Aniron Renewables
Horton Lodge Farm
NN7 2BA
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Project Name: Capalex Aluminium Extrusions Ltd

09/01/2023

Your PV system from Aniron Renewables

Address of Installation

Capalex Aluminium Extrusions
Leconfield Industrial Estate
Cleator Moor
CA25 5QB

Project Overview

Figure: Overview Image, 3D Design

PV System

3D, Grid-connected PV System with Electrical Appliances

Climate Data	Capalex, GBR (1996 - 2015)	
Values source	Meteonorm 8.1(i)	
PV Generator Output	280.28	kWp
PV Generator Surface	1,354.8	m²
Number of PV Modules	728	
Number of Inverters	4	

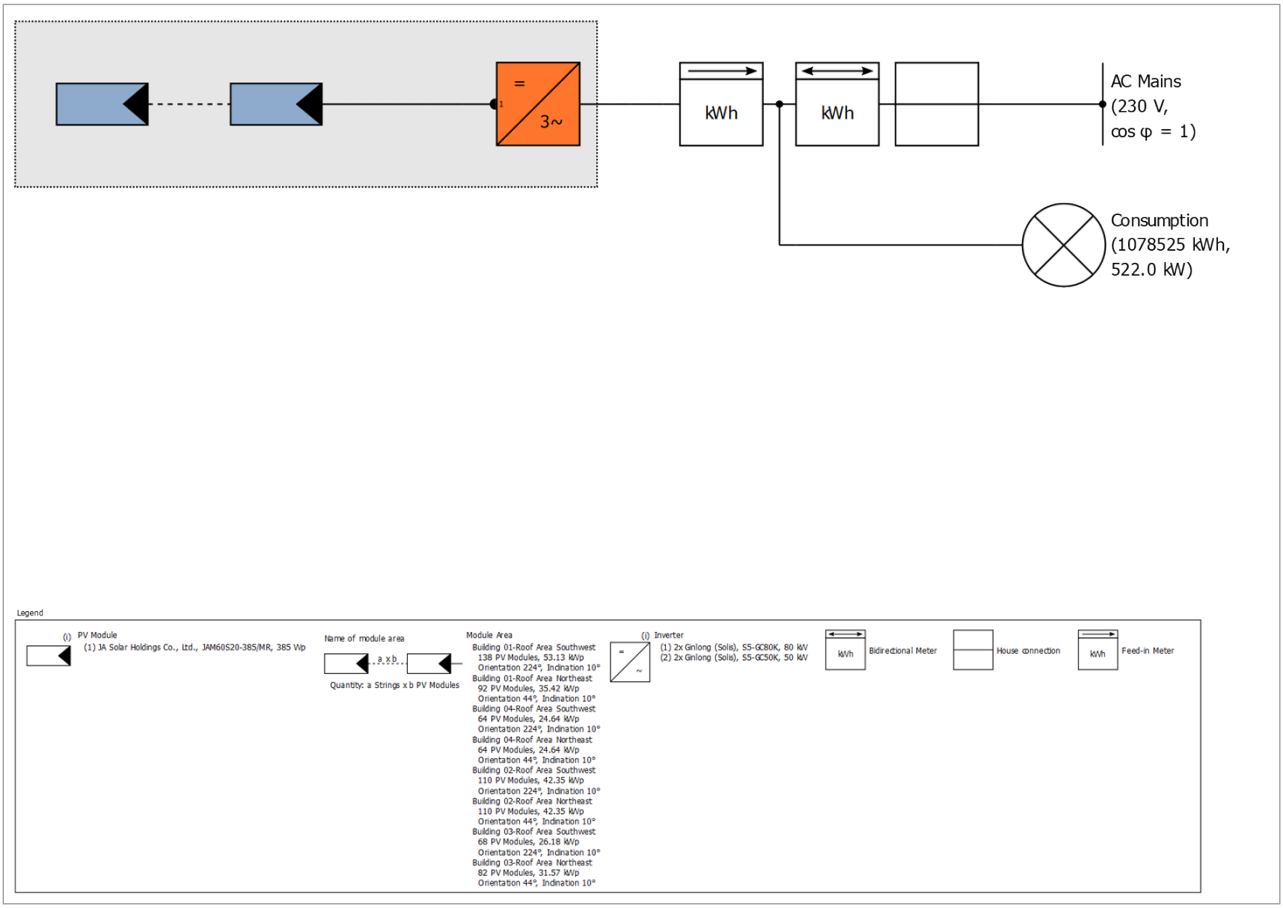


Figure: Schematic diagram

Production Forecast

Production Forecast

PV Generator Output	280.28	kWp
Spec. Annual Yield	793.87	kWh/kWp
Performance Ratio (PR)	84.67	%
Yield Reduction due to Shading	6.2	%
PV Generator Energy (AC grid)	222,548	kWh/Year
Own Consumption	176,504	kWh/Year
Down-regulation at Feed-in Point	0	kWh/Year
Grid Feed-in	46,045	kWh/Year
Own Power Consumption	79.3	%
CO_2 Emissions avoided	43,166	kg / year
Level of Self-sufficiency	16.4	%

Financial Analysis

Your Gain

Total investment costs	420,420.00	£
Internal Rate of Return (IRR)	7.48	%
Amortization Period	11.3	Years
Electricity Production Costs	0.1002	£/kWh
Energy Balance/Feed-in Concept	Surplus Feed-in	

The results have been calculated with a mathematical model calculation from Valentin Software GmbH (PV*SOL algorithms). The actual yields from the solar power system may differ as a result of weather variations, the efficiency of the modules and inverter, and other factors.

Set-up of the System

Overview

System Data

Type of System	3D, Grid-connected PV System with Electrical Appliances

Climate Data

Location	Capalex, GBR (1996 - 2015)
Values source	Meteonorm 8.1(i)
Resolution of the data	1 h
Simulation models used:	
- Diffuse Irradiation onto Horizontal Plane	Reindl reduced
- Irradiance onto tilted surface	Hay & Davies

Consumption

Total Consumption	1078525 kWh
Capalex HHD Starting 01.01.22	1078525 kWh
Load Peak	522 kW

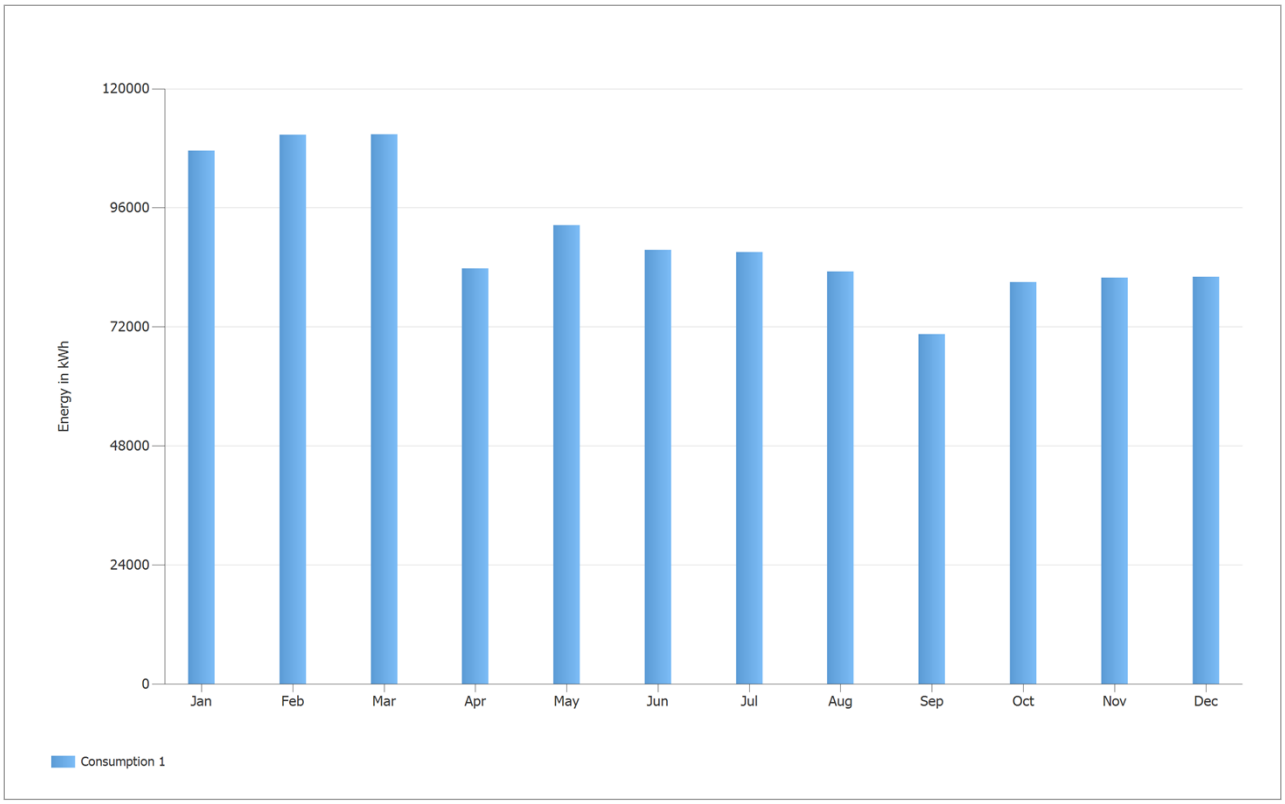


Figure: Consumption

Module Areas

1. Module Area - Building 01-Roof Area Southwest

PV Generator, 1. Module Area - Building 01-Roof Area Southwest

Name	Building 01-Roof Area Southwest
PV Modules	138 x JAM60S20-385/MR (v6)
Manufacturer	JA Solar Holdings Co., Ltd.
Inclination	10 °
Orientation	Southwest 224 °
Installation Type	Roof parallel
PV Generator Surface	256.8 m²

Figure: 1. Module Area - Building 01-Roof Area Southwest

2. Module Area - Building 01-Roof Area Northeast

PV Generator, 2. Module Area - Building 01-Roof Area Northeast

Name	Building 01-Roof Area Northeast
PV Modules	92 x JAM60S20-385/MR (v6)
Manufacturer	JA Solar Holdings Co., Ltd.
Inclination	10 °
Orientation	Northeast 44 °
Installation Type	Roof parallel
PV Generator Surface	171.2 m²

Figure: 2. Module Area - Building 01-Roof Area Northeast

3. Module Area - Building 04-Roof Area Southwest

PV Generator, 3. Module Area - Building 04-Roof Area Southwest

Name	Building 04-Roof Area Southwest
PV Modules	64 x JAM60S20-385/MR (v6)
Manufacturer	JA Solar Holdings Co., Ltd.
Inclination	10 °
Orientation	Southwest 224 °
Installation Type	Roof parallel
PV Generator Surface	119.1 m²

Figure: 3. Module Area - Building 04-Roof Area Southwest

4. Module Area - Building 04-Roof Area Northeast

PV Generator, 4. Module Area - Building 04-Roof Area Northeast

Name	Building 04-Roof Area Northeast
PV Modules	64 x JAM60S20-385/MR (v6)
Manufacturer	JA Solar Holdings Co., Ltd.
Inclination	10 °
Orientation	Northeast 44 °
Installation Type	Roof parallel
PV Generator Surface	119.1 m²

Figure: 4. Module Area - Building 04-Roof Area Northeast

5. Module Area - Building 02-Roof Area Southwest

PV Generator, 5. Module Area - Building 02-Roof Area Southwest

Name	Building 02-Roof Area Southwest
PV Modules	110 x JAM60S20-385/MR (v6)
Manufacturer	JA Solar Holdings Co., Ltd.
Inclination	10 °
Orientation	Southwest 224 °
Installation Type	Roof parallel
PV Generator Surface	204.7 m²

Figure: 5. Module Area - Building 02-Roof Area Southwest

6. Module Area - Building 02-Roof Area Northeast

PV Generator, 6. Module Area - Building 02-Roof Area Northeast

Name	Building 02-Roof Area Northeast
PV Modules	110 x JAM60S20-385/MR (v6)
Manufacturer	JA Solar Holdings Co., Ltd.
Inclination	10 °
Orientation	Northeast 44 °
Installation Type	Roof parallel
PV Generator Surface	204.7 m²

Figure: 6. Module Area - Building 02-Roof Area Northeast

7. Module Area - Building 03-Roof Area Southwest

PV Generator, 7. Module Area - Building 03-Roof Area Southwest

Name	Building 03-Roof Area Southwest
PV Modules	68 x JAM60S20-385/MR (v6)
Manufacturer	JA Solar Holdings Co., Ltd.
Inclination	10 °
Orientation	Southwest 224 °
Installation Type	Roof parallel
PV Generator Surface	126.5 m²

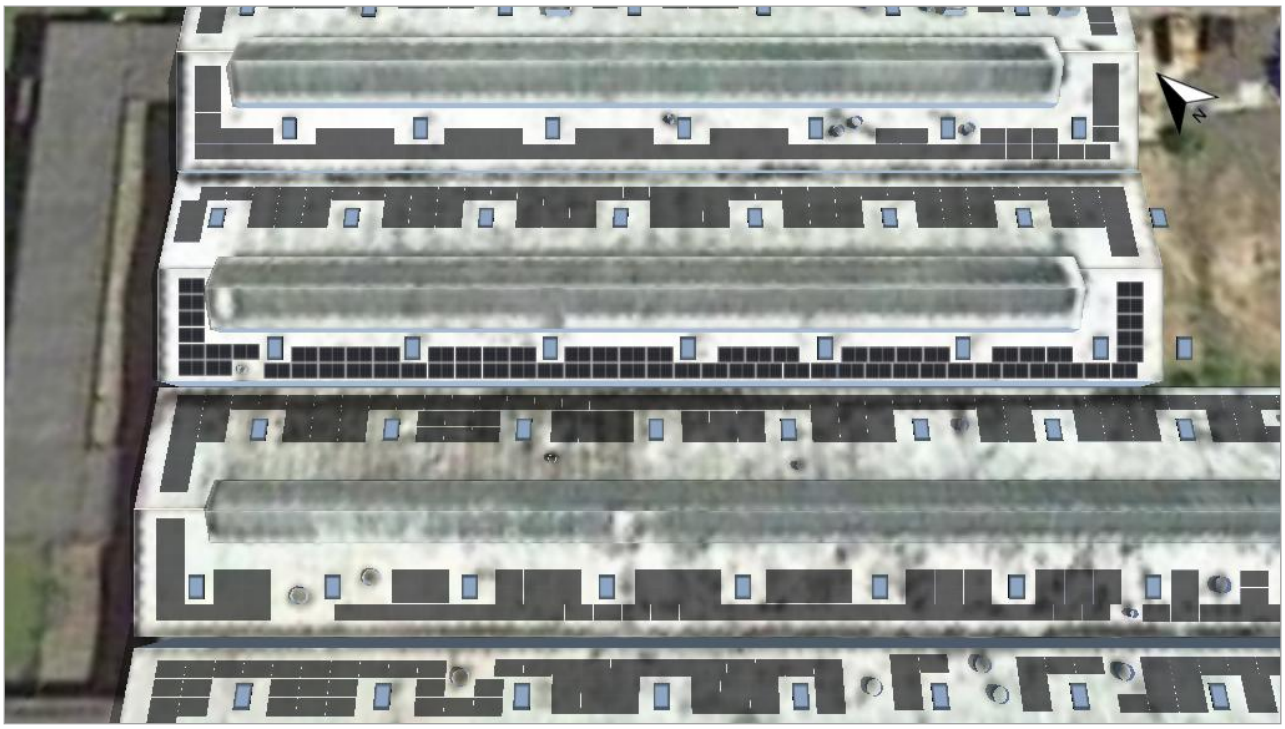


Figure: 7. Module Area - Building 03-Roof Area Southwest

8. Module Area - Building 03-Roof Area Northeast

PV Generator, 8. Module Area - Building 03-Roof Area Northeast

Name	Building 03-Roof Area Northeast
PV Modules	82 x JAM60S20-385/MR (v6)
Manufacturer	JA Solar Holdings Co., Ltd.
Inclination	10 °
Orientation	Northeast 44 °
Installation Type	Roof parallel
PV Generator Surface	152.6 m²

Figure: 8. Module Area - Building 03-Roof Area Northeast

Horizon Line, 3D Design

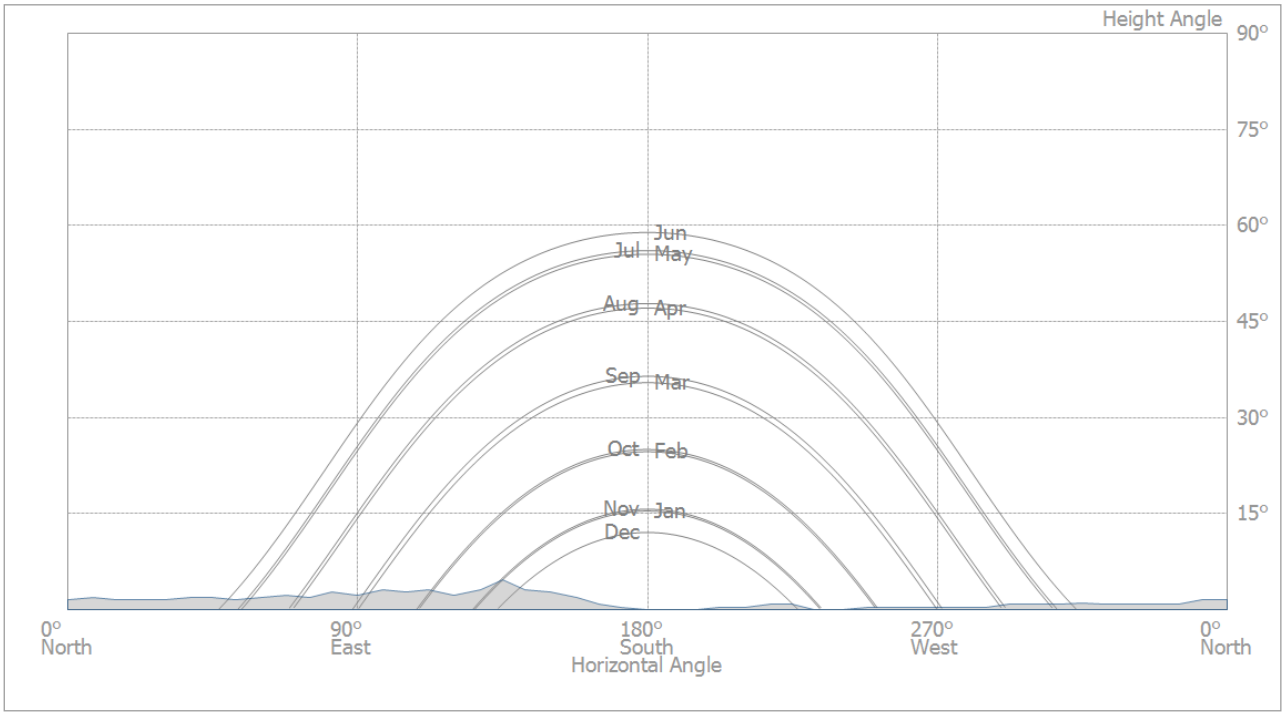


Figure: Horizon (3D Design)

Inverter configuration

Configuration 1

Module Areas	Building 01-Roof Area Southwest + Building 01-Roof Area Northeast
Inverter 1	
Model	S5-GC80K (v3)
Manufacturer	Ginlong (Solis)
Quantity	1
Sizing Factor	110.7 %
Configuration	MPP 1: 2 x 15
	MPP 2: 2 x 15
	MPP 3: 2 x 12
	MPP 4: 1 x 18
	MPP 5: 1 x 18
	MPP 6: 1 x 18
	MPP 7: 2 x 17
	MPP 8: 2 x 15
	MPP 9: 2 x 14

Configuration 2

Module Areas	Building 04-Roof Area Southwest + Building 04-Roof Area Northeast
Inverter 1	
Model	S5-GC50K (v2)
Manufacturer	Ginlong (Solis)
Quantity	1
Sizing Factor	98.6 %
Configuration	MPP 1: 2 x 14
	MPP 2: 1 x 18
	MPP 3: 1 x 18
	MPP 4: 2 x 17
	MPP 5: 2 x 15

Configuration 3

Module Areas	Building 02-Roof Area Southwest + Building 02-Roof Area Northeast
Inverter 1	
Model	S5-GC80K (v3)
Manufacturer	Ginlong (Solis)
Quantity	1
Sizing Factor	105.9 %
Configuration	MPP 1: 2 x 15
	MPP 2: 2 x 12
	MPP 3: 1 x 20
	MPP 4: 1 x 18
	MPP 5: 1 x 18
	MPP 6: 2 x 17
	MPP 7: 2 x 17
	MPP 8: 2 x 12
	MPP 9: 1 x 18

Configuration 4

Module Areas	Building 03-Roof Area Southwest + Building 03-Roof Area Northeast
Inverter 1	
Model	S5-GC50K (v2)
Manufacturer	Ginlong (Solis)
Quantity	1
Sizing Factor	115.5 %
Configuration	MPP 1: 2 x 17
	MPP 2: 2 x 17
	MPP 3: 2 x 16
	MPP 4: 2 x 15
	MPP 5: 1 x 20

AC Mains

AC Mains

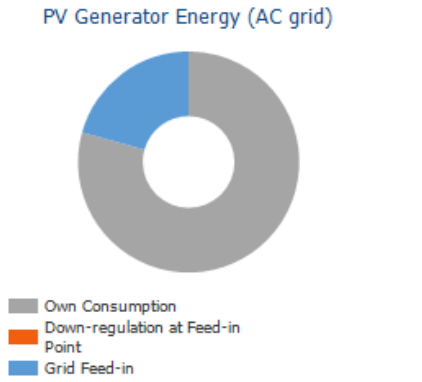
Number of Phases	3
Mains voltage between phase and neutral	230 V
Displacement Power Factor (cos phi)	+/- 1

Simulation Results

Results Total System

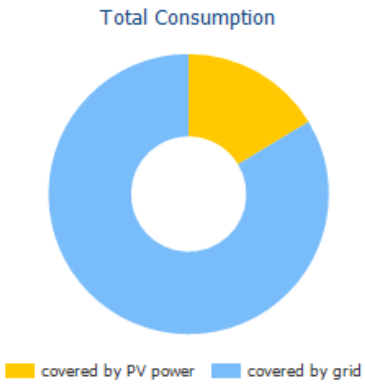
PV System

PV Generator Output	280.28	kWp
Spec. Annual Yield	793.87	kWh/kWp
Performance Ratio (PR)	84.67	%
Yield Reduction due to Shading	6.2	%
PV Generator Energy (AC grid)	222,548	kWh/Year
Own Consumption	176,504	kWh/Year
Down-regulation at Feed-in Point	0	kWh/Year
Grid Feed-in	46,045	kWh/Year
Own Power Consumption	79.3	%
CO_2 Emissions avoided	43,166	kg / year



Appliances

Appliances	1,078,525	kWh/Year
Standby Consumption (Inverter)	42	kWh/Year
Total Consumption	1,078,567	kWh/Year
covered by PV power	176,504	kWh/Year
covered by grid	902,064	kWh/Year
Solar Fraction	16.4	%



Level of Self-sufficiency

Total Consumption	1,078,567	kWh/Year
covered by grid	902,064	kWh/Year
Level of Self-sufficiency	16.4	%

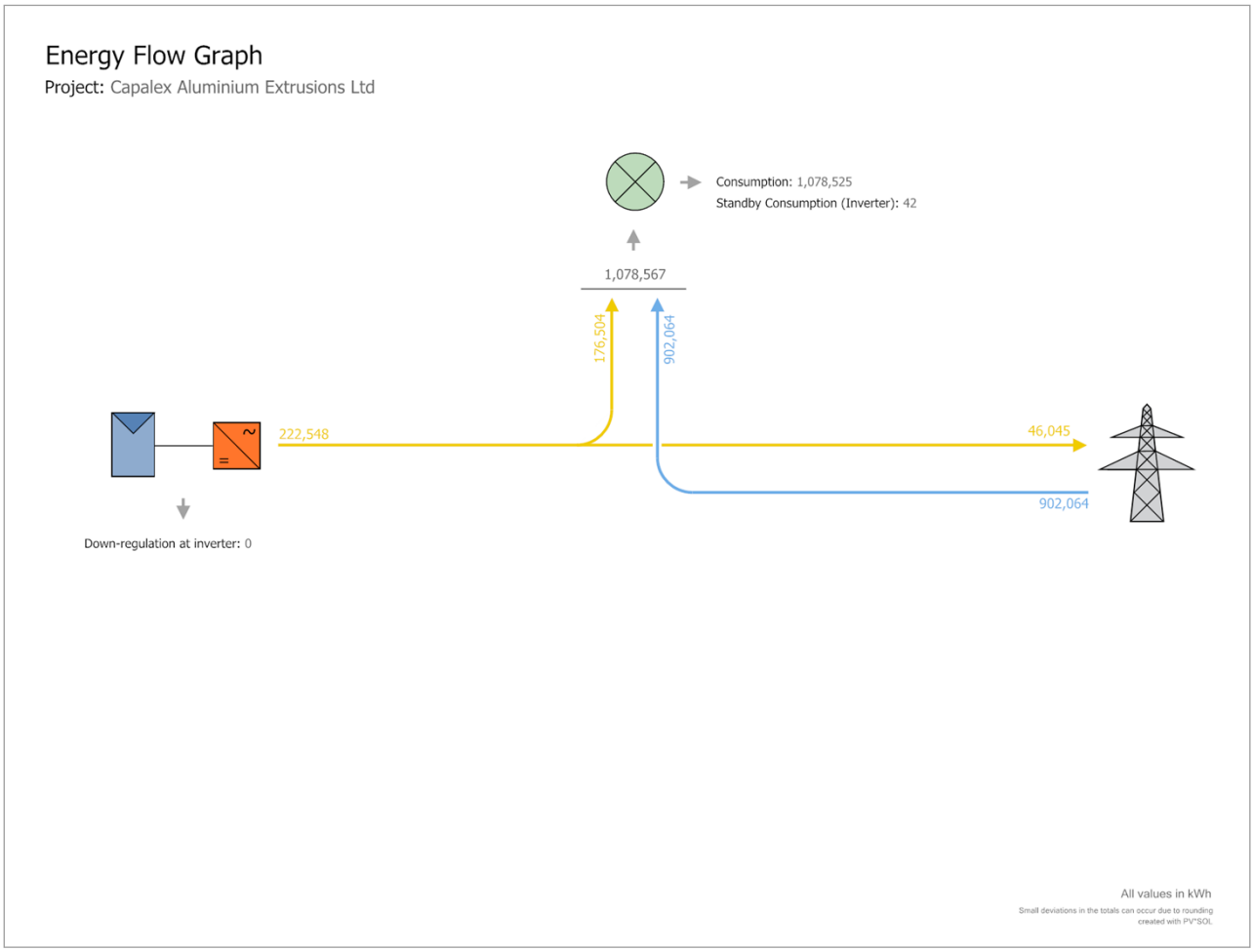


Figure: Energy flow

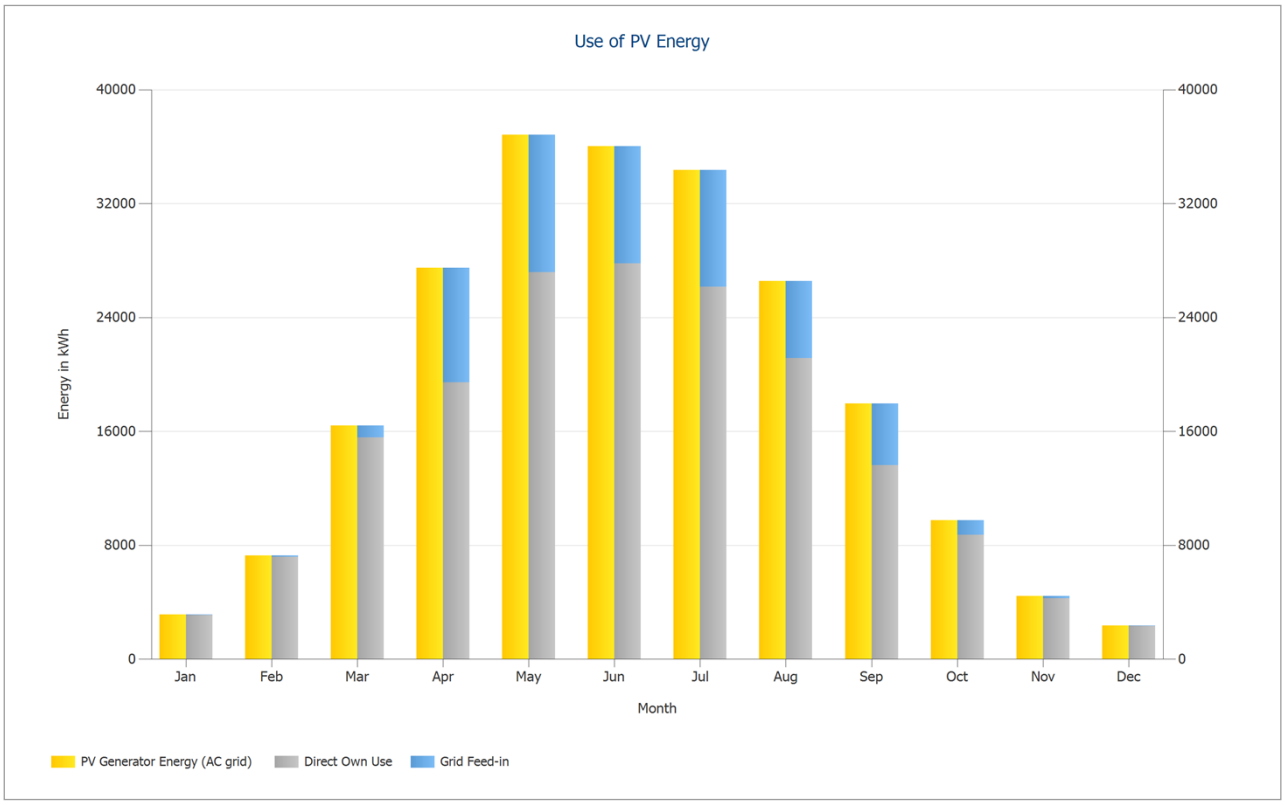


Figure: Use of PV Energy

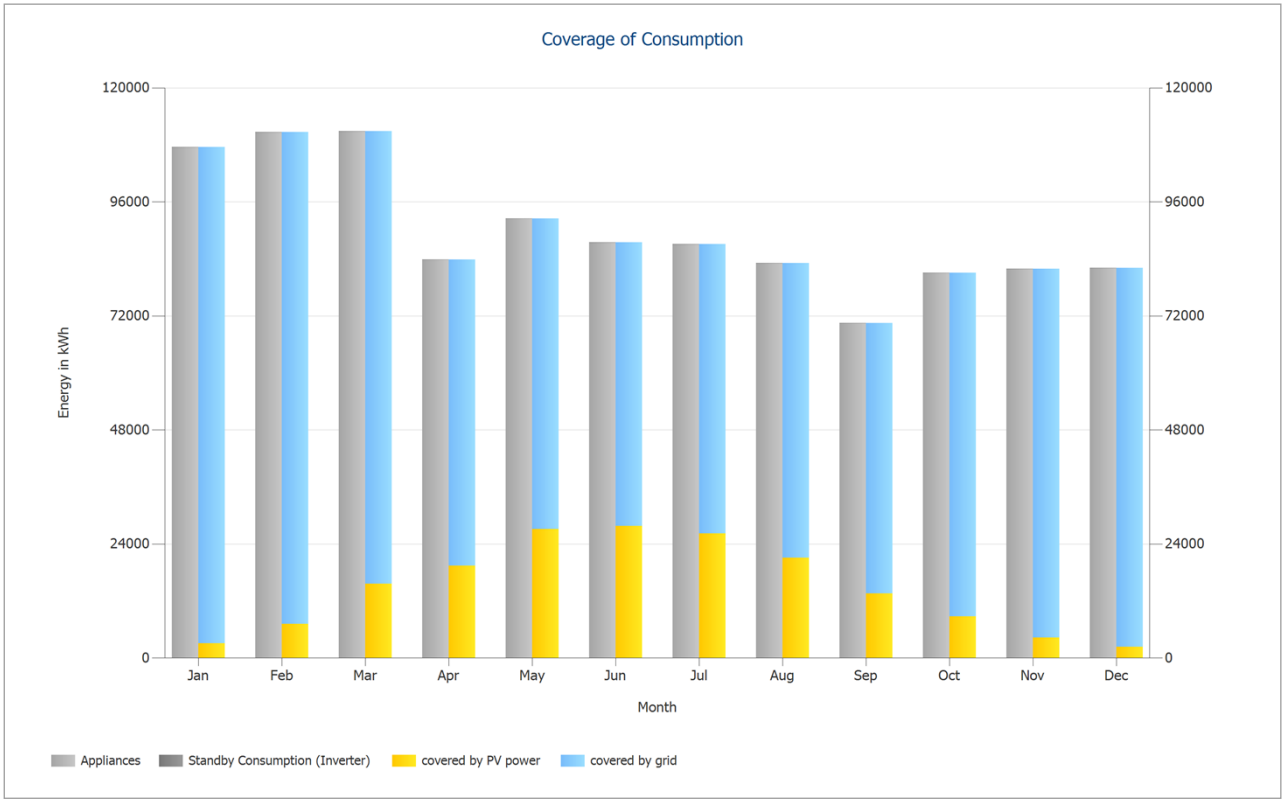


Figure: Coverage of Consumption

Financial Analysis

Overview

System Data

Grid Feed-in in the first year (incl. module degradation)	45,297	kWh/Year
PV Generator Output	280.3	kWp
Start of Operation of the System	09/01/2023	
Assessment Period	20	Years
Interest on Capital	1	%

Economic Parameters

Internal Rate of Return (IRR)	7.48	%
Accrued Cash Flow (Cash Balance)	362,583.70	£
Amortization Period	11.3	Years
Electricity Production Costs	0.1002	£/kWh

Payment Overview

Specific Investment Costs	1,500.00	£/kWp
Investment Costs	420,420.00	£
One-off Payments	0.00	£
Incoming Subsidies	0.00	£
Annual Costs	0.00	£/Year
Other Revenue or Savings	0.00	£/Year

Remuneration and Savings

Total Payment from Utility in First Year	1,039.17	£/Year
First year savings	38,510.14	£/Year
EEG 2023 (Teileinspeisung) - Gebäudeanlagen		
Validity	09/01/2023 -	31/12/2043
Specific feed-in / export Remuneration	0.0229	£/kWh
Feed-in / Export Tariff	1039.165	£/Year
Example Private (Example)		
Energy Price	0.2218	£/kWh
Base Price	6.9	£/Month
Inflation Rate for Energy Price	2	%/Year

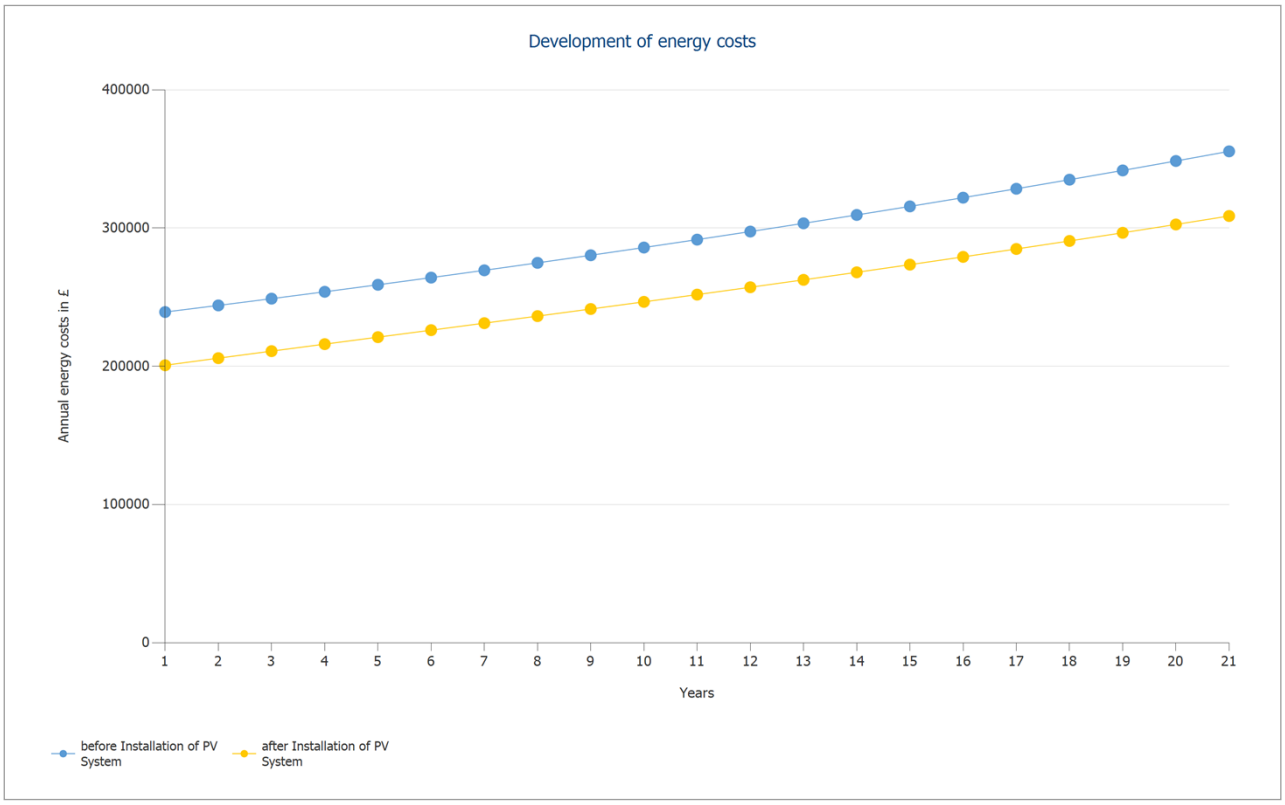


Figure: Development of energy costs

Cash flow

Cash flow

	Year 1	Year 2	Year 3	Year 4	Year 5
Investments	-£420,420.00	£0.00	£0.00	£0.00	£0.00
Feed-in / Export Tariff	£1,028.72	£989.68	£955.47	£925.47	£899.01
Electricity Savings	£37,953.52	£37,409.03	£36,837.45	£36,393.57	£36,059.78
Annual Cash Flow	**-£381,437.76**	**£38,398.71**	**£37,792.92**	**£37,319.04**	**£36,958.80**
Accrued Cash Flow (Cash Balance)	-£381,437.76	-£343,039.04	-£305,246.12	-£267,927.08	-£230,968.29

Cash flow

	Year 6	Year 7	Year 8	Year 9	Year 10
Investments	£0.00	£0.00	£0.00	£0.00	£0.00
Feed-in / Export Tariff	£875.56	£854.64	£835.88	£818.93	£803.52
Electricity Savings	£35,820.98	£35,664.15	£35,578.22	£35,553.56	£35,582.06
Annual Cash Flow	**£36,696.54**	**£36,518.79**	**£36,414.10**	**£36,372.49**	**£36,385.58**
Accrued Cash Flow (Cash Balance)	-£194,271.75	-£157,752.96	-£121,338.86	-£84,966.37	-£48,580.79

Cash flow

	Year 11	Year 12	Year 13	Year 14	Year 15
Investments	£0.00	£0.00	£0.00	£0.00	£0.00
Feed-in / Export Tariff	£789.42	£776.43	£764.40	£753.17	£742.63
Electricity Savings	£35,656.61	£35,771.24	£35,920.78	£36,100.76	£36,307.38
Annual Cash Flow	**£36,446.03**	**£36,547.68**	**£36,685.17**	**£36,853.92**	**£37,050.01**
Accrued Cash Flow (Cash Balance)	-£12,134.76	£24,412.91	£61,098.09	£97,952.01	£135,002.02

Cash flow

	Year 16	Year 17	Year 18	Year 19	Year 20
Investments	£0.00	£0.00	£0.00	£0.00	£0.00
Feed-in / Export Tariff	£732.68	£723.24	£714.25	£705.63	£697.34
Electricity Savings	£36,537.39	£36,788.05	£37,056.87	£37,341.89	£37,641.33
Annual Cash Flow	**£37,270.08**	**£37,511.29**	**£37,771.12**	**£38,047.52**	**£38,338.67**
Accrued Cash Flow (Cash Balance)	£172,272.09	£209,783.38	£247,554.50	£285,602.02	£323,940.69

Cash flow

	Year 21
Investments	£0.00
Feed-in / Export Tariff	£689.34
Electricity Savings	£37,953.67
Annual Cash Flow	**£38,643.01**
Accrued Cash Flow (Cash Balance)	£362,583.70

Degradation and inflation rates are applied on a monthly basis over the entire observation period. This is done in the first year.

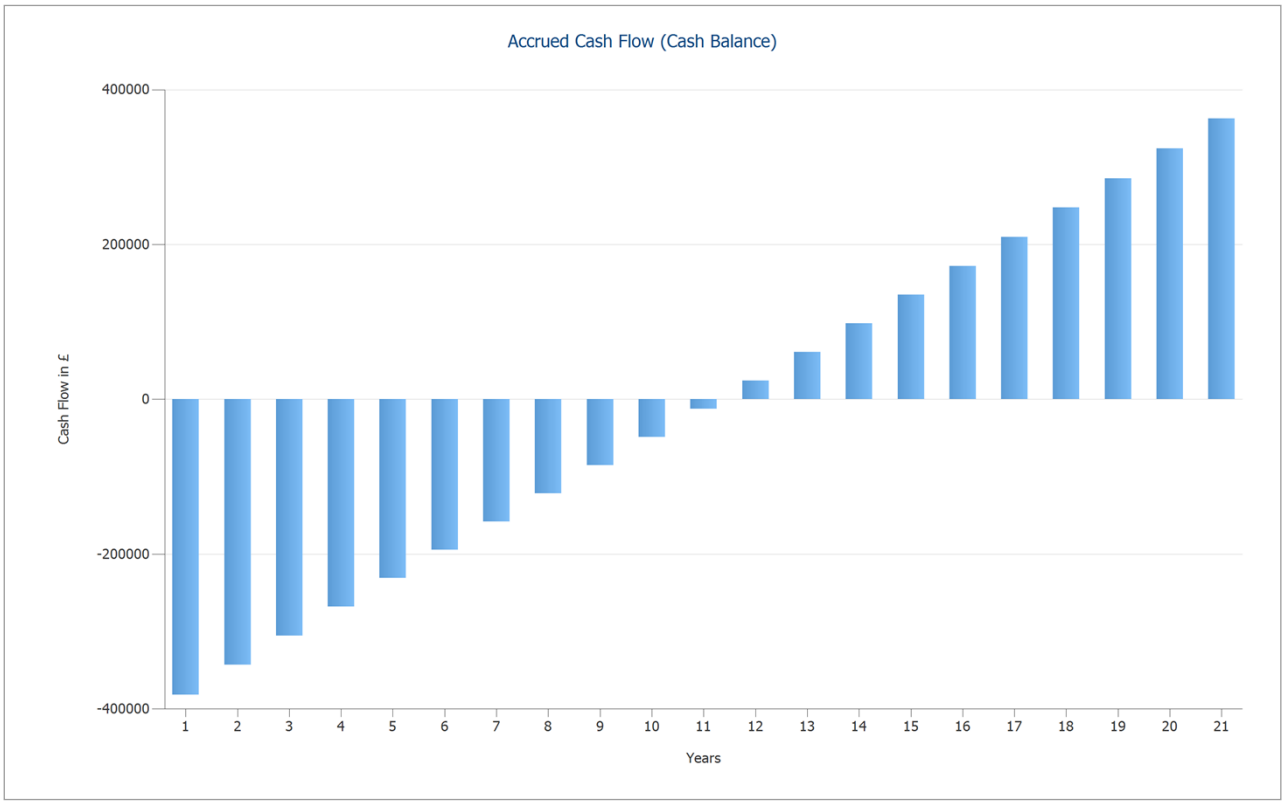


Figure: Accrued Cash Flow (Cash Balance)

Plans and parts list

Circuit Diagram

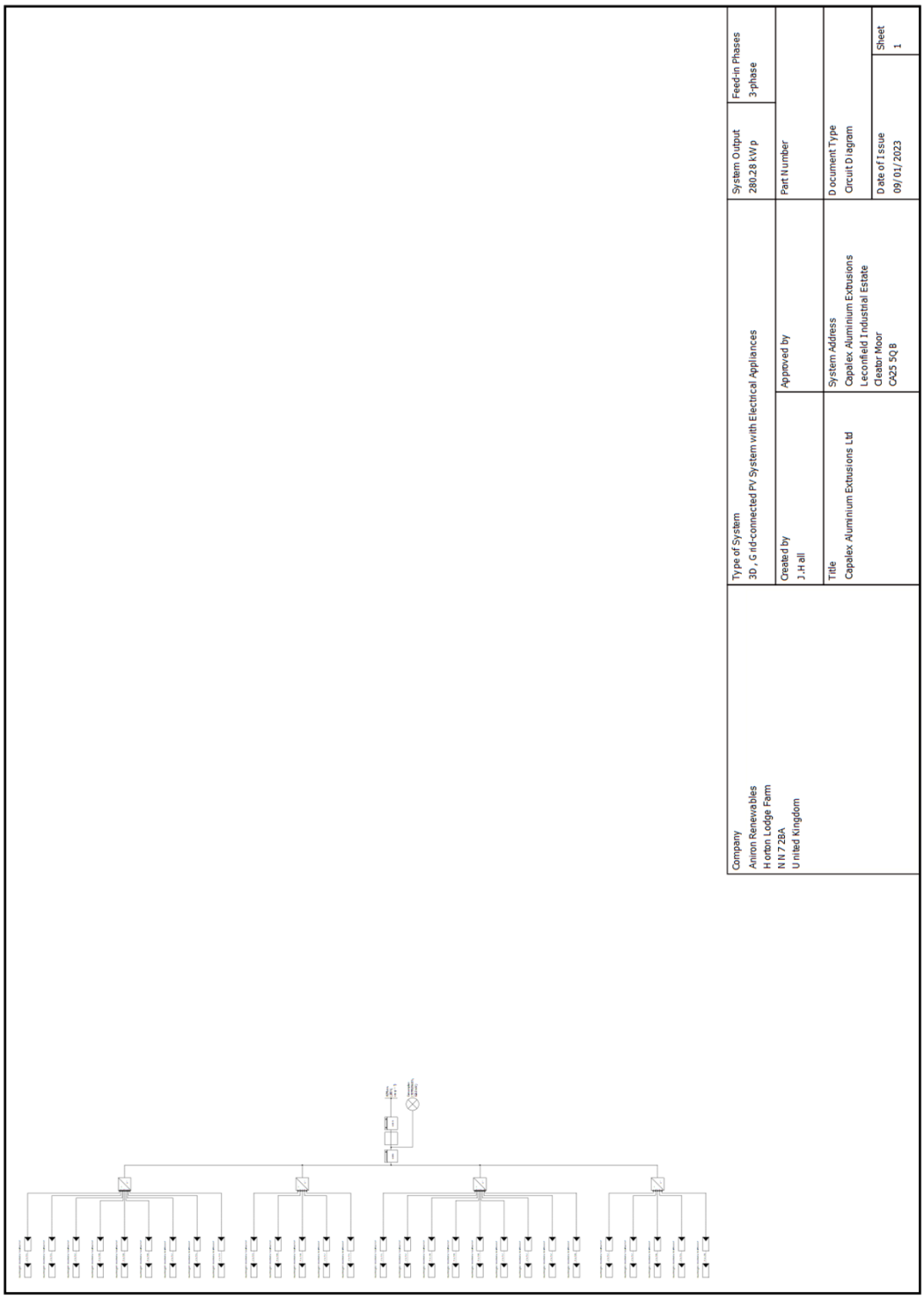


Figure: Circuit Diagram

Overview plan

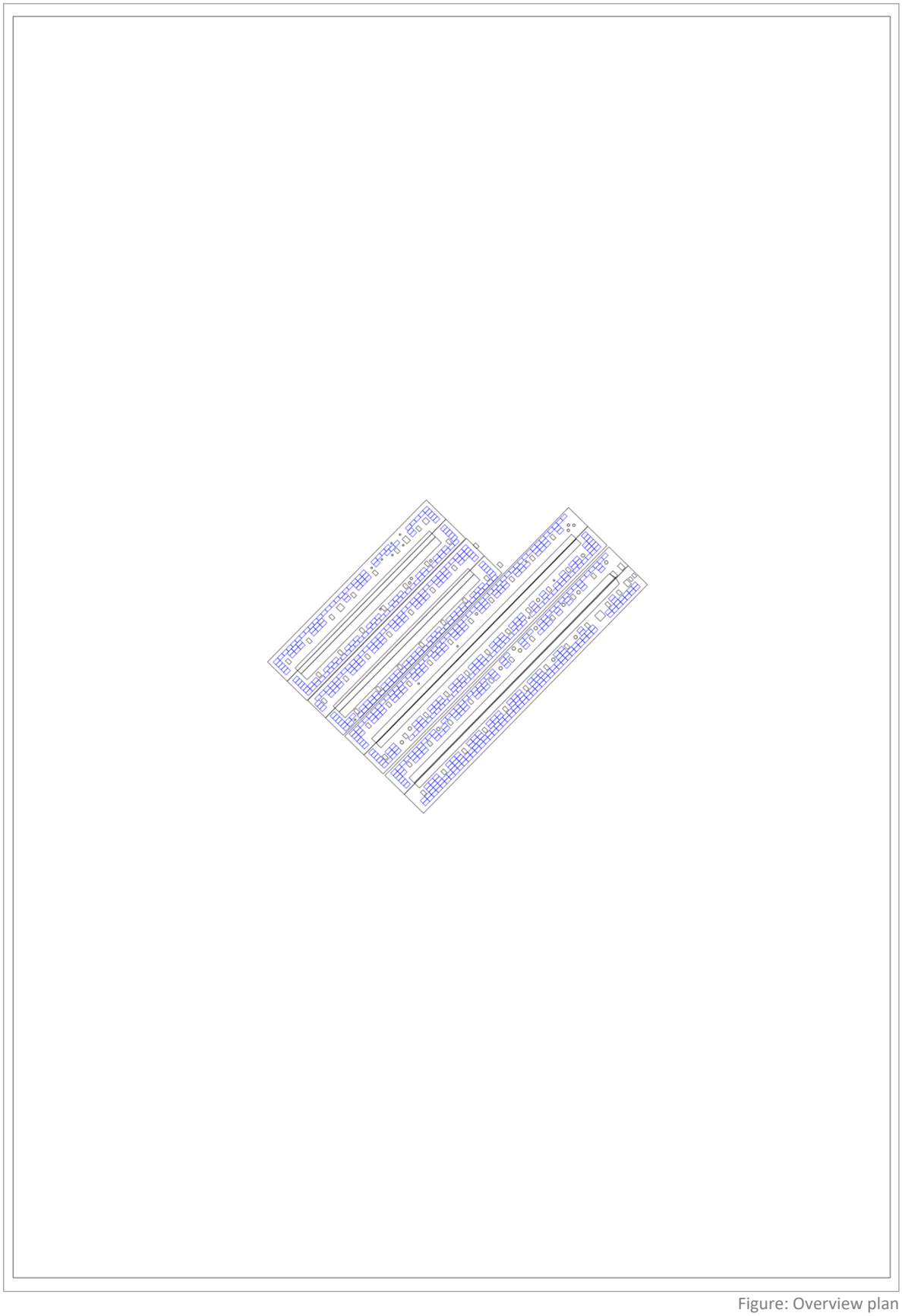


Figure: Overview plan

Dimensioning Plan

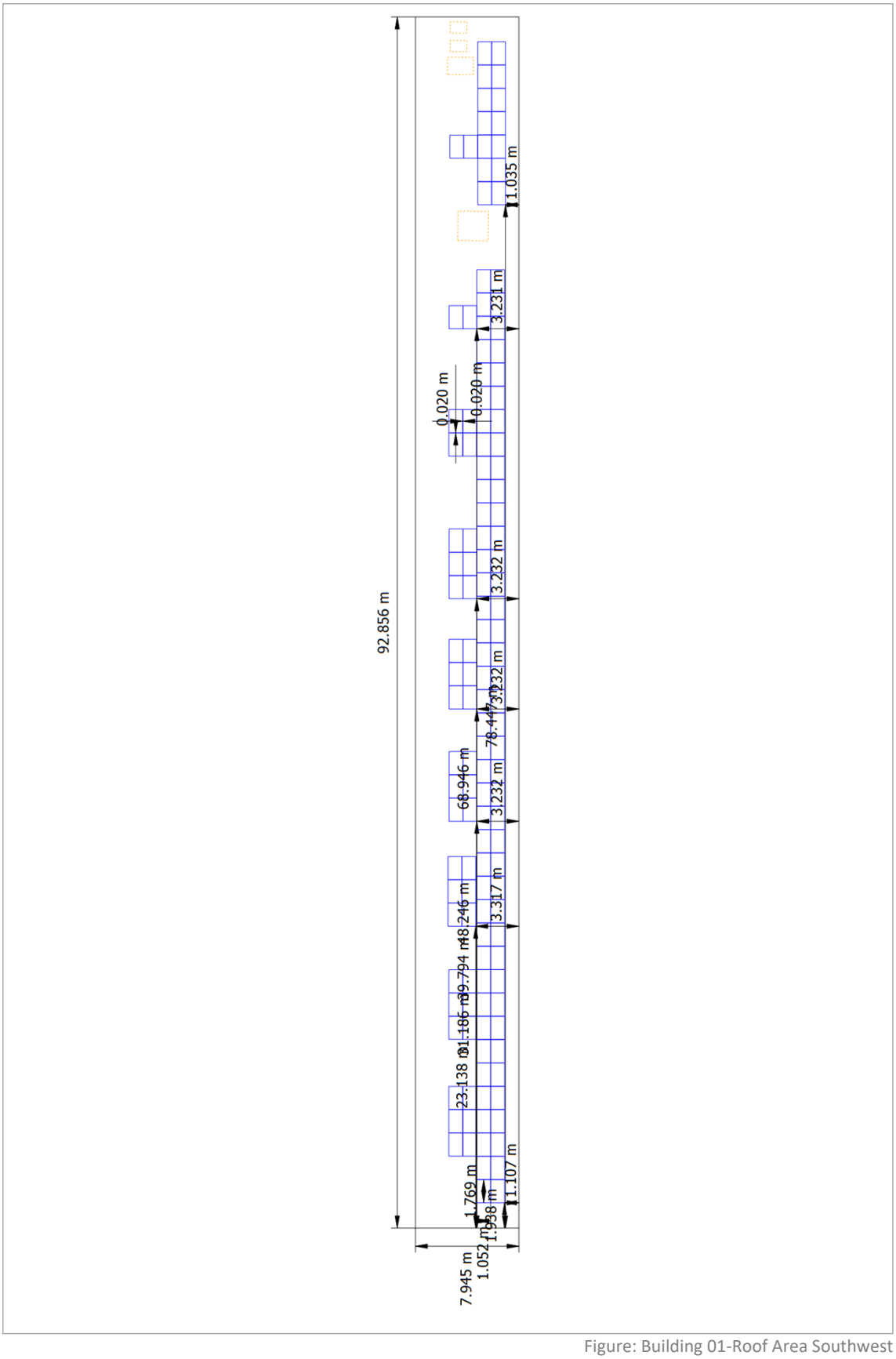


Figure: Building 01-Roof Area Southwest

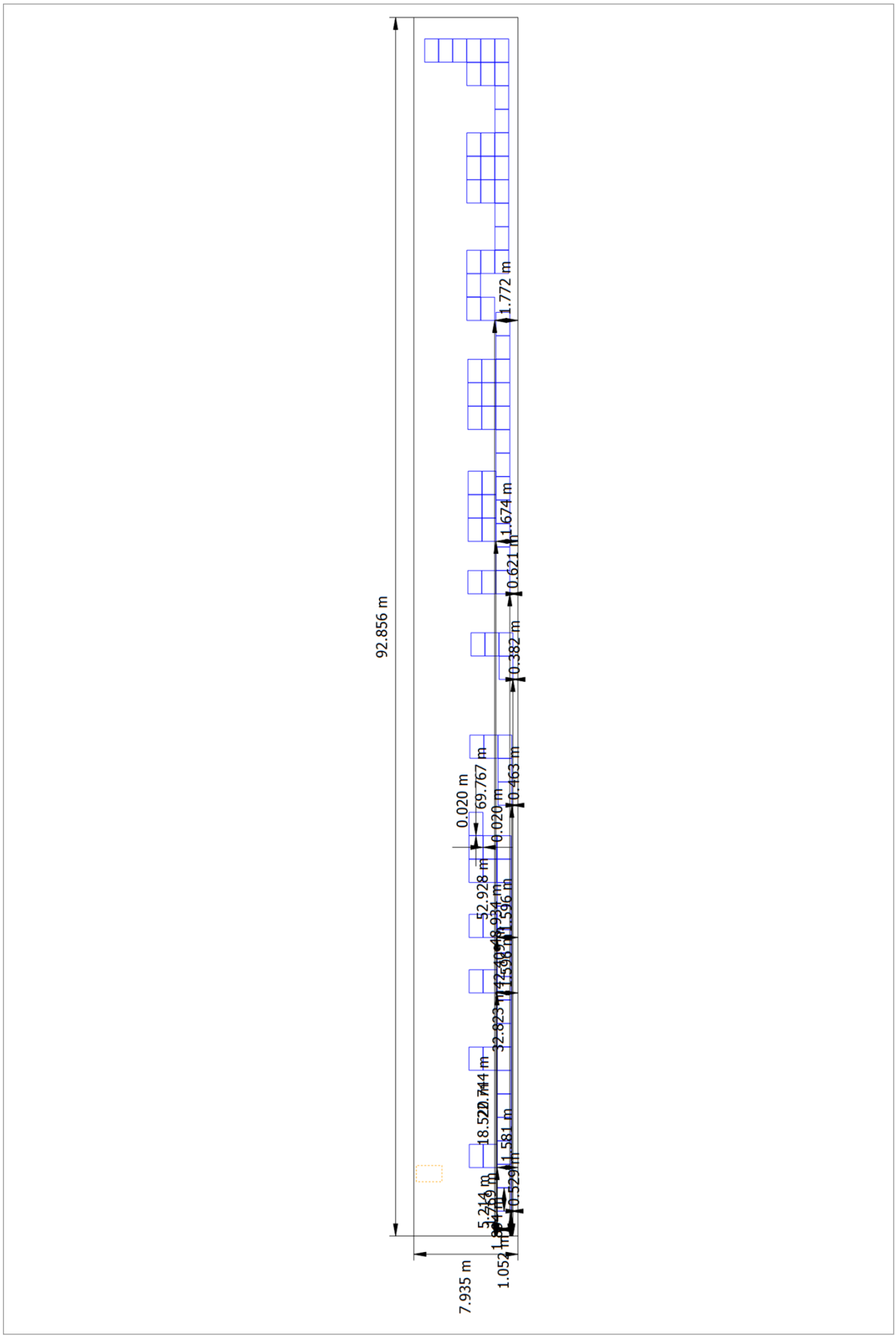


Figure: Building 01-Roof Area Northeast

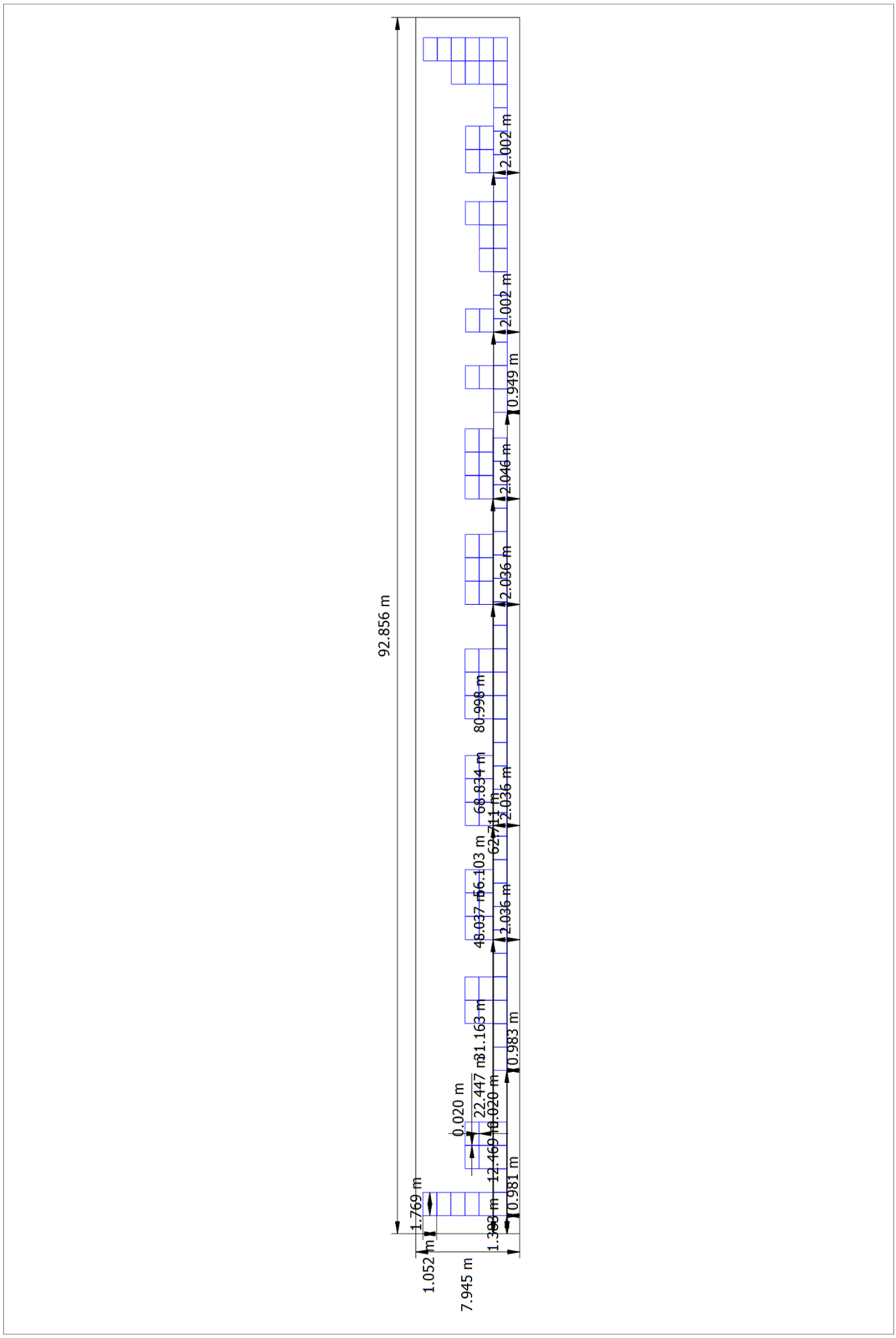


Figure: Building 02-Roof Area Southwest

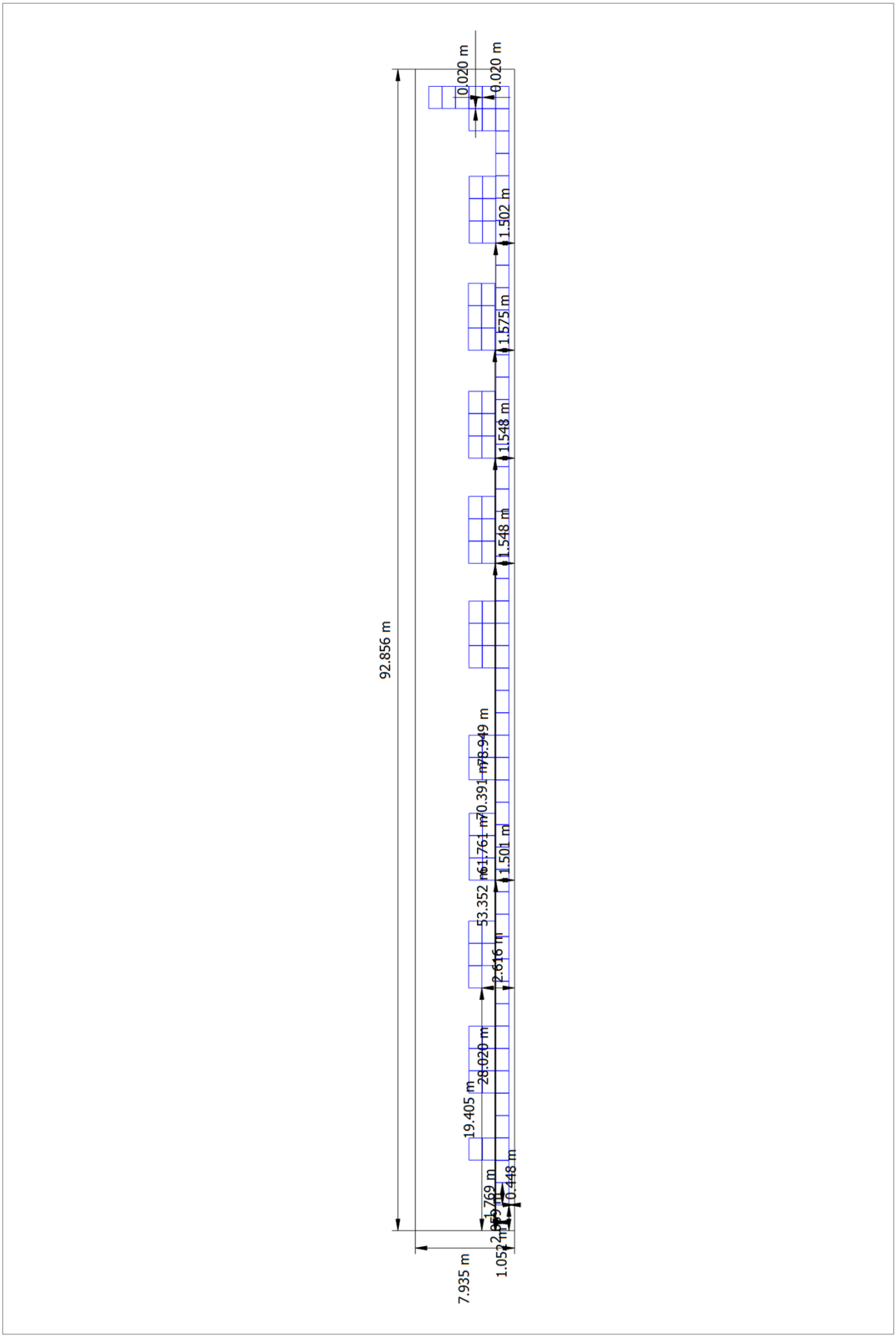


Figure: Building 02-Roof Area Northeast

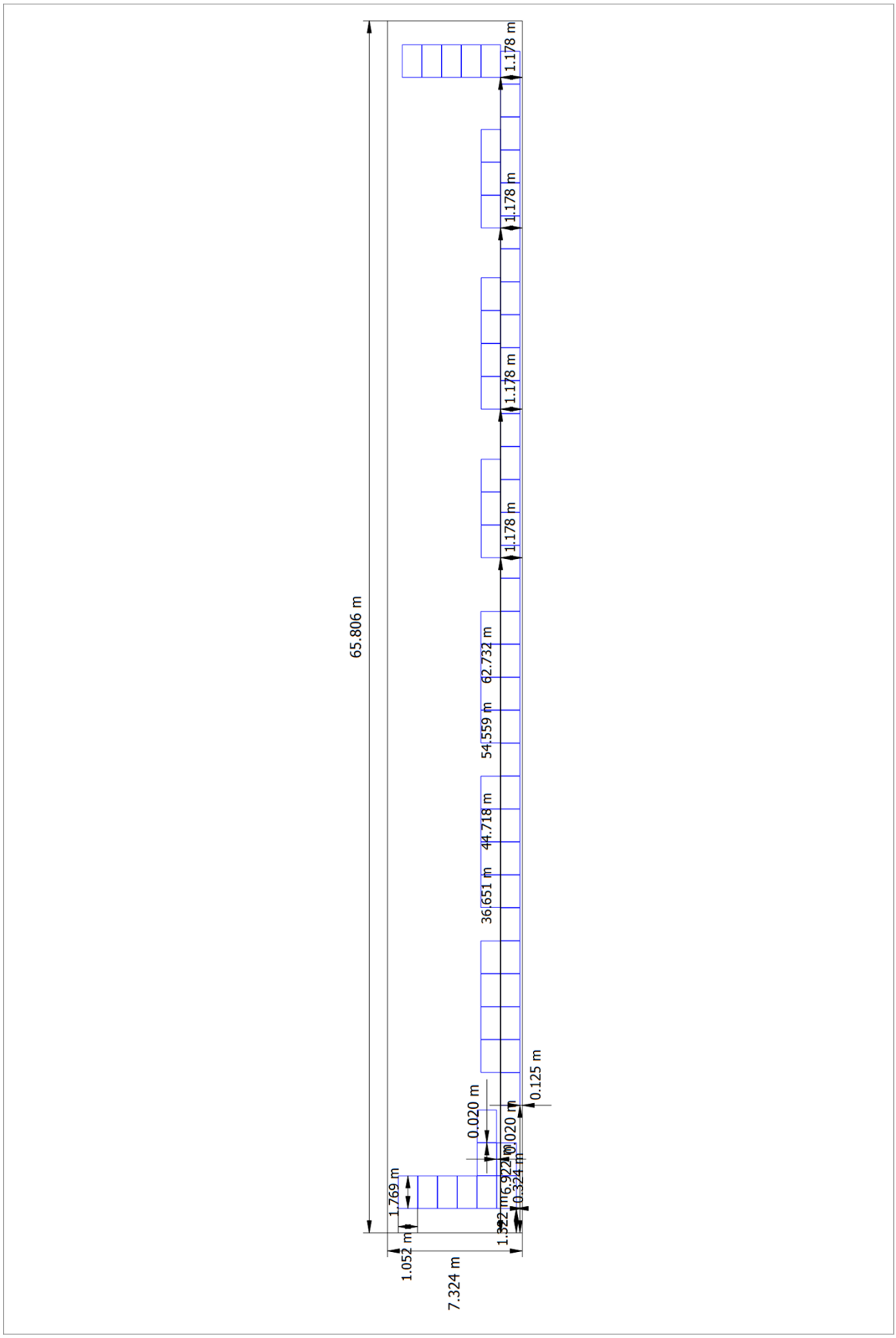


Figure: Building 03-Roof Area Southwest

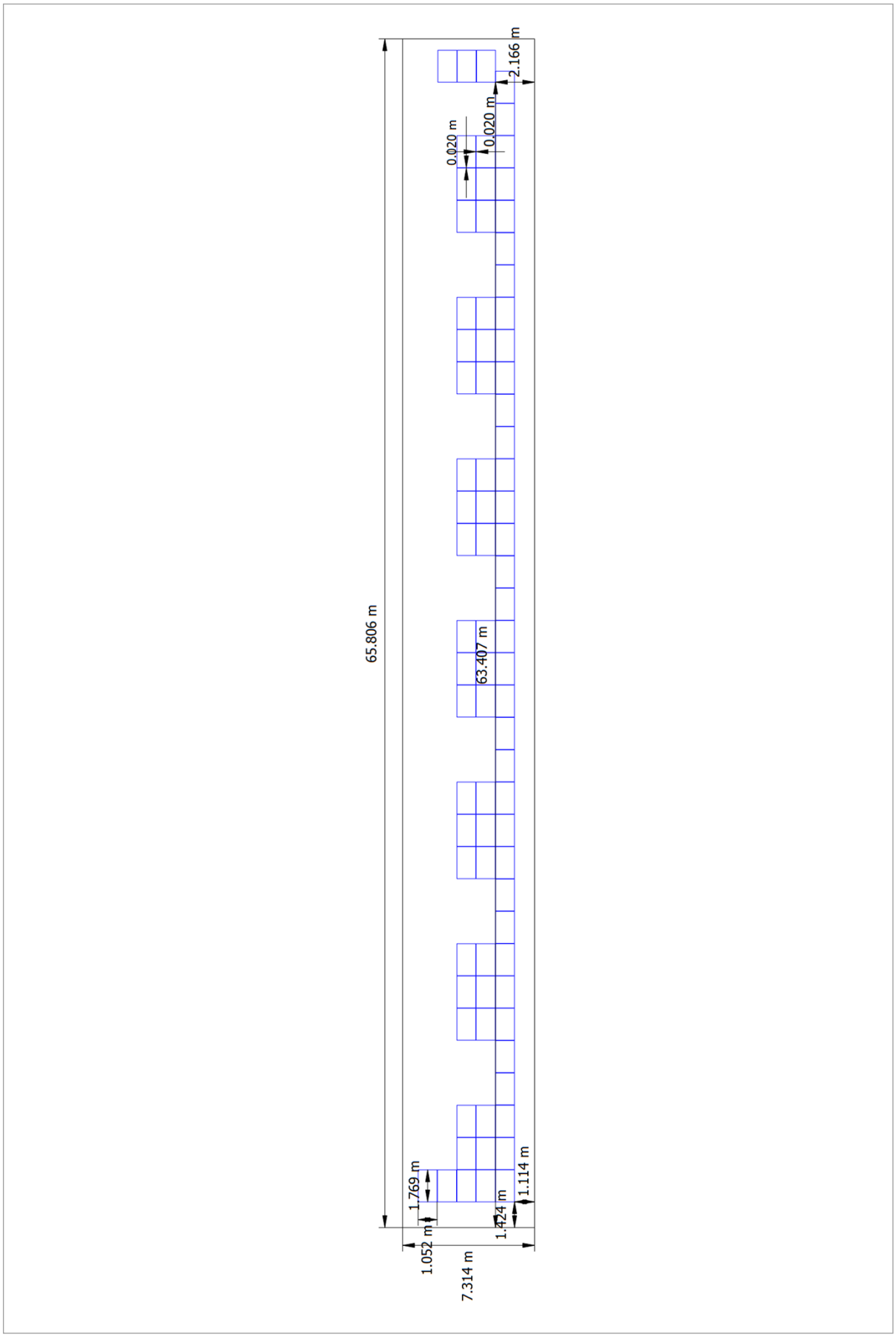


Figure: Building 03-Roof Area Northeast

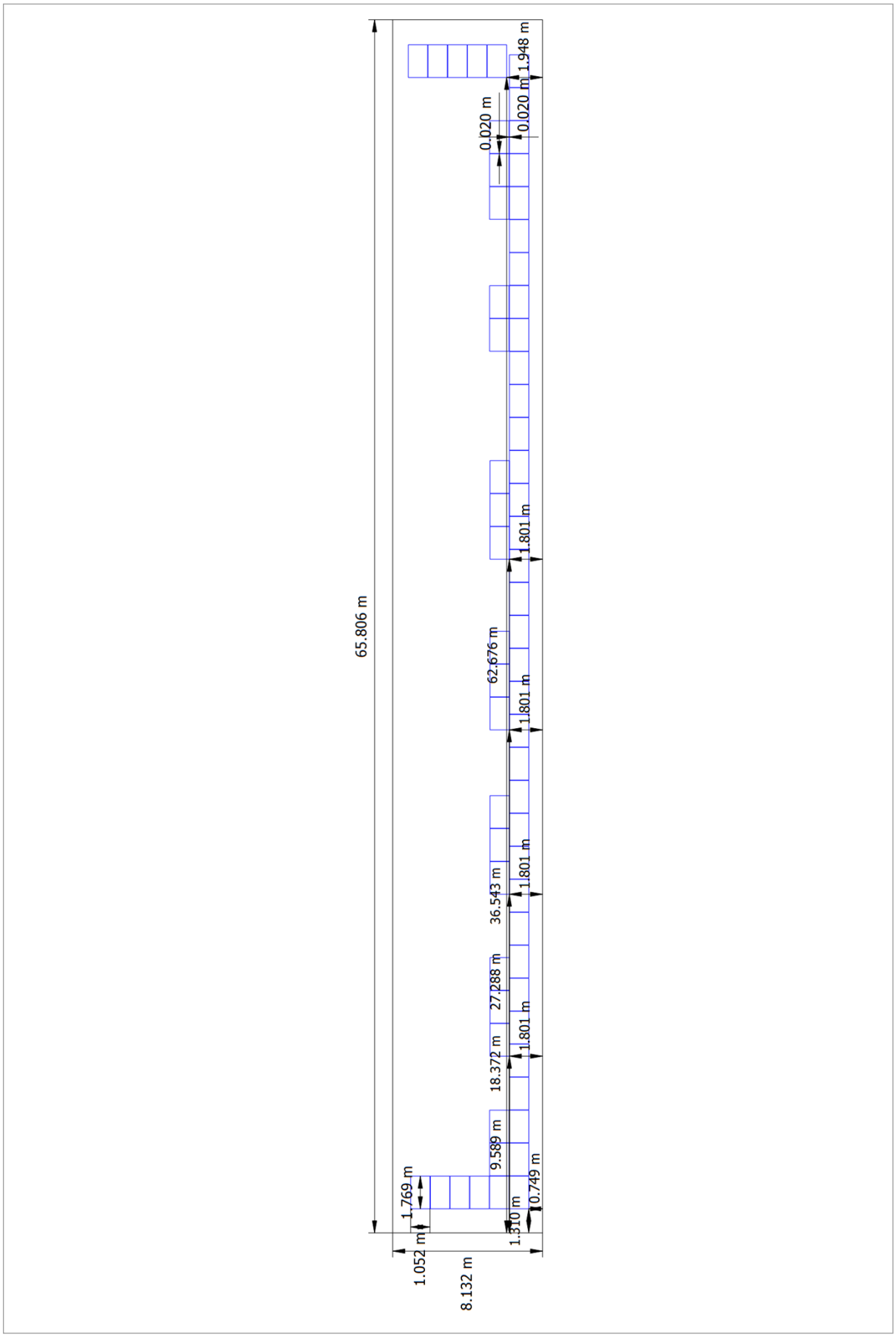


Figure: Building 04-Roof Area Southwest

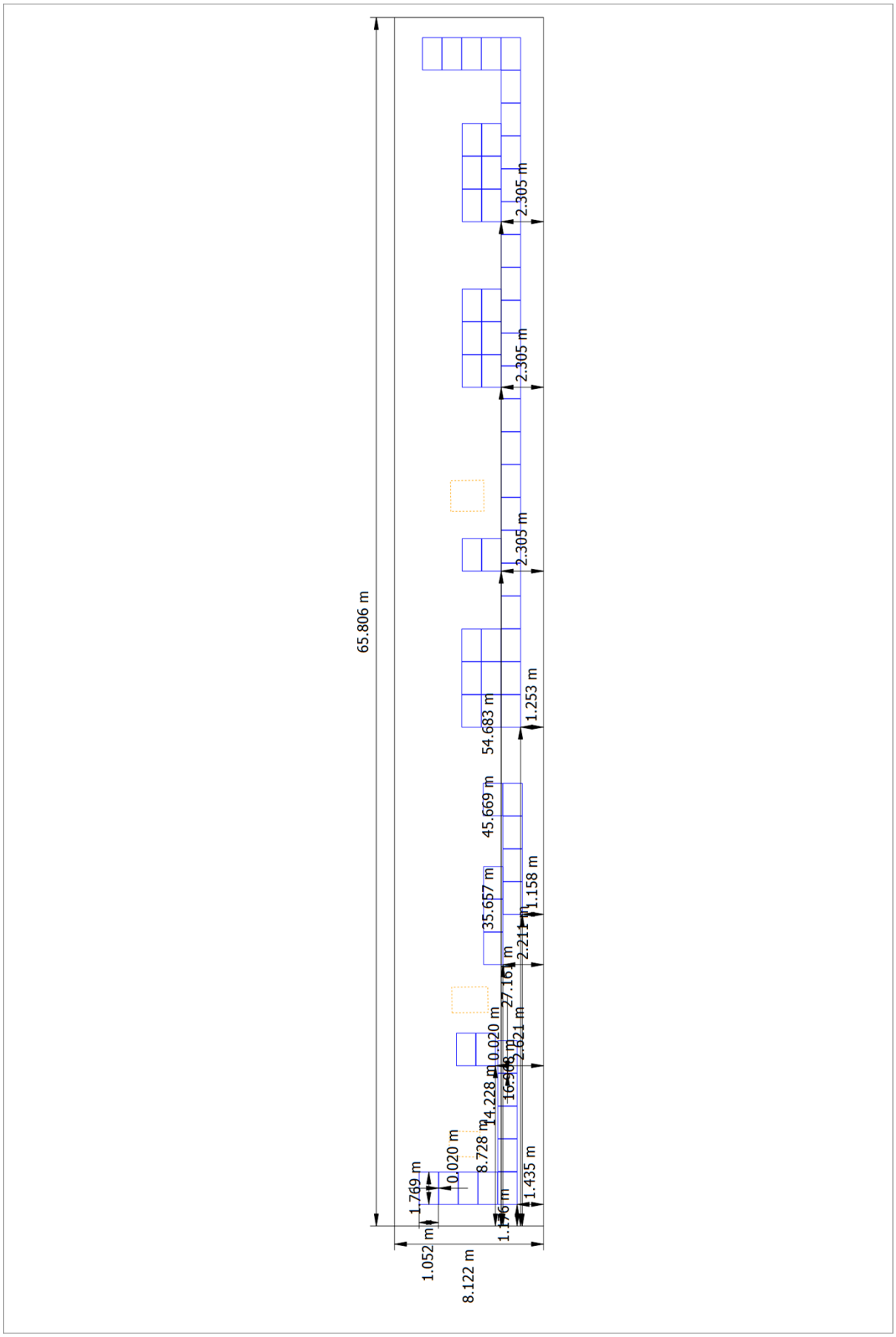


Figure: Building 04-Roof Area Northeast

String Plan

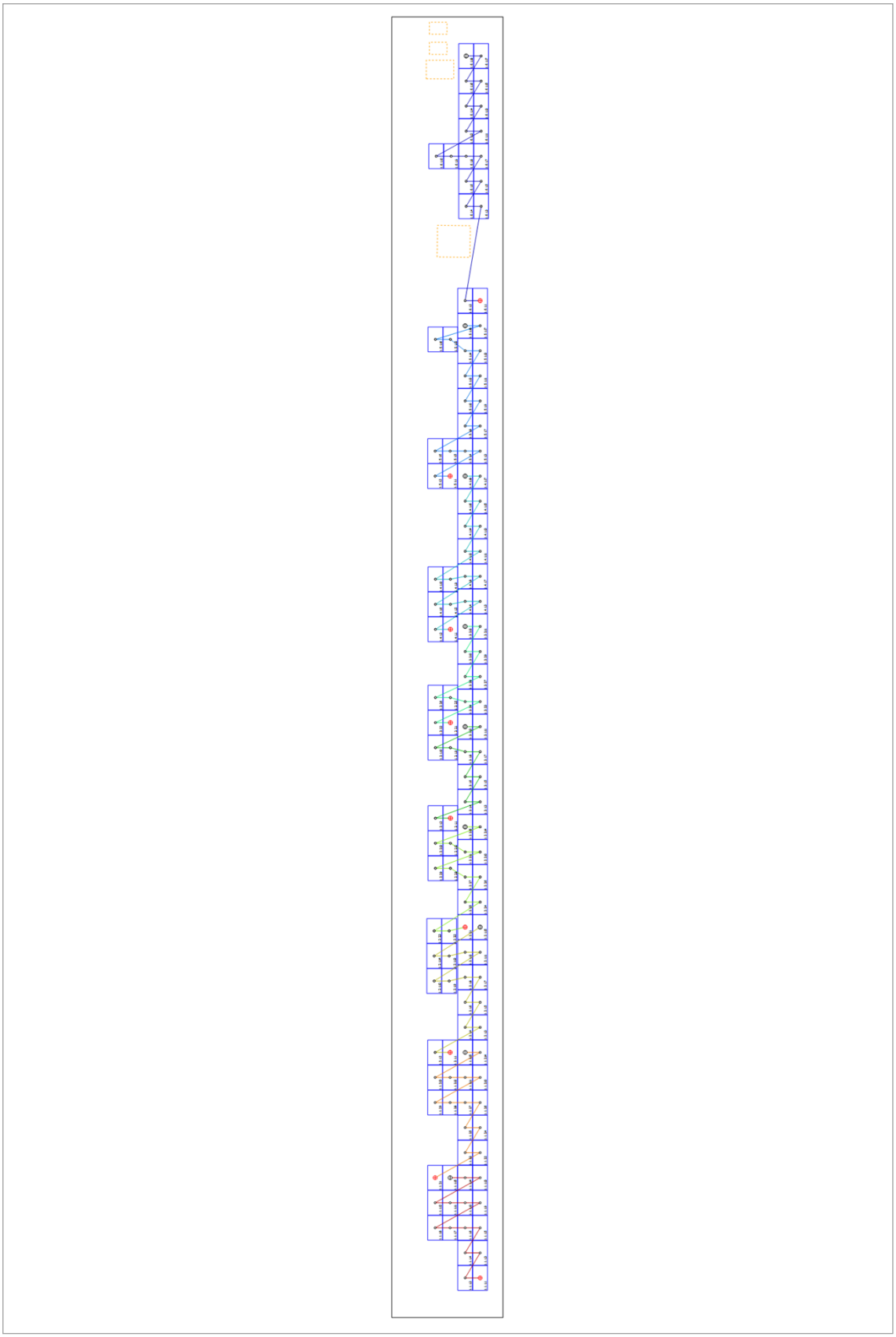


Figure: Building 01-Roof Area Southwest

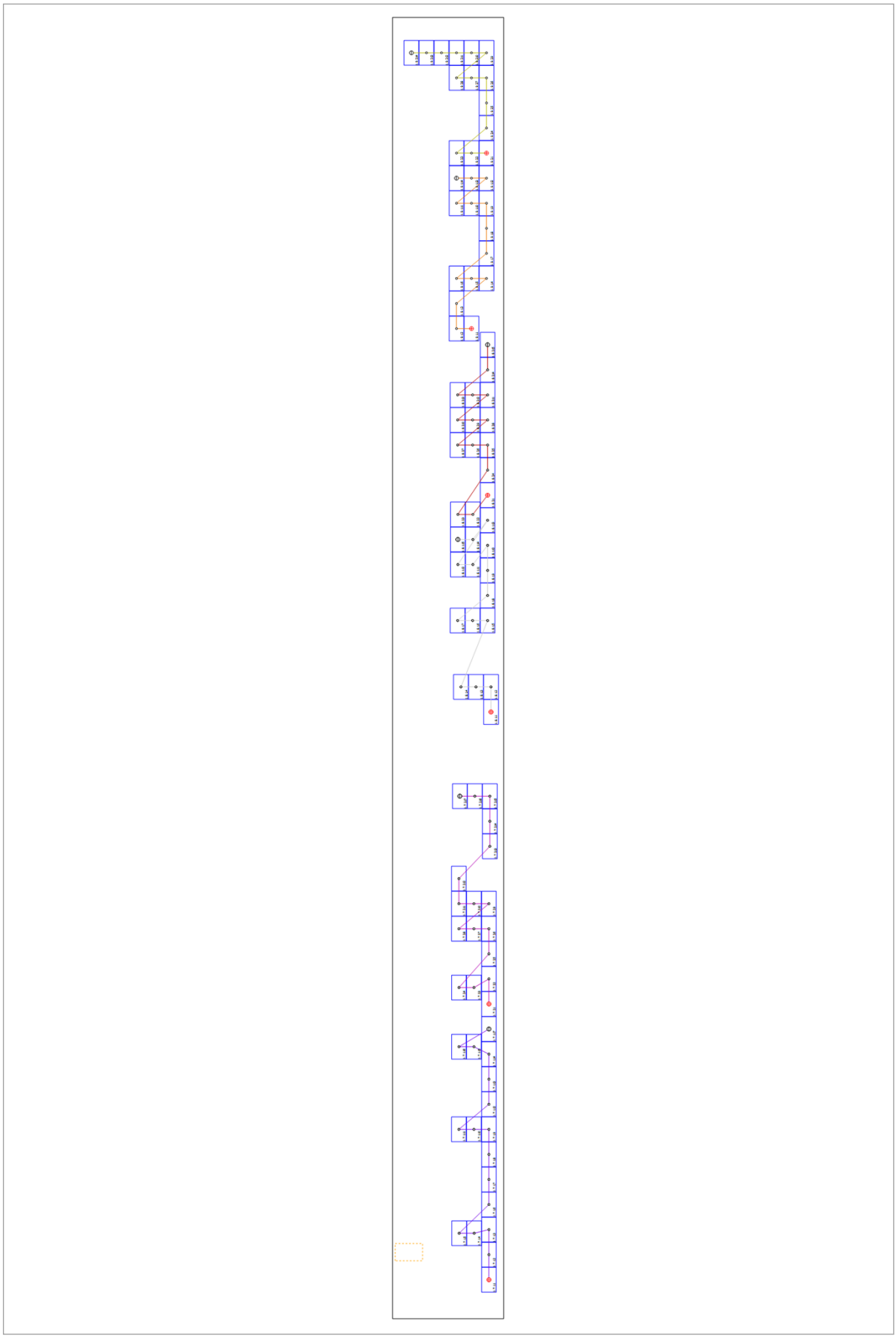


Figure: Building 01-Roof Area Northeast

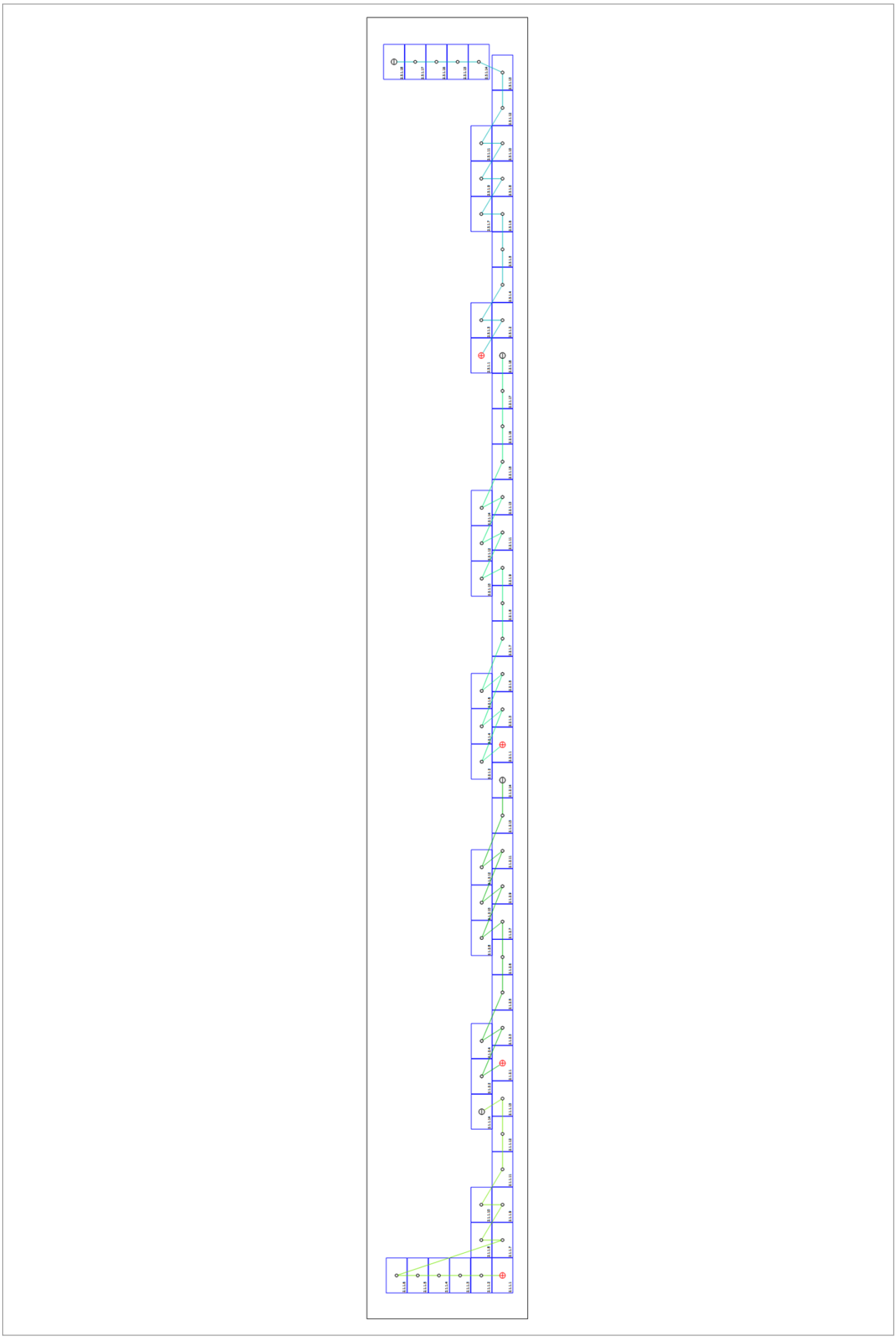


Figure: Building 04-Roof Area Southwest

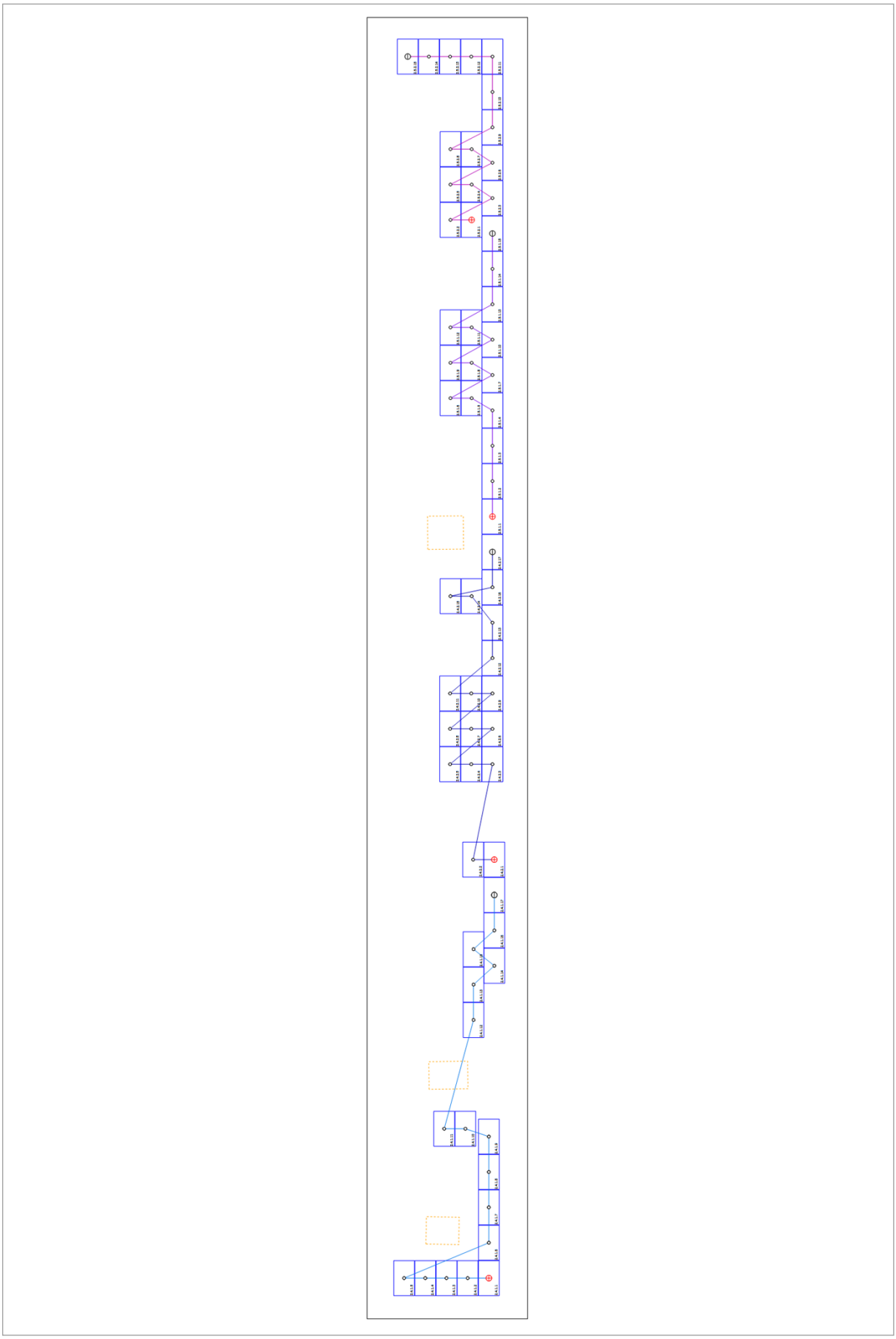


Figure: Building 04-Roof Area Northeast

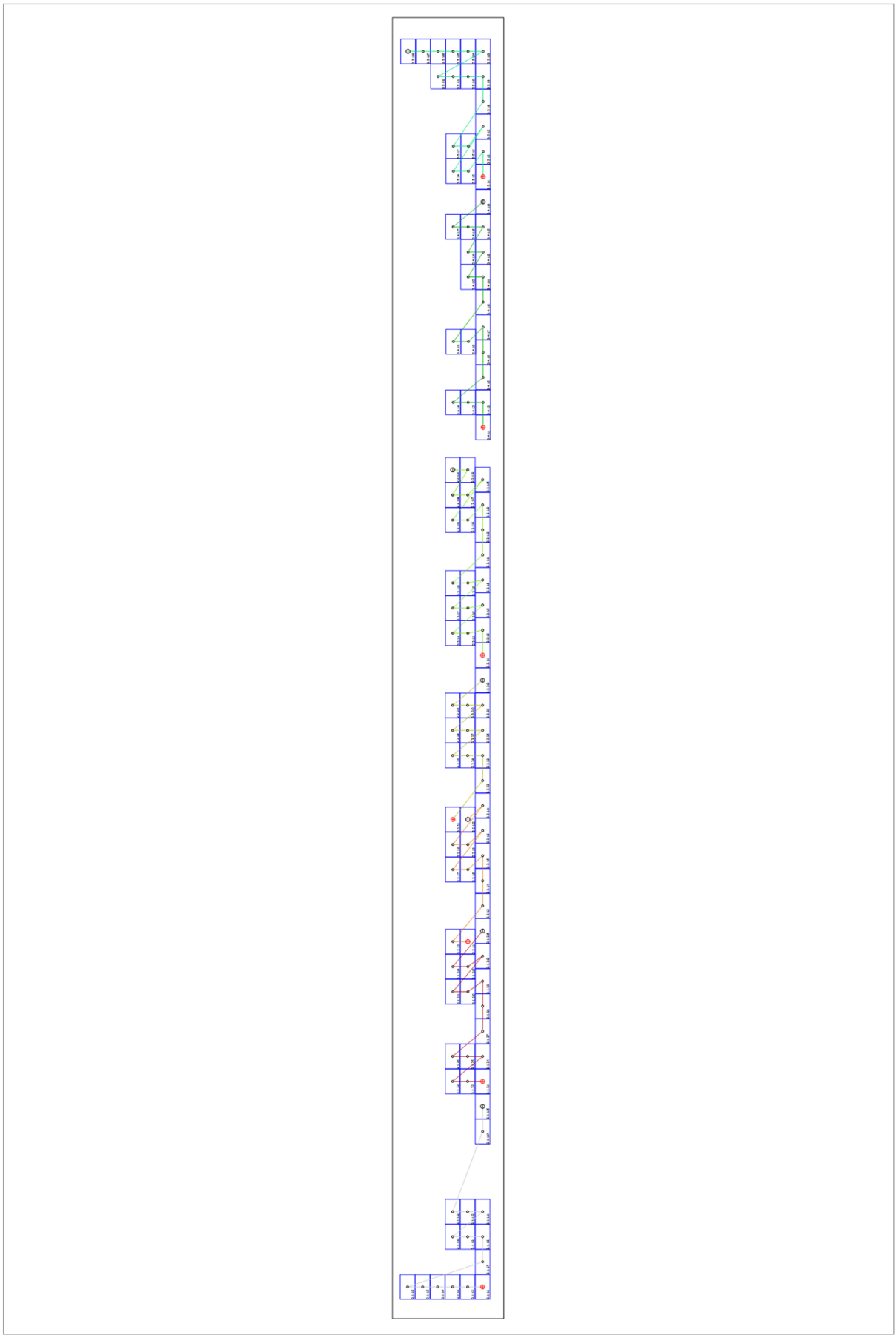


Figure: Building 02-Roof Area Southwest

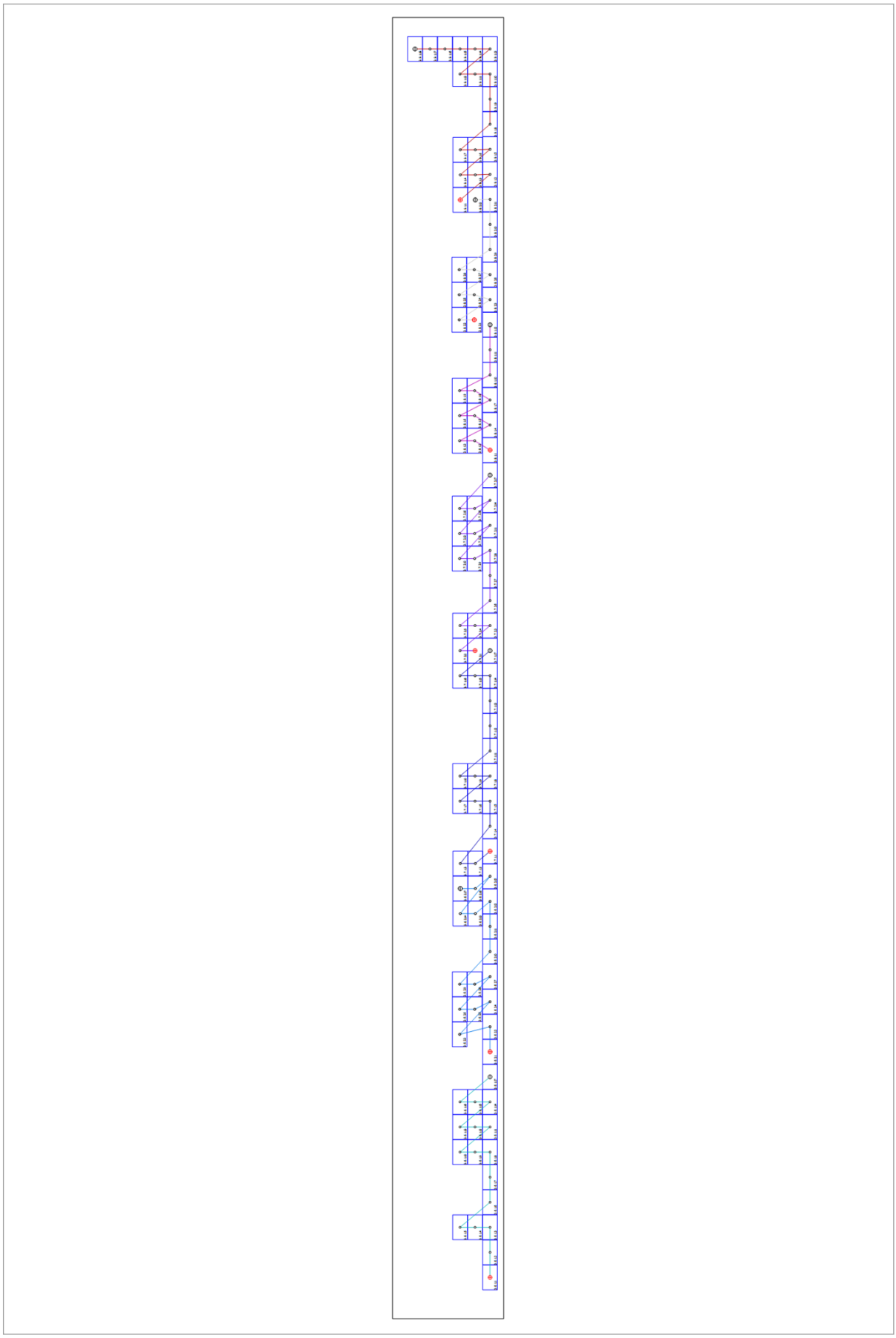


Figure: Building 02-Roof Area Northeast

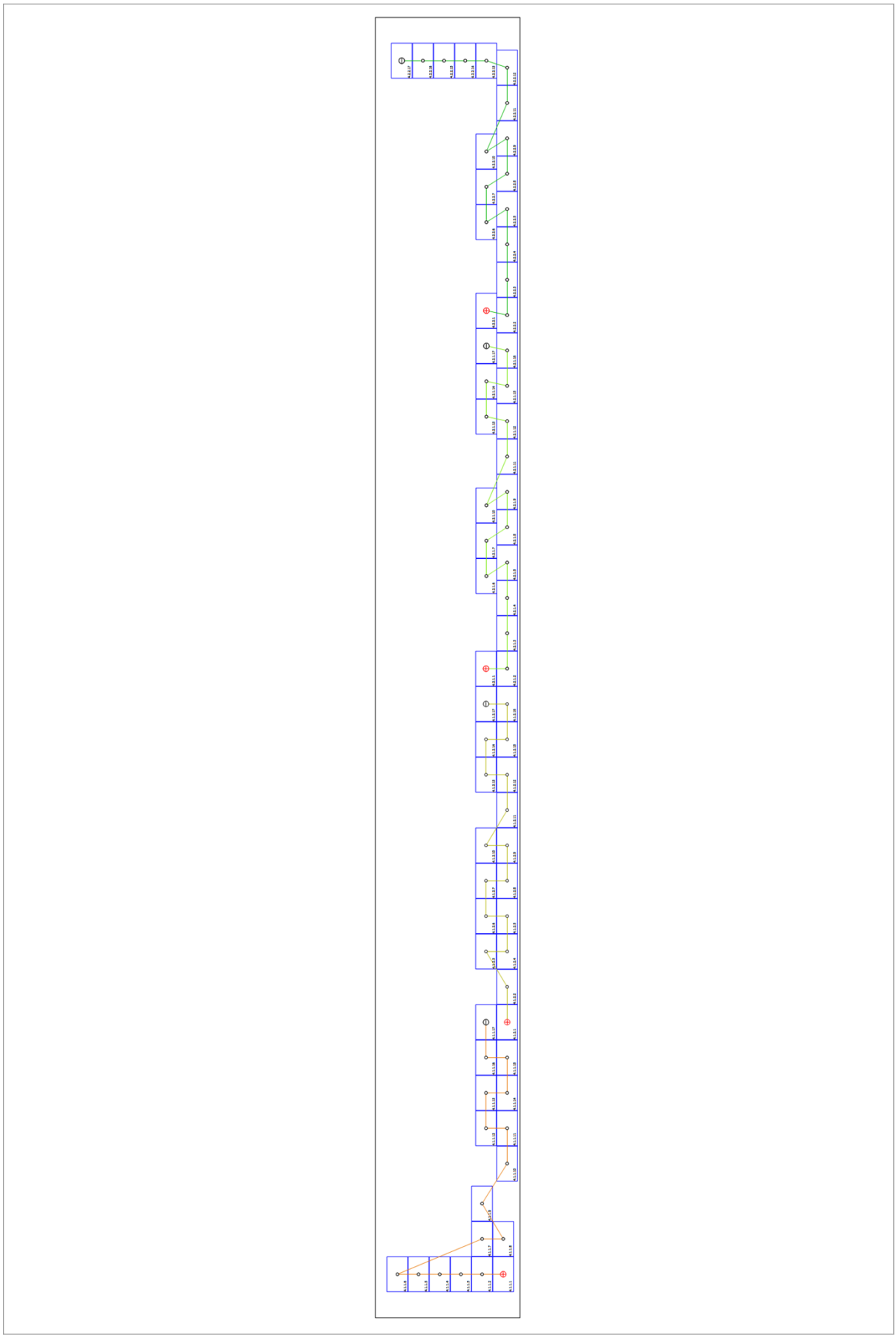


Figure: Building 03-Roof Area Southwest

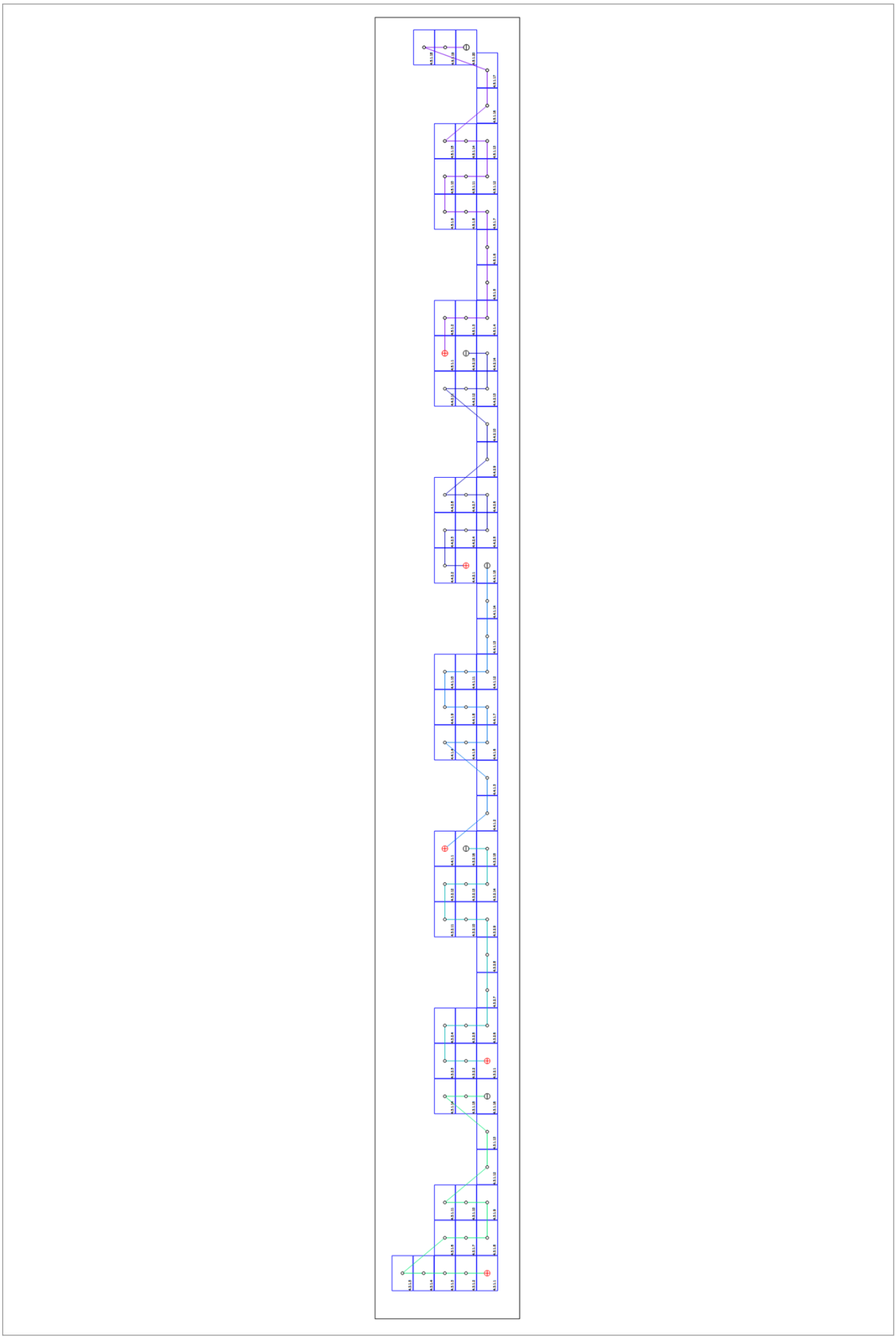


Figure: Building 03-Roof Area Northeast

Parts list

Parts list

#	Type	Item number	Manufacturer	Name	Quantity	Unit
1	PV Module		JA Solar Holdings Co., Ltd.	JAM60S20-385/MR	728	Piece
2	Inverter		Ginlong (Solis)	S5-GC80K	2	Piece
3	Inverter		Ginlong (Solis)	S5-GC50K	2	Piece
4	Components			Feed-in Meter	1	Piece
5	Components			House connection	1	Piece
6	Components			Bidirectional Meter	1	Piece