

TASK 3.3

# Environmental Impacts

**1: Project Process**

**2: Wind**

**3: Shadows**

**4: Groundwater**

**5: Next Steps**



TASK 3.3

# Environmental Impacts

## 1: Project Process

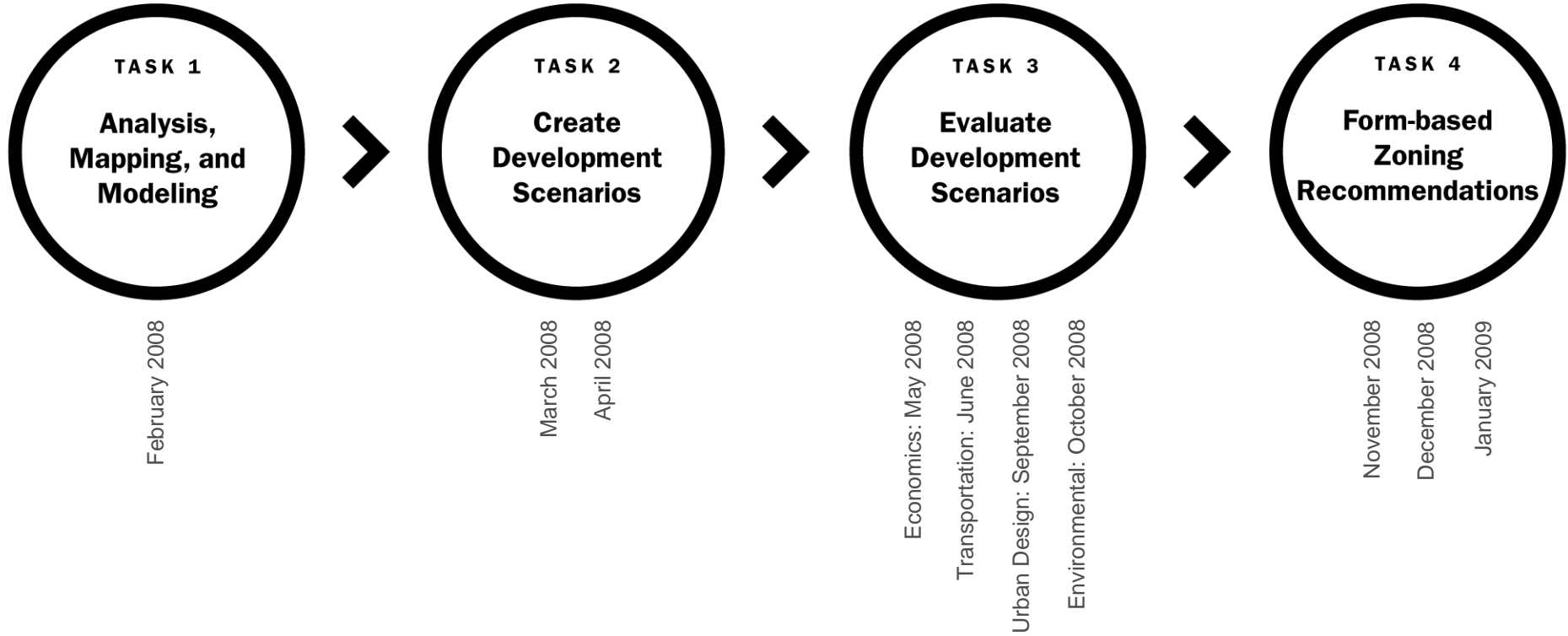
2: Wind

3: Shadows

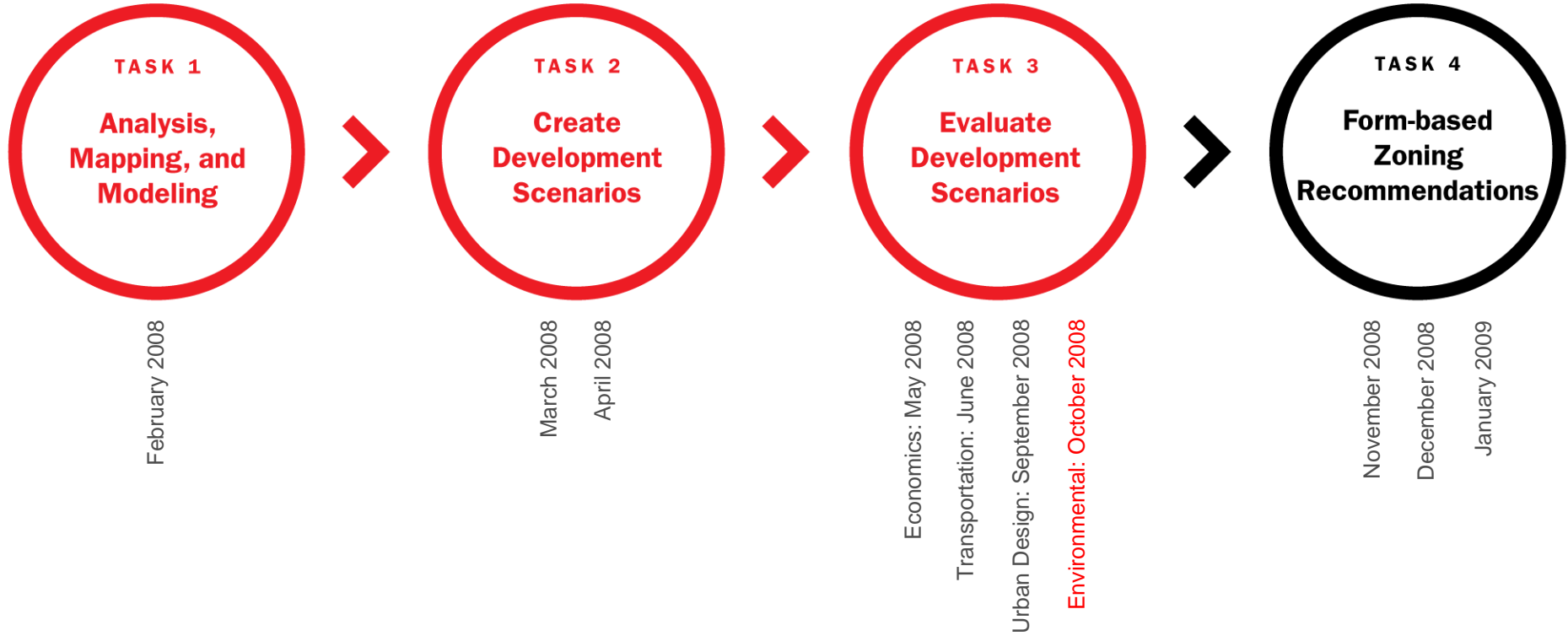
4: Groundwater

5: Next Steps





Project Timeline



Project Timeline

### Task 3.3 (today)

#### Environmental Impacts

- Wind
- Shadows
- Groundwater

#### Transportation

- Public Transit Access
- Automobile Traffic
- Loading and Servicing
- Parking

#### Economics and Real Estate

- Financial Viability: Total GSF
- Financial Viability: Floorplates
- Retail Capacity

#### Urban Design

- Public Realm Contribution
- Pedestrian Connectivity
- Ground-Level Active Uses
- Streetscape Definition
- View Corridors
- Skyline Design and Composition
- Program and Use Mix

TASK 3.3

# Environmental Impacts

1: Project Process

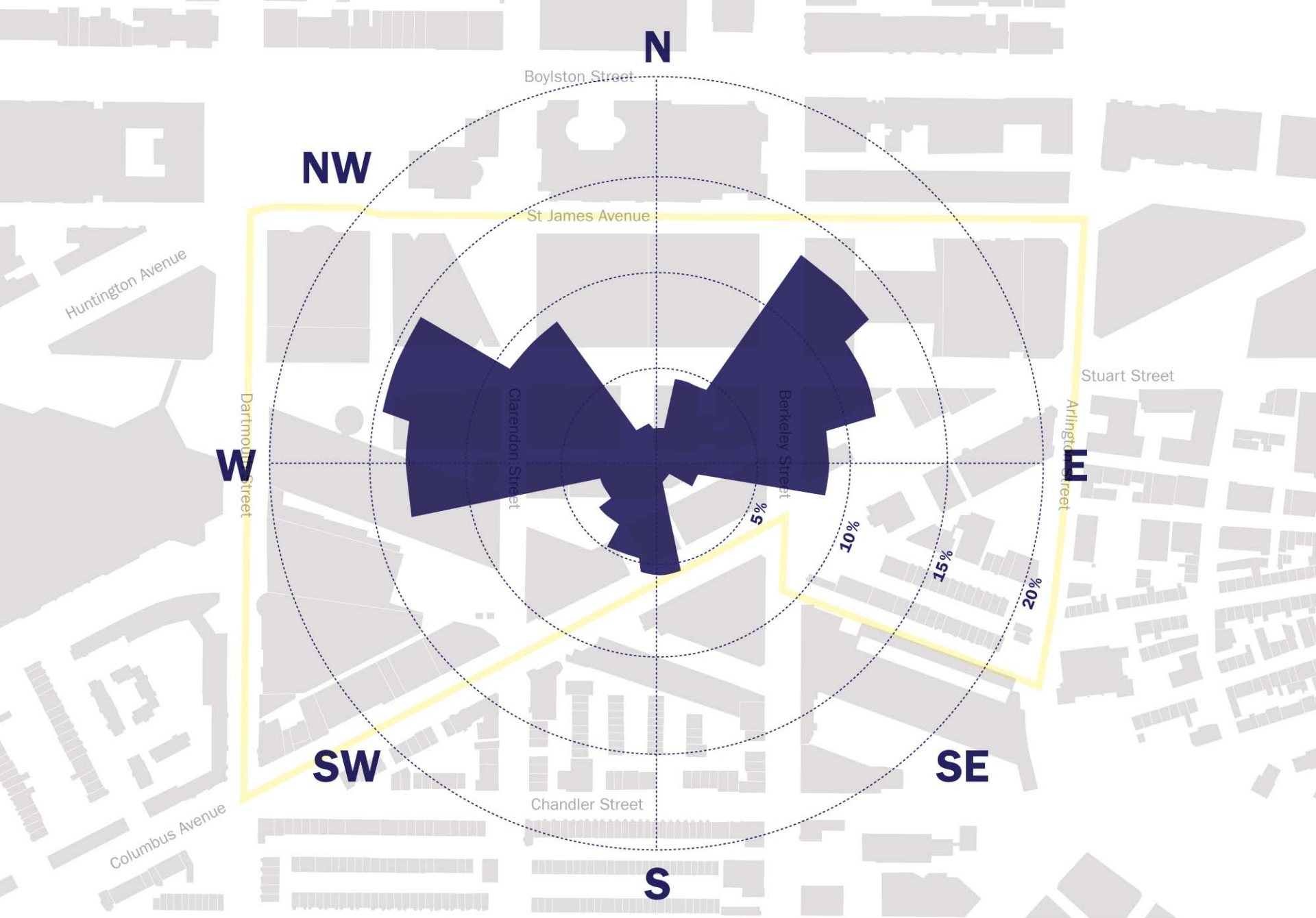
**2: Wind**

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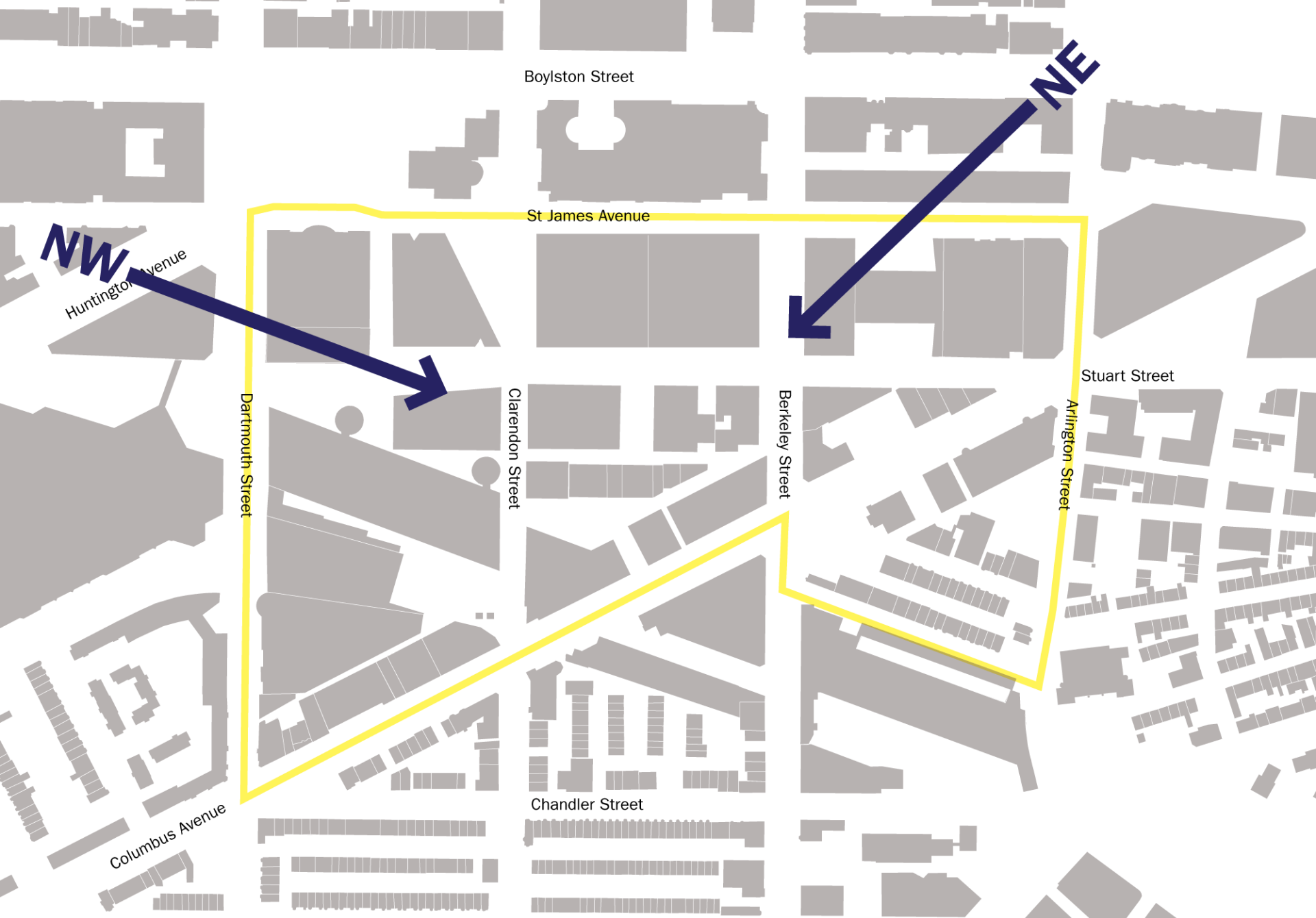




# Strong Annual Winds

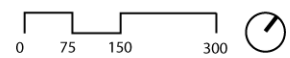
Source: RWDI – Directional distribution (%) of winds – Boston Logan International Airport, MA (1945-1998)



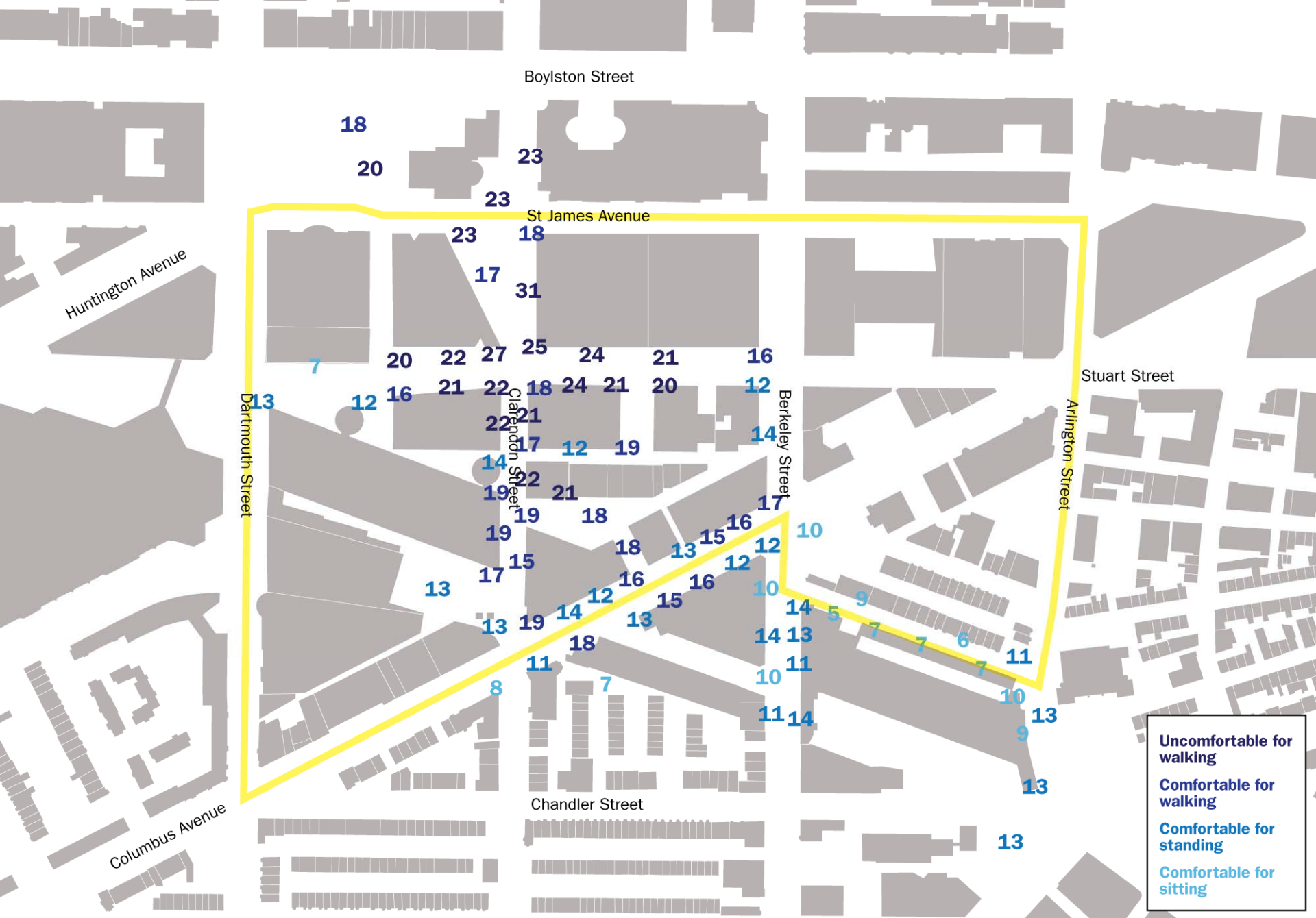


# Strong Annual Winds

Source: RWDI – Directional distribution (%) of winds – Boston Logan International Airport, MA (1945-1998)

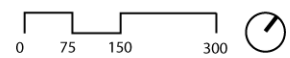


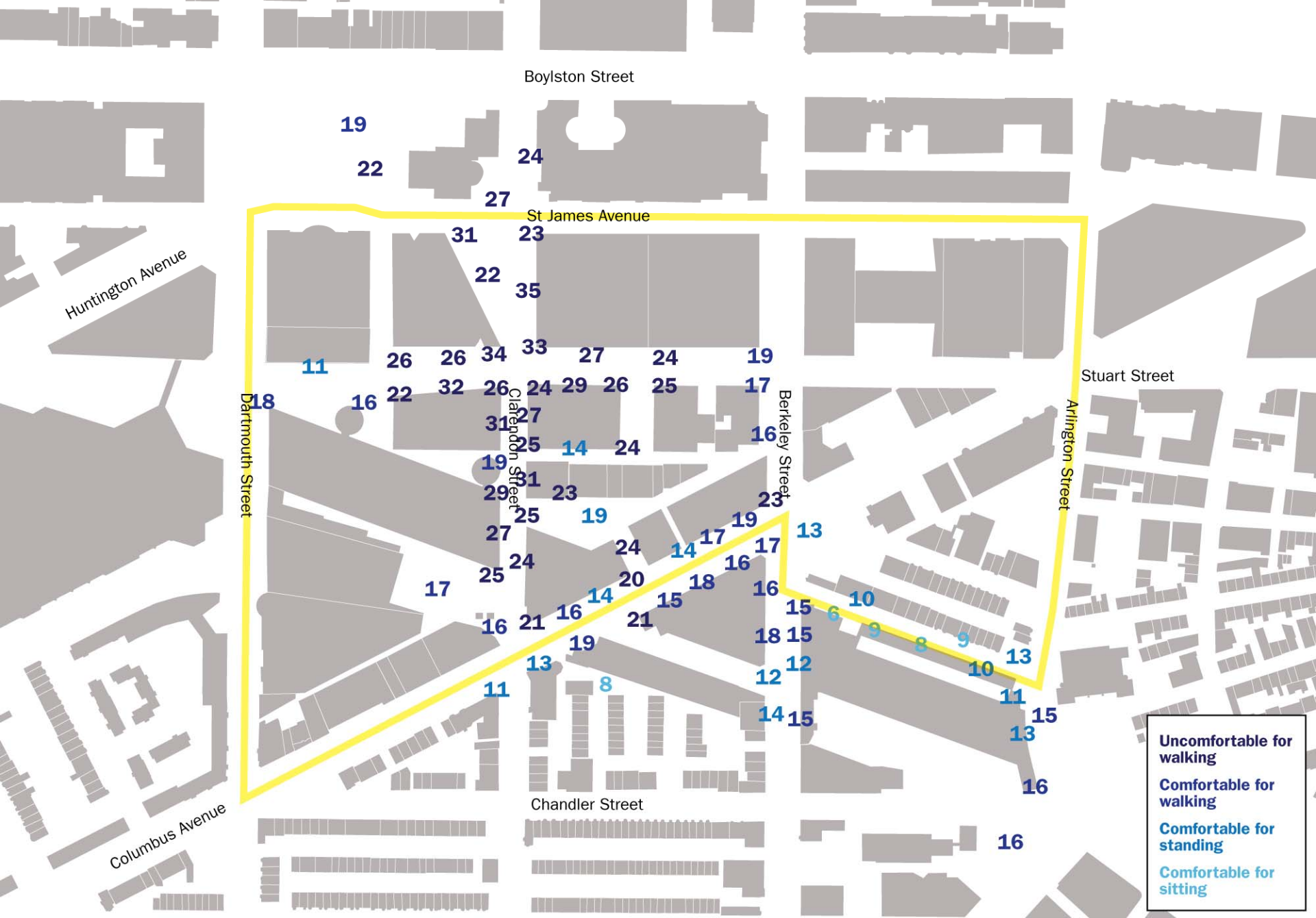




# Summer Mean Wind Speeds (MPH)

Source: Clarendon Article 80 – Cermak Peterka Petersen Inc., Columbus Center Article 80 - CBT





**Uncomfortable for walking**

**Comfortable for walking**

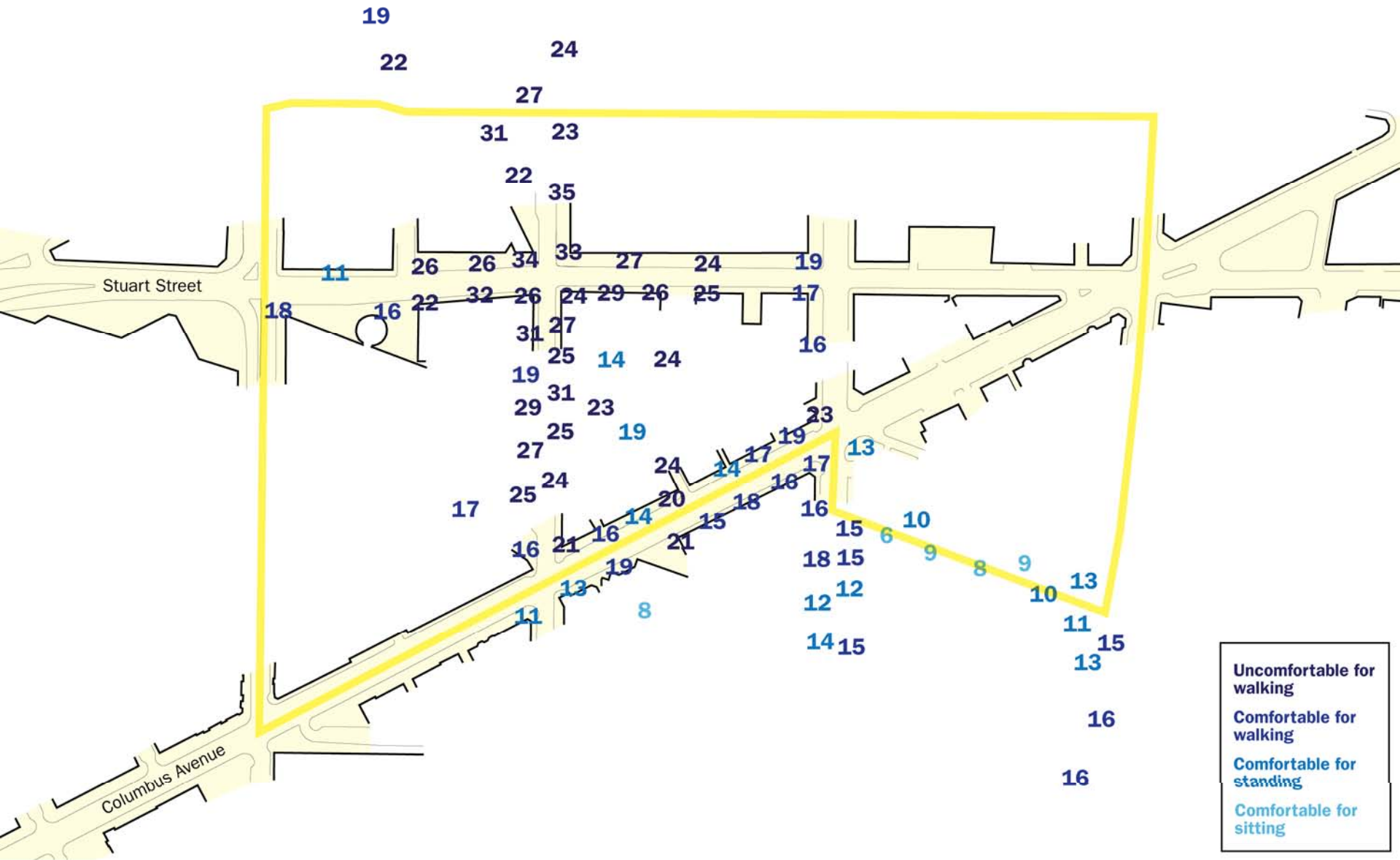
**Comfortable for standing**

**Comfortable for sitting**

# Winter Mean Wind Speeds (MPH)

Source: Clarendon Article 80 – Cermak Peterka Petersen Inc., Columbus Center Article 80 - CBT

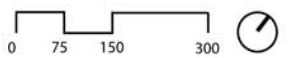


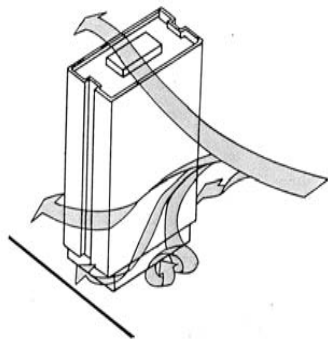


Uncomfortable for walking
Comfortable for walking
Comfortable for standing
Comfortable for sitting

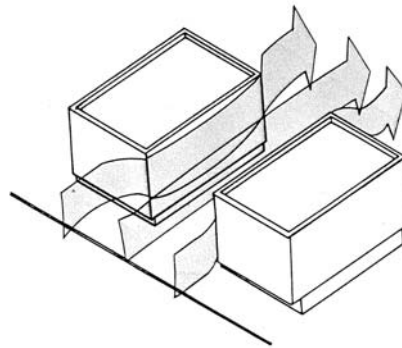
Winter Mean Wind Speeds (MPH) and Columbus Ave vs. Stuart Street

Source: Clarendon Article 80 – Cermak Peterka Petersen Inc., Columbus Center Article 80 - CBT

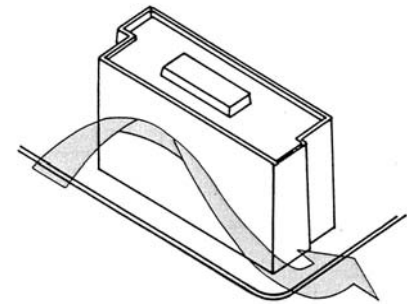




**Downwashing Flow**



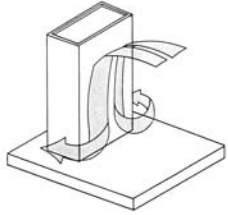
**Channeling Effect**



**Oblique Wind**

## Common Types of Wind Flow in Study Area

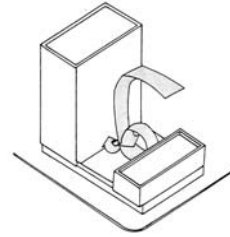
Source: RWDI



### Podium

A podium can deflect downwashing and oblique flows from pedestrian areas.

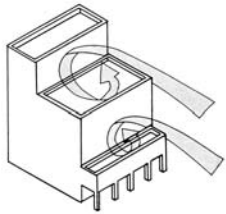
A 25-foot setback on the north and west sides is recommended.



### Sheltering Effect

Locating a taller building upwind of a shorter building can create calmer wind conditions immediately downwind.

The opposite scenario can also work if used in conjunction with a podium.



### Setbacks

A series of setbacks can reduce downwashing flows.

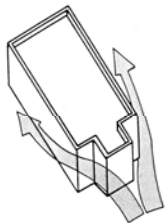
Setbacks should be oriented perpendicular to the strong northwesterly winds.



### Building Massing

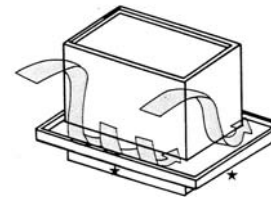
Circular and octagonal buildings reduce more downwashing flows than square and rectangular buildings.

An undulating façade oriented perpendicular to prevailing winds can also deflect wind flows.



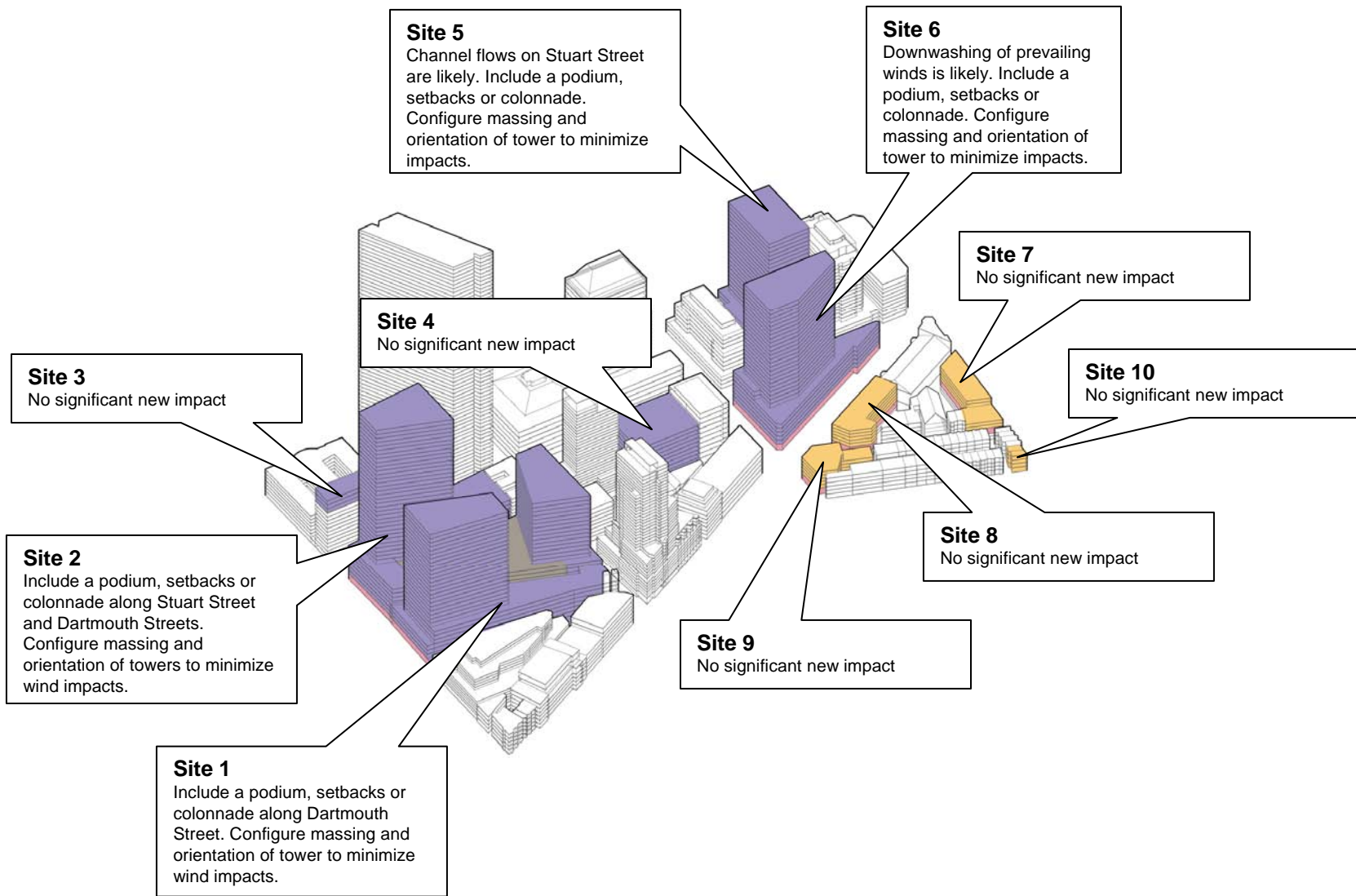
### Align Narrow Buildings with Prevailing Winds

A small windward façade can help limit oblique flows and downwashing flows.



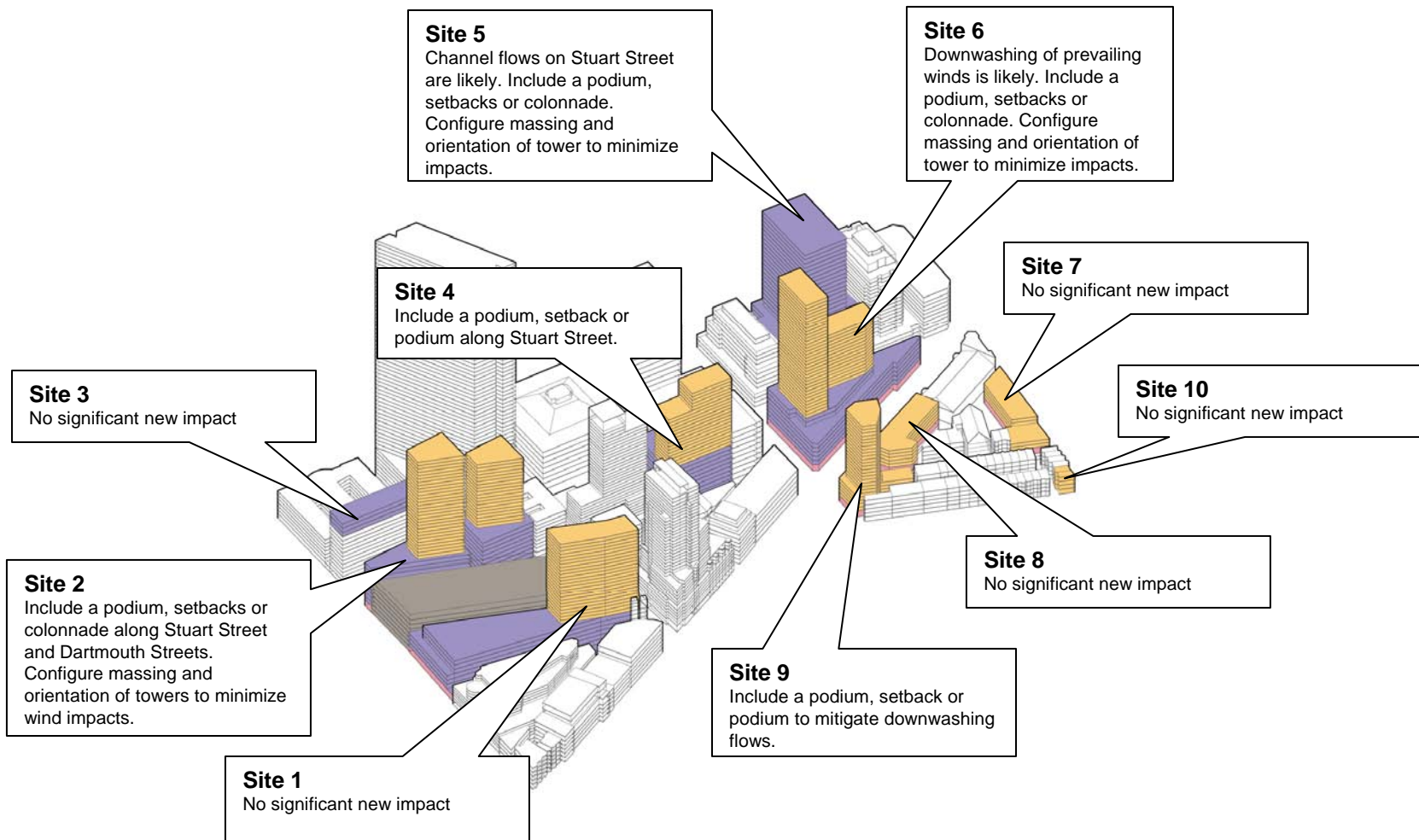
### Colonnades

If a podium or setback is not possible, a colonnade can protect pedestrians from downwashing flows.

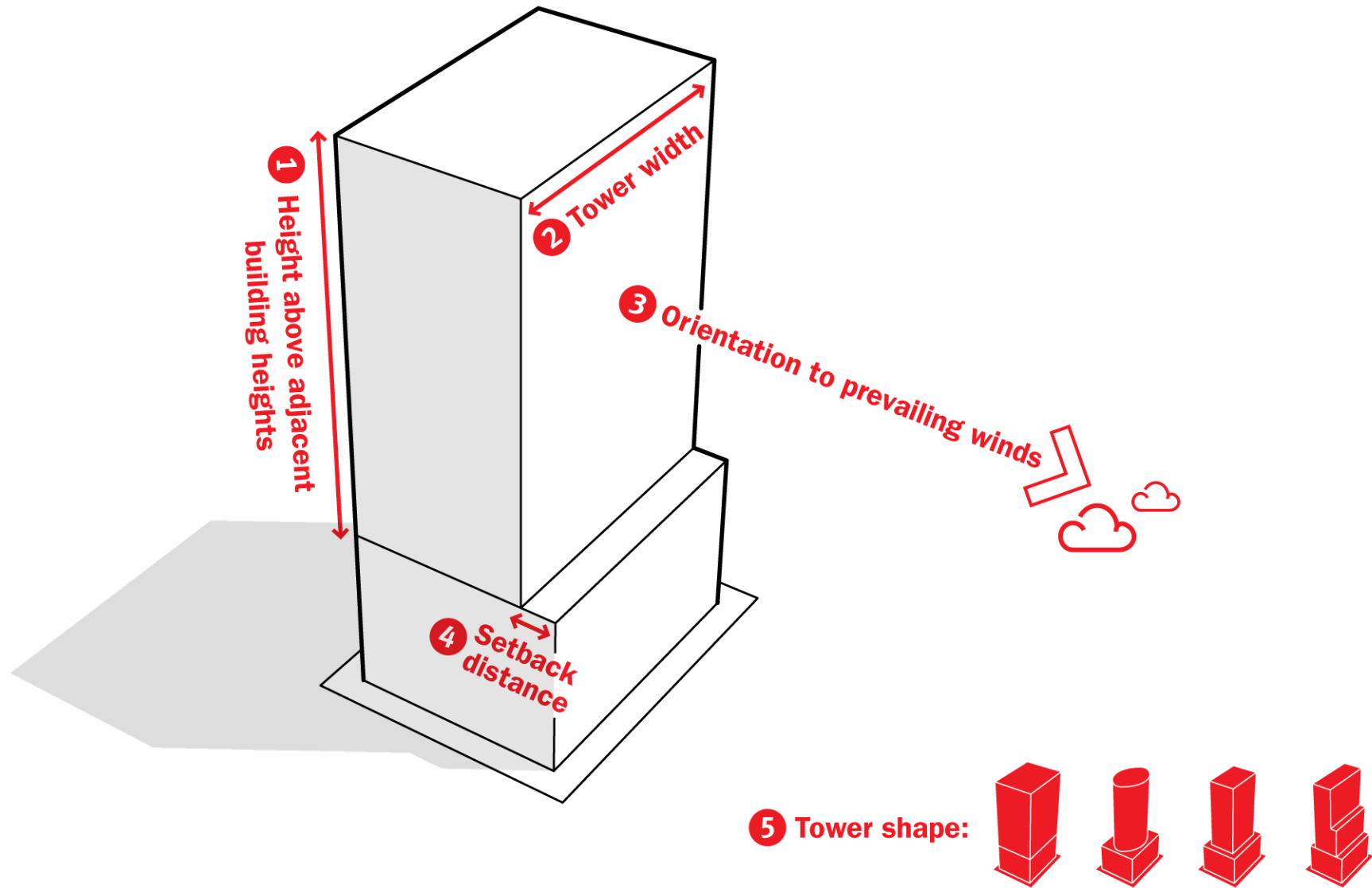


# Wind Mitigation Recommendations for Development Scenarios

Source: RWDI



# Wind Mitigation Recommendations for Development Scenarios



Multiple form-related variables affect wind performance

Source: RWDI and Utile



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Commercial Development Scenario: March 21 Shadows

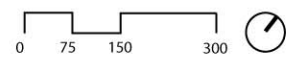
Source: Utile, Inc.

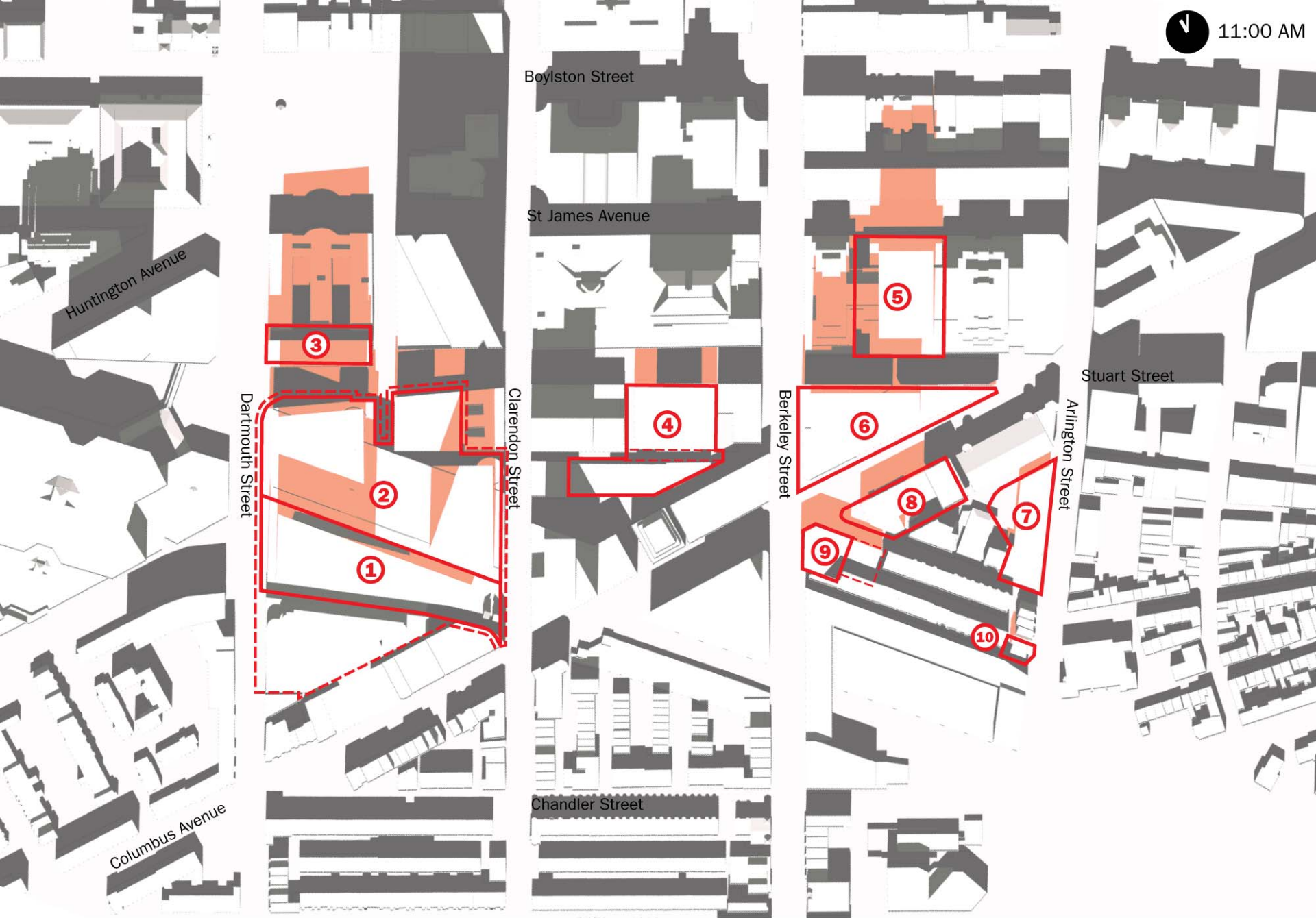




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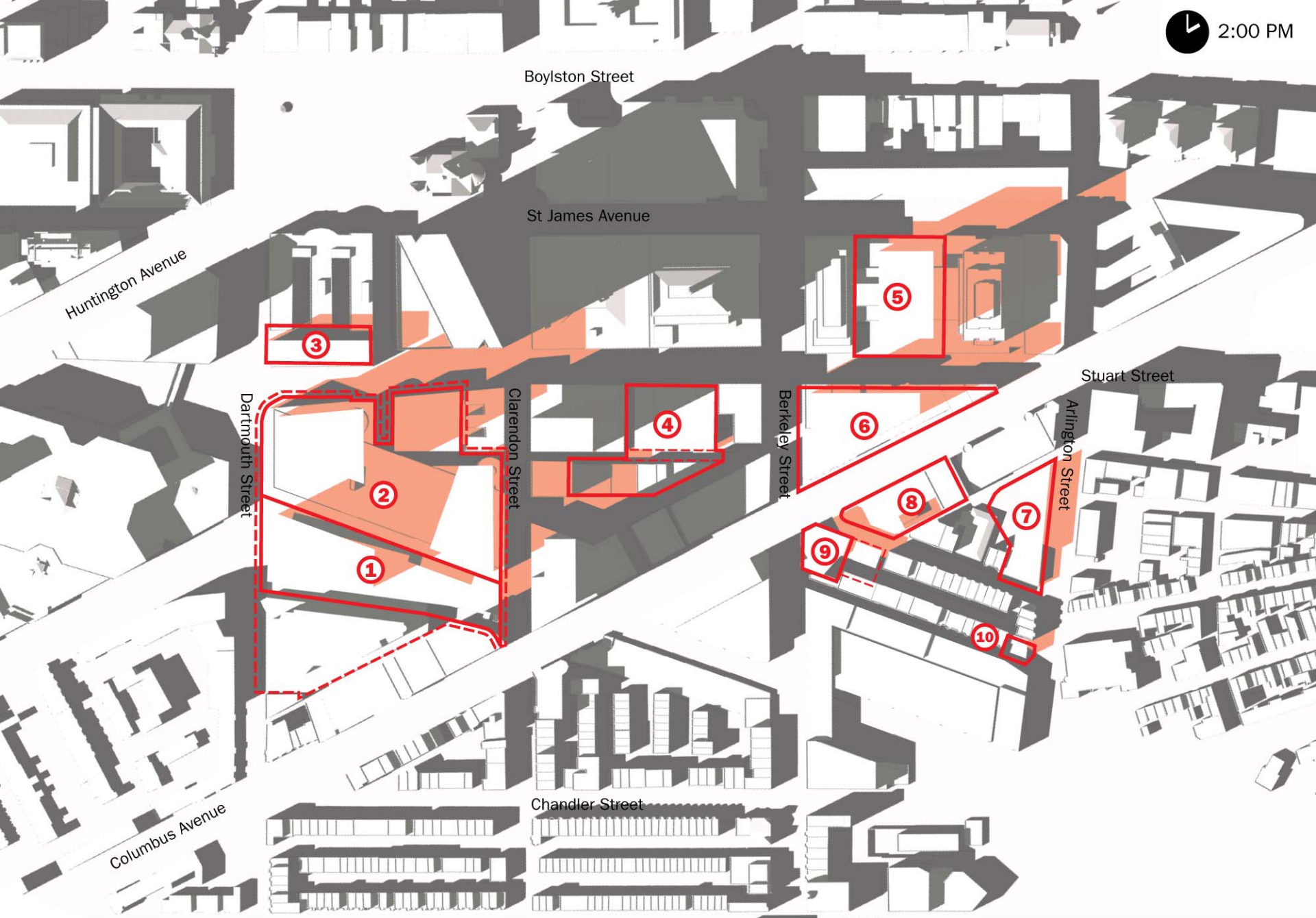




# Commercial Development Scenario: March 21 Shadows

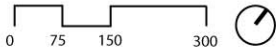
Source: Utile, Inc.

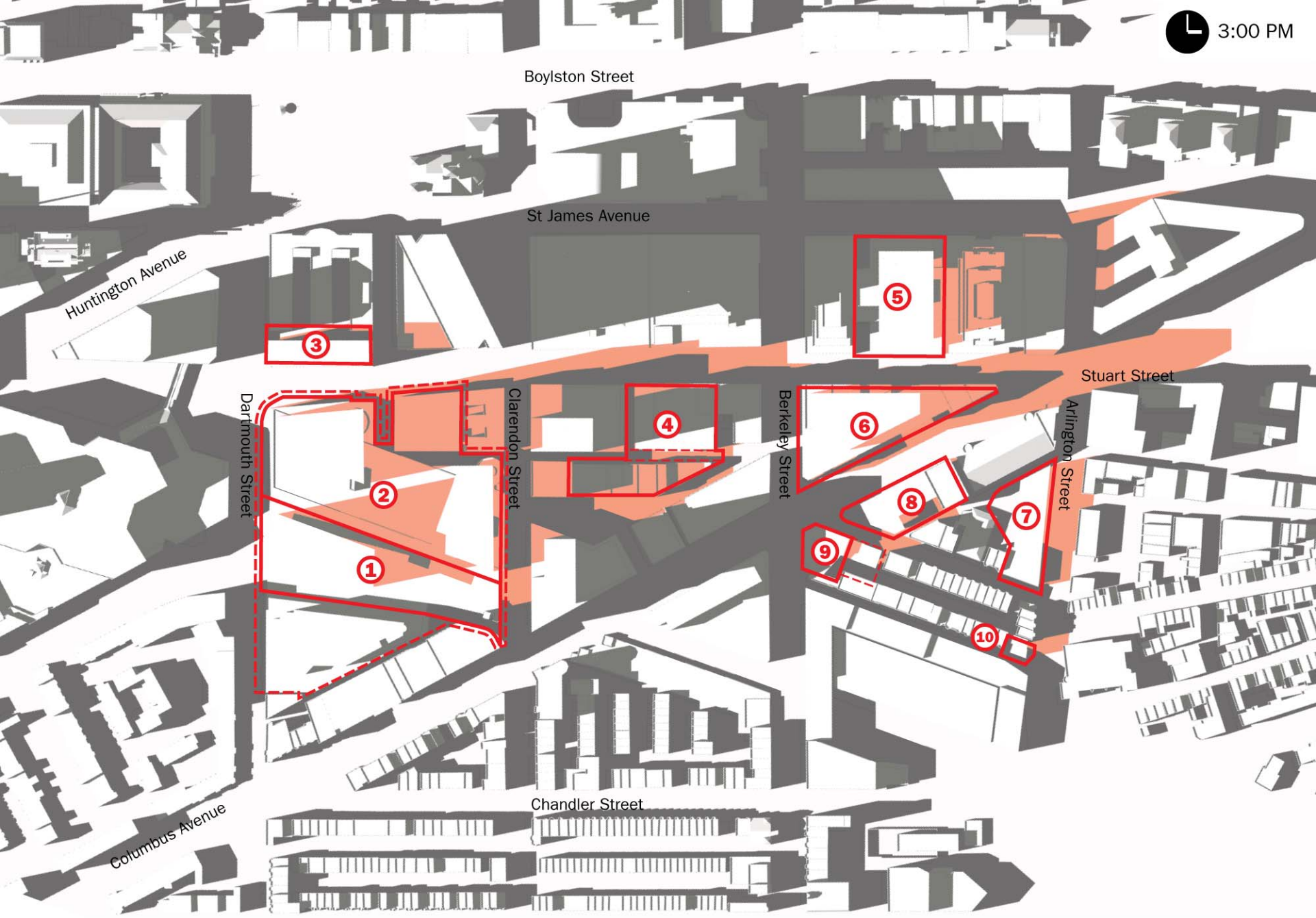




Commercial Development Scenario: March 21 Shadows

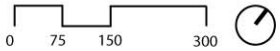
Source: Utile, Inc.



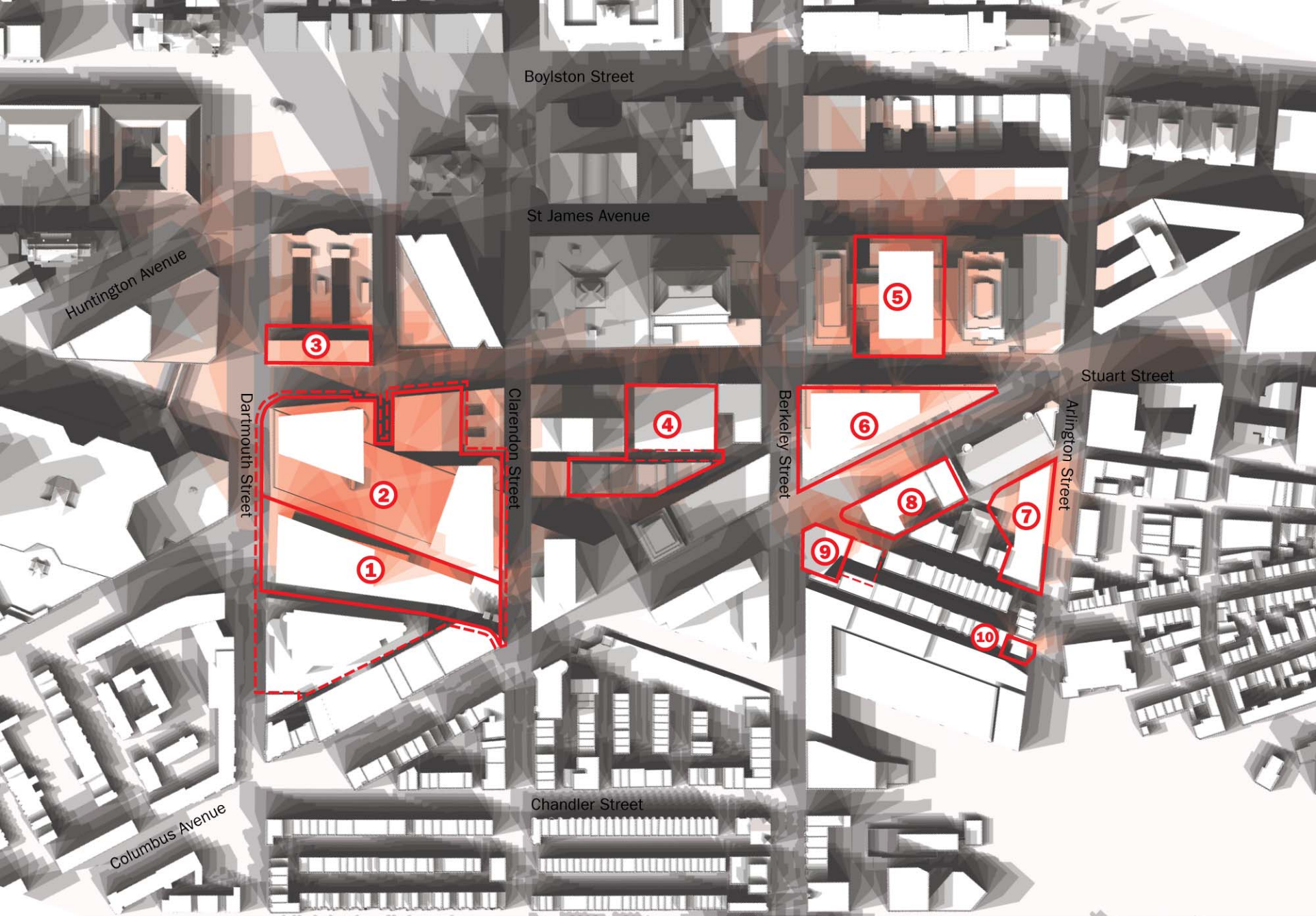


# Commercial Development Scenario: March 21 Shadows

Source: Utile, Inc.

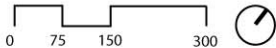






Commercial Development Scenario: March 21 Shadow Composite 9am - 3pm

Source: Utile, Inc.





Residential Development Scenario: March 21 Shadows

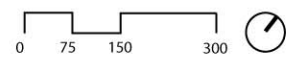
Source: Utile, Inc.

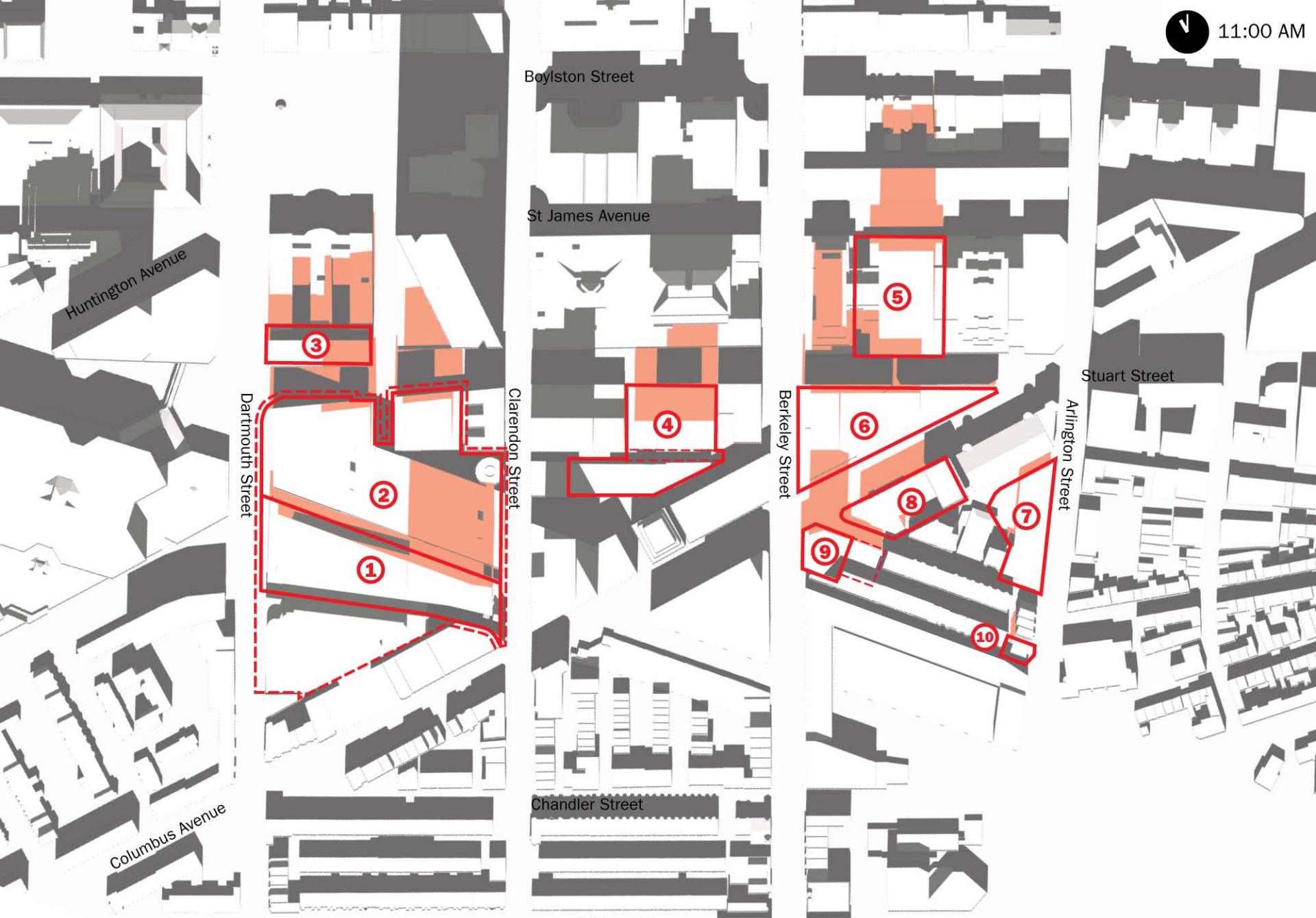




# Residential Development Scenario: March 21 Shadows

Source: Utile, Inc.

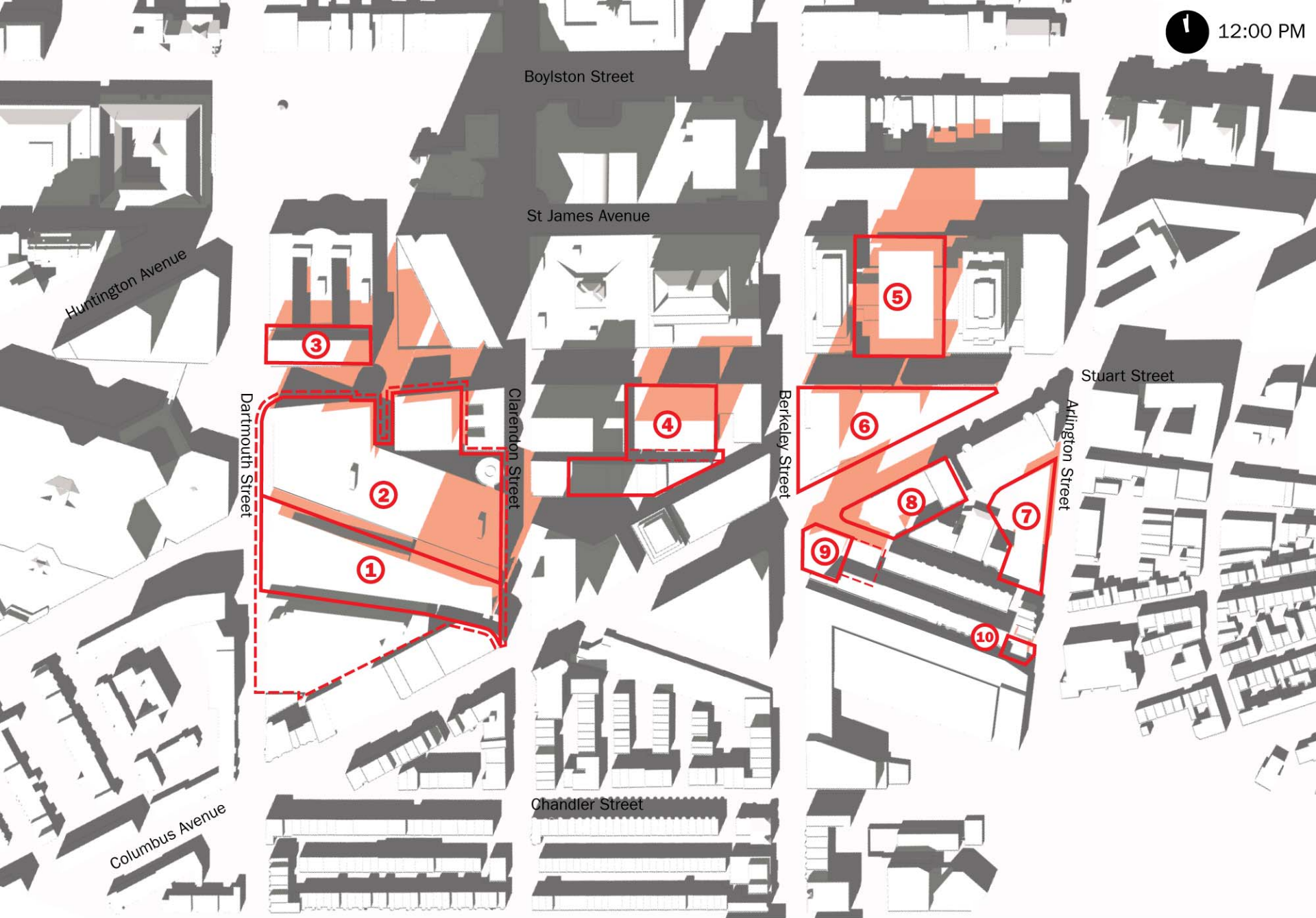




# Residential Development Scenario: March 21 Shadows

Source: Utile, Inc.

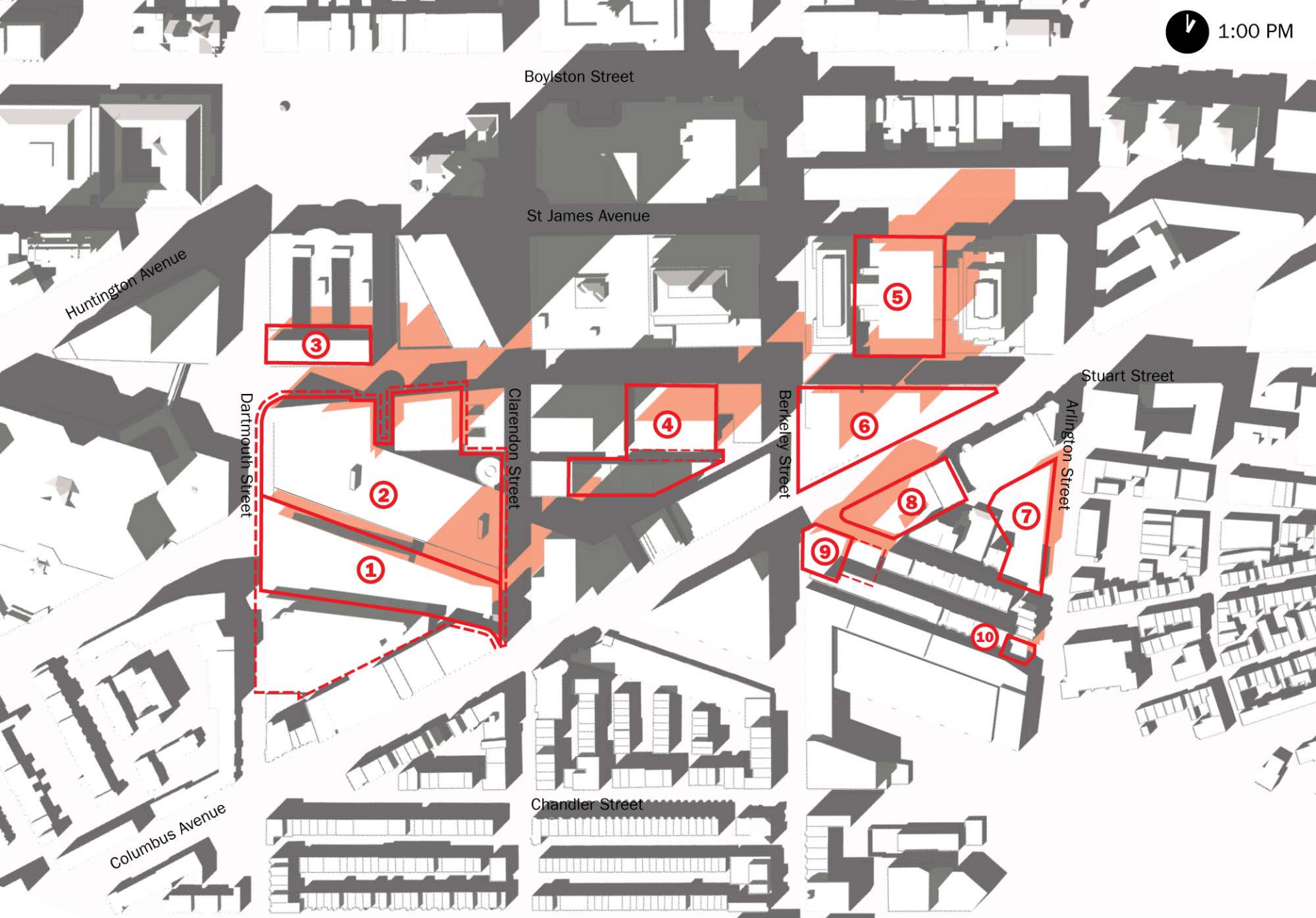




Residential Development Scenario: March 21 Shadows

Source: Utile, Inc.

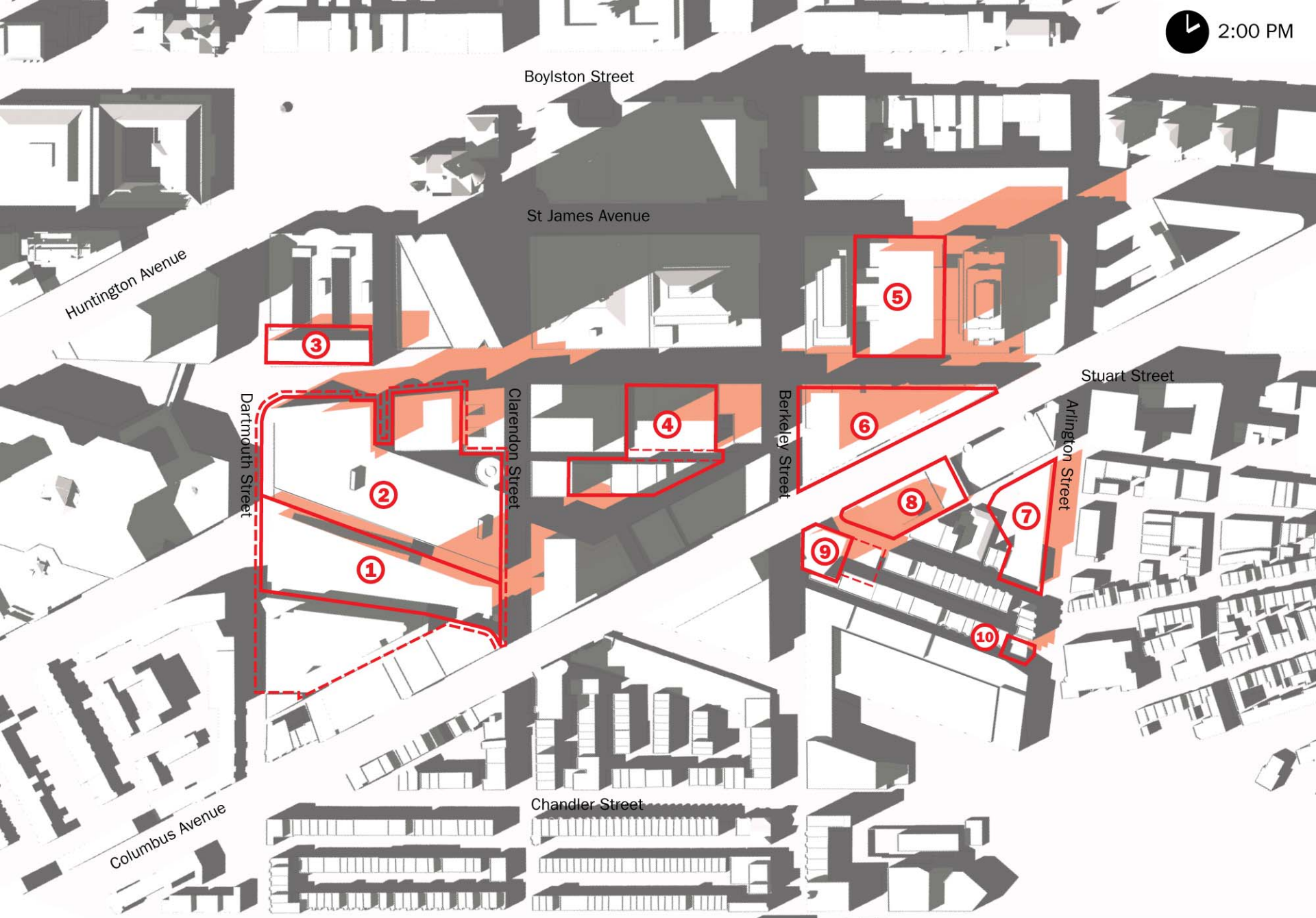




Residential Development Scenario: March 21 Shadows

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Residential Development Scenario: March 21 Shadows

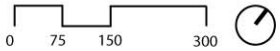
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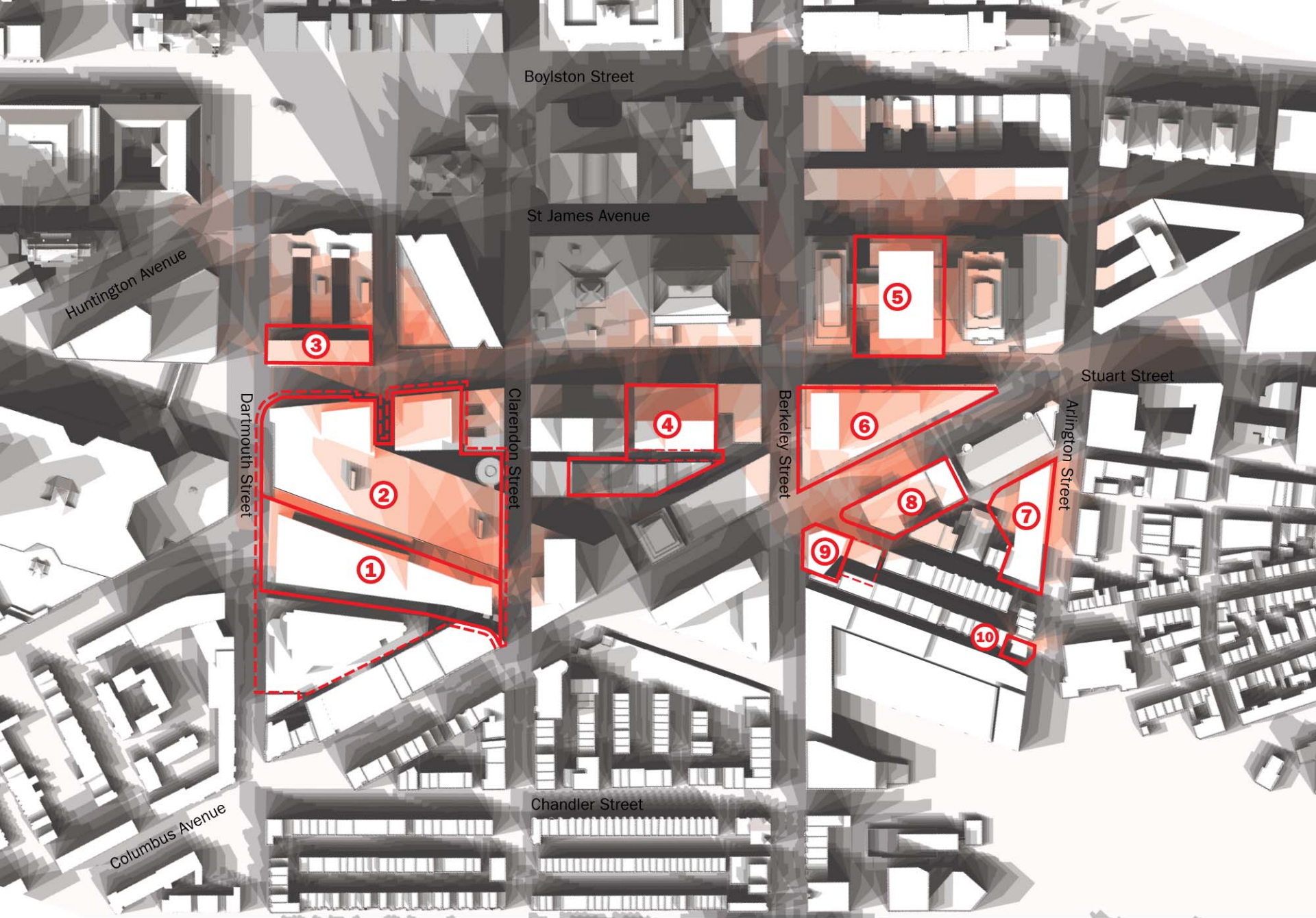


Residential Development Scenario: March 21 Shadows

Source: Utile, Inc.







Boylston Street

St James Avenue

Huntington Avenue

3

5

Dartmouth Street

Clarendon Street

4

Berkeley Street

Stuart Street

Arlington Street

2

6

1

8

7

9

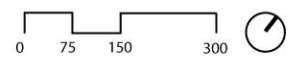
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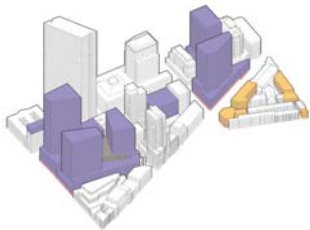
Columbus Avenue

Chandler Street

Residential Development Scenario: March 21 Shadow Composite 9am - 3pm

Source: Utile, Inc.

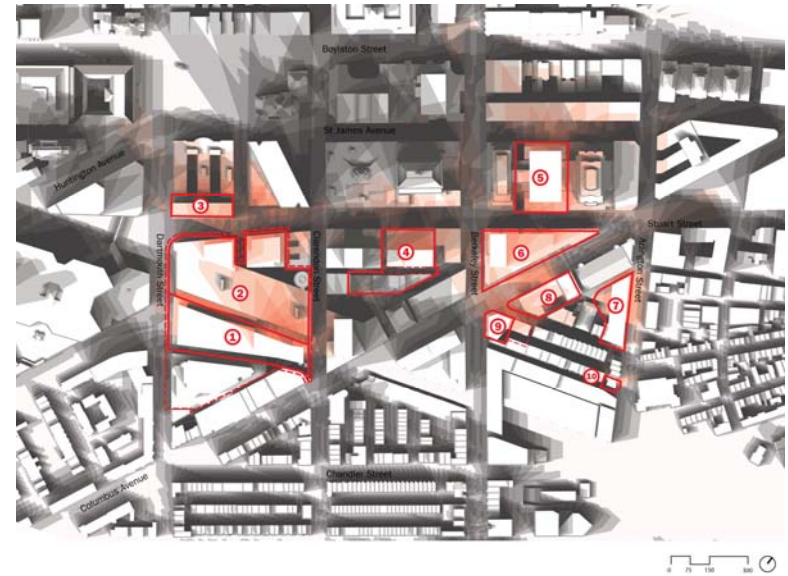




**Commercial Scenario**



**Residential Scenario**





# Site 6 Commercial Scenario: Winter Solstice Shadows

Source: Utile, Inc.





Site 6 Commercial Scenario: Winter Solstice Shadows

Source: Utile, Inc.





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# Site 6 Commercial Scenario: Winter Solstice Shadows

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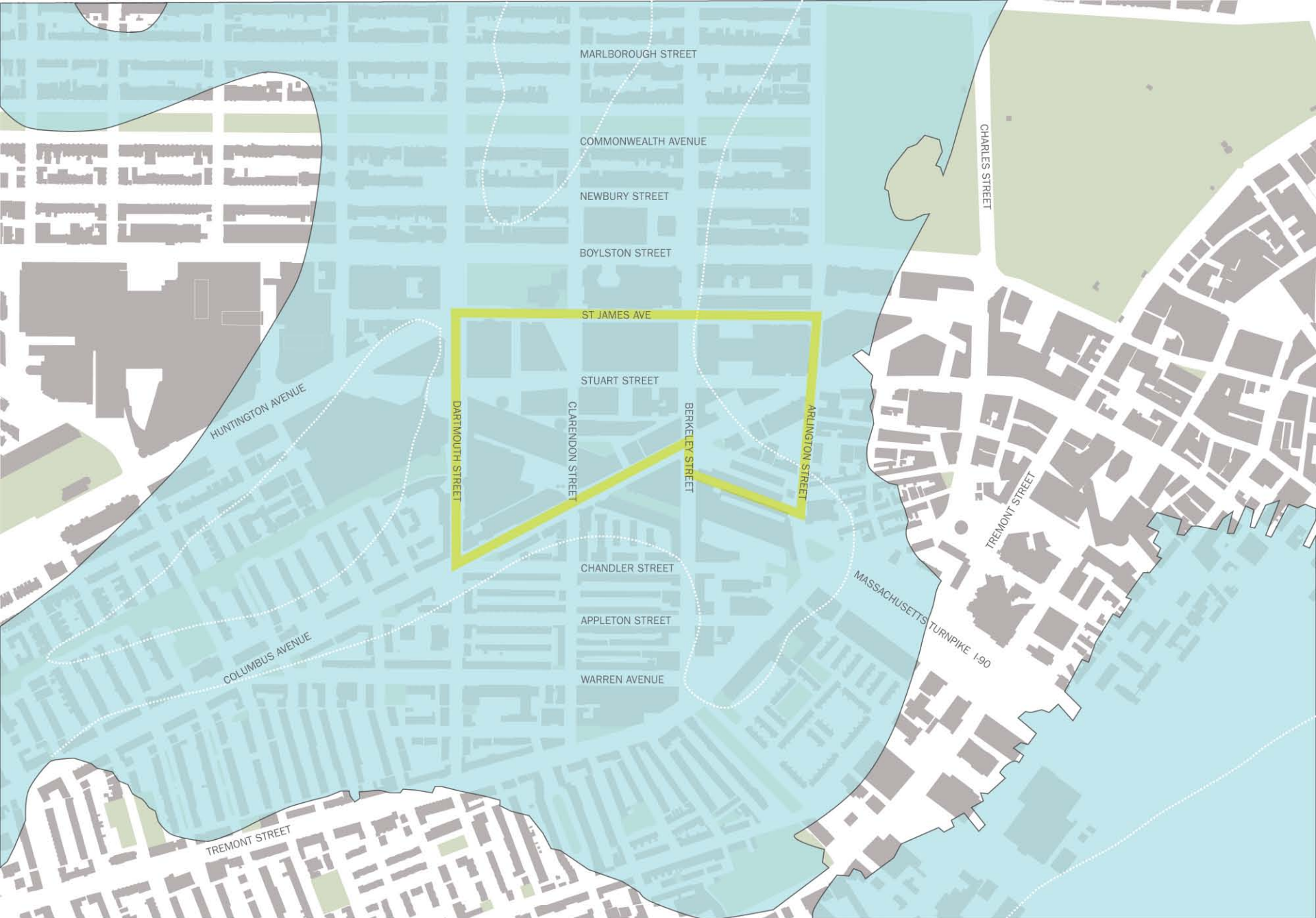
2: Wind

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# 1775 Shoreline

Source: The Boston Atlas; Reference: LC Maps of North America, 1750-1789, 911





MARLBOROUGH STREET

COMMONWEALTH AVENUE

NEWBURY STREET

BOYLSTON STREET

ST JAMES AVE

STUART STREET

CLARENDON STREET

CHANDLER STREET

APPLETON STREET

WARREN AVENUE

CHARLES STREET

DARTMOUTH STREET

BERKELEY STREET

ARLINGTON STREET

TREMONT STREET

MASSACHUSETTS TURNPIKE I-90

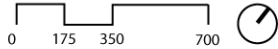
HUNTINGTON AVENUE

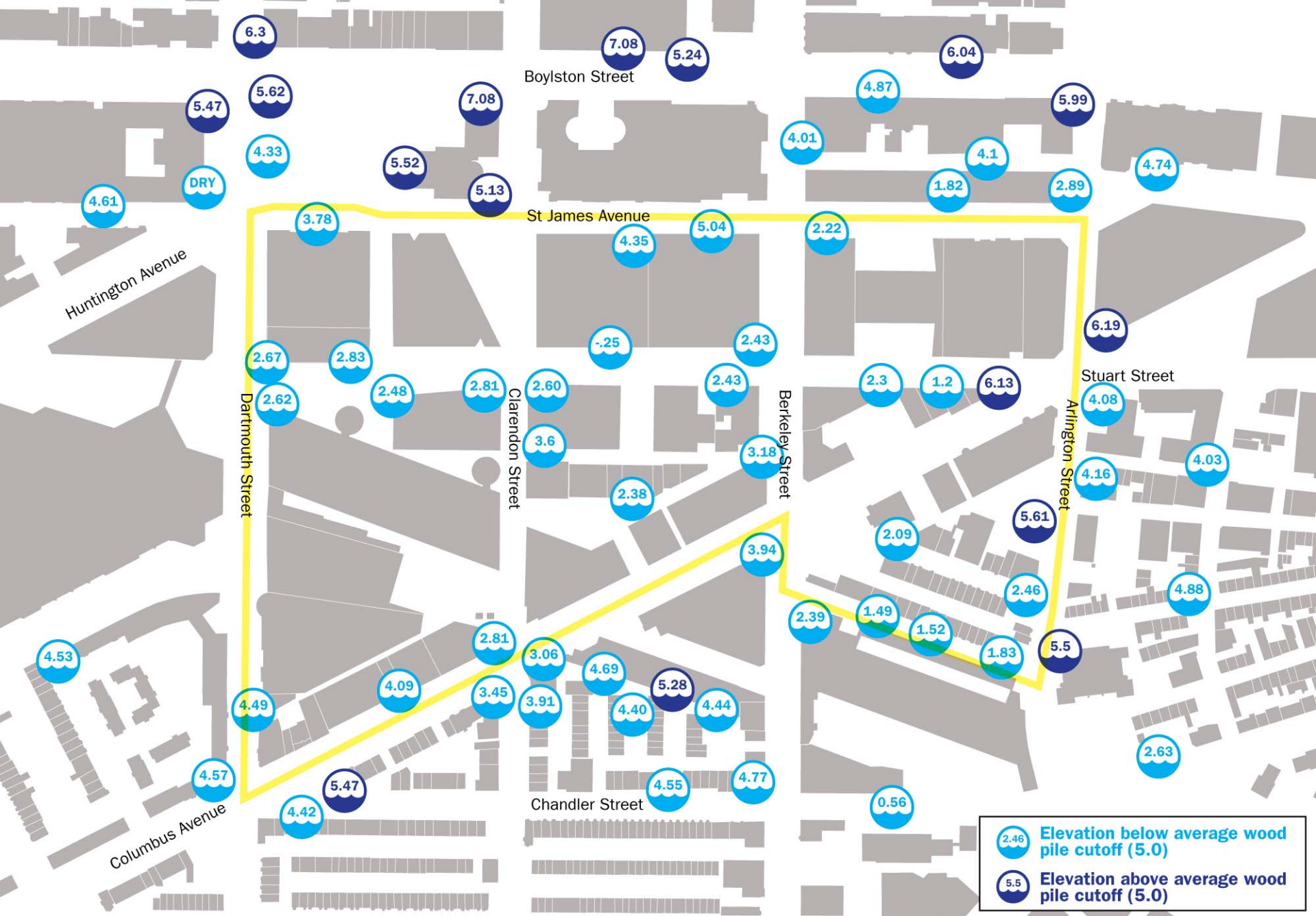
COLUMBUS AVENUE

TREMONT STREET

# Groundwater Conservation Overlay District

Source: Boston Zoning Code





December 2007 Groundwater Elevations (referenced to Boston City Base datum - feet)

Source: Boston Groundwater Trust



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**01** Best-practices research

**02** Draft form-based code recommendations

**03** Final form-based code recommendations