MEMORANDUM

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TO: Ms. Kathryn Golden, CPMSM, CFM, Storm Water Manager, City of Lorain
Mr. Sanford Washington Jr., Safety/Service Director, City of Lorain

FROM: Hien Pham, CPG, Senior Project Manager, Verdantas
Sarah Ewing, VAP Certified Professional, Verdantas

CC: Steven Gross, VAP Certified Professional, Verdantas

DATE: November 22, 2022

RE: Summary of Evaluation of Remedial Options for Building Debris Removal at the City of Lorain Former St. Joseph Hospital Assessment Project (Property); 15011.0011.

PROJECT BACKGROUND AND OBJECTIVES

In accordance with approved May 27, 2022 Scope of Work, Verdantas, LLC (Verdantas) completed a series of test pits at the Property for further determination of the presence of Regulated Asbestos Containing Materials (RACM) and characterization of building demolition debris. Verdantas also installed and sampled six soil borings, five of which were converted to permanent monitoring wells, for the characterization of soil and groundwater media at the Property. These activities were conducted in effort to provide the City an Evaluation of Remedial Options (ERO) alternatives and associated Project Assumptions and Cost Estimate (PACE) for potential remedial activities at the Property.

The ERO and PACE discussed herein were developed based upon: the findings of radiation screening activities; visual observations, sampling of building debris, lead sheeting, and residual liquids during test pit activities; and sampling of soil and groundwater. A detailed discussion of these activities and the associated findings will be presented within a Phase II Property Assessment report, which will be submitted to the City under separate cover. The overall objective of this Memorandum is to provide the City with a probable ERO and PACE so that the City can evaluate the reasonably anticipated remedial activities and associated budgetary costs to conduct such activities that would be protective of human health and the environment and allow for the redevelopment of the Property.

Additionally, the investigation activities and findings were developed to further support the appropriate response actions associated with the Notice of Violations (NOVs) issued for the Property by both the Ohio EPA and the Lorain County Public Health Department (LCPH). The NOVs issued for the Property were in reference to improper clearance and disposal of building demolition debris including, the potential presence of hazardous waste, including observed lead sheeting materials comingled with demolition debris and failure to properly remove and dispose of asbestos-containing materials (ACM). LCPH also indicated that solid waste debris was present and that water that was infiltrating the former basement areas was considered leachate and must be disposed of in accordance with applicable laws and regulations.

INFORMATION AND INVESTIGATION ACTIVITIES

The following information was used in the development of this ERO and PACE:

- Results of radiological screening survey conducted both at the surface and of material at depth within test pits and rubble mound piles;
- Results of an October 2021 *Environmental Assessment Report* by Pardee Environmental to examine the Property and other tracts of land for suspect Asbestos Containing Material (ACM);
- Results of an August 2022, *Asbestos Demolition Debris Assessment Report* by Pardee Environmental to further characterize potential RACM in building debris at the Property, including at depth during test pit activities;
- Visual observations and analytical results of building debris material collected during test pit activities by Verdantas and Pardee;
- Analytical results of water samples from residual liquids (potential leachate) that has collected in the voids (i.e., basement areas) of the former building footprint areas on the Property; and,
- Analytical results of soil and groundwater samples collected from the installation and sampling of six soil borings, five of which were converted to permanent monitoring wells.

Between August 29 and August 31, 2022, exploratory test pits were advanced at the Property to further investigate the contents of the building debris material at the Property. Verdantas personnel oversaw test pit activities conducted by Precision Environmental Co., who also sub-contracted Pardee Environmental to evaluate potential RACM. Both Contractors are Ohio licensed Asbestos Hazardous Abatement specialist and were retained by Verdantas. A total of eighteen (18) test pits were advanced across the Property to various depths, depending on the height/depth of rubble mound piles and the absence/presence of former basement areas that were filled in during demolition activities. Test pits were advanced for visual observations by Verdantas staff as well as Pardee Environmental for identification of potential RACM and Solid Waste. Based upon observations, several of the test pits were composited into a sample for laboratory characterization. During test pit activities, Verdantas also collected grab samples of residual liquids that had accumulated within the voids of the former building footprints in four areas across the Property (identified as W-1 through W-4 on the attached figure and noted below) to evaluate proper disposal requirements. Additionally, discrete samples were collected of material surrounding observed pieces of lead sheeting (VL-1 through VL-4) to characterize the potential for the lead sheeting to have leached to the surrounding building debris. The locations of the test pits are illustrated with former building features on the attached figure. A sampling summary of the test pits is provided in the attached Table 1A, and a sampling summary of soil and groundwater media is provided in Table 1B. Tabulated analytical results will be provided as part of the forthcoming Phase II report.

On October 24 and October 25, 2022, Verdantas installed six soil borings at the Property. Samples were collected from each soil boring from the 0-2 foot depth interval and based on the highest observed PID reading observed between 2 foot and the termination of the boring/soil boring refusal. Five of the six soil borings were converted to permanent monitoring wells. The monitoring wells were developed, purged, gauged, and sampled to characterize the conditions of groundwater underlying the Property.

FINDINGS OF TEST PIT ACTIVITIES, SOIL AND GROUNDWATER SAMPLING ACTIVITIES

In general, the test pits advanced at the Property consistently identified construction and demolition debris (C&DD) including brick, concrete, masonry, drywall, plaster, glass, wood, metal, wiring, insulation, and carpeting. The C&DD materials are all co-mingled and cannot be easily segregated. Verdantas personnel did not observe solid waste materials such as clothing, refuse bags, mattresses, furniture, or other household materials. Verdantas did observe isolated components of light ballasts in two of the test pits (TP-3 and TP-8) which will need to be separated and disposed of properly.

Radiological screening investigation activities both at the surface, at depth in the test pits and rubble mound piles did not identify any radiological readings above normal background levels.

Based upon a cursory review of the analytical results associated with samples collected from the C&DD material and the water that has infiltrated the void spaces, there are no characteristically hazardous materials. Limited detections of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), metals, and total petroleum hydrocarbons (TPH) were present; however, the concentrations were not of significant concern.

Analytical results of the water samples collected from the building voids exhibited detections of metals, VOCs, and SVOCs in addition to reportable oil and grease. A cursory review of the water results in comparison to Ohio Voluntary Action Program (VAP) unrestricted potable use standards (UPUS) identified detections of 1,4-dioxane (maximum of 14 ug/L above VAP UPUS 4.6 ug/L) and pentachlorophenol (maximum of 1.7 ug/L above VAP UPUS of 1 ug/L), which is not an applicable or representative comparison but can be utilized as a screening tool to gauge the concentrations of chemicals reported and facilitate evaluation of appropriate disposal options.

Analytical results for building debris sampled in the vicinity of observed lead sheeting material did contain concentrations of lead above direct contact soil standards for residential land use and construction/excavation activities. However, the objective of the sampling was to characterize the material for proper disposal. Samples of the debris in the vicinity of the lead sheeting material are below the toxicity characteristic leaching procedure (TCLP) criteria for lead. The maximum lead TCLP result of 3.42 mg/L at lead sheeting location VL-2 is below the TCLP criteria of 5 mg/L. This indicates that the material can be disposed of as characteristically non-hazardous.

Pardee Environmental did identify RACM consisting of transite debris and pipe insulation debris in both the southern section of the large rubble mound pile and the western section of the main basement fill area in the vicinity of test pit TP-2. Pardee estimates that approximately 4,000 cubic yards of RACM is present at the Property, co-mingled within the southern portion of the large rubble mound pile and in the western portion of the Former Building E basement area.

Two soil samples were collected from each of the six soil borings installed at the Property and were submitted for analysis of VOCs, SVOCs, PCBs, TPH, and VAP metals. Soil samples did not exhibit any detections of VOCs or PCBs above laboratory reporting limits. Select SVOCs were detected in soil boring VSB-6 from 2-4 feet at concentrations below applicable VAP direct contact standards for a residential land use category. TPH was detected in several soil samples at concentrations below VAP residual soil saturation limits. Various metals were detected in all soil samples at concentrations that do not pose significant concerns and will be discussed further within the Phase II report to be submitted under separate cover.

Groundwater samples were collected from each of the five monitoring wells installed at the Property. There were no detections of VOCs or SVOCs above laboratory reporting limits. Several metals were detected in groundwater, including detections of select metals at concentrations above VAP UPUS. Concentrations of cadmium, cobalt, and chromium were reported in one or more monitoring wells at concentrations above UPUS. Nevertheless, a groundwater use restriction was placed on the southern portion of the Property as part of the 2015 VAP NFA and CNS, and it is not reasonably anticipated that groundwater is utilized for potable purposes. Additionally, groundwater was determined to be low yielding (i.e., Class B determination) based on the investigation activities conducted during October 2022 as well as the 2015 NFA and CNS. A more detailed evaluation of groundwater will be presented in the Phase II report.

ERO and PACE

As indicated, the information obtained from the screening investigation activities, the advancement, and observations of test pits, the Pardee ACM investigation activities, and a cursory review of the analytical results were utilized in order to develop a reasonably anticipated evaluation of remedial options and associated cost estimate for proper removal and disposal of the C&DD at the Property.

The ERO and PACE are based upon the following assumptions:

- The City does not own the Property but is contemplating purchase of the Property.
- If the Property is acquired, it is assumed that the City would proceed through the Ohio VAP to obtain a new VAP No Further Action Letter and request a Covenant Not to Sue from Ohio EPA to ensure redevelopment is deemed protective of human health and the environment.
- Redevelopment plans for the Property may include some combination of mixed use, including restricted residential and commercial/industrial uses.
- The ERO and PACE does not include any potential remedial activities associated with the existing parking garage, the only remaining structure within the Property limits, which is known to also contain RACM based upon the information contained within the October 2021 Pardee report.
- The ERO and PACE does not include any potential remedial activities associated with the partially demolished former x-ray room structures, which may potentially contain additional lead sheeting material that would require additional characterization and proper handling for demolition and disposal activities.
- There are no indication of radiological materials remaining at the Property that were formerly utilized in the former x-ray areas of the Property. However, the partially demolished x-ray structures should be further evaluated for proper demolition and

disposal activities, as the remaining thick concrete structures were not characterized herein.

- The building demolition debris generated on the Property primarily consists of C&DD materials, as defined in OAC 3745-400-01(C)(4).
- Given the co-mingled nature of the C&DD materials, and the fact that it has been used to fill in former basement areas, there is potential that once removal is initiated, some minor amount of solid waste (as defined in OAC 3745-27-01(S)(22) and OAC 3734;0101(E)) could be encountered. Therefore, as a contingency for appropriate disposal purposes, the ERO assumes that approximately 5% of the C&DD material could be characterized as solid waste.
- RACM is present and co-mingled within the southern portion of the large rubble mound pile (TP12-2 and TP12-3) and within the western portion of the Former Building E basement area (CTP-1 and CTP-4). These areas consist of approximately 4,000 cubic yards.
- Universal wastes may be encountered and require additional disposal considerations. However, given that components of light ballasts were observed in only 2 of the 18 test pits (TP-3 and TP-8), the potential to encounter additional universal wastes is considered isolated and nominal.
- The PACE assumes that an Ohio licensed Asbestos Hazardous Abatement Inspector will be present on Property during the remedial activities to observe and properly direct and document the removal and handling activities of ACM and RACM as noted above.

Based on the information gathered and the assumptions identified above, a PACE table was developed to provide a summary of remedial cleanup alternatives and professional environmental support services for consideration of selecting the most feasible remedial approaches at the Property to comply with potential future VAP requirements. The array of budgeting initial cost estimates associated with the summary for remedial cleanup alternatives were developed for use as the basis for future contract planning, decisions, and remedy selection decisions only, and are not intended for final project budgeting. Due to the preliminary nature of our study associated with potential remedial alternatives, the cost estimate developed accounts only for the initial proposed implementation of the various potential remedial alternatives and does not include any cost estimates associated with demolition, grading, and potential future redevelopment activities. For reference, the PACE table is attached hereto as Table 2.

It is anticipated that completion of these proposed remedial activities might range from approximately $3,265,625 (does not include contingency or off-site residual liquid disposal) to $4,545,993 (include contingency and off-site disposal of residual liquids).

A comprehensive Phase II Property Assessment Report will be prepared and submitted under separate cover to provide a more detailed discussion of the assessment activities conducted and associated Phase II findings.

TABLES

MEMORANDUM: SUMMARY OF EVALUATION OF REMEDIAL OPTIONS FOR BUILDING DEBRIS REMOVAL
FORMER ST. JOSEPH HOSPITAL REDEVELOPMENT
205 & 208 W 20th STREET, LORAIN, OHIO

TABLE 1A

SUMMARY OF TEST PIT INVESTIGATION ACTIVITIES

Sample Location Area Description	Test Pit Location / Sample Location	Sample Name	Sample Depth (feet)	Sample Date	Field Sample ID	Laboratory Analytical Parameters													Notes
						VOCs	SVOCs	PCBs	RCRA 8 Metals	TCLP RCRA 8 Metals	RACM Identified *	VAP 16 Metals	Oil & Grease	Lead	TCLP Lead	TPH C_6-C_{12}	TPH C_{10}-C_{20}	TPH C_{20}-C_{34}	
Former Building E / B Basement Area - West	TP-1	CTP-1	0 - 14 feet	8/30/2022	LRN005:CTP-1:D083022	X	X	X	X	X	X					X	X	X	Several test pits, short in length but deep to characterize material placed within the former basement footprint. Based upon visual observations, individual test pits were composited for into four samples for laboratory analysis as noted.
	TP-2																		
	TP-6	CTP-4	0 - 14 feet	8/31/2022	LRN005:CTP-4:D083122	X	X	X	X	X	X					X	X	X	
	TP-10																		
	TP-11																		
Former Building E / B Basement Area - East	TP-3	CTP-2	0 - 14 feet	8/30/2022	LRN005:CTP-2:D083022	X	X	X	X	X						X	X	X	
	TP-4																		
	TP-7																		
	TP-5	CTP-3	0 - 14 feet	8/30/2022	LRN005:CTP-3:D083022	X	X	X	X	X						X	X	X	
	TP-8																		
	TP-9																		
Large Rubble Mound Piles between basement area and parking garage - North	TP-12-1	TP12-1	0 - 5 feet	8/29/2022	LRN005:TP12-1:D082922	X	X	X	X	X						X	X	X	Long shallow transect test pits to characterize the material in the large rubble piles. Visual observations will be used to determine RACM, solid waste, and identify any additional lead sheeting material.
Large Rubble Mound Piles between basement area and parking garage - South	TP-12-2	TP-12-2	0 - 5 feet	8/29/2022	LRN005:TP12-2:D082922	X	X	X	X	X	X					X	X	X	
	TP-12-3	TP-12-3	0 - 5 feet	8/29/2022	LRN005:TP12-3:D082922	X	X	X	X	X	X					X	X	X	
Former radiology film storage basement room near northeast corner of parking garage.	TP-13	TP-13	0 - 12 feet	8/29/2022	LRN005:TP-13:D082922	X	X	X	X	X						X	X	X	One long deep test pit to characterize material placed within former radiological storage basement area.
Rubble located outside footprint of partially demolished former X-ray rooms at the northwest portion of the Property.	TP-14	TP-14	0 - 5 feet	8/29/2022	LRN005:TP-14:D082922	X	X	X	X	X						X	X	X	Shallow test pit to characterize debris outside of former x-ray rooms.
Former mechanical room basement area northeast portion of Property	TP-15-1	CTP-5	0 - 14 feet	8/30/2022	LRN005:CTP-5:D083022	X	X	X	X	X						X	X	X	Deep transect test pits to characterize the material in the rubble pile and former basement footprint. Based on visual observations, the individual test pits were composited into one sample for laboratory analysis as noted.
	TP-15-2																		
Lead sheeting characterization	TP12-2	VL-1	0 - 0 feet	8/30/2022	LRN005:VL-1:D083022									X	X				Additional Discrete samples to characterize debris around lead sheeting material
	TP-4	VL-2	0 - 0 feet	8/30/2022	LRN005:VL-2:D083022									X	X				
	TP-10	VL-3	0 - 0 feet	8/31/2022	LRN005:VL-3:D083122									X	X				
	Adjacent to Parking Garage	VL-4	0 - 0 feet	8/31/2022	LRN005:VL-4:D083122									X	X				
Characterization of liquid accumulated in former basment void areas	W-1	W-1	Not Applicable (NA)	8/29/2022	LRN005:W-1:W082922	X	X	X				X	X						Liquid samples to characterize water that has filled former basement areas / voids of building debris
	W-2	W-2		8/30/2022	LRN005:W-2:W083022	X	X	X				X	X						
	W-3	W-3		8/30/2022	LRN005:W-3:W083022	X	X	X				X	X						
	W-4	W-4		8/31/2022	LRN005:W-4:W083122	X	X	X				X	X						

* Regulated Asbestos Containing Material (RACM) was investigated by Pardee Environmental and identified through analysis at this test pit location.

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FORMER ST. JOSEPH HOSPITAL REDEVELOPMENT
205 & 208 W 20th STREET, LORAIN, OHIO

TABLE 1B

SUMMARY OF SOIL AND GROUNDWATER INVESTIGATION ACTIVITIES

IA/REC [a]	IA/REC Description	Sample Location	Sample Type		Sample Depth	Sample Date	Field Sample ID	Laboratory Analytical Parameters [b]					
			Soil Boring	Monitoring Well				VOCs	SVOCs	PCBs	VAP 16 Metals	TPH	
												GRO	DRO
IA-1/REC-1	Demolition Debris	VSB-1/MW-1	X		0 - 2 feet	10/24/2022	LRN005:VMW-1:S000020	X	X	X	X	X	X
					7 - 9 feet		LRN005:VMW-1:S070090	X	X	X	X	X	X
		VSB-2/VMW-2	X		0 - 2 feet	10/25/2022	LRN005:VMW-2:S000020	X	X	X	X	X	X
					2 - 2.5 feet		LRN005:VMW-2:S020025	X	X	X	X	X	X
		VSB-3/VMW-3	X		0 - 2 feet	10/24/2022	LRN005:VMW-3:S000020	X	X	X	X	X	X
					4 - 5 feet		LRN005:VMW-3:S040050	X	X	X	X	X	X
		VSB-4/VMW-4	X		0 - 2 feet	10/24/2022	LRN005:VMW-4:S000020	X	X	X	X	X	X
					5 - 7 feet		LRN005:VMW-4:S050070	X	X	X	X	X	X
		VSB-5/VMW-5	X		0 - 2 feet	10/24/2022	LRN005:VMW-5:S000020	X	X	X	X	X	X
					5 - 7 feet		LRN005:VMW-5:S050070	X	X	X	X	X	X
		VSB-6	X		0 - 2 feet	10/24/2022	LRN005:VSB-6:S000020		X	X	X	X	X
					2 - 4 feet		LRN005:VSB-6:S020040		X	X	X	X	X
		VMW-1		X	--	10/28/2022	LRN005:VMW-1:G102822	X	X		X		
		VMW-2		X	--	10/28/2022	LRN005:VMW-2:G102822	X	X		X		
		VMW-3		X	--	10/28/2022	LRN005:VMW-3:G102822	X	X		X		
		VMW-4		X	--	10/28/2022	LRN005:VMW-4:G102822	X	X		X		
		VMW-5		X	--	10/28/2022	LRN005:VMW-5:G102822	X	X		X		

Notes:

a. Identified Area (IA)/Recognized Environmental Condition (REC), as determined in the 2022 *Phase I Property Assessment* (Verdantas Document #15011.0006, September 2022).

b. Laboratory Analytical Parameter Acronym Summary:
Volatile Organic Compounds (VOCs)
Semi-Volatile Organic Compounds (SVOCs)
Voluntary Action Program (VAP) Metals
Polychlorinated Biphenyls (PCBs)
Total Petroleum Hydrocarbons (TPH), gasoline range organics (GRO) and diesel range organics (DRO)

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FORMER ST. JOSEPH HOSPITAL REDEVELOPMENT
205 & 208 W 20th STREET, LORAIN, OHIO

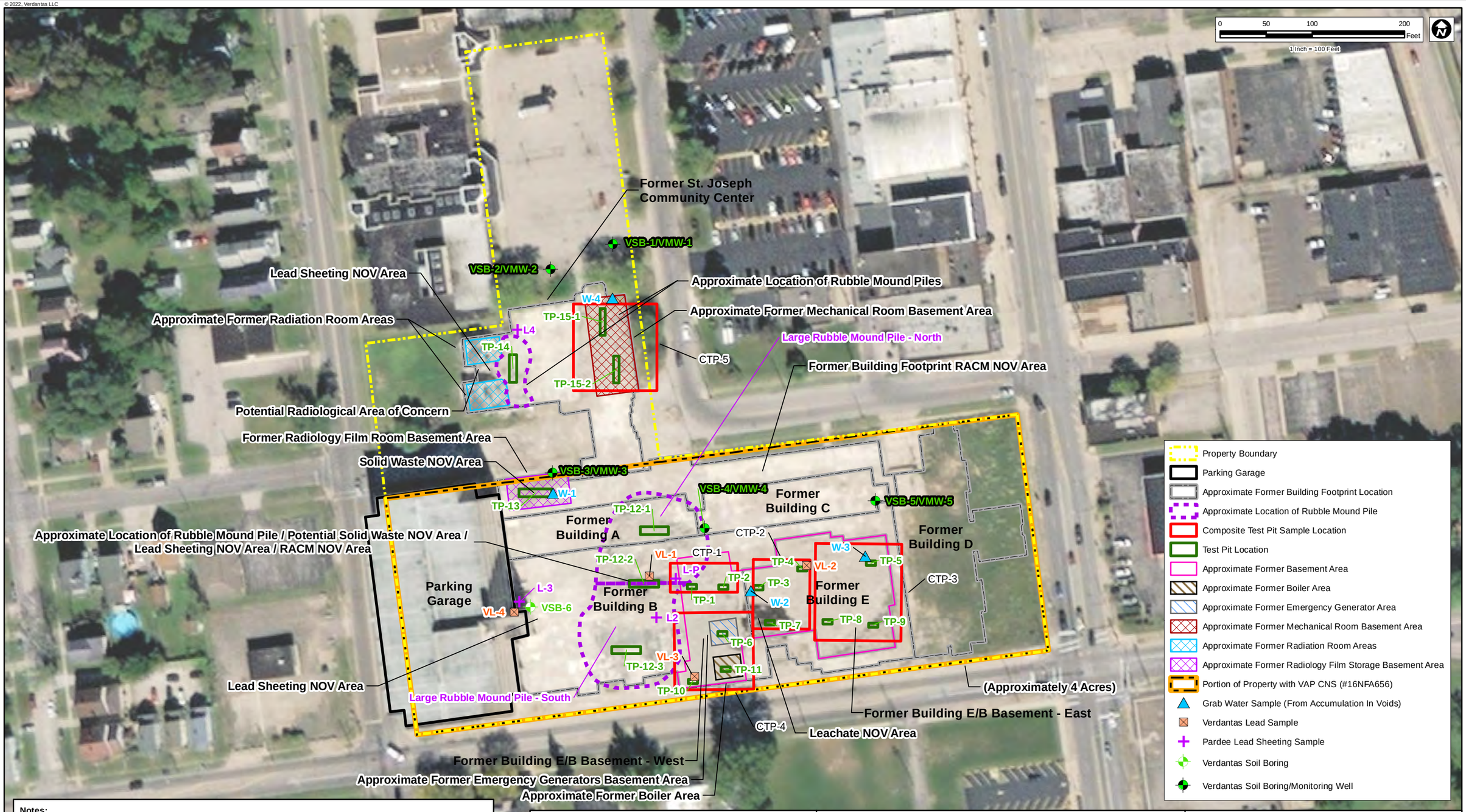
TABLE 2

PROJECT ASSUMPTIONS AND COST ESTIMATE (PACE)

Category	Item	Units	Estimated Unit Price	Estimated Quantity	Estimated Total	Notes
Cleanup/Remediation						
Site Debris Remediation	Health & Safety Plan	ls	$ 5,000.00	1	$ 5,000	
	Mobilization/ Demobilization/ General Conditions	ls	$ 20,000.00	1	$ 20,000	Assumes an estimated 2 month remediation schedule.
	Remedial Excavation and Loading of Assumed RACM Co-mingled with Demo Debris Complete	cy	$ 81.00	4,185	$ 339,006	
	Off-Site Transportation and Disposal of Assumed RACM Co-mingled with Demo Debris Complete	ton	$ 116.00	6,696	$ 776,784	
	Excavation and Loading of Construction Demolition Debris Complete	cy	$ 5.50	13,076	$ 71,916	
	Off-Site Transportation and Disposal of Construction Demolition Debris Complete	ton	$ 46.50	20,921	$ 972,824	
	Excavation and Loading of Solid Waste Co-mingled with Demo Debris Complete	cy	$ 8.50	688	$ 5,850	
	Off-Site Transportation and Disposal of Solid Waste Co-mingled with Demo Debris Complete	ton	$ 67.00	1,101	$ 73,774	
	Management Residual Liquids	gallons	$ 0.20	561,408	$ 112,282	Assumes basement areas to be filled to about 15% of capacity with residual liquids.
	Off-Site Transport and Disposal of Residual Liquids	gallons	$ 1.25	561,408	$ 701,761	If Residual Liquids can be discharged directly to Sanitary Sewer line then there could be a potential cost savings.
	Off-Site Borrow Material Complete	cyds	$ 32.00	18,528	$ 592,907	Assumes Borrow material will be required to meet VAP residential standards.
	Backfill and Compaction of Remedial Areas Complete.	cyds	$ 10.00	18,528	$ 185,283	Assumes compaction to achieve 98% .
Contingency						
Contingency	15% Project Contingency	ls	$ 578,607.82	1	$ 578,608	Assumes a 15% Project Contingency on Site Debris Remediation Activities.
Compliance and Regulatory Support Services						
Compliance and Regulatory Support Services	Regulatory Compliance Technical Implementation Activities Support	ls	$ 35,000.00	1	$ 35,000	Assumes Support through an estimated 2 month remediation schedule.
	Remedial Action Plan for RACM, Solid Waste, Leachate, and C&DD Removal and Disposal Activities	ls	$ 5,000.00	1	$ 5,000	
	Observation and Documentation of Remediation Activities	ls	$ 60,000.00	1	$ 60,000	Assumes Support through an estimated 2 month remediation schedule.
	Confirmation Sampling Activities and Clearance Report	ls	$ 10,000.00	1	$ 10,000	
Estimated Total Costs					**$ 4,545,993**	

Notes:
1. Costs are provided as a general summary estimate and are our opinion of the most probable project costs based on our best judgment and experience.
2. The opinion of probable cost prepared will vary accordingly to the actual cost of labor, materials, equipment, competitive bidding, market condition, specific site requirements, and size, as well as actual quantities expended.
3. Unit prices were estimated using published cost data for similar types of materials or construction.
4. The total project cost will also be affected by the time of year that bids are solicited, the amount of time allocated for construction, and the total amount of construction performed under a particular contract.

FIGURE



Notes:
1) Building D was demolished in April 2016 as part of a Clean Ohio Revitalization Fund (CORF) grant implementation, prior to obtaining the VAP CNS.
2) Samples submitted for laboratory analysis from Test Pits TP-1 through TP-11 within the Former Building E basement area were composited as follows given the observed homogeneous nature of the debris material. Each test pit was excavated as proposed for visual observations and materials were bagged for sample selection in the field. Composite test pit samples (CTP) consisted of: CTP-1 = TP-1, TP-2; CTP-2 = TP-6, TP-10, TP-11; CTP-3 = TP3, TP-4, TP-7; CTP-4 = TP-5, TP-8, TP-9.
3) The aerial photo was acquired through the Esri Imagery Web Service. Aerial photography dated 2021.

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PEOPLE FOCUSED FUTURE

November 2022

Memorandum: Evaluation of Remedial Options for Building Debris Removal
City of Lorain

Test Pit Investigation

W. 20th Street
Lorain, Lorain County, Ohio

Figure 1