



## Seagull Environmental Technologies, Inc.

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January 17, 2016

Ms. Christine O'Keefe  
Environmental Specialist  
Missouri Department of Natural Resources  
Brownfields/Voluntary Cleanup Program  
Jefferson City, Missouri 65102

**Subject: Analysis of Brownfields Cleanup Alternatives  
Mayview School Site, Mayview, Missouri  
Missouri Environmental Assessment Services Contract, Contract No. C312021002  
Vendor No. 48120656000**

Dear Ms. O'Keefe:

Seagull Environmental Technologies, Inc. (Seagull) is submitting the attached Analysis of Brownfields Cleanup Alternatives (ABCA) report for the Mayview School site in Mayview, Missouri. If you have any questions or comments, please contact the project manager at (913) 213-7718.

Sincerely,

Cosmo Canacari  
Project Manager

Enclosures

**ANALYSIS OF BROWNFIELDS CLEANUP ALTERNATIVES**

**MAYVIEW SCHOOL SITE, MAYVIEW, MISSOURI**

Missouri Environmental Assessment Services Contract

Contract No. C312021002

Vendor No. 48120656000

Prepared For:

Missouri Department of Natural Resources – Brownfields/Voluntary Cleanup Section

P.O. Box 176

Jefferson City, Missouri 65102

January 17, 2016

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## **1.0 INTRODUCTION**

Seagull Environmental Technologies, Inc. (Seagull) was tasked by the Missouri Department of Natural Resources (MDNR), under the Missouri Environmental Assessment Services contract, to complete an Analysis of Brownfields Cleanup Alternatives (ABCA) report for the Mayview School site in Mayview, Missouri. This ABCA examines alternatives for cleanup of asbestos-containing materials (ACM), lead-based paint (LBP), and items potentially containing hazardous materials, including preliminary cost estimates.

## **2.0 SITE LOCATION AND DESCRIPTION**

The site encompasses approximately 1.63 acres and is currently comprised of two vacant buildings in Mayview, Lafayette County, Missouri. According to the Lafayette County Assessor's website, the physical address for the property is Long Road. Coordinates for the approximate center of the Mayview School site are 39.0548200 degrees north latitude and 93.8374700 degrees west longitude (see Appendix A, Figures 1 and 2). The subject property is bordered north by cropland, east by Forest Avenue, south by Long Road, and west by the former Mayview School baseball field.

The site contains two vacant buildings. The original Mayview School building was built in 1918. Two additions (both attached to the original school building) were constructed in 1948 and 1966. The Mayview School building and the additions (considered all one building) are referred to in this report as the "school building." The other building, north of the school building, was constructed in 1948 and contained the school's woodshop (referred to in this report as the "woodshop"). A third building, a small portable building (referred to in this report as the "outside bathroom"), was previously at the site. However, at the time this ABCA report was completed, the outside bathroom building had been removed from the site. The school building is primarily constructed of brick and block with some wood-framed interior portions and an asphalt roof. The woodshop is a wood-framed structure with an asphalt roof, sitting on a concrete slab. Historical information obtained for the subject property indicates that the buildings were used by the school from 1918 through 1996. The subject property is surrounded by cropland, pastures, vacant lots, and residences.

## **3.0 POTENTIAL CLEANUP ALTERNATIVES**

The overall goal of any Brownfields cleanup action is to address environmental conditions preventing or impeding the preferred type of site redevelopment, and to do so in a manner protective of human health

and the environment. The preferred future plan for the site buildings is to renovate them for community and/or commercial uses. However, demolition is a possibility based on their structural conditions (particularly for the 1918 school building).

Brownfields cleanup alternatives were evaluated for the site to address specific environmental concerns identified in Phase I and Phase II Environmental Site Assessment (ESA) reports for the site (Seagull 2015a and 2015b). The purpose of the ABCA is to present viable cleanup alternatives based on site-specific conditions, technical feasibility, and preliminary cost evaluations.

The Phase I and II ESAs identified ACM, LBP, and items potentially containing hazardous materials associated with the school building and woodshop. Items potentially containing hazardous materials consisted of: fluorescent light bulbs and thermostats (potentially containing metals, including mercury), electrical ballasts (potentially containing polychlorinated biphenyls [PCB]), exit signs (potentially containing low-level radiation sources and metals), and items likely containing oxygen depleting substances (ODS) (water fountains, etc.).

The following sections describe Brownfields cleanup alternatives for addressing the ACM, LBP, and items potentially containing hazardous materials at the site, including a “No Action” alternative. Following the description, each alternative is evaluated in terms of its effectiveness, implementability, and cost.

The effectiveness of an alternative refers to its ability to meet the objectives of the Brownfields cleanup. Specific criteria used to assess the effectiveness of an alternative include the following:

- Overall protection of public health and the environment;
- Compliance with applicable or relevant and appropriate requirements (ARAR) and other criteria, advisories, and guidance;
- Long-term effectiveness (includes resilience to impacts associated with natural disasters, climate change, etc.); specific effects of climate change evaluated for the site were for increased/decreased temperatures and precipitation, as well as extreme weather events (e.g., storms of unusual intensity, increased frequency and intensity of localized flooding events);
- Reduction of toxicity, mobility, or volume through treatment/removal;
- Short-term effectiveness.

The implementability criteria address the technical and administrative feasibility of implementing an alternative, and the availability of various services and materials required during its implementation. Specific criteria used to assess implementability of an alternative include:

- Technical feasibility;
- Administrative feasibility;
- Availability of services and materials;
- State acceptance;
- Community acceptance.

Each alternative is evaluated to determine its estimated cost. The evaluations compare each alternative's direct capital costs, which include equipment, services, and contingency allowances. The purpose of evaluating each alternative is to determine its advantages and disadvantages relative to the other alternatives in order to identify key tradeoffs that would affect selection of the preferred alternative.

### **3.1 EVALUATED CONTAMINATION**

Contaminants and other hazardous materials evaluated as part of this ABCA include ACM, LBP, and items potentially containing hazardous materials. The sections below discuss contaminants/materials identified in the Phase I and II ESA reports. Site photographs included as Appendix B show building materials determined to contain asbestos and LBP.

#### **3.1.1 Asbestos-Containing Materials**

During the Phase II ESA, 96 samples of building materials suspected to contain asbestos were collected for laboratory analysis. Eleven materials associated with the school building and woodshop were determined to contain asbestos. Specifically, ten materials were associated with the school building and one was associated with the woodshop. Those materials included asphalt roofing; roof flashing; roof tar; various-sized vinyl floor tile and associated mastic; window glaze; carpet mastic; chalkboard mastic; and drywall joint compound. In those materials, asbestos (chrysotile) was detected at concentrations that ranged from 2 to 15 percent (%). The U.S. Environmental Protection Agency (EPA) defines ACM as any material containing asbestos at a concentration above 1%. Of note, Seagull conducted a site visit on January 11, 2016, to confirm quantities of ACM. Based on that site visit, some of the quantities of ACM were revised from totals previously listed in the Phase II ESA.

It should be noted that asbestos was detected in drywall joint compound at 2%; however, no asbestos was detected in the drywall. Missouri regulations allow for compositing drywall systems for inspection/characterization purposes. Prior to conducting abatement of the joint compound, re-sampling of the drywall system (a composite sample of both drywall and joint compound) is recommended to

determine if the drywall system is ACM (greater than 1% asbestos), thus requiring abatement. For the purposes of this ABCA, costs to abate the joint compound are included. Table 1 summarizes the ACM identified in the Phase II ESA.

**TABLE 1**  
**ASBESTOS-CONTAINING MATERIALS**  
**MAYVIEW SCHOOL SITE, MAYVIEW, MISSOURI**

<b>Material</b>	<b>Location</b>	<b>Estimated Quantity</b>	<b>Asbestos Result (%)</b>
Roof Flashing	Chimney of Former School Woodshop	2 ft <sup>2</sup>	15% Chrysotile
Roof Flashing	Along Roof Perimeter and at Penetrations of 1966 Addition	964 ft <sup>2</sup>	15% Chrysotile
Multi-colored 9"x 9" Vinyl Tile/Mastic	Kitchen, Staff Lounge, Cafeteria, and Throughout 1966 Addition	5,000 ft <sup>2</sup>	Tile – Up to 5% Chrysotile Mastic – Up to 5% Chrysotile
Window Glaze	Windows of Room at Northeast Corner of the 1966 Addition	672 LF - 12 Windows (7'x4' Each)	2% Chrysotile
Asphalt Roofing Roof Flashing Roof Tar	On Roof of 1948 Addition	10,800 ft <sup>2</sup>	Up to 15% Chrysotile
Cream 12"x 12"; Tan 9"x 9"; Black 2"x 6'; Red 1"x 2' Vinyl Tile/Mastic Vinyl Tile/Mastic	Throughout Gymnasium, Bathrooms, Classrooms, and Hallways in 1948 Addition	8,700 ft <sup>2</sup>	Tile – No Asbestos Present Mastic – Up to 8% Chrysotile
Roof Flashing	Along Roof Perimeter and at Penetrations of 1918 Building	270 ft <sup>2</sup>	15% Chrysotile
Carpet Mastic	Home Economics Room in South-Central Portion of 1918 Building	580 ft <sup>2</sup>	4% Chrysotile
Dark and Light Green 9"x 9" Vinyl Tile/Mastic	Old Cafeteria in the 1918 Building	630 ft <sup>2</sup>	Tile – Up to 8% Chrysotile Mastic – Up to 3% Chrysotile
Chalkboard Mastic	Old Cafeteria in the 1918 Building	10 ft <sup>2</sup>	3% Chrysotile
Joint Compound	In Office Rooms on Second Floor of the 1918 Building	1,237 ft <sup>2</sup>	2% Chrysotile

Notes:

- ' Feet
- " Inches
- % Percent
- ft<sup>2</sup> Square feet
- LF Linear feet



### 3.1.2 Lead-Based Paint

The LBP inspection was completed with an x-ray fluorescence spectrometer (XRF). Paint-covered surfaces indicated by the XRF to contain lead at a concentration equal to or greater than (>) 1 milligram per square centimeter (mg/cm<sup>2</sup>) were considered LBP. LBP was identified on structural components inside the 1918 building and 1966 addition. Those components were wooden doors and frames, a garage door and metal header, and concrete stair riser. Specifically, the wooden doors and frames (white color) were in rooms of the 1918 building, the concrete stair riser (brown color) was on the east wall of the gymnasium stage entry, and the garage door and metal header (white) were at the garage entrance on the north side of the 1966 addition. XRF readings from those areas ranged from 1.12 to greater than 5.00 mg/cm<sup>2</sup>. The quantity of LBP was estimated to cover approximately 138 square feet (ft<sup>2</sup>) on the metal garage door header and garage door, 16 ft<sup>2</sup> on the stair riser, and 264 ft<sup>2</sup> (totaling 418 ft<sup>2</sup>) on the doors and door frames. The identified LBP was found to be in good (intact) to poor (chipped and flaking) condition.

**TABLE 2**  
**MATERIALS CONTAINING LEAD-BASED PAINT**  
**MAYVIEW SCHOOL SITE, MAYVIEW, MISSOURI**

Location	Substrate	Paint Color	Estimated Quantity (ft <sup>2</sup> )
<b>1966 Addition</b>			
Garage Door	Wood	White	128
Garage Door Header	Metal	White	10
Step Riser - Stage Entry East Wall	Concrete	Brown	16
<b>1918 Building</b>			
Door- Original Cafeteria - Room G2	Wood	White	42
Door Frame - Original Cafeteria - Room G2	Wood	White	24
Door - Science Room - Room G1	Wood	White	42
Door Frame - Science Room - Room G1	Wood	White	24
Door - Mechanical Room - Room MEG	Wood	White	42
Door Frame - Mechanical Room - Room MEG	Wood	White	24
Door - Home Economics Room - Room G3	Wood	White	42
Door Frame - Home Economics Room - Room G3	Wood	White	24

Notes:

ft<sup>2</sup>      Square feet

### 3.1.3 Items Potentially Containing Hazardous Materials

A survey was completed during the Phase I ESA to quantify items/materials potentially containing hazardous materials inside the site buildings. Table 3 below summarizes the items identified inside the site buildings.

**TABLE 3**  
**ITEMS POTENTIALLY CONTAINING HAZARDOUS MATERIALS**  
**MAYVIEW SCHOOL SITE, MAYVIEW, MISSOURI**

<b>Material</b>	<b>Location</b>	<b>Quantity</b>
Fluorescent Bulbs	School Building	408
Electrical Ballasts	School Building	204
Mercury-containing Thermostats	School Building	5
Exit Signs	School Building	7
Water Fountains	School Building	2

### 3.2 EVALUATION OF CLEANUP ALTERNATIVES

Evaluation of cleanup alternatives includes two options for ACM, four options for LBP, and two options for items potentially containing hazardous materials. Evaluations for ACM, LBP, and items potentially containing hazardous materials have been developed with specific consideration to the Missouri Department of Natural Resources (MDNR) Brownfields/Voluntary Cleanup Program (BVCP) procedural requirements and Missouri Risk-Based Corrective Action (MRBCA) technical guidance. This consideration was made because cleanup projects implemented with EPA Brownfields Cleanup funding generally require participation in a state voluntary cleanup program (or equivalent). For reference, fees associated with enrollment into the MDNR BVCP include a \$200 application fee and refundable oversight deposit of \$5,000.

#### 3.2.1 Asbestos-Containing Materials

For ACM, two options were evaluated: (1) no action, and (2) proper abatement.

##### **Alternative 1: No Action**

Alternative 1 (no action) would consist of leaving ACM in place at the site.

### Effectiveness

This alternative would not be effective regarding renovation and/or demolition of the site buildings that contain ACM. In accordance with National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations, demolition or rehabilitation/renovation of the site buildings cannot precede proper abatement; therefore, renovation or demolition could not occur if this alternative would be selected. This alternative would also be ineffective in achieving the goal of reducing health risks.

### Implementation

Implementation of this alternative is straightforward—the ACM would be left in place. Renovation or demolition of the site buildings could not be conducted prior to abatement.

### Cost

This alternative would not involve any direct costs.

## **Alternative 2: Abatement of Asbestos-Containing Material**

Alternative 2 would involve proper abatement of the ACM associated with the site buildings. Abatement would be conducted in accordance with applicable local, state, and federal regulations by a registered asbestos abatement contractor. Regulatory clearance would be obtained through successful implementation of a Remedial Action Plan (RAP) and a post-abatement inspection. Because the ACM is non-friable, the collection of clearance air samples is not required.

Two abatement options could be considered, full abatement and selective abatement. Full abatement would involve removal of all ACM at the site. Selective abatement would consist of abatement of ACM in poor condition or in areas planned to be disturbed by renovation or demolition. Other ACM (such as roofing materials) would remain in place if disturbance is not planned.

### Effectiveness

If all of the identified ACM was removed, then Alternative 2 would be most effective in removing the risk to human health posed by the ACM. In addition, full abatement would allow for renovation or demolition without restrictions concerning disturbance of ACM.

If selective abatement were to occur, then restrictions (institutional controls) would apply concerning future disturbance of that ACM. For sites enrolled in the BVCP, MDNR requires an Operations and Maintenance (O&M) Plan to document existence, location, and future maintenance procedures regarding ACM left in place. In addition, the O&M Plan must be filed on the property's chain of title as an institutional control.

## Implementation

Abatement would be conducted in accordance with applicable local, state, and federal regulations by a registered asbestos abatement contractor.

## Cost

Estimated abatement costs were gathered from local vendors. The costs below are for full abatement of the ACM. It should be noted that if selective abatement were to occur, the site would be required to be entered into the MDNR Long-Term Stewardship Program, which includes a \$15,000 fee for long-term MDNR oversight. Abatement costs per square foot (ft<sup>2</sup>) and per window unit are provided and include removal and disposal costs. Total abatement cost for all of the ACM is estimated at \$120,966. Additional costs to be considered, particularly if the site would be enrolled in the MDNR BVCP, would include preparation of technical reports (Remedial Action Plan [RAP]—\$3,500, and Final Cleanup Report—\$3,500). No restoration or replacement costs have been accounted for. Table 4 below summarizes abatement costs for ACM identified at the site.

**TABLE 4**  
**ACM ABATEMENT COSTS**  
**MAYVIEW SCHOOL SITE, MAYVIEW, MISSOURI**

<b>Material</b>	<b>Location</b>	<b>Estimated Quantity</b>	<b>Cost/Unit</b>	<b>Total Cost</b>
Roof Flashing	Chimney of Former School Woodshop	2 ft <sup>2</sup>	\$4/ft <sup>2</sup>	\$8
Roof Flashing	Along Roof Perimeter and at Penetrations of 1966 Addition	964 ft <sup>2</sup>	\$4/ft <sup>2</sup>	\$3,856
9"x 9" Vinyl Tile and Mastic	Kitchen, Staff Lounge, Cafeteria, and Throughout 1966 Addition	5,000 ft <sup>2</sup>	\$4/ft <sup>2</sup>	\$20,000
Window Glaze	Windows of Room at Northeast Corner of the 1966 Addition	672 LF - 12 Windows (7'x4' Each)	\$350/window	\$4,200
Asphalt Roofing Roof Flashing Roof Tar	On Roof of 1948 Addition	10,800 ft <sup>2</sup>	\$5/ft <sup>2</sup>	\$54,000
Vinyl Tile Mastic (tile is located on top of mastic)	Throughout Gymnasium, Bathrooms, Classrooms, and Hallways in 1948 Addition	8,700 ft <sup>2</sup>	\$3/ft <sup>2</sup>	\$26,100
Roof Flashing	Along Roof Perimeter and at Penetrations of 1918 Building	270 ft <sup>2</sup>	\$4/ft <sup>2</sup>	\$1,080
Carpet Mastic (carpet is on top of mastic)	Home Economics Room in South-Central Portion of 1918 Building	580 ft <sup>2</sup>	\$3/ft <sup>2</sup>	\$1,740
9"x 9" Vinyl Tile and Mastic	Old Cafeteria in the 1918 Building	630 ft <sup>2</sup>	\$4/ft <sup>2</sup>	\$2,520

Material	Location	Estimated Quantity	Cost/Unit	Total Cost
Chalkboard Mastic	Old Cafeteria in the 1918 Building	10 ft <sup>2</sup>	\$4/ft <sup>2</sup>	\$40
Joint Compound	In Office Rooms on Second Floor of the 1918 Building	1,237 ft <sup>2</sup>	\$6/ft <sup>2</sup>	\$7,422
<b>Total ACM Abatement Cost</b>				<b>\$120,966</b>

Notes:

' Foot  
 " Inch  
 ACM Asbestos-containing material  
 ft<sup>2</sup> Square feet

### 3.2.2 Lead-Based Paint

Four cleanup alternatives were evaluated to address LBP found on components associated with the school building. These options include: (1) no action, (2) removal by stripping, (3) removal by demolition, and (4) stabilization and encapsulation. Each approach (excluding no action) is capable of achieving clearance or restricted clearance criteria under the MDNR BVCP.

#### **Alternative 1: No Action**

Alternative 1 (no action) would consist of leaving LBP in place at the site.

##### Effectiveness

This alternative would not be effective regarding renovation of the site. The areas containing LBP would be restricted to ensure those materials were not disturbed. This alternative would be ineffective in achieving the goal of reduction of health risks.

##### Implementation

Implementation of this alternative is straightforward — the LBP is left in place. Renovation would have to consider the location and condition of the LBP and ensure those materials were not disturbed.

##### Cost

This alternative would not involve any direct costs.

#### **Alternative 2: Lead-Based Paint Removal by Chemical Stripping**

Alternative 2 includes removal of LBP using wet stripping and/or chemical stripping techniques. This is the most direct approach, because LBP is removed, and controls are not required to manage LBP left in

place. LBP would be removed and disposed of off site as special or hazardous waste. Disposal characterization testing would be required prior to disposal. In addition, successful completion would require the collection of dust-wipe samples in accordance with MDNR clearance regulations.

For this site, chemical stripping is a viable option for the structural components (step risers on stairs and metal garage door header).

#### Effectiveness

The LBP is permanently removed. This alternative would allow for redevelopment of the site without restrictions concerning disturbance and management of LBP.

#### Implementation

Abatement would be conducted in accordance with applicable state and federal regulations by registered LBP contractors. Approximately 26 ft<sup>2</sup> of LBP is located on the metal garage door header and concrete step risers, both associated with the school building. The complete removal of all LBP can be difficult, dependent on substrate conditions. In addition, this technique can generate a hazardous waste stream and requires careful consideration and precautions concerning worker health and safety.

#### Cost

Estimated stripping costs were gathered from local vendors. The costs are only for stripping the step risers and garage door header. The cost per ft<sup>2</sup> includes removal and disposal costs. The estimated removal cost using wet and/or chemical stripping is \$25 per ft<sup>2</sup>. Based on that estimated cost, removal of LBP (26 ft<sup>2</sup>) would be \$650. Additional costs to be considered include technical plans/reports (RAP and Final Cleanup Report) and the collection of clearance samples. Estimated costs for technical plans/reports are \$3,500 for the RAP and \$3,500 for the Final Cleanup Report (cost of RAP and Final Report includes consideration of all environmental issues to be addressed by cleanup activities). Cost for clearance sampling is estimated at \$1,000.

#### **Alternative 3: Lead-Based Paint Removal by Demolition**

Alternative 3 includes stabilization of LBP in poor condition (chipping, flaking, etc.) and removal (by demolition) for proper disposal. In accordance with state regulations, the condition of LBP-containing surfaces should be inspected, and loose (chipped, flaking, etc.) LBP is required to be removed. The removed LBP residue should be segregated for proper disposal. All surfaces/components that contain LBP determined to be in good condition can be removed/demolished and disposed of as demolition waste.

Removal/demolition techniques are required to be conducted in a manner that does not chip, shred, mulch, or mill the LBP.

Based on discussed future use of the site, which includes renovation, this alternative is likely the most appropriate and economically feasible for the majority of LBP-containing components. For this alternative, materials containing LBP would be removed and disposed of off site as special (demolition) waste. This alternative is a direct approach, because LBP is removed, and controls are not required to manage LBP left in place when redevelopment occurs. LBP residue removed during stabilization would be disposed of as hazardous waste (if required). Disposal characterization testing would be required prior to disposal. In addition, successful completion would require the collection of dust-wipe clearance samples in accordance with MDNR clearance regulations.

For this site, removal by demolition is a viable option for the LBP-containing wood structural components associated with the school building. These components can be easily removed for demolition.

#### Effectiveness

The LBP is permanently removed. This alternative would allow for renovation of the site without restrictions concerning disturbance and management of LBP.

#### Implementation

Removal would be conducted in accordance with applicable state and federal regulations. The identified LBP-covered components would be properly removed and disposed of. Removal/demolition is required to be conducted in a manner that does not chip, shred, mulch, or mill the LBP.

#### Cost

Estimated removal by demolition costs were gathered from local vendors. Total cost to remove the LBP - containing components and properly dispose of them as special waste is estimated at \$3,000. Additional costs to be considered include technical reports (RAP and Final Cleanup Report), the collection of clearance samples, and the installation of door coverings (plywood) to secure the building. Estimated costs for technical plans/reports are \$3,500 for the RAP and \$3,500 for the Final Cleanup Report (cost of RAP and Final Cleanup Report includes consideration of all environmental issues to be addressed by cleanup activities). Costs for clearance sampling is estimated at \$1,000. Installation of door coverings for building security is estimated at \$1,000.

#### **Alternative 4: Lead-Based Paint Encapsulation**

Alternative 4 includes encapsulation of LBP surfaces with a 20-year, durable, air- and dust-tight surface coating material. The encapsulating material would require approval by MDNR BVCP prior to use.

Encapsulation of LBP would be conducted on surfaces following proper preparation. Surface preparation would include proper removal of loose, flaking, and peeling paint and other surface contaminants so the proposed encapsulant would adhere properly. Encapsulation is conducted using standard paint application techniques (brush, roller, spraying, etc.). Encapsulation would stabilize the remaining lead-based paint. After the surfaces are encapsulated, the paint would not likely be subject to future deterioration. Minimization of dust/debris generated during this technique is required. After encapsulation and all other abatement activities conducted at the site are complete, the regulated area would be vacuumed with a high-efficiency particulate air (HEPA) filter-equipped vacuum, wiped with a cleaning solution, rinsed, and re-HEPA vacuumed.

For this site, encapsulation is not a likely option. Compared to Alternatives 2 and 3, waste generation and disposal costs would be reduced. Regulatory clearance would be obtained through a post-encapsulation inspection and the collection of dust-wipe samples in accordance with MDNR clearance regulations.

#### **Effectiveness**

Encapsulation is a relatively simple process that does not significantly alter structural conditions. This alternative would allow for redevelopment of the site; however, restrictions (institutional controls) would apply concerning future disturbance of LBP. For sites enrolled in the MDNR BVCP, MDNR requires that an O&M Plan be created to document the existence, location, and future maintenance procedures regarding the LBP. In addition, the O&M Plan is required to be filed on the property's chain of title as an institutional control. The site would also be required to be entered into the MDNR Long-Term Stewardship Program, which includes a \$15,000 fee for long-term MDNR oversight.

#### **Implementation**

Encapsulation would be conducted in accordance with applicable state and federal regulations by a registered LBP contractor. Encapsulation is not a viable alternative for surfaces that are subject to impact or friction. Encapsulation requires follow-up inspections, maintenance, and potential building restrictions.

#### **Cost**

Estimated encapsulation costs were gathered from local vendors. Cost per ft<sup>2</sup> is provided and includes labor and materials. Estimated encapsulation cost is \$15 per ft<sup>2</sup>. Based on that estimated cost,



encapsulation of LBP on the previously identified components (418 ft<sup>2</sup>) would be \$6,270. Additional costs to be considered include technical reports (RAP, Final Cleanup Report, and O&M Plan) and the collection of clearance samples. Estimated costs for technical plans/reports are \$3,500 for the RAP, \$3,500 for the Final Cleanup Report, and \$2,500 for the O&M Plan (cost of RAP and Final Cleanup Report includes consideration of all environmental issues to be addressed by cleanup activities). Long-Term Stewardship costs are \$15,000. Cost for clearance sampling is estimated at \$1,000.

### **3.2.3 Items Potentially Containing Hazardous Materials**

For items potentially containing hazardous materials, two options were evaluated: (1) no action, and (2) proper removal for recycling or disposal.

#### **Alternative 1: No Action**

Alternative 1 (no action) would consist of leaving the identified items and materials in place at the site.

##### Effectiveness

This alternative would not be effective regarding renovation of the property and could pose health risks to future occupants.

##### Implementation

Implementation of this alternative is straightforward — the items potentially containing hazardous materials are left in place.

##### Cost

This alternative would not involve any direct costs.

#### **Alternative 2: Removal of Items Potentially Containing Hazardous Materials**

Alternative 2 would involve properly disposing/recycling of the items potentially containing hazardous materials. Typically, those materials are classified as universal waste and should be handled by a qualified waste management company.

##### Effectiveness

Alternative 2 would be effective in removing the items potentially containing hazardous materials.

### Implementation

Disposal would be arranged by a qualified waste management company. The items would be removed for proper disposal/recycling.

### Cost

Estimated disposal/recycling costs were gathered from local vendors. The estimated disposal/recycling cost for the items is \$2,530. Table 5 below summarizes removal costs for items potentially containing hazardous materials.

**TABLE 5**  
**ITEMS POTENTIALLY CONTAINING HAZARDOUS MATERIALS - REMOVAL COSTS**  
**MAYVIEW SCHOOL SITE, MAYVIEW, MISSOURI**

<b>Items</b>	<b>Quantity</b>	<b>Costs Per Unit</b>	<b>Estimated Costs</b>
Fluorescent Bulbs	408	\$2.50	\$1,020
Electrical Ballasts	204	\$5.00	\$1,020
Mercury-containing Thermostats	5	\$30.00	\$150
Exit Signs	7	\$20.00	\$140
Water Fountains	2	\$100.00	\$200
<b>Total Estimated Removal/Disposal Cost</b>			<b>\$2,530</b>

### **3.3 RECOMMENDED CLEANUP ALTERNATIVES**

#### Asbestos-Containing Material

Alternative 2 – abatement of ACM – is the recommended cleanup alternative for ACM identified at the site. Future plans at the site include renovation (and possibly demolition of the 1918 portion of the school building). Therefore, removal of all of the identified ACM would be most effective in removing the risk to human health posed by the ACM.

#### Lead-Based Paint

Alternatives 2 and 3 – a combination of removal by chemical stripping and removal by demolition – is the recommended cleanup alternatives for LBP identified at the site. These are the most cost effective and direct options allowing for renovation of the school building.

#### Items Potentially Containing Hazardous Materials

Alternative 2 – removal and disposal/recycling is the recommended cleanup alternative for the items potentially containing hazardous materials located at the site.

### 3.3.1 Total Cleanup Cost

Based on the recommended cleanup alternatives for ACM, LBP, and items potentially containing hazardous materials, the estimated total cleanup cost is \$141,346, and includes site enrollment in the MDNR BVCP, and fees associated with preparation of required technical plans/reports. Specifically, full abatement of the ACM is estimated at \$120,966 and a combination of removal of LBP by chemical stripping and demolition is estimated at \$5,650 (includes \$1,000 for clearance sampling). Installation of door coverings for building security is estimated at \$1,000. Proper removal and disposal/recycling of the items potentially containing hazardous materials is estimated at \$2,530. It should be noted, that the disposal costs provided in this report are based on the assumption that all demolition debris will be disposed of as demolition waste, excluding the segregated LBP residue. Site enrollment fees into the MDNR BVCP program are \$5,200, while fees associated with preparation of technical reports would be \$7,000 (\$3,500 each for a RAP and Final Cleanup Report). Table 6 summarizes the discussed costs.

**TABLE 6  
SUMMARY OF COSTS  
MAYVIEW SCHOOL SITE, MAYVIEW, MISSOURI**

Contaminant/Material	Recommended Alternative	Action – Cost	Total Cost
ACM	Alternative 2 – Abatement	Abatement - \$120,966	\$120,966
LBP	Alternatives 2 and 3 – Removal of LBP By Chemical Stripping and Demolition	Removal by Stripping - \$650	\$5,650
		Removal by Demolition - \$3,000	
		Clearance Sampling - \$1,000	
		Installation of Window/Door Coverings - Building Security - \$1,000	
Hazardous Materials	Alternative 2 – Removal/Disposal	Removal - \$2,530	\$2,530
MDNR Brownfields/Voluntary Cleanup Program Fees			\$5,200
Technical Plan Preparation (RAP and Final Cleanup Report)			\$7,000
<b>Total Cost - \$141,346</b>			

Notes:

ACM	Asbestos-containing materials
LBP	Lead-based paint
MDNR	Missouri Department of Natural Resources
RAP	Remedial Action Plan

#### **4.0 REFERENCES**

- Seagull Environmental Technologies Inc. (Seagull). 2015a. Phase I Environmental Site Assessment for the Mayview School Building Site. April.
- Seagull Environmental Technologies Inc. (Seagull). 2015b. Phase II Environmental Site Assessment for the Mayview School Building Site. October.

**APPENDIX A**

**FIGURES**

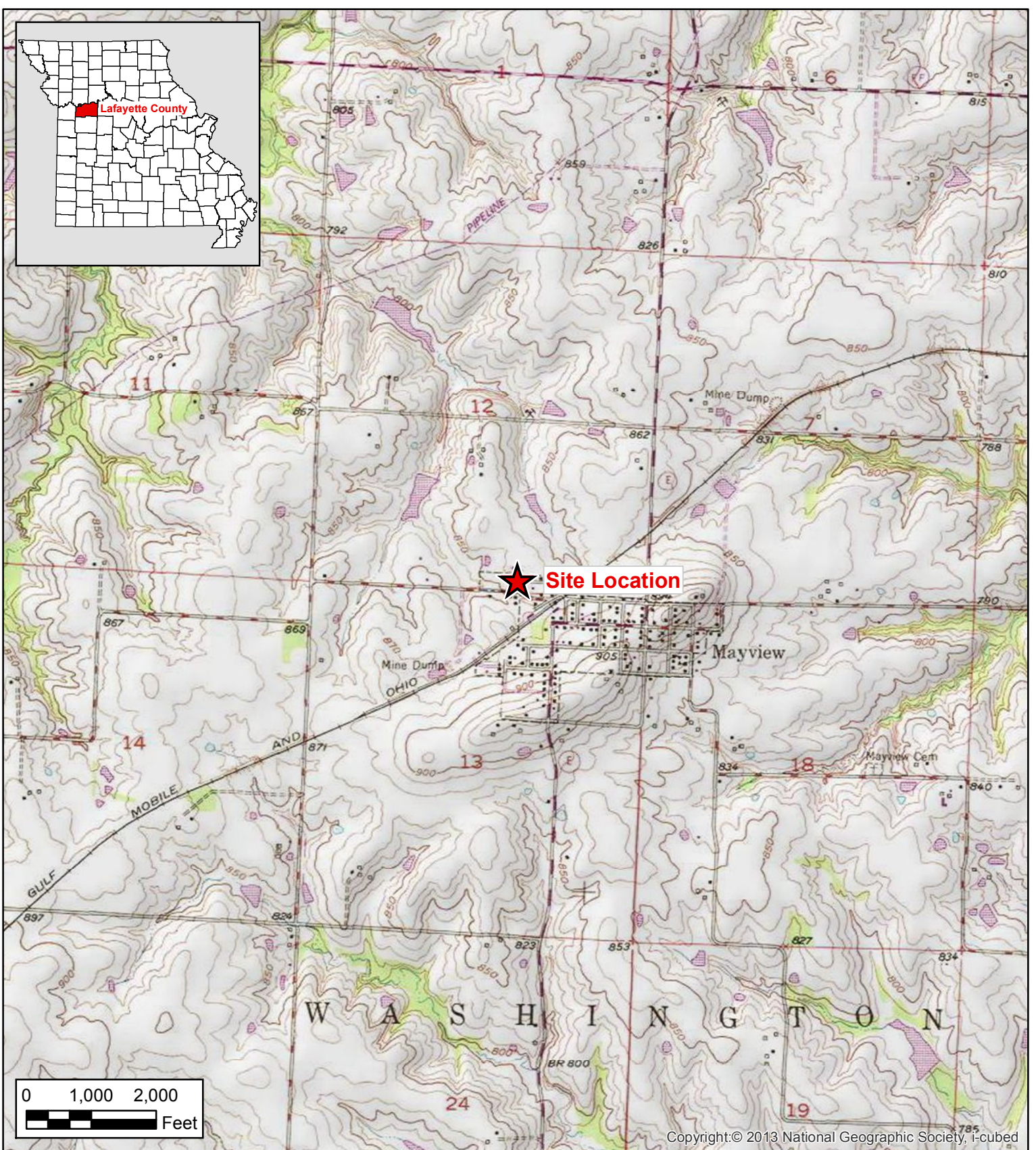
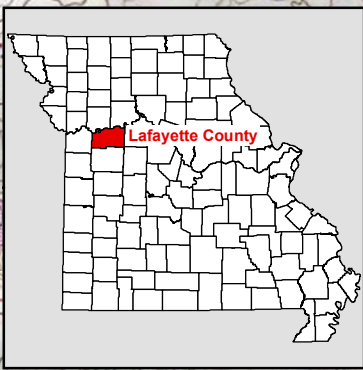
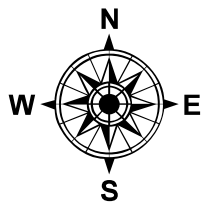


Figure 1  
 Site Location Map  
 Mayview School Site  
 Mayview, Missouri



Seagull Environmental Technologies, Inc.

Source: USGS Mayview, MO 7.5 Minute Topo Quad, 1979

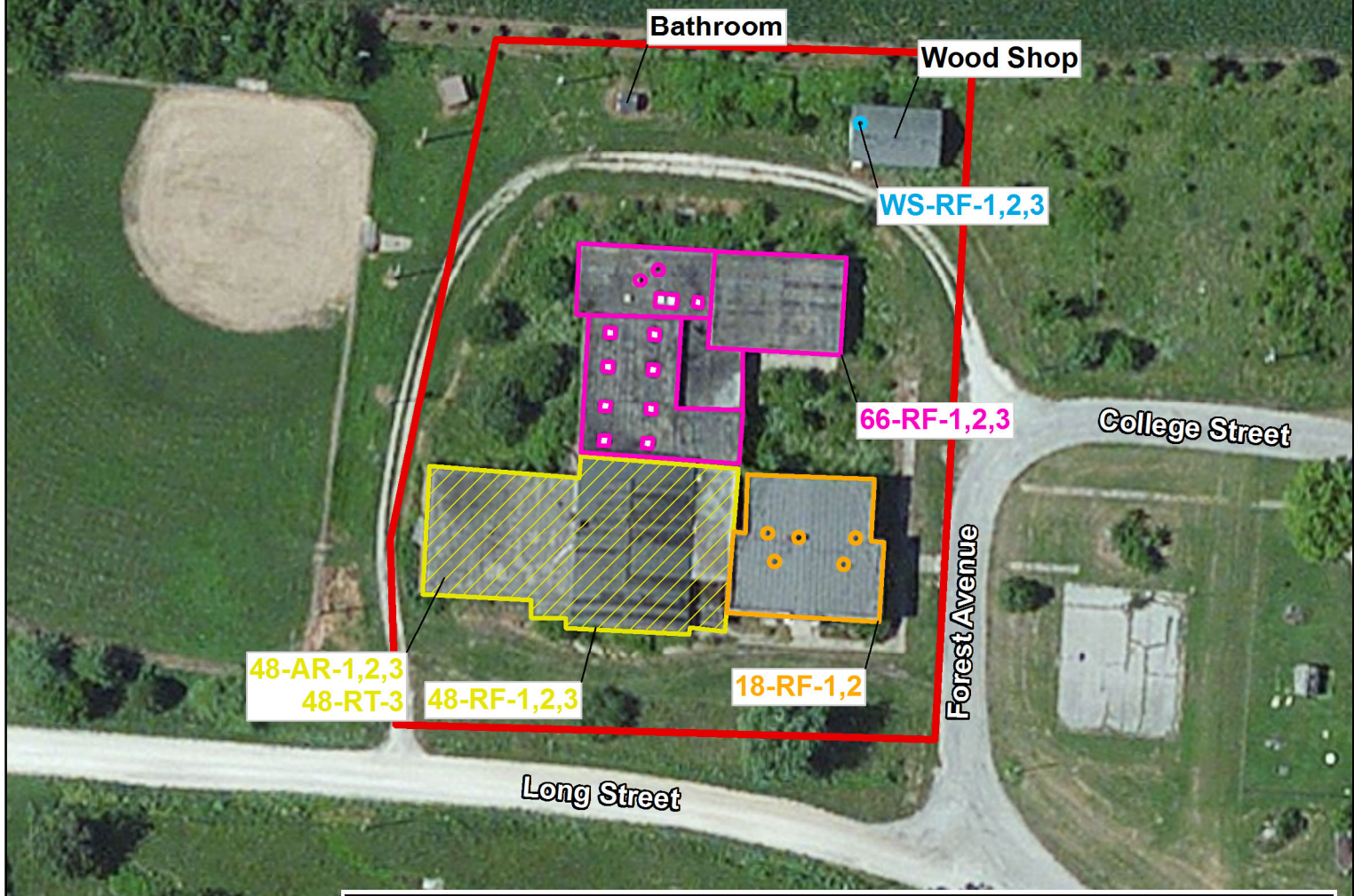
Date: January 2016

Project No: MOESA047EA2

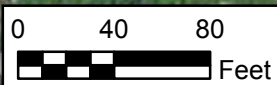
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**Legend**

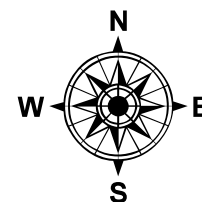
 Approximate Subject Site Boundary



Material	Location	Sample Number
Roof Flashing	Chimney of Former School Wood Shop	WS-RF-1,2,3
Roof Flashing	Along Roof Perimeter and at Penetrations of 1966 Addition	66-RF-1,2,3
Asphalt Roofing	On Roof of 1948 Addition	48-AR-1,2,3
Roof Flashing	Along Roof Perimeter and at Penetrations of 1948 Addition	48-RF-1,2,3
Roof Tar	On Roof of 1948 Addition	48-RT-3
Roof Flashing	Along Roof Perimeter and at Penetrations of 1918 Addition	18-RF-1,2



**Figure 2**  
**Asbestos-Containing Materials Located on Roof**  
**Mayview School Site**  
**Mayview, Missouri**



Seagull Environmental Technologies, Inc.

Source: Bing Maps Aerial Imagery, 2012

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Material	Location	Sample Number
Tan 9"x 9" Vinyl Tile/Mastic	Kitchen, Staff Lounge, Cafeteria, and Throughout 1966 Addition	66-FT1-1,2,3 (tile and mastic)
Brown 9"x 9" Vinyl Tile/Mastic		66-FT2-1,2,3 (tile and mastic)
Beige 9"x 9" Vinyl Tile/Mastic		66-FT3-1,2,3 (tile and mastic)
Gray 9"x 9" Vinyl Tile/Mastic	Staff Lounge, Cafeteria and Throughout 1966 Addition	66-FT4-1,2,3 (tile and mastic)
Yellow 9"x 9" Vinyl Tile/Mastic		66-FT5-1,2,3 (tile and mastic)
Black 9"x 9" Vinyl Tile/Mastic	Cafeteria and Staff Lounge in 1966 Addition	66-FT6-1,2,3 (tile and mastic)
Window Glaze	Windows of Room at Northeast Corner of the 1966 Addition	66-WG-1,2,3
Cream 12"x 12" Vinyl Tile Mastic	Throughout Gymnasium, Bathrooms, and Hallways in 1948 Addition	48-FT1-1,2 (mastic)
Black 2"x 6" Vinyl Tile/Mastic	Gymnasium in 1948 Addition	48-FT2-1,2
Red 1"x 2" Vinyl Tile/Mastic		48-FT3-1,2
Tan 9"x 9" Vinyl Tile/Mastic	Classrooms in 1948 Addition	48-FT4-1,2,3 (mastic)
Carpet Mastic	Home Economics Room in South Central Portion of 1918 Building	18-CM1-1
Dark Green 9"x 9" Vinyl Tile/Mastic	Old Cafeteria in the 1918 Building	18-FT1-1,2,3
Light Green 9"x 9" Vinyl Tile/Mastic		18-FT2-1
Chalkboard Mastic	Old Cafeteria in the 1918 Building	18-CBM-1
Joint Compound	In Office Rooms on Second Floor of the 1918 Building	18-DW-1,2,3

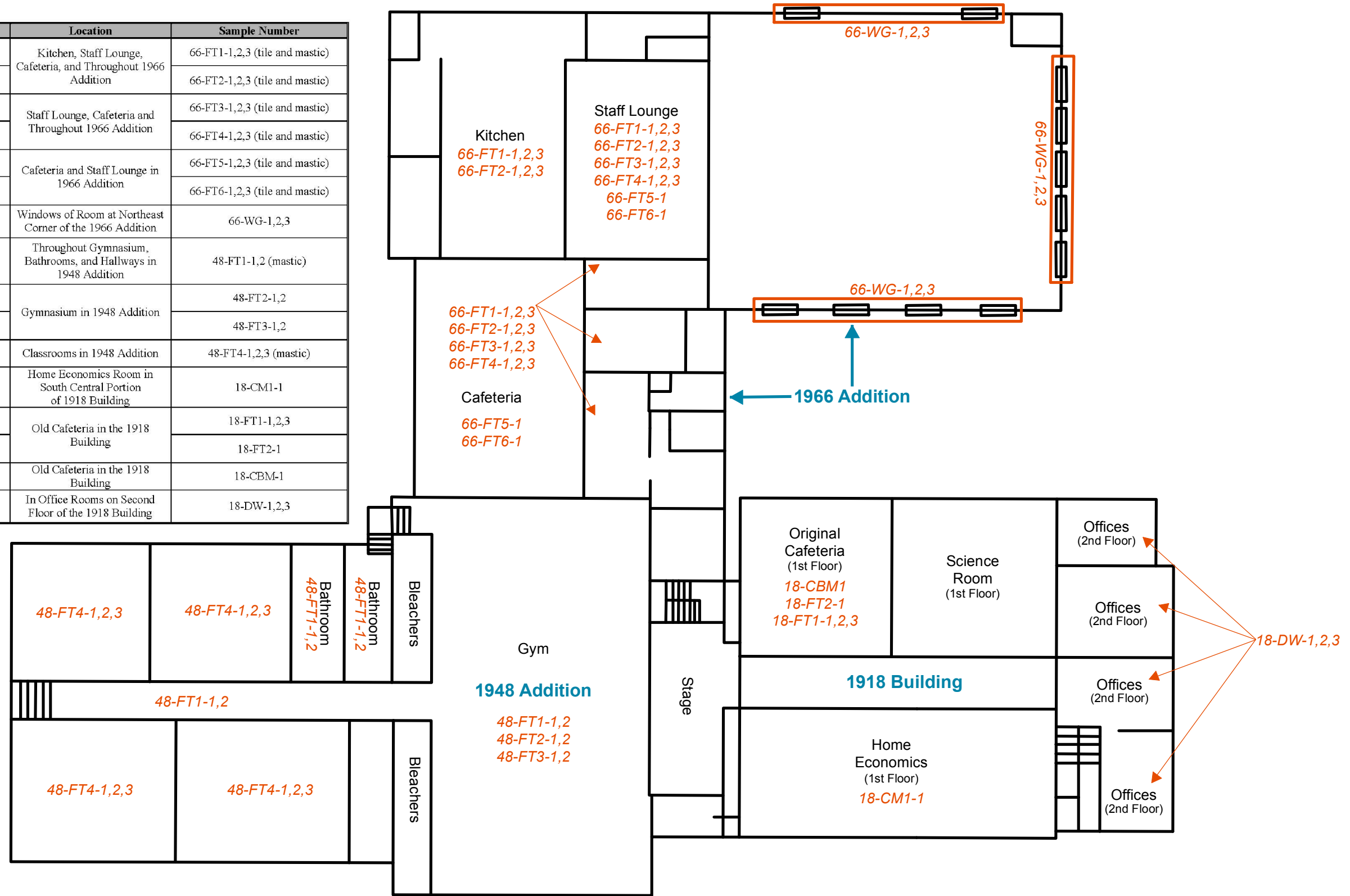
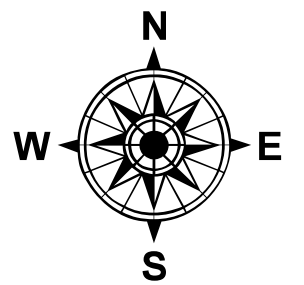


Figure 3  
Asbestos-Containing Materials Location Map  
Mayview School Site  
Mayview, Missouri



Note: Drawing is not to scale



Seagull Environmental Technologies, Inc.



**APPENDIX B**  
**SITE PHOTOGRAPHS**



Client: Missouri Department of  
Natural Resources

Description: Photograph showing the front of the former Mayview  
School.

Photograph  
Number: 1

Direction: Northeast

Photographer: Cosmo Canacari

Date: 8/13/2015



Client: Missouri Department of  
Natural Resources

Description: Photograph showing the structure used for the former  
Mayview School wood shop. Asbestos was determined to  
be in the roof flashing around the chimney base.

Photograph  
Number: 2

Direction: North

Photographer: Cosmo Canacari

Date: 8/13/2015



Client: Missouri Department of Natural Resources

Description: Photograph showing the roof of the 1966 addition, which has roof flashing that was determined to contain asbestos.

Photograph Number: 3

Direction: West

Photographer: Cosmo Canacari

Date: 8/13/2015



Client: Missouri Department of Natural Resources

Description: Photograph showing part of the roof on the 1948 addition. Asphalt roofing, tar, and roof flashing samples collected from the roof of the 1948 building addition were determined to contain asbestos.

Photograph Number: 4

Direction: West

Photographer: Cosmo Canacari

Date: 8/13/2015



<p>Client: Missouri Department of Natural Resources</p>	<p>Description: Photograph showing the roof of the 1918 building. Laboratory analysis of roof flashing samples collected from the roof were determined to contain asbestos. The roof flashing is along the roof perimeter and at penetrations.</p>	<p>Photograph Number: 5</p>
<p>Direction: South</p>	<p>Photographer: Cosmo Canacari</p>	<p>Date: 8/13/2015</p>



<p>Client: Missouri Department of Natural Resources</p>	<p>Description: Photograph showing tan 9- by 9-inch and brown 9- by 9-inch vinyl floor tile. Those tiles and associated mastic were determined to contain asbestos. They are in the kitchen, staff lounge, cafeteria, and throughout the 1966 addition.</p>	<p>Photograph Number: 6</p>
<p>Direction: N/A</p>	<p>Photographer: Cosmo Canacari</p>	<p>Date: 8/13/2015</p>



Client: Missouri Department of Natural Resources	Description: Photograph showing beige, gray, black and yellow 9- by 9- inch vinyl floor tiles. All of those floor tiles were determined to contain asbestos. The mastic associated with those tiles (except for the yellow tile) were also determined to contain asbestos.	Photograph Number: 7
Direction: N/A	Photographer: Cosmo Canacari	Date: 8/13/2015



Client: Missouri Department of Natural Resources	Description: Photograph showing cream-colored 9- by 9- inch vinyl floor tile in the gymnasium. Mastic associated with that tile, along with black and red tile in the gymnasium were determined to contain asbestos.	Photograph Number: 8
Direction: N/A	Photographer: Cosmo Canacari	Date: 8/13/2015



Client: Missouri Department of Natural Resources	Description: Photograph showing tan 9- by 9-inch vinyl floor tile in the classrooms of the 1948 addition. The mastic associated with that tile was determined to contain asbestos.	Photograph Number: 9
Direction: West	Photographer: Cosmo Canacari	Date: 8/13/2015



Client: Missouri Department of Natural Resources	Description: Photograph showing green 9- by 9-inch vinyl floor tile in the old cafeteria of the 1918 building. That tile and a light green 9- by 9-inch vinyl floor tile and associated mastic were determined to contain asbestos.	Photograph Number: 10
Direction: N/A	Photographer: Cosmo Canacari	Date: 8/13/2015



Client: Missouri Department of Natural Resources	Description: Photograph showing the white painted surface of a garage door that was determined to contain lead-based paint (LBP).	Photograph Number: 11
Direction: N/A	Photographer: Cosmo Canacari	Date: 8/13/2015



Client: Missouri Department of Natural Resources	Description: Photograph of the metal garage door header determined to contain LBP.	Photograph Number: 12
Direction: N/A	Photographer: Cosmo Canacari	Date: 8/13/2015