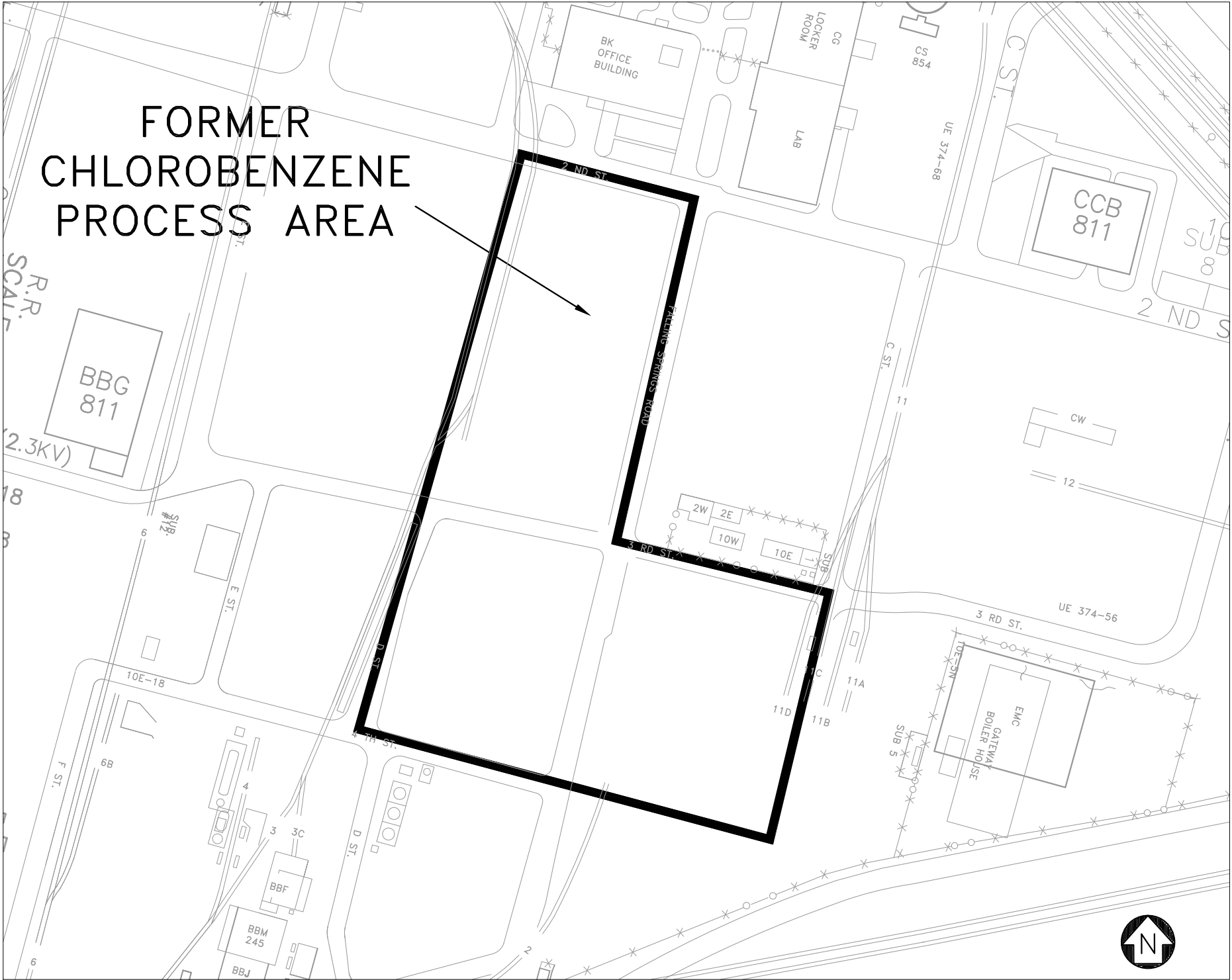


US EPA ARCHIVE DOCUMENT

FIGURES

FULL – SCALE THERMALLY ENHANCED SOIL VAPOR EXTRACTION SYSTEM

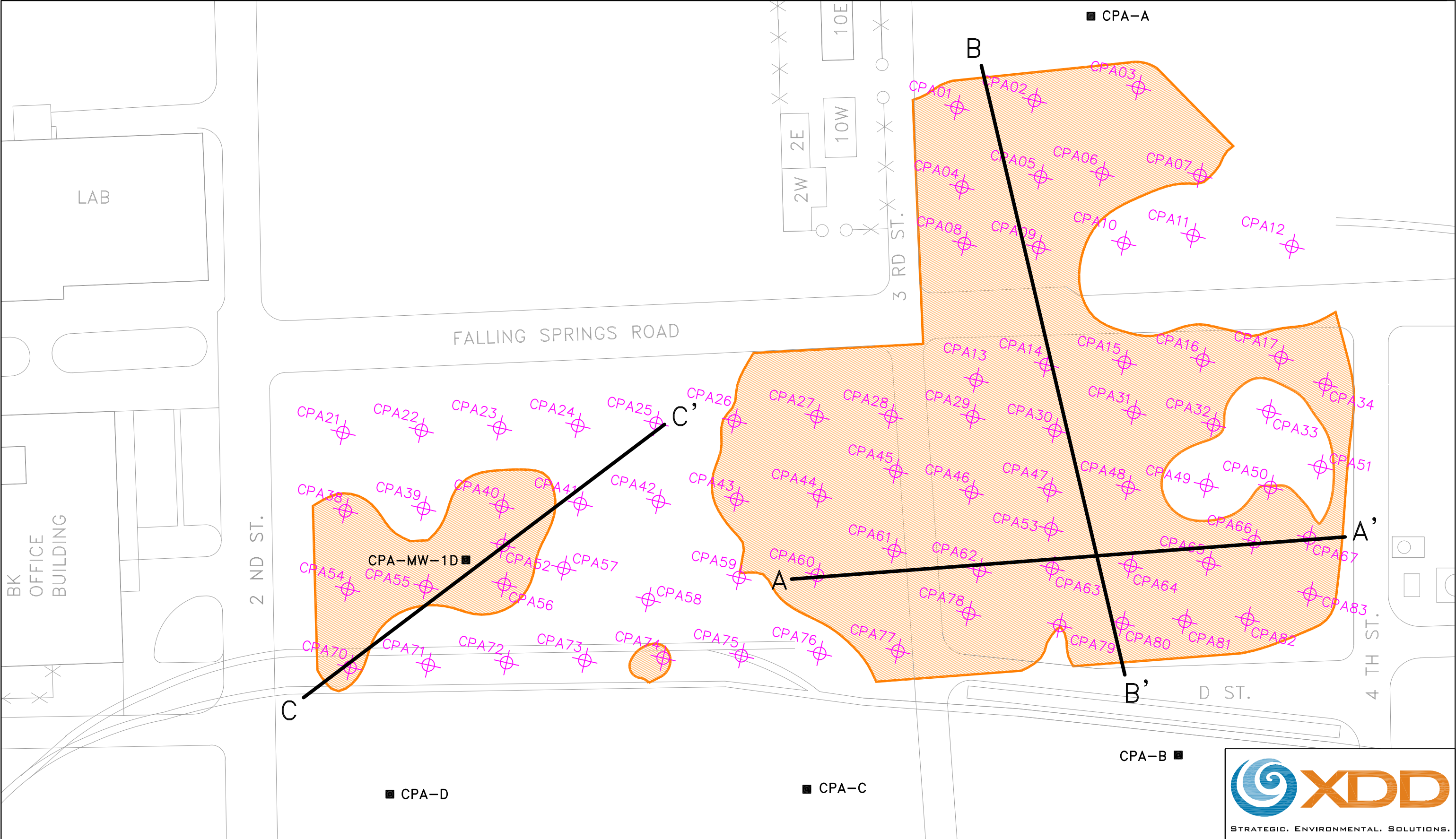
W.G. KRUMMRICH FACILITY – SAUGET, IL



DRAWING NO.	DRAWING TITLE
FIGURE 1	SITE PLAN & DRAWING INDEX
FIGURE 2	T-SVE TREATMENT AREA
FIGURE 3	GEOLOGICAL CROSS-SECTION A-A'
FIGURE 4	GEOLOGICAL CROSS-SECTION B-B'
FIGURE 5	GEOLOGICAL CROSS-SECTION C-C'
FIGURE 6	SVE/AI SYSTEM PROCESS FLOW DIAGRAM
FIGURE 7	T-SVE WELL LOCATIONS
FIGURE 8	T-SVE WELL CONSTRUCTION DIAGRAM
FIGURE 9	VAPOR PROBE CONSTRUCTION DIAGRAM
FIGURE 10	SVE PIPING LAYOUT
FIGURE 11	AI PIPING LAYOUT
FIGURE 12	PIPE SUPPORTS
FIGURE 13	EXPANSION JOINTS/FLEX JOINTS
FIGURE 14	CLEANOUTS AND SUMPS
FIGURE 15	STEAM TRAPS/CONDENSATE DETAILS
FIGURE 16	SVE AND SVE/AI WELLHEAD DETAILS
FIGURE 17	PIPING HEAT TRACE
FIGURE 18	SVE PIPING AND INSTRUMENTATION DIAGRAM
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FIGURE 20	ELECTRICAL DETAILS – SENSORS & INTERLOCKS WIRING
FIGURE 21	TEMPERATURE PROBE AND WATER LEVEL TRANSDUCER LOCATIONS
FIGURE 22	THERMOX PIPING AND INSTRUMENTATION DIAGRAM
FIGURE 23	ACID GAS SCRUBBER PIPING AND INSTRUMENTATION DIAGRAM
FIGURE 24	EQUIPMENT BUILDING LAYOUT
FIGURE 25	INSULATING CAP
FIGURE 26	ELECTRICAL UTILITIES LAYOUT
FIGURE 27	ELECTRICAL DETAILS – MAIN POWER & SUB-PANEL LAYOUT
FIGURE 28	ELECTRICAL DETAILS – ELECTRICAL LINE DIAGRAM
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FIGURE 30	NATURAL GAS SUPPLY LINE CONNECTION
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FIGURE 32	SEWER DISCHARGE LINE CONNECTION
FIGURE 33	SEWER DISCHARGE LINE DETAILS
FIGURE 34	WATER SUPPLY LINE CONNECTION
FIGURE 35	WATER SUPPLY LINE DETAILS
FIGURE 36	STEAM SUPPLY LINE CONNECTION
FIGURE 37	STEAM SUPPLY LINE DETAILS
FIGURE 38A	CPA DESIGN & CONSTRUCTION SCHEDULE
FIGURE 38B	T-SVE OPERATION SCHEDULE



SCALE: AS SHOWN	TITLE:	
DATE: NOVEMBER 2011	SITE PLAN AND DRAWING INDEX	
PROJECT No.: 11003	W.G. KRUMMRICH FACILITY	
CLIENT: SOLUTIA INC.	SAUGET, IL	
DRAWN BY: JTH	DRAWING NO.:	REV:
CHECKED BY: ELS	FIGURE 1	3
PROJ. MGMT. APPROVAL: SCC		



- LEGEND:**
- EXISTING MONITORING WELL/CLUSTER
 - ⊕ URS SOIL BORING (2009)
 - 0-15 FOOT INTERVAL COC EXCEEDANCE AREA
 - CROSS-SECTION LOCATIONS (REFER TO FIGURES 3 THROUGH 5)

NOTES:

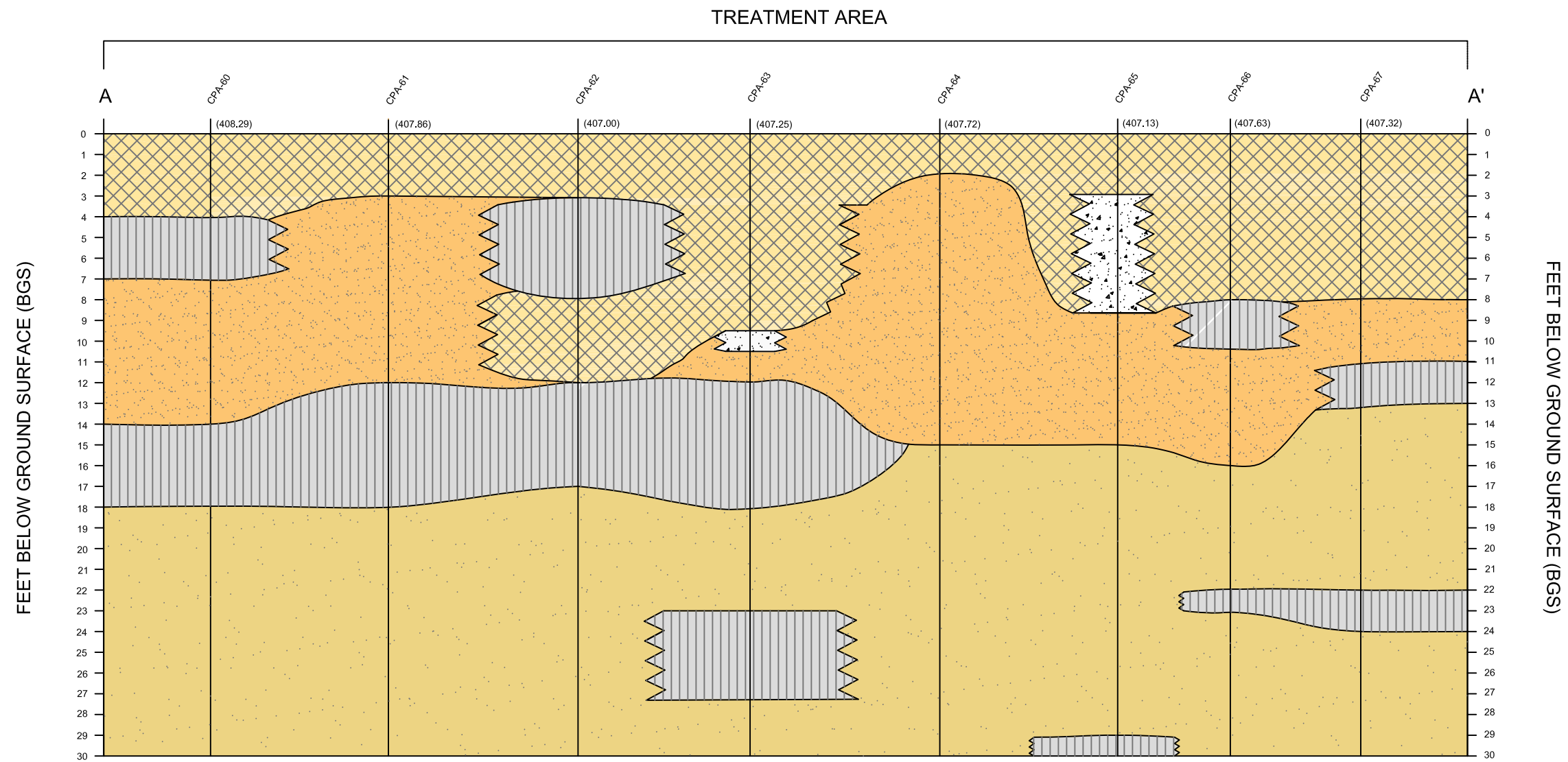
- COC: CONTAMINANT OF CONCERN
- T-SVE: THERMALLY ENHANCED SOIL VAPOR EXTRACTION

SCALE: AS SHOWN
DATE: NOVEMBER 2011
PROJECT No.: 11003
CLIENT: SOLUTIA INC.
DRAWN BY: LBC
CHECKED BY: SCC
PROJ. MGMT. APPROVAL: SCC

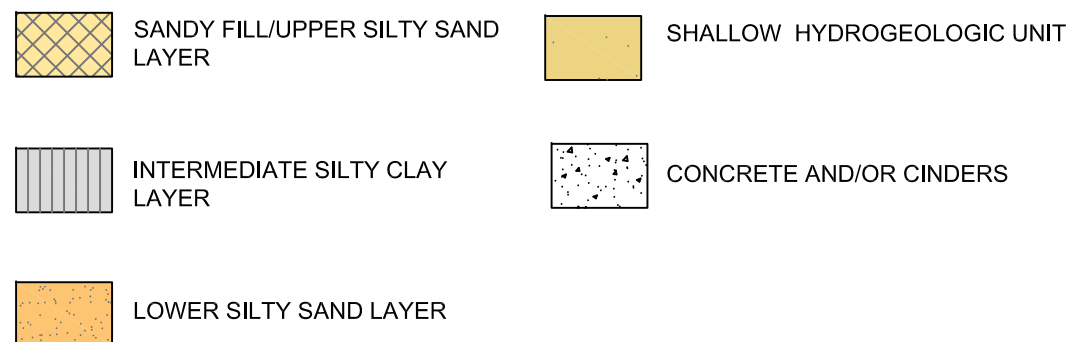


TITLE:
T-SVE TREATMENT AREA
W.G. KRUMMRICH FACILITY
SAUGET, IL

DRAWING NO.: FIGURE 2	REV: 3
---------------------------------	------------------

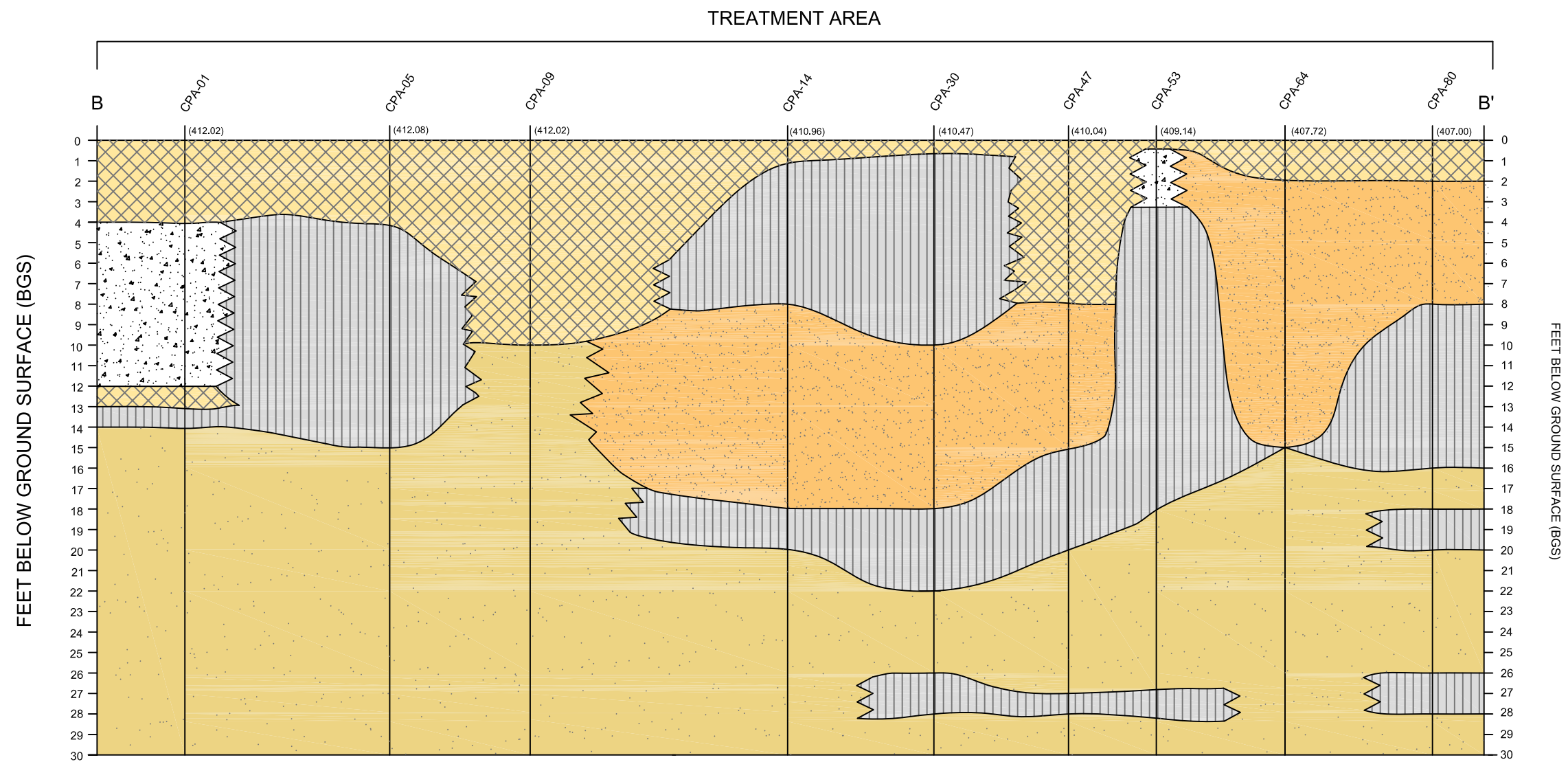


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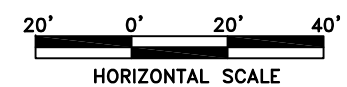
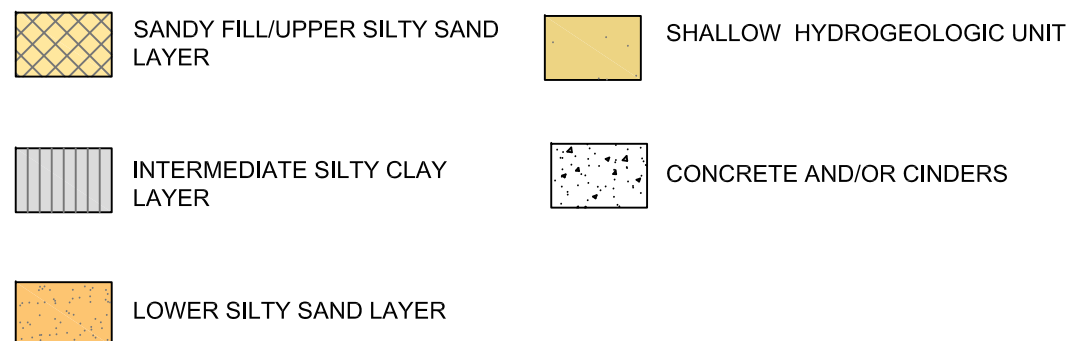


SCALE: AS SHOWN
DATE: NOVEMBER 2011
PROJECT NO.: 11003
CLIENT: SOLUTIA INC.
DRAWN BY: PC
CHECKED BY: ELS
PROJ. MGMT. APPROVAL: SC

TITLE: GEOLOGICAL CROSS SECTION A-A' W.G. KRUMMRICH FACILITY SAUGET, IL	
DRAWING NO.: FIGURE 3	REV: 1

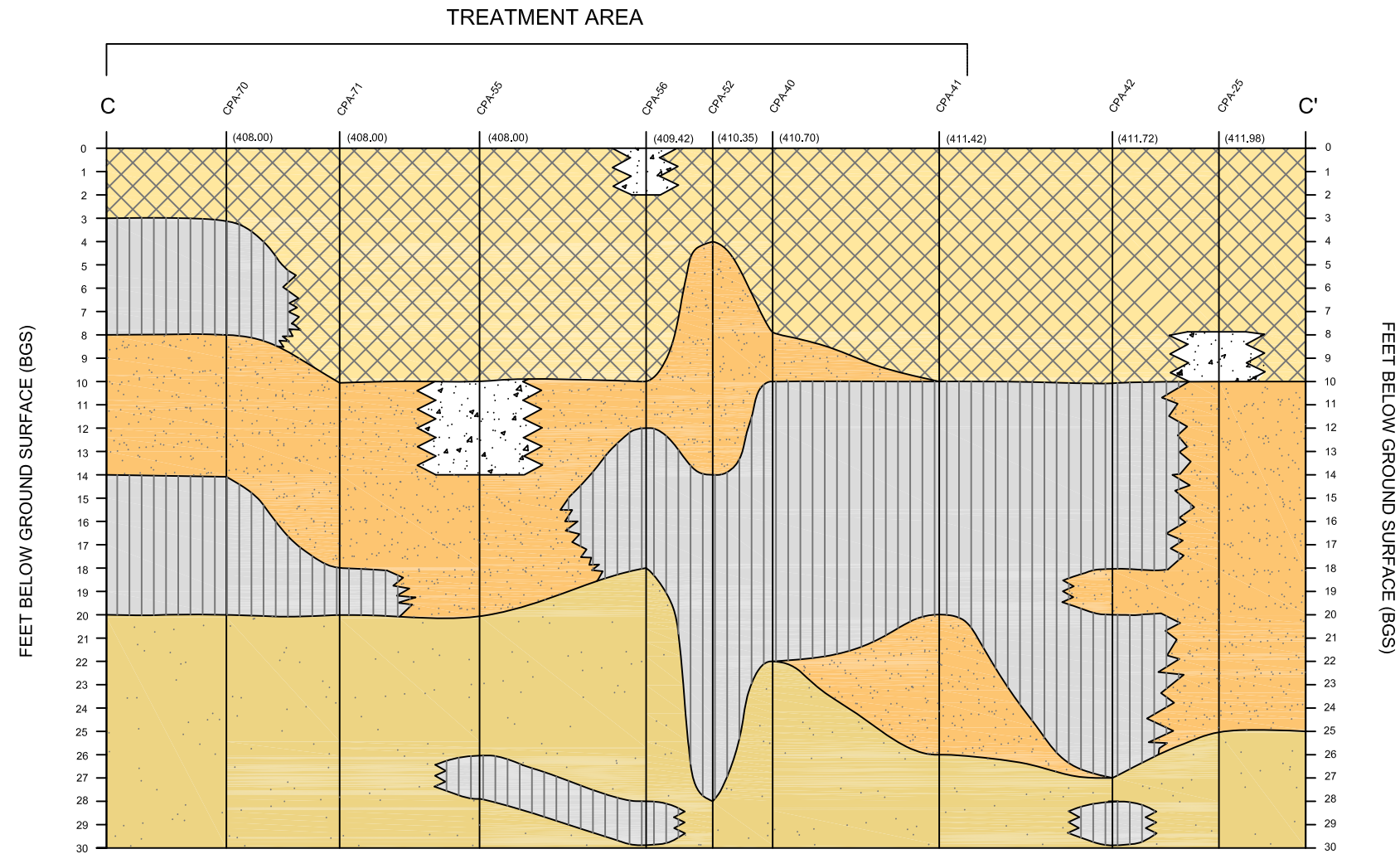


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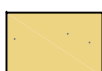
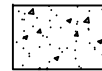


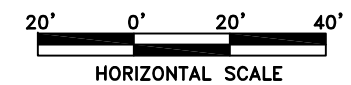
SCALE: AS SHOWN
DATE: NOVEMBER 2011
PROJECT NO.: 11003
CLIENT: SOLUTIA INC.
DRAWN BY: PC
CHECKED BY: ELS
PROJ. MGMT. APPROVAL: SC

TITLE: GEOLOGICAL CROSS-SECTION B-B' W.G. KRUMMRICH FACILITY SAUGET, IL	
DRAWING NO.: FIGURE 4	REV: 2



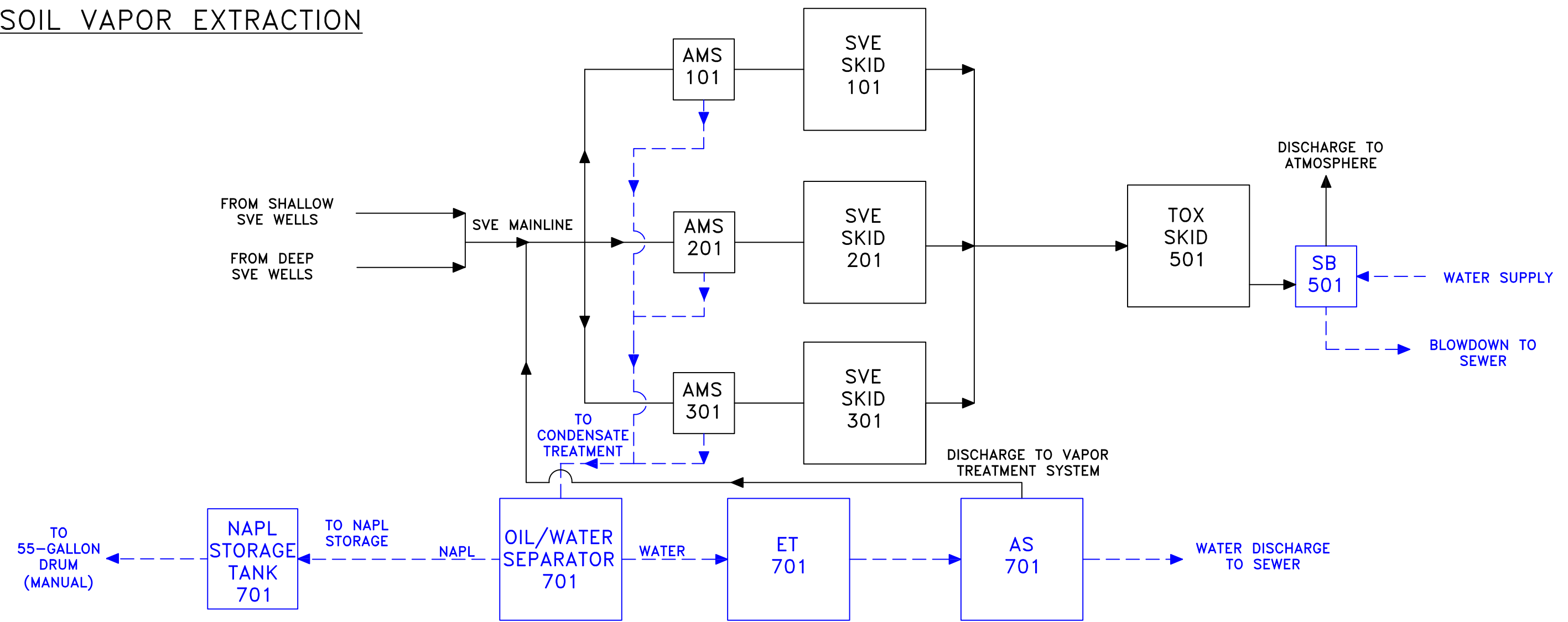
LEGEND:

- | | | | |
|--|-----------------------------------|---|----------------------------|
|  | SANDY FILL/UPPER SILTY SAND LAYER |  | SHALLOW HYDROGEOLOGIC UNIT |
|  | INTERMEDIATE SILTY CLAY LAYER |  | CONCRETE AND/OR CINDERS |
|  | LOWER SILTY SAND LAYER | | |

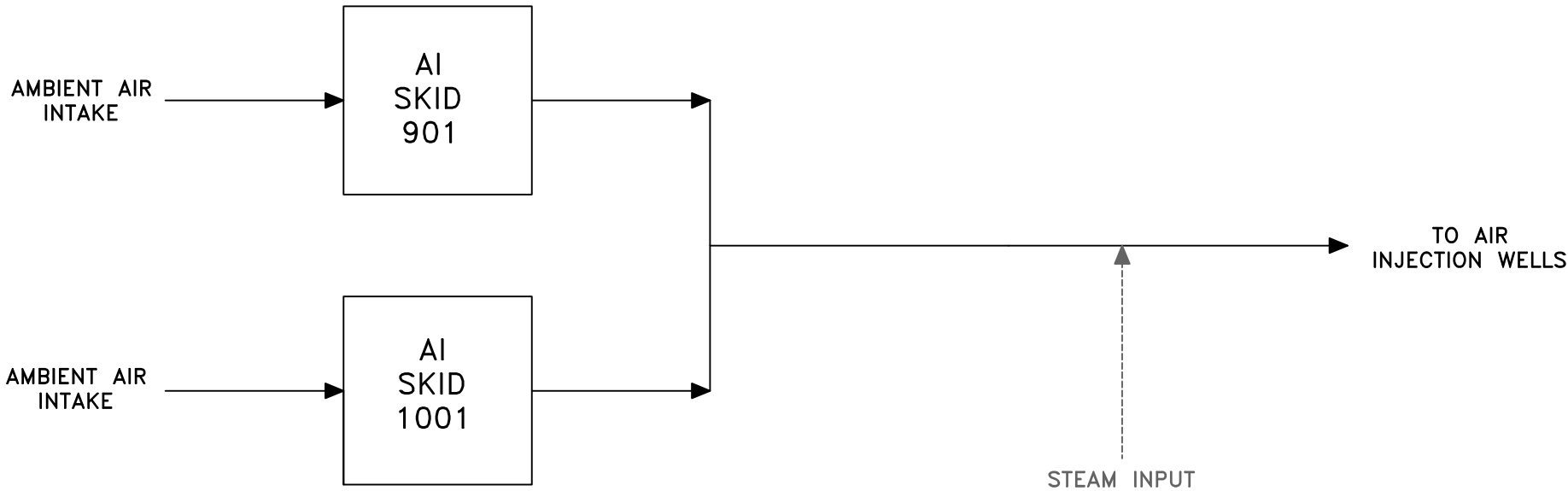


SCALE: AS SHOWN	TITLE: GEOLOGICAL CROSS-SECTION C-C' W.G. KRUMMRICH FACILITY SAUGET, IL	
DATE: NOVEMBER 2011		
PROJECT NO.: 11003		
CLIENT: SOLUTIA INC.		
DRAWN BY: PC	DRAWING NO.: FIGURE 5	REV: 2
CHECKED BY: ELS		
PROJ. MGMT. APPROVAL: SC		

SOIL VAPOR EXTRACTION



AIR INJECTION



LEGEND:	
	AIR FLOW DIRECTION
	WATER FLOW DIRECTION
	STEAM FLOW DIRECTION

NOTES:	
AMS	Air Moisture Separator
AI	Air Injection
AS	Air Stripper
ET	Equalization Tank
HE	Heat Exchanger
NAPL	Non-Aqueous Phase Liquid
SB	Acid-Gas Scrubber
SVE	Soil Vapor Extraction
TOX	Thermal Oxidizer



SCALE: NOT TO SCALE	TITLE: SVE/AI PROCESS FLOW DIAGRAM W.G. KRUMMRICH FACILITY SAUGET, IL	
DATE: NOVEMBER 2011		
PROJECT No.: 11003		
CLIENT: SOLUTIA INC.		
DRAWN BY: ELS	DRAWING NO.: FIGURE 6	REV: 2
CHECKED BY: DK		
PROJ. MGMT. APPROVAL: SCC		



LEGEND:

- T-SVE COMBINATION SHALLOW AND DEEP WELL LOCATION

○ T-SVE DEEP WELL LOCATION

⊙ AIR INJECTION WELL LOCATION

⊕ VP SHALLOW AND DEEP NESTED VAPOR PROBE LOCATION
- ▽ SHALLOW PIEZOMETER LOCATION

▽ DEEP PIEZOMETER LOCATION

□ PRE-BORING (EABR) LOCATION TO CONFIRM GEOLOGY PRIOR TO EABR WELL INSTALLATION

◇ ADDITIONAL BORING LOCATION TO CONFIRM GEOLOGY PRIOR TO T-SVE WELL INSTALLATION

— 0-15 FOOT INTERVAL COC EXCEEDANCE AREA

NOTES:

— COC: CONTAMINANT OF CONCERN
— EABR: ENHANCED AEROBIC BIOREMEDIATION
— T-SVE: THERMALLY ENHANCED SOIL VAPOR EXTRACTION

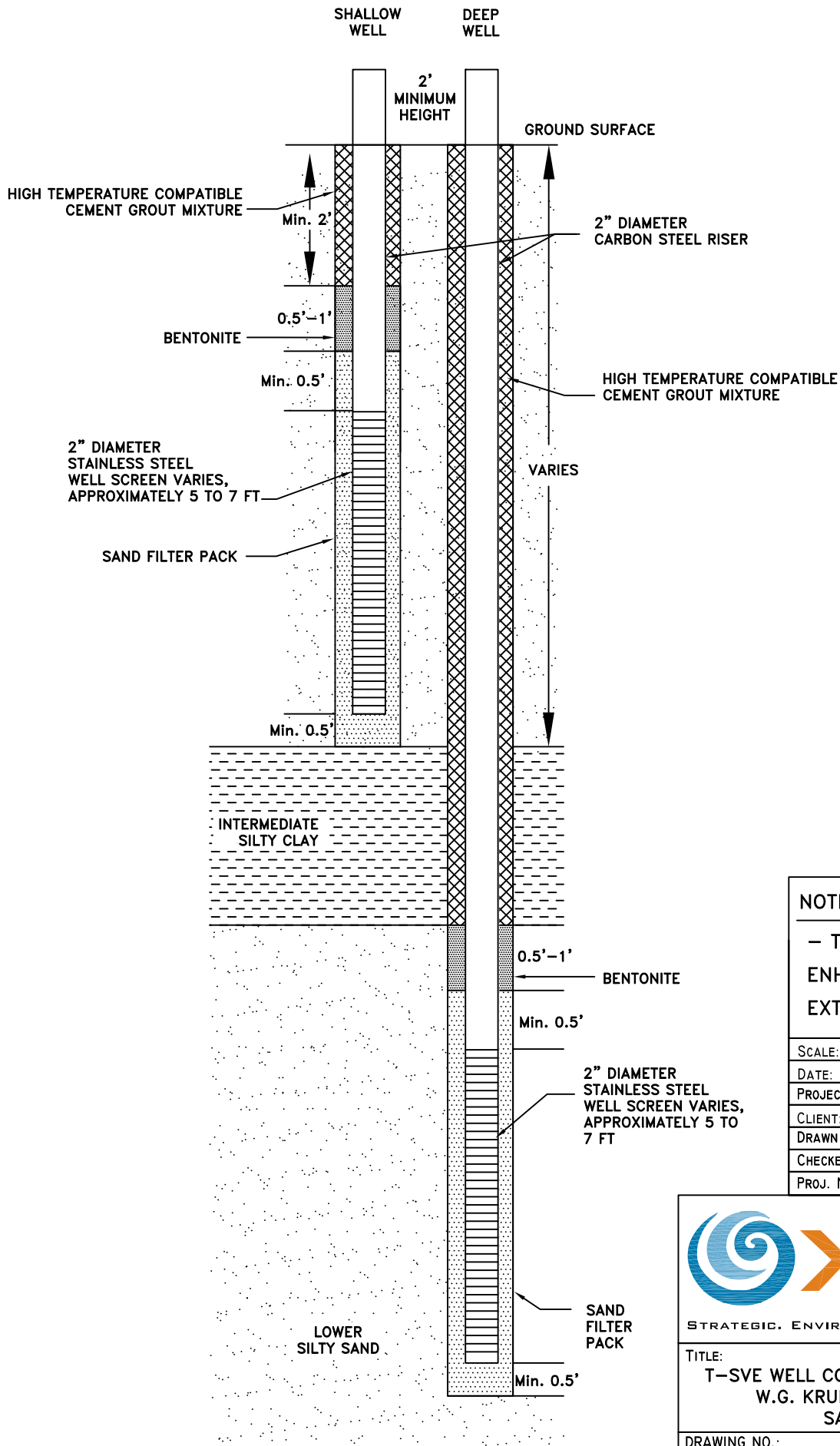


SCALE: AS SHOWN
DATE: NOVEMBER 2011
PROJECT No.: 11003
CLIENT: SOLUTIA INC.
DRAWN BY: LBC
CHECKED BY: SCC
PROJ. MGMT. APPROVAL: SCC



TITLE: T-SVE WELL LOCATIONS W.G. KRUMMRICH FACILITY SAUGET, IL	
DRAWING NO.: FIGURE 7	REV: 2

TYPICAL T-SVE/AI WELL



NOTES:

- T-SVE: THERMALLY ENHANCED SOIL VAPOR EXTRACTION

SCALE: NOT TO SCALE

DATE: NOVEMBER 2011

PROJECT NO.: 11003

CLIENT: SOLUTIA INC.

DRAWN BY: JTH

CHECKED BY: ELS

PROJ. MGMT. APPROVAL: SC



STRATEGIC. ENVIRONMENTAL. SOLUTIONS.

TITLE:
T-SVE WELL CONSTRUCTION DIAGRAM
W.G. KRUMMRICH FACILITY
SAUGET, IL

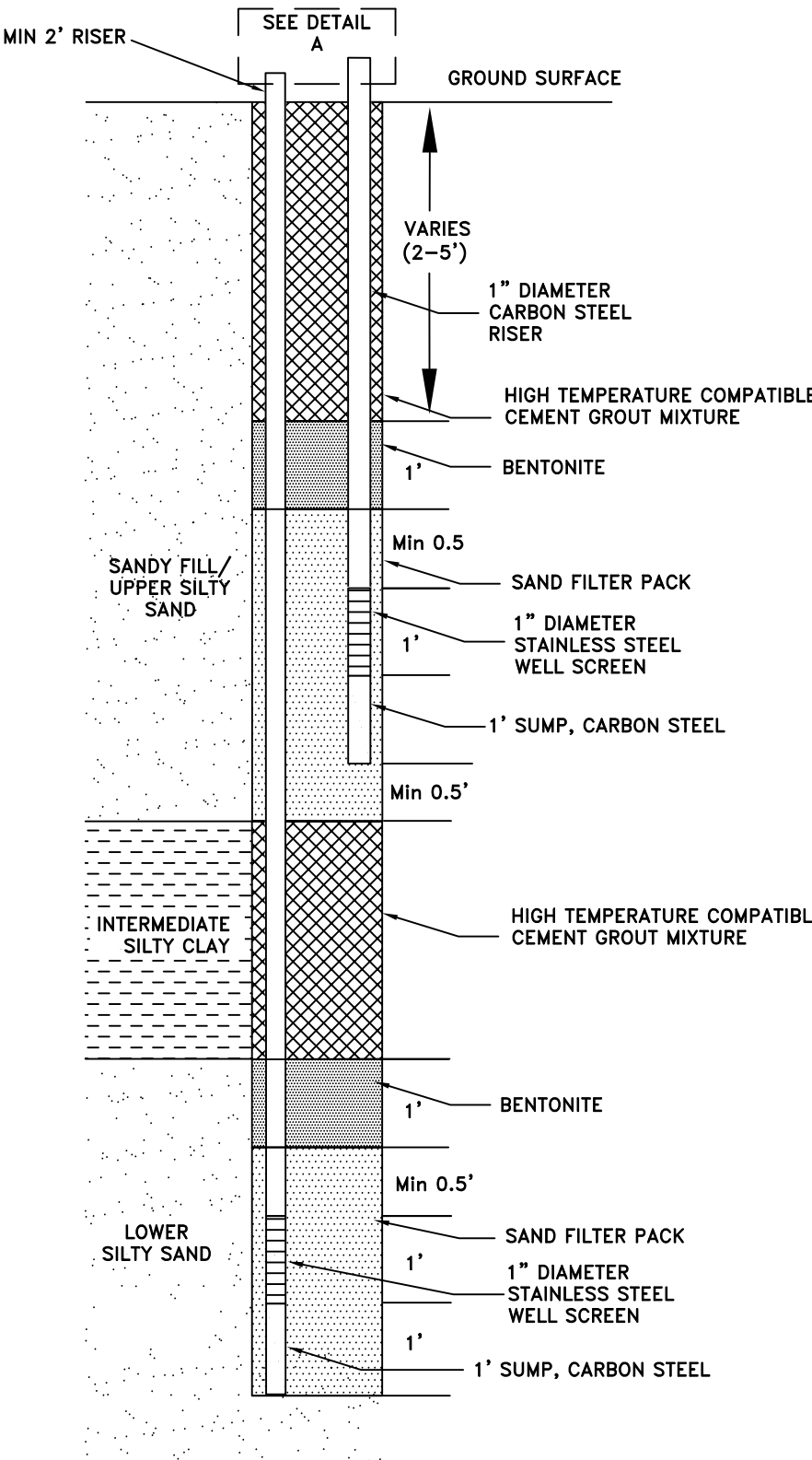
DRAWING NO.:

FIGURE 8

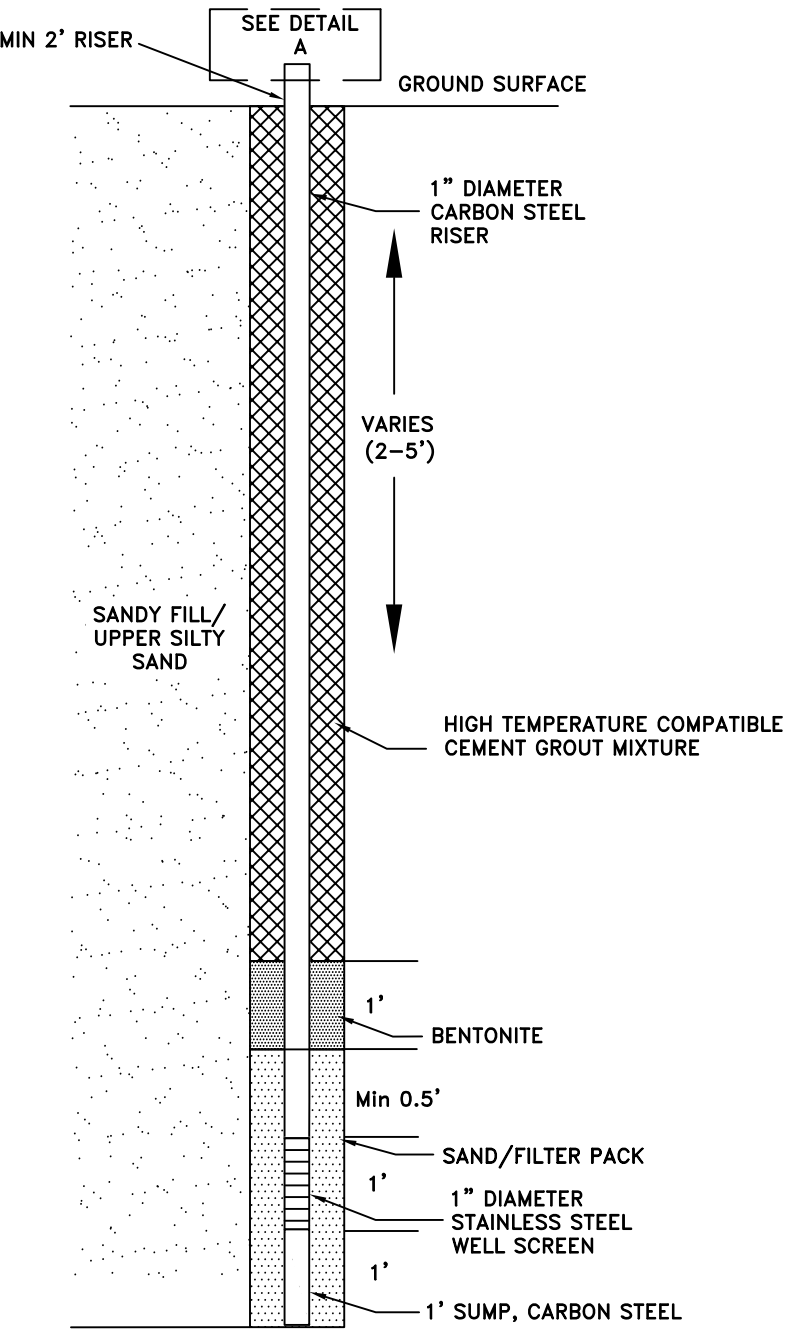
REV:

1

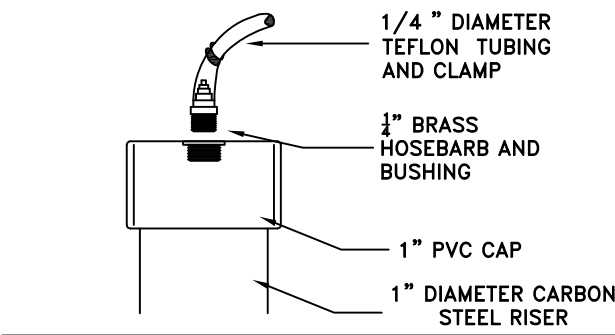
TYPICAL NESTED VAPOR PROBE



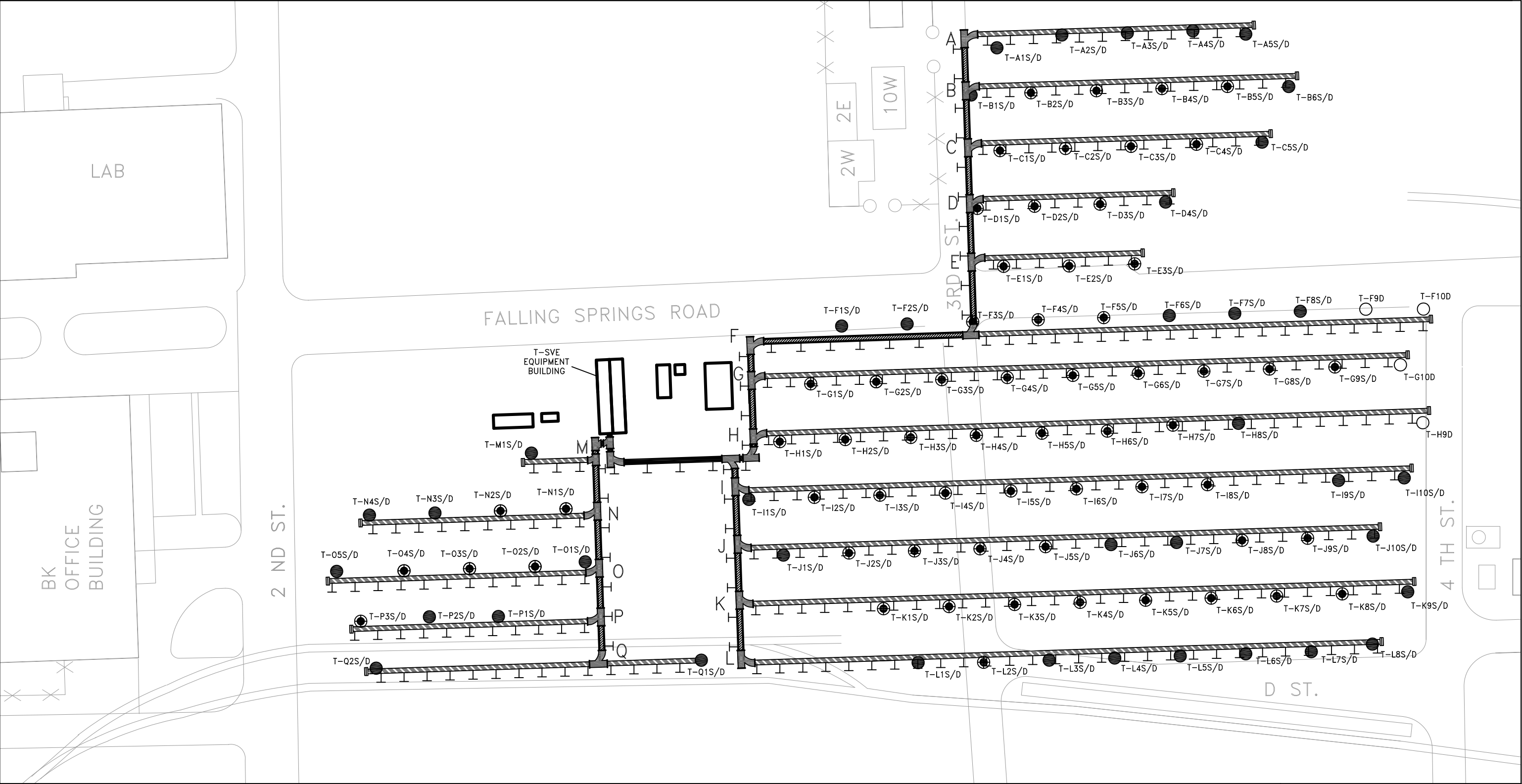
TYPICAL SINGLE VAPOR PROBE



TYPICAL VAPOR PROBE
PROBE COMPLETION DETAIL A



SCALE: NOT TO SCALE	TITLE:	
DATE: NOVEMBER 2011	VAPOR PROBE CONSTRUCTION DIAGRAM	
PROJECT No.: 11003	W.G. KRUMMRICH FACILITY	
CLIENT: SOLUTIA INC.	SAUGET, IL	
DRAWN BY: JTH	DRAWING NO.:	REV:
CHECKED BY: ELS	FIGURE 9	1
PROJ. MGMT. APPROVAL: SC		



LEGEND:

- COMBINATION SHALLOW AND DEEP SVE WELL LOCATION
- DEEP SVE WELL LOCATION
- SVE/AI WELL LOCATION
- SWEEP TEE
- BLIND FLANGE
- 4-INCH CARBON STEEL PIPING
- 8-INCH CARBON STEEL PIPING
- 12-INCH CARBON STEEL PIPING
- LEG IDENTIFICATION LETTER
- PIPE SUPPORT

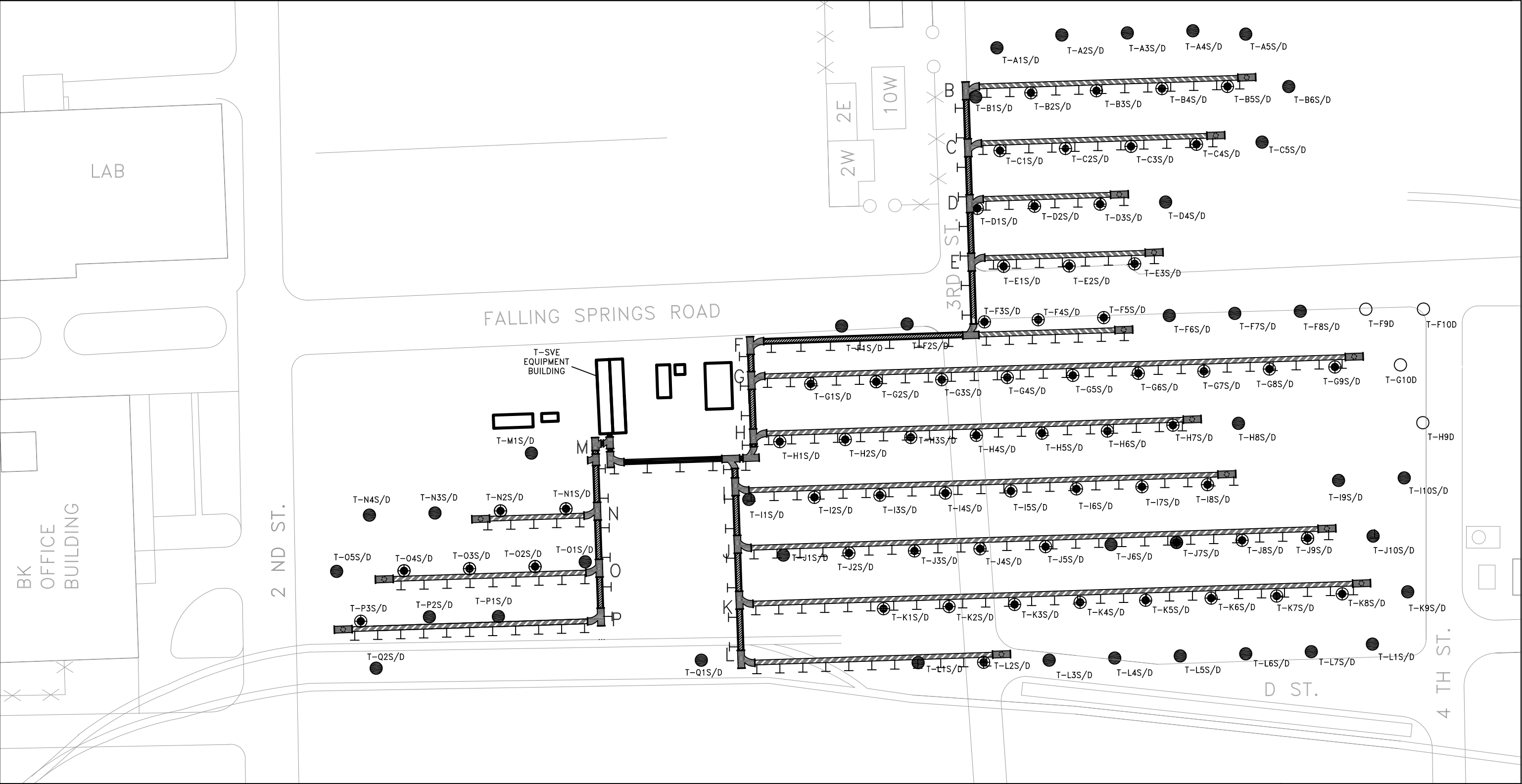
NOTES:
- T-SVE: THERMALLY ENHANCED SOIL VAPOR EXTRACTION



SCALE: AS SHOWN
DATE: NOVEMBER 2011
PROJECT NO.: 11003
CLIENT: SOLUTIA INC.
DRAWN BY: LBC
CHECKED BY: SCC
PROJ. MGMT. APPROVAL: SCC



TITLE: SVE PIPING LAYOUT W.G. KRUMMRICH FACILITY SAUGET, IL	
DRAWING NO.: FIGURE 10	REV: 2



LEGEND:

- COMBINATION SHALLOW AND DEEP SVE WELL LOCATION
- DEEP SVE WELL LOCATION
- ⊕ SVE/AI WELL LOCATION
- └ SWEEP TEE
- ⊞ SUMP/CLEANOUT

- ▬ 4-INCH CARBON STEEL PIPING
- ▬ 8-INCH CARBON STEEL PIPING
- ▬ 12-INCH CARBON STEEL PIPING
- A LEG IDENTIFICATION LETTER
- └ PIPE SUPPORT



NOTES:

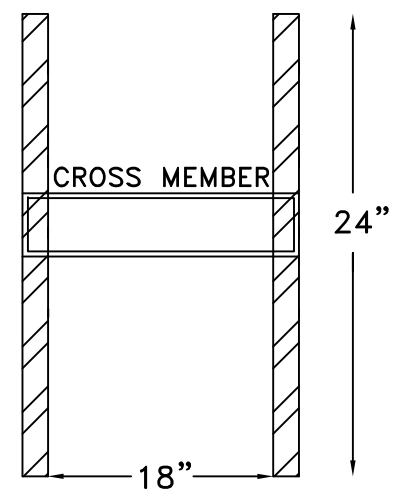
- T-SVE: THERMALLY ENHANCED SOIL VAPOR EXTRACTION
- AI: AIR INJECTION



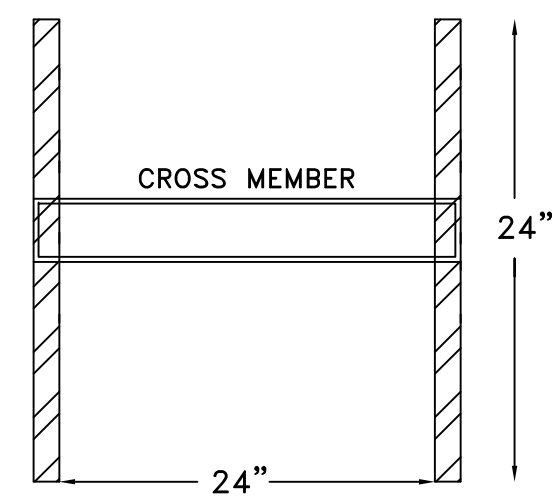
SCALE: AS SHOWN
DATE: NOVEMBER 2011
PROJECT No.: 11003
CLIENT: SOLUTIA INC.
DRAWN BY: LBC
CHECKED BY: SCC
PROJ. MGMT. APPROVAL: SCC

TITLE: AI PIPING LAYOUT W.G. KRUMMRICH FACILITY SAUGET, IL	
DRAWING NO.: FIGURE 11	REV: 3

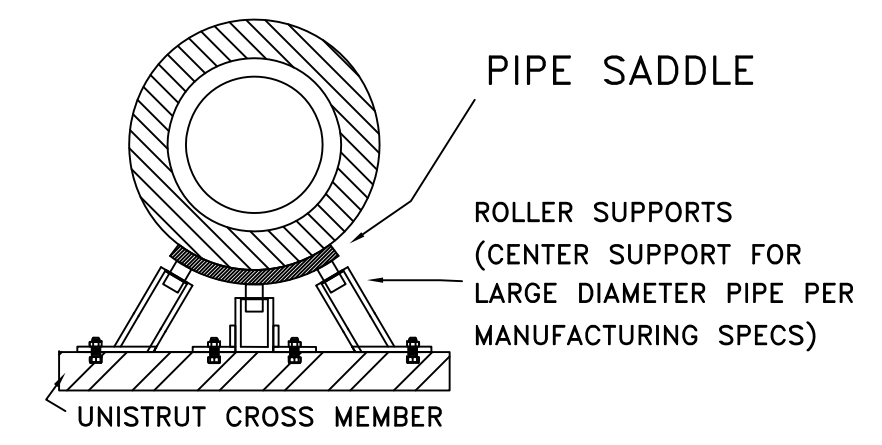
PLAN-VIEW LATERAL



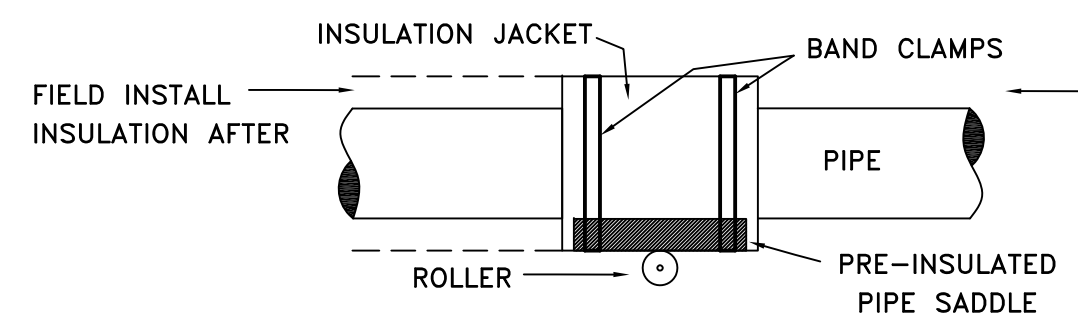
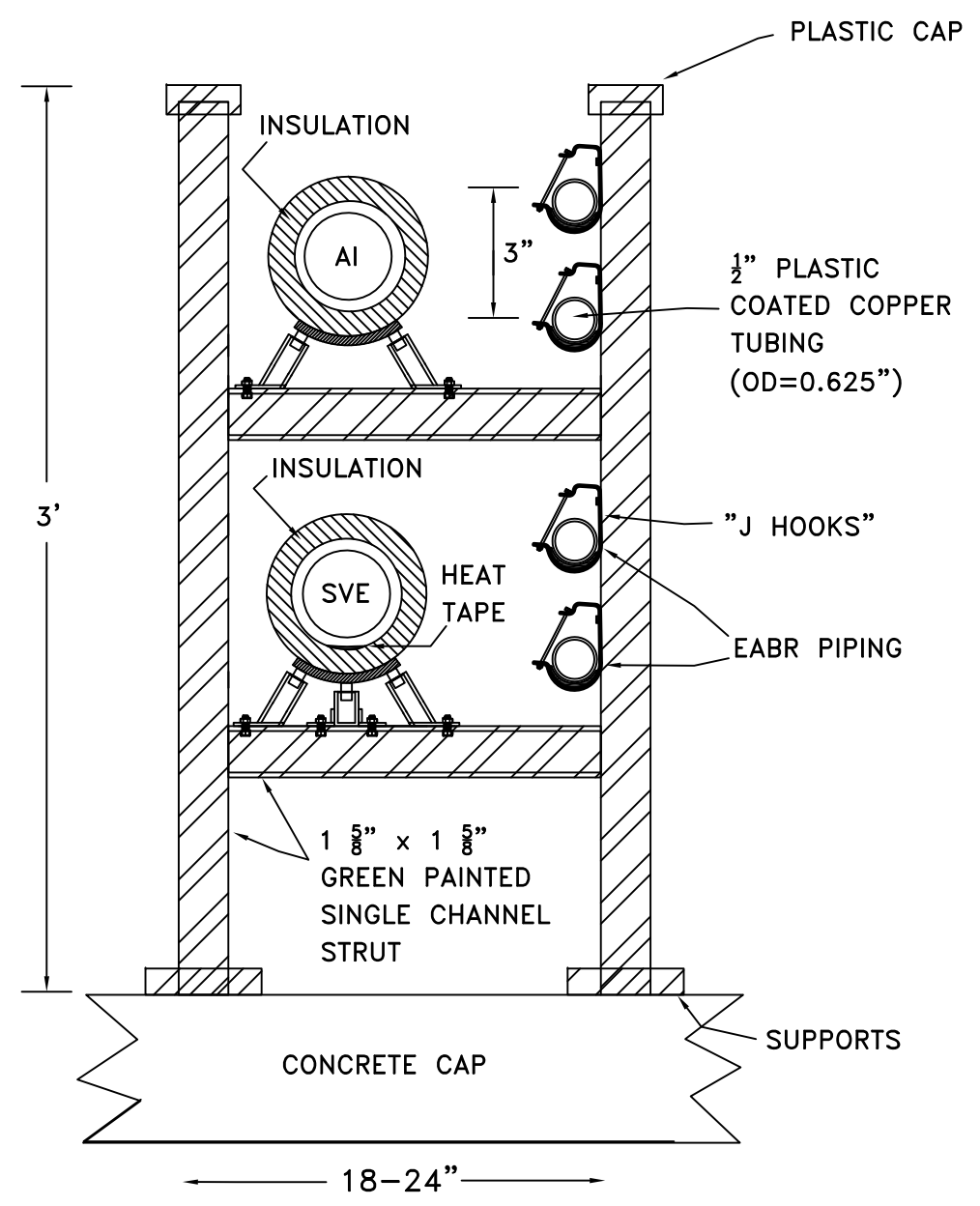
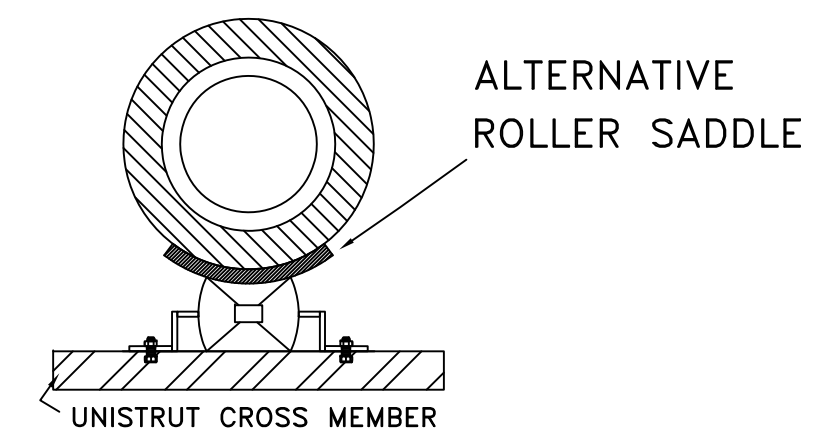
PLAN-VIEW MAINS AND LATERALS



SUPPORT DETAILS



OR



MAY USE PRE-INSULATED PIPE SADDLE AND ROLLER ASSEMBLY FOR INSTALLATION PURPOSES

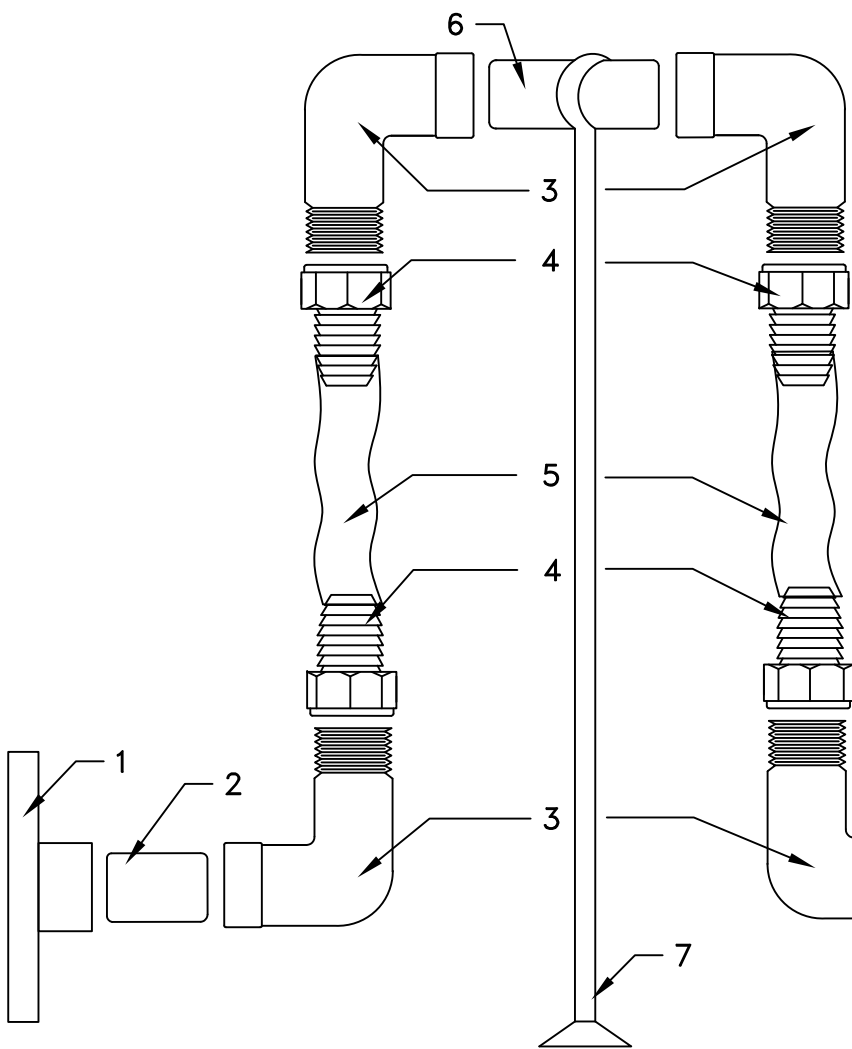
- NOTES:
- AI: AIR INJECTION
 - EABR: ENHANCED AEROBIC BIOREMEDIATION
 - SVE: SOIL VAPOR EXTRACTION
 - OD: OUTER DIAMETER
 - ALL WELLHEADS (SVE AND SVE/AI) AND AI MANIFOLD PIPING WILL INSULATED.
 - ALL SVE MANIFOLD PIPING WILL BE INSULATED AND HEAT TRACED FOR FREEZE PROTECTION.



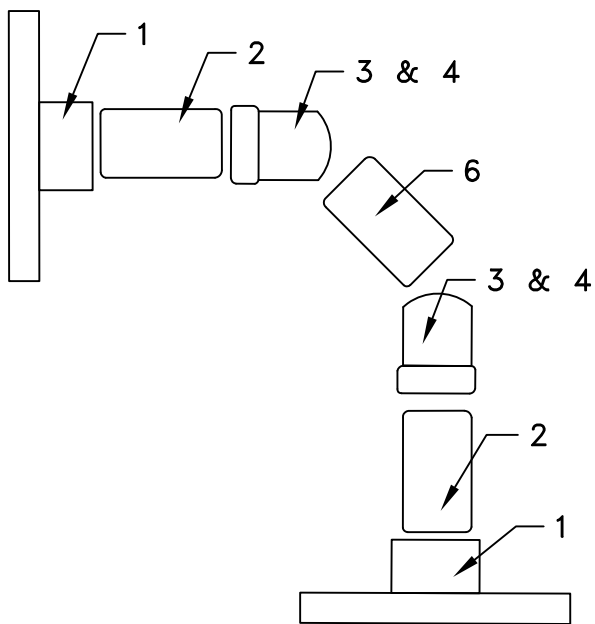
SCALE: NOT TO SCALE	TITLE: PIPE SUPPORTS	
DATE: NOVEMBER 2011	W.G. KRUMMRICH FACILITY	
PROJECT No.: 11003	SAUGET, IL	
CLIENT: SOLUTIA, INC.	DRAWING NO.:	REV:
DRAWN BY: LBC	FIGURE 12	2
CHECKED BY: SCC		
PROJ. MGMT. APPROVAL: SCC		

EXPANSION JOINT

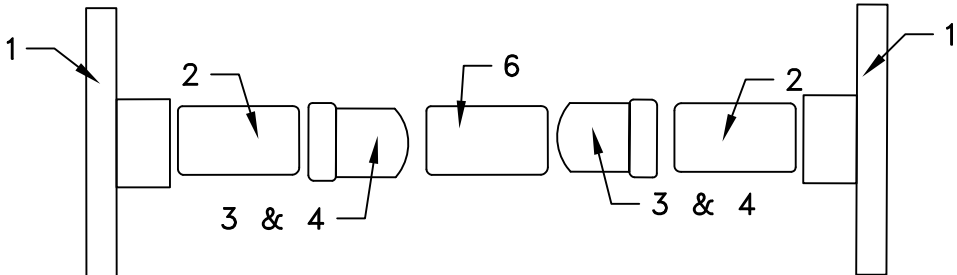
LAYOUT VIEW



PLAN VIEW – 90° ORIENTATION



PLAN VIEW – STRAIGHT ORIENTATION



SEE NOTE 1

Item No.	Description
1	BUTT-WELD FLANGE (FITTED WITH FULL-FACE VITON® GASKET WITH BOLT HOLES)
2	SCHEDULE 10 CARBON STEEL
3	SCHEDULE 10 CARBON STEEL EL 90°
4	316SS HOSE BARB ADAPTER
5	WHMWPE/PTFE/XLPE HOSE
6	SCHEDULE 10 CARBON STEEL (3" LENGTH)
7	SUPPORT BRACKET

NOTES:

- FLANGE BOLT HOLES WILL BE PROPERLY ALIGNED AND BOLT HOLES WILL BE ORIENTED PERPENDICULAR AND PARALLEL TO GROUND SURFACE.
- HOSES WILL BE FITTED ONTO THE HOSE BARBS USING TWO STAINLESS STEEL HOSE CRIMP CLAMPS AT EACH BARBED HOSE FITTING.

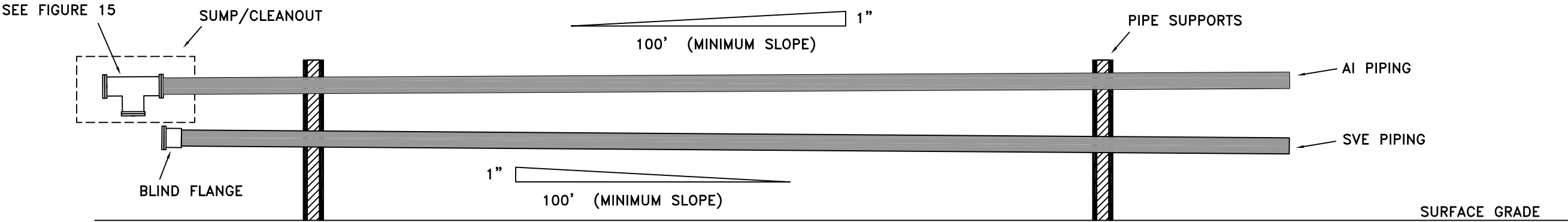
SCALE: NOT TO SCALE
DATE: NOVEMBER 2011
PROJECT No.: 11003
CLIENT: SOLUTIA, INC.
DRAWN BY: KJO
CHECKED BY: LBC
PROJ. MGMT. APPROVAL: SCC



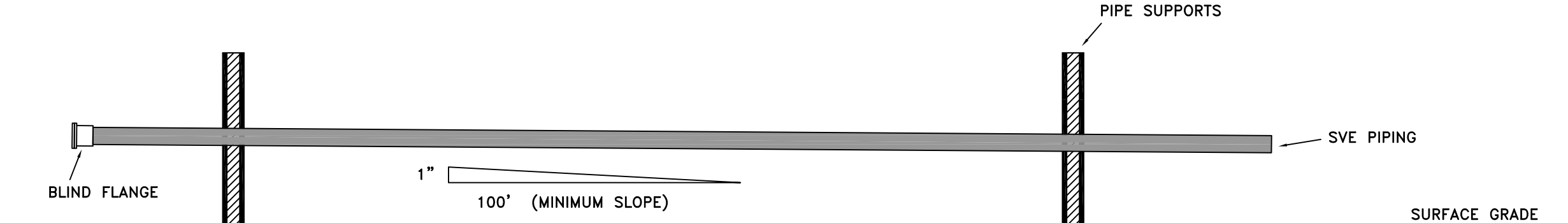
TITLE:
EXPANSION JOINTS/FLEX JOINTS
W.G. KRUMMRICH FACILITY
SAUGET, IL

DRAWING NO.: FIGURE 13	REV: 1
---------------------------	-----------

LEGS WITH COMBINATION SVE/AI WELLS

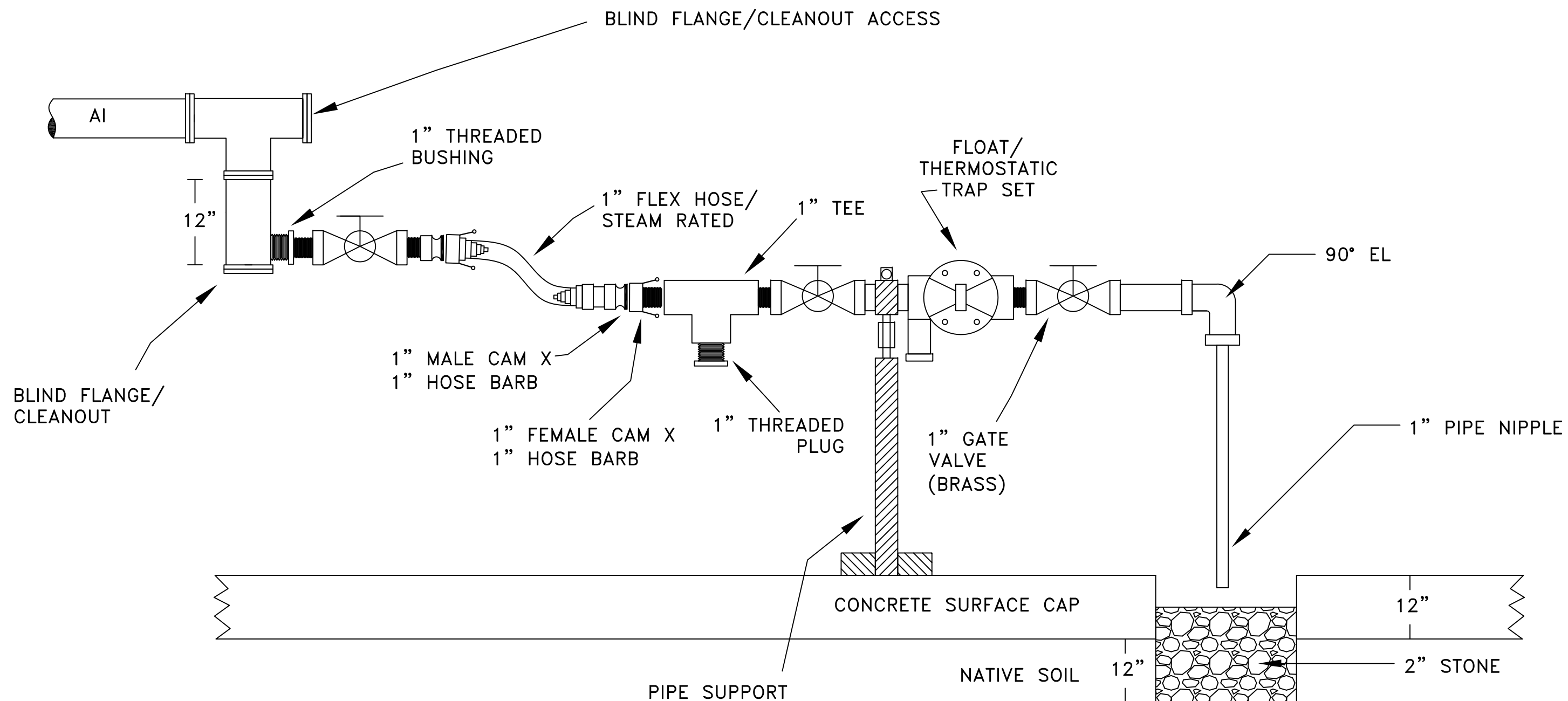


LEGS WITH COMBINATION SVE WELLS ONLY



- NOTES:
- AI = AIR INJECTION
 - SVE = SOIL VAPOR EXTRACTION

SCALE: NOT TO SCALE	TITLE: CLEANOUTS AND SUMPS W.G. KRUMMRICH FACILITY SAUGET, IL	
DATE: NOVEMBER 2011		
PROJECT No.: 11003		
CLIENT: SOLUTIA INC		
DRAWN BY: JTH	DRAWING NO.: FIGURE 14	REV: 2
CHECKED BY: ELS		
PROJ. MGMT. APPROVAL: SCC		

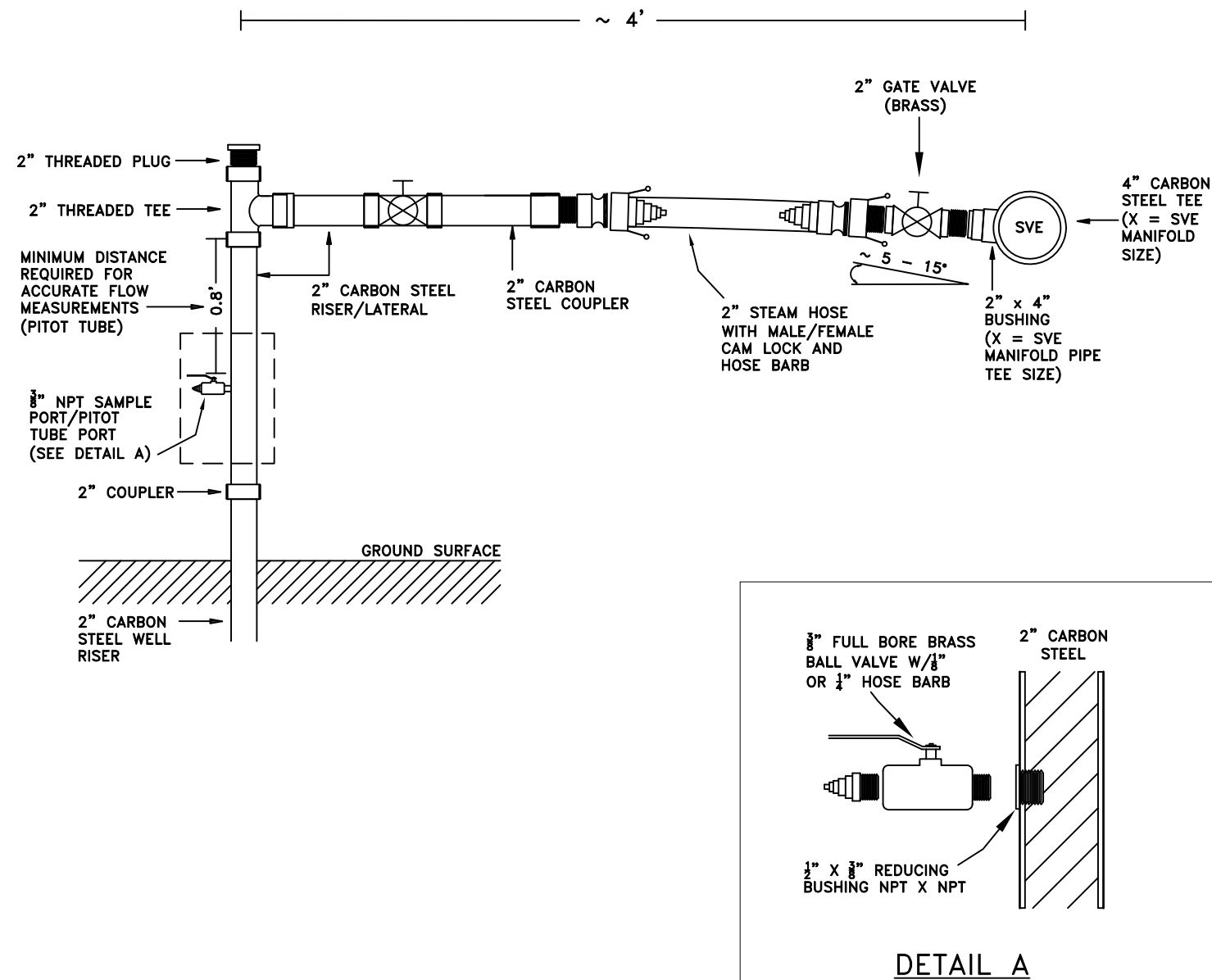


NOTES:
 - AI = AIR INJECTION

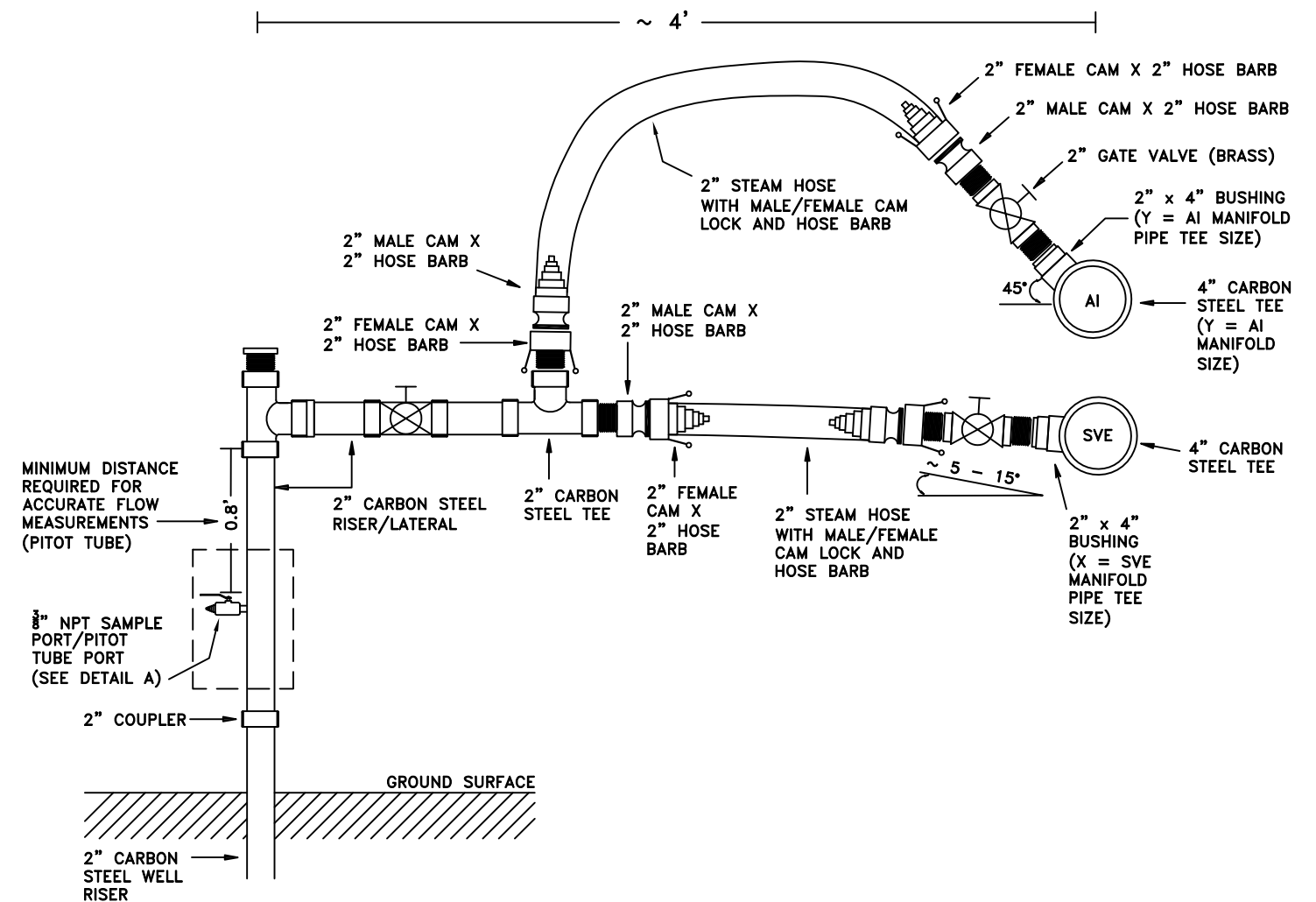


SCALE: NOT TO SCALE	TITLE: STEAM TRAPS/CONDENSATE MAINS W.G. KRUMMRICH FACILITY SAUGET, IL	
DATE: NOVEMBER 2011		
PROJECT No.: 11003		
CLIENT: SOLUTIA INC.		
DRAWN BY: LBC	DRAWING NO.: FIGURE 15	REV: 2
CHECKED BY: SCC		
PROJ. MGMT. APPROVAL: SCC		

SVE WELLHEAD - SIDEVIEW



COMBINATION SVE/AI WELLHEAD – SIDEVIEW



NOTES:

- AI = AIR INJECTION
- SVE = SOIL VAPOR EXTRACTION
- ALL WELLHEAD MATERIALS WILL BE CONSTRUCTED OF SCHEDULE 10 CARBON STEEL (UNLESS NOTED)
- ALL SVE AND COMBINATION SVE/AI WELLHEADS WILL BE INSULATED

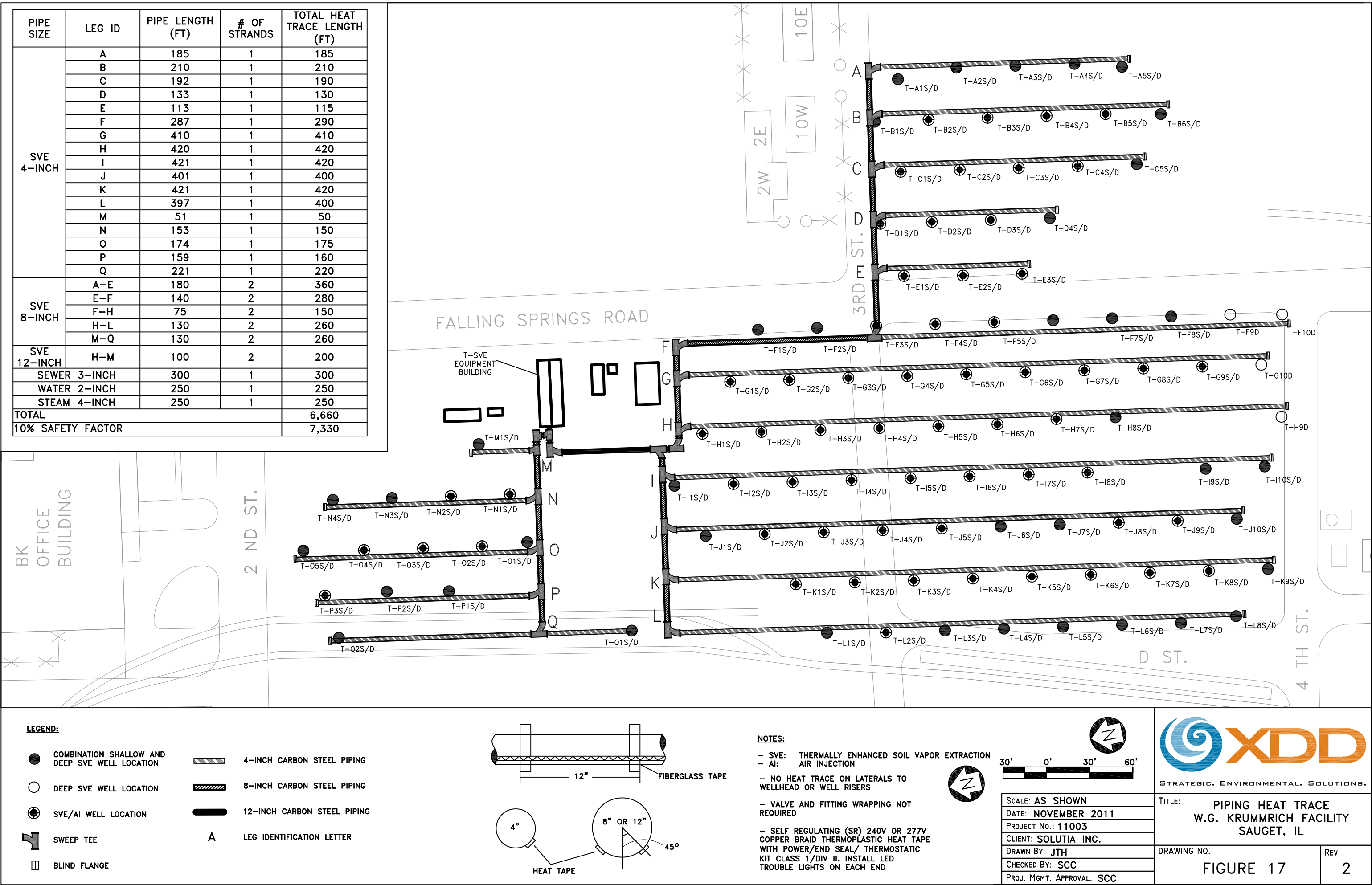
SCALE: NOT TO SCALE
DATE: NOVEMBER 2011
PROJECT NO.: 11003
CLIENT: Solutia Inc.
DRAWN BY: ELS
CHECKED BY: ELS
PROJ. MGMT. APPROVAL: SCC



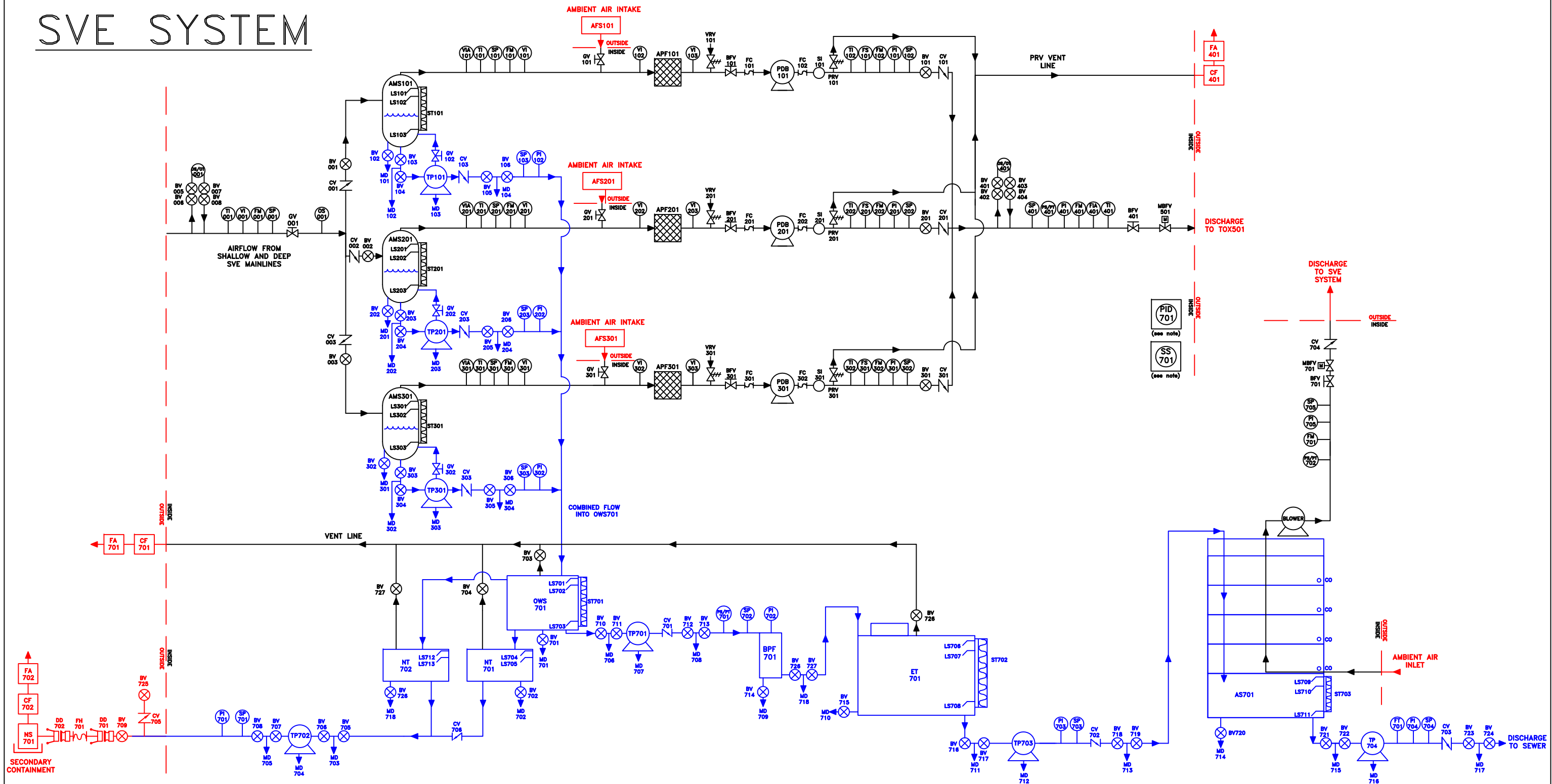
STRATEGIC. ENVIRONMENTAL. SOLUTIONS.

TITLE:	SVE AND SVE/AI WELLHEAD DETAILS W.G. KRUMMRICH FACILITY SAUGET, IL
--------	--

DRAWING NO.:	REV:
FIGURE 16	1



SVE SYSTEM



LEGEND:

AFS	Air Filter/Silencer	FT	Flow Totalizer	PS	Pressure Switch
AMS	Air Moisture Separator	GV	Gate Valve	PT	Pressure Transducer
APF	Air Particulate Filter	HM	Hour Meter	QCV	Quick Connect Valve
AS	Air Stripper	LEL	Lower Explosive Limit	SI	Silencer
BFV	Butterfly Valve	LS	Level Switch	SP	Sample Port
BPF	Bag Particulate Filter	MBFV	Motorized Butterfly Valve	SS	Seismic Sensor
BV	Ball Valve	MD	Manual Drain	ST	Sight Tube
CF	Carbon Filter	NS	Non-Aqueous Phase Liquid (NAPL) Storage	SVE	Soil Vapor Extraction
CO	Clean Out	NT	NAPL Tank	TI	Temperature Indicator
CV	Check Valve	OS	Oxygen Sensor	TOX	Thermal Oxidizer Unit
DD	Dry Disconnect	OT	Oxygen Transducer	TP	Transfer Pump
ET	Equalization Tank	OWS	Oil/Water Separator	VI	Vacuum Indicator
FA	Flame Arrestor	PDB	Positive Displacement Blower	VIA	Vacuum Indicator Analog
FH	Flexible Hose	PI	Pressure Indicator	VRV	Vacuum Relief Valve
FIA	Flow Indicator Analog	PID	Photolization Detector Meter		
FM	Differential Flow Meter	PRV	Pressure Relief Valve		
FS	Flow Switch				

NOTES:

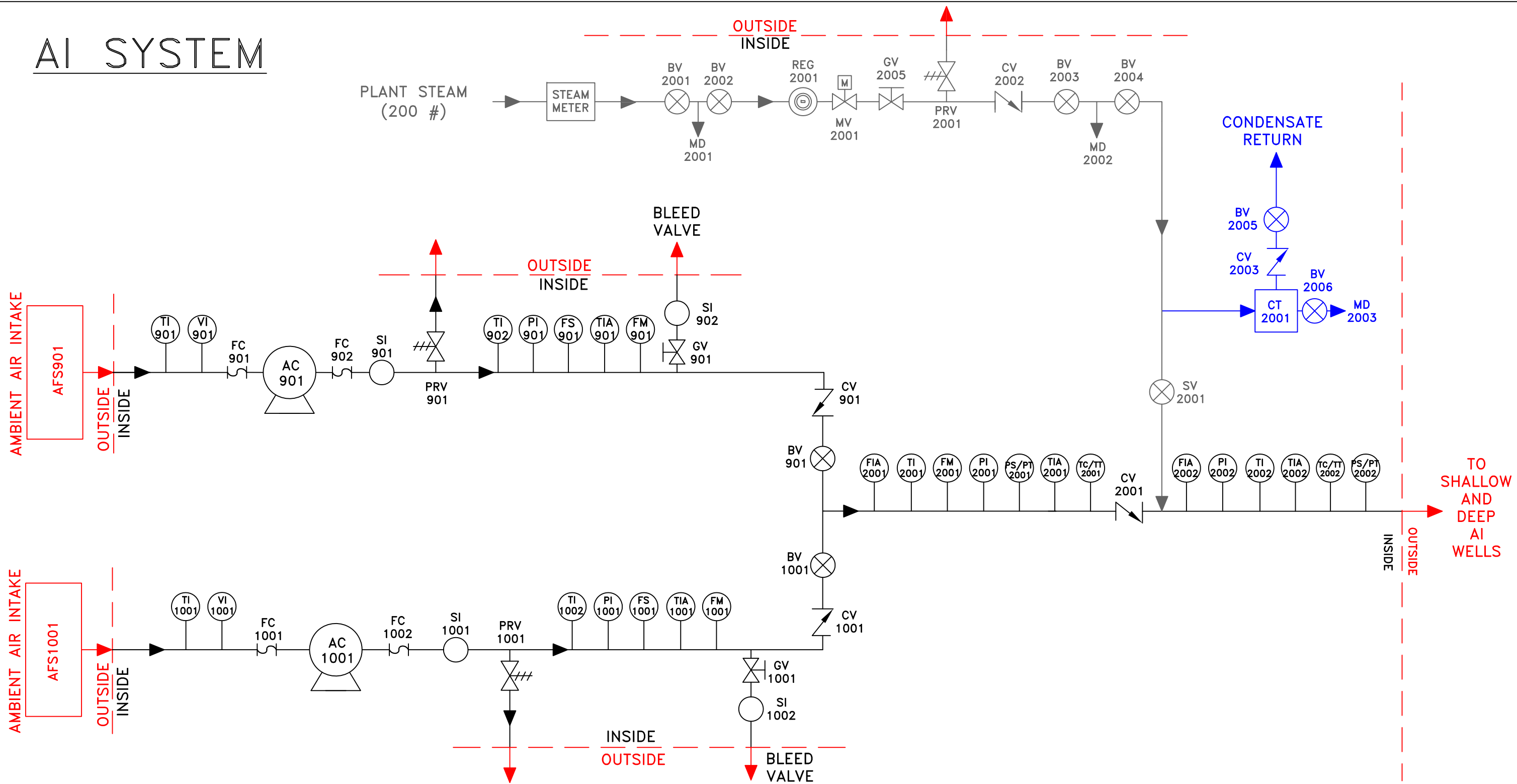
- Equipment to be placed/installed outside the equipment container/building shown in red.
- Water stream line shown in blue.
- Air stream line shown in black.
- All manual drain ball valves will be plugged.
- Pressure relief valves (PRVs) may be added to vents to prevent pressure buildup if ball valves BV703 and/or BV704 are accidentally closed.
- FT701 will be used to measure discharge totals and will be monitored via programmable logic controller (PLC) telemetry.
- All process piping will be carbon or stainless steel.
- PID 701 - A VOC meter will be mounted on the inside of the equipment container/building to monitor conditions inside.
- SS 701 - A seismic sensor will be mounted on the inside of the building to provide alarm notification of any seismic incident of magnitude 5.0 or greater within a 50 mile radius.
- HM 101, HM 102, HM 201, HM 202, HM 301, HM 302, HM 701, HM 702, HM 703, HM 704, and HM 705 Runtime Meters are for PDB 101, TP 101, PDB 201, TP 201, PDB 301, TP 301, TP 701, TP 702, TP 703, TP 704, and AS 701 respectively.



SCALE: NOT TO SCALE
DATE: NOVEMBER 2011
PROJECT No.: 11003
CLIENT: SOLUTIA INC.
DRAWN BY: MAW
CHECKED BY: DK
PROJ. MGMT. APPROVAL: SCC

TITLE: SVE PIPING AND INSTRUMENTATION DIAGRAM
W.G. KRUMMRICH FACILITY
SAUGET, IL
DRAWING NO.:
FIGURE 18
REV: 2

AI SYSTEM



LEGEND:

AC	Air Compressor	MV	Motorized Valve
AI	Air Injection	PI	Pressure Indicator
AFS	Air Filter/Silencer	PRV	Pressure Relief Valve
BV	Ball Valve	PS	Pressure Switch
CT	Condensation Trap	PT	Pressure Transducer
CV	Check Valve	REG	Flow Regulator
FC	Flex/Flange Coupling	SI	Silencer
FIA	Flow Indicator Analog	SV	Solenoid Valve
FM	Differential Flow Meter	TC	Temperature Controller
FS	Flow Switch	TI	Temperature Indicator
GV	Gate Valve	TIA	Temperature Indicator Analog
HE	Heat Exchanger	TT	Temperature Transducer
HM	Hour Meter	VI	Vacuum Indicator
MD	Manual Drain		

NOTES:

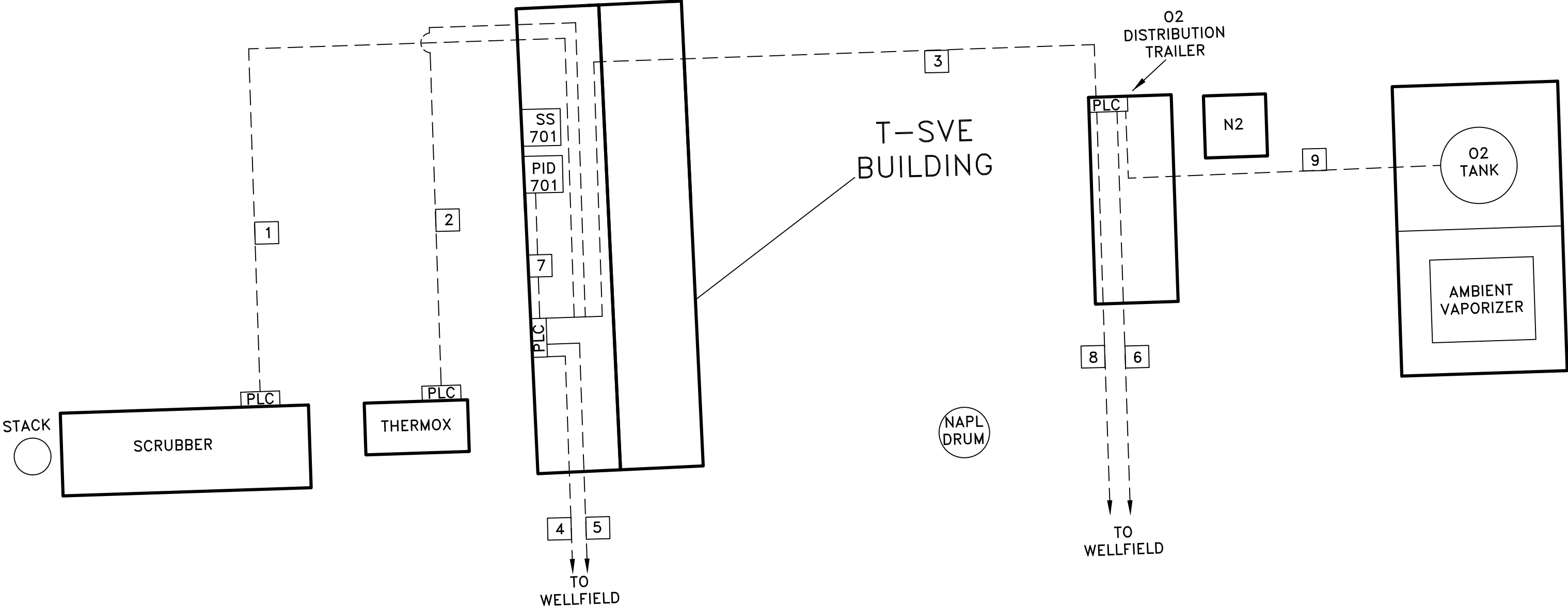
- Equipment to be placed/installed outside the equipment container/building shown in red.
- Air stream line shown in black.
- Steam line shown in gray.
- Water line shown in blue.
- All manual drain ball valves will be plugged.
- All process piping will be carbon steel.
- HM 901 and HM 1001 Total Runtime Meters are for AC 901 and AC 1001, respectively.



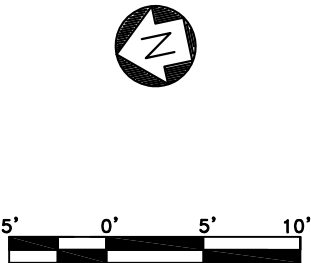
STRATEGIC. ENVIRONMENTAL. SOLUTIONS.

SCALE: NOT TO SCALE	TITLE: AI PIPING AND INSTRUMENTATION DIAGRAM W.G. KRUMMRICH FACILITY SAUGET, IL	
DATE: NOVEMBER 2011		
PROJECT No.: 11003	DRAWING NO.: FIGURE 19	
CLIENT: SOLUTIA INC.		
DRAWN BY: MAW	REV: 2	
CHECKED BY: DK		
PROJ. MGMT. APPROVAL: SCC		

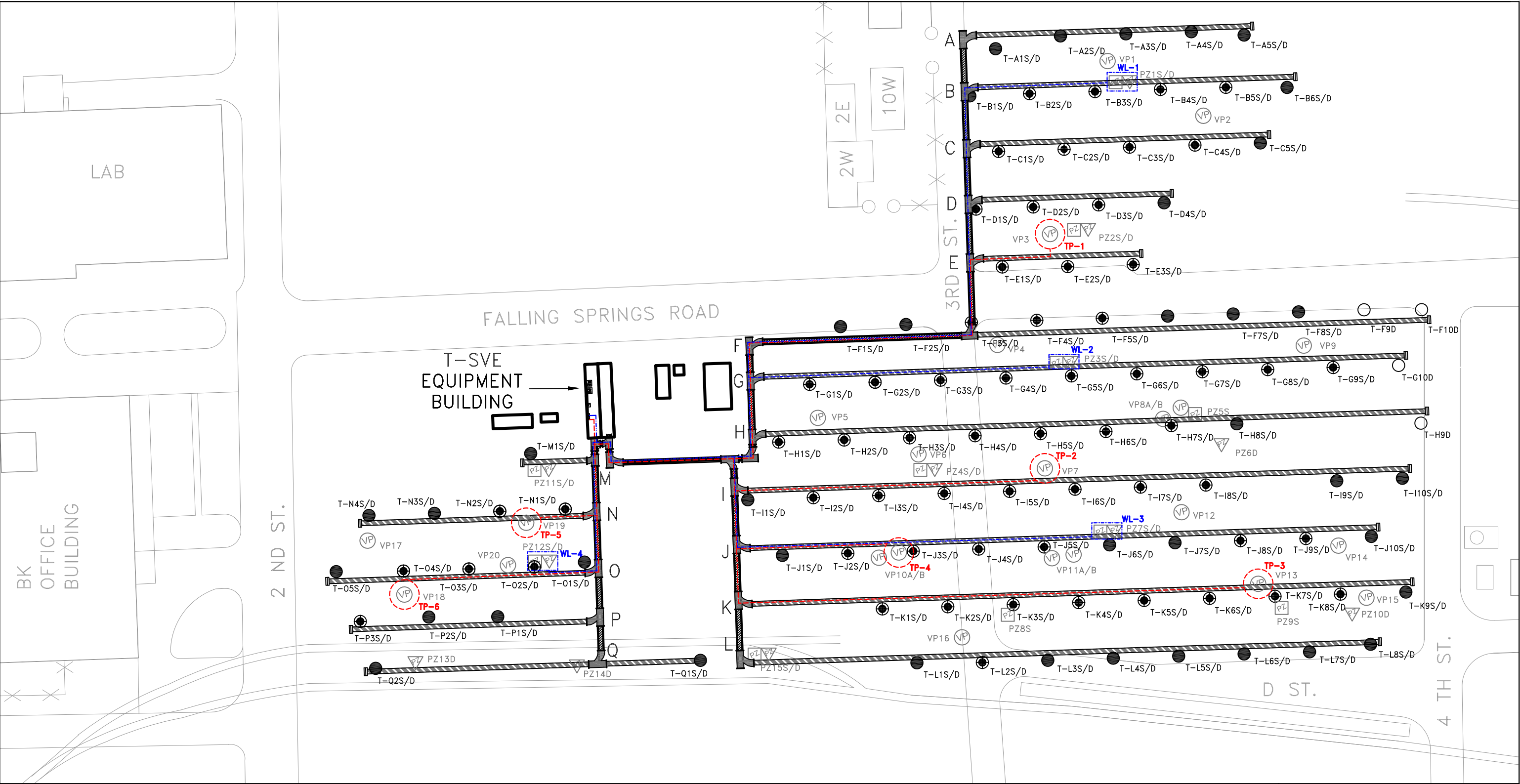
FALLING SPRINGS ROAD



CONDUIT INTERLOCK	# OF INTERLOCKS	CONTROL/INTERLOCK CONNECTIONS	WIRE TYPE/GAUGE	APPROXIMATE CONDUIT LENGTH (FT)	SETS OF WIRES
1	2	PAH403/PAL403 – HIGH/LOW PRESSURE SPRAY	18 AWG / 2 WIRE W/ GROUND	60	6 + 1 SPARE
	1	TAH403 – QUENCH TEMPERATURE			
	2	LAH402/LALL402 – SUMP HIGH/LOW			
	1	AAL401/AAH401 – pH HIGH/LOW AND READOUT			
2	1	THERMOX READY (SVE START) AND ALLOW OPENING OF INLET VALVE	18 AWG / 2 WIRE W/ GROUND	50	2 + 1 SPARE
	1	THERMOX ALARM (SHUT DOWN SVE AND SCRUBBER) – CLOSE INLET VALVE			
3	1	O2 TRAILER – O2 SENSORS TRIGGER FULL SHUTDOWN (REFER TO 100% EABR DESIGN)	18 AWG / 2 WIRE W/ GROUND	50	2 + 1 SPARE
	1	SVE/THERMOX PROCESS INLET – O2 SENSORS TRIGGER FULL SHUTDOWN			
4	11	TEMPERATURE PROBES/DATA LOGGER	18 AWG / 2 WIRE W/ GROUND	SEE FIGURE 21	SEE FIGURE 21
5	4	WATER LEVEL TRANSDUCERS/DATA LOGGER	SUPPLIED BY OTHERS		
6	10	DO PROBES/DATA LOGGER (4 WIRE, 24V DC, 4–20 MA – REFER TO 100% EABR DESIGN)			
7	2	PID701 (SVE BUILDING VOCs)/SS701 SEISMIC SWITCH– TRIGGER FULL SHUTDOWN	18 AWG / 2 WIRE W/ GROUND	10	2
8	221	SOLENOID VALVES SV401–SV591 and SV601–630 (REFER TO 100% EABR DESIGN)	18 AWG / 2 WIRE W/ GROUND	REFER TO 100% EABR DESIGN	221 + 30 SPARES (1 PER SOLENOID VALVE BANK)
9	1	OXYGEN SUPPLY SOLENOID VALVE SV001 (REFER TO 100% EABR DESIGN)	18 AWG / 2 WIRE W/ GROUND	REFER TO 100% EABR DESIGN	1



SCALE: AS SHOWN	TITLE: ELECTRICAL DETAILS – SENSORS AND INTERLOCKS WIRING W.G. KRUMMRICH FACILITY SAUGET, IL	
DATE: NOVEMBER 2011		
PROJECT No.: 11003		
CLIENT: SOLUTIA INC.		
DRAWN BY: LBC	DRAWING NO.: FIGURE 20	REV: 1
CHECKED BY: LBC		
PROJ. MGMT. APPROVAL: SCC		



LEGEND:

- COMBINATION SHALLOW AND DEEP SVE WELL LOCATION
- DEEP SVE WELL LOCATION
- ⊙ SVE/AI WELL LOCATION
- └ SWEEP TEE
- BLIND FLANGE

- ▬ 4-INCH CARBON STEEL PIPING
- ▬ 8-INCH CARBON STEEL PIPING
- ▬ 12-INCH CARBON STEEL PIPING
- A LEG IDENTIFICATION LETTER
- ⊙ PROPOSED SHALLOW AND DEEP NESTED VAPOR PROBE LOCATION

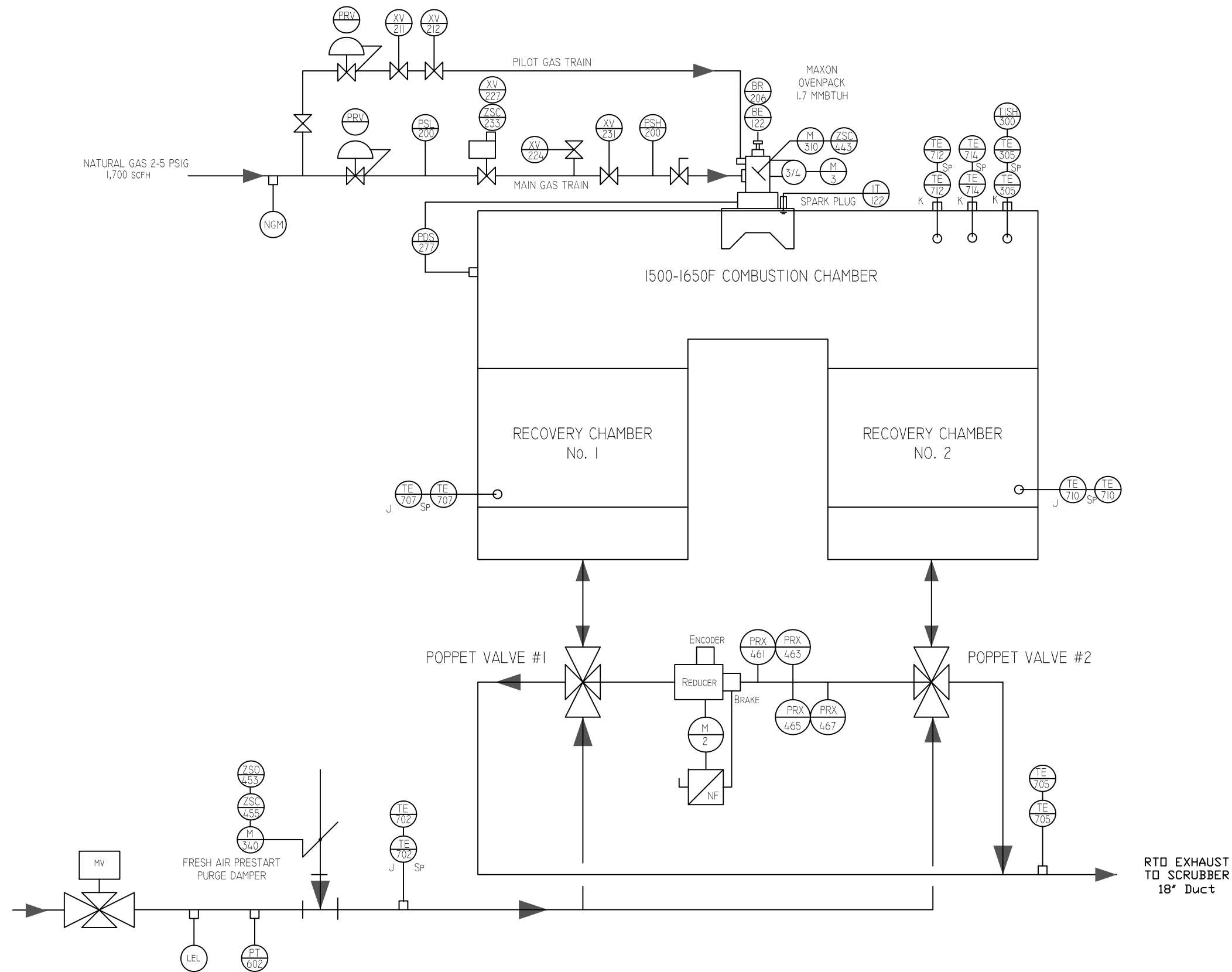
- PROPOSED SHALLOW PIEZOMETER LOCATION
- ▽ PROPOSED DEEP PIEZOMETER LOCATION
- TP-1 PROPOSED TEMPERATURE PROBE VAPOR PROBE LOCATION AND CONNECTIVE WIRING (REFER TO FIGURE 20 FOR SENSOR AND INTERLOCK WIRING DETAILS)
- WL-1 PROPOSED WATER LEVEL TRANSDUCER PIEZOMETER LOCATION AND CONNECTIVE WIRING (REFER TO FIGURE 20 FOR SENSOR AND INTERLOCK WIRING DETAILS)



SCALE: AS SHOWN
DATE: NOVEMBER 2011
PROJECT NO.: 11003
CLIENT: SOLUTIA INC.
DRAWN BY: LBC
CHECKED BY: SCC
PROJ. MGMT. APPROVAL: SCC



TITLE: TEMPERATURE PROBE AND WATER LEVEL TRANSDUCER LOCATIONS W.G. KRUMMRICH FACILITY SAUGET, IL	
DRAWING NO.: FIGURE 21	REV: 2

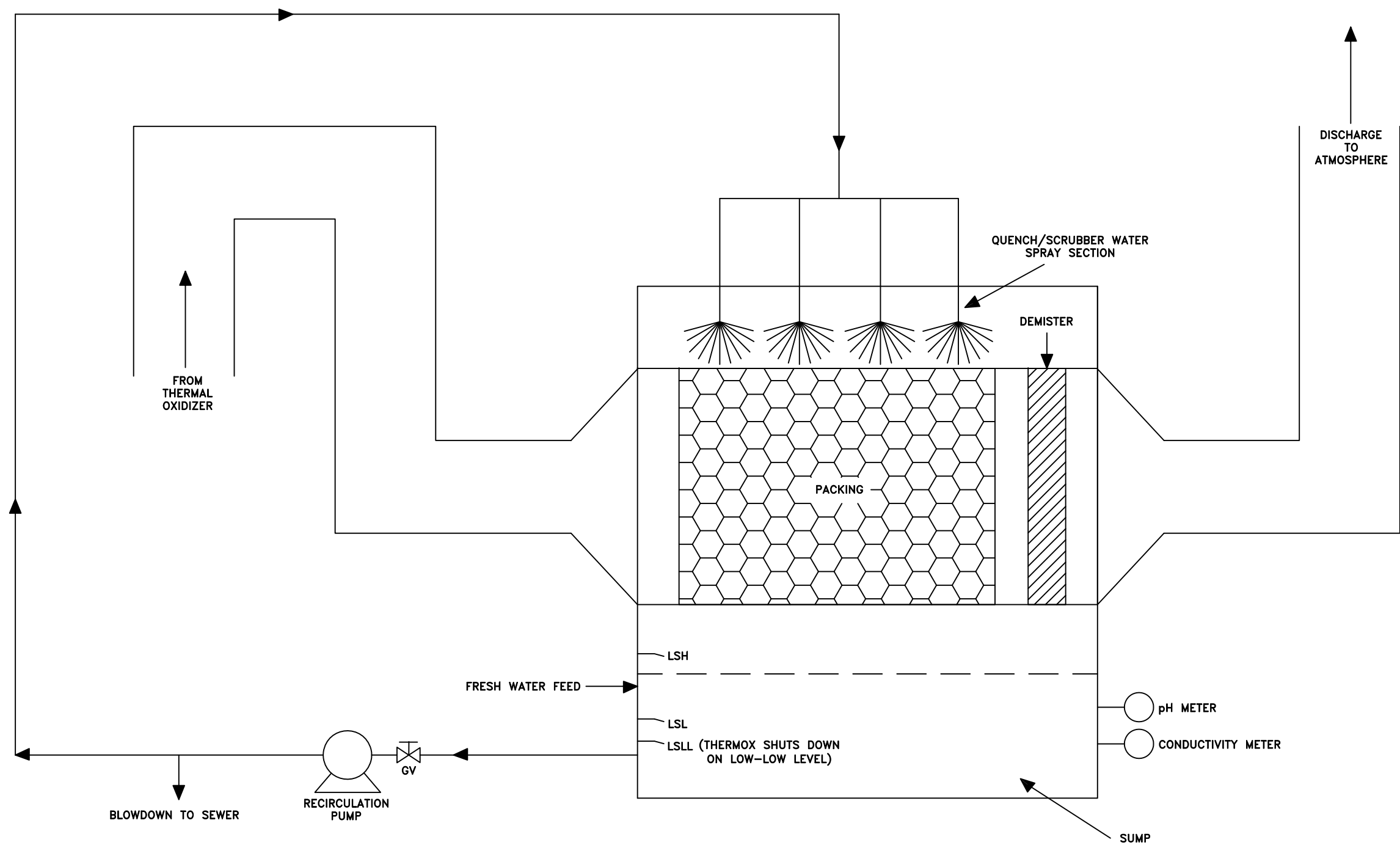


NOTES:

- Burner Management System (BMS) and overall Thermox unit must be designed in accordance with NFPA 86.
- Unit will be designed to 85 dBA at 10 feet.
- LEL meter will trigger system shutdown if unit fails electronically.
- BMS will have a self checking scanner that will shut down in the event of any flame abnormalities.
- MV = Motorized Shutoff Valve
- NGM = Natural Gas Meter
- LEL = Lower Explosive Limit Meter



SCALE: NOT TO SCALE	TITLE: THERMOX PIPING AND INSTRUMENTATION DIAGRAM W.G. KRUMMRICH FACILITY SAUGET, IL	
DATE: NOVEMBER 2011		
PROJECT NO.: 11003	DRAWING NO.: FIGURE 22	
CLIENT: SOLUTIA INC.		
DRAWN BY: MAW	REV: 1	
CHECKED BY: DK		
PROJ. MGMT. APPROVAL: SCC		

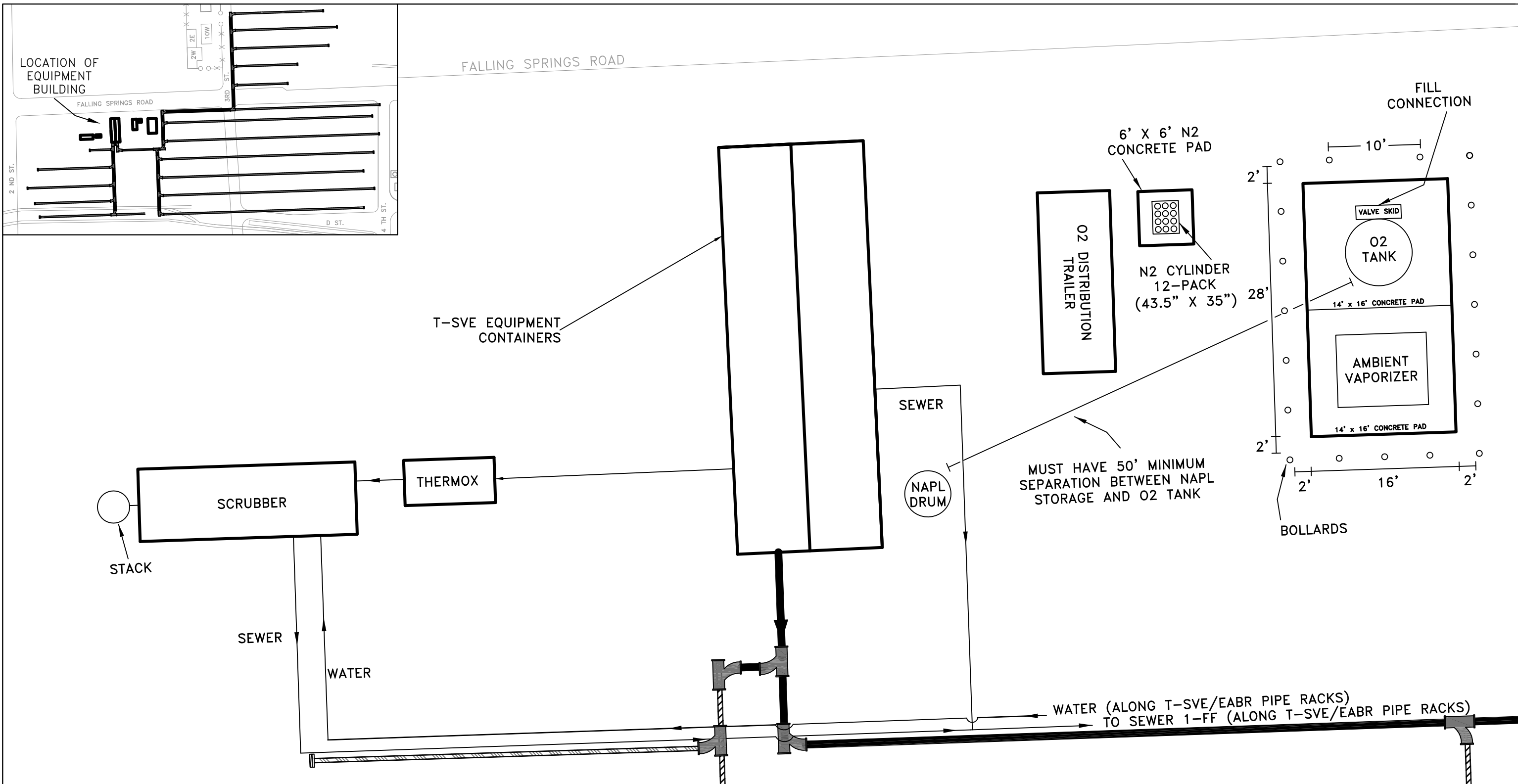


LEGEND:

GV Gate Valve
 LSH Level Switch High
 LSL Level Switch Low
 LSL Low Level Switch



SCALE: NOT TO SCALE	TITLE: ACID-GAS SCRUBBER PIPING AND INSTRUMENTATION DIAGRAM W.G. KRUMMRICH FACILITY SAUGET, IL	
DATE: NOVEMBER 2011		
PROJECT No.: 11003		
CLIENT: SOLUTIA INC.		
DRAWN BY: LBC	DRAWING NO.: FIGURE 23	REV: 2
CHECKED BY: SCC		
PROJ. MGMT. APPROVAL: SCC		



LEGEND:

- 4-INCH CARBON STEEL PIPING
- 8-INCH CARBON STEEL PIPING
- 12-INCH CARBON STEEL PIPING
- SWEEP TEE
- BLIND FLANGE

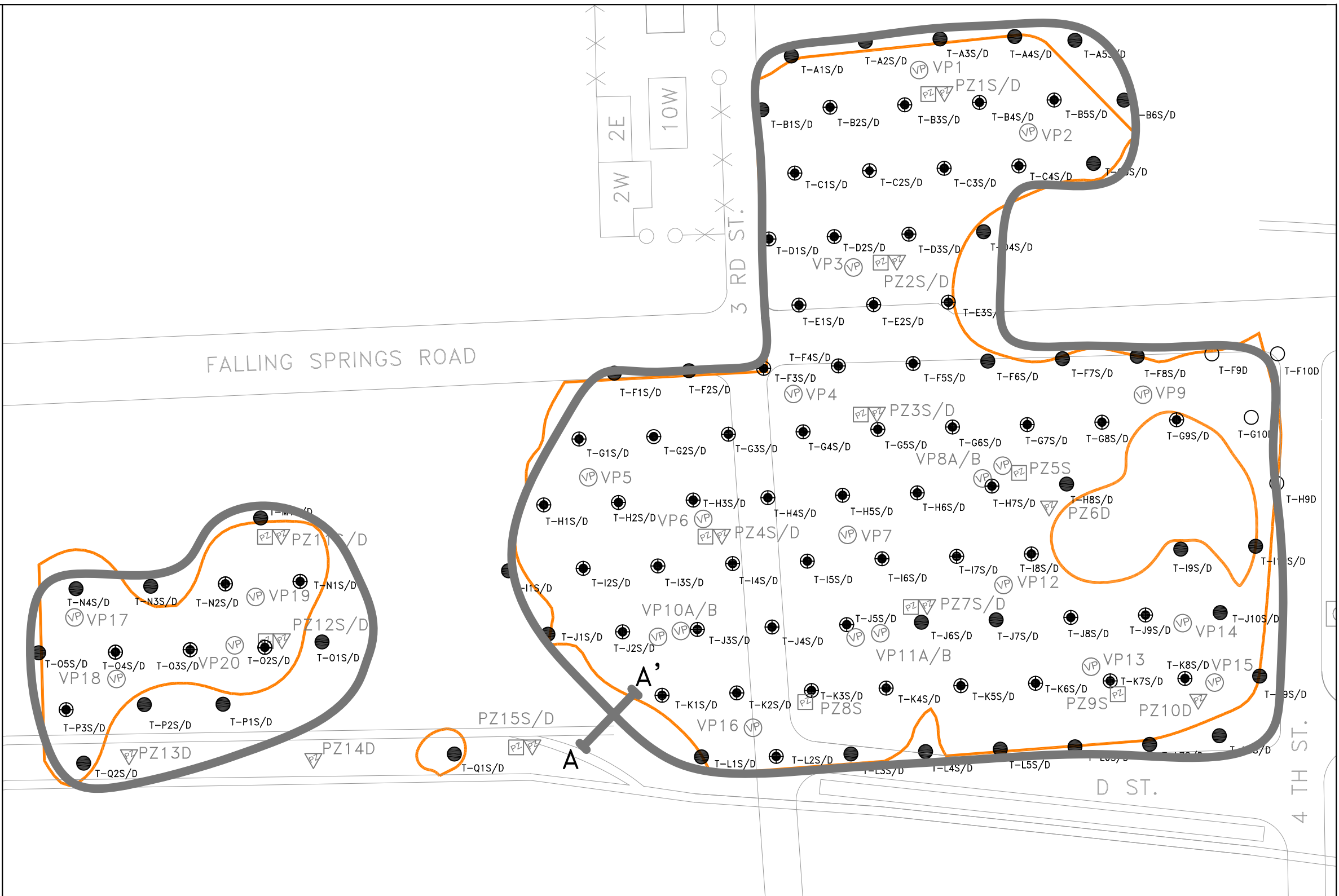
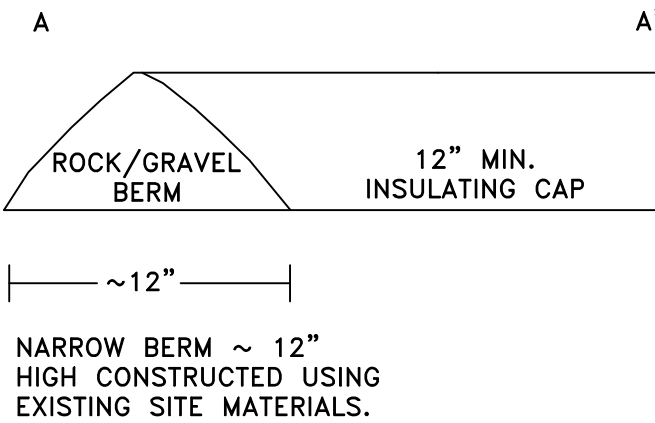
- NOTES:
- N2: NITROGEN
 - NAPL: NON-AQUEOUS PHASE LIQUID
 - O2: OXYGEN
 - THERMOX: REGENERATIVE THERMAL OXIDIZER
 - SVE: SOIL VAPOR EXTRACTION
 - T-SVE: THERMALLY ENHANCED SVE
 - THE THERMOX AND SCRUBBER CANNOT BE WITHIN 20' OF ANY PIPE RACKS



SCALE: AS SHOWN
DATE: NOVEMBER 2011
PROJECT No.: 11003
CLIENT: SOLUTIA INC.
DRAWN BY: MAW
CHECKED BY: LBC
PROJ. MGMT. APPROVAL: SCC

TITLE: EQUIPMENT BUILDING LAYOUT W.G. KRUMMRICH FACILITY SAUGET, IL	
DRAWING NO.: FIGURE 24	REV: 1

CROSS-SECTION A-A': EDGE DETAIL



LEGEND:

- T-SVE COMBINATION SHALLOW AND DEEP WELL LOCATION
- T-SVE DEEP WELL LOCATION
- AIR INJECTION WELL LOCATION
- SHALLOW AND DEEP NESTED VAPOR PROBE LOCATION

- SHALLOW PIEZOMETER LOCATION
- DEEP PIEZOMETER LOCATION
- 0-15 FOOT INTERVAL COC EXCEEDANCE AREA
- INSULATING CAP



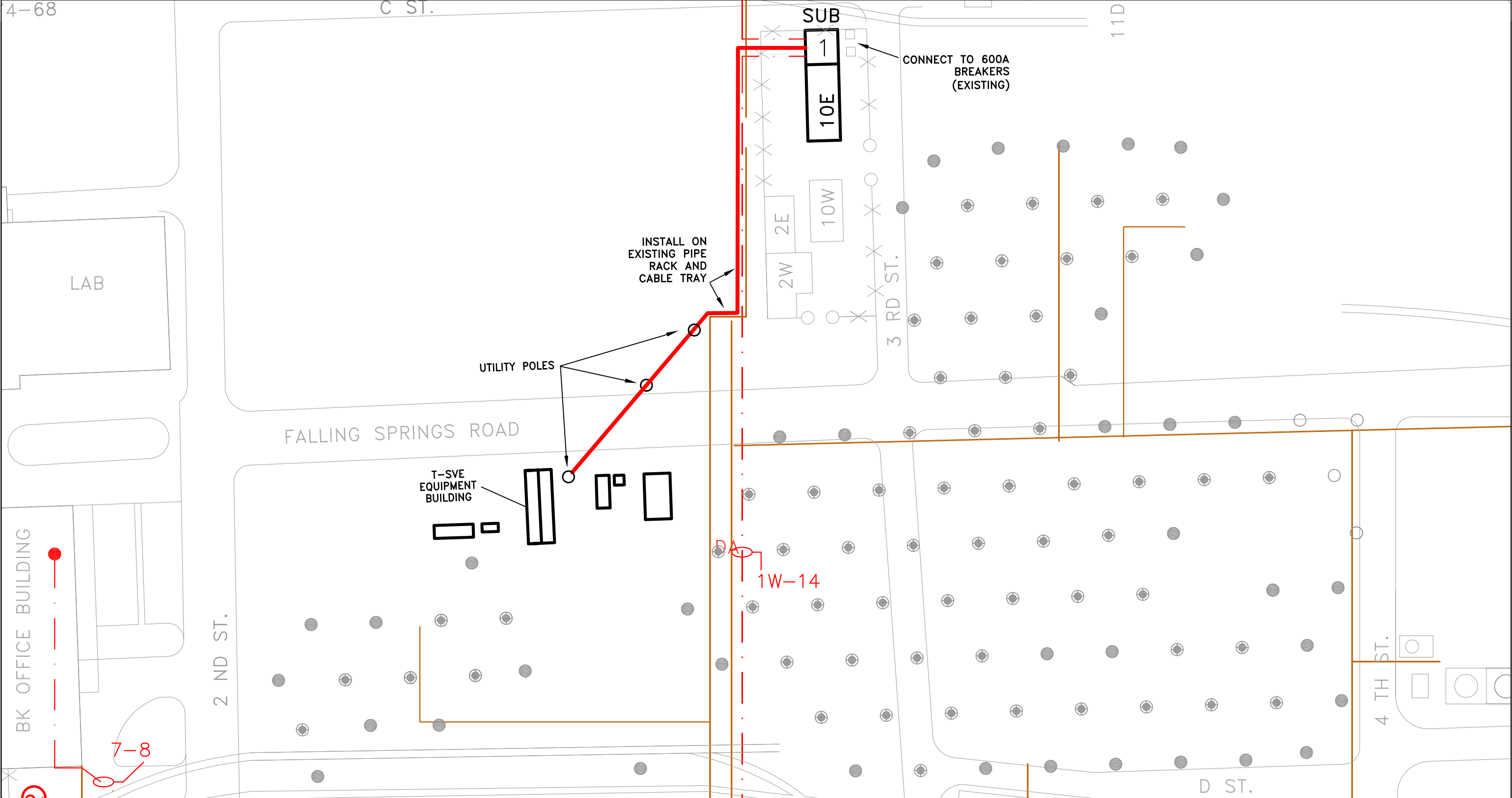
NOTES:
- COC: CONTAMINANT OF CONCERN



SCALE: AS SHOWN
DATE: NOVEMBER 2011
PROJECT No.: 11003
CLIENT: SOLUTIA INC.
DRAWN BY: LBC
CHECKED BY: SCC
PROJ. MGMT. APPROVAL: SCC



TITLE: INSULATING CAP W.G. KRUMMRICH FACILITY SAUGET, IL	
DRAWING NO.: FIGURE 25	REV: 2



LEGEND:

- EXISTING 480 VOLT OVERHEAD ELECTRICAL LINE
- PROPOSED 13.8 KILOVOLT OVERHEAD ELECTRICAL LINE
- PIPE BRIDGE
- T-SVE COMBINATION SHALLOW AND DEEP WELL LOCATION
- T-SVE DEEP WELL LOCATION
- ⊗ AIR INJECTION WELL LOCATION

NOTES:

- BASE MAP PROVIDED BY W.G. KRUMMRICH FACILITY.
- ONLY 480 VOLT POWER FEEDERS ARE INDICATED, NOT ALL 480 VOLT CABLES.

SCALE: AS SHOWN

DATE: NOVEMBER 2011

PROJECT NO.: 11003

CLIENT: SOLUTIA INC.

DRAWN BY: LBC

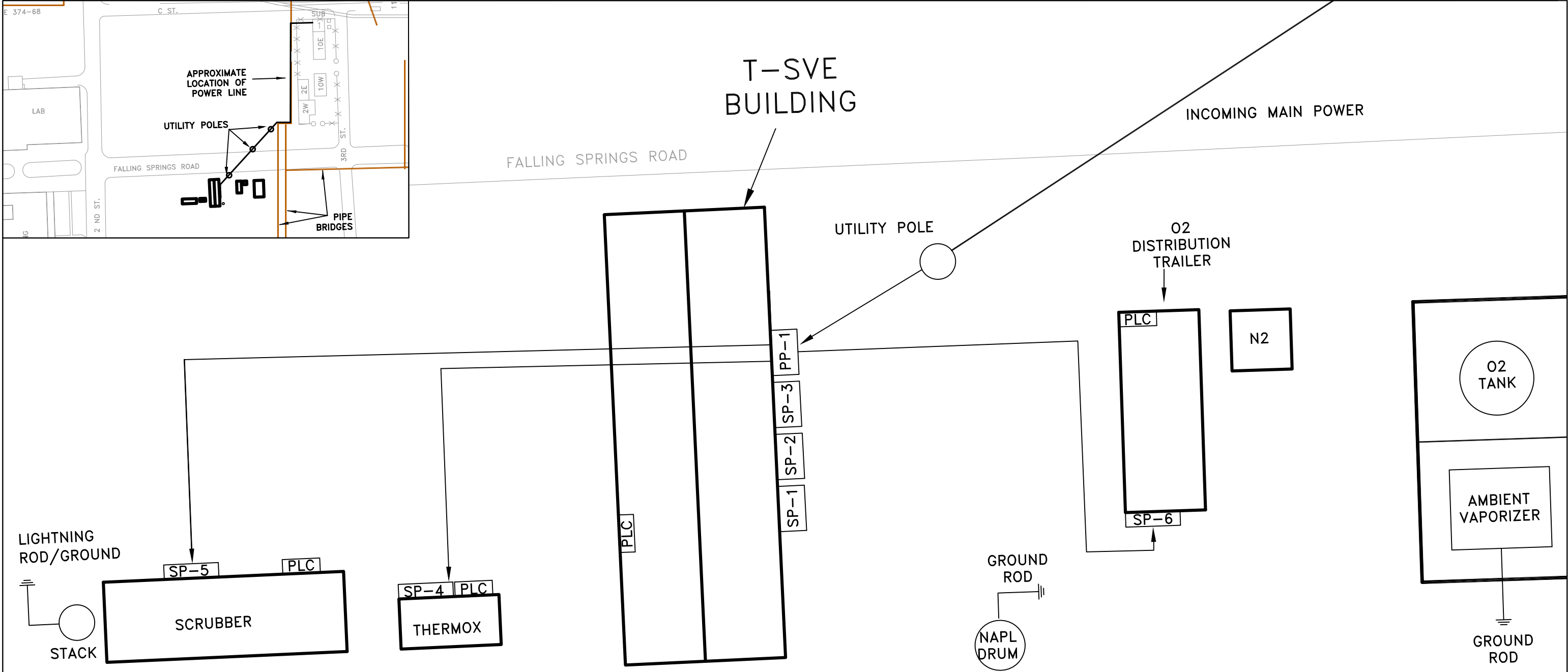
CHECKED BY: SCC

PROJ. MGMT. APPROVAL: SCC

TITLE: ELECTRICAL UTILITIES LAYOUT
W.G. KRUMMRICH FACILITY
SAUGET, IL

DRAWING NO.: FIGURE 26

REV: 2



PP-1	MAIN PANEL	NEMA 3R, 480V/277V, 3PH, 4 WIRE
SP-1	T-SVE PANEL	NEMA 3R, 480V, 3PH, 4 WIRE
SP-2	T-SVE HVAC PANEL	NEMA 3R, 277V, 3PH, 4 WIRE
SP-3	HEAT TRACE PANEL	NEMA 3R, 277V, 3PH, 4 WIRE
SP-4	THERMOX PANEL	NEMA 3R, 480V, 3PH, 4 WIRE
SP-5	SCRUBBER PANEL	NEMA 3R, 480V, 3PH, 4 WIRE
SP-6	O2 BUILDING PANEL	NEMA 3R, 480V, 3PH, 4 WIRE

- NOTES:**
- HEAT TRACE - 10 W/FT SELF REGULATING (SR) 240 V COPPER BRAID THERMOPLASTIC HEAT TAPE, WITH POWER/END SEAL/THERMOSTAT KIT CLASS I/DIV II.
 - UTILITY POLE - 40 FT CLASS II UTILITY POLE WITH CABLE TRAY OR ELECTRICAL NON-METALLIC TUBING (ENT) AND STRAIN RELIEF CORD GRIPS (CGB-TYPE).
 - N2: NITROGEN
 - NAPL: NON-AQUEOUS PHASE LIQUID
 - O2: OXYGEN
 - PLC: PROGRAMMABLE LOGIC CONTROLLER
 - PP: POWER PANEL
 - SP: SUB-PANEL
 - SVE: SOIL VAPOR EXTRACTION
 - V: VOLT

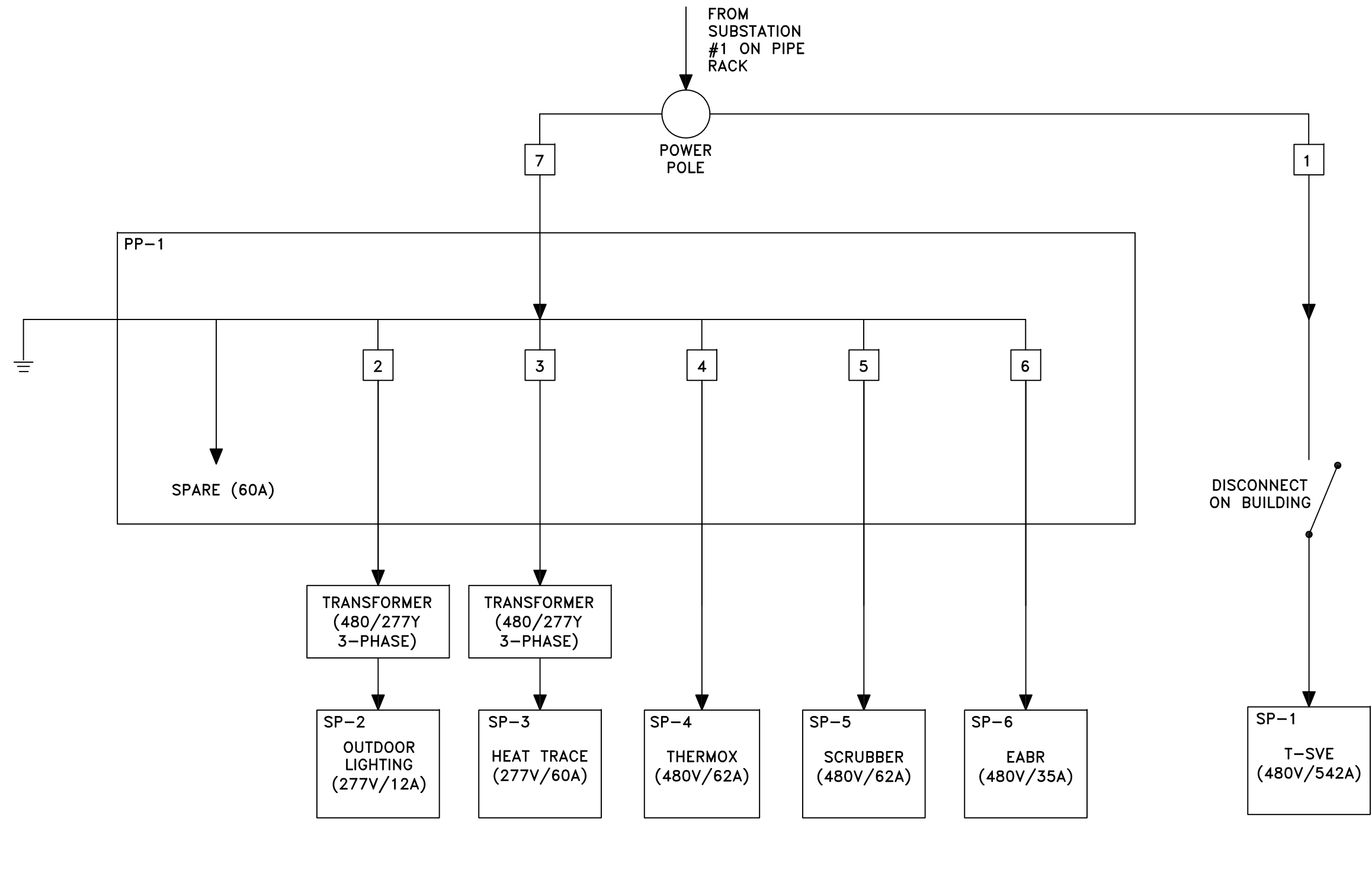


SCALE: AS SHOWN
DATE: NOVEMBER 2011
PROJECT No.: 11003
CLIENT: SOLUTIA INC.
DRAWN BY: MAW
CHECKED BY: LBC
PROJ. MGMT. APPROVAL: SCC



TITLE: ELECTRICAL DETAILS - MAIN POWER AND SUB-PANEL LAYOUT
W.G. KRUMMRICH FACILITY
SAUGET, IL

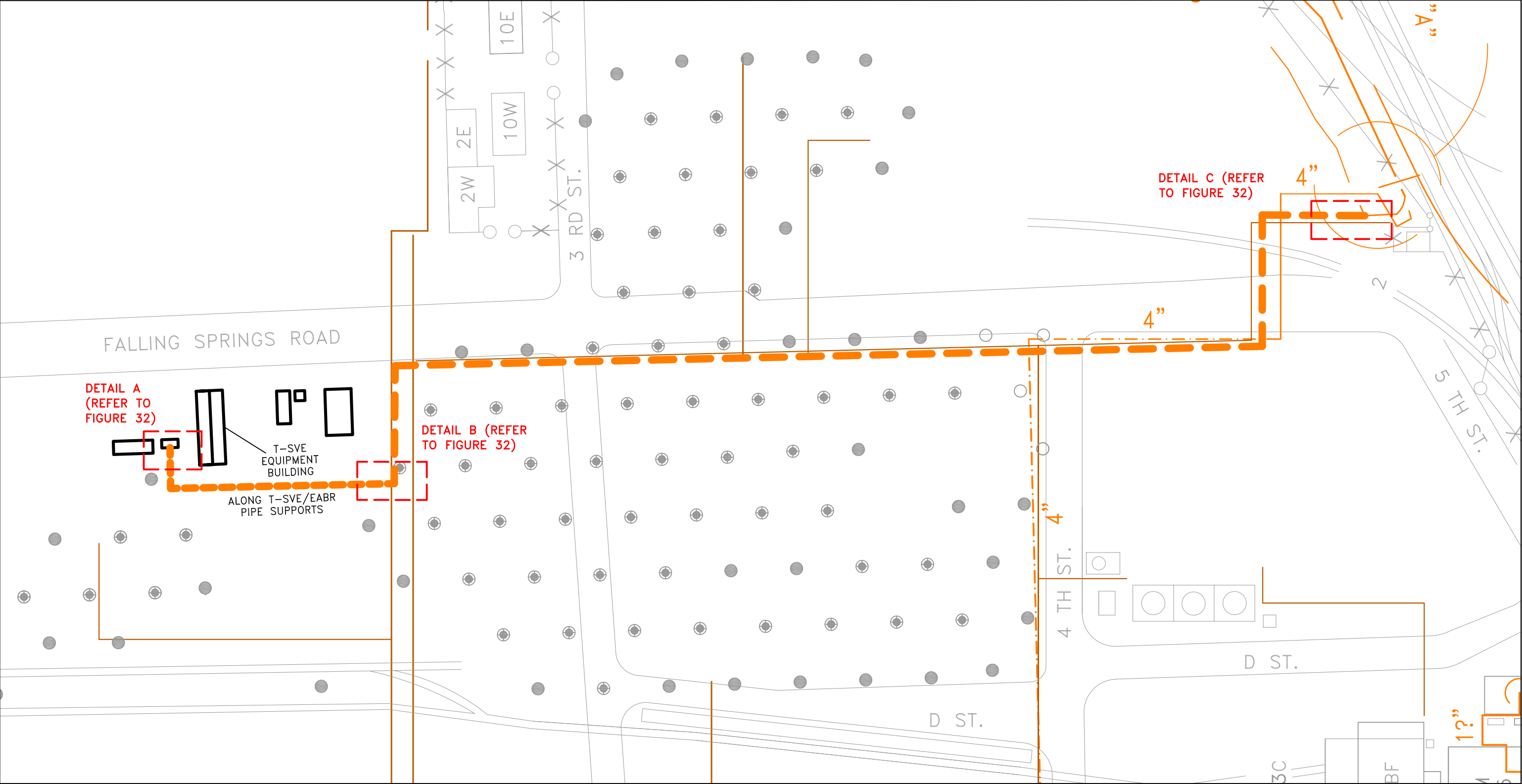
DRAWING NO.: FIGURE 27	REV: 2
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ID	APPROXIMATE CABLE/CONDUIT DISTANCE (FT)	DESCRIPTION	WIRE TYPE/CAUGE
1	30	CABLE-3/CONDUCTOR COPPER WITH GROUND	SPECIFIED BY CONTRACTOR
2	20	CABLE-3/CONDUCTOR COPPER WITH GROUND	SPECIFIED BY CONTRACTOR
3	25	CABLE-3/CONDUCTOR COPPER WITH GROUND	SPECIFIED BY CONTRACTOR
4	70	CABLE-3/CONDUCTOR COPPER WITH GROUND	SPECIFIED BY CONTRACTOR
5	100	CABLE-3/CONDUCTOR COPPER WITH GROUND	SPECIFIED BY CONTRACTOR
6	60	CABLE-3/CONDUCTOR COPPER WITH GROUND	SPECIFIED BY CONTRACTOR
7	40	CABLE-3/CONDUCTOR COPPER WITH GROUND	SPECIFIED BY CONTRACTOR



SCALE: NOT TO SCALE	TITLE: ELECTRICAL DETAILS – ELECTRICAL LINE DIAGRAM W.G. KRUMMRICH FACILITY SAUGET, IL	
DATE: NOVEMBER 2011		
PROJECT NO.: 11003		
CLIENT: SOLUTIA		
DRAWN BY: JWH	DRAWING NO.: FIGURE 28	REV: 2
CHECKED BY: SC		
PROJ. MGMT. APPROVAL: SC		



LEGEND:

- EXISTING OVERHEAD NATURAL GAS LINE
- PROPOSED OVERHEAD NATURAL GAS LINE (ALONG EXISTING PIPE BRIDGE)
- PROPOSED OVERHEAD NATURAL GAS LINE (ALONG T-SVE/EABR PIPE SUPPORTS)
- PIPE BRIDGE
- T-SVE COMBINATION SHALLOW AND DEEP WELL LOCATION
- T-SVE DEEP WELL LOCATION
- AIR INJECTION WELL LOCATION

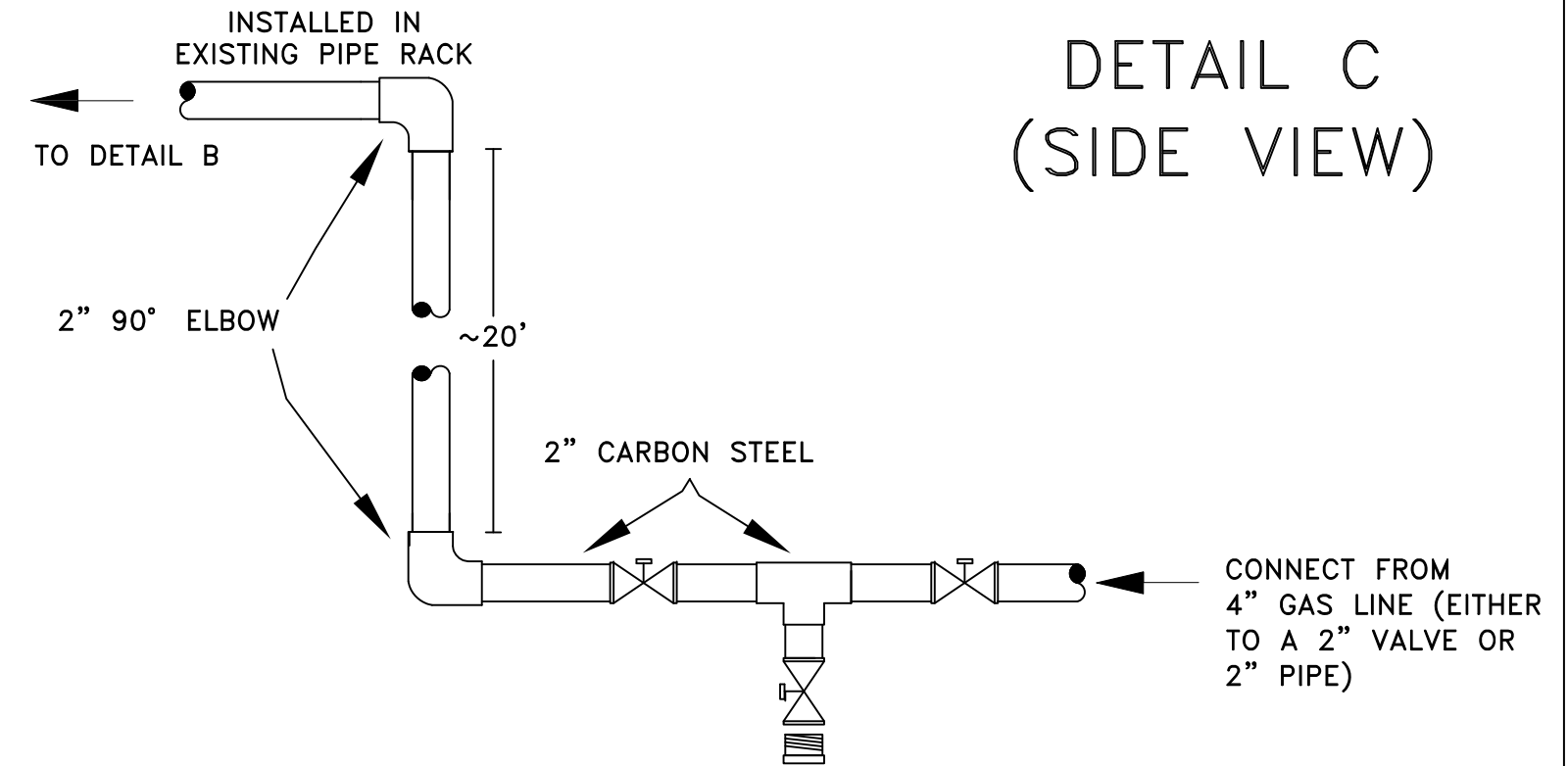
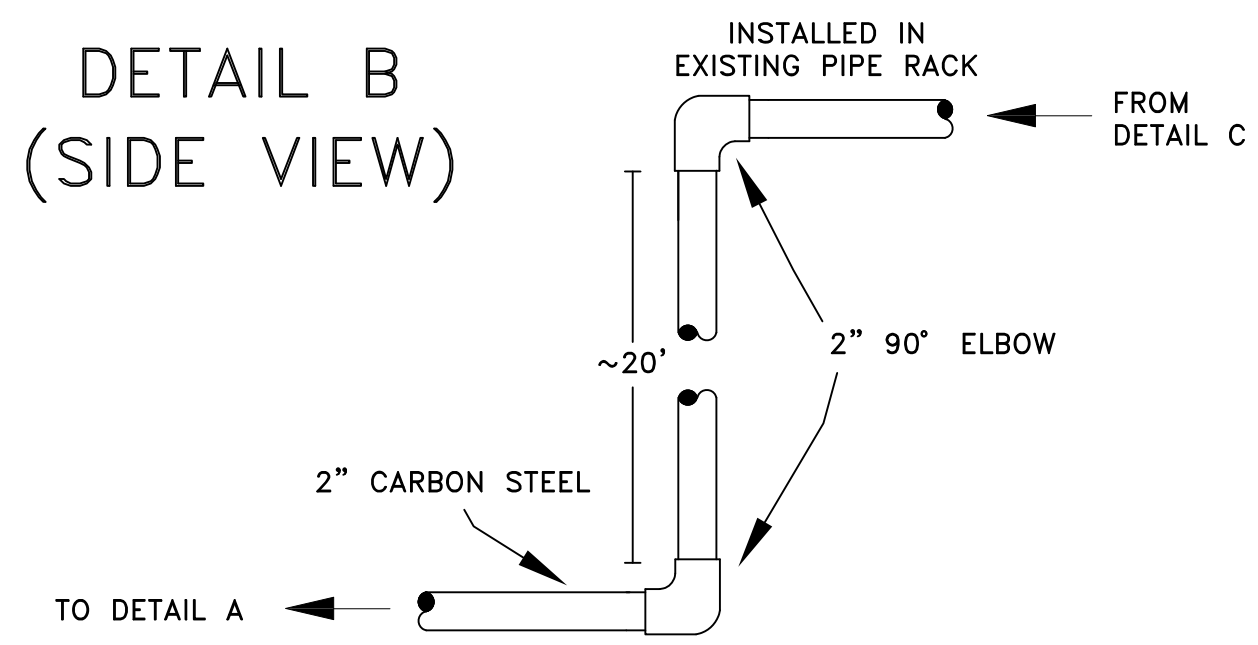
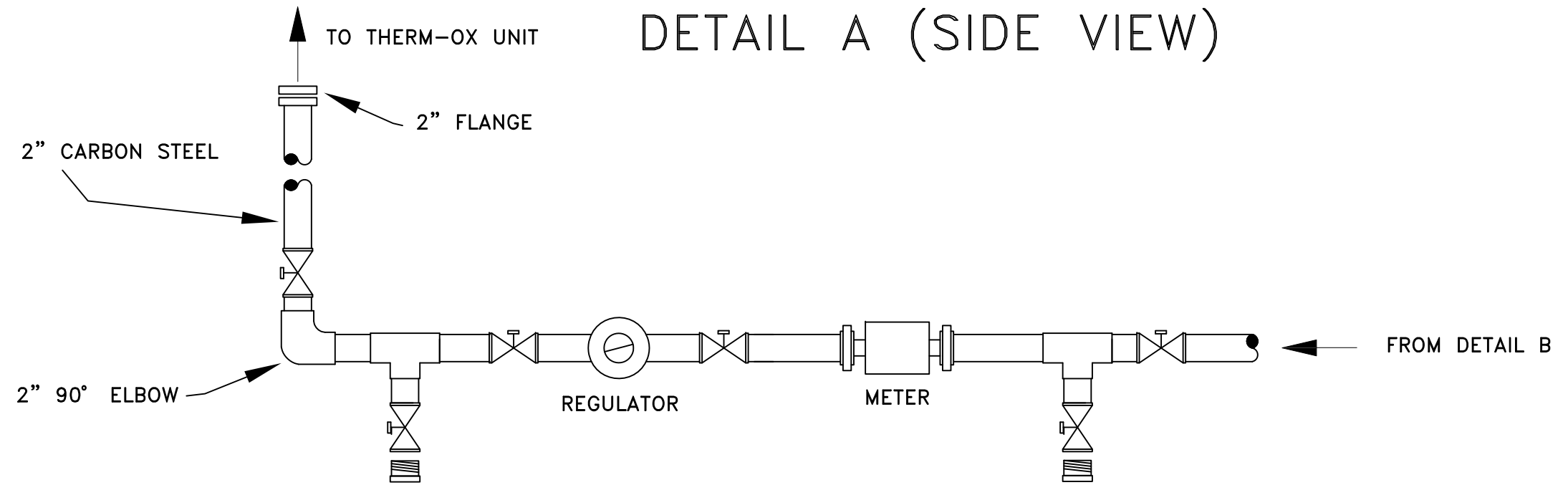
NOTES:

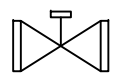
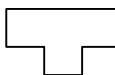
- BASE MAP PROVIDED BY W.G. KRUMMRICH FACILITY.
- T-SVE: THERMALLY ENHANCED SOIL VAPOR EXTRACTION
- EABR: ENHANCED AEROBIC BIOREMEDIATION

30' 0' 30' 60'

XDD
STRATEGIC. ENVIRONMENTAL. SOLUTIONS.

SCALE: AS SHOWN	TITLE:	
DATE: NOVEMBER 2011	NATURAL GAS SUPPLY LINE CONNECTION	
PROJECT No.: 11003	W.G. KRUMMRICH FACILITY	
CLIENT: SOLUTIA INC.	SAUGET, IL	
DRAWN BY: LBC	DRAWING NO.:	REV:
CHECKED BY: SCC	FIGURE 30	3
PROJ. MGMT. APPROVAL: SCC		

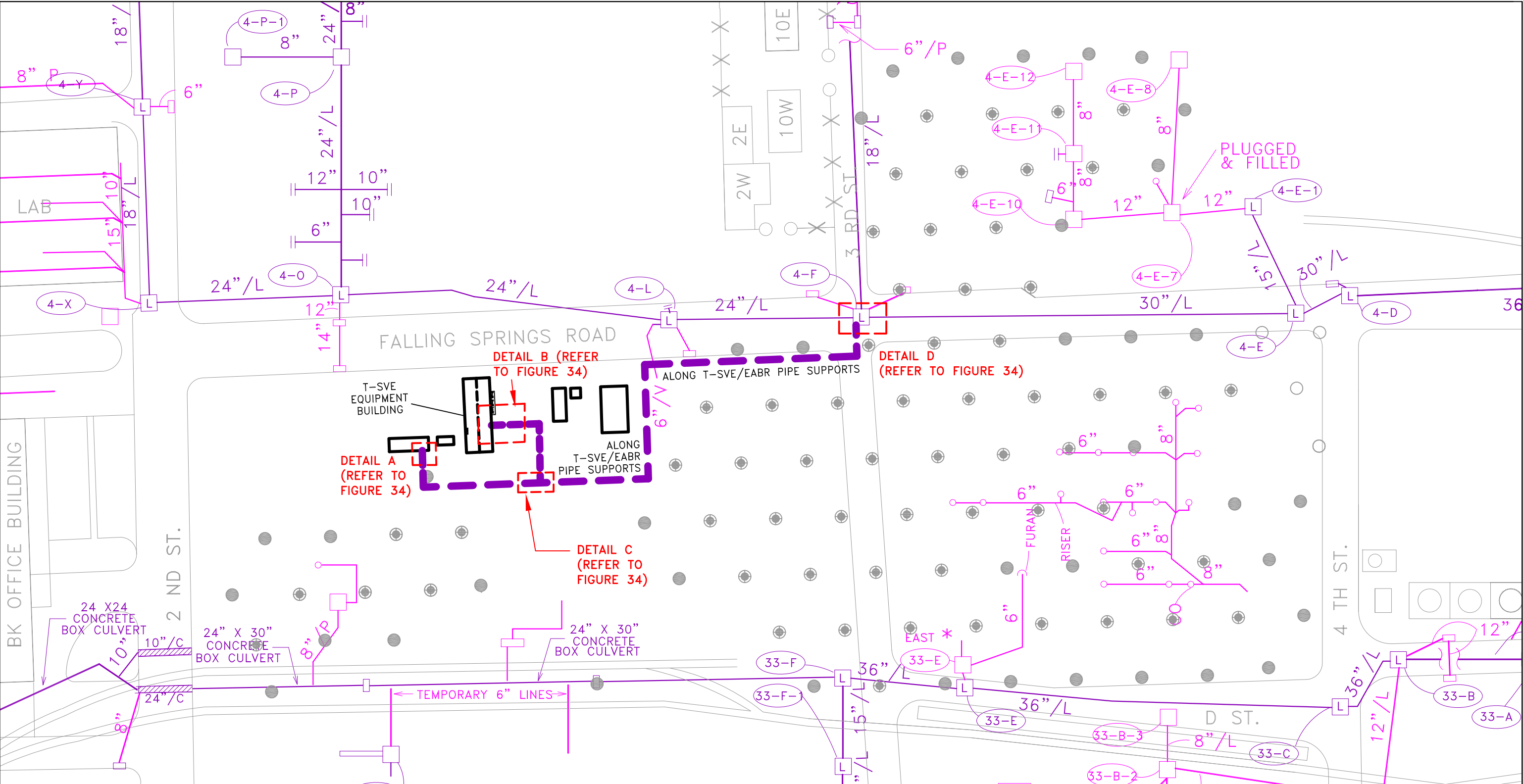


- LEGEND:**
-  BALL VALVE
 -  TEE CONNECTION
 -  THREADED CAP

- NOTES:**
- INSTALLATION SHALL BE IN COMPLIANCE WITH SOLUTIA PMS BICS2 STANDARD PRACTICES
 - T-SVE: THERMALLY ENHANCED SOIL VAPOR EXTRACTION
 - EABR: ENHANCED AEROBIC BIOREMEDIATION



SCALE: NOT TO SCALE	TITLE: NATURAL GAS SUPPLY LINE DETAILS W.G. KRUMMRICH FACILITY SAUGET, IL	
DATE: NOVEMBER 2011		
PROJECT No.: 11003	DRAWING NO.: FIGURE 31	
CLIENT: SOLUTIA INC.		
DRAWN BY: JDA	REV: 3	
CHECKED BY: SCC		
PROJ. MGMT. APPROVAL: SCC		



LEGEND:

— MAIN SEWER LINE	— GRATED SEWER LID
— SECONDARY SEWER LINE	— SEWER
— PROPOSED SEWER LINE	— DRAIN
— TRENCH SEWER	— PLUG OR CAP
— LINED SEWER SYSTEM	● T-SVE COMBINATION SHALLOW AND DEEP WELL LOCATION
18" / V 18" DIA. VITRIFIED CLAY PIPE SEWER LINE	○ T-SVE DEEP WELL LOCATION
— VINYL ESTER LINED MANHOLE	● AIR INJECTION WELL LOCATION
— STREET DRAIN	

NOTES:

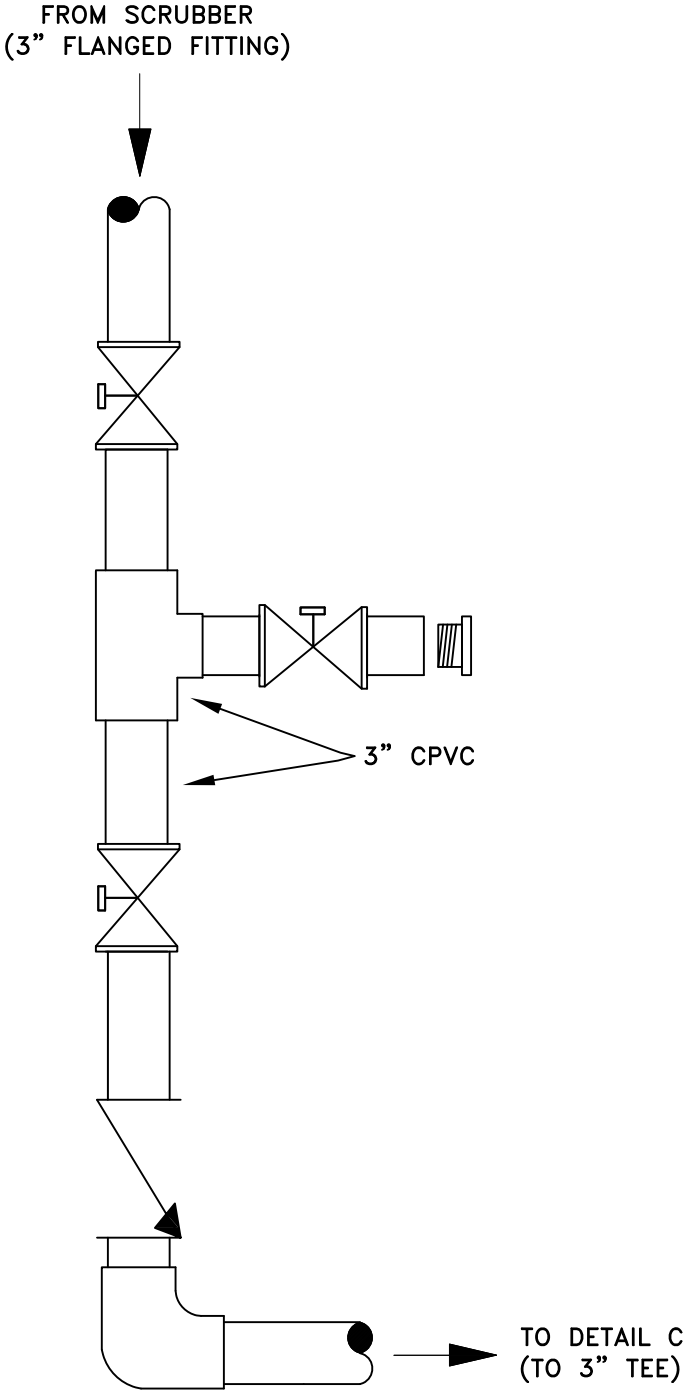
- BASE MAP PROVIDED BY W.G. KRUMMRICH FACILITY.
- T-SVE: THERMALLY ENHANCED SOIL VAPOR EXTRACTION
- EABR: ENHANCED AEROBIC BIOREMEDIATION

30' 0' 30' 60'

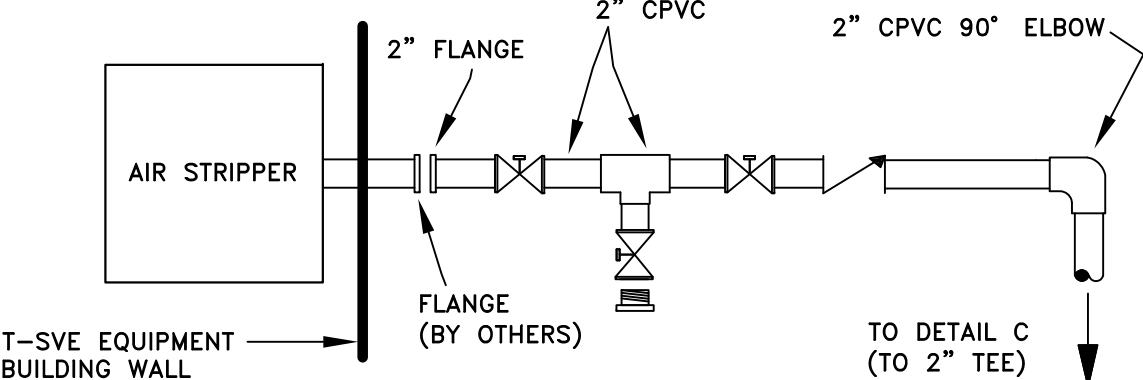
XDD
STRATEGIC. ENVIRONMENTAL. SOLUTIONS.

SCALE: AS SHOWN	TITLE:
DATE: NOVEMBER 2011	SEWER DISCHARGE LINE CONNECTION
PROJECT No.: 11003	W.G. KRUMMRICH FACILITY
CLIENT: SOLUTIA INC.	SAUGET, IL
DRAWN BY: LBC	DRAWING NO.:
CHECKED BY: SCC	FIGURE 32
PROJ. MGMT. APPROVAL: SCC	REV:
	2

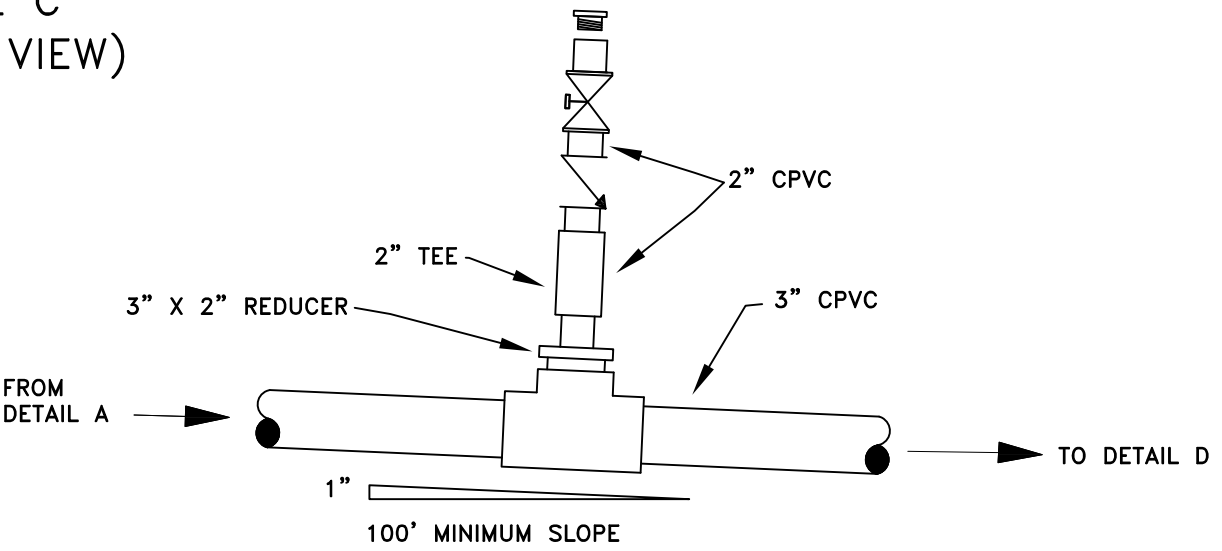
DETAIL A



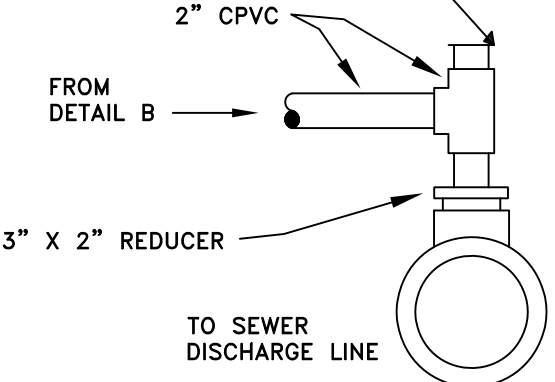
DETAIL B
(TOP VIEW)



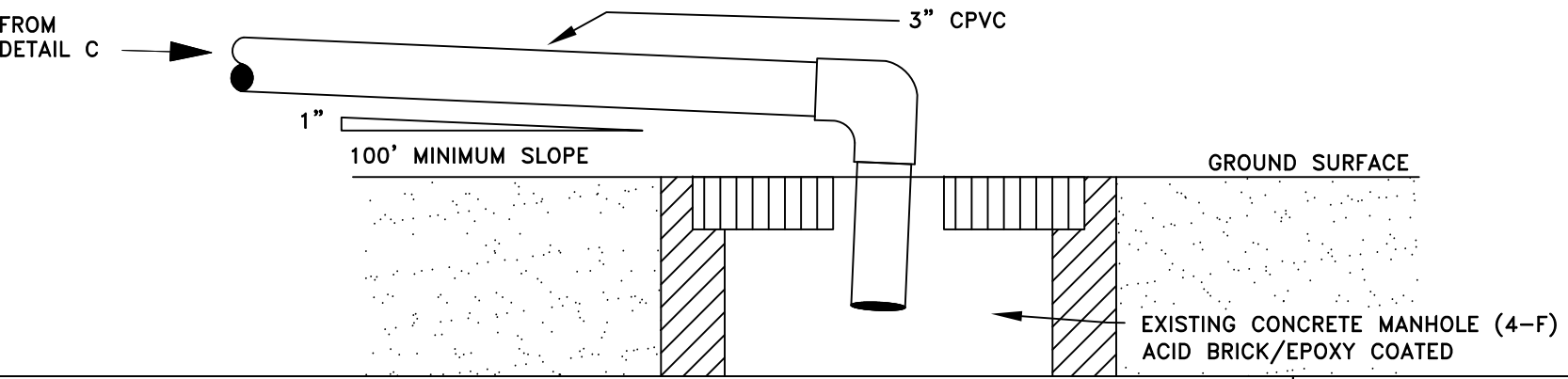
DETAIL C
(SIDE VIEW)



DETAIL C INSET
(ALTERNATE
SIDE-VIEW)



DETAIL D
(SIDE VIEW)



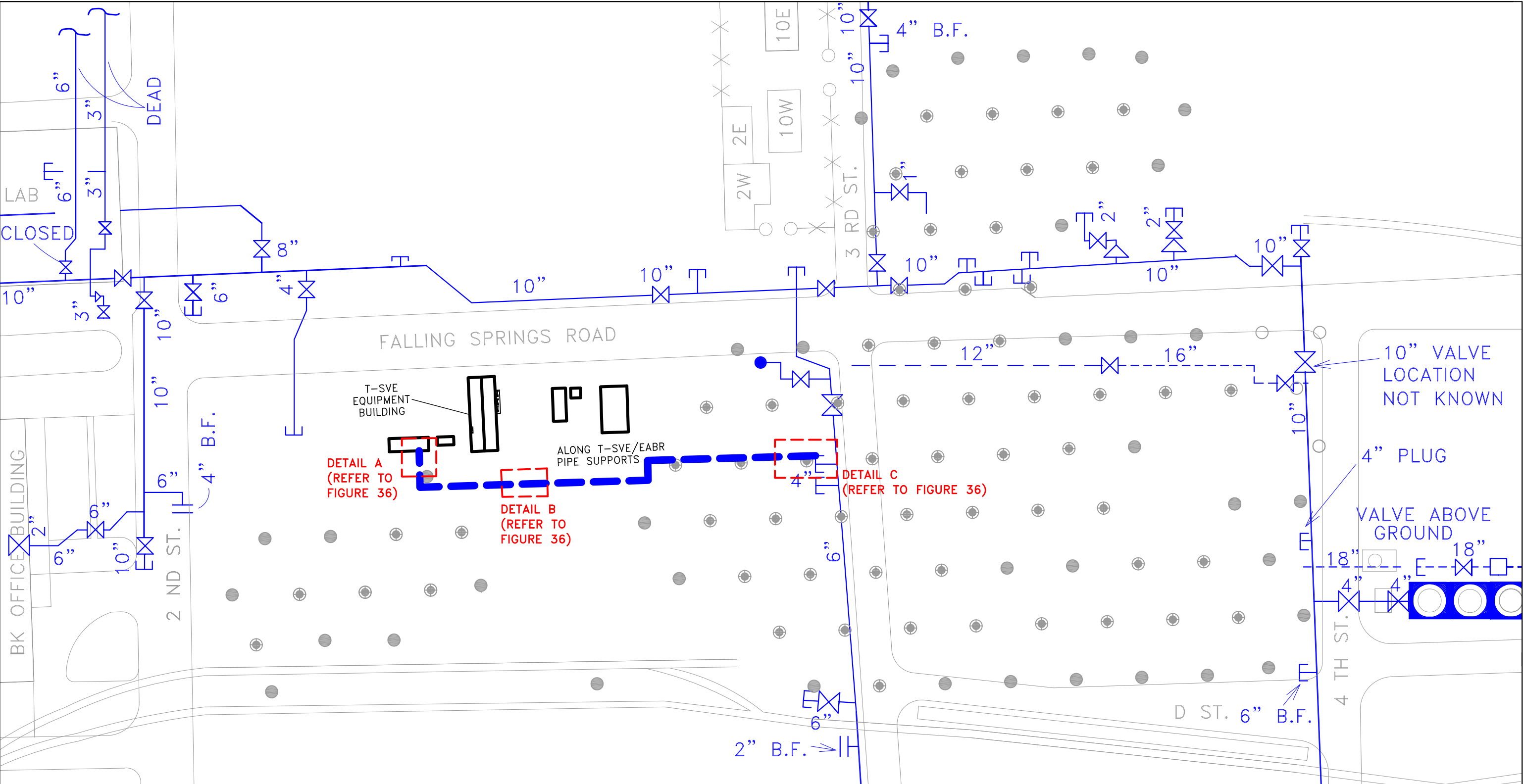
LEGEND:

-  BALL VALVE
-  TEE CONNECTION
-  THREADED CAP
-  CHECK VALVE

NOTES:
- CPVC: CHLORINATED POLYVINYL CHLORIDE



SCALE: NOT TO SCALE		TITLE: SEWER DISCHARGE LINE DETAILS W.G. KRUMMRICH FACILITY SAUGET, IL	
DATE: NOVEMBER 2011			
PROJECT No.: 11003			
CLIENT: SOLUTIA INC.			
DRAWN BY: JDA		DRAWING NO.: FIGURE 33	REV: 3
CHECKED BY: SCC			
PROJ. MGMT. APPROVAL: SCC			



LEGEND:

	EXISTING CITY WATER LINE (~3 FOOT BELOW GRADE)		T-SVE COMBINATION SHALLOW AND DEEP WELL LOCATION
	TOWER WATER LINE		T-SVE DEEP WELL LOCATION
	PROPOSED WATER LINE		AIR INJECTION WELL LOCATION
	VALVE		
	REDUCER		
	METER INSTALLED		
	CAP OR PLUG		
	B.F. BLIND FLANGE		
	SAFETY SHOWER		

NOTES:

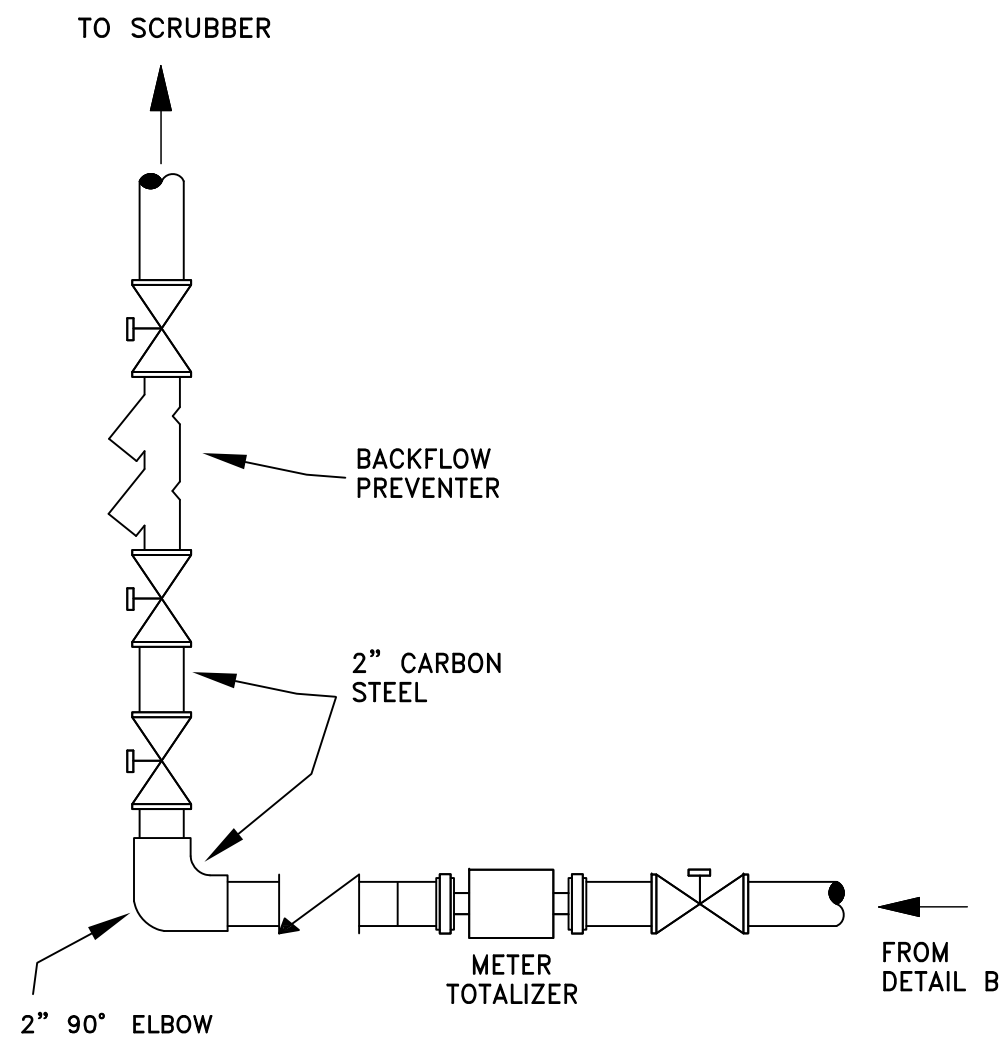
- BASE MAP PROVIDED BY W.G. KRUMMRICH FACILITY.
- T-SVE: THERMALLY ENHANCED SOIL VAPOR EXTRACTION
- EABR: ENHANCED AEROBIC BIOREMEDIATION

30' 0' 30' 60'

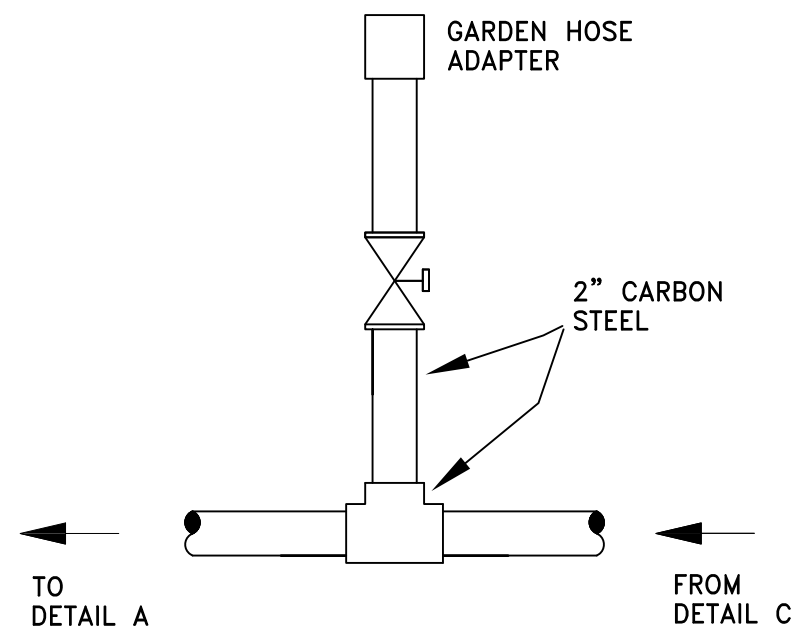
SCALE: AS SHOWN	TITLE: WATER SUPPLY LINE CONNECTION W.G. KRUMMRICH FACILITY SAUGET, IL
DATE: NOVEMBER 2011	
PROJECT No.: 11003	
CLIENT: SOLUTIA INC.	
DRAWN BY: LBC	DRAWING NO.: FIGURE 34
CHECKED BY: SCC	
PROJ. MGMT. APPROVAL: SCC	
	REV: 3

STRATEGIC. ENVIRONMENTAL. SOLUTIONS.

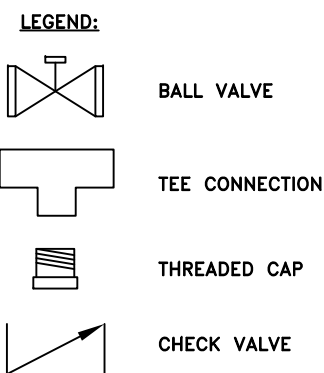
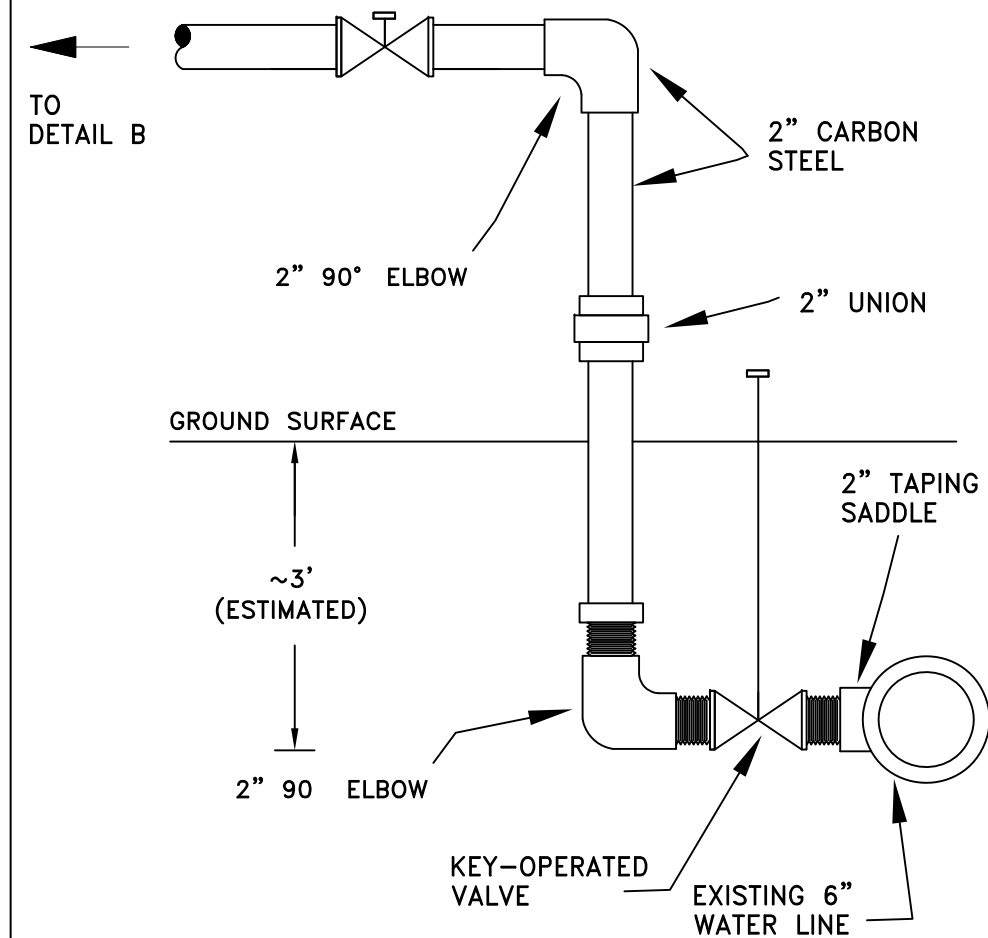
DETAIL A



DETAIL B



DETAIL C

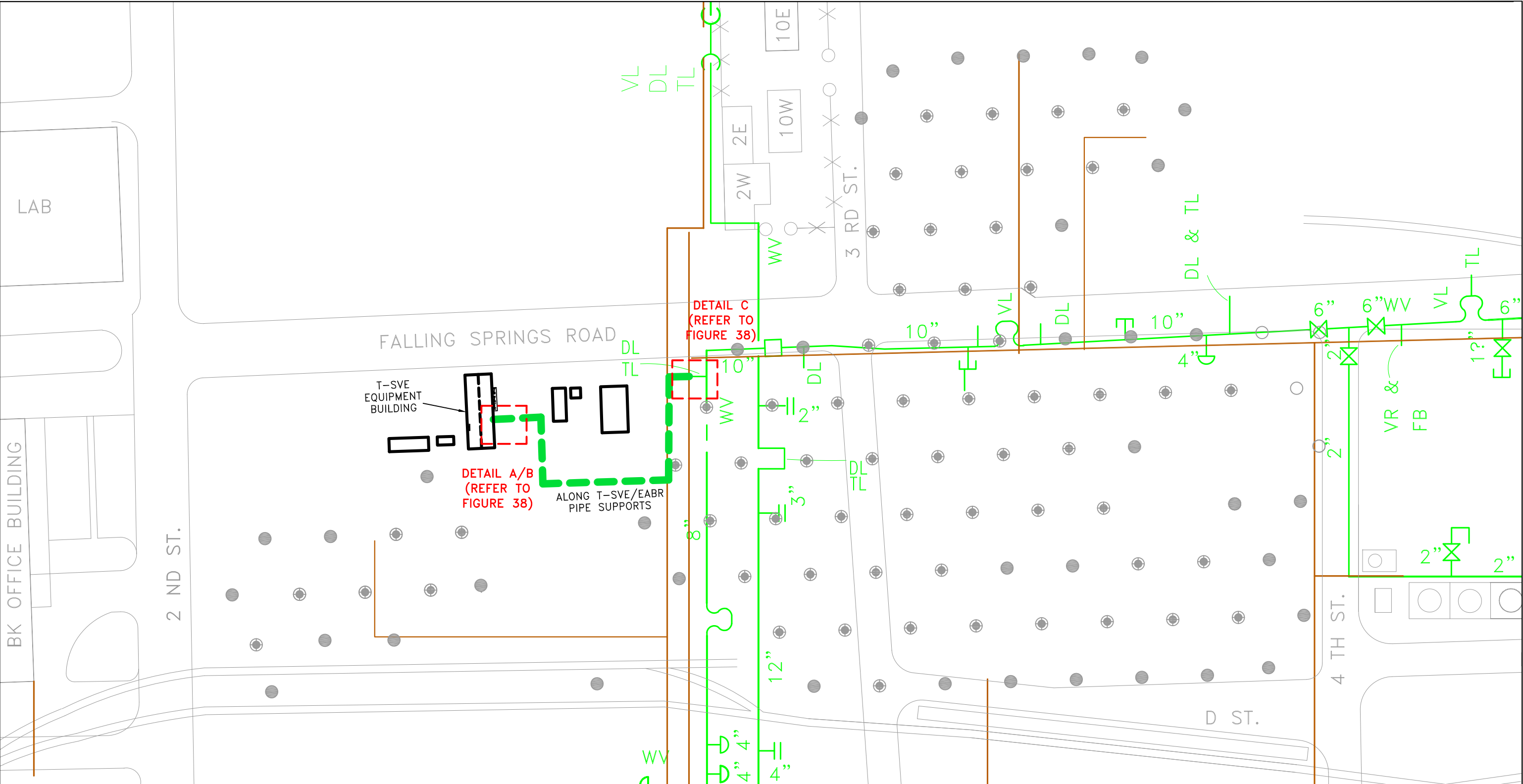


SCALE: NOT TO SCALE
DATE: NOVEMBER 2011
PROJECT No.: 11003
CLIENT: SOLUTIA INC.
DRAWN BY: JDA
CHECKED BY: SCC
PROJ. MGMT. APPROVAL: SCC

TITLE:
WATER SUPPLY LINE DETAILS
W.G. KRUMMRICH FACILITY
SAUGET, IL

DRAWING NO.:
FIGURE 35

REV:
3



LEGEND:

	PIPE BRIDGE		DL DRIP LEG
	EXISTING 200 # STEAM LINE		FB FREE-BLOW CONNECTION
	PROPOSED 200 # STEAM LINE		TL TRAP LINE
	VALVE		WV WARM UP VALVE
	REDUCER		VR VERTICAL RISER
	METER INSTALLED		VL VERTICAL LOOP
	BLANKED W/ CAP		T-SVE COMBINATION SHALLOW AND DEEP WELL LOCATION
	BLANKED W/ BLIND FLANGE		T-SVE DEEP WELL LOCATION
			AIR INJECTION WELL LOCATION

NOTES:

- BASE MAP PROVIDED BY W.G. KRUMMRICH FACILITY.
- T-SVE: THERMALLY ENHANCED SOIL VAPOR EXTRACTION
- EABR: ENHANCED AEROBIC BIOREMEDIATION POUND
- #:

SCALE: AS SHOWN

DATE: NOVEMBER 2011

PROJECT No.: 11003

CLIENT: SOLUTIA INC.

DRAWN BY: LBC

CHECKED BY: SCC

PROJ. MGMT. APPROVAL: SCC

STRATEGIC. ENVIRONMENTAL. SOLUTIONS.

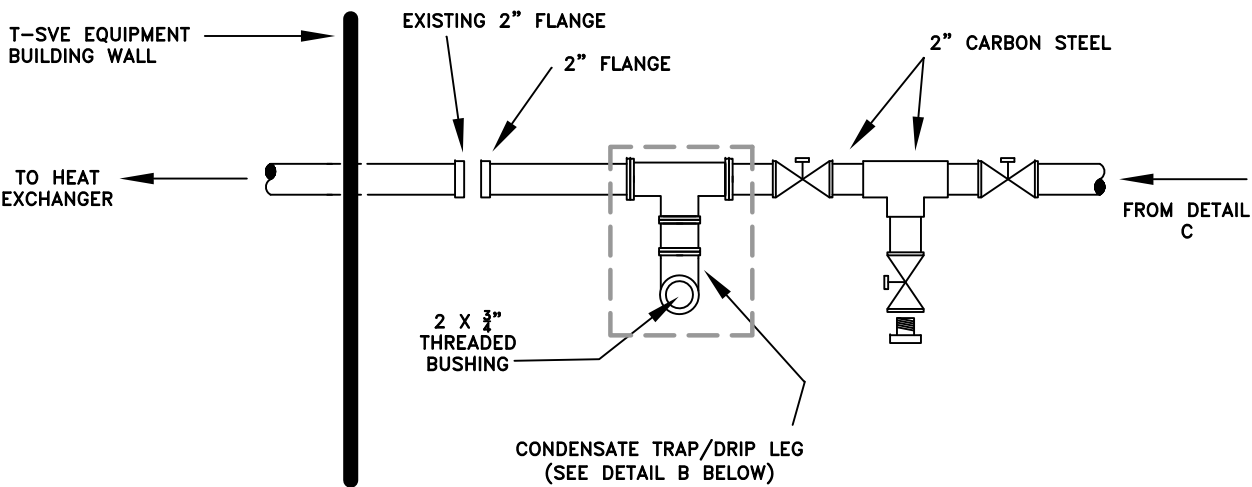
XDD

TITLE: STEAM SUPPLY LINE CONNECTION
W.G. KRUMMRICH FACILITY
SAUGET, IL

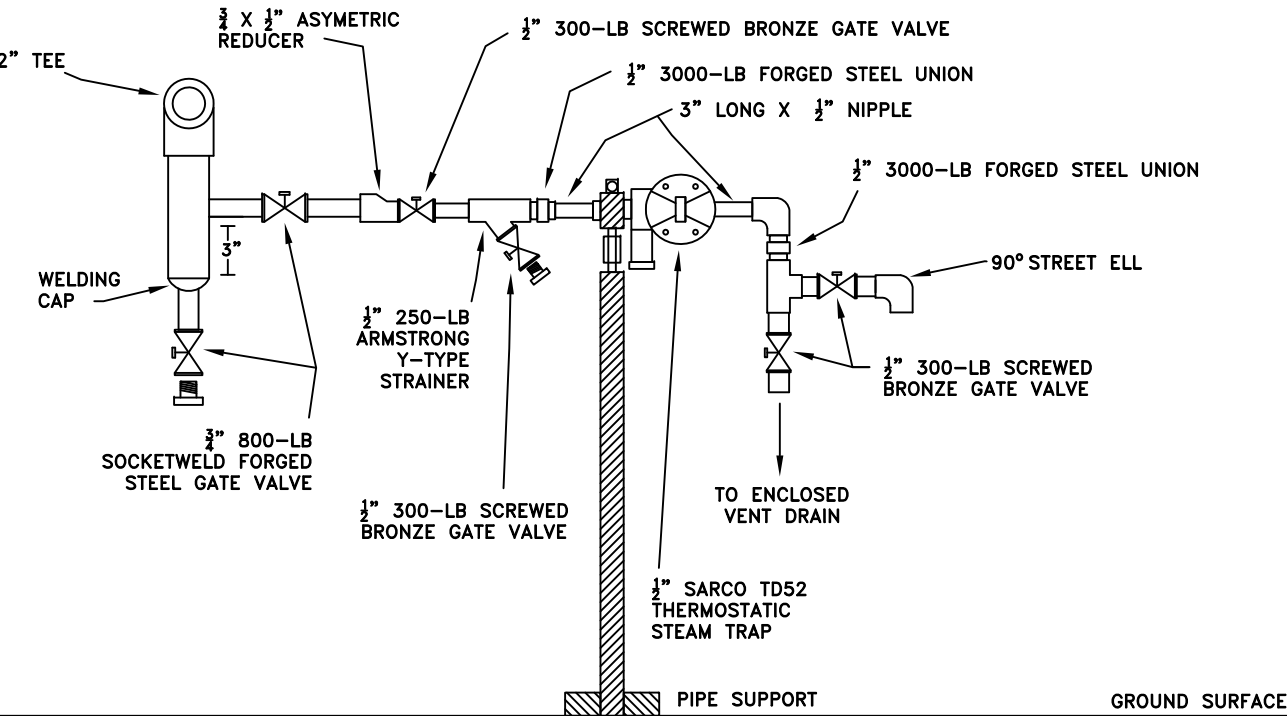
DRAWING NO.: FIGURE 36

REV: 3

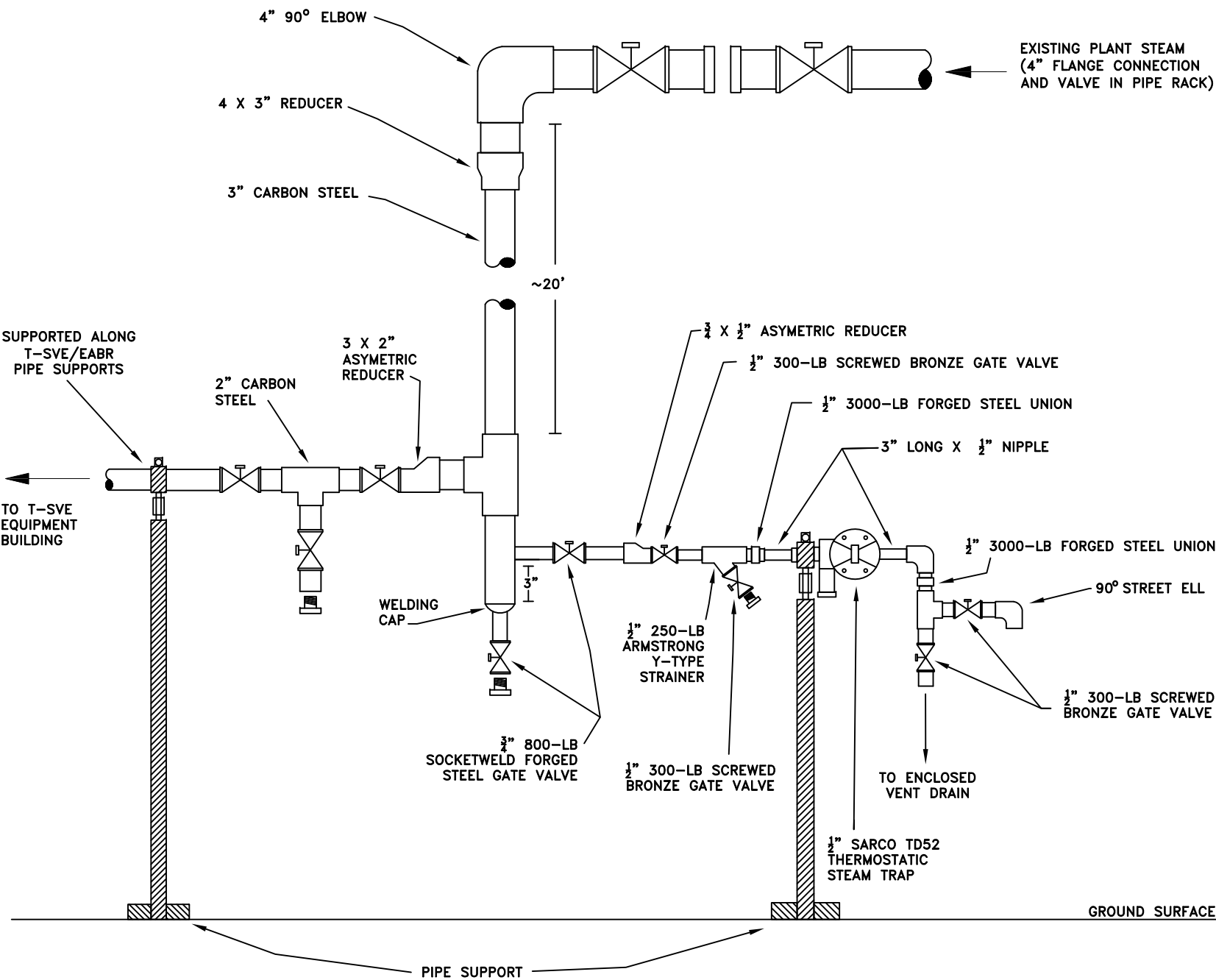
DETAIL A (SIDE VIEW)



DETAIL B INSET (SIDE VIEW)



DETAIL C (SIDE VIEW)



LEGEND:

	BALL VALVE
	TEE CONNECTION
	THREADED CAP
	CHECK VALVE

- NOTES:**
- INSTALLATION SHALL BE IN COMPLIANCE WITH SOLUTIA PMS BICS2 STANDARD PRACTICES
 - T-SVE: THERMALLY ENHANCED SOIL VAPOR EXTRACTION
 - EABR: ENHANCED AEROBIC BIOREMEDIATION



SCALE: NOT TO SCALE	TITLE: STEAM SUPPLY LINE DETAILS W.G. KRUMMRICH FACILITY SAUGET, IL	
DATE: NOVEMBER 2011		
PROJECT No.: 11003		
CLIENT: SOLUTIA INC.		
DRAWN BY: JDA	DRAWING NO.: FIGURE 37	REV: 3
CHECKED BY: SCC		
PROJ. MGMT. APPROVAL: SCC		

FIGURE 38A - PROJECT SCHEDULE

Design, Permitting, and Construction

Chlorobenzene Process Area (CPA) Thermally Enhanced Soil Vapor Extraction (T-SVE) and Enhanced Aerobic Bioremediation (EABR) Treatment
W.G. Krummrich Facility, Sauget, Illinois

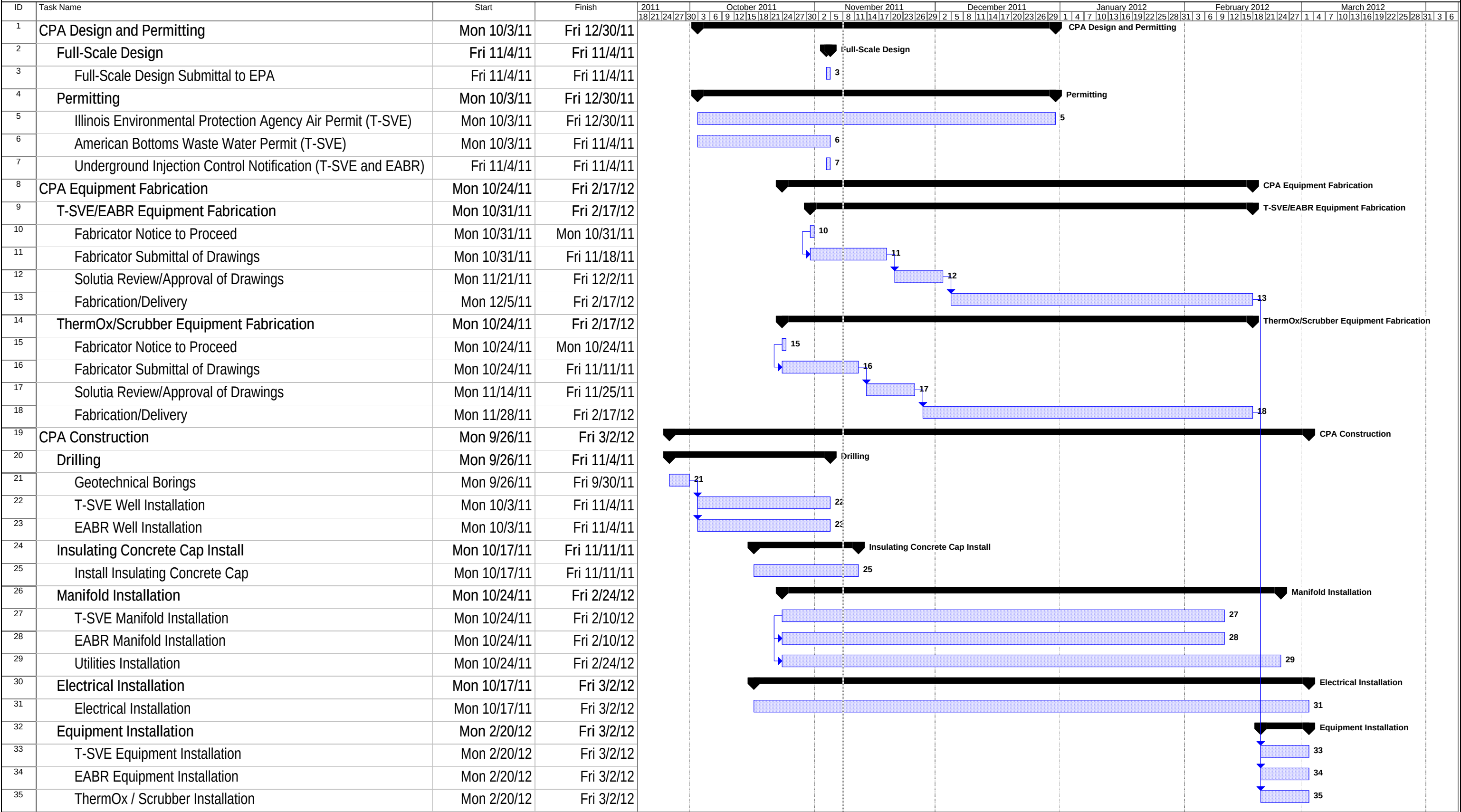


FIGURE 38B
T-SVE/BV OPERATION SCHEDULE
Thermally Enhanced Soil Vapor Extraction (T-SVE) and Bioventing (BV) Treatment
Former Chlorobenzene Process Area (CPA), W.G. Krummrich Facility, Sauget, Illinois

