Volpe Working Group May 3, 2017

Community Development Department

CAMBRIDGE
CDD@344
COMMUNITY DEVELOPMENT DEPARTMENT
344 Broadway

Agenda

1. **Climate, Energy, & Environment**

   Presentation & Discussion

2. **Transportation**

   Presentation & Discussion

3. **Housing**

   Presentation & Discussion

Meeting Goals

- What outcomes should the Volpe redevelopment aim to achieve?
- How do these issues relate to the urban design principles that we have discussed?

Climate, Energy, & Environment

K2 Strategy and Vision (2013)

- Improve building energy performance
- Prevent urban heat gain
- Reduce reliance on automobiles
- Reduce stormwater runoff
- Increase use of renewable energy and/or district energy
- **Go beyond existing approaches to sustainability**

Climate, Energy, & Environment

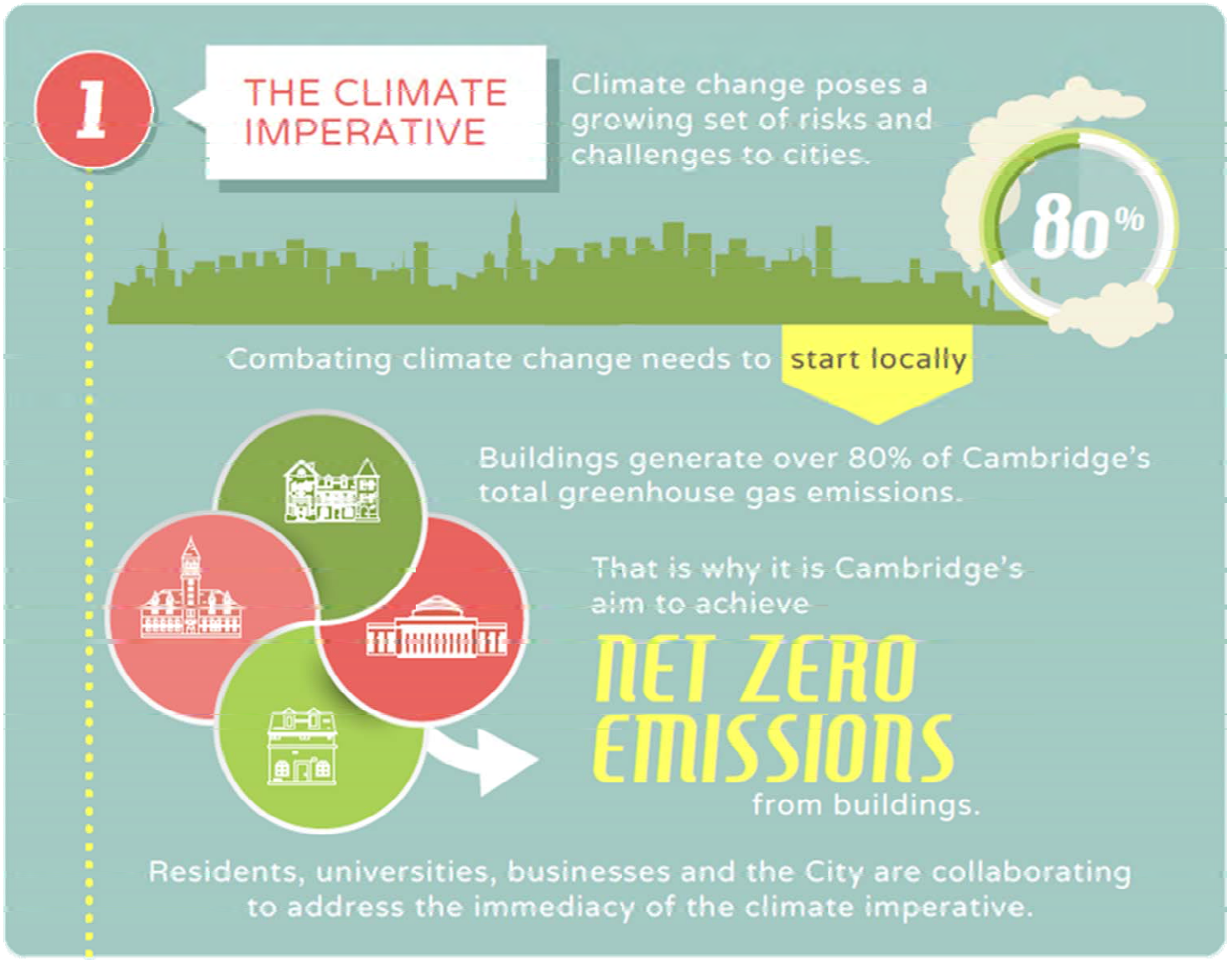
The Bigger Picture

- Getting to “Net Zero”
- Climate Change Vulnerability
- Stormwater and Infrastructure

*In the spring of 2016, the City of Cambridge achieved the highest rating in the country from **STAR Communities** for its leadership in sustainability.*

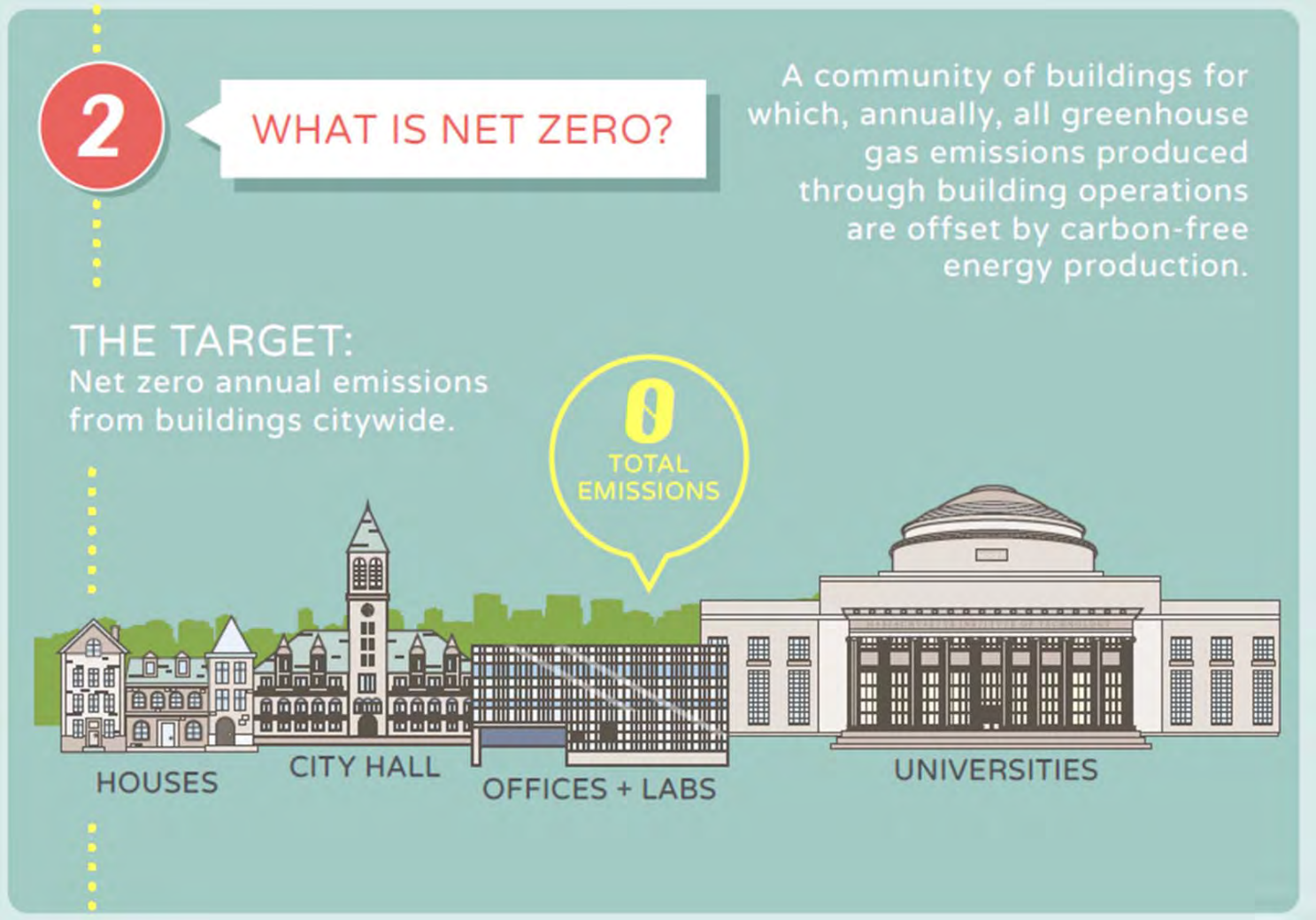
Climate, Energy, & Environment

Getting to Net Zero



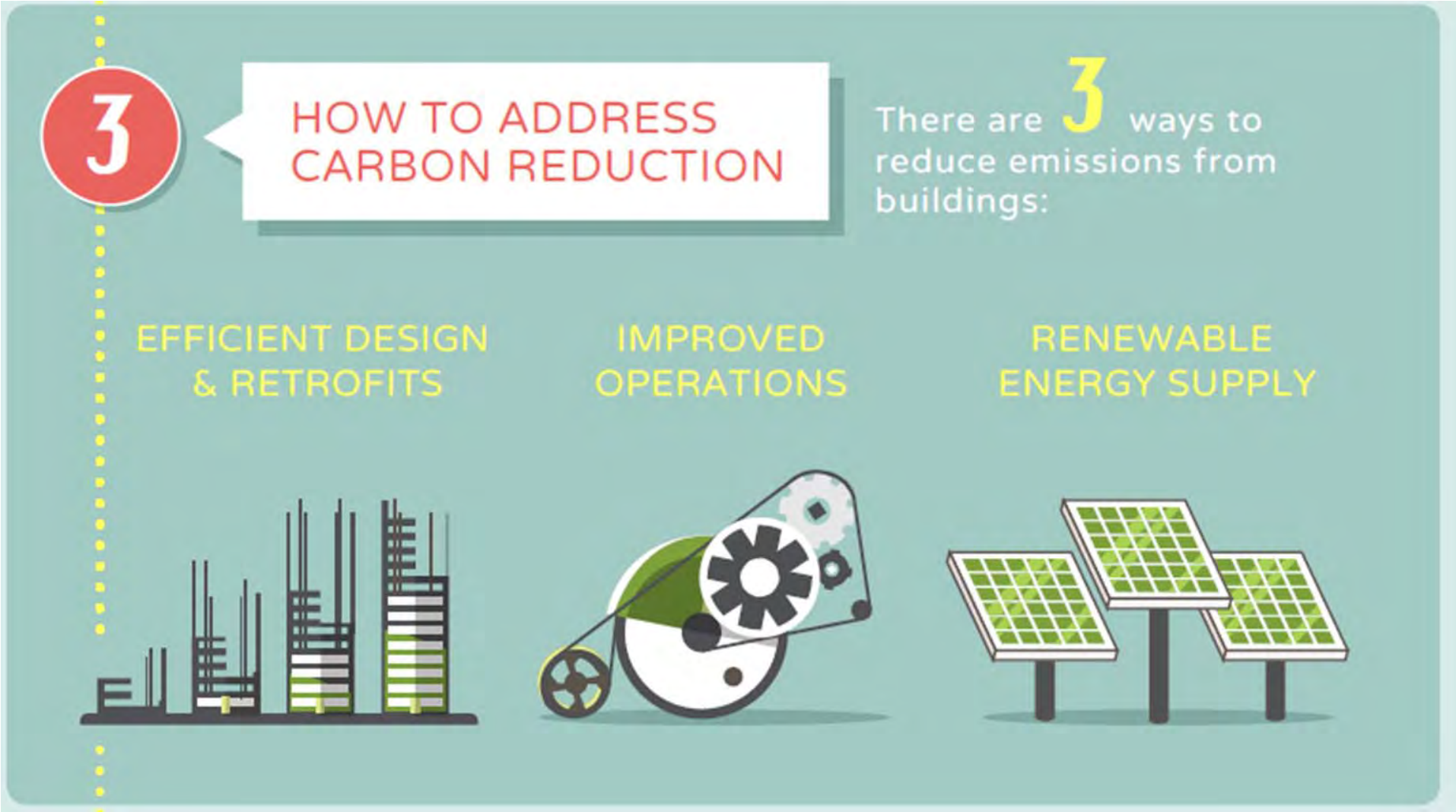
Climate, Energy, & Environment

Getting to Net Zero



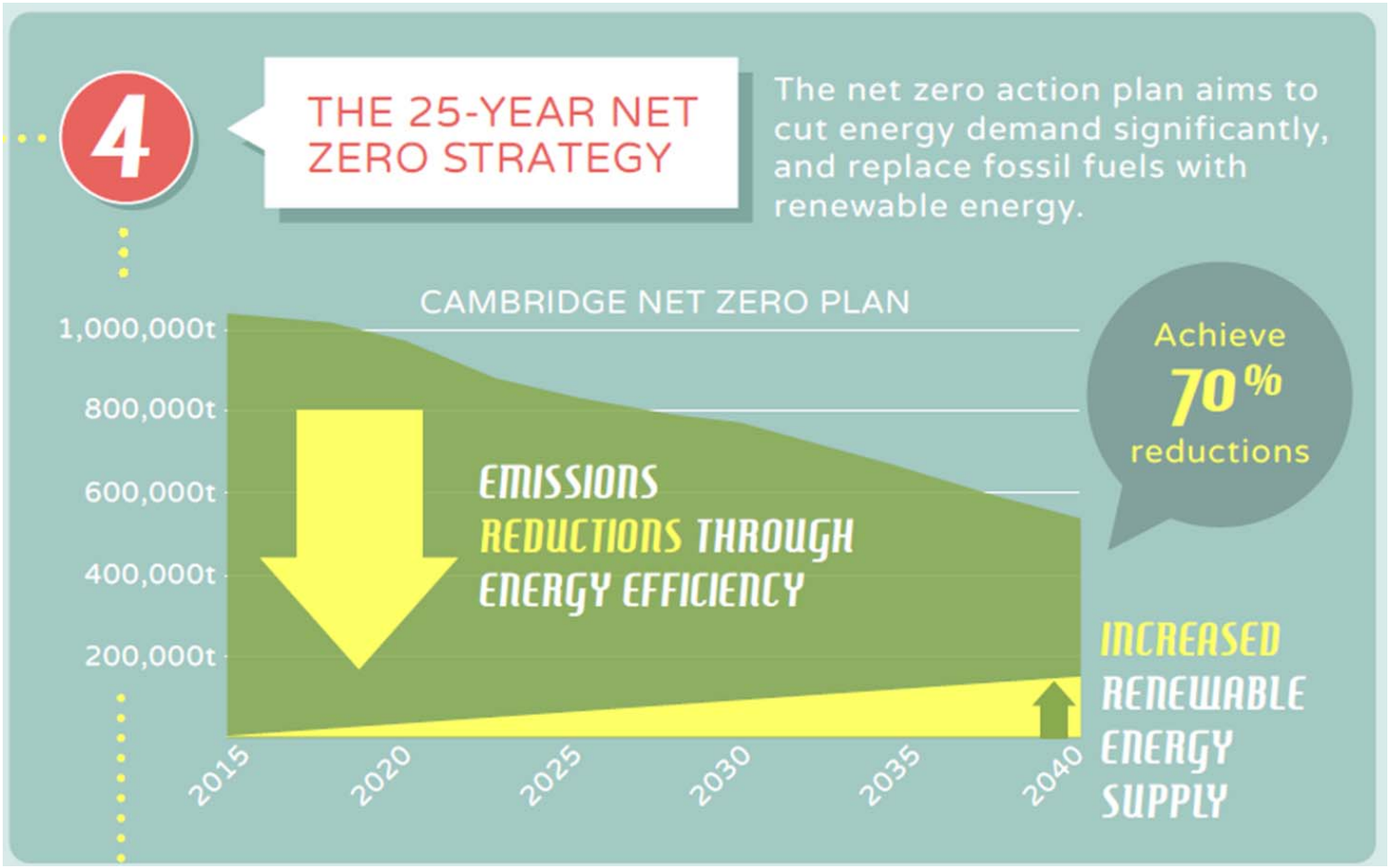
Climate, Energy, & Environment

Getting to Net Zero



Climate, Energy, & Environment

Getting to Net Zero



Climate, Energy, & Environment

Getting to Net Zero

Targets for Net Zero New Construction by Sector

Type:	Municipal	Residential	Multi-Family	Commercial	Institutional	Labs
Target Year:	2020	2022	2025	2025	2025	2030

Implementation Strategies for New Construction:

- Citywide LEED Gold Standard
- Prioritize Optimize Energy and Enhanced Commissioning
- Building Energy Use Disclosure Ordinance (BEUDO) requirements
- Rooftop “Solar Ready” design standard
- Required “Pathway to Net Zero”
- Removal of barriers to increased insulation

Climate, Energy, & Environment

Getting to Net Zero

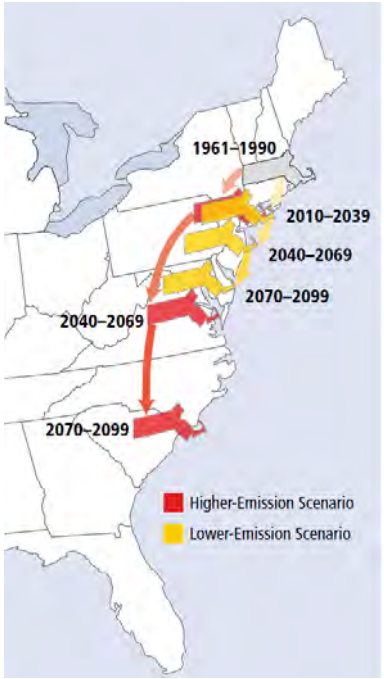
Beyond Design/Development Standards:

- Optimizing solar orientation in site design
- District Energy Approaches (e.g., shared solar, microgrids, cogeneration, utilizing existing steam system)
- EcoDistricts (KSA collaboration)
- Low Carbon Energy Supply (City study underway)

Climate, Energy, & Environment

Climate Change Vulnerability

Temperature



Precipitation

More extreme events

Sea Level Rise (SLR)

Cambridge is more vulnerable to **increasing heat and precipitation-driven flooding** in the near future than to sea level rise and coastal storm surges.

Alewife is likely to be the first of Cambridge neighborhoods **to experience SLR/SS flooding** as early as 2045.

Climate, Energy, & Environment

Temperature Projections

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

1971 - 2000
(Baseline)

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

2015 - 2044
(2030)

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
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10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

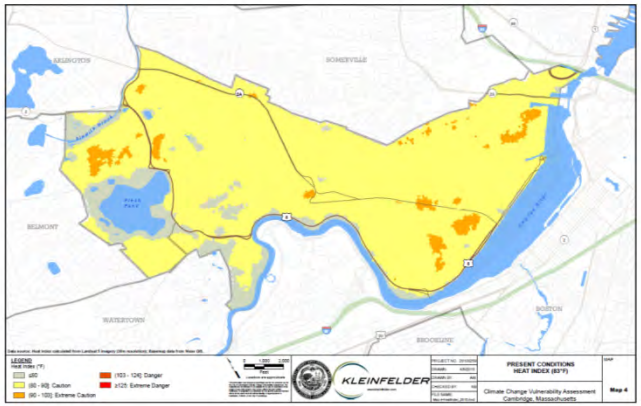
2055 - 2084
(2070)

Above 90°F - Low Scenario Above 90°F - High Scenario Above 100°F - Low Scenario High 100°F - High Scenario

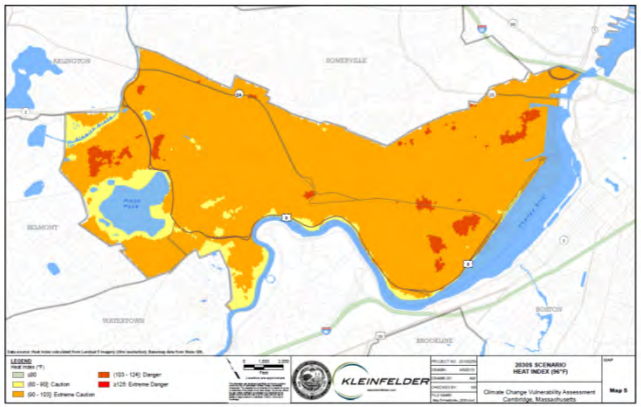
*Summer is considered to be the 91 days of June through August

Climate, Energy, & Environment

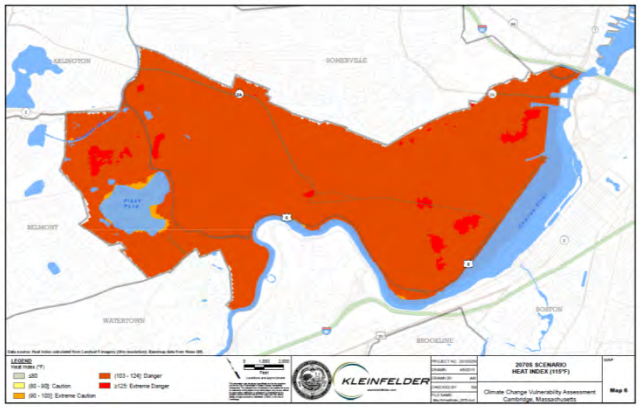
Heat Index



Present Conditions
Heat Index (83°F)



2030s Scenario
Heat Index (96°F)

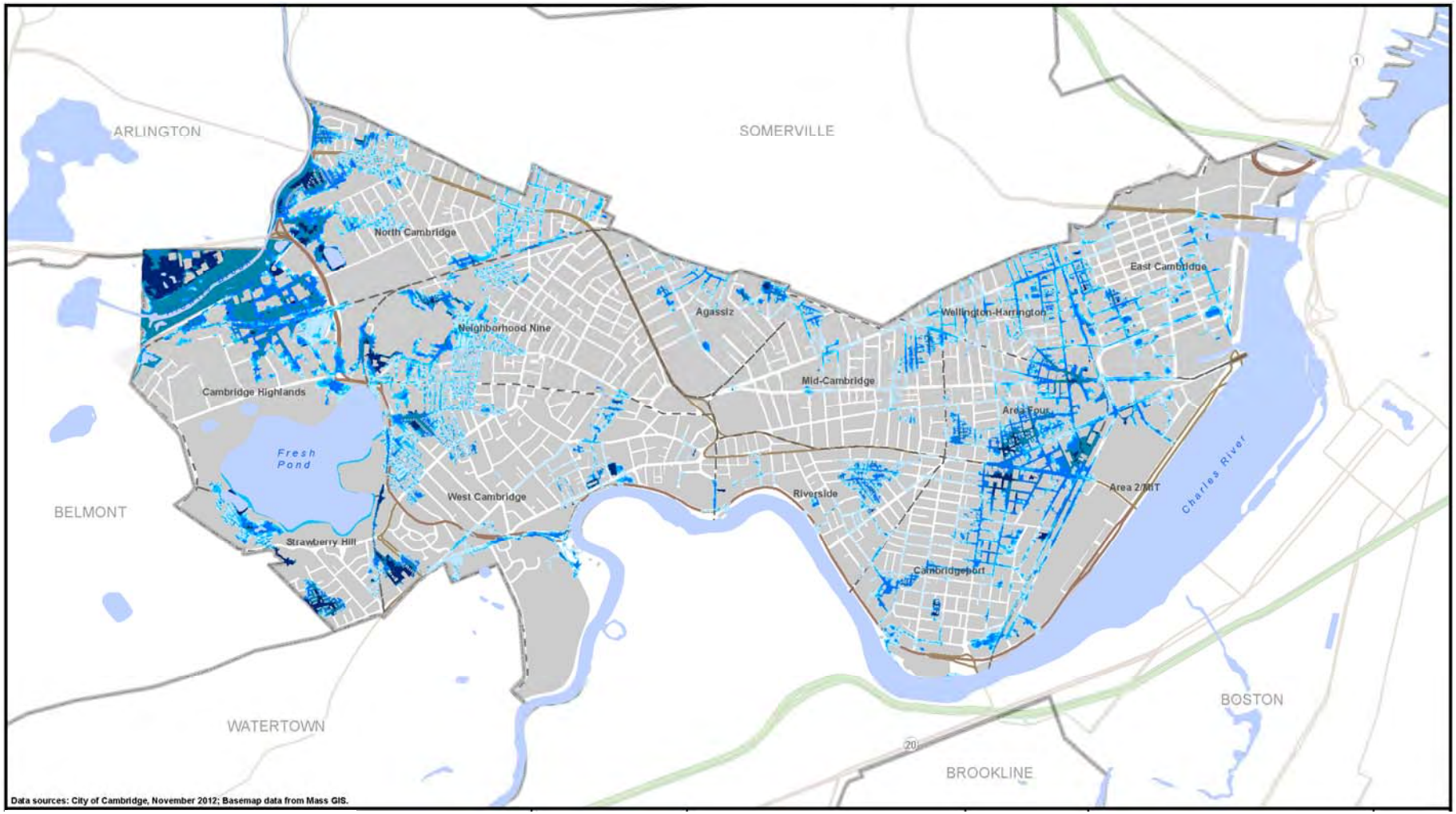


2070s Scenario
Heat Index (115°F)

Climate, Energy, & Environment

Flooding from Precipitation

2070 Projections – 100-Year (1%) Flood Scenario



Kleinfelder, for City of Cambridge

Climate, Energy, & Environment

Sea Level Rise and Storm Surge Flooding

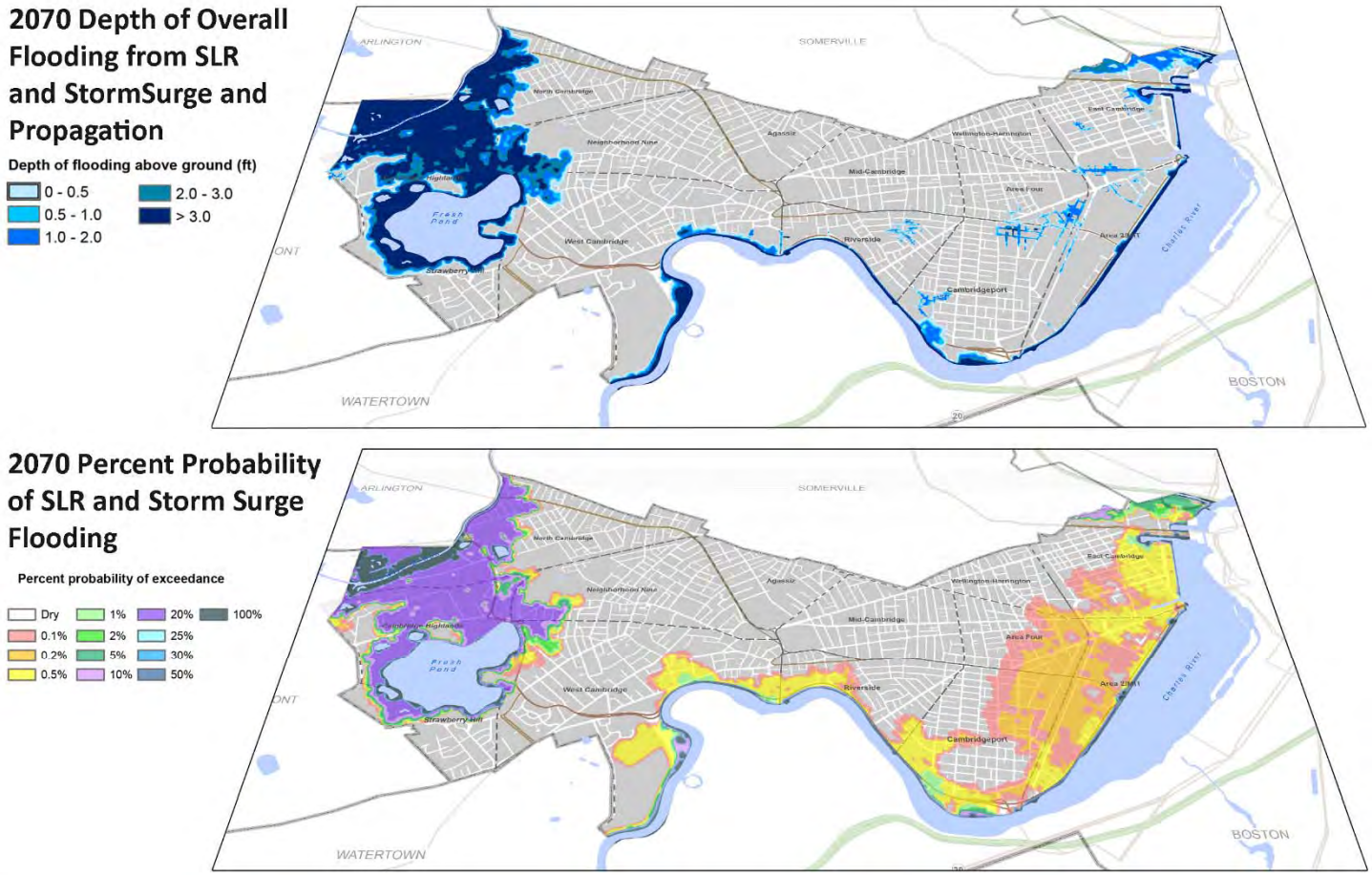
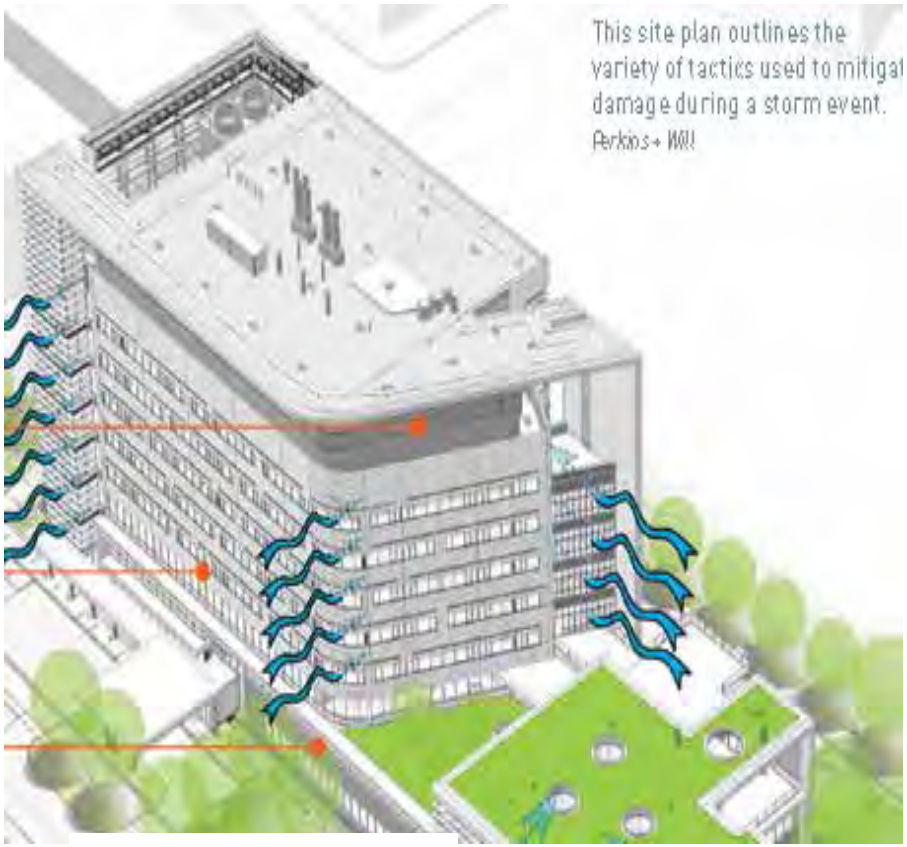


Fig. 9 Top map: **2070 Depth of Flooding from SLR and Storm Surge at 0.1% Probability** Bottom map: **2070 Percent Probability of Sea Level Rise and Storm Surge Flooding** (Source: Kleinfelder, February 2017, based on WHG MassDOT Boston Harbor Flood Risk Model)

Climate, Energy, & Environment

Resilient Building Design

- Protecting critical building systems (e.g., elevating)
- Maintaining on-site energy, water (e.g., backup systems)
- Ensuring occupant safety and comfort during a flood event (e.g., operable windows)
- Recovering after a flood event



Spaulding Hospital, Boston

Cambridge DPW Standards:

- Build/Protect to the 2070 10% annual flood risk elevation
- Recover from the 2070 1% annual flood risk elevation

Managing Water with Infrastructure

DPW Requirements

- *Stormwater:* Manage quantity and quality through on-site storage and treatment
- *Sanitary Sewage:* Mitigate impacts by removing a proportional amount of stormwater from the City's overburdened combined sewer system
  - Typically a 4:1 ratio ("I/I removal")

Climate, Energy, & Environment

Managing Water with Infrastructure

Typical Stormwater Mitigation for New Buildings

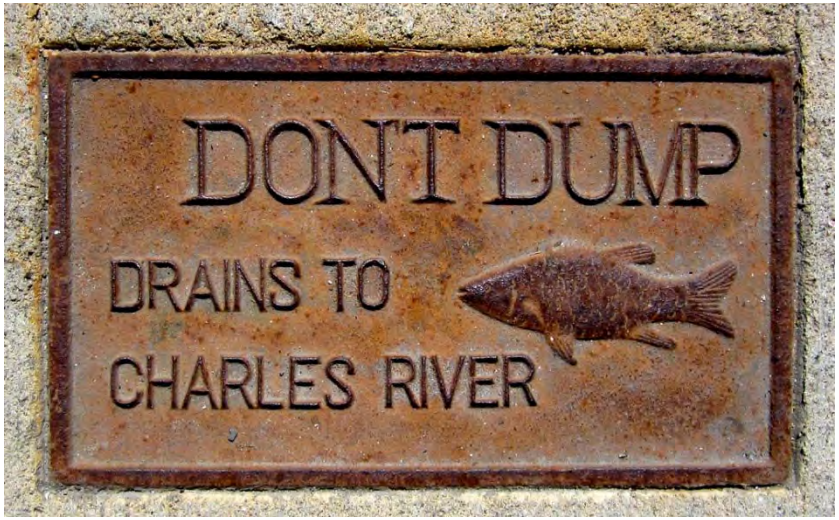
- Traditional underground, “hidden” infrastructure
- Utilitarian, no ancillary community benefits
- Costly and disruptive to construct/maintain

Climate, Energy, & Environment

Managing Water with Infrastructure

Low Impact Development (LID) Techniques

- Replicate natural hydrologic functions (infiltration, vegetative uptake, evapotranspiration)
- More “naturally” improve stormwater quality/reduce quantity prior to discharge



Climate, Energy, & Environment

Managing Water with Infrastructure

District-Wide Approach

- Holistic design integrating stormwater, open space, transportation
- Multifunctional infrastructure
- Public amenities
- Heat island mitigation
- Visible showcase for environmental commitment

Richard Burck Associates, *Connect Kendall Square* proposal (2015)

Climate, Energy, & Environment

Managing Water with Infrastructure

Precedents

Stata Center, MIT

NorthPoint Common

Alewife Stormwater Wetland, City of Cambridge

Climate, Energy, & Environment

Questions:

- What are the opportunities to further the City's climate & energy goals in the Volpe redevelopment?

- How do the City's climate & energy goals align with the urban design principles that have been discussed?

Transportation

K2 Strategy and Vision (2013)

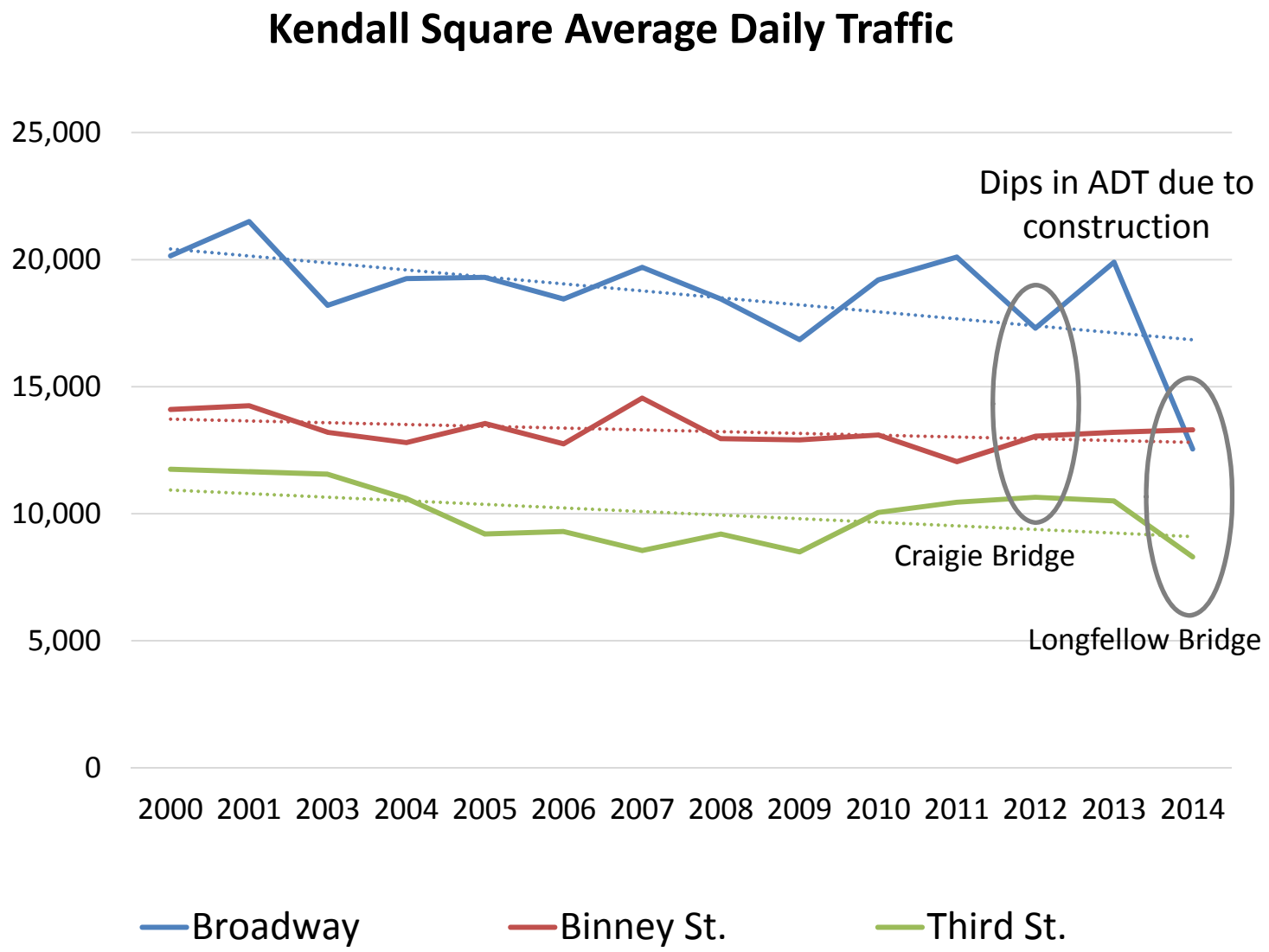
- Reduce Drive-Alone Rates ("Mode Share")
- Improve Vehicular Traffic Management
- Enhance Pedestrian and Bicycle Pathway Network
- Enhance Transit Options

Transportation

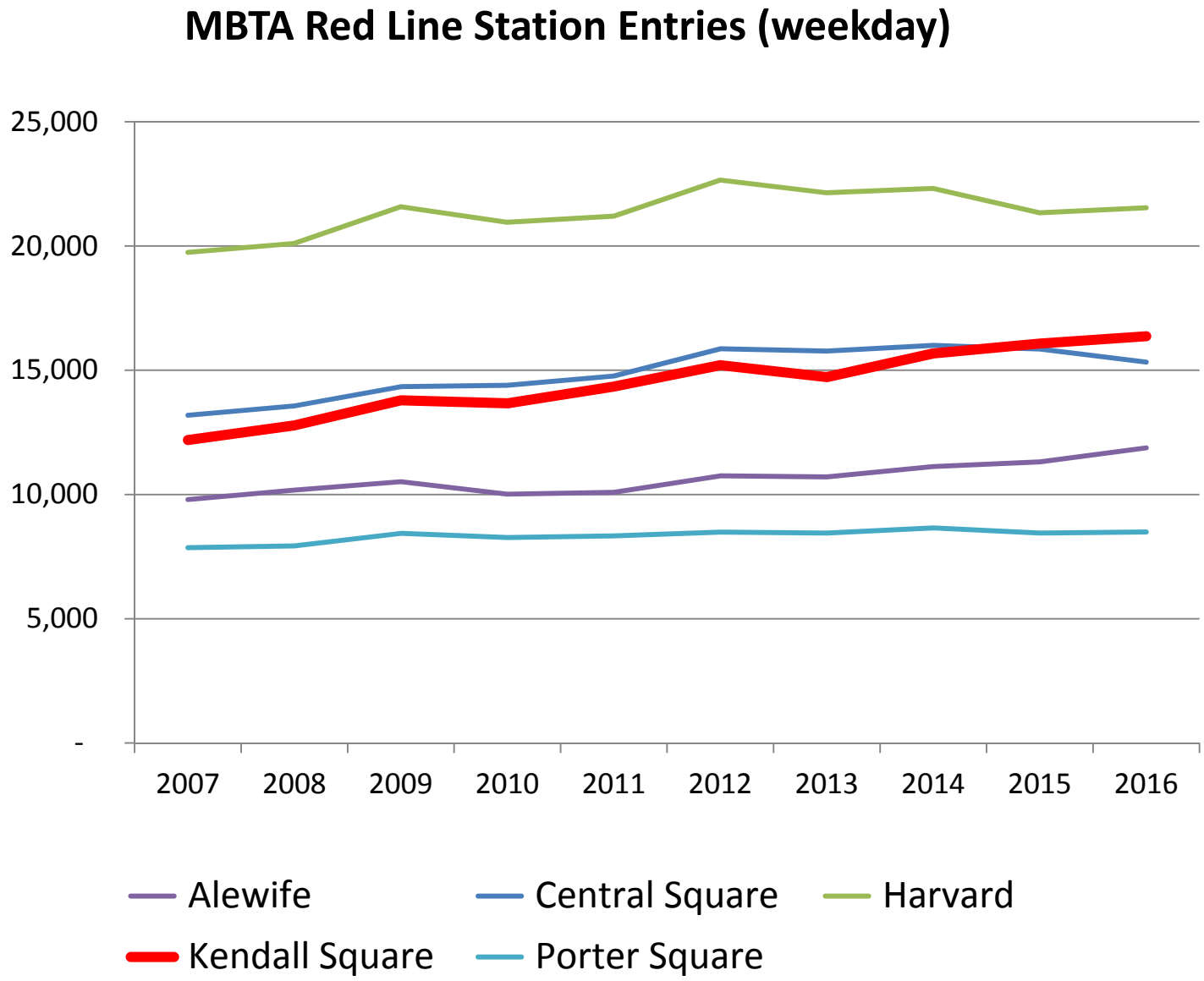
The Bigger Picture

- Current and future transportation patterns in Kendall Square
- Planning tools
- Kendall Square Mobility Task Force (KSMTF) recommendations
- Bicycle Network Vision and Binney Street Redesign Process

Transportation



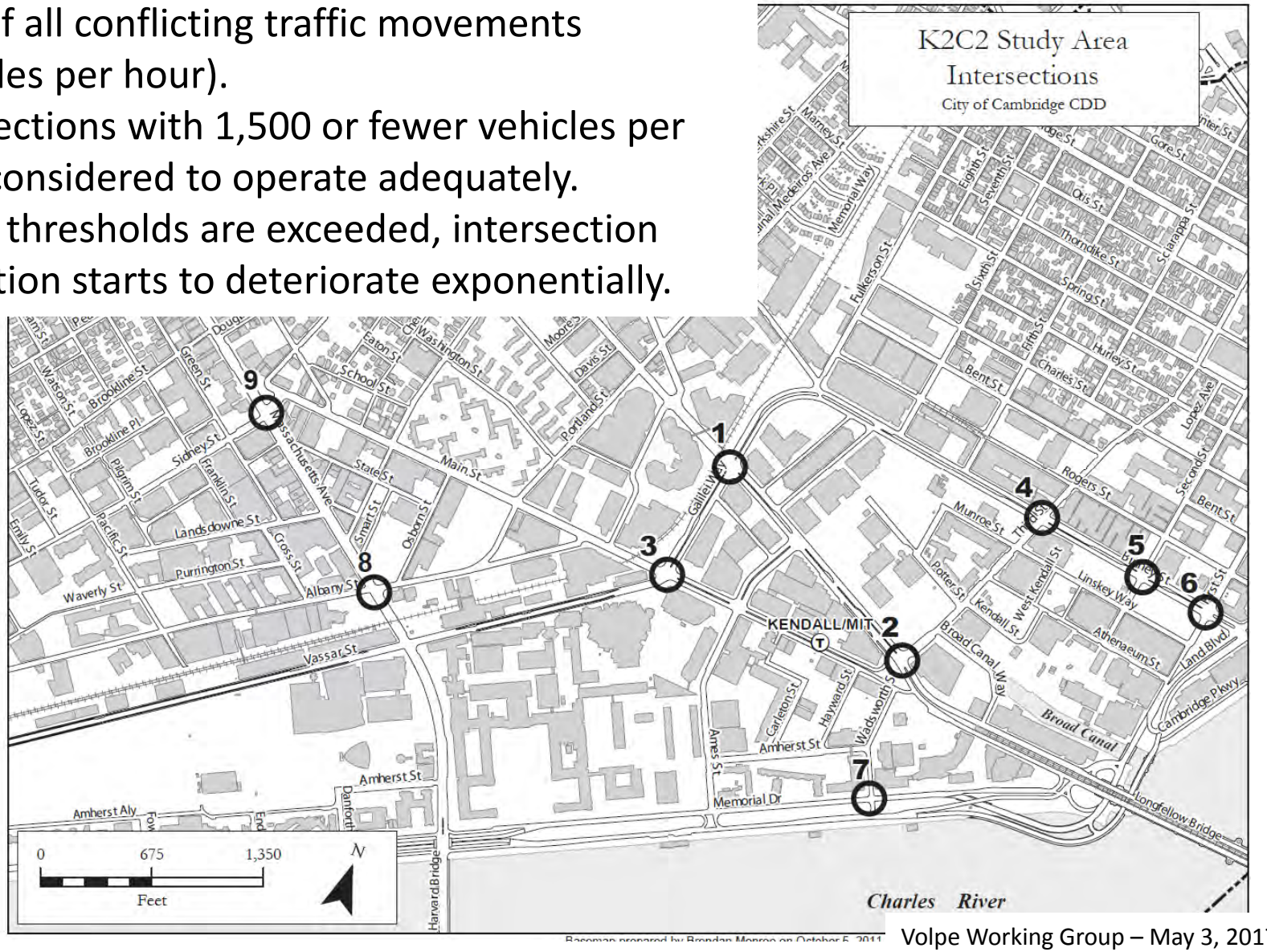
Transportation



Transportation

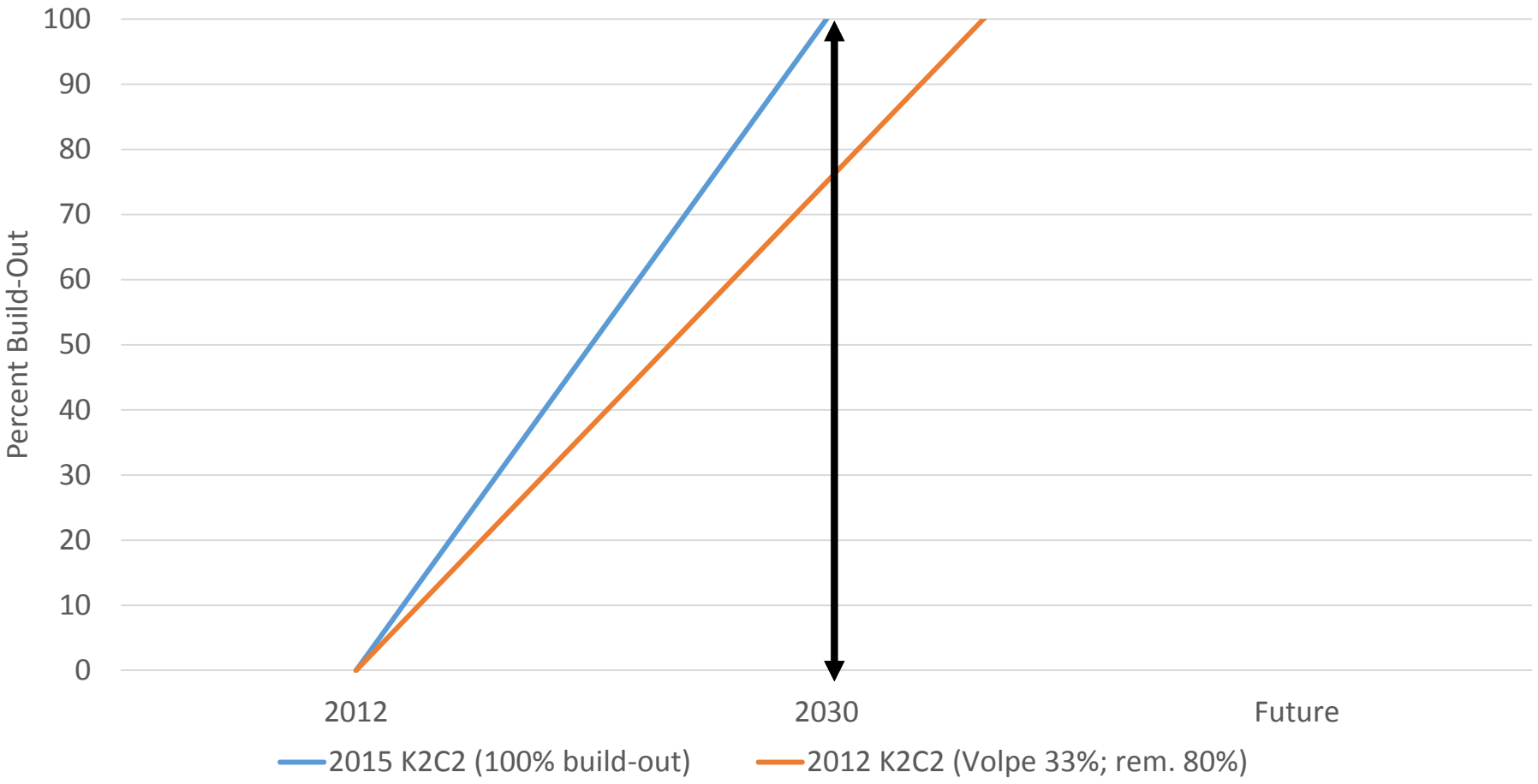
Critical Sums Analysis

- Sum of all conflicting traffic movements (vehicles per hour).
- Intersections with 1,500 or fewer vehicles per hour considered to operate adequately.
- When thresholds are exceeded, intersection operation starts to deteriorate exponentially.

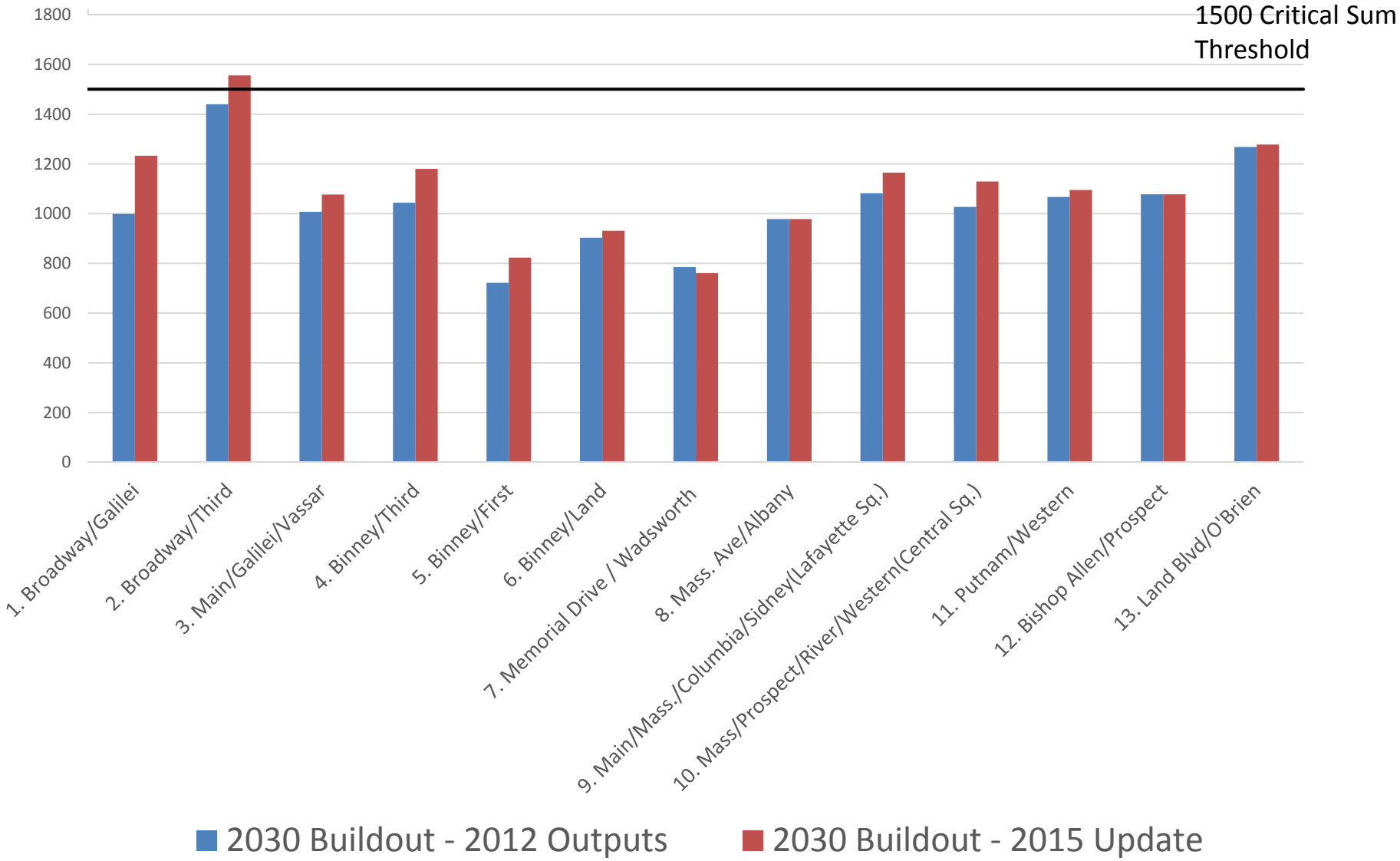


Transportation

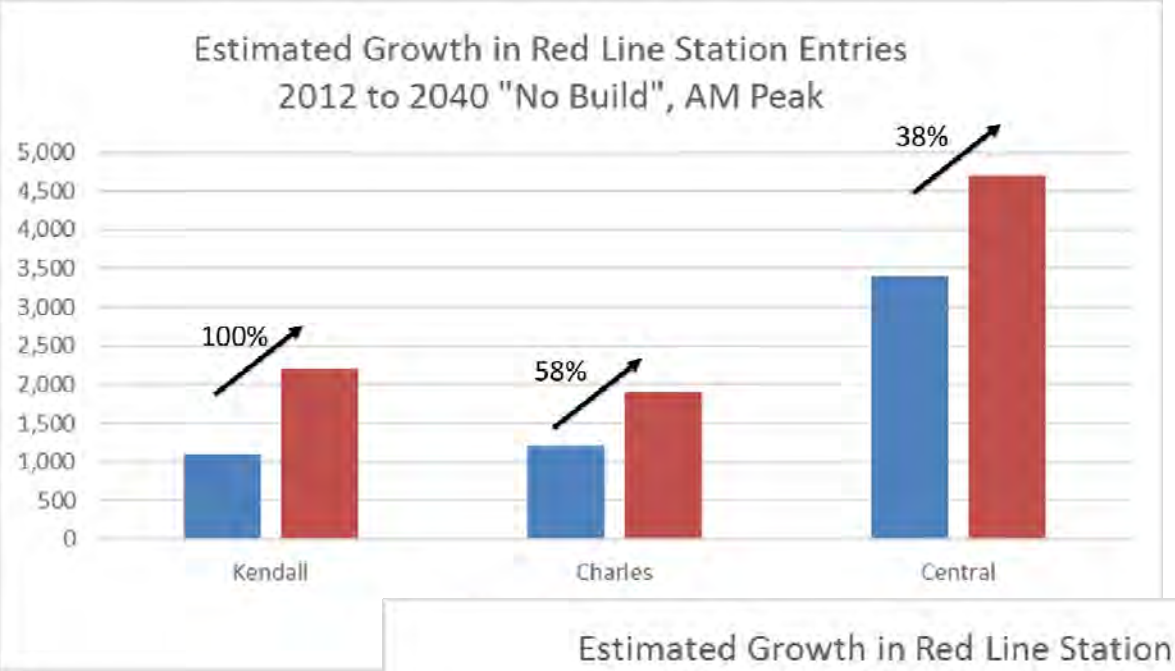
Critical Sums Analysis – Updated Scenario 2015



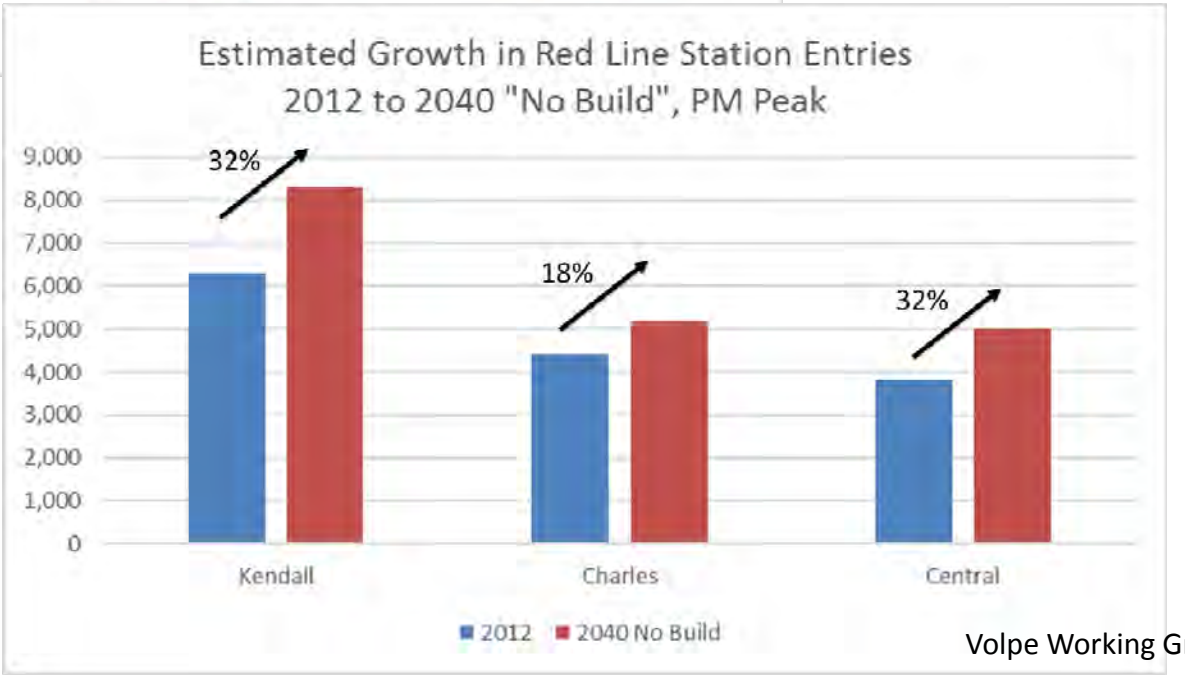
Transportation



Transportation



Note: The "No Build" scenario uses projected growth in the area but includes no transit improvements other than the Green Line Extension



Transportation

Key Takeaways

- Sensitive intersection at Broadway/Third
- Continued implementation of parking supply/demand management and mitigation strategies
- **Importance of investing in transit, bicycling, and walking as main modes of transportation**

Transportation

Planning Tools: Regulation

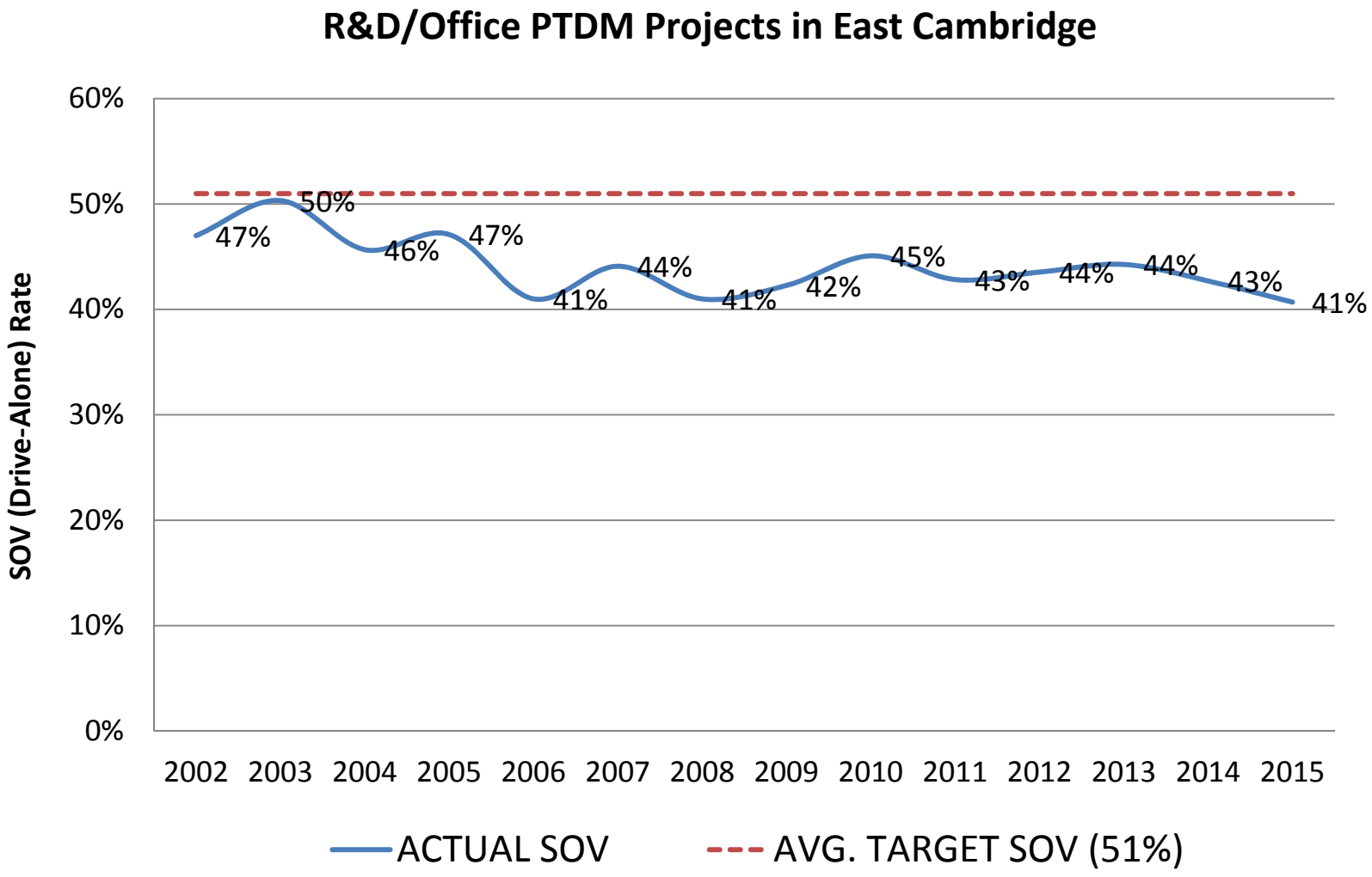
- **Managing Supply:** Maximum Parking Ratios, Shared Use Parking

Use	Auto Parking	
	Minimum	Maximum
R&D	Based on analysis	0.8 sp/1000 sq. ft.
Office		0.9 sp/1000 sq. ft.
Retail/consumer service		0.5 sp/1000 sq. ft.
Residential	0.5 sp/du	0.75 sp/du

- **Managing Demand:** Parking and Transportation Demand Management (PTDM) Ordinance, TDM Programs
  - Subsidized transit use
  - Bicycle/pedestrian amenities
  - Removing "hidden subsidy" of driving/parking

Transportation

PTDM Ordinance



Transportation

Planning Tools: Investment

Infrastructure Improvements:

- Main Street & Broadway (completed by City)
- Ames Street Cycle Track (required for MIT/Kendall Development)
- Sixth Street Pedestrian/Bicycle Improvements (required for Boston Properties Development)

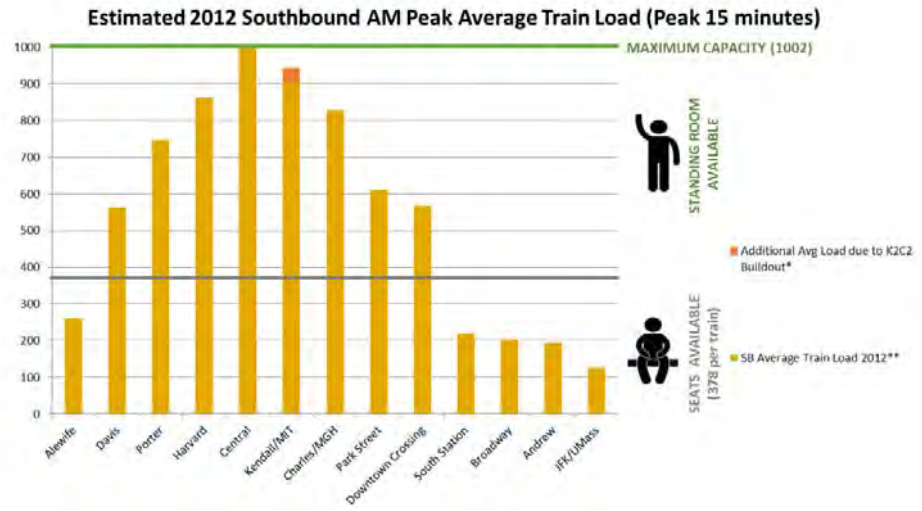
Transit Investment:

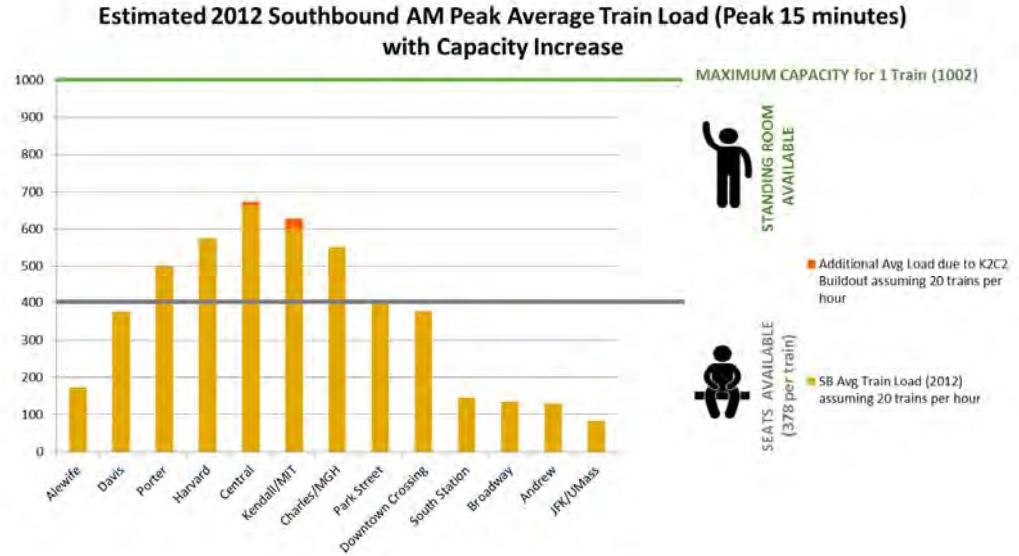
- Kendall Square Transit Enhancement Program (KSTEP) – funding for future public transit improvements (MBTA, MassDOT, City)

Additional investment priorities were a focus of Kendall Square Mobility Task Force (KSMTF) work

Transportation

KSMTF: Red Line Improvements



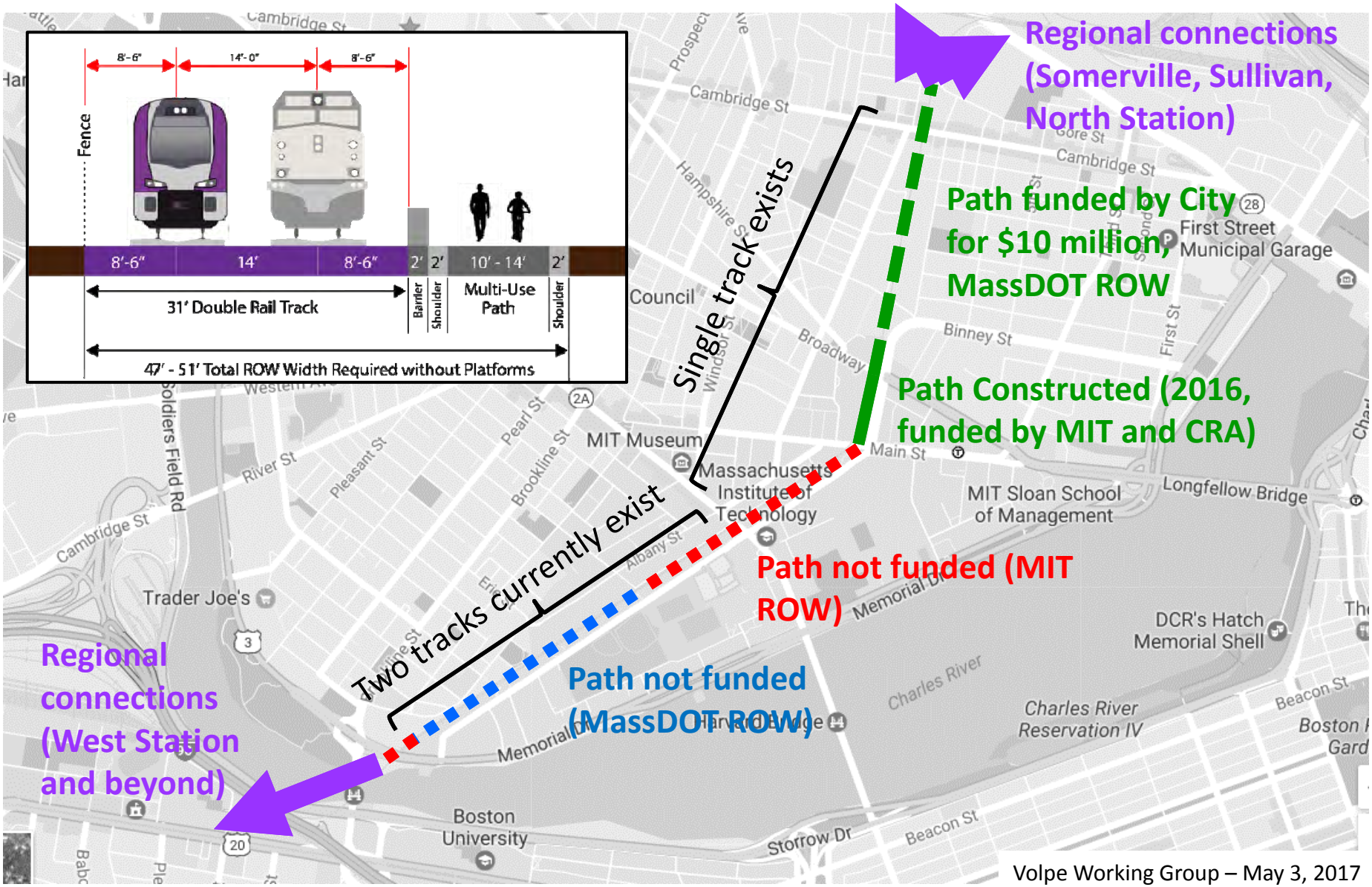


Source: MBTA data, modified

- Capacity increase with new Red Line car purchase
- Station improvements (MIT, Boston Properties developments)

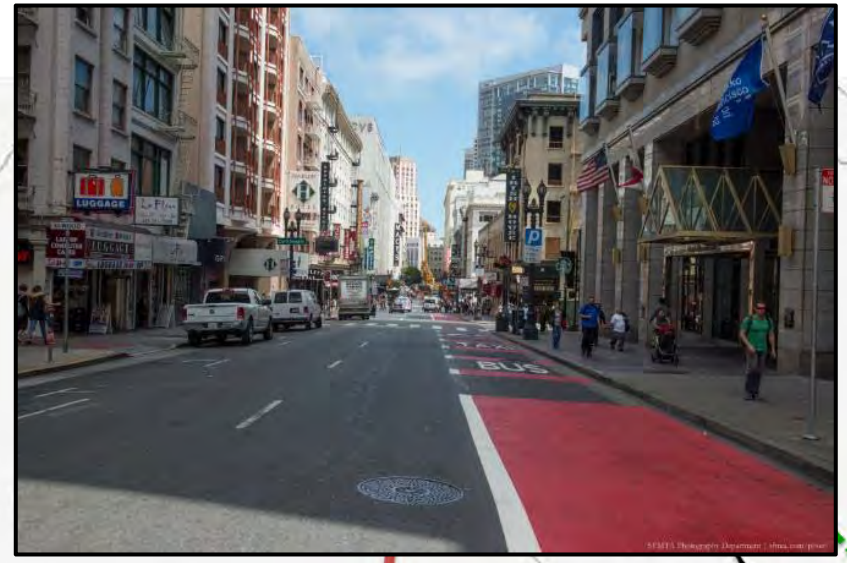
Transportation

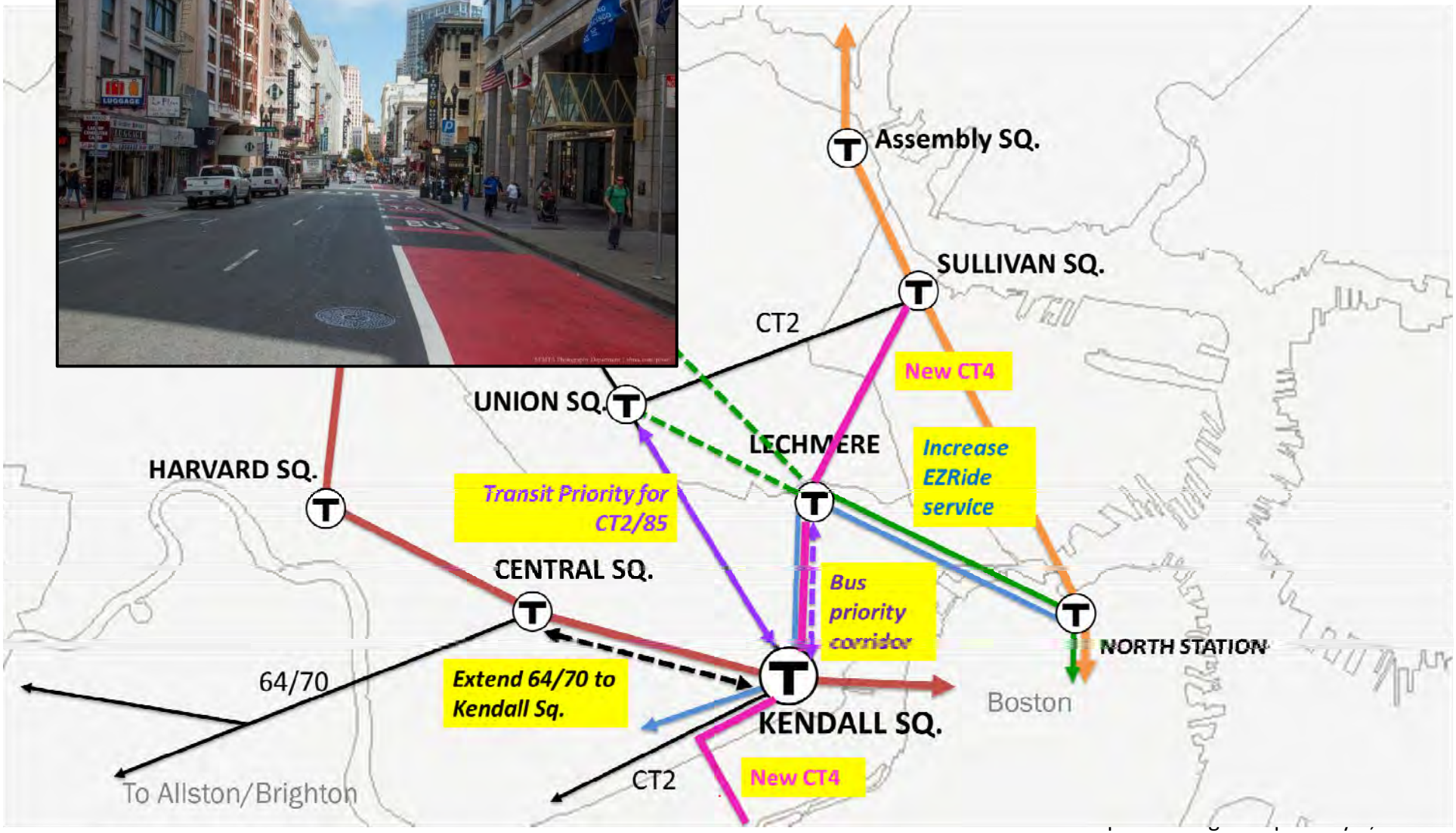
KSMTF: Grand Junction Rail Corridor



Transportation

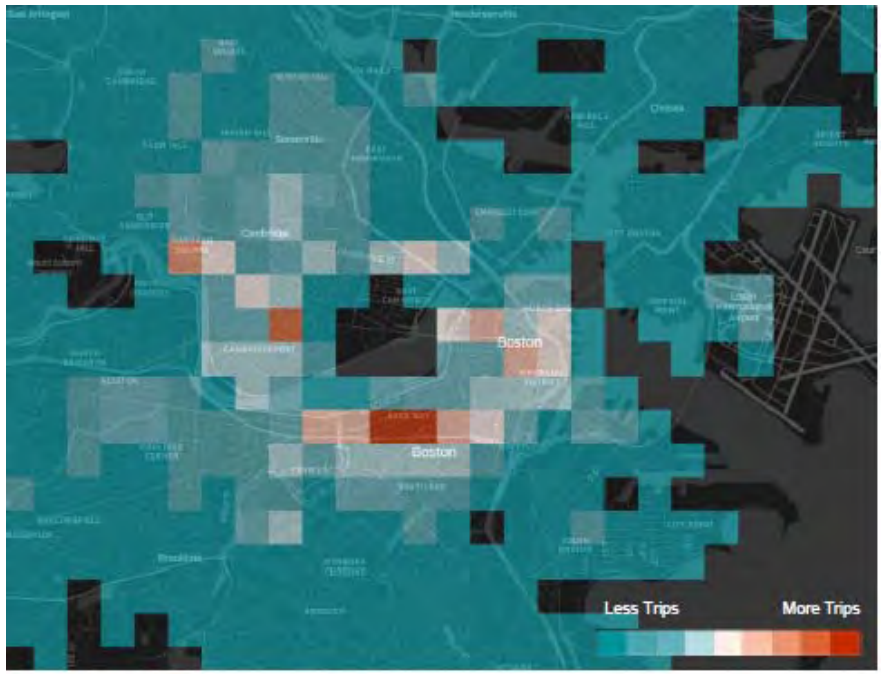
KSMTF: Bus Prioritization





Transportation

KSMTF: Shuttles and Ride-Hailing Services

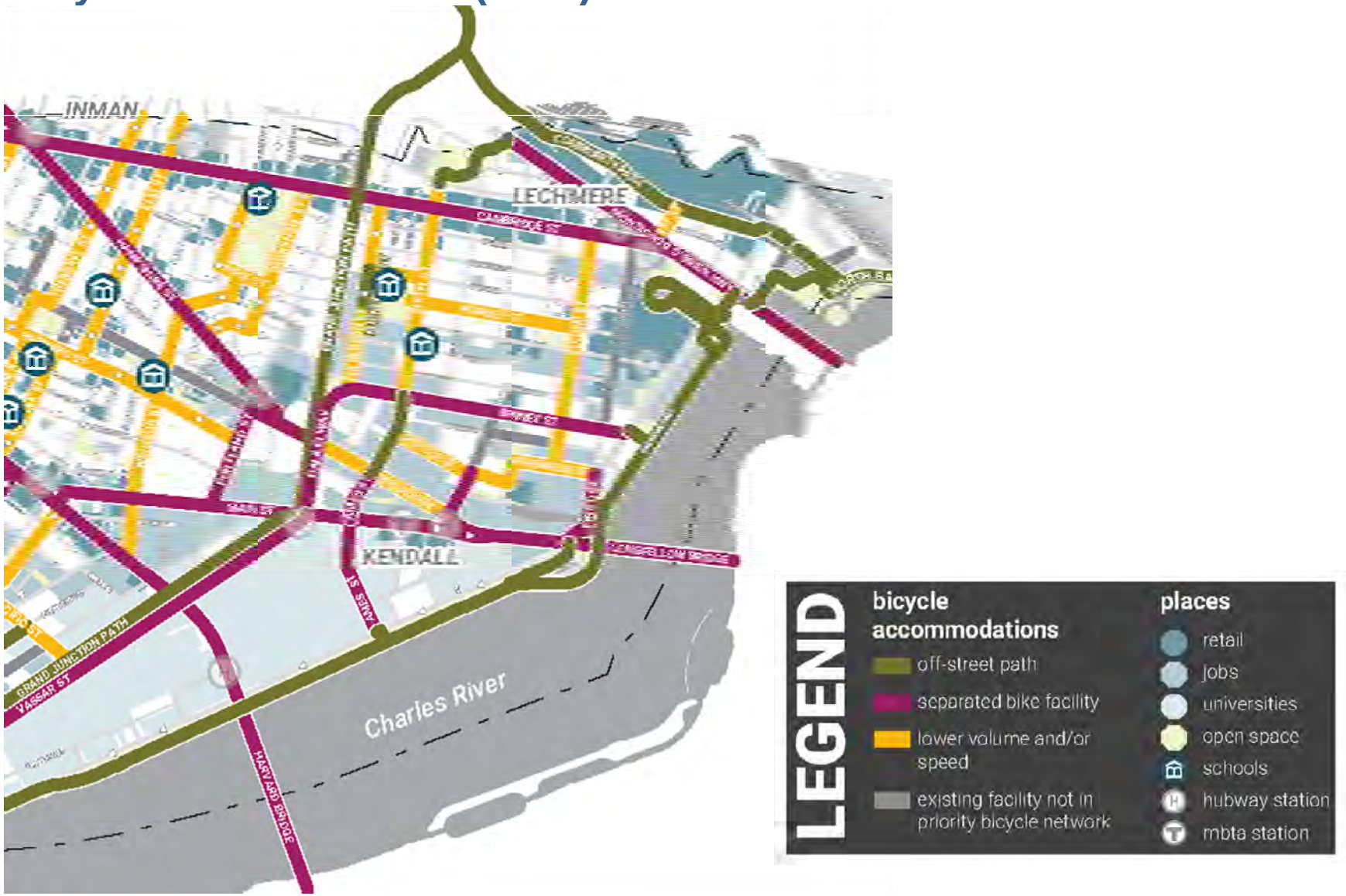


Heatmap of top origin points for trips ending in Kendall

- Many corporate shuttle services in the area, benefits of consolidation
- Not much data on ride-hailing services
- Long-term impacts on transportation system not well known

Transportation

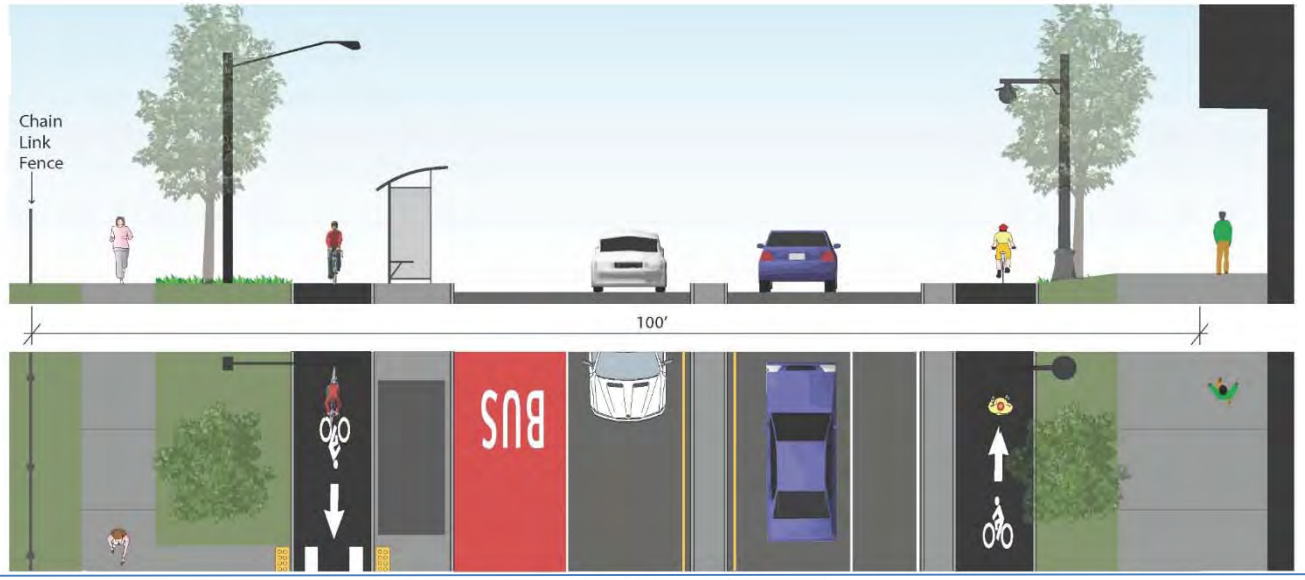
Bicycle Network Vision (2015)



Transportation

Binney/Galileo/Broadway Redesign Process

"Median Scheme"



"Island Scheme"

Cambridge Redevelopment Authority |

Transportation

Questions:

- What are the opportunities to further the City's transportation goals in the Volpe redevelopment?

- What transportation priorities align with the urban design principles that have been discussed?

Housing

K2 Strategy and Vision (2013)

- Housing required along with commercial growth
- Twofold purpose: To increase housing supply in general, and to improve the mix of uses in Kendall in particular
- Diverse incomes and household types, including families with children

Housing

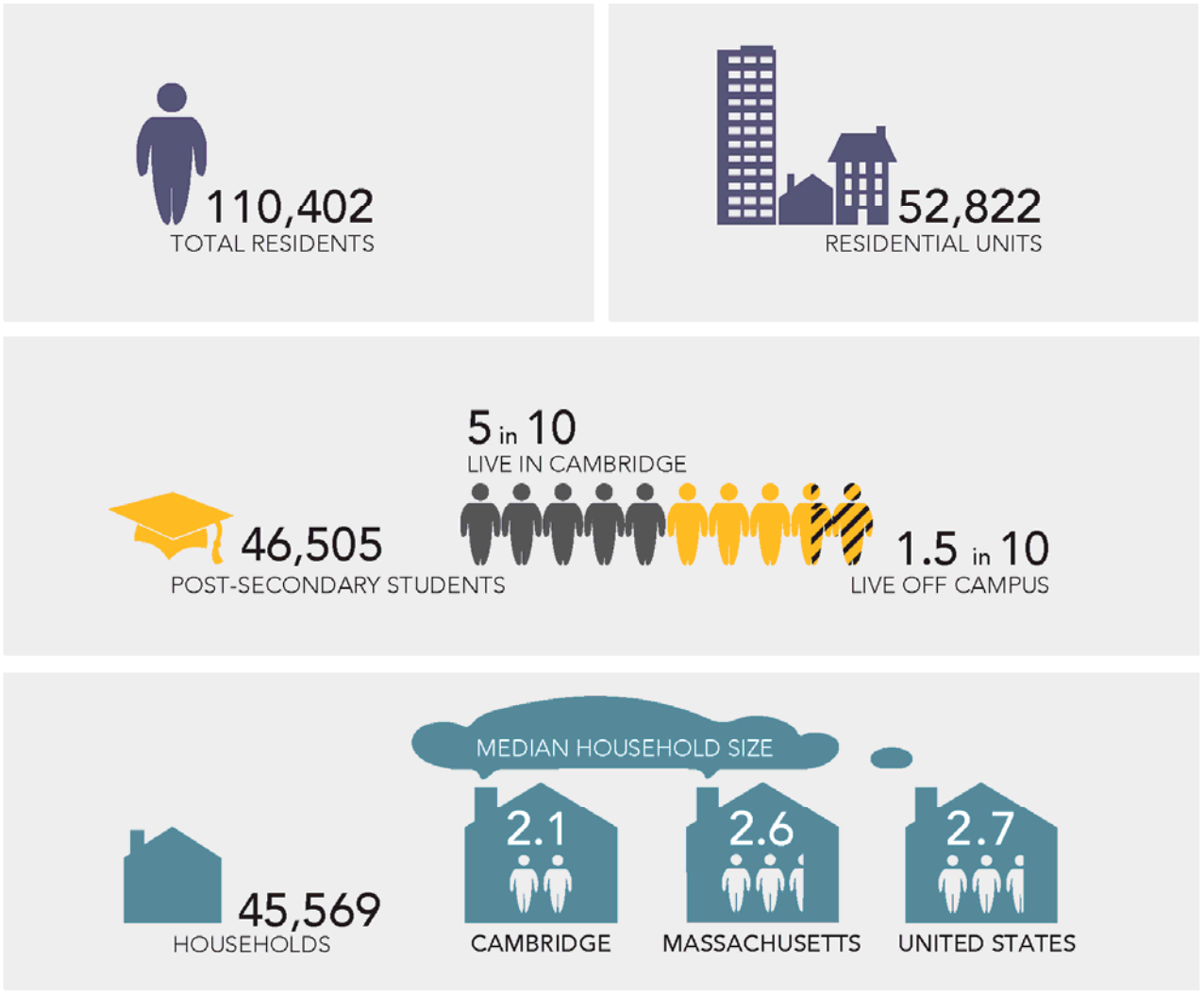
The Bigger Picture

- Housing in Cambridge today
- Projected future population (Cambridge, regional)
- Changes in housing types
- Housing in Kendall Square
- Who is living in new Cambridge housing?

Housing

INTRODUCTION: KEY DRIVERS

FIGURE X:
Housing Stock Key Drivers: 2016

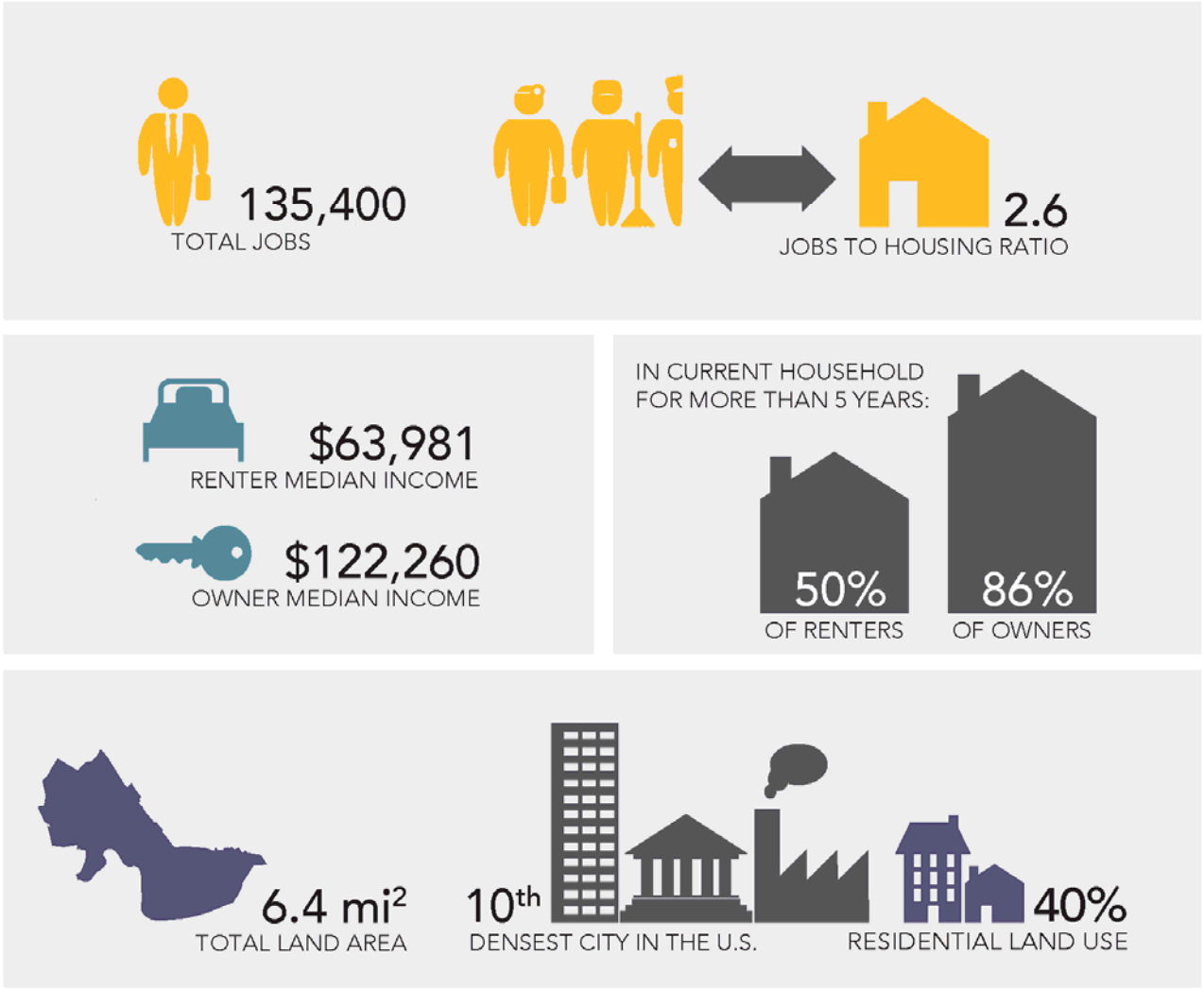


Sources, from top left: Total Residents, 2015 American Community Survey (ACS) 1-Year Estimates; Residential Units, Cambridge Development Log 2015 Q4 as analyzed by Cambridge Community Development Department; Total Post-Secondary Students and Summary Statistics, "Town Gown Report," 2015; Total Households and Median Household Size, 2015 ACS 1-Year Estimates.

Housing

INTRODUCTION: KEY DRIVERS

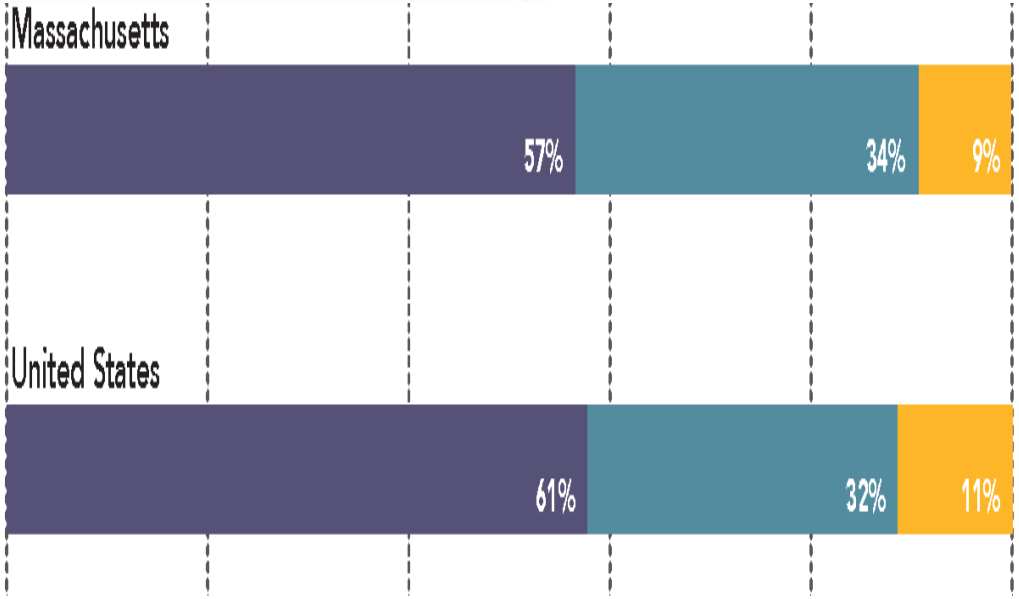
FIGURE X:
Housing Stock Key Drivers: 2016



Sources, from top left: Total workforce jobs, 2015 American Community Survey (ACS) 1-Year Estimates; Median Income by Tenure, 2015 ACS1-Year Estimates; Population by Tenure by Year Householder Moved into Unit, 2015 ACS 1-Year Estimates; Land Use and Area, 2016 Land Use and Roads GIS Layer; Population Density, Population, Housing Units, Area and Density: 2010, U.S. Census Bureau.

Housing

HOUSING STOCK: TENURE



HOUSING STOCK: VACANCY

TABLE X:
Vacancy Status: 2010

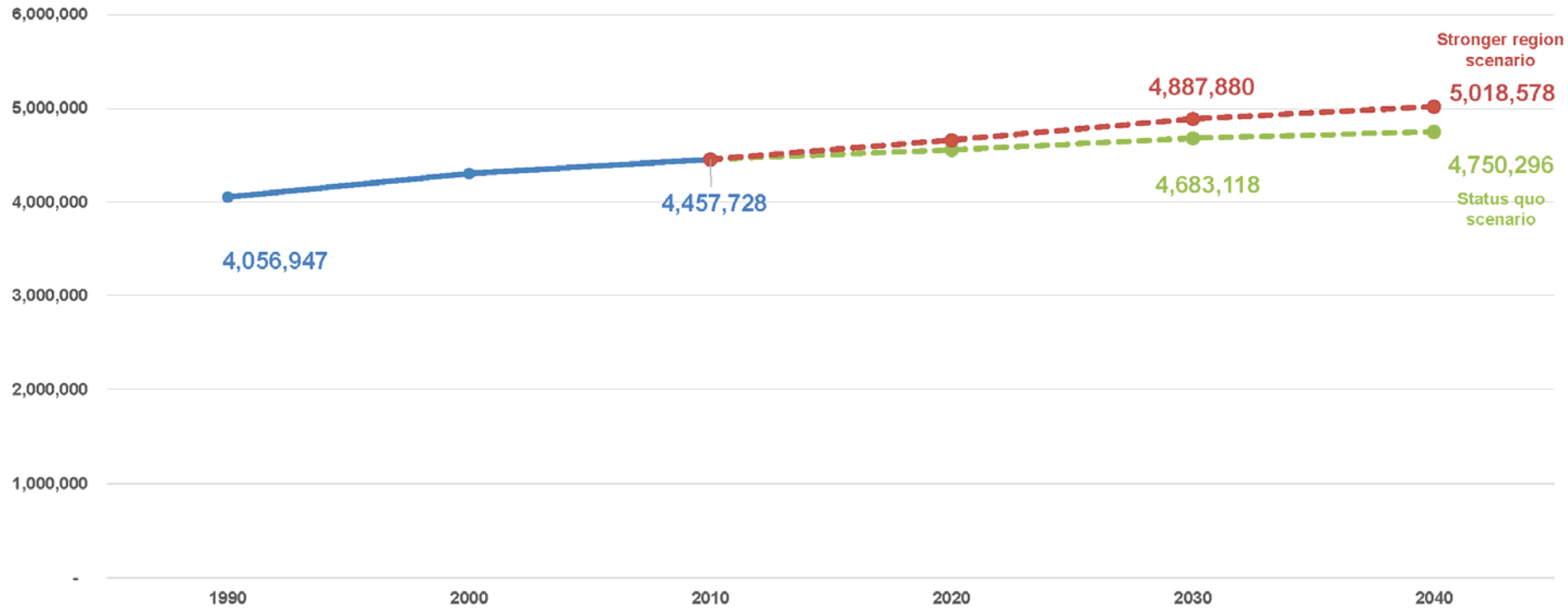
VACANCY STATUS
On the Market

Source: U. S. Census Bureau, 1950, 1960, 1970,1980, 1990, 2000, and 2010 Decennial Census, U. S. Census Bureau.

Housing

Regional Population Projections

MAPC projects that the region will add more than 400,000 residents over the next 20 years, and an additional 130,000 in the following decade under its **Stronger Region** scenario.

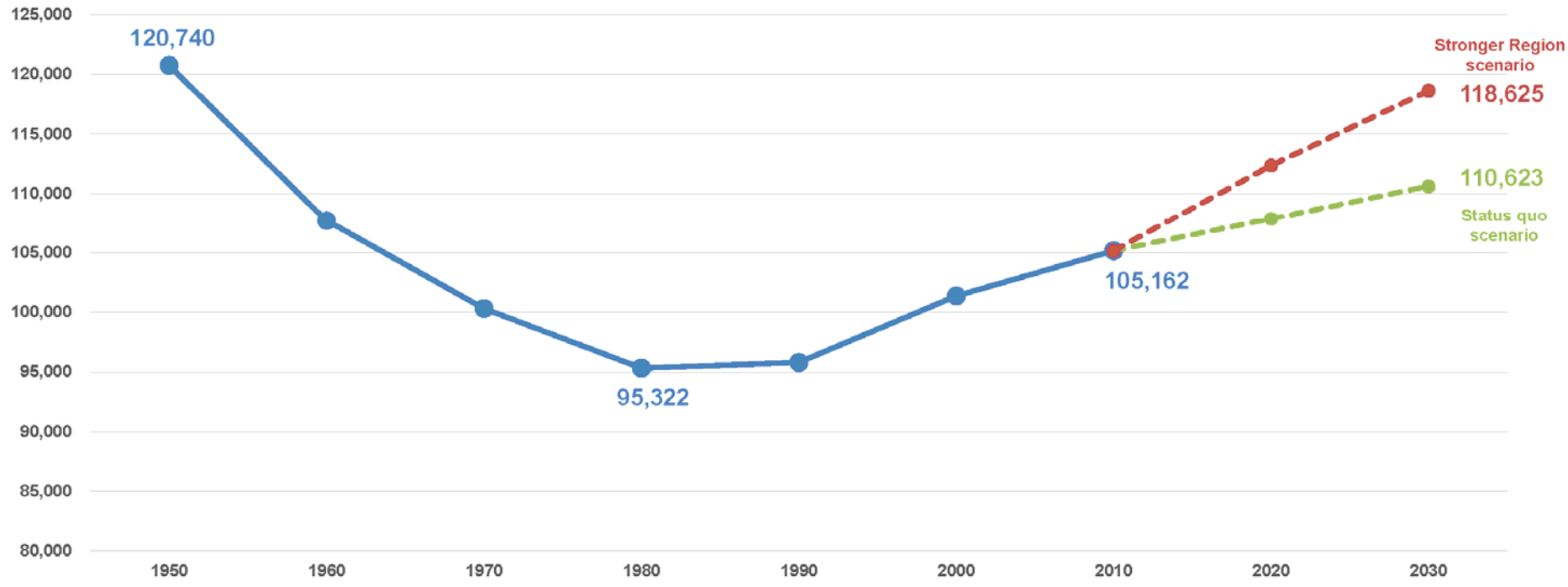


Source: 2014 MAPC Population Growth Projections

Housing

Citywide Population Growth

MAPC "Stronger Region" projections show Cambridge approaching its peak population by 2030.

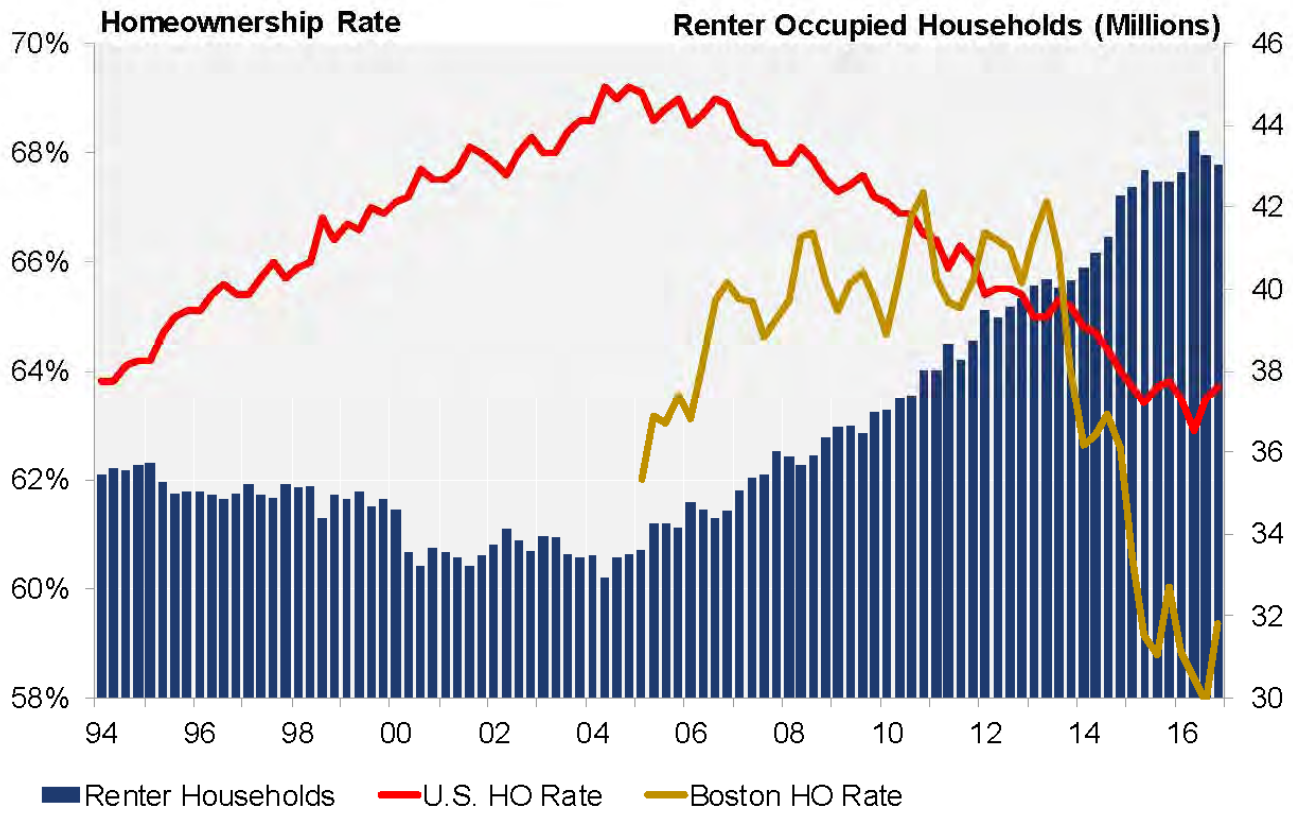


Source: 2014 MAPC Population Growth Projections; US Census, 1950–2010. Projections based on historical births, deaths, migratory patterns of different age cohorts, and steps forward by applying variations on those historical patterns to each age cohort as they age over time.

Housing

Decline In Homeownership Has Driven Rental Demand

Homeownership Rate: Boston vs. U.S., And Renter Occupied Households (U.S. Only)



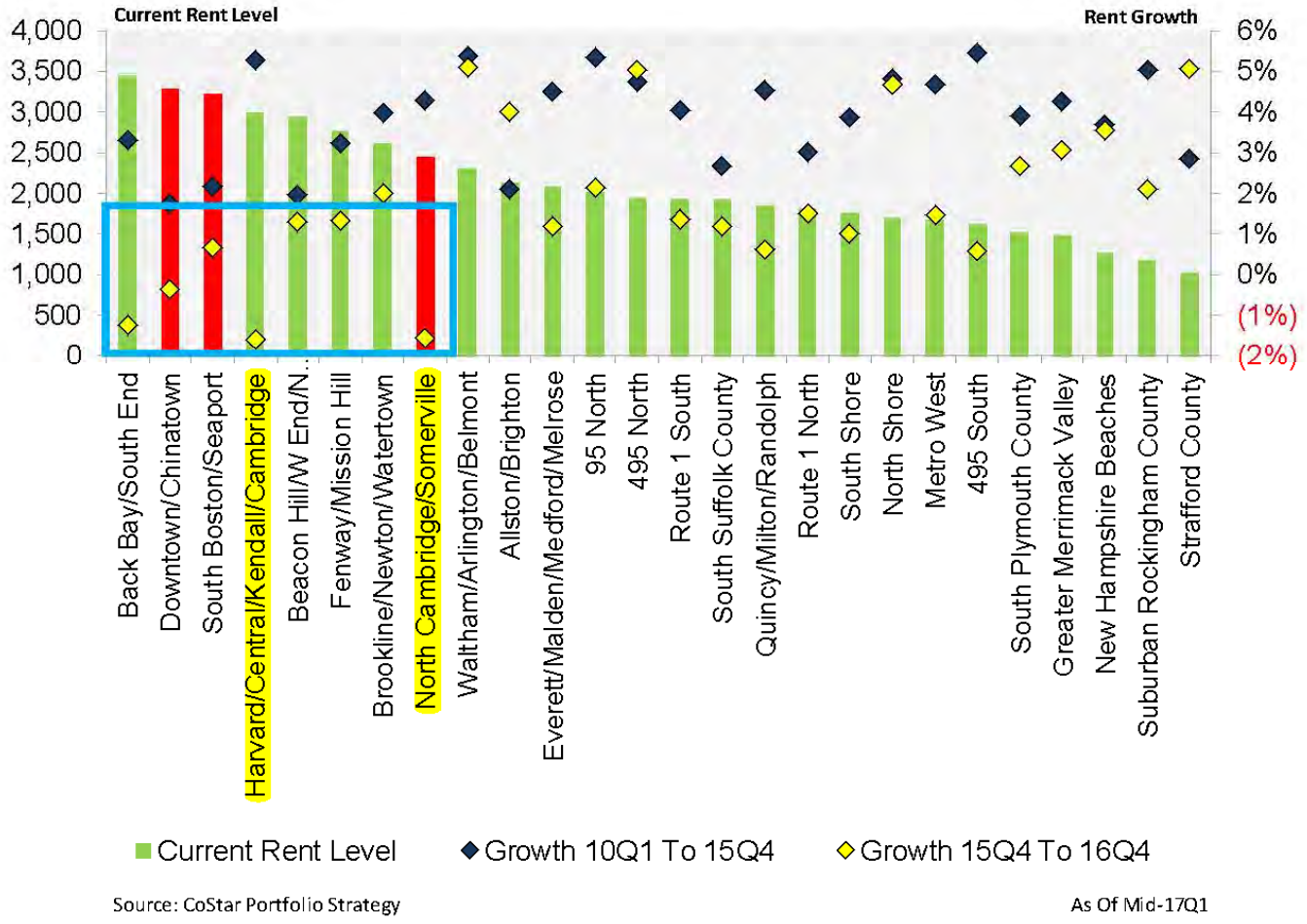
Sources: Moody's Analytics; U.S. Census Bureau (CPS/HVS); CoStar Portfolio Strategy

As of 16Q4

Housing

Rent Growth Decelerating, Or Shrinking In Pricey Submarkets

Current Rents Ranked By Submarket And Growth 10Q4 To 15Q4 vs. Growth Over Last 4Q's



Source: CoStar Portfolio Strategy

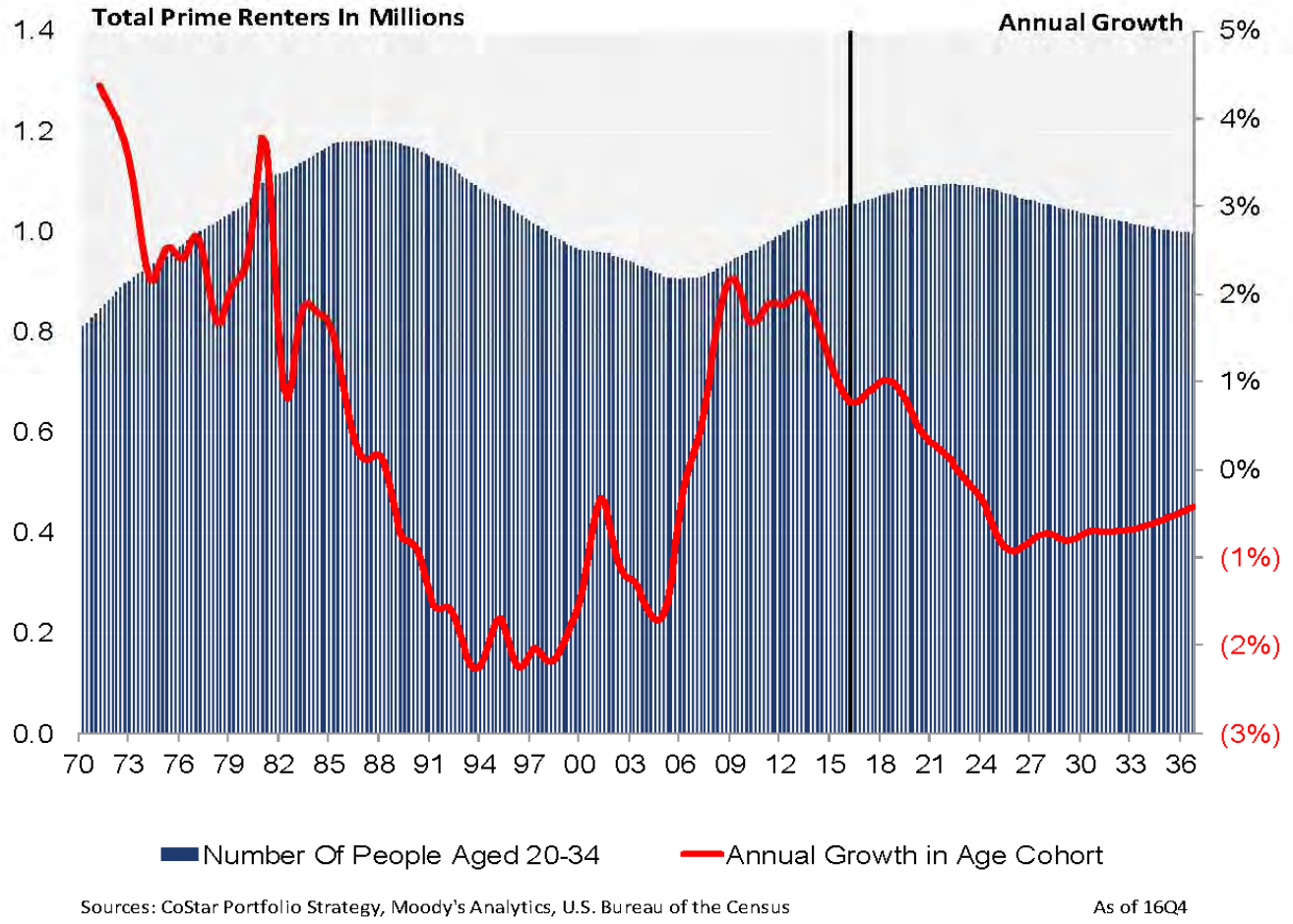
As Of Mid-17Q1

Housing

So What Happens Six Years From Now?

CoStar

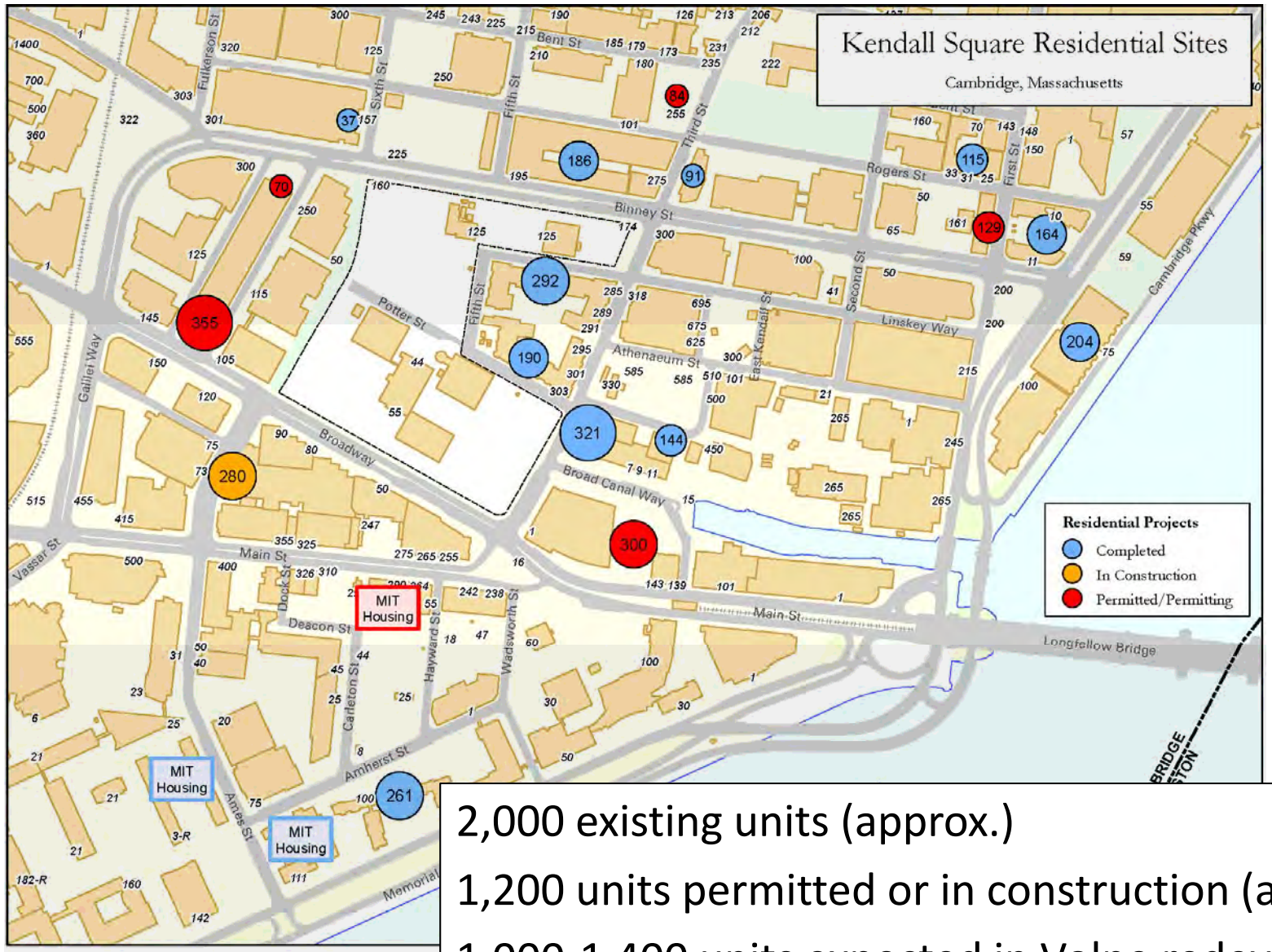
Population In Boston Aged 20-34



Sources: CoStar Portfolio Strategy, Moody's Analytics, U.S. Bureau of the Census

As of 16Q4

Housing



2,000 existing units (approx.)

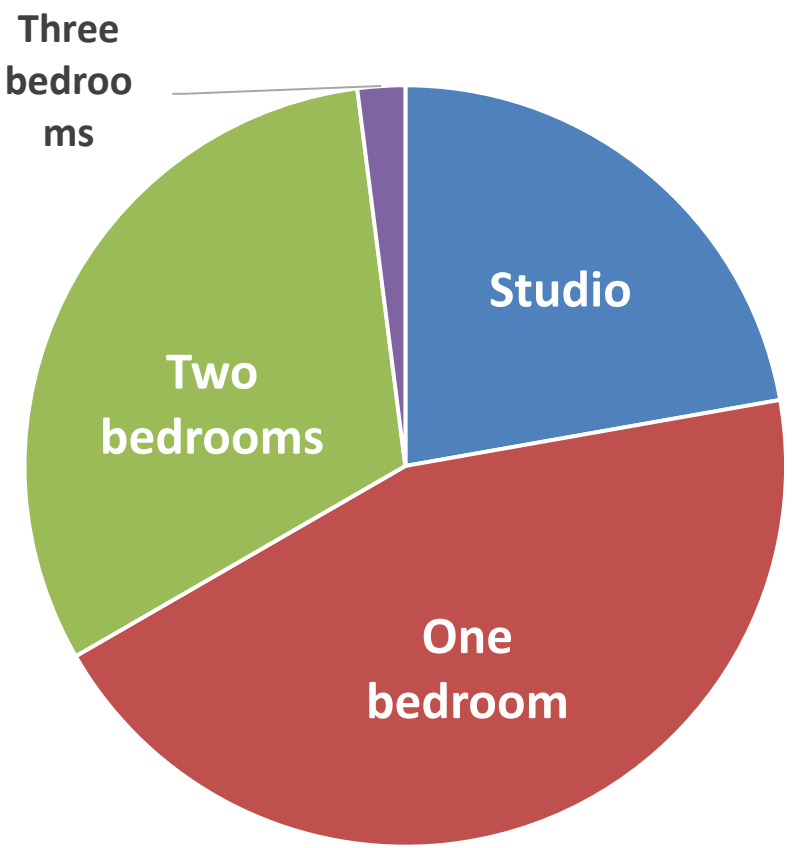
1,200 units permitted or in construction (approx.)

1,000-1,400 units expected in Volpe redevelopment

Housing

Six recent residential projects in Kendall Square:

Unit Types	Number of Units	Percent of Total
Studio	303	22 %
One bedroom	600	44 %
Two bedrooms	425	31 %
Three bedrooms	31	2 %
TOTAL	1,359	100 %

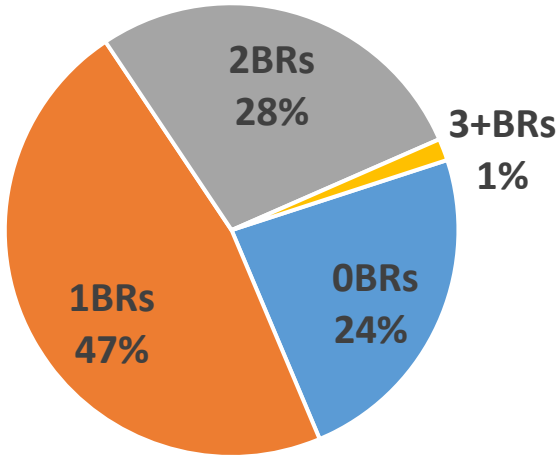


Housing

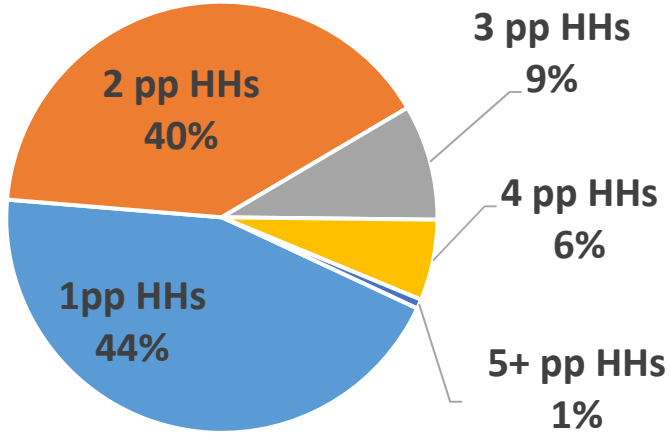
What types of households are living in new housing units?

- 2016 survey of recent multifamily projects by CDD Housing Division
- Responses from 6 buildings, 756 units
- Projects in North Point, Kendall Square, North Cambridge, Cambridge Highlands, and Neighborhood Nine

Breakdown of Unit Types in Surveyed Multifamily Developments



Breakdown of Household Types in Surveyed Multifamily Developments

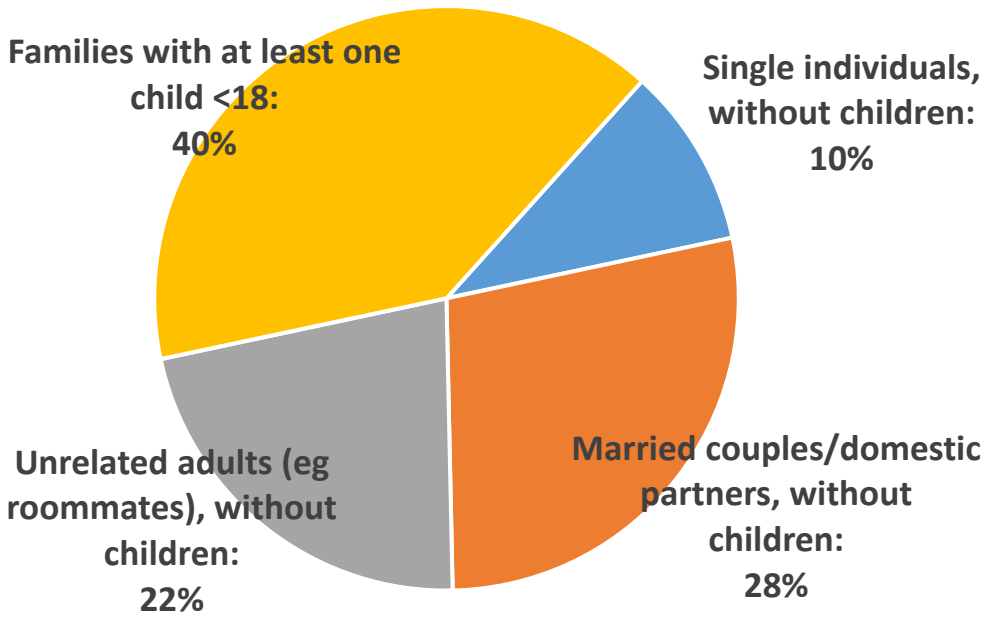


Housing

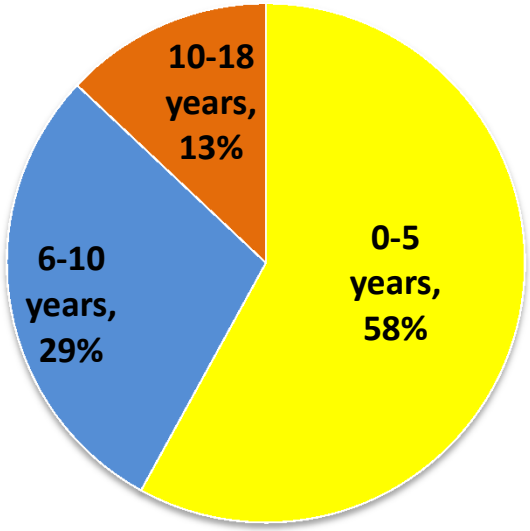
What types of households are living in new housing units?

- 101 children (under 18) in 756 surveyed units
- 108 seniors (55 and older) in 756 surveyed units
- Includes affordable units through inclusionary housing

Household Types Occupying 2+ BR Units



Ages of Children in Surveyed Units



Housing

Questions:

- What is the vision for Kendall Square's future residential population?

- What mix of housing types and other amenities are needed to support a vibrant neighborhood?


Aerial by lesvants.com