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Memorandum

To: Steve Teel, Washington State Department of Ecology
Copies: Brad Jones, Gordon Thomas Honeywell; Gary Burleson
From: Tom Colligan and Erin Cosnowski, Floyd|Snider
Date: January 3, 2014
Project No: GTH-Olympia
Re: **Feasibility Study Addendum, Former Olympia Dry Cleaners Site, Olympia, Washington**

INTRODUCTION

This Feasibility Study Addendum presents a proposed modification to a previously proposed cleanup action alternative for the Former Olympia Dry Cleaners Site (Site) located in Olympia Washington. Seven cleanup action alternatives were originally presented for this Site in the Revised Draft Feasibility Study (Draft FS) (Sound Earth Strategies 2013), including Alternative 6A, Limited Excavation with Shoring. Based on the Draft FS, the recommended cleanup action alternative was Alternative 3, which used injection and recirculation of permanganate to treat contaminated soil and groundwater at the Site. However, based on an additional review and analysis of the Draft FS by Floyd|Snider, a meeting and discussions with Ecology, and the fairly limited extent of contaminated soil remaining at the Site, a modification to Alternative 6A is recommended that focuses on the excavation of most of the remaining known and accessible residual source mass soil at the Site using slot trenches. The proposed modification of Draft FS Alternative 6A, Limited Excavation with Shoring, would have a smaller footprint, and the excavation technique would be much easier and more cost-effective compared with that of Draft FS Alternative 6A. A more complete description of Modified Alternative 6A, Limited Excavation Using Slot Trenches, is presented below in a level of detail similar to that provided in the Draft FS. Additionally, the following text presents a brief comparison of Modified Alternative 6A and the Draft FS Alternatives using the Model Toxics Control Act (MTCA) disproportionate cost analysis evaluation criteria and provides justification for the selection of Modified Alternative 6A as the recommended cleanup action alternative for this Site.

DESCRIPTION OF MODIFIED ALTERNATIVE 6A, LIMITED EXCAVATION USING SLOT TRENCHES

Modified Alternative 6A would remove almost all of the known and accessible residual source mass soil from the Site. It would limit the extent of excavation to outside the footprints of the two existing buildings on the Site and would involve a limited amount of excavation within the public right-of-way. Under this alternative, excavation would be performed in two areas; the approximate excavation footprints are shown on Figure 1. The estimated mass of soil to be excavated in these two areas would be approximately 400 tons.

The main excavation area is located near the northwest corner of the Former Olympia Dry Cleaners Property. This is the same area in which an interim remedial action was previously performed in 2006. The remaining soil at the limits of the interim remedial action contained tetrachloroethylene (PCE) concentrations as high as 96 milligrams per kilogram (mg/kg), which indicates that a residual source mass of PCE was left in place. The existing soil data show that the bulk of the residual source mass soil in this area is located primarily at depths of 4 to 10 feet below ground surface (bgs) within the sidewall limits of the prior excavation. Figure 2 shows a cross section of the Modified Alternative 6A excavation areas, the interim remedial action excavation area, and PCE concentrations within the soil. Modified Alternative 6A would remove all the known and accessible soil in this area with residual PCE concentrations equal to or greater than the PCE MTCA A cleanup level of 0.05 mg/kg with a single exception. That exception lies well within Cherry Street at Boring B05, where a single soil sample from the boring at 7 feet bgs contained PCE at a concentration of 2.9 mg/kg. PCE was not detected in soil samples collected from this boring above and below that depth, at 3 feet, 11 feet, and 14 feet bgs. The soil data from Boring B05 indicate that at that distance from the source, the PCE has been constrained to soil stringers and represents very little source mass. Given this low concentration of PCE in Boring B05, the small amount of affected area and the difficulties associated with excavating into the public right-of-way, the proposed excavation limit for Modified Alternative 6A would extend approximately 5 feet into Cherry Street. This main excavation footprint would also include the current seep location. Soil would be removed up to a depth of 12 feet bgs.

The second excavation area for this alternative is located near the northeast corner of the Former Olympia Dry Cleaners property. This shallow (5 feet bgs or less) excavation area would address an area of historical PCE concentrations in soil that slightly exceeded the MTCA Method A cleanup level.

Slot trenches would be used to remove the contaminated soil within the main excavation area. The slot trench methodology involves the use of a trench box to dig a series of parallel 4-foot-wide trenches across the excavation area. The trench box would provide the necessary shoring. A conceptual layout of these slot trenches within this excavation area is shown in the inset on Figure 1. The conceptual layout of these slot trenches is shown with the trenches running perpendicular to Cherry Street, but these trenches could also be laid out parallel to Cherry Street. The actual slot trench layout would be determined during design. Regardless of the layout, the edges of the slot trenches would be placed approximately a foot away from the edge of the current buildings to avoid any exposure of or damage to the foundation elements of these buildings. Because only one slot would be dug at a time with the use of the trench box for shoring, there would be no risk to adjacent building foundations.

The conceptual excavation sequencing using the slot trenches is shown in the inset on Figure 1. The slot trench areas shown in green would be excavated first by digging out soil within each of the trench boxes to a depth of up to 12 feet bgs. After each green trench is dug, the trench would be backfilled with controlled-density fill (CDF) to within 4 feet of the ground surface. CDF is essentially lean concrete with a high proportion of sand. During the CDF hardening process, the trench box would be removed. Once the CDF cures, it leaves behind a solid low-permeability wall. After the backfilling of each of the green slot trench areas, the yellow slot trench areas would be excavated; however, use of the trench box would no longer be necessary because support would be provided by the adjacent CDF walls. Once excavated, these trenches would also be backfilled with CDF to within 4 feet of the ground surface. The final 4

feet of this entire excavation area would be backfilled with either site overburden soil that has tested as clean or with imported granular fill.

The key advantages of the slot trench methodology are (1) it allows work to be performed to depth near buildings without shoring, and (2) it leaves in place a large area of low-permeability CDF. The CDF backfill would greatly reduce or divert the flow of artesian groundwater up into or through the excavated area. This would greatly improve groundwater quality in this area compared to the current conditions.

The current seep would be eliminated because its location would be excavated and filled with CDF. However, there would still be a possibility of another seep reemerging once groundwater flow is reestablished around the excavated area. If this occurs, and the seep is determined to be contaminated, it would need to be captured by a drain system and routed to the nearby sanitary sewer. Depending on the concentrations of volatile organic compounds (VOCs) in the seep, some form of pretreatment, such as granular activated carbon, may be required until the permit conditions are met.

Additional key assumptions for this alternative include the following:

- The lateral limits and depth of the excavation areas would remain as shown and will not be enlarged during construction.
- Slot trenches are likely not necessary in the second smaller excavation area; however, confirmation samples would be necessary to determine the final excavation depth in that area.
- Any utilities within the excavation footprint, including the existing natural gas line, would be rerouted before excavation and replaced when the excavation is completed.
- Prior to excavation, the three monitoring wells (MW-10, MW-12, and MW-5) located with the main excavation area would be abandoned.
- Dewatering is not expected to be required because soil could be removed within the trench segment and the trench box would prevent the sidewall soil from collapsing. Additionally, the current water supply well would be run at its maximum capacity to lower the artesian pressure in that area. Some amount of water control would be required to avoid displacement of groundwater outside the trench box while the trench is being filled with CDF.
- Contaminated soil would be placed into roll-off boxes and characterized for proper off-site disposal. To the degree possible, cleaner overburden (such as the soil placed after the interim action) would be segregated from soil coming from areas of known contamination and separately stockpiled.
- A street use permit would be required to perform the excavation within the public right-of-way.
- Compliance soil sampling would be performed at one or two final bottom locations within each trench segment to confirm that the contaminated soil has been removed from bottom of the excavation. Additional compliance soil sampling would also be performed along the ends of the slot trenches to confirm the removal of contaminated soil or to document the remaining PCE concentrations; however,

sidewall sampling along the length of each trench would not be possible due to the use of the trench boxes. Compliance soil sampling would also be performed in the second excavation area to confirm the removal of contaminated soil. Details would be provided in a work plan.

- Loss of rent/revenue during the excavation is not expected to occur given the small footprint of the work activities.
- Access would be provided by the Cherry Street Q-Tip Trust to perform the excavation on their property.
- The properties would be restored to their original grades, then paved and landscaped. The sidewalk and a portion of Cherry Street would be repaved to City of Olympia standards.
- Semi-annual to eventually annual groundwater monitoring for 5 years is assumed in a network of four downgradient wells (MW-6, MW-11, MW-14, and MW-09).

The present worth cost estimate to implement Modified Alternative 6A, assuming a real discount rate of 0.9 percent and a life cycle of 10 years, is approximately $335,000 (Table 1).

COMPARISON OF ALTERNATIVES

This section provides a brief summary of the evaluation of Modified Alternative 6A in comparison to the other Draft FS cleanup action alternatives using the MTCA disproportionate cost analysis evaluation criteria (WAC 173-340-360[3][f]).

Similar to Draft FS Alternatives 6A and 6B, Modified Alternative 6A would provide a greater degree of protectiveness, permanence, and long-term effectiveness relative to Draft FS Alternatives 1 through 5, because of the physical removal of source soil from all the known and accessible areas of contaminated soil at the Site (with the exception of one location in Cherry Street). Draft FS Alternatives 6A and 6B would provide an even greater degree of protectiveness, permanence, and long-term effectiveness in comparison to Modified Alternative 6A because they would both remove more contaminated soil.

Modified Alternative 6A has potentially greater short-term risks compared to Draft FS Alternatives 1 though 5 because it involves the use of trench boxes, excavation (including in the public right-of-way), and transport and handling of hazardous materials. However, it has less short-term risks compared to Draft FS Alternatives 6A and 6B, which both excavate more soil.

For technical and administrative implementability, Modified Alternative 6A ranks moderately in comparison to the other Draft FS alternatives. Difficulties with implementing Modified Alternative 6A include using the trench boxes, working in the public right-of-way, and temporarily rerouting the gas line. However, Modified Alternative 6A would be considerably easier to implement in comparison to Draft FS Alternatives 6A and 6B where sheetpile shoring is involved.

Ranking of the Draft FS alternatives based on the five evaluation criteria discussed above was performed in the Draft FS (refer to Table 19 of the Draft FS). Ranking scores for the Draft FS alternatives ranged from 4.8 for Draft FS Alternative 5 to 7.4 for Draft FS Alternative 3. Based on the above evaluation, the ranking for Modified Alternative 6A would likely be comparable to

or slightly higher (due to less short-term risks and greater ease of implementation) than Draft FS Alternative 6A, which had a ranking score of 6.2.

The present worth cost of Modified Alternative 6A is estimated to be $335,000, whereas present worth costs for the Draft FS alternatives ranged from $737,000 for Draft FS Alternative 3 to $2,530,000 for Draft FS Alternative 6B. Costs are considered disproportionate to benefits if the incremental costs of one alternative versus a less expensive alternative exceed the incremental degree of benefit achieved by the more expensive alternative. Cost-to-benefit ratios calculated based on the relative costs and ranking scores for the Draft FS alternatives and Modified Alternative 6A indicate that Modified Alternative 6A has the lowest cost-to-benefit ratio. Alternative 3 was previously ranked the lowest in the Draft FS with a ratio of 100 (refer to Chart 6 of the Draft FS); however, Modified Alternative 6A has a cost-to-benefit ratio of approximately 54 (assuming the same ranking score as Alternative 6A).

RECOMMENDED CLEANUP ACTION ALTERNATIVE

Modified Alternative 6A would meet the threshold requirements for cleanup actions set forth in WAC 173-340-360(3) and WAC 173-340-370.

Based on the comparative analysis and the ranking of the proposed alternatives in accordance with the MTCA evaluation criteria, Modified Alternative 6A is the recommended alternative for the Site. Modified Alternative 6A is comparable to many of the other alternatives in terms of its short-term risks and ease of implementation, and it would be considerably easier and less risky in the short term than the shoring assumed for Draft FS Alternatives 6A and 6B. However, it would provide greater protectiveness, permanence, and long-term effectiveness compared with many of these other alternatives and is comparable to Draft FS Alternative 6A. The cost of implementing Modified Alternative 6A would be considerably less than the costs of each of the other alternatives, and it shows the lowest cost-to-benefit ratio.

Further details regarding the implementation of recommended Modified Alternative 6A will be provided in the draft Cleanup Action Plan.

REFERENCES

Sound Earth Strategies. 2013. *Revised Draft Feasibility Study, Former Olympia Dry Cleaners, Olympia, Washington*. 26 February.

Sound Environmental Strategies. 2009. Draft Remedial Investigation Report, Former Olympia Dry Cleaners, Olympia, Washington. 2 April.

ENCLOSURES

Table 1 Feasibility-Level Cost Estimate, Modified Alternative 6A, Limited Excavation Using Slot Trenches

Figure 1 Conceptual Site Plan, Modified Alternative 6A, Limited Excavation Using Slot Trenches

Figure 2 Cross Section A-A′

Table 1
Feasibility-level Cost Estimate for
Modified Alternative 6A, Limited Excavation Using Slot Trenches

CAPITAL COST ITEM	Quantity	Unit	Unit Price	Cost
Permitting (excludes labor)				
Curb/Sidewalk, Right-of-Way, Grading, and Landscape	1	per permit	$ 5,000	$ 5,000
Geotechnical/Structural Engineering Support Services				
Geotechnical Design	1	lump sum	$ 1,650	$ 1,650
Site Work				
Equipment and Labor	1	lump sum	$ 40,000	$ 40,000
Trench Box and Steel Plates	1	lump sum	$ 4,500	$ 4,500
Security Fence	1	lump sum	$ 3,500	$ 3,500
Alley Excavation	1	lump sum	$ 8,500	$ 8,500
Controlled-Density Fill	250	cubic yard	$ 125	$ 31,250
Soil Disposal (estimated 350 tons @ 22 tons/box)	16	box	$ 1,875	$ 30,000
Place Clean Backfill and Compact	120	cubic yard	$ 15	$ 1,800
Traffic Control	1	lump sum	$ 1,500	$ 1,500
Water Management and Disposal	1	lump sum	$ 4,500	$ 4,500
Tank Cleaning after Exacavation	1	lump sum	$ 3,500	$ 3,500
Gas Line Rerouting/Propane Conversion Plus Tank and Propane	1	lump sum	$ 7,500	$ 7,500
Plastic and Stockpile Management	1	lump sum	$ 3,000	$ 3,000
Replace Sidewalk	1	lump sum	$ 8,500	$ 8,500
Asphalt Street and Drive	1	lump sum	$ 6,500	$ 6,500
Standby Time	1	lump sum	$ 3,500	$ 3,500
Landscaping	1	lump sum	$ 1,500	$ 1,500
Well Abandonment (eight wells)	1	lump sum	$ 3,650	$ 3,650
Subtotal				*$ 163,200*
Labor and Other Direct Costs				
Professional Labor	1	lump sum	$ 58,000	$ 58,000
Other Direct Costs and Equipment	1	lump sum	$ 3,000	$ 3,000
Analytical Costs	30	each	$ 150	$ 4,500
Subtotal				*$ 65,500*
CONSTRUCTION SUBTOTAL				**$ 235,400**
Mobilization, Contingencies, and Demobilization				
Mobilization (1% of construction subtotal)				$ 2,354
Bid (2% of construction subtotal)				$ 4,708
Scope (15% of construction subtotal)				$ 35,310
Cleanup and Demobilization (1% of construction subtotal)				$ 2,354
Subtotal				*$ 44,726*
CONSTRUCTION TOTAL				**$ 280,100**
Indirect Capital Costs				
Engineering Construction Services (8% of construction total)				$ 22,408
TOTAL CAPITAL COST				**$ 302,500**

O&M MONITORING COST ITEMS	Annual Cost (2013 Dollars)	Present Worth Cost of Annual O&M Real Discount Rate = 0.9%
Semi-annual Groundwater Monitoring/Reporting (Year 1)	$ 4,000	$ 4,000
Present Worth of Future Semi-annual Monitoring/Reporting (Years 2 through 5)		$ 15,000
Present Worth of Future Annual Monitoring/Reporting (Years 6 through 10)		$ 10,500
Present Worth of Future Well Abandonment (Year 10)		$ 2,800
TOTAL PRESENT WORTH O&M MONITORING COST		**$ 32,300**

TOTAL PRESENT WORTH COST OF MODIFIED ALTERNATVE 6A	**$ 334,800**

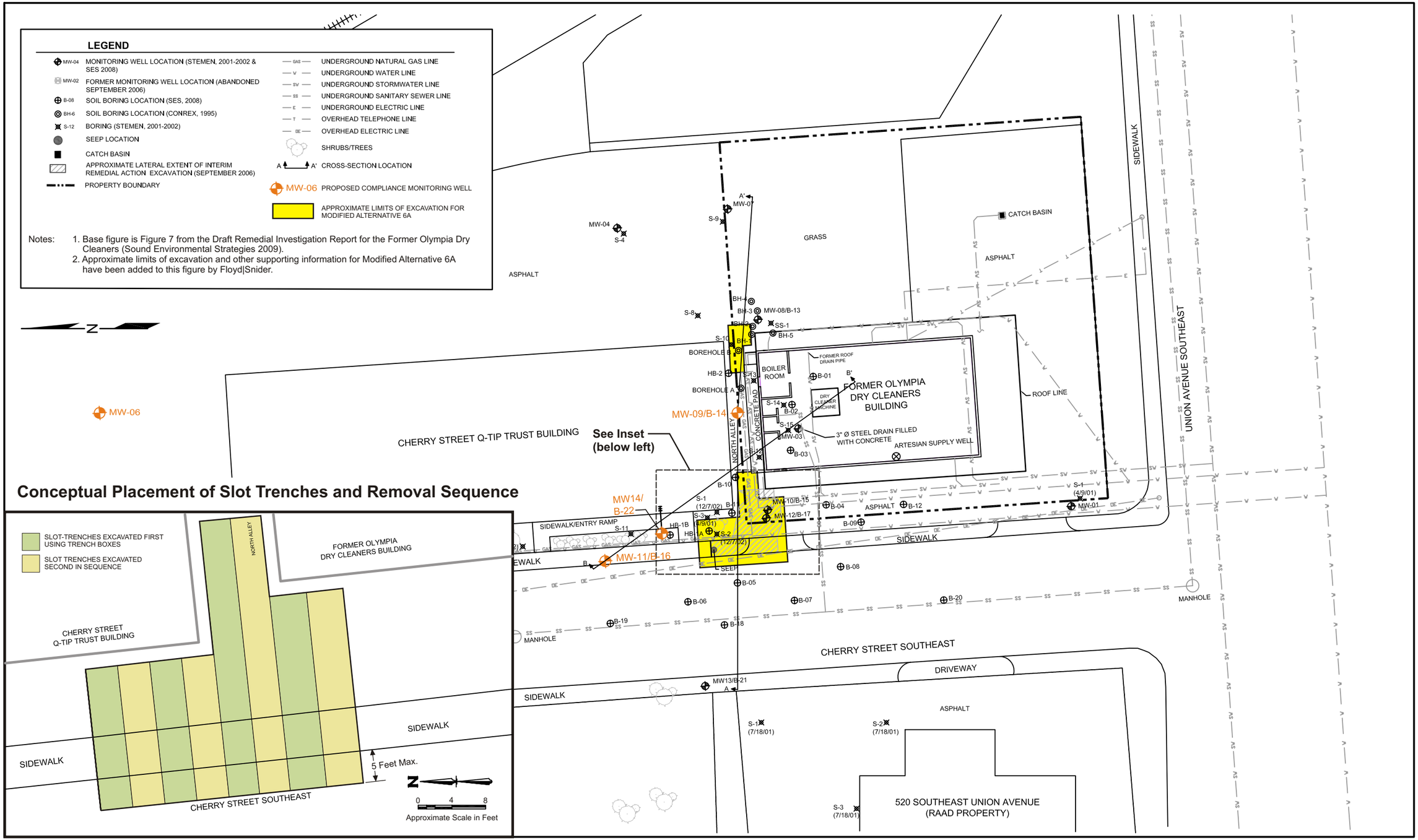

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Figure 1
Conceptual Site Plan
Modified Alternative 6A
Limited Excavation Using Slot Trenches

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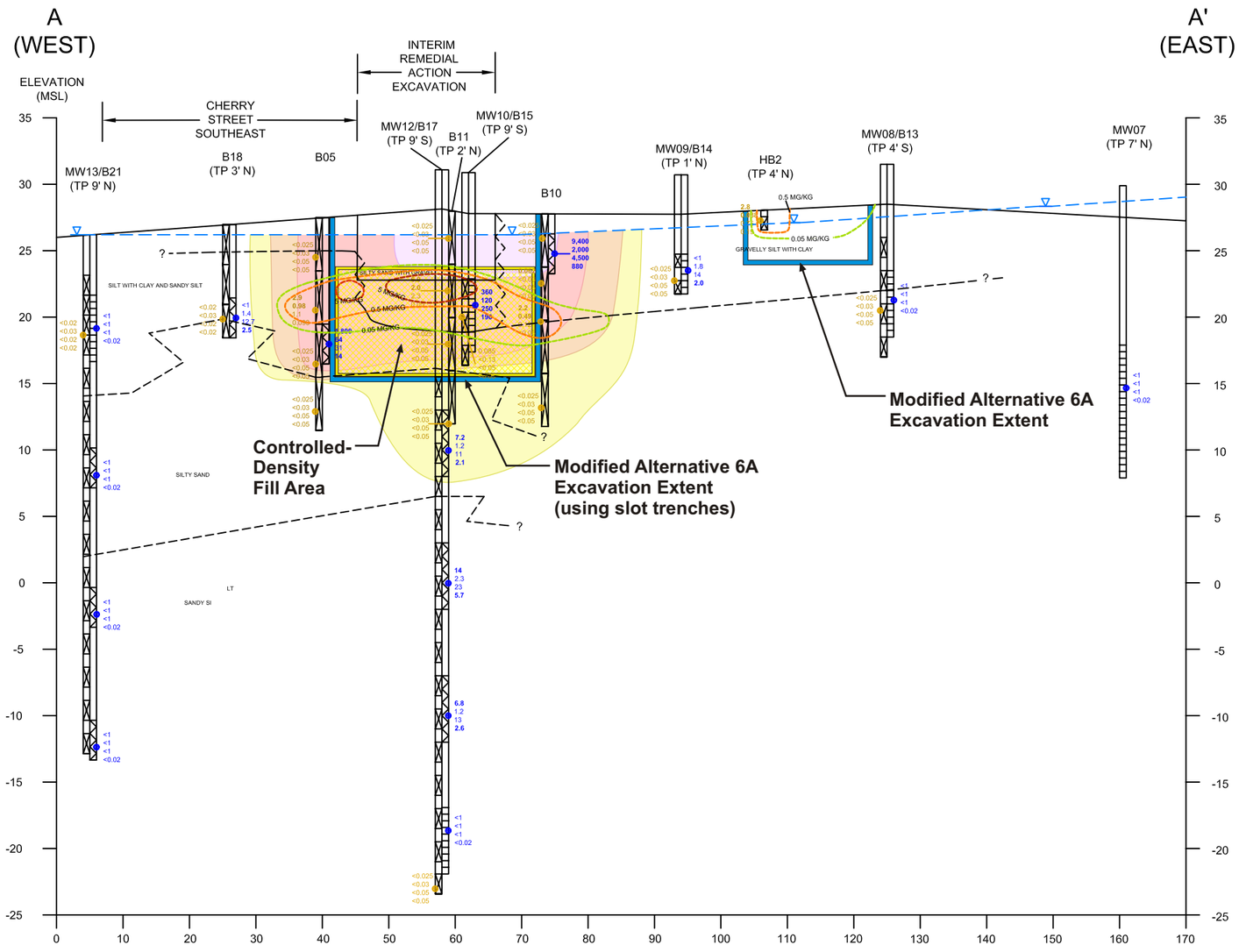

Notes:
1. Cross section is Figure 8 from the Draft Remedial Investigation Report for the Former Olympia Dry Cleaners (Sound Environmental Strategies 2009)
2. Approximate limits of excavation and the controlled-density fill area for Modified Alternative 6A have been added to this cross section by Floyd|Snider.

LEGEND:

MW08/B13 (TP 4' S) — MONITORING WELL/BORING LOCATION TRANSPOSED (TP) IN FEET, NORTH (N), SOUTH (S), EAST (E), OR WEST (W), OF CROSS SECTION LINE

- BLANK CASING
- SOIL SAMPLE INTERVAL
- GROUNDWATER LEVEL (1/14/2009)
- TEMPORARY WELL SCREEN INTERVAL
- WELL SCREEN INTERVAL

PCE = TETRACHLOROETHENE

TCE = TRICHLOROETHENE

< = NON DETECT AT THE LABORATORY PRACTICAL QUANTITATION LIMIT

NA = EITHER NO GROUNDWATER ENCOUNTERED OR NO ANALYTICAL DATA AVAILABLE

MG/KG = MILLIGRAMS PER KILOGRAM

µg/L = MICROGRAMS PER LITER

MSL = FEET BELOW MEAN SEA LEVEL

SOIL CONCENTRATION IN MILLIGRAMS PER KILOGRAM (MG/KG)

6.0	PCE
2.0	TCE
2.3	CIS - 1,2 - DICHLOROETHENE
<0.05	VINYL CHLORIDE

GROUNDWATER CONCENTRATION IN MICROGRAMS PER LITER (µg/L)

<1	PCE
1.8	TCE
14	CIS - 1,2 - DICHLOROETHENE
2.0	VINYL CHLORIDE

14 — BOLD INDICATES CONCENTRATION EXCEEDING MTCA CLEANUP LEVEL

PCE CONCENTRATION IN GROUNDWATER

- >5,000 µg/L
- 500-5,000 µg/L
- 50-500 µg/L
- 5-50 µg/L

PCE CONCENTRATION IN SOIL

- 5 MG/KG
- 0.5 MG/KG
- 0.05 MG/KG

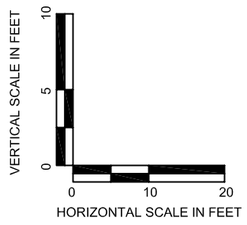

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Figure 2
Cross Section A-A'

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