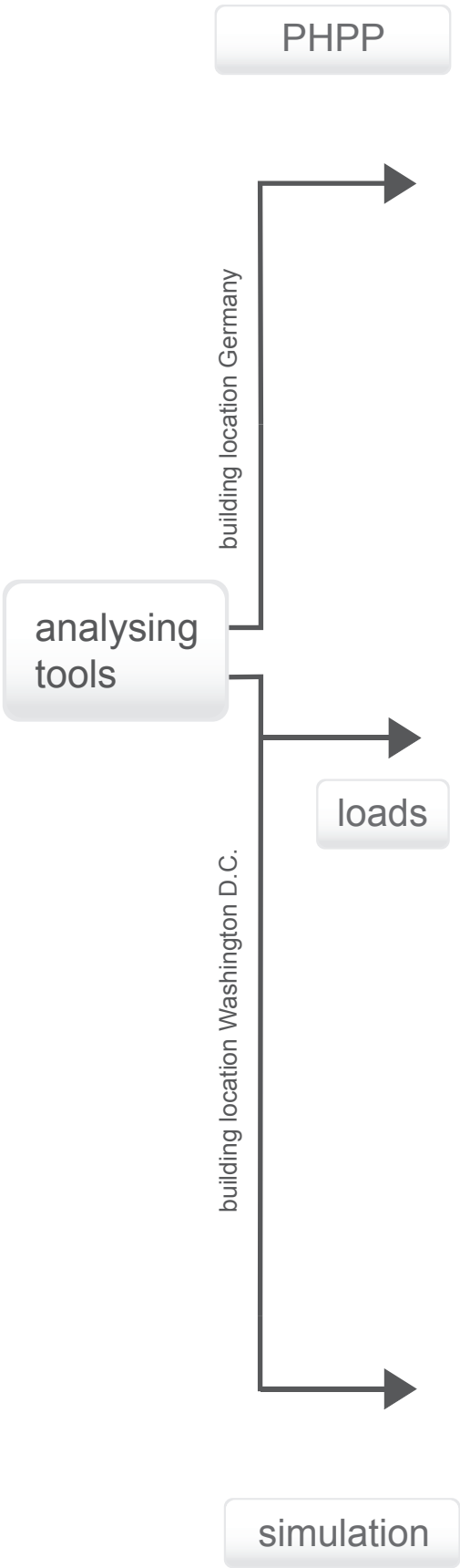
By and by we worked with more precise tools to determine how our building in detail.

One of these optimizatoin tools, was the “PHPP”, a program to certify passive houses

Other analysing appliances were programs to calculate the heating and cooling loads, as well as a dynamic building simulation. These appliances we primarily intended to get a rating of our house for Washington.

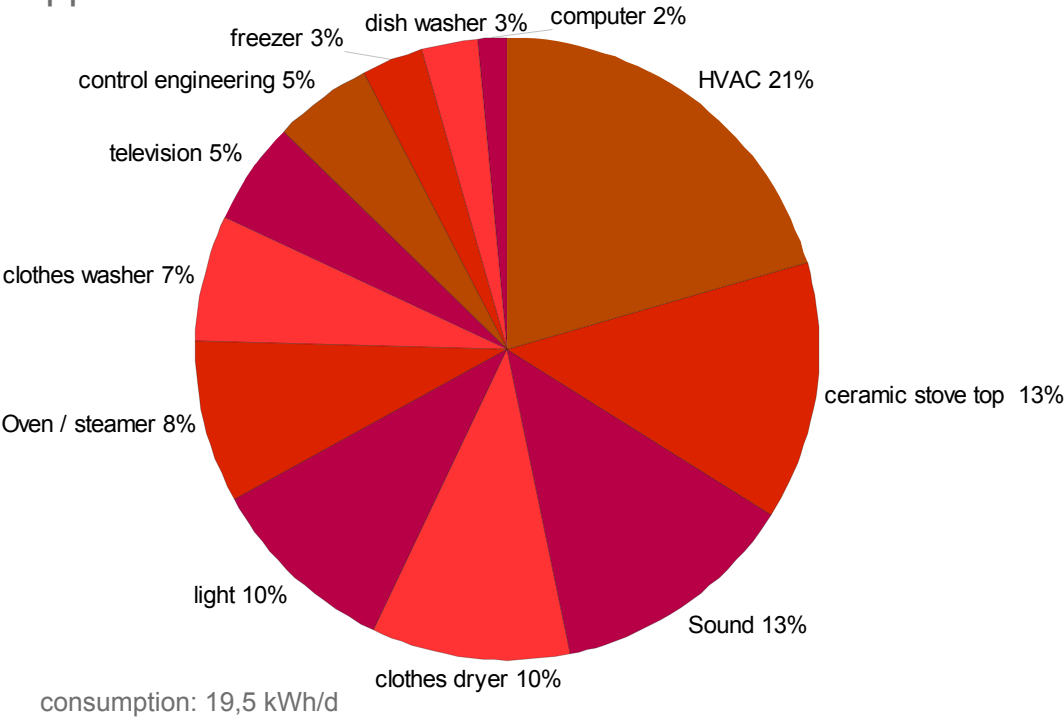
The results of our calculations influenced applicable many decisions in the planning process like:

- general building service system,
- lighting,
- shading,
- pv mounting and orientation,
- openings,
- pv-call technology,
- isolation quality,
- HVAC distribution and
- appliances

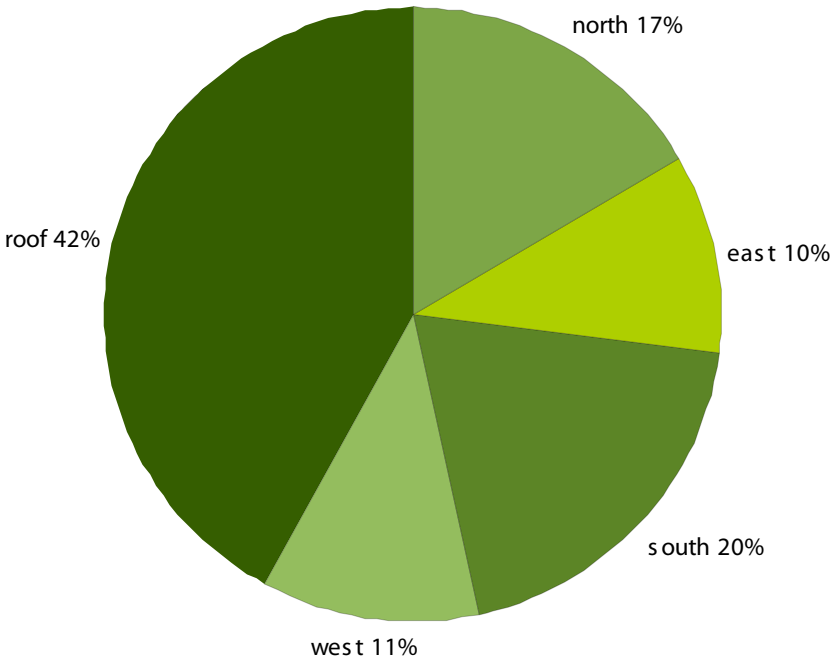


Energy Balance Washington (day in contestweek)

Appliances



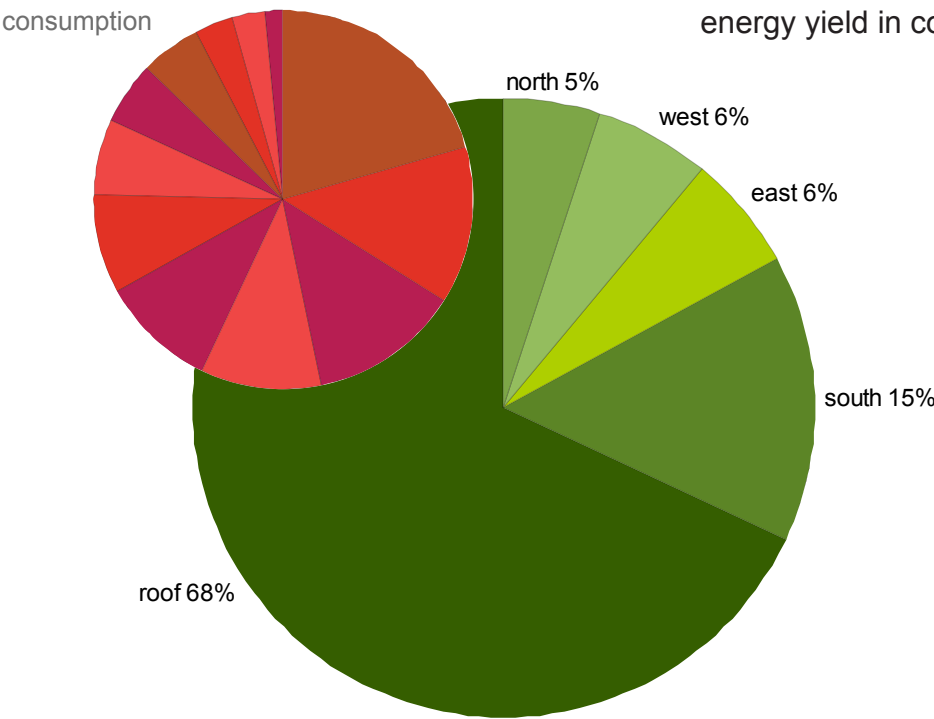
Surface Relations



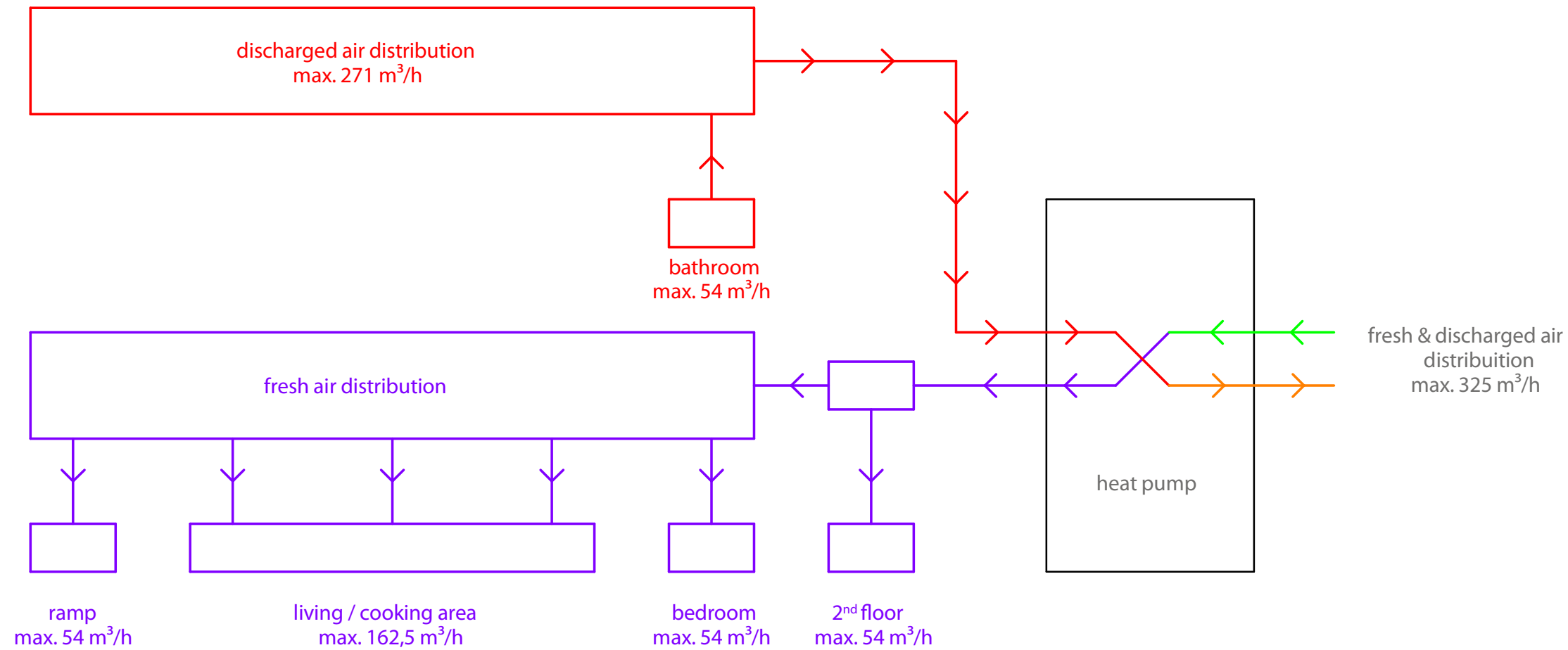
Calculation (relating to available space)

orientation	irridation (Wash. October)	irridation/d	allocated area	energy cycle efficiency	gain per area
roof	107 kWh	3,5 kWh/m²d	63,72 m²	0,183	40,81 kWh/d
south	120 kWh	3,9 kWh/m²d	30,24 m²	0,11	12,97 kWh/d
west	65 kWh	2,2 kWh/m²d	17,64 m²	0,11	4,27 kWh/d
north	27 kWh	0,9 kWh/m²d	25,56 m²	0,11	2,53 kWh/d
east	67 kWh	2,1 kWh/m²d	16,2 m²	0,11	3,75 kWh/d
aggregate power level					64,33 kWh/d
contamination (-10%)					57,90 kWh/d
losses of system (-5%)					55,01 kWh/d
losses of inverter (-10%)					49,51 kWh/d
energy yield per day:					49,51 kWh/d
energy yield in contest week:					396,04 kWh








Avails Relations

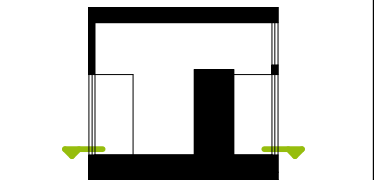
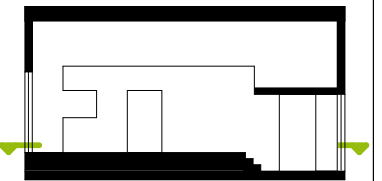






Balance (day): 49,51 - 19,5 kWh = 30,01 kWh
Balance (week): 396,04 - 156 kWh = 240,04 kWh



Heat Pump System Schematic Diagramm

 SOLAR DECATHLON		
Project  SOLAR DECATHLON 2009 TEAM GERMANY		
Constructor  TECHNISCHE UNIVERSITÄT DARMSTADT Department of Architecture Energyefficient Building Design Unit El-Lissitzky-Str. 1 64287 Darmstadt +49 (0) 6151 / 165448 +49 (0) 6151 / 165247 team@solardecathlon2009.de		
Navigation/Legend <div>  supply air  exhaust air  fresh air  discharged air </div>		
Drawn	AO SK	
Issued	09/05/30	
Last index		
Component	Mechanical	
Description	Heat Pump System Schematic Diagram	
Project #	Scale	dwg #
P 140		M-211



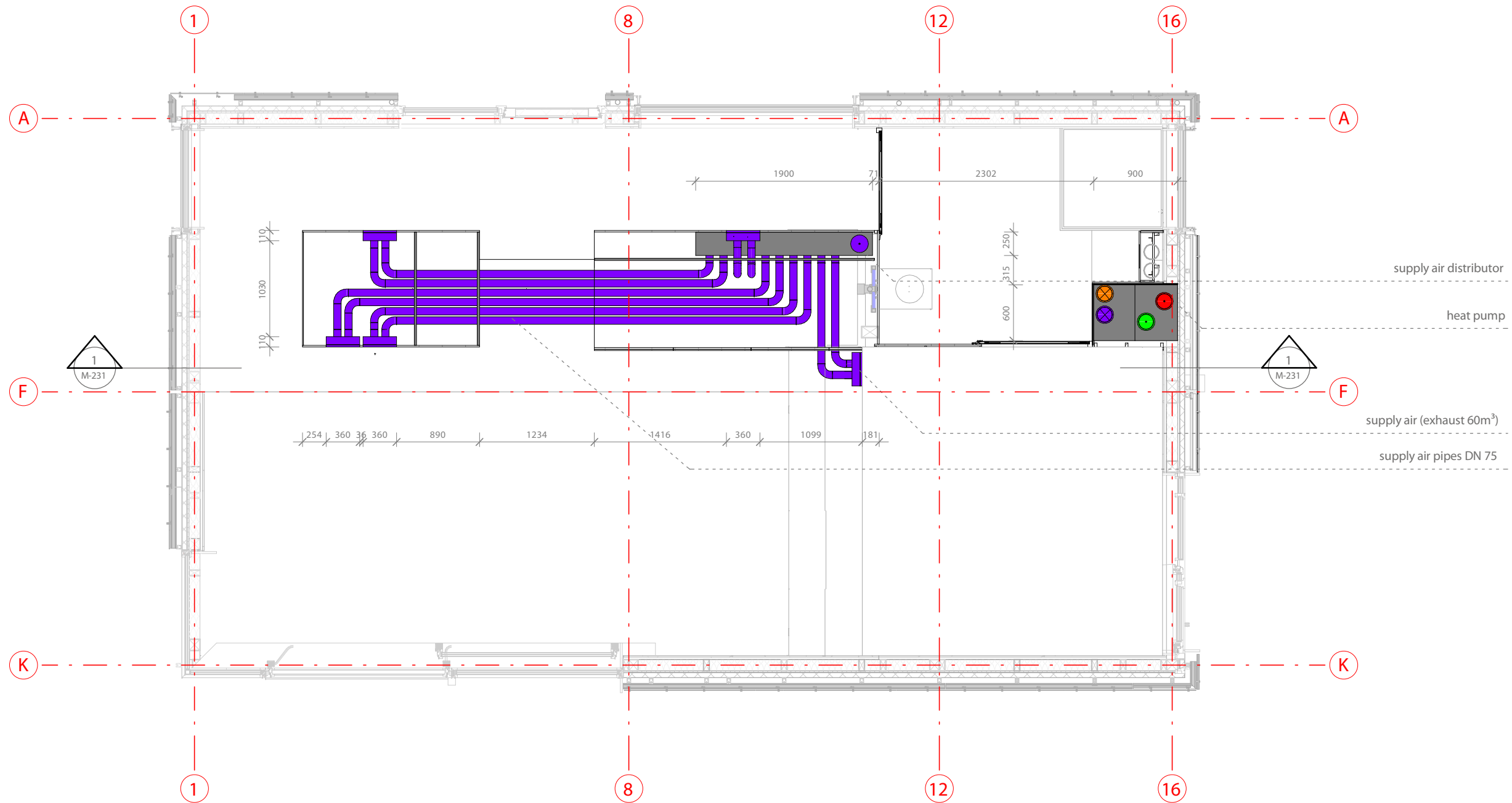
-  fresh air pipe
-  supply air pipe
-  discharged air pipe
-  exhaust air pipe

Drawn AG SK
Issued 09/05/30
Last index

Component
Mechanical

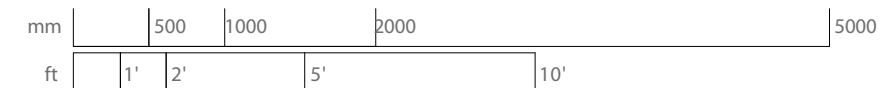
Description
**Heat Pump System And
Distribution Floor Plan**

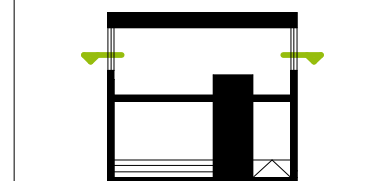
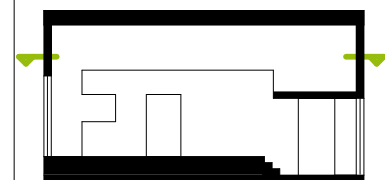
Project # Scale dwg #
P 140 1 : 50 M-221



1
M-221
Heat Pump System - Pipes In Platform
Scale 1:50

1:50





- fresh air pipe
- supply air pipe
- discharged air pipe
- exhaust air pipe

Drawn AG SK

Issued 09/05/30

Last index

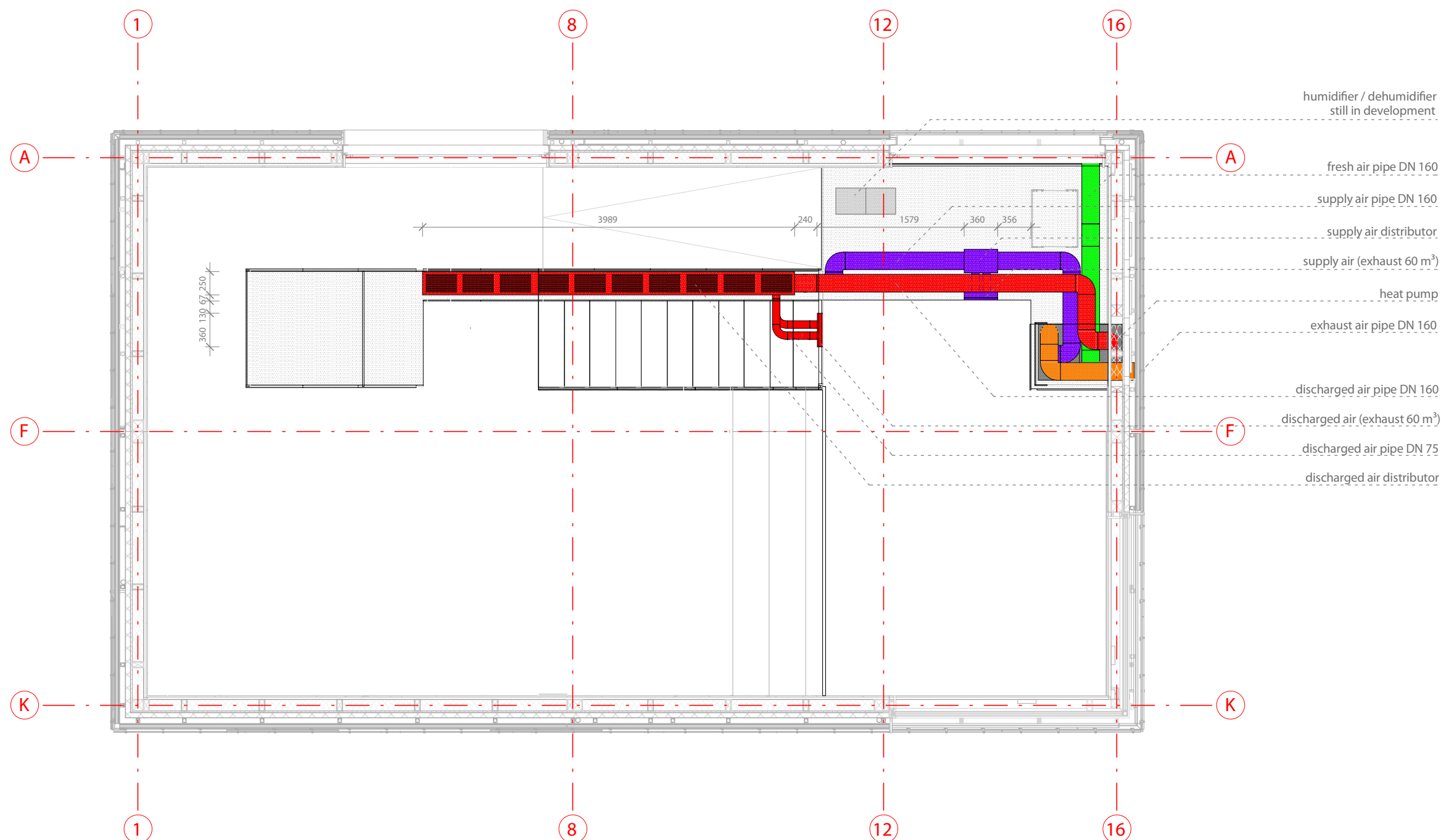
Component

Mechanical

Description

Heat Pump System And
Distribution Floor Plan

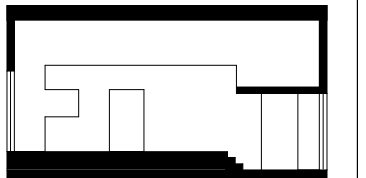
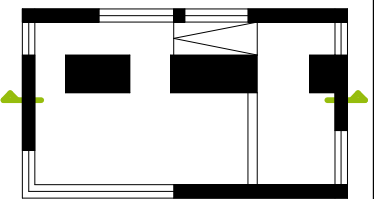
Project # Scale dwg #
P 140 1 : 50 M-222







Heat Pump System - Pipes In Upper Level
Scale 1:50

1:50





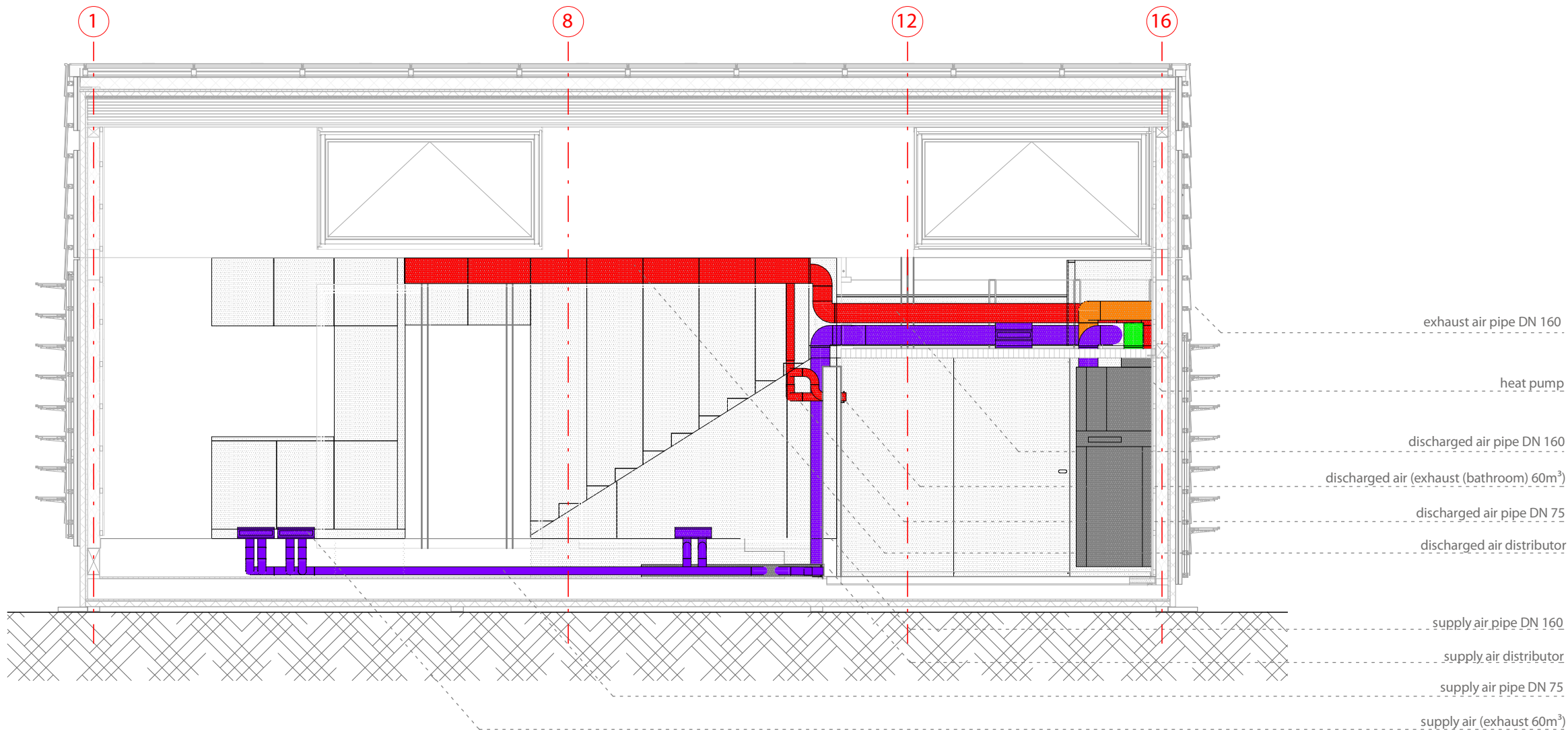
-  fresh air pipe
-  supply air pipe
-  discharged air pipe
-  exhaust air pipe

Drawn AG SK
 Issued 09/05/30
 Last index

Component
Mechanical

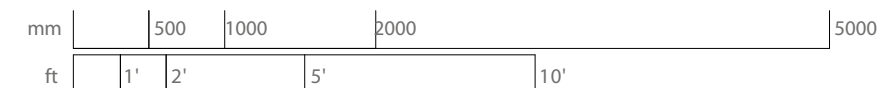
Description
**Heat Pump System And
 Distribution Section**

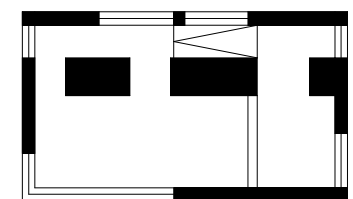
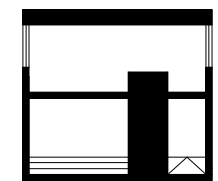
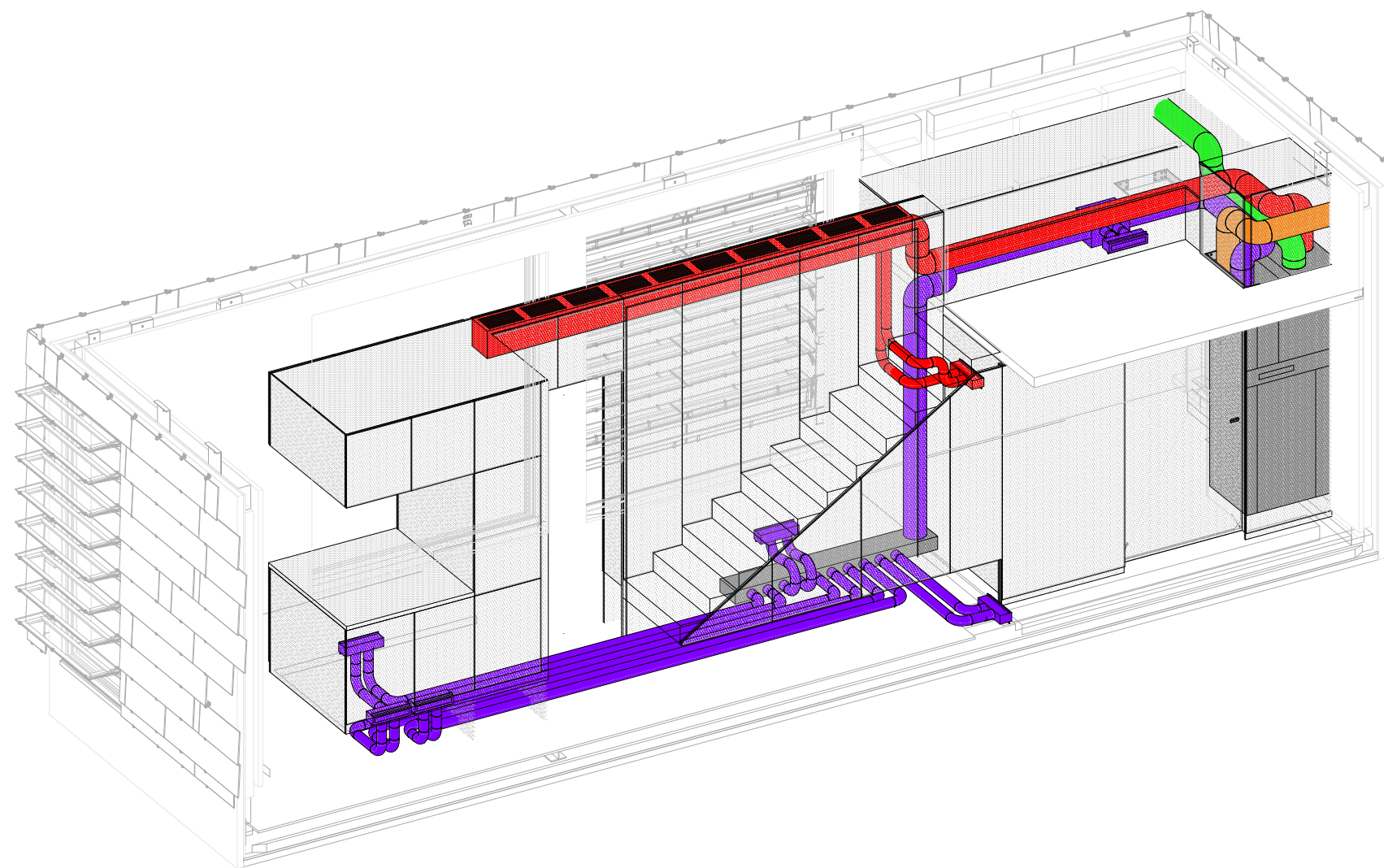
Project # Scale dwg #
 P 140 1 : 50 M-231







Longitudinal Section - Heat Pump System
 Scale 1:50

1:50





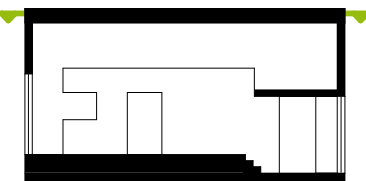
-  fresh air pipe
-  supply air pipe
-  discharged air pipe
-  exhaust air pipe




Drawn	AG SK
Issued	09/05/30
Last index	

Component	Mechanical
-----------	------------

Description	Heat Pump System And Distribution Isometric
-------------	--

Project #	Scale	dwg #
P 140	1 : 50	M-271



-  PCM stack
-  insulation
-  polycarbonat profile

Drawn AG SK

Issued 09/05/30

Last index

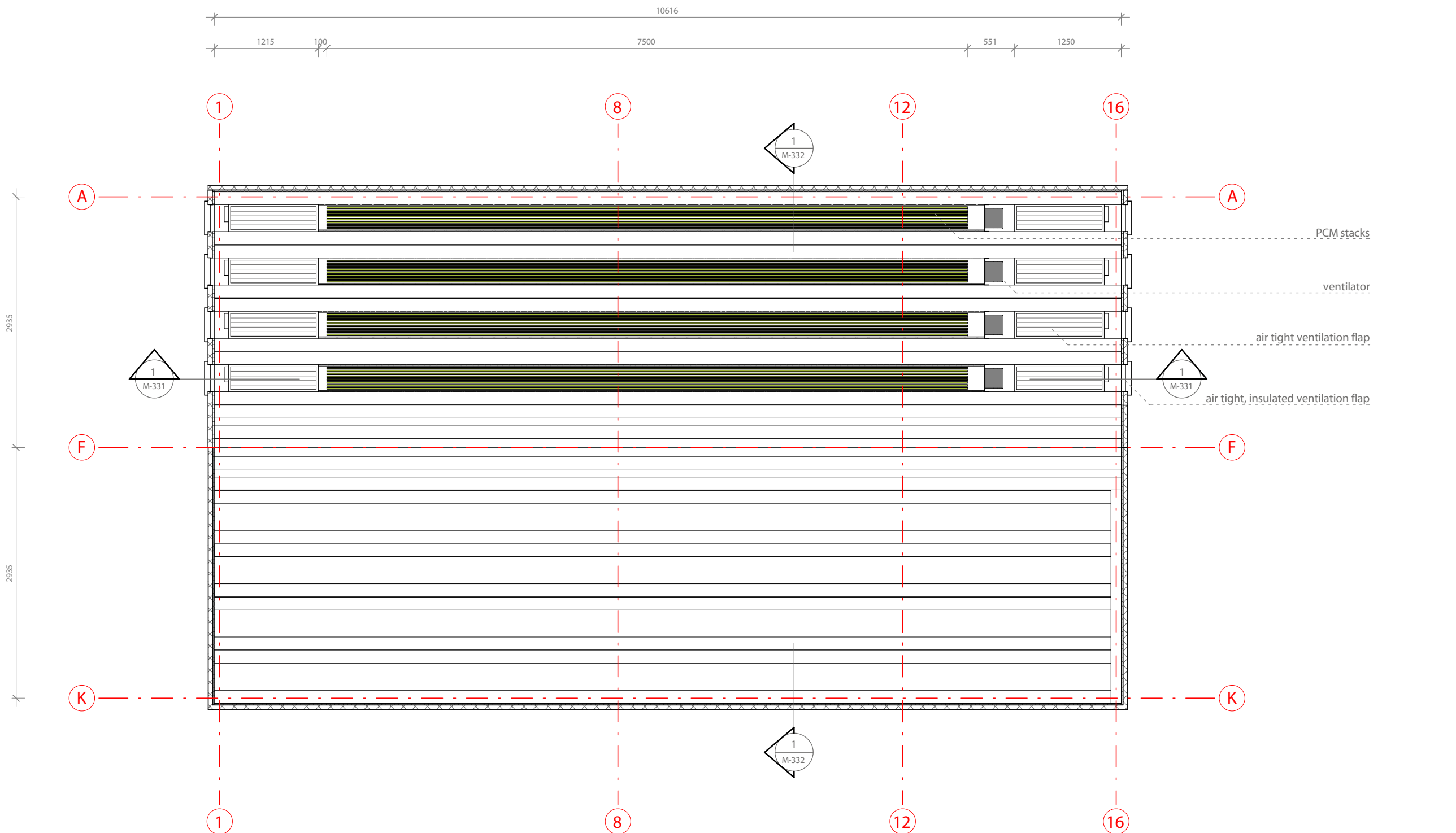
Component

Mechanical

Description

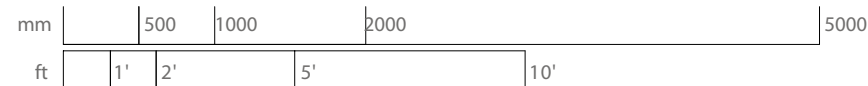
Cooling Ceiling

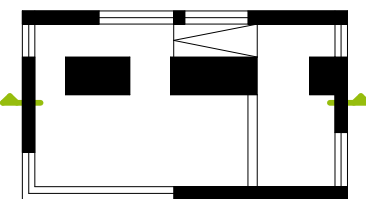
Project #	Scale	dwg #
P 140	1 : 50	M-321






Horizontal Section - Cooling Ceiling
Scale 1:50

1:50





-  PCM stack
-  insulation
-  polycarbonat profile

Drawn AG SK

Issued 09/05/30

Last index

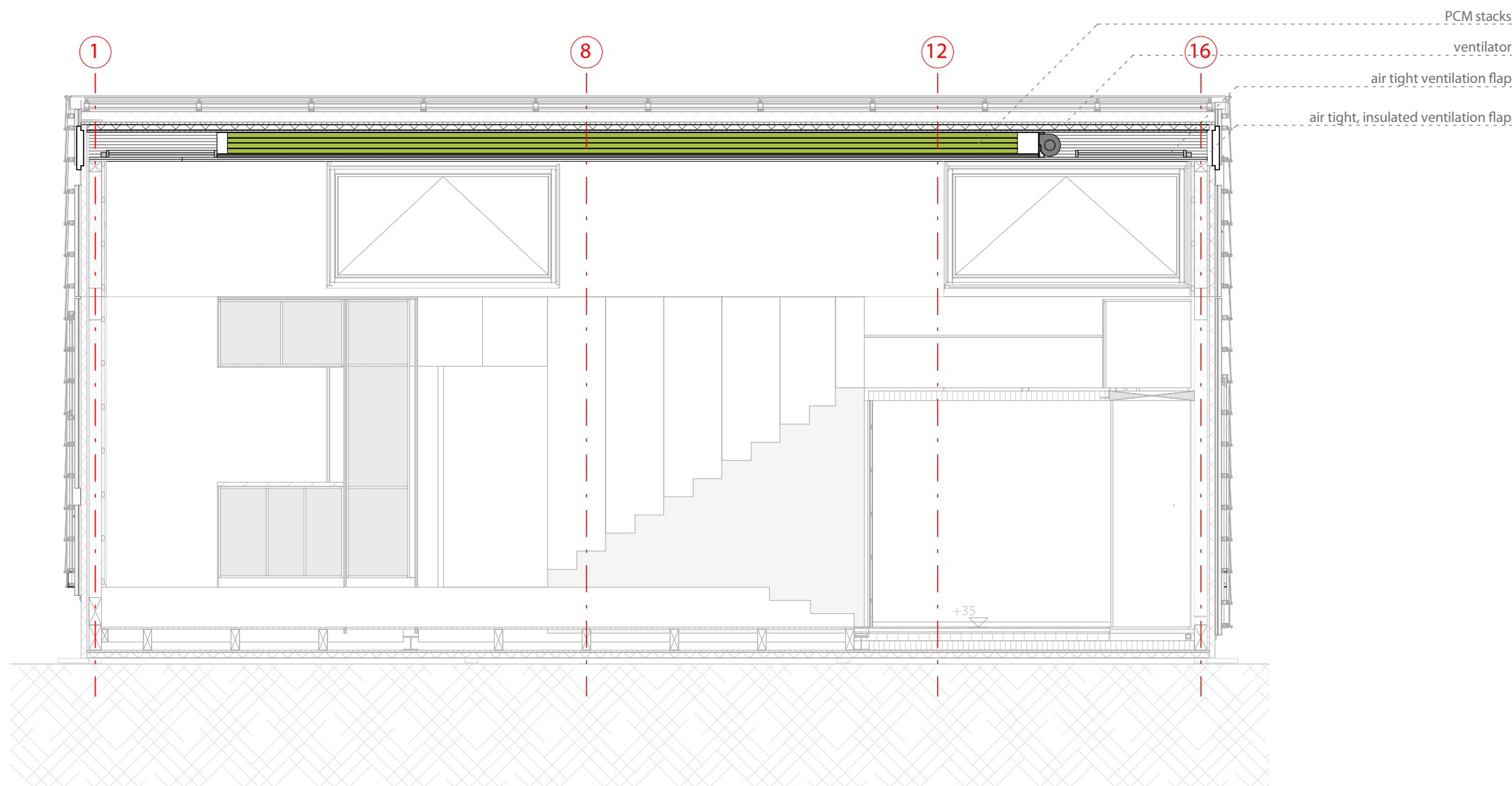
Component

Mechanical

Description

Section Cooling Ceiling

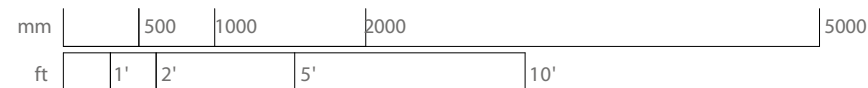
Project #	Scale	dwg #
P 140	1 : 50	M-331

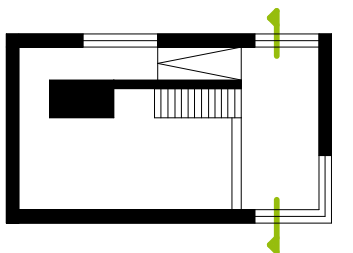


Longitudinal Section - Cooling Ceiling

Scale 1:50

1:50





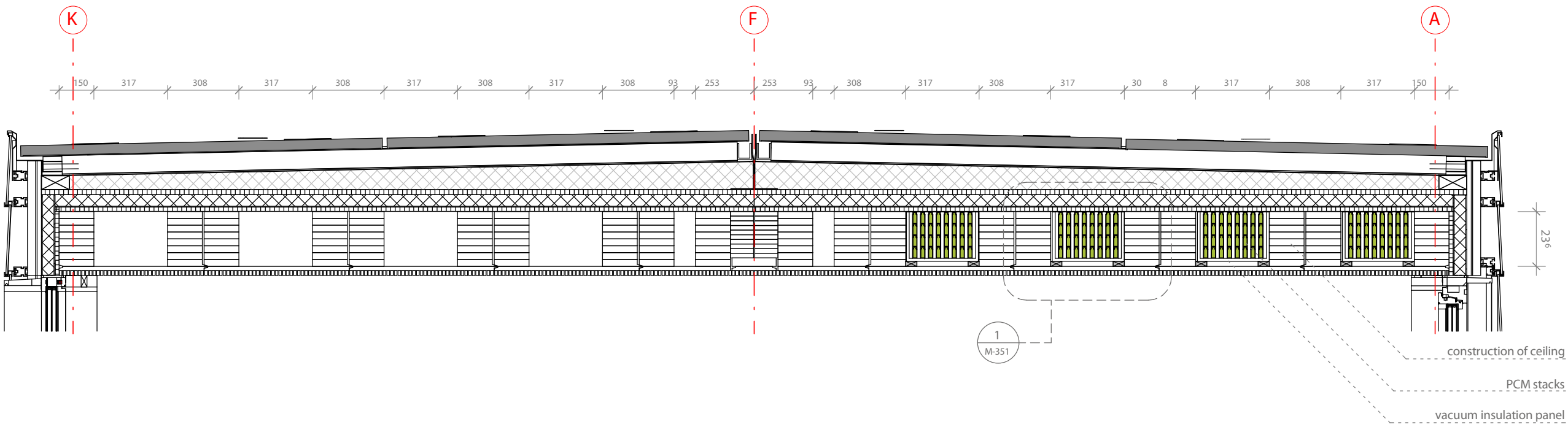
- PCM stack
- insulation
- polycarbonat profile

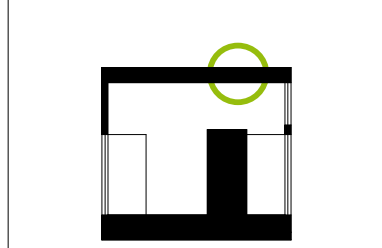
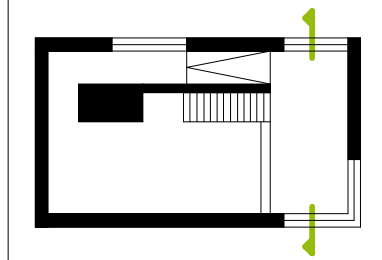
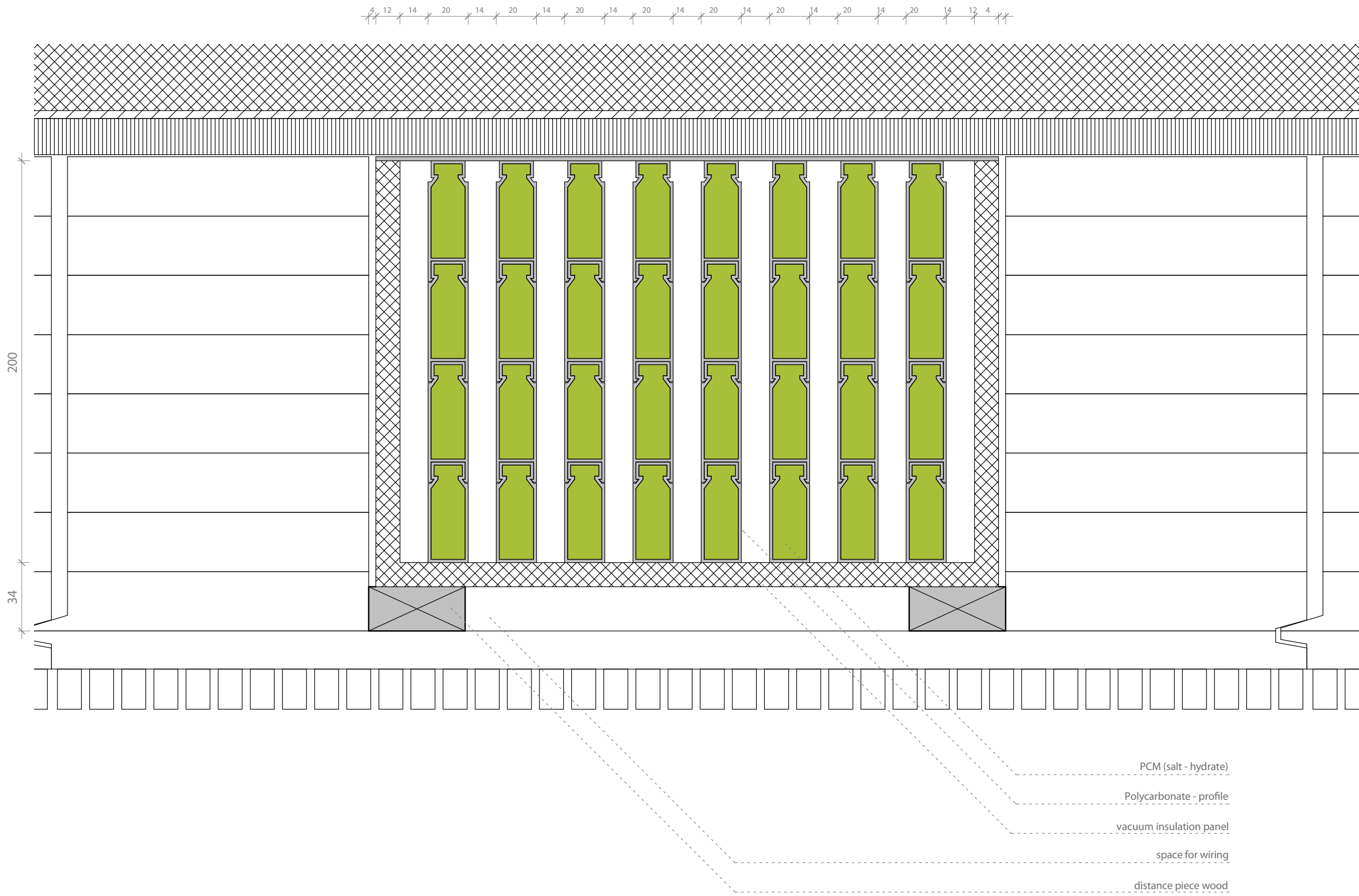
Drawn AG SK
Issued 09/05/30
Last index

Component
Mechanical

Description
Section Cooling Ceiling

Project # Scale dwg #
P 140 1:20 M-332





- PCM stack
- insulation
- polycarbonat profile

Drawn AG SK
Issued 09/05/30
Last index

Component
Mechanical

Description
Detail Cooling Ceiling

Project # P 140
Scale 1:2
dwg # M-351



SOLAR DECATHLON

Pr



SOLAR DECATHLON 2009
TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energy Efficiency
El-Lis Itzk
4287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009

Navigation/Legend

DrawnSK

Issued09/05/30

Las index

Component

Mechanical

Description

Schedules

Project #P140

Scale

dwg #M-411

Schedule for HVAC and Air-Distribution (Heat Pump)

Schedule for HVAC and air-distribution (heat pump)

Plan No.	Project Manual Division Master Format	Article Name	Article Manufacturer	Article Number	Size			Quantity		Specification			
					L	H	W	Amount	Unit	Wattage	Weight	Connection to Building Services	Other Specs
M-221 - M-271	Div. 23	VP 18 Compact Heat Pump	Nilan	731214B	900 mm	2060 mm	600 mm	1	PC	2300 W	206 kg	CTS 602 (EI- Bus)	with integrated 4-way- reversing valve for active cooling
M-221 - M-271	Div. 23	Supply air exhaust 60m³	Nilan	W409002				7	PC	/		/	
M-221 - M-271	Div. 23	Supply air distributor	Nilan	W401110	1900 mm	/	280 mm	1	PC	/		/	custom made product
M-221 - M-271	Div. 23	Supply air distributor	Nilan	W401202	1200 mm	/	180 mm	1	PC	/		/	custom made product
M-221 - M-271	Div. 23	Discharged air distributor	Nilan	/	/	/	/	1	PC	/		/	custom made product
M-221 - M-271	Div. 23	grid for supply air exhaust	Nilan	/	/	/	/	7	PC	/		/	custom made product
M-221 - M-271	Div. 23	Air distribution pipe ø 75mm	Nilan	W420001	50 m	/	/	2	PC	/		/	
M-221 - M-271	Div. 23	Air distribution pipe ø 160mm	Nilan										
M-221 - M-271	Div. 23	Air distribution pipe ø 200mm	Nilan										
M-221 - M-271	Div. 23	Connection sleeve ø 75mm	Nilan	W441001				12	PC	/		/	
M-221	Div. 42	CT - 10 + dehumidifier	Climetools	/				1	PC	/		/	
M-221	Div. 42	CT - B450 + humidifier	Climetools	/				1	PC	/		/	

 SOLAR DECATHLON

Pr
 SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
 TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energy Efficient Buildings
El-Lis Itzkowitz
4287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

Drawn SK
Issued 09/05/30
Last index








Component
Mechanical














Description
Schedules


Project # P140
Scale
Drawing # M-412


Schedule for HVAC and Air-Distribution (PCM-Ceiling)


Plan No.	Project Manual Division Master Format	Article Name	Article Manufacturer	Article Number	Size			Quantity			
					L	H	W	Amount	Unit	Wattage	Weight
M-321 - M-351	Div. 23	PCM (Salt hydrate) in Polycarbonate Profile	Dörken	DeltaCool 23	/	60 mm	20 mm	960	m	/	1113 kg
M-321; M-331	Div. 23	EC radial fan D3G 133	ebm-papst	D3G 133-BF03-02	/	/	/	4	PC	52	3 kg
M-321; M-331	Div. 23	Lamella flap	Robert Geiger	JK-A-06 L	1200 mm	65 mm	300 mm	8	PC		
M-321; M-331	Div. 23	fascade flaps	Energate		2500 mm	300 mm	58 mm	2	PC		

	high power LED light strips
	high power LED spotlights
	occhio pendulum lamp
	occhio wall lamp
	occhio stand lamp
	table lamp
	LED mood panels (PMMA)

	switch for light
	switch for shading
	isolated ground receptacle
	television
	speaker
	soundcontrol
	blu-ray player
	i-pod / docking station
	touch-panel
	electrical cabinet
	laptop
	wireless touch-panel
	i-phone


 SOLAR DECATHLON

Project
 
 SOLAR DECATHLON 2009
 TEAM GERMANY

Constructor
 
 TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
 Energyefficient Building Design
 Unit
 El-Lissitzky-Str. 1
 64287 Darmstadt
 +49 (0) 6151 / 165448
 +49 (0) 6151 / 165247
 team@solardecathlon2009.de

Navigation/Legend

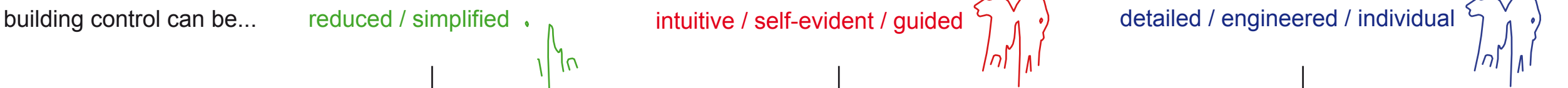
Drawn	HB RR
Issued	05/30/09
Last index	

Component	Electric
-----------	----------

Description	Symbols And Notes
-------------	-------------------

Project #	Scale	dwg #
P 140		E-001

Building Automation - Inhabitant Conditioned



first level of utilization - switches

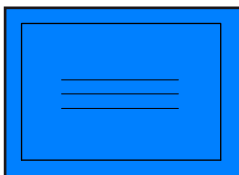
classic - intuitive



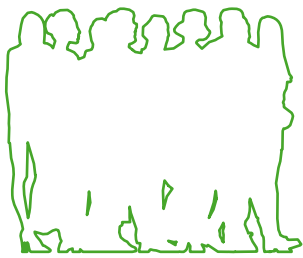
- switch for light
 - base illumination
- switch for shading
 - blinds

second level of utilization - touch-panel

advanced function range / interconnectedness of first degree of utilization



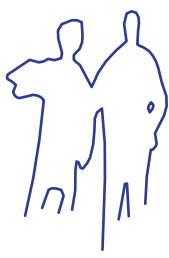
- climate control
 - heating / cooling / shading
 - fanlight ventilation
- meteorological data
- visualization by consumption / earnings from the building
- scenarios (light / music / shading)
 - interconnect several elements to a group (for instance movie night)
- mood atmospheric lighting
 - allows different atmospheres and moods for various occasions



visitors



friends



inhabitant



friends



inhabitant



third level of utilization - automation

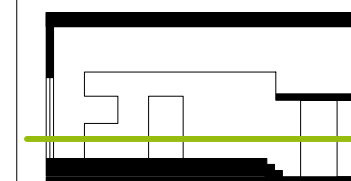
detailed / self made function range / adaptive building














- self-made scenarios
- detailed information for consumption of single appliances
- climate scenarios
 - for instance: at absence overheat control / ventilation
- smoke alarm control



inhabitant

 SOLAR DECATHLON		
Project		
 SOLAR DECATHLON 2009 TEAM GERMANY		
Constructor		
 TECHNISCHE UNIVERSITÄT DARMSTADT		
Department of Architecture Energyefficient Building Design Unit El-Lissitzky-Str. 1 64287 Darmstadt +49 (0) 6151 / 165448 +49 (0) 6151 / 165247 team@solardecathlon2009.de		
Navigation/Legend		
Drawn	HB	
Issued	05/30/09	
Last index		
Component	Electric	
Description	Building Automation Utilization Concept	
Project #	Scale	dwg #
P 140		E-002



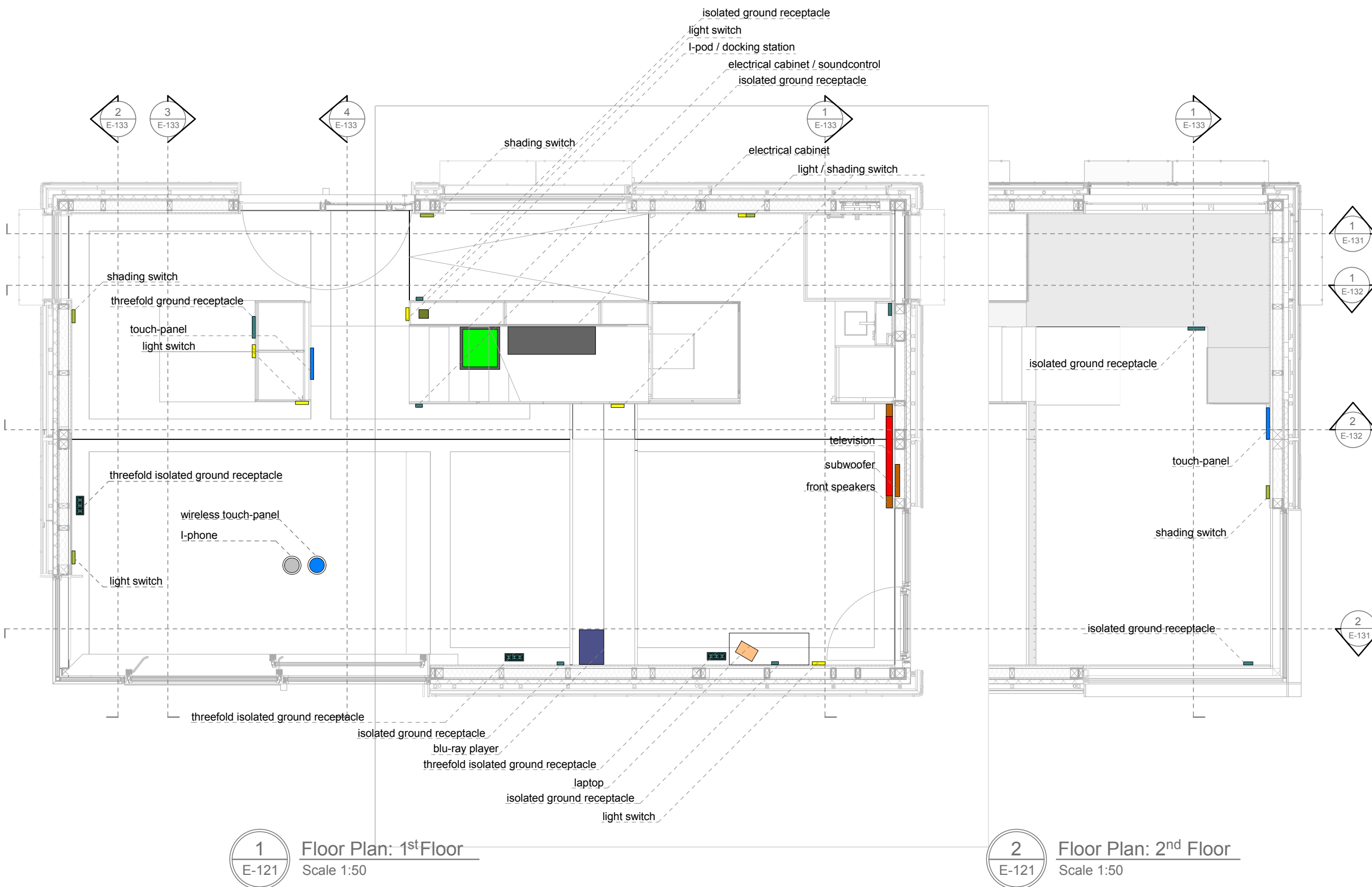
-  switch for light
-  switch for shading
-  isolated ground receptacle
-  television
-  speaker
-  soundcontrol
-  blu-ray player
-  I-POD / docking station
-  touch-panel
-  electrical cabinet
-  laptop
-  wireless touch-panel
-  I-Phone

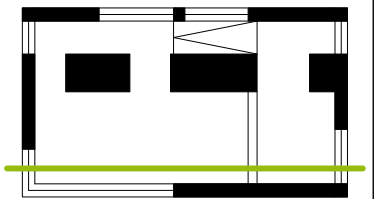
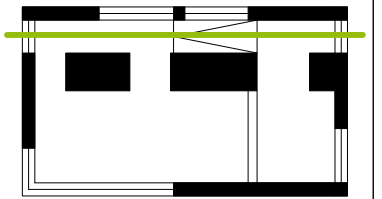
Drawn HB
Issued 05/30/09
Last index

Component
Electric

Description
**Electrical Appliances
And Installations**

Project # Scale dwg #
P 140 1 : 50 E-121





- switch for light
- switch for shading
- isolated ground receptacle
- television
- speaker
- soundcontrol
- blu-ray player
- I-POD / docking station
- touch-panel
- electrical cabinet
- laptop
- wireless touch-panel
- I-Phone

Drawn HB

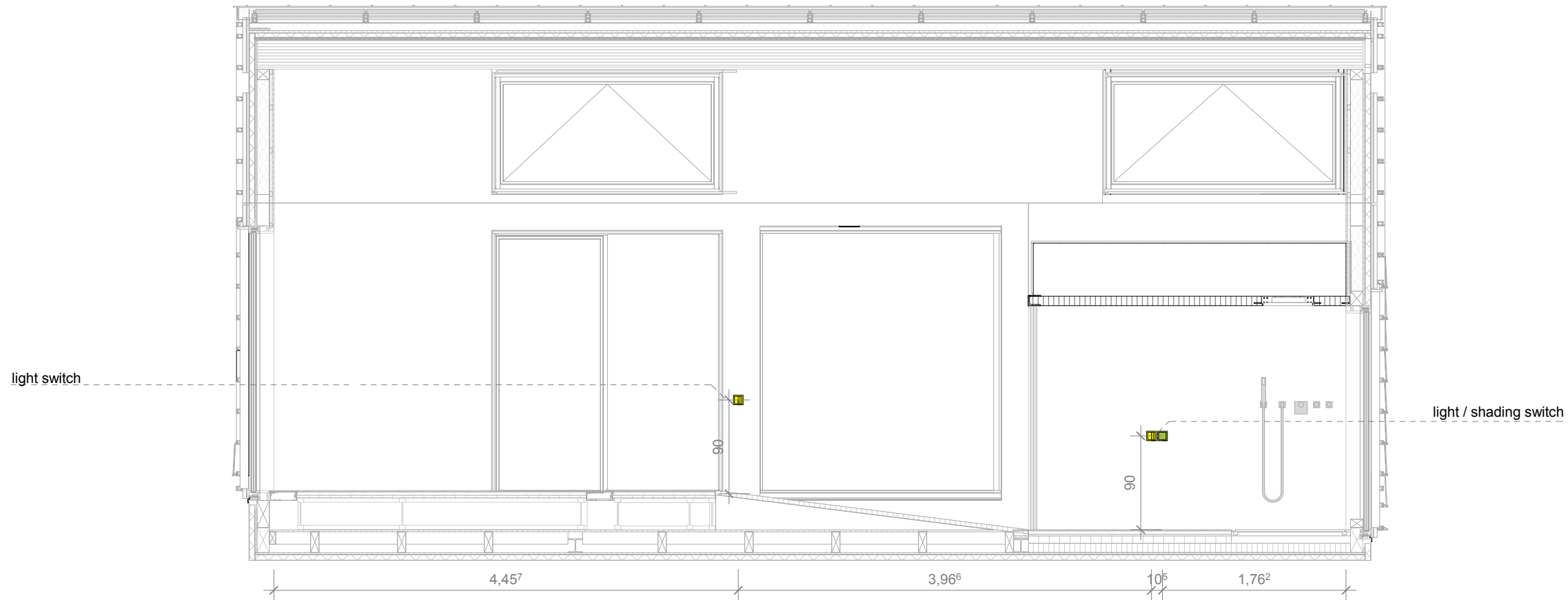
Issued 05/30/09

Last index

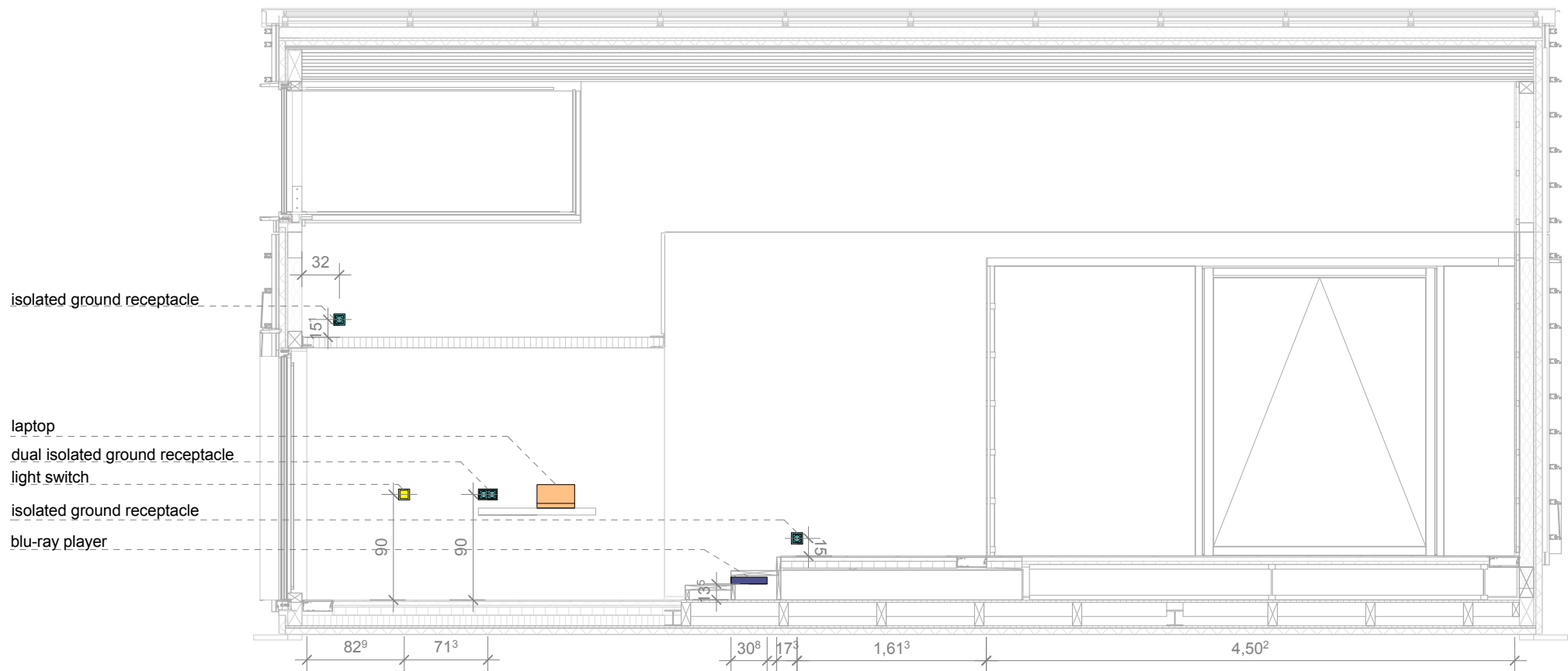
Component
Electric

Description
**Electrical Appliances
And Installations**

Project # Scale dwg #
P 140 1 : 50 E-131

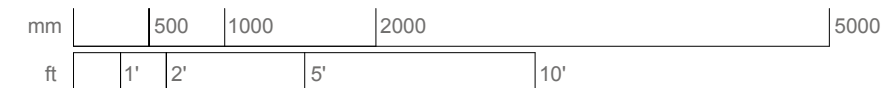


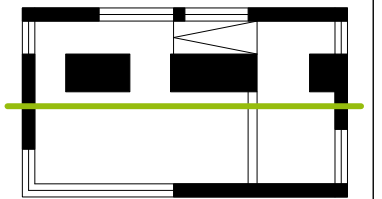
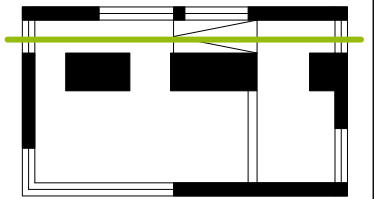
1
E-131
Section Interior Wall North
Scale 1:50
















2
E-131
Section Interior Wall South
Scale 1:50

1:50





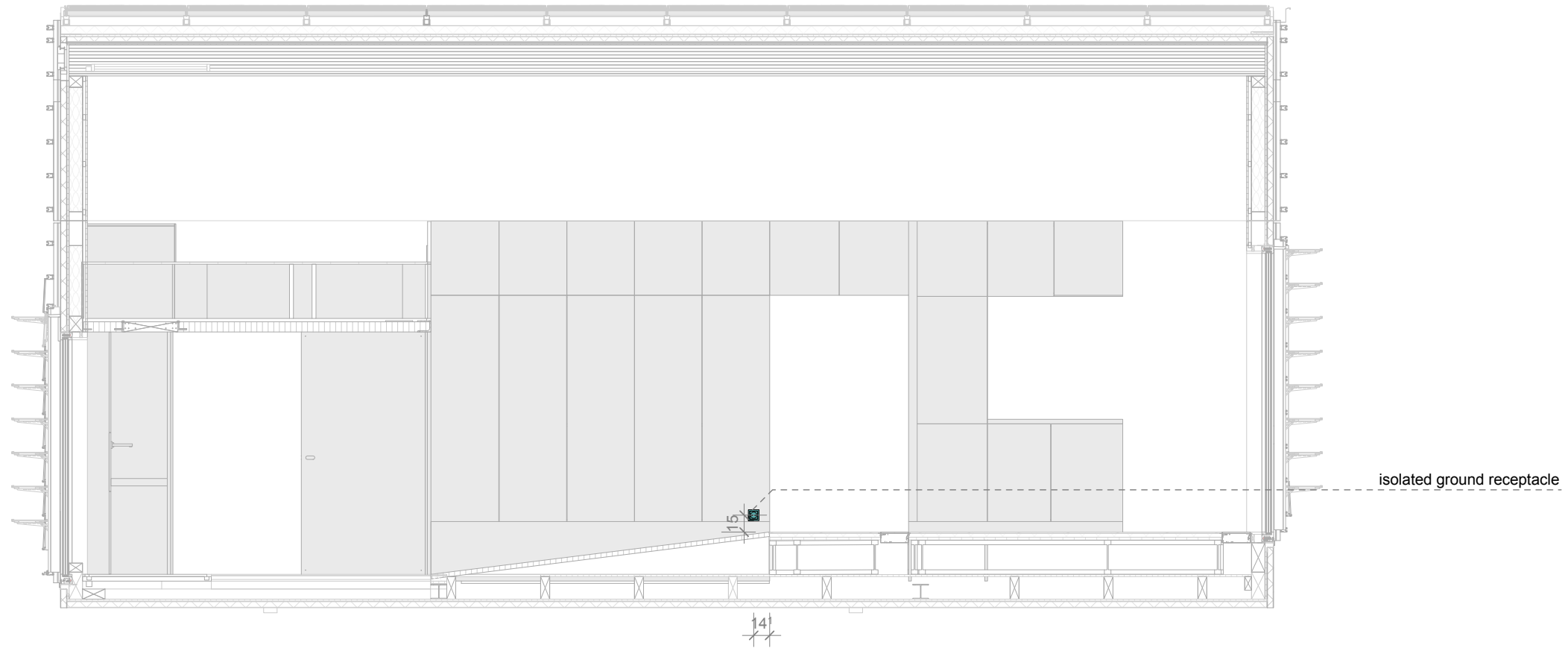
-  switch for light
-  switch for shading
-  isolated ground receptacle
-  television
-  speaker
-  soundcontrol
-  blu-ray player
-  I-POD / docking station
-  touch-panel
-  electrical cabinet
-  laptop
-  wireless touch-panel
-  I-Phone

Drawn **HB**
 Issued **05/30/09**
 Last index

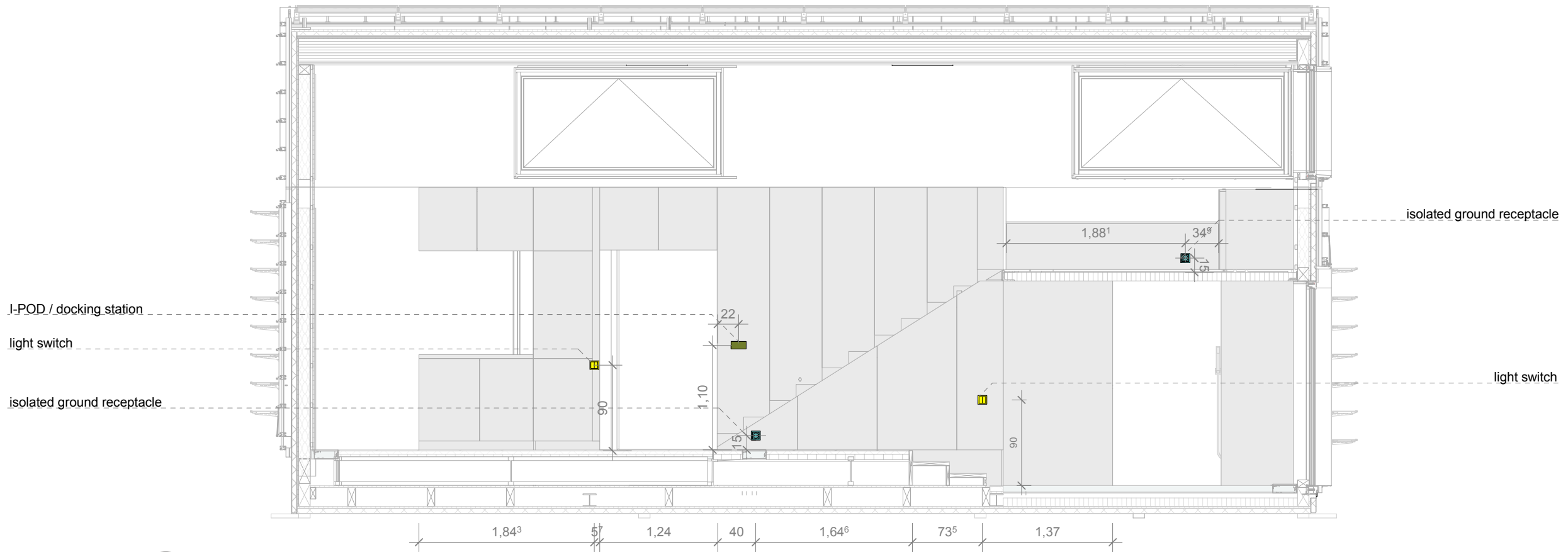
Component
Electric

Description
**Electrical Appliances
And Installations**

Project # **P 140** Scale **1 : 50** dwg # **E-132**

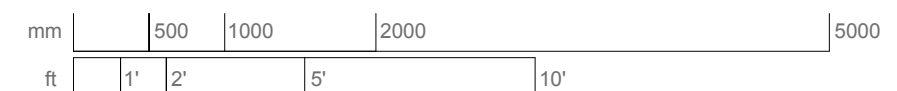


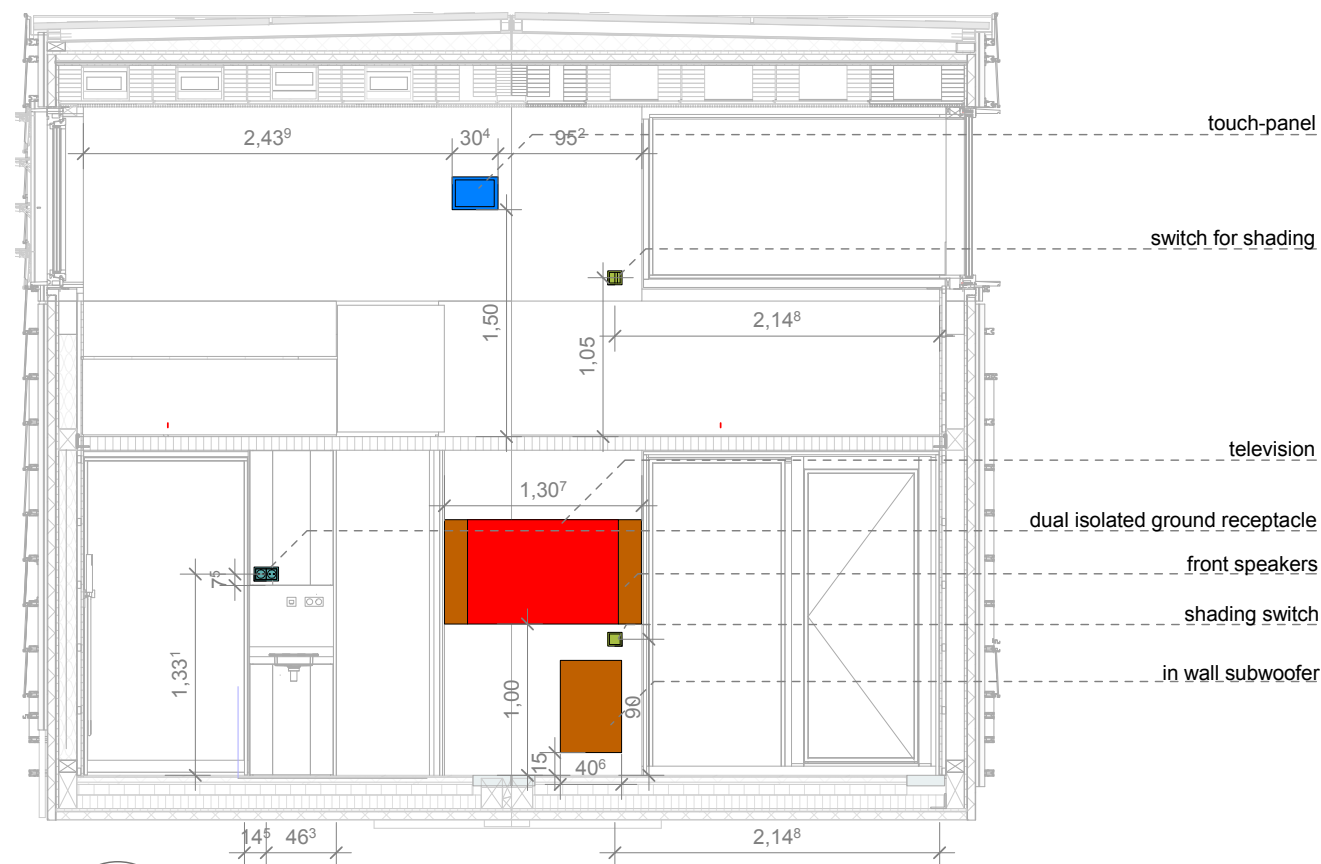
1
 E-132
Section Core North
 Scale 1:50



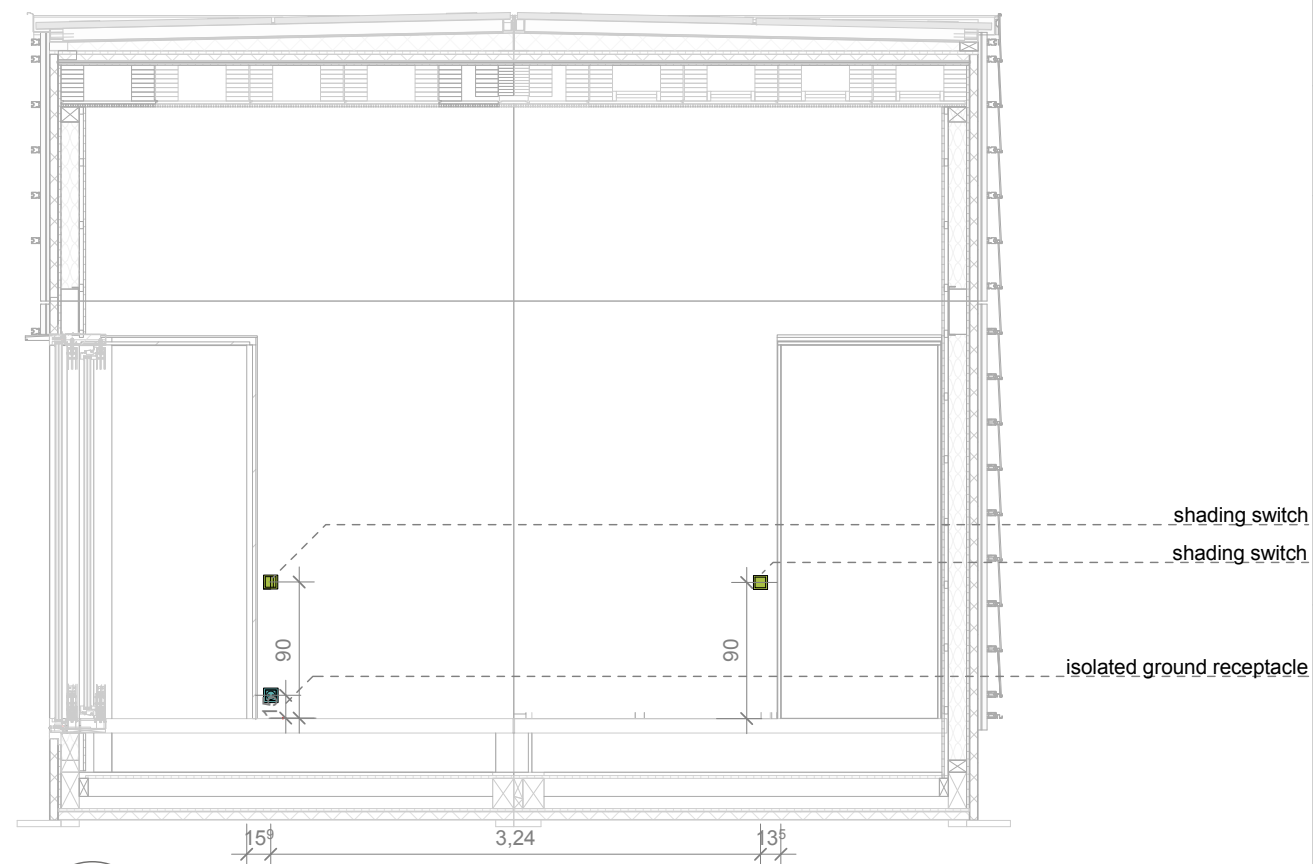
2
 E-132
Section Core South
 Scale 1:50

1:50

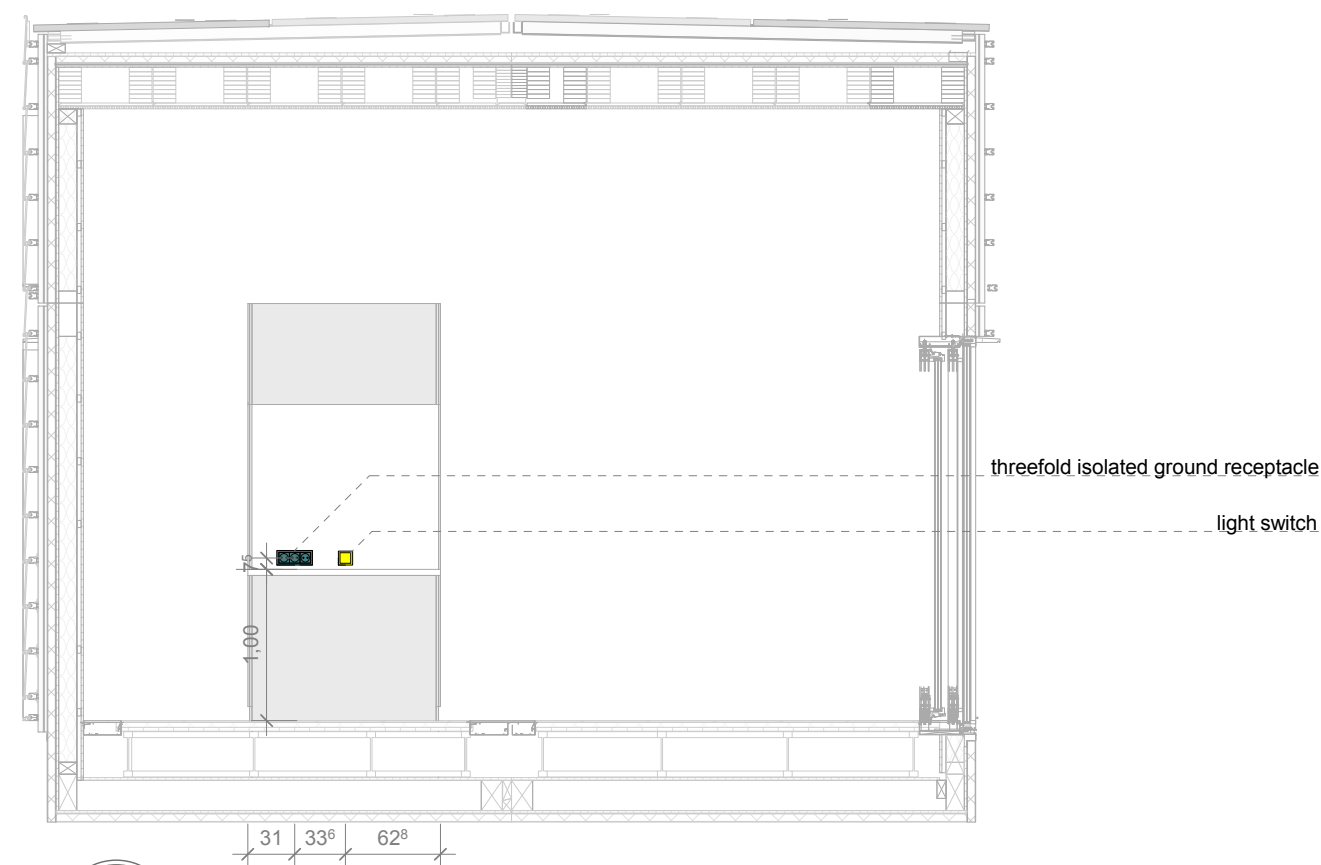




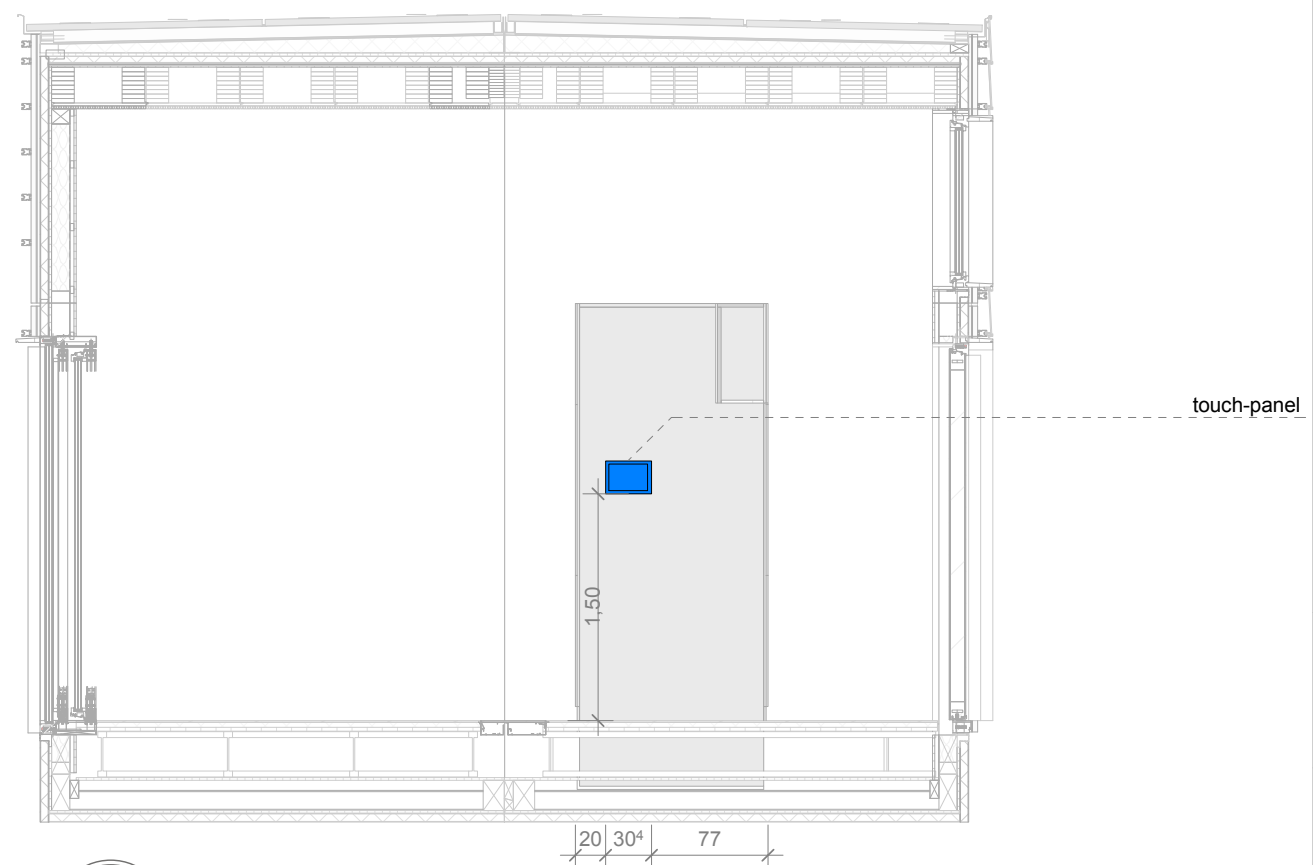
1
E-133
Section Inner Wall East
Scale 1:50



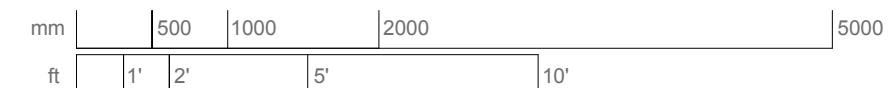
2
E-133
Section Inner Wall West
Scale 1:50



3
E-133
Section Core Kitchen
Scale 1:50



4
E-133
Section Core Passageway
Scale 1:50



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

- switch for light
- switch for shading
- isolated ground receptacle
- television
- speaker
- soundcontrol
- blu-ray player
- I-POD / docking station
- touch-panel
- electrical cabinet
- laptop
- wireless touch-panel
- I-Phone

Drawn HB

Issued 05/30/09

Last index

Component Electric

Description **Electrical Appliances And Installations**

Project # P 140 Scale 1 : 50 dwg # E-133

BKB by Tehalit, Cable Conduit



Data Logger Box

Sensor 1 - Contest 8, Appliances

place: fridge

thermocouple inserted in rubber "super ball" for mass

sensor: TT-T-24S_TWT-SLE-50

Sensor 2 - Contest 6, Comfort Zone

temperature and humidity probe with custom radiation shield

sensor: HMP50-L

Sensor 3 - Contest 9, Home Entertainment


place: workstation

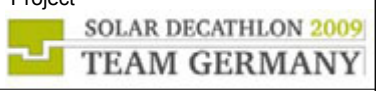
Photometer mounted on base


sensor: LI-210SA

base: 2003S

Schedule for electrical Appliances and Installations														
Plan No.	Project Manual Division Master Format	Article Name	Article Manufacturer	Article Number	Size			Quantity		Specification				Notes
					L	H	W	Amount	Unit	Wattage	Weight	Connection to Building Services	Other Specs	
E-121, E-133	Div.27	Television	Loewe	68436U42	1069 mm	694 mm	121 mm	1	PC	170 W	27.2 kg	EI-Bus/ network	1.920 x 1.080 pixels 100Hz	still to decide, optional Philips
E-121, E-131	Div.27	Blu-Ray Player	Philips	BDP5000	435 mm	58 mm	308 mm	1	PC	32 W	6.4 kg	/		still to decide, optional Sony PS3
E-212	Div.27	Satellite Speaker	Sonance	VP 65S SUR	234 mm	234 mm	148 mm	2	PC	5-130 W		connection to soundcontrol	max 90 dB	
E-121, E-133	Div.27	Front Speaker	Artison	Portrait LCR	153 mm	616 mm	89 mm	2	PC	3x100 W		connection to soundcontrol	max 89 dB	
E-121, E-133	Div.27	Subwoofer	Sonance	SAW	406 mm	610 mm	98 mm	1	PC	150 W	7.7 kg	connection to soundcontrol	max 90 dB	
E-121, E-132	Div.27	Sound-control	Crestron	AMSI	435.9 mm	187.8mm	471.3 mm	1	PC	1000 W	26.99 kg	EI-Bus	7.1 Surround Sound possible	
E-121, E-132	Div.27	I-POD Dcing station	Crestron	CENI-IDOC- DS				1	PC			connection to soundcontrol		
E-121	Div.27	I-POD	Apple	Nano	38.7 mm	90.7 mm	6.2 mm	1	PC		36.8 g	/		still to decide
E-121, 133	Div.25	Wall Mount Touchpanel I	Crestron	TPS-6L	184.5 mm	138.8 mm	57.8 mm	1	PC	15 W	0.69 kg	EI-Bus	640 x 480 pixels	
E-122, 133	Div.25	Wall Mount Touchpanel II	Busch & Jäger	Comfort Panel 8136-0-0001	283 mm	192 mm	79 mm	1	PC	25 W	0.70 kg	EI-Bus	640 x 480 pixels	still to decide
E-121	Div.25	Wireless Touchpanel	Crestron	TPS-6X	129.6 mm	205.1 mm	39.8 mm	1	PC	15 W	0.72 kg	EI-Bus	640 x 480 pixels internal Battery: NIMH, 48 Volt 2000mAh	
E-121	Div.27	Laptop	Apple	Macbook	325 mm	24.1 mm	227 mm	1	PC		2.04 kg	network		still to decide
E-121	Div.25	I-Phone	Apple	3G	62.1 mm	115.5 mm	12.3 mm	1	PC		133 g	/		still to decide
E-121, E-122, E-131, E-132, E-133, E-221	Div.26	Light Switch	Busch & Jäger	Busch future- linear				6	PC			EI-Bus		
E-121, E-122, E-131, E-132, E-133, E-221	Div.26	Shading Switch	Busch & Jäger	Busch KNX- sensor				6	PC			EI-Bus		
E-121, E-122, E-131, E-132, E-133	Div.26	Isolated Ground Receptacle	Busch & Jäger	Busch future- linear				20	PC			EI-Bus		


SOLAR DECATHLON

Project

**SOLAR DECATHLON 2009
TEAM GERMANY**

Constructor

**TECHNISCHE
UNIVERSITÄT
DARMSTADT**

**Department of Architecture
Energyefficient Building Design
Unit**
 El-Lissitzky-Str. 1
 64287 Darmstadt
 +49 (0) 6151 / 165448
 +49 (0) 6151 / 165247
 team@solardecathlon2009.de

Navigation/Legend

Drawn HB
 Issued 05/30/09
 Last index

Component
Electric

Description
Schedules

Project # Scale dwg #
P 140 **E-151**

Electric lighting:

Our Lighting Design refers to the concept of a multi-functional room and its integrated multifunctional body. Despite the one-room concept different sections and special properties are offered to the inhabitant.

In order to accent the multi-functionality of the room, the lighting concept contains three lighting types:

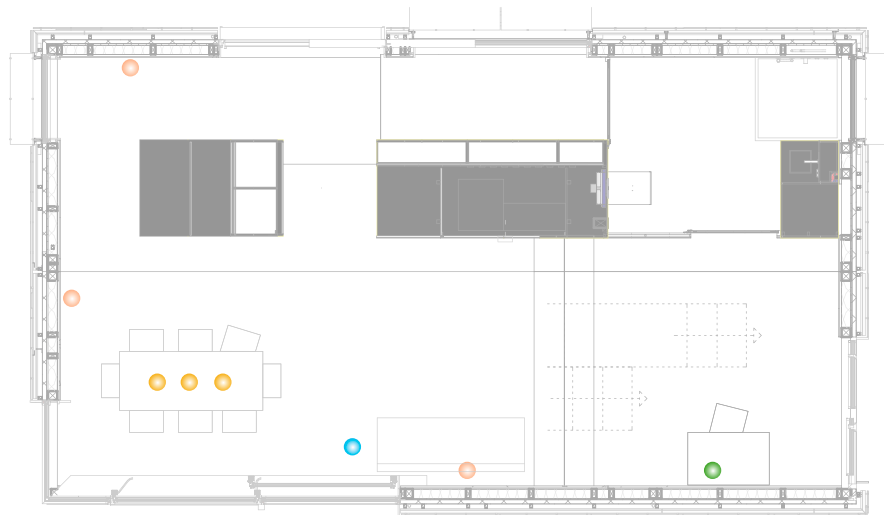
- 1. functional lighting
- 2. accent lighting
- 3. atmospheric lighting

1. The functional lighting refers to the functions of each section of the room. Integrated light-emitting diodes are serving the different requests

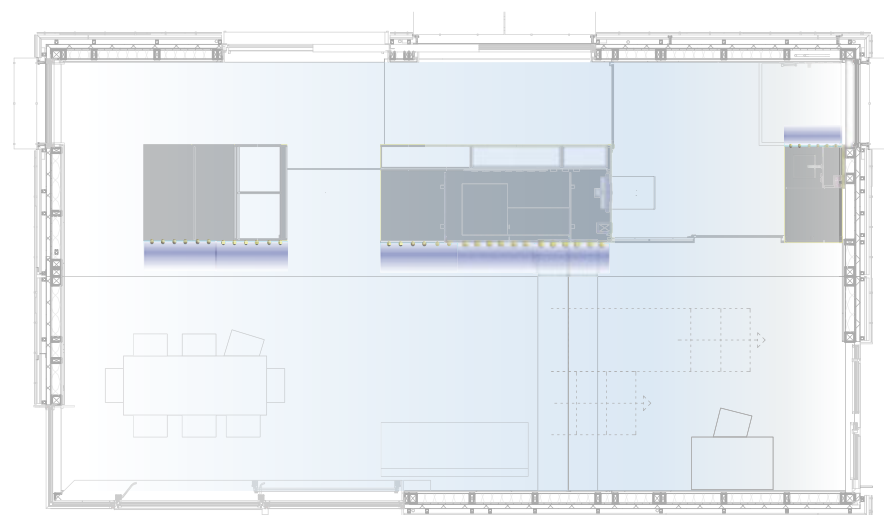
2. Accent lighting allows the inhabitant to design his own lighting locations where needed.

3. The atmospheric lighting is integrated by LEDs in the multifunctional body, offering different atmospheres and moods for various occasions. For example in the dining area this light will provide a warm, pleasant atmosphere. This will be plexiglas integrated lighting on the surface of the multifunctional body.

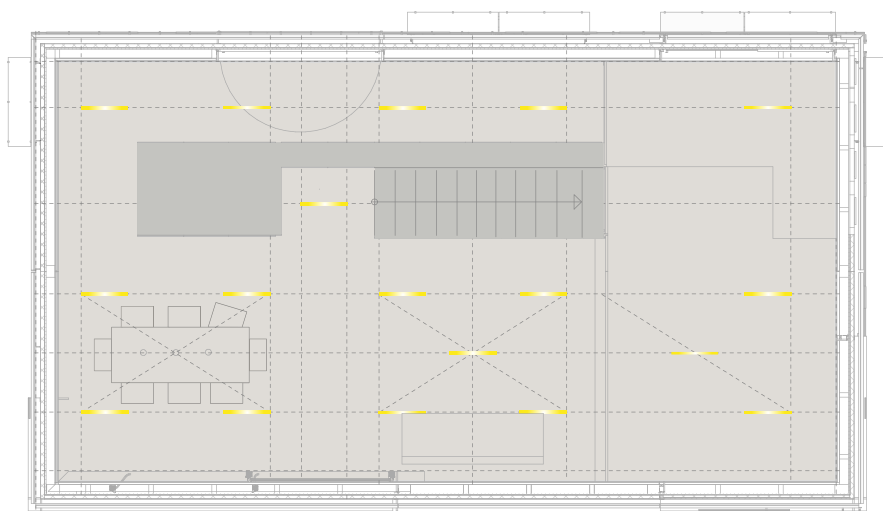
In order to optimize occupant control over lighting, the lighting system can be individually controlled by the bus system and operated with the touch panel situated on the functional body at the entrance side, mobile touch panel and as well as manual switches.



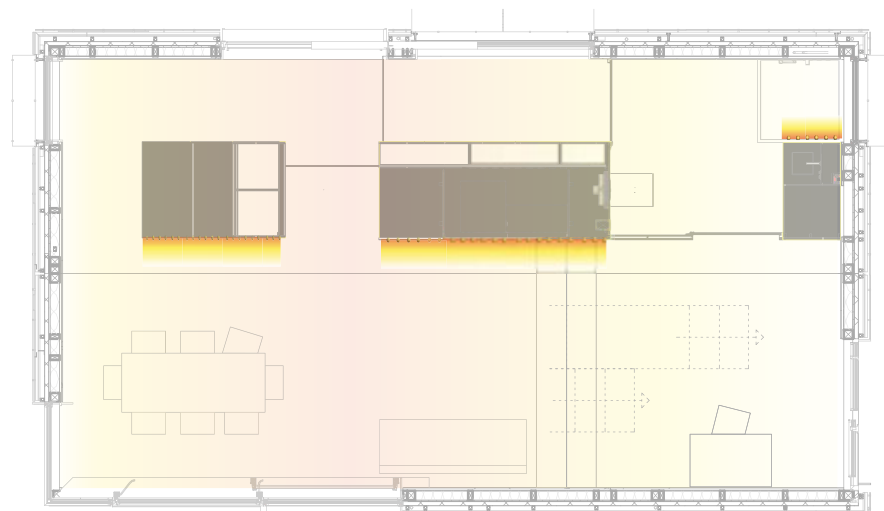
1 Accent Lighting
E-211 Scale 1:100



2 Mood / Atmospheric Lighting
E-211 Scale 1:100



3 Functional Lighting
E-211 Scale 1:100



4 Mood / Atmospheric Lighting
E-211 Scale 1:100

Electric Lighting - Multifunctional Body
E-211 Scale 1:100

1:100

mm	500	1.000	2.500	5.000	10.000
ft	2,5'	5'	10'	20'	

Navigation/Legend

High power LED light strips



High Power LED Spotlights



Occhio pendulum lamp



Occhio wall lamp



Occhio stand lamp



LED mood panels (PMMA)



Table lamp



Drawn RR

Issued 05/19/09

Last index

Component
Electric

Description
Lighting Concept

Project #	Scale	dwg #
P 140	1:100	E-211

Navigation/Legend

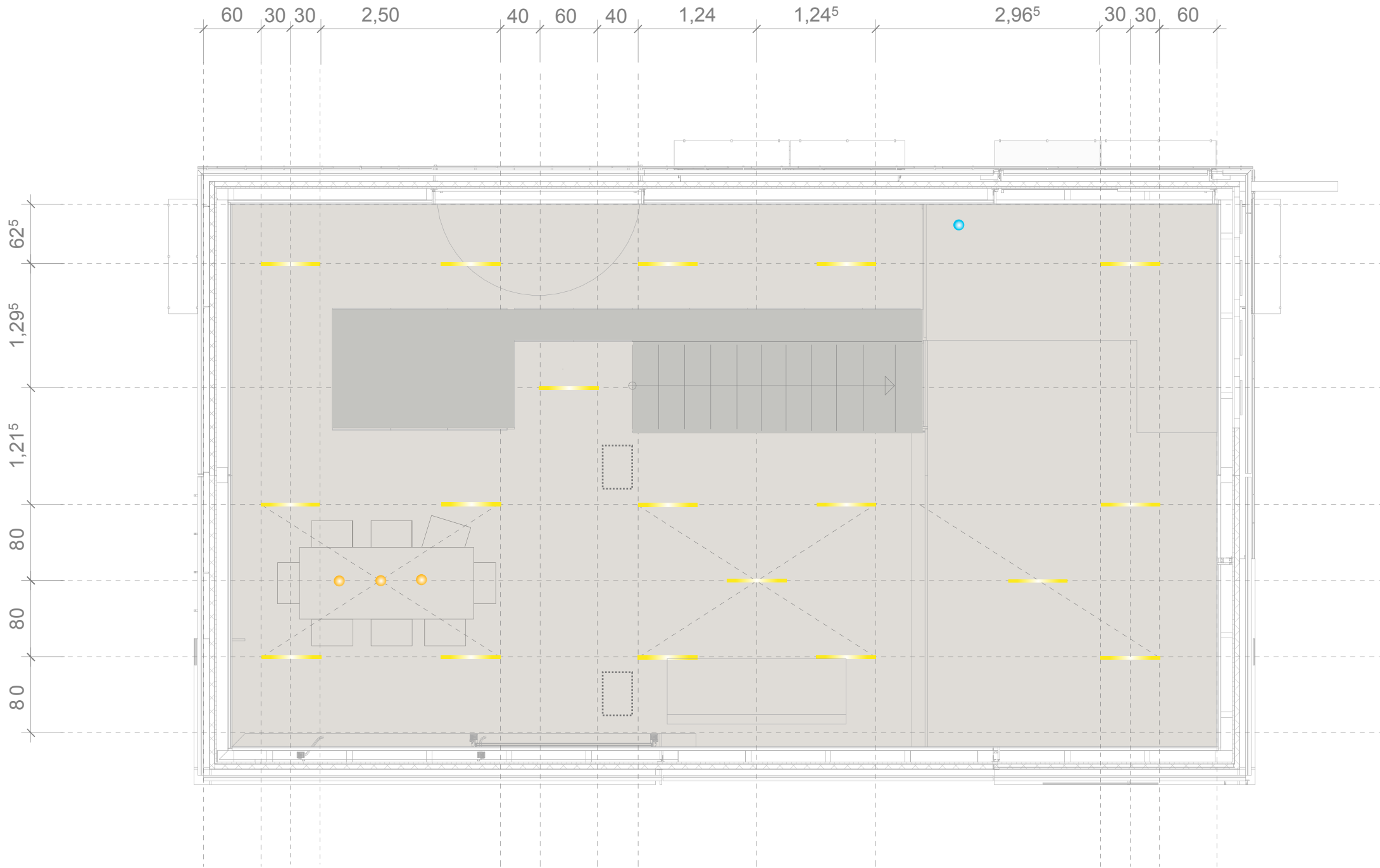
- High power LED light strips
- High Power LED Spotlights
- Occhio pendulum lamp
- Occhio wall lamp
- Occhio stand lamp
- LED mood panels (PMMA)
- Table lamp
- inwall satellite speakers

Drawn RR
Issued 05/19/09
Last index

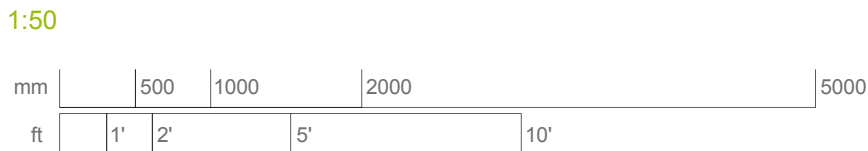
Component
Electric

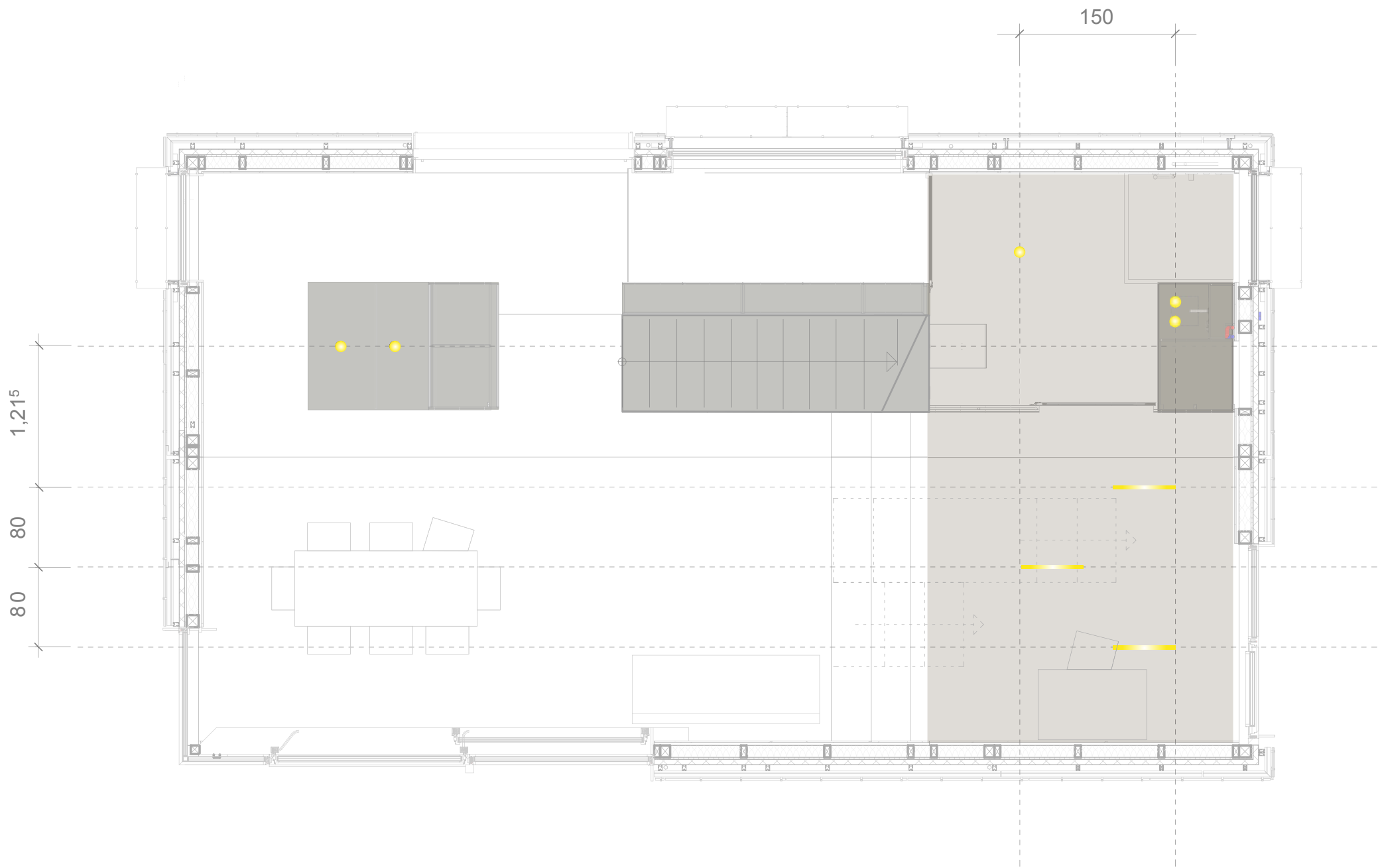
Description
Functional Lighting
Upper Level

Project # Scale dwg #
P 140 1:50 E-212



1
E-212
Ceiling Plan - Functional Lighting
Scale 1:50

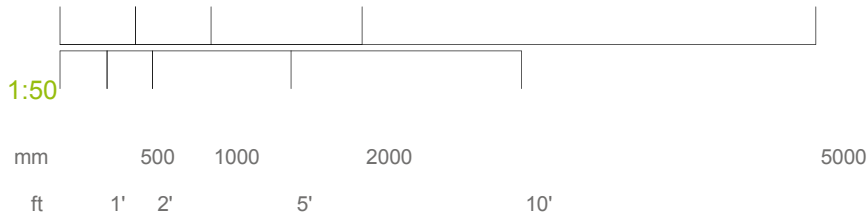




1
E-213

Lower Level - Functional Lighting

Scale 1:50

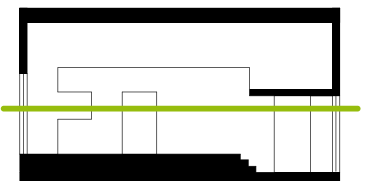


Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



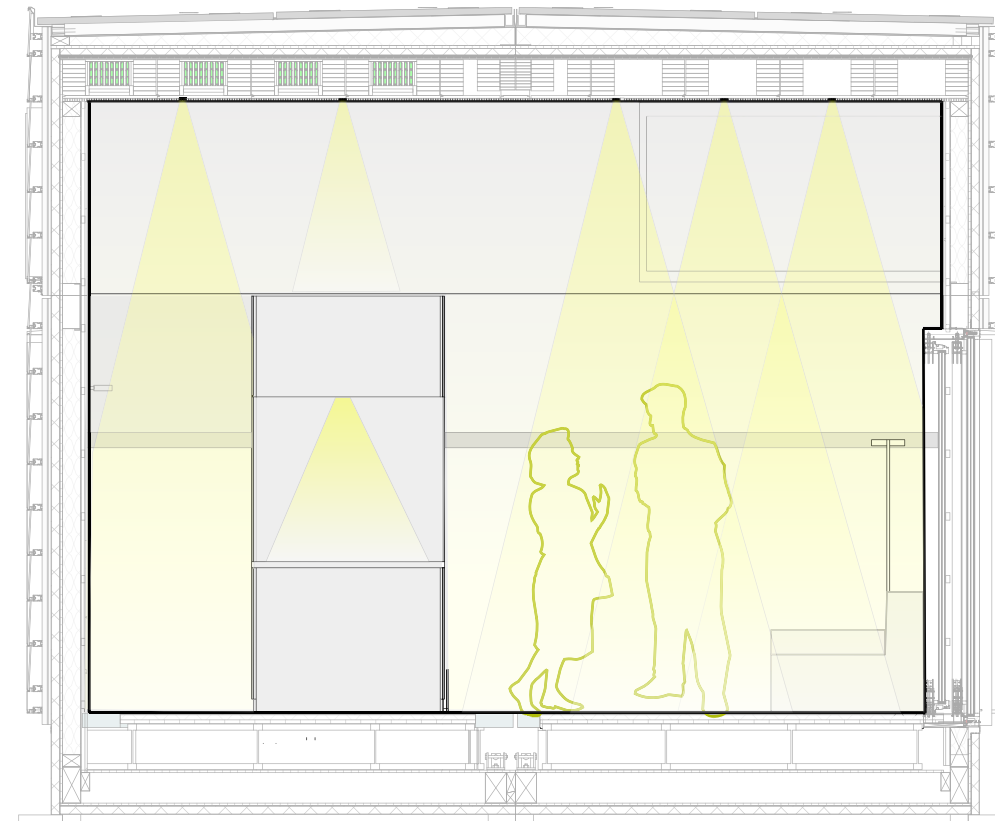
- High power LED light strips
- High Power LED Spotlights
- Occhio pendulum lamp
- Occhio wall lamp
- Occhio stand lamp
- LED mood panels (PMMA)
- Table lamp

Drawn RR
Issued 05/19/09
Last index

Component
Electric

Description
Functional Lighting
Lower Level

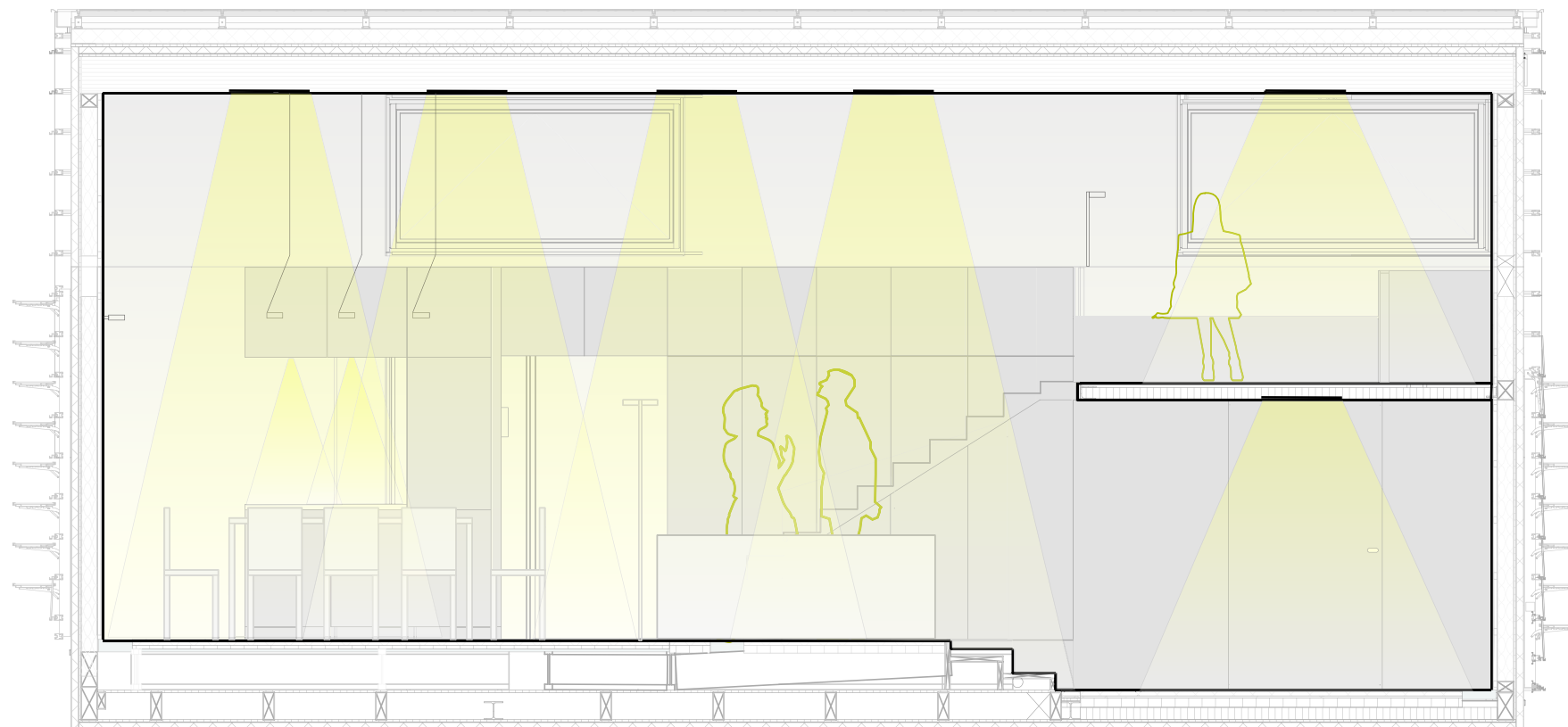
Project # Scale dwg #
P 140 1:50 E-213



1
E-214

Section - Functional Lighting

Scale 1:50



1:50



Navigation/Legend

High power LED light strips



High Power LED Spotlights



Occhio pendulum lamp



Occhio wall lamp



Occhio stand lamp



LED mood panels (PMMA)



Table lamp



Drawn RR

Issued 05/19/09

Last index

Component

Electric

Description

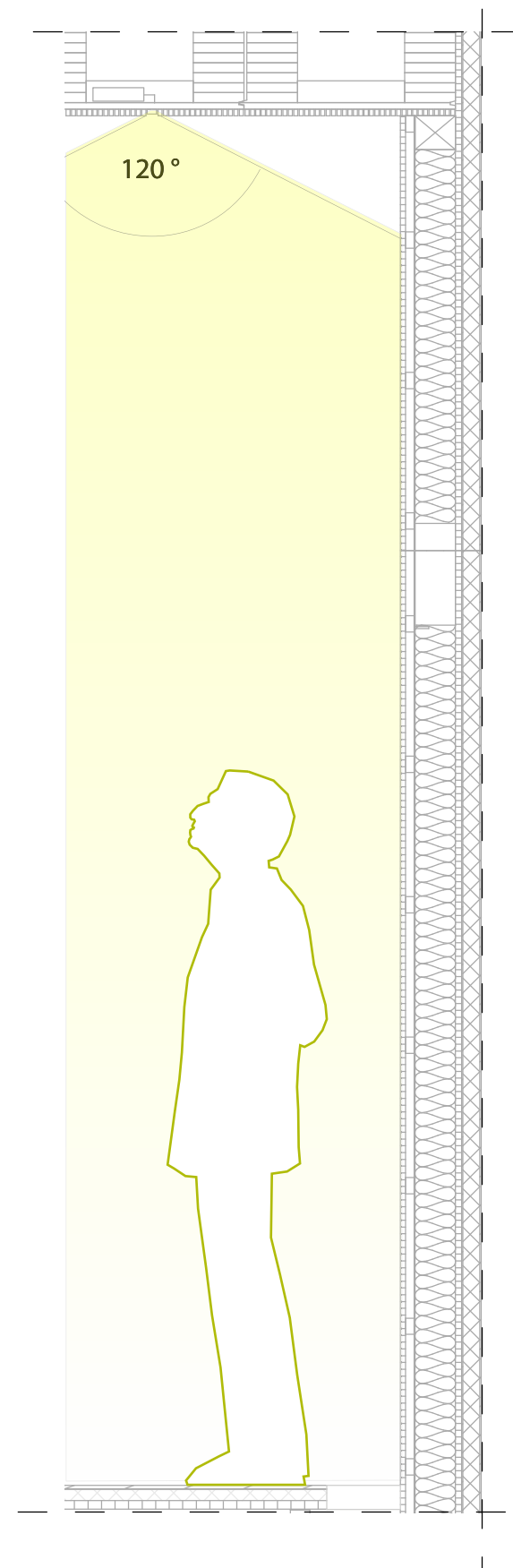
Functional Lighting

Project #	Scale	dwg #
P 140	1:50	E-214

2
E-214

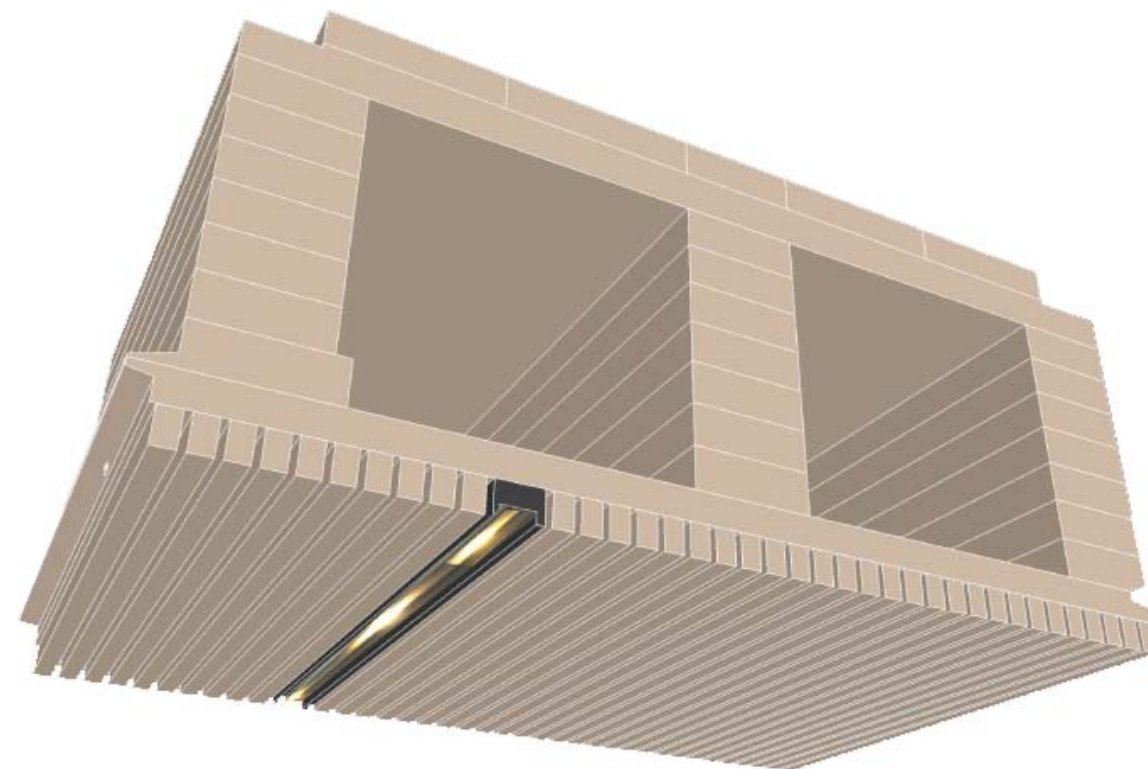
Section - Functional Lighting

Scale 1:50



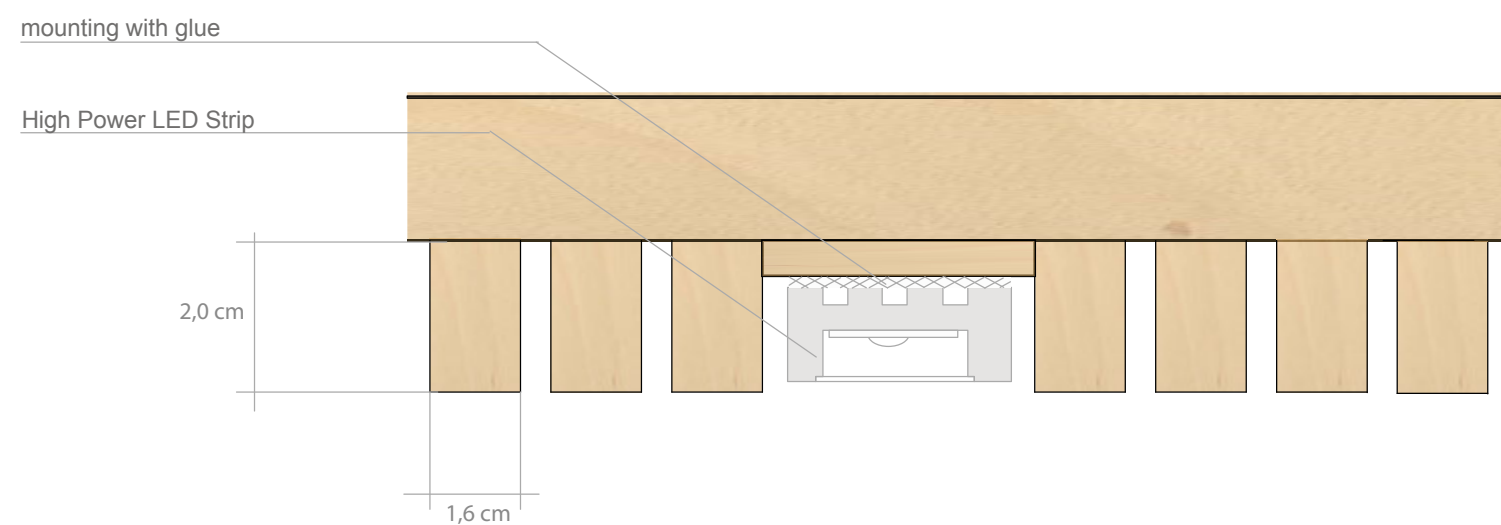
2
E-215

Section - Functional Lighting
Scale 1:20



1
E-215

Isometry - Ceiling With LED Strip



3
E-215

Integration - LED Strip In The Acoustic Ceiling
Scale 1:1

SOLAR DECATHLON

Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

High power LED light strips

High power LED Spotlights

Occhio pendulum lamp

Occhio wall lamp

Occhio stand lamp

LED mood panels (PMMA)

Table lamp

Drawn RR

Issued 05/19/09

Last index

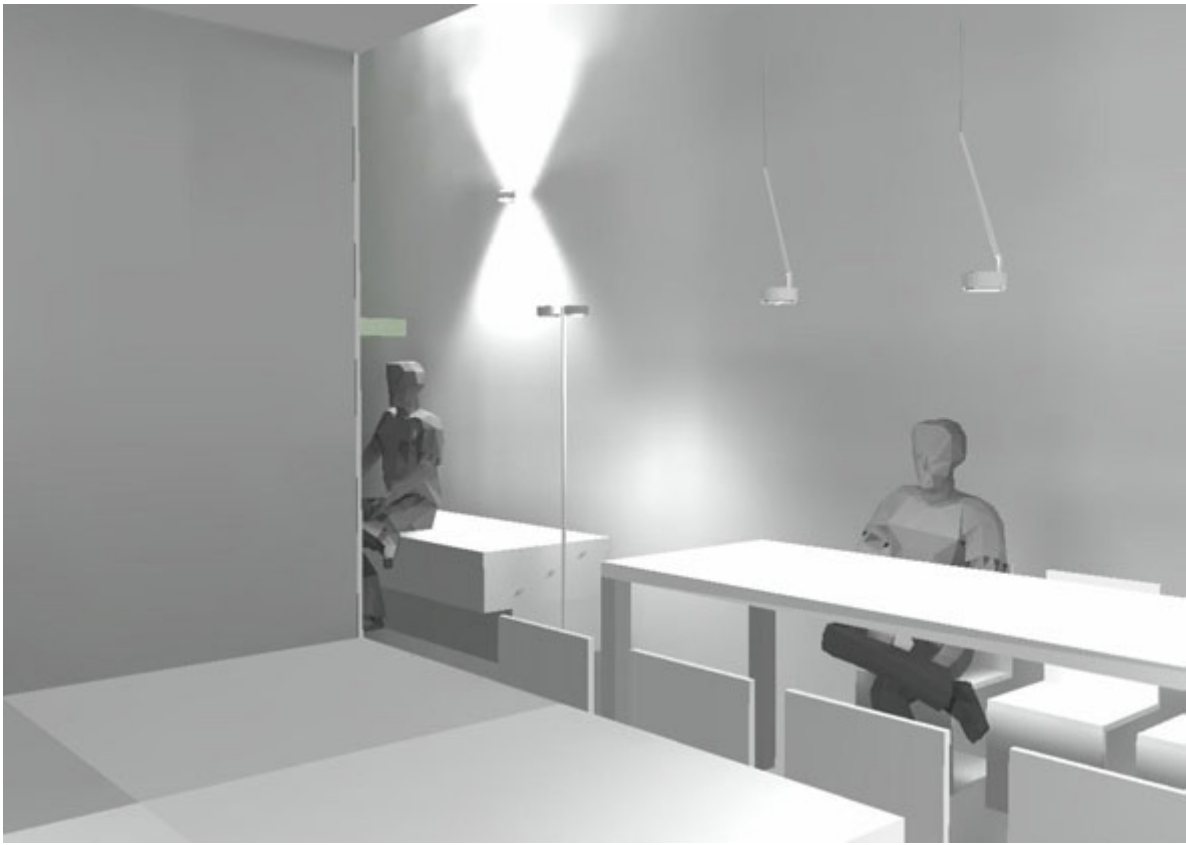
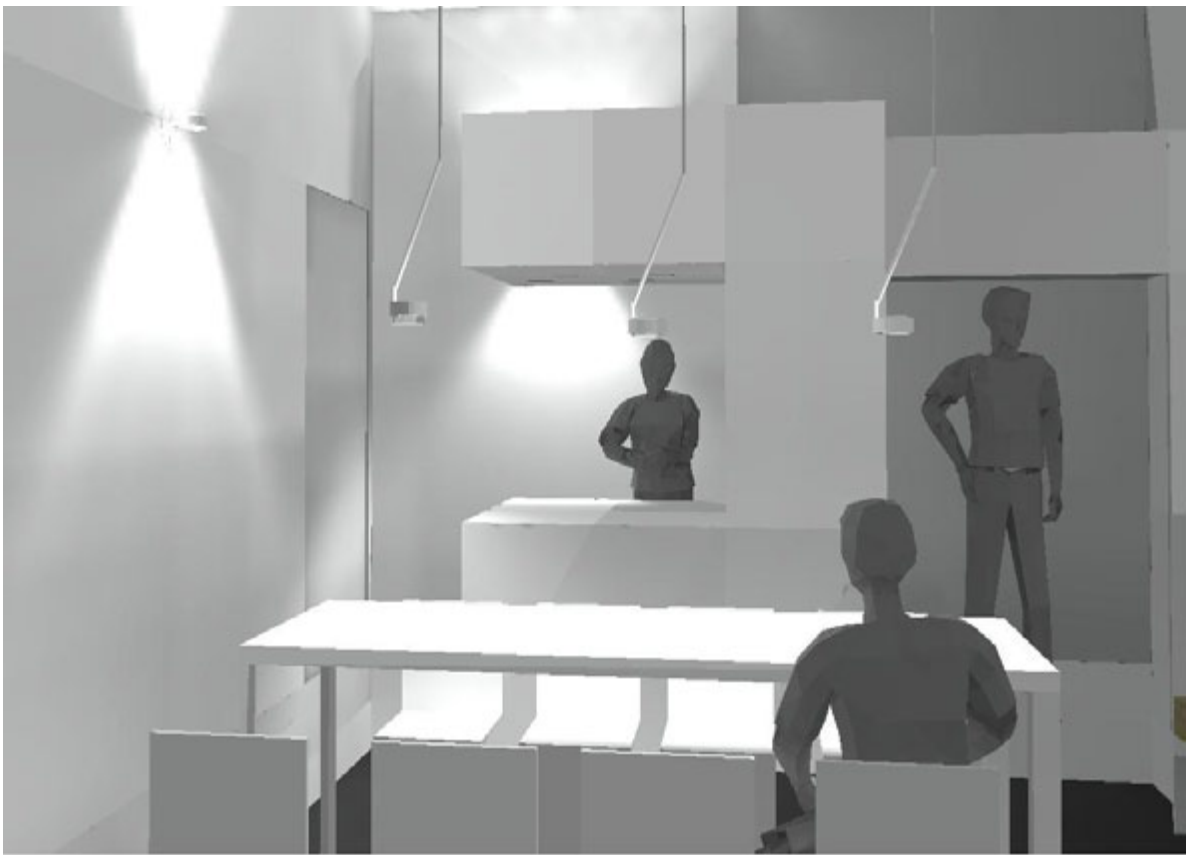
Component
Electric


Description
Lighting Concept

Project # P 140

Scale


dwg # E-215






SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

High power LED light strips

High power LED Spotlights

Occhio pendulum lamp

Occhio wall lamp

Occhio stand lamp

LED mood panels (PMMA)

Table lamp

DrawnRR

Issued05/19/09

Last index

Component

Electric

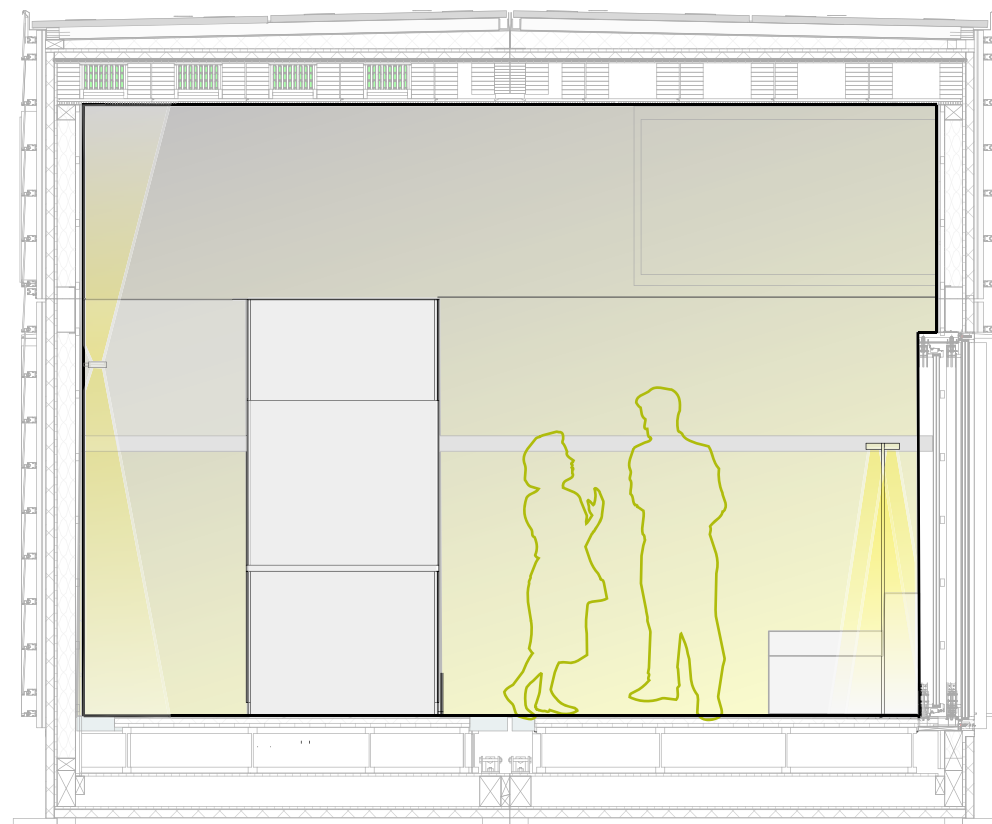
Description

Lighting Renderings

Project #P 140

Scale

dwg #E-216



Section - Accent Lighting
Scale 1:50



1:50

mm	500	1000	2000	5000
ft	1'	2'	5'	10'



Section - Accent Lighting
Scale 1:50

Navigation/Legend

High power LED light strips



High power LED Spotlights



Occhio pendulum lamp



Occhio wall lamp



Occhio stand lamp



LED mood panels (PMMA)



Table lamp

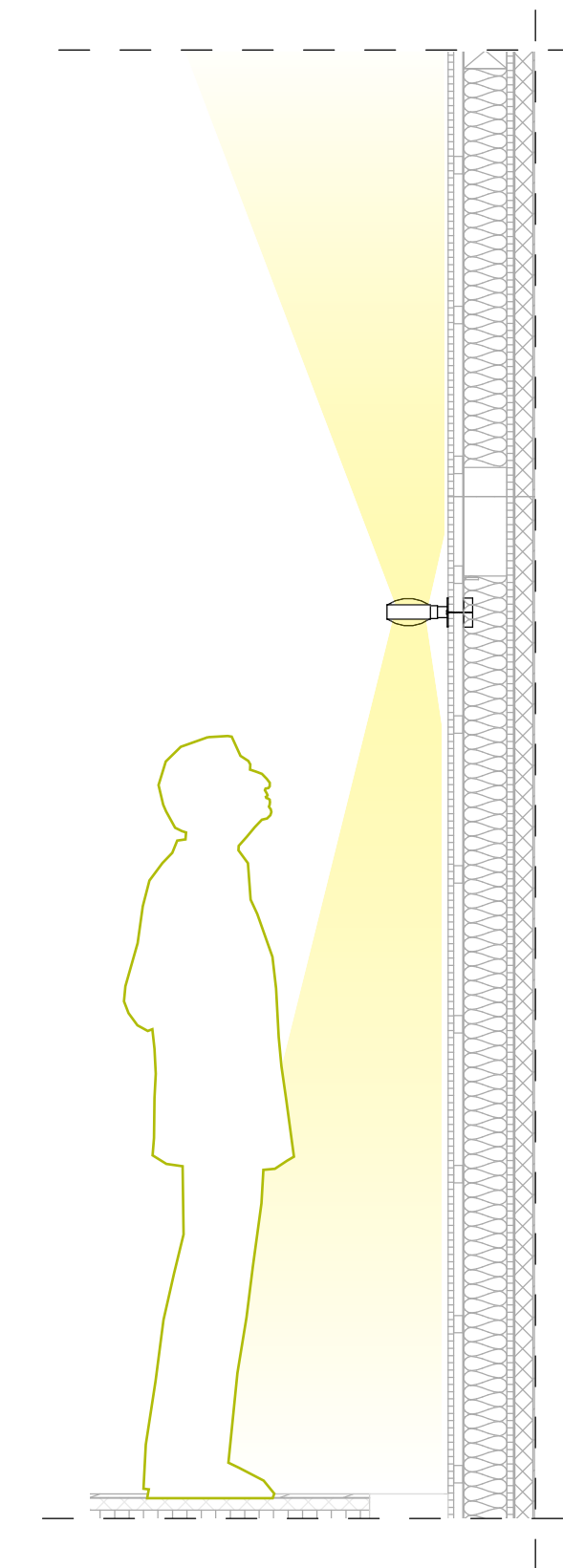


Drawn RR
Issued 05/19/09
Last index

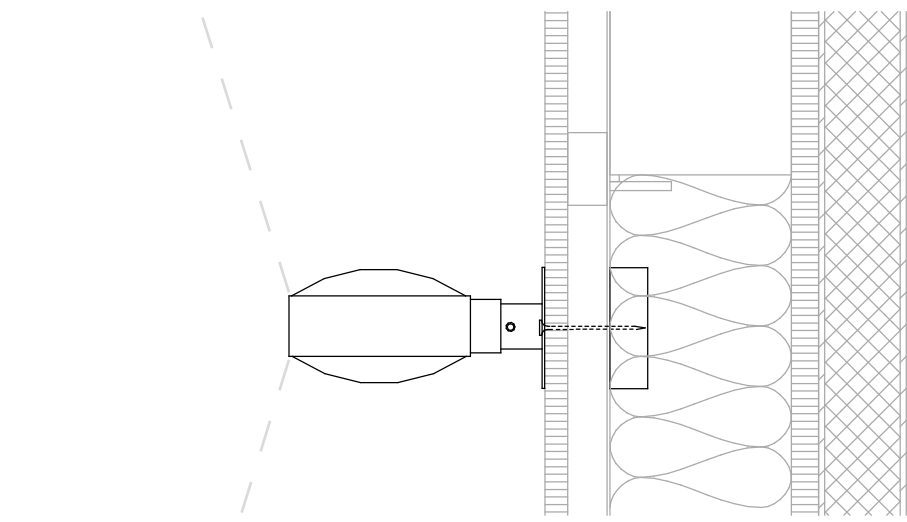
Component
Electric

Description
**Accent Lighting
Concept**

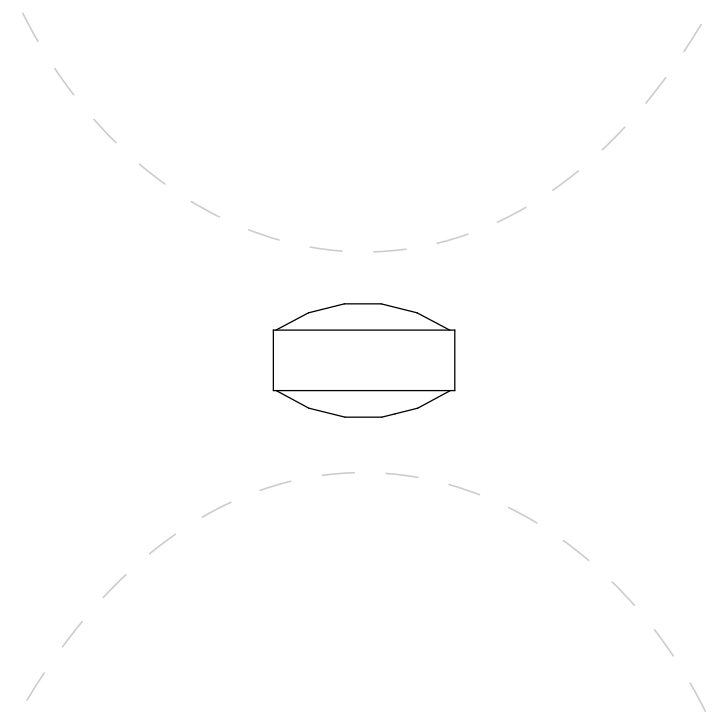
Project # Scale dwg #
P 140 1:50 E-217



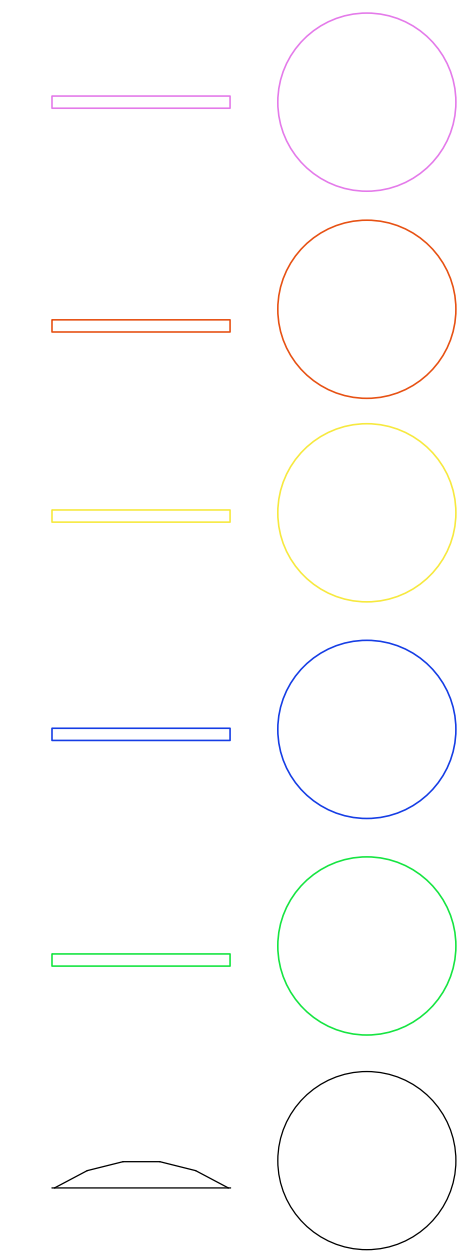
2
E-218
Section - Accent Lighting
Scale 1:20



1
E-218
Section - Occhio Wall Lamps
Scale 1:5



3
E-218
Front View Occhio Wall Lamps
Scale 1:5



4
E-218
Lens Varieties Occhio Lamps
Scale 1:5

Project

TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

High power LED light strips

High Power LED Spotlights

Occhio pendulum lamp

Occhio wall lamp

Occhio stand lamp

LED mood panels (PMMA)

Table lamp

Drawn
RR

Issued
05/19/09

Last index

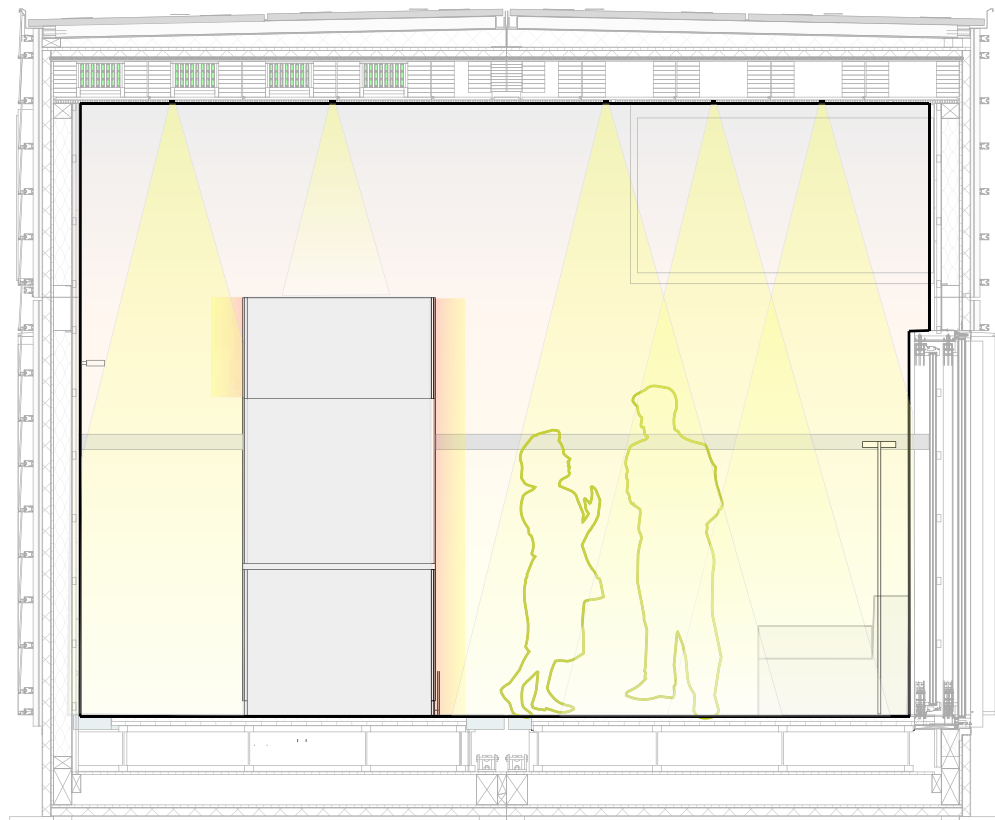
Component
Electric

Description
**Accent Lighting
Concept**

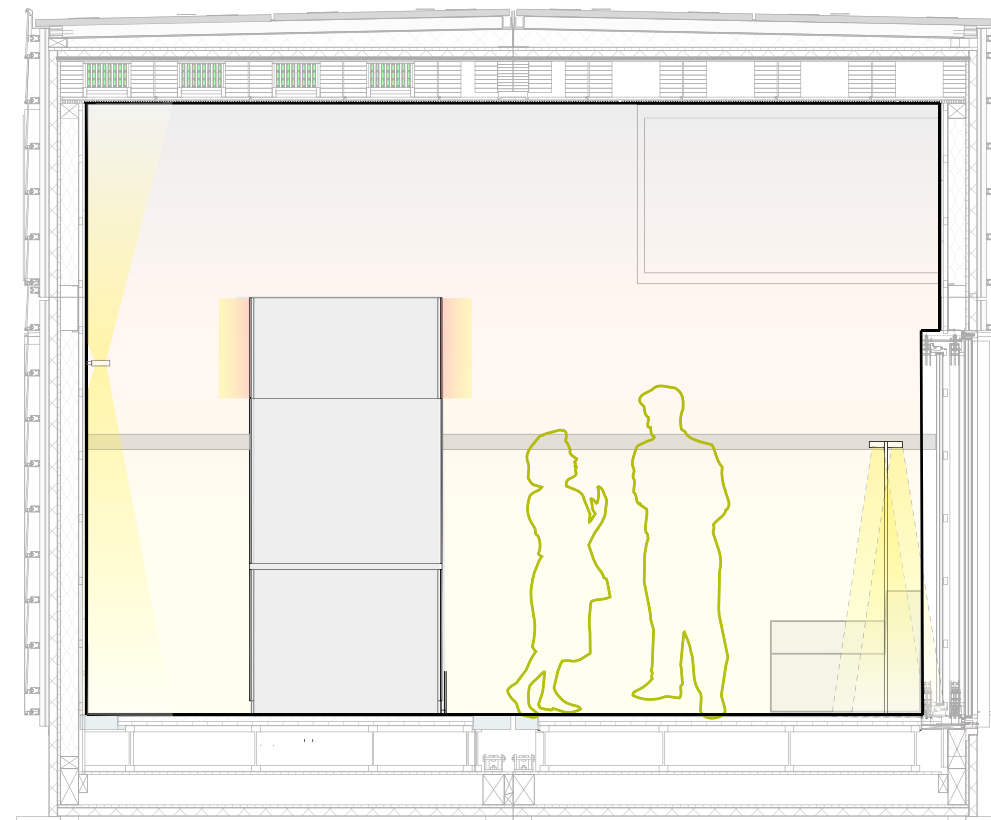
Project #
P 140

Scale

dwg #
E-218



1 Section - Functional Lighting / Mood Lighting
E-219 Scale 1:50



2 Section - Accent Lighting / Mood Lighting
E-219 Scale 1:50



3 Section - Accent Lighting / Mood Lighting
E-219 Scale 1:50

1:50



SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

High power LED light strips

High power LED spotlights

Occhio pendulum lamp

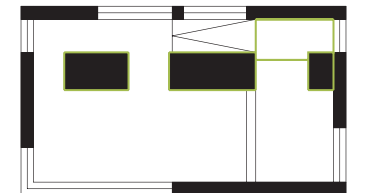
Occhio wall lamp

Occhio stand lamp

LED mood panels (PMMA)

Table lamp

Drawn	RR	
Issued	05/19/09	
Last index		
Component	Electric	
Description	Atmospheric Lighting Concept	
Project #	Scale	dwg #
P 140	1:50	E-219

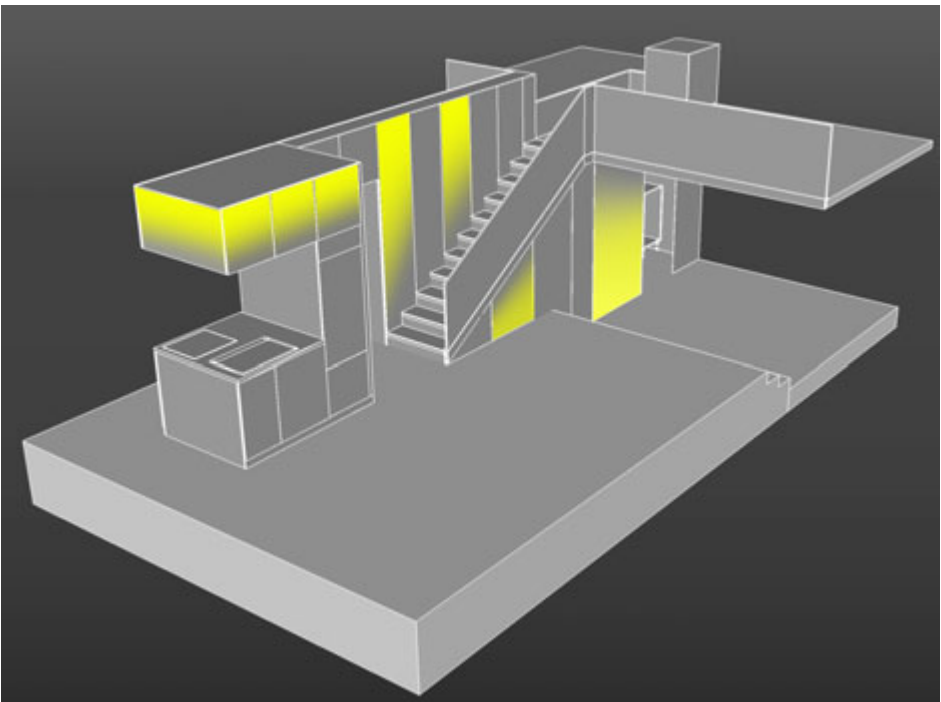
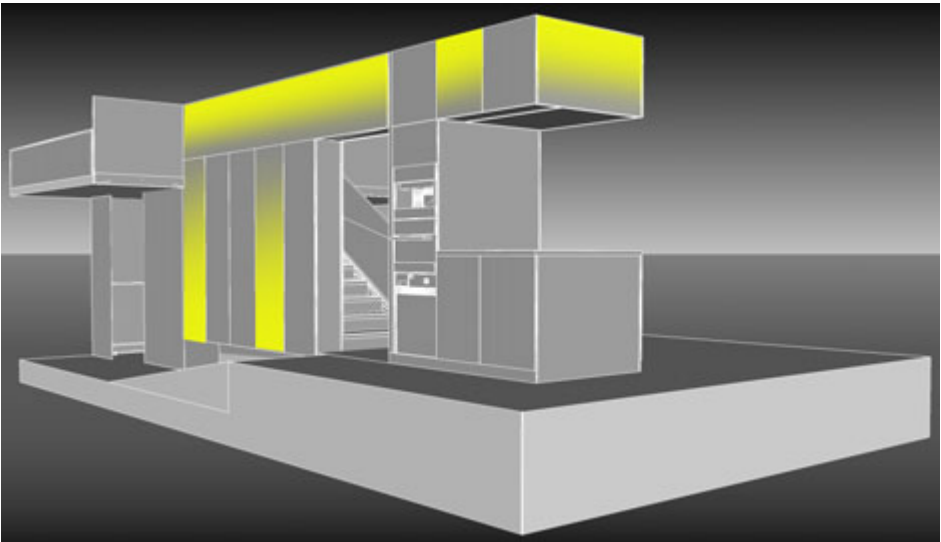


Drawn AS RR
Issued 09/05/30
Last index

Component
Electric

Description
Multifunctional Body Illumination

Project # Scale dwg #
P 140 1:1 E-220



View from north
Illumination scheme

View from south
Illumination scheme

2 Multifunctional Body Illumination

E-220

Integration of LED strip
in PMMA and Endlighten

Longitudinal section
cabinet body door
M 1:1

Elevation front
cabinet body door
M 1:1

Illuminant
LED RGB stripe
bonded

Diffusion disc
Plexiglas Crystal Ice
3mm

Carrier plate
MDF Topan Colour grey
16mm

Light bearing
Plexiglas EndLighten
8mm

Block revolving
MDF Topan Colour grey
white coated

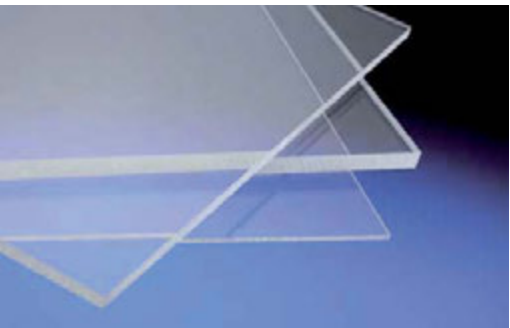
1 Lighting Panel - Detail Cabinet Body Door

Scale 1:1

Illuminant
LED RGB strip
bonded



Diffusion disc
Plexiglas Crystal Ice
3mm



Light bearing
Plexiglas
EndLighten 8mm





- switch for light
- switch for shading
- touch-screen

Drawn HB
 Issued 09/05/30
 Last index

Component
Electric

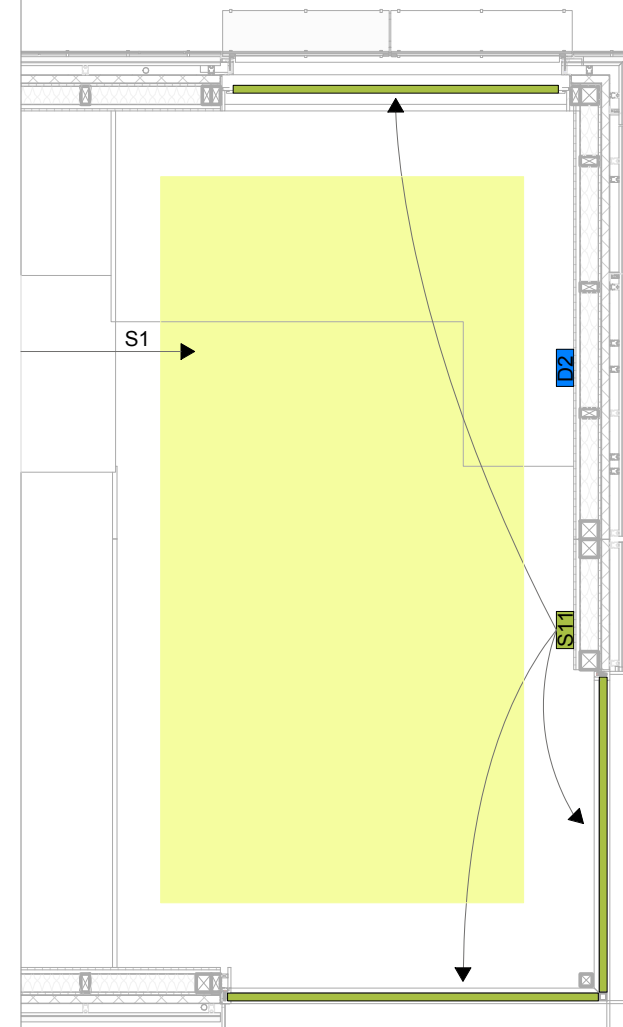
Description
Light Switch Concept

Project #	Scale	dwg #
P 140	1 : 50	E-221



1
E-221

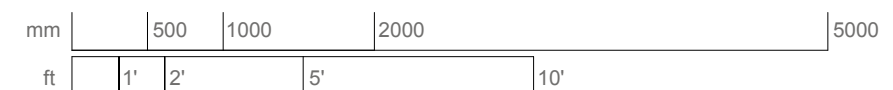
Floor Plan: 1st Floor - Light Switch Concept
 Scale 1:50



2
E-221

Floor Plan: 2nd Floor
 Scale 1:50

1:50



High power LED light strips



High Power LED Spotlights



Occhio pendulum lamp



Occhio wall lamp



Occhio stand lamp



LED mood panels (PMMA)


 Drawn **RR**
 Issued **09/05/30**
 Last index


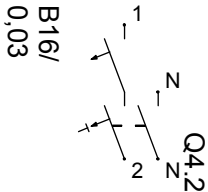

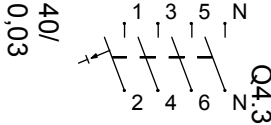
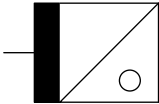




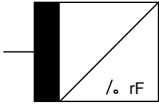

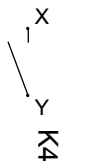
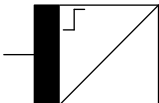
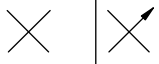
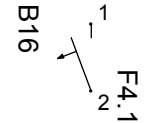
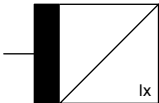


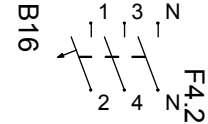
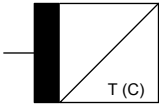


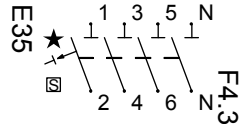
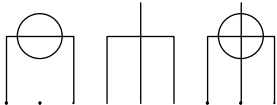

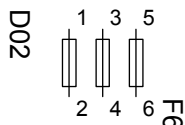
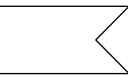
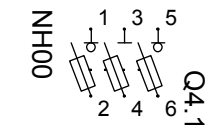

 Component
Electric

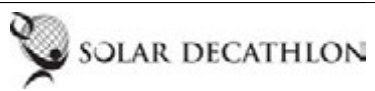
 Description
Lighting Schedule

 Project # **P 140** Scale dwg # **E-222**

Schedule for Lighting fixture												
Plan No.	Project Manual Division Master Format	Description	Manufacturer	Lamps			connection to building service	Lens	Finish	Mouting	Nr. of units	Notes
				Type	Volts	Watt						
E-212	Div. 26	High Power LED light strips	Lumitonix	LED	12	16,8	SP-100-48	PMMA translucent covering	aluminium	ceiling system	18	
E-213	Div. 26	High Power LED spots	Lumitonix	LED	230-240	12	on/off	glass	brash-stainless steel	recessed luminair	5	
E-213	Div. 12	Occhio System floor lamps	Occhio	Halogen	230-240	25	on/off power socket	glass	brash stainless steel	variable	3	
E-213	Div. 12	Occhio System pendulum lamps	Occhio	Halogen	230-240	25	on/off power socket	glass	brash stainless steel	variable	3	
E-213	Div.12	Occhio System wall lamps	Occhio	Halogen	230-240	25	on/off power socket	glass	brash stainless steel	variable	3	
E-220	Div.26	LED lighting Panels		LED	230-240	140		PMMA				Endlighten panels alternative Kobek light panels
E-213	Div.12	LED High Power table lamp		LED			on/off powe socket				1	

Symbols and notes

	Oven		Residual Current Circuit-Breaker with Cutout (1 Phase) Type: B, Current: 16A, FI: 30mA		KNX Switch (1 or 2 Buttons)
	Stove				
	Washer		Residual Current Circuit-Breaker (4 Phases) Current: 40A, FI: 30mA		KNX Push-Button (1, 2 or 4 Buttons)
	Dishwascher				
	Dryer				
	Fridge		Virtual Circuit Connector		KNX Humidity Sensor
	Freezer	S. ?			
	Outlet		Actuator Switch		KNX Reed Contact (2 or 4 Contacts)
	Light		Cutout (1 Phase) Type: B, Current: 16A		KNX Light Sensor
	LCD-TV, Blu-ray				
	Motor		Cutout (2 Phases) Type: B, Current: 16A		KNX Temperature Sensor
	Fan				
	Air Condition		Main Cutout (4 Phases) Type: E, Current: 35A		Power measurement
	PV Inverter				Fuse (3 Phases)
	PV Module		NH00 Circuit Breaker (3 Phases)		
	Connector				



Project

TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

Description

SYMBOLS AND NOTES

Project #Scale

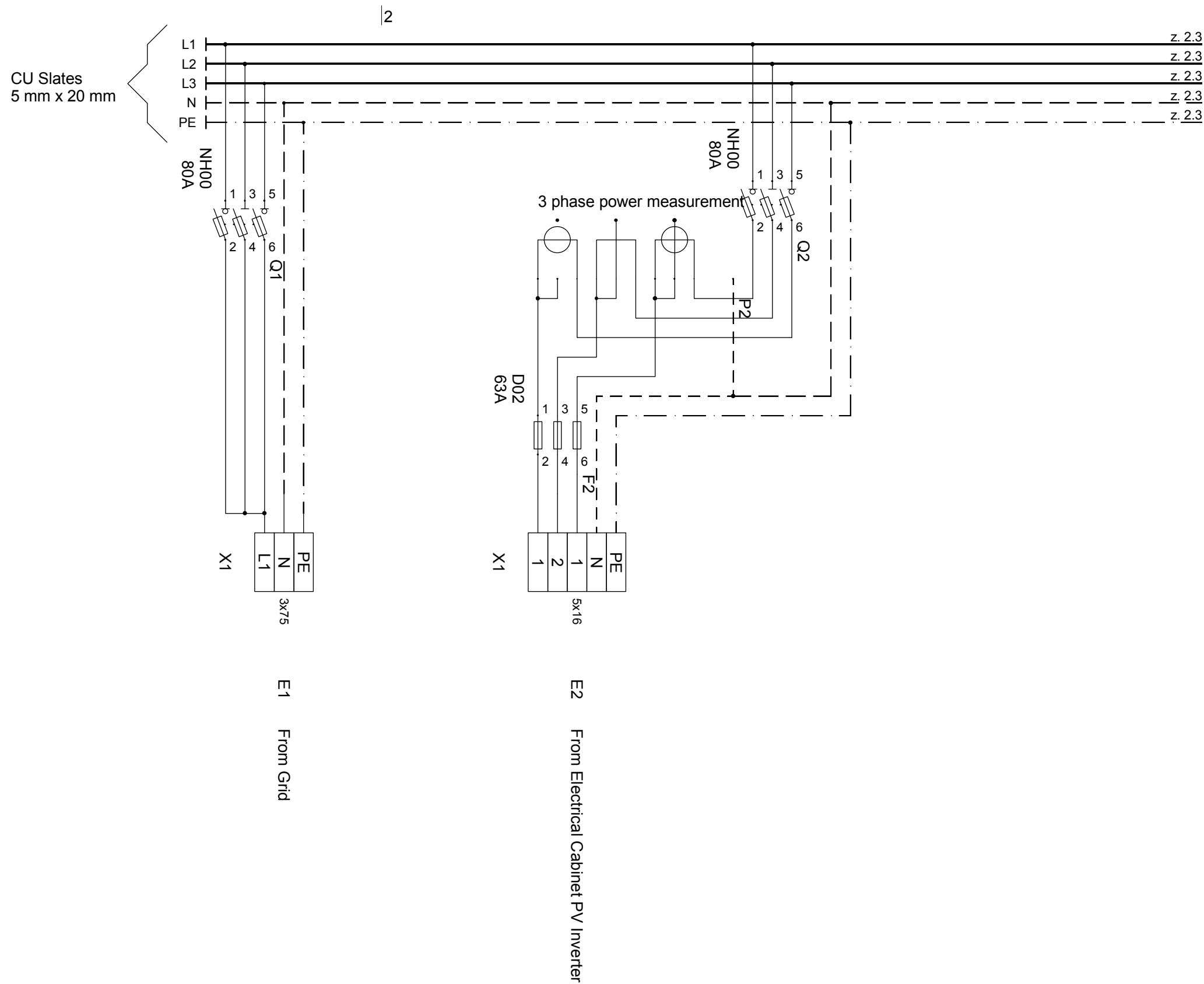
P140

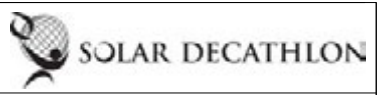
dwg #

E - 300

Electrical Cabinet Outside 1


Circuit | 1






SOLAR DECATHLON

Project



SOLAR DECATHLON 2009
TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

Drawn LS, HZ, AS

Issued 05/26/09

Last index

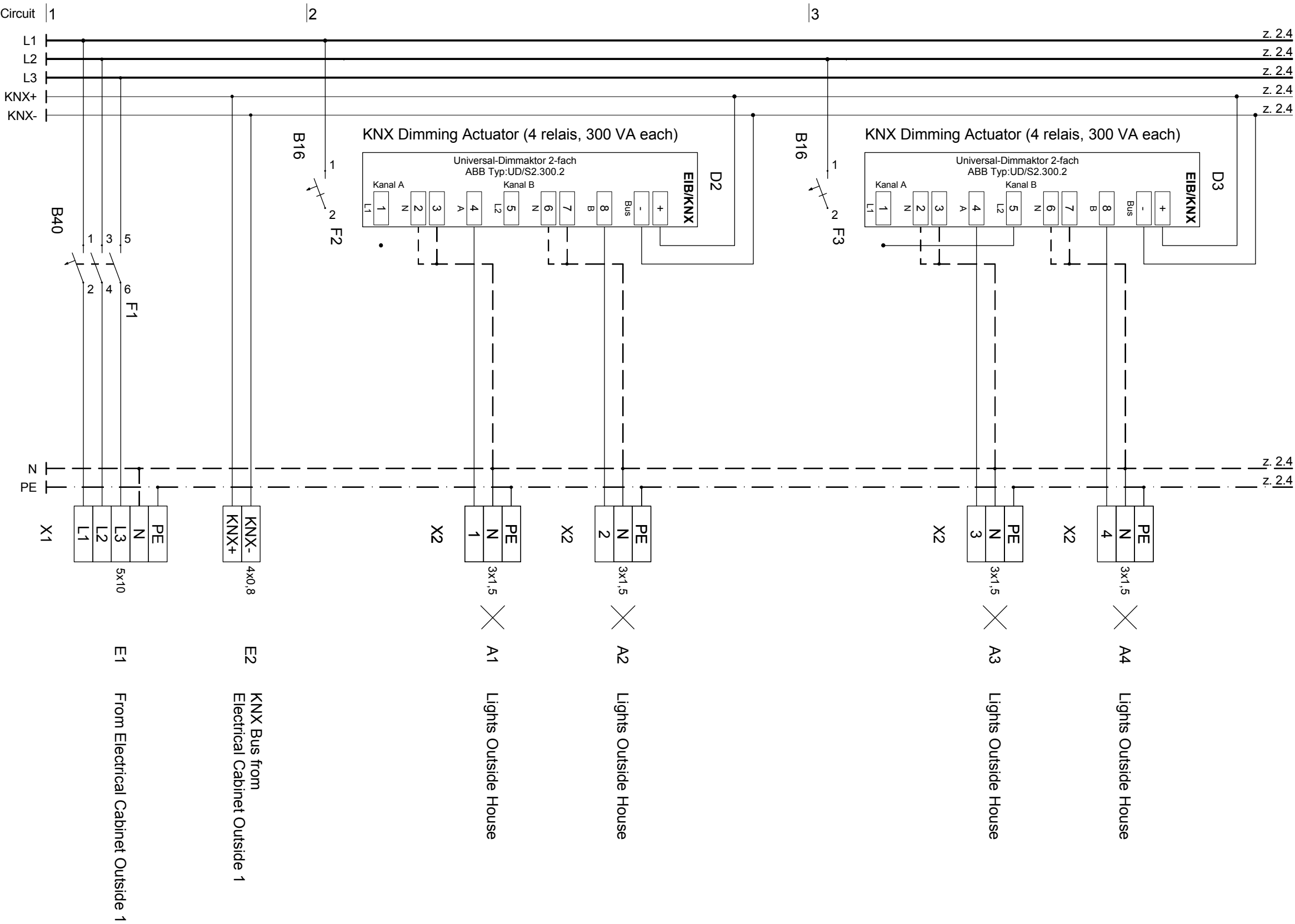
Component

Description

**ELECTRICAL CABINET
OUTSIDE 1**

Project # Scale dwg #

P140 **E - 301**





SOLAR DECATHLON

Project



SOLAR DECATHLON 2009
TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

Drawn LS, HZ, AS

Issued 05/26/09

Last index

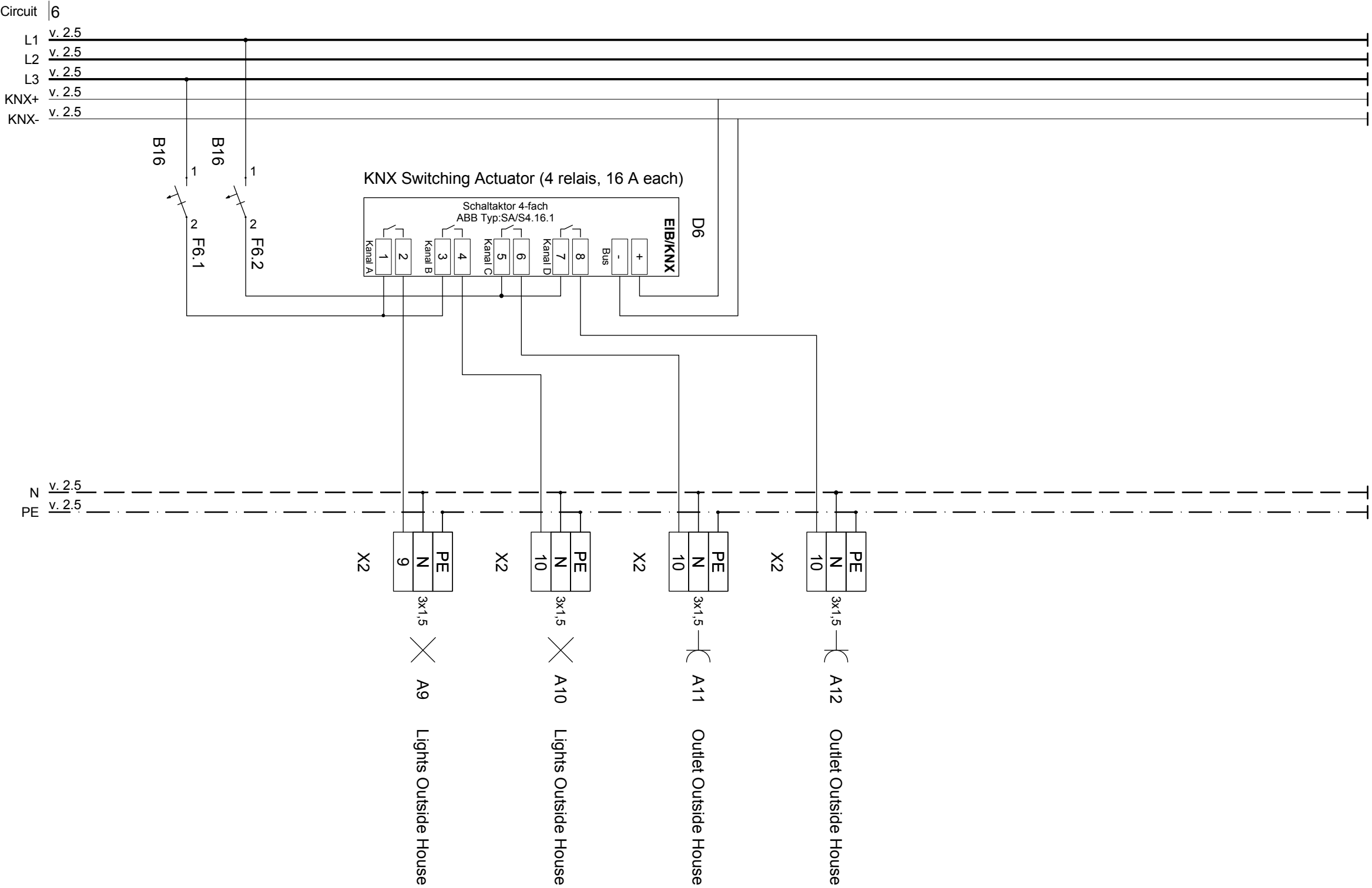
Component

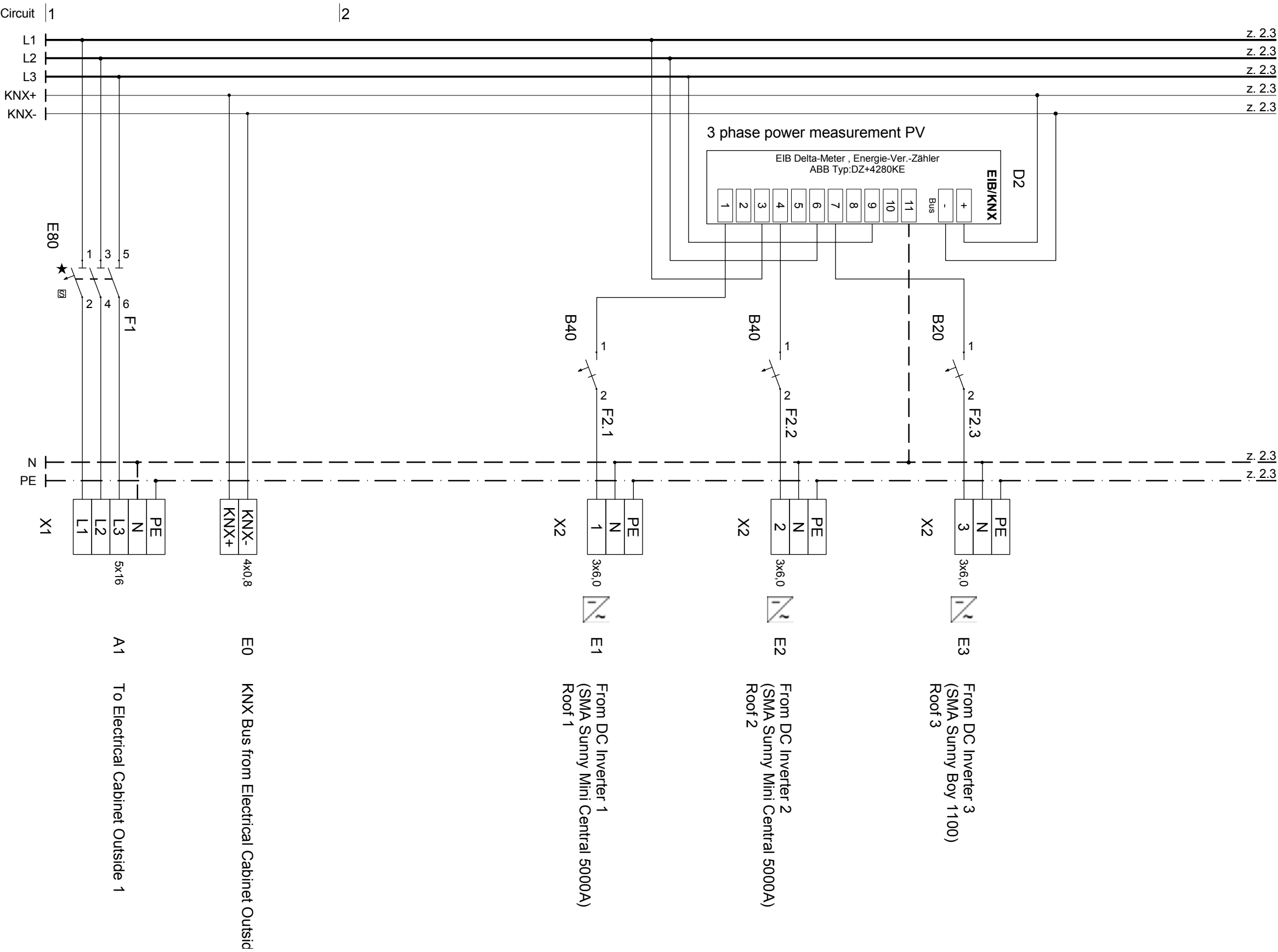
Description


**ELECTRICAL CABINET
OUTSIDE 2**

Project # Scale dwg #

P140 **E - 303**










SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

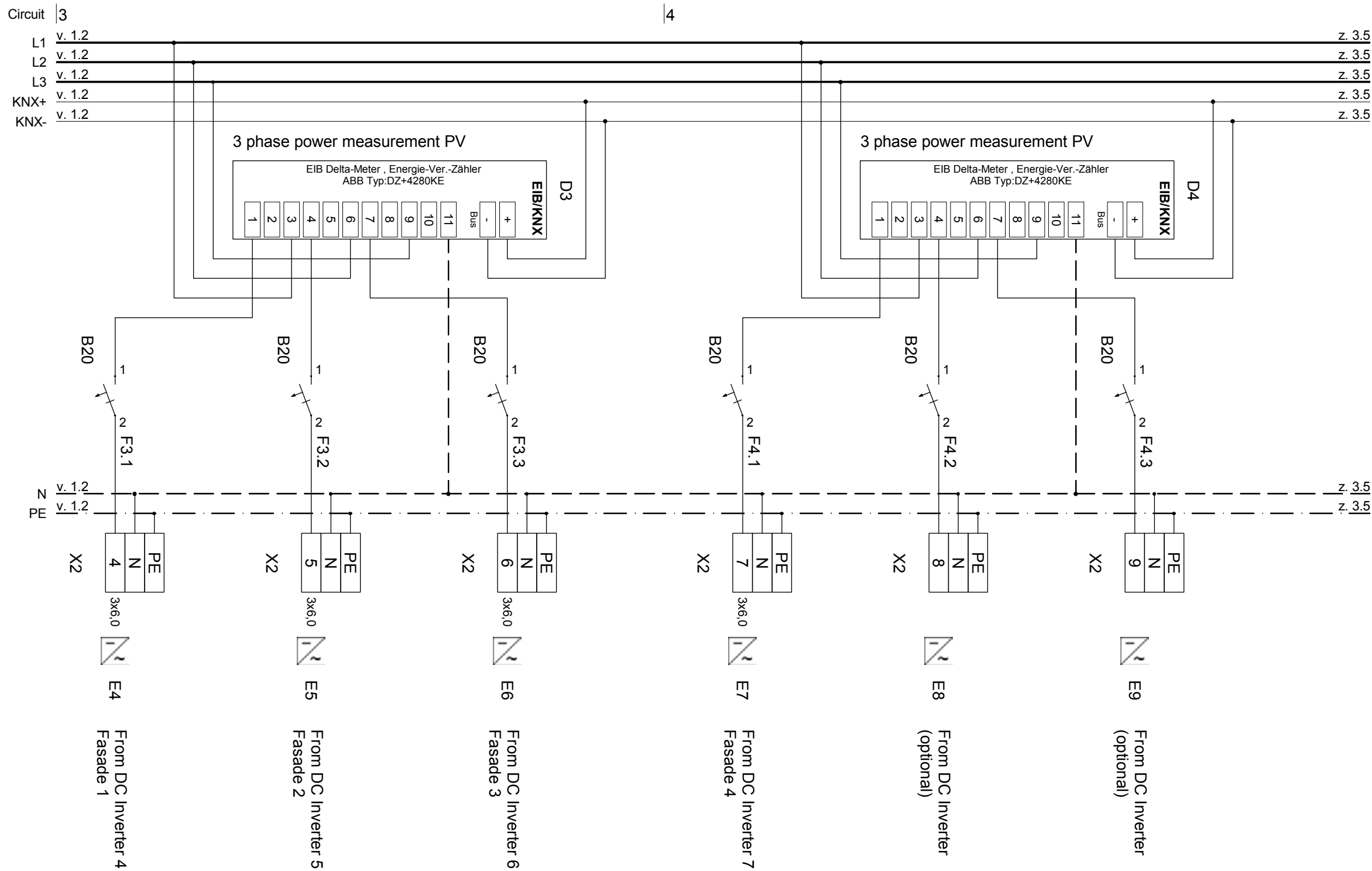
Description

**ELECTRICAL CABINET
PV INVERTER JOINT**

Project #Scale

dwg #

P140E - 306



Project

SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

Drawn LS, HZ, AS

Issued 05/26/09

Last index

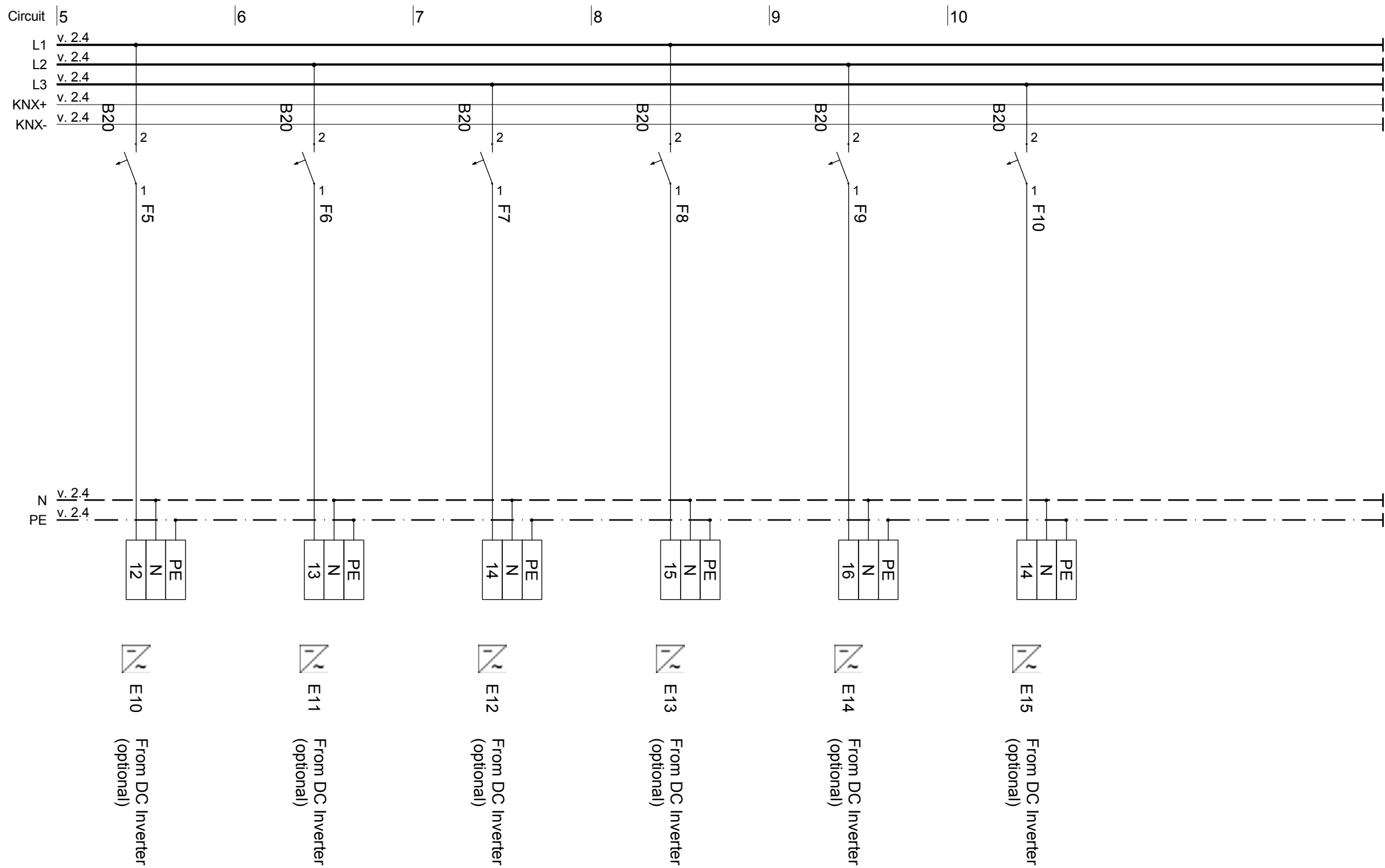
Component


Description

**ELECTRICAL CABINET
PV INVERTER JOINT**

Project # Scale dwg #


P140 **E - 307**






SOLAR DECATHLON

Project




SOLAR DECATHLON 2009



TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

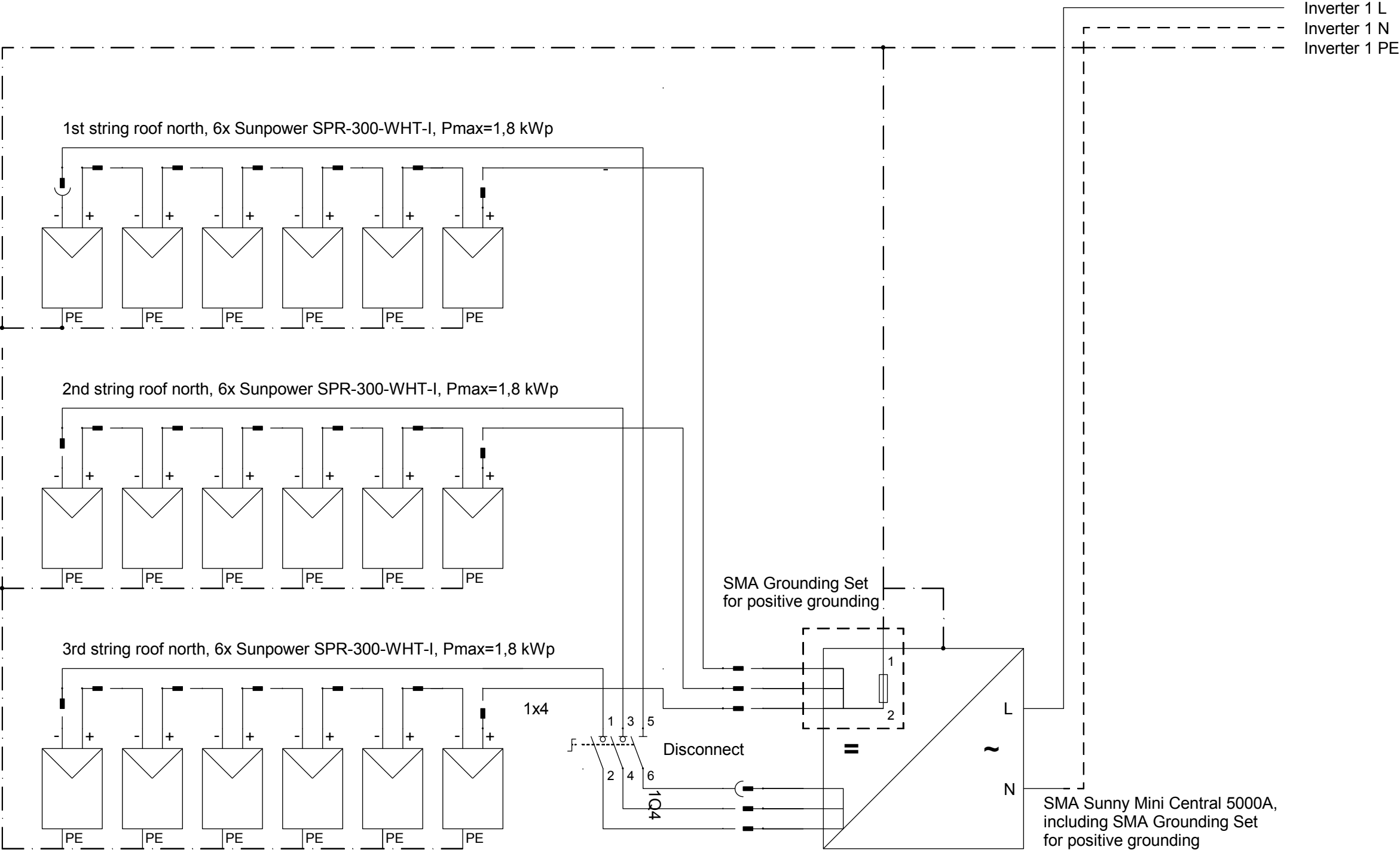
Component

Description

**ELECTRICAL CABINET
PV INVERTER JOINT**

Project #Scaledwg #

P140E - 308





SOLAR DECATHLON

Project



SOLAR DECATHLON 2009
TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

Drawn

LS, HZ, AS

Issued

05/26/09

Last index

Component

Description

**PV INTERCONNECTION
OVERVIEW**

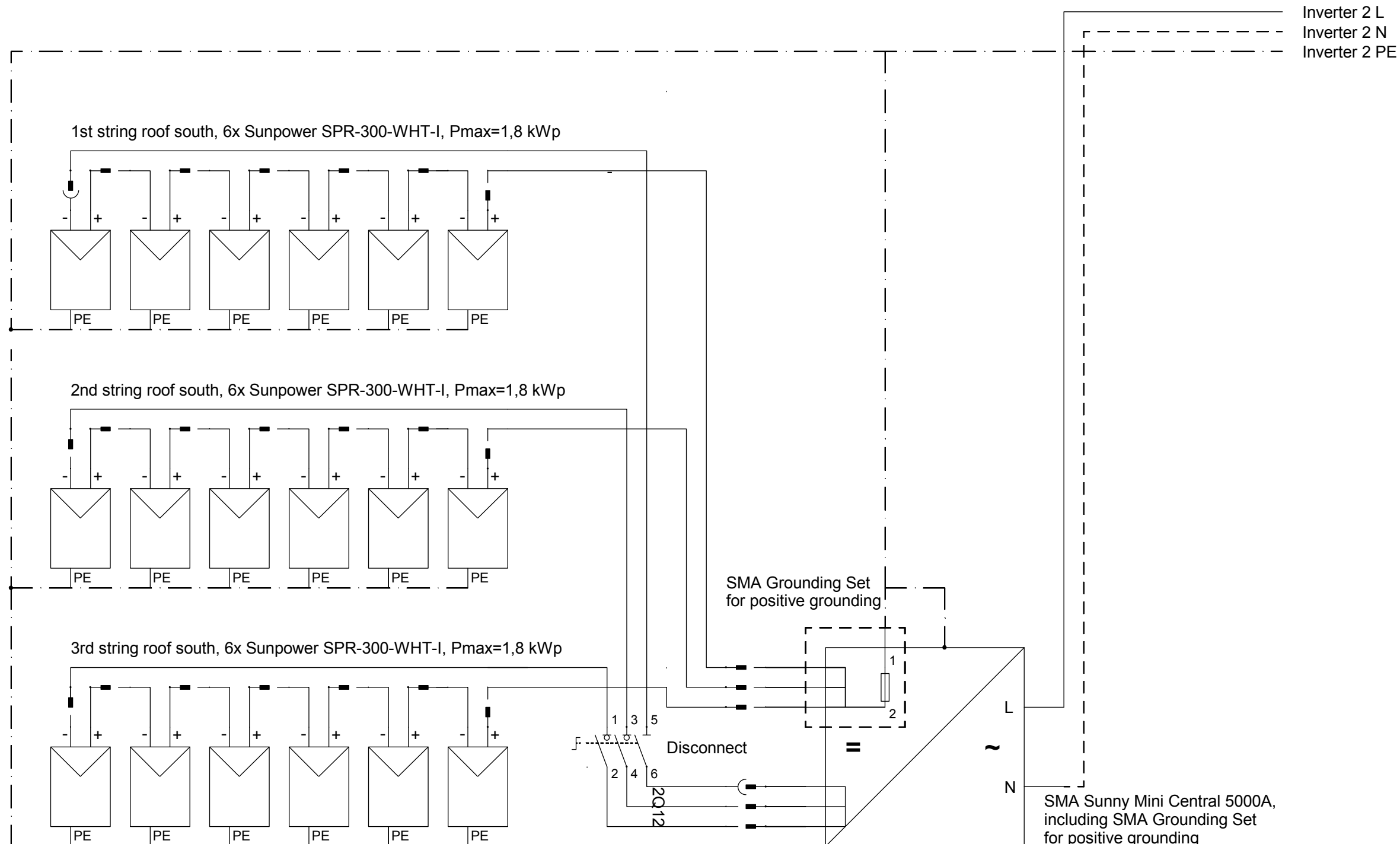
Project #

Scale

dwg #

P140

E - 309



Project

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

Drawn

LS, HZ, AS

Issued

05/26/09

Last index

Component

Description

PV INTERCONNECTION OVERVIEW

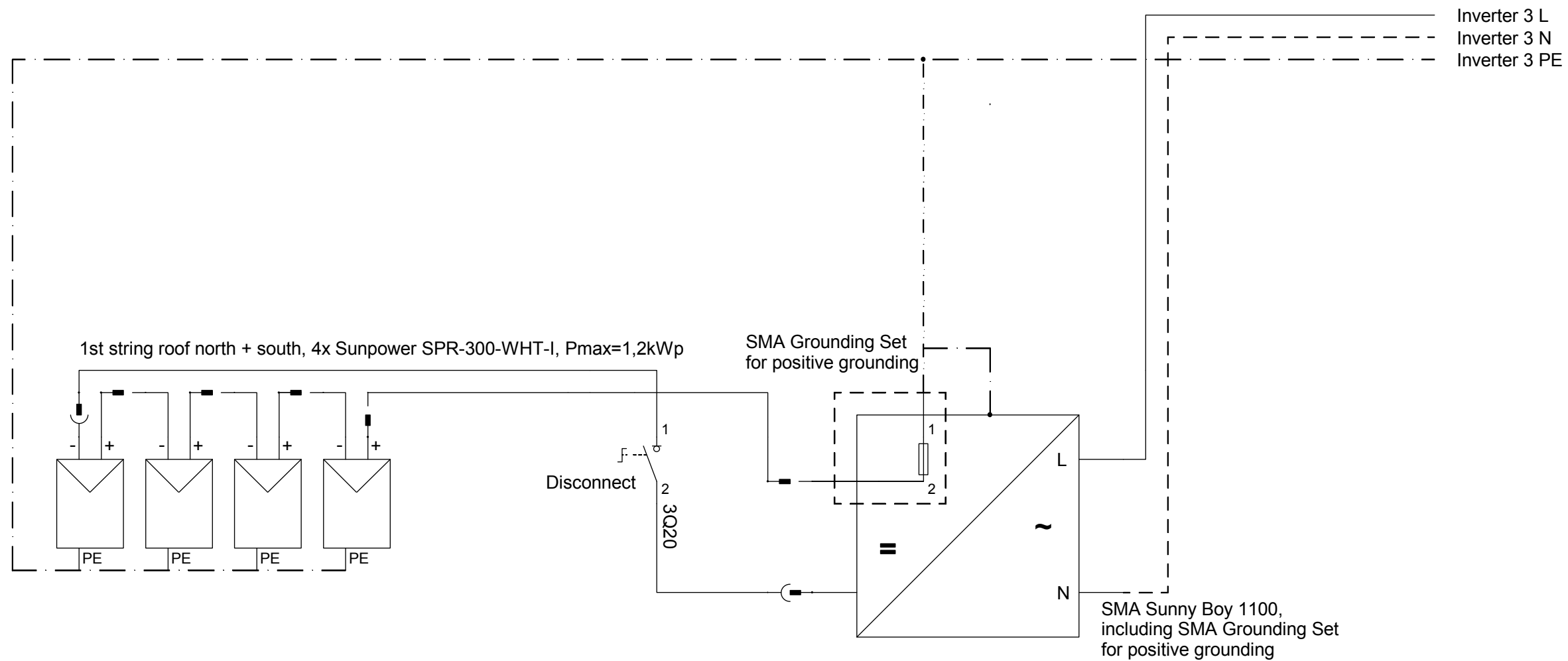
Project #

Scale

dwg #

P140

E - 310



Design of the roof’s photovoltaic system

1. Design of the inverters installed on the roof

The design temperature range will be Tmin = -15 °C (258 K) and Tmax = 80 °C (353 K). On the roof of Team Germany’s Solar Decathlon 2009 house SunPower WHT-300-I solar-panels will be installed. For their specifications see the specification sheet included. The panel’s voltage range within the MPP (Maximum Power Point) as well as its maximum open circuit voltage and maximum short circuit current can be calculated using the following equations and the given design temperature range. The temperature coefficient of the voltage would be refered to as c_v and the temperature coefficient of the current would be refered to as c_i .

$$V_{mp}(T) = c_v(T - T_{STC}) + V_{mp,STC}$$
$$V_{oc}(T) = c_v(T - T_{STC}) + V_{oc,STC}$$
$$I_{sc}(T) = c_i(T - T_{STC}) + I_{sc,STC}$$

Where T_{STC} = 25 °C (298 K) would be the temperature under Standard Test Conditions (STC). Thus for the SunPower WHT-300-I the following results will occur.

$$V_{mp,max} = V_{mp}(T = 258\text{ K}) = 61.76\text{ V}$$
$$V_{mp,min} = V_{mp}(T = 353\text{ K}) = 44.99\text{ V}$$
$$V_{oc,max} = V_{oc}(T = 258\text{ K}) = 71.06\text{ V}$$
$$I_{sc,max} = I_{sc}(T = 353\text{ K}) = 6.16\text{ A}$$

1.1 South roof configuration

On the south side of the roof three strings with 6 solar panels each will be installed. They will deliver a maximum dc power of $P_{dc,max}$ = 5.4 kW. This configuration will lead to the following string voltage range, maximum open circuit voltage and maximum dc current output.

$$V_{str,mp,max} = 6\ V_{mp,max} = 370.56\text{ V}$$
$$V_{str,mp,min} = 6\ V_{mp,min} = 269.94\text{ V}$$
$$V_{str,oc,max} = 6\ V_{oc,max} = 426.36\text{ V}$$
$$I_{dc,max} = 3\ I_{sc,max} = 18.48\text{ A}$$

As an inverter the SMA Sunny Mini Central 5000 A will be used to meet this configuration. For its specifications see the specification sheet included. Since the voltage range for MPP-Tracking, the maximum input dc voltage and maximum input dc current won’t be exceeded, the system should work properly under the given temperature conditions.

1.2 North roof configuration

On the north side of the roof the same configuration of 2 strings with 6 solar panels each will be used and thus the same inverter will be installed and should work properly as well.

1.3 Four additional panels

To make use of the whole roof area, four additional SunPower WHT-300-I panels will be installed and interconnected in one string. This will lead to a maximum dc power of $P_{dc,max}$ = 1.2 kW.

The following string voltage range, maximum open circuit voltage and maximum dc output current will occur.

$$V_{str,mp,max} = 4\ V_{mp,max} = 247.04\text{ V}$$
$$V_{str,mp,min} = 4\ V_{mp,min} = 179.96\text{ V}$$
$$V_{str,oc,max} = 4\ V_{oc,max} = 426.36\text{ V}$$
$$I_{dc,max} = I_{sc,max} = 6.16\text{ A}$$

To meet this configuration a SMA Sunny Boy 1100 inverter will be used. See the specification sheet included for more information. Since the voltage range for MPP-Tracking, the maximum input dc voltage and maximum input dc current won’t be exceeded, the additional string of 4 panels should work properly under the given temperature conditions.

2. Wiring of the roof’s photovoltaic configuration

In general copper wire having a sectional area of A_{CU} = 4 mm² will be used for the connection of the strings to the inverter as well as for the interconnection between the solar panels.

2.1 South and north roof wiring

A total of 12 dc wires are necessary to connect the inverter of the south and the north roof to the 3 south and 3 north roof solar panel strings. The maximum length of each wire should not exceed l_{max} = 20 m. Since the specific resistivity of the wires would be ρ = 1.81 x 10⁻⁸ Ωm, the overall resistance of one wire could be calculated as follows.

$$R_{CU} = 0.09\ \Omega$$

For additional information on the installed dc wires see the specification sheet included. M The following maximum current will flow through the dc wire of each string, while each string M will provide a maximum dc power of $P_{dc,max}$ = 1.8 kW. M

$$I_{dc,max} = \frac{P_{dc,max}}{V_{str,mp,max}} = 6.67\text{ A}$$

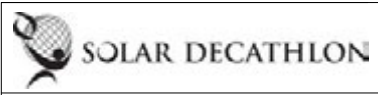
Thus the voltage drop and power loss on one wire would be:

$$\Delta V = I_{dc,max}\ R_{CU} = 0.6\text{ V}$$
$$P_{loss} = \Delta V\ I_{dc,max} = 4\text{ W}$$

For the south and the north roof configuration together this would lead to a power loss of

$$P_{loss,south,north} = 12\ P_{loss} = 48\text{ W}$$


which would be l an acceptable range.



Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

Description

DESIGN OF PV
ROOF

Project # Scale dwg #
P140E - 312

2.2 Wiring of the four additional panels

For the additional string of 4 solar panels two additional dc wires are necessary. As well as for the south and north roof configuration a maximum length of $l_{max} = 20\text{ m}$ shouldn't be exceeded. The additional string will provide a maximum dc power of $P_{dc,max} = 1.2\text{ kW}$, which will lead to a maximum current of $I_{dc,max} = 4.86\text{ A}$. This will lead to a voltage drop and power loss as follows.

ΔV

$= I_{dc,max} R_{CU} = 0.45\text{ V}$

P_{loss}

$= \Delta V I_{dc,max} = 2.2\text{ W}$

Thus the wiring of the four additional panels would lead to a power loss of

$P_{loss,south,north} = 2 P_{loss} = 4.4\text{ W}$

which would be in an acceptable range.

2.3 Overall maximum power loss through dc wiring

Following the calculations above, the overall power loss will add up to $P_{loss,dc} = 52.4\text{ W}$.

2.4 Design of the dc wire dimensions


In general copper wire having a sectional area of $A_{CU} = 4\text{ mm}^2$ (similar to an AWG 12 wire) will be used for the connection of the strings to the inverters as well as for the interconnection between the solar panels on the façade.

The maximum current for such a wire would be $I_{max} = 46\text{ A}$ in air at a temperature of $T = 30\text{ °C}$. The maximum current has to be reduced to 34 A due to the metal conduit in which it is placed. As the conduit might be exposed to sunlight, an ambient temperature of $T = 60\text{ °C}$ has to be taken into account. This reduces the maximum current to $I = 17\text{ A}$. Since the current flowing in either one of the dc wires of the roof or façade photovoltaic system doesn't exceed this value it should meet our configuration.

Since the strings will be connected in parallel before being connected to the inverters it has to carry a larger current in this particular region. Thus the parallel connection will be made in a shaded place near the inverters where the ambient temperature is less than $T = 40\text{ °C}$ and thus the wire is able to carry a current of $I = 29.58\text{ A}$.


SOLAR DECATHLON

Project

SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

TECHNISCHE UNIVERSITÄT DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

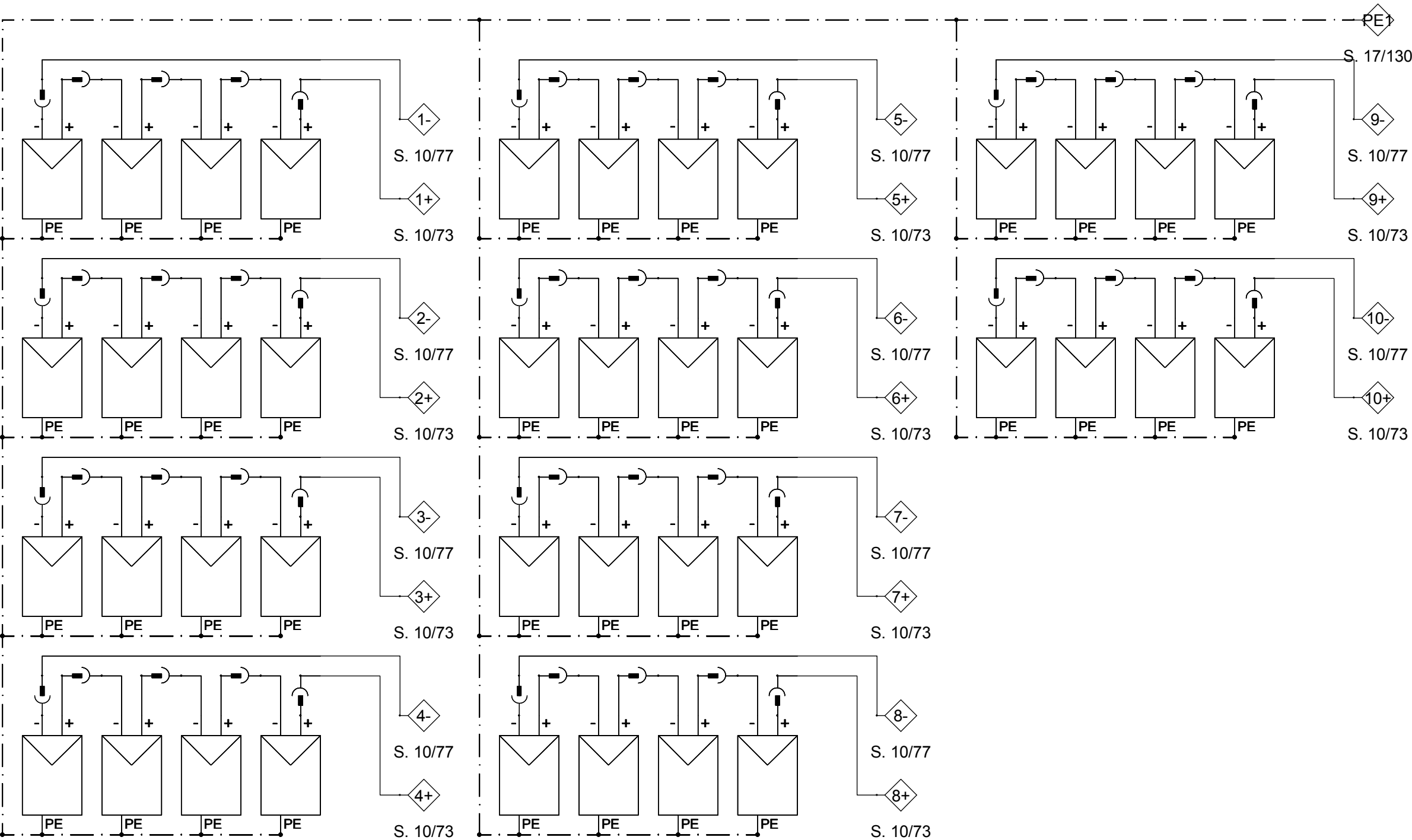
Description

DESIGN OF PV ROOF

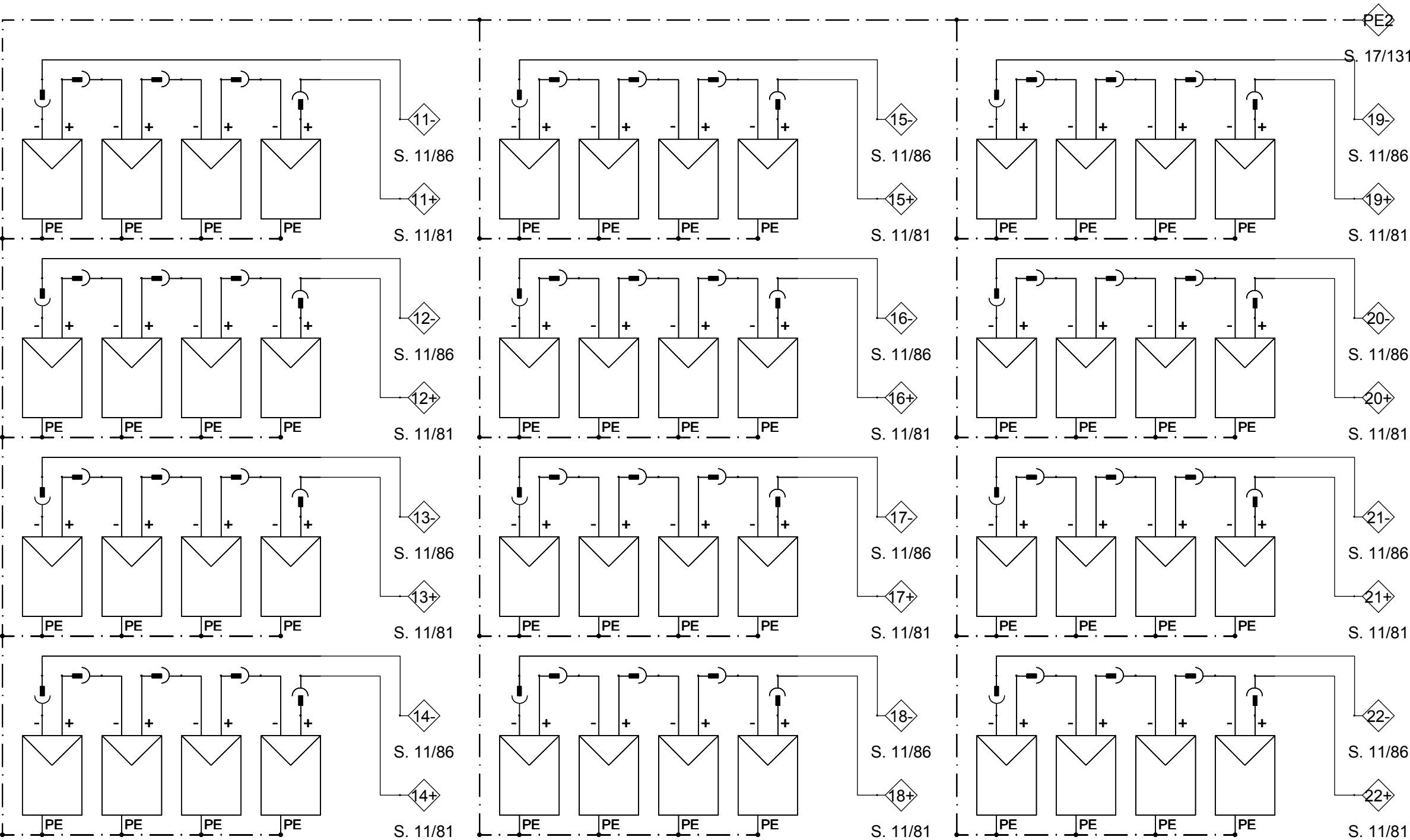
Project #Scaledwg #

P140E - 313

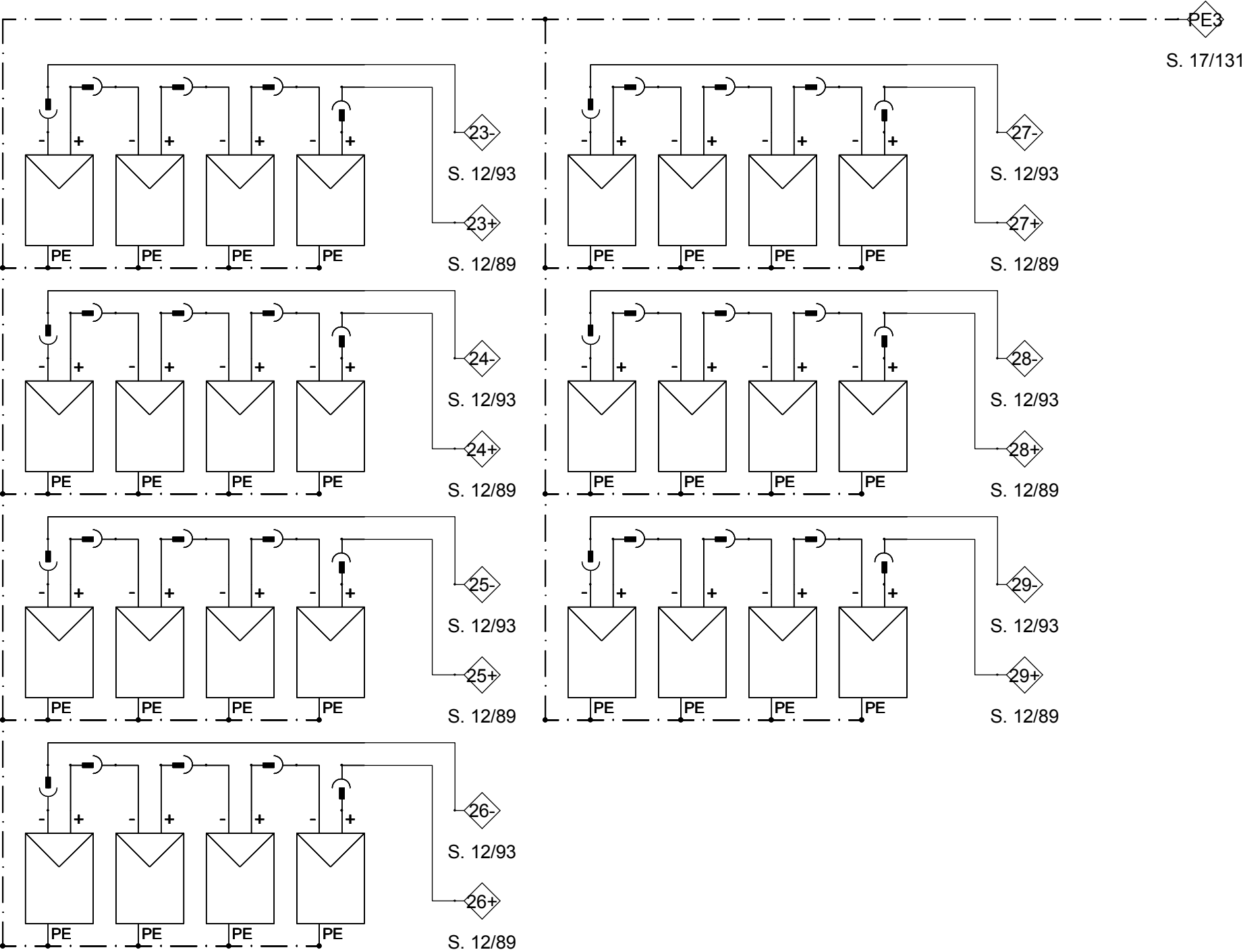
PV Generator upper facade south



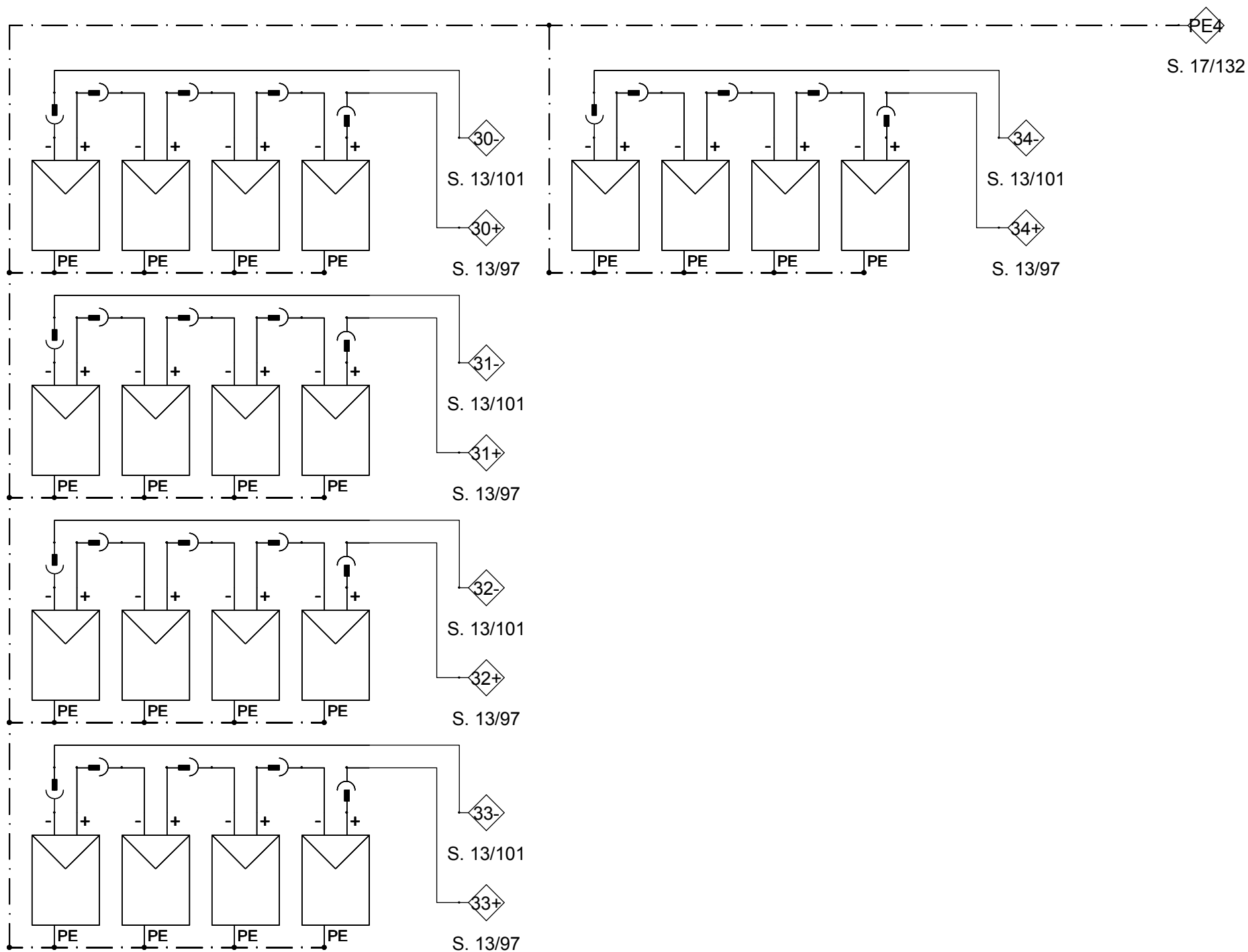
PV Generator lower facade south



PV Generator upper facade east



PV Generator lower facade east



Drawn LS, HZ, AS

Issued 05/26/09

Last index

Component

Description

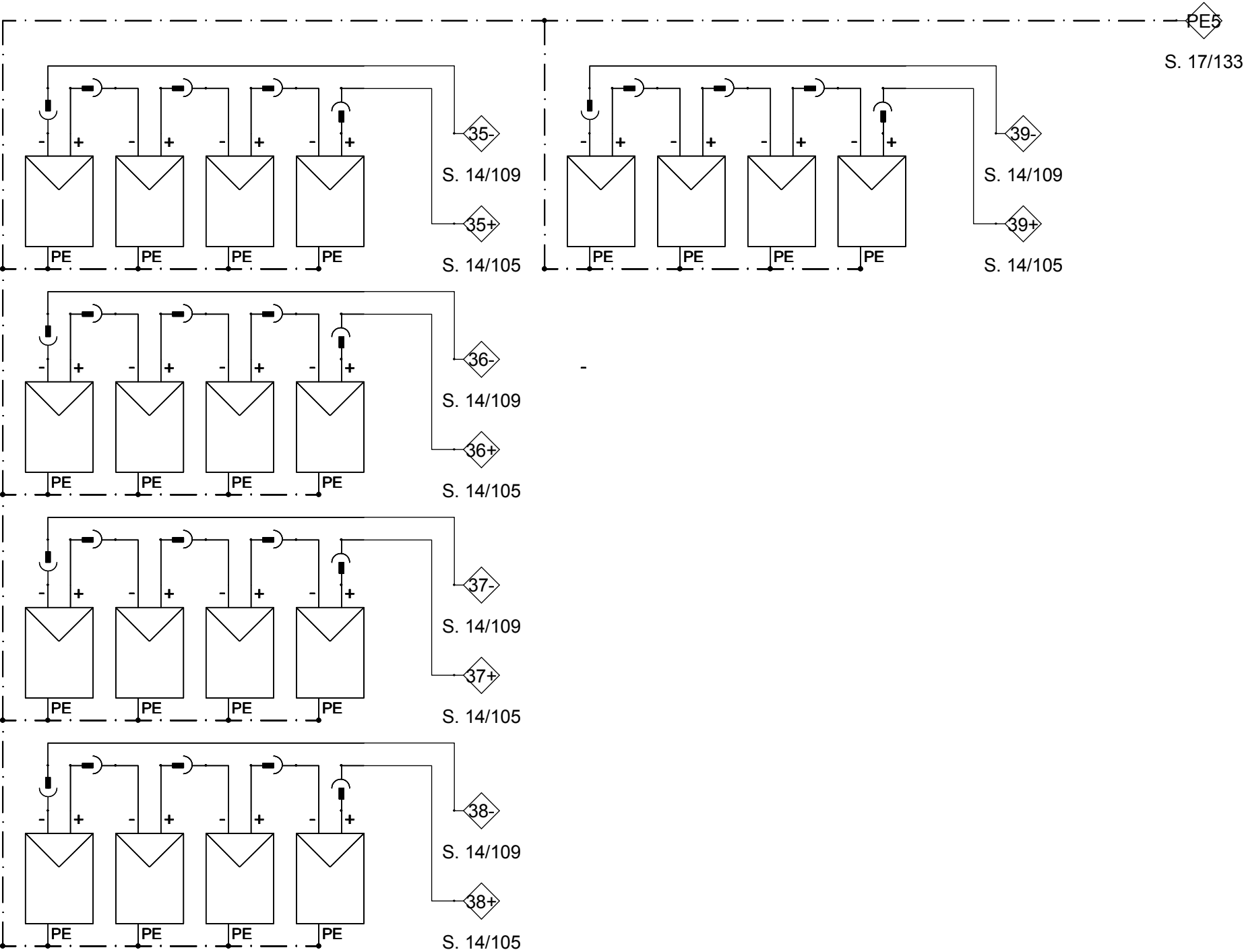
**PV INTERCONNECTION
OVERVIEW FASCADE**

Project # Scale dwg #

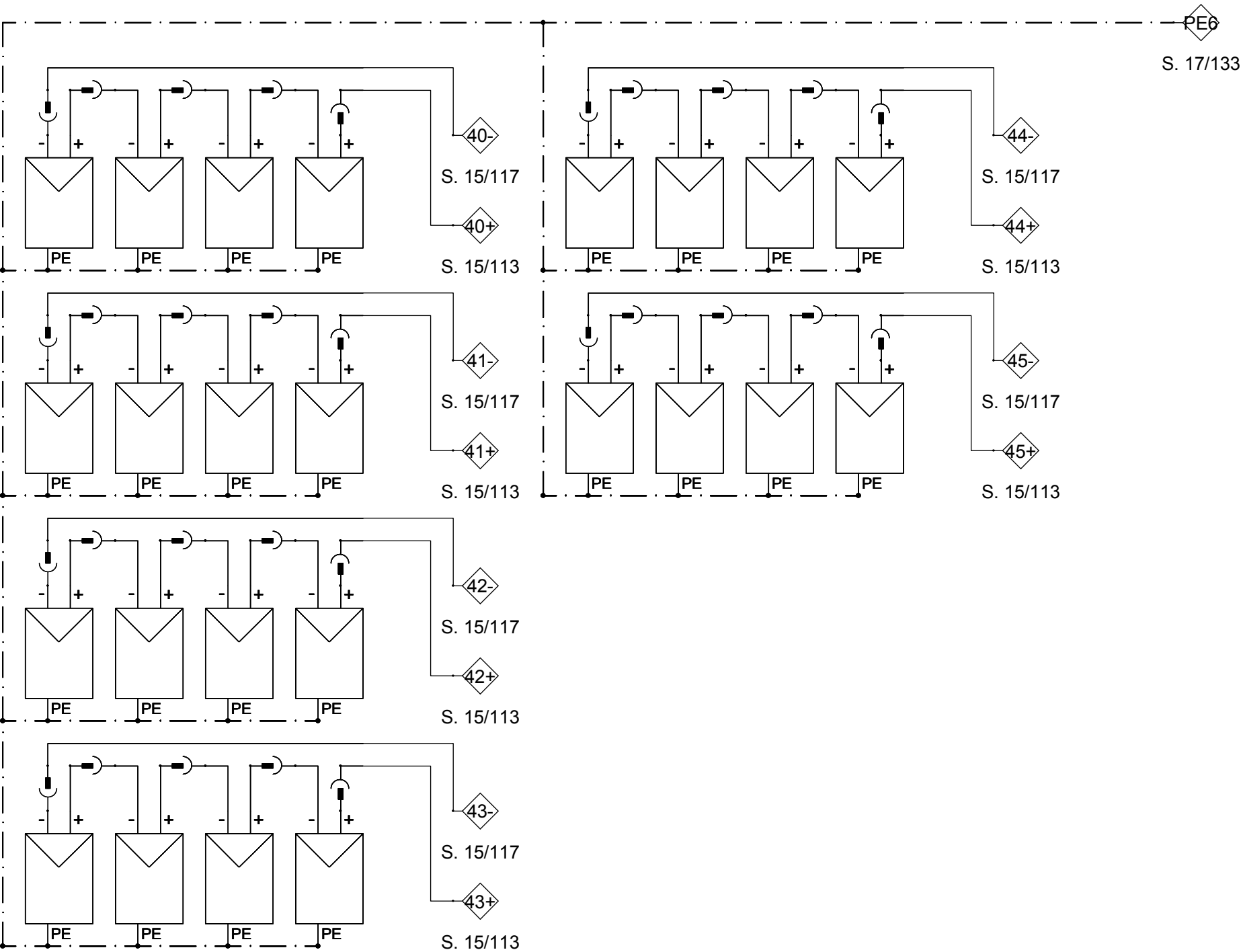
P140

E - 317

PV Generator upper facade west



PV Generator lower facade west



Drawn LS, HZ, AS

Issued 05/26/09

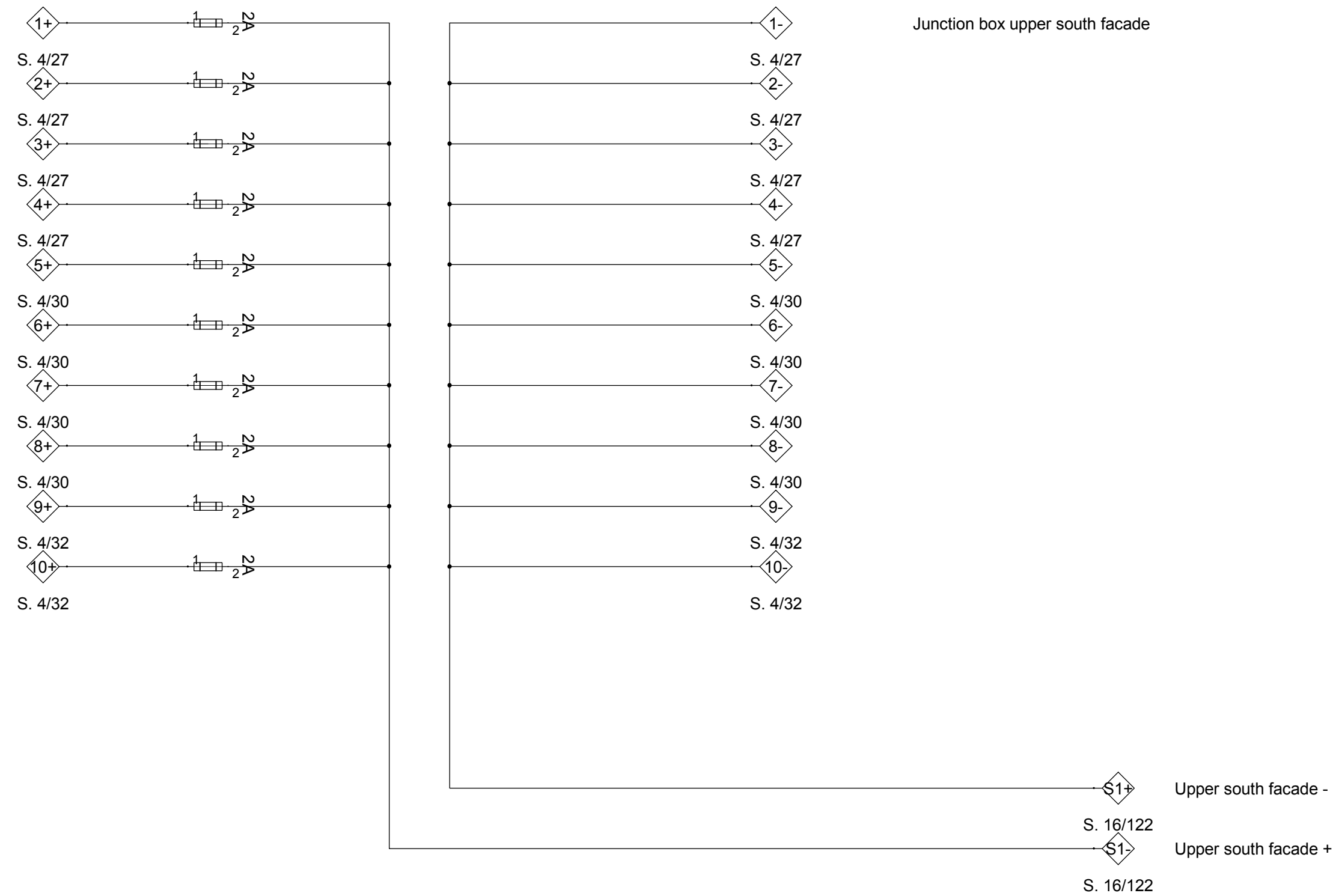
Last index

Component

Description
**PV INTERCONNECTION
OVERVIEW FASCADE**

Project # Scale dwg #

P140 **E - 319**





SOLAR DECATHLON

Project



SOLAR DECATHLON 2009



TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

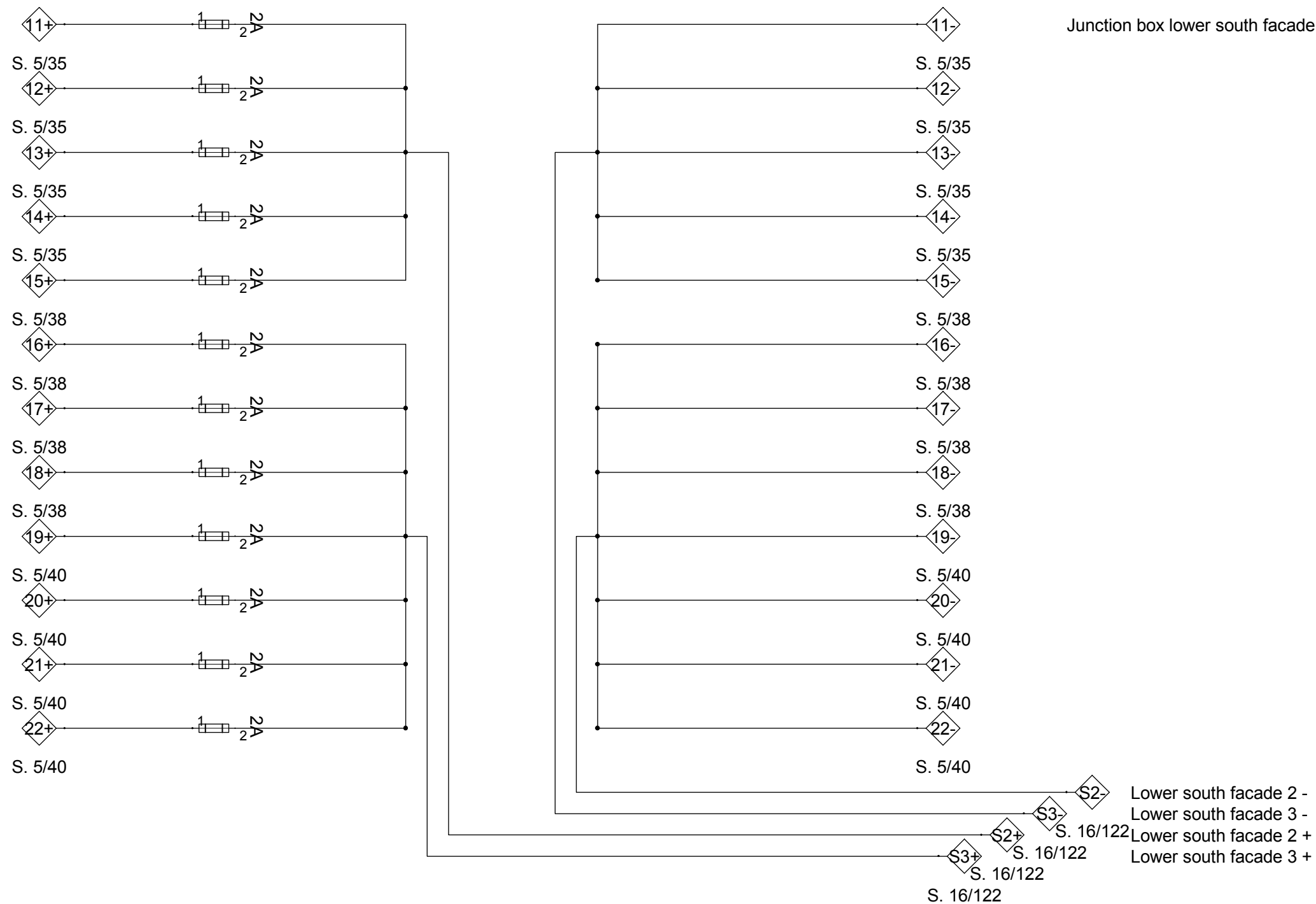
Component

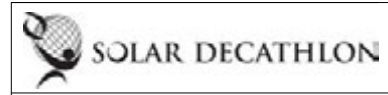
Description

**PV INTERCONNECTION
OVERVIEW FASCADE**

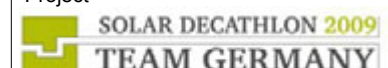
Project #Scaledwg #

P140E - 320






Project

**TEAM GERMANY**

Constructor

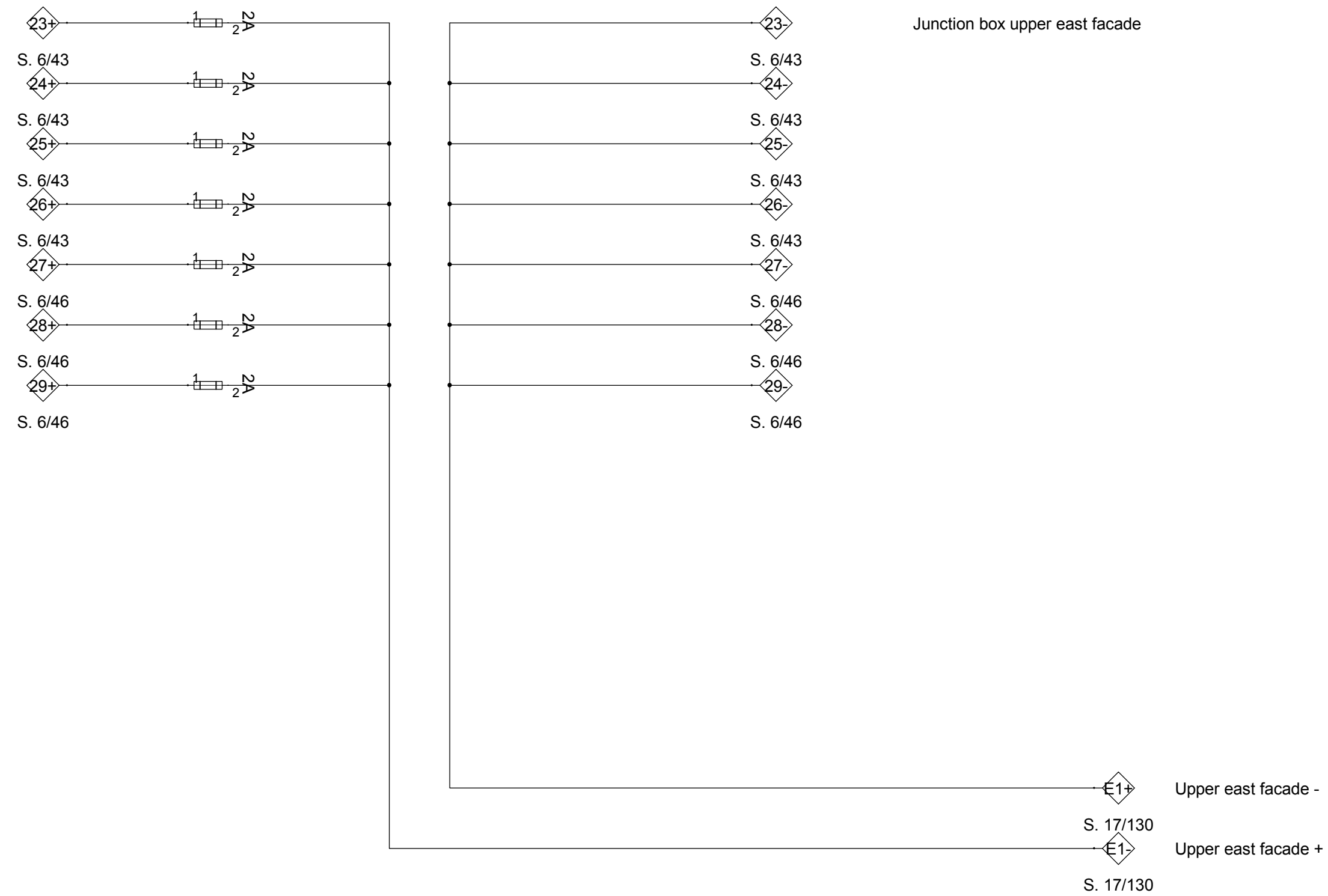
**TECHNISCHE UNIVERSITÄT DARMSTADT**

**Institute of Electrical Energy Systems
Department of Renewable Energies**

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

Drawn	LS, HZ, AS
Issued	05/26/09
Last index	
Component	
Description	PV INTERCONNECTION OVERVIEW FASCADE
Project #	P140
Scale	
dwg #	E - 321





SOLAR DECATHLON

Project



SOLAR DECATHLON 2009



TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

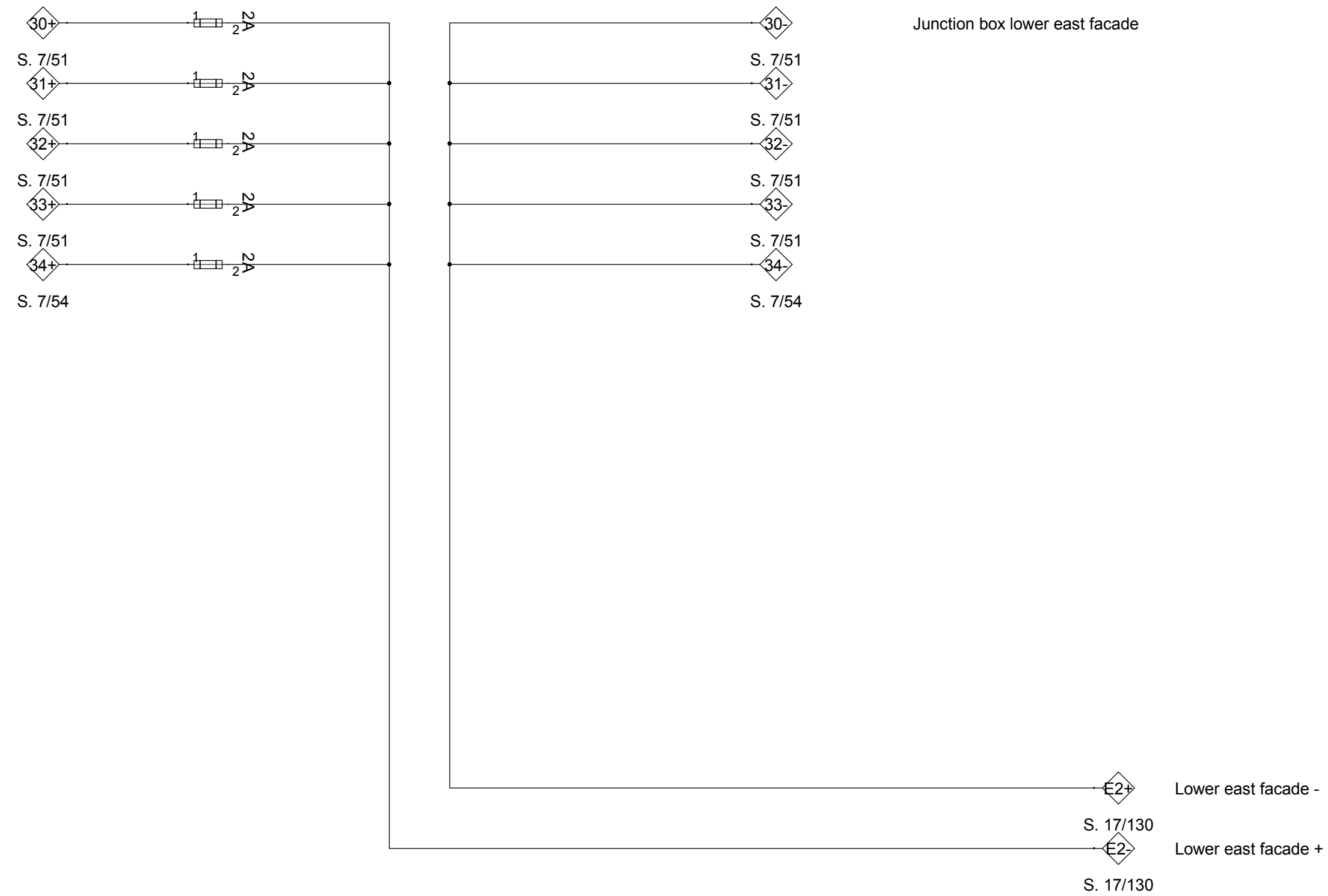
Description

**PV INTERCONNECTION
OVERVIEW FASCADE**

Project #Scaledwg #

P140

E - 322





SOLAR DECATHLON

Project



SOLAR DECATHLON 2009



TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

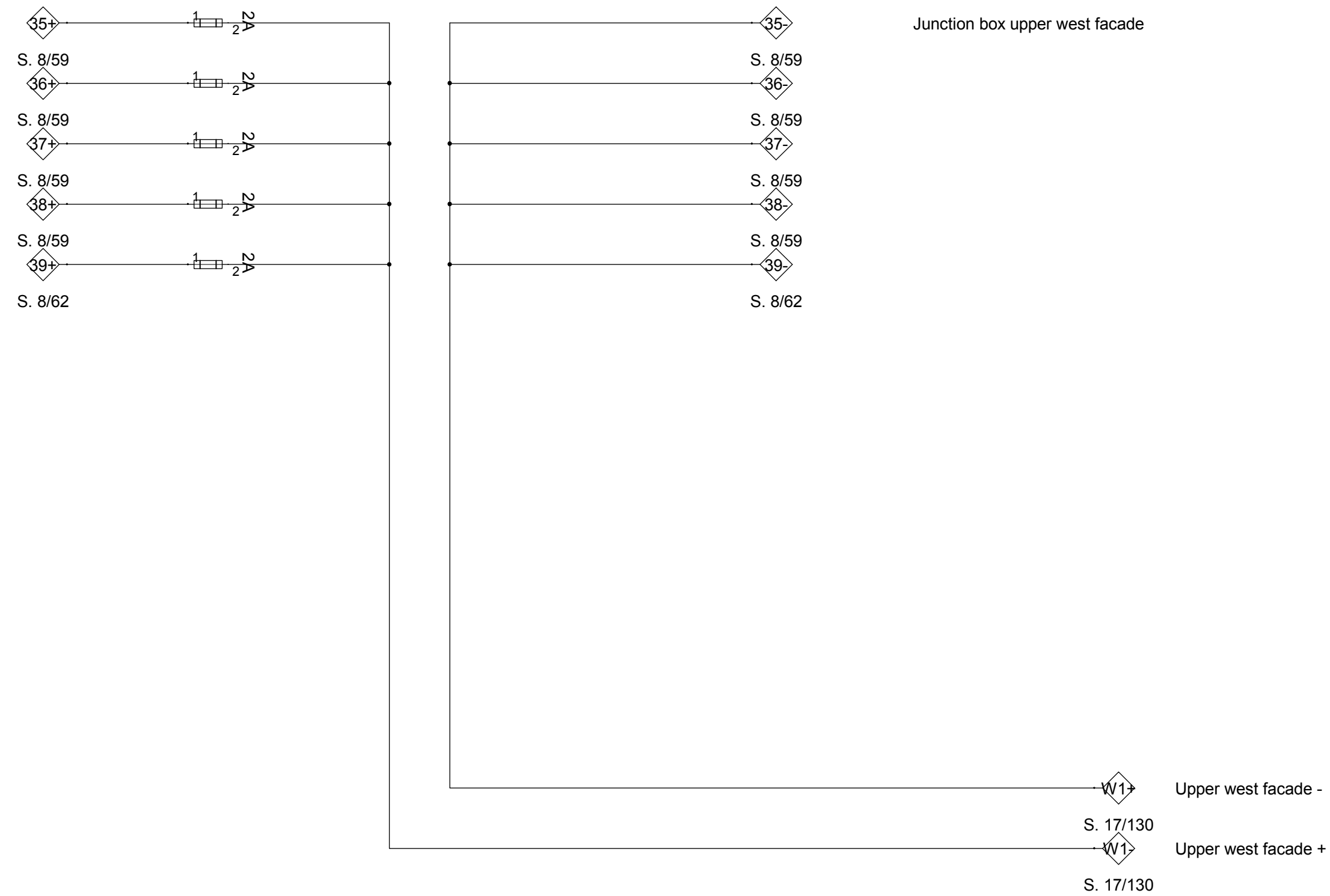
Description


**PV INTERCONNECTION
OVERVIEW FASCADE**

Project #Scaledwg #

P140


E - 323^






SOLAR DECATHLON

Project




SOLAR DECATHLON 2009



TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

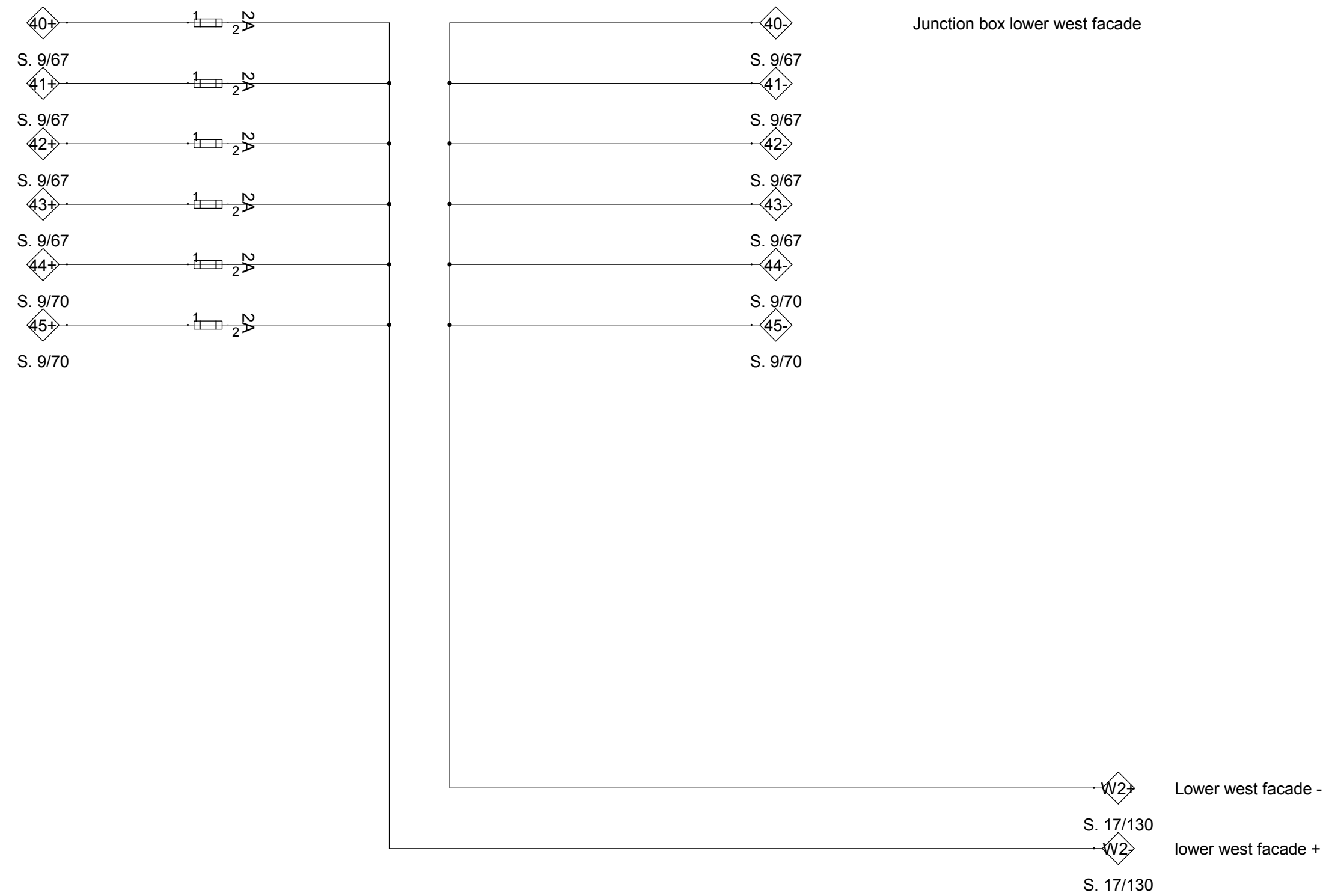
Description

**PV INTERCONNECTION
OVERVIEW FASCADE**

Project #Scaledwg #

P140

E - 324





SOLAR DECATHLON

Project



SOLAR DECATHLON 2009



TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

Description

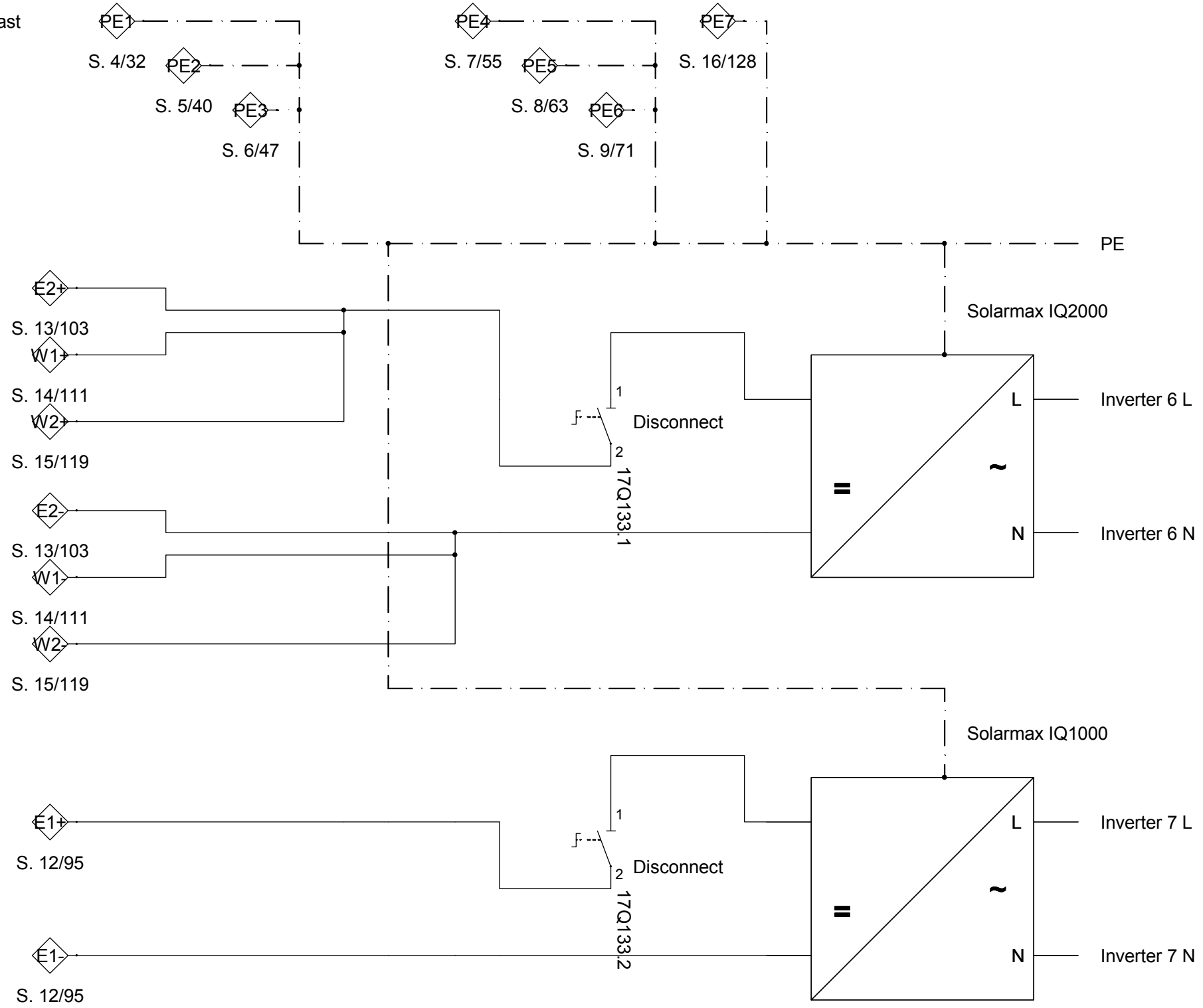
**PV INTERCONNECTION
OVERVIEW FASCADE**

Project # Scale dwg #

P140

E - 325

Inverter West + East





SOLAR DECATHLON

Project



SOLAR DECATHLON 2009
TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

Drawn

LS, HZ, AS

Issued

05/26/09

Last index

Component

Description

**PV INTERCONNECTION
OVERVIEW FASCADE**

Project #

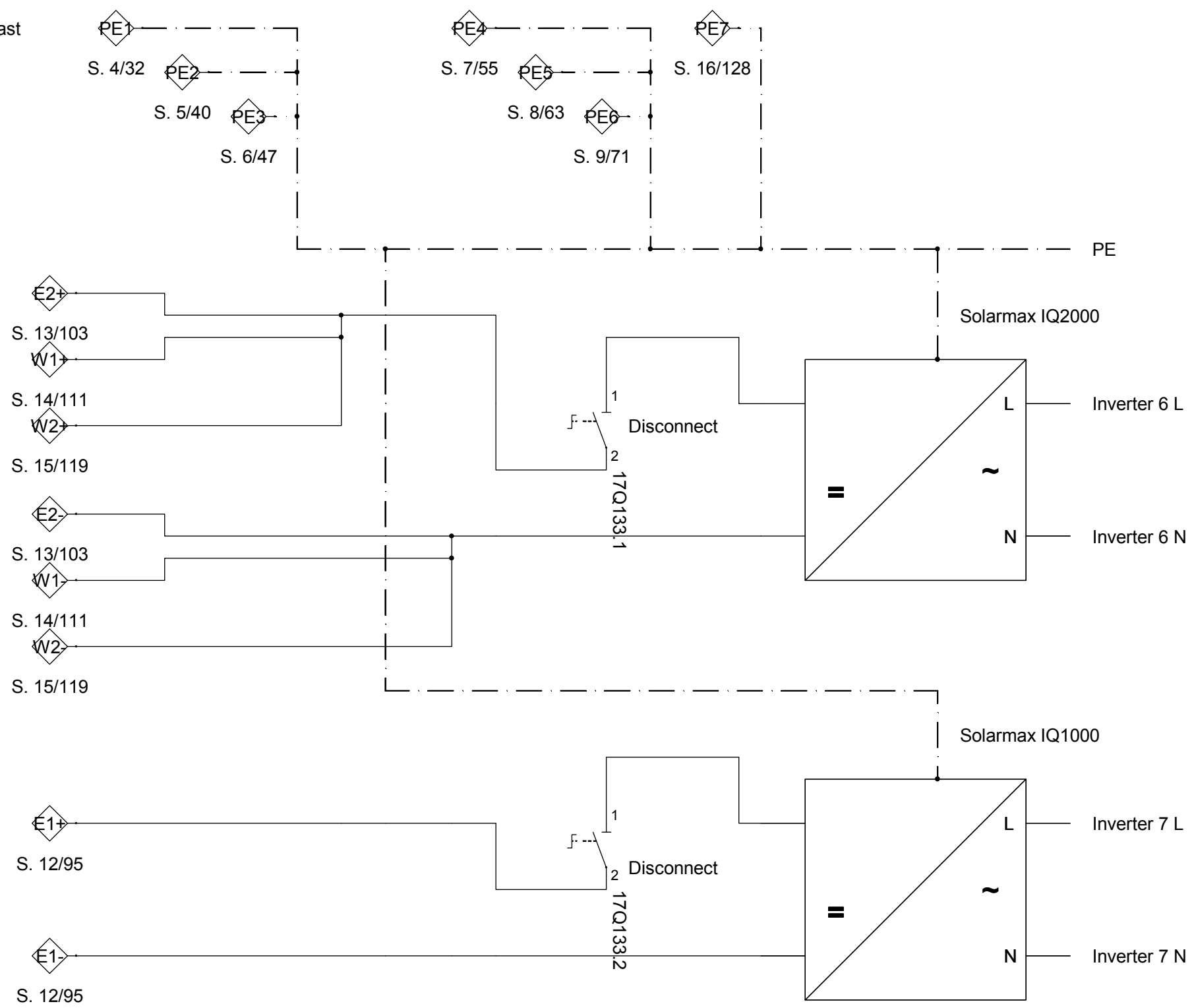
Scale

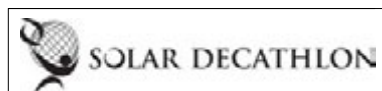
dwg #

P140

E - 326


Inverter West + East






SOLAR DECATHLON

Project



SOLAR DECATHLON 2009
TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

Drawn	LS, HZ, AS	
Issued	05/26/09	
Last index		
Component		
Description	PV INTERCONNECTION OVERVIEW FASCADE	
Project #	Scale	dwg #
P140		E - 327

Design of the façade’s photovoltaic system

1. Design of the inverters installed on the façade

The design temperature range will be $T_{\min} = -15\text{ }^{\circ}\text{C}$ (258 K) and $T_{\max} = 70\text{ }^{\circ}\text{C}$ (343 K). On the façade of Team Germany’s Solar Decathlon 2009 house Würth Solar WSG 00xx solar-panels will be installed. For detailed information on the solar-panel see the specification sheet included.

The panel’s voltage range within the MPP (Maximum Power Point) as well as its maximum open circuit voltage and maximum short circuit current can be calculated using the following equations and the given design temperature range. The temperature coefficient of the voltage would be refered to as c_v and the temperature coefficient of the current would be referd to as c_i .

$$V_{mp}(T) = c_v(T - T_{STC}) V_{oc,STC} + V_{mp,STC}$$
$$V_{oc}(T) = c_v(T - T_{STC}) V_{oc,STC} + V_{oc,STC}$$
$$I_{sc}(T) = c_i(T - T_{STC}) I_{sc,STC} + I_{sc,STC}$$

Where $T_{STC} = 25\text{ }^{\circ}\text{C}$ (298 K) would be the temperature under Standard Test Conditions (STC). Thus for the Würth Solar WSG 00xx the following results will occur.

$$V_{mp,max} = V_{mp}(T = 258\text{ K}) = 23.02\text{ V}$$
$$V_{mp,min} = V_{mp}(T = 343\text{ K}) = 16.61\text{ V}$$
$$V_{oc,max} = V_{oc}(T = 258\text{ K}) = 29.02\text{ V}$$
$$I_{sc,max} = I_{sc}(T = 343\text{ K}) = 1.87\text{ A}$$

1.1 South façade configuration

On the south façade 22 strings with 4 solar panels each will be installed. They will deliver a maximum dc power of $P_{dc,max} = 2.84\text{ kW}$. 15 strings leading to the following string voltage range, maximum open circuit voltage and maximum dc current output will be connected in parallel to the SolarMax SolarStar IQ2000 inverter.

$$V_{str,mp,max} = 4 V_{mp,max} = 92.08\text{ V}$$
$$V_{str,mp,min} = 4 V_{mp,min} = 66.44\text{ V}$$
$$V_{str,oc,max} = 4 V_{oc,max} = 116.08\text{ V}$$
$$I_{dc,max} = 15 I_{sc,max} = 28.05\text{ A}$$

Another 7 strings leading to the following string voltage range, maximum open circuit voltage and maximum dc current output will be connected in parallel to the SolarMax SolarStar IQ1000 inverter.

$$V_{str,mp,max} = 4 V_{mp,max} = 92.08\text{ V}$$
$$V_{str,mp,min} = 4 V_{mp,min} = 66.44\text{ V}$$
$$V_{str,oc,max} = 4 V_{oc,max} = 116.08\text{ V}$$
$$I_{dc,max} = 7 I_{sc,max} = 13.09\text{ A}$$

Since the voltage range for MPP-Tracking, the maximum input dc voltage and maximum input dc current won’t be exceeded, the system should work properly under the given temperature conditions.

1.2 West and east façade configuration

A total of 11 strings having 4 modules each will be installed on the west façade. On the east M façade 12 strings having 4 modules each will be installed. Both, the west and the east façade M strings will be distributed among one SolarMax SolarStar IQ2000 and one SolarMax SolarStar M IQ1000 inverter. M

16 strings will be interconnected with the IQ2000 leading to the following string voltage range, M maximum open circuit voltage and maximum dc current output. M

$$V_{str,mp,max} = 4 V_{mp,max} = 92.08\text{ V}$$
$$V_{str,mp,min} = 4 V_{mp,min} = 66.44\text{ V}$$
$$V_{str,oc,max} = 4 V_{oc,max} = 116.08\text{ V}$$
$$I_{dc,max} = 16 I_{sc,max} = 29.92\text{ A}$$

7 strings will be interconnected with the IQ1000. The following string voltage range, maximum open circuit voltage and maximum dc output current will occur.

$$V_{str,mp,max} = 4 V_{mp,max} = 92.08\text{ V}$$
$$V_{str,mp,min} = 4 V_{mp,min} = 66.44\text{ V}$$
$$V_{str,oc,max} = 4 V_{oc,max} = 116.08\text{ V}$$
$$I_{dc,max} = 7 I_{sc,max} = 13.09\text{ A}$$

Since the voltage range for MPP-Tracking, the maximum input dc voltage and maximum input dc current won’t be exceeded, the additional string of 4 panels should work properly under the given temperature conditions.

2. Wiring of the façade’s photovoltaic configuration

In general copper wire having a sectional area of $A_{CU} = 4\text{ mm}^2$ will be used for the connection of the strings to the inverter as well as for the interconnection between the solar panels.

2.1 South façade wiring

Two dc wires are necessary to connect 10 strings of the south façade to its IQ2000 inverter delivering a maximum power of $P_{dc,max} = 1292\text{ W}$. The maximum length of each wire should not exceed $l_{max} = 20\text{ m}$. Since the specific resistivity of the wires would be $\rho = 1.81 \times 10^{-8}\text{ }\Omega\text{m}$, the overall resistance of one wire could be calculated as follows.

$$R_{CU} = 0.09\text{ }\Omega$$

The following maximum current will flow through each dc wire, while a maximum dc power of $P_{dc,max} = 1938\text{ W}$ is being provided.

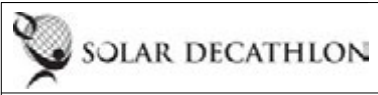
$$I_{dc,max} = \frac{P_{dc,max}}{V_{str,mp,max}} = 14.03\text{ A}$$

Thus the voltage drop and power loss on one wire would be:


$$\Delta V = I_{dc,max} R_{CU} = 1.26\text{ V}$$
$$P_{loss} = \Delta V I_{dc,max} = 17.68\text{ W}$$

For the south and the north roof configuration together this would lead to a power loss of


$$P_{loss,south,façade\ 1} = 2 P_{loss} = 35.36\text{ W}$$



Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

Description

DESIGN OF PV
FASCADE

Project # Scale dwg #
P140E - 328

The following maximum current will flow through each dc wire, while a maximum dc power of M $P_{dc,max} = 1938 \text{ W}$ is being provided. M

Thus the voltage drop and power loss on one wire would be:

For the south and the north roof configuration together this would lead to a power loss of

The following maximum current will flow through each dc wire, while a maximum dc power of M $P_{dc,max} = 1938 \text{ W}$ is being provided. M

Thus the voltage drop and power loss on one wire would be:

For the south and the north roof configuration together this would lead to a power loss of

Thus there will be a total maximum power loss on the wires for the south façade of

That would be in an acceptable range.

The following maximum current will flow through each dc wire, while a maximum dc power of M $P_{dc,max} = 1938 \text{ W}$ is being provided. M

Thus the voltage drop and power loss on one wire would be:

Thus the wiring of the four additional panels would lead to a power loss of

The following maximum current will flow through each dc wire, while a maximum dc power of M $P_{dc,max} = 1938 \text{ W}$ is being provided. M

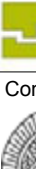
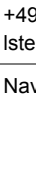

Thus the voltage drop and power loss on one wire would be:

Thus the wiring of the four additional panels would lead to a power loss of

The following maximum current will flow through each dc wire, while a maximum dc power of M $P_{dc,max} = 1938 \text{ W}$ is being provided. M

Thus the voltage drop and power loss on one wire would be:

Thus the wiring of the four additional panels would lead to a power loss of

 SOLAR DECATHLON		
Project  SOLAR DECATHLON 2009 TEAM GERMANY		
Constructor  TECHNISCHE UNIVERSITÄT DARMSTADT Institute of Electrical Energy Systems Department of Renewable Energies Landgraf-Georg-Straße 4 64283 Darmstadt +49 (0) 6151 / 16 2367 +49 (0) 6151 / 16 6074 lsteiner@re.tu-darmstadt.de		
Navigation		
<div></div>		
Drawn	LS, HZ, AS	
Issued	05/26/09	
Last index		
Component		
Description DESIGN OF PV FASCADE		
Project #	Scale	dwg #
P140		E - 329

The following maximum current will flow through each dc wire, while a maximum dc power of M $P_{dc,max} = 1938 \text{ W}$ is being provided. M

Thus the voltage drop and power loss on one wire would be:

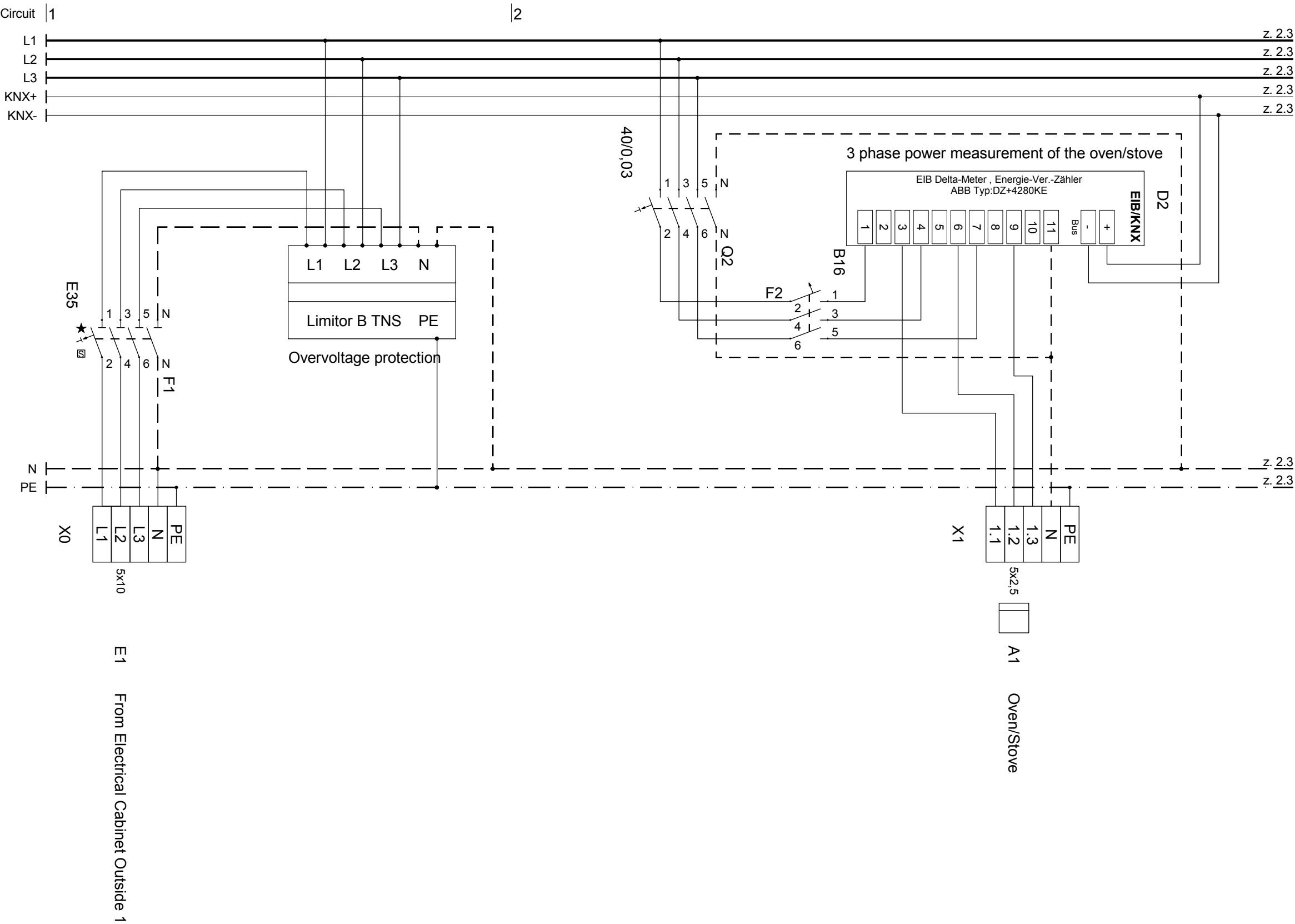
Thus the wiring of the four additional panels would lead to a power loss of

2.3 Overall maximum power loss through dc wiring for the façade

Following the calculations above, the overall power loss will add up to $P_{\text{loss,dc}} = 109.24 \text{ W}$.

In general copper wire having a sectional area of $A_{Cu} = 4 \text{ mm}^2$ (similar to an AWG 12 wire) will be used for the connection of the strings to the inverters as well as for the interconnection between the solar panels on the façade.

Since the strings will be connected in parallel before being connected to the inverters it has to carry a larger current in this particular region. Thus the parallel connection will be made in a shaded place near the inverters where the ambient temperature is less than $T = 40\text{ }^{\circ}\text{C}$ and thus the wire is able to carry a current of $I = 29.58\text{ A}$.





SOLAR DECATHLON

Project



SOLAR DECATHLON 2009



TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

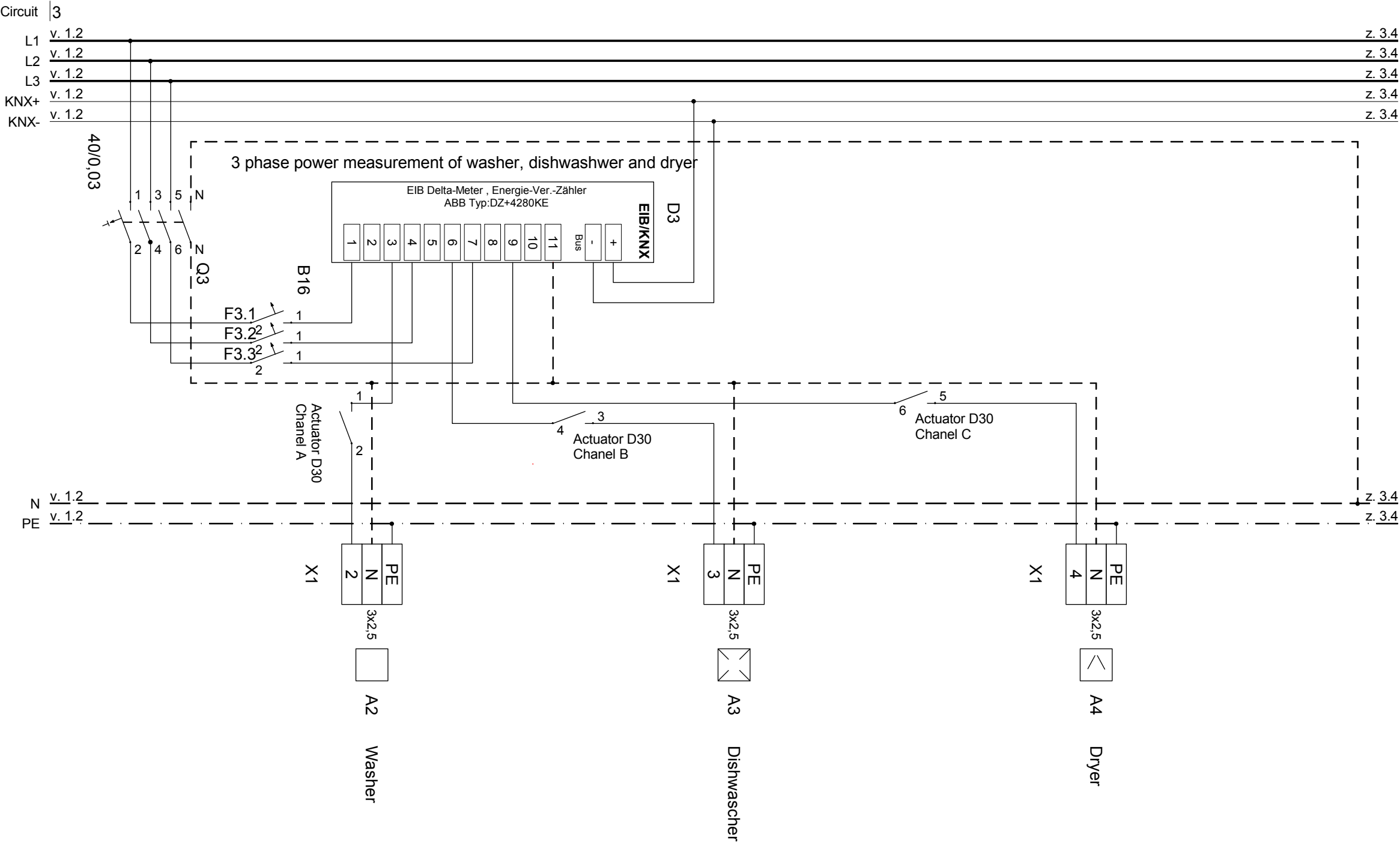
Description

**ELECTRICAL CABINET
INSIDE**

Project #Scaledwg #

P140

E - 401



Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

Drawn LS, HZ, AS

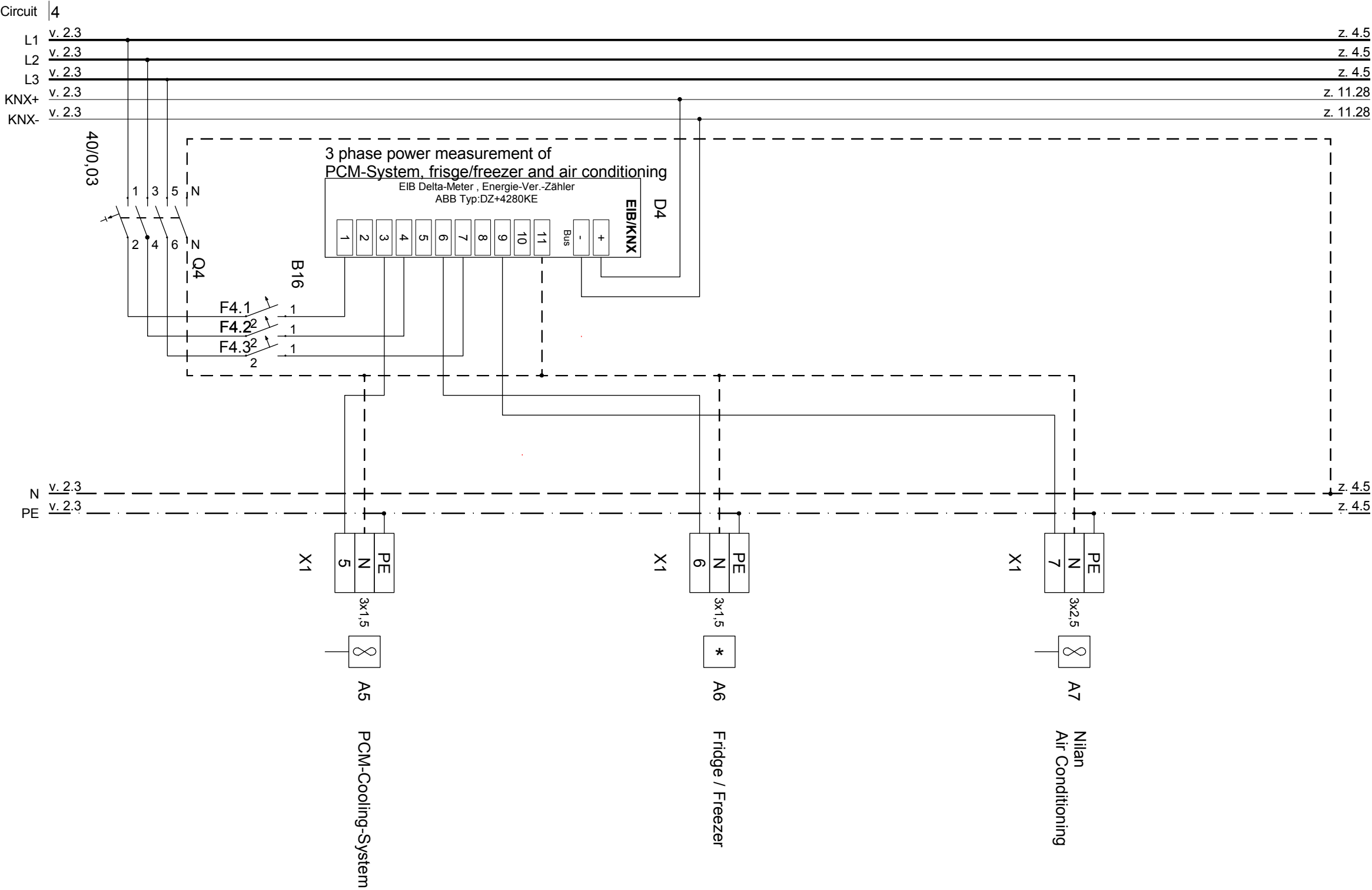
Issued 05/26/09

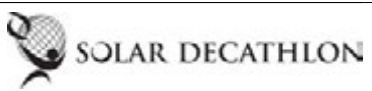
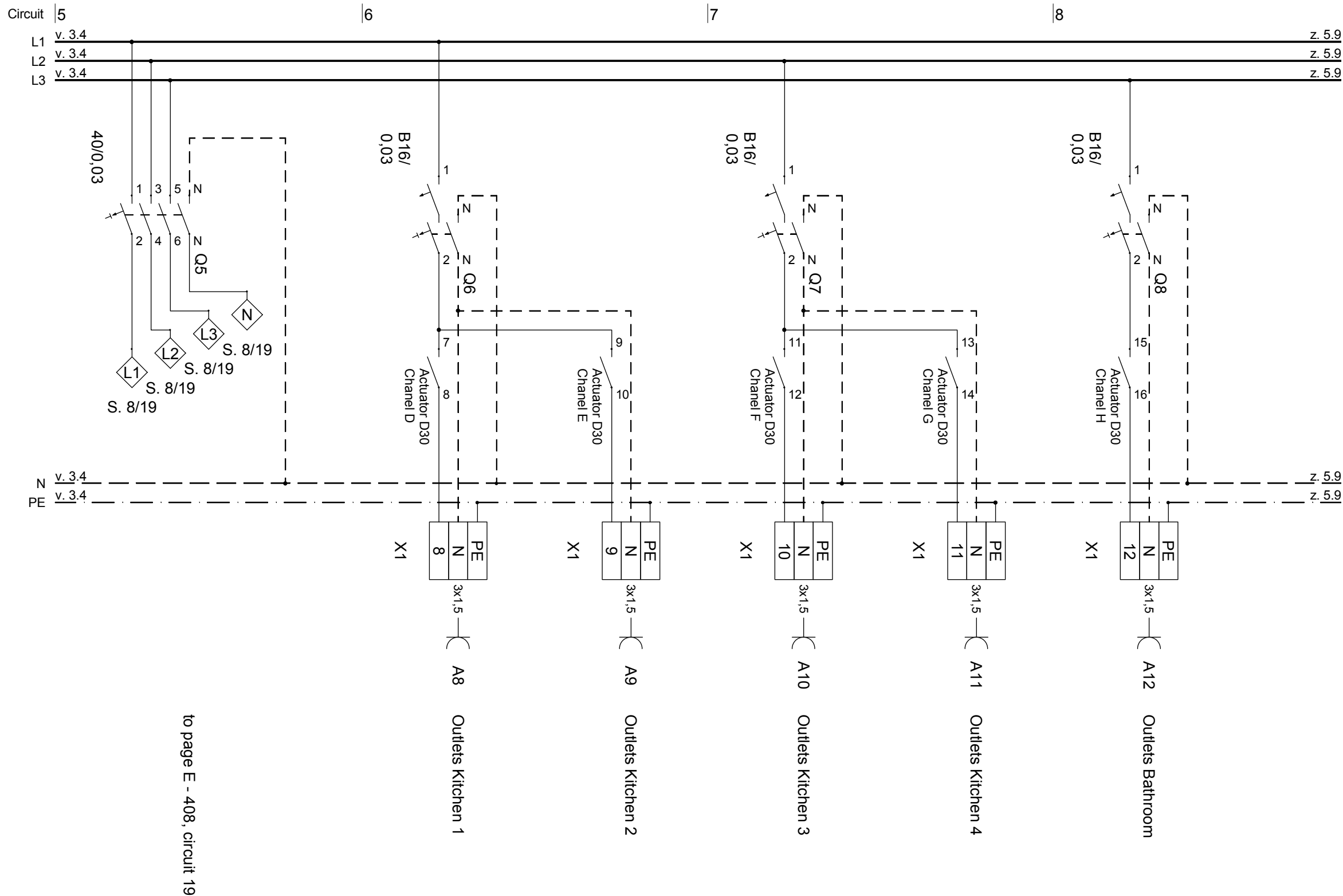
Last index

Component

Description
**ELECTRICAL CABINET
INSIDE**

Project # Scale dwg #
P140 **E - 402**





Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

Drawn LS, HZ, AS

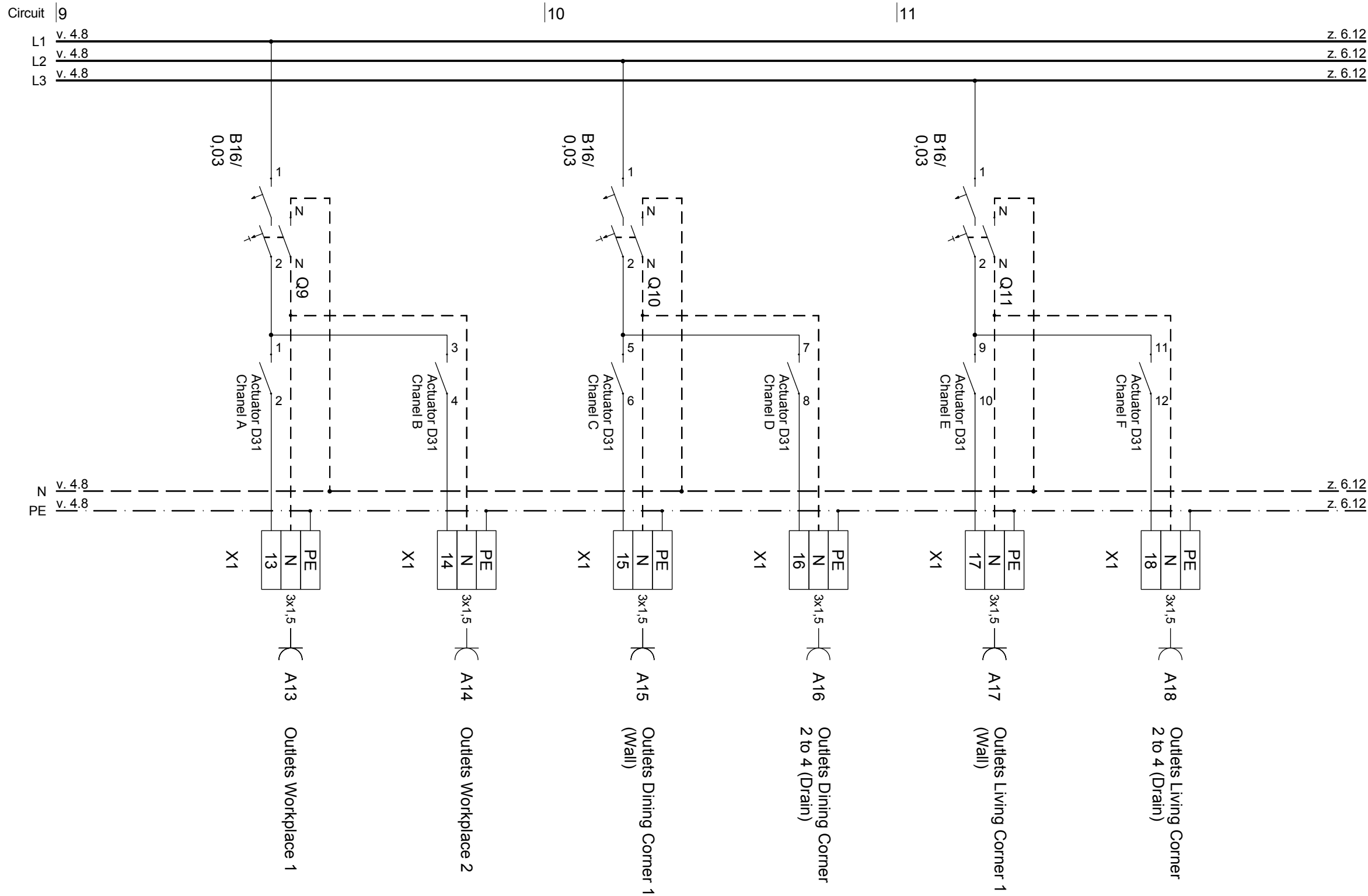
Issued 05/26/09

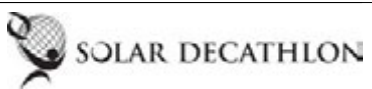
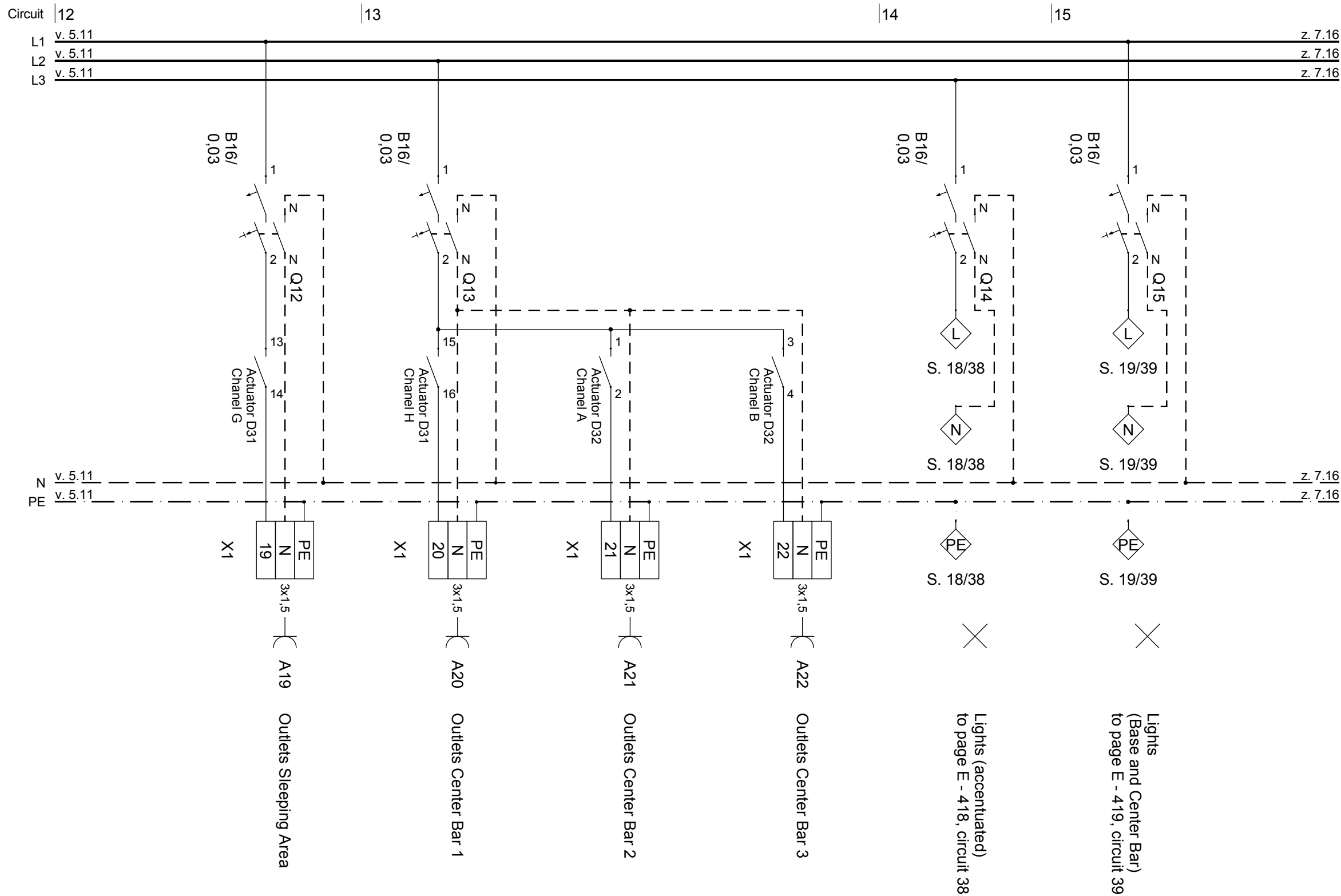
Last index

Component

Description
ELECTRICAL CABINET
INSIDE

Project # Scale dwg #
P140 E - 404





Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

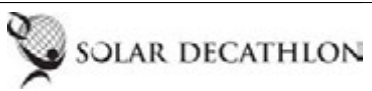
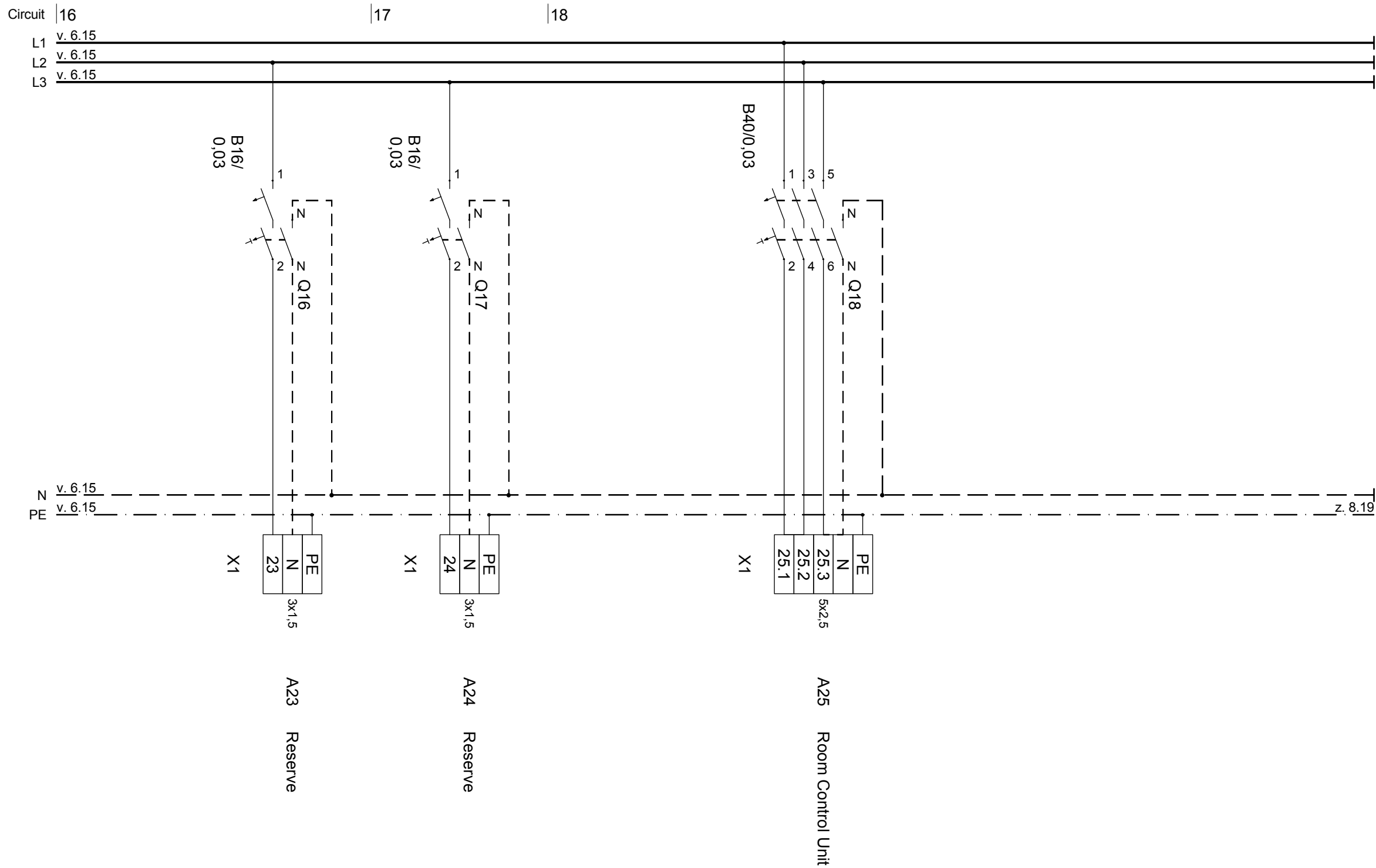
Navigation

Drawn LS, HZ, AS
Issued 05/26/09
Last index

Component

Description
**ELECTRICAL CABINET
INSIDE**

Project # Scale dwg #
P140 **E - 406**



Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

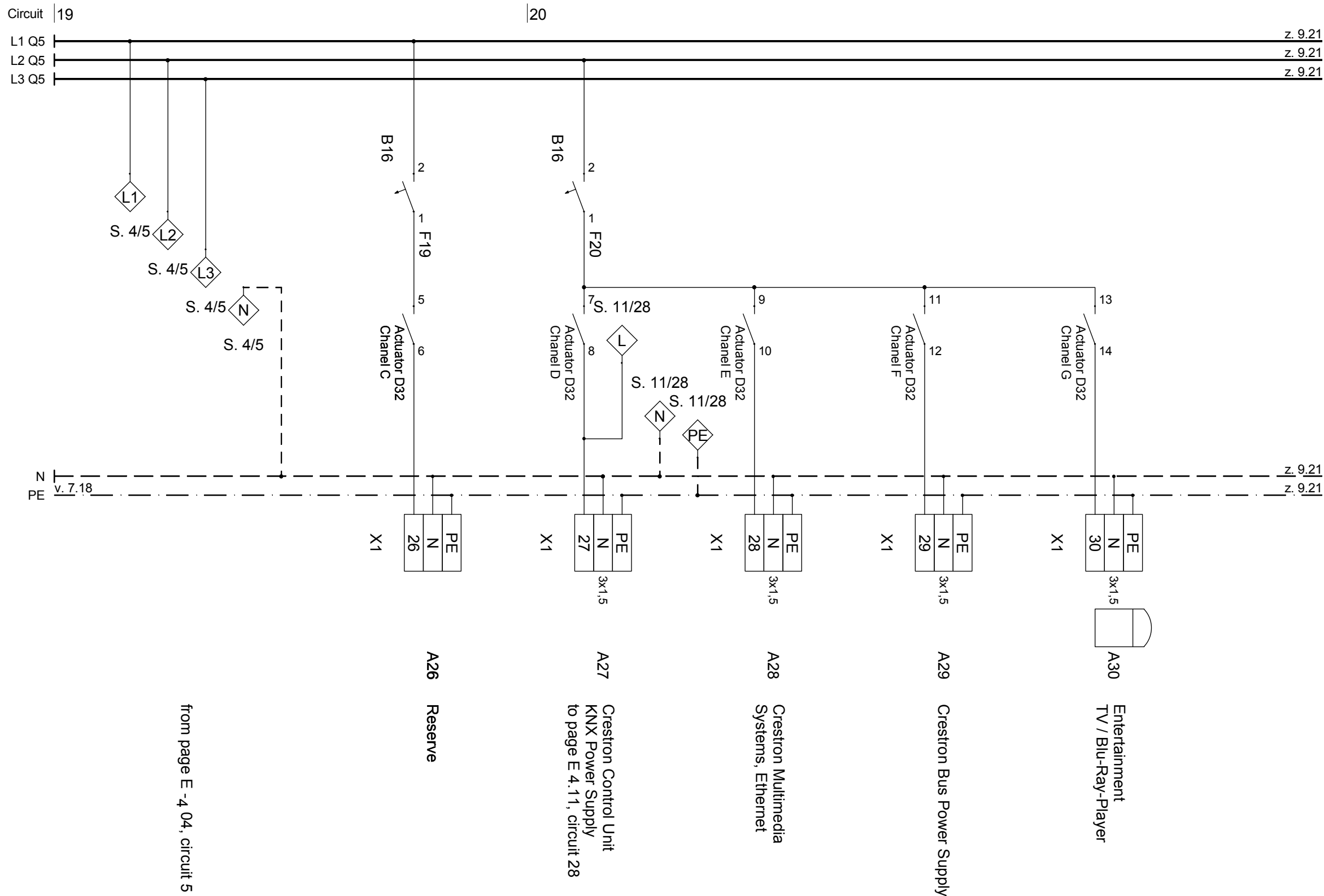
Navigation

Drawn LS, HZ, AS
Issued 05/26/09
Last index

Component

Description
ELECTRICAL CABINET
INSIDE

Project # Scale dwg #
P140 E - 407





SOLAR DECATHLON

Project



SOLAR DECATHLON 2009
TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

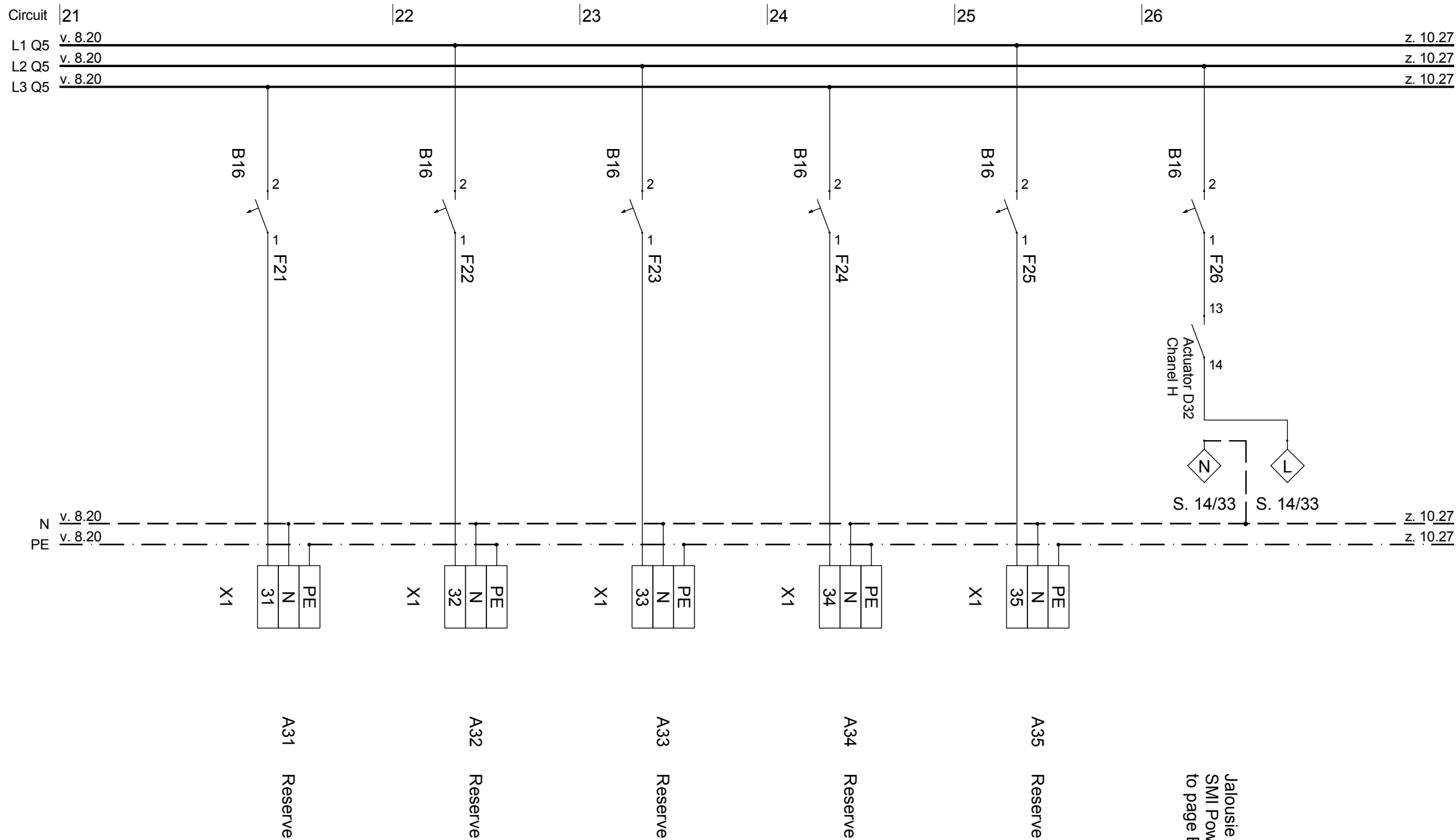
Description

ELECTRICAL CABINET
INSIDE

Project #Scale


dwg #


P140E - 408



Jalousie Control 1
SMI Power Supply
to page E - 414, circuit 33



Project

Constructor

Institute of Electrical Energy Systems

Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

Description

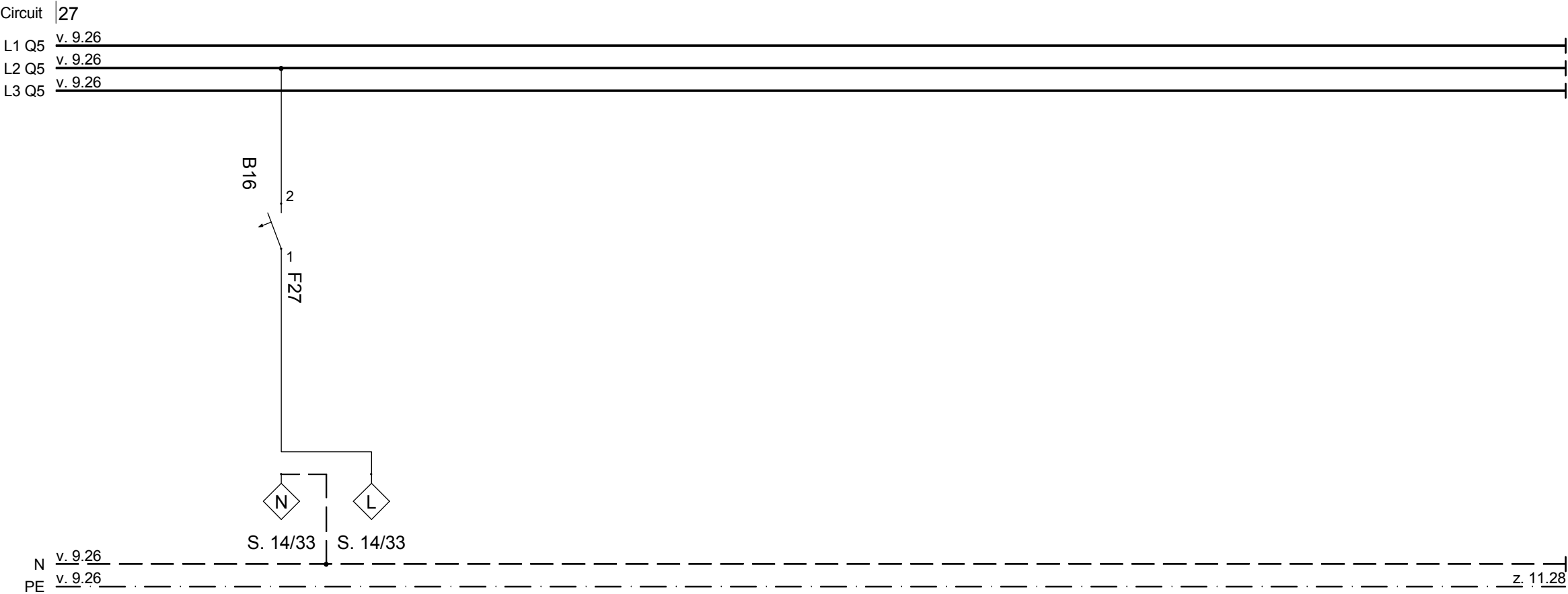
ELECTRICAL CABINET

INSIDE


Project #Scale

dwg #

P140E - 409



Jalousie Control 2
to page E - 414, circuit 33


 SOLAR DECATHLON

Project

 SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

 TECHNISCHE UNIVERSITÄT DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

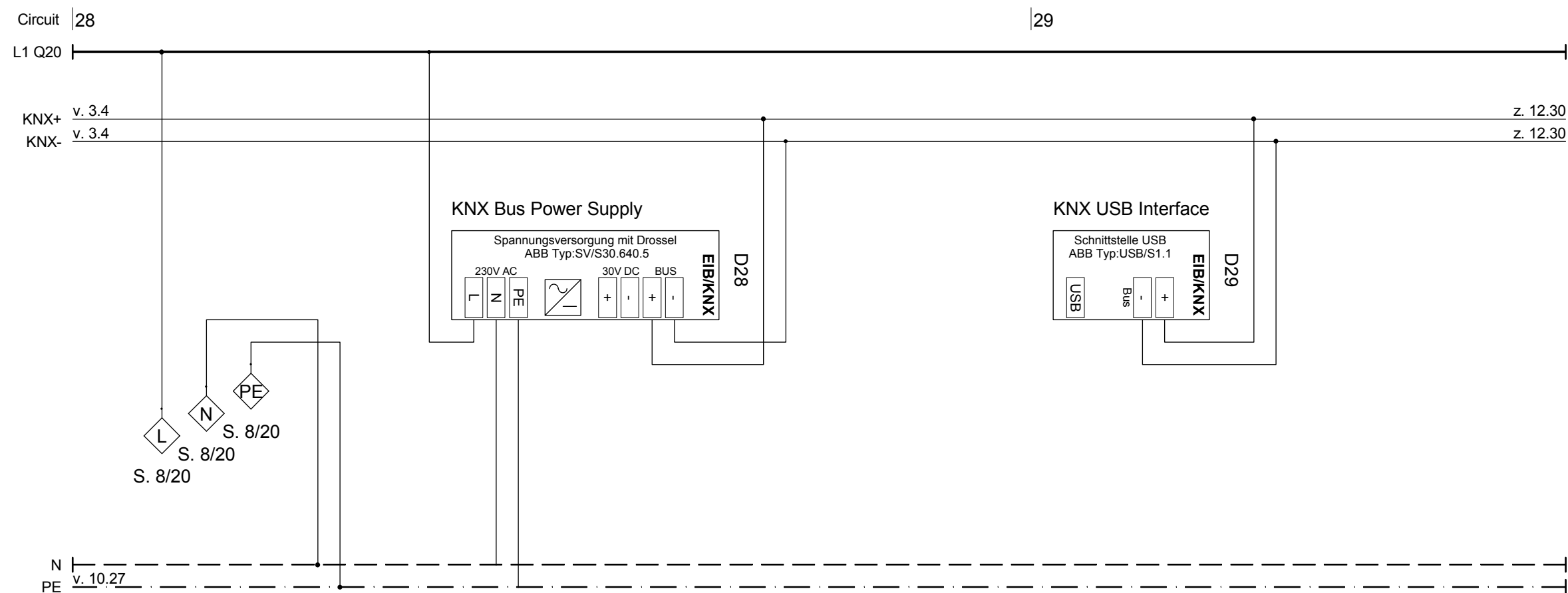
Component

Description


ELECTRICAL CABINET INSIDE

Project #Scaledwg #


P140E - 410



from page E - 408, circuit 20


 SOLAR DECATHLON

Project

 SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

 TECHNISCHE UNIVERSITÄT DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

Description

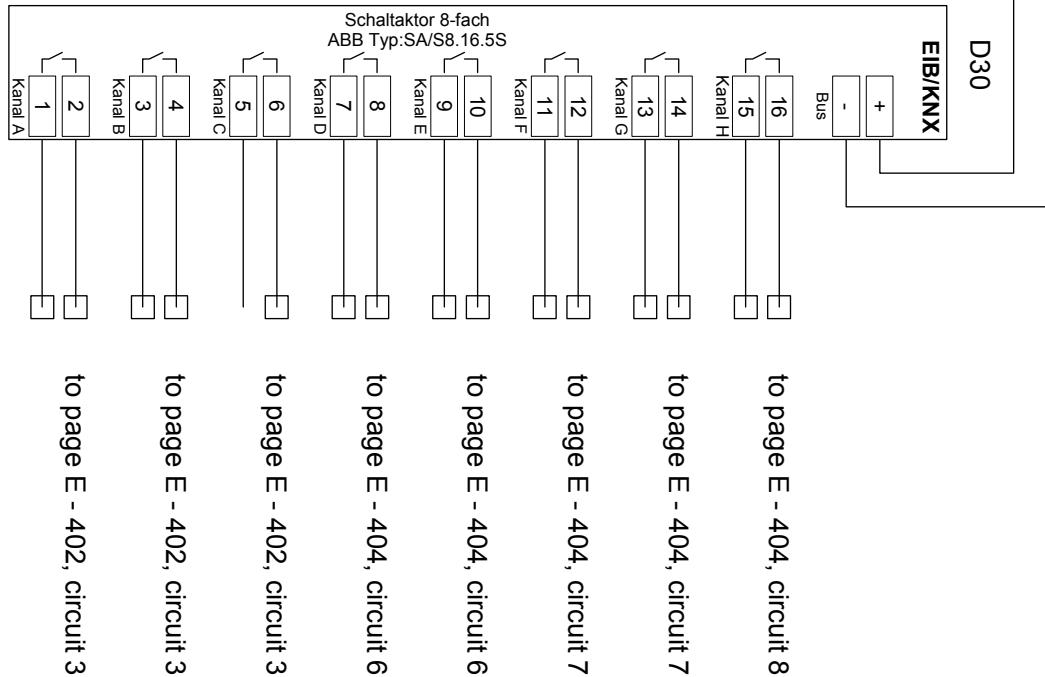
ELECTRICAL CABINET INSIDE

Project #Scaledwg #

P140E - 411

KNX+ v. 11.29
KNX- v. 11.29

KNX Switching Actuator (8 relais, 16 A each)



z. 13.32
z. 13.32

KNX Switching Actuator (8 relais, 16 A each)





SOLAR DECATHLON

Project



SOLAR DECATHLON 2009
TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

Description

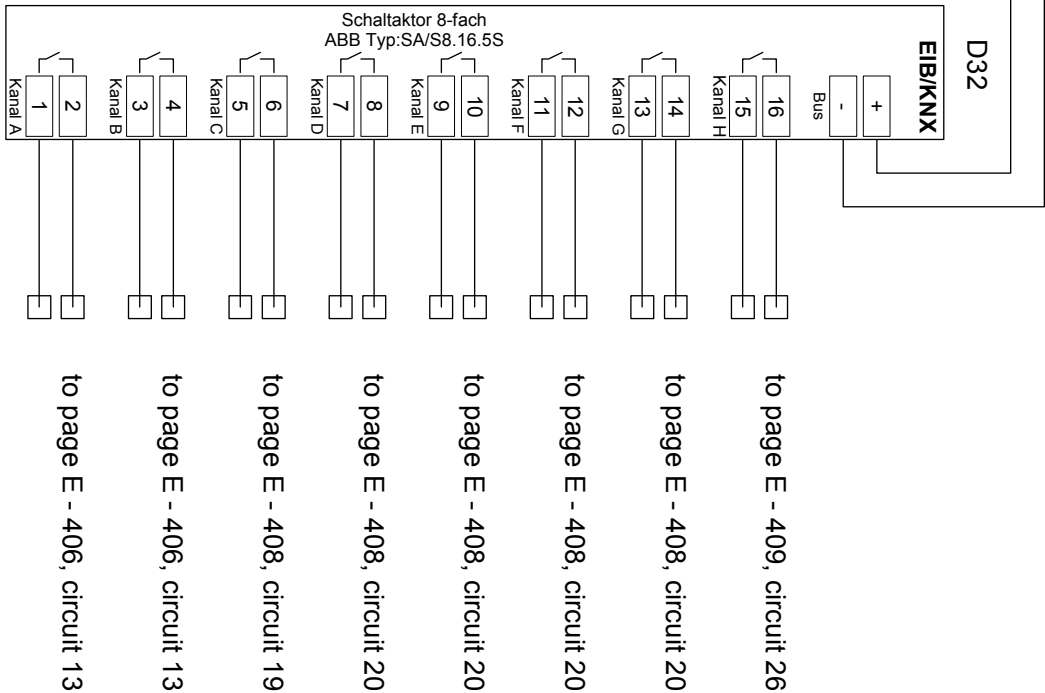
**ELECTRICAL CABINET
INSIDE**

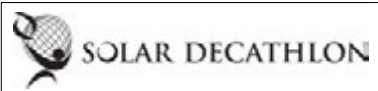
Project # Scale dwg #

P140E - 412

KNX+	v. 12.31	z. 14.33
KNX-	v. 12.31	z. 14.33


KNX Switching Actuator (8 relais, 16 A each)





SOLAR DECATHLON

Project



SOLAR DECATHLON 2009
TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

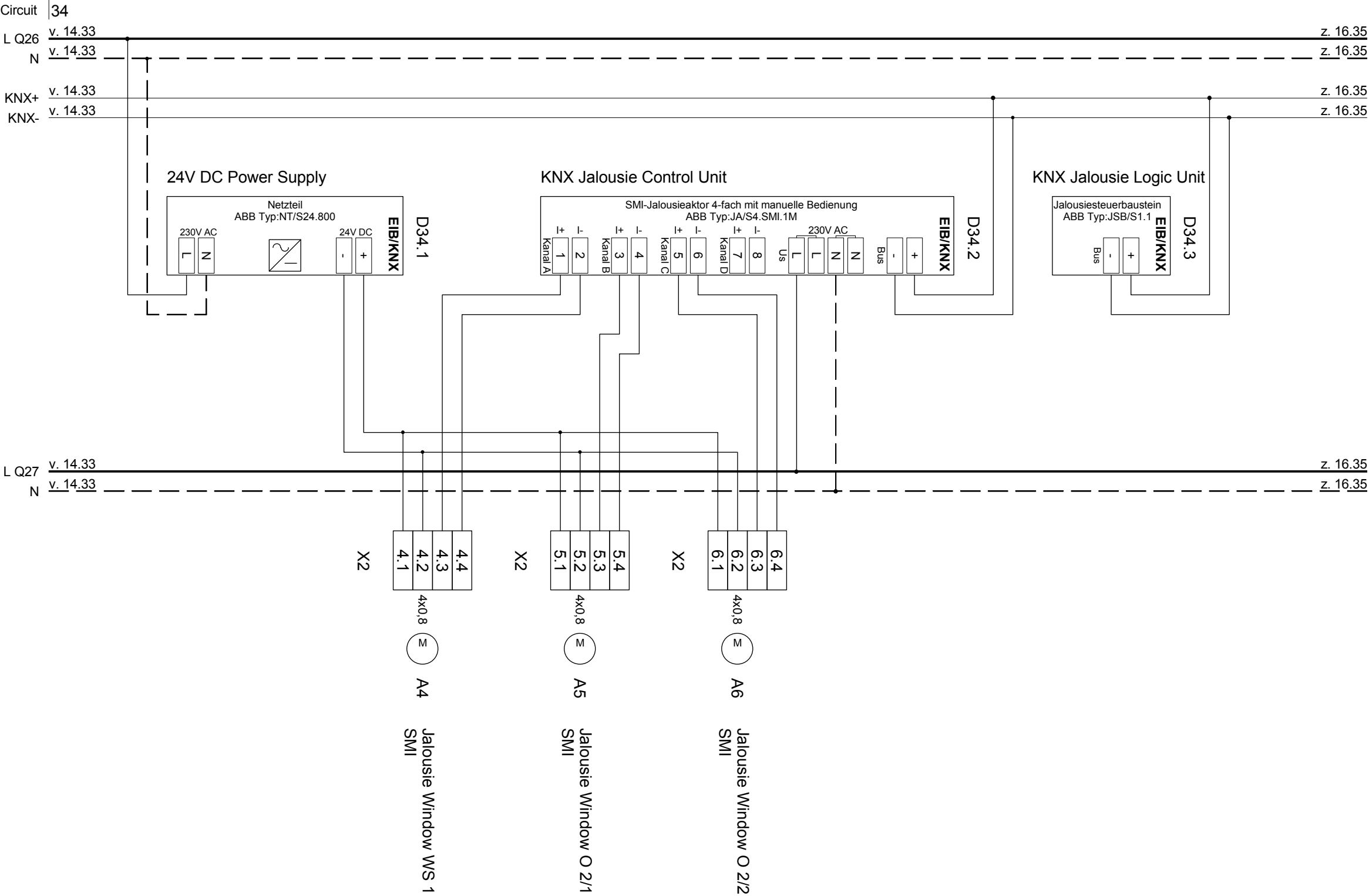
Component

Description

**ELECTRICAL CABINET
INSIDE**

Project #Scaledwg #

P140E - 413





SOLAR DECATHLON

Project



SOLAR DECATHLON 2009



TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

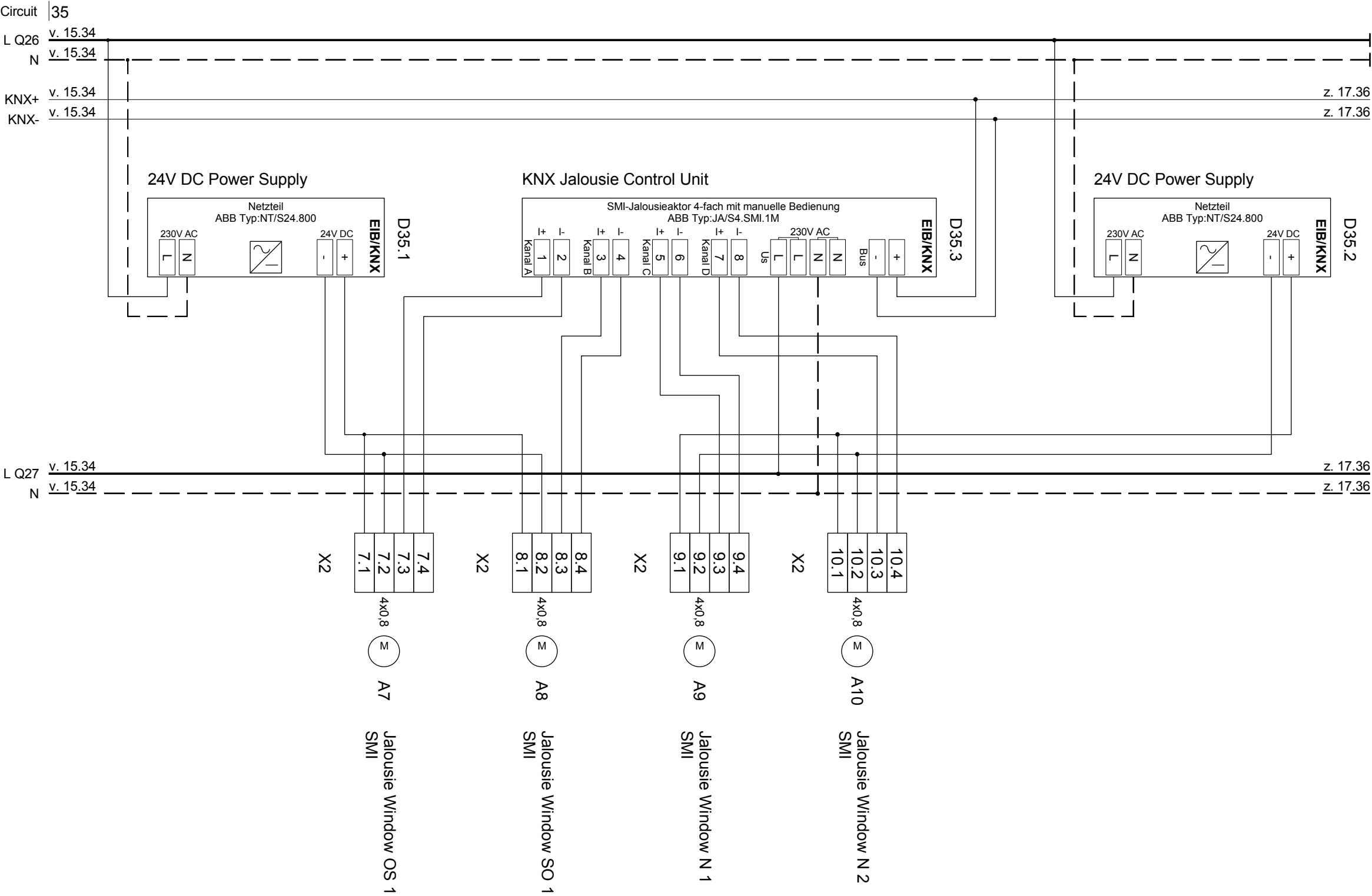
Description

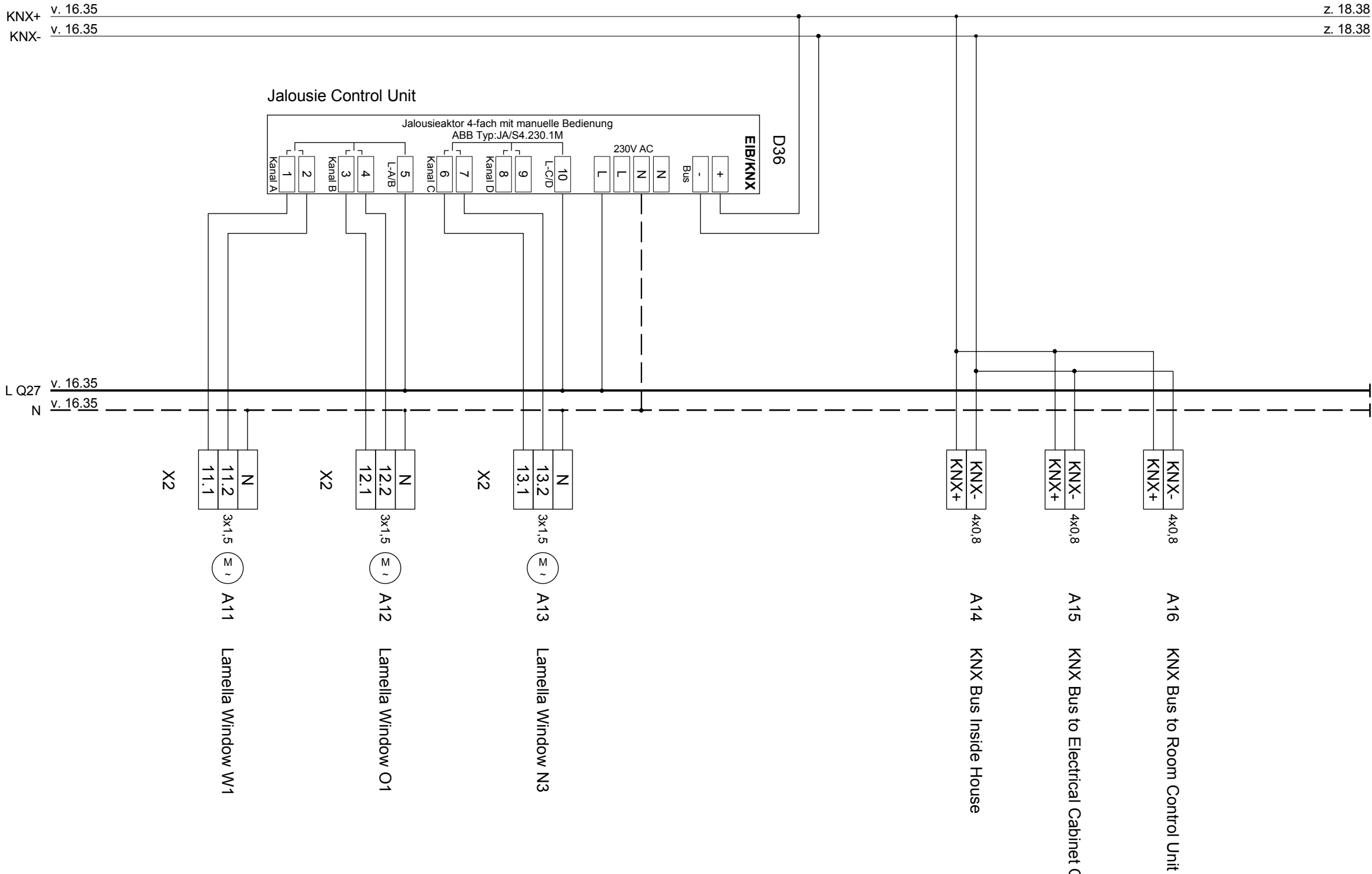
**ELECTRICAL CABINET
INSIDE**


Project #Scaledwg #

P140

E - 415









SOLAR DECATHLON

Project




SOLAR DECATHLON 2009



TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

Description

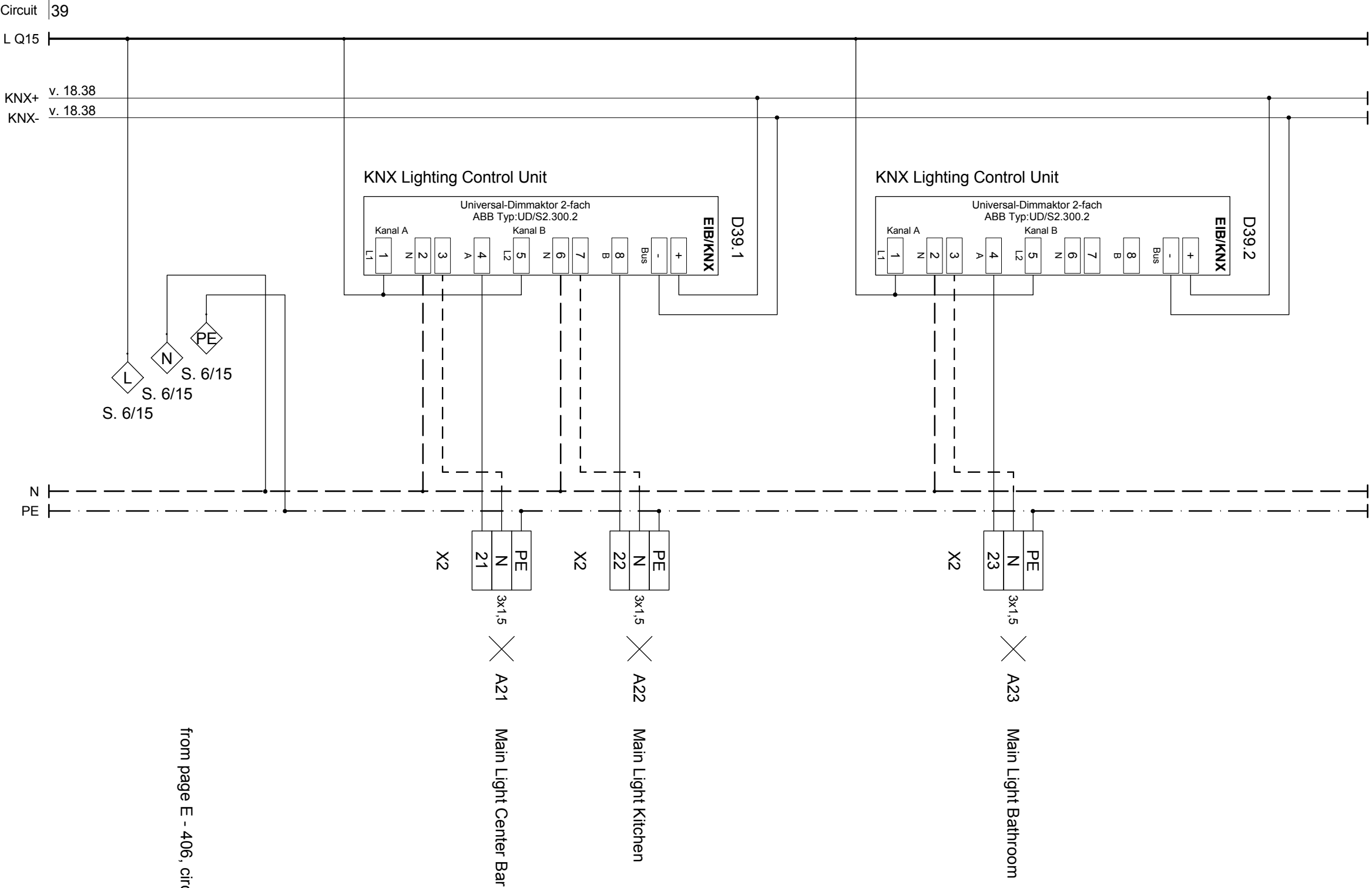
**ELECTRICAL CABINET
INSIDE**

Project #Scale

dwg #

P140

E - 417



from page E - 406, circuit 15



Project

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

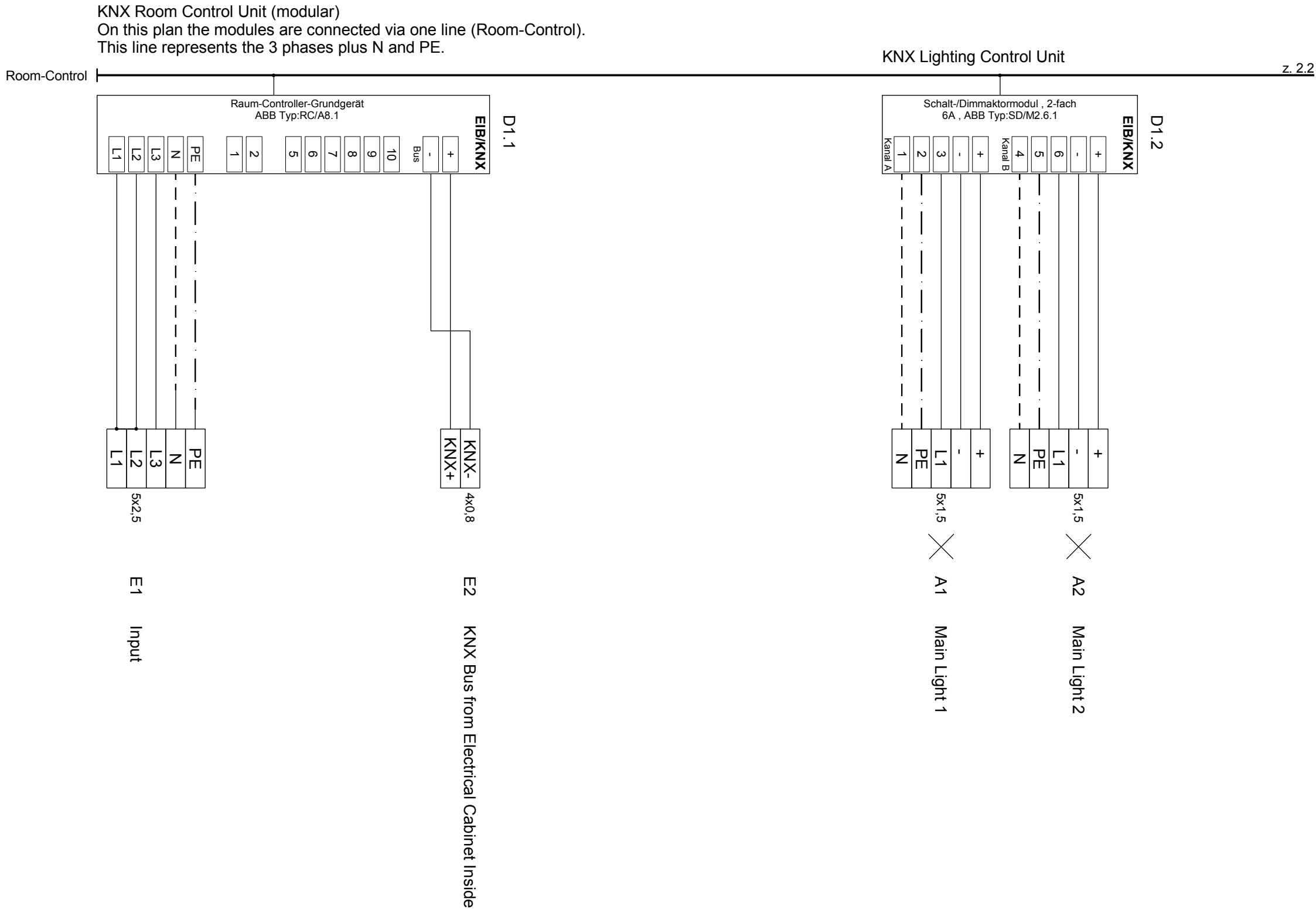
Description

ELECTRICAL CABINET
INSIDE

Project #Scale

dwg #

P140E - 419





Project

TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

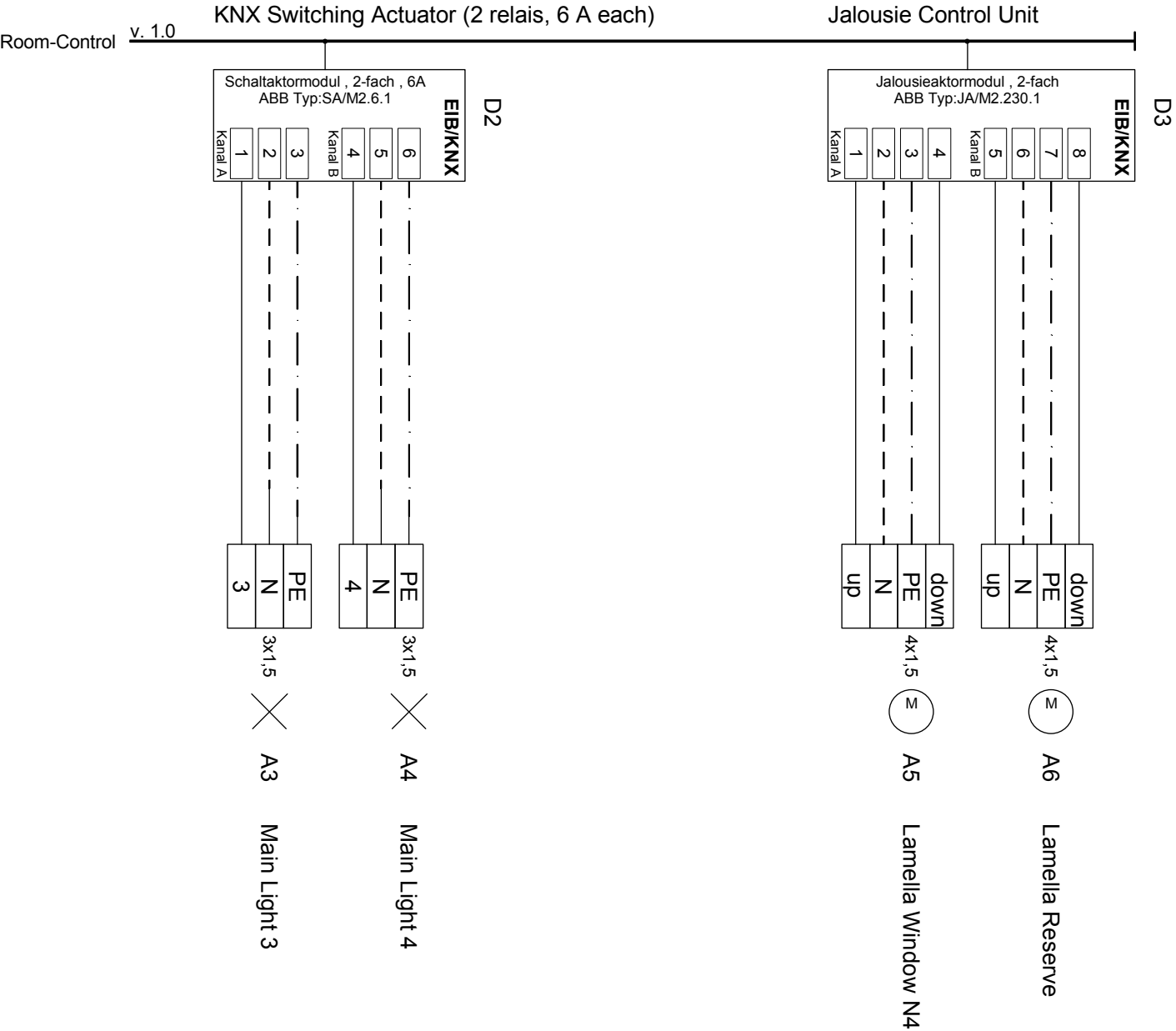
Component

Description

ROOM CONTROL UNIT

Project #Scaledwg #

P140E - 420





Project

TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

Description

ROOM CONTROL UNIT

Project #Scaledwg #

P140E - 421

Design and overcurrent protection of the electrical wiring inside the house

1. Power Supply from terminal box

The terminal box and the electric cabinet inside of the house will be connected via a NYM-J 5x10 mm² copper wire (similar to an AWG 8 wire).
The ABB S704 E35 circuit breaker will be used for a 35 A overcurrent protection. In addition the ABB Limitor B TNS will be used for overvoltage (e.g. lighting) protection. For further information on the devices see the specification sheets included.

2. Protection through RCD's


Every circuit inside the house is protected by a RCD limiting the residual current to be <30 mA. Circuits providing electrical power to lights and outlets will be protected by a combined RCD and 16 A circuit breaker, the ABB F202A-B16/0,03.
The ABB F204A-40/0,03 will be used to provide a RCD to groups of electric circuits (see also the electrical wiring plan of the electrical cabinet).
As mentioned before, see the specification sheets included for further information on the installed RCD's.

3. Overcurrent protection of the electric circuits

Devices having a maximum power consumption <3.6 kW will be supplied using a H07BQ-F 3x1.5 mm² copper wire (similar to an AWG 16 wire) and thus be protected by an 16 A circuit breaker, the ABB S-201 B16 or the ABB F202A-B16/0,03 for lights and outlets.
Devices having a greater power consumption will be supplied using a H07BQ-F 5x2.5 mm² copper wire (similar to an AWG 14 wire) and thus be protected by a 20 A three phase circuit breaker, the ABB S-203 B20. See also the specification sheets included and the electrical wiring plan.



Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

Drawn

LS, HZ, AS

Issued

05/26/09

Last index

Component

Description

DESIGN AND OVER-CURRENT PROTECTION

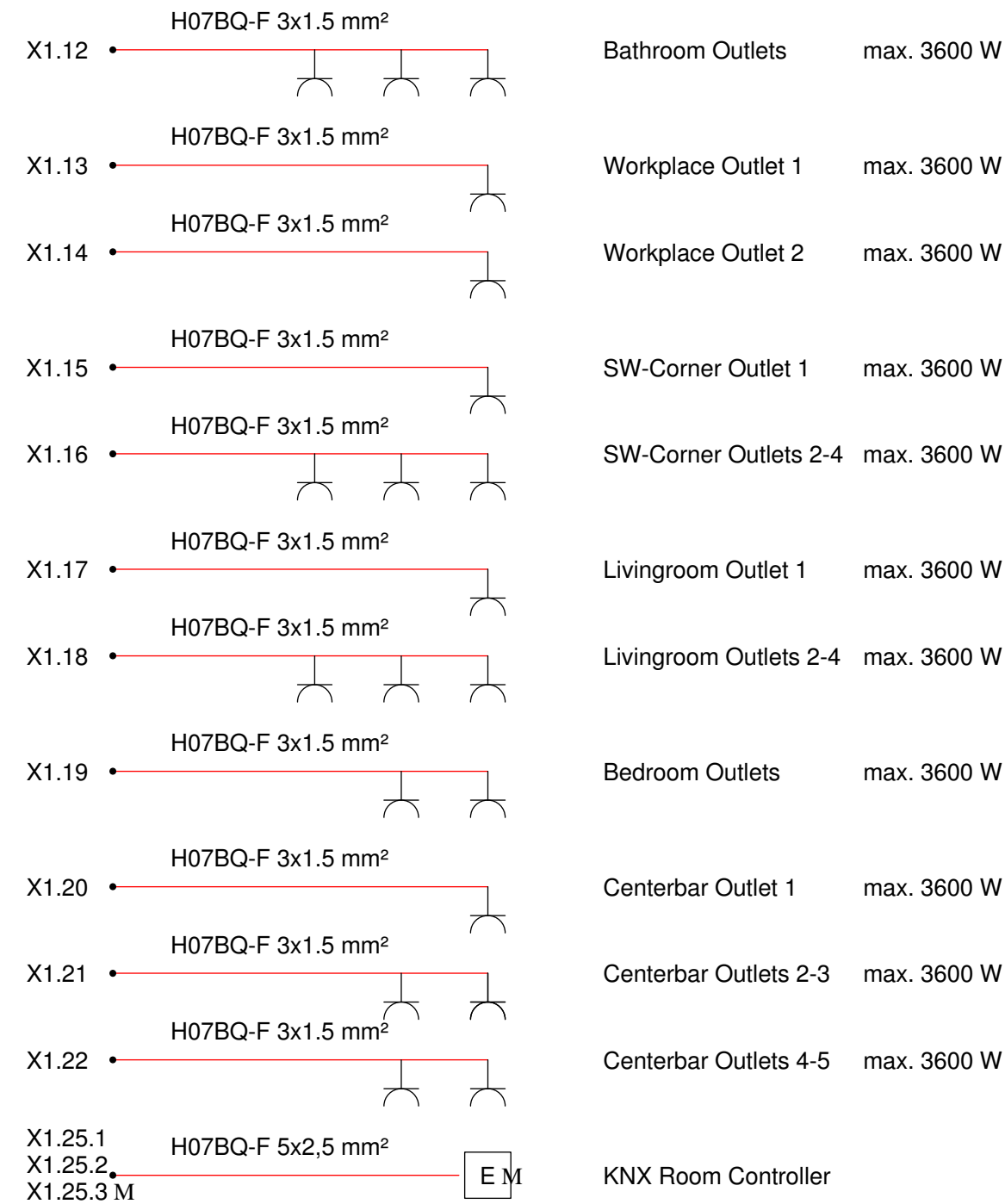
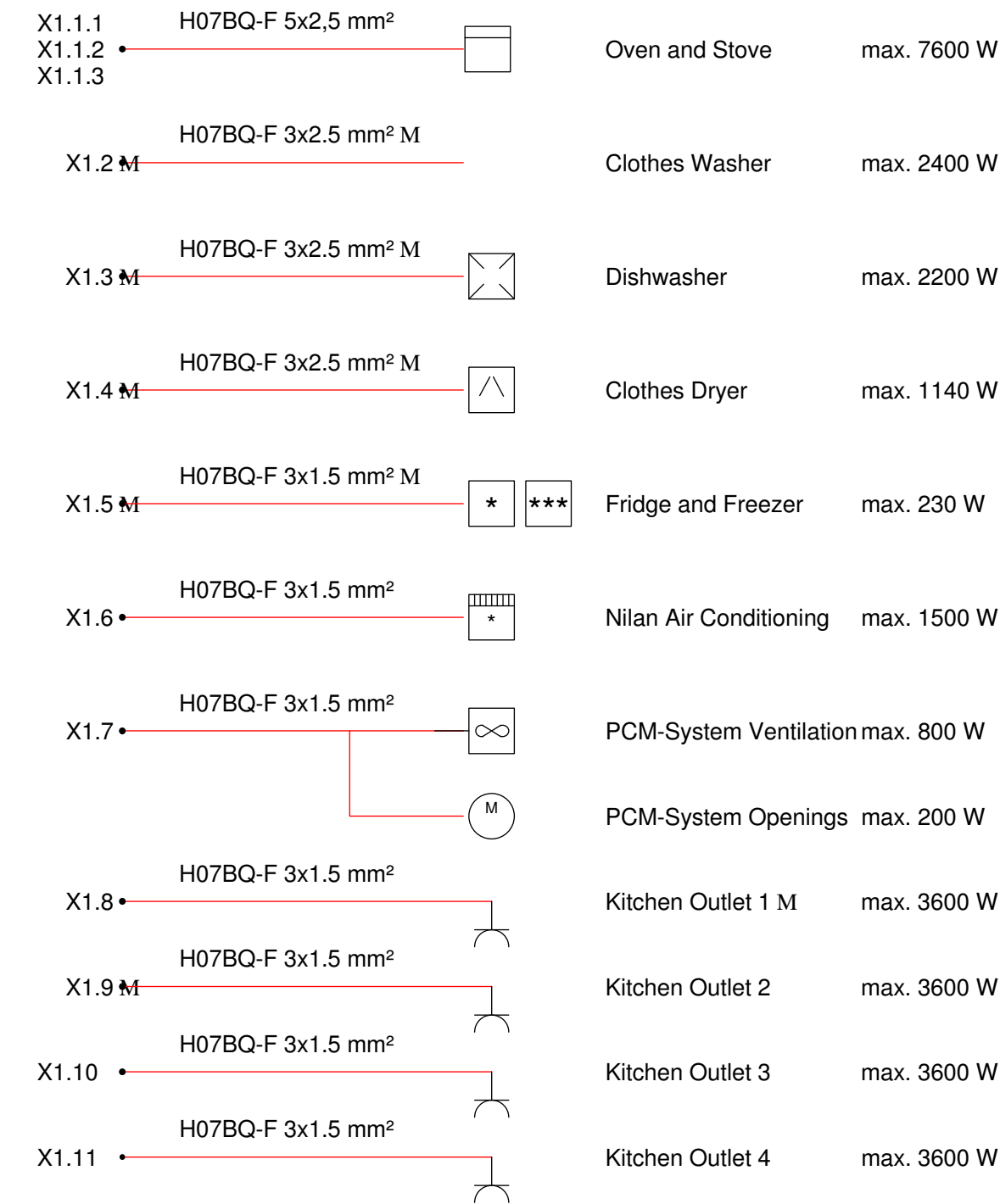
Project #

Scale

dwg #

P140

E - 422





Project

TEAM GERMANY

Constructor



Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

Description


LOAD LIST

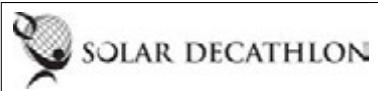
Project #Scale

P140


dwg #

E - 501

X1.27	•	H07BQ-F 3x1.5 mm ²	E	Crestron CP2E KNX Power Supply	max. 100 W
X1.28	•	H07BQ-F 3x1.5 mm ²	E	Crestron AMSI Crestron iPod-Socking-Station Crestron Wireless Display Communication Device Ethernet Switch	max. 1100 W
X1.29	•	H07BQ-F 3x1.5 mm ²	E	Crestron Bus Power Supply	max. 75 W
X1.30	•	H07BQ-F 3x1.5 mm ²		LCD-TV Blu-Ray Player	max. 266 W



Project



SOLAR DECATHLON 2009
 TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
 Department of Renewable Energies

Landgraf-Georg-Straße 4
 64283 Darmstadt
 +49 (0) 6151 / 16 2367
 +49 (0) 6151 / 16 6074
 lsteiner@re.tu-darmstadt.de

Navigation

Drawn

LS, HZ, AS

Issued

05/26/09

Last index

Component

Description

LOAD LIST

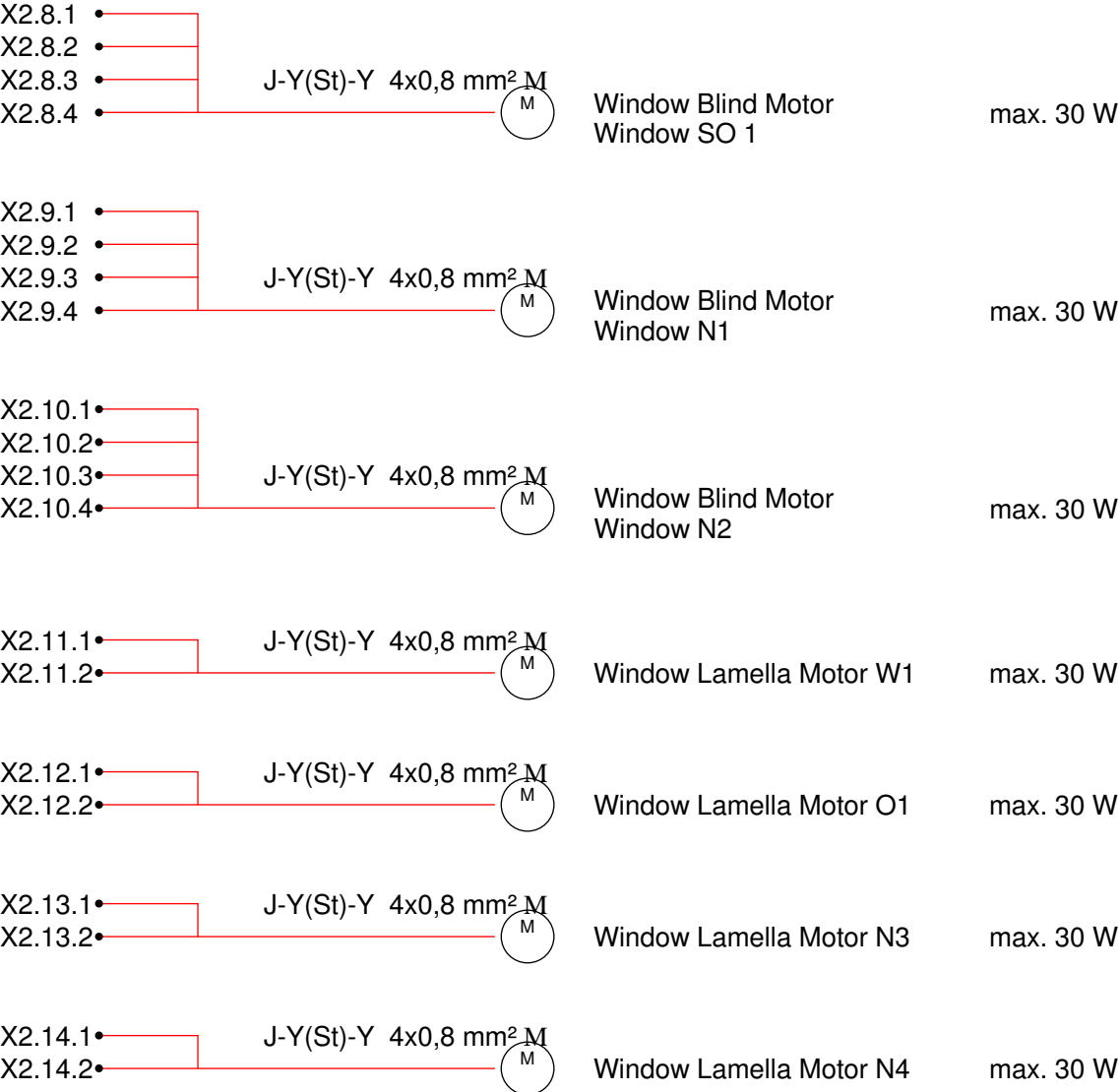
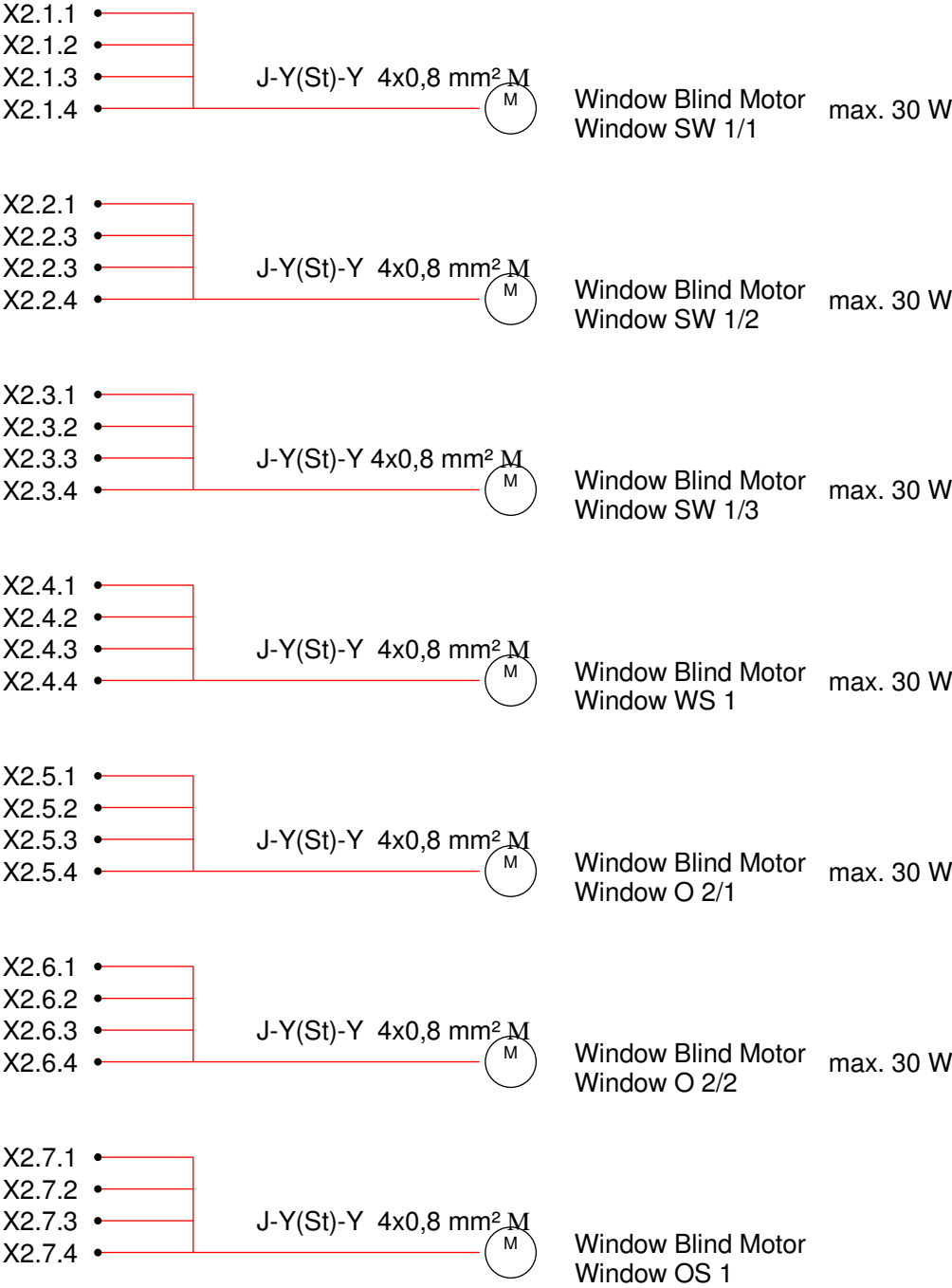
Project #

Scale

dwg #

P140

E - 502



 SOLAR DECATHLON

Project

 SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

 TECHNISCHE UNIVERSITÄT DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

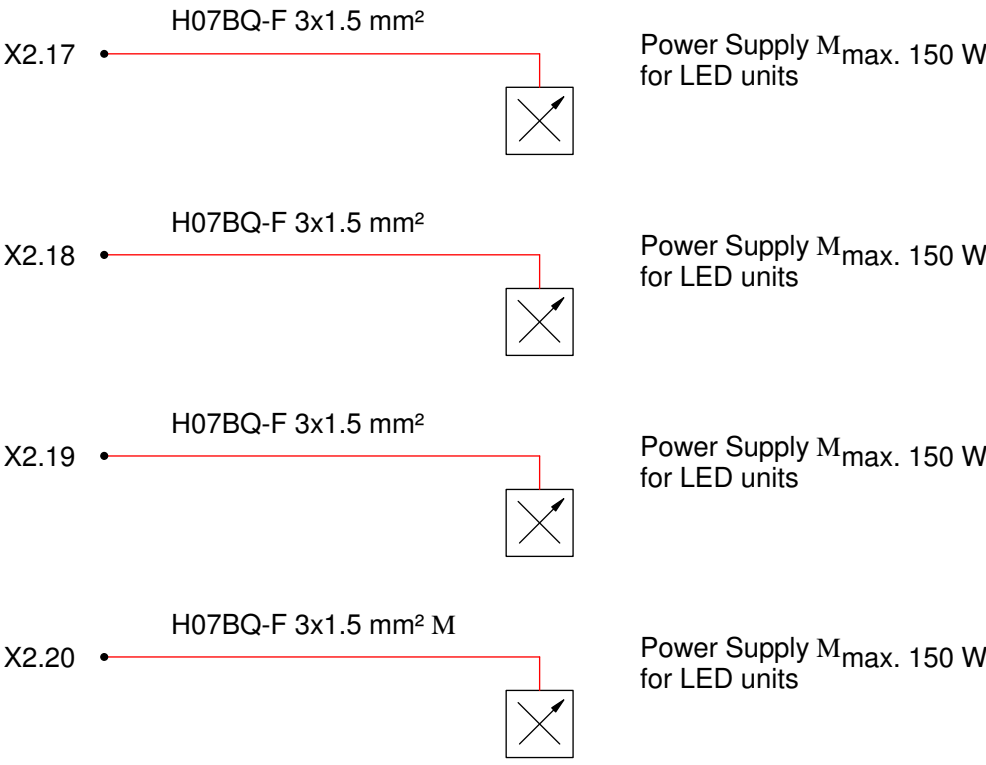
Component

Description

LOAD LIST

Project #Scaledwg #

P140E - 503





Project

TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

Description

LOAD LIST

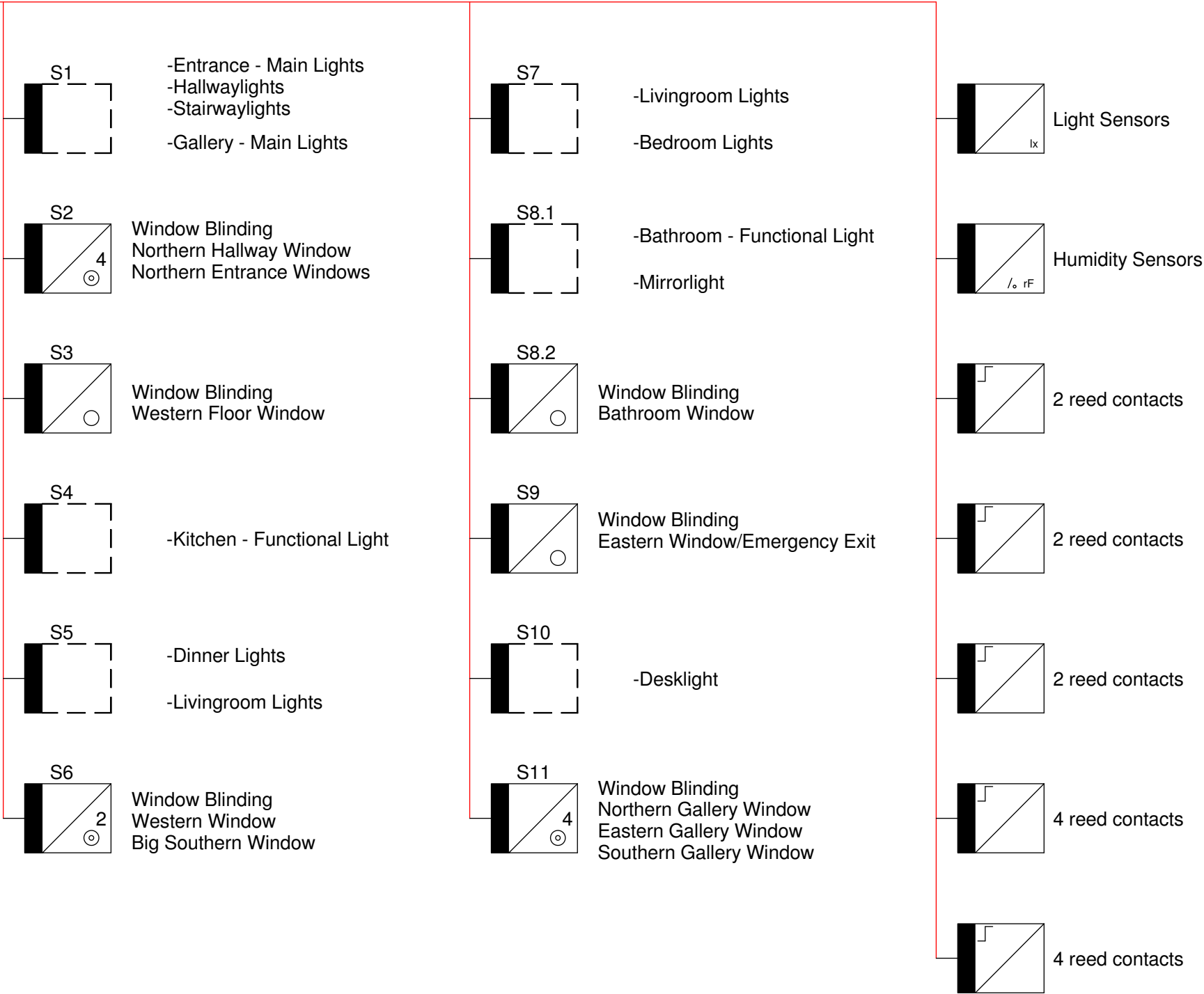
Project #Scaledwg #

P140E - 504

KNX Busline inside (outside of Electrical Cabinet)

KNX busline inside of the house
(outside of electric cabinets)

J-Y(St)-Y 2x0,8 mm²





Project

TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

Component

Description

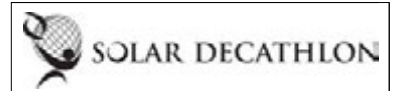
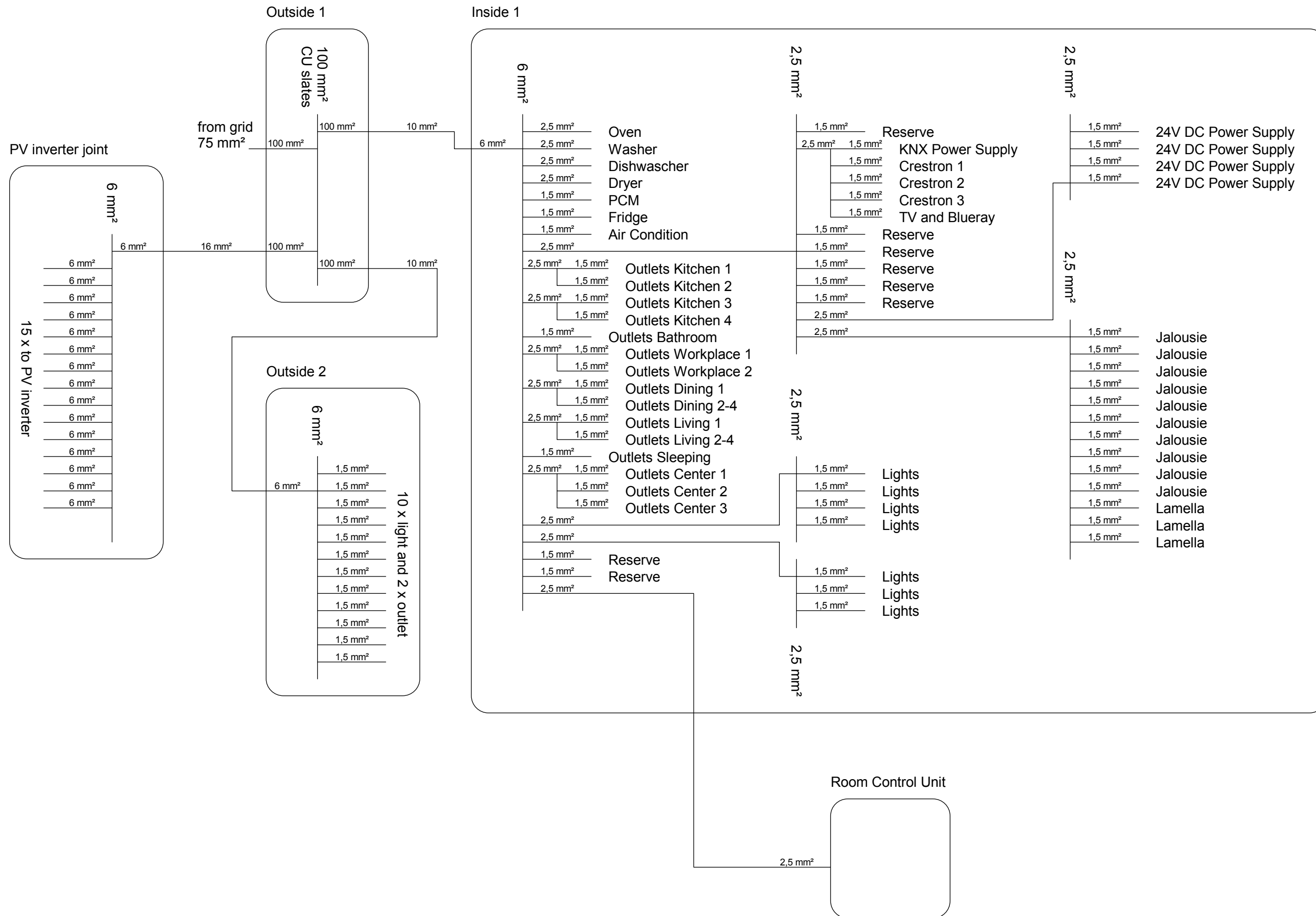
KNX BUSLINE INSIDE

Project #Scale

dwg #

P140E - 505

Cross-section and wiring overview



Project



Constructor



Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

Drawn	LS, HZ, AS
-------	------------

Issued	05/26/09
--------	----------

[Last index](#)

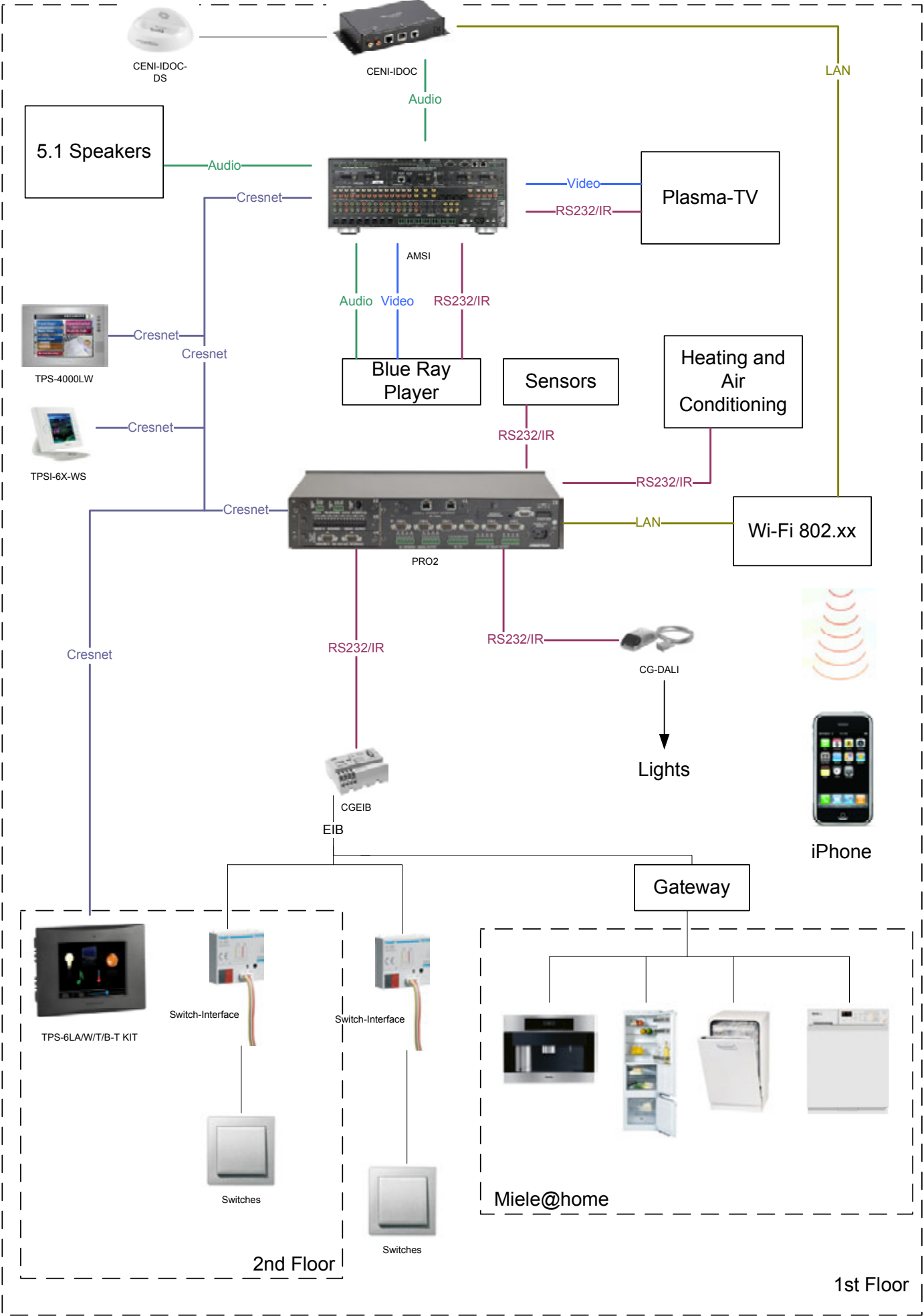
Component	Value
1. Introduction	10%
2. Methodology	20%
3. Results	30%
4. Discussion	20%
5. Conclusion	10%
6. References	10%

Description

CROSS-SECTION AND WIRING OVERVIEW

Project #	Scale	dwg #
-----------	-------	-------

P140 **E - 506**





SOLAR DECATHLON

Project



SOLAR DECATHLON 2009



TEAM GERMANY

Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09

Last index

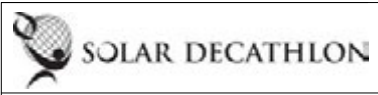
Component

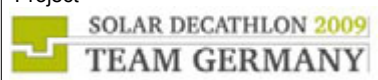
Description

HOME AUTOMATION
OVERVIEW

Project # Scale dwg #
P140E - 507

Schedule for Electrical Diagrams					
Plan No.	Division	Manufacturer	Device	Description	Price per unit
E-309, E-310	48	SMA	Sunny Mini Central 5000A	DC/AC Inverter for roof photovoltaics	-
E-311	48	SMA	Sunny Boy 1100	DC/AC Inverter for roof photovoltaics	-
E-326, E-327	48	SolarMax	SolarStar IQ2000	DC/AC Inverter for facade photovoltaics	-
E-326, E-327	48	SolarMax	SolarStar IQ1000	DC/AC Inverter for facade photovoltaics	-
E-309, E-310, E-311	26	SunPower	WHT-300-I	300 W photovoltaik module (monocrystalline)	-
E-314 until E-319	26	WürthSolar	WSG 00xx	32 W photovoltaik module (CIS)	-
E-309, E-310, E-311, E-326, E-327	26	ABB	S-800 PV	DC disconnecter	-
E-301, E-302	26	Striebel & John	NH-00	3-phase disconnecter with fuses included	-
E-301	26	ABB	NEOZED	63 A NEAZED fuse	-
E-306, E-401	26	ABB	S 751/3-E35	Main 35 A circuit breaker of inner electrical cabinet	210,00 €
E-401	26	ABB	Limiter B TNS	Overvoltage Protection for inner electrical cabinet	788,00 €
E-303, E-304, E-305, E-418, E-419	26	ABB	UD/S 2.300.3	KNX dimming actuator (4 relais, 300 VA each)	370,00 €
E-303	26	ABB	S 203-B 40	3-phase 40 A circuit breaker	205,00 €
E-302, E-306, E-307, E-401, E-402, E-403	26	ABB	DBB 13000	3-phase power measurement device	420,00 €
E-401, E-402, E-403	25	ABB	ZS/S 1.1	Interface between power measurement device and KNX-bus	175,00 €
E-401, E-402, E-403, E-404	26	ABB	F204 A-40/0,03 AP-R	3-phase and neutral RCD	72,50 €
E-404, E-405, E-406, E-407	26	ABB	F 271 A-B16/0,03	1-phase and neutral RCD with 16 A circuit breaker included	94,50 €
E-407	26	ABB	F 274 AB-20/0,03	3-phase and neutral RCD with 20 A 3 phase circuit breaker	143,00 €
E-303, E-304, E-305, E-402, E-403, E-408, E-409, E-410	26	ABB	S 201-B 16	1-phase 16 A circuit breaker	6,15 €
E-306, E-307, E-308, E-401	26	ABB	S 201-B 20	1-phase 20 A circuit breaker	9,00 €
E-306	26	ABB	S 201-B 40	1-phase 40 A circuit breaker	14,00 €
E-401	26	ABB	S 203-B 20	3-phase 20 A circuit breaker	47,40 €
E-411	25	ABB	SV/S 30.640.5	KNX bus power supply unit 30 V DC/640 mA	347,00 €
E-411	25	ABB	SV/S 30.320.5	KNX bus power supply unit 30 V DC/320 mA	251,00 €
E-505	25	ABB	US/U 2.2	binary to KNX interface with 2 inputs	54,00 €
E-505	25	ABB	US/U 4.2	binary to KNX interface with 4 inputs	96,00 €
E-411	25	ABB	IPS/S 2.1	IP to KNX interface	230,00 €
E-412, E-413	25	ABB	SA/S 8.16.5S	KNX switch actuator (8 relais, 16 A)	482,00 €
E-503	25	ABB	JSB/S 1.1	KNX jalousie control logic	596,00 €
E-503	25	ABB	JA/S 4.230.1M	KNX jalousie control unit	375,00 €
E-501	25	ABB	FC/S 1.1	KNX fan-coil-controller	399,00 €
E-501	25	ABB	WZ/S 1.1	KNX weather station	814,00 €



Project

Constructor

Institute of Electrical Energy Systems
Department of Renewable Energies

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

DrawnLS, HZ, AS

Issued05/26/09


Last index

Component


Description
SCHEDULE

Project # Scale dwg #
P140**E - 508**


E-501	25	ABB	WES/A 1.1	KNX meteorological measurement device for WZ/S 1.1	375,00 €
E-420	25	ABB	RC/A 8.1	KNX room control unit	407,00 €
E-421	25	ABB	SA/M 2.6.1	KNX switching actuator for room control unit (2 relais, 6 A)	80,50 €
E-420	25	ABB	SD/M 2.6.1	KNX switch/dimmer acuator (max. 6 A)	167,00 €
E-414,E-415, E-416, E-417, E-421	25	ABB	JA/M 2.230.1	KNX jalousie control unit	121,00 €
E-506	26	Striebel & John	3/2 WS	Electrical cabinet	622,00 €
E-506	26	Striebel & John	3/2 FS	Electrical cabinet	505,00 €
E-502, E-507	25	Crestron	CP2E	Main control processor	983,00 €
E-502, E-507	27	Crestron	AMSI	7.1 Multiroom audio/video processor	4.683,00 €
E-502, E-507	25	Crestron	CENI-IDOC	iPod docking station	363,00 €
E-502, E-507	25	Crestron	RMK-5U	Rack mounting device for AMSI	110,00 €
E-502, E-507	25	Crestron	TPS-4000L	10.4" LCD-touchdisplay	2.498,00 €
E-502, E-507	25	Crestron	BBI-4000	wall mounting device for TPS-4000L	65,00 €
E-502, E-507	25	Crestron	TPSI-6X-W-S	5.7" wireless LCD-touchdisplay	1.664,00 €
E-502, E-507	25	Crestron	CEN-HPRFGW-KIT	2.4 GHz gateway station for wireless LCD-touchdisplay	312,00 €
E-502, E-507	25	Crestron	CG-EIB	Crestron to KNX interface	585,00 €
E-502, E-507	25	Crestron	CG-DALI	Crestron to DALI interface	120,00 €
E-502, E-507	25	Crestron	CG-DALI-PS1	DALI power supply	129,00 €
E-502, E-507	25	Crestron	CNPWSI-75	Crestron bus power supply	234,00 €
E-502, E-507	25	Crestron	Cresnet-NP-TL-SP1000	1000 ft. Spool control cabel (2 x 18 AWG and 2 x 22 AWG)	260,00 €
E-502, E-507	27	Loewe	68436U42	LCD-TV	3.880,00 €
E-502, E-507	27	Philips	BDP 5000	Blu-Ray-Player	269,95 €
E-505, E-507	26	Busch-Jäger	6120 U-102	KNX bus interface for common switches	80,00 €
E-505, E-507	26	Busch-Jäger	6127-83-101	KNX switching device (4 switches)	90,00 €
E-505, E-507	26	Busch-Jäger	6126-83-101	KNX switching device (2 switches)	60,00 €
E-505, E-507	26	Busch-Jäger	6125-83-101	KNX switching device (1 switch)	48,50 €
E-505, E-507	26	Busch-Jäger	1786-83	Single switch	5,50 €
E-505, E-507	26	Busch-Jäger	1785-83	Double Switch	7,25 €
E-501, E-507	26	Miele	T 8626 WP	Dryer	-
E-501, E-507	26	Miele	Allwater W3841	Washer	-
E-501, E-507	26	Miele	CVA 5060	Coffee dispenser	-
E-501, E-507	26	Miele	DGC 5080	Oven	-
E-501, E-507	26	Miele	G 1834 Sci (Beispiel)	Dishwasher	-
E-501, E-507	26	Miele	KF 9757 ID	Fridge/freezer	-
E-501, E-507	26	Miele	KM 5975 Facette	Stove	-
E-301 until E-421	26	Helukabel	NYM-J 3x1.5	Inflexible wire	-
E-301 until E-421	26	Helukabel	NYM-J 3x2,5	Inflexible wire	-
E-301 until E-421	26	Helukabel	NYM-J 5x2,5	Inflexible wire	-
E-501	26	Helukabel	H07-BQ-F 3x1,5	Flexible wire	-
E-501	26	Helukabel	H07-BQ-F 3x2,5	Flexible wire	-
E-501	26	Helukabel	H07-BQ-F 5x2,5	Flexible wire	-
E-501	26	Helukabel	J-Y(St)-Y 4x0,8	KNX bus wire	-


SOLAR DECATHLON

Project


SOLAR DECATHLON 2009
TEAM GERMANY

Constructor


**TECHNISCHE
UNIVERSITÄT
DARMSTADT**

**Institute of Electrical Energy Systems
Department of Renewable Energies**

Landgraf-Georg-Straße 4
64283 Darmstadt
+49 (0) 6151 / 16 2367
+49 (0) 6151 / 16 6074
lsteiner@re.tu-darmstadt.de

Navigation

Drawn

LS, HZ, AS

Issued

05/26/09

Last index

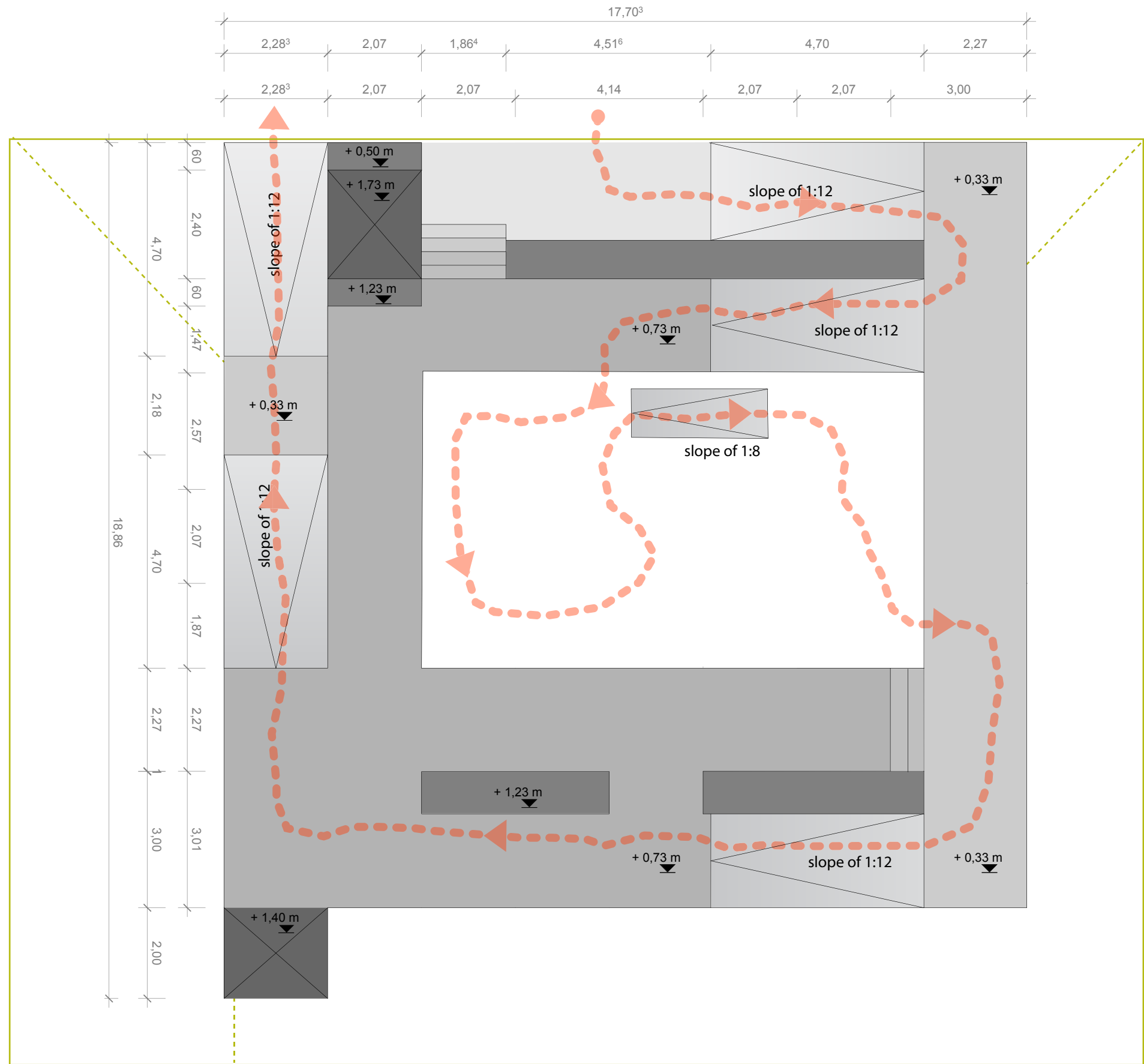
Component

Description





SCHEDULE

Project # Scale dwg #

P140 **E - 509**



Navigation/Legend

-  Visitors
-  Team Member / Organizers
-  Team Member / Tour Guides
-  Tour Route

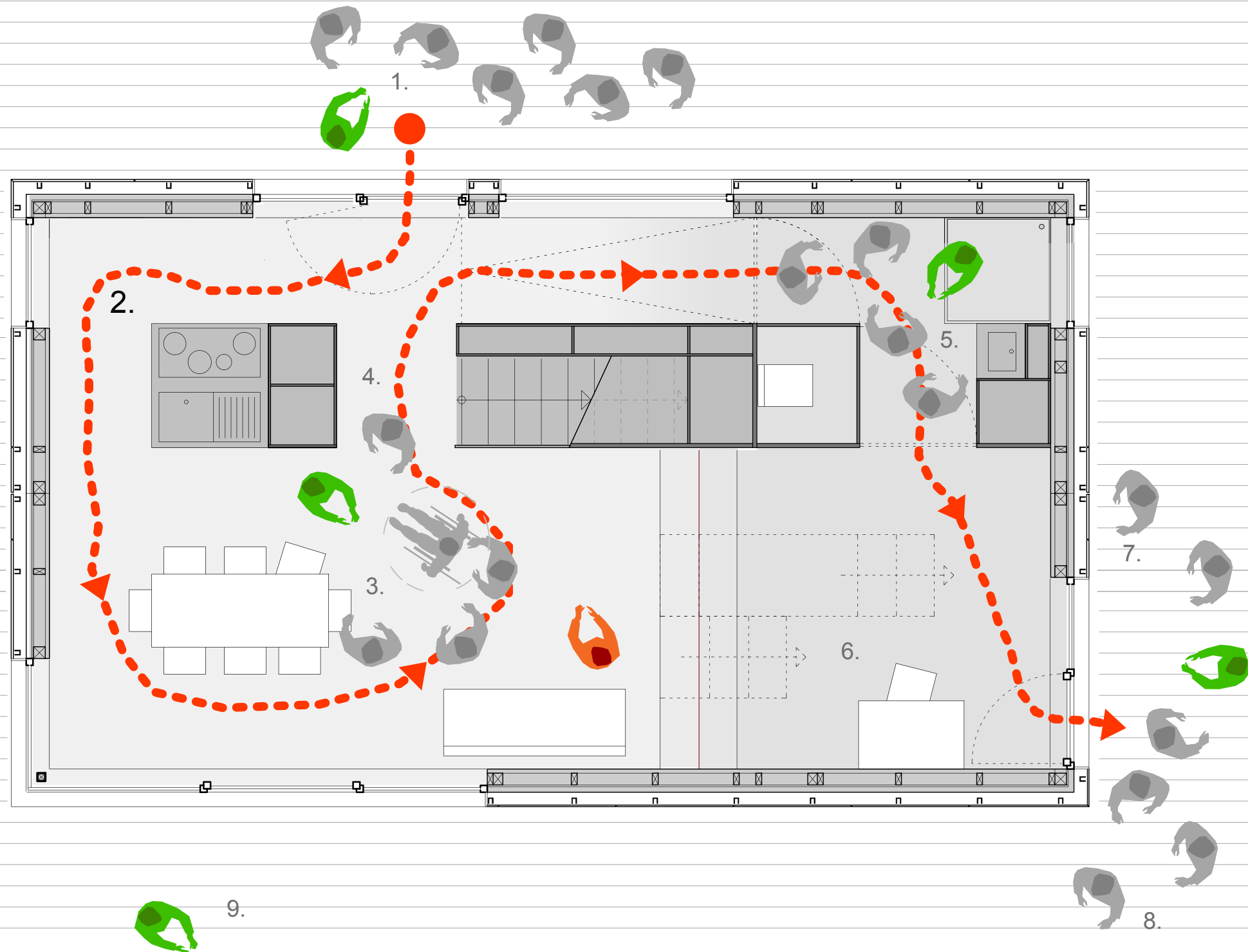
Drawn SM, KE
Issued 05/18/09
Last index

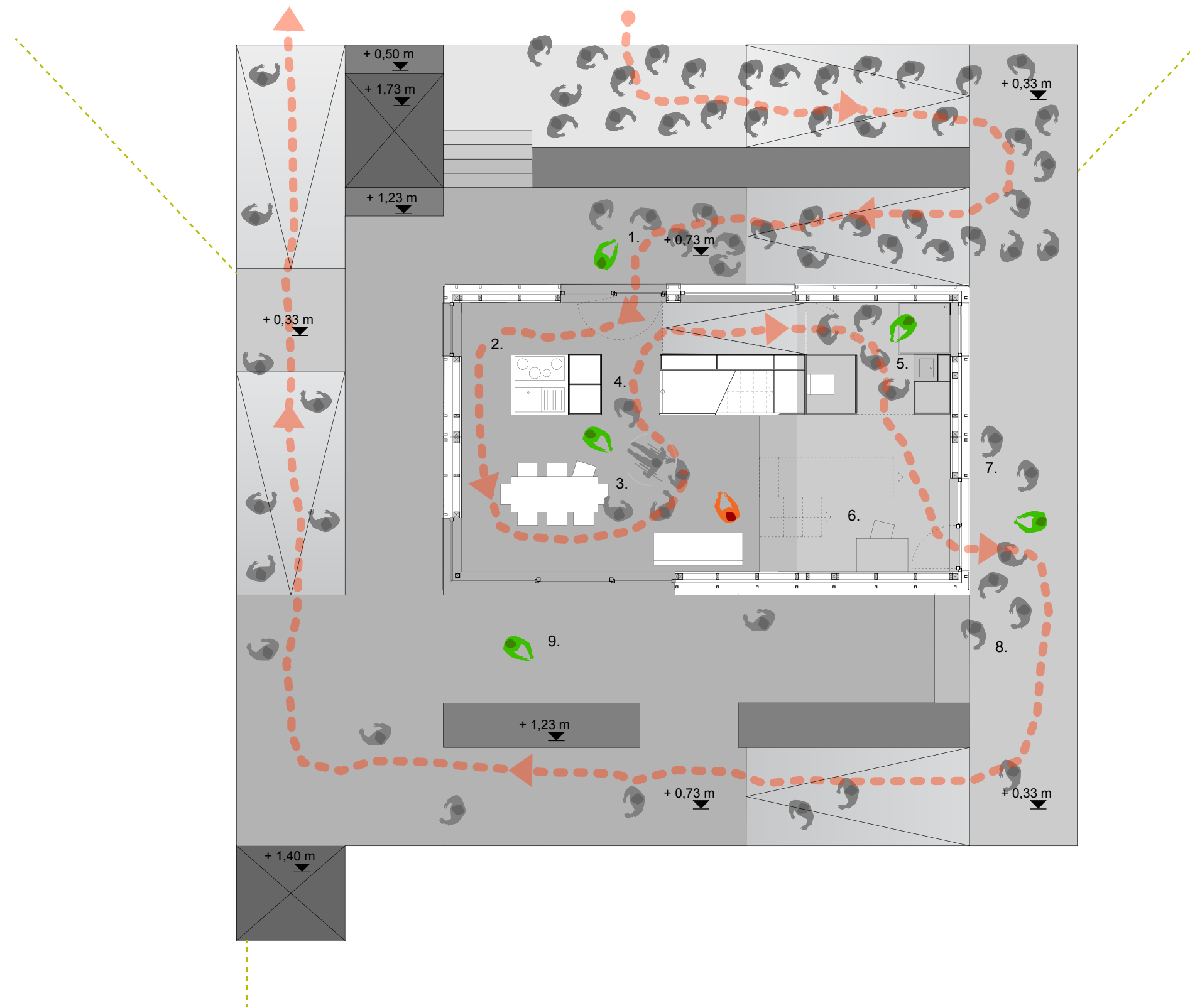
Component
Other Disciplines

Description
Public Exhibit Plan

Project # Scale dwg #
P 140 1 : 50 X-211

1. Welcome
2. Kitchen
3. Concept interieur
4. Technical devices
5. Flexible bathroom
6. Bed and workspace
7. Facade
8. Concept exterior
9. Goodbye






1
X-212

Public Exhibit Deck
Scale 1:100


1:100






SOLAR DECATHLON

Project



SOLAR DECATHLON 2009
TEAM GERMANY






Constructor



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

-  Visitors
-  Team Member / Organizers
-  Team Member / Tour Guides
-  Tour Route
-  Solar Envelope

Drawn SM, KE

Issued 05/12/09

Last index

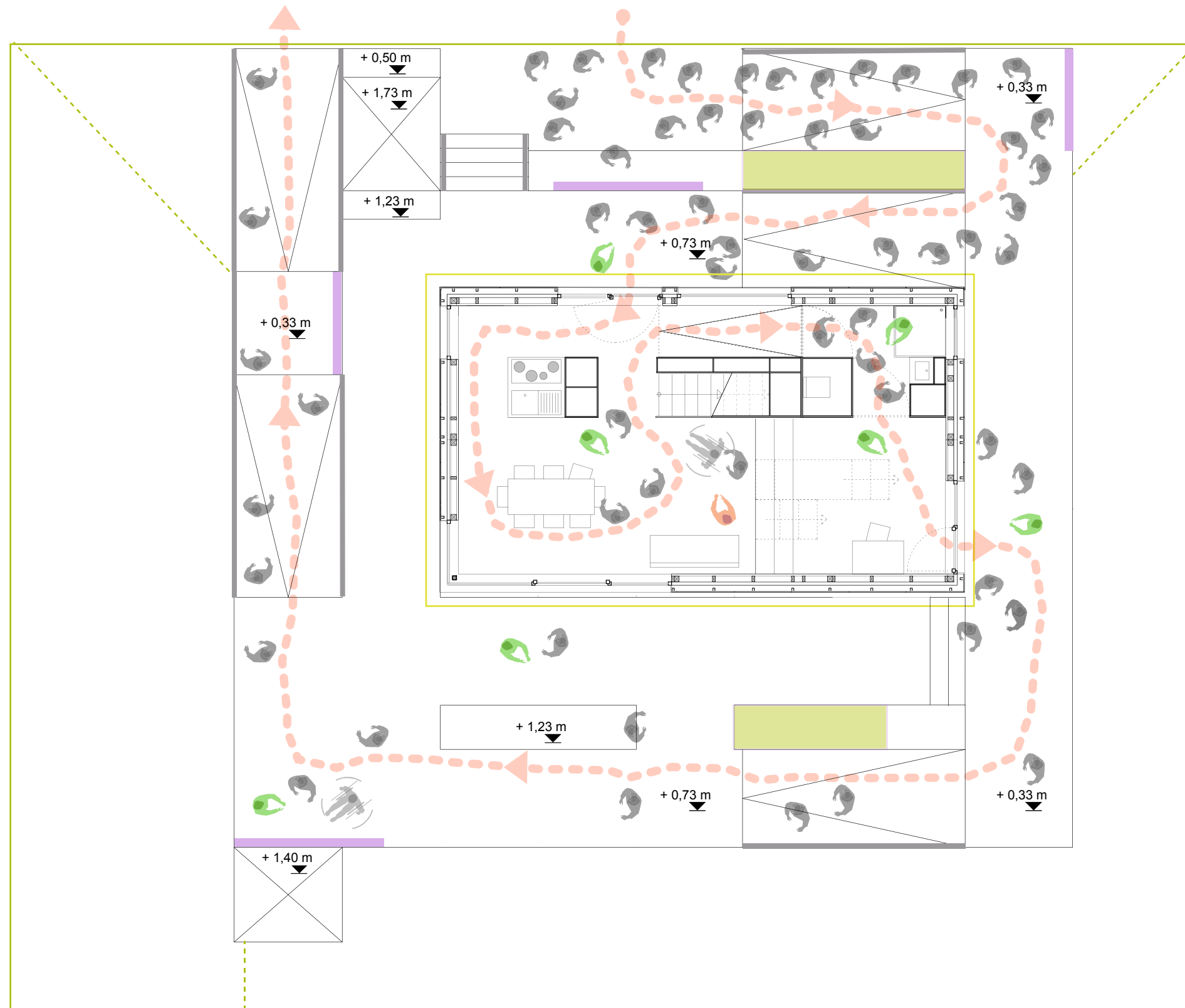
Component

Other Disciplines

Description

Public Exhibit Deck

Project #	Scale	dwg #
P 140	1:100	X-212



Public Exhibit Mock Ups
Scale 1:100

1:100



Project
 TEAM GERMANY

Constructor
TECHNISCHE UNIVERSITÄT DARMSTADT
Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend
 Visitors
 Team Member / Organizers
 Team Member / Tour Guides
 Tour Route
 Solar Envelope
 Security Barrier
 Security Barrier
 Product Samples
 Information Boards


Drawn SM, KE
Issued 05/12/09
Last index

Component
Other Disciplines

Description
Public Exhibit Mock Ups

Project # P 140
Scale 1:100
dwg # X-213

Schedule for Public_Tour			
Plan No.	Project Manual Division Master Format	Description	Notes
X - 213	Div.27	Signage	To be designed
X - 213	Div.05	Handrails	To be designed
X - 213	Div.01	Material Samples	Vaccum Insulation Panels
X - 213	Div.01	Material Samples	Ligno Trend Ceiling
X - 213	Div.01	Material Samples	Phase Changing Material- Salt Hydrate
X - 213	Div.01	Material Samples	Phase Changing Material- Micro Encapsalted Wax
X - 213	Div.01	Handout	To be designed
X - 213	Div.01	Giveaways	The giveaways are still open, as we would are still seeking funding in this sector.


 SOLAR DECATHLON

Project

 SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

 TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

DrawnSM

Issued02/12/09

Last index

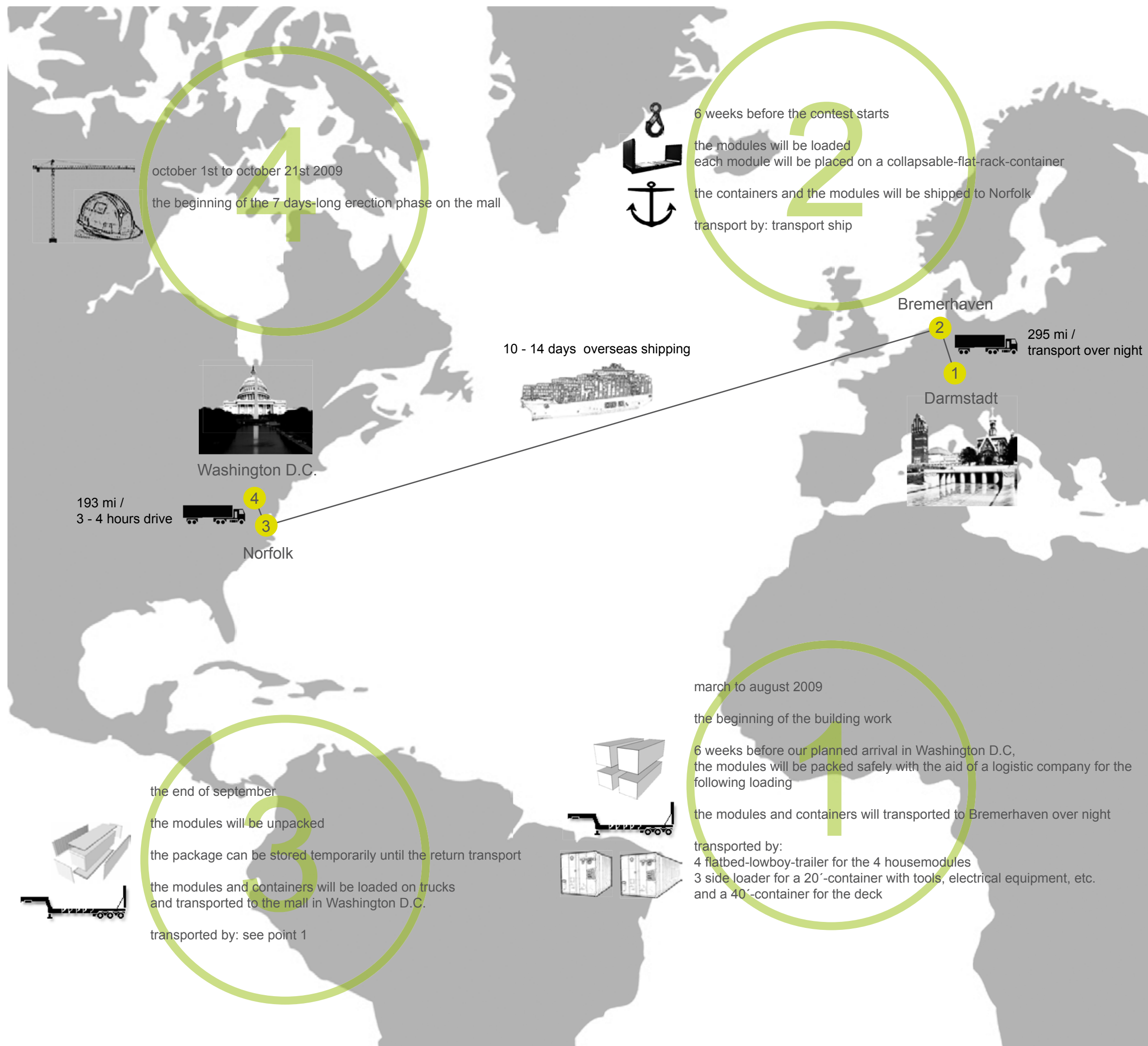
ComponentOther Disciplines

DescriptionSchedules

Project #P 140


Scale-


dwg #X- 311




**SOLAR DECATHLON**

Project

**SOLAR DECATHLON 2009**

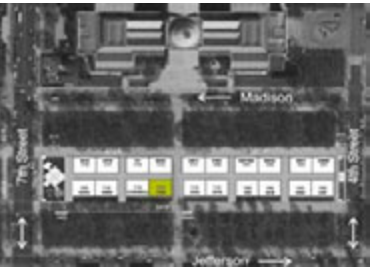
**TEAM GERMANY**

Constructor

**TECHNISCHE UNIVERSITÄT DARMSTADT**

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



Drawn	AS, SS
Issued	05/12/09
Last index	

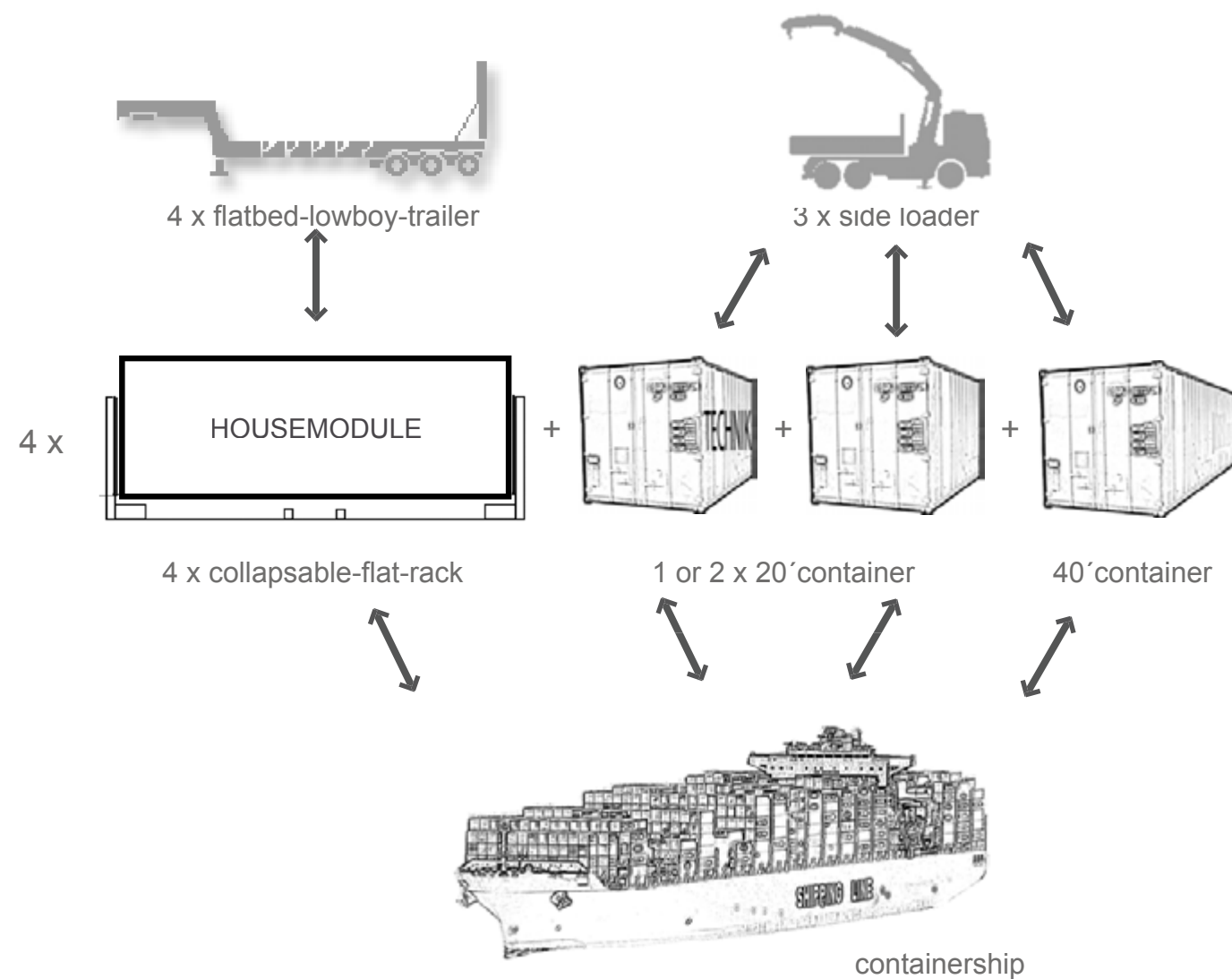
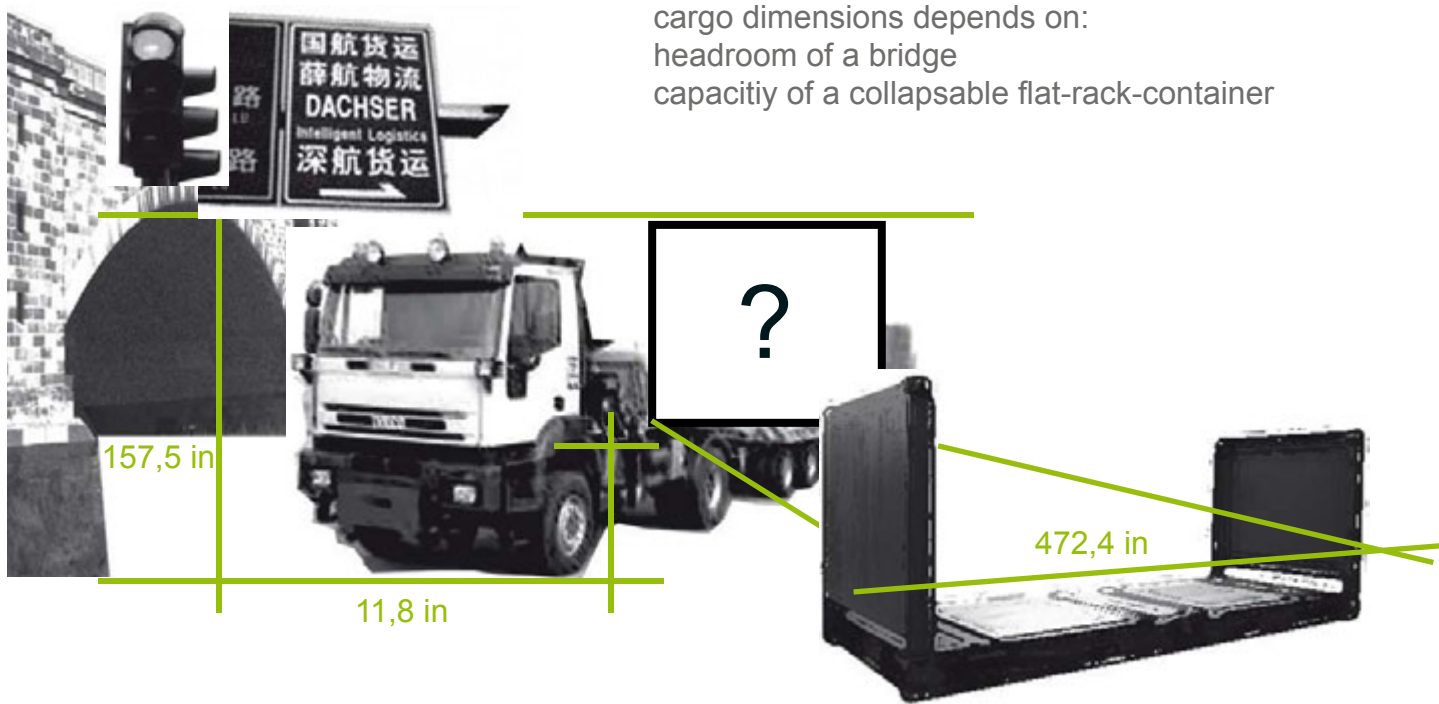
Component

Operations

Description

Transport Germany - Washington D.C.

Project #	Scale	dwg #
P 140		O-110



Assembly Plans TUD

Vehicles

Number

- Six vehicles plus crane

Type

- Two vehicles are side-loader-crane-trucks, carrying the 20'- and the 40'-sea-container.
- Four vehicles are semi-trailer-trucks with flatbed trailers carrying the 4 house modules, these 4 will be oversized loads.

Cargo Description

- The 40'-sea-container holds the tools for the assembly of the house, spares and the pv-roof installed system and facade.
- The 20'-sea-container holds the deck-pieces.
- The 4 house-modules are complete with glazing, furniture, appliances and facade-fragments, they are protected against damage during transit with covering under wooden plates and fixed with transport-bracing.
- The bracing-elements will be removed after assembling the housemodules on the mall.

Cargo Dimensions

- Weight is estimated. likely it will be lower.

number	type	length	wide	height	weight
1	20'-sea-container	20'	8'	8'6"	about 10 metric tons
2	40'-sea-container	40'	8'	8'6"	about 12 metric tons
3	1st. house module	37'4"	10'6"	10'8"	11,5 metric tons
4	2nd. house module	37'4"	10'6"	10'8"	8,5 metric tons
5	3rd. house module	37'4"	10'6"	6'4"	7,6 metric tons
6	4th. house module	37'4"	10'6"	6'4"	7,3 metric tons

- In the table above you find the module sizes without packing. below you find it including packing.

number	type	length	wide	height	weight
3	1st. house module	38'6"	11'3"	11'5"	< 12 metric tons
4	2nd. house module	38'6"	11'3"	11'5"	< 9 metric tons
5	3rd. house module	38'6"	11'3"	7'1"	< 8 metric tons
6	4th. house module	38'6"	11'3"	7'1"	< 8 metric tons

Number and Description of Axles

- We don't know our logistic company jet

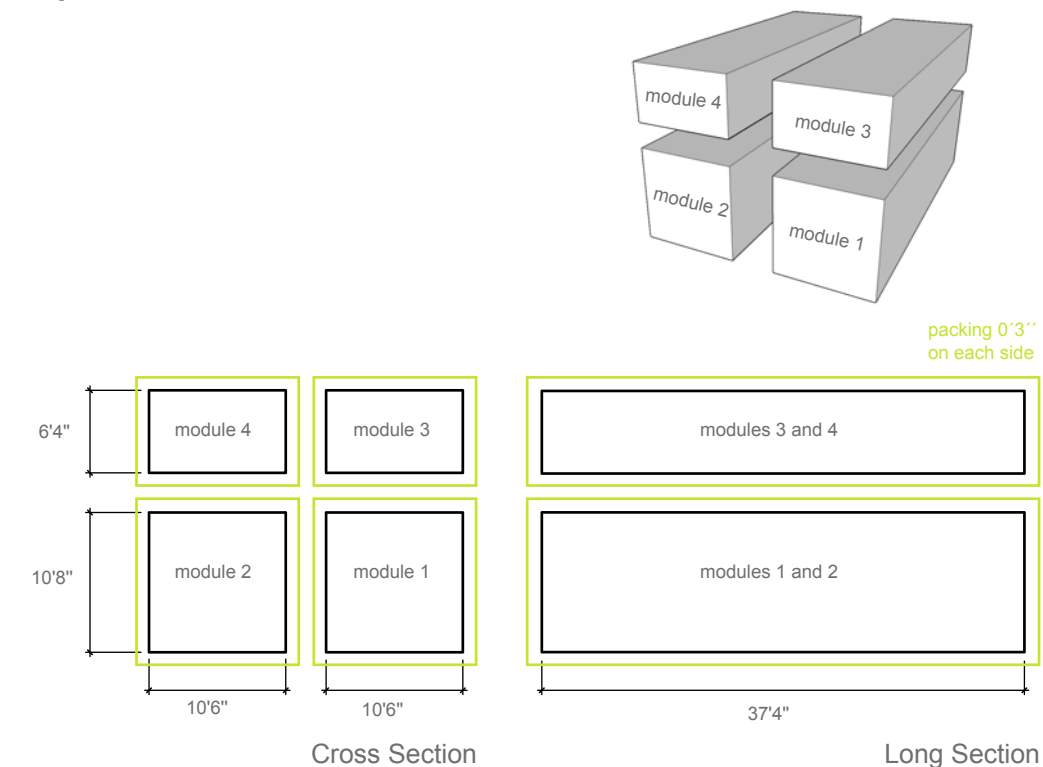
On-the-Road-Dimensions (height, width, length, overhang)

- The two container-trucks have the normal dimensions.

Total Weight of Each Vehicle

- The weight of the cargo you find in the table above.
- Additionally the tractor and the trailer we may be less than 30 metric tons for each vehicle

major house module dimensions



Critical Path

- The risks of damaging our house during the transport, assembly and disassembly are high.
- It is arguable to ship the modules including the whole filigree facade in particular, although this would save time during assembly and disassembly considerably.
- The fact of having 2 house modules each with applied upon the other is really risky at all.
- We do have replacement for all parts critical to be damaged, such as building technology, household appliances, window panes and alternate pv-elements for roof and facade. these can be exchanged in the days following the 2nd assembling-day.

Estimated Amount and Type of Materials for Disposal or Recycling


- We don't know our packaging-company jet. we will look after that all used materials for packing can be recycled.
- We assume of storing the packing intermediately in Norfolk to reuse it for return transport.

Special Equipment (crane, scaffolding, forklift, traverse, transport-bracing)


- According status quo we need a crane with 200 metric tons counterweight, that means that it can handle 20 metric tons extended over 8'. we need it for day 1 and day 2 at the mall.
- We will need a mobile scaffolding to complete grout- and facade-operations.
- We may need a forklift if our window panes arrive broken.
- For protection during the shipping we need special transport-bracing inside of our house modules (details see 2d-drawings), these can be handled by manpower and will be removed after assembly-day-2
- To lift the house modules by crane we need an especially fabricated steel-traverse. we suppose to carry it inside one of the sea-containers.

PPE Requirements

- Helmets, gloves, safety goggles, harnesses, safety boots.
- The team is equipped with all necessary equipment.


 SOLAR DECATHLON

Project

 SOLAR DECATHLON 2009

TEAM GERMANY

Constructor

 TECHNISCHE UNIVERSITÄT DARMSTADT

Department of Architecture
Energyefficient Building Design Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

DrawnAS, SS

Issued05/12/09

Last index

Component

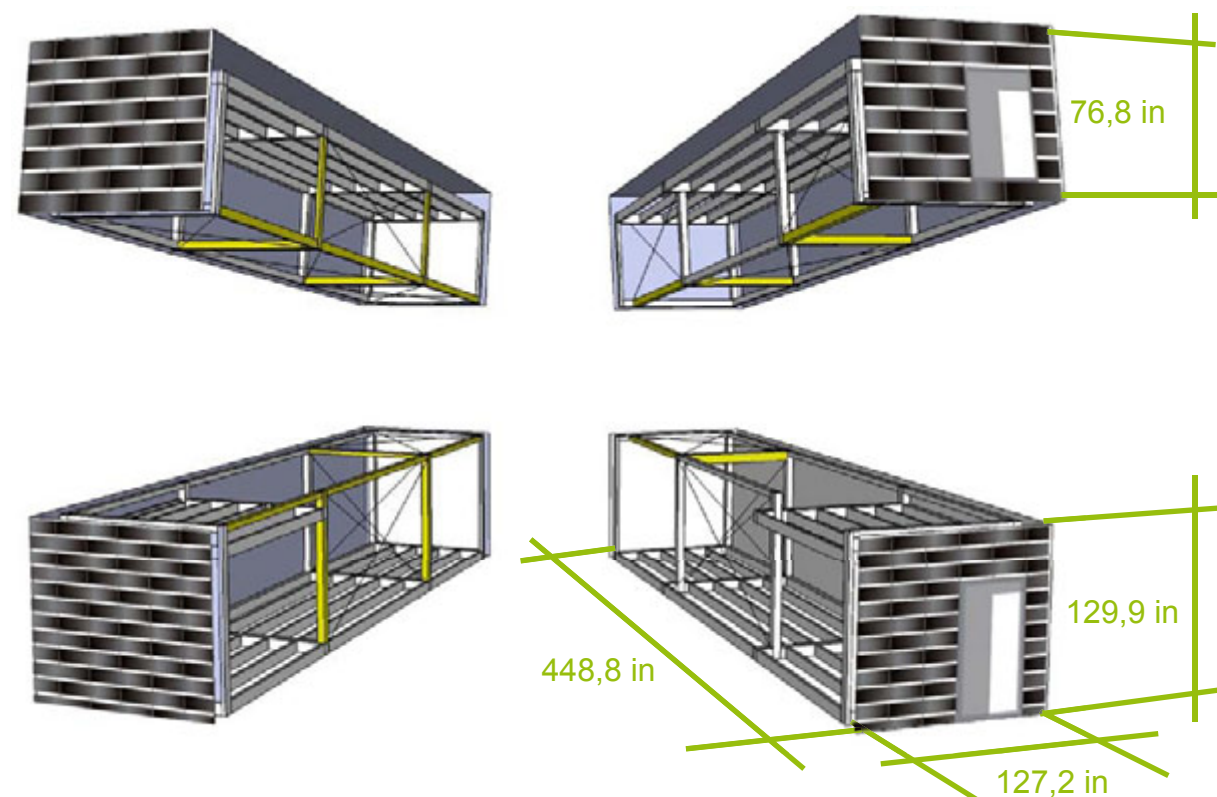
Operations

Description

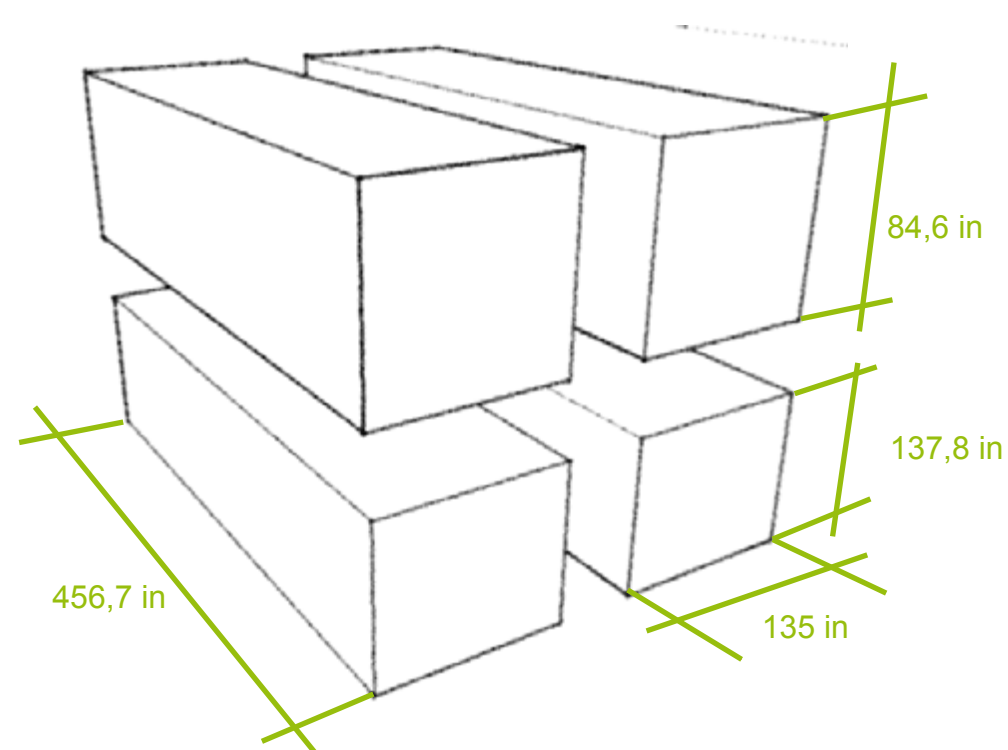
Transport Details

Project #Scaledwg #

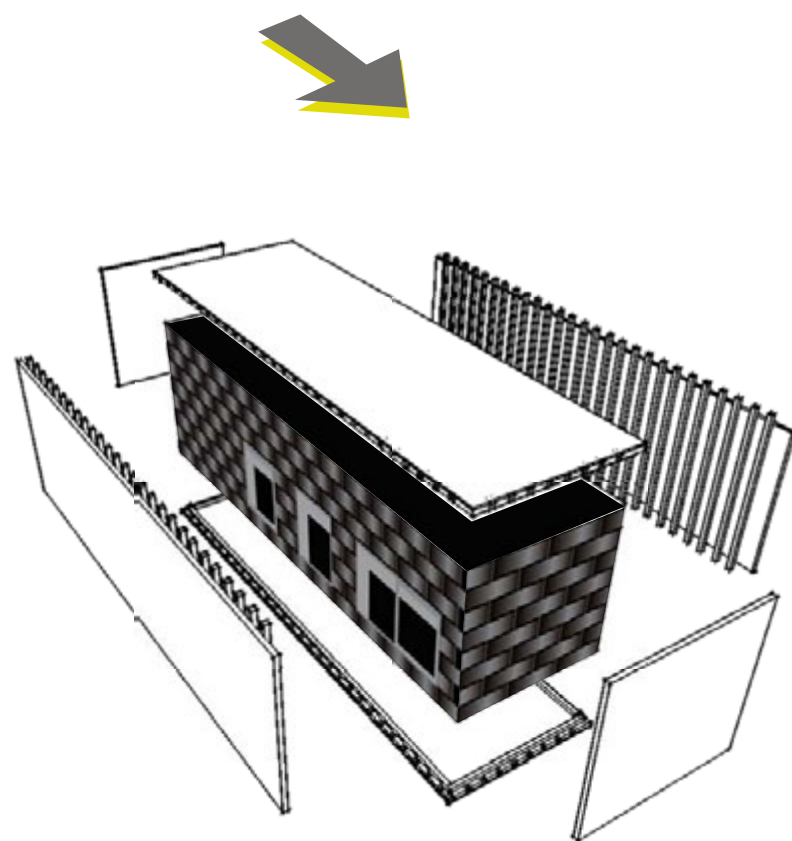
P 140O-130



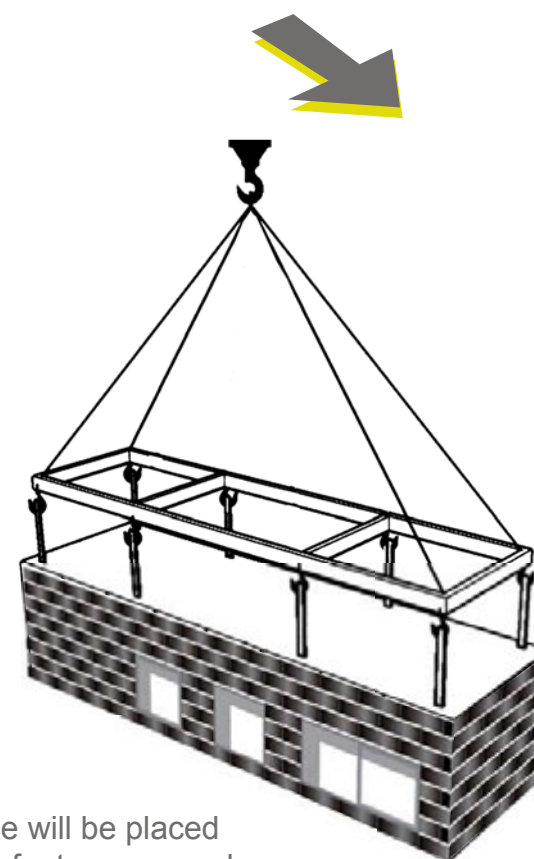
Module proportion with transport-bracing



Module proportion with package



All modules will be packed separate

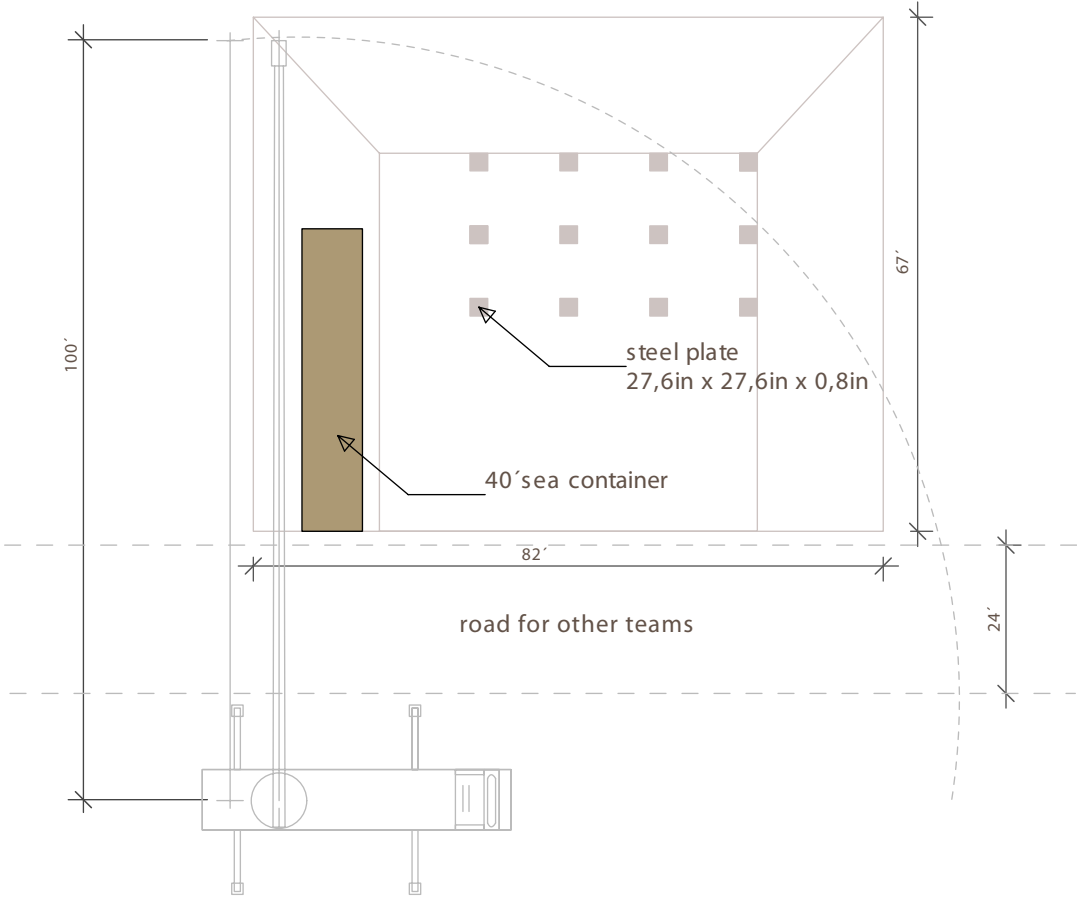

Every module will be placed
with the aid of a traverse and a crane

assembly day 1

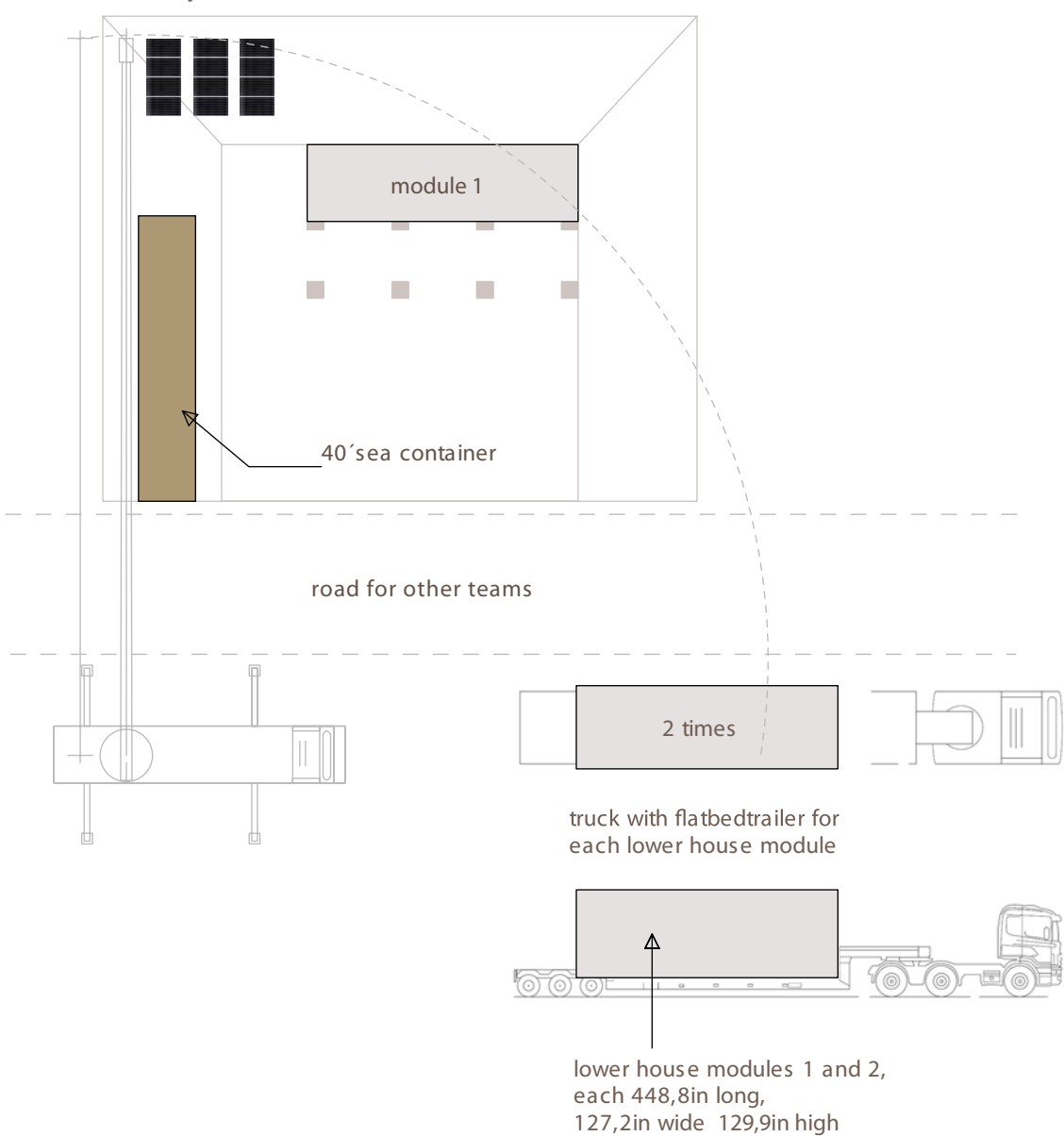
- early morning
- crane setup
 - bring in the 40'-sea-container containing tools, spares and pv-system for the roof
 - unload the 40'-sea-container
 - level the steel-plates on the mall

- during the day
- set up the two lower housemodules on the plates first, then set up the two upper housemodules above and fix them together

site-plan, 1st. day, morning
thursday 01.10.2009



site-plan, 1st. day, whole day
thursday 01.10.2009

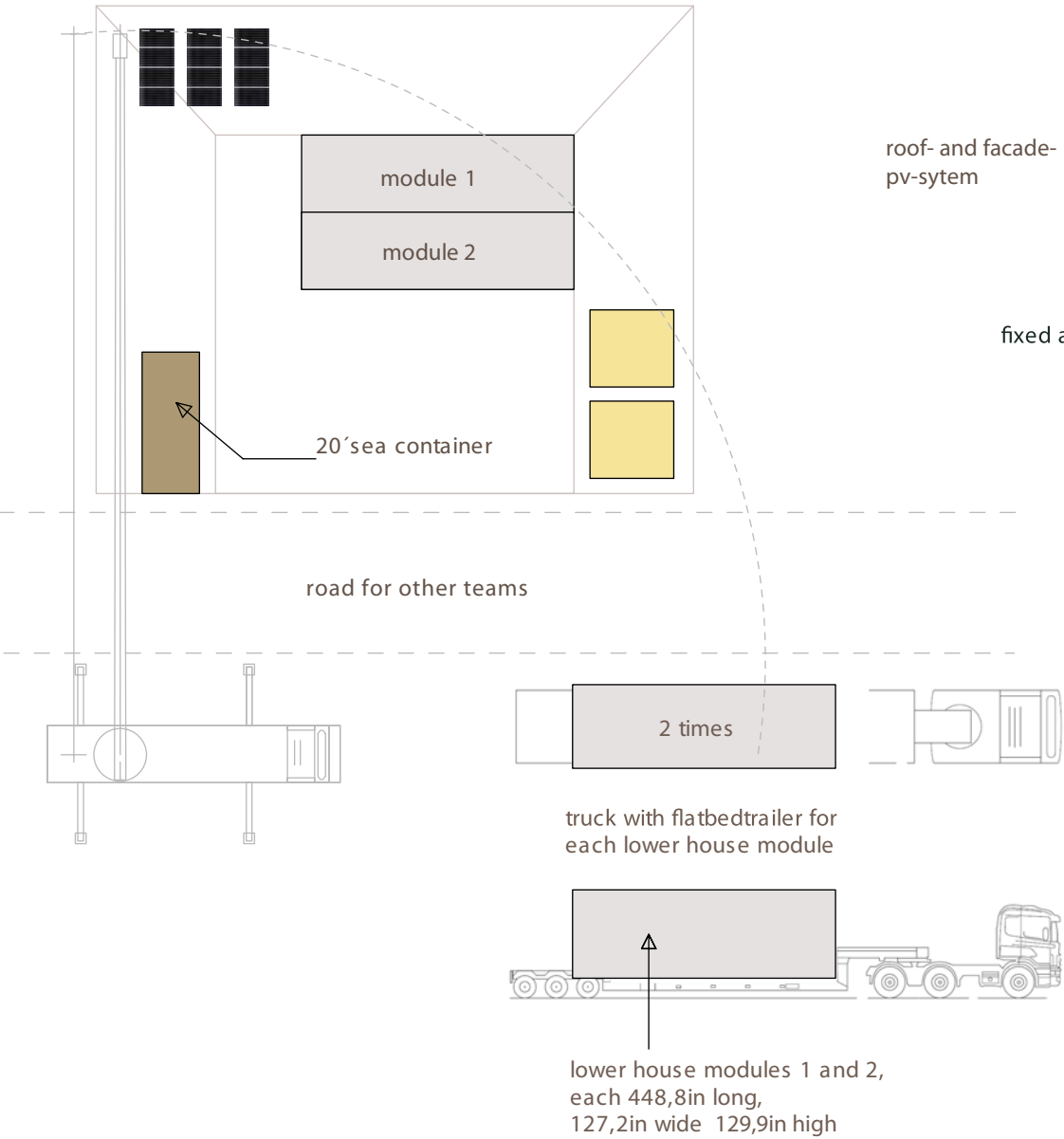


- till evening and at night
- remove covering and transport-bracing
 - assemble a scaffolding to start grout- and facade-operations

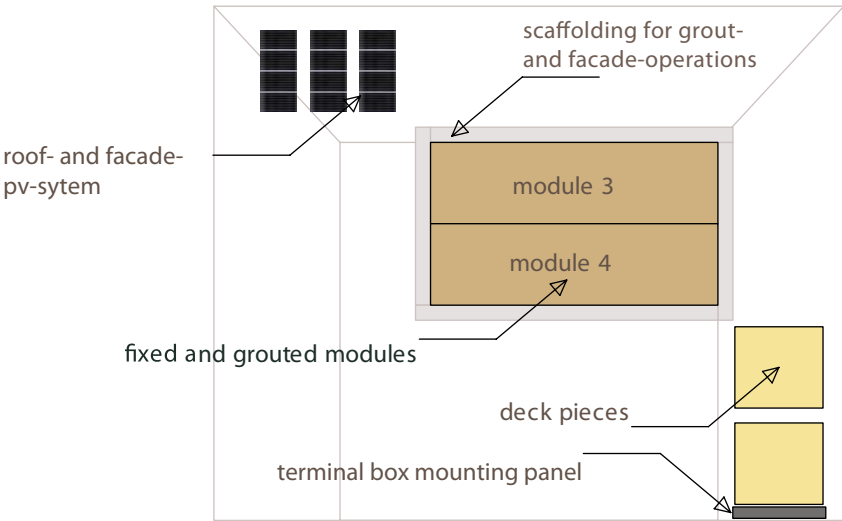
assembly day 2

- early morning
- free standing terminal box mounting panel will be placed
 - remove the 40'-sea-container and bring in the 20'-sea-container containing deckpieces
 - unload the 20'-sea-container and remove the crane

site-plan, 1st. day, evening/ night
thursday 01.10.2009



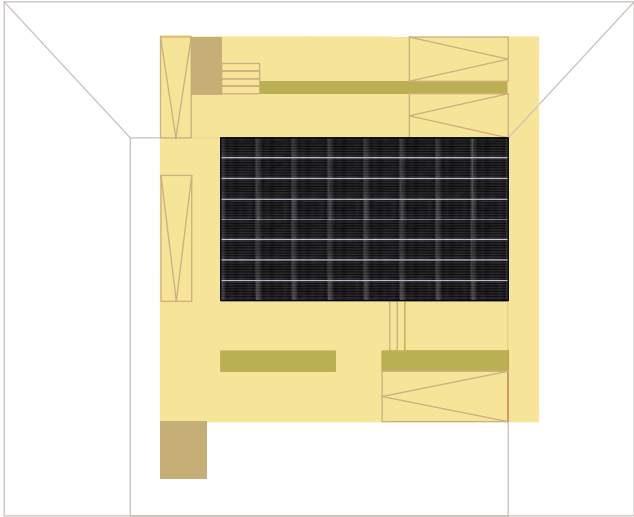
site-plan, 2nd. day, during the day
friday 02.10.2009



during this day
- start assembling the deck and roof-pv-system

during the following days
- facade-, roof-, deck- and interior-operations will be continued

site-plan, 2nd. till 7th.day
friday 02.10. - wednesday 07.10.2009

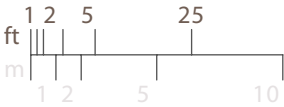
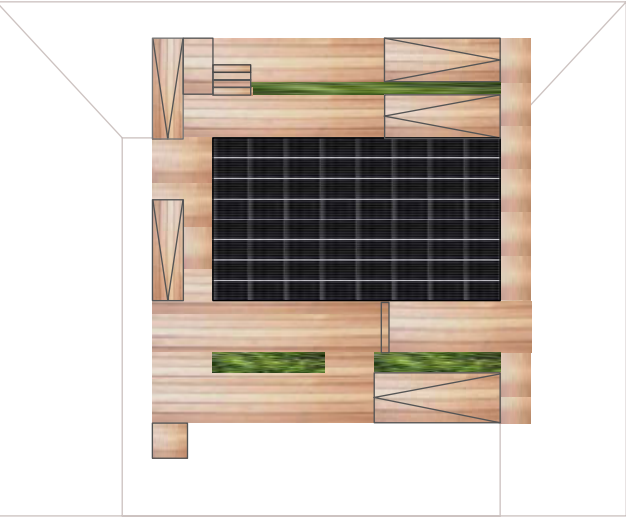


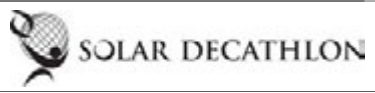
disassembly

day 19 till 21/
monday 19.10. till wednesday 21.10.2009

- uninstall roof- and facade-pv-cells
- set up crane
- bring in 20'-sea-container
- load deck and remove 20'-sea-container
- remove 4 house modules
- bring in 40'-sea-container
- depart

site-plan, 7th. day, work is finished
wednesday 07.10.2009





Project

SOLAR DECATHLON 2009
TEAM GERMANY

Constructor

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

DrawnAS, SS

Issued05/12/09

Last index

Component

Operations

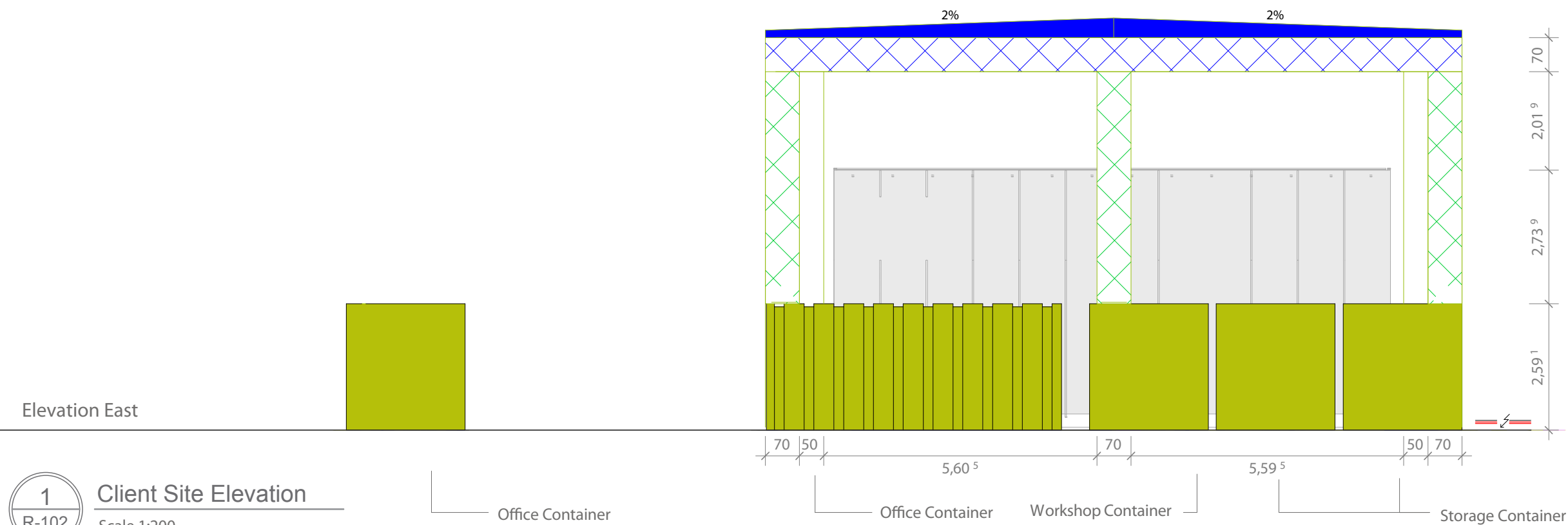
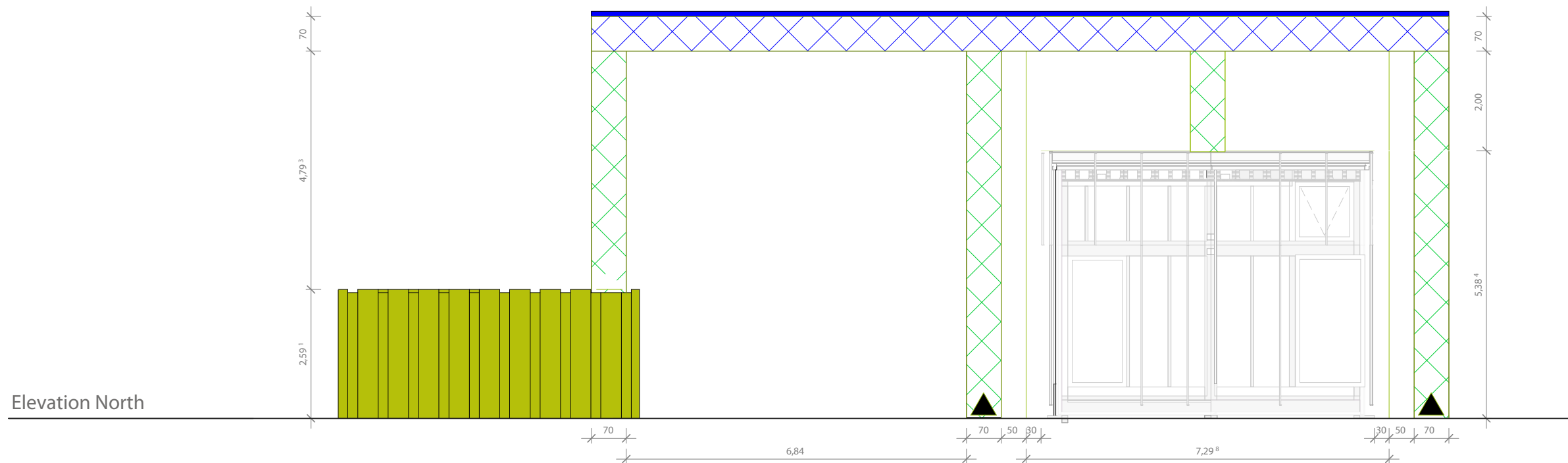
Description

Site Operations, Day 1-7
and Disessembly

Project #Scaledwg #

P 140O-310

Schedules for Operation Equipment										
Plan No.	Project Manual Division Master Format	Article Name	Article Manufacturer	Article Number	Size			Quantity		Notes
					L	H	W	Amount	Unit	
O-110 - O-310	Div. 26	Generator, ESE 4500 T	Endress	110 002	580	618	527	2	PC	
O-110 - O-310	Div. 01	Crane with 200 metric tons counterweight, able to handle 20 metric tons extended over 8'	-	-	-	-	-	1	PC	under examination
O-110 - O-310	Div. 01	Side-loader-crane-trucks	-	-	-	-	-	2	PC	under examination
O-110 - O-310	Div. 01	Semi-trailer-trucks with flat-bed trailers	-	-	-	-	-	4	PC	under examination
O-110 - O-310	Div. 01	Mobile scaffolding	-	-	-	-	-	1	PC	under examination
O-110 - O-310	Div. 01	Packing (wooden plates)	-	-	-	-	-			under examination
O-110 - O-310	Div. 01	20'-sea container			20'	8'6"	8'	1	PC	under examination
O-110 - O-310	Div. 01	40'-sea container			40'	8'6"	8'	2	PC	under examination
O-110 - O-310	Div. 01	helmets, gloves, safety goggles, harnesses, safety boots, tools	-	-	-	-	-	-	PC	



Client Site Elevation

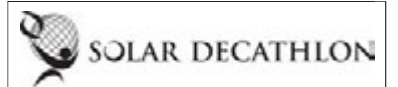
Scale 1:200

Office Container

Office Container

Workshop Container

Storage Container



Project



Constructor



Department of Architecture
Energyefficient Building Design
Unit

El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend

- Scaffolding, Bearing
- Scaffolding, horizontal
- Scaffolding, vertikal
- Roofing
- Site Fence
- Site Power Supply

Drawn PT, KE

Issued 05/12/09

Last index

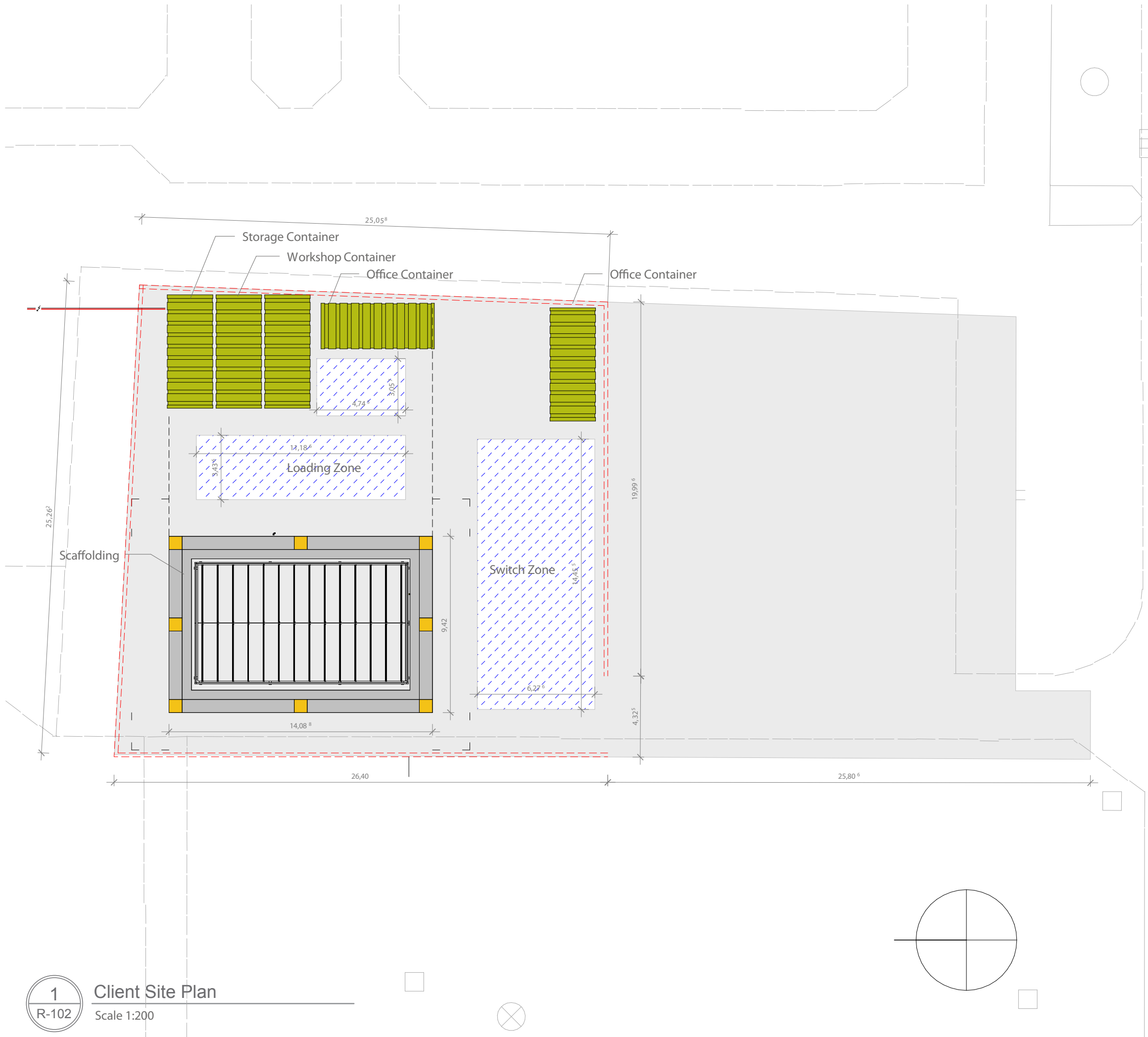
Component

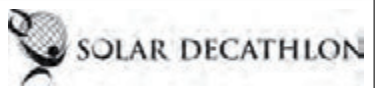
Resources

Description

Client Site Elevation

Project #	Scale	dwg #
P 140	1:200	R-101





Project
SOLAR DECATHLON 2009
TEAM GERMANY

Constructor
TECHNISCHE
UNIVERSITÄT
DARMSTADT

Department of Architecture
Energyefficient Building Design
Unit
El-Lissitzky-Str. 1
64287 Darmstadt
+49 (0) 6151 / 165448
+49 (0) 6151 / 165247
team@solardecathlon2009.de

Navigation/Legend



Drawn KE, PT
Issued 05/12/09
Last index

Component
Resources

Description
Client Site Photographs

Project # Scale dwg #
P 140 R-103