GIT Department of Computer Engineering CSE 222/505 - Spring 2022
## Homework # Report

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1. System Requirements

- User has to choose mode on menu (user or driver mode). If user choose 'user mode', street length must be determined by the user to execute other parts.

- On the second section, user has to again choose mode such as editing mode, viewing mode or focus a building. On editing mode, user must select 'add a building' or 'delete a building' part. In these two selections, building information is requested. If user wants to see actual street display and some calculations about the street, he/she has to add some buildings to the street, otherwise he/she see empty street info.

- There must be empty spaces for the 2 sides of the street. frontStreet and backStreet array's size are equal to the street length.

- jdk and jre are requested from operating system to execute this java program.

2. Diagrams

2.1 Use Case Diagram
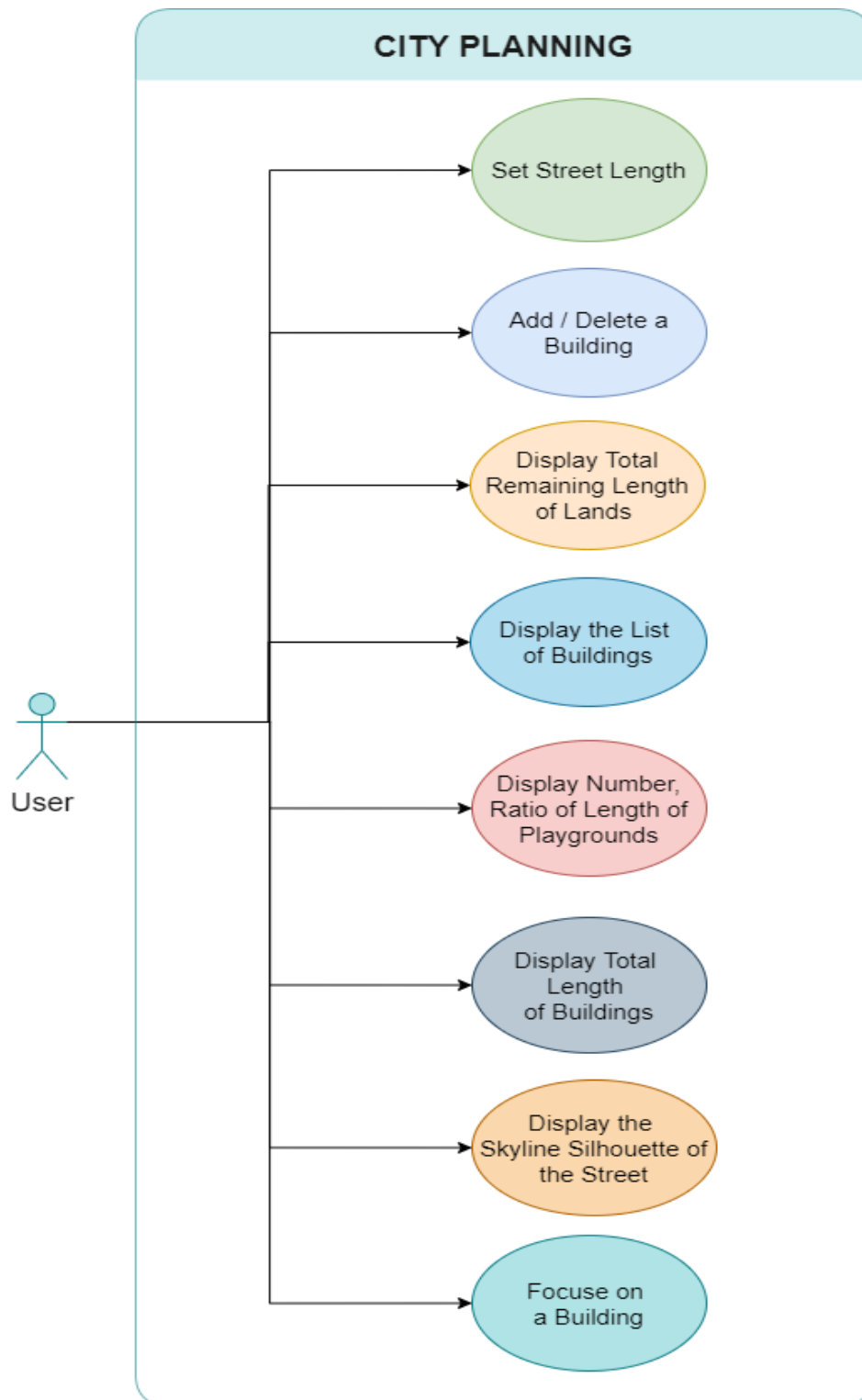
2.2 Class Diagram

City is an interface. I didn't need to implement City as a class.
Required operations (add/delete building) are generally stored in Street class.
House, Office and Market extend Building class.
Playground is different from building but they have similarity.
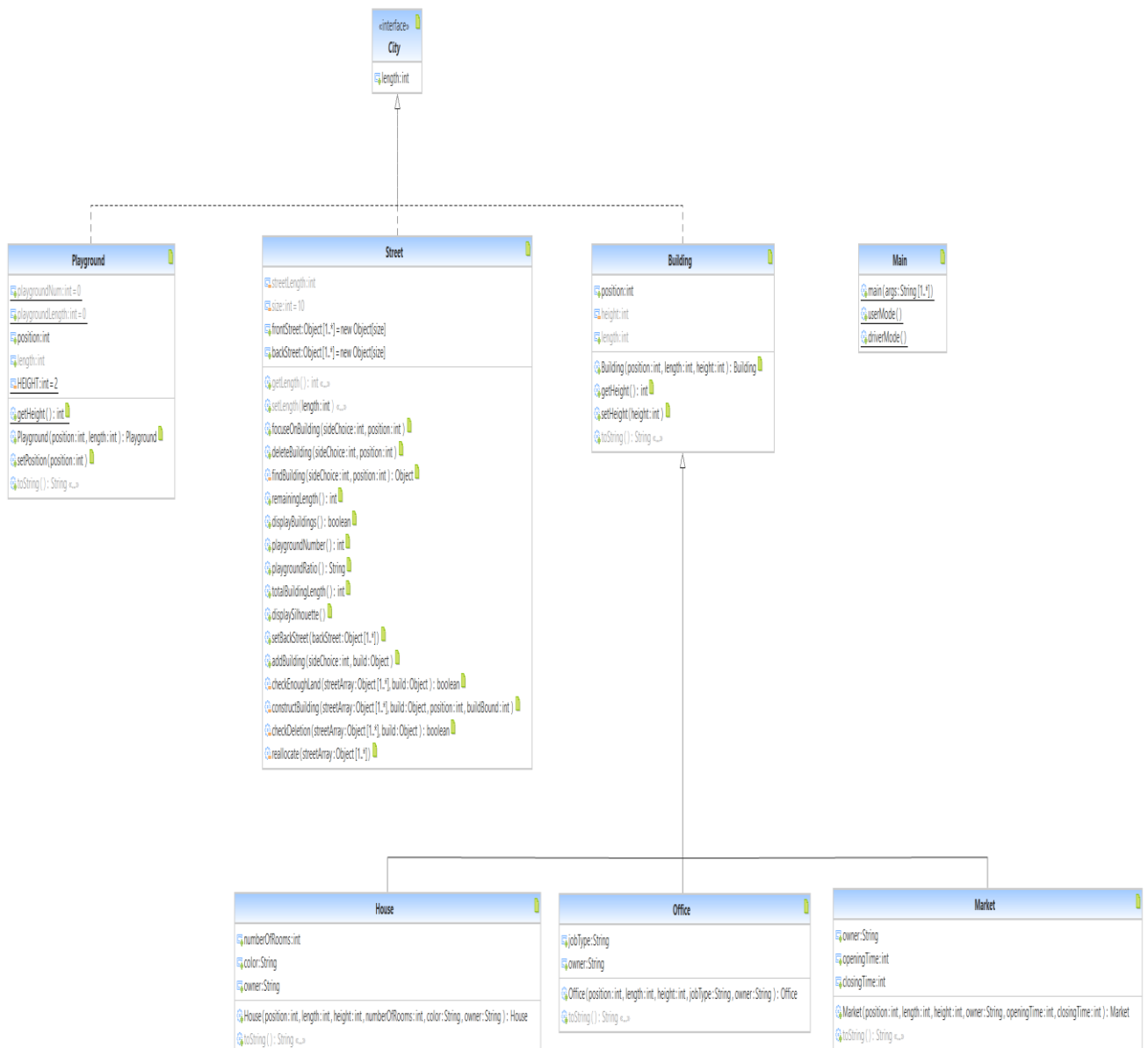
3. Problem Solution Approach

Firstly, I wrote City interface and created Street class which has 2 arrays to hold the sides of the street and then I identified the differences between building and playground. I implemented City interface on these classes (Street, Building, Playground). Building class has 3 subclass - House, Market and Office -. They have own constructors for filling their own properties. Additionally, Playground class has 2 static parameters for viewing mode - playground number and total playground length -.

Street class has a lot of functions such as add/delete building, display silhouette of the street. On add and delete functions, I checked whether enough land or not with null detection. Also, I changed playground number and total playground length on these functions, when adding or deleting playground operations occur.
I figured out displaying silhouette of the street with 2d char array. I printed '|' or '-' according to old height and current height. If old height is equal to current height, I printed '-', otherwise '|'. I controlled whether object on the street array is null or not. I have 2 separate conditions for this silhouette situation.
I generally solved other problems with class constructors or basic algorithms.

4. Test Cases

- Setting street length with negative and correct input
- Empty street actions:
    - Delete building from empty street
    - Display total remaining length of empty street
    - Display buildings on empty street
    - Show number and ratio of playgrounds
    - Show total length of street occupied by the markets, houses or offices
    - Focusing on a building and playground on empty street
    - Display the skyline silhouette of empty street

- Adding buildings and playground to the street
- Adding building or playground to the filled area of street
- Adding building or playground to the outside of street
- Deleting building from empty position on the street
- Deleting building from outside of the street
- Deleting building from the street (correct input)
- Displaying the total remaining length of lands on the street
- Displaying the list of buildings on the street
- Display the number and ratio of length of playgrounds
- Display the total length of street occupied by the markets, houses or offices
- Focusing on a building or playground
- Displaying the skyline silhouette of the street

5. Running Command and Results

```
sefa@DESKTOP-O4JURCM:/mnt/c/Users/seffa/Desktop/VsJava$ javac Main.java
sefa@DESKTOP-O4JURCM:/mnt/c/Users/seffa/Desktop/VsJava$ java Main
Welcome!
1- User Mode
2- Driver Mode
0- Exit

Choose the mode:
2
Setting street length -> -20
java.lang.NegativeArraySizeException: -20
        at Street.setLength(Street.java:24)
        at Main.driverMode(Main.java:272)
        at Main.main(Main.java:34)
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Setting street length -> 100
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EMPTY STREET
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Deleting from empty street
Side choice = 1 (front)
position = 5
java.lang.NullPointerException
        at Street.deleteBuilding(Street.java:212)
        at Main.driverMode(Main.java:294)
        at Main.main(Main.java:34)
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Displaying the total remaining length of lands on the street

--Total remaining length: 200

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Displaying the list of buildings on the street

Front of street:
--This side is empty.

Back of street:
--This side is empty.

--There is no building for display!

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Display the number and ratio of length of playgrounds

--Number: 0

--Ratio: 0/200

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Display the total length of street occupied by the markets, houses or offices

--Total length of buildings: 0

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Focusing on a building

Front of street:
--This side is empty.

Back of street:
--This side is empty.

--There is no building for focusing!

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Focusing on a playground
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Front of street:
--This side is empty.

Back of street:
--This side is empty.

--There is no playground for focusing!

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Displaying the skyline silhouette of the street


_____
|_____|

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END OF THE EMPTY STREET PART
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Adding buildings to the front of street

House [position=0, length=7, height=14, numberOfRooms=3, color=ocean blue, owner=sefa]
--Building has added!

Front of street:
House [position=0, length=7, height=14, numberOfRooms=3, color=ocean blue, owner=sefa]

Back of street:
--This side is empty.


Office [position=10, length=12, height=14, openingTime=8, closingTime=22, owner=bim]
--Building has added!

Front of street:
House [position=0, length=7, height=14, numberOfRooms=3, color=ocean blue, owner=sefa]
Office [position=10, length=12, height=14, openingTime=8, closingTime=22, owner=bim]

Back of street:
--This side is empty.

Office [position=48, length=8, height=9, jobType=detective, owner=faruk]
--Building has added!

Front of street:
House [position=0, length=7, height=14, numberOfRooms=3, color=ocean blue, owner=sefa]
Office [position=10, length=12, height=14, openingTime=8, closingTime=22, owner=bim]
Office [position=48, length=8, height=9, jobType=detective, owner=faruk]

Back of street:
--This side is empty.


Office [position=58, length=8, height=9, openingTime=9, closingTime=21, owner=a101]
--Building has added!

Front of street:
House [position=0, length=7, height=14, numberOfRooms=3, color=ocean blue, owner=sefa]
Office [position=10, length=12, height=14, openingTime=8, closingTime=22, owner=bim]
Office [position=48, length=8, height=9, jobType=detective, owner=faruk]
Office [position=58, length=8, height=9, openingTime=9, closingTime=21, owner=a101]

Back of street:
--This side is empty.

Adding playground to the front of street

Playground [position=0, length=4, height=2]
--Building cannot be added to this position.

Front of street:
House [position=0, length=7, height=14, numberOfRooms=3, color=ocean blue, owner=sefa]
Office [position=10, length=12, height=14, openingTime=8, closingTime=22, owner=bim]
Office [position=48, length=8, height=9, jobType=detective, owner=faruk]
Office [position=58, length=8, height=9, openingTime=9, closingTime=21, owner=a101]

Back of street:
--This side is empty.
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Adding buildings to the back of street

Office [position=5, length=7, height=4, jobType=lawyer, owner=robby]
--Building has added!

Front of street:
House [position=0, length=7, height=14, numberOfRooms=3, color=ocean blue, owner=sefa]
Office [position=10, length=12, height=14, openingTime=8, closingTime=22, owner=bim]
Office [position=48, length=8, height=9, jobType=detective, owner=faruk]
Office [position=58, length=8, height=9, openingTime=9, closingTime=21, owner=a101]

Back of street:
Office [position=5, length=7, height=4, jobType=lawyer, owner=robby]


House [position=19, length=11, height=25, numberOfRooms=4, color=red, owner=cicek]
--Building has added!

Front of street:
House [position=0, length=7, height=14, numberOfRooms=3, color=ocean blue, owner=sefa]
Office [position=10, length=12, height=14, openingTime=8, closingTime=22, owner=bim]
Office [position=48, length=8, height=9, jobType=detective, owner=faruk]
Office [position=58, length=8, height=9, openingTime=9, closingTime=21, owner=a101]

Back of street:
Office [position=5, length=7, height=4, jobType=lawyer, owner=robby]
House [position=19, length=11, height=25, numberOfRooms=4, color=red, owner=cicek]


House [position=53, length=10, height=14, numberOfRooms=5, color=orange, owner=muzaffer]
--Building has added!

Front of street:
House [position=0, length=7, height=14, numberOfRooms=3, color=ocean blue, owner=sefa]
Office [position=10, length=12, height=14, openingTime=8, closingTime=22, owner=bim]
Office [position=48, length=8, height=9, jobType=detective, owner=faruk]
Office [position=58, length=8, height=9, openingTime=9, closingTime=21, owner=a101]

Back of street:
Office [position=5, length=7, height=4, jobType=lawyer, owner=robby]
House [position=19, length=11, height=25, numberOfRooms=4, color=red, owner=cicek]
House [position=53, length=10, height=14, numberOfRooms=5, color=orange, owner=muzaffer]



House [position=82, length=14, height=10, numberOfRooms=3, color=lime, owner=robo]
--Building has added!

Front of street:
House [position=0, length=7, height=14, numberOfRooms=3, color=ocean blue, owner=sefa]
Office [position=10, length=12, height=14, openingTime=8, closingTime=22, owner=bim]
Office [position=48, length=8, height=9, jobType=detective, owner=faruk]
Office [position=58, length=8, height=9, openingTime=9, closingTime=21, owner=a101]

Back of street:
Office [position=5, length=7, height=4, jobType=lawyer, owner=robby]
House [position=19, length=11, height=25, numberOfRooms=4, color=red, owner=cicek]
House [position=53, length=10, height=14, numberOfRooms=5, color=orange, owner=muzaffer]
House [position=82, length=14, height=10, numberOfRooms=3, color=lime, owner=robo]

Adding playground to the back of street

Playground [position=35, length=4, height=2]
--Building has added!

Front of street:
House [position=0, length=7, height=14, numberOfRooms=3, color=ocean blue, owner=sefa]
Office [position=10, length=12, height=14, openingTime=8, closingTime=22, owner=bim]
Office [position=48, length=8, height=9, jobType=detective, owner=faruk]
Office [position=58, length=8, height=9, openingTime=9, closingTime=21, owner=a101]

Back of street:
Office [position=5, length=7, height=4, jobType=lawyer, owner=robby]
House [position=19, length=11, height=25, numberOfRooms=4, color=red, owner=cicek]
Playground [position=35, length=4, height=2]
House [position=53, length=10, height=14, numberOfRooms=5, color=orange, owner=muzaffer]
House [position=82, length=14, height=10, numberOfRooms=3, color=lime, owner=robo]


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Adding building or playground to the filled area of street

Office [position=3, length=12, height=18, jobType=dentist, owner=necmi]
--Building cannot be added to this position.
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Front of street:
House [position=0, length=7, height=14, numberOfRooms=3, color=ocean blue, owner=sefa]
Office [position=10, length=12, height=14, openingTime=8, closingTime=22, owner=bim]
Office [position=48, length=8, height=9, jobType=detective, owner=faruk]
Office [position=58, length=8, height=9, openingTime=9, closingTime=21, owner=a101]

Back of street:
Office [position=5, length=7, height=4, jobType=lawyer, owner=robby]
House [position=19, length=11, height=25, numberOfRooms=4, color=red, owner=cicek]
Playground [position=35, length=4, height=2]
House [position=53, length=10, height=14, numberOfRooms=5, color=orange, owner=muzaffer]
House [position=82, length=14, height=10, numberOfRooms=3, color=lime, owner=robo]


Playground [position=55, length=9, height=2]
--Building cannot be added to this position.

Front of street:
House [position=0, length=7, height=14, numberOfRooms=3, color=ocean blue, owner=sefa]
Office [position=10, length=12, height=14, openingTime=8, closingTime=22, owner=bim]
Office [position=48, length=8, height=9, jobType=detective, owner=faruk]
Office [position=58, length=8, height=9, openingTime=9, closingTime=21, owner=a101]

Back of street:
Office [position=5, length=7, height=4, jobType=lawyer, owner=robby]
House [position=19, length=11, height=25, numberOfRooms=4, color=red, owner=cicek]
Playground [position=35, length=4, height=2]
House [position=53, length=10, height=14, numberOfRooms=5, color=orange, owner=muzaffer]
House [position=82, length=14, height=10, numberOfRooms=3, color=lime, owner=robo]

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Adding building or playground to the outside of street
Office [position=-10, length=5, height=14, openingTime=7, closingTime=22, owner=bakkal mito]
Playground [position=135, length=20, height=2]
--Invalid build property!
java.lang.ArrayIndexOutOfBoundsException
        at Street.checkEnoughLand(Street.java:148)
        at Street.addBuilding(Street.java:100)
        at Main.driverMode(Main.java:396)
        at Main.main(Main.java:34)
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Deleting from empty position of the street
position = 25
java.lang.NullPointerException
        at Street.deleteBuilding(Street.java:212)
        at Main.driverMode(Main.java:410)
        at Main.main(Main.java:34)
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Deleting from outside of the street
position = 150 (street length = 100)
java.lang.ArrayIndexOutOfBoundsException: Index 150 out of bounds for length 100
        at Street.findBuilding(Street.java:260)
        at Street.deleteBuilding(Street.java:205)
        at Main.driverMode(Main.java:421)
        at Main.main(Main.java:34)
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Deleting from the street (correct input - position = 82)

House [position=82, length=14, height=10, numberOfRooms=3, color=lime, owner=robo]
--Building has deleted.

Front of street:
House [position=0, length=7, height=14, numberOfRooms=3, color=ocean blue, owner=sefa]
Office [position=10, length=12, height=14, openingTime=8, closingTime=22, owner=bim]
Office [position=48, length=8, height=9, jobType=detective, owner=faruk]
Office [position=58, length=8, height=9, openingTime=9, closingTime=21, owner=a101]

Back of street:
Office [position=5, length=7, height=4, jobType=lawyer, owner=robby]
House [position=19, length=11, height=25, numberOfRooms=4, color=red, owner=cicek]
Playground [position=35, length=4, height=2]
House [position=53, length=10, height=14, numberOfRooms=5, color=orange, owner=muzaffer]


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Displaying the total remaining length of lands on the street

--Total remaining length: 133


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Displaying the list of buildings on the street

Front of street:
House [position=0, length=7, height=14, numberOfRooms=3, color=ocean blue, owner=sefa]
Office [position=10, length=12, height=14, openingTime=8, closingTime=22, owner=bim]
Office [position=48, length=8, height=9, jobType=detective, owner=faruk]
Office [position=58, length=8, height=9, openingTime=9, closingTime=21, owner=a101]

Back of street:
Office [position=5, length=7, height=4, jobType=lawyer, owner=robby]
House [position=19, length=11, height=25, numberOfRooms=4, color=red, owner=cicek]
Playground [position=35, length=4, height=2]
House [position=53, length=10, height=14, numberOfRooms=5, color=orange, owner=muzaffer]

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Display the number and ratio of length of playgrounds

--Number: 1

--Ratio: 4/200

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Display the total length of street occupied by the markets, houses or offices

--Total length of buildings: 63

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Focusing on a building

Front of street:
House [position=0, length=7, height=14, numberOfRooms=3, color=ocean blue, owner=sefa]
Office [position=10, length=12, height=14, openingTime=8, closingTime=22, owner=bim]
Office [position=48, length=8, height=9, jobType=detective, owner=faruk]
Office [position=58, length=8, height=9, openingTime=9, closingTime=21, owner=a101]

Back of street:
Office [position=5, length=7, height=4, jobType=lawyer, owner=robby]
House [position=19, length=11, height=25, numberOfRooms=4, color=red, owner=cicek]
Playground [position=35, length=4, height=2]
House [position=53, length=10, height=14, numberOfRooms=5, color=orange, owner=muzaffer]

Side of the street (1 -- front)
Position of building to focus (3)
--House owner: sefa

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Focusing on a playground

Front of street:
House [position=0, length=7, height=14, numberOfRooms=3, color=ocean blue, owner=sefa]
Office [position=10, length=12, height=14, openingTime=8, closingTime=22, owner=bim]
Office [position=48, length=8, height=9, jobType=detective, owner=faruk]
Office [position=58, length=8, height=9, openingTime=9, closingTime=21, owner=a101]

Back of street:
Office [position=5, length=7, height=4, jobType=lawyer, owner=robby]
House [position=19, length=11, height=25, numberOfRooms=4, color=red, owner=cicek]
Playground [position=35, length=4, height=2]
House [position=53, length=10, height=14, numberOfRooms=5, color=orange, owner=muzaffer]

Side of the street (2 -- back)
Position of playground to focus (35)
--Playground length: 4

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Displaying the skyline silhouette of the street