Big Building Model at Former Manufacturing Facility

Environmental Remediation and Risk Management Conference

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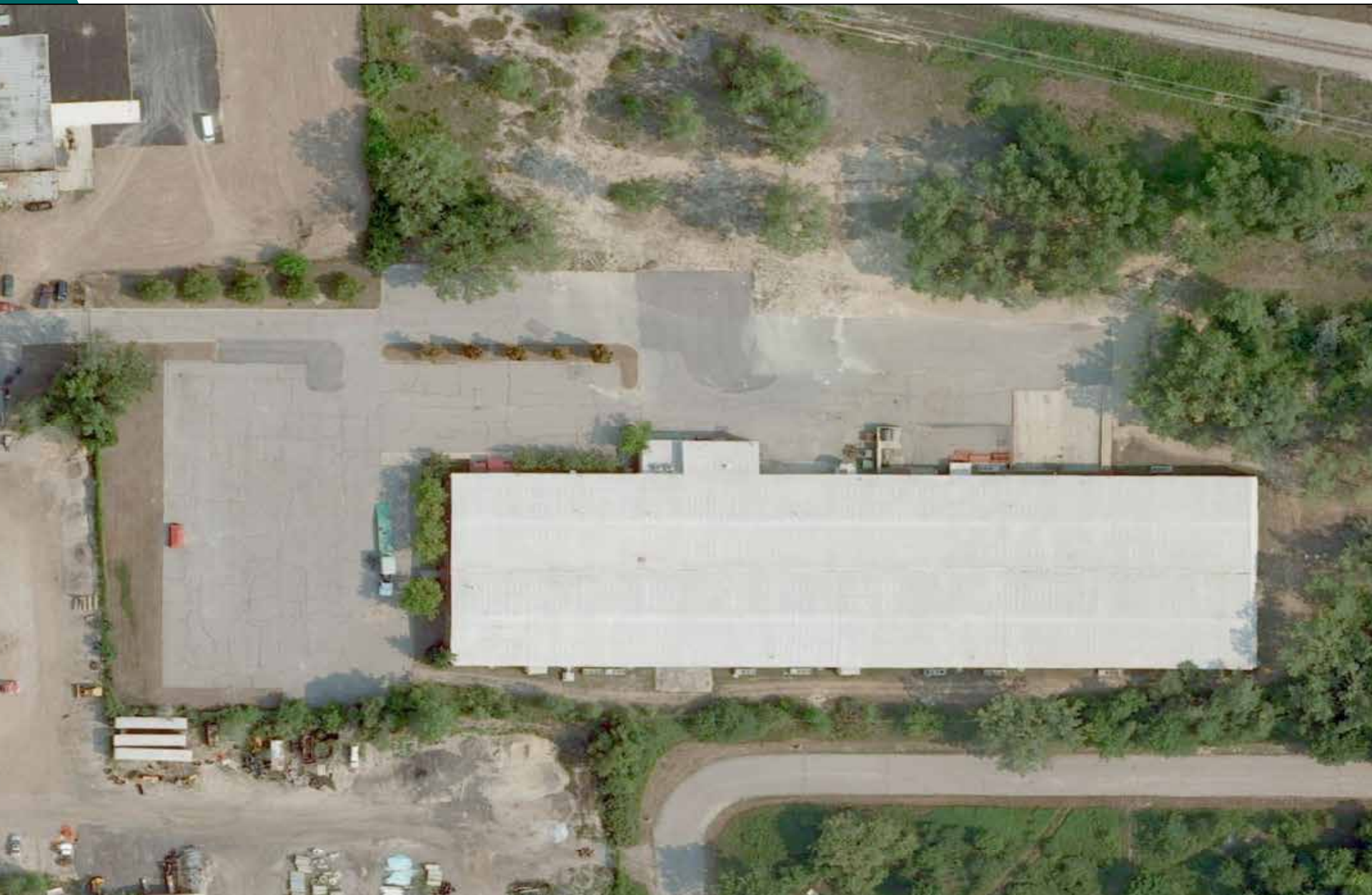
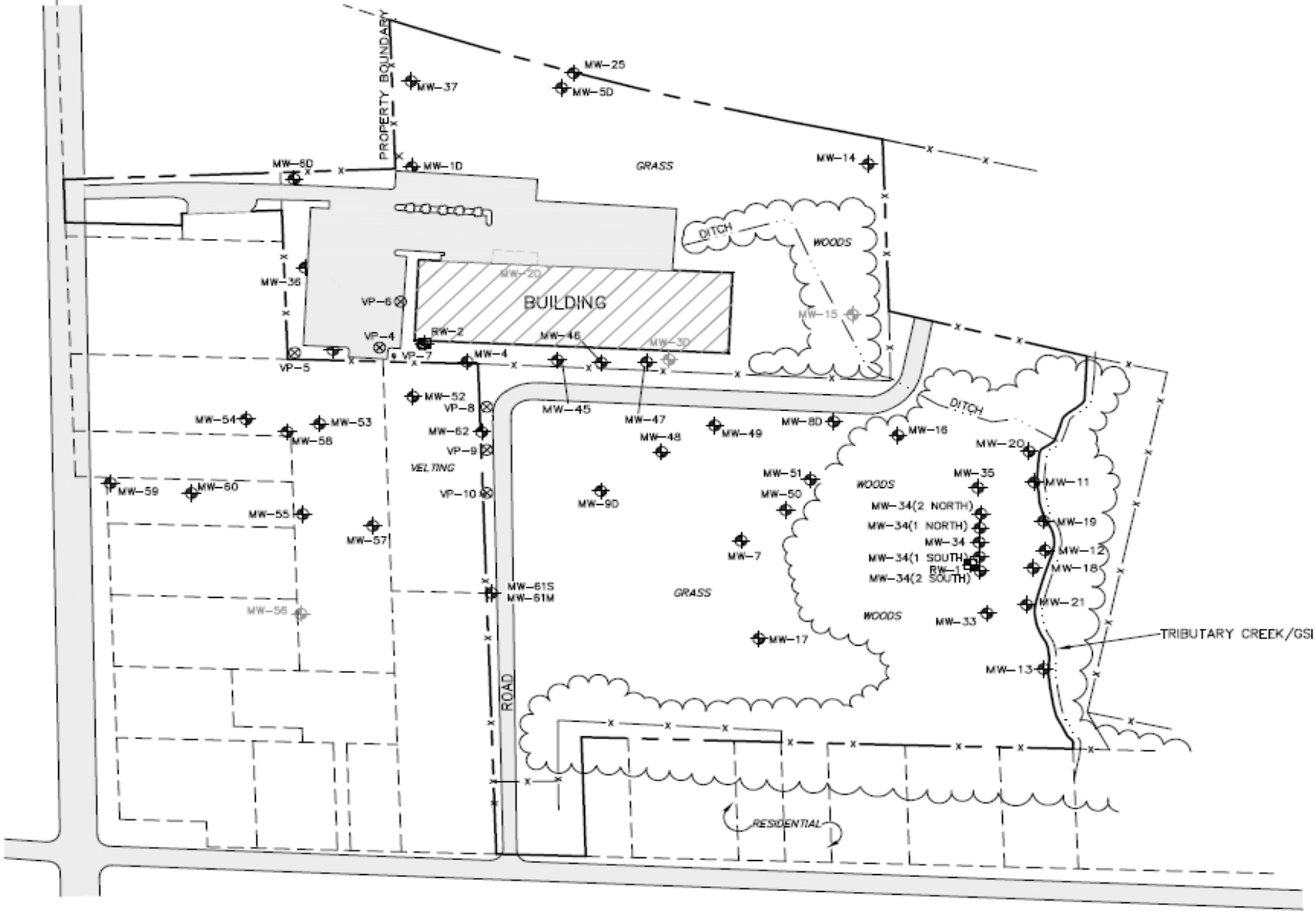
Outline:

- History
- Conceptual Site Model
- Remedial Actions Taken
- Big Building Model
- Lines of Evidence
- Collaboration-Redevelopment

Former Manufacturing Building



SITE MAP WITH LO

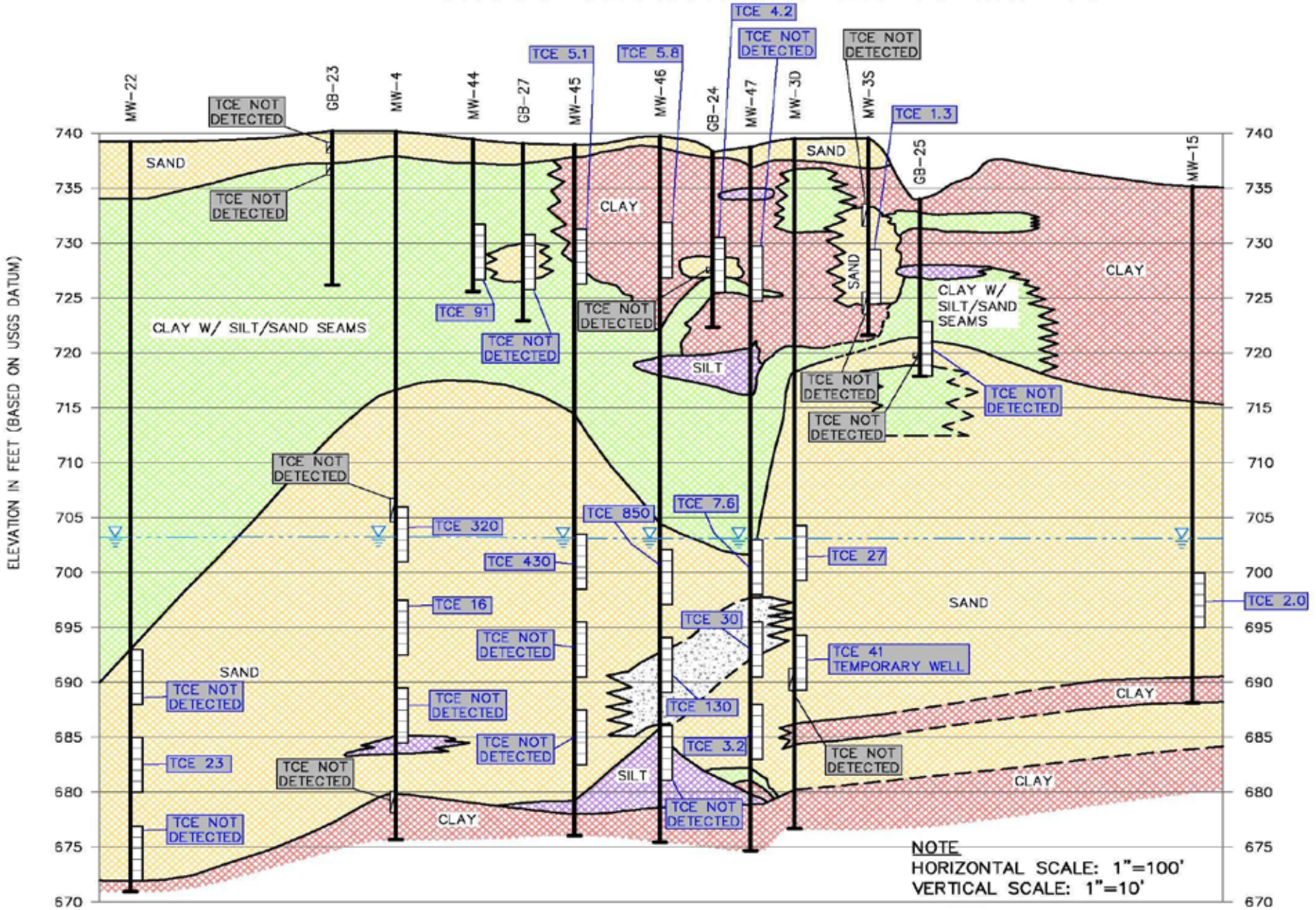


Drawn By	
CADD Review	

Conceptual Site Model:

- Large Industrial Facility, slab on grade on 26 acres
- Degreasing operations used TCE
- Contaminated GW & Soils
- Mixed geology
- Perched GW at 2’ under building
- Regional GW at 45’ bgl
- Stream just East of building

CROSS SECTION MW–22 TO MW–15



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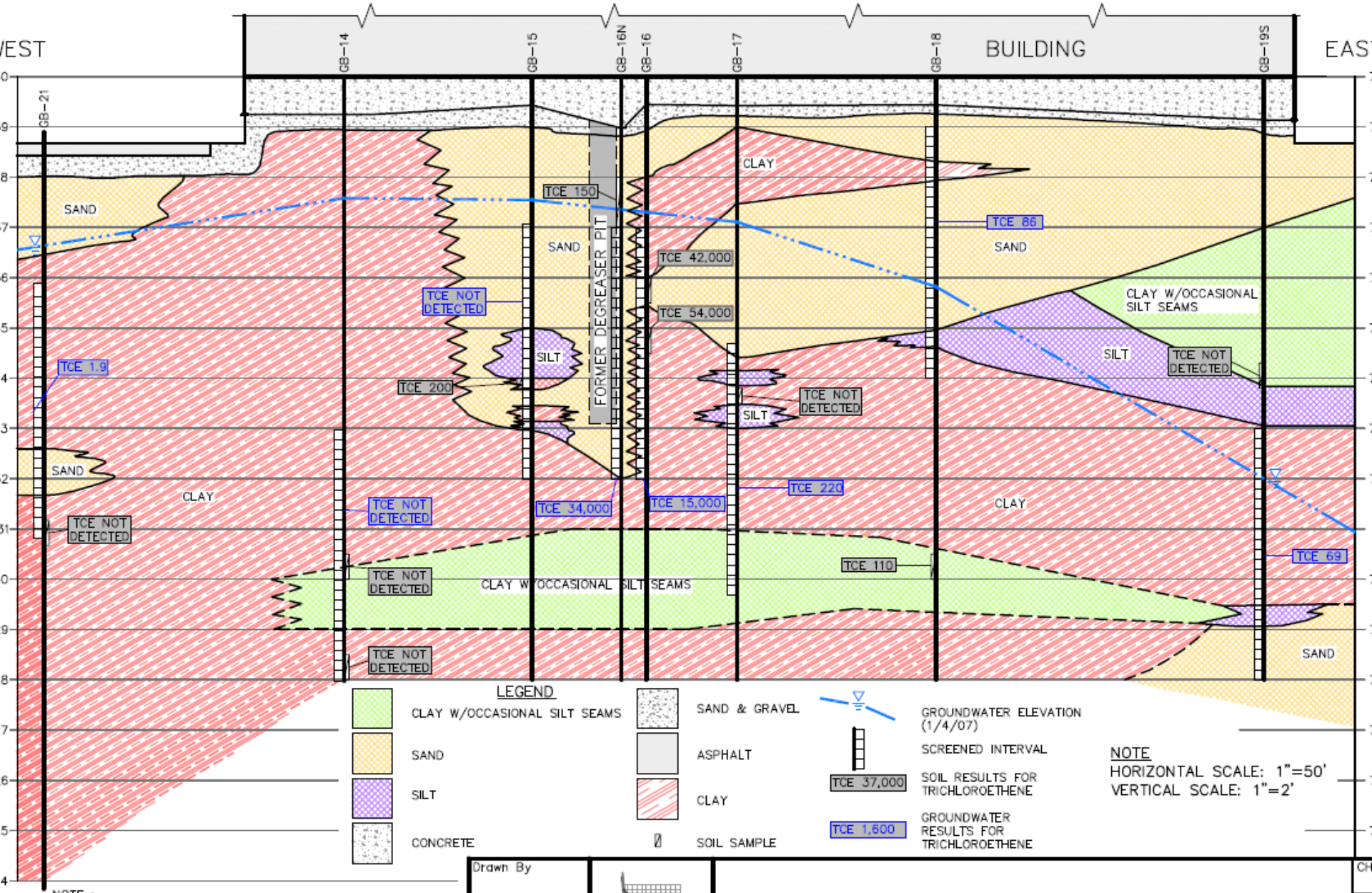
3050 BRETON ROAD

CROSS SECTION GB-21 TO GB-19S



NOTE
HORIZONTAL SCALE: 1"=50'
VERTICAL SCALE: 1"=2'

NOTE :
1) SOIL RESULTS IN µg/Kg ; GROUNDWATER RESULTS IN µg/l.
2) GEOLOGY IS BASED ON PRE-EXCAVATION CONDITIONS (2006).
3) CONCENTRATION DATA BASED ON 2006/2007 TESTING.

Drawn By	
CADD Review	
Date Drawn/Rev'd	

ERM

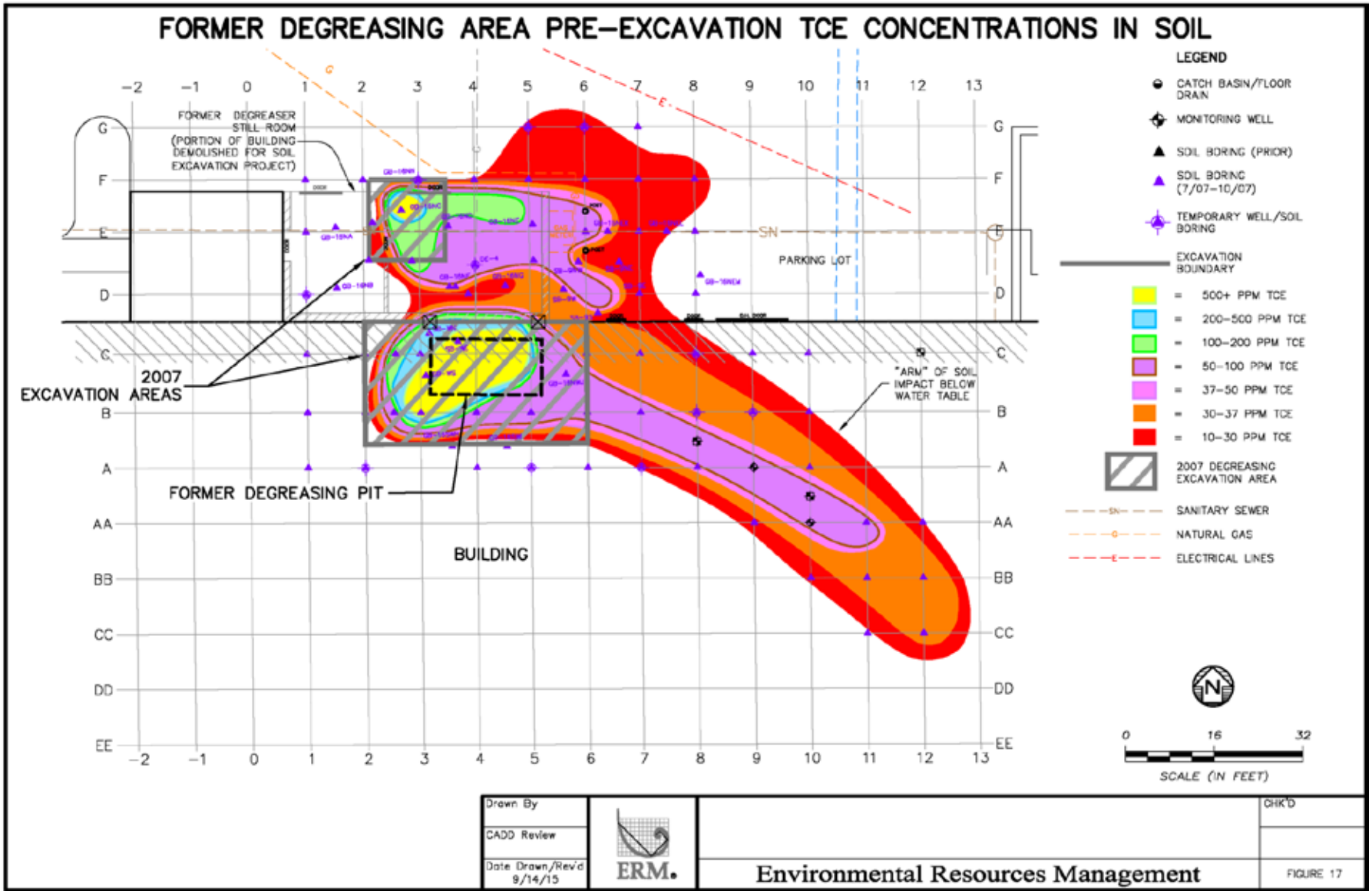
Environmental Resources Management

Remedial Actions To Date:

- Two Large Excavations of Csat Soils
- Groundwater Treatment System
- Sub-slab depressurization system
- Perched GW purge and treat


KOMATSU

Former Degreaser Pit


FORMER DEGREASING AREA PRE-EXCAVATION TCE CONCENTRATIONS IN SOIL
FORMER DEGREASER STILL ROOM (PORTION OF BUILDING DEMOLISHED FOR SOIL EXCAVATION PROJECT)
2007 EXCAVATION AREAS
FORMER DEGREASING PIT
BUILDING
PARKING LOT
"ARM" OF SOIL IMPACT BELOW WATER TABLE
LEGEND
CATCH BASIN/FLOOR DRAIN
MONITORING WELL
SOIL BORING (PRIOR)
SOIL BORING (7/07-10/07)
TEMPORARY WELL/SOIL BORING
EXCAVATION BOUNDARY
= 500+ PPM TCE
= 200-500 PPM TCE
= 100-200 PPM TCE
= 50-100 PPM TCE
= 37-50 PPM TCE
= 30-37 PPM TCE
= 10-30 PPM TCE
2007 DEGREASING EXCAVATION AREA
SANITARY SEWER
NATURAL GAS
ELECTRICAL LINES
N
0
16
32
SCALE (IN FEET)
Drawn By
CADD Review
Date Drawn/Rev'd 9/14/15
ERM.
Environmental Resources Management
CHK'D
FIGURE 17

VI- TAPS TEAM

michigan.gov/deq/vapor intrusion

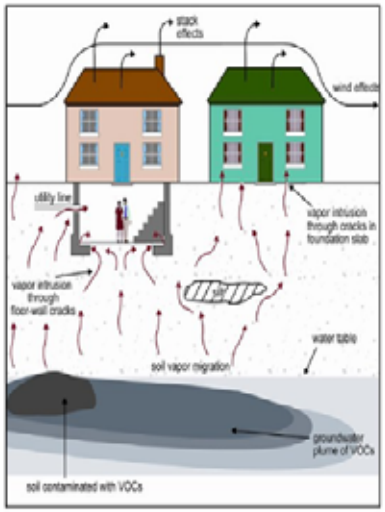
Collaboration & Solutions

- DEQ approached the responsible party to try a new concept from a 2009 paper outlining the BBM.
- “Prediction of Indoor Air Quality from Soil-Gas Data at Industrial Buildings (Eklund and Burrows, 2009).”

Big Building Model

Guidance Document
FOR THE VAPOR INTRUSION PATHWAY

MAY 2013
REMEDIATION AND REDEVELOPMENT DIVISION



- **BBM approach:** offers alternative for large nonresidential buildings to evaluate risk for the VI pathway.

Traditional VI Approach:

- **Issue:** a generic approach may overestimate risk to users of large non-res. Buildings
- Assumes Vapors under entire building
- Assumes small spaces

Area of Impact vs. Size of Building

Big Building Characteristics:

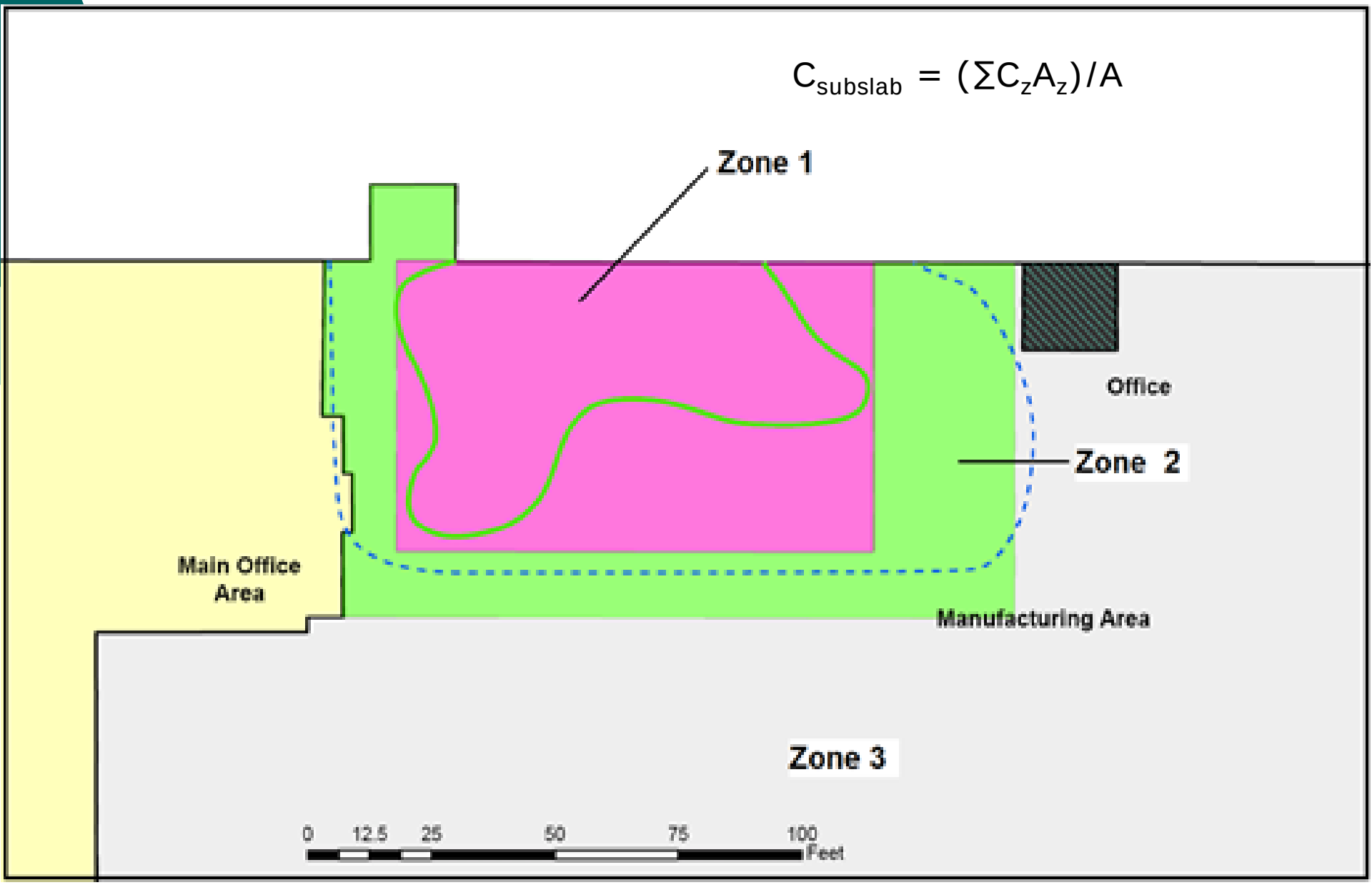
- Large continuous open areas greater than 4,000 m^2 (43,000 ft^2)
- Ceiling heights greater than 5 m (16 ft)
- Slab-on-grade construction with thicknesses greater than 15 cm (6 inches)
- Air Exchange rates higher (2 per hr)
- No dry wells, floor drains, sumps,
- Groundwater concentrations are stable and/or decreasing

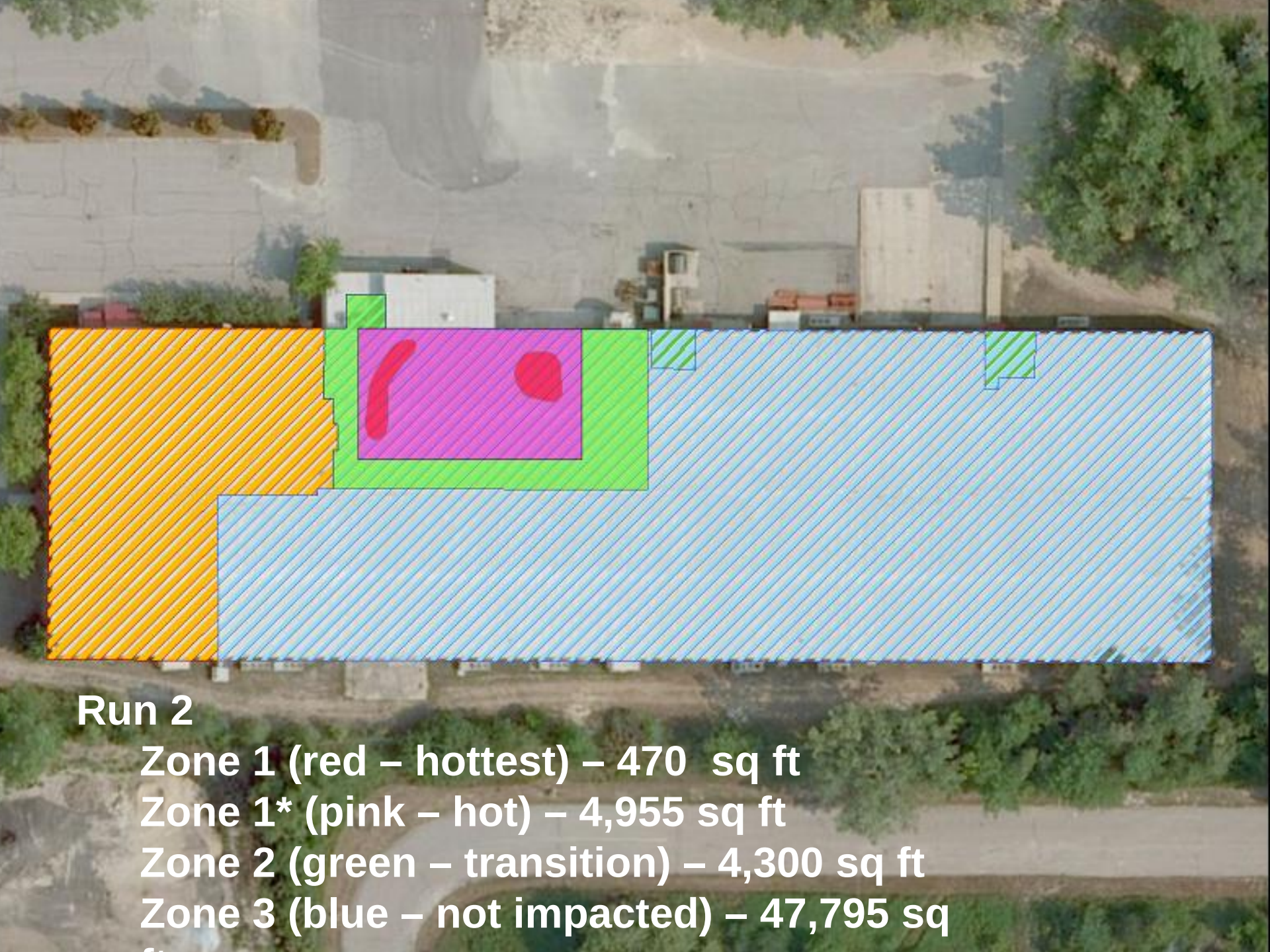

950

Big Building Model Zones

Big Building Model Zones

$$C_{subslab} = (\Sigma C_z A_z)/A$$





Run 2

- **Zone 1 (red – hottest) – 470 sq ft**
- **Zone 1* (pink – hot) – 4,955 sq ft**
- **Zone 2 (green – transition) – 4,300 sq ft**
- **Zone 3 (blue – not impacted) – 47,795 sq**

· TABLE 2 – EXAMPLE DATA AND RESULTS TABLE

	Model Input Variables	*BBM Run #1*	*BBM Run #2*	*BBM Run #3*	*BBM Run #4*
Zone 1 Square Footage (ft^2)	$Zone1_{area}$	5,425	5,425	5,425	10,850
Zone 2 Square Footage (ft^2)	$Zone2_{area}$	4,300	4,300	4,300	8,600
Zone 3 Square Footage (ft^2)	$Zone3_{area}$	47,795	47,795	47,795	38,070
Total Square Footage (ft^2)		57,520	57,520	57,520	57,520
MDEQ Attenuation Factor (subslab)	$A_{subslab}$	0.02	0.02	0.02	0.02
MDEQ SG_{vi-ss} for TCE (ppbv)	*540*	540	540	540	540
AIAC TCE Nonresidential (ppbv)	11	11	11	11	11
Zone 1 Max Concentration	$Zone1_{max}$	1,500	4,500	4,500	1,500
Zone 2 Max Concentration	$Zone2_{max}$	540	540	1,620	540
Zone 3 Max Concentration	$Zone3_{max}$	5	5	5	5
RESULTS					
BBM Soil Gas Concentration	BBM_{conc}	186	469	550	367
Modeled Air Concentration	BBM_{air}	3.7	9.4	11.0	7.3

Results for BBM

- Evaluation of BBM Calculations showed that the modeled Indoor Air concentrations using the maximum soil gas concentrations would be below Part 201 Non Residential Indoor Air Criteria.

Further evidence to support the use of BBM

- Evaluation conducted
- Stressed the model
- Increased the area
- Increased the concentrations
- Showed that the model will be protective of human health.

LINES OF EVIDENCE FOR NO VI RISK

- Source removal
- Concentrations will decrease over time.
- GW treatment of 80 million gallons
- Monitored soil gas- stable concentrations
- Deed Restrictions on interior modifications to the building
- Big Building Model

OUTCOMES:

- Remedial Action Plan Approved
- Property was sold and redeveloped for use as a Trucking company
- Continued collaboration between DEQ and Responsible Party
- Continued GW Treatment

THANK YOU!!

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