Groundwater Remediation Project

Naval Weapons Industrial Reserve Plant

Bethpage, NY

GM-38 Area

Restoration Advisory Board Meeting

June 7, 2006

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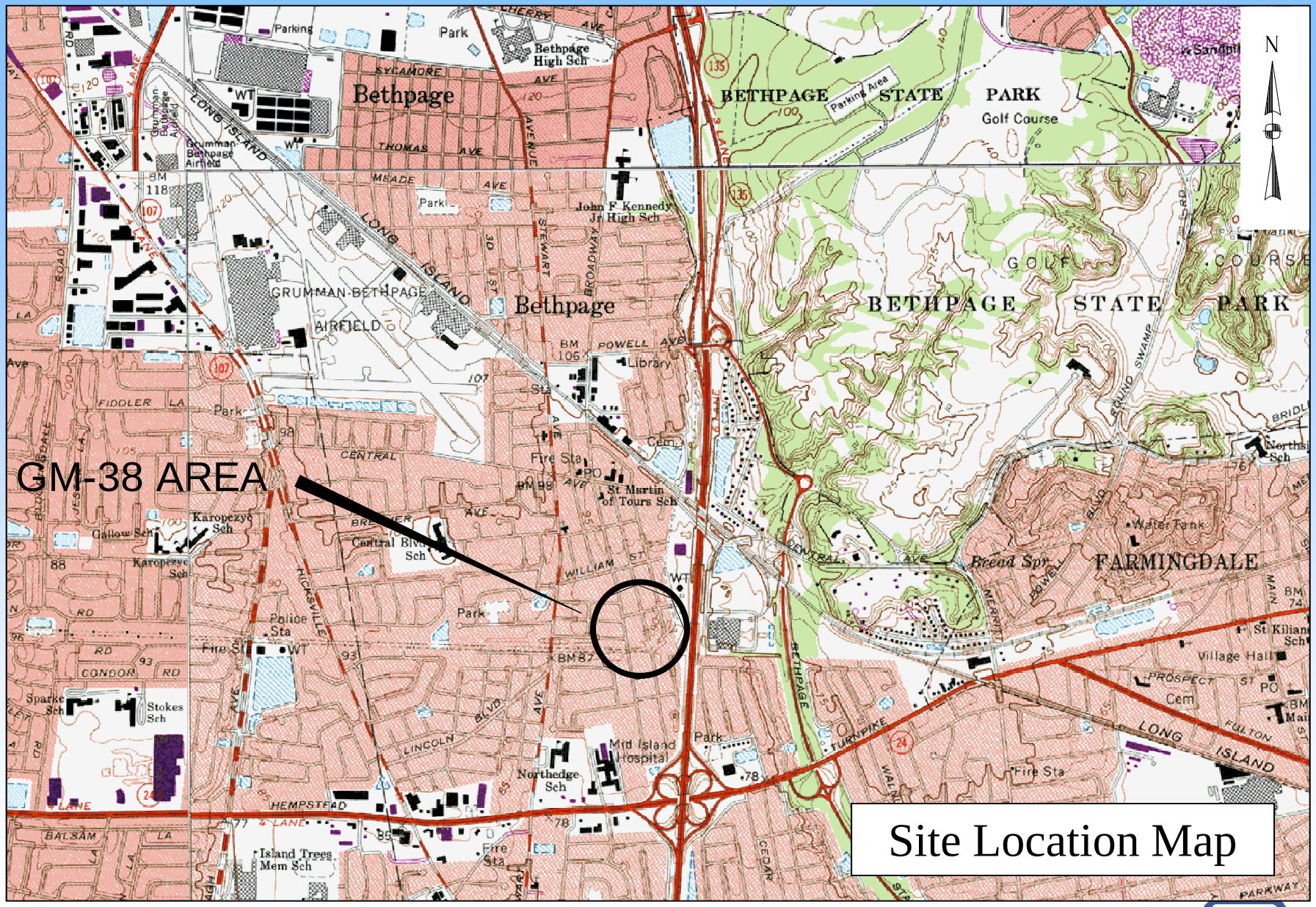

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Groundwater Remediation Project

- Site History
- Treatment System Design
- Well Installations
- Construction
- Operation & Maintenance

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Site History

- Chlorinated solvents detected in GW
- GW pump & treat system installed on Northrop Grumman property (Nov 1998)
- GM-38 Area delineated (June 2000-April 2002)
- Conceptual Plans to design and build GWTP in GM-38 Area for mass removal (February 2003)

Site History (cont'd)

- Community Workshop (September 2004)
- Pre-design investigation (November 2004)
- Draft Remedial Design (February 2005)
  - Reviewed by Navy and Third Party Consultant
- 90% Draft Final Design (November 2005)
  - Reviewed by same plus NYS DEC, TOB, and public
- Final Design (May 2006)

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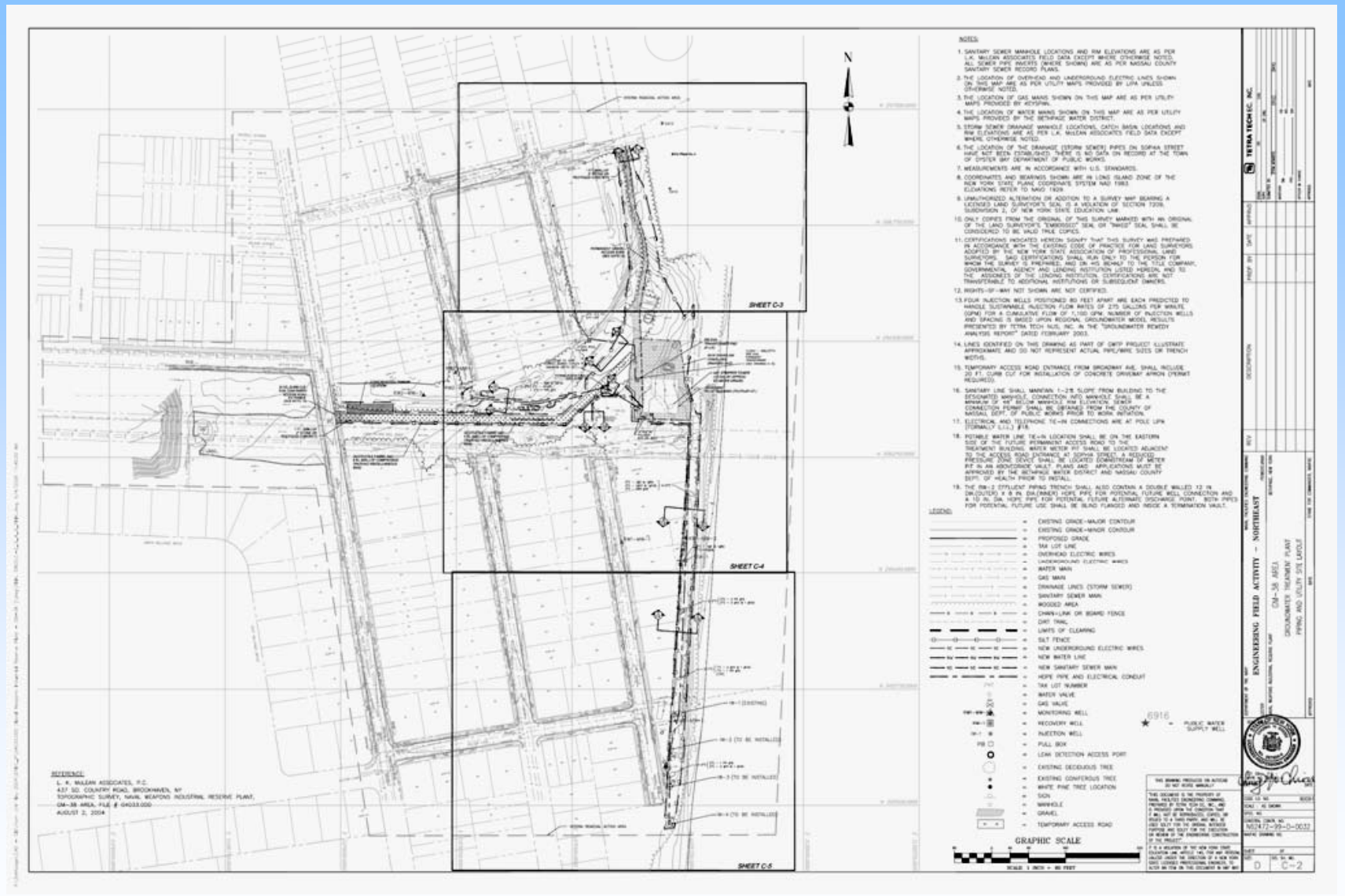
Treatment System Design (cont'd)

- Mass Removal of Volatile Organic Compounds (VOC's) from groundwater
- Process Flow Rate = 1,100 gallons / minute
- Pumping from two recovery wells
- Primary treatment is Air Stripping
- Secondary treatment (polish) is Carbon Media
- Vapors from Air Stripping Treated w/ Carbon
- Inject treated water into four injection wells



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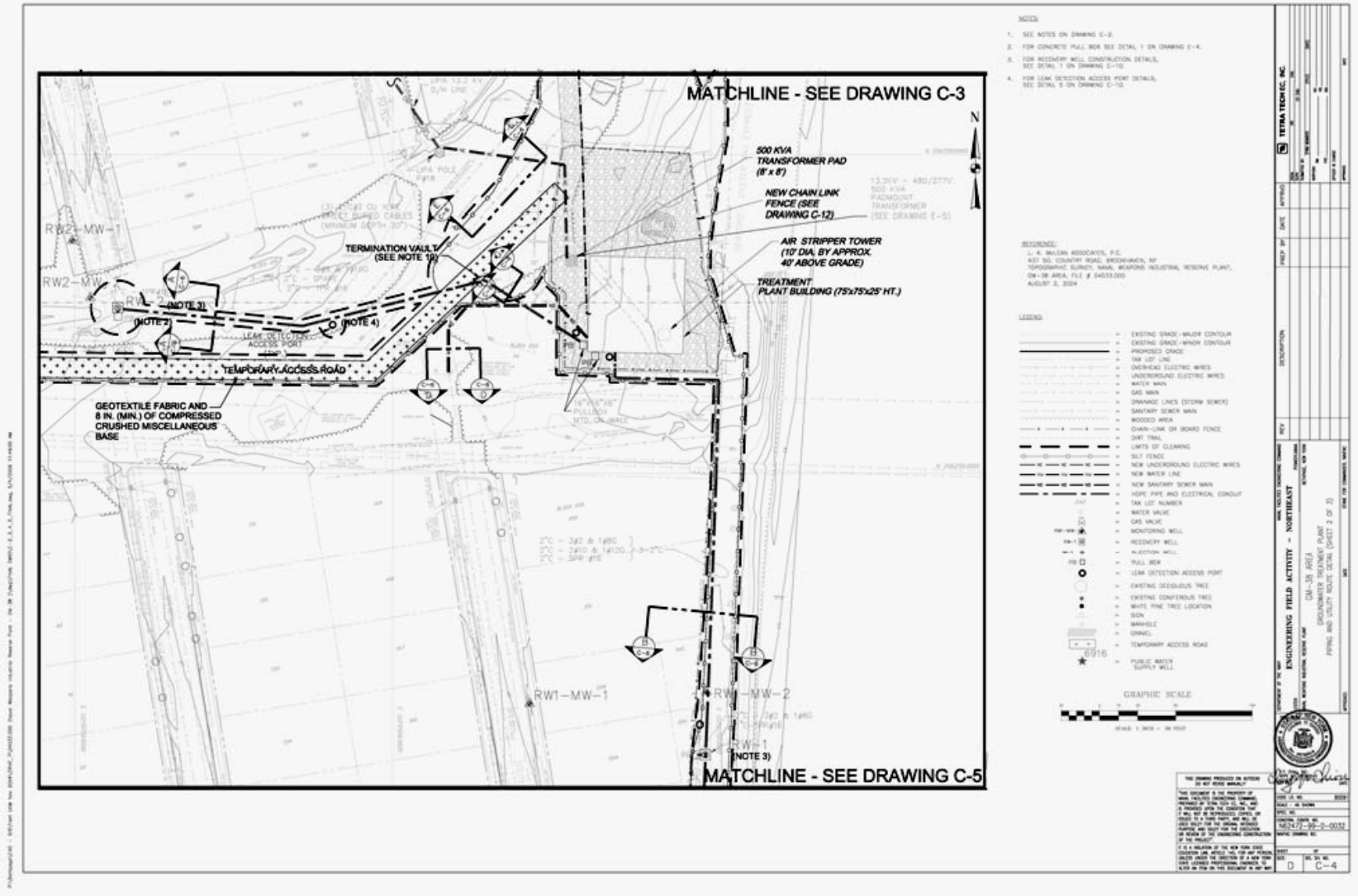

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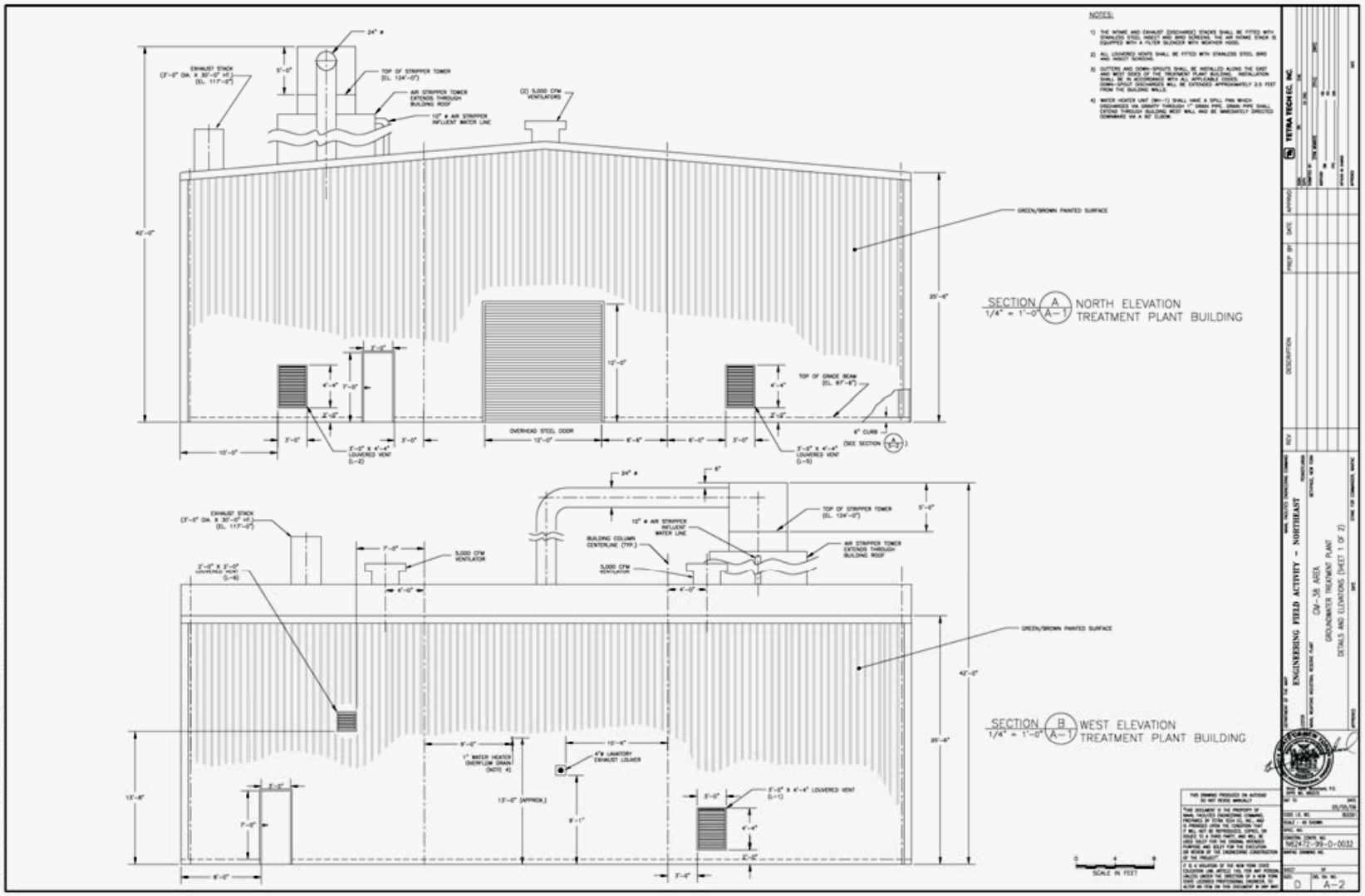

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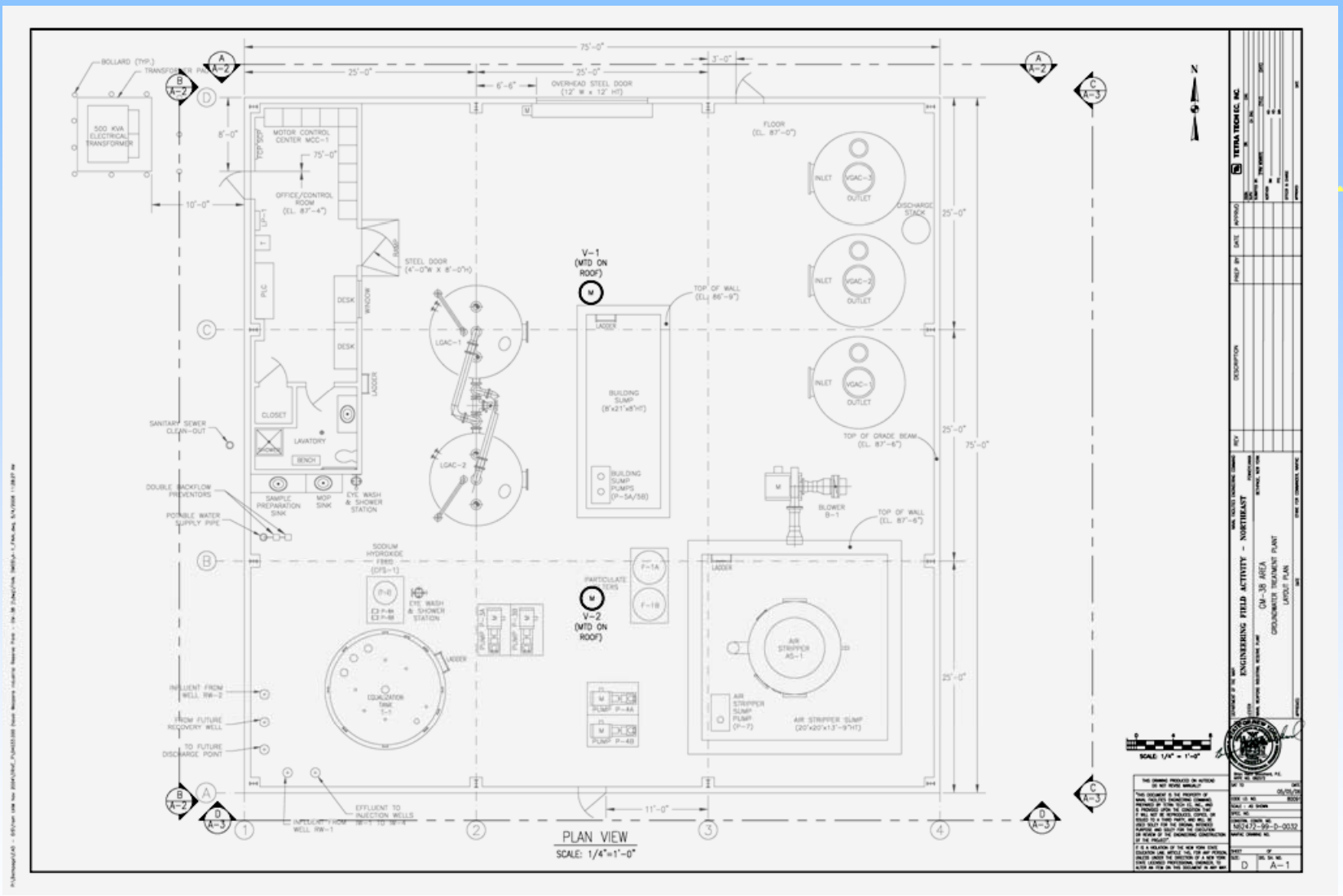

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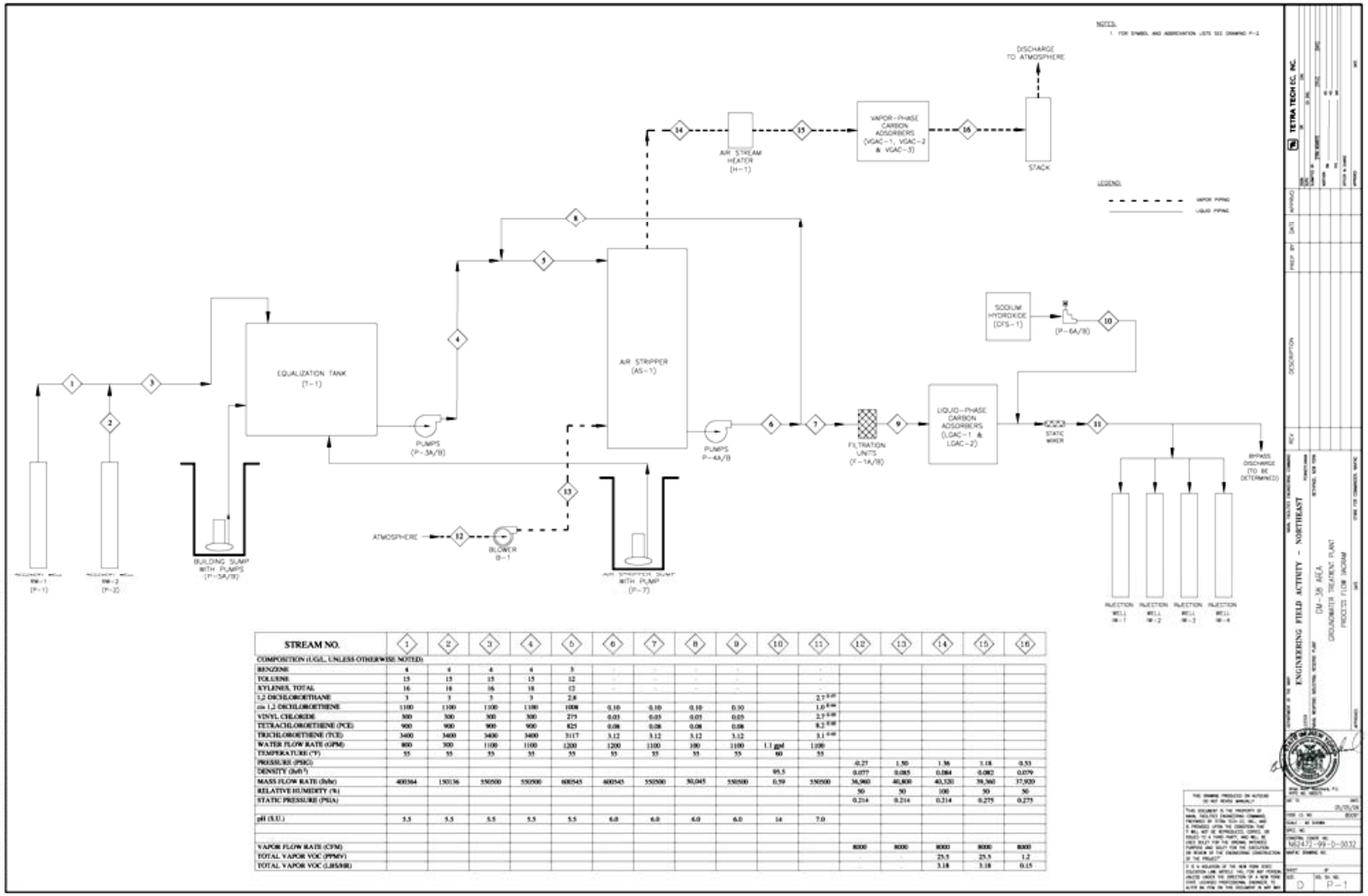

STREAM NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COMPOSITION (UG/L, UNLESS OTHERWISE NOTED)																
BENZENE	4	4	4	4	3	-	-	-	-	-	-					
TOLUENE	15	15	15	15	12	-	-	-	-	-	-					
XYLENES, TOTAL	16	16	16	16	13	-	-	-	-	-	-					
1,2 DICHLOROETHANE	3	3	3	3	2.6						2.7 (1)					
cis 1,2 DICHLOROETHENE	1100	1100	1100	1100	1008	0.10	0.10	0.10	0.10		1.0 (1)					
VINYL CHLORIDE	300	300	300	300	275	0.03	0.03	0.03	0.03		2.7 (1)					
TETRACHLOROETHENE (PCE)	900	900	900	900	825	0.08	0.08	0.08	0.08		8.2 (1)					
TRICHLOROETHENE (TCE)	3400	3400	3400	3400	3117	3.12	3.12	3.12	3.12		3.1 (1)					
WATER FLOW RATE (GPM)	800	300	1100	1100	1200	1200	1100	100	1100	1.1 gpd	1100					
TEMPERATURE (°F)	55	55	55	55	55	55	55	55	55	60	55					
PRESSURE (PSIG)												-0.27	1.50	1.36	1.18	0.53
DENSITY (lb/ft³)										95.5		0.077	0.085	0.084	0.082	0.079
MASS FLOW RATE (lb/hr)	400364	150136	550500	550500	600545	600545	550500	50,045	550500	0.59	550500	36,960	40,800	40,320	39,360	37,920
RELATIVE HUMIDITY (%)												50	50	100	50	50
STATIC PRESSURE (PSIA)												0.216	0.214	0.214	0.275	0.275
pH (S.U.)	5.5	5.5	5.5	5.5	5.5	6.0	6.0	6.0	6.0	14	7.0					
VAPOR FLOW RATE (CFM)												8000	8000	8000	8000	8000
TOTAL VAPOR VOC (PPMV)												-	-	25.5	25.5	1.2
TOTAL VAPOR VOC (LB/HR)												-	-	3.18	3.18	0.15

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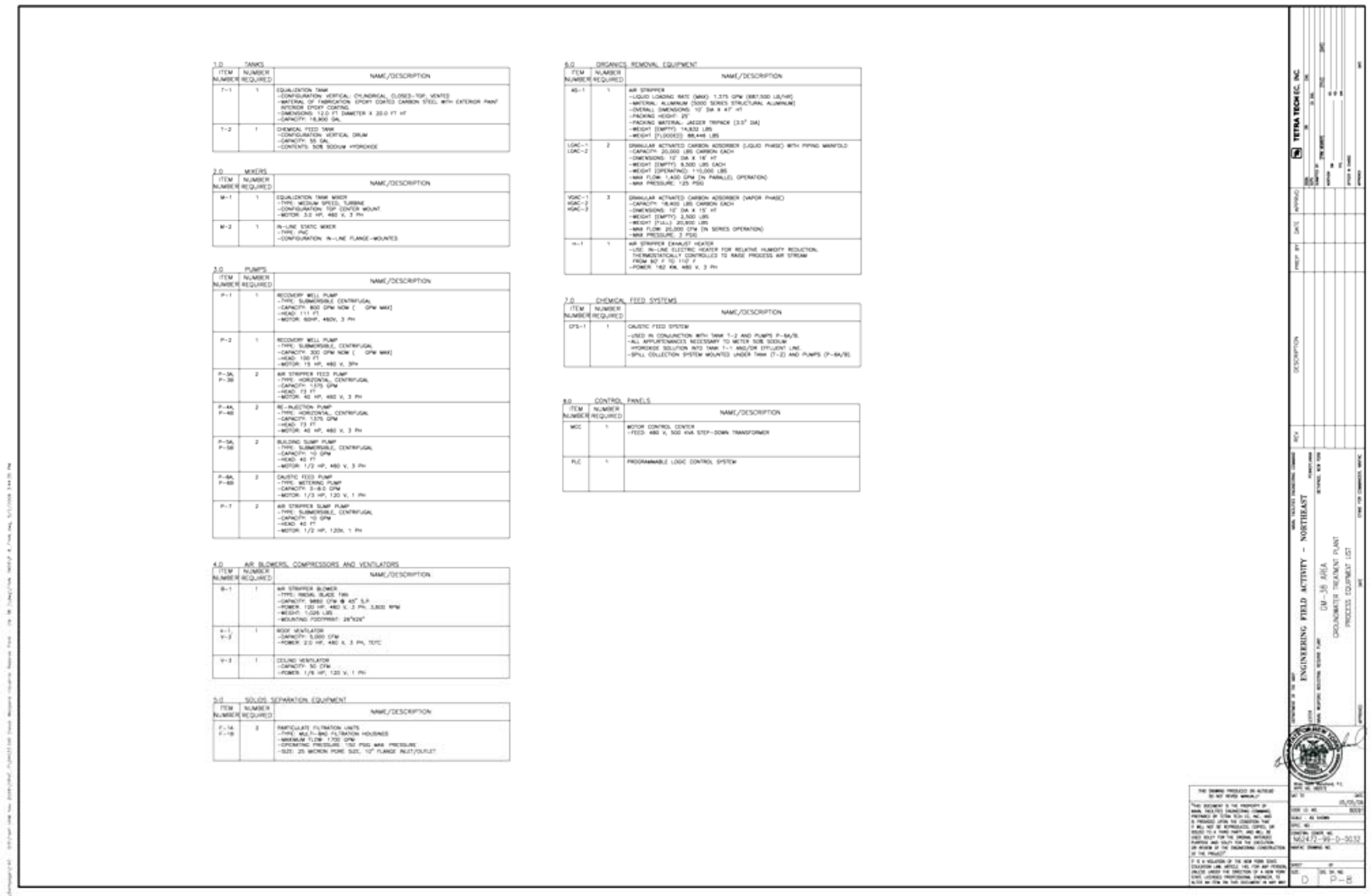

1.0 TANKS

ITEM NUMBER	NUMBER REQUIRED	NAME/DESCRIPTION
T-1	1	EQUALIZATION TANK -CONFIGURATION: VERTICAL; CYLINDRICAL, CLOSED-TOP, VENTED -MATERIAL OF FABRICATION: EPOXY COATED CARBON STEEL WITH EXTERIOR PAINT INTERIOR EPOXY COATING -DIMENSIONS: 12.0 FT DIAMETER X 20.0 FT HT -CAPACITY: 16,900 GAL
T-2	1	CHEMICAL FEED TANK -CONFIGURATION: VERTICAL DRUM -CAPACITY: 55 GAL -CONTENTS: 50% SODIUM HYDROXIDE

2.0 MIXERS

ITEM NUMBER	NUMBER REQUIRED	NAME/DESCRIPTION
M-1	1	EQUALIZATION TANK MIXER -TYPE: MEDIUM SPEED, TURBINE -CONFIGURATION: TOP CENTER MOUNT -MOTOR: 3.0 HP, 460 V, 3 PH
M-2	1	IN-LINE STATIC MIXER -TYPE: PVC -CONFIGURATION: IN-LINE FLANGE-MOUNTED.

3.0 PUMPS

ITEM NUMBER	NUMBER REQUIRED	NAME/DESCRIPTION
P-1	1	RECOVERY WELL PUMP -TYPE: SUBMERSIBLE CENTRIFUGAL -CAPACITY: 800 GPM NOM (GPM MAX) -HEAD: 111 FT -MOTOR: 60HP, 460V, 3 PH
P-2	1	RECOVERY WELL PUMP -TYPE: SUBMERSIBLE, CENTRIFUGAL -CAPACITY: 300 GPM NOM (GPM MAX) -HEAD: 100 FT -MOTOR: 15 HP, 460 V, 3PH
P-3A, P-3B	2	AIR STRIPPER FEED PUMP -TYPE: HORIZONTAL, CENTRIFUGAL -CAPACITY: 1,575 GPM -HEAD: 73 FT -MOTOR: 40 HP, 460 V, 3 PH
P-4A, P-4B	2	RE-INJECTION PUMP -TYPE: HORIZONTAL, CENTRIFUGAL -CAPACITY: 1,575 GPM -HEAD: 73 FT -MOTOR: 40 HP, 460 V, 3 PH
P-5A, P-5B	2	BUILDING SUMP PUMP -TYPE: SUBMERSIBLE, CENTRIFUGAL -CAPACITY: 10 GPM -HEAD: 40 FT -MOTOR: 1/2 HP, 460 V, 3 PH
P-6A, P-6B	2	CAUSTIC FEED PUMP -TYPE: METERING PUMP -CAPACITY: 0-8.0 GPM -MOTOR: 1/3 HP, 120 V, 1 PH
P-7	2	AIR STRIPPER SUMP PUMP -TYPE: SUBMERSIBLE, CENTRIFUGAL -CAPACITY: 10 GPM -HEAD: 40 FT -MOTOR: 1/2 HP, 120V, 1 PH

4.0 AIR BLOWERS, COMPRESSORS AND VENTILATORS

ITEM NUMBER	NUMBER REQUIRED	NAME/DESCRIPTION
B-1	1	AIR STRIPPER BLOWER -TYPE: RADIAL BLADE FAN -CAPACITY: 5850 CFM @ 45" S.P. -POWER: 100 HP, 460 V, 3 PH, 3,600 RPM -WEIGHT: 1,025 LBS -MOUNTING FOOTPRINT: 28"X29"
V-1, V-2	1	ROOF VENTILATOR -CAPACITY: 5,000 CFM -POWER: 2.0 HP, 460 V, 3 PH, TCYC
V-3	1	CEILING VENTILATOR -CAPACITY: 50 CFM -POWER: 1/6 HP, 120 V, 1 PH

5.0 SOLIDS SEPARATION EQUIPMENT

ITEM NUMBER	NUMBER REQUIRED	NAME/DESCRIPTION
F-1A, F-1B	2	PARTICULATE FILTRATION UNITS -TYPE: MULTI-BAG FILTRATION HOUSINGS -MAXIMUM FLOW: 1,700 GPM -OPERATING PRESSURE: 100 PSIG MAX PRESSURE -SIZE: 25 MICRON PORE SIZE, 10" FLANGE INLET/OUTLET

6.0 ORGANICS REMOVAL EQUIPMENT

ITEM NUMBER	NUMBER REQUIRED	NAME/DESCRIPTION
AS-1	1	AIR STRIPPER -LIQUID LOADING RATE (MAX): 1,375 GPM (687,500 LB/HR) -MATERIAL: ALUMINUM (5000 SERIES STRUCTURAL ALUMINUM) -OVERALL DIMENSIONS: 10' DIA X 47' HT -PACKING HEIGHT: 25' -PACKING MATERIAL: JAEGER TRIPACK (3.5" DIA) -WEIGHT (EMPTY): 14,832 LBS -WEIGHT (FLOODED): 68,446 LBS
LGAC-1 LGAC-2	2	GRANULAR ACTIVATED CARBON ADSORBER (LIQUID PHASE) WITH PIPING MANIFOLD -CAPACITY: 20,000 LBS CARBON EACH -DIMENSIONS: 12' DIA X 18' HT -WEIGHT (EMPTY): 9,500 LBS EACH -WEIGHT (OPERATING): 110,000 LBS -MAX FLOW: 1,400 GPM (IN PARALLEL OPERATION) -MAX PRESSURE: 125 PSIG
VGAC-1 VGAC-2 VGAC-3	3	GRANULAR ACTIVATED CARBON ADSORBER (VAPOR PHASE) -CAPACITY: 18,400 LBS CARBON EACH -DIMENSIONS: 12' DIA X 15' HT -WEIGHT (EMPTY): 2,500 LBS -WEIGHT (FULL): 20,900 LBS -MAX FLOW: 20,000 CFM (IN SERIES OPERATION) -MAX PRESSURE: 2 PSIG
H-1	1	AIR STRIPPER EXHAUST HEATER -USE: IN-LINE ELECTRIC HEATER FOR RELATIVE HUMIDITY REDUCTION, THERMOSTATICALLY CONTROLLED TO RAISE PROCESS AIR STREAM FROM 80° F TO 110° F -POWER: 162 KW, 480 V, 3 PH

7.0 CHEMICAL FEED SYSTEMS

ITEM NUMBER	NUMBER REQUIRED	NAME/DESCRIPTION
CFS-1	1	CAUSTIC FEED SYSTEM -USED IN CONJUNCTION WITH TANK T-2 AND PUMPS P-6A/B. -ALL APPURTENANCES NECESSARY TO METER 50% SODIUM HYDROXIDE SOLUTION INTO TANK T-1 AND/OR EFFLUENT LINE. -SPILL COLLECTION SYSTEM MOUNTED UNDER Tanks (T-2) AND PUMPS (P-6A/B).

8.0 CONTROL PANELS

ITEM NUMBER	NUMBER REQUIRED	NAME/DESCRIPTION
MCC	1	MOTOR CONTROL CENTER -FEED: 480 V, 500 kVA STEP-DOWN TRANSFORMER
PLC	1	PROGRAMmable LOGIC CONTROL SYSTEM

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ENGINEERING FIELD ACTIVITY - NORTHEAST

CU-36 AREA

GROUNDWATER TREATMENT PLANT

PROCESS EQUIPMENT LIST

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Esthetic Considerations

- Excavated soil used to construct berm
- Maintain as many existing trees as possible
- 100 new trees to be planted
- Building exterior to be a natural color
- Exterior building lights are motion activated
- No audible exterior alarms
- Chain link fence with privacy screening

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Well Installations

- Currently installed (Nov 2004 - May 2005)
  - 2 Recovery Wells
  - 1 Injection Well
  - 6 Monitoring Wells
  - To be installed during construction
  - 3 Injection Wells
  - 4 Monitoring Wells

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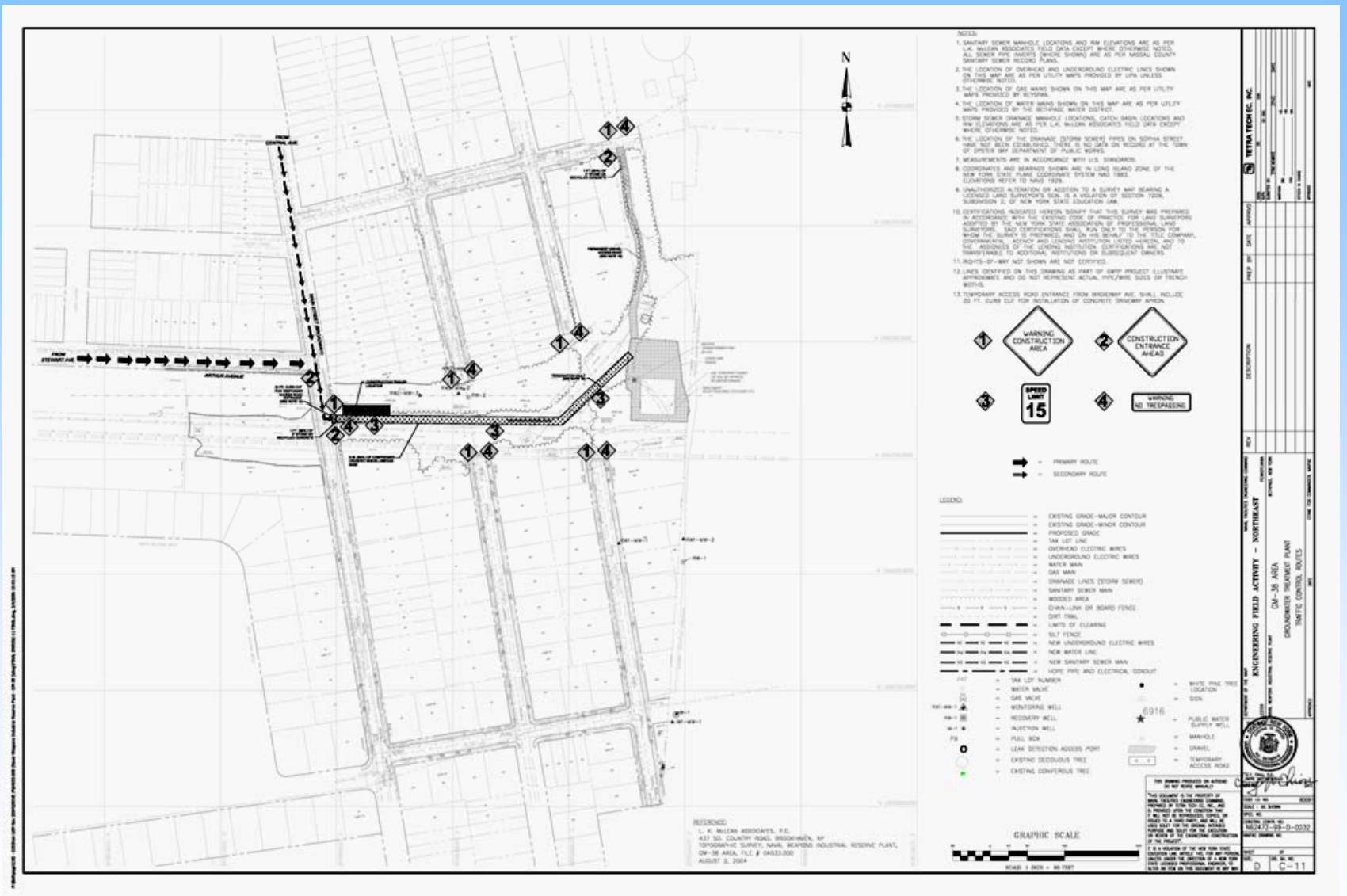
Construction

- Project Signage and Traffic Controls
- Erosion and Sediment Controls
- Access Roads (permanent and temporary)
- Install Building Footers and Foundation
- Trenching to Recovery and Injection Wells
- Utility Tie-in Connections (electric, phone, water, and sanitary sewer)
- Building Floor



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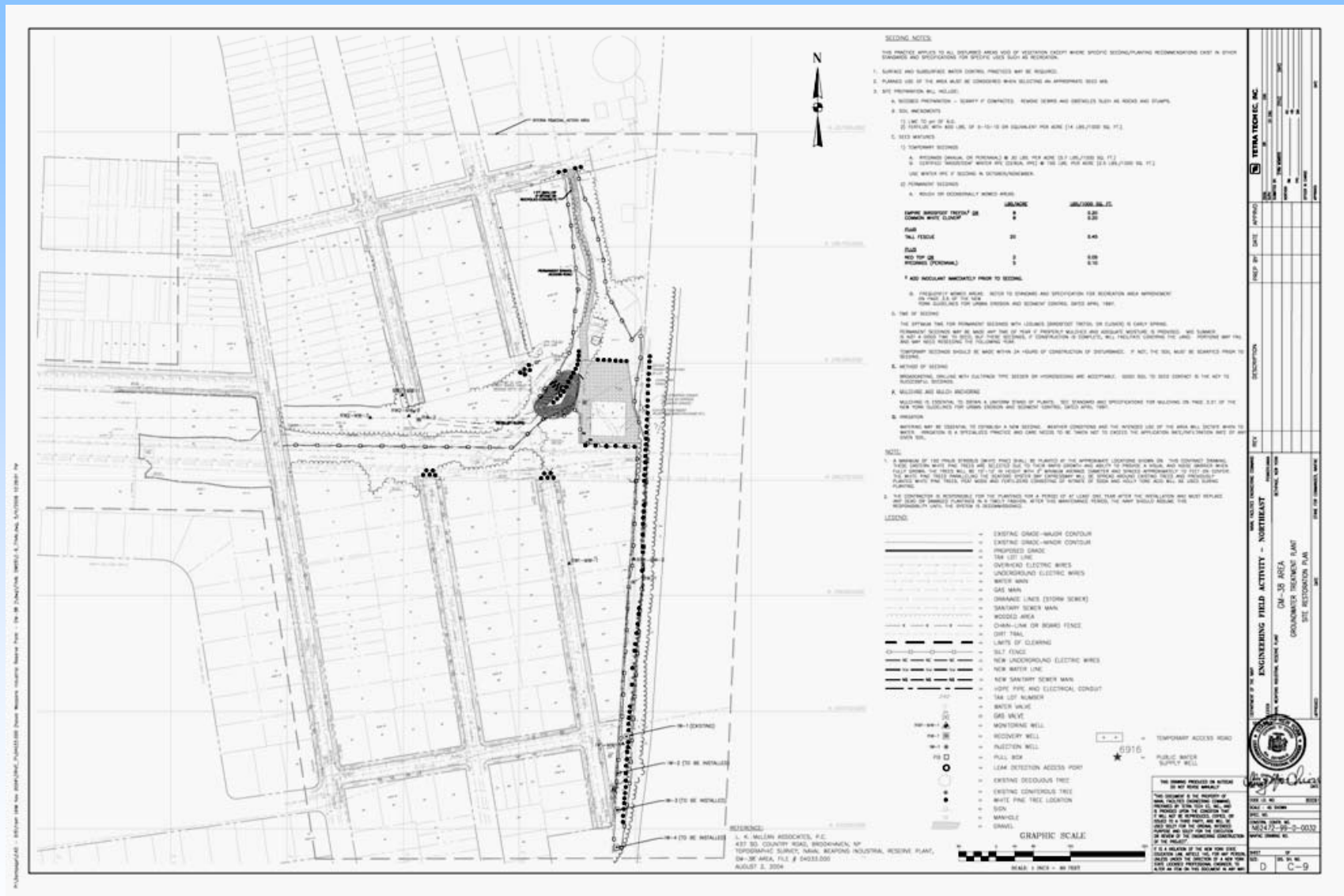
Construction (cont'd)

- Set Large Equipment with Crane
- Erect Building Building
- Interior Piping and Electric
- Install Fire Alarm and Security Systems
- Install and Test Instrumentation
- Test and Balance All Systems
- Site Restoration



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Operation & Maintenance

- Operate 24 hours per day
- Trained personnel visits
  - 3 days per week during initial 6 months
  - Additional visits as needed

Safety Considerations

- Double-walled extraction piping and access ports
- GWTP sloped floor to sump – contain spills
- Liquid-phase carbon units – Total VOC polish
- Backflow preventor on influent potable water line
- Instrumentation
  - Monitor key operating parameters
  - Redundant controls to ensure safe operation
  - Automatic system shut-down signals
  - Requires manual restart
  - Telemonitoring system

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Telemonitoring

- Remote system monitoring via PC
- Alarm conditions communicated to designated personnel via autodialer
- Troubleshooting operational issues before arriving at the site

Future Operating Considerations

- Piping to termination vaults
  - One vault for additional recovery well
  - One vault for future discharge location
- Current GWTP flow will be 1100 gpm
  - Maximum capacity = 1375 gpm (+25%)
- GWTP can treat future development water
  - Water piped/transported to GWTP sump

Operation, Maintenance and Monitoring Plan

- Establishes method of operating & tracking progress of GWTP
- Sampling frequency (system & wells)
- Modify GW model with analytical results
  - Decrease in Total VOC over time
- Emergency response and troubleshooting

Operation, Maintenance and Monitoring Plan (cont'd)

- Components:
  - Regulatory requirements
  - Plant Safety
  - GWTP control and monitoring system
  - GW collection and treatment systems
  - Vapor and ancillary treatment systems
  - Preventative maintenance
  - Exit strategy based on GW modeling

Operation, Maintenance and Monitoring Plan (cont'd)

- Appendices:
  - Final list of equip., instrumentation & valves
  - Recommended spare parts list
  - Maintenance schedule
  - GWTP start-up procedure
  - Record drawings (surveys, process, PLC, etc.)

Project Status

- Obtain real estate access agreements from three property owners – TOB, NYS DOT, and Long Island Railroad
- Obtain all necessary permits
- Competitive bidding for all subcontracted work and equipment
- Notice to Proceed from NYS DEC
- Mobilize and start construction

Anticipated Schedule

Milestones	Date
Project Planning	On-going
Mobilization & Start of Construction	Summer 2006
End of Construction	Summer 2007
Plant Start-Up and Shakedown	Summer - Fall 2007
Start of Operation & Maintenance	Fall 2007

Wrap-up

Questions?