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State of Vermont

Agencies of Agriculture and Natural Resources

COLLABORATIVE LABORATORY

PRELIMINARY PROGRAM OF SPACES AND EQUIPMENT

WITH

PROGRAM DESCRIPTIONS AND PROCESSES

Buildings & General Services

FINAL DRAFT 5/27/14

Agencies of Agriculture and Natural Resources

COLLABORATIVE LABORATORY

PRELIMINARY PROGRAM

COLLABORATIVE LABORATORY

Overview

From 1990 until 2011, the research and regulatory laboratories of Vermont's Agencies of Agriculture and Natural Resources co-existed in LaRosa Lab on the State's Waterbury campus. The scientists and techs benefited from shared space but were, for the most part, financially and administratively separate. Storm Irene scattered these scientists over the State, and most have camped out since then. Some are isolated from their colleagues. Others commute between desk and lab. Many services were discontinued and shipped out of state, and these services are only now beginning to be restored. Having just finished a state-of-the-art Public Health lab, the State is now examining the future of agricultural and environmental lab services and the markets they now (and will) serve.

The Agencies of Agriculture and Natural Resources are embarking on an exciting collaboration to join their research facilities and support staff. They have agreed to merge their lab administration and facilities with the creation of a governance board, a lab director, and an advisory board. They envision a community of environmental scientists, with a core of analytical chemists and biologists and a periphery of applied scientists. In a new facility this community can share support staff and increase their quality assurance, data systems, and safety. They can share collection space (such as native insect specimens), meeting and training rooms, and special equipment such as precision balances and auto-analyzers. This building will be flexible so that State programs can evolve for positive trends such as new agricultural markets and negative trends such as new pathogens. Decisions about specific growth and specialization are being made in the context of regional and national collaboration.

Larger questions to address

In creating this inventory of what exists now, and how the lab programs would like to grow, several leadership questions have been revealed. These may not be new questions, and they may not be easy ones. This is a chance to address them before they are concretized in the new building.

The largest question is that of administration, and both Agencies have been working on this. It will continue to filter down to smaller questions such as:

- LIMS protocol and particulars, like who enters data and where
- Which programs will retain their own supplies, from computers to glassware, to equipment

The next large question is whether the facility needs a BSL-3 lab. It has been clarified that VDH's new lab can handle tens of thousands of samples, so one may never be needed. However, it may be prudent to "rough in" space and utilities for a BSL-3 lab on site. The group has decided to price both options.

One significant question is space and equipment for veterinary pathology. Vermont's food animal production is growing on farms for both domesticated breeds and wild breeds in captivity. Yet both UVM and the Agency of Agriculture have scaled back their animal labs. While the Ag Lab still tests general veterinary samples, the State no longer has any NAHLN-certified lab. The VDH lab cannot take veterinary samples unless it is certified for the testing procedures and has the required equipment.

As a result many tens of thousands of samples are sent out state for testing every year; besides lost revenue this causes a delay in diagnosis. It is worth examining what veterinary diagnostic services should be offered in Vermont, perhaps in the context of neighboring states' services. Staff suggest that a small committee be formed to review reports from out-of-state tests to determine what, if any, services make financial sense. It is recommended that the Molecular Biology Lab (rather than VDH) accommodate growth in this sector.

NEXT STEPS... joint effort of FSCP and the lab?

- Review test reports from out-of-state facilities to document how many tests and what kinds are being done.
- Interview or poll the vet/animal health/food safety community
- Perhaps reach out through the VT Vet Medical Association annual meeting
- Coordinate with other regional (New England and New York) agencies

Summary of spaces
(possible further efficiencies are green; additional options are blue)

Core Chemistry Labs			**6,335 sf**
Nutrients Labs	600 sf		
Metals Labs	800		
Non-automated Labs	950		
Organics Labs	3,100		
Gas cylinder storage	150		
8+ offices	735		
Core Biology Labs			**2,915 sf** + 300 sf option
Microbiology Labs	1,994 sf		
Molecular Biology Labs	477		
GMO Grinding	144		
4 office spaces	300		
BSL-3 required spaces	300		
Applied Science Labs			**7,884 sf**
Air Quality Program		1,019 sf	
Sample Prep	250 sf		
AP Balance Room	120		
Shop & Storage	384		
Pump area (merge gases?)	25		
Desk areas	240		
Watershed Management		1,375 sf + 100 sf if located in central VT	
Unloading/Loading	325 sf	(and 200 sf less at N.L.)	
Log In/Calibration	150		
Taxonomy	625		
Basic Chemistry	125		
3 work areas	150		
Possible 2 work areas	100		
Plant Industry Program		1,400 sf	
Staging	450 sf		
Sample Prep	100		
Clean labs (share hood?)	450		
4 offices	400		
Forest Biology Program		450 sf	
Entomology lab (share hood?)	300 sf		
Forest Pathology lab	100		
Forest Pathology/clean (to Bio?)	50		
Animal Pathology Program		1,200 sf	
Receiving and Samples	200 sf		
Gown/Degown (share shower?)	200		
Necropsy	600		
2 offices	200		
Fish & Wildlife Program		840 sf	
Labs	740 sf		
Adjacent office space	100		

Weights and Measures Program		1,600 sf	+ 400 sf option
Weights/Measures Labs	1,000 sf		
Adjacent office space	100		
Storage and Staging/Prep	400		
Loading area (share?)	100		
Possible garage space	(+400)		
Support Areas			12,880 sf
Administration		2,440 sf	
Director	150 sf		
2 admin officers @ 120 sf	240		
Reception	200		
Public sample receiving	200		
Conference	650		
Small meeting/focus room	150		
Training Lab/Classroom	800		
Visiting QAO/IT work station	50		
Storage, Supplies & Staff		3,090 sf	
Refrigerated Storage	150 sf		
Frozen Storage	225		
Autoclave/Washing	315		
Glassware storage	120		
General Storage	1,000		
Hazardous Supply Storage	100		
Equipment Shop/Storage	300		
Analytical Common Space	200		
Chemistry Common Space	200		
Biology Common Space	200		
Specimen Collection	280		
Maintenance, Utility, Waste, and Circulation		7,350 sf	
Restrooms	280 sf		
Janitor	120		
Maintenance	100		
Maintenance supply	100		
Recycling	75		
Bio and hazardous waste	100		
Electrical closet(s)	200		
Data closet(s)	375		
Mechanical room(s)	800		
Water treatment	50		
Elevator and equip. room	150		
Circulation	5,000		
		SUB-TOTAL	**30,014 sf**
		Add desired spaces:	800 sf
		GROSS TOTAL	**30,814 sf**

CORE CHEMISTRY LABS

Processes performed, both current and anticipated over next 10 years:

Nutrients Section

- Anions by Ion Chromatography : Fluoride, Chloride, Nitrate, Nitrite, Sulfate
- Lachat auto analyzer: Chloride, Ammonia, Total and Dissolved Phosphorus, Nitrate/Nitrite, Silica, Total Kjeldhal Nitrogen, Total and Dissolved Nitrogen, and Ortho Phosphate (also called Soluble Reactive Phosphorus).

Metals Section

- Metals analysis by ICP and ICP-MS
- Mercury analysis in water and soil
- A microwave extractor is hoped for in the next 10 years.
- Acid digestion for metals is needed for all metals except Acid Rain Metal samples.

Non-Automated Inorganics Section

- Environmental: Alkalinity, Biochemical Oxygen Demand, Chemical Oxygen Demand, Chlorophyll, Conductivity, Dissolved Oxygen, Total Suspended Solids, Turbidity, pH, and ion selective electrode analysis.
- Agricultural: Feed, fertilizer, and meat inspection (protein, fat, fiber, moisture, ash, salt, nitrogen)
- Fat extraction will be with ether.
- Volunteers collect 9,000 samples/year that count as matching funds ($125,000) to leverage grants. This service has provided data for numerous problem streams, ponds and lakes where fish, livestock, and humans were in danger. It administers a statewide grant to local watershed-monitoring groups. (800 sites since 2003) Over next 10 years, there will be increasing water samples to be tested.

Organics Section:

- VOC's in water (Method 8260) and air (Method TO-15).
- Carbonyls in air (Method TO-11A), analyzing DNPH cartridges.
- Now working to add Diesel Range Organics (DRO) on line.
- Method 8021B volatile in waters by GC.
- Pesticide monitoring similar to EPA methods 525, 515, 535, 536 and USGS open report 01-454.
- Pesticide misuse investigations, receive on moment's notice. Analyze quickly.
- Pesticide special projects, compost, railroad herbicide monitoring, golf course pesticide monitoring, etc.
- Pesticide formulations analysis, use and dilution verification samples, correct application strength.
- Expand: Food safety, NOFA to verify regulations, GAP, for example pesticide food tolerances.
- Expand Air Pollution semi-volatile analyses to include PAH (Method TO-13A), Metals analysis (EPA Method ILMO3 and IO 3.5).
- Expand Air Pollution testing, analyzing other New England states samples (regional laboratory expertise).

Staffing, 10-year forecast:	Nutrients:	2 full-time, 1 part-time
	Metals:	1 full-time
	Non-automated:	1 full-time, 1 part-time
	Organics:	4 full-time
Space Summary:	Nutrients:	600 sf
	Metals:	800
	Non-automated:	950
	Organics:	3,250
	Offices	735
	TOTAL	**6,335 sf**

Function/task details with equipment

Task	Size (sf)	Fixed Equipment/Notes	Movable Equipment	
Nutrients Section				
Nutrients Lab	600	16' open bench space Prefer one long island with "curb" and shelf down the center Eye wash station (1) 8' fume hood 80 L waste/week— 2 small deep sinks 1 large deep sink	2 Lachat analyzers for all nutrients (1= new) Both analyzers will be Lachat QC8500, one existing and one new. Auto sampler for each Lachat Dionex Ion chromatograph w/ computer (new) Fisher IsoTemp Refrigerator TKN block digester or micro digester (new) 2- Hatch COD Reactors hot blocks/plates Thermodyne 7200 Stir plate Mettler AT400 Balance w/draft shield (new) 2 lab carts	12' ea. incl. 14' 3' in hood in hood 1' 2'
Metals Section				
Metals Prep	400	2-6' hoods/plastic & acid safe w/ hot blocks in each 20' open bench space Large deep sink Eye wash station	Precision water bath 2 hot plates digestion block: DigiPrep MS w/ controller Environmental Express hot block SCP Sciences DigiPrep MS hot block Fisher Ashing/muffle furnace w/ own vent CEM microwave digester w/ own vent Cool Lab Standard refrigerator/freezer Mettler Toledo PL602-S balance 2 lab carts	3' 2 @ 1' in hood in hood in hood 2' 2' 3' 1'
Instruments	300	small sink w/ eyewash **UPS system** Moveable instrument benches	ICP (inductively coupled plasma) w/ computer (NEW) w/chiller and autosampler (was Perkin Elemer) ICP mass spectrometer w/autosampler, (NEW) vacuum pump and power conditioner (was a Thermo 640028S, now dead) Perkin Elmer FIMS 100 mercury analyzer with computer **gas cylinder space for mercury analyzer** future analyzer (current bench space)	8' 8' 8' **3'** 8'
Chiller Room	100	Temp and humidity Control Dedicated Electrical Circuits For each instrument	Chiller for each ICP **2- argon Dewars (Waterbury had 1000 gal in ground)**	
Nonautomated Section				
Grinding & Fertilizer Prep	75	Negative air pressure 4' hood w/filter rack (dust) 4' bench space Small sink w/ eyewash Temp & humidity control	Grinder on stand with cover Second smaller grinder Third grinder (The grinders will be used in the hood.)	2' 2' 2'
NA Extraction Lab	400	6' fume hood Large deep sink 8' bench space Eye Wash Station Gas Tanks (CO2 & O2)	3 programmable drying ovens w/vent (NEW) Elementar Rapid N Cube w/Computer Ankom fiber analyzer/extractor (away fromN2) Bag Sealer Standard Refrigerator/Freezer Sartorius AC210 Balance 2 Lab Carts	3@2 8' 8' 1' 3' 1'

"Wet Lab"	475	6' bench space 6' fume hood 2 large, deep sinks Eye wash station	Fisher Isotemp refrigerator Fisher 307 incubator for BOD w/ bench space Thermo pH meter 2 Fisher stirring plates Precision bench-top oven Genesys 10 spectrophotometer Micro 100 Turbidimeter (benchtop) Analytical balance (new) Precision water bath Dissolved oxygen meter YSI Conductivity meter 3 lab carts	3' 13' 1' 2 @ 1' 2' 2' 1' 1' 2' 1' 1'
Organics Section				
Automated Extraction	475	3 – 6' fume hoods w/ solvent storage hoods on different walls compressed air & vacuum CO2 & nitrogen supply 16' bench space large deep sink Eye wash station	2 Dionex Auto Trace w/exhaust & N2 Dionex ASE 350 w/exhaust & N2 Tanks Soxhlet Dionex ASE w/exhaust & N2 Tanks (new) Drying Oven (w/ own exhaust) Nitrogen Evaporator (needs N2) Solvent Refrigerator/Freezer Analytical balance (new) Zymark TurboVap 500 2 Glassware Cabinets Fisher chiller/circulator 2 lab carts	2 @ 4' 6' in hood 6' 2' in hood 3' 1' in hood 2 @ 4' 2'
Manual Extraction	600	3-6' fume hoods w/solvent storage compressed air & vacuum Nitrogen piped? large deep sink Eye wash station 24' open bench space 3' concrete balance table	Burrell wrist shaker Innova 2100 Platform Shaker Lab Line Junior Orbital Shaker Legend XRF centrifuge (Floor) IEC model K centrifuge (Floor) IEC Clinical centrifuge (Bench) Thermo Scientific Hera Therm Oven (vent) Mettler-Toledo XS603S analytical balance 2nd Drying Oven (vent) 2 Glassware Cabinets Roto-X-tract Visi-Prep vacuum pump Steam bath (stored when not used) Polytron Sonicator (stored when not used) Fisher Ultra sonic bath Dry Block Incubator(stored when not used) Thermolyne 7200 hot plate/stirrer Fisher hot plate/stirrer Caliper TurboVap Nitrogen Evaporator (needs N2) VWR Mini Vortexer Explosion proof blender (stored) Fisher FMS Refrigerator/Freezer Solvent Refrigerator/Freezer 2 lab carts	2' 2' 1' 2' 3' 2' 2' on table 2' 2 @ 4' in hood 2' in hood 1' 2' in hood 1' 1' in hood in hood 1' 2' 3' 3'

Overflow Extraction (special projects)	200	2- 6' fume hoods w/ solvent storage Compressed air & vacuum Nitrogen Piped Deep sink w/ eyewash	Nitrogen Evaporator (needs N2) Solvent Refrigerator/Freezer Balance (new) Move equipment in as necessary 2 lab carts	in hood 3' 1'
Chlorophyll Room/ Formulations	340	2 - 6' fume hoods w/ solvent storage Compressed air & vacuum Balance table This room is dark. Large deep sink w/eyewash 12' bench space	Turner Triology fluorometer IEC Centrifuge (explosion proof, on floor) Fisher Isotemp 200 drying oven w/exhaust Analytical Balance: Mettler Toledo XS204 Small (u/c) freezer, non-FMS Fisher FMS u/c refrigerator Eberbach grinder Vortex Genie mixer 2 – Pesticide Standards storage best storage? Branson Ultrasonic bath Glassware cabinet? 2 lab carts	in hood 3' 2' 3'+ 2' 2' 2' 2' 2 @ 4' 2'
TO-11 Extraction/ HPLC Instruments	350	6' fume hood compressed air & vacuum Humidity & Temp Control (Critical) Dedicated Electrical Circuits **UPS System** Moveable Instrument Benches 14' bench space	Cartridge Extractor Fisher FMS Refrigerator/Freezer 2nd FMS Refrigerator/Freezer Waters HPLC System w/ computer, Alliance Separations Module 2695, and Dual Absorbance Detector Module 2487 Dionex Ultimate 3000 UHPLC System Future HPLC System	in hood 3' 3' 8' 8' 8'
Semi-Volatiles Instrument Room	375	6' Fume Hood Humidity & Temp Control (Critical) Dedicated Electrical Circuits **UPS System** Moveable Instrument Benches 2' bench space at each instrument, plus 6' in room	Thermo Ion Trap GC/MS system w/computer Waters Acquity LC/MS system w/computer Thermo Trace Ultra GC system w/computer New GC system w/ computer **Toshiba 1600XP UPS** **Liquid Nitrogen Dewars**	10' 8' 8' 8'
Volatiles Instrument Room	280	6' Fume Hood Humidity & Temp Control (critical) Dedicated Electrical Circuits **UPS System** Moveable Instrument Benches 10' bench space	TO-15 GC/MS w/ computer, vacuum pump, Concentrator, and Canister "Tree" Agilent 6890N GC/MS System Archon Purge and Trap Autosampler Teledyne Tekmar 70 Autosampler **Liquid Nitrogen Dewars (2 minimum)**	12' 16'
Flex Lab (close to Biology)	280	6' fume hood w/solvent Large deep sink 20' bench space Eye Wash Station Piped gas **UPS**	2 Lab Carts	

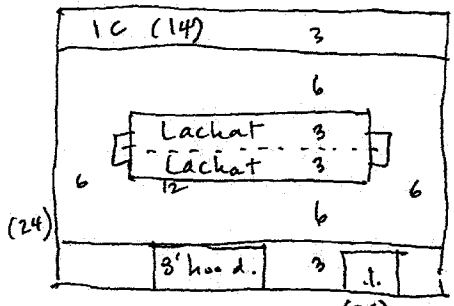
Can Cleaning and Storage	200	6' Fume Hood Humidity & Temp Control Liquid Nitrogen for Cleaning 8' bench space	Can Cleaning Apparatus Shelving for Can Storage (both 12.5" H and 9.25" dia, and 17" H and 12.25" dia) Allow for 40 regular and 10 large cylinders.
Gas Cylinder Room	**150**	**Ventilation** **Temp Control** **Needs to be between the 2 instrument rooms** **Gas Distribution to both instrument rooms** **Need: nitrogen, helium, argon, hydrogen, methane and compressed air**	**Manifolds for Gas Distribution** **Gas Cylinder securement**

General Chemistry Needs

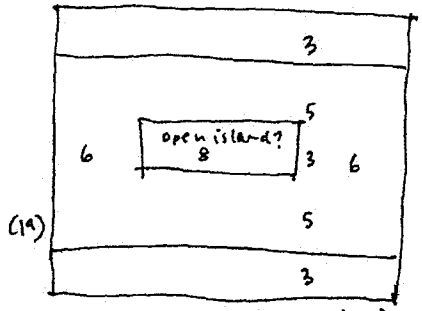
Full-time offices	600	4 @ 150 sf (2 per office) Organics might want 4 in one room	2 desks & chairs, 12' bookcases, file cabinets
Part-time stations	60	2 @ 30 sf	desk and chair
Common printer area	75	near instrument rooms	

NOTES and ADJACENCIES

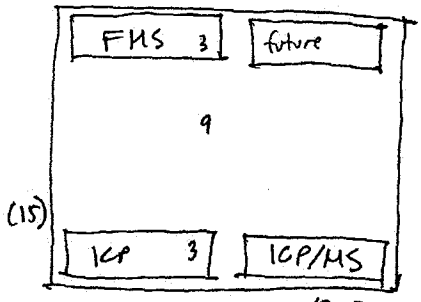
- Most of the *NEW* equipment is replacing old and out-of-date equipment (rather than starting new processes).
- Currently each computer in the Chemistry area is isolated. It would be optimal to network the area, if not the building. DII has had some concerns about this but they should be addressed.
- Question of autoclaves. Chemistry uses a lot of glassware. It may make sense for them to have their own. If use common autoclaves, make sure there is storage and transportation for equivalent of 12 racks.
- TO-11 Lab and Volatiles Instrument Room should not be adjacent to acetone use (extraction labs, semi-volatiles instrument room, and Chlorophyll Lab).
- Semi-Volatiles and Volatiles Instrument Rooms should be close enough to share gas cylinder room (could be different floors).
- Manual and automated extraction labs should be together and near semi-volatiles instrument room.
- Overflow Lab & Chlorophyll Lab do not need to be near anything else.
- Can Cleaning should be next to Volatiles Instrument Room.



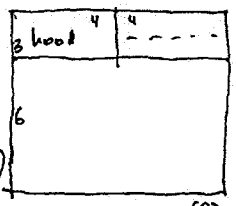
NUTRIENTS



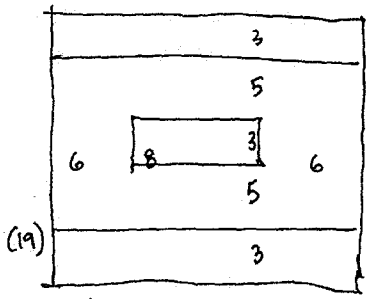
METALS PREP



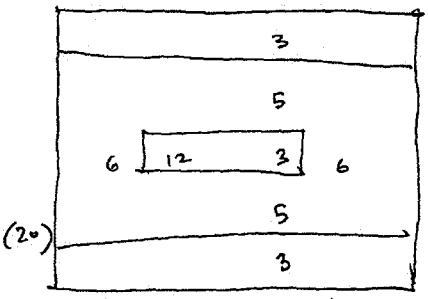
MTLS. INSTRUMENTS



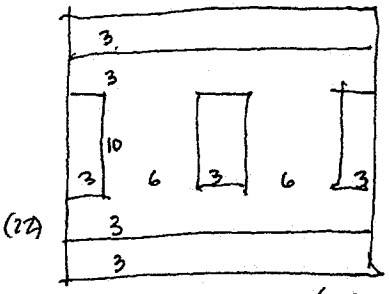
GRINDING



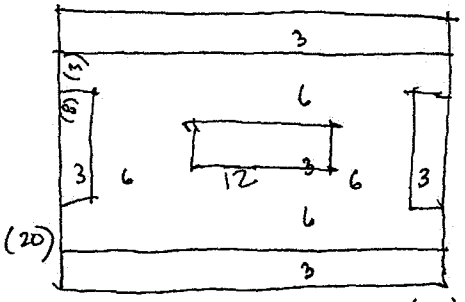
NA EXTRACT.



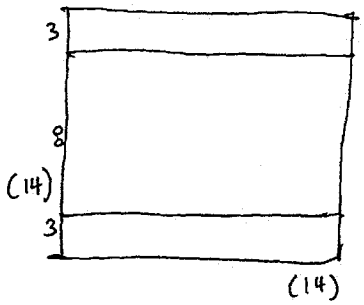
WET LAB



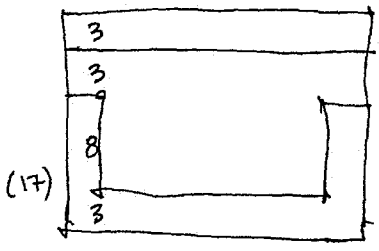
AUTOMATED EXTR.



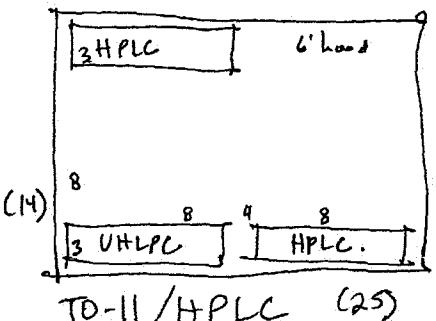
MANUAL EXTRACTION



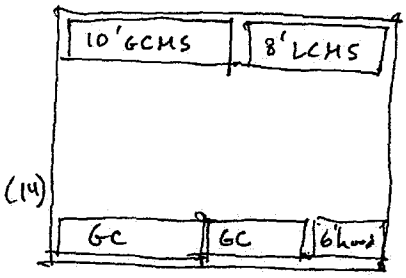
OVERFLOW EXTR.



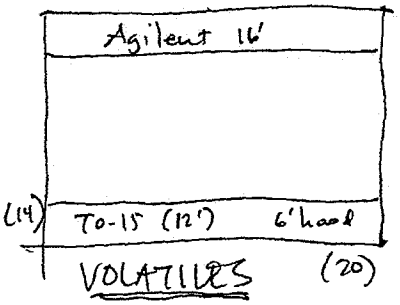
CHLOROPHYLL



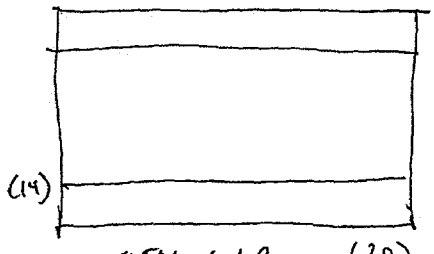
TO-11/HPLC



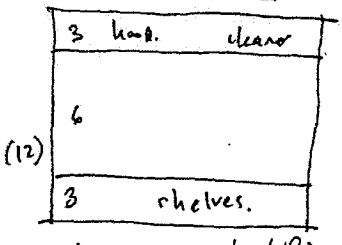
SEMI-VOLATILES



VOLATILES



FLEX LAB

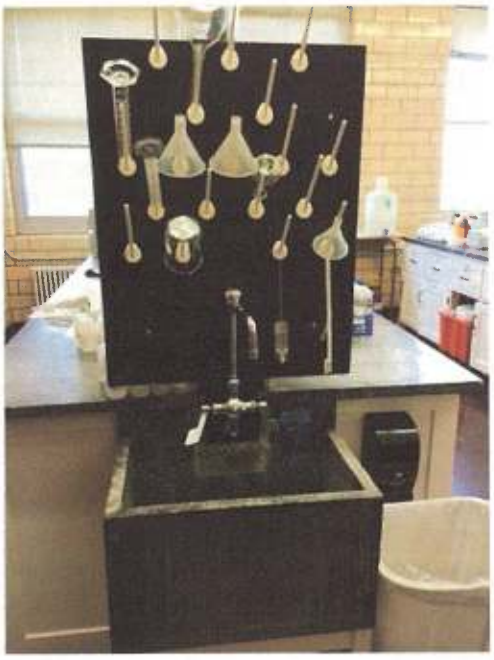


CAN CLEAN'G

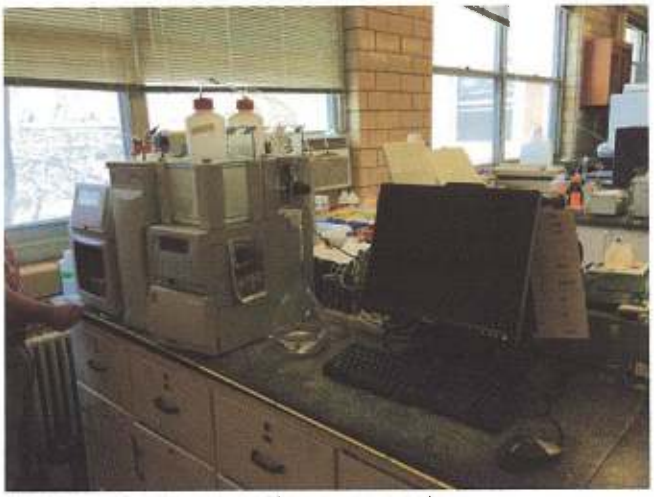
Mixture of functions in old lab. Fat/ether extraction hood on right.

Nutrients: Lachat analyzer. Note wire problem.

Nutrients Section: Lachat Analyzers

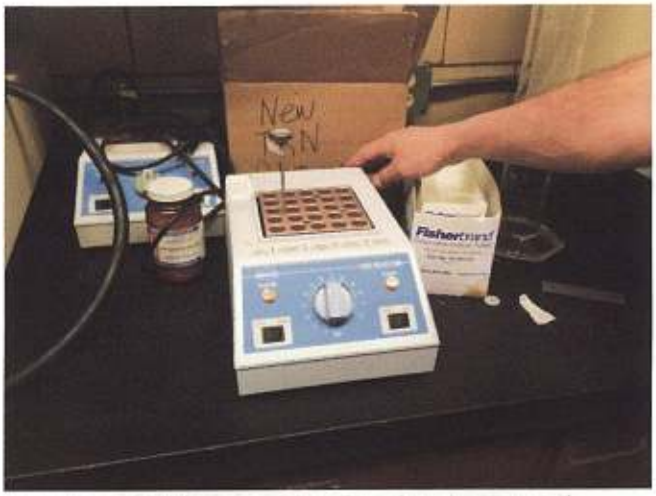


Nutrients: Glassware drainboard over sink



Nutrients Section: Ion Chromatograph

Nutrients: Ideal height for first shelf on island or bench. Note also the "curb."

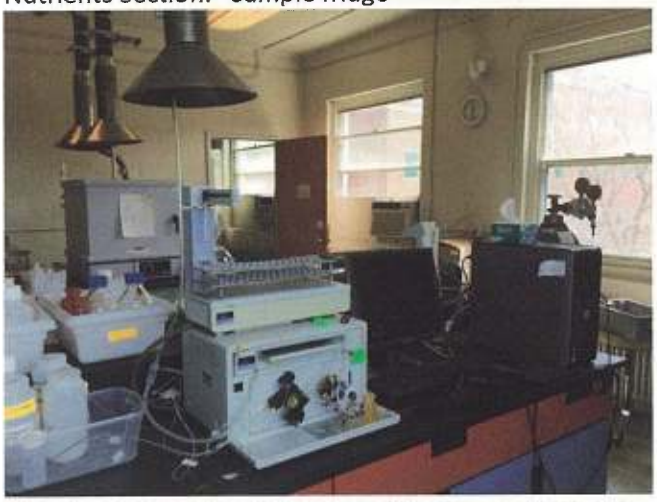


Nutrients: COD block reactor (used under a hood)

Metals Section, Instruments: ICP and ICP-MS in the distance (both being replaced, both need direct exhaust)

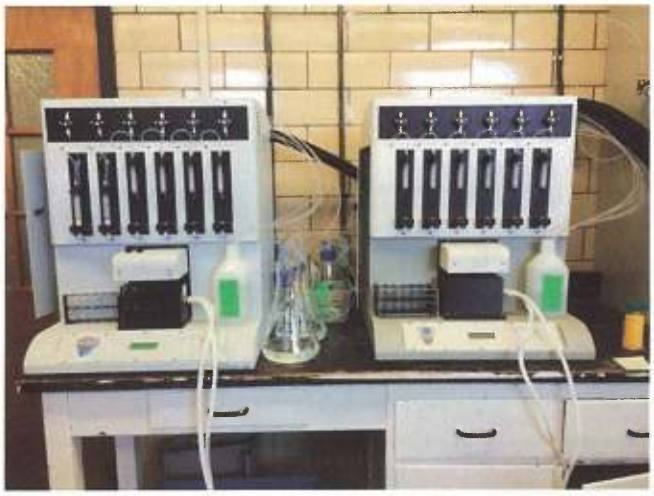
Nutrients Section: Sample fridge

Metals: ICP-MS (will be replaced)



Metals Section, Instruments: Perkins Elemer FIMS 100 Mercury Analyzer

Organics, Automated Extraction: Dionex ASE Extractor



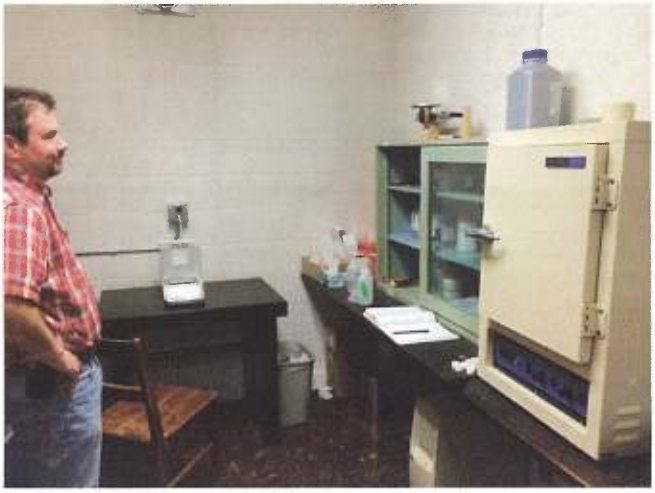
Organics, Automated Extraction: two Auto Trace machines (one is Dionex, one is Thermo Scientific)

Organics, Manual Extraction: Reagents cabinet (replace with new over-counter cabinets)

Organics, Manual Extraction: Platform Shakers

Organics, Manual Extraction: Legend Centrifuge

Chlorophyll Room: TKN block (used under a hood)



Reagents mixing & storage

Chlorophyll Room: IEC Centrifuge (explosion proof)

Chlorophyll Room: Analytical balance on concrete table

Chlorophyll Room: Chlorophyll Hood

Organics Section, Chlorophyll Room: bench space

Organics Section, TO-11 Room: Extraction Hood

Organics Section, TO-11 Room: Dionex LC

Semi-Volatiles: Toshiba UPS 1600 XP

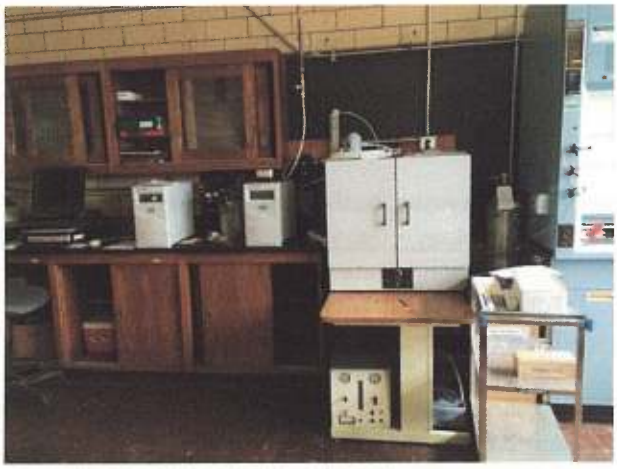
Organics, TO-11 Room: Waters HPLC for Carbonyl analysis

Semi-Volatiles: Waters Acquity LC-MS System

Semi-Volatiles: Thermo Ion Trap GC/MS System

Semi-Volatiles: Thermo Ultra Trace GC System

Volatiles, left to right: TO-15 GCMS, 7100 concentrator (will get 7200), canister tree, nitrogen dewar



Organics Section: Canister Cleaner

Volatiles: Agilent 8260 GC/MS w computer (16' bench) With purge and trap on right. GCMS will be replaced; Purge and trap will be used in new facility.

Volatiles: Agilient 8260 GC/MS continued... auto sampler to the right.

Summary of processes, both current and anticipated for next 10 years:

Microbiology – Dairy – BSL2 (all processes are FDA-mandated and need individual certification)
Heterotrophic Plate Counts
Total Coliform in Milk Products
Total Coliform in Dairy Waters
Somatic Cell "Leukocyte" Enumeration (Flow Cytometry & Direct Microscopic)
Alkaline Phosphatase Enzyme – proper pasteurization
Antibiotic Residues
Additional Antibiotics – Anticipated
Antibiotic Residues in Meat – USDA Anticipated
Milk Component Testing – Butterfat, Protein, Solids
Milk Component Testing (semi-solid products) - Anticipated
Cryoscope – Added water - Anticipated

Serology/Mastitis – BSL2
Brucellosis – *USDA mandate, lab certification
Equine Infectious Anemia Virus (AGID & ELISA) – *USDA mandate, lab certification
Anaplasmosis
Performance Enhancing Drug Testing
Bovine Leukosis - Anticipated
Ovine Progressive Pneumonia – Anticipated
Other Serological testing for emerging diseases – Anticipated
Johnnes Disease – Anticipated
Pseudorabies – Anticipated
Salmonella pullorum - Anticipated
Mastitis culture/identification
Bulk Tank Cleaning culture

Food Pathogens - BSL2
Dairy Products – *Listeria monocytogenes, E.coli 0157:H7, Campylobacter spp., Salmonella spp. - Anticipated*
Meat Carcasses – *E.coli 0157:H7, Salmonella spp., Campylobacter spp.* - Anticipated
Produce (Leafy Greens, Strawberries) - *E.coli 0157:H7, Salmonella spp.* - Anticipated

Molecular Biology
Lyme Disease BSL2
Anaplasmosis BSL2
Babesiosis BSL2
GMO
Powasson Virus BSL2+ - Anticipated
West Nile Virus BSL2+ - Anticipated???
Avian Influenza BSL2+, NAHLN certification- Anticipated
Plant Viruses – Anticipated
Plant Fungal Agents – Anticipated
Eastern Equine Encephalitis BSL3, Select Agent – Anticipated???
Emerging Livestock Bacterial and Viral Pathogens BSL2 – BSL3, NAHLN certification– Anticipated

Staffing, 10-year forecast:	Microbiology	2 full-time		
	Molecular Biology	2 full-time		

Space summary (includes 10-year plan)

Microbiology			**1,994 sf**
Dairy Chemistry & Thermocyclers	754 sf		
Storage	80 sf		
Dairy Micro	580 sf	BSL 2	
Seriology/Mastitis	290 sf	BSL 2	
Food Pathogen	290 sf	BSL 2	
Molecular Biology:			**477 sf**
Clean Prep	108 sf		
Template Addition	153 sf		
Nucleic Acid Extraction & Homogenization	216 sf	BSL 2+ (OPTION, BSL 3)	
GMO Grinding (remote location from labs)			**144 sf**
4 offices @ 75 sf each			**300 sf**
			2,915 sf

BSL-3 Options

Base design is for one lab (Extraction/Homogenization) to be a BSL-2+ lab.
OPTION 1: Make Extraction/Homogenization a BSL-3 lab. Include all required spaces and equipment.
OPTION 2: Design Extraction/Homogenization so that it can be easily fitted out as a BSL-3 lab in the future. Make room and rough in for required spaces (eg, changing/shower, decontamination, waste disposal).

For these labs, we assume these spaces:

Autoclave room	90 sf	BSL 3		
Autoclave service/maintenance	81 sf	BSL 3		
Shower/Decontamination	81 sf	BSL 3		
Changing Room	45 sf	BSL 3		**297 sf**
			TOTAL	**3,212 sf**

Microbiology/Molecular Workstations & Floor Equipment Footprints

(notes for equipment: M = movable, F = fixed, E= existing, N = new. These notes are preliminary.)

Dairy Chem & Molecular Thermocyclers (2nd Floor) **754 sq ft**

Negative Air Pressure due to Fume Hood; no HEPA filtration necessary
At island sink: install traditionally venting (cup drains overflow regularly and leak sewer gas)
Use high shelf down center of island with 18" h pass-through space below.
Wide aisles allow lab carts to create movable bench space

SL5	3' – 36"bench	
IDEXX SNAP	3' – 36"bench, internet port	
IR analyzer	7' – 36" island near island sink (ded. electrical circuit) under counter Hazardous waste, internet port in island with computer & printer	Foss FT120
Bentley flow cytometer	6' – 36" island near island sink (dedicated electrical circuit), under counter Hazardous waste, internet port in island with computer & printer	Somacount 150

AP/Anti analyzer	10' – 36" internet port in island With computer & printer	Charm II		
Top Loading Balance		Sartorius		
Heating Blocks		Charm II		
MaxiMixer		Charm II		
Labofuge 200		Charm II		
Rapid antibiotic test instrument				
Delvo	5' – 30" bench, internet port			
Microscope	4' – 30" bench , with light source			
Electrophoresis	6' – 36" bench			
Cyroscope	4' – 36" bench			
Gel Photo Station	4' – 36" bench internet port	Nikon E2400	M	E
UV light box				
MJ Opticon (molcr)	4' – 30" bench (dedicated electrical circuit & internet port) with computer & printer			
Smart Cycler (molcr)	5' – 30" bench (dedicated electrical circuit & internet port) with computer & printer	M48 BioRobot computer		
Island sink	3' – 18"deep – overflow drain and good vent			
Slide staining	4' Hood with solvent storage cabinet			
2-bay sink	4' with eyewash and hand sensor, DI water			
Fridge	3' x 3' (dedicated electrical circuit)	Crosely Shelador		
Freezer	3' x 3' (dedicated electrical circuit)	Kenmore		
Onerc Power conditioner				
Drying box				
Thermo scientific Model 280 waterbath				
Corning stirrer/hot plate				

Micro Stockroom **80 sq ft**

Open metal shelving floor to 6'
Adjacent to Dairy Chemistry

Dairy Micro (2nd Floor) – BSL2 **580 sq ft**

Positive Pressure with HEPA filtered incoming air
Wide aisles allow lab carts to create movable bench space
Prefer high divider on island to store items.
Dual gas jets

PI Incubator	2' – 36" bench	VWR	M	E
Weigh up station	5' – 36" bench with dual gas jet			
DEC Quantitray	5' – 36" bench near 3' sink DI water	Idexx	M	E
Dairy Colilert	4' – 36" bench near 3' sink DI water			
pH meter	3' – 36" bench	Orion 420A	M	E
Plating	22' – 36" island			
Plate reading	4' – 36" bench with cut away			
Glassware washing	6' – 36" bench 4' 2-bay sink with hand sensor and eyewash			
2-Bay Fridge	5' x 3' floor (dedicated electrical circuit)			
2-Stacked Incubators	2' x 2.5' floor space	Foss	M	E
		Foss	M	E
2-Stacked Incubators	2' x 2.5' floor space			
2-Lab Carts	2.5' x 2'			

Biowaste container	2' x 2'			
Quebec Colony counter				
Dilution pump				
Fisher waterbath				
Napco waterbath				
Dissecting microscope				
Light source for scope				
Top load balance		Ohaus	M	E

Serology/Mastitis (2nd Floor) - BSL2 **290 sq ft**

Negative Air Pressure HEPA filtered outgoing air
Wide aisles allow lab carts to create movable bench space
LIMS station

2-Stacked Incubators	2' x 2.5' floor	Fisher Iso Temp	M	E
		Forma	M	E
Centrifuge	3' x 3' floor	IEC floor model	M	E
Fridge	3' x 3' floor (dedicated electrical circuit)	Crowley	M	E
Fridge	3' x 3' floor (dedicated electrical circuit)	Kenmore	M	E
ELISA	7' – 36" bench			
Strip Washer		Biotek ELx50		
Plate Reader		Biotek ELx800		
	with printer	HP Deskject 6122	M	E
Streaking plates	6' – 36" bench			
Brucellosis	5' – 36" bench			
Plate Incubator	(for Brucellosis)			
Check-in PC	4' – 36" bench with cut away, internet port			
AGID	6' – 36" bench (gas jet, vacuum)			
vacuum pump	(for AGID)	Fisher Maxima		
Light box	(for AGID)			
Brainweigh		Ohause 3000D		
Benchtop Centrifuge	2' x 2'	Fisher Centrific	M	E
Microscope	2'-- 36" bench	B&L Balpan	M	E
Light Source		Lecia		
2-Bay sink	4' DI water			
1-Bay gram stain	2' with hand wash sensor and eye wash			
Biowaste container	2' x 2'			
4' Fume Hood	4'			
2-3 workspaces	w/ internet ports			

Food Pathogens/ Flex Space - BSL-2 **290 sq ft**

Negative pressure HEPA filtered incoming and outgoing air
Wide aisles allow lab carts to create movable bench space
Dual gas jets

2-Stacked Incubators	2' X 2.5' floor space
2-Stacked Incubators	2' x 2.5' floor space
Fridge	3' x 3' (dedicated electrical circuit)
Freezer	3' x 3' (dedicated electrical circuit)
Benchtop centrifuge	2' x 2' – 36" bench

Stomacher	3' x 2'
BSC	6' with UV (dedicated electrical circuit)
Microscope	4' – 36" h bench
2-Bay sink	4' DI water
Biowaste container	2' x 2'
1-bay sink	3' - hand wash & eye wash
3 Internet ports	

Molecular Clean Prep (2nd floor) Restricted card access **108 sq ft**

Negative Pressure HEPA filtered incoming and outgoing air, sealed wall and ceiling (no drop)

PCR Enclosure	3' – 36" bench with cutaway	Labconco Purifier
Revco Ultralow	3' x 3' floor (dedicated electrical circuit)	
1 bay sink	3' – hand sensor, eyewash, DI water	
Benchtop centrifuge	2' – 36" bench	

Molecular PCR Template Addition (2nd floor) Restricted card access **153 sq ft**

Negative Pressure HEPA filtered incoming and outgoing air, sealed wall and ceiling (no drop)\

4' BSC	36" with UV (dedicated electrical circuit)
Refrigerator	3' x 3' (dedicated electrical circuit)
4' counter	1' hand sink, eyewash, DI water
Biowaste container	2' x 2' floor

Molecular Nucleic Acid Extraction and Sample Homogenization BSL -2+ (min): Restricted card access **216 sq ft**

Negative Pressure HEPA filtered incoming and outgoing air, sealed wall and ceiling (no drop)

6' BSC	VENTED!!! UV light (dedicated electrical circuit)
Revco freezer	3' x 3' floor (dedicated electrical circuit)
Refrigerator	3' x 3' floor (dedicated electrical circuit)
Plate shaker	2' – 36" counter
Mixer Mill	2' x 2' – 36" counter
Block incubator	1' x 1' – 36" counter
Biowaste container	2' x 2' floor
2-bay sink	4' hands free, eyewash, DI water
General workspace	8' – 36" bench
Floor to ceiling cabinet	4'L x 6'H x 2'D with glass doors
Micro centrifuge	2' – 36" bench

Autoclave room (2nd Floor) BSL-3: Restricted card access **90 sq ft**

Negative Pressure HEPA filtered incoming and outgoing air, sealed wall and ceiling (no drop)

Autoclave	4' x 4' floor steam line/drain (dedicated electrical circuit)
1-bay sink	2' – 36" bench (6'L)
Biowaste Boxes	6' x 2' floor
Lab Cart	2' x 2.5'

Autoclave Service/Maintenance (2nd Floor) **BSL-3: Restricted card access** **81 sq ft**

Negative Pressure HEPA filtered incoming and outgoing air, sealed wall and ceiling (no drop)
Low hazard space for accessing Autoclave mechanics and emergency steam shutoff

Shower Decon (2nd Floor) **BSL-3: Restricted card access** **81 sq ft**

Negative Pressure HEPA filtered incoming and outgoing air, sealed wall and ceiling (no drop)

Shower	3' x 3'
Linen storage	3' x 2'
Bio Hamper	2' x 2'
Washer/dryer	6' x 3' (dedicated electrical circuits)

Changing Room (2nd Floor) **Restricted card access** **45 sq ft**

Negative Pressure HEPA filtered incoming and outgoing air, sealed wall and ceiling (no drop)

Bench	4' x 2'
Clothes Hooks	

GMO Grinding (1st Floor) – attached to Plant Pathology/Entomology Freezer Farm **144 sq ft**

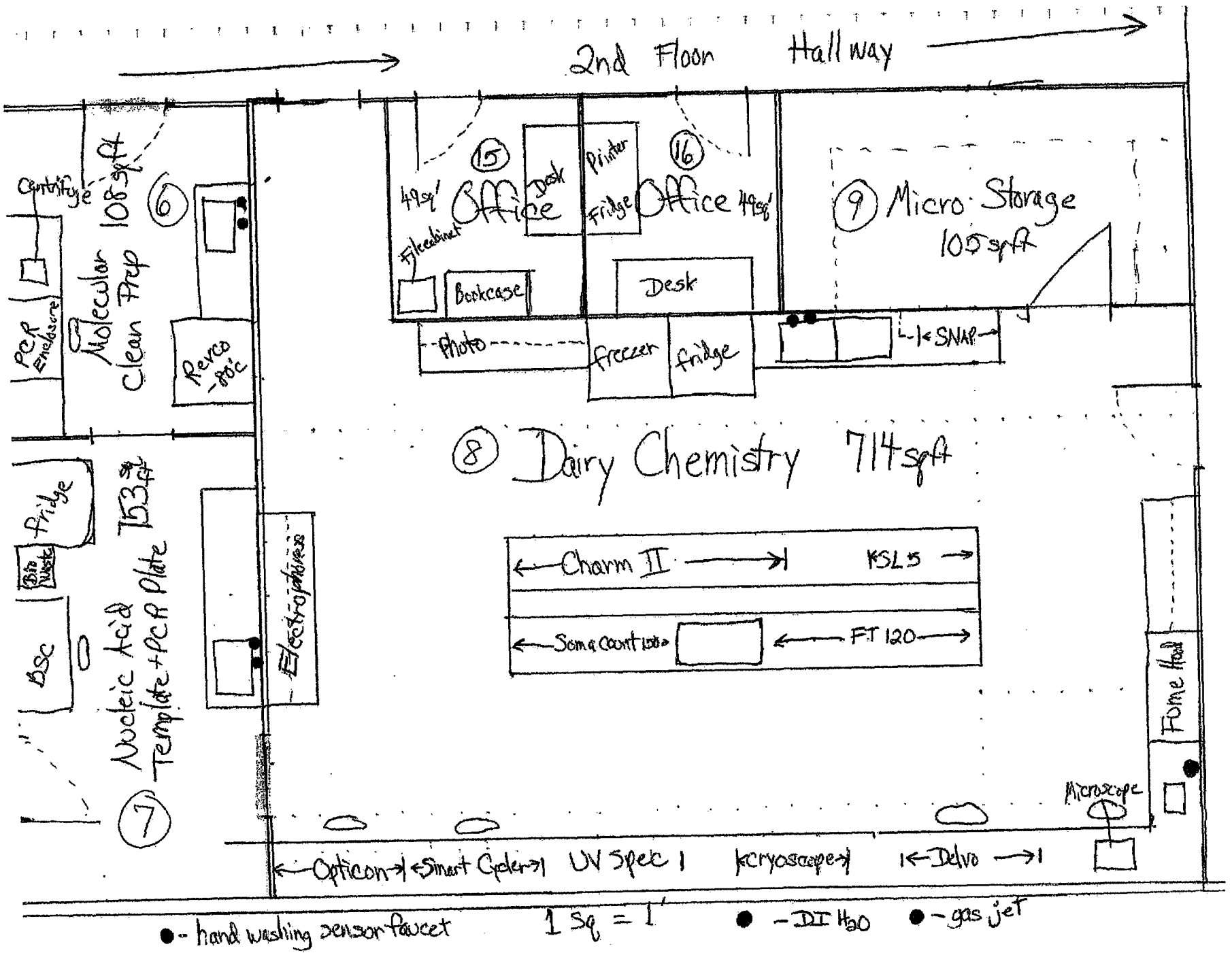
Close proximity to Glassware Washing Room

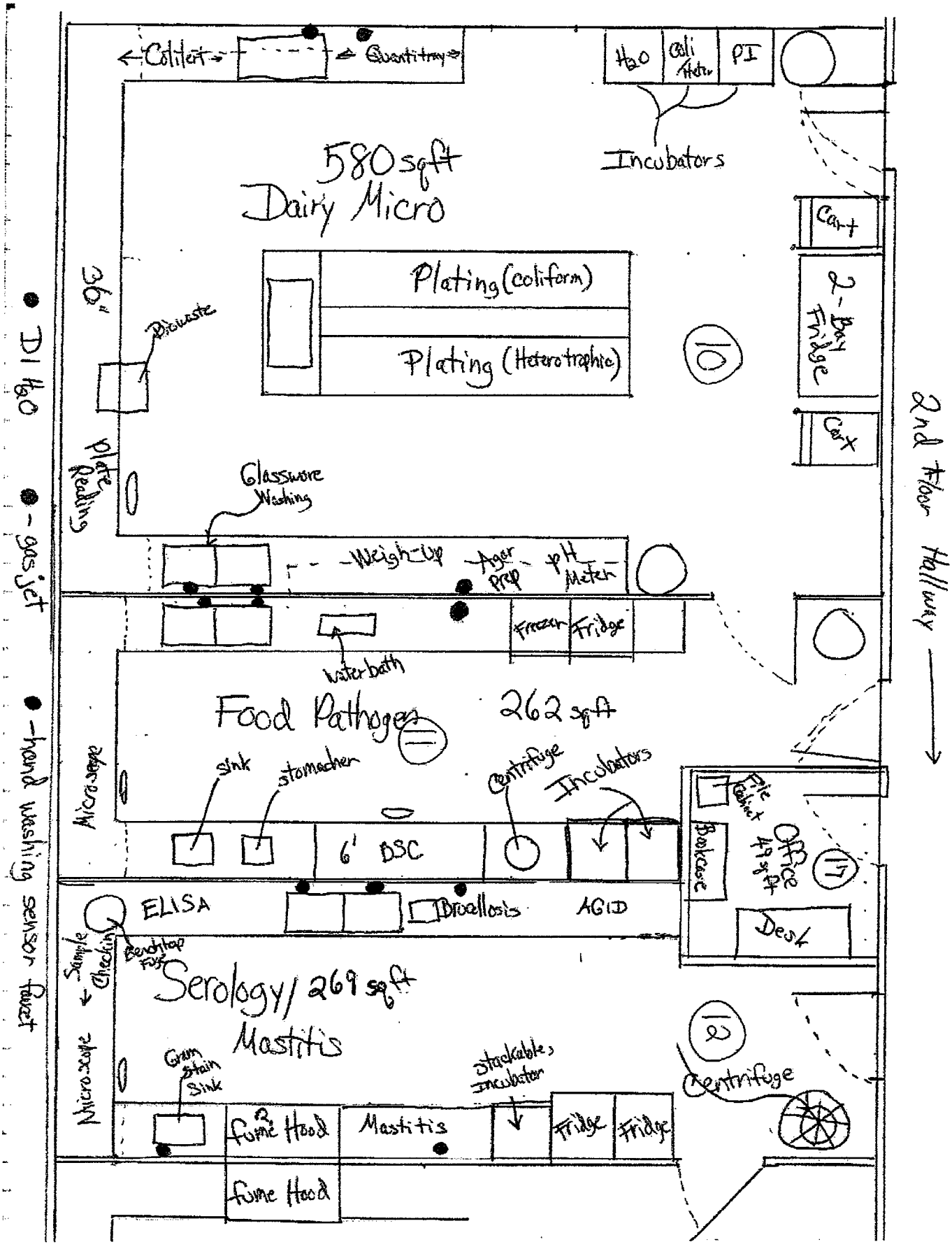
6' BSC	36" (dedicated electrical circuit)
Freeze dryer	3' x 3' Floor (dedicated electrical circuit)
2-Bay sink	hand free, DI water
Open bench space	8' – 36" h bench

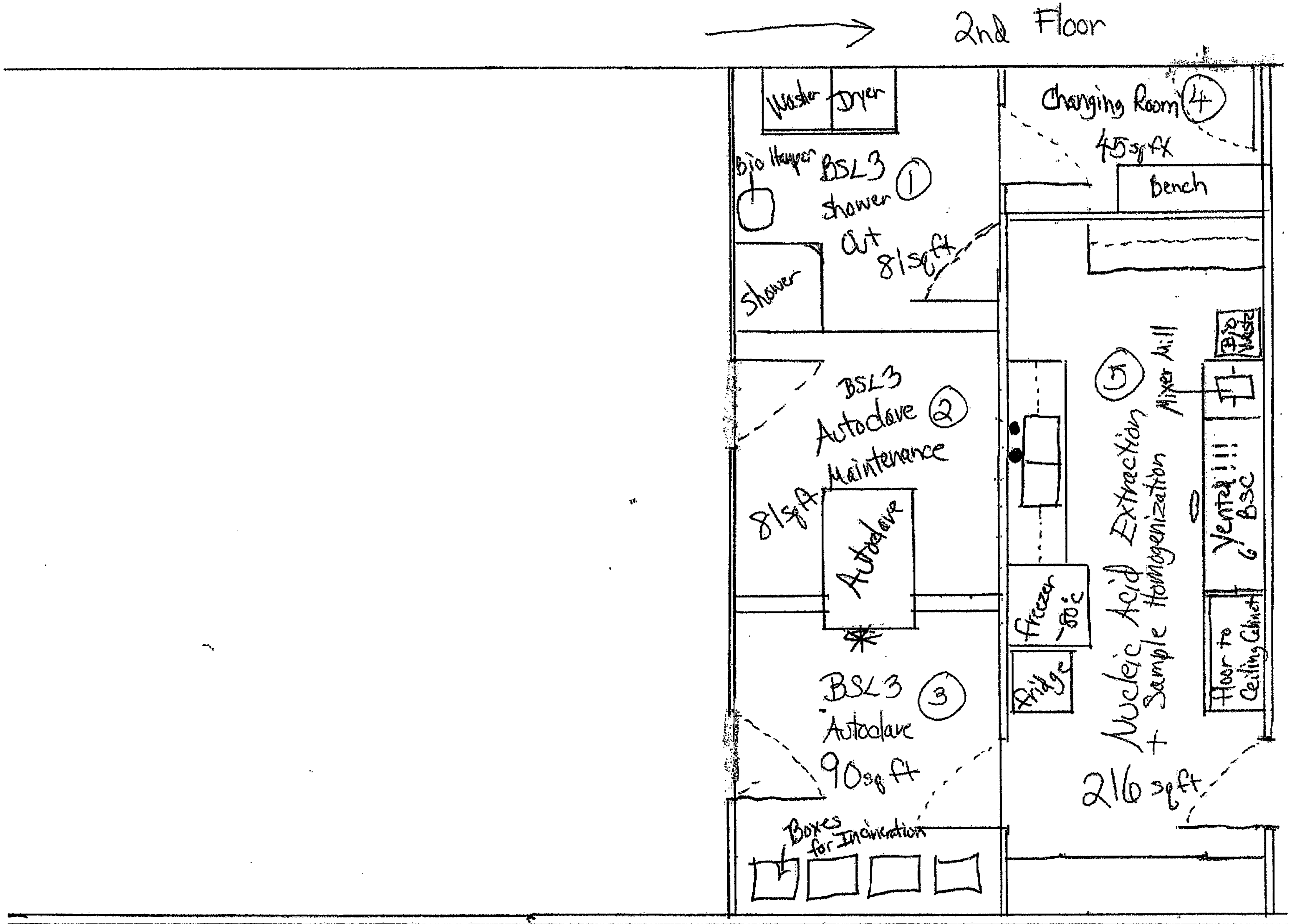
4 Offices @ 75 sf **300 sq ft**

2 internet ports per office
Locate close to labs.
Offices should be accessed from central corridor, not the labs, for safety.

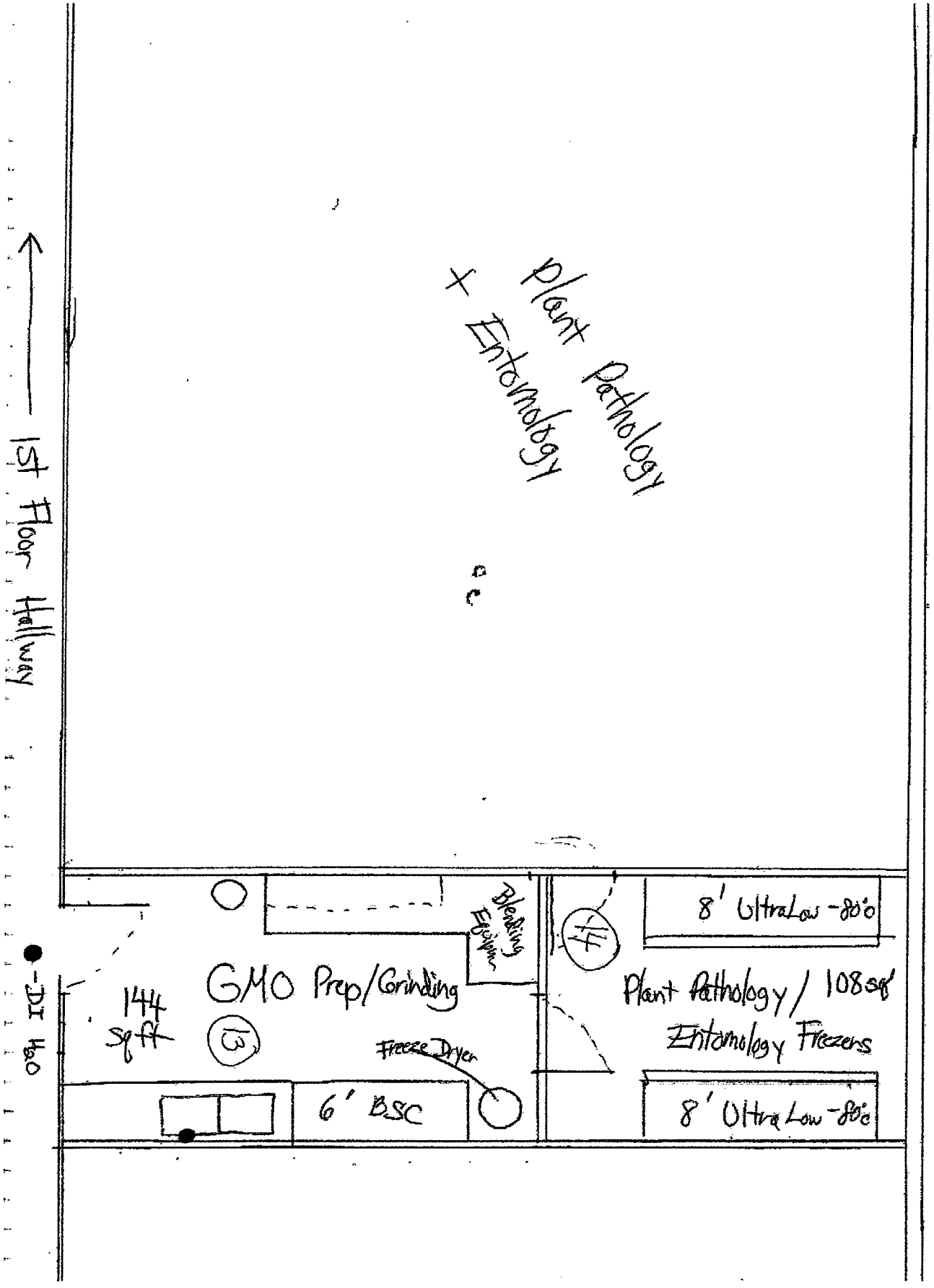
Desk, chair, and 2-3'w 6' h bookcases


2nd Floor Hallway
Centrifuge
6
Molecular Clean Prep 108 sqft
PCR enclosure
Revco -80c
15
49sq' Office
Desk
Printer
Fridge
16
Office 49sq'
Filecabinet
Bookcase
Desk
Photo
freezer
fridge
9 Micro Storage 105sqft
SNAP
8 Dairy Chemistry 714sqft
Charm II
KSL 5
Somacount 150
FT 120
Electrophoresis
Fridge
Bio Waste
BSC
7 Nucleic Acid Template + PCR Plate 153sqft
Fume Hood
Microscope
Opticon
Smart Cycler
UV Spec 1
kcryoscope
Delvo
hand washing sensor faucet
1 Sq = 1'
DI H2O
gas jet

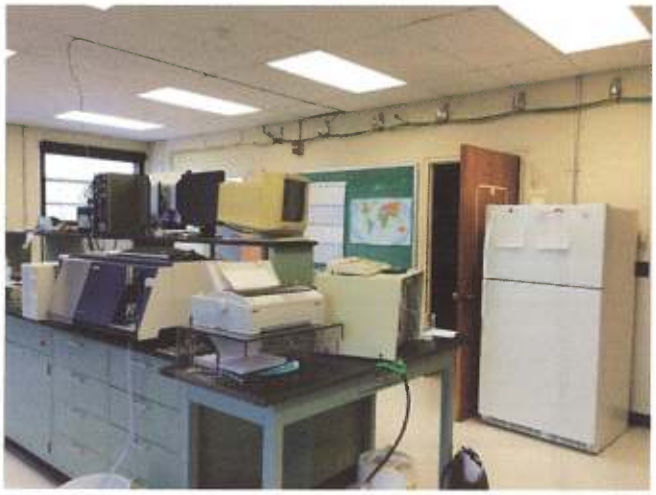

Colilert
Quantitray
H2O
Coli Meter
PI
Incubators
580 sqft
Dairy Micro
Cart
2-Bay Fridge
Cart
Plating (coliform)
Plating (Heterotrophic)
10
36"
Biowaste
Plate Reading
Glassware Washing
Weigh-Up
Agar Prep
pH Meter
Freezer
Fridge
Waterbath
2nd Floor Hallway
Food Pathogen
262 sqft
9
Microscope
Sink
Stomacher
Centrifuge
Incubators
File Cabinet
Bookcase
Office 49 sqft
17
6' BSC
ELISA
Brucellosis
AGID
Desk
Benchtop Fuge
Sample Checking
Serology/ 269 sqft
Mastitis
Microscope
Gram Stain Sink
Stackable Incubator
12
Centrifuge
Fume Hood
Mastitis
Fridge
Fridge
Fume Hood
DI H2O
Gas jet
Hand washing sensor faucet



Restricted card access ● -DI H_2O ● hand washing sensor faucet


1st Floor Hallway
Plant Pathology
+ Entomology
Bleeding Equipment
8' UltraLow -80'c
GMO Prep/Grinding
144 sqft
Plant Pathology / 108sqf
Entomology Freezers
Freeze Dryer
6' BSC
8' UltraLow -80'c

Dairy Chemistry: SL5 and Idexx SNAP



Dairy Chemistry Island (note 18" clearance below shelf)
Bentley Somacount 150 in foreground.

Dairy Chemistry: island. Note 18" clearance below shelf.

Dairy Chemistry: Charm II AP-Anti

Dairy Chemistry: Foss FT 120

Dairy Chemistry: Delvo

Dairy Chemistry (view from door)

Dairy Chemistry: light microscope for enumerating Leukocytes in milk

Dairy Micro: Note high shelf on island.

Dairy Chemistry: Sample fridge

Dairy Micro. Note high shelf on island.

Dairy Micro: 2 Bay fridge

Dairy Micro: view of island

Dairy Micro: Plate Reader

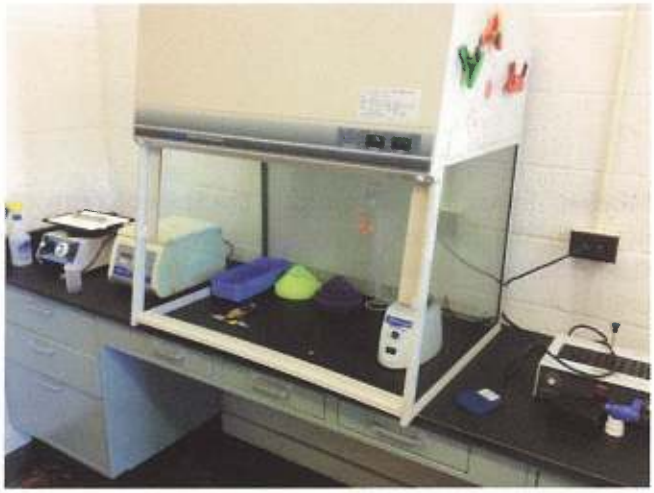
Dairy Micro: DEC Quantitray (5' bench space)

Dairy Micro

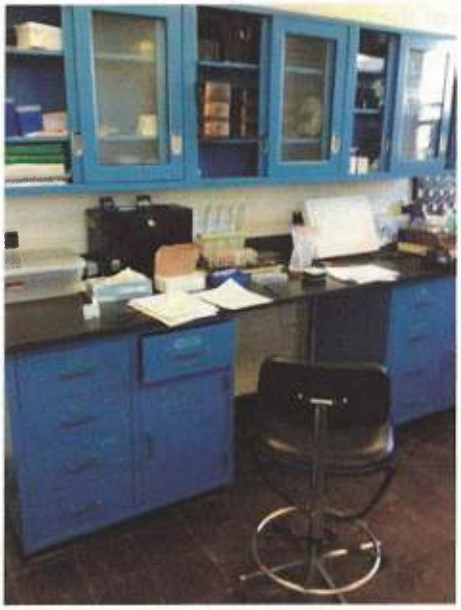
Dairy Micro: Plating Island

Dairy Micro: Glassware wash sink

Dairy Micro Stockroom



Molecular PCR Enclosure



Seriology/Mastitis: Brucellosis and EIA

Molecular—Molecular BSC (left) & Extraction (right)

Seriology ELISA and Mastitis

Molecular DNA Extraction

AIR QUALITY (ANR)

Mission: To operate and maintain the State of Vermont air monitoring network and all sampling systems in the network. The data collected by the network is utilized to demonstrate compliance with Federal National Ambient Air Quality Standards (NAAQS) and State of Vermont Hazardous Ambient Air Standards (HAAS). This lab's data is also utilized in trends analysis, health studies, public health air quality warnings, and research efforts.

Summary of services:

- Operate, maintain, collect, and analyze ambient air samples at five sites: Bennington, Burlington (2 sites), Rutland, and Underhill. The program performs ambient air monitoring for federally mandated criteria (National Ambient Air Standards), ambient pollutants (CO, NO2, O2, ozone, SO2, particulates - PM2.5/PM10, Lead), as well as air toxics and all required meta data (meteorological parameters, flow rates, transfer standards, etc.).
- For all five sites, AQCD uses weighting to determine concentrations of the filter-based particulate samples. These data are compared to both the NAAQS and other methods collecting similar data.
- The Burlington, Rutland, Underhill sites operate air toxics monitoring programs. The Underhill site is one of 27 national sites for the EPA's National Air Toxics Trends Stations, to track long-term trends in ambient levels of air toxic pollutants such as volatile organic compounds, carbonyls, and metals. Vermont's air toxics data is rated amongst the best in the nation. Past programs include monitoring and analyzing benzene and related compounds through an EPA grant. The Federal/State mandated hazardous air contaminant (HAC) program identifies pollutants that are to be monitored for comparison to Vermont's hazardous ambient air standards (HAAS). Currently AQCD is using DEC Chemistry for these processes: VOC-TO-15, Carbonyl -TO-11, Metals, GC/MS, ICP/MS, HPLC analysis of canisters, cartridges, filters, PUF/XAD, & other media extracts.
- The AQCD program will utilize the new space for 1) Field operation center for the maintenance and repair of all equipment, 2) PM filter weighing for our PM2.5 air monitoring program, 3) Sample processing and analytical services for our air toxics monitoring program, 4) Flex space for air monitoring one time study/projects, enforcement section instrument maintenance, and staff training opportunities; as well as 5) office space.

Future for services:

- Add PAH and metals analyses of air samples. Uses EPA funding. Hope to increase from 70 to 150 samples/year.
- Use Chemistry lab for semi-volatile HACs analyzed by TO-13A. Currently 70 samples/year; could grow to 150 samples/year. (Potential revenue source)
- Expand VOC-air analysis.
- Could analyze other states' air toxic and particulate samples. (Potential revenue source)

Staffing: 1 full-time, 6 field staff and technicians who are in the office 1-3 days/week
(no changes since Irene, nor predicted for 10 years)

Locations and space:

Pre-Irene:	LaRosa Lab	1,100 sf at LaRosa + 350 sf at 3 South (Wbury)
Currently:	Industrial Lane, Berlin, and N.L.	850 sf + 252 sf at National Life
10-year forecast:		**1,019 sf** + keeping space at National Life

Exterior space requirements: loading area outside storage/shop with loading dock if possible
3 fleet vehicles (truck sized)
1 trailer transporter
2 monitoring trailers (8' x 8' x 8')

Function/task details with equipment

Task	Size (sf)	Fixed Equipment/Notes	Movable Equipment
Sample Prep	250	Near Chemistry lab and Balance Room Hood: 5' lighted w/vacuum and compressed air lines Would like benches, shelving, hoods to be on wheels. (note MA DEP lab, Lawrence MA) deep lab sink 8' – 10' bench space w/cabinets above DI water	Large 49 cf commercial refrigerator (store particulate samples @ 4degC) Chest freezer (for ice blocks)
AP Balance Rm.	120	Gravimetric filter operations need temp. and humidity control. * Isolated footing/slab below table 3' x 3' concrete table 16'-20' bench space w/ glass cabinets abv.	Micro balance Magnifying lamp
Shop & Storage	384	Bench test/calibrate monitoring system. Do repairs & maintain equipment. Needs ambient air supply manifold of non-reactive material and isolated exhaust system. Articulating fume hood for gas and solder. 20' bench space with shelves above. Prefer movable benches. Must be on first floor w/ double ext. door	6- 6'w x 3'd Movable shelving and racks for storing equipment. Dedicated storage of 75-100 6L canisters (active and back up). **Flammable storage cabinet (stores paint cans, graffiti remover, small amount of hexane)**
Pump Room	25	Compressor & gases for calibrating in Shop. Excellent sound insulation. Must be immediately adjacent to Shop.	2- 4'w x 3'd racks to store calibration gas** in cylinders. **Can centralize.** Compressor: Gast 5Z672, 1/6 HP
Desk areas	240	3 @ 50 near lab 3 @ 30	L-shaped cubicle and chair 2 3'w 6' h bookcases desk and chair. Movable is best.

Notes

* Gravimetric filter room needs to be controlled: 20-23 Deg. C, ±2 Deg C, 24 hrs/day and RH 30-40% ± 5%, 24 hrs/day. Gravimetric facility ("AP Balance Room") must be isolated from building entries to reduce the fugitive dust/moisture/ temperature/pressure/ changes. Room must be physically separated from pesticides programs. Under slight positive pressure to prevent outside air contamination. This room must meet and maintain requirements listed in 40 CFR Part 50 appendix L, Section 8.0, and EPA Quality Assurance Document 2.12 Monitoring PM2.5 in Ambient Air Using Designated Reference or Class I Equivalent Method.

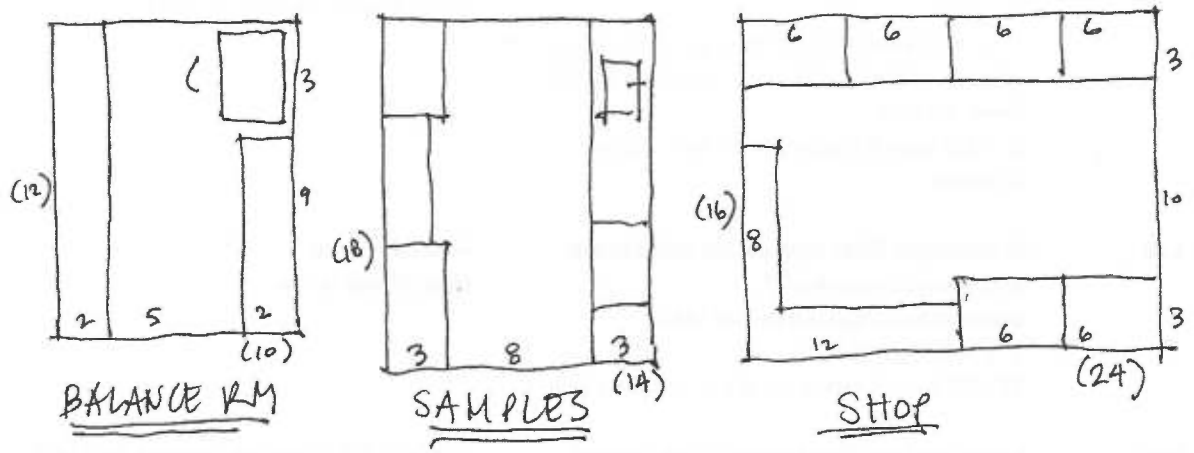
** Gas types for AQCD:

1. Nitrogen - SS 200 size cylinder 9"x 51"
2. Nitrogen balance with mixed or single component gas (Example: SO2,NO,CO,Pure Air) - AL 150 size cylinder 8" x 48" and/or AL 33 size cylinder (7" x 16")
3. Nitrogen with trace BTEX (Benzene, Toluene, Ethylene, Xylene) component gases AL LB 2" x 12"

- Would like an outside wall pass-through for air sampling manifold to connect backup analyzers where monitor system also provides ports for instrumental and blender exhaust.
- All waste must comply with State and Federal regulations in the entire facility due to EPA funding.
- Compressed cylinder storage must comply with OSHA/DOT regulations

Sharing and adjacencies

This program can share a printer with immediate neighbor programs.
Hood is used once a week. It can be shared with other programs.
No perchloric hood is needed for filter digestion/extractions.



Micro balance

Sample storage

Sample layout bench in balance room

Desk area and calibrating instruments, also storage

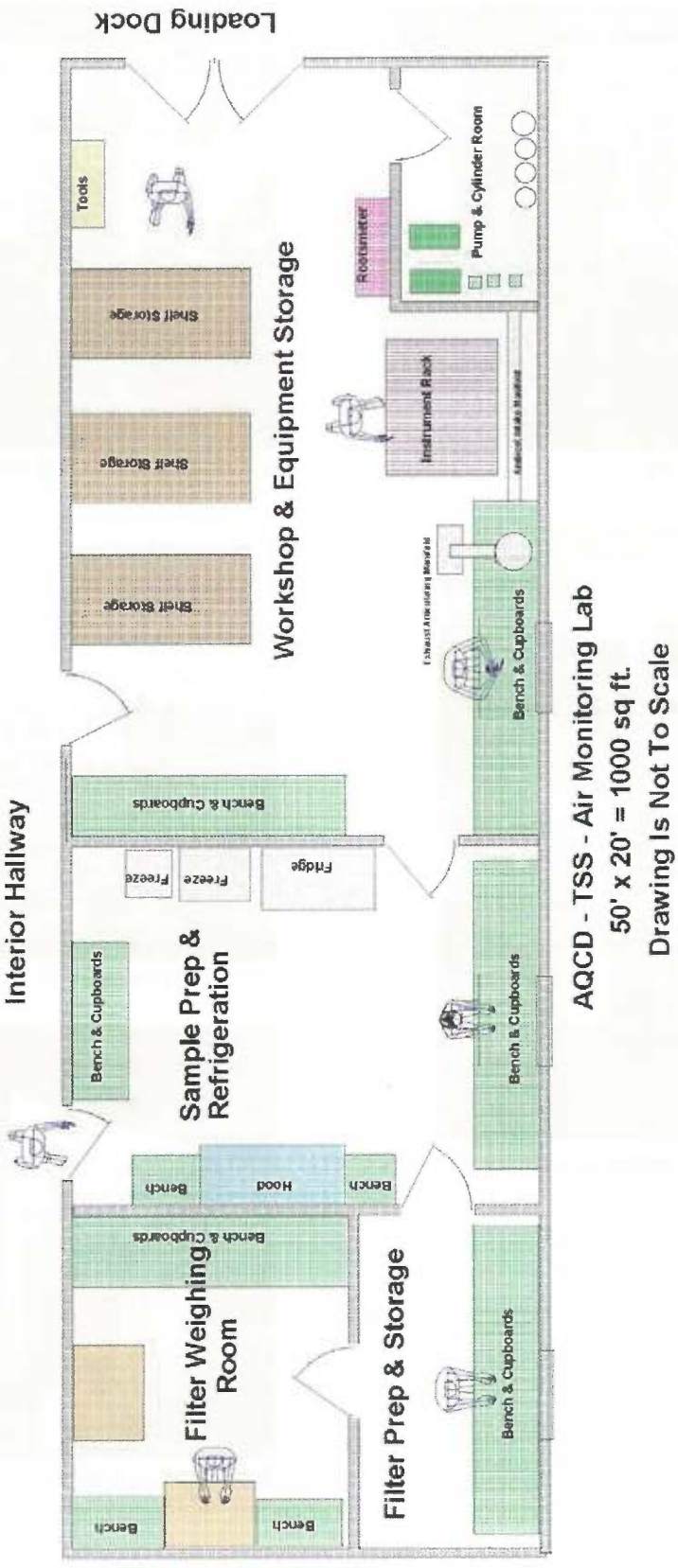
Desk area with storage nearby

Monitoring trailer and misc. storage

Tanks and calibration instruments w/ venting.
Chest freezer for ice blocks

Trailers being stored outdoors.

A monitoring trailer in storage.



Possible layout for the Air Quality Lab

WATERSHED MANAGEMENT (ANR)

Mission: The Watershed Management Division's primary mission is to protect, maintain, enhance and restore the quality of Vermont's surface water resources. Inherent in this effort is the support of both healthy ecosystems and public uses in and on Vermont's lakes, ponds, rivers, streams, and all wetlands. For more information, visit www.vtwaterquality.org

This facility is the "base camp" for six of the Division's field programs: Lakes & Ponds, Rivers, Wetlands, Wastewater Management, Ecosystem Restoration, and Monitoring Assessment & Planning. About 100 people staff the Division; of these, about 20 will use this new facility frequently. Of these 20, six will work primarily at the facility. The facility sees much heavier use in non-snow months, but it processes samples and specimens year-round.

Summary of services:

- Taxonomy for fish, aquatic insects, algae, and aquatic and wetland plants.
- Water chemistry analysis, using Chemistry Lab. $250,000-300,000/year (16,500 samples)
- Mobilization for field research and receiving/clean up
- Equipment storage and calibration
- This lab provides services to New Hampshire (revenue?)
- This lab has worked with the USGS and EPA under grants.
- Wastewater permitting, trains personnel. They need a classroom with a bench somewhere in the building.

Future for services:

- Would like to increase the number of contaminants can test for, including direct mercury analysis.

Staffing:

Currently:	6 full-time, 1 part-time, 1 seasonal
10-year forecast:	**6 full-time, 1 part-time, 1 seasonal**

Locations and space:

Pre-Irene:	LaRosa Lab	2,150 sf
Currently:	National Life, Montpelier (offices)	1,000 sf (approximate: 8 desks)
	Dewey Lab, National Life	1,150 sf (900 sf lab; 250 sf storage)
10-year forecast:		**1,375 sf + 100 sf if move 2 people from N.L.**

Exterior space requirements: Loading dock for boats on trailers
Exterior racks for cleaning gear, frost-free water supply
Fenced area for loading and storage: (5) 20' boats with trailers, kayaks, canoes, etc.
(The fenced area can be off site, up to a few miles away.)

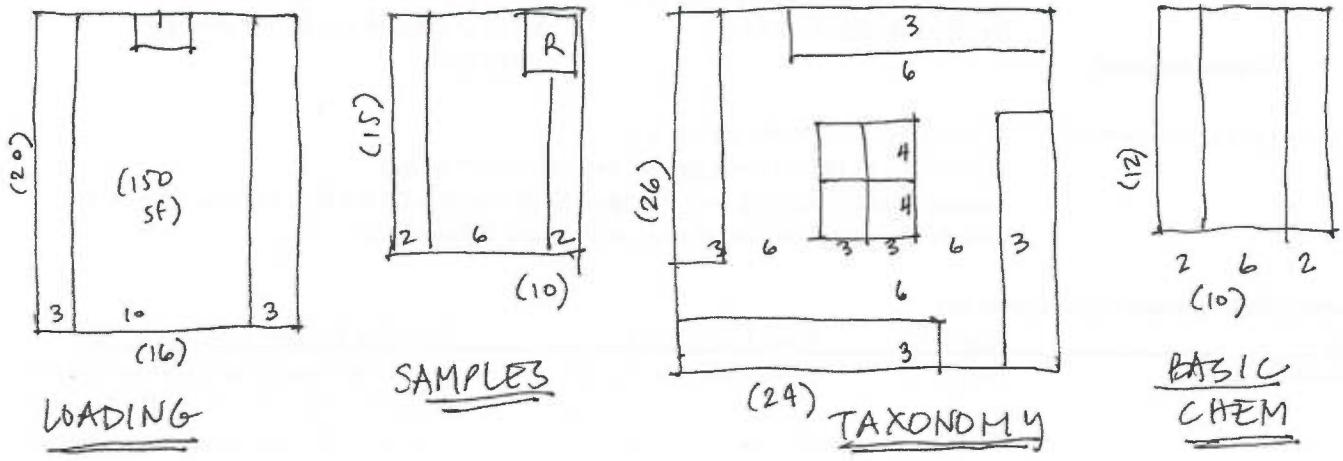
Function/task details with equipment

Task	Size (sf)	Fixed Equipment	Movable Equipment
Unloading/Loading	325	Serve up to 10 staff at one time. (15 sf/person?) (Ex: Chelmsford MA)	Equipment washing/decontamination. DI water, deep double sink: hot water and quat (ammonia), proper disposal. 40 lin ft. equipment storage on periphery (open shelves, 3' deep) for nets, waders, coolers, etc.
Log-In and Calibration	150	cleaner area	LIMS station

		10' bench space w/cabinets above Deep sink (Ex: Chelmsford MA)	Shelves: water sampling probes, sample bottles, etc. Calibration tools
Taxonomy	625	Ventilation impt (alcohol) 40' bench space (6 stations) 3 shelves above benches	4 "Picking" benches (4' wide, desktop) 1 LIMS station 1 inverted microscope 2 compound microscopes 6 dissecting microscopes 4 magnifying lights Double sink Standard fridge/freezer
Basic Chemistry	125	15' bench space (1 station) Need DI water Deep double sink Snorkel-type exhaust Safety shower	ph tester Aqua tester (colors) Spectrophotometer filter samples for Chem Standard fridge/freezer
3 Work areas	150	3 @ 50 sf	desk, chair, computer, OH storage
2 additional work areas	**100**	**2 @ 50 sf ... if located in central VT (also less space at National Life)**	

Adjacencies and Sharing

- These scientists will use the fume hoods in Chemistry and the core freezers/refrigerators.
- If this lab remains part of this project, it will need a focus room (a 150 sf meeting space for 8-10 people) nearby
- If this lab moves to a stand-alone location, it needs a processing area for water samples. These samples are preserved with nitric or sulfuric acid for a few days to minimize trips to Burlington. (Currently this method is used, and staff make about two trips a week in non-snow months.) A processing area would require 5' bench space and 2 standard refrigerator/freezers. (100 sf)
- This lab, if stand-alone, would also need a significantly larger freezer for whole fish and large water samples.



Taxonomy

Water sampling desk area

Overlap area: both taxonomy and water sampling

Water sampling (Chemistry) area

More taxonomy with picking tables in center.

Water sampling

PLANT INDUSTRY (AG)

Mission: Plant and plant product regulatory oversight and enforcement, certification and inspection for interstate and international shipment, mosquito/other biting arthropod surveys and control oversight and technical assistance, cooperative agricultural and forest pest survey and outreach, represent Vermont on plant pest advisory boards, plant-related legislative testimony, technical assistance and outreach.

Summary of services:

- Diagnostic services for commercial nurseries & greenhouses. Not revenue producing.
- Arbovirus and insect vector survey and management, supervision of nuisance mosquito control efforts
- Insect and pathogen/disease identification, microbiological work (fungal culturing, ELISA and immuno-chemistry work), seed inspection/certification, seed potato certification.
- Ginseng certification
- PUBLIC SERVICE: help USDA with regulated pests (eg Asian longhorned beetle, emerald ash borer, sudden oak death hemlock woolly adelgid). 2014: will process 3,000 arbovirus samples (BSL 3 services currently provided by VT DOH). By 2025 will process up to 30,000 samples/year

Future for services:

- GMO/GE testing in cooperation with the Mol. Biology lab. Priority, both for mandates and revenue.
- Hemp THC testing.
- Increasing phytosanitary regulation for interstate and international exports. (currently sent out of state)

Staffing:

Pre-Irene:	4 full-time, 4 seasonal (April – October)
Currently:	4 full-time, 4-7 seasonal (April – October)
10-year forecast:	will add part-time Forest pest outreach, plus seasonal field staff: 6 arbovirus + 1 nursery **4 full-time, 1 part-time, 11 seasonal**

Locations and space:

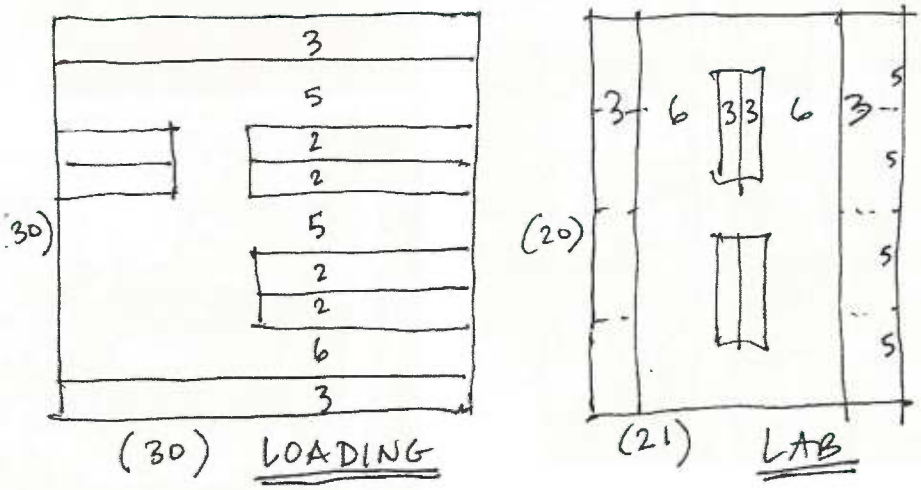
Pre-Irene:	LaRosa Lab	1,300 sf. + 300 offsite storage
Currently:	Industrial Lane, Berlin Mplr (NL) and Burlington	1,800 sf (350 sf office, 350 sf lab, 1100 storage) 200 sf office space (will no longer need)
10-year forecast:		**1,400 sf**

Exterior space requirements: Storage for two trailers

Function/task details with equipment

Task	Size (sf)	Fixed Equipment/Notes	Movable Equipment
Load/Unload	450	Must be on first floor Cleaning and prep for field equip. Deep sink 6' bench space Floor drain	Racks to store insect traps, survey equipment, vials, bottles, bags.
Sample prep	100	Deep sink Prep seeds to send to Cornell 15' bench space	Cabinet freeze dryer/lyophilizer LIMS station

Clean Lab (areas)	450	Flexibility is critical 50' bench space w/ cabinets above (10 stations total) Some chemicals will be stored in these overhead cabinets. Glassware storage DI water	**36" Safety cabinet: ethanol (3000 vials)** LIMS station Standard fridge/freezer 4 dissecting microscopes 2 compound microscopes Hot plates incl. stirring hot plates Fiberoptic lights 9' lin ft. 6' h bookshelves
• Arbovirus		needs humidity & temp. control needs positive pressure This area will use 4 of the workstations **Separate from Mol. Bio, but P.I. could use their overflow space to work.**	
• Seed Propagation/ Nurseries		(uses 2 of the workstations)	**Laminar flow hood/safety cabinet**
• Entomology (Apiary)		Entomology (tests pesticides) cannot be near Pesticide Residue Lab. Needs excellent dehumidification. (uses 2 of the workstations)	They use dry ice chill tables (homemade) Counters (to count with) External lights
• Plant Pathology **(could be in Mol. Bio)**		**laminar flow hood** (uses 2 of the workstations)	
Office #1	200	For 2 people.	2 Desks & chairs 6 lin ft bookcases
Office #2	200	For 2 people.	2 Desks & chairs 6 lin ft bookcases



Current clean lab

Current sample prep area

Storage area

Loose storage (could be on shelves)

Field gear (could be on shelves)

Very well stored goods!

FOREST BIOLOGY LAB (FPR)

Mission: The Forest Biology Lab, a section of the Forestry Division, helps protect the integrity and diversity of Vermont's forest habitats. We support forest health assessments and management through survey and detection, education and extension activities. We provide timely information on the ecological, economic, and aesthetic effects of insects, diseases, and other stressors on Vermont's timberland, sugarbush, urban forest, Christmas tree, and non-commercial forest resources. Our work contributes to topics of regulatory and land use concern, and adds to the understanding and maintenance of biodiversity. Contact with other agencies is routine.

Summary of services:

- Provide information, identification and diagnoses of insects and diseases to foresters, land managers and landowners, maple syrup producers and Christmas tree growers, pest control operators, landscapers, the general public, and others. (We average over 750 inquiries a year, pre-screened by regional staff)
- Monitor native pest species through annual survey and detection procedures such as pheromone and sticky traps and ground surveys, and maintain historical records on native pests.
- Monitor and address newly arriving species (such as deer ticks, emerald ash borer and others) that can have devastating effects on the health of Vermonters as well as the wood industry.
- Maintain Vermont entomological records and collections, contribute to state and regional faunal lists, and promote access to collected data, cataloged references and curated specimens. This archived material and broad database is a cornerstone of any forest health work and provides an index to understanding climate change and habitat transformation and/or disturbance.
- Continue state-wide monitoring of phenological events (seasonal plant and insect development) that help determine long-term climatic trends.
- Public outreach through regular bulletins during the growing season, communications on special topics, our Annual Conditions Report and other venues that provide comprehensive coverage of current and on-going forest health concerns. Participate in presentations, conferences, school programs and other outreach efforts with foresters, land managers and landowners, various organizations and the general public.

Future for services: Goal is to resume the Forest Pathology position.

Staffing:

Pre-2009:	2 full-time, 1 part-time, 2-3 interns (year round), many volunteers.
Since 2009:	1 full-time, 1 part-time, 2-3 interns (year round), many volunteers.
10-year forecast:	2 full-time, 1 part-time, 2-3 interns (year round), many volunteers.

Locations and space:

Pre-Irene:	LaRosa Lab	600 sf	included Forest Pathology
	LaRosa Lab	120 sf	shared storage & insect collection space
Currently:	111 West Street, Essex Junction	1,020 sf	(stand alone building)
	National Life	50 sf	
10-year forecast:		**450 sf**	

Exterior space requirements: (none)

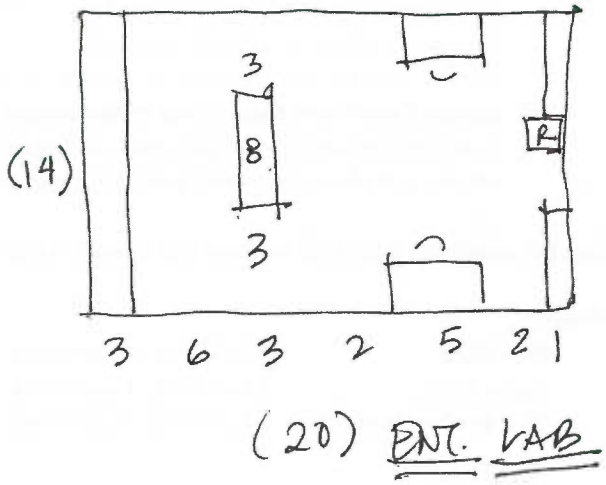
Function/task details with equipment

Task	Size (sf)	Fixed Equipment	Movable Equipment
Lab : Entomology incl. ticks	300	20' bench space (3' deep) for 4 stations. Ethernet & outlets @ 4' o.c. Deep sink Compressed air **Hood (2x/wk, can share with other labs)** **access to 20 cf fridge & freezer space**	(4) dissecting microscopes 14 lin ft 6' h bookcases (or over benches) 2 desks & chairs in lab LIMS station + 2 computers drying oven
Lab: Forest Pathology			
"dirty lab" **Can be with Ent. Lab**	**100**	**5' bench space**	**LIMS station/1 computer**
"clean lab": culturing (can be in Mol. Bio)	**50**	**access to autoclave** **laminar flow hood** **access to 20 cf fridge/freezer space**	**refrigerator** **1 compound microscope** **1 dissecting microscope**

Adjacencies and Sharing

If this program were to be located in another building, it would also need a meeting room, equipment that it could share in the collaborative lab, and more freezer/refrigeration space (as well as utility and support space).

Insect collection cabinet (fireproof)



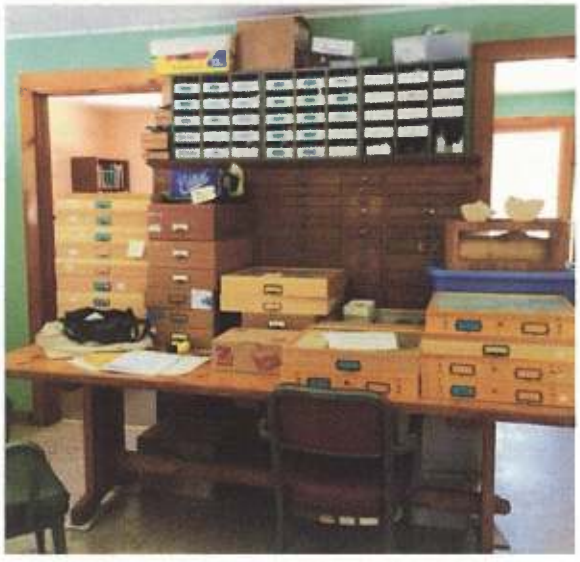
Educational display


Entomologist's work bench and desk


Moth specimen being prepared for collection


Leopard moth "nest" in log with screened protection


Entomologist's work bench and references


Insect drawers under repair from the flood

ANIMAL PATHOLOGY (AG)

Mission: To protect the health of Vermont's livestock and consumers by advancing a safe and secure food supply within a marketplace that provides fair and equal access to consumers and processors while enhancing Vermont's working landscape, rural character and local economies.

Summary of services:

- For many years the State's veterinary staff have conducted necropsies, gross pathology, and microscopic examination without a proper facility. Currently their only lab space is in a dusty basement, sharing a sink with maple syrup inspectors.
- Staff examine slaughterhouse specimens, investigate livestock farm populations with high mortality, and train field staff and private veterinary practitioners in new techniques.
- Staff collect required samples from farmed livestock and wild populations. For instance, feral swine are now being tested for brucellosis and pseudorabies.
- Currently all samples and animals requiring further analysis are sent out of state, mailed or driven, to laboratories in the National Animal Health Laboratory Network, such as New York, Connecticut, and Wisconsin. From all Vermont sources, there are thousands of samples sent annually. Transportation time delays diagnosis.

Future for services:

- In-state animal pathology services would be of great use in the state. Ideally a Veterinary Pathologist position would be created.
- Vermont's Agriculture Lab did not renew its NAHLN certification in 2009. Staff recommends that the State focus on tests and species that are common in Vermont, in cooperation with neighboring states. For instance, Connecticut has a large poultry population and performs Vermont's poultry testing. Vermont could specialize in dairy and other expanding populations, like small ruminants and swine.
- Private veterinarians conduct the vast majority of examinations and specimen collection in Vermont. Presently there is no place to train animal stakeholders in new techniques or to confer about disease trends. VTC's facilities are basic, and UVM does not have equivalent space. A training facility is needed in Vermont, and central Vermont would be the most efficient and accessible location.

Staffing:

Currently: 2 State veterinarians, with no lab space
10-year forecast: **2 State vets, 1 full-time Veterinary Pathologist, two techs/parapathologists**

Locations and space:

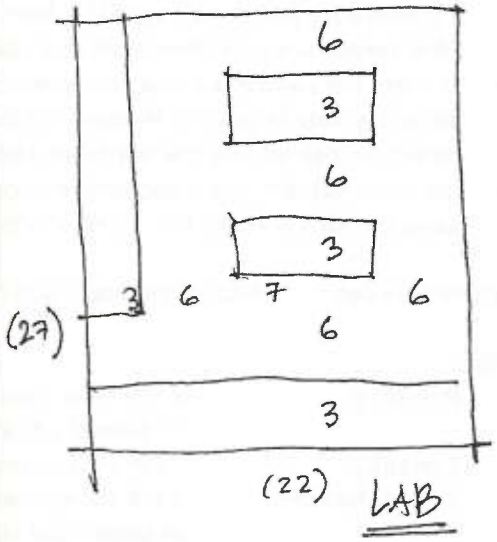
Currently: Having to use the basement of 116 State Street (Ag Building)
10-year forecast: **1,200 sf.** **Central VT location is important for access to herds.**

Exterior space requirements: none

Function/task details with equipment

Task	Size (sf)	Fixed Equipment	Movable Equipment
Receiving	200	Separate entrance with parking 8' bench space Impermeable floor and floor drain Slop sink Deep sink with cabinets above	2 cabinets with doors LIMS station bio waste storage
Gown/Shower/Degown	200	Shower, sink **This area could be available for**	lockers & benches for 12 Gown storage cabinet

		other lab staff to shower	PPE cabinet
Necropsy room	600	2 surgery tables, room for 12 people Impermeable floor Drains & hoses 15' bench space w/ glass cabinets above & below (3 work stations) LIMS station All liquid waste from table & sink must be pretreated before entering sewer system	other stainless steel tables locked storage for equip. and tranquilizers dissecting microscope staining microscope compound microscope centrifuge Fridge/freezer 1 desk space Bio waste storage
Work areas	200	1 @ 100 sf; 2 @ 50 sf	desk, chair, 6' bookshelves



Current "lab" space is shared with maple inspectors and storage.

The "lab" space is neither sterile nor sufficiently sized.

FISH & WILDLIFE (ANR)

Mission: To protect and conserve our fish, wildlife, plants, and their habitats for the people of Vermont, including both wild fish populations and fish in commercial and state fish hatcheries.

Summary of services:

- State-of-the-art disease diagnostic and fish health inspection services, conducting annual fish health inspections at 5 state fish culture facilities as well as private fish hatcheries located throughout the state.
- Diagnostic investigations and diagnosis of fish disease outbreaks when they occur on state and/or commercial fish culture facilities. By monitoring an individual fish culture facility's disease status, we can isolate fish disease outbreaks and prevent their spread into other fish culture facilities or State waters.
- Fish health testing on Vermont's wild populations of fish as well as fish kill investigations. The Fish Health Lab is a cooperative partner with the U.S. Fish and Wildlife Service assisting with the National Wild Fish Health Survey. F&W serves as a surveillance program to guide management decisions involving fish movement and passage.
- Manage intra and interstate movement of fish including fish to be stocked into public waters. The lab's services allow the state to partner through the Northeast Fish Health Committee in following the New England Fish Health Guidelines and the Northeast Fish Health Importation Guidance for managing fish health.
- Lab work includes but is not limited to cell culture, ELISA, PCR, live bacterial culture, serology and parasitology. Samples include whole fish, internal organs, live cultures, fish heads, scrapes of mucous and gills, and water.

Future for services: Ability to necropsy and dispose of whole fish in/at the lab.

Staffing:

Pre-Irene:	2 full-time, 1 seasonal (full-time/9 months), 1 seasonal (full-time/5 months), 1 seasonal (full-time/2 months) *depending on projects and grants for funding
Currently:	2 full-time, 1 seasonal (full-time/9 months)
10-year forecast:	**2 full-time, 1 seasonal (full-time/9 months), 1 seasonal (full-time/5 months), 1 seasonal (full-time/2 months)** *depending on projects and grants for funding

Locations and space:

Pre-Irene:	LaRosa Lab	600 sf. + 250 @ 10 South, Waterbury
Currently:	Hills Building (UVM)	600 sf + 260 Roxbury F&W District Office
10-year forecast:		**840 sf.**

Exterior space requirements: parking for 1 State vehicle

Function/task details with equipment

Task	Size (sf)	Fixed Equipment/Notes	Movable Equipment
Processing	200	For initial viral sample processing, necropsy. LIMS station Whirling disease assay: 10' bench w/ sink Incl. & 16' for viral processing (separate); Benches 36" height with drawer and Cabinets under except LIMS station Glass sliding-door cabinets above both. *(Typical for all areas in this program.)* Double deep sink	Standard fridge/freezer small upright freezer refrigerated centrifuge (28"w) Hot water bath/shaker Digital gram scale 2 stomachers (approx. 15" w) Storage for items headed out to field Fireproof storage cabinet
Bacteriology	112	clean lab: assays using serological confirm-ation techniques.	dedicated small fridge/freezer Large incubator (20 deg C)

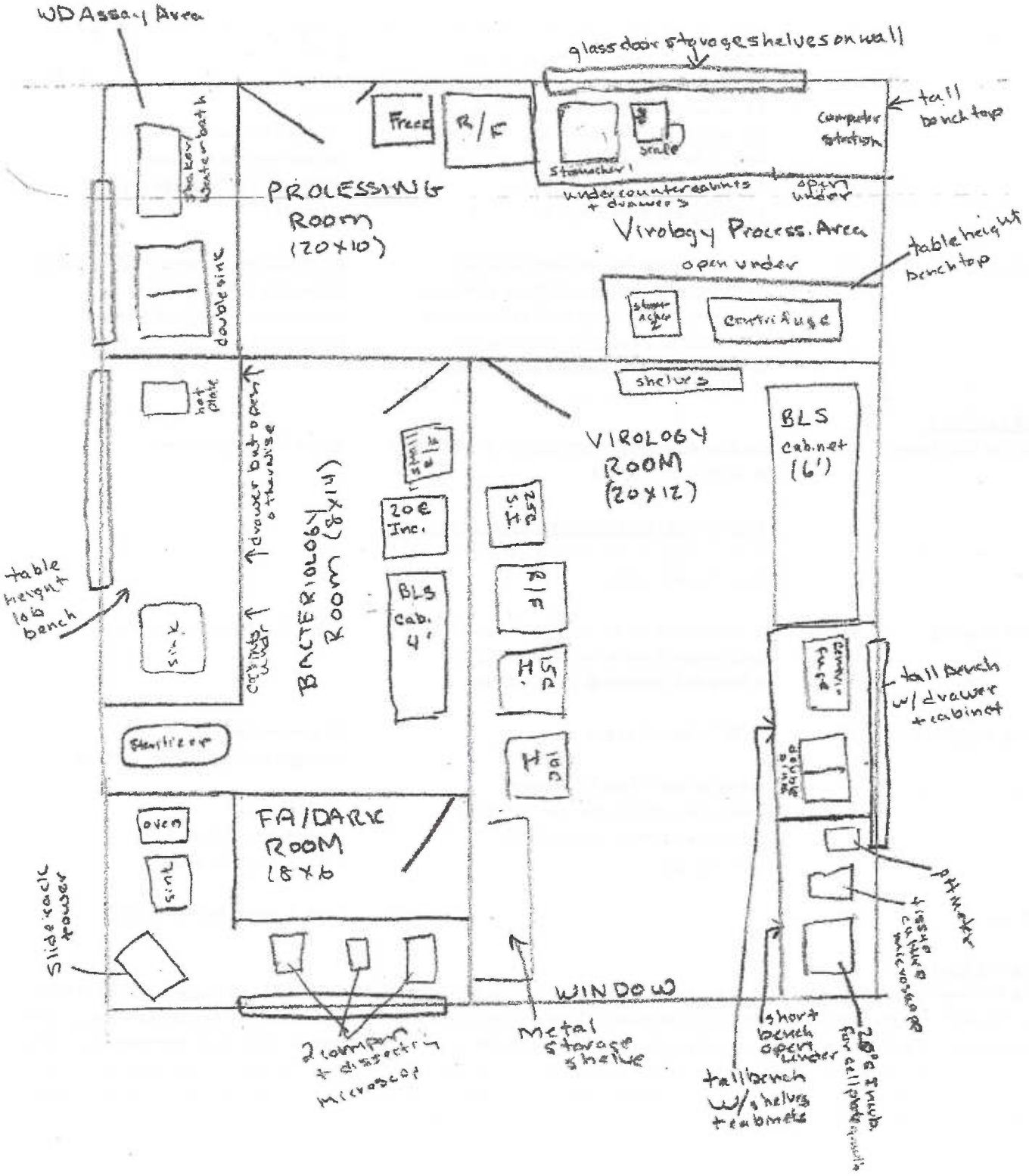
		Sterilizer – plumbed in 4 foot (BSII) biological safety cabinet 10' Bench space incl. sink at 32" height Some drawers and cabinets below w/ cabinets above bench	Hot plate
Virology	240	clean lab: assays using cell culture technique and seriological confirmation assays. 6 foot (BSII) biological safety cabinet 14' bench with double (deep) sink (6' w/width 14' bench with double (deep) sink (6' w/ sink at 36" height cabinets and drawers under; 8' at 32" open under) and cabinets above bench	2 large incubators (10 & 15 deg. C), 32" width 2 small incubators, (20 & 25 deg. C) 24" width inverted tissue culture scope refrigerated centrifuge supply cart w/ storage area pH meter
FA (dark) Rm	48	For serological Fluorescent Antibody Technique for bacterial kidney disease screening; for reading PCR assay results 11' bench w/deep sink, open below counter all 32". Cabinets above bench	2 Compound Florescent Microscopes Dissecting microscope Microscope slide Rack Tower Small oven
<u>PCR Lab Suite</u>			
Master Mix Room	40	Dedicated sterile room just for this purpose 6' bench, 32" height <u>Must avoid cross-contamination of samples</u>	4' BSL II safety cabinet
Area: extraction	30	6' bench space, 36" height, cabinets and drawers under	scale
Area: loading	40	8' bench space, 36" height, cabinets and drawers under w/ legroom space where BSL cabinet & LIMS located	4' BSL II safety cabinet (on counter)
Area: amplification	30	6' 36" h bench space General use in this PCR Room: Deep sink with 6' counter, 36" height Computer station (with LIMS) Cart storage	Thermocycler UV light source for sterilization Microwave Small Refrigerator Small Upright Freezer
Office	100		desk & chair, bookshelves

Sharing Spaces

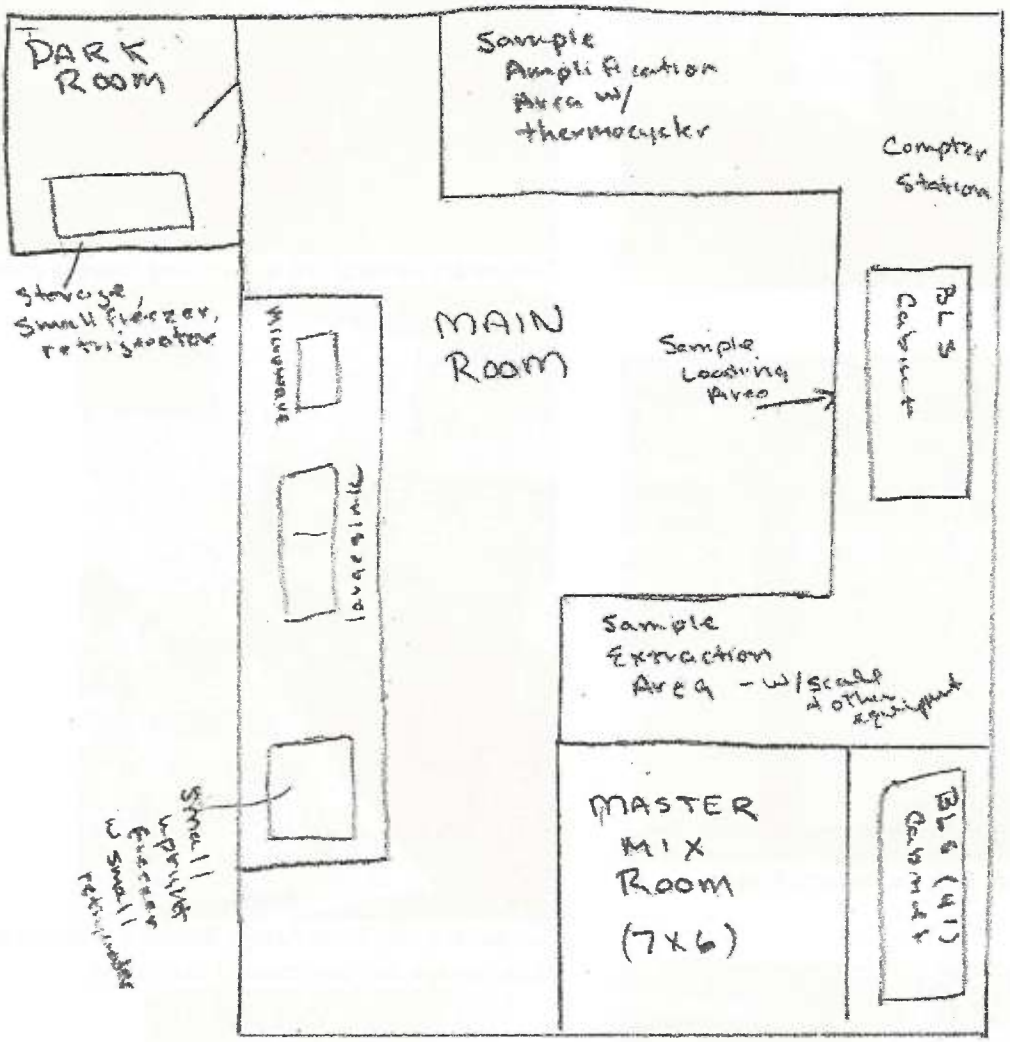
The Fish Health Lab is a specialty lab that currently does not use any of the "core" DEC/AG lab spaces. Equipment is purchased through dedicated Fish & Wildlife Funds. (Dingle Johnson & State Wildlife Grant) Cross contamination and consistency of staff biosecurity protocols is essential for adequate testing. We work on state and commercial/private aquaculture facilities – results of testing impact operations, facility's fish health certification, and commercial output. The freezers and refrigerators are dedicated to a specific lab area and are used for varying types of medias & samples that should not be stored or kept with others due to cross contamination concerns.

Within F&W, further efficiencies may be possible if rooms are configured to meet the multiple assay needs. One way to save space is careful storage...previously had many cabinets/drawers/storage areas under benches as well as closed (door) wall shelves where much was stored.

Main Fish Health Labs (Waterbury Design)
~ 20 x 30' = 600 sf (not to scale)



PCR Lab - currently in basement of F+W Roxbury Offices (Nothing to Scale)
(~ 260 s.f.)



With the exception of the master mix room which is ideal, benchboard and all built w/ leg room openings in some locations (like the BSC cabinet + computer area). The dark room can be combined in the new lab design to do both PCR Assay results + FA work by BKO Assay.

Temporary Virology Lab

Temporary Space: Virology BSC, incubators, fridge

Temporary Bacteriology Lab BSC and supply shelving

Temporary General Lab w/ Whirling Disease equipment

Temporary Lab: Bacteriology Biochem with media tube storage and compound microscope

Processing, Whirling Disease, and Bacteriology refrigerators + incubator

WEIGHTS & MEASURES (AG)

Mission: The mission of the Weights and Measures (W&M) Laboratory in conjunction with the W&M Regulatory Program is to promote economic development and consumer protection by providing equity and confidence in the marketplace anywhere a good or service is offered by weight or measure. This mission is accomplished by maintaining custody the state's official traceable standards of weight and measure; these standards are used to provide legally traceable measurements in support of and as a resource base for the W&M regulatory program, Vermont Agency of Agriculture, private weighing and measuring community, consumers, and other stakeholders.

Summary of services:

- The lab provides tolerance testing of hydrometers for the maple industry. By regulatory statute all maple syrup hydrometers, or sap hydrometers used to derive a charge, must be tested by the Agency of Agriculture before being offered for sale. The testing of maple hydrometers has expanded into providing the testing service for maple supply companies doing business in other states including New Hampshire, Connecticut, and Michigan. The lab tested 11,000 hydrometers during the 2013 calendar year.
- The lab provides calibrations of test weights from a range of 1,000 lbs. to 0.001 lbs. for both the W&M regulatory program and private industry. These weights are used to test and calibrate all the commercial direct trade scales in VT. These scales are located in grocery stores, concrete plants, asphalt plants, transfer stations, metals purchasing stations, mines, feed plants, fertilizer plants, and farm markets. The accuracy of the weights ensures the scales are both accurate and correct for legal trade.
- The lab provides calibrations of 5 gallon test measures used to test and calibrate all of the gasoline/fuel pumps in the state of VT. This directly impacts over 6,000 commercial gas pumps and much of the state's population.
- The lab provides technical assistance and serves as a resource center for the Weights and Measures regulatory program, Vermont Agency of Agriculture, private weighing and measuring community, consumers, and other stakeholders. The lab provides direction, advice, and references for related services that the program does not directly offer.

The lab operates on a fee for service model. Most of the functions are charged a fee according to a structure that is periodically reviewed. A fee is not charged to the regulatory program (internal customer) however the service provided saves a considerable amount of funds by not having to transport and have another state provide (and charge) for this service that is both legally mandated and necessary to operate the W&M inspection program. The W&M inspection program also charges fees through a licensing system. The lab and inspection program together account for hundreds of thousands of dollars of revenue each year.

Future for services:

- Due to the growth of the maple industry, the lab has seen a large increase in the testing of hydrometers. If the maple industry continues to grow there will be an associated expanded need of for this service.
- The lab continues to provide services to out of state companies for the calibration of both weights and test measures. Many state labs have begun specializing in certain areas. The Vermont lab has been specializing in larger Class F weights. Companies have been coming from NH and Mass. for this service. The lab has concentrated on quick turnaround time and customer service to keep and add these businesses that pay a fee for the service.
- The lab has started doing some specialized testing not done before. An example of this is an engineering firm who needed plates of cut steel assigned a mass and associated uncertainty. The firm was building a force balance for use in a wind tunnel and using this device to conduct studies for companies building wind towers, bridges, and buildings. The company is located in Williston and our service allowed them to keep the activity in the Vermont and not take the business out of state. Opportunities such as this may increase as the state's economy grows.

Staffing:

Pre-Irene:	1 full-time and 6 remote staff (maximum 3 of these in office at one time)
Currently:	1 full-time and 6 remote staff (maximum 3 of these in office at one time)
10-year forecast:	**1 full-time and 6 remote staff (typically no more than 2 of these in office at one time, but could have 8 at once)**

Locations and space:

Pre-Irene:	LaRosa Lab	900 sf + offsite storage
Currently:	Industrial Lane, Berlin	2,527 sf (includes garage space)
10-year forecast:		**1,600 sf** **+ 400 sf truck storage**

Exterior space requirements: need dedicated adjacent outdoor loading area or loading dock
vehicle storage: (2) 14' trailers (seasonal)
outdoor storage of scale truck if not provided indoors

Function/task details with equipment

Task	Size (sf)	Fixed Equipment/Notes	Movable Equipment
Large Mass Rm (500-1,000 lbs)	400	Echelon III: 18.0^0 C to 27^0 C, maximum change 2.0^0 C/h. Relative Humidity 40 to 60 % +- 20/ 4h. Isolated footing under balance (5' x 5') Double door to storage. 5' workbench w/ open shelves above	21+ 1,000 weights various other large weights gantry Standard weight (1,000 lbs) 2 7' long hand carts drill press
Small Mass Rm (.0001-50 lb)	300	Echelon II: 20^0 C to 23^0 C, max change 1.0^0 C/h Relative Humidity 40.0 to 60.0 % + - 10/4 h 3 concrete balance tables Isolated 4' x 4' footings for the balance tables. 5' bench space with cabinets above No window in this room. Interior preferred. Careful air flow; minimize drafts	2-36"w weight cabinets 1-36"X18"X78" weight cabinet 3 balances 36 sf floor area for weights
Hydrometer & Volumetric Room	300	Echelon III: 18.0^0 C to 27^0 C, maximum change 2.0^0 C/h. Relative Humidity 40 to 60 % +- 20/ 4h. 24' bench space with cabinets above (3 work spaces) 2 deep sinks, each with a hood for gasoline fumes and potassium iodine. Drain trap/filter for waste petroleum. DI water supply	Barrel for 5 gal "slicker 2 work areas (desks) gas pump calibration device
Office	100		1 desk and chair 6 lin ft 6'high bookshelves 2- 36" filing cabinets
Storage & Staging**	400 + 100	Adjacent to Mass Rooms and Hydrometer. Direct truck access with garage door (dual use, high clearance) or loading dock to stage truck and trailers. Beam lift: see note below	14' shelving, 6' h x 2' d 2 6' tables Portable platform scale Hand carts Layout area for weights
Scale Truck Storage	400	Desired space. Open to Staging. For 10 wheel scale truck (Freightliner): 25' long, 12'-6" high. Needs a door 14'-3"w x 14'-3" h.	

Further Adjacencies and Sharing
If this becomes a stand-alone facility it will need more meeting and training space as well as utility/support space.

The three W&M labs may not be shared with other users due to NIST certification standards. Storage and staging may not be shared for security reasons. These labs' sizes are also determined by NIST and may not be reduced.

** A real economy could be found by building one loading dock for the whole building. W&M's staging/storage (400 sf) must be secure, and they need direct access to the dock, but they can move through double doors. 100 sf of access area is available to share. If shared, it is essential that no other programs leave items in this area.

Note: Beam in Staging area
A number of scales and masses show up in trucks with no way to be removed. W&M can use its scale truck for this when it is present, but it is often on the road. A gantry-type or telescoping beam with a 1,200 lb capacity is needed. It could be located just outside the building as a cantilever. It could be inside the building, either in the loading area or in the truck storage area.

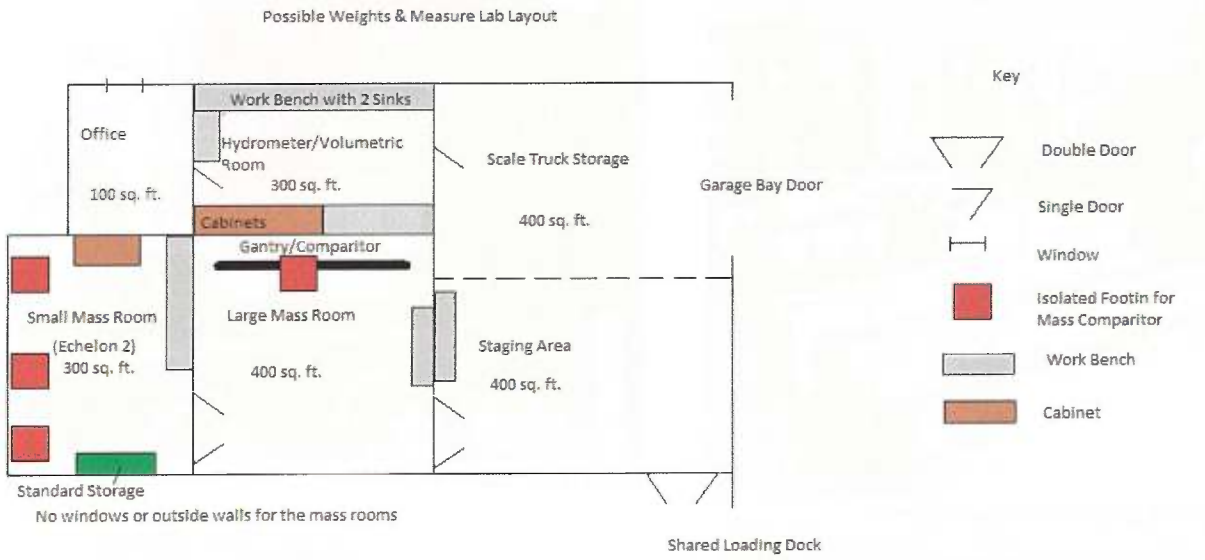


Diagram of possible W&M layout

Gantry beam lifting a proving mass (or standard).

Weight cart arriving with its own unloading beam.

A variety of large weights in the staging area.

Scale truck loading up

Large mass room showing hand truck and work bench.

Small mass room with balances on concrete tables.

Hydrometers ready for shipping out in busy season.

Tiny weights in their storage cabinet.

The scale truck (with a scale figure!)

Small weights (really masses)

ADMIN & SUPPORT

Staffing, 10-year forecast:

Director
2 Other Admin (facility manager, logistics, hazardous supply/waste, safety?)
Assistant
Consulting IT?
Consulting/independent QAO?

Space Summary:

Administrative	2,440 sf
Support Space	3,090
Utility & Circulation	7,350
	12,880 sf

Task	Size (sf)	Fixed Equipment/Notes	Movable Equipment
Administrative			
Director	150		Large work station Table & chairs for 4 6 lin ft. bookcases
Second admin officer	120		large work station Other furniture?
Third admin officer	120		large work station Other furniture?
Reception area	200		medium sized station 2 chairs and 1 side table Durable rug Heavy-duty printer/copier Cabinet for office supplies?
Sample receiving w/ LIMS station	200	Log-in by Admin or program staff will meet public. Some programs may set up volunteers to log in. Adjacent to Storage.	8' Desk & 2 chairs Stand of cubby lockers for volunteers 8'w shelves for temporary storage Refrigerator Storage shelves for 10 coolers
Conference	650	Full A/V capability with a smart board and nearby access panel or closet	tables & chairs for 20. Flexible layouts. Podium to be stored in corner. A/V cart?
Meeting/Focus Room	150	(no A/V needed)	table & chairs for 8
Training Lab/Classroom	800	bench space for 25 Smart board and nearby access 2 sinks w/eyewash stations 6' fume hood Many dedicated electrical circuits	A/V cart
Visiting QAO/IT work station	50		cubicle with file cabinets

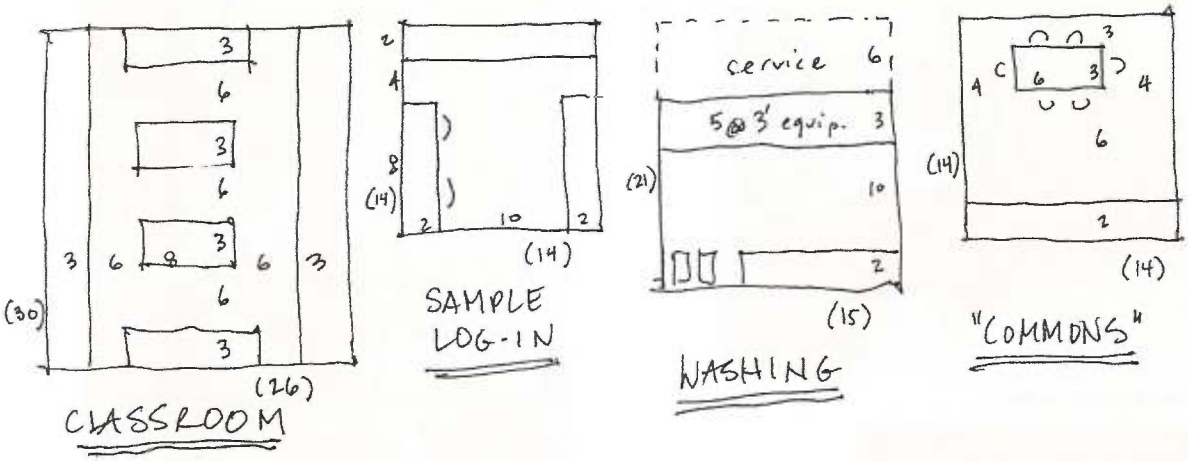
Storage, Supplies & Staff

Refrigerated Storage	150	must be secure	(2) Microbiology (6) 30" fridges for Chem/H20 samples (3) general Chemistry (1) Watersheds (1) Forest Biology
Frozen Storage	225	Dedicated electrical circuits Must be secure UPS	Bio: 2 UltraLow chests -80C 8'w x 3'd Chem: 2 freezers AQ: 1 large commercial freezer PI: 3 Ultralow chests (3'w x 4'd) 1 household chest freezer
Autoclave/Washing	315	Includes 6' service area Supply storage Deep 3 basin sink 6' counter space w/ cabinets above All get DI water Autoclave & glassware washers-- Canopy hood to exhaust heat and steam	Autoclave (Micro) 3' Autoclave (Acid Digest) 3' Dishwasher 3' Drying Oven 3' 3-Bay sink 10', hand wash sensor, 4 lab carts
Glassware storage	120	2' deep shelving? Floor to 6'.	For boxes of new goods
General segregated storage	1,000		general Chemistry 28 lin ft. Plant Industry 600 sf Forest Biology 100 sf Watersheds 16 lin ft.
Hazardous supply storage	100?	Tanks outdoors? Solvent storage cabinet Gas and chemical storage	Chem: Argon & Nitrogen AQ: Calibration gas (see their program) Watersheds: ethanol? PI: Ethanol F&W: 5 gal ethanol
Equipment shop & Storage	300	10' bench 2' deep shelves	
Analytical commons (Chemistry & Biology)	200	sinks w/ shelves above	clerical supplies recycling bin & garbage table & 6 chairs fridge/freezer microwave
Chemistry commons (AQ, WM, & Watersheds)	200	sink w/ shelves above **fume hood? or go upstairs?** **"hotel" work spaces??**	copier clerical supplies recycling bin & garbage table & 6 chairs fridge/freezer microwave
Biology commons (PI, FB, AP, FW)	200	sinks w/ shelves above **fume hood? or go upstairs?**	copier clerical supplies

		"hotel" work spaces??	recycling bin & garbage table & 6 chairs fridge/freezer microwave
Specimen archives	**280**	**probably on biology side** **humidity control** **outlets @ 8' o.c.** **must be secure**	**Watersheds: 10 2'w x 2'd** **liquid specimen cabinets** **Insect cabinets: PI 6 + FB 10** **(for photo, see Forest Bio.)** **desk and chair**
Maintenance, Utility, Waste, and Circulation			
Bathrooms	200	4 @ 50; all unisex and accessible	
Enhanced bathroom	80	baby changing table lactation station (4' counter)	3 cubby lockers
		Hopefully the staff can use the Animal Pathology shower.	
Janitor	120	Mop sink and rack 10' w 24"d shelves min.	3' w desk & chair supply cart
Maintenance	100	5' bench w/ shelves above 10' w 24"d shelves	ladder 5' w desk and chair
Maintenance Supply	100	24" d shelves both sides	
Recycling	75	weekly pick up shelf above bins for supplies Possible recycling dumpster (garbage will go to dumpster)	roll-out bins
Bio & Hazardous Waste	100	near Necropsy close to access out **Solvents must be stored indoors** **Can bio waste be stored outdoors in a shed?**	special roll-out bins??
Electrical Closet(s)	200	2 @ 100 sf? Or one large, dedicated room?	
Data Closet(s)	300	2 @ 150 sf. It is possible the building will have an intranet/server. Security's panels will be in a data closet.	
	75	**Possible additional closet if the building has a penthouse.**	
Mechanical Area	800	Assuming 4 rooms + heating/chiller in one of the rooms.	
Water Treatment	50	RO/DI	
Elevator/Equip	150	6' x 8' cab; 4500 lb capacity. This will be in the secured (non-public) area.	
Circulation	5,000		

Notes

- Depending on the site, the building may use district heat, probably a wood pellet boiler plant.
- Most site candidates have fiber optic available on/off site. Assume the building will connect and make full use of its capabilities.
- The building will have one or more local data networks and a Laboratory Information Management System. This will be coordinated with DII (Division of Information and Innovation).
- The building's life safety systems will be battery back up.
- Add safety showers and drench hoses as needed for compliance.
- The building will have a back-up generator for much of the building's circuits.
- There will be one UPS system serving all critical circuits in the building, located in the primary electrical closet. This system shall use N+1 redundancy.
- Card readers will be installed at all building entrances and at interior locations noted in the program. The design team will work with State Security and Fire Safety to determine other access, security, and life safety equipment needed for the building.
- If the building is not located in Waterbury, it will require exterior surveillance cameras around the property. The Waterbury site will just need a few cameras.



Public Sample Log-In

Current water "polishing" system: distilled and deionized.

Current shared autoclave, washer, dryer.

Shared washing/sterilization area

Water sample bottle storage

Shared sample storage

Behind-the-wall service area for Autoclave, etc.

Chemistry general storage

D.

To **Vermont Joint Fiscal Committee**

From **Vermont Agency of Agriculture, Food and Markets**
Vermont Agency of Natural Resources

Re. **Consolidated Laboratory Siting Proposal**

September 2, 2014

In August, 2011, Winooski River floodwaters resulting from Tropical Storm Irene severely damaged the Vermont Agency of Agriculture Food and Markets (VAAFM) and Vermont Agency of Natural Resources (ANR) Laboratory in the Waterbury State Office Complex. Since that time, laboratory operations have been scattered among several temporary locations, most significantly the Hills Building at the University of Vermont. Meanwhile, the decision was made to demolish the Waterbury laboratory facility as part of the comprehensive redevelopment of that site. Current co-location of the two programs in the Hills Building is subject to a lease that expires in August, 2015 (extendable to August, 2017). No permanent replacement plan has yet been identified for these programs.

In Act 51 of 2013, the Vermont Legislature authorized and funded a study by VAAFM, ANR and the Department of Buildings and General Services (BGS) to examine a range of options to permanently replace the functionality that was lost when the Waterbury facility was flooded. That study, presented to the Vermont Legislature during the 2014 legislative session, recommended consolidating designated VAAFM and DEC programs in one combined laboratory facility, operated jointly by the two agencies under a new governance model, in order to maximize efficiency and eliminate duplication.

Nine different House and Senate legislative committees reviewed the consolidation proposal during the 2014 session, and each voted to support the recommendation for a consolidated laboratory facility. Subsequently, in Act 178 of 2014, the Vermont Legislature charged BGS, VAAFM and ANR with providing by August 15, 2014, a detailed site location proposal for a shared laboratory to the House Committee on Corrections and Institutions and the Senate Committee on Institutions (Institutions Committees).

During the summer of 2014, the BGS-led team, including representatives from VAAFM and ANR, evaluated 19 potential sites for the new facility, including state-owned sites and sites offered in response to an inquiry published in area newspapers. The team developed a comprehensive list of criteria – including lot size, lot characteristics, utilities, zoning/permitting, neighborhood, special construction costs, benefits to lab users, and benefits to the State of Vermont – and scored each site according to those criteria over two rounds of evaluation.

In each round, a proposed site on the campus of Vermont Technical College in Randolph, Vermont was the highest scoring site. Following the selection process, Commissioner

Obuchowski and Secretaries Ross and Markowitz submitted a recommendation for the Vermont Technical College site to the Institutions Committee on August 8, 2014, and provided testimony in a full-day hearing before the House Committee on Corrections and Institutions. Each of the Institutions Committees voted unanimously on August 27, 2014, to support the siting recommendation at Vermont Technical College.

In the short term, BGS, VAAFM and ANR do not see any significant changes in the overall operating budget. There we will be a proposal to move some portions of ANR lab budget, including personnel and operations, to VAAFM's budget in 2016 budget proposal. As a result, VAAFM's lab budget would increase, but there would be a corresponding decrease in ANR's lab budget. For the State of Vermont general fund, the transfer of funds will have a neutral effect.

Laboratory Missions

The laboratories of VAAFM and DEC provide a wide range of services to the people of Vermont, under the broad missions to protect human and animal health, to protect environmental health, and to foster commerce. Services provided by the labs protect the integrity of iconic Vermont industries such as dairy and maple syrup, provide data that help to protect the long term vitality of important resources such as Lake Champlain, and extend into many other areas of Vermont life.

While the daily services provided by the labs are critical to commercial activities and long term environmental protection, the labs' ability to quickly and effectively respond to urgent and emergency situations is equally important. In reviewing many years of data, it is apparent that major unanticipated situations are a regular occurrence. These situations by their nature cannot be planned out in advance, so the capacity to respond immediately is essential. A few are highlighted below, with many others included in the appendix to this report:

1. *Bedbug / Pesticide Misuse*: It was found that hundreds of residential units had potentially been treated with a bedbug pesticide that had been banned for residential use. The Agriculture lab, the Department of Health Lab, and federal authorities worked closely together to obtain and test more than 1000 samples, and provide prompt feedback to concerned citizens.
2. *Public Schools / Pesticide Misuse*: It was found that a pesticide to control head lice had been sprayed on a school carpet. The Agriculture lab was able to collect samples, analyze them, and send detailed results and risk analysis to parents within one day.
3. *Contaminated Pet Food*: It was found that imported pet food was contaminated with melamine nationwide. The Agriculture lab was able to rapidly obtain and test pet food products locally, and then quickly advise state citizens of the specific risks in their local areas.
4. *Contaminated Produce / Commerce*: After Tropical Storm Irene, the federal Food and Drug Administration recommended that thousands of acres of animal feed be destroyed

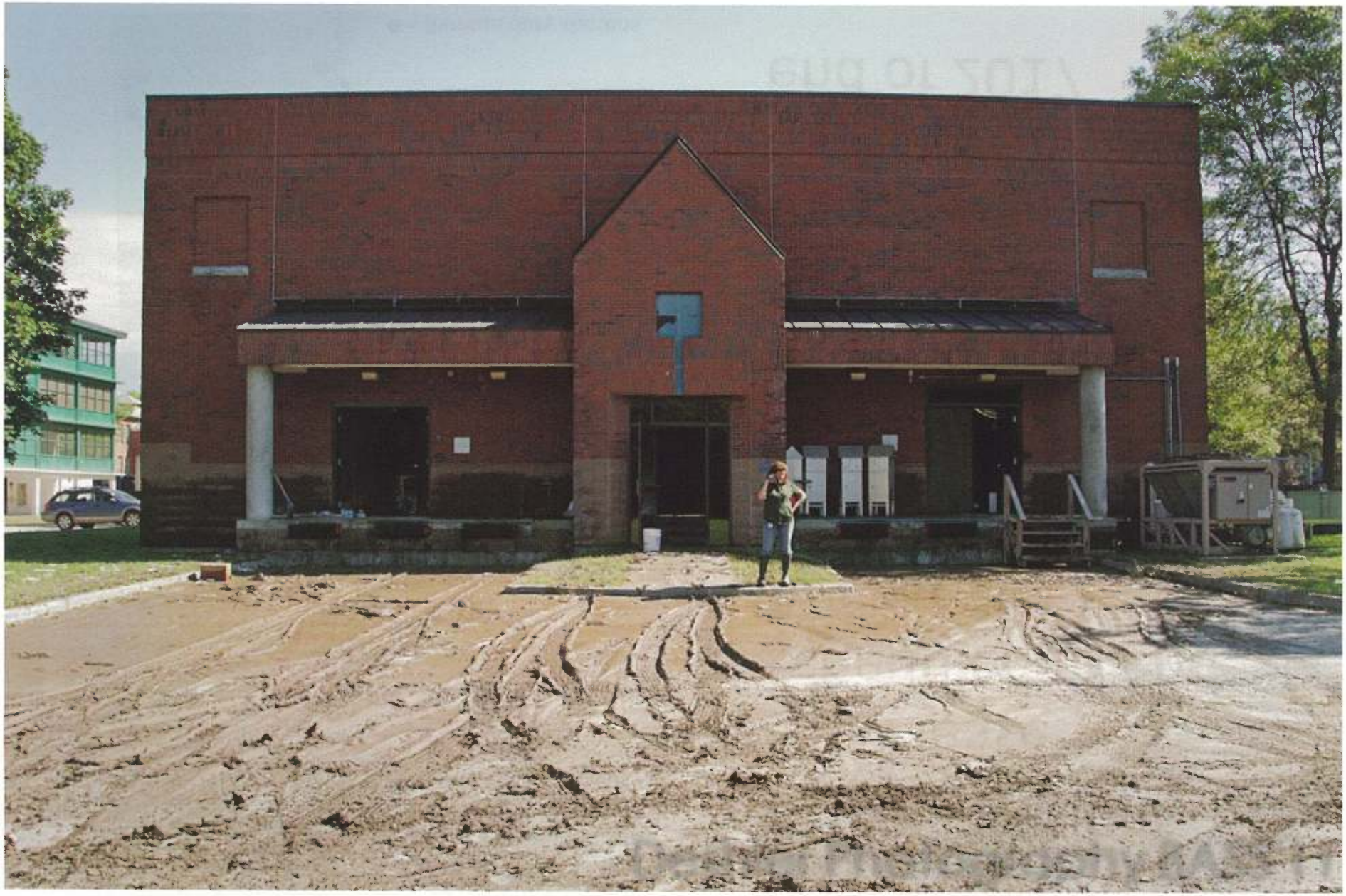
due to potential contamination. The Agriculture lab was able to test the feed and promptly confirm that it was safe to use, saving the crops and sparing farmers from further financial harm.

5. *Maple / Food Safety*: Testing over several years has led to numerous improvements in maple industry practices, addressing food safety issues as well as contaminants affecting the flavor of the syrup.
6. *Mercury Contamination*: As part of a major study of mercury in the northeast, the DEC Lab was instrumental in the development of data describing sediment and fish tissue mercury concentrations from lakes in the Vermont-New Hampshire region, and contributing water chemistry measurements. The DEC laboratory work substantiated the need for Vermont's comprehensive mercury legislation, signed into law in 2005.
7. *Water Resources*: The LaRosa Analytical Services Grant is a partnership between some of Vermont's volunteer (citizen) watershed groups, the DEC Monitoring, Assessment and Planning Program, and the DEC Laboratory. The project began in 2003 and has since fostered partnerships with 31 associations and assessed over 800 sites throughout Vermont. This program is organized and coordinated so that volunteer sampling expands upon DEC staff sampling; effectively furthering a primary mission of DEC to protect, maintain, enhance and restore the quality of Vermont's surface water resources. The DEC Laboratory provides the analysis at no cost to the volunteer groups.
8. *Air Pollutants*: In 2004, EPA established a National Air Toxics Trends Station (NATTS) monitoring network to fulfill the need for long-term air toxics monitoring data of consistent quality. The primary purpose of this 27-site national network of air toxics monitoring stations is tracking trends in ambient levels of air toxic pollutants that are associated with a wide variety of adverse health effects and regulated under the Clean Air Act. DEC's monitoring site in Underhill, Vermont is one of the NATTS sites and is considered a representative national "background" site. The DEC Laboratory provides air toxics analytical results such as volatile organic compounds, carbonyls, and metals to AQCD for this air monitoring.

Conclusion

The proposal before the Vermont Joint Fiscal Committee is to design and build a new laboratory facility on the campus of Vermont Technical College in Randolph, Vermont that will serve the needs of the state for many years to come. This facility would be collaboratively run by the two agencies in order to promote improved functionality, growth, efficient cost of construction, and reduced operational cost. The proposed laboratory also provides unique opportunities for future partnerships with Vermont Technical College that would create educational and employment opportunities for future generations of Vermonters.

D.



Ag/ANR Lab after TS Irene, August 28, 2011

Agencies of Agriculture & Natural Resources Collaborative Laboratory

Presentation to Joint Fiscal Committee • September 5, 2014

- All programs are now in rented space in five locations.
- UVM lease scheduled to end August 2017
- SLAM feasibility study endorsed a collaborative lab.
- With sustained effort, we can finish construction by the end of 2017

The focus today is site selection.

detailed site analysis (testing and assessments)

detailed program already developed

+ final adjustments due to location

12 weeks:
Conceptual Design

= better numbers

Detailed Proposal & Cost Estimate for FY 16/17 Capital Bill

FIRST LOOK: STATE SITES

- Waterbury
- 195 Colchester Ave, Burlington
- Berlin Regional Library
- F & W land, Berlin

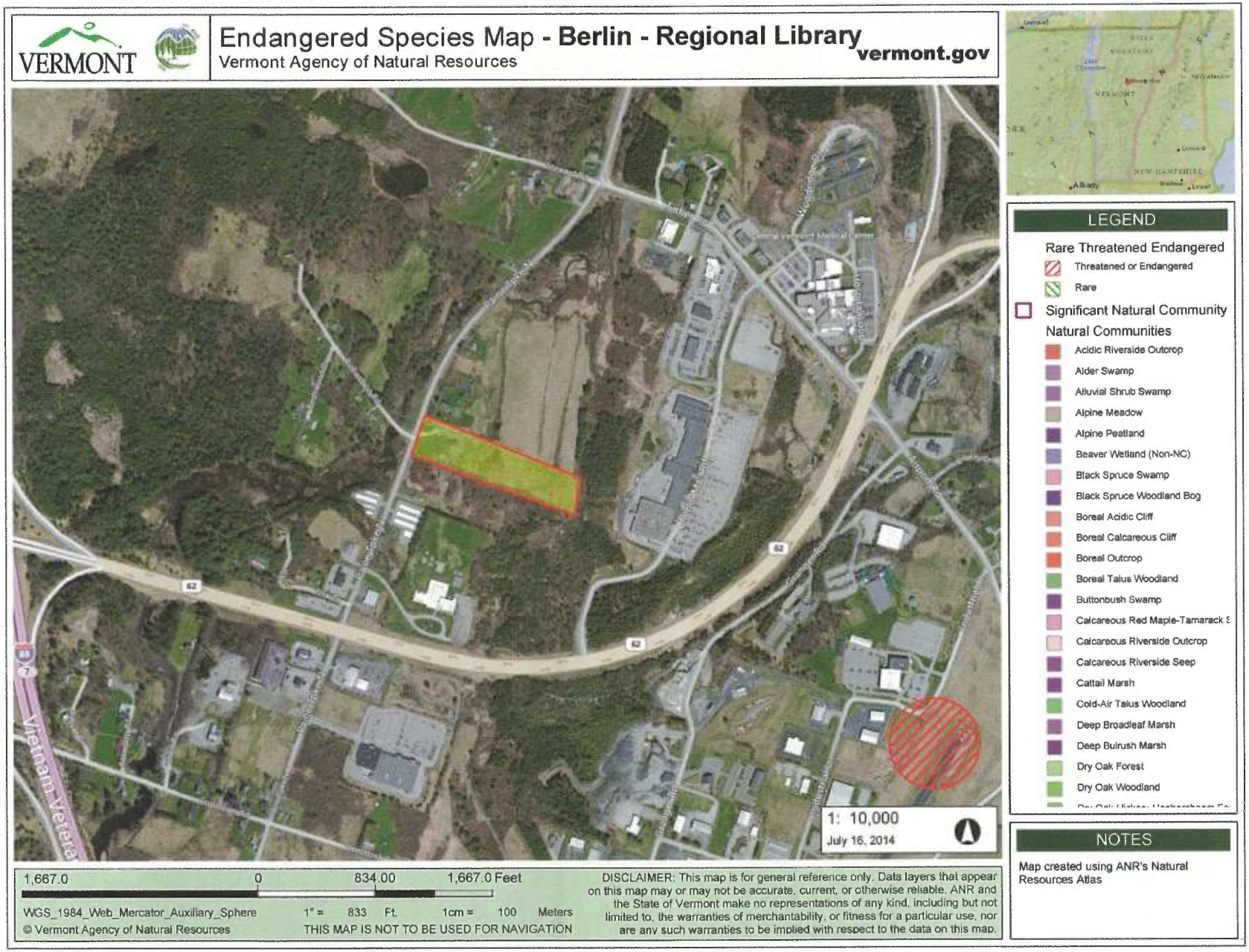
SECOND LOOK: REQUEST FOR SITE PROPOSALS

- 11 landowners offered 12 sites between Randolph and Milton
- UVM offered two sites
- VTC offered one site

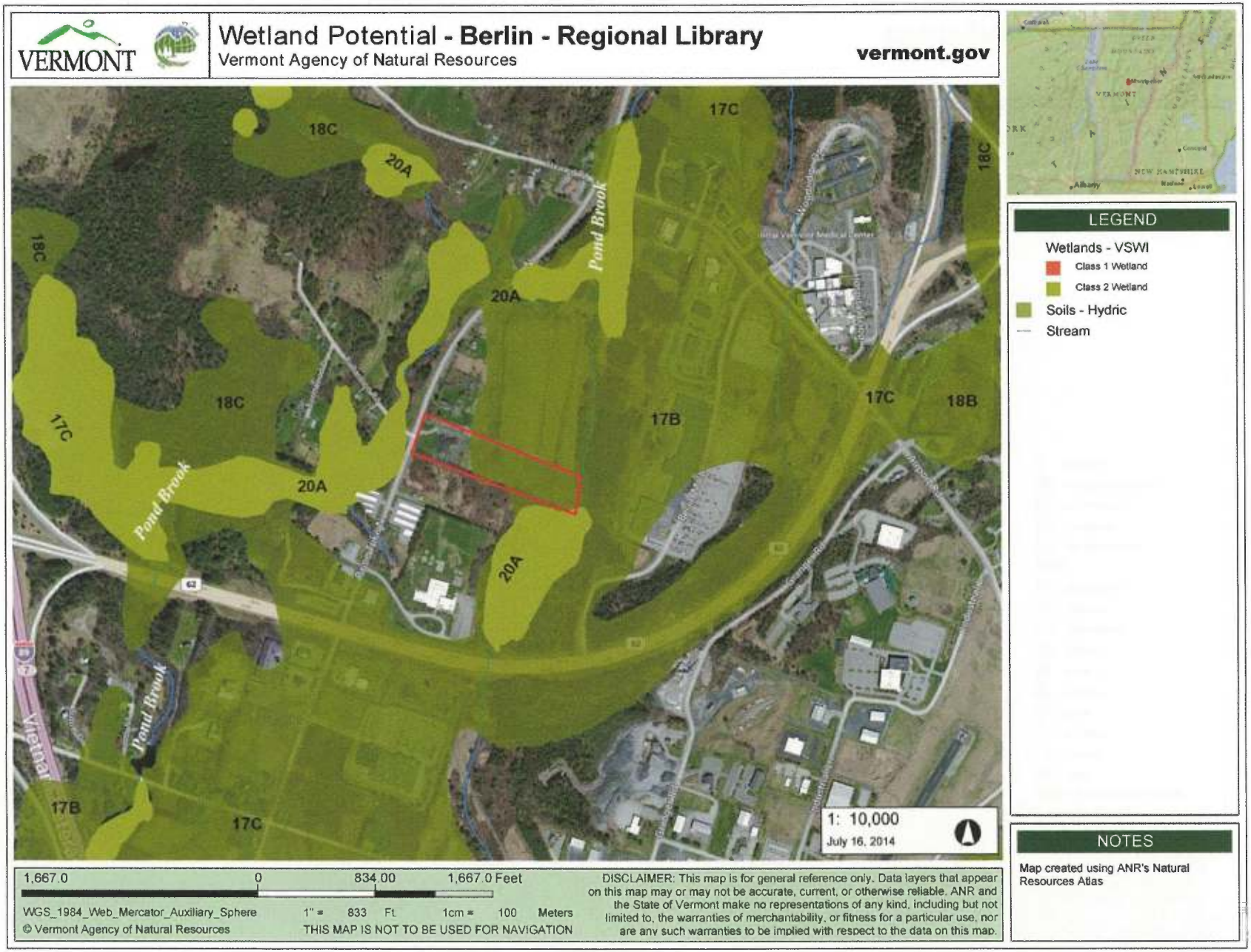
= 19 SITES

Example of PRELIMINARY SITE REVIEW

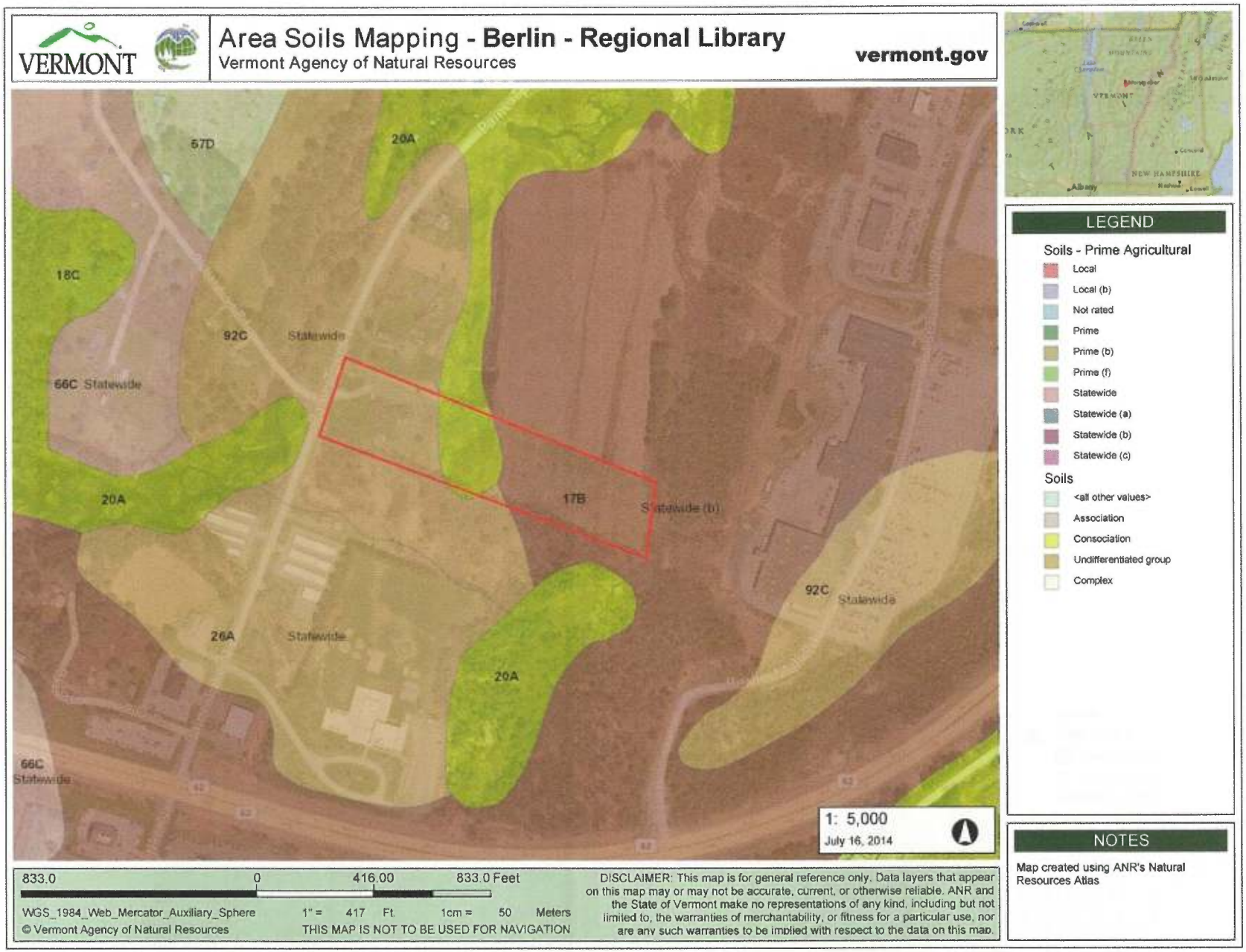
Example: Berlin Regional Library



Example: Berlin Regional Library



Example: Berlin Regional Library



Example: Berlin Regional Library

Example: Berlin Regional Library

Permitting Summary

Municipal
Zone: Town Center. Laboratory use is prohibited. There is a precedent established in Berlin to honor Title 24.
15' front yard setback; 10' side and rear yard setback. Building height 45' Lot coverage 75%

State
Wastewater – The project will rely upon the timely construction of the extension of municipal sewer to this portion of the Town of Berlin. This is scheduled to occur in the near future. A modest water and sewer allocation will be required to be acquired from the Town for this project. There are no other known technical issues associated with the acquisition of is permit.

Water Supply – The project may require the acquisition of a Permit to Construct from the Water Supply Division if a hydrant is required on the property. Fire Flow Capacity may become an issue as this is located at the higher portion of the proposed distribution system.

Construction Stormwater – The project may qualify for a Low Risk Authorization under the State Construction Stormwater General Permit.

Operational Stormwater – Coverage under the State Operation Stormwater General Permit will be required as amount of impervious area on the property exceeds the one acre jurisdictional limit. The extent of the mitigation may change as the State is in the process of modifying the Stormwater Rules to require additional on-site retention of storm events.

Wetlands – The project does extend into the wetland buffer thereby requiring the acquisition of a State Wetland Permit.

Stream Alteration – not applicable

Act 250 – Currently the parcel is less than 10 acres and barring any other jurisdictional triggers associated with the creation of residential units or lots within the last 15 years and 5 miles of this site, Act 250 jurisdiction should not attach to this project.

Federal
Corps of Engineers – The project is not proposing any wetland impact, therefore no authorization should be required.

NEPA – Many of the criterions otherwise handled within the Act 250 process will need to be addressed as part of the NEPA review. Items of exposure are archaeological issues (much of the site has been disturbed but sits on fill perhaps encapsulating sensitive items) and traffic impacts.

SCORING PROCESS

- Members of BGS, AAFM, and ANR
- 8 criteria, weighted equally: 5 points each
  - Ability to accommodate program
  - Physical characteristics
  - Utility service
  - Ease of zoning and permitting
  - Neighborhood/context
  - Construction challenges (demolition, traffic, etc)
  - Benefits to program staff and users
  - Benefits to Agencies and State of Vermont

Acquisition cost was not considered in the scoring.

VERMONT AGENCIES OF AGRICULTURE & NATURAL RESOURCES LAB FACILITY FACILITY SITE OPTIONS CRITERIA SCORING SUMMARY										
SITE	VARIATION	CRITRION 1 LOT SIZE	CRITERION 2 PHYSICAL	CRITERION 3 UTILITIES	CRITERION 4 ZONING	CRITERION 5 NEIGHBORHOOD	CRITERION 6 CONSTRUCTION	CRITERION 7 QUALITY	CRITERION 8 BENEFITS	TOTAL
1	Milton	2.8	2.8	3.2	2.8	3.2	3	1.2	1.2	20.2
2	Colchester Severance	4.3	4.2	4.3	3.7	4	4.8	1.7	2.2	29.2
3	Colchester Health Lab	3.5	3.3	4.8	4.5	4.2	4	2.2	3.3	29.8
4	Burlington 195 Colchester	1.2	1.5	4.8	2	2	1	1.5	3.2	17.2
5	So Burl Spear St	3.3	3.5	4.7	3	3.8	3.8	2.3	3.8	28.2
6	So Burl Tech Park	3.5	3.8	4.8	4.3	4.5	3.3	2.2	2.2	28.6
7	So Burl Hinesburg Rd	4	4.3	4.8	4.2	3.5	4.2	1.3	1	27.3
8	Richmond Rte 2	2.3	3	1.5	2.5	2.2	3	1.7	1.3	17.5
9	Richmond Creamery	2.3	3.3	4.3	3.8	2.7	3.5	1.8	2.5	24.2
10	Waterbury	4	3.7	4.3	4	2.8	3.8	4	4	30.6
11	Montpelier Armory	2	2.7	4.5	3.3	3.8	3.5	4	3	26.8
12	Montpelier 2 Rivers Farm	4.2	2.8	4.3	3.3	3.8	2.7	3.7	3	27.8
13	Berlin F&W Land	3.7	2.2	1.2	3.2	2.8	3.5	3.8	2.8	23.2
14	Berlin Route 12	3.8	3.5	1.8	3.2	3.7	3.2	4.3	3.7	27.2
15	Berlin Dog River Rd	4.2	3.8	2	3.8	3.7	3.7	4.3	3.7	29.2
16	Berlin Regional Library	3.3	3.2	4.2	2	3.7	2.7	3.5	3.5	26.1
17	Berlin Back Field	4.5	3.5	4.2	2	4	3.7	3.7	3.7	29.3
18	Randolph VTC Campus	4.5	4.5	4	4.3	4	4.5	3.6	4.6	34
19	Randolph Exit 4	3.6	2.4	2.6	2.8	3.2	3.6	2.8	3	24

TABULATED SCORES FOR EACH SITE

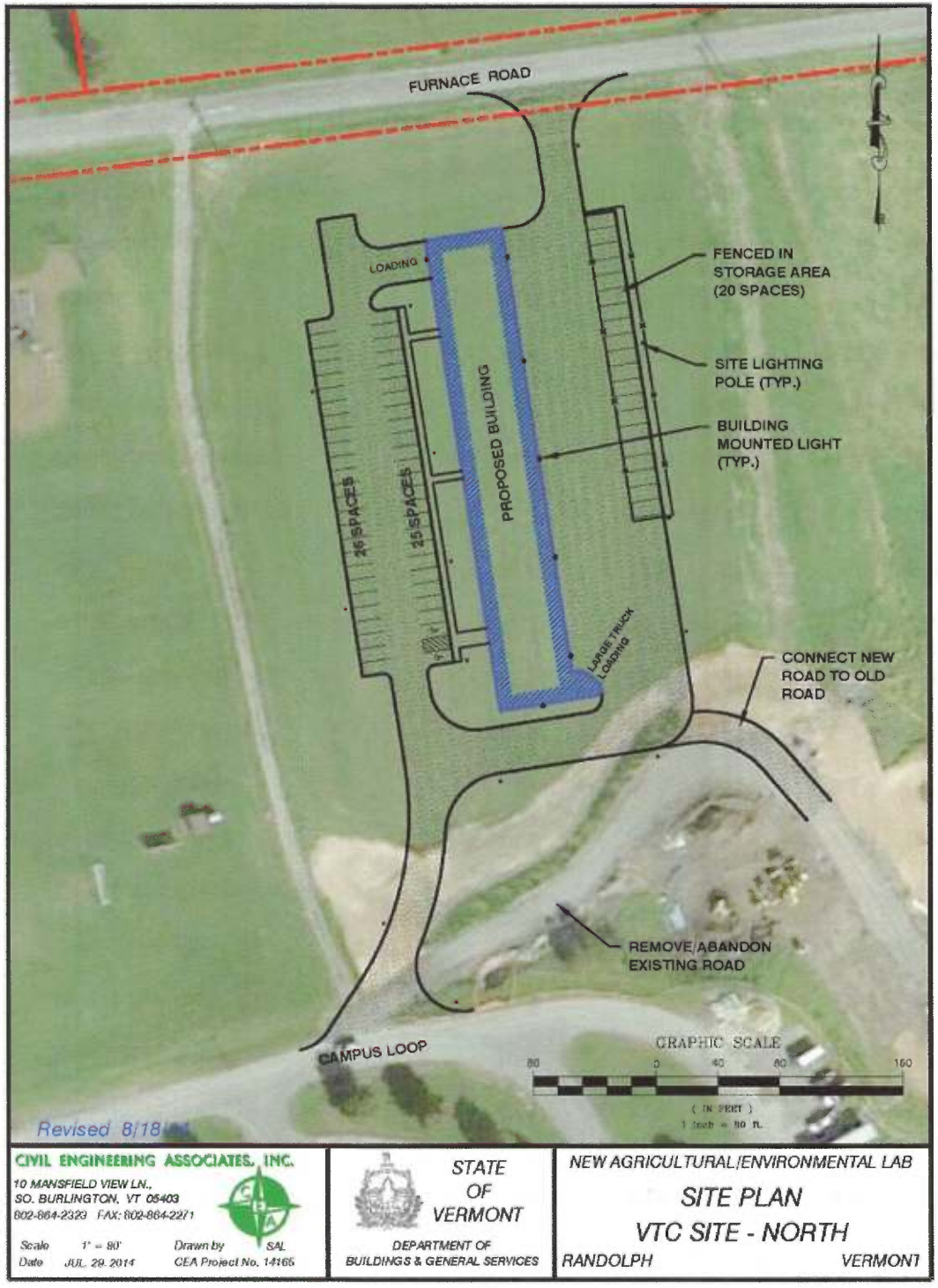
	LOCATION	SCORE	CRITERIA 1-6		CRITERIA 7 & 8		Acquisition Cost	Site Devel. Cost	Peripheral Cost	TOTAL COST
1	Randolph: VTC	34	25.8	(#1)	8.2	(#1)	$50	$840,000	$50,000 (1) ($ 470,000) (2)	$370,0(
2	Waterbury	30.6	22.6	(#6)	8	(#2 tie)	$0	$1,460,000	($1,130,000) (2)	$330,0(
3	Colchester: Health Lab	29.8	24.3	(#4)	5.5	(#12)	$50	$660,000		$660,0(
for 4	Berlin: Back Lot	29.3	21.9	(#8)	7.4	(#5)	$1,200,000	$1,140,000		$2,340,0(
for 4	Berlin: Dog River Rd	29.2	21.2	(#9)	8	(#2 tie)	$632,500	$1,450,000		$2,082,0(
for 4	Colchester: Severance Rd	29.2	25.3	(#2)	3.9	(#16)	$1,260,000	$550,000		$1,810,0(
7	So Burl: Tech Park	28.6	24.2	(#5)	4.4	(#14)	lease	< $500,000		r
8	So Burl: Spear St	28.2	22.1	(#7)	6.1	(#10)	$50	average		$700,00(
9	Mplr: 2 Rivers Farm	27.8	21.1	(#10)	6.7	(#8)	$245,000	very high		$1,050,00
10	So Burl: Hinesburg Rd	27.3	25.0	(#3)	2.3	(#19)	$725,000	average		$1,400,00
11	Berlin: Rte 12	27.2	19.2	(#13)	8	(#2 tie)	$400,000	abv. average		$1,200,00
12	Mplr: Armory	26.8	19.8	(#12)	7	(#6 tie)	lease	abv. average		r
13	Berlin: Regional Library	26.1	19.1	(#14)	7	(#6 tie)	$0	$810,000	$3,700,000 (3)	$4,510,0(
14	Richmond: Creamery	24.2	19.9	(#11)	4.3	(#15)	$575,000	abv. average		$1,400,00
15	Randolph: Exit 4	24	18.2	(#15)	5.8	#11)	$500-750k	abv. average		$1,300,00
16	Berlin: F&W Land	23.2	16.6	(#17)	6.6	(#9)	$0	$1,720,000	$170,000 (4)	$1,720,0(
17	Milton	20.2	17.8	(#16)	2.4	(#18)	$550,000	average		$1,200,00
18	Richmond: Rte 2	17.5	14.5	(#18)	3	(#17)	$1,250,000	abv. average		$2,100,00
19	Burl.: 195 Colchester Ave	17.2	12.5	(#19)	4.7	(#13)	$0	very high		$950,00

otes:

(1) replace orchard if south lot is chosen
(2) shared heat plant: equipment savings

(3) replace library structure elsewhere
(4) possible compensation to F&W

Average: approx $700,000
Above average: $800,000 - $950,000
Very high: $950,000 - $1,200,000



Acquisition cost: none
Lease terms: $1/year
Site development cost: $840,000
Possible capital savings if
share heating plant: ($470,000)

NET COST $370,000

VTC/RANDOLPH SITE

Site Development Cost Estimate

VTC
Randolph
Summary of Estimate of Probable Site Development Cost
August 18, 2014

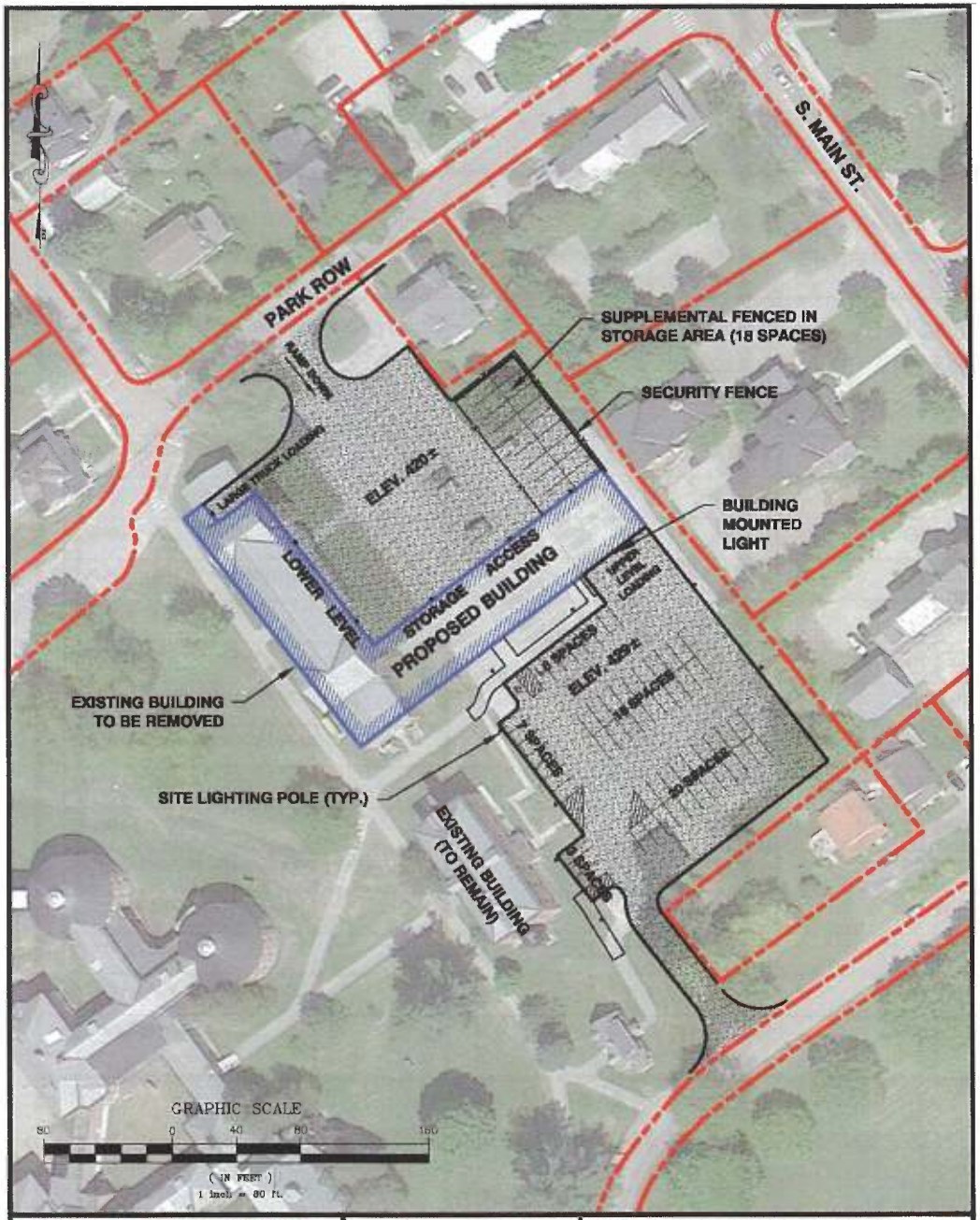
Description	Qty	Unit		Unit Cost		Cost
Site & Building Demolition	1	LS	x	$0	=	$0
Mass Earthwork	12,133	CY	x	$12.00	=	$145,600
Rock Removal	10	CY	x	$40	=	$400
Supplemental Foundation Costs	1	LS	x	$2,000	=	$2,000
Sewer Disposal	1	LS	x	$21,300	=	$21,300
Water Supply	1	LS	x	$17,900	=	$17,900
Stormwater Management	1	LS	x	$62,000	=	$62,000
Site Development Components	1	LS	x	$118,550	=	$118,550
Special Site Conditions	1	LS	x	$16,325	=	$16,325
Retaining Walls	1	SF	x	$3,200	=	$3,200
Communications Utilities	1	LS	x	$62,000	=	$62,000
Pavement Surfaces	30,000	SF	x	$5.54	=	$166,169
Wetland Mitigation Measures	1	LS	x	$44,400	=	$44,400
Environmental Permitting	1	LS	x	$1,000	=	$38,700
					Subtotal	$698,544
		20%			Contingency	$141,456
					Total	**$840,000**

Numbers in blue were revised 8/18/14

CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802-864-2323 FAX: 802-864-2271 web: www.cea-vt.com

Not included:
Landscaping, foundation work, sidewalks and ramps, signage, solar infrastructure, or solar panels.

VTC/RANDOLPH SITE



Acquisition cost: none
Lease terms: none
Site development cost: $1,460,000
Possible capital savings if
share heating plant: ($1,130,000)

NET COST $330,000

WATERBURY SITE

Site Development Cost Estimate

Waterbury

Summary of Estimate of Probable Site Development Cost
August 18, 2014

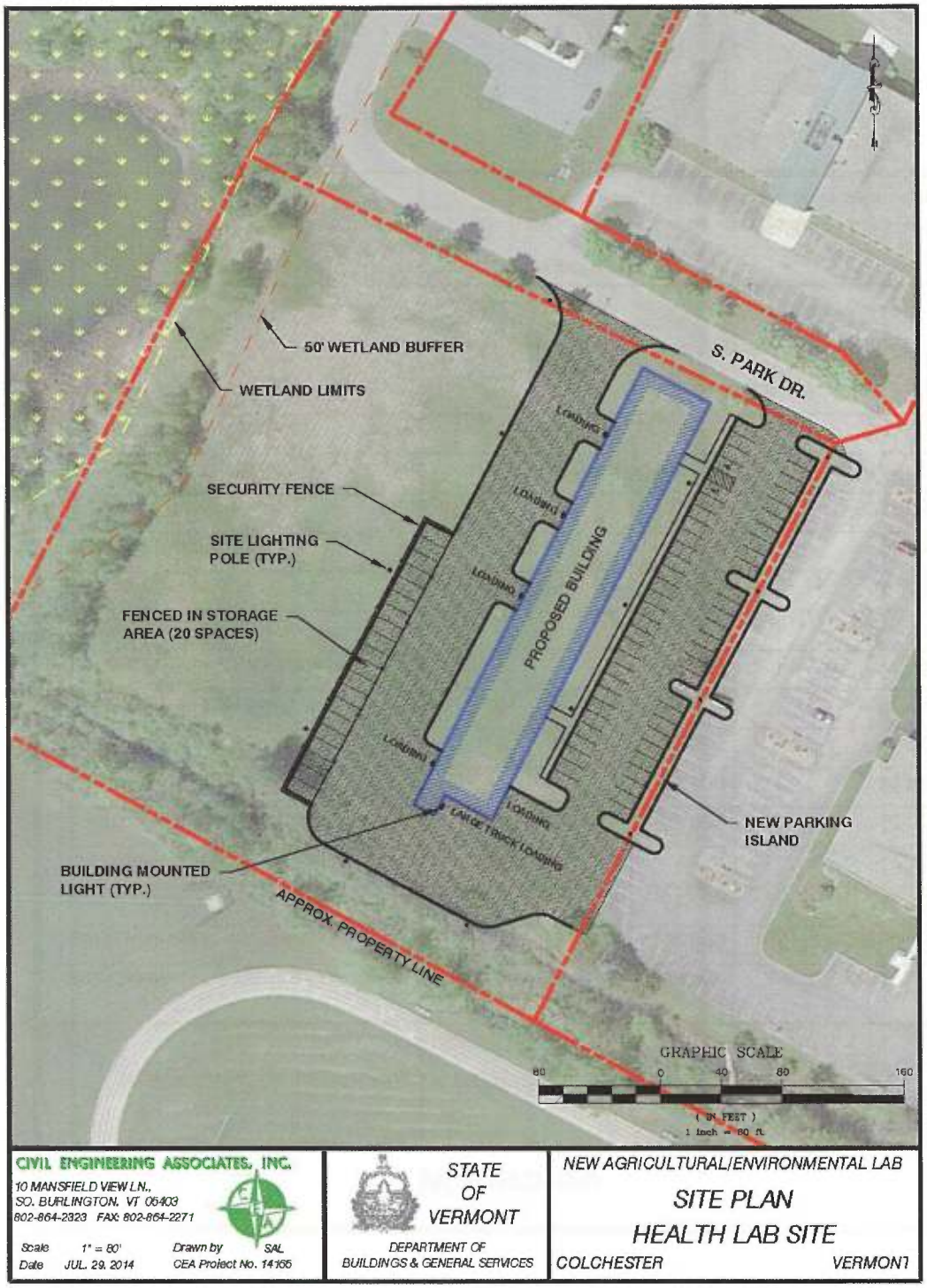
Description	Qty	Unit		Unit Cost		Cost
Site & Building Demolition	1	LS	x	$100,000	=	$100,000
Mass Earthwork	6,000	CY	x	$15.00	=	$90,000
Rock Removal	10	CY	x	$40	=	$400
Supplemental Foundation Costs	1	LS	x	$2,000	=	$2,000
Sewer Disposal	1	LS	x	$1,800	=	$1,800
Water Supply	1	LS	x	$8,150	=	$8,150
Stormwater Management	1	LS	x	$122,500	=	$122,500
Site Development Components	1	LS	x	$76,150	=	$76,150
Special Site Conditions	1	LS	x	$373,523	=	$373,523
Retaining Walls	1	SF	x	$4,800	=	$4,800
Communications Utilities	1	LS	x	$9,500	=	$9,500
Pavement Surfaces	53,800	SF	x	$5.26	=	$282,991
Flood Plain Mitigation Measures	1	LS	x	$103,800	=	$103,800
Environmental Permitting	1	LS	x	$1,000	=	$43,700
					Subtotal	$1,219,314
		20%			Contingency	$240,686
Numbers in blue were revised 8/18/14					**Total**	**$1,460,000**

CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802 864 2323 FAX: 802 864 2271 web: www.cea vt.com

Not included:

Landscaping, foundation work, sidewalks and ramps, signage, solar infrastructure, or solar panels.

WATERBURY SITE



Acquisition cost: none
Lease terms: $1/year
Site development cost: $650,000

(no sharing of heat/cooling)

NET COST $650,000

UVM/COLCHESTER SITE

Site Development Cost Estimate

Health Lab Site
Colchester
Summary of Estimate of Probable Site Development Cost
August 8, 2014

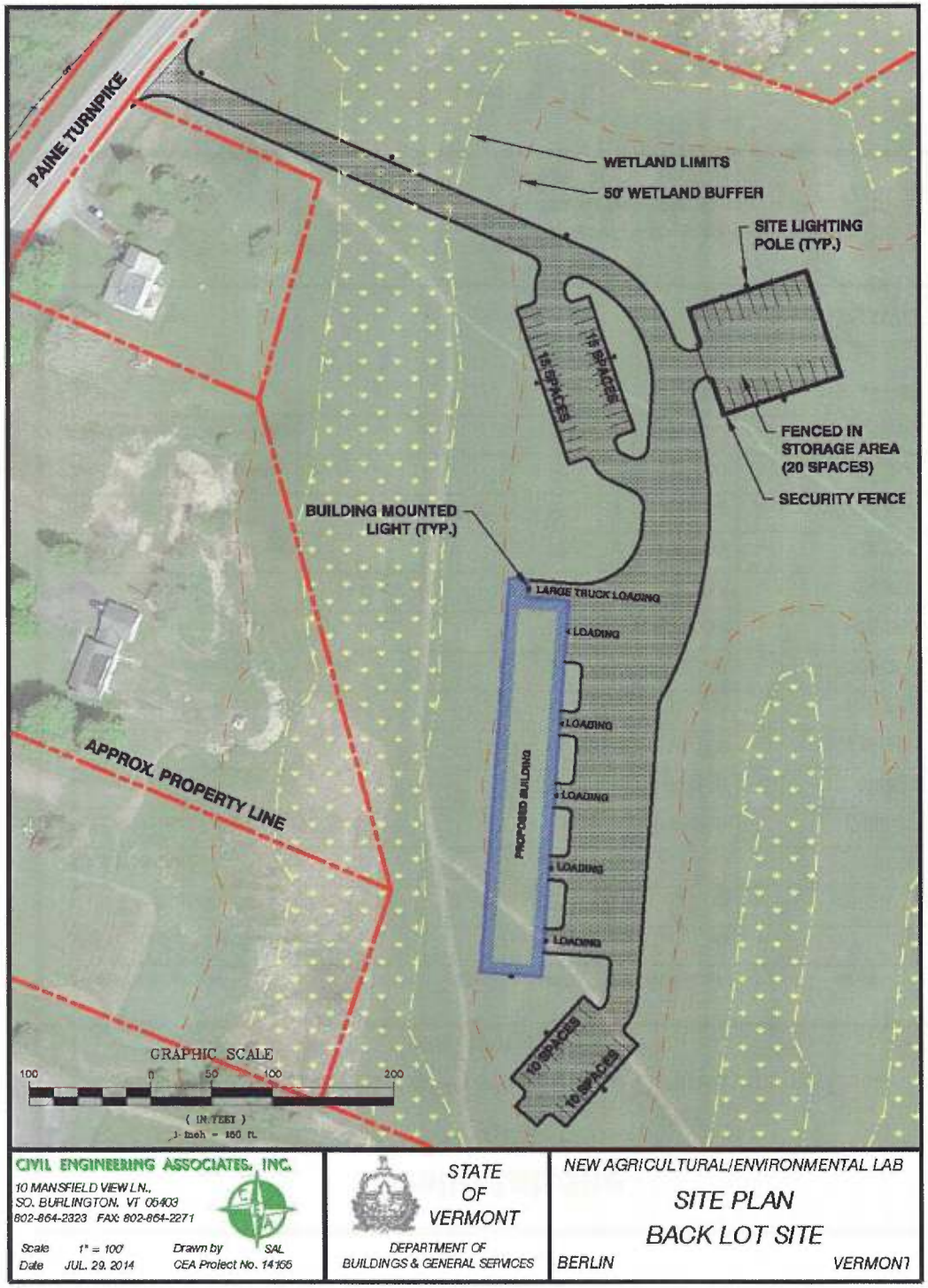
Description	Qty	Unit		Unit Cost		Cost
Site & Building Demolition	1	LS	x	$0	=	$0
Mass Earthwork	1,667	CY	x	$15.00	=	$25,000
Rock Removal	10	CY	x	$40	=	$400
Supplemental Foundation Costs	1	LS	x	$30,000	=	$30,000
Sewer Disposal	1	LS	x	$6,200	=	$6,200
Water Supply	1	LS	x	$16,250	=	$16,250
Stormwater Management	1	LS	x	$32,000	=	$32,000
Site Development Components	1	LS	x	$109,200	=	$109,200
Special Site Conditions	1	LS	x	$18,200	=	$18,200
Retaining Walls	1	SF	x	$4,800	=	$4,800
Communications Utilities	1	LS	x	$11,000	=	$11,000
Pavement Surfaces	50,900	SF	x	$5.08	=	$258,498
Wetland Mitigation Measures	1	LS	x	$1,200	=	$1,200
Environmental Permitting	1	LS	x	$1,000	=	$32,200
					Subtotal	$544,948
		20%			Contingency	$105,052
					Total	**$650,000**

CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802-864-2323 FAX: 802-864-2271 web: www.cea-vt.com

Not included:

Landscaping, foundation work, sidewalks and ramps, signage, solar infrastructure, or solar panels.

UVM/COLCHESTER SITE



Acquisition cost: $1,200,000

Site development cost: $1,140,000

(no sharing of heat/cooling)

NET COST $2,340,000

BERLIN "BACK LOT" SITE

Site Development Cost Estimate

Back Lot
Berlin
Summary of Estimate of Probable Site Development Cost
August 8, 2014

Description	Qty	Unit		Unit Cost		Cost
Site & Building Demolition	1	LS	x	$0	=	$0
Mass Earthwork	100	CY	x	$8.00	=	$800
Rock Removal	10	CY	x	$40	=	$400
Supplemental Foundation Costs	1	LS	x	$46,000	=	$46,000
Sewer Disposal	1	LS	x	$30,900	=	$30,900
Water Supply	1	LS	x	$64,700	=	$64,700
Stormwater Management	1	LS	x	$65,000	=	$65,000
Site Development Components	1	LS	x	$169,472	=	$169,472
Special Site Conditions	1	LS	x	$4,600	=	$4,600
Retaining Walls	1	SF	x	$4,800	=	$4,800
Communications Utilities	1	LS	x	$137,500	=	$137,500
Pavement Surfaces	68,150	SF	x	$5.52	=	$376,252
Wetland Mitigation Measures	1	LS	x	$7,600	=	$7,600
Environmental Permitting	1	LS	x	$1,000	=	$41,500
					Subtotal	$949,524
		20%			Contingency	$190,476
					Total	**$1,140,000**

CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802-864-2323 FAX: 802-864-2271 web: www.cea-vt.com

Not included:

Landscaping, foundation work, sidewalks and ramps, signage, solar infrastructure, or solar panels.

BERLIN "BACK LOT" SITE

Agencies of Agriculture and Natural Resources Collaborative Library

COMPARISON OF THE FINAL FOUR SITES

Criterion	Randolph RANK #1	Waterbury RANK #2	Colchester RANK #3	Berlin RANK #4
Buildability (1-6)	**25.8/30 (#1)** open land; easy utilities; easy permitting; agreeable neighborhood; good construction site	**22.6/30 (#6)** tight site; stormwater problems; height could be an issue with neighbors; average site for construction	**24.3/30 (#4)** tight site; have to screen exterior storage and it may be separated; utilities all available and complex is similar use; permitting easy	**21.9/30 (#8)** large site but has wetlands; roads and utilities have to be extended; use not permitted; neighborhood in transition; grades & soil small issue
Program & Customer Benefits (Crit. 7)	**3.6/5 (#8)** 24 miles from Montpelier 62 miles from Health Lab Closer for east, south & SW staff Closer for out-of-state customers Room for boat/trailer storage Ability to expand More central for sample drop off	**4.0/5 (tied for #3)** 13 miles from Montpelier 29 miles from Health Lab Closer for western staff Room for boat/trailer storage Ability to expand (Wasson?)	**2.2/5 (tied for #12)** 40 miles from Montpelier next to Health Lab Farther for all users except staff on western edge of state May lose space for boat/trailer storage No room to expand	**3.7/5 (tied for #6)** 4 miles from Montpelier 42 miles from Health Lab Optimal for users from NE Kingdom Middle for other users Room for boat/trailer storage Ability to expand Central for sample drop-off
SOV Benefits (Crit. 8)	**4.6/5 (#1)** Tech-oriented interns year-round Strong vet tech program; potential to share classrooms & programs CE tech program-- overlap with Wastewater training? Strong program benefit to VTC. VTC is already used as a meeting point Ag business incubator nearby Can use heat from VTC plant (no cooling) Is it good for the State to have a BSL-2+ lab remote from Burlington?	**4.0/5 (#2)** Removed from interns Potential to share meeting space with other State buildings Benefit to Village of Waterbury Waterbury is already used as a meeting point. Close to the Forensics lab Shared heating & cooling in Complex Maintenance staff can be shared.	**3.3/5 (#8)** Year-round interns Pre-vet program at UVM. Would not share meeting space/classrooms. Coud share meeting space with Health Lab Benefit to Health Lab and UVM. Next to the Health Lab Has to be stand-alone building Maintenance staff can be shared.	**3.7/5 (tied for #4)** Removed from interns Potential to share meeting space with other State buildings Negative impact on Berlin town center? Could create campus for heat/cooling. Maintenance staff can be shared.
Overall score	**34.0/40 (#1)**	**30.6/40 (#2)**	**29.8/40 (#3)**	**29.3/40 (tied for #4)**
Cost	**Acquisition: $1/yr ground lease** **Site Dev. Costs: $840,000** **$840,000** Possible equipment savings from sharing heat: $470,000 **($370,000 net)**	**Acquisition: already owned** **Site Dev. Costs: $1,460,000** **$1,130,000** Possible equipment savings from sharing heat and cooling: $1,130,000 **($ 330,000 net)**	**Acquisition: $1/yr ground lease** **Site Dev. Costs: $650,000** **$650,000** **($660,000 net)**	**Acquisition: $1,200,000** **Site Dev. Costs: $1,140,000** **$2,340,000** **($2,340,000 net)**

Legend: 14.5/30 (#3) = scored points/possible points (rank out of 19 sites)

PROCESS OF ELIMINATION: BERLIN "BACK LOT"

- **Benefits:**
  - **Proximity to Montpelier**
  - **Room on site for exterior functions and future growth**
  - **Possibility of sharing heating and cooling, but there is no existing infrastructure.**
- **Disadvantages:**
  - **TOTAL COST. The "Back Lot" site costs about $2 million more than the other top three sites.**
  - **NO ADDITIONAL RESEARCH OR EDUCATIONAL BENEFIT**

Note: There were seven sites in Berlin/Montpelier. All of them had similar high costs due to acquisition or obstacles such as flood plains, steep slopes, or distant utilities.

PROCESS OF ELIMINATION: UVM/HEALTH LAB

- **Benefits:**
  - **Proximity to the Health Lab**
  - **Strong research and educational benefit for lab and UVM**
- **Disadvantages:**
  - **LOT SIZE (2 ACRES). Difficult to accommodate exterior functions. No room for expansion.**
  - **DISTANCE FROM AGENCY ADMINISTRATION.**
  - **NO POSSIBILITY OF SHARED HEATING/COOLING.**

Note: The Spear Street site has more space but no room for growth, and it is more difficult for staff and users to access.

PROCESS OF ELIMINATION: WATERBURY

- **Benefits:**
  - Close to other State properties
  - Benefits Village of Waterbury
  - Possibility of sharing heat and cooling
- **Disadvantages:**
  - SITE DEVELOPMENT COST. Most expensive to build on due to flood plain and tight urban site.
  - NO ADDITIONAL RESEARCH OR EDUCATIONAL BENEFIT.
  - THE PROPERTY MAY HAVE BETTER USE.

By building the lab at Randolph and a future building at Waterbury, heating and cooling savings are maximized. The net gain is as much as $500,000.

RECOMMENDATION: VTC/RANDOLPH

- **Benefits:**
  - One of the least expensive sites to build on
  - Central location for regional services
  - Room on site for exterior functions and future growth
  - Strong research and educational benefit for lab and VTC
- **Disadvantage:**
  - **DISTANCE FROM AGENCY ADMINISTRATION.**

This site makes sense in terms of cost and wider benefits. The Agencies have the opportunity to envision new services and delivery that take advantage of the location.

FINAL SCORES

• VTC/Randolph	34.0	#1
• Waterbury	30.6	#2
• UVM/Health Lab	29.8	#3
• Berlin	29.3	#4

The choice is yours on behalf of the General Assembly.

ACT 178 of 2014, Sec. 33

a) On or before August 15, 2014, the Department of Buildings and General Services, the Agency of Agriculture, Food and Markets, and the Agency of Natural Resources shall submit a site location proposal for a shared laboratory to the House Committee on Corrections and Institutions and the Senate Committee on Institutions. It is the intent of the General Assembly that when evaluating site locations, preference shall be given to State-owned property.

(b) With approval of the Speaker of the House and the President Pro Tempore, as appropriate, the House Committee on Corrections and Institutions and the Senate Committee on Institutions may meet up to one time when the General Assembly is not in session to evaluate the proposal described in subsection (a) of this section and make a recommendation on the site location to the Joint Fiscal Committee. ...

(c) The Joint Fiscal Committee shall review the recommendation of the Committees described in subsection (b) of this section at its September 2014 meeting. If the Joint Fiscal Committee so determines, it shall approve the proposal as recommended by the Committees.

(d) On or before December 1, 2014, the Department of Buildings and General Services, in consultation with the Agency of Agriculture, Food and Markets and the Agency of Natural Resources, shall develop a detailed proposal on the site location recommended by the Committees if approved by the Joint Fiscal Committee. The proposal shall include programming, size, design, and preliminary cost estimates for a shared laboratory.

D.

115 STATE STREET
MONTPELIER, VT 05633
TEL: (802) 828-2228
FAX: (802) 828-2424

STATE OF VERMONT
GENERAL ASSEMBLY
SENATE COMMITTEE ON INSTITUTIONS

MEMORANDUM

To: Joint Fiscal Committee

From: Rebecca Wasserman

Date: September 2, 2014

Subject: Site location proposal for Agency of Agriculture, Food and Markets and Agency of Natural Resources Laboratory

In 2014 Acts and Resolves No. 178, Sec. 33 (the "2014 Capital Bill"), funding in the amount of $300,000.00 was appropriated to the Department of Buildings and General Services for the development of a proposal for the site location, programming and design for a shared Agency of Agriculture, Food and Markets and Agency of Natural Resources laboratory. In connection with this appropriation, the Department of Buildings and General Services, the Agency of Agriculture, Food and Markets and the Agency of Natural Resources were required to submit a site location proposal to the House Committee on Corrections and Institutions and the Senate Committee on Institutions for review by August 15, 2014. The 2014 Capital Bill authorized the House Committee on Corrections and Institutions and the Senate Committee on Institutions to review the proposal and make a recommendation for the laboratory site location to the Joint Fiscal Committee ("JFC") prior to its September meeting. The JFC is authorized to approve or reject the proposal as recommended by the Committees.

The Senate Committee Institutions has reviewed the site location proposal submitted pursuant to Section 33 of the 2014 Capital Bill and voted 5-0 in favor of recommending that the State proceed with the proposal to locate the laboratory at the Vermont Technical College ("VTC") in Randolph. This recommendation is conditioned upon the Department of Buildings and General Services, the Agency of Agriculture, Food and Markets and the Agency of Natural Resources developing a plan with the VTC for the management of the laboratory and laboratory staff.

D.

Agencies of Agriculture and Natural Resources Collaborative Laboratory
SITE LOCATION PROPOSAL

August 8, 2014

The statutory request:
On or before August 15, 2014, the Department of Buildings and General Services, the Agency of Agriculture, Food and Markets, and the Agency of Natural Resources shall submit a site location proposal for a shared laboratory to the House Committee on Corrections and Institutions and the Senate Committee on Institutions. It is the intent of the General Assembly that when evaluating site locations, preference shall be given to State-owned property. (Act 178 of 2014, Section 33)

Dear House Corrections & Institutions and Senate Institutions Committees:

Buildings and General Services was charged by the Legislature to evaluate and propose a site for new shared laboratory facilities for the Agencies of Agriculture and Natural Resources. The search for a site has been methodical. A comprehensive list of criteria was developed, and BGS advertised in area newspapers for land offers. Fifteen sites were offered, and these were analyzed in addition to four State-owned sites. The details and summary of this process may be found in our two-volume report.

After conducting due diligence, BGS proposes the laboratory be located at VTC in Randolph.

In our search, Randolph ranked first in physical characteristics as well as benefits for both Agencies' programs and the State of Vermont. When shared heating is factored in, VTC is the most economical site. While it ranked lower in benefits to program staff and users, it ranked #1 overall.

RANK	SITE	BUILDABILITY 30 points (rank)	PROGRAM BENEFITS 5 points (rank)	SOV BENEFITS 5 points (rank)	TOTAL 40 points	(rank)	COST
1	**Randolph**	**25.8 (#1)**	**3.6 (#8)**	**4.6 (#1)**	**34.0**	**(#1)**	**$890,000**
2	Waterbury	22.6 (#6)	4.0 (#3)	4.0 (#2)	30.6	(#2)	$1,170,000
3	Colchester	24.3 (#4)	2.2 (#12)	3.3 (#8)	29.8	(#3)	$690,000
4	Berlin	21.9 (#8)	3.7 (#6)	3.7 (#4)	29.3	(#4)	$2,230,000

The Waterbury complex, ranked #2 overall, offers reduced upfront costs and operational savings by sharing heating/cooling infrastructure. These savings significantly affect cost comparisons, and it may seem prudent to realize them now. However, these savings are available for any future State project, and the benefits of collaboration for both the laboratory and VTC outweigh this immediate savings.

The Department of Buildings and General Services and the Agencies of Agriculture and Natural Resources are excited about the positive impact this project will on laboratory staff and all users, from Vermont farmers and businesses, to fish hatcheries and regulatory programs. We also envision substantial benefits for VTC students pursuing careers in agriculture and environmental science. This site offers the richest long-term benefits to Vermont's natural environment and its stewards.

Chuck Ross, Secretary, Agency of Agriculture

Deb Markowitz, Secretary, Agency of Natural Resources

Michael J. Obuchowski, Commissioner of Buildings & General Services

VERMONT TECH

August 7, 2014

Dear House Corrections & Institutions and Senate Institutions Committees:

Vermont Technical College proposes partnering with the state of Vermont in locating the laboratories for the Vermont Agencies of Agriculture and Natural Resources Labs on the College's Randolph Center campus.

A decision to locate the Agency of Agriculture and Agency of Natural Resources State Laboratory on Vermont Technical College's Randolph campus will have longstanding positive implications for the Agencies, the College and the state of Vermont. A collocated facility approximately a mile from Exit 4 of 1-89 in the geographic heart of Vermont will become a natural focal point for the agricultural, food, and environmental economies of the state.

Locating the state's collaborative laboratory on campus would be mutually and highly beneficial. Having the laboratory on campus is consistent with Vermont Technical College's public responsibility to provide educational opportunities in science, engineering and agriculture for Vermonters and will also provide not only physical resources but also workforce resources to the state agencies through our students and faculty.

Programming Commitments from Vermont Technical College:

Appointment of a Campus Liaison to the State Laboratory: A Science Department faculty member, Michelle Sama, Ph.D, who will be the point person for all collaboration between the College and the Laboratory.

Designation of Faculty Leads from each appropriate academic department responsible for program collaboration by department: Agriculture, Civil & Environmental Engineering, Veterinary Technology, Sustainable Design & Technology, Mechanical Engineering (specifically, Metrology), Architectural Engineering Technology (specifically, Air Quality Technology) and Landscape Design & Sustainable Horticulture (specifically, Plant Pathology).

Student interns and work-study staff: Internship, applied undergraduate research and work-study opportunities for our students will provide a significant workforce resource to the State Laboratory, providing substantial leverage and increasing the service capacity of the Agencies. The collaborative laboratory would provide work-study and internship opportunities for Vermont Tech students enrolled and skilled in appropriate disciplines. Faculty would be available to provide expertise and consultation for the agencies' laboratory whenever needed and Agency experts would have the opportunity to engage Vermont students, then entrepreneurs, engineers and farmers of the future in the classroom, on the Vermont Tech farm and in the Lab.

Faculty/Scientist Collaboration: Vermont Technical College's 65 full-time faculty's similar academic and professional backgrounds with the State Laboratory staff provide opportunities for collaboration, especially in the summer months. In addition State Laboratory staff interested in teaching will be welcome to teach, where appropriate, and will be mentored by Vermont Tech faculty.

College Classroom and Laboratory Space for state training needs, research and flex capacity for testing: Scheduling priority to the State Laboratory and the Agencies will be provided by the College in the months of June, July and August. Space will be provided where possible during the academic year.

Vermont Interactive Technologies studios: Scheduling priority to the State Laboratory will be provided by the College for State Laboratory staff meetings with staff off-site and other training or meeting needs. Vermont Interactive Technologies has 16 studios located strategically throughout the state of Vermont, including a location in Morrill Hall on Vermont Tech's Randolph Center campus, four hundred yards from the proposed State Laboratory site.

Development of a Collaborative Business Model: College entities including Continuing Education & Workforce Development, the Vermont Manufacturing Extension Center and the Department of External Degree Programs are self-sustaining through revenue generating programming, many of which are custom designed to meet the needs of our partners. The College will lend its entrepreneurial expertise and business office operations to assist the State Laboratory in providing fee for service testing that leads to significant revenue generation for the State Laboratory.

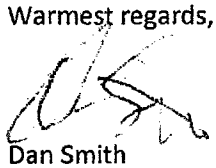
Grant Writing: The College will pursue appropriate grant opportunities that lend themselves to the expertise of the State Laboratory staff, including applications to the U.S. Department of Agriculture, National Institute for Standards and Technology and the National Science Foundation.

Town of Randolph: Randolph is a uniquely enjoyable place to visit, work and live, just thirty minutes from Lebanon, NH and just two and a half hours from Boston. The Downtown is part of the National Main Street Program. The Village area is registered as a National Historic District, and the recreation opportunities offered locally all provide services that many other small town residents need to go elsewhere to find. **Chandler Center for the Arts** is a community-based arts organization in Randolph, Vermont, serving Central Vermont and the Upper Valley region with a year-round series of performances, art exhibits and educational opportunities in historic Chandler Music Hall and Gallery.

Locating the lab in Randolph will embed it with an institution where Vermont students come to learn a set of skills and knowledge that lead them to jobs in industries, often as business owners and entrepreneurs, overseen by and partnered with both of these state agencies, not to mention the opportunity for the training of Vermont's future inspectors and field staff. Over time, it has the potential to create a culture of deep collaboration between Vermont entrepreneurs and businesses and the agencies because of the natural cross pollination and acquaintance that happens when facilities and staff are co-located.

The significance of locating the state's collaborative laboratory on the Vermont Technical College campus should not be underestimated. This is not just another building on a college campus to us; instead, this is an opportunity to maximize the state's limited resources in a way that serves the most Vermonters and that will benefit generations of Vermonters to come.

Warmest regards,



Dan Smith
Interim President