Design Report

Third Ward Manufactured Gas Plant Site
City of Milwaukee Property
and
Peters=Johnson Property
Milwaukee, Wisconsin

Prepared by:

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RETEC Project No.: 1-2824-300

Prepared for:

Wisconsin Gas Company
5400 N. Green Bay Avenue
Milwaukee, Wisconsin 53209

October 20, 1997

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Prepared by:

M L Salisbury, P.E.

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Technically Reviewed by:

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October 20, 1997

DESGNRPT.WPD

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1 Introduction

1.1 Background

This document provides the Design Report for certain portions of the Third Ward Manufactured Gas Plant (MGP) site (Site). The location of the Site is shown on Figure 1-1. This Design Report has been prepared by RETEC on behalf of Wisconsin Gas Company in accordance with the requirements for a Design Report under Wisconsin Administrative Code NR 724.09. This Design Report provides information about the soil remedy planned for a portion of the Site consisting of the following areas as shown on Figure 1-2:

- City of Milwaukee Property (City Property) - bounded by North Jefferson Street, East Menomonee Avenue, North Jackson Street, and East Corcoran Avenue consisting of Blocks 115 and 158

- Peters=Johnson Property (P=J Property) - bounded by North Milwaukee Street, East Menomonee Avenue, North Jefferson Street, and East Corcoran Avenue consisting of Blocks 116 and 157

Figure 1-3 shows the locations of certain MGP structures formerly located on the City Property and on the P=J Property.

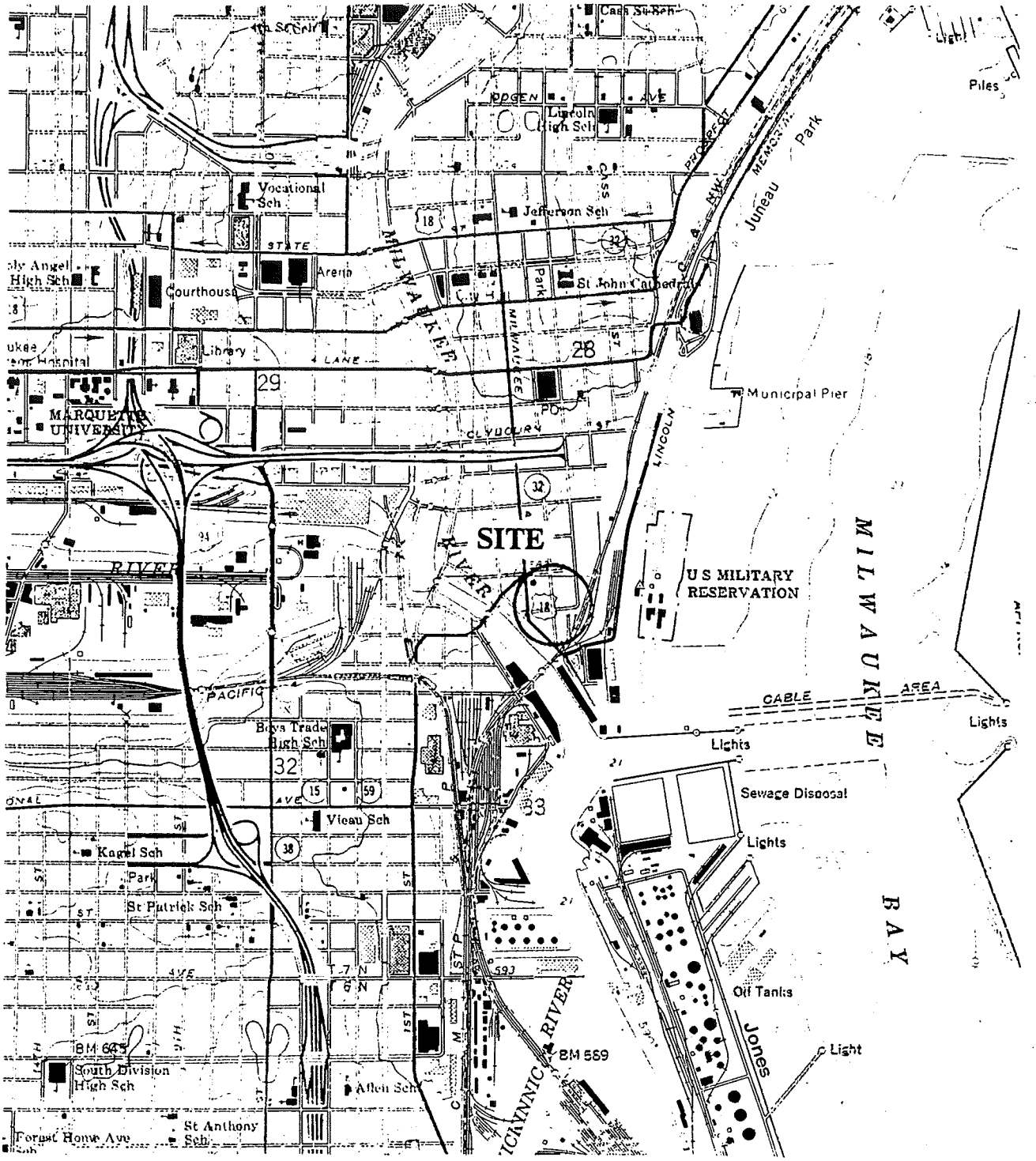
Several reports document the history of the Site and the results of environmental investigations of soil and groundwater conducted at the Site. The following reports were previously submitted to the Wisconsin Department of Natural Resources (WDNR) and contain information that was used in developing this Design Report:

- *Phase III Environmental Site Investigation Report, Former Third Ward Manufactured Gas Plant Site, April 1993* (Phase III ESI Report), which presents the results of the Phase III Environmental Site Investigation (Phase III ESI), conducted by RETEC in 1992 and 1993

- *Addendum No. 1 Phase III Environmental Site Investigation Report, Former Third Ward Manufactured Gas Plant Site, June 1994* (River Sediment Sampling Report), which presents the results of the river Sediment sampling effort performed in the Milwaukee River in September 1993

- *Preliminary Feasibility Study Report Former Third Ward Manufactured Gas Plant Site, Milwaukee, Wisconsin, July 1994*, (Preliminary FS), which provides certain of the information required for a Remedial Action Options Report (RAOR) according to NR 722.13

REIEC



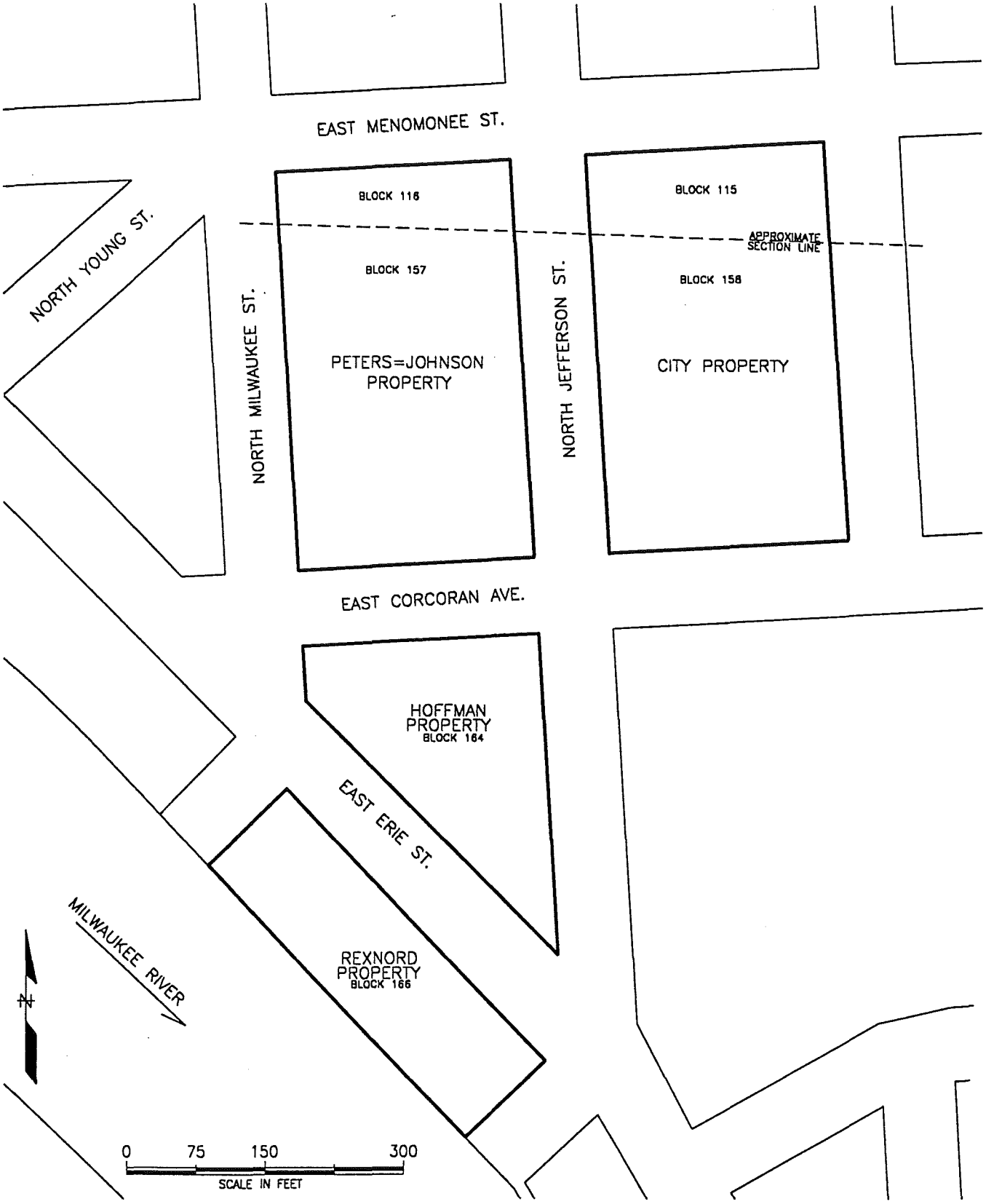
SOURCE: MILWAUKEE 7-1/2 MINUTE TOPOGRAPHIC QUADRANGLE

SCALE 1 inch = 2,000 feet

THIRD WARD MGP SITE
SITE LOCATION MAP

FIGURE 1-1

RETEC



SITE MAP
FORMER THIRD WARD MGP SITE
MILWAUKEE, WISCONSIN

FIGURE 1-2

REV.	2	SITEMAP.DWG
	DRAFT	N/A

EAST MENOMONEE AVE.

NORTH MILWAUKEE ST.

NORTH JEFFERSON ST.

NORTH JACKSON ST.

EAST CORCORAN AVE.

CONTROL ROOM

TAR WELL

GAS HOLDER #5 AND TAR STORAGE

WATER AND GAS TANK HOUSE

GAS HOLDER #4

GAS PUSHERS AND PUMP HOUSE

TAR WELL

TAR COOKERS

BOILER ROOM

DRIP WELL

PURIFYING HOUSE

STORE ROOM

OIL/TAR SETTLING TANK

OIL WELL

TAR WELL

OFFICE

PURIFYING TANK

GAS HOLDER #2

TAR WELL

GAS HOLDER #1

PURIFYING TANK

GAS HOLDER #3 AND CRUDE OIL TANK #2

OIL RESERVOIR #1

GASOLINE TANK

PURIFYING TANK

AMMONIA WORKS

AMMONIA TANK

OIL TANK

TAR TANK

PITCH KETTLE

EXPLANATION

LIMIT OF MGP OPERATIONS

FORMER MGP STRUCTURES

N

0 30 60 120

SCALE IN FEET

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THIRD WARD MGP SITE
MILWAUKEE, WISCONSIN
1-2824-300

CURRENT DATE: 10/6/97

CAD FILE FORWSTRU.DWG

SELECTED FORMER MGP STRUCTURES
CITY AND PETERS-JOHNSON PROPERTIES
(VARIOUS YEARS)

RETEC
REMEDIATION TECHNOLOGIES INC

DRAWING NO. FIGURE 1-3

REV 0

- *Shallow Soil Predesign Investigation Report, Former Third Ward Manufactured Gas Plant Site, May 1996* (SSPI Report), which presents the results of the shallow soil pre-remedial design investigation conducted by RETEC in 1995

- *Remedial Action Options Report, Third Ward Manufactured Gas Plant Site, City of Milwaukee Property and Peters=Johnson Property, Milwaukee Wisconsin August 1997*, (RAOR), which provides the information required for submittal of a RAOR according to NR 722.13. A revised version of Section 5.1 of the RAOR was submitted to the WDNR in October 1997

1.2 Design Report Organization

This Design Report provides information regarding the following topics:

- Brief Site history
- Remedial action design
- Engineering criteria, concepts, and assumptions used in the remedial action design
- Permits, licenses, and approvals required to implement the remedy
- Laws, standards, and regulations pertaining to the remedial action
- Monitoring that will be conducted during implementation of the remedial action
- Operation and maintenance of the remedial action
- Proposed schedule for implementation of the remedial action

1.3 Abbreviated Site History

The Site was the location of the former Third Ward MGP. Gas was made at the Site from the 1850s to the 1950s. MGP operations were conducted on land comprising an area of approximately 5.5 acres. All of the land on which the former MGP was located was sold by Wisconsin Gas to other parties after the MGP was decommissioned and demolished in 1959. The methods that were used in MGP operations evolved during the life of the former facility and involved

three different gas manufacturing processes. The Phase III ESI Report contains additional information regarding the history of the Site.

After the sale of the Site, other parties constructed certain buildings on the Site. Two buildings were constructed on the P=J Property and a large structure was constructed on the City Property. Lurie Glass Company (Lurie Glass) presently operates on the P=J Property. Lurie Glass is located on the southern portion of the P=J Property. An unoccupied vehicle maintenance facility, formerly known as Care Cab, is located on the northern portion of the P=J Property. The buildings present on the City Property have been demolished.

1.4 Summary of Environmental Conditions

A complete discussion of impacts observed at the Site is provided in the Phase III ESI Report, the SSPI Report and in the Preliminary FS. The Preliminary FS identifies four media of interest at the Site. The following identifies the media and their relation to this Design Report:

- Subsurface Structures - the subsurface structures on the City Property and the P=J Property will be addressed in the planned soil remedy for these properties

- Impacted Soil - the impacted soil on the City Property and the P=J Property will be addressed in the planned soil remedy for these properties

- Impacted Groundwater - the impacted groundwater at the Site will be addressed in another RAOR and Design Report to be submitted at a later date

- Impacted Sediments - impacted sediments will be addressed in another RAOR and Design Report to be submitted at a later date

The balance of this subsection provides a summary of impacts present on the City Property and P=J Property.

The environmental investigations of subsurface conditions have identified polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs) in soil and groundwater at the Site. Those compounds are typical of the residuals of MGP operations. A summary of the environmental conditions on each of the two properties is provided in the RAOR.

The following provides a description of the media present on the City Property and the P=J Property that have been affected by MGP residuals:

- Soil - this medium consists of unsaturated fine-grained, non-native fill material, primarily silty sand, with areas of gravel and clay. Some Debris is included in this medium and consists of coarse-grained and large-sized materials such as cinders, ash, coal, coal slag, brick, piping, other metal, wood, asphalt, and concrete.

- Subsurface Structures - these include the former MGP structures shown on Figure 1-3. Subsurface structures include both MGP structures (e.g., former gas holders, tar wells, etc.) and non-MGP structures (e.g., building foundations, vaults). Some Debris is included in this medium and consists of coarse-grained and large-sized materials such as cinders, ash, coal, coal slag, brick, piping, other metal, wood, asphalt, and concrete.

- Groundwater - groundwater was encountered approximately 4 to 11 feet below ground surface. Groundwater generally flows to the south/southeast at the Site.

The RAOR provides a complete summary of the depths and dimensions of the former MGP structures and the distribution of impacts inside and outside of subsurface structures.

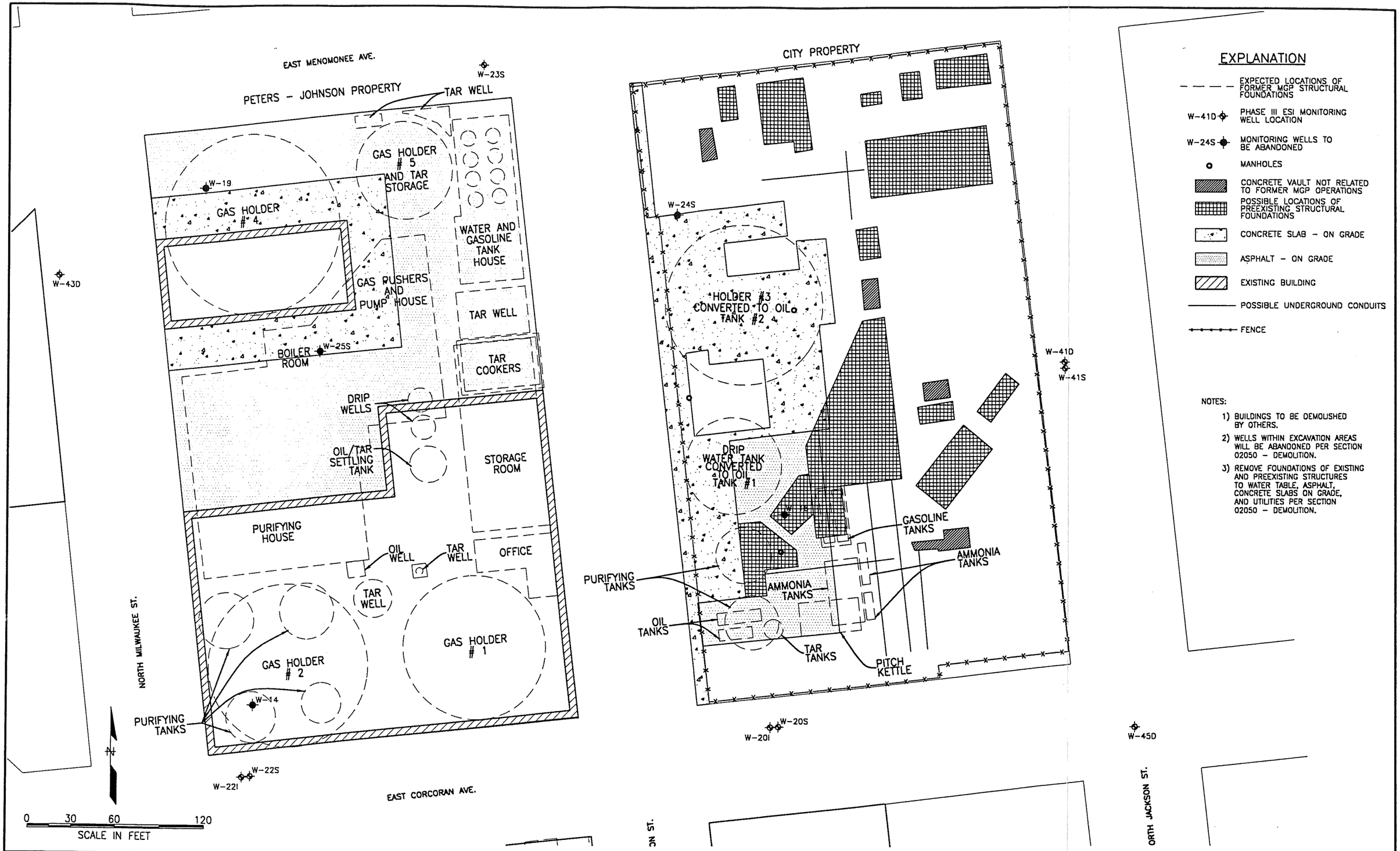
2 Basis of Design

This section describes the design of the remedial action, including the regulatory and engineering parameters that form the basis for the design.

2.1 Scope of Remedial Action

The remedial action addresses the following work:

- Demolition and removal of two existing buildings and removal of selected surface pavement as shown on Figure 2-1
- Excavation of Soil and Subsurface Structures consisting of the following:
  - Excavation of Soil with chemicals of interest greater than the Residual Contaminant Levels (RCLs), nominally to the depth of the water table. The excavation areas correspond with the impacts identified on Figures 2-2 and 2-3
  - Excavation of MGP residuals present within certain MGP Subsurface Structures as identified on Figure 2-4
- Dewatering, as necessary, to facilitate excavation activities
- Segregation and appropriate management of excavated material, based on physical composition and chemical characteristics
- Thermal treatment of Soil, including Debris, that is suitable for such treatment according to particle size and material characteristics
- Recycling/disposal of selected Debris according to material characteristics (e.g., metal debris, masonry debris, etc.)
- Placement and compaction of backfill, which may consist of treated soil, imported backfill, or re-sized on-site material, as necessary. Such placement will be to the depth of the approximate groundwater level at the Site



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REFERENCE DWG | DESCRIPTION

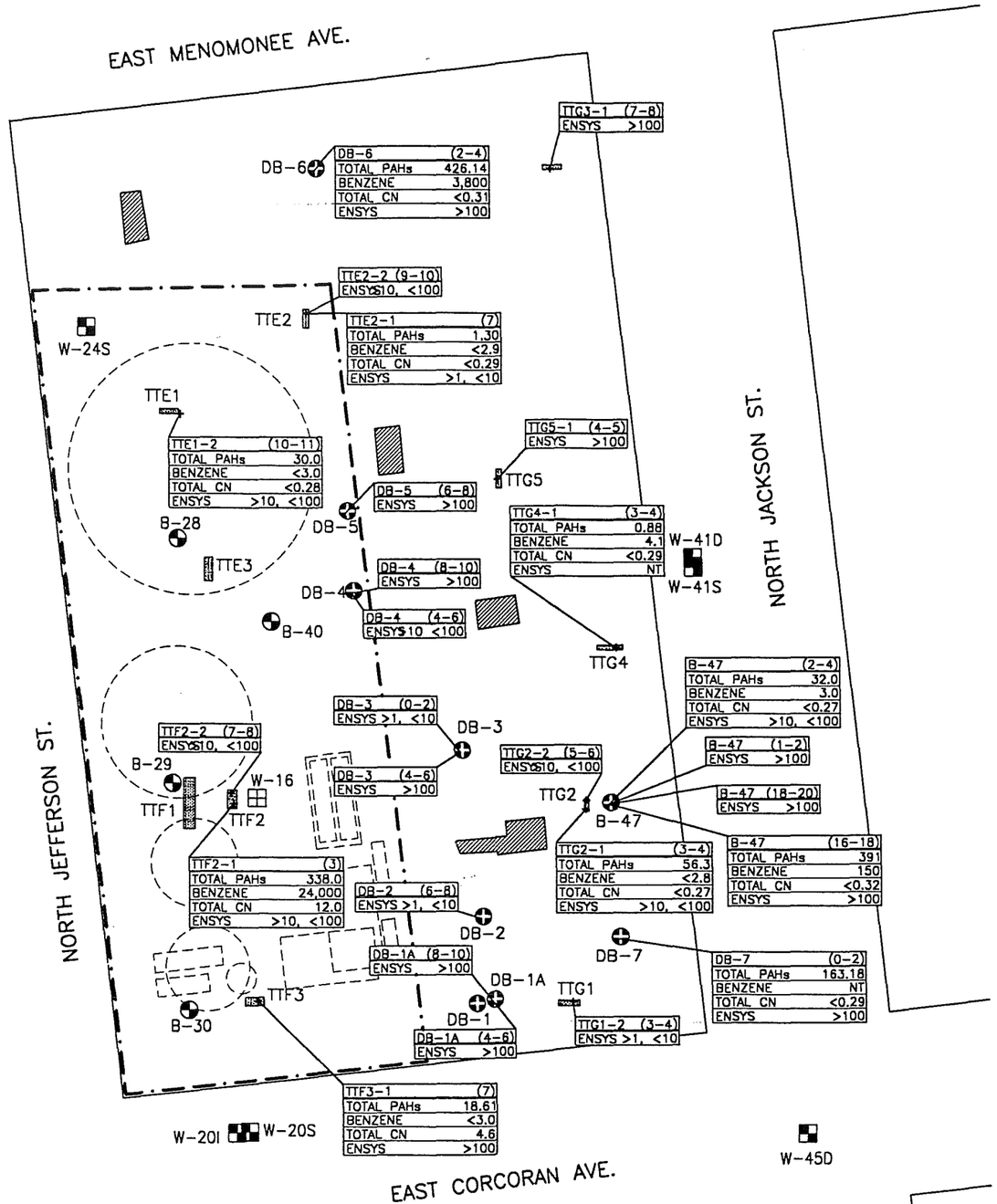
THIRD WARD MGP SITE
MILWAUKEE, WISCONSIN
1-2824-300

CURRENT DATE: 8/29/97 | CAD FILE | SWL-DEMO.DWG

DEMOLITION PLAN

RETEC REMEDIATION TECHNOLOGIES INC

DRAWING NO. FIGURE 2-1 | REV 0



EXPLANATION

- LIMIT OF MGP OPERATIONS
- FORMER MGP STRUCTURES
- EXISTING BUILDING
- TTA3-2 + TRENCH SAMPLE LOCATION
- TTA3 SSPI TEST TRENCH
- DB-1 DEMOLITION SOIL BORING
- B-21D PHASE III ESI BORING LOCATION
- W-46D PHASE III ESI MONITORING WELL LOCATION
- B-17 BORING COMPLETED BY OTHERS
- W-16 MONITORING WELL INSTALLED BY OTHERS
- CONCRETE VAULT – NOT RELATED TO MGP OPERATIONS

SAMPLE DEPTH (FEET)
TOTAL PAHs mg/Kg
BENZENE ug/Kg
TOTAL CN mg/Kg
ENSYS ppm TOT. PAHs

SAMPLE DEPTH (FEET)
ENSYS ppm TOT. PAHs

NT = NOT TESTED

N

0 30 60 120

SCALE IN FEET

REFERENCE DWG	DESCRIPTION	NO	DRWN	DATE	REVISION	CHKD	DATE	APPVD	DATE
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		1							
		0							

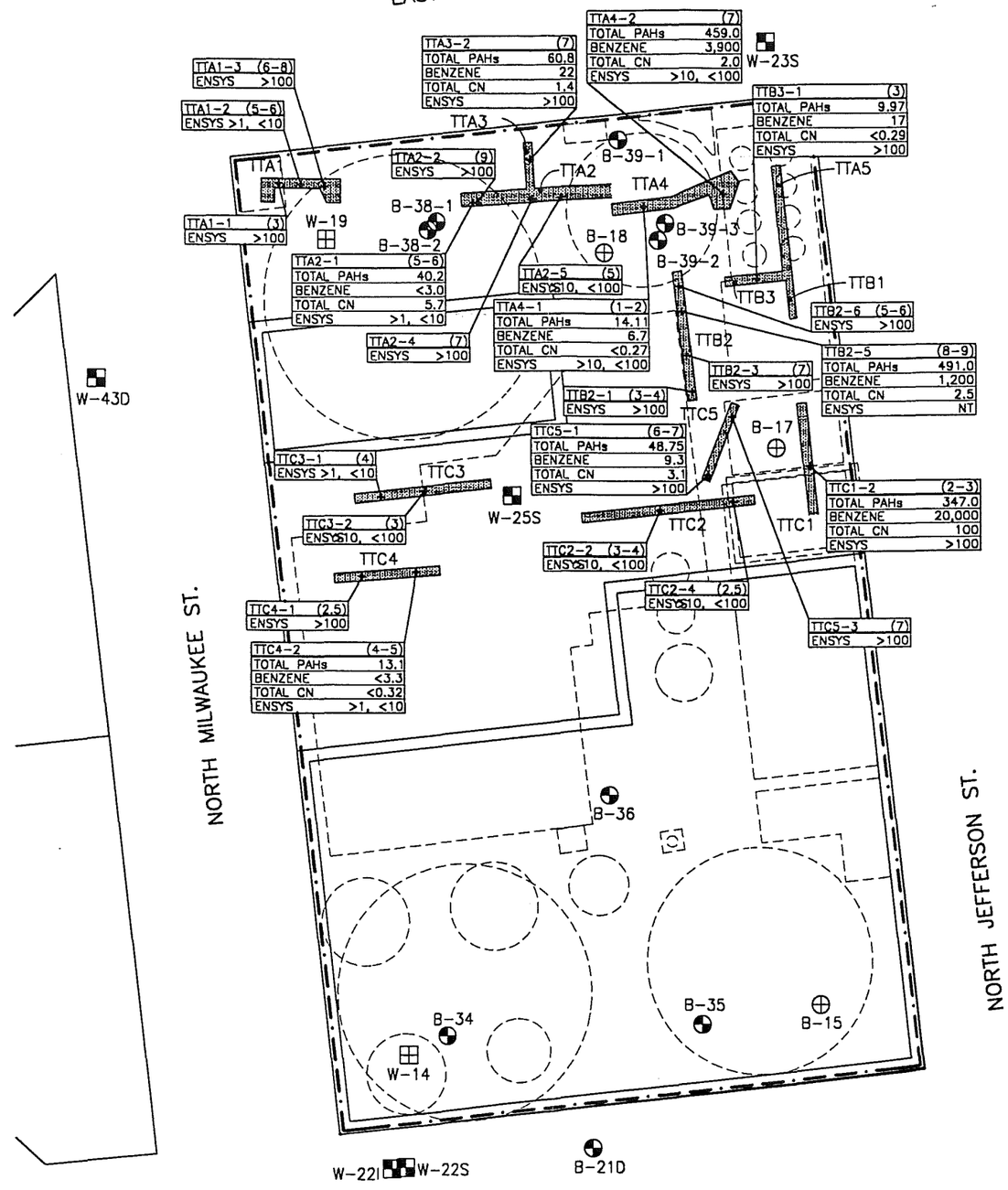
THIRD WARD MGP SITE
MILWAUKEE, WISCONSIN
1-2824-300

CURRENT DATE: 10/6/97 CAD FILE: SUL-DEMO.DWG

DISTRIBUTION OF IMPACTS
CITY PROPERTY

REMEDIATION TECHNOLOGIES INC

DRAWING NO FIGURE 2-2 REV 0



EXPLANATION

- LIMIT OF MGP OPERATIONS
- FORMER MGP STRUCTURES
- EXISTING BUILDING
- TTAJ-2 + TRENCH SAMPLE LOCATION
- TTA3 SSPI TEST TRENCH
- B-21D PHASE III ESI BORING LOCATION
- W-46D PHASE III ESI MONITORING WELL LOCATION
- B-17 BORING COMPLETED BY OTHERS
- W-16 MONITORING WELL INSTALLED BY OTHERS

SAMPLE DEPTH (FEET)
TOTAL PAHs mg/Kg
BENZENE ug/Kg
TOTAL CN mg/Kg
ENSYS ppm TOT. PAHs

SAMPLE DEPTH (FEET)
ENSYS ppm TOT. PAHs

NT = NOT TESTED

N

0 30 60 120

SCALE IN FEET

REFERENCE DWG	DESCRIPTION	NO	DRWN	DATE	REVISION	CHKD	DATE	APPVD	DATE
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THIRD WARD MGP SITE
MILWAUKEE, WISCONSIN
1-2824-300

CURRENT DATE: 10/8/97 CAD FILE: ANALYTIC.DWG

DISTRIBUTION OF IMPACTS
PETERS=JOHNSON PROPERTY

RETEC
REMEDIATION TECHNOLOGIES INC

DRAWING NO. FIGURE 2-3 REV. 0

EAST MENOMONEE AVE.

NORTH MILWAUKEE ST.

NORTH JEFFERSON ST.

NORTH JACKSON ST.

EAST CORCORAN AVE.

CONTROL ROOM

TAR WELL #4

TAR WELL #5

GAS HOLDER #5 AND TAR STORAGE

WATER AND GAS TANK HOUSE

GAS HOLDER #4

GAS PUSHERS AND PUMP HOUSE

TAR WELL #6

TAR COOKERS

BOILER ROOM

DRIP WELL #1

PURIFYING HOUSE

DRIP WELL #2

STORE ROOM

OIL/TAR SETTLING TANK

OIL WELL

TAR WELL #2

OFFICE

PURIFYING TANK

GAS HOLDER #2

TAR WELL #1

GAS HOLDER #1

PURIFYING TANK

GAS HOLDER #3 AND CRUDE OIL TANK #2

OIL RESERVOIR #1

GASOLINE TANK

PURIFYING TANK

AMMONIA WORKS

AMMONIA TANK

OIL TANK

TAR TANK

PITCH KETTLE

EXPLANATION

- LIMIT OF MGP OPERATIONS
- FORMER MGP STRUCTURES
- SUBSURFACE STRUCTURE CONTENTS (TO BE REMOVED)
- VAULT

N

0 30 60 120

SCALE IN FEET

REFERENCE DWG	DESCRIPTION	NO	DRWN	DATE	REVISION	CHKD	DATE	APPVD	DATE
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		0							

THIRD WARD MGP SITE
MILWAUKEE, WISCONSIN
1-2824-300

CURRENT DATE: 10/6/97 | CAD FILE: FORMSTRU.DWG

SUBSURFACE STRUCTURE CONTENTS
(TO BE REMOVED)
CITY AND PETERS-JOHNSON PROPERTIES

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DRAWING NO. FIGURE 2-4 | REV 0

Table 2-1 provides the soil RCLs as presented in the RAOR. Complete discussions of the chemicals of interest, the media at the Site, potential receptors, and exposure pathways are presented in the Preliminary FS and RAOR.

The remedial action has been divided into certain work elements. Specifications and Drawings that describe these elements of the work tasks are being developed. The tasks consist of the following:

- Mobilization
  - Excavation and Treatment Equipment

- Construction Facilities and Temporary Controls
  - Temporary Utilities
  - Temporary Controls: Traffic Controls; Work Zones; Fencing
  - Construction Facilities: Access Roads; Parking; Field Offices

- Non-Scheduled Contract Work
  - Project Coordination
  - Health and Safety
  - Submittal of Project Documents
  - Progress Schedule
  - Quality Control
  - Temporary Erosion and Sedimentation Control
  - Monitoring Well Protection
  - Stormwater and Decontamination Water Handling
  - Contract Closeout

- Demolition
  - Building Demolition: Two Buildings and Associated Foundations
  - Concrete and Asphalt Pavement
  - Subsurface Structures

- Excavation
  - Soil and Debris
  - Limit-Of-Excavation Sampling

- Disposal
  - Asphalt and Concrete Recycling
  - Landfill Disposal
  - Hazardous Waste Disposal

RETEC

Table 2-1 Soil Residual Contaminant Levels

Chemical of Interest	Soil Residual Contaminant Levels (mg/Kg)		
	Long-Term Direct Contact Based RCLs [1,3]	Lifetime Direct Contact Based RCLs [1,3]	Groundwater Protection Based RCLs [2,3]
PAHs			
Acenaphthene	60,000	900	69
Acenaphthylene	360	18	1.2
Anthracene	300,000	5,000	6,000
*Benzo(a)anthracene	3.9	0.088	30
*Benzo(b)fluoranthene	3.9	0.088	650
*Benzo(k)fluoranthene	39	0.88	16,000
Benzo(g,h,i)perylene	39	1.8	12,000
*Benzo(a)pyrene	0.39	0.0088	90
*Chrysene	390	8.8	66
*Dibenzo(a,h)anthracene	0.39	0.0088	69
Fluoranthene	40,000	600	1,000
Fluorene	40,000	600	200
*Indeno(1,2,3-cd)pyrene	3.9	0.088	✓12,000
1-Methylnaphthalene	70,000	1,100	42
2-Methylnaphthalene	40,000	600	30
Naphthalene	110	20	0.7
Phenanthrene	390	18	3.3
Pyrene	30,000	500	16,000
VOCs			
*Benzene	99	NC	0.0055
Toluene	139,918	NC	1.5
Ethylbenzene	69,992	NC	2.9
Xylenes	1,000,000	NC	4.1

Notes:

[1] Long-term and lifetime direct contact-based RCLs for PAHs from Table 1, WDNR March 1997 PAH Guidance. VOC RCLs were calculated by RETEC using exposure assumptions in NR 720.19.

[2] Groundwater protection RCLs for PAHs from Table 1, WDNR March 1997 PAH Guidance. VOC RCLs were obtained from Table 1 in NR 720.

[3] Soil will be treated to the extent practicable.

NC - Not Calculated

*=Carcinogenic

- Material Handling
  - Stockpile Management
  - Screening
  - Crushing
  - Loading
  - Sampling

- Thermal Treatment
  - Soil Processing
  - Sampling

- Backfilling
  - Placement
  - Compaction

- Site Restoration
  - Grading
  - Parking Surface
  - Final Cleanup
  - Pavement Repair

The work will generally be conducted by one contractor that will provide all the equipment for the excavation and thermal treatment. The Specifications and Drawings will provide a complete description of the work.

2.2 Design Parameters and Calculations

Based on the RCLs and the scope of the remedial action, specific design parameters that apply to the scope of the remedial action have been identified. The design parameters are presented in Table 2-2.

2.3 Test Results Used in Design

Certain test results have been used in the development of the design of the remedial action. Soil boring logs, monitoring well logs, and soil/groundwater sample analytical results have been obtained from the Phase III ESI Report and the SSPI Report. In addition, a geophysical survey was conducted of the City Property in March 1997. The results of the geophysical survey are provided in Appendix A of this report and are incorporated into the design to provide the approximate locations of subsurface structures that will be removed during the remedial action.

Table 2-2 Design Parameters

Design Parameter	Location	Size / Volume / Description	Reference
Existing Buildings to be Demolished	Peters=Johnson Property	Bldg 1 - 48,415 sq. ft. Cinder block Bldg 2 - 7,984 sq. ft. Cinder block	Figure 2-1
Existing Surface Slabs and Asphalt to be Removed	Peters=Johnson and City Properties	Concrete Area: 30,196 sq. ft. Asphalt Area: 48,549 sq. ft.	Figure 2-1
Existing Subsurface Structures to be Removed	Peters=Johnson and City Properties	Estimated Debris Volume: 2,320 cu. yd.	Figure 2-1
Impacted Material to be excavated	Peters=Johnson Property	Estimated Volume above RCLs: 32,500 cu. yd.	Figure 2-3
Impacted Material to be excavated	City Property	Estimated Volume above RCLs: 19,300 cu. yd.	Figure 2-2
Unimpacted Material to be excavated	Peters=Johnson Property	Estimated Volume below RCLs: 13,610 cu. yd.	Figure 2-3
Unimpacted Material to be excavated	City Property	Estimated Volume below RCLs: 9,527 cu. yd.	Figure 2-2
Thermal Treatment Backfill Criteria	Peters=Johnson and City Properties	Treatment of material above RCLs to levels below RCLs[1]	RCLs

Note:
(1) Thermal treatment will be utilized to attain the best achievable treatment goals. The treatment goal attained by use of thermal treatment will dictate the RCL that is achieved by the remedial action.

2.4 Permits and Approvals

The permits and approvals required to implement the remedial action, with the corresponding local or state code and contact person, are listed in Table 2-3.

2.5 Applicable Regulations

Public health and environmental laws that apply to the remedial action at the Site include the following sections of *Wisconsin Administrative Code, Department of Natural Resources, Environmental Protection, Chapters NR700:*

- Chapter NR 718 Management of Solid Wastes Excavated During Response Actions - these were followed in developing the RAOR and this Design Report, and will be followed to develop the remedial design, which will consist of the Drawings and Specifications. Department approval, as required in NR 718 for portions of the proposed design, will be obtained as WDNR approval of this Design Report.

- Chapter NR 720 Soil Cleanup Standards - these were followed in developing RCLs for the Site.

- Chapter NR 722 Standards for Selecting Remedial Actions - these were followed to evaluate remedial actions, and to recommend the remedial action presented in the RAOR and in this Design Report.

- Chapter NR 724 Remedial and Interim Action Design, Implementation, Operation, Maintenance, and Monitoring Requirements - these were followed in developing the RAOR and this Design Report, and will be followed to develop the remedial design, which will consist of the Drawings and Specifications. This section will also be used to determine long term operations, monitoring, and maintenance requirements for the Site.

- Chapter NR 419 Control of Organic Compound Emissions - these will be applied to the remedial activities. This portion of the regulations provide emission limitations for remediation activities which will apply to the thermal treatment.

Table 2-3 Permits and Approvals

Permit / Approval	Code Reference	Contact Telephone	Notes
Building Demolition, Plumbing and Condemnation /Razing Permit	City of Milwaukee Code 200-24-1	Marge Piwaron (414)286-2503	33 day approval period
Building Demolition Licensing and Bonding	City of Milwaukee Code 200-24-1	Marge Piwaron (414)286-2503	Annual bond of $50,000 or $10,000 per building
Street Closure Permit	City of Milwaukee Code 200-24-1	Linda Eichorst (414)286-3312	Required for closing Jefferson Street
Traffic Re-routing Notification	City of Milwaukee Code 200-24-1	Jim Schneider (414)286-3276	Submit site plan, sketch of planned work, equipment location, damage and traffic re-routing procedures.
Temporary Electrical Permit	City of Milwaukee Code 200-24-1	Electrical Dept. (414)286-2532	$60 fee required
Hydrant Use Permit	City of Milwaukee Code 200-24-1	Water Dept. (414)286-2853	Wrench and cap use for $50 deposit, $16/wk
Utility Excavation Notification	Digger's Hotline	Diggers Hotline (414)269-1181	Contact 72 hours prior to excavating / drilling
Excavation Erosion Control Permit and Hazardous Occupancy Notification	City of Milwaukee Code 200-24-1	Tim Timperly (414)286-2590	Provide executive summary of work for approval. Deposit/irrevocable letter of credit/bond required for erosion control permit.
Building Permit	City of Milwaukee	Building Inspection Plan Review Section (414)286-2590	Submittal of Site Plan
Noise Permit	Environmental Health City of Milwaukee Code 200-24-1	David Krey (414)286-3538	Noise variance allowed from 7am to 9pm. If work planned outside this time, Noise Variance Application required including distribution of information flier to surrounding residential neighbors.
Asbestos Removal Permit	Environmental Health City of Milwaukee Code 200-24-1	David Krey (414)286-3538	NA
Work Notification	City of Milwaukee Code 200-24-1	Rudy Salcedo (414)286-5833	Provide executive summary of work
Excavation Permit	City of Milwaukee Code 200-24-1	Linda Eichorst (414)286-3312	Required only if excavating in public right-of-way

Table 2-3 Permits and Approvals (Continued)

Permit / Approval	Code Reference	Contact Telephone	Notes
Oversize/Overweight Permit	City of Milwaukee Code 200-24-1	Ken Huber (414)286-2409	Required for oversize/ overweight trucks
Building Demolition Notification Form	Wisconsin DNR		Requires 10 day lead time
Wastewater Discharges	Milwaukee Metropolitan Sewer District	Harvey Matyas	Limited to 5 mg/L Total Organics. Processing fee $290. Discharge fee @ $1.05/1,000 gallons.
Stormwater Pollution Prevention Plan	Wisconsin DNR		Required only if construction activities encompass > 5 acres
Notice of Relocation Form 4400-25	Wisconsin DNR Air Pollution Division	Ron Dillehunt (414)263-8559	For mobile units already permitted in Wisconsin. Non-permitted units will need to acquire state air permit.
Soil and Water Remediation Procedure Notification and Approval - Form 4400-120	Wisconsin DNR NR 419.07		Submit at least 10 days prior to commencing remediation activities
Design Report Submittal	Wisconsin DNR NR 724.09	Jim Schmidt (414)229-0863	Design Plan covers this requirement
Design Plans and Specifications Submittal	Wisconsin DNR NR 724.11	Jim Schmidt (414)229-0863	NA

Table 2-3 Permits and Approvals (Continued)

Permit / Approval	Code Reference	Contact Telephone	Notes
Oversize/Overweight Permit	City of Milwaukee Code 200-24-1	Ken Huber (414)286-2409	Required for oversize/ overweight trucks
Building Demolition Notification Form	Wisconsin DNR		Requires 10 day lead time
Wastewater Discharges	Milwaukee Metropolitan Sewer District	Harvey Matyas	Limited to 5 mg/L Total Organics. Processing fee $290. Discharge fee @ $1.05/1,000 gallons.
Stormwater Pollution Prevention Plan	Wisconsin DNR		Required only if construction activities encompass > 5 acres
Notice of Relocation Form 4400-25	Wisconsin DNR Air Pollution Division	Ron Dillehunt (414)263-8559	For mobile units already permitted in Wisconsin. Non-permitted units will need to acquire state air permit.
Soil and Water Remediation Procedure Notification and Approval - Form 4400-120	Wisconsin DNR NR 419.07		Submit at least 10 days prior to commencing remediation activities
Design Report Submittal	Wisconsin DNR NR 724.09	Jim Schmidt (414)229-0863	Design Plan covers this requirement
Design Plans and Specifications Submittal	Wisconsin DNR NR 724.11	Jim Schmidt (414)229-0863	NA

3 Remedial Action Monitoring

Remedial action activities will be monitored to ensure the remedial action meets RCLs and applicable regulations and standards. The following subsections describe the monitoring activities that will be conducted during the work.

3.1 Soil

Soil will be monitored in relation to the following three elements of the remedial action:

- Limit-Of-Excavation - selected samples will be collected at the horizontal limits of the excavation. These samples will be used to guide the excavation and to identify the soil conditions at the limit of the excavation.

- Unimpacted Soil Stockpile - samples will be collected of visually non-impacted soils that are segregated during excavation. These samples will be utilized to confirm that the soils are not impacted at levels greater than the RCLs, or to identify that the soils will require thermal treatment. These soils will be sampled at the rate of one sample for each 1,000 tons.

- Treated Soil Stockpile - samples will be collected of the soil that is stockpiled after thermal treatment. These samples will be utilized to confirm that the soils are not impacted at levels greater than the RCLs, or to identify that the soils will require further thermal treatment. These soils will be sampled at the rate of one sample for each 800 tons.

The thermal treatment will be utilized to attain the best achievable treatment goals. The treatment goal attained by use of thermal treatment will dictate the RCL that is achieved by the remedial action.

The following describes the process that will be used to determine the need for engineering controls after the placement of the treated soil:

- Thermal Treatment Attains Lifetime RCLs and Groundwater Protection RCLs - treated soil backfill to be placed to the depth of the water table without engineering controls

- Thermal Treatment Attains Long Term RCLs and Groundwater Protection RCLs - treated soil backfill to be placed to the depth of the water table and to be covered with a soil or synthetic cap

3.2 Water

Water generated during decontamination and/or dewatering activities will be sampled and analyzed for the constituents required according to the pretreatment requirements of the Milwaukee Publicly Owned Treatment Works (POTW).

3.3 Air

Air monitoring will be conducted, on a real-time basis, periodically during the work. The air will be monitored with a total volatile organic vapor analyzer. This testing will be used to assure that the level of protection (i.e., Personal Protective Equipment) worn by the workers on the Site is adequate given the air quality in the breathing zone.

4 Implementation Schedule

The remedial action will be started in November/December 1997 and will proceed into the Spring of 1998. The work will either be completed or terminated by the end of May 1998.

Site work may be re-started and conducted in the Fall and Winter of 1998.

Appendix A
Geophysical Survey

Geophysical Investigation

Of The

Third Ward MGP Site

Milwaukee, Wisconsin

for

RETEC, Inc.
St. Paul, Minnesota

March 1997

Geosphere Midwest No. 97-515

1 INTRODUCTION

The Third Ward MGP site is located in Milwaukee, Wisconsin. It is bounded on the north by East Menomonee Street, on the south by East Corcoran Avenue, on the west by North Jefferson Street and on the east by North Jackson Street. The investigation covered an area of about 250 x 400 feet. There are currently no buildings on the site, although foundations are present and portions of the site are covered with asphalt and concrete surfaces (Figure 1). Short weeds cover most of the site. The site is surrounded by a chain link fence.

The objective of the geophysical investigation was to map foundations and other features no apparent from the surface. The investigation was performed on March 12 and 13, 1997.

2 GEOPHYSICAL METHODS

Two geophysical methods were used at the MGP site. These were electromagnetic (EM) conductivity using a Geonics EM31 and EM conductivity with a Geonics EM38. Ground penetrating radar (GPR) had been considered for use at the site, but conductivity levels measured during the EM surveys suggest that GPR would have been ineffective.

ELECTROMAGNETIC CONDUCTIVITY METHOD

The EM method determines electrical conductivity of earth materials by inducing electromagnetic eddy currents in the ground and measuring the secondary magnetic field produced by these currents. An alternating current is generated in a wire loop or coil above the ground's surface; both the primary magnetic field (produced by the transmitter coil in the instrument) and the secondary field (produced by eddy currents in the earth) induce a corresponding alternating current in the receiver coil of the instrument.

After compensating for the primary field (which is determined from the coil geometry - orientation and separation), both the magnitude and phase of the secondary field are measured. These measurements are then converted to components in-phase and 90 degrees out of phase (quadrature phase) with the transmitted field. The quadrature component is converted to apparent ground conductivity. The conversion to apparent conductivity assumes a homogeneous, isotropic earth. In practice, this value is an estimate of the average conductivity of the ground in the proximity of the instrument. The in-phase measurement is related to the conductivity, but requires higher conductivity than in normal soil in order to respond. It is often called the "metal detection mode" because it is used to map the distribution of metal. The depth of investigation depends on the separation between the transmitter and receiver coils. The EM31 typically "sees" to a depth of about 15 to 20 feet, while the EM38 sees to approximately 4 to 6 feet.

GROUND PENETRATING RADAR

Ground penetrating radar is used to locate features in the subsurface materials. The radar method determines subsurface conditions by sending high frequency radio waves into the ground from a transmitter antenna located on the surface. Subsurface structures cause some of the wave energy to be reflected back to the surface, which is picked up by a receiver antenna. These signals are then processed and plotted in a distance versus time-depth display. Therefore, as a radar antenna is slowly towed across the surface, a continuous cross-sectional "picture" of subsurface conditions is generated. The technique is analogous to the common water depth recorders which use an acoustic transducer instead of a radar antenna. The radar responses are caused by wave reflections from interfaces of materials having different electrical properties; they include many natural conditions such as bedding, cementation, moisture, clay content, voids, fractures, and intrusions as well as man-made objects.

Depth of penetration is very dependent on conditions found at each site. Radar waves are attenuated (absorbed or scattered) by certain properties of the site's soil; the most important of which is the electrical conductivity of the material. Generally, better overall penetration is achieved in dry sandy soils; lesser penetration is achieved in moist, clayey, or conductive soils. Considerable depth may be attained in saturated sands or through lake water if the specific conductance of the water is low. Radar penetration is excellent in massive dry materials such as granite, limestone and concrete. As a rule of thumb, if ground conductivity is greater than about 100 millimhos per meters (mmho/m), then the depth of investigation of GPR is very limited, often no more than 1 foot. Observed conductivities at the site were mostly greater than 100 mmho/m, so for this reason GPR was not used at this site.

3 DATA ACQUISITION

The area investigated extended 250 feet in the east-west direction and 400 feet north-south. A grid was established over the site prior to any data collection. The fence along the east side of the site was used to define grid north-south. It was arbitrarily assigned grid coordinate 300 E. A grid line perpendicular to the fence was established next and was assigned grid coordinate 300 N. The remainder of the grid was laid out using these two lines as a reference.

EM31 conductivity data were collected at intervals of 2 1/2 feet along east-west grid lines 10 feet apart (Figure 1). Conductivity and in-phase values were stored along with grid coordinates in a digital data logger and periodically transferred to a computer for review while at the site. After data collection with the EM31 was complete and the data reviewed, three areas were identified for detailed coverage with the EM38. EM38 conductivity data were collected at intervals of 2 1/2 feet along east-west grid lines 5 feet apart. The coverage by both methods is shown in Figure 1.

A field log book was maintained concurrently with data collection. The log book was used to record the locations of site features, which were needed to prepare a base map of the site.

4 RESULTS AND INTERPRETATION

Contours of EM31 conductivity and in-phase values are presented in Figures 2 and 3, respectively. The EM38 data are shown in Figure 4. The red contours indicate areas of high conductivity and the blue areas indicate lows. Negative conductivity values are due to extremely high subsurface conductivities and are due to the presence of metal.

The interpreted results of the investigation are shown superimposed over contours of EM31 in-phase values in Figure 5. The features shown on the map are a composite interpretation of EM31 conductivity and in-phase data and EM38 conductivity data. Two types of features have been identified. Long, linear, straight features are interpreted as possible utility lines, such as pipes. Wider and shorter features are interpreted as possible foundations.

The largest feature identified as a possible foundation is near the middle of the site, centered at about 225 N, 175 E. It is not clear that this is a single feature. The close spacing of several features in a small area make it difficult, if not impossible, to identify each individual feature. In these instances, multiple features will be shown as a single feature.

Strong negative conductivity and in-phase anomalies over the concrete surfaces are due to steel rebar in the concrete. It is not possible to determine if there are other features beneath the concrete in these areas. Sections of concrete with little or no rebar are apparent at 100 East between 280 and 340 North and at about 220 North between 110 and 155 East.

Railroad tracks are present at the fence at both the north and south ends of the site. The tracks are located at about 175 East at each end and are buried starting a couple feet from the fence. It is not known if the rails are still present running across the site. One of the interpreted possible utility lines corresponds with the assumed location of the tracks, but similar responses were not observed in the northern part of the site. It is possible that the tracks are still present across the site, but the geophysical data are inconclusive in this matter.

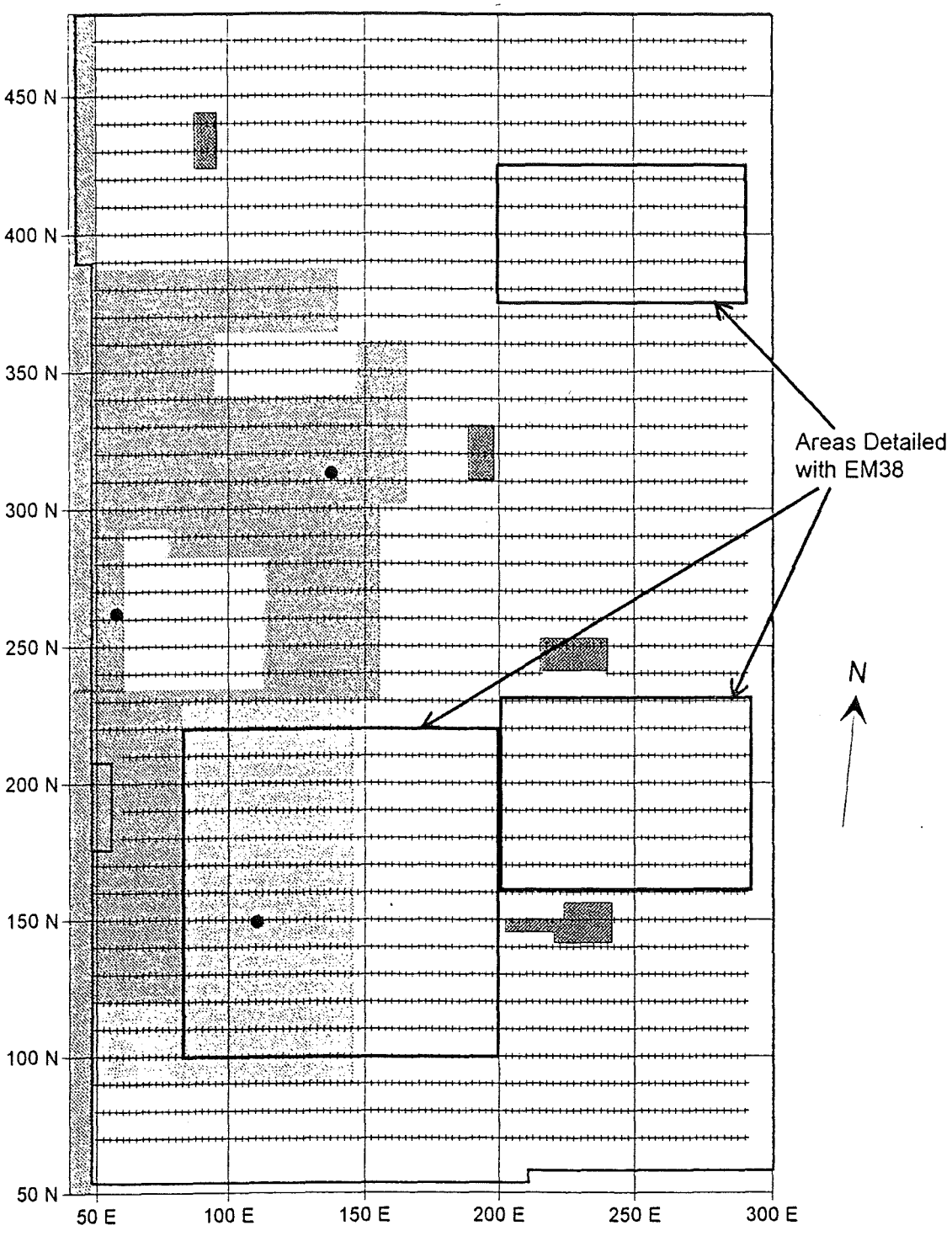
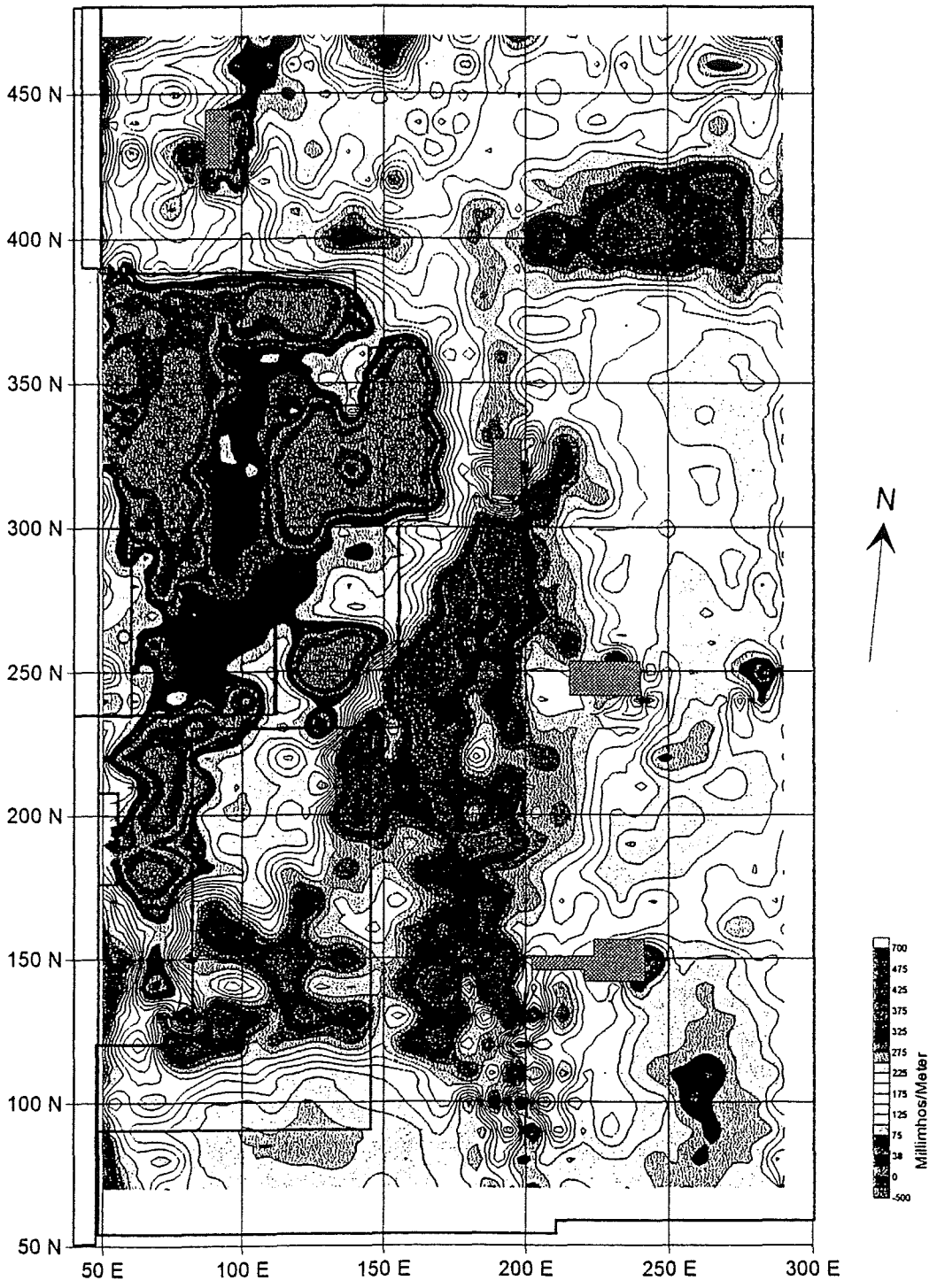


Figure 1

Extent of Survey

Third Ward MGP Site

GEOSPHERE MIDWEST



LEGEND

Fence

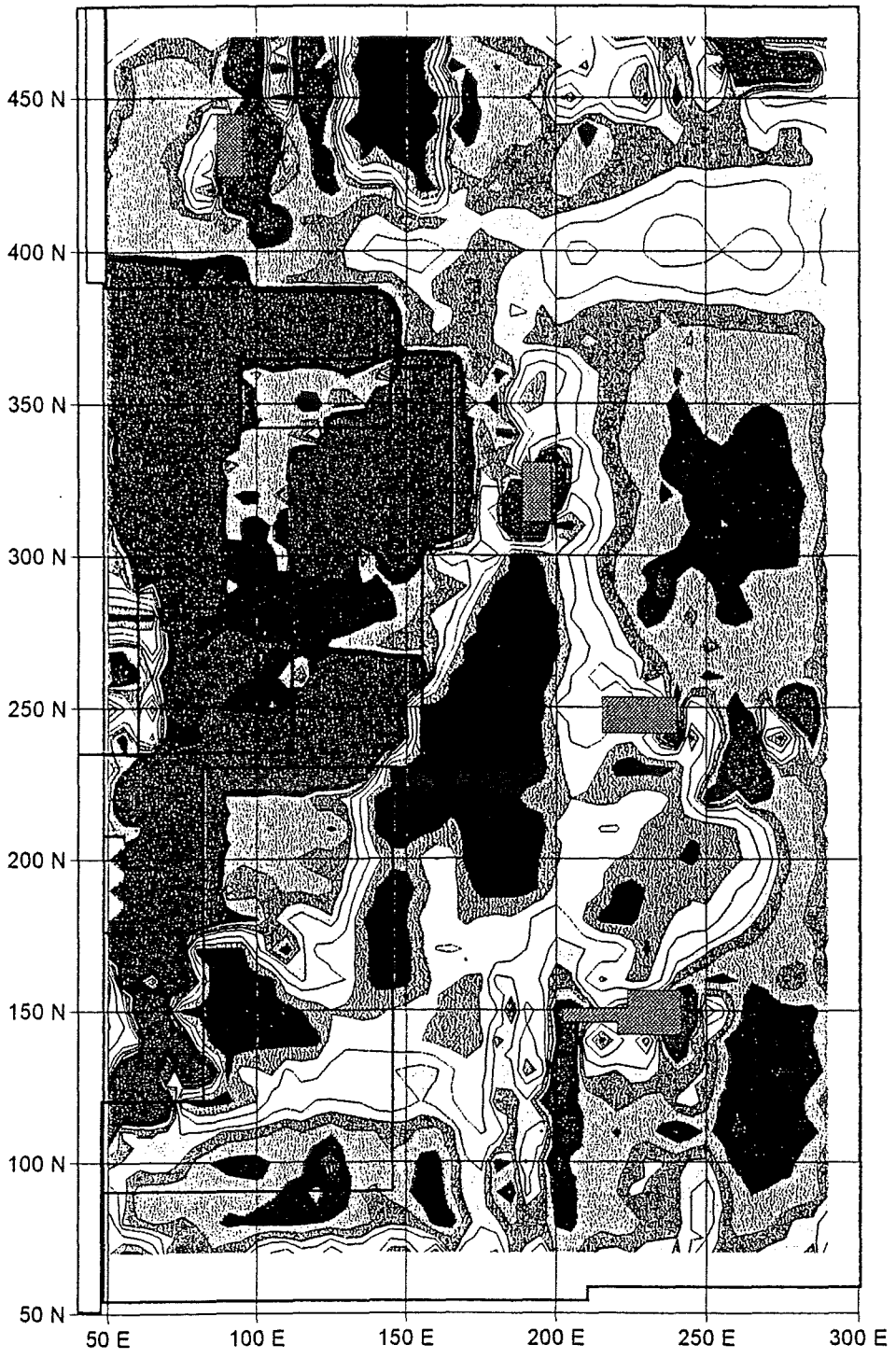
Manhole/Storm Drain

Foundation

Figure 2

Contours of EM31 Conductivity

Third Ward MGP Site



LEGEND

——— Fence

○ Manhole/Storm Drain

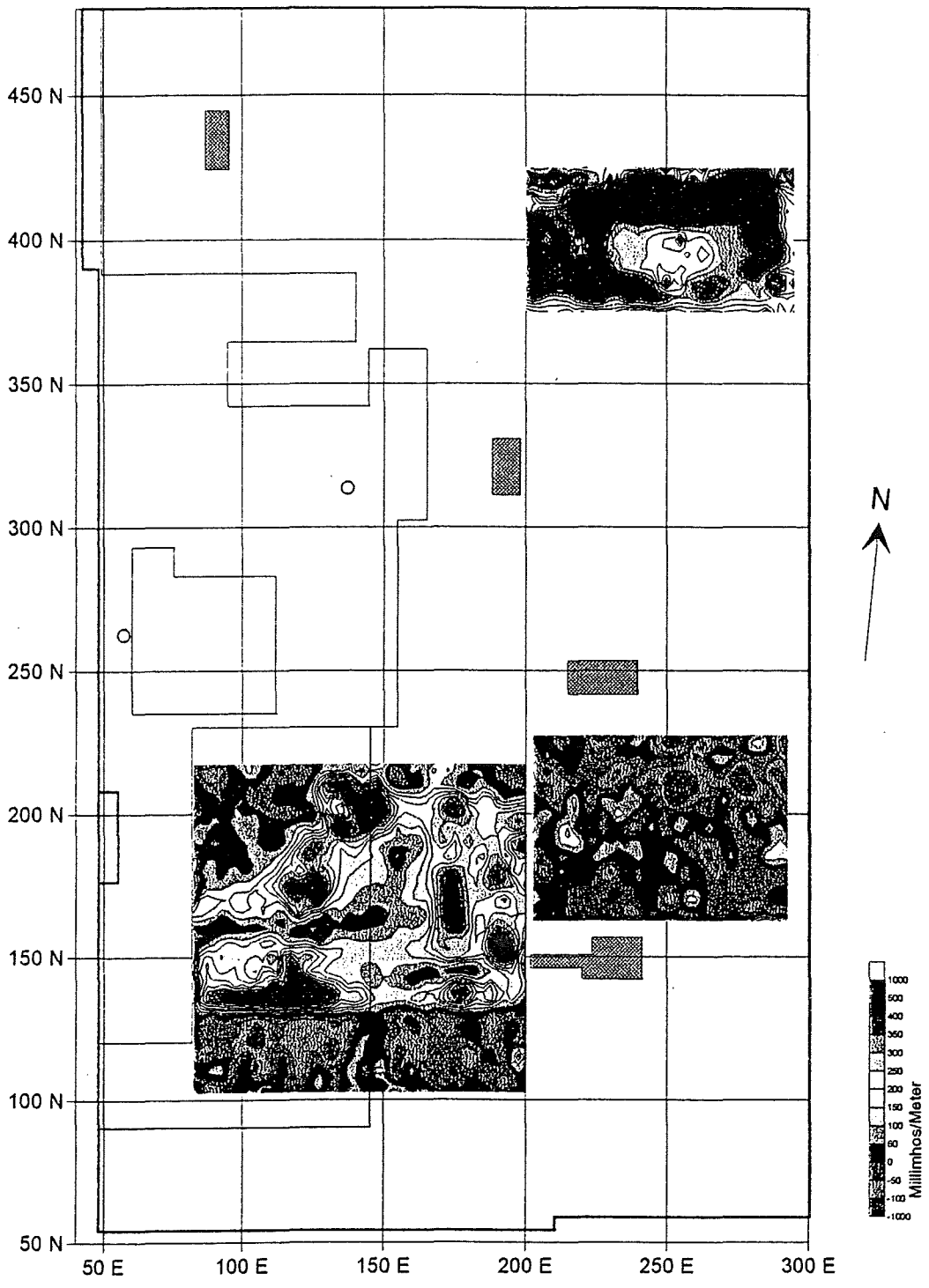
▨ Foundation

Figure 3

Contours of EM31 In-Phase

Third Ward MGP Site

GEOSPHERE MIDWEST



LEGEND

——— Fence

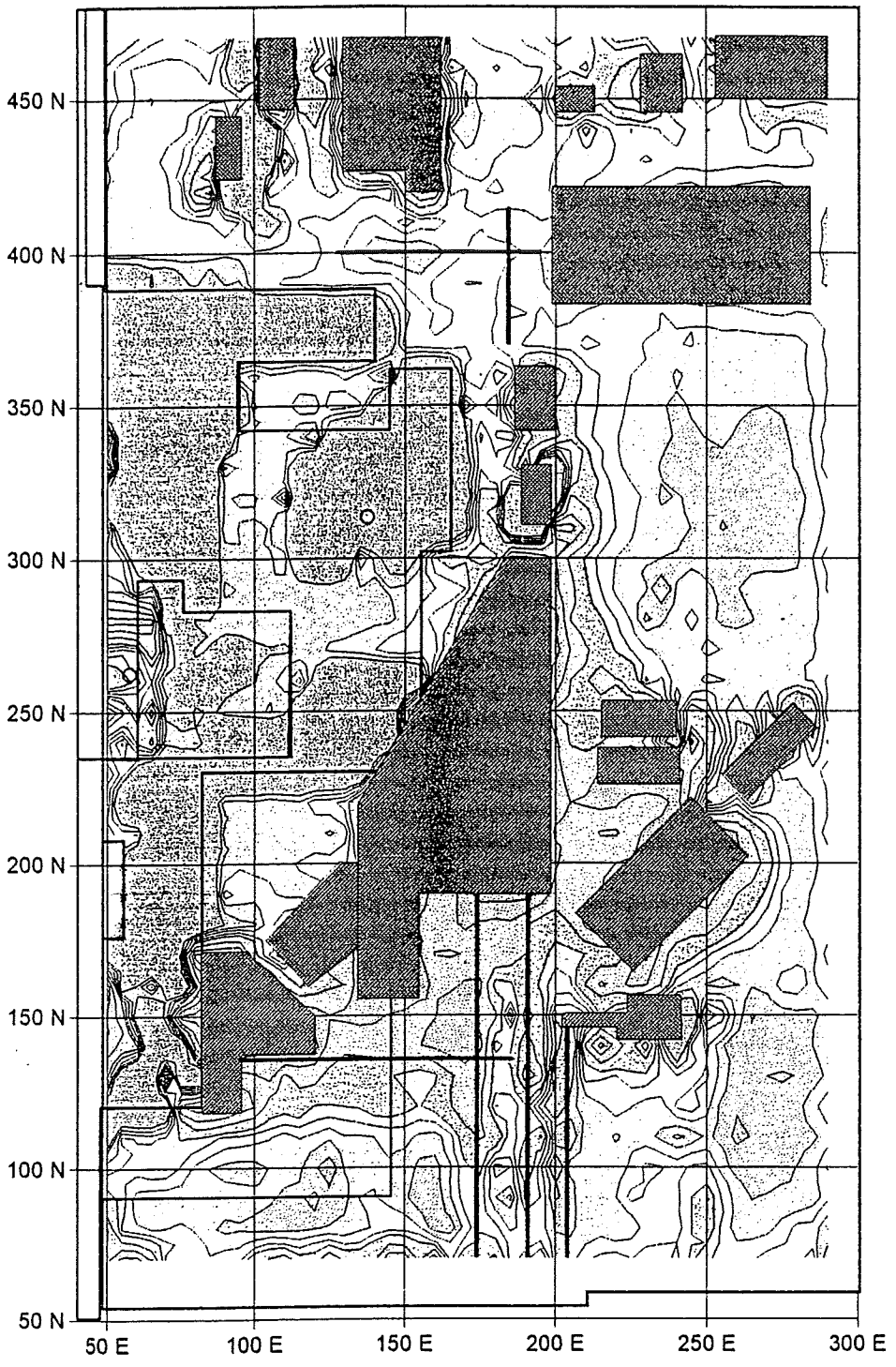
o Manhole/Storm Drain

▨ Foundation

Figure 4

Contours of EM38 Conductivity

Third Ward MGP Site



LEGEND

- Fence
- Manhole/Storm Drain
- Foundation
- Possible Foundation
- Possible Utility

Figure 5

Results of Investigation

Third Ward MGP Site

GEOSPHERE MIDWEST