

# Guiding the Guide: Shaping the future of the Urban Bikeway Design Guide

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Wednesday, May 17, 2023

9:30 AM - 10:45 PM



# Urban Bikeway Design

*The Atlantic*

## The Design Bible That Changed How Americans Bike in Cities

A movement has brought safer bicycle lanes to the United States. But it took a manual to spread them.

By Steven Higashide

# By Cities for Cities

Crashes w/ Injuries

**-48%**

Bike Volume

**+65%**



Crashes w/ Injuries

**-43%**



Left turn signal phase with bike signal on  
9<sup>th</sup> Avenue

Crashes w/ Injuries

**-20%**



8<sup>th</sup> Avenue at 19<sup>th</sup> Street

# Urban Bikeway Design Guide

National Association of  
City Transportation Officials

Second Edition



## Designing for All Ages & Abilities

Contextual Guidance for  
High-Comfort Bicycle Facilities



December 2017



## Don't Give Up at the Intersection

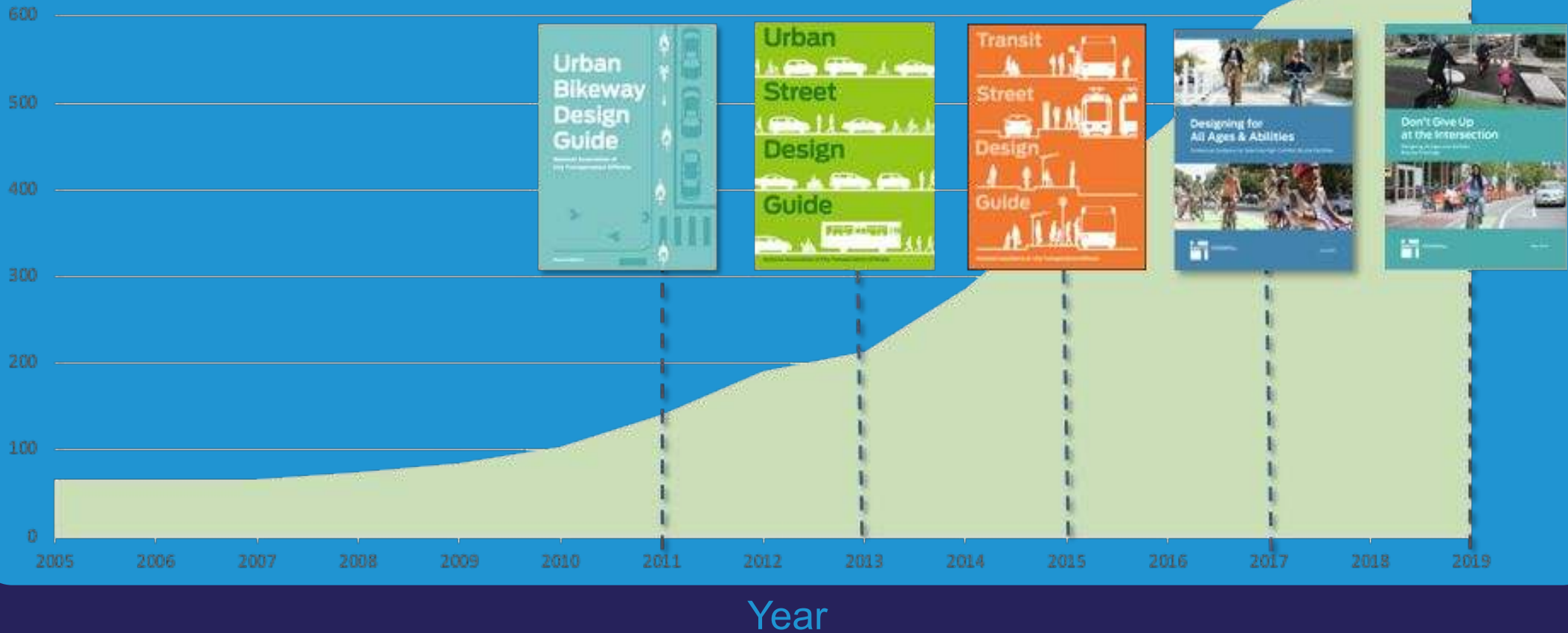
Designing All Ages and Abilities  
Bicycle Crossings



May 2019

# Growth in guidance and experience

Miles of protected bike lanes





### Shared Micromobility Permitting, Process, and Participation

December 2022



### Moving Together

Collaborating with Communities for More Equitable Outcomes | January 2023



### Breaking the Cycle

Reevaluating the Laws that Prevent Safe & Inclusive Biking | June 2022



### Making Bikes Count

Effective Data Collection, Metrics, & Storytelling | March 2022



### Material Success

Designing Durable Bikeways | March 2023



### Designing for Small Things With Wheels

February 2023



### Complete Connections

Building Equitable Bike Networks | March 2023

# From permission slip to prescription

**Urban Bikeway Design Guide**  
National Association of City Transportation Officials  
Second Edition

**Working Papers:**

- Shared Micromobility Permitting, Process, and Participation (December 2022)
- Moving Together: Collaborating with Communities for More Equitable Outcomes (January 2023)
- Breaking the Cycle: Reimagining the Lane-Plus-Shoulder Safety & Inclusion Model (June 2022)
- Making Bikes Count: Effective Data Collection, Metrics, & Benchmarking (March 2022)
- Material Success: Designing Usable Bikeway (March 2022)
- Designing for Small Things With Wheels (February 2022)
- Complete Connections: Building Equitable Bike Networks (March 2021)

**Photographs:**

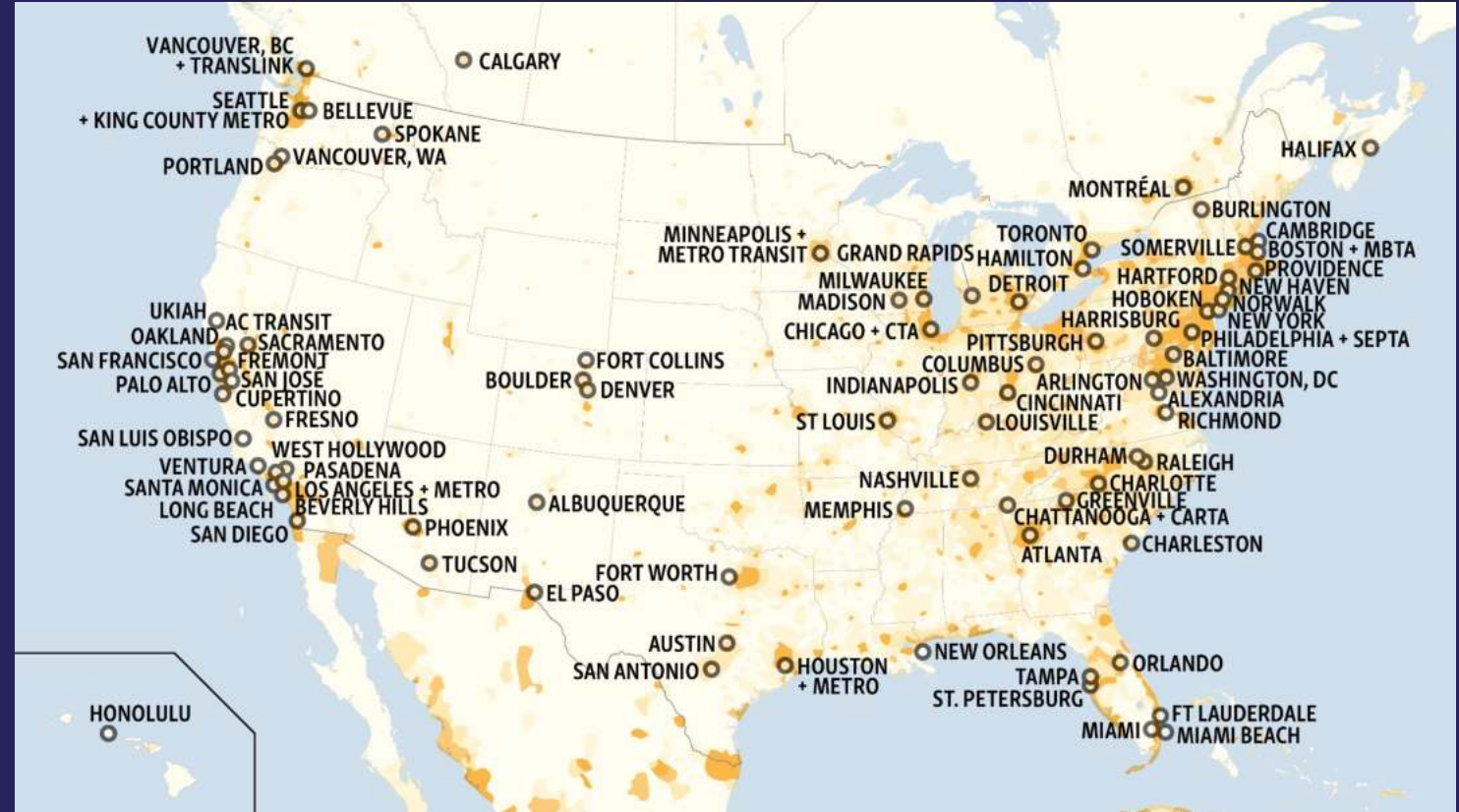
- "Don't Give Up at the Intersection": Designing All Ages and Abilities Bicycle Crossings (May 2019)
- Photograph of a person riding a bicycle on a green-painted bike lane.
- Photograph of a person riding a bicycle on a green-painted bike lane with a car in the background.

**NACTO National Association of City Transportation Officials**  
December 2017  
May 2019

# By cities

Consultants

Expert  
advisors





# For cities

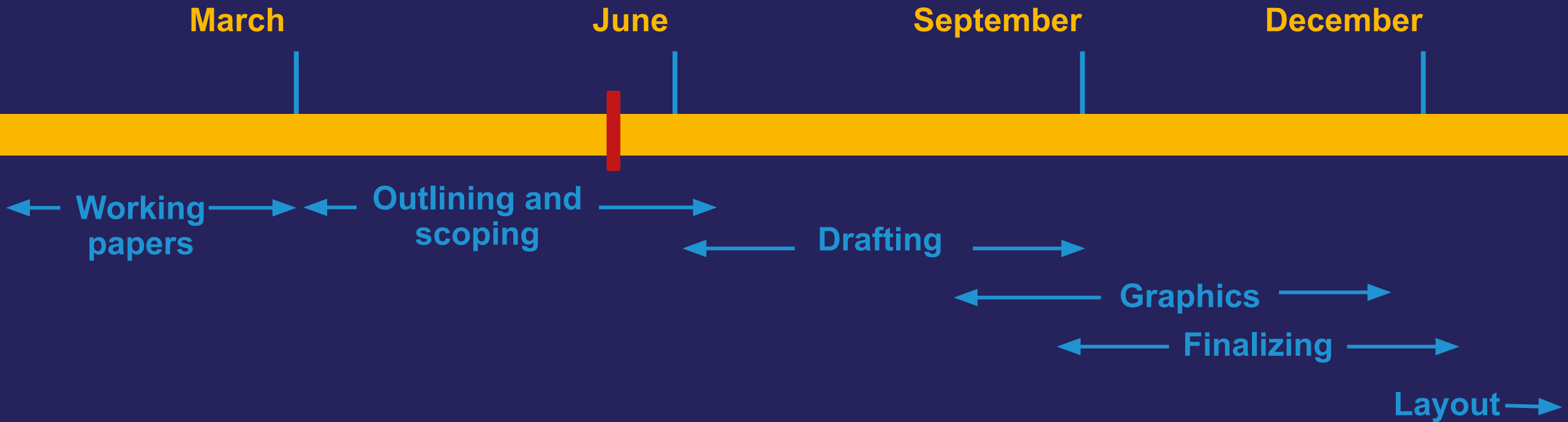
**Bikeway planners**  
**Bikeway designers**  
Influences scope,  
organization, and  
content decisions

**Reviewing engineer**  
**Policy makers**  
**City leadership**  
Influences framing,  
writing style, and layout



# 2023 Schedule

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# Outlining

## The Why: Making the case

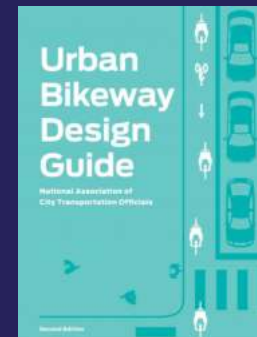
Bikeable cities are safe, healthy, sustainable, and equitable

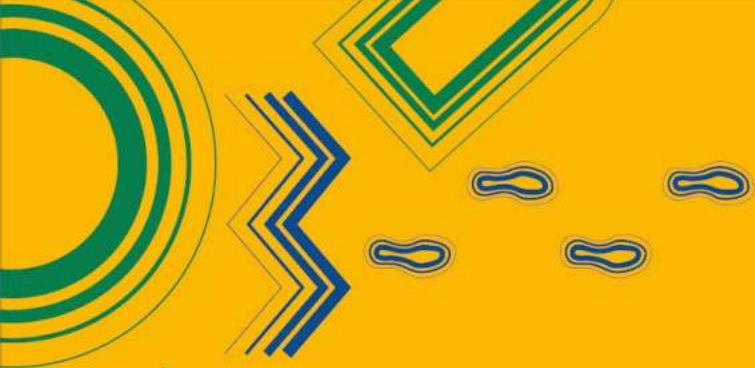
## The How: Planning & Project Development

- Planning a network
- Project development
- Facility selection and facility alignment

## The What: Bikeway Design Guidance

- Facility types
- Intersection treatments
- Design details
- Maintenance & Operations





**NACTO** DESIGNING CITIES  
**DENVER** 2023

**#NACTO2023**

**Activity**

#1

Half-page primer on engineering design guidance/standards decision-making process

- Reference FHWA design flexibility memo
- Flow chart of engineering design decision-making/examples

"How to use the guide" section

- Shall/should/may - definitions/guidance on how to use NACTO

Call-out box:

- Case study/example of  
great process/implementation  
of design specifics

Call-out box:

Implementation guidance

Call-out box:

- Request for  
experimentation  
process

Q1: What other guides do people use and why?

MUTCD

State

City

CROW (Netherlands)

FHWA - Separated Bike Lanes

AASHTO

OTHER COUNTRIES - BC, Canada (AT Design Guide)

Built Examples

## WHAT'S MISSING?

Conflicts

ADA/PROWAG

Rail

On-OFF road transitions

Operations

signals

Maint.

Constraints

details

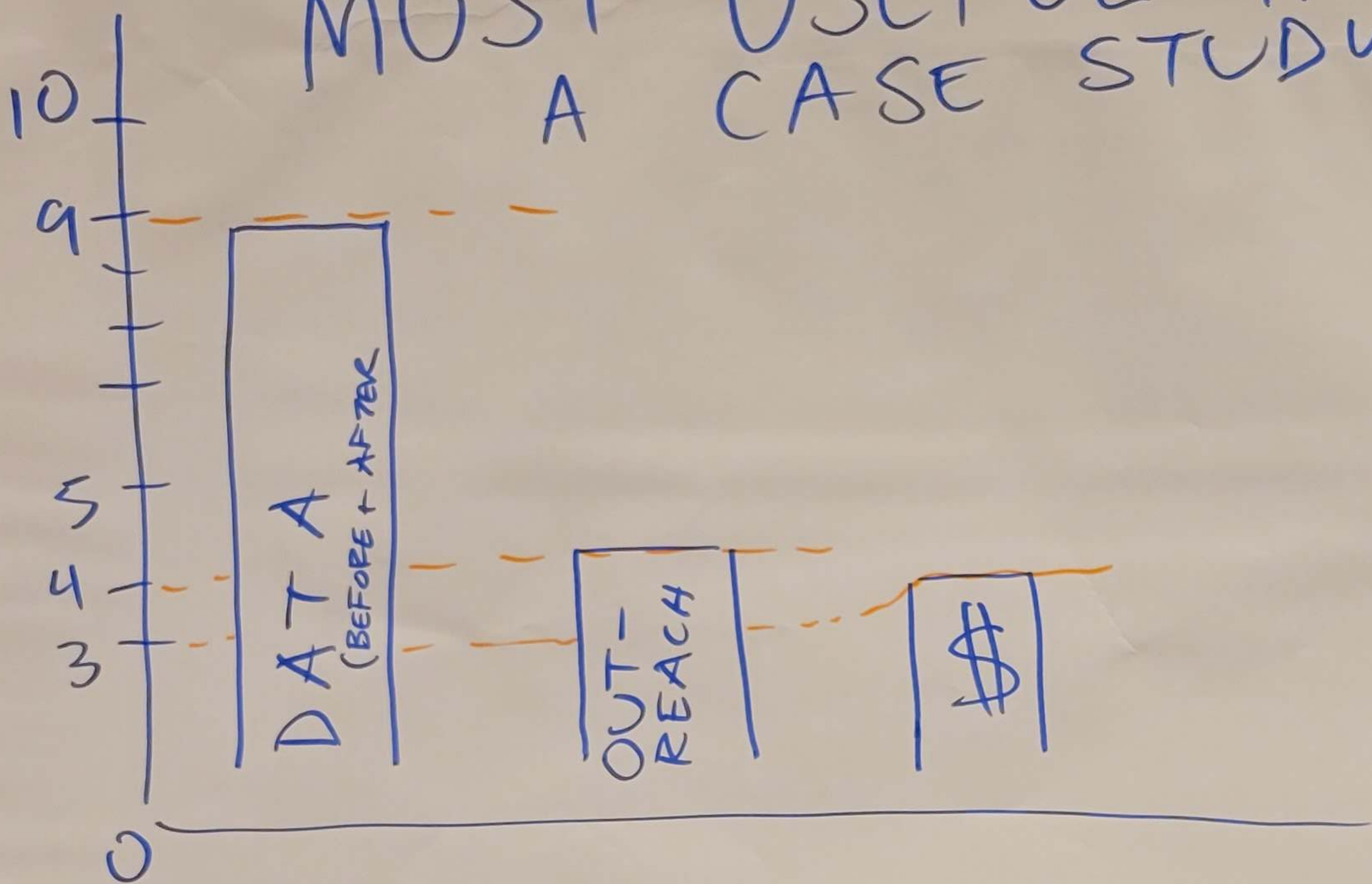
retrofit

streets

\$\$\$

# MOST USEFUL IN A CASE STUDY

2



## TAKEAWAYS

- CONTEXT (IS IT APPLICABLE TO YOUR DESIGN?)
- LOCAL POLICIES / PLACE (ANY UNIQUE CONDITIONS?)
- DATA: MORE THAN BEFORE / AFTER
  - ADJUSTMENT PERIOD
  - DEMOGRAPHICS
  - # LANES
  - DATA FROM MULTIPLE STAGES (NOT JUST BEFORE / AFTER)

#2

How can case studies be catalogued (in lieu of ad hoc) to be better shared amongst organizations?

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### CASE STUDY FRAMEWORK

WIKI / DEWEY DECIMAL SYSTEM "Organized by TOPIC"

BIKE LANES ←  $\begin{matrix} 1. \\ 2. \\ 3. \end{matrix}$

CYCLE TRACKS ←  $\begin{matrix} 1. \\ 2. \\ 3. \end{matrix}$

INTERSECTION TREATMENTS ←  $\begin{matrix} 1. \\ 2. \\ 3. \end{matrix}$

BIKE SIGNALS ←  $\begin{matrix} 1. \\ 2. \\ 3. \end{matrix}$

SIGNING + MARKING ←  $\begin{matrix} 1. \\ 2. \\ 3. \end{matrix}$

BIKE BLVDs ←  $\begin{matrix} 1. \\ 2. \\ 3. \end{matrix}$

DESIGNING for ALL AGES ←  $\begin{matrix} 1. \\ 2. \\ 3. \end{matrix}$



① How does your city communicate the MOST effective use of curb space? Q3.

- more frequent + better communication during the process
- offer alternatives
  - markings, signs,

② In equity areas, where parking is in high demand, how do we provide better connectivity for people biking?

- ◆ off site mitigations
- ◆ more sustainable transportation options
- ◆ Permit options ⇒ need based parking
- ◆ Traffic Calming options for shared roadways

Q3. what is the most persuasive argument for expanding Bike Networks

How Do you change your community culture to see biking as mode of Transportation

Safe Design  
**DEMONSTRATE**  
WAYFINDING  
EDUCATION  
Traffic Calming  
Stakeholder Collaboration  
Volume management

Q3

How does your city communicate

THE MOST EFFECTIVE USE OF CURB SPACE?

- PSA'S + WEBSITES
- TALK W/ STAKEHOLDERS
- YARD SIGNS, SANDWICH BOARDS, FLYERS
- MARKINGS + SIGNAGE
- ~~SPACE~~ MATERIAL CHANGE  
- BRICK, CONC., ASPHALT
- VERTICAL SLOPE CHANGE  
↑ ON-STREET PARKING

IN EQUITY AREAS, WHERE PARKING IS IN HIGH DEMAND, HOW DO WE PROVIDE BETTER CONNECTIVITY FOR BICYCLISTS?

- DOES NOT HAPPEN -
- OFFSITE LOT W/ CIRCULATOR / SHUTTLE
- SHARE FACILITIES → SHARE BIKES
- MORE TRANSIT!
- SUBSIDISE SUSTAINABLE TRAVEL
- ~~ALLOCATION~~  
- Better manage parking - DEMAND BIASED
- PERMIT PROGRAM → NEED BIASED  
How far do you live from work?

Traffic Calming

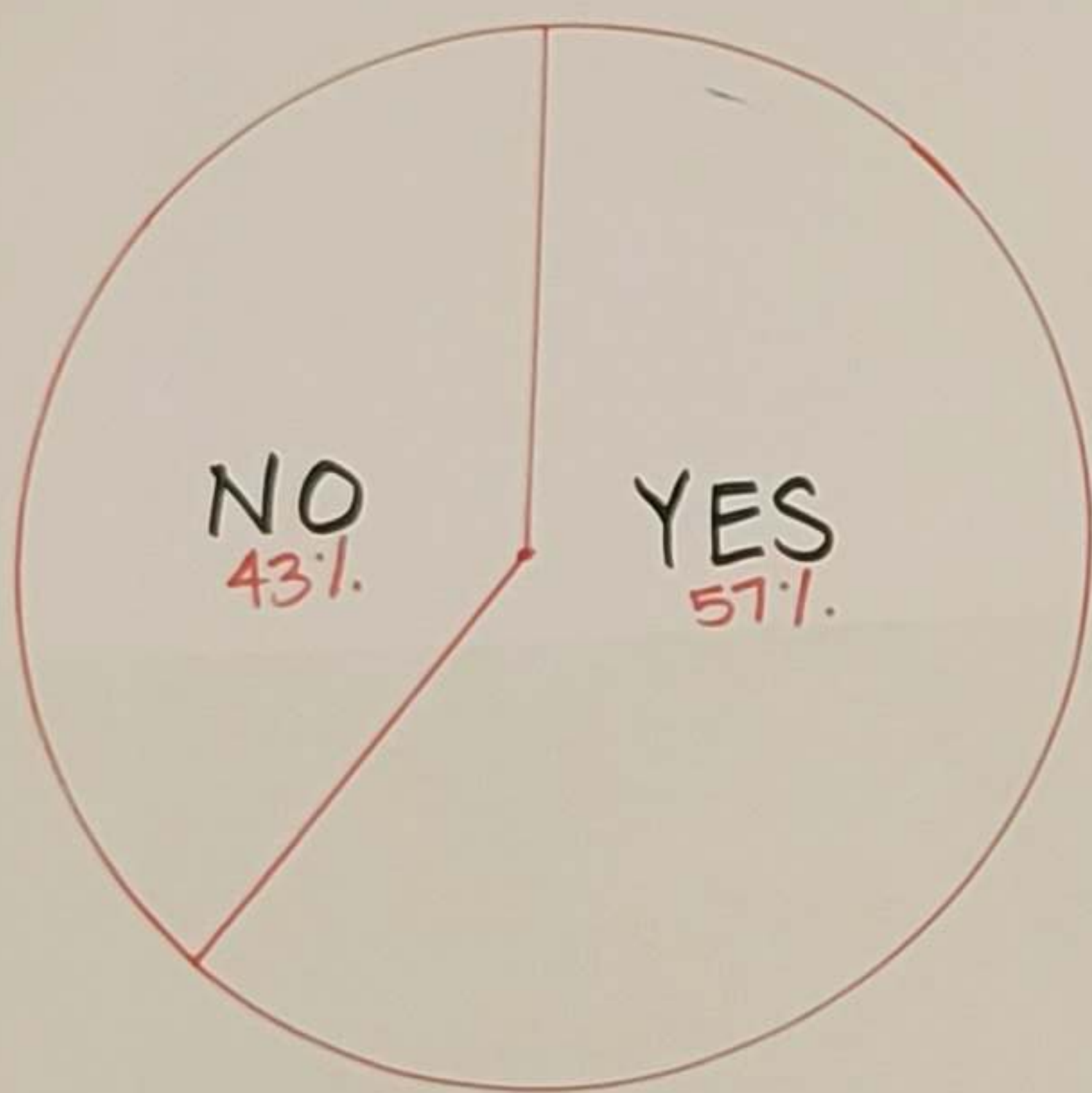
4  
 HOW CONTEXTUALIZATION REFLECTS  
 INTO AN EQUITABLE IMPLEMENTATION?

YET TO BE DEFINED  
 HOWEVER, ALL IMPLEMENTATION SHOULD BE  
 EQUITABLE  
 ABOUT THE  
 HOW NOT NECESSARILY THE WHAT

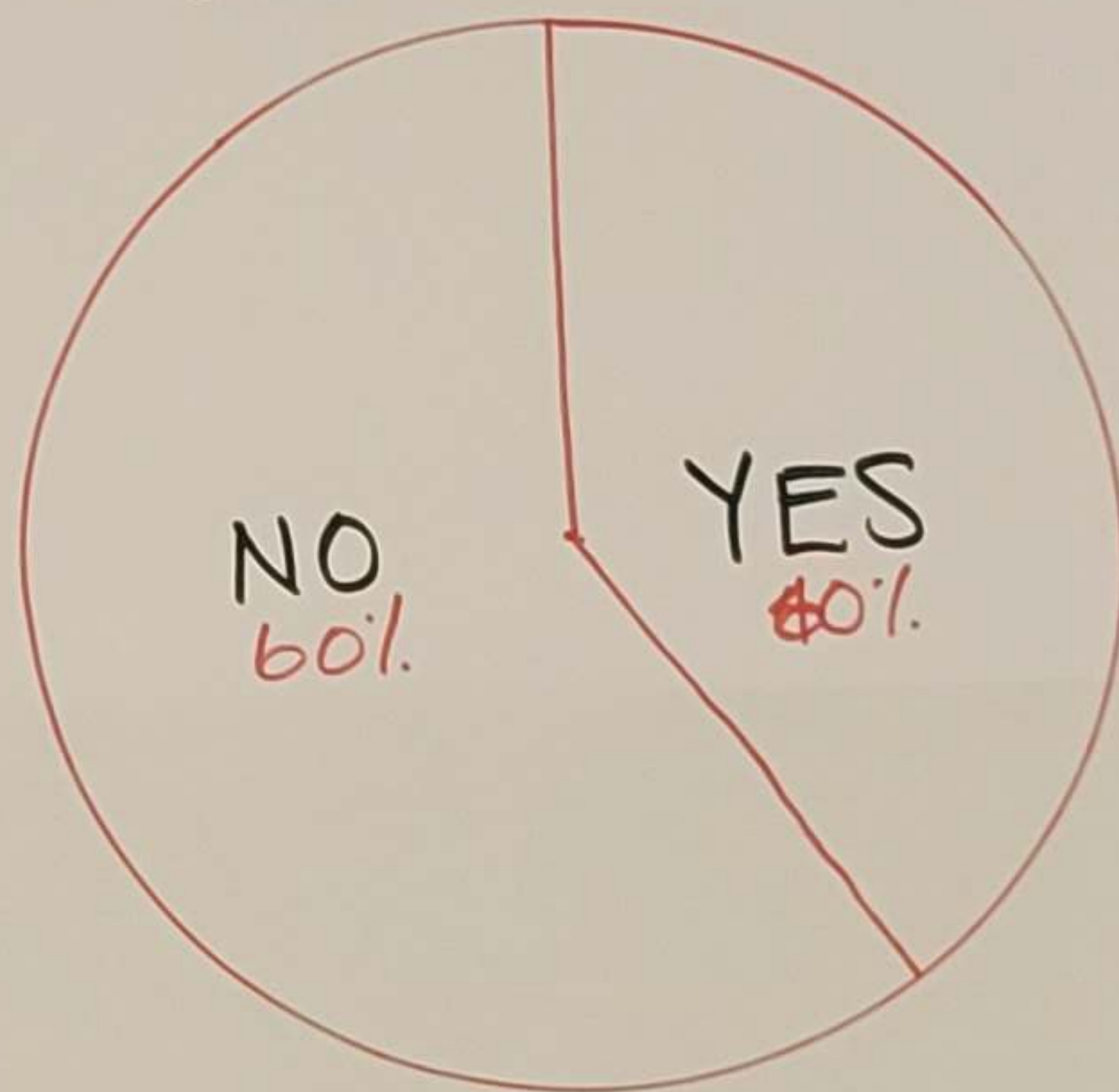
OF COURSE CONTEXT MATTERS,  
 INSTEAD OF URBAN VS. SUBURBAN  
 REFRAME AS A SPATIAL CONTINUUM

#4

Do you use  
 the NACTO  
 AAA Guide?



Do you have  
 your own  
 Contextual  
 Guidance?



What Contexts are missing from  
 the NACTO AAA Guide?

Existing vs.  
 Potential/  
 Future  
 Volumes

Suburban

rural

Narrow Streets

flexibility with  
 Volumes / Speed

less detail

More Detail

ALL STREETS  
 exceed 30mph

HIGH PARKING DEMAND

complex  
 intersections

Intersections

ASSUME ~~AAA~~ <sup>Agencies</sup> <sup>abilities</sup> isn't possible... Tues. #5

Tell a story based on data  
and Engineering judgement. grounded in  
Safety, local context, and connectivity.

Factors include:

- Crashes
- Speed
- AADT
- Land use
- Parking utilization
- ROW availability
- Parallel routes

Work w/ leaders  
and key stakeholders  
to prioritize weights  
on these factors,

#6

great already !!

### URBAN BIKEWAY DESIGN GUIDE

Urban arterial (4 lanes)  
bike boulevards  
protected bikeways (quick build)  
Shared lane  
buffered bike lane

Existing Wheelhaus

SUBURBAN ARTERIALS - High speed /  
high volume /  
lots of driveways

- access management
- material selection
- trade offs of design +  
safety

NETHERLAND STYLE

- grade separated bikeway
- super high quality bikeways
- ped / bike separation

Needs more focus

Q6. How Does Built Environment Matter When Illustrating Bikeway Concepts?

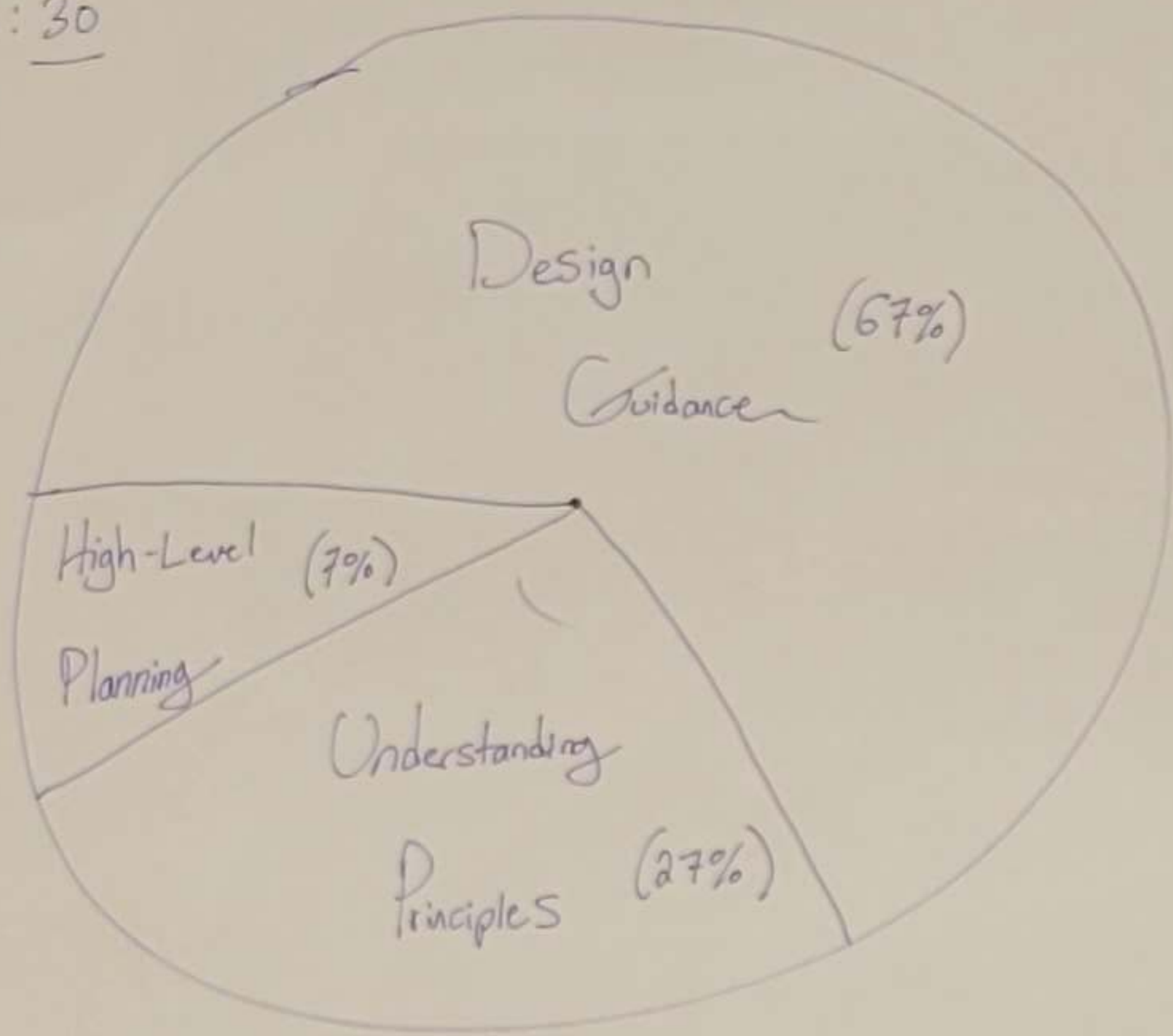
- SUBURBAN TYPOLOGIES
- ROW ENCROACHMENTS & PARKING DIVERSITY
- BUILDING SETBACKS / LAND USE & BIKEWAY SELECTION
- OVERALL NETWORK CONNECTIVITY
  - CROW (Netherlands Bike Guide)
- COSTS OF MOVING CURB WHEN CONSIDERING SELECTION
- HOW TO BUILD A BIKEWAY OVER TIME. AN EVOLVING STREETSCAPE
  - TURN MANAGEMENT
    - LEFT TURNS @ 2-WAY CYCLE TRACKS
- NEED TO SEE MORE COMMUNITIES REFLECTED.

# HOW DO PEOPLE USE THE CURRENT EDITION OF NACTO?

1027

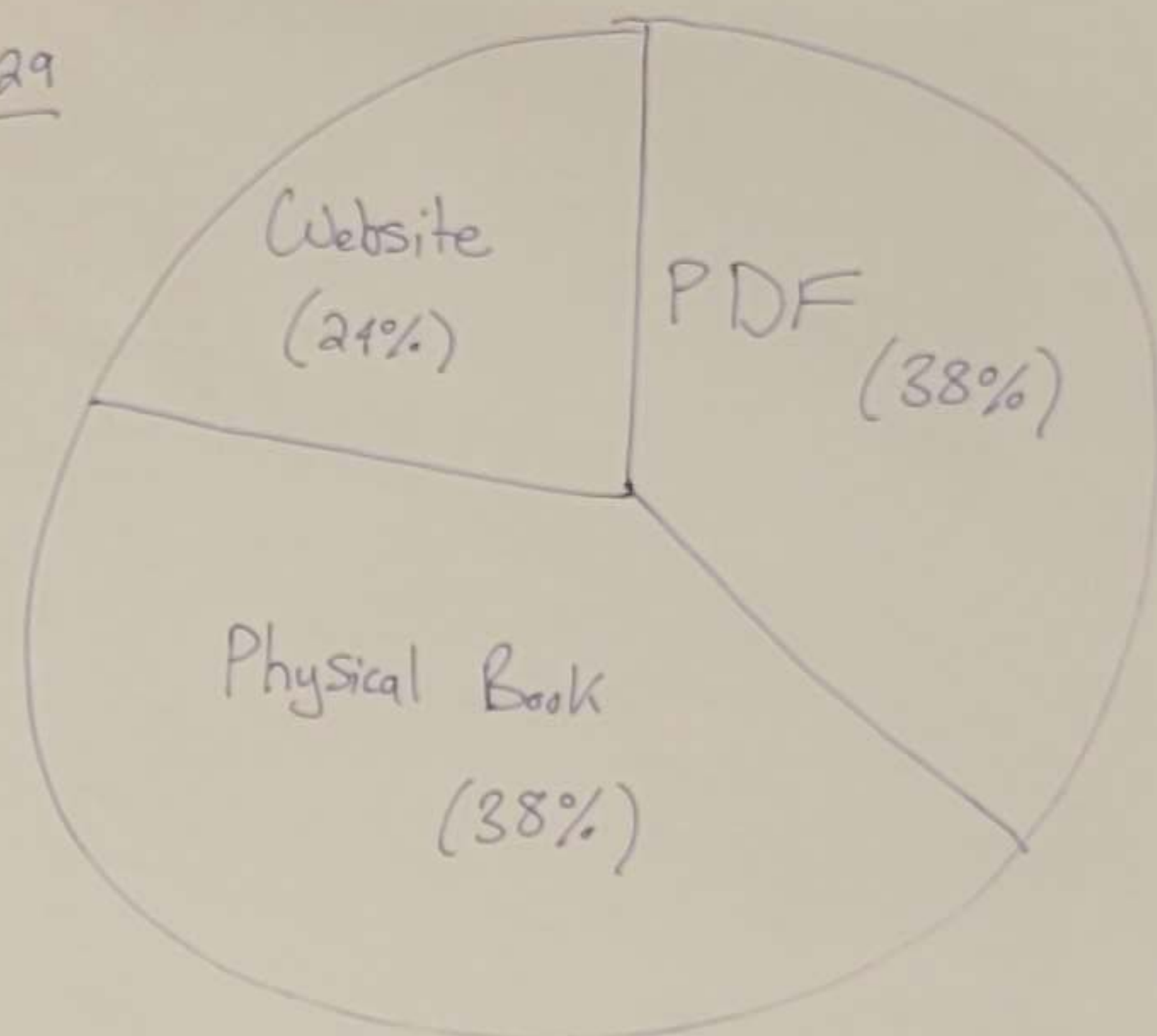
## HOW ARE YOU USING THE GUIDE?

Responses: 30



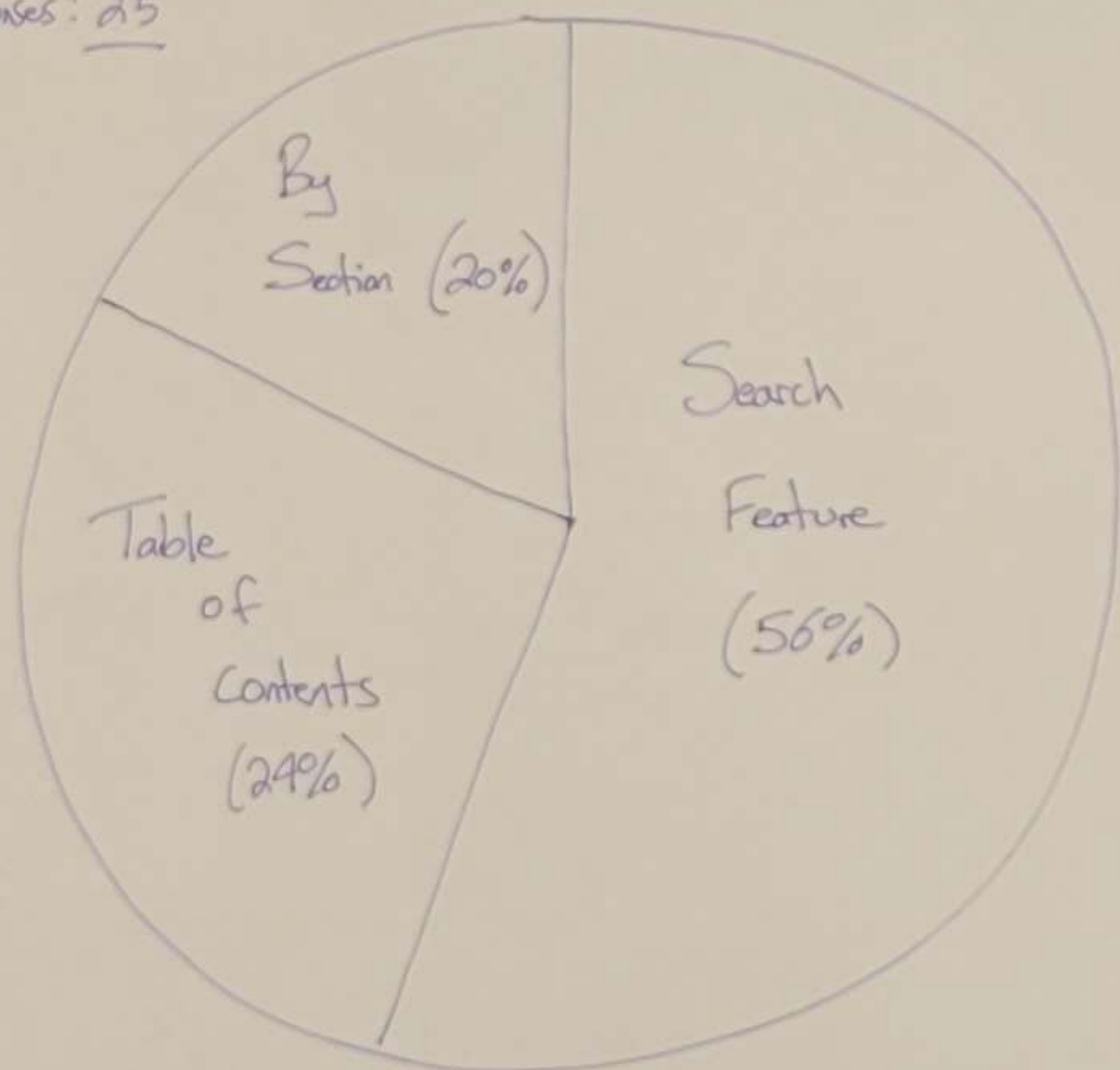
## Which Medium Do You Prefer?

Responses: 29



## How Do You Navigate THE GUIDE?

Responses: 25



## Which Topics Do You MOST USE?

Highest

- Prescriptive Design Guidance (e.g., dimensions)
- Intersection Design
- Creative Applications
- Case Studies
- New Metrics to replace Vehicle LOS.

lowest



8. Which factor do you consider most important when considering raising a bike way

A - Roadway speed - 40%

B - Adjacent Land use - 36%

C - Traffic Volume - 16%

D - Community Input - 8%

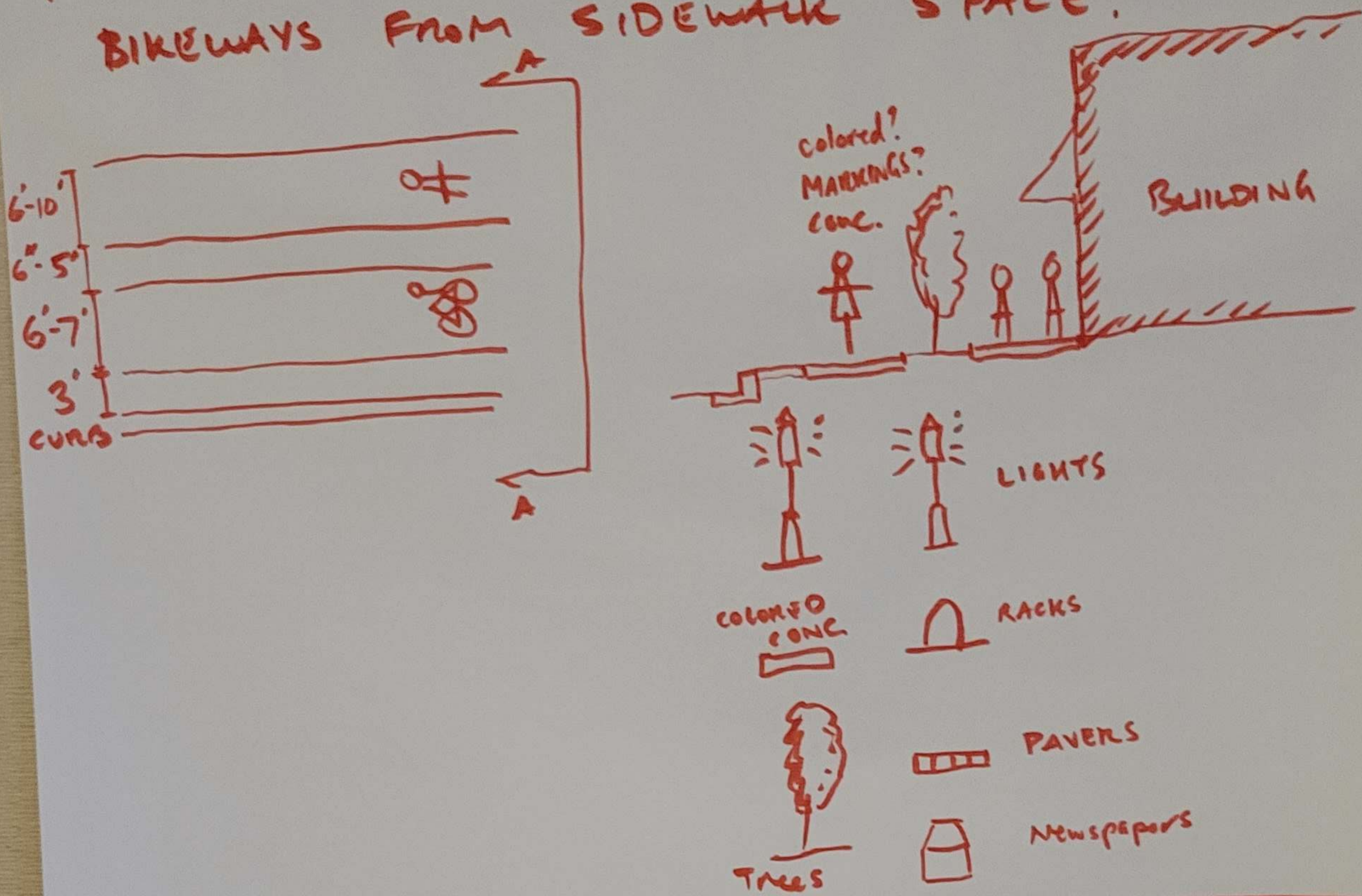
E - Funding/Maint - 8%

## #8 - Why raise a bikeway?

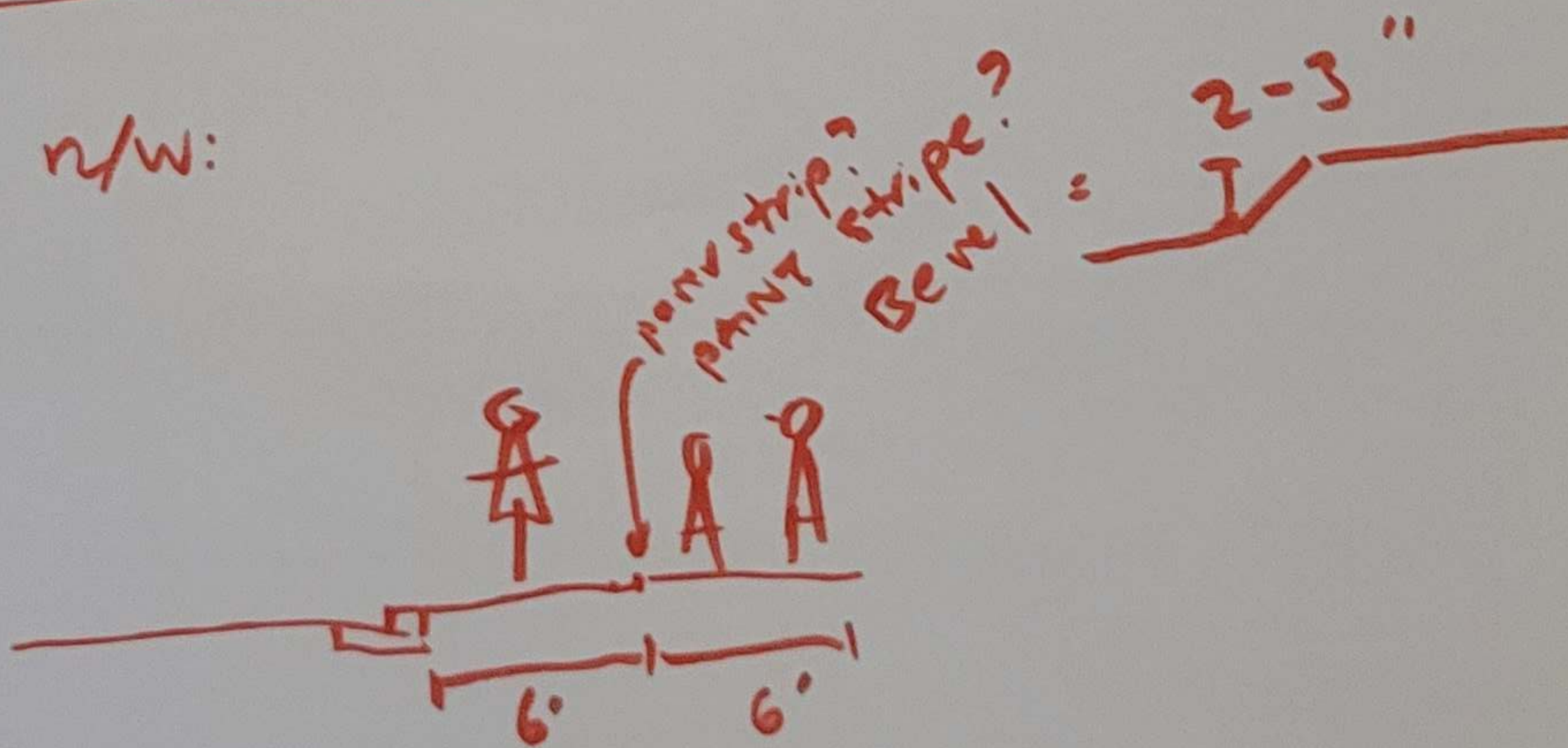
Factors to consider -

- Volume of bike traffic
- Available ROW
- Traffic speed
- Presence of transit
- Planned bike network
- Schools
- Volume of peds
- Nearby destinations
- Drainage
- Driveways & transitions

# 9. HOW DO YOU SEPARATE SIDEWALK LEVEL BIKEWAYS FROM SIDEWALK SPACE?



MINIMAL R/W:



# QUESTION # 9

WHAT DESIGN CONSIDERATIONS ARE PRESENT WHEN CONSTRUCTING A SIDEWALK LEVEL BIKEWAY?

## DESIGN:

- DRAINAGE
- MAINTENANCE PROGRAMMING (FLOW; SWEEP)
- CURB CUT REGULATION
- LOOK FOR COMPLIMENTARY LAND USES
- ADDRESS PARKING ISSUES ON BIKEWAY
- INTERSECTION TREATMENTS
- ACTIVE ; PASSIVE DETECTION OF PEDS ; BIKES
- ACCESSIBILITY (DETECTABLE)

COLLECT DATA

VOLUMES of PEDS ; BIKES

# 10

## Advisory Bike Lanes

Under which circumstances:

~~High~~ Traffic Volume: ~~very low~~ low or very low

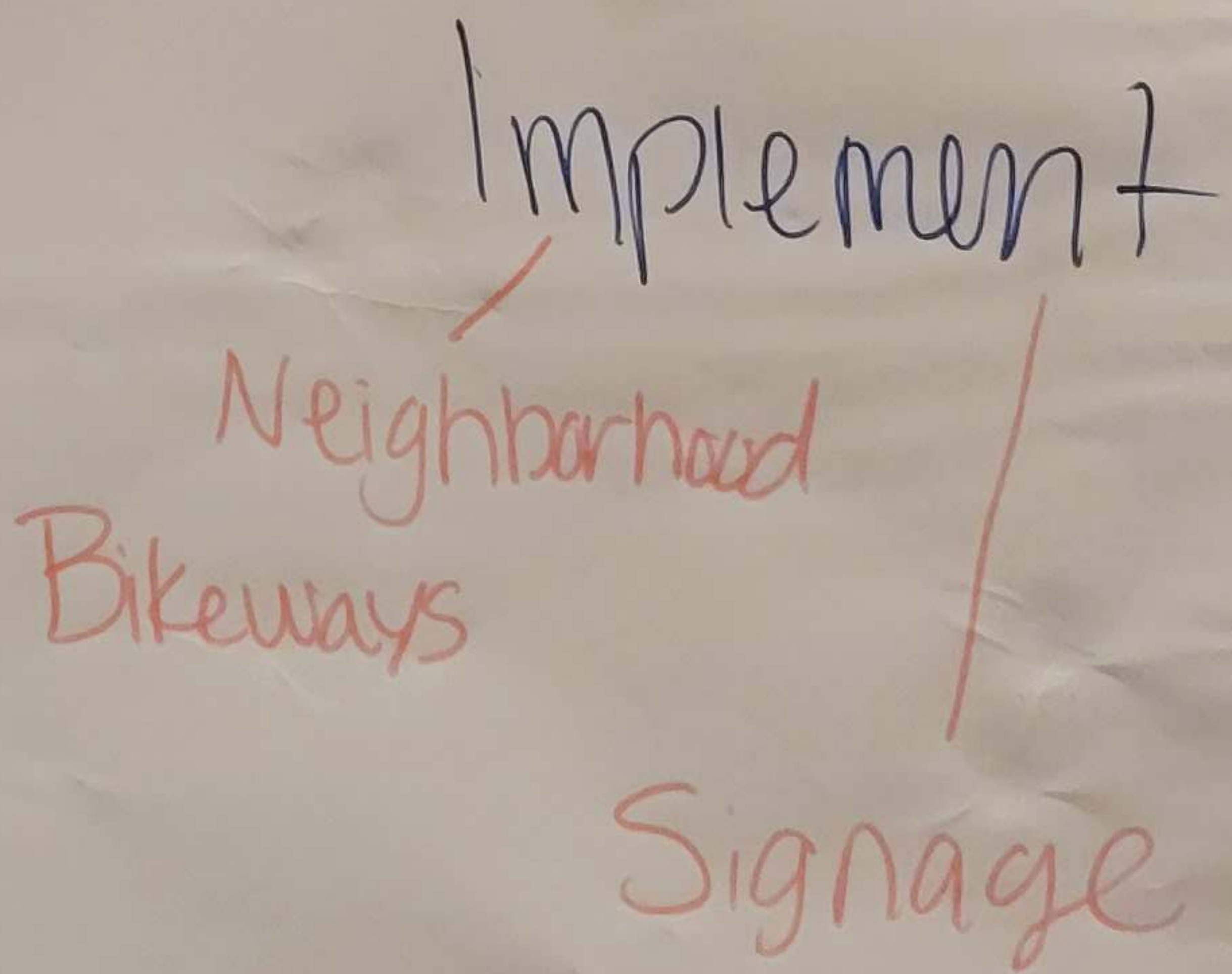
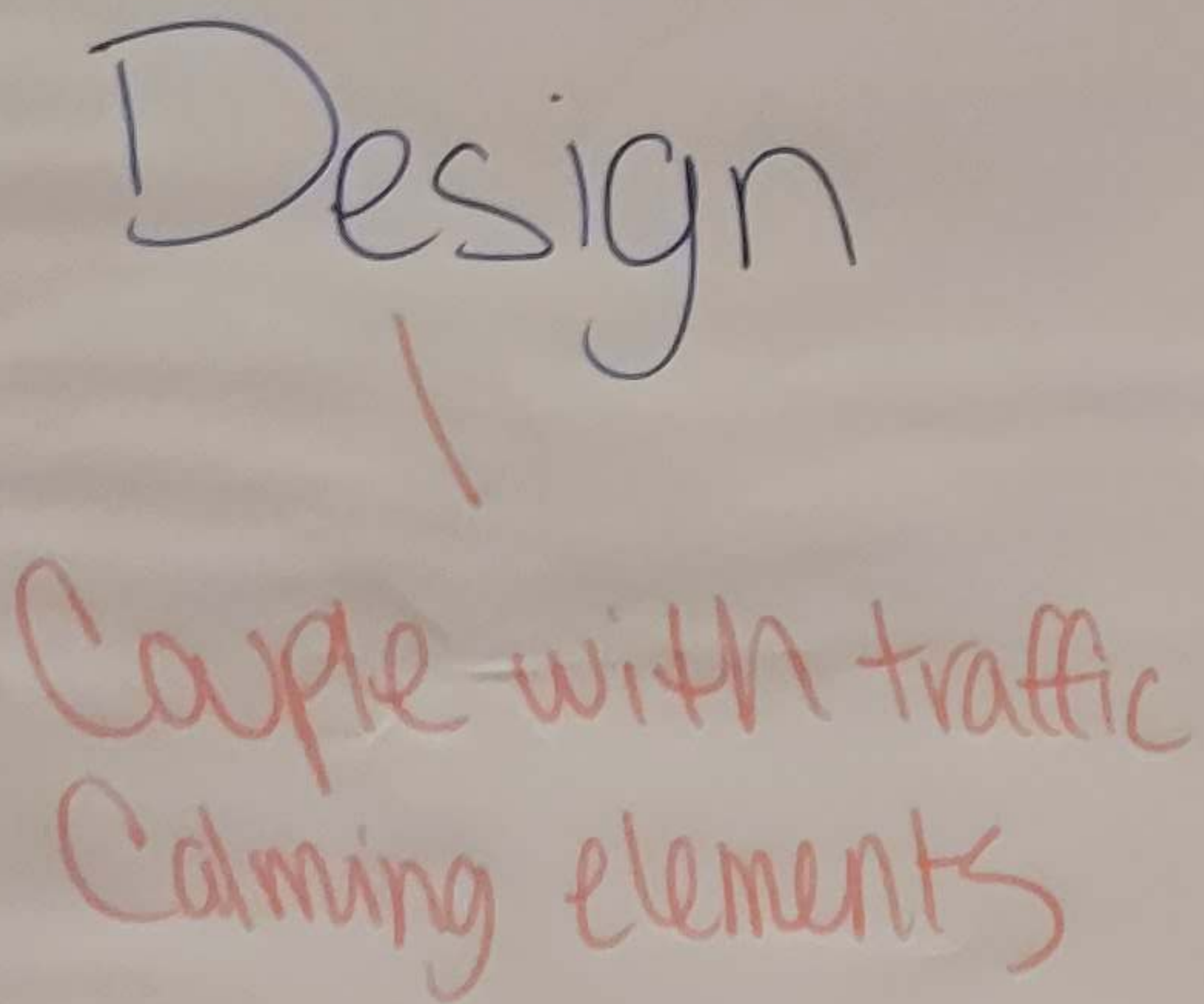
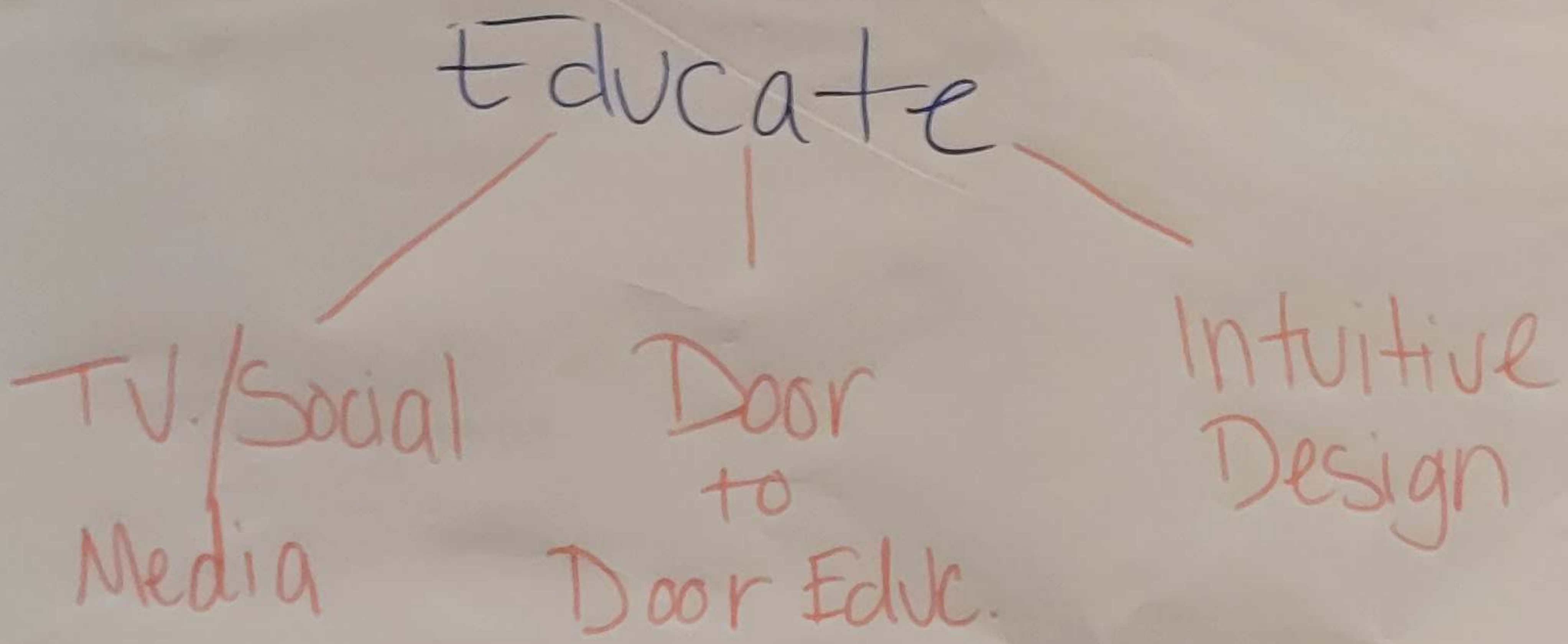
Speeds: low or very low

Bike lane width: Standard

Travel lane width: One standard lane

Cross section width: 22 ft

# ⑩ Advisory Bike Lane



# IDEAL SEPARATED BIKEWAY

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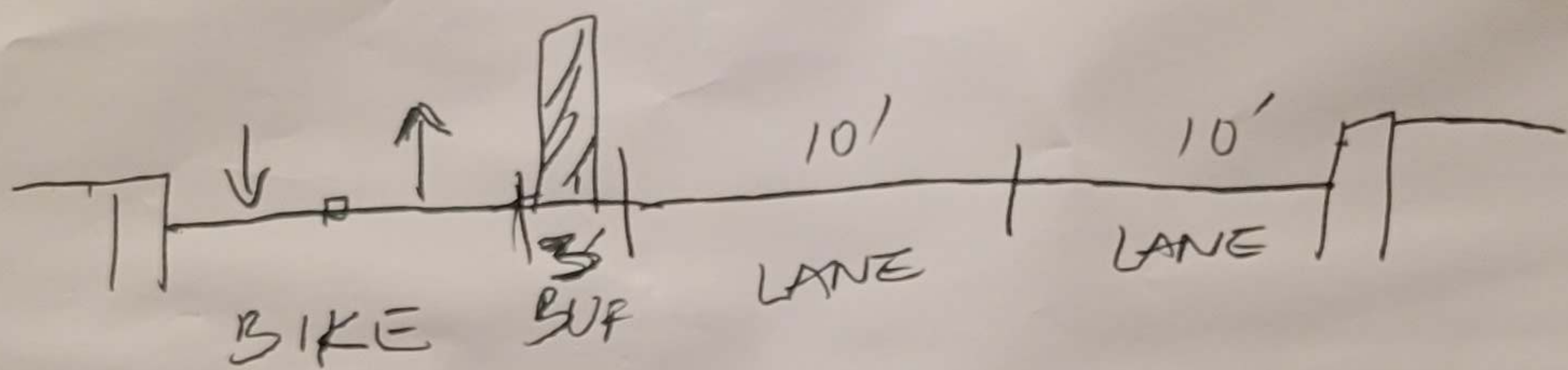
Adjacent Lane Width : 10' - 11'

Buffer : 4' + w/o separators  
3' with vertical separators

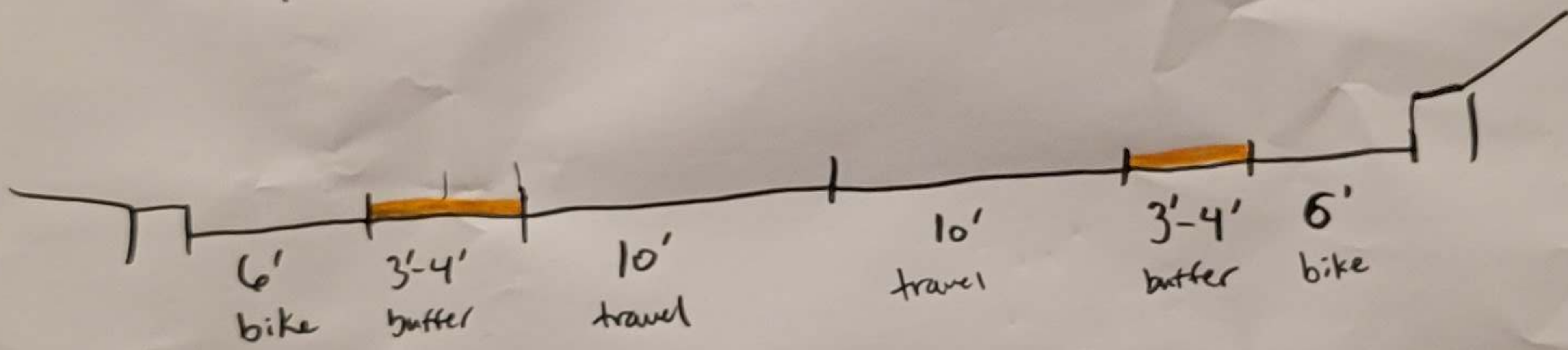
Bike Lane Width : 5' - 7' → 6'

What is the ideal separated bikeway on a busy road?

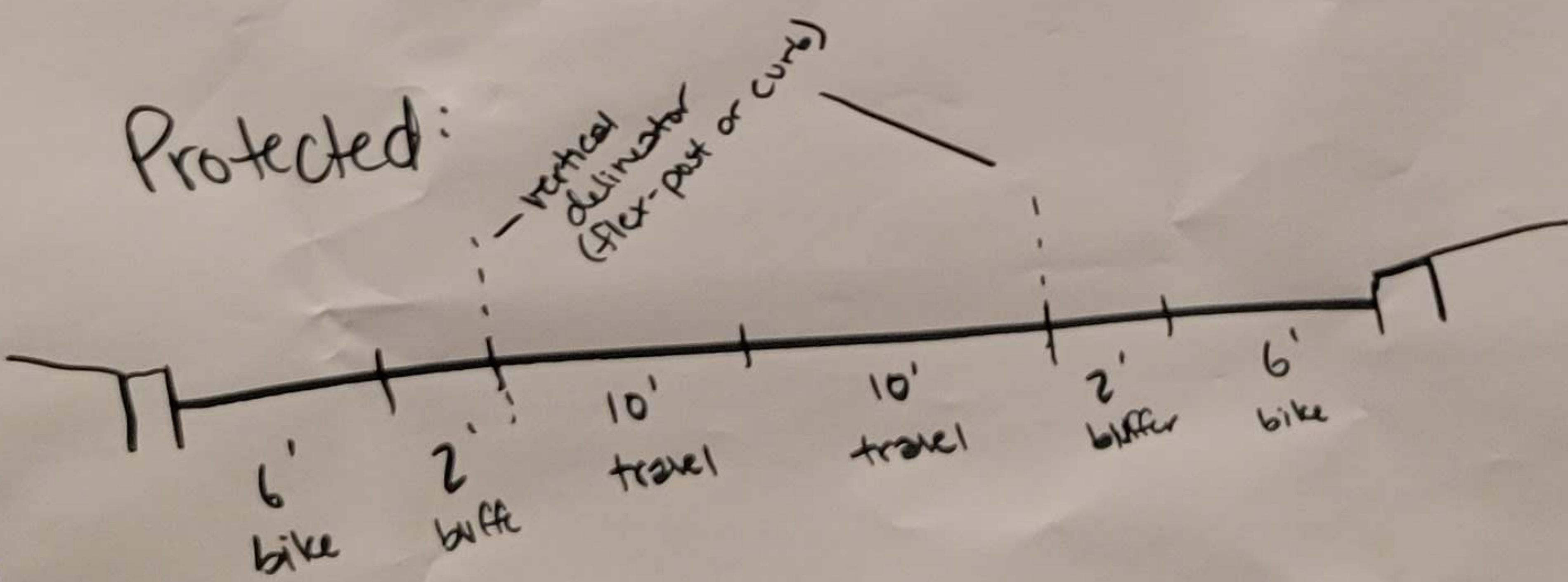
- Street-level protected bikeway on a 30 mph (50 km/h) Collector without parking



Unprotected:



Protected:

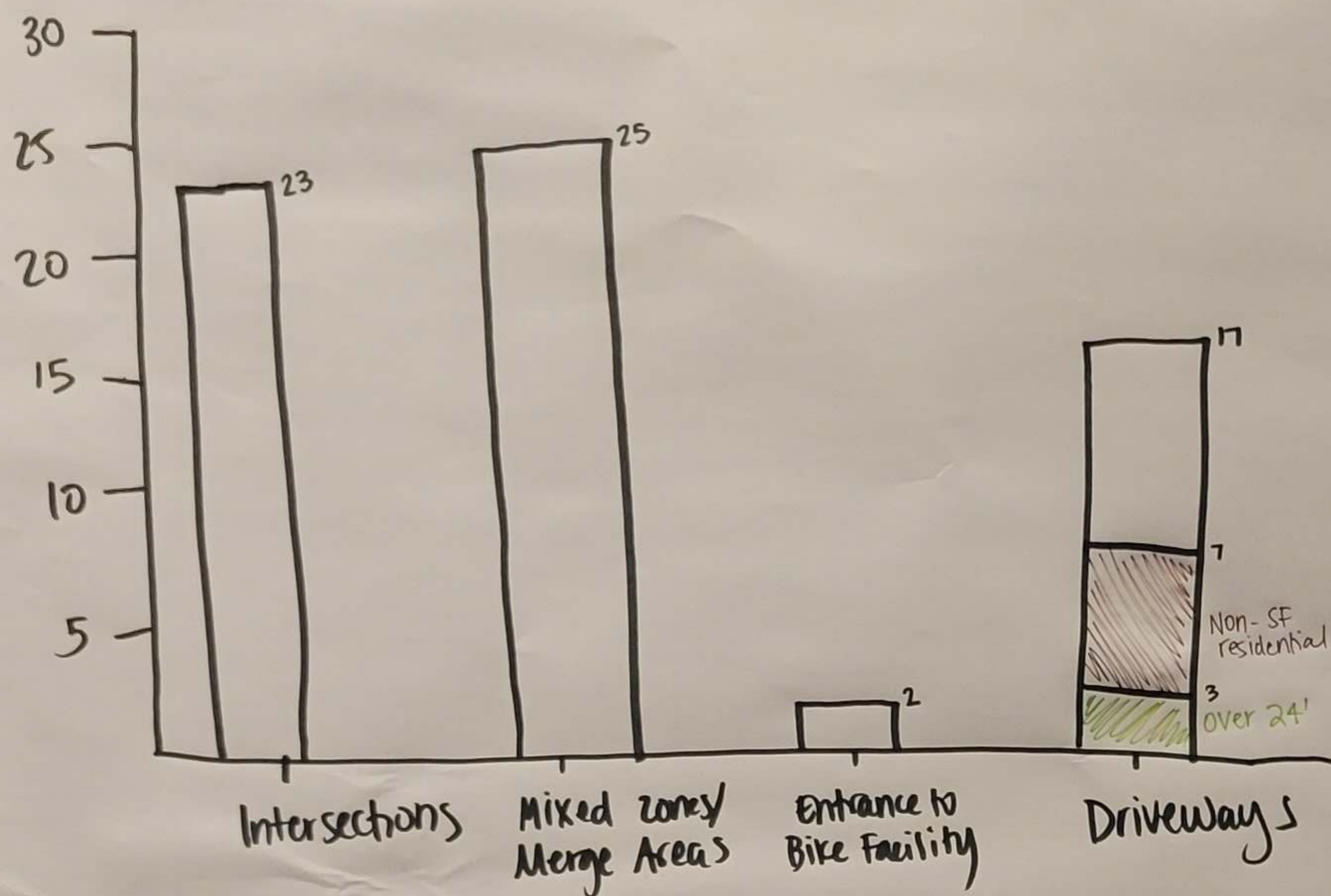


✓  
curb



## Question 12

① If you could only use green pavement markings in limited areas, which locations would you prioritize?



② What type of materials does your jurisdiction use for green pavement markings?

### ASPHALT ROADS

- Green MMA - 10
- Water-based paint - 1
- Thermoplastic - 14
- Durable paint - 2

### CONCRETE ROADS

- Green MMA - 4
- Integral color - 2  
(green paint mixed into the concrete)

① Where should green markings be used?

A. Full width/length

B. All intersections 1 (2 1)

↘ C. <sup>only</sup> High Traffic Intersections 1

2 D. Bike Boxes 2 2 2 2

m E. Driveways 3 3 3 2

↘ F. Multiuse Trail Crossings 3 3 3

How do you decide which pavement materials to use?

2 (A) Cost (capital) 3 2 1 1

1 (B) Durability 1 1 2 1 6

1 (C) Cost Operating 3 3

D. Climate 3

E. Visibility 3

3 (F) Street Context 2 2

## Q13. MAINTENANCE

THERE IS A CLEAR NEED FOR GUIDANCE & BEST PRACTICES.

### STRATEGIES:

- WIDER BIKE LANES WHEN POSSIBLE
- CONSIDER RAISED LANES IF CITY HAS SIDEWALK MAINTENANCE PROGRAM
- CONSIDER ALL BUDGET RESOURCES NEEDED (EQUIPMENT, LABOR, MATERIALS, STORAGE)
- CONSIDER OPERATIONAL DEPLOYMENT OPTIONS (ZONES/DISTRICTS/PRIORITY ROUTES, ETC.)
- DEVELOP PERFORMANCE METRICS (eg. RESPONSE TIMES, QUALITY, ETC.) ALSO PUBLIC EXPECTATION?  
- RIDERSHIP CRITERIA?
-

13A. AS YOUR BIKEWAY NETWORK EXPANDS, HOW DO YOU ALSO CREATE A MAINTENANCE BUDGET?

A: ADVOCATE POLICY CHANGES THAT INCREASE/EVALUATE OPERATIONS BUDGETS.

13B: HOW DO YOU BUILD CAPACITY TO MAINTAIN NEW/INNOVATIVE MATERIALS ASSOCIATED W/ BIKEWAY DESIGN ELEMENTS?

A: PARTNERSHIPS ?  
INCENTIVES (PUBLIC & PRIVATE)

## Question 14:

When to build a 2-way bikeway or not?

### Two-way Pros

1. Row constraints allow to use space more efficiently.
2. When not congested, a 2 way feels larger/safer and accommodates larger design bikes
3. Has maintenance benefits (can fit trucks) Drainage or sun exposure may help or sweepers)
4. Avoids conflicts that are focused on one side of the corridor.
5. Can provide more comfortable access to destinations on one side of street
6. On one way street it can benefit two way bike travel with no wrong way travel

### Two-way Cons

1. Most cities assume that a one-way bike facility is the standard
2. Drivers don't expect to have to look both ways for bikes
3. May require signal upgrades to allow intersection operations.
4. Complexities on corridors (mixing facility types)
5. Additional way finding may be needed.

# 2-WAY BIKEWAYS

Factors influencing suitability

Green = positive for 2 way Brown = negative for 2 way

Factor	Score
One-way street	7
Connectivity at ends	7
High # of driveways	6
Turning conflicts	5
Cross-section width	4
Short block lengths	3
Total length of facility	2
Land use/desire paths	2
Signal modifications	2
Designing wider at ends	2
Maintenance ease	1
ROW limitations	1

#15

# CAN WE TAKE YOUR PARKING?

Residential

Non-Res

Can the community handle reduction in parking supply?

Yes  
 No analysis needed up to 30% reduction.  
 Analysis needed beyond this.

Yes, Almost always

ADA + Loading always ~~needs~~ needs to be considered.

" "

Can bike parking be a replacement?

Yes  
 Who are the residents?  
 seniors  
 ADA

Yes.  
 Need loading ADA nearby.

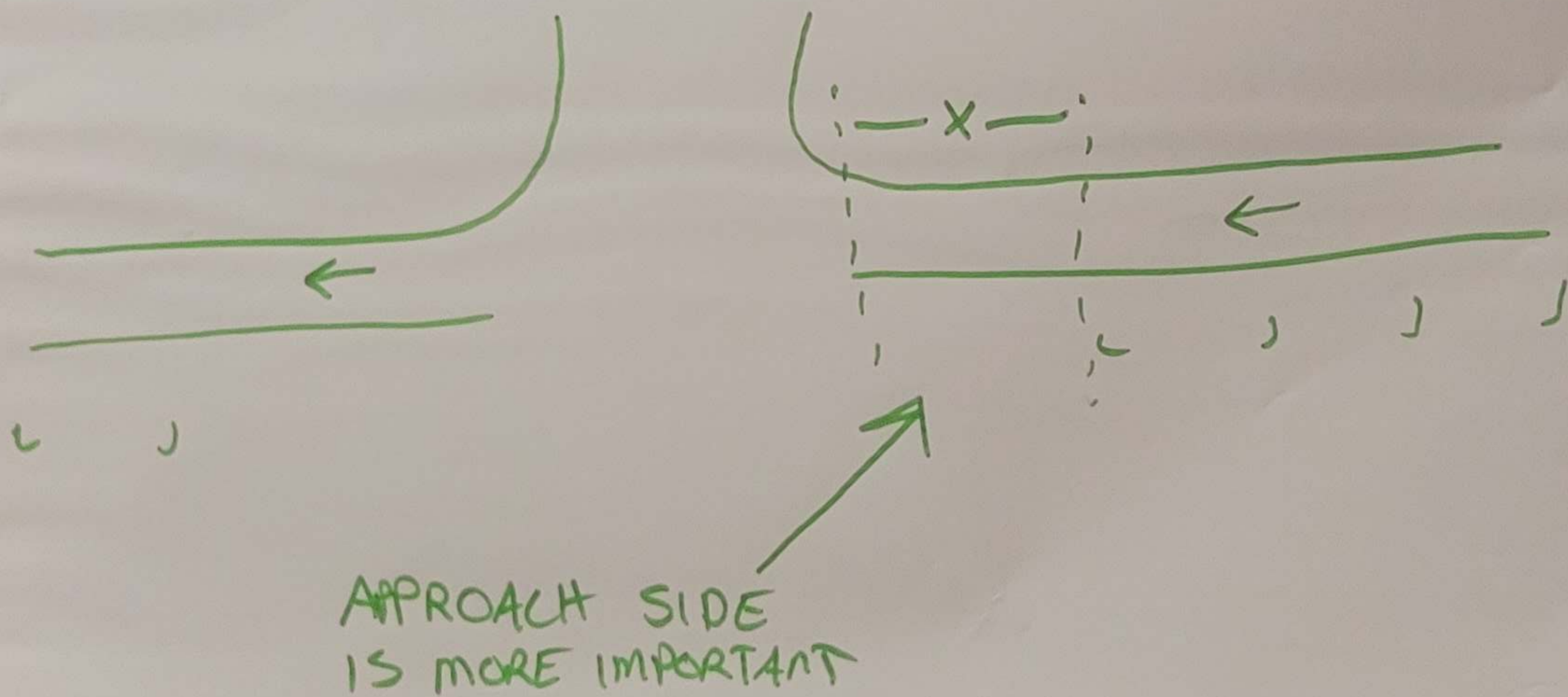


# QUESTION #15

HOW MUCH IS TOO MUCH?  
REMOVING PARKING ALONG A PARKING  
PROTECTED BIKEWAY?

-GUIDANCE FOR PARKING REMOVAL  
IS CONTEXT.

-TYPICAL RESTRICTIONS ARE IN  
A RANGE OF 10-15 FT, HOWEVER  
SIGHT VISIBILITY SHOULD DICTATE.



Question 15: How much is too much -  
removing parking along a parking  
protected bikeway?

Important Design Criteria

Width of Road

- 1) Vertical elements to buffer parking
- 2) Road Diet
- 3) Width for Sweeping
- 4) Door zone Buffer

Length of Facility

- 1) Sight zone Lengths
- 2) # of access conflicts
- 3) Turn radii for conflicts & Preserving ADA Parking

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connectedness & Access.