AMAZON PRIME AIR PROJECT.

Team 2

INTRODUCTION

This project focuses on analyzing optimal locations for Amazon Prime Air drone delivery warehouses, starting with Cambridge, MA, as our main location.

The study incorporates demographic, logistical, and technological factors to support our decision.

Delivery in 15 min?

SMALL ELECTRONICS

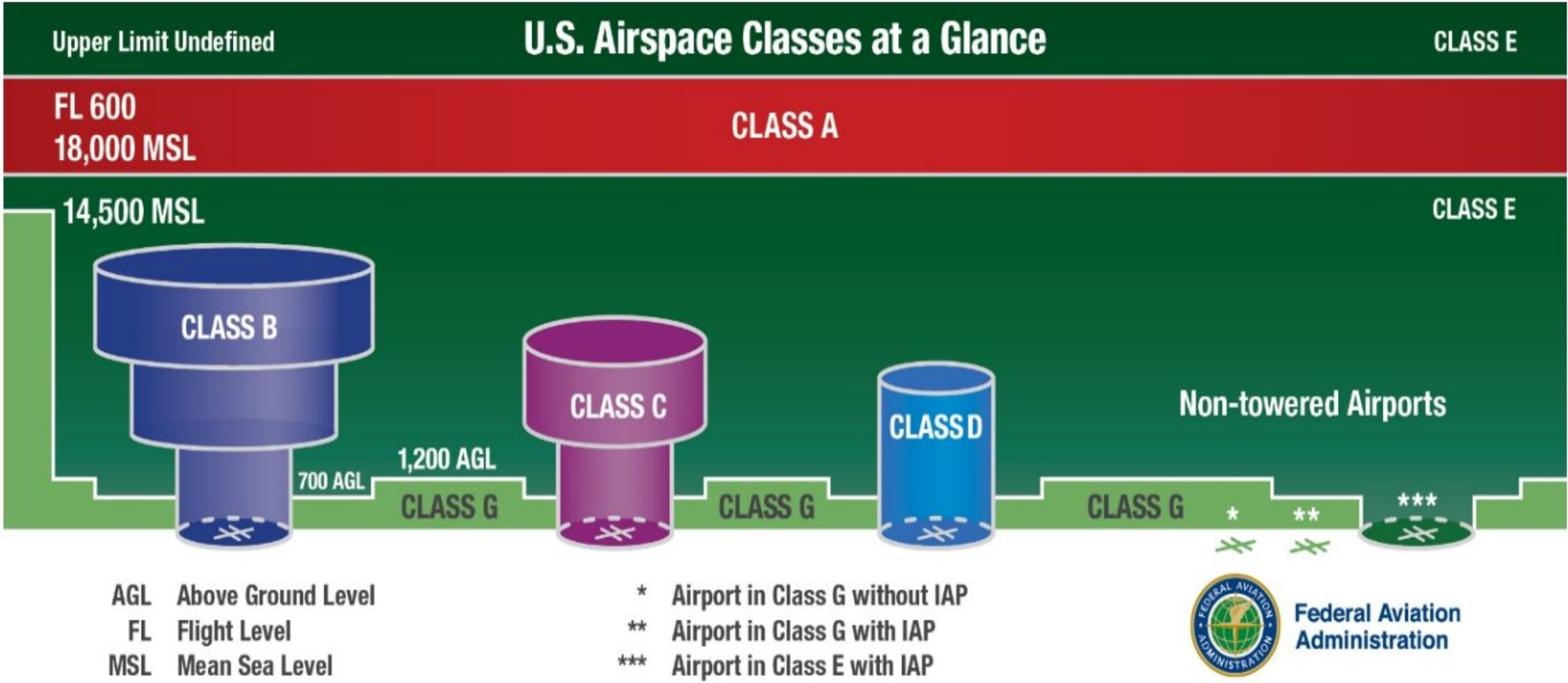
TOYS AND GAMES

FASHION AND ACCESSORIES

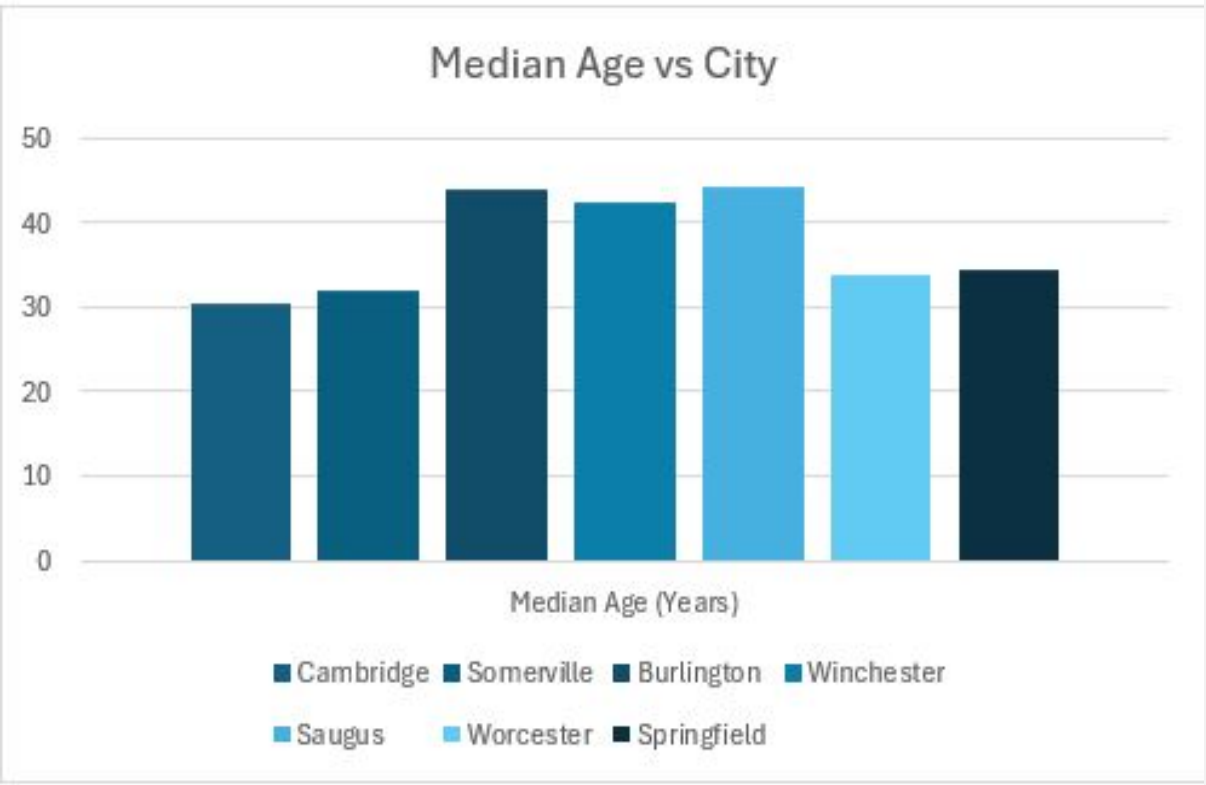
SMALL KITCHEN APPLIANCES

HEALTH AND PERSONAL CARE PRODUCTS

Location analysis



Targeting young population:



Considering some areas from Eastern, Western and Central Massachusetts for analysis.

Calculate the miles traveled by drone:

Average speed of MK30 drone considered as 50mph.

For 5 minutes:

Distance = 50 mph × (1/12) hours = 50 / 12 miles = 4.17 miles

For 10 minutes:

Distance = 50 mph × (1/6) hours = 50 / 6 miles = 8.33 miles

For 15 minutes:

Distance = 50 mph × (1/4) hours = 50 / 4 miles = 12.5 miles

Populations covered by drone:

City Considered	Prime Air Drone Delivery Possibility	City	Areas	Minutes	Miles	Population	Median Age (Years)	Average Income ($)
BOSTON	Eastern Mass	Cambridge	Central Square	5 min	4.17	790,067	30.5	134307
				10 min	8.33	1,608,223		
				15 min	12.5	2,116,588		
			Kendall Square	5 min	4.17	816,271		
				10 min	8.33	1,588,019		
				15 min	12.5	2,119,210		
			Harvard Square	5 min	4.17	710,825		
				10 min	8.33	1,607,095		
				15 min	12.5	2,103,903		
		Somerville	Davis Square	5 min	4.17	639,844	32	126619
				10 min	8.33	1,564,936		
				15 min	12.5	2,107,050		
			Union Square	5 min	4.17	785,365		
				10 min	8.33	1,589,078		
				15 min	12.5	2,113,246		
			Ball Square	5 min	4.17	649,274		
				10 min	8.33	1,537,487		
				15 min	12.5	2,121,293		
		Burlington	-	5 min	4.17	119,643	43.9	133936
				10 min	8.33	535,304		
				15 min	12.5	1,634,790		
		Winchester	-	5 min	4.17	294,793	42.3	208531
				10 min	8.33	1,246,337		
				15 min	12.5	2,007,727		
		Saugus	-	5 min	4.17	284,137	44.4	96064
				10 min	8.33	979,619		
				15 min	12.5	1,801,796		
Worcester	Central Mass	Worcester	-	5 min	4.17	96118	33.9	69262
				10 min	8.33	324346		
				15 min	12.5	506639		
Springfield	Western Mass	Springfield	-	5 min	4.17	202546	34.3	47101
				10 min	8.33	431084		
				15 min	12.5	577332		

Rationale used to select Cambridge:

01

Average age of 30.5 years, indicative of a youthful, technology-embracing demographic

02

Average income of $134,307, reflecting strong purchasing power

03

Large portion of the population within a 5-minute radius potential for efficient, profitable drone deliveries with reduced flight times

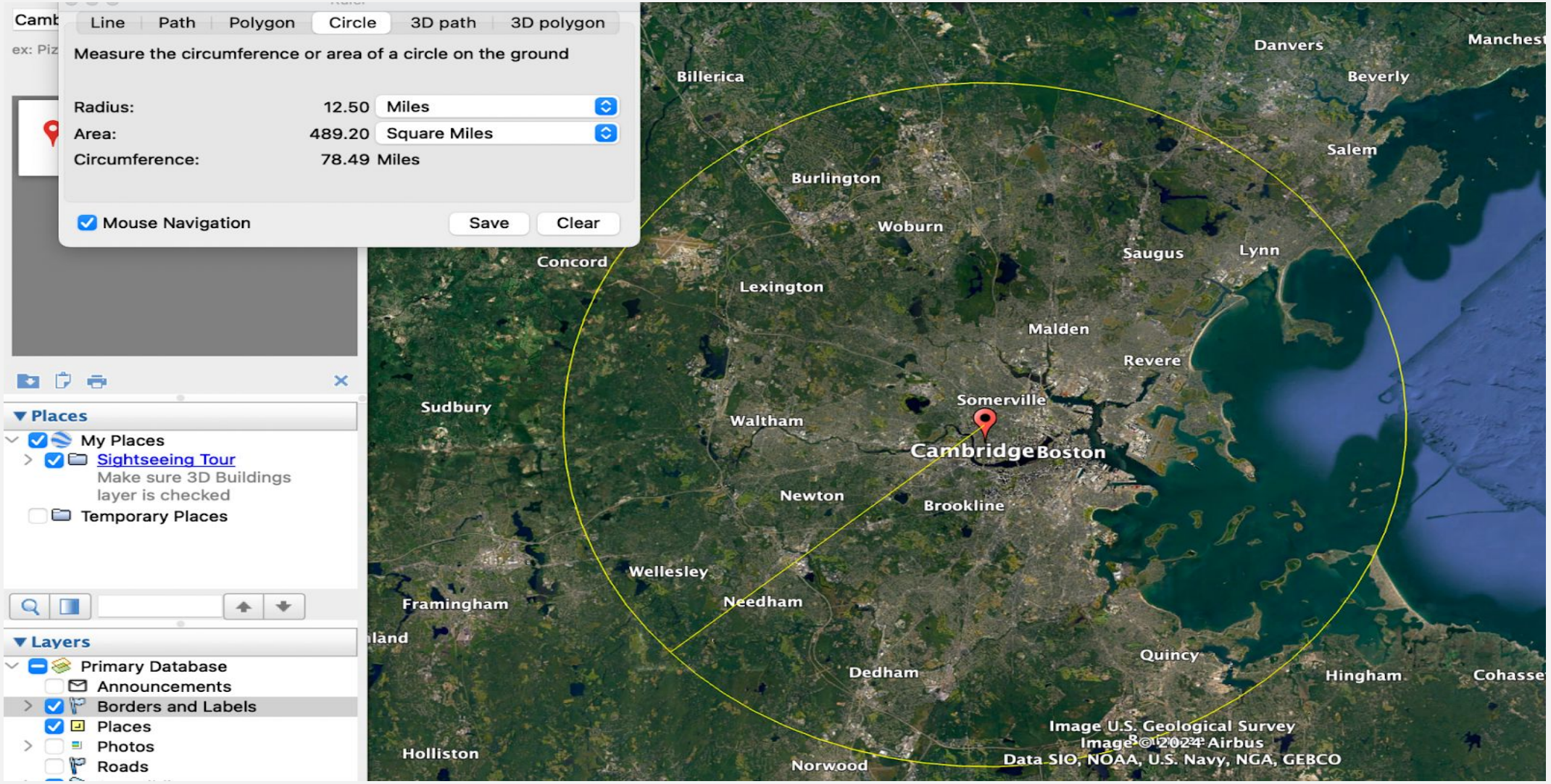
Tool for mapping out:

Google Earth Pro

Ruler Tool: Google Earth Pro includes a ruler tool that allows you to measure distances, including circular radii, accurately.

We will use Cambridge city for illustration.

Defining the coverage radius:



Cities within 12.5-mile radius from Cambridge:

Cities	Approx.Population(July 2023)
Cambridge	118,214
Boston	653,833
somerville	80,407
Brookline	62,962
Revere	57,954
Lexington	33,882
Newton	88,415
Malden	65,133
Saugus	28,630
Burlington	26,527
Quincy	101,597
Lynn	101,241
Woburn	41,647
Waltham	64,477
Wellesley	30,733
Dedham	24,968
Total	**1,580,620**

Volume handled by facility?

	A	B	C	D
1				
2				
3	Input	Value	Description	
4	Population (12.5mile radius)	1,580,620	Total population within a 12-mile radius.	
5	E-commerce Penetration (%)	15%	Percentage of the population shopping online	
6	Avg. Orders per Shopper/Year	24	Number of orders per year per shopper.	
7	Drone-Suitable Orders (%)	30%	Percentage of orders suitable for drones.(Assumption)	
8				

STEP 1: Calculate the online shoppers

E-commerce penetration means that **15%** of the 1.5 million population shops online:

Online Shoppers=1,580,620×0.15=237,093

So, **237,093** people are potential online shoppers.

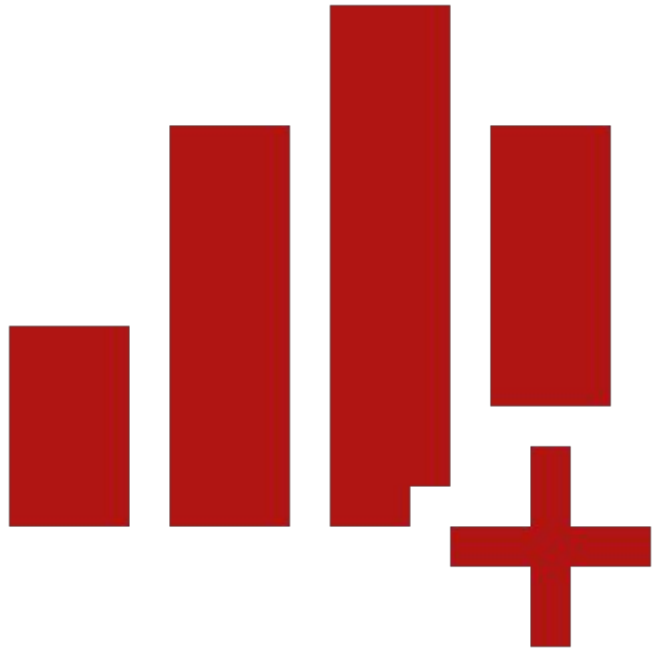
Step 2: Calculate total annual orders

Each shopper places an average of 24 orders per year:

Total Annual Orders

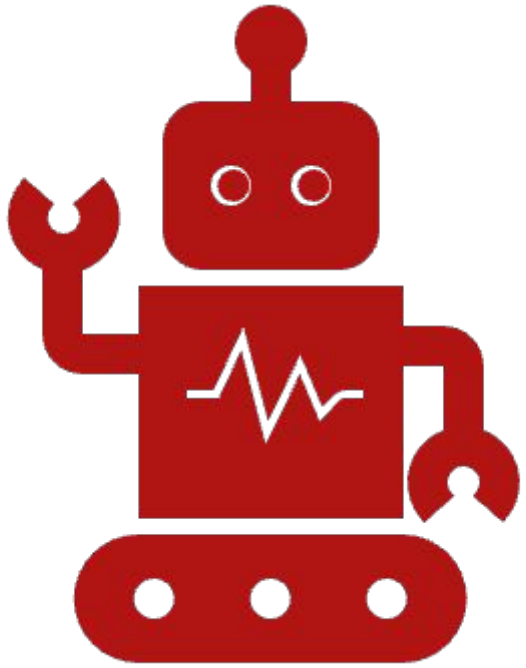
=237,093 × 24 = 5,690,232

There are approximately **5.7 million** orders annually.



Step 3: Estimate drone-suitable orders

- Assume 30% of these orders are suitable for drone delivery:
- Drone-Suitable Orders = 5,690,232×0.30=1,707,069.6
- This means **1.7 million** orders per year could potentially be delivered by drones.

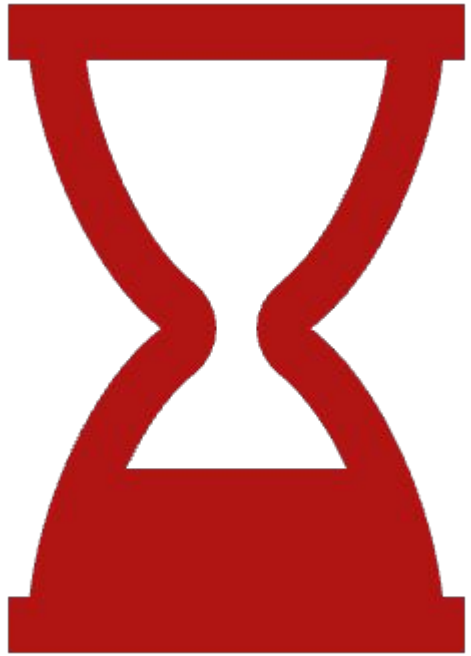


Step 4: Convert annual orders to daily volume

Daily Volume=1,707,069 / 365

=4,676.903

Approximately **4700** orders per day.



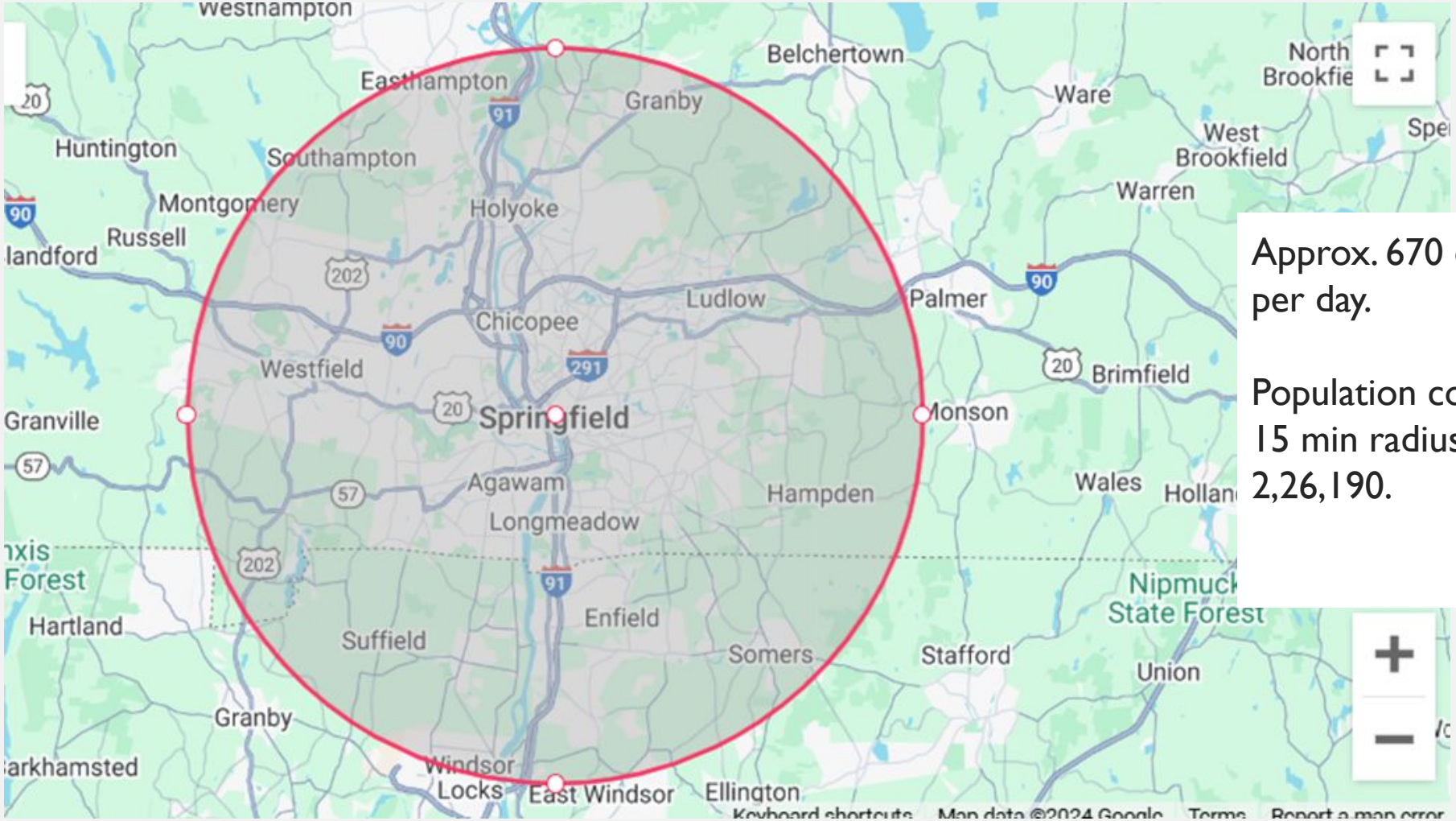
Take away:

Assuming I want to reach customers in a 15-minute threshold in a warehouse in Cambridge, MA.I will need a warehouse with a daily capacity of approximately 4700 orders .

This is a base study for any location one chooses to build a warehouse.

Having the 12.5-mile radius population, we can determine the volume each facility can hold in any given location.

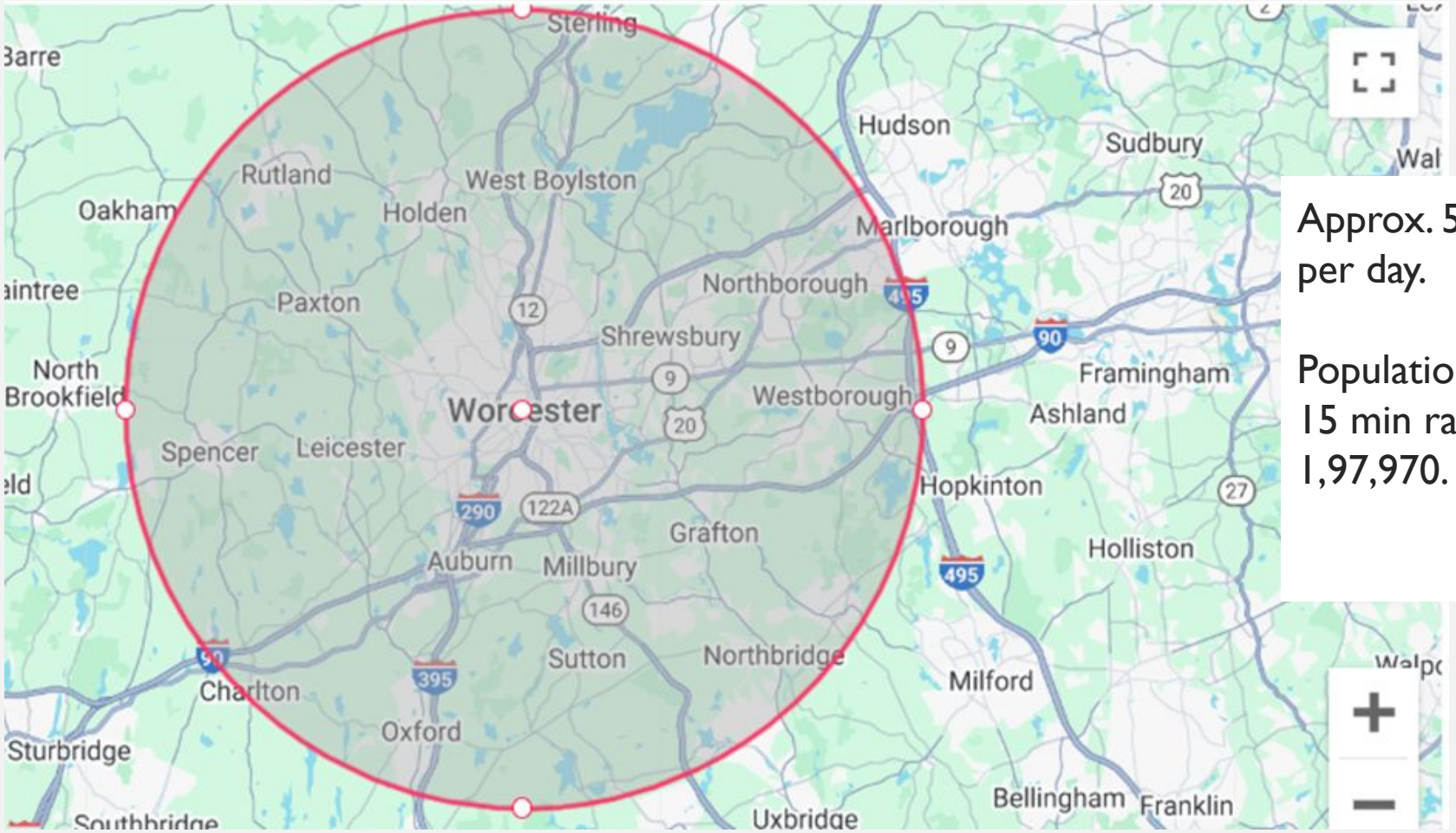
Springfield



Approx. 670 orders per day.

Population covered in 15 min radius would be 2,26,190.

Worcester

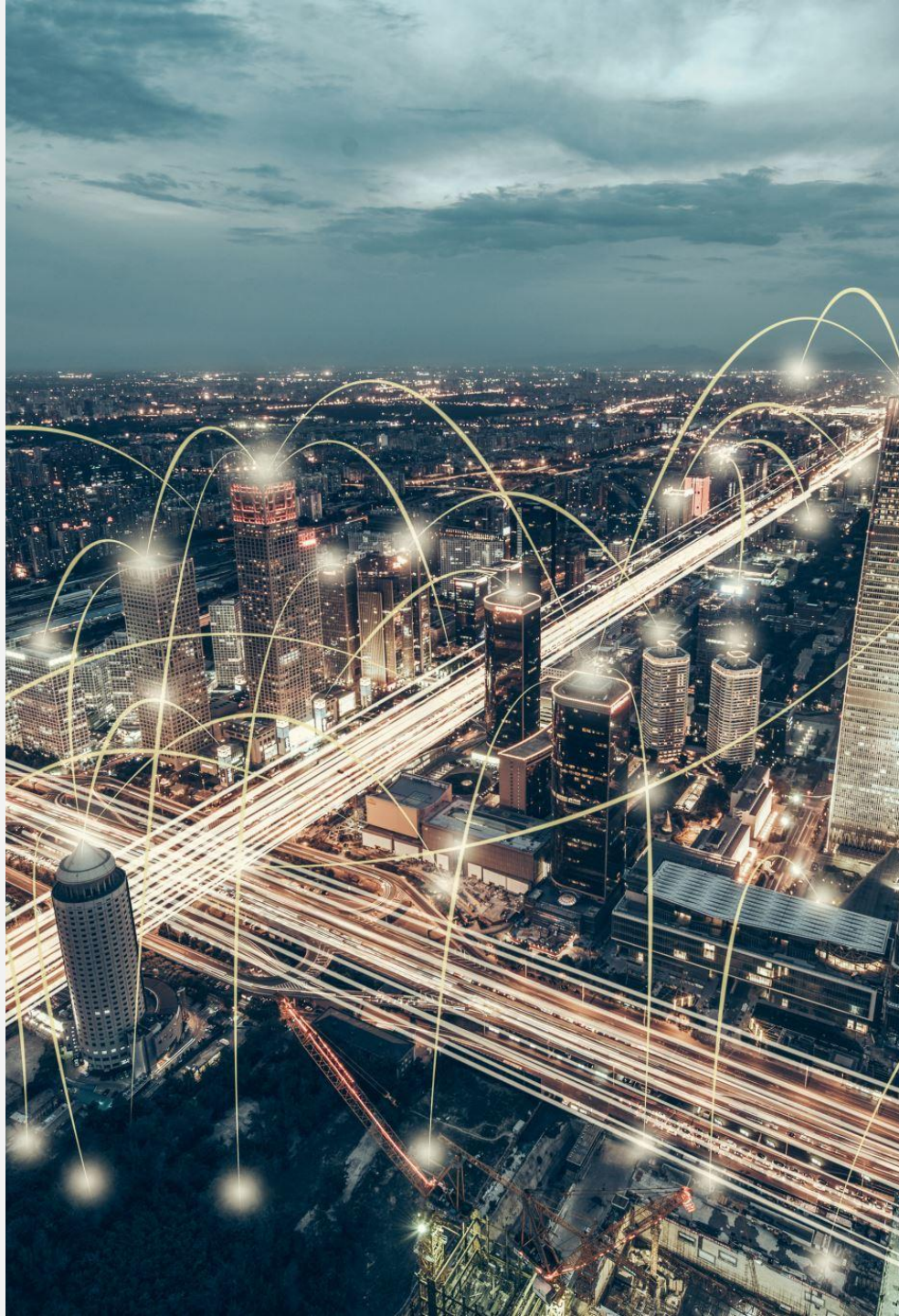


Approx. 585 orders per day.

Population covered in 15 min radius would be 1,97,970.

Why Cambridge?

- High population Density within 12-mile radius
- High demand for E-commerce : tech savvy customer base
- Technological ecosystem : Cambridge is a hub for innovation
- Regulatory advantages : FAA approved



Focus on certain towns?

Yes

Start with high density towns only

Evaluate demand hotspots

Other Cities to consider:

Western Mass-Springfield

Central Mass-Worcester

Why? high population density and large customer base.

Relevant sources:

https://www.census.gov/

www.freemaptools.com

https://www.faa.gov/air_traffic

Thank you !