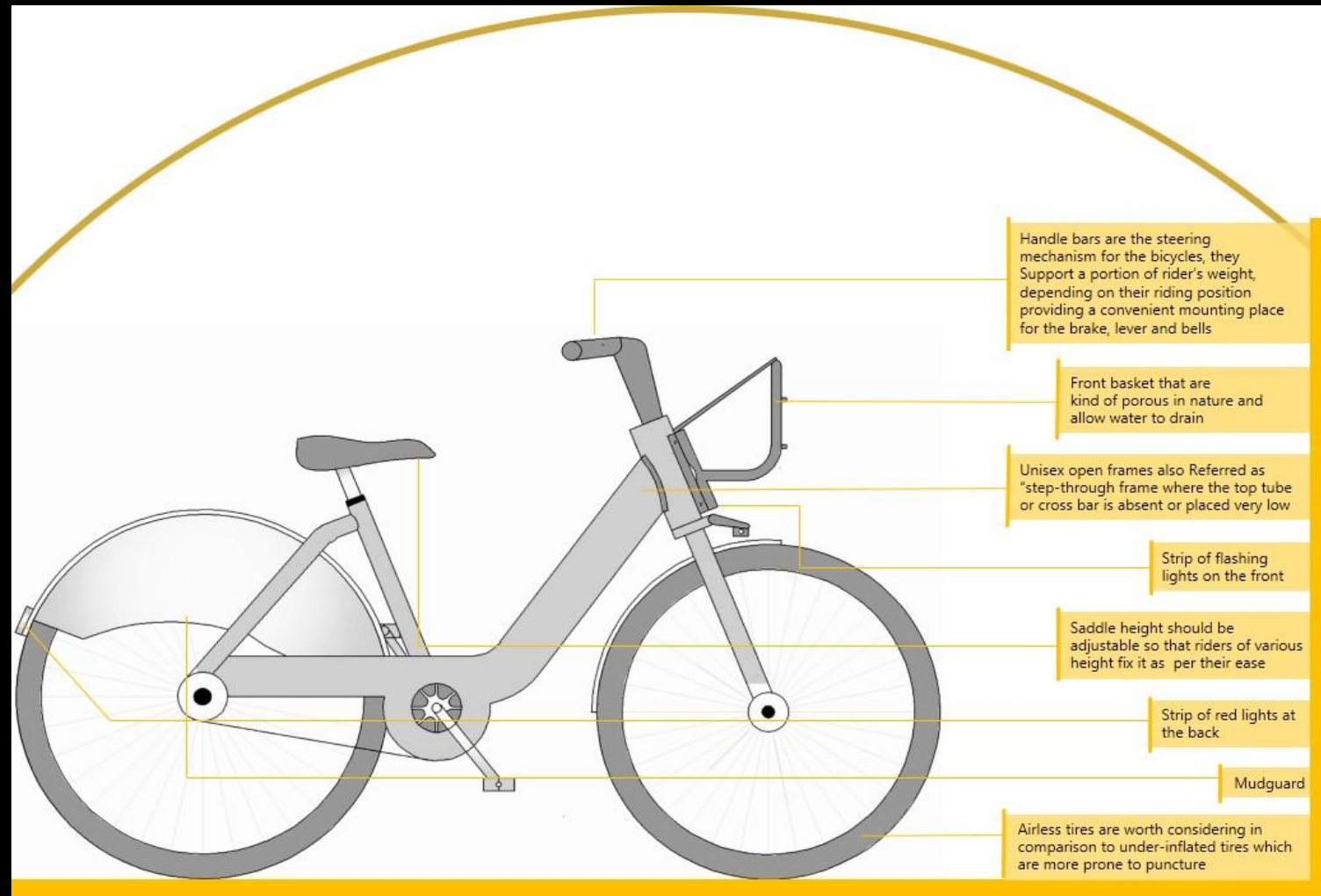


SPACE EFFICIENT  
PARKING DOCK DESIGN  
STRATEGIES  
FOR  
BIKE SHARING SYSTEMS

Shravan Shah, Ashish Choudhary

# Bike Design



Designing a bicycle for PBS, keeping women and children in mind

# Public Bike Sharing System



A row of public bicycles in a station, with a semi-transparent dark overlay containing white text. The bicycles are blue and yellow, and the text reads "Public Bike Sharing System – Why is it Important?".

# Public Bike Sharing System – Why is it Important ?



Space

Transportation



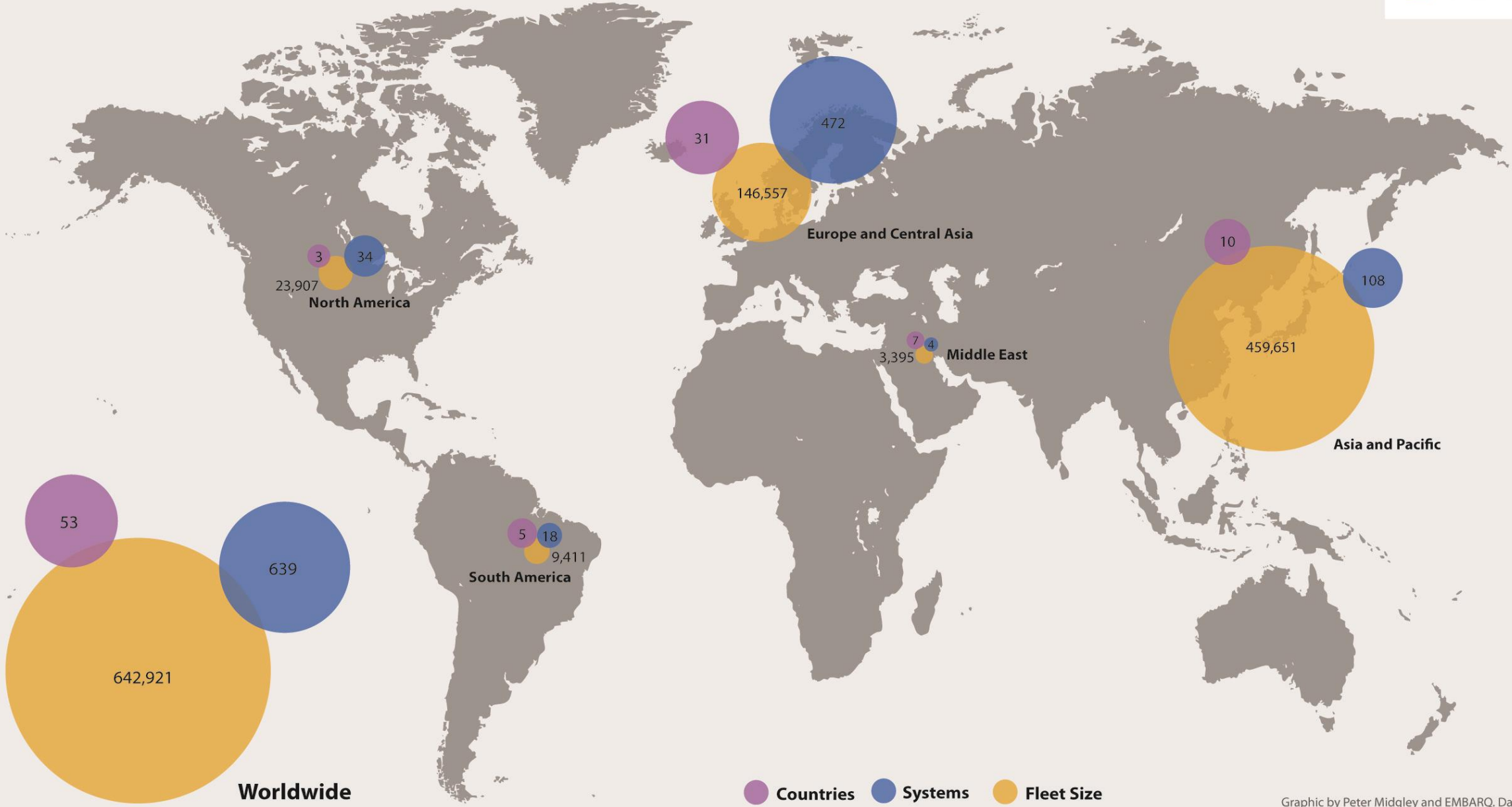


Better places to live

No more traffic jams



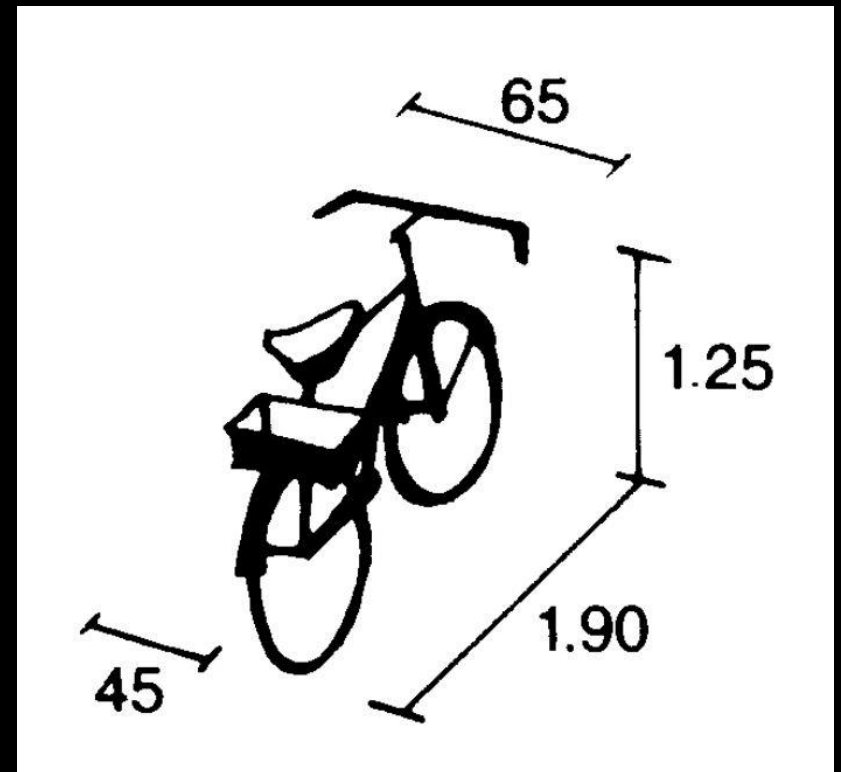
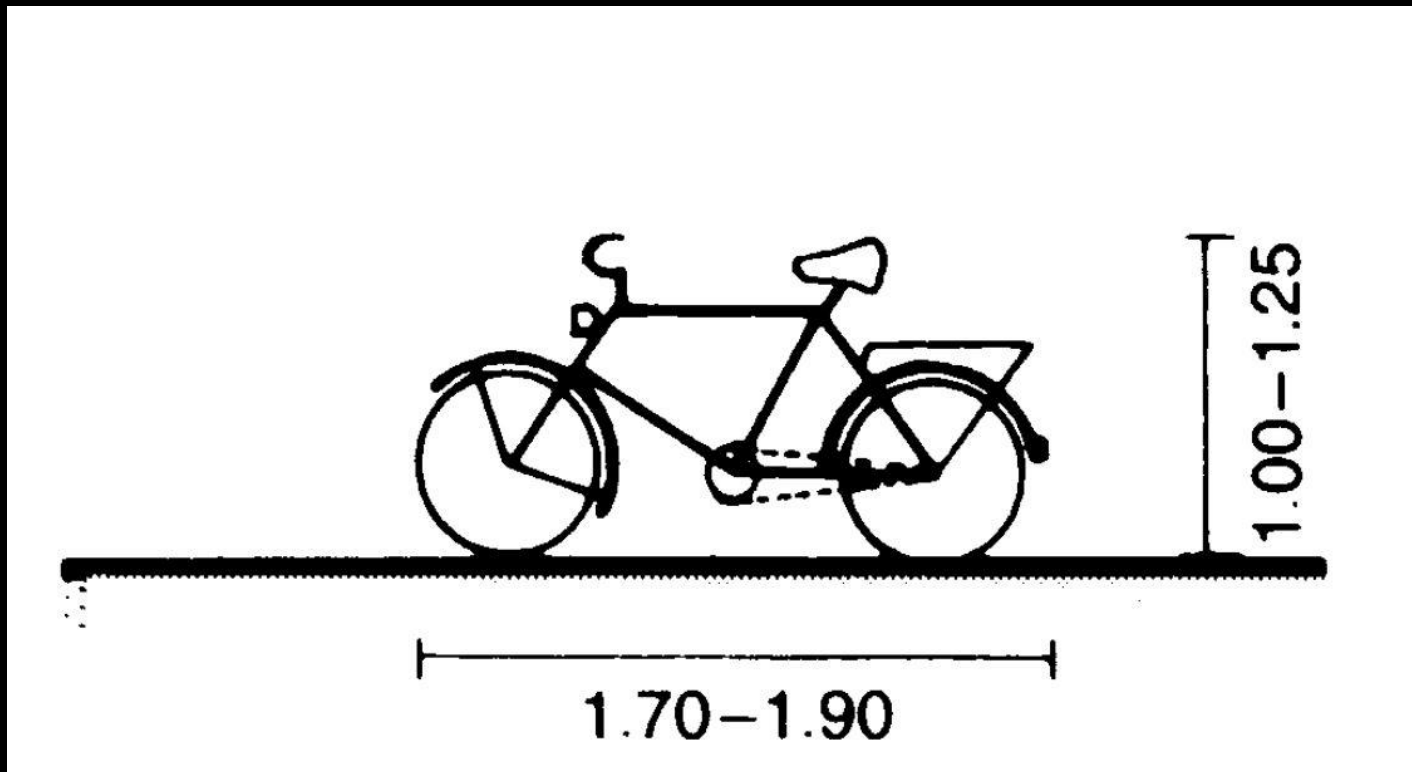
# Global expansion of bike-sharing



● Countries ● Systems ● Fleet Size

Graphic by Peter Midgley and EMBARQ. Data via Peter Midgley, 2013.

# Bike Dimensions



Source: Ernst & Neufert Architects' data



# The problem!

No Public bike sharing system

Parking space which is not properly designed



# PBS Parking Components

Eastern Market Metro  
8th St & Pennsylvania Ave SE 

capital bikeshare

Local Capital Bikeshare Stations



www.capitalbikeshare.com

**EASY TO FIND STATIONS – SIGNAGE**

**STEADY DOCK DESIGN**

**LOCKING FACILITY**

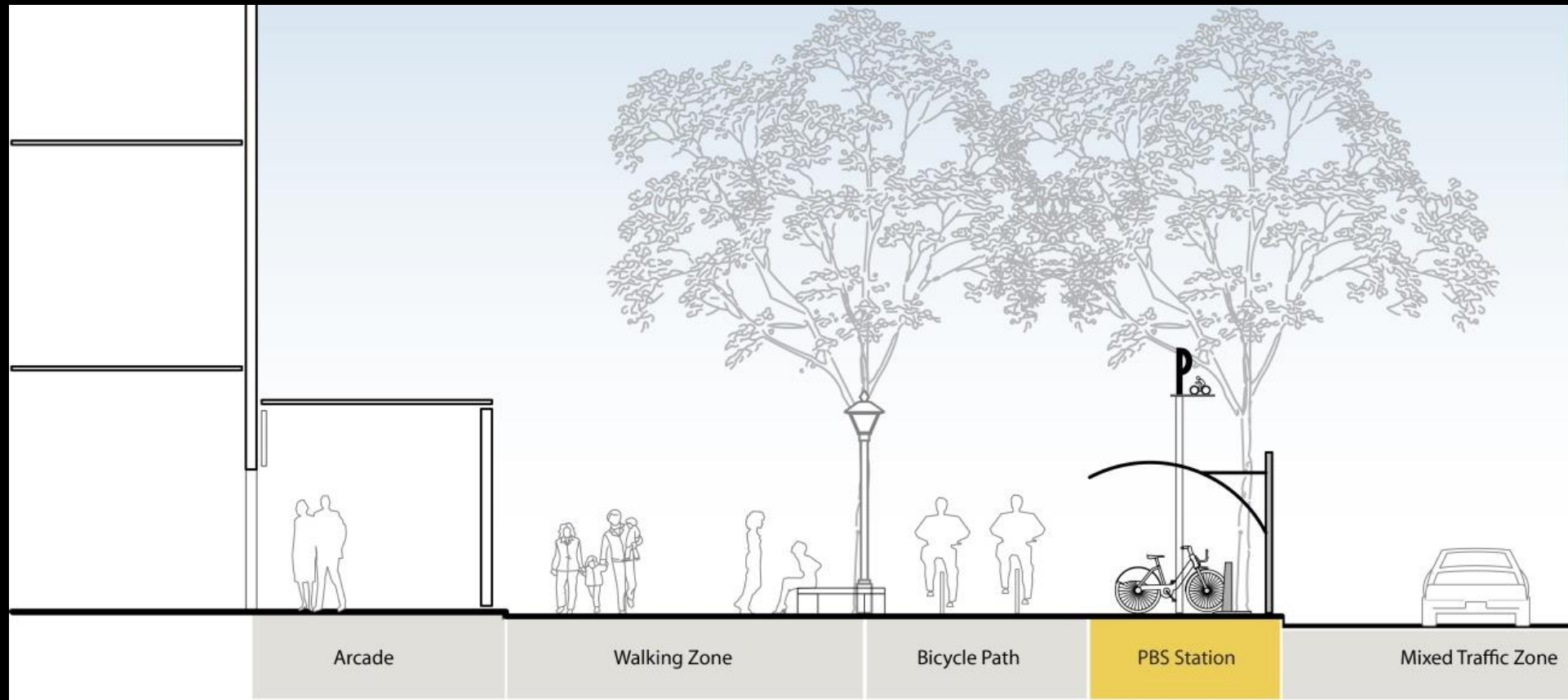
**OTHER FACILITIES**

**EASY ACCESS**

- ↑ Old Naval Hospital
- Barracks Row
- Marine Barracks
- Navy Yard
- ← Lincoln Park



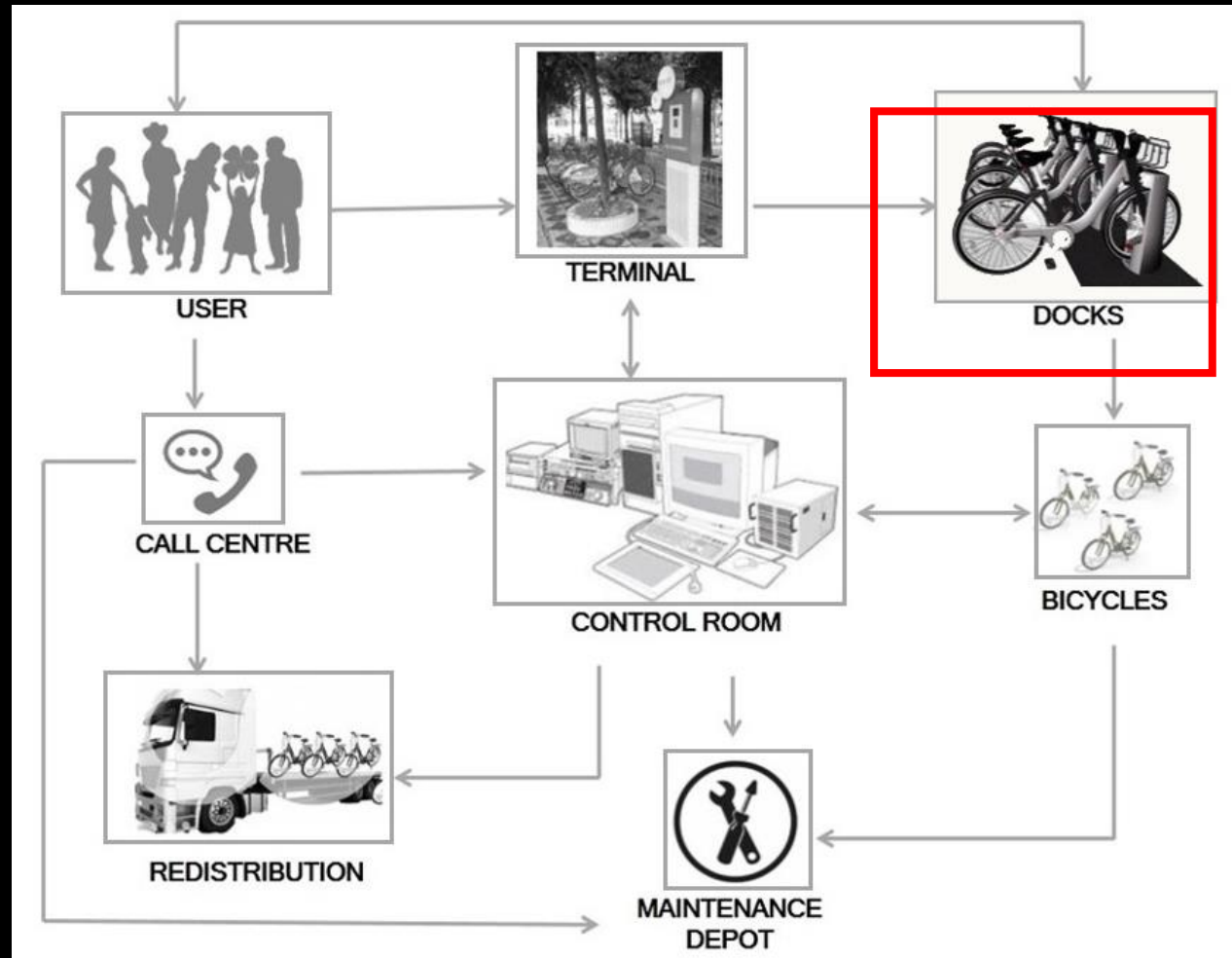
# Typical Street Section



Street section of a PBS station

Source: Center for Green Mobility

# Docks in PBS system



Docks play an important role in the PBS system

# Our Proposal of 'Space efficient PBS Docks'

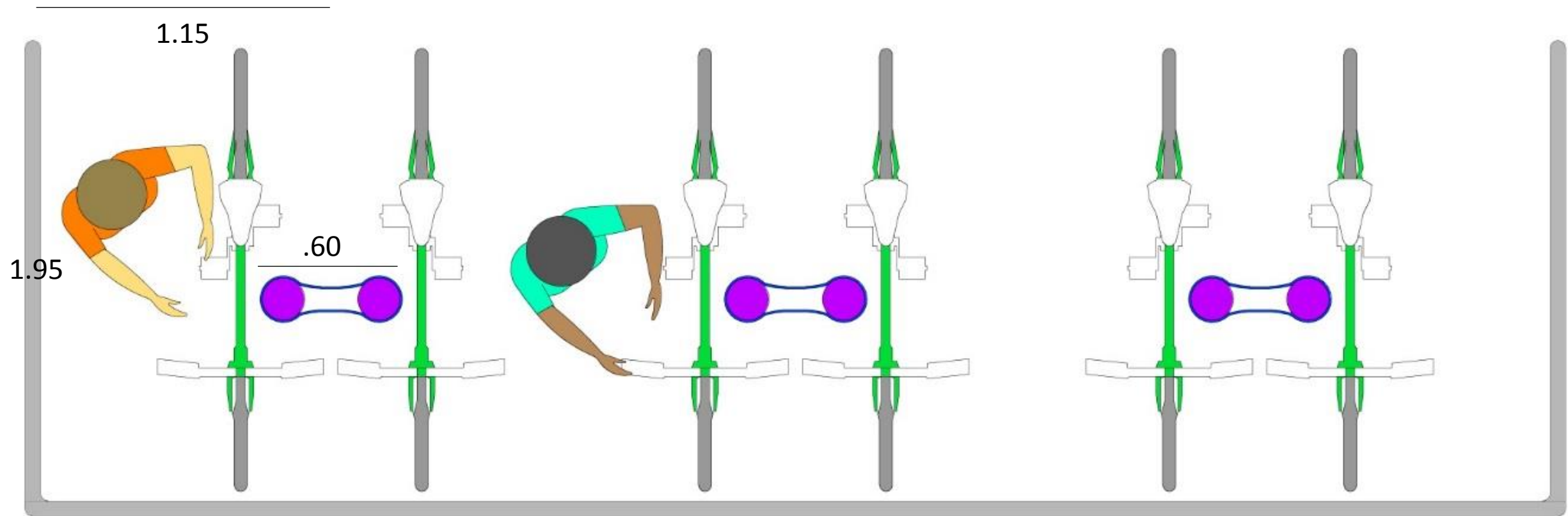
# Approach to designing easily accessible docks

- Design Approach
- Operational Approach

# Design Approach



# Double serving dock



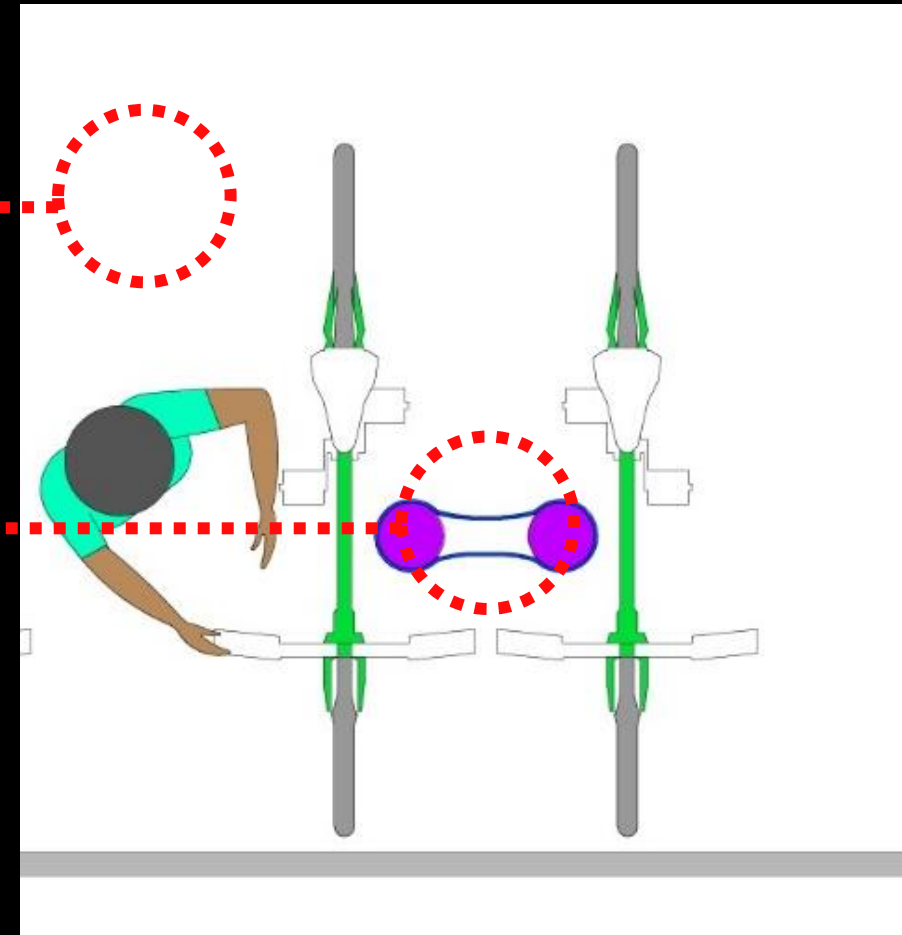
Double serving PBS dock design

# Double serving dock

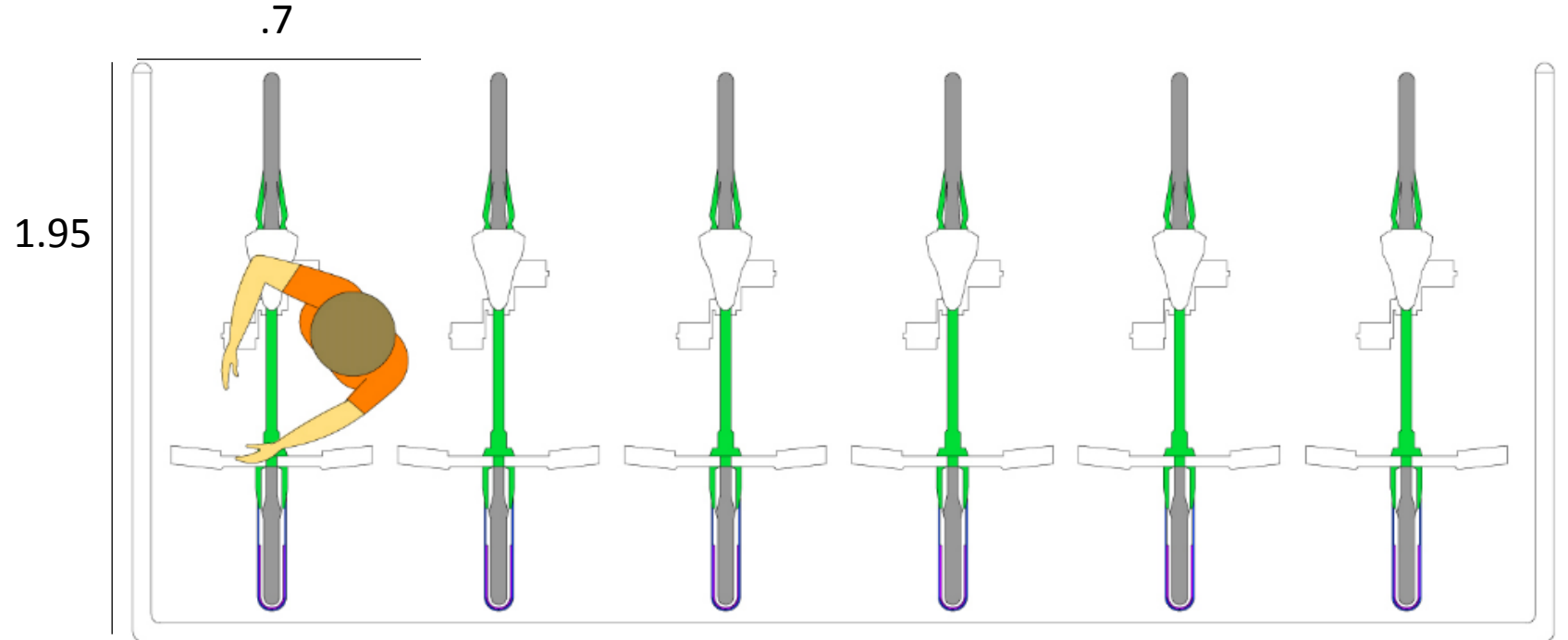
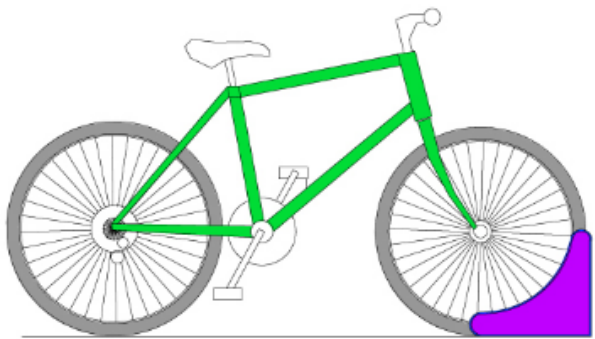
Space Saved at Access area by merging access spaces of two cycles

Space Saved at Dock area by merging Dock spaces of two cycles

Approximate Space required for 8 Units:  
 $8.25 \times 1.95 = 16.05 \text{ m}^2$   
Saved nearly one meter square.



# Wheel Curb Dock

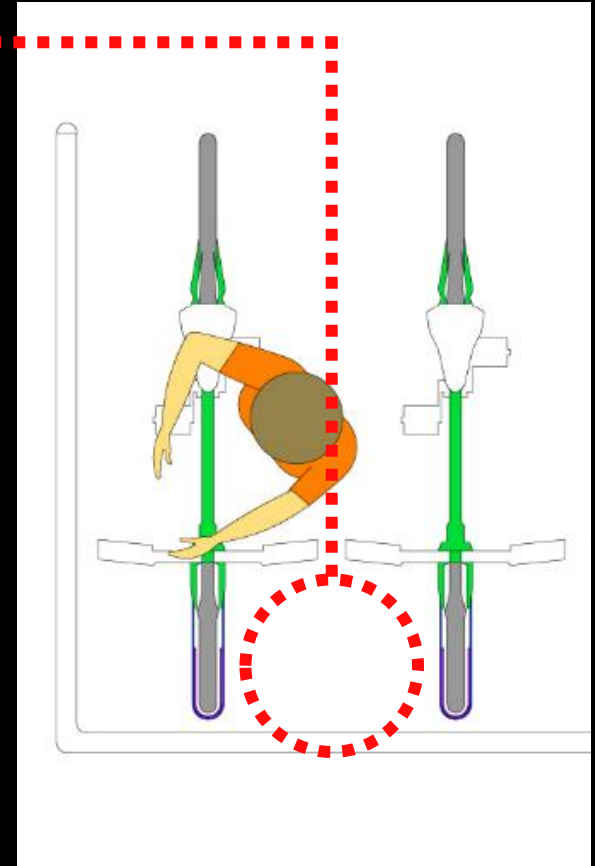


Wheel curb dock design

# Wheel Curb Dock

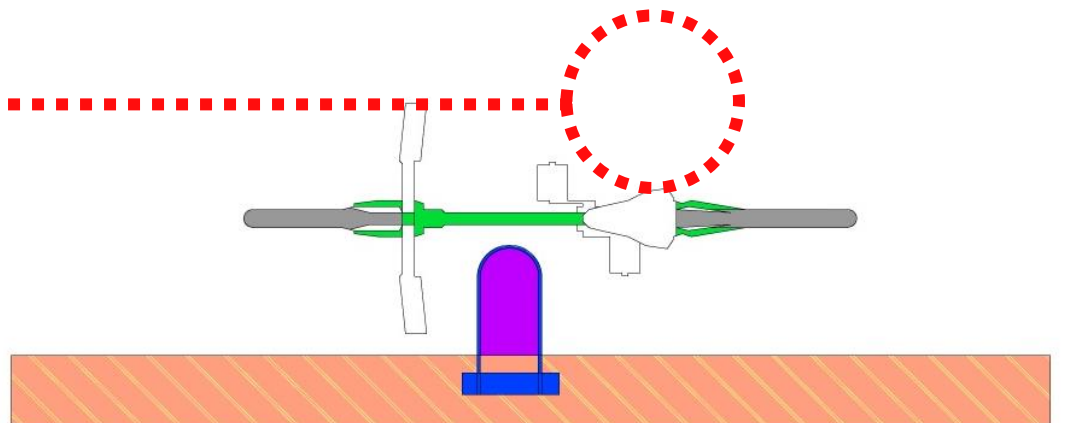
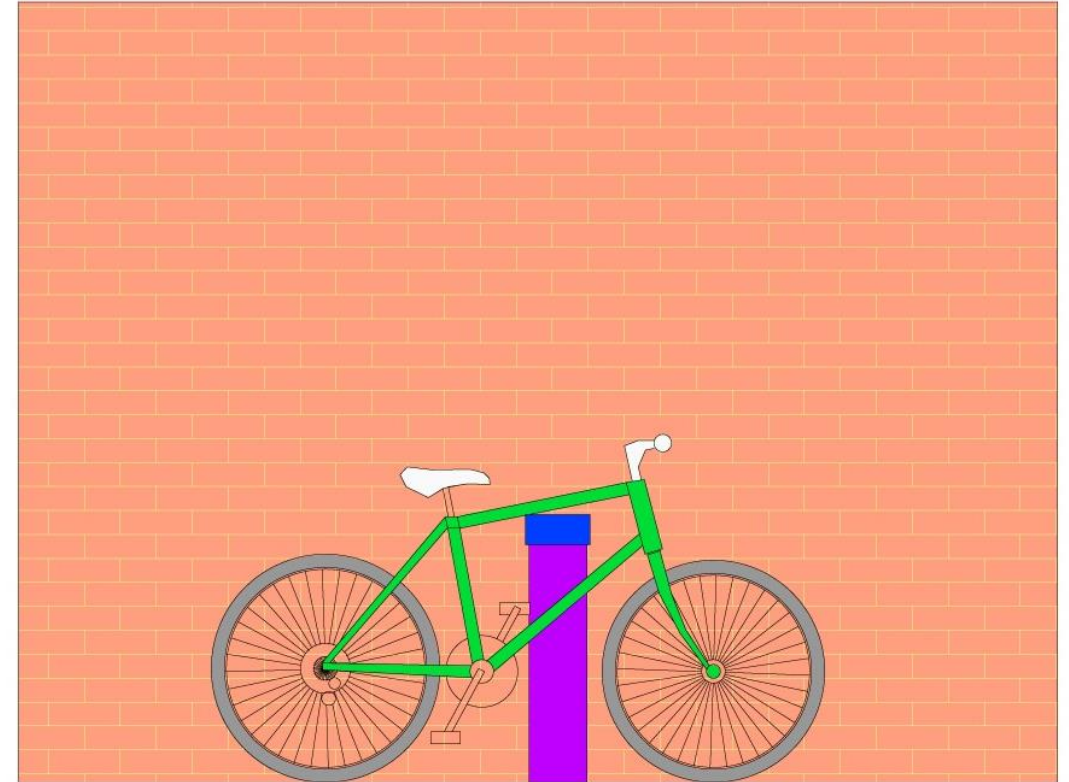
Space Saved at Dock area by  
Eliminating docks.

Approximate Space required for 8 Units:  
 $5.25 \times 1.95 = 10.23 \text{ m}^2$   
Saved nearly 6 meter square.



# Wall mounted dock

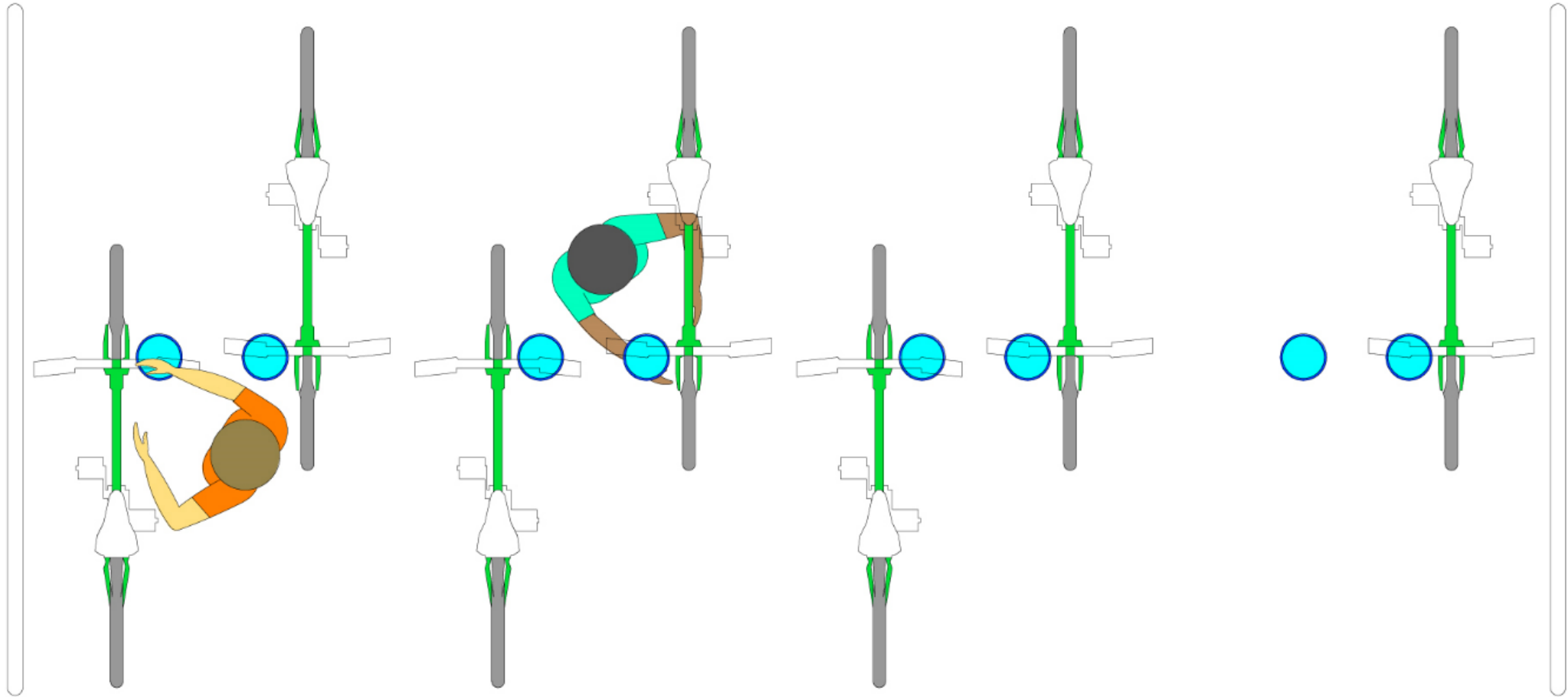
Space Saved at Buffer Zone by merging walking area and access space.



Wall mounted dock design

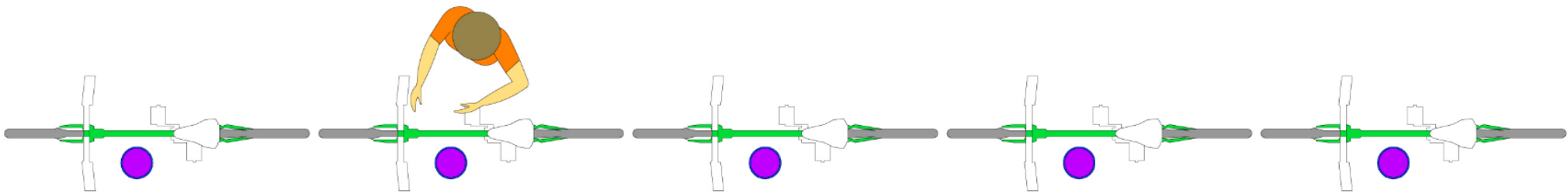
# Operational Approach

# Double sided parking



Double sided parking design of the PBS dock

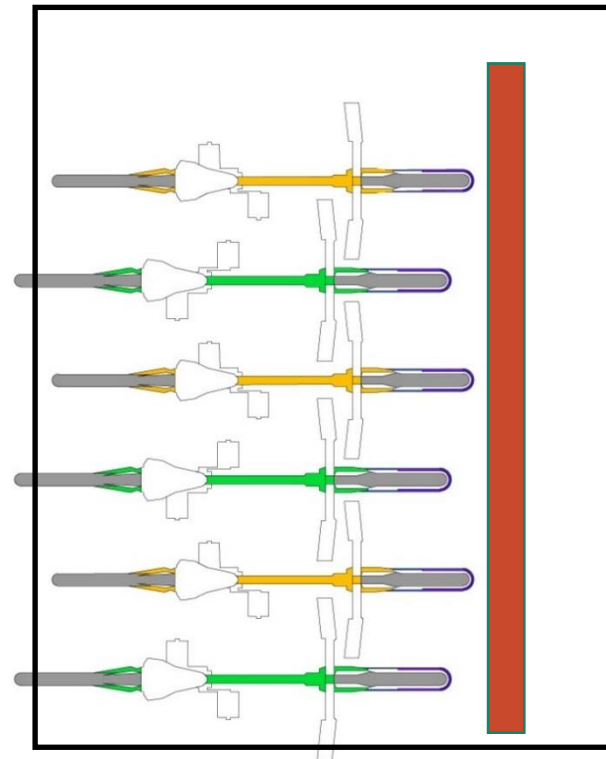
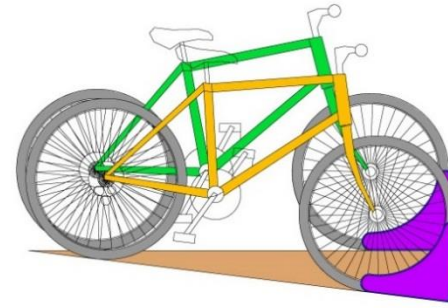
# Queued parking



Queued parking – space efficient dock design



# Grade Parking



Graded parking dock design for PBS to maximize the space efficiency

# Other factors affecting the design of the dock

- Access to the PBS station
- Location of the PBS station
- Materials used in designing a PBS docking station
- Design with users ( women / children ) in mind
- Capital cost and operational cost
- Pricing

# Comparison of Public Bike Sharing Dock Designs

|   | Type                      | Space saved at  | BPU (Approx.) | Efficiency Ratio (Relative to conventional PBS parking Station) | Explanation   |
|---|---------------------------|---|---------------|---|---|
| 1 | Conventional              | -   | 8             | 1   |   |
| 2 | Type A (Wall Mounted)     | Buffer Space  | 8             | 1   | Can be placed in a busy street on property wall along footpath            |
| 3 | Type B (Double Entry)     | Handlebar   | 6.2           | 1.2   | Access Spaces for 4 cycles merged other with 4 cycles                     |
| 4 | Type C (Wheel Curb)       | Dock Space replaced   | 5.3           | 1.5   | Space of conventional docks eliminated                                    |
| 5 | Type D (Grade Difference) | Handlebar, Seats and Pedals alternatively stacked over one another. | 4.2           | 1.9   | Space consumed by every entity merged into each other at different grade. |

1 BPU ( Bicycle Parking Unit ) = 2m<sup>2</sup>

# Questions

- Do you think more space is used in any PBS dock design you have seen and is the optimization necessary ?
- What is an ideal public bicycle sharing dock design ?
- Which design do you find most interesting and why?
- Suggestions to improve on any of the existing proposed designs ?
- Should PBS docks include parking space for other cycles as well ?

# Thank You

I am an urban researcher working in the field of cycling.

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