

1. Project Overview

Overview

What: Redesigning a bus shelter

Where: Washington D.C.

Why: Adapt to rising urban heat levels

Goals

1. Health & Comfort: Reduce heat induced illnesses by lowering ambient air and surface temperatures
2. Sustainable Design: Utilize renewable materials

2. Selecting Bus Stop

Ridership Data → Routes

- Total Users (Weight: 1)
- Weekend Services (Weight: 0.3)
- 24/7 / Late Night Services (Weight: 0.1)
- Frequency of buses (Weight: 0.6)

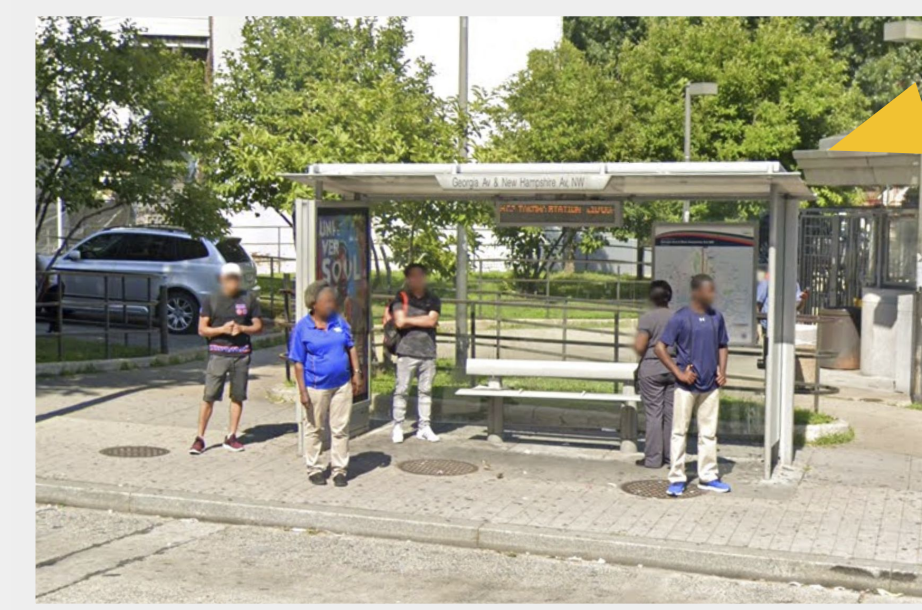
Coverage & Temperature Data → Bus Stops

- Ridership Points (Weight: 0.5)
- Intersections (Weight: 0.5)
- Heat Sensitivity Index (Weight: 0.4)
 - Factors: POC, Poverty, Age, Obesity, Health Issues
- Heat Exposure Index (Weight: 0.6)
 - Factors: Tree Cover, Air Temp, Impervious Surfaces
- Existing Infrastructure (Weight: 1)

Georgia Ave NW & Shepherd St NW (Route 70)



Renderings



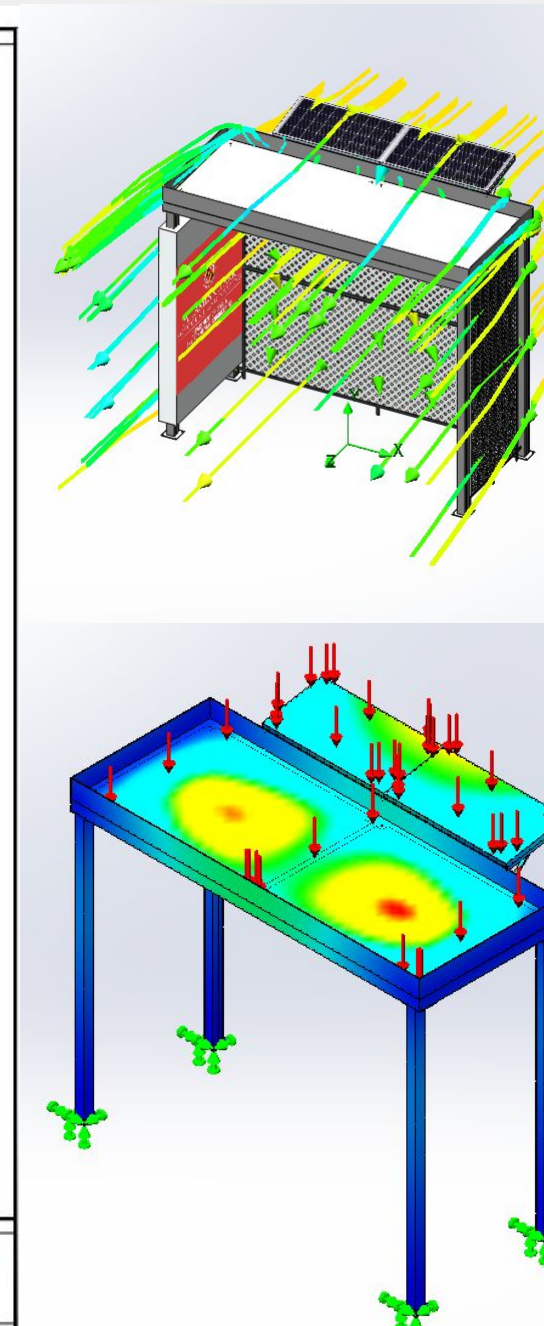
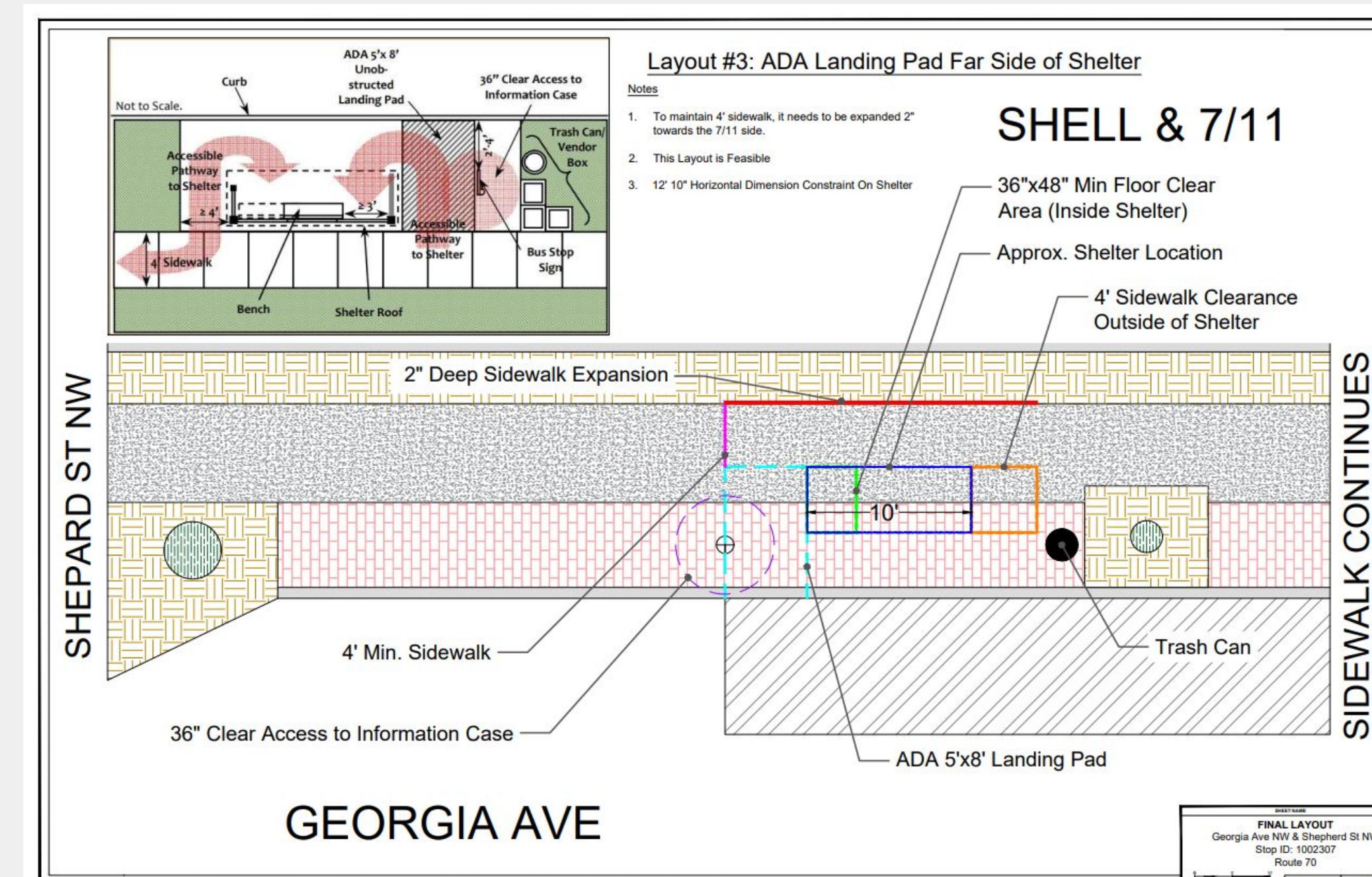
Typical Bus Shelter

- Single Bench
- Glass Sides
- No Cooling Mechanism



Key Design Components

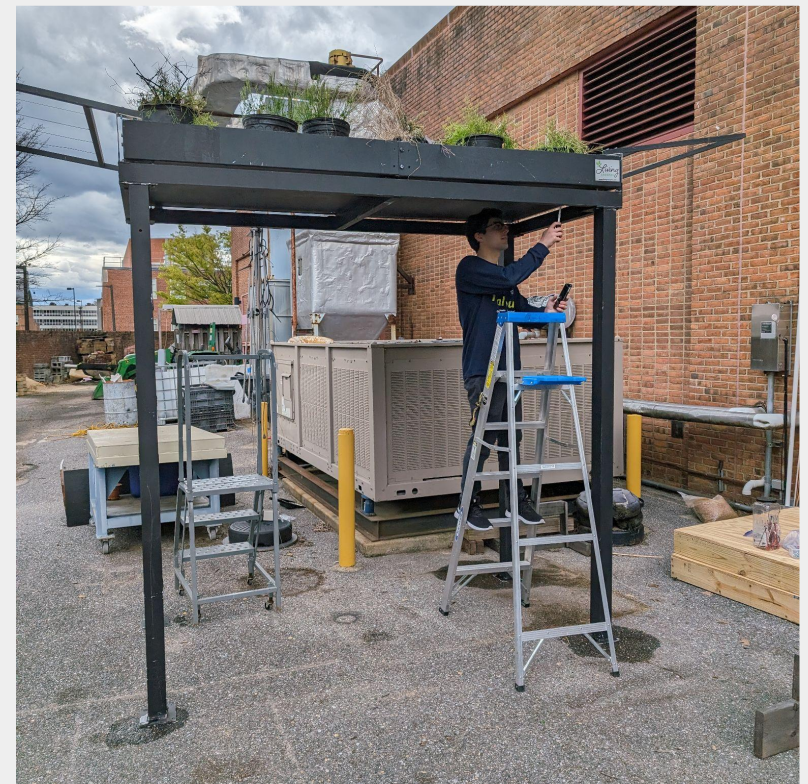
- Green Roof
 - Stormwater | Cooling | Renewable
- Solar Powered Lighting
 - Safety | Sustainable
- Perforated Sides
 - Heat Resilient | Weather Resistant
- Stadium Seating
 - Efficient Space Use | Individualized
- Aluminum Structure
 - Industry Standard | Cost Effective
- Charging Stations
 - Community Center | Solar Powered



3. Interviews

Community Engagement

- In-Person Survey (77 responses)
 - Face to Face Surveys
 - Convenience Bias
 - School Commuters
 - Want Improved Seating



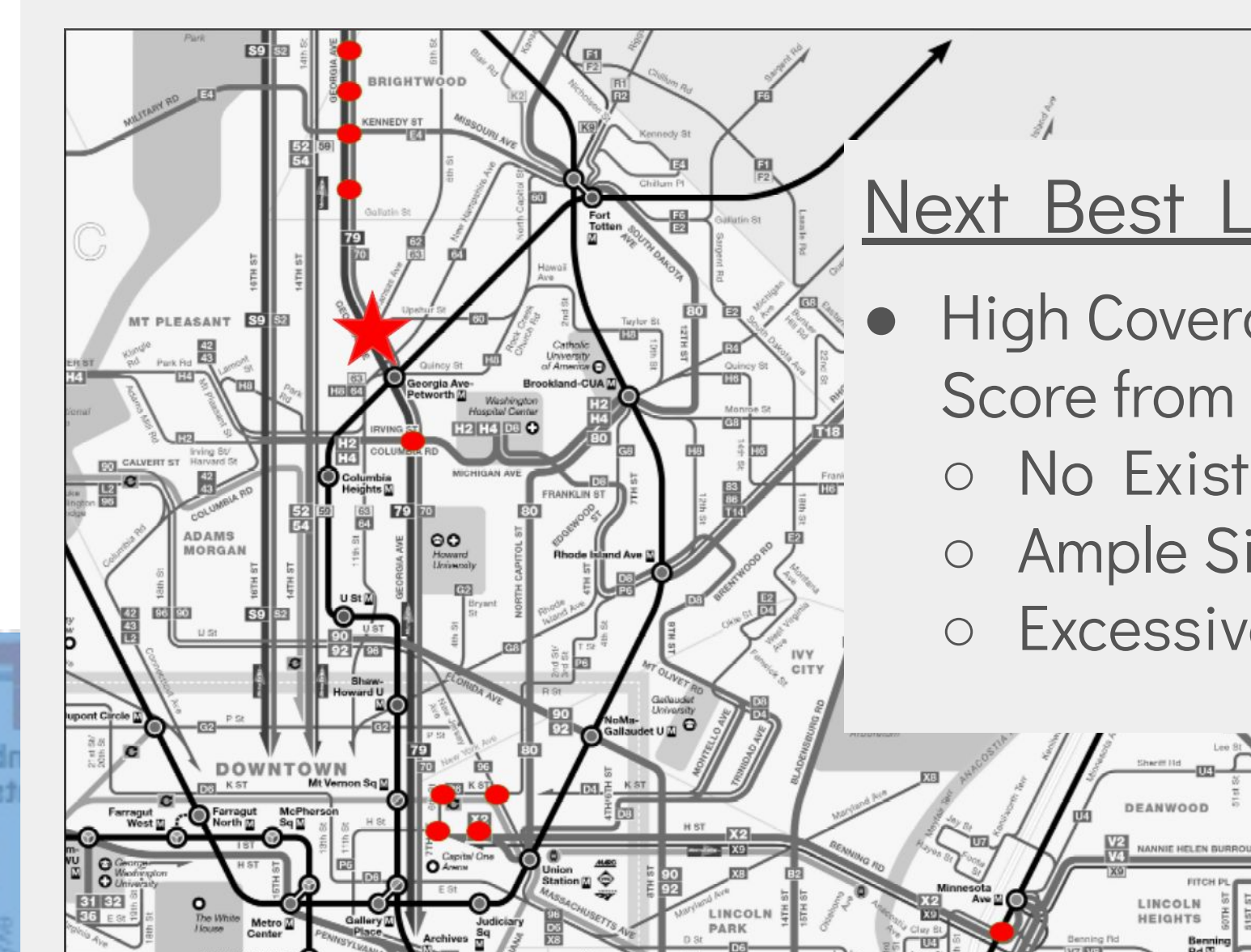
Professionals / Organizations

- WMATA & MTA
 - Costs, Regulations, Feasibility
- Living Canopies
 - Full Scale Model, Design Ideas, Temperature Readings

4. Final Specs

- Temperature Change
 - Expected Ambient Air Temperature Drop: 5-10°F
 - Collected Sensor Readings with Living Canopies
- Renewable Materials:
 - Every Component Recyclable
 - % of Cooling Mechanism Renewable by Volume: 83%
- Installation Costs: \$14,700 (typical: \$10k-\$20k)
 - Structural: \$8,500 | Solar: \$5,000 | Green Roof: \$1,200
- O&M Costs: First 2 yrs: \$650 (for green roof) | After: \$450
- Structural Calculations:
 - Snow Load: 30 psf | Wind: 48 psf | Green Roof: 31 psf
- Stormwater Management: 600 gal. treated annually
- Solar Power: 1.8 kWh daily production
 - 2x450W Panels → Charge Controller → Battery → Inverter
 - 417 tons of CO₂ reduced annually → 90 gas cars

5. Big Picture Application



Next Best Locations

- High Coverage & Temperature Score from Step 2 with...
 - No Existing Bus Shelter
 - Ample Sidewalk Space
 - Excessive Sun Exposure