Design Considerations for Off-Site COVID-19 Testing Centers

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nrhi Network for Regional Healthcare Improvement

MASS.

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About this Document

This document has been assembled to highlight key considerations and best practices for organizations who are currently operating an OSCTC and those are considering doing so in the future.

The work supports a broader initiative by the Network for Regional Healthcare Improvement (NRHI) , which has been leading a national effort to identify and disseminate lessons and best practices related to COVID-19 testing. As a complement to a larger *toolkit developed by NRHI*, this document focuses specifically on spatial and physical design considerations for COVID-19 testing sites.

These recommendations were assembled by MASS Design Group, a non-profit architecture and research firm with 10 years of global experience designing spaces to promote infection control and maximize positive health outcomes. They draw upon previous COVID-19 infection control guidelines MASS co-developed with healthcare practitioners as well as conversations with industry experts, healthcare providers, and testing site operators. Interviews were facilitated by NRHI, and included a range of testing sites across several different US geographies.

Thank you to the following organizations, contributors, and thought leaders who have lent their insight and support to this resource.

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Christ Community Health Services · UC Health · University Clinical Health · Church Health (care for one another) · HealthSource of Ohio · Wayne State School of Medicine

How is this resource designed to be used?

1. **Are you establishing a new OSCTC?**
   This resource will help you identify which type of site will work best with your community and goals.

2. **Are you improving an existing OSCTC?**
   This resource will help you improve the safety and efficiency of your site, improving overall experience.

3. **Are you expanding services beyond COVID-19 testing?**
   This resource provides a case study that has accomplished that goal.

What is an Off-Site COVID-19 Testing Center?

An Off-Site COVID-19 Testing Center (OSCTC) is a non-traditional, non-medical site for COVID-19 testing.

Since March 2020, over twenty-five thousand testing sites have been set up in the United States. The performance of at least 30 million tests per week nationwide has been facilitated by an industrious and innovative deployment of rapid, flexible, and modular OSCTCs in a range of contexts.

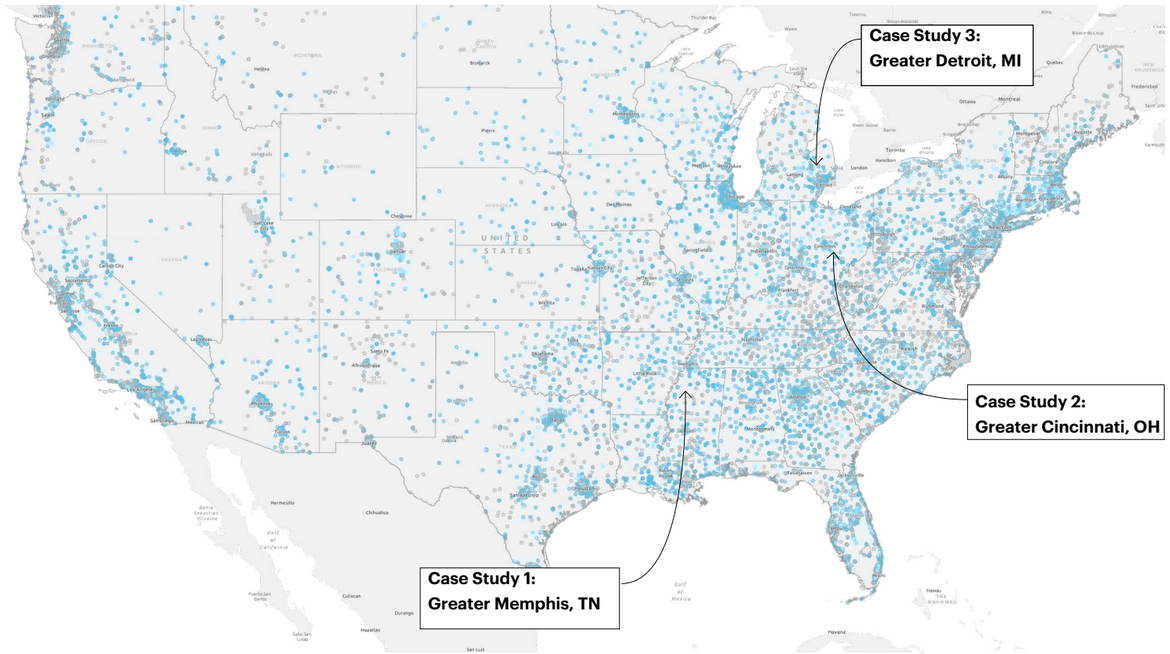
Some OSCTCs are providing community services beyond COVID-19 testing, including clinical consultations, food distribution, and catch-up immunizations. The infrastructure and lessons learned from OSCTCs will be critical to safely and efficiently provide COVID-19 vaccines once they become widely available.

The lack of federal oversight and guidance about testing center setup has required many organizations to recreate the wheel and make iterative improvements themselves, without an outlet for sharing best practices or lessons learned.

More than ever before, we are all attuned to how the design of built spaces affect our health, safety, and morale, as well as the effective delivery of care. The pandemic has highlighted the cracks in our health systems, however, it has also created opportunities to innovate and to develop new typologies of spaces - like OSCTCs that are scrappy, nimble, and resilient as we continue to plan for COVID-19 era and beyond.

Highlighted locations on the map are the three case studies used to develop this document.

Source: GISCorps COVID-19 Testing Sites Locator



Who is Operating Testing Centers?

To meet the immense testing needs across the country, a wide array of organizations are setting up OSCTCs.

Health systems jumped in quickly to establish testing facilities on their own sites. But beyond traditional health providers like hospitals and clinics, a range of other types of organizations have also participated. Some are government-affiliated like the National Guard to fast track execution by tapping into federal funding and set -up high capacity centers, Large pharmacy networks like CVS have also set up over 4000 testing facilities on their premises.

Public Health Department, community based organizations, emergency services, faith based organizations, human services, and others have come together to support successful implementation of testing sites.

Hospitals | **Clinics** | **Federally Qualified Health Centers (FQHC)** | **National Guard** | **Emergency Medical Services** | **Pharmacies** | **Institutions** | **Community Organizations**

Getting Started

Before honing in on a specific site, think through these considerations.

1 Geographic Location

Many regional leaders are using data to identify high risk populations in order to prioritize site location. A variety of data sources including clinical, claims, social vulnerability index, and other sources of SDoH data are used to compile risk scores and matrices.

For more information refer to the NRHI toolkit- *Identify and prioritize the population to be tested*

2 Partnership with “host” in community

It’s important to anchor testing facilities alongside existing community organizations and infrastructure. Understand how different partnerships can help with your specific location and target population.

Refer to NRHI Toolkit section - *Identify and Mobilize Your Partners*

Types of Testing Centers

There are many different types of OSCTCs. This is one way to understand the range of structures and conditions under which testing is being performed across the country.

Access and layout:

How do people get to the site?

Drive-through

At drive-through sites, vehicles queue in lanes and pass through a set of designated testing stations. Each testing station has designated staff who administer the tests.

Drive-through sites are very common for several reasons: they accommodate social distancing and enforce a sense of personal safety; and are capable of being efficient and high capacity when set up well.

Drive-up

In drive-up sites, vehicles pull into designated parking spots, and testers come up to each vehicle to administer the test. Drive-up sites are usually located in parking lots.

Drive-up sites tend to accommodate a smaller capacity than drive-through sites but advantages include: fewer required resources such as space, personnel, and supplies; and a centralized back-of-house support area.

Walk-up

A walk-up testing area can be added to any of the other types of testing sites.

Walk-ups are aimed at expanding testing access to those without access to a car, and for patients arriving by foot or via public transportation. These sites are staff- and resource-intensive as they require continuous monitoring for social distancing, distribution of masks and water for those waiting in line, and screens or seating.

Infrastructural setup:

What physical structures are supporting the testing on site?

Adapted Infrastructure

Some sites leverage converted non-clinical buildings like decommissioned car emissions facilities, car washes, airplane hangers, or warehouses. These sites provide large-scale interior spaces and offer the best weather protection in a fixed setup.

Pop-up

Pop-up sites are usually tent-based and can move to different locations daily or weekly. A pop-up can be set up in a drive-up or drive-through configuration. The term 'pop-up' generally refers to the temporal nature of the site, and how readily they can be moved.

Mobile sites

Mobile testing facilities are centered around a vehicle (usually a large van) that has been fit out with the equipment and resources needed for testing. Mobile testing sites can be easily and quickly moved to different locations, and offer flexibility and accessibility in reaching different communities.

Drive-up [1]

Drive-through [2]
(Adapted Infrastructure)

Drive-through [3]
(Adapted Infrastructure)

Drive-through [4]
(Adapted Infrastructure)

Drive-through [5]
(Pop - up)

Drive-through [6]
(Mobile)

Walk-up [7]
(Pop - up)

Walk-up [8]
(Pop - up)

[1] The Drive Up Model for Mass COVID -19 Testing aka the "Urban Cookie", **Arizona Department of Health Services, July, 2020.** [2] Drive -Through Testing at the VEIP site on Robin Circle in Forest Hill by Upper Chesapeake Healthlink Community Outreach team (Matt Button/The Ageis/ Baltimore Sun Media)**, The Baltimore Sun, April 2, 2020.** [3] "Three tents in a parking garage at UW Medical Center Northwest make up a drive-through corona-virus testing clinic for symptomatic employees." (Jon Hamilton/NPR), **NPR, March 8, 2020.** [4] "Examination tents at the Michigan State Fairgrounds. (AP Photo/ Carlos Osorio)", **The Oakland Press, April 7, 2020.**[5] Christ Community Frayser testing site. [6] Mobile testing set-up in southeast Michigan, **Community Foundation for Southeast Michigan, July 20, 2020.** [7] COVID-19 Testing at Antioch Baptist Church, in San Jose, California (Karl Mondon/Bay Area News Group)", **The Mercury News, May 20, 2020.** [8] Mobile walk-up testing , **School of Medicine News, Wayne State University, April 15, 2020.**

Design Strategies

Balancing design priorities can be challenging. Here are some principles that apply across all types of testing sites.

Streamline and sequence flows of people

COVID-19 testing centers must not only be optimized for efficiency, but also must be laid out in a way that keeps people safe.

- The best way to reduce congestion is to handle registration prior to arriving on site
- Separate designated entry and exit points, supporting one-way flow
- Make a clear route and waiting zone for walk-ins
- Provide an 'off-ramp' in case cars need to exit
- Separate lines/express lines for walk-in vulnerable population who are at an elevated risk of infection and therefore shouldn't be in the waiting line with a symptomatic patient
- The majority of communication, such as information sharing and registration, should be performed prior to arriving at the testing site.
- Dedicate some spaces for staff parking

Provide spatial cues to reinforce behavior change

Design can help remind users of changes or new protocols and reinforce communication so everyone shares clear expectations. Signs and graphics can help reveal the systems that are working behind the scenes and provide visual cues that the behavior change necessary to prevent contagion.

- Provide markers for lanes and social distancing
- Demarcate risk zones/ staff zones
- Provide clear instructional signage (for example "keep your windows up")

Expand accessibility

Testing is particularly difficult for specific populations including the elderly, people with medical conditions, those with mobility needs, pregnant/single mothers, racial and ethnic minority groups - with different literacy levels.

- Provide information in multiple languages as appropriate, and use visual icons and other communication devices
- Ensure that staff change PPE before testing any elderly visitors
- Provide benches/ seats where elderly can be tested, if arriving as walk-ups
- Consider adding ramps to sidewalks if needed
- Provide separate on call testing next to the entrance or accessible parking area
- Consider providing on-site interpretation support if appropriate

Protect from inclement weather

Testing sites are mainly set up outdoors because the risk of infection transmission is lower outdoors where there is access to fresh air. The outdoor nature of testing facilities makes them susceptible to inclement weather.

- Consider rotating staff shifts frequently to provide breaks
- Orient tents to protect from rain/wind/sun
- Locate sites near trees or natural shade
- Set up tent/shelters that cars can pull up inside or indoor locations like emission check, parking garage, huge warehouses
- Provide fans and heaters on site
- For more considerations refer to NRHI Toolkit section - *Plan for weather extremes*

Prioritize Ventilation and Distancing

Most OSCTCs are set up outdoors because the risk of infection transmission is lower where there is access to fresh air. However, it's still important to make sure that spaces where people interact are well ventilated, with ample space for social distancing.

- If the weather permits, keep tents as open as possible. If tents must be closed on 3 sides to protect against inclement weather, then make sure to leave more space per person.
- In spaces with very little ventilation, consider flushing air out using fans etc in regular intervals throughout the day
- Provide extra ready-to-use shared material that can be sanitized easily -

Minimize surface contamination

Surfaces contaminated with infected droplets can transmit the virus. Minimizing physical exchanges and enacting clear cleaning protocols will not only improve patient and staff safety but also increase trust and comfort levels.

- Make hand washing units or sanitizing stations available at the transition between contaminated and safe zones.
- Use car windshield to communicate information or signage for drive-in patients
- Provide extra ready-to-use shared material that can be sanitized easily - pens, clipboards, laminated information + QR codes

Design for trust

Testing sites must be designed to be thoughtful, clear, and reassuring.

- Make sure you have a well marked entrance, consistent branding and signage
- Staff will be wearing PPE, but may consider wearing Polaroid photo badges to make the PPE less scary and show human faces
- Consider partnering with local government body for security on site
- Identify on-site lighting options for darker hours
- Provide regular schedule for Community awareness
- Partner with a trusted community organization. Refer to NRHI Toolkit section - *Explore a broader role for your OSCTC*

OSCTC Decision-Making Tool

What considerations are most important to keep in mind while designing your site?

Mobility

Is your priority population going to fluctuate geographically over time?

Yes	No
☐	☐
Movable	**Fixed**
Consider using a mobile van.	*Look for a covered facility like emissions center or a parking garage.*

Proximity

Does your priority population have access to their own vehicles?

Usage of public transport should be avoided where possible to minimize infection exposure.

Yes	No
☐	☐
Cars	**Pedestrian**
Drive-through sites minimize transmission by lowering physical interaction between patients and staff.	*Consider arranging transportation, locating the site in a walkable area, or offering at-home testing.*

Other Services

What services are you providing other than COVID-19 testing?

Groceries + Supplies	Blood Tests/ Vaccinations/ Blood Pressure/ HIV Screening/ Other medical services	Social Services (Family Health Navigators, Housing, unemployment, etc.)
On site for a day		
☐	☐	☐
Package should be placed directly in the vehicle trunk - no interaction is required.	*These processes require more time than the usual COVID testing.* ***For drive -through*** *Plan for multiple cars to be parked without blocking the traffic while these tests are being performed.* ***For Walk-in*** *another tent with sitting facility should be considered.*	*This information can be shared with forms, pamphlets and test messages - the patient can remain in vehicle. Requires for the vehicle to be parked for a shorter period of time as compared to medical services.*

Accessibility

Traffic flows

How many people will you be moving through a site everyday?

Locate sites on roads with multiple lanes, so that queues won't block traffic.

0-50	50-150	150-250
☐	☐	☐
1 lane	*2 lanes*	*3 lanes*

Consider number of lanes and possible traffic build-up if capacity doesn't meet demand.

Site flows

Is your testing site spacious and self-contained?

Yes	No
☐	☐
A high efficiency drive-through center may be a good fit.	*If your site is located closely alongside other spaces that remain active for the general public (like a store or library), site flows should be organized to keep testing traffic contained and separate.* *Pre-registration is strongly recommended to avoid congestion.*

Other Considerations:

Utilities

Do you need access to ...

Electricity	Water	WiFi
☐	☐	☐
Consider setting up a generator if access is not available.	*Check if partner sites have bathroom facilities that can be used by staff.*	*Portable WiFi devices are available if there is no local connection.*

Weather

What challenges do you anticipate around weather?

Ice, cold, storms, and wind may mean tents are not reasonable and require identifying semi-permanent structures for testing.

Vehicle oriented testing center to minimize weather effects.

Scheduling can limit the number of patients visiting at a time for walk-up options.

Heat	Cold/ Snow
☐	☐
Consider orienting tents in a way that reduces direct sun and leveraging existing shade on site (eg trees). If using a semi-enclosed tent, consider perforated sides to maximize airflow. *Provide cooled tents, vans, or interior spaces for staff to rest between their shifts.*	*Locate the tents under maximum direct sun.* *If tents will be somewhat closed off, consider tents with high canopies for more air volume, and determine a maximum number of people that can be inside at one time.* *Install exhaust fans with HEPA filters for indoor spaces.*

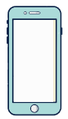
Site Flows

Generally all testing facilities are organized along a standard series of steps that are expanded or condensed depending on the type of facility or specific site constraints.

1 

Entry

The entrance is the access point into the site, marked by a sign and a staff member distributing supplies like masks, water, information pamphlets or instructions on the process.

2 

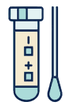
Screening

During screening, a staff member walks up to the car to ask a series of questions to determine a person's risk for COVID-19. They include questions about symptoms being experienced, travel history in recent weeks, and exposure to someone who has been confirmed to have COVID-19. This step is often combined with registration process to reduce the communication or paperwork share between staff and patient.

3 

Registration

The majority of sites require online or phone pre-registrations. In this step a staff member walks up to the car and hands over the paperwork to check the info in the registration form and fill in the consent form.

4 

Sample Collection

This is step is for the actual specimen collection. This is either done by the clinical staff or is self-performed under supervision. There are usually two staff members involved; one conducting the test and other handling the labels and tube for the swab.

5 

Staff Support

Testing sites should have a back-of-house area that is only for staff members. It includes tech support like printers and computers and supplies like PPE, testing kits, and specimen storage.

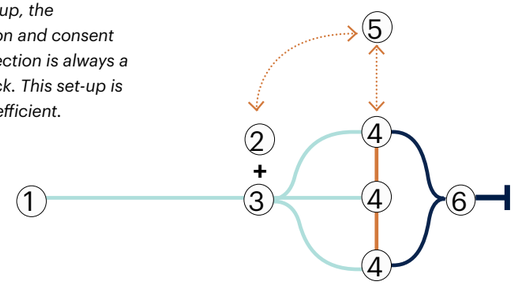
6 

Other Services (Optional)

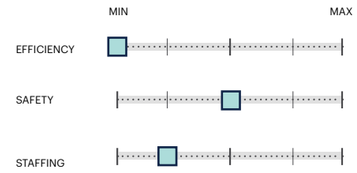
Testing sites may be combined with other community support services including food access or unemployment help, or other medical services including vaccinations, other tests, primary care etc.

Linear Flow

In this setup, the registration and consent form collection is always a bottle neck. This set-up is the least efficient.

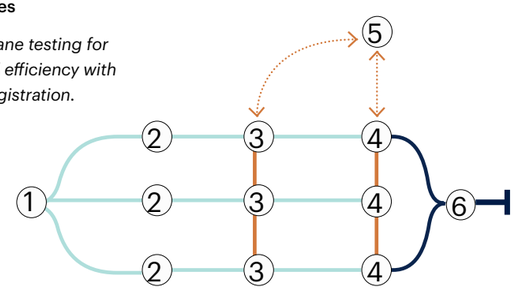


Solution *(This can be applied to any on-site registration site to increase efficiency)*: Dedicate parking spots to complete on site registration instead of combining with pre-registered lane**.** Plan an overtake/bypass lane along step 2+3 in case of glitches in the process for a patient.

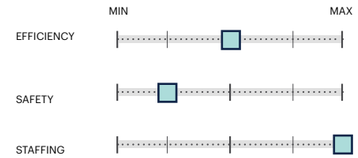


Multi Lanes

Multiple lane testing for increased efficiency with on-site registration.

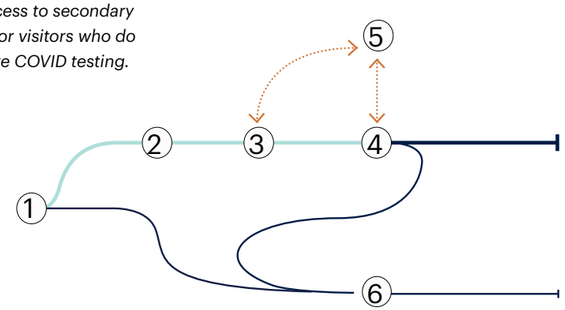


Solution: To reduce staff load maintain staff along one lane for patients that require assistance and for remainder of the lanes provide instructions signage along the path/ instructions on windshield of the vehicle.

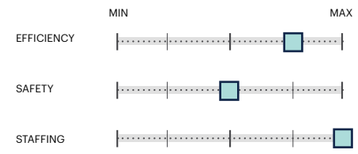


Alternate Flow

Direct access to secondary services for visitors who do not require COVID testing.

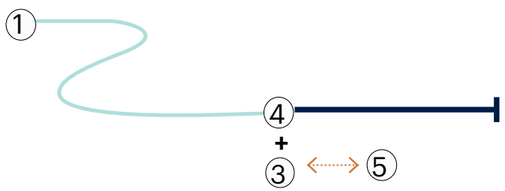


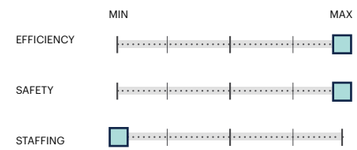
Solution: Staffing can further be reduced by *eliminating the need of helper - provide a desk next to each tester or pockets in PPE in cases where high staff mobility is required.*
Physical screens instead of seating for walk-up facilities to reduce cleaning post each patient.



One Step

This pre-registered model is preferred from efficiency and safety perspective.





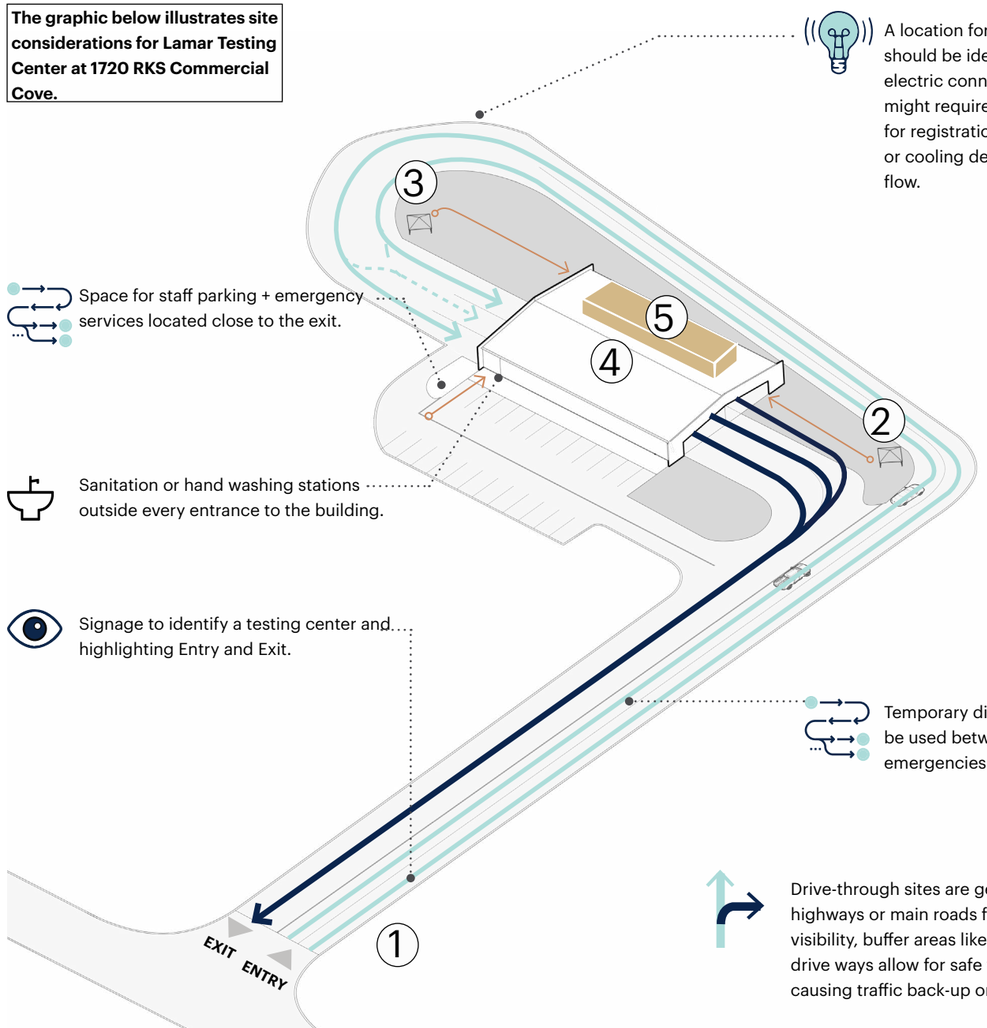
Case Study 1: Retrofitting existing infrastructure for indoor drive-through testing

Car emissions inspection facilities are equipped to be easily transformed into a drive-through COVID-19 testing facility with covered indoor space. Many organizations are developing innovative ideas to prepare for continuity through the winter months. These facilities usually run for the whole day and are prepared for heavy testing loads. Because they are car-based infrastructure, these facilities are almost always close to highways for easy access.

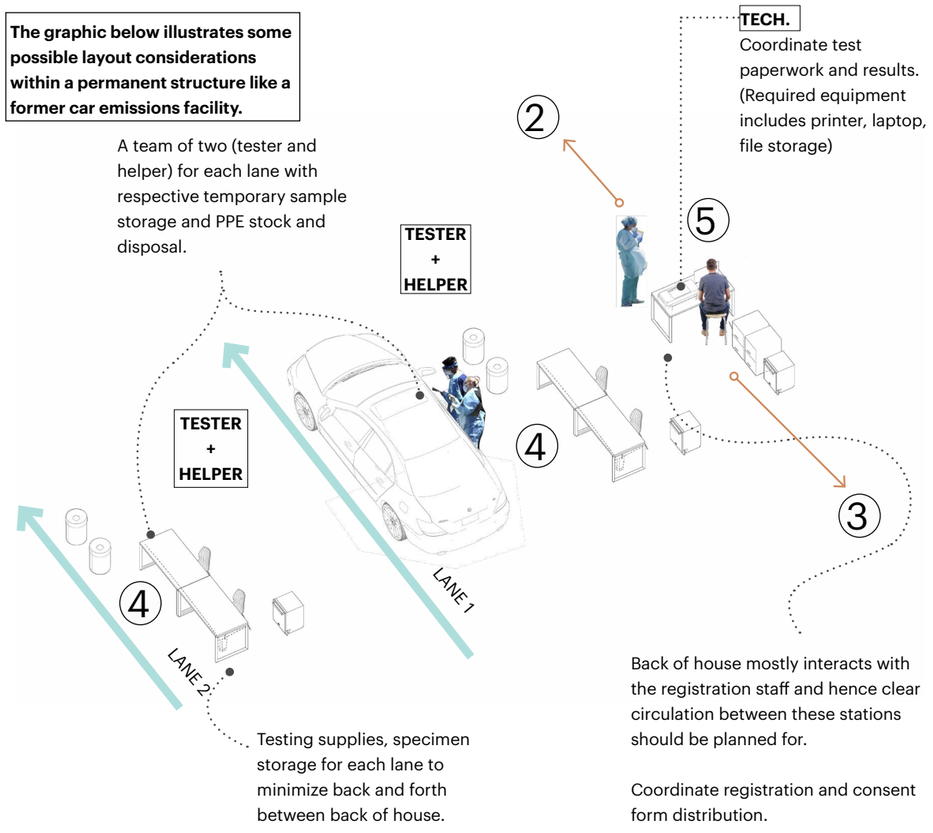
Christ Community Health Services (CCHS), the largest FQHC in West Tennessee - has a network of facilities in Shelby County, providing quality healthcare and spiritual healing to the underserved communities. Over 7 months they have set up 8 testing sites in the county. Their site in Memphis was set up in a decommissioned emissions inspection facility at Lamar Ave to shelter staff from inclement weather.

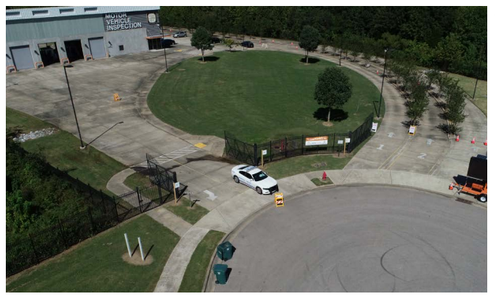
University Clinical Health (UCH), the clinical arm of the University of Tennessee Health Science Center (UTHSC) has partnered with the City of Memphis and the Shelby County Health Department to provide additional testing via CARES Act relief funding and to date, has administered a third of all testing in Shelby County — totaling about 70,000 tests. Affiliation form UTHSC has given access to staff members and lab to sustain these sites. Along with testing at UTHSC for faculty students and patients, they have established four outdoor sites, set up in a parking lot, community park, liberty stadium, event Colosseum. Like CCHS, they have narrowed their community testing site to another decommissioned motor vehicle inspection center at 2355 Appling City Cove.

The graphic below illustrates site considerations for Lamar Testing Center at 1720 RKS Commercial Cove.



The graphic below illustrates some possible layout considerations within a permanent structure like a former car emissions facility.





UCH Vehicle Inspection COVID Testing Center at 2355 Appling City Cove

Possibilities Beyond COVID

The COVID-19 pandemic has driven need-based innovation, and has allowed health care providers to radically rethink current health care infrastructure. As we move through this current pandemic and into the future, we will apply lessons learned. For example, emissions center typologies can transform the next generation of urgent care and health clinics. The drive-through model has proven to be safe and efficient for myriad reasons:

- Decreased interaction between patients (reduce the risk for communicable disease)
- Further expand on patient experience (maximize patient comfort and privacy through eliminating steps like park, walk to the entrance, waiting room)

Christ Community Health Services + University Clinical Health

Organization

Adapted Infrastructure (Drive-through)

Fixed

Semi-Permanent

COVID Testing

Capacity
500
tests/ day
(6 lanes)

Population type
Asymptomatic + Symptomatic

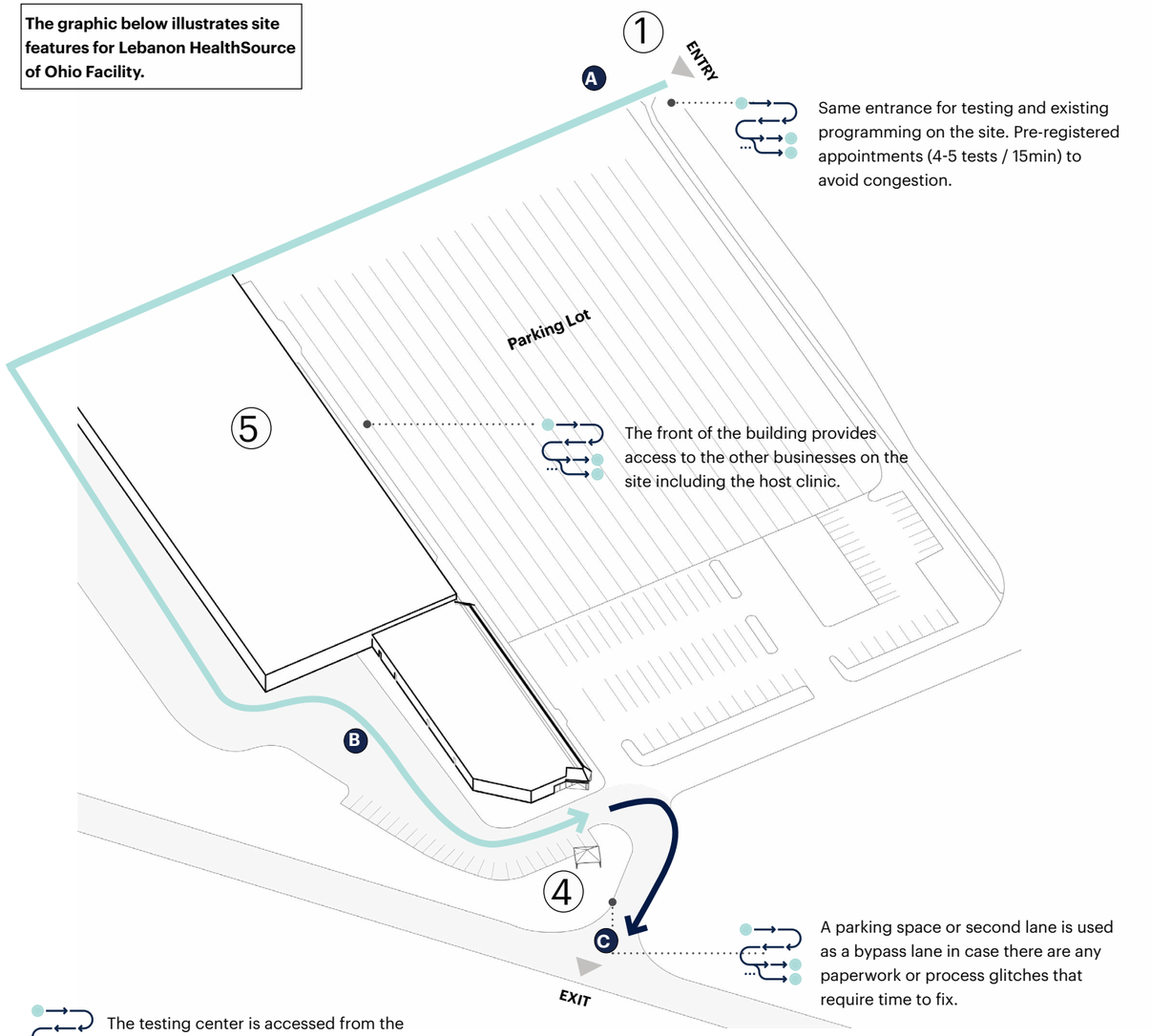
Appointments + on site registration available

Case Study 2: Strategies for running a small testing center with the support of an existing on-site health care center

Many small scale health centers in rural areas are offering COVID community testing only for asymptomatic patients. These locations are typically car-centric due to a general lack of public transport. As the target population is smaller, testing centers in these contexts can dedicate limited resources for a short time period every day and leverage tech support from the parent facility on site (such as printers, and logistics/systems for appointments and test reporting)

HealthSource of Ohio identifies themselves as more of a permanent rural network of testing service due to their geography. In this facility, set up in Lebanon, HealthSource established a testing site on the premises of an existing medical clinic. Their capacity is to run 4-5 tests every 15 min for two hours a day. In order to avoid back and forth between the main facility and the temporary set on the exteriors, they only allow preregistered patients.

The graphic below illustrates site features for Lebanon HealthSource of Ohio Facility.



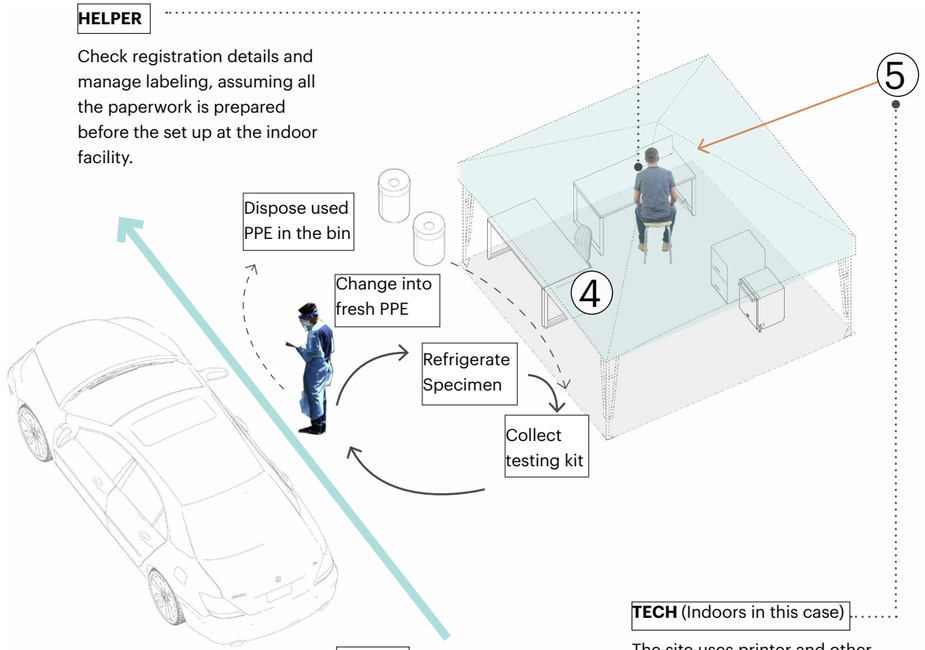


Image above shows the minimal setup required for drive-through facilities. This model can easily be transformed into a drive-up model as well.

◀ Signage is important. Provide clear markers at the entrance and along the route to the testing center. Reiterating steps or safety requirements like “Stay in car” can help reduce the need for additional staff.

HealthSource of Ohio

Organization

Pop-up (Drive-through)

Fixed

Semi-Permanent

COVID Testing

Capacity

25

tests/ day in the span of 1-2 hours

Population type

Asymptomatic

Appointment only

Case Study 3: Strategies for setting up mobile testing units

Mobile van-based testing centers can be deployed at different locations and are particularly appropriate for areas with vulnerable populations - those with limited healthcare access and transportation. The overall approach is to retrofit a vehicle to serve as a fully-mobile back-of-house facility and a source for electricity, WiFi and storage.

Wayne State University Physician Group in coalition with ACCESS and Ford Motor Co. retrofitted Ford vans to develop a model for accessible holistic community health services. The collective believes this model can serve as pop-up clinics/community services beyond COVID and fill the gaps in the present healthcare system in underserved areas.

The graphic below illustrates some possible layout considerations for mobile testing.

Temperature controlled awnings on either sides on either side use heaters and air conditioners to maintain comfortable environment in adverse weather.

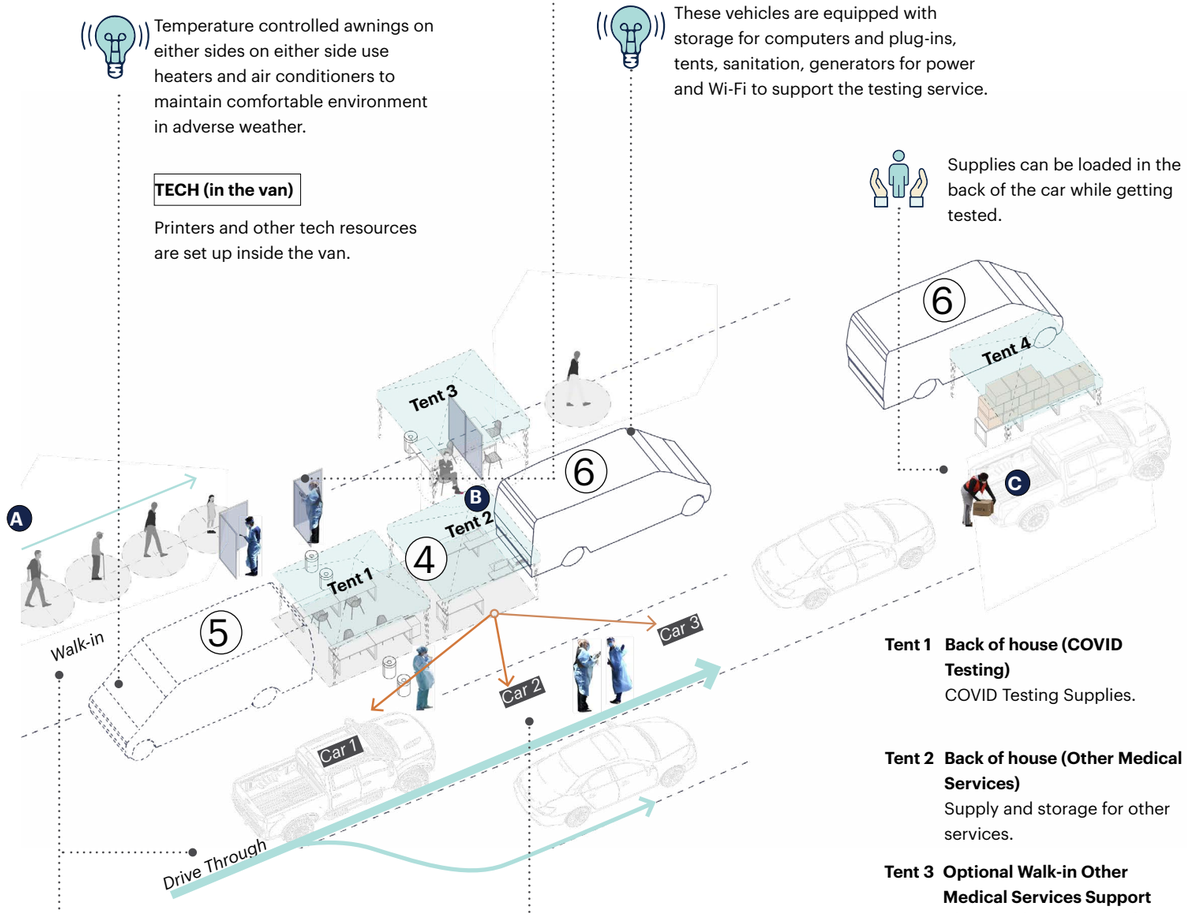
TECH (in the van)

Printers and other tech resources are set up inside the van.

Foldable Acrylic screens with a surface to place a tablet and testing kit to accommodate walk up testing.

These vehicles are equipped with storage for computers and plug-ins, tents, sanitation, generators for power and Wi-Fi to support the testing service.

Supplies can be loaded in the back of the car while getting tested.



The back of house area is in the center, with lanes on either side of the vans. This allows clearly separated walk-in and drive-through access.

Since other medical services will take longer than a COVID test multiple cars access at the same given time and a pass-by lane are critical for efficiency.

Tent 1 **Back of house (COVID Testing)**
COVID Testing Supplies.

Tent 2 **Back of house (Other Medical Services)**
Supply and storage for other services.

Tent 3 **Optional Walk-in Other Medical Services Support**
Chairs and tables to perform tests. Screens for patient privacy and infection control.

Tent 4 **Social Services**
Food can be either directly loaded from the van or depending on the traffic could be another station.

Layout: The constraints of an individual site, projected number of patients, and secondary services determine the layout of this model. The above image demonstrates multiple linear stations, each with its own dedicated service.

Queuing alternatives: Consider providing seats for elderly patients. The tester can go to each patient and conduct the tests easily while maintaining social distance between the patients via assigned seats.

Registration stations are on wheeled stands.

Back of house: Food and useful information can be safely placed in the trunk for the patients.

Safe Supplies: Distribution: Food and useful information can be placed in the truck of patients' cars, minimizing additional contact between patients and staff.

WAYNE STATE School of Medicine

Organization

Mobile

Movable

Temporary

COVID Testing + Other Services

Capacity
100
tests/ day

Population type
Asymptomatic + Symptomatic

Appointment + Registration on site