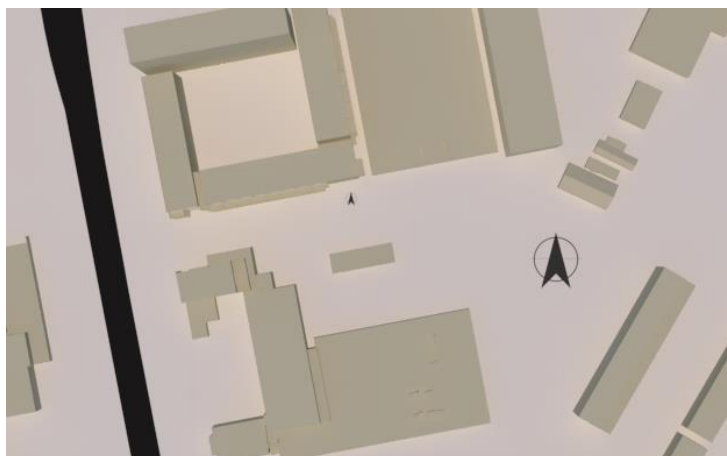
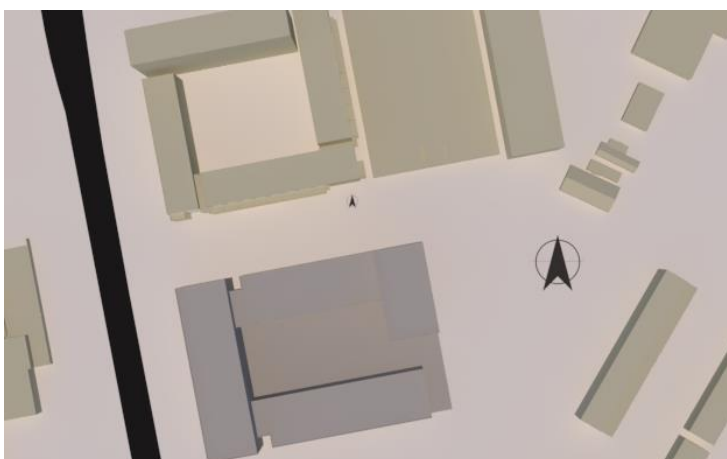




Bestaande situatie



Geplande situatie



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I Aanleiding en doelstelling

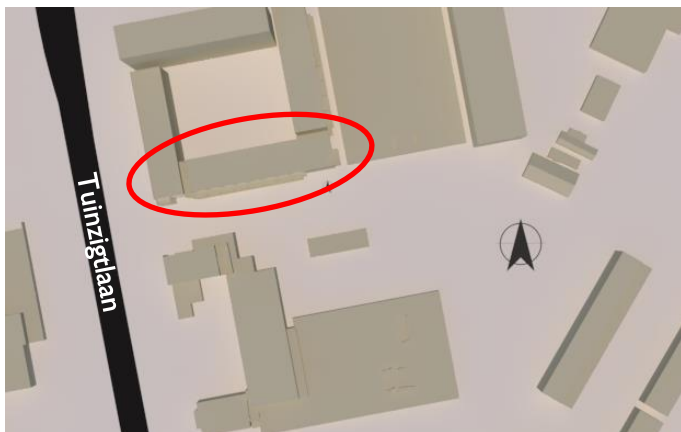
In opdracht van dhr. J. Martens van VaMaS BV, is deze bezonningsstudie uitgevoerd. Dit naar aanleiding van het bouwplan Tuinzigtlaan 12 te Breda.

Deze studie is uitgevoerd met als doel de veranderende bezonningsituatie ter plaatse van het appartementencomplex aan de Vijfhagen visueel inzichtelijk te maken. De wijze van uitwerking wordt in het vervolg nader toegelicht.

2 Situatie

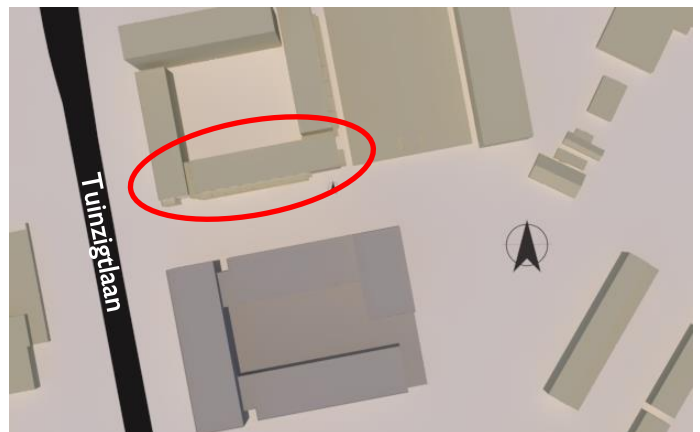
Geogegevens	
Locatie	Tuinzigtlaan 12 te Breda
Lengtegraad	4.7529OL
breedtegraad	51.5823NB

Tabel 1: Geogegevens

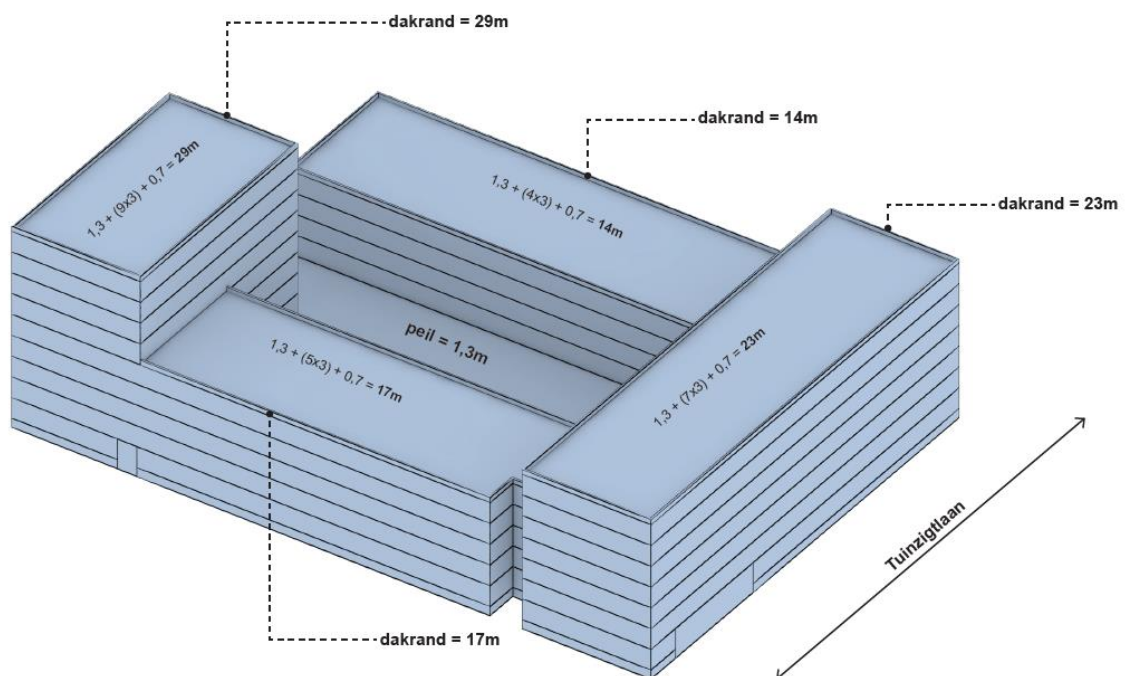


Afbeelding 1: Bestaande situatie (s0, s2)

De effecten binnen de rode cirkel zijn in beeld gebracht



Afbeelding 2: Geplande situatie (s1, s3)



Afbeelding 2: Gepland bouwvolume conform concept bestemmingsplan Breda, Princenhage Tuinzigtlaan 12.

3 Onderzoek en methode

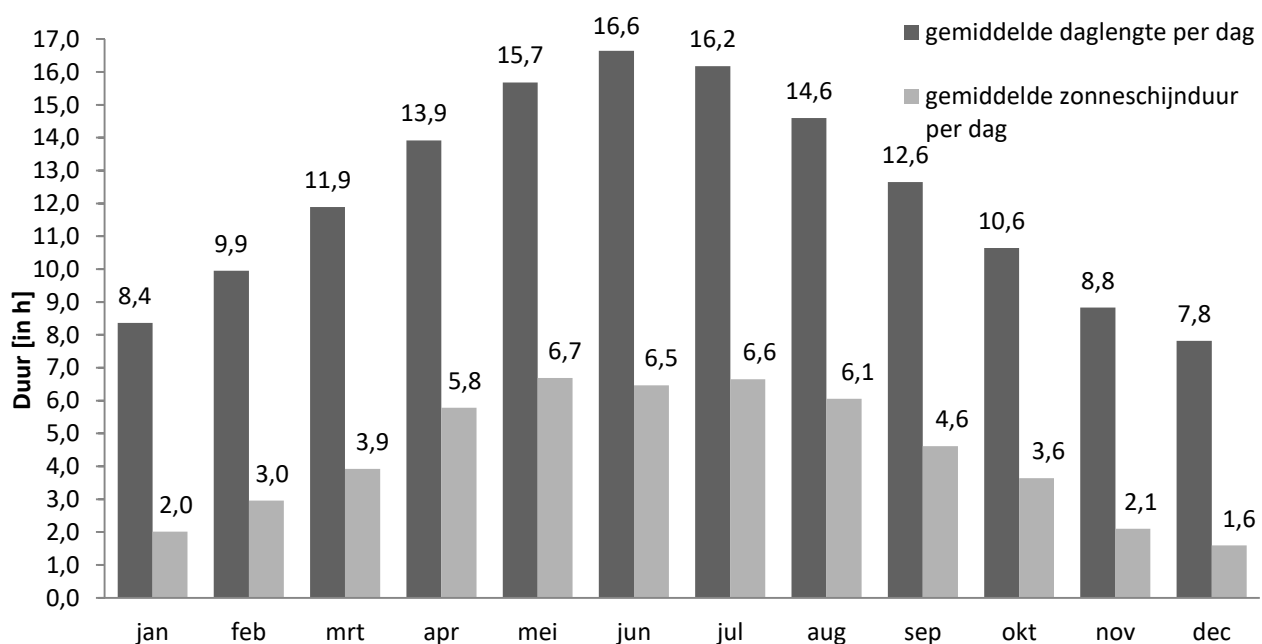
Voor dit onderzoek is een 3D-model van de omgevingssituatie opgezet. Er wordt uitgegaan van de volgende uitgangspunten en aannamen:

Algemeen

- In deze studie zijn de volgende situaties in beeld gebracht: 1. Bestaande (0s&2s) 2. Geplande (1s&3s).
- Relevante gebouwde objecten die van invloed zijn op de bezonning zijn in dit onderzoek meegenomen. Het 3D-model t.b.v. deze studie is gebaseerd op de gegevens zoals omschreven in de colofon.
- Eventuele begroeiing is in dit onderzoek buiten beschouwing gelaten.

Bezonning situatie

- Onder bezonning verstaan we de duur dat direct zonlicht een vlak raakt. In dit onderzoek wordt uitgegaan van de theoretisch mogelijke bezonningsduur (cq. dagduur of daglengte). Dit betekent dat de zon ononderbroken schijnt. In onderstaande staafdiagram staan de gemiddelde zonneshijnduur (licht grijs) en de gemiddelde daglengte (donker grijs) weergegeven.



Grafiek 1: De gemiddelde daglengte en de gemiddelde zonneshijnduur gemeten per maand in De Bilt (bron: KNMI)

- Door relatief veel bewolking en een korte daglengte (weinig daguren) is de gemiddelde zonneshijnduur per dag laag (zie grafiek 1) in de periode van 21 oktober – 19 februari. In dit onderzoek laten we deze periode buiten beschouwing en is 19 februari maatgevend.



4 Berekeningsmethoden

4.1 Visuele uitwerking van bezonning

Doel is om een indruk te krijgen waar en wanneer er direct zonlicht (bezonning) mogelijk is en vermindering van bezonning optreedt. De verschillen in schaduwwerking zijn op peildata van 19 februari tot en met 21 juni met een interval van 1,0 uur weergegeven. De daglengte neemt tussen 21 juni en 21 oktober navenant af. Daarom zijn de onderzochte peildata representatief voor de tussen haakjes aangegeven peildata.

Gehanteerde peildata:

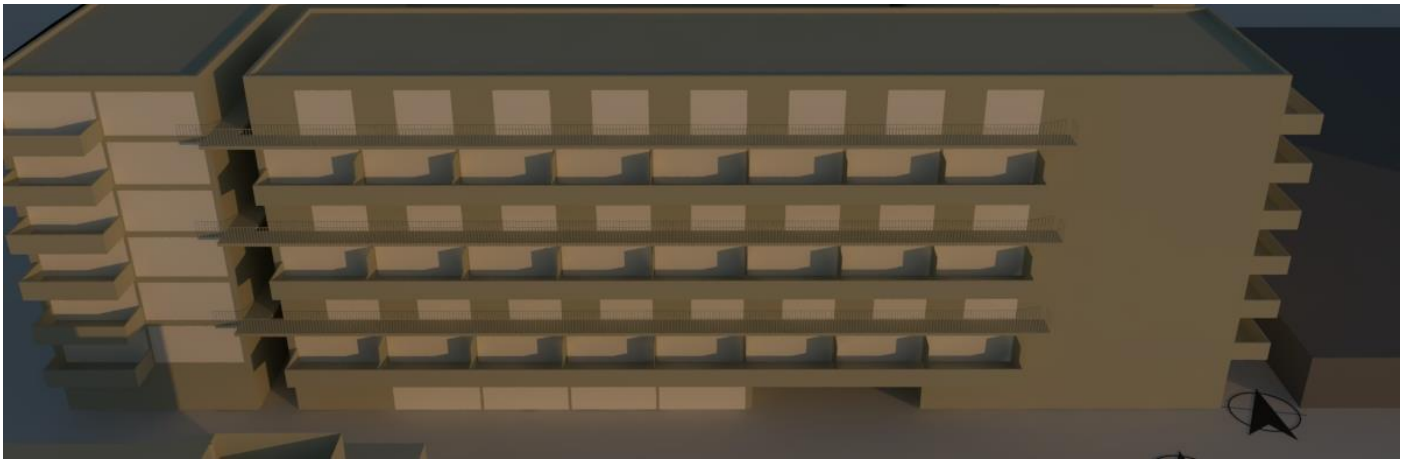
- 19 februari (21 oktober) : Peildatum
- 21 maart (23 september) : Peildatum en equinox (lengte van de dag en nacht is gelijk)
- 21 april (23 augustus) : Peildatum
- 21 mei (21 juli) : Peildatum
- 21 juni : Peildatum, langste dag van het jaar



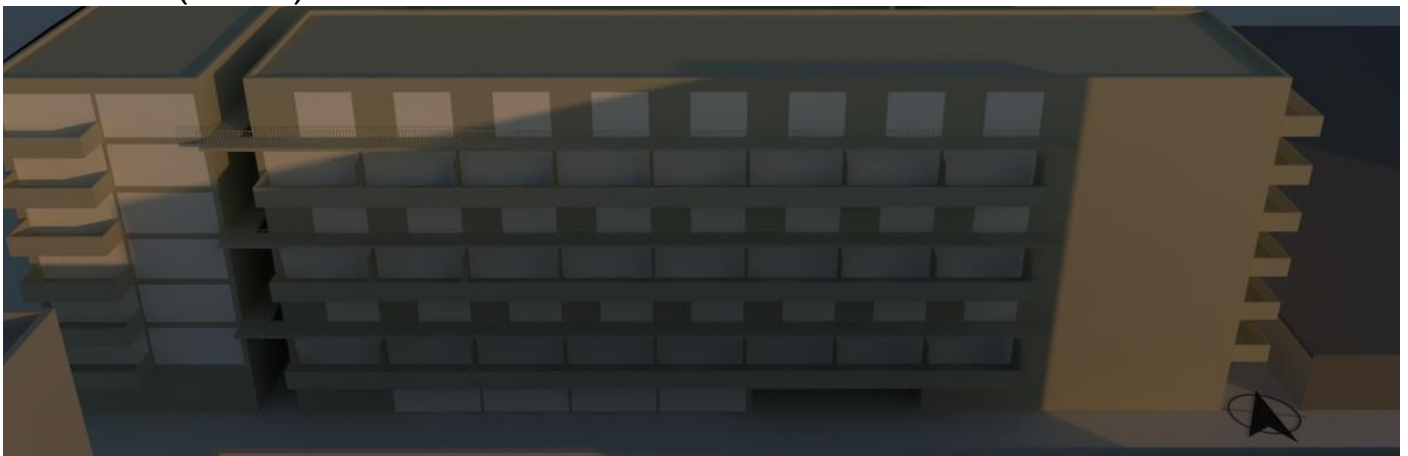
helder over zonlicht

bezonningsingenieur.nl

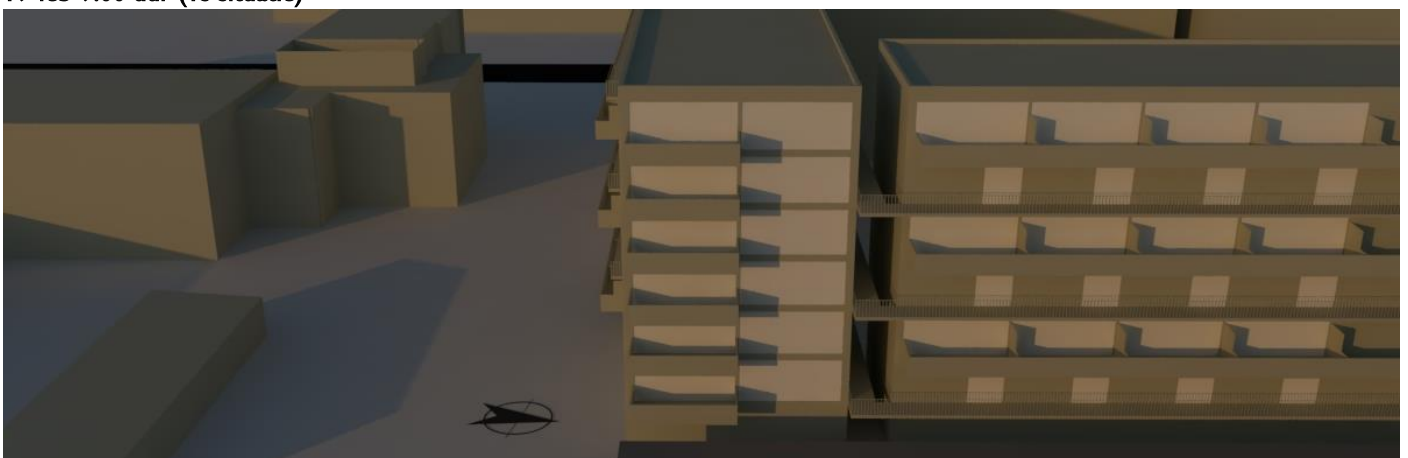
3D-schaduwafbeeldingen



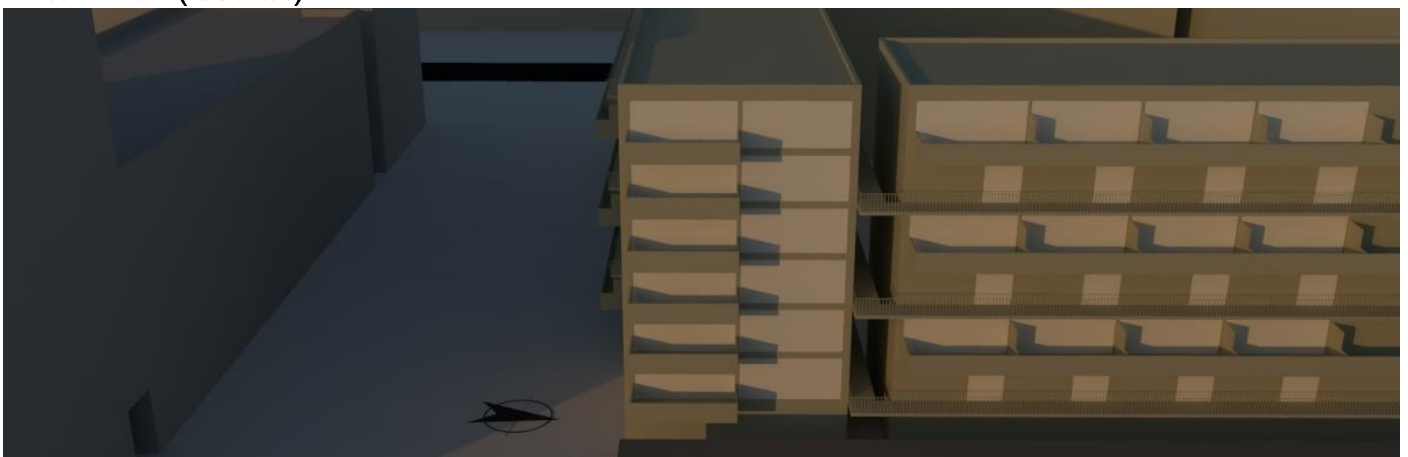
19-feb-9:00 uur (0s situatie)



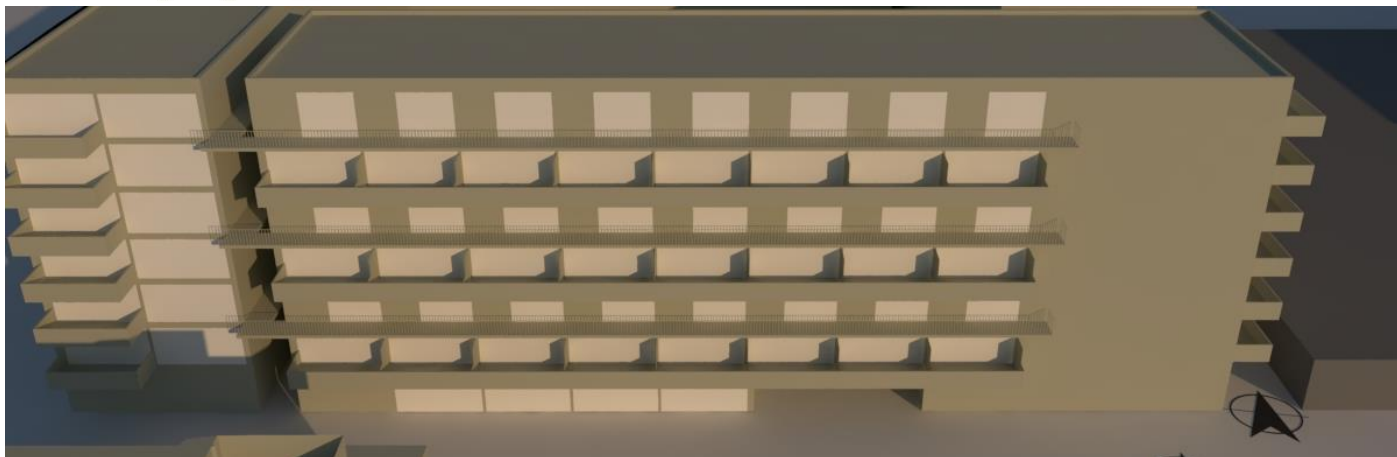
19-feb-9:00 uur (1s situatie)



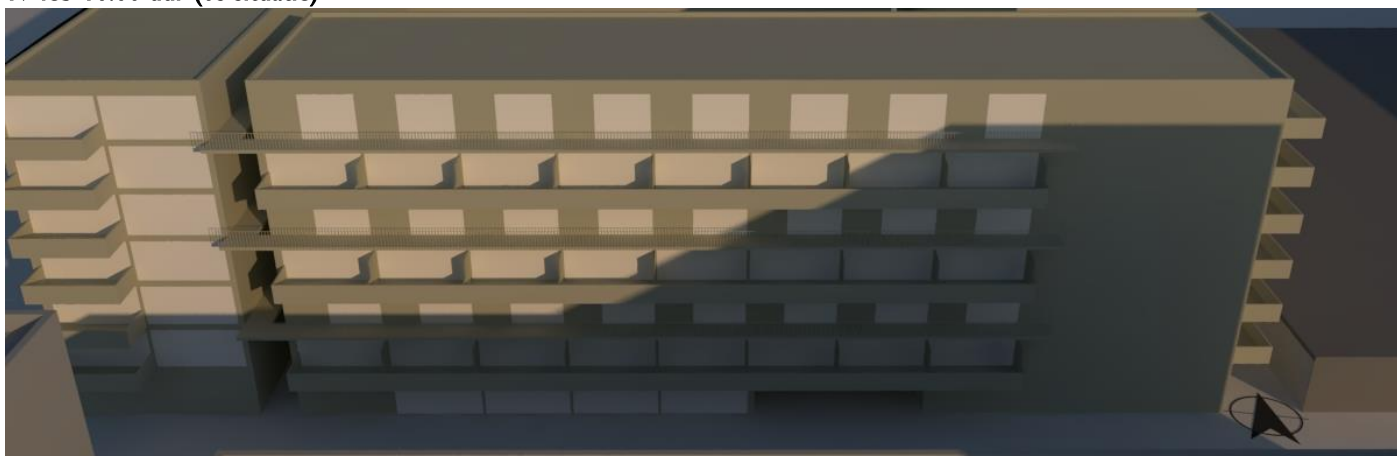
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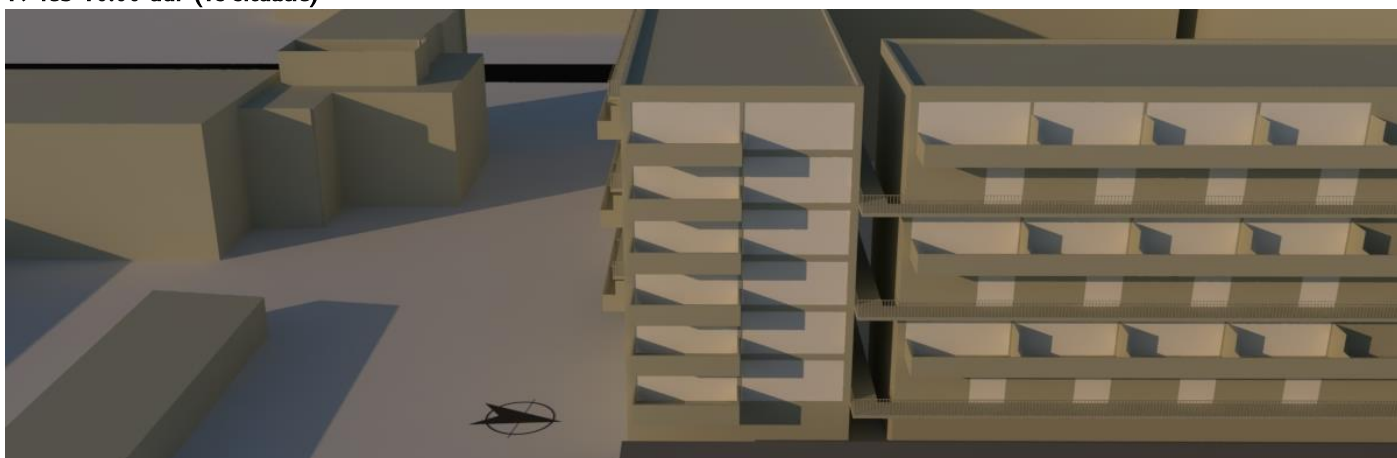
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19-feb-10:00 uur (0s situatie)



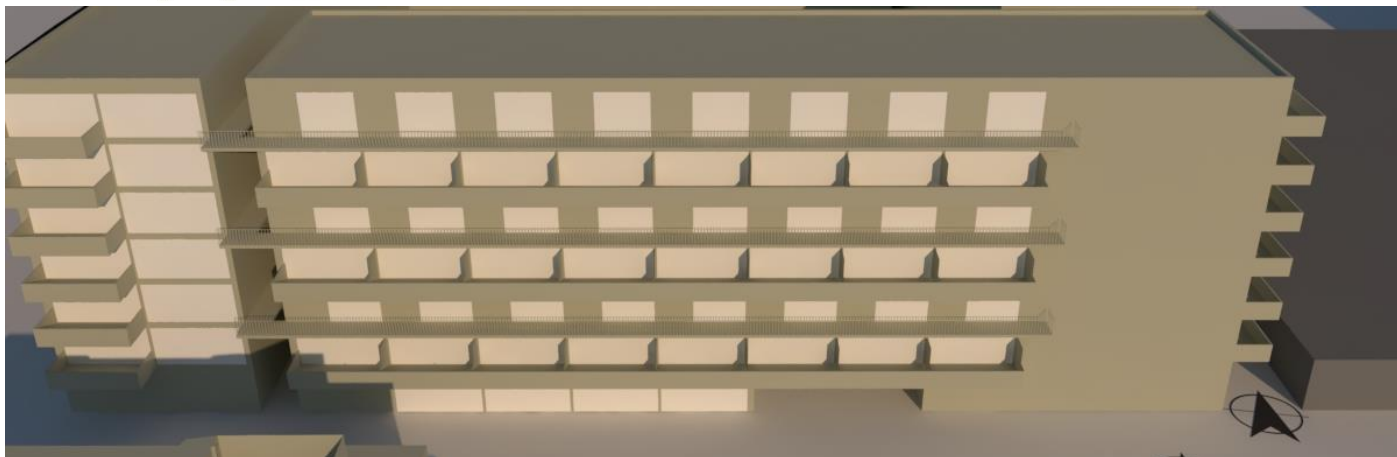
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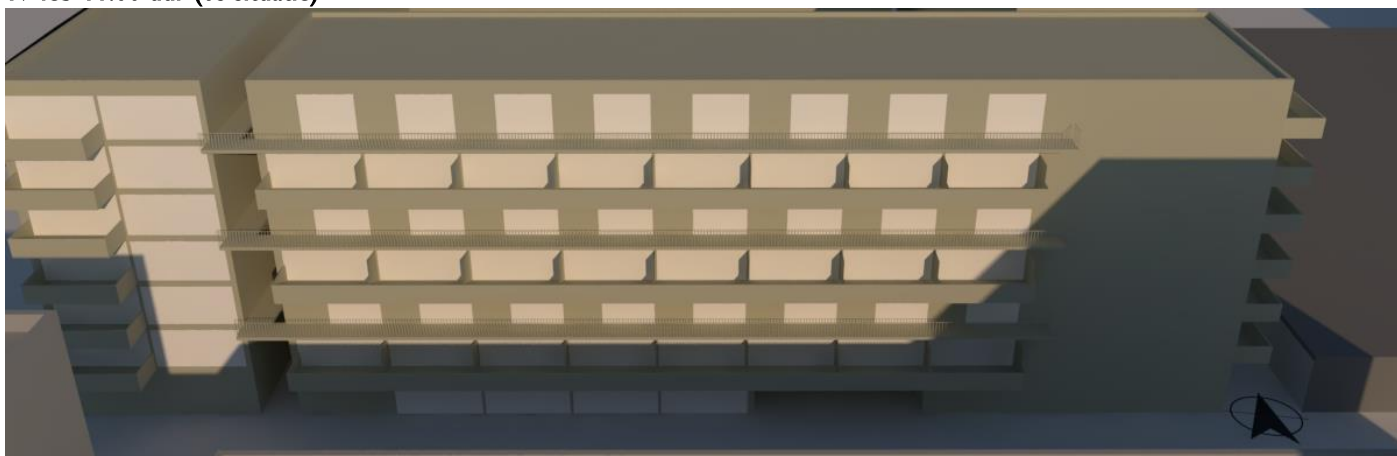
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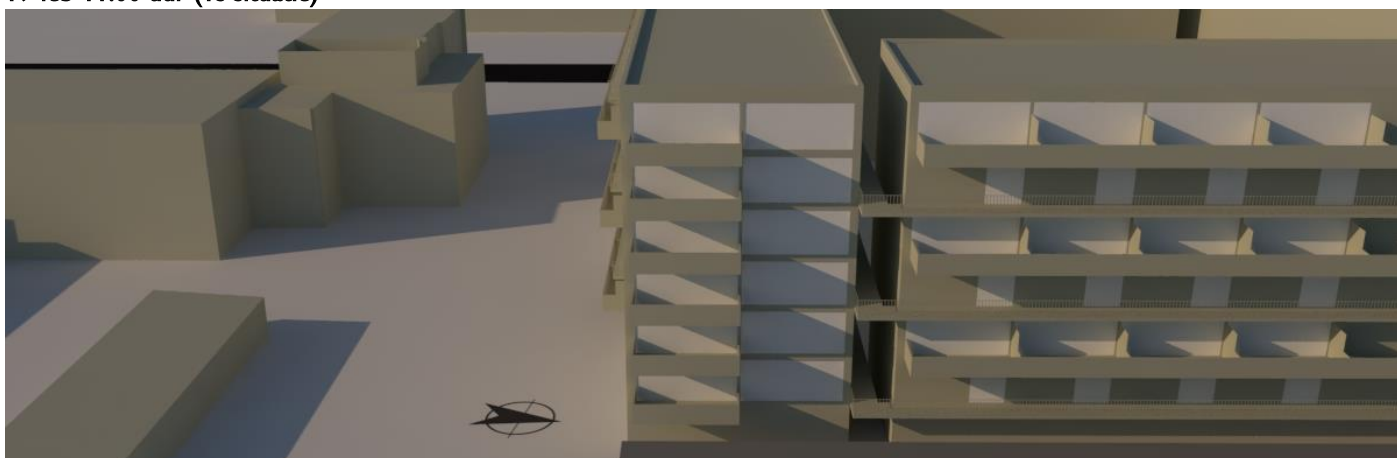
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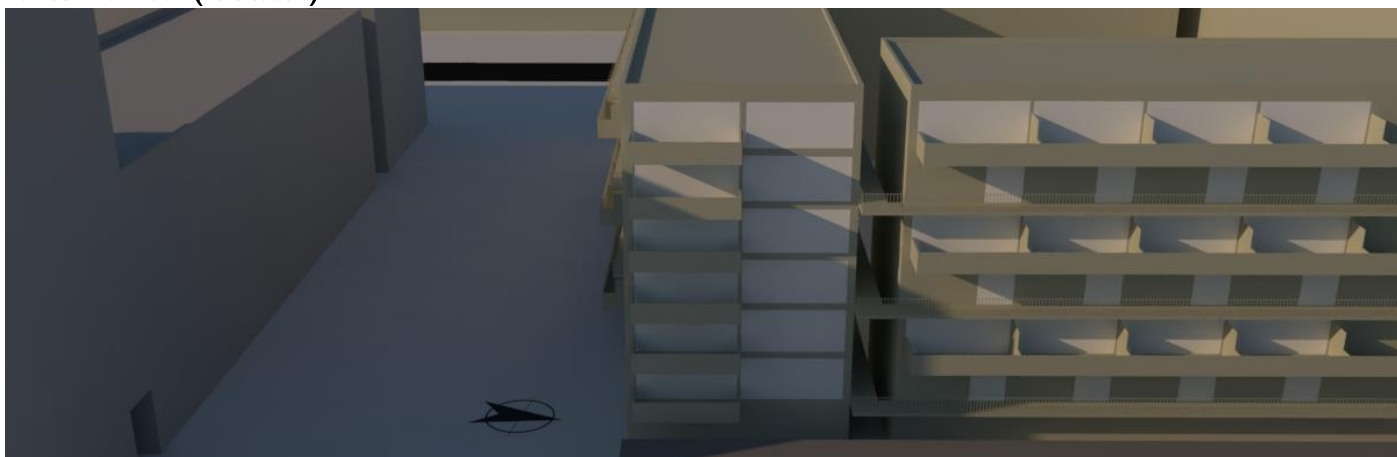
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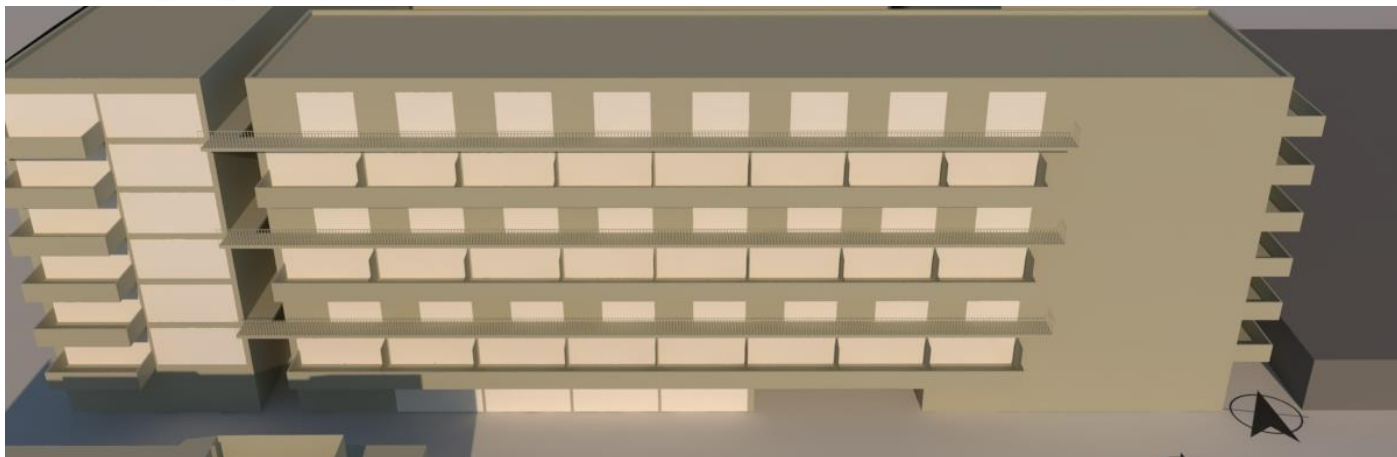
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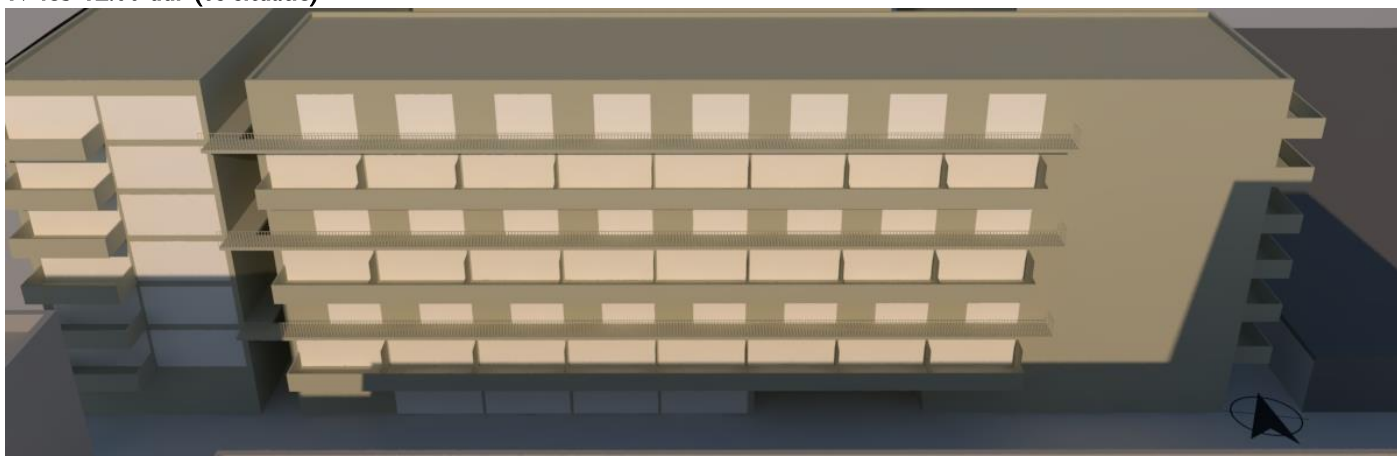
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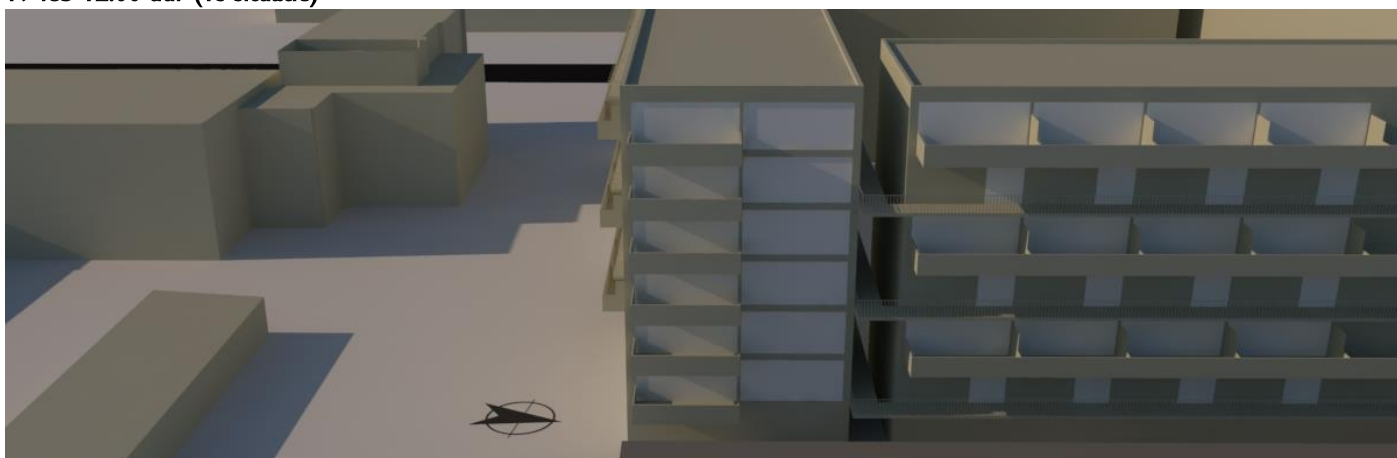
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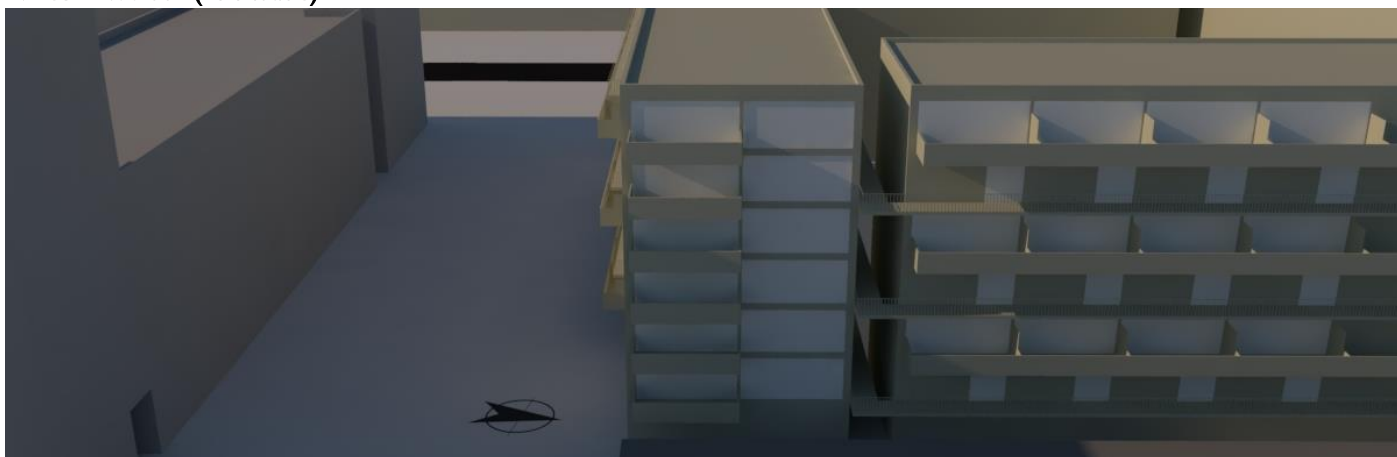
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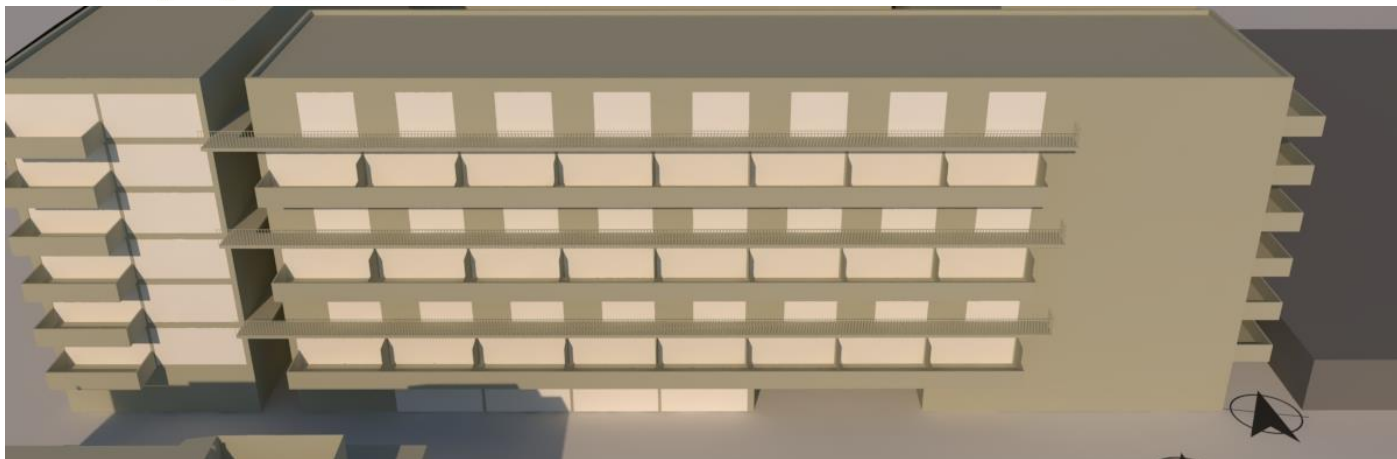
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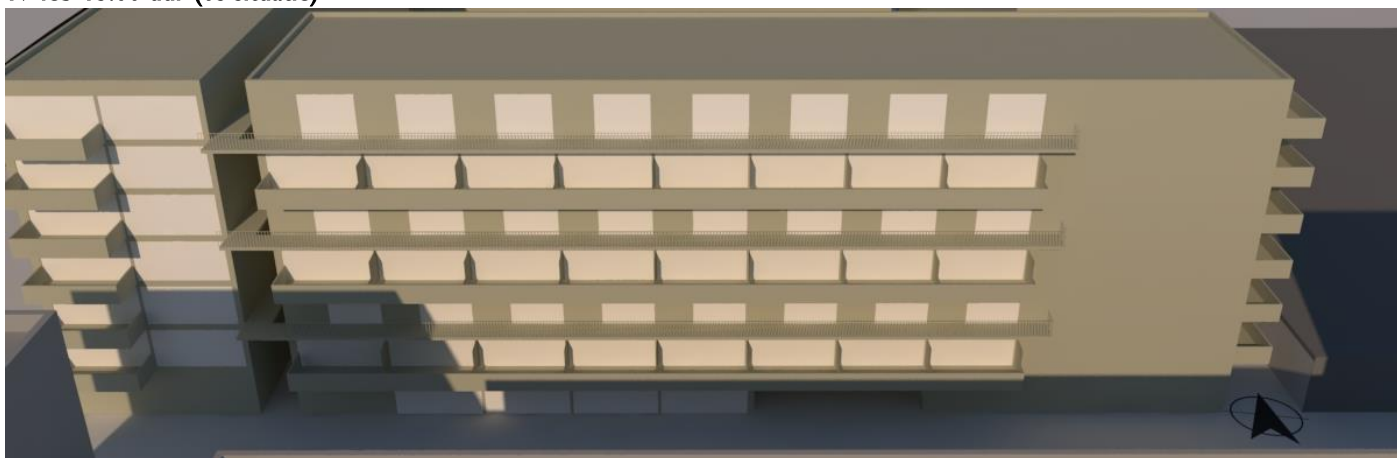
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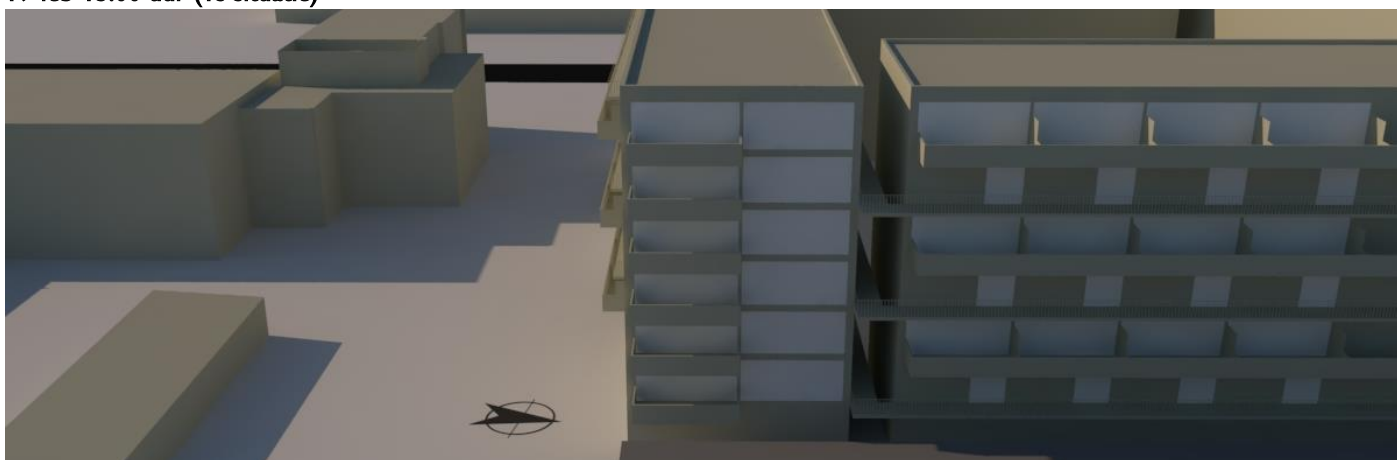
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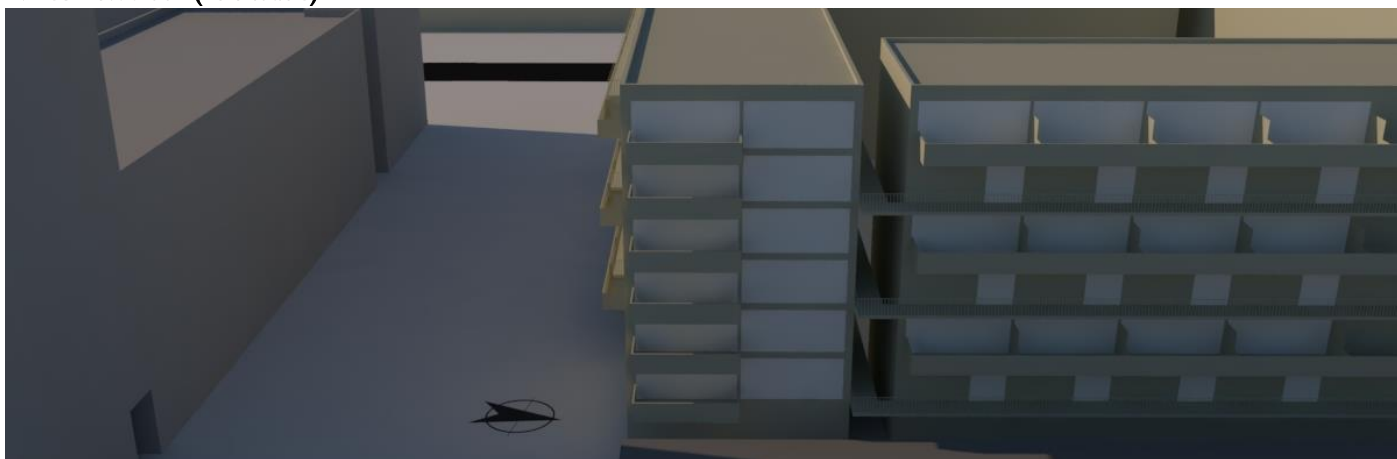
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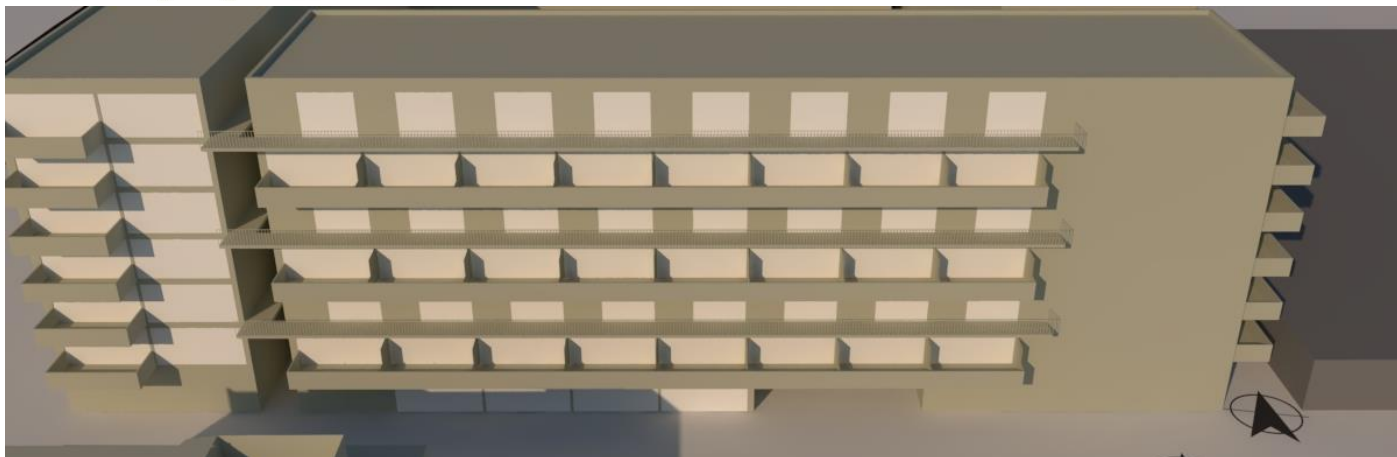
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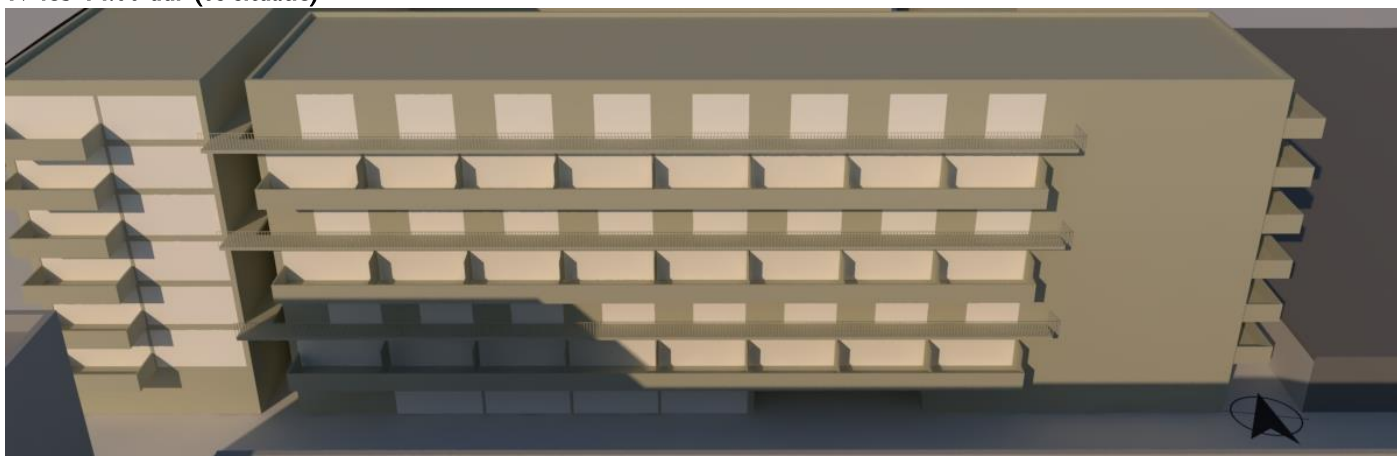
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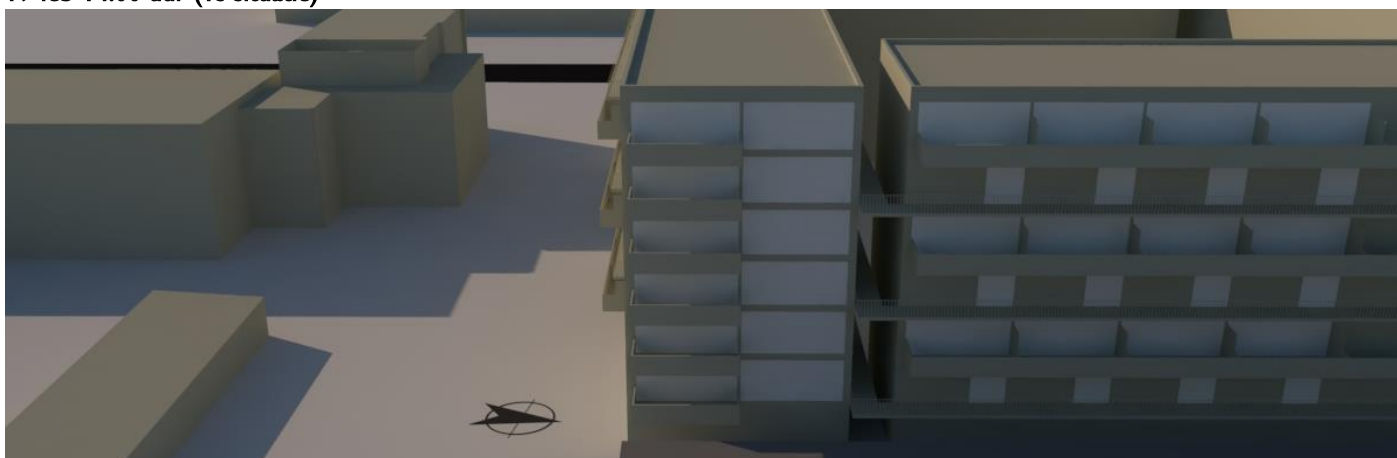
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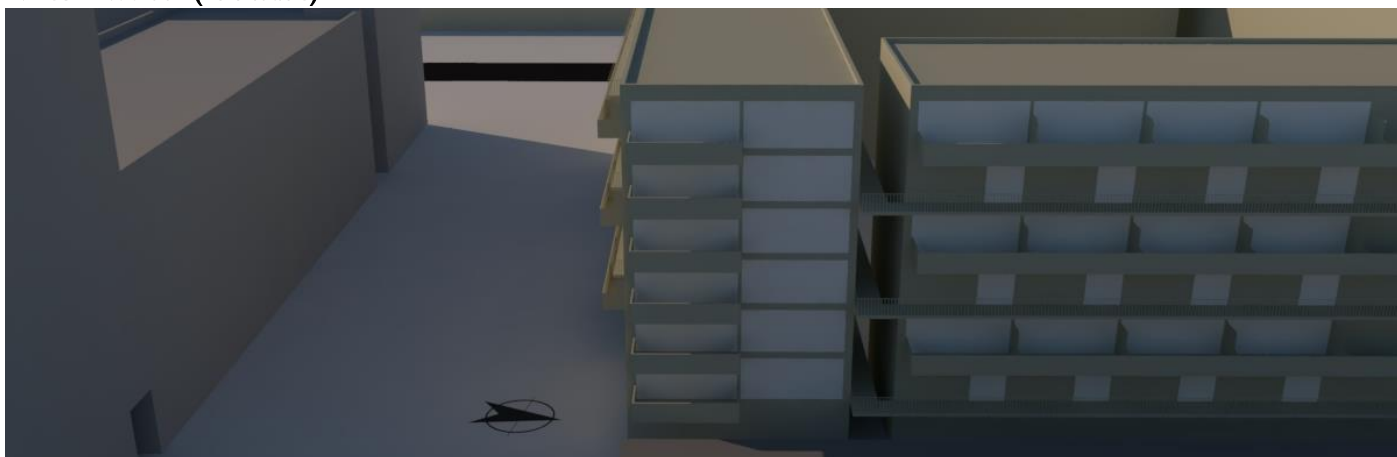
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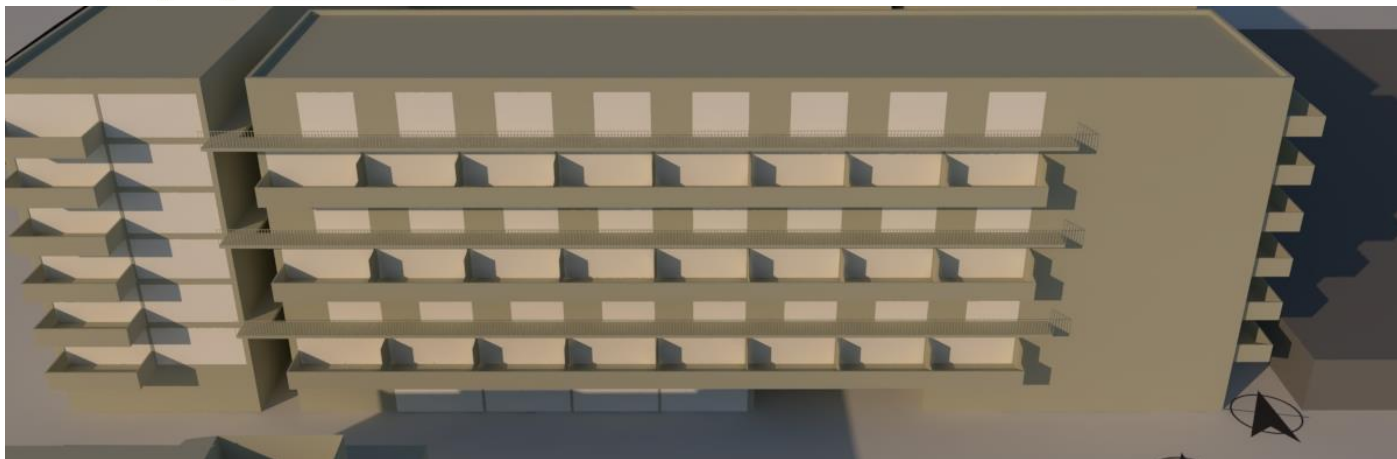
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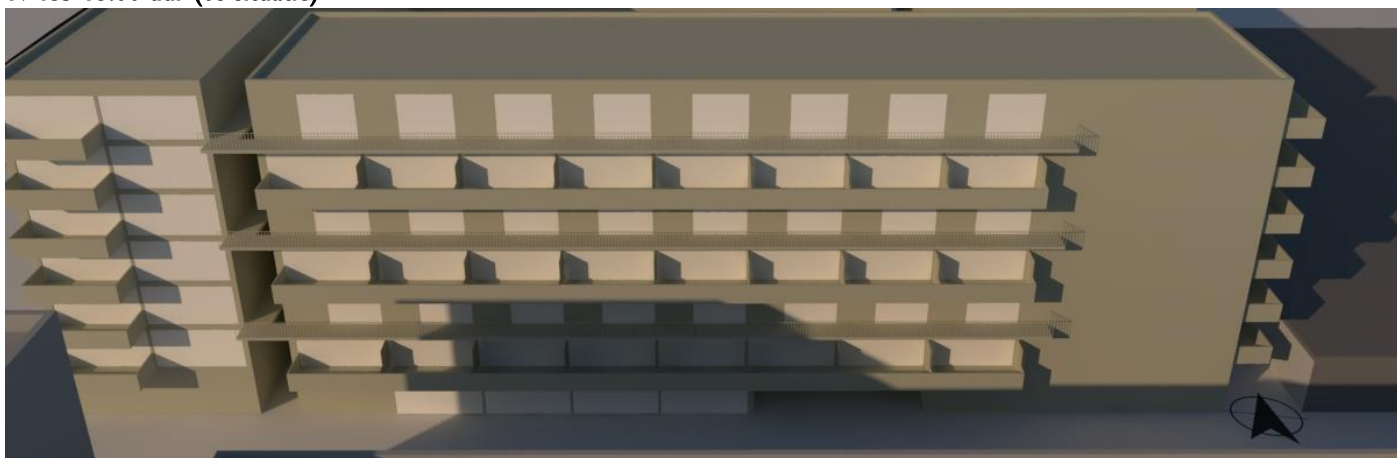
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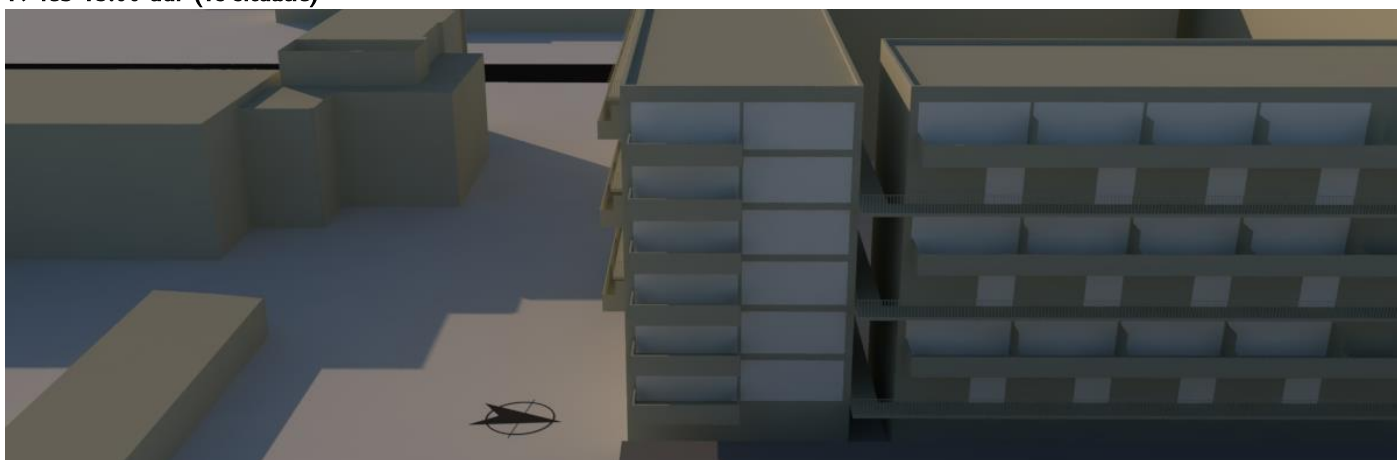
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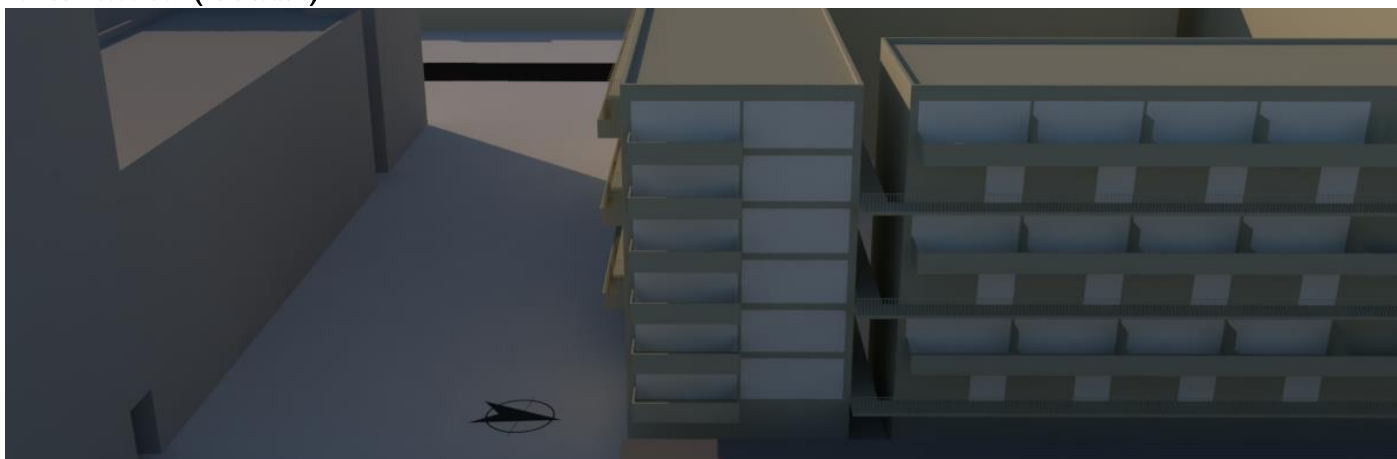
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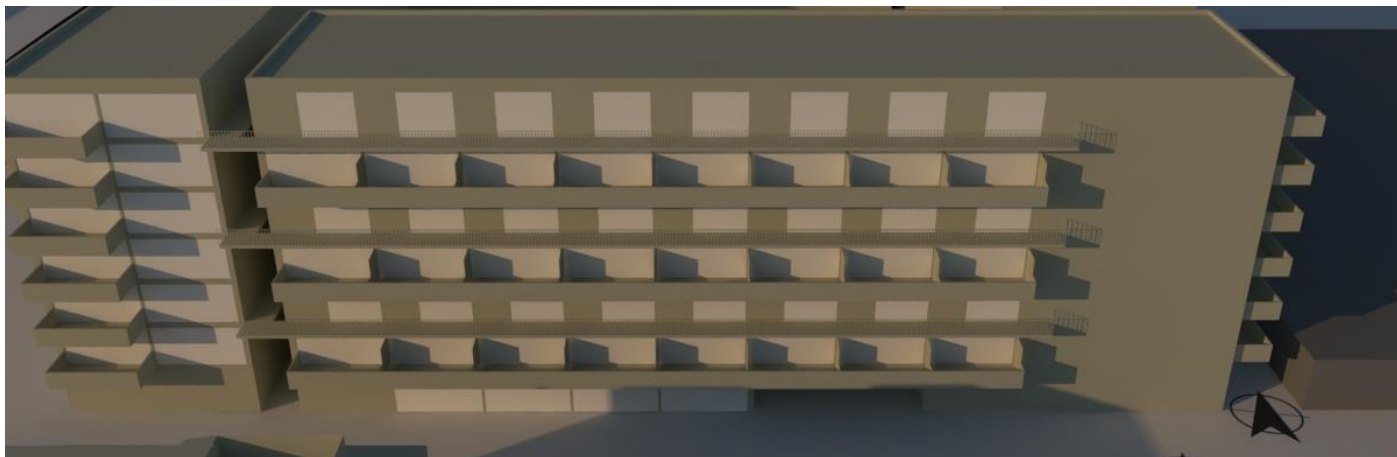
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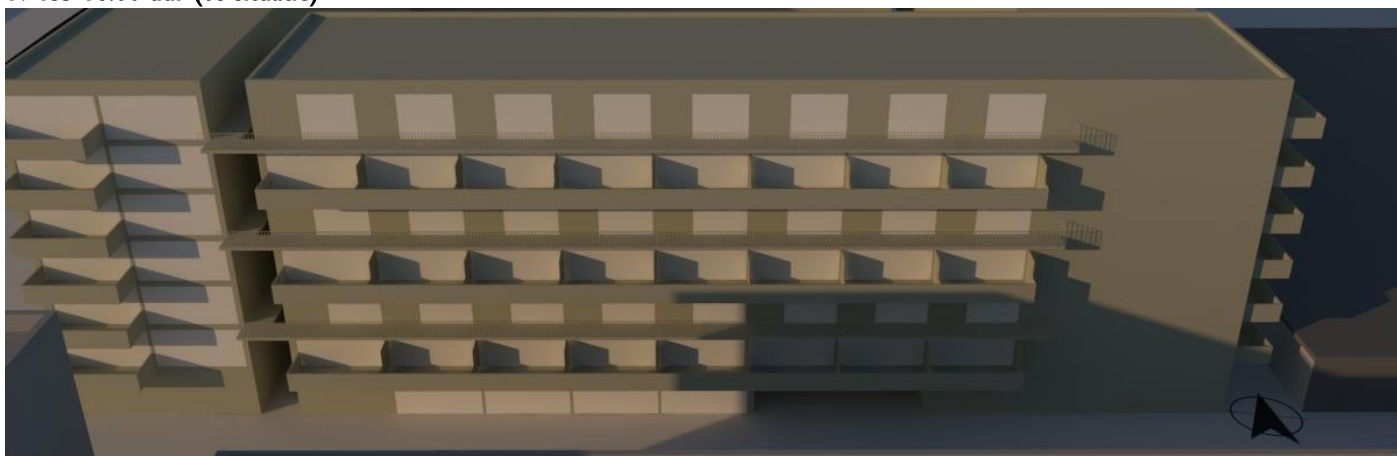
19-feb-15:00 uur (2s situatie)



19-feb-15:00 uur (3s situatie)



19-feb-16:00 uur (0s situatie)



19-feb-16:00 uur (1s situatie)



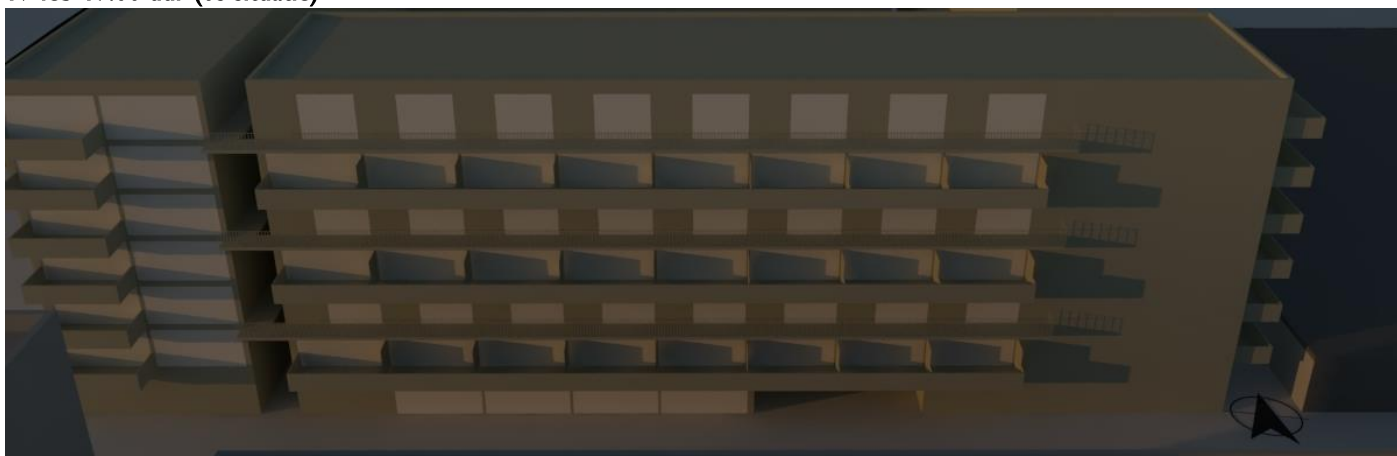
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19-feb-16:00 uur (3s situatie)



19-feb-17:00 uur (0s situatie)



19-feb-17:00 uur (1s situatie)



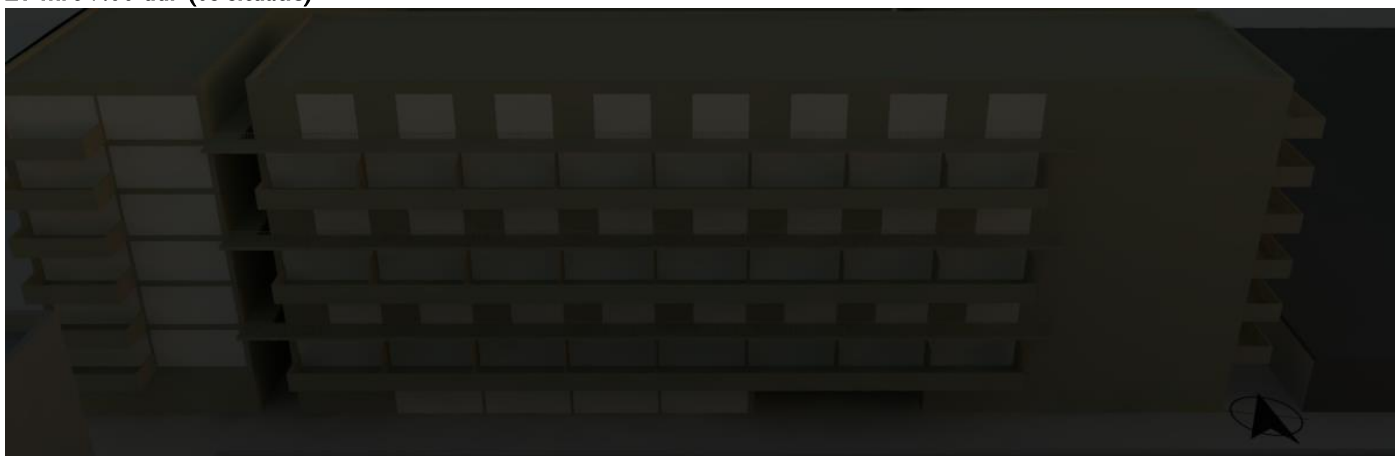
19-feb-17:00 uur (2s situatie)



19-feb-17:00 uur (3s situatie)



21-mrt-7:00 uur (0s situatie)



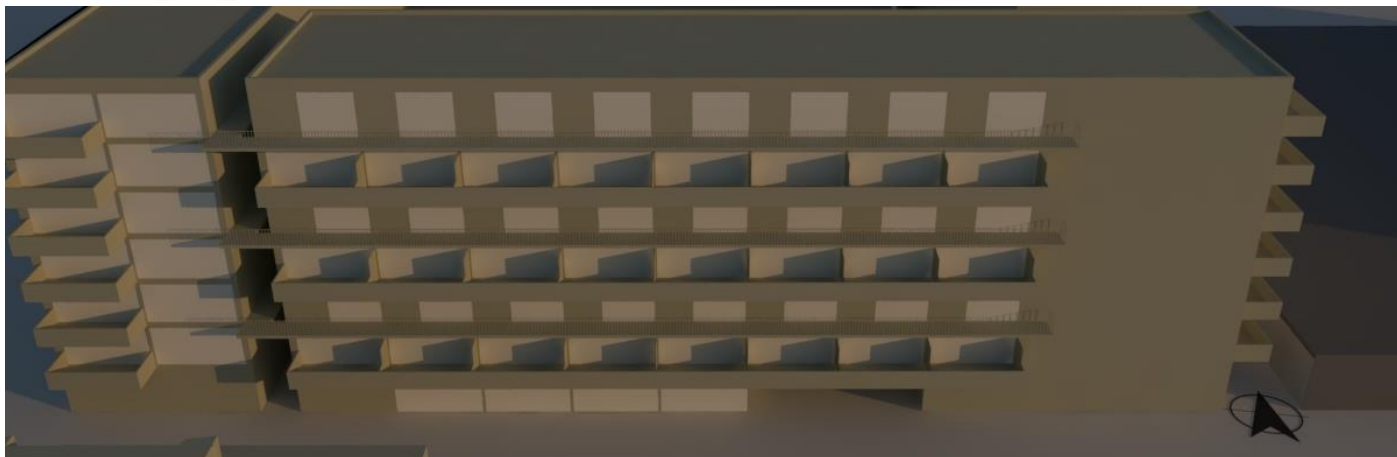
21-mrt-7:00 uur (1s situatie)



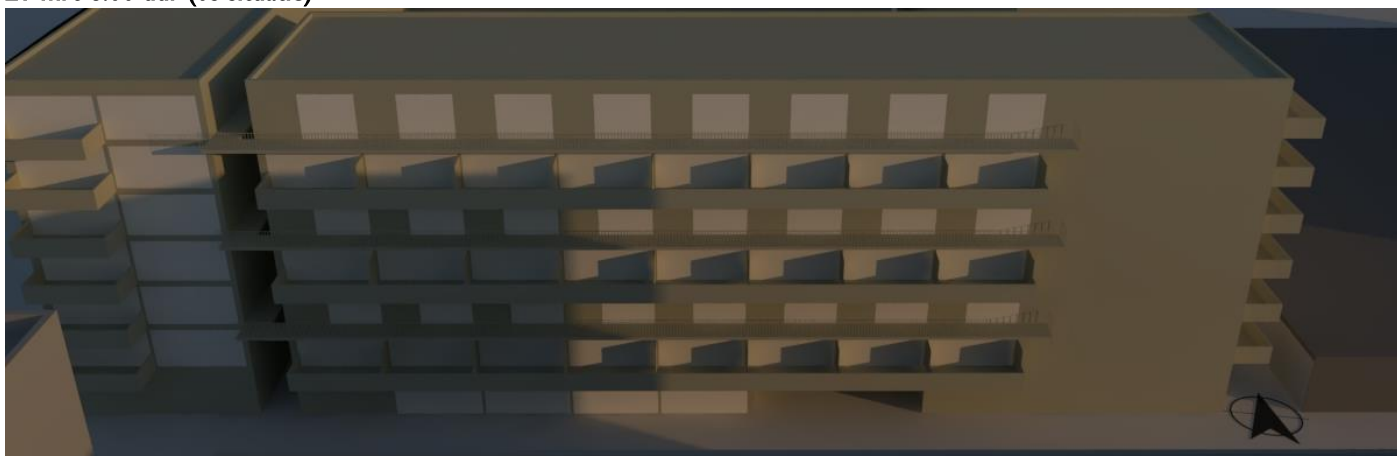
21-mrt-7:00 uur (2s situatie)



21-mrt-7:00 uur (3s situatie)



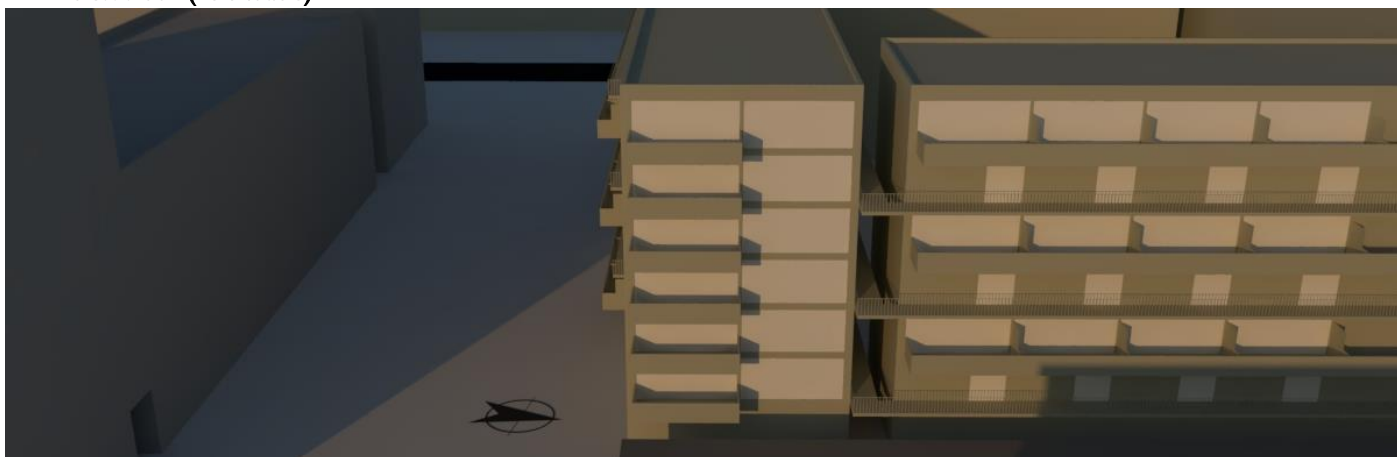
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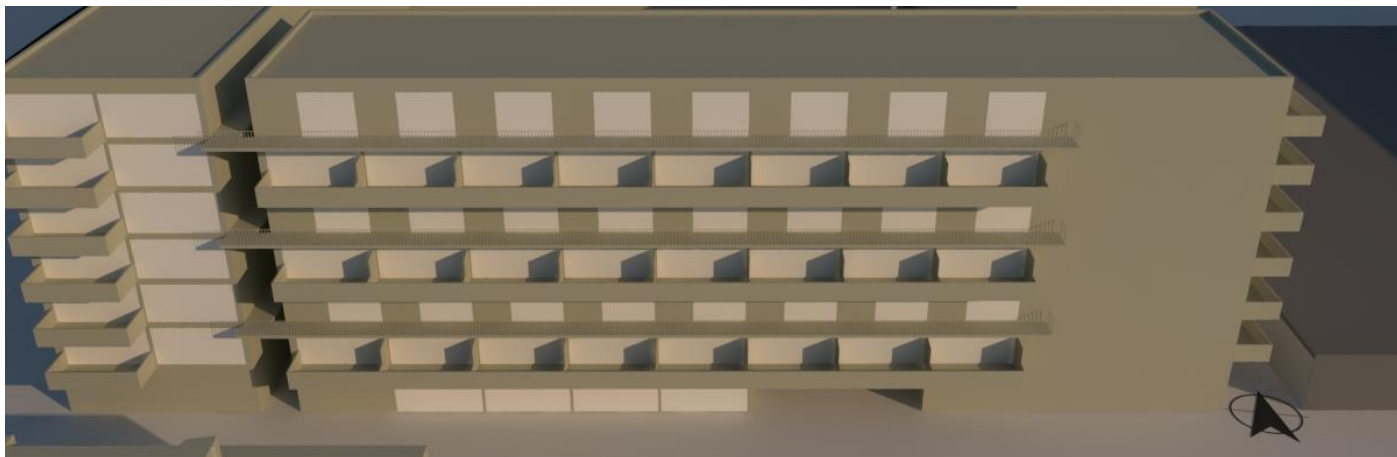
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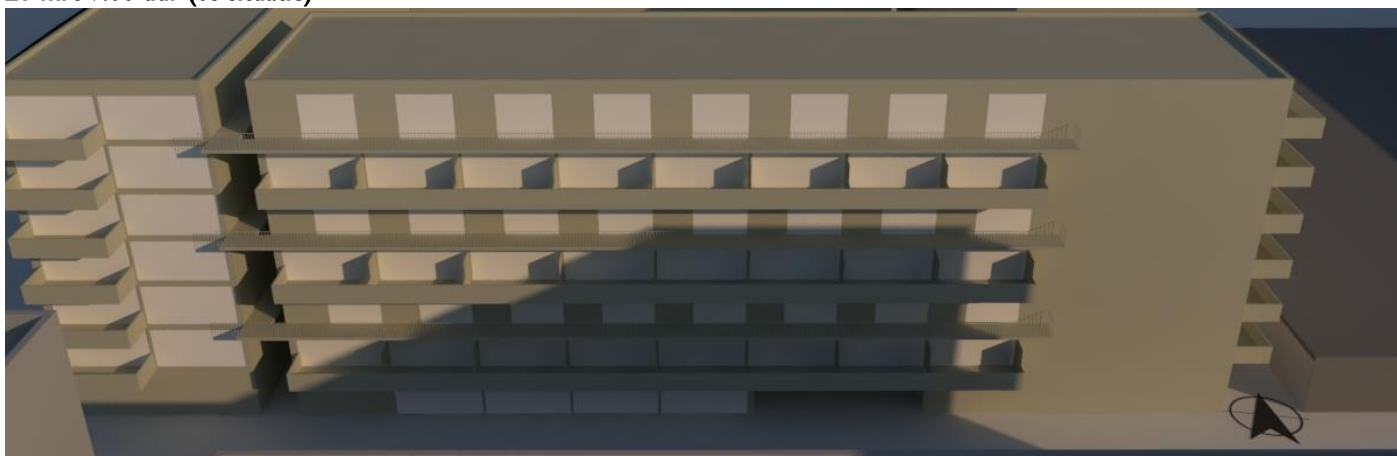
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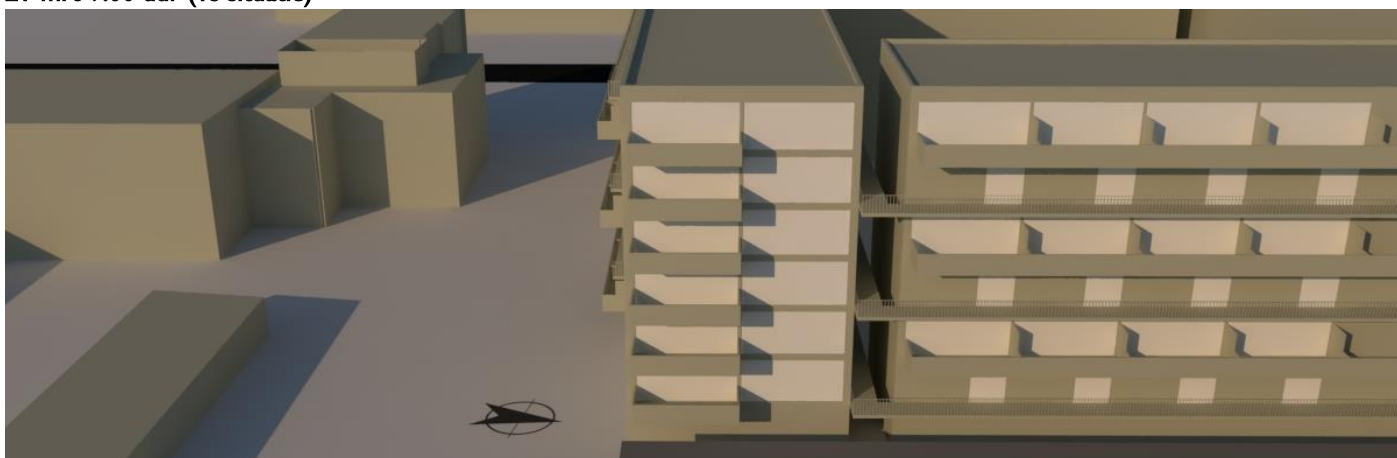
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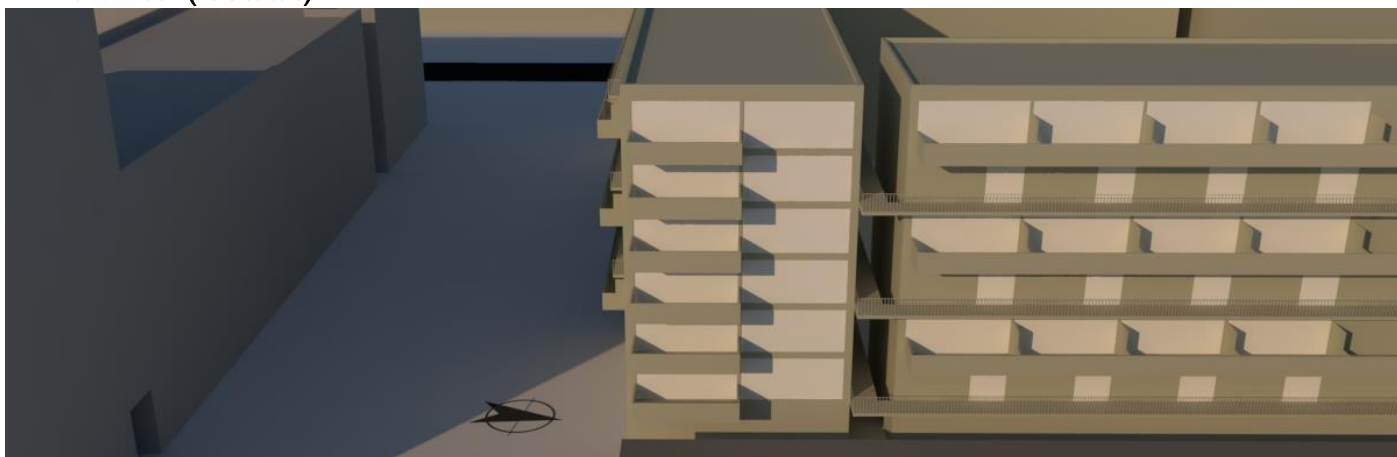
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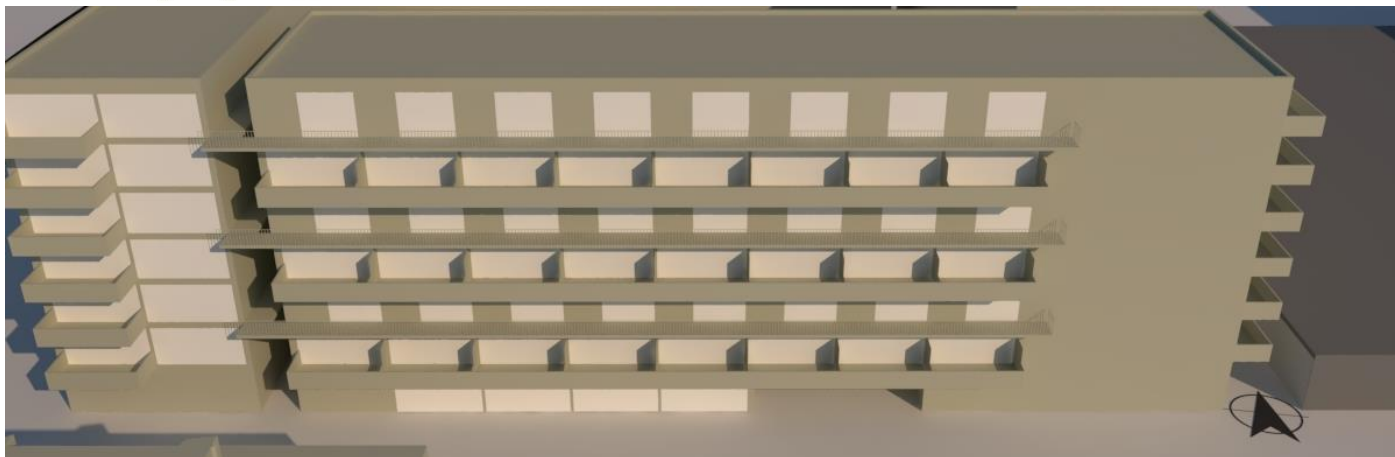
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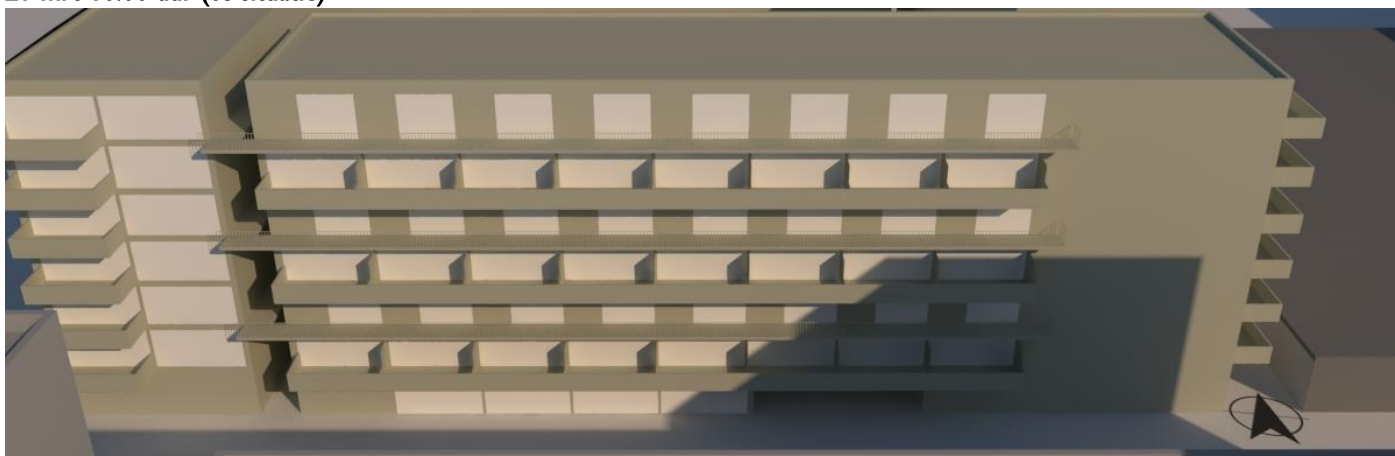
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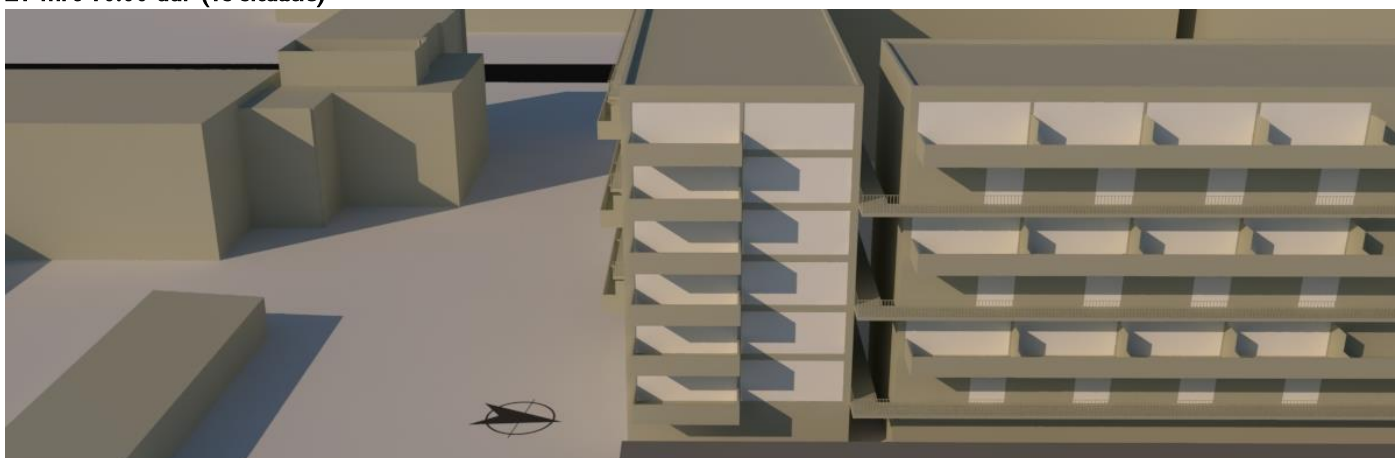
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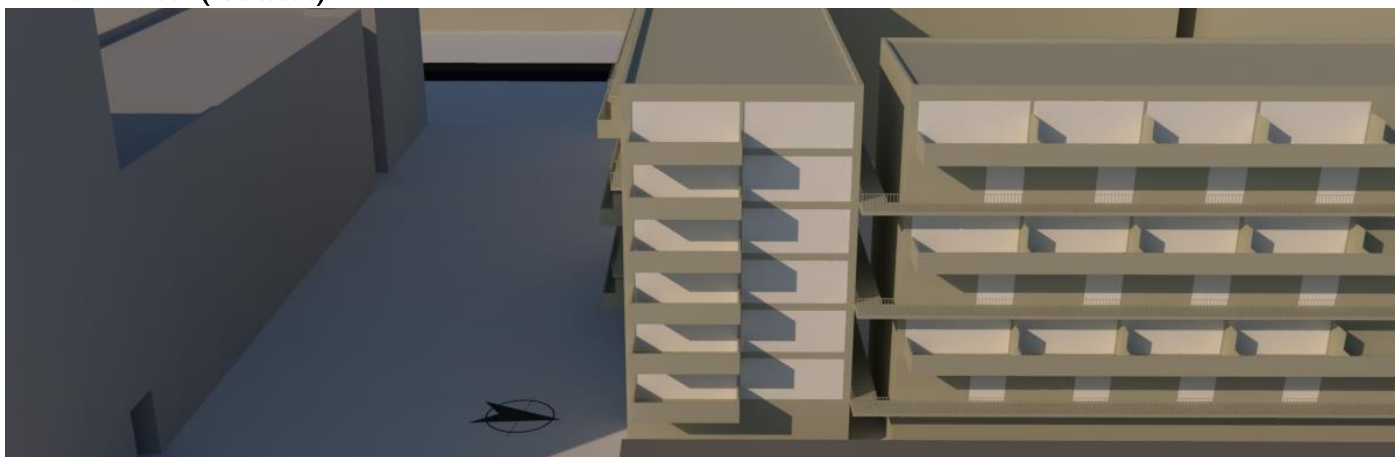
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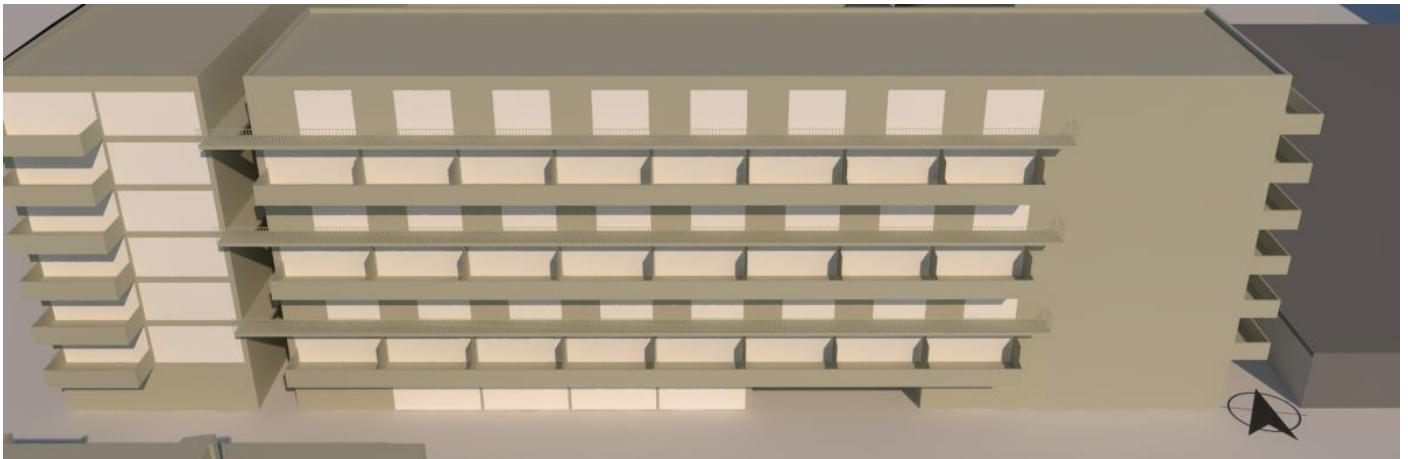
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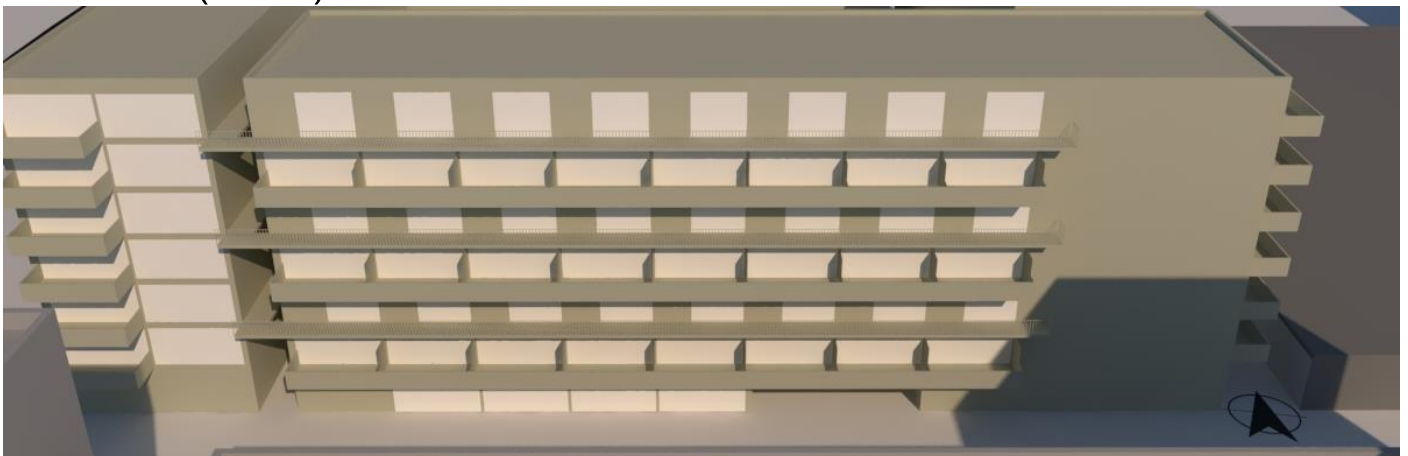
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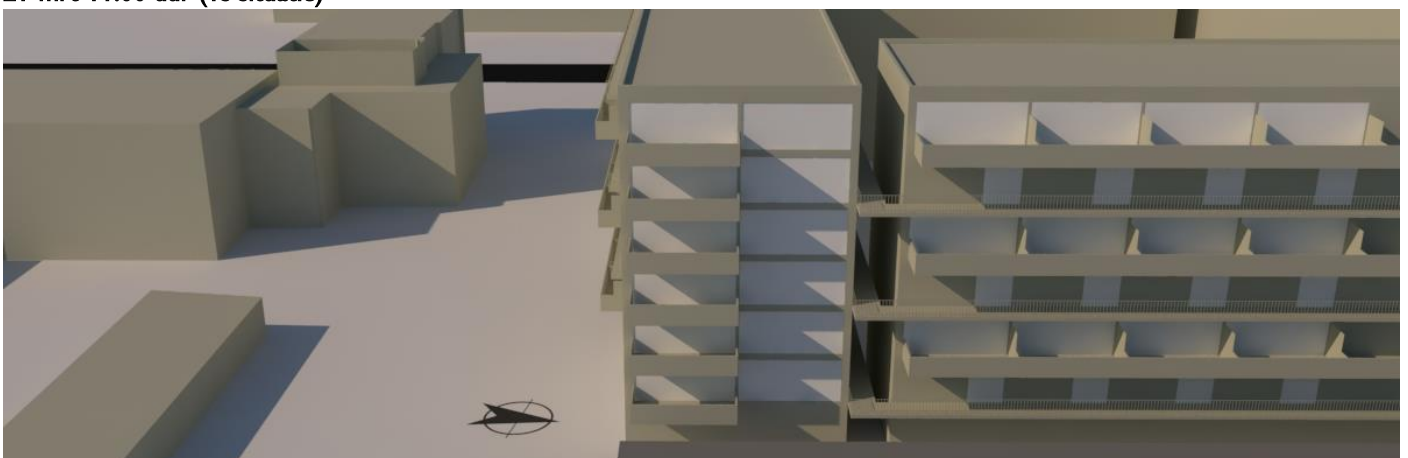
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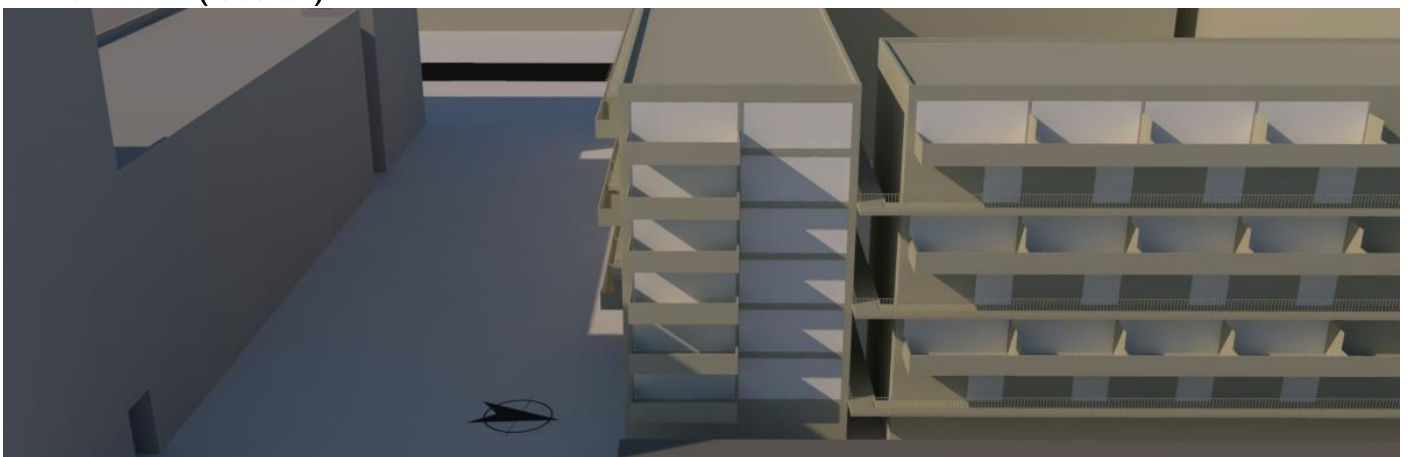
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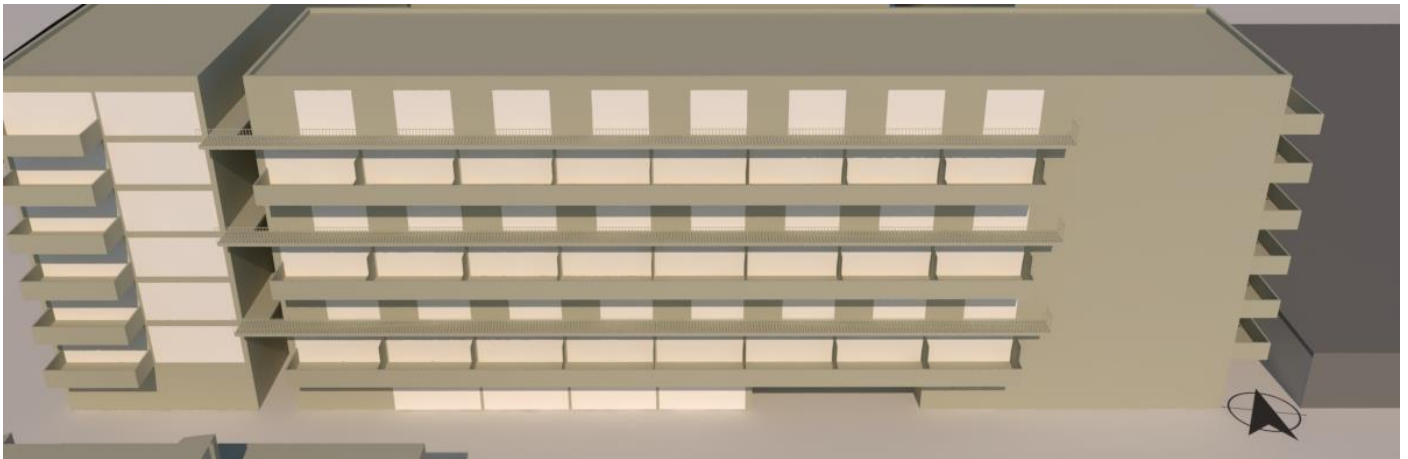
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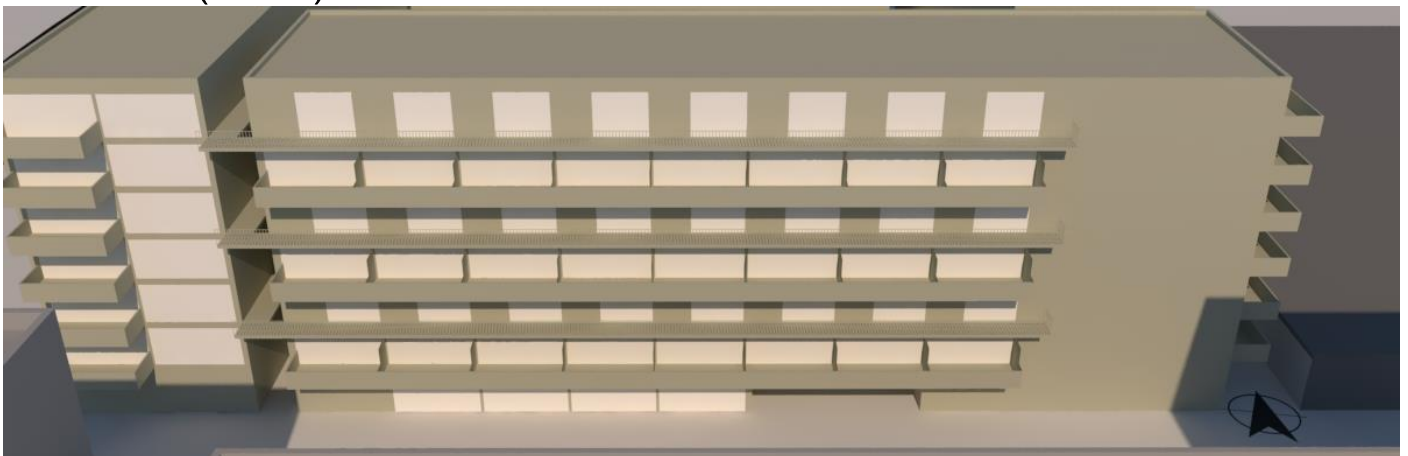
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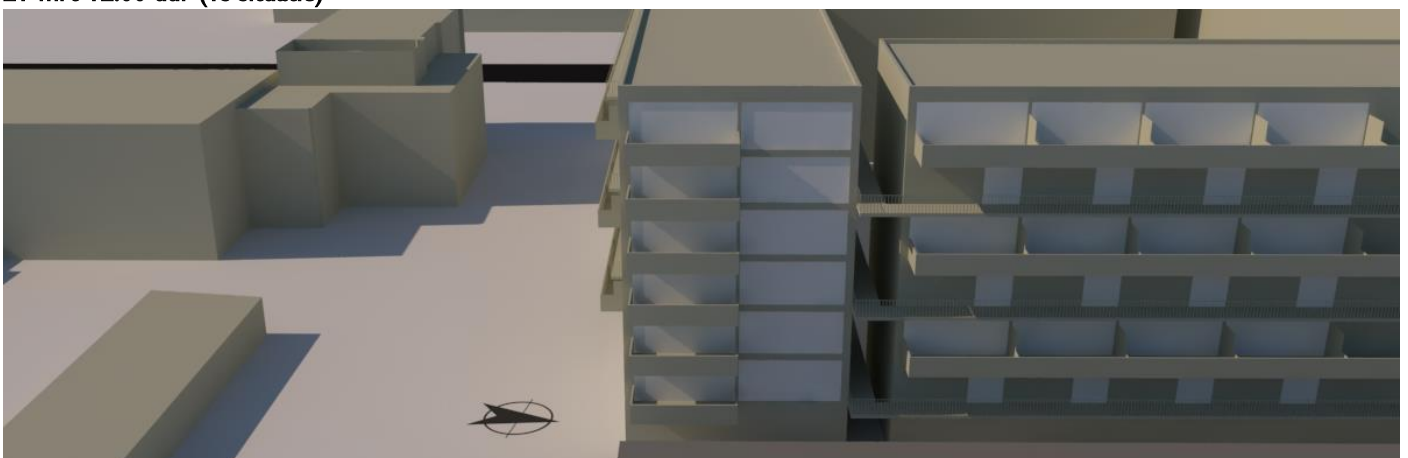
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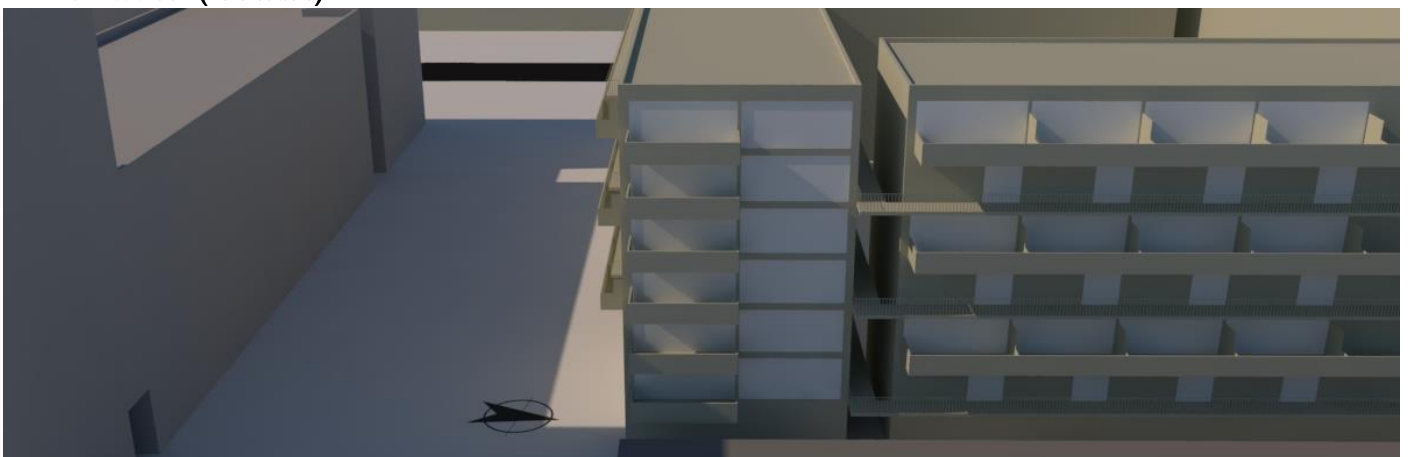
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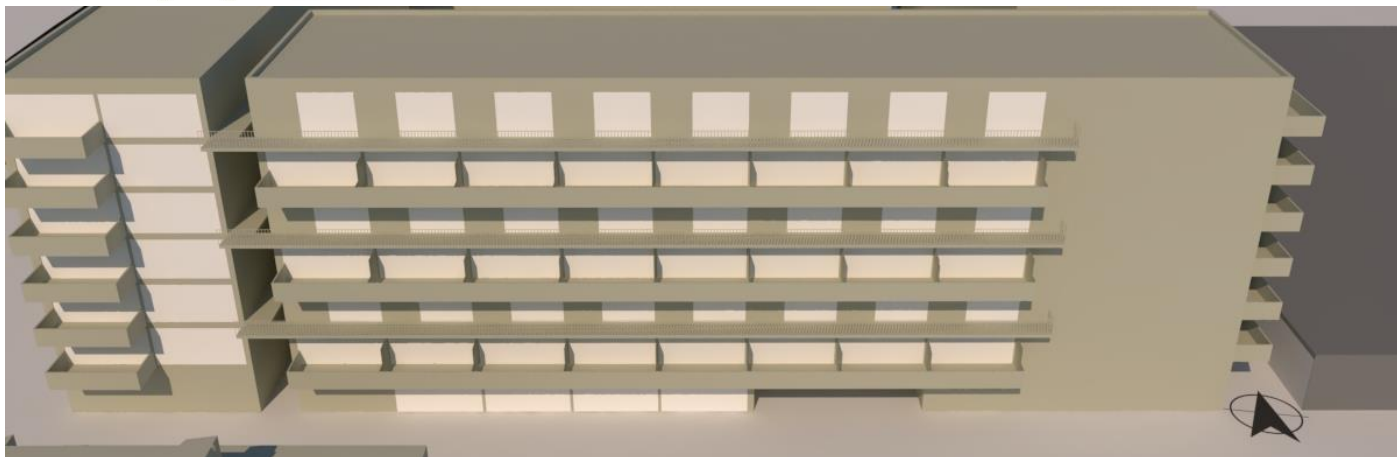
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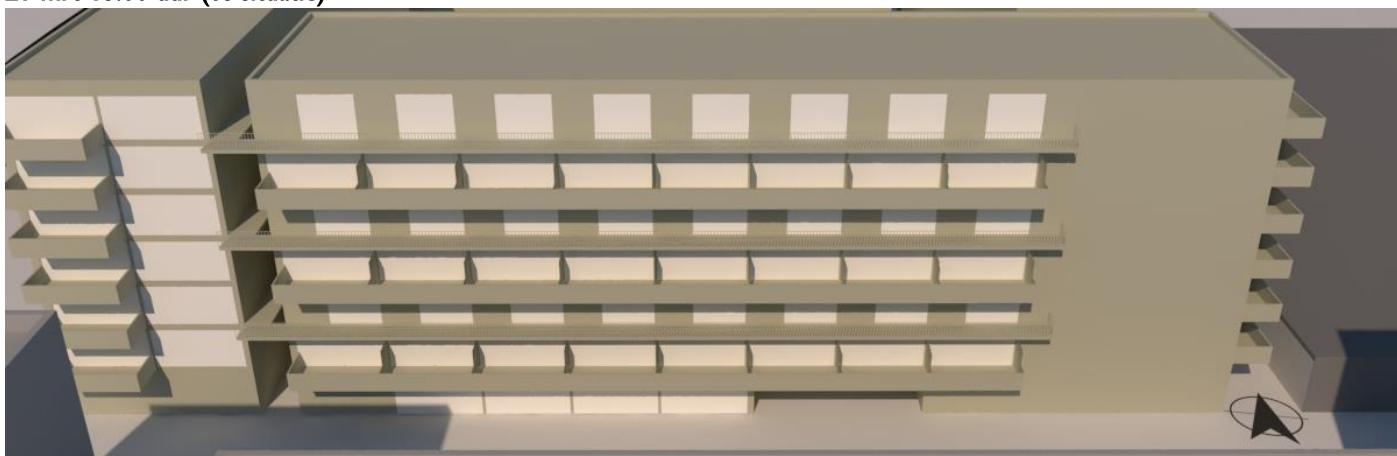
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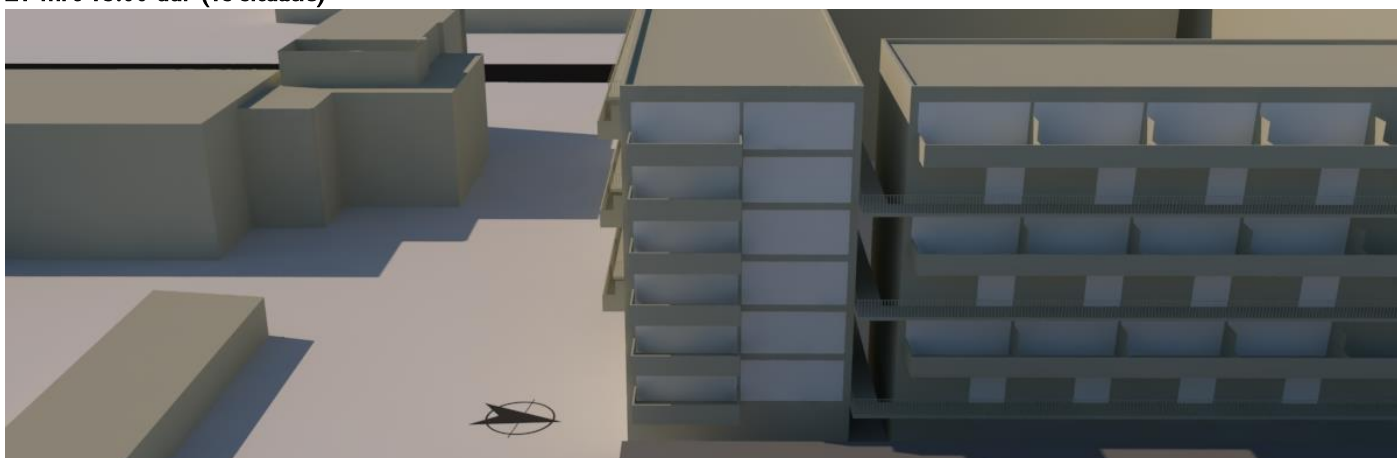
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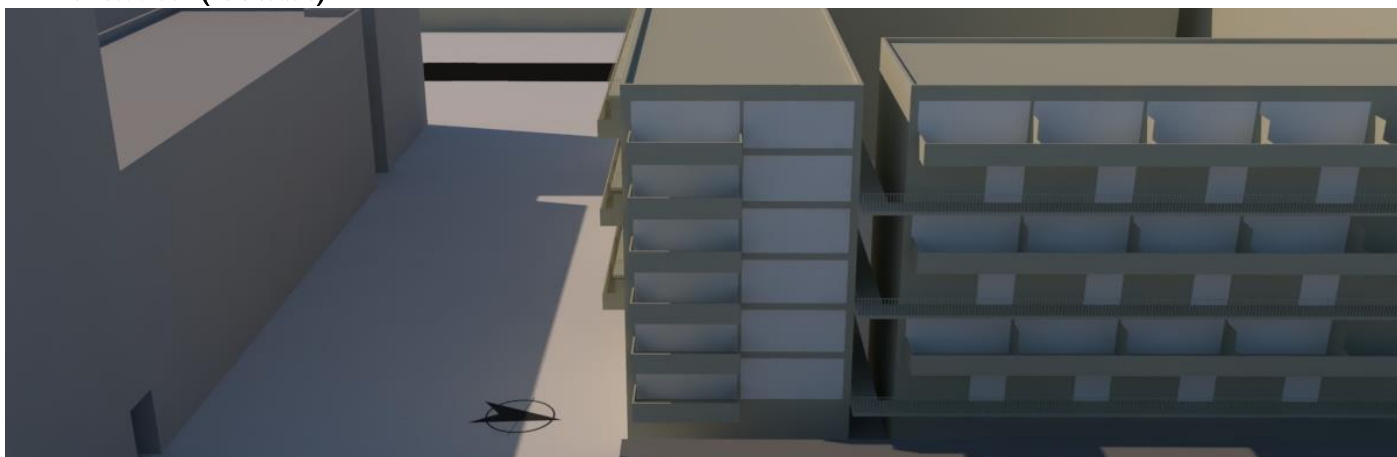
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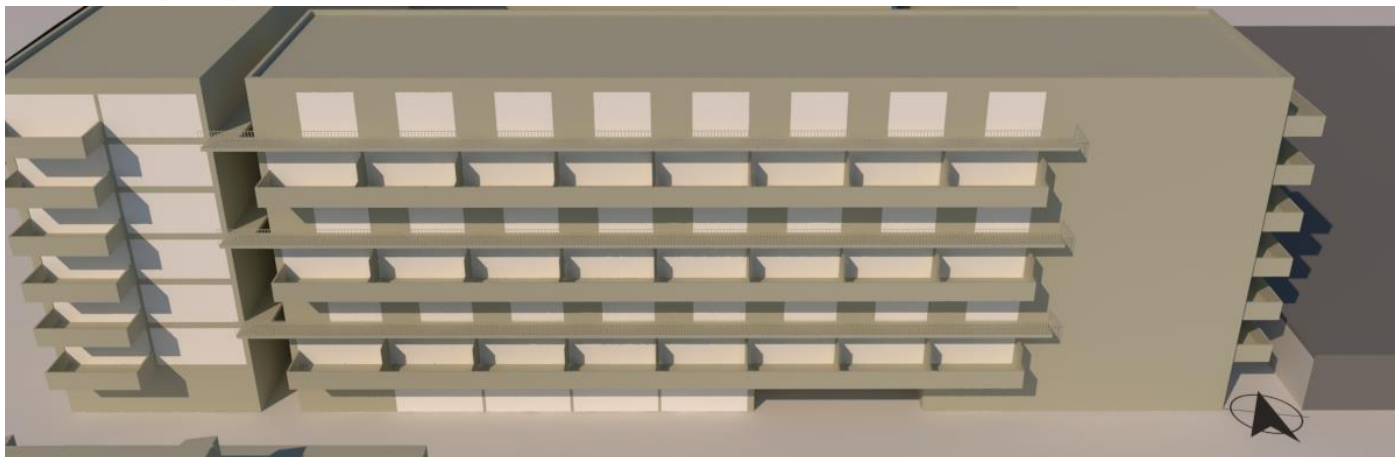
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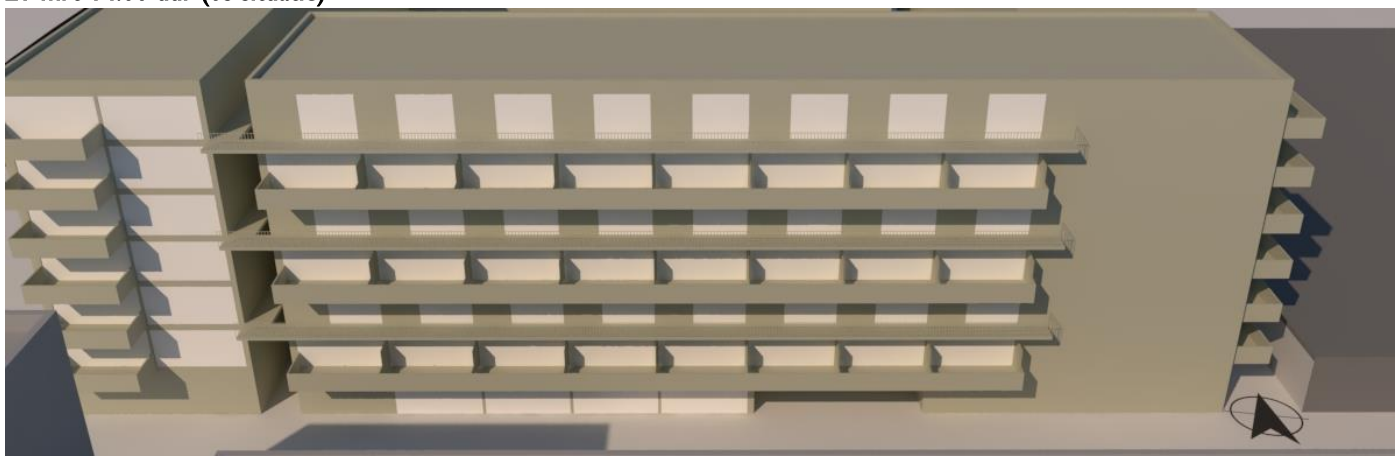
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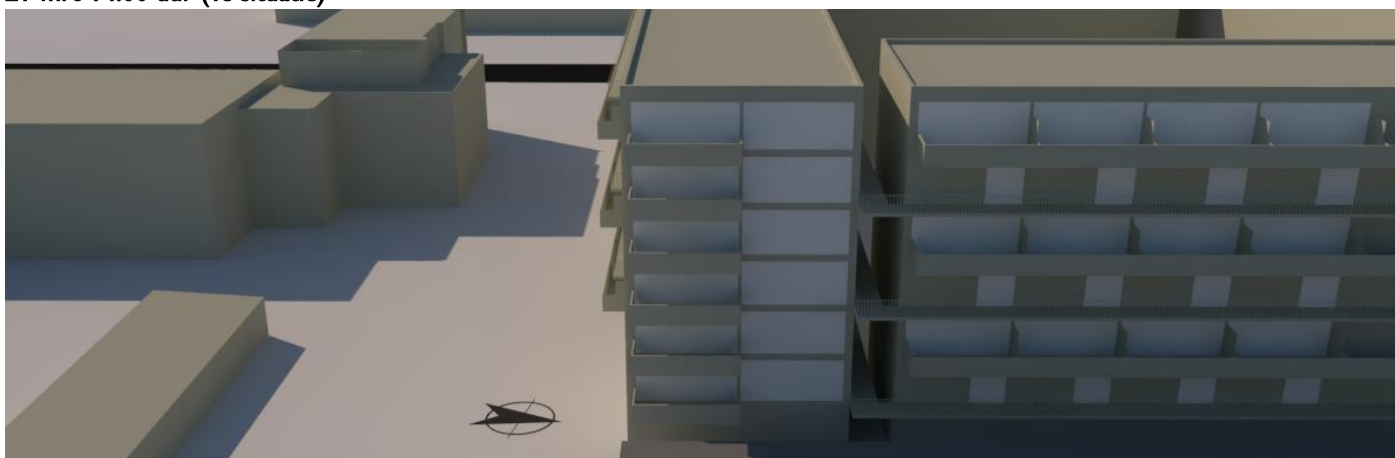
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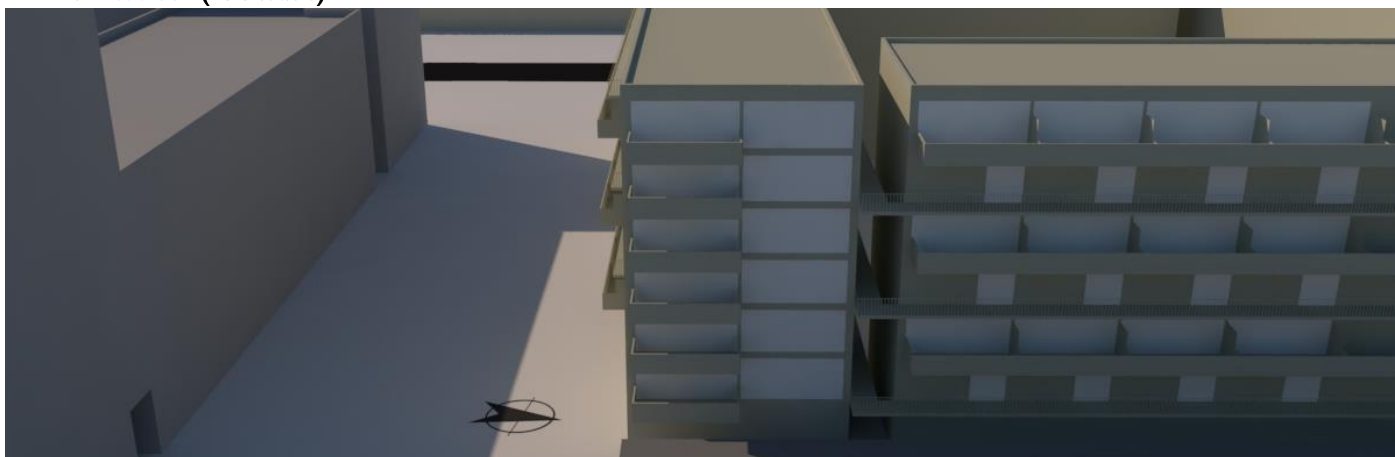
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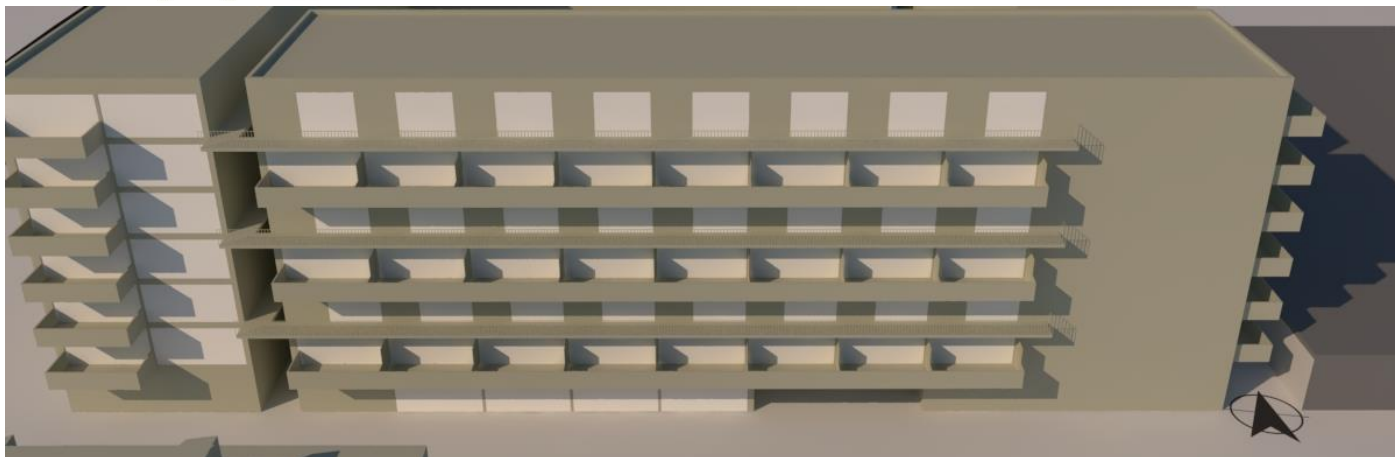
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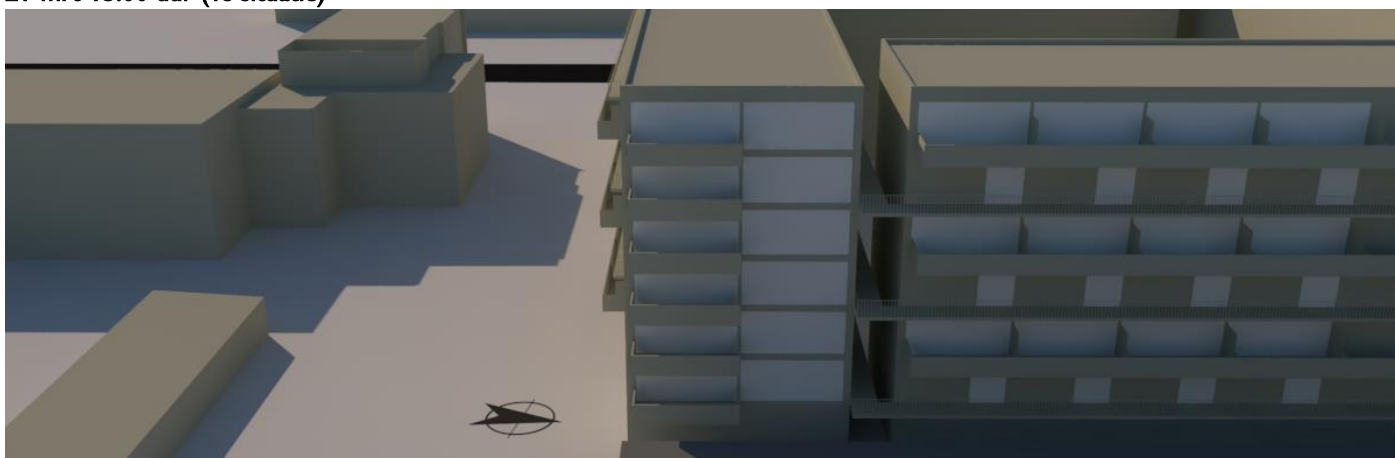
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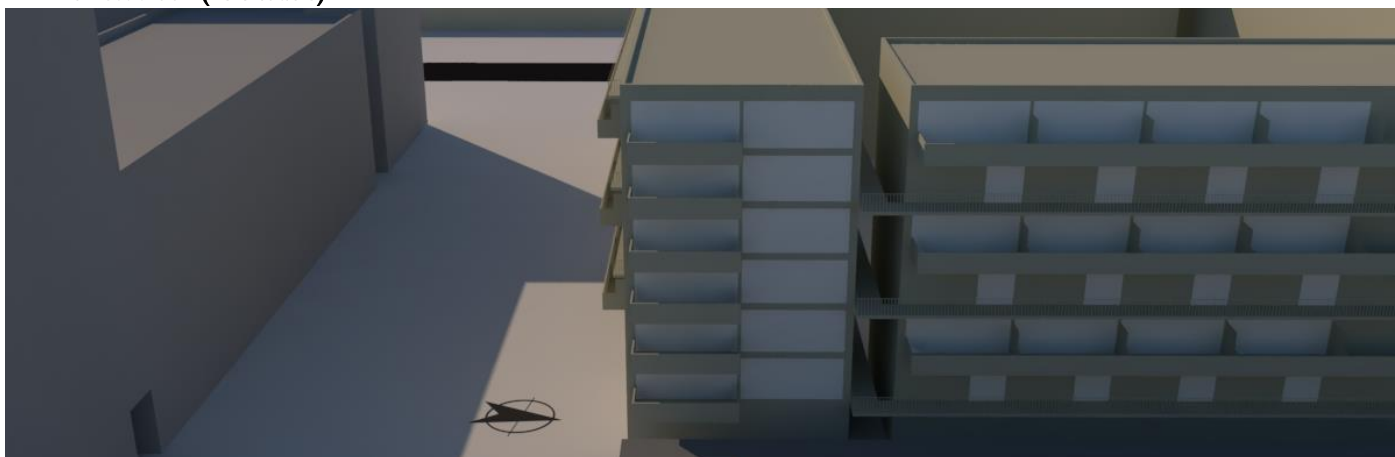
21-mrt-15:00 uur (0s situatie)



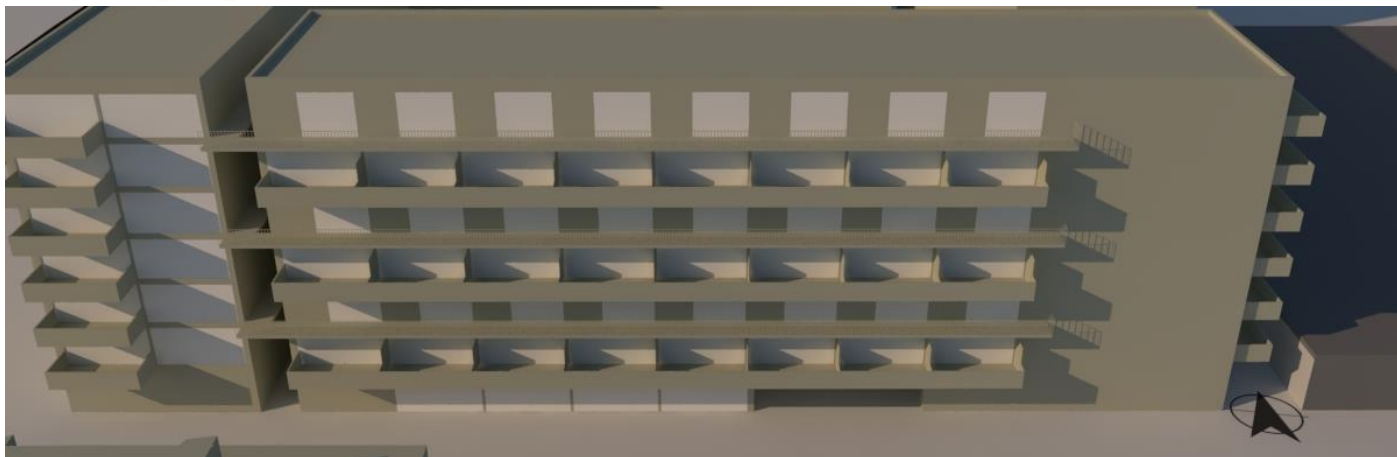
21-mrt-15:00 uur (1s situatie)



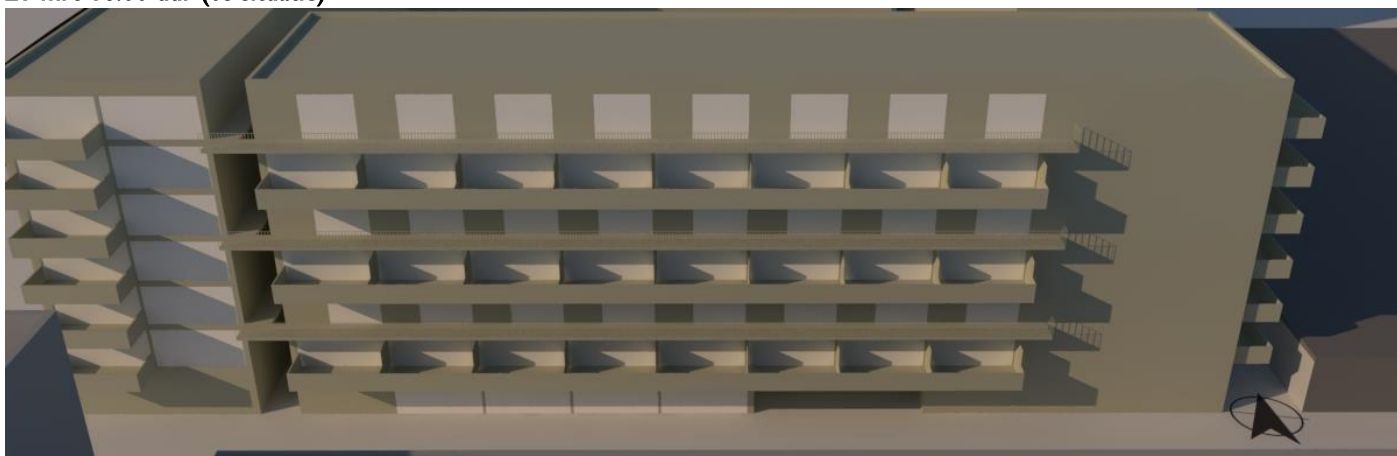
21-mrt-15:00 uur (2s situatie)



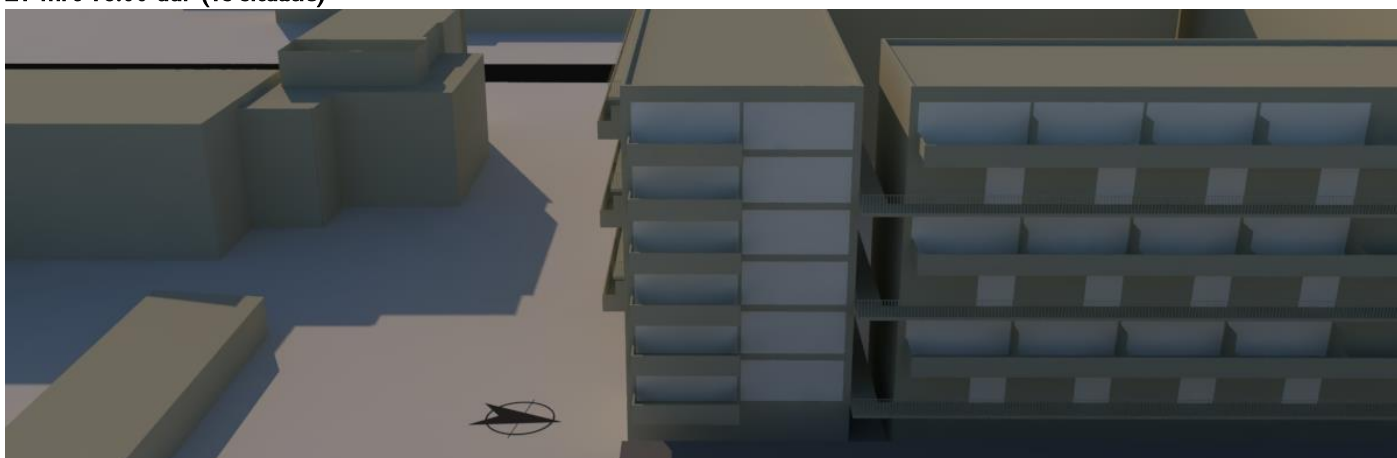
21-mrt-15:00 uur (3s situatie)



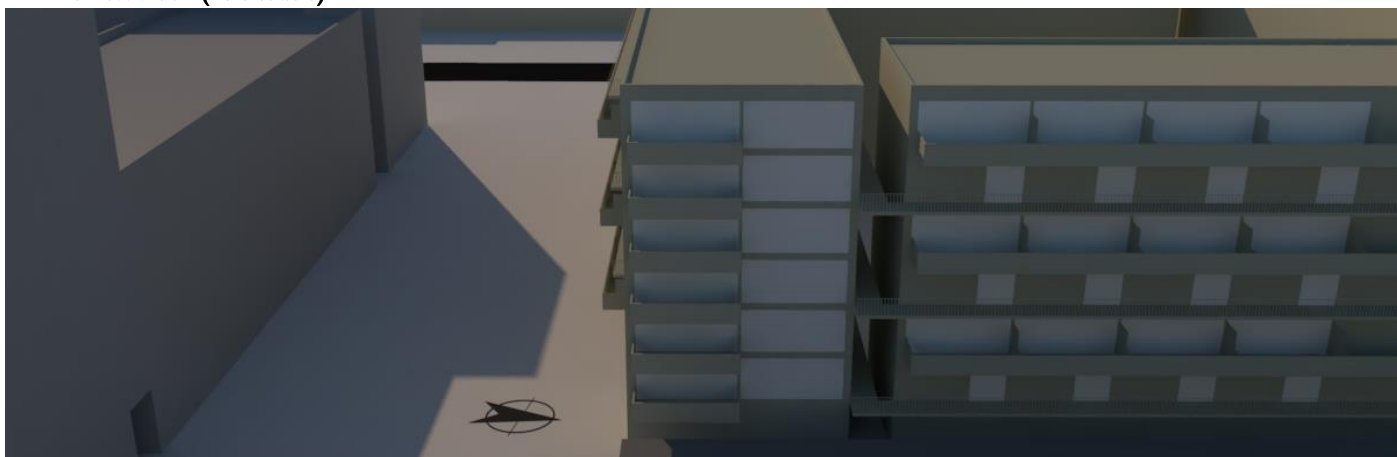
21-mrt-16:00 uur (0s situatie)



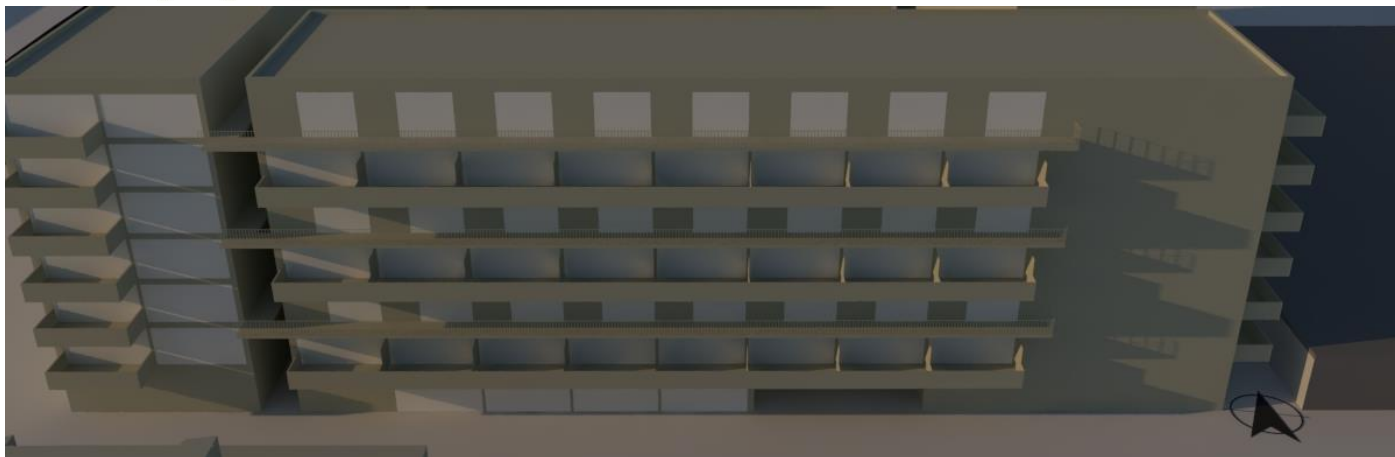
21-mrt-16:00 uur (1s situatie)



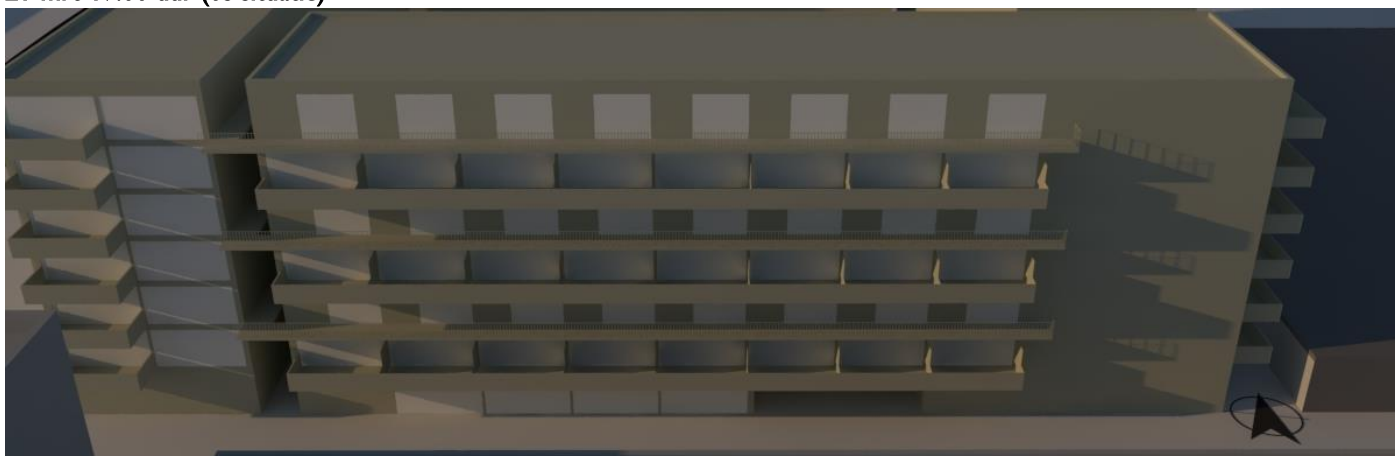
21-mrt-16:00 uur (2s situatie)



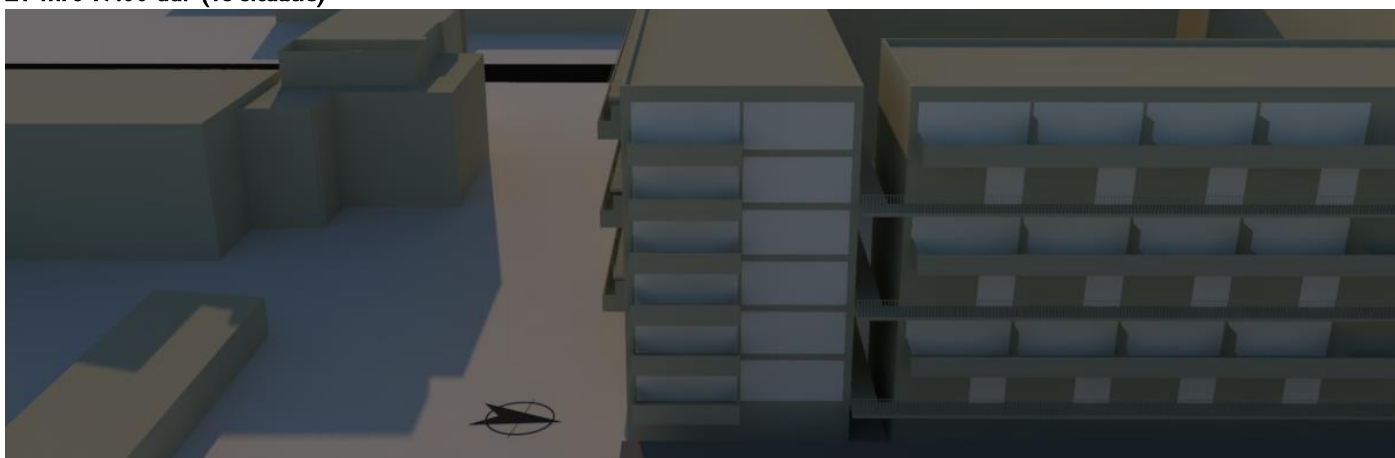
21-mrt-16:00 uur (3s situatie)



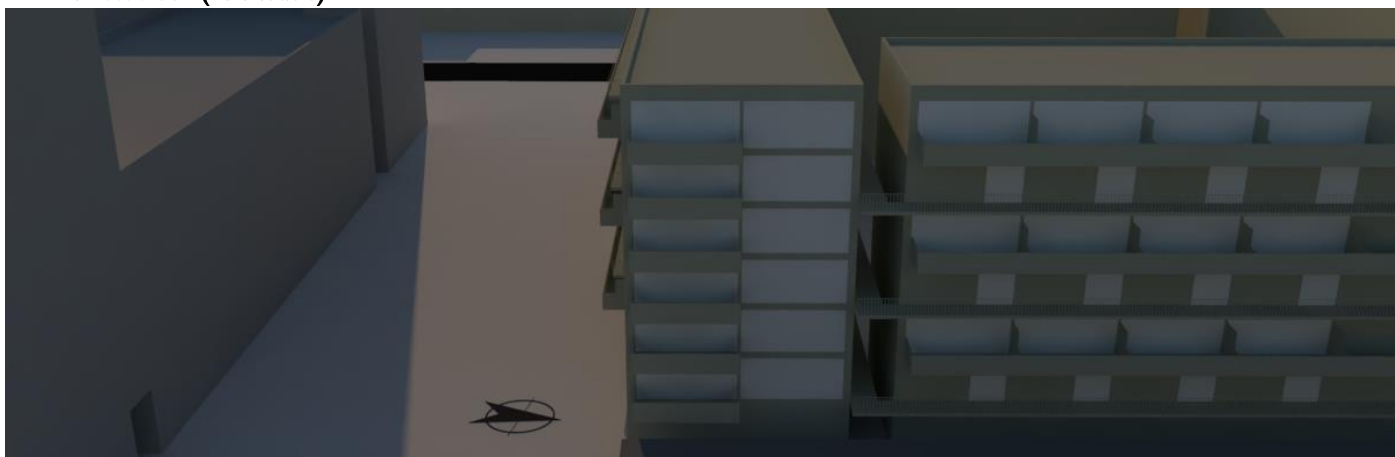
21-mrt-17:00 uur (0s situatie)



21-mrt-17:00 uur (1s situatie)



21-mrt-17:00 uur (2s situatie)



21-mrt-17:00 uur (3s situatie)



21-mrt-18:00 uur (0s situatie)



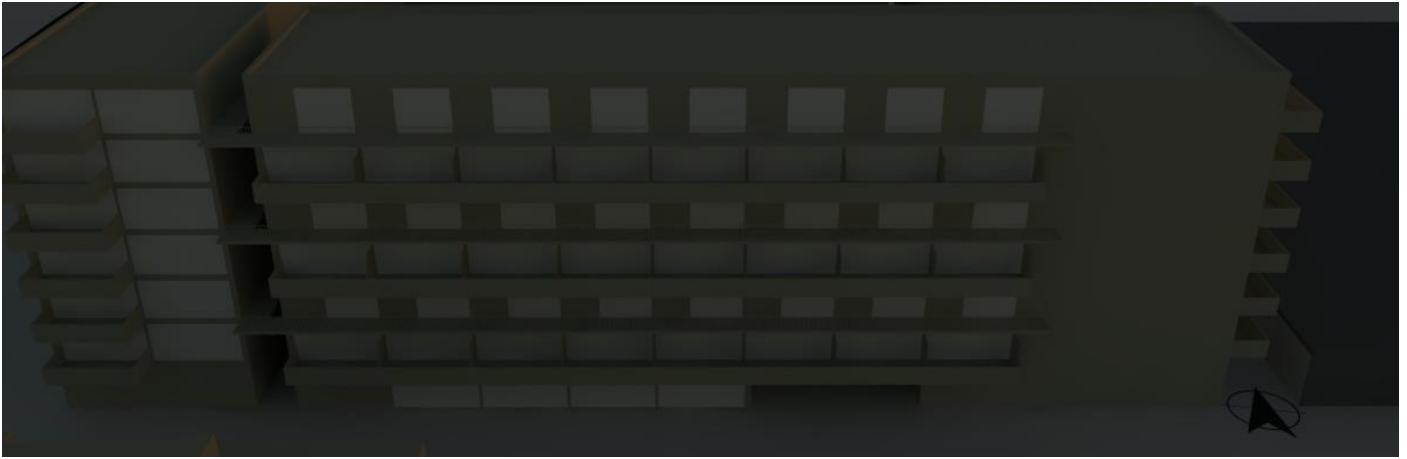
21-mrt-18:00 uur (1s situatie)



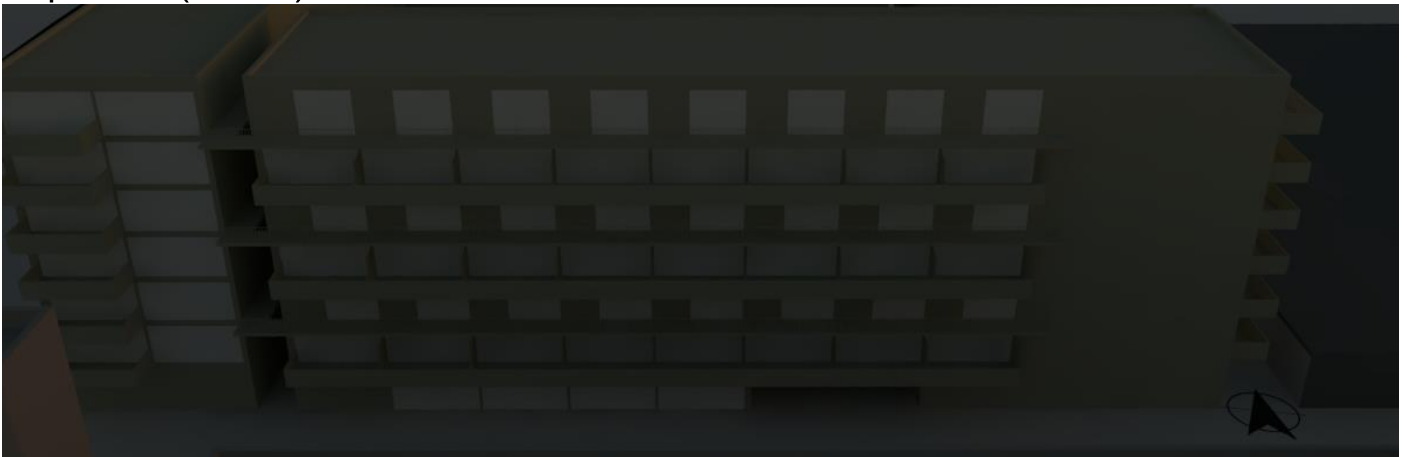
21-mrt-18:00 uur (2s situatie)



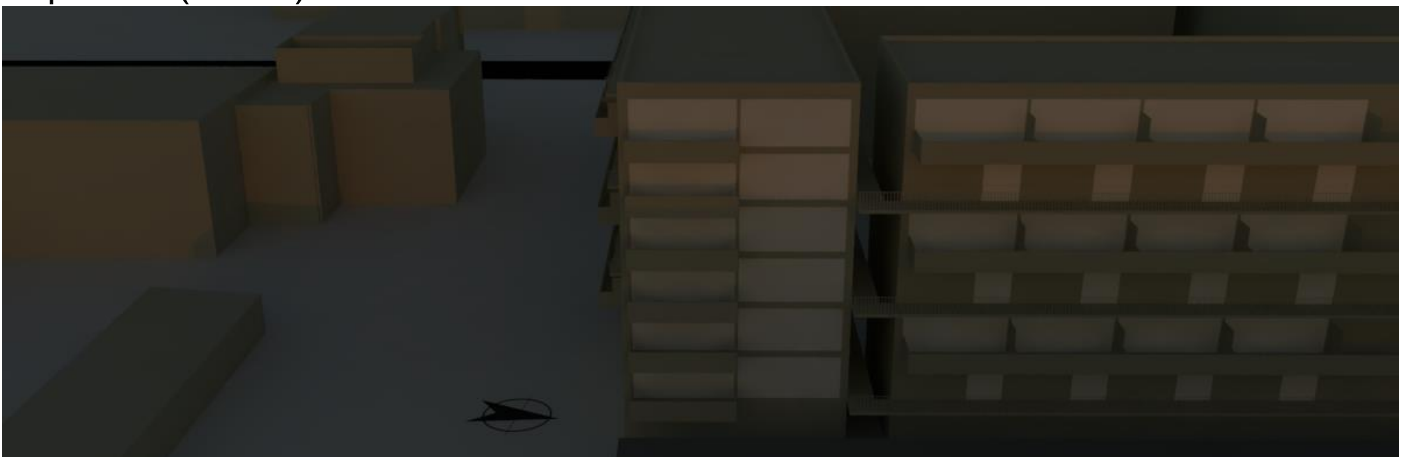
21-mrt-18:00 uur (3s situatie)



21-apr-7:00 uur (0s situatie)



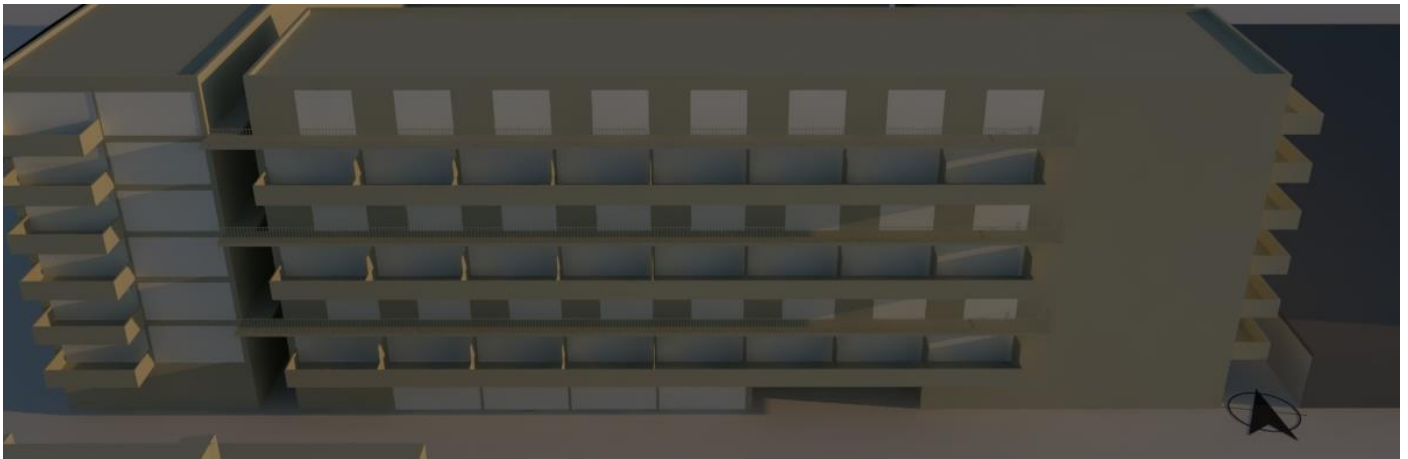
21-apr-7:00 uur (1s situatie)



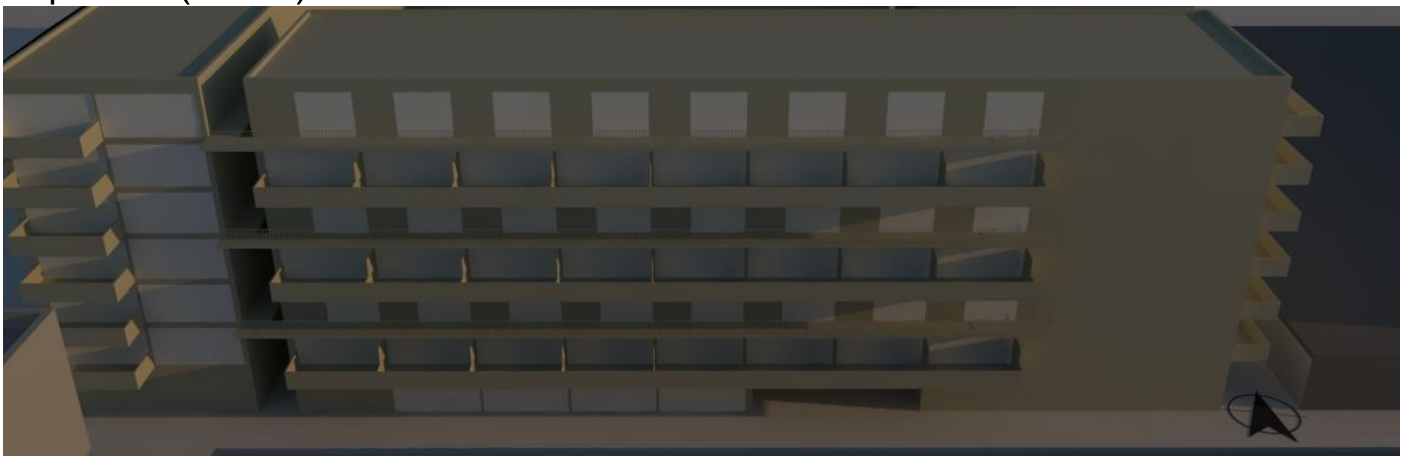
21-apr-7:00 uur (2s situatie)



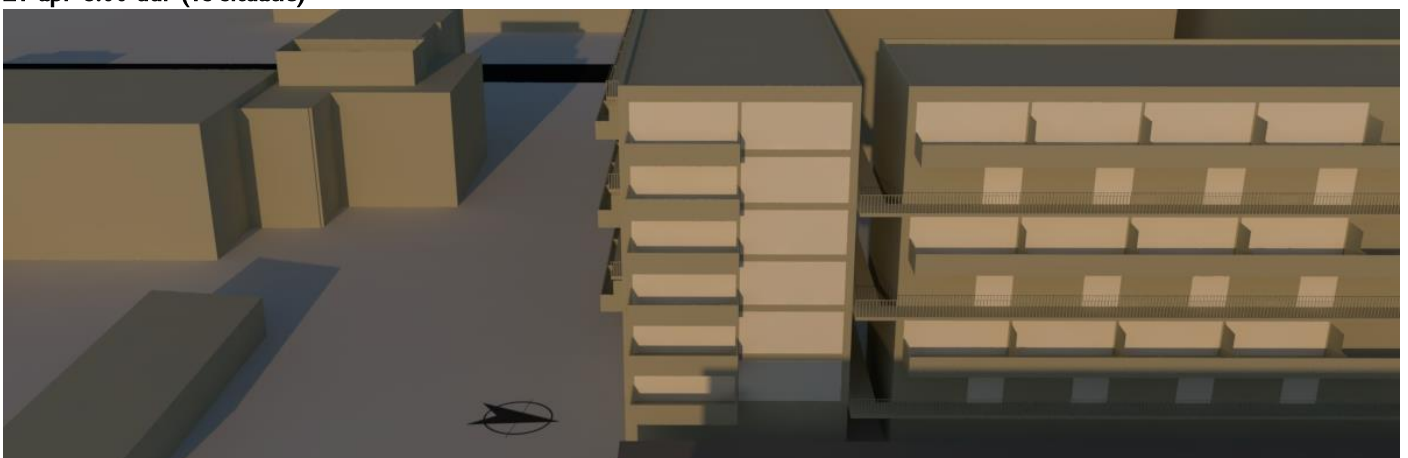
21-apr-7:00 uur (3s situatie)



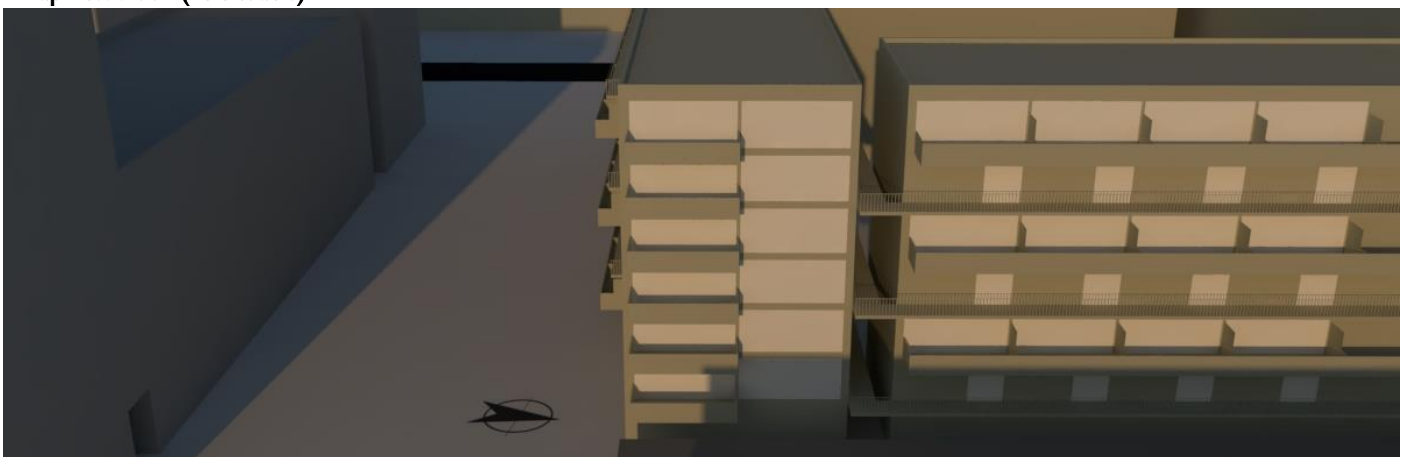
21-apr-8:00 uur (0s situatie)



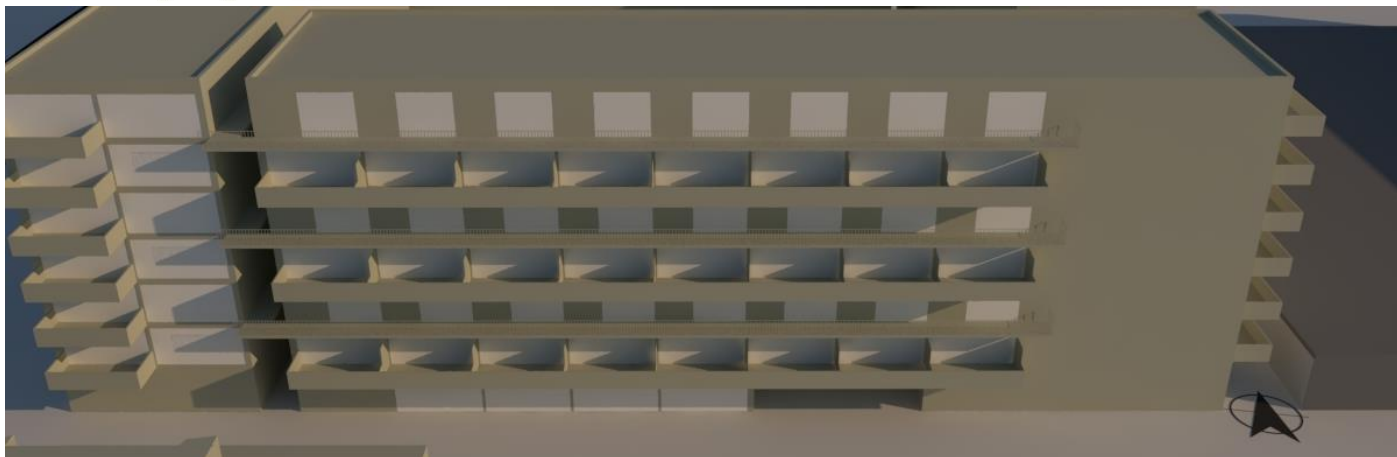
21-apr-8:00 uur (1s situatie)



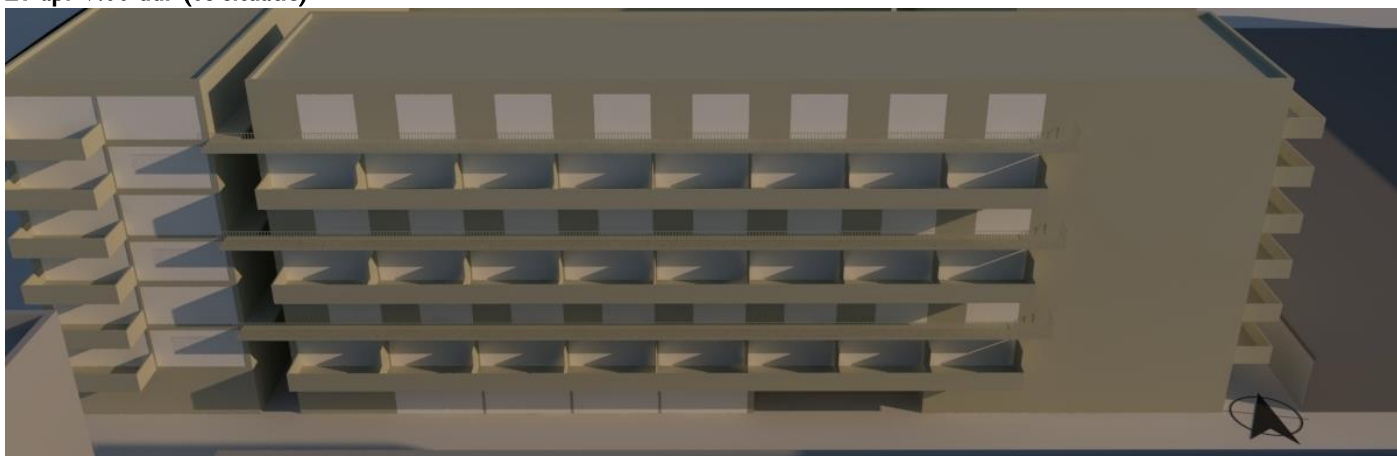
21-apr-8:00 uur (2s situatie)



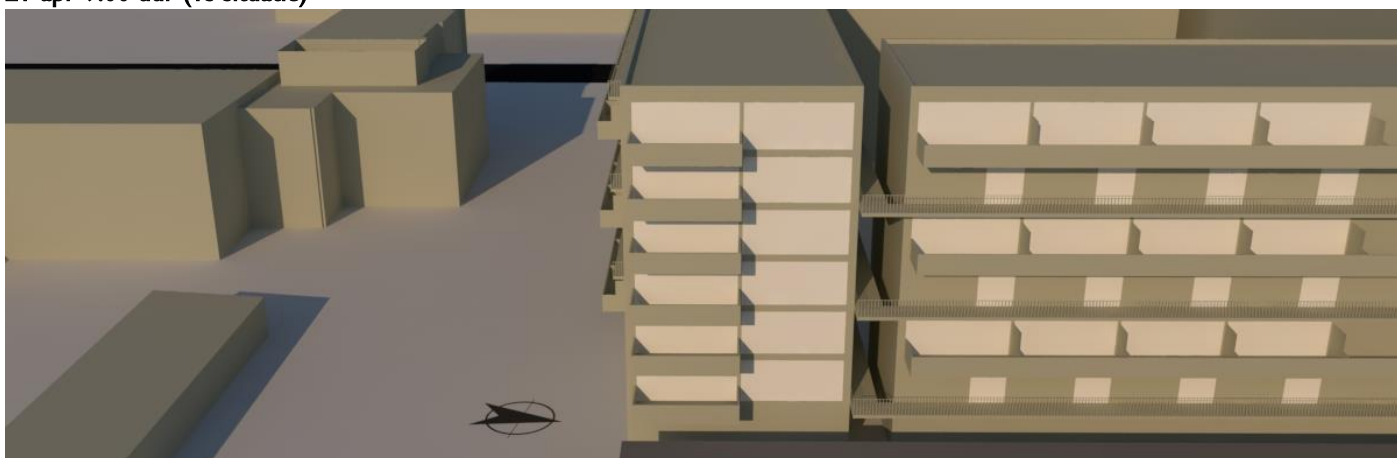
21-apr-8:00 uur (3s situatie)



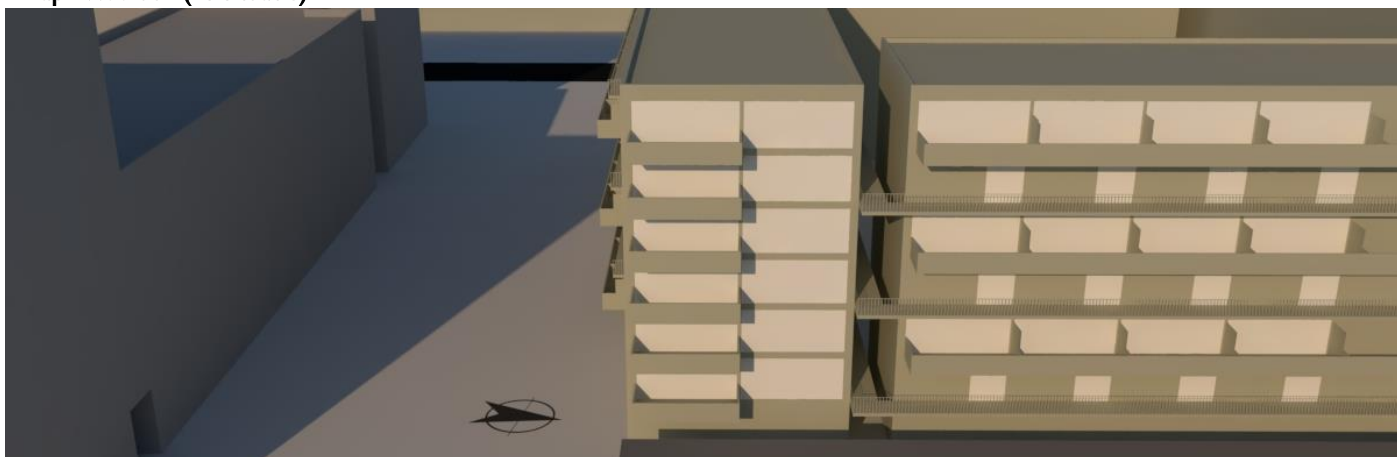
21-apr-9:00 uur (0s situatie)



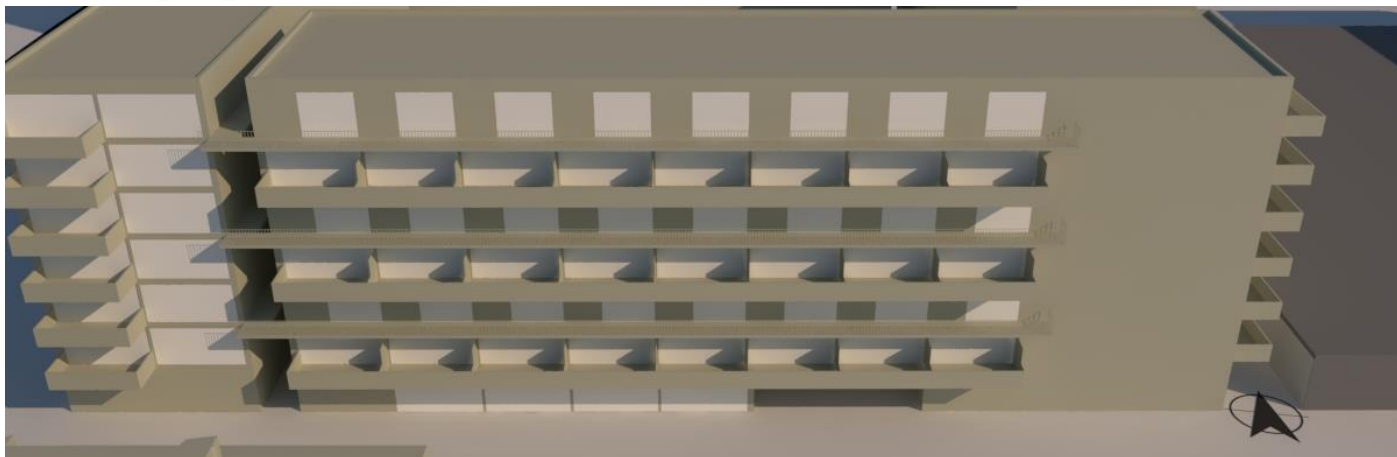
21-apr-9:00 uur (1s situatie)



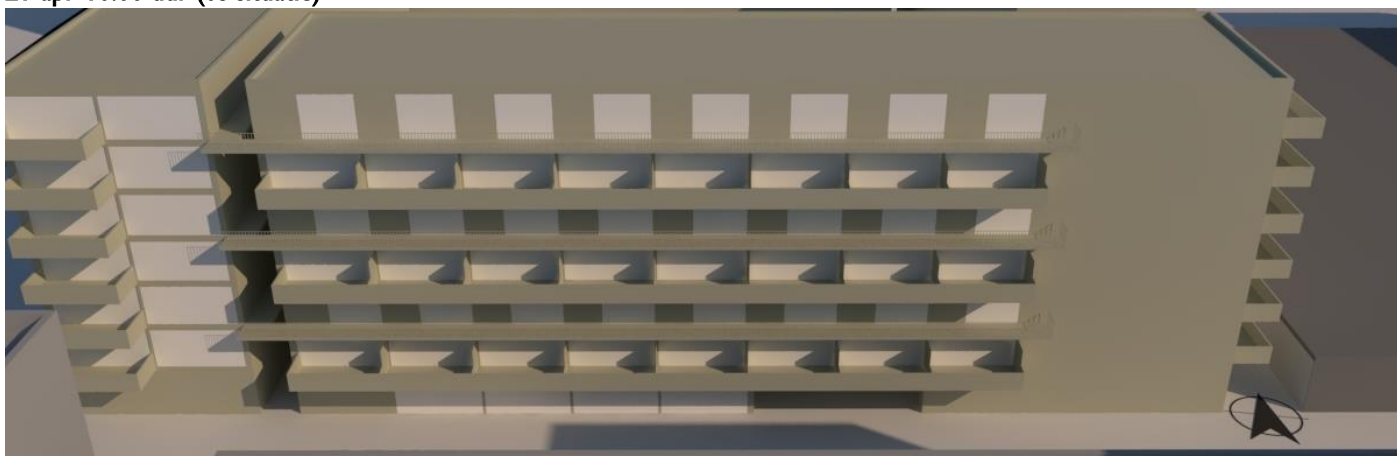
21-apr-9:00 uur (2s situatie)



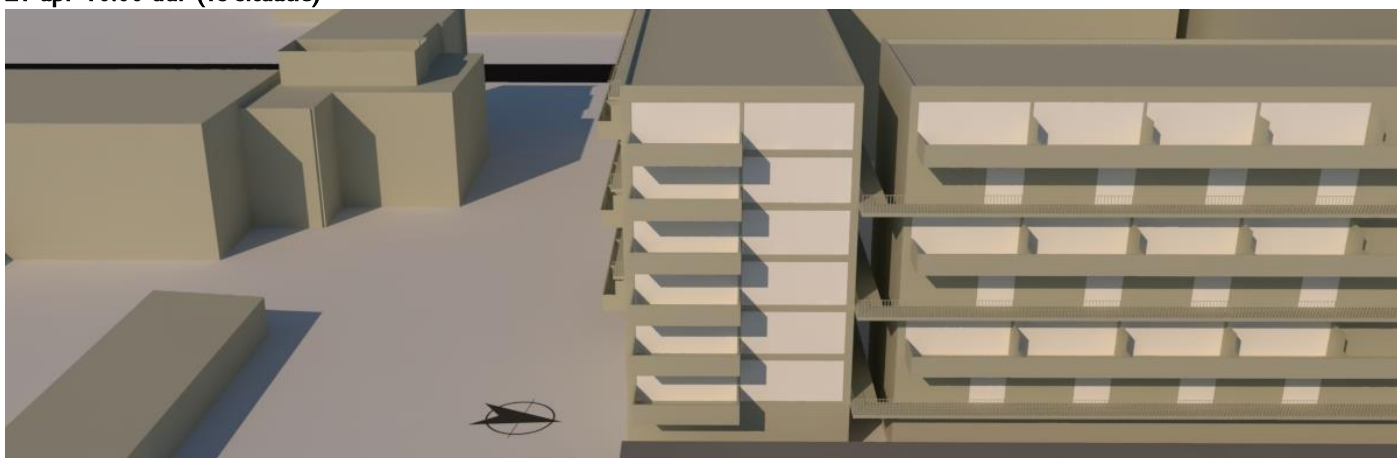
21-apr-9:00 uur (3s situatie)



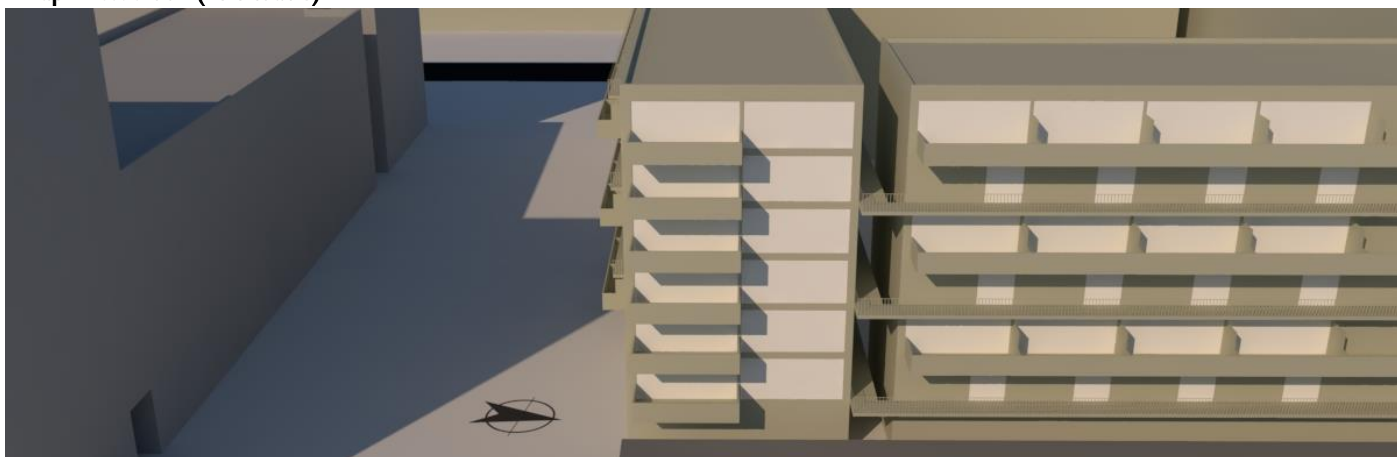
21-apr-10:00 uur (0s situatie)



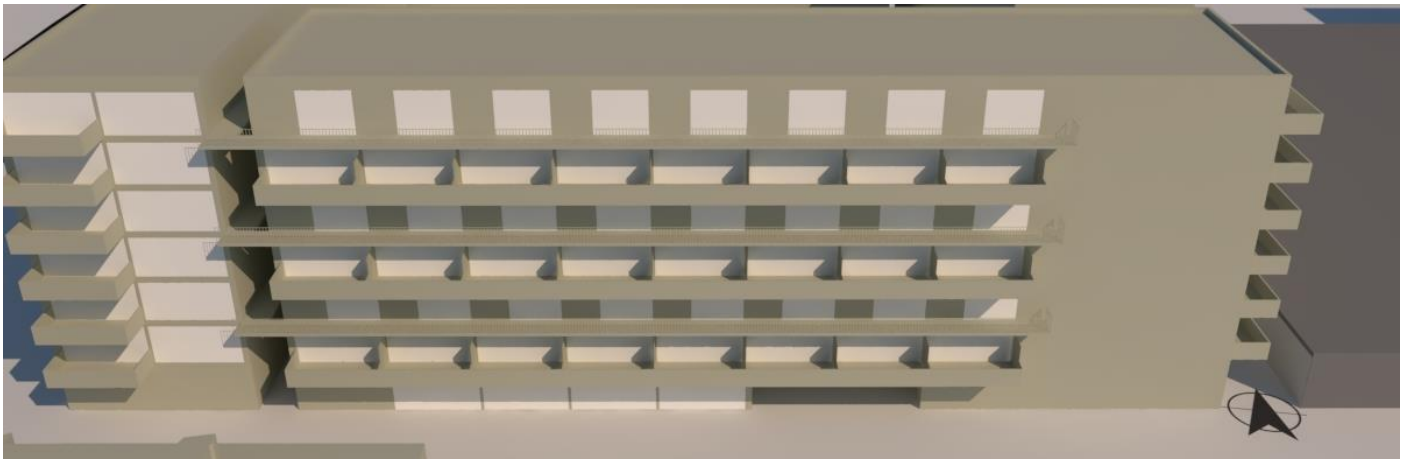
21-apr-10:00 uur (1s situatie)



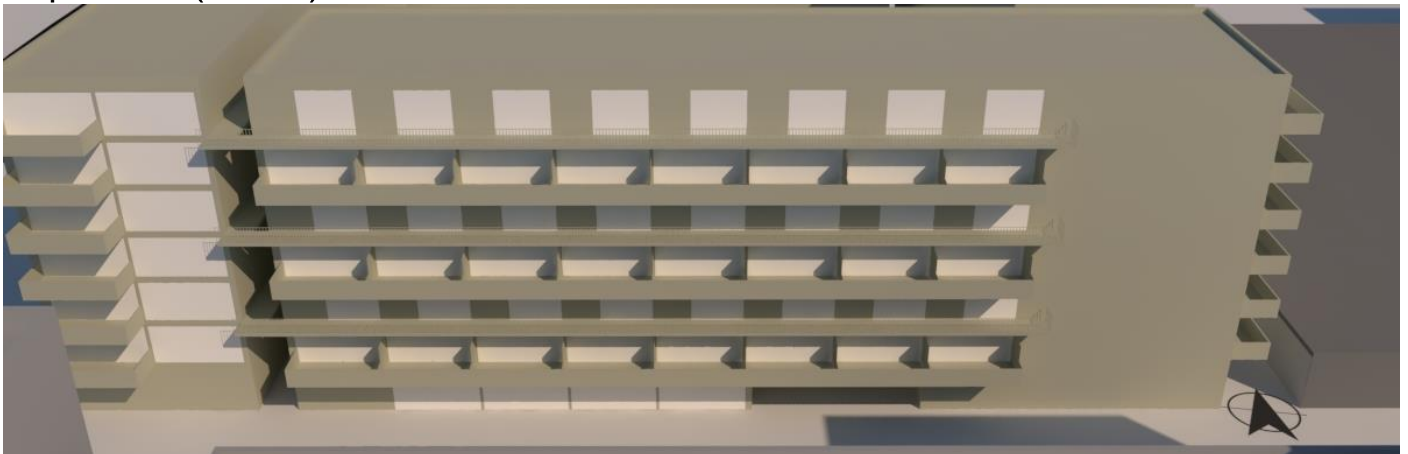
21-apr-10:00 uur (2s situatie)



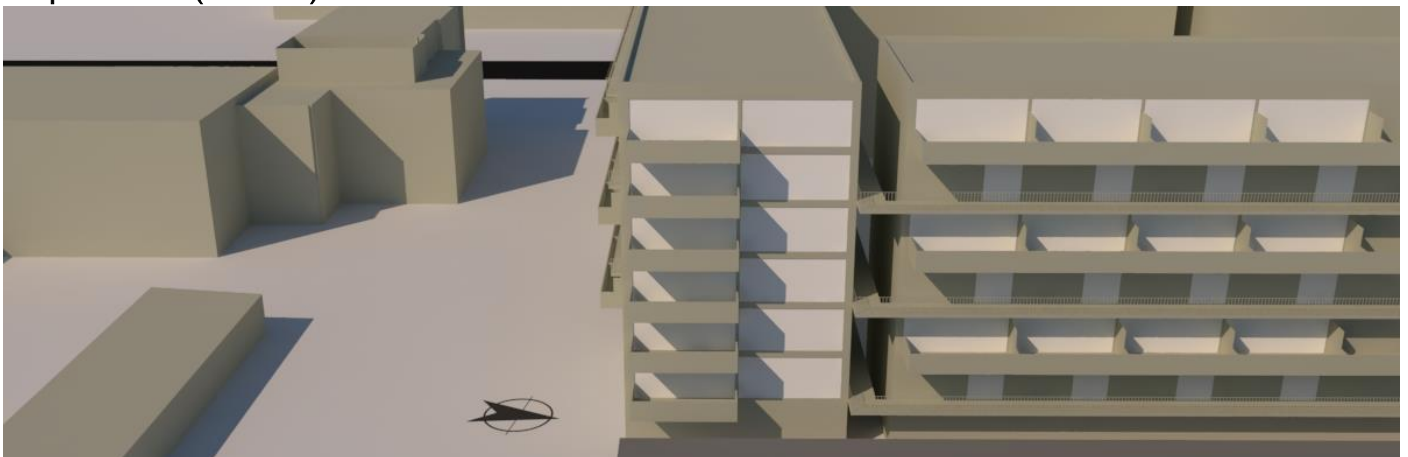
21-apr-10:00 uur (3s situatie)



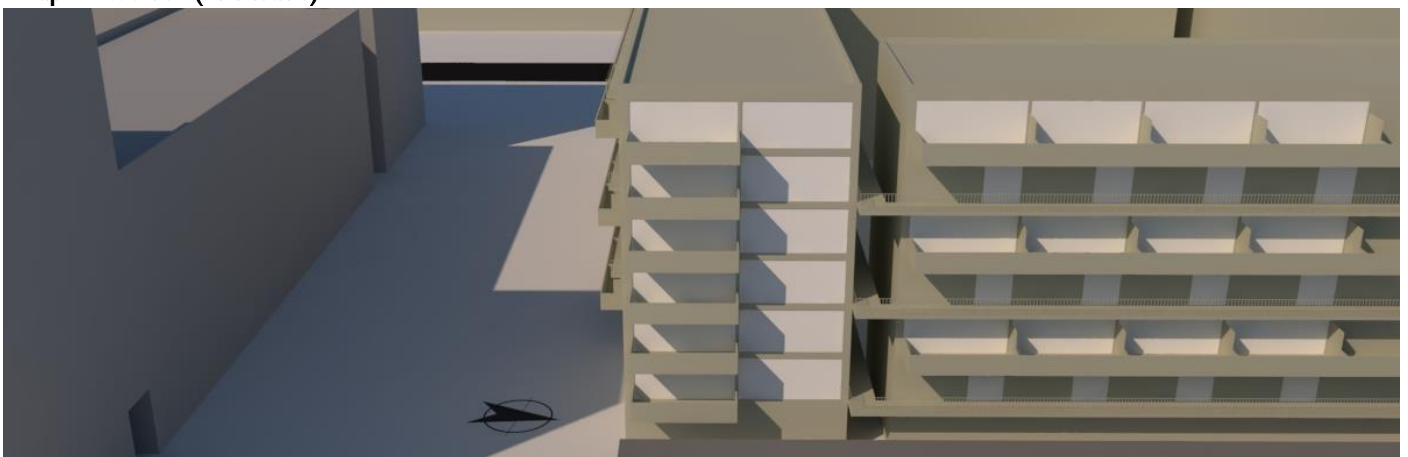
21-apr-11:00 uur (0s situatie)



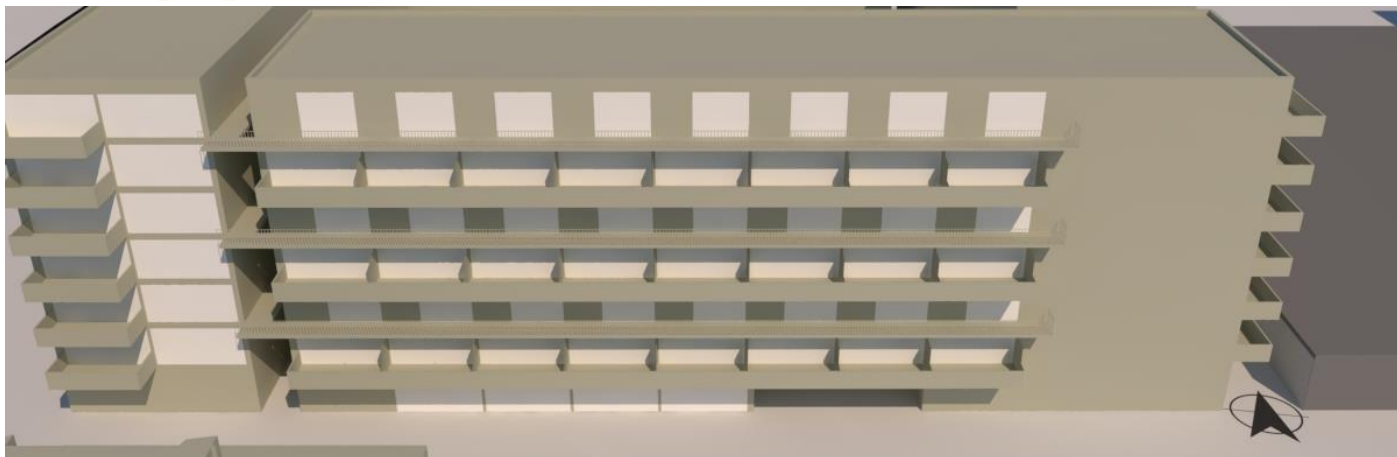
21-apr-11:00 uur (1s situatie)



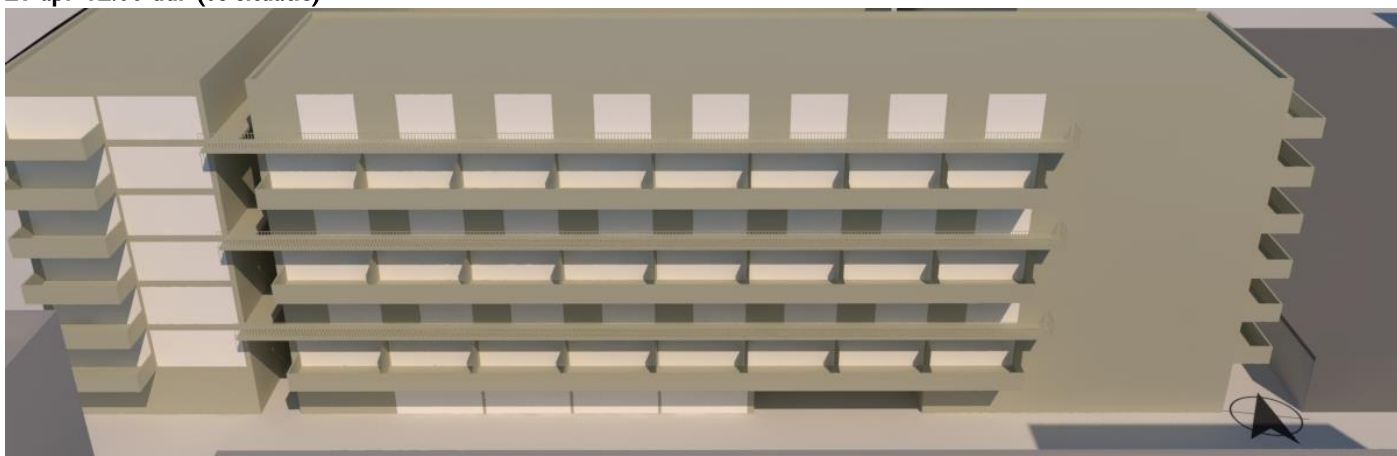
21-apr-11:00 uur (2s situatie)



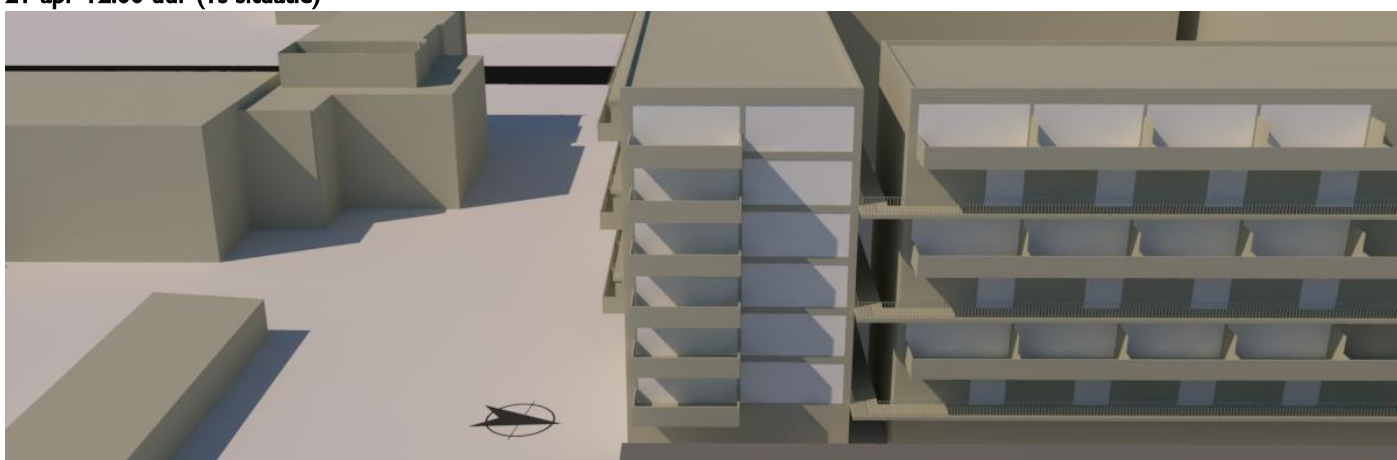
21-apr-11:00 uur (3s situatie)



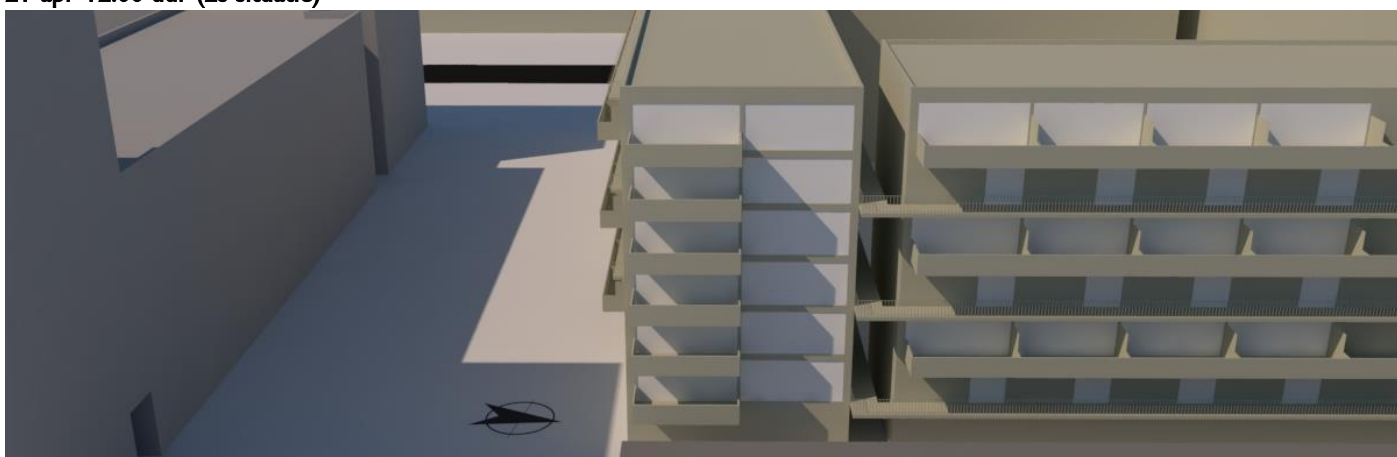
21-apr-12:00 uur (0s situatie)



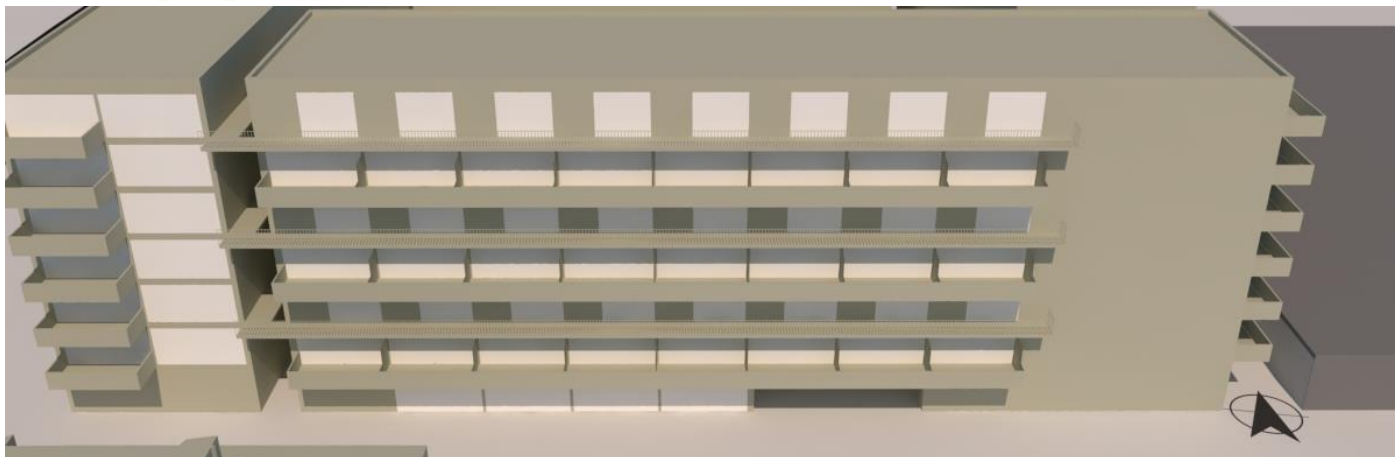
21-apr-12:00 uur (1s situatie)



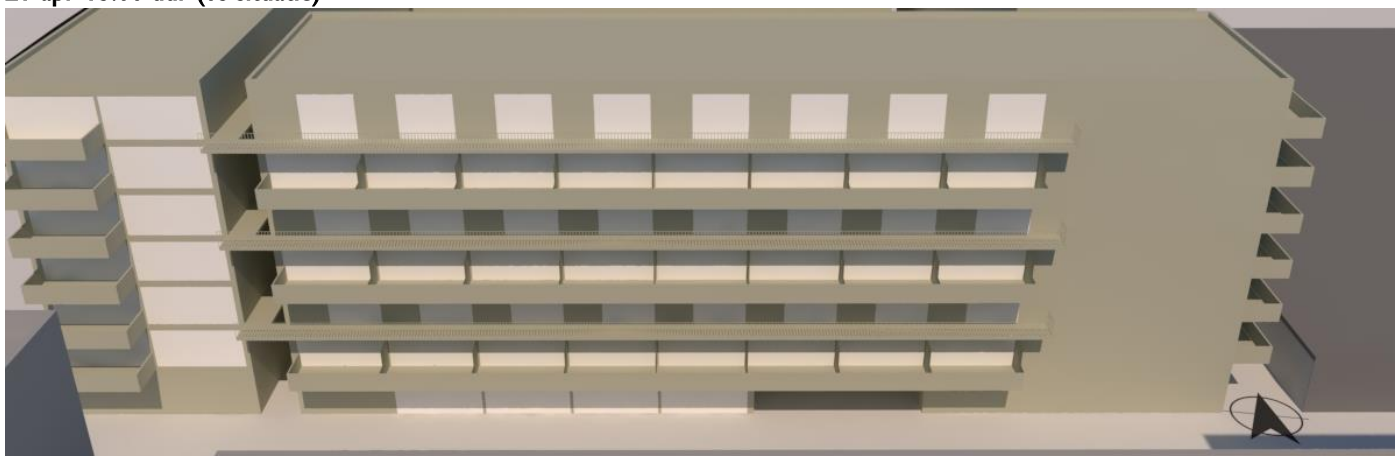
21-apr-12:00 uur (2s situatie)



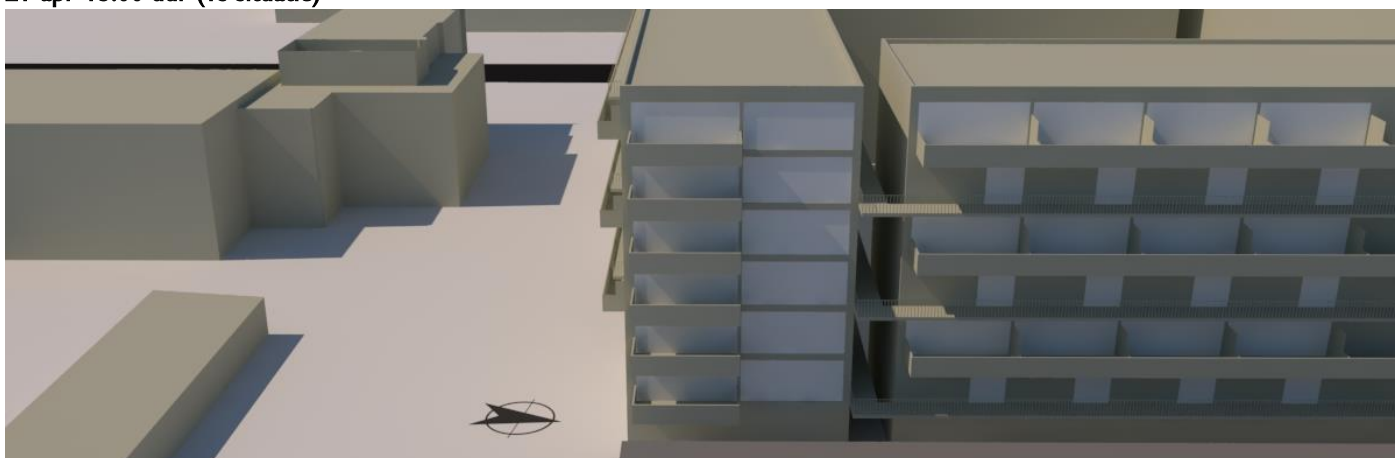
21-apr-12:00 uur (3s situatie)



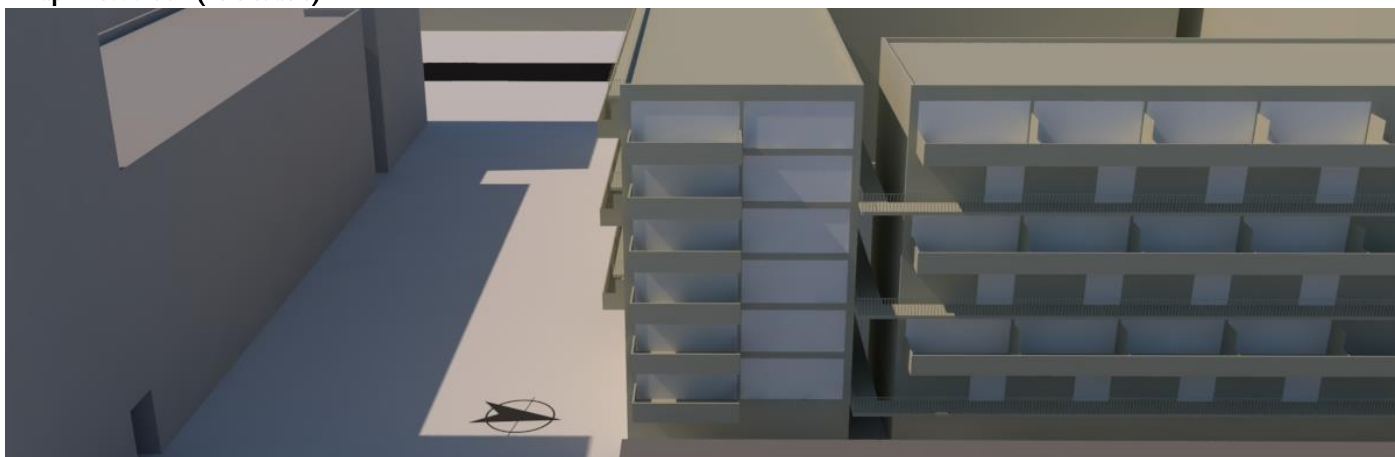
21-apr-13:00 uur (0s situatie)



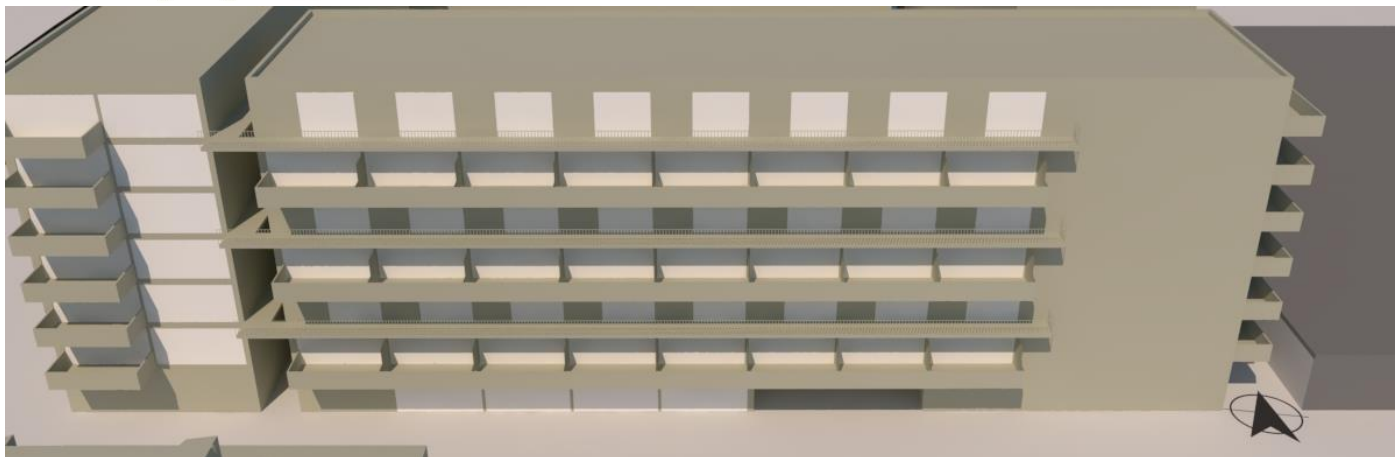
21-apr-13:00 uur (1s situatie)



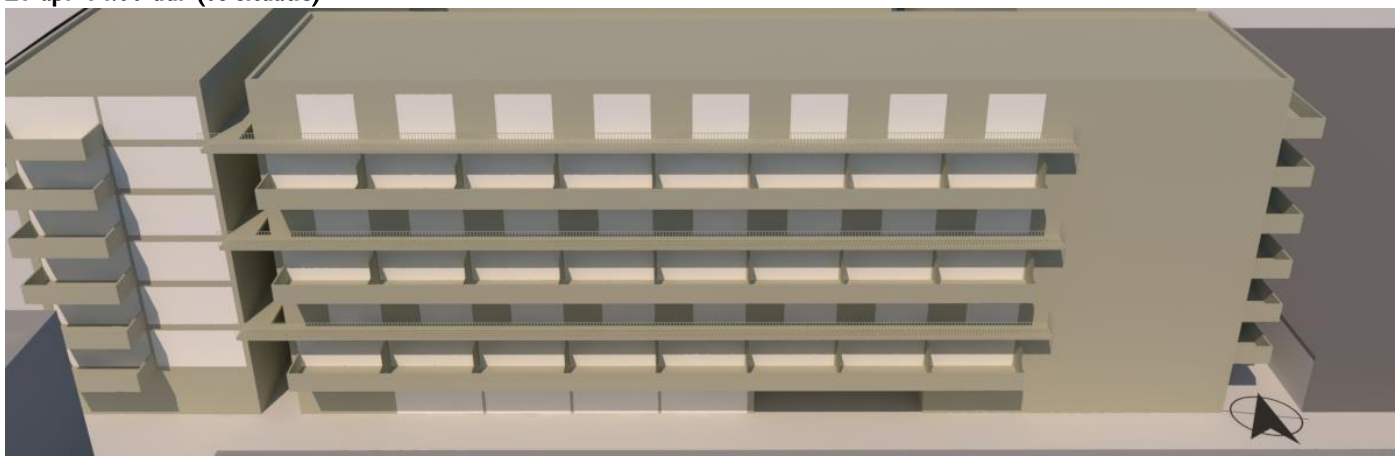
21-apr-13:00 uur (2s situatie)



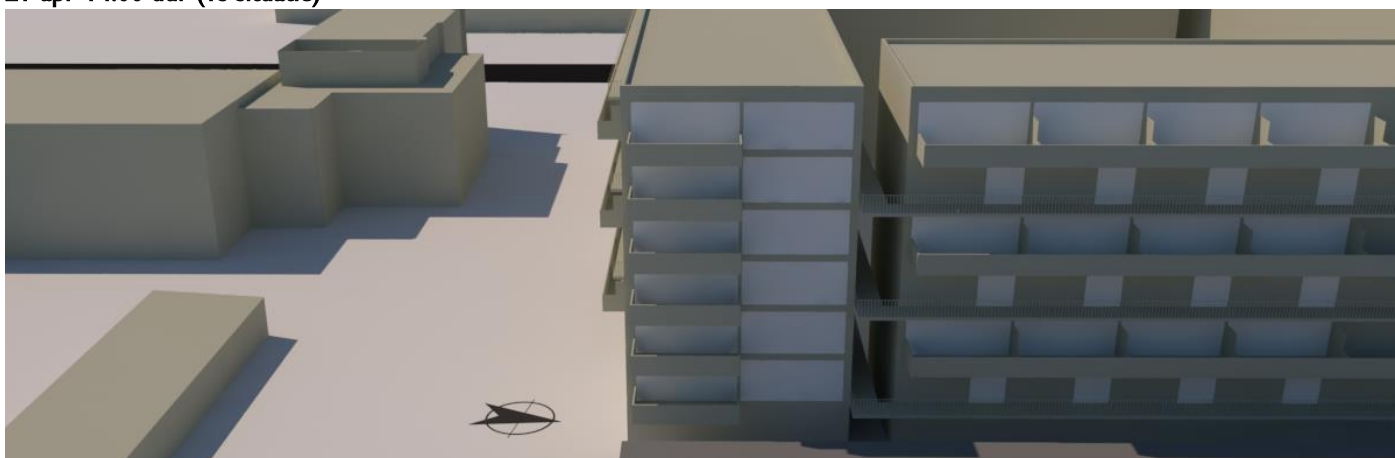
21-apr-13:00 uur (3s situatie)



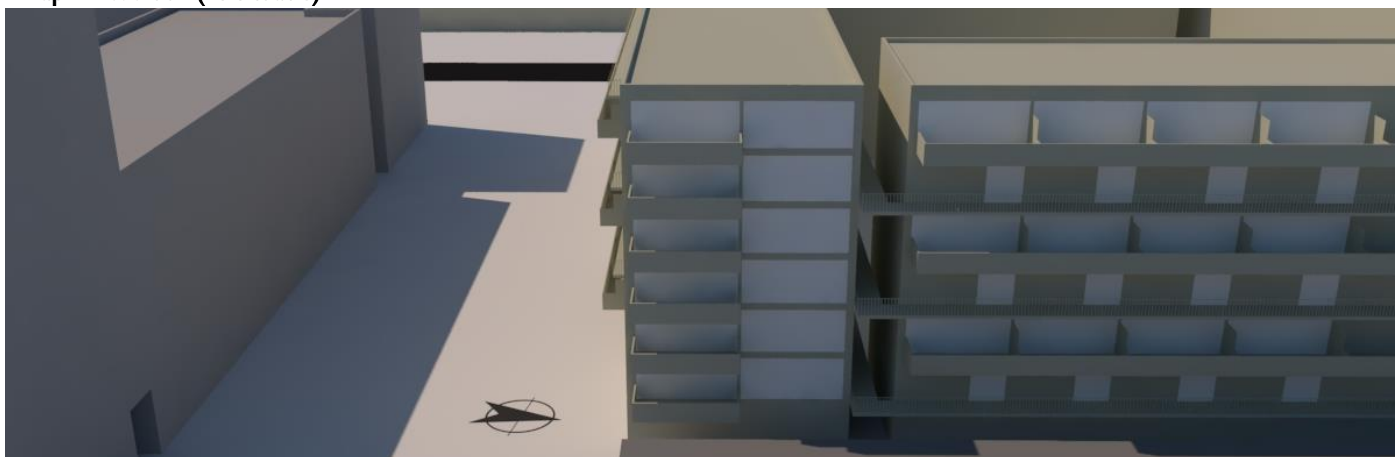
21-apr-14:00 uur (0s situatie)



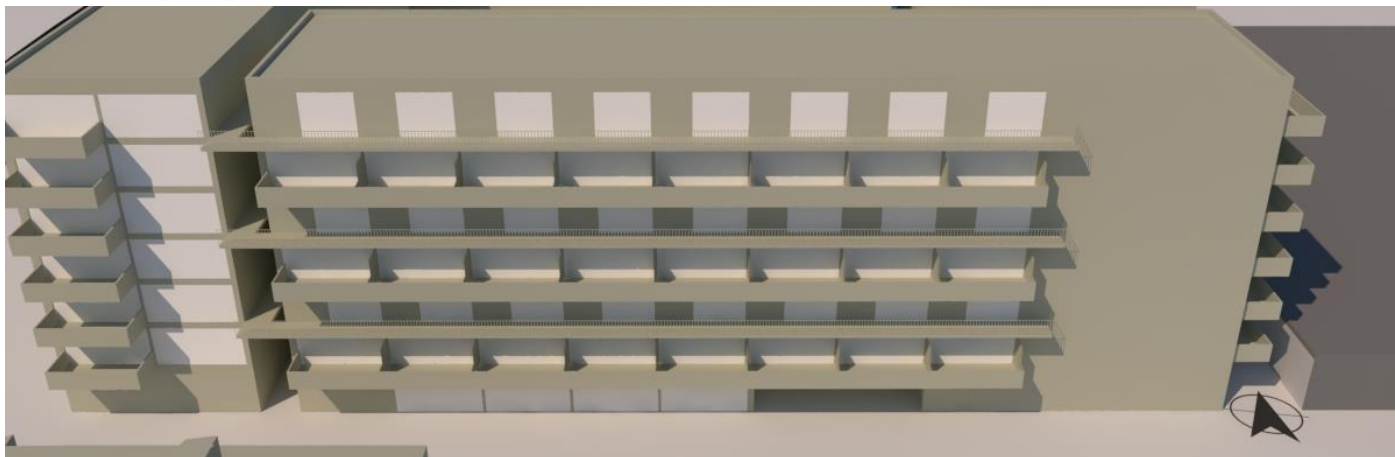
21-apr-14:00 uur (1s situatie)



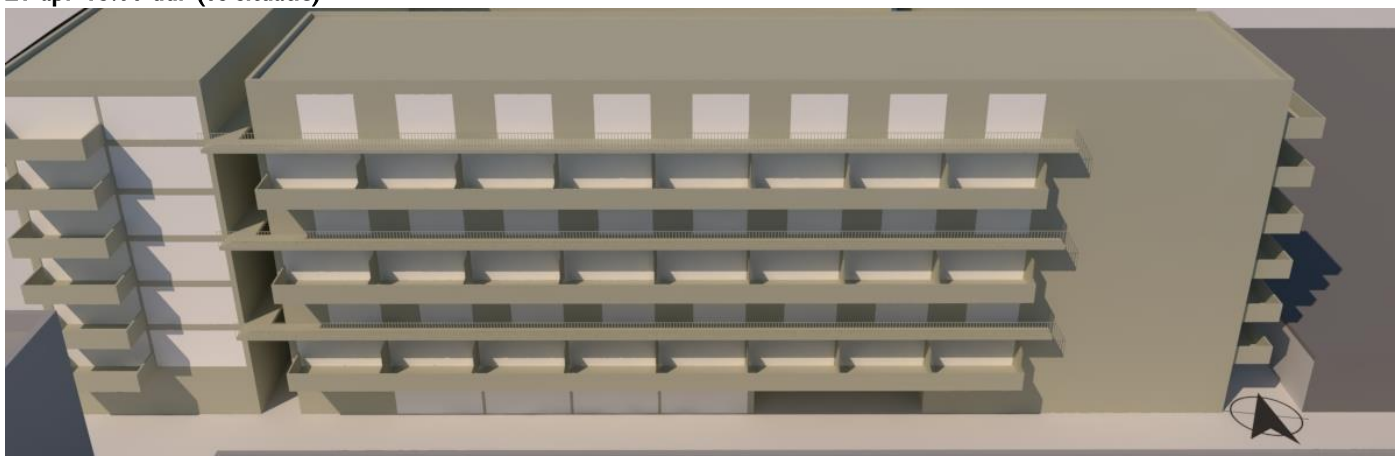
21-apr-14:00 uur (2s situatie)



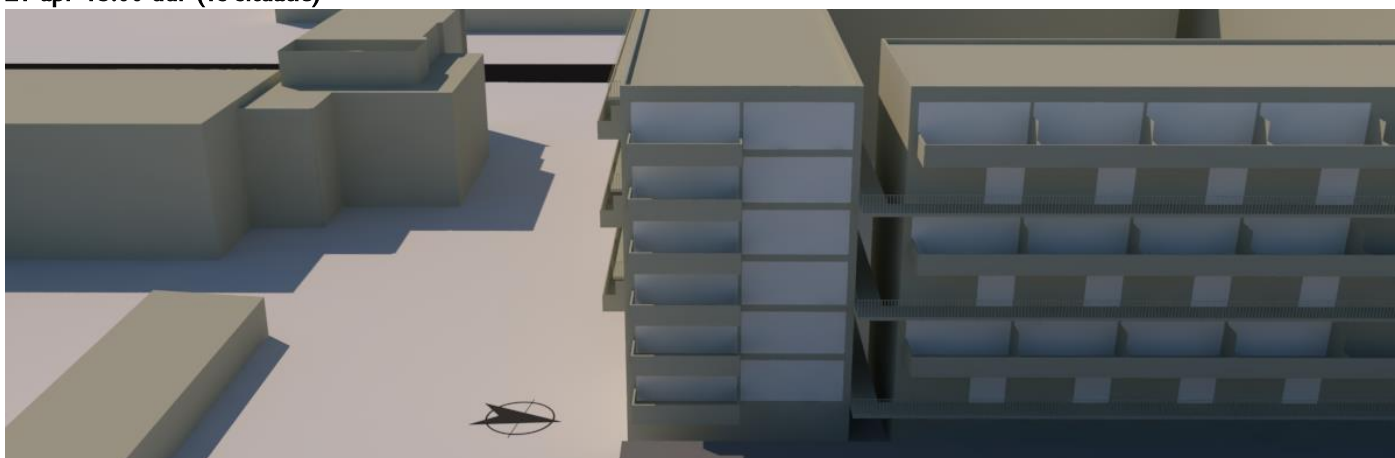
21-apr-14:00 uur (3s situatie)



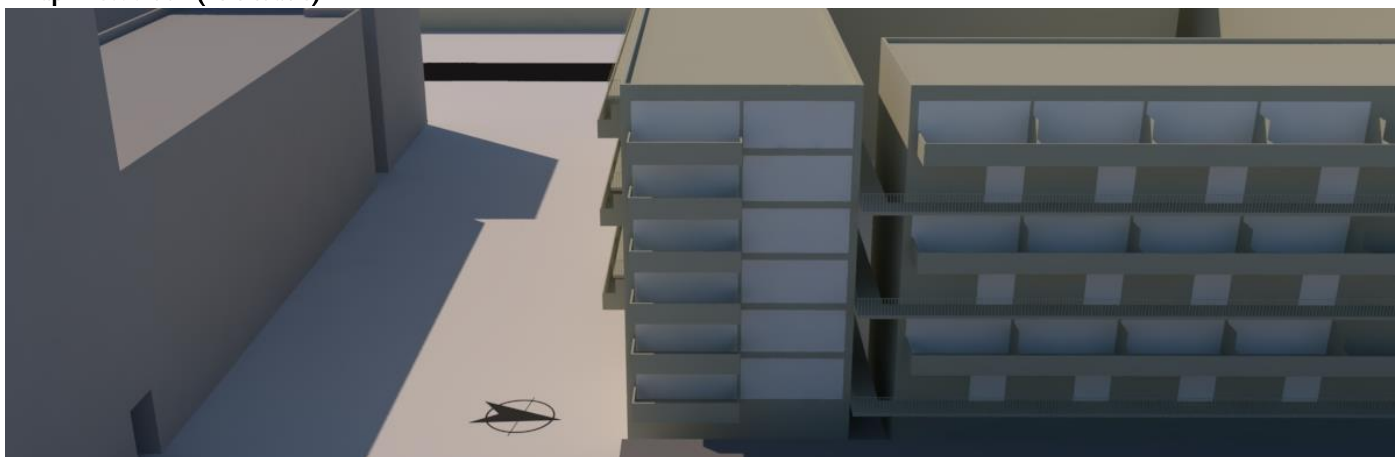
21-apr-15:00 uur (0s situatie)



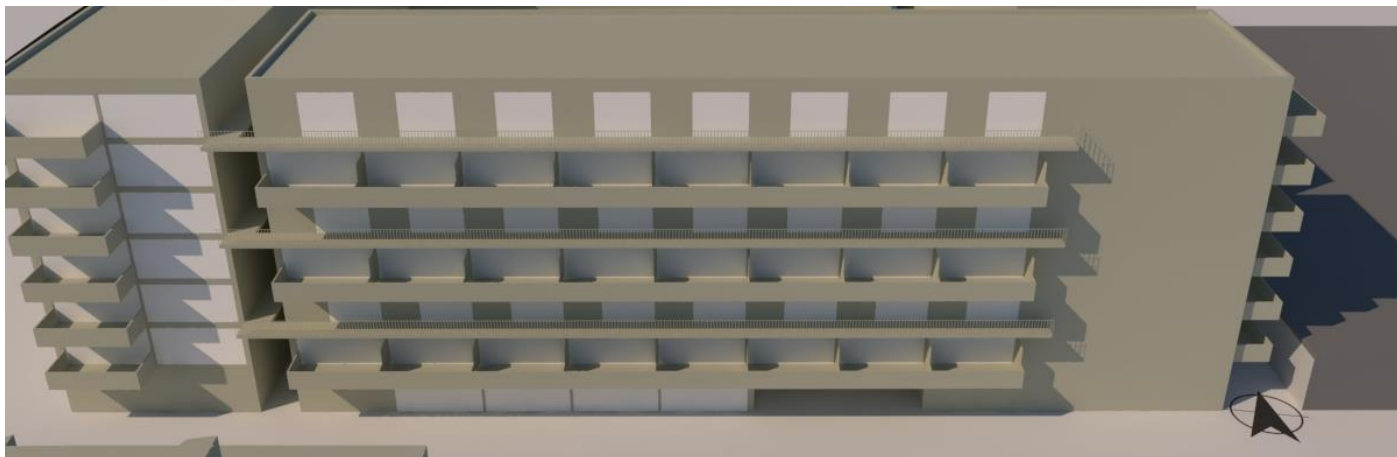
21-apr-15:00 uur (1s situatie)



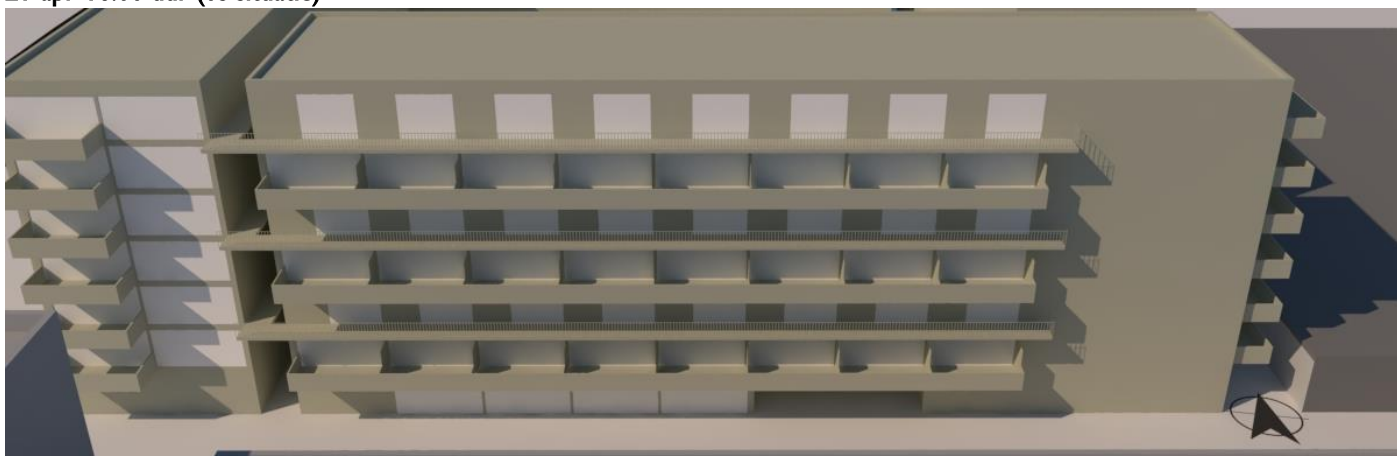
21-apr-15:00 uur (2s situatie)



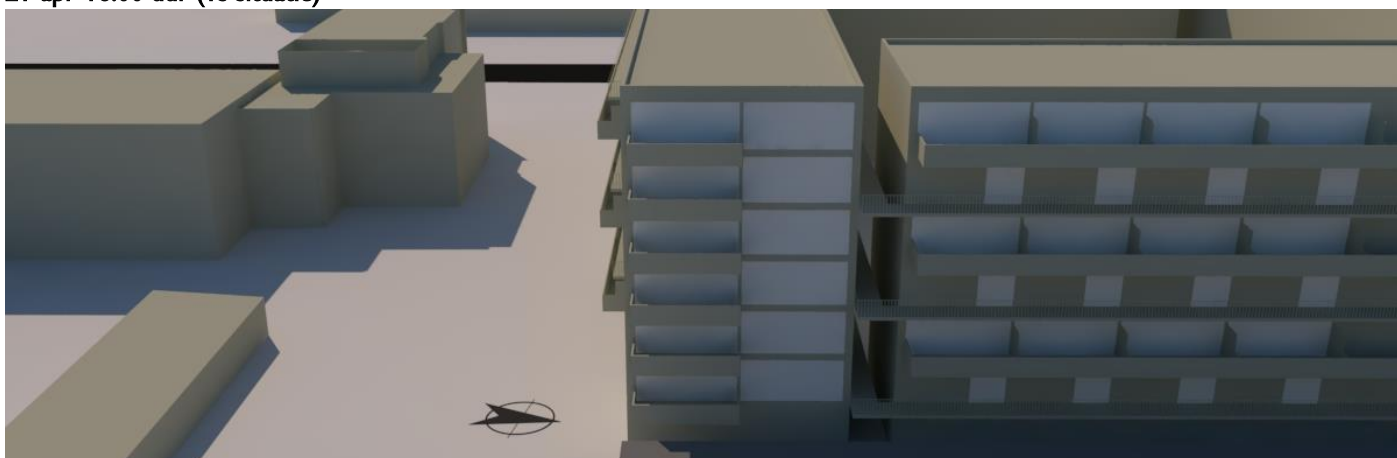
21-apr-15:00 uur (3s situatie)



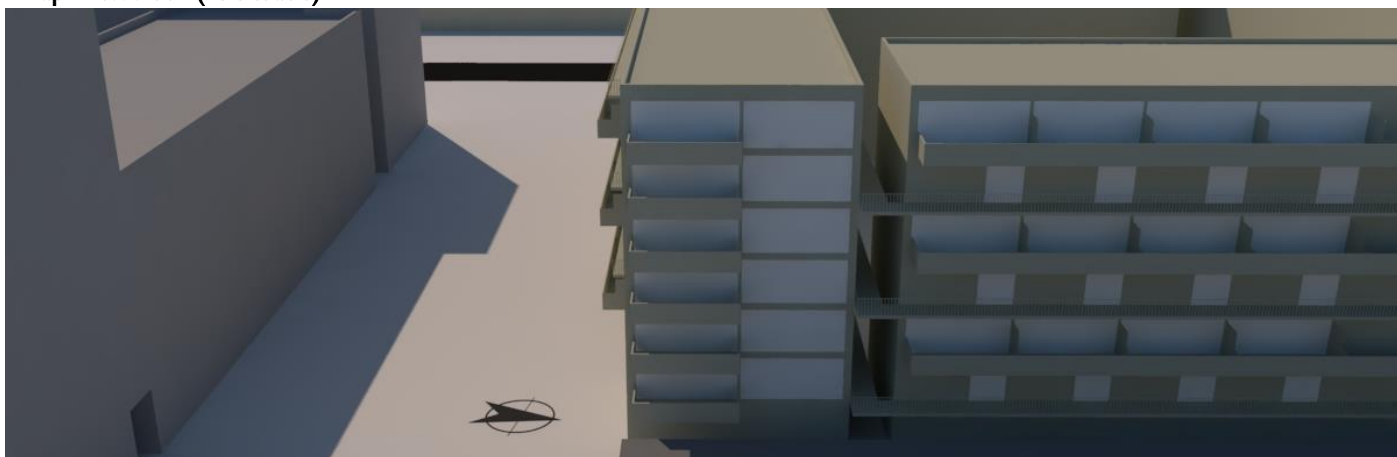
21-apr-16:00 uur (0s situatie)



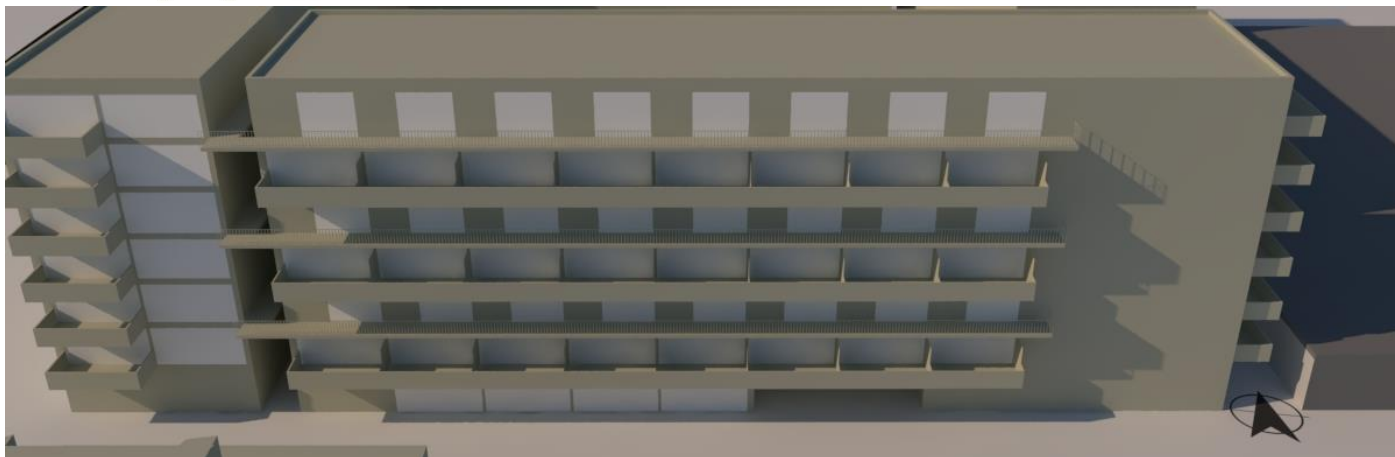
21-apr-16:00 uur (1s situatie)



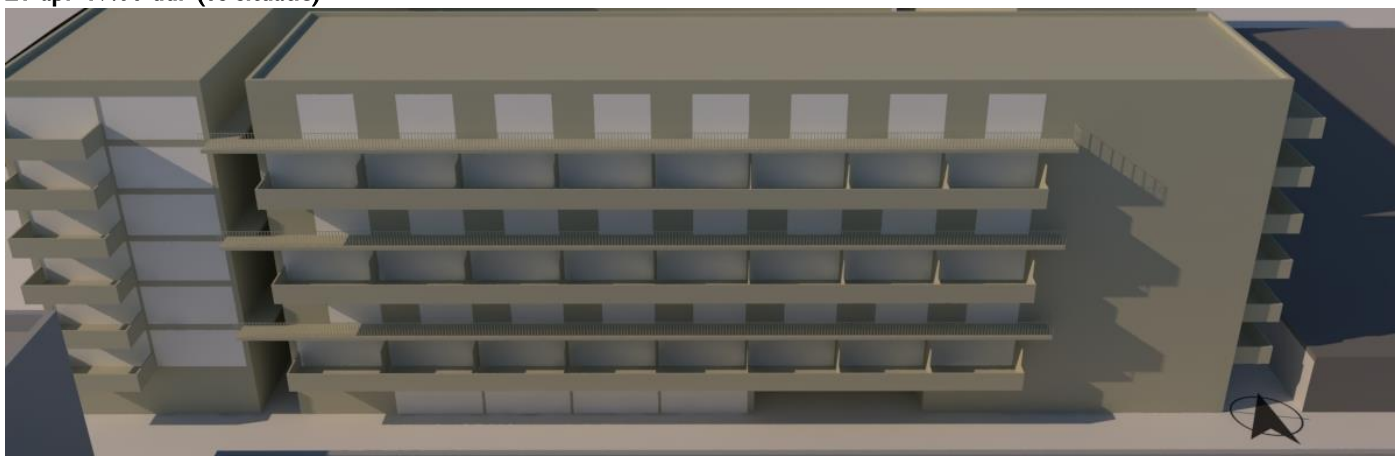
21-apr-16:00 uur (2s situatie)



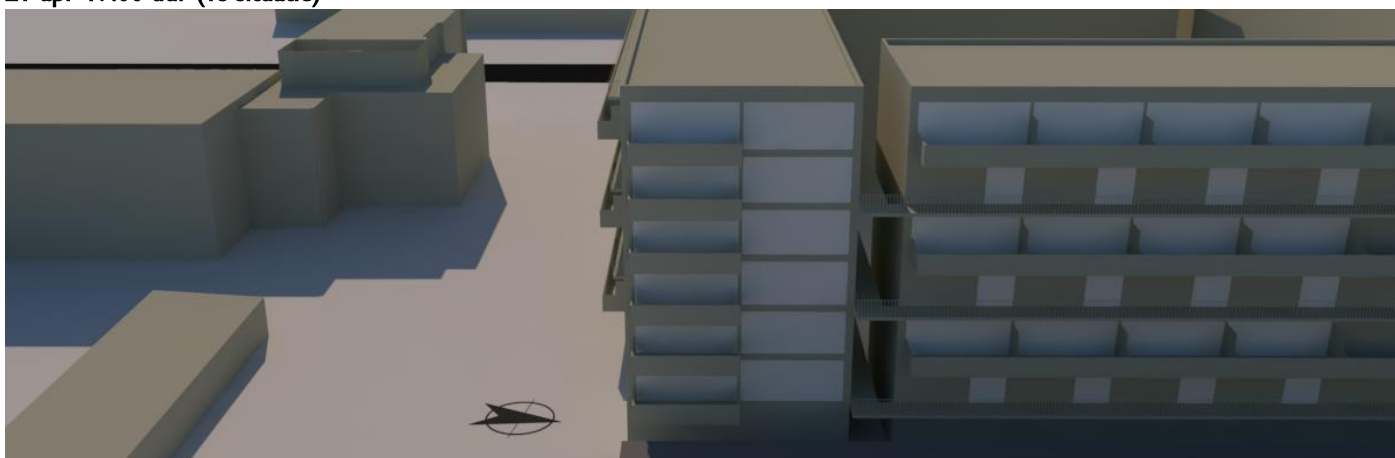
21-apr-16:00 uur (3s situatie)



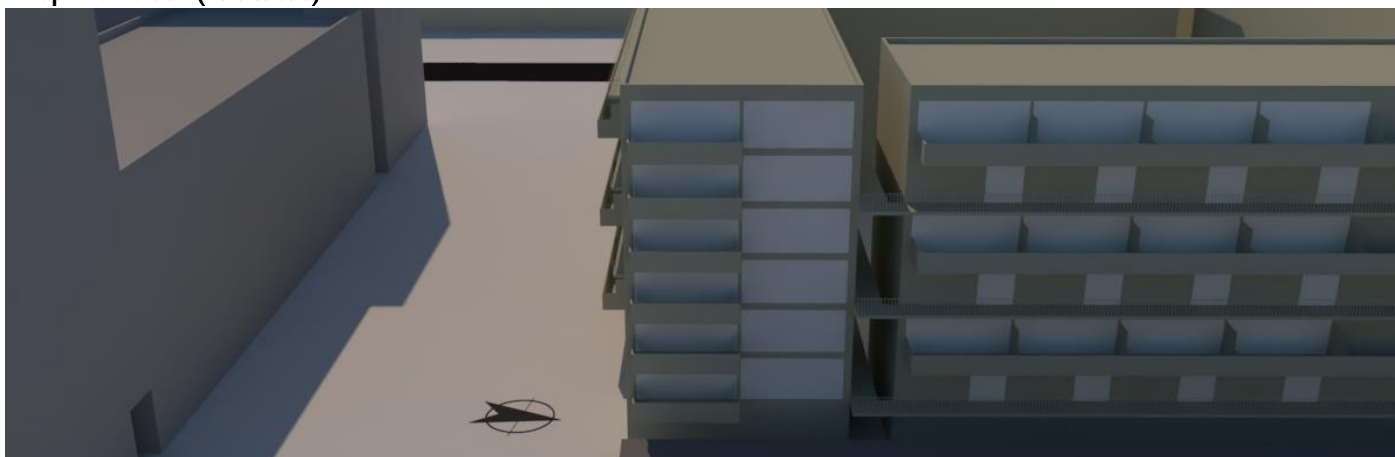
21-apr-17:00 uur (0s situatie)



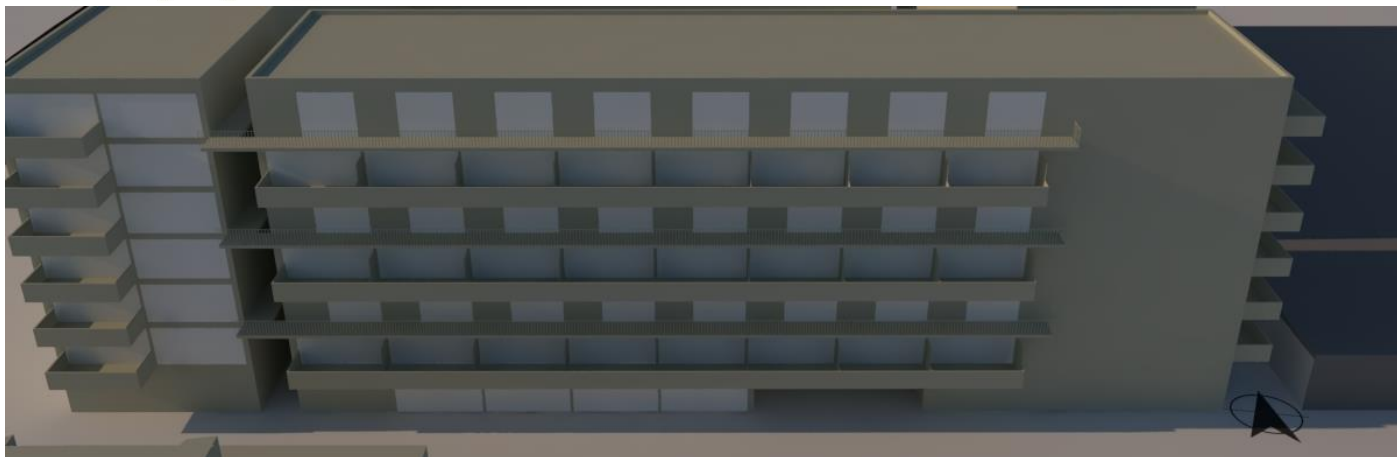
21-apr-17:00 uur (1s situatie)



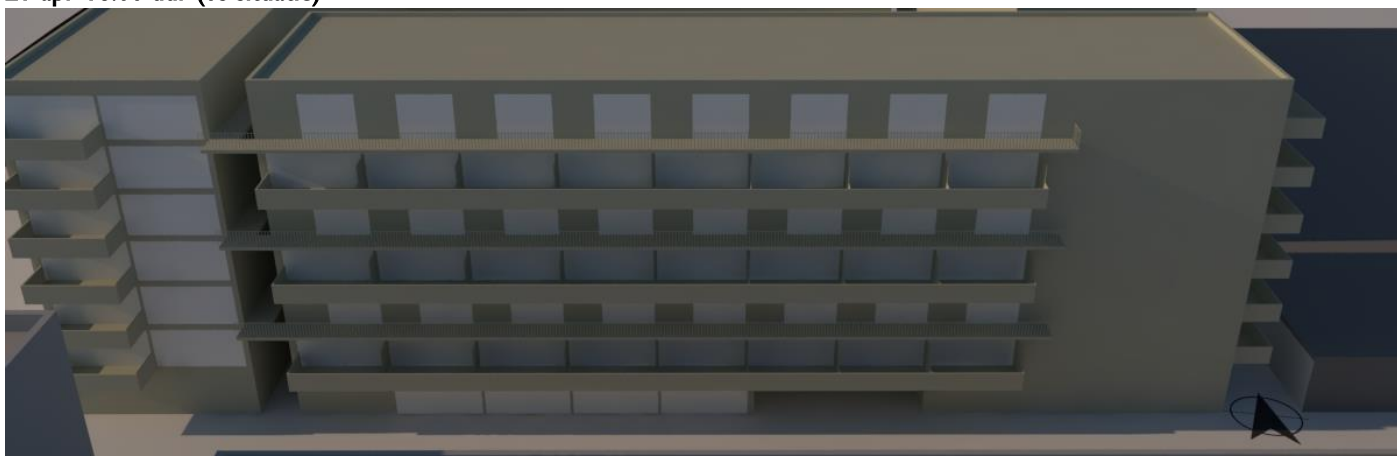
21-apr-17:00 uur (2s situatie)



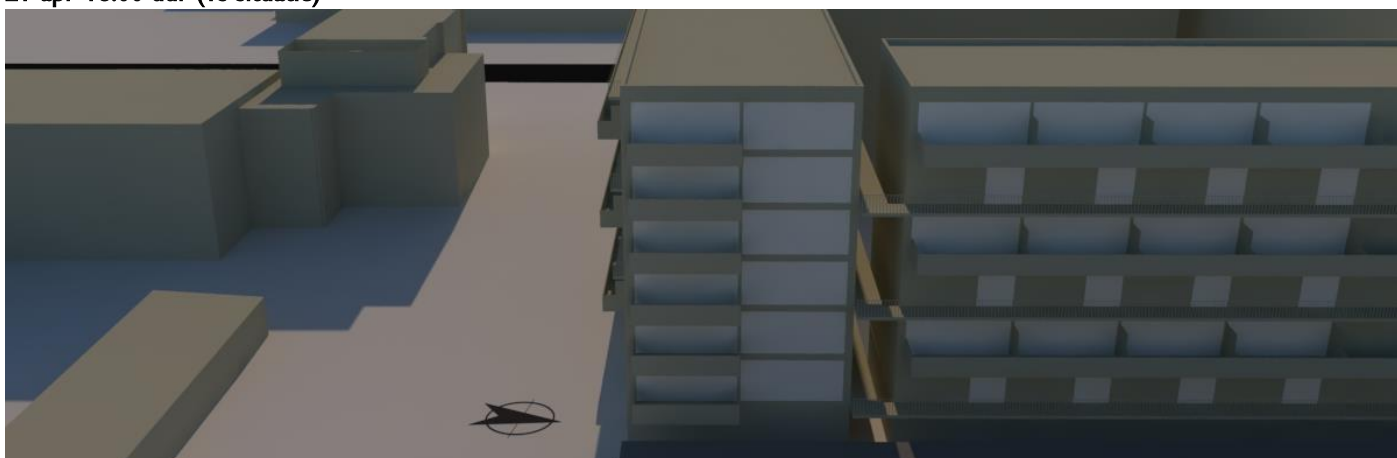
21-apr-17:00 uur (3s situatie)



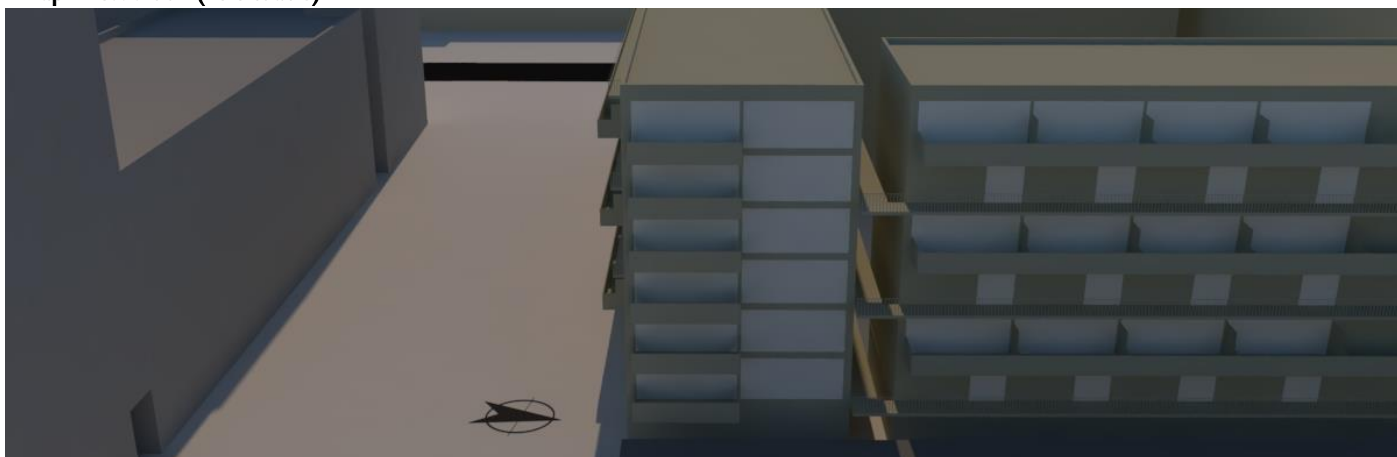
21-apr-18:00 uur (0s situatie)



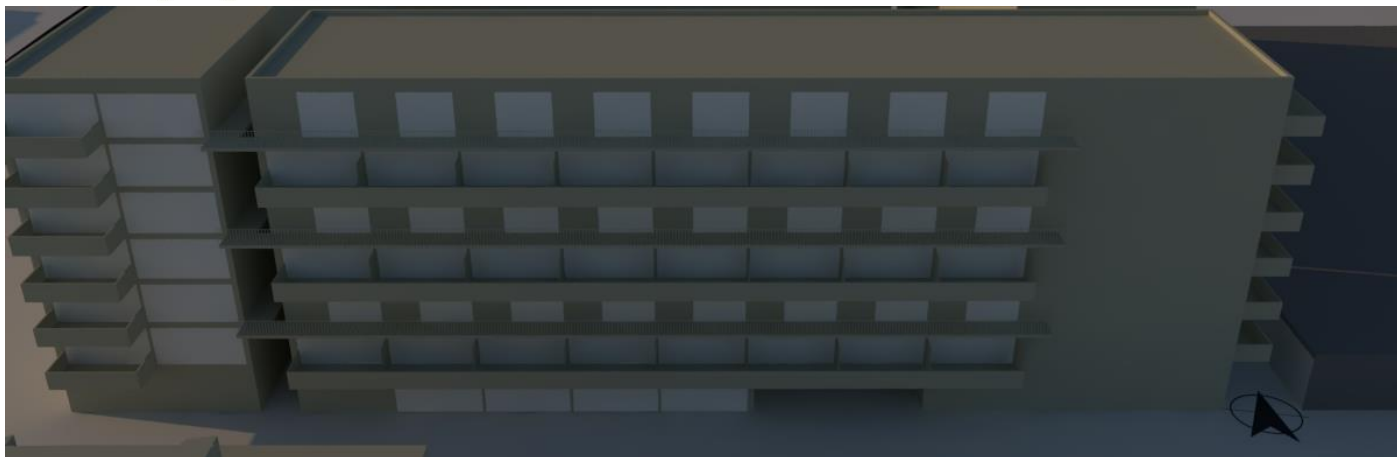
21-apr-18:00 uur (1s situatie)



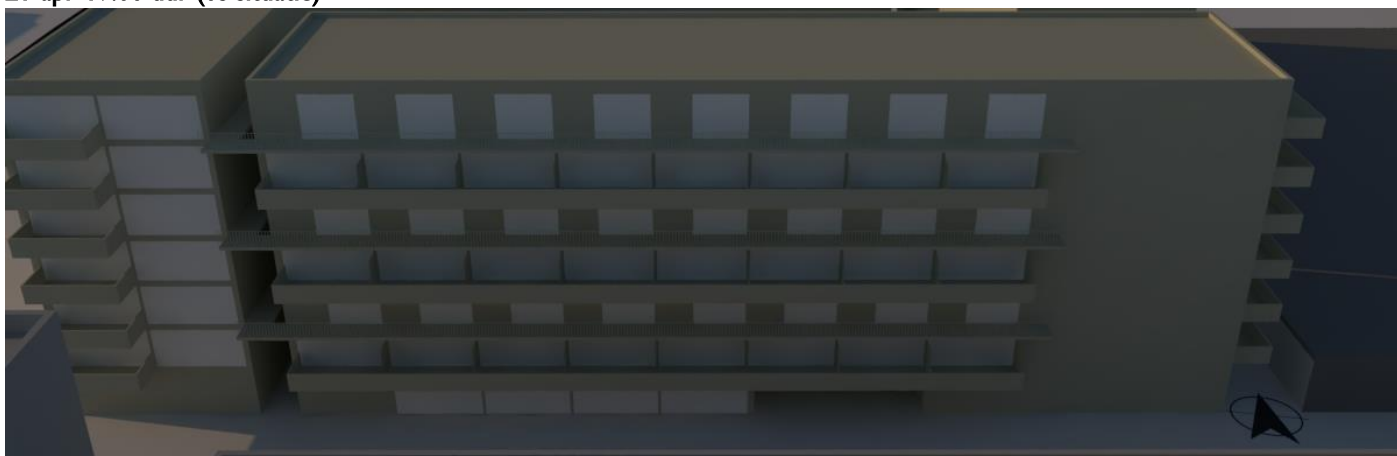
21-apr-18:00 uur (2s situatie)



21-apr-18:00 uur (3s situatie)



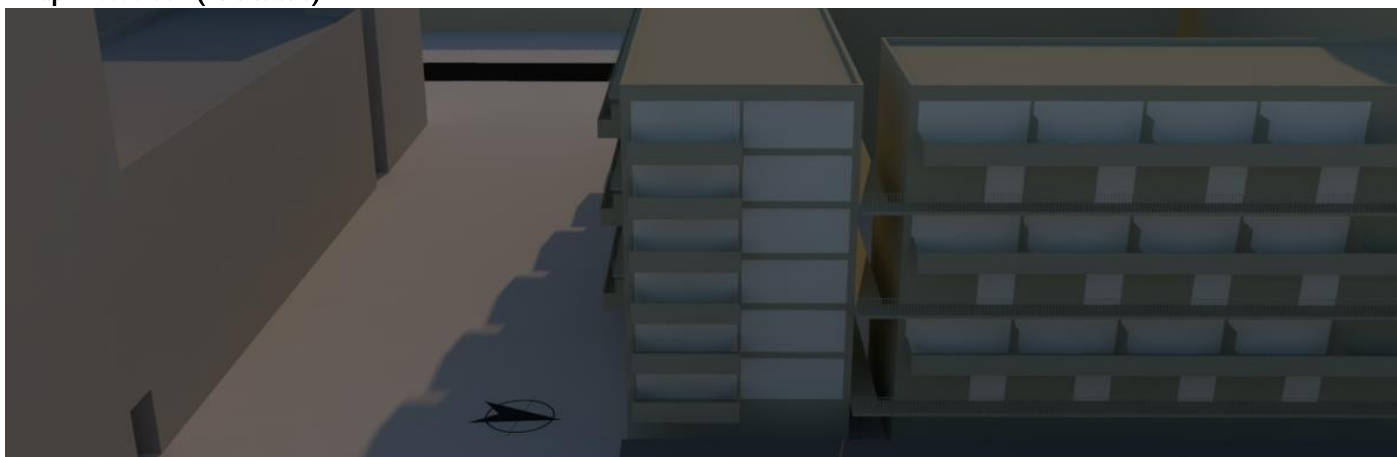
21-apr-19:00 uur (0s situatie)



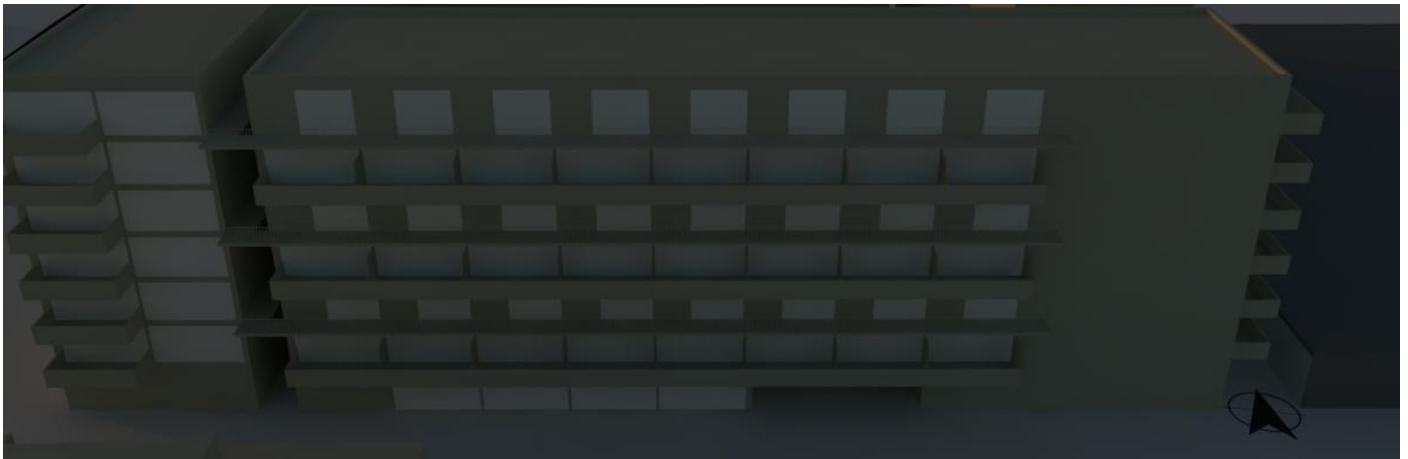
21-apr-19:00 uur (1s situatie)



21-apr-19:00 uur (2s situatie)



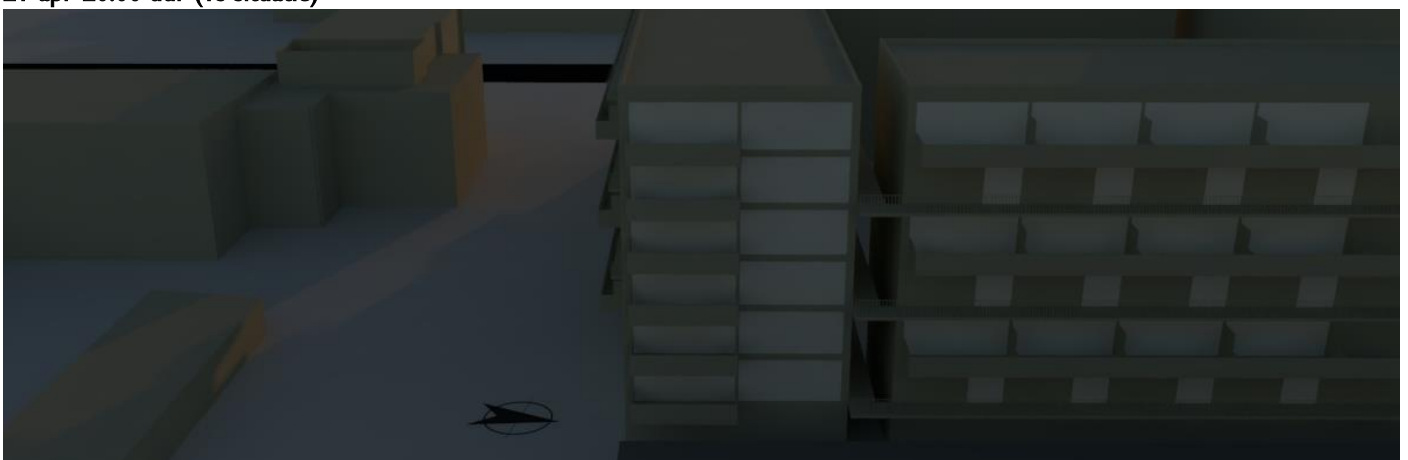
21-apr-19:00 uur (3s situatie)



21-apr-20:00 uur (0s situatie)



21-apr-20:00 uur (1s situatie)



21-apr-20:00 uur (2s situatie)



21-apr-20:00 uur (3s situatie)



21-mei-6:00 uur (0s situatie)



21-mei-6:00 uur (1s situatie)



21-mei-6:00 uur (2s situatie)



21-mei-6:00 uur (3s situatie)



21-mei-7:00 uur (0s situatie)



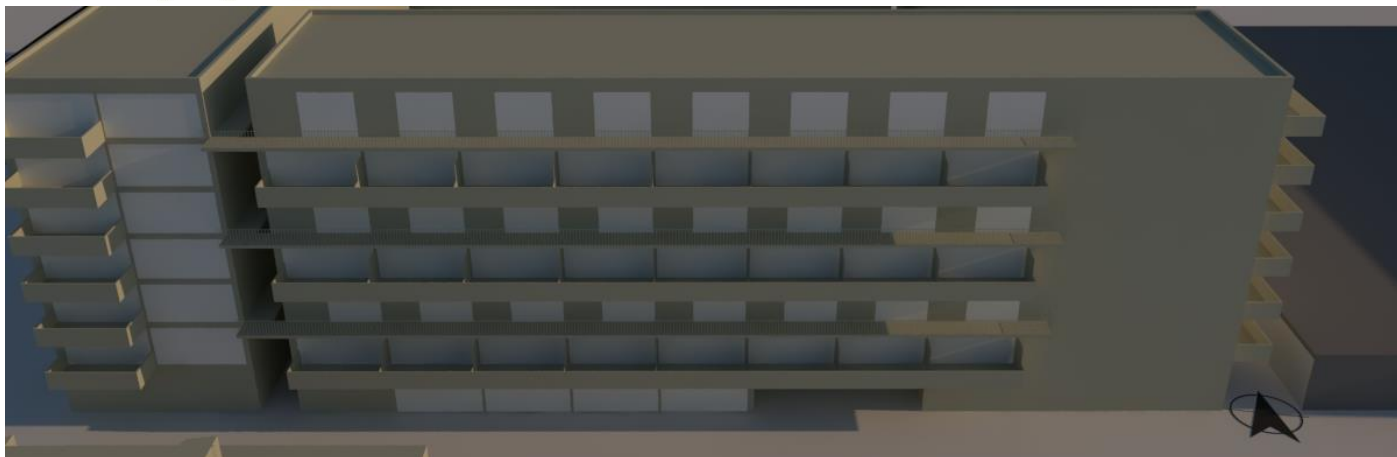
21-mei-7:00 uur (1s situatie)



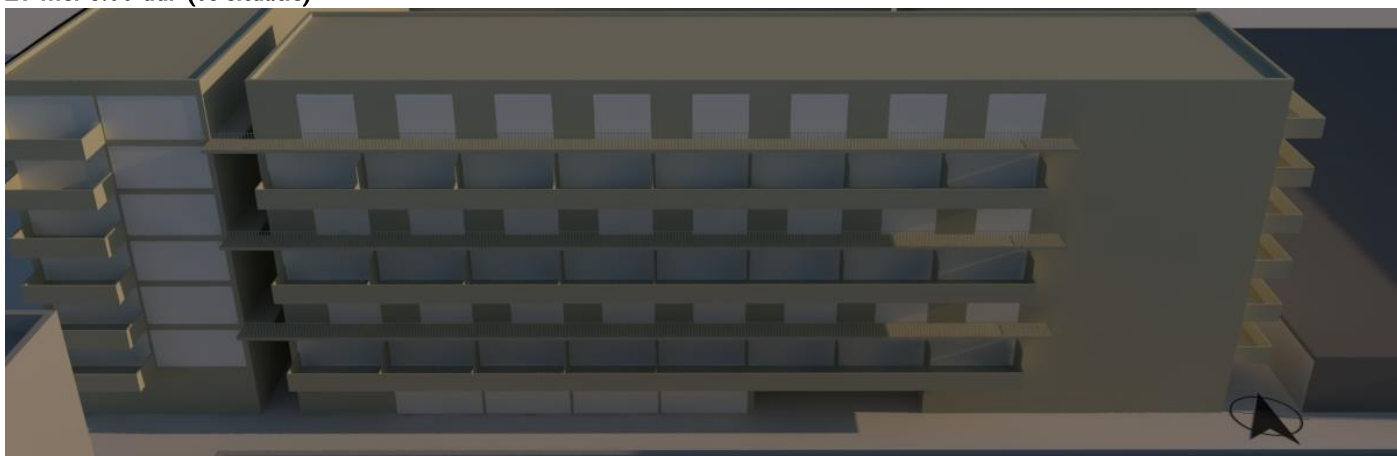
21-mei-7:00 uur (2s situatie)



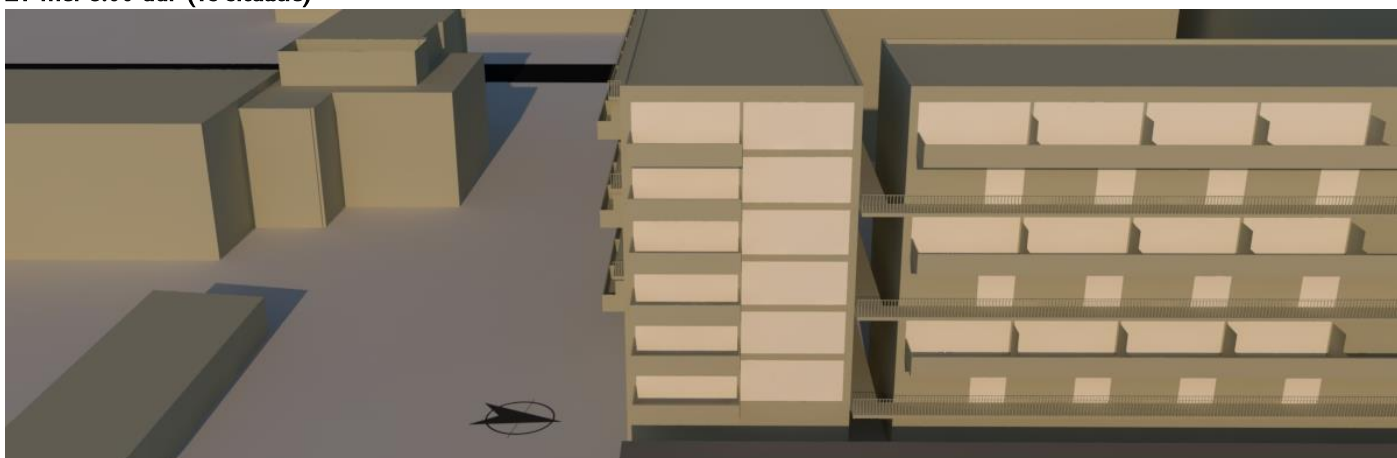
21-mei-7:00 uur (3s situatie)



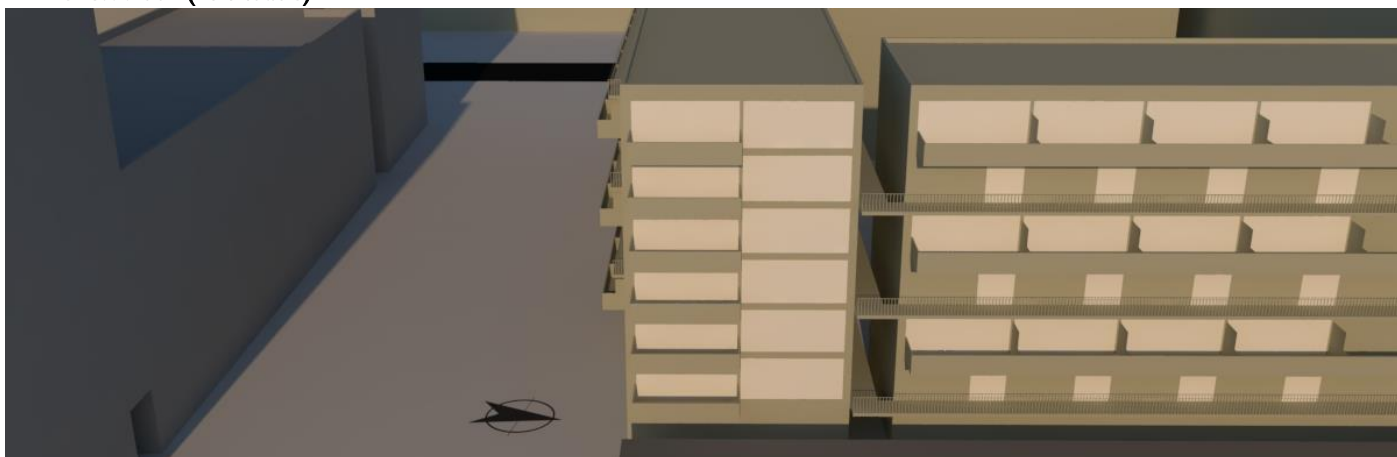
21-mei-8:00 uur (0s situatie)



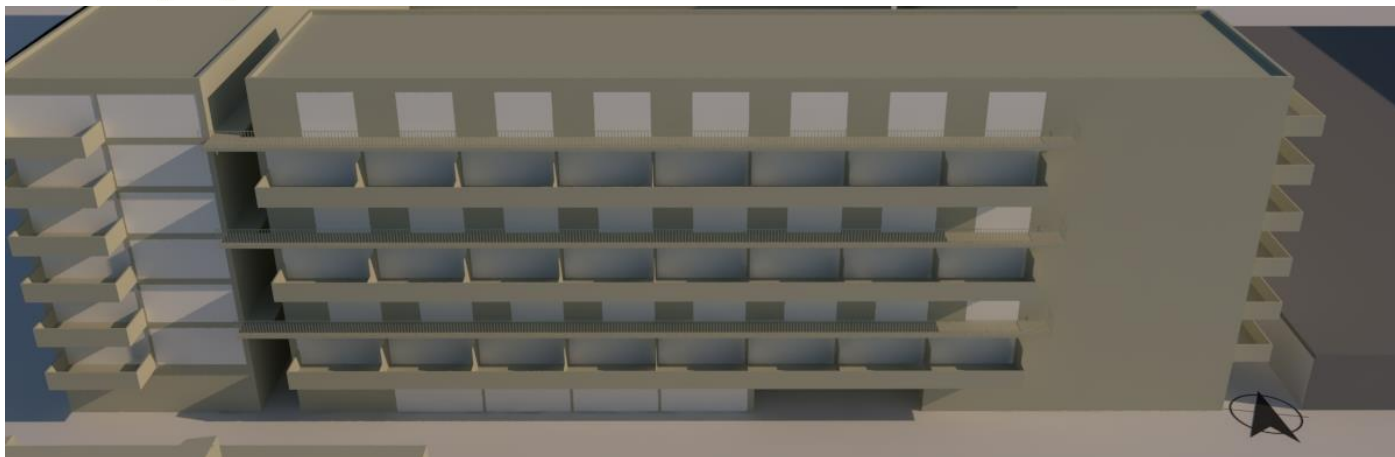
21-mei-8:00 uur (1s situatie)



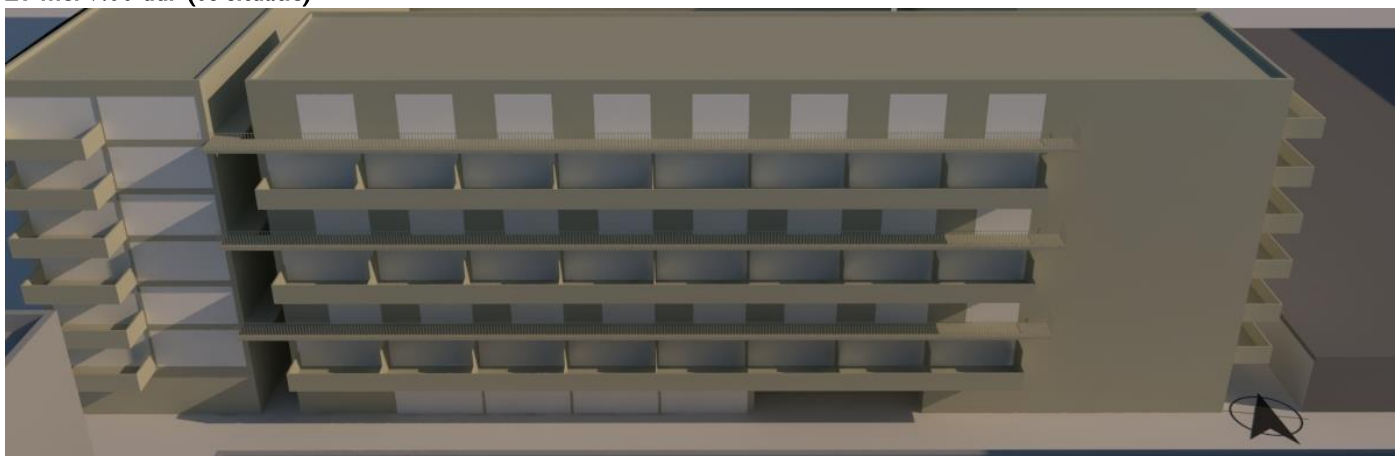
21-mei-8:00 uur (2s situatie)



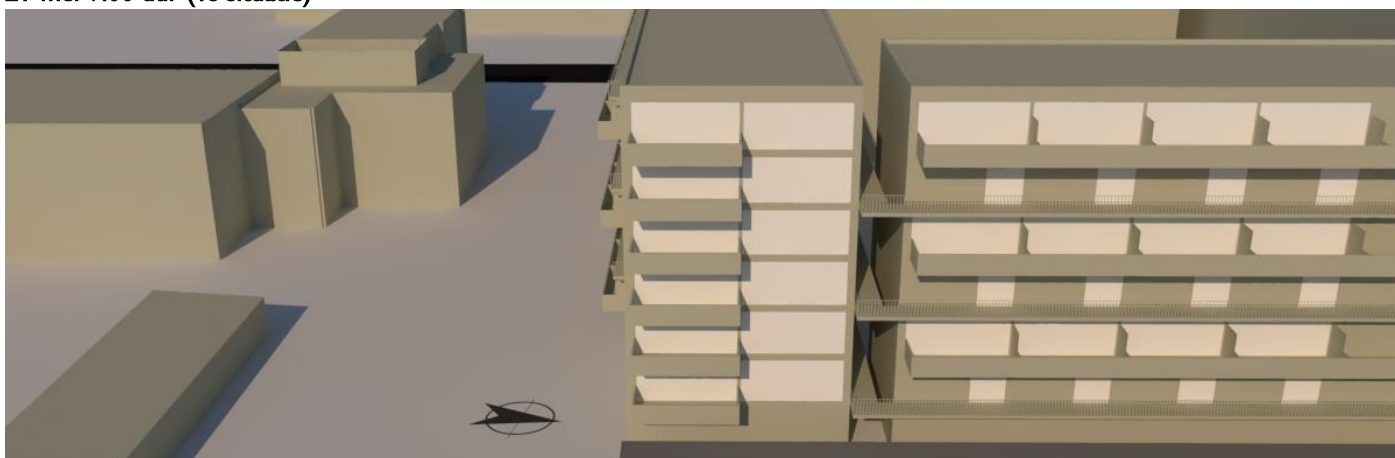
21-mei-8:00 uur (3s situatie)



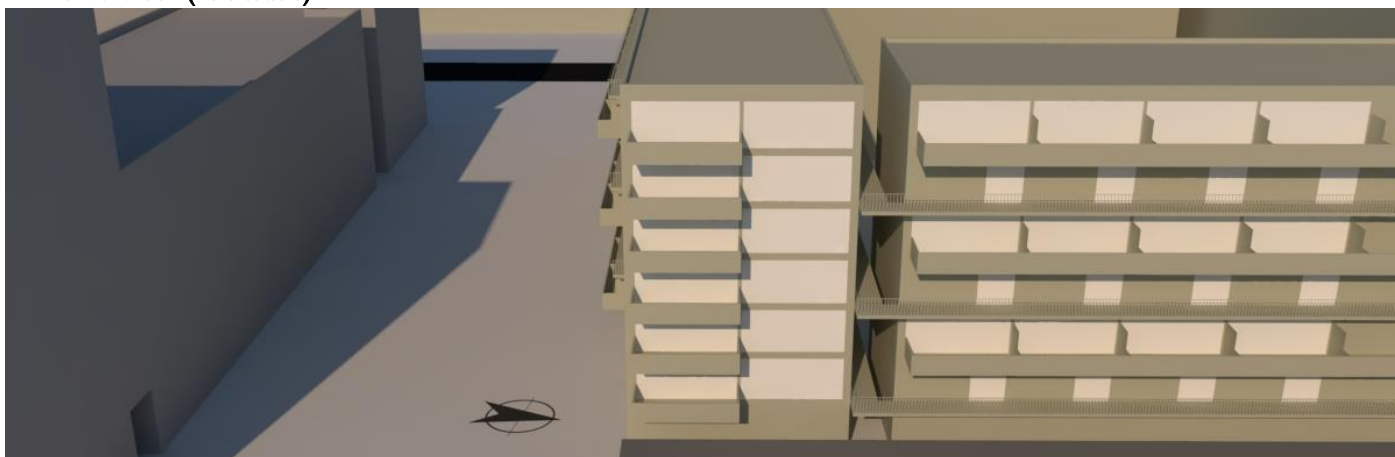
21-mei-9:00 uur (0s situatie)



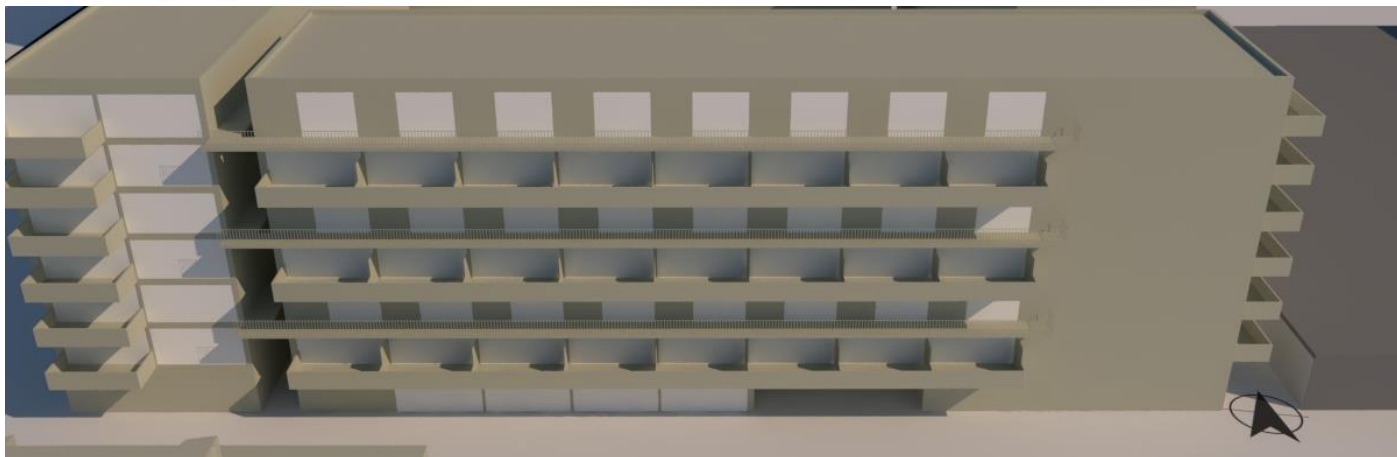
21-mei-9:00 uur (1s situatie)



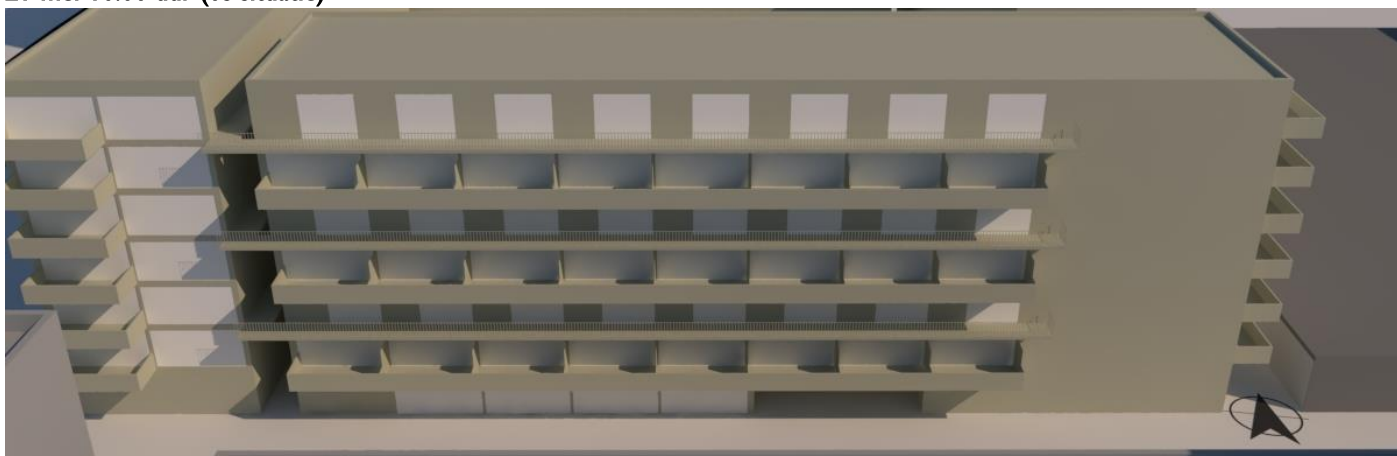
21-mei-9:00 uur (2s situatie)



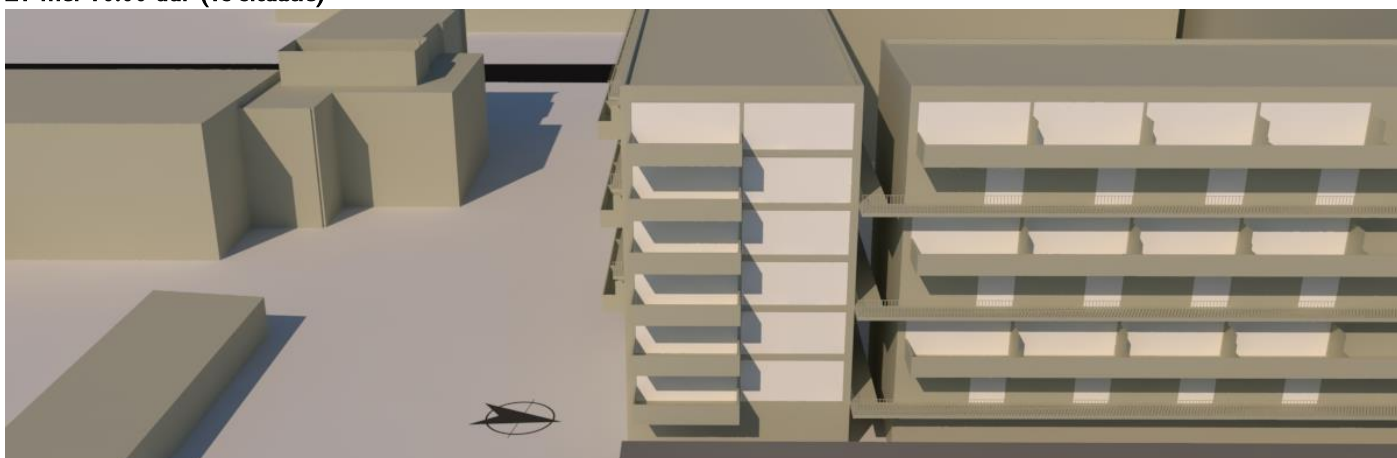
21-mei-9:00 uur (3s situatie)



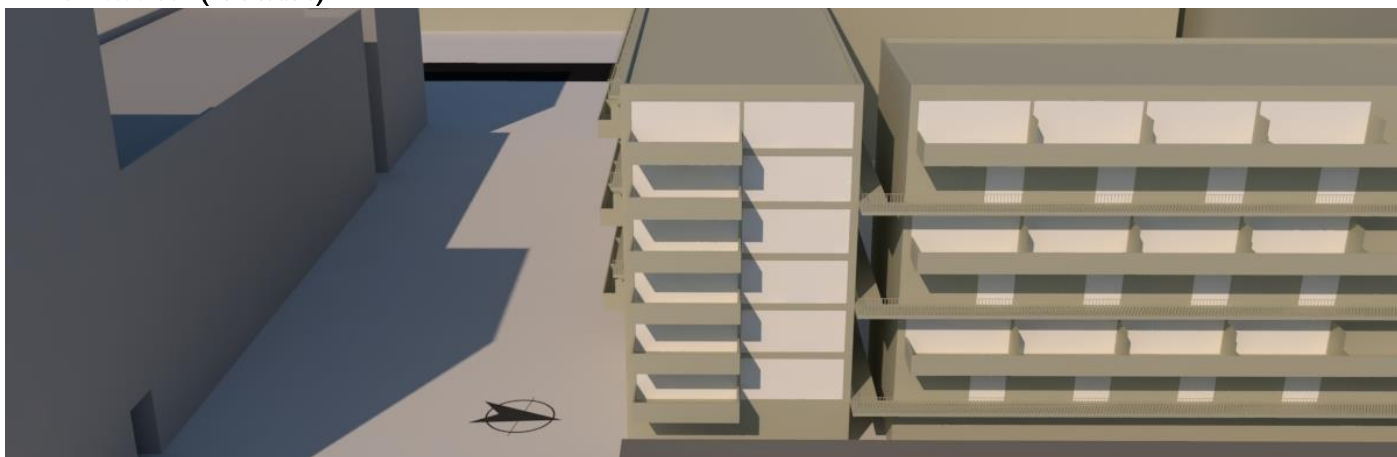
21-mei-10:00 uur (0s situatie)



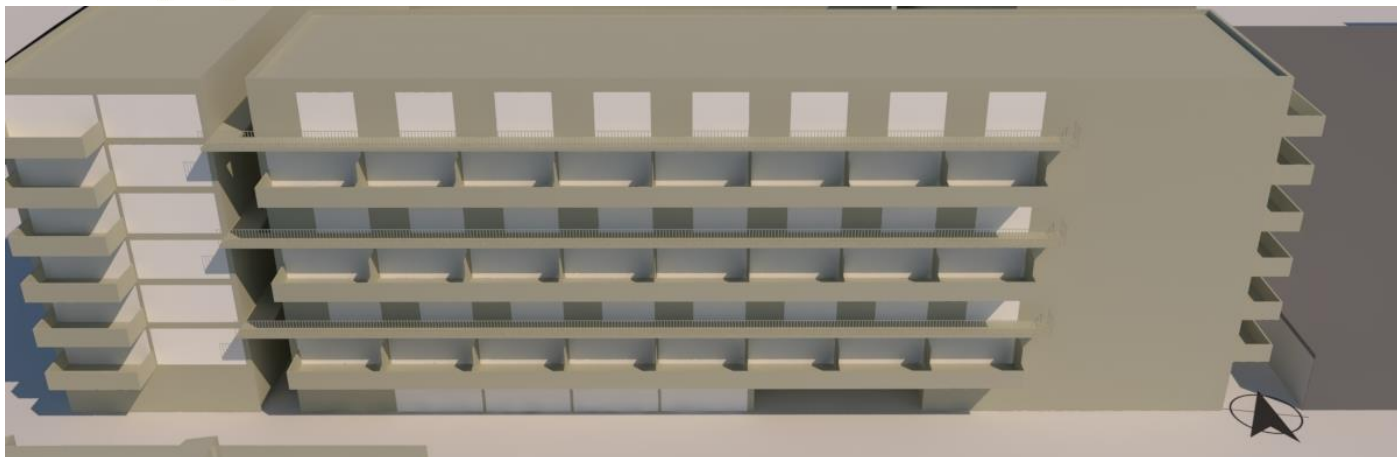
21-mei-10:00 uur (1s situatie)



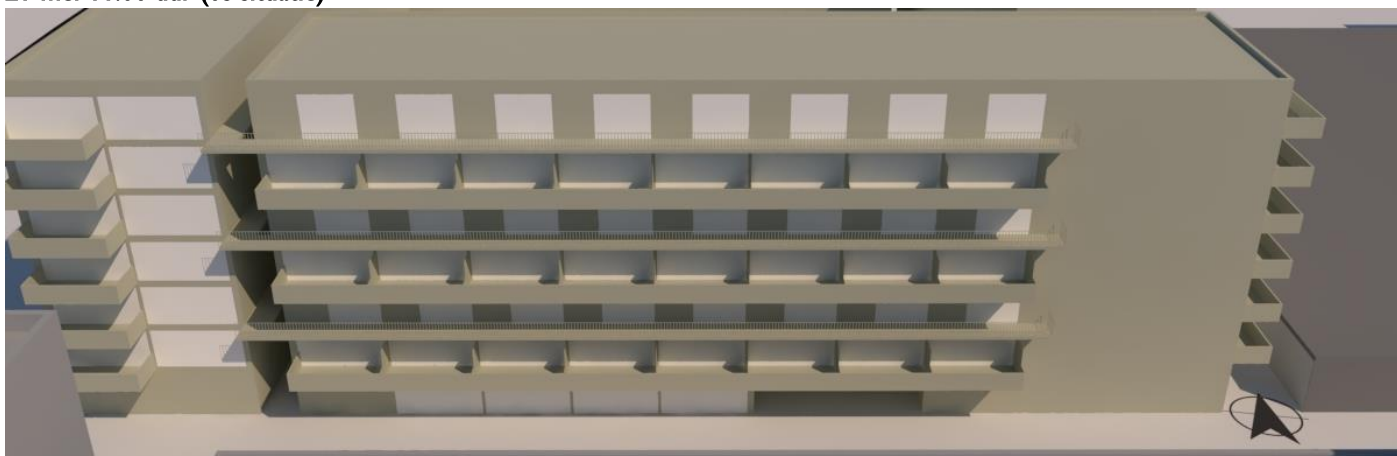
21-mei-10:00 uur (2s situatie)



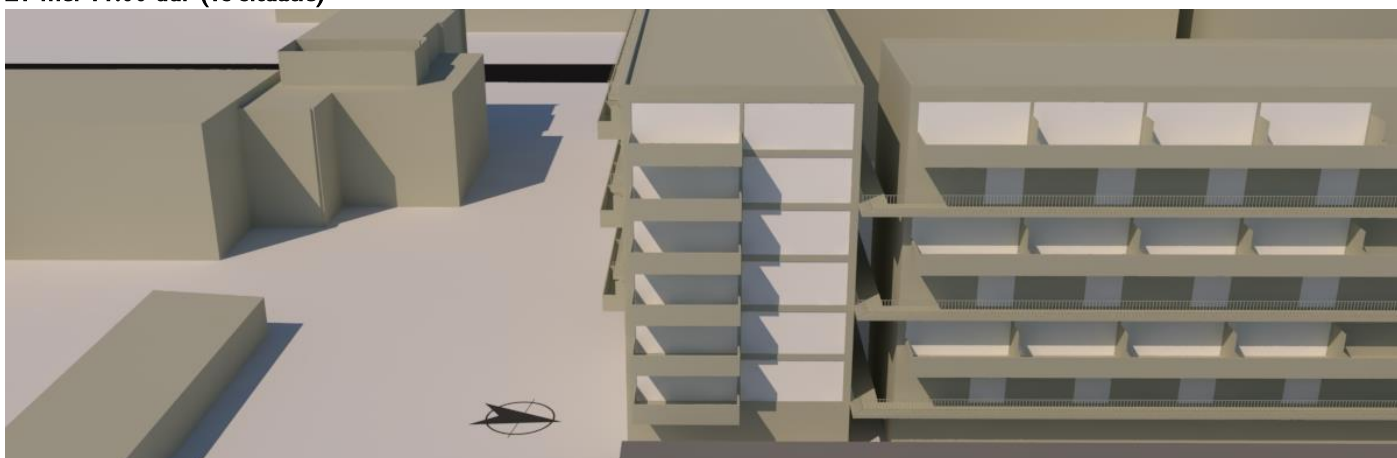
21-mei-10:00 uur (3s situatie)



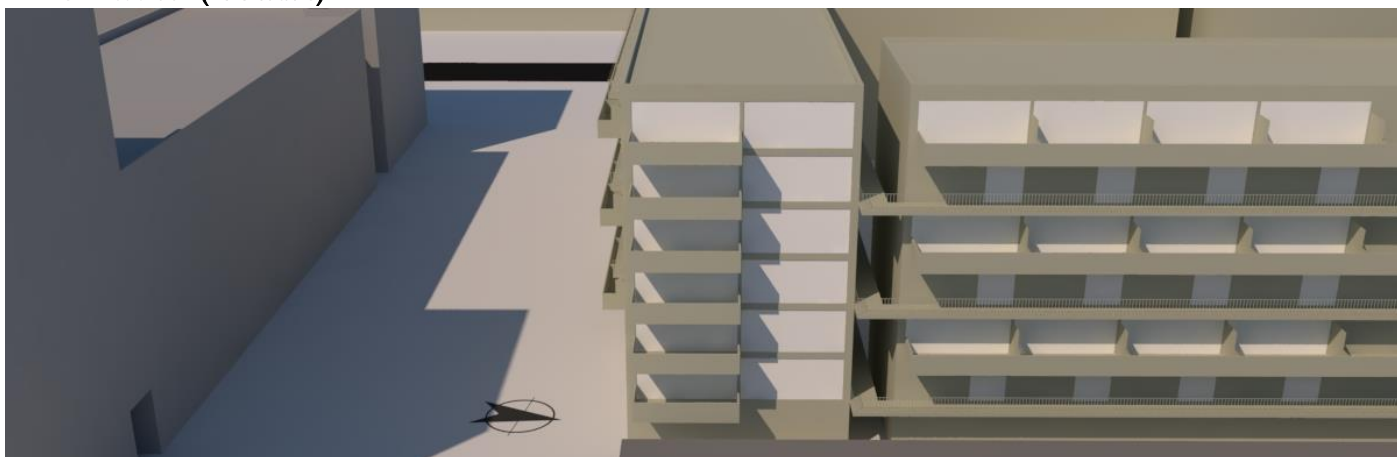
21-mei-11:00 uur (0s situatie)



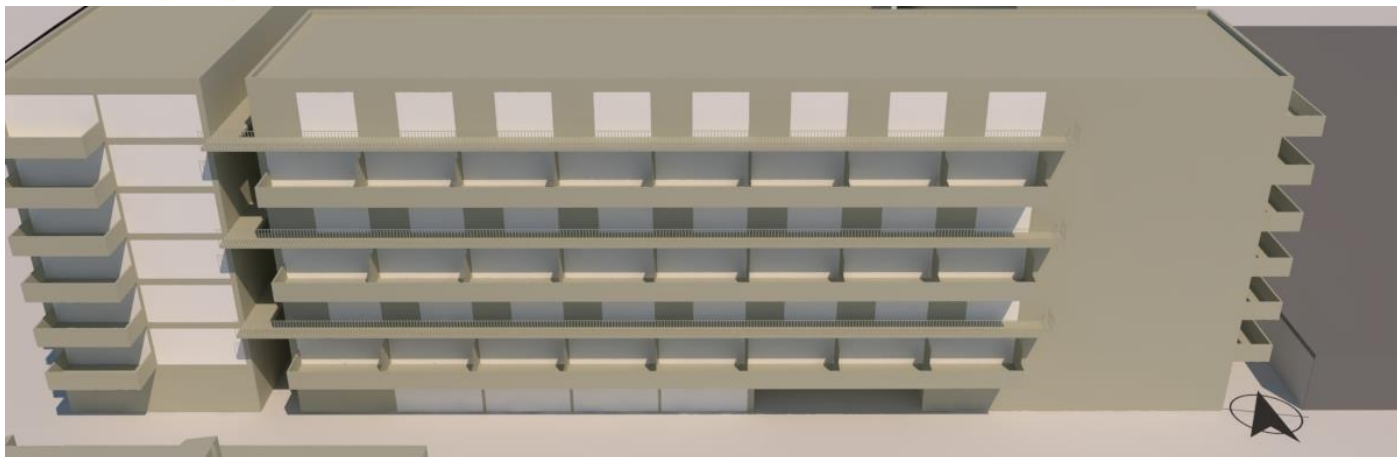
21-mei-11:00 uur (1s situatie)



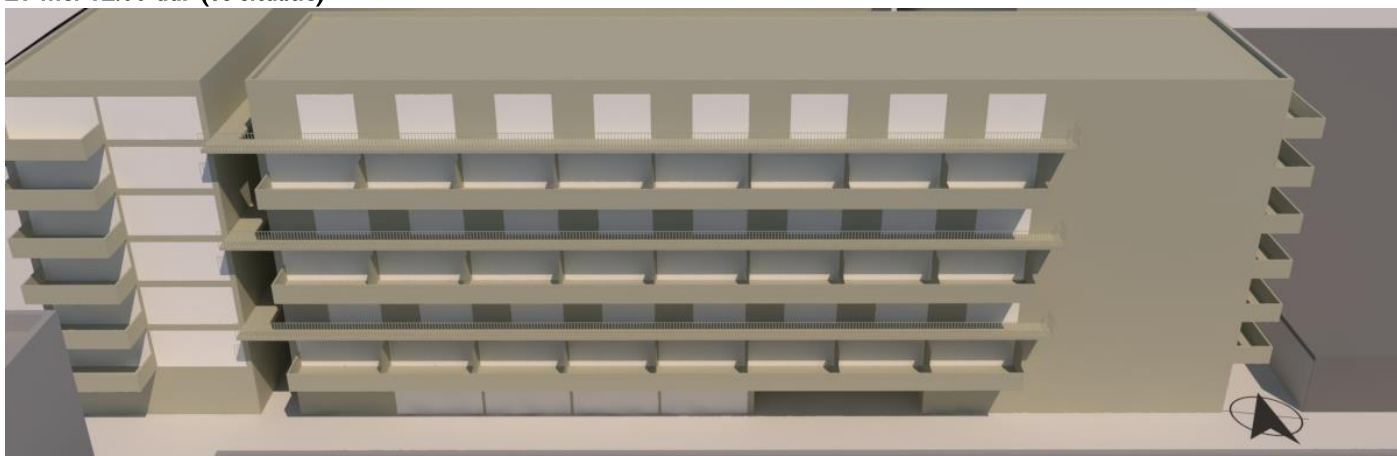
21-mei-11:00 uur (2s situatie)



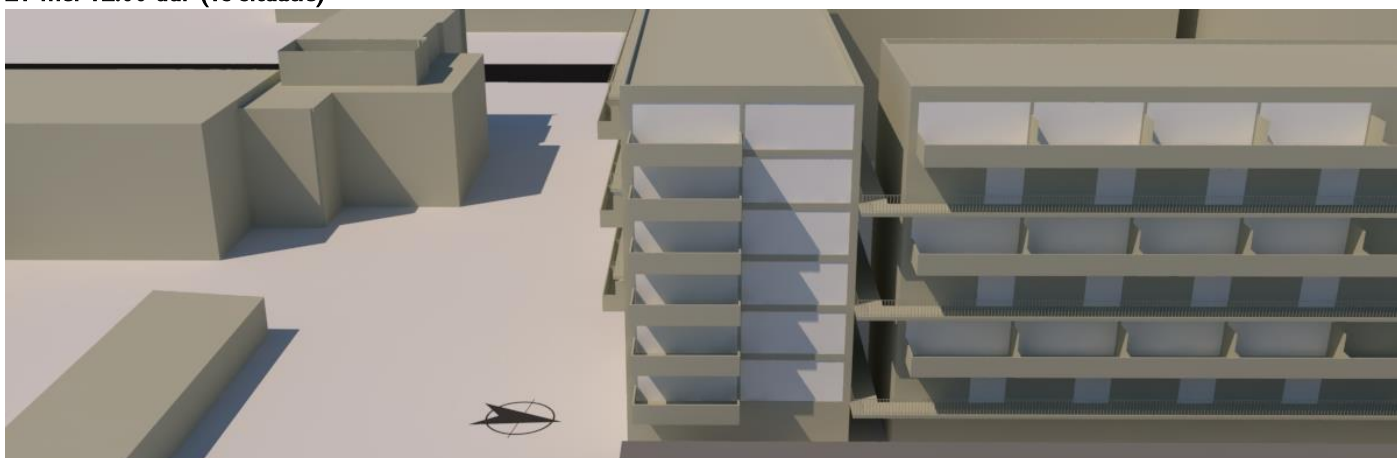
21-mei-11:00 uur (3s situatie)



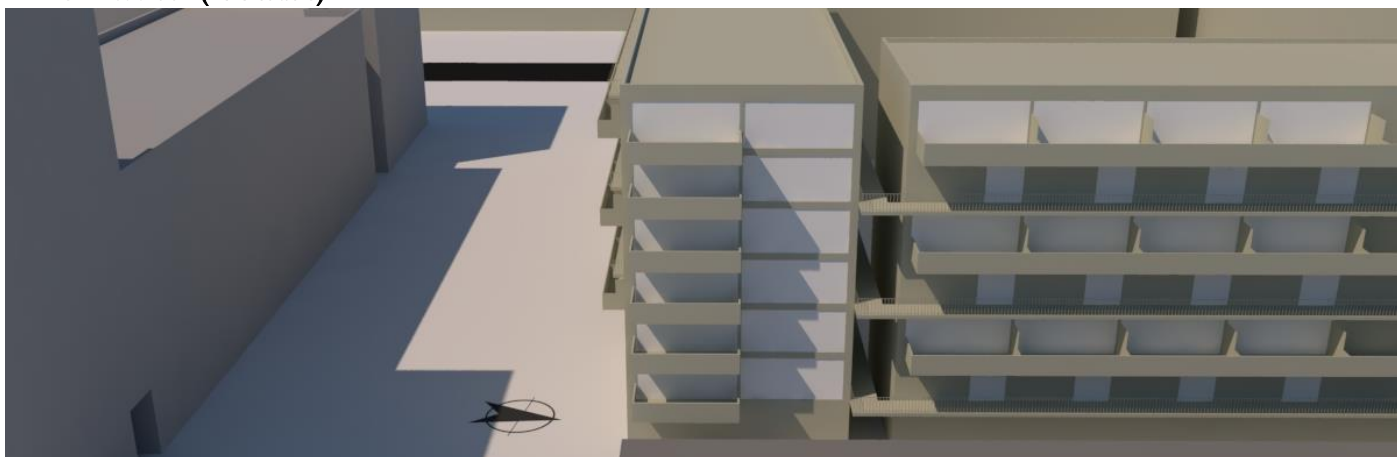
21-mei-12:00 uur (0s situatie)



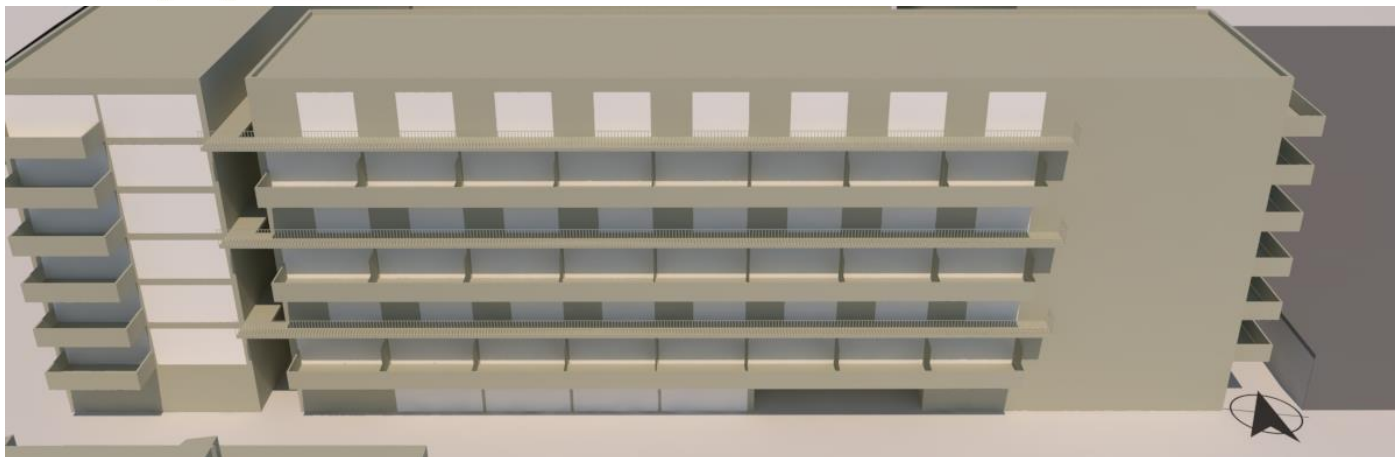
21-mei-12:00 uur (1s situatie)



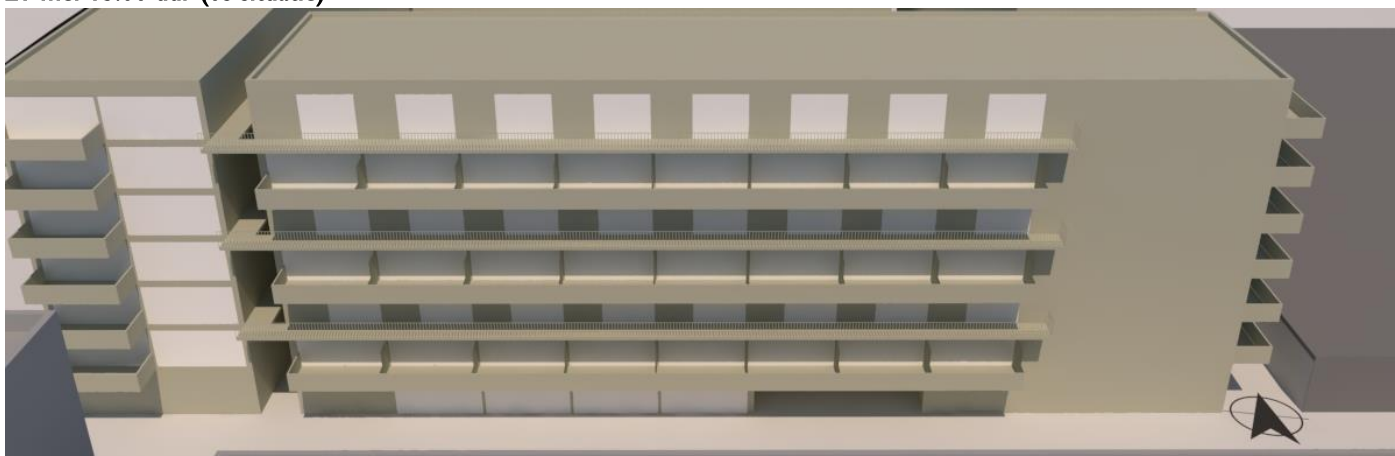
21-mei-12:00 uur (2s situatie)



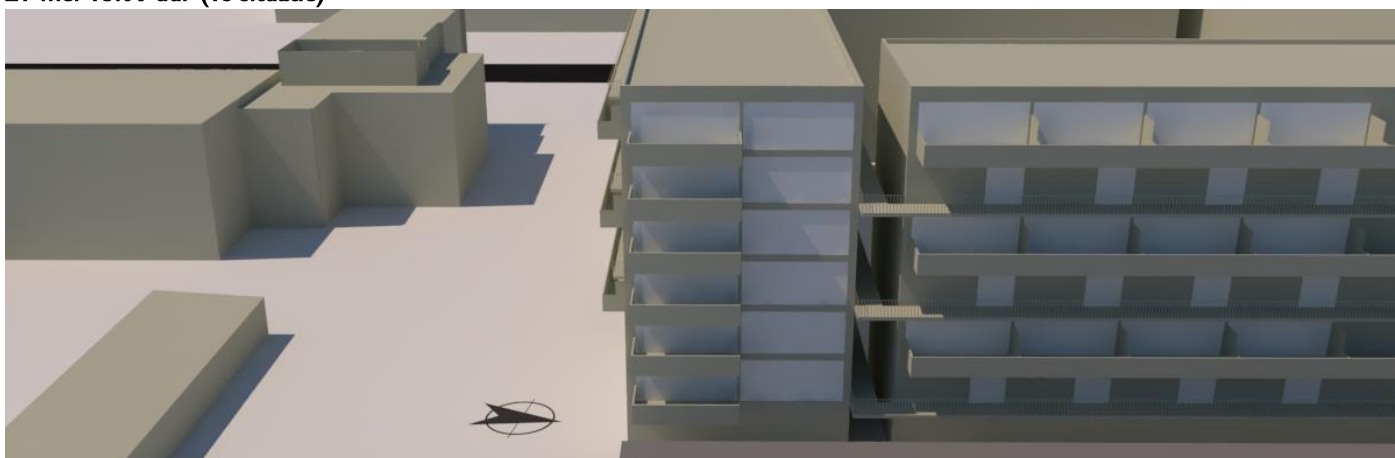
21-mei-12:00 uur (3s situatie)



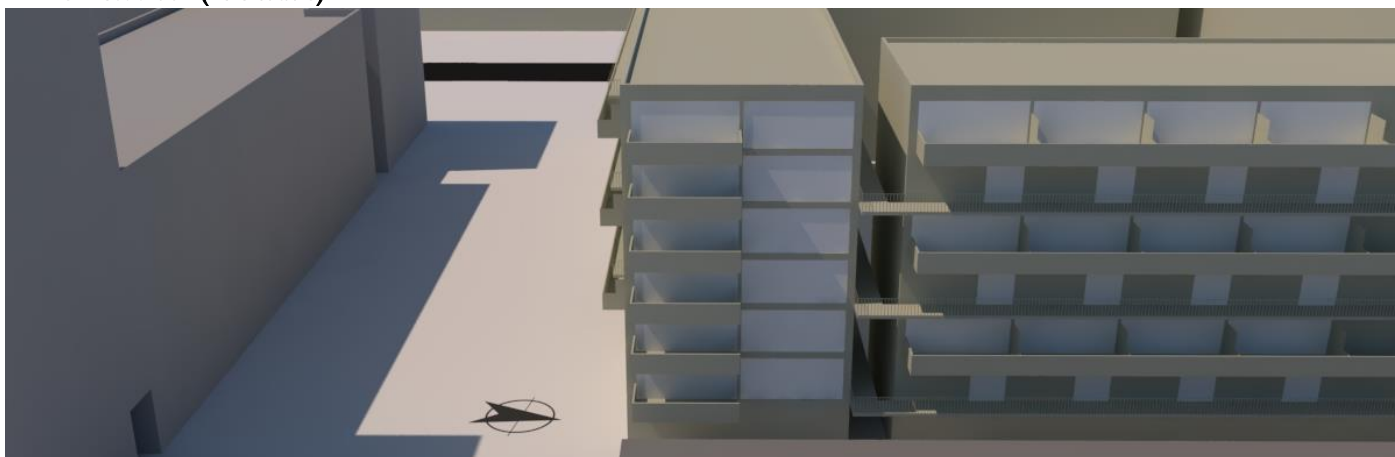
21-mei-13:00 uur (0s situatie)



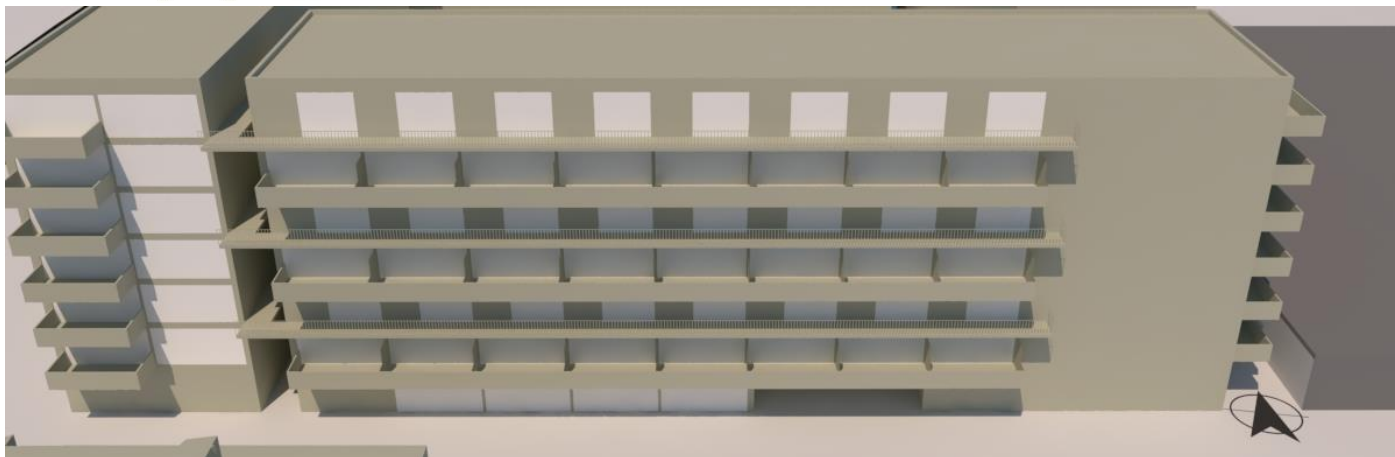
21-mei-13:00 uur (1s situatie)



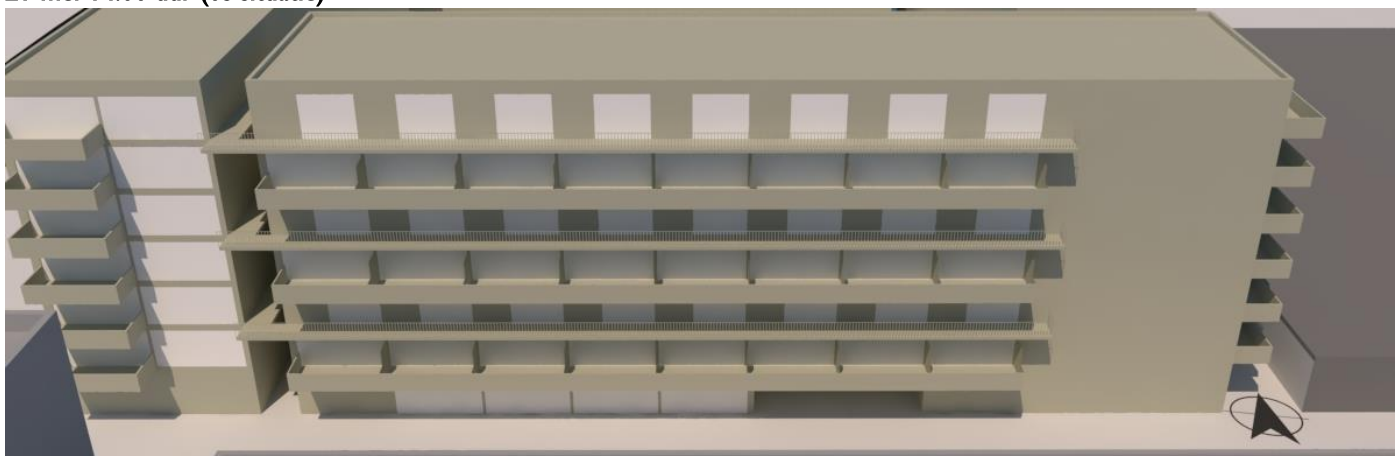
21-mei-13:00 uur (2s situatie)



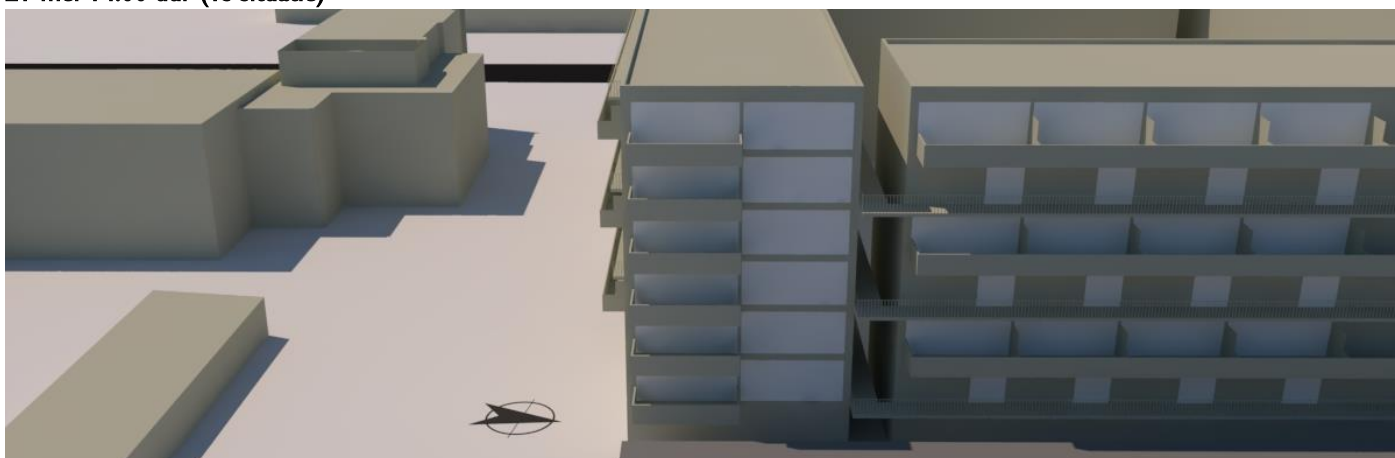
21-mei-13:00 uur (3s situatie)



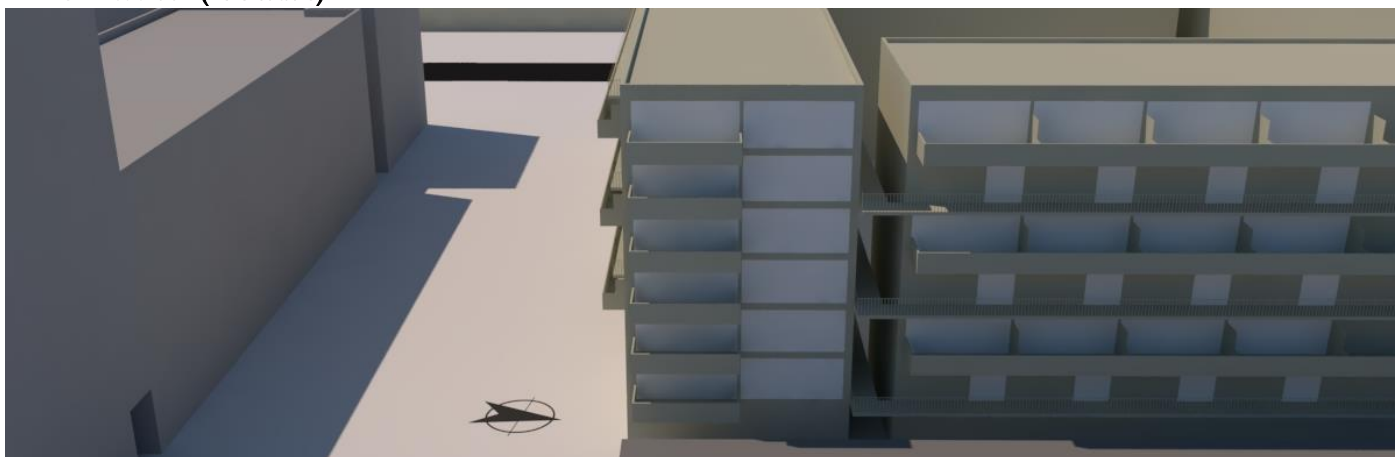
21-mei-14:00 uur (0s situatie)



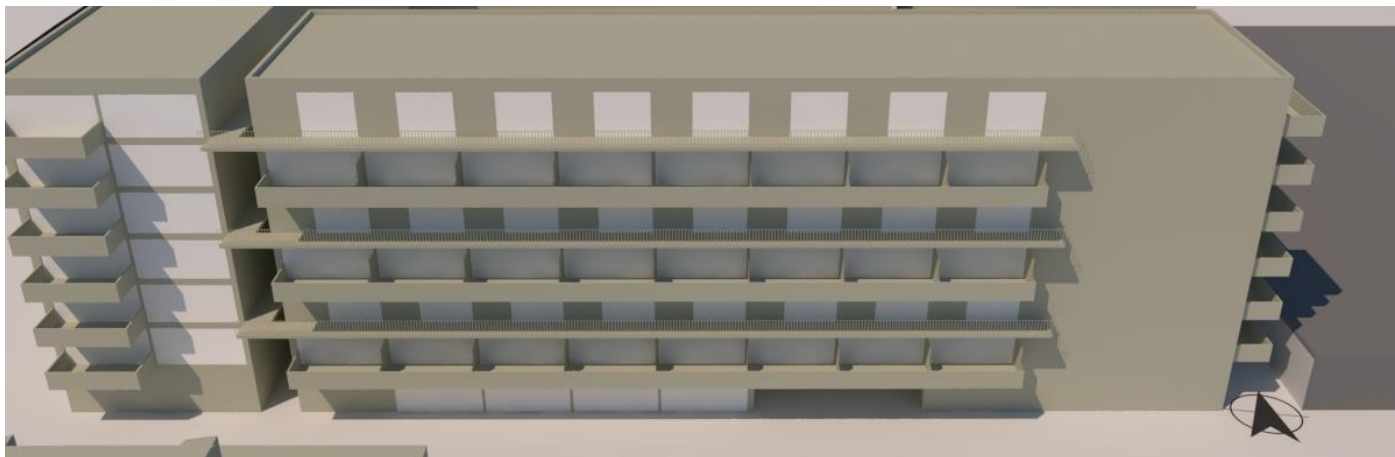
21-mei-14:00 uur (1s situatie)



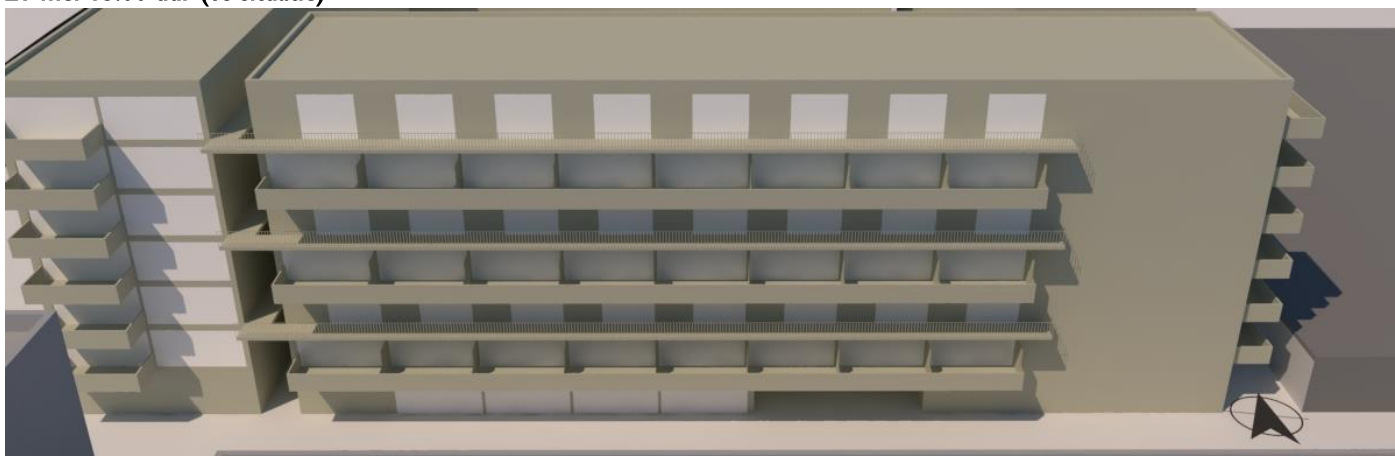
21-mei-14:00 uur (2s situatie)



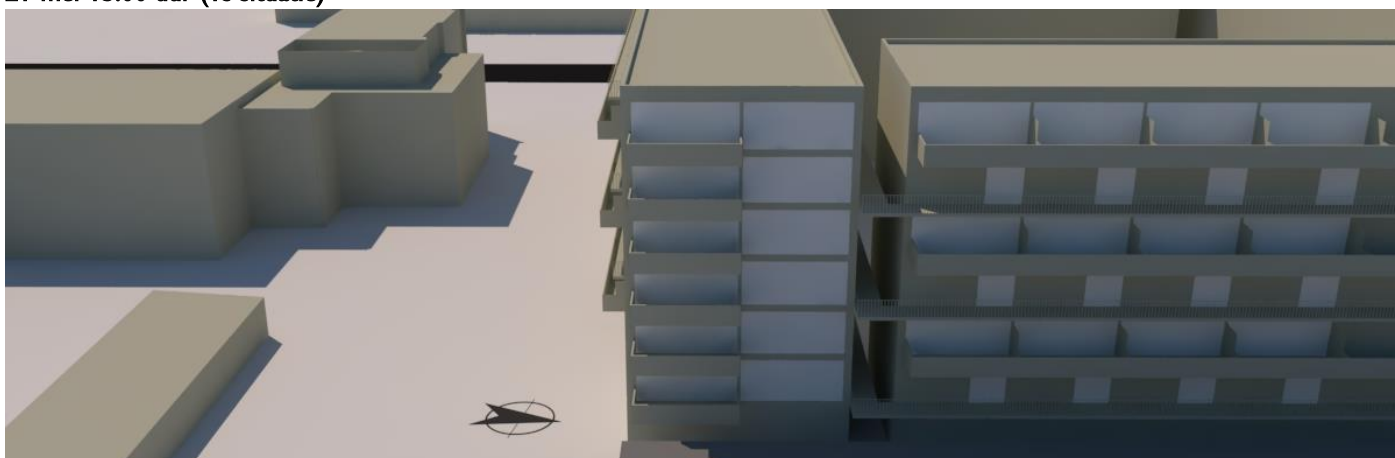
21-mei-14:00 uur (3s situatie)



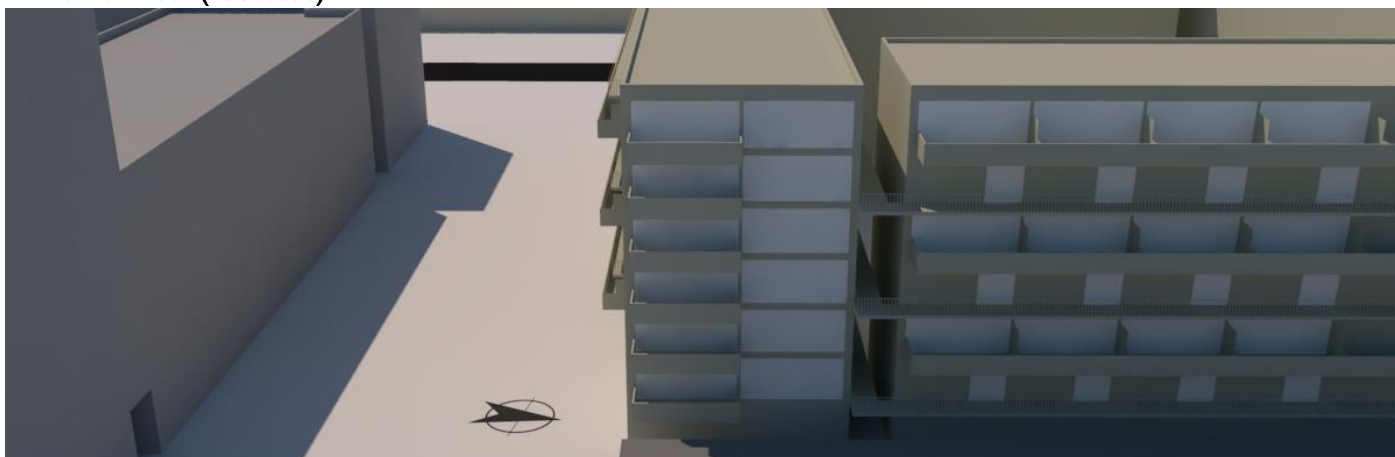
21-mei-15:00 uur (0s situatie)



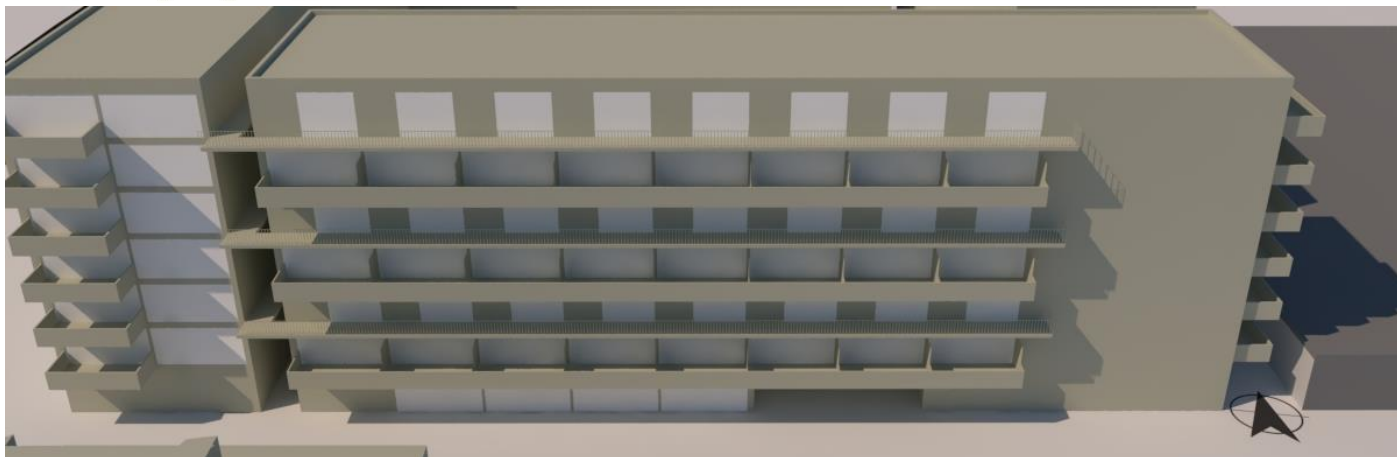
21-mei-15:00 uur (1s situatie)



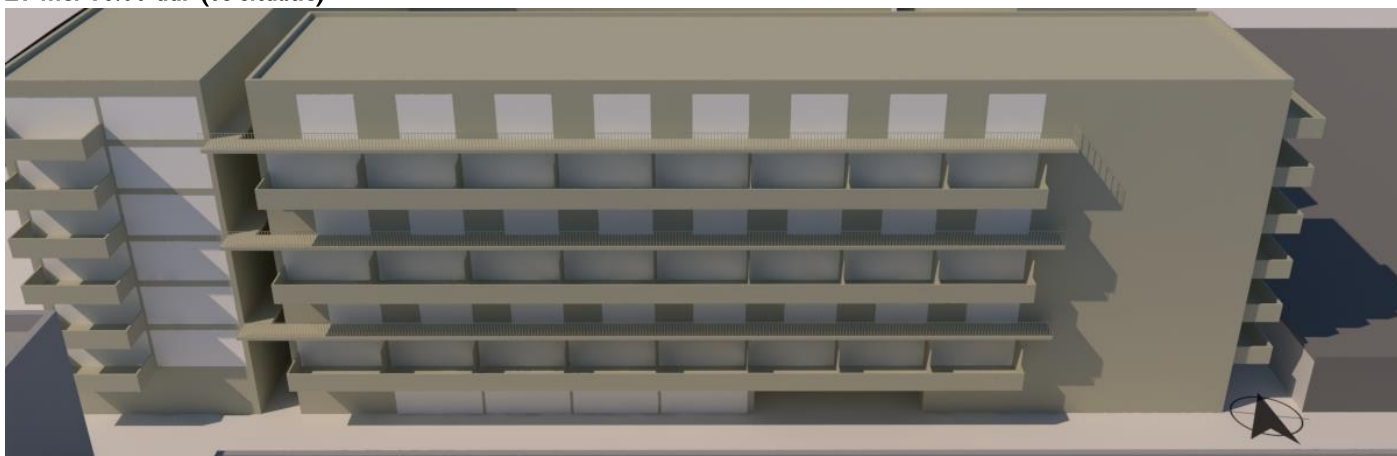
21-mei-15:00 uur (2s situatie)



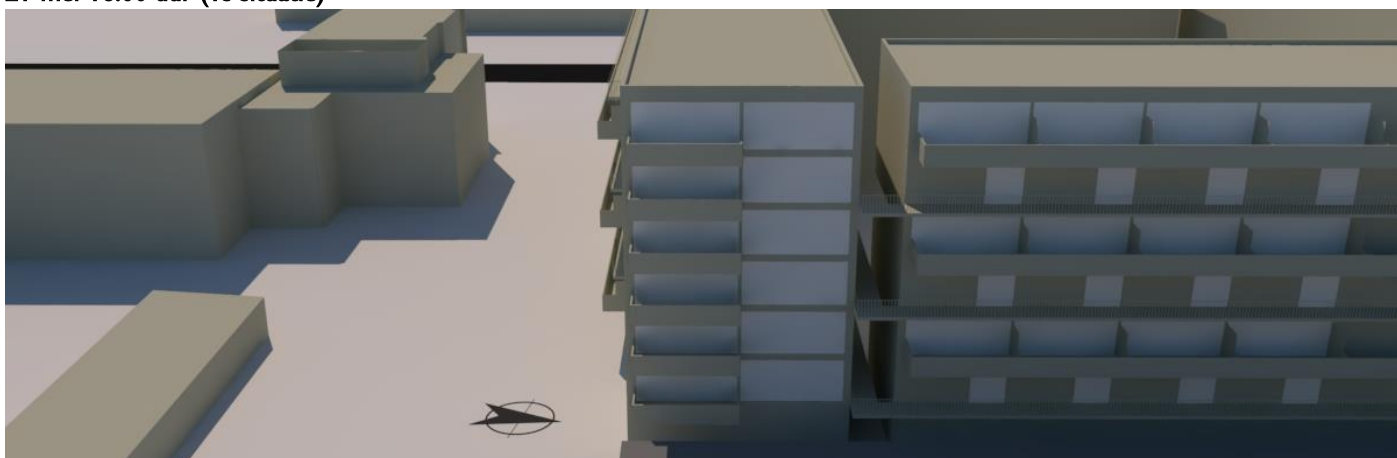
21-mei-15:00 uur (3s situatie)



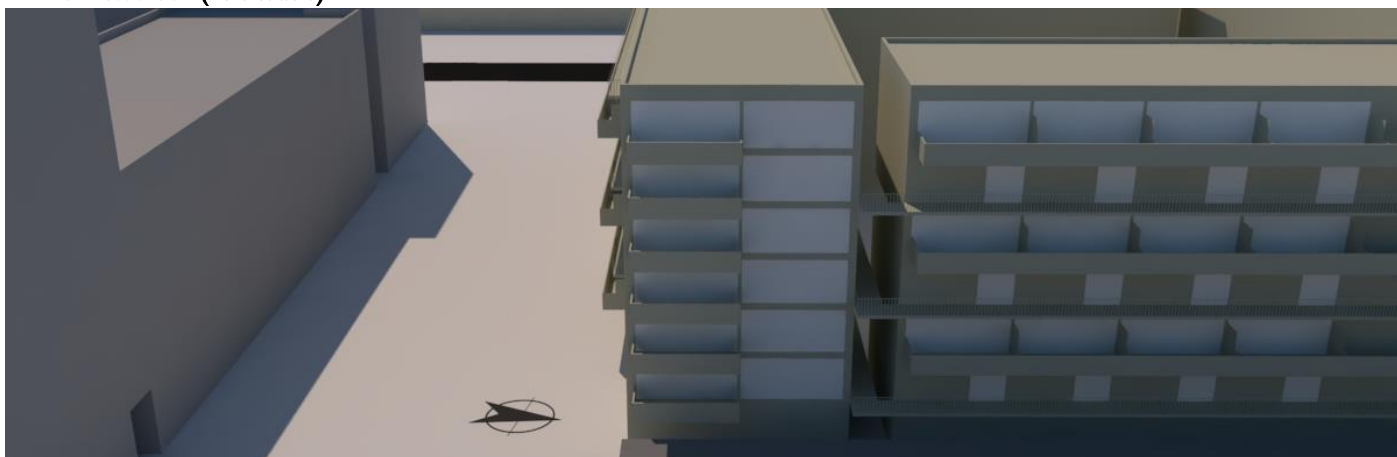
21-mei-16:00 uur (0s situatie)



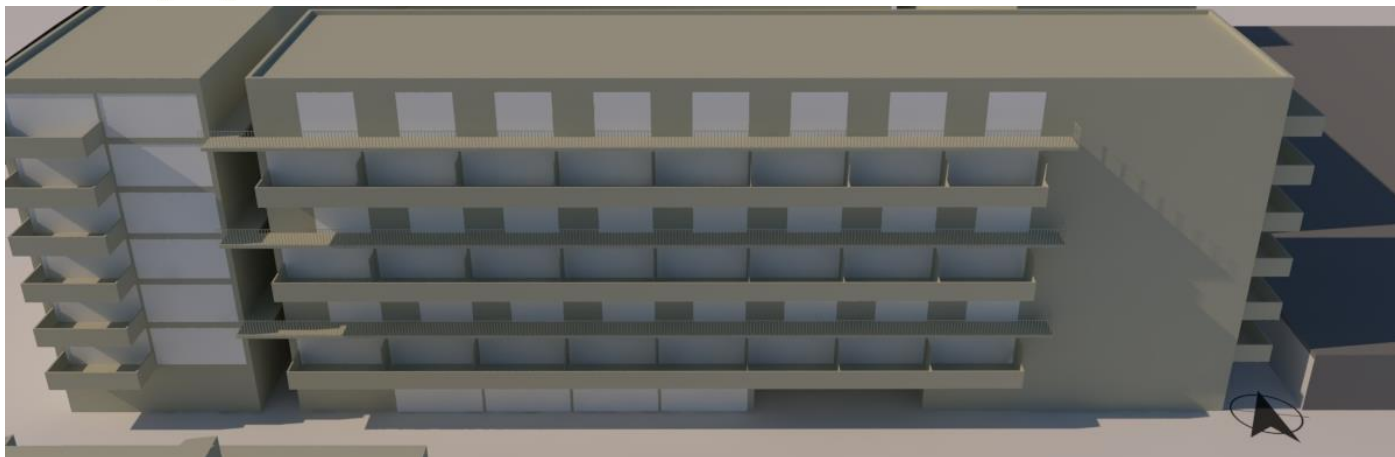
21-mei-16:00 uur (1s situatie)



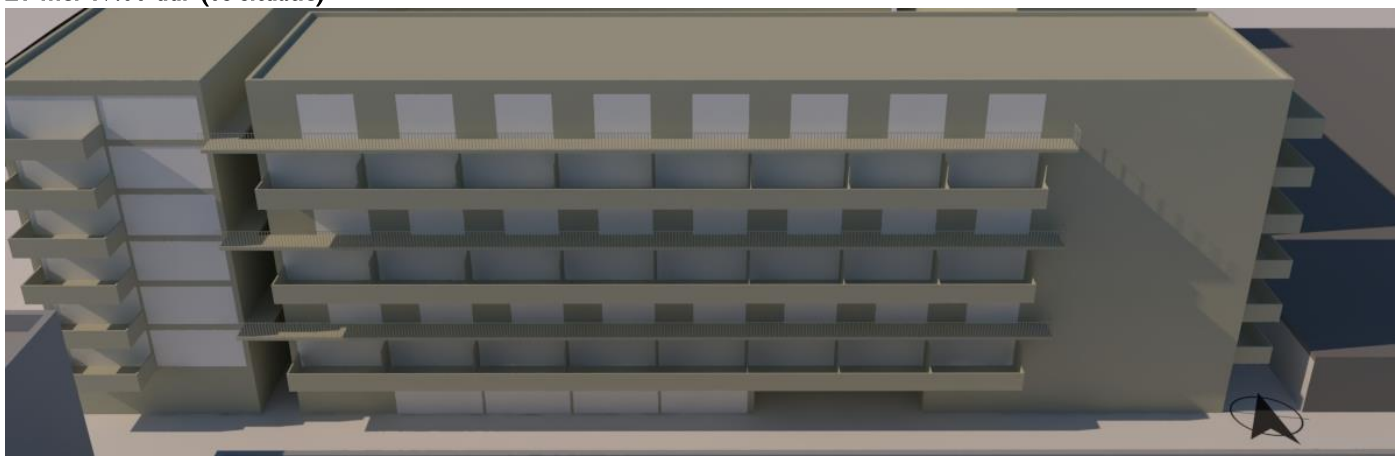
21-mei-16:00 uur (2s situatie)



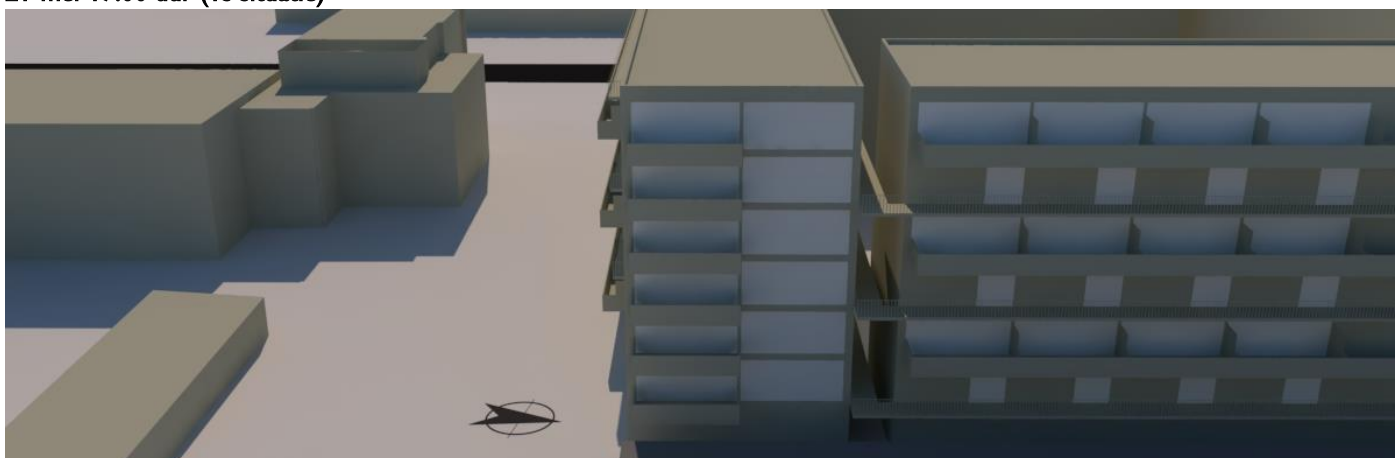
21-mei-16:00 uur (3s situatie)



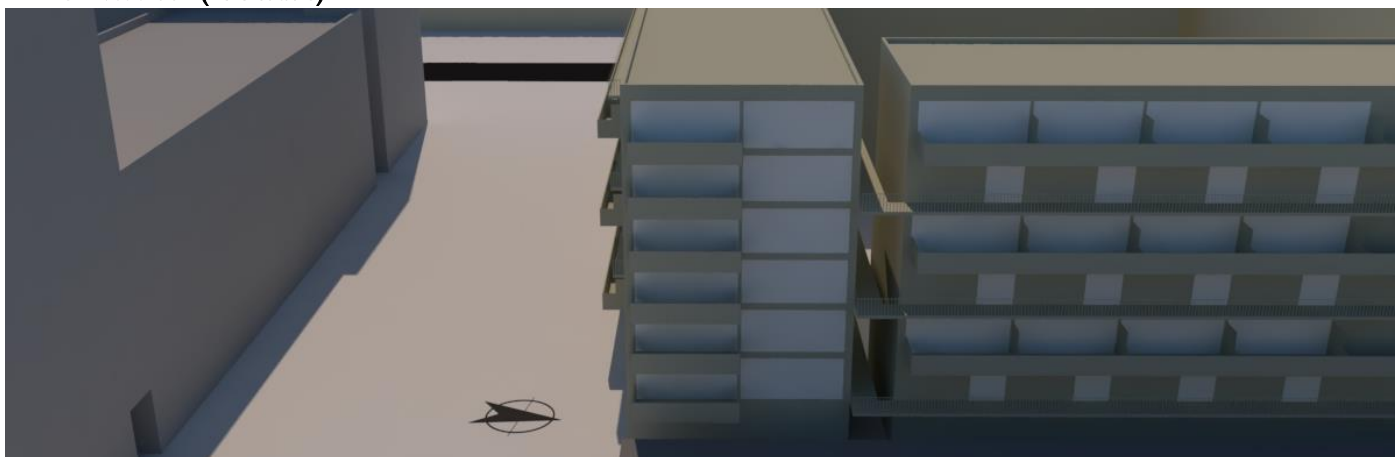
21-mei-17:00 uur (0s situatie)



21-mei-17:00 uur (1s situatie)



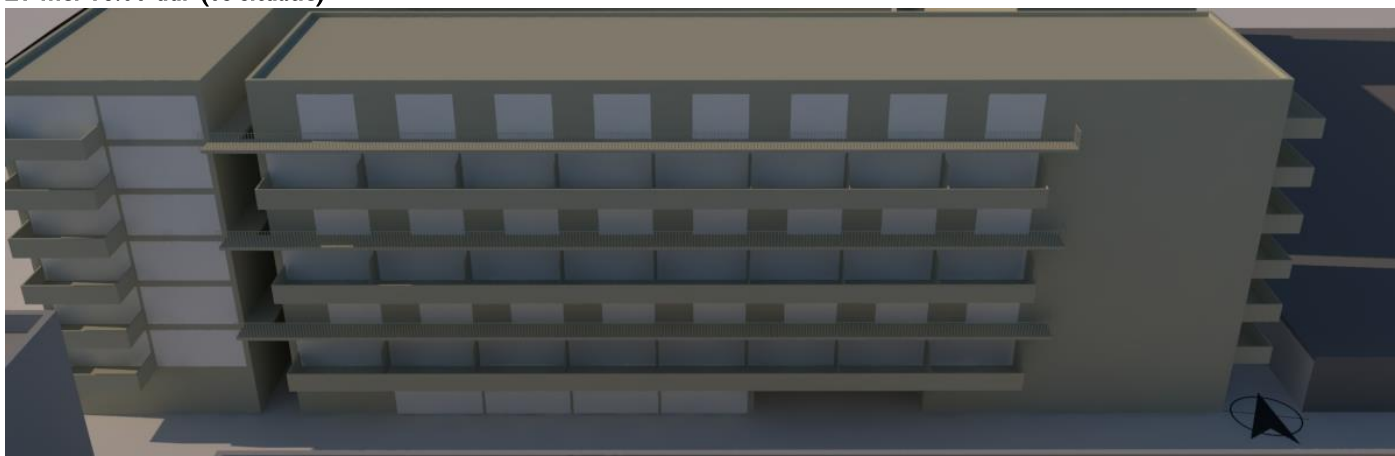
21-mei-17:00 uur (2s situatie)



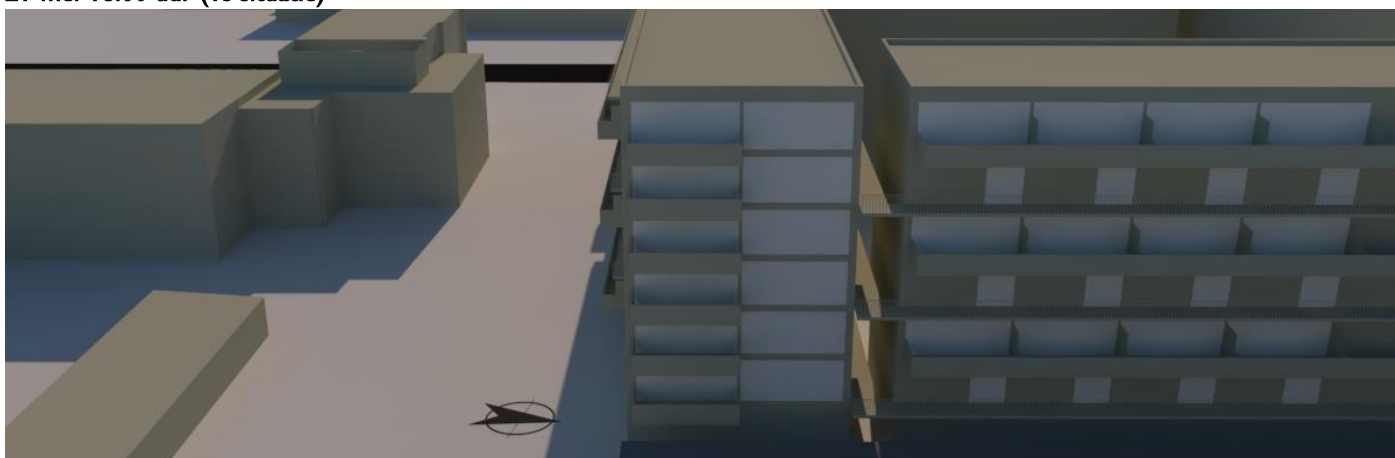
21-mei-17:00 uur (3s situatie)



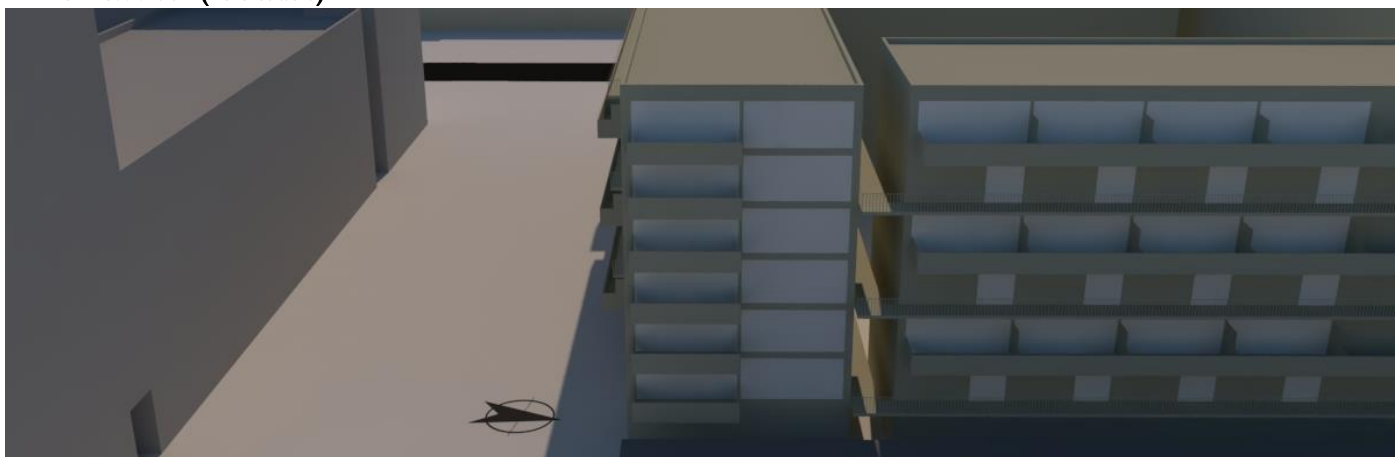
21-mei-18:00 uur (0s situatie)



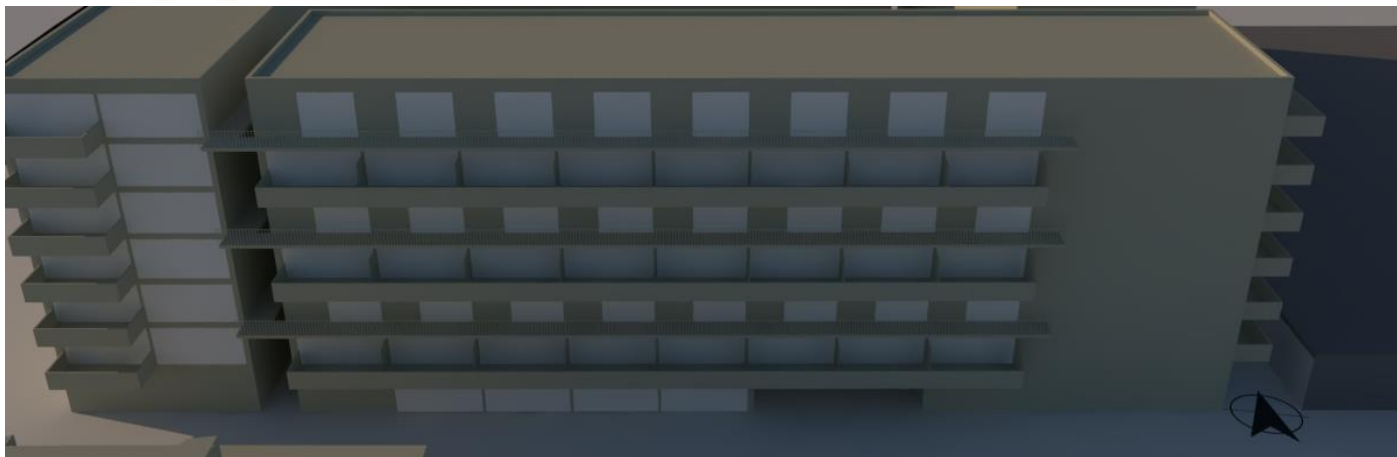
21-mei-18:00 uur (1s situatie)



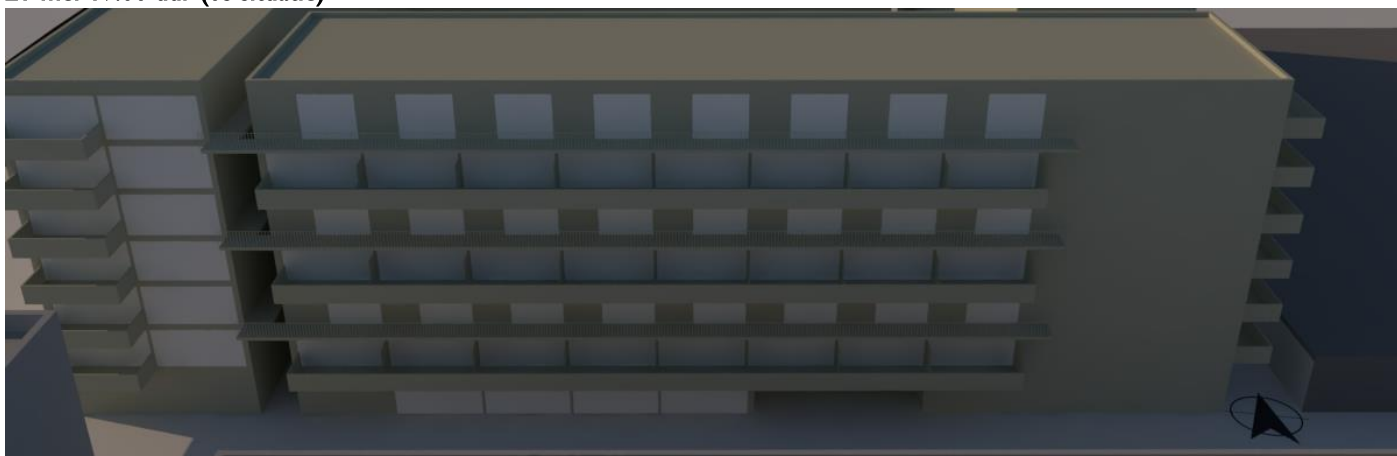
21-mei-18:00 uur (2s situatie)



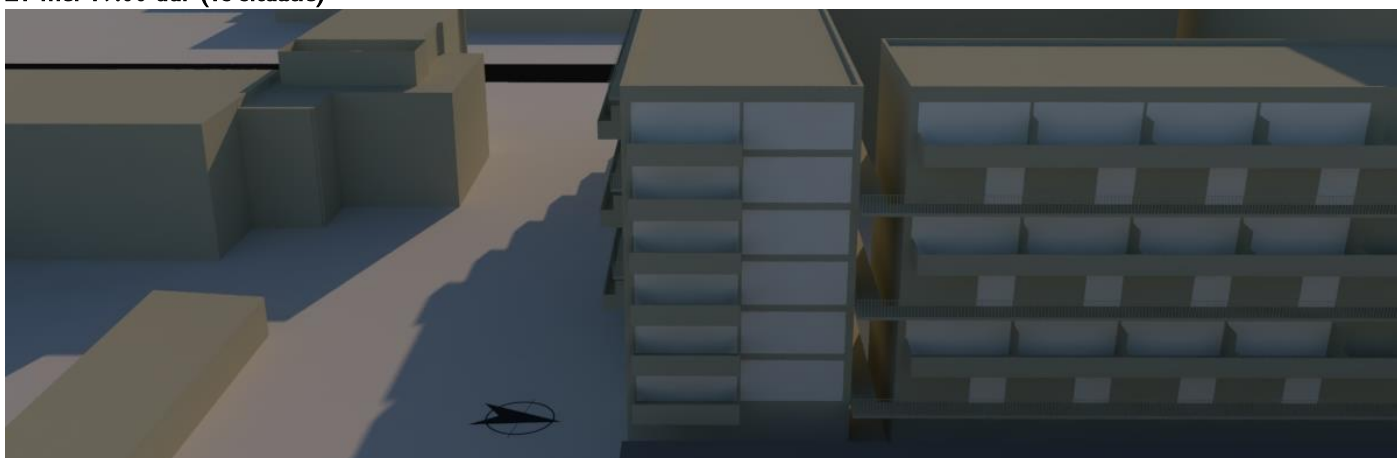
21-mei-18:00 uur (3s situatie)



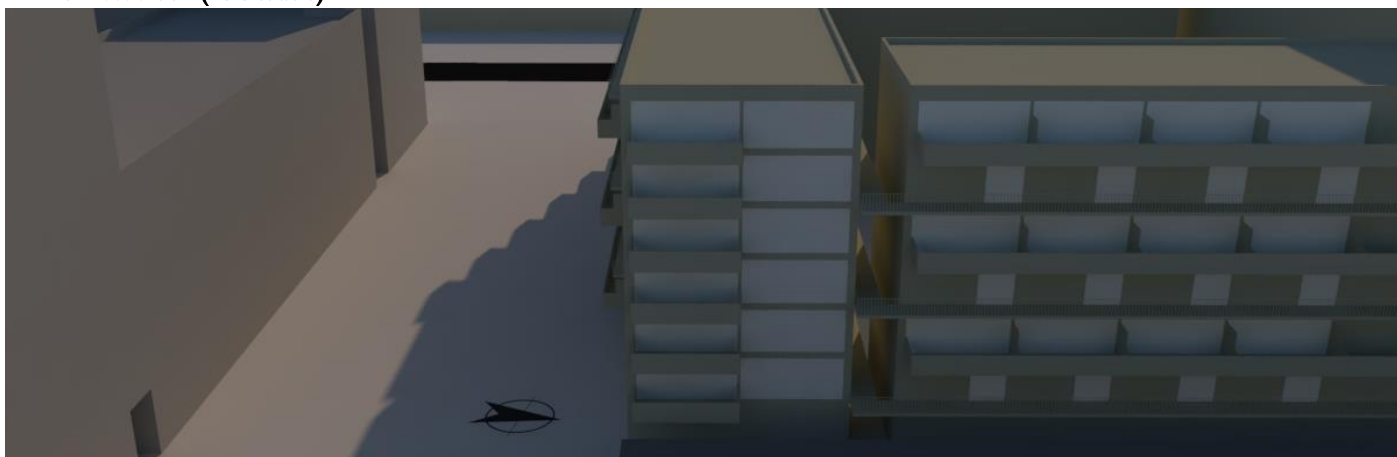
21-mei-19:00 uur (0s situatie)



21-mei-19:00 uur (1s situatie)



21-mei-19:00 uur (2s situatie)



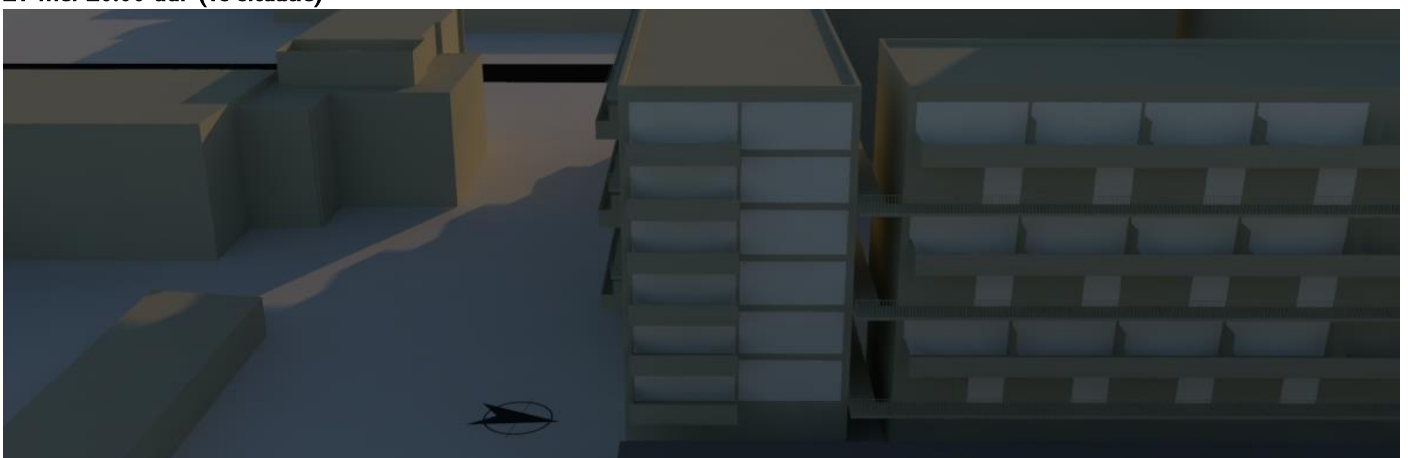
21-mei-19:00 uur (3s situatie)



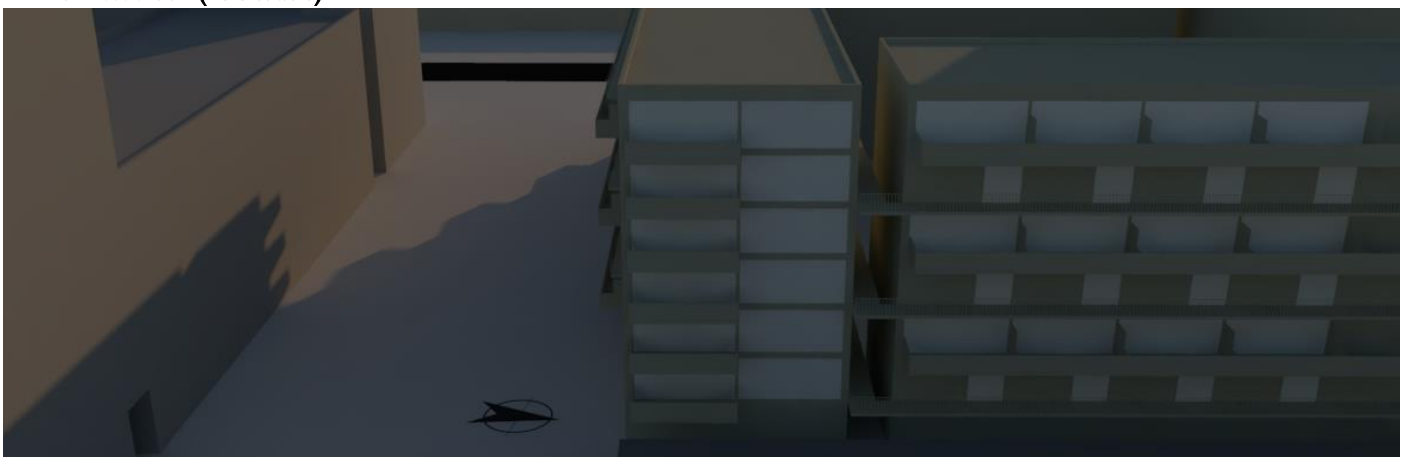
21-mei-20:00 uur (0s situatie)



21-mei-20:00 uur (1s situatie)



21-mei-20:00 uur (2s situatie)



21-mei-20:00 uur (3s situatie)



21-mei-21:00 uur (0s situatie)



21-mei-21:00 uur (1s situatie)



21-mei-21:00 uur (2s situatie)



21-mei-21:00 uur (3s situatie)



21-jun-6:00 uur (0s situatie)



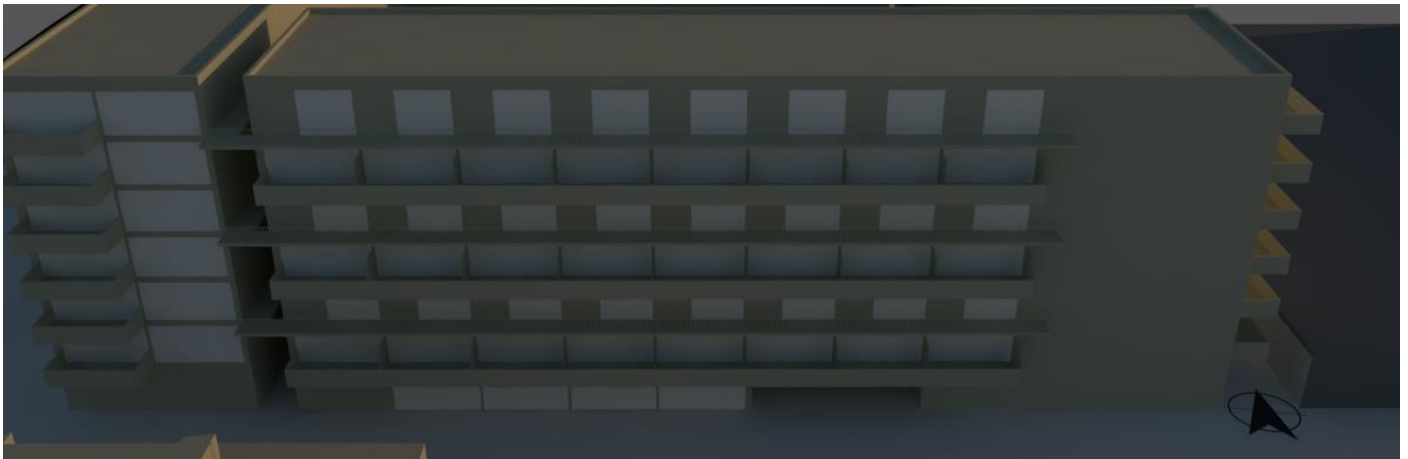
21-jun-6:00 uur (1s situatie)



21-jun-6:00 uur (2s situatie)



21-jun-6:00 uur (3s situatie)



21-jun-7:00 uur (0s situatie)



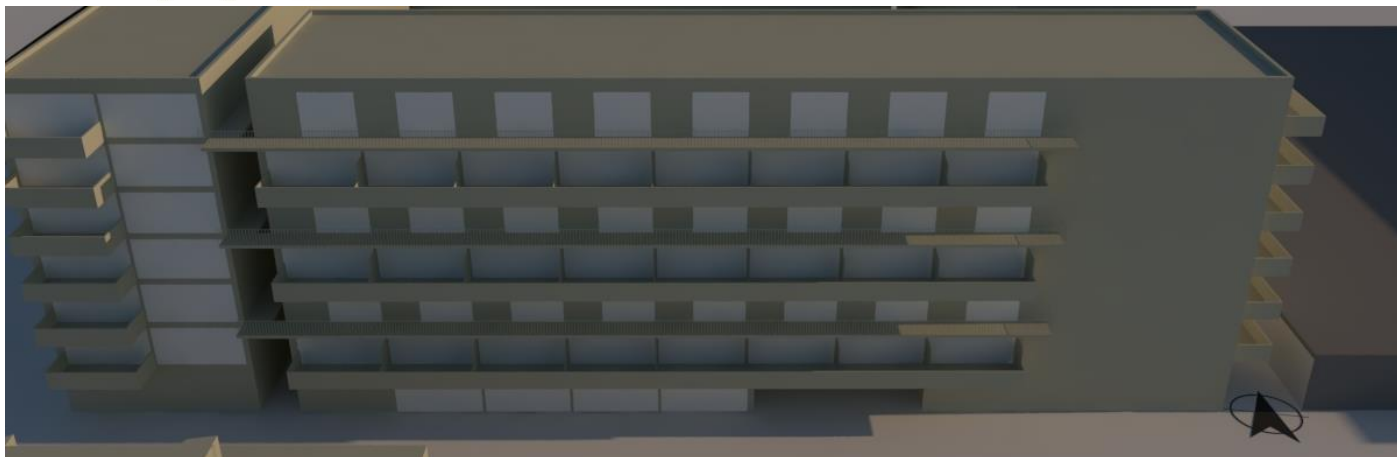
21-jun-7:00 uur (1s situatie)



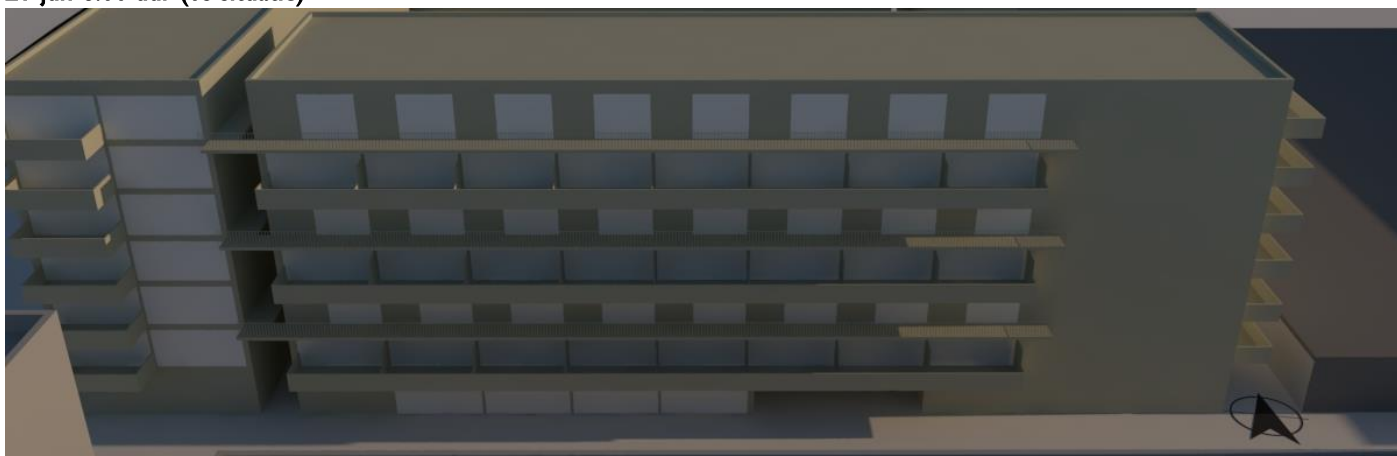
21-jun-7:00 uur (2s situatie)



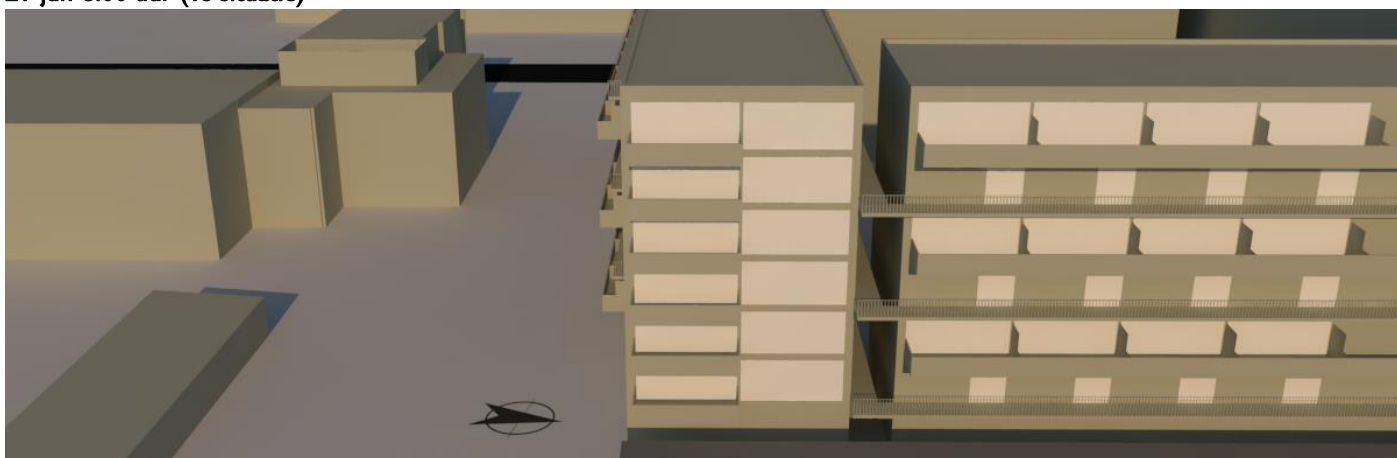
21-jun-7:00 uur (3s situatie)



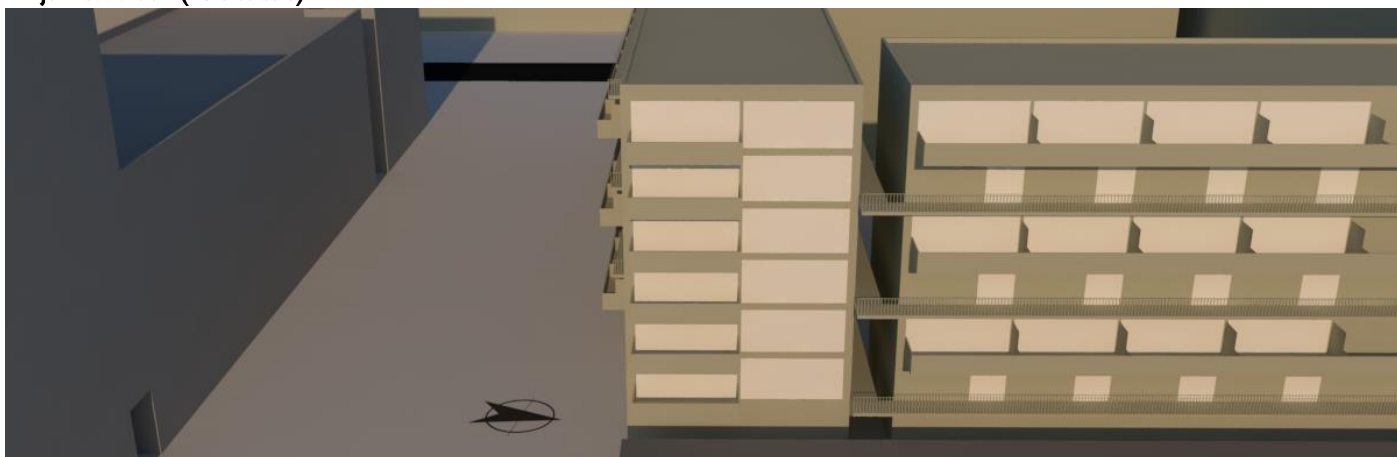
21-jun-8:00 uur (0s situatie)



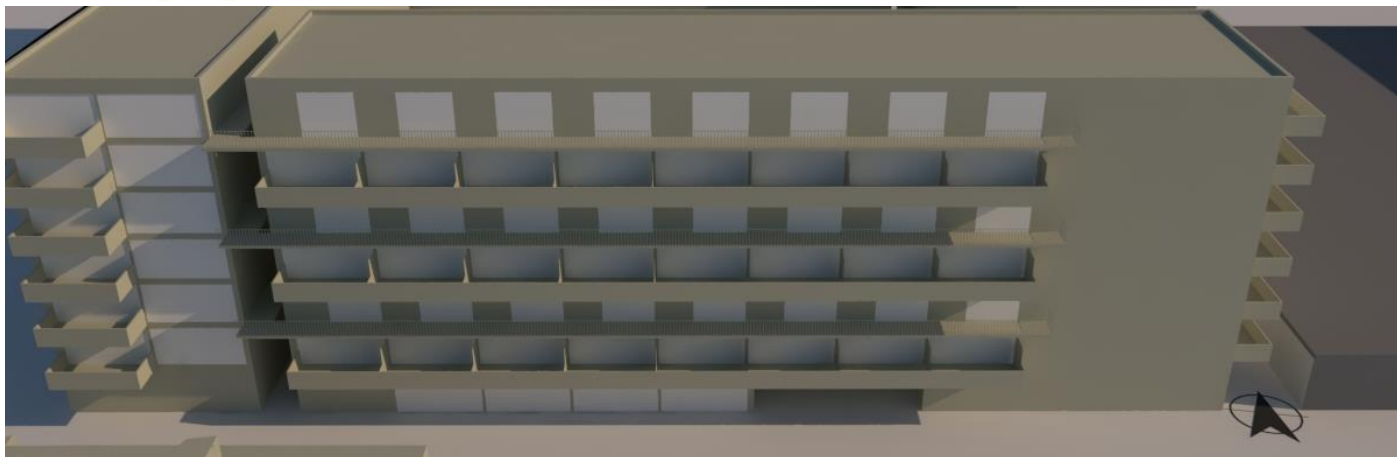
21-jun-8:00 uur (1s situatie)



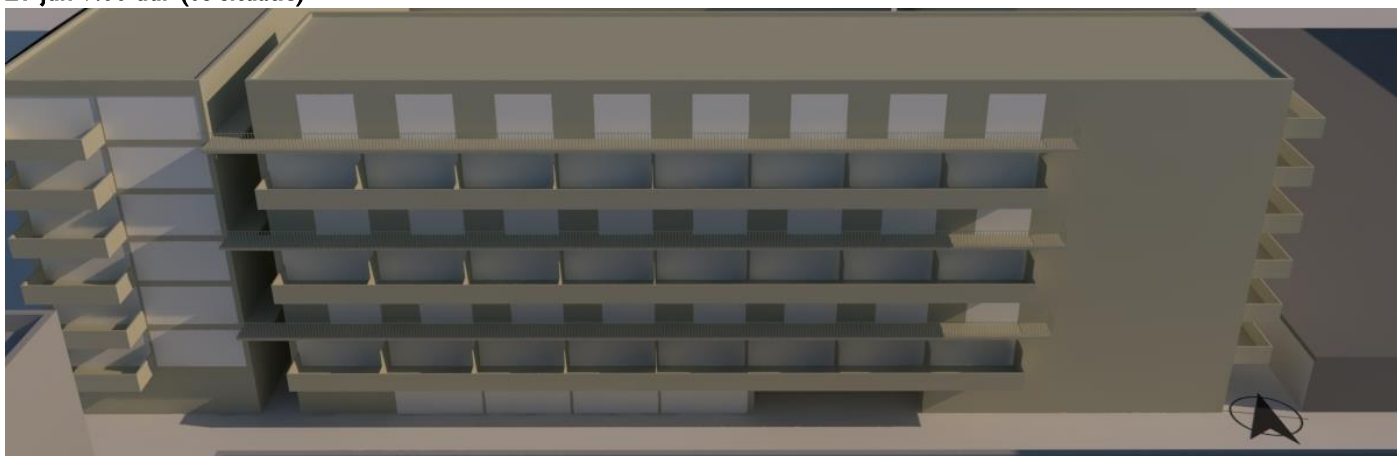
21-jun-8:00 uur (2s situatie)



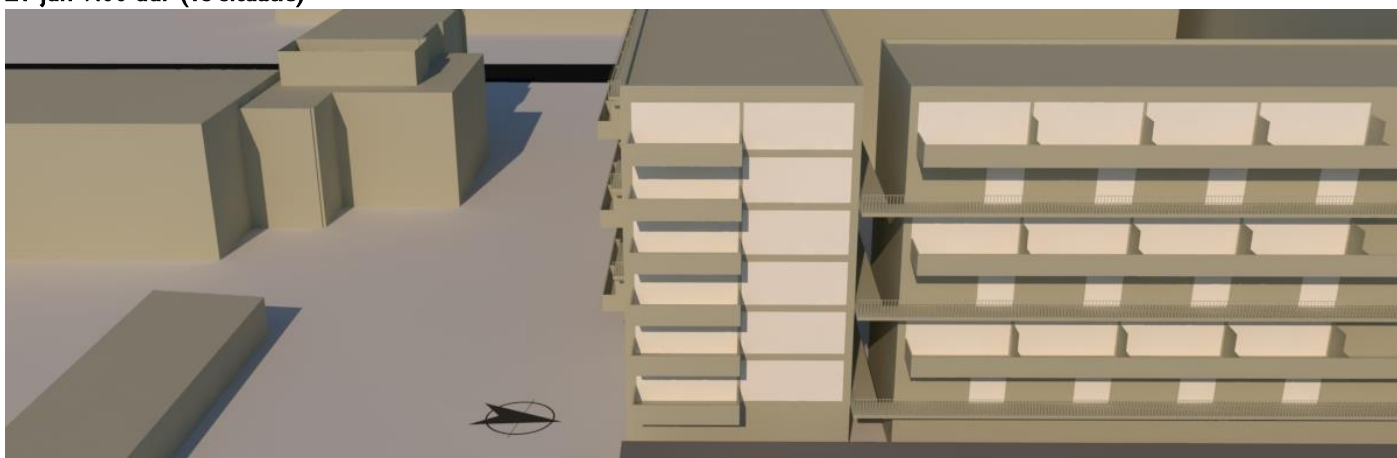
21-jun-8:00 uur (3s situatie)



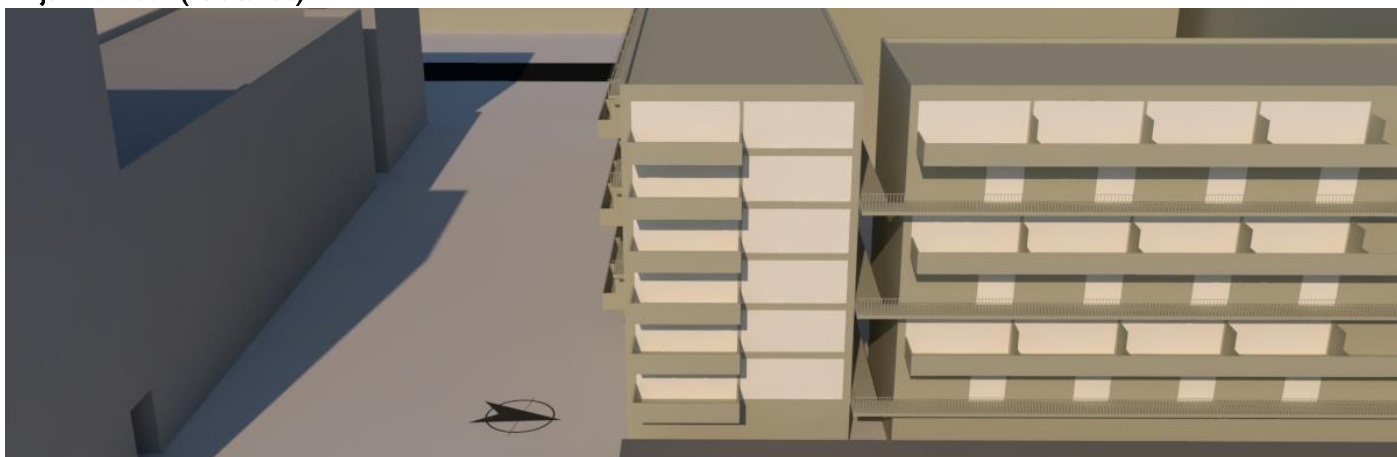
21-jun-9:00 uur (0s situatie)



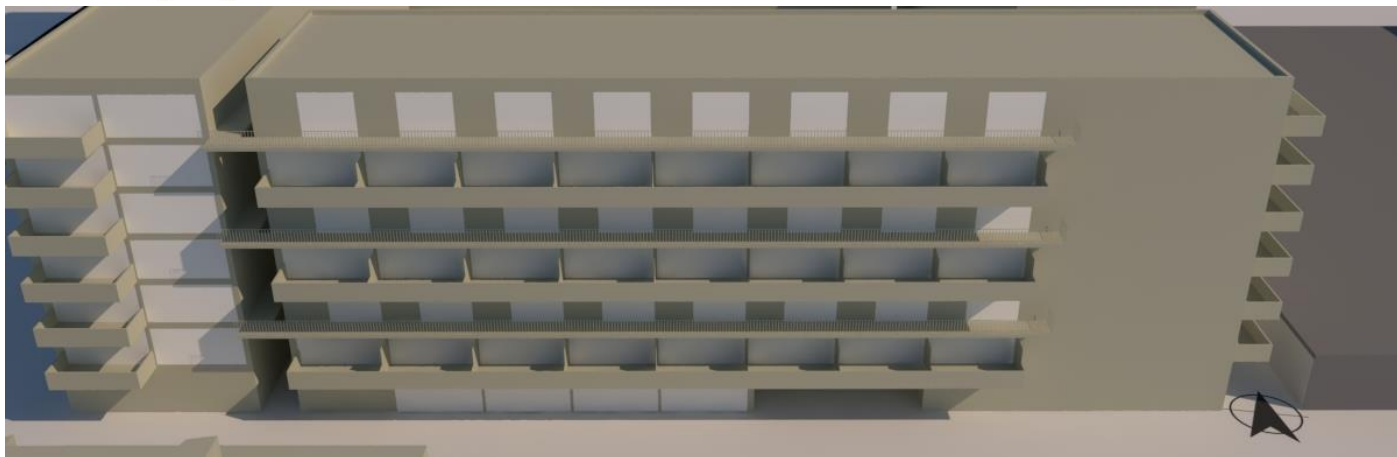
21-jun-9:00 uur (1s situatie)



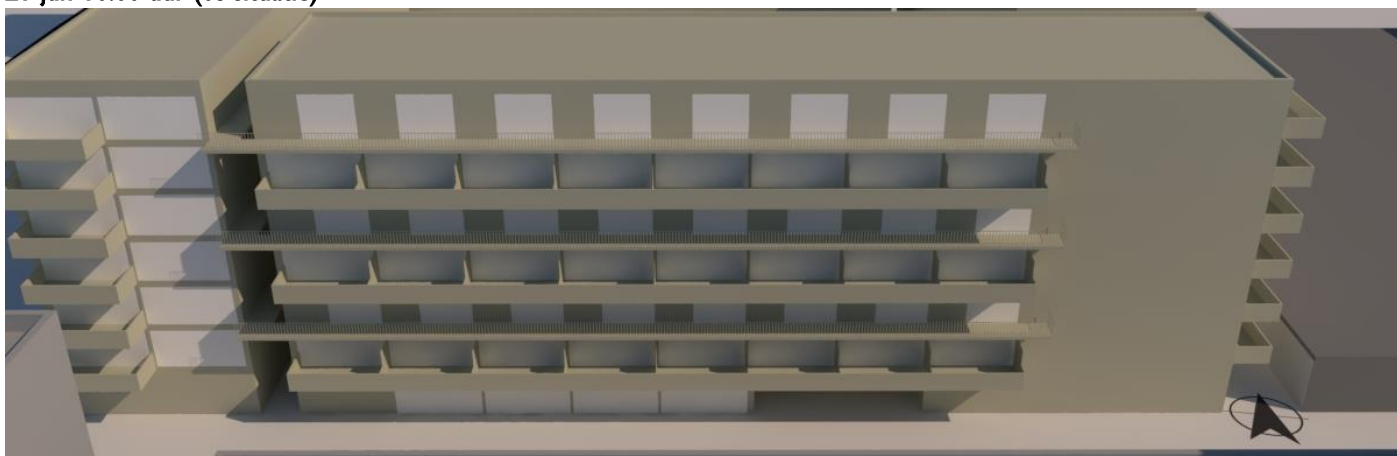
21-jun-9:00 uur (2s situatie)



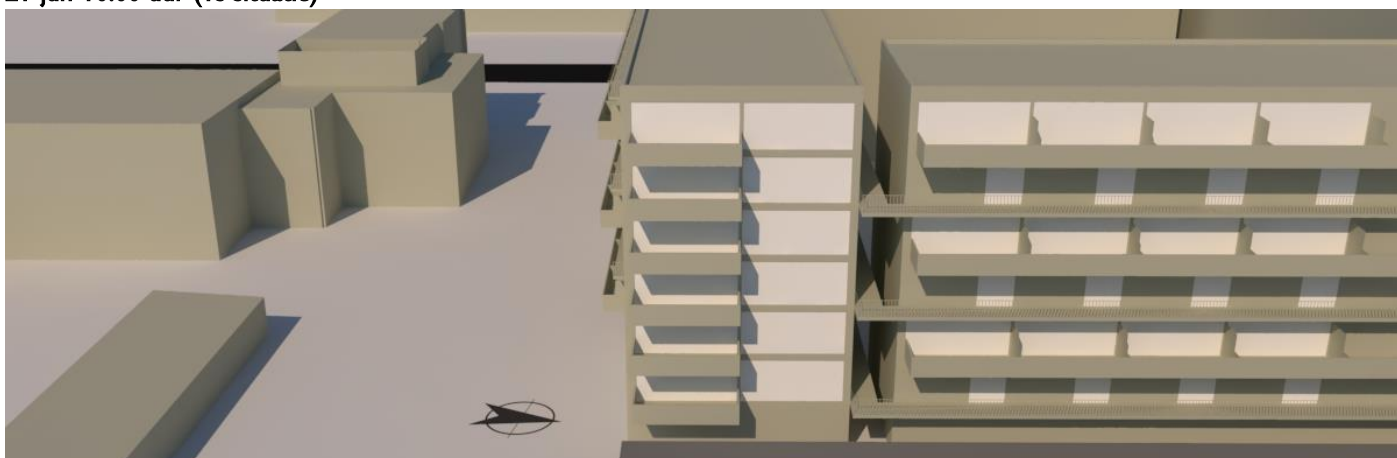
21-jun-9:00 uur (3s situatie)



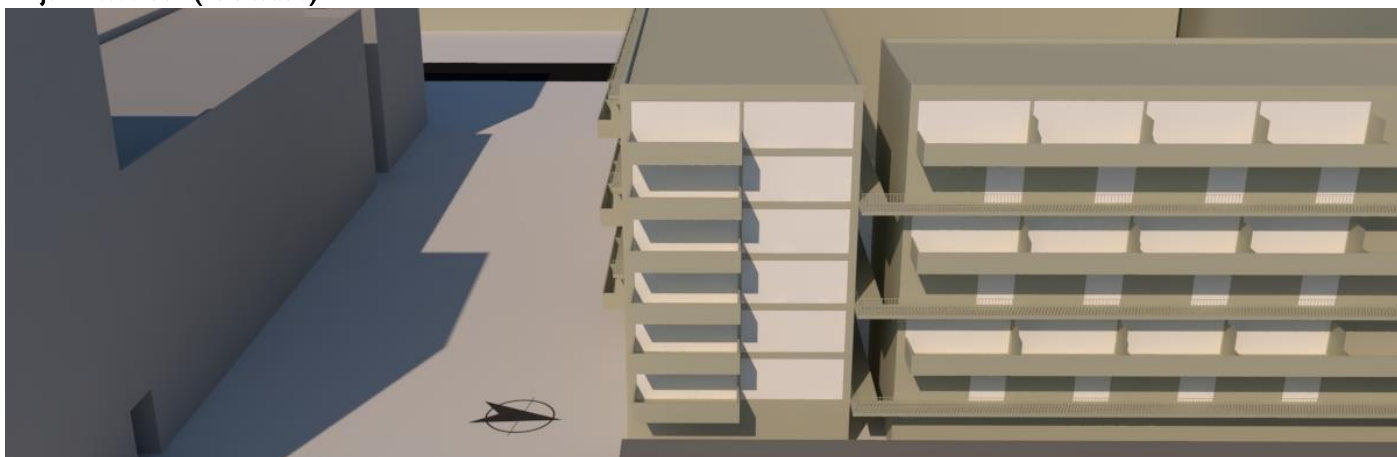
21-jun-10:00 uur (0s situatie)



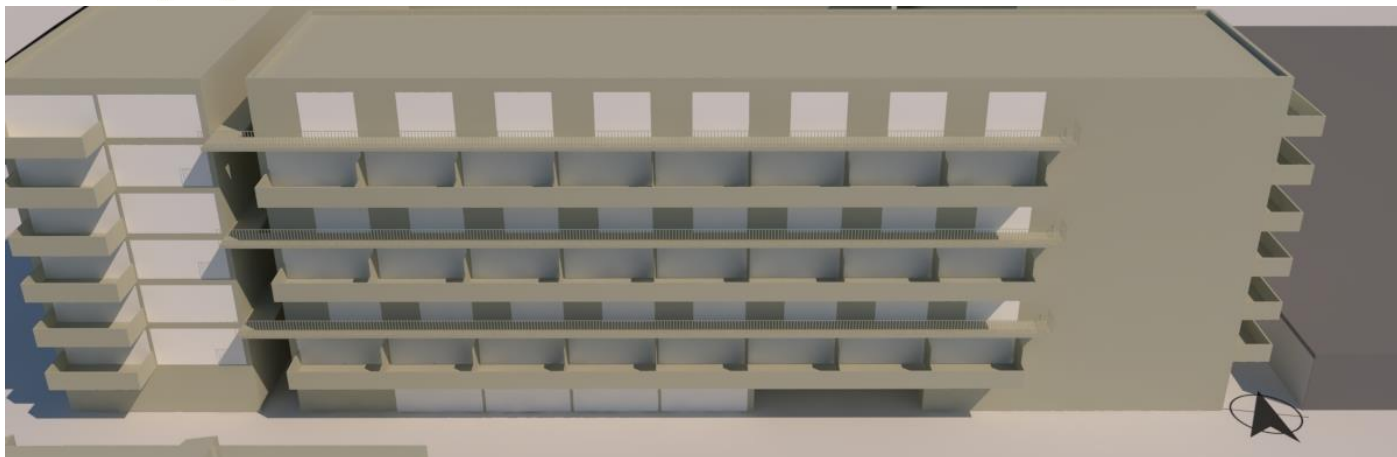
21-jun-10:00 uur (1s situatie)



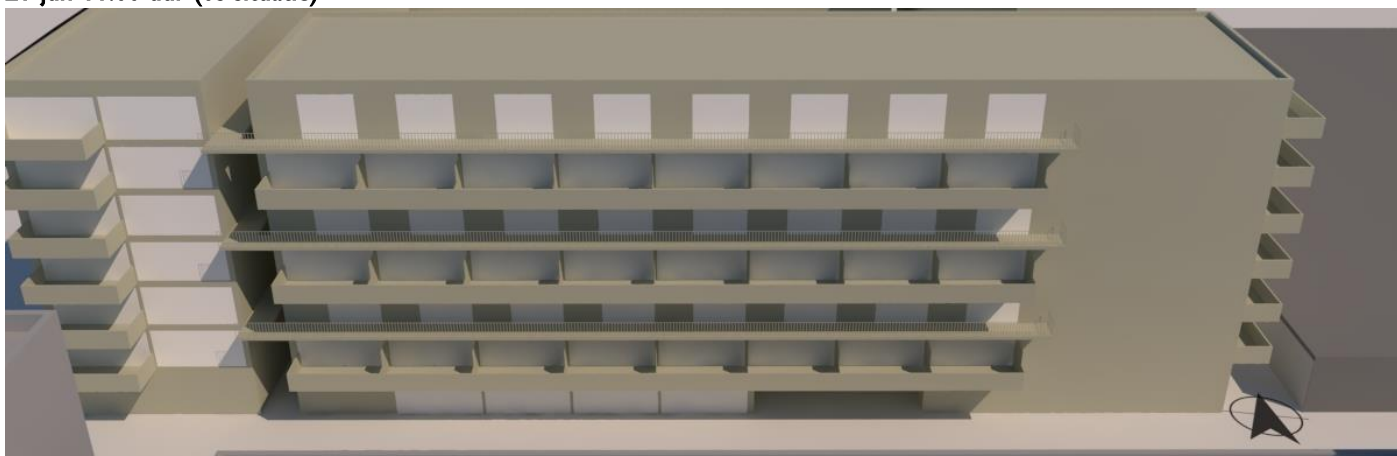
21-jun-10:00 uur (2s situatie)



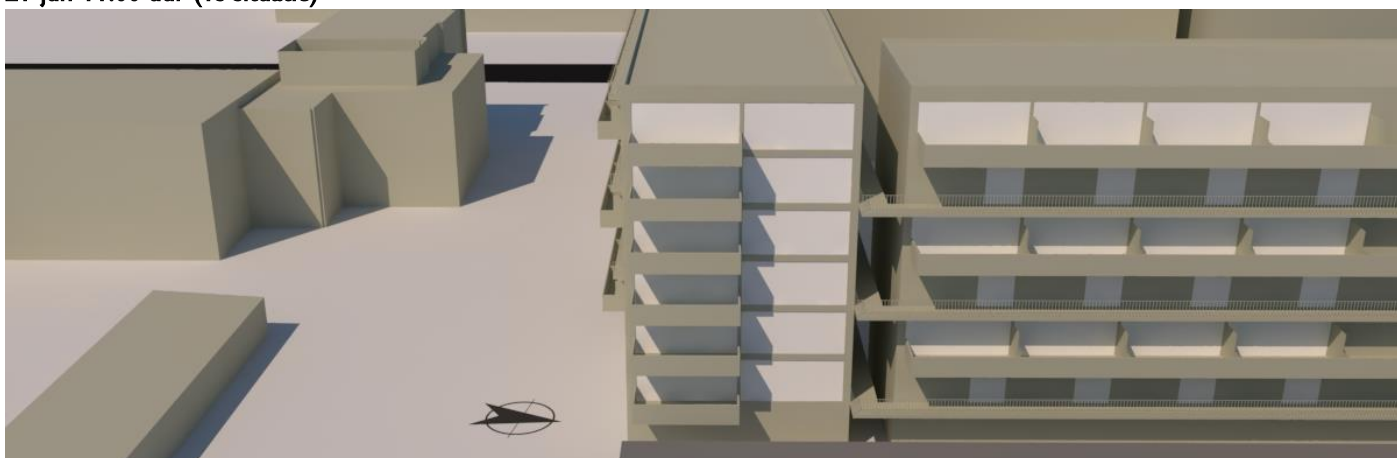
21-jun-10:00 uur (3s situatie)



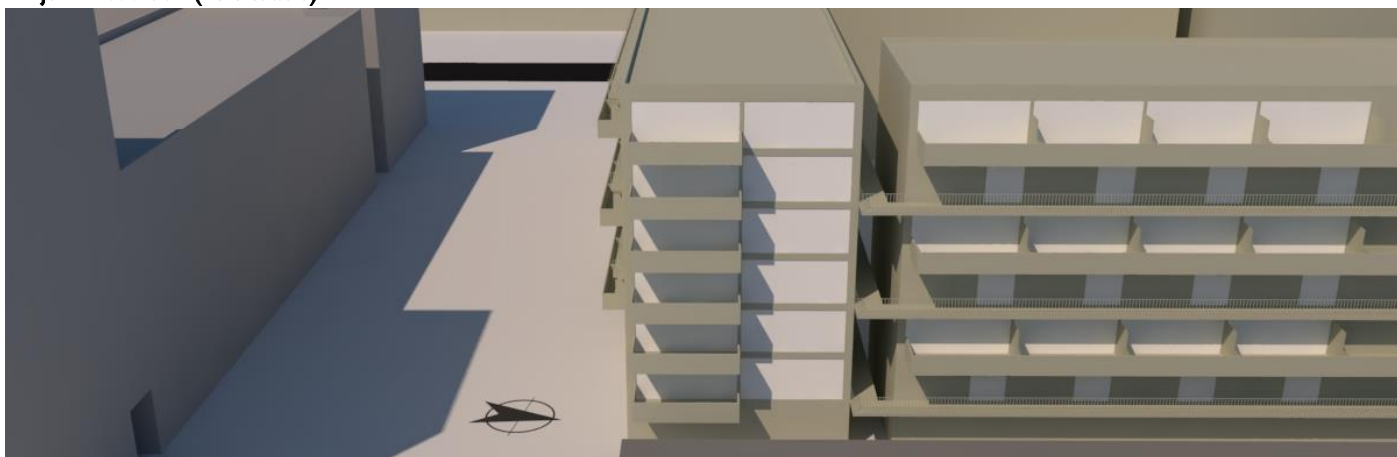
21-jun-11:00 uur (0s situatie)



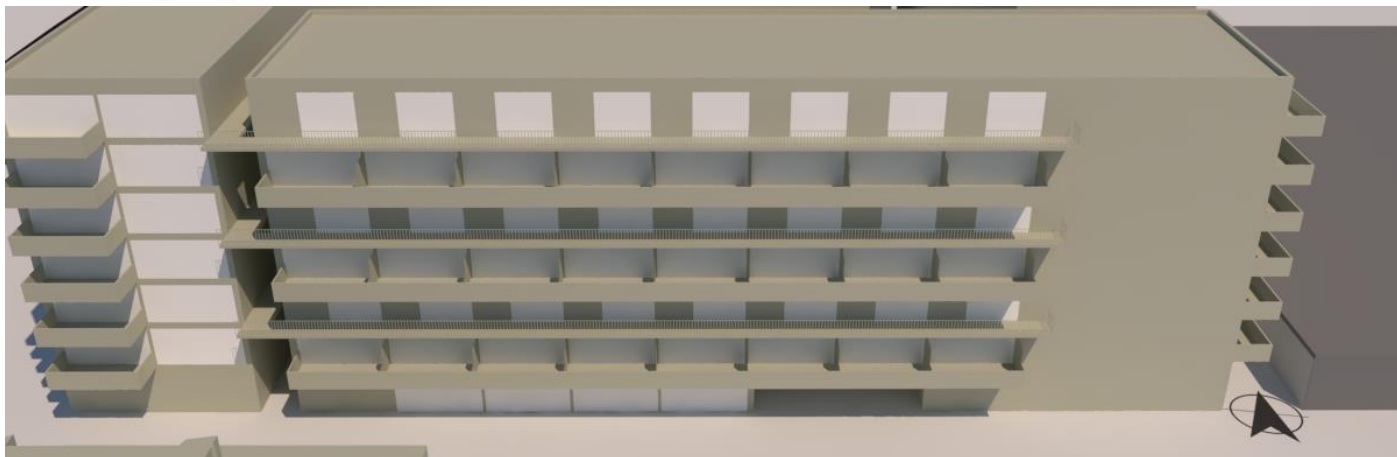
21-jun-11:00 uur (1s situatie)



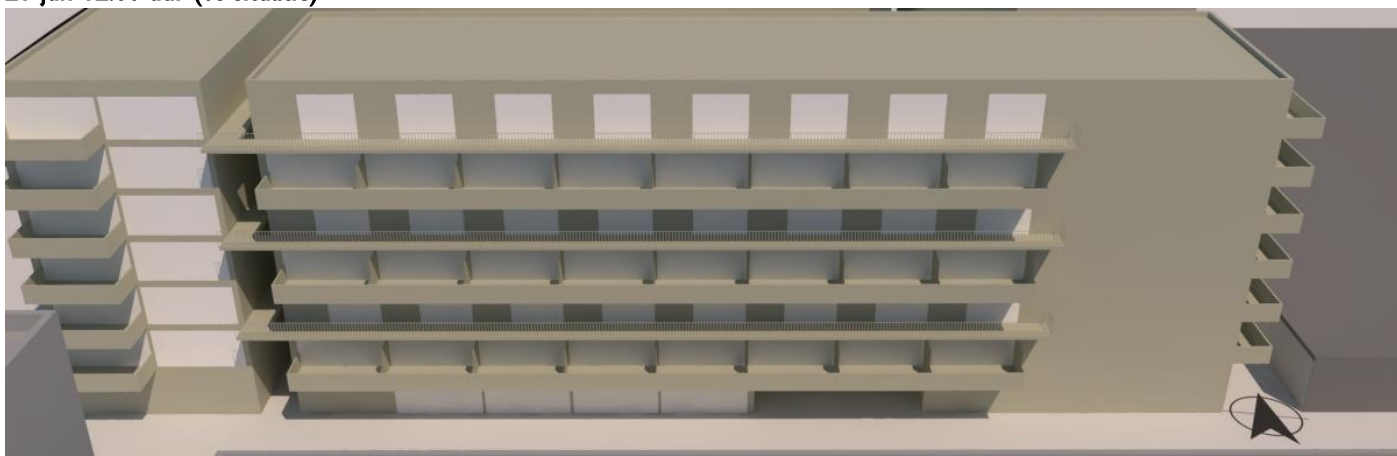
21-jun-11:00 uur (2s situatie)



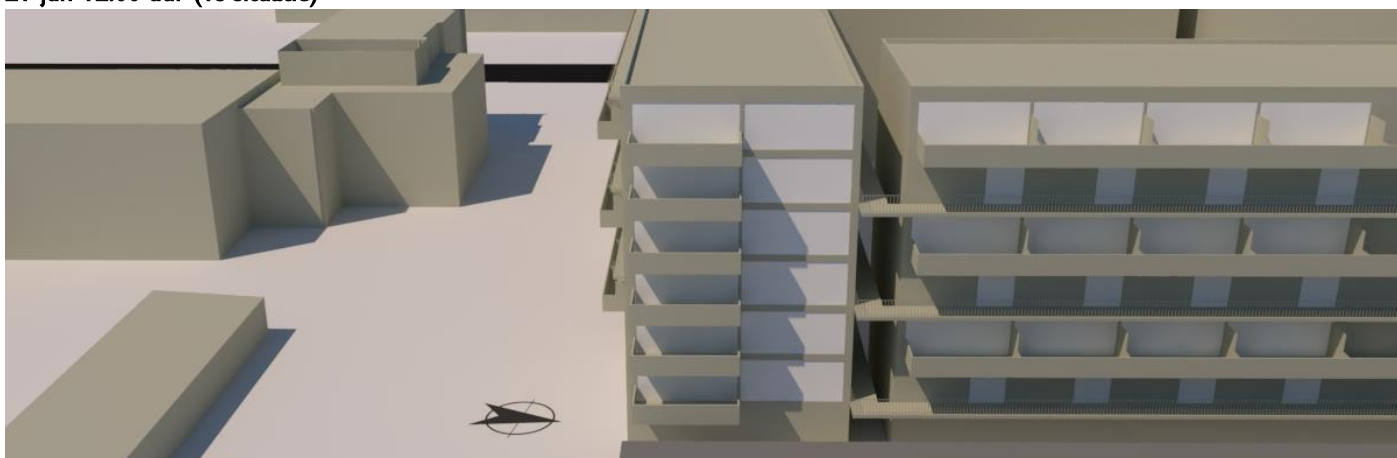
21-jun-11:00 uur (3s situatie)



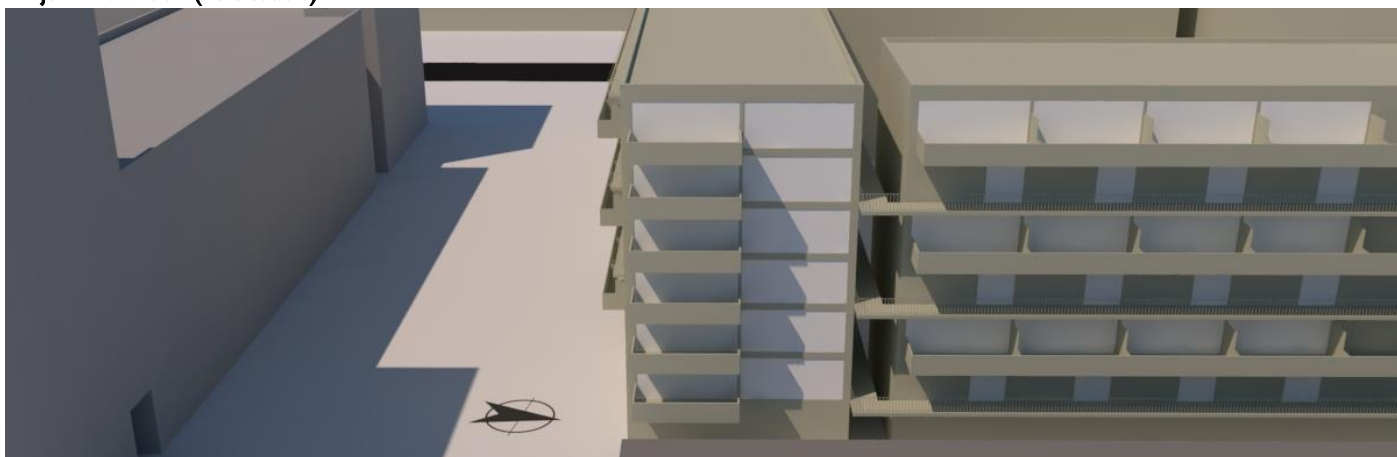
21-jun-12:00 uur (0s situatie)



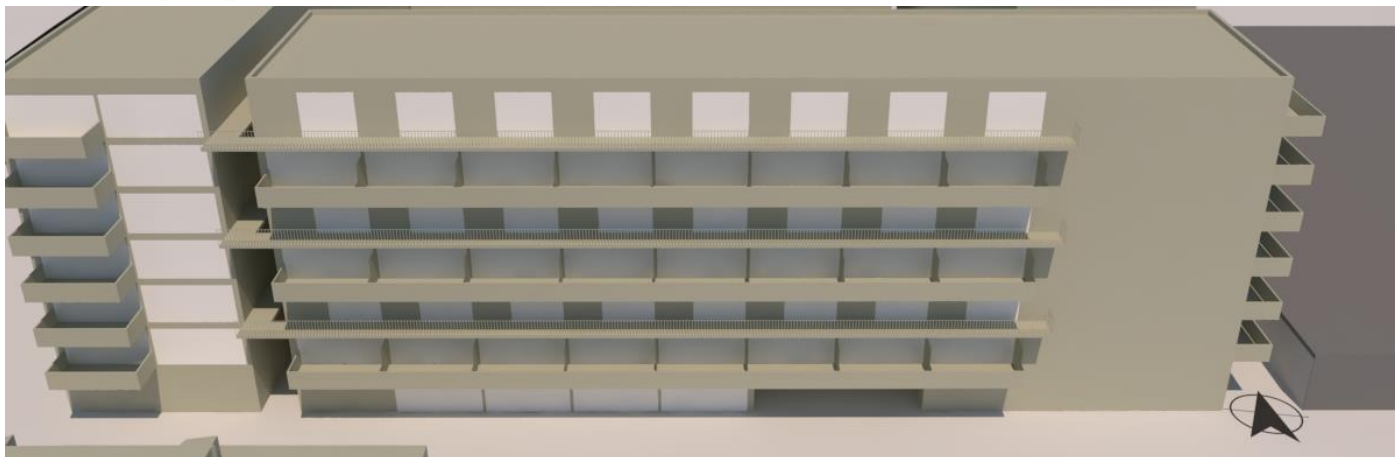
21-jun-12:00 uur (1s situatie)



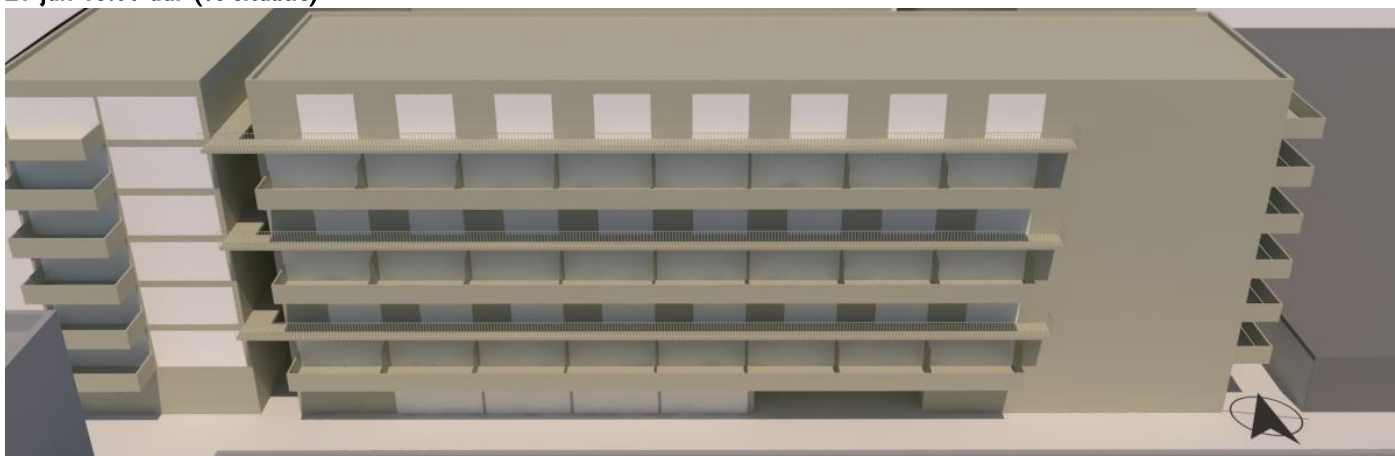
21-jun-12:00 uur (2s situatie)



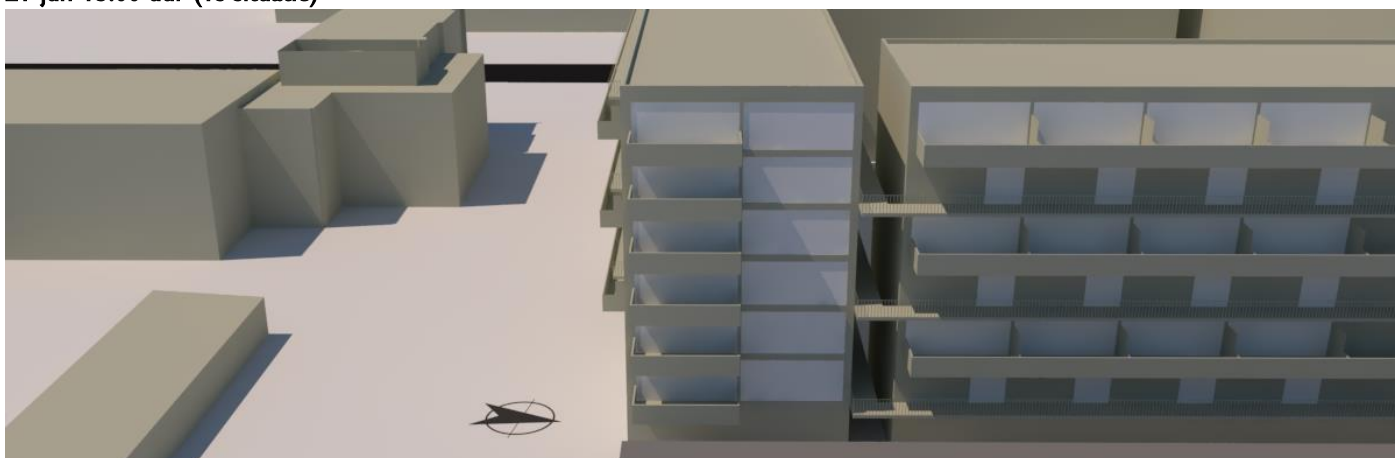
21-jun-12:00 uur (3s situatie)



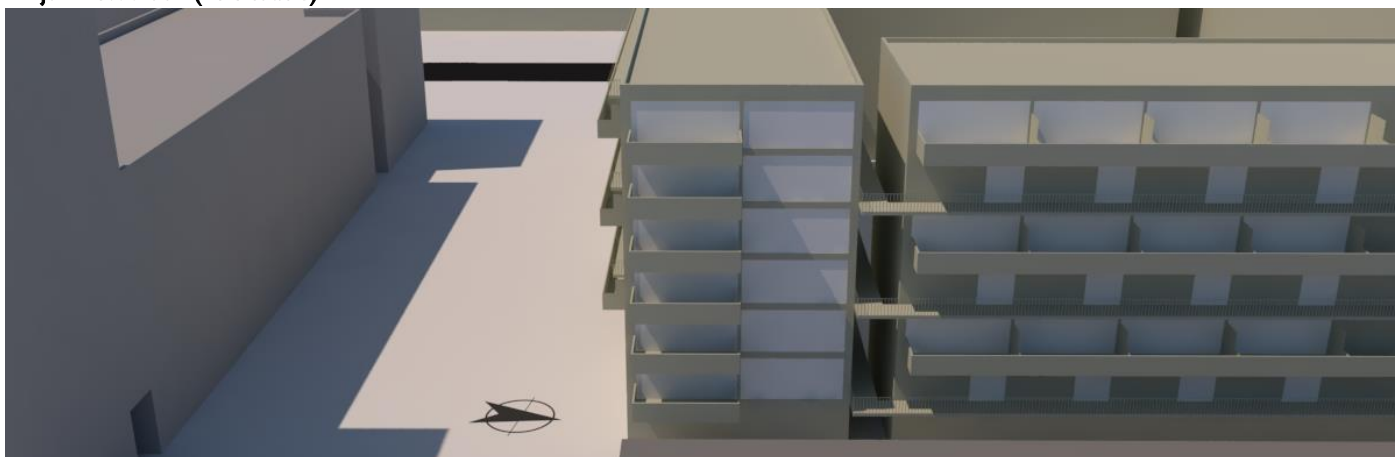
21-jun-13:00 uur (0s situatie)



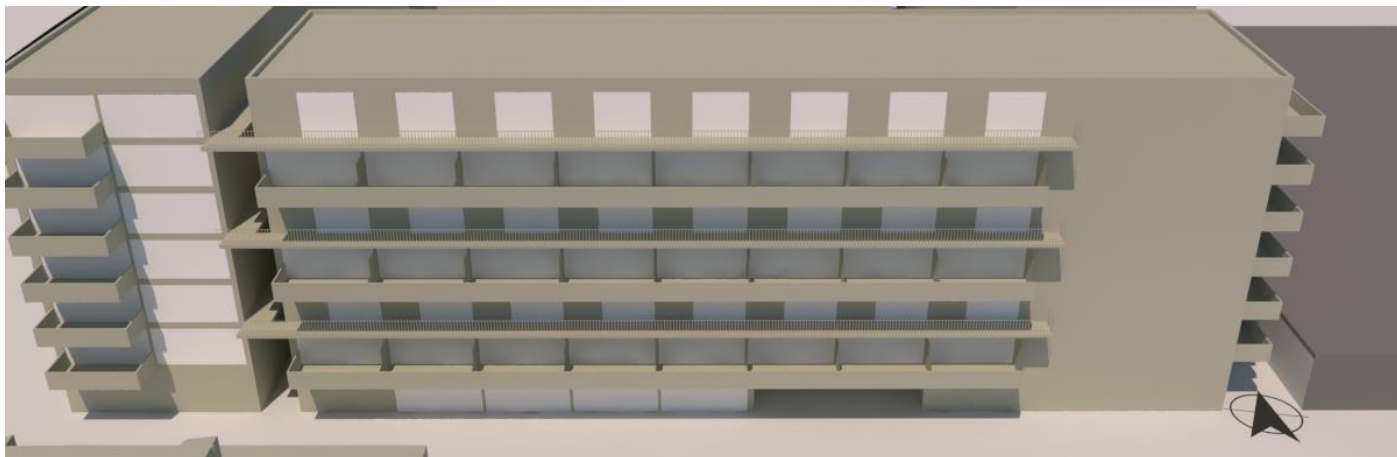
21-jun-13:00 uur (1s situatie)



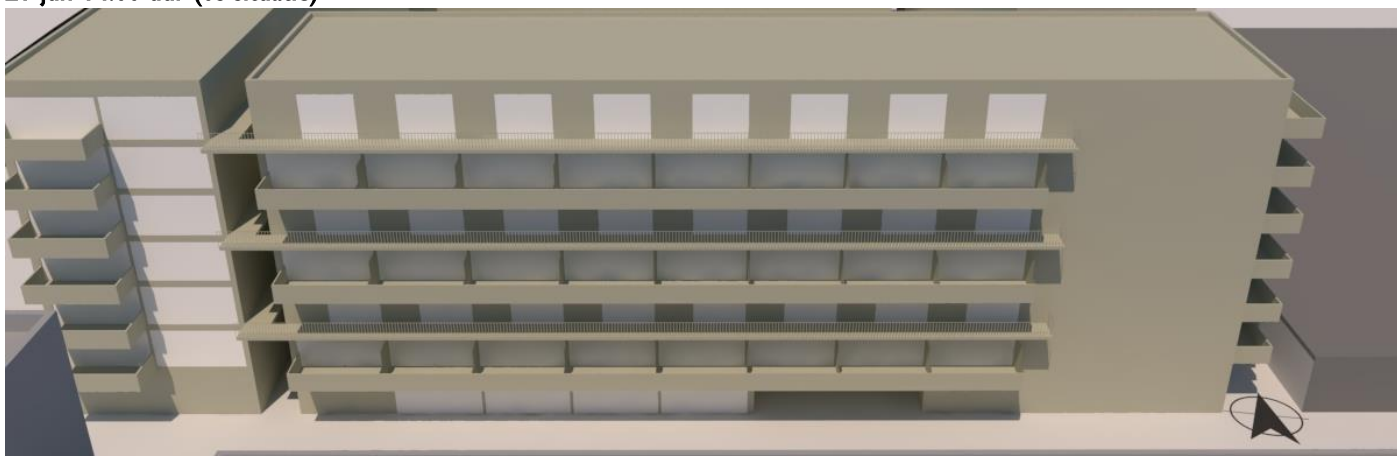
21-jun-13:00 uur (2s situatie)



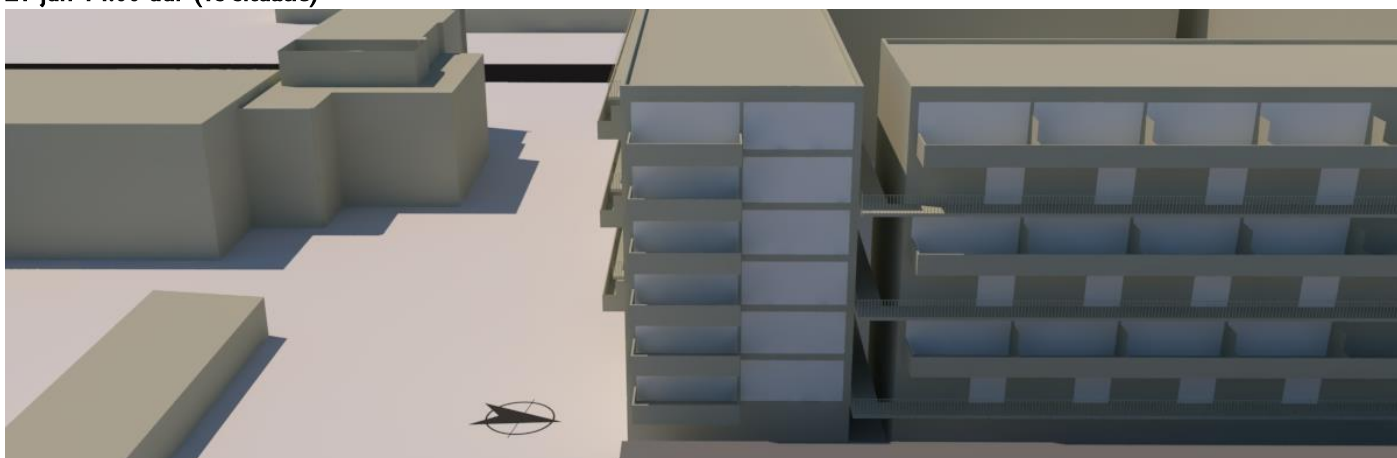
21-jun-13:00 uur (3s situatie)



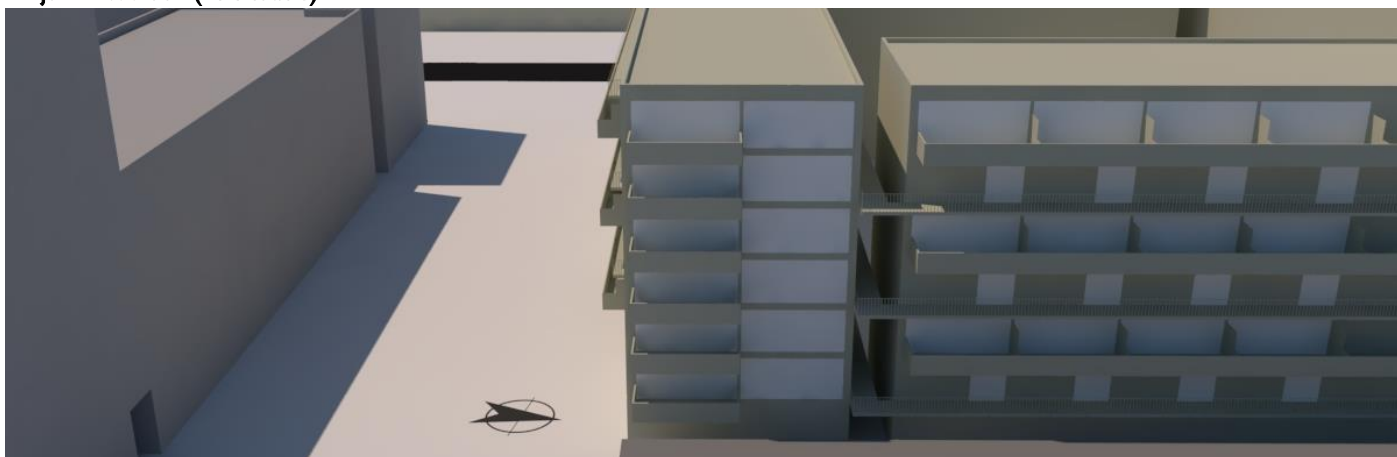
21-jun-14:00 uur (0s situatie)



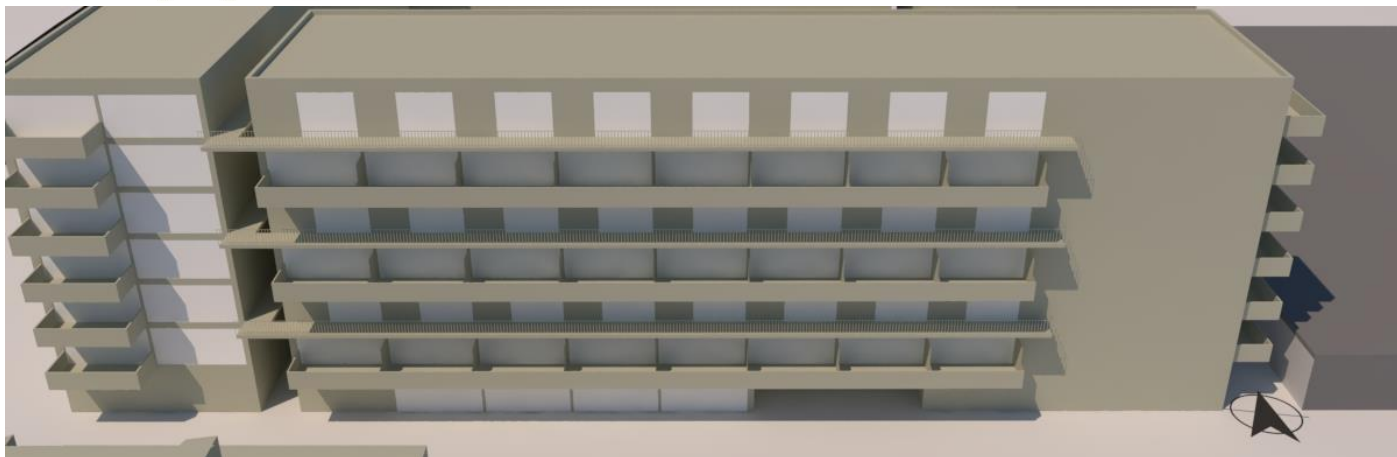
21-jun-14:00 uur (1s situatie)



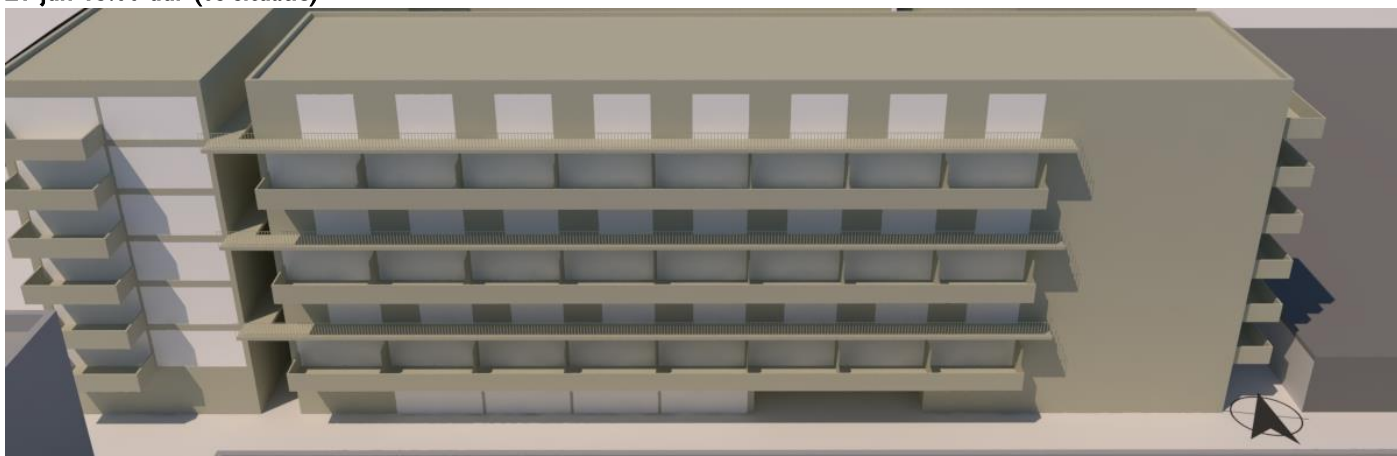
21-jun-14:00 uur (2s situatie)



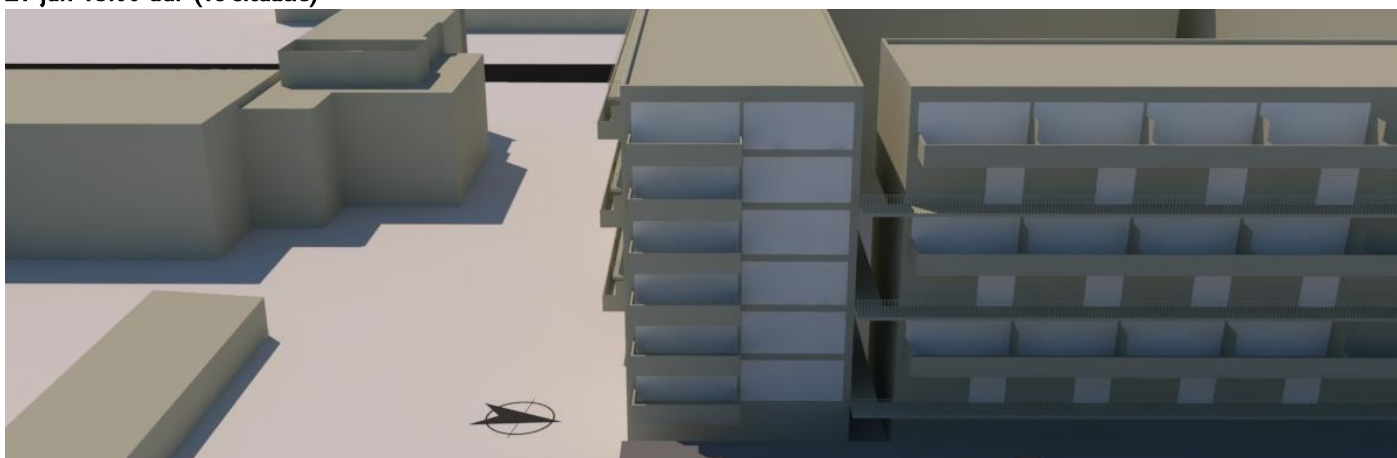
21-jun-14:00 uur (3s situatie)



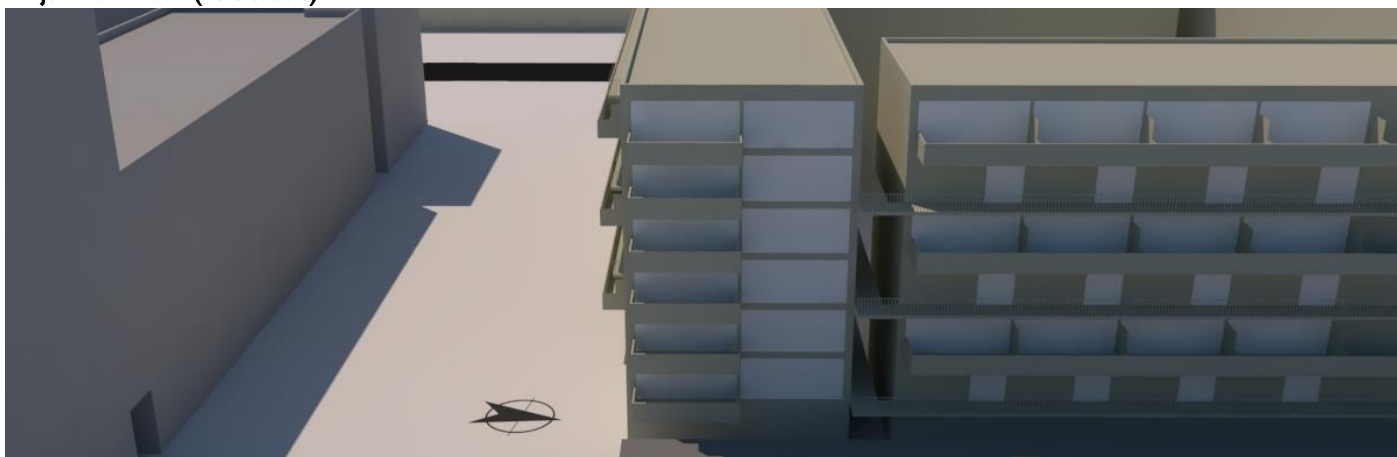
21-jun-15:00 uur (0s situatie)



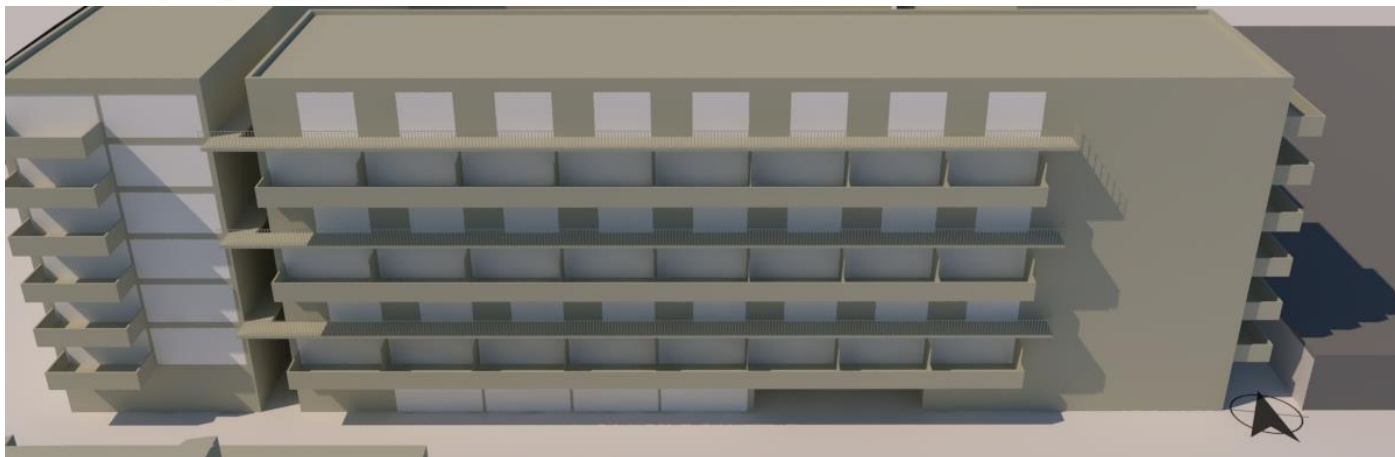
21-jun-15:00 uur (1s situatie)



21-jun-15:00 uur (2s situatie)



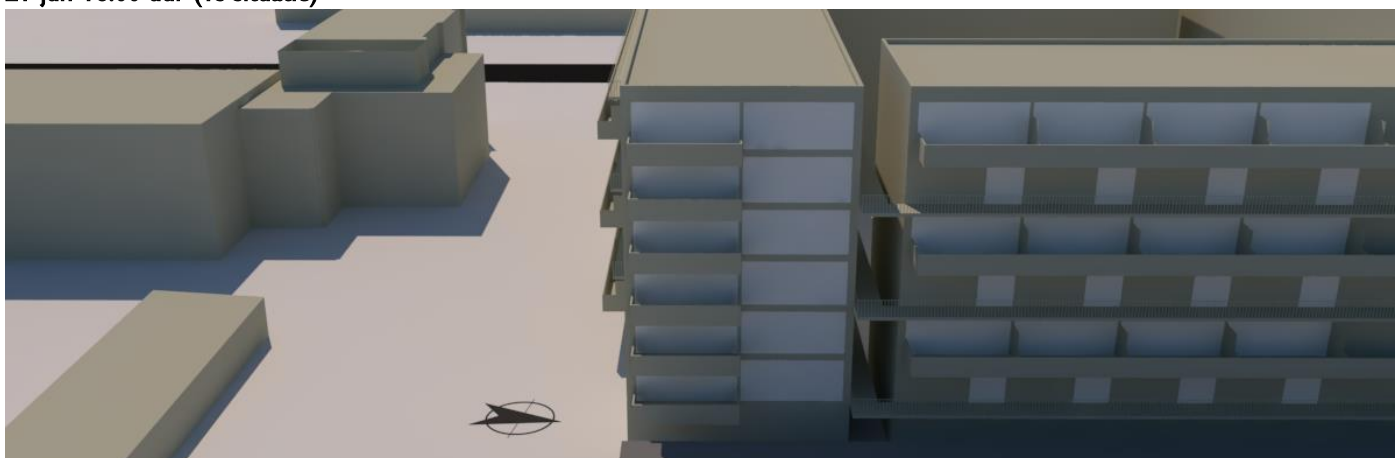
21-jun-15:00 uur (3s situatie)



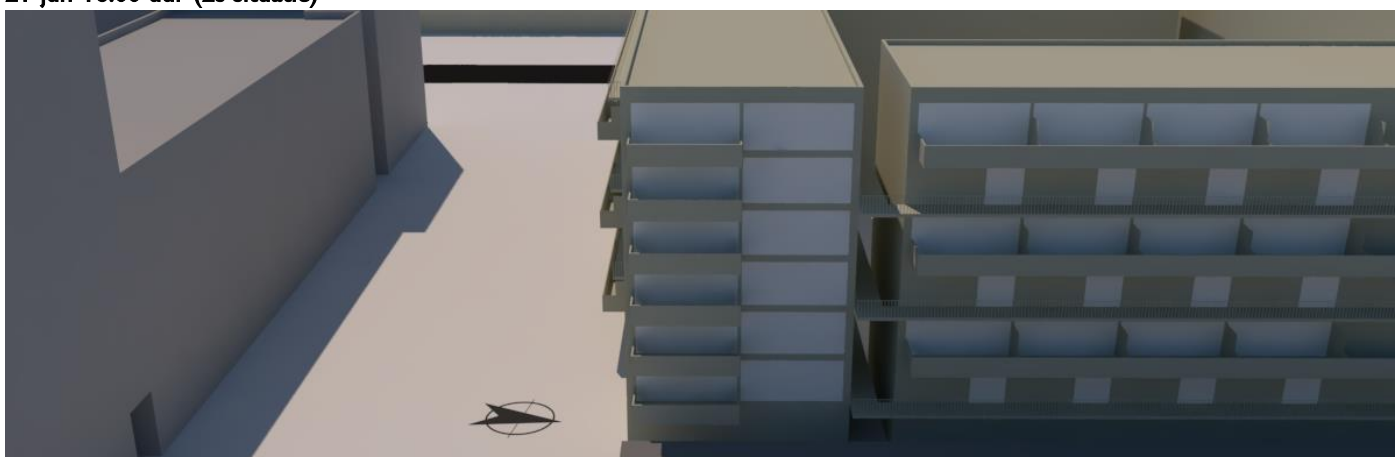
21-jun-16:00 uur (0s situatie)



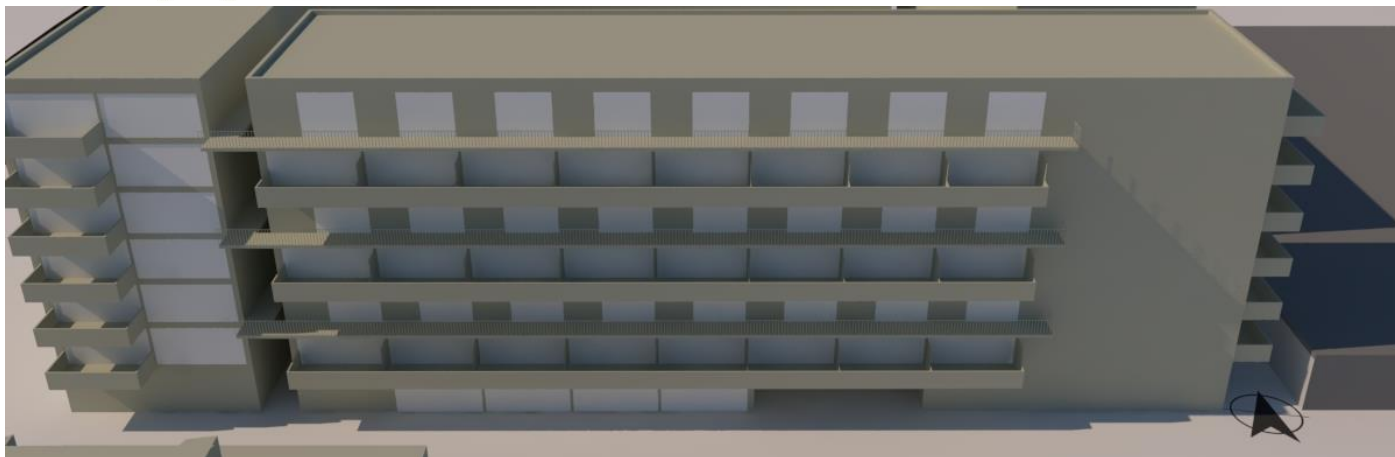
21-jun-16:00 uur (1s situatie)



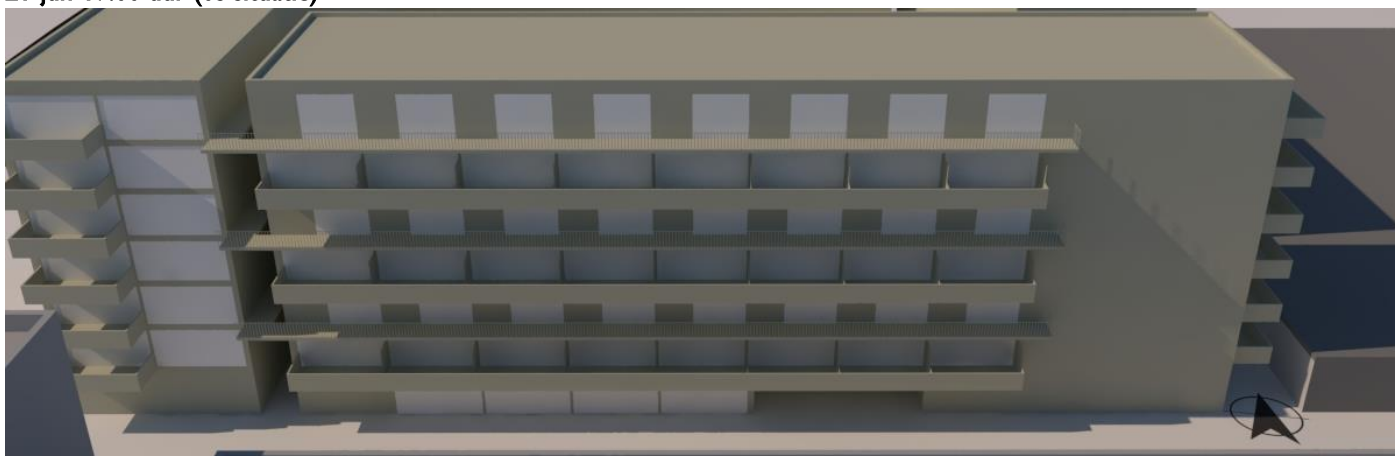
21-jun-16:00 uur (2s situatie)



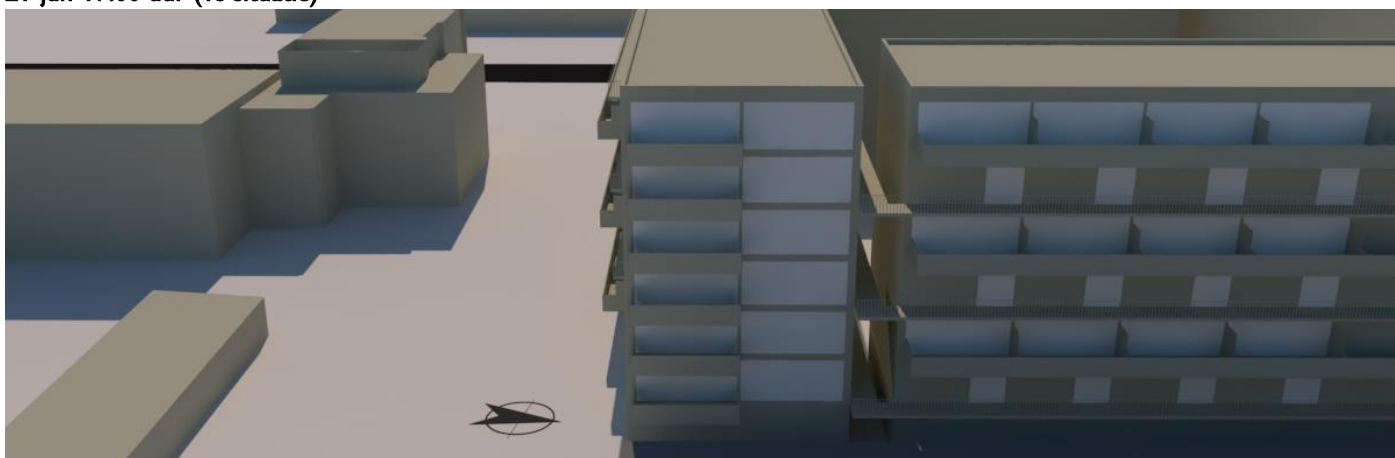
21-jun-16:00 uur (3s situatie)



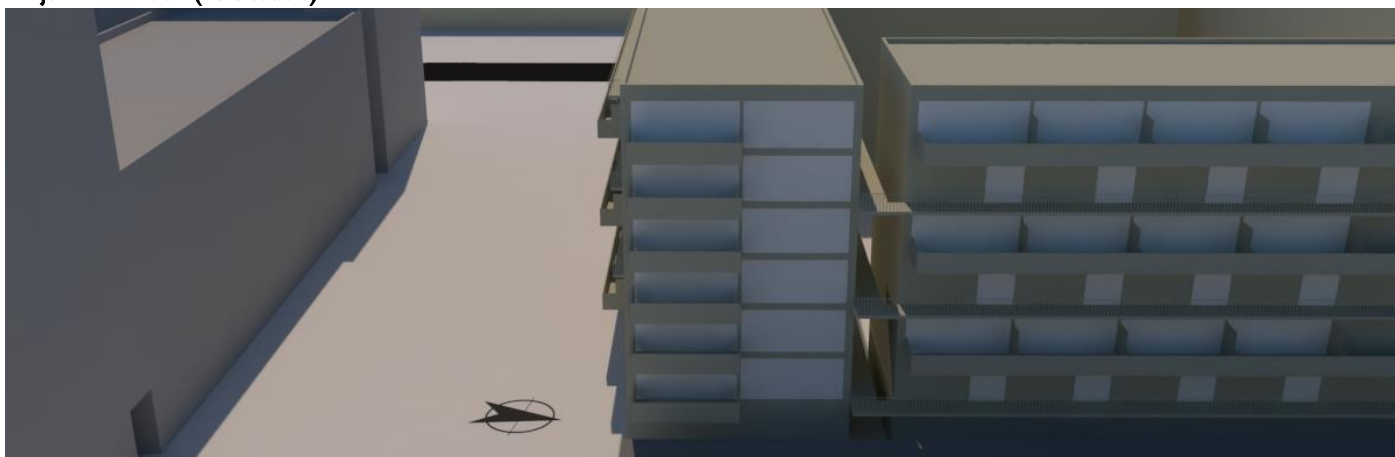
21-jun-17:00 uur (0s situatie)



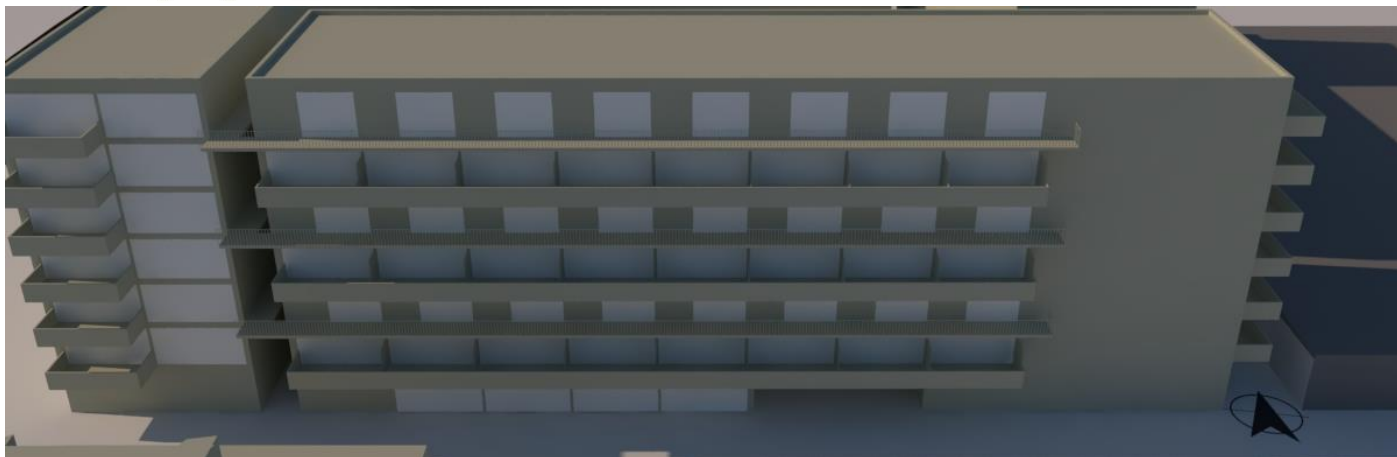
21-jun-17:00 uur (1s situatie)



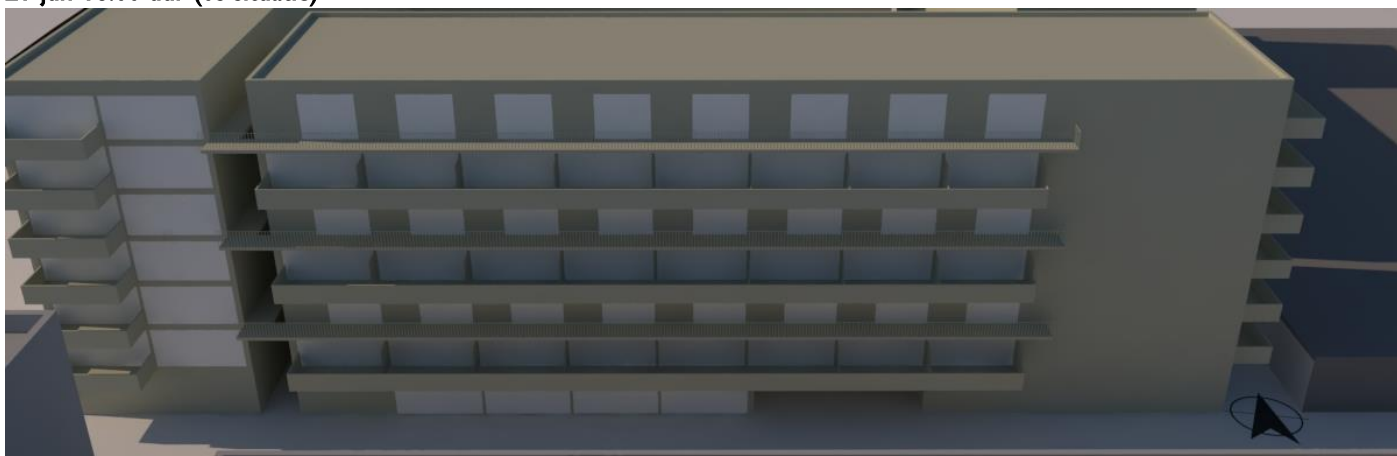
21-jun-17:00 uur (2s situatie)



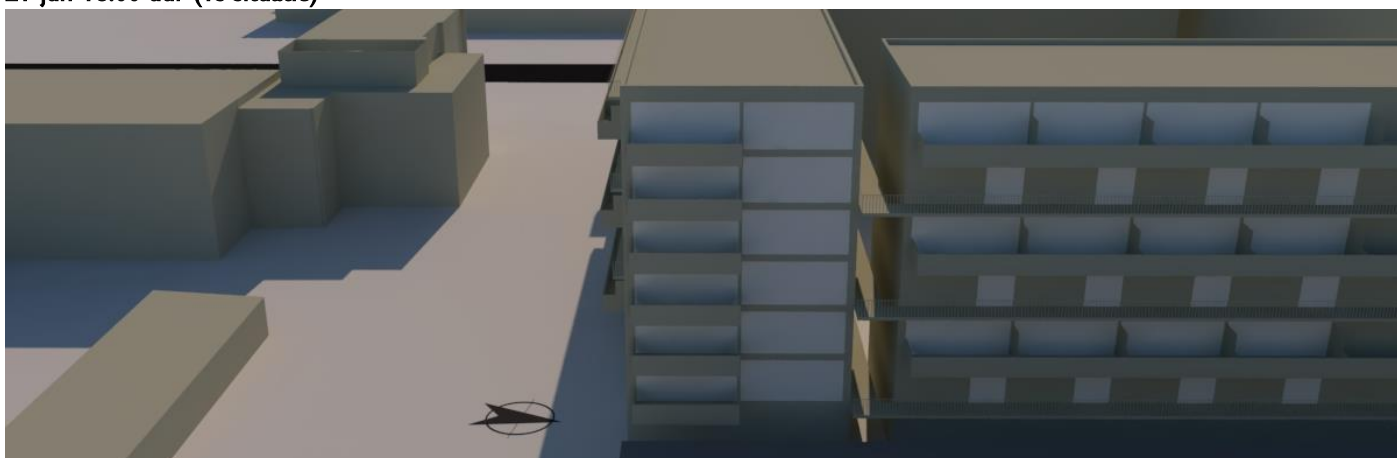
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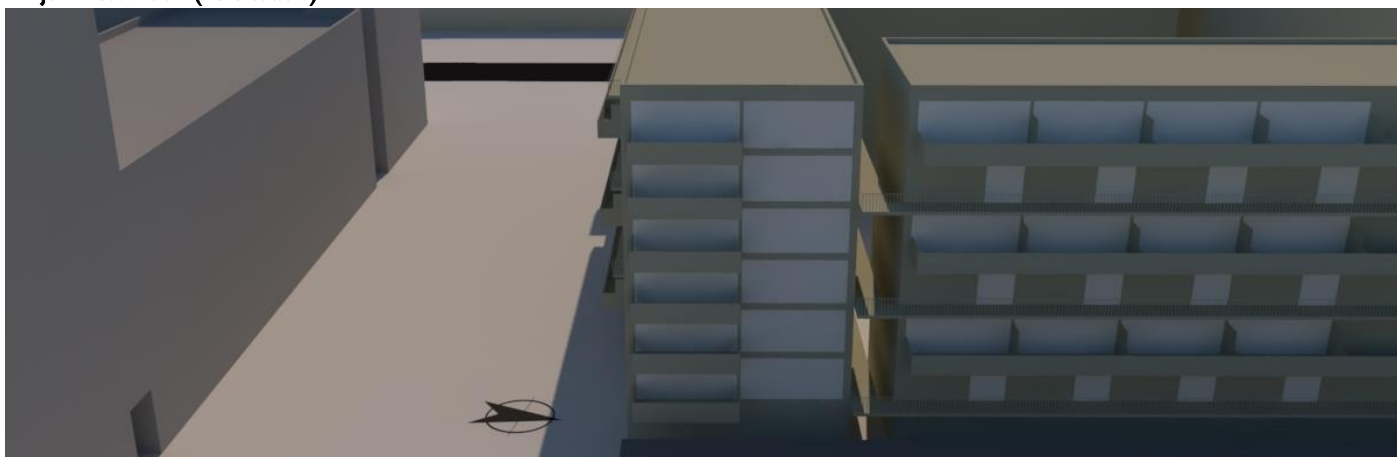
21-jun-18:00 uur (0s situatie)



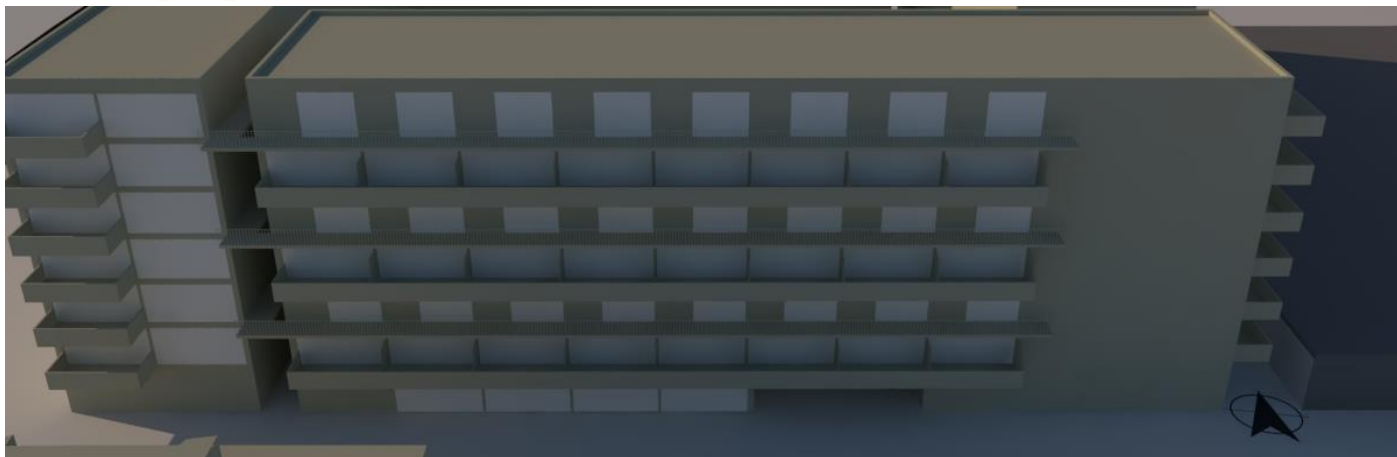
21-jun-18:00 uur (1s situatie)



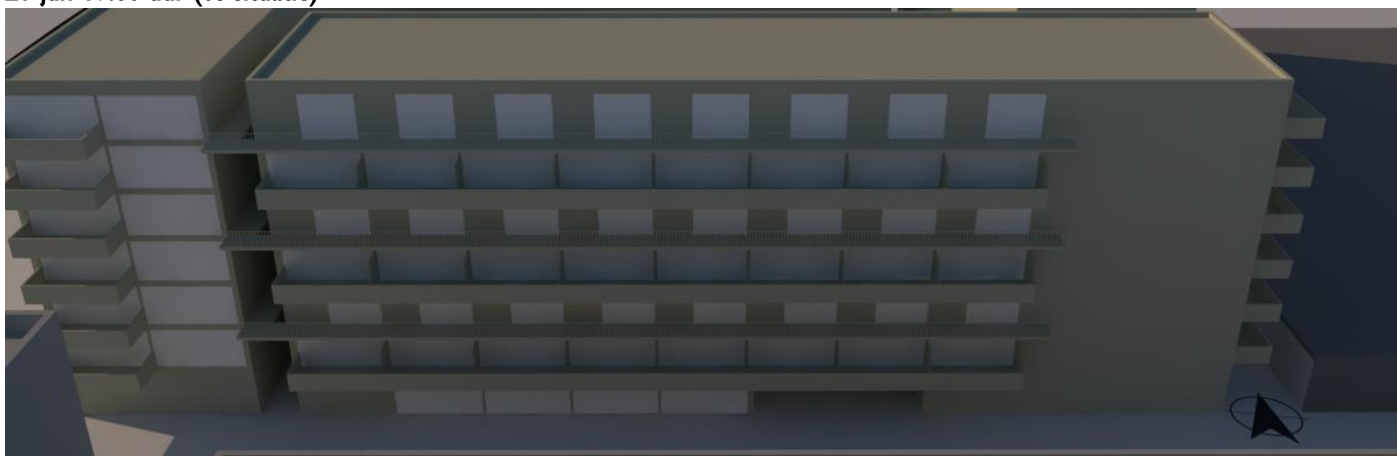
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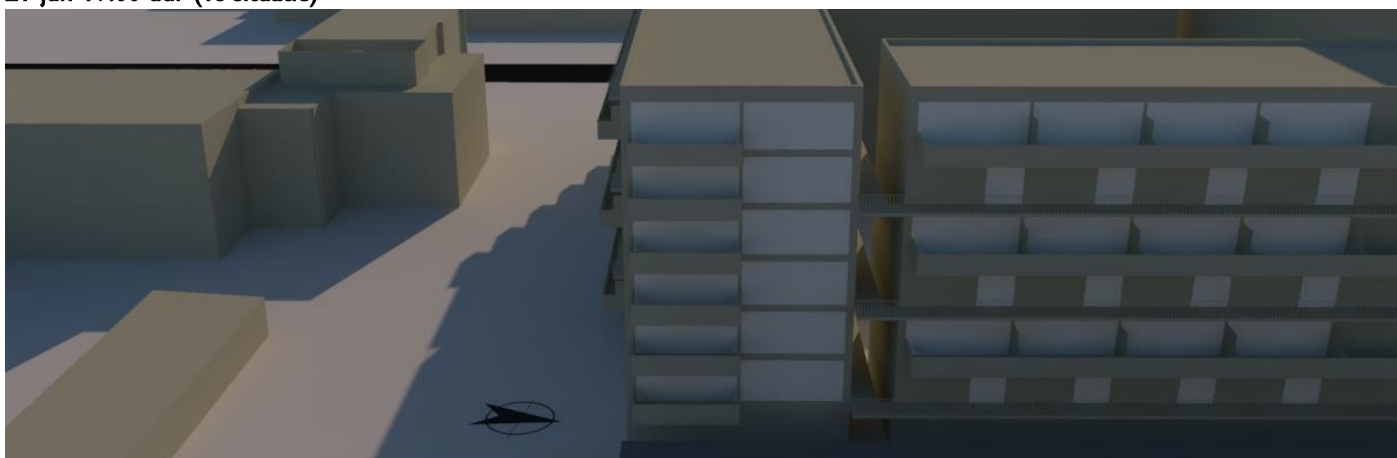
21-jun-18:00 uur (3s situatie)



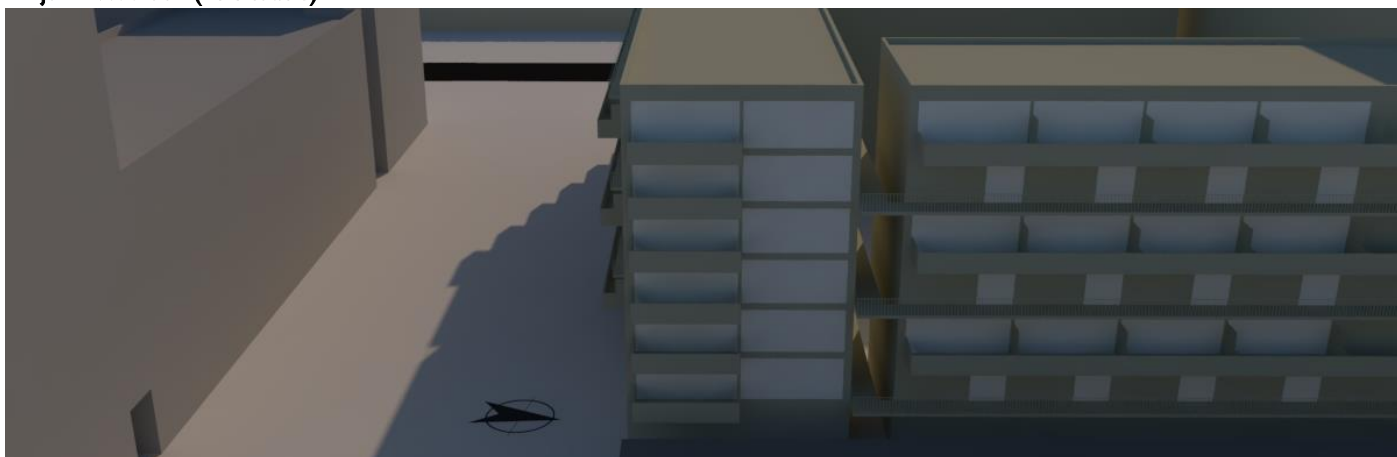
21-jun-19:00 uur (0s situatie)



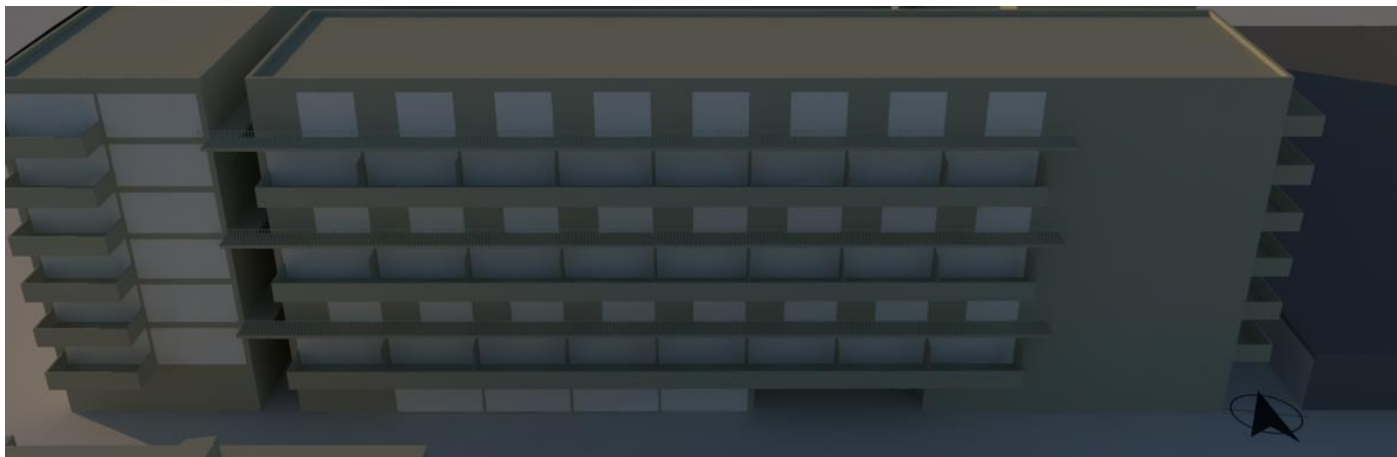
21-jun-19:00 uur (1s situatie)



21-jun-19:00 uur (2s situatie)



21-jun-19:00 uur (3s situatie)



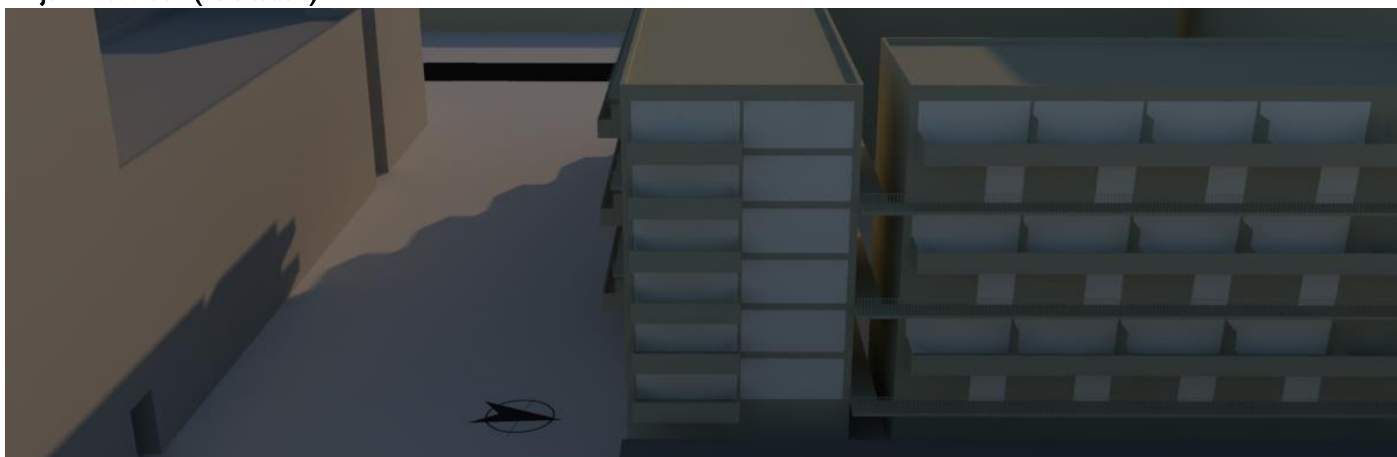
21-jun-20:00 uur (0s situatie)



21-jun-20:00 uur (1s situatie)



21-jun-20:00 uur (2s situatie)



21-jun-20:00 uur (3s situatie)



21-jun-21:00 uur (0s situatie)



21-jun-21:00 uur (1s situatie)



21-jun-21:00 uur (2s situatie)



21-jun-21:00 uur (3s situatie)

Colofon

Opdrachtgever:

dhr. J. Martens van aannemersbedrijf Van Agtmaal.

Bezonningsonderzoek:

Dit onderzoek is gebaseerd op:

- Tekeningen en model digitaal aangeleverd door opdrachtgever
- AHN

Bij de meting in het 3D-model is in de periode van 28 maart tot 31 oktober uitgegaan van zomertijd (UCT+2). Bij de overige meting van de hoeveelheid bezonning is uitgegaan van de wintertijd volgens de Midden-Europese Tijd (MET) of UCT+1.

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