1. Pole Tagger Manual

MANUAL POLE TAGGER

STEP 1:
Start up the program by calling ‘python3 pole_tagger.py’ in a terminal which has the same directory as the pole_tagger.py file.

STEP 2:
A segmented example pops up in the screen. Look at the segmented example and perform one of the following options:

i. Press **[j]** If the example is a street light and the red line is correct
ii. Press **[c]** If the example is a street light but red line is not correct
iii. Press **[i]** If the segmented example is not a street light
iv. Press **[n]** If it is not clear if the segmented example is a street light
v. Press **[backspace]** if you would like to redo the previous segmented example
vi. Press **[esc]** if you would like to stop tagging and exit the program

POSSIBLE CONTINUATIONS FROM STEP 2:

- If option **i** was chosen, one additional step follows to classify the type of street light. See page 2 how to classify the type of street light.
- If option **ii** was chosen, two additional steps follow: (1) Correct the red line and (2) determine the type of street light. See page 3 how to correct the red line and (similar as with option **i**) page 2 on how to classify the type of street light.

- If option **iii** or **iv** is chosen, the program repeats step 2 for the next example
- If option **v** is chosen, the program repeats step 1 for the previous example
- If option **vi** is chosen, the program stops. Everything that has been tagged in this session is saved in the csv file named ‘poles_extracted_annotated.csv’

NOTES
- Sometimes, one street light is separated into two or more clusters, resulting in two or more images of the same pole that is fitted multiple times. If you notice this, you can regard one image as a true positive and the other(s) as false positives.

HOW CLASSIFY THE STREET LIGHT TYPE

STEP 1:
An additional window pops up which can iterate through the existing types of street light to determine the street light type in the example.

STEP 2:
Perform one of the following options when the window pops up:

i. Press **[j]** if the type shown is the same as the type visible in the example
ii. Press **[f]** if the type shown is not the same as the type visible in the example
iii. Press **[backspace]** to go to the previous type that was shown in the pop up window
iv. Press **[1]** if the street light example is not in the types available to iterate trough (e.g., an unique street light)

POSSIBLE CONTINUATIONS FROM STEP 2:

- If option **i** was chosen, the pop up window disappears and the next example is shown in the regular window
- If option **ii** was chosen, the next most likely light type is shown in the pop up window and step 2 repeats
- If option **iii** was chosen, the previous street light type is shown in the pop up window and step 2 repeats
- If option **iv** was chosen, the pop up window disappears and the next example is shown in the regular window

NOTES:

- The types to iterate trough are ranked by likeliness retrieved by a trained regression model that utilizes the height, radius and color. Thereby, the tool aims to display the correct type as quickly as possible.
- If you have iterated trough all images, the pop up window closes itself automatically and the segmented example is assigned an ‘unkown’ label automatically

HOW TO CORRECT THE RED LINE FOR A STREET LIGHT

STEP 1:
Two additional windows pop up sequentially, which enable to refit the red line according to the bottom and top. The first image is to refit the x-axis and the second image is to refit the y-axis.

STEP 2:
Click on the spot where the street light hits the ground (either visibly or by approximation) with a mouse click

STEP 3:
Click on the spot where the highest point of the street light is reached while fitting the pole.

STEP 4:
Check if the red line that appears fits the street light correcly and perform one of the following options:

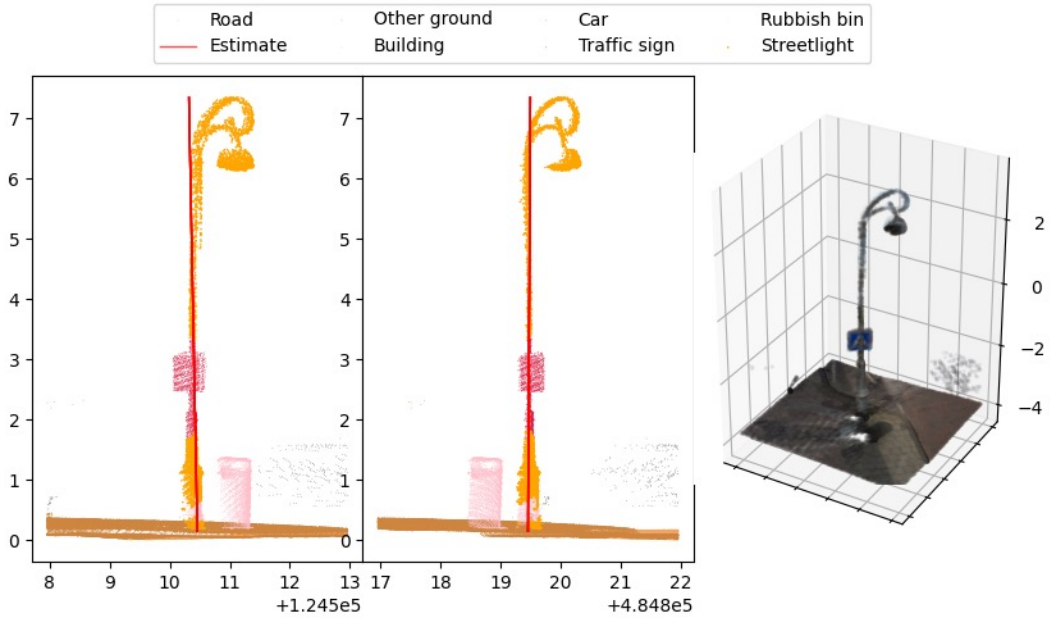
i. Click **[space]** if the red line fits the street light correctly
ii. Click **[c]** if the red line does not fit the street light correctly

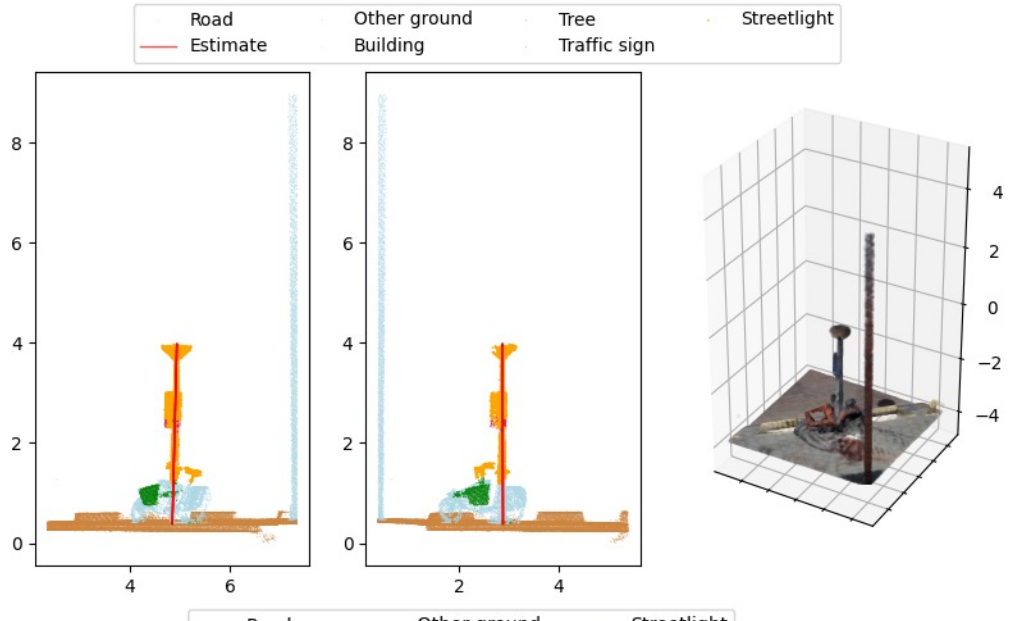
POSSIBLE CONTINUATIONS FROM STEP 4:

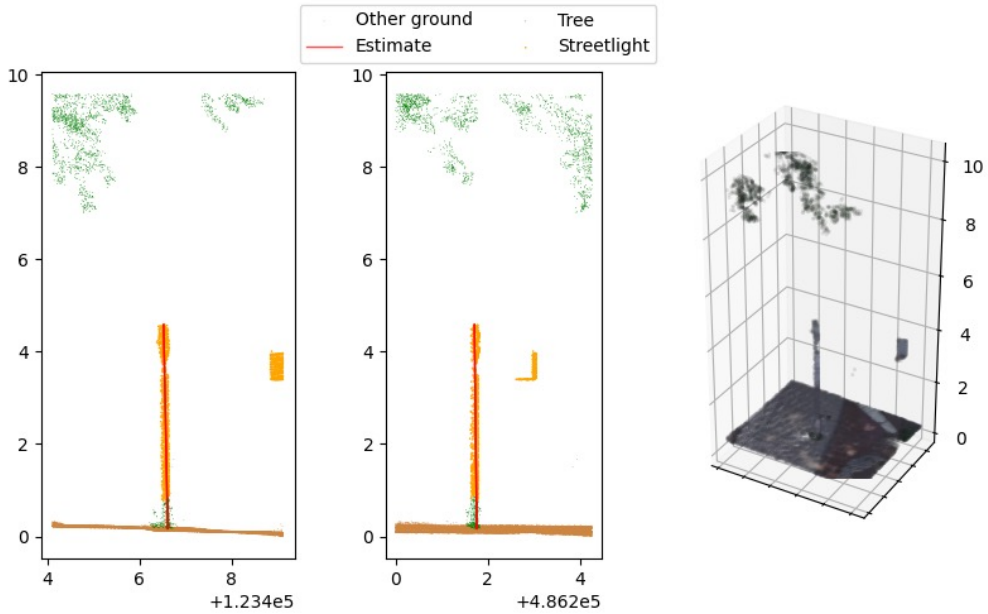
- If option **i** was chosen and the refit for the x-axis was done, the steps should be repeated for the y-axis
- If option **i** was chosen and the refit for the y-axis was done, the pop-up window disappears and the window to determine the street light type pops up (see page 2 on how to do this)
- If option **ii** was chosen, the red line in the pop-up disappears and the refit should be done again (from step 2 onwards)

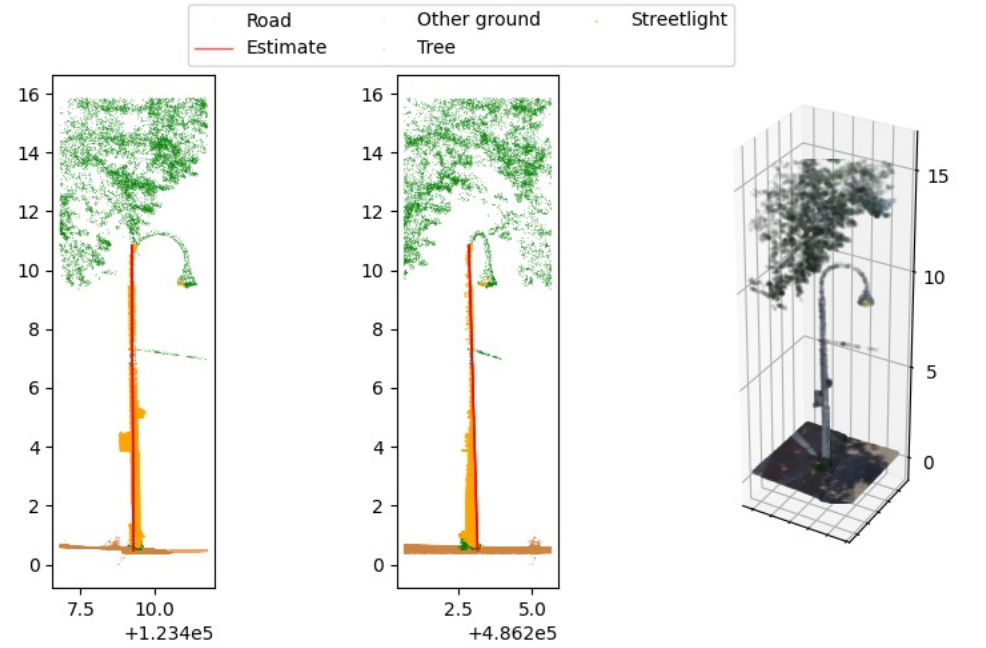
2. Segmentation Examples

EXAMPLES OF TRUE POSITIVE EXAMPLES THAT DO NOT NEED A FIX

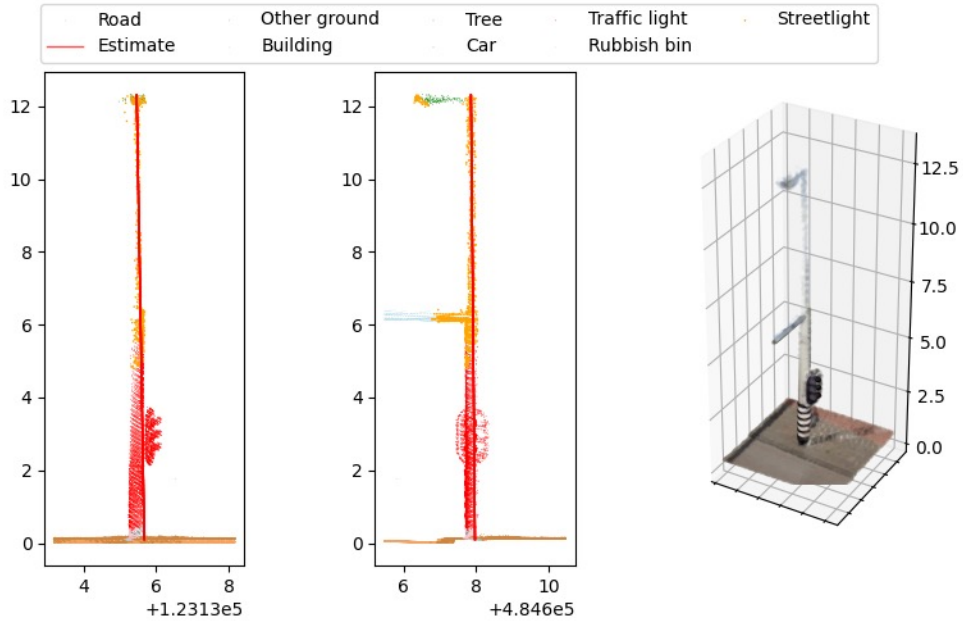




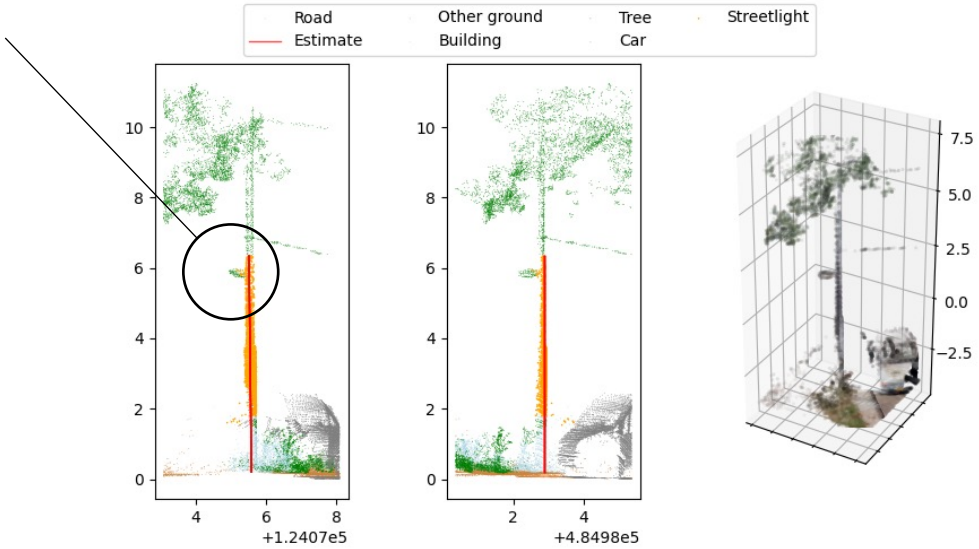


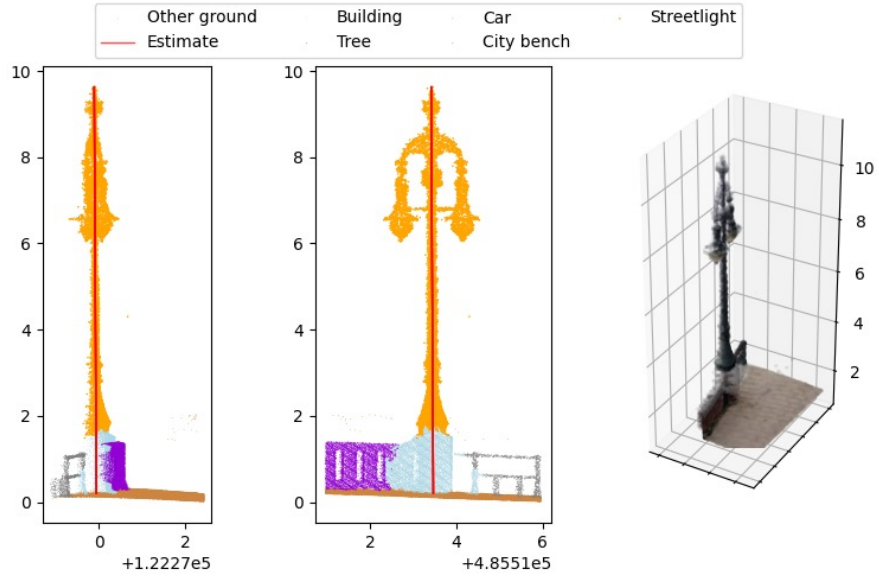


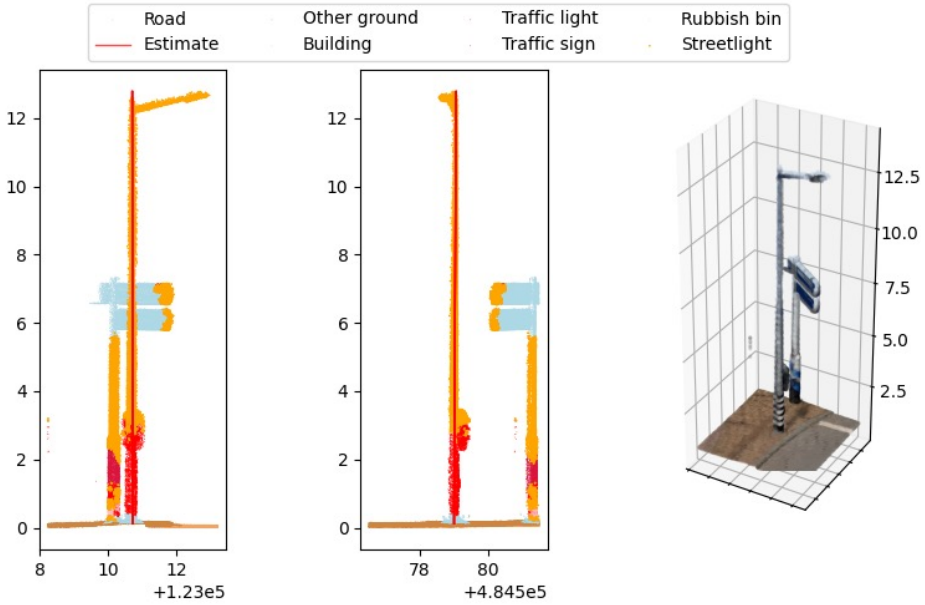
EXAMPLES OF TRUE POSITIVE EXAMPLES THAT DO NOT NEED A FIX



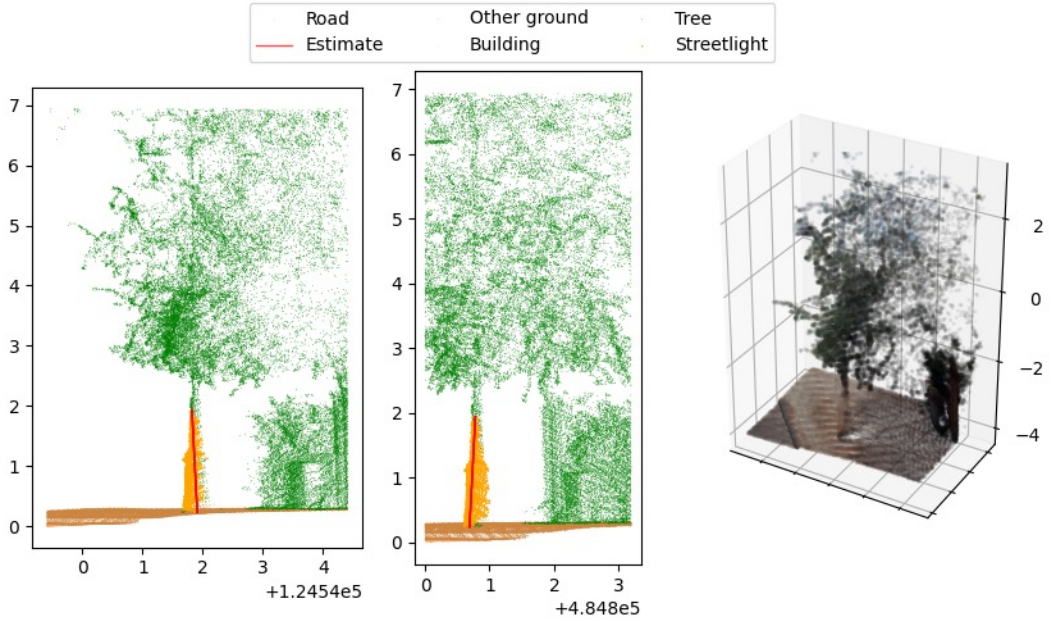
Small lamp as attachment, red line should roughly stop at the small lamp if there is not a lamp at the top

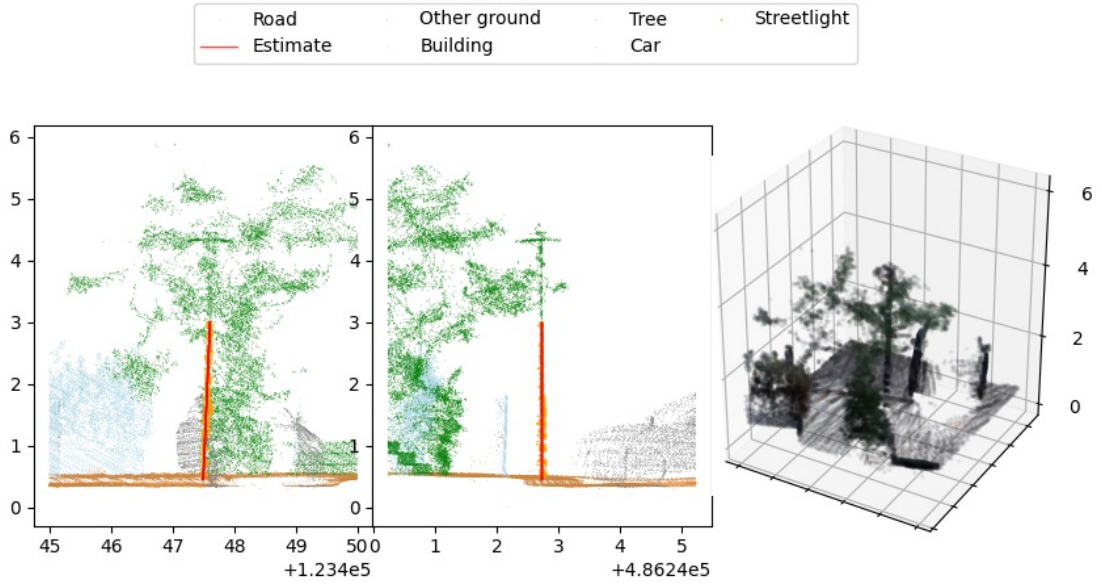


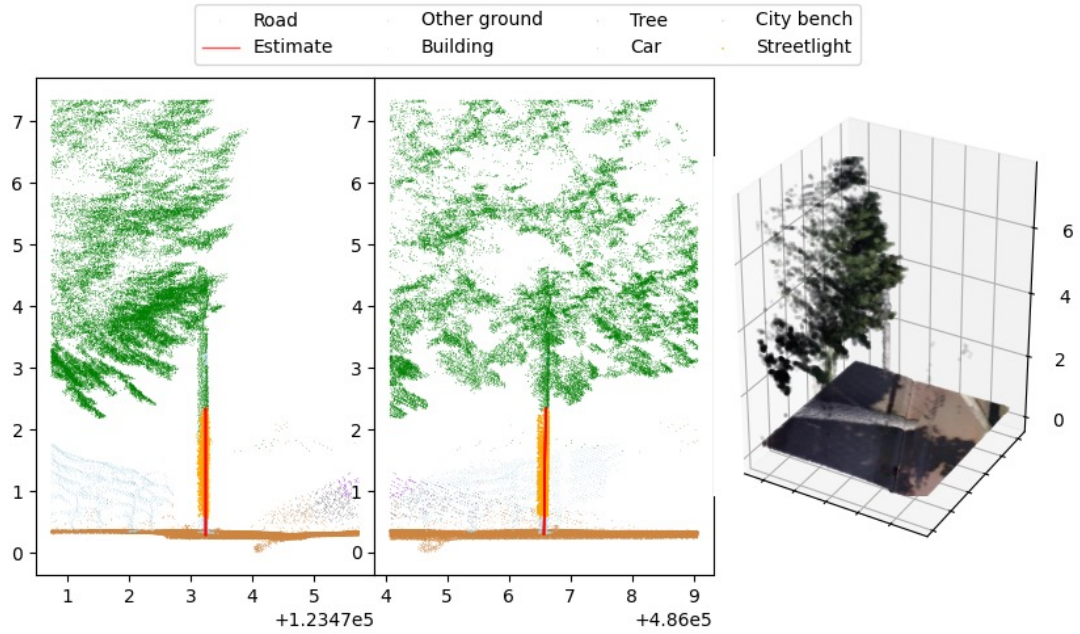


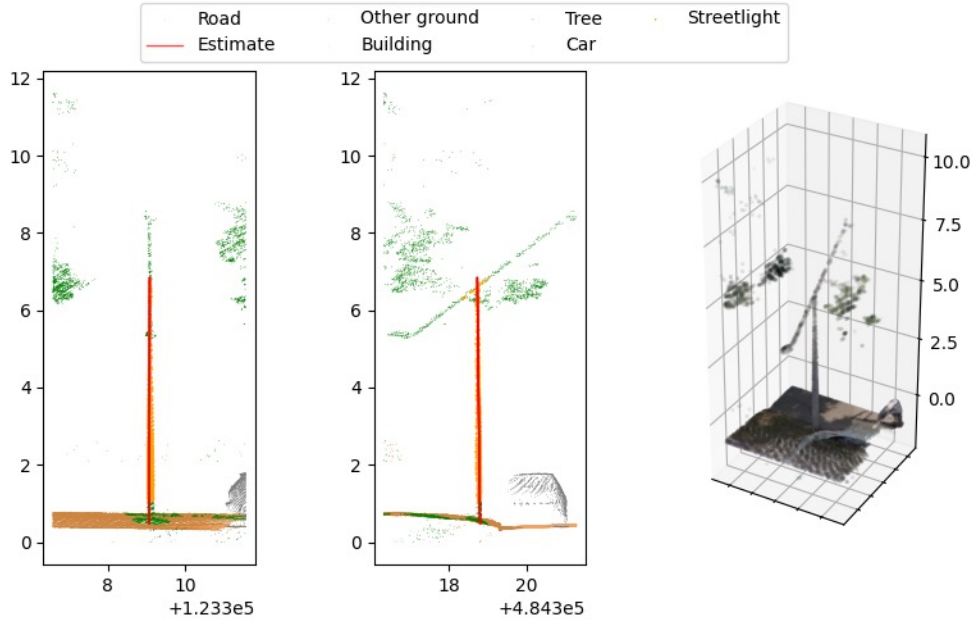


EXAMPLES OF TRUE POSITIVE EXAMPLES THAT NEED A FIX

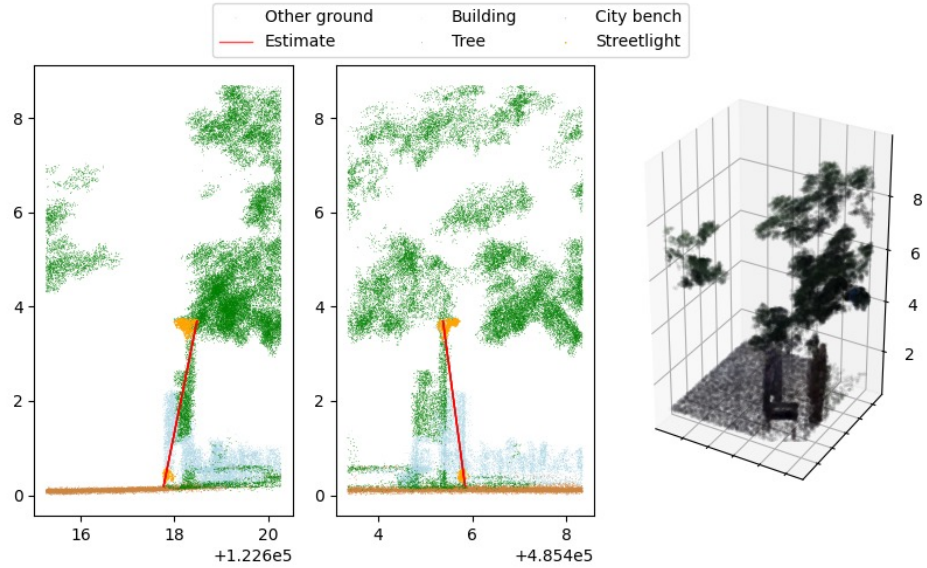




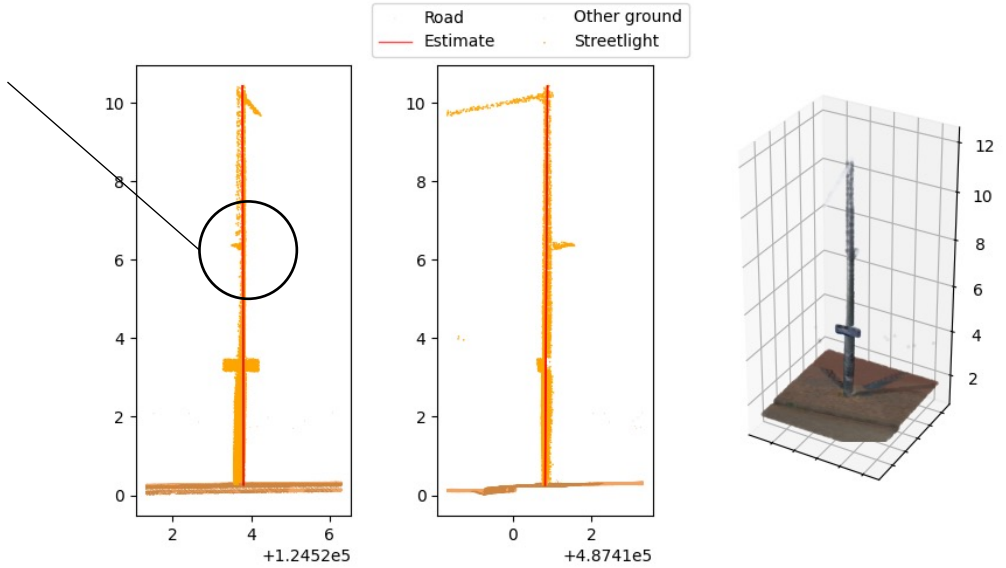


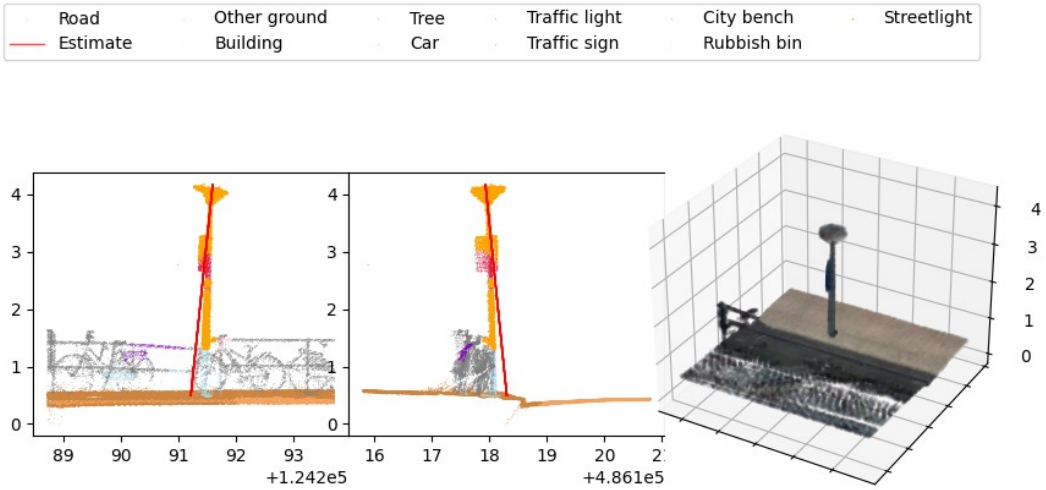


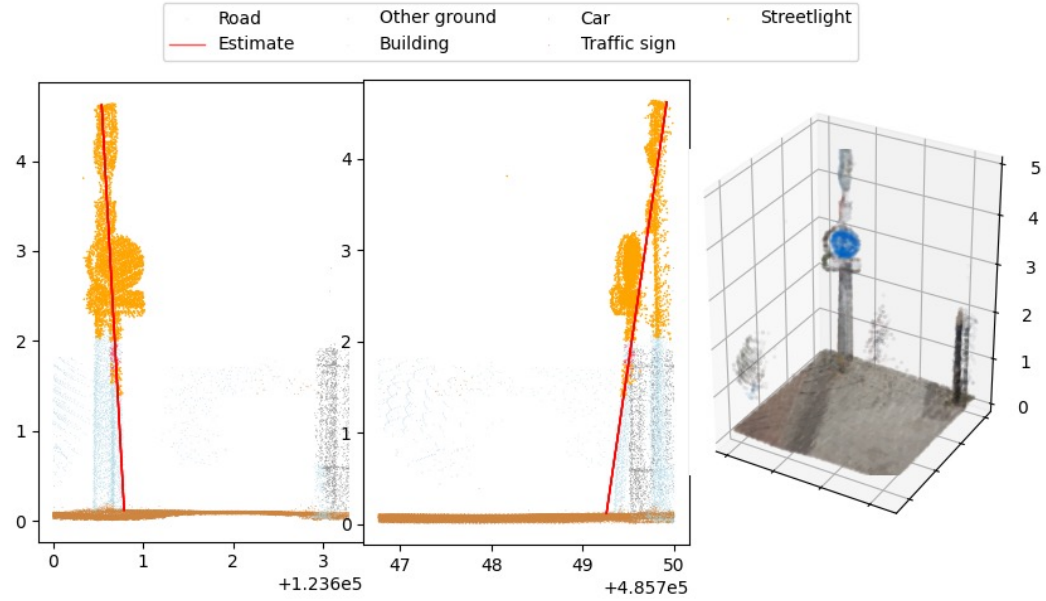
EXAMPLES OF TRUE POSITIVE EXAMPLES THAT NEED A FIX



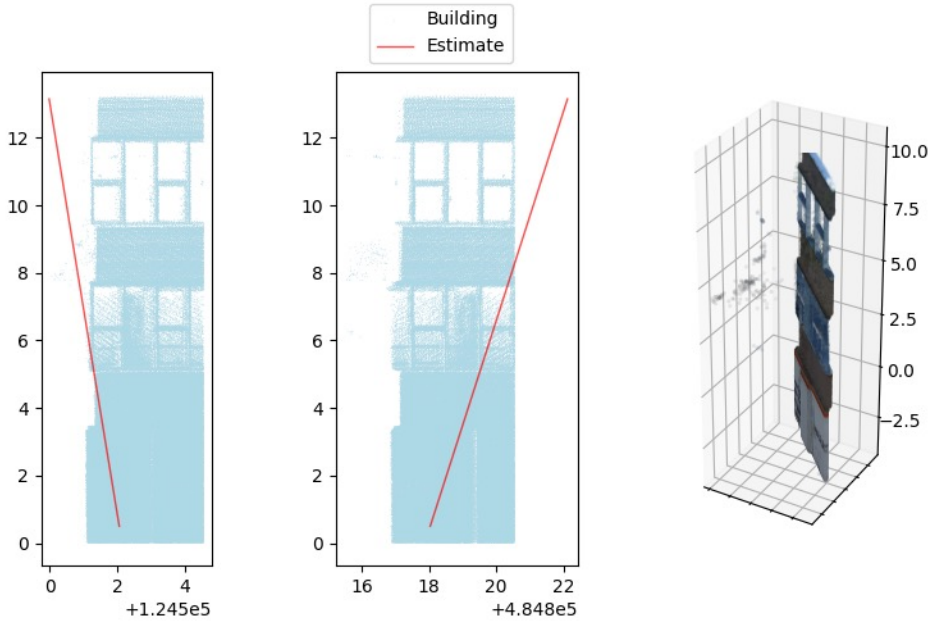
Small lamp as attachment, but red line should roughly stop at height of lamp if there is not lamp at the top of pole)

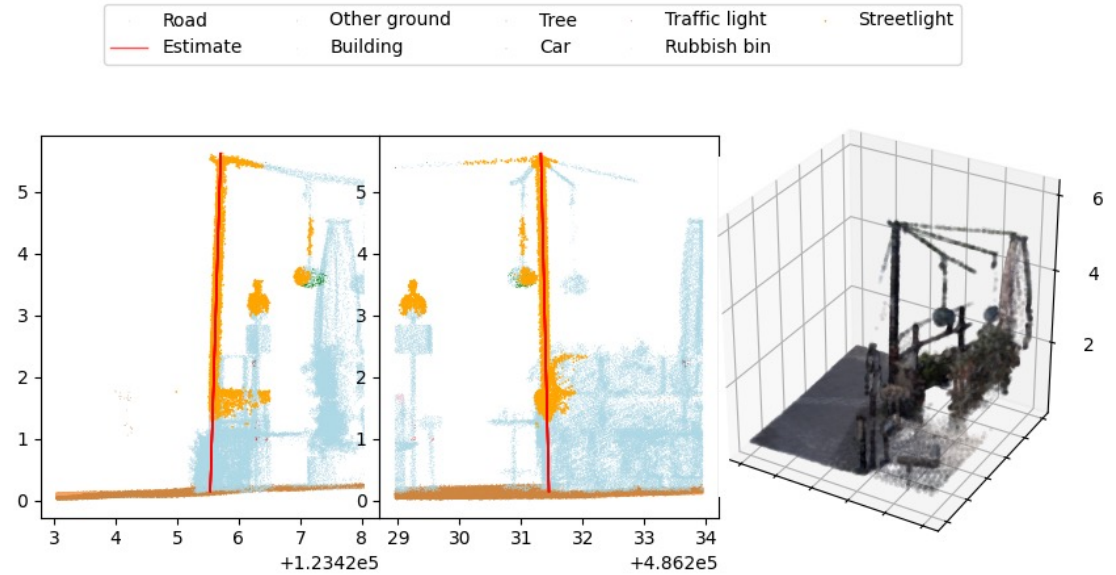


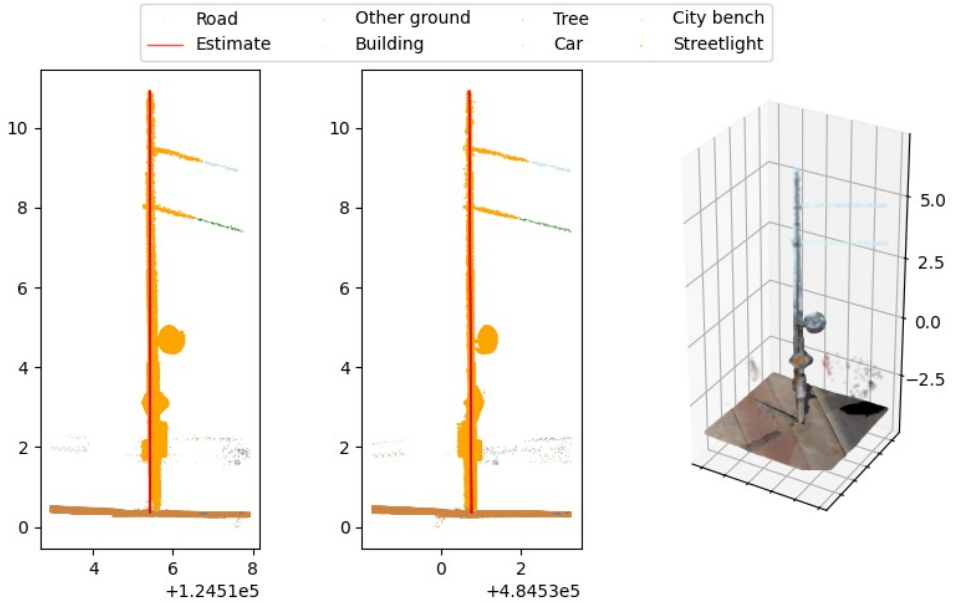


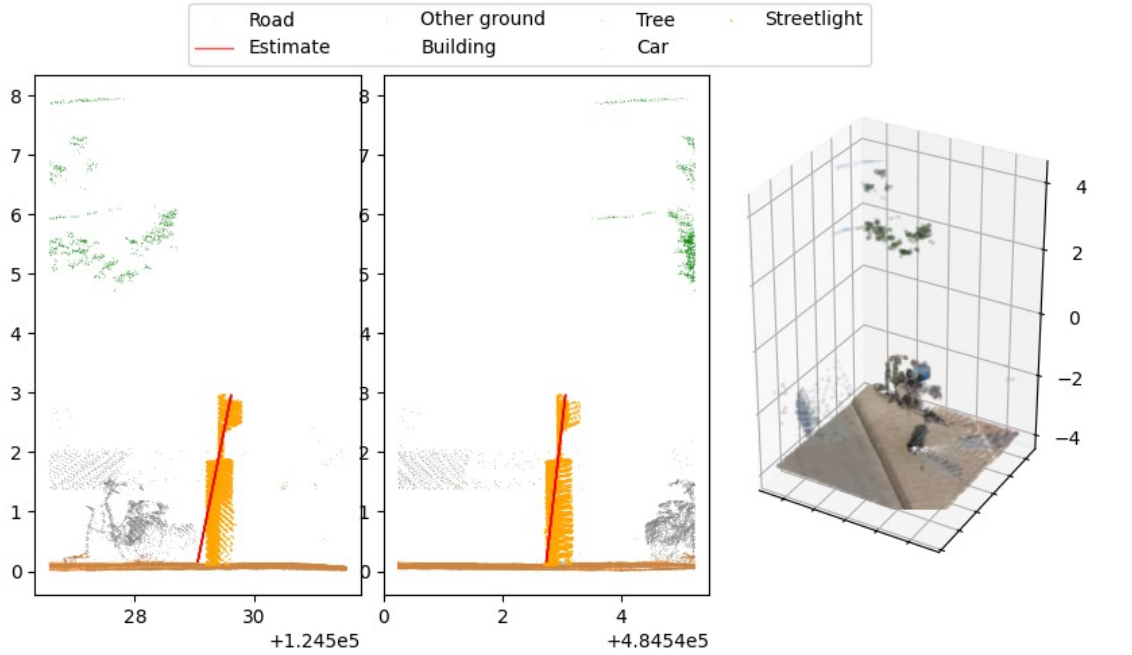


EXAMPLES FALSE POSITIVES

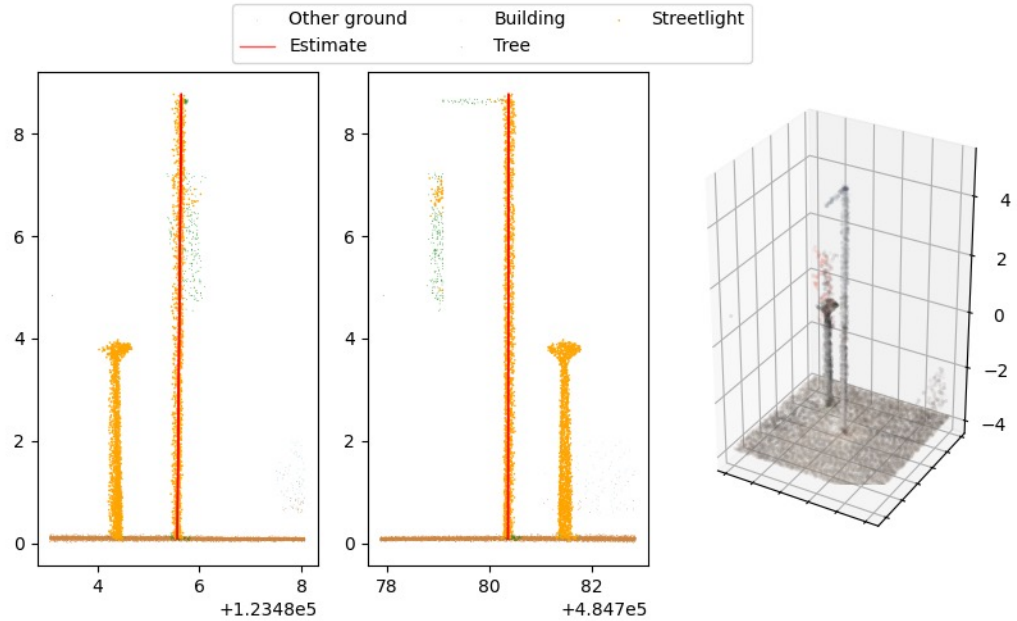


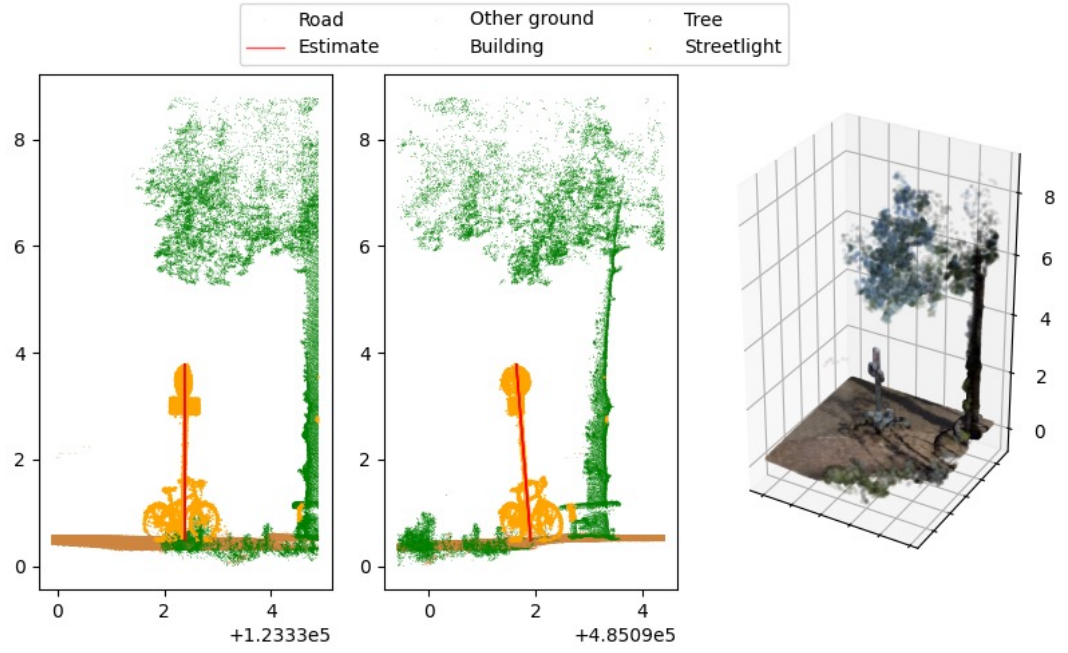


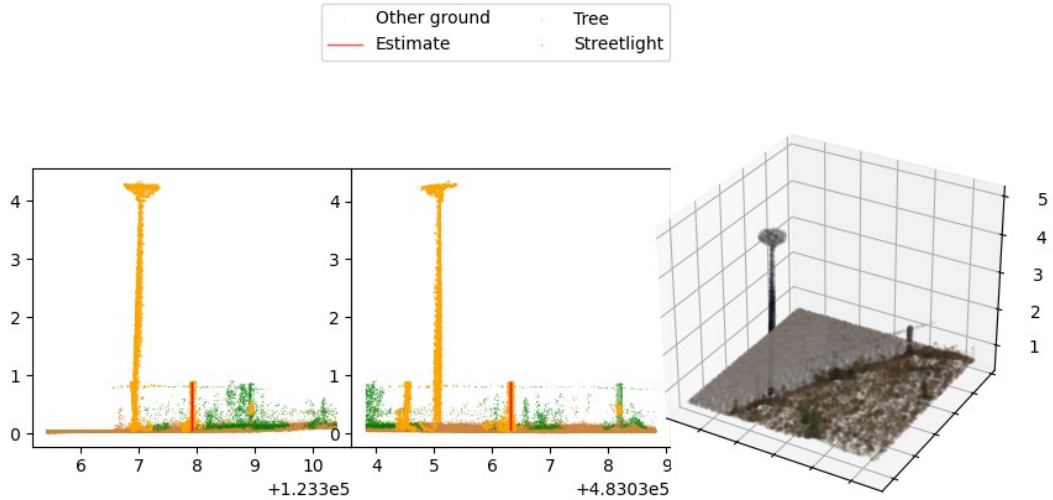


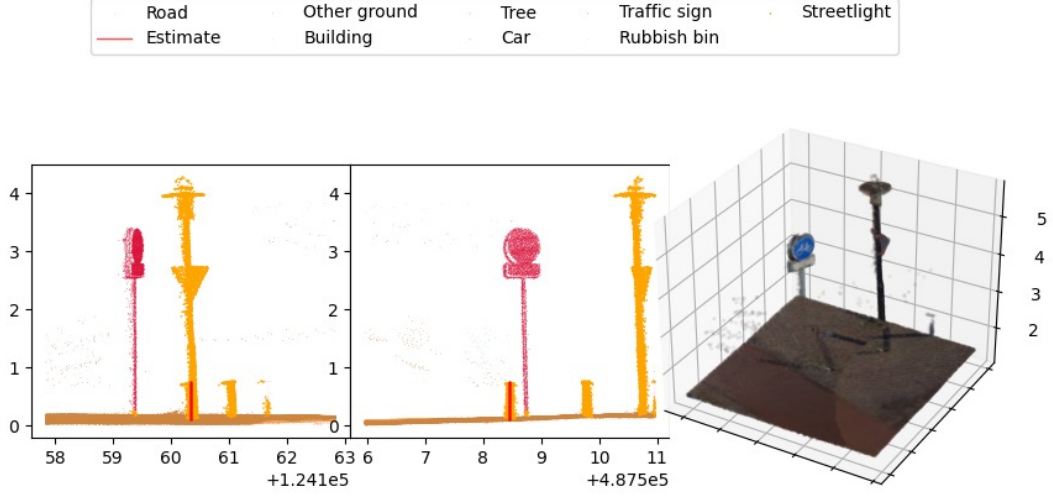


EXAMPLES OF FALSE POSITIVES







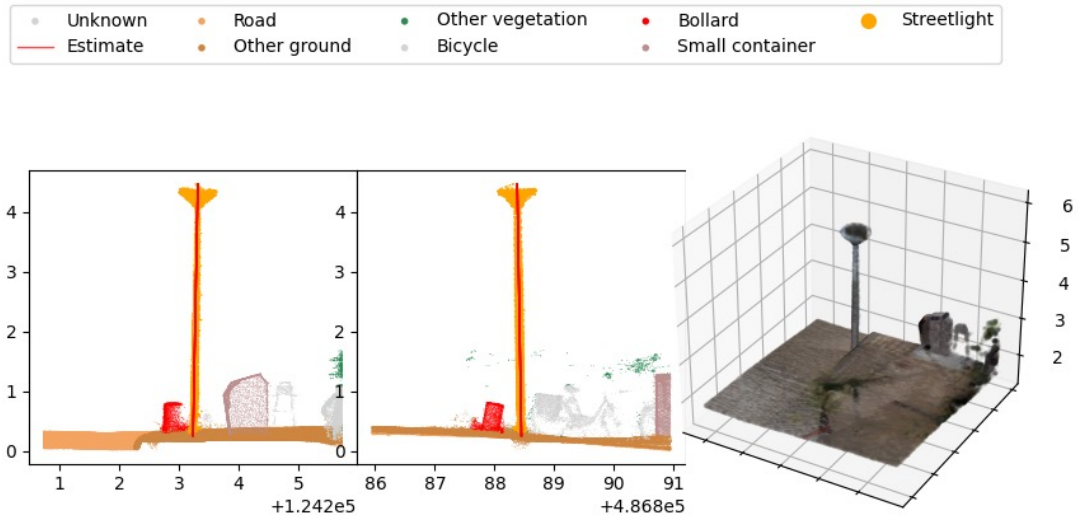


3. Street Light Types To Distinguish

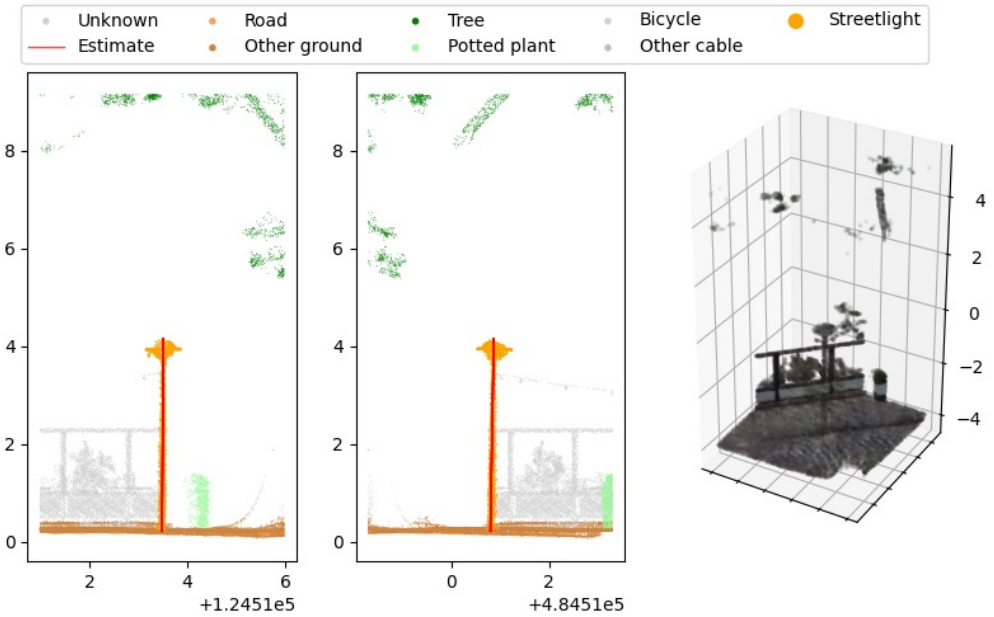
TYPE 1

- Around 4m tall
- Cone as lamp
- Two variants:
  - Flat top
  - Rounded top
- Variant with rounded top similar to type 5

Flat top

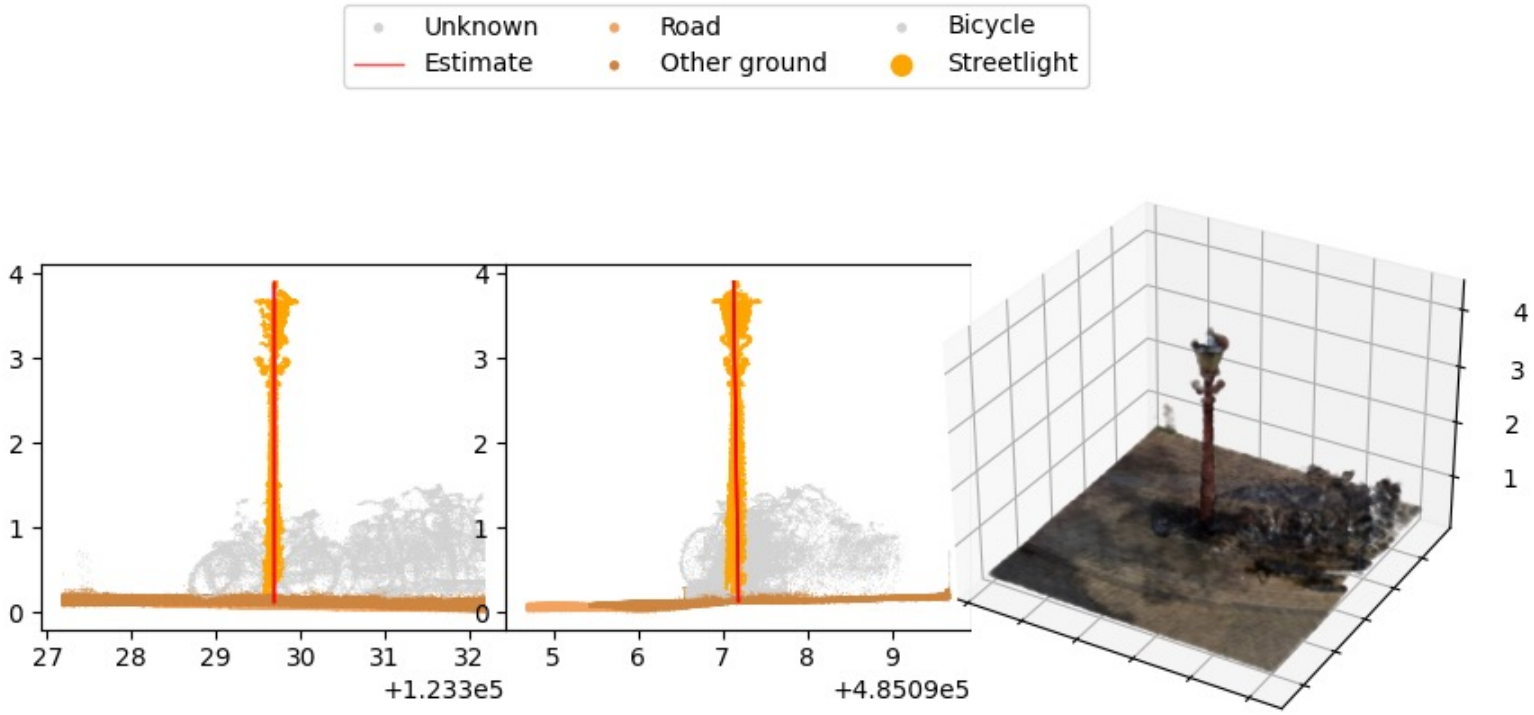


Rounded top



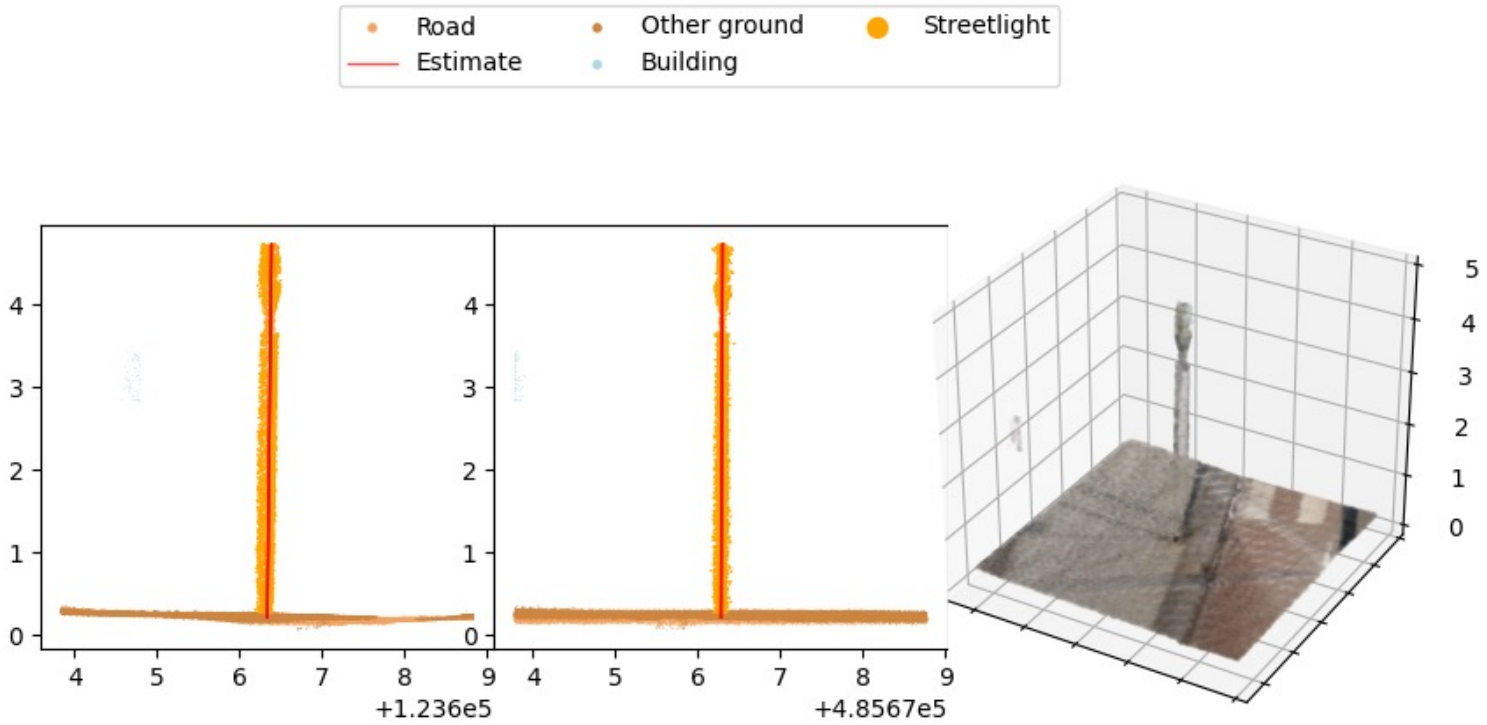
TYPE 2

- Around 4m tall
- Classical look
- Red coating



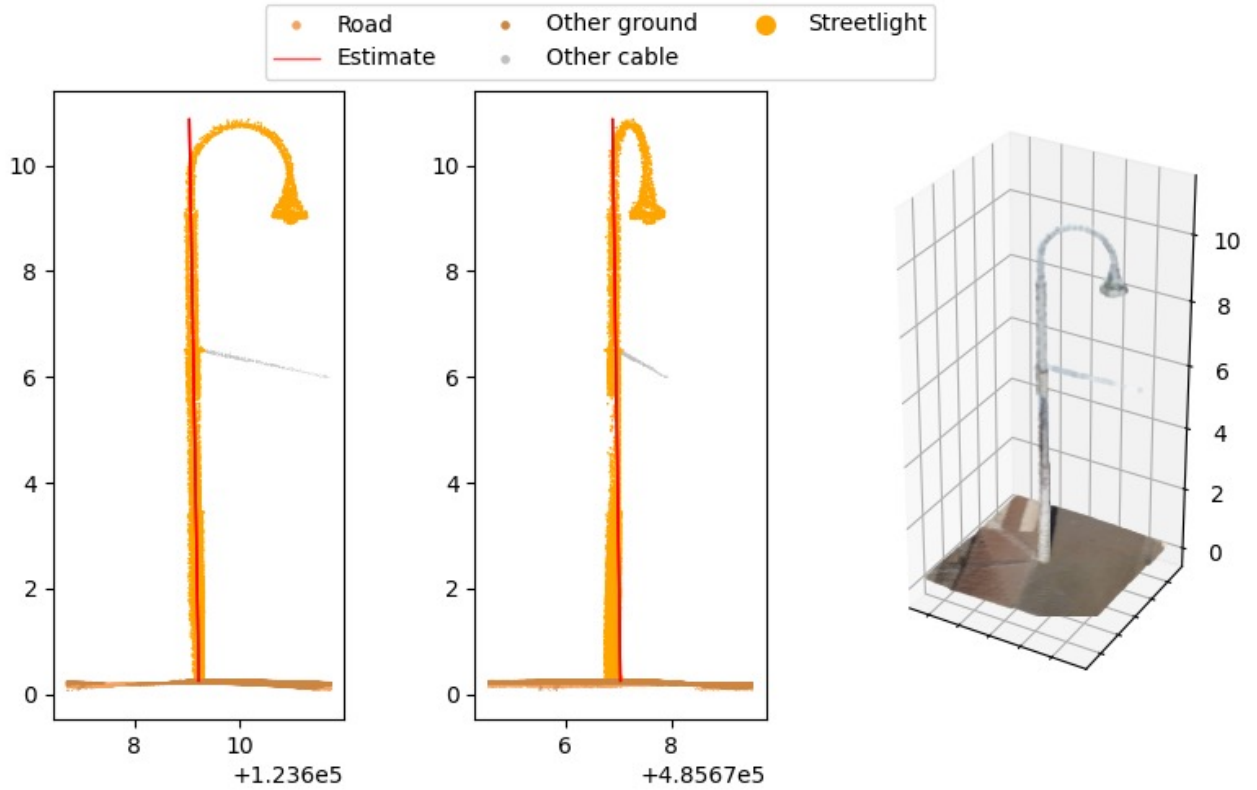
TYPE 3

- Around 4m tall
- Narrow pole
- Grey coating



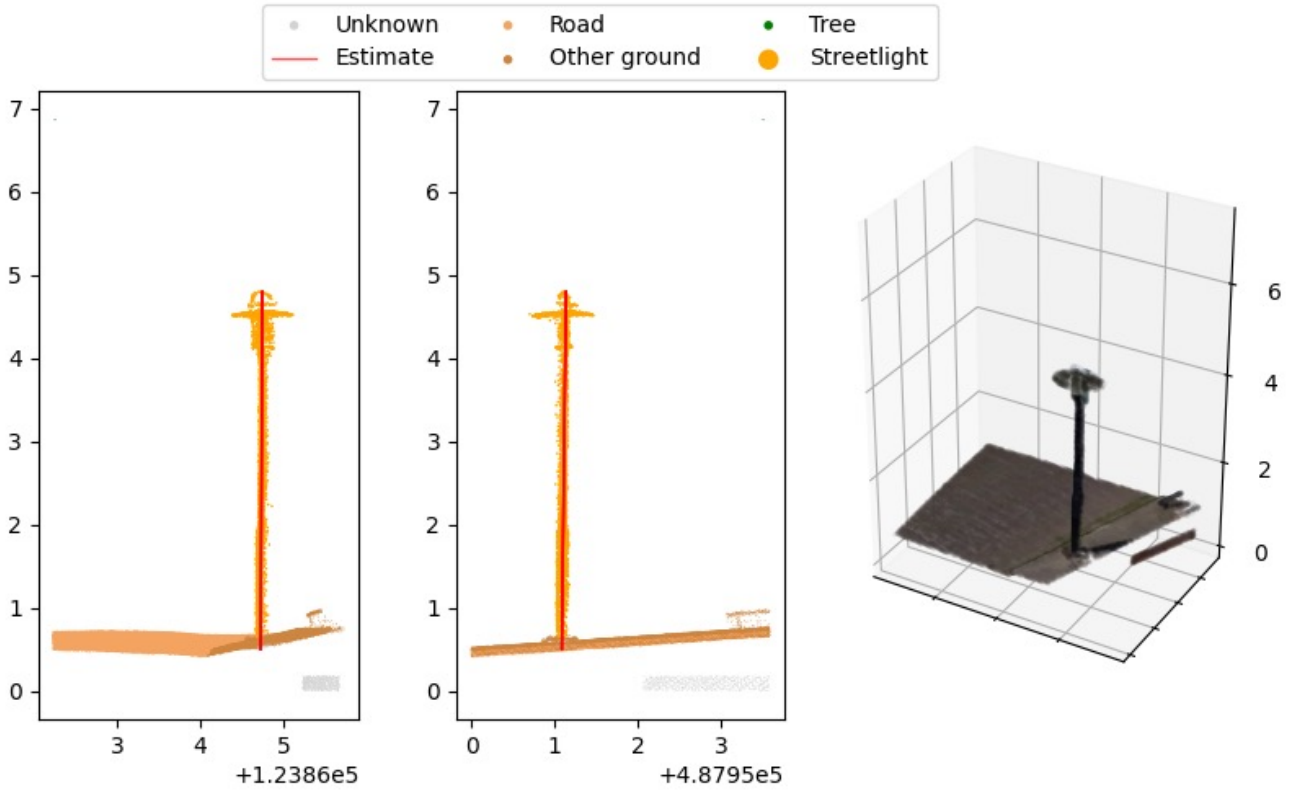
TYPE 4

- Around 11m tall
- ‘Hanging’ lamp
- Similar to type 13 but bigger



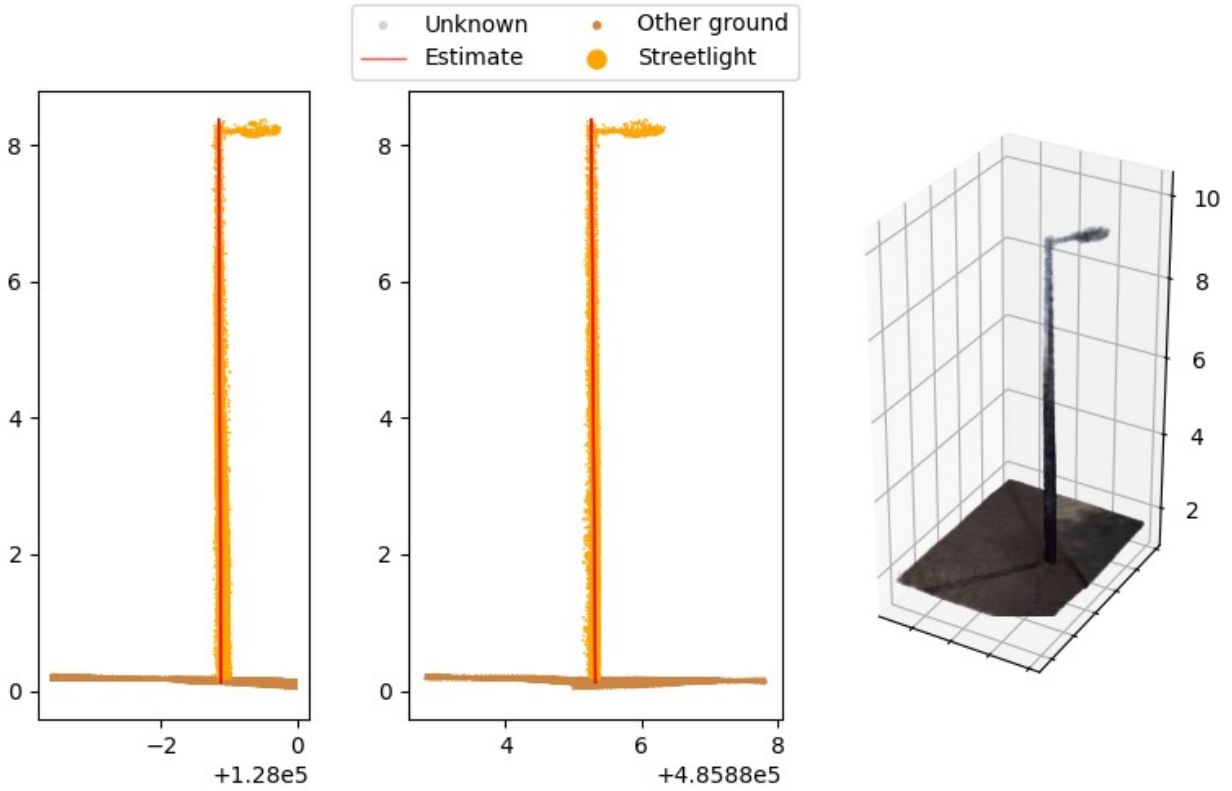
TYPE 5

- Around 4m tall
- Hat-shaped lamp
- Similar to type 1 (with rounded top)



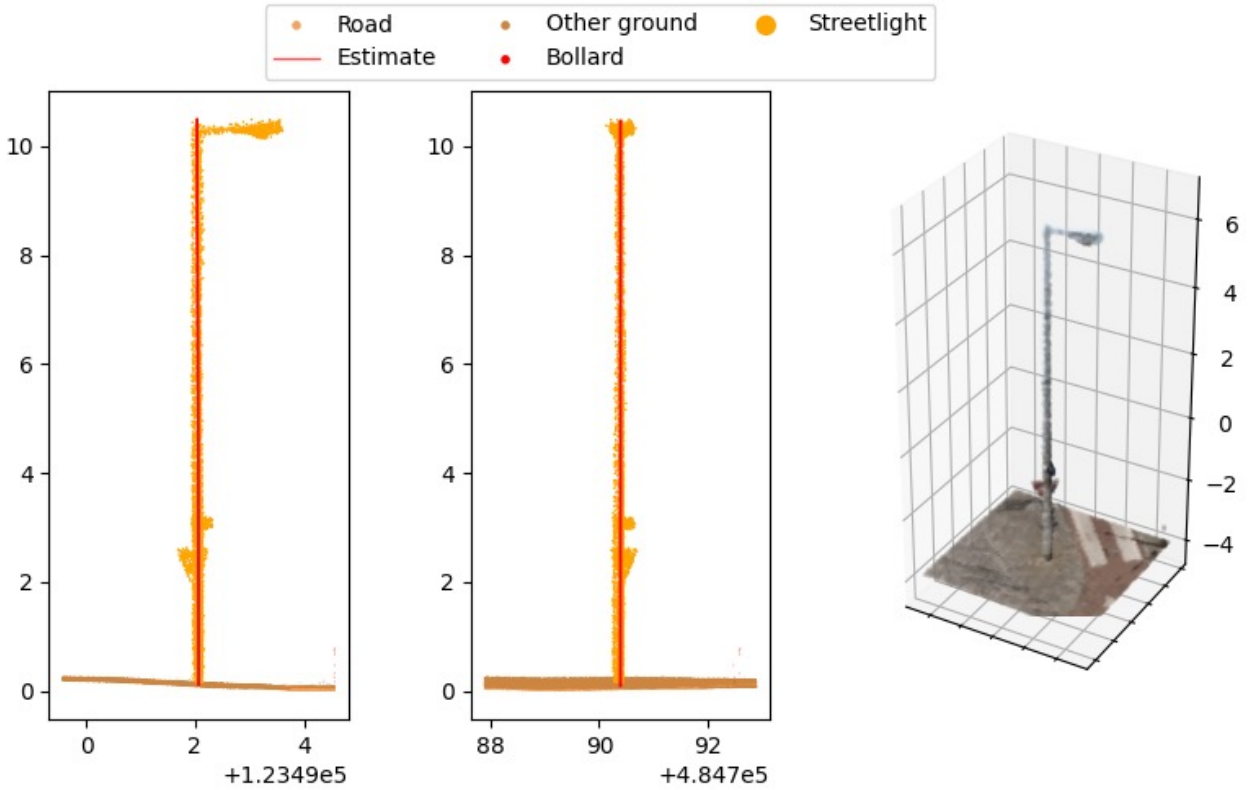
TYPE 6

- Around 8m tall
- Similar to types 7 and 8 but different length
- Usually black or grey



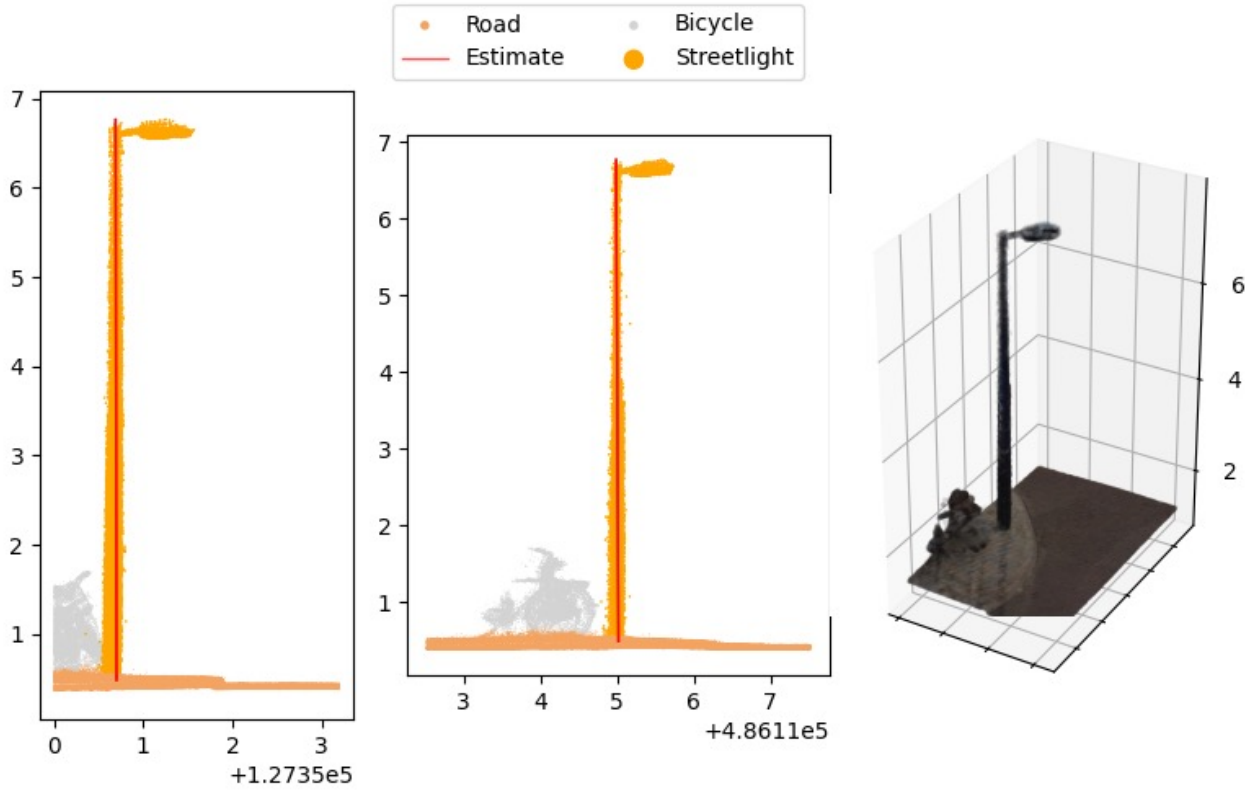
TYPE 7

- Around 10m tall
- Similar to types 6 and 8 but different length
- Usually grey



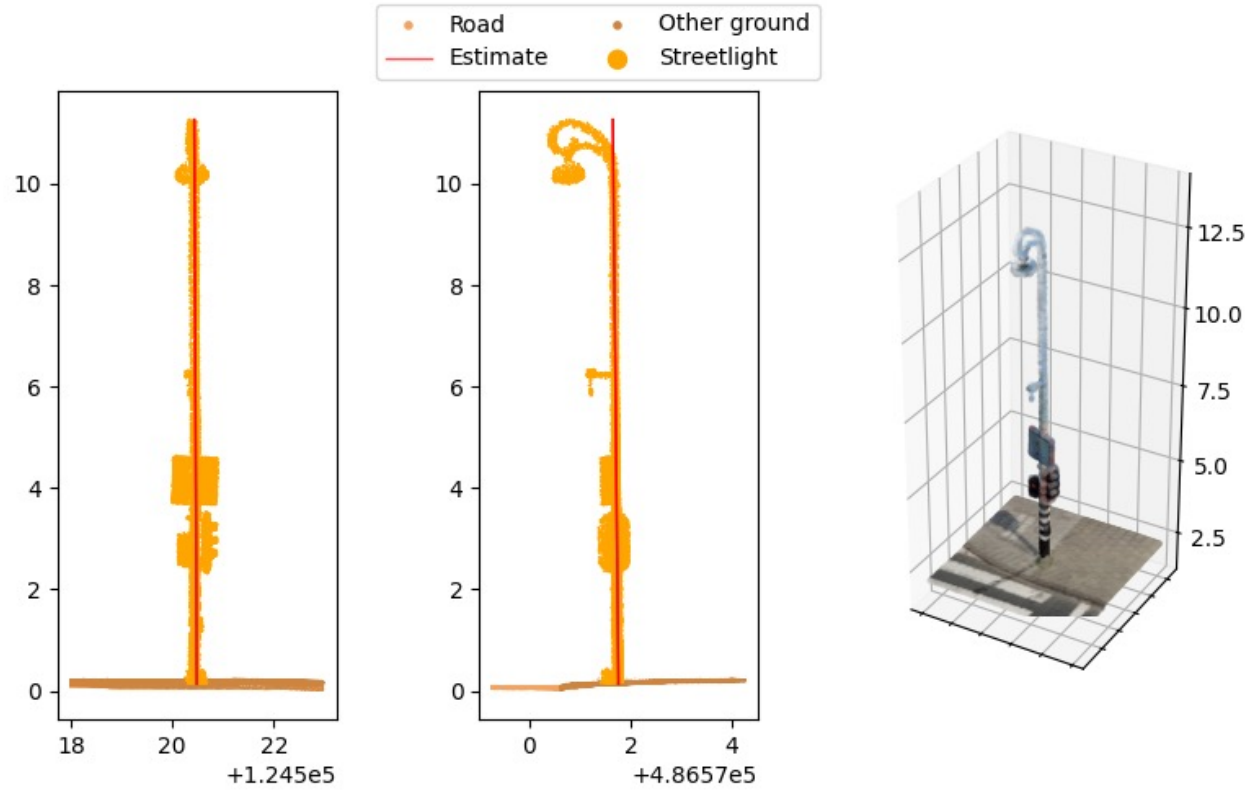
TYPE 8

- Around 6m tall
- Similar to types 6 and 7 but different length
- Usually black



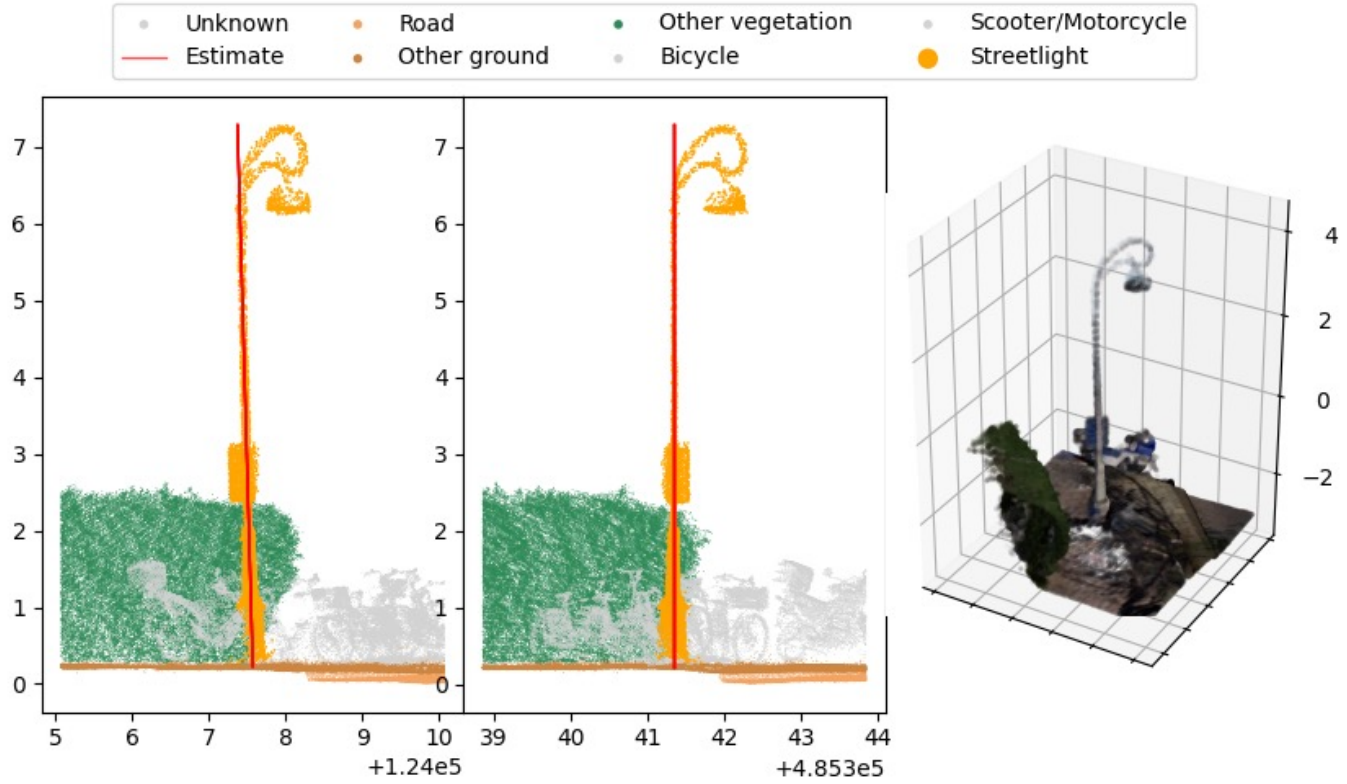
TYPE 9

- Around 11m tall
- Same as type 10 but taller
- Grey
- Classical look



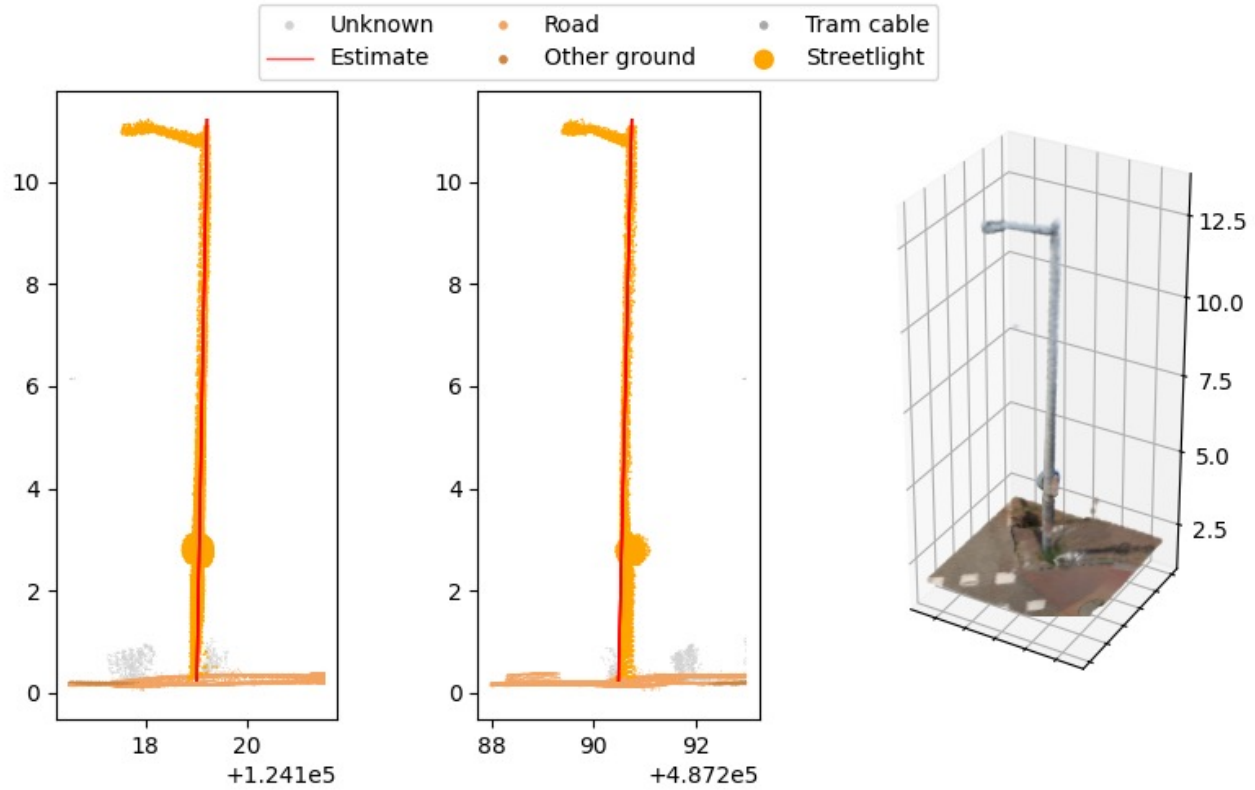
TYPE 10

- Around 7m tall
- Same as type 9 but shorter
- Grey
- Classical look



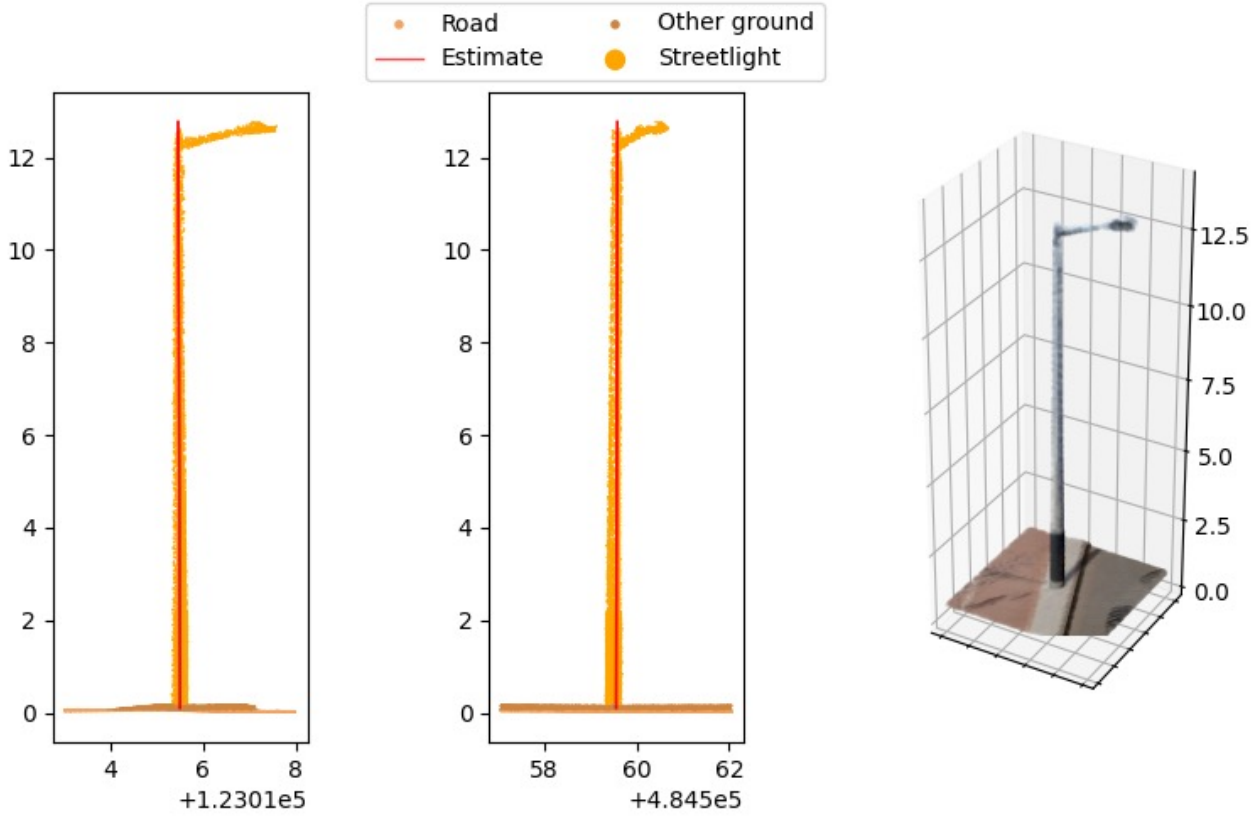
TYPE 11

- Around 11m tall
- Same as type 12 but shorter



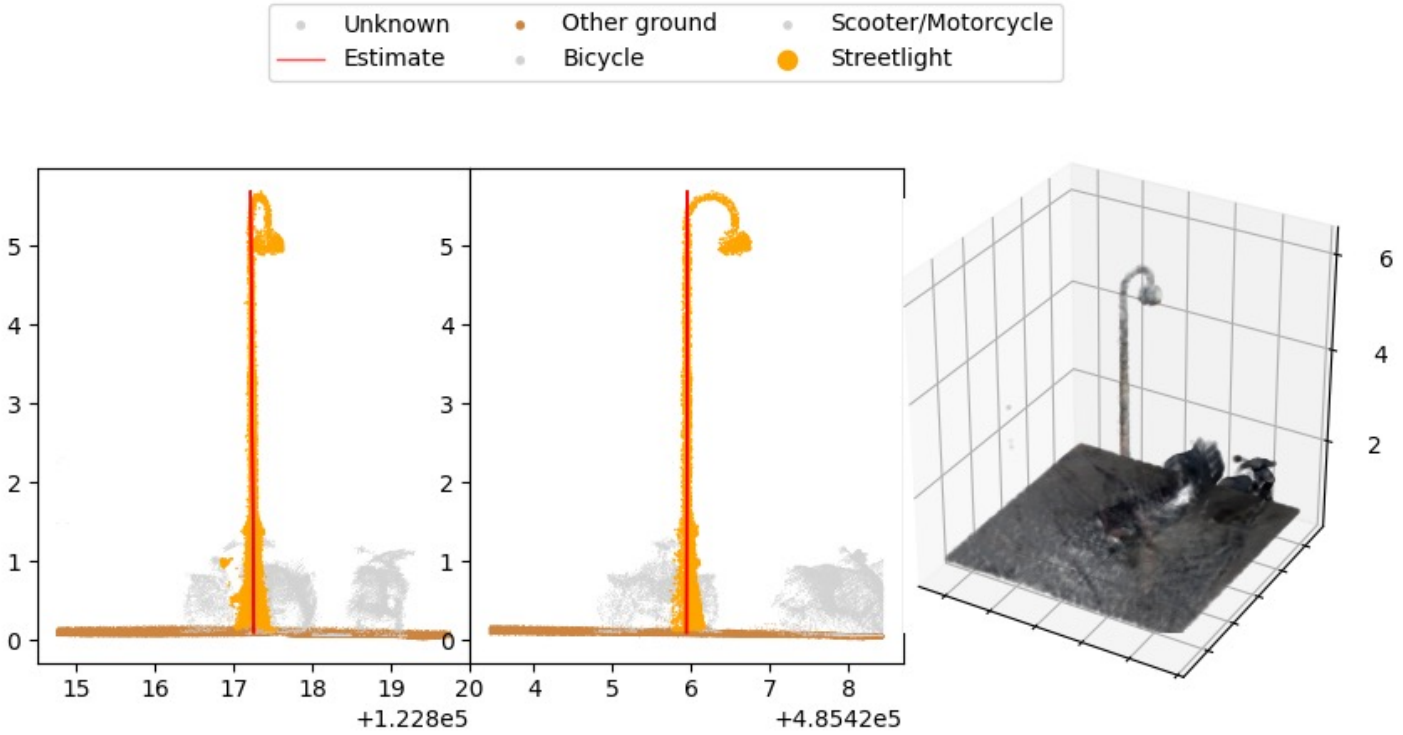
TYPE 12

- Around 13m tall
- Same as type 11 but taller



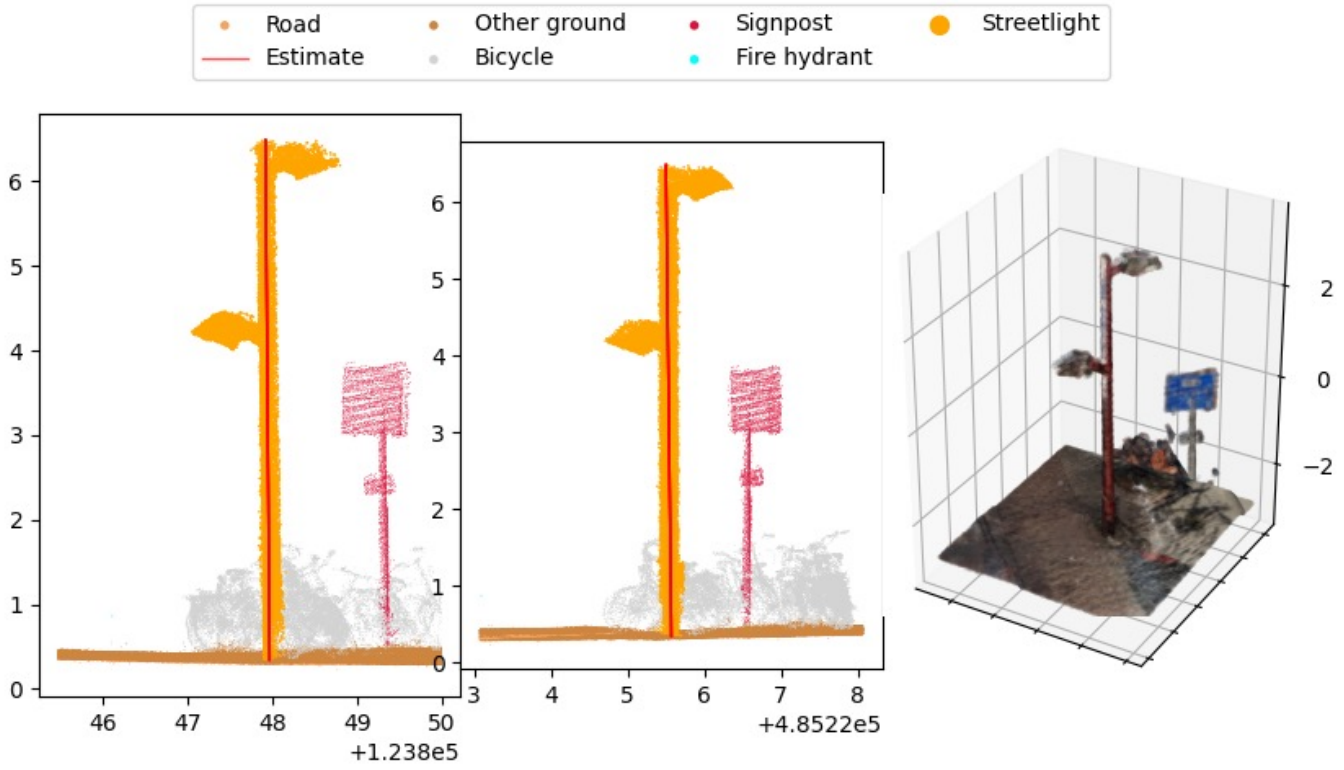
TYPE 13

- Around 6m tall
- ‘Hanging’ lamp
- Similar to type 4 but bigger



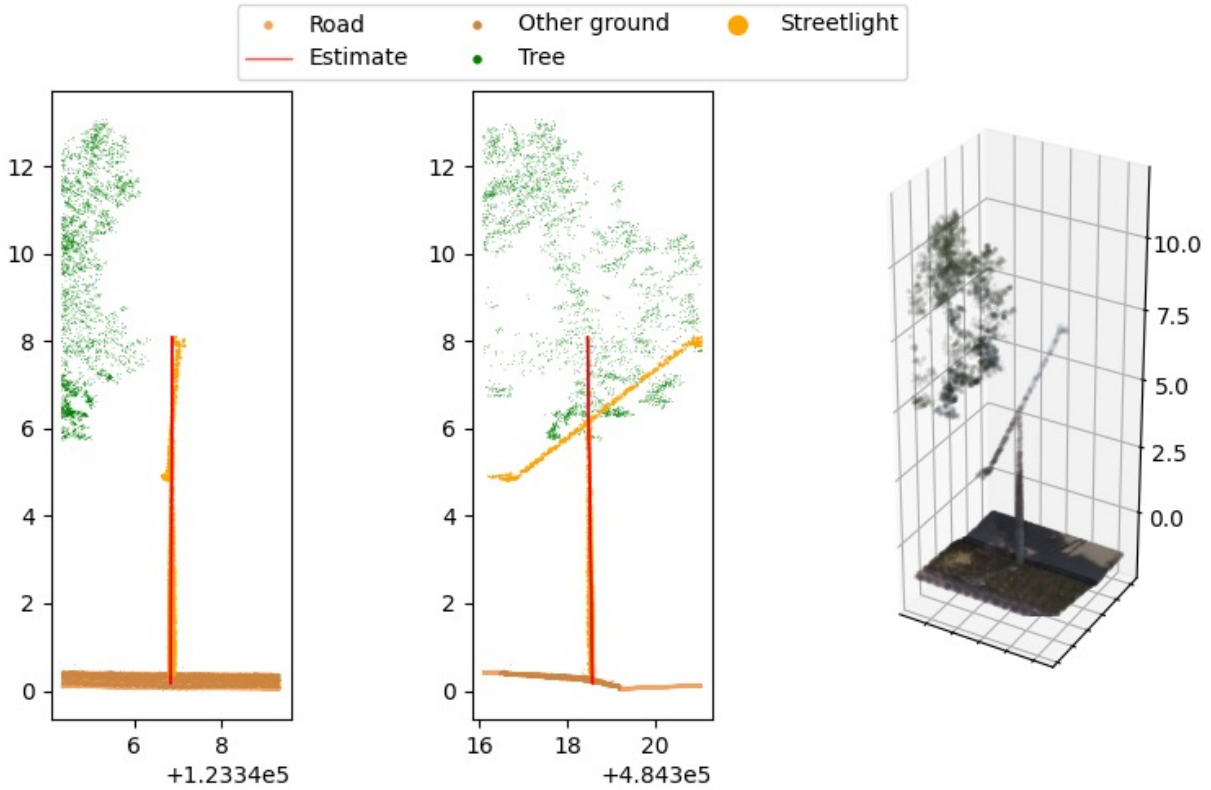
TYPE 14

- Around 6m tall
- Two lamps
- Unique shape



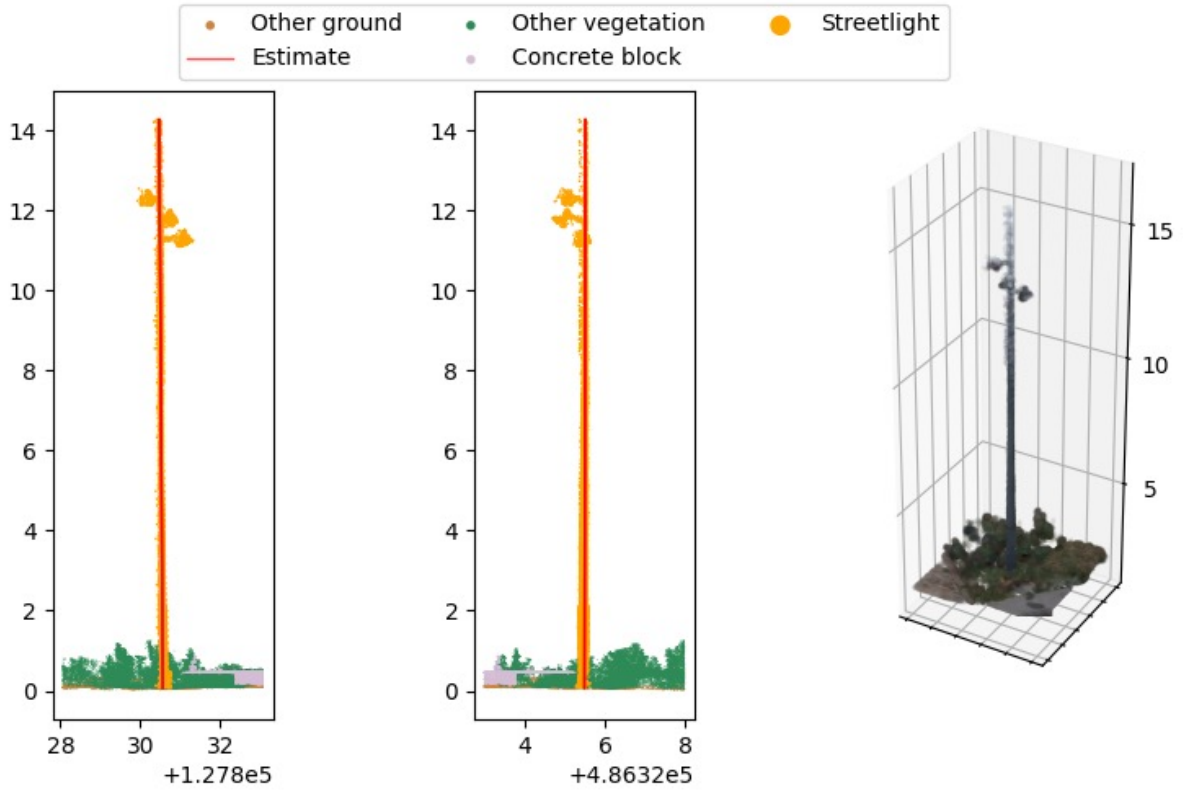
TYPE 15

- Around 8m tall
- Two lamps
- Unique shape



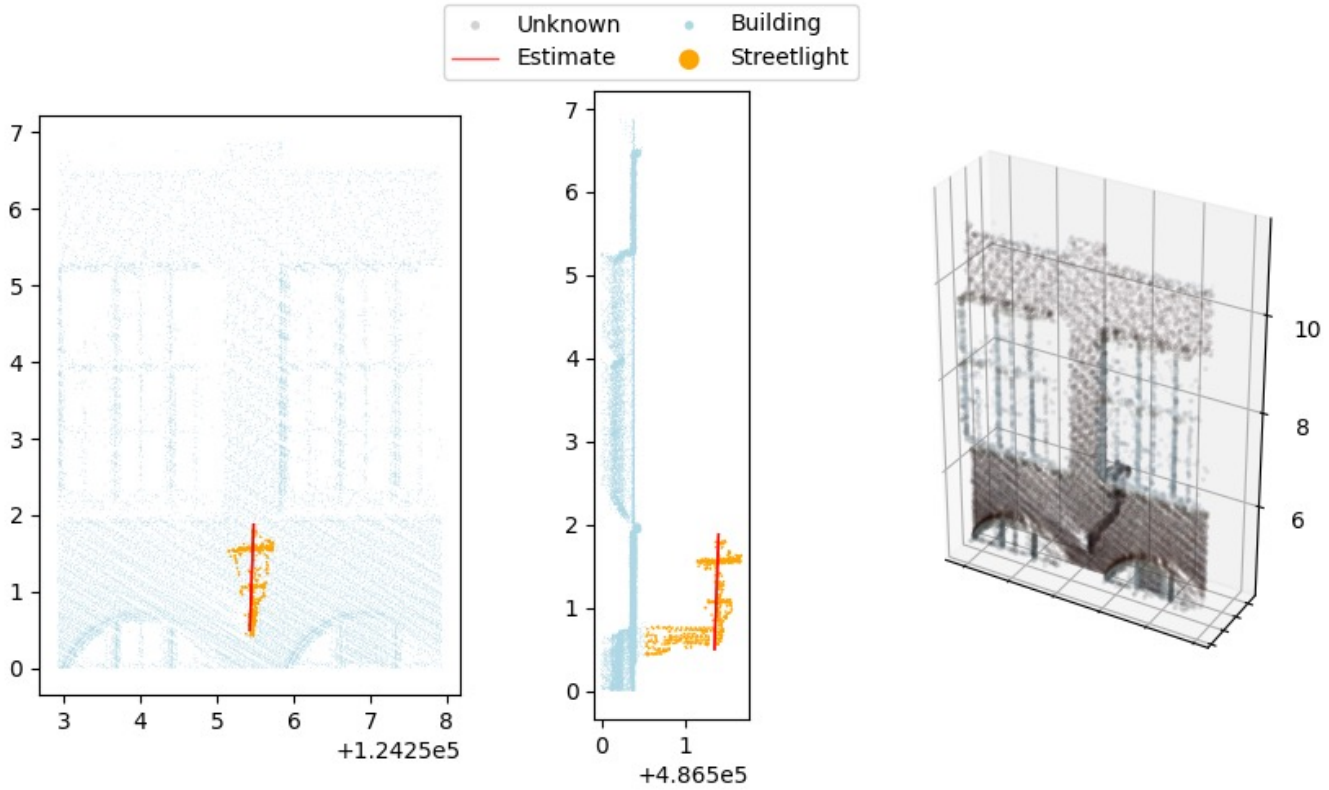
TYPE 16

- Between 10m/15m
- Multiple lamps attached at almost the top



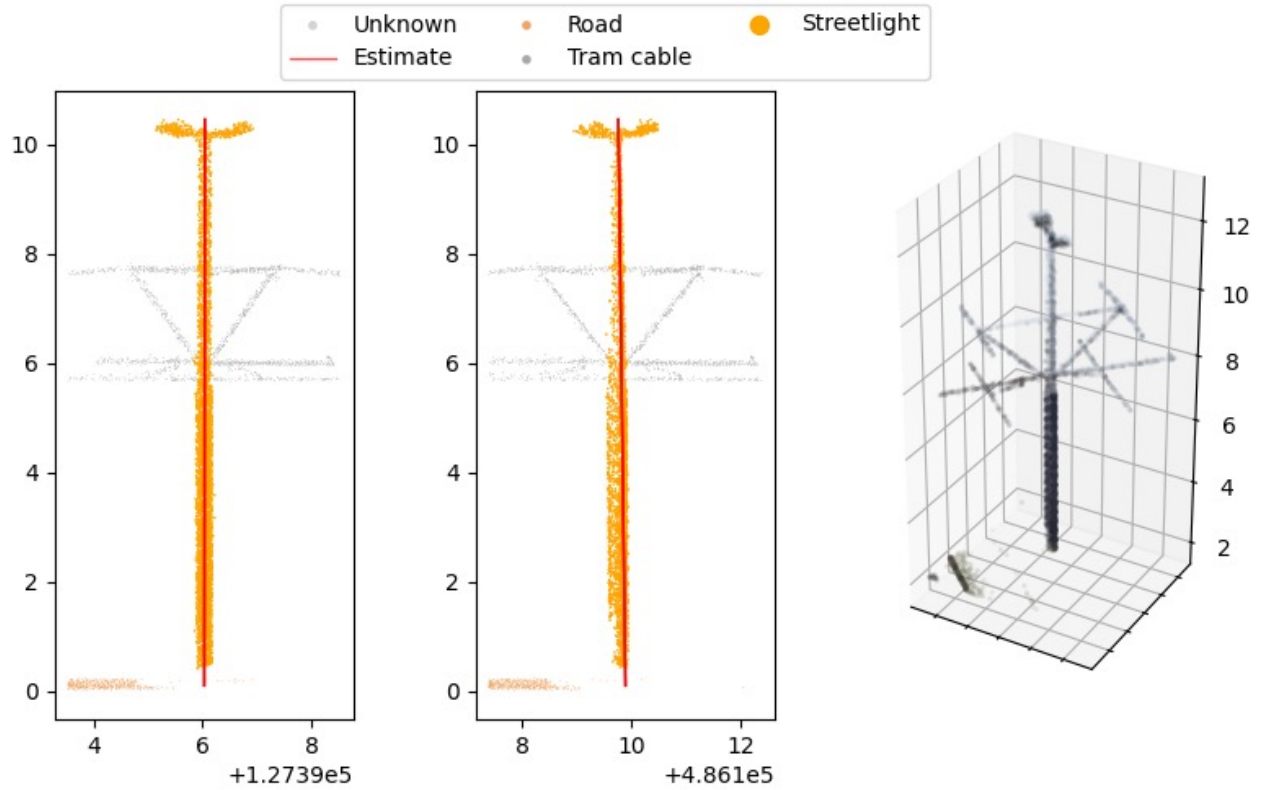
TYPE 17

- Wall attachment
- Can have different shapes



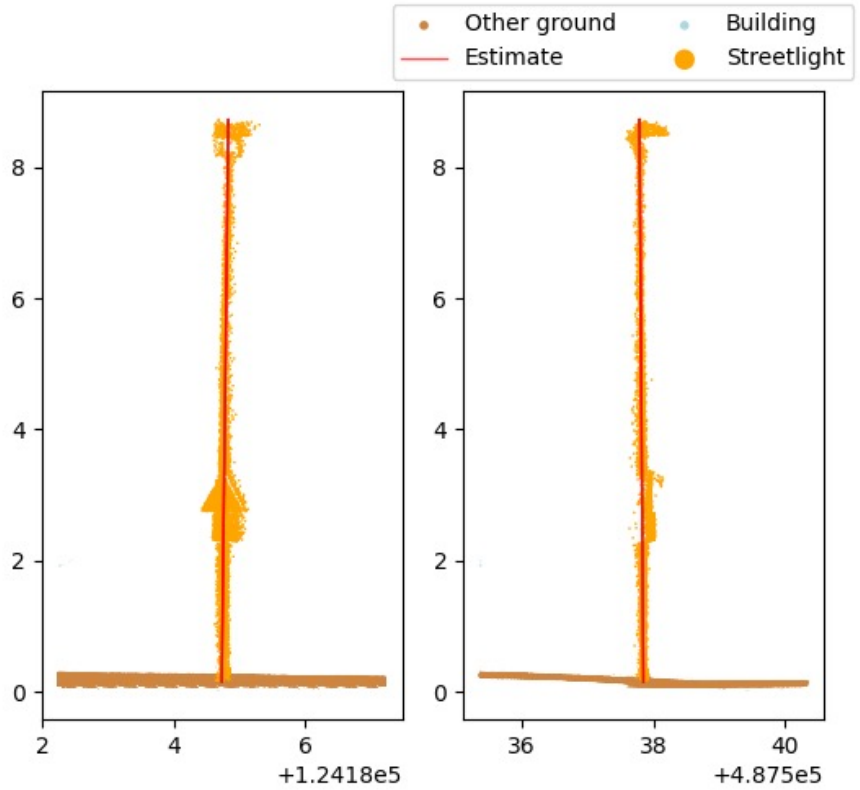
TYPE 18

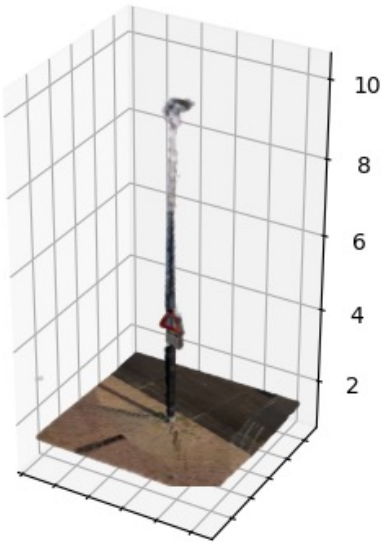
- Around 10m tall
- Usually 2 or 3 lamps
- Usually grey and black



TYPE 19

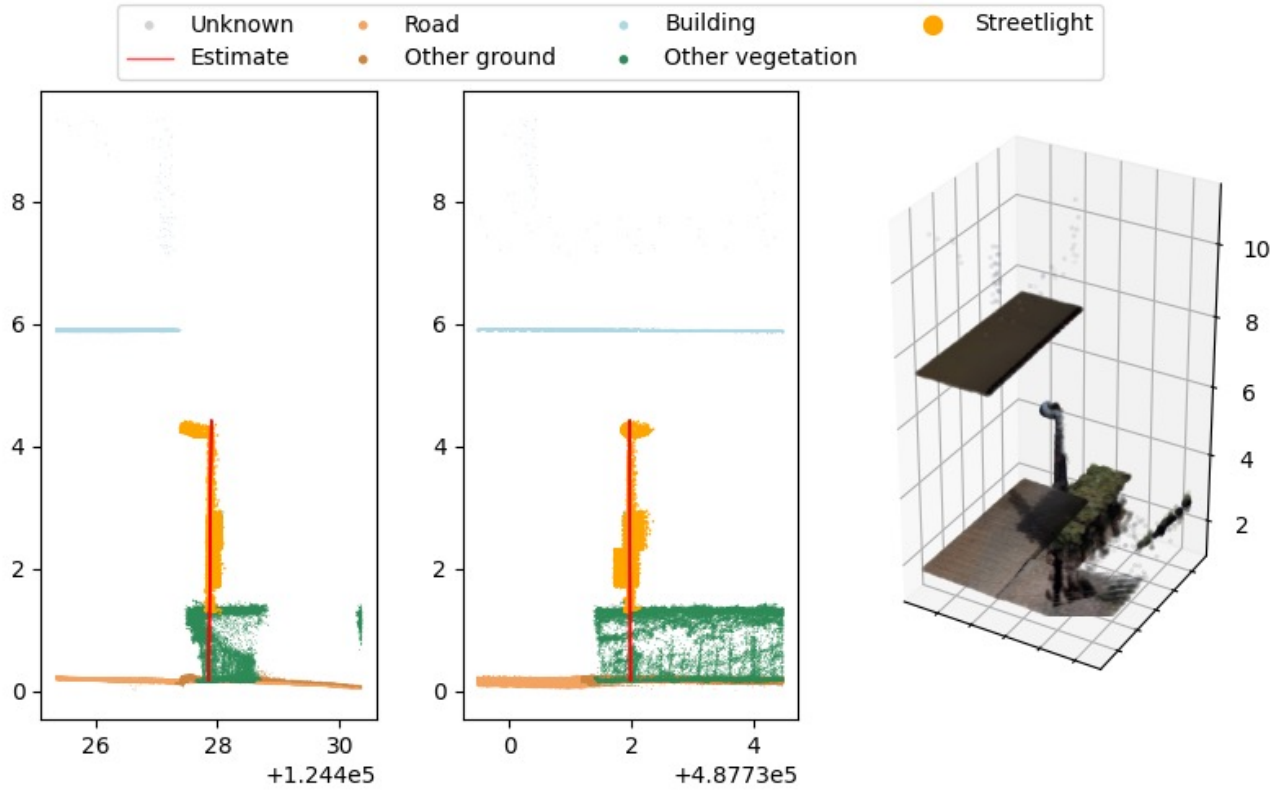
- Around 8m tall
- Short lamp





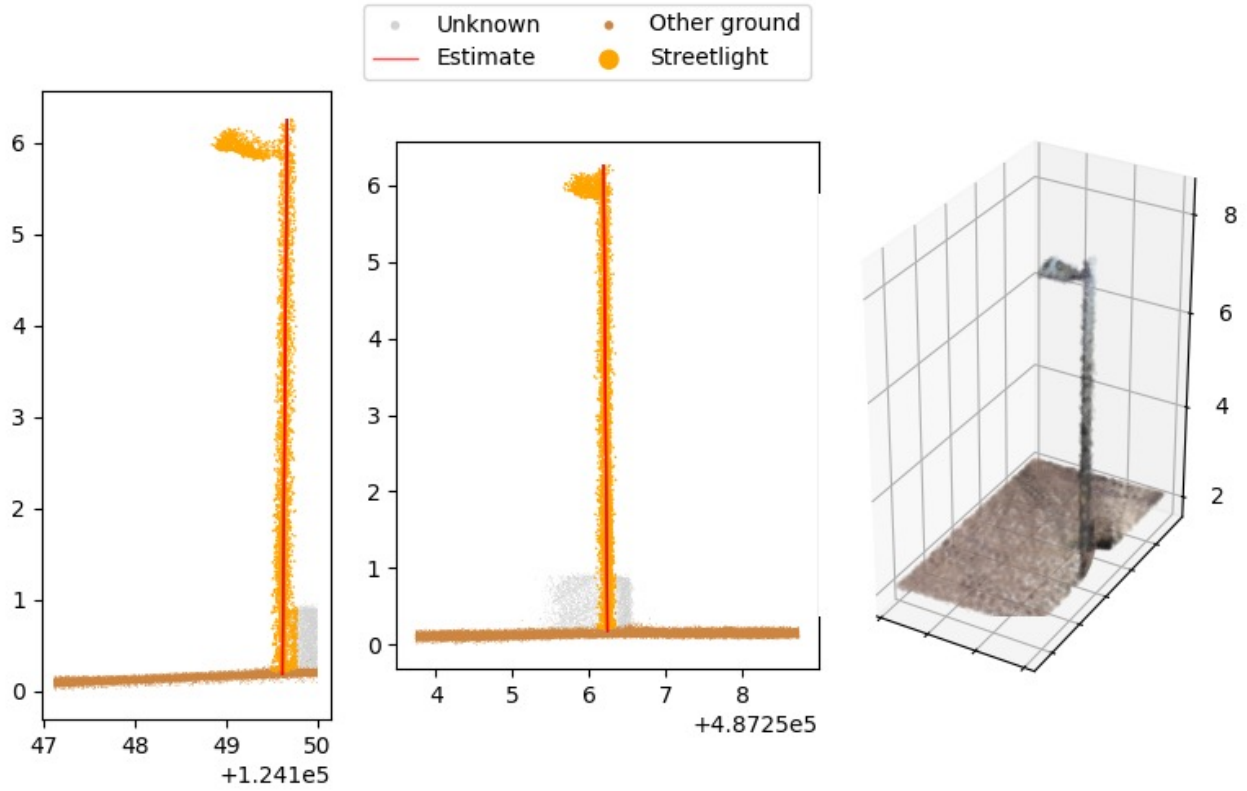
TYPE 20

- Around 4m tall
- Short lamp
- Usually black



TYPE 21

- Around 6m tall
- Short lamp
- Usually grey



TYPE 22

- Around 10m tall
- Short lamp
- Usually grey