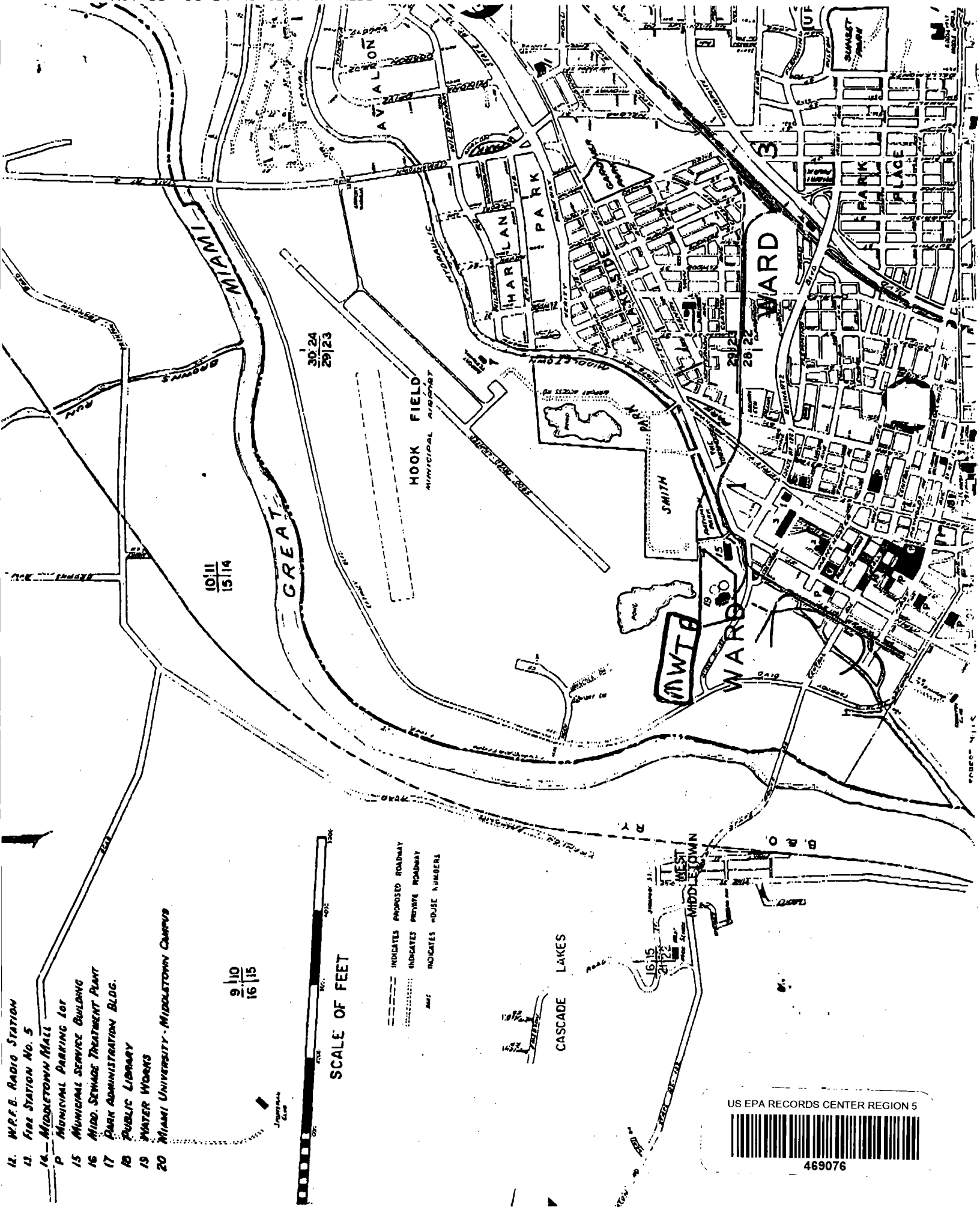
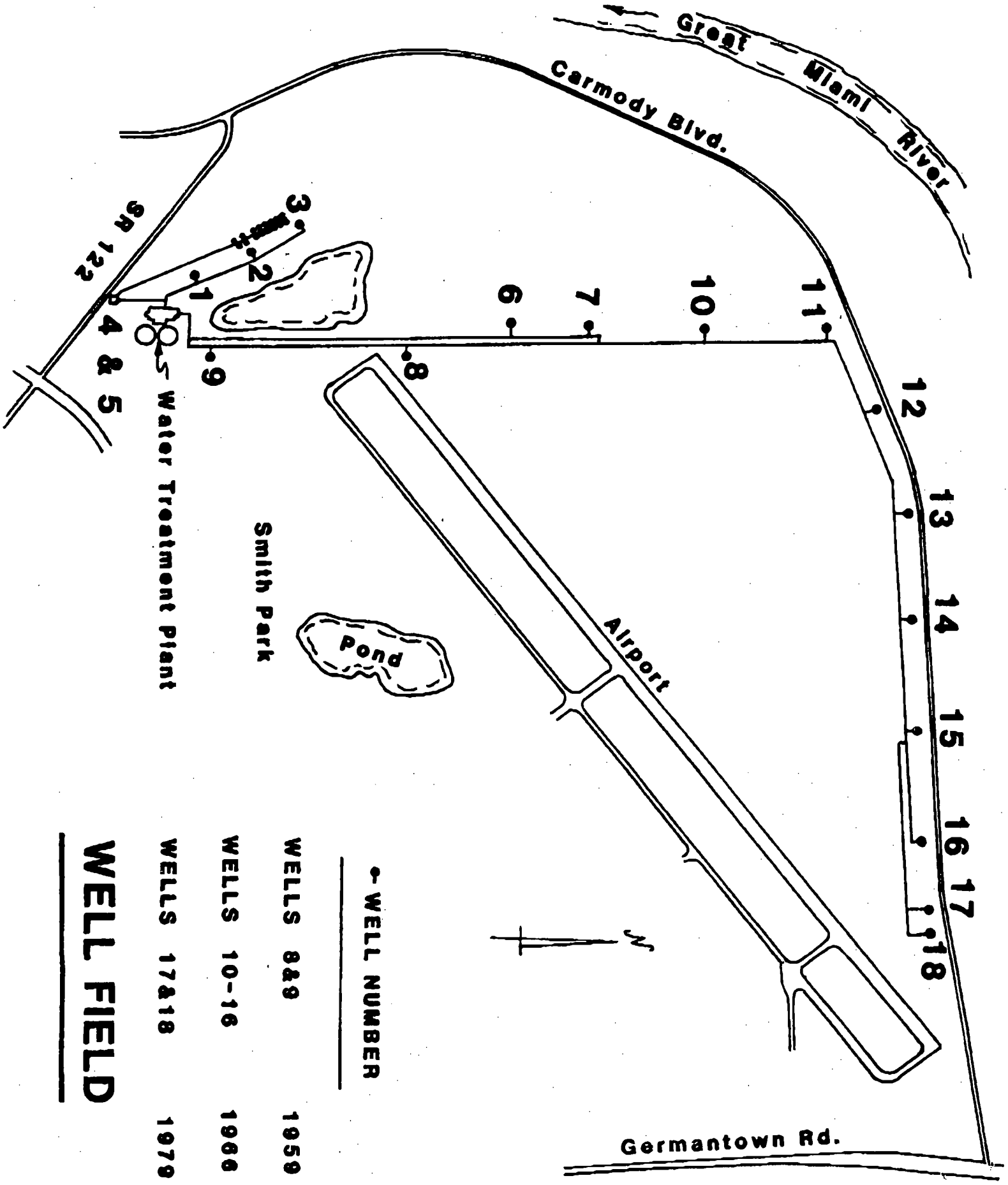
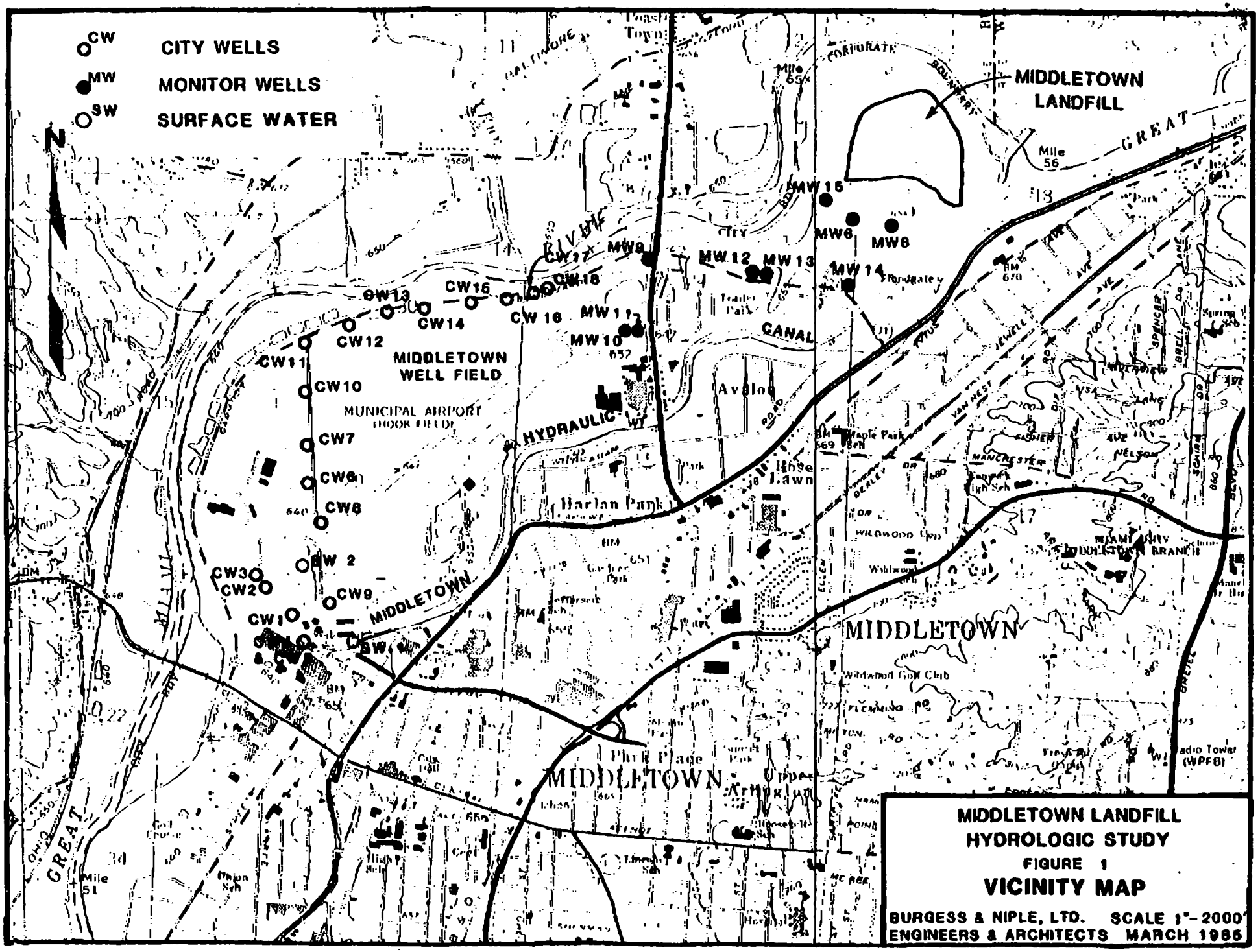


US EPA RECORDS CENTER REGION 5
469076


Great Miami River
Carmody Blvd.
SR 122
3
2
1
4 & 5
Water Treatment Plant
9
8
6
7
10
11
12
13
14
15
16
17
18
Smith Park
Pond
Airport
Germantown Rd.
• WELL NUMBER
WELLS 8&9 1959
WELLS 10-16 1966
WELLS 17&18 1979
WELL FIELD


CW CITY WELLS
MW MONITOR WELLS
SW SURFACE WATER
N
MIDDLETOWN LANDFILL
MIDDLETOWN WELL FIELD
MUNICIPAL AIRPORT
HOOK FIELD
HYDRAULIC
CANAL
MIDDLETOWN
CW1
CW2
CW3
CW7
CW8
CW9
CW10
CW11
CW12
CW13
CW14
CW15
CW16
CW17
CW18
MW6
MW8
MW9
MW10
MW11
MW12
MW13
MW14
MW15
SW 1
SW 2
GREAT
Mile 56
Mile 51
Mile 65
Avalon
Harlan Park
Rose Lawn
Maple Park
Wildwood Golf Club
Radio Tower (WPFB)
MIDDLETOWN LANDFILL
HYDROLOGIC STUDY
FIGURE 1
VICINITY MAP
BURGESS & NIPLE, LTD. SCALE 1"=2000'
ENGINEERS & ARCHITECTS MARCH 1986

FILE COPY

• • • Please • • •

The Following Pages are **URGENT** and should be given to: PATRICK McGOWAN as soon as possible.

Date Transmitted	August 11, 92
Number of Pages	This page + One
Contact Person	RAJ SHARMA
Phone Number	(513)748-1041
Fax	748-0815

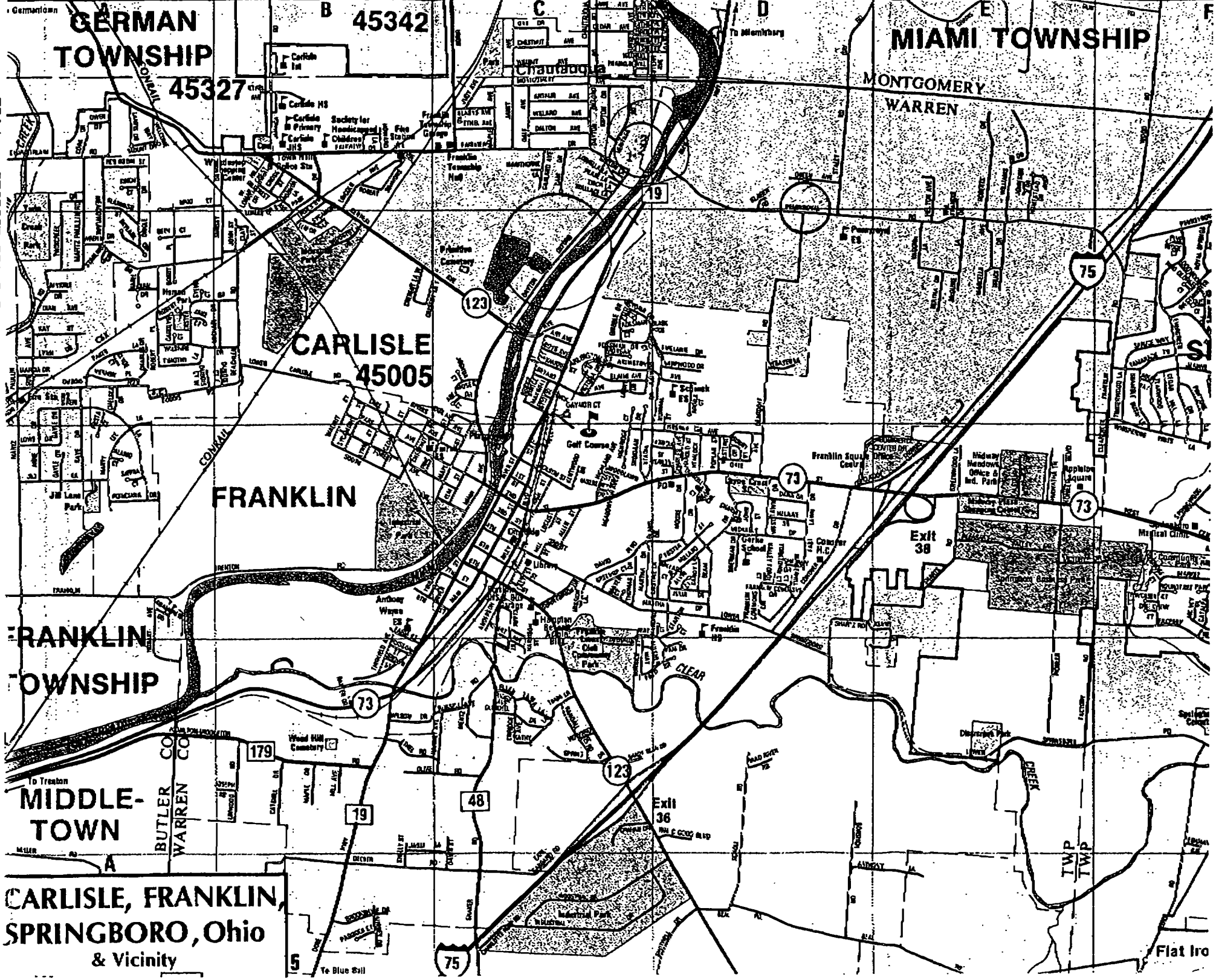
SPRINGBORO

Document Description: Location of Wells no 1, 2 and 3

Comments:

Thank You . . . . .

City of Springboro, Ohio
320 W. Central Avenue
Springboro, Ohio 45066

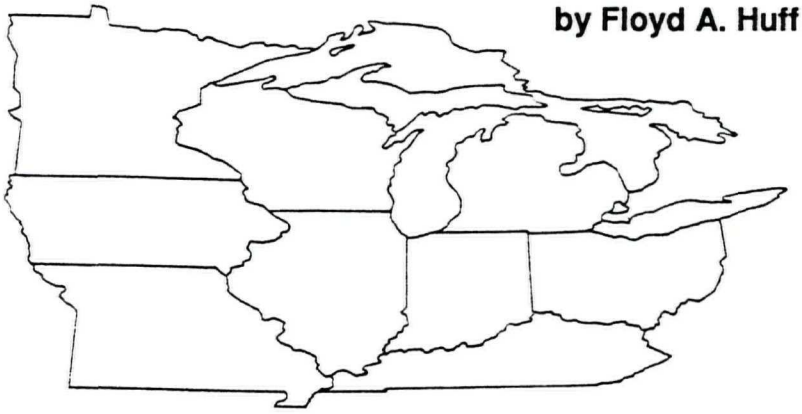

GERMAN TOWNSHIP
45327
45342
MIAMI TOWNSHIP
MONTGOMERY
WARREN
CARLISLE
45005
FRANKLIN
FRANKLIN TOWNSHIP
MIDDLE-TOWN
BUTLER CO
WARREN CO
CONRAIL
Chautauqua
Franklin Square Center
Exit 38
Exit 36
CLEAR CREEK
Flat Iro
CARLISLE, FRANKLIN, SPRINGBORO, Ohio
& Vicinity

Bulletin 71
(MCC Research Report 92-03)

FILE COPY

RAINFALL FREQUENCY ATLAS OF THE MIDWEST

by Floyd A. Huff and James R. Angel



Midwestern Climate Center
Climate Analysis Center
National Weather Service
National Oceanic and Atmospheric Administration

and

Illinois State Water Survey
A Division of the Illinois Department of Energy and Natural Resources

1992

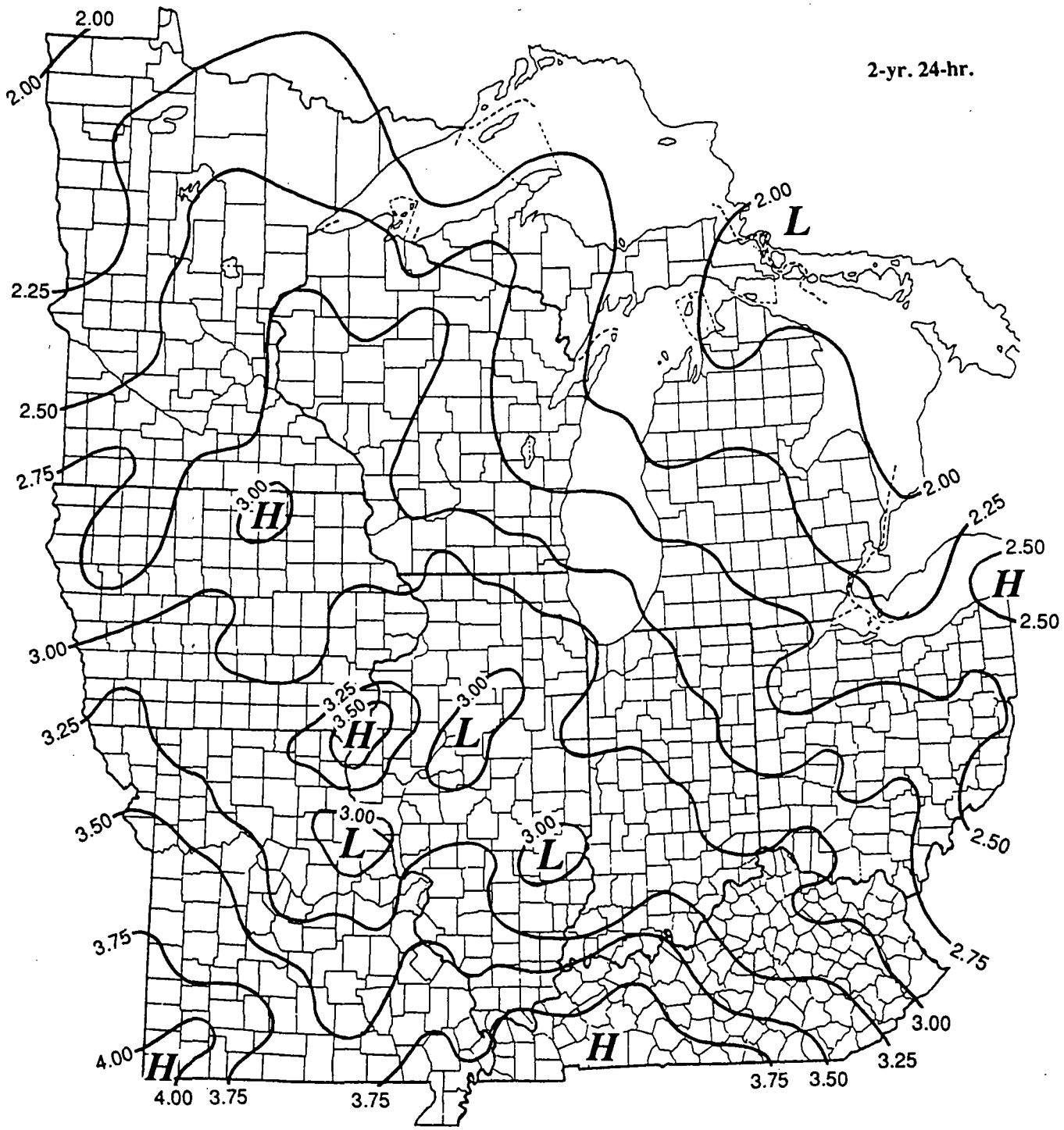


Figure 6. Spatial distribution of 24-hour rainfall (inches)

KEY TO MAP

500-Year Flood Boundary	
100-Year Flood Boundary	
Zone Designations*	ZONE B / ZONE B
100-Year Flood Boundary	
500-Year Flood Boundary	
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7x
Zone D Boundary	
River Mile	•M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

INITIAL IDENTIFICATION:

NOVEMBER 16, 1973

FLOOD HAZARD BOUNDARY MAP REVISIONS:

AUGUST 8, 1975

determine if flood insurance is available in this community, tact your insurance agent, or call the National Flood Insurance gram, at (800) 638-6620.

FILE COPY

APPROXIMATE SCALE

800 0 800 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

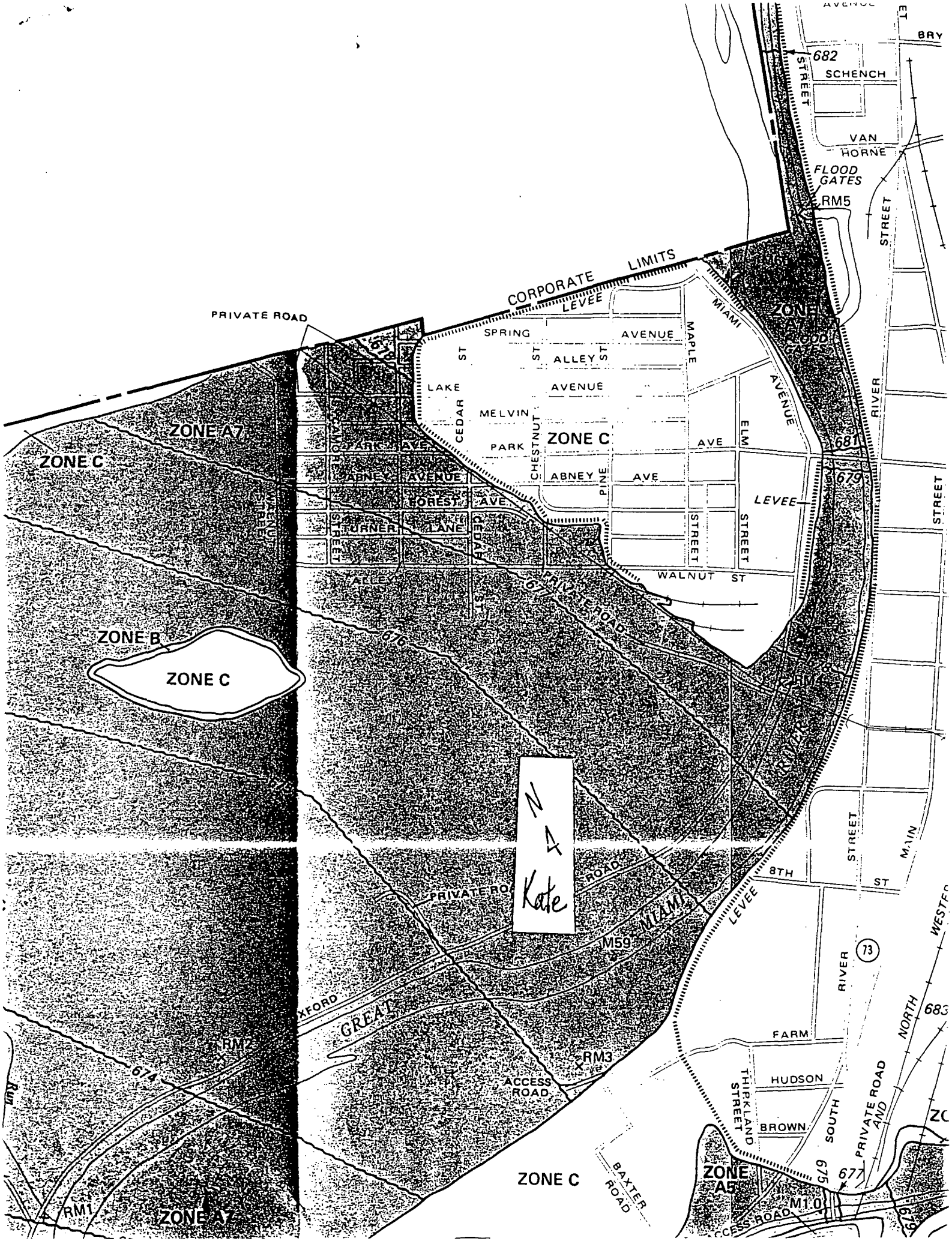
CITY OF
FRANKLIN, OHIO
WARREN COUNTY

(ONLY PANEL PRINTED)

COMMUNITY-PANEL NUMBER
390556 0005 C

MAP REVISED:
MARCH 4, 1987

Federal Emergency Management Agency


CORPORATE LIMITS
LEVEE
PRIVATE ROAD
ZONE A7
ZONE C
ZONE B
ZONE C
ZONE A7
ZONE C
ZONE A5
ZONE A7
SPRING
AVENUE
ALLEY
LAKE
AVENUE
MELVIN
PARK
ZONE C
PARK AVE
ABNEY AVENUE
FOREST AVE
TURNER LANE
ALLEY
ABNEY AVE
WALNUT ST
MAPLE
ELM
AVE
STREET
STREET
CEDAR
CHESTNUT
PINE
WAENG STREET
MIAMI
AVENUE
RIVER
LEVEE
STREET
682
SCHENCH
VAN HORNE
FLOOD GATES
RM5
681
679
RM4
N A Kate
8TH ST
MAIN STREET
WESTFO
PRIVATE ROAD
M59
MIAMI
LEVEE
RIVER
73
NORTH
683
FARM
HUDSON
BROWN
THIRKLAND STREET
SOUTH
PRIVATE ROAD AND
677
676
M10
ACCESS ROAD
BAXTER ROAD
GREAT
OXFORD
RM2
RM3
674
ACCESS ROAD
RM1
BRY

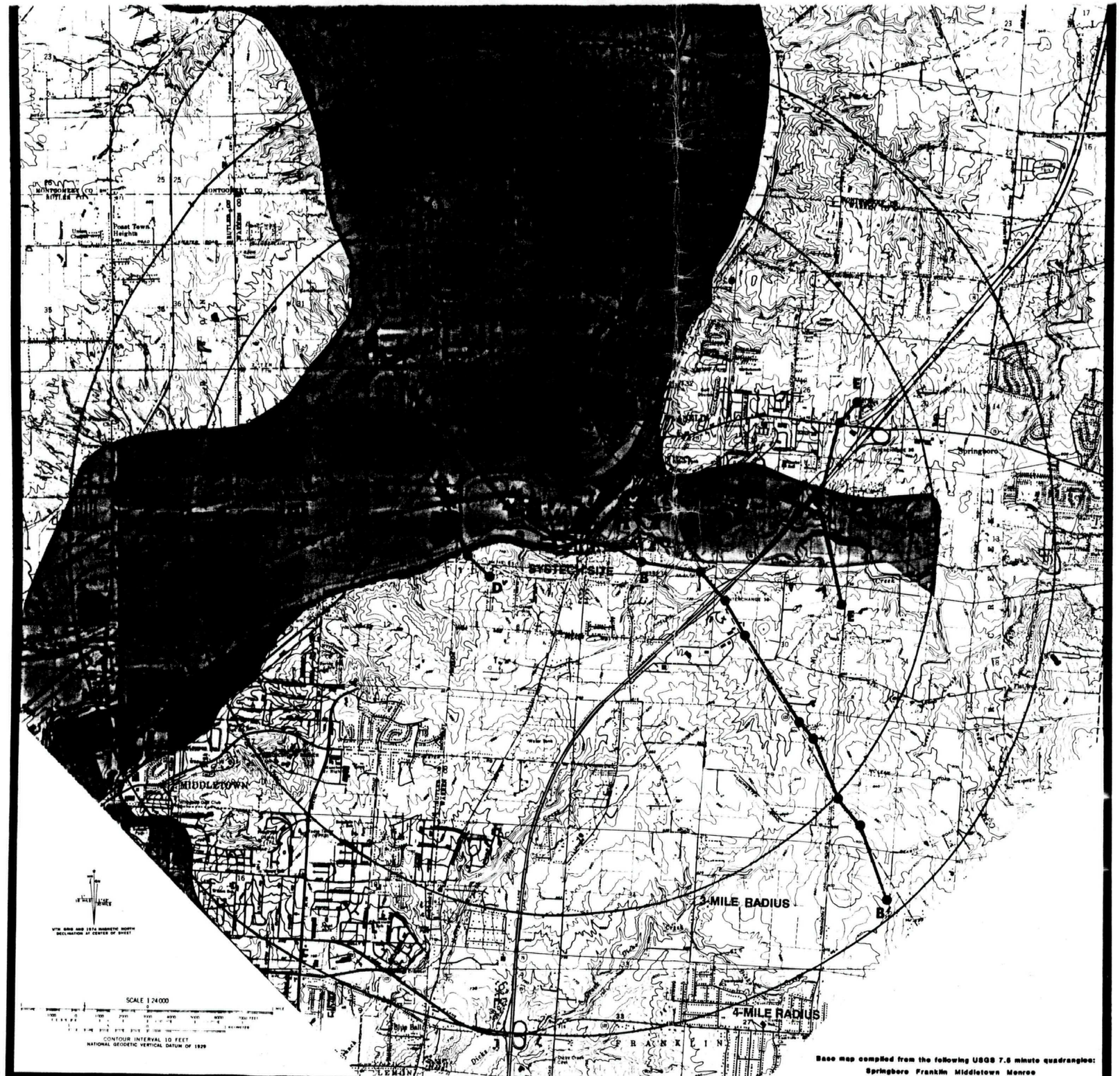


PLATE 1

HYDROGEOLOGIC SETTING FRANKLIN, OHIO AND VICINITY

LEGEND

- LOCATION OF BURIED VALLEY AQUIFER SYSTEM
- LINES OF CROSS SECTIONS
- DOMESTIC WELLS
- INDUSTRIAL OR MUNICIPAL WELLS

FILE COPY

TERRAR CORPORATION
P.O. Box 1410, Fairborn, OH 45324

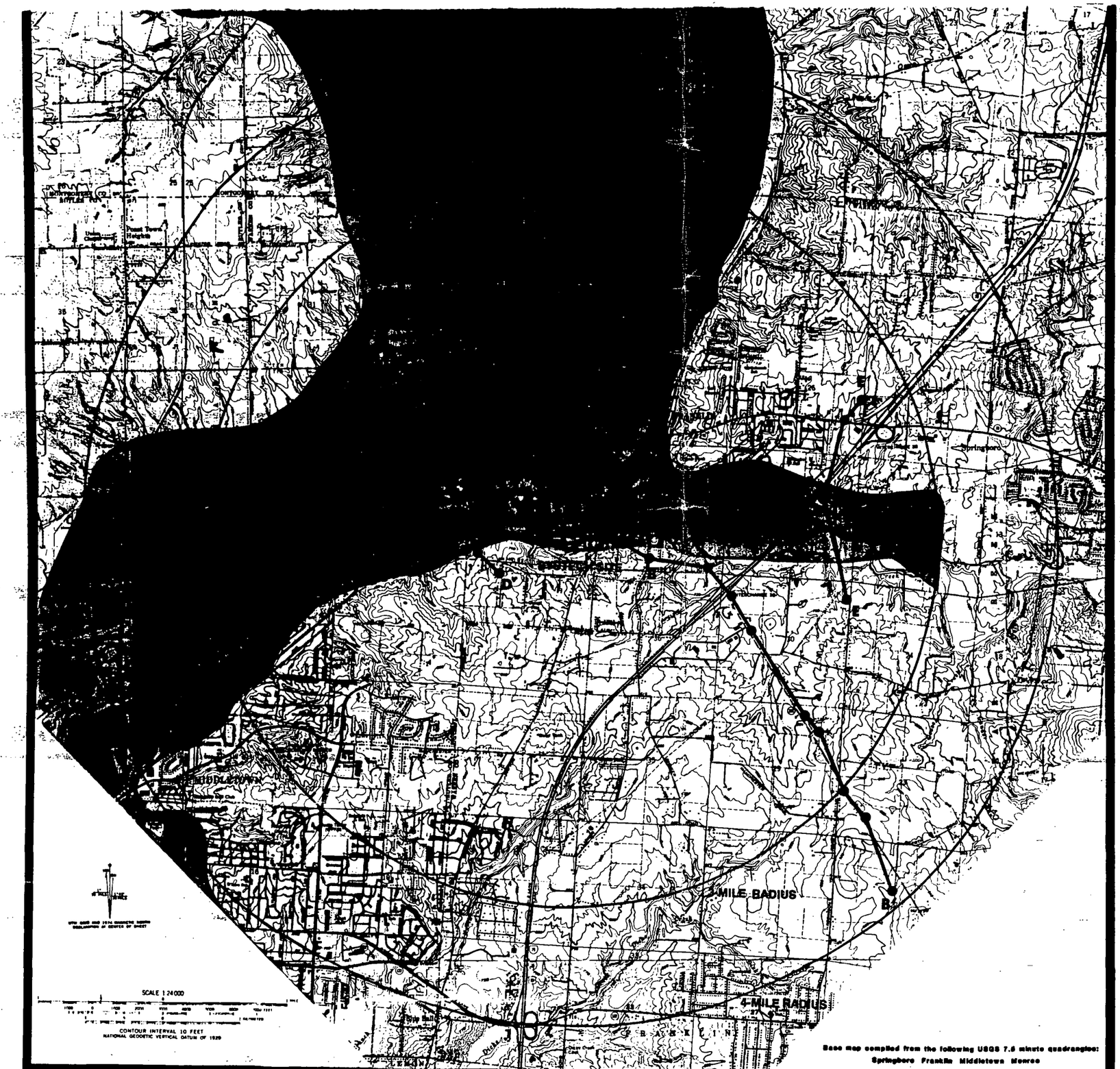


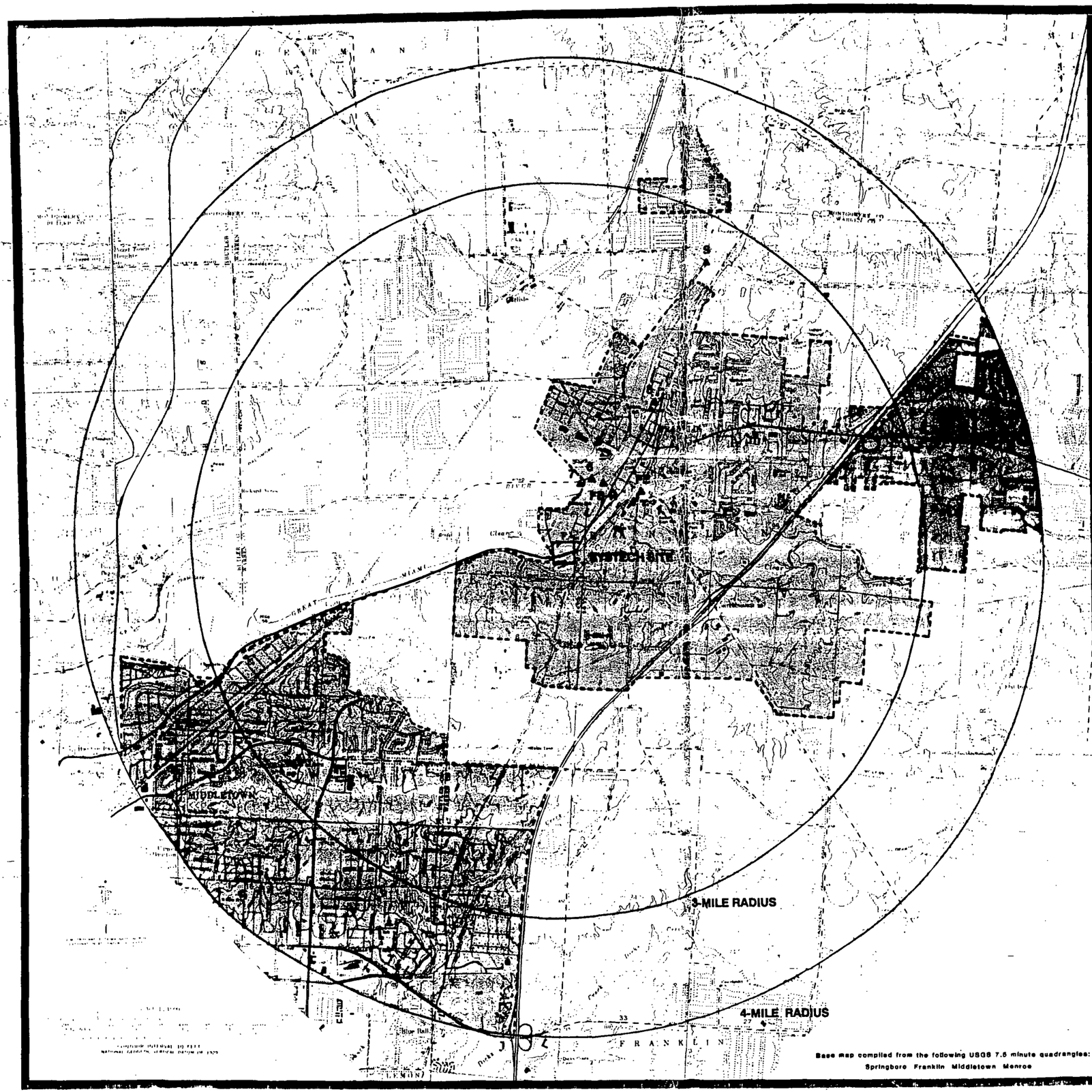
PLATE 1

HYDROGEOLOGIC SETTING FRANKLIN, OHIO AND VICINITY

LEGEND

- LOCATION OF BURIED VALLEY AQUIFER SYSTEM
- LINES OF CROSS SECTIONS
- DOMESTIC WELLS
- INDUSTRIAL OR MUNICIPAL WELLS

TERRAR CORPORATION
P.O. Box 1410, Fairborn, OH 45324



Base map compiled from the following USGS 7.5 minute quadrangles:
Springboro Franklin Middletown Monroe

PLATE 2

MUNICIPAL WATER SERVICE FRANKLIN, OHIO AND VICINITY

LEGEND

- FRANKLIN CITY WATER SERVICE AREA
- MIDDLETOWN CITY WATER SERVICE AREA
- SPRINGBORO CITY WATER SERVICE AREA
- ▲ MUNICIPAL OR INDUSTRIAL WELL USED FOR AQUIFER CHARACTERIZATION

TERRAR CORPORATION
P.O. Box 1618, Fairborn, OH 45324

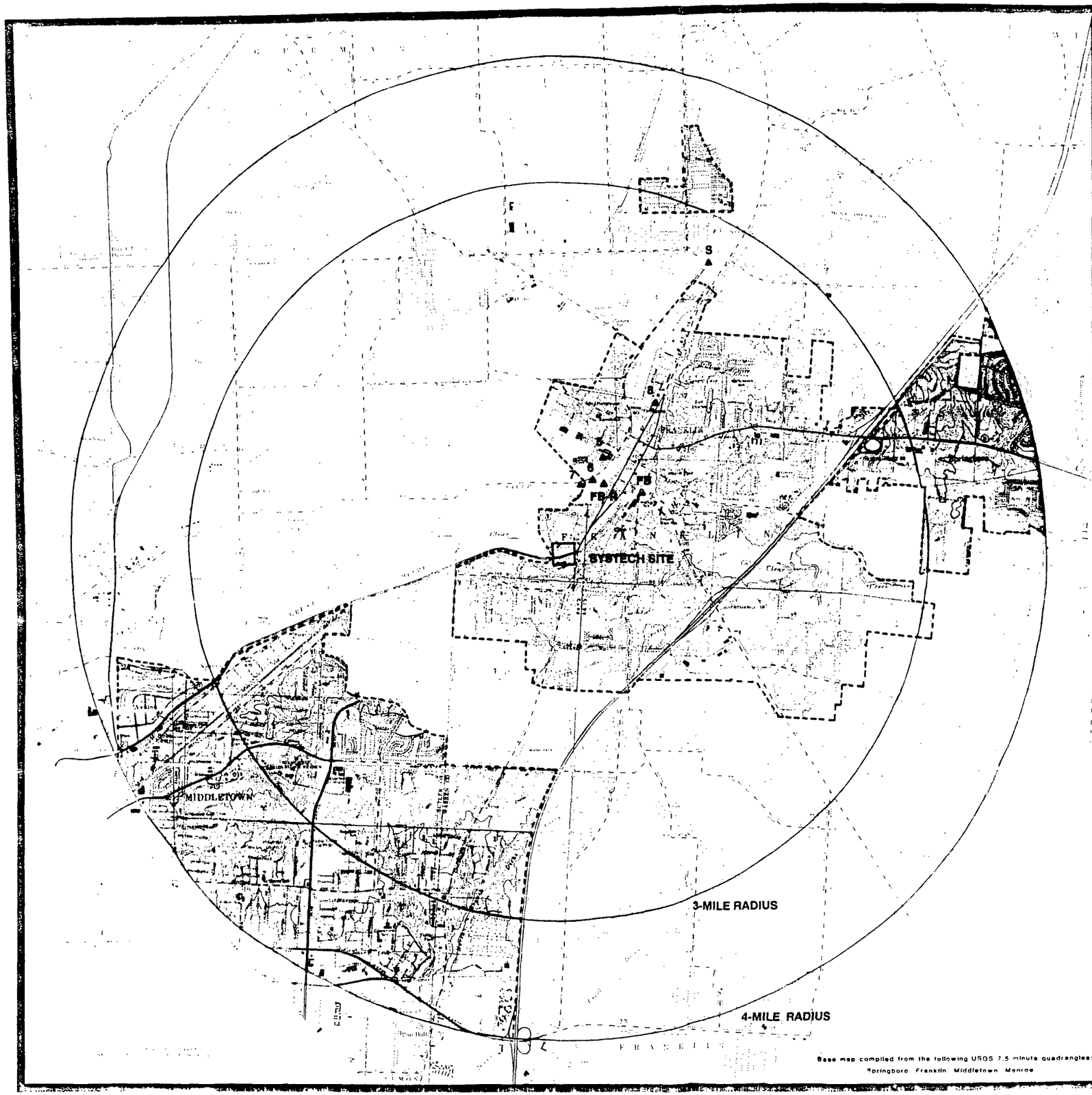


PLATE 2

MUNICIPAL WATER SERVICE FRANKLIN, OHIO AND VICINITY

LEGEND

- FRANKLIN CITY WATER SERVICE AREA
- MIDDLETOWN CITY WATER SERVICE AREA
- SPRINGBORO CITY WATER SERVICE AREA
- ▲ MUNICIPAL OR INDUSTRIAL WELL USED FOR AQUIFER CHARACTERIZATION

TERRAR CORPORATION
P.O. Box 1410, Fairborn, OH 45324

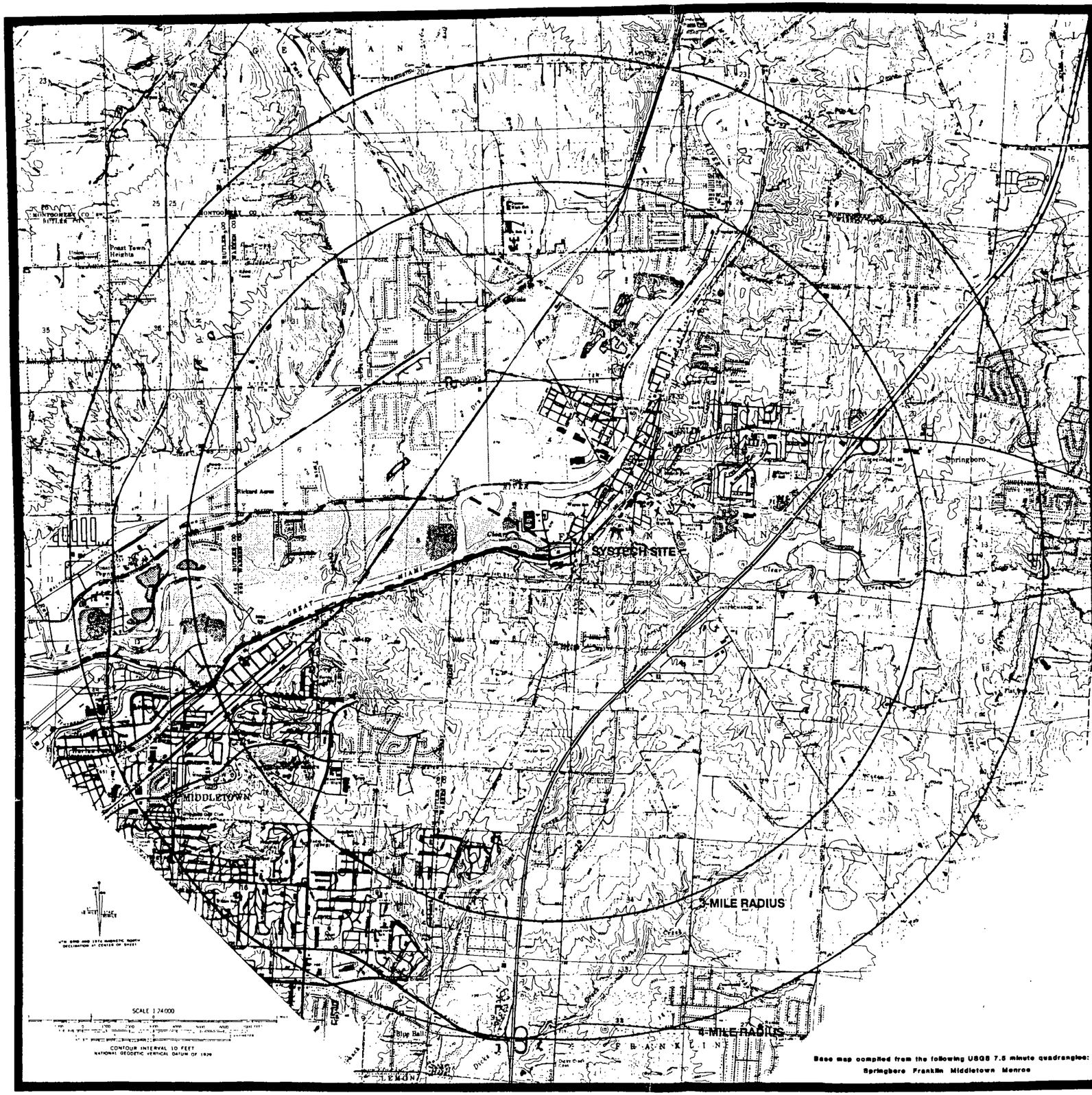


PLATE 3

PROJECTED DISPERSAL PATTERN OF GROUND WATER CONTAMINANTS FROM SYSTECH SITE FRANKLIN, OHIO AND VICINITY

TERRAB CORPORATION
P.O. Box 1410, Fairborn, OH 45324

PLATE 3

PROJECTED DISPERSAL PATTERN OF GROUND WATER CONTAMINANTS FROM SYSTECH SITE FRANKLIN, OHIO AND VICINITY

TERRAN CORPORATION
P.O. Box 1410, Fairborn, OH 45324

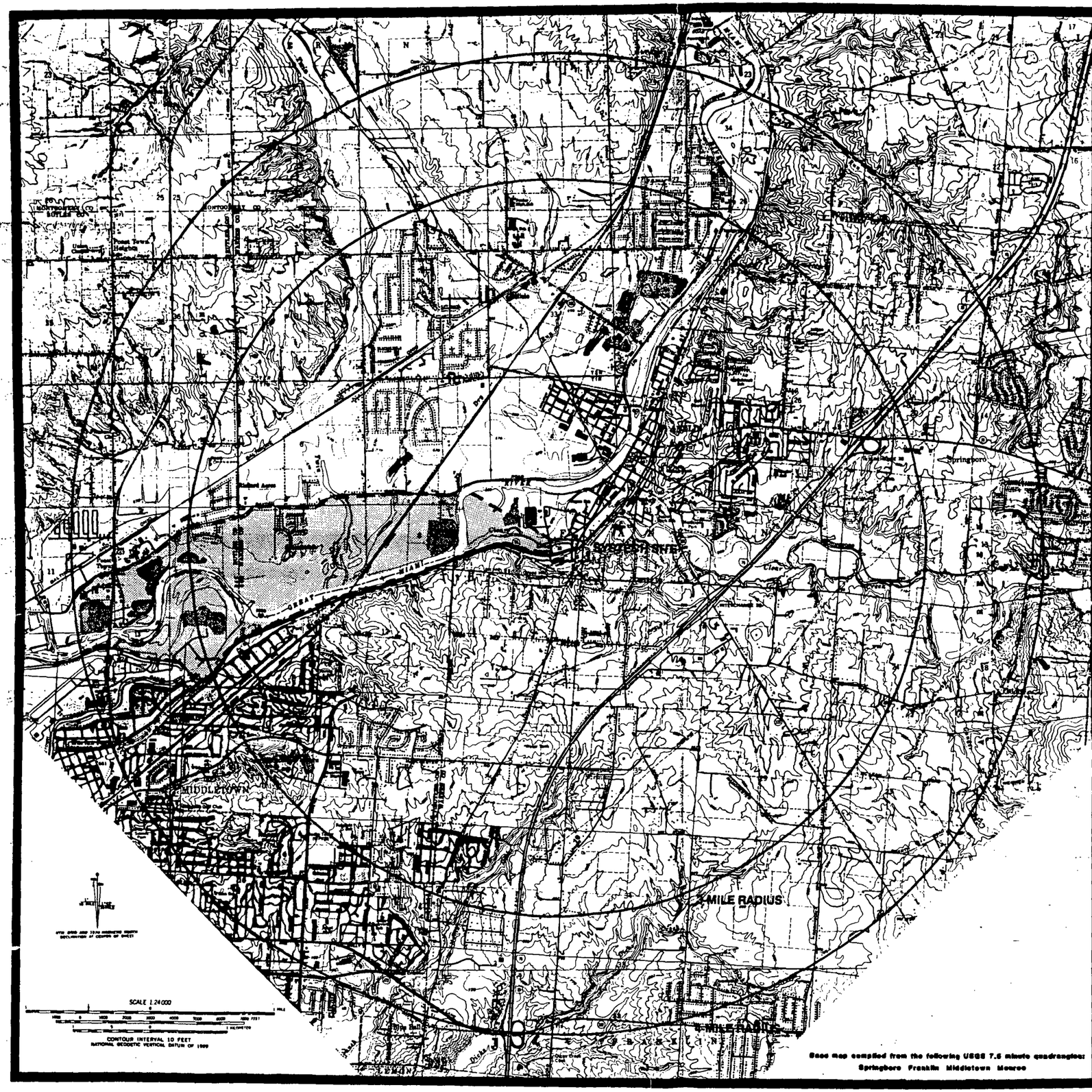
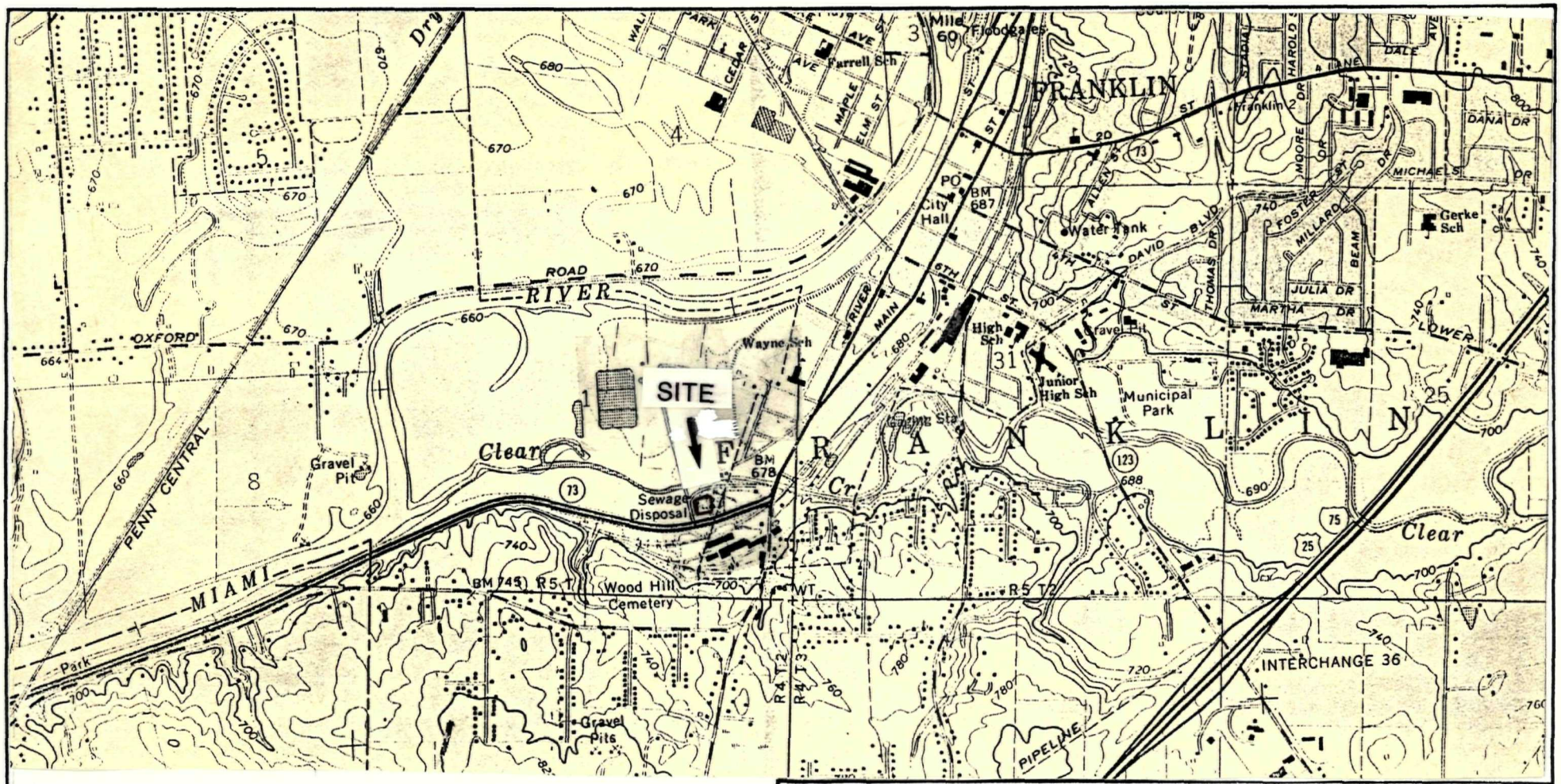


PLATE 3

PROJECTED DISPERSAL PATTERN OF GROUND WATER CONTAMINANTS FROM SYSTECH SITE FRANKLIN, OHIO AND VICINITY

TERRAN CORPORATION
P.O. Box 1410, Fairborn, OH 45324

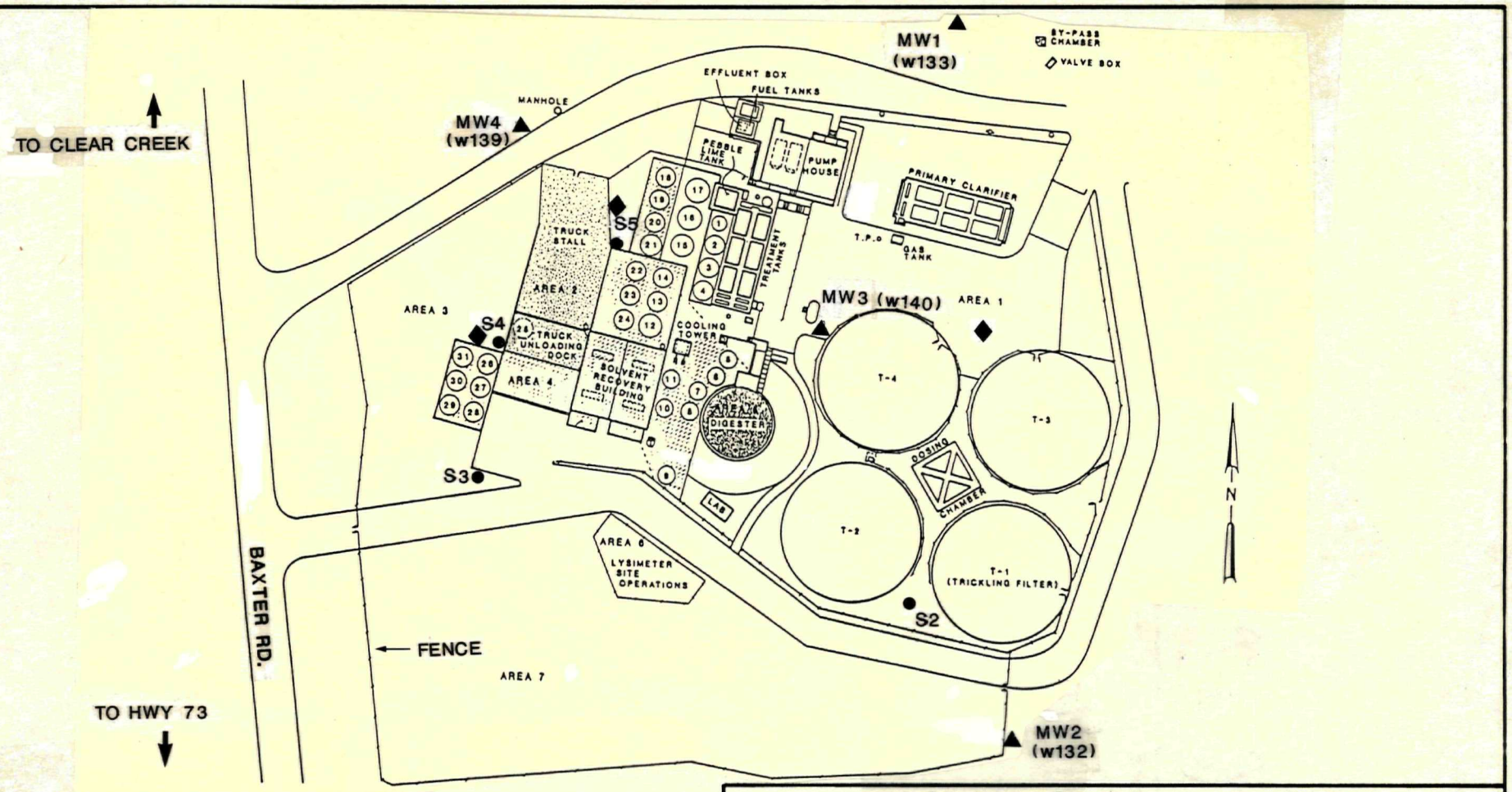


N

ecology and environment, inc.

111 WEST JACKSON BLVD., CHICAGO, ILLINOIS 60604, TEL. 312-663-9415

TITLE: SITE LOCATION	FIGURE #: 1
SITE: SYSTECH LIQUID TREATMENT CORP.	SCALE: 1:24,000
CITY: FRANKLIN STATE: OH	P.A.N.: OH0574SI
SOURCE: U.S.G.S. FRANKLIN, OH QUADRANGLE	DATE: 1965 REVISED: 1974



● = SOIL SAMPLE LOCATION

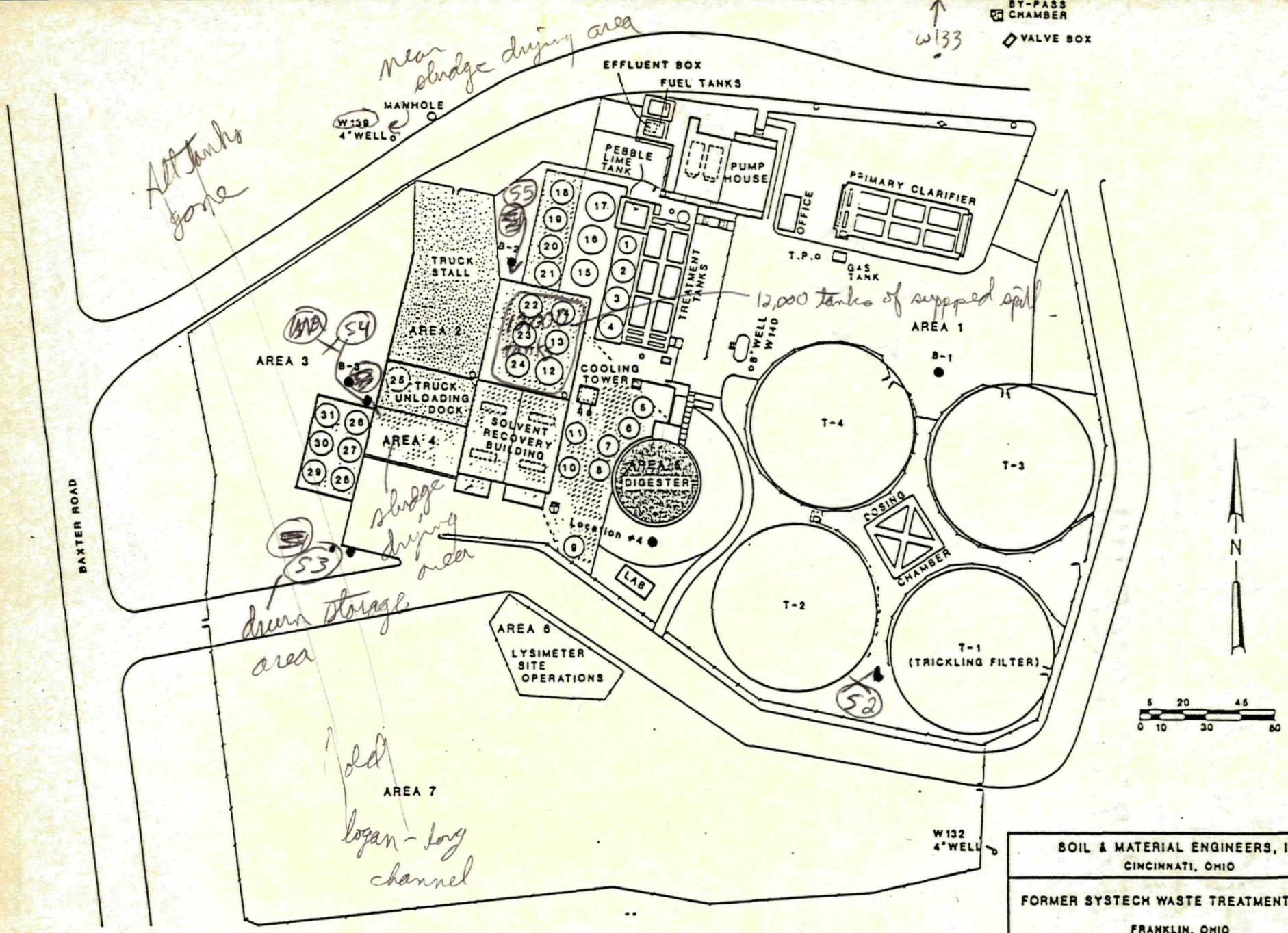
▲ = MONITORING WELL LOCATION

◆ = LOCATION OF PRIOR SOIL BORING

ecology and environment, inc.

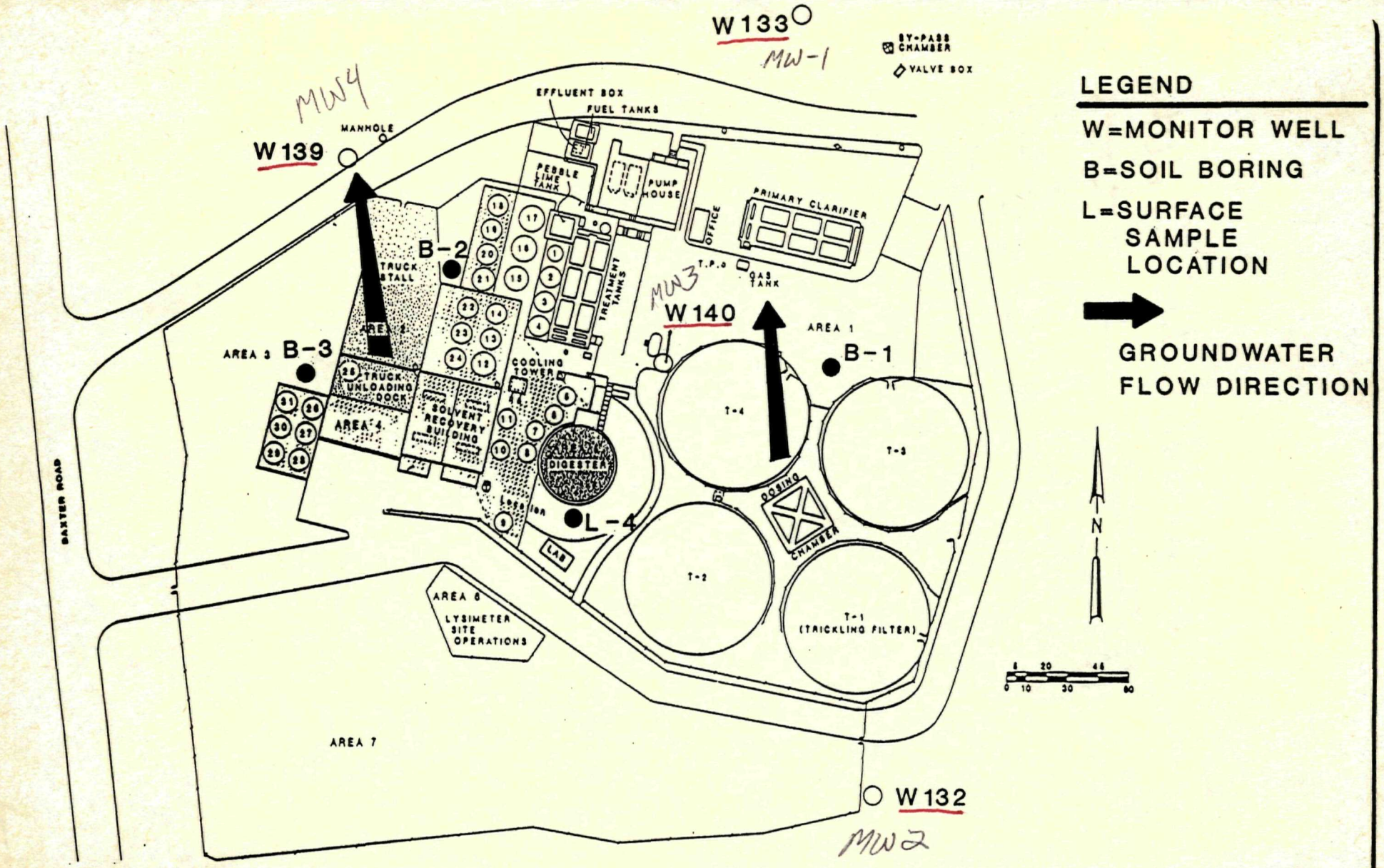
111 WEST JACKSON BLVD., CHICAGO, ILLINOIS 60604, TEL. 312-663-9415

TITLE: SITE MAP/SAMPLE LOCATION MAP	FIGURE #: 2
SITE: SYSTECH LIQUID TREATMENT CORP.	SCALE: 0 10 20 30 40 50
CITY: FRANKLIN STATE: OH	P.A.N.: OH0574SI
SOURCE: SITE INSPECTION, SOIL & MATERIALS ENGINEERS, INC. MAP	DATE: 5/87 REVISED: N/A

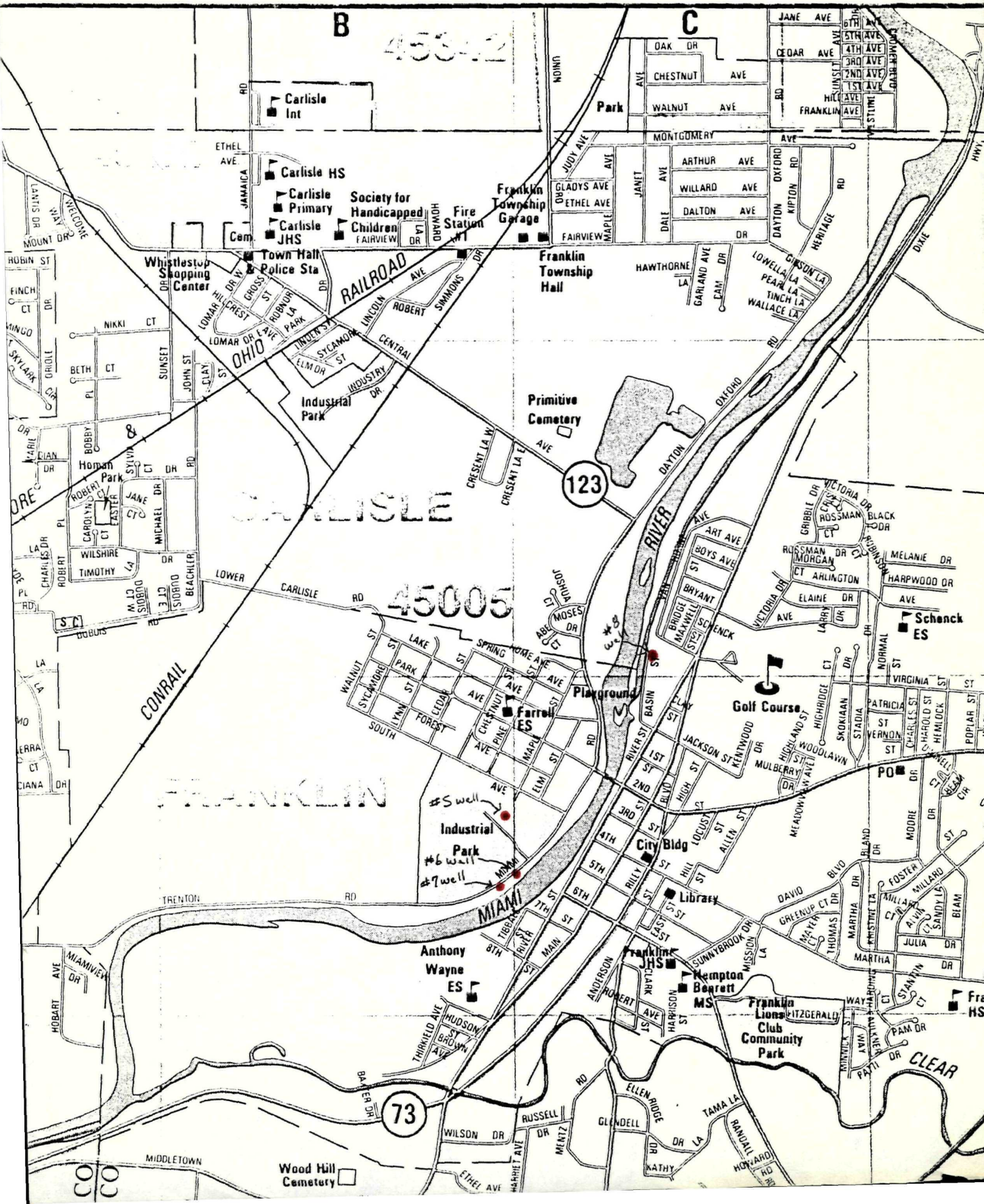


B-boring

SOIL & MATERIAL ENGINEERS, INC. CINCINNATI, OHIO	
FORMER SYSTECH WASTE TREATMENT CENTER FRANKLIN, OHIO	
SCALE: -	DRAWN BY: LAZENBY
DATE: 3/11/86	APPR. BY:



October 6, 1968	Systech Site Plan	**SOIL & MATERIAL ENGINEERS INC.** **CINCINNATI, OHIO**


B
C
45342
45005
CARLISLE
FRANKLIN
Carlisle Int
Carlisle HS
Carlisle Primary
Carlisle JHS
Society for Handicapped Children
Fire Station
Franklin Township Garage
Franklin Township Hall
Town Hall & Police Sta
Whistlestop Shopping Center
Park
Primitive Cemetery
Industrial Park
Homan Park
Schenck ES
Golf Course
Farrell ES
Playground
Industrial Park
City Bldg
Library
Anthony Wayne ES
Franklin JHS
Hempton Bearett MS
Franklin Lions Club Community Park
Wood Hill Cemetery
PO
#5 well
#6 well
#7 well
#8 well
MIAMI
RIVER
CLEAR
CONRAIL
RAILROAD
OHIO
123
73
ETHEL AVE
MONTGOMERY AVE
LOWER CARLISLE RD
TRENTON RD
MIDDLETOWN
OXFORD
DAYTON
DIXIE
HWY

CONTOUR INTERVAL 20 FEET

PRC ENVIRONMENTAL MANAGEMENT, INC.

N

TITLE: 4-MILE RADIUS MAP
SITE NAME: SYSTECH LIQUID TREATMENT
CITY, STATE: FRANKLIN, OHIO
EPA ID #: OHD 030935852

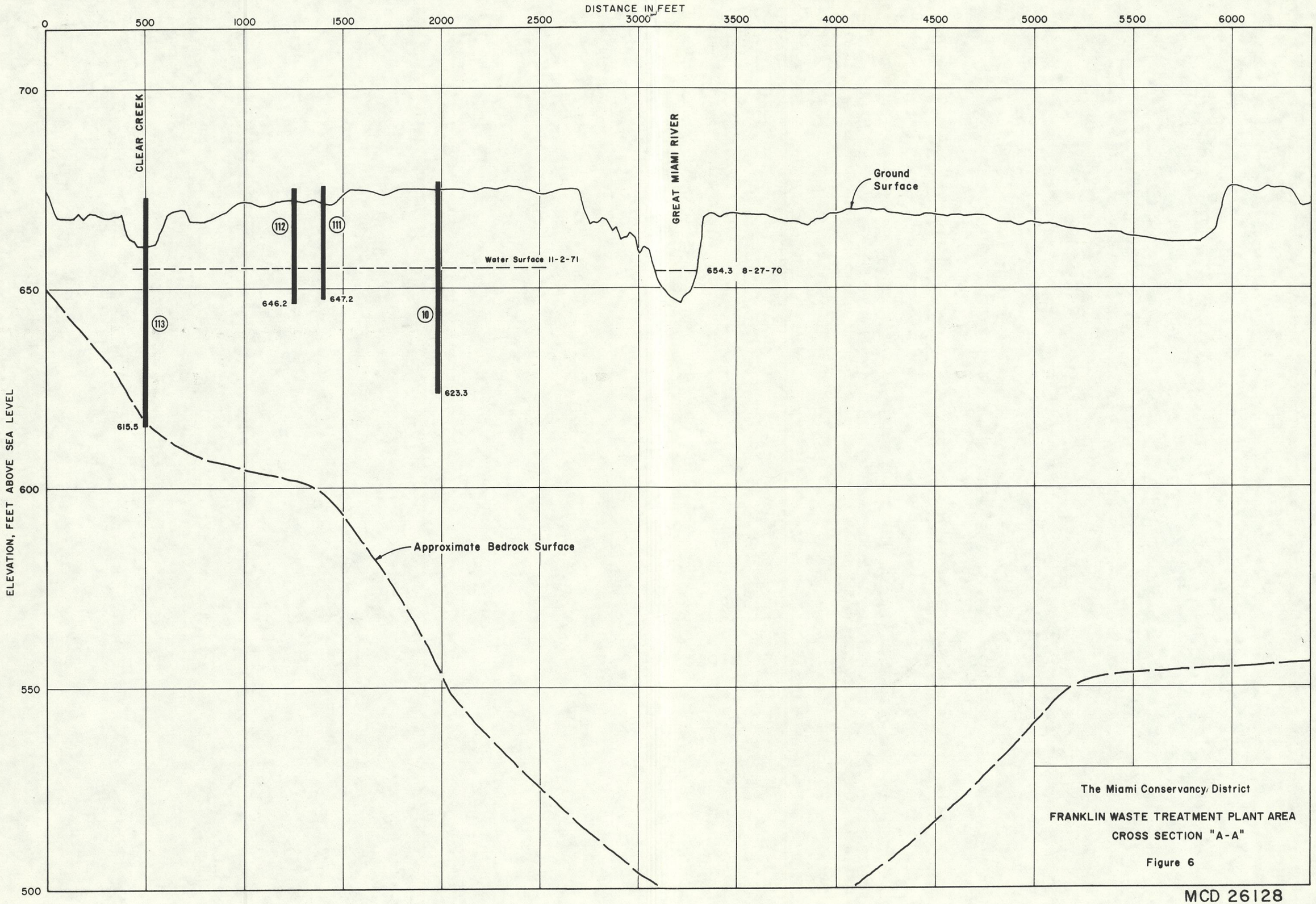
USGS TOPOGRAPHIC MAPS:

NAME: MIDDLETOWN	NAME: FRANKLIN
DATE: 1959	DATE: 1965
REVISED: 1981	REVISED: 1974
NAME: MONROE	NAME: SPRINGBORO
DATE: 1965	DATE: 1965
REVISED: 1974	REVISED: 1981

0 1/2 1 MILE
SCALE

OHIO
QUADRANGLE LOCATION

ecology and environment, inc.
USGS TOPOGRAPHIC MAPS:
NAME FRANKLIN
DATE 1965
REVISED 1974
NAME
DATE
REVISED
NAME
DATE
REVISED
NAME
DATE
REVISED
0
1/2
1 MILE
SCALE
N
REFERENCE
SITE NAME
SITE ID
OHIO
QUADRANGLE LOCATION
T.2.N
R.5.E
T.3.N
R.4.E
T.2.
R.5
R.4.E
T.2.N
T.1.N
R.5.E
R.4
T.2.
T.3
R.4
MONTGOMERY CO
BUTLER CO
WARREN CO
FRANKLIN
MIDDLETOWN
Chautauqua
Carlisle
Rickard Acres
Wood Hill Cemetery
Clear Creek
Dicks Creek
INTERCHANGE 38
INTERCHANGE 36
PENN CENTRAL
BALTIMORE
OHIO
GREAT MIAMI RIVER
MIAMI UNIV MIDDLETOWN BRANCH
Junior High Sch
High Sch
City Hall
Wayne Sch
Farrell Sch
Schenck Sch
Gerke Sch
Golf Course
Municipal Park
Sewage Disposal
Water Tank
Radio Tower
Floodgate
Indian Mound
Greenwood Ch
Mt Olive Ch
Tapscott Ch
Gravel Pits
Playground
Wildwood Golf Club
Rosedale Sch
St Marys Sch
Wilson Sch
Creekview Sch
Trailer Park
Spring Hill Sch
Maple Park Sch
Fairfield High Sch
Manchester Jr High Sch
Fresh Air Camp
Radio Tower (WPFB)
Jacob Park
Park
Mile 56
Mile 60
CORPORATE BOUNDARY
MONTGOMERY CO BOUNDARY
T2N
T1N
R4E
R5E
R4T2
R4T3
R5T1
R5T2



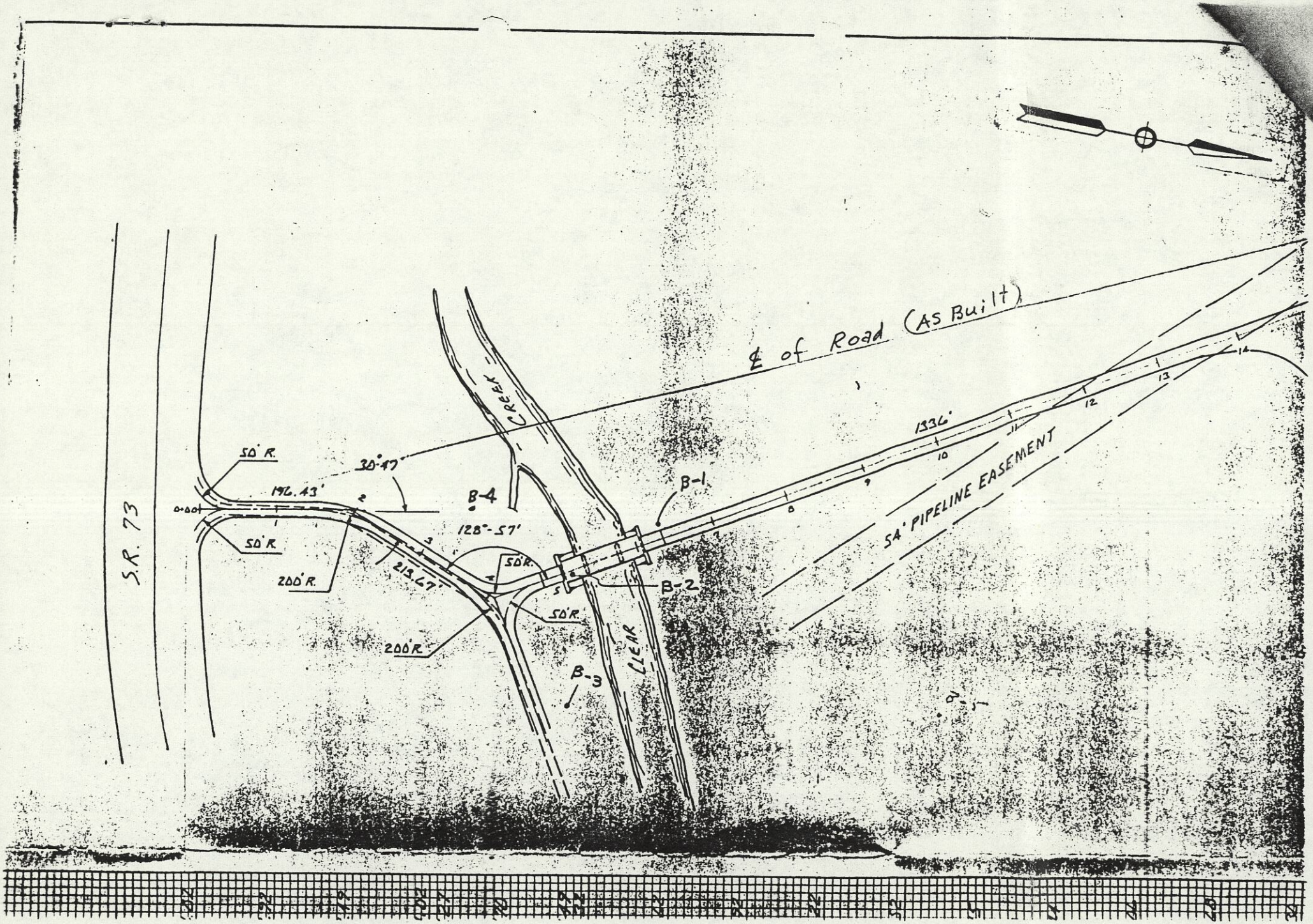
The Miami Conservancy District

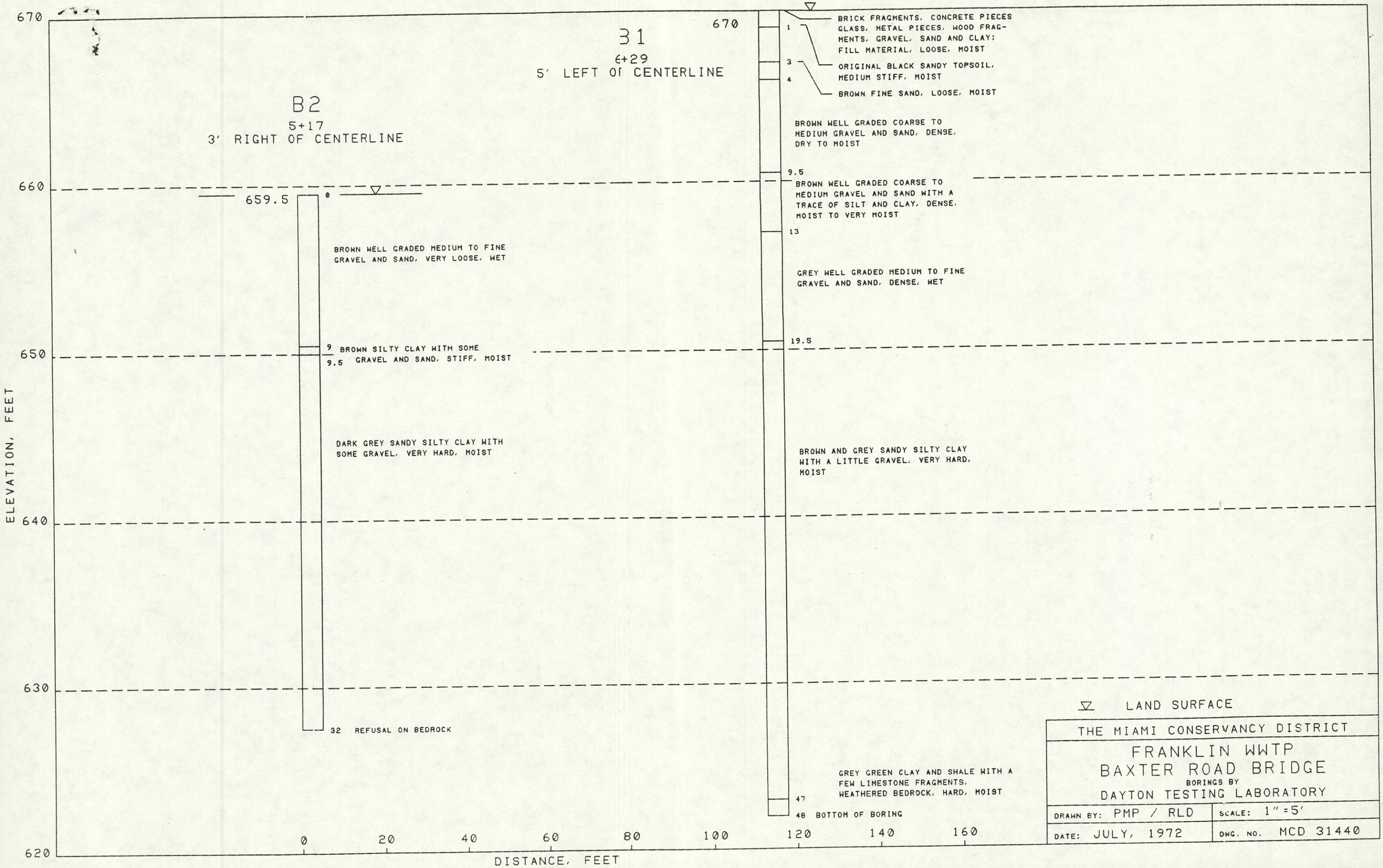
FRANKLIN WASTE TREATMENT PLANT AREA

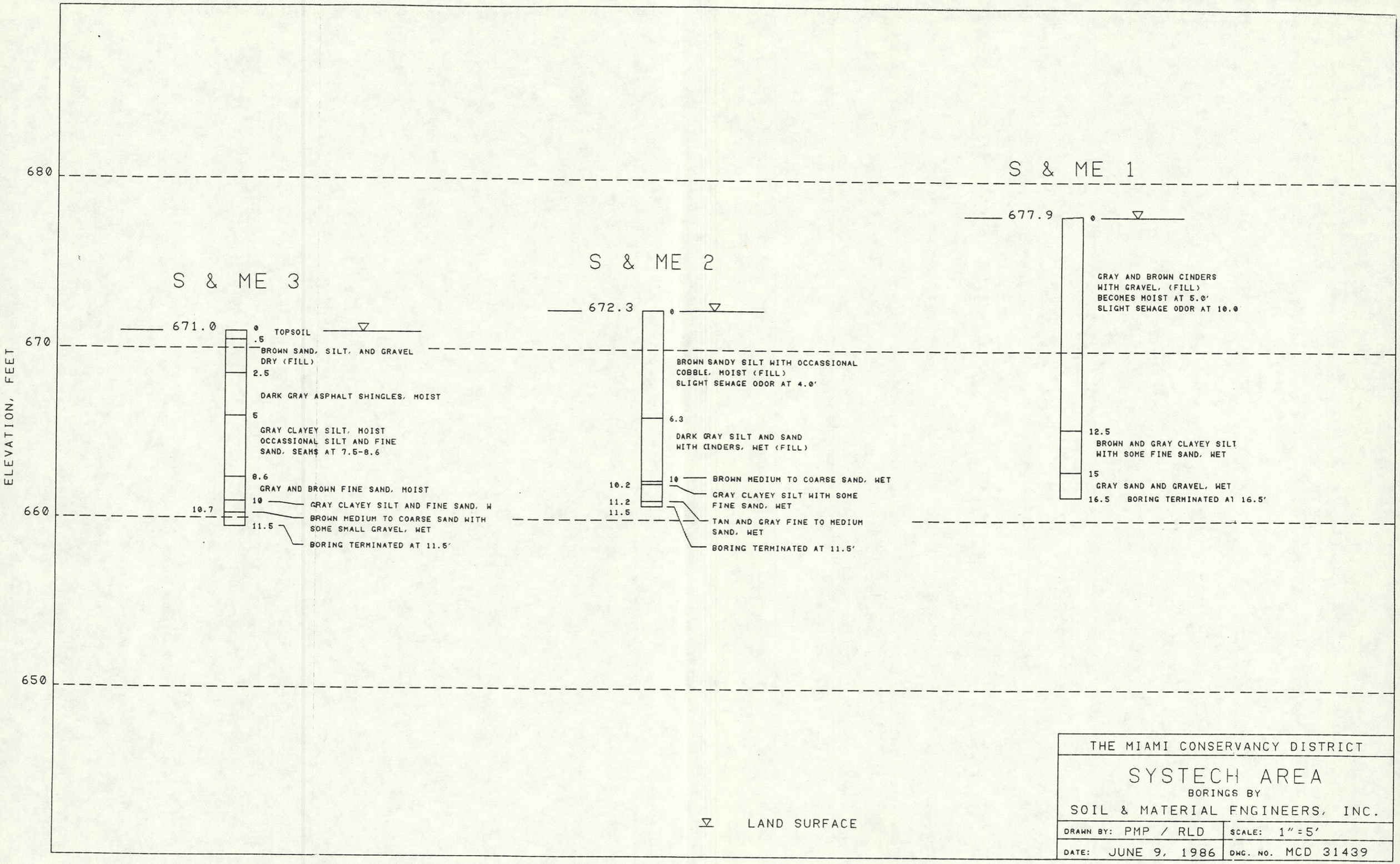
CROSS SECTION "A-A"

Figure 6

MCD 26128


S.R. 73
50' R.
50' R.
200' R.
196.43'
30°-47'
0+00
1
2
3
4
5
B-4
128°-57'
213.67'
50' R.
200' R.
50' R.
B-3
CREEK
CLEAR
B-1
B-2
℄ of Road (As Built)
1336'
10
11
12
13
14
54' PIPELINE EASEMENT


670
660
650
640
630
620
ELEVATION, FEET
0
20
40
60
80
100
120
140
160
DISTANCE, FEET
B2
5+17
3' RIGHT OF CENTERLINE
659.5
0
BROWN WELL GRADED MEDIUM TO FINE GRAVEL AND SAND, VERY LOOSE, WET
9
9.5
BROWN SILTY CLAY WITH SOME GRAVEL AND SAND, STIFF, MOIST
DARK GREY SANDY SILTY CLAY WITH SOME GRAVEL, VERY HARD, MOIST
32
REFUSAL ON BEDROCK
B1
6+29
5' LEFT OF CENTERLINE
670
1
BRICK FRAGMENTS, CONCRETE PIECES GLASS, METAL PIECES, WOOD FRAGMENTS, GRAVEL, SAND AND CLAY; FILL MATERIAL, LOOSE, MOIST
3
ORIGINAL BLACK SANDY TOPSOIL, MEDIUM STIFF, MOIST
4
BROWN FINE SAND, LOOSE, MOIST
BROWN WELL GRADED COARSE TO MEDIUM GRAVEL AND SAND, DENSE, DRY TO MOIST
9.5
BROWN WELL GRADED COARSE TO MEDIUM GRAVEL AND SAND WITH A TRACE OF SILT AND CLAY, DENSE, MOIST TO VERY MOIST
13
GREY WELL GRADED MEDIUM TO FINE GRAVEL AND SAND, DENSE, WET
19.5
BROWN AND GREY SANDY SILTY CLAY WITH A LITTLE GRAVEL, VERY HARD, MOIST
GREY GREEN CLAY AND SHALE WITH A FEW LIMESTONE FRAGMENTS, WEATHERED BEDROCK, HARD, MOIST
47
48
BOTTOM OF BORING
LAND SURFACE
THE MIAMI CONSERVANCY DISTRICT
FRANKLIN WWTP
BAXTER ROAD BRIDGE
BORINGS BY
DAYTON TESTING LABORATORY
DRAWN BY: PMP / RLD
SCALE: 1" = 5'
DATE: JULY, 1972
DWG. NO. MCD 31440



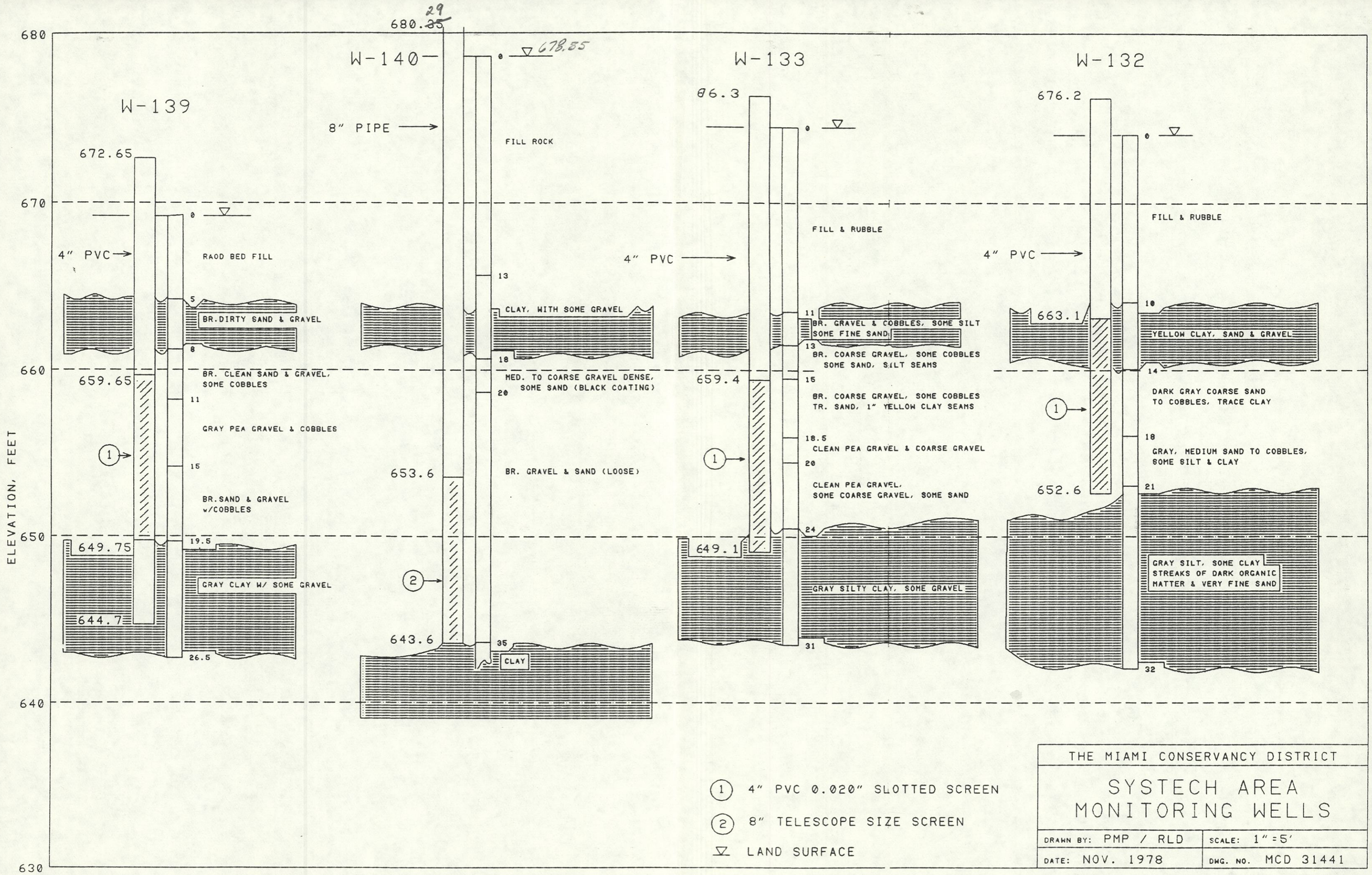
THE MIAMI CONSERVANCY DISTRICT

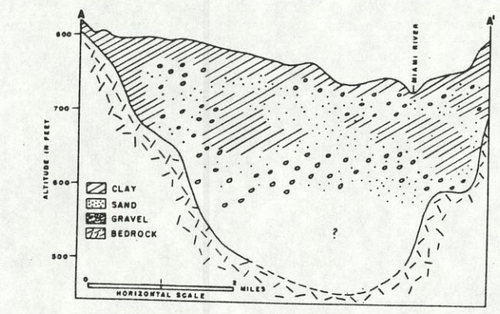
SYSTECH AREA

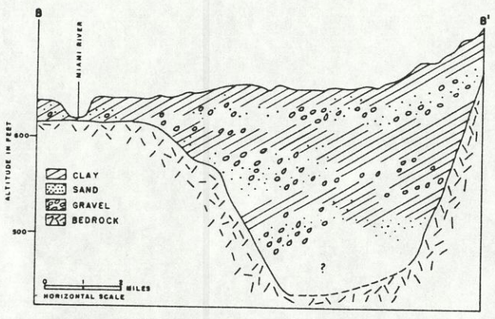
BORINGS BY

SOIL & MATERIAL ENGINEERS, INC.

DRAWN BY: PMP / RLD	SCALE: 1" = 5'
DATE: JUNE 9, 1986	DWG. NO. MCD 31439


ELEVATION, FEET
680
670
660
650
640
630
W-139
672.65
659.65
649.75
644.7
4" PVC
8" PIPE
RAOD BED FILL
BR.DIRTY SAND & GRAVEL
BR. CLEAN SAND & GRAVEL, SOME COBBLES
GRAY PEA GRAVEL & COBBLES
BR.SAND & GRAVEL w/COBBLES
GRAY CLAY W/ SOME GRAVEL
W-140
680.29
678.55
653.6
643.6
FILL ROCK
CLAY, WITH SOME GRAVEL
MED. TO COARSE GRAVEL DENSE, SOME SAND (BLACK COATING)
BR. GRAVEL & SAND (LOOSE)
CLAY
W-133
686.3
659.4
649.1
4" PVC
FILL & RUBBLE
BR. GRAVEL & COBBLES, SOME SILT SOME FINE SAND
BR. COARSE GRAVEL, SOME COBBLES SOME SAND, SILT SEAMS
BR. COARSE GRAVEL, SOME COBBLES TR. SAND, 1" YELLOW CLAY SEAMS
CLEAN PEA GRAVEL & COARSE GRAVEL
CLEAN PEA GRAVEL, SOME COARSE GRAVEL, SOME SAND
GRAY SILTY CLAY, SOME GRAVEL
W-132
676.2
663.1
652.6
4" PVC
FILL & RUBBLE
YELLOW CLAY, SAND & GRAVEL
DARK GRAY COARSE SAND TO COBBLES, TRACE CLAY
GRAY, MEDIUM SAND TO COBBLES, SOME SILT & CLAY
GRAY SILT, SOME CLAY STREAKS OF DARK ORGANIC MATTER & VERY FINE SAND
0
5
8
11
15
19.5
26.5
13
18
20
35
11
13
15
18.5
20
24
31
10
14
18
21
32
1 4" PVC 0.020" SLOTTED SCREEN
2 8" TELESCOPE SIZE SCREEN
LAND SURFACE
THE MIAMI CONSERVANCY DISTRICT
SYSTECH AREA MONITORING WELLS
DRAWN BY: PMP / RLD
SCALE: 1" = 5'
DATE: NOV. 1978
DWG. NO. MCD 31441





CROSS SECTIONS A-A' AND B-B'
SHOWING CHARACTER OF MATERIAL
FILLING BURIED VALLEY

Note: This is a generalized map, showing the potential underground-water resources, based on data presently available. Detailed studies and exploratory drilling are needed to fully define buried valley and bedrock aquifers.

EXPLANATION OF SYMBOLS

- Domestic well
- Industrial well
- Municipal well
- Observation well

SS Sandstone
SH Shale
LS Limestone
S Sand
G Gravel

C/2 Chemical analysis in text.

Total depth (ft.) - Water-bearing formation - Yield (gpm)
Depth to bedrock (Ft.)

LEGEND

AREAS IN WHICH YIELDS OF 500, OR MORE, GALLONS PER MINUTE CAN BE DEVELOPED

Large industrial and municipal supplies available from permeable sand and gravel deposits. Yields from drilled wells depend upon the amount of infiltration which may be induced from the Miami River.

AREAS IN WHICH YIELDS OF 100, OR MORE, GALLONS PER MINUTE CAN BE DEVELOPED

Good ground-water areas. Permeable sand and gravel deposits may yield several hundred gallons per minute. Underlying bedrock is a poor water source.

AREAS IN WHICH YIELDS OF 25 TO 100 GALLONS PER MINUTE CAN BE DEVELOPED

Limestone, covered with an average of 30 feet of glacial drift. Adequate domestic supplies may be available from sand and gravel layers in the drift and small industrial yields from the underlying limestone.

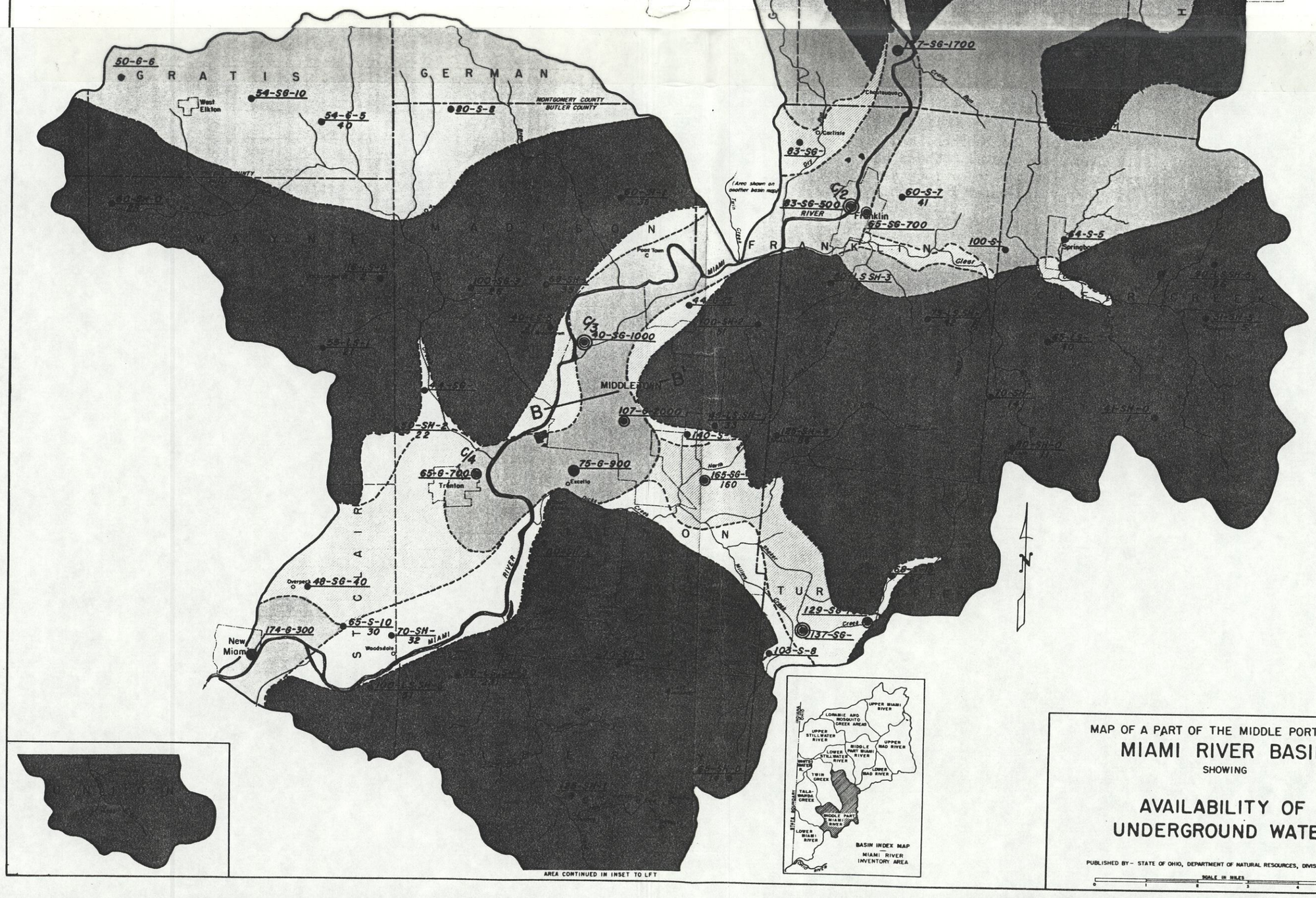
AREAS IN WHICH YIELDS OF MORE THAN 5 GALLONS PER MINUTE CAN BE DEVELOPED

Glacial drift covers shales and thin limestones. Farm and domestic supplies available from the drift. Little or no water in the bedrock.

Farm and domestic supplies available from valley fill. Little or no water in the underlying bedrock.

AREAS IN WHICH LESS THAN 5 GALLONS PER MINUTE CAN BE DEVELOPED

Interbedded shales and thin limestones covered with clay. Poor source of underground water.



MAP OF A PART OF THE MIDDLE PORTION OF
MIAMI RIVER BASIN
SHOWING

AVAILABILITY OF
UNDERGROUND WATER

PUBLISHED BY - STATE OF OHIO, DEPARTMENT OF NATURAL RESOURCES, DIVISION OF WATER

SCALE IN MILES

OHIO DEPARTMENT OF NATURAL RESOURCES, DIVISION OF WATER
1562 W. First Ave., Columbus 12, Ohio

OHIO WATER PLAN INVENTORY
1960

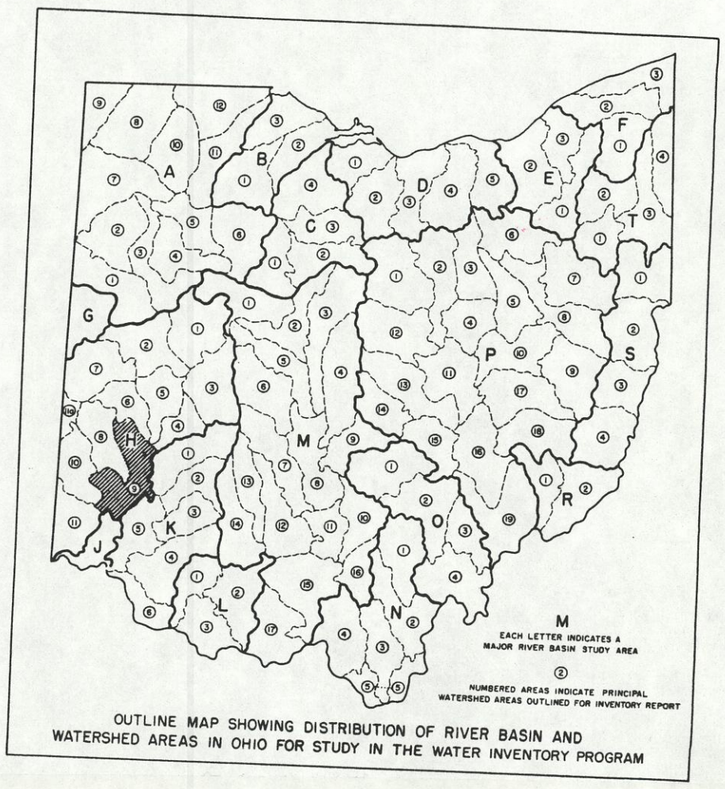
FILE COPY

MIAMI RIVER BASIN

Lower part of middle portion

UNDERGROUND WATER RESOURCES

Prepared by ALFRED C. WALKER, Geologist,
Ohio Division of Water



OUTLINE MAP SHOWING DISTRIBUTION OF RIVER BASIN AND WATERSHED AREAS IN OHIO FOR STUDY IN THE WATER INVENTORY PROGRAM

FILE INDEX
H-9

The occurrence of underground water in any region is controlled by the size, shape, and number of openings in the rocks of that region for it is in these spaces that water is contained. The openings are usually interconnected and therefore permit the movement of water from one opening to another. The number, size and interconnection of the water-bearing openings in various formations differ greatly. For this reason, wide variations in underground-water conditions are found as the geology differs from place to place.

The rocks of the area comprise two major units:

(1) Shale and limestone which form the bedrock, and (2) unconsolidated deposits of clay, silt, sand, and gravel. These unconsolidated deposits are the more important of the two major rock divisions with respect to the availability of underground-water supplies.

GENERALIZED STRATIGRAPHIC TABLE OF THE ROCKS IN THE MIDDLE PORTION OF THE MIAMI RIVER BASIN

System or Series		Group or Formation	Character of Material	Water-bearing Characteristics
Quaternary	Recent	Alluvium	Clay, silt, sand, and gravel.	Extremely variable. May supply small yields to shallow wells.
	Pleistocene	Wisconsin and Illinoian drift	Clayey till with local lenses of sand and gravel.	
			Glacial outwash deposits of stratified clay, sand, and gravel in buried valleys.	Large yields where well-sorted sands and gravels occur with good recharge conditions.
Silurian		Niagaran	Massive to thin-bedded limestones and dolomites with some shale beds.	Adequate supplies for farm, domestic, and possibly small industrial needs.
		Clinton	Massive to irregularly-bedded limestone.	
Ordovician		Richmond and Maysville	Interbedded soft shales and thin, hard limestones.	Poor source of water. Water, where present, generally occurs in top few feet of strata. May be high in iron, sulfur and hardness.

Deposits of permeable sand and gravel interbedded with layers and lenses of clayey materials fill a deep buried valley now occupied in part by the Miami River. The buried valley was cut into relatively impermeable shales and limestone, and the thick deposits of sand and gravel were deposited during the period of Pleistocene glaciation.

Large industrial and municipal supplies are available to wells in the valley fill deposits by induced infiltration from the Miami River. The amount of underground water available by induced infiltration depends on the mud and silts on the river bottom, the thickness and permeability of the sand and gravel deposits, and the distance between the wells and the river. Properly constructed individual wells near the river may yield from 500 gallons per minute to 1500, or more, gallons per minute.

Where such valleys are not traversed by a surface stream, or where they contain less extensive sand and gravel deposits, smaller yields are obtained.

Limestone, which forms the bedrock in the extreme northern part of the basin area, may supply yields of more than 25 gallons per minute for small industrial use. Throughout most of the basin, however, very small water supplies are available from shale and limestone bedrock.

In most of the upland areas, the adequacy of drilled well supplies depends upon the nature of the glacial deposits covering the bedrock. Farm and domestic supplies may be obtained where sand and gravel is present in the till or in local valley fill deposits. Where clay covers the bedrock, extremely small yields are obtained. In such areas, drilled wells are seldom satisfactory. Large-diameter dug wells in the till are sometimes successful in furnishing water for farm and domestic use. In many instances cisterns are also used.

The extreme variation in availability of underground water is shown by the logs of two wells drilled within two miles of each other in Butler County.

A well, drilled in Middletown, was developed in buried valley gravels:

Formation	Thickness (ft.)	Depth (ft.)
Top soil	4	4
Clay	16	20
Sand and gravel	20	40

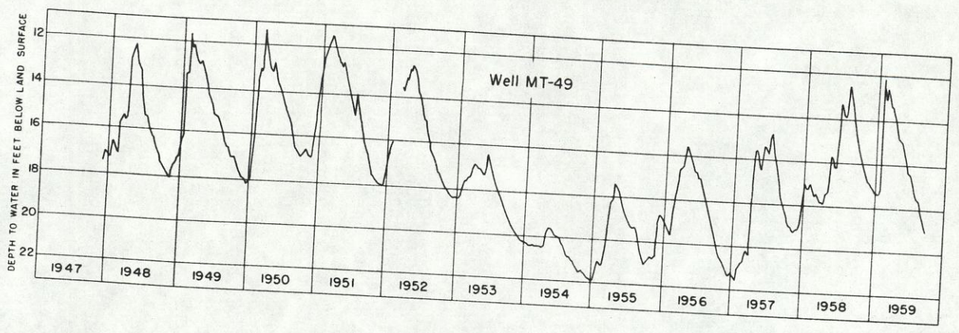
Well diameter: 38 inches
Yield: 1500 gallons per minute

Another well, less than two miles west of Middletown, was drilled in the upland.

Formation	Thickness (ft.)	Depth (ft.)
Clay	50	50
Shaley limestone	75	125

Well diameter: 8 inches
Yield: ½ gallon per minute

Measurements of the water level in an observation well in the village of Whitfield have been recorded since 1947 by the Ohio Division of Water and the Ground-Water Branch, U. S. Geological Survey. This well was drilled, by the Division of Water, into sand and gravel deposits in the buried valley. A hydrograph for the well is given below:



The long-term trends of water level in this well are chiefly in response to rainfall and the stage of the Miami River.

Records of approximately 4000 water wells in the basin area are on file at the Ohio Division of Water. Locations of a number of typical wells are indicated on the availability of underground-water map.

Partial analyses of the water obtained from four wells are shown in the following table.

Well number	C-1	C-2	C-3	C-4
Depth (ft.)	75	83	40	65
Water-bearing formation	gravel	gravel	gravel	gravel
	parts per million			
Iron (Fe)	0.03	0.05	0.20	0.1
Chloride (Cl)	78.0	4.00	14.0	11.0
Dissolved solids	678.	364.	387.	420.
Total hardness	500.	334.	311.	338.
pH	7.20	7.55	7.65	7.3