



# Groundwater Remediation Project

Naval Weapons Industrial Reserve Plant

Bethpage, NY

GM-38 Area

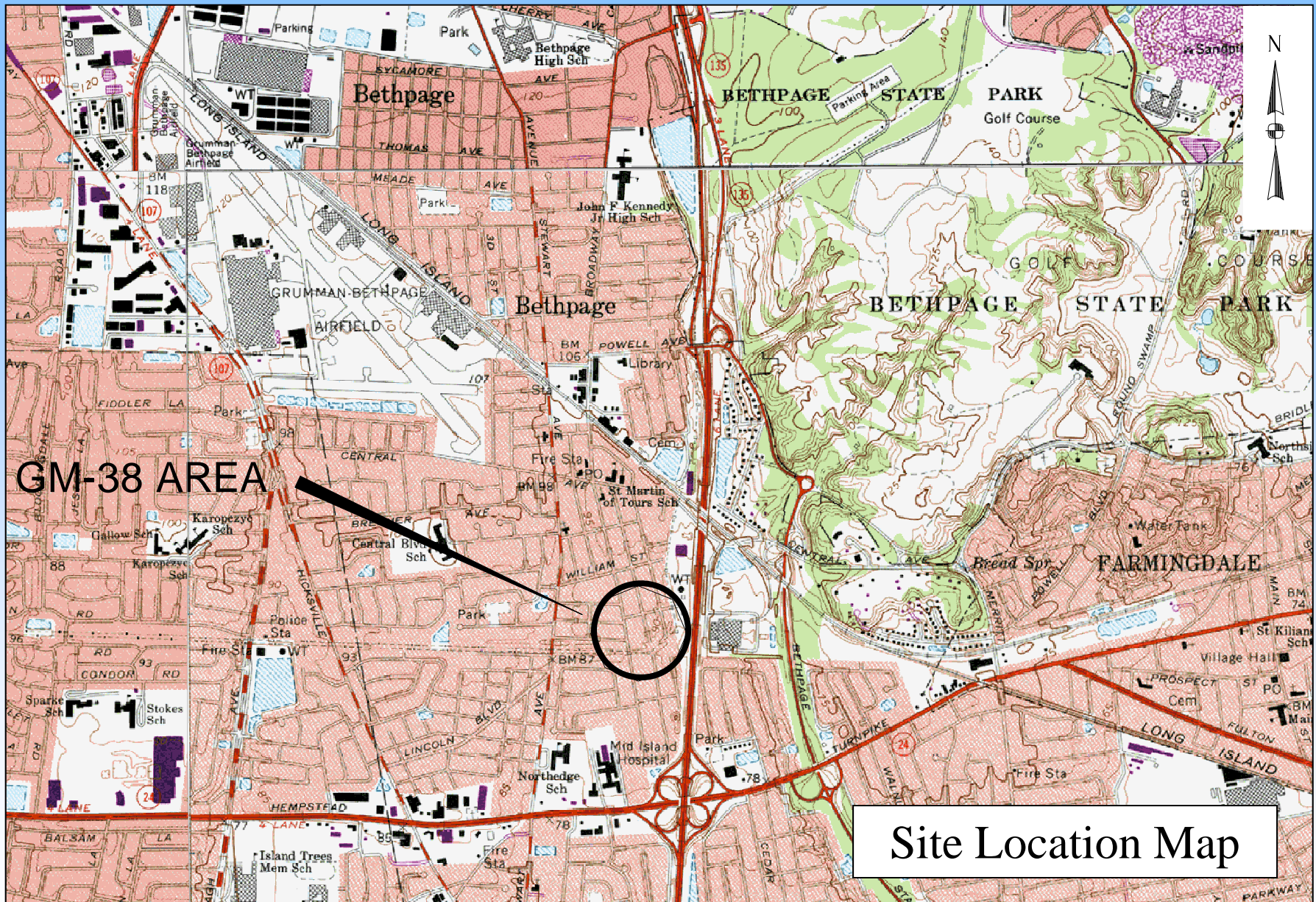
Restoration Advisory Board Meeting

June 7, 2006



TETRA TECH EC, INC.





Site Location Map

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# Groundwater Remediation Project

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

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# Site History

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- 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)

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# Site History (cont'd)

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- 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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# Groundwater Remediation Project

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

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# Treatment System Design (cont'd)

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- 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





- NOTES**
1. SANITARY SEWER MANHOLE LOCATIONS AND RIM ELEVATIONS ARE AS PER L.A. MUELEN ASSOCIATES FIELD DATA EXCEPT WHERE OTHERWISE NOTED. ALL OTHER PIPE LOCATIONS (POWER, SHOWING AS PER NATIONAL COUNTY SANITARY SEWER RECORD PLANS.
  2. THE LOCATION OF OVERHEAD AND UNDERGROUND ELECTRIC LINES SHOWN ON THIS MAP ARE AS PER UTILITY MAPS PROVIDED BY LPA UNLESS OTHERWISE NOTED.
  3. THE LOCATION OF GAS MAINS SHOWN ON THIS MAP ARE AS PER UTILITY MAPS PROVIDED BY KEYSTONE.
  4. THE LOCATION OF WATER MAINS SHOWN ON THIS MAP ARE AS PER UTILITY MAPS PROVIDED BY THE BEAVERCREEK WATER DISTRICT.
  5. STORM SEWER DRAINAGE MANHOLE LOCATIONS, CATCH BASIN LOCATIONS AND RIM ELEVATIONS ARE AS PER L.A. MUELEN ASSOCIATES FIELD DATA EXCEPT WHERE OTHERWISE NOTED.
  6. THE LOCATION OF THE DRAINAGE (STORM SEWER) PIPES ON SOPHIA STREET HAVE NOT BEEN ESTABLISHED THERE IS NO DATA ON RECORD AT THE TOWN OF OUSTER BRP DEPARTMENT OF PUBLIC WORKS.
  7. MEASUREMENTS ARE IN ACCORDANCE WITH U.S. STANDARD.
  8. COORDINATES AND BEARINGS SHOWN ARE IN LONG ISLAND ZONE OF THE NEW YORK STATE PLANE COORDINATE SYSTEM NAD 1983. ELEVATIONS REFER TO MGS 1988.
  9. UNAUTHORIZED ALTERATION OR ADDITION TO A SURVEY MAP BEARING A LICENSED LAND SURVEYOR'S SEAL IS A VIOLATION OF SECTION 7208, SUBSECTION 2, OF NEW YORK STATE EDUCATION LAW.
  10. ONLY COPIES FROM THE ORIGINAL OF THIS SURVEY MAPS WITH AN ORIGINAL OF THE LAND SURVEYOR'S "EMBOSSMENT" SEAL OR "WAXED SEAL" SHALL BE CONSIDERED TO BE VALID TRUE COPIES.
  11. CERTIFICATIONS INDICATED HEREON SIGNIFY THAT THIS SURVEY WAS PREPARED AND CONDUCTED IN ACCORDANCE WITH THE CODE OF PROFESSIONAL ETHICS AND STANDARDS ADOPTED BY THE NEW YORK STATE ASSOCIATION OF PROFESSIONAL LAND SURVEYORS. ANY CERTIFICATION SHALL BE VOID TO THE EXTENT THAT ANY PART OF THE SURVEY IS EXEMPTED, AND IS AS SUCH TO THE TITLE COMPANY, GOVERNMENTAL AGENCY AND LICENSEE RESTRICTION STATE ADDRESSED TO THE ADDRESS OF THE LICENSED INSTITUTION. CERTIFICATIONS ARE NOT TRANSFERABLE TO ADDITIONAL INSTRUMENTS OR SUBSEQUENT OWNERS.
  12. RIGHTS-OF-WAY NOT SHOWN ARE NOT CERTIFIED.
  13. FOUR INJECTION WELLS POSITIONED 80 FEET APART AND EACH PROTECTED TO HANDLE SUSCEPTIBLE FLOW RATES OF 220 GALLONS PER MINUTE (GPM) FOR A CUMULATIVE FLOW OF 1,100 GPM. NUMBER OF INJECTION WELLS AND BRACHES TO BE INSTALLED PERFORM UNDERGROUND MODEL RESULTS PRESENTED BY TETRA TECH INC. IN THE "UNDERGROUND REMEDIATION ANALYSIS REPORT" DATED FEBRUARY 2003.
  14. LINES CENTERED ON THIS DRAWING AS PART OF THIS PROJECT ILLUSTRATE APPROXIMATE AND DO NOT REPRESENT ACTUAL PIPE/WIRE SIZES OR TRENCH WIDTHS.
  15. TEMPORARY ACCESS ROAD ENTRANCE FROM BROADWAY AVE. SHALL INCLUDE 20 FT. CURB CUT FOR INSTALLATION OF CONCRETE DRAINAGE ARCH (TEMPER REQUIRED).
  16. SANITARY LINE SHALL MAINTAIN 1-2% SLOPE FROM BUILDING TO THE TREATMENT PLANT. WATER METER W/ SHALL BE LOCATED ALONGSIDE THE ACCESS ROAD ENTRANCE AT SOPHIA STREET. A REDUCED PRESSURE ZONE DEVICE SHALL BE LOCATED DOWNSTREAM OF METER. IT IS AN ADVISORY WELLS PLANS AND APPLICATIONS MUST BE APPROVED BY THE BEAVERCREEK WATER DISTRICT AND NASSAU COUNTY DEPT. OF HEALTH PRIOR TO INSTALL.
  17. ELECTRICAL AND TELEPHONE 12-IN CONNECTIONS ARE AT FULL LPA (FORMALLY L.L.C.) # 8.
  18. POTENTIAL WATER LINE 12-IN LOCATION SHALL BE ON THE EASTERN SIDE OF THE FUTURE PERMANENT ACCESS ROAD TO THE TREATMENT PLANT. WATER METER W/ SHALL BE LOCATED ALONGSIDE THE ACCESS ROAD ENTRANCE AT SOPHIA STREET. A REDUCED PRESSURE ZONE DEVICE SHALL BE LOCATED DOWNSTREAM OF METER. IT IS AN ADVISORY WELLS PLANS AND APPLICATIONS MUST BE APPROVED BY THE BEAVERCREEK WATER DISTRICT AND NASSAU COUNTY DEPT. OF HEALTH PRIOR TO INSTALL.
  19. THE 18-IN 2 EFFLUENT PIPING TRENCH SHALL ALSO CONTAIN A DOUBLE WALLED 12-IN UNGLAZED 4 IN DIA. ENLARGED HOPE PIPE FOR POTENTIAL FUTURE WELLS CONNECTION AND A 10 IN DIA. HOPE PIPE FOR POTENTIAL FUTURE ALTERNATE DISCHARGE POINT. BOTH PIPES FOR POTENTIAL FUTURE USE SHALL BE BLIND FLANGED AND MADE A TERMINATION WELLS.

**LEGEND**

- EXISTING GRADE-MAJOR CONTOUR
- EXISTING GRADE-MAJOR CONTOUR
- PROPOSED GRADE
- 36" DIA. SINK
- OVERHEAD ELECTRIC WIRES
- UNDERGROUND ELECTRIC WIRES
- WATER MAIN
- GAS MAIN
- DRAINAGE LINES (STORM SEWER)
- SANITARY SEWER MAIN
- WOODS/AREA
- DRIVE/YARD OR BOARD FENCE
- CURB TRENCH
- LIMITS OF CLEARING
- SAT FENCE
- NEW UNDERGROUND ELECTRIC WIRES
- NEW WATER LINE
- NEW SANITARY SEWER MAIN
- HOPE PIPE AND ELECTRICAL CONDUIT
- TIN LOT NUMBER
- WATER VALVE
- GAS VALVE
- MONITORING WELL
- RECOVERY WELL
- INJECTION WELL
- PULL BOX
- LEAK DETECTION ACCESS PORT
- EXISTING DECIDUOUS TREE
- EXISTING CONIFEROUS TREE
- WHITE PINE TREE LOCATION
- SIGN
- MANHOLE
- GRAVEL
- TEMPORARY ACCESS ROAD

**GRAPHIC SCALE**

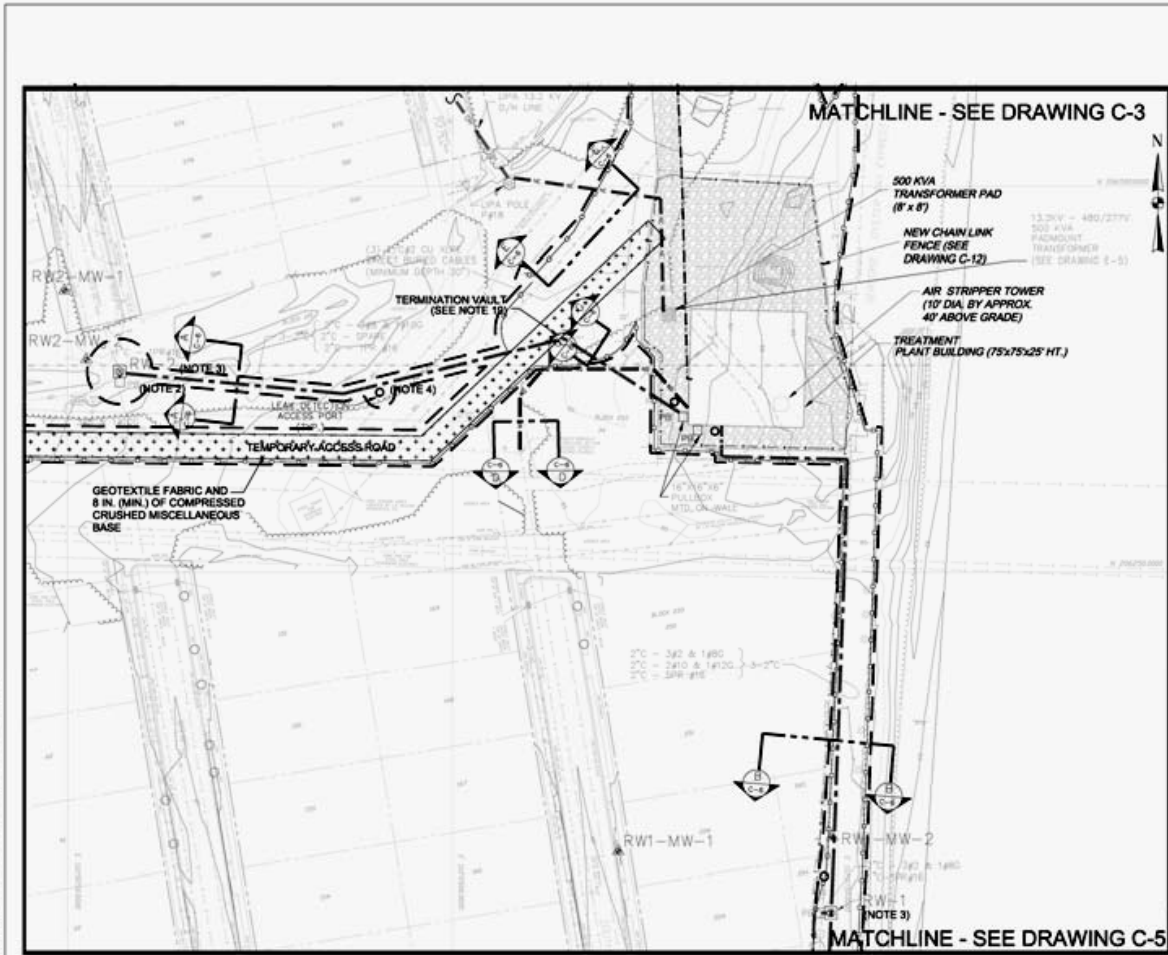
1" = 40' 0"

SCALE 1/4" = 40' 0"

**REFERENCE**

L.A. MUELEN ASSOCIATES, P.C.  
 437 50 COUNTRY ROAD, BROOKHAVEN, NY  
 TOPOGRAPHIC SURVEY, TOWN, BEAVERCREEK INDUSTRIAL RESERVE PLANT,  
 04-18 AREA, FILE # 04033.000  
 AUGUST 2, 2004

<b>TETRA TECH, INC.</b> 1000 W. 10TH STREET, SUITE 200 BEAVERCREEK, NY 12012 TEL: 518-885-1100 FAX: 518-885-1101 WWW.TETRA-TECH.COM	
PROJECT NO. 04-18-0001 SHEET NO. C-2	DATE: 08/02/04 DRAWN BY: J. CHANG CHECKED BY: J. CHANG APPROVED BY: J. CHANG
<b>ENGINEERING FIELD ACTIVITY - NORTHEAST</b> 04-18-0001 COMMUNITY HARBORWAY PART PIPING AND UTILITY SITE LAYOUT	
THE WORK HEREON IS A PART OF THE PROJECT OF THE BEAVERCREEK WATER DISTRICT AND NASSAU COUNTY DEPARTMENT OF HEALTH AND SOCIAL SERVICES, BEAVERCREEK INDUSTRIAL RESERVE PLANT, 04-18 AREA, FILE # 04033.000. THIS DRAWING IS THE PROPERTY OF TETRA TECH, INC. AND IS NOT TO BE REPRODUCED, COPIED, OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF TETRA TECH, INC.	



- NOTES:**
1. SEE NOTES ON DRAWING C-2.
  2. FOR CONCRETE PAV. SEE DETAIL 1 ON DRAWING C-4.
  3. FOR REEDERY WELL CONSTRUCTION DETAILS, SEE DETAIL 1 ON DRAWING C-12.
  4. FOR LEAK DETECTION ACCESS POINT DETAILS, SEE DETAIL 2 ON DRAWING C-12.

**REFERENCE:**  
 G. K. MAREK ASSOCIATES, P.C.  
 4550 5th COURTYARD ROAD, PROSPECT HILLS,  
 COLUMBIAN SURVEY, WASH. RESERVE INDUSTRIAL RESERVE PLANT,  
 ON-28 AREA, FILE # 34013.000  
 AUGUST 2, 2004

- LEGEND:**
- EXISTING GRADE-WATER CONTOUR
  - EXISTING GRADE-WHARF CONTOUR
  - PROPOSED GRADE
  - TAX LOT LINE
  - - - UNDERGROUND ELECTRIC WIRES
  - - - UNDERGROUND ELECTRIC WIRES
  - - - WATER MAIN
  - - - GAS MAIN
  - - - DRAINAGE LINES (EXISTING WORK)
  - - - SANITARY SEWER MAIN
  - - - WOODED AREA
  - - - CHAIN-LINK OR BOARD FENCE
  - - - DIRT TRAIL
  - - - LIMITS OF CLEARING
  - - - SILT FENCE
  - - - NEW UNDERGROUND ELECTRIC WIRES
  - - - NEW WATER LINE
  - - - NEW SANITARY SEWER MAIN
  - - - HOSE PIPE AND ELECTRICAL CONDUIT
  - - - TAX LOT NUMBER
  - - - WATER VALVE
  - - - GAS VALVE
  - - - MONITORING WELL
  - - - REEDERY WELL
  - - - PLACEMENT WELL
  - - - PULL BOX
  - - - LEAK DETECTION ACCESS POINT
  - - - EXISTING DECIDUOUS TREE
  - - - EXISTING CONIFEROUS TREE
  - - - WHITE PINE TREE LOCATION
  - - - SIGN
  - - - WHARF
  - - - CRANES
  - - - TEMPORARY ACCESS ROAD
  - ☆ PUBLIC WATER SUPPLY WELL



**REVISIONS:**

NO.	DESCRIPTION	DATE	BY

DATE: 08-10-04  
 DRAWING NO.: 2205  
 TITLE: ENGINEERING FIELD ACTIVITY - NORTHEAST  
 PROJECT: WASHINGTON NATIONAL GUARD CANAL  
 SHEET: PIPING AND UTILITY ROUTE DECAL (SHEET 2 OF 2)

DESIGNED BY: [Signature]  
 CHECKED BY: [Signature]  
 IN CHARGE: [Signature]

SCALE: 1" = 10'

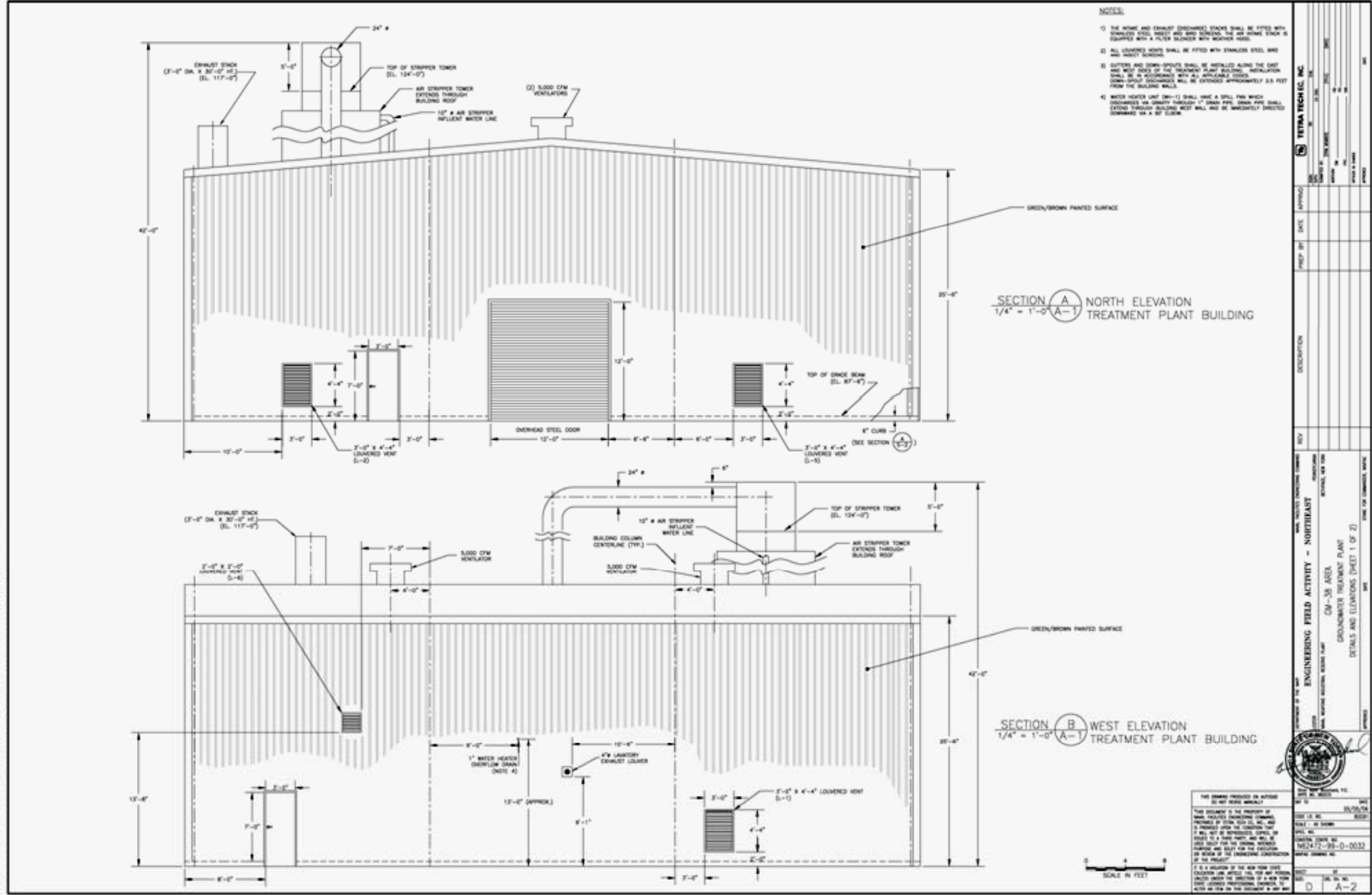
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TERRA TECH, INC.  
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 SUITE 200  
 DENVER, CO 80202  
 TEL: 303.733.8900  
 FAX: 303.733.8901  
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**APPENDIX:**

NO.	DESCRIPTION



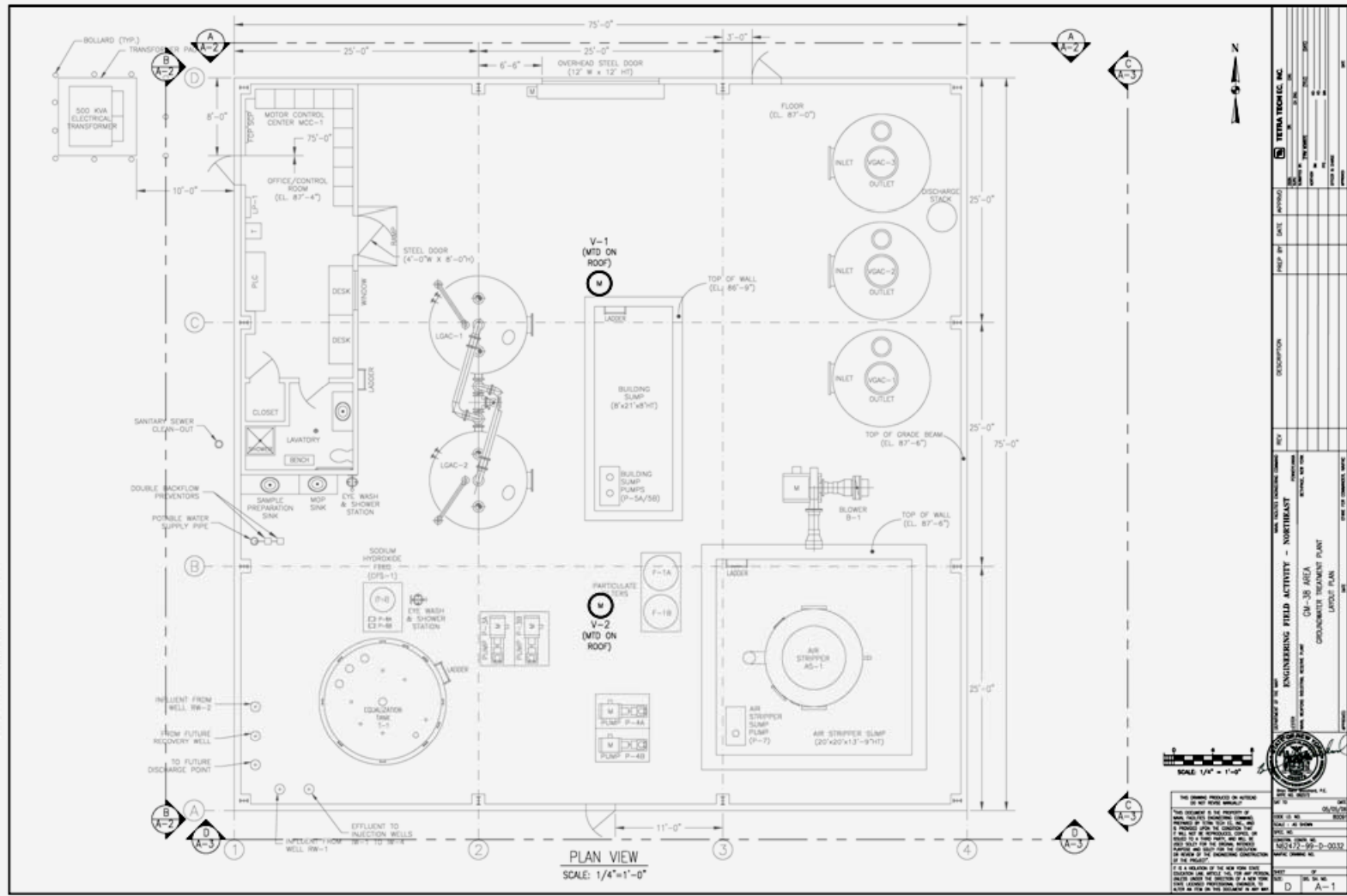


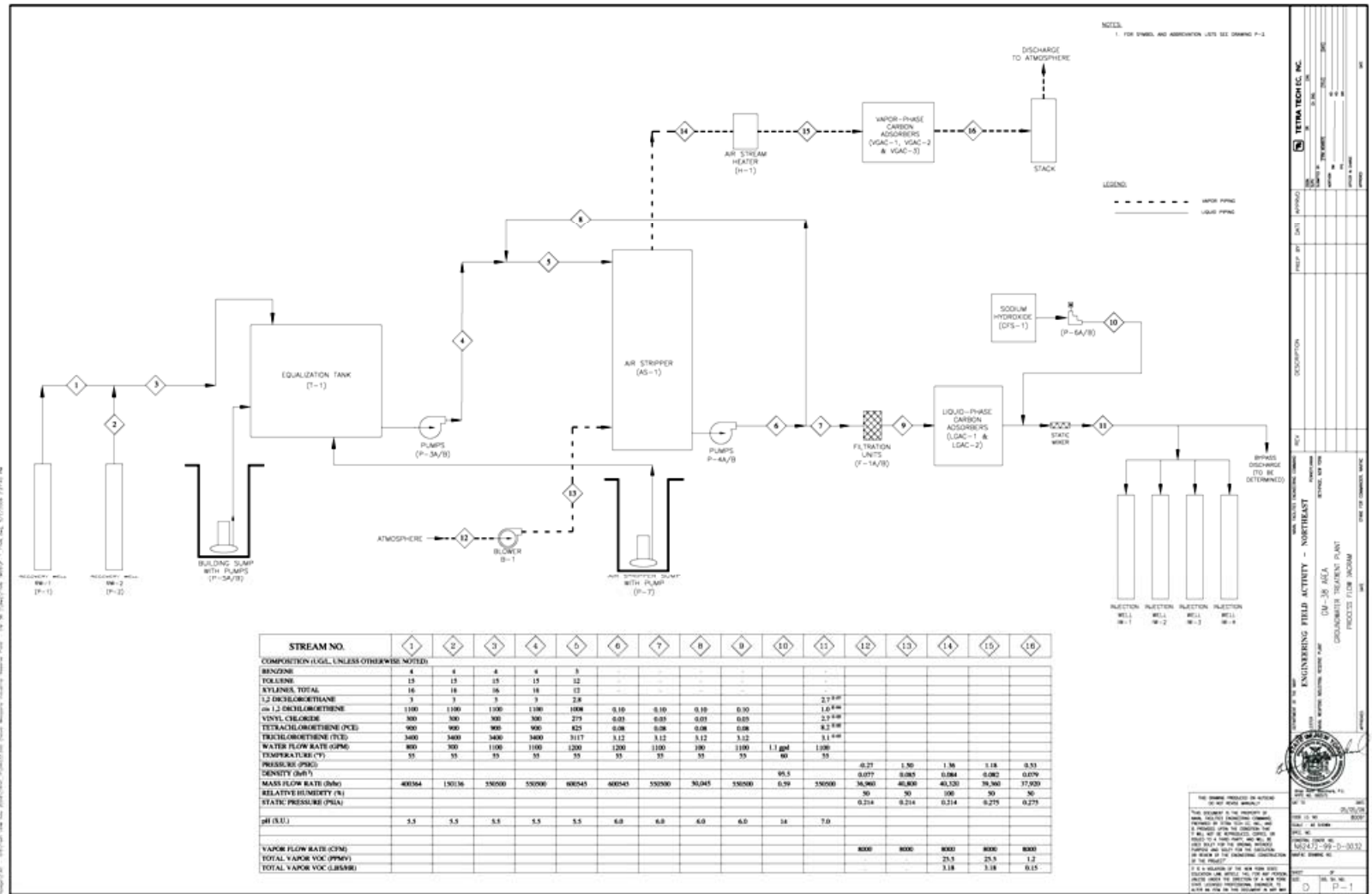
- NOTES:**
- THE ROOF AND EXHAUST/EXHAUSTER STACKS SHALL BE FITTED WITH GALVANIZED STEEL SHEET AND GUTTERS SHALL BE GALVANIZED STEEL SHEET. THE ROOF SHALL BE FITTED WITH A FLARE BLENDER WITH WEATHER HOOD.
  - ALL LOADED ROOFS SHALL BE FITTED WITH STAINLESS STEEL BARS AND WEATHER BANDING.
  - GUTTERS AND DOWNSPOUTS SHALL BE INSTALLED ALONG THE EAST AND WEST SIDES OF THE TREATMENT PLANT BUILDING. INSTALLATION SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES. DOWN-SPOUT EXHAUSTERS SHALL BE EXTENDED APPROXIMATELY 3.0 FEET FROM THE BUILDING WALL.
  - WATER HEATER UNIT (HW-1) SHALL USE A STEEL TANK WHICH IS DISCHARGED VIA GRAVITY THROUGH 1/2" GALV. PIPE. DRAIN PANS SHALL EXTEND THROUGH BUILDING ROOF WALL AND BE IMMEDIATELY DRENCHED DOWNWARD VIA A 3/4" CUM. W.

**SECTION A**  
1/4" = 1'-0" (A-1)  
**NORTH ELEVATION**  
TREATMENT PLANT BUILDING

**SECTION B**  
1/4" = 1'-0" (A-1)  
**WEST ELEVATION**  
TREATMENT PLANT BUILDING

APPROVALS		DATE	
DESIGNER	DATE	CHECKED	DATE
APPROVED	DATE	DESIGNED	DATE
DESCRIPTION		REV.	
ENGINEERING FIELD ACTIVITY - NORTHEAST		1	01/01/2000
CM-38 ASER		2	02/01/2000
GROUNDWATER TREATMENT PLANT		3	03/01/2000
DETAILS AND ELEVATIONS (SHEET 1 OF 2)		4	04/01/2000
SCALE: AS SHOWN		5	05/01/2000
DRAWN BY: J. W. ...		6	06/01/2000
CHECKED BY: ...		7	07/01/2000
APPROVED BY: ...		8	08/01/2000
SCALE: AS SHOWN		9	09/01/2000
SCALE: AS SHOWN		10	10/01/2000
SCALE: AS SHOWN		11	11/01/2000
SCALE: AS SHOWN		12	12/01/2000





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	12	-	-	-	-	-	-	-	-	-	-	-
1,2-DICHLOROETHANE	7	7	7	7	2.8	-	-	-	-	-	-	2.7 E-07	-	-	-	-
1,1-DICHLOROETHENE	1100	1100	1100	1100	1000	0.10	0.10	0.10	0.10	-	-	1.6 E-06	-	-	-	-
VINYL CHLORIDE	300	300	300	300	275	0.03	0.03	0.03	0.03	-	-	2.1 E-06	-	-	-	-
TETRACHLOROETHENE (PCE)	900	900	900	900	825	0.08	0.08	0.08	0.08	-	-	8.2 E-06	-	-	-	-
TRICHLOROETHENE (TCE)	3400	3400	3400	3400	3117	3.12	3.12	3.12	3.12	-	-	3.1 E-06	-	-	-	-
WATER FLOW RATE (GPM)	800	900	1100	1100	1200	1200	1100	100	1100	1.1 E+04	1.00	-	-	-	-	-
TEMPERATURE (°C)	55	55	55	55	55	55	55	55	55	60	55	-	-	-	-	-
PRESSURE (PSIG)	-	-	-	-	-	-	-	-	-	99.5	-	40.27	1.30	1.30	1.18	0.53
DENSITY (GPM)	-	-	-	-	-	-	-	-	-	0.077	0.003	0.004	0.002	0.009	-	-
MASS FLOW RATE (GPM)	40064	13016	51000	51000	60543	60543	51000	30245	51000	0.59	51000	34360	40400	40120	39300	37900
RELATIVE HUMIDITY (%)	-	-	-	-	-	-	-	-	-	-	-	50	50	50	50	-
STATIC PRESSURE (PSIA)	-	-	-	-	-	-	-	-	-	-	-	0.214	0.214	0.214	0.215	0.215
pH (SU)	5.5	5.5	5.5	5.5	5.5	6.0	6.0	6.0	6.0	10	7.0	-	-	-	-	-
VAPOR FLOW RATE (CFM)																
TOTAL VAPOR VOC (PPMV)	-	-	-	-	-	-	-	-	-	-	-	8000	8000	8000	8000	8000
TOTAL VAPOR VOC (LB/HR)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1.0 TANKS		
ITEM NUMBER	NUMBER REQUIRED	NAME/DESCRIPTION
T-1	1	EQUALIZATION TANK -CONFIGURATION: VERTICAL, CYLINDRICAL, CLOSED-TOP, VENTS -MATERIAL OF CONSTRUCTION: STAINLESS STEEL CARBON STEEL WITH EXTERIOR PAINT -INTERNAL EQUIP COATING -DIMENSIONS: 122 FT DIAMETER X 20.0 FT HT -CAPACITY: 16,800 GALS
T-2	1	CHEMICAL FEED TANK -CONFIGURATION: VERTICAL DRUM -CAPACITY: 95 GALS -CONTENTS: 50% SODIUM HYDROXIDE

2.0 MIXERS		
ITEM NUMBER	NUMBER REQUIRED	NAME/DESCRIPTION
M-1	1	EQUALIZATION TANK MIXER -TYPE: MEDIUM SPEED, TURBINE -CONFIGURATION: 50% COVER MOUNT -MOTOR: 3.0 HP, 480 V, 3 PH
M-2	1	IN-LINE SOLIDS MIXER -TYPE: PDC -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 (1.0 GPM MAX) -HEAD: 111 FT -MOTOR: 50HP, 480V, 3 PH
P-2	1	RECOVERY WELL PUMP -TYPE: SUBMERSIBLE, CENTRIFUGAL -CAPACITY: 300 GPM (1.0 GPM MAX) -HEAD: 130 FT -MOTOR: 15 HP, 480 V, 3 PH
P-3A P-3B	2	AIR STRIPPER FEED PUMP -TYPE: HORIZONTAL, CENTRIFUGAL -CAPACITY: 120 GPM -HEAD: 73 FT -MOTOR: 40 HP, 480 V, 3 PH
P-4A P-4B	2	RE-INJECTION PUMP -TYPE: HORIZONTAL, CENTRIFUGAL -CAPACITY: 120 GPM -HEAD: 73 FT -MOTOR: 40 HP, 480 V, 3 PH
P-5A P-5B	2	BUILDING WASH PUMP -TYPE: SUBMERSIBLE, CENTRIFUGAL -CAPACITY: 10 GPM -HEAD: 40 FT -MOTOR: 1/2 HP, 480 V, 3 PH
P-6A P-6B	2	CAUSTIC FEED PUMP -TYPE: METERSIDE PUMP -CAPACITY: 3-8.5 GPM -MOTOR: 1/2 HP, 120 V, 1 PH
P-7	2	AIR STRIPPER SLAM PUMP -TYPE: SUBMERSIBLE, CENTRIFUGAL -CAPACITY: 20 GPM -HEAD: 80 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: WINDMILL BLADE FAN -CAPACITY: 8000 CFM @ 40" S.P. -MOTOR: 100 HP, 480 V, 3 PH, 3000 RPM -WEIGHT: 1000 LBS -MOUNTING: (OPTIONAL) 20"X20"
V-1	1	ROOF VENTILATOR -CAPACITY: 5000 CFM -MOTOR: 2.0 HP, 480 V, 3 PH, 120C
V-2	1	CEILING VENTILATOR -CAPACITY: 50 CFM -MOTOR: 1/8 HP, 120 V, 1 PH

5.0 SOLIDS SEPARATION EQUIPMENT		
ITEM NUMBER	NUMBER REQUIRED	NAME/DESCRIPTION
S-1A	2	PARTICULATE COLLECTION UNITS -TYPE: MULTI-UNIT FILTRATION HOUSINGS -MATERIAL: 1.50 GPM -OPERATING PRESSURE: 150 PSIG MAX. PRESSURE -HEAD: 20 INCHES FINE SIEVE 10" FLANGE MULTI-UNIT

6.0 DISINTEGRATION REMOVAL EQUIPMENT		
ITEM NUMBER	NUMBER REQUIRED	NAME/DESCRIPTION
RS-1	1	AIR STRIPPER -LIQUID LOADING RATE (MAX): 1.375 GPM (MAX) 300 LBS/HR -MATERIAL: ALUMINUM (5000 SERIES EXCLUSION: ALUMINUM) -INTERNAL DIMENSIONS: 10' DIA X 4' HT -FINING HEIGHT: 30" -FINING MATERIAL: JACOB TYPHOON (13' DIA) -WEIGHT (EMPTY): 1400 LBS -WEIGHT (LOADED): 3640 LBS
LOC-1 LOC-2	2	SHIMLAR ACTIVATED CARBON ADSORBER (LIQUID PHASE) WITH PIPING MANIFOLD -CAPACITY: 25,000 LBS CARBON EACH -DIMENSIONS: 10' DIA X 16' HT -WEIGHT (EMPTY): 8,000 LBS EACH -WEIGHT (OPERATING): 17,000 LBS -MAX FLOW: 1.450 GPM (IN PARALLEL OPERATION) -MAX PRESSURE: 1.25 PSIG
YOC-1 YOC-2 YOC-3	3	SHIMLAR ACTIVATED CARBON ADSORBER (VAPOUR PHASE) -CAPACITY: 16,400 LBS CARBON EACH -DIMENSIONS: 10' DIA X 15' HT -WEIGHT (EMPTY): 2,800 LBS -WEIGHT (FULLY LOADED): 10,000 LBS -MAX FLOW: 20,000 CFM (IN SERIES OPERATION) -MAX PRESSURE: 2.75 PSIG
H-1	1	AIR STRIPPER EXHAUST HEATER -USE: IN-LINE ELECTRIC HEATER FOR RELATIVE HUMIDITY REDUCTION -TEMPERATURALLY CONTROLLED TO RAISE PROCESS AIR STREAM FROM 80.0 F TO 100.0 F -POWER: 160 KW, 480 V, 3 PH

7.0 CHEMICAL FEED SYSTEMS		
ITEM NUMBER	NUMBER REQUIRED	NAME/DESCRIPTION
CF-1	1	CAUSTIC FEED SYSTEM -USE: IN CONNECTION WITH TANK 1-2 AND PUMPS P-6A/B -ALL APPURTENANCES NECESSARY TO METER 100 SODIUM HYDROXIDE SOLUTION AND TANK 1-1 INJECTOR EFFLUENT LINE -SPILL COLLECTION SYSTEM MOUNTED UNDER TANK (7-2) AND PUMPS (P-6A/B)

8.0 CONTROL PANELS		
ITEM NUMBER	NUMBER REQUIRED	NAME/DESCRIPTION
REC	1	MOTOR CONTROL CENTER -FEED: 480 V, 500 KVA STEP-DOWN TRANSFORMER
PLC	1	PROGRAMMABLE LOGIC CONTROL SYSTEM

DATE	10/17/95
BY	W. J. BROWN
FOR	ENGINEERING FIELD ACTIVITY - NORTHEAST
PROJECT NO.	DAW-25-056A
PROJECT NAME	GROUNDWATER TREATMENT PLANT
PROCESS EQUIPMENT LIST	

NO.	1	DESCRIPTION	DATE
NO.	2		
NO.	3		
NO.	4		
NO.	5		
NO.	6		
NO.	7		
NO.	8		
NO.	9		
NO.	10		

THE DESIGN PRESENTED ON THESE PLANS IS THE PROPERTY OF TETRA TECH, INC. IT IS TO BE USED ONLY FOR THE PROJECT AND SITE SPECIFICALLY IDENTIFIED HEREON. IT IS NOT TO BE REPRODUCED, COPIED, OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF TETRA TECH, INC.

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DATE: 10/17/95  
 BY: W. J. BROWN  
 TITLE: PROJECT ENGINEER



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# Esthetic Considerations

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- 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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# Groundwater Remediation Project

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- Site History
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- Well Installations
- Construction
- Operation & Maintenance



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# Well Installations

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- 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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# Groundwater Remediation Project

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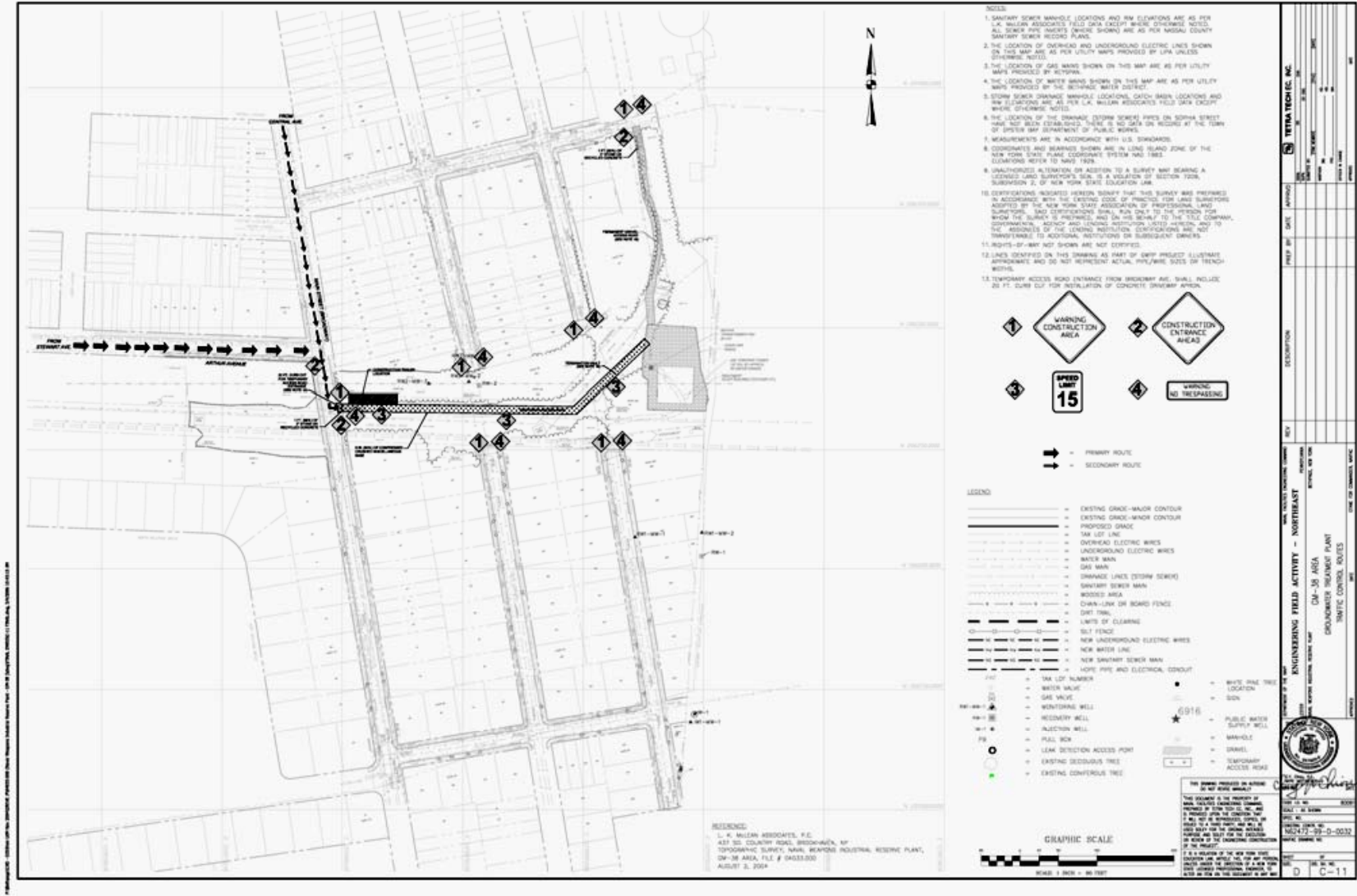
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# Construction

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- 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)

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- 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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# Groundwater Remediation Project

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

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# Operation & Maintenance

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



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# Safety Considerations

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- 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

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

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# Future Operating Considerations

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- 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

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# Operation, Maintenance and Monitoring Plan

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- 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

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# Operation, Maintenance and Monitoring Plan (cont'd)

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- 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

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# Operation, Maintenance and Monitoring Plan (cont'd)

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

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# Project Status

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- 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

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# Anticipated Schedule

<b>Milestones</b>	<b>Date</b>
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



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# Wrap-up

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Questions?