



Lahey Lost Valley

MEP Assessment

9750 Brookmeadow Drive
Vienna, VA 22182



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INTRODUCTION

The Fairfax County Park Authority is evaluating Lahey Lost Valley, which includes a house and a cottage previously used as an artist studio, for the Resident Curator program. Lahey Lost Valley is located at 9750 Brookmeadow Drive in Vienna. The house is listed on the Fairfax County Inventory of Historic Sites and therefore qualifies as a historic building when applying the building code. The cottage is noted as a site feature on the inventory report; however, it is not specifically listed as a contributing feature.

The purpose of this report is to document the existing conditions of the mechanical, electrical, and plumbing (MEP) systems, identify deficiencies, make recommendations, and estimate the repair costs. A field survey was conducted to examine the systems; however the investigation was non-destructive and hence some conditions could not be completely assessed such as wiring within the walls.

Recommendations for corrections are based on the building remaining a residential use. An Opinion of Probable Cost is provided for correcting the deficiencies. The Opinion of Cost assumes that the party who enters into a contract with the County will perform the role of general contractor.

A historic structures report (HSR), prepared by Wiss, Janney, Elstner Associates, Inc. in September 2018, was referenced to identify the historical significance and character-defining features related to the mechanical, electrical, and plumbing systems. An evaluation of potential National Register of Historic Places eligibility found that the house and cottage are significant under Criterion B, for association with both the Gunnell family and the Laheys, and under Criterion C for the federal architecture of the original house. SWSG recommends considering the inclusion of colonial-revival architecture under Criterion C due to Mrs. Lahey's stated desire to incorporate colonial features in the design of the addition such as hand-made bricks, random width boards, and "Williamsburg" shingles.

The list of MEP character defining features in the HSR includes the radiator enclosures; therefore, SWSG has included the radiators as significant due to their association with the enclosures. Other character defining features are as follows:

- Four exterior colonial-style lantern light fixtures at the exterior doors of the original house
- One interior ceiling-mounted lantern-style light fixture at the addition's staircase.

For consistency, the room name designations used in the HSR are retained in this report. The kitchen and cellar are on the ground floor, the living room, parlor, and hall on the first floor, and the east loft and west loft on the second floor.

Building Code Applicability

The International Existing Building Code (IEBC 2012) allows that existing buildings do not need to be brought up to 100% compliance with today's code. This is advantageous for historical buildings where it is desirable to limit modifications of original building materials.

This assessment assumes that the buildings will remain residential, i.e. Residential Use Group R3. The code requires compliance modifications based on the level of work being performed and the work area.

Work area is defined as that portion or portions of a building consisting of all reconfigured spaces as indicated on construction documents. Work area excludes other portions of the building where incidental work entailed by the intended work must be performed and portions of the building where work not initially intended by the owner is specifically required by the code.

It is likely that any work done at Lahey Lost Valley will fall under the IEBC category of Level 2 Alterations. By definition, this includes reconfiguration of any space, the additional or elimination of any door or window penetration, the reconfiguration or extension of any system, or the installation of any additional equipment.

Executive Summary of Recommendations

The following list identifies the major recommendations included in this report. Additional recommendations are included in the mechanical, plumbing, and electrical sections.

1. Provide new mechanical equipment.
2. Replace two panelboards
3. Provide power to new mechanical equipment.

MECHANICAL CONDITION ASSESSMENT

Existing Mechanical Systems

There are five HVAC systems that condition the main house and one system for the cottage:

1. The first system consists of a nominal 9 MBH (0.75 ton) Sanyo ductless mini-split heat pump system that serves the kitchen in the cellar level. The system was on stand-by (cooling) mode at the time of survey. The system is not properly working. It is dated January 2001 and is past its useful life.



Image 1: Indoor Air-Handling Unit for Kitchen



Image 2: Outdoor Condensing Unit for Kitchen

2. The second system consists of a similar nominal 9 MBH (0.75 ton) Sanyo ductless mini-split heat pump system that serves the cellar. The system was on stand-by (cooling) mode at the time of survey. The system is not properly working. It is dated January 2001 and is past its useful life.



Image 3: Indoor Air-Handling Unit for Cellar



Image 4: Outdoor Condensing Unit for Cellar

3. The third system consists of a nominal 30 MBH (2.5 ton) Bryant heat pump split system with a horizontal Air-Handling Unit (AHU) located on the second floor in the east loft. The AHU is ducted to supply registers serving the west loft on the second floor and the hall, parlor, living room, and bathroom on the first floor. The return is ducted to two large ceiling grilles in the hall and living rooms of the first floor. The ductwork is comprised of galvanized steel mains with flexible duct runouts to the diffusers. The system did not appear to be working. The condensate is pumped through a condensate pump to the exterior through PEX tubing. The date of manufacture for the outdoor unit is 2001 and the system appears to be at the end of its useful life.



Image 5: Air-Handling Unit in East Loft



Image 6: Outdoor Condensing for Main House System

4. The fourth system consists of a free standing floor-mounted dehumidifier placed at the entrance to the kitchen. Its condensate is pumped into the kitchen sink through a PEX tube. It is dated July 2015 and appeared to be in good condition. It appears this unit was installed as a temporary means to help with the humidity in the house since the HVAC systems are not fully functional. Residential dehumidifiers typically only last 3-4 years. This system should most likely not be necessary once the house is occupied and air conditioning systems are operating properly.



Image 7: Kitchen Dehumidifier



Image 8: Kitchen Condensate Piping

5. The fifth system consists of a Weil McLain hot water boiler system that provides heating to the entire house through two recirculating pumping loops and recessed Sunrad radiators. The boiler uses propane for fuel. It is located in a utility room off the kitchen. There is a 500-gallon underground propane storage tank located between the main house and the cottage. The heating water system has an expansion tank with a make-up water connection. The equipment is working and providing some heat. The date of manufacture for the equipment was unavailable, though the Laheys likely installed the Sunrad radiators in the 1940s.



Image 9: Boiler



Image 10: Heating Water Piping



Image 11: Propane Tank Access



Image 12: Sunrad Radiator

6. The cottage has a thru-the-wall heat pump unit. It appears to be in good condition and is working well. The date of manufacture for the equipment was unavailable.



Image 13: Thru-the-Wall Heat Pump in Cottage

The first-floor bathroom does not have an exhaust fan, nor an operable window.

The kitchen has an electric range which appears to be in good condition. It has a recirculating-type ventilation hood.

The laundry area is in the kitchen with a utility sink, clothes washer, and electric clothes dryer. The clothes dryer is exhausted directly through the wall to the exterior of the house.

Proposed Mechanical Systems

- Remove and replace HVAC system 1 with a new ductless split system to condition the kitchen area.
- Remove and replace HVAC system 2 with a new ductless split system to condition the cellar.
- Remove and replace HVAC system 3 indoor and outdoor units.
 - There are other modifications to consider if the spaces on the second floor, where the indoor unit and ductwork are installed, are desired to be used as living space.
 - The return air grille can be relocated to the northwest corner of the hall and still be far enough away from the supply grilles. This will eliminate the return ductwork that extends across the east loft floor.
 - The ductwork that extends to the ceiling supply grilles in the hall and parlor on the south side of the house (quantity 2) may be relocated under the flooring between the joists. This is possible because the joists extend from the front to the back of the house.

- Historical note: The flooring in the loft rooms may be late-19th century, based on its thickness. The loft floor boards are not original as suggested by two observations: (1) The extant original first-floor flooring is not tongue and groove, and (2) planing mills that could mass-produce tongue and groove floor boards weren't available in this area until the mid-1850s.
- Historical note: The HSR suggests that the ceiling in the parlor is gypsum wall board, and therefore not original. The ceiling material in the hall is not specified in the report; however, the lack of cracks suggests that it is also gypsum wall board. If so, then it would be better to install ductwork between the joists from below rather than remove late-19th century flooring.
- Historical note: Unless it was added later, there likely isn't any cross-bracing between the joists that would impede installation of ductwork.
- Clean the existing ductwork and all grilles.
- Remove the floor-mounted dehumidifier (HVAC system 4) from the kitchen. A new dehumidifier may not be necessary once the HVAC systems are replaced and fully operational.
- The boiler, radiators, and circulating pumps (HVAC system 5) should be serviced. The grill to one of the hall radiators was placed on top of the radiator and should be reinstalled.
- Provide an exhaust fan for the first-floor toilet room. Duct the exhaust through the wall and install a vent cover.
 - Historical note: Both the wall and the roof are from the same 1940s period, so it is preferable to extend the exhaust pipe through the wall due to the difficulty of penetrating the slate roof.
- Insulate the exposed hydronic heating water piping in the utility room.
- Service the thru-the-wall unit in the cottage and verify proper operation.

PLUMBING CONDITION ASSESSMENT

Existing Plumbing Systems

The house has a 3/4" domestic water service that enters the building at the northeast corner of the utility room. There is a pressure reducing valve downstream a the main shutoff valve. There is a new PEX bypass pipe with two new ball valves and tees with push-to-connect type fittings that can be used to bypass the water heater. It is not clear why the water heater would need to be bypassed.



Image 14: Pressure Reducing Valve



Image 15: Blue PEX Bypass Pipe

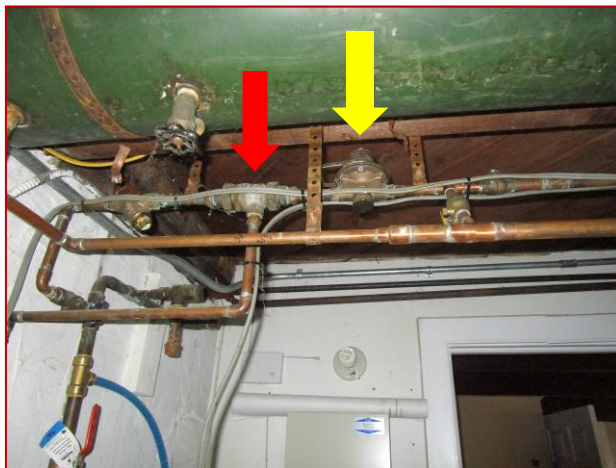


Image 16: Backflow Preventer (red arrow) and Pressure Regulator (yellow arrow)

There is a makeup water connection to the boiler consisting of a backflow preventer and pressure regulator.

The existing electric domestic water heater has a 40-gallon capacity and 4500W heating element. It has a January 2008 manufacture date, but there is a service ticket noting that it was installed in October 2011. It should typically have approximately 7 years of useful life left. This could be much shorter since it is not currently being used with water flowing through it every day.



Image 17: Water Heater

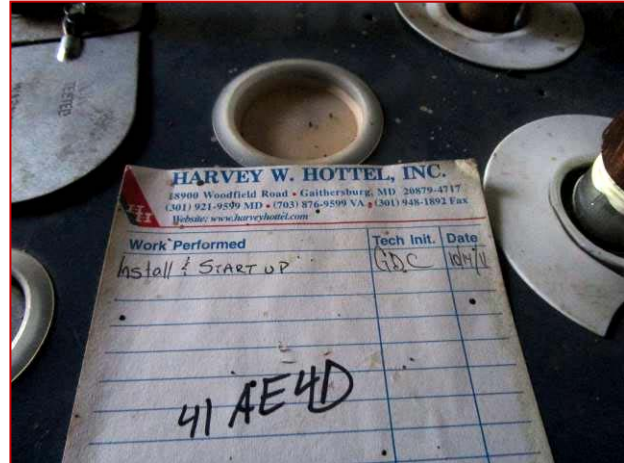


Image 18: Water Heater Installation Ticket



The kitchen sink has a single compartment with a single-lever faucet and an air gap fitting for the dishwasher. There is a garbage disposer, but it was not functional. An under-counter dishwasher beside the sink appears to be very old. It is not known if it is functional.

Image 19: Kitchen Sink and Dishwasher

There is a utility/washer sink, washer, and dryer beside the kitchen counter. The utility sink is in good condition, but the washer and dryer have rust in them.



Image 20: Laundry Equipment in Kitchen

The first floor has a bathroom with a wall-mounted lavatory, water closet, and a bathtub. The plumbing fixtures appear to be in good condition.



Image 21: Lavatory



Image 22: Water Closet



Image 23: Bathtub with Showerhead

The second floor west loft was converted at one time, possibly in the 1940s, to a bathroom with bathtub, water closet, and lavatory. All plumbing fixtures were removed and all of the piping is capped.



Image 24: Bathtub Platform

County records show that the house is connected to the utility sewer system and is not on septic. PVC cleanout plugs were observed in the wooded area west of the house extending in a line toward the stream valley.

There are at least two hose bibbs on the exterior of the house. They appear to be normal hose bibbs (not non-freeze type) which is typical for residential installations.

The roof has gutters with downspouts that discharge directly onto grade. There are no splash blocks. One of the downspouts is dented at the end.



Image 25: Downspout with Damaged Pipe

There is an existing well for underground water utilization. This water can be utilized for irrigation purposes, but all the pipes connecting to this system are disconnected. There's a frost free hydrant connected to this system, which is in fair condition.



Image 26: Yard hydrant

Proposed Plumbing

- Inspect and service the electric water heater to verify it functions properly.
- Insulate the exposed domestic hot and cold water piping in the cellar.
- Remove and replace the garbage disposer.
- Remove and replace the dishwasher.
- Remove and replace clothes washer and clothes dryer.
- Clean gutters and downspouts to verify they are clear. Replace the damaged downspout with a new one matching material and style.
- Provide splash blocks at all downspouts where there isn't a diverter pipe.

ELECTRICAL CONDITION ASSESSMENT

General Electrical

The 2017 National Electric Code (NEC) has been released, but not adopted in Virginia where the 2014 code is currently in use. All code references are based on 2014 National Electrical Code (NEC).

The house is approximately 2,000 square feet and served by a 200A, 120/240V, single phase, three-wire electric distribution panel. This yields approximately 19 watts/square foot, which is adequate for the building.

When any Level 2 Alteration (see Introduction for definition) occurs, the following must be corrected if located within the work area (see Introduction for definition).

- All enclosed areas, other than closets, kitchens, basements, hallways, laundry area, utility areas, storage areas and bathrooms shall have minimum of two duplex receptacle outlets or one duplex receptacle outlet and one ceiling or wall-type lighting outlet.
- Kitchens shall have a minimum of two duplex receptacle outlets.
- Laundry areas shall have a minimum of one duplex receptacle outlet located near the laundry equipment and installed on an independent circuit.
- Newly installed receptacle outlets shall be provided with ground fault circuit interruption as required by NFPA 70.
- At least one lighting outlet shall be provided in every bathroom, hallway, and stairway, and to illuminate outdoor entrances and exits.
- At least one lighting outlet shall be provided in utility rooms and basements where such spaces are used for storage or contain equipment requiring service.
- Clearance for electrical equipment shall be provided in accordance with NFPA 70.

Electrical Service Entrance

Electrical power is brought to the house by an underground 120/240V, single-phase, three-wire service. The underground utility feeder is connected to an electric meter on the side of the house at the northeast corner. From the meter, the utility service feeds the 200A main electric distribution panel located on the interior east wall of the cellar.

*Image 27, 28: Electric
Meter and 200A Main
Electric Distribution Panel*





Image 29: Subpanel

The main distribution panel feeds the HVAC/Furnace (two pole loads), kitchen appliances, lighting, and receptacle loads. The main distribution panel also supplies a 100A, 16-pole sub-panel located in the utility space in the cellar near the kitchen. This sub-panel feeds the washer and dryer, a cellar HVAC unit, exterior condenser unit, kitchen lights and landscape lighting.

The main distribution panel and sub-panelboards are estimated to be 22 to 25 years old, although neither is dated. The main distribution panel has a concealment inspection date of 1996, but it is unknown if the panel was installed previous to the interior alterations in 1996 that included framing inspections. The HSR notes that new electrical wiring and a new heating unit were installed in 1996.

The useful life of the panels is contingent upon maintenance practices and environmental conditions. Both panelboards have exterior rust damage which implies the interior of the circuit breakers may also be rusted. The panelboards should be replaced. The feeders for the panelboards are assumed to be in good condition. It is also noted that the main distribution panel in the cellar is located above a radiator, which is a code violation; however, this condition does not functionally impact the panelboard.

The building wiring is a mixture of types which include AC cable, conduit, BX and 'Romex' cable. The insulation on the cables supplied by the panelboards, though not tested, does not appear to be damaged and should be able to be reused. In general, cable appears to be adequately supported in the space. The NEC requires support every 4 1/2 feet and within 12 inches of junction boxes. Some Flexible Metallic Conduits are noted to be inadequately supported in the utility room in the basement.

A ground rod and ground wire connected to the domestic water pipe entrance (providing building ground) is required by the NEC, but was not observed and is required to be installed.

Receptacles and Mechanical Equipment Circuits

In general, receptacles are present in sufficient numbers and locations to provide adequate power to the space. The 2017 National Electric Code (NEC) has been released, but not adopted in Virginia where the 2014 code is currently in use. The NEC requires Ground Fault Protection (GFCI) in Bathrooms, Garages, Outdoors, Kitchens, Basements, and Laundry areas.

Image 30, 31: Standard Duplex Receptacle and Exterior GFCI Receptacle



The NEC also requires Arc-Fault Circuit Interruption Protection (AFCI) in most other areas in a dwelling unit. Protection can be provided by individual receptacles or be provided on the branch circuit breakers supplying the receptacles. While upgrading is not code required, it is recommended to provide GFCI and AFCI circuit breakers in the panelboards that are recommended for replacement.



Image 32: Insufficient Number of GFCI Receptacles at Kitchen Sink

Most of the receptacles observed in the spaces were rated 120 Volt, 20 Amp (NEMA 5-20R). The receptacles in the space appear to be in good condition and can be reused. GFCI receptacles were noted in the toilet room and kitchen.

Dedicated kitchen circuits are now required by the NEC as well a minimum of two dedicated above-counter receptacles. Only one above-counter, surface-mounted GFCI receptacle is in place. Dedicated circuiting for this receptacle is indicated on the panelboard schedule. SWSG recommends providing an additional above-counter kitchen GFCI receptacle with a

dedicated circuit and a GFCI receptacle within 3 feet of the toilet room sink.

One non-grounded receptacle was observed in the first-floor hall. A non-grounded receptacle can be visually identified as it does not have a third opening for a three-prong plug. This receptacle is located in the partition wall near the stairs. For safety of the residents, it should be replaced.

- Historical note: The wall material where the non-grounded receptacle is located is not original. Gypsum wall board replaced the original plaster.

The NEC also requires one receptacle per 12 linear feet of wall space, which has not been strictly met in the east and west loft (2nd floor) rooms. For Level 2 Alterations, correcting this deficiency is not required; however, there are four non-grounded receptacles (two in each loft room) mounted on the baseboard that should be replaced.

The NEC requires at least one GFCI exterior receptacle and GFCIs supplying mechanical equipment in dwelling units. One GFCI exterior wall-mounted receptacle was observed; which meets the code requirement. It is recommended to provide one additional GFCI receptacle at the mechanical equipment on the south side of the house.

- Historical note: Mount the receptacle on a post independent of the exterior wall of the building. This will preserve historic brick.

The telephone company entrance box location was not found although several telephone jacks were observed in the space. Exposed telephone wiring and damaged telephone jacks were observed in the space. SWSG recommends repairing, replacing, or removing (if a land line is not desired) the telephone board and damaged telephone jacks and removing unused wire.

The disconnecting means for mechanical equipment appeared sufficient and in good condition.

In the cottage, provide missing covers for receptacles.

Lighting

The NEC requires a switched light fixture in every habitable room, kitchen, and bathroom. In rooms other than the kitchen and bathrooms the requirement can be met with a switched receptacle.

In general, the house contains a mixture of light fixtures types.



Image 33, 34, 35: Light Fixtures

Surface-mounted fluorescent fixtures and wall sconces are used in the kitchen. The utility room has a wall-mounted fluorescent screw-in fixture. Ceiling-mounted fixtures are used for stair landings and hallways. The bathroom has a wall-mounted vanity fixture and wall sconces are used the west loft space. The utility space in the cottage building has a ceiling-mounted fluorescent fixture (operation was not verified).

Spaces that did not have either fixtures or switched receptacles are the cellar, living room, parlor, east loft and the main room in cottage building. It is recommended to provide either switched receptacles or a switch and light fixture in these spaces provided these spaces are within the work area. In the west loft, the light switch with a burn mark should be replaced and the wiring checked for damage.

- Historical note: If the parlor is included in the work area, consider adding a switched receptacle in the partition wall since this wall no longer has its original plaster finish.
- Historical note: If the east loft is included in the work area, consider adding a switched receptacle in the partition wall since this wall no longer has its original plaster finish.

Two exterior wall fixtures for one of the main dwelling north entrances were observed to be non-functioning; however, it is unknown if this is due to non-functioning light bulbs or the fixtures themselves. There were also two exterior wall fixtures noted on the south entrance that were functioning, except for one light bulb that should be replaced. Exterior flood lights (controlled by integral photocell) were noted for the main building and the cottage building, but their operation was not verified.

- Historical note: The exterior carriage wall fixtures on the original house might be considered of historical significance if it is determine that the Lahey construction is colonial revival.

Life Safety

Battery-powered smoke detectors were observed throughout the building, in the immediate vicinity of sleeping rooms, and on each story, including the basement. The smoke detector in the stair landing next to the kitchen was missing, which should be provided.

Table of Proposed Electrical Modifications

Recommendation	Optional but Recommended	Required if in Work Area	Required or Recommended for Safety
Replace (1) 200A (30 pole) panelboard in cellar room with GFCI and AFCI circuit breakers			✓
Add GFCI receptacle near sink in first-floor toilet room off living room		✓	
Replace (5) non-grounded receptacles in east loft, west loft, and hall			✓
Provide (1) additional kitchen above-counter GFCI receptacle. Provide each GFCI receptacle with a dedicated circuit. Install new circuits in EMT conduit and flexible metallic conduit		✓	
Provide (1) additional GFCI receptacles at exterior on a post adjacent to proposed mechanical equipment			✓
Locate or provide grounding electrode extended to ground rod near the electric meter			✓
Locate or provide ground wire connected to the domestic water pipe entrance providing building ground			✓
Provide supports for inadequately supported cabling in basement and remove abandoned			✓

cabling			
Repair, replace, or remove telephone board and damaged telephone jacks.	✓		
Salvage and reuse existing light fixtures where possible throughout the house.		✓	
Provide (1) missing bulb on exterior wall-mounted fixture (south entrance), replace (1) toilet room wall vanity fixture bulb		✓	
Repair non-functioning fixture: (2) exterior wall mounted fixtures (north entrance), (2) kitchen wall sconces, (1) second floor stair landing ceiling mounted fixture, (2) wall sconces in west loft		✓	
Provide light switch and associated switched receptacle for cellar space, the living room space and the parlor space		✓	
Provide replacement light switch for west loft			✓
Verify exterior flood lights with photocell and time clock are functional	✓		
Provide power for proposed kitchen area replacement HVAC 1 split system air conditioning system			✓
Provide power for proposed dining area replacement HVAC 2 split system air conditioning system			✓
Provide power for proposed second floor replacement HVAC 3 system indoor and outdoor units			✓
Feeders to HVAC system may be reused if sized correctly for the proposed equipment			✓
Provide power for proposed exhaust fan in toilet room			✓
Provide missing receptacle covers in Cottage room			✓
Provide light switch and associated switched receptacle for main room in cottage building		✓	
Replace or Repair non-functioning fixture: (1) utility room fluorescent fixture in cottage building		✓	

Proposed Fire Alarm

- Battery operated smoke detectors observed in cellar, kitchen, living room, parlor space, dining hall and stair landings (outside each sleeping area) and on each story, including the basement.

Recommendation	Optional but Recommended	Required if in Work Area	Required or Recommended for Safety
Provide missing smoke detector in stair landing next basement kitchen.			✓

OPINION OF PROBABLE COST

(Note: The Opinion of Probable Cost does not include reconfiguring the layout of the mechanical systems since any desired new layout is unknown at this time.)

Lahey Lost Valley House

Opinion of Probable Construction Cost

		SWSG Estimate
Division 1 - General Requirements		700
Division 2 - Site Work		0
Division 3 - Concrete		100
Division 4 - Masonry		0
Division 5 - Metals		0
Division 6 - Carpentry		700
Division 7 - Thermal & Moisture Protection		500
Division 8 - Doors & Windows		0
Division 9 - Building Finishes		5,000
Division 10 - Specialties		0
Division 11 - Equipment		0
Division 12 - Furnishings		0
Division 13 - Special Construction		0
Division 14 - Conveying Systems		0
Division 15 - Mechanical		18,530
Division 16 - Electrical		13,830
Subtotal		\$39,360
Contingency for hidden conditions	15%	5,904
Opinion of Probable Construction Cost		\$45,263

Notes:

1. Excludes general contractor fees
2. Excludes payment and performance bonds
3. Excludes engineering plans

Budget Estimate

	Category/Trade	Qty	Unit	Price	Estimated Cost	Subtotals
1.01	Division 1 - General Requirements					
	Permits	1	LS	450.0	450	
	Trash removal	1	LS	250.0	250	700
2.01	Division 2 - Site Work					
	Not Applicable		SF	0.0	0	0
3.01	Division 3 - Concrete					
	Post foundation	1	LS	100.0	100	100
4.01	Division 4 - Masonry					
	Not Applicable		LS	0.0	0	0
5.01	Division 5 - Metals					
	Not Applicable		EA	0.0	0	0
6.01	Division 6 - Carpentry					
	Backboards	1	LS	500.0	500	
6.02	Exterior post for mechanical receptacle	1	EA	200.0	200	700
7.01	Division 7 - Thermal & Moisture Protection					
	Cutting, patching exhaust penetration	1	LS	500.0	500	500
8.01	Division 8 - Doors & Windows					
	Not Applicable		EA	0.0	0	0
9.01	Division 9 - Building Finishes					
	Cutting and patching	1	LS	2,500.0	2,500	
9.02	Painting walls that were cut and patched	1	LS	2,500.0	2,500	5,000
10.01	Division 10 - Specialties					
	Not Applicable		LS	0.0	0	0
11.01	Division 11 - Equipment					
	Not Applicable		LS	0.0	0	0
12.01	Division 12 - Furnishings					
	Not Applicable		LS	0.0	0	0
13.01	Division 13 - Special Construction					
	Not Applicable		LS	0.0	0	0
14.01	Division 14 - Conveying Systems					
	Not Applicable		LS	0.0	0	0
15.01	Division 15 - Mechanical					
	Demolition	1	LS	1,000.0	1,000	
15.02	HVAC system 1	1	LS	2,500.0	2,500	
15.03	HVAC system 2	1	LS	2,500.0	2,500	
15.04	HVAC system 3	1	LS	5,000.0	5,000	
15.05	Cleaning Ductwork and Grilles	1	LS	500.0	500	
15.06	HVAC system 5 Servicing	1	LS	1,500.0	1,500	
15.07	Toilet exhaust fan	1	LS	250	250	
15.08	Insulation - piping	1	LS	500.0	500	
15.09	Cottage Room through the wall unit servicing	1	LS	250.0	250	
15.10	Water Heater servicing	1	LS	250.0	250	
15.11	Garbage disposer	1	EA	380	380	
15.12	Dishwasher	1	EA	1,000.0	1,000	
15.13	Clothes washer	1	LS	1,200.0	1,200	
15.14	Clothes dryer	1	LS	1,200.0	1,200	
15.15	Clean gutters and downspouts	1	LS	250.0	250	
15.16	Splashblocks	1	LS	250.0	250	18,530
16.01	Division 16 - Electrical					
	Demolition	1	LS	500.0	500	
16.02	200A, 120/240V 1-phase panelboard + GFI/AFCI CBs	1	EA	2,500.0	2,500	
16.03	Replace non-grounded receptacles w/Grounded type	5	EA	55.0	275	
16.04	Provide GFCI within 3 ft of Toilet Room sink	1	EA	300.0	300	
16.05	Provide GFCI receptacles at exterior adjacent to proposed mechanical equipment	2	EA	625.0	1,250	
16.06	Provide GFCI above cabinet receptacle in Kitchen	1	EA	55.0	55	
16.07	Provide Dedicated appliance circuit in kitchen	2	EA	500.0	1,000	

16.08	Replace Convenience Receptacles in east and west loft	5	EA	175.0	875
16.09	Provide receptacle covers in Cottage room	5	EA	10.0	50
16.10	Provide supports for inadequately supported cabling in basement	1	LS	175.0	175
16.11	Repair or replace telephone board and damaged telephone jacks.	1	LS	200.0	200
16.12	Provide missing/burned out bulb(s): exterior wall mounted fixture, toilet room vanity fixture	2	EA	25.0	50
16.13	Repair/replace non-functioning light fixtures: (2) exterior wall mounted fixtures (north entrance), (1) second floor stair landing ceiling mounted fixture	3	EA	250.0	750
16.14	Replace lamp or repair non-functioning light fixtures: (2) kitchen wall sconces, (1) utility room fluorescent fixture in cottage building, (2) wall sconces west loft	5	EA	75.0	375
16.15	Install light switch and switched receptacle: cellar, living room space, parlor space, east loft and main room in cottage building	5	EA	200.0	1,000
16.16	Install replacement light switch in west loft check for damaged wire	1	EA	50.0	50
16.17	Support HVAC Replacements (basement split system 1 air conditioning system - kitchen)	1	EA	925.0	925
16.18	Support HVAC Replacements (first floor split system 2 air conditioning system - dining area)	1	EA	750.0	750
16.19	Support HVAC Replacements (indoor and out door unit system 3)	1	EA	750.0	750
16.20	Support HVAC Replacements (add toilet room exhaust, wiring w/ switch)	1	EA	350.0	350
16.21	Provide battery powered smoke detectors in stair landing (basement)	1	LS	150.0	150
16.22	Misc. Electrical	1	LS	1,500.0	1,500
					13,830
Estimated Construction Costs					39,360