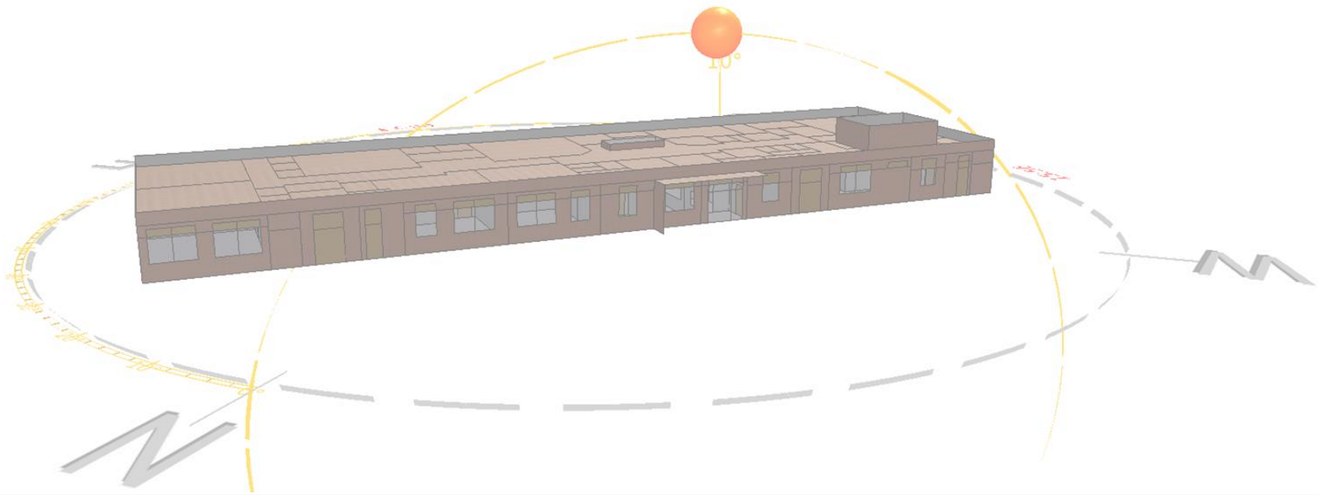
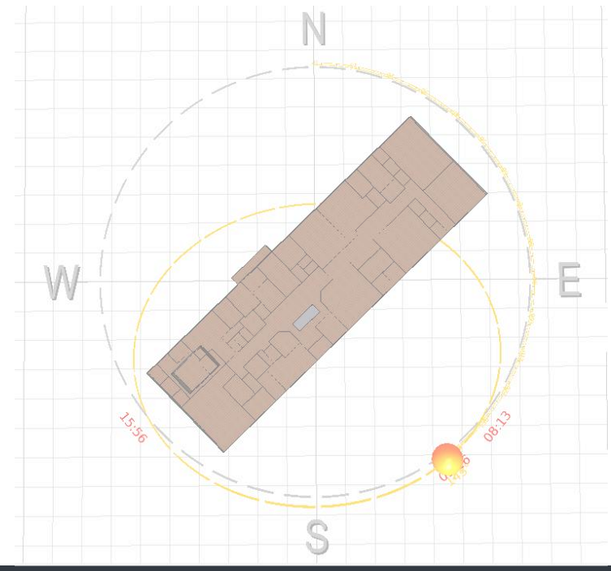
Bexley Road Transitional Learning Centre

Daylight Assessment Report

BTLC-MEP-XX-XX-RP-ME-3003





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GallifordTry

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Executive Summary

Design MEP was appointed by Galliford Try to produce a **Climate Base Daylight Modelling assessment** for **Bexley Road Transitional Learning Centre** to achieve their target of building a new school that complies with DfE requirements.

Report Type	Climate Base Daylight Modelling assessment
Building Name	Bexley Road Transitional Learning Centre
Building Location	77 Bexley Road, Eltham
GIFA	1,116 m^2
Company	Galliford Try
Proposed Works	Demolition; Newbuild School
Scope of Works	Classrooms, SEN Spaces, Staff Rooms, Admin Spaces

Climate based daylight modelling was carried out using **IES VE 2025** in accordance with the following:

- Department for Education (DfE) Output Specification – ***Technical Annex 2E:*** *Daylight & Electric Lighting* (Nov 2022)
- **CIBSE AM11**: *Building Performance Modelling* (2020)
- **CIBSE TM40**: *Health and Wellbeing in Building Services* (2020) (informative reference)

Iterations for Compliance Summary

The current architectural design failed to meet the daylight requirements, therefore multiple iterations were run in this assessment to reach compliance. The Proposed Design is Rev 11. Rev 12 was a test to see if total compliance was possible. Details on each iteration can be found in Section 3 of this report but a small **summary of the parameters investigated can be seen below**:

- **Increased glazing area on NW façade** to increase lux
- **Decreased glazing area** on all SW and SE façades
- **Window sill heights brought up** to 1100mm across site to make design uniform
- **Additional external shading device** in form of roof overhang on all SW and SE façades.
- **Modelling parameters** to improve results (frame factor, Light transmittance value, weather file and room categories)

Reference	Overall Compliance
Current Design	**Fail**
Rev 01 - 10	**Fail**
Rev 11 (Proposed Design)	**Pass**
Rev 12	**Pass**

Proposed Design Results Summary

The results of the Proposed Design can be seen in Section 4, they are as follows:

Overall: Annex 2E targets are fully met, with **L1, L2 and L3 passing**.

ADS Code	No. Rooms	PASS	FAIL	Pass Rate	DfE Target
L1	9	9	0	100 %	80 %
L2	2	2	0	100 %	65 %
L3	7	5	2	71 %	50 %

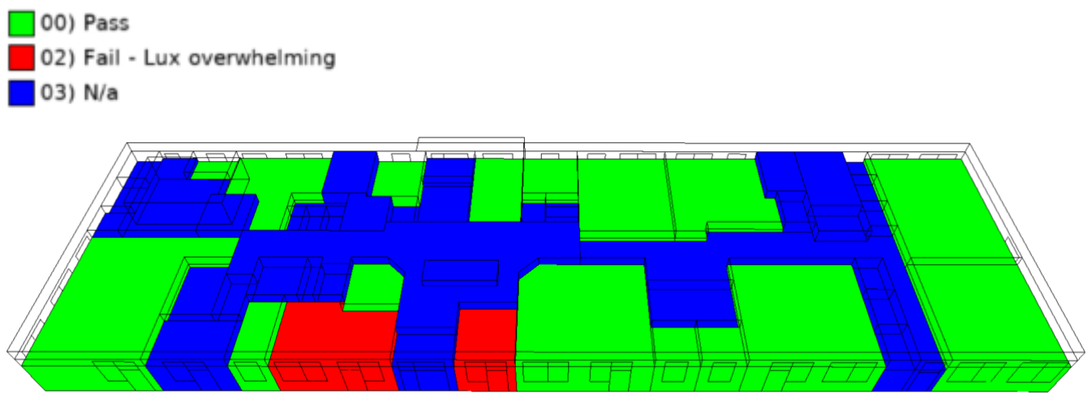


Figure 1. CBDM Pass/Fail IESVE Model Visualisation.

The breakdown of the design changes to meet the Proposed Design can be found in Section 3 of this report, but below is a small summary:

- Reception Desk window increased to 2200mm width
- Glazing on SW and SE façades have reduced Light Transmittance (LT) value of 0.6
- All windowsill heights brought to 1100mm, reducing glazing area
- Glazing modelled with 20% frame factor
- Double glazed unit window removed from SE façade of Dining space
- All single unit windows next to single unit glazed doors reduced width (1200mm)
- Positions of single unit window and double unit window in Staff Base / Social space swapped

The information contained within this report should be reviewed and confirmed as acceptable. If any discrepancies are found, they should be highlighted to both Galliford Try and Design MEP Ltd so that they can be checked, responded to and (where applicable) incorporated, as necessary.

Contents

Glossary of Terms

DfE	**Department for Education**	**SEND**	**Special Educational Needs and Disabilities**
Annex 2E	DfE Technical Annex 2E – Daylight & Electric Lighting (2022)	**ADS**	Area Data Sheets – room classifications for daylight compliance
L1 Spaces	Basic Teaching, admin offices, staff rooms – require ≥80% of rooms to pass	**L2 Spaces**	Halls, dining, PE, libraries – require ≥65% of rooms to pass
L3 Spaces	SEN/support spaces, study areas, staff areas – require ≥50% of rooms to pass	**CBDM**	Climate-Based Daylight Modelling – annual simulation of daylight availability
sDA	Spatial Daylight Autonomy – % of area achieving ≥300 lux for ≥50% of occupied hours	**UDI**	Useful Daylight Illuminance – % of occupied hours daylight is between 100–3000 lux
UDI-e	Exceedance of Useful Daylight Illuminance – % of hours >3000 lux (potential glare)	**IES VE**	Integrated Environmental Solutions Virtual Environment (modelling software)
RadianceIES	IES module for raytracing-based daylight simulations	**AM11**	CIBSE Application Manual 11 – Building Performance Modelling
LT Value	Light Transmission value of glazing	**Reflectance**	% of light reflected by internal surfaces (walls, ceilings, floors)
EPW	EnergyPlus Weather file – local climate data used for simulation	**Working Plane**	Reference height for daylight assessment (0.55 m in primary classrooms)
AOI	Area of Interest – floor area assessed, excluding 0.5 m perimeter band		

1. Introduction

Design MEP was appointed by GallifordTry to undertake a Climate Based Daylight Modelling (CBDM) assessment for **Bexley Road Transitional Learning Centre** to demonstrate compliance with the Department for Education (DfE) Output Specification – Technical Annex 2E: *Daylight and Electric Lighting* (Nov 2022). The purpose of this report is to evaluate daylight provision across all relevant teaching and occupied spaces and confirm whether the proposed design meets the required sDA and UDI-a performance thresholds.

Site Context	
Name	Bexley Road Transitional Learning Centre
Building Location	77 Bexley Road, Eltham
Post Code	SE9 2PE
Company	Galliford Try
Building GIFA	1,116 m^2
No. of Storeys	1
Site Type	Suburban
Proposed Works	Demolition; Newbuild School
Scope of Works	Classrooms, SEN Spaces, Staff Rooms, Admin Spaces

Figure 2. Bexley Road Site image (left) & plan (right).

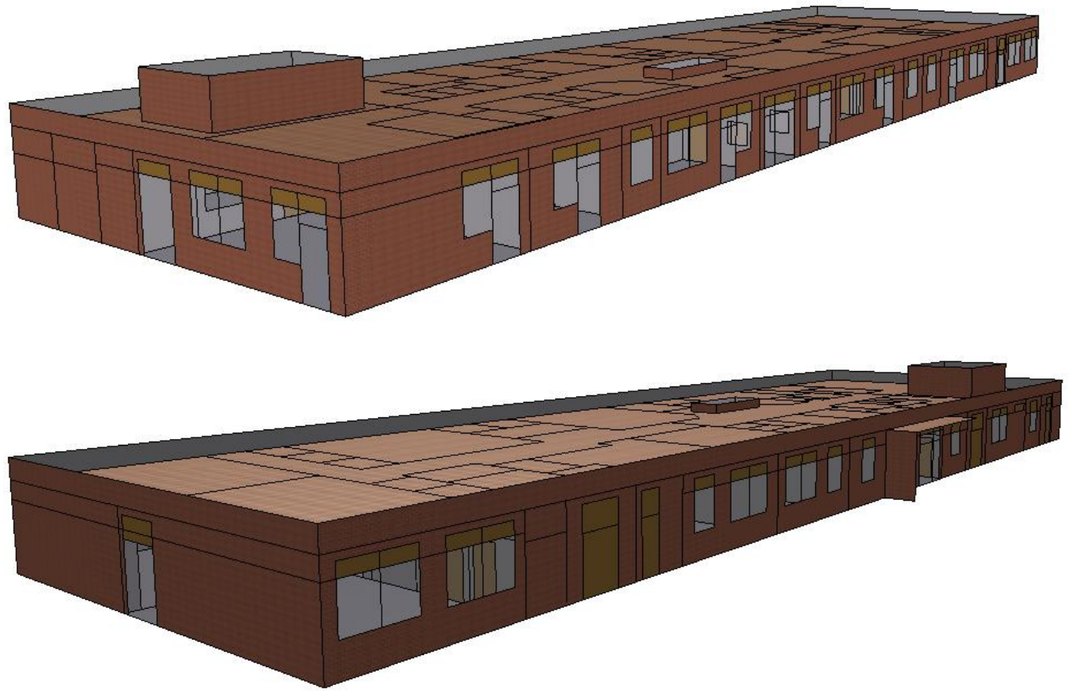


Figure 3. IESVE 2025 Model of Proposed Design with all parameters applied

Section	Description
Methodology	Sets out the standards and guidance used (DfE Annex 2E, CIBSE AM11), and describes the modelling approach, IES-Radiance software, and input parameters (geometry, reflectance's, weather file, schedules). Establishes the criteria against which daylight performance is assessed (sDA and UDI).
Proposed Design Results	Presents room-level and group-level daylight results (L1–L3), compared against Annex 2E compliance thresholds. Highlights pass/fail rates, identifies shortfalls, and provides design recommendations where relevant (e.g., lighter finishes, glazing optimisation, functional exceptions for SEN/support spaces).
Conclusion	Summarises overall compliance against Annex 2E, noting where group targets were met, where exemptions apply (e.g., L3 SEN spaces), and whether the project can proceed to the next stage in line with DfE requirements.

2. Methodology

2.1. Standards & Specifications

The **Climate-Based Daylight Modelling** (CBDM) assessment was undertaken in accordance with:

- Department for Education (DfE) Output Specification – ***Technical Annex 2E:*** *Daylight & Electric Lighting* (Nov 2022)
- **CIBSE AM11**: *Building Performance Modelling* (2020)
- **CIBSE TM40**: *Health and Wellbeing in Building Services* (2020) (informative reference)

The purpose of this assessment is to confirm adequate natural daylight access in teaching and support spaces, reducing reliance on artificial lighting and ensuring visual comfort in line with Annex 2E requirements.

2.2. Performance Criteria

Spaces were classified using the DfE ADS schedule (*SSB_Annex_SS1-SchoolSpecificSoAandADSTemplate*). Required performance thresholds are summarised below:

ADS Code	Space Type	Assessment Criteria	DfE Target
L1	Basic Teaching spaces (excluding drama studios); independent life skills rooms (in special schools); science preparation rooms; administration offices; staff rooms	**sDA** (300/50%) ≥ 50% **UDI-a** (100-3000lux) ≥80%	**80%**
L2	Halls, dining, and PE area; LRCs	**UDI-a** (100-3000lux) ≥80%	**65%**
L3	SEN and support spaces; Arts learning resources and study areas; staff areas	**UDI-a** (100-3000lux) ≥80%	**50%**
L4	Circulation, Kitchens, changing rooms	Daylight access required	**Qualitative**
L5	Storage, toilets, hygiene	**N/A**	**None**
L6	Drama, Sensory rooms	Daylight to be excluded/controlled	**None**

Notes:

- Only L1, L2, & L3 spaces were included in assessment.
- For SEND spaces, sDA is not required (Annex 2E).
- Where primary performance criteria are not achieved, spaces must still demonstrate daylight access and be designed as close to compliance as feasible.

If spaces do not pass primary performance criteria:

- **L1 spaces** – must have access to daylight to achieve levels as near as possible to required threshold with adjoining connection daylit rooms for max visual comfort.
- **L2 spaces** – require daylight access.
- **L3 spaces** – no requirement to meet the primary performance criteria.

2.3. Modelling Approach

Criteria	Description
Software	IES Virtual Environment 2025 (RadianceIES Module)
Calculation Method	Raytracing (≥5 bounces) – sDA & UDI-a
Weather File	London_TRY.epw
Occupied Hours	8:30 – 16:00
Sky Model	Standard CIE Overcast Sky
Work Plane (WP) Height	0.7 m
Grid Size	0.25 m
AOI Offset	Max 0.50 m

2.4. Passive Shading devices

As part of the overall façade design these are the strategies consider, complying with the Technical Annex 2E.

- Local shades due to windows recesses have been included in the construction data to consider local shading benefits in mitigating risks of summer overheating.
- Building's self-shading and orientation has been accounted for in the assessment.
- Shading canopies to the entrance of the school. (Fig. 4)

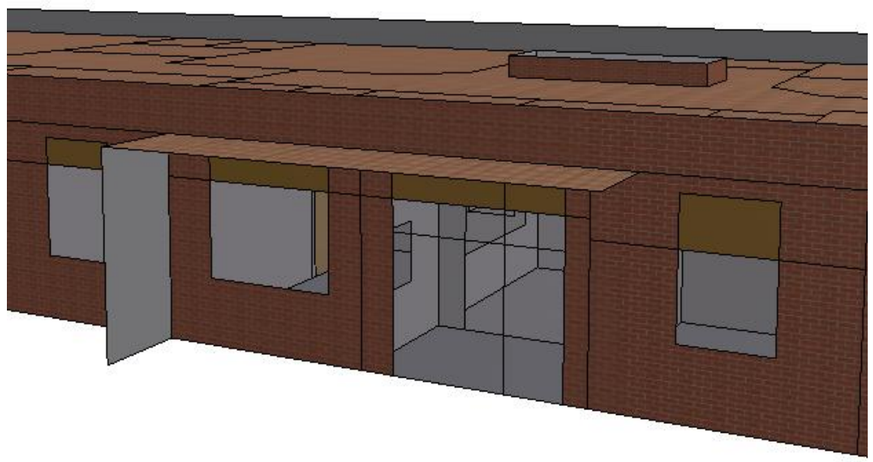


Figure 4 Entrance canopy

2.5. Surface & Glazing Inputs

Criteria	Description
Ceiling Reflectance	80 %
Wall Reflectance	60 %
Floor Reflectance	20 %
Glazing Light Transmittance	66 % (g-value: 36 %) NW and NE façades 60 % (g-value: 36 %) SW and SE façades
External Shading	Louvres, recesses, and canopies
Maintenance Factors	Room surfaces, glazing, and luminaire factors per Annex 2E Table 16

2.6. Occupied Spaces for Assessment

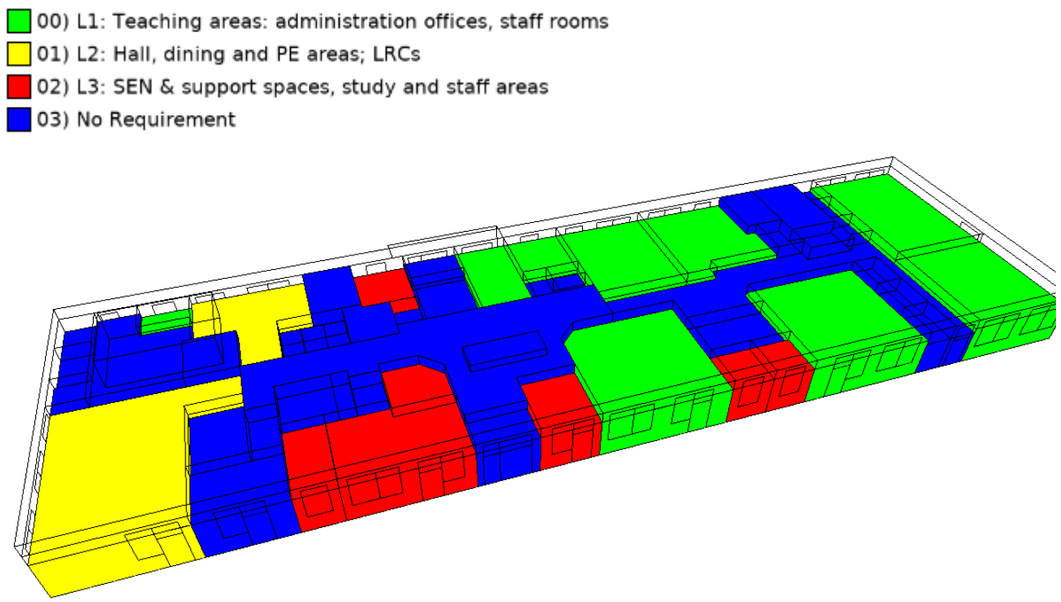


Figure 5. CBDM Room Groupings in IES VE Model: Ground Floor

3. Design Iterations to Achieve Compliance

The initial modelling and assessments of the current design failed at Stage 3, therefore alternative iterations of the building were run to investigate other options towards compliance. The Methodology and results outlined in the rest of this report are for the new Proposed Design as a result of the iterative process. The iterative process is included in this section of the report to indicate other considered options.

Reference	Overall Compliance	L1 Compliance (80%)	L2 Compliance (65%)	L3 Compliance (50%)	Design Parameters
Current Design	**Fail**	**56%**	**50%**	**33%**	As per Architectural plan
Rev 01	**Fail**	**67%**	**50%**	**33%**	Reception Desk Window (2200mm width), SW and SE Façade glazing has light transmittance of 0.6.
Rev 02	**Fail**	**67%**	**50%**	**44%**	As Rev 01, SW and SE façades glazing sill height brought to 1100mm.
Rev 03	**Fail**	**89%**	**50%**	**67%**	As Rev 02, external shade overhang added to SW and SE façade (1600mm depth).
Rev 04	**Fail**	**100%**	**50%**	**89%**	As Rev 03, all glazing sill heights brought to 1100mm.
Rev 05	**Fail**	**67%**	**50%**	**67%**	As Rev 01, all glazing sill heights brought to 1100mm
Rev 06	**Fail**	**67%**	**50%**	**71%**	As Rev 05, room categories refined within model
Rev 07	**Fail**	**78%**	**50%**	**71%**	As Rev 06, weather file refined within model (London TRY)
Rev 08	**Fail**	**67%**	**50%**	**71%**	As Rev 07, revised frame factors to 20% within model
Rev 09	**Fail**	**67%**	**50%**	**71%**	As Rev 08, removed glazing from Southeast double window in Dining
Rev 10	**Fail**	**67%**	**100%**	**71%**	As Rev 09, width of all single unit windows next to single unit glazed doors reduced (1200mm).
Rev 11 (Proposed Design)	**Pass**	**100%**	**100%**	**71%**	As Rev 10, swapped positions of the single and double unit windows in 00_Staff Base / Social space.
Rev 12	**Pass**	**100%**	**100%**	**71%**	As Rev 11, width of all single unit windows next to single unit glazed doors reduced further (1000mm).

The above table investigates the following parameters to improve the Daylighting assessments.

- Increased glazing area on NW façade to increase lux to *00_Reception Desk and Admin office*
- Decreased glazing area on all SW and SE façades
- Window sill heights brought up to 1100mm across site to make design uniform
- Additional external shading device in form of roof overhang on all SW and SE façades.
- Modelling parameters to improve results (frame factor, Light transmittance value, weather file and room categories)

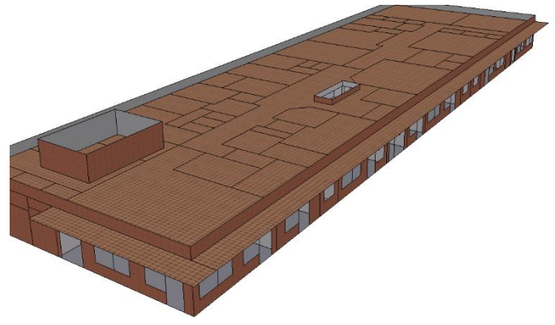


Figure 6) IES VE model showing 1600mm roof overhang on SW and SE facades as described in Rev 03 and 04.

While Rev 11 is the Proposed Design for this report in order to achieved compliance, these changes have not yet been applied to the rest of the Stage 3 documents due to the number of additional scenarios required for compliance. This will be implemented in the design later at Stage 4.

Rev 12 was simply to investigate if all Daylighting categories could pass compliance at 100%.

4. Proposed Design Results

L1 teaching spaces: 9 of 9 L1 spaces passed the daylighting assessment. The required pass rate for compliance is 80%, these spaces achieved 100%.

L2 large spaces: 2 of 2 L1 spaces passed the daylighting assessment. The required pass rate for compliance is 60%, these spaces achieved 100%.

L3 SEN/support/staff: 5 of 7 rooms achieved compliance. Failures were Multipurpose/ therapy rooms which suffered from over illumination. These failing spaces were borderline failing at 79% compliant (80% UDI requirement). Overall the L3 achieved a total of 71% compliance overall, exceeding the 50% group pass rate.

Overall: Annex 2E targets are met, with L1, L2 and L3 passing.

4.1. L1 Room Results

Room Name	sDA (> 300 lux) ≥50%	UDI-a (100-3000 lux) ≥80%	PASS/FAIL
00_Staff Base / Social	85	85	Pass
00_Reception Desk and Admin office	89	89	Pass
00_Managers office	92	92	Pass
00_Kitchen office	98	98	Pass
00_Learning Base 02	80	80	Pass
00_Vocational Base 01	90	90	Pass
00_Life skills	86	86	Pass
00_Learning Base 01	80	80	Pass
00_Vocational Base 02	81	81	Pass

4.2. L2 Room Results

Room Name	sDA (> 300 lux) ≥50%	UDI-a (100-3000 lux) ≥80%	PASS/FAIL
00_Intimate Dining	N/a	81	Pass
00_Dining	N/a	81	Pass

4.3. L3 Room Results

Room Name	sDA (> 300 lux) ≥50%	UDI-a (100-3000 lux) ≥80%	PASS/FAIL
00_Calming 01	N/a	84	Pass
00_Calming 02	N/a	84	Pass
00_Multipurpose / therapy 01	N/a	79	Fail
00_Medical	N/a	83	Pass
00_Advice and Family	N/a	85	Pass
00_Breakout / therapy 02	N/a	79	Fail
00_Multipurpose room	N/a	No windows in zone	Pass

4.4. Summary Results

ADS Code	No. Rooms	PASS	FAIL	Pass Rate	DfE Target
L1	9	9	0	100 %	80 %
L2	2	2	0	100 %	65 %
L3	7	5	2	71 %	50 %

4.5. Sample Room UDI-a Result

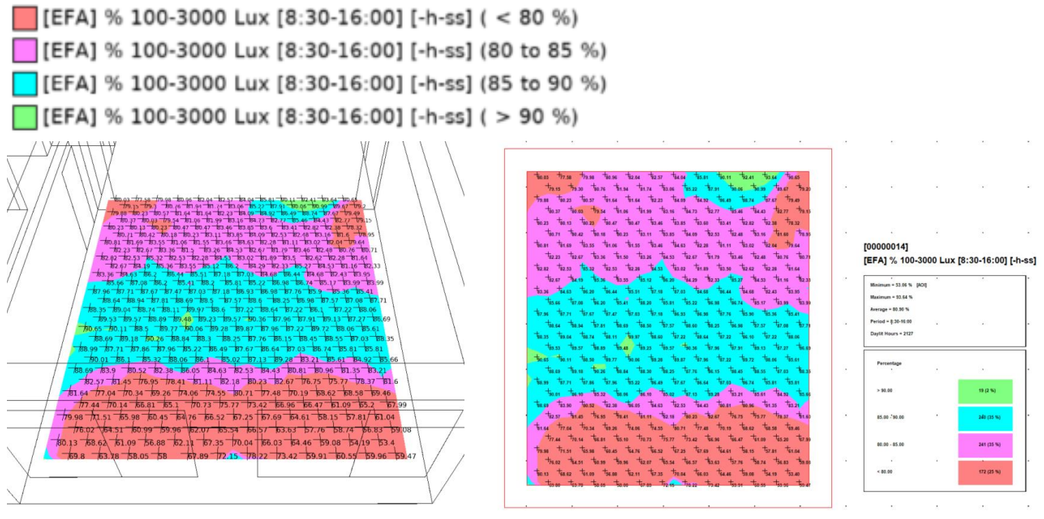


Figure 7. 00_Vocational Base 02 - Sample UDI-a results map.

5. Conclusion

The Climate-Based Daylight Modelling (CBDM) assessment for **Bexley Road Transitional Learning Centre** demonstrates full compliance with the Department for Education (DfE) Technical Annex 2E (2022) daylighting requirements. *Figure 8* below gives a visual representation of the individual failing rooms in the daylighting model for the Proposed Design.

Overall Outcomes

- **L1 – Basic Teaching / Admin / Staff Spaces:** 9 of 9 rooms passed (100%), exceeding the 80% compliance target.
- **L2 – Halls, Dining & LRCs:** 2 of 2 rooms passed (100%), exceeding the 65% group target.
- **L3 – SEN & Support Spaces:** 5 of 7 rooms passed (71%), exceeding the 50% target. Failures were predominantly a result of over illumination to the Multipurpose / therapy rooms.

ADS Code	No. Rooms	PASS	FAIL	Pass Rate	DfE Target
L1	9	9	0	100 %	80 %
L2	2	2	0	100 %	65 %
L3	7	5	2	71 %	50 %

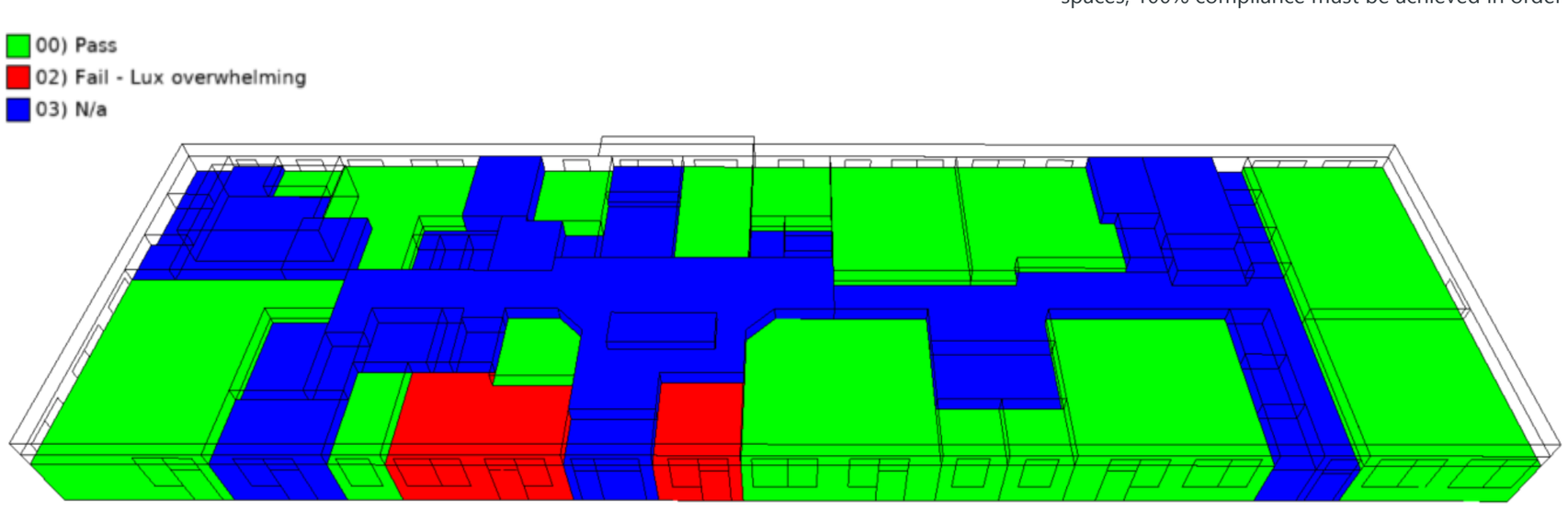


Figure 8. CBDM Pass/Fail Visualisation on IES Model.

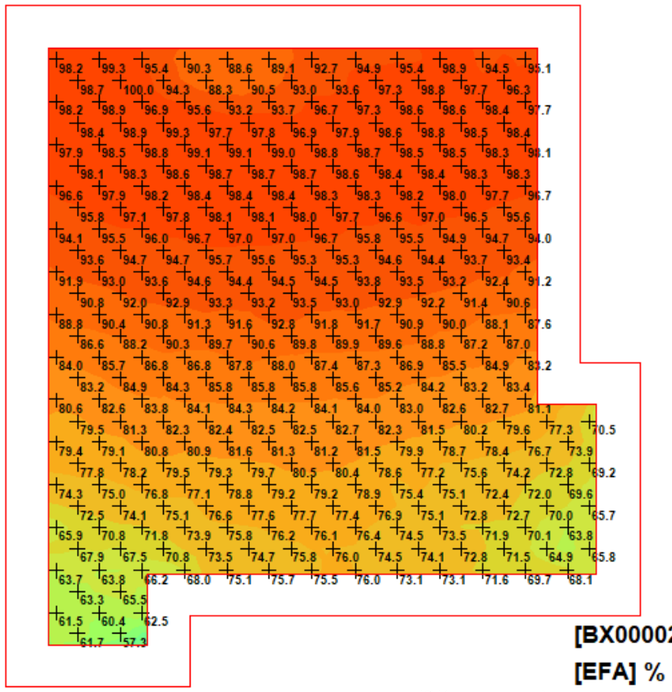
Key Observations

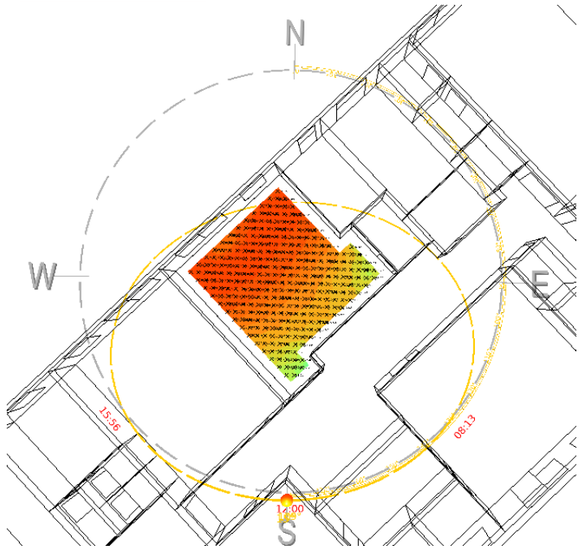
Orientation:
Many spaces on South facing facades (Southeast and Southwest) are only borderline passing due to over illumination, as this is outside the assessed useful Lux levels (100-3000 Lux). The over illumination is also what causes the individual fails in L3 rooms. This can be seen in *Figure 10* where the UDI result is worse nearer the Southeast facing windows.

The spaces on the Northern facades are all a secure pass, the only borderline pass is 00_Intimate Dining (L2) space at 81%. *Figure 9* shows a sample room on the Northwest façade 00_Life skills. The UDI of the Daylighting assessment scores higher closer to the window, indicating that rooms on the Northern façade, while currently all passing, are at a higher risk of under illumination.

Borderline compliance

The proposed design achieves full compliance in L1, L2 and L3 spaces overall but individually, many of these spaces are achieving only borderline compliance. As this is Stage 3 and the design/ façade is likely to change, it is highlighted as a risk that any changes could cause some of the borderline rooms to fail. With enough of the borderline rooms failing, overall compliance will not be achieved. This is exaggerated in L2 spaces, which require 60% of rooms passing to achieve compliance, but given there are only two spaces, 100% compliance must be achieved in order to satisfy this requirement.





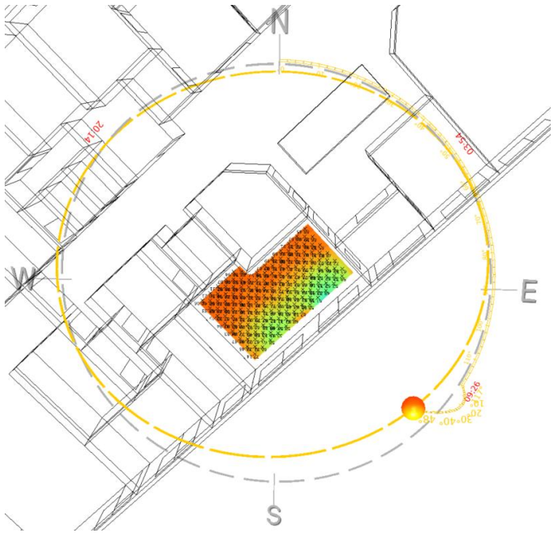
[BX000024]
[EFA] % 100-3000 Lux [8:30-16:00] [-h-ss]

Minimum = 51.69 % [AOI]
Maximum = 100.00 %
Average = 86.43 %
Period = 8:30-16:00
Daylit Hours = 2127

% Contour

96.00
88.00
80.00
72.00
64.00
56.00
48.00
40.00
32.00
24.00
16.00
8.00
0.00

Figure 9: UDIs results for 00_Life skills (L1), contour line for 80% of useful daylight near the window only with North orientation and windows shown. This identifies location for 80% of useful daylight near the window only.



[BX000031]
[EFA] % 100-3000 Lux [8:30-16:00] [-h-ss]

Minimum = 45.86 % [AOI]
Maximum = 90.65 %
Average = 76.77 %
Period = 8:30-16:00
Daylit Hours = 2127

% Contour

96.00
88.00
80.00
72.00
64.00
56.00
48.00
40.00
32.00
24.00
16.00
8.00
0.00

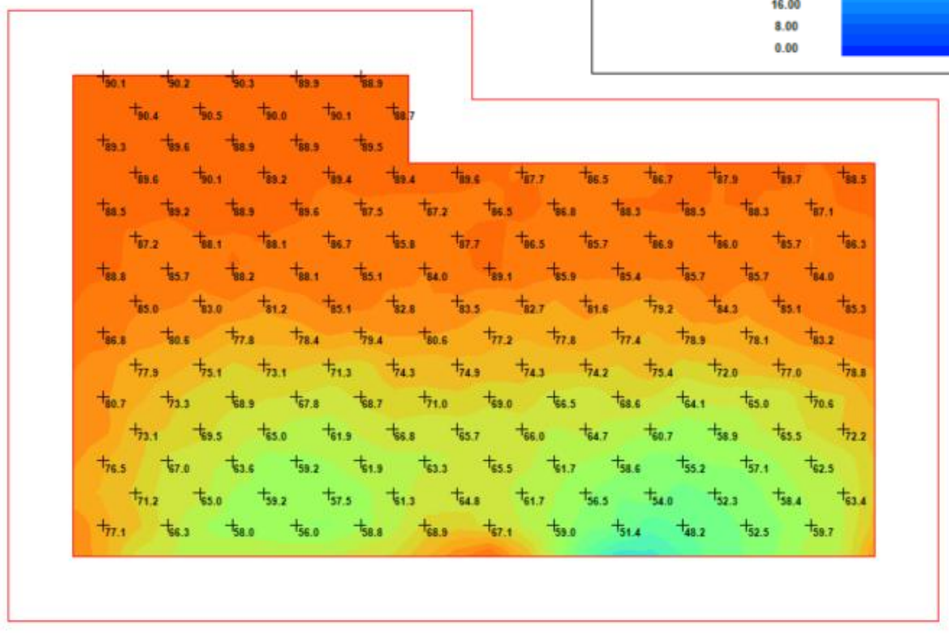


Figure 10: UDIs results for 00_Breakout / therapy 02 (L3), contour line for 80% of useful daylight away from the window only with North orientation and windows shown. This identifies location for 80% of useful daylight away from the window due to over illumination on the Southeast façade.

Appendix A: Architectural Layouts & Elevations

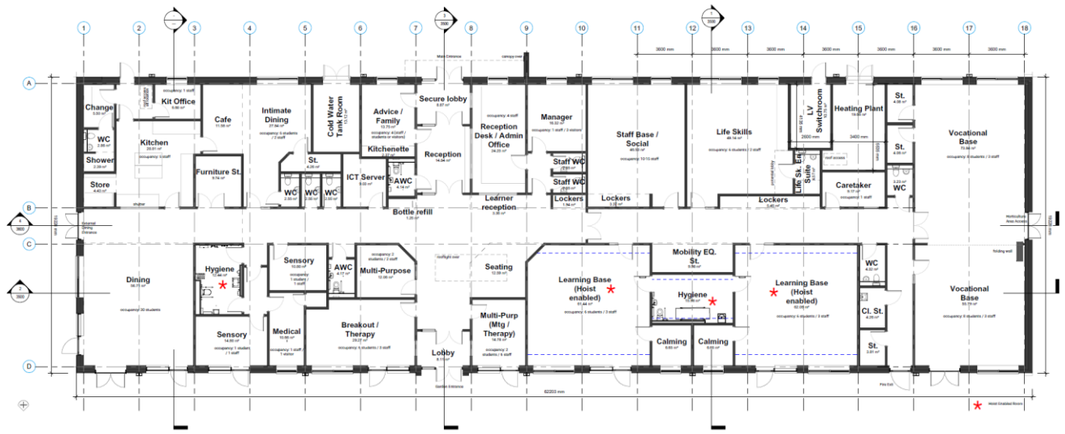


Figure 11. Ground & First Floor Plan. Courtesy: Pozzoni Architects

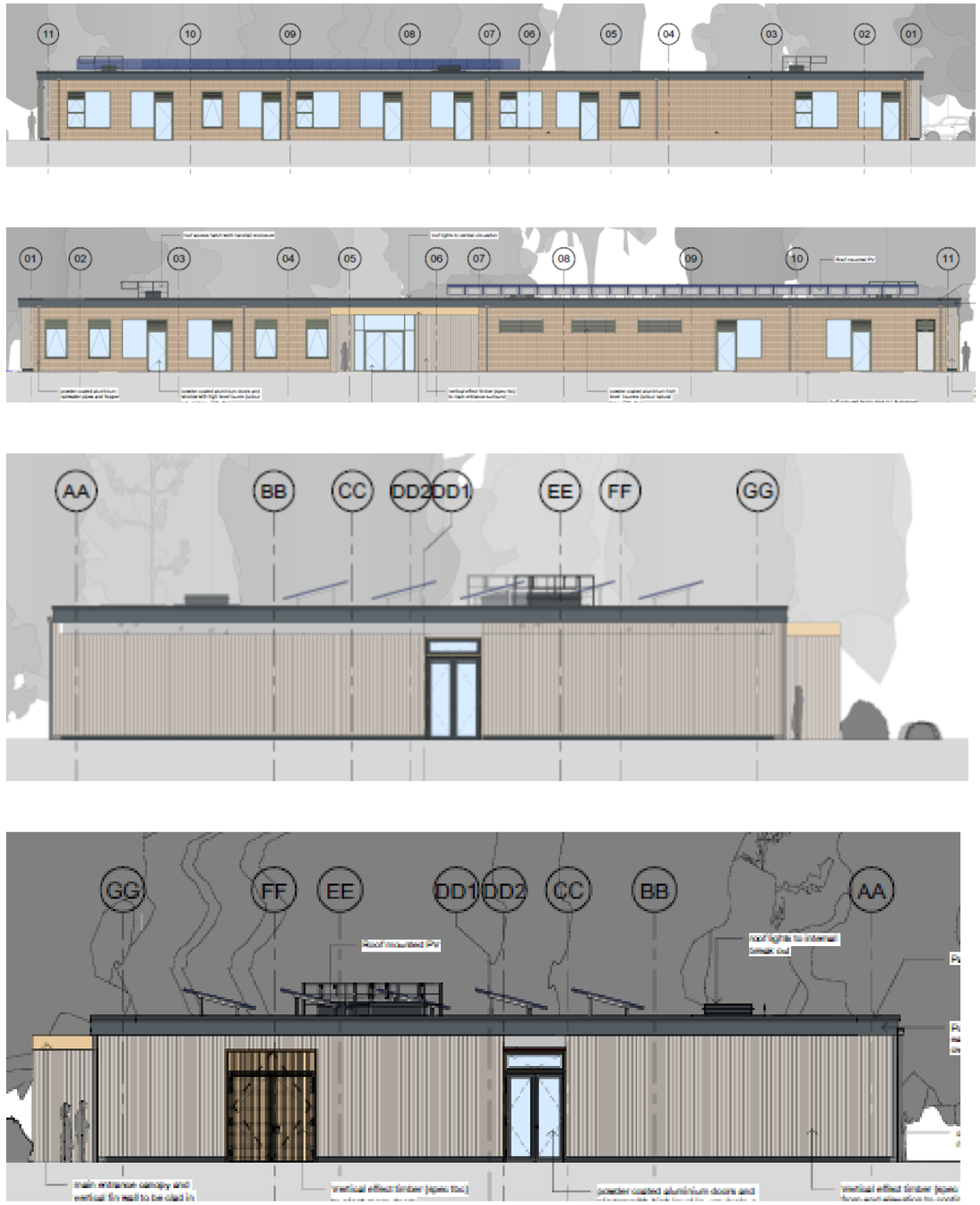


Figure 12. Architectural Elevations. Courtesy: Pozzoni Architects

Appendix B: IES CBDA Model

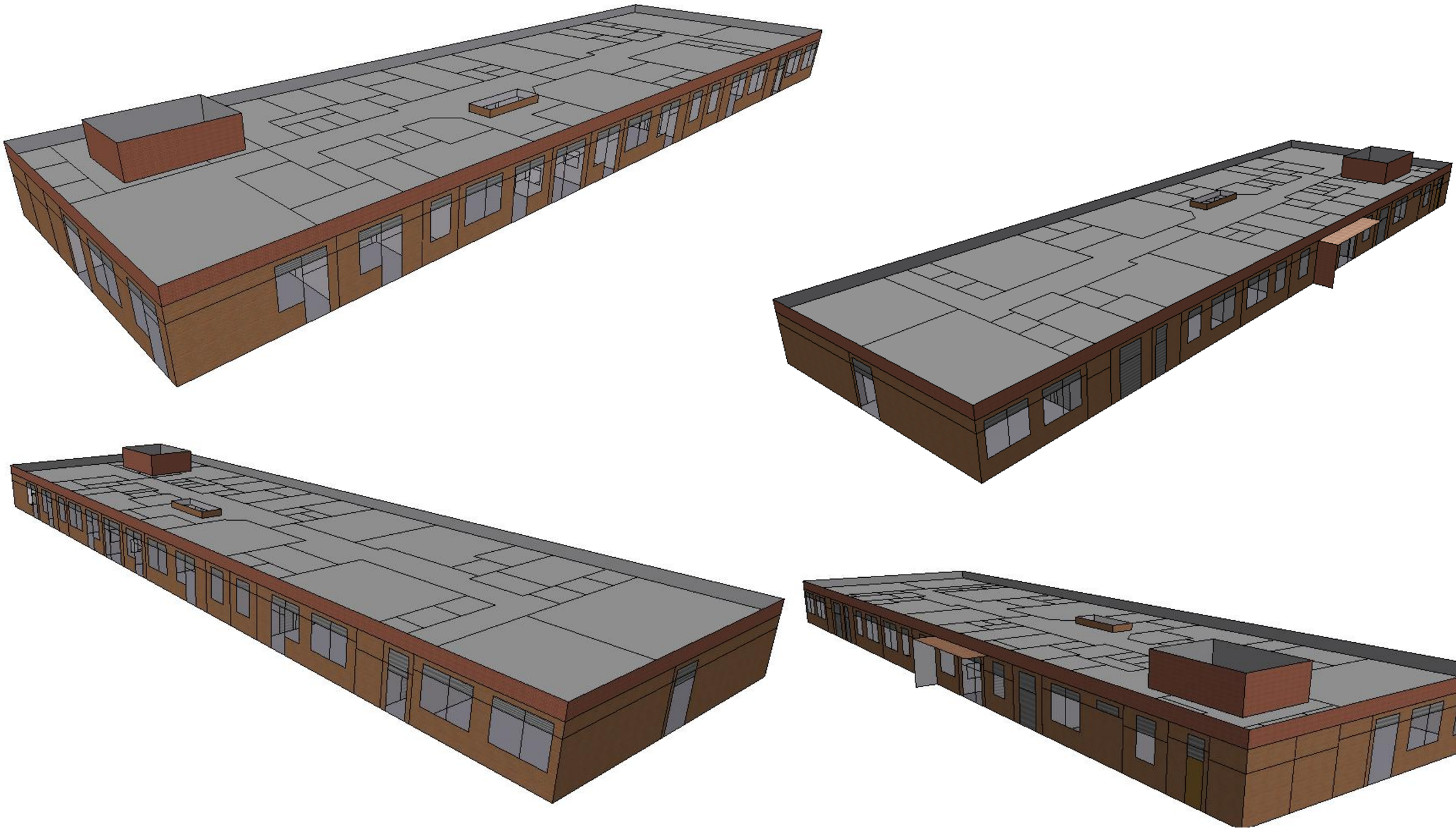


Figure 13. IES Daylight Model Images.

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