Analysis of Brownfield Cleanup Alternatives
Lexington History Museum
215 West Main Street
Lexington, Kentucky 40508

Grant Number BF-95461610-1

Prepared for:

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List of Acronyms and Abbreviations

ABCA	Analysis of Brownfield Cleanup Alternatives
ACM	Asbestos-containing material
AHERA	Asbestos Hazard Emergency Response Act
AMEC	AMEC Environment & Infrastructure, Inc.
EPA	United States Environmental Protection Agency
ESA	Environmental Site Assessment
KDWM	Kentucky Division of Waste Management
LBP	Lead-based paint
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NVLAP	National Voluntary Laboratory Accreditation Program
OSHA	Occupational Safety and Health Administration
O&M	Operations and Maintenance
PLM	Polarized light microscopy
Site	Lexington History Museum, 215 W. Main St., Lexington, KY

1.0 INTRODUCTION

This document presents the results of an Analysis of Brownfield Cleanup Alternatives (ABCA) for the Lexington History Museum (Site, Property, or Subject Property) at 215 West Main Street, Lexington, Kentucky. The Lexington-Fayette Urban County Government (LFUCG) was awarded a U.S. Environmental Protection Agency (EPA) Brownfields Assessment Grant for qualified environmental assessment work, a portion of which was used at this site to conduct surveys for asbestos-containing material (ACM), lead-based paint (LBP), and dust containing lead. Other potential hazardous substances were also noted, including mold growth and bird guano. A hazardous materials inventory was also conducted to determine the number of lamps, ballasts, mercury-containing devices, chlorofluorocarbon (CFC)-containing equipment, and polychlorinated biphenyl (PCB)-containing equipment. This ABCA includes a discussion of the following:

- Identification and Development of Cleanup Alternatives
  - Description of Current Situation
  - Establishment of Cleanup Objectives
  - Screening of Cleanup Technologies
- Evaluation of Cleanup Alternatives
  - Technical/Environmental/Human Health/Institutional
  - Cost Estimates
- Justification and Recommendation of Cleanup Alternative(s)
  - Technical
  - Environmental
  - Human Health

1.1 Facility Background

AMEC was authorized by the LFUCG to perform sampling of building materials for ACM, LBP, and dust containing lead associated with the Lexington History Museum. The field survey was performed by Mr. Milo Eldridge and Mr. Phillip Applegate, both licensed asbestos inspectors in the State of Kentucky. **Figure 1** is a topographic map of the Site and adjacent areas. **Figure 2** is an aerial photograph of the Site.

Information provided below on property description and history was derived from a Phase I Environmental Site Assessment (ESA) conducted by AMEC (AMEC 2012). The Lexington History Museum building consists of approximately 41,900 square feet and while no build date was provided, according to a plaque mounted on the building, it was constructed between 1898 and 1900. The building has been used as a museum since 2000. Prior to 2000, the building was the Fayette County Courthouse. The property is owned by the LFUCG.

The proposed redevelopment plan for the subject property is still being finalized. Since the building is historic, renovations and restorations will take place to prepare it for continued public or commercial use.

Recognized environmental conditions (RECs) were not identified based on the historical records reviewed and the site visit conducted. However, environmental concerns were noted in connection with ACM, LBP, and mold.

AMEC reviewed a Limited Site Survey of Indoor Air Quality prepared by Air Source Technology, Inc. (ASTI) dated September 20, 2012. Initial laboratory testing for mold spores found three areas on the first floor which susceptible individuals should not enter: the “Fallen Heroes” exhibit, the first floor hallway, and the Public Safety Exhibit. A follow up study was conducted and visible mold was observed above the ceiling on the first floor. According to ASTI, water intrusion appears to be emanating from a second floor balcony.

AMEC reviewed a Lead Paint Inspection Report prepared by the LFUCG Division of Facilities dated July 2012. This report found high levels of lead in the basement and penthouse of the building, and recommended that these areas should be either abated or stabilized by repainting damaged walls and ceilings. For floors 1 through 4, specialized cleaning under a containment setting with monitoring was recommended.

AMEC reviewed an Interpretation of Lead-Based Paint Risk Assessment Report prepared by Compliance Technologies, LLC (CT) dated August 6, 2012. This letter recommended restricting access to the basement and penthouse, and limiting access to the 4th floor to staff only. Floors 1 through 3 should be cleaned, and afterward an inspection, cleaning and maintenance regiment should be implemented to reduce the exposure to potential hazards. This report also recommended airborne lead monitoring be conducted to determine if an airborne lead hazard exists. Finally, CT recommended repair and maintenance items to reduce mold on the first floor.

AMEC reviewed an Asbestos Identification Survey and Inspection Report prepared by the LFUCG Division of Facilities dated July 2012. This report found Asbestos Containing Material (ACM) on all floors of the building, though ACM on the 2nd floor was assumed, not confirmed. The report cited potential risks associated with floor tile mastic on the 3rd and 4th floors, mastic over fiber board on the 3rd floor, pipe fittings throughout the building, soil and pipe fittings in the crawlspace, and transite panels and gaskets associated with mechanical systems. Air sampling was conducted and found asbestos levels to be below the Permissible Exposure Limit (PEL).

1.2 Survey Results

This section summarizes the results of ACM, LBP, and dust containing lead surveys conducted to date at the Site. AMEC (2013) describes the detailed results of the survey conducted by AMEC.

Results of ACM Surveys:

AMEC used the asbestos report prepared by the LFUCG Division of Facilities as a base to perform an updated asbestos survey. As part of AMEC's 2013 survey, a total of 48 samples were collected from 19 different homogeneous sampling areas to supplement earlier surveys. For asbestos samples collected during the survey, a unique identification was assigned that identified the homogeneous sampling area and unique sampling number for each sample collected. Asbestos bulk samples and chain-of-custody submittal sheets were delivered to the AMEC laboratory in Atlanta, Georgia for asbestos analysis.

Of the samples collected and analyzed, seven materials were reported to contain asbestos in varying concentrations, including window caulk in the penthouse, white sheet flooring on the 4th floor, stairwell tread mastic on the 4th floor, black mastic under the carpet, the boiler sealer, boiler gasket and square duct insulation in the boiler room.

In December 2013, TriEco, LLC conducted additional sampling for ACM. A total of nine samples were collected from three different homogeneous areas.

A summary table of all ACM identified as part of the surveys conducted in the building including a determination of quantity based on findings of the three entities (AMEC, LFUCG and TriEco) is included below as Table 1.

Table 1: Summary of Asbestos-Containing Materials

Location	Material Location	Material Description	Qty	Condition	Friable? (Y/N)	Notes
Rotunda	Rotunda Penthouse	Cooling Tower Panels (Elevator Panels)	520 SF	Minor Damage	N	
Rotunda	Rotunda Penthouse	Pipe Insulation	10 LF	damaged	Y	
Rotunda	Rotunda Penthouse	Pipe Fitting	6	damaged	Y	
Rotunda	Rotunda Penthouse	Gasket (vibration dampening cloth)	20 SF	Minor Damage	N	Three seen, two at floor level and one on top of elevator control room.
Penthouse	Penthouse Attic	Window Glazing	140 SF	Damaged	Y	Not identified in initial inspection - Older windows. Unable to safely sample - 3 windows.
Penthouse	Exterior Penthouse Room 2	Window Caulking	50 LF	Damaged	N	3 windows.
4th Floor	4th floor	Black Mastic on Floor	3885 SF	good	N	
4th Floor	4th floor	Mastic adhered to existing floor tile	197 SF	good	N	
4th Floor	4th floor	Floor Mastic Under Carpet	4265 SF	good	N	
4th Floor	4th Floor Pipe Chase	Pipe Fitting	15	Minor damage	Y	
4th Floor	4th Floor Pipe Chase	Pipe Wrap (Asbestos in Tar Coating)	50 LF	Minor damage	N	
4th Floor	4th Floor Stairwell	Stair Tread Material/Mastic	220SF	good	N	
3rd Floor	Throughout	Pipe Fitting (some with tar Coating)	91	minor damage	Y	

Location	Material Location	Material Description	Qty	Condition	Friable? (Y/N)	Notes
3rd Floor	3rd Floor	Black Mastic on Floor	956 SF	good	N	
3rd Floor	3rd Floor	Mastic adhered to existing floor tile	396 SF	good	N	
3rd Floor	3rd Floor	Floor Mastic Under Carpet	6729 SF	good	N	
2nd Floor	2nd Floor	Mastic adhered to existing floor tile	7366 SF	good	N	
2nd Floor	2nd Floor	Floor Mastic Under Carpet	649 SF	good	N	
2nd Floor	2nd Floor	Pipe Fitting	120	minor damage	Y	
1st Floor	1st Floor	Mastic adhered to existing floor tile	2536 SF	good	N	
1st Floor	1st Floor	Floor Mastic Under Carpet	5606 SF	good	N	
1st Floor	1st Floor, Pharmacy & Public Safety	Safe Doors	300 SF	good	N	
1st Floor	1st Floor	Pipe Fitting	104	minor damage	Y	
1-4th Floors	Various Rooms	Fire Doors	10	good	N	assumed doors to stairways and other pertinent areas are fire doors - quantity is estimated
Basement	Basement Crawlspaces	Pipe Fitting	90	damaged	Y	
Basement	Basement Crawlspaces	Impacted Soil and debris	4500 SF	damaged	Y	
Basement	Basement Boiler Room	Boiler	1	damaged	Y	Sealer, 55 SF Rope Gasket, 24 LF
Basement	Boiler Basement Room 5	Square Duct Insulation	180 SF	good	Y	Boiler Duct
Elevator	Elevator	brake shoes elevator	2	unknown	Y	

Results of Lead-Based Paint Survey:

In December 2013, TriEco, LLC used the initial lead based paint survey to conduct a LBP quantity survey and performed some additional sampling for lead-based paint. A total of seven paint chip samples were collected to supplement the original inspection conducted by LFUCG.

Based on the previous survey results, LBP has been identified in the building. A summary table of all LBP identified as part of the surveys conducted in the building including a determination of quantity based on findings of the three entities (AMEC, LFUCG and TriEco) is included below as Table 2. In the penthouse AMEC observed pigeon guano up to three inches thick and in many places the guano is mixed with peeling LBP. The area affected is approximately is 50 feet x 70 feet, plus balconies and equipment. AMEC estimates approximately 6,000 square feet with a mixture of guano and flaked LBP.

Table 2: Summary of Lead Based Paint

Location	Description	Quantity	Unit	Notes
Penthouse/Rotunda	Walls	6000	SF	Includes ornate plaster
	Ceilings	1200	SF	Includes dome area
	Floors	900	SF	Concrete floor
4th Floor	Walls	0		
	Ceilings	0		
	Floors	0		
3rd Floor	Walls	2364	SF	Room 49 - Wall A/ Room 46 - Wall A, C, D/ Room 45 - Wall C, D/ Room 44 - Wall A, D
	Ceilings	0		
	Floors	0		
	Window Sash	1		Room 49 - Wall A - Right
2nd Floor	Walls	1388	SF	Room 61 - Arches & Short Walls/ Room 70 - Wall A/ Room 69 - Walls A, B, C, D
	Ceilings	8200	SF	Throughout
	Floors	0		
	Window Well	2		Room 65 - Wall C - Left, Right/
	Window Sill	5		Room 67 - Wall D - Left, Room 68 - Wall A - Left, Right, Center and Wall D - Right
1st Floor	Walls	7164	SF	Room 75 - Walls C,B/ Room 76 - Walls B, C/ Room 77 - All Walls/ Room 78 - Walls A, B, C/ Room 79 - Walls A, B, C, D/ Room 80 - Walls B, C, D/ Room 82 - Walls A, B, C, D/ Room 87 - Walls C, D/ Room 97 - Walls B, C, D/ Room 98 - Walls C, D/ Room 100 - Wall D
	Ceilings	4136	SF	Rooms 76, 80, 81, 82, 87, 88, 90, 93, 94, 95, 96, 97
	Floors	0		
	Window Sill	5		Room 82 - Wall B - Left, Right and Wall C - Center/ Room 93 - Wall D - Left/ Room 97 - Wall D - Left
	Window Well	1		Room 88 - Wall C - Left

Location	Description	Quantity	Unit	Notes
	Window Jamb	1		Room 88 - Wall C - Left
Basement	Walls	5760	SF	All walls
	Ceilings	2677	SF	All ceilings
	Floors	2677	SF	All floors
Stairways	Walls	1200	SF	Basement access only

The Department of Housing and Urban Development *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* (June 1995), and the EPA *Requirements for Lead-Based Paint Activities in Target and Child-Occupied Facilities* (40 CFR Part 745) provide regulatory and industry guidelines for conducting lead-based paint sampling. Both HUD and EPA have set a threshold of 5,000 parts per million (ppm), or 0.5% by weight, for defining LBP. Additionally, the Consumer Product Safety Commission (CPSC) defines lead-free paint as containing no greater than 0.06% lead by weight. OSHA has no "lower threshold" for exposure of lead, and therefore any remediation contractor should be informed of the results of the survey so the applicable requirements and regulations are followed.

Results of Lead Dust Survey:

Using the results of lead dust wipe sampling previously conducted by LFUCG, AMEC collected 20 additional lead wipe samples in order to determine current conditions within the building. Regarding lead dust, the EPA and HUD standard for lead dust is 40 micrograms per square feet (ug/ft^2) on floors, 250 ug/ft^2 on interior window sills, and 400 ug/ft^2 for window troughs. **Table 3** below summarizes AMEC's dust wipe sample results.

Table 3: Summary of 2013 Survey Results – Lead Dust Wipe Samples

Location	Sample Name	Result (ug/ft^2)
Attic Stair Landing Floor	PBD-01	**7,100**
4th floor Room 22 Floor	PBD-02	**47**
4th floor N. Stairway floor	PBD-03	**360**
4th floor Room 8 floor	PBD-04	**310**
4th floor Lobby N. floor	PBD-05	**220**

Location	Sample Name	Result (ug/ft^2)
3rd floor Room 47 floor	PBD-06	35
3rd floor entry to N. stairway floor	PBD-07	21
3rd floor Room 35 floor	PBD-08	<10
3rd floor Room 45 floor	PBD-09	<10
2nd floor Room 62 floor	PBD-10	**150**
2nd floor Room 67 floor	PBD-11	24
2nd floor lobby floor	PBD-12	**68**
2nd floor stairway floor	PBD-13	**190**
1st floor entrance lobby floor	PBD-14	39
1st floor entrance lobby floor	PBD-15	**200**
1st floor Room 79 floor	PBD-16	17
1st floor entrance lobby floor	PBD-17	**61**
1st floor elevator lobby floor	PBD-18	**50**
Basement floor	PBD-19	**340**
Basement Mechanical Room floor	PBD-20	**920**

Based on the results of the lead dust survey, in addition to the areas impacted by lead based paint, the following table represents the additional areas of the building potentially impacted by lead dust which may require additional cleaning or removal. The drop ceiling has not been sampled, but in some areas is located beneath areas painted with loose and flaking LBP.

Table 4: Lead Dust Impacted Areas

Location	Description	Quantity	Unit	Notes
4th Floor	Floors	1274	SF	
3rd Floor	Floors	1357	SF	
2nd Floor	Floors	1428	SF	
1st Floor	Floors	2457	SF	
4th Floor	Drop Ceiling	9500	SF	Large amount of insulation and debris above
3rd Floor	Drop Ceiling	9500	SF	
2nd Floor	Drop Ceiling	9500	SF	
1st Floor	Drop Ceiling	8500	SF	

Other Survey/Inspection Results:

AMEC counted a total of approximately 455 fluorescent light fixtures in the building, each likely having at least one ballast. No labeled PCB containing light ballasts were observed. AMEC also conducted a visual screening survey of the buildings for the presence of suspected radioactive material containing smoke detectors or lighted exit signs. A total of 25 lighted exit signs were seen in the building along with emergency lighting.

Potential sources of mercury seen inside the buildings included the following:

- 4 foot Fluorescent light tubes – approximately 1,700 light tubes were seen in the building;
- All thermostats inspected were electric. No mercury containing thermostats were seen in the building.

A visual screening survey of equipment within the buildings was conducted to observe and document the presence, location, and condition of equipment which may contain CFC refrigerants such as R-11, R-12, and R-22. Examples of such equipment include refrigerators, air conditioning units, and walk-in coolers and freezers. AMEC visually inspected the equipment for external labels indicating CFC content and serial numbers. AMEC's scope did not include dismantling or opening any equipment. The following equipment was seen on the roof of the warehouse building:

- Approximately 11 window air conditioning units seen within the building

- 3 residential 2 ton air conditioning coil units in the penthouse.

AMEC noted approximately 320 total square feet of mold growth on the 1st, 2nd, 3rd, and 4th floors. Some areas have musty odors without visible mold growth.

2.0 IDENTIFICATION AND DEVELOPMENT OF REMEDIAL ALTERNATIVES

This section describes establishment of cleanup objectives and screening of remedial technologies.

2.1 Establishment of Remedial Objectives

ACM is subject to a variety of regulatory requirements summarized as follows:

- 40 Code of Federal Regulations (CFR) 61 – National Emissions Standards for Hazardous Air Pollutants (NESHAP) requires removal of ACM from buildings prior to renovation or demolition. This typically requires an intrusive investigation to identify ACM hidden in floors, wall, ceilings, etc.
- 40 CFR 763 - EPA Asbestos Hazard Emergency Response Act (AHERA) requires management of asbestos in schools and provides a standard of care for asbestos surveys. AHERA surveys are typically baseline surveys; they do not identify several types of NESHAP regulated materials (e.g. hidden or exterior ACM).
- 29 CFR 1910.1101 – Occupational Safety & Health Administration (OSHA) asbestos regulations require management of asbestos in buildings to protect workers. AHERA surveys meet the OSHA requirement to identify ACM in buildings.

LBP is subject to the following regulation, at a minimum:

- OSHA 1926.62, Safety & Health Regulations for Construction, Occupational Health & Environmental Controls, Lead

In accordance with the current consensus of federal agencies such as the EPA, OSHA, National Institute of Occupational Safety and Health (NIOSH), and Centers for Disease Control (CDC) and industry organizations such as the American Industrial Hygiene Association (AIHA), American Conference of Governmental Industrial Hygienists (ACGIH), and American College of Environmental Medicine (ACOEM), molds are present everywhere (ubiquitous) in the environment (indoors and outdoors) and the mere presence of mold spores detected on an air sample and/or tape sample is not necessarily indicative of a potential hazardous condition.

Currently, the consensus is that there are no known quantities of fungi or molds that would be considered acceptable or unacceptable for indoor environments with respect to health. This is due to the variability of human responses to molds and/or other biological agents and the lack of relevant scientific studies. Therefore, there are currently no permissible exposure limits or threshold limit values for exposures to molds. However, the identification of mold growth in indoor environments should be remediated because mold physically destroys the building materials it is growing on, mold growth is unsightly and may produce offensive odors, and may potentially sensitize and produce responses in allergic individuals.

2.2 Exposure Pathways

If friable and damaged, ACM, unless addressed and included in an Operations and Maintenance (O&M) Plan, can result in exposure to building occupants. Exposure to LBP or dust containing lead of workers during construction projects and during later occupancy of a commercial or industrial facility is governed by U.S. and Kentucky Occupational Health and Safety Administration regulations (e.g., 29 Code of Federal Regulations 1926.62). Exposure to mold can affect humans by three ways: allergic reactions, infections, and toxicity.

2.3 Screening of Cleanup Technologies

This section discusses screening of appropriate cleanup technologies for Site media.

2.3.1 General Response Actions

General response actions describe those actions that will satisfy the site remedial objectives. These include:

- No action;
- Engineering and/or institutional controls;
- Encapsulation;
- Abatement or otherwise removal of the medium; and
- Any combination of the above technologies, as appropriate.

Specific remedial technologies then were identified for these general response actions, as described in Section 2.3.2.

2.3.2 Identification of Potential Remedial Technologies

A comprehensive list of cleanup alternatives was assembled for the ABCA. Several remedial technologies or categories of technologies were identified and screened, and are listed below. A list of potential remedial technologies is described in **Table 1**. This table identifies each potential remedial technology, compares the technology against relevant screening criteria, and provides a brief description of each technology and its apparent advantages and disadvantages.

ACM:

No Action
Removal/Abatement
Encapsulation

LBP/Dust containing Lead/Guano Mixed with LBP:

No Action
Removal/Abatement
Encapsulation

Mold:

No Action
Cleaning/Vacuuming
Discarding of Affected Materials

2.3.3 Description of Initial Potential Remedial Technologies

2.3.3.1 No Action

Under the no action option, no remedial action or monitoring would be performed, nor would any engineering or institutional controls be implemented. This alternative is provided as a baseline for comparison to the remedial technologies considered.

2.3.3.2 Removal/Abatement

Removal/Abatement of ACM. This involves removal of ACM identified in the survey, except for certain roofing materials, using a licensed contractor. This precludes having to develop and implement an O&M Plan for friable materials.

Removal/Abatement of LBP/Dust containing Lead/Guano mixed with LBP*.* This alternative involves removal of components with LBP or dust containing lead and properly disposing of wastes. Removal of LBP + dust + guano is included in this category.

2.3.3.3 Encapsulation and Other Alternatives

For friable ACM and lead in paint, encapsulation is an alternative which would be designed to prevent exposure to or release of fibers, dust, or other materials containing these substances. For example, an encapsulating acrylic, water-based, low VOC primer and conditioner can be applied to fibrous and porous ACM. This functions as a penetrating and flexible encapsulant and primer to which a topcoat(s) can be applied. Other similar elastomeric acrylic coatings can also be used to encapuslate painted surfaces. Most encapsulants can be brushed, rolled, or sprayed on. If ACM is to left in place, i.e., not removed/abated, then an O&M Plan will be required to be developed and implemented. This Plan would detail training requirements for employees and contractors, notification requirements prior to ACM removal activities, administrative procedures covering work that may disturb ACM, maintenance of ACM including routine maintenance and cleaning and discussion of prohibited activities, requirements for removing or disturbing ACM, and requirements for ACM contractors/consultants.

2.3.3.4 Cleaning/Vacuuming

Vacuuming can include wet vacuuming to be used only when materials are still wet and should not be used to vacuum porous materials. A High-Efficiency Particulate Air (HEPA) vacuum can be used as part of final remediation after materials have been thoroughly dried and contaminated materials removed.

Cleaning involves removal of mold from non-porous surfaces by wiping or scrubbing with water or water + detergent. Surfaces must be thoroughly dried after cleaning to minimize further mold growth. Biocide (e.g., bleach) may be used but does not remove the mold

2.3.3.5 Discarding of Affected Materials

Porous materials that are wet and have mold growth may not be able to be cleaned, since the mold can be difficult to completely remove from empty spaces or crevices. In these cases, the materials may have to be discarded. The typical procedure is to double bag and seal the materials in polyethylene sheeting

2.3.4 Initial Screening Criteria for Potential Remedial Technologies

The initial screening of potential remedial technologies has been completed based upon six balancing factors, as described below. The six balancing factors are summarized below.

- *Effectiveness* - Considers the magnitude of risk from untreated contamination or treatment residuals, adequacy of institutional and engineering controls, extent to which beneficial uses are restored or protected, and time until remedial action objectives are achieved.
- *Long-term Reliability* - Evaluates the reliability of the treatment technology, the reliability of engineering and institutional controls necessary to manage risk, and uncertainties in long-term management (operation, maintenance, and monitoring).
- *Implementability & Implementability Risk* - Focuses on practical, technical, and legal difficulties and unknown factors associated with the remedy; the ability to monitor effectiveness; federal, state, and local requirements; and the availability of necessary services, materials, equipment, and specialists. Also looks at potential impacts on the community; potential impacts on workers and site operations; potential impacts on the environment; and the time required to complete the remedial action.
- *Reduction of Toxicity, Mobility, or Volume of Wastes* - Focuses on treatment process used and materials tested; the amount of hazardous materials destroyed or treated; the degree of expected reductions in toxicity, mobility, and volume; the degree to which treatment is irreversible; and the type and quantity of residuals remaining after treatment.
- *State and Community Acceptance* - Considers reuse and future planning.
- *Reasonableness of Cost* - Determines capital, operation and maintenance, and periodic review costs of the remedial action; and the degree to which costs are proportionate to benefits to human health and the environment.

Estimates of construction costs or other costs, if any in later sections, are order-of-magnitude estimates only and are only to be used for comparison of alternatives.

The potentially applicable remedial technologies are evaluated in greater detail in later sections to assist in determining which remedial technology or technologies may be most appropriate for the site. The remedial technologies included in the screening process are grouped into several general response actions, as described in Section 2.3.1, and the results of the screening are summarized in the following sections.

2.3.4.1 No Action

The No Action option has no inherent implementation risk, has no cost, and is easily implementable. However, the No Action option is not effective and does not offer long-term reliability, because it is not protective of human health and the environment. Furthermore, the cleanup goals for the site would not be met if this option were implemented. However, this alternative will be retained to serve as a baseline.

2.3.4.2 Removal

Removal/Abatement of ACM. For existing friable ACM, abatement provides the best solution for mitigating risks and avoiding later exposure should the site not be maintained properly. Cost will depend on the extent of friable ACM to be abated behind current walls, but this may not be an issue because of the extensive refurbishment that may be required to meet future use plans. ACM abatement, except for certain roofing materials, is retained.

Removal/Abatement of LBP/Dust containing Lead/Guano mixed with LBP. LBP, dust containing lead, and guano mixed with LBP removal is a highly labor intensive activity, and creates an increased risk of associated exposure to site personnel. This alternative is retained for removal of flaking paint, paint chips on floors, accumulated dust containing lead, and LBP mixed with guano.

2.3.4.3 Encapsulation and Other Alternatives associated with ACM and Paint

Encapsulation does not remove the need to maintain friable ACM, so such an approach would require an O&M Plan. To allow for a variety of potential redevelopment scenarios for the interior of the building, encapsulation is not considered viable for friable ACM. However, for LBP, this alternative is considered appropriate because exposure can be minimized through easily available encapsulation products.

2.3.4.4 Cleaning/Vacuuming for Mold

Based on the survey, extensive mold growth is not present in the building. It is not considered cost effective to clean the areas affected by mold. Therefore, this alternative is not retained.

2.3.4.5 Discarding of Affected Materials

This alternative is retained to account for the need to remove the small area of materials with mold growth that cannot not cost effectively be cleaned or vacuumed in place.

2.4 Retained Remedial Technologies

As described in Section 2.3, several potential remedial technologies appeared to meet the screening criteria and are retained for further evaluation. The retained potential technologies are discussed further in Section 3.0.

3.0 IDENTIFICATION OF CLEANUP ALTERNATIVES

Based upon the screening in Section 2, the following alternatives were identified, and will be discussed in detail in the subsequent sections:

Alternative No. 1 – No Action
Alternative No. 2 – Removal/Abatement (ACM; flaking & flaked paint; dust containing lead; guano mixed with LBP)
Alternative No. 3 – Encapsulation for Remainder of LBP
Alternative No. 4 – Cleaning/Vacuuming of Mold
Alternative No. 5 – Discarding of Affected Materials

Media (contaminant)	Retained Alternatives
ACM & Dust with Lead	1 – No Action; 2 – Removal/Abatement
LBP	1 – No Action; 2 – Removal/Abatement; 3 – Encapsulation
Mold	1 – No Action; 5 – Discarding

A broad conceptual design and summary of these remedial alternatives is provided to enable adequate evaluation and comparison. It is expected that a final detailed design of the selected remedial alternative will be completed prior to implementation. As part of the design process, necessary modifications to the conceptual design may be necessary. Also note that the cost estimates included in the evaluation are based upon a conceptual design and are provided only to enable comparison of alternatives.

3.1 Alternative 1: No Action

Alternative 1 would involve no remedial actions and serves as a baseline for comparing other alternatives. Facility activities would occur without any restrictions and without regard for existing contamination or conditions.

3.2 Alternative 2: Removal/Abatement

Alternative 2 involves abatement of ACM, dust containing lead, as well as flaking or flaked LBP or guano mixed with LBP as found in the surveys and inspections reviewed in Section 1.2.

It is assumed that ACM in the windows will be abated by removing the glazing and caulking. It is anticipated that if abatement of window glazing is by window removal and replacement, review and approval of a mitigation plan will be required by the Kentucky Historic Preservation Office. Abatement eliminates the risk from friable ACM. However, a basic O&M Plan will also be required for any ACM left in place.

Removal for dust containing lead could include HEPA vacuuming, sweeping floors, and/or wiping affected surfaces. For LBP, flaking paint and loose paint on the floor, dust containing lead, and guano mixed with LBP would be removed and disposed off-site as hazardous waste, if samples fail the Toxicity Characteristic Leaching Procedure for lead.

3.3 Alternative 3: Encapsulation

This alternative involves applying a coating(s) to LBP on walls to remain after removal of flaking and flaked paint. Coating types could include epoxy, acrylic, polyurethane, polyurea, oil-base, and latex. Important properties to consider when choosing a coating include elongation (i.e., elasticity or rigidity), dry film thickness, drying or curing time, and compatibility with existing surfaces. Epoxy-type coatings are widely used for LBP encapsulation. Epoxy coatings generally consist of a three part epoxy-polyamide coating applied in a primary layer, clad layer, and surface layer.

3.4 Alternative 5: Discarding of Affected Materials

For certain materials that cannot be cost effectively cleaned or where the mold cannot be completely removed (e.g., carpet and backing, porous flooring, furniture, wallboard, wood), they will need to be placed in sealed bags or sheeting and discarded as construction waste or other appropriate disposal (e.g., if also ACM, then disposal at a permitted landfill).

4.0 EVALUATION OF CLEANUP ALTERNATIVES

In this section, each retained cleanup alternative is described in greater detail. Each alternative was evaluated against: protectiveness, effectiveness, long-term reliability, implementability, implementation risk, and cost reasonableness. Capital and operation and maintenance costs are expressed in 2013 dollars. The cost estimates are not based on contractor bids, and are therefore order of magnitude estimates only.

4.1 Alternative 1: No Action

Protectiveness. The No Action alternative does not achieve the protectiveness requirements, and the corrective action objectives are not satisfied.

Effectiveness. The alternative is not effective at reducing or managing risk. The magnitude of residual risk is unacceptable.

Long-term Reliability. This alternative does not achieve long-term reliability.

Implementability. The No Action alternative is easy to implement.

Implementation Risk. No risk would be incurred during implementation of the No Action alternative.

Reasonableness of Cost. No costs would be incurred in implementing the No Action alternative.

4.2 Alternative 2: Removal/Abatement

Alternative 2 involves removal of ACM currently identified in the building, with the exception of roofing materials. Alternative 2 also involves removal of flaking and flaked LBP, dust containing lead, and guano mixed with LBP.

Protectiveness. This alternative satisfies the protectiveness criterion. Protectiveness is achieved by removal of friable, most of the non-friable ACM, LBP that is currently flaking on walls and paint chips on floors, dust containing lead, and guano mixed with LBP.

Effectiveness. This alternative is effective, since the risk of exposure to friable ACM will be mitigated and the risk of non-friable ACM becoming friable is also eliminated. The main hazards from LBP, which derives from flaking and flaked paint, dust containing lead, and guano are also eliminated.

Long-Term Reliability. Removal/abatement is a permanent fix for ACM and LBP, dust, and guano.

Implementability. Implementation of Alternative 2 would be moderately difficult. Proper containment and health & safety practices would have to be implemented during removal/abatement, and final air and other clearance samples collected before re-occupation of abated areas would be allowed.

Implementation Risk. The implementation risk associated with this alternative is considered low to moderate. Potential ACM behind walls would have to be removed. For cleaning up flaked and flaking paint, dust containing lead, and guano mixed with LBP, contractors will need to include appropriate health & safety considerations.

Reasonableness of Cost. A cost estimate for abatement of ACM is included in Table 5, which provides cost details which are for order of magnitude estimating purposes only and assume concurrent abatement of ACM, LBP, dust containing lead, and guano mixed with LBP.

4.3 Alternative 3: Encapsulation

Alternative 3 involves application of coating(s) to paint remaining on surfaces and known to contain lead.

Protectiveness. This alternative satisfies the protectiveness criterion. Protectiveness is achieved by minimizing exposure since the current paint will be beneath newly applied coatings.

Effectiveness. This alternative is effective, since existing coating technologies are available which have been used in similar applications. To increase effectiveness, it may be necessary during building refurbishment to remove small areas of paint where it is damaged or beginning to flake.

Long-Term Reliability. Several types of long-lasting, robust coatings have been developed which should minimize O&M.

Implementability. Implementation of Alternative 3 would be relatively easy. Coatings are readily available and application with rollers, brush, or other typical methods for applying paint can be used.

Implementation Risk. The implementation risk associated with this alternative is considered low. Coatings can be applied as part of building refurbishment.

Reasonableness of Cost. A cost estimate for LBP encapsulation, removal of flaking, flaked, and loose or heavily damaged LBP, mold abatement, and guano removal is provided in Table 5.

4.4 Alternative 5: Discarding of Affected Materials

Alternative 5 involves removal of mold-containing materials that cannot be cost effectively cleaned.

Protectiveness. This alternative satisfies the protectiveness criterion. Protectiveness is achieved by removing from the building certain materials with mold growth. However, this alternative assumes that other measures are taken during building refurbishment to eliminate water intrusion after clean-up to minimize later mold growth.

Effectiveness. This alternative is effective, since mold growth is stopped by removal of certain affected materials, as long as concomitant efforts are made to eliminate water intrusion or moisture issues during building refurbishment to minimize later growth on surfaces that remain.

Long-Term Reliability. Long-term reliability is good, if efforts to eliminate water intrusion and/or moisture issues are also undertaken as part of clean-up (but such efforts are not included in cost estimates for this ABCA).

Implementability. Implementation of Alternative 5 would be relatively easy. During building refurbishment if materials such as porous flooring, wallboard, wood, or carpet must be removed, it is assumed disposal can be as construction waste, unless the materials also contain asbestos, lead, or other hazardous substances. In some cases, testing may be required to determine proper disposal methods and locations.

Implementation Risk. The implementation risk associated with this alternative is considered low, as long as appropriate PPE is worn by mold remediation contractors and appropriate containment is employed to limit release of mold into the air and surroundings.

Reasonableness of Cost. The cost estimate for Alternative 5 is included in Table 5.

Table 5: Cost Estimates for Alternative 5

Fayette County Courthouse Cost Estimate / Assumes Scale Wages

Contaminant or Component	1st Floor	2nd Floor	3rd Floor	4th Floor	Basement	Rotunda	Crawlspaces to 3"	Contractor Markup (10%)	Total Cost Estimate by Contaminant or Component
Asbestos	$23,729	$15,852	$24,152	$16,581	$9,500	$4,883	$72,108	$16,681	$183,486
LBP/Final Clean Up	$16,751	$10,951	$5,655	$3,734	$15,323	$40,395	$0	$9,281	$102,090
MPE*/Lights	$22,305	$22,305	$22,305	$22,305	$28,305	$60,000	$0	$17,753	$195,278
Elevator Removal	$0	$0	$0	$0	$0	$8,500	$0	$850	$9,350
Scaffolding	$0	$0	$0	$0	$0	$40,500	$0	$4,050	$44,550
Drop Ceilings	$10,800	$10,800	$10,800	$15,800	$0	$0	$0	$4,820	$53,020
Guano	$0	$0	$0	$0	$0	$24,000	$0	$2,400	$26,400
Total Cost Estimate by Area	**$73,585**	**$59,908**	**$62,912**	**$58,420**	**$53,128**	**$178,278**	**$72,108**	**$55,834**	**$614,173**

* MPE = mechanical, plumbing, & electrical
For additional assumptions, see Section 5.0 of the ABCA

Additional Tasks	Cost Estimate
Mobilization	$3,000
Develop Specifications for Abatement	$14,000
Containment Teardown & Demobilization	$5,000
Reports	$15,000
O&M Plan	$5,000
Project Management, Clearance Testing, & Oversight	$45,000
TOTAL Additional Tasks:	**$87,000**

Total Cost Estimate: $614,173 + $87,000 + 10% contingency = $771,290

5.0 RECOMMENDED CLEANUP ALTERNATIVES

The selection of the recommended cleanup alternatives is based upon the evaluation and comparison of alternatives contained within preceding sections of this report.

Based upon the evaluation of the technologies, the recommended remedial alternatives are as follows:

Alternative No. 2 - Removal/Abatement (ACM; LBP that is flaking or is on floors; it should be assumed that all flaking and flaked paint contains lead; dust containing lead; and guano mixed with LBP).

Alternative No. 3 - Encapsulation for LBP that is not flaking or flaked or badly damaged.

Alternative No. 5 – Discarding of Certain Affected Materials with Mold

Media (contaminant)	Alternatives
Asbestos; dust containing lead; guano mixed with LBP	2 – Removal/Abatement
LBP	2 – Removal/Abatement; 3 - Encapsulation
Mold	5 – Discarding of Affected Materials

ACM identified in Table 1 will be abated, with the potential exception of safe and fire doors. These doors will either remain or be replaced.

Per 401 KAR 58:040 (Requirements for Asbestos Abatement Entities), disposal will occur at a landfill that has approval from the KDWM to accept asbestos-containing waste according to the provisions of Title 401, Chapter 47, and shall meet all other applicable local, state, and federal laws.

LBP that is not flaking, flaked, or heavily damaged will be encapsulated with a durable, compatible coating system. Prospective vendors will be contacted and their products researched to determine which is best for this application (e.g., Fiberlock Technologies, Inc. LBP encapsulants).

LBP identified in previous and current surveys that is flaking, flaked, or heavily damaged, dust containing lead, and LBP mixed with guano will be abated. Clean-up criteria for surfaces with dust containing lead will be determined after a detailed building renovation/restoration and future use plan has been developed.

The scope of work for cleanup of the building includes removal of other regulated materials such as fluorescent lamps, ballasts, mercury-containing devices, CFC-containing equipment, and PCB-containing equipment. Alternatives for such items were not considered.

The following list of assumptions is relevant to the cost estimates and proposed work:

1. Only walls and ceiling components with identified Lead Based Paint (LBP) will be encapsulated following removal of loose and peeling paint. All remaining surfaces that did not contain LBP as identified through testing, have been removed from the scope of work and are not included in the estimates provided.
2. Mold identified on surfaces, including walls and drop ceiling tiles, will be stabilized during the LBP management and ceiling tile removal.
3. Water intrusion to deter future mold growth will be managed by others. Assistance will be provided during the abatement, demolition, and stabilization process to identify potential water intrusion areas.
4. Removal of one (1) elevator will be necessary to remove the mechanical components from the 4th floor areas. The shaft will be left open following abatement, demolition, and stabilization efforts. A cost to re-install the elevator is not included in the estimates provided.
5. An allowance has been placed into the estimate to allow for a 400 amp electrical panel and temporary service provisions to each floor. Usage fees have been included in the estimates. Temporary provisions will remain upon completion for re-construction purposes.
6. Estimate has been determined based on wages from the U.S. Department of Labor.
7. Pricing assumes that a Structural Engineer has evaluated and confirmed that the mechanical room floor can support the required weight of scaffolding anticipated and

also that the dome and access areas can support the man/weight required for stabilization and removal of guano.

8. Light fixtures and ballasts are included in the cost of removal and disposal.
9. No testing, removal, or disposal of miscellaneous stored chemicals is included in the estimate provided.
10. Ceiling tile and grid are included as funded items due to potential LBP & mold and for access to LBP painted areas required for stabilization throughout the building.
11. Crawl space areas have been estimated based on limited visual inspection and provided drawings. It is anticipated that 3" of existing dirt floor surface inside the crawl space areas will be removed due to damaged ACM.
12. All floors will be cleaned in preparation of remodeling upon completion of demolition, abatement, and stabilization.
13. Depending on the renovation plan, pricing has been provided for complete abatement of all carpet glue.
14. No destructive sampling was performed during the inspection(s) process. Hidden or inaccessible materials may be encountered during the demolition / abatement process. These materials have not been accounted for by any allowance within this cost estimate.
15. Pricing does not include any ceramic tile, bathroom fixtures, or divider wall removal.

An O&M Plan will be required for remaining LBP or ACM. Other constraints/conditions include:

- Contractors associated with the renovation activities should be trained in 'lead safe work practices', follow all applicable OSHA regulations regarding renovation and LBP, including requirements for air sampling and respirator use (if applicable), and perform a Toxicity Characteristic Leaching Procedure (TCLP) analysis of a sample of the representative waste stream for lead prior to disposal to determine if the waste is considered hazardous as it relates to lead.

- All contractors and employees should be alerted to the presence and location of the identified LBP, dust containing lead, and LBP mixed with guano and associated hazards, in accordance with applicable OSHA regulations.

- Employees who work with LBP or dust containing lead should be provided with proper personal protective equipment, as well as the appropriate removal equipment, training and licensure as applicable.

- All LBP, materials mixed with LBP, or dust containing lead must be disposed of in accordance with the Federal, State and Local regulations.

- Removal of LBP or materials containing lead should be monitored to ensure that no lead dust is released into ambient air. Air monitoring must be performed in accordance with applicable regulations and potentially affected employees must be notified of any LBP work.

- If deemed necessary, a standardized specification for abatement should be established for the removal of ACM and LBP. It is recommend that a licensed ACM and LBP designer develop the specification to address important issues including an accurate scope of work, regulatory requirements, insurance requirements, notification procedures, air sampling requirements, and other pertinent information.

- If concealed LBP or ACM is observed during renovation activities, it will be necessary to investigate and collect samples in order to confirm the presence or absence of LBP or ACM.

For remediation of mold, professional judgment will be used to determine the methods, PPE, and containment needed. A more in-depth mold survey may also be required to develop a remediation plan. Cost estimates in this ABCA have not considered application of mold resistant, fungicidal, or other specialty coatings on surfaces affected by mold. Also, waterproofing of building materials or components has not been considered and is assumed to be part of other building refurbishment. Any materials discarded because of mold growth should be properly disposed based on whether ACM, LBP, and/or other hazardous substances are present.

During removal of hazardous materials such as fluorescent lamps, etc., the following precautions and steps should be taken:

- Ballasts and/or equipment manufactured subsequent to 1979 were required to be labeled as not containing PCBs. Therefore, ballasts and/or equipment observed labeled “No PCBs” are considered to not contain PCBs. If the “No PCBs” label is not observed, a ballast should be assumed to contain PCBs.
- Fluorescent lighting ballast for the building may also contain di (2-ethylhexyl) phthalate (DEHP), which was used a replacement for PCB until around 1991. DEHP containing ballasts should also be handled and disposed of in accordance with applicable regulations.
- In accordance with current Kentucky Division of Waste Management recommendations, AMEC recommends that during renovations if PCB containing or unlabeled ballasts are found, the equipment and ballasts be removed and disposed of by a qualified hazardous waste contractor and sent to an EPA and Kentucky approved recycling facility.
- Leaking or suspected leaking PCB-containing equipment and/or ballasts should be segregated from the other non-leaking items and immediately placed in sealed 6-mil thick plastic bags and/or lined 55-gallon metal drums for handling and disposal at an approved incinerator.
- Workers who handle hazardous materials should be trained in safe and proper hazardous materials handling procedures.
- All hazardous materials leaving the property should be transported to a licensed hazardous waste recycling/disposal facility under a properly executed Uniform Hazardous Waste Manifest or alternate.
- Low-mercury or “green end cap” lamps are not mercury free and must still be recycled or managed by an authorized facility in accordance with the Mercury-Added Consumer Products Law, which became effective July 12, 2005.
- Additional types of fluorescent lamps that may be discovered in the buildings during renovation activities that do not have the green painted end caps or green stamped writing, should be assumed to contain concentrations of mercury and other metals such as cadmium and lead higher than the regulatory limits and should be considered as an EPA Universal Waste.

- In accordance with current EPA regulations, fluorescent light tubes, including low-mercury or “green end cap” lamps, HID lamps, and mercury-containing thermostats and other sources should be removed, packaged, transported, and recycled (unbroken bulbs) or incinerated at an EPA and/or State approved facility by a qualified hazardous waste contractor in accordance with State Hazardous Waste Regulations or the Universal Waste Rule.
- If any radioactive sources are found during renovation, AMEC recommends the smoke detector units or exit signs with radioactive sources be removed, packaged, and returned to the manufacturer for recycling, reuse, or proper disposal.
- The EPA requires all CFC refrigerants be properly evacuated from equipment prior to dismantling and/or demolition. AMEC recommends that the equipment be inspected and, if necessary, the refrigerant be evacuated and recovered by technicians properly trained in accordance with the EPA approved program.
- Under the Clean Air Act, the EPA has regulated CFCs in EPA regulation 40 CFR 82, Subpart F. CFCs are regulated materials by the EPA and must be handled and recycled or disposed of in accordance with EPA Federal Regulations 40 CFR 82 by an EPA qualified, trained specialist.
- AMEC recommends that a certificate of recycling or disposal should be provided for removed CFCs.

Total estimated cost is approximately $771,290.

6.0 REFERENCES

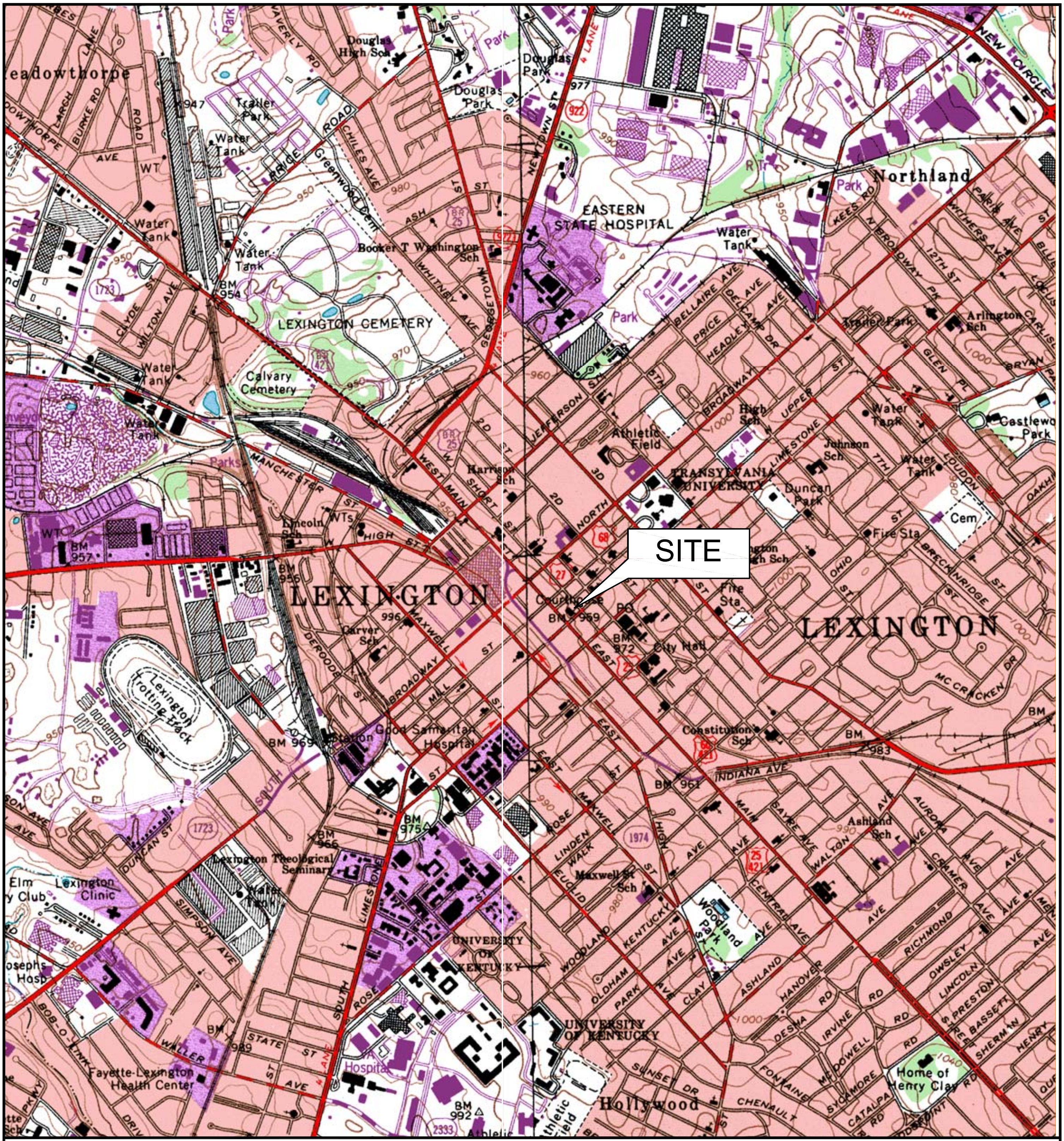
AMEC, 2012. *Phase I Environmental Site Assessment, Lexington History Museum, 215 W. Main St., Lexington, KY 40965*, October, 2012.

AMEC, 2013. *Limited Hazardous Building Material Survey, Historic Fayette County Courthouse, 215 West Main Street, Lexington, Kentucky*, September 2013.

FIGURES

Figure 1: Site Location Map

Figure 2: Site Aerial Photo



SOURCE: USGS 7.5' TOPOGRAPHIC QUADRANGLE MAP, LEXINGTON EAST1965. REVISED 1993.

0 1000 2000
SCALE IN FEET

amec
2456 Fortune Drive, Suite 100
Lexington, Kentucky 40509
Phone: (859) 255-3308

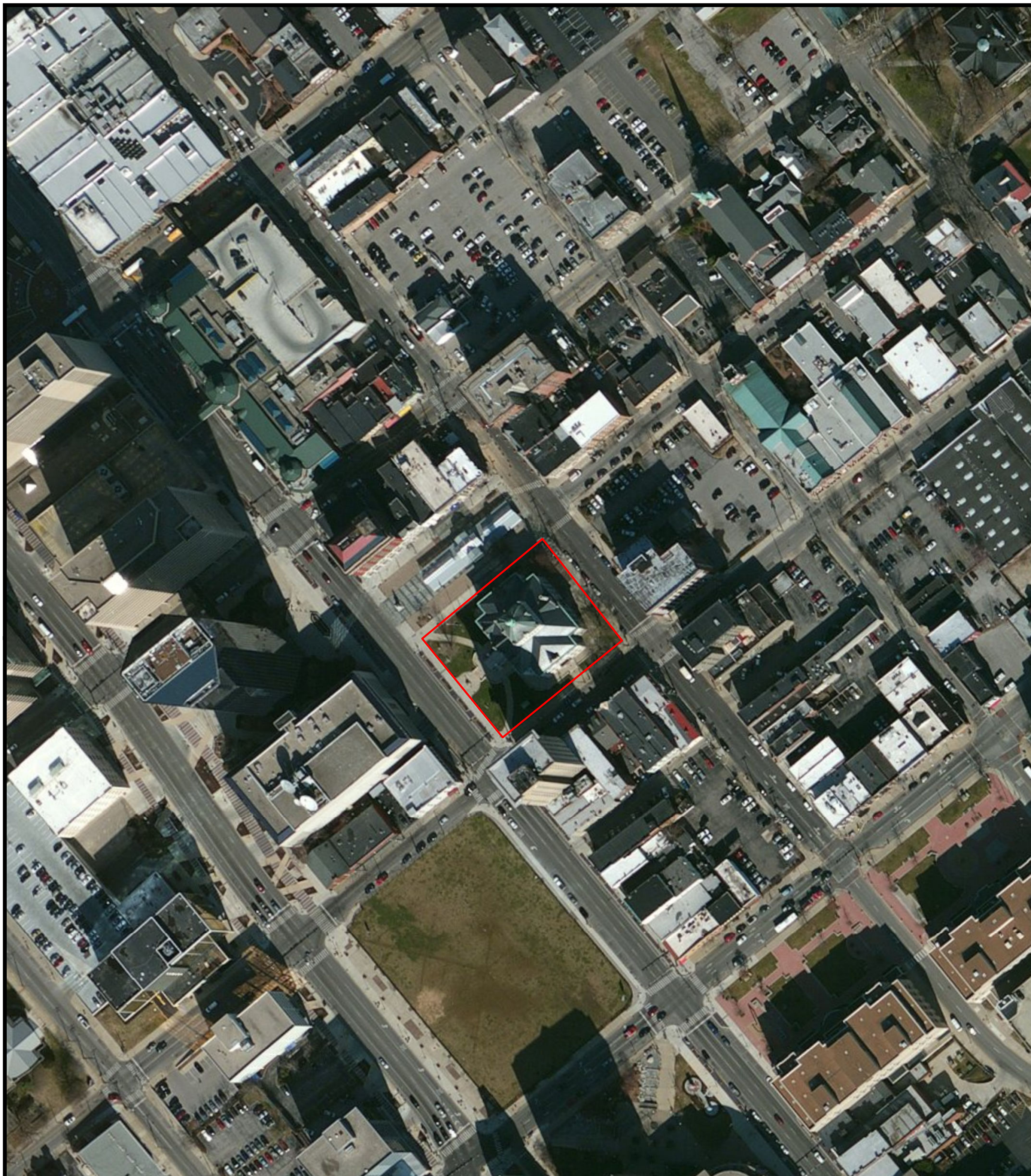
TOPOGRAPHIC MAP

215 WEST MAIN STREET
LEXINGTON KY, 40509

PROJECT NUMBER: 564420001

SCALE	1" = 2000'
DATE	10/26/2012
DRAWN BY	CSRP
APPROVED BY	RDM

FIG. 1



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

0 50 100 200
SCALE IN FEET

NORTH

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AERIAL PHOTOGRAPH
LFUCG BROWNFIELDS
215 W MAIN STREET
LEXINGTON, KENTUCKY

PROJECT NUMBER: 564420001

SCALE	1" = 200'
DATE	1/8/2014
DRAWN BY	TMR
APPROVED BY	RDM

FIG. 2