

Online/On-site

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This mapping-based research and design project studies the digital divide in Detroit, focusing on Internet access in the city's most disenfranchised neighborhoods. As investors pour money into the residential and commercial development of areas like Downtown, Midtown, and Corktown, residents in marginalized neighborhoods lack access to digital infrastructure and the necessary skills to use information effectively once connected. Indeed, despite recent development, Detroit has the lowest rate of Internet connectivity in the United States, excluding thousands of people from the opportunities for education, employment, and belonging afforded to those with the ability to get online.¹ This condition is exacerbated by the economic precarity of many Detroiters, the high costs of individual residentially-based internet access, and uneven

broadband internet service provision throughout Detroit's neighborhoods. Referred to as "digital redlining," some view disinvestment in digital infrastructure for less affluent, non-white communities as commensurate to discrimination. Many of those affected are school-aged kids that need the Internet to complete their homework, submit job applications, or simply socialize with their classmates. While research shows that most teens have some access to the Internet via schools, libraries, or public WiFi connections, young people remain at a severe disadvantage if their households are unable to get online. As various grassroots and political organizations work to build a robust digital ecosystem, and urban development is increasingly influenced by broadband or wireless accessibility, architects and urbanists must critically engage the following

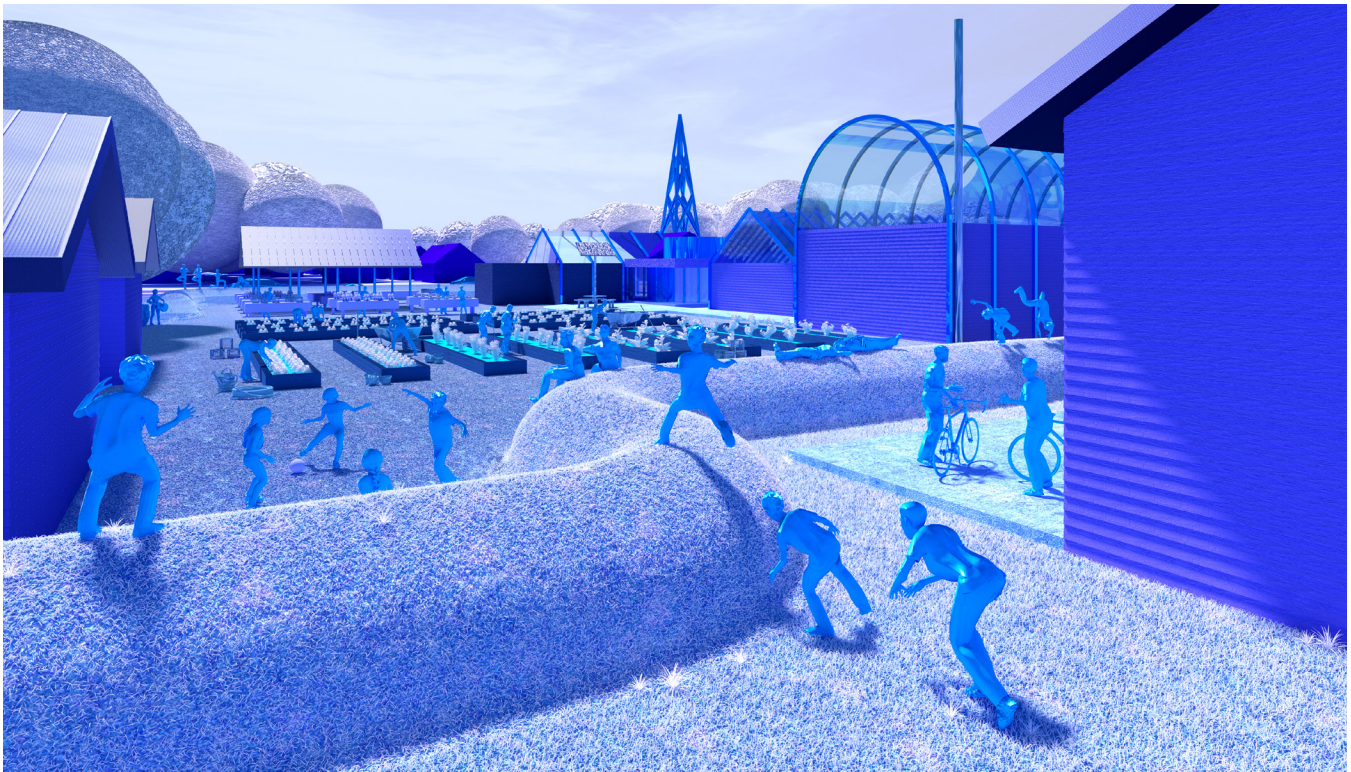


Figure 1. View from Site Speculation # 3 – fiber optic berms that outline new civic spaces for residents to gather in various ways. Cyrus Peñarroyo.

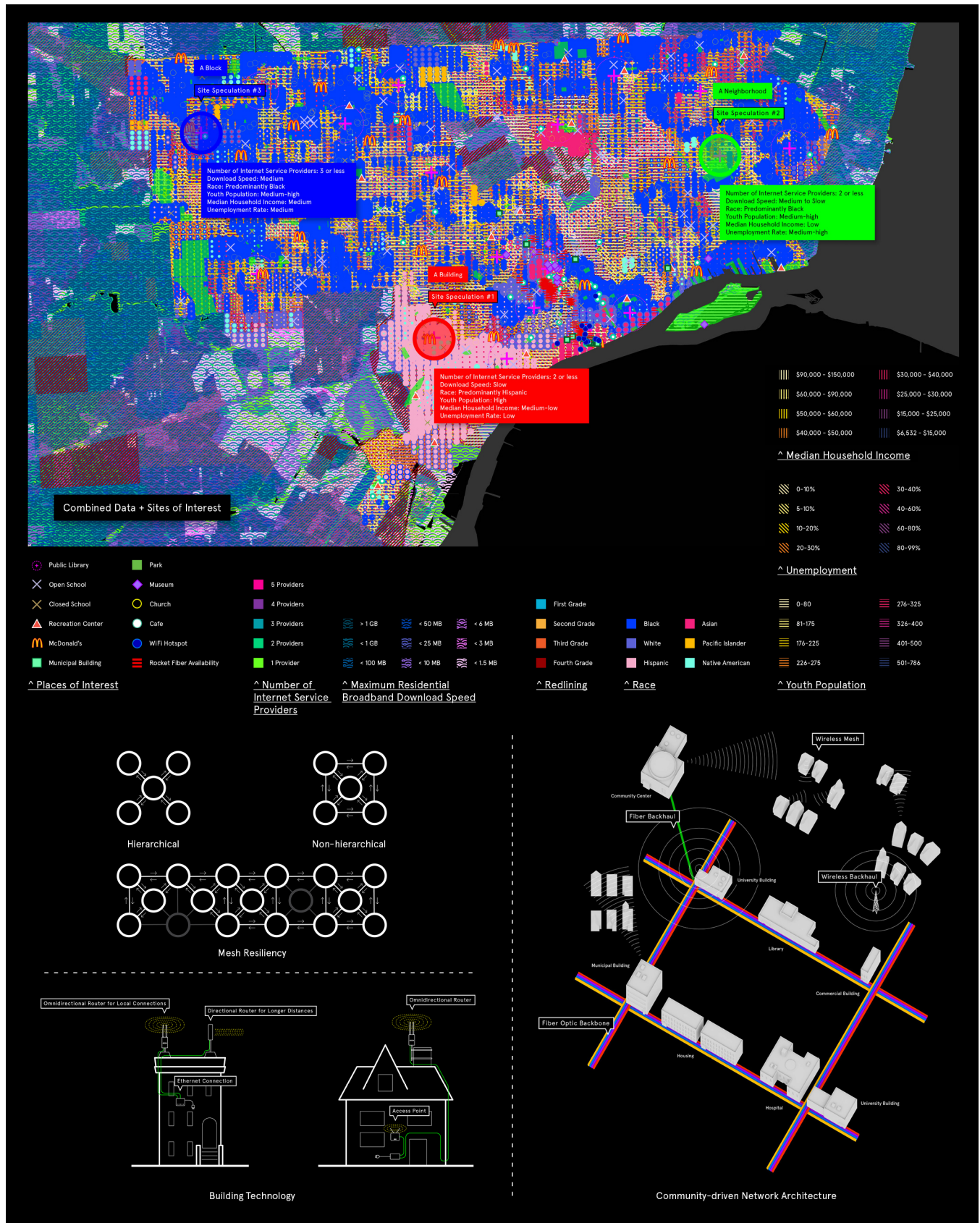


Figure 2. Composite map of Detroit indicating the three site speculations (top) and diagrams explaining how community-driven mesh network infrastructure operates (bottom). Cyrus Peñarroyo, with diagrams redrawn from inverse.com and commotionwireless.net.

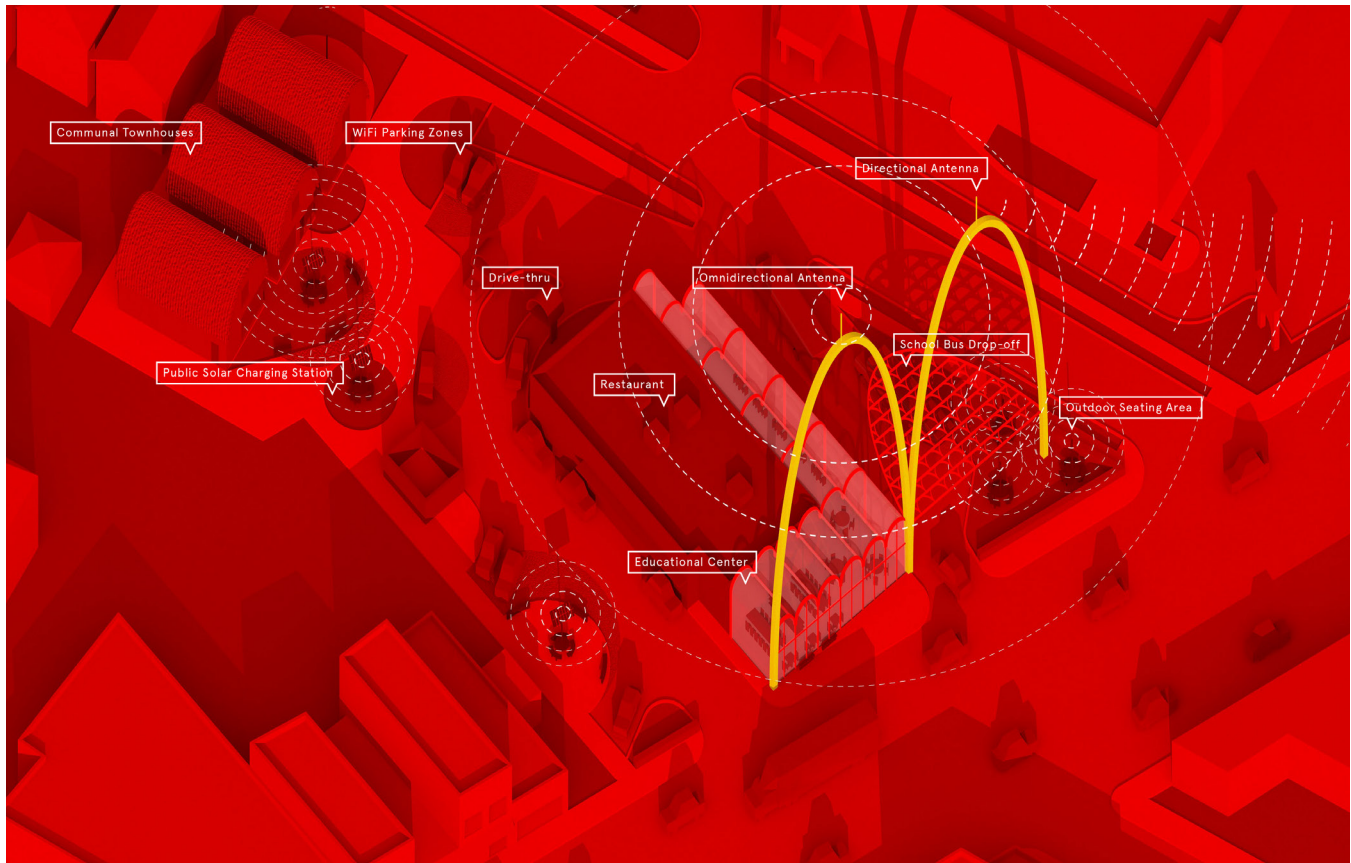


Figure 3. Site Speculation #1: McNet Learning Center – An existing McDonald’s is converted into a community anchor site that provides computers, tutoring services, and workstations to students that need additional time and resources for their education. Cyrus Peñarroyo.

questions: What new egalitarian spaces emerge under this evolving techno-infrastructure? If the Internet fosters a more complex sense of belonging, how is the built environment re-configuring to support nascent social structures and promote inclusion? How does access (or lack thereof) to these virtual networks challenge conventional understandings of public and private space? How do teenagers in the iGeneration occupy or navigate a metropolis that is significantly offline? If citizens are emboldened by access to digital technologies, how might a community-driven network architecture breakdown certain hierarchies and power structures commonly found in the city?

As an alternative to commercial Internet service provision, a community-driven network architecture uses mesh networks and community anchors to redistribute access across a neighborhood. Typically, individual users subscribe to an Internet Service Provider (ISP) like AT&T that supplies top-level Internet exchanges to a region. This hierarchical model is problematic because user access is solely determined by the ISP – if AT&T unexpectedly shuts down, people are forced offline. Mesh networks, on the other hand, connect devices directly to each other instead of relying on a centralized ISP, allowing for more flexibility based on bandwidth and storage availability. Since mesh networks are decentralized and non-hierarchical, the only way to disrupt a mesh is to turn off every single node in

the network, which makes them more resilient to interference. The nodes – referred to as community anchors – include schools, libraries, municipal buildings, and other stakeholders in the neighborhood with the resources, access to fiber, and willingness to form public/private partnerships. In a community-driven network architecture, buildings like factories, apartments, and houses are outfitted with different routers and converted into access points for residents to get online. The placement of the routers is based on line-of-sight, which means that airspace has to be clear of obstructions – including trees and signage – for the network to function. Taller buildings can act as long-span nodes to link different areas of the neighborhood, while shorter buildings can distribute WiFi access more locally and allow people to connect with their phones, laptops, or tablets. In other words, mesh networks are highly attuned to the physical attributes of the urban environment – heights, proximities, and materials play a pivotal role in the network’s success. This research project follows groups like Detroit’s Equitable Internet Initiative who, in addition to steadily establishing meshes across the city, are conceiving a new imaginary for urban connectivity.²

Online/On-site combines publicly available spatial data in G.I.S. with information gathered from interviews of local high school students³ in order to map detailed geographies of digital access



Figure 4. View from Site Speculation # 2 – a ring of duplexes with shared porches that feed off WiFi from a central antenna. Cyrus Peñarroyo.

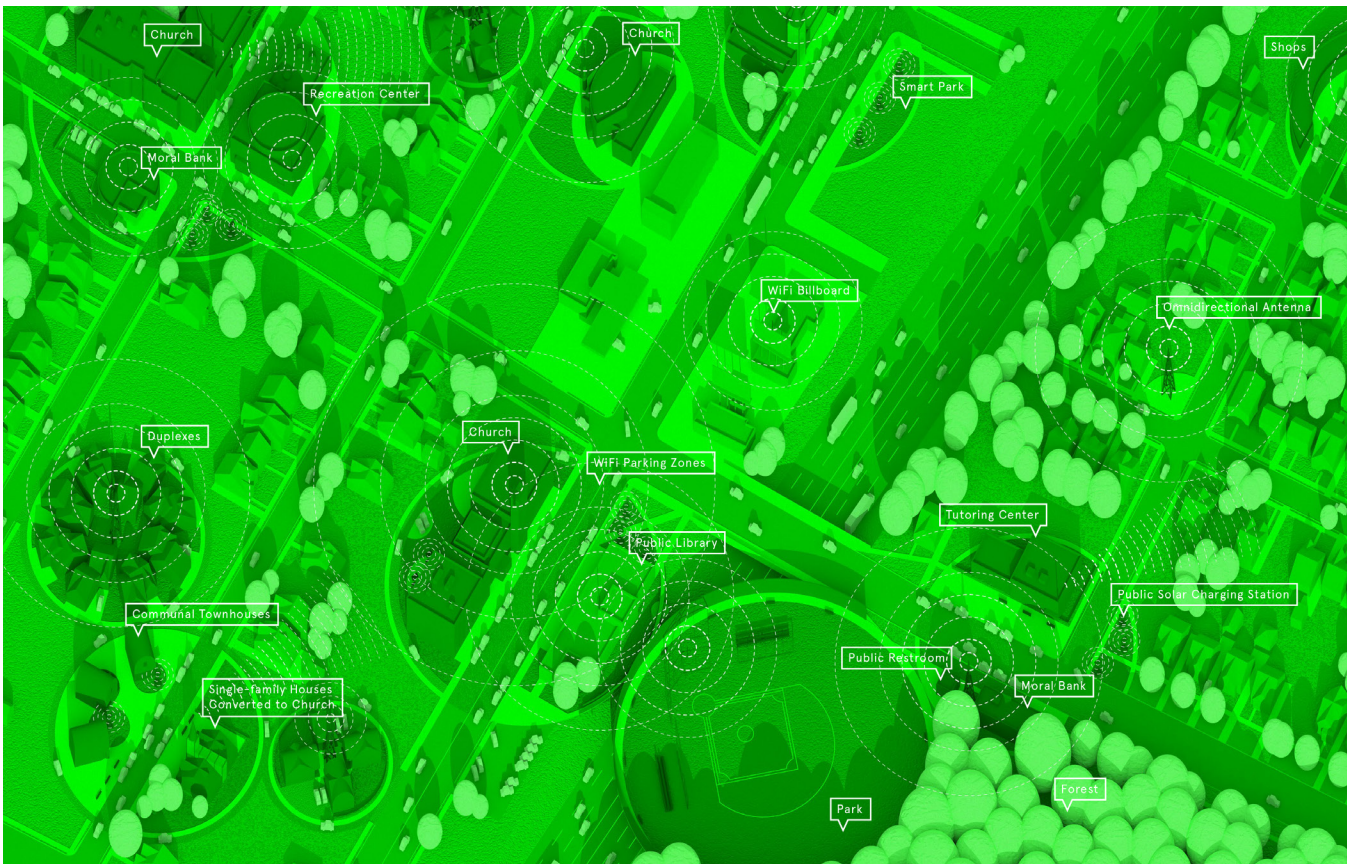


Figure 5. Site Speculation #2: Broad Span Connection – The neighborhood, which has a significant amount of vacant land and housing, is re-envisioned as a network defined by social and cultural programs. Cyrus Peñarroyo.



Figure 6. After reviewing the combined data on Detroit (Figure 2), the three selected sites were studied in more detail, with a focus on the 1/2-mile zone around the public library. Cyrus Peñarroyo

and exclusion across Detroit's neighborhoods. The management of this data does not directly correlate with building form. Rather, the project uses this information to identify latent opportunities for reimagining Detroit's disinvested neighborhoods in ways that enable public assembly and internet connectivity, proposing urban design scenarios that are rich with innovative ways to connect physically and virtually. The project results in detailed maps and design strategies that articulate what would be necessary in order to develop strong community mesh networks across Detroit for internet access. By visualizing these invisible networks, this project hopes to create a heightened sense of community, empower citizens to create new spaces for public discourse in their neighborhoods, and redefine what digital access and equity could look like in the urban environment.



Figure 7. Viewshed diagram hatching areas that are free of obstruction if the public library were to become a mesh node. Cyrus Peñarroyo.

ENDNOTES

1. Abbey-Lambertz, Kate. "Trapped In An Internet Desert, Detroit Teens Struggle To Stay Online," HuffPost, March 29, 2018. Accessed September 6, 2018. https://www.huffpost.com/entry/detroit-internet-teens_n_5abfb34e4b06409775cc5ea.
2. Rogers, Kaleigh. "Ignored By Big Telecom, Detroit's Marginalized Communities Are Building Their Own Internet," Vice, November 16, 2017. Accessed September 6, 2018. https://www.vice.com/en_us/article/kz3xyz/detroit-mesh-network.
3. In addition to Detroit high school students, this project learned from conversations with various community members and representatives from the City of Detroit Mayor's Office, as well as online manuals for DIY mesh infrastructure.



Figure 8. Video screenshot featuring interviews with Detroit high school students discussing their online experiences. Cyrus Peñarroyo.

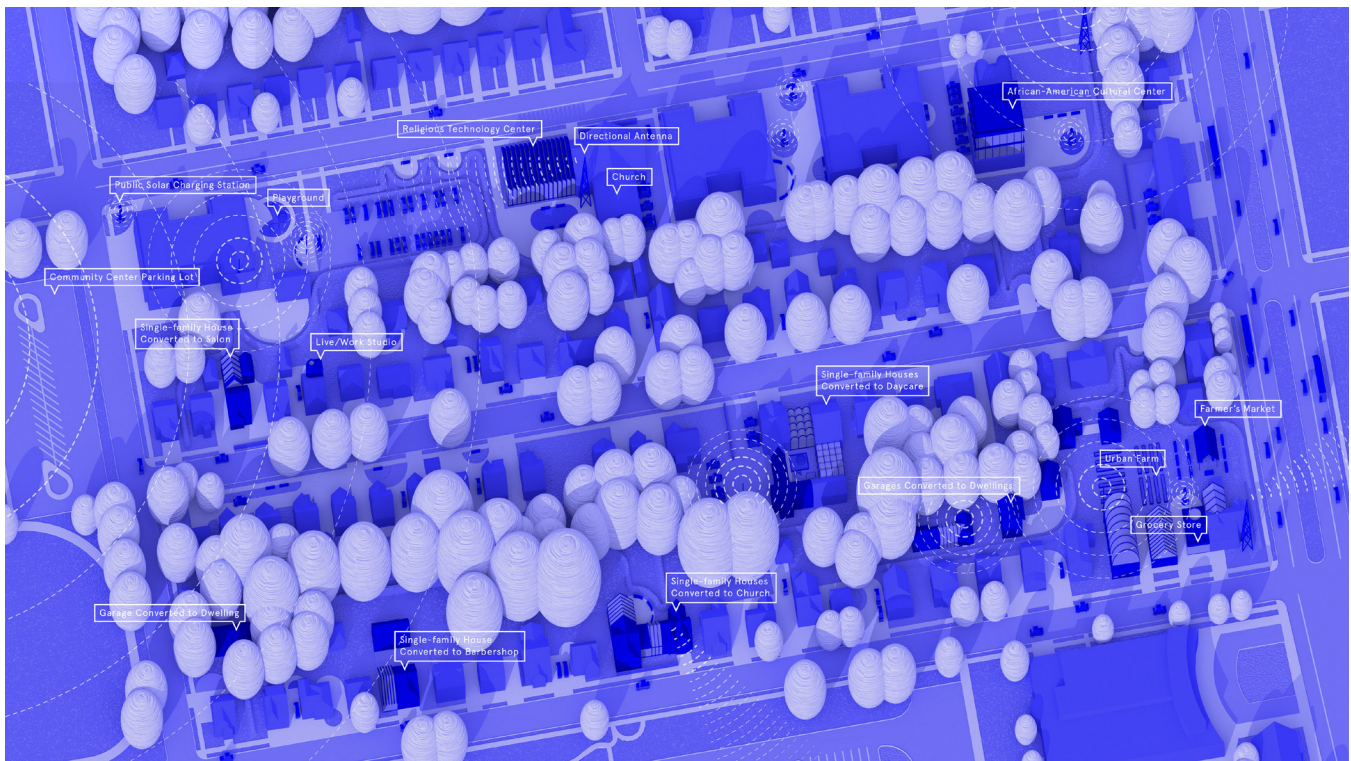


Figure 9. Site Speculation #3: .COM/Land-Trust – Two blocks are developed as a community land trust where property lines are dissolved in favor of shared WiFi and resources. Cyrus Peñarroyo.