

Course challenge exercise with grading rubric

Create a performance-driven massing and sustainability strategy

Software Required: Autodesk Forma, Autodesk Insight, Autodesk Revit

You are part of a design team tasked with developing a conceptual site plan for an urban downtown location. Your goal is to model three mixed-use buildings of varying sizes and heights, evaluate their environmental performance using Autodesk Forma, and refine your massing to enhance thermal comfort, daylight, and sustainability outcomes. You will then export your optimized model into Autodesk Revit and Autodesk Insight for deeper energy and carbon evaluation.

Two of the three buildings should be **65 ft (19.8 m)** deep to optimize daylight penetration.

Complete the required activities:

Part 1 – Conceptual Modeling & Environmental Analysis in Forma

1. **Select a real-world site** when creating your new Autodesk Forma project.
2. **Create three buildings:**
 - Vary size, height, and footprint among them.
 - Two buildings must be 65 ft (19.8 m) deep to support daylight optimization.
3. **Run integrated analysis** on your proposal:
 - Sun hours and daylight potential
 - Wind flow and pedestrian comfort
 - Noise impact zones
4. **Refine your massing:** Adjust placement or orientation of at least two buildings to improve performance results.
5. **Capture screenshots** of the final proposal and analysis overlays (daylight, wind, noise).

Part 2 – Energy + Carbon Evaluation in Insight

6. **Create a massing model** of one of your three buildings in Revit and then **generate an Energy Analysis Model (EAM)**.
7. **Send the model to Insight and then view the results:**
 - Operational carbon (EUI, HVAC assumptions)
 - Embodied carbon
8. **Create an Insight Dashboard** and the Light Power Density dropdown.
9. **Document** the Energy Use Intensity (EUI), embodied carbon totals, and the design factors adjusted.

Part 3 – Summary & Submission

10. **Create a 1-page PDF summary** that includes:
 - Screenshots from Forma & Insight
 - A comparison table of baseline vs. optimized results
 - Brief explanation of what you changed and why
11. **Name your files per the BIM Execution Plan** (e.g., PRJ100-ARC-ZZ-ZZ-M3-A-0001). Optional.

What to Submit

- Forma Project Screenshots (Daylight, Wind, Noise overlays)
- Revit EAM + Insight Dashboards
- One-page Performance Summary PDF
- Correctly named Revit/Insight files (optional ZIP)

Success Criteria:

- Accurately model **three buildings** of varying sizes and heights, ensuring **two are 65 ft (19.8 m) deep** to support daylight optimization.
- Use **Autodesk Forma's daylight, wind, and noise analysis** tools to evaluate the proposal and make design adjustments that measurably improve results.
- Demonstrate **clear evidence of optimization** by showing before-and-after improvements in at least two buildings.
- Export an **Energy Analysis Model (EAM)** to Autodesk Insight and simulate **both operational and embodied carbon** impacts.
- Create an **Insight Dashboard** that compares baseline and optimized scenarios, including key metrics like EUI and carbon totals.
- Deliver a **concise, visual one-page summary** explaining the design changes, performance outcomes, and sustainability benefits.

Grading Rubric:

Reference for instructors.

| CRITERIA | ADVANCED | PROFICIENT | BASIC | EMERGING |
|--|--|---|--|----------------------------------|
| MASSING SETUP | Three buildings modeled accurately with intended size, height, and two at 65 ft (19.8 m) depth | Two buildings accurate; one has errors | Only one or two buildings accurate; depth requirement missed | Fewer than two buildings modeled |
| DAYLIGHT & SUN HOURS ANALYSIS | All buildings analyzed with clear interpretation of | Analysis run but interpretation minimal | Only one analysis type used | No analysis shown |

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|------------------------------------|---|--|--|------------------------------------|
| | daylight and sun hours potential | | | |
| WIND & NOISE ANALYSIS | Both wind and noise maps used to adjust massing; improvements documented | Analysis run but interpretation minimal | Analysis completed but no interpretation | No analysis performed |
| OPTIMIZATION EVIDENCE | At least two buildings revised with improved metrics demonstrated | One building revised with some improvement | Minimal revisions, unclear benefit | No revision or improvement shown |
| ENERGY SIMULATION (INSIGHT) | EAM created and Insight used for both operational & embodied carbon | Insight used for either operational or embodied carbon | Insight launched but incomplete metrics | No Insight workflow performed |
| DASHBOARD COMPARISON | Dashboard shows baseline vs. optimized metrics and design factors | Dashboard included but comparisons unclear or incomplete | Data exported but not visualized | No dashboard or comparison created |
| SUMMARY REPORT QUALITY | Summary clearly communicates findings, includes visuals, and design logic | Summary includes visuals but lacks clarity or detail | Basic screenshots, limited explanation | Summary missing or incomplete |