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SPECIAL REPORT
REVIEW OF THE STATE'S LABORATORY FACILITIES

**State Laboratory Testing Facilities' Needs and
Issues Are at Critical Points**



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PERFORMANCE EVALUATION & RESEARCH DIVISION

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Introduction

The legislative auditor directed the Performance Evaluation and Research Division (PERD) to examine the current conditions of state agency laboratory facilities, the various needs and concerns they have, and determine the best option to address the concerns, including the viability of consolidating state agency laboratories into a single facility. Although this report provides estimates on construction cost of building new laboratory facilities, it does not preclude the need for architectural studies. This report is voicing an opinion on the best course of action to take in terms of whether to construct new lab facilities or co-locate state lab programs at existing facilities, and what are the potential costs of such approaches. **The legislative auditor determines that an independent architectural study will be needed to arrive at the best approach for the State to take.**

In order to assess the current conditions and needs of state lab facilities, PERD toured the facilities of the State's major laboratory testing programs. These include:

- the Department of Agriculture's laboratories located at the Gus Douglass Agricultural Center in Guthrie;
- the Department of Environmental Protection's Air Quality Laboratory;
- the Bureau of Public Health's Public Health Laboratory in South Charleston, and the Newborn Screening Laboratory at the West Virginia Regional Technology Park (South Charleston);
- the Division of Labor's Weights and Measure Laboratory in St. Alban;
- the State Police Forensic Laboratory in South Charleston;
- the Office of the Chief Medical Examiner's autopsy suite and laboratory in Charleston; and
- Public Health's Environmental Chemistry Laboratory in Big Chimney.

In addition to touring the state labs, PERD visited the Kentucky Centralized Laboratory Facility in Frankfurt, Kentucky, and gathered information on other consolidated state labs in the country to determine the benefits of having multiple laboratories under one roof.

Most of West Virginia's Laboratory Facilities Are Relatively Old, Have Insufficient Space, and Were Not Constructed for Lab Purposes.

Every state-owned laboratory facility PERD toured had significant inadequacies and insufficiencies. Nearly all the State's laboratory testing programs are in facilities dating back to the middle of the last century. Not only are they relatively old, but many were not constructed for lab testing purposes. In addition, each of the State's lab testing programs do not have sufficient lab space in their current facilities, and no facility upgrades or remodeling have occurred to maintain modern standards. The lack of space and upgrades has made it difficult to maintain scientific standards under each laboratory's accreditation standards, which in turn, puts at risk current lab testing programs, and precludes the State from conducting new lab testing programs. Finally, some of the lab facilities do not have secure perimeters. These issues have created

significant issues that threaten the viability of the State’s regulatory testing programs. The following sections address these major areas of concern.

Department of Agriculture

The Department of Agriculture has labs within three divisions. The first, is the Animal Health Division which is responsible for operating the United States Department of Agriculture’s disease testing in livestock program. The Guthrie Animal Health Lab receives field samples and conducts 13 different tests to assist the division in its mission to prevent and eradicate disease outbreaks from occurring. Plant Industries is the second division with labs at Guthrie. It operates the Pest Identification Laboratory, which is responsible for:

1) identification of insects, plant diseases, weeds and other pests; 2) information and/or control recommendations on the problems identified; 3) investigation of those problems considered significant from a biological, regulatory or impact standpoint; and 4) maintenance of permanent reference collections of insects, plant diseases and weeds, and their accompanying record systems.

The third lab is the Regulatory and Environmental Affairs Division (READ) which “functions as a consumer protection and consumer service organization with the mission of enforcing laws, rules, and regulations to protect the public food supply.” READ is a member of the National Food Emergency Response Network that integrates the nation’s food-testing laboratories at the local, state, and federal levels into a network that can respond to emergencies involving biological, chemical, or radiological contamination of food. READ also registers pet food, soil amendments, fertilizers, and wildlife feed. The registration process includes testing for the accuracy of content claims made on labels. The Hemp Program regulates all hemp products and hemp vendors in the state, regardless of the hemp’s origin. The Research & Development Section has developed several methods for identifying toxins in foods. For instance, it was the first laboratory in the United States to develop a method and proficiency testing program for the detection of abrin, an extremely toxic plant protein that can be fatal if consumed even in very small amounts.

Agriculture’s laboratories suffer from being in old buildings, not designed to be laboratories. The Gus R. Douglas Agriculture Center in Guthrie was built as a Cold War Air Force base, and later was donated to the State. The buildings that house the labs were originally designed as offices, and part of the READ building was a gymnasium.

All of Agriculture’s labs are running out of space to house equipment and provide adequate workspace for employees. As the pictures above show, workbenches are crowded with equipment and the agency has had to utilize old office furniture to place equipment on. Also, the lack of space and layout of the buildings requires samples to be carried from room to room to go from preparation to testing, as the layout is not conducive to the workflows of the labs. The agency also recently purchased a piece of equipment for testing for foodborne pathogens. As shown in Figure 1 below, the machine is catty-corner to a freezer in the Dairy lab and there is barely enough space between the two appliances for a person to walk through. The agency would like to add a Level-3 Biological Safety Lab (BLS-III) to the READ labs but lacks the space. Even if the space was

available in the building, it would be difficult to retrofit the current building to comply with the requirements for a BLS-III laboratory.

Figure 1
Department of Agriculture Laboratories at the
Gus R. Douglass Agriculture Complex, Guthrie, WV



Decade Built:	1950s	Lab-purposed?	No
Secure Perimeter?	Yes	Adequate Space?	No
Testing Programs:	Animal Disease Diagnostic Tests, Pest Identification, Cooperative Forest Health Protection Plant Pathology, Food, Commercial Feed, Environmental, and Water Microbiology, Dairy, Research & Development (Biothreats), Metals, Agricultural Materials, Seed, Pesticides and Residues, and Hemp/Cannabis		

The Department of Health and Human Resources’ Public Health Laboratory

The Department of Health and Human Resource’s Office of Laboratory Services (OLS) promotes and protects West Virginia's public health by supporting state and local infectious disease control efforts through diagnostic testing, preventing metabolic disorders detectable at birth, and assuring the quality of testing in clinical and environmental laboratories. The agency accomplishes

this goal by providing laboratory testing for programs such as Family Planning, Maternal and Child Health, the Sexually Transmitted Disease Control program, Epidemiology, Environmental Health Services, and local health departments. It also works to improve laboratory performance in West Virginia laboratories through training, information updates, laboratory approval programs, personnel licensure, and consultative services.

Figure 2 shows the Public Health lab facility that is located in South Charleston. The age and location of the Public Health Lab has created several problems for OLS. Built in 1954, the Bureau of Public Health's Laboratory is the second oldest public health laboratory facility in the United States. The building has had few renovations over the years which has allowed the building to become dated. The major components (e.g. the floors, windows, plumbing fixtures) are original to the building's construction. For instance, asbestos is an issue throughout the building. It has been found under the sinks and in the window insulation in the labs as well as in the subflooring under the tiles.

Lack of space is also a significant concern. The Newborn Screening Lab and Environmental Chemistry Lab were relocated due to lack of space. The Newborn lab was moved to the West Virginia Regional Technology Park and the Environmental Chemistry Lab was moved to Big Chimney, West Virginia. The lab director informed PERD's staff that the agency cannot hire the necessary number of staff in certain areas because there is no workspace available. The lack of space also affects testing procedures. For instance, the microbiology lab's testing equipment and sample prep areas are co-located in the same room but should be separate to avoid contamination of samples. However, the agency does not have enough space to put them in separate rooms.

Figure 2
The Department of Health and Human Resources,
Public Health Laboratory in South Charleston, West Virginia



Year Built:	1954	Lab-purposed?	Yes
Secure Perimeter?	Yes	Adequate Space?	No
Testing Programs:	Diagnostic Immunology, Environmental Microbiology, Microbiology, and Threat Preparedness (Biological)		

The Public Health Lab’s HVAC system is also antiquated which impacts the agency’s work. It is difficult to control ambient temperatures in the laboratory because the labs’ windows are single-paned and leak air. The agency has installed window AC units in many of the labs to help maintain the required ambient temperatures required for the testing equipment. In the

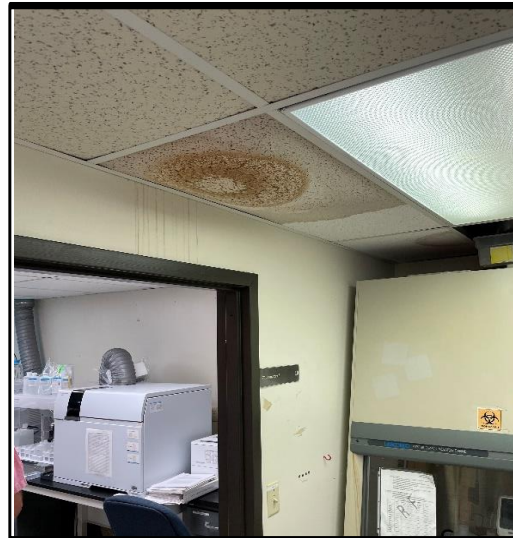
Chlamydia and Gonorrhea section of the Diagnostic Immunology Lab, the staff must use space heaters to maintain adequate temperatures to complete tests. The Tuberculous Laboratory was shut down in October 2020 because the HVAC's negative air pressure system could not be maintained due to gaps in the walls and ceiling. Replacing the hood would be costly and it cannot be repaired. Without the lab, OLS must send out test samples to a private laboratory. The private lab is slow in providing test results. Furthermore, the Tuberculous Lab is antiquated and not ideal for a Level III, Biological Safety Laboratory (BSL-III). The agency is considering options for replacing the lab, and it has received an expression of interest to develop plans for a new lab within the current building.

Office of Laboratory Services' Environmental Chemistry and Medical Cannabis Laboratories

Figure 3 shows the OLS's Environmental Chemistry and Medical Marijuana Testing Laboratories, which are housed in an old elementary school in Big Chimney. The mission of the Environmental Chemistry Section is "to provide the highest quality of analytical testing to identify issues with drinking water quality." The tests conducted by this section includes heavy metals (e.g. lead, copper, and mercury), organic compounds, and wet chemistry (e.g. alkalinity, fluoride, nitrate, sulfate). The Chemical Threat Preparedness lab is also located within the Big Chimney lab. This lab is the counterpart to the Biological Threat Preparedness lab in South Charleston. If a chemical terrorist attack were to occur or if a suspicious liquid or powder is found, this lab is designed to detect and identify the chemical. Finally, the Medical Cannabis lab will test samples from licensed cannabis growers to ensure medical cannabis is free of bacterial and chemical impurities, such as fungal and bacterial contamination, residual pesticides, metals, and solvents. It also measures cannabinoid and terpene levels to ensure accuracy in product labeling. At the time of PERD's visit, the lab was awaiting its first samples for testing.

Figure 3

The Department of Health and Human Resources Environmental Chemistry and Medical Cannabis Laboratory, Elkview, WV



Year Built:	1959	Lab-purposed?	No
Secure Perimeter?	No	Adequate Space?	No
Testing Programs:	Environmental Chemistry (Water testing), Threat Preparedness (Chemistry) and Medical Cannabis		

The building needed significant renovations to convert the classrooms to laboratories and additional changes are still needed. Specifically, the labs need electrical upgrades and additional ventilation installed. In OLS's experience, projects like these typically take about a year to complete at this facility because building modifications require changes to the lease and the new

equipment must be purchased through the Purchasing Division. Both processes are time-consuming.

Theft is a significant concern at this lab. According to the lab supervisor, every tenant in the building has been broken into except for OLS. He also said that several employees' cars had been broken into while parked in the lot outside the building. This is particularly concerning since the Medical Marijuana lab is located within this facility and could become a target of criminal activity in the future.

The Organics and Heavy Metals Lab has several issues. The room must be under positive pressure which makes controlling temperature in the lab difficult since the air in the room is constantly being pulled out of the room. The machinery generates a significant amount of heat that is vented into the drop ceiling above the lab, rather than through the roof or wall. OLS would like to have the machines vented outside the building, but the cost to install an exterior vent is about \$17,000. OLS has installed free-standing air conditioning units to supply additional cooling but better temperature control is needed. The air conditioners in turn create condensation issues in the lab. The roof also leaks in several areas. During the 2016 Elk River Flood, the building did not flood; however, shortly after the flood, part of the building's foundation dropped, creating a dip and crack in the floor.

Public Health's Environmental Chemistry Lab also usually loses power about 14 days a year and does not have a backup power supply such as a gas generator. Following the 2012 Derecho, the building was without power for 10 days. As a result, the Total Coliform Testing section lost all its reagents because the lab could not refrigerate them. Also, anytime the power goes out, any tests that are running must be rerun. Finally, the machinery must reset which can take up to four hours to complete.

Office of the Chief Medical Examiner

Figure 4 shows the facility for the Office of the Chief Medical Examiner (Medical Examiner). The primary functions of the Medical Examiner are to perform death investigations, establish cause and manner of death, formulate conclusions, opinions, or testimony in judicial proceedings, and provide consultations as necessary. The Medical Examiner's facility includes an autopsy suite, where medicolegal autopsies are performed and a toxicology laboratory that supports the autopsy function in determining the presence of toxins that may have contributed to the cause of death.

Figure 4
Office of the Chief Medical
Examiner Charleston, WV



Year Built:	1957	Lab-purposed?	No
Secure Perimeter?	No	Adequate Space?	No
Testing Programs:	Autopsy Suite and Toxicology (associated with autopsies)		

The Medical Examiner’s facility is housed in an office building that required significant retrofitting to add the autopsy suite, cold storage to house decedent remains and toxicology laboratory. The size, configuration, and location of the building are all hinderances for the agency and its staff. The Medical Examiner is not currently accredited due to several issues associated with its facility. According to the agency, the issues include understaffing, and the autopsy suite is undersized for the number of autopsy cases it handles. The accreditation standard for case completion is 90 percent of cases completed within 90 days. Currently, the Medical Examiner’s average completion rate is 240 days which the agency attributes to a high caseload, the lack of

adequate space in the facility, and understaffing. The Medical Examiner administrator informed PERD that:

The autopsy suite is only large enough to safely allow for two doctors and the associated support staff simultaneously, with a target to complete a minimum of four autopsies each, for an average of eight per day during the workweek. The OCME also schedules one doctor on Saturdays who completes an average of an additional four autopsies, for an average minimum of 44 autopsies weekly. The current caseload is averaging an influx of 58 autopsies per week, requiring the physicians to exceed the daily target of eight in order to properly manage the caseload.

Based on the figures presented by the agency, the autopsy suite requires nine exam tables to meet the standard, but the current space only allows for two permanent exam tables and one "mobile" table. All sections of the agency are understaffed, due in part to the lack of space within the facility. For instance, the administrator informed PERD that the Fatality and Mortality Review Section has enough space for five staff, but the agency needs an additional five. Furthermore, the toxicology lab has need for a total of 12 full-time lab technicians, but due to lack of space in the lab, it can only employ five.

Like Agriculture and OLS, the Medical Examiner's Toxicology Laboratory is overcrowded. The lab employees six analysts who are crowded into two small offices. Furthermore, one lab technicians' workspace is in the middle of the lab while a second technician's workspace is on one of the bench spaces (see Figure 4 above). The lab also needs a second biological safety hood and additional work benches. The lack of bench space forces the agency to store equipment in the hoods to free up space on the benches. The technicians also coordinate their schedules to take turns using the available bench space because there is insufficient bench space for all of them to work at the same time.

The Medical Examiner suffers from several issues with its HVAC systems. The building's HVAC and its air handling system that maintain the negative air pressure flow in the autopsy suite are antiquated, and all five of the building's air conditioning units need major repairs to keep them operational. Even when operational, the air conditioning units cannot maintain temperatures adequately in many spaces, so the Medical Examiner runs freestanding air conditioning units in almost every section of the building.

The West Virginia State Police's Forensics Laboratory

Figure 5 shows the facility and labs at the West Virginia State Police Forensic Laboratory. The State Police performs specialized examinations on evidence that is collected during criminal investigations. Services are provided free of charge to all law enforcement entities operating within the 55 counties of West Virginia. The laboratory is composed of seven specialized sections that provide the following services:

- **Seized Drugs Section:** analyzes and identifies samples to determine if they are controlled substances.
- **Toxicology Section:** analyzes, identifies, and quantifies ethyl alcohol, suspected alcoholic beverages, and blood alcohol content level, as well as analysis of urine and blood specimens for the presence of drugs.
- **Trace Evidence Section:** analyzes and identifies ignitable liquids in charred debris and other forms of evidence, as well as primer gunshot residues.
- **Biology/ Processing Section:** analyzes evidence for the presence of biological material on items.
- **Biology/ DNA and Databasing Sections:** performs DNA analysis on evidentiary samples and database samples.
- **Latent Prints Section:** analyzes, compares, evaluates, and verifies friction ridge skin impressions found at crime scenes and on evidence.
- **Firearm/Toolmark Section:** identifies and compares tool marks, firearms, and distance determinations which includes analysis of obliterated marks, fractured, cut, torn items, and impressions. This section also analyzes and compares footwear and tire tread impressions.

The State Police's Forensic Laboratory also does not have the ability to control the air temperature in individual labs, and the types of tests the machinery conducts in many of its labs require specific ambient temperatures to operate. Temperature control was noted as an issue in the DNA, Seized Drugs, and Toxicology labs, and like the other three agencies already discussed, the Forensic Lab is using stand-alone air conditioning units in these spaces.

The building also sits adjacent to railroad tracks that create issues with coal dust and vibrations. Some of the equipment in this lab is also highly sensitive to vibrations, so if a train goes by, the tests in this equipment must be shut down until the train passes. The technicians who maintain the testing equipment noted black dust inside the machines and the source is suspected to be coal dust from passing trains. As far as the agency knows, the dust has not impacted the tests conducted in this lab.

**Figure 5
West Virginia State Police Forensics
Laboratory Charleston, WV**



Year Built:	1970	Lab-purposed?	No
Secure Perimeter?	Yes	Adequate Space?	No
Testing Programs:	Seized Drugs, Toxicology, Trace Evidence, Biology/Processing, Biology/DNA and Databasing, Latent Prints, and Firearm/Toolmark		

Department of Environmental Protection, Division of Air Quality

The Department of Environmental Protection’s Air Monitoring Laboratory operates ambient air quality sampling sites throughout West Virginia. The laboratory analyzes air filters from sampling sites to determine the amount of fine particulate matter in the air. Nearly all air quality monitoring equipment is located at permanent sites, in buildings or shelters designed for monitoring purposes. The 13 sampling sites are in specific locations to assess air quality levels based on population exposure and industry emissions to determine compliance with the National

Ambient Air Quality Standards, background levels, and other special purposes. The lab provides analysis for metals in particulate matter for the National Air Toxics Trends site located in Washington, DC. The lab also analyzes metals for the West Virginia toxics monitoring sites and other participating EPA Region 3 states and local agencies.

Figure 6
Department of Environmental Protection’s Air Quality Laboratory
Guthrie, WV



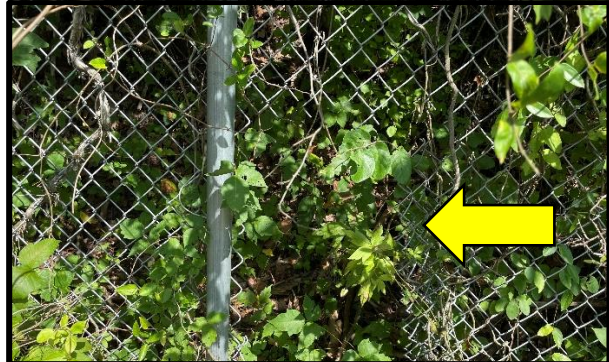
Age of Buildings:	1951	Lab-purposed?	No
Secure Perimeter?	Yes	Adequate Space?	Yes
Testing Programs:	PM 2.5 filter analysis and air toxics metals analysis		

The only issues reported by the staff of the DEP lab were the need for a back-up power supply and the building not being lab purposed. The DEP lab is one of a few buildings at Guthrie that does not have a back-up generator. The building required significant retrofitting to add the required HVAC components to make the sample prep room into a “clean room.” (see Figure 6 above).

The West Virginia State Measurement Laboratory within the Division of Labor

The West Virginia State Measurement Laboratory, within the Division of Labor, houses the state standards of mass and volume. Standards are used to ensure that scales and provers used in commerce are accurate. This laboratory also maintains measurement traceability to the National Standards in Gaithersburg, Maryland. The agency employs certified metrologists who calibrate the weighing and measuring standards. The building that houses the Division’s offices and laboratories was purchased by the Division of Highways in the 1970s. It originally contained offices and a garage. An addition was constructed to the back of the original structure sometime between the 1970s and 1990s.

Figure 7
Division of Labor’s State Measurement Laboratory
St. Albans, WV



Decade Built:	1970s	Lab-purposed?	No
Secure Perimeter?	No	Adequate Space?	No
Testing Programs:	Small Mass, Small Volume, Intermediate Mass and Volume, and Large Mass and Volume		

Security was the most significant issue noted by the lab’s director. For instance, the director stated that someone once rammed the gate surrounding the backside of the building and stole a utility trailer off the lot. He also showed PERD staff holes in the buildings perimeter fence that had been cut by trespassers trying to break into the facility. It should also be noted that rocks have slipped from the adjacent hillside and damaged sections of the fencing. While not necessarily a criminal issue, falling rocks are a threat to both people and equipment on the property (see Figure 7 above).

In 2015, the Weights and Measures building was renovated after the Division's accrediting body, the National Institute of Standards and Technology, threatened to withdraw the division's accreditation unless upgrades were made to the facility. The facility was updated, and the Division maintained its accreditation to date. These updates included rubber floors to improve insulation, and independent temperature and humidity controls for the Small-Mass Lab. The National Institute of Standards and Technology grandfathered the Division from complying with certain requirements under the accreditation standards, but if the agency is moved, the facility must meet the current standards. This included having the Small-Mass Lab built on an independent foundation and installing marble bench tops in the lab to help reduce vibrations. Furthermore, the Large Mass and Large Volume is currently grandfathered for the environmental conditions due to the cost of controlling such a large space but would be required to meet the specifications in a new lab. The Weights and Measures lab also did not have a back-up generator for its facility but had bids out for two at the time of PERD's visit.

Summary of Basic State Lab Conditions

Table 1 is a summary of the basic conditions of the seven state laboratories. These labs are in relatively old buildings ranging from 40 to 90 years old. The only lab-purposed facility is the Public Health Laboratory, which is also the oldest building of these lab programs. Operating from within a facility that is not lab-purposed creates inefficiencies and problems that can compromise lab testing. Some of the labs have secure perimeters but others do not. While all the state labs have various security access measures, some of the buildings are in close proximity to residential or well-traveled areas that expose them to unsafe activities. With exception to the Air Quality Laboratory, each of the State's labs have inadequate space.

State Laboratories	Year/Decade Constructed	Lab-purposed?	Secure Perimeter?	Adequate Space?
Agriculture Laboratories	1950s	No	Yes	No
Public Health Laboratory	1954	Yes	No	No
Environmental Chemistry and Medical Cannabis	1959	No	No	No
Chief Medical Examiner	1957	No	No	No
Forensics Laboratory	1970s	No	Yes	No
Air Quality Laboratory	1951	No	Yes	Yes
State Measurements Laboratory	1970s	No	No	No

Sources: Information provided to PERD by each state laboratory.

The Issues Identified in this Report Were Cited in a Study 15 Years Ago

In 2005, the West Virginia Chemical Alliance Zone commissioned Battelle Eastern Science and Technology Center to conduct an “Evaluation of Laboratory Services in the State of West Virginia.” The report was released in 2010 with the following intention:

An initial evaluation... to assess capabilities across state laboratories, to identify feasible laboratory reconfiguration options, and to compare these options for short and long-term economic impact. This effort investigated the possibility of integrating and sharing resources, co-locating laboratory functions, and pursuing revenue generating opportunities to optimize use of state assets for public safety and health.

The Battelle study reviewed the conditions and needs of West Virginia state-owned laboratories and provided recommendations to maximize the operations of the testing programs. The Battelle report states that “Nearly unanimous input from responding personnel highlighted the need for facility and infrastructure improvements, additional space, increased physical security, equipment upgrades, personnel recruiting and retention solutions, modernization of laboratory procedures, and data management.” West Virginia’s state-owned laboratories continue to face the same issues identified 15 years ago.

With the Need for Lab Upgrades at a Critical Point and State Agencies Developing Lab Expansion Plans, a Coordinated Approach Is Needed for Cost-effectiveness

With the deficiencies in the State’s labs reaching a critical point, some agencies are developing proposals for new facilities or renovations to their lab spaces. The West Virginia State Police has been in discussions with an architecture firm to develop plans for a multiphase renovation. The first step is a \$3.7 million dollar renovation, which will include adding office space and upgrades to the electrical system and a new fire suppression system. The remaining plan will cost about an additional \$5 million to \$6 million, and up to \$10 million if the building is expanded. An expansion could include additional lab space as well as a third bay to the agency’s garage on the bottom floor of the building.

Using the same architecture firm as the State Police, the Department of Agriculture has completed a Lab Facility Programming and Feasibility Study with the recommendation that a new laboratory facility be built at the Guthrie location. The estimated cost for this project is a little more than \$39 million which includes site development costs, equipment, and contingencies. The estimated cost per gross square foot (GSF) for the lab space is \$620.

Table 2 below shows the gross square footage of current labs and the needed square footage as stated to PERD by the agencies or are indicated in the agencies' proposals. The concern with state agencies addressing these needs individually is that the State will invariably spend millions more than if it does not utilize available vacant lab space in the state and consider co-locating laboratory programs.

Agency	Current Lab Square Footage	Needed Lab Square Footage	Estimated Cost
State Police	30,000	37,200	\$10,000,000
Weights and Measures	6,420	6,420	Not Available
Agriculture*	18,647	44,242	\$39,404,651
DEP	2,700	2,700	Not Available
Public Health	36,355	80,589	Not Available
Medical Examiner	18,351	111,390	Not Available
Totals	112,473	282,541	
<i>Source: PERD's tabulations of data reported by state agencies. Data are presented as reported.</i>			

The OCME provided PERD with an analysis of its facility space needs, which are broken down in Table 3 below. The calculations are estimates developed by the Office's administrator based on national standards outlined by the Scientific Working Group for Medicolegal Death Investigation of the National Research Council, and the experience of leadership and staff of the OCME. They are not formal calculations developed by a professional architecture or engineering study. Based on the National Research Council study, the OCME has determined that it should target about 50 square feet per capita of non-autopsy space for a total of roughly 89,000 square feet and about 12 square feet per capita of autopsy space for a total of roughly 22,000 square feet in the autopsy suite. In total, the agency estimates that it needs 111,390 square feet of space to adequately house its programs and staff. Table 3 provides a detailed breakdown for each section of the Office, the estimated space needed, and the estimated number of staff.

Building Sections	Estimated Square Footage Needed	Number of Staff
Physician's Suite	7,396	14
Case Management	8,284	13
Personnel & Customer Service	3,514	11
Maintenance & Custodial Service	5,280	2
Fatality & Morality Review Program	3,468	9
Administration Section	8,654	7
Forensic Toxicology Laboratory	23,694	15
Forensic Investigations Unit	13,160	18
Morgue Technician Section	15,940	11
Autopsy Suite	22,000	--
Totals	111,390	100
<i>Source: Office of the Chief Medical Examiner, "Facility Shortcomings: Caseload Driven Needs."</i>		

Many States Have Consolidated or Co-located Lab Testing Programs

Consolidating or co-locating state laboratory programs is a common approach in many states of the country. PERD identified 16 states and the District of Columbia that have either consolidated or co-located lab programs. Consolidated lab programs involve multiple lab testing programs conducted by one state agency, independent of the agencies that require and request lab tests be performed. Co-located laboratory programs are programs operated independent of each other but located in the same building. Table 4 shows that nine states and the District of Columbia operate consolidated lab programs. Typically, these are public health labs that also test for one or more other agencies including environmental, agricultural, forensics, and medical examiner programs. For example, the Virginia Division of Consolidated Laboratory Services provide lab testing services to the Virginia Departments of Health Environmental Quality, and Agriculture and Consumer Services. PERD identified seven states that have co-located lab programs in which agencies share one facility but maintain their independence from each other. These states include Alaska, Kentucky, Minnesota, Nebraska, New Jersey, North Dakota, and Wyoming. Kentucky's co-located facility is described below in greater detail.

Table 4
States with Consolidated or Co-located Laboratory Facilities

State	Lab Program 1	Lab Program 2	Lab Program 3	Lab Program 4	Consolidated/ Co-located Agencies*
Alaska	Public Health	Medical Examiner			Co-located
Delaware	Public Health	Environmental	Agriculture		Consolidated
Hawaii	Public Health	Environmental	Forensic		Consolidated
Kentucky	Public Health	Environmental	Medical Examiner	Forensic	Co-located
Minnesota	Public Health	Agriculture			Co-located
Nebraska	Public Health	Agriculture			Co-located
Nevada	Public Health	Environmental	Agriculture		Consolidated
New Jersey	Public Health	Environmental	Agriculture		Co-located
New Mexico	Public Health	Agriculture	Environmental	Medical Examiner	Consolidated
North Dakota	Public Health	Environmental			Co-located
Rhode Island	Public Health	Forensic	Medical Examiner		Consolidated
South Dakota	Public Health	Environmental	Forensic		Consolidated
Utah	Public Health	Forensic	Medical Examiner		Consolidated
Virginia	Public Health	Environmental	Agriculture		Consolidated
Wisconsin	Public Health	Environmental	Forensic		Consolidated
Wyoming	Public Health	Environmental	Forensic		Co-located
D.C.	Public Health	Forensic	Medical Examiner		Consolidated

Sources: PERD compilation from various state agency websites.

**States with consolidated programs have multiple lab testing programs performed by a single agency. States with co-located programs have lab testing programs independent of each other but located in the same building.*

New Jersey's Public Health, Environmental, and Agricultural Laboratory Facilities is a multi-tenant facility opened in 2011. The facility consists of approximately 165,000 sq. ft. of laboratory space and approximately 35,000 sq. ft. of space for administrative and support services. The facility includes a biological safety lab; a necropsy lab for the detection of animal-borne diseases; a greenhouse for the evaluation and prevention of threats to the state's agricultural resources; and training facilities for personnel. According to documentation obtained from the New Jersey Building Authority, the total cost of the project was \$159,450,000 or \$797.25 per square foot.

The State of Montana also recently began construction of a consolidated laboratory facility for multiple state agencies. In 2017, the Montana Legislature adopted and the governor signed into law HB 661 that established an interim study on Montana state laboratories. The intent of the bill was for the Legislative Finance Committee to direct a study of the long-term future of and possible efficiencies to be gained from consolidating or co-locating the state-supported labs that are currently located on the Montana State University campus in Bozeman. The labs included in the study were the Montana Department of Livestock Veterinary Diagnostic Lab; the Montana Agricultural Experiment Station's Wool Lab; the MAES Seed Lab; the Montana Department of Fish, Wildlife, & Parks Wildlife Lab; the Montana State University Pulse Crops Diagnostic Lab; and the Montana Department of Agriculture Analytical Lab.

The legislative subcommittee considered two options, both of which would include constructing a new facility for some of the agencies and renovating laboratory space for other agencies to move into. The first option would house three laboratories in a new 62,007 square foot facility, and remodel already existing laboratory space for the remaining three agencies. The total cost for the new construction was estimated to be \$39,151,079 or \$631.40 per square foot. The renovations to the existing laboratory building would cost another \$4,173,439. The second option would include constructing a new 49,212 square foot building for two agencies for a total cost of \$31,368,024 or \$637.41 per square foot.

Kentucky's Laboratory Highlights the Advantages of Having a Co-located Facility

Kentucky dealt with a similar situation with its laboratories in the 1990s that West Virginia is currently facing. The Kentucky Centralized Laboratory Facility is a state facility that houses laboratories for the State Police Forensic Services; the Department of Public Health's Division of Laboratory Services and the Radiation/Environmental Monitoring Section; the Department of Environmental Protection's Division of Environmental Program Support; and the Office of the Medical Examiner's Office (see Figure 8 below). Several agencies have additional laboratories around the state; however, the Consolidated Laboratory is the primary lab for each of the agencies listed above. Each agency's labs are in their own section (called "cores") of the building, although the State Police has one lab within the Laboratory Services core. The building is owned and managed by the Kentucky Finance and Administration Cabinet which leases space to the agencies located in the building. The facility was opened in 1994 at a cost of \$41,696,160 with 240,354 GSF of lab and office space. This facility provides an example of how a co-located laboratory could be set up and managed.

Figure 8
Kentucky State Centralized Laboratory
Facility Frankfort, KY

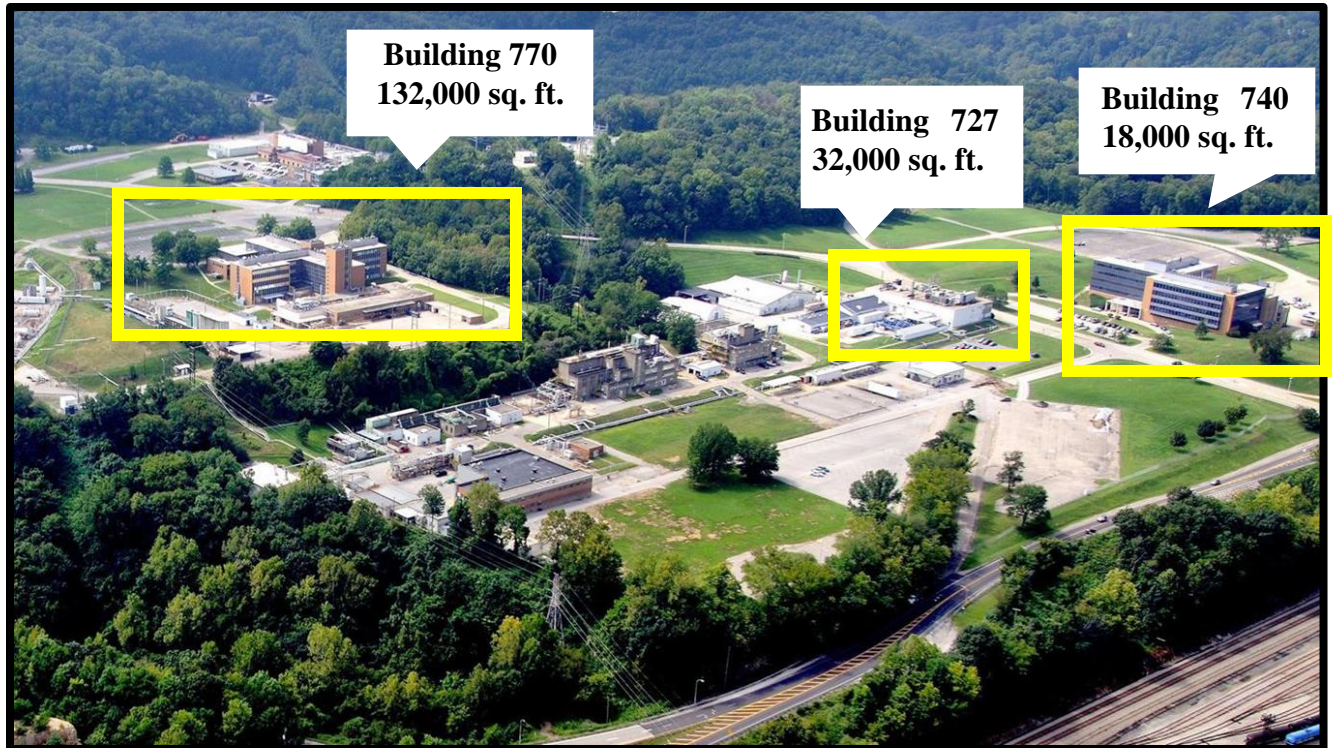


Since the State Owns the West Virginia Regional Technology Park, Co-locating Some of the State’s Lab Programs Is a Logical Approach

Figure 9 below shows an aerial view of the West Virginia Regional Technology Park (Tech Park) in South Charleston. The Tech Park opened in 1949 as the Union Carbide Corporation Technology Center and became Union Carbide’s largest research and development center. Through a donation from Dow Chemical, the Tech Park is owned by the State through the Higher Education Policy Commission. The Legislature established the West Virginia Regional Technology Park Corporation as a 501(c)(3) non-profit organization to operate the Tech Park. As Figure 9 shows, there are three lab-purposed buildings (727, 740, and 770) that each have substantial vacant lab and office space. Building 727 is entirely vacant with 32,000 square feet of lab and office space. Although Building 740 has tenants, it has approximately 18,000 square feet of vacant lab space. Building 770 is entirely vacant with 132,000 square feet of lab space. **Given that the Tech Park is owned by the State, and it has already invested over \$10 million into**

the facilities, as will be discussed below, any strategy to address the State's laboratory needs should include the Tech Park as part of the solution.

Figure 9
Available Lab and Office Space
West Virginia Regional Technology Park
South Charleston, WV

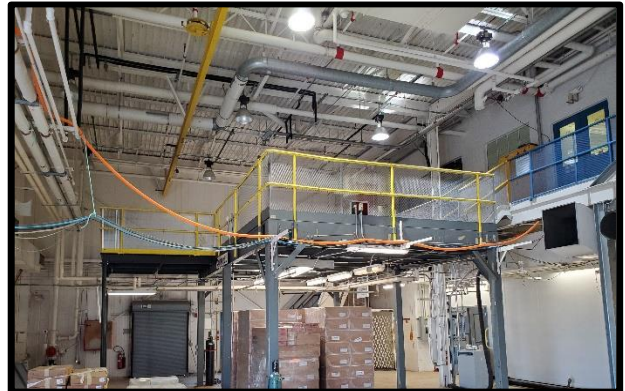
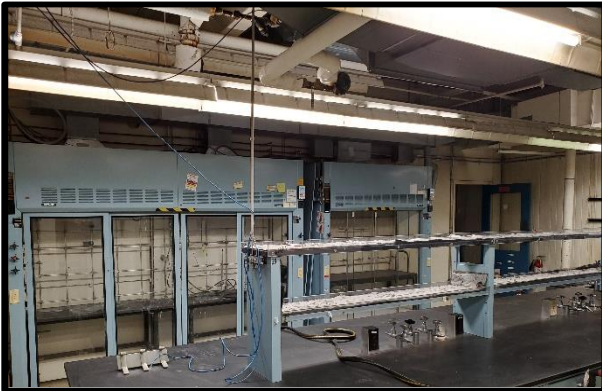


Building 727

Figure 10 shows Building 727. It is entirely vacant and contains a total of 32,000 square feet in office and laboratory space. The building was constructed in 1965 and was used by Bayer as a research and development lab for new foam products until approximately 2013. It includes labs, offices, and a large loading dock with three bays on the first floor. Most of the labs have office space within the labs. This building also has a 18,000 square foot warehouse adjacent to it that is available. The building has been maintained since Bayer vacated the property, but it will require renovations prior to occupancy by a new tenant. According to the executive director of the Tech Park, renovating Building 727 will cost around \$15 million.

The interior of the building has been untouched since the previous owner vacated the property, but the Tech Park has begun the process of rehabilitating it. The Tech Park received a \$10,000 Brownfield Evaluation Grant from the United States Environmental Protection Agency to identify remediation, if present, of mold, asbestos (in the tile and insulation), and lead paint (on the handrails in the stairwells). The total cost for environmental remediation that was identified will cost less than \$90,000. It also needs three of its five HVAC units replaced. The building also needs a new roof. The building has a freight elevator but no passenger elevators. The Tech Park staff were unsure if the freight elevator needs replaced and need to have it inspected. It is also considering the addition of a passenger elevator. The hoods and benches also need to be replaced. The building only has one locker room, and the Tech Park plans to construct a second one. The building also does not currently have a reception area, which the Tech Park plans to add through remodeling the front of the building.

Figure 10
Building 727
West Virginia Regional Technology Park
South Charleston, WV

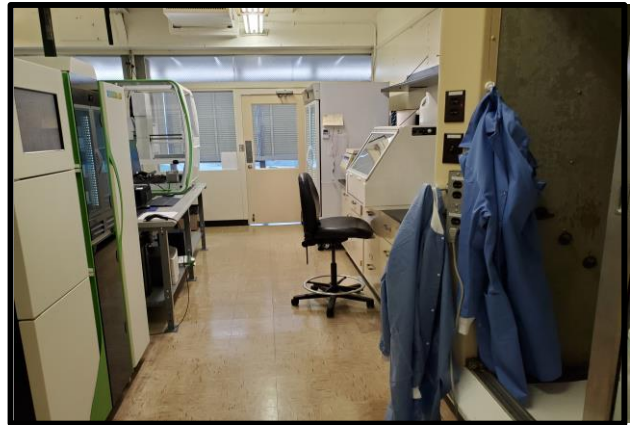


Building 740

Figure 11 shows Building 740 and some of its labs. This building has tenants, one of which is the Department of Health and Human Resources' Newborn Screening Testing Laboratory. The

picture at the top right of Figure 11 is one of the Newborn Screening labs. However, Building 740 has approximately 18,000 square feet of available lab and office space on multiple floors. The two pictures at the bottom of Figure 11 show two vacant labs. The vacant lab and office spaces in Building 740 are move-in ready unless a tenant needs special modifications. This building also has a conference room on each floor.

Figure 11
Building 740
Occupied and Vacant Lab Space
West Virginia Regional Technology Park
South Charleston, WV



Building 770

Building 770 can be seen in Figure 12. The building was built in 1958, it is four stories, and is entirely vacant with 132,000 square feet of which 120,000 is useable for office and lab space. According to the Tech Park's executive director, the building is about 60 percent lab space and 40 percent office space in its current layout; however, the ratio of lab to office space could be adjusted if agencies needed more lab space and less office space.

The Tech Park offers several advantages related to utility services. First, the campus has dual gas suppliers with independent lines that feed the entire campus. Second, the campus also has redundant electrical supplies from separate substations. Third, the water supply has multiple supply lines and can be closed off if there is a break in the line that feeds the campus, while maintaining service to the buildings. Fourth, all the buildings on the campus have access to cable fiber with internet speeds of 100 gigabytes. Finally, snow removal is provided by the city of South Charleston. The utilities are metered by building.

The building includes two passenger elevators in the middle of the building and a freight elevator in the rear. If multiple agencies were to move into this building, the elevators include key card readers that can be set to limit access to each floor only to those with authorized access. All the labs are under positive pressure. It also has a back-up generator.

Figure 12
Building 770
West Virginia Regional Technology Park South
Charleston, WV



Building 770 has been vacant for over a decade, but the Tech Park has invested in improvements to the building while seeking out a tenant for it. The Tech Park received \$11 million in federal and state funds to replace the HVAC and electrical systems around 2015. The funding included \$5.25 million in federal money, \$5.25 million from the State and again, the Park contributed a level of funding, that pushed the total spent to over \$11 million. The work completed included replacing the chillers, boilers, heat pumps, and air conditioning units. The fire suppression system has also been replaced. The main roof has also been replaced and the Tech Park plans to replace the façade on the outside of the building. The building has also been remediated for asbestos. Building 770 needs around \$60 million in additional work before tenants could move in. Some of the smaller roof sections, apart from the main roof, need to be replaced. The windows are

original, and the Tech Park plans to replace them all. The bathrooms on every floor need updated and refurbished.

The Complexity of Laboratory Infrastructure, and the Mechanical and Technical Components Require Architectural and Engineering Expertise to Develop Reasonably Accurate Cost Projections for Laboratory Facilities

Unlike office space, estimating costs for new or retrofitted laboratory buildings is difficult due to the complexity and variation of the mechanical and technical requirements of laboratory infrastructure. Cost drivers typically related to building lab programs, regardless of the type, include space efficiency, security requirements, ADA requirements, blocking and stacking, adjacency requirements, and the functional mix of space. Additionally, laboratories vary in specialized infrastructure requirements, including HVAC, electrical systems, plumbing, and furniture, which impacts the overall cost for constructing or retrofitting laboratories. According to a 2017 publication from the American Institute of Architects (AIA), and the National Council of Architectural Registration Boards (NCARB):

The breakdown of costs can vary widely according to building type. For instance, a standard office building is typically built for between \$80 per square foot and \$150 per square foot, depending on quality and performance requirements. A laboratory building, on the other hand, may cost from \$150 per square foot to more than \$400 per square foot, again depending on quality and performance requirements. The disparity between costs for these two building types is caused largely by laboratory mechanical costs, which alone can exceed \$150 per square foot, especially when extreme requirements of control, filtration, and cleanliness are required.

The AIA's and NCARB's estimates of \$150 to \$450 appear to be on the low end as compared to other estimates found by PERD. The commercial real estate services company, JLL provides a range from \$350 to \$1,325 per square foot as of October 2016. JLL's estimates appear to be in line with the actual costs reported by New Jersey and estimates provided by Montana, both of which were well over \$600 per square foot.

Most agencies reviewed in this report require a mix of space types, both different types of labs as well as office space for staff, which further complicates any cost estimates. Again, the AIA and NCARB provide clear explanations of why the mix of spaces is such a critical factor:

By far the most significant of these factors is the mix of space types required in a building. For example, laboratory space may cost \$400 per square foot, while standard administrative or office space may cost \$100- 150 per square foot. An exact 50-50 program mix in this example would yield a building cost of \$200-220 per square foot. If the same building comprised 70 percent laboratories and 30 percent office space, the building cost would exceed \$300 per square foot.

Laboratory technicians and other staff that work directly in the lab space need adequate office space to fulfill their non-testing job duties, such as data analysis and completing reports. According to best practices, these spaces should be located near but outside the laboratory space. Furthermore, many agencies have support staff that work outside the laboratory space but still need to be in the same building thereby creating additional needs for office space. For instance, the OCME informed PERD that administrative and operational support staff sections of its agency need to be located within the same facility as the forensic pathologists and forensic toxicology staff because their duties support the work of these sections. **To determine an accurate cost estimate the State will require a formal architectural and engineering study for any option it chooses.**

Three Options Should Be Considered by the Legislature and Executive Branch Regarding the Future of State-Owned Laboratory Facilities

Although PERD cannot provide precise cost estimates of building new state laboratories, the following discussion is to provide the Legislature with a range of potential costs for three options to consider. These options are as follows:

1. Build new laboratory facilities for each agency.
2. Co-locate laboratory programs to the West Virginia Regional Technology Park.
3. Co-locate laboratory programs in one newly constructed lab facility.

Each of these options are discussed in detail below and summarized in Appendix A.

The projects presented in the following paragraphs consider the potential cost of construction but not the costs of purchasing land, project planning, or site development. Although the composition of lab and office space is not known at this time, PERD's analysis provides a range of potential costs that likely encompass various compositions of office and lab space. As previously discussed, PERD's review of lab constructions costs found significant variation. For the purpose of this study, we relied on cost estimates that come from actual costs, and costs determined through architectural studies, such as costs from New Jersey lab (\$797.25 per sq. ft.), proposed costs of the Montana laboratories (\$631.40 to \$637.41 per GSF), and estimated costs from West Virginia Department of Agriculture's Lab Facility Programming

and Feasibility Study (\$620 per GSF). Given these cost figures, PERD determined that a range of \$600 to \$800 per square foot would establish a cost interval containing reasonably accurate estimates of the potential cost of constructing lab facilities.

Option 1: Constructing New Laboratory Facilities for Each Agency

Option 1 involves construction of new facilities for six separate laboratory programs. Table 5 below shows projected costs for each facility at \$600, \$700, and \$800 per square foot. These calculations are based on the needed square footage reported by the agencies multiplied by the corresponding square footage dollar amount. Table 5 shows that building separate lab facilities for each of the State's major lab programs could cost between \$169 million to \$225 million.

A major difference between constructing several separate facilities and one building for several co-located lab programs is that economies of scale would likely occur in constructing one facility. It is difficult to measure economies of scale, which explains why the construction cost estimates for Options 1 and 3 are the same. However, if a choice had to be made between these two options, Options 3 would be the better choice because of the expected economies of scale. In addition, having several agencies co-located in one building has advantages of sharing operating expenses.

Table 5
Option 1
Constructing New Facilities for Each Agency's Laboratory Programs

Agency	Agency-reported Square Feet Needed	Construction Cost at \$600 Per Square Feet	Construction Cost at \$700 Per Square Feet	Construction Cost at \$800 Per Square Feet
State Police	37,200	\$22,320,000	\$26,040,000	\$29,760,000
Weights and Measures	6,420	\$3,852,000	\$4,494,000	\$5,136,000
Agriculture*	44,242	\$26,545,200	\$30,969,400	\$35,393,600
DEP	2,700	\$1,620,000	\$1,890,000	\$2,160,000
Public Health	80,589	\$48,353,400	\$56,412,300	\$64,471,200
Medical Examiner	111,390	\$66,834,000	\$77,973,000	\$89,112,000
Totals	282,541	\$169,524,600	\$197,778,700	\$226,032,800

Source: PERD analysis of agency-reported facility needs.
**This includes the agency's proposed immediate needs. It does not include the agency's proposed print shop or expansion lab space.*

Option 2: Co-Locating State-Owned Laboratories at the West Virginia Regional Technology Park

Option 2 involves co-locating state lab programs to the West Virginia Regional Technology Park in South Charleston. Given the circumstances that the State owns the Tech Park, and it has already invested nearly \$11 million into Building 770, it is necessary to maximize the use of the Tech Park's available space. Although the Tech Park has approximately 182,000 gross square feet of vacant lab space (see Table 6 below), that is insufficient to meet all the State's lab needs of over 282,000 square feet. Therefore, a combination of lab programs that can maximize the use of the vacant lab space at the Tech Park should be considered.

PERD reviewed several combinations of state labs into the available facility space at the Tech Park, and the combination presented in Table 6 is the optimal choice. In this scenario, the labs for the Department of Agriculture, and Public Health would be co-located in Building 770 and the Division of Labor's State Measurements Lab, and DEP's Air Quality lab would be co-located in Building 740. This combination of co-located agencies would fill 130,688 square feet of the available space. This scenario leaves vacant 51,312 square feet of space including all of building 727. This unused space is insufficient to accommodate the State Police and OCME lab programs.

The Tech Park CEO estimates that an additional \$50 to \$60 million is needed in rehabilitation work to Building 770, and there could also be additional costs for specific needs that co-locating agencies may desire. The available space in Building 740 is move-in ready according to the Tech Park administrator; therefore, the main cost for co-locating the two lab programs would be dependent on specific needs of the agencies.

Building Number	Available Square Footage	Possible Co-located Agencies	Total Square Footage	Remaining Square Footage in Buildings	Renovation Costs (Incurred and needed)
Building 727	32,000	---	---	32,000	\$15 million needed plus tenants' needs
Building 740	18,000	DEP's Air Quality, and DOL's State Measurements Lab	9,120	8,880	Dependent on tenants needs
Building 770	132,000	Agriculture and Public Health Labs*	121,568	10,432	\$11 million spent; \$50-60 mill needed plus tenants' needs
Totals	182,000		130,688	51,312	\$50 - \$60 million plus tenants' needs

Source: The West Virginia Regional Technology Park, and PERD analysis of agency-reported facility needs.
**Excludes the New Born Screening Laboratory*

Since the Tech Park cannot accommodate all the State's lab programs, the lab needs of the OCME and the State Police forensic program will have to be addressed through creating new facilities or one facility. Kentucky's central lab has these two agencies co-located. Although they are in the same facility, the agencies have separate and independent sections of the building. Although, State Police forensics and the OCME can be co-located in one building, it is the legislative auditor's opinion that consideration be given to keeping the State Police in its current facility, allow it to proceed with its current plan to renovate its building, and build a new, separate facility for the OCME. The building that houses the forensic labs was built around 1970 and was retrofitted for lab purposes. However, the building was expanded in 2000. The planned renovations will address the issues the building has and will provide needed additional space. It is not in the best interest of the State to construct a new building to co-locate the State Police and the OCME when the State Police is in a building that has a section that is relatively recent, lab-

purposed, and can be renovated at an estimated cost of \$10 million. Moreover, co-locating State Police in a new facility will leave the current lab facility vacant of 30,000 square feet on a campus with other state police functions.

Therefore, the State should consider constructing a new facility for the OCME. An architectural study will be needed to determine the appropriate size and estimated costs. The agency estimates the need for a facility of 111,390 square feet. As stated previously, this estimate is based on national standards developed by the Scientific Working Group for Medicolegal Death Investigation of the National Research Council. It may be determined by an architectural study that a smaller facility is sufficient for the OCME.

Table 7 shows the full estimated cost of Option 2. Again, this involves allowing the State Police forensic program to remain in its current facility and proceed with its renovation plans, co-locate four of the State's lab programs at the Tech Park, and build a new facility for the OCME, either at the higher estimated square footage or something smaller such as 75,000 square feet. This option has two ranges of \$126-159 million and \$105-130 million. In either case, Option 2 has a lower estimated cost than Options 1 or 2, particularly if it is determined that a smaller facility is sufficient for the OCME.

Agency	Estimated Costs
State Police – Renovate Current Facility	\$10 Million
Co-locate Agriculture, Public Health, Weights & Measure, and DEP at Tech Park	\$50-\$60 Million
New Facility for OCME (111,390 sq. ft.)	\$66-\$89 Million
Smaller OCME Facility:	
New Smaller Facility for OCME (75,000 sq. ft.)	\$45-\$60 Million
Total Cost (with larger OCME facility)	\$126-\$159 Million
Total Cost (with smaller OCME facility)	\$105-\$130 million

A Recent Architectural Study Performed for the Department of Agriculture Determined the Tech Park to Be a Viable Option for the Department's Lab Programs

The Lab Facility Program and Feasibility Study for the Department of Agriculture includes an evaluation of the strengths and weaknesses of Buildings 727 and 770 as potential new sites for Agriculture's labs. While intended for Agriculture specifically, the analysis is applicable to all the labs reviewed in this study. The analysis reviewed the following topics: site and location, employee survey feedback, the buildings, utilities, financials, and logistics. The architect's analysis identified 17 strengths and 8 weakness in its evaluation of building 770 and 19 strengths and 9 weaknesses with 727. The strengths and weaknesses identified by the architects were consistent between buildings, with a few exceptions. Shared strengths identified in both buildings include:

- “Connectivity between departments would merely be by floors if all were located in this building. Space planning would be required to co-locate primary adjacencies for minimum travel and optimization.”
- Lab spaces can be adapted to be “static and flexible.”
- It was voted as the first or second choice in most of the employee feedback survey.
- “No issues with utilities at tech park.”
- “Tech park is secure and individual WVDA bldg. and parking could be within separate fenced perimeter to allow additional security.”
- “Existing Tech Park, includes accommodations for supporting the hazardous lab activities including resources and site strategies to maintain standards for safety, security, air entrapment, and the material resource allocation.”
- “Less relative construction cost than Guthrie as site is easily accessible and construction can occur unhampered.”

All these strengths address problems with the current locations of many of the labs discussed in this report, and the weaknesses identified do not appear to be significant or are already being addressed by the administration of the Tech Park. The common weaknesses identified include:

- “Unknown if this is a purchase or lease/rent or lease/purchase”
- “If all co-located, what if facility is compromised (would impact all services).”
- “Being “moth-balled” the building should be thoroughly evaluated to be sure no mold or other detrimental issues have been allowed to fester.”
- “Potential issues with exterior envelope....”

According to conversations between PERD staff and the Tech Park’s CEO, the buildings at the Tech Park can either be rented or purchased, if an agency would want to assume ownership. As for the “moth-ball” issue, all three buildings discussed in this report have been evaluated for mold, as well as asbestos and lead paint. The buildings are free of mold. Asbestos and lead have been remediated from buildings 740 and 770 and the Tech Park is in the process of securing funding to remediate lead paint found in Building 727. According to the CEO, there are plans to replace the exterior envelope on Building 770. As for the final issue with co-location, this is a real issue that would need to be addressed in the agencies’ emergency response and business continuity plans; however, such plans would need to be developed regardless if the labs are in a facility with another agency or in a stand-alone entity. To overcome this issue, agencies would need to consider developing back-up sites.

Option 3: Co-Locating State-Owned Laboratories into a Newly Constructed Facility

Option 3, co-locating several labs into a newly constructed facility, would likely be more expensive than refurbishing existing laboratory space, as in Option 2, but less than the cost of building separate facilities as presented in Option 1 because of economies of scale. Table 7 shows the estimated costs of building one facility at \$600, \$700, and \$800 per square foot. Such a facility would need to be more than 282,000 square feet. It is difficult to measure potential economies of scale that would lower costs below what are shown in Table 8.

Table 8 Option 3 Co-Locating State-Owned Laboratories into One New Facility			
Total Reported Square Footage Needs	Facility Cost at \$600 per sq. ft.	Facility Cost at \$700 per sq. ft.	Facility Cost at \$800 per sq. ft.
282,541	\$169,524,600	\$197,778,700	\$226,032,800

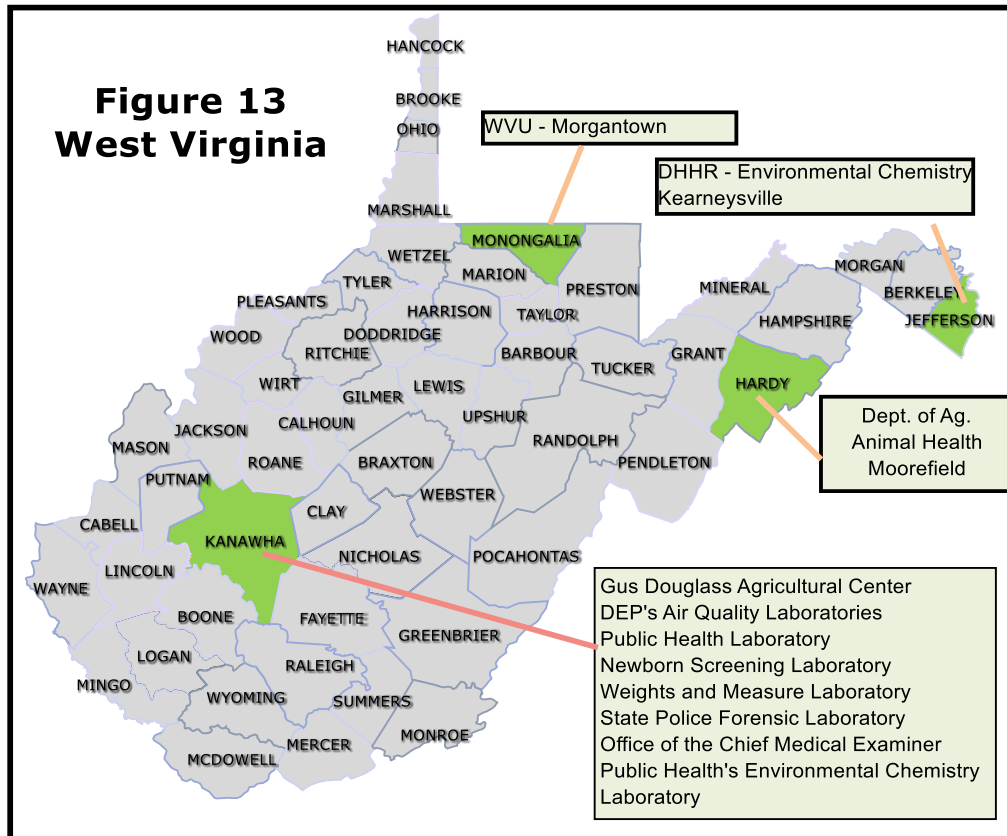
However, an additional advantage of one co-located facility for all the State’s lab programs is that operational costs would be shared and sharing expertise would be possible. A tour of the Kentucky Centralized Laboratory Facility in August 2021 provided PERD with an understanding of the potential benefits a co-located facility could provide to the State of West Virginia. A consolidated facility could provide cost savings by streamlining the major building components

that most, if not all, laboratories need to operate. Components such as backup power and laboratory gases (e.g. hydrogen, nitrogen, and argon) can be centralized and the costs shared among the agencies. For instance, the building also has a back-up generator in the basement for the entire facility. Many overhead expenses—including rent, utilities, janitorial services, trash removal (including biohazard and chemical waste) landscaping, and security—are prorated among the tenants. Rent is prorated based on the percentage of space each agency has in the building. The labs also have several gases and liquids piped through mainlines that run from the basement. These included distilled water, natural gas, steam, air, helium, and hydrogen. The HVAC system is built so that humidity and temperature can be controlled to each lab's specific needs through one centralized system. Having many labs in a single location would be easier to manage than if they each had separate facilities, as the mechanical and building service needs are similar for all the tenants.

In addition, one co-located facility allows laboratory agencies to share their expertise and interact with one another. First-responder issues often involve multiple agencies. Having these agencies in the same building could be beneficial in a statewide crisis. Interagency communication in general is easier with agencies sharing the same facility.

An Open Mind Is Needed in Determining Where a Co-located Facility Should Be Constructed

Kanawha County is a logical place to build a co-located facility because it is where most of the State's lab programs are located. This is indicated in Figure 13 below. However, as Figure 13 shows, the State has other locations where labs exist. Several agencies have established satellite laboratories outside of Kanawha County. The Department of Agriculture has labs for its Animal Health and READ laboratories in Moorefield in Hardy County. The programs at this laboratory include animal diseases diagnostic testing, microbiology, water quality, environmental soils, environmental nutrient management, and Grade A Dairy. These programs are in Moorefield to support the dairy and poultry farms in the eastern panhandle. OLS's Environmental Chemistry section also has a lab in the eastern panhandle in Kearneysville. This lab conducts testing of potable water for the presence of Coliform bacteria.



In addition, population trends in the state show declining population in the central parts of the state and relatively large growth on the eastern part of the state. PERD inquired with staff of lab testing agencies concerning what parts of the state are lab testing conducted for. The responses invariably indicated Kanawha County and other counties in the central parts of the state are where much of their work comes from.

Nevertheless, the State should acknowledge other parts of the state that have existing lab facilities in order to optimize the use of the State's lab resources and expertise. The Medical Examiner is currently in discussions with West Virginia University Medicine about re-establishing an autopsy program at the hospital morgue in Morgantown. In years past, the two entities had a contract for a specified number of autopsies to be performed by WVU Medicine at its morgue in Morgantown, WV. The agreement ended when the hospital's forensic pathologist left for another job. The Medical Examiner and WVU Medicine are currently working out a new agreement to have a forensic pathologist employed by the Medical Examiner working out of the Morgantown morgue. The Medical Examiner was reviewing WVU Medicine's proposal at the time of PERD's visit. A satellite location in Morgantown would reduce the OCME's facility needs in Charleston. The reduction in space needs in Kanawha County could potentially free up space for additional agencies to move to the Tech Park. The opinion of the legislative auditor is that if the Tech Park is not going to be considered as a means to addressing the needs of state labs and a newly constructed co-located facility is built, then Morgantown should be considered along with Charleston as the location for the facility.

Conclusion

The facilities of West Virginia state-owned laboratories have surpassed their useful lives in most cases. Laboratories are specialized buildings with technical and mechanical requirements that make retrofitting non-laboratory buildings difficult. The legislative auditor concludes that the State is at a critical point in its lab programs, and it is imperative that the concerns raised in this report be addressed. This report presents three possible approaches in addressing the facility needs of the State's lab programs. These approaches are as follows:

- (1) Build separate facilities for each laboratory.
- (2) Co-locate a combination of the labs at the West Virginia Regional Technology Park in South Charleston and upgrade and/or construct new facilities for the remaining programs that cannot be accommodated at the Tech Park.
- (3) Build one new co-located laboratory facility for all the agencies to share.

The legislative auditor concludes that the second option is the most logical and prudent choice. The State owns the property, and it has already invested over \$10 million in the Tech Park. If selected, the Legislature should consider allowing the State Police to proceed with the expansion and renovation of its forensic laboratory, and construct a new facility for the OCME. Based on the site visits conducted by PERD, it is the legislative auditor's opinion that the OCME has the greatest need of any of the laboratory facilities reviewed. If the third option is selected, the Legislature should be open to locating such a facility outside of Kanawha County to take advantage of the State's lab resources and expertise in other parts of the state, specifically in Morgantown where there is a significant amount of lab resources and scientific expertise. However, it is important to state that any decision should be based on an architectural study which will provide decision-makers with precise estimates for the cost, and facility spatial and technical needs. Whatever is decided, moving the labs will require careful planning and likely coordination between agencies if they are co-located.

Recommendations:

1. *The Legislature should consider contracting with an architectural firm to develop estimates for the actual needs and cost for each of the options presented in this report.*
2. *The Legislature should consider optimizing the use of the West Virginia Regional Technology Park if the state-owned laboratory programs are co-located.*



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