March 11, 2024

Ms. Lisa Dunning
Task Order Contracting Officer's Representative
U.S. Environmental Protection Agency, Region 7
11201 Renner Boulevard
Lenexa, Kansas 66219

Subject: Contract No. 68HERH19D0018; Task Order No. 68HE0719F0190
Joplin Union Depot
205 North Main Street, Joplin, Jasper County, Missouri
Analysis of Brownfields Cleanup Alternatives

Dear Ms. Dunning:

Toeroek Associates, Inc. (Toeroek) and our teaming subcontractor, Tetra Tech, Inc. (Tetra Tech), (hereafter "Toeroek Team") are pleased to present the Analysis of Brownfields Cleanup Alternatives of the Joplin Union Depot Site (the Site) in Joplin, Missouri. This deliverable has been reviewed internally as part of Tetra Tech's quality assurance program, as well as Toeroek's quality assurance program, and is consistent with Toeroek's Quality Management Plan for the Resource Conservation and Recovery Act (RCRA) Enforcement and Permitting Assistance (REPA) contract. Documentation of this review is retained in the Toeroek Team's project files.

If you have any questions or comments, please contact Greg Hanna at 720-898-4102 or Kaitlyn Mitchell at 816-412-1742.

Sincerely,

Greg Hanna
Toeroek Team Program Manager

Kaitlyn Mitchell
Toeroek Team Project Manager

Enclosure: Analysis of Brownfields Cleanup Alternatives

cc: Amber Krueger, EPA Region 7
Heather Wood, Tetra Tech
Brad Martin, Toeroek
Toeroek Team Project Files

300 Union Boulevard, Suite 520
Lakewood, Colorado 80228
Telephone: 303-420-7735
Fax: 303-420-7658

ANALYSIS OF BROWNFIELDS CLEANUP ALTERNATIVES

JOPLIN UNION DEPOT
205 NORTH MAIN STREET
JOPLIN, JASPER COUNTY, MISSOURI

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 7

Task Order	:	68HE0719F0190
Subtask	:	19.03
EPA Region	:	7
Date Prepared	:	March 11, 2024
Contract No.	:	68HERH19D0018
Prepared by	:	Toeroek Associates, Inc.
Project Manager	:	Kaitlyn Mitchell
Telephone	:	(816) 412-1742
EPA TOCOR	:	Lisa Dunning
Telephone	:	(913) 551-7964

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1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) tasked Toeroek Associates, Inc. (Toeroek) and its teaming subcontractor, Tetra Tech, Inc. (Tetra Tech), (hereafter "Toeroek Team") to provide technical support to the EPA Region 7 Brownfields Program under Contract 68HERH19D0018, Task Order (TO) 68E0719F0190. EPA Region 7 requested that the Toeroek Team conduct an Analysis of Brownfields Cleanup Alternatives (ABCA) of the Joplin Union Depot (the Site) located at 205 North Main Street in Joplin, Jasper County, Missouri (Appendix A, Figure 1).

Currently, the Site hosts one two-story railroad depot structure of approximately 23,826 square feet. The building is currently not in use. The Site is within a mixed-use commercial and residential area, with the nearest residence located approximately 500 feet to the west.

The Toeroek Team performed this ABCA based on results of a Targeted Brownfields Assessment (TBA), which consisted of a Phase II Environmental Site Assessment (ESA) and Hazardous Materials Survey (HMS) conducted by the Toeroek Team (Toeroek Team 2023b, c). The Phase II ESA report concluded that further investigation and/or remediation appeared warranted based on analytical results from soil, groundwater, and soil-gas samples. The HMS found asbestos-containing materials (ACM) in black roof flashing on the roof and lead-based paint (LBP) on various door frames, trim, walls, columns, railings, windows, window frames, and ceilings. The HMS concluded that ACM and LBP should be appropriately addressed prior to any building renovation or demolition activities.

According to the Brownfields Assessment Application (EPA 2022), the current property owner, Missouri Department of Natural Resources (MoDNR), has shown interest in developing the Site contingent on findings from the Phase II ESA and HMS. Future use of the Site is unknown; however, to be conservative, residential land use is assumed for this ABCA.

This ABCA considers state and federal regulations regarding ACM. The federal Asbestos Hazard Emergency Response Act (AHERA) defines ACM as any material or product that contains more than 1 percent asbestos. MoDNR regulations outline ACM inspection, reporting, and disposal requirements for demolition or renovation of commercial buildings (MoDNR 2024).

This ABCA also considers state and federal regulations regarding groundwater, soil, and soil gas. Data will be compared to MoDNR Risk-Based Corrective Action (MRBCA) Tier 1 Residential Risk Based Target Levels (RBTLs), which are the standards for contamination used by the Missouri Brownfields/Voluntary Cleanup Program (BVCP) (MoDNR 2006).

2.0 BACKGROUND AND DESCRIPTION

The Site consists of one parcel encompassing approximately 3.6 acres, and hosts a two-story building located at 205 North Main Street in Joplin, Jasper County, Missouri. The Site is depicted on the Joplin East, Missouri, U.S. Geological Survey (USGS) 7.5-minute topographic series map (USGS 1979) (Appendix A, Figure 1). Coordinates at the approximate center of the Site are 37.0916710 degrees north latitude and 94.5120340 degrees west longitude (Appendix A, Figure 1) (Toeroek Team 2023a).

The Site is within a mixed commercial and residential area of downtown Joplin. The Site hosts a vacant building formerly used as a railroad depot, as well as an active communications tower and associated compound for the Kansas City Southern railroad. Historical documentation indicates the Site was undeveloped until 1900, when multiple dwellings and a junkyard were developed. Construction of the building occurred sometime between 1900 and 1911, and currently encompasses approximately 23,816 square feet.

Currently, the Site is bounded to the north by Simpson Sheet Metal, with Becton Avenue and commercial properties beyond; to the east by Becton Avenue, with Joplin Union Depot Company railroad tracks, Joplin Creek, and residential properties beyond; to the south by 1st Street, with John and Dave's Automotive, Dollar General, and other commercial properties beyond; and to the west by Commercial Gasket & Packing Company and a post office, with Main Street, commercial properties, and residential properties beyond.

3.0 PREVIOUS INVESTIGATIONS

In April 2023, the Toeroek Team conducted a Phase I ESA (Toeroek Team 2023a), identifying the following recognized environmental conditions (RECs), vapor encroachment conditions (VECs), and business environmental risk (BER) for the Site:

RECs

- A railroad spur was present on the Site from as early as 1950 (based on Sanborn maps) until 1967, and the Site was listed in city directories as Joplin Union Depot from 1964 to 1981. Further, railroad tracks were observed adjacent to the Site. The railroad tracks were considered to pose a REC for the Site because of possible contamination commonly associated with creosote-soaked railroad ties and metals.
- A junkyard and coal storage were present on the southern portion of the Site as early as 1896 until 1900. Possible contamination from historical use of the Site as a junkyard and coal storage was considered to pose a REC for the Site.
- Five lead and zinc mines were identified within a 0.25-mile radius of the Site. Documented widespread metals contamination from mines in the area as a result of airborne dispersion of dust or debris from ore transport was considered to pose a REC for the Site.
- The following facilities were identified in historical documentation and determined to be potential sources of environmental contamination because of close proximity to the Site: Southwestern White Lead & Paint Works adjacent to and west in 1891; a junk facility adjacent to and south-southwest in 1896; the "It" Mining Company shaft to the south in 1900; multiple filling stations to the south and west as early as 1950; multiple auto repair shops to the southwest as early as 1954; and a printing facility to the west as early as 1967. Several nearby properties hosted gas stations as early as 1964. Nearby historical operations of manufacturing, mining, automotive repair, and fueling facilities were considered to pose a REC for the Site.
- A possible railroad roundhouse used for railcar maintenance was adjacent to and northeast of the Site as early as 1938 until sometime before 1974. The railroad roundhouse was considered to pose a REC for the Site because of possible contamination commonly associated with railroad maintenance activities.
- A lead smelter and large tailings piles depicted west of the Site in 1978 were considered to pose a REC for the Site.

RECs and VECs

- The Oronogo-Duenweg Mining Belt site includes the City of Joplin and is part of the Tri-State Mining District of Missouri, Kansas, and Oklahoma. This site was placed on the National Priorities List (NPL) in September 1983 and is currently listed on the Final NPL. Superfund-financed remedial activities are ongoing. Lead, zinc, and cadmium were mined, milled, and smelted throughout Jasper County from 1848 to the late 1960s. Groundwater and surface water in the area are contaminated with lead, cadmium, and zinc. The Toeroek Team could not document any previous sampling on the Site for contamination with metals related to this site; therefore, this listing was considered to pose a REC and VEC for the Site.

- The Al's 66 Service site, adjacent to and west-northwest of the Site at 228 North Main Street, is listed in the Environmental Data Resources, Inc. (EDR) Historic Automotive database as being a gas station in 1971. EDR provides no further information. Based on the close proximity to the Site and operations prior to implementation of environmental regulations, this site was considered to pose a REC and a VEC for the Site.
- The Jefferson-Greyhound Bus Terminal site, located approximately 0.174 mile southwest of the Site at 219 West 2nd Street, is listed for a leaking underground storage tank incident involving a release of unknown material in 1992. The date of finished cleanup of this facility was April 30, 1992; however, issuance of a No Further Action letter is not reported. Based on the upgradient location of this site and lack of documented regulatory closure, this listing was considered to pose a REC and VEC for the Site.
- The Luz's Pro Alterations and Drycleaning site, located approximately 400 feet southwest of the Site at 106 Main Street, is listed in the MO Drycleaners database. The current facility at 106 North Main Street is Prince Payday Loans, and the current facility at 106 South Main Street is The Boardroom restaurant. No additional information was obtained regarding the status of this site or years of operation. Given the uncertainty regarding the site status and upgradient location, this listing was considered to pose a REC and a VEC for the Site.

BER

- According to the Jasper County Assessor, the Site building was constructed in 1900 (Jasper County 2023). According to the Site owner representative, the Site building was built in 1911; therefore, based on age, ACM and LBP were likely used during construction. The possible presence of ACM and LBP within the Site building was considered to pose a BER for the Site.

The Toeroek Team conducted a Phase II ESA and HMS in 2023 (Toeroek Team 2023b, c). Results of that investigation are discussed in Section 5.1.

4.0 PLANS FOR FUTURE USE

Future use of the Site is unknown; however, the current property owner, MoDNR, has shown interest in developing the Site. Structures on the Site include the approximately 23,826 square-foot (SF) train depot structure. Currently, groundwater is not used for drinking water at the Site. The City of Joplin derives its drinking water from Missouri American Water, which sources potable water from Shoal Creek surface water and from wells with depths exceeding 1,000 feet below ground surface (bgs) in the Springfield Plateau Province of the Ozark Aquifer. The nearest well is approximately 1.3 miles to the east of the Site and has a total depth exceeding 1,500 feet bgs. The Shoal Creek intake is approximately 4.5 miles southwest of the Site (Missouri American Water 2022).

Based on analytical results from soil, groundwater, and soil-gas samples (Section 5.1), further investigation and/or remediation appears warranted. In addition, ACM and LBP should be appropriately addressed prior to building renovation or demolition. No remedial activities have occurred at the Site to date.

5.0 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. This ABCA considers ACM, LBP, and environmental media. For ACM, this ABCA uses AHERA definitions, and considers the MoDNR requirements for ACM inspection, reporting, and disposal for demolition or renovation of commercial buildings. Cleanup alternatives are evaluated against MRBCA Tier 1 Residential RBTLs assuming clayey soil.

The Toeroek Team evaluated brownfields cleanup alternatives to address environmental effects identified during the Phase II ESA and HMS (Toeroek Team 2023b, c). The purpose of this ABCA is to present viable cleanup alternatives based on Site-specific conditions, technical feasibility, and preliminary cost evaluations.

The following subsections describe brownfields cleanup alternatives for addressing presence of ACM and LBP, and contamination in soil, groundwater, and soil gas, including a "No Action" alternative. Following the description, each alternative is evaluated in terms of its effectiveness, implementability, and cost. 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.

Effectiveness of an alternative refers to its ability to meet objectives of the brownfields cleanup. Criteria applied to assess effectiveness of an alternative include all of the following:

- Overall protection of human health and the environment;
- Long-term effectiveness;
- Reduction of toxicity, mobility, or volume through treatment/removal; and
- Short-term effectiveness.

Criteria applied to assess implementability of an alternative are all of the following:

- Technical feasibility;
- Administrative feasibility;
- Availability of services and materials required during implementation of the alternative;
- State acceptance; and
- Community acceptance.

Each alternative is evaluated to determine an estimated cost. The evaluations compare the alternatives' respective direct capital costs, which include equipment, services, and contingency allowances, as well as long-term institutional controls (ICs), engineering controls (ECs), and operations and maintenance (O&M) costs. The purpose of evaluating each alternative is to determine its advantages and disadvantages relative to the other alternatives in order to identify key trade-offs that would affect selection of the preferred alternative. For cost companions, a site under the EPA guidance for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) recommends costs within an accuracy range of -30 to +50 percent. Costs presented this ABCA conform to this guidance and are not at the level of detail necessary for budgetary estimates.

5.1 EVALUATED CONTAMINATION

This ABCA evaluates ACM and LBP, soil and groundwater, and soil gas at the Site. The following subsections discuss contaminants and materials identified during the Phase II ESA and HMS at the Site. Additional details regarding the sampling methodology and detected constituents are in the respective Phase II ESA and HMS reports (Toeroek Team 2023b, c).

5.1.1 Asbestos-Containing Material

During the ACM survey portion of the HMS, the Toeroek Team collected 21 bulk samples of suspected ACM from the building. Collection of samples of building materials accorded with National Emissions Standards for Hazardous Air Pollutants (NESHAP) as adopted by EPA, and with AHERA protocols. Suspect ACM samples were analyzed via polarized light microscopy. AHERA defines ACM as any material or product that contains more than 1 percent asbestos. ACM sample locations appear on Figure 3 and Figure 4 in Appendix A.

The ACM survey identified approximately 1,250 SF of black roof flashing on the roof as non-friable ACM.

5.1.2 Lead-Based Paint

During the LBP survey portion of the HMS, the Toeroek Team screened 108 surfaces in the building using a handheld x-ray fluorescence (XRF) spectrometer. LBP screening locations appear on Figure 3 and Figure 4 in Appendix A. The HMS report describes LBP screening locations (Toeroek Team 2023c). The LBP survey accorded with protocols similar to the single-family housing inspection procedures in *Guidelines for the Evaluation and Control of LBP in Housing* (HUD Guidelines) (HUD 2012). HUD guidelines suggest that paint applied before 1978 may contain lead. HUD considers LBP as paint with lead

levels above 1.0 milligram per square centimeter (mg/cm^2). Various colors of LBP totaling approximately 38,153 SF and 64 linear feet (LF) were identified on a variety of substrates throughout the building—including door frames, decorative trim, columns, door trim, walls, stair railings, window frames, windows, and ceilings.

5.1.3 Polychlorinated Biphenyls

During the HMS, the Toeroek Team collected one sample of suspected polychlorinated biphenyl (PCB)-containing caulk material from the roof of the building. Suspect PCB-containing caulk sample locations appear on Figure 3 and Figure 4 in Appendix A. Collection of the samples accorded with EPA guidance. Upon completion of sampling activities, bulk samples were sent for analysis for PCBs. EPA has set an action level of 50 parts per million (ppm) for PCBs in materials, which was the benchmark used for the HMS. Laboratory results indicated no detection of PCBs in the sampled building material. As such, PCBs are not addressed in this ABCA.

5.1.4 Soil

As part of the Phase II ESA in 2023, the Toeroek Team collected a surface soil sample and a subsurface soil sample at eight locations across the Site (soil boring [SB]-1 through SB-8), (Appendix A, Figure 5). Surface soil samples were collected within 0 to 3 feet bgs. Subsurface soil samples were collected within select intervals based on visual staining, detected odor, or elevated photoionization detector (PID) readings. If no staining/odor or elevated PID reading was noted, a sample was collected from the bottom of the soil core.

Surface and subsurface soil samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH) – gasoline range organics (GRO), TPH – diesel-range organics (DRO), TPH – oil-range organics (ORO), and target analyte list (TAL) metals. Soil sample results from the Phase II ESA were compared to MRCBA lowest default target levels (LDTLs), MRBCA Tier 1 RBTLs for soil type 3 (clayey), and EPA regional screening levels (RSLs), assuming a total hazard quotient (THQ) of 1.0 (MoDNR 2006, EPA 2023a). Metals results from soil samples also were compared to naturally occurring Jasper County average concentrations plus one standard deviation to determine if detected metals concentrations were naturally occurring or results of human activity (USGS 2022). Comparisons of analytical data to MRBCA RBTLs resulted in the following noteworthy findings.

No VOC, SVOC, or TPH exceeded an MRBCA Tier 1 residential RBTL.

Metals were detected at concentrations that exceeded MRBCA RBTLs. In surface soil, the following metals were detected at concentrations exceeding MRBCA RBTLs in at least one surface soil sample (sample IDs indicated in parentheses).

- Arsenic – residential RBTL (SB-1, SB-2, SB-3, SB-5, SB-6, SB-8): The detections were consistent with naturally occurring concentrations (less than the maximum observed USGS concentration).
- Cadmium – residential RBTL (SB-1, SB-5): The USGS has not established a background concentration for cadmium.
- Lead – residential RBTL (SB-3, SB-4, SB-5, SB-6) and non-residential RBTL (SB-8): The detections above the residential RBTL were consistent with naturally occurring concentrations (less than the maximum observed USGS concentration),; however, the detection at SB-8 significantly exceeded the maximum observed USGS concentration.

In subsurface soil, the following metals were detected at concentrations exceeding MRBCA RBTLs or EPA RSLs in at least one subsurface soil sample.

- Arsenic – residential RBTL (SB-4, SB-7) and non-residential RBTL (SB-2, SB-3, SB-5, SB-8): Of these, the detections at SB-3, SB-5, and SB-8 exceeded the maximum observed USGS concentration.
- Beryllium - residential RBTL (SB-2, SB-7): The USGS has not established a background concentration for beryllium.
- Lead – non-residential RBTL (SB-7 and SB-8): The detections significantly exceeded the maximum observed USGS concentration.
- Thallium – non-residential RBTL (SB-1): The USGS has not established a background concentration for thallium.

The following locations have concentrations of metals that exceeded a non-residential RBTL that are not likely to be naturally occurring or for which no background information is available: surface soil at SB-8 and subsurface soil at SB-1, SB-2, SB-3, SB-5, SB-7, and SB-8.

The following locations have concentrations of metals that exceeded a residential RBTL are are not likely to be naturally occurring or for which no background information is available: surface soil at SB-1, SB-3, SB-4, SB-5, SB-6 and subsurface soil at SB-4.

5.1.5 Groundwater

As part of the Toeroek Team Phase II ESA in 2023, to investigate the possible presence of contaminants in groundwater from historical activities at the Site, the Toeroek Team collected four groundwater samples (groundwater [GW]-2, GW-4, GW-6, and GW-7) co-located with the like- numbered soil borings. (Appendix A, Figure 5). Groundwater samples were analyzed for VOCs, SVOCs, TPH-GRO,

TPH-DRO, TPH-ORO, and TAL metals. Analytical data were compared to MRBCA RBTLs for clayey soil (MoDNR 2006) and resulted in the following noteworthy findings

No VOC, SVOC, or TPH exceeded an MRBCA Tier 1 residential RBTL.

Metals were detected in every sample. Concentrations of total metals in groundwater were assumed to derive largely from suspended sediment. Comparisons of analytical data to MRBCA RBTLs resulted in detections of the following dissolved metals at concentrations exceeding MRBCA RBTLs:

- Dissolved cadmium – residential RBTL (GW-6 and GW-7); and
- Dissolved manganese – residential RBTL (GW-5 and GW-6).

5.1.6 Soil Gas

As part of the Toeroek Team Phase II ESA in 2023, to investigate the possible presence of contaminants in soil gas from historical activities at the Site, eight soil-gas samples (soil gas [SG]-1 through SG-8) were collected (Appendix A, Figure 5). Soil-gas samples were analyzed for VOCs. Analytical data were compared to EPA vapor intrusion screening levels (VISLs) and MRBCA RBTLs for clayey soils (EPA 2023b; MoDNR 2006) to provide an initial screen for potential residential exposure risk from vapor intrusion. Because risk from the detected constituents is primarily or entirely driven by cancer risk, a total hazard quotient of 1.0 was assumed.

VOCs were detected in all soil-gas samples. Concentrations of benzene in soil-gas samples SG-1 and SG-4 exceeded the residential VISL, and concentration of benzene in SG-1 also exceeded the commercial VISL. However, neither concentration exceeded the MRBCA RBTL for clayey soils, assuming a residential land use. Even assuming the most conservative soil type (sandy soil), concentrations of benzene in soil gas were below the MRBCA RBTLs for soil vapor. Soil vapor is not discussed further in this ABCA.

5.2 EVALUATION OF CLEANUP ALTERNATIVES FOR ASBESTOS-CONTAINING MATERIAL

Evaluations of cleanup alternatives are based on potential future use scenarios at the Site—to be conservative, residential development is assumed. The Toeroek Team has developed three cleanup alternatives for ACM. Although demolition of the Site buildings is presumed, cleanup alternatives for ACM are developed to indicate alternatives for limited abatement of damaged ACM, as well as demolition or removal of all hazardous materials.

Regarding ACM, three options were evaluated: (1) no action; (2) abatement of all ACM wastes; and (3) O&M plan. Alternatives 2 and 3 are expected to achieve clearance criteria under MoDNR requirements.

5.2.1 Alternative 1: No Action (Baseline)

The no action alternative is included as a baseline for comparison to the other proposed alternatives. Alternative 1 (No Action) would leave ACM in place at the Site.

Effectiveness

Redevelopment of areas containing ACM would have to be restricted to ensure that those materials remain undisturbed. Additionally, in accordance with NESHAP regulations, demolition of the Site building cannot proceed before proper abatement; therefore, demolition could not occur if Alternative 1 would be selected. Alternative 1 would be ineffective in achieving the goal of reducing health risks.

Implementation

Implementation of Alternative 1 is straightforward—ACM left in place. Future redevelopment would have to consider the location and condition of the ACM and ensure that those materials remain undisturbed. Demolition could not occur prior to abatement.

Cost

Alternative 1 would not involve any direct costs.

5.2.2 Alternative 2: Abatement of all Asbestos-Containing Material

Alternative 2 would involve, prior to demolition or renovations, proper abatement of all ACM identified in the Site buildings. Abatement by a licensed State of Missouri asbestos abatement contractor would accord with applicable local, state, and federal regulations, and a pre-approved Remedial Action Plan (RAP). Regulatory clearance sampling would occur according to a pre-approved quality assurance project plan (QAPP), and MoDNR may conduct pre/post-abatement inspections (if required).

Effectiveness

Removal of all identified ACM under Alternative 2 would meet applicable or relevant and appropriate requirements (ARARs) established by the NESHAP regulation, and would address the risk to human health posed by ACM. In addition, full abatement would allow redevelopment of the Site without restrictions pertaining to disturbance of ACM.

Implementation

Abatement of ACM by a licensed State of Missouri asbestos abatement contractor would accord with applicable local, state, and federal regulations. EPA, state, and Occupational Safety and Health Administration (OSHA) requirements must be met during removal of ACM and during demolition. A pre-approved RAP and Health and Safety Plan would address these regulations.

Cost

The estimated total cost of Alternative 2 is $21,000. Table 1 lists total costs associated with Alternative 2. Listed cost per LF includes removal and disposal costs. The estimated cost for abatement of ACM associated with the Site building is $5,000. This estimate does not include restoration costs. Additional costs to be considered include those for three technical plans/reports (RAP, QAPP, and Final Abatement Report) and for collection of clearance samples. The estimated cost of technical plans/reports is $12,000 total (cost of plans includes consideration of all environmental issues to be addressed by cleanup activities). Additional costs for oversight and clearance sampling are considered variable based on requirements and duration of abatement. The estimated cost associated with oversight and clearance is $4,000.

These costs are considered to be rough order-of-magnitude estimates with an accuracy range of -25 to +75 percent based on the Project Management Institute's (2017) A Guide to the Project Management Body of Knowledge of evaluated cleanup alternatives intended for comparison purposes only; these costs should not be used as budget- or design-level estimates

TABLE 1

ASBESTOS-CONTAINING MATERIAL ALTERNATIVE 2 – TOTAL COSTS

Line Item	Cost
Abatement of ACM (1,250 SF at $4 per square foot)	$5,000
Development of RAP	$4,500
Development of QAPP	$3,500
Final Abatement Report	$4,000
Oversight and clearance sampling	$4,000
Total Alternative 2 Cost	**$21,000**

Notes:

ACM	Asbestos-containing material
QAPP	Quality Assurance Project Plan
RAP	Remedial Action Plan
SF	Square feet

5.2.3 Alternative 3: Operations and Management Plan

If demolition of the Site building is not to occur, Alternative 3 would involve preparing an O&M plan for the Site to address any ACM present. The O&M plan would include the following: maps and drawings showing locations of remaining ACM, description of accessibility, protocols and schedules for regular inspections, and contingency plans for dealing with any damaged or necessarily disturbed ACM. In addition, filing the O&M Plan on the property's chain-of-title as an IC would be required. If renovation of the building is to occur, any remaining ACM is not to be disturbed and may remain in place. The building may not be demolished unless all identified ACM is abated therefore, selection of Alternative 3 would preclude demolition.

Effectiveness

An O&M Plan for the Site under Alternative 3 would meet ARARs established by the NESHAP regulation and would address the risk to human health posed by ACM. As such, ACM left to remain in place would have to be regularly monitored to ensure no damage occurs. Future redevelopment plans would have to consider locations and condition of any remaining ACM and ensure those materials would not be disturbed.

Implementation

Regular inspections of ACM by a licensed State of Missouri asbestos inspector would accord with applicable local, state, and federal regulations. A Health and Safety Plan would address these regulations.

Cost

Estimated cost of an O&M plan is $3,500. Additional costs for oversight and regular inspections are considered variable based on requirements and duration of inspections. The estimated total cost of Alternative 3 starts at $3,500 for the O&M plan alone. Ongoing oversight and subsequent inspections should be expected for the duration of the life of the building and will accrue significant additional costs.

5.3 EVALUATION OF CLEANUP ALTERNATIVES FOR LEAD-BASED PAINT

Evaluations of cleanup alternatives are based on potential future use scenarios at the Site—to be conservative, residential development is assumed. The Toeroek Team has developed three cleanup alternatives for LBP. Although demolition of the Site building is presumed, cleanup alternatives for LBP are developed to indicate alternatives for limited abatement of damaged LBP, as well as demolition or removal of all hazardous materials.

Regarding LBP, three options were evaluated: (1) no action; (2) abatement of all LBP wastes; and (3) encapsulation of LBP with O&M and ICs. Alternatives 2 and 3 are expected to achieve clearance criteria under MoDNR requirements.

5.3.1 Alternative 1: No Action (Baseline)

The no action alternative is included as a baseline for comparison to the other proposed alternatives. Alternative 1 (No Action) would leave LBP in place at the Site.

Effectiveness

Alternative 1 would not be effective if the Site building is renovated. Redevelopment of areas containing LBP would have to be restricted to ensure that those materials remain undisturbed. Alternative 1 would also be ineffective in achieving the goal of reducing health risks. If the building is remodeled, a sample of the debris must be collected for toxicity characteristic leaching procedure (TCLP) analysis for Resource Conservation and Recovery Act metals to determine if demolition debris is hazardous waste.

Implementation

Implementation of Alternative 1 is straightforward—LBP left in place. Future redevelopment would have to consider location and condition of the LBP, and ensure that those materials remain undisturbed. Demolition could occur without abatement. If the building is completely demolished, the presumption would be the demolition debris, in bulk, is non-hazardous waste (U.S. Army 1993). However, TCLP confirmation sampling of demolition debris would be required prior to disposal for any remodeling or partial demolition activities.

Cost

Alternative 1 would not involve any direct costs.

5.3.2 Alternative 2: Abatement of all Lead-Based Paint

Alternative 2 would involve, prior to demolition or renovations, proper abatement of all LBP identified in the Site buildings. All surfaces and components that contain LBP determined to be in good condition would be removed for proper disposal. LBP removal by a licensed LBP removal professional would comply with applicable local, state, and federal regulations. Regulatory clearance sampling would occur according to a pre-approved QAPP, and MoDNR may conduct pre/post-abatement inspections (if required).

Effectiveness

Removal of all identified LBP under Alternative 2 would effectively address the risk to human health posed by the LBP. In addition, full abatement would allow redevelopment of the Site without restrictions pertaining to disturbance of LBP.

Implementation

Abatement of LBP by a licensed LBP removal professional would accord with applicable local, state, and federal regulations. EPA, state, and OSHA requirements must be met during removal of LBP and during demolition. A pre-approved RAP and Health and Safety Plan would address these regulations.

Cost

The estimated total cost of Alternative 2 is $645,225. Table 2 lists total costs associated with Alternative 2. Listed cost per LF and SF includes removal and disposal costs. The estimated cost for abatement of LBP associated with the Site building is $573,255. This estimate does not include restoration costs. Additional costs to be considered include those for three technical reports (RAP, QAPP, and Final Abatement Report) and for collection of clearance samples. The estimated cost of technical plans/reports is $12,000 total (cost of plans includes consideration of all environmental issues to be addressed by cleanup activities). Additional costs for oversight and clearance sampling are considered variable based on requirements and duration of abatement. The estimated cost associated with oversight and clearance is $60,000.

These costs are considered to be rough order-of-magnitude cost estimates with an accuracy range of -25 to +75 percent based on the Project Management Institute's (2017) A Guide to the Project Management Body of Knowledge of evaluated cleanup alternatives intended for comparison purposes only; these costs should not be used as budget- or design-level estimates.

TABLE 2

LEAD-BASED PAINT ALTERNATIVE 2 – TOTAL COSTS

Line Item	Cost
Abatement of LBP (64 LF at $15 per linear foot and 38,153 SF at $15 per square foot)	$573,255
Development of RAP	$4,500
Development of QAPP	$3,500
Final Abatement Report	$4,000
Oversight and clearance sampling	$60,000
Total Alternative 2 Cost	**$645,225**
Total Alternative 2 Cost (rounded)	**$650,000**

Notes:

LBP	Lead-based paint
LF	Linear feet
QAPP	Quality Assurance Project Plan
RAP	Remedial Action Plan
SF	Square feet

5.3.3 Alternative 3: Lead-Based Paint Encapsulation and Operations and Maintenance

If demolition of the Site building is not to occur, Alternative 3 would involve encapsulating LBP in the Site building and preparing ICs and an O&M plan for the Site to address any LBP present. LBP-containing surfaces would be inspected, and removal of loose LBP would be required. Removed LBP residue would be segregated for proper disposal. LBP encapsulant would be a durable, air- and dust-tight surface coating. Application of the encapsulant would ensure that remaining LBP could not leach to the painted surface and pose a threat to future occupants. This would prevent access and disturbance of LBP identified during the Phase II ESA. The O&M plan would include the following: maps and drawings showing locations of remaining LBP, description of accessibility, protocols and schedules for regular inspections, and contingency plans for dealing with any damaged or necessarily disturbed LBP. In addition, filing the O&M Plan on the property's chain-of-title as an IC would be required. If renovation of the building is to occur, the remaining LBP is not to be disturbed and may remain in place. The building may not be demolished unless the LBP is abated, so selection of Alternative 3 would preclude demolition.

Effectiveness

LBP encapsulation and O&M for the Site under Alternative 3 would effectively address the risk to human health posed by the LBP. As such, LBP left to remain in place would have to be regularly monitored to ensure it is not damaged, and future redevelopment plans would have to consider locations and condition of the remaining LBP and ensure those materials would not be disturbed.

Implementation

Regular inspections of LBP by a licensed State of Missouri lead inspector would accord with applicable

local, state, and federal regulations. A Health and Safety Plan would address these regulations.

Cost

Estimated cost of LBP Encapsulation and O&M plan is $310,000. Additional costs for oversight and regular inspections are considered variable based on requirements and duration of inspections. The estimated total cost of Alternative 3 is $310,000. Ongoing oversight and subsequent inspections to support the O&M plan should be expected for the duration of the life of the building and will accrue significant additional costs.

5.4 EVALUATION OF CLEANUP ALTERNATIVES FOR SOIL AND GROUNDWATER

The Toeroek Team has also developed three cleanup alternatives for soil and groundwater. Because a risk assessment of the Site was not completed and the current property owner is expected to enroll the Site in the MoDNR BVCP, cleanup levels for metals in soil and groundwater are based on the MoDNR Tier 1 Residential RBTLs for residential land use (MoDNR 2006). Soil is considered "contaminated" where concentrations of metals exceed the residential RBTL, and the metal is not considered naturally occurring. Groundwater is considered "contaminated" if dissolved concentrations of metals exceed the residential RBTL. Evaluations considered MoDNR BVCP procedural requirements—because cleanup projects implemented with EPA Brownfields Cleanup funding require participation in the MoDNR BVCP. For reference, fees associated with enrollment in the MoDNR BVCP include a $200 application fee and refundable oversight deposit of $5,000. However, whether the Site will be enrolled in the MoDNR BVCP program, is unknown.

Three options were evaluated for residential and/or commercial reuse: (1) no action; (2) soil management plan (SMP), ECs, and ICs; and (3) soil excavation with off-site disposal. Each approach (excluding no action) can satisfy clearance criteria under the MoDNR BVCP.

5.4.1 Alternative 1: No Action (Baseline)

The no action alternative is included as a baseline for comparison to the other proposed alternatives. Alternative 1 would involve no containment, treatment, removal, or monitoring of contaminants. All contaminated soil and groundwater would be left in place, and no restrictions on future land use would be imposed.

Effectiveness

Because the no action alternative would not be protective of human health and the environment, it is not considered effective.

Implementation

Implementation of Alternative 1 would require no effort because no containment, treatment, removal, or monitoring of contaminants would occur. Future redevelopment would have to consider the potential threat to human health and the environment.

Cost

Alternative 1 would not involve any direct costs.

5.4.2 Alternative 2: Soil Management Plan, Engineering Controls, and Institutional Controls

The alternative would leave contaminated soil and groundwater in place. Potential site receptors currently are not protected from exposure to contaminated soil via dermal contact and incidental ingestion. However, a SMP would guide proper handling of soil at the Site if the soil is disturbed (for example, during new structure construction). The SMP would present a tiered approach to soil management, regulatory approval, documentation, and record keeping in order to minimize administrative requirements.

Groundwater at the Site contains dissolved concentrations of cadmium and manganese that exceed residential RBTLs. ICs should be implemented at the Site to ensure that installation of shallow groundwater drinking water wells is prohibited.

ECs would be necessary to ensure that potential site receptors are protected from exposure to contaminated soils. Based on the results of surface soil sampling, surface soil is contaminated across most of the Site. Alternative 2 would involve capping the entire area of the Site with a geotextile, compacted soil, and vegetative cover. For the purposes of estimating cost, the entire area of the Site is assumed (or 157,000 SF). The cap would consist of a geotextile layer, a 2-foot layer of low-permeability compacted clay, 6 inches of topsoil, and a vegetative cover. Long term O&M would be required to maintain protection and ensure effectiveness of the cap, which will accrue additional costs. Ongoing oversight and subsequent inspections to support cap O&M should be expected for the duration of the life of the cap and will accrue significant additional costs Additional soil sampling may be needed to further delineate on-site contamination.

ICs would be necessary to ensure that a SMP is in place to manage contaminated soils. ICs would be implemented in the form of a deed restriction/environmental covenant disallowing excavation of on-site

soil where metals were detected at concentrations exceeding cleanup levels, and disallowing installation of shallow groundwater drinking water wells on the Site.

Alternative 2 would allow redevelopment of the Site as planned; however, ICs and ECs would be required in perpetuity.

Effectiveness

Alternative 2 would be effective in limiting exposure of affected soils to Site occupants and allow for residential and/or commercial redevelopment of the Site. However, Alternative 2 would leave affected soil in place and require long-term stewardship to ensure continuation of all restrictive measures over the life of the ECs and ICs.

Implementation

A SMP, ECs, and ICs would be easy to implement, as no physical remediation would be required. Implementation of ICs would include a restrictive covenant filed with the Register of Deeds to prohibit disturbance of contamination left in place under any future use scenario and a restrictive covenant to restrict installation of shallow groundwater drinking water wells on the Site. Alternative 2 would mandate annual inspections to ensure that Site occupants comply with restrictive covenants.

Cost

Estimated total cost of Alternative 2 in 2024 dollars is $860,000. Table 3 lists total costs associated with Alternative 2: $31,000 for a SMP, $600,000 for ECs, and $31,000 for ICs. Additional costs for oversight and regular inspections of the cap are considered variable based on requirements and duration of inspections. Ongoing oversight and subsequent inspections should be expected for the duration of the life of the building and will accrue significant additional costs. Costs were estimated by applications of selected functions of Remedial Action Cost Engineering and Requirements System (RACER) Version 11.2.16.0 and professional judgment. Details of costs are in Appendix B.

These costs are considered to be rough order-of-magnitude cost estimates with an accuracy range of -25 to +75 percent based on the Project Management Institute's (2017) A Guide to the Project Management Body of Knowledge of evaluated cleanup alternatives intended for comparison purposes only; these costs should not be used as budget- or design-level estimates.

TABLE 3

SOIL AND GROUNDWATER ALTERNATIVE 2 – TOTAL COSTS

Line Item	Cost
SMP	$31,000
ECs	$600,000
ICs	$31,000
Contingency	$193,000
Total Alternative 2 Cost	**$855,000**
Total Alternative 2 Cost (rounded)	**$860,000**

Notes:

EC	Engineering control
IC	Institutional control
SMP	Soil Management Plan

5.4.3 Alternative 3: Soil Excavation with Off-Site Disposal

Alternative 3 would involve localized excavation of soil in the areas where metals were detected at concentrations exceeding cleanup levels. Disposal of excavated soil then would occur off of the Site at a landfill facility. Alternative 3 would allow unrestricted use of the Site.

For cost estimating purposes, the Toeroek Team assumed the following:

- Soil Excavation – Sample Location SB-1: The volume of soil to be excavated to cleanup levels is approximately 96 cubic yards (cy), assuming an area of 400 SF and depth of 6.5 feet bgs. The approximate area for excavation is depicted on Figure 6 in Appendix A.
- Soil Excavation – Sample Location SB-2: The volume of soil to be excavated to cleanup levels is approximately 133 cy, assuming an area of 400 SF and depth of 9 feet bgs.
- Soil Excavation – Sample Location SB-3: The volume of soil to be excavated to cleanup levels is approximately 170 cy, assuming an area of 400 SF and depth of 11.5 feet bgs.
- Soil Excavation – Sample Location SB-4: The volume of soil to be excavated to cleanup levels is approximately 170 cy, assuming an area of 400 SF and depth of 11.5 feet bgs.
- Soil Excavation – Sample Location SB-5: The volume of soil to be excavated to cleanup levels is approximately 133 cy, assuming an area of 400 SF and depth of 9 feet bgs.
- Soil Excavation – Sample Location SB-6: The volume of soil to be excavated to cleanup levels is approximately 133 cy, assuming an area of 400 SF and depth of 9 feet bgs.
- Soil Excavation – Sample Location SB-7: The volume of soil to be excavated to cleanup levels is approximately 133 cy, assuming an area of 400 SF and depth of 9 feet bgs.
- Soil Excavation – Sample Location SB-8: The volume of soil to be excavated to cleanup levels is approximately 111 cy assuming an area of 400 SF and depth of 7.5 feet bgs.
- Confirmation Sampling: Confirmation soil sampling will require collection of five 5-point composite soil samples from each excavated area—four from the walls and one from the floor—to ensure contaminant concentrations in remaining soils are below cleanup levels.

- Backfill: Excavated areas to be backfilled with clean material from off of the Site, graded, and seeded, as necessary, for redevelopment.
- Waste Disposal: Presumably, all excavated soil would be accepted at a landfill facility as non-hazardous waste.

ICs would be implemented to disallow installation of shallow groundwater drinking water wells on the Site.

Effectiveness

Soils with contaminant concentrations above MRBCA residential RBTLs would be removed from the Site, thus allowing Site redevelopment. Alternative 3 would allow unrestricted use of the Site.

Implementation

Soil excavation by qualified equipment operators would accord with applicable state and federal regulations. Excavation of at least 1,079 cy of soil is necessary to clean up the Site. Excavation will be difficult to implement due to the likelihood of contaminated soils extending at greater distances from the soil borings than the assumed distances above. Excavation would need to continue laterally and to depth until concentrations were below RBTLs. All waste soil excavated during this process would be transported for disposal off of the Site as either non-hazardous or hazardous waste, depending on results of TCLP analysis. For cost estimating purposes, assumptions are that none of the excavated soil would be used as backfill and all excavated soil would be handled as non-hazardous waste. In addition, planning for this alternative would require careful precautionary consideration concerning worker health and safety.

Cost

Estimated total cost of Alternative 3 in 2024 dollars is $460,000. Table 4 lists total costs associated with Alternative 3. Costs were estimated by applying selected functions of RACER Version 11.2.16.0 and professional judgement. Details of costs are in Appendix B. The estimated costs for Alternative 3 could be reduced if additional sampling occurs to further delineate lateral and vertical extents of contamination; thereby, possibly reducing excavation volume.

These costs are considered to be rough order-of-magnitude cost estimates with an accuracy range of -25 to +75 percent based on the Project Management Institute's (2017) A Guide to the Project Management Body of Knowledge of evaluated cleanup alternatives intended for comparison purposes only; these costs should not be used as budget- or design-level estimates.

TABLE 4

SOIL AND GROUNDWATER ALTERNATIVE 3 – TOTAL COSTS

Line Item	Cost
Construction, Confirmation Sampling, and Transportation/Disposal	$356,000
Contingency	$107,000
Total Alternative 3 Cost	**$463,000**
Total Alternative 3 Cost (rounded)	**$460,000**

5.5 RECOMMENDED CLEANUP ALTERNATIVES

The following subsections discuss recommended cleanup alternatives for ACM, LBP, and contaminated soil and groundwater at the Site.

5.5.1 Asbestos-Containing Material

Alternative 2 (Abatement of ACM) is the recommended cleanup alternative for ACM. Future plans at the Site are unknown; however, the current building is gutted and either substantial rehabilitation/renovation or demolition is necessary; therefore, removal of the identified ACM would be required prior to initiation of those activities.

5.5.2 Lead-Based Paint

Alternative 2 (Abatement of all LBP) is the recommended cleanup alternative for LBP. Future plans at the Site are unknown; however, the current building is gutted and either substantial rehabilitation/renovation or demolition is necessary; therefore, removal of the identified LBP would be required prior to initiation of those activities.

5.5.3 Affected Soils and Groundwater

Alternative 2 (SMP, ECs, and ICs) is the recommended cleanup alternative for soils and groundwater. Alternative 2 would achieve regulatory compliance and allow for residential and/or commercial redevelopment of the Site. Alternative 2 would be the more cost-effective option (excluding Alternative 1) to address contaminated soil at the Site. Moreover, the unbounded extent of soil excavation for Alternative 3 introduces an unacceptable level of uncertainty. Groundwater would be addressed with ICs implemented at the Site to ensure the installation of shallow groundwater drinking water wells is prohibited.

5.5.4 Total Cleanup Cost

Table 5 summarizes total cleanup costs for the recommended alternatives. Based on the recommended cleanup alternatives, estimated total cleanup cost is $1,500,000. As stated above, costs for demolition of the building, Site restoration, and any associated disposal costs for addressing construction and demolition waste materials are not included in this ABCA.

TABLE 5

SUMMARY OF COSTS FOR RECOMMENDED ALTERNATIVES

Contaminant / Material	Recommended Alternative	Total Cost
ACM	Alternative 2 – Abatement of ACM (1,250 SF)	$21,000
LBP	Alternative 2 – Abatement of LBP (38,153 SF and 64 LF)	$650,000
Affected Soils	Alternative 2 – SMP, ECs, and ICs	$860,000
Total Cost		**$1,531,000**
Total Cost (rounded)		**$1,500,000**

Notes:

ACM	Asbestos-containing material
EC	Engineering control
IC	Institutional control
LBP	Lead-based paint
LF	Linear feet
SF	Square feet
SMP	Soil Management Plan

6.0 REFERENCES

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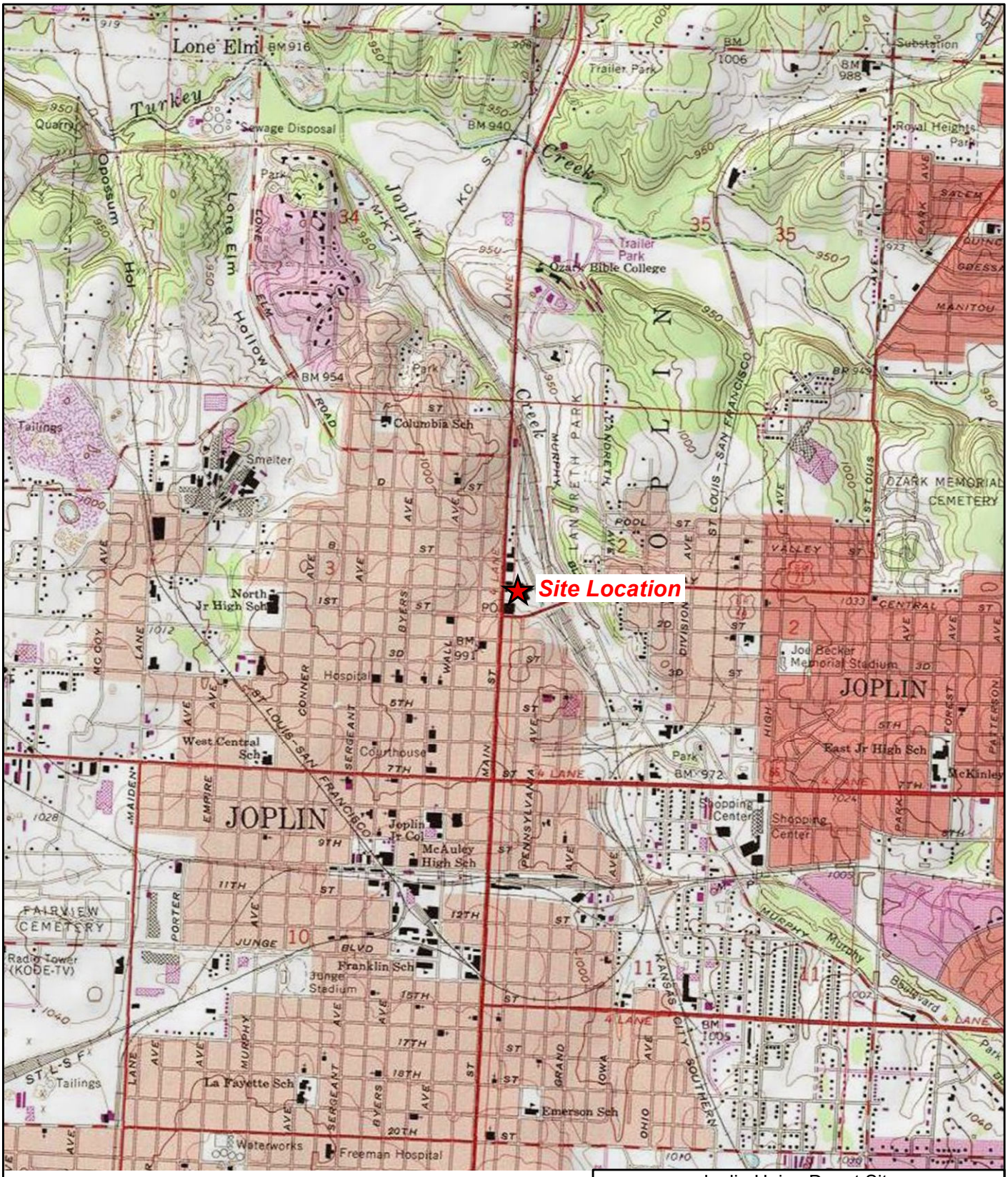
APPENDIX A

FIGURES

FIGURE 1 SITE LOCATION MAP



Source: USGS Joplin East, MO 7.5 Minute Topo Quad, 1979;
USGS Joplin West, MO 7.5 Minute Topo Quad, 1979

Joplin Union Depot Site
205 North Main Street
Joplin, Jasper County, Missouri

Figure 1
Site Location Map

TETRA TECH

TOEROEK ASSOCIATES, INC.

Date: 1/3/2024 Drawn By: Susmita Shrestha Project No: 103G65210190.19.03

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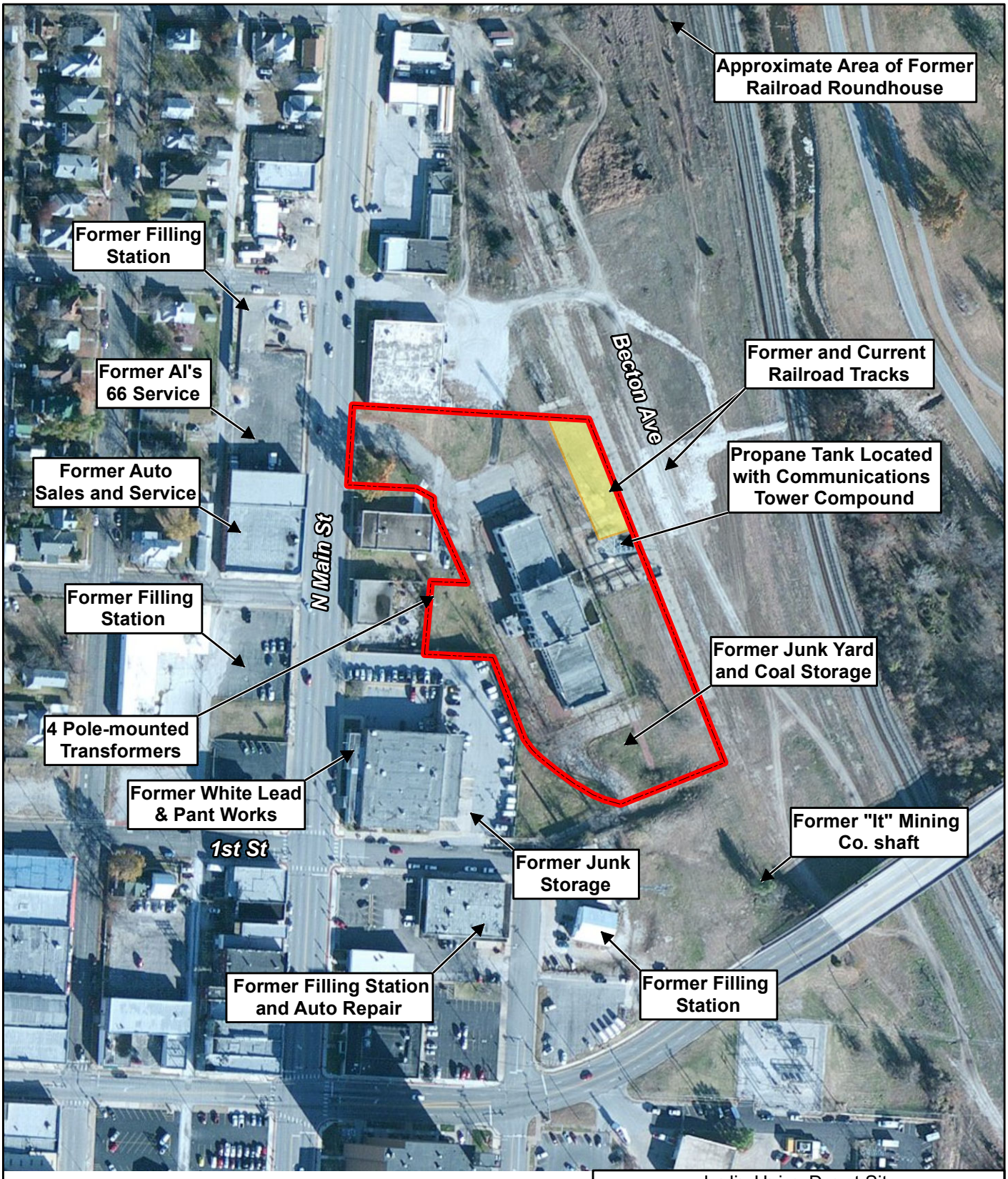
FIGURE 2 SITE LAYOUT MAP



Legend

Approximate former railroad spur

Approximate subject property boundary

N

0 100 200

Feet

Source: Esri, ArcGIS Online, World Imagery (Clarity)

Joplin Union Depot Site
205 North Main Street
Joplin, Jasper County, Missouri

Figure 2
Site Layout Map

TETRA TECH

TOEROEK ASSOCIATES, INC.

Date: 1/3/2024 Drawn By: Susmita Shrestha Project No: 103Z65210190.19.03

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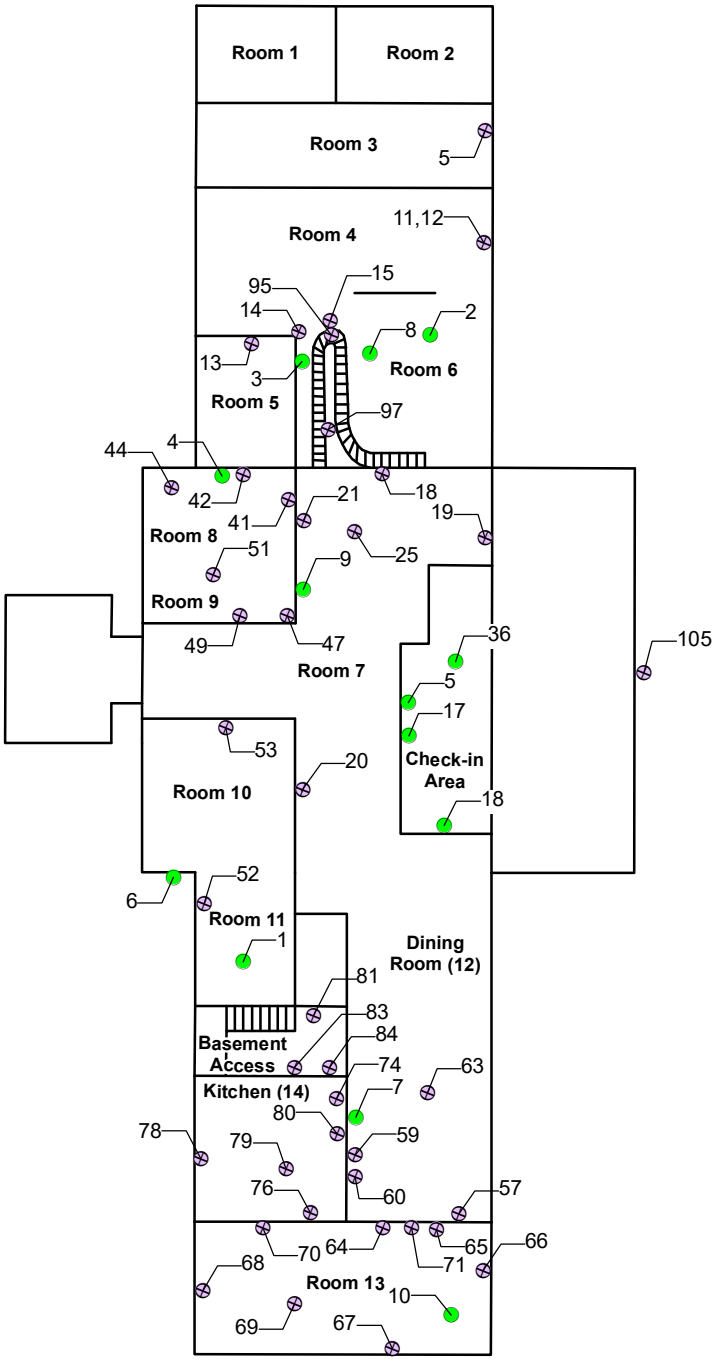
FIGURE 3 SAMPLE LOCATION MAP – HAZARDOUS MATERIALS FIRST FLOOR



Legend

- Negative Asbestos Sample Location
- Positive LBP Sample Location

LBP Lead-Based Paint

All sample points for the building are tabulated above, including points on other floors. Red text indicates confirmed asbestos-containing material (ACM).

N

Not to Scale

Joplin Union Depot
205 North Main Street
Joplin, Jasper County, Missouri

Figure 3
Sample Location Map - Hazardous Materials
First Floor

TETRA TECH

TOEROEK ASSOCIATES, INC.

Date: 2/8/2024 Drawn By: Nick Wiederholt Project No: 103Z65210190.19.01

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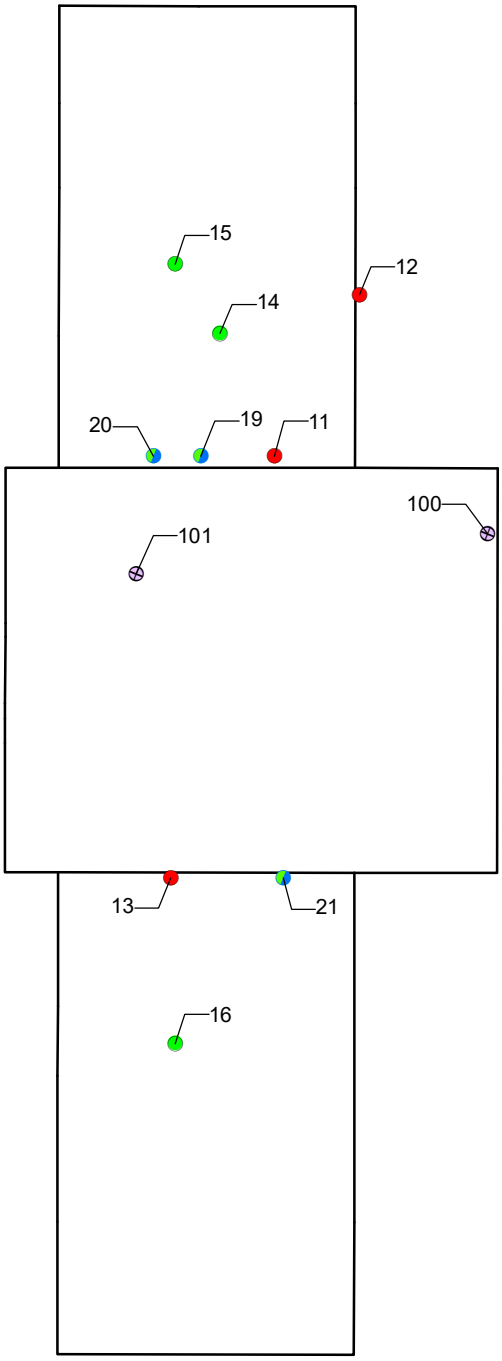
FIGURE 4 SAMPLE LOCATION MAP – HAZARDOUS MATERIALS SECOND FLOOR



Legend

- Negative Asbestos Sample Location
- Negative Asbestos / PCB Sample Location
- Positive Asbestos Sample Location
- Positive LBP Sample Location

LBP Lead-Based Paint

PCB Polychlorinated Biphenyl

All sample points for the building are tabulated above, including points on other floors. Red text indicates confirmed asbestos-containing material (ACM).

N

Not to Scale

Joplin Union Depot
205 North Main Street
Joplin, Jasper County, Missouri

Figure 4
Sample Location Map - Hazardous Materials
Second Floor

TETRA TECH

TOEROEK ASSOCIATES, INC.

Date: 2/8/2024 Drawn By: Nick Wiederholt Project No: 103Z65210190.19.01

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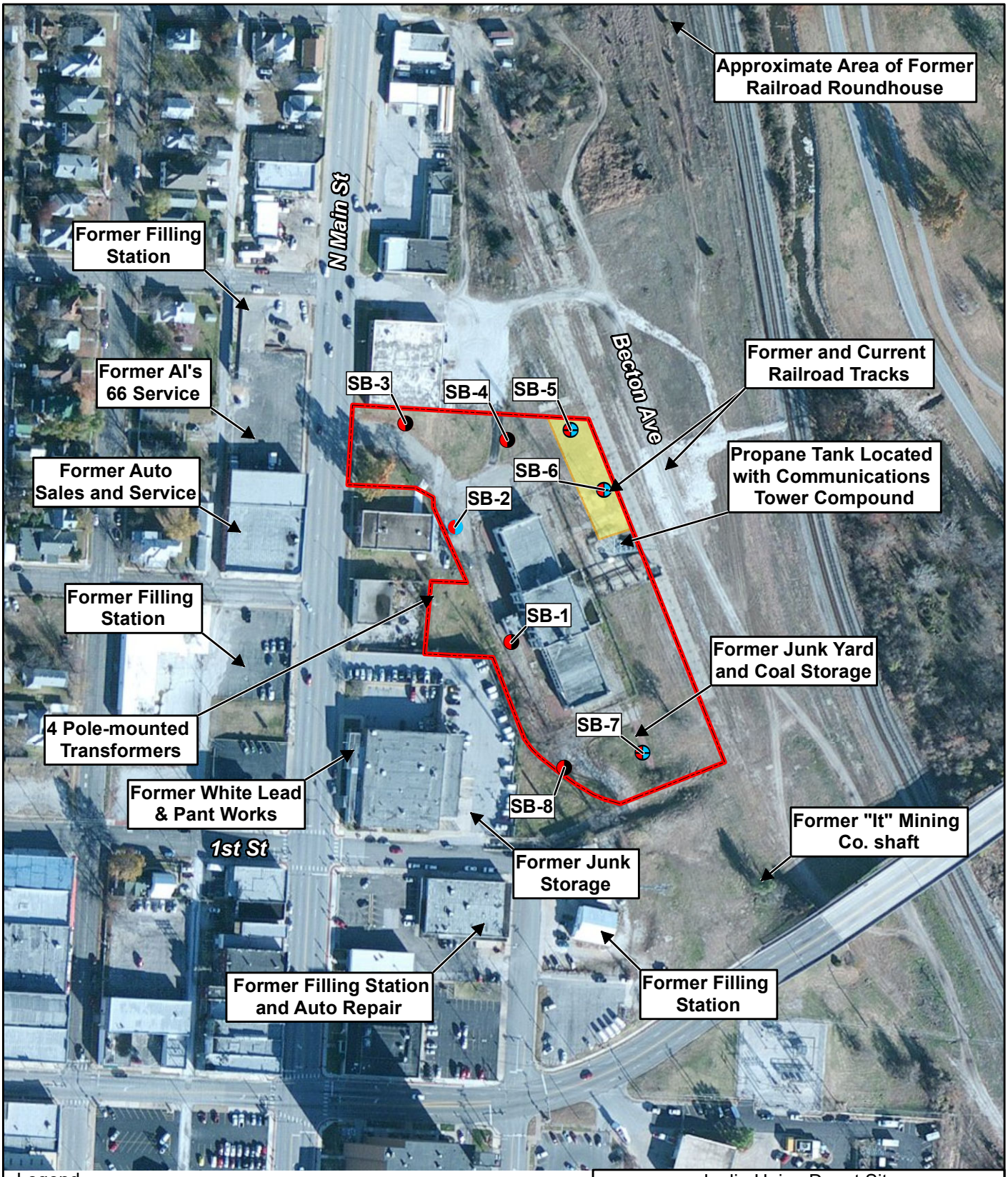
FIGURE 5 SAMPLE LOCATION MAP – SOIL, GROUNDWATER, AND SOIL GAS



Legend

- Soil/groundwater sample location
- Soil/groundwater/soil gas sample location
- Soil/soil gas sample location
- Approximate former railroad spur
- Approximate subject property boundary

N

0 100 200

Feet

Source: Esri, ArcGIS Online, World Imagery (Clarity)

Joplin Union Depot Site
205 North Main Street
Joplin, Jasper County, Missouri

Figure 5
Sample Location Map -
Soil, Groundwater, Soil Gas

TETRA TECH

TOEROEK ASSOCIATES, INC.

Date: 1/3/2024 Drawn By: Nick Wiederholt Project No: 103Z65210190.19.03

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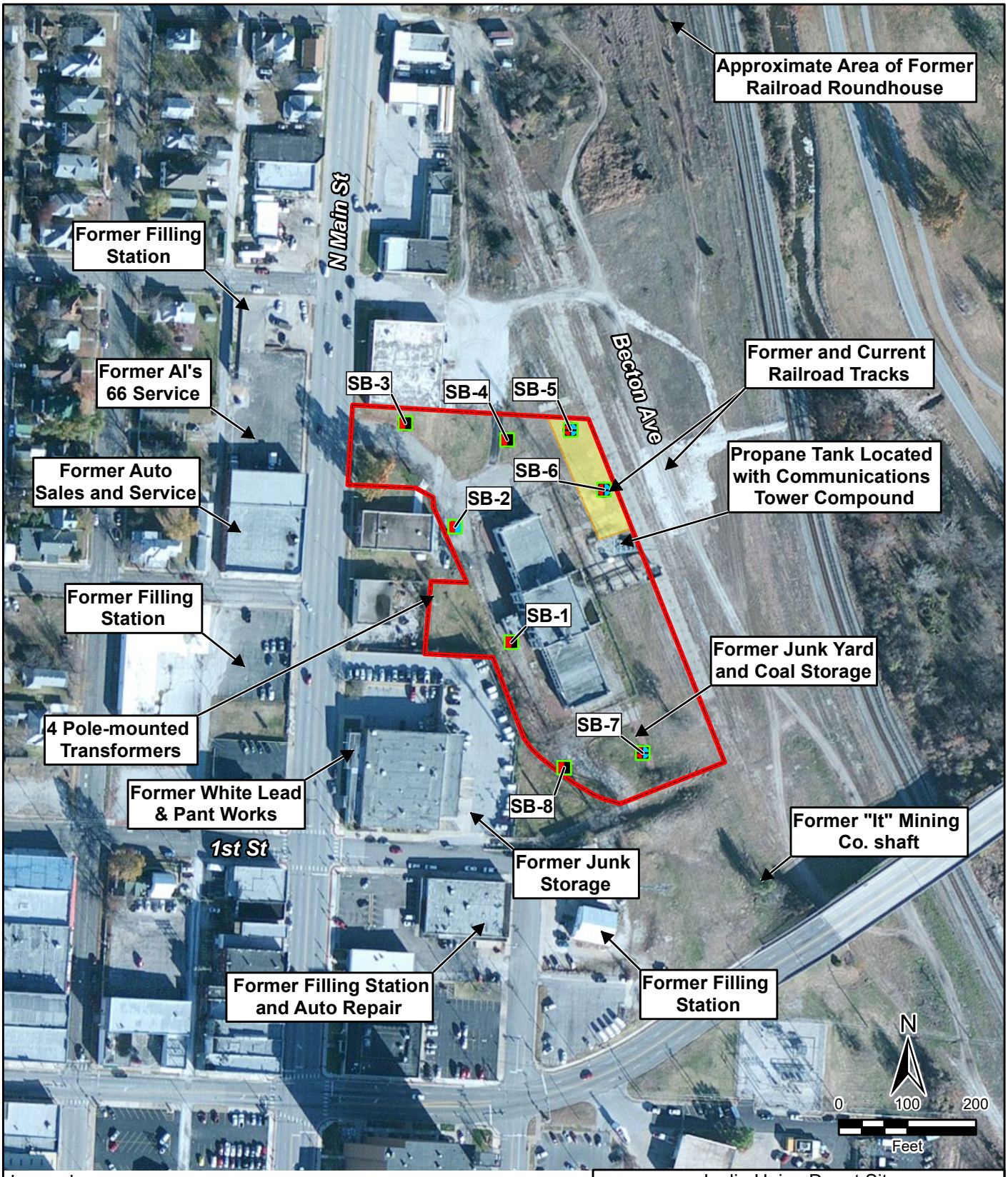
FIGURE 6 EXCAVATION AREA MAP



Legend

- Soil/groundwater sample location
- Soil/groundwater/soil gas sample location
- Soil/soil gas sample location
- Approximate excavation area
- Approximate former railroad spur
- Approximate subject property boundary

Source: Esri, ArcGIS Online, World Imagery (Clarity)

Joplin Union Depot Site
205 North Main Street
Joplin, Jasper County, Missouri

Figure 6

Soil Excavation Map

TETRA TECH | TOEROEK ASSOCIATES, INC.

Date: 1/3/2024 | Drawn By: Nick Wiederholt | Project No: 103Z65210190.19.03

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APPENDIX B

COST ESTIMATES

Appendix B
Remedial Alternatives Cost Estimates for Soil
Site 19 - Joplin Union Depot
Joplin, Jasper County, Missouri

TABLE B-1					
COST SUMMARY					
Alternative	**Description**	**Capital Cost**	**Institutional Controls**	**Operation & Maintenance**	**Total**
1	No Action	$0	$0	$0	$0
2	SMP, ECs and ICs	$ 39,000	$ 39,000	$ 777,000	$ 855,000
3	Soil Excavation with Off-Site Disposal	$ 463,000	$ -	$ -	$ 463,000

Notes:

EC	Engineering control
IC	Institutional control
SMP	Soil management plan

Appendix B
Remedial Alternatives Cost Estimates for Soil
Site 19 - Joplin Union Depot
Joplin, Jasper County, Missouri

ALTERNATIVE 2
SMP AND ICs

TABLE B-2
Cost Summary
Alternative 2 - SMP, EC and ICs

Source	Description	Subtotal	Contingency	Total (Rounded)
Table B-4	Soil Management Plan	$ 30,241	$ 9,072	$ 39,000
Table B-4	Institutional Controls	$ 30,343	$ 9,103	$ 39,000
Table B-4	Engineering Controls - Low Permeability Cap	$ 597,515	$ 179,254	$ 777,000

Contingency	30%		$ 197,429.68
Total			**$ 855,000**

Location factor (for zip code 64801)

ECHOS	1
Get-a-Quote	1.04

Note: Location factor applies only to national average unit costs; it does not apply to local unit costs such as from vendors or Means.

Appendix B
Remedial Alternatives Cost Estimates for Soil
Site 19 - Joplin Union Depot
Joplin, Jasper County, Missouri

Overhead and Profit (O&P)

General	25%	Typical general contractor overhead and profit (attributes to 15% overhead and 10% profit[1])
RACER	35%	Assumed markup for costing purposes
Professional judgment	0%	Professional judgement

Inflation 2.91% Avg. annual inflation from 2015 to 2024

TABLE B-3
Institutional Controls
Alternative 2 - SMP, EC and ICs

Item	Description	Quantity	Unit	Unit Price Source	Year	Unit Price	Unit Price (Incl. O&P and Inflation)	Subtotal Costs
A	**Soil Management Plan**							**$ 25,697**
1	Project manager	12	hrs	RACER	2015	$ 76.23	$ 133.19	$ 1,598
2	Project engineer	60	hrs	RACER	2015	$ 55.79	$ 97.47	$ 5,848
3	Staff engineer	80	hrs	RACER	2015	$ 67.62	$ 118.14	$ 9,451
4	QA/QC officer	12	hrs	RACER	2015	$ 63.57	$ 111.07	$ 1,333
5	Word processing/clerical	24	hrs	RACER	2015	$ 34.31	$ 59.95	$ 1,439
6	Draftsman/CADD	30	hrs	RACER	2015	$ 36.80	$ 64.30	$ 1,929
7	Attorney, partner, real estate	8	hrs	RACER	2015	$ 244.43	$ 427.06	$ 3,416
8	Other direct costs	1	ls	RACER	2015	$ 390.83	$ 682.85	$ 683
	Meetings with Agencies							**$ 4,544**
9	Per diem (per person)	1	day	RACER	2015	$ 174.00	$ 304.01	$ 304
10	Project manager	20	hrs	RACER	2015	$ 76.23	$ 133.19	$ 2,664
11	Word processing/clerical	16	hrs	RACER	2015	$ 34.31	$ 59.95	$ 959
12	Draftsman/CADD	8	hrs	RACER	2015	$ 36.80	$ 64.30	$ 514
13	Other direct costs	1	ls	RACER	2015	$ 59.20	$ 103.43	$ 103
B	**Institutional Controls**							**$ 30,343**
14	Overnight deliver, 8 oz letter	3	ea	RACER	2015	$ 19.23	$ 33.60	$ 101
15	Project manager	24	hrs	RACER	2015	$ 76.23	$ 133.19	$ 3,196
16	Word processing/clerical	32	hrs	RACER	2015	$ 34.31	$ 59.95	$ 1,918
17	Attorney, associate, real estate	60	hrs	RACER	2015	$ 172.46	$ 301.32	$ 18,079
18	Paralegal, real estate	80	hrs	RACER	2015	$ 50.17	$ 87.66	$ 7,012
19	Other direct costs	1	ls	RACER	2015	$ 21.18	$ 37.01	$ 37
C	**Engineering Controls - Low Permeability Cap**							**$ 378,174**
21	Selective clearing, brush, medium clearing, with dozer and brush rake, excludes removal offsite - (based on 157000 square feet area of topsoil with a 6" layer)	4	Ac	RACER	2016	$ 196.69	$ 333.94	**$ 1,202**
22	Landfill Nonhazardous Solid Bulk Waste by Ton - (based on 15700 square feet of area cleared up to 6")	785	Ton	RACER	2016	$ 25.97	$ 44.09	**$ 34,612**
23	Haul & Dispose 16.5 cy truck, 10 miles, landfill - to Jordan Disposal | Landfill & Waste Removal Service - Galena 1040 E Front St, Galena, KS 66739 (8 miles distance) - (based on 1080 cy of cleared volume divided by 16.5 cy of truck)	176	cy	RACER	2016	$ 29.89	$ 50.75	**$ 8,932**
24	2 foot of Compacted Clay, delivered and spread, 12 oz	1,080	cy	RACER	2016	$ 30.87	$ 52.41	**$ 56,604**
25	105 Mil Geotextile layer, non woven - (based on 157000 sq feet))	17,444	sy	RACER	2016	$ 3.75	$ 6.37	**$ 111,063**
26	Loam or topsoil, imported topsoil, 6" deep, furnish and place - (based on 157000 square feet area of topsoil with a 6" layer)	2,907	cy	RACER	2016	$ 28.47	$ 48.34	**$ 140,515**
27	Seeding, Vegetative Cover	4	Ac	RACER	2016	$ 4,130.40	$ 7,012.66	**$ 25,246**
28	**Surveying - 3 man crew**	3	Day	RACER	2016	$ 1,125.52	$ 1,910.93	**$ 5,733**

Appendix B
Remedial Alternatives Cost Estimates for Soil
Site 19 - Joplin Union Depot
Joplin, Jasper County, Missouri

	Construction subtotal		**$**	**378,174**
	Construction Contractor Mob./Demob., Site Prep and Submittals	10%	**$**	**37,817**
	Remedial design[1, 2]	20%	$	75,634.80
	Project management and construction oversight[1]	18%	$	68,071.32
	Capital Cost Subtotal		**$**	**597,515**

Notes:
Labor rates will be required to conform to the Davis-Bacon Act.

1	Based on "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study" (EPA 2000).
2	Remedial design includes developing plans and specifications, such as a remedial action work plan, design analysis, and construction cost estimating.
"	Inches
Ac	Acres
CADD	Computer-aided design
cy	Cubic yards
Demob	Demobilization
ea	Each
EPA	U.S. Environmental Protection Agency
hrs	Hours
IC	Institutional control
ls	Lump sum
LUC	Land use control
O&P	Overhead and profit
QA/QC	Quality assurance/quality control
RACER	Remedial Action Cost Engineering and Requirements System
sy	Square yards

Reference:
EPA. 2000. "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study." EPA 540-R-00-002, Office of Solid Waste and Emergency Response 9355.0-75. July.

Appendix B
Remedial Alternatives Cost Estimates for Soil
Site 19 - Joplin Union Depot
Joplin, Jasper County, Missouri

ALTERNATIVE 3
SOIL EXCAVATION WITH OFF-SITE DISPOSAL

TABLE B-4
Cost Summary
Alternative 3 - Soil Excavation with Off-Site Disposal

Source	Description	Subtotal	Contingency	Total (Rounded)
TABLE B-5	Soil Excavation with Off-site disposal	$ 356,442	$ 106,933	$ 463,000
NA	Institutional Controls	$ -	$ -	$ -
NA	Operation and Maintenance	$ -	$ -	$ -

Contingency	30%		$ 106,932.50
Total			**$ 463,000**

Appendix B
Remedial Alternatives Cost Estimates for Soil
Site 19 - Joplin Union Depot
Joplin, Jasper County, Missouri

Overhead and Profit (O&P)

General	25%	Typical general contractor overhead and profit (attributes to 15% overhead and 10% profit[1])
RACER	35%	Assumed markup for costing purposes
Professional judgment	0%	

Inflation 2.91% Avg. annual inflation from 2015 to 2024

TABLE B-5
Capital Cost
Alternative 3 - Soil Excavation with Off-Site Disposal

Item	Description	Quantity	Unit	Source	Year	Unit Price	Unit Price (Incl. O&P and Inflation)	Total Cost
	Soil Excavation (~1,080 cy)							**$ 225,596**
1	Dump truck (12 cy)	40	hrs	RACER	2016	$ 111.15	$ 173.17	$ 6,927
2	Excavate soil (2 cy bucket, hydraulic excavator)	1,080	bcy	RACER	2016	$ 1.50	$ 2.34	$ 2,524
3	Backfill (includes delivery, spreading, and compaction)	1,080	cy	RACER	2016	$ 28.47	$ 44.36	$ 47,904
4	Seeding, vegetative cover	3.60	ac	RACER	2016	$ 4,075.49	$ 6,349.46	$ 22,858
5	Haul & Dispose 16.5 cy truck, 10 miles, landfill - to Jordan Disposal | Landfill & Waste Removal Service - Galena 1040 E Front St, Galena, KS 66739 (8 miles distance)	65.00	CY (converted based on 2907 cy of cleared	RACER	2016	$ 29.89	$ 46.57	$ 3,027
6	Landfill Nonhazardous Solid Bulk Waste by Ton	1,458.00	Ton	RACER	2016	$ 25.97	$ 40.46	$ 58,991
7	Disposable materials for sampling - 5 confirmation samples+2qc	7	ea	RACER	2016	$ 10.55	$ 16.44	$ 115
8	TCLP analysis 5 confirmation samples+2qc	7	ea	RACER	2016	$ 199.98	$ 311.56	$ 2,181
9	TPH analysis 5 confirmation samples+2qc	7	ea	RACER	2016	$ 125.83	$ 196.04	$ 1,372
10	Project scientist	6	hrs	RACER	2016	$ 117.00	$ 182.28	$ 1,094
11	Reporting & Misc Items	1	ea		2024	$ 1,500.00	$ 1,720.55	$ 1,721
	Construction subtotal							**$ 225,596**
	Construction Contractor Mob./Demob., Site Prep and Submittals		10%					$ 22,560
	Remedial design[1, 2]		20%					$ 45,119.20
	Project management and construction oversight[1]		18%					$ 40,607.28
	Capital Cost Subtotal							**$ 356,442**

Notes:
Labor rates will be required to conform to the Davis-Bacon Act.

1	Based on "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study" (EPA 2000).
2	Remedial design includes developing plans and specifications, such as a remedial action work plan, design analysis, and construction cost estimating.
bcy	Bank cubic yard
cy	Cubic yard
ea	Each
EPA	U.S. Environmental Protection Agency
hrs	Hours
ls	Lump sum
NA	Not applicable
O&P	Overhead and profit
qc	Quality control
RACER	Remedial Action Cost Engineering and Requirements System
sy	Square yard
TCLP	Toxicity characteristic leaching procedure
TPH	Total petroleum hydrocarbons

Reference:
EPA. 2000. "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study." EPA 540-R-00-002, Office of Solid Waste and Emergency Response 9355.0-75. July.