Change parameters

While changing the map, the following parameters were taken into consideration.

• Better use of resources such as AI budget in combination with other gameplay elements such as alarms, cameras and laser traps
• Creation of more interesting areas that use cover spaces to guide the player
• Creation of high-intensity moments followed by some safer areas where the player could gather themselves and plan their next move
• Trying to keep as close as possible to the essence of the 2D map and the important beats and ideas expressed in that design
Some elements were removed during implementation because they didn't reiterate these parameters during gameplay.
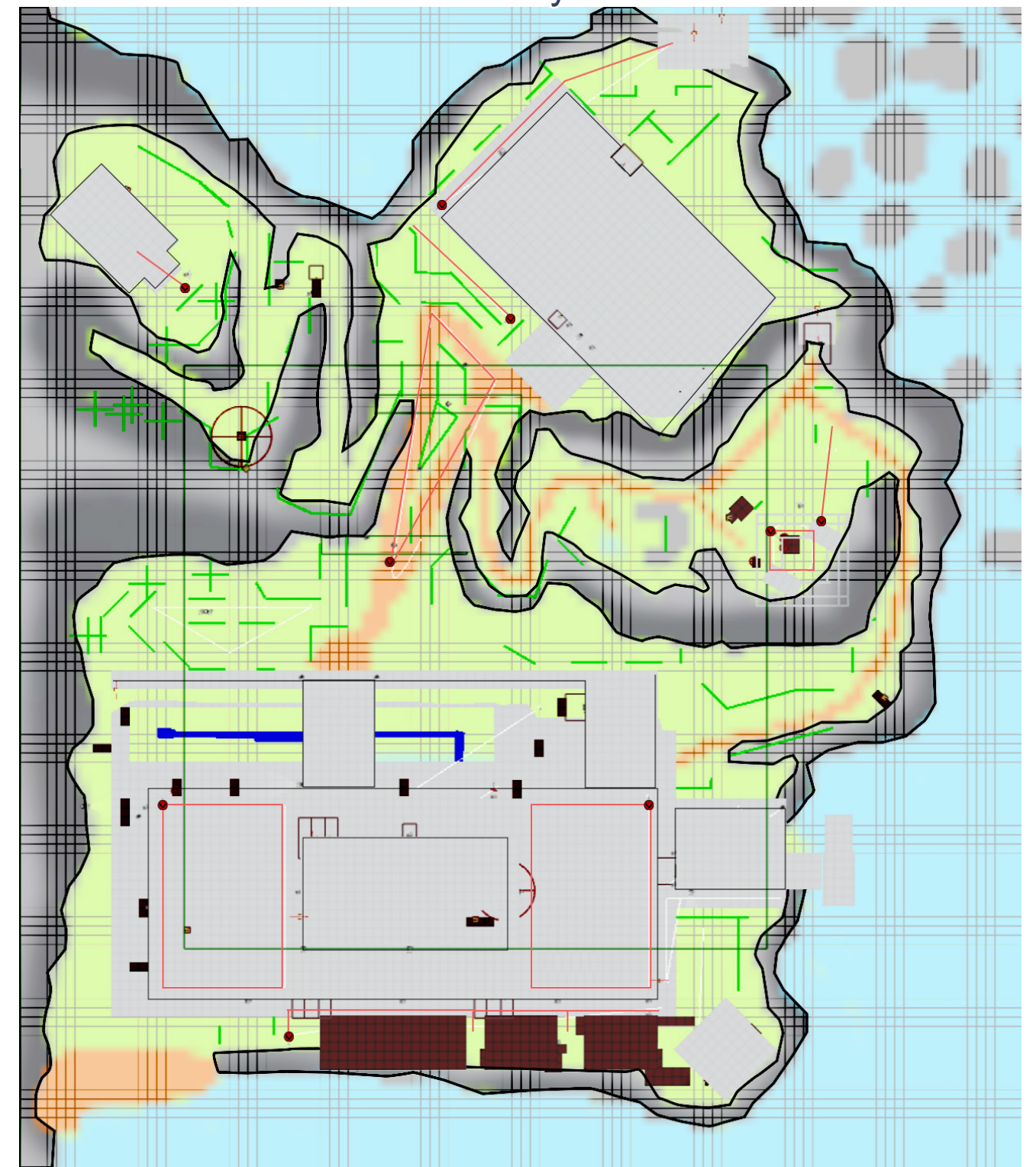
The three main objectives of the map remain the same and their locations have suffered minor alterations. The "Disable All Cameras" side objective has been implemented and it works by collecting two treasures and then triggering a switch on the Security Lodge. Other events have been added to the map to make good use of the AI budget and to keep the tension at a high level throughout the entire map depending on the style of play.

Overall the redesigns also support a more 360 approach to all objectives, giving the player scenarios where they can tailor their approach to their preferred play style.

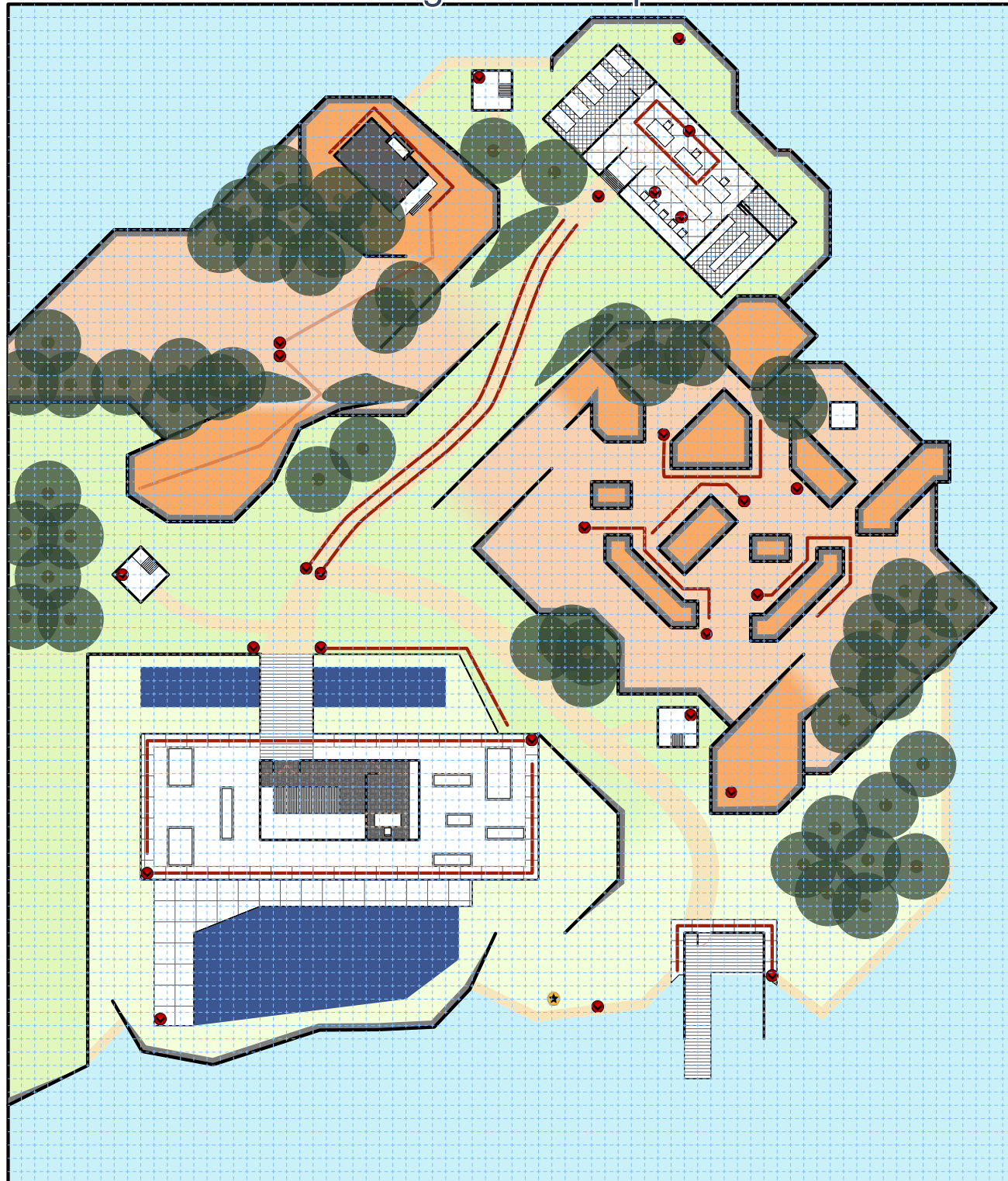## Original 2D Map

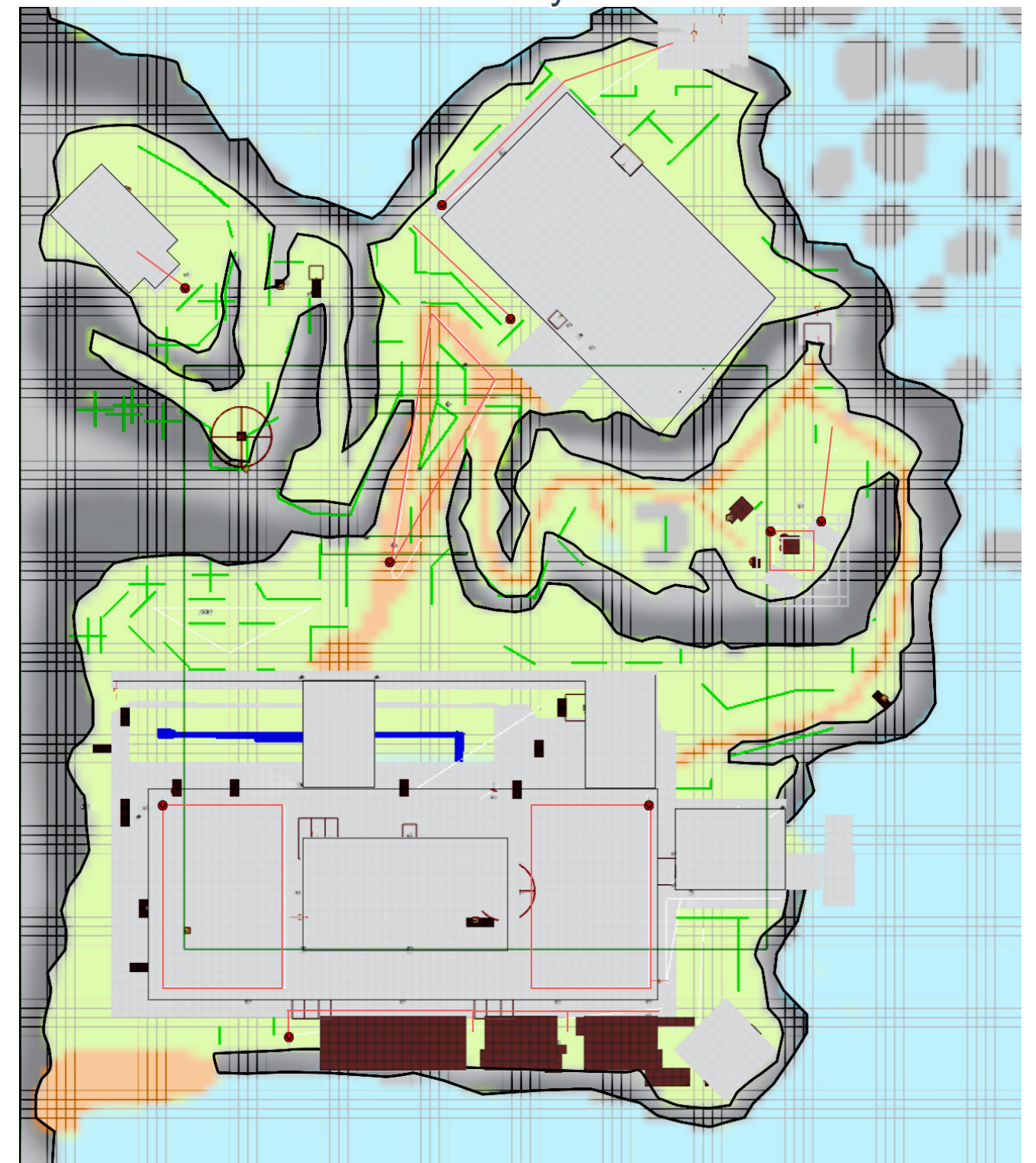## Screenshot from Playable Blockmesh

New Objectives

Two new main objectives have been added to the mission. They are:

- Read the Mission Brief
  - Description: At the start of the mission, a document sits in front of the player with the mission brief, after they read it the other objectives will be unlocked
  - Reason for the addition: This objective was added to provide a small introduction to the mission to the player. In a full game scenario this would be replaced either by a Journal entry, cutscenes or context that was given to the player on previous missions. This objective is merely for playtesting purposes

- Escape via the Boathouse
  - Description: After the player plants the virus, steals the documents, and assassinates Johan, they must escape via the boathouse. This objective will unlock after the previous three have been completed. The player must enter the boathouse to complete this objective
  - Reason for the addition: This objective gives closure to the mission narrative with the player escaping the area. It also creates the opportunity for an increase in tension near the end of the mission. If the player has eliminated some guards and has triggered an alarm, reinforcements will arrive to prevent their escape.

Original 2D Map

Screenshot from Playable Blockmesh

Layout Changes

First Area - West Mountain

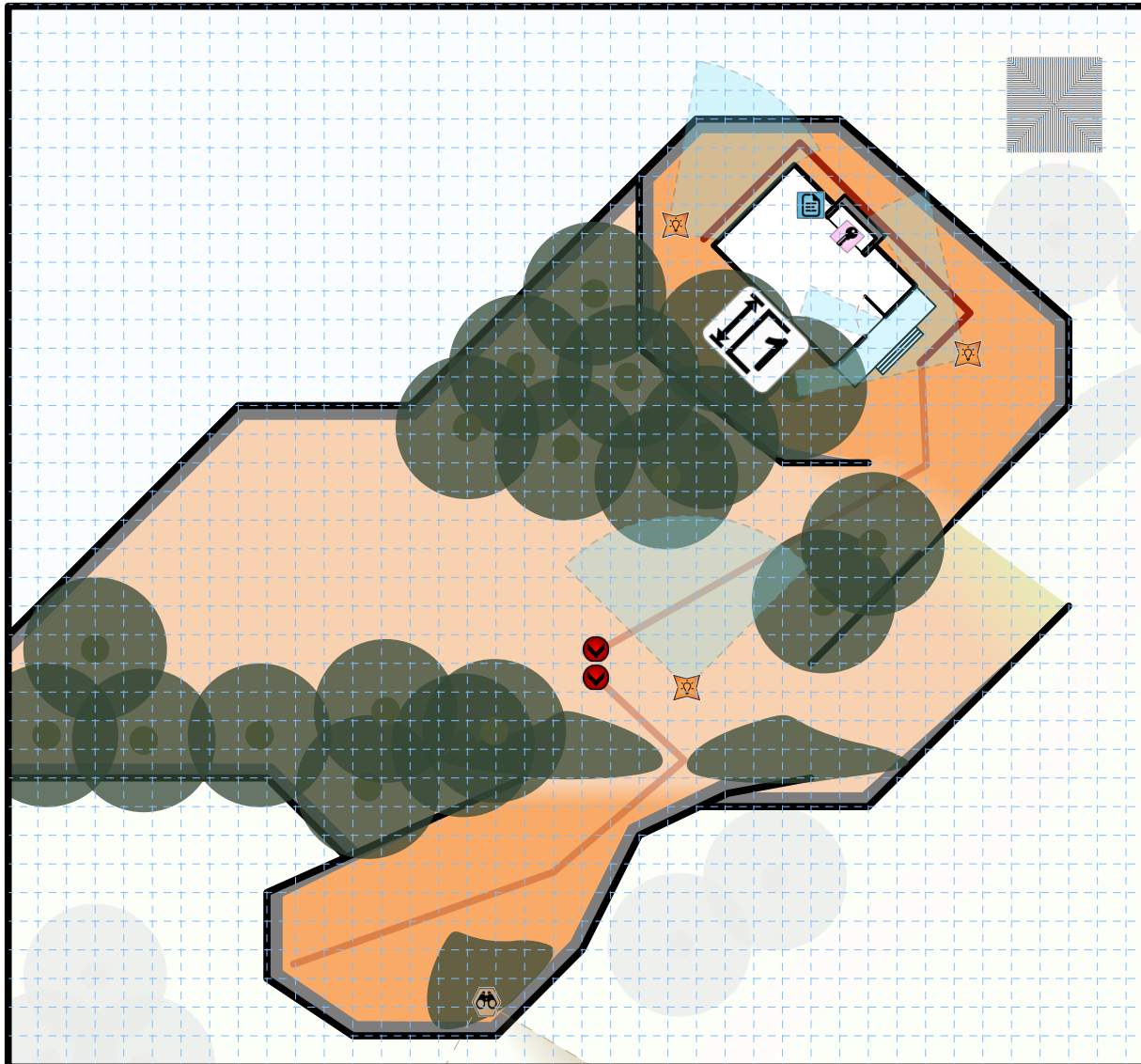Core elements have remained in place such as the Hunters house and the Vantage Point watching over the Main House.

This area has the following purposes on the map:
• Introduce the mission to the player
• Give the player access to two Vantage Points from where they can see the two major buildings
• Introduce the Laser mechanic and teach the player how to use it in a simple and safe way
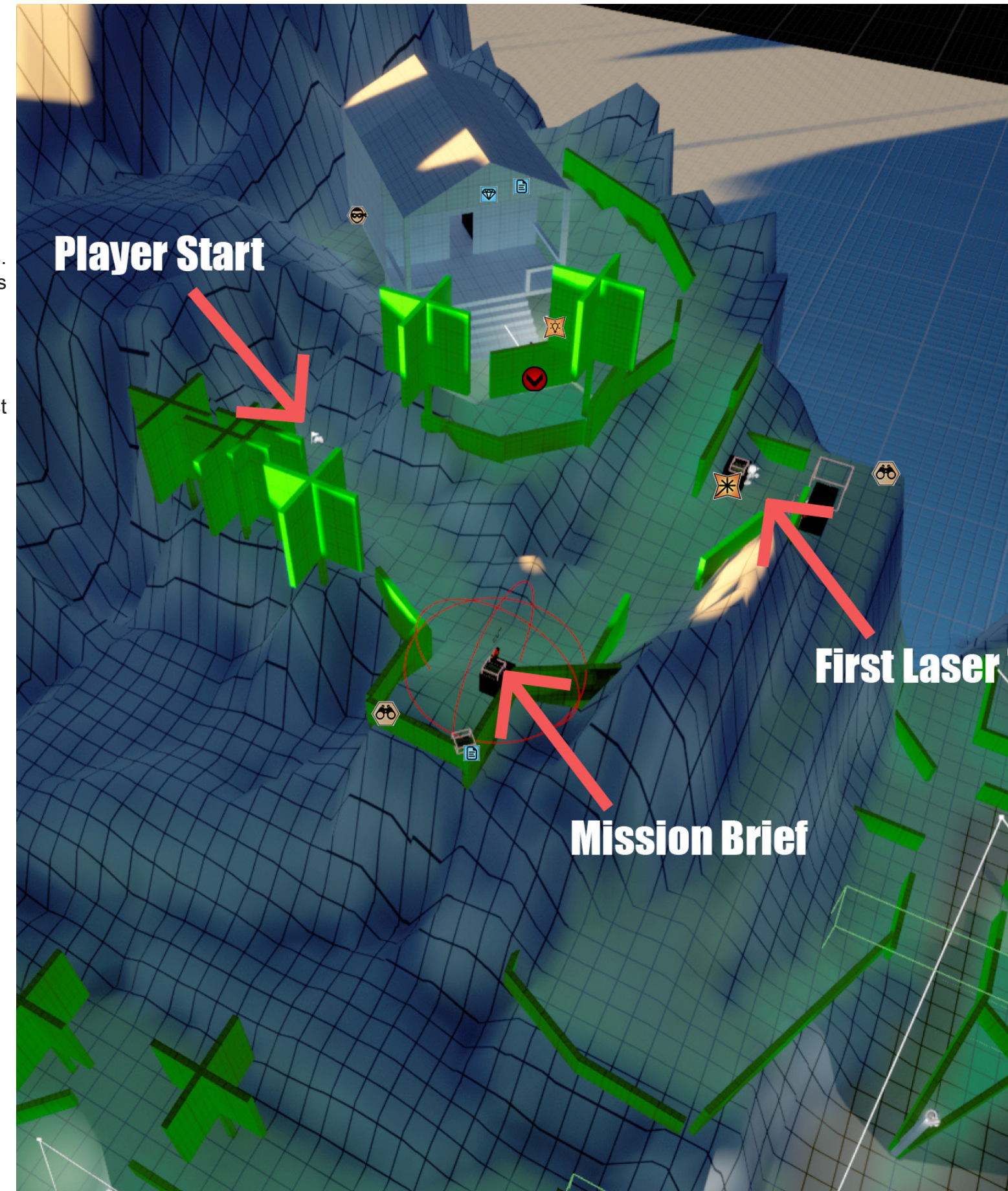• Introduce the "Deactivate All Cameras" side quest

Following changes were made to accommodate for these goals
• Added a "Mission Brief" goal that the player must interact with in order to unlock the next set of objectives. On a full game, this would either be available via Player Journal, cutscene or the player would carry this knowledge from previous missions
• The entire area is smaller and more focused
• Player starts facing the First Vantage Point.
• Kept only one guard in the area, instead of the two guards that were on the 2D map
• Introduced a simple laser trap here that will function as a "new" gameplay mechanic, when in fact it is just one way of organizing certain gameplay elements that were given on the package
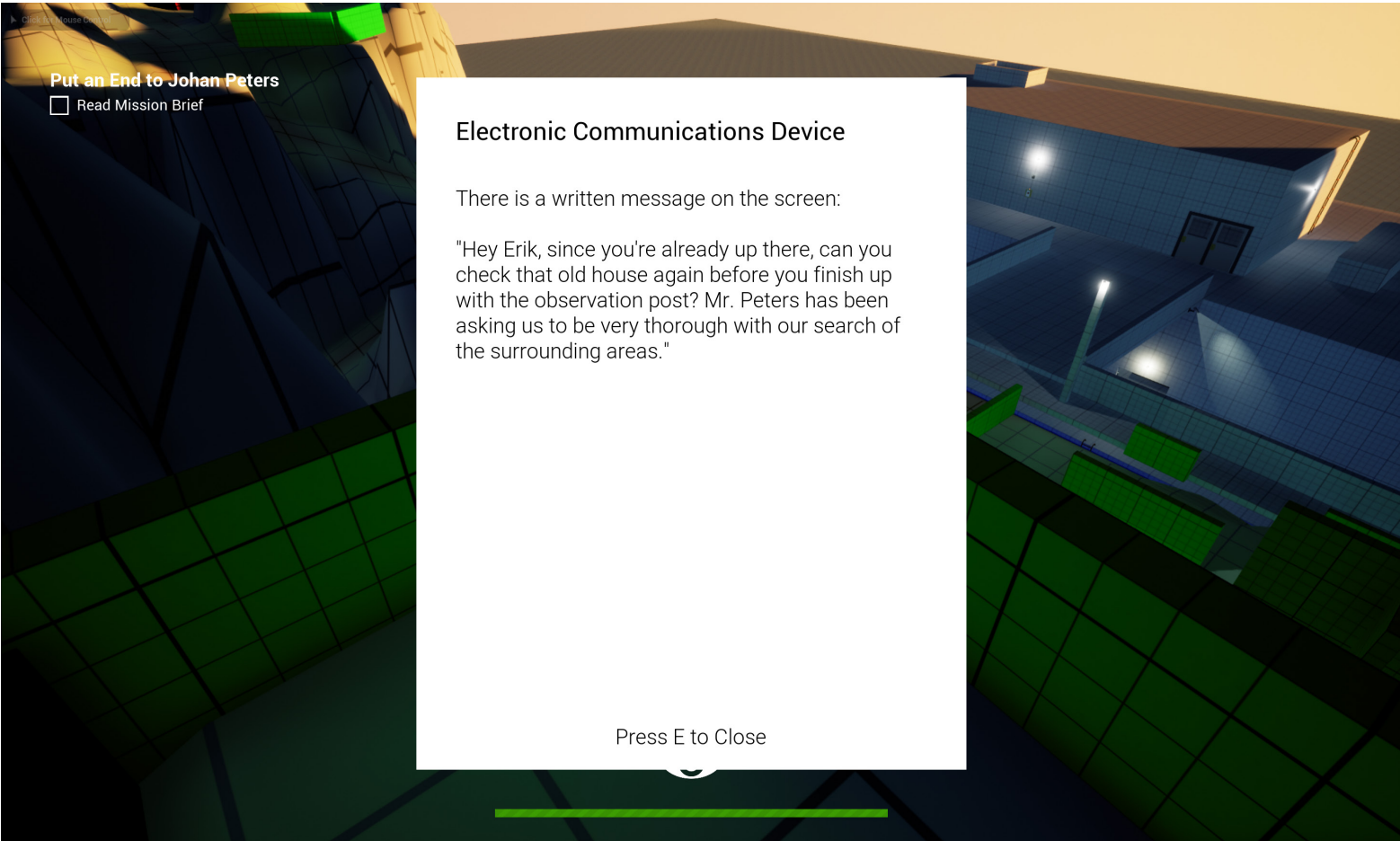
Original 2D Map

Screenshot from Playable Blockmesh

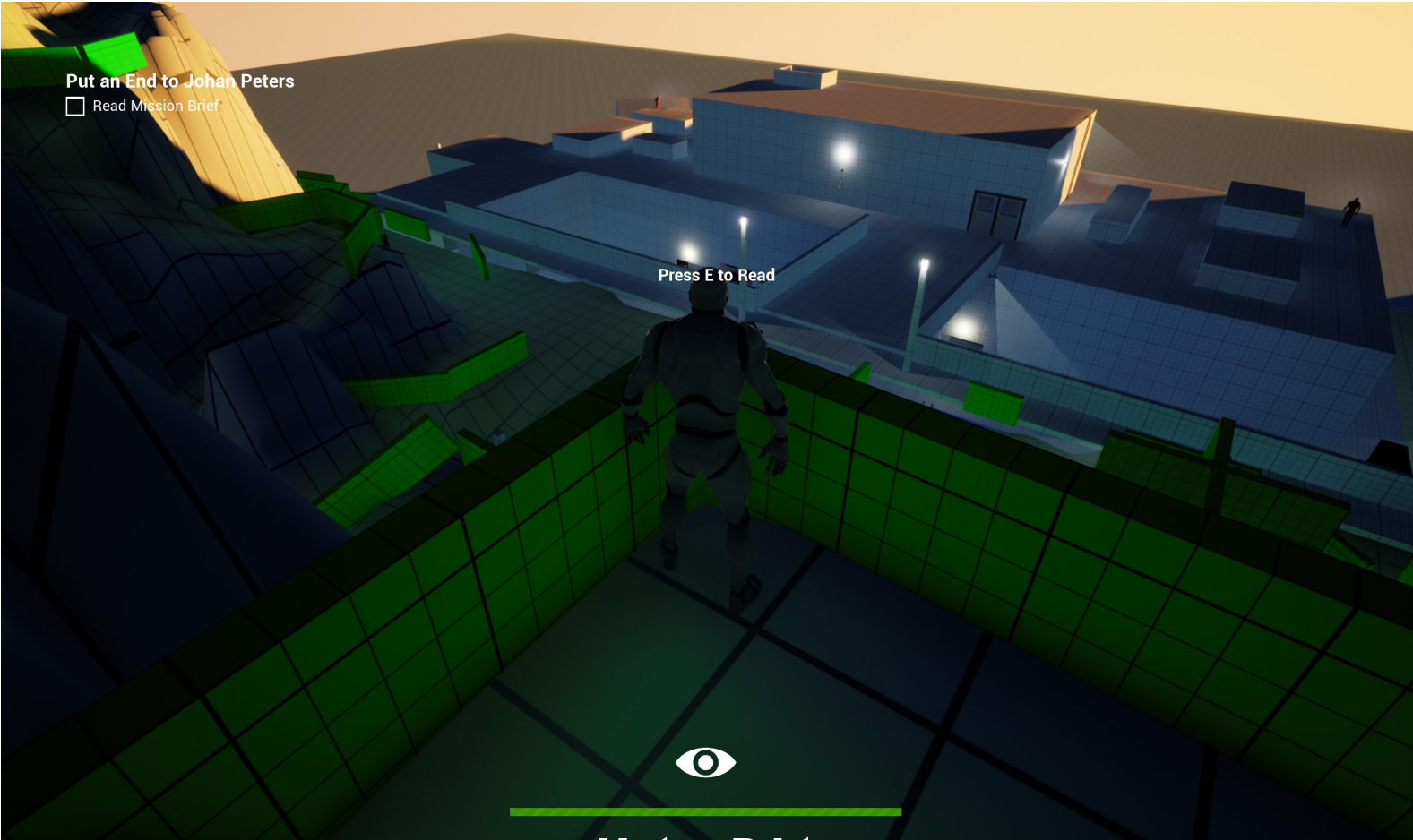Player Start

First Laser

Mission Brief

The initial goal for the mission is to read the Mission Brief, located right in front of the player at the start of the map. This is for a better playtesting experience, but it would be removed on a final version

Electronic Communications Device

There is a written message on the screen:

"Hey Erik, since you're already up there, can you check that old house again before you finish up with the observation post? Mr. Peters has been asking us to be very thorough with our search of the surrounding areas."

Press E to Close

This document points the player to the House on top of that same mountain

Vantage Point

As you turn around you see the Old House as well as the laser trap and the path to exit this area

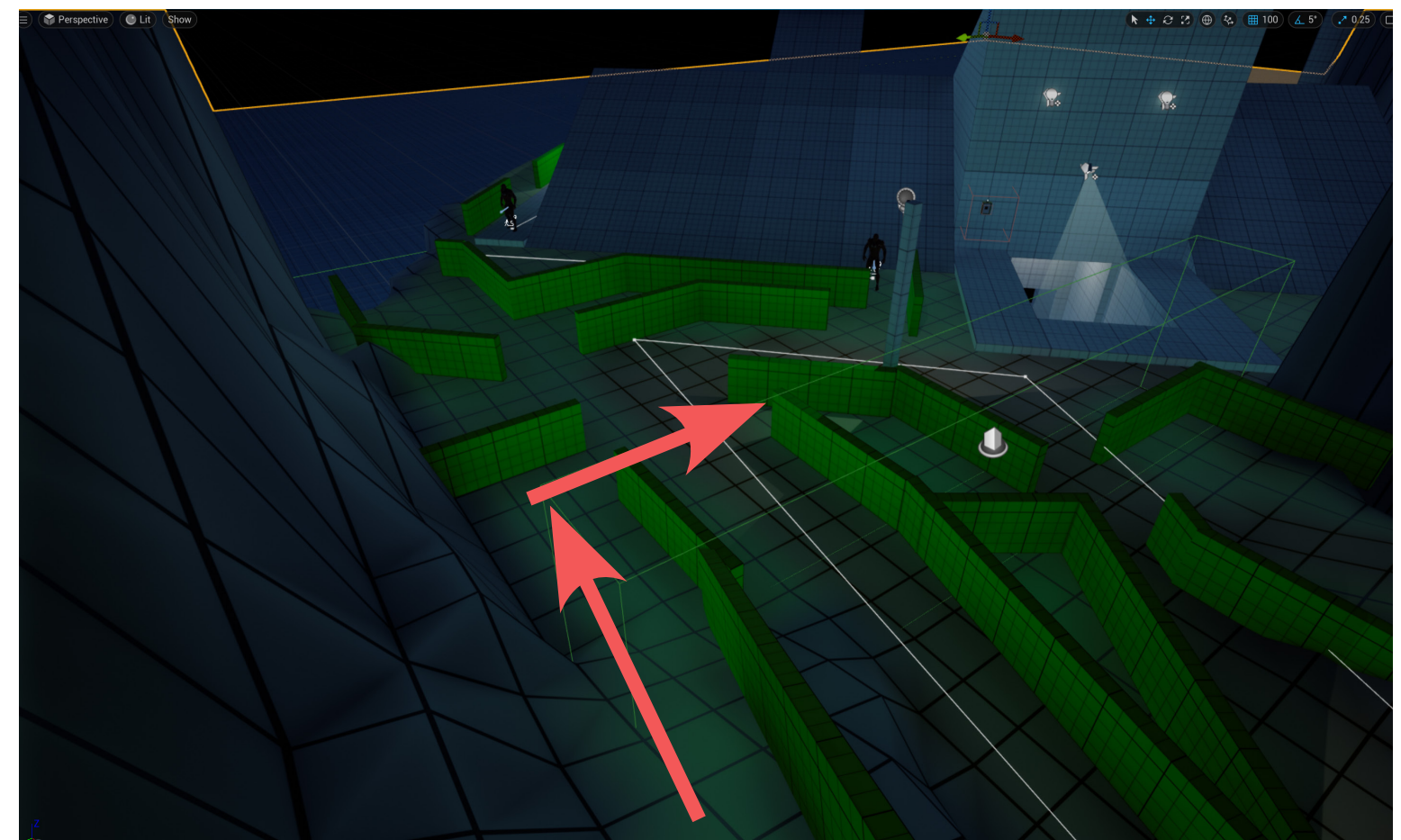Vantage Point overlooking the Security Lodge

The ramps that descend from that initial area now leave the player facing the security lodge instead of the main house.

The Golden Path for the level involves the player going in the direction of the security lodge first in order to complete the side mission, so the orientation of the ramps was changed to better imply that to the player.
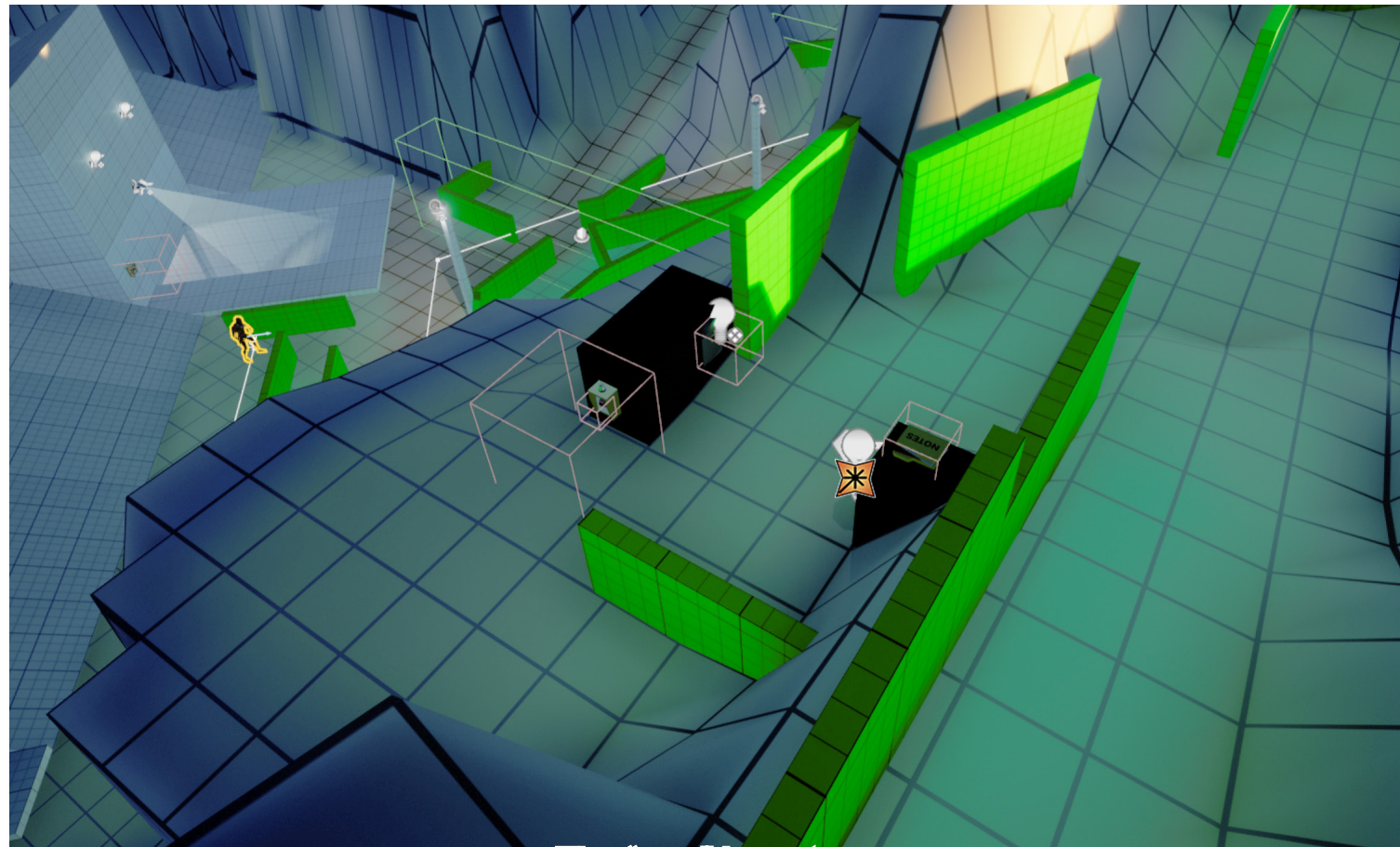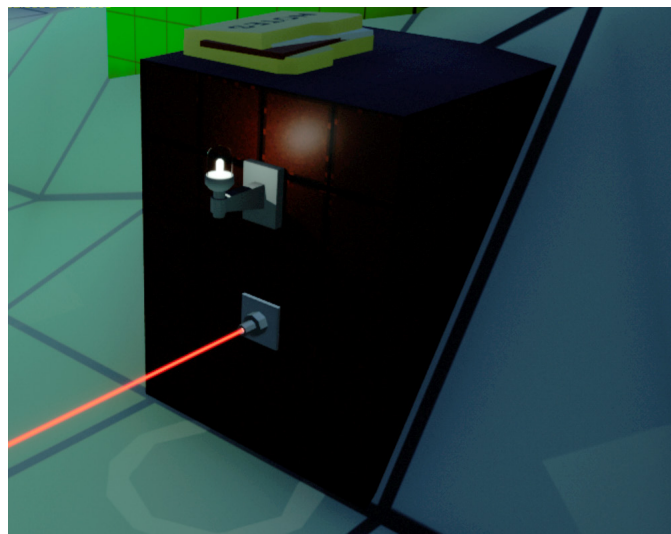

The end of the ramp provides cover for the player from patrols and suggests a path for them as well.

The "new" laser trap

The message explaining to the player how these traps work
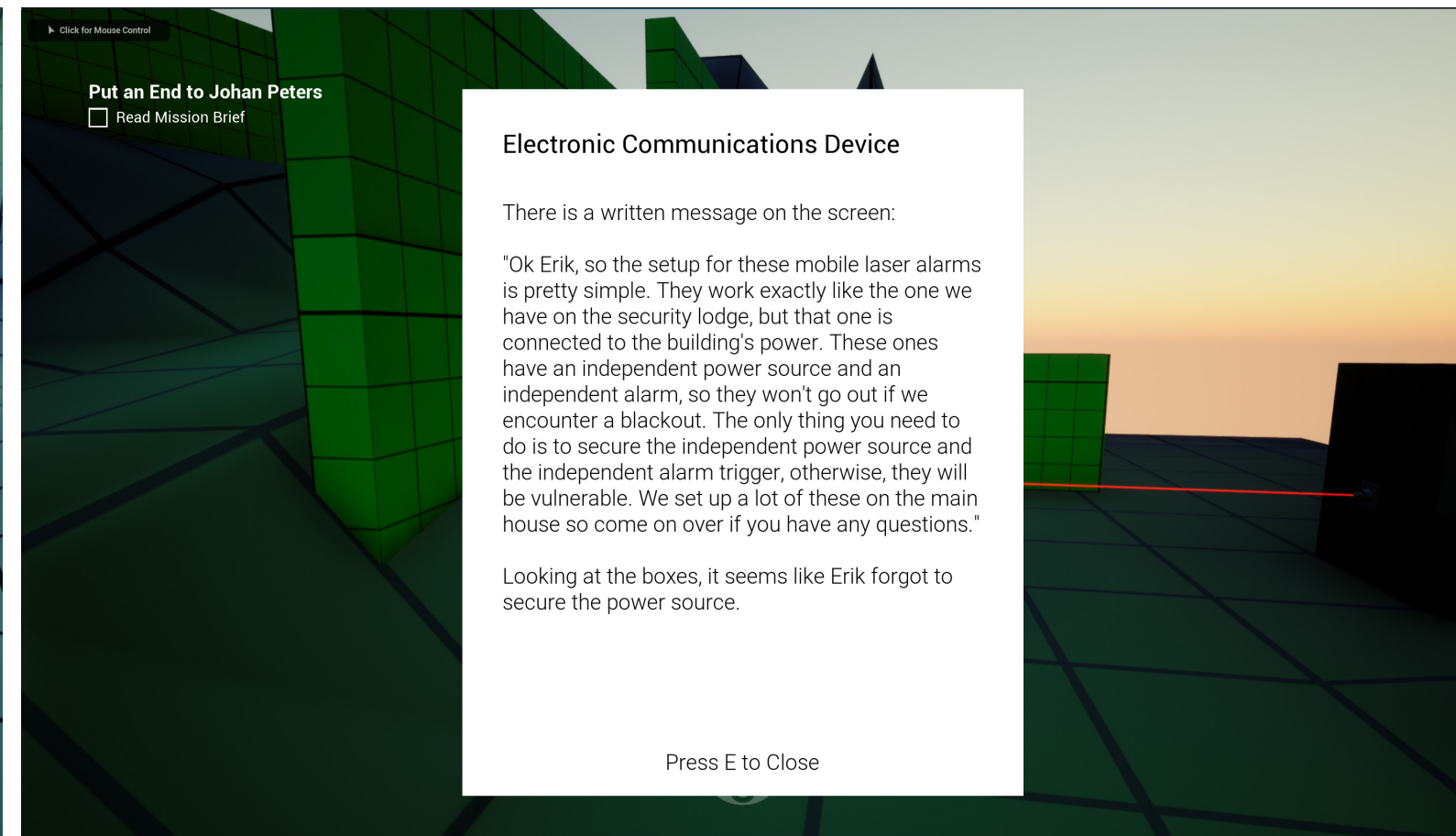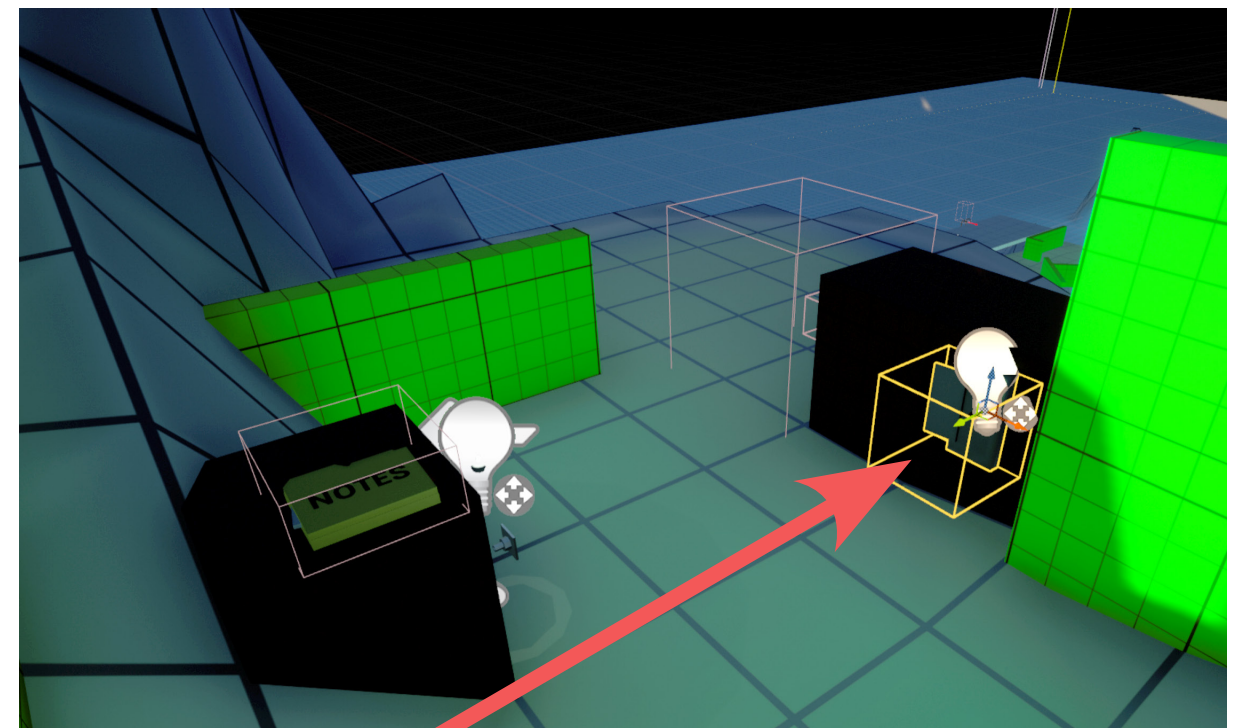
- Currently, lasers are meant to work in tandem with Power Breaker and an Alarm Box in order for the player to be able to deactivate them.
- However, they can work without an Alarm Box and Power Breaker, they will still trigger an alarm, but the player won't be able to deactivate them.
- This makes for an interesting obstacle that the guards can pass through but the player can't.
- So I propose the concept of a "mobile Laser Alarm" which will be used to its full potential later on in the level. For this simple encounter, the option to turn it off is right there next to the laser
- On top of the laser trap there is a document explaining both lasers and the "mobile laser alarm"

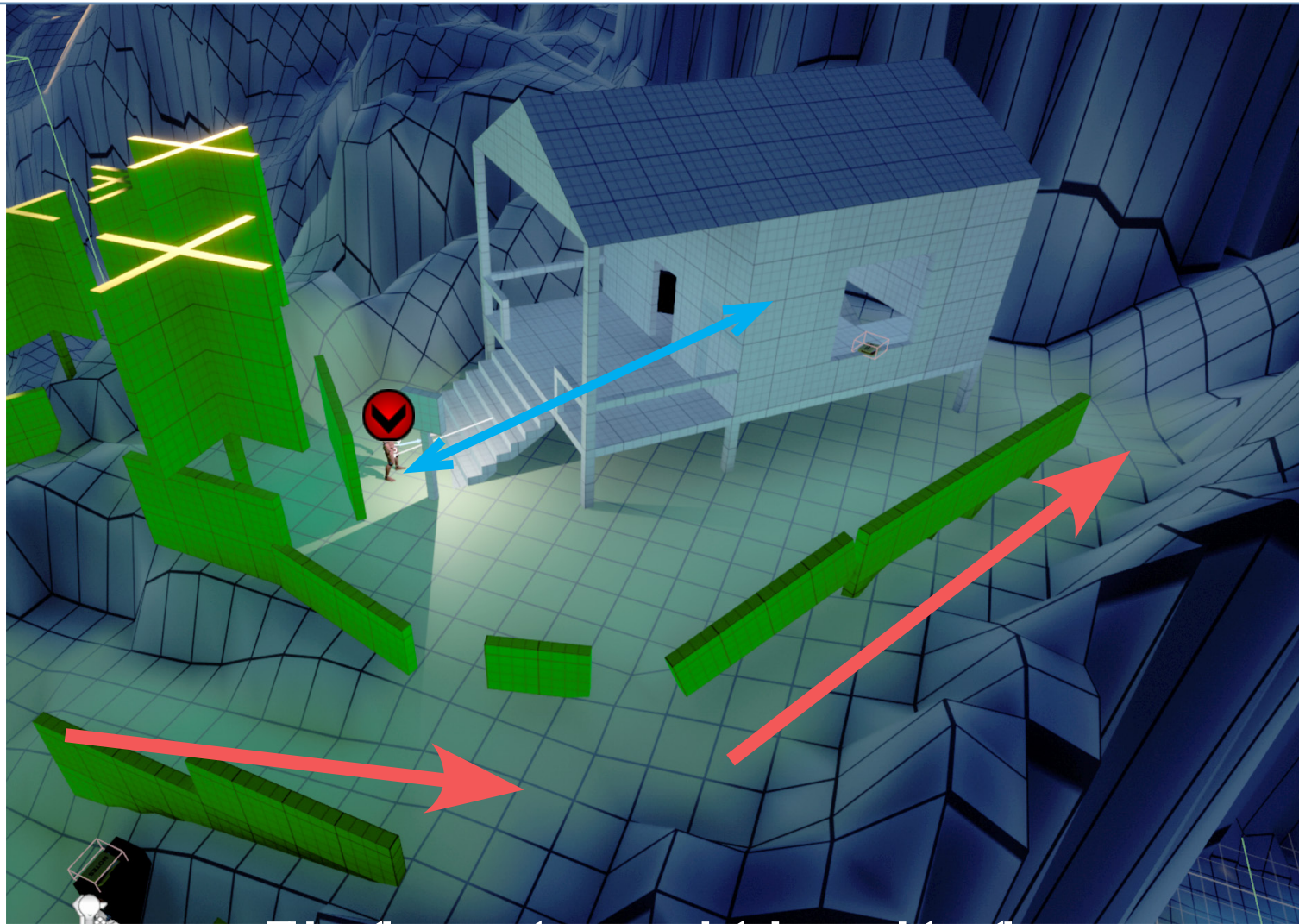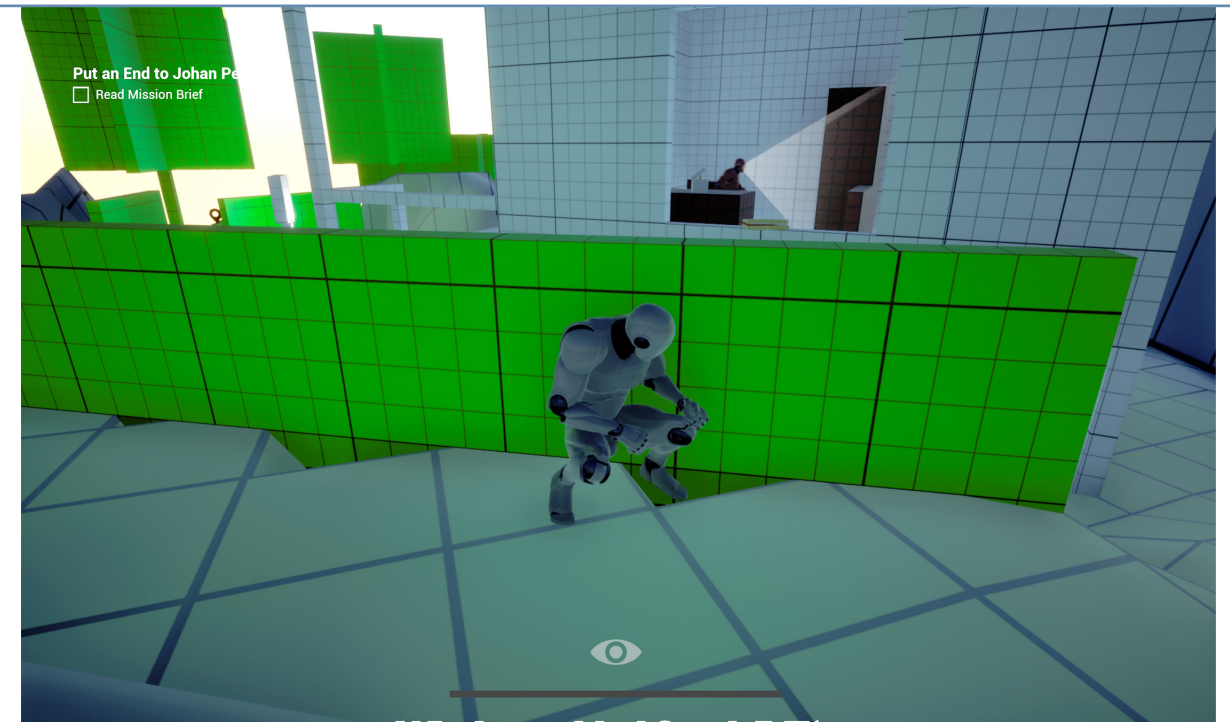I place Alarm Lights right above the Laser for immediate feedback to the player

The Power Breaker is right next to the laser for the player
There is also some immediate cover right after the laser, just in case the player triggers the alarm and needs to hide from the incoming guard
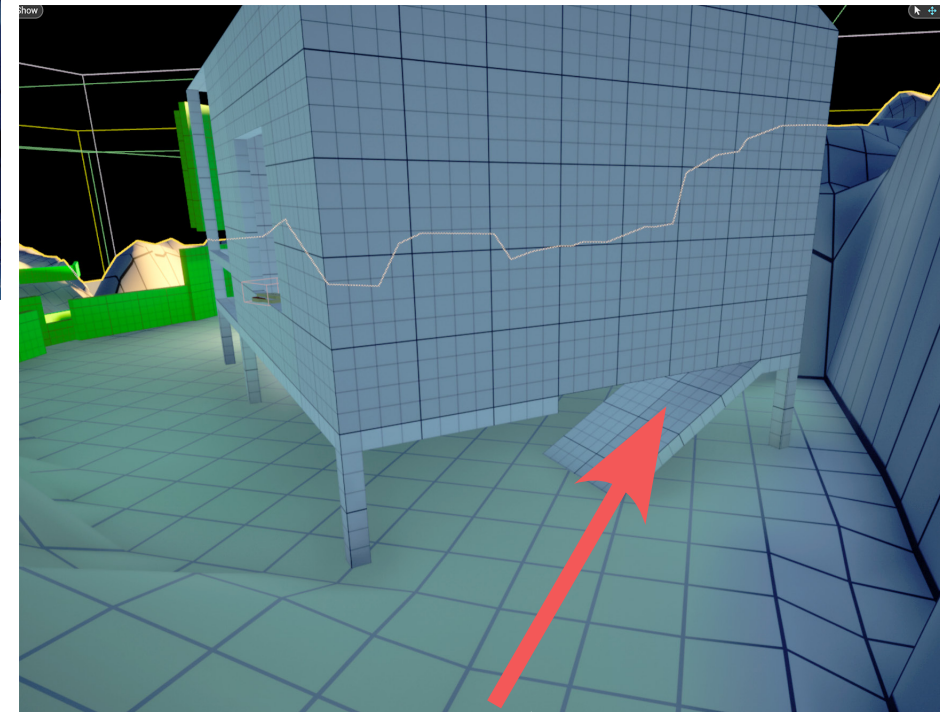
Window added for visibility
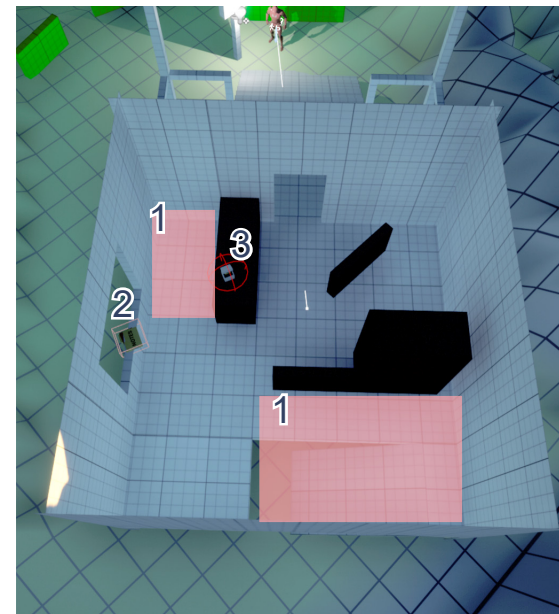
This entire encounter was made to be more interesting

- One guard keeps patrolling this area going inside and outside in a simple pattern
- There is one light outside the lodge
- The bottom of the lodge is a crawlable space for the player
- A hidden entrance through the floor was added behind the Hunting Lodge
- A stealth path was added on the farther side of it that the player can take to go behind the lodge
- The lodge also has a window on the far side of it so the player can see what's going on inside of it
- More cover has been added to the Lodge
- There is a diary inside it, further explaining the "Disable All Cameras" sidequest
- Item #1 one the Disable All Cameras sidequest is here

Hidden Entrance

1. Extra Cover areas for the player.
2. Document talking about the "Disable All cameras" side objective
3. First Item required for the "Disable All Cameras" side objective
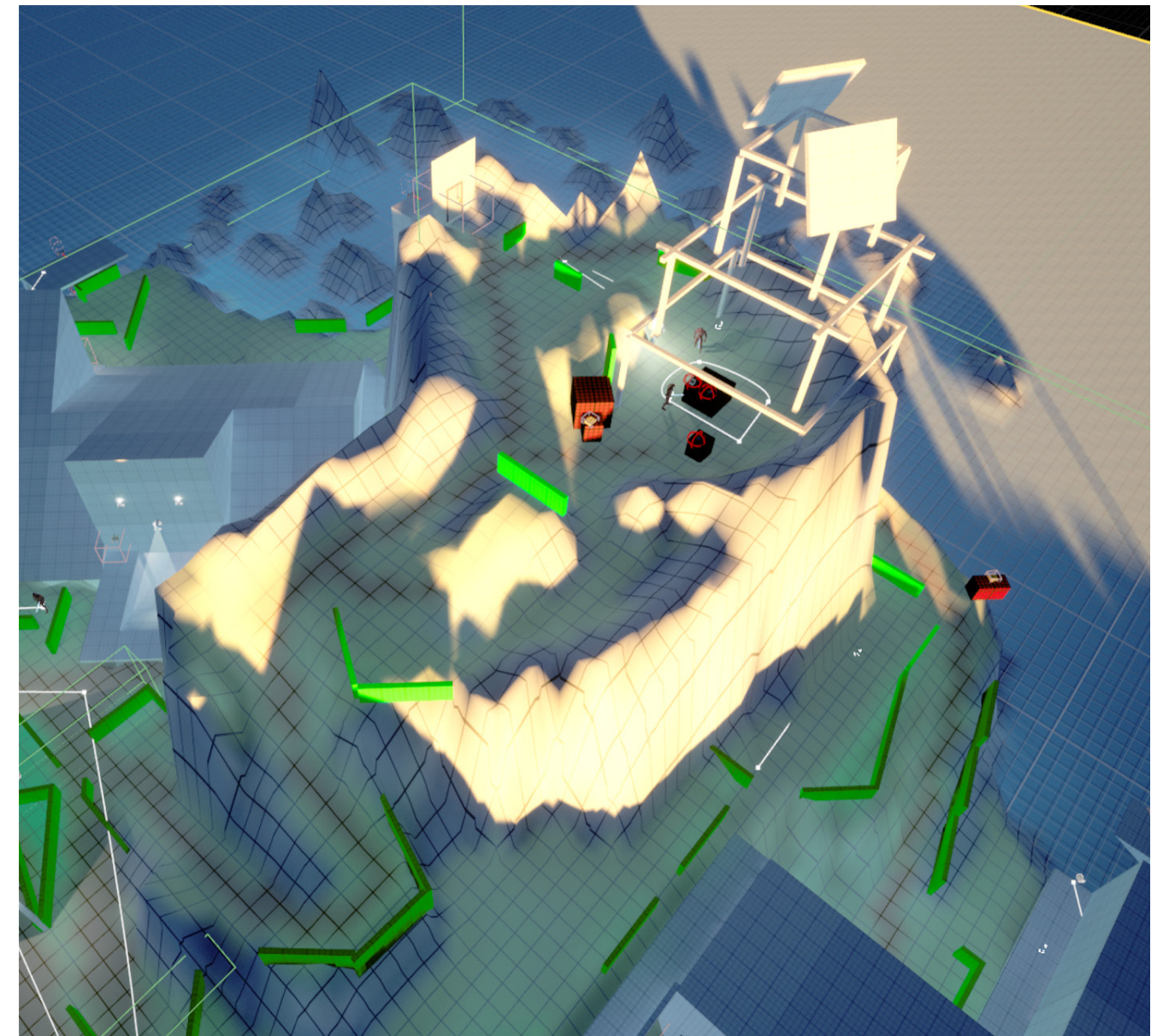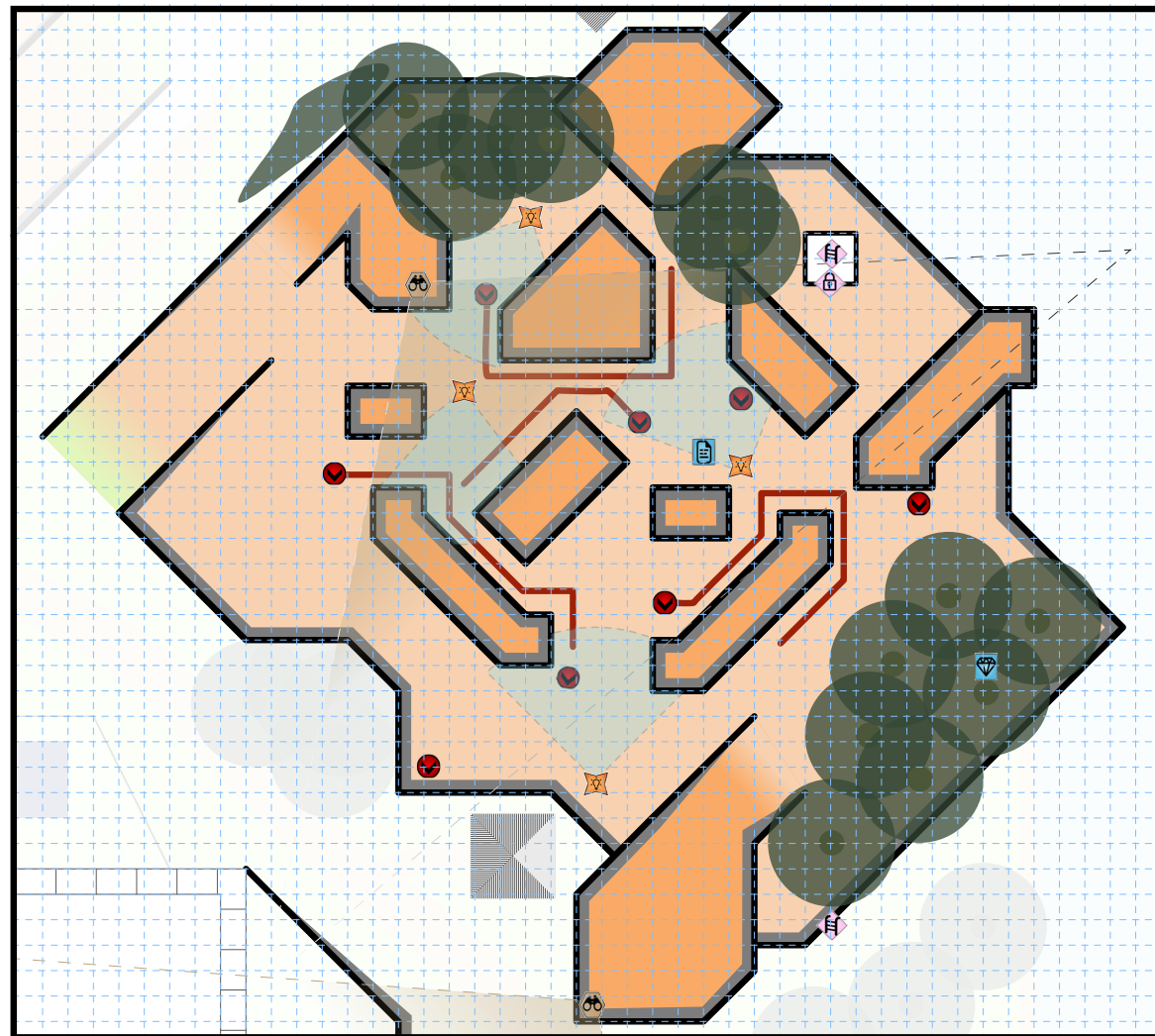
East Mountain - Radio Tower

There were two major goals with designing this area:

- Give the player access to the backside of the Security Lodge
- Complete the "Disable All Cameras" side objective

There was also a connection between this area and the South Beach on the 2D map via ladder, but that was replaced with a ramp on the implementation. Both of the main design goals remain in place even with the redesign. The area was filled with guards and almost entirely optional so the changes are meant to make this area more attractive to the player and make better use of the resources available.
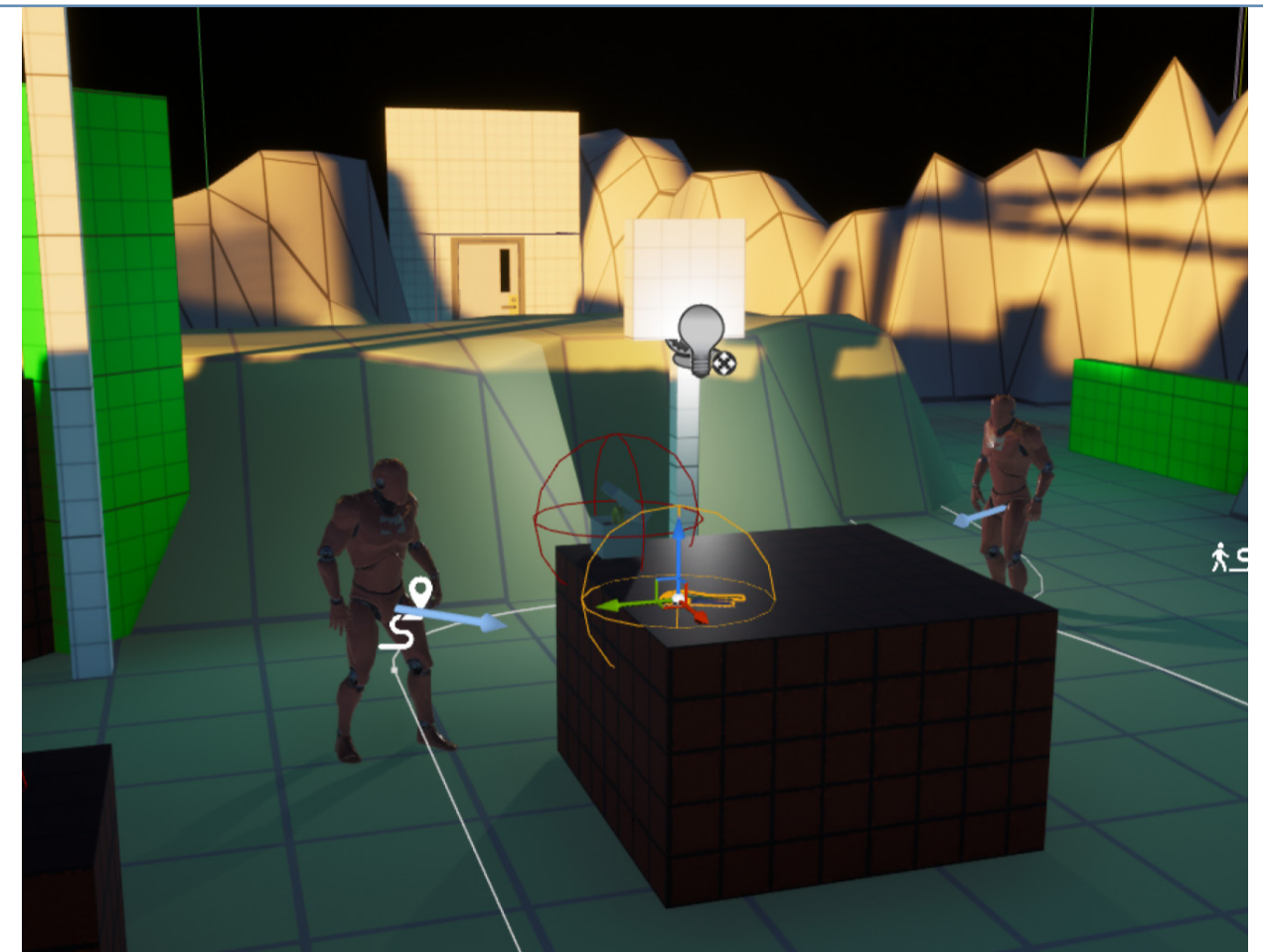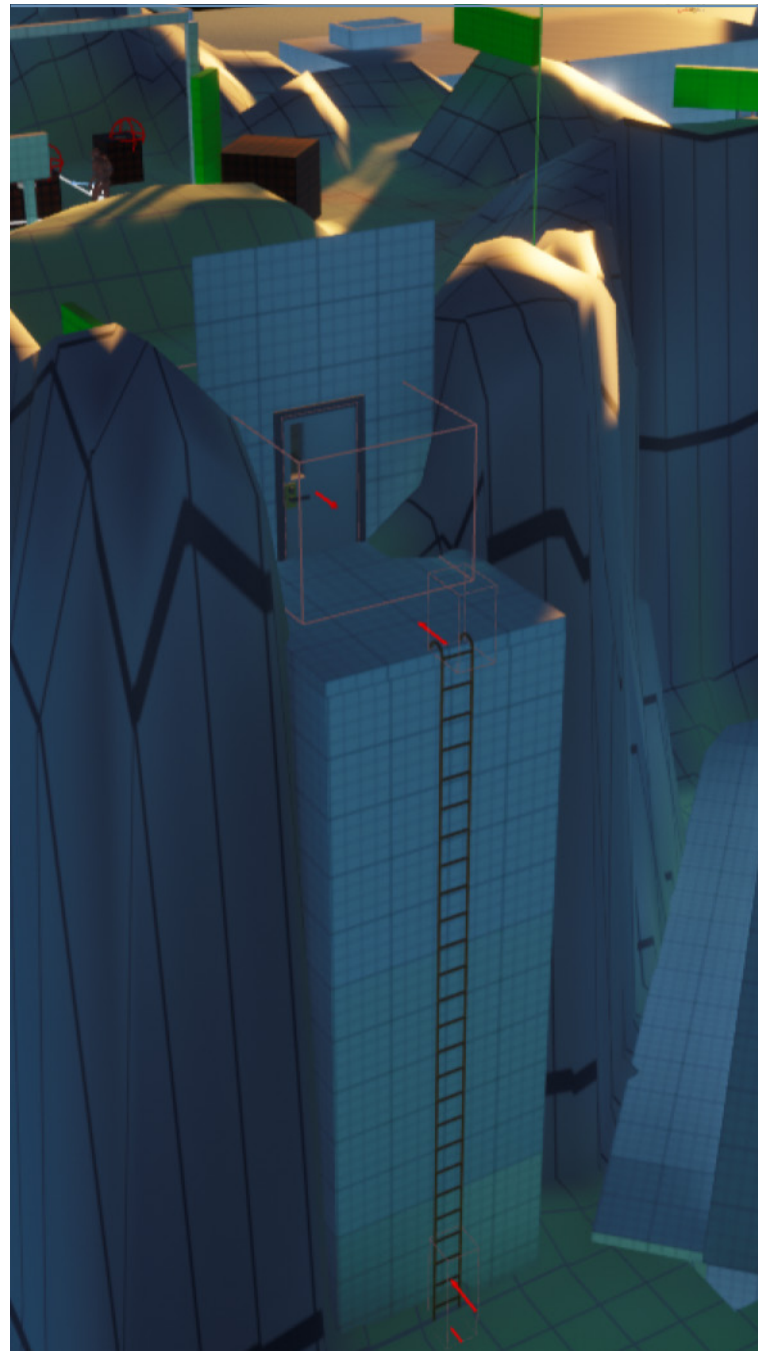
- Added a "Radio Tower" to function as a landmark on the map for the player. Use this landmark to reference the location on documents
- The second item for the "Deactivate All Cameras" objective is located here
- There are two keys here that take the player to a back door of the Security Lodge
- Two guards patrol the area and guard the items below the Radio Tower
- There is a landscape ramp on the outer side of the Mountain that leads to the area of the map with the Main House
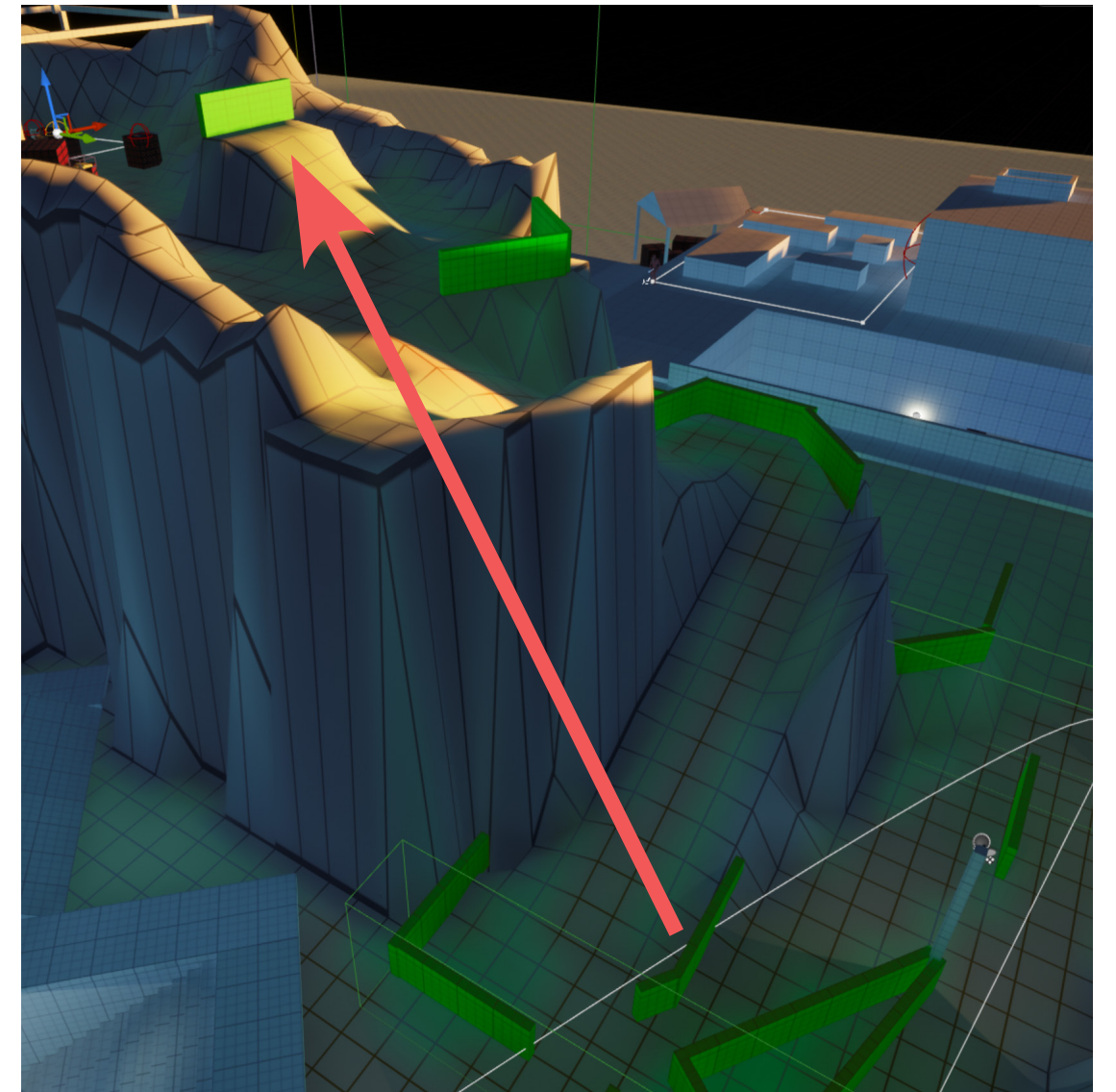

Original 2D Map

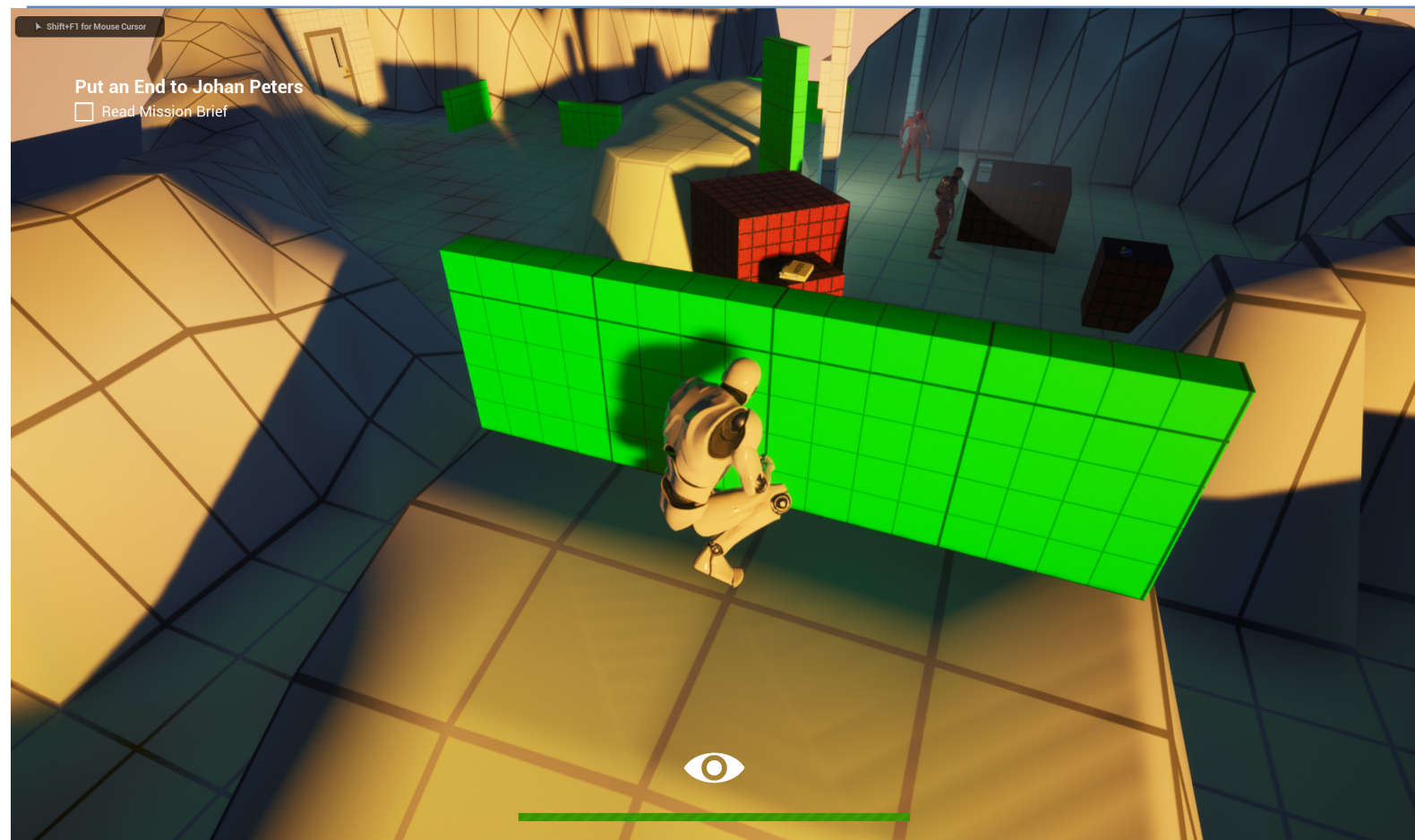Radio Tower visible from the first Vantage Point

- The secret tunnel was replaced by a Ladder addition that takes the player to the backside of the Security Lodge
- The in-game logic for this is that it makes sense for there to be a direct connection between the lodge and a Radio Tower
- Key to the ladder is at the bottom of the Security Tower
- Key to the backside of the security lodge can also be found at the bottom of the Radio Tower
- Only two guards patrol the area instead of the small battalion present on the 2D map
- There is a small vantage point for the player to scout the area before engaging right when they arrive on top of the Radio Tower Mountain
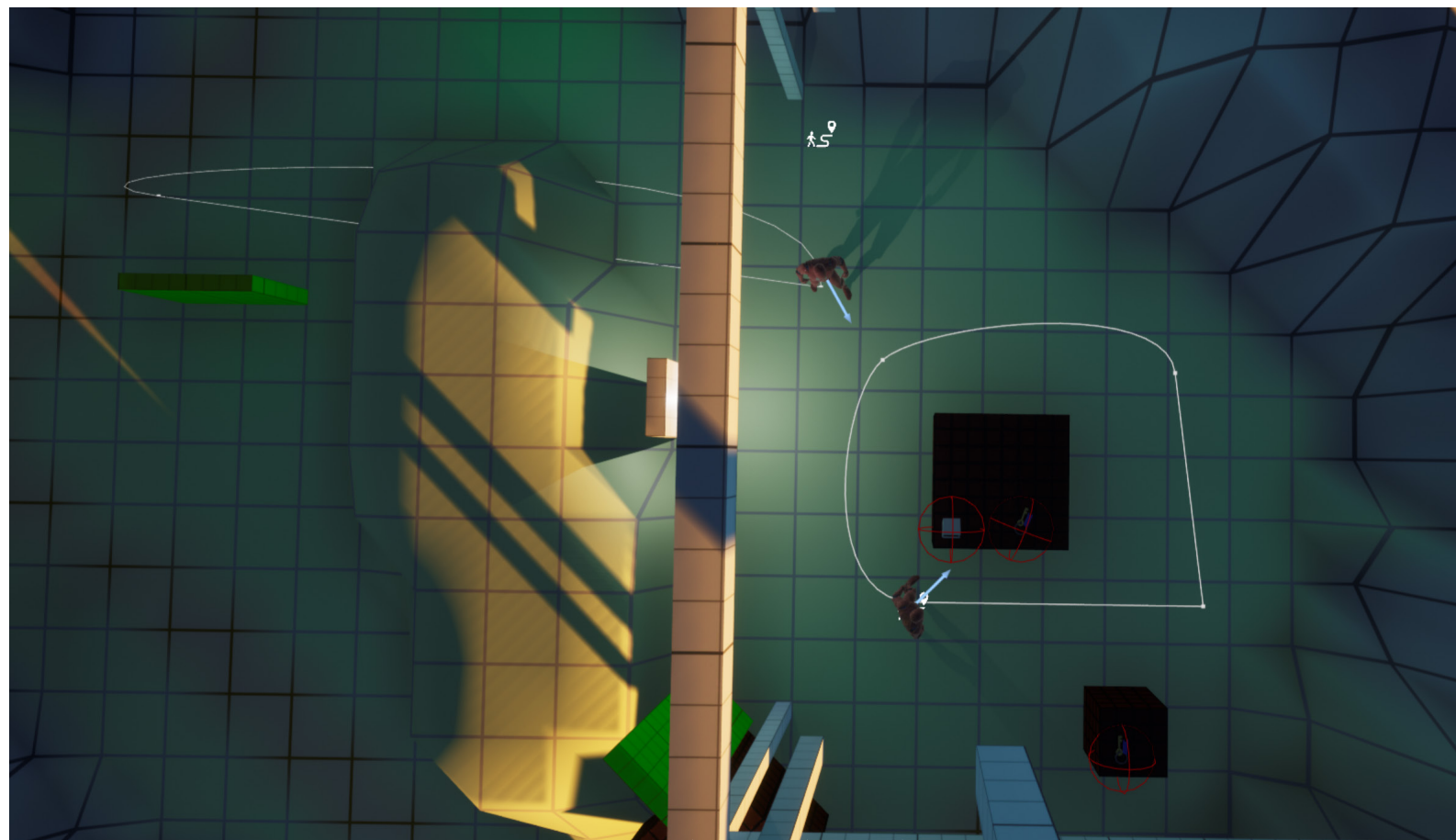
View From the Vantage Point

- An extra ramp has been added that connects that area to the Main House area
- This gives this area extra purpose and gives the player another access avenue to the Main House
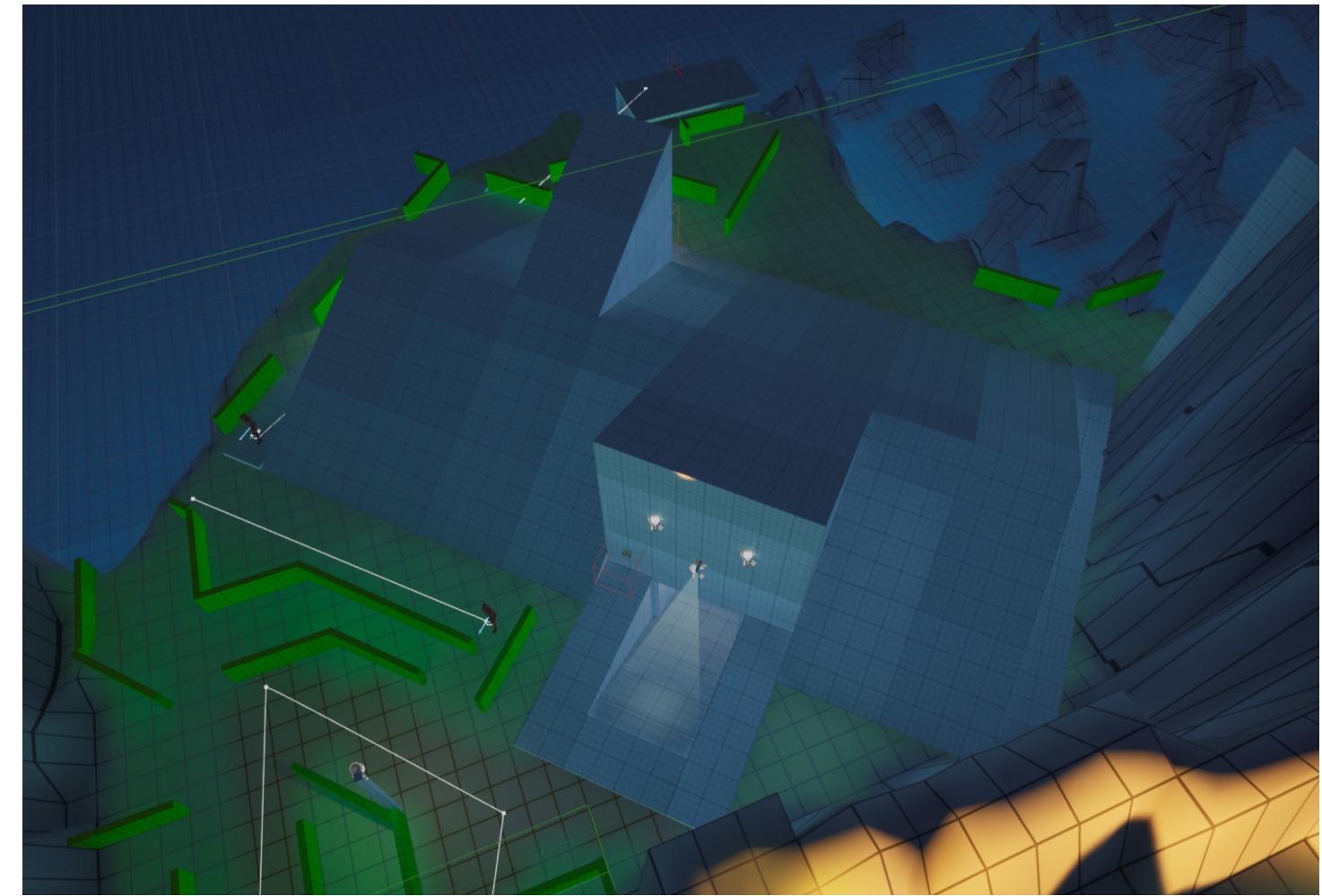

Guards and their patrol paths
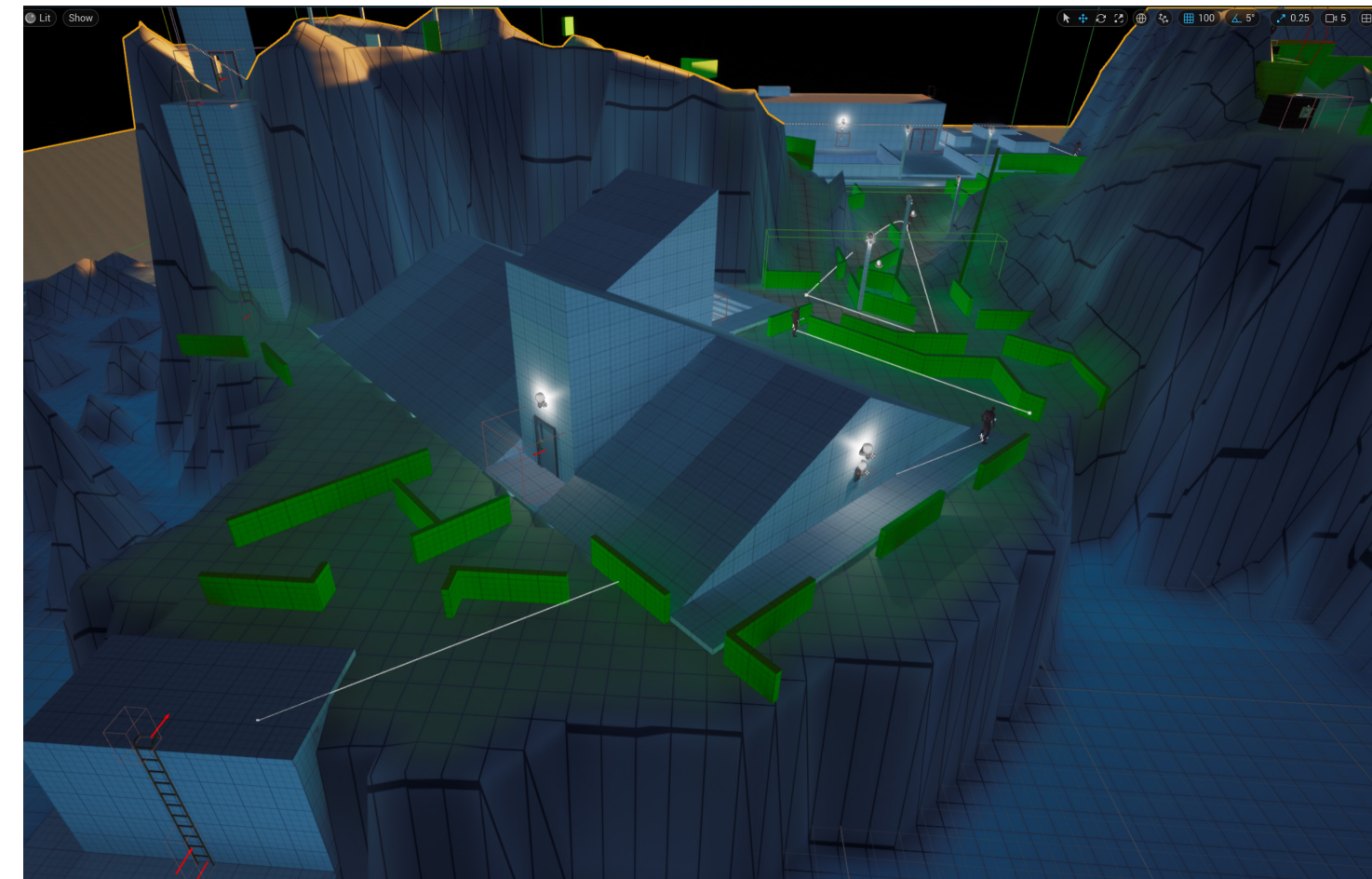
North Beach - Security Lodge

This area has one of the Main Objectives which is to Plant The Virus on the Security Server. It is also where the player can deactivate all cameras on the compound if they gathered the two treasures on the Initial Area and on the Radio Tower Area

- The Floor plan has been mirrored to keep the Goal within the POI_Volume area
- One guard patrols the inside of the Security Area, and two guards patrol the outside
- Some cameras and lasers have been better positioned in relation to the design and some lights were added to the overall layout both to guide the player and serve as a small obstacle (makes the player more visible)

Original 2D Map

The mirrored version of the Security Lodge

The backside of the security lodge with the back entrance, the building's power breaker and the ladder on the background

The back entrance that leads to the catwalk

The door to the Server Room is now based on a passcode. It is also working on a different Power Breaker than the rest of the Security Lodge, so that the player will not be locked inside of it

There is a laser trap blocking the entrance to the server room from the catwalk. The player can turn it off if they turn off the building's power breaker

The catwalk leads to both the server room and the locker room
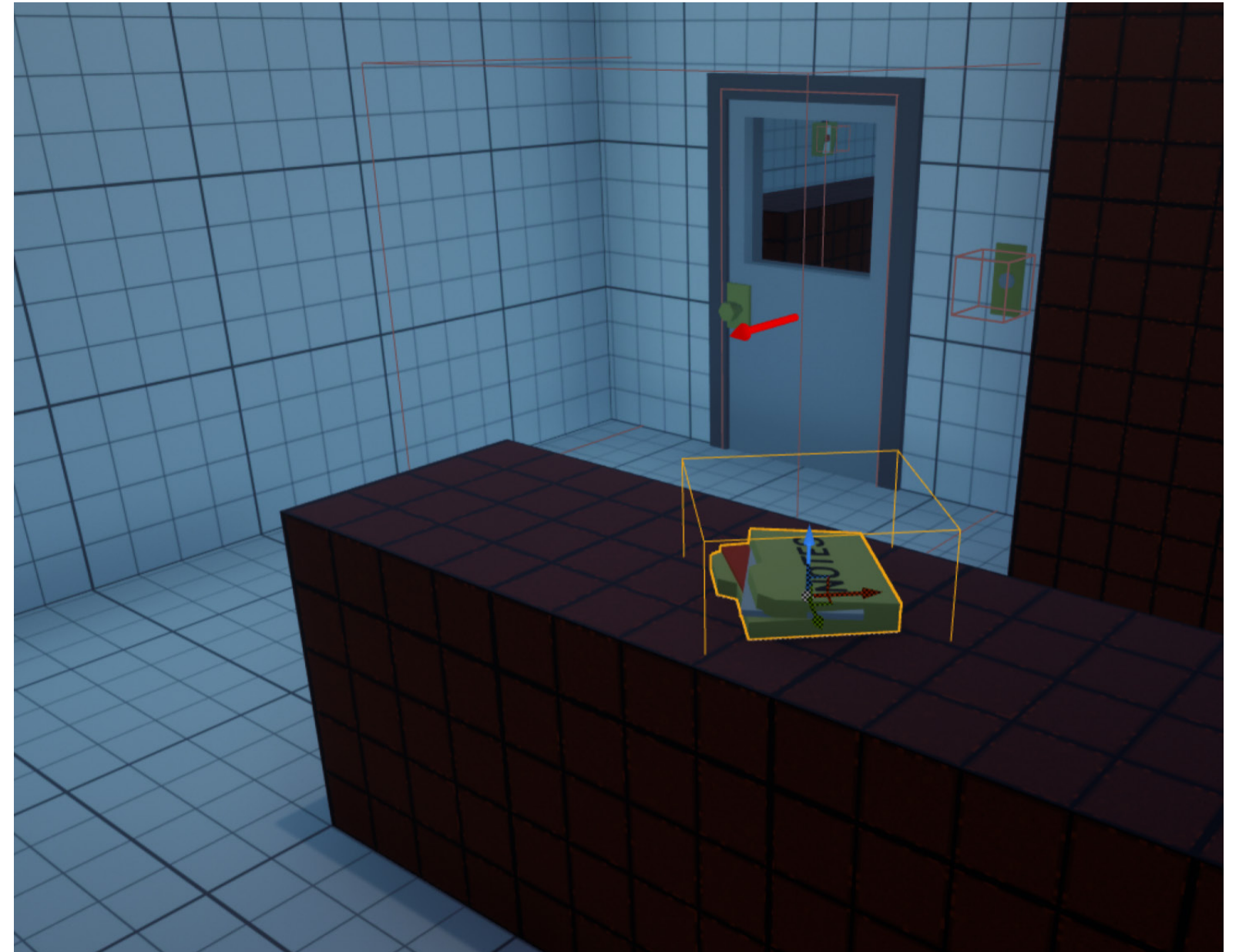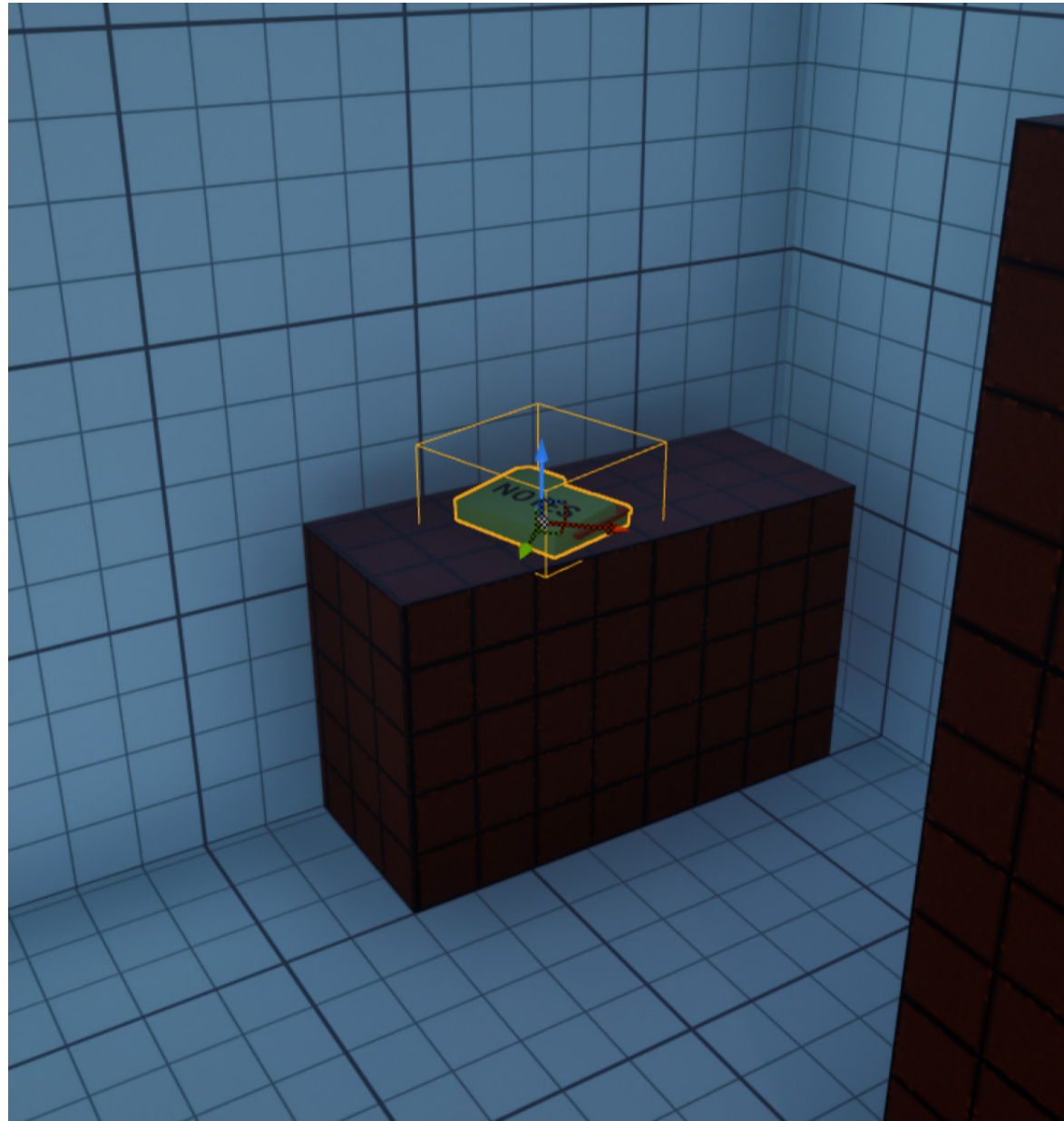
Main Entrance

View from the Catwalk, with the laser trap looking in the direction of the server room

Put an End to Johan Peters

☐ Read Mission Brief

Since the player can drop directly inside the Server Room, there are two documents in the building with the Room's passcode. One of them is inside the Server Room so that the player will not get stuck

MAIN
SERVER

Plant the virus

Disable All Cameras

The Server Room with the Plant The Virus main goal (for the sake of the gameplay it is a treasure object).

There is also the Disable All Cameras switch that will only work if the player has gathered the other two items required for this goal

Perspective   Lit   Show

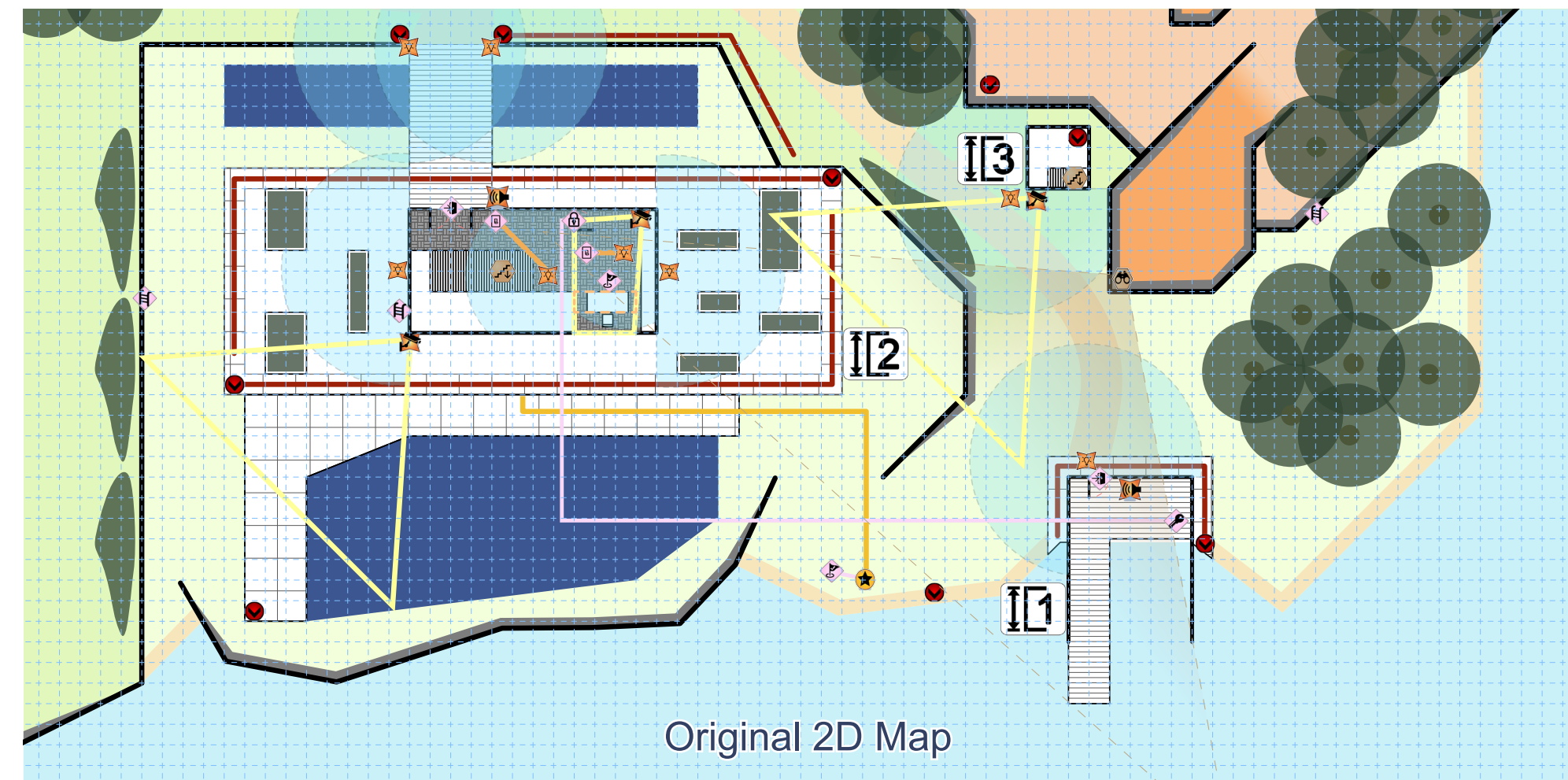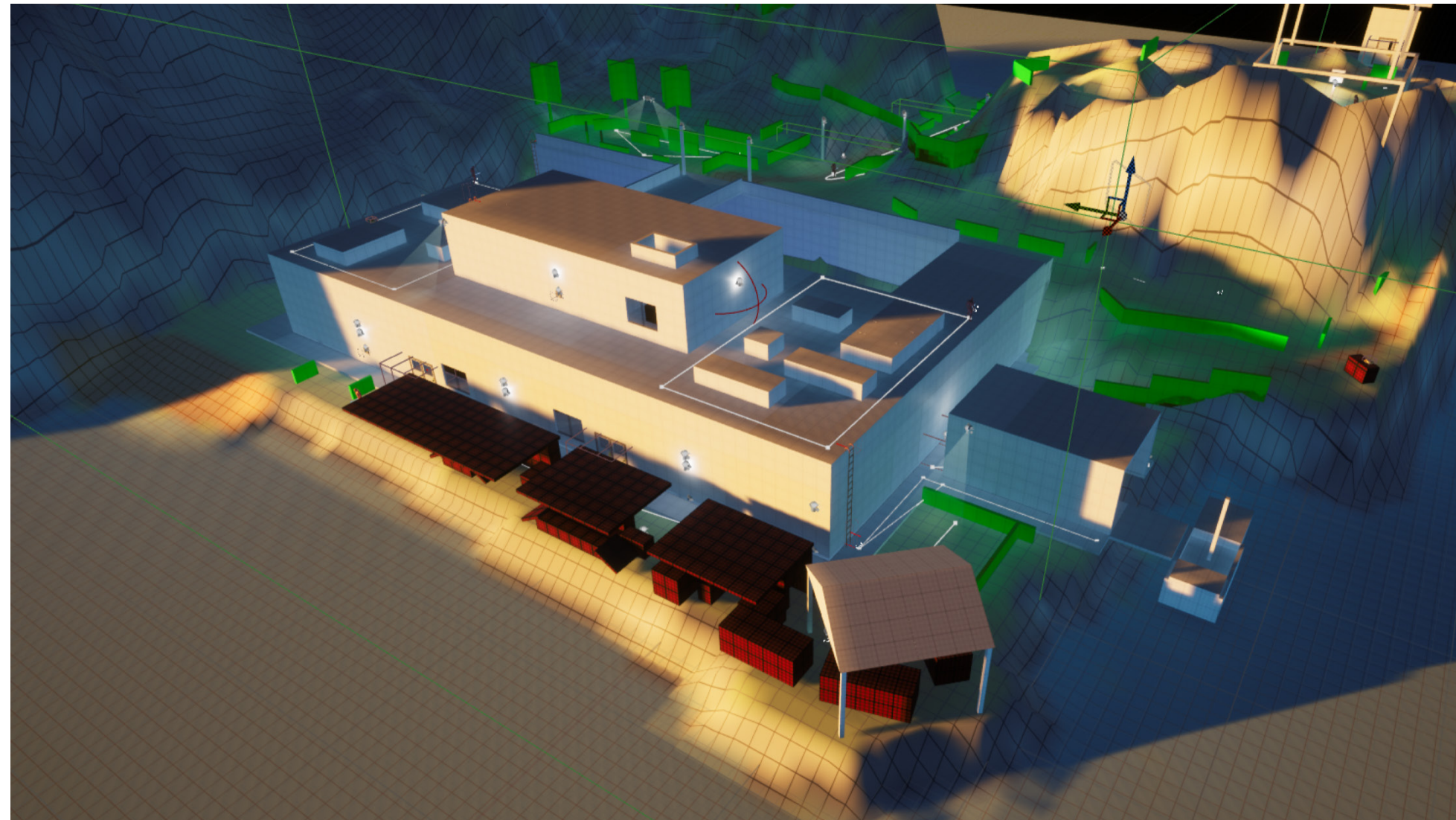A ladder leads from what would be the ocean floor into the back area of the security lodge. While there is no gameplay at the bottom of the ladder or beyond it, it is there to demonstrate a new possible approach to this area should this map be added to a larger open world map.

South Beach - Main House

This area suffered a lot of major redesigns. The goal was to make the entire area more effective and engaging for the player. Unnecessary empty spaces were removed as well as sections that didn't add much tension to the gameplay. Laser traps and cameras were added to work in tandem with the limited AI budget as well as space.

Two main objectives are completed in this area, Steal Compromising Documents and Assassinate Johan, after all the main objectives are completed, the player will have a new objective to escape via the Boathouse. This area has been heavily redone in relation to the 2D map in order to create more interesting scenarios and make better use of resources.
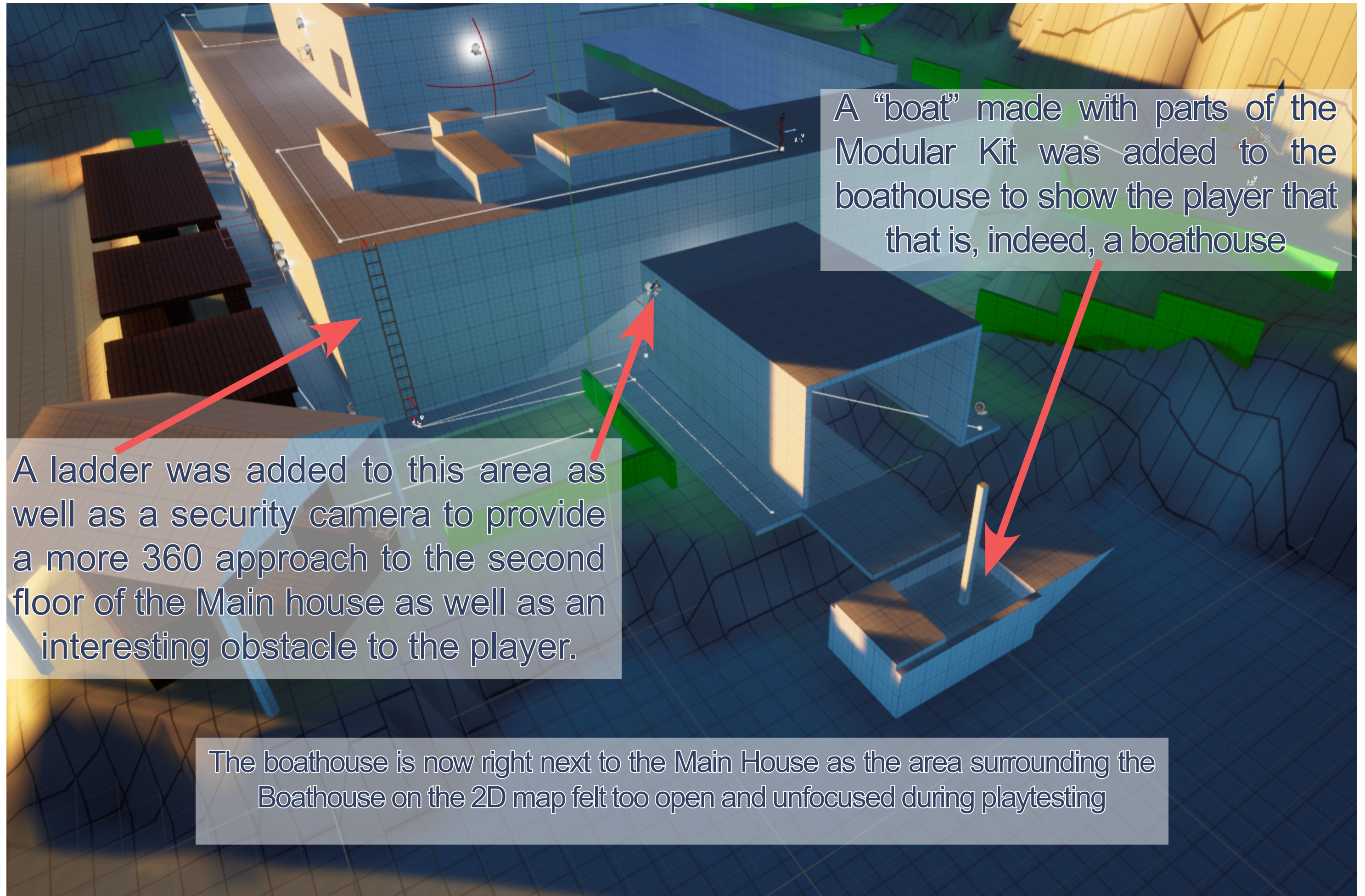

Original 2D Map

The West side of the house was redone with extra security cameras and a path with cover for the player. The open window leading to the kitchen remains, with a small stepping stool for easier access.

A "boat" made with parts of the Modular Kit was added to the boathouse to show the player that that is, indeed, a boathouse

A ladder was added to this area as well as a security camera to provide a more 360 approach to the second floor of the Main house as well as an interesting obstacle to the player.

The boathouse is now right next to the Main House as the area surrounding the Boathouse on the 2D map felt too open and unfocused during playtesting

Patrol paths for all guards have been simplified and streamlined. They now work in simple loop patterns

The pool to the south was removed and instead there is a longer section that combines crawl spaces, laser traps and one guard to provide a high-intensity moment to the player. The reward is a good access point to the bottom floor of the main house.

There is lore in the form of a document nearby that explains the reason for the clutter

These lasers are the "Mobile laser Alarm" that were introduced in the first area

▶ Click for Mouse Control

Put an End to Johan Peters
☐ Read Mission Brief

Moving In Report

Mr. Peters is dissatisfied with the slow progress of his moving process. The living room and dining room are filled with boxes of furniture and unopened paintings. We are to expect additional ones to unpack in a few days arriving via boat. In the meantime, if extra boxes arrive please set up a tent outside of the house or throw a tarp over them to protected them from the weather.

Press E to Close

The explanation for the crawl space

Perspective Lit Show

100 5° 0.25 5

The entry point at the end of the crawl space

Some double doors were completely deleted to allow the AI to walk outside of the house.

The original 2D map had 4 groups of double doors on the north and south walls of the Main House; this has been changed to 2 groups of double doors and 2 windows. the goal is to give the player visibility to the inside of the building without having to access it.

The north pool remains, but a camera was added to the location as well as some cover options for the player.

Perspective   Lit   Show

100   5°   0.25   5

There is a door now leading directly to the Sauna where Johan is located. A window with glass shows Johan to the player, without allowing the player to get to them directly, should they get the key for it.
The key is on the opposite side of the pool

The patio/forest area to the northwest of the house has been redone with more cover and two security cameras to make for a more interesting encounter. The reward for going through that space is access to the Sauna Door Key, which gives direct access to Johan

Perspective | Lit | Show

The Office Door now has an Access Code and its own individual Power Breaker, so it will still be operational even if the player turns off the power breaker for the second floor.

Similar to the Server Room, the player can access the office directly, so there are two documents with the passcode for that door, one of which is inside the office

The office now has a window to the outside, providing visibility to the objective

Perspective Lit Show 5 5° 0.25 5

The boathouse remains with its interior plan basically intact, but it is now the site of the final mission objective to "Escape Via the Boathouse" This objective unlocks after the player finishes all other objectives
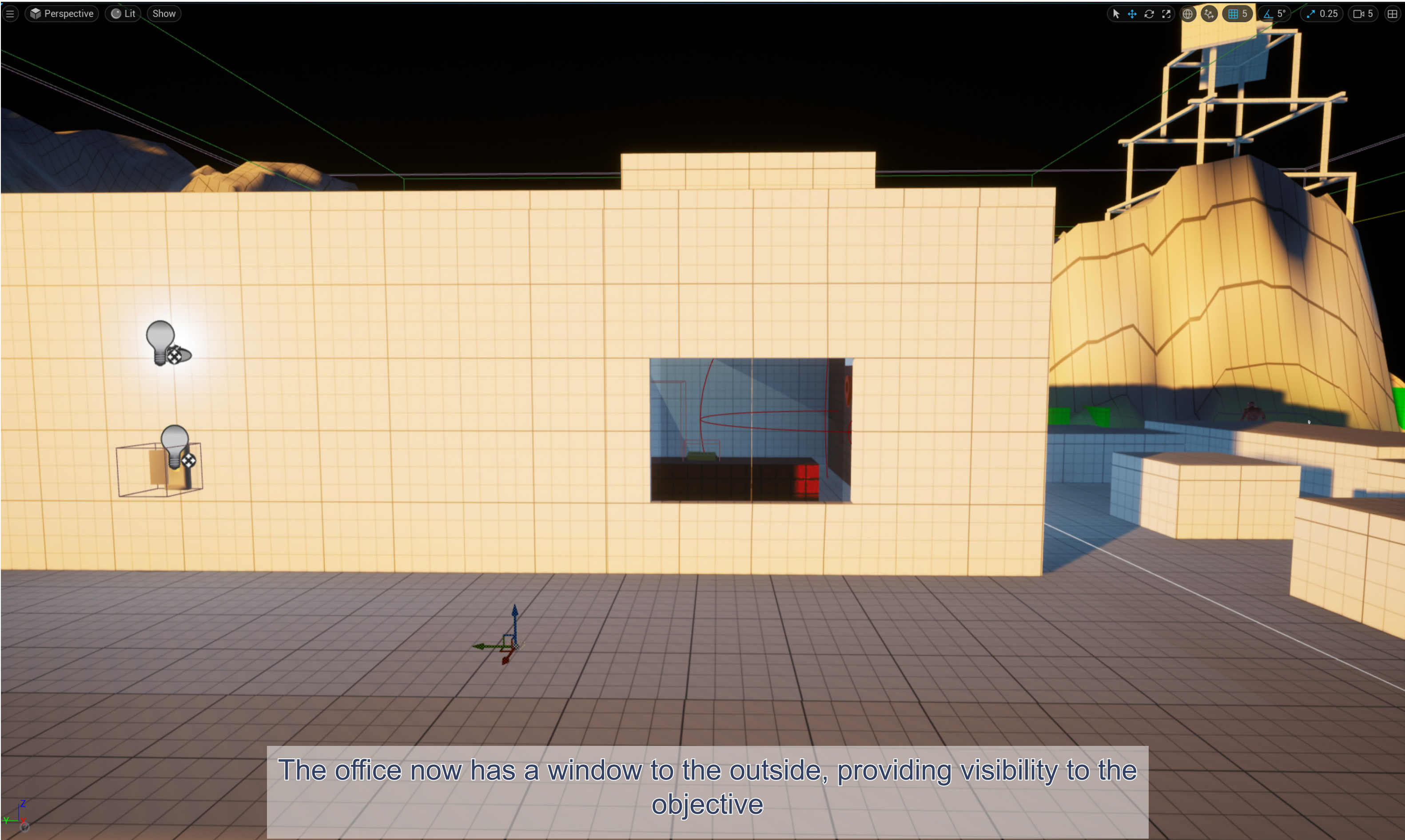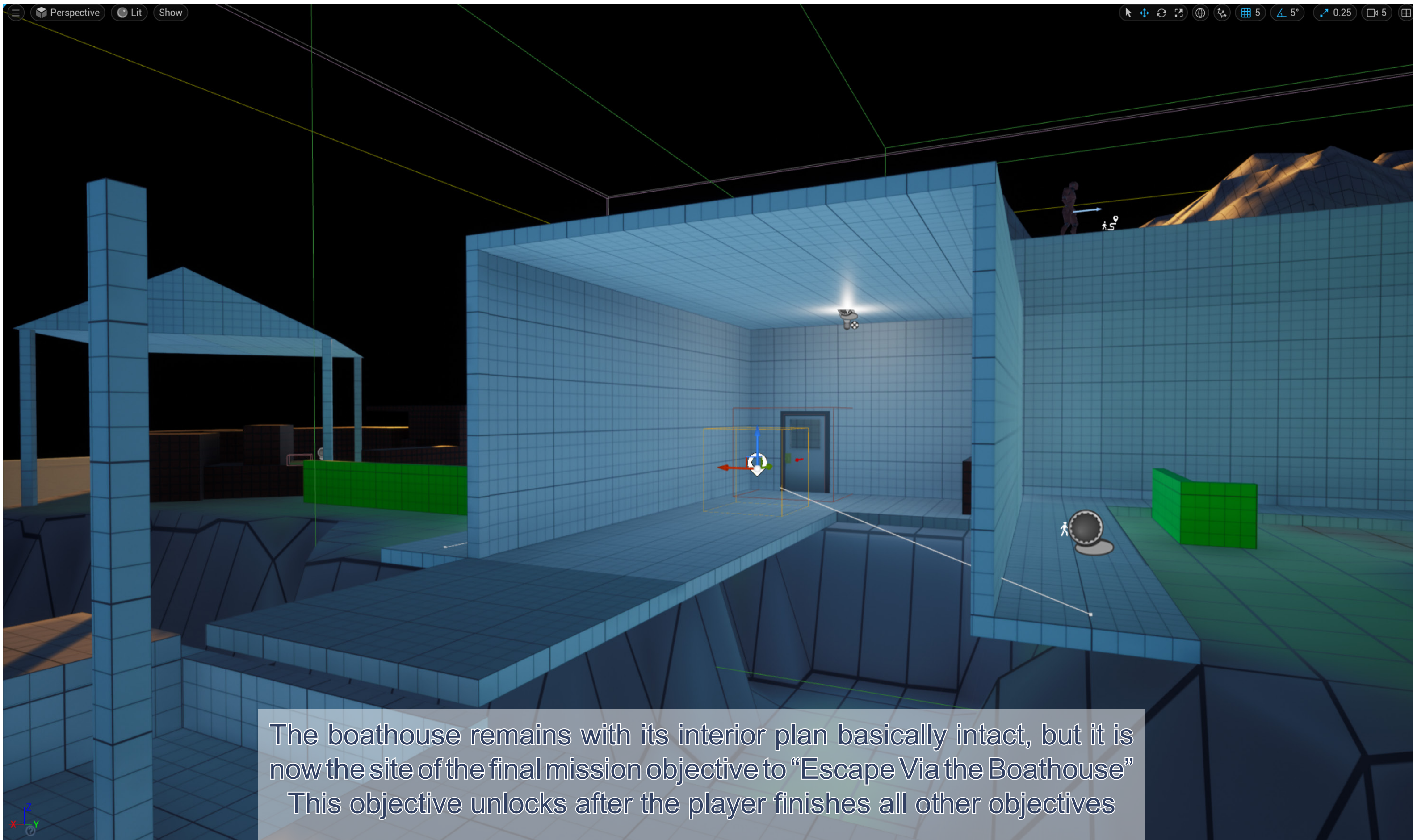
The inner ceiling height of the living room has been increased and an elevated catwalk has been added. This catwalk has two access points and the goal is to provide the player with some verticality so they can view the situation from a safe and advantageous position.

This also mirrors the catwalk on the security building that gives the player this feeling of safety and advantage

Put an End to Johan Peters

☐ Read Mission Brief

View from the Catwalk

Catwalk Access Points

Direction:1
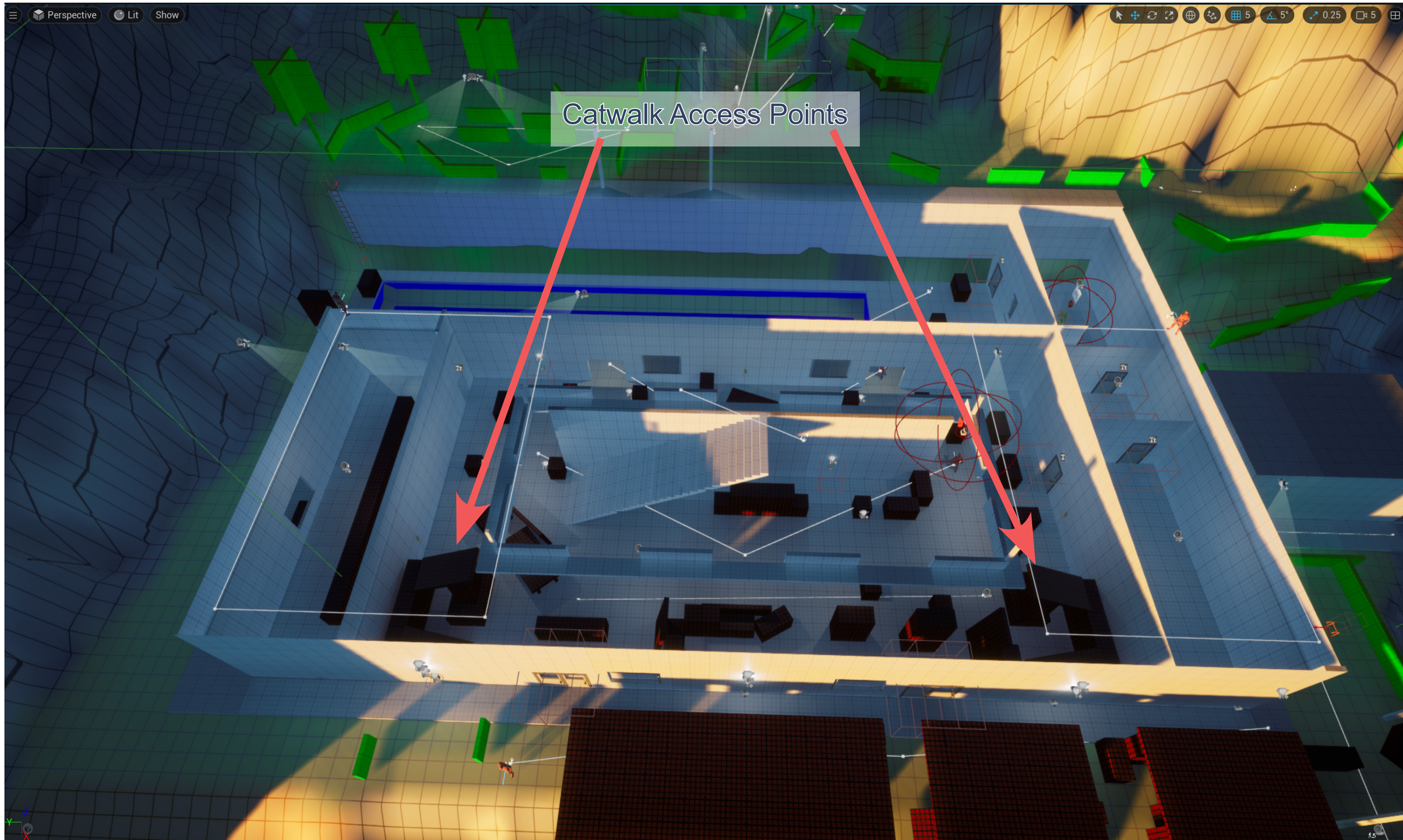Enemy: BP_PlayerCharacter_C_0
EnemyInRange:false
EnemySpotted:false
HasPatrolPath:true
HasSight:false
LKP: (invalid)
NearestToLKP: false
PathLooping:true
PatrolPathIndex:1
PatrolPathVector:X=-5986.377 Y=-758.478 Z=750.000
PlayerLightValue:0.000000
SecurityLKPSource: None
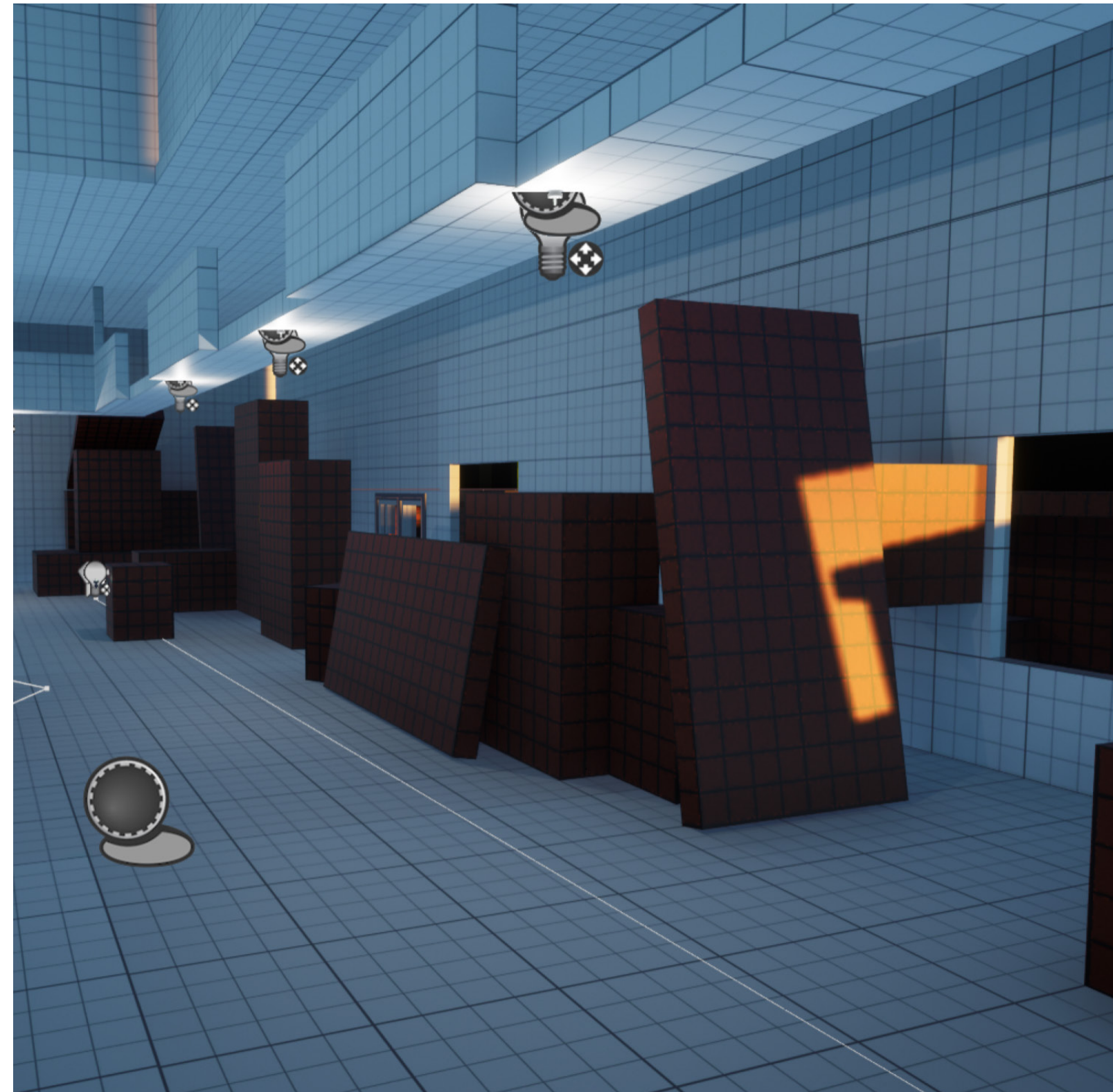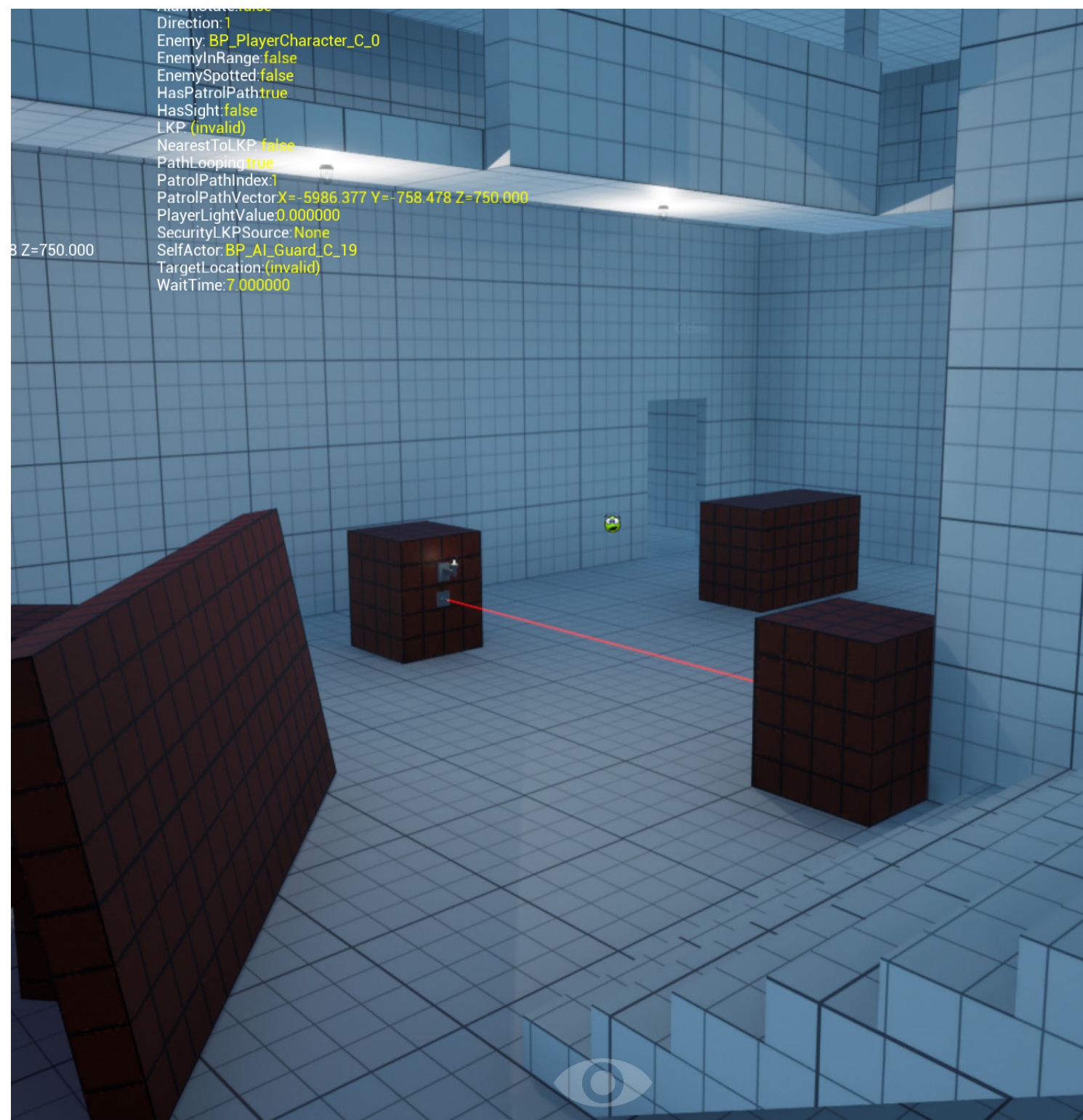SelfActor: BP_AI_Guard_C_19
TargetLocation:(invalid)
WaitTime:7.000000

Laser traps and more cover were added to the interior to make it a more interesting space

Sidequests, Events, Keys and Watchtowers

Deactivate All Cameras Side Quest

There is a side quest in place that allows the player to deactivate all cameras on the level. It is introduced in the first area via a document present in the first building that the player encounters.

To complete this quest the player must:

- Collect two items that are spread out through the map, one in each mountain

- After these items are collected the player must interact with a Power Switch on the Main Server Room, inside the Security Lodge

- After interacting with that switch, all cameras will be deactivated across the entire map.
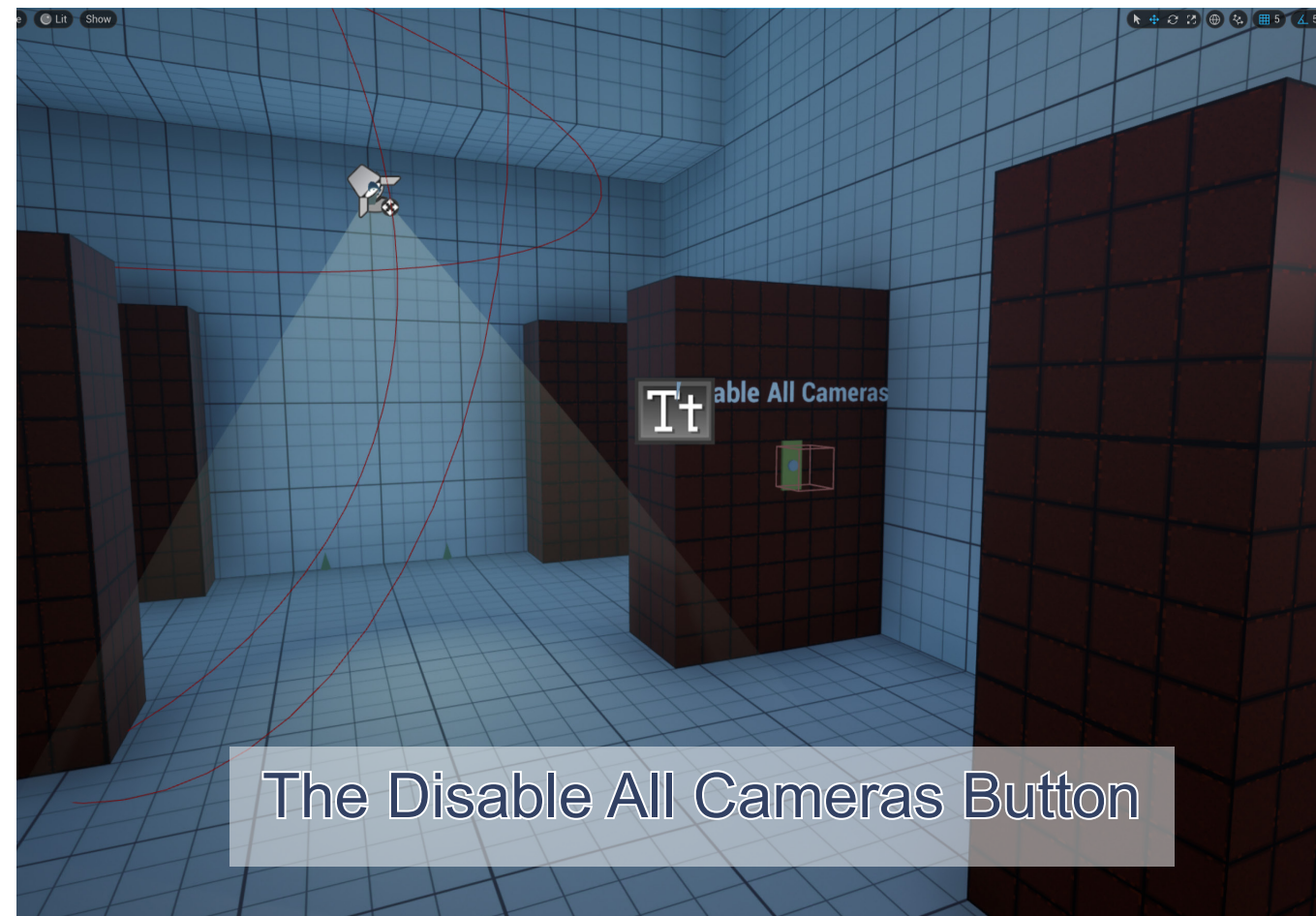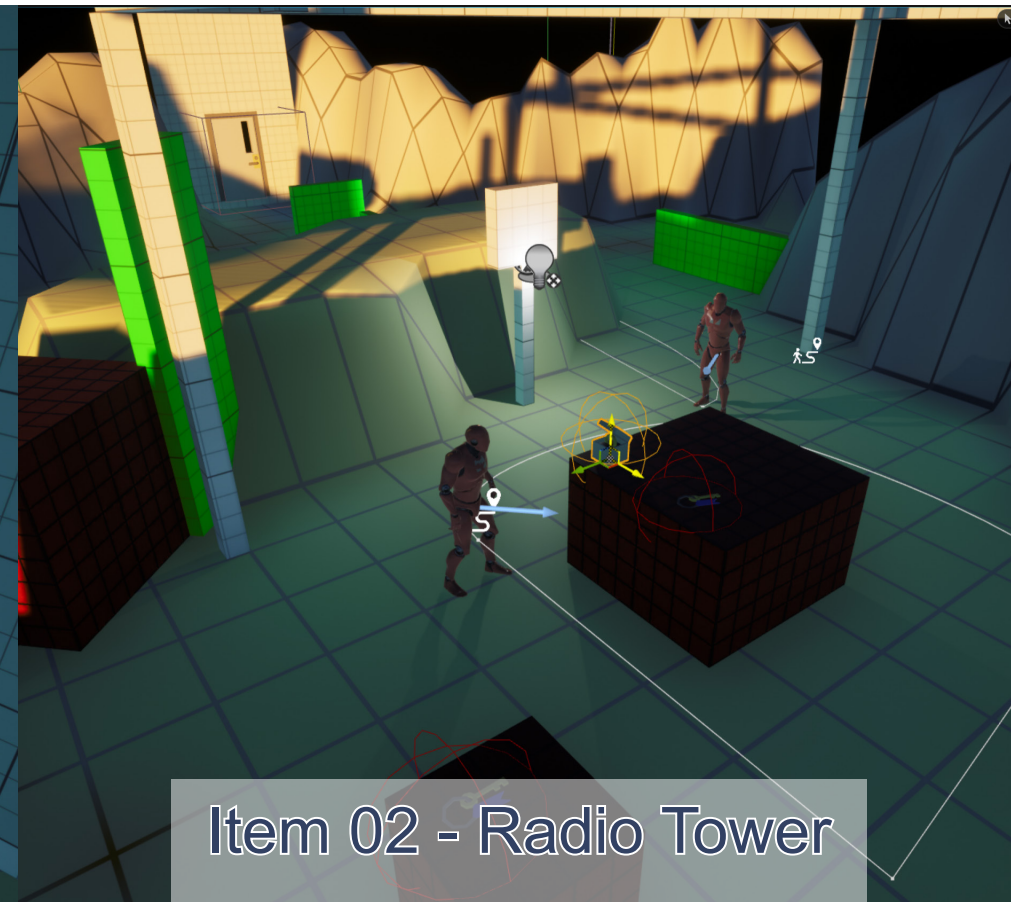
In-Game Story

The same organization that sent the player to Assassinate Johan already had an infiltrated agent in the region. He was trying to find vulnerabilities in the security system for the compound, but was captured right before that.

The agent left some notes and part of a small device that they were working on. The player can pick up this device, read the notes and continue with the previous agent's work.

Item 01 - Hunting Lodge

Item 02 - Radio Tower

The Disable All Cameras Button

Deactivate All Cameras Side Quest
The Guards will notice something is wrong

After the cameras are deactivated, the guards will notice that something is wrong with the security system and some patrols will change to accommodate that.

The guards stationed on each mountain will switch to patrolling the surrounding areas of the main house if they were not killed by the player.

- The goal with this is to make maximum use of the AI budget as is. After completing this quest, the three guards on the mountains become mostly irrelevant.
- It makes sense for the story of the level that the guards would be moved to guard the position of the VIP should something go wrong with the security system
- This helps keep the tension on the level high once the player decides to go to the main house after completing this side quest
- Also, while this may sound like a punishment, guards and cameras are two different types of obstacles, with guards being, at times, easier to evade
- Guards have the added bonus of being able to be deactivated by the player directly, while cameras can only be deactivated via power breaker or alarm box
- For Ghost players, this keeps the challenge interesting while also creating new safe spots for them to rest and plan.
- For Panther style players, there is a clear reward in eliminating those guards when you first encounter them.

If alive, this guard will go here

If alive, both guards here will go to these areas
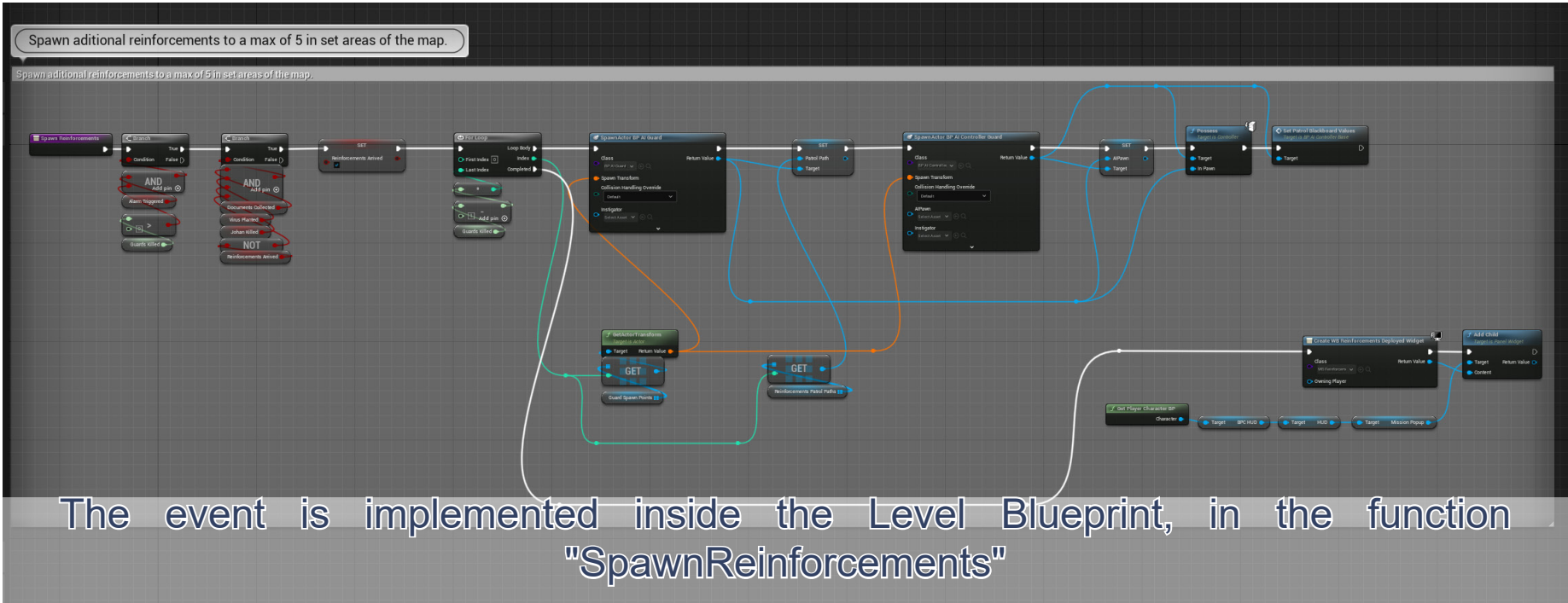
Reinforcements Arrive

Let's say that the player eliminates guards along the way but they also made some mistakes and alarms were triggered throughout the gameplay. It would make sense that reinforcements would arrive via the boathouse to help in flushing out the intruder.

Therefore, an event was created that will spawn up to 5 guards after the player completes the three main objectives. This spawn will only happen if
- One or more alarms have been triggered throughout the level
- The player has eliminated at least one guard

The event will spawn up to 5 guards, always respecting the maximum AI budget of 12 AI Agents. So if the player eliminates 3, only 3 more will spawn and if the player eliminate 6, then only 5 more will spawn.

This is meant to increase the tension near the end of the level. All guards will patrol around the main house and near the boathouse,WWW which is the escape point for the player.

The event is implemented inside the Level Blueprint, in the function "SpawnReinforcements"

The function is called whenever the player finishes one of the main objectives. It does the following:

1. Checks if an alarm has been triggered and if the player has eliminated more than one guard

2. Checks if the three main objectives have been completed and if Reinforcements have NOT been spawned yet

3. Sets "Reinforcements Spawned" to true so this function won't run again

4. Enters a loop, where the max index is the number of guards killed - 1 (the max that this number can reach is 5)

5. For each loop index it gets one of the spawn points and one of the patrols (assigned to an array on the level blueprint)

6. Spawns a Guard AI and sets it to patrol that area

7. After this is completed, it adds visual feedback to the player letting them know that reinforcements have arrived.

Guards Spawn Points and Patrols grouped together in the editor

Key Placement

One thing to note about Key Placement throughout the level is that I opted for placing keys near their respective doors so that the player wouldn't have to scour the level to find an appropriate key.
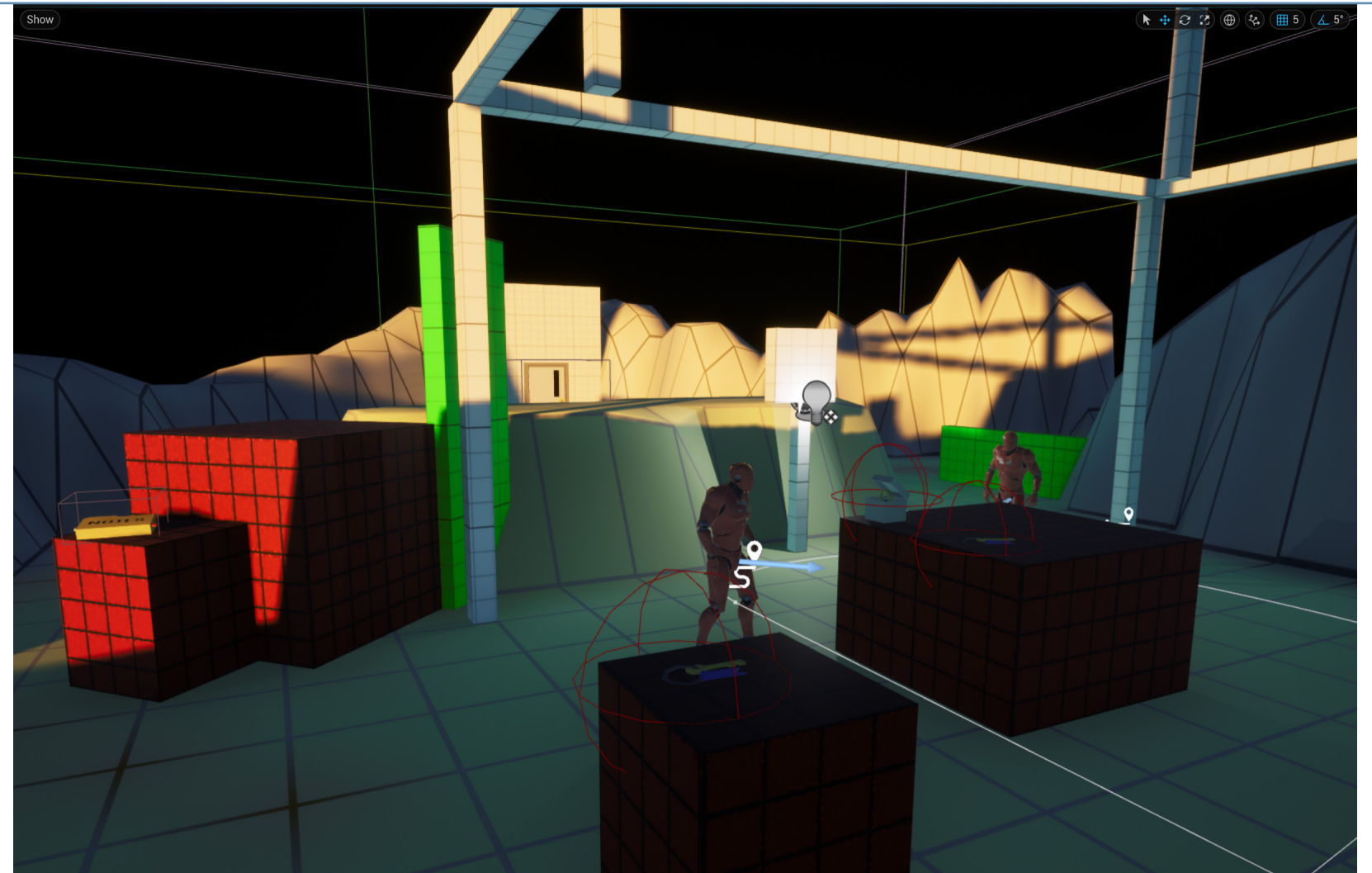
For example, the Sauna room key is placed on the opposite side of the pool. When the player picks up that key they can already see the door that it opens and the challenge that they will have to overcome to get to it.

The Bedroom Key, similarly, is in the living room, on the opposite side of the door, the player can pick it up coming from the kitchen and will then have to go through the entire living room to use it.

The ladder key and the Maintenance Area Key are both under the Radio Tower. You use one of those keys on the nearest door and the second door you see going in the same path uses the second key.

Some rooms, such as the server room and the office, have more than one way of getting inside it but the player can only exit through the door. For this to work, I made it so these doors work with passcodes.

- Passcodes can be retrieved from anywhere, so I added two documents for each door. One outside and one inside the room
- Both of these doors work on an individual power breaker, so the player can still turn off the power to an area and use the doors

Both Ladder and Maintenance area keys are located here, the Ladder Door is on the background

Sauna Key on the foreground and Sauna Door on the background

Bedroom key on the foreground and bedroom door on the background
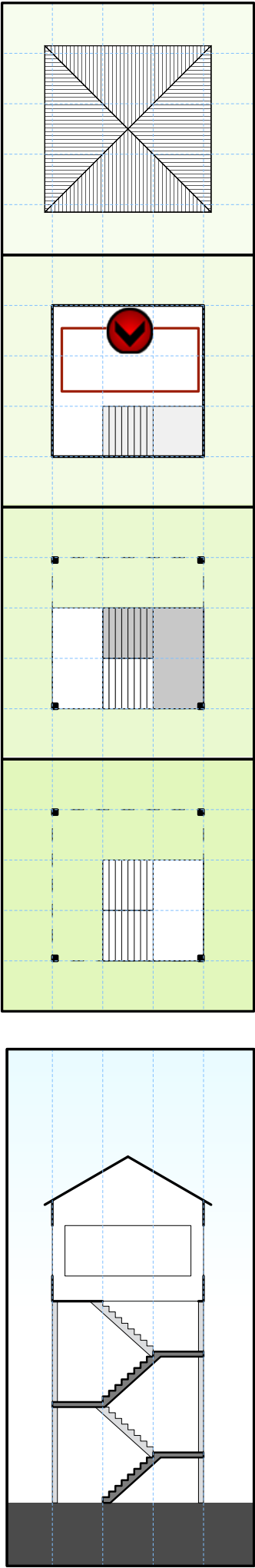
Watchtowers

There were three watchtowers on the original 2D map, upon further playtesting all of those were eliminated, this was due to the following reasons:

- Due to the limited size of the map there would not be enough space for the watchtowers
- As it stands, the AI cannot walk down ladders or attack the player at long range, so positioning an AI on top of a watchtower is a waste of budget
- Although the watchtowers could provide an interesting Vantage Point to the player, there are already enough of those throughout the map

Watchtowers in general provide an interesting scenario in which the player will have to keep in mind the verticality of the level and deal with the possibility of enemies spotting them from above. This still happens in the level with the guards on the outside area of the main house in relation to the ground floor. In this area, the player can be spotted by them if they are not careful.
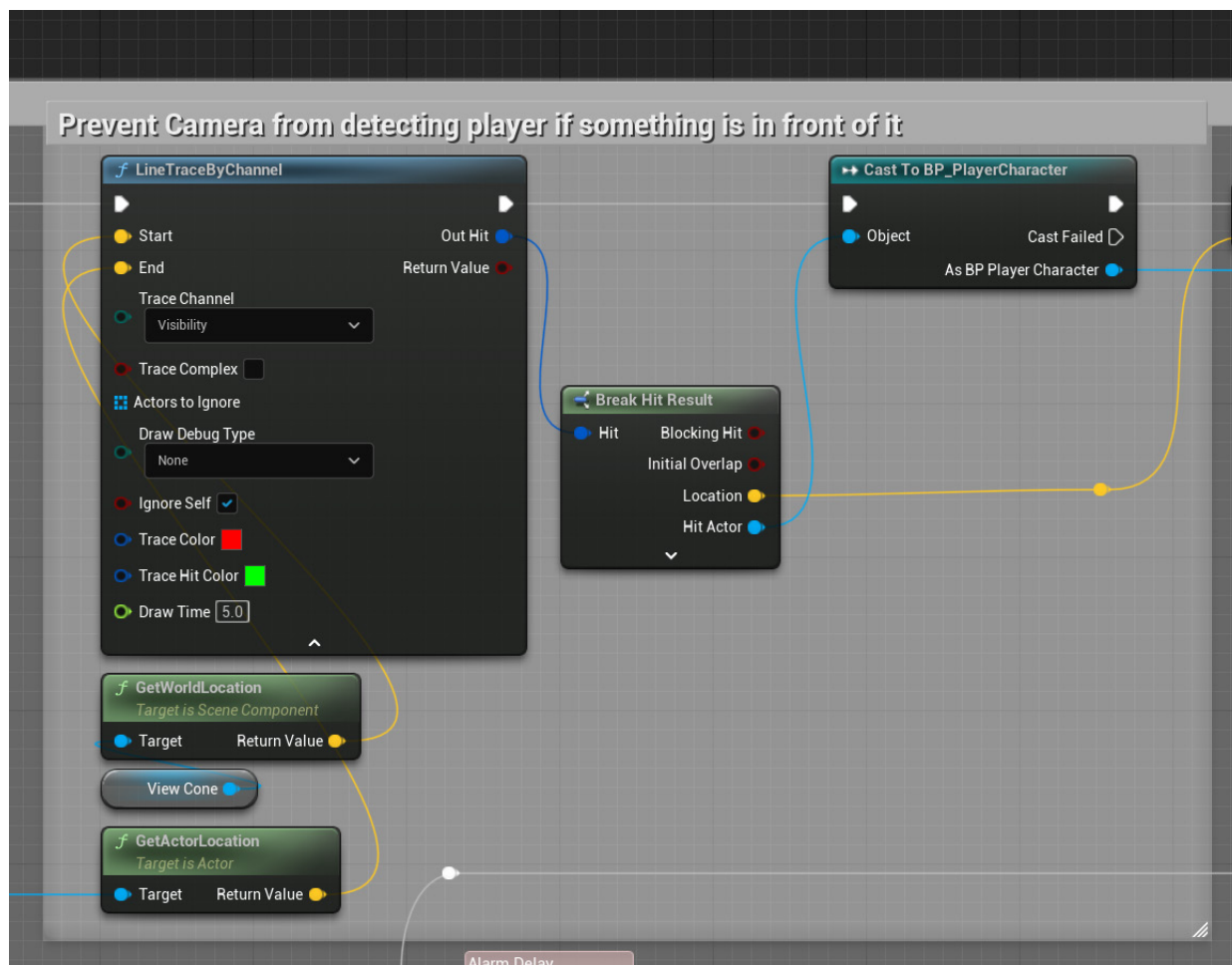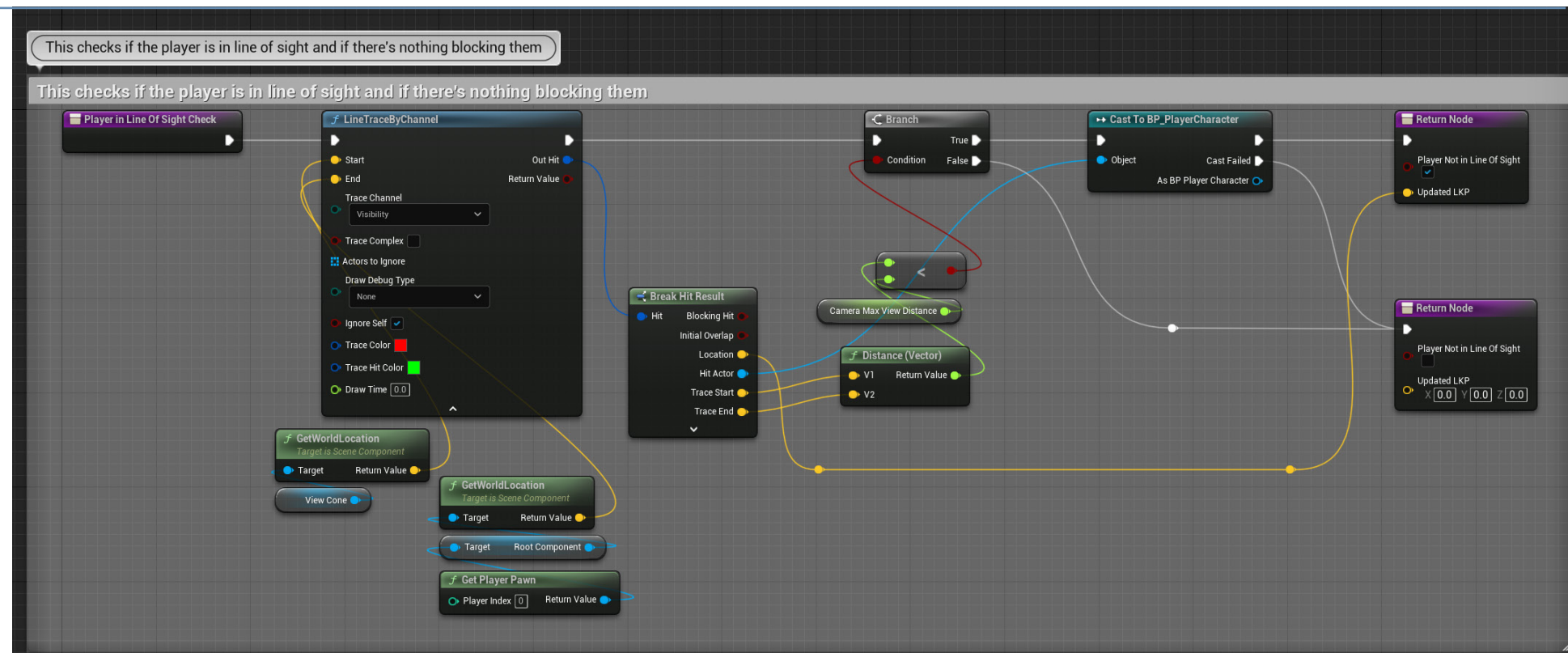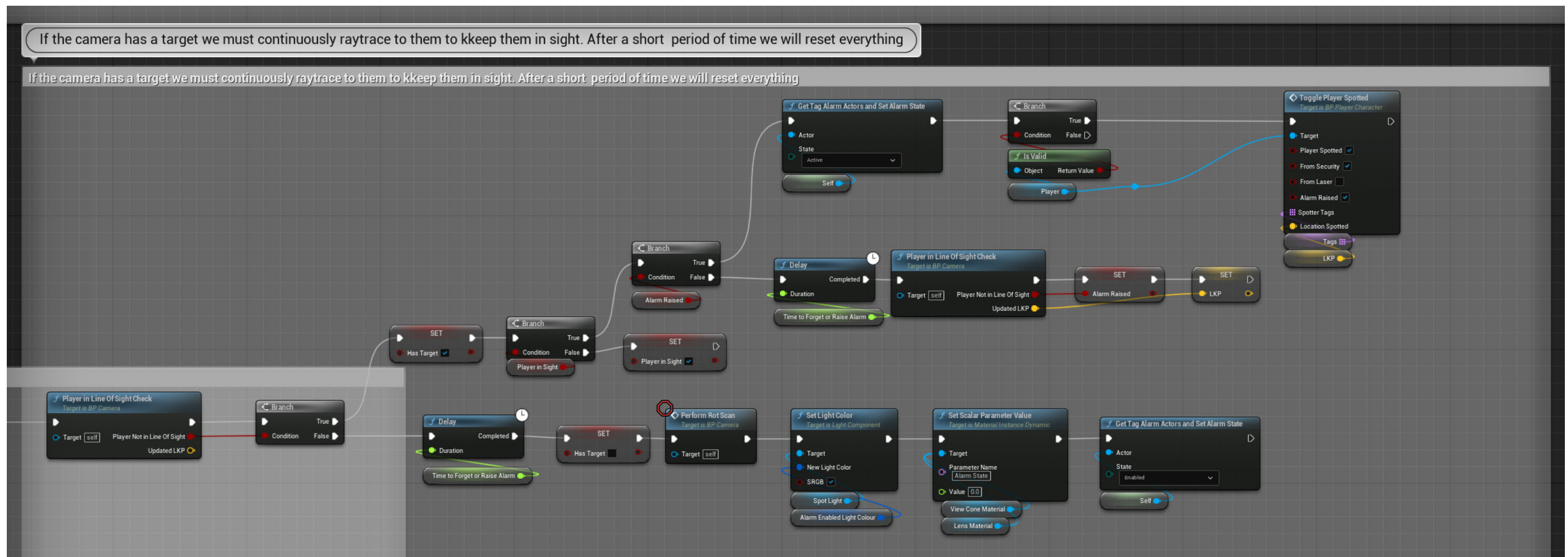
Blueprint changes and fixes

BP_Camera

- **BUG**: Player could be spotted by the camera even if behind cover
  - Reason: The script to spot the player would trigger once the player entered the ViewCapsule area, but it didn't check to see if there was anything in front of the player
  - Solution: I added a LineTraceByChannel node to the blueprint that draws a line between the camera and the player once they enter the ViewCapsule area
    - The aim is to check whether there is something in front of the player or not
    - The node also checks for distance, so the player can be unseen by the camera if they go far enough away
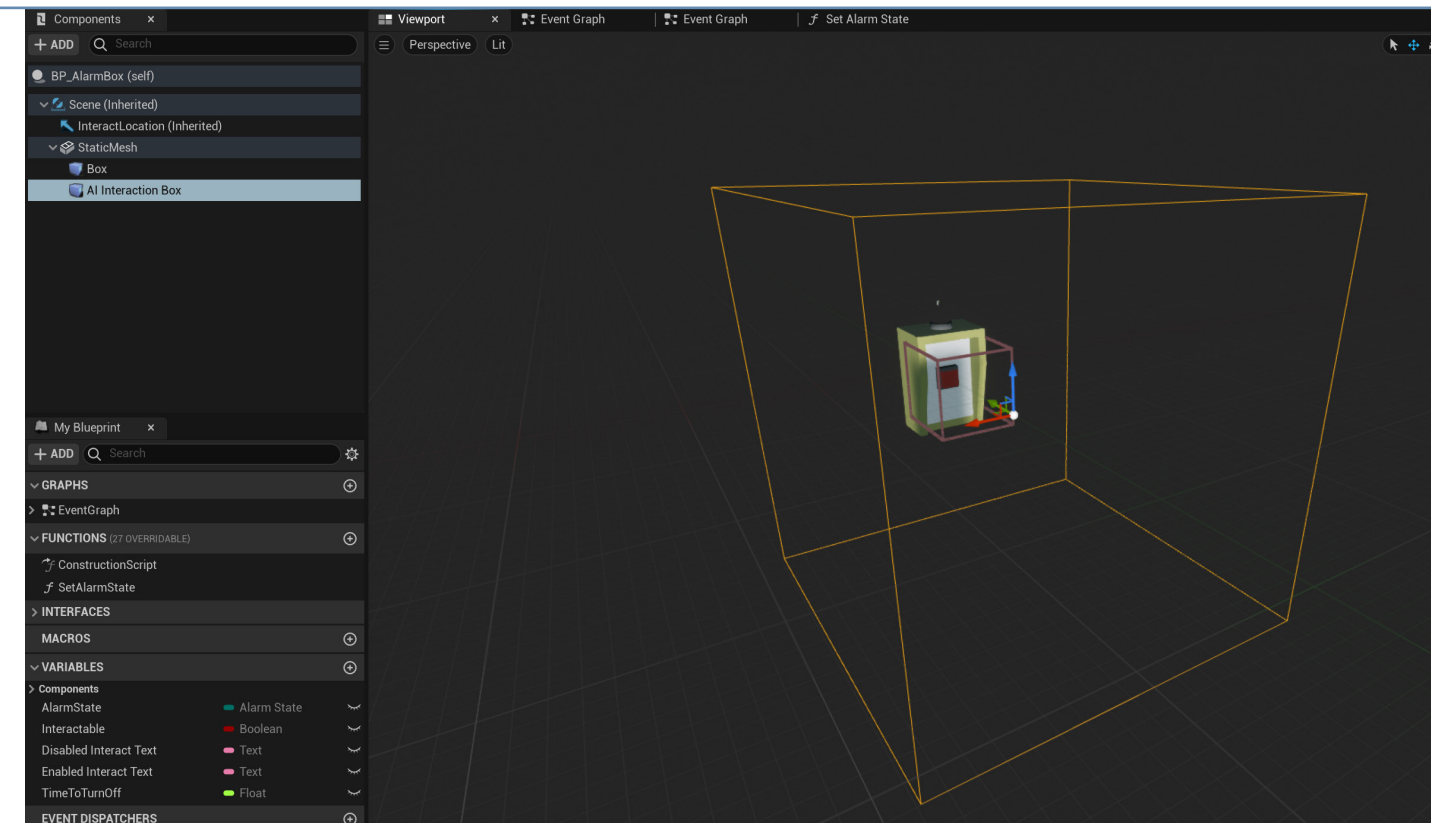
BP_Camera

- **Weird Behavior:** Camera would not raise alarms
  - Reason: There was no script to raise an alarm, only to spot the player
  - Solution: Added a script that will raise an alarm if the player remains in the ViewCapsule area after being seen for X amount of time
    - The X amount of time is a variable called TimeToForgetOrRaiseAlarm with the default value set to 5

- **Weird Behavior:** Camera can't forget the player
  - Reason: There was no script to clear the camera status after the player hides again
  - Solution: Added a script that will forget the player if they hide again within a certain timeframe

- **Weird Behavior:** Camera would warn all guards of the players position which is unfair
  - Reason: The script for spotting the player will just get All Actors of class BP_AI_Controller_Guard and send the information to them.
  - Solution: This involved changes on several scripts but now if an alarm device sends information to guards it will also filter their TAGS and send information only to the relevant guards.
  - This is meant to work in a similar fashion to the alarm system, that also uses tags to update only the correct actors
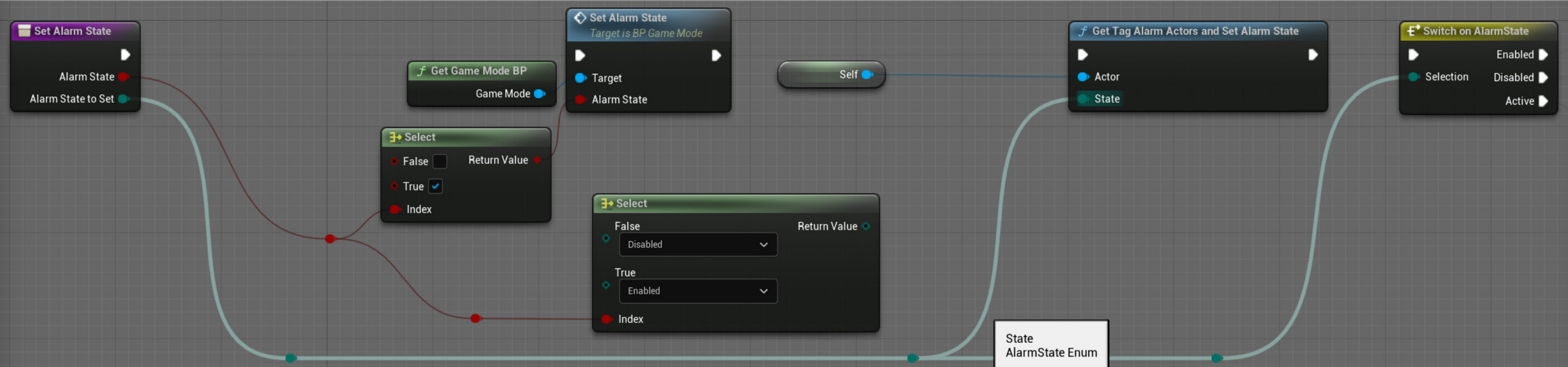
BP_AlarmBox

- **BUG:** AI could not raise alarms
  - Description: AI would attempt to raise the alarm, but instead they would just remain stopped in front of the box.
  - Reason: There was nothing on the AlarmBox script that would dynamically change the alarm state once receiving input from the AI. It was treated as a boolean even though the enum has three values
  - Solution: Now the literal value of the enum is being passed on the SetAlarmState function
  - Also added an AI Interaction Box so the AI will change the Alarm State once it gets within that box
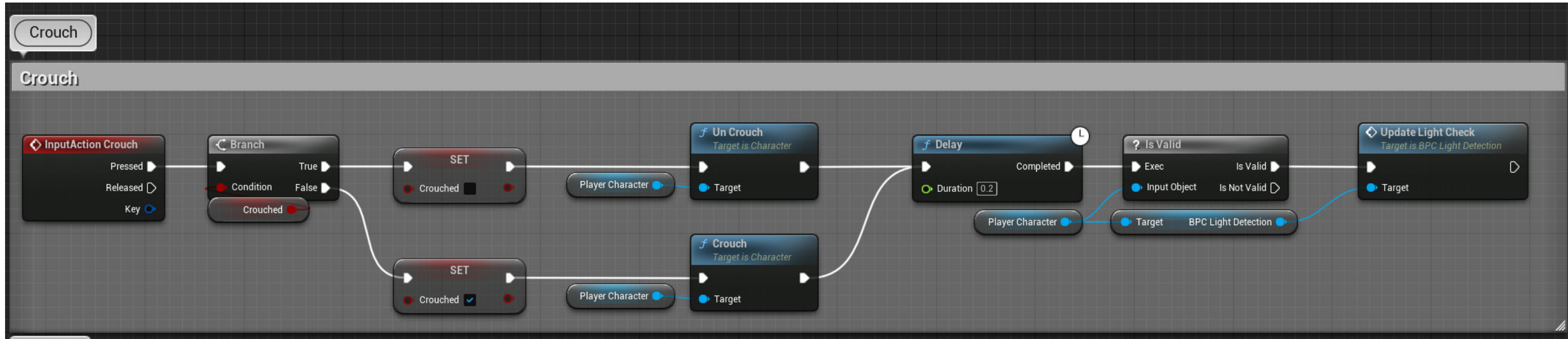
BP_PlayerCharacter and BP_PlayerController

- **Annoying Controls:** Player would have to keep crouch pressed to remain crouched.
  - This is extremely annoying in a stealth game and it poses issues with accessibility.
  - SOLUTION: Created the bCrouched boolean, which is being used on the crouch function.
  - This means that crouching is now simply a toggle instead of a hold

- **Improved Behavior:** On the Broadcast Player Location script, I'm now passing along the TAGS of the object that saw the player in order to only war guards that are relevant
  - This makes it so that guards on one end of the map won't also "spot" the player if guards from the opposite side spot them.
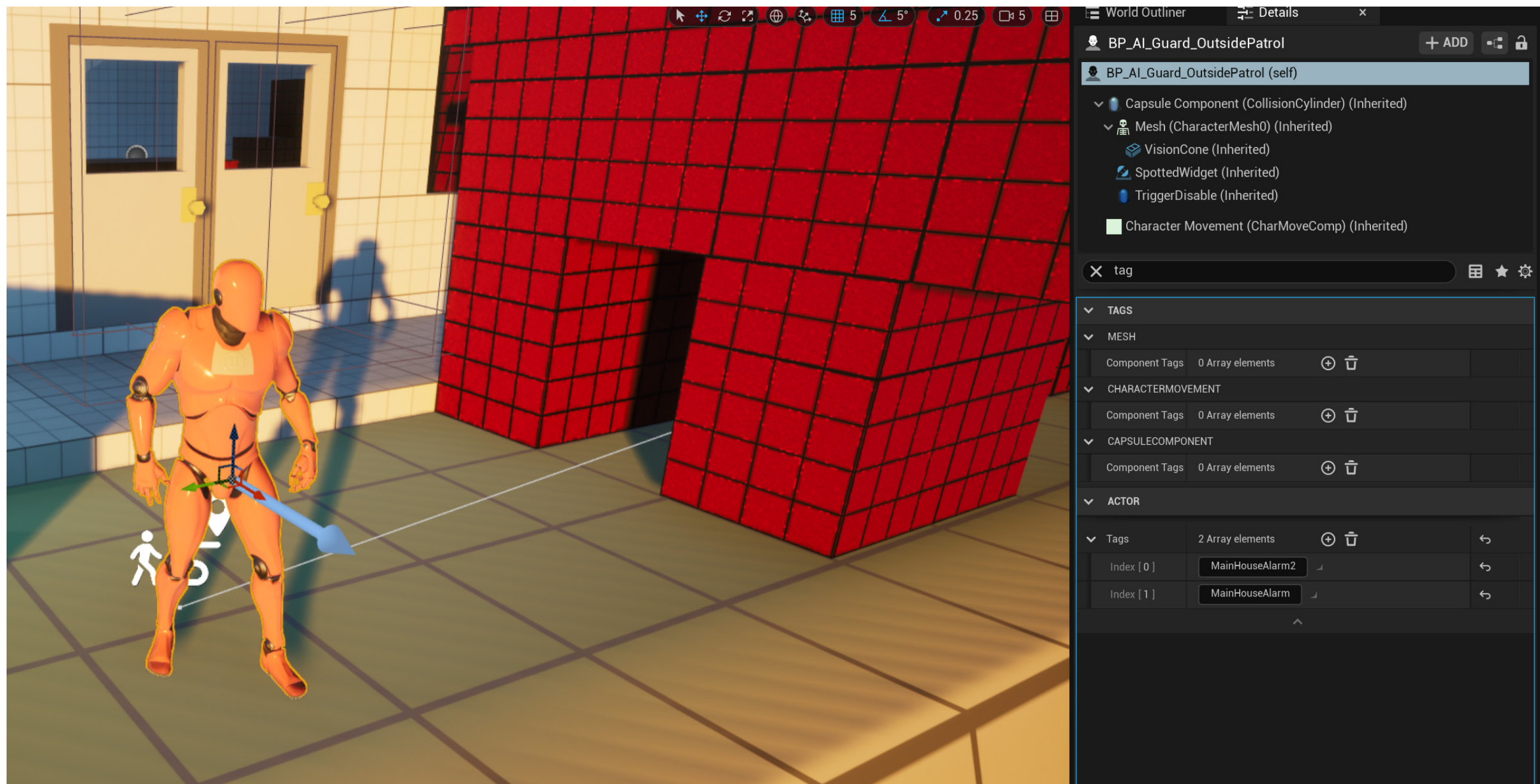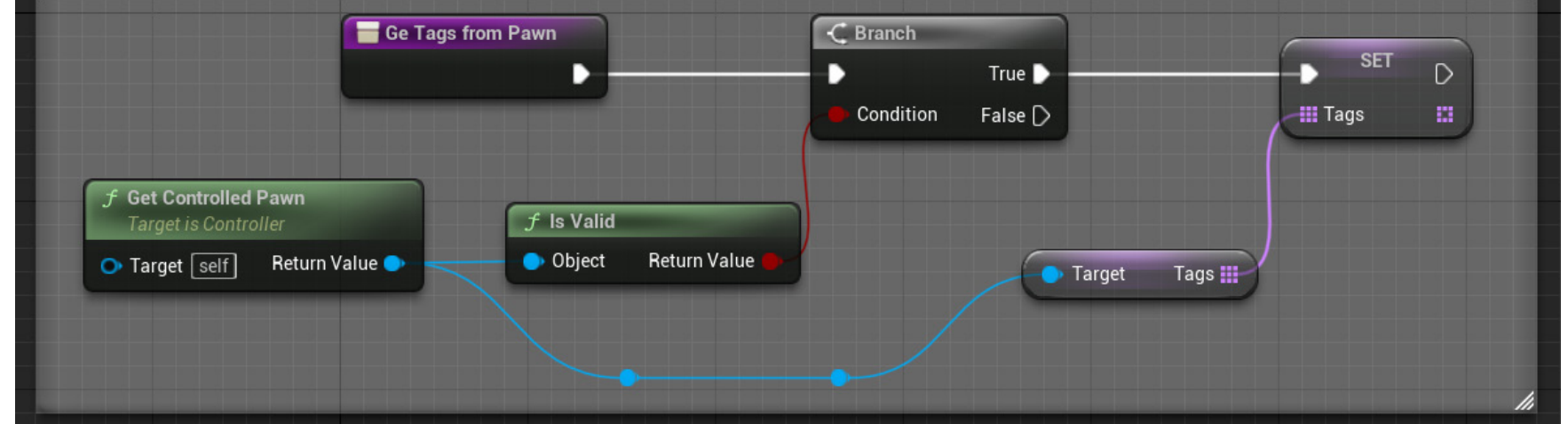
BP_AI_Controller_Guard

- **Improved Behavior:** In order to use the tags on the guard AI similar to how we use it on the Alarm system, a script was added to copy the tags from the BP_AI_Guard into the controller
- This function is called on Event Begin play

AI Behavior Tree

- **BUG:** All AI Agents spot the player if only one agent sees them
  - Description: If the player was heard or seen by one AI, that AI agent would turn to the player's location but so would all other AI on the level
  - Reason: Some Blackboard entries relating to the player's location were being shared among all instances of the AI
  - Solution: Set these entries as not "Instance Synched"
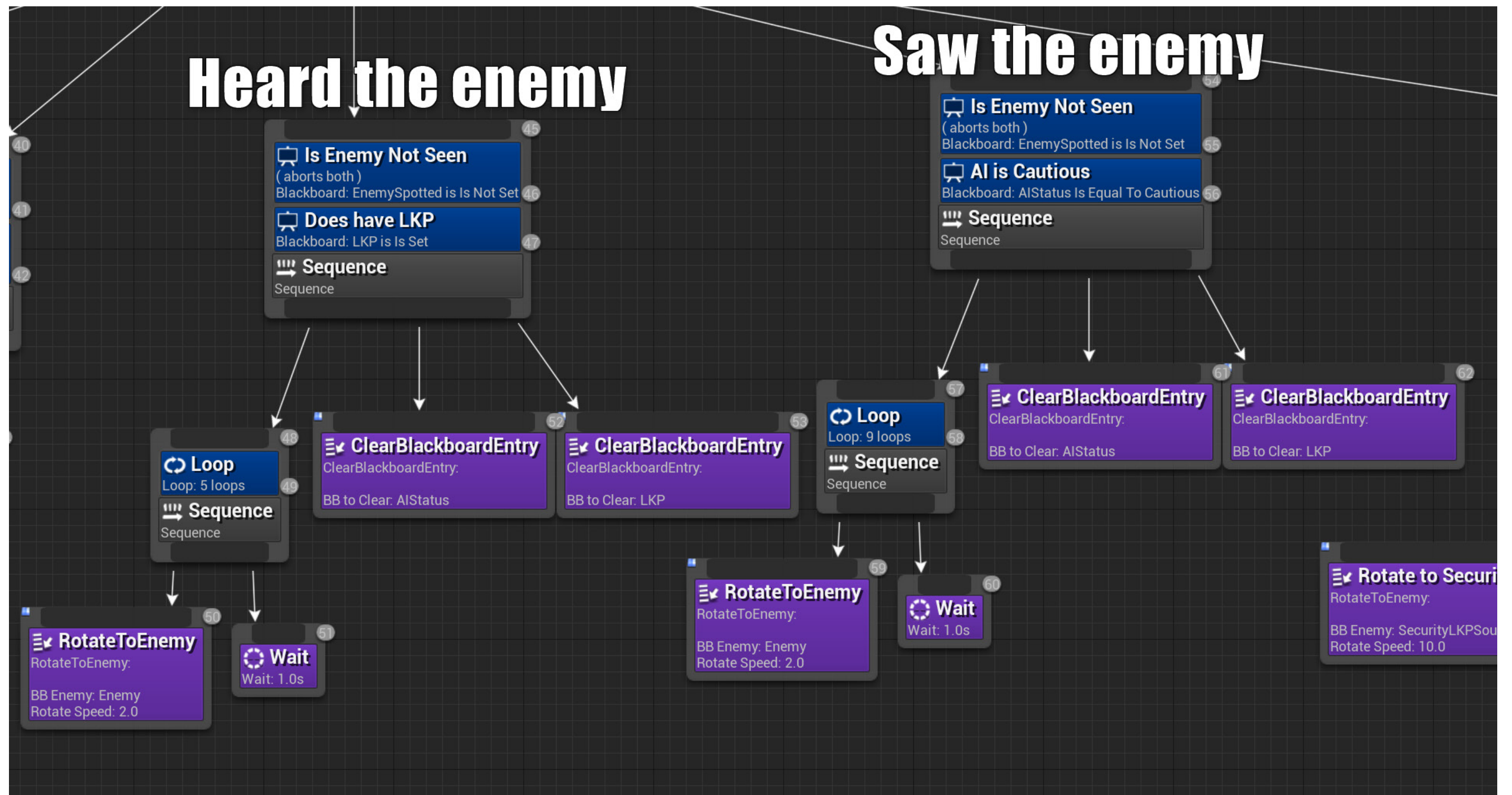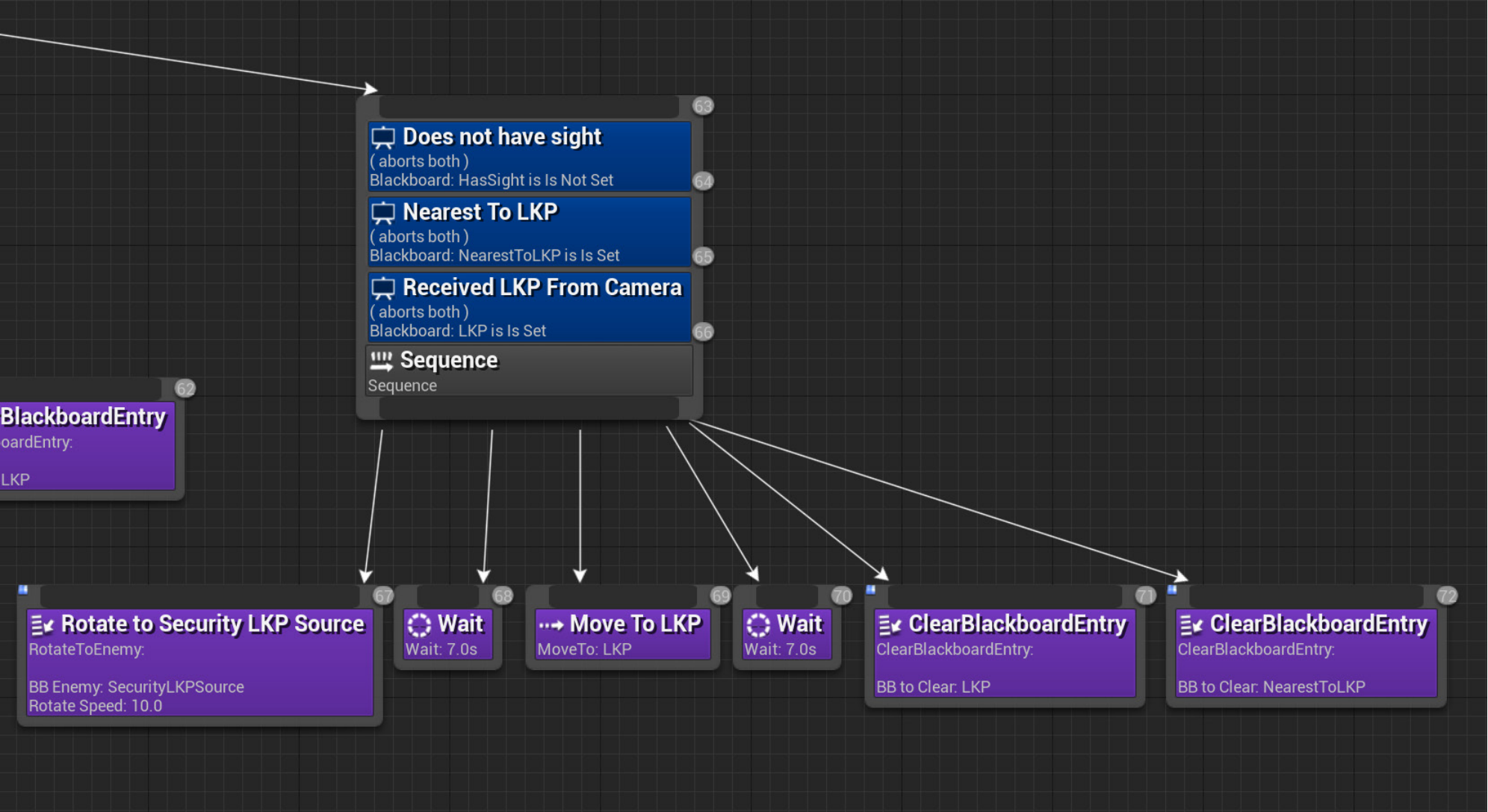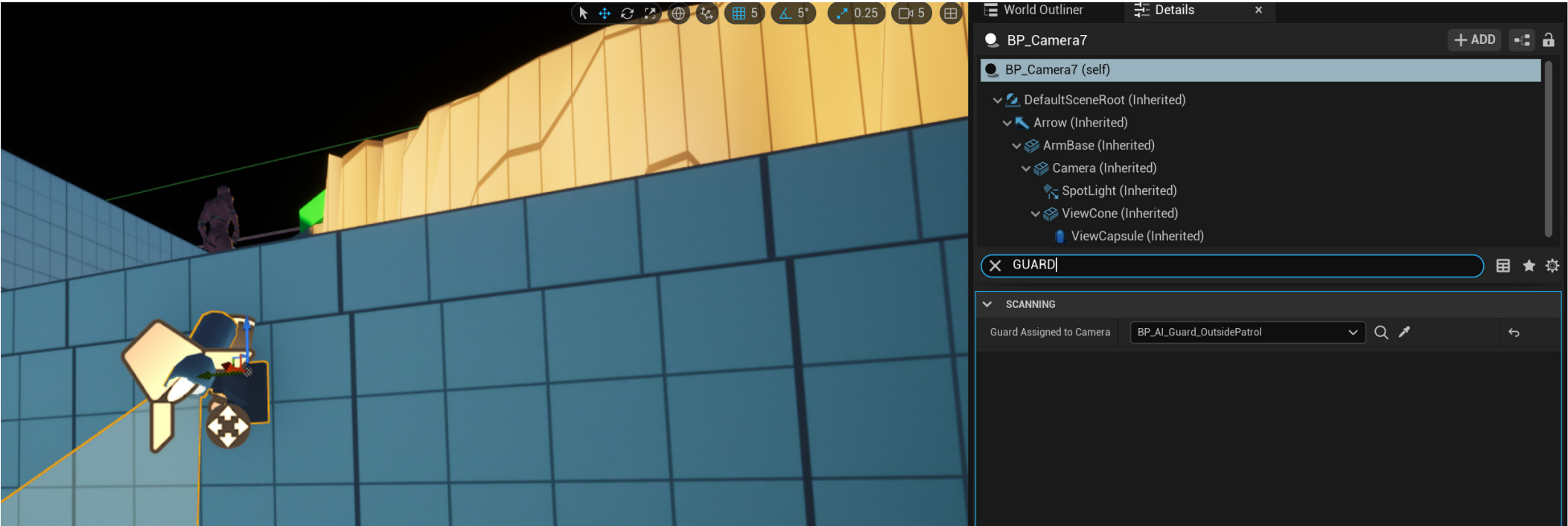
AI Behavior Tree

- **BUG:** AI Agents would not "forget" the player location. They would remain in place turning to the players location after seeing or hearing them
  - Description: If an AI agent were to hear or see the player, they would stop what they were doing and turn to the player. They would do this forever and never "forget" that the player was there
  - Reason: The Behavior tree that made this behavior possible had no "exit condition". Meaning that there was nothing there to clear the status of the AI should the player hide again
  - Solution: Added nodes to keep the AI rotating to the player for a certain amount of time, but then forgetting that they were there and getting back to patrol.

AI Behavior Tree

- **Improved Behavior:** AI would not investigate if the player was spotted by a camera
  - If the player is quickly spotted by a camera, it would make sense that one guard would move to investigate but there was no script allowing the AI to do that
  - Solution: Cameras now have a "Guard Assigned to Camera" property that we can use to assign a guard to that specific camera
    - When the player is spotted, the camera will message that guard
    - The guard will turn to the location, wait a while and move there.
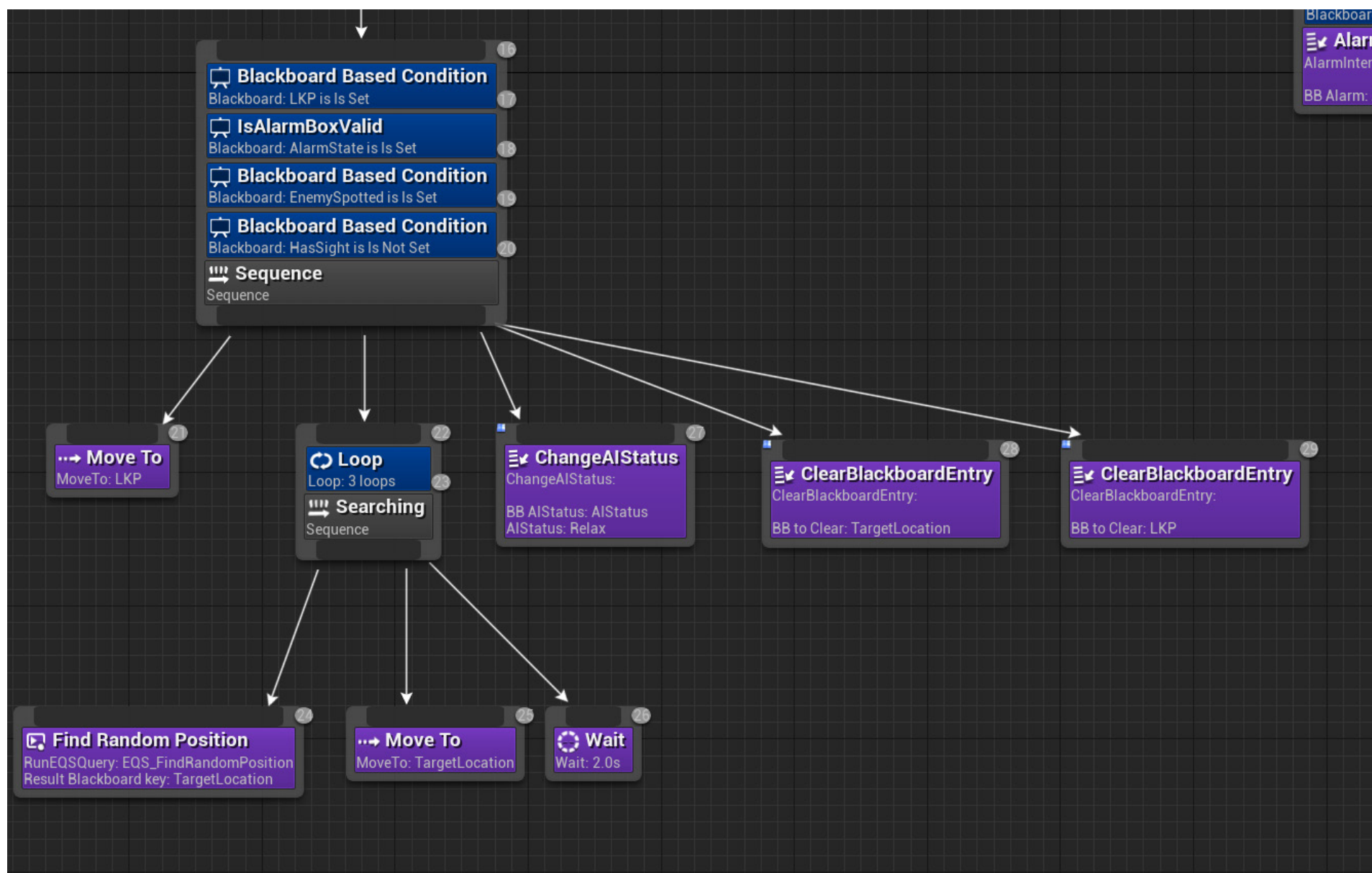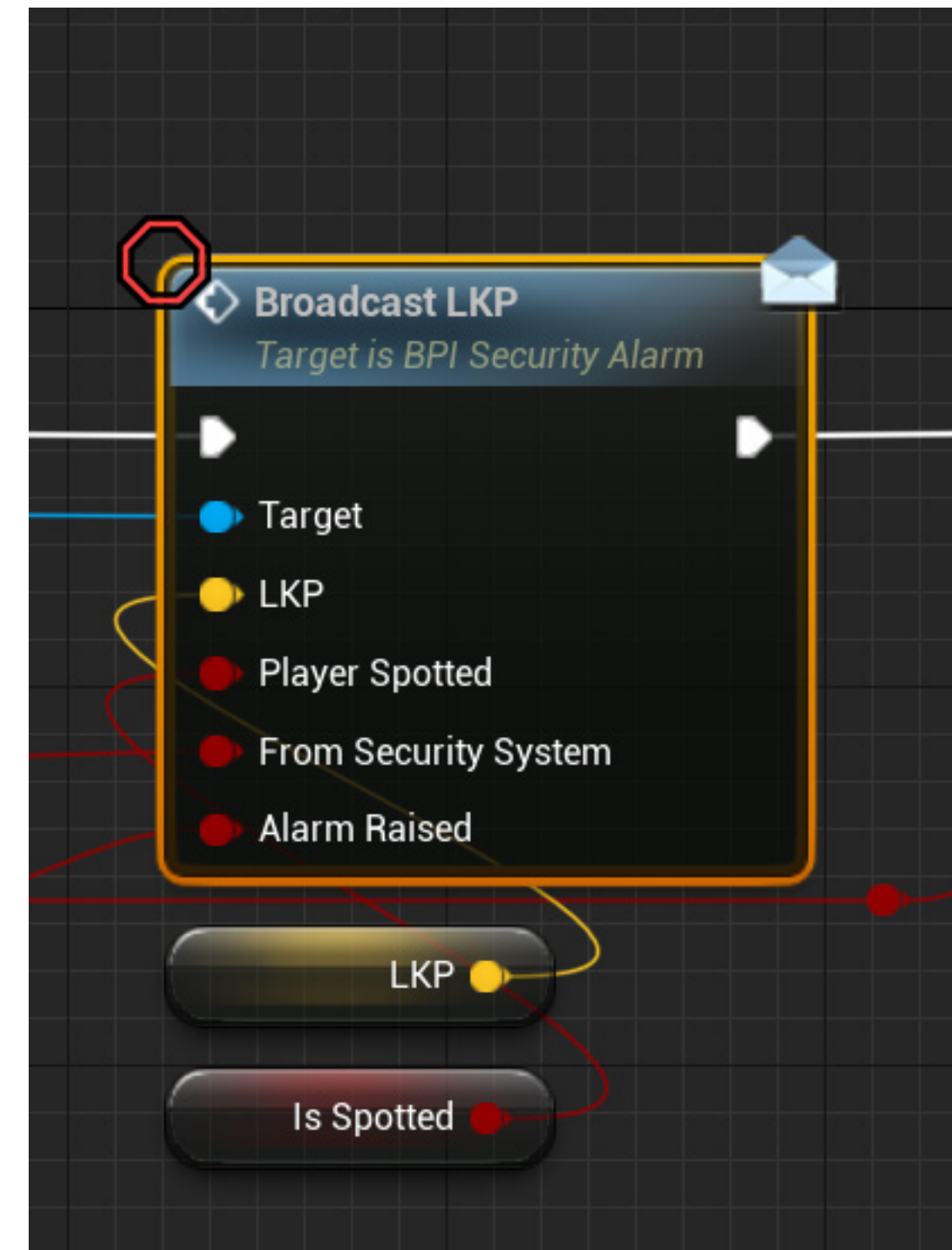   - After a short period of time, they will resume their standard activity

AI Behavior Tree

- **Improved Behavior:** AI Guards warned by a laser should be hostile
  - Lasers raise an alarm immediately as soon as the player crosses them
  - They also warn the guards of a location
  - Therefore, it makes sense that guards would move to that location as soon as possible with hostile intent
  - Solution: Created Behavior Tree nodes that make it so the AI will immediately move to the laser location in a hostile mode, meaning that they will attack the player
  - This only happens with guards that have the same tag as the laser alarm
  - The Broadcast LKP function was also changed inside the BP_PlayerCharater
    - It now sends also the Alarm Raised boolean, the AI will behave differently due to that boolean
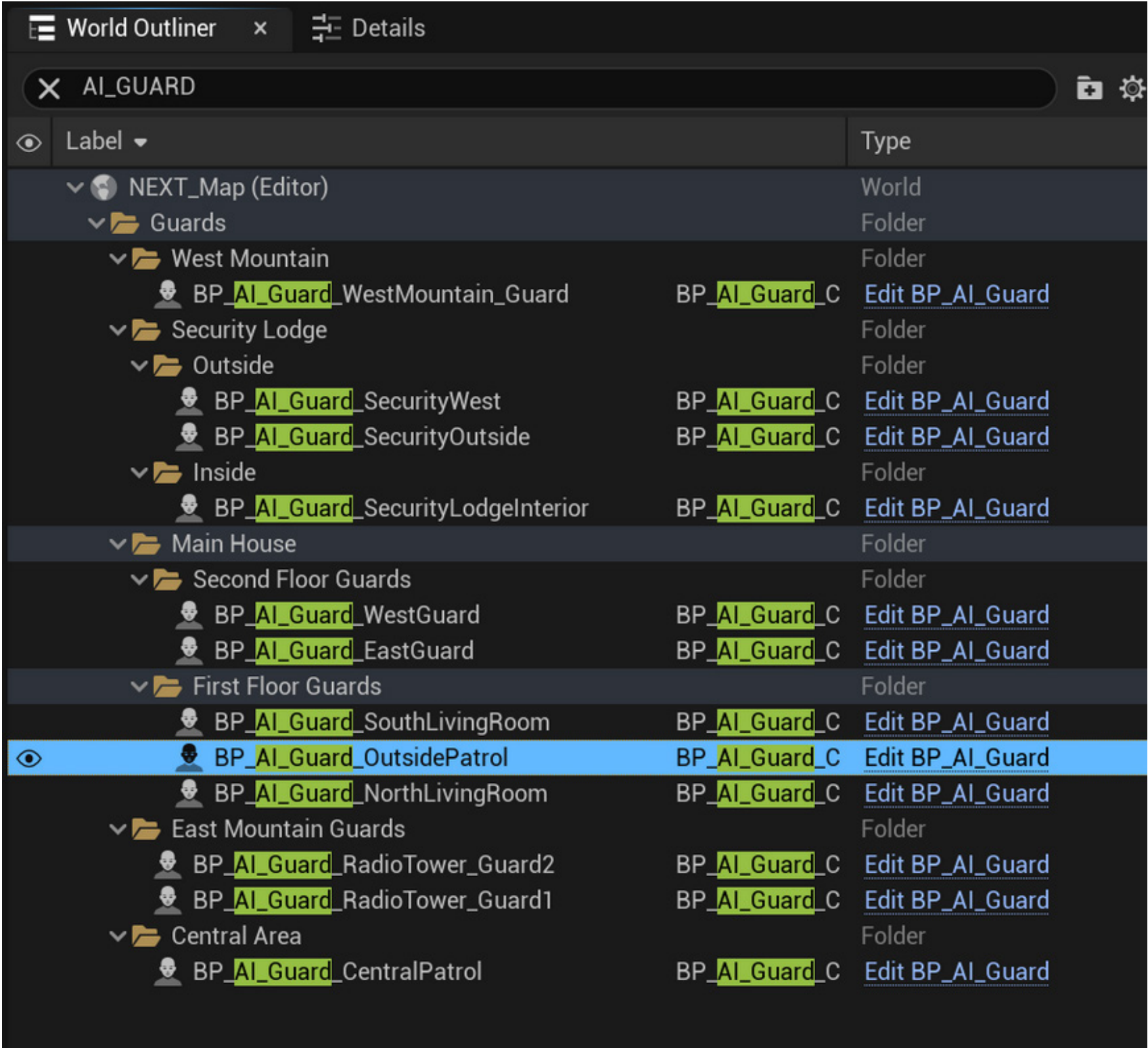
QA

Question 1

Provided that I keep the total number of AI at a maximum of 12 at all times, is it possible to spawn more AI at the end of the level if the player has eliminated a few?

I currently have 12 AI placed around my level, but I wanted to increase the tension near the end of the level if the player has triggered one or more alarms. So if the player has eliminated 4 out of those 12, is it possible to spawn an extra 4 later on or would that be breaking the AI budget?

Answer:

Yes, as long as you ensure that the AI count doesn't go above 12

Question 2

I felt the need to change the Behavior Tree for the Guard AI to make it fairer to the player and make it more interesting for gameplay. Are these types of changes OK for the scope of the competition?
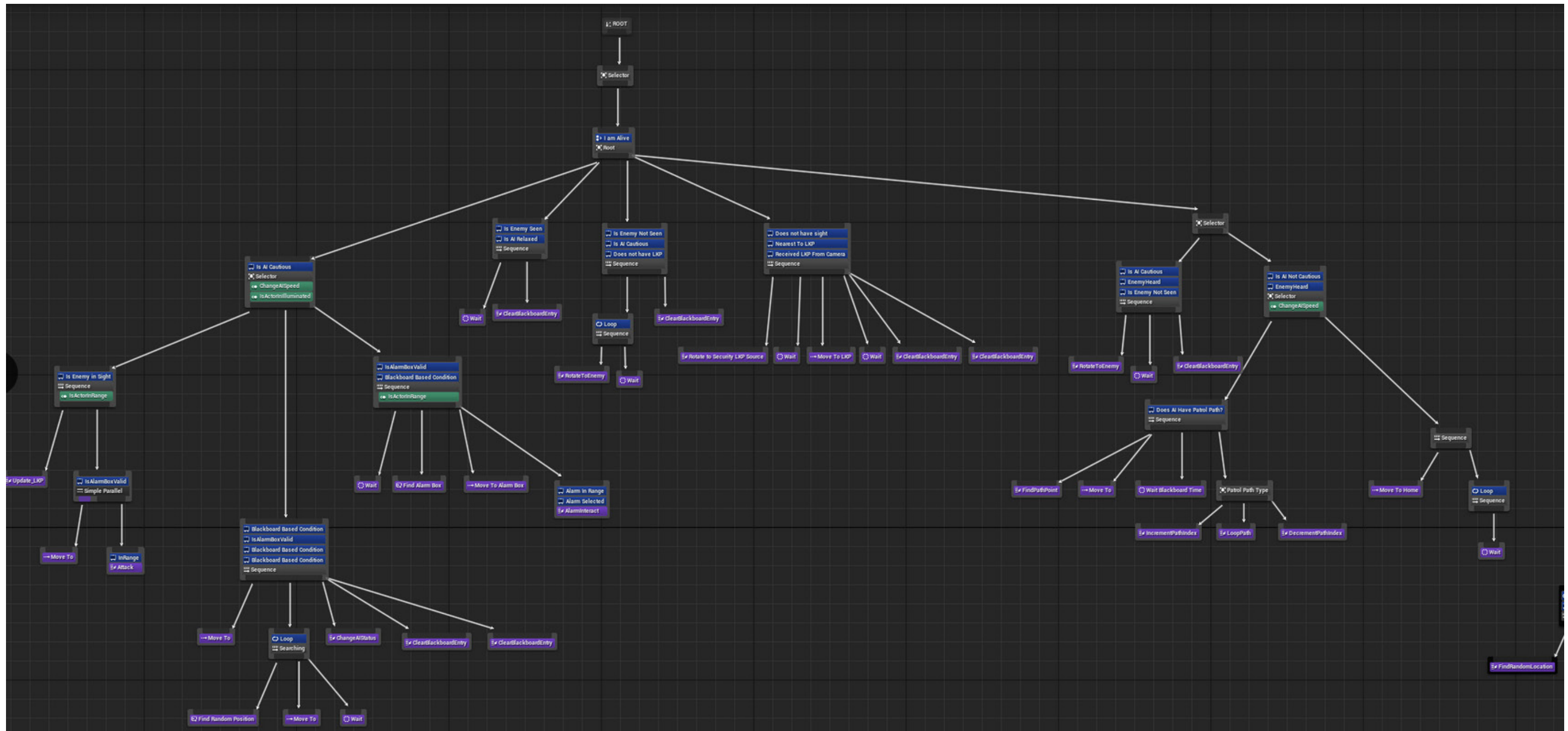
During implementation I noticed some things that I considered Bugs in the AI. Some of those were, for example:
- If one guard notices the player, all guards turn to face the player (fixed, now only one guard turns to the player)
- Guard does not "forget" the player if they go out of sight for a while (fixed, guard will remain in position for a while and then return to their normal activity)
- If the guard spots the player, the first thing it'll do is run to an Alarm box, even if the player is closer to them (I did not fix this but is seems weird)

Should I revert these changes? The first issue caused a lot of problems during playtesting in which one minor mistake would ruin the entire run so I felt is was an error?

Answer:

If you want to change things in the script that's okay but our main focus is your layout – making sure that your layout is clear and clean for your submission

Question 3

I added two main goals on my main mission in relation to the Mission Document that I delivered on phase 1, one is for story purposes just to explain the setting to the playtester. Is that OK for the scope of the competition?

I added two other objectives in relation to the three original ones I had on the Mission Document.The first one is for the player to read a document that is placed in front of them, this document just details the setting a bit and unlocks the three objectives from the MDD. The final objective is an "escape" objective where the player needs to get to a certain area. I felt it made sense but I'm wondering if it's over scoped for the competition

Answer:

It is fine to add those objectives just be sure document why those were added