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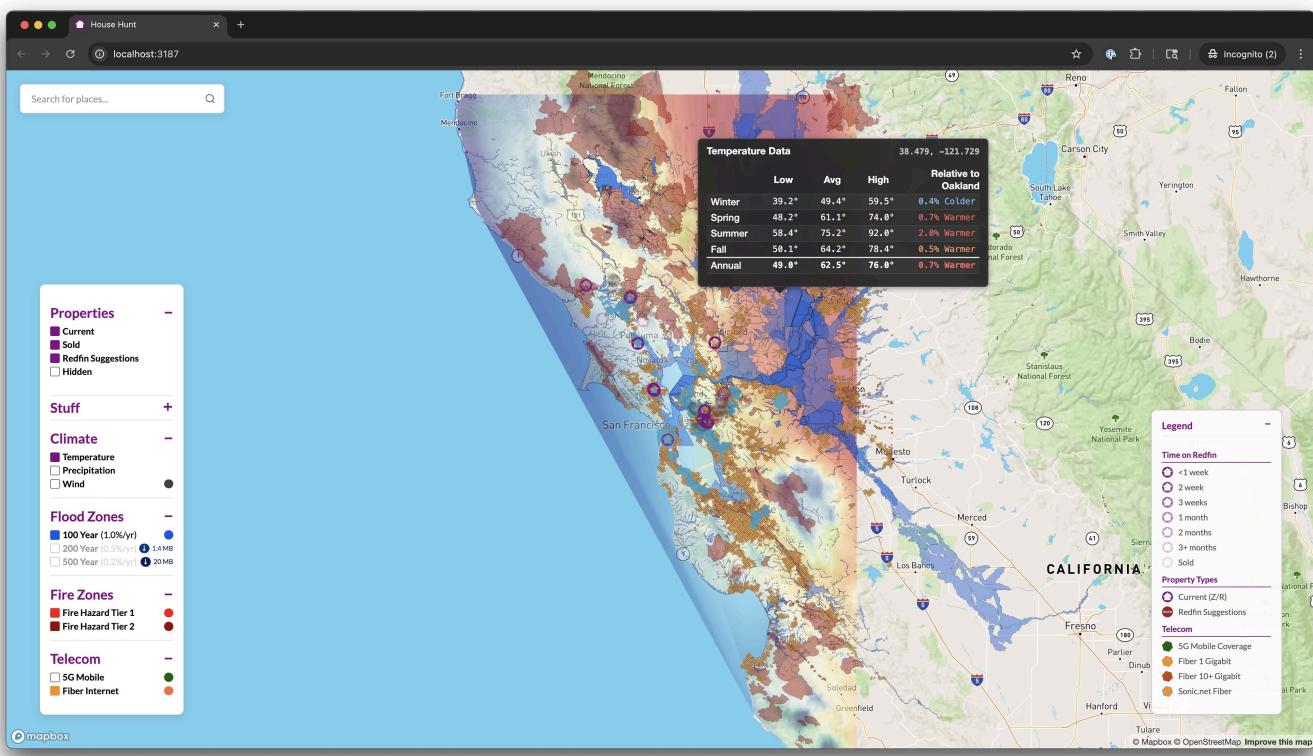
# House Hunt

A smart map for finding our new home in the Bay Area.

This is an interactive map to help us house hunt more effectively. It shows the houses we're considering, nearby amenities that matter to us, important risk information like flood zones and fire hazards, and accessibility of fiber optic and 5G wireless internet service.

🌐 Live Site: <https://max:gracie@househunt.ezzat.com>

**Note:** Credentials are baked into the URL above but, if prompted, use username `max` and password `gracie`.



# What It Does

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## Tracks and Maps Potential New Homes

When we find a house on Redfin that looks promising, we just share it to an email alias (`houses@ezzat.com`) that forwards to a dedicated gmail account (`ziadandrebecca@gmail.com`).

Every 30 minutes, Google Apps Script `gs/collectHouseListings.gs` checks for new emails from Redfin and adds them to the map.

### Email Filtering Criteria:

The system processes two types of Redfin emails:

1. **Shared Listings:** Subject contains `"wants you to see"` (marked Z/R for Ziad/Rebecca)
2. **Redfin Suggestions:** Subject starts with `"A "` or `"An "` and contains `"home for you"` (marked with em dash —)

### Processing Rules:

- URLs must be from `redfin.com` or `redf.in` domains
- Redfin URLs must contain `/home` path (ignores generic pages)
- Ignores social media links (Facebook, Twitter, Pinterest)
- Deduplicates against existing properties in the sheet
- **Tracks who suggested each property** based on email type and sender
- Adds them to our map with all the details (price, beds, baths, square footage, etc.)
- Grabs the main photo URL from the listing
- Calculates how long it's been on the market (newer listing markers are more opaque)
- Estimates the total monthly cost including mortgage, taxes, HOA, and insurance

## Points of Interest

- **Coffee shops** (Starbucks, Peet's)
- **Retail stores** (Container Store, Total Wine, Walmart)
- **Big box stores** (Target, Costco, Home Depot, Lowe's)
- **Healthcare facilities** (Kaiser medical centers and offices)
- **Grocery stores** (Whole Foods, Safeway, Albertsons, Trader Joe's, Raley's, Bel Air, Nob Hill)
- **Telecom coverage** (5G mobile and fiber internet areas)

## Environmental Risks & Climate Data

- **Flood zones** show areas that could flood during major storms
- **Fire hazard zones** highlight areas with higher wildfire risk
- **Climate data** displays temperature, precipitation, and wind patterns with interactive hover popups
- **Relative comparisons** show how each location compares to our North Oakland home using quintile-based rankings
- All data comes from official government sources (FEMA, CAL FIRE, NOAA, and NREL)

## Real Monthly Cost Estimates

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For each property, we can see the true monthly cost including:

- Mortgage payments (using 15-year fixed mortgage rates from [Bankrate.com](#))
- Property taxes (with Prop 19 considerations)
- HOA fees, if applicable
- Insurance costs (including [FAIR Plan](#) insurance for high-risk areas)

## How to Use It

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### Finding Properties

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1. **Browse Redfin** like you normally would
2. **Share interesting listings** using the native Redfin share button to [houses@ezzat.com](mailto:houses@ezzat.com)
3. **Check the map** - new properties appear automatically within a few minutes
4. **Click any house marker** to see details, photos, and calculated monthly costs

### Understanding the Map

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- **Brighter markers** = newer listings (just hit the market)
- **Faded markers** = been on the market for weeks/months
- **Gray markers** = sold properties (for reference)
- **Property popups** show who suggested each property (Z=Ziad, R=Rebecca, --=Redfin direct suggestions)
- **Toggle layers** using the controls to show/hide different types of places
- **Legend sections** are collapsible - click any section header to expand/collapse
- **Default view** shows Properties and Time on Redfin sections open, others collapsed
- **Your preferences** are saved automatically and persist between visits
- **Clean up button** quickly resets the map to show only current properties, turning off all other layers



# Backend Operations

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## How It All Works

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I set up an email alias (`houses@ezzat.com`) for sharing Redfin listings, and a Google Apps Script to watch for incoming Redfin listings. When either of us shares a property to that address, the system:

1. Recognizes it's a Redfin listing (ignores spam and other emails)
2. Extracts the property URL from the email and adds it to our Google Sheet
3. `redfinUpdateCurrent.gs` and `redfinUpdateAll.gs` visit the Redfin pages to collect detailed property data
4. Calculates the monthly costs using current rates and tax info
5. Shows it on the map within a few minutes

## The Email-to-Data Process

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**Step 1: Email Detection** Every 30 minutes, a Google Apps Script checks our shared Gmail inbox for new emails from `donotreply@redfin.com` that contain “wants you to see” in the subject line. This filters out all the other Redfin emails (price changes, saved searches, etc.) and only processes the ones where we actually shared a specific property.

**Step 2: URL Extraction and Storage** `collectHouseListings.gs` reads the email body and looks for Redfin property URLs. It's smart enough to ignore social media links, generic Redfin pages, and other junk - it only grabs the actual property listing URLs. It also figures out who sent the email (`Ziad wants you to see` vs. `Rebecca wants you to see`) based on the subject line format, then adds the URL to our Google Sheet with basic metadata including the **Suggested By** field that tracks who found each property.

**Step 3: Data Scraping with Multiple Scripts** Two different scripts handle data extraction based on urgency and scope:

`redfinUpdateCurrent.gs` (runs every 12 hours) focuses on active listings and extracts over 20 different pieces of information:

- **Basic details:** Price, beds, baths, square footage, lot size, year built
- **Market info:** Days on market, price history, HOA dues
- **Property features:** Garage spaces, basement, pool, etc.
- **Photos:** Grabs the main listing photo
- **Location data:** Converts the address to map coordinates

`redfinUpdateAll.gs` (batch processing) handles comprehensive updates for all properties, including sold ones, processing 100 records at a time to avoid timeouts and ensure complete data coverage.

**Step 4: Smart Data Processing** The system is designed to handle Redfin's quirks - like how they sometimes show “Coming Soon” instead of a price, or how square footage might be listed in different places on the page. It tries multiple ways to find each piece of data and falls back gracefully when something isn't available.

## Property Suggestion Tracking

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The system automatically tracks property sources using two different systems:

### 1. Shared Listings (Manual Shares)

- **Email Pattern:** Subject contains "wants you to see"
- **Name Detection:** Looks for "Ziad" or "Rebecca" in subject line
- **Markers:** Z (Ziad), R (Rebecca), or blank if no name detected
- **Examples:**
  - "Ziad wants you to see this home" → Found: Z
  - "Rebecca wants you to see this home" → Found: R

### 2. Redfin Direct Suggestions (Algorithm-Generated)

- **Email Pattern:** Subject starts with "A " or "An " and contains "home for you"
- **Marker:** – (em dash) for all Redfin algorithm suggestions
- **Examples:**
  - "A home for you in Oakland" → Found: –
  - "An updated home for you in Berkeley" → Found: –

Map Display:

- **Regular properties:** Use standard property icon (Z/R found values)
- **Redfin suggestions:** Use special Redfin icon (– found value)
- **Separate toggles:** Independent checkboxes to show/hide each type
- **Default state:** Both property types visible by default for new visitors

This dual-tracking system helps distinguish between properties we manually discovered vs. ones Redfin's algorithm suggested to us!

## The Data Sources

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- **Property info:** Automatically scraped from Redfin listings
- **Monthly costs:** Calculated using our [mortgage calculator spreadsheet](#)
- **Climate data:** [NOAA Climate Normals](#) (2006-2020 period)
- **Wind data:** [NREL Wind Integration National Dataset](#) (2001-2020 period)
- **Flood zones:** Official FEMA flood maps
- **Fire hazards:** [California fire risk data](#)
- **Broadband coverage:** [FCC nationwide broadband data](#)
- **Points of interest:** Manually curated locations we care about

# Map Markers Reference

## Property Markers

### Active Properties (Age-Based Opacity)

Property age is calculated using "Days on Redfin" data automatically extracted from each listing page, providing accurate market timing information.

Icon	Age Range	Description
	< 1 week	Newest listings (100% opacity)
	1-2 weeks	Recent listings (85% opacity)
	2-3 weeks	Moderately recent (70% opacity)
	1 month (4-7 weeks)	Month-old listings (55% opacity)
	2 months (8-11 weeks)	Two-month-old listings (40% opacity)
	3+ months (12+ weeks)	Oldest active listings (25% opacity)
	Sold Properties	Properties marked as sold (grayscale filter + 15% opacity)
	Redfin Suggestions	Properties suggested by Redfin's algorithm (— found value)
	Hidden Properties	Properties with "Hide" column checked in the Google Sheet
	Home	Our current home in North Oakland

## Healthcare

Icon	Type	Description
	Kaiser Medical Centers	Large comprehensive facilities with hospitals
	Kaiser Medical Offices	Smaller outpatient clinics and primary care

## Coffee Shops

Icon	Type	Description
	Starbucks	Starbucks Coffee locations
	Peet's Coffee	Peet's Coffee & Tea locations

## Retail Stores

Icon	Type	Description
	<b>Target</b>	Target retail stores <sup>1</sup>
	<b>Container Store</b>	The Container Store locations
	<b>Costco</b>	Costco Wholesale warehouses
	<b>Total Wine</b>	Total Wine & More stores
	<b>Walmart</b>	Walmart retail locations <sup>2</sup>

## Hardware Stores

Icon	Type	Description
	<b>Ace Hardware</b>	Ace Hardware stores
	<b>Home Depot</b>	The Home Depot locations
	<b>Lowe's</b>	Lowe's Home Improvement stores

## Grocery Stores

Icon	Type	Description
	<b>Albertsons</b>	Albertsons grocery stores
	<b>Whole Foods</b>	Whole Foods Market locations
	<b>Safeway</b>	Safeway grocery stores
	<b>Trader Joe's</b>	Trader Joe's grocery stores
	<b>Raley's</b>	Raley's supermarkets
	<b>Bel Air</b>	Bel Air Markets
	<b>Nob Hill</b>	Nob Hill Foods stores

## Climate Data

Climate data helps understand long-term weather patterns for each area. The map displays temperature and precipitation using smooth heatmap overlays with comprehensive hover information.

Layer	Data Type	Description
	<b>Temperature</b>	Average patterns across the region using NOAA climate normals (2006-2020)
	<b>Precipitation</b>	Annual patterns using NOAA climate normals (2006-2020)
	<b>Wind</b>	Average wind speed and direction patterns using NREL data (2001-2020)

## Hover Information

### Temperature

- Annual, Summer, Winter temperature data
- Low (minimum), Avg (average), High (maximum) values for each period
- All temperatures shown in degrees Fahrenheit

### Precipitation

- Annual total precipitation in inches
- Summer and Winter seasonal averages

### Wind

- Seasonal wind speeds (Winter, Spring, Summer, Fall) in miles per hour (converted from m/s)
- Prevailing wind directions using 16-point compass rose (N, NNE, NE, etc.)
- Vector-averaged directions (meteorologically correct averaging)
- Visual wind arrows showing both speed (color intensity) and direction on the map
- Relative windiness compared to North Oakland home location using quintile-based rankings

Climate data comes from [NOAA Climate Normals](#) for temperature/precipitation (2006-2020) and [NREL Wind Integration National Dataset](#) for wind patterns (2001-2020).

## Climate Comparison System

The climate popups include a “Relatively” column that compares each location’s climate to our current home in North Oakland (37.854, -122.271). This provides personally meaningful context for house hunting decisions.

### How It Works

#### Reference Point Selection:

- System finds the closest NOAA climate data point to our North Oakland home coordinates
- All comparisons use this single reference point for consistency
- Provides “compared to home” context rather than abstract regional rankings

#### Quintile-Based Comparison Logic:

The system calculates quintiles (5 equal groups) from all climate data points in the region, then compares each location’s quintile position to our home location’s quintile position.

```
// Temperature & Precipitation Quintile Logic
Much Colder/Dryer: ≥ 2 quintiles below home
Colder/Dryer: 1 quintile below home
Similar: Same quintile as home
Warmer/Wetter: 1 quintile above home
Much Warmer/Wetter: ≥ 2 quintiles above home
```

## Telecom Coverage

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### Fiber Internet Coverage

Icon	Speed Tier	Description
	<b>1 Gigabit</b>	Standard gigabit fiber connections
	<b>10+ Gigabit</b>	Multi-gigabit fiber connections
	<b>Sonic.net</b>	Sonic.net fiber service (highlighted with blue border)

### 5G Mobile Coverage

Icon	Coverage Type	Description
	<b>5G Mobile</b>	5G NR mobile broadband coverage areas

Data comes from the [FCC's nationwide broadband database](#). Hexagons represent H3 geographic coverage areas.

### Marker Behavior

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- Dynamic Sizing:** All markers scale with map zoom level (larger when zoomed in)
- Z-Index Layering:** Properties on top, then Peet's over Starbucks, then other POIs
- Age-Based Opacity:** Property markers fade over time (newest listings are most opaque)
- Interactive Popups:** Click any marker for detailed information
- Group Toggle:** Control visibility by category (Coffee, Retail, etc.) or individual type
- Smart Property Filtering:** Property visibility follows logical rules:
  - Current only:** Shows current properties (Z/R found)
  - Sold only:** Shows sold properties (Z/R found)
  - Redfin only:** Shows current Redfin suggestions
  - Current + Sold:** Shows all regular properties (current and sold)
  - Sold + Redfin:** Shows all Redfin properties (current and sold suggestions)
  - All checked:** Shows all property types
- Authentic Icon Shapes:** Markers respect their original SVG shapes (Redfin icons show less rounded corners)

# Resources

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## Design & Data

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- **Figma Design File:** [ezzat.com Design System](#) - Contains all custom icons, graphics, and design assets
- **Property Database:** [House Hunt Listings](#) - Live Redfin property data and configuration
- **Mortgage Calculator:** [Monthly Cost Calculator](#) - Detailed monthly payment calculations including Prop 19<sup>3</sup> considerations

## External APIs & Services

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- **Mapbox GL JS:** Interactive map rendering and controls
- **Google Sheets API:** Real-time data synchronization
- **Google Apps Script:** Automated data collection and processing
- **FEMA National Flood Hazard Layer:** Environmental risk data
- **CAL FIRE Hazard Severity Zones:** Fire risk assessment data
- **NOAA Climate Normals:** Temperature and precipitation data
- **NREL Wind Integration National Dataset:** High-resolution wind speed and direction data
- **FCC Nationwide Broadband Data:** Telecom coverage information



# For Developers

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## Customization Guide

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### Adding New POI Types

1. Add data to `/data/stuff.json`
2. Create icon in `/img/icons/`
3. Update POI groups in `js/houseHunt.js`
4. Add checkbox controls in `index.html`

### Customizing Property Data

1. Update Google Sheets column headers
2. Modify server endpoint in `server/server.js`
3. Update popup template in `js/houseHunt.js`

### Adding Environmental Layers

1. Process data to GeoJSON format
2. Add files to `/data/` directory
3. Implement loading logic in `js/houseHunt.js`
4. Add UI controls in `index.html`

## Architecture

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- **Frontend:** Vanilla JavaScript with Mapbox GL JS for the interactive map, SCSS for styling
- **Backend:** Node.js/Express server that serves the frontend and provides API endpoints
- **Database:** Google Sheets for property data
- **Automation:** Google Apps Script for email monitoring and data collection
- **Deployment:** PM2 on a Synology NAS

# How the Email Automation Works

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## Collection Script (Google Apps Script):

1. **Email Monitoring:** Checks `ziadandrebecca@gmail.com` every 30 minutes
2. **Filtering:** Only processes emails from `donotreply@redfin.com` with "wants you to see" in the subject
3. **URL Extraction:** Pulls the property URL from the email body, avoiding social media links
4. **Deduplication:** Maintains a list of processed URLs to avoid duplicates
5. **Basic Storage:** Adds the URL and sender info to the Google Sheet

## Data Scraping Scripts:

6. `redfinUpdateCurrent.gs` : Fast updates for active listings only - skips sold properties, runs every 12 hours
7. `redfinUpdateAll.gs` : Comprehensive updates for all properties - processes 100 records per run, runs every 10 minutes, cycles through entire database
8. `redfinExtractors.gs` : Contains shared utility functions for geocoding and data extraction
9. **Sheet Updates:** All scripts populate the detailed property data in the Google Sheet

# Script Timing & Strategy

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## `redfinUpdateCurrent.gs` - Frequent Updates (Every 12 Hours)

- **Scope:** Only processes properties where `Sold = FALSE`
- **Speed:** Fast execution since it skips sold properties
- **Purpose:** Keep active listings fresh with current prices, status changes, and new photos
- **Why frequent:** Active listings change rapidly (price drops, status updates, new photos)

## `redfinUpdateAll.gs` - Comprehensive Cycles (Batch Processing)

- **Scope:** Processes ALL properties in the database (sold and active)
- **Speed:** Slower, handles 100 properties per run to avoid timeouts
- **Purpose:** Backfill missing data, update historical records, catch edge cases
- **Why less frequent:** Sold properties rarely change, comprehensive updates are resource-intensive

# Key Files

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- `gs/collectHouseListings.gs` - Email monitoring and URL extraction
- `gs/redfinUpdateAll.gs` - Main data scraping orchestrator
- `gs/redfinExtractors.gs` - Individual data extraction functions
- `server/server.js` - Express server with Google Sheets API integration
- `js/houseHunt.js` - Frontend map logic, marker management, and climate popup functionality
- `css/househunt.scss` - All the styling including marker opacity rules and climate popup styling

# Getting Started (Technical)

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1. **Prerequisites:** Node.js, Google Cloud Project with Sheets API, Mapbox account
2. **Clone and install:** `git clone` → `npm install` in root and server directories
3. **Configuration:** Add service account JSON, update Mapbox token, set Google Sheets ID
4. **Run:** `cd server && node server.js` for development, or `pm2 start ecosystem.config.js` for production

## Adding New Features

- New POI types: Add data to `data/stuff.json`, create icon, update `js/houseHunt.js`
- New property fields: Update scraping functions in `gs/redfinExtractors.gs`, modify popup template
- New environmental layers: Process data to GeoJSON, add loading logic to frontend

## CSS Z-Index Reference

The following table shows all z-index values used in the application, ordered from highest to lowest:

Z-Index	Element	Purpose	Location
15000	<code>.mapboxgl-ctrl-top-right</code> , <code>.mapboxgl-ctrl-bottom-left</code>	Mapbox navigation and scale controls	<code>css/househunt.scss:183</code>
12001	<code>#search-results</code>	Search dropdown results	<code>css/househunt.scss:133</code>
12000	<code>#search-container</code>	Search input box	<code>css/househunt.scss:66</code>
12000	<code>#layer-controls</code>	Layer toggle controls (left side)	<code>css/househunt.scss:676</code>
12000	<code>#property-legend</code>	Property legend (bottom right)	<code>css/househunt.scss:136</code>
11000	<code>.mapboxgl-popup</code>	Property and marker popups	<code>css/househunt.scss:188</code>
10500	<code>.mapboxgl-popup.climate-hover-popup</code>	Climate data hover tooltips	<code>css/househunt.scss:198</code>
10000	<code>.mapboxgl-popup.layer-popup</code>	Layer information popups	<code>css/househunt.scss:193</code>
1000	<code>.cleanup-button[title]:before</code>	Clean up button fast tooltip	<code>css/househunt.scss:154</code>
999	<code>.mapboxgl-ctrl</code>	Default Mapbox controls (before fix)	Mapbox GL JS default
100	<code>.mapboxgl-popup</code>	Default Mapbox popups (before fix)	Mapbox GL JS default
10	<code>.mapboxgl-marker</code>	Default Mapbox markers	Mapbox GL JS default
0	<code>.mapboxgl-canvas-container</code>	Map canvas (base map, layers)	Mapbox GL JS default

### Notes:

- All z-index values use `!important` to ensure proper stacking
- Mapbox controls were given the highest z-index (15000) to ensure visibility
- Interactive elements (search, controls) are above informational elements (popups)
- Climate hover tooltips are between regular popups and layer popups for proper interaction

## Footnotes

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1. **Target:** Yes, we are currently boycotting Target because they are [hot garbage.](#) ↵
2. **Walmart:** Walmart is also hot garbage, of course, but are they really worse than Amazon at this point? ↵
3. **Proposition 19:** California's Proposition 19 (passed in 2020) allows homeowners over 55, disabled persons, or disaster victims to transfer their property tax basis to a new home anywhere in the state. This is relevant to us because we can potentially take our current low property tax assessment with us when we move, significantly reducing the property taxes on a new home. ↵