IN-FIELD CONDITIONS REPORT

CITY OF WAUSAU

MARATHON COUNTY, WISCONSIN

Site of Fill
at the
Wausau Wastewater Treatment Plant
and City Garage and Public Works Property

September 1989

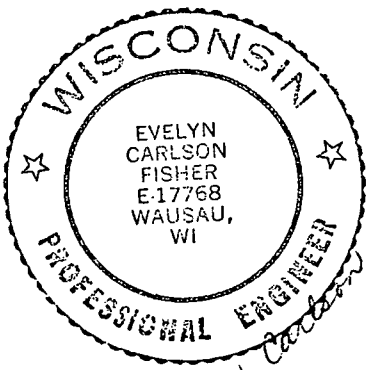
Prepared for: City of Wausau
by: Becher-Hoppe, Inc., Wausau, Wisconsin

INTERIM IN-FIELD CONDITIONS REPORT

SITE OF FILL AT THE WAUSAU WASTEWATER TREATMENT PLANT AND CITY GARAGE AND PUBLIC WORKS PROPERTY

CITY OF WAUSAU, MARATHON COUNTY, WISCONSIN

September 1989



Prepared for: The City of Wausau, Wisconsin

Prepared by: Becher-Hoppe, Inc.
330 Fourth Street
Wausau, Wisconsin 54402-8000

September 19, 1989

I, Vladimir Wojnar have reviewed the enclosed interim In-field Conditions Report with the knowledge that the final and updated version will be submitted to the Wisconsin Department of Natural Resources at a later date as stated by Becher-Hoppe, Inc. Furthermore, it is my understanding that the final report will also be reviewed by the Certified Hydrogeologist.

Hydrogeologist's Certification

Based upon my education and experience, I Vlad. Wojnar (Vladimir Wojnar), hereby certify that I am a Hydrogeologist meeting the requirements of NR 500.03(64), Wisconsin Administrative Code.

STS Consultants Ltd.
Consulting Engineers

540 Lambeau Street
Green Bay, Wisconsin 54303
414.494.9656/Fax 414.494.0851

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A set of plan sheets size 24" x 36" accompanies this report.

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I. GENERAL FACILITY INFORMATION

This In-field Conditions Report was requested by the Wisconsin DNR in accordance with Wisconsin Administrative Code NR 508.20(1). The purpose of the report is to help determine whether material used as fill on the property in question has a potential to impact the health, safety and welfare of the public or the environment.

The property is owned by the City of Wausau, Marathon County, Wisconsin and is used for the facilities of the Wausau Wastewater Treatment Plant and the City of Wausau Garage and Public Works. Primary contacts include Mayor John Robinson, Water and Sewerage Director Joseph Gehin, and City Engineer David Koch at the address and phone number shown below.

City Hall
407 Grant Street
Wausau, Wisconsin 54401
715/845-5279

The City has retained the engineering services of Becher-Hoppe, Inc. to prepare this report. The Engineer has also been involved with the rehabilitation of the Wausau Wastewater Treatment Plant. The address of the Engineer is as follows:

Gerald Bizjak, P.E., Evelyn Fisher, P.E.,
and Patrice Schaepe, EIT
Becher-Hoppe, Inc.
330 Fourth Street
P.O. Box 8000
Wausau, Wisconsin 54402-8000
715/845-8000

This study has had hydrogeological input from Becher-Hoppe, Inc. and has also been reviewed by a certified hydrogeologist who meets the qualifications of the State of Wisconsin. The hydrogeologist has also been involved with pump tests done at the site earlier this year.

Vladimir Wojnar

STS Consultants Ltd.

540 Lambeau Street

Green Bay, Wisconsin 54303

414/494-9656

The property is located on the west bank of the Wisconsin River in the City of Wausau, to the south of Thomas Street as shown on Plan Sheet 2. It lies at the intersection of Sections 35 and 36 of T29N, R7E and Sections 1 and 2 of T28N, R7E. The majority of the property lies in the SW 1/4 of the SW 1/4 of Section 36. The property is bounded to the north by Adrian Street, to the east and south by the Wisconsin River, and to the west by private property. The total acreage of the City property is approximately 25.8 acres.

No public or private water supply wells lie within one-half mile of the fill area. A number of private wells were in use in the area south of Chellis Street (then part of the Town of Rib Mountain) before it was annexed to the City in 1983. City water was provided to the area after the time of annexation and all the property owners are currently hooked up to City water; no private wells remain connected for domestic use. Well logs have been obtained from the Wisconsin Geological and Natural History Survey for private wells in the annexed area and are shown in Appendix A. The location of those lying within 1200 feet of the believed limits of fill are also shown in the appendix.

II. FACILITY HISTORY

The property owned by the City of Wausau is currently used for the community wastewater treatment plant on the eastern half and also houses the City of Wausau Garage and Public Works Department on the western half. The treatment plant and an incinerator were built in 1939-40 at the site to serve the City of Wausau. Rehabilitation of the plant occurred in 1969-70 at which time most of the incinerator was dismantled. The smokestack, however, still stands over the north end of the site. The public works land now has some buildings, garages, and areas used to store equipment and piles of sand.

Sloughs of the Wisconsin River were present at the site before the wastewater treatment plant was constructed. Aerial photographs taken of the area in 1938, 1948, and 1958 show the sloughs during the progression of filling. The 1938 photograph (Appendix B) shows what is believed to be the undisturbed original topography of the site. A diagram from 1947 (Plan Sheet 3) shows the slough contours from that time and the proposed fill area for a new shoreline. By 1958 the fill had been extended to contours which were close to those observed most recently. It is believed that the area has not accepted fill since 1968-69 when the incinerator was taken out of commission. There are no active fill areas.

Three main types of fill are believed to have been placed at the site: 1) waste sand from the nearby Minnesota Mining and Manufacturing Company (3M) plant, 2) ashes from the incinerator that was in operation at the site, and 3) municipal refuse. The City of Wausau has not been able to find any records concerning the waste volumes, base grades, extent of fill, or the fill practices at the site. Consequently, a

number of test pits were dug as shown on Plan Sheet 2. Excavation done for the current rehabilitation of the treatment plant has also proved helpful in determining how the site was filled and the vertical and horizontal extents of the filling.

The 3M sand has been used for fill over much of the site. This material is relatively inert and when properly compacted is considered a good fill material in the local area. It is generally light colored with patches of darker colors, usually green and blue. Ashy material from the incinerator may have also been used as fill. Fine black or gray material has been found at several locations at the site. Reports from area landowners indicate that in some areas municipal refuse was placed directly into the sloughs before being covered and leveled off with 3M sand. The municipal refuse fill encountered in excavations has generally consisted of bottles, cans, ceramic pieces, newspapers, leather items, etc, in a dark, soil layer. The lateral extent of the refuse seems to be confined to the area of the original sloughs as shown on Plan Sheet 2 and in Figure 1. The outline of the sloughs was taken from the 1938 aerial photograph of the region. Some of the test pits and excavations have also shown that refuse lies in rather thin layers in areas such as around the proposed secondary clarifier. East of the proposed secondary digesters and south of the proposed filtration and disinfection building, however, the refuse has been found to be about ten feet thick, at five to six feet below ground surface. A thick layer of refuse was also found to the south of the proposed sludge storage building.

Gas generation and migration is thought to be somewhat limited at the site since a large amount of the fill appears to be 3M sand which is generally low in organics and not likely to generate large quantities of

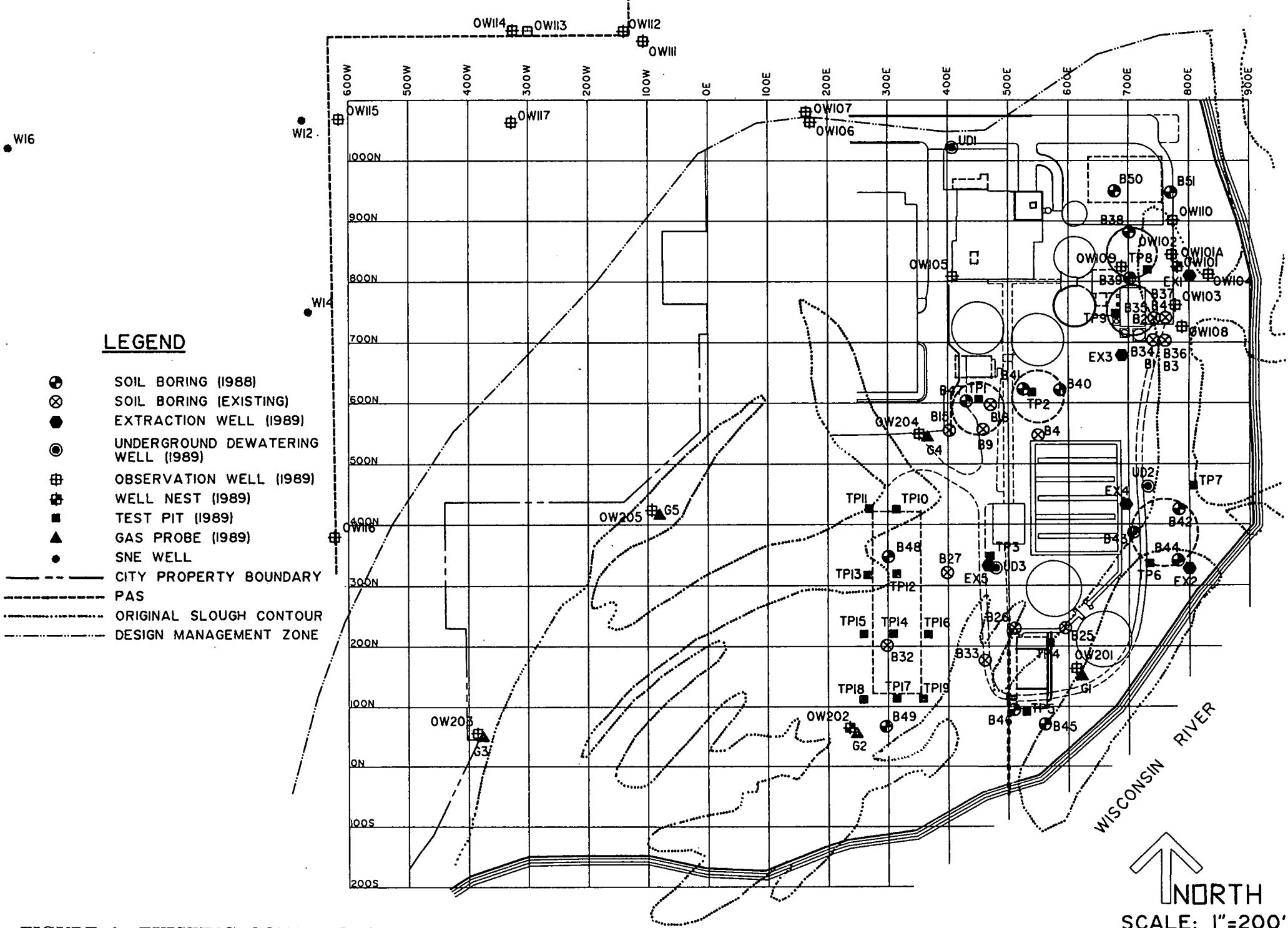


FIGURE 1. EXISTING CONDITIONS

gases. The municipal refuse, however, has more potential to generate methane and carbon dioxide during the decomposition process. A series of gas probes have been installed around the site in order to measure the gas concentrations. The locations of the five gas probes can be found on Plan Sheet 2. Due to the generally sandy nature of the soils, if gas is or was generated, it has potential for migration.

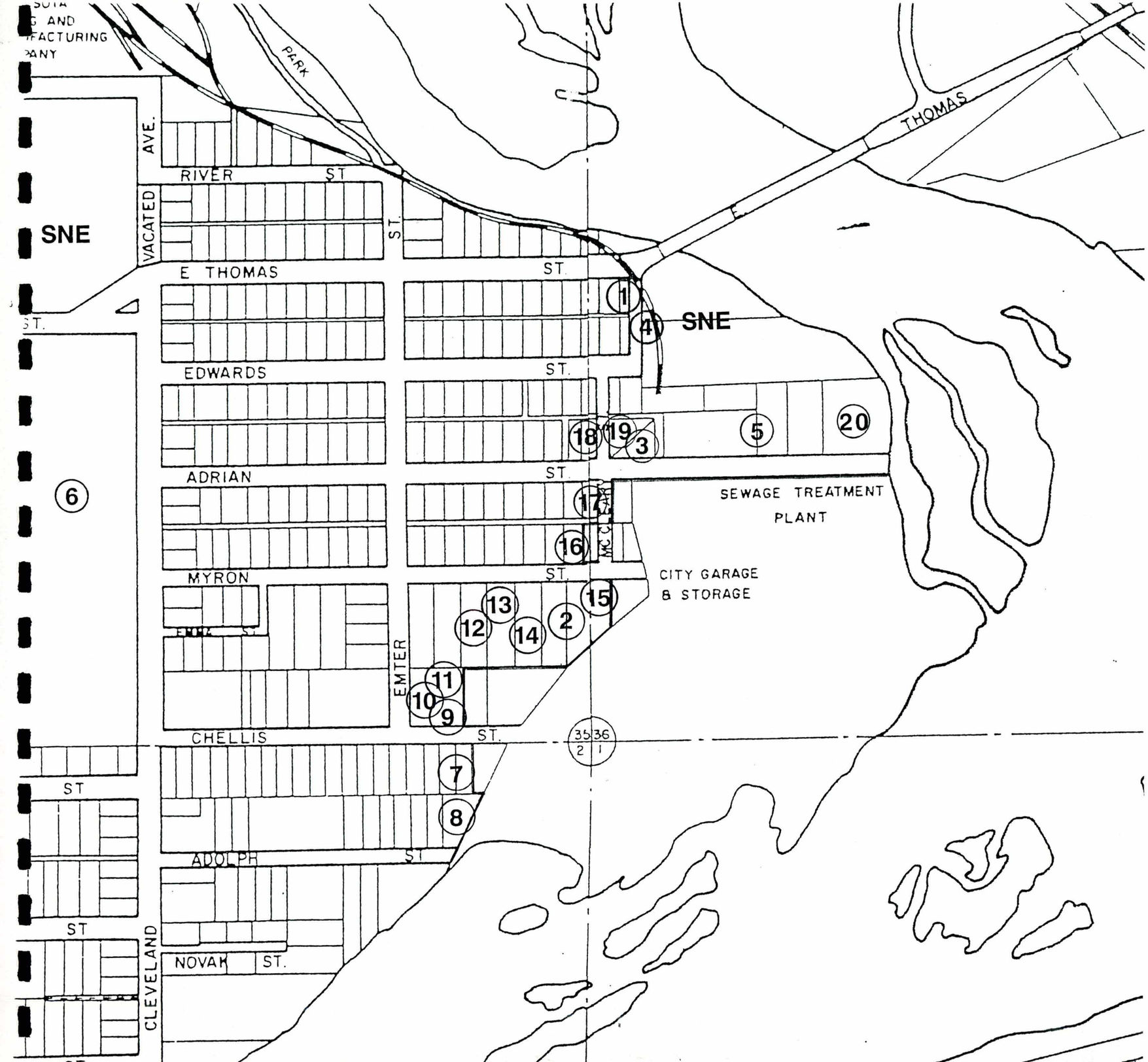
III. LAND USE INFORMATION

The area around the fill property is developed and has consequently seen varied uses for many years. A general zoning map for the region within a mile of the area of fill is shown on Plan Sheet 4. It shows the areas used for residential, industrial, and commercial activities (2). The area south of Chellis Street was not sewered until after annexation probably in 1985, so there may be locally impacted groundwater areas where septic systems were densely located or not working properly.

Several industries are located in the area of the City of Wausau property. At least one of these operations is known to have affected the groundwater in the region; SNE Enterprises (formerly Crestline), 910 Cleveland Avenue, Wausau, is responsible for contaminating groundwater with a plume of pentachlorophenol (PCP). Other businesses in the area which are located on Figure 2 include:

1. Jim's Mobil Service at 249 Thomas Street
2. Wausau Crankshaft at 233 Myron Street
3. Linder Electric Motors at 308 Adrian Street
4. Miller Machine and Supply at 1109 McCleary Street
5. Wausau Supply Company at 320 Adrian Street
6. Connor Forest Industries at Thomas and Cleveland (major building closed and demolished, Connor Toy still operating).

The quality of the Wisconsin River in the area is affected by municipalities and industry within and outside of Marathon County and by improper agricultural practices (3). A number of industries located more than one mile upstream of the site may have affected the quality of the water over the years. Some major plants bordering the Wisconsin River



SNE Enterprises (formly Crestline) - 910 Cleveland Avenue

1. Jim's Mobil Service - 249 Thomas Street
2. Wausau Crankshaft - 233 Myron Street
3. Linder Electric Motors - 308 Adrian Street
4. Miller Machine and Supply - 1109 McCleary Street
5. Wausau Supply Company - 320 Adrian Street
6. Connor Forest Industries - Thomas and Cleveland
7. Lawrence Andreas - 109 Chellis Street
8. Robert F. Sachse & Paula Gourdoux - 104 Adolph Street
9. Barbara L. Guenther - 1429 Emter Street
10. William J. Bergs - 1423 Emter Street
11. Gary J. Seubert - 1419 Emter Street
12. Roger A.Kittel - 213 Myron
13. Harvey H. Rusch - 219 Myron
14. William J. Evenson Jr. - 225 Myron
15. Norman F. Knoblock - 239 Myron
16. Michael M. Savola - 236 Myron
17. Gregory D. Jesse - 239 Adrian
18. Elsie P. Schewe - 240 Adrian Street
19. Larry G. Gibson - 1215 McCleary
20. Harold Steinagel - 336 Adrian

N

SCALE: 1" = 300'

FIGURE 2. ADJACENT PROPERTY OWNERS

upstream of the fill area include Marathon Electric Manufacturing Corp., Wausau Chemical Corp., James River Corp. (formerly American Can Co.) and Wausau Paper Mills Co. in Brokaw.

Property owners adjacent to the fill area are identified in Figure 2. Ownership of these properties was verified in September 1989 at the Marathon County Courthouse.

A number of recreational areas are located in the region of the treatment plant, the most prominent of which are Oak Island and Isle of Ferns City parks. A letter from the DNR Bureau of Endangered Resources identifies the flora and fauna of concern in this area and is included in Appendix C. No endangered species, critical habitats, or unique natural or scientific areas have been identified in the immediate area of the treatment plant.

The State Historical Society has also been contacted to determine whether any historical or archaeological areas exist in the region. A letter from Richard Dexter (Appendix C) indicates that no historical sites are known in the area. In a phone conversation with Jennifer Kold of the Society a concern was expressed for any deep archaeological sites which would be directly affected by excavation and construction deeper than the depth of the existing fill. The deepest excavation for the rehabilitation of the treatment plant will not extend much deeper than the original fill so any potential deep sites would not be affected.

Since the site is not proposed for additional landfill purposes, the need to address transportation routes, access roads and weight limits does not seem to apply. Local roads are shown on the plan sheets.

IV. REGIONAL GEOTECHNICAL INFORMATION

A. Existing Topography

The regional topography of this section of Marathon County is dominated by Rib Mountain, an inclusion of quartzite rising to the southwest of the City of Wausau. Several other bedrock hills are present in the area. Glacial activity that entered the county during three different periods (as shown in Figure 3) and the erosion caused by the Wisconsin River have been important in determining the topography of the region (4). In general, the topography ranges from rather flat to somewhat rolling as shown on the USGS quadrangle maps of the area presented on Plan Sheet 5.

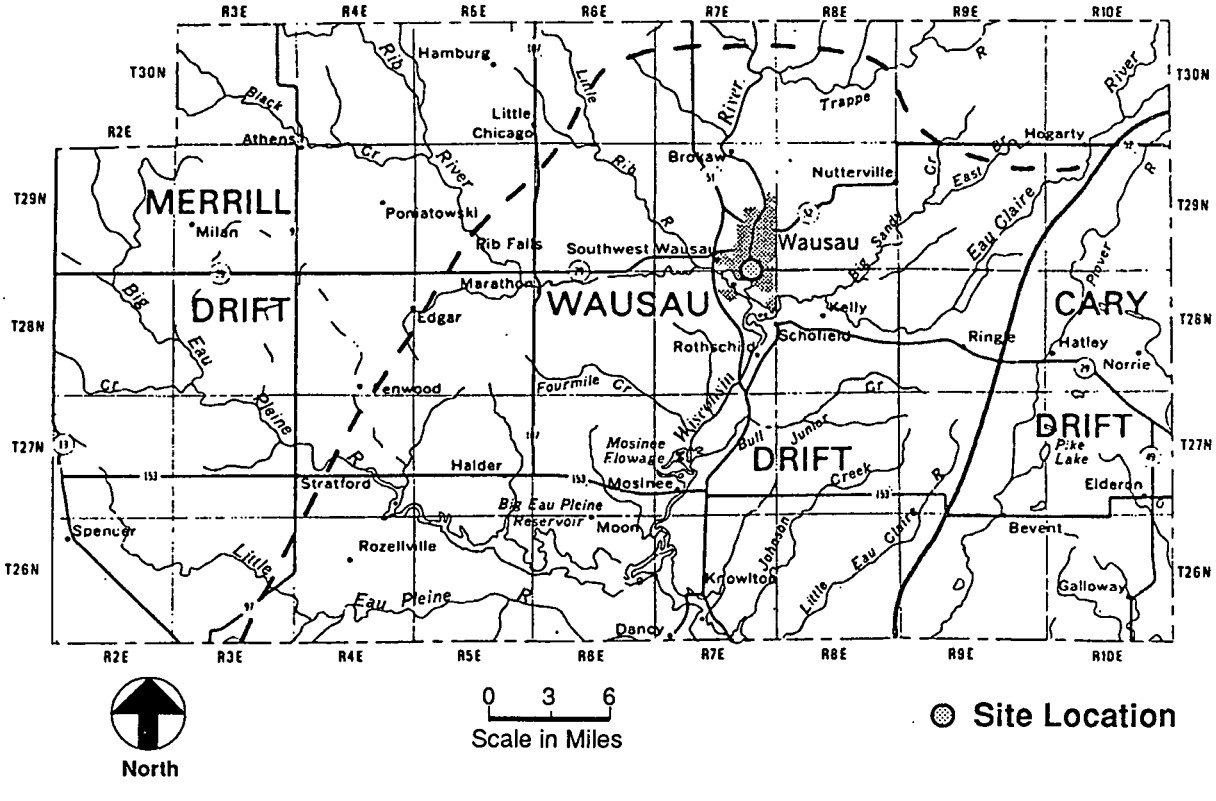


FIGURE 3. MARATHON COUNTY GLACIAL DRIFT MAP
Showing the approximate distribution of different till sheets.
Source: Precambrian Geology of Marathon County, Wisconsin, LaBerge and Myers, 1983.

al **Alluvium.** Stream-deposited sand and gravel.

gl **Glacial Deposits.** Till and outwash; shown only in areas where geology of underlying units cannot be determined.

db **Diabase dikes.** Microgabbro with or without olivine occurring as dikes.

nmg **Granite and quartz monzonite.** Moderate orange to pink, coarse-grained granite and quartz monzonite near Nine Mile Swamp consisting of alkali feldspars, quartz, and biotite (s21,T28,R7).

tsy **Tabular syenite.** Pyroxene- and amphibole-bearing syenite with alkali feldspar laths and lensoidal mafic inclusions forming a tabular fabric (SE¼ s22,T29,R6).

nsy **Nepheline syenite.** Coarse-grained to pegmatitic gneissic amphibole-biotite-nepheline syenite (SE¼ s22,T29,R6).

asy **Amphibole syenite.** Pink to gray, amphibole-bearing syenite with texture varying from aplitic to pegmatitic (s23,T29,R6).

psy **Pyroxene syenite.** Moderate olive gray, coarse-grained, flow-lineated, pyroxene-bearing syenite (s14, T29, R6).

lsy **Lensoidal syenite.** Pyroxene- and amphibole-bearing syenite with flow-oriented lensoidal xenoliths (s27, T29, R7).

lqsy **Quartz syenite.** Quartz syenite with abundant flow-oriented metasedimentary and metavolcanic xenoliths (s7, T28, R7).

syv **Syenitized metavolcanics.** Fine- to medium-grained metavolcanics with masses and veinlets of potassium feldspar and biotite (s30, T30, R7).

q **Quartzite.** White to gray, coarse-grained quartzite which locally shows relict stratification, ripple marks, and cross bedding. This unit occurs as xenoliths in the Wausau syenite and its age is unknown (s8,T28, R7).

lg **Leucogranite.** Leucogranite with texture varying from aplitic to pegmatitic with common graphic granite texture and consisting mainly of potassium feldspar and quartz.

ghg **Granite.** Brownish red, medium-grained leucocratic granite near Granite Heights with a homogeneous, allotriomorphic granular texture and consisting of 25 to 35 percent quartz, 45 to 60 percent perthitic microcline, 15 to 20 percent plagioclase (An_{5-10}), and less than 5 percent green biotite (s26, T30, R7).

gr **Granite.** Pink, medium-grained leucocratic granite east of Abbotsford. Similar to lrg (s11, T28, R2).

qd **Quartz diorite.** Quartz diorite occurring as intrusion breccias consisting of chaotic mixtures of felsic intrusive rock and metavolcanic country rock. The rock consists of 20 to 30 percent quartz, 40 to 60 percent strongly zoned plagioclase (AN_{35}, average), and 10 to 30 percent hornblende and biotite.

MAP SYMBOLS

contact - dashed where approximately located
- dotted where concealed

fault - dashed where approximately located

zone of intense cataclasis

Strike and dip of beds

70 inclined — vertical — 80 overturned — top of pillow

Strike and dip of foliation

70 inclined — vertical

Bearing and plunge of lineation

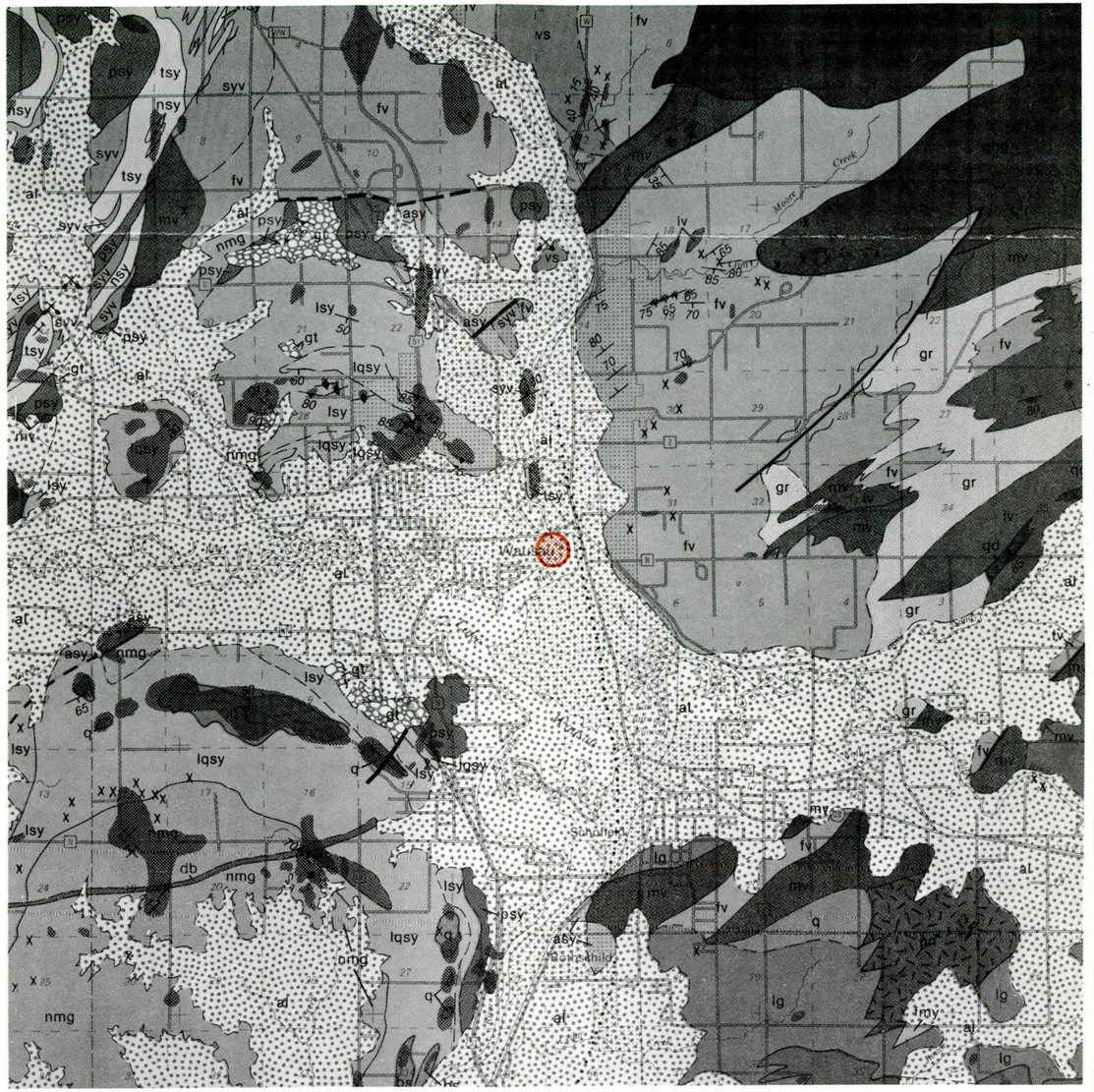
15 inclined

Note: Planar symbols (strike and dip of beds, foliation or schistocity) may be combined with linear symbols to record data observed at same locality by superimposed symbols at point of observation.

shaft — quarry — gravel pit

Area of outcrop

large — small, isolated



vs **Volcanogenic metasedimentary rocks.** Argillite, graywacke, conglomerate, and iron-formation; locally this unit is strongly foliated.

fv **Felsic metavolcanic rocks.** Rhyolite to dacite occurring as welded and non-welded felsic tuff, bedded tuff, volcanic breccia, and lava flows, with subordinate interstratified metasedimentary rocks, pyroclastic breccia, flow breccia, massive and flow-banded flows, and conglomerates.

iv **Intermediate metavolcanic rocks.** Medium-gray to pale-green, andesite and dacite occurring as tuffs and porphyritic, massive, and pillowed flows.

mv **Mafic metavolcanic rocks.** Green to black, chlorite-rich basalt occurring as pillowed and massive flows and tuff.

gn **Quartzofeldspathic gneiss and migmatite.** Medium- to coarse-grained, quartzofeld spathic, biotite- and hornblende-bearing gneiss, amphibole, and migmatite.

Site Location

N

0 1 2 3 4
Scale in Miles

FIGURE 4. BEDROCK MAP
Source: Bedrock Geology of Marathon County, Wisconsin, G. L. LaBerge and P. E. Myers, 1983

The USGS topographic maps also show that the major surface water drainage features in the region are the Wisconsin River in the general vicinity of the site, and two tributaries of the Wisconsin River to the south of the site: the Rib River (and Little Rib) to the west; and the Eau Claire River (and Big Sandy Creek) to the east. Run off in the metropolitan area of Wausau is generally directed into storm sewers which conduct the flow eventually into the Wisconsin River. The site is located between two dams on the river. The upstream dam is about one mile north of the site, the other is about five miles downstream which creates Lake Wausau.

B. Geology

The geology of Marathon County has been examined by LaBerge and Myers (4). Part of their bedrock map has been reproduced in Figure 4. A more general account of the geology of the region is given by Kendy and Bradbury in their report on the Wausau Aquifer (5) which is recounted here.

The Precambrian units consist of Early Proterozoic metavolcanic and granitic rock that were intruded by Middle Proterozoic syenite and associated granitic bodies including the Wausau and Stettin syenite and the Ninemile granite. The Wausau syenite outcrops are found west of the Wisconsin River. The Ninemile granite forms most of Rib Mountain; the tops of Rib Mountain and Mosinee and Harwood Hills are large quartzite inclusions.

The Ninemile granite is often found weathered to a poorly sorted, clayey residuum directly over unweathered bedrock. This is called grus, weathered bedrock, or rotten granite, and has a high silt and clay content and low sand content. It often contains angular granitic rock

fragments including angular feldspar fragments that rarely occur in the outwash. The bedrock weathered zone is several orders of magnitude less permeable than the overlaying sand and gravel, and acts as the lower boundary of the unconfined aquifer.

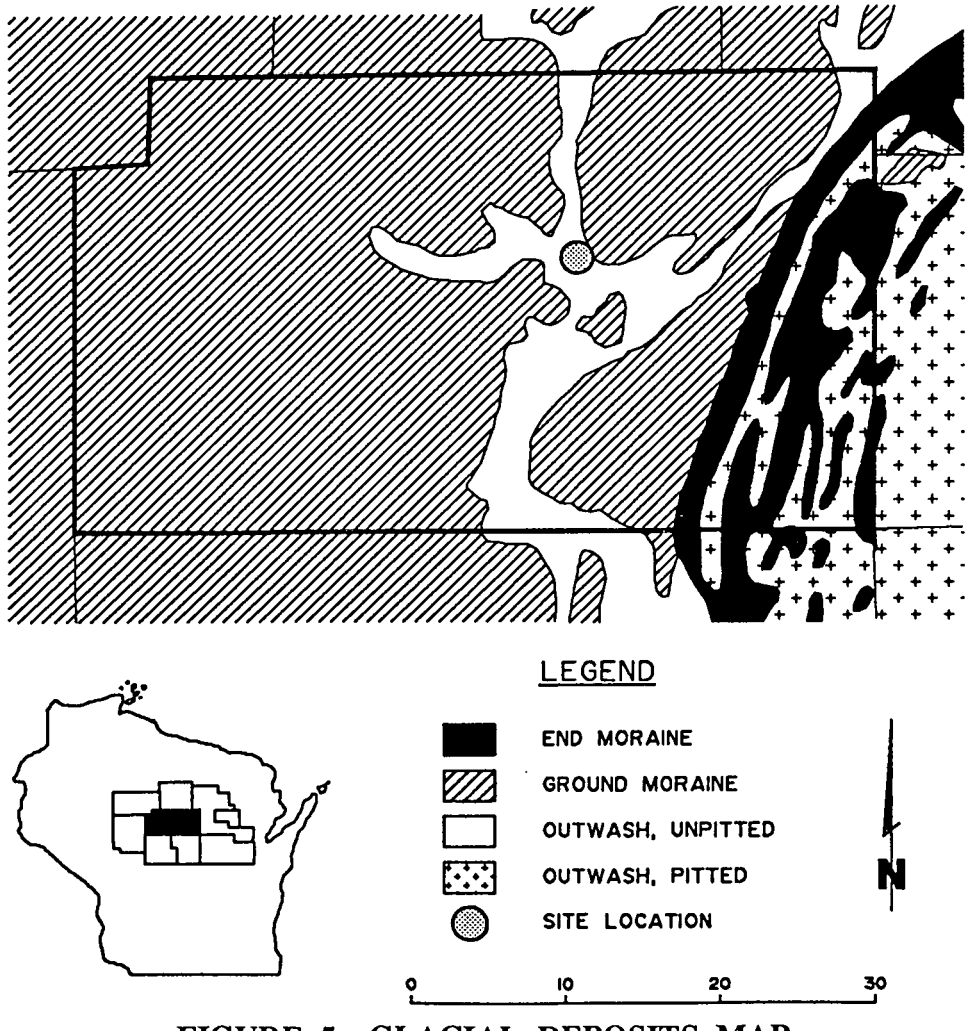


FIGURE 5. GLACIAL DEPOSITS MAP
Source: Surface Water Resources of Marathon County, WDNR, 1977

Surrounding the Wausau Aquifer is an eroded upland, partly covered by Pleistocene glacial sediment derived from late Wisconsin terminal moraines of the three separate glacial lobes. The glaciers that contributed outwash traversed a complex of Precambrian rocks. Although no till has been found in the Wisconsin River Valley itself, a variety of lithologies occurs in the moraines surrounding the Wausau aqulfer. Figure 5 shows the general location of glacial deposits in Marathon County.

The Wisconsin River and its tributaries, which were probably formed in Precambrian fault zones, carried away large loads of outwash at highly variable discharges from the ice margin of the glacial lobes. This resulted in the formation of braided stream channels in the valleys. The deposits are stratified, often cross-bedded, well rounded to angular sand and gravel. Lateral correlation of stratigraphic units is virtually impossible due to the extremely heterogeneous nature of the depositional bedding.

C. Surficial Soils

The soils found in the Wisconsin River Valley near the site are generally sandy soils with sandy subsoils and substrata, and are found on outwash plains. More specifically the soils belong to the Mahtomedi-Manahga-Kronen Association (6) as shown in Figure 6. The only other general soil type within a five-mile radius of the site is the Fenwood-Milladore-Rozellville Association: gently sloping to steep, well to somewhat poorly drained loamy soils (6). More specific soils maps from the Marathon County Soil Survey Report which is being prepared by the Marathon County Land Conservation Dept and the U.S. Dept. of Agriculture -- Soil Conservation Service are included in Appendix D. These maps show the majority of the property to be Dunnville fine sandy loam.

U. S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

LEGEND FOR GENERAL SOIL MAP OF MARATHON COUNTY

Revised 1/81

A. Loamy soils developed in glacial drift

1. Magnor - Freeon - Cable Association
   Nearly level to sloping, poorly to moderately well drained, silty soils with loamy subsoils and reddish brown sandy loam substrata; on uplands.

2. Withee- Marshfield - Angelica Association
   Nearly level and gently sloping, somewhat poorly to very poorly drained, silty soils with loam to clay loam subsoils and substrata; on uplands.

3. Kennan - Rosholt Association
   Nearly level to moderately steep, well drained silty and loamy soils with sandy loam to loam subsoils and substrata of brown sandy loam to loamy sand glacial till or stratified sand and gravel; on uplands and outwash plains.

4. Same as 3.

B. Loamy soils developed in residuum weathered from bedrock.

5. Fenwood - Milladore - Rozellville Association
   Gently sloping to steep, well to somewhat poorly drained loamy soils with loam to clay loam subsoils and substrata weathered from granitic and gneissic rocks; on uplands.

6. Point - Mosinee - Dancy Association
   Gently sloping, well to poorly drained loamy soils with sandy loam subsoils and loam to gravelly loam substrata weathered from gneissic rocks; on uplands.

7. Marathon - Moberg - Mylrea Association
   Gently sloping to moderately steep, well to somewhat poorly drained loamy and silty soils with very gravelly sandy loam and gravelly loamy sand subsoils and substrata weathered from coarse-grained granitic rock; on uplands.

C. Loamy and sandy soils developed in sandy and gravelly outwash

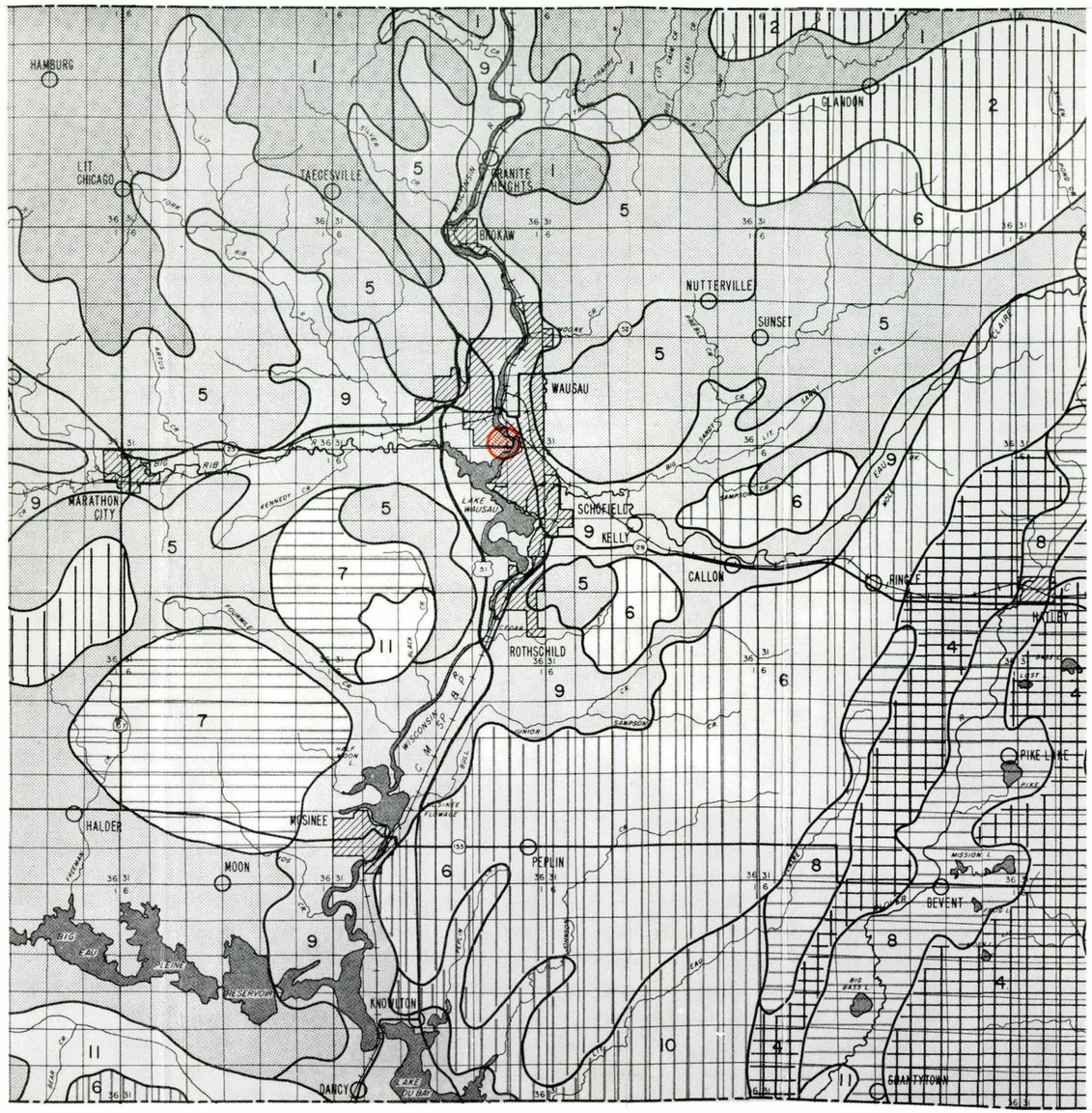
8. Rosholt - Oesterle - Scott Lake Association
   Nearly level and gently sloping, somewhat poorly to well drained silty and loamy soils with sandy loam to loam subsoils and substrata of sand and gravel; on outwash plains.

9. Mahtomedi - Menahga - Kronen Association
   Nearly level to sloping, moderately well to excessively drained, sandy soils with sandy subsoils and substrata; on outwash plains.

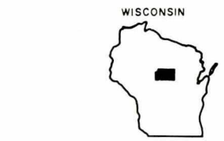
10. Same as 6.

D. Organic soils

11. Markey - Rifle - Kinross Association
    Nearly level, very poorly drained organic soils over sand, deep organic soils, and poorly drained sandy soils with sandy subsoils and substrata; in basins or depressions and outwash plains.



WISCONSIN



SCALE 1/253,440

SCALE I 0 1 2 3 4 5 MILES

LEGEND

- COUNTY BOUNDARY
- INCORPORATED TOWN
- UNINCORPORATED TOWN
- DRAINAGE
- U.S. HIGHWAY
- STATE HIGHWAY
- RAILROAD
- G.L.O. TOWNSHIP LINE
- SECTION LINE
- SITE LOCATION

N

SOURCE: SCS FAMILY OF MAPS 5,S-32,828
AND INFORMATION FROM FIELD TECHNICIANS

USDA-SCS-LINCOLN, NEBR. 1974

POLYCONIC PROJECTION

FIGURE 6.
SOIL ASSOCIATION MAP
OF CENTRAL MARATHON COUNTY
Source: Marathon County Solid Waste Management Plan Update, Marathon County Planning Commission, 1980

This series has bedrock deeper than 5 feet and "apparent" groundwater from 3 to 6 feet, November through May. The soil Interpretations Records for the soil types found on and adjacent to the site are included in Appendix D also.

D. Groundwater

The groundwater in the region near the site can be thought of as belonging to two aquifers: the Wausau Aquifer (5) consisting of sand and gravel deposits which fill the lower part of the Wisconsin River valley. It is extremely heterogeneous and rests on bedrock or clay. Aquifer thickness ranges from about 160 feet in the north to 40 feet in the south (5). The confined aquifer in the region consists of fractured granitic bedrock. The old wells in the area south of Chellis Street are either shallow in the sand and gravel, or deeper - often more than a hundred feet - into granitic rock. Well logs appear in Appendix A. The sand and gravel Wausau Aquifer is the more important supply for providing drinking water, and water for irrigation and industrial purposes near the Wisconsin River.

Groundwater contours in the Wausau Aquifer have been calculated by Kendy and Bradbury as shown in Figure 7. Contours for the surrounding area have been calculated by Lippelt and Hennings (7) as shown in Figure 8. According to Kendy and Bradbury the groundwater flow direction can be greatly influenced by the localized deposit in that less permeable beds will inhibit flow which could be directed through more permeable deposits; well sorted, coarse-grained material. Variations in hydraulic gradients can also occur in localized areas due to pumping, geology, river level fluctuations, and infiltration events. In general, however, flow is southward and toward the river, with large gradients

SCALE 1:62500

1 ½ 0 1

MILES

N

B B'

C C'

-1.5 x 10⁻³

-1.5 x 10⁻³

-7.1 x 10⁻⁴

+7.7 x 10⁻⁴

+5.2 x 10⁻⁴

-1.3 x 10⁻²

-3.9 x 10⁻²

0

+6.2 x 10⁻³

-3.4 x 10⁻⁴

Wausau

Schofield

Rothschild

Kelly

Rib River

Lake Wausau

Eau Claire Flowage

Moore Jim

Eau Claire River

EXPLANATION

Site Location

Boundary of the Wausau aquifer

1240 Contour interval is 10 feet.
Datum is mean sea level.

+5.2 x 10⁻⁴ Vertical hydraulic gradient (ft/ft) measured at piezometer nest.
Within the boundary of the Wausau aquifer the water table is within the sand and gravel aquifer; outside the boundary it is within fractured bedrock.

CROSS SECTIONS

EXPLANATION

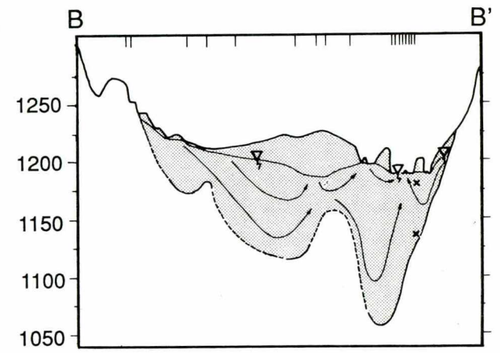
Sand and gravel

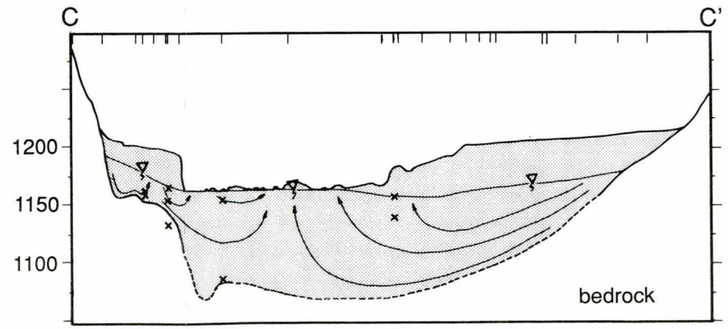
Water table

Piezometer screen

Well location

Streamline





Scale

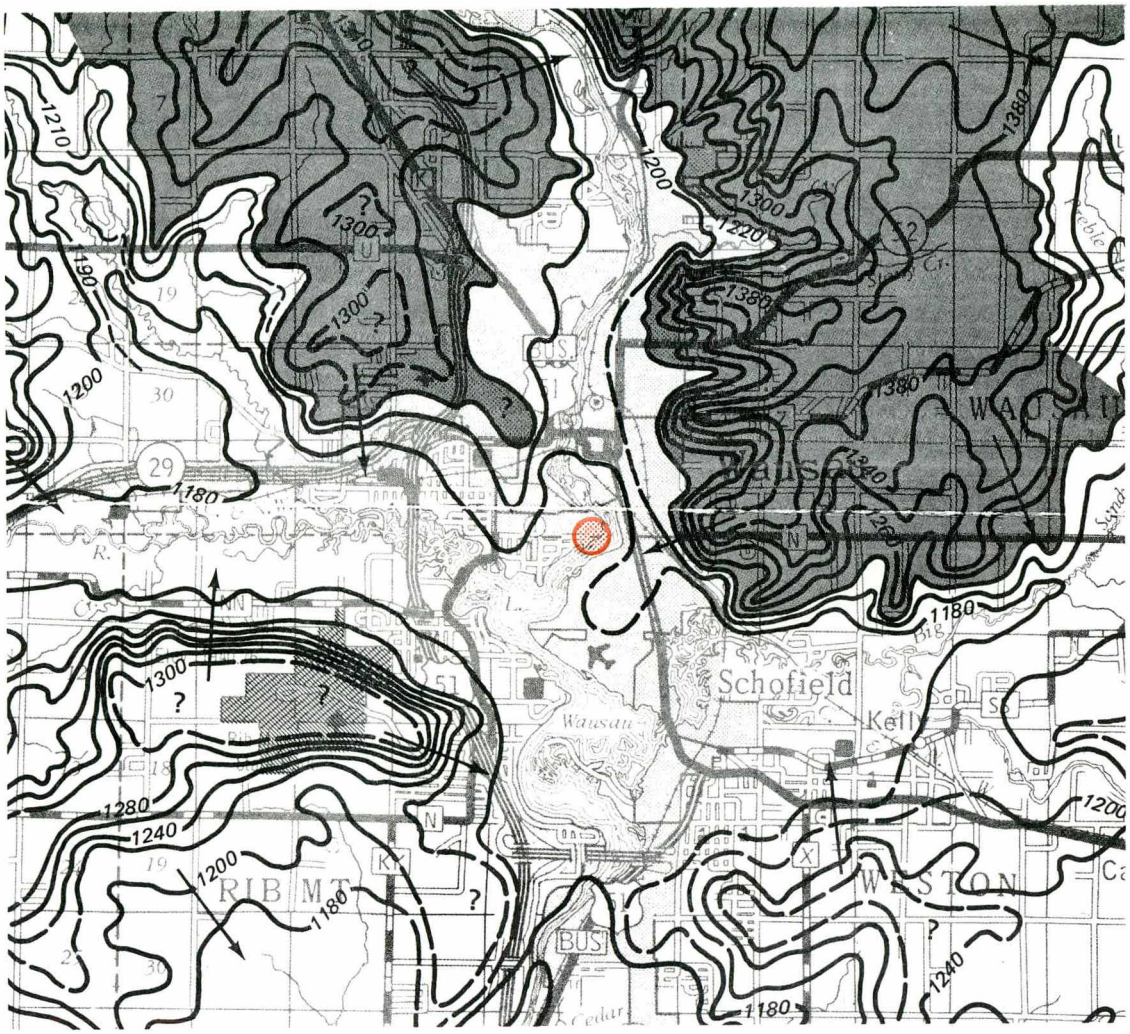
0 3000 6000 ft

0
50
100 ft

Vertical exaggeration
40 : 1

FIGURE 7. GROUNDWATER CONTOURS IN THE WAUSAU AQUIFER.

Source: Hydrogeology of the Wisconsin River Valley in Marathon County, Wisconsin, Kendy and Bradbury, WGNHS Informational Circular 64, 1988.



EXPLANATION

- Site Location
- Elevation of water table, 20-ft. interval Datum is mean sea level
- Areas with 40 ft. interval
- Probable location of water table
- Inferred location of water table
- ? Location of water table unknown, insufficient data
- Half interval, 10-ft.
- Direction of ground-water movement
- Ground-water divide, approximate location
- Probable ground-water divide
- Federal/state lands

Data have not been field checked.

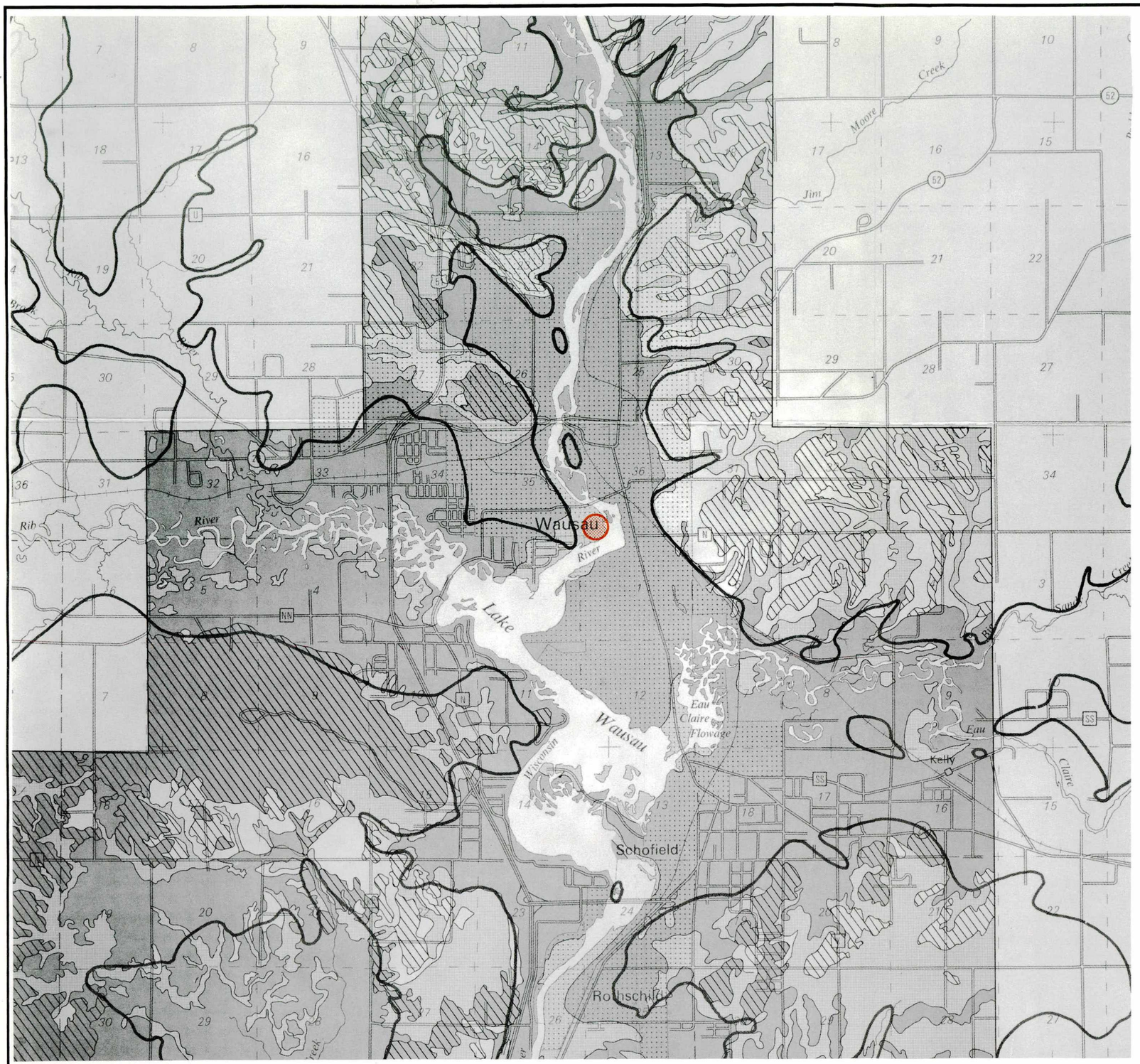
N

0 1 2

Scale in Miles

FIGURE 8. REGIONAL GROUNDWATER CONTOUR MAP

Source: Irrigable Lands Inventory—Phase I Groundwater and Related Information, Lippelt and Hennings, WGNHS, 1981



EXPLANATION

Site Location

Boundary of the Wausau aquifer

Attenuation potential

- Good
- Marginal
- Least
- Bedrock within 5 feet of surface.

Note: No soils in this area of Marathon County fall into the category "*best*" attenuation potential.

SCALE 1:62500

1 ½ 0 1

MILES

N

FIGURE 9. ATTENUATION POTENTIAL OF SOILS OVERLAYING PARTS OF THE WISCONSIN RIVER VALLEY, MARATHON COUNTY, WISCONSIN

Source: Hydrogeology of the Wisconsin River Valley in Marathon County, Wisconsin, Kendy and Bradbury, WGNHS Informational Circular 64, 1988.

existing where the topographic relief is greatest, to the east and southwest of the site.

The depth to groundwater varies across the region. Kendy and Bradbury have compiled data from about 500 wells in the Wausau Aquifer. Their data show that the depth to groundwater generally extends from 0 to 58 feet; the majority of wells have water at depths of 20 to 30 feet. The relatively shallow depth to the groundwater affects the ability of the soil to act as a buffer to potential contamination. Kendy and Bradbury have also published a potential groundwater contamination map. As shown in Figure 9, the Wausau Aquifer has generally low contaminant attenuation potential because of the shallow depth to groundwater and the relatively high permeability of the sand and gravel deposits. The study site is shown as having marginal potential.

E. Water Quality

The Wisconsin River quality has been studied and modeled for a number of years; much detailed testing information has been collected by the Wisconsin DNR. The hard-working Wisconsin River receives treated effluent from a number of sources, both municipal and industrial, upstream of this site. The Wausau Wastewater Treatment Plant typically discharges on the order of six million gallons per day (MGD) into the Wisconsin River just east of the study area. The current reconstruction work at the plant, 1989-90, will result in better quality effluent from this facility.

The Hydrologic Atlas (HA-367) for the Central Wisconsin River Basin (8) indicates large fluctuations in values of dissolved oxygen and BOD in samples collected from the Wisconsin River near the Wausau dam. The total dissolved solids also varies throughout the year. These values

are dependent upon several factors - river flow, precipitation, and temperature, among others.

The hydrologic atlas describes the groundwater as "generally good" with local problems due to high iron, hardness, and total dissolved solids. Also it must be noted that human activities have negatively affected the groundwater in many areas. The Marathon County Groundwater Plan (January 1988) (9) presents many examples of groundwater contamination problems which have occurred in the County. Some of the known causes of groundwater contamination problems include leaking underground fuel tanks, chemical spills or leaks, improper septic systems, old landfills, pesticides, and others. The Kendy and Bradbury report (5) mentioned the high potential for groundwater contamination in the Wausau Aquifer and many problem cases were also reported.

Within one mile of the study area contamination problems have been identified. The SNE Corporation (formerly Crestline) on Cleveland Avenue is responsible for an underground plume of pentachlorophenol (PCP). Concentrations of PCP have been measured in monitoring wells up to levels above 30,000 micrograms per liter. The plant is located about 2,000 feet northwest of the study area. The Wisconsin DNR has stated that the extent of the plume has stabilized and is not believed to be moving away from its current position. The distance from the City property to the nearest part of the plume is less than 1,000 feet.

Also directly west and southwest of the City fill area, there were many homes with private wells and septic systems. In 1984 several residents contacted the Wisconsin DNR and requested assistance. The Department began its "Adolph Street" file which documents water quality testing in several private wells. In their research a number of possible

sources of contamination were also suggested - underground gasoline tanks in the 100 block between Chellis and Adolph Streets, a possible fuel oil spill, and the old municipal fill area. Of six well tests reviewed, nearly all owners reported bad taste. In the same block one well had measured levels of benzene and xylene and another had benzene and tetrachloroethylene. Soon after these problems were found, the area was annexed to the City of Wausau and municipal water and sewerage were provided. The well construction information for the private wells in this area are included in Appendix A.

V. SPECIFIC FACILITY INVESTIGATIONS AND DATA PRESENTATION

A. Site Topography

Plan Sheet 2 shows the Existing Conditions at the City property. It can be seen from the two-foot contours shown on this diagram that the topography of the site is rather gentle; the surface elevations range from 1166 feet MSL in the southwest corner to about 1173 feet MSL in the center of the wastewater treatment facility.

B. Subsurface Conditions

Subsurface investigations have been done at the site throughout the history of the treatment plant, and are summarized below. Plan Sheet 2 and Figure 1 show the locations of the monitoring devices and facility boundaries. Soil boring logs and well construction diagrams are provided in Appendices E and F. These data have been used to prepare the Geological Cross Sections as located on Figure 10 and shown on Plan Sheets 8 through 11.

1. Twenty-six soil borings (B-1 to B-26) were made at the site in 1967 by Soil Testing Services of Wisconsin for the subsurface investigation for the proposed sewage treatment facilities rehabilitation (10). The findings from the drilling indicated that there was an average of 9 to 10 feet of sand fill over the entire site which was underlain by 2 to 5 feet of organic silt at all but three borehole locations. At one location (B-25) ash-type fill was noted from 0 to 21.5 feet. A medium dense sand deposit was found below the fill and organic soil.

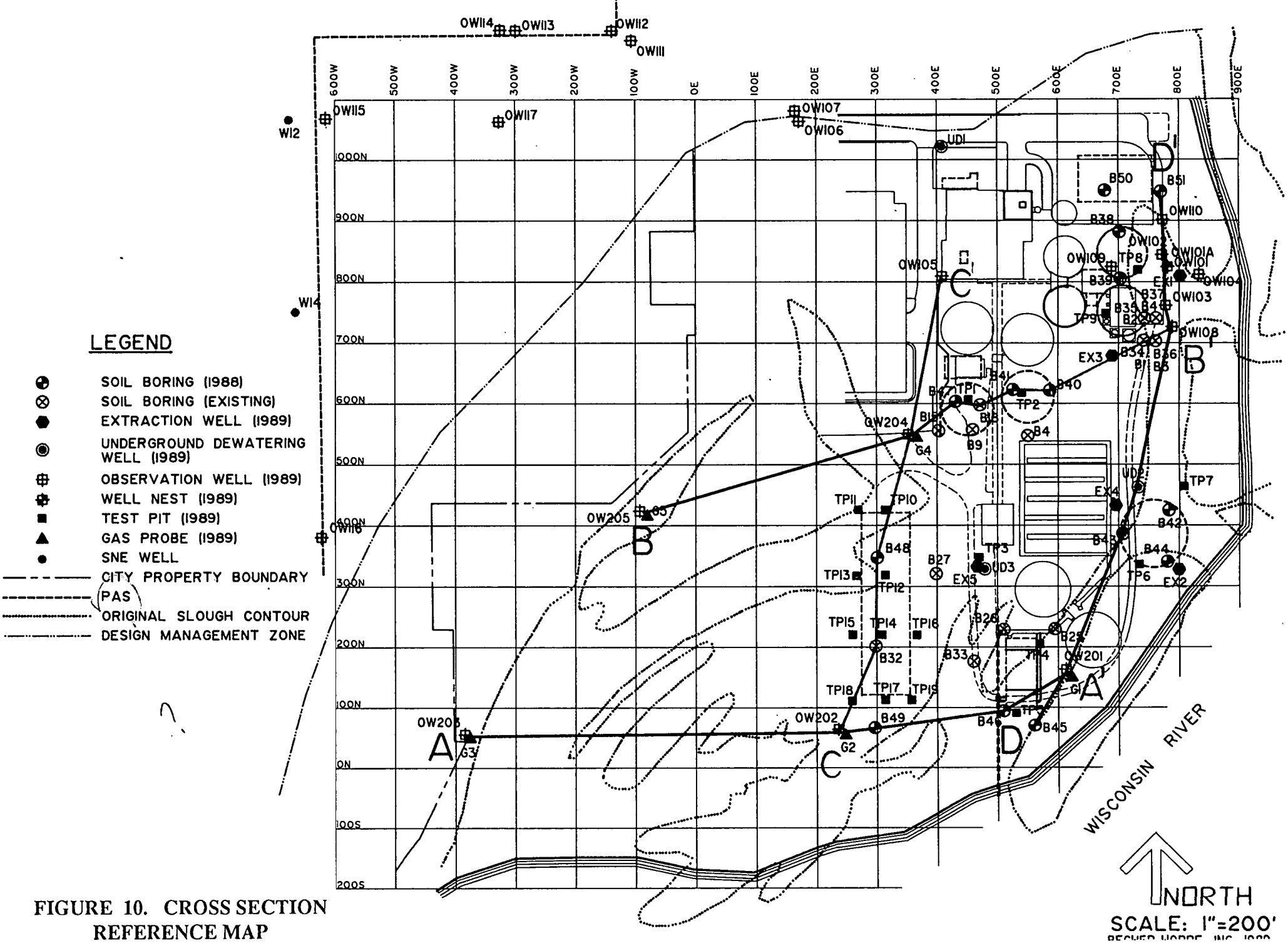


FIGURE 10. CROSS SECTION REFERENCE MAP

In some boreholes, organic silt was found under the fill at 1155 to 1158 feet MSL; down to 1153.5 ft. MSL in B-21. These organic silts or slightly organic silty fine sands range in thickness from 2 to 5 feet.

2. Seven more boreholes were drilled in June 1967 (10) (B-27 to B-33). 3M fill extended from 6 to 15 feet in depth. The fill tended to be slightly deeper in areas closer to the river. No organic silty soil layer was reported beneath the fill. B-29 had fill consisting of wood, cinders and metals to a depth of 17 feet.

3. Four borings were made in 1974 (10) (B-1 to B-4, or B-34 to B-37) to explore the foundation for the filter press building. Fill consisting of topsoil, sands, cinders, ash, brick, and glass extended to depths of 10 to 16 feet. Some 3M sand was also noted. Below the fill were granular soils consisting of silty sands and gravels, well graded sands and uniformly graded fine sands which were medium dense to very dense in relative density.

4. Four more borings were made in 1975 (10) (B-1 to B-4) at another location on the site for foundation purposes. Results?

5. Fourteen soil borings were also made in 1988 (B-38 to B-51) by Twin City Testing Corp. (11) for design of the current treatment plant renovations. Sandy fill was found at all the borings and extended below the surface 7 to 17 feet. Organic silt was found in Borings 41, 45 and 49 ranging from 2 to 8 feet deep. Cinders were found in Borings 44,

49 and 50 while glass and other materials were found in Borings 45, 46, 47 and 49.

6. Many borings and wells were installed in 1989 for the City of Wausau to evaluate groundwater flow (OW-101 to OW-110 and piezometer OW-101A) and to project and monitor the effects of dewatering for construction and the groundwater recharge system (OW-111 to OW-117) described below (10).

7. Five more borings, five observation wells (OW-201 through OW-205) and one piezometer (OW-202A) were installed on the south and west ends of the City property to better define the overall groundwater movement at this site. Well information forms (WIF) will also be provided. A hydrogeologist meeting the requirements of NR 500 supervised the well installations at this site.

8. During summer 1989 numerous test pits were excavated during construction at the site to evaluate the type, thickness and extent of fill.

9. Numerous borings and wells were installed by others in this area to monitor the PCP in the groundwater for the SNE Corporation. The wells are numbered with a "W" prefix (e.g. W-29). These logs are not included in the appendix.

Several deep boreholes were drilled in the past year at the site. The borehole for Well OW-102 was extended to 95.5 feet where weathered granitic bedrock was encountered. The borehole extended down to 83.5 feet at Well OW-107 did not show signs of bedrock. At OW-202 , the borehole was drilled down to 75 feet where a silty-clayey fine sand was found which was believed to be a weathered surface just above bedrock.

Bedrock was encountered at 21 feet at well OW-203. A five-foot rock core sample was identified as dark green mafic rock, most likely pyroxinite. (More specific rock classification was not possible without analysis of a polished thin section which was not in the scope of this report.) Several fractures were found in the core sample.

The private well logs also show bedrock to be rather shallow south of Chellis Street; at 12 to 41 feet blue, brown, red and gray "granite" was encountered. In general, the bedrock drops quite rapidly to the east from the southwest corner of the property

C. Laboratory and Field Analysis

The soil samples collected have been described and classified on the boring logs. Grain size analyses are being run on a number of samples per NR 512.11(4). In-field hydraulic conductivity has been determined to have values of 4×10^{-2} to 7×10^{-2} cm/sec (10) based on the pumping tests conducted at this site.

D. Groundwater

The depth to groundwater, groundwater flow direction and gradients, have been defined from the monitoring wells which were constructed over the past year. The elevation of the water table across the site has been monitored frequently since July 1989 when dewatering for the treatment plant rehabilitation construction began. One requirement prior to the start of dewatering was the installation and use of a groundwater recharge system designed to prevent the dewatering activities from affecting the PCP plume to the north and west of the site. A total of five extraction wells (EX-1 through EX-5) have been installed by the dewatering consultant, Underground Dewatering, to dewater the site during the current rehabilitation construction.

Groundwater elevations have been monitored during the dewatering at the following wells: those drilled for SNE (W-11, W-12, W-14, W-16, W-21, W-27, W-29 and W-31); new wells related to the pump test at the site (OW-101 through OW-110 and piezometer OW-101A); and seven rather shallow wells related to the groundwater recharge system (OW-111 through OW-117). In addition, five new wells (OW-201 through OW-205) and one piezometer (OW-202A) were recently installed on the south and west ends of the City property. These same wells are proposed to be checked for future rounds of measuring water levels.

STS Consultants Ltd. has reviewed groundwater data measured by Keystone Environmental for SNE and prepared groundwater contour maps of recent groundwater elevation measurements (10). These contour maps show that groundwater movement from the SNE property is generally eastward, perpendicular to the contours. At Emter Street, however, the contours flatten out and the water table remains horizontal eastward to the Wisconsin River. The river will generally control the water levels in the area around the treatment plant; although the flow is generally from west to east, flow may take on a more southerly direction when the river elevation is relatively high. Groundwater elevations are variable; the levels were more than one foot higher in January 1989 than three months earlier.

Groundwater elevations measured at the wells around the treatment plant before dewatering pumping began show no groundwater contours (Plan Sheet 6). A current water table contour map drawn from groundwater elevations measured September 12, 1989, is shown on Plan Sheet 7. Due to the pumping in extraction wells EX-1 through EX-5, the usually flat water table has taken on quite steep gradients and flow in

the system is directed towards the extraction pumps. The gradients are steepest on the east side of the site between the dewatering pumps and the river.

E. Groundwater Monitoring Plan

The five new wells and new piezometer have been designated, along with some of the old wells, as the water quality monitoring wells for this In-Field Conditions Report. New data will be collected to supplement the existing water quality data and to determine the background water quality. The designated wells include observation wells 201 through 205, 101, 105 and 107 and piezometers 101A and 202A. Since there are no longer any private water supply wells within 1200 feet of the site, none are proposed for sampling. Once the water quality assessment has been made from the designated site wells, the remaining wells may be abandoned in accordance with NR 141.

When the designated wells have been property developed, at least three rounds of water quality sampling will be performed in accordance with NR 508.20(5)(e). We propose to collect the samples (1.) in late September-early October 1989, (2.) in early to mid-November 1989, and (3.) in mid-to-late December 1989, allowing at least 30 days between rounds. The parameters to be tested include field conductivity, field pH, chloride, COD, hardness, alkalinity, dissolved iron, and the Table 2 (1) public health and welfare parameters. A VOC scan including xylenes will also be run for the first round at all designated water quality wells, and for the second and third rounds at the wells which may have had detections. We intend to have Enviroscan of Rothschild collect and analyze these samples. We will then tabulate and analyze the results.

Based on the three rounds of water quality analyses, at least three iso-concentration maps will be prepared for the site.

F. Gas Monitoring

Gas generation and migration will be monitored through the use of five gas probes located around the site. Gas probes were installed above the water table in September 1989. Initial gas readings using a Bacharach Model HPK taken on September 15, 1989, shown on Table 1, indicate that the methane concentrations are relatively low for a fill site, but that oxygen has also been depleted from the soil atmosphere. More readings are necessary to fully define the gas characteristics and the potential for gas migration.

Table 1

GAS PROBE READINGS - September 15, 1989

Probe	Oxygen (% by volume)	Methane (% by volume)
G-1	1.5	0.25
G-2	<1	<1
G-3	---	---
G-4	13	1.25
G-5	3	0

Note: Probe G-3 did not allow enough gas flow for readings.

VI. DATA ANALYSIS AND RECOMMENDATIONS

A number of items remain to be completed for this In-Field Conditions Report. We recommend that the following be done:

1. Take three rounds of water level measurements and groundwater samples for the designated wells and perform the analyses for background water quality as described in the Groundwater Monitoring Plan. This is scheduled to be done September through December 1989.
2. Collect at least three more rounds of gas monitoring data for the five probes at approximately the same schedule. We will analyze the results with regard to the site conditions and potential for migration.
3. Review soil test information and groundwater flow data. Summarize findings with regard to fill materials on-site. Complete the site water budget (12) including these.
4. Thoroughly analyze the water quality information to determine the degree and extent of contamination if any.
5. Make recommendations for future long-term groundwater monitoring, perhaps changing to a quarterly schedule corresponding with other solid waste facilities. Make recommendations for remedial actions at this site if necessary.

REFERENCES

1. Wisconsin Department of Natural Resources, Wisconsin Administrative Code, Solid and Hazardous Waste Management, Series NR 500, Madison, January 1988; Groundwater Quality NR 140; and other sections.

2. City of Wausau Zoning Ordinance, Wausau, June 6, 1989.

3. Wisconsin Department of Natural Resources (WDNR), Surface Water Resources of Marathon County, Madison, 1977.

4. LaBerge, G.L. and Myers, P.E. Precambrian Geology of Marathon County, Wisconsin, Information Circular Number 45, WGNHS, Madison, 1983.

5. Kendy, E. and Bradbury, K.R., Hydrogeology of the Wisconsin River Valley in Marathon County, Wisconsin, Information Circular 64, WGNHS, Madison, 1988.

6. Marathon County Planning Commission, Marathon County Solid Waste Management Plan Update, 1980.

7. Lippelt, I.D. and Hennings, R.G., Irrigable Lands Inventory - Phase I Groundwater and Related Information, Marathon County Land Conservation Department, WGNHS, Madison, September 1981.

8. Levaul, R.W. and Green, J.H., Water Resources of Wisconsin, Central Wisconsin River Basin, Hydrologic Investigations Atlas HA-367, USGS, Washington, D.C., 1971.

9. Marathon County Planning Department, Marathon County Groundwater Plan, January 1988.

10. STS Consultants Ltd., Analysis of Construction Dewatering, Additions to Wastewater Treatment Plant, Wausau, Wisconsin, Green Bay, July 1989, and many previous geotechnical reports, 1967-present.

11. Twin City Testing Corp., Geotechnical Exploration Program for Proposed Wastewater Treatment Facilities, Wausau, Wis., May 1988.

12. Scharch, J.F., Water Balance Analysis Program, WDNR, Madison, May 1985.

Appendix A

State of Wisconsin
Department of Natural Resources
Private Water Supply
Box 7921
Madison, Wisconsin 53707

NOTE:
White Copy – Division's Copy
Green Copy – Driller's Copy
Yellow Copy – Owner's Copy

WELL CONSTRUCTOR'S REPORT

Form 3300-15 Rev. 2-79

AUG 19 1981

1. COUNTY: Marathon
CHECK (✓) ONE: ☒ Town ☐ Village ☐ City
Name: Rib Mountain

2. LOCATION: ¼ Section or Gov't. Lot: NE¼ | Section: 2 | Township: 28N | Range: 7E
OR – Grid or Street No.: 152 | Street or Road Name: Adolph Street
AND – If available subdivision name, lot & block No.:

3. NAME ☒ OWNER ☐ AGENT AT TIME OF DRILLING CHECK (✓) ONE: Erwin Wiensch
ADDRESS: 152 Adolph Street
POST OFFICE: Wausau, WI
ZIP CODE: 54401

4. Distance in feet from well to nearest: (Record answer in appropriate block)

Building	Sanitary Bldg. Drain		Sanitary Bldg. Sewer		Floor Drain Connected To:		Storm Bldg. Drain		Storm Bldg. Se	
	C.I.	Other	C.I.	Other	C.I. Sewer	Other Sewer	C.I.	Other	C.I.	Other
15			45							

Street Sewer		Other Sewers		Foundation Drain Connected to:		Sewage Sump		Clearwater Sump	Septic Tank	Holding Tank	Sewage Absorption Unit	Manure Hopper c Retention or Pnuematic Tank
San.	Storm	C.I.	Other	Sewer		Sewage Sump	C.I.	Other			Seepage Pit	
				Clearwater Dr.		Clearwater Sump			75		Seepage Bed 95	
											Seepage Trench	

Privy	Pet Waste Pit	Pit: Nonconforming Existing	Subsurface Pumproom	Barn Gutter	Animal Barn Pen	Animal Yard	Silo With Pit	Glass Lined Storage Facility	Silo w/o Pit	Earthen Silage Storage Trench Or Pit	Earthen Manure Ba
		Well	Nonconforming Existing								
		Pump									
		Tank									

Temporary Manure Stack or Platform	Watertight Liquid Manure Tank or Basin	Manure Pressure Pipe	Subsurface Gasoline or Oil Tank	Waste Pond or Land Disposal Unit (Specify Type)	Manure Storage Basin	Other (Describe)
					Concrete Floor Only	
					Concrete Floor and Partial Concrete Walls	

5. Well is intended to supply water for: Home

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10	Surface	25	8	25	40
6	40	189			

7. CASING, LINER, CURBING AND SCREEN
Material, Weight, Specification

Dia. (in.)	Mfg. & Method of Assembly	From (ft.)	To (ft.)
6	O-Kura Mills ASTM A53 Gr. B 18.97# P.E.	Surface	40

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Drill Cuttings	Surface	6
Pressure Cement	6	40

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Sandy Clay	Surface	25
Grey Granite	25	180
Red Granite	180	189

10. TYPE OF DRILLING MACHINE USED
☐ Cable Tool ☐ Rotary-hammer w/drilling mud & air ☐ Jetting with
☐ Rotary-air w/drilling mud ☒ Rotary-hammer & air ☐ Air
☐ Rotary-w/drilling mud ☐ Reverse Rotary ☐ Water

Well construction completed on July 30 19 81

11. MISCELLANEOUS DATA
Yield Test: 2 Hrs. at 3 GPM
Depth from surface to normal water level 12'6" Ft.
Depth of water level when pumping 178 Ft. Stabilized ☒ Yes ☐ No

Well is terminated 12 inches ☒ above ☐ below final grade
Well disinfected upon completion ☒ Yes ☐ No
Well sealed watertight upon completion ☒ Yes ☐ No

Water sample sent to Wausau, WI laboratory on July 30 19 81

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, method of finishing the well, amount of cement used in grouting, blasting, etc., should be given on reverse side.

Signature: Alan F. Lang
Registered Well Driller

Business Name and Complete Mailing Address
Alan Lang Well & Pump, Inc.
3802 West Stewart Ave, Wausau, WI 54401

State of Wisconsin
Department of Natural Resources
Box 7921
Madison, Wisconsin 53707

NOTE: MAY 19 1977

White Copy – Division's Copy
Green Copy – Driller's Copy
Yellow Copy – Owner's Copy

WELL CONSTRUCTOR'S REPORT

Form 3300-15 Rev. 12-76

1. COUNTY: Marathon

CHECK (✓) ONE: ☒ Town ☐ Village ☐ City

Name: Weston

2. LOCATION: ¼ Section: NE¼ | Section: 2 | Township: 28N | Range: 7E

OR – Grid or Street No. | Street Name

AND – If available subdivision name, lot & block No.

3. NAME ☒ OWNER ☐ AGENT AT TIME OF DRILLING CHECK (✓) ONE: Jerel Tiedemann

ADDRESS: 121 Nowak St.

POST OFFICE: Wausau, WI 54401

4. Distance in feet from well to nearest: (Record answer in appropriate block)

Building	Sanitary Bldg. Drain		Sanitary Bldg. Sewer		Floor Drain Connected To:		Storm Bldg. Drain		Storm Bldg. Sewer	
	C.I.	Other	C.I.	Other	C.I. Sewer	Other Sewer	C.I.	Other	C.I.	Other
10	–	–	–	–	–	–	–	–	–	–

Street Sewer		Other Sewers		Foundation Drain Connected to:				Sewage Sump		Clearwater Sump	Septic Tank	Holding Tank	Sewage Absorption Unit	
San.	Storm	C.I.	Other	Sewer	–	Sewage Sump	–	C.I.	Other				Seepage Pit	60
–	–	–	–	Clearwater Dr.	–	Clearwater Sump	–	–	–	–	36	–	Seepage Bed	–
													Seepage Trench	–

Privy	Pet Waste Pit	Pit: Nonconforming Existing		Subsurface Pumproom Nonconforming Existing	Barn Gutter	Animal Barn Pen	Animal Yard	Silo With Pit	Glass Lined Storage Facility	Silo w/o Pit	Earthen Silage Storage Trench Or Pit
–	–	Well	–	–	–	–	–	–	–	–	–
		Pump	–								
		Tank	–								

Temporary Manure Stack	Watertight Liquid Manure Tank	Solid Manure Storage Structure	Subsurface Gasoline or Oil Tank	Waste Pond or Land Disposal Unit (Specify Type)	Other (Give Description)
–	–	–	–	–	none

5. Well is intended to supply water for: Home

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10	Surface	20			
6	20	142			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification & Method of Assembly	From (ft.)	To (ft.)
6	19.45# new black Std. steel T&C casing API-5L mfg. Valley Steel Corp.	Surface	40

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
puddle clay	Surface	20

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Clay	Surface	40
Gray granite	40	142

10. TYPE OF DRILLING MACHINE USED

☐ Cable Tool
☐ Rotary-air w/drilling mud
☐ Rotary-w/drilling mud
☐ Rotary-hammer w/drilling mud & air
☒ Rotary-hammer & air
☐ Reverse Rotary
☐ Jetting with: ☐ Air ☐ Water

Well construction completed on 5/16 19 77

11. MISCELLANEOUS DATA

Yield Test: 1 Hrs. at 2½ GPM

Depth from surface to normal water level 6'6" Ft.

Depth of water level when pumping 142 Ft. Stabilized ☒ Yes ☐ No

Well is terminated 8 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

Water sample sent to Wausau laboratory on 5/17 19 77

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, method of finishing the well, amount of cement used in grouting, blasting, etc., should be given on reverse side.

Signature: Alan Lang — Registered Well Driller

Complete Mail Address: Alan Lang Well & Pump, Inc.
7514 Stettin Dr. Wausau, WI 54401

STATE OF WISCONSIN

WELL CONSTRUCTOR'S REPORT — DEPARTMENT OF RESOURCE DEVELOPMENT — Wel

1. COUNTY: Marathon | CHECK ONE: [X] Town [ ] Village [ ] City | NAME: Rib Mountain

2. LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.)
120 Nowak St. Wausau, Wis. NE NE Sec 2 T28 R7E

3. OWNER AT TIME OF DRILLING
Edwin Engman

4. OWNER'S COMPLETE MAIL ADDRESS
120 Nowak St. Wausau, Wis. 54401

5. Distance in feet from well to nearest: (Record answer in appropriate block)

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
9'10"	46		50		)			

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		50		75					

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

6. Well is intended to supply water for:
Home

7. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
6	Surface	34			

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	New black std steel T&C 19.45#	Surface	34

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
None	Surface	

10. FORMATIONS

Kind	From (ft.)	To (ft.)
Sand & Gravel	Surface	21
Clay & Gravel	21	34

Well construction completed on Aug. 1 196

Well is terminated 8 inches [X] above [ ] below final grad

Well disinfected upon completion [X] Yes [ ] N

Well sealed watertight upon completion [X] Yes [ ] N

11. MISCELLANEOUS DATA

Yield test: 3 Hrs. at 15 GPM

Depth from surface to normal water level 6 ft.

Depth to water level when pumping 18 ft.

Water sample sent to Madison, Wis. laboratory on: Aug. 1 196

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to near wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, s surface pumprooms, access pits, etc., should be given on reverse side.

SIGNATURE: Hubert J. Lang

Hubert J. Lang Registered Well Driller

COMPLETE MAIL ADDRESS: Marathon, Wis. 54448

Please do not write in space below

COLIFORM TEST RESULT	GAS — 24 HRS.	GAS — 48 HRS.	CONFIRMED	REMARKS

Wel. G-30M (G-50)

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

See Instructions on Reverse Side

1. County Marathon (T28 R7E NENE Sec 2) {Town ☒ / Village ☐ / City ☐} Rib Mountain — Check one and give name

2. Location 115 Adolph St., Wausau, Wis.
Name of street and number of premise or Section, Town and Range numbers

3. Owner ☒ or Agent ☐ Lawrence Schulz
Name of individual, partnership or firm

4. Mail Address 230 N. Sixth Ave., Wausau, Wis.
Complete address required

5. From well to nearest: Building 6 ft; sewer --- ft; drain -- ft; septic tank -- ft; dry well or filter bed -- ft; abandoned well --- ft.

6. Well is intended to supply water for: Private Home

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
6	0	26			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	Standard Weight		
	Steel Pipe	0	16

9. GROUT:

Kind	From (ft.)	To (ft.)
None		

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Sand & Gravel	0	16
Granite	16	26

11. MISCELLANEOUS DATA:

Yield test: 2 Hrs. at 3 GPM.

Depth from surface to water-level: 6 ft.

Water-level when pumping: 0 ft.

Water sample was sent to the state laboratory at: Wausau, Wis. (City) on May 20, 19 53

Construction of the well was completed on: May 19, 19 53

The well is terminated 8 inches ☒ above, below ☐ the permanent ground surface.

Was the well disinfected upon completion? Yes x No

Was the well sealed watertight upon completion? Yes x No

Signature Hugo N. Lang — Registered Well Driller

903 So. 20th Ave., Wausau, Wis. — Complete Mail Address

Please do not write in space below

Rec'd 5-21-53 No. 3584

Ans'd 5-22-53

Interpretation Unsafe

	10 ml	10 ml	10 ml	10 ml	10 ml
Gas—24 hrs.	0	0	0	0	0
48 hrs.	+	+	+	+	+
Confirm					
B. Coli	+	+	+	+	+

Examiner

Wel. 6-30M (6-50)

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

See Instructions on Reverse Side

1. County MARATHON { Town ☑ / Village ☐ / City ☐ } of RIB MT. (Check one and give name)

T28 R7E NE,NE Sec 2

2. Location 138 ADOLPH ST.
Name of street and number of premise or Section, Town and Range numbers

RECEIVED DEC 24 1951 WISCONSIN STATE BOARD OF HEALTH SANITARY BUREAU

3. Owner ☒ or Agent ☐ CHARLES LUTZKE
Name of individual, partnership or firm

4. Mail Address 138 ADOLPH ST. WAUSAU, WIS.
Complete address required

5. From well to nearest: Building 5 ft; sewer 9 ft; drain ____ ft; septic tank ____ ft; dry well or filter bed 55 ft; abandoned well ____ ft.

6. Well is intended to supply water for: House Use

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	0	26			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
8"	STD WHT	0	18

9. GROUT:

Kind	From (ft.)	To (ft.)
NONE		

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
SAND	0	10
GRAVEL	10	16
CLAY	16	17
BROWN GRANITE	17	26

Construction of the well was completed on: DEC 10 1951

The well is terminated 48 inches ☐ above, below ☒ the permanent ground surface.

Was the well disinfected upon completion? Yes ✓ No ____

Was the well sealed watertight upon completion? Yes ✓ No ____

11. MISCELLANEOUS DATA:

Yield test: 10 Hrs. at 4 GPM.

Depth from surface to water-level: 7 ft.

Water-level when pumping: 15 ft.

Water sample was sent to the state laboratory at: WAUSAU City on DEC 13 1951

Signature Frederick A. Lang
Registered Well Driller

1708 W. Garfield Ave Wausau,
Complete Mail Address

Please do not write in space below

Rec'd 12-13-51 No. 8716

Ans'd 12-17-51

Interpretation Safe

	10 ml	10 ml	10 ml	10 ml	10 ml
Gas—24 hrs.	0	0	0	0	+
48 hrs.	0	0	0	0	0
Confirm					
B. Coli	0	0	0	0	0

Examiner

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

Wel 6

See Instructions on Reverse Side

1. County Marathon (Town ☒ / Village ☐ / City ☐) Rib Mountain — Check one and give name

2. Location 1531 Cleveland Ave. Wausau, Wis. SE NE NE Sec 2 T 28 R 7E
Name of street and number of premise or Section, Town and Range numbers

3. Owner ☒ or Agent ☐ William Lutzke
Name of individual, partnership or firm

4. Mail Address 1531 Cleveland Ave. Wausau, Wis.
Complete address required

5. From well to nearest: Building 10 ft; sewer 40 ft; drain ---- ft; septic tank 60 ft; dry well or filter bed 70 ft; abandoned well ---- ft.

6. Well is intended to supply water for: Home

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
6	0	22			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	Std steel	0	21

9. GROUT:

Kind	From (ft.)	To (ft.)
None		

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Sand & Gravel	0	22
(Packed gravel on bottom and does not cave in)		

RECEIVED
SEP 21 1961
SANITARY ENGINEERING

Construction of the well was completed on: September 8 1961

The well is terminated 8 inches ☒ above, below ☐ the permanent ground surface.

Was the well disinfected upon completion? Yes X No

Was the well sealed watertight upon completion? Yes X No

11. MISCELLANEOUS DATA:

Yield test: 1 Hrs. at 7 GPM.

Depth from surface to water-level: 8 ft.

Water-level when pumping: 12 ft.

Water sample was sent to the state laboratory at: Wausau, Wis. (City) on 9-11 1961

Send tripl.

Signature Hubert J. Lang
Registered Well Driller

Marathon, Wis.
Complete Mail Address

Please do not write in space below

Rec'd 9-11-61 No. 7667

Ans'd

Interpretation

	10 ml	10 ml	10 ml	10 ml	10 ml
Gas—24 hrs.	0	0	0	0	0
48 hrs.	0	0	0	0	1
Confirm					
B. Coli					

Examiner

JUN 15 1970

WELL CONSTRUCTOR'S REPORT

Wel–6

WHITE COPY – DIVISION'S COPY
GREEN COPY – DRILLER'S COPY
YELLOW COPY – OWNER'S COPY

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
Box 450
Madison, Wisconsin 53701

1. COUNTY: Marathon

CHECK ONE: ☒ Town ☐ Village ☐ City

NAME: Rib Mountain

2. LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.)
1504 Cleveland Ave. Wausau, Wis. SE NE NE Sec 2 T28 R7E

3. OWNER AT TIME OF DRILLING
Arnold Hoffman

4. OWNER'S COMPLETE MAIL ADDRESS
1905 Poppy Lane Wausau, Wis. 54401

5. Distance in feet from well to nearest: (Record answer in appropriate block)

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRA C. I.	WASTE WATER DRA TILE
9'3"	25							

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		44			64				

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)
– – – – – –

6. Well is intended to supply water for:
Home

7. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	40			
6	40	50			

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	New black std steel PE 18.97#	Surface	32

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Pressure cement ~~Pressure cement~~	Surface	32

10. FORMATIONS

Kind	From (ft.)	To (ft.)
Coarse Gravel	Surface	15
Clay	15	21
Red Granite	21	50
Most of the water came in above the 32 foot ~~level and that was cemented shut but there~~ still is enough for the house.		

Well construction completed on: June 12 19 70

Well is terminated 18 inches ☒ above ☐ below final grac

Well disinfected upon completion ☒ Yes ☐ N

Well sealed watertight upon completion ☒ Yes ☐ N

11. MISCELLANEOUS DATA

Yield test: 2 Hrs. at 2½ GPM

Depth from surface to normal water level: 5 ft.

Depth to water level when pumping: 50 ft.

Water sample sent to: Madison, Wis. laboratory on: June 12 19 7

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nea wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, s surface pumprooms, access pits, etc., should be given on reverse side.

SIGNATURE: Hubert J. Lang

Lang Well Drilling Co. Registered Well Driller

COMPLETE MAIL ADDRESS: 1708 W. Garfield Ave. Wausau, Wis. 54401

Please do not write in space below

COLIFORM TEST RESULT	GAS — 24 HRS.	GAS — 48 HRS.	CONFIRMED	REMARKS
				See 6/11/71 letter in file

STATE OF WISCONSIN

WELL CONSTRUCTOR'S REPORT — DEPARTMENT OF RESOURCE DEVELOPMENT — Wel

1. COUNTY: Marathon | CHECK ONE: ☒ Town ☐ Village ☐ City | NAME: Rib Mountain

2. LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.)
214 Chellis St. Wausau, Wis. NW NE NE Sec 2 T 28 R 7E

3. OWNER AT TIME OF DRILLING
Allen Johnson

4. OWNER'S COMPLETE MAIL ADDRESS
4861 Eldred St. Los Angeles, Cal. 90042

5. Distance in feet from well to nearest: (Record answer in appropriate block)

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAI C. I.	WASTE WATER DRAI TILE
7	25		25					

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		60		75					

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

6. Well is intended to supply water for:
Home

7. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	40			
6	40	47			

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	Std steel new black PE 18.97#	Surface	40

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Drill cuttings	6	6
Pressure cement	Surface	40

10. FORMATIONS

Kind	From (ft.)	To (ft.)
Coarse gravel	Surface	17
Blue Granite	17	38
Red Granite	38	47

Well construction completed on Aug. 22 1967

11. MISCELLANEOUS DATA
Yield test: 2 Hrs. at 6 GPM

Depth from surface to normal water level 6 ft.

Depth to water level when pumping 40 ft.

Well is terminated 8 inches ☒ above ☐ below final grad

Well disinfected upon completion ☒ Yes ☐ N

Well sealed watertight upon completion ☒ Yes ☐ N

Water sample sent to Madison, Wis. laboratory on: Aug. 22 19 6

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to near wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, su surface pumprooms, access pits, etc., should be given on reverse side.

SIGNATURE: Hubert J. Lang
Hubert J. Lang Registered Well Driller

COMPLETE MAIL ADDRESS: Marathon, Wis. 54448

Please do not write in space below

COLIFORM TEST RESULT	GAS — 24 HRS.	GAS — 48 HRS.	CONFIRMED	REMARKS

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

Wel 6

See Instructions on Reverse Side

1. County Marathon (N½ NENE Sec 2 T28 R7E) — Town ☒ / Village ☐ / City ☐ Rib Mountain — Check one and give name

2. Location 112 Adolph St. Wausau, Wis.
Name of street and number of premise or Section, Town and Range numbers

3. Owner ☒ or Agent ☐ Ormand Bauer
Name of individual, partnership or firm

4. Mail Address 112 Adolph St. Wausau, Wis.
Complete address required

5. From well to nearest: Building 5½ ft; sewer 15 ft; drain ---- ft; septic tank 40 ft; dry well or filter bed 55 ft; abandoned well ---- ft.

6. Well is intended to supply water for: Home

RECEIVED
JUN 10 1963
SANITARY ENGINEERIN

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	0	40			
6	40	128			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	Std steel	0	40

9. GROUT:

Kind	From (ft.)	To (ft.)
Drill Cuttings	0	6
Pressure cement	6	40

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Sand, Gravel & Clay	0	12
Gray Granite	12	125
Red Granite	125	128

11. MISCELLANEOUS DATA:

Yield test: 2 Hrs. at 18 GPM.

Depth from surface to water-level: 4½ ft.

Water-level when pumping: 55 ft.

Water sample was sent to the state laboratory at: Wausau, Wis. (City) on 6-3 1963

Construction of the well was completed on: May 3 1963

The well is terminated 15 inches ☒ above, below ☐ the permanent ground surface.

Was the well disinfected upon completion? Yes X No

Was the well sealed watertight upon completion? Yes X No

Signature Frederick A. Lang — Registered Well Driller

Send tripl. 1708 W. Garfield Ave. Wausau, Wis. — Complete Mail Address

Please do not write in space below

Rec'd JUN 3 1963 No 5256

Ans'd

Interpretation

	10 ml	10 ml	10 ml	10 ml	10 ml
Gas—24 hrs.	0	0	0	0	0
48 hrs.	0	0	0	0	0
Confirm					
B. Coli					

Examiner

State of Wisconsin
Department of Natural Resources
Box 7921
Madison, Wisconsin 53707

NOTE:
White Copy – Division's Copy
Green Copy – Driller's Copy
Yellow Copy – Owner's Copy

MAY 22 1979

WELL CONSTRUCTOR'S REPORT

Form 3300-15 Rev. 12-76

1. COUNTY: Marathon

CHECK (✓) ONE: ☒ Town ☐ Village ☐ City

Name: Rib Mountain

2. LOCATION: ¼ Section: NE | Section: 2 | Township: 28N | Range: 7E

OR – Grid or Street No.: 123 | Street Name: Adolph St. Wausau, Wi.

AND – If available subdivision name, lot & block No.:

3. NAME ☒ OWNER ☐ AGENT AT TIME OF DRILLING CHECK (✓) ONE: John Mroczenski

ADDRESS: 1106 So. 17th Ave.

POST OFFICE: Wausau, Wi. 54401

4. Distance in feet from well to nearest: (Record answer in appropriate block)

Building	Sanitary Bldg. Drain		Sanitary Bldg. Sewer		Floor Drain Connected To:		Storm Bldg. Drain		Storm Bldg. Sewer	
	C.I.	Other	C.I.	Other	C.I. Sewer	Other Sewer	C.I.	Other	C.I.	Other
–	– –	–	–	–	–	–	–	–	–	–

Street Sewer		Other Sewers		Foundation Drain Connected to:				Sewage Sump		Clearwater Sump	Septic Tank	Holding Tank	Sewage Absorption Unit	
San.	Storm	C.I.	Other	Sewer		Sewage Sump		C.I.	Other				Seepage Pit	
–	–	–	–	Clearwater Dr.	–	Clearwater Sump		–	–	–	–	–	Seepage Bed	
													Seepage Trench	– –

Privy	Pet Waste Pit	Pit: Nonconforming Existing		Subsurface Pumproom Nonconforming Existing	Barn Gutter	Animal Barn Pen	Animal Yard	Silo With Pit	Glass Lined Storage Facility	Silo w/o Pit	Earthen-Silage Storage Trench Or Pit
		Well									
–	–	Pump		– – –	–	–	–	–	–	–	– – –
		Tank	– –								

Temporary Manure Stack	Watertight Liquid Manure Tank	Solid Manure Storage Structure	Subsurface Gasoline or Oil Tank	Waste Pond or Land Disposal Unit (Specify Type)	Other (Give Description)
–	–	–		– –	–

5. Well is intended to supply water for: Home

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10	Surface	19	6	40	68
8	19	40			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification & Method of Assembly	From (ft.)	To (ft.)
6	USS ASTM A53 Gr. B PE 18.97#	Surface	40

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Drill cuttings	Surface	6
Pressure cement	6	40

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Fill	Surface	2
Clay	2	14
Shale	14	18
Brown Granite	18	38
Gray Granite	38	68

10. TYPE OF DRILLING MACHINE USED

☐ Cable Tool
☒ Rotary-air w/drilling mud
☐ Rotary-w/drilling mud
☐ Rotary-hammer w/drilling mud & air
☒ Rotary-hammer & air
☐ Reverse Rotary
☐ Jetting with
☐ Air
☐ Water

Well construction completed on: May 18 1979

11. MISCELLANEOUS DATA

Yield Test: 2 Hrs. at 13 GPM

Depth from surface to normal water level: 11½ Ft.

Depth of water level when pumping: 53 Ft. Stabilized ☒ Yes ☐ No

Well is terminated: 12 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

Water sample sent to: Wausau, Wi. laboratory on: May 18 1979

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, method of finishing the well, amount of cement used in grouting, blasting, etc., should be given on reverse side.

Signature: Hubert J. Lang

Lang Well Drilling Co. Registered Well Driller

Complete Mail Address: 1708 W. Garfield Ave. Wausau, Wi. 54401

State of Wisconsin
Department of Natural Resources
Box 7921
Madison, Wisconsin 53707

NOTE:
White Copy – Division's Copy
Green Copy – Driller's Copy
Yellow Copy – Owner's Copy

MAY 18 1979

WELL CONSTRUCTOR'S REPORT

Form 3300-15 Rev. 12-76

1. COUNTY: Marathon

CHECK (✓) ONE: [X] Town [ ] Village [ ] City

Name: Rib Mountain

2. LOCATION: ¼ Section: NE; Section: 2; Township: 28N; Range: 7E

OR – Grid or Street No.: 117; Street Name: Adolph St. Wausau, Wi.

AND – If available subdivision name, lot & block No.:

3. NAME [X] OWNER [ ] AGENT AT TIME OF DRILLING CHECK (✓) ONE: Anthony Magrecki

ADDRESS: 117 Adolph St.

POST OFFICE: Wausau, Wi. 54401

4. Distance in feet from well to nearest: (Record answer in appropriate block)

Building	Sanitary Bldg. Drain		Sanitary Bldg. Sewer		Floor Drain Connected To:		Storm Bldg. Drain		Storm Bldg. Sewer	
	C.I.	Other	C.I.	Other	C.I. Sewer	Other Sewer	C.I.	Other	C.I.	Other
10			45							

Street Sewer		Other Sewers		Foundation Drain Connected to:				Sewage Sump		Clearwater Sump	Septic Tank	Holding Tank	Sewage Absorption Unit	
San.	Storm	C.I.	Other	Sewer		Sewage Sump		C.I.	Other				Seepage Pit	51
				Clearwater Dr.		Clearwater Sump					45		Seepage Bed	
													Seepage Trench	

Privy	Pet Waste Pit	Pit: Nonconforming Existing		Subsurface Pumproom Nonconforming Existing	Barn Gutter	Animal Barn Pen	Animal Yard	Silo With Pit	Glass Lined Storage Facility	Silo w/o Pit	Earthen Silage Storage Trench Or Pit
		Well									
		Pump									
		Tank									

Temporary Manure Stack	Watertight Liquid Manure Tank	Solid Manure Storage Structure	Subsurface Gasoline or Oil Tank	Waste Pond or Land Disposal Unit (Specify Type)	Other (Give Description)

5. Well is intended to supply water for: Home

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10	Surface	24	6	41	98
8	24	41			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification & Method of Assembly	From (ft.)	To (ft.)
6	USS ASTM A53 Gr. B PE 18.97#	Surface	41

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Drill cuttings	Surface	6
Pressure cement	6	41

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Top Soil	Surface	1
Fill	1	3
Sand, Gravel & Clay	3	24
Soft Rock	24	41
Grey Granite	41	85
Red "	85	98

10. TYPE OF DRILLING MACHINE USED

[ ] Cable Tool
[X] Rotary-air w/drilling mud
[ ] Rotary-w/drilling mud
[ ] Rotary-hammer w/drilling mud & air
[X] Rotary-hammer & air
[ ] Reverse Rotary
[ ] Jetting with: [ ] Air [ ] Water

Well construction completed on: May 15 19 79

11. MISCELLANEOUS DATA

Yield Test: 1 Hrs. at 1 GPM

Depth from surface to normal water level: 4½ Ft.

Depth of water level when pumping: 98 Ft. Stabilized [X] Yes [ ] No

Well is terminated: 24 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

Water sample sent to: Wausau, Wi. laboratory on: May 15 19 79

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, method of finishing the well, amount of cement used in grouting, blasting, etc., should be given on reverse side.

Signature: Hubert J. Lang
Lang Well Drilling Co. Registered Well Driller

Complete Mail Address: 1708 W. Garfield Ave. Wausau, Wi. 54401

State of Wisconsin
Department of Natural Resources
Box 7921
Madison, Wisconsin 53707

NOTE:
White Copy – Division's Copy
Green Copy – Driller's Copy
Yellow Copy – Owner's Copy

AUG 31 19[illegible]

WELL CONSTRUCTOR'S REPORT

Form 3300-15 Rev. 12-76

1. COUNTY: Marathon
CHECK (✓) ONE: ☒ Town ☐ Village ☐ City
Name: Rib Mountain

2. LOCATION: ¼ Section: NE¼ | Section: 2 | Township: 28N | Range: 7E
OR – Grid or Street No.: 513 | Street Name: Cleveland St.
AND – If available subdivision name, lot & block No.:

3. NAME ☒ OWNER ☐ AGENT AT TIME OF DRILLING CHECK (✓) ONE: Jerome Windorski
ADDRESS: 1513 Cleveland St.
POST OFFICE: Wausau, Wis.

4. Distance in feet from well to nearest: (Record answer in appropriate block)

Building	Sanitary Bldg. Drain C.I.	Sanitary Bldg. Drain Other	Sanitary Bldg. Sewer C.I.	Sanitary Bldg. Sewer Other	Floor Drain Connected To: C.I. Sewer	Floor Drain Connected To: Other Sewer	Storm Bldg. Drain C.I.	Storm Bldg. Drain Other	Storm Bldg. Sewer C.I.	Storm Bldg. Sewer Other
12	–	–	–	–	–	–	–	–	–	–

Street Sewer San.	Street Sewer Storm	Other Sewers C.I.	Other Sewers Other	Foundation Drain Connected to: Sewer	Foundation Drain Connected to: Sewage Sump	Foundation Drain Connected to: Clearwater Dr.	Foundation Drain Connected to: Clearwater Sump	Sewage Sump C.I.	Sewage Sump Other	Clearwater Sump	Septic Tank	Holding Tank	Sewage Absorption Unit
–	–	–	–	–	–	–	–	–	–	–	69	–	Seepage Pit: 79; Seepage Bed: –; Seepage Trench: –

Privy	Pet Waste Pit	Pit: Nonconforming Existing		Subsurface Pumproom / Nonconforming Existing	Barn Gutter	Animal Barn Pen	Animal Yard	Silo With Pit	Glass Lined Storage Facility	Silo w/o Pit	Earthen Silage Storage Trench Or Pit
–	–	Well	–	–	–	–	–	–	–	–	–
		Pump	–								
		Tank	–								

Temporary Manure Stack	Watertight Liquid Manure Tank	Solid Manure Storage Structure	Subsurface Gasoline or Oil Tank	Waste Pond or Land Disposal Unit (Specify Type)	Other (Give Description)
–	–	–	– –	–	none

5. Well is intended to supply water for: Future Home

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10	Surface	20	6	40	202
8	20	40			

7. CASING, LINER, CURBING AND SCREEN
Material, Weight, Specification & Method of Assembly

Dia. (in.)	Material, Weight, Specification & Method of Assembly	From (ft.)	To (ft.)
6	18.97# new black steel P.E. casing ASTM A-53 Grade B Mfg. LaBarge, Inc.	Surface	40

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
pressure cement grout	Surface	40

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Sand & Gravel	Surface	7
Course Gravel & Clay	7	16
Decomposed Granite	16	20
Gray Granite	20	202

10. TYPE OF DRILLING MACHINE USED (14W)
☐ Cable Tool ☒ Rotary-hammer w/drilling mud & air ☐ Jetting with
☐ Rotary-air w/drilling mud ☐ Rotary-hammer & air ☐ Air ☐ Water
☐ Rotary-w/drilling mud ☐ Reverse Rotary

11. MISCELLANEOUS DATA
Yield Test: 1 Hrs. at 4 GPM
Depth from surface to normal water level 17 Ft.
Depth of water level when pumping 202 Ft. Stabilized ☒ Yes ☐ No

Well construction completed on 8/14 19 78
Well is terminated 8 inches ☒ above ☐ below final grade
Well disinfected upon completion ☒ Yes ☐ No
Well sealed watertight upon completion ☒ Yes ☐ No

Water sample sent to Wausau, Wisconsin laboratory on 8/14 19 78

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, method of finishing the well, amount of cement used in grouting, blasting, etc., should be given on reverse side.

Signature: Alan Lang Registered Well Driller

Complete Mail Address:
ALAN LANG WELL & PUMP, INC.
7514 Stettin Dr., Wausau, Wis.

WELL CONSTRUCTOR'S REPORT

Wel–6

WHITE COPY – DIVISION'S COPY
GREEN COPY – DRILLER'S COPY
YELLOW COPY – OWNER'S COPY

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
Box 450
Madison, Wisconsin 53701

1. COUNTY: Marathon | CHECK ONE: [X] Town [ ] Village [ ] City | NAME: Rib Mountain

2. LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.)
1523 Cleveland Ave. Wausau, Wis. SE NE NE Sec 12 T28 R7E

3. OWNER AT TIME OF DRILLING
Henry Lutzke

4. OWNER'S COMPLETE MAIL ADDRESS
1523 Cleveland Ave. Wausau, Wis. 54401

5. Distance in feet from well to nearest: (Record answer in appropriate block)

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRA C. I.	WASTE WATER DRA TILE
10'7"	33							

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		68		95					

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)
– – – – – – –

6. Well is intended to supply water for:
Home

7. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
6	Surface	30			

8. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	New black std steel T&C 19.45#	Surface	25
5½	Stainless steel screen	25	30

9. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
None	Surface	

10. FORMATIONS

Kind	From (ft.)	To (ft.)
Sand & Gravel	Surface	30

Well construction completed on Aug. 12 19 7

11. MISCELLANEOUS DATA

Yield test: 3 Hrs. at 10 GPM

Depth from surface to normal water level 8 ft.

Depth to water level when pumping 12 ft.

Well is terminated 9 inches [X] above [ ] below final grad

Well disinfected upon completion [X] Yes [ ]

Well sealed watertight upon completion [X] Yes [ ]

Water sample sent to Madison, Wis. laboratory on: Aug. 12 19 7

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nea wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, s surface pumprooms, access pits, etc., should be given on reverse side.

SIGNATURE: Lang Well Drilling Co. Registered Well Driller

COMPLETE MAIL ADDRESS: 1708 W. Garfield Ave. Wausau, Wis. 54401

Please do not write in space below

COLIFORM TEST RESULT	GAS — 24 HRS.	GAS — 48 HRS.	CONFIRMED	REMARKS

Appendix B

1938 Aerial Photo

Appendix C

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES
Carroll D. Besadny
Secretary

BOX 7921
MADISON, WISCONSIN 53707

File Ref:
1650

August 2, 1989

Evelyn L. Fisher
Becher - Hoppe
P.O. Box 8000
Wausau, WI 54402-8000

Dear Ms. Fisher:

The Bureau of Endangered Resources has reviewed the project area described in your letter of July 18, 1989 regarding the Wausau Waste Water Treatment Facility, Marathon County.

Our data files contain the following information for this site: **Potamogeton vaseyi** (Vasey pondweed) a Special Concern plant occurs at Fern Island Park and is common in the shallow waters of quiet bays in the south end of the island in the Wisconsin River. P. vaseyi occurs in the NE1/4 of the SE1/4 of Section 35 and last observed on July 2, 1976. It was also found in Section 36. P. vaseyi has been found in only a few lakes scattered throughout WI.

Special Concern (Watch) List species are species about which some problem of abundance or distribution is suspected but not yet proven. The main purpose of this category is to focus attention on certain species before they become endangered or threatened.

Comprehensive endangered resource surveys may not have been completed for this project area. As a result, our data files may be incomplete. The absence of known occurrences does not preclude the possibility of their presence.

Sincerely,

Ronald F. Nicotera

Ronald F. Nicotera
Director, Bureau of Endangered Resources

cc: Gary Birch - EA/6
Terrence McKnight - NCD
Arlyn Loomans - NCD

THE STATE HISTORICAL SOCIETY OF WISCONSIN

H. Nicholas Muller III, Director

816 State Street
Madison, Wisconsin 53706
608/262-3266

September 13, 1989

Ms. Evelyn L. Fisher
Becher-Hoppe
Engineers Architects Planners
330 Fourth Street/P.O. Box 8000
Wausau, Wisconsin 54402-8000

SHSW: #89-1397
RE: Wausau Wastewater Treatment Facility

Dear Ms. Fisher:

We have reviewed the above-referenced project as required for compliance with Section 106 of the National Historic Preservation Act and 36 CFR Part 800: Protection of Historic Properties, the regulations of the Advisory Council on Historic Preservation governing the Section 106 review process.

There are no properties listed in the National Register of Historic Places located within the area of potential effect of the proposed undertaking. Furthermore, we are not aware of any properties that may be eligible for the National Register in this area.

We have no further knowledge of historic properties in the project area, and therefore no further concerns at this time. Information may exist, however, which has not come to our attention. We remind you that 36 CFR 800.4 includes the requirement that you seek information, as appropriate to the undertaking, from parties likely to have knowledge of or concerns with historic properties in the project area - such as Indian tribes, local governments, and public and private organizations.

If there are any questions concerning this matter, please contact Judy Patton of my staff at (608) 262-2732.

Sincerely,

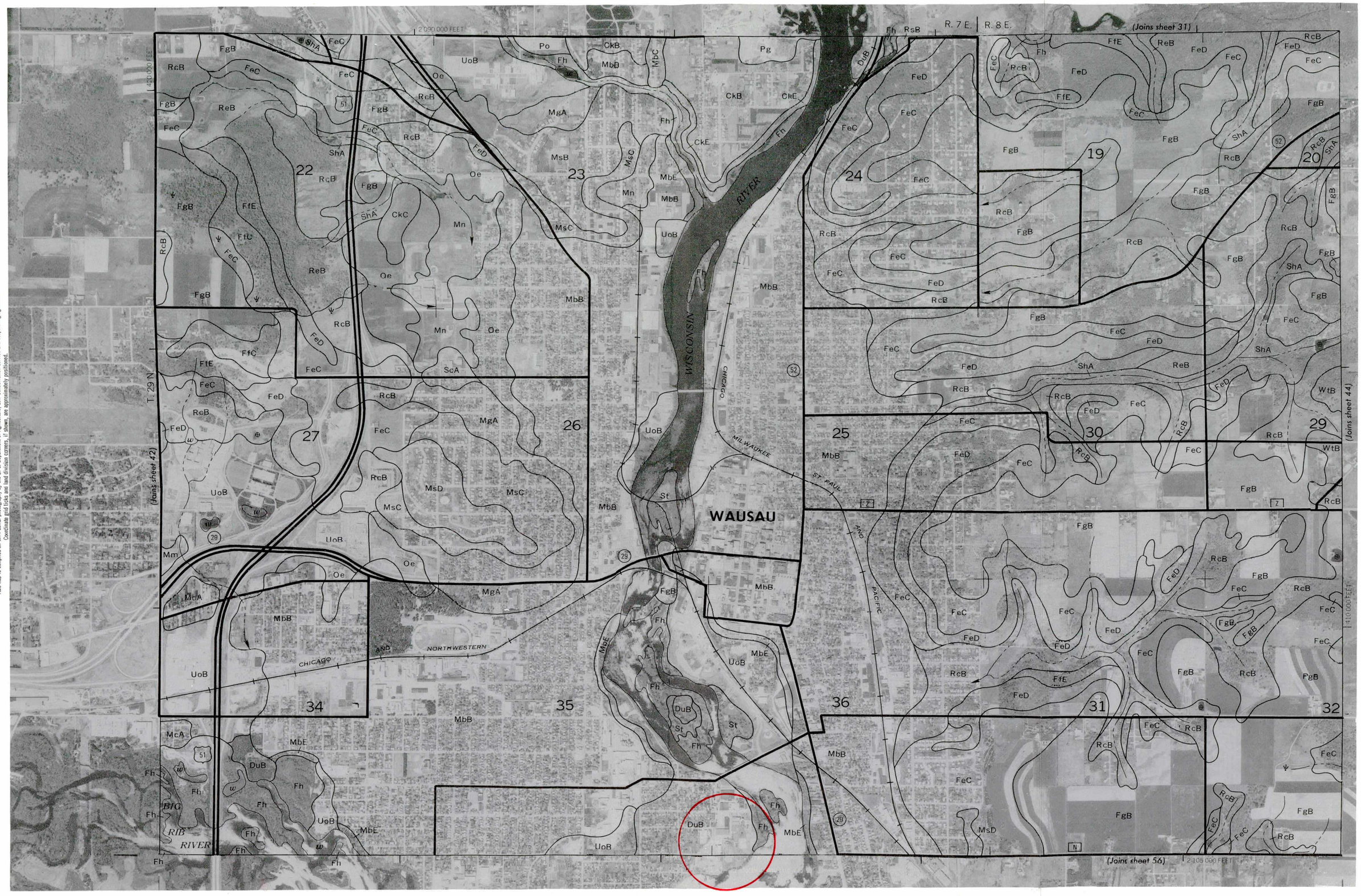
Richard W. Dexter
Chief, Compliance Section
DIVISION OF HISTORIC PRESERVATION

RWD:lkr

0581a/1665a

1665a

Appendix D



43

N

1 MILE

1 KILOMETER

Scale 1:20000

0 1/4 1/2 3/4
0 0.5

56

N

1 MILE

1 KILOMETER

Scale 1:20000

0 1/4 0.5 1/2 1 3/4 1

WAUSAU

BIG RIB RIVER

WISCONSIN RIVER

Lake Wausau

EAU CLAIRE RIVER

EAU CLAIRE

FLOWAGE

Sanitary landfill

SCHOFIELD

PACIFIC AND

ST. PAUL

MILWAUKEE

CHICAGO

R. 7 E. | R. 8 E.

T. 28 N.

(Joins sheet 43)

(Joins sheet 55)

(Joins sheet 57)

(Joins sheet 68)

2 105 000 FEET

2 090 000 FEET

This map as compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Doublelide grid ticks and land division corners, if shown, are approximately positioned.

March, 1986 WDF

ALPHABETICAL SOIL SURVEY LEGEND FOR MARATHON COUNTY

Alphabetical Symbol	Numerical Symbol	Soil Mapping Unit Name
AbB	68B	Alban loam, 1 to 6 percent slopes
Ad	241	Altdorf mucky silt loam, 0 to 2 percent slopes
AmC	64C	Amery silt loam, 5 to 15 percent slopes
CbA	45A	Cable silt loam, 0 to 3 percent slopes, stony
Ch	02L	Cathro muck, 0 to 1 percent slopes
CkA	84A	Chetek sandy loam, 0 to 2 percent slopes
CkB	84B	Chetek sandy loam, 2 to 6 percent slopes
CkC	80C	Chetek sandy loam, 6 to 15 percent slopes
CkE	80E	Chetek sandy loam, 15 to 30 percent slopes
Da	152	Dancy sandy loam, 0 to 2 percent slopes
DoA	242A	Dolph silt loam, 0 to 3 percent slopes
DuB	216B	Dunnville fine sandy loam, 1 to 4 percent slopes
FeC	20C	Fenwood silt loam, 6 to 12 percent slopes
FeD	20D	Fenwood silt loam, 12 to 20 percent slopes
FfC	22C	Fenwood silt loam, 2 to 15 percent slopes, stony
FfE	22E	Fenwood silt loam, 15 to 30 percent slopes, stony
FgB	30B	Fenwood-Rozellville silt loams, 2 to 6 % slopes
Fh	2	Fordum silt loam, 0 to 1 percent slopes
FnC	633C	Freeon silt loam, 6 to 12 percent slopes

Alphabetical Symbol	Numerical Symbol	Soil Mapping Unit Name
GcB	681B	Graycalm loamy sand, 2 to 6 percent slopes
Gm	684	Graycalm loamy sand, moderately well drained, 0 to 2 percent slopes
Gr	03	Greenwood peat, 0 to 1 percent slopes
GuB	475B	Guenther loamy sand, 2 to 6 percent slopes
HtB	236B	Hatley silt loam, 1 to 6 percent slopes
HyB	196B	Hatley silt loam, 1 to 6 percent slopes, bouldery
KaB	135B	Kennan sandy loam, 2 to 8 percent slopes
KaC	135C	Kennan sandy loam, 8 to 15 percent slopes
KaD2	135D2	Kennan sandy loam, 15 to 30 percent slopes, eroded
KeB	691B	Kennan sandy loam, 2 to 8 percent slopes, bouldery
KeC	961C	Kennan sandy loam, 8 to 15 percent slopes, bouldery
KeE	691E	Kennan sandy loam, 15 to 30 percent slopes, bouldery
MaB	632B	Magnor silt loam, 1 to 6 percent slopes
MbB	83B	Mahtomedi loamy sand, 0 to 6 percent slopes
MbC	83C	Mahtomedi loamy sand, 6 to 15 percent slopes
MbE	18E	Mahtomedi loamy sand, 15 to 45 percent slopes
McA	184A	Mahtomedi loamy sand, moderately well drained, 0 to 3 percent slopes
MdB	10B	Marathon silt loam, 2 to 6 percent slopes
MdC	10C	Marathon silt loam, 6 to 12 percent slopes

Alphabetical Symbol	Numerical Symbol	Soil Mapping Unit Name
MeC	13C	Marathon silt loam, 2 to 15 percent slopes, stony
MfA	51	Marshfield silt loam, 0 to 3 percent slopes
MgA	274A	Meadland loam, 0 to 3 percent slopes
MhA	273A	Meadland loam, 0 to 3 percent slopes, stony
Mm	126	Meehan loamy sand, 0 to 2 percent slopes
Mn	195	Minocqua sandy loam, 0 to 2 percent slopes
MoB	12B	Moberg gravelly silt loam, 2 to 6 percent slope
MoC	12C	Moberg gravelly silt loam, 6 to 15 percent slopes
MsB	14B	Mosinee sandy loam, 2 to 6 percent slopes
MsC	14C	Mosinee sandy loam, 6 to 12 percent slopes
MsD	14D	Mosinee sandy loam, 12 to 20 percent slopes
MtC	19C	Mosinee sandy loam, 2 to 15 percent slopes, stony
MyB	102B	Mylrea silt loam, 1 to 6 percent slopes
MzB	123B	Mylrea silt loam, 1 to 6 percent slopes, stony
Ne	90	Newson mucky loamy sand, 0 to 1 percent slopes
Oe	88	Oesterle loam, 0 to 2 percent slopes
Py	GP	Pits, gravel
Ph	QU	Pits, quarries
Po	682	Plover sandy loam, 0 to 2 percent slopes
RbC	28C	Ribhill silt loam, 6 to 15 percent slopes, stony

Alphabetical Symbol	Numerical Symbol	Soil Mapping Unit Name
RbE	28E	Ribhill silt loam, 15 to 30 percent slopes, stony
RcB	202B	Rietbrock silt loam, 1 to 8 percent slopes
ReB	222B	Rietbrock silt loam, 1 to 8 percents slopes, stony
RhA	275A	Rockers loamy sand, 0 to 3 percent slopes
RoA	80A	Rosholt sandy loam, 0 to 2 percent slopes
RoB	80B	Rosholt sandy loam, 2 to 6 percent slopes
RsA	81A	Rosholt silt loam, 0 to 2 percent slopes
RsB	81B	Rosholt silt loam, 2 to 6 percent slopes
ScA	180A	Scott Lake sandy loam, 0 to 3 percent slopes
SdA	181A	Scott Lake silt loam, 0 to 3 percent slopes
Se	02	Seelyeville muck, 0 to 1 percent slopes
ShA	447A	Sherry silt loam, 0 to 3 percent slopes
St	1A	Sturgeon silt loam, 0 to 2 percent slopes
UoB	55B	Udorthents, loamy, gently sloping
WtB	43B	Withee silt loam, 1 to 6 percent slopes

SOIL NO.	SOIL NAME
02	Seelyeville muck
447	Sherry silt loam
1A	Sturgeon silt loam
55 (3)	Udorthents, loamy (cut and fill made land)
43	Withee silt loam
GP (3)	Gravel pits
QU (3)	Quarries

(1) The interpretations for these 2 soils are on the same sheet. Most interpretations are the same except where SIL refers to silt loam and SL refers to sandy loam.

(2) This soil is only mapped as a complex with Fenwood on 2 to 6 percent slopes.

(3) Interpretation sheets are not available for these soils. Soil properties are too variable to rate. Soils require onsite investigations to determine suitability for use.

WI0348 S O I L I N T E R P R E T A T I O N S R E C O R D

PLRA(S): 90, 91, 105
REV. NRB,FLA, 2-87
LOIC HAPLUDORCLLS, COARSE-LOAMY, MIXED

DUNNVILLE SERIES
MODERATELY WET

THE DUNNVILLE SERIES, MODERATELY WET, CONSISTS OF MODERATELY WELL DRAINED SOILS FORMED IN LOAMY DEPOSITS OVERLYING WATER-LAID SAND ON LOW STREAM TERRACES. THE SURFACE SOIL IS VERY DARK BROWN AND DARK BROWN LOAM 12 INCHES THICK. THE SUBSOIL IS DARK REDDISH BROWN AND REDDISH BROWN LOAM IN THE UPPER 8 INCHES AND REDDISH BROWN SANDY LOAM IN LOWER 4 INCHES. THE SUBSTRATUM IS DARK BROWN SAND AND FINE SAND IN THE UPPER 6 INCHES AND STRONG BROWN SAND IN THE LOWER PART. THERE ARE MOTTLES BELOW A DEPTH OF 41 INCHES. SLOPES RANGE FROM 0 TO 6 PERCENT. MOST AREAS ARE USED FOR CROPLAND.

ESTIMATED SOIL PROPERTIES (A)

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-12	L	ML, CL-ML	A-4	0	95-100	90-100	80-95	55-75	<25	2-7
0-12	SL, FSL, VFSL	SM, ML	A-2, A-4	0	95-100	90-100	55-95	30-65	<20	NP-4
12-20	L, SL, FSL	CL, CL-ML, SC, SM-SC	A-2, A-4	0	95-100	90-100	55-95	30-75	20-30	4-9
20-24	SL, FSL, LFS	SM, ML	A-2, A-4	0	95-100	90-100	55-85	30-55	<20	NP-4
24-60	S, GR-S, FS	SP, SM, GP, GM	A-2, A-3, A-1	0	50-100	50-100	25-70	2-20	-	NP

DEPTH (IN.)	CLAY (PCT)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CONCRETE
0-12	7-15	1.35-1.55	0.6-6.0	0.15-0.22	5.1-6.5	-	LOW	.28	4	5	2-4	MODERATE	MODERATE
0-12	5-10	1.35-1.55	0.6-6.0	0.12-0.22	5.1-6.5	-	LOW	.20	4	3	1-3		
12-20	10-18	1.55-1.65	0.6-6.0	0.11-0.15	5.1-6.5	-	LOW	.28					
20-24	5-10	1.60-1.70	0.6-6.0	0.05-0.17	5.1-6.5	-	LOW	.28					
24-60	1-5	1.60-1.70	>6.0	0.03-0.07	5.1-6.5	-	LOW	.15					

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	BEDROCK HARDNESS	BEDROCK DEPTH (IN)	SUBSIDENCE HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYDROPOTENTIAL GRP	HYDROPOTENTIAL FROST ACTION
RARE-OCCASIONAL	BRIEF	NOV-JUN	3.0-6.0	APPARENT	NOV-MAY	-		>60				B	LOW

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	RARE: SEVERE-WETNESS,POOR FILTER OCCAS: SEVERE-FLOODING,WETNESS,POOR FILTER
SEWAGE LAGOON AREAS	RARE: SEVERE-SEEPAGE,WETNESS OCCAS: SEVERE-SEEPAGE,FLOODING,WETNESS
SANITARY LANDFILL (TRENCH)	RARE: SEVERE-SEEPAGE,WETNESS OCCAS: SEVERE-FLOODING,SEEPAGE,WETNESS
SANITARY LANDFILL (AREA)	RARE: SEVERE-SEEPAGE,WETNESS OCCAS: SEVERE-FLOODING,SEEPAGE,WETNESS
DAILY COVER FOR LANDFILL	POOR-SEEPAGE,TOO SANDY

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	SEVERE-CUTBANKS CAVE
DWELLINGS WITHOUT BASEMENTS	SEVERE-FLOODING
DWELLINGS WITH BASEMENTS	SEVERE-FLOODING
SMALL COMMERCIAL BUILDINGS	SEVERE-FLOODING
LOCAL ROADS AND STREETS	RARE: MODERATE-FLOODING OCCAS: SEVERE-FLOODING
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	L,RARE: SLIGHT SL,FSL,VFSL,RARE: MODERATE-DROUGHTY L,OCCAS: MODERATE-FLOODING SL,FSL,VFSL,OCCAS: MODERATE DROUGHTY,FLOODING

CONSTRUCTION MATERIAL

ROADFILL	GOOD
SAND	PROBABLE
GRAVEL	PROBABLE
TOPSOIL	POOR-SMALL STONES

WATER MANAGEMENT

POND RESERVOIR AREA	SEVERE SEEPAGE
EMBANKMENTS DIKES AND LEVEES	SEVERE SEEPAGE,PIPING
EXCAVATED PONDS AQUIFER FED	SEVERE CUTBANKS CAVE
DRAINAGE	DEEP TO WATER
IRRIGATION	0-3% L: FAVORABLE 3+% L: SLOPE 0-3% SL,FSL,VFSL: DROUGHTY,SOIL BLOWING 3+% SL,FSL,VFSL: SLOPE,DROUGHTY,SOIL BLOWING
TERRACES AND DIVERSIONS	L: TOO SANDY SL,FSL,VFSL: TOO SANDY,SOIL BLOWING
GRASSED WATERWAYS	L: FAVORABLE SL,FSL,VFSL: DROUGHTY

REGIONAL INTERPRETATIONS

DUNNVILLE SERIES
MODERATELY WET

WI0348

RECREATIONAL DEVELOPMENT

CAMP AREAS	SEVERE-FLOODING	PLAYGROUNDS	0-2% RARE: SLIGHT 2-6% RARE: MODERATE-SLOPE 0-2% OCCAS: MODERATE-FLOODING 2-6% OCCAS: MODERATE-SLOPE,FLOODING
PICNIC AREAS	SLIGHT	PATHS AND TRAILS	SLIGHT

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY	CORN (BU)		CORN SILAGE (TONS)		OATS (BU)		BROMEGRASS-ALFALFA HAY (TONS)		KENTUCKY BLUEGRASS (AUM)		SOYBEANS (BU)		TIMOTHY-RD CLOV HAY (TONS)	
		NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
0-2%	3S	75		12		65		4.0		2.3		27		3.0	
2-6%	3E	70		11		60		3.7		2.1		25		3.0	

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROS HAZARD	EQUIP. LIMIT.	SEEDL. MORTY	WINDTH HAZARD	PLANT COMPET	POTENTIAL PRODUCTIVITY: COMMON TREES	SITE INDX	PROD CLASS	TREES TO PLANT
ALL	3A	SLIGHT	SLIGHT	SLIGHT	SLIGHT	MODER.	NORTHERN RED OAK SUGAR MAPLE AMERICAN BASSWOOD	55	3	EASTERN WHITE PINE RED PINE WHITE SPRUCE

WINDBREAKS (B)

CLASS-DETERMING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
ALL	EASTERN WHITE PINE	30	RED PINE	30	JACK PINE	30	MANYFLR COTONEASTER	6
	SIBERIAN PEASHRUB	6	NORWAY SPRUCE	20	EASTERN REDCEDAR	15	LILAC	10
	AMER CRANBERRYBUSH	10	AMUR MAPLE	10	SILKY DOGWOOD	8	GRAY DOGWOOD	8

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL	FAIR	FAIR	GOOD	GOOD	GOOD	-	POOR	POOR	FAIR	FAIR	POOR	-

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPM)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE
GRAY DOGWOOD	COFOR	
AMERICAN HAZEL	COAM3	
BLACKBERRY	RUBUS	
TREFOIL TICKCLOVER	DEGLE	
WOODBINE	PAVI5	
SOUTHERN RAGWEARLT	AMBR2	
SPOTTED GERANIUM	GEMA	
FEATHER SOLOMON PLUME	SMRA	

POTENTIAL PRODUCTION (LBS./AC. DRY WT):
- FAVORABLE YEARS
- NORMAL YEARS
- UNFAVORABLE YEARS

FOOTNOTES

A ESTIMATES OF ENGINEERING PROPERTIES BASED PARTIALLY ON HIGHWAY DEPARTMENT TEST DATA ON 3 PEDONS.
B WINDBREAK GROUP 6G.
* SITE INDEX IS A SUMMARY OF 5 OR MORE MEASUREMENTS ON THIS SOIL.

WI0397 S O I L I N T E R P R E T A T I O N S R E C O R D

MLRA(S): 90, 93, 94A, 95A, 105 FORDUM SERIES
REV. WOF,FLA, 1-87
MOLLIC FLUVAQUENTS, COARSE-LOAMY, MIXED, NONACID, FRIGID

THE FORDUM SERIES CONSISTS OF POORLY AND VERY POORLY DRAINED SOILS FORMED IN RECENT ALLUVIUM ON FLOOD PLAINS. THE SURFACE LAYER IS VERY DARK BROWN SILT LOAM 6 INCHES THICK. THE SUBSTRATUM IS 12 INCHES OF DARK GRAY MOTTLED SILT LOAM OVER 12 INCHES OF DARK GRAY MOTTLED FINE SANDY LOAM OVER GRAY SAND WITH A FEW STRATA OF SILT LOAM. SLOPES ARE 0 TO 2 PERCENT. WOODLAND IS THE MAIN USE. SOME AREAS ARE USED FOR PASTURELAND OR NATIVE MARSH HAYLAND.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-6	SIL, L, MK-SIL	ML, CL, SM, SC	A-4, A-6	0-15	80-100	75-100	65-100	45-95	20-35	3-15
0-6	SL, FSL, MK-VFSL	SM, SM-SC, ML, CL-ML	A-4, A-2, A-1	0-15	80-100	75-100	45-95	20-65	<25	3-7
0-6	SP, MUCK	PT	A-8	C						
6-30	SIL, FSL, L	SM, SC, ML, CL	A-2, A-4, A-1	0-15	80-100	75-100	45-100	20-90	<30	3-10
30-60	S, FS, LFS	SP, SM	A-3, A-2, A-1	0-15	80-100	75-100	35-80	2-35	-	NP

DEPTH (IN.)	CLAY (PCT)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	EROSION FACTORS T	WIND ERODIBILITY GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CORROSIVITY CONCRETE
0-6	10-23	1.35-1.45	0.6-2.0	0.17-0.24	5.6-8.4	-	LOW	.28	4	8	4-12	HIGH	HIGH
0-6	8-15	1.35-1.50	0.6-6.0	0.11-0.18	5.6-8.4	-	LOW	.20	4	8	3-12		
0-6	0-4	0.15-0.37	2.0-6.0	0.35-0.45	5.6-8.4	-	LOW	-	4	2	50-80		
6-30	8-18	1.40-1.50	0.6-2.0	0.10-0.22	5.6-8.4	-	LOW	.43					
30-60	2-8	1.55-1.70	>6.0	0.04-0.10	5.6-8.4	-	LOW	.15					

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENTIAL FROST ACTION
COMMON	BRIEF-LONG	MAR-JUNE	+1-1.0	APPARENT	JAN-DEC	-		>60		-		D	HIGH

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SEVERE-FLOODING,PONDING,POOR FILTER
SEWAGE LAGOON AREAS	SEVERE-SEEPAGE,FLOODING
SANITARY LANDFILL (TRENCH)	SEVERE-FLOODING,SEEPAGE,PONDING
SANITARY LANDFILL (AREA)	SEVERE-FLOODING,SEEPAGE,PONDING
DAILY COVER FOR LANDFILL	POOR-SEEPAGE,TOO SANDY,PONDING

CONSTRUCTION MATERIAL

ROADFILL	POOR-WETNESS
SAND	PROBABLE
GRAVEL	IMPROBABLE-TOO SANDY
TOPSOIL	POOR-SMALL STONES,WETNESS

WATER MANAGEMENT

POND RESERVOIR AREA	SEVERE-SEEPAGE
EMBANKMENTS DIKES AND LEVEES	SEVERE-SEEPAGE,PIPING,PONDING
EXCAVATED PONDS AQUIFER FED	SEVERE-CUTBANKS CAVE
DRAINAGE	PONDING,FLOODING,FROST ACTION
IRRIGATION	PONDING,FLOODING
TERRACES AND DIVERSIONS	PONDING,TOO SANDY
GRASSED WATERWAYS	WETNESS

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	SEVERE-CUTBANKS CAVE,PONDING
DWELLINGS WITHOUT BASEMENTS	SEVERE-FLOODING,PONDING
DWELLINGS WITH BASEMENTS	SEVERE-FLOODING,PONDING
SMALL COMMERCIAL BUILDINGS	SEVERE-FLOODING,PONDING
LOCAL ROADS AND STREETS	SEVERE-PONDING,FLOODING,FROST ACTION
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	OCCAS: SEVERE-PONDING FREQ: SEVERE-PONDING,FLOODING

REGIONAL INTERPRETATIONS

FORDUM SERIES

WI0397

RECREATIONAL DEVELOPMENT

CAMP AREAS	SEVERE-FLOODING,PONDING	PLAYGROUNDS	OCCAS: SEVERE-PONDING FREQ: SEVERE-PONDING,FLOODING
PICNIC AREAS	SEVERE-PONDING	PATHS AND TRAILS	SEVERE-PONDING

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPA-BILITY	REED CANARYGRASS (AUM)		KENTUCKY BLUEGRASS (AUM)		CORN SILAGE (TONS)		TIMOTHY-RD CLOV HAY (TONS)							
		NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
FREQ	6W	6.5		3.0		-		-							
OCCAS	4W	6.5		3.0		10		2.0							

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORDI-NATION SYM	MANAGEMENT PROBLEMS: EROS'N HAZARD	EQUIP. LIMIT	SEEDL. MORTLTY	WINDTH HAZARD	PLANT COMPET	POTENTIAL PRODUCTIVITY: COMMON TREES	SITE INDX	PROD CLASS	TREES TO PLANT
ALL	2W	SLIGHT	SEVERE	SEVERE	SEVERE	SEVERE	SILVER MAPLE	80	2	SILVER MAPLE
							RED MAPLE	-		RED MAPLE
							WHITE ASH	-		WHITE ASH
							NORTHERN WHITE-CEDAR	-		
							TAMARACK	-		
							BLACK SPRUCE	-		
							BALSAM FIR	-		
							WHITE SPRUCE	-		

WINDBREAKS (A)

CLASS-DETERMINING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL	V. POOR	V. POOR	POOR	FAIR	FAIR	-	GOOD	GOOD	V. POOR	FAIR	GOOD	-

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPM)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE
SWEETSCENTED BEDSTRAW	GATR3	
FIELD MINT	MEAR4	
STINGING NETTLE	URDI	
NIGHTSHADE	SOLAN	
OXALIS	OXALI	
REED CANARYGRASS	PHAR3	
SENSITIVE-FERN	ONSE	
POTENTIAL PRODUCTION (LBS./AC. DRY WT): FAVORABLE YEARS		
NORMAL YEARS		
UNFAVORABLE YEARS		

FOOTNOTES

A WINDBREAK GROUP 10.

NH0246

SOIL INTERPRETATIONS RECORD

NLRA(S): 88, 97, 98, 99
REV. JON,JAJ, 7-85
TYPIC UDIPSAMMENTS, MIXED, FRIGID

MANTOMEDI SERIES

THE MANTOMEDI SERIES CONSISTS OF DEEP, EXCESSIVELY DRAINED SOILS FORMED IN SANDY OUTWASH UNDER MIXED HARDWOOD FORESTS ON UPLANDS AND OUTWASH PLAINS. THE SURFACE LAYER IS VERY DARK GRAY LOAMY SAND 5 INCHES THICK. THE SUBSURFACE LAYER IS BROWN SAND 3 INCHES THICK. THE SUBSOIL IS DARK BROWN AND REDDISH BROWN GRAVELLY COARSE SAND AND GRAVELLY SAND 22 INCHES THICK. THE SUBSTRATUM IS REDDISH BROWN AND LIGHT REDDISH BROWN GRAVELLY SAND. SLOPES RANGE FROM 0 TO 45 PERCENT. AREAS ARE USED FOR WOODLAND AND PASTURE.

ESTIMATED SOIL PROPERTIES (1)

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRAGS >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-5	LS, LCOS, LFS	SM, SM-SC	A-2, A-1	0-2	95-100	60-90	40-85	15-30	<20	NP-4
5-8	LS, COS, FS	SP-SM, SM	A-2, A-1, A-1	0-2	95-100	60-90	30-75	5-15	<20	NP
8-30	LS, COS, GR-S	SP-SM, SM	A-2, A-3, A-1	0-15	70-95	50-90	30-75	5-15	<20	NP
30-60	LS, COS, GR-S	SP, SM, SP-SM	A-2, A-3, A-1	0-15	55-95	50-90	30-70	2-15	<20	NP

DEPTH (IN.)	CLAY (PCT)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	EROSION FACTORS T	WIND ERODIBILITY GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CORROSIVITY CONCRETE
0-8	2-15	1.40-1.60	6.0-20	0.10-0.12	5.1-6.5	-	LOW	.15	5	2	<1	LOW	HIGH
8-8	0-10	1.40-1.60	6.0-20	0.06-0.08	5.1-6.5	-	LOW	.10	5	1	<1		
8-30	0-10	1.45-1.70	6.0-20	0.05-0.07	5.1-6.5	-	LOW	.10					
30-60	0-10	1.45-1.75	6.0-20	0.04-0.05	5.1-7.8	-	LOW	.10					

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	WEI GRP	POTENTIAL FROST ACTION
NONE			>6.0			-		>60		-		4	LOW

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	0-15%: SEVERE-POOR FILTER 15+%: SEVERE-POOR FILTER,SLOPE
SEWAGE LAGOON AREAS	0-7%: SEVERE-SEEPAGE 7+%: SEVERE-SEEPAGE,SLOPE
SANITARY LANDFILL (TRENCH)	0-15%: SEVERE-SEEPAGE,TOO SANDY 15+%: SEVERE-SEEPAGE,SLOPE,TOO SANDY
SANITARY LANDFILL (AREA)	0-15%: SEVERE-SEEPAGE 15+%: SEVERE-SEEPAGE,SLOPE
DAILY COVER FOR LANDFILL	POOR-SEEPAGE,TOO SANDY,SMALL STONES

CONSTRUCTION MATERIAL

ROADFILL	0-15%: GOOD 15-25%: FAIR-SLOPE 25+%: POOR-SLOPE
SAND	PROBABLE
GRAVEL	PROBABLE
TOPSOIL	POOR-TOO SANDY,SMALL STONES,AREA RECLAIM

WATER MANAGEMENT

POND RESERVOIR AREA	0-8%: SEVERE-SEEPAGE 8+%: SEVERE-SEEPAGE,SLOPE
EMBANKMENTS DIKES AND LEVEES	SEVERE-SEEPAGE
EXCAVATED PONDS AQUIFER FED	SEVERE-NO WATER
DRAINAGE	DEEP TO WATER
IRRIGATION	0-3%: DROUGHTY,FAST INTAKE 3+%: SLOPE,DROUGHTY,FAST INTAKE
TERRACES AND DIVERSIONS	0-8%: TOO SANDY,SOIL BLOWING 8+%: SLOPE,TOO SANDY,SOIL BLOWING
GRASSED WATERWAYS	0-8%: DROUGHTY,ROOTING DEPTH 8+%: SLOPE,DROUGHTY,ROOTING DEPTH

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	0-15%: SEVERE-CUTBANKS CAVE 15+%: SEVERE-CUTBANKS CAVE,SLOPE
DWELLINGS WITHOUT BASEMENTS	0-8%: SLIGHT 8-15%: MODERATE-SLOPE 15+%: SEVERE-SLOPE
DWELLINGS WITH BASEMENTS	0-8%: SLIGHT 8-15%: MODERATE-SLOPE 15+%: SEVERE-SLOPE
SMALL COMMERCIAL BUILDINGS	0-4%: SLIGHT 4-8%: MODERATE-SLOPE 8+%: SEVERE-SLOPE
LOCAL ROADS AND STREETS	0-8%: SLIGHT 8-15%: MODERATE-SLOPE 15+%: SEVERE-SLOPE
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	0-8% LS,LCOS,LFS: MODERATE-SMALL STONES 8-15% LS,LCOS,LFS: MODERATE-SMALL STONES 15+% LS,LCOS,LFS: SEVERE-SLOPE 0-15% S,COS,FS: SEVERE-DROUGHTY 15+% S,COS,FS: SEVERE-DROUGHTY,SLOPE

REGIONAL INTERPRETATIONS

PASTURE AND HAYLAND	0-12%: GROUP 10 12+%: GROUP 10

MAHTOMEDI SERIES

MN0246

RECREATIONAL DEVELOPMENT

CAMP AREAS	0-8% LS.LCOS.LFS: MODERATE-SMALL STONES	PLAYGROUNDS	0-6% LS.LCOS.LFS: SEVERE-SMALL STONES
	8-15% LS.LCOS.LFS: MODERATE-SLOPE.SMALL STONES		6-% LS.LCOS.LFS: SEVERE-SLOPE.SMALL STONES
	15-% LS.LCOS.LFS: SEVERE-SLOPE		0-6% S.COS.FS: SEVERE-SMALL STONES.TOO SANDY
	0-15% S.COS.FS: SEVERE-TOO SANDY		6-% S.COS.FS: SEVERE-SLOPE.SMALL STONES. TOO SANDY
	15-% S.COS.FS: SEVERE-SLOPE.TOO SANDY		
PICNIC AREAS	0-8% LS.LCOS.LFS: MODERATE-TOO SANDY	PATHS AND TRAILS	0-15% LS.LCOS.LFS: MODERATE-TOO SANDY
	8-15% LS.LCOS.LFS: MODERATE-SLOPE.TOO SANDY		15-25% LS.LCOS.LFS: MODERATE-TOO SANDY.SLOPE
	15-% LS.LCOS.LFS: SEVERE-SLOPE		25-% LS.LCOS.LFS: SEVERE-SLOPE
	0-15% S.COS.FS: SEVERE-TOO SANDY		0-25% S.COS.FS: SEVERE-TOO SANDY
	15-% S.COS.FS: SEVERE-SLOPE.TOO SANDY		25-% S.COS.FS: SEVERE-TOO SANDY.SLOPE

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY	OATS (BU)		CORN SILAGE (TONS)		KENTUCKY BLUEGRASS (AUM)		GRASS-LEGUME HAY (TONS)		BROMEGRASS-ALFALFA (AUM)					
		NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
0-12%	4S		40		5		1.2		2.1		3.0				
12-25%	6S		-		-		1.0		-		-				
25-%	7S		-		-		0.8		-		-				

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROSION HAZARD	EQUIP. LIMIT	SEEDL. MORT*	WINDTH HAZARD	PLANT COMPET	POTENTIAL PRODUCTIVITY: COMMON TREES	SITE INDX	PROD CLAS	TREES TO PLANT
0-15%	4S	SLIGHT	MODER.	MODER.	SLIGHT	MODER.	RED PINE	55	6	RED PINE
15-35%	6R	MODER.	MODER.	MODER.	SLIGHT	MODER.	WHITE SPRUCE	55	7	JACK PINE
35-%	6R	SEVERE	SEVERE	MODER.	SLIGHT	MODER.	JACK PINE	60	6	EASTERN WHITE PINE
							EASTERN WHITE PINE	50	6	WHITE SPRUCE

WINDBREAKS (3)

CLASS-DETERMINING PHASE:	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
LOW PPT	EASTERN WHITE PINE	26	RED PINE	20	EASTERN REDCEDAR	13	JACK PINE	20		
	TATARIAN HONEYSUCKLE	8	LILAC	8	SIBERIAN PEASHRUB	8	GREEN ASH	18		
	MANCHURIAN CRABAPPLE	14	RUSSIAN-OLIVE	16	SIBERIAN CRABAPPLE	12	SIBERIAN ELM	26		
HIGH PPT	MANITOBA COTONEASTER	5	GRAY DOGWOOD	8	SILKY DOGWOOD	8	SIBERIAN PEASHRUB	8		
	AMER CRANBERRYBUSH	10	AMUR MAPLE	10	LILAC	10	EASTERN REDCEDAR	15		
	NORWAY SPRUCE	20	JACK PINE	30	RED PINE	30	EASTERN WHITE PINE	30		

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	NARROW TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
0-12% LS.LCOS.LFS	POOR	FAIR	FAIR	POOR	POOR	-	V. POOR	V. POOR	FAIR	POOR	V. POOR	-
12-%	V. POOR	POOR	FAIR	POOR	POOR	-	V. POOR	V. POOR	POOR	POOR	V. POOR	-
0-12% S.COS.FS	V. POOR	POOR	FAIR	POOR	POOR	-	V. POOR	V. POOR	POOR	POOR	V. POOR	-

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPM)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE				

POTENTIAL PRODUCTION (LBS./AC. DRY WT):

FAVORABLE YEARS					
NORMAL YEARS					
UNFAVORABLE YEARS					

FOOTNOTES

A RATINGS BASED ON LAB. DATA FROM 2 PEDONS IN WASHINGTON COUNTY, MINNESOTA. SEE MAES CFC 2006 AND 2008.

3 WINDBREAK GROUP 7

MN0513

SOIL INTERPRETATIONS RECORD

MLRA(S): 90, 91
REV. FLA,WDF, 8-87
TYPIC UDIPSAMMENTS, MIXED, FRIGID

MAHTOMEDI SERIES
MODERATELY WET

THE MAHTOMEDI SERIES, MODERATELY WET, CONSISTS OF MODERATELY WELL DRAINED SOILS FORMED IN SANDY DEPOSITS ON OUTWASH PLAINS AND STREAM TERRACES. THE SURFACE LAYER IS VERY DARK GRAYISH BROWN LOAMY SAND 7 INCHES THICK. THE SUBSOIL IS 12 INCHES OF DARK YELLOWISH BROWN AND DARK BROWN LOAMY COARSE SAND AND 7 INCHES OF DARK BROWN GRAVELLY COARSE SAND. THE SUBSTRATUM IS 11 INCHES OF STRONG BROWN GRAVELLY COARSE SAND OVER LIGHT YELLOWISH BROWN MOTTLED SAND STRATIFIED WITH GRAVEL. SLOPES RANGE FROM 0 TO 3 PERCENT. AREAS ARE USED FOR WOODLAND AND PASTURELAND.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-7	LS, LCOS	SM, SP-SM	A-2, A 1	0 2	95-100	60-90	30-70	10 25	<20	NP-4
7-19	LCOS, LS, GR-LS	SM, SP-SM	A-2, A 1	0 2	75-100	60-90	30-70	10-25	<20	NP-4
19-37	GR-COS, COS, S	SP-SM, SM	A-2, A-3, A-1	0 15	70-95	50-90	30-70	5-15	<20	NP
37-60	GR-S, GR-COS, COS	SP, SM, SP-SM	A-2, A-3, A-1	0-15	55-95	50-90	30 70	2 15	<20	NP

DEPTH (IN.)	CLAY (PCT)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CONCRETE
0-7	2-15	1.40-1.60	6.0-20	0.07 0.11	5.1-6.5	-	LOW	.17	5	2	<1	LOW	HIGH
7-19	2-15	1.45-1.75	6.0-20	0.06 0.10	5.1-6.5	-	LOW	.17					
19-37	0-10	1.45-1.75	6.0-20	0.04 0.10	5.1-7.8	-	LOW	.10					
37-60	0-10	1.45-1.75	6.0-20	0.03 0.06	5.1-7.8	-	LOW	.10					

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYDROLOGIC GRP	POTENTIAL FROST ACTION
NONE			2.5-6.0	APPARENT	NOV-APR	-		>60		-		A	LOW

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SEVERE-WETNESS,POOR FILTER
SEWAGE LAGOON AREAS	SEVERE-SEEPAGE,WETNESS
SANITARY LANDFILL (TRENCH)	SEVERE-SEEPAGE,WETNESS,TOO SANDY
SANITARY LANDFILL (AREA)	SEVERE-SEEPAGE,WETNESS
DAILY COVER FOR LANDFILL	POOR-SEEPAGE,TOO SANDY,SMALL STONES

CONSTRUCTION MATERIAL

ROADFILL	FAIR-WETNESS
SAND	PROBABLE
GRAVEL	PROBABLE
TOPSOIL	POOR-SMALL STONES,AREA RECLAIM

WATER MANAGEMENT

POND RESERVOIR AREA	SEVERE SEEPAGE
EMBANKMENTS DIKES AND LEVEES	SEVERE SEEPAGE
EXCAVATED PONDS AQUIFER FED	SEVERE CUTBANKS CAVE
DRAINAGE	CUTBANKS CAVE
IRRIGATION	WETNESS,DROUGHTY,FAST INTAKE
TERRACES AND DIVERSIONS	WETNESS,TOO SANDY,SOIL BLOWING
GRASSED WATERWAYS	DROUGHTY,ROOTING DEPTH

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	SEVERE-CUTBANKS CAVE
DWELLINGS WITHOUT BASEMENTS	SLIGHT
DWELLINGS WITH BASEMENTS	MODERATE-WETNESS
SMALL COMMERCIAL BUILDINGS	SLIGHT
LOCAL ROADS AND STREETS	SLIGHT
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	LS: MODERATE-SMALL STONES,DROUGHTY LCOS: MODERATE-SMALL STONES,DROUGHTY, TOO SANDY

REGIONAL INTERPRETATIONS

MAHTOMEDI SERIES
MODERATELY WET

MN0513

RECREATIONAL DEVELOPMENT

CAMP AREAS	MODERATE-SMALL STONES, TOO SANDY	PLAYGROUNDS	SEVERE SMALL STONES
PICNIC AREAS	MODERATE-SMALL STONES, TOO SANDY	PATHS AND TRAILS	MODERATE-TOO SANDY

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY	CORN (BU)		CORN SILAGE (TONS)		OATS (BU)		BROMEGRASS-ALFALFA HAY (TONS)		KENTUCKY BLUEGRASS (AUM)		TIMOTHY-RD CLOV HAY (TONS)			
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
ALL	4S		50		5		40		2.5		2.0		2.0			

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROS*N HAZARD	EQUIP. LIMIT	SEEDL. MORT*Y	WINDTH HAZARD	PLANT COMPET	POTENTIAL PRODUCTIVITY: COMMON TREES	SITE INDX	PROD CLAS	TREES TO PLANT
ALL	6S	SLIGHT	MODER.	SLIGHT	SLIGHT	SLIGHT	RED PINE	55	6	RED PINE
							EASTERN WHITE PINE			EASTERN WHITE PINE
							NORTHERN PIN OAK			JACK PINE
							JACK PINE	69	7	WHITE SPRUCE

WINDBREAKS (A)

CLASS-DETERMIN*G PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
ALL	EASTERN WHITE PINE	30	RED PINE	30	JACK PINE	30	NORWAY SPRUCE	20
	EASTERN REDCEDAR	15	LILAC	10	AMUR MAPLE	10	AMER CRANBERRYBUSH	10
	SIBERIAN PEASHRUB	8	SILKY DOGWOOD	8	GRAY DOGWOOD	8	MANYFLR COTONEASTER	6

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	POTENTIAL AS HABITAT FOR: WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL	POOR	FAIR	FAIR	POOR	FAIR	-	V. POOR	V. POOR	FAIR	POOR	V. POOR	-

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE				

POTENTIAL PRODUCTION (LBS./AC. DRY WT):
FAVORABLE YEARS
NORMAL YEARS
UNFAVORABLE YEARS

FOOTNOTES

A WINDBREAK GROUP 7.

MI0335

SOIL INTERPRETATIONS RECORD

MLRA(S): 90, 92, 93
REV. DPR,LWB, 8-87

STURGEON SERIES

AQUIC UDIFLUVENTS, COARSE-SILTY OVER SANDY OR SANDY-SKELETAL, MIXED, NONACID, FRIGID

THE STURGEON SERIES CONSISTS OF SOMEWHAT POORLY DRAINED SOILS FORMED IN LOAMY OVER SANDY ALLUVIUM ON FLOOD PLAINS. THE SURFACE LAYER IS REDDISH BROWN SILT LOAM 8 INCHES THICK. THE NEXT 22 INCHES IS REDDISH BROWN SILT LOAM. THE SUBSTRATUM IS BROWN FINE SAND. SLOPES ARE 0 TO 2 PERCENT. AREAS ARE USED FOR WOODLAND, CROPLAND AND PASTURELAND.

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-8	SIL	ML, CL-ML	A-4	0	100	95-100	85-100	60-90	<25	2-7
0-8	FSL	SM, SM-SC	A-4	0	100	95-100	65-85	35-50	<25	NP-6
0-8	VFSL	ML, SM, SM-SC, CL-ML	A-4	0	100	95-100	75-95	45-65	<25	NP-6
8-30	SIL, VFSL, LVFS	ML, SM, SC, CL	A-4	0	100	95-100	85-100	35 95	<30	NP-10
30-60	S, FS	SM, SP-SM	A-2, A 1	0	95-100	75-100	35-50	5-35	-	NP

DEPTH (IN.)	CLAY (PCT)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CONCRETE
0-8	2-15	1.40-1.65	0.6-2.0	0.22 0.24	4.5-6.5	-	LOW	.37	4	5	2 3	MODERATE	MODERATE
0-8	2-15	1.40-1.65	0.6-2.0	0.16 0.18	4.5-6.5	-	LOW	.28	4	3	2-3		
0-8	2-15	1.40-1.65	0.6-2.0	0.20 0.22	4.5-6.5	-	LOW	.37	4	3	2-3		
8-30	5-18	1.50-1.70	0.6-2.0	0.10 0.22	4.5-6.5	-	LOW	.28					
30-60	0-10	1.50-1.65	6.0-20	0.05 0.07	4.5-6.5	-	LOW	.15					

FLOODING FREQUENCY	FLOODING DURATION	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYD GRP	POTENTIAL FROST ACTION
OCCASIONAL	BRIEF	MAR-MAY 0.5-1.5	APPARENT	NOV-MAY	-		>60				B	HIGH

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SEVERE-FLOODING,WETNESS,POOR FILTER
SEWAGE LAGOON AREAS	SEVERE-SEEPAGE,FLOODING,WETNESS
SANITARY LANDFILL (TRENCH)	SEVERE-FLOODING,SEEPAGE,WETNESS
SANITARY LANDFILL (AREA)	SEVERE-FLOODING,SEEPAGE,WETNESS
DAILY COVER FOR LANDFILL	POOR-SEEPAGE,TOO SANDY,WETNESS

CONSTRUCTION MATERIAL

ROADFILL	POOR-WETNESS
SAND	PROBABLE
GRAVEL	IMPROBABLE TOO SANDY
TOPSOIL	POOR-WETNESS

WATER MANAGEMENT

POND RESERVOIR AREA	SEVERE SEEPAGE
EMBANKMENTS DIKES AND LEVEES	SEVERE SEEPAGE,PIPING,WETNESS
EXCAVATED PONDS AQUIFER FED	SEVERE CUTBANKS CAVE
DRAINAGE	FLOODING,FROST ACTION,CUTBANKS CAVE
IRRIGATION	SIL,VFSL: WETNESS,FLOODING FSL: WETNESS,FLOODING,SOIL BLOWING
TERRACES AND DIVERSIONS	FSL: WETNESS,TOO SANDY SIL,VFSL: ERODES EASILY,WETNESS,TOO SANDY
GRASSED WATERWAYS	FSL: WETNESS SIL,VFSL: WETNESS,ERODES EASILY

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	SEVERE-CUTBANKS CAVE,WETNESS
DWELLINGS WITHOUT BASEMENTS	SEVERE-FLOODING,WETNESS
DWELLINGS WITH BASEMENTS	SEVERE-FLOODING,WETNESS
SMALL COMMERCIAL BUILDINGS	SEVERE-FLOODING,WETNESS
LOCAL ROADS AND STREETS	SEVERE-WETNESS,FLOODING,FROST ACTION
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	SEVERE-WETNESS

REGIONAL INTERPRETATIONS

RECREATIONAL DEVELOPMENT

CAMP AREAS	SEVERE-FLOODING,WETNESS	PLAYGROUNDS	SEVERE WETNESS
PICNIC AREAS	SEVERE-WETNESS	PATHS AND TRAILS	SEVERE WETNESS

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

CLASS-DETERMINING PHASE	CAPABILITY	OATS (BU)		BROMEGRASS-ALFALFA HAY (TONS)		SMOOTH BROMEGRASS (AUM)		ALFALFA HAY (TONS)							
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
ALL	3W		80		2.8		1.3		4.0							

WOODLAND SUITABILITY

CLASS-DETERMINING PHASE	ORD SYM	MANAGEMENT PROBLEMS: EROS HAZARD	EQUIP. LIMIT	SEEDL. MORTY	WINDTHI HAZARD	PLANT COMPET	POTENTIAL PRODUCTIVITY: COMMON TREES	SITE INDX	PROD CLAS	TREES TO PLANT
ALL	3W	SLIGHT	SEVERE	MODER.	SEVERE	SEVERE	RED MAPLE	65	3	WHITE SPRUCE
							AMERICAN BASSWOOD			NORWAY SPRUCE
							YELLOW BIRCH			EASTERN WHITE PINE
							QUAKING ASPEN			
							BALSAM FIR			
							EASTERN HEMLOCK			
							WHITE SPRUCE			
							NORTHERN WHITE-CEDAR			
							AMERICAN ELM			
							SUGAR MAPLE			
							SILVER MAPLE	80	2	

WINDBREAKS (A)

CLASS-DETERMING PHASE	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
ALL	WHITE SPRUCE	22	EASTERN WHITE PINE	28	NORWAY SPRUCE	28	NORTHERN WHITE-CEDAR	20
	IMP CAROLINA POPLAR	70	SILKY DOGWOOD	10	MANCHURIAN CRABAPPLE	19	NANNYBERRY VIBURNUM	15
	AMER CRANBERRYBUSH	9	AMUR PRIVET	11	GREEN ASH	30	RED MAPLE	30

WILDLIFE HABITAT SUITABILITY

CLASS-DETERMINING PHASE	POTENTIAL FOR HABITAT ELEMENTS: GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	POTENTIAL AS HABITAT FOR: OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
ALL	FAIR	GOOD	GOOD	GOOD	GOOD	-	FAIR	FAIR	GOOD	GOOD	FAIR	-

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT) BY CLASS DETERMINING PHASE
RED MAPLE	ACRU	
SUGAR MAPLE	ACSA3	
YELLOW BIRCH	BEAL2	
WHITE SPRUCE	PIGL	
SPINULOSE WOODFERN	DRSP4	
REDOSIER DOGWOOD	COST4	
WILLOW	SALIX	
SEDGE	CAREX	
SWEET CICELY	OSCL	
SPINULOSE WOODFERN	DRSP4	
LADYFERN	ATFI	
CANADA MAYFLOWER	MACA4	
SWEET CICELY	OSCL	
POTENTIAL PRODUCTION (LBS./AC. DRY WT):		
FAVORABLE YEARS		
NORMAL YEARS		
UNFAVORABLE YEARS		

FOOTNOTES

A WINDBREAK GROUP 1.

MARATHON COUNTY SHORT SOIL DESCRIPTIONS

April, 1986 - WDF

(This information subject to change)

Alban loam - Moderately well drained, nearly level and gently sloping soils with loamy surface layers and loamy subsoils underlain by stratified loamy and sandy lacustrine deposits. These soils have moderate permeability and high available water capacity.

Altdorf mucky silt loam - Poorly drained, nearly level soils with silty and mucky surface layers and clayey subsoils underlain by loamy glacial till, and residuum weathered from bedrock. These soils have slow permeability and high available water capacity.

Amery silt loam - Well drained, gently sloping to moderately steep soils with silty surface layers and loamy and gravelly subsoils underlain by loamy and gravelly glacial till. These soils have moderate permeability and moderate avialable water capacity.

Cable silt loam, stony - Poorly and very poorly drained, nearly level soils with stony and silty surface layers and loamy subsoils underlain by loamy glacial till. These soils have moderate or moderately slow over moderatley slow to moderately rapid permeability and moderate available water capacity.

Cathro muck - Very poorly drained, nearly level soils formed in organic deposits underlain by loamy materials. These soils have moderately rapid over moderately slow permeability and very high available water capacity.

Chetek sandy loam - Somewhat excessively drained, nearly level to steep soils with loamy surface layers and loamy, sandy, and gravelly subsoils underlain by sandy and gravelly outwash. These soils have moderately rapid over rapid or very rapid permeability and low available water capacity.

Dancy sandy loam - Poorly drained, nearly level soils with loamy surface layers and loamy subsoils underlain by loamy glacial till, and residuum weathered from bedrock. These soils have moderate permeability and moderate available water capacity.

Dolph silt loam - Somewhat poorly drained, nearly level and gently sloping soils with silty surface layers and silty and clayey subsoils underlain by loamy glacial till, and residuum weathered from bedrock. These soils have slow permeability and high available water capacity.

Dunnville fine sandy loam - Moderately well drained, nearly level and gently sloping soils with loamy surface layers and loamy and sandy subsoils underlain by sandy alluvial materials. These soils have moderate or moderately rapid over rapid or very rapid permeability and low available water capacity.

Fenwood silt loam - Well drained, sloping to moderately steep soils with silty surface layers and loamy, gravelly and cobbly subsoils underlain by bedrock at a depth of 40 to 60 inches. These soils have moderate permeability and moderate available water capacity.

Fenwood silt loam, stony - Well drained, gently sloping to steep soils with stony and silty surface layers and loamy, cobbly and gravelly subsoils underlain by bedrock at a depth of 40 to 60 inches. These soils have moderate permeability and moderate available water capacity.

Fenwood - Rozellville silt loams - Well drained, gently sloping soils with silty surface layers and loamy subsoils underlain by cobbly, gravelly, and loamy glacial till, and residuum weathered from bedrock. The depth of bedrock ranges from 40 to greater than 60 inches. These soils have moderate permeability and moderate available water capacity.

Fordum silt loam - Poorly and very poorly drained, nearly level soils formed in silty, loamy, and sandy alluvial deposits. These soils have moderate or moderately rapid over rapid or very rapid permeability and moderate available water capacity.

Freeon silt loam - Moderately well drained, sloping soils with silty surface layers and loamy subsoils underlain by loamy glacial till. These soils have moderate over very slow permeability and moderate available water capacity.

Graycalm loamy sand - Somewhat excessively drained, gently sloping soils with sandy surface layers and sandy subsoils underlain by stratified sandy lacustrine deposits. These soils have rapid permeability and low available water capacity.

Graycalm loamy sand, moderately well drained - Moderately well drained, nearly level soils with sandy surface layers and sandy subsoils underlain by stratified sandy lacustrine deposits. These soils have rapid permeability and low available water capacity.

Greenwood peat - Very poorly drained, nearly level soils formed in acid organic materials. These soils have moderately rapid permeability and very high available water capacity.

Guenther loamy sand - Moderately well drained, gently sloping soils with sandy surface layers and sandy and loamy subsoils underlain by loamy glacial till, and residuum weathered from bedrock. These soils have rapid over moderate permeability and moderate available water capacity.

Hatley silt loam - Somewhat poorly drained, nearly level and gently sloping soils with silty surface layers and loamy subsoils underlain by sandy glacial till. These soils have moderate permeability and moderate available water capacity.

Hatley silt loam, bouldery - Somewhat poorly drained, nearly level and gently sloping soils with bouldery and silty surface layers and loamy subsoils underlain by sandy glacial till. These soils have moderate permeability and moderate available water capacity.

Kennan sandy loam - Well drained, gently sloping to steep soils with loamy surface layers and loamy subsoils underlain by sandy glacial till. These soils have moderate permeability and moderate available water capacity.

Kennan sandy loam, bouldery - Well drained, gently sloping to steep soils with bouldery and loamy surface layers and loamy subsoils underlain by sandy glacial till. These soils have moderate permeability and moderate available water capacity.

Magnor silt loam - Somewhat poorly drained, nearly level and gently sloping soils with silty surface layers and loamy subsoils underlain by loamy glacial till. These soils have moderate over very slow permeability and moderate available water capacity.

Mahtomedi loamy sand - Excessively drained, nearly level to very steep soils with sandy surface layers and sandy and gravelly subsoils underlain by sandy and gravelly outwash. These soils have rapid permeability and low available water capacity.

Mahtomedi loamy sand, moderately well drained - Moderately well drained, nearly level soils with sandy surface layers and sandy and gravelly subsoils underlain by sandy and gravelly outwash. These soils have rapid permeability and low available water capacity.

Marathon silt loam - Well drained, gently sloping and sloping soils with silty surface layers and silty, loamy, sandy, and gravelly subsoils underlain by gravelly and sandy residuum weathered from granite. These soils have moderate and moderately rapid over rapid or very rapid permeability and moderate available water capacity.

Marathon silt loam, stony - Well drained, gently sloping to moderately steep soils with stony and silty surface layers and silty, loamy, sandy and gravelly subsoils underlain by gravelly and sandy residuum weathered from granite. These soils have moderate and moderately rapid over rapid or very rapid permeability and moderate available water capacity.

Marshfield silt loam - Poorly drained, nearly level and gently sloping soils with silty surface layers and silty and loamy subsoils underlain by loamy glacial till. These soils have moderately slow permeability and high available water capacity.

Meadland loam - Somewhat poorly drained, nearly level and gently sloping soils with loamy surface layers and loamy subsoils underlain by loamy glacial till, and residuum weathered from bedrock. These soils have moderate or moderately slow permeability and high available water capacity.

Meadland loam, stony - somewhat poorly drained, nearly level and gently sloping soils with loamy and stony surface layers and loamy subsoils underlain by loamy glacial till, and residuum weathered from bedrock. These soils have moderate or moderately slow permeability and high available water capacity.

Meehan loamy sand - Somewhat poorly drained, nearly level soils with sandy surface layers and sandy subsoils underlain by sandy outwash. These soils have rapid permeability and low available water capacity.

Minocqua sandy loam - Very poorly and poorly drained, nearly level soils with loamy surface layers and loamy, sandy and gravelly subsoils, underlain by sandy and gravelly outwash. These soils have moderate over rapid or very rapid permeability and low available water capacity.

Moberg gravelly silt loam - Somehwat excessively drained, gently sloping to moderately steep soils, with gravelly and silty surface layers and gravelly, loamy, and sandy subsoils underlain by gravelly and sandy residuum weathered from granite. These soils have moderately rapid over very rapid permeability and low available water capacity.

Mosinee sandy loam - Well drained, gently sloping to moderately steep soils, with loamy surface layers and loamy and cobbly subsoils underlain by bedrock at a depth of 40 to 60 inches. These soils have moderate or moderately rapid permeability and low available water capacity.

Mosinee sandy loam, stony - Well drained, gently sloping to moderately steep soils with stony and loamy surface layers and loamy and cobbly subsoils underlain by bedrock at a depth of 40 to 60 inches. These soils have moderate or moderately rapid permeability and low available water capacity.

Mylrea silt loam - Somewhat poorly drained, nearly level and gently sloping soils with silty surface layers and silty, loamy and gravelly subsoils underlain by gravelly and sandy residuum weathered from granite. These soils have moderate over rapid or very rapid permeability and moderate available water capacity.

Mylrea silt loam, stony - Somewhat poorly drained, nearly level and gently sloping soils with stony and silty surface layers and silty, loamy, and gravelly subsoils underlain by gravelly and sandy residuum weathered from granite. These soils have moderate over rapid or very rapid permeability and moderate available water capacity.

Newson mucky loamy sand - Poorly and very poorly drained, nearly level soils with mucky and sandy surface layers and sandy subsoils underlain by sandy outwash. These soils have rapid permeability and low available water capacity.

Oesterle loam - Somewhat poorly drained, nearly level soils with loamy surface layers and loamy subsoils, underlain by sandy and gravelly outwash. These soils have moderate over rapid or very rapid permeability and low available water capacity.

Pits, gravel - Areas where sand and gravel or weathered bedrock, either rotten granite or soft sandstone, are or have been excavation for roadfill and other uses.

Pits, quarries - Areas where hard bedrock is being or has been quarried for monuments, building stone, and other uses.

Plover sandy loam - Somewhat poorly drained, nearly level soils with loamy surface layers and loamy subsoils underlain by stratified silty, loamy and sandy lacustrine deposits. These soils have moderate permeability and moderate available water capacity.

Ribhill silt loam, stony - Well drained, sloping to steep soils with stony and silty surface layers and silty and cobbly subsoils underlain by quartzite bedrock at a depth of 20 to 40 inches. These soils have moderate permeabiity and low available water capacity.

Rietbrock silt loam - Somewhat poorly drained, nearly level to sloping soils with silty surface layers and loamy, gravelly and cobbly subsoils underlain by bedrock at a depth of 40 to 60 inches. These soils have moderate or moderately slow permeability and moderate available water capacity.

Rietbrock silt loam, stony - Somewhat poorly drained, nearly level to sloping soils with stony and silty surface layers and silty, loamy and cobbly subsoils underlain by bedrock at a depth of 40 to 60 inches. These soils have moderate or moderately slow permeability and moderate available water capacity.

Rockers loamy sand - Somewhat poorly drained, nearly level and gently sloping soils with sandy surface layers and sandy, loamy and gravelly subsoils underlain by loamy glacial till, and residuum weathered from bedrock. These soils have moderately rapid over moderately slow permeability and moderate available water capacity.

Rosholt sandy loam - Well drained, nearly level and gently sloping soils with loamy surface layers and loamy, sandy and gravelly subsoils underlain by sandy and gravelly outwash. These soils have moderate or moderately rapid over rapid or very rapid permeability and low available water capacity.

Rosholt silt loam - Well drained, nearly level and gently sloping soils with silty surface layers and loamy and gravelly subsoils underlain by sandy and gravelly outwash. These soils have moderate over rapid or very rapid permeability and moderate available water capacity.

Scott Lake sandy loam - Moderately well drained, nearly level and gently sloping soils with loamy surface layers and loamy and sandy subsoils underlain by sandy and gravelly outwash. These soils have moderate or moderately rapid over rapid or very rapid permeability and low available water capacity.

Scott Lake silt loam - Moderately well drained, nearly level and gently sloping soils with silty surface layers and loamy subsoils underlain by gravelly and sandy outwash. These soils have moderate orver rapid or very rapid permeability and moderate available water capacity.

Seelyeville muck - Very poorly drained, nearly level soils formed in non-acid organic materials. These soils have moderately rapid permeability and very high available water capacity.

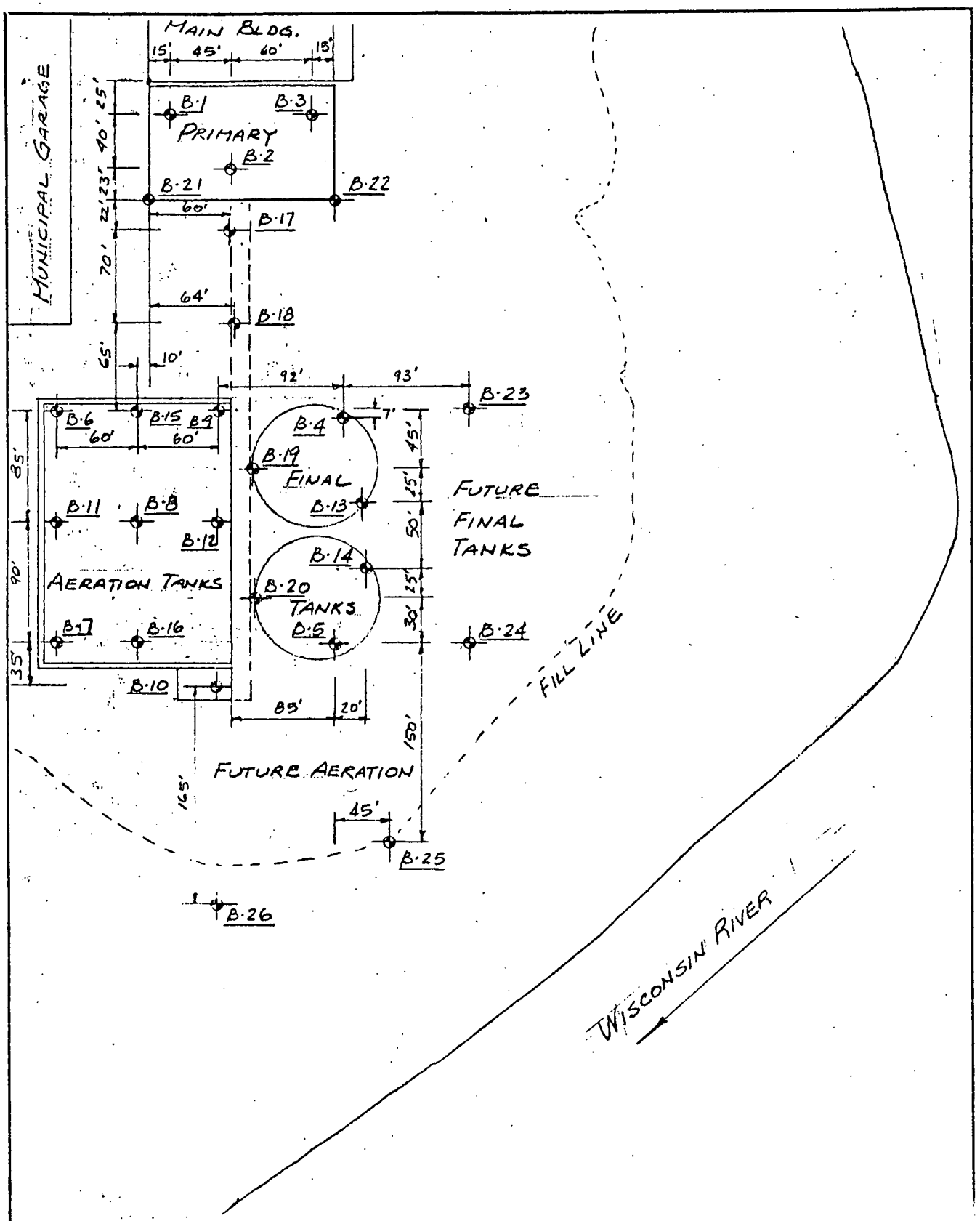
Sherry silt loam - Poorly and very poorly drained, nearly level soils with silty surface layers and silty and loamy subsoils underlain by loamy glacial till, and residuum weathered from bedrock. These soils have moderately slow permeability and high available water capacity.

Sturgeon silt loam - Somewhat poorly drained, nearly level soils formed in silty, loamy, and sandy alluvial deposits. These soils have moderate over rapid permeability and moderate available water capacity.

Udorthents, loamy - Areas with the upper 3 feet or more disturbed (cut & fill), non-soil material (made land), or excavations in non-sandy or non-gravelly soils (borrow pit). Original soil generally not recognizeable. These soils have slow to rapid permeability and low to high available water capacity.

Withee silt loam - Somewhat poorly drained, nearly level and gently sloping soils with silty surface layers and silty and loamy subsoils underlain by glacial till. These soils have moderate over very slow permeability and moderate available water capacity.

Appendix E



SOIL BORING LOCATION DIAGRAM
PROPOSED SEWAGE TREATMENT FACILITIES
WAUSAU, WISCONSIN

SOIL TESTING SERVICES OF WIS., INC.
Route 7, Boeten Road
GREEN BAY WISCONSIN

BP	1"=100'	2-8-67	1878

P.P. No. 6—1M

GENERAL NOTES

1950 Chicago Building Code Soil Classifications are Used Except Where Noted

DRILLING & SAMPLING SYMBOLS

SS : Split-Spoon – 1⅜" I.D., 2" O.D., except where noted
ST : Shelby Tube – 2" O.D., except where noted
PA : Power Auger Sample
DB : Diamond Bit – NX: BX: AX:
CB : Carboloy Bit – NX: BX: AX:
OS : Osterberg Sampler – 3" Shelby Tube
HS : Housel Sampler
WS : Wash Sample
FT : Fish Tail
RB : Rock Bit
WO: Wash Out

Standard "N" Penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch OD split spoon, except where noted.

WATER LEVEL MEASUREMENT SYMBOLS

WL : Water Level
WCI: Wet Cave In
DCI : Dry Cave In
WS : While Sampling
WD : While Drilling
BCR : Before Casing Removal
ACR : After Casing Removal
AB : After Boring

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable ground water levels. In impervious soils, the accurate determination of ground water elevations is not possible in even several days observation, and additional evidence on ground water elevations must be sought.

CLASSIFICATION

COHESIONLESS SOILS

"Trace"	:	1% to 10%	
"Trace to some"	:	10% to 20%	
"Some"	:	20% to 35%	
"And"	:	35% to 50%	
Loose	:	0 to 9 Blows	or equivalent
Medium Dense	:	10 to 29 Blows	
Dense	:	30 to 59 Blows	
Very Dense	:	≥ 60 Blows	

COHESIVE SOILS

If clay content is sufficient so that clay dominates soil properties, then clay becomes the principle noun with the other major soil constituent as modifier; i.e., silty clay. Other minor soil constituents may be added according to classification breakdown for cohesionless soils; i.e., silty clay, trace to some sand, trace gravel.

Soft	:	0.00 — 0.59 tons/ft²
Stiff	:	0.60 — 0.99 tons/ft²
Tough	:	1.00 — 1.99 tons/ft²
Very tough	:	2.00 — 3.99 tons/ft²
Hard	:	≥ 4.00 tons/ft²

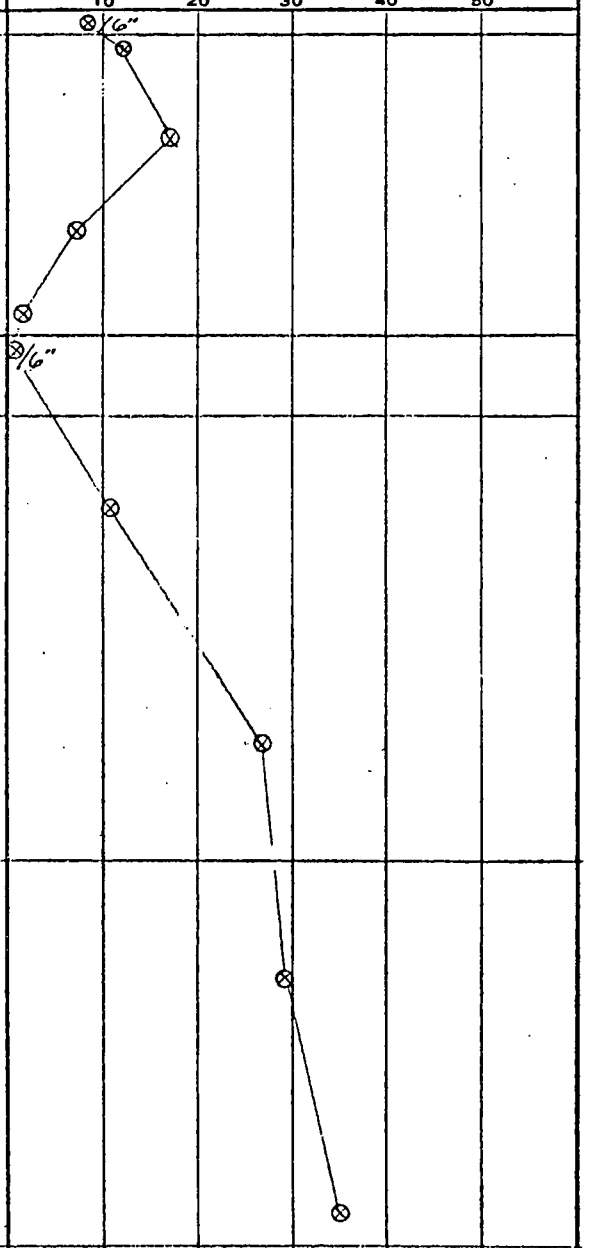
LOG OF BORING NO. 1

OWNER	ARCHITECT - ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME** Proposed Addition to
Wausau, Wisconsin	Sewage Treatment Plant

SURFACE ELEVATION 1170.41

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
	1				DARK BROWN SILTY AND SANDY TOPSOIL-(OL)	
	1A	SS			FINE-MEDIUM SAND-TRACE TO SOME SILT-LIGHT BROWN AND WHITE CHANGING TO GRAY TRACE GREEN AT 4'-MEDIUM DENSE TO LOOSE-MOIST-INDUSTRIAL FILL	
	2	SS				
5	3	SS				
	4	SS				
	4A				FINE-MEDIUM SAND-SOME SILT-TRACE TOPSOIL-BROWN TRACE DARK BROWN-LOOSE-MOIST-(SM)	
10	5	SS			FINE-MEDIUM SAND-TRACE SILT-BROWN CHANGING TO MEDIUM DARK GRAY-WET-MEDIUM DENSE-(SP)-1/2" ORGANIC SILT SEAM AT 16'	
15	6	SS				
20	7	SS			FINE-COARSE SAND-TRACE TO SOME GRAVEL-TRACE SILT-GRAYISH BROWN-WET-MEDIUM DENSE TO DENSE-(SW)	
25	8	SS				
26.5					END OF BORING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % · WATER CONTENT % · LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



25' NX CASING

WATER LEVEL OBSERVATIONS		
W.L.	W.S. OR W.D.	
W.L.	9' B.C.R.	5' A.C.R.
W.L.		

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	1/26/67		
BORING COMPLETED	1/26/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P No. 8—1M

LOG OF BORING NO. 2

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE Wausau, Wisconsin	**PROJECT NAME** Proposed Addition To Sewage Treatment Plant

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² — 1 2 3 4 5

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD "N" PENETRATION (BLOWS/FT.) — 10 20 30 40 50

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
					SURFACE ELEVATION 1170.16	
		PA			SLUDGE FILL	
	1	SS			FINE SAND-SOME SILT-TRACE FINE GRAVEL-LIGHT BROWN-MOIST-LOOSE TO MEDIUM DENSE-INDUSTRIAL FILL	
	2	SS				
5	3	SS				
	4					
	4A	SS			FINE SAND-TRACE TO SOME SILT-TRACE GRAVEL-BROWN-MOIST TO WET-MEDIUM DENSE TO LOOSE-(SM)	
10	5	SS				
15	6	SS			FINE-COARSE SAND-SOME FINE-MEDIUM GRAVEL-TRACE SILT-GRAYISH BROWN-WET-MEDIUM DENSE TO DENSE-(SW)	
20	7	SS				
25	8	SS			FINE-MEDIUM SAND-TRACE SILT-BROWN-WET-MEDIUM DENSE-(SP)	
26.5					END OF BORING	

⊗/6"

63

WATER LEVEL OBSERVATIONS		
W.L.	10'	W.S. ~~XXXXXX~~
W.L.	7' B.C.R.	A.C.R.
W.L.	CI AT 1' ACR	

25' NX CASING

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	1/27/67		
BORING COMPLETED	1/27/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

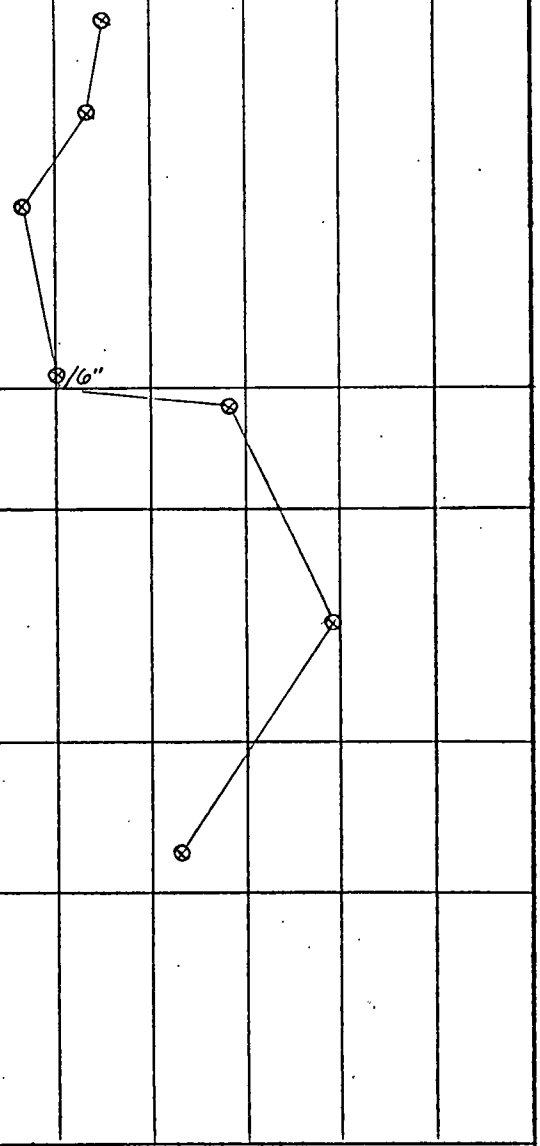
P.P. No. 8—1M

LOG OF BORING NO. 3

OWNER City of Wausau	**ARCHITECT-ENGINEER** Becher-Hoppe Engineers, Inc.
SITE Wausau, Wisconsin	**PROJECT NAME** Proposed Addition to Sewage Treatment Plant

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
					SURFACE ELEVATION 1171.26	
					FROZEN SAND AND TOPSOIL-FILL	
	1	SS			FINE SAND-SOME SILT-TRACE CINDERS AT 10'-WHITE TRACE LIGHT BROWN-MOIST-MEDIUM DENSE TO LOOSE-INDUSTRIAL FILL	
5	2	SS				
	3	SS				
10						
	4					
	4A	SS			FINE-MEDIUM SAND-TRACE SILT-BROWN-WET-MEDIUM DENSE-(SP)	
15	5	SS			FINE SAND-TRACE TO SOME SILT-GRAYISH BROWN-WET-DENSE-(SM) THIN SEAMS OF GRAY ORGANIC SILT	
20	6	SS			FINE-COARSE SAND-SOME GRAVEL-TRACE SILT-BROWN-WET-MEDIUM DENSE-(SW)	
21.5					END OF BORING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS		
W.L.	10'	XXXXX W.D.
W.L.	B.C.R.	A.C.R.
W.L.	10' AB	
	9' 9 DAYS AB	

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	1/26/67		
BORING COMPLETED	1/26/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M

LOG OF BORING NO. 4

OWNER	ARCHITECT - ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed Addition to Sewage Treatment Plant

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² — 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.) — 10 20 30 40 50

SURFACE ELEVATION 1169.97

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
		PA			TOPSOIL	
	1	SS			FINE SAND-SOME SILT-WHITE TRACE LIGHT BROWN AND GREEN-MOIST-MEDIUM DENSE TO LOOSE-INDUSTRIAL FILL	
	2	SS				
5	3	SS				
	4	SS				
	4A				FINE SAND-TRACE TO SOME TOPSOIL-BROWN-LOOSE-(SM-OL)	
10					SILT-TRACE CLAY AND SAND-BROWN-LOOSE-(ML)	
	5	SS				
	5A				SILT-TRACE TO SOME FINE SAND-GRAY-MODERATELY ORGANIC-LOOSE-(ML-OL)	
15	6	SS			FINE-COARSE SAND-SOME GRAVEL-TRACE SILT-BROWN-WET-DENSE TO MEDIUM DENSE-(SW)	
20	7	SS				
25	8	SS				
26.5					END OF BORING	

25' NX CASING

WATER LEVEL OBSERVATIONS		
W.L.		W.S. OR W.D.
W.L.	9' B.C.R.	9' A.C.R.
W.L.		

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	1/26/67		
BORING COMPLETED	1/26/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M

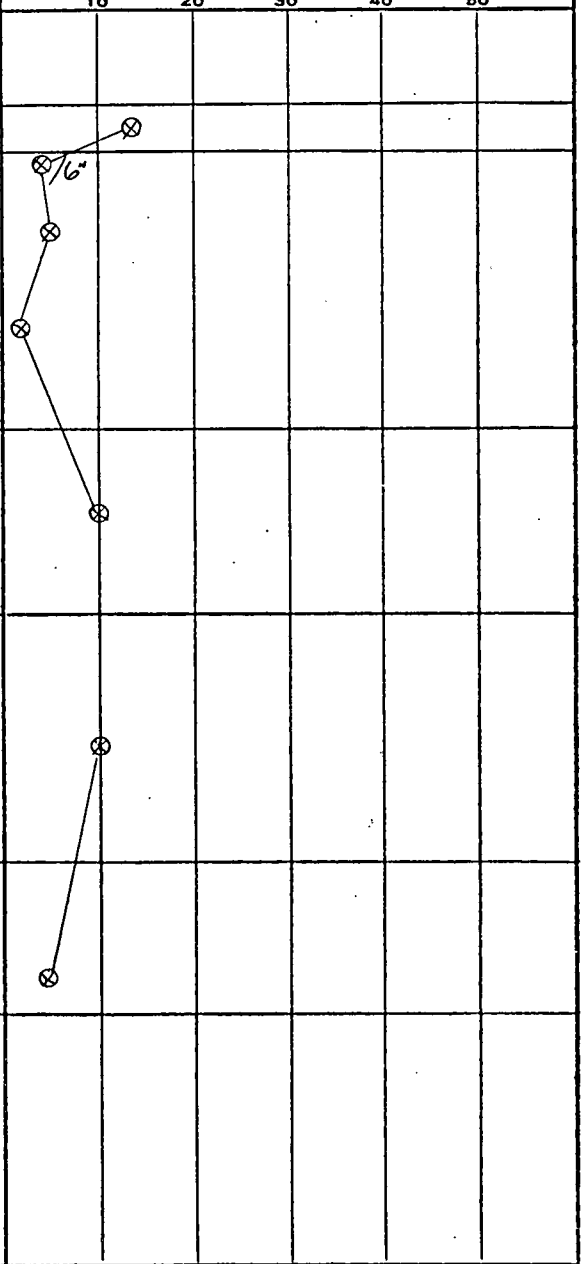
LOG OF BORING NO. 5

OWNER	ARCHITECT - ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE Wausau, Wisconsin	**PROJECT NAME** Proposed Addition to Sewage Treatment Plant

SURFACE ELEVATION 1168.63

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
	1	PA			FINE SAND AND SILT-TRACE GRAVEL-DARK BROWN-FILL	
	2	SS			FINE SAND-SOME SILT-LIGHT BROWN AND WHITE-MOIST-MEDIUM DENSE-FILL	
	2A					
5	3	SS			FINE-MEDIUM SAND AND FINE SAND-SOME SILT-GREEN AND LIGHT BROWN-WET-LOOSE-INDUSTRIAL FILL	
	4	SS				
10	5	SS			SILT-TRACE CLAY AND SAND-DARK BROWN-SLIGHTLY ORGANIC-MEDIUM DENSE-(ML-OL)	
15	6	SS			FINE-MEDIUM SAND-TRACE TO SOME SILT-MEDIUM DARK GRAYISH BROWN-WET-MEDIUM DENSE-(SM)	
20	7	SS			FINE-COARSE SAND-TRACE SILT AND FINE GRAVEL-BROWN-WET-LOOSE-(SW)	
21.5					END OF BORING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS			
W.L.	8'	W.S. ~~XXXXXX~~	
W.L.	B.C.R.		A.C.R.
W.L.	9' AB		
	10' 9 DAYS AB		

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	1/26/67		
BORING COMPLETED	1/26/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M

LOG OF BORING NO. 6

OWNER City of Wausau

ARCHITECT-ENGINEER Becher-Hoppe Engineers, Inc.

SITE Wausau, Wisconsin

PROJECT NAME Proposed Addition to Sewage Treatment Plant

SURFACE ELEVATION 1168.56

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
	1	PA			FINE SAND-SOME SILT-TRACE FINE GRAVEL-DARK BROWN-FILL	
	2	SS			FINE-MEDIUM SAND-TRACE TO SOME SILT-LIGHT BROWN-MOIST-INDUSTRIAL FILL	
5	3	SS			FINE SAND-SOME SILT-LIGHT BROWN-MOIST-LOOSE-INDUSTRIAL FILL	
	4	SS				
	4A				FINE-MEDIUM SAND-SOME SILT-GRAY BROWN TRACE GREEN-WET-LOOSE-INDUSTRIAL FILL	
10	5	SS			ORGANIC SILT-TRACE SAND AND FINE ROOTS-GRAY-MEDIUM DENSE-(OL)	
	5A				FINE-MEDIUM SAND-TRACE TO SOME SILT AND GRAVEL-BROWN-WET-MEDIUM DENSE-(SM)	
15	6	SS				
20	7	SS			FINE-COARSE SAND-TRACE GRAVEL AND SILT-GRAY-WET-MEDIUM DENSE-(SW)	
21.5					END OF BORING	

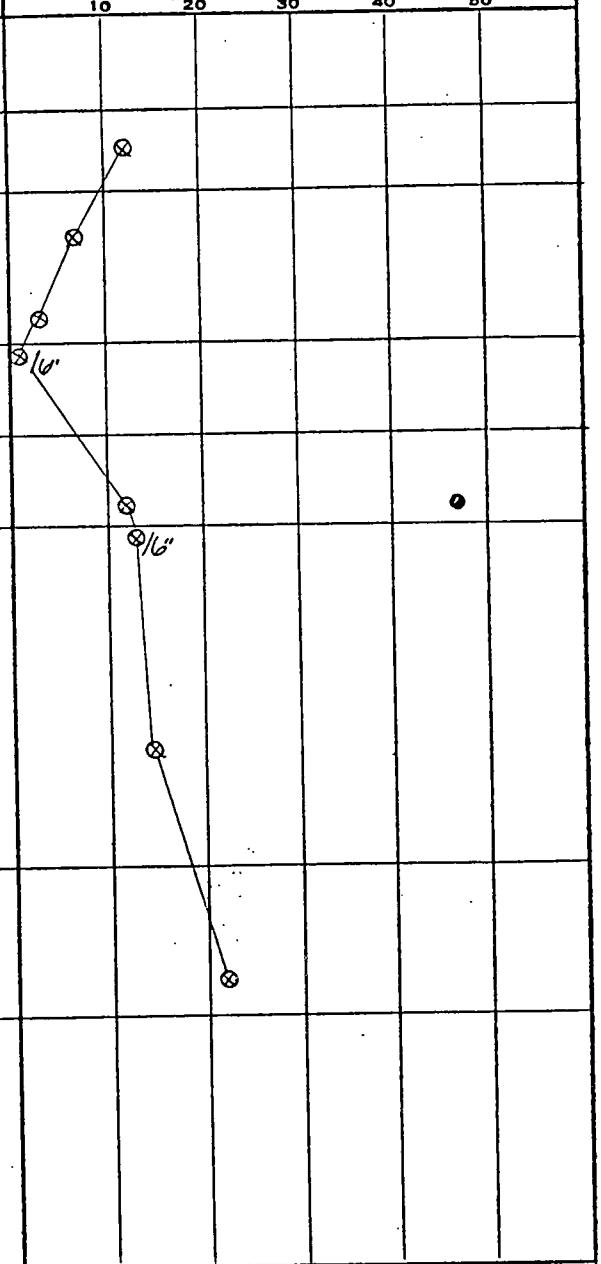
UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²

1 2 3 4 5

PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %

STANDARD "N" PENETRATION (BLOWS/FT.)

10 20 30 40 50



WATER LEVEL OBSERVATIONS

W.L.	7'	W.S. XXXXXX
W.L.	B.C.R.	A.C.R.
W.L.	7.5' AB	
	10' 8 DAYS AB	

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	1/27/67		
BORING COMPLETED	1/27/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

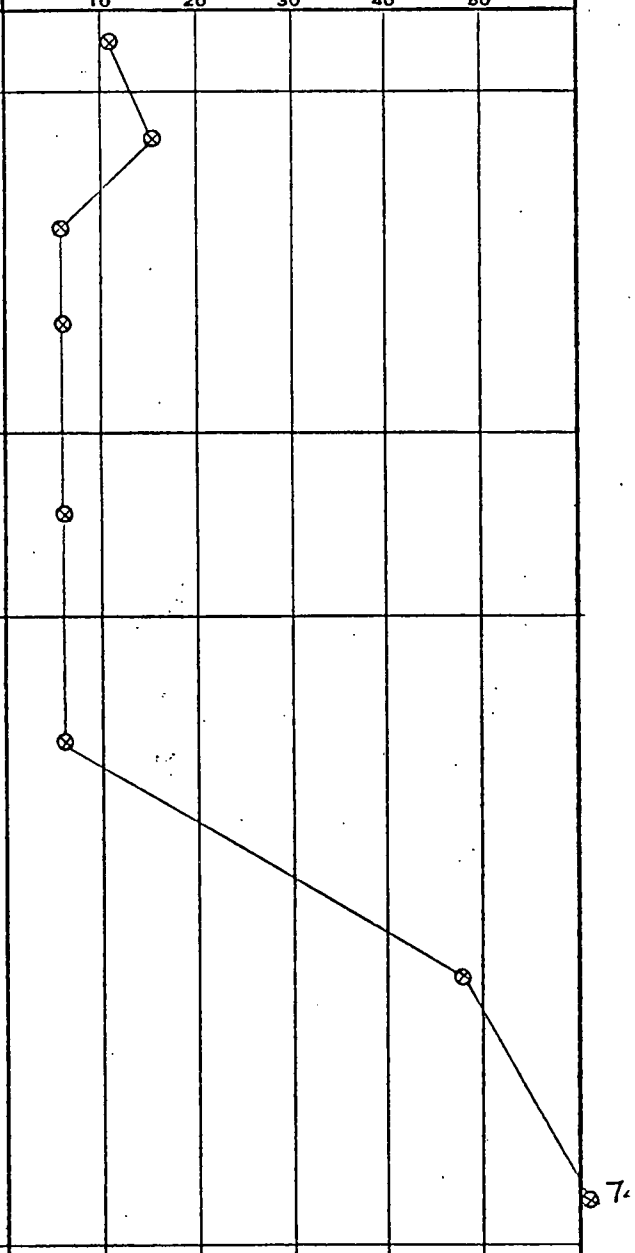
P.P. No. 8—1M

LOG OF BORING NO. 7

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed Addition To Sewage Treatment Plant

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
					SURFACE ELEVATION 1167.77	
	1	SS			FINE-MEDIUM SAND-TRACE FINE GRAVEL AND SILT-BROWN-FILL	
	2	SS			FINE SAND-TRACE TO SOME SILT-LIGHT BROWN-MOIST-MEDIUM DENSE TO LOOSE-INDUSTRIAL FILL	
5	3	SS				
	4	SS				
10	5	SS			ORGANIC SILT-DARK GRAY-LOOSE-(OL)-SEAMS OF SILTY FINE SAND	
15	6	SS			FINE-COARSE SAND-TRACE TO SOME GRAVEL-TRACE SILT-GRAY-WET-LOOSE TO DENSE-(SW)	
20	7	SS				
25						
26.5	8	SS			END OF BORING 25' NX CASING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS			
W.L.		W.S. OR W.D.	
W.L.	6'	B.C.R.	A.C.R.
W.L.			

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	2/8/67		
BORING COMPLETED	2/8/67		
RIG	W-6	FOREMAN	JG
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

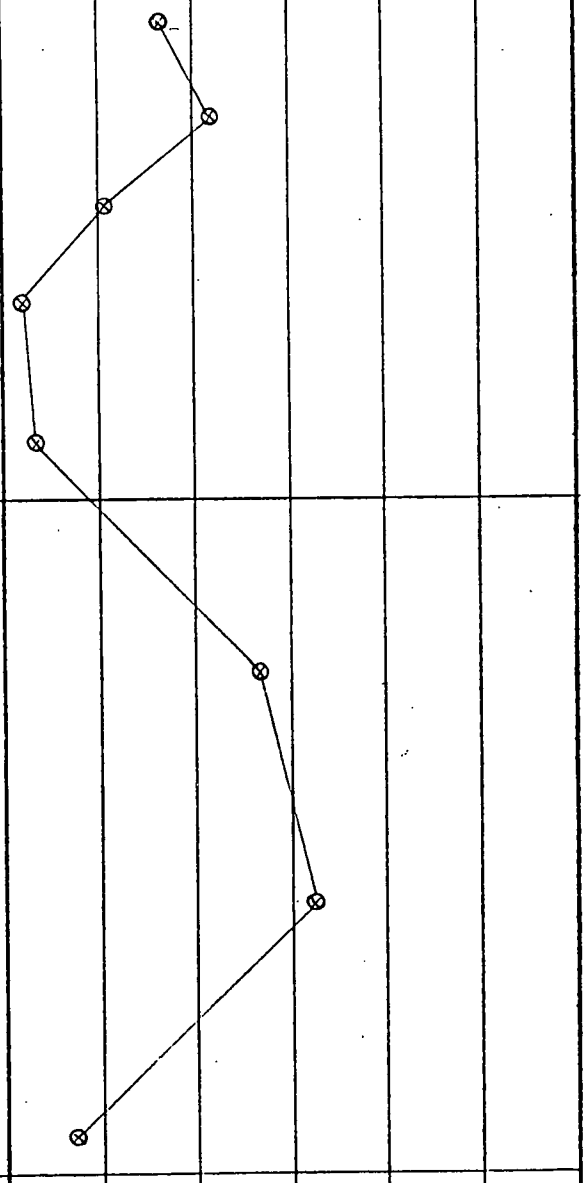
P.P. No. 8—1M

LOG OF BORING NO. 8

OWNER City of Wausau	**ARCHITECT-ENGINEER** Becher-Hoppe Engineers, Inc.
SITE Wausau, Wisconsin	**PROJECT NAME** Proposed Addition to Sewage Treatment Plant

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
SURFACE ELEVATION						
1		PA			BLACK SANDY TOPSOIL	
	1	SS				
	2	SS			FINE SAND-SOME SILT-TRACE FINE GRAVEL-WHITE TRACE LIGHT BROWN MOIST BECOMING WET AT 10'-MEDIUM DENSE TO LOOSE-INDUSTRIAL FILL	
5	3	SS				
	4	SS				
10	5	SS				
15	6	SS			FINE-MEDIUM SAND-TRACE FINE GRAVEL-AND SILT-BROWN-WET-DENSE TO LOOSE-(SP)	
20	7	SS				
25	8	SS				
26.5					END OF BORING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS		
W.L.	10'	W.S. ~~XXXX~~
W.L.	7' B.C.R.	10' A.C.R.
W.L.		

25' NX CASING

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	1/27/67		
BORING COMPLETED	1/27/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M

LOG OF BORING NO. 9

OWNER City of Wausau

ARCHITECT-ENGINEER Becher-Hoppe Engineers, Inc.

SITE Wausau, Wisconsin

PROJECT NAME Proposed Addition to Sewage Treatment Plant

SURFACE ELEVATION 1169.08

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL
	1	PA			FINE-MEDIUM SAND-TRACE FINE GRAVEL-BROWN-FILL
	2	SS			FINE SAND-SOME SILT-WHITE AND LIGHT BROWN-FILL
5	3	SS			FINE-COARSE SAND-SOME GRAVEL-BROWN-FILL
	3A				FINE SAND-SOME SILT-WHITE-MOIST-MEDIUM DENSE TO LOOSE-INDUSTRIAL FILL
	4	SS			
	4A				FINE SAND-SOME SILT-GRAY-MOIST-LOOSE-INDUSTRIAL FILL
10	5	SS			ORGANIC SILT-TRACE TO SOME FINE SAND-GRAY-LOOSE-(OL)
	5A				FINE-MEDIUM SAND-TRACE TO SOME GRAVEL-TRACE SILT-MEDIUM DARK BROWN CHANGING TO BROWN-WET-MEDIUM DENSE TO DENSE-(SP)
15	6	SS			
20	7	SS			
21.5					END OF BORING

UNIT DRY WT. LBS./FT.³

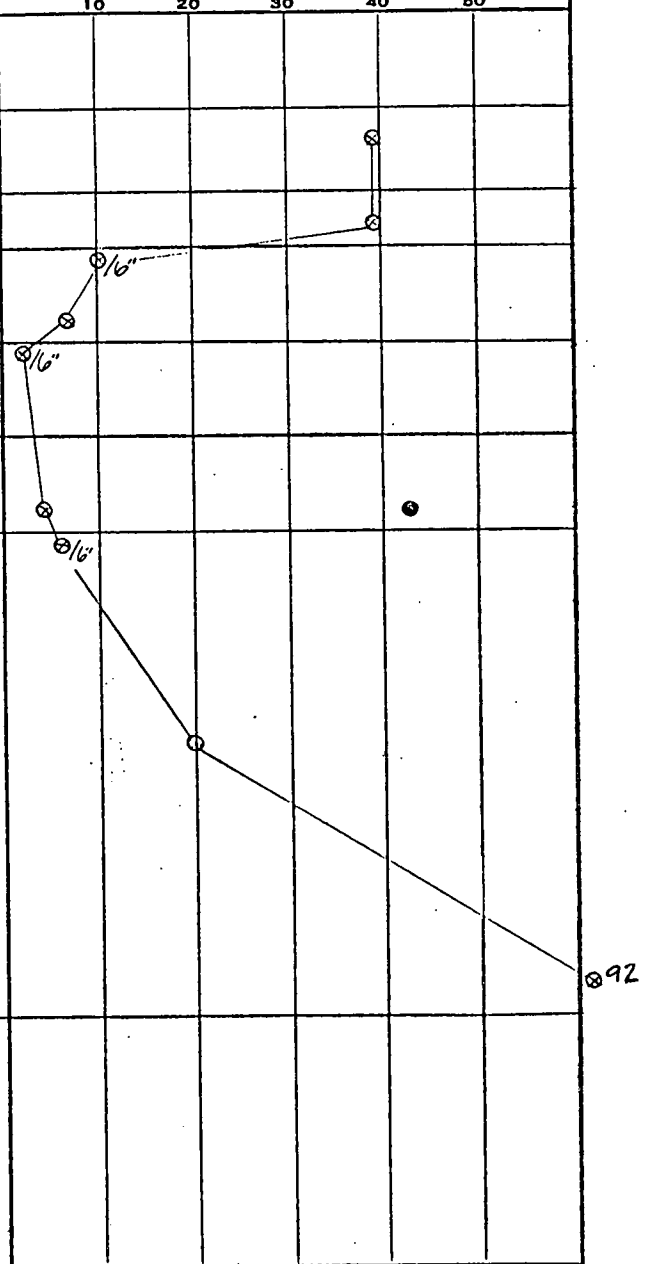
UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²

1 2 3 4 5

PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %

STANDARD "N" PENETRATION (BLOWS/FT.)

10 20 30 40 50



WATER LEVEL OBSERVATIONS

W.L.	10'	W.S. ~~CAVE~~	
W.L.		B.C.R.	A.C.R.
W.L.	9' AB		

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	1/27/67		
BORING COMPLETED	1/27/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

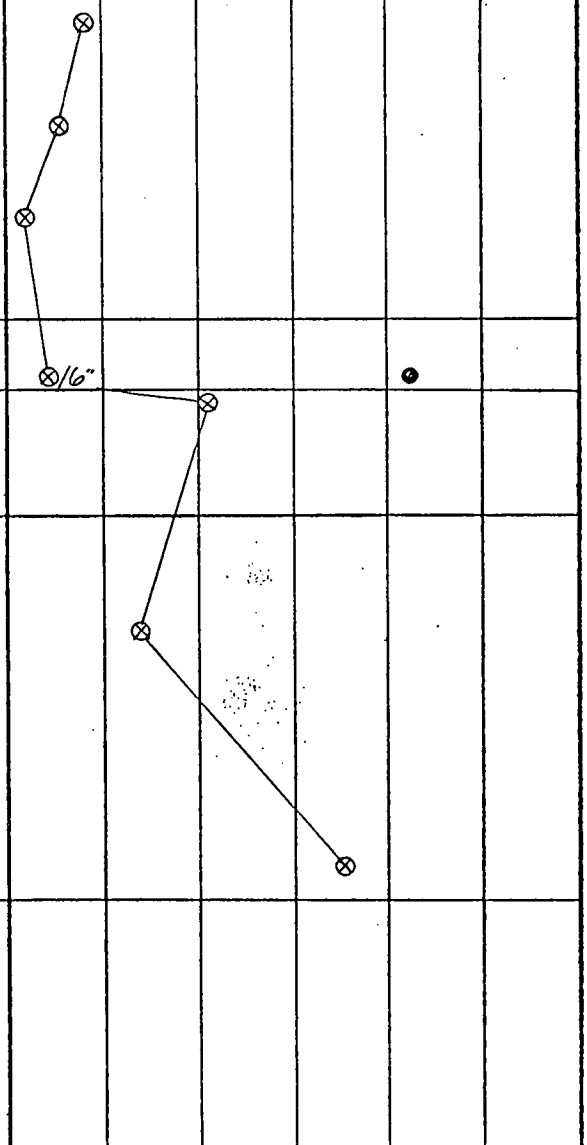
P.P. No. 8—1M

LOG OF BORING NO. 10

OWNER City of Wausau	**ARCHITECT - ENGINEER** Becher-Hoppe Engineers, Inc.
SITE Wausau, Wisconsin	**PROJECT NAME** Proposed Addition to Sewage Treatment Plant

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
					SURFACE ELEVATION → 1168.64	
					BLACK TOPSOIL	
	1	PA			FINE SAND-SOME SILT-WHITE AND LIGHT BROWN-MOIST-LOOSE-INDUSTRIAL FILL	
	2	SS				
5	3	SS				
	4	SS				
10	5				ORGANIC SILT-TRACE SAND-GRAY-LOOSE-(OL)-SILTY SAND SEAMS	
	5A	SS			FINE-MEDIUM SAND-TRACE TO SOME SILT-BROWN-MOIST-MEDIUM DENSE-(SM)	
15	6	SS			FINE-COARSE SAND-SOME FINE GRAVEL-TRACE SILT-BROWN-WET-MEDIUM DENSE TO DENSE-(SW)	
20	7	SS				
21.5					END OF BORING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS		
W.L.	8'	W.S. ~~OPEN~~
W.L.	B.C.R.	A.C.R.
W.L.	8' AB	

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	1/27/67		
BORING COMPLETED	1/27/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

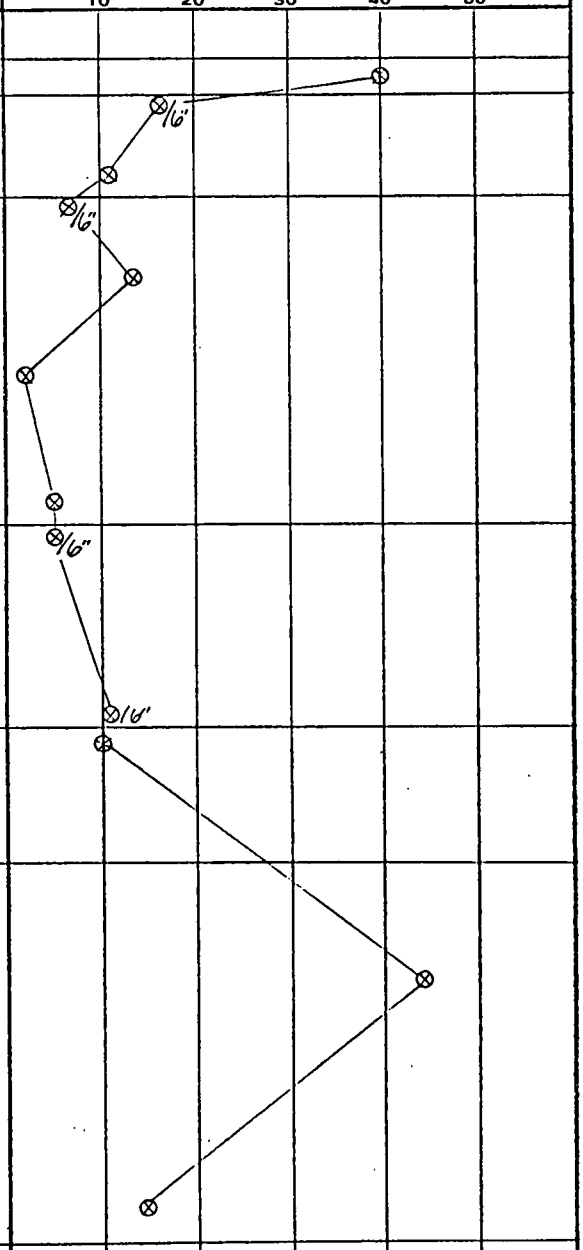
P.P. No. 8—1M

LOG OF BORING NO. 11

OWNER City of Wausau	**ARCHITECT-ENGINEER** Becher-Hoppe Engineers, Inc.
SITE Wausau, Wisconsin	**PROJECT NAME** Proposed Addition to Sewage Treatment Plant

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
					SURFACE ELEVATION 1168.74	
					FROZEN SANDY TOPSOIL	
	1	SS			FINE SAND-SOME SILT-LIGHT BROWN-FILL	
	1A				FINE-MEDIUM SAND-TRACE GRAVEL AND SILT-BROWN-FILL	
	2	SS				
	2A					
5						
	3	SS			FINE SAND-SOME SILT-WHITE TRACE LIGHT BROWN-MOIST BECOMING WET AT 7'-MEDIUM DENSE TO LOOSE-INDUSTRIAL FILL	
	4	SS				
10						
	5	SS				
	5A				FINE SAND-SOME SILT-TRACE WOOD PIECES-DARK GRAY AND DARK BROWN-LOOSE TO MEDIUM DENSE-(SM)-DARK GRAY 1/4" ORGANIC SILT SEAMS	
15						
	6					
	6A	SS			FINE-MEDIUM SAND-TRACE TO SOME GRAVEL AND SILT-DARK BROWN-WET-MEDIUM DENSE-(SM)	
20						
	7	SS			FINE-COARSE SAND-TRACE TO SOME FINE GRAVEL-TRACE SILT-BROWN-WET-DENSE TO MEDIUM DENSE-(SW)	
25						
	8	SS				
26.5					END OF BORING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % · WATER CONTENT % · LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS		
W.L.	7'	W.S. XXXXXX
W.L.	9' B.C.R.	5' A.C.R.
W.L.		

25' NX CASING

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	1/27/67		
BORING COMPLETED	1/27/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

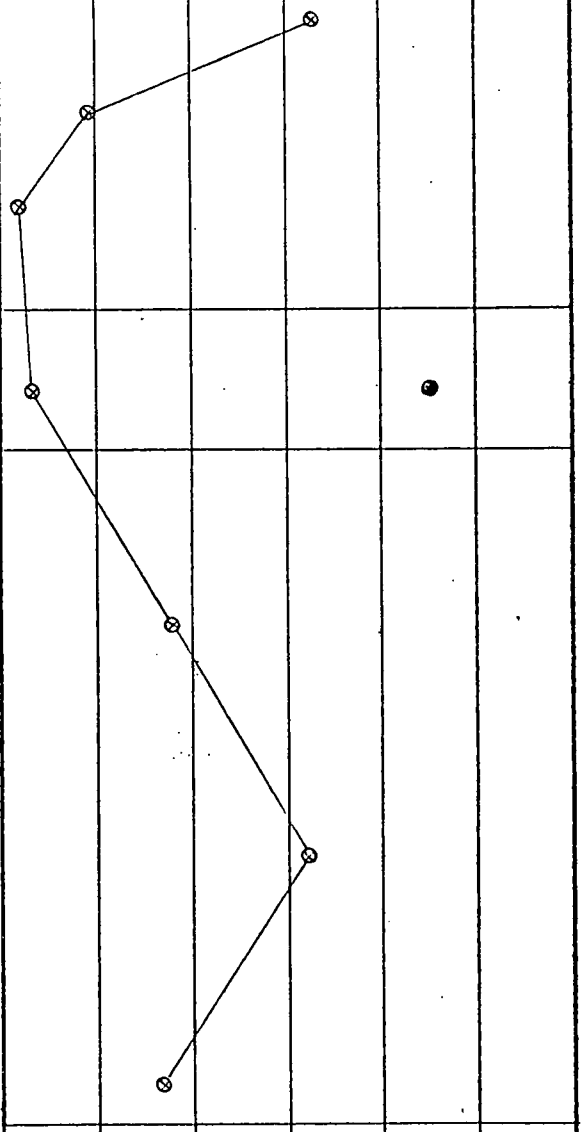
P.P. No. 8—1M

LOG OF BORING NO. 12

OWNER	ARCHITECT - ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed Addition To Sewage Treatment Plant

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
				SURFACE ELEVATION 1168.66	
	1	PA		FINE SAND-SOME SILT-TRACE GRAVEL AND CINDERS-DARK BROWN-FROZEN FILL	
	2	SS		FINE SAND-SOME SILT-WHITE, LIGHT BROWN, AND GRAY-MOIST-LOOSE-INDUSTRIAL FILL	
5	3	SS			
	4	SS			
10	5	SS		ORGANIC SILT-TRACE FIBERS-DARK BROWN-LOOSE-(OL)	
15	6	SS		FINE-MEDIUM SAND-TRACE TO SOME GRAVEL AND SILT-TRACE WOOD AT 15'-GRAYISH BROWN-WET-MEDIUM DENSE TO DENSE-(SP)	
20	7	SS			
25	8	SS			
26.5				END OF BORING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS			
W.L.	7'	W.S. ~~ORXW.OX~~	
W.L.	B.C.R.	A.C.R.	
W.L.	8' AB		

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	1/30/67		
BORING COMPLETED	1/30/67		
RIG	ACKER	FOREMAN	DK
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M

LOG OF BORING NO. 13

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed Addition to Sewage Treatment Plant

SURFACE ELEVATION 1169.47

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
	1	PA			FINE SAND AND SILT-TRACE FINE GRAVEL-BROWN-FILL	
	2	SS			FINE SAND-SOME SILT-WHITE TRACE LIGHT BROWN-MOIST-MEDIUM DENSE TO LOOSE-INDUSTRIAL FILL	
5	3	SS				
	4	SS				
10	5	SS			ORGANIC SILT-TRACE TO SOME SAND-DARK GRAY-LOOSE-(OL)	
15	6	SS			FINE-COARSE SAND-SOME FINE-MEDIUM GRAVEL-TRACE SILT-BROWN-WET-MEDIUM DENSE-(SW)	
20	7	SS				
21.5					END OF BORING	

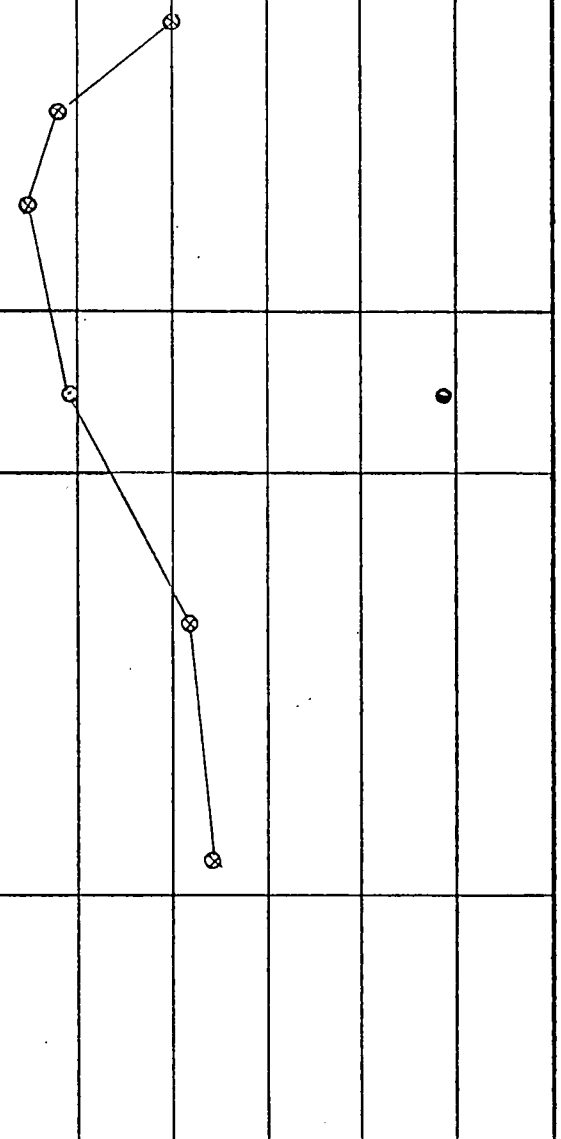
UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²

1 2 3 4 5

PLASTIC LIMIT % · WATER CONTENT % · LIQUID LIMIT %

STANDARD "N" PENETRATION (BLOWS/FT.)

10 20 30 40 50



WATER LEVEL OBSERVATIONS			
W.L.	8'	W.S. ~~DRKD.~~	
W.L.	B.C.R.	A.C.R.	
W.L.	8' AB		

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	1/27/67		
BORING COMPLETED	1/27/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M

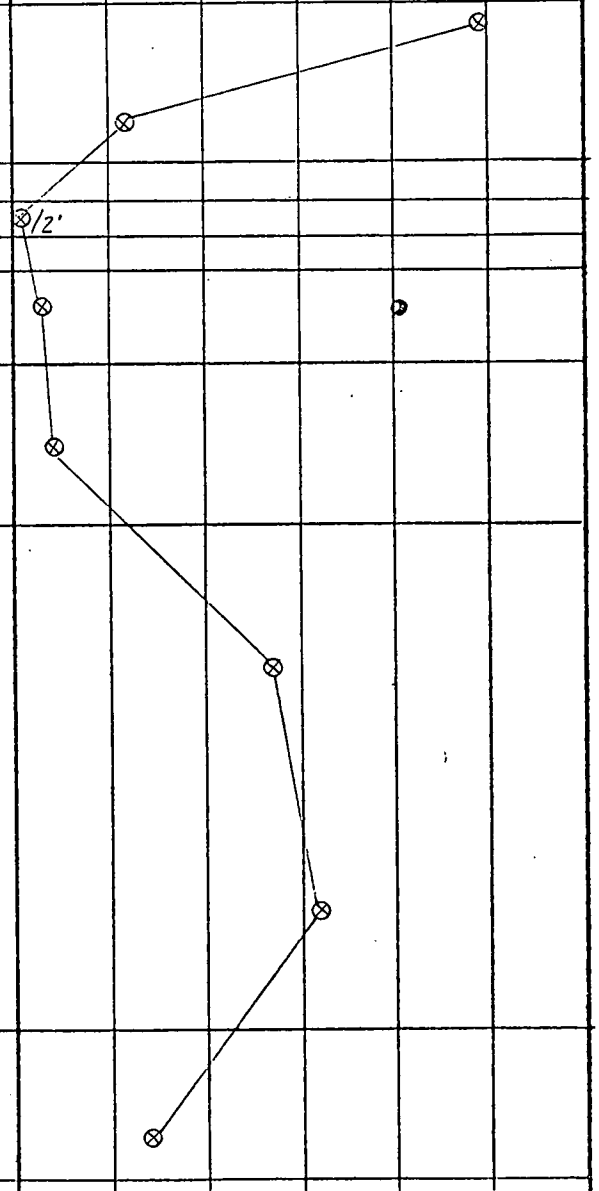
LOG OF BORING NO. 14

OWNER	ARCHITECT - ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed Addition to Sewage Treatment Plant

SURFACE ELEVATION 1168.98

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
	1	PA			FINE SAND AND SILT-TRACE WOOD CHIPS-BROWN TRACE DARK BROWN	
	1A	SS			FINE SAND-SOME SILT-WHITE TRACE LIGHT BROWN-MOIST-MEDIUM DENSE-INDUSTRIAL FILL	
	2	SS				
5	3				FINE-MEDIUM SAND-TRACE SILT-GREEN GRANULES-FILL	
	3A	SS			FINE SAND-SOME SILT-LIGHT BROWN-TRACE GREEN-FILL	
	3B	SS			DARK BROWN SILTY TOPSOIL-(OL)	
	4	SS			ORGANIC SILT-TRACE SAND-DARK GRAY-LOOSE-(OL)	
10	5	SS			FINE SAND AND SILT-DARK GRAY-SLIGHTLY ORGANIC-LOOSE-(SM-OL)	
15	6	SS			FINE-COARSE SAND-SOME FINE-MEDIUM GRAVEL-TRACE SILT-BROWN-GRAY BROWN-WET-MEDIUM DENSE TO DENSE-(SW)	
20	7	SS				
25	8	SS			FINE-MEDIUM SAND-TRACE GRAVEL AND SILT-BROWN-WET-MEDIUM DENSE-(SP)	
26.5					END OF BORING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS			
W.L.	8'	W.S. ~~ORXWXX~~	
W.L.	9' B.C.R.	11' A.C.R.	
W.L.			

25' NX CASING

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	1/27/67		
BORING COMPLETED	1/27/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M

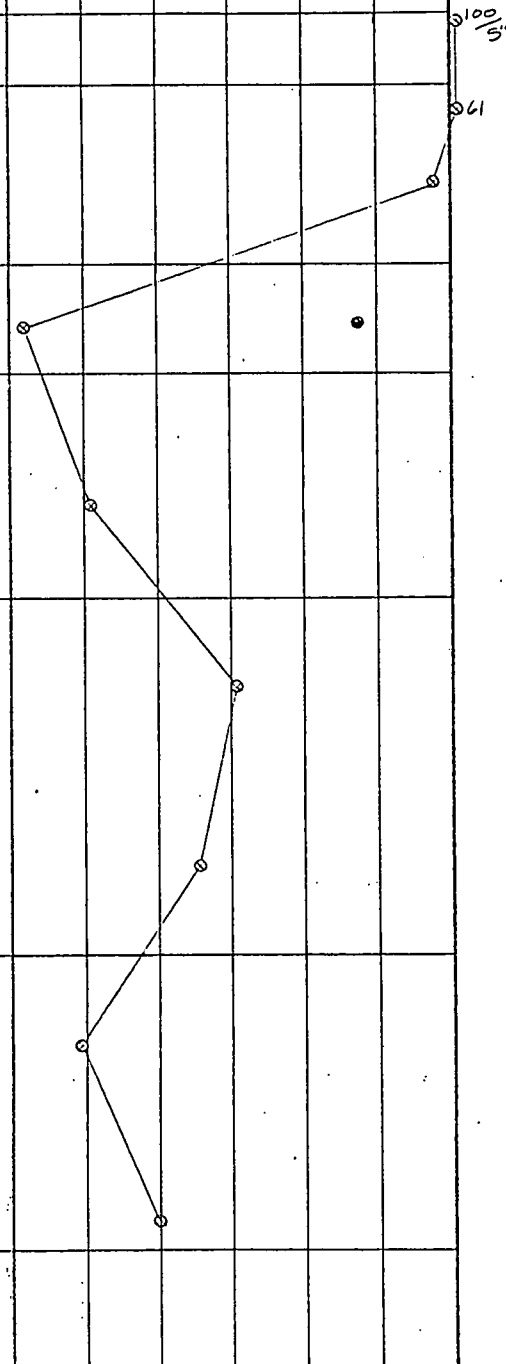
LOG OF BORING NO. 15

OWNER: City of Wausau	ARCHITECT-ENGINEER: Becher-Hoope Engineers, Inc.
SITE: Wausau, Wisconsin	PROJECT NAME: Proposed Addition To Sewage Treatment Plant

SURFACE ELEVATION: 1169.50

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
					FROZEN SAND	
					FROZEN WHITE FINE SAND	
	—	SS			SAND AND GRAVEL-FROZEN TO 3'	
5	1	SS			FINE SAND-TRACE TO SOME SILT-LIGHT BROWN-INDUSTRIAL FILL	
	2	SS				
10	3	SS			ORGANIC SILT-GRAY AND BROWN-LOOSE-(OL)	
15	4	SS			FINE-MEDIUM SAND-TRACE TO SOME SILT-TRACE FINE GRAVEL-GRAYISH BROWN TRACE BLACK-MEDIUM DENSE-(SM)	
20	5	SS			FINE-COARSE SAND-TRACE TO SOME GRAVEL-TRACE SILT-GRAYISH BROWN-WET-DENSE TO MEDIUM DENSE-(SW)	
25	6	SS				
30	7	SS			FINE-MEDIUM SAND-TRACE SILT-GRAYISH BROWN-WET-MEDIUM DENSE-(SP)	
35	8	SS				
36.5					END OF BORING 35' NX CASING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % · WATER CONTENT % · LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS			
W.L.		W.S. OR W.D.	
W.L.	12' B.C.R.	5' A.C.R.	
W.L.			

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	2/3/67		
BORING COMPLETED	2/3/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M.

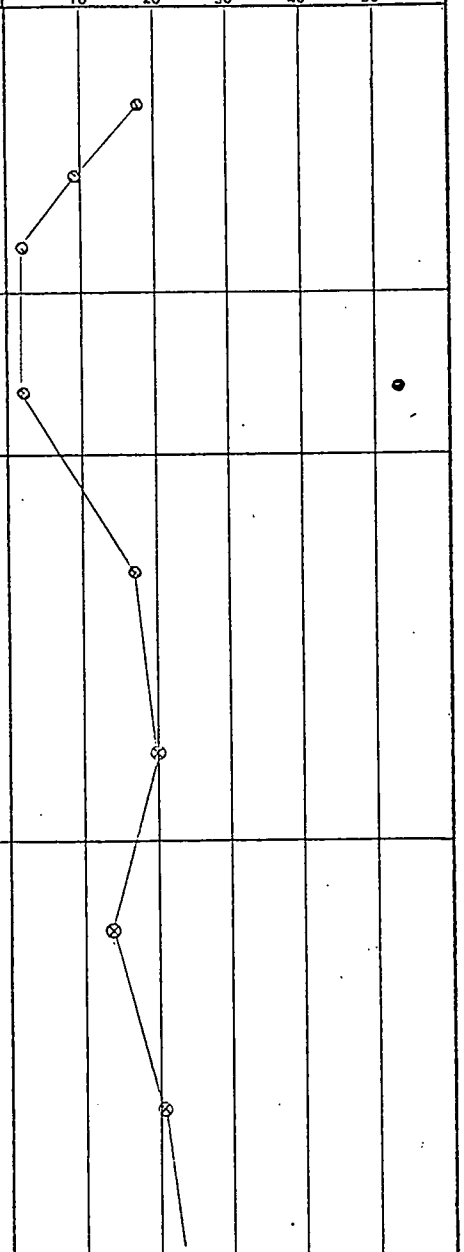
LOG OF BORING NO. 16

OWNER: City of Wausau	ARCHITECT-ENGINEER: Becher-Hoope Engineers, Inc.
SITE: Wausau, Wisconsin	PROJECT NAME: Proposed Addition To Sewage Treatment Plant

SURFACE ELEVATION 1168.32

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
	1	SS			FINE-MEDIUM SAND-TRACE TO SOME SILT-WHITE, BROWN, AND LIGHT BROWN-MOIST-MEDIUM DENSE TO LOOSE-INDUSTRIAL FILL	
5	2	SS				
	3	SS				
10	4	SS			ORGANIC SILT-TRACE FIBERS-DARK GRAY-LOOSE-(OL)	
15	5	SS			FINE-COARSE SAND-TRACE FINE GRAVEL AND SILT-GRAYISH BROWN-MEDIUM DENSE-(SW)	
20	6	SS				
25	7	SS			FINE-MEDIUM SAND-TRACE COARSE SAND, FINE GRAVEL, AND SILT-GRAYISH BROWN-MEDIUM DENSE TO LOOSE-(SP)	
30	8	SS				
35					CONT'D.	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS			
W.L.	W.S. OR W.D.		
W.L.	9' B.C.R.	5' A.C.R.	
W.L.			

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	2/3/67		
BORING COMPLETED	2/4/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M.

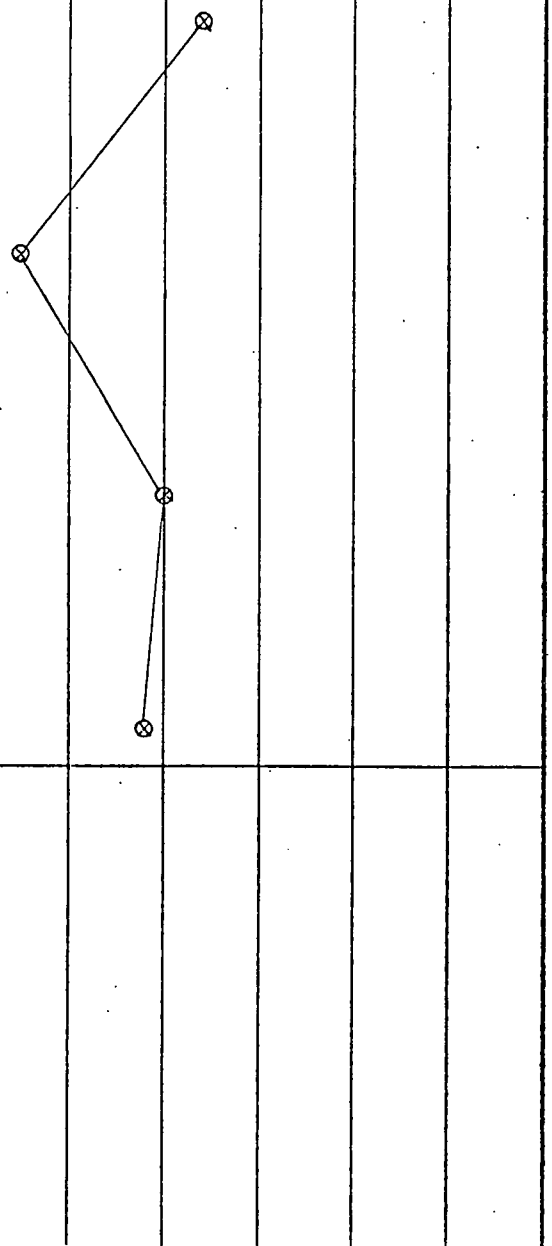
LOG OF BORING NO. 16 CONT'D.

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed Addition To Sewage Treatment Plant

SURFACE ELEVATION 1168.32

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
35	9	SS			FINE-MEDIUM SAND-TRACE COARSE SAND, FINE GRAVEL, AND SILT-GRAYISH BROWN-MEDIUM DENSE TO LOOSE-(SP)	
40	10	SS				
45	11	SS				
50	12	SS				
51.5					END OF BORING 50' NX CASING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS		
W.L.	W.S. OR W.D.	
W.L.	9' B.C.R.	5' A.C.R.
W.L.		

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	2/3/67		
BORING COMPLETED	2/4/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M

LOG OF BORING NO. 17

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed Addition To Sewage Treatment Plant

SURFACE ELEVATION 1169.78

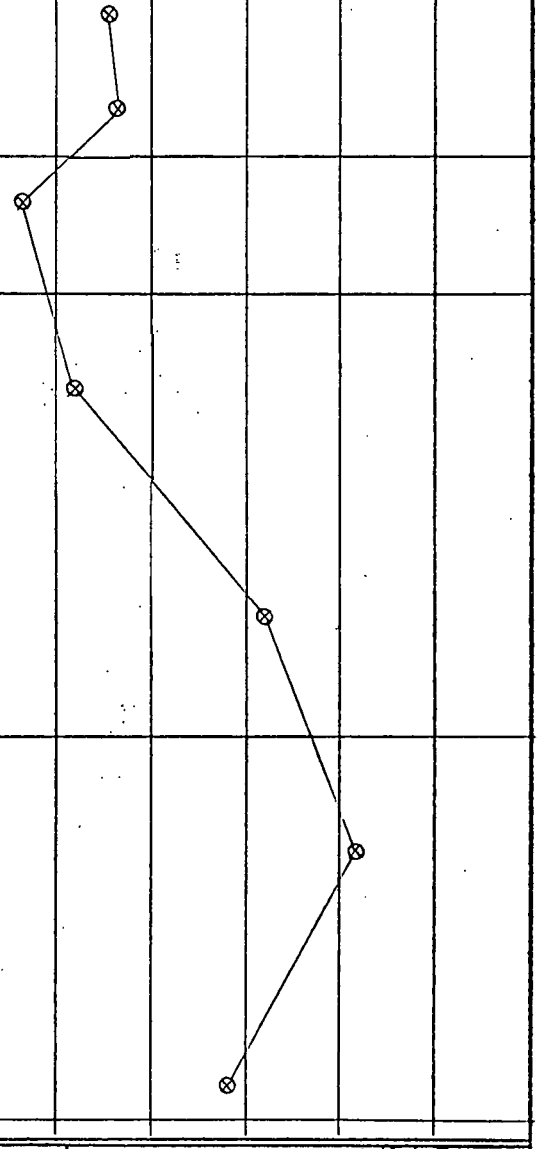
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL
	1	PA			FINE-MEDIUM SAND-SOME SILT-BROWN-FROZEN FILL
	2	SS			FINE SAND-SOME SILT-LIGHT BROWN AND WHITE-MEDIUM DENSE-INDUSTRIAL FILL
5	3	SS			
	4	SS			FINE SAND-SOME SILT-TRACE CLAY-LIGHT BROWN-LOOSE-FILL
10	5	SS			FINE SAND-TRACE TO SOME SILT-RUSTY BROWN CHANGING TO MEDIUM DARK BROWN-MEDIUM DENSE TO DENSE-(SM)
15	6	SS			
20	7	SS			FINE-COARSE SAND-TRACE TO SOME FINE-COARSE GRAVEL-TRACE SILT-GRAYISH BROWN-WET-DENSE TO MEDIUM DENSE-(SW)
25					
26.5	8	SS			END OF BORING

UNIT DRY WT. LBS./FT.³

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS			
W.L.	8'	W.S. ~~XXXXX~~	
W.L.	10' B.C.R.	9' A.C.R.	
W.L.			

20' NX CASING

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	2/1/67		
BORING COMPLETED	2/1/67		
RIG	ACKER	FOREMAN	DK
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M

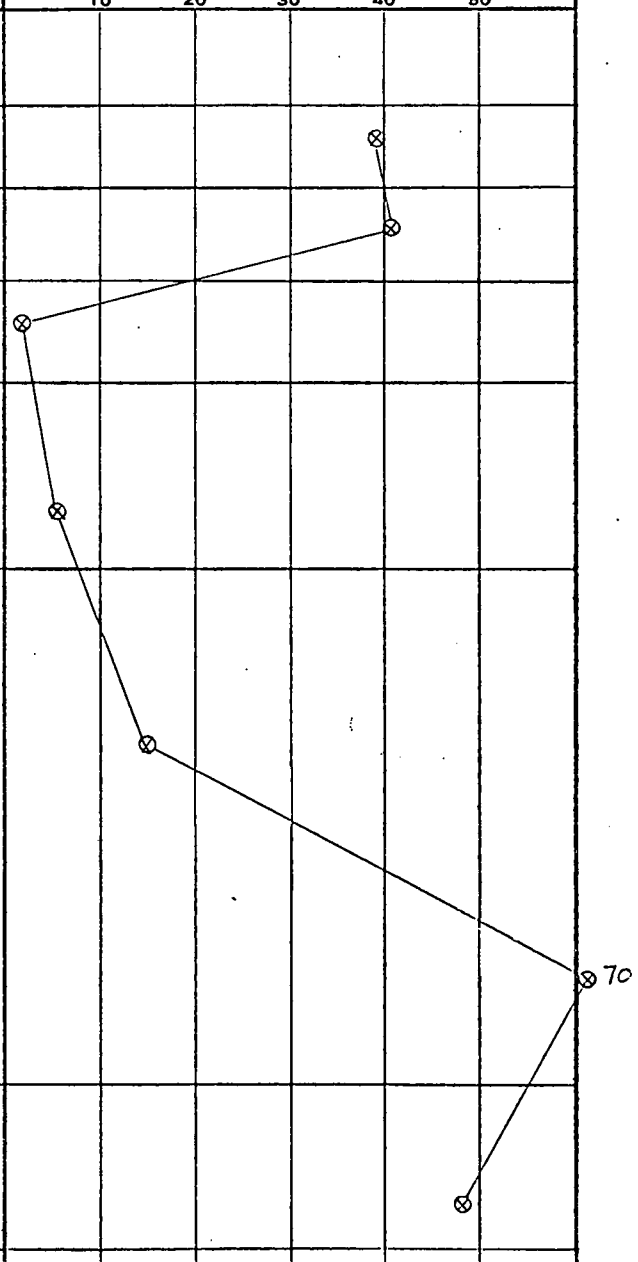
LOG OF BORING NO. 18

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed Addition To Sewage Treatment Plant

SURFACE ELEVATION 1169.00

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
	1	PA			FINE-COARSE SAND-SOME FINE-MEDIUM GRAVEL-TRACE SILT-GRAYISH BROWN-FROZEN FILL	
	2	SS			FINE SAND-SOME SILT-LIGHT BROWN-DENSE-INDUSTRIAL FILL	
5	3	SS			FINE-COARSE SAND-SOME FINE-MEDIUM GRAVEL-GRAYISH BROWN-DENSE-FILL	
	4	SS			MEDIUM SAND-TRACE GRAVEL-GRAY AND GREEN-LOOSE-INDUSTRIAL FILL	
10	5	SS			FINE SAND-SOME SILT-TRACE TOP-SOIL-BROWN TRACE BLACK-LOOSE-(SM-OL)	
15	6	SS			FINE-MEDIUM SAND-TRACE TO SOME SILT-TRACE GRAVEL-GRAY-MEDIUM DENSE TO DENSE-(SM)	
20	7	SS				
25	8	SS			FINE-COARSE SAND-TRACE TO SOME FINE-MEDIUM GRAVEL-TRACE SILT-GRAYISH BROWN-DENSE-(SW)	
26.5					END OF BORING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS			
W.L.	10'	W.S. XXXXXX	
W.L.	10' B.C.R.	8' A.C.R.	
W.L.			

25' NX CASING

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	1/30/67		
BORING COMPLETED	1/30/67		
RIG	ACKER	FOREMAN	DK
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M

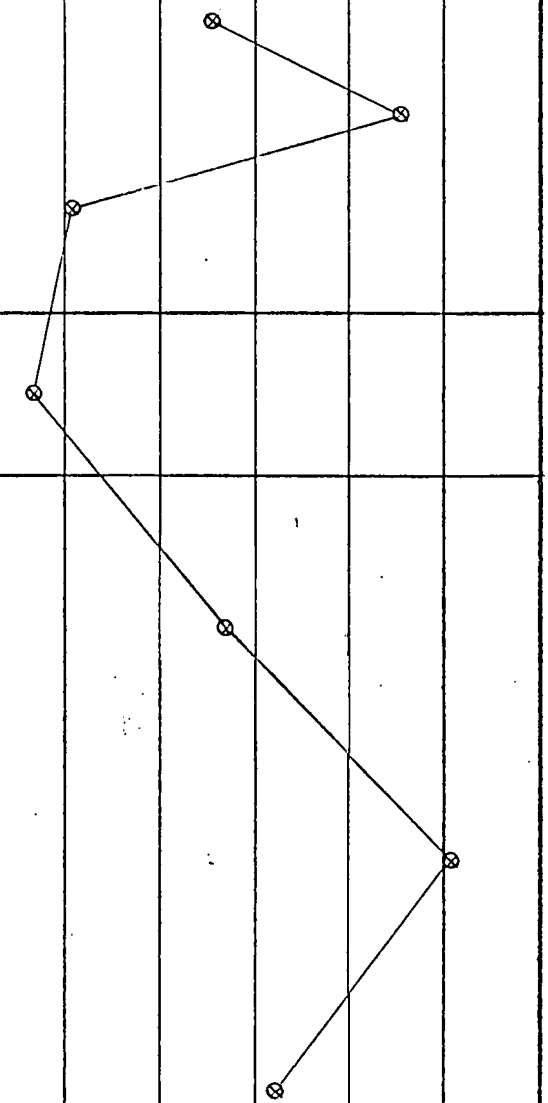
LOG OF BORING NO. 19

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed Addition To Sewage Treatment Plant

SURFACE ELEVATION 1169.76

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
	1	PA			FINE SAND-SOME SILT-TRACE FINE GRAVEL-MEDIUM DARK BROWN-FROZEN FILL	
	2	SS			FINE SAND-TRACE TO SOME SILT-WHITE TRACE LIGHT BROWN AND GREEN-MOIST-MEDIUM DENSE-INDUSTRIAL FILL	
5	3	SS				
	4	SS				
10	5	SS			FINE SAND-SOME SILT-TRACE TOPSOIL-BROWN AND DARK BROWN-LOOSE-(SM-OL)	
15	6	SS			FINE-MEDIUM SAND-TRACE GRAVEL AND SILT-RUSTY BROWN CHANGING TO GRAYISH BROWN AT 20'-WET-MEDIUM DENSE TO DENSE-(SP)	
20	7	SS				
25	8	SS				
26.5					END OF BORING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS			
W.L.	8'	W.S. ~~OR WX~~	
W.L.	8' B.C.R.	9' A.C.R.	
W.L.			
	9' 4 DAYS AB		

25' NX CASING

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	1/31/67		
BORING COMPLETED	1/31/67		
RIG	ACKER	FOREMAN	DK
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M

LOG OF BORING NO. 20

OWNER	ARCHITECT - ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed Addition To Sewage Treatment Plant

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
				SURFACE ELEVATION 1168.62	
	1	PA		FINE SAND-TRACE TO SOME SILT-LIGHT BROWN-TRACE DARK BROWN TO 2'-MOIST-MEDIUM DENSE TO LOOSE-INDUSTRIAL FILL FROZEN TO 2'	
	2	SS			
5	3	SS			
	4	SS			
	4A			DARK BROWN SILTY TOPSOIL-LOOSE-(OL)	
10	5	SS		FINE-MEDIUM SAND-TRACE SILT AND GRAVEL-DARK GRAYISH BROWN CHANGING TO GRAYISH BROWN-WET-LOOSE TO DENSE-(SP)	
15	6	SS			
20	7	SS			
25	8	SS			
26.5				END OF BORING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50

9/6"

WATER LEVEL OBSERVATIONS			
W.L.	8'	XXXXX W.D.	
W.L.	10' B.C.R.	8' A.C.R.	
W.L.			

25' NX CASING
SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	1/31/67		
BORING COMPLETED	2/1/67		
RIG	ACKER	FOREMAN	DK
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M

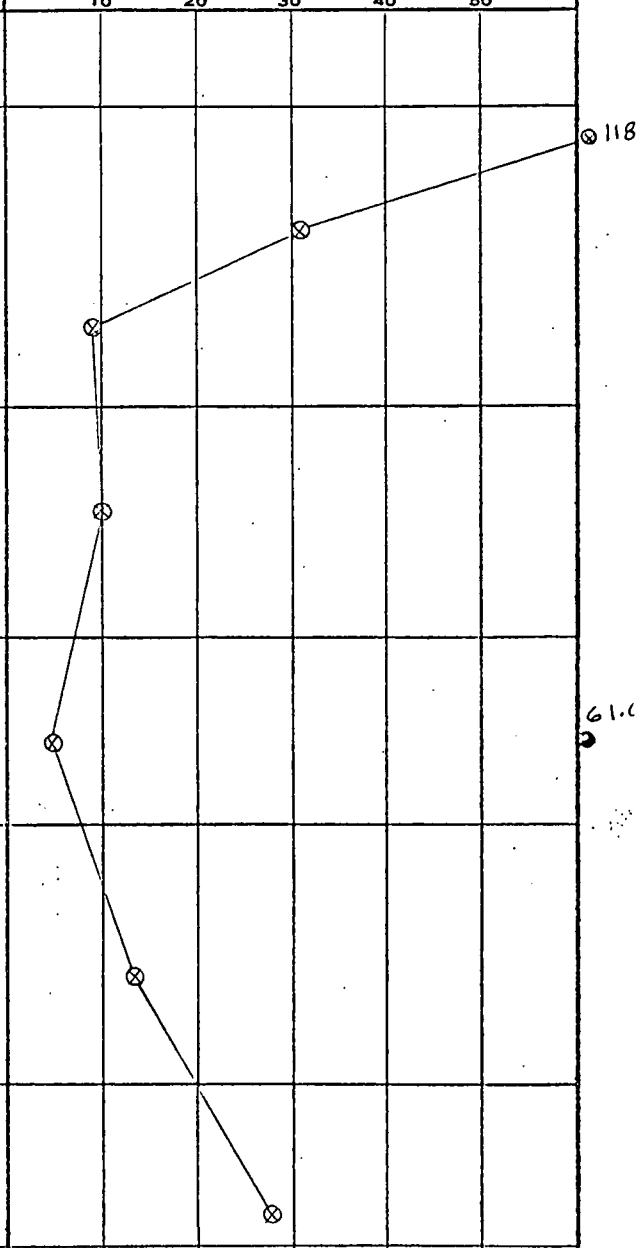
LOG OF BORING NO. 21

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed Addition To Sewage Treatment Plant

SURFACE ELEVATION 1169.74

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
	1	PA			FINE SAND-SOME SILT-TRACE FINE GRAVEL-MEDIUM DARK BROWN-FROZEN FILL	
	2	SS			FINE SAND-TRACE TO SOME SILT-LIGHT BROWN-MOIST-MEDIUM DENSE-INDUSTRIAL FILL	
5	3	SS				
	4	SS				
10	5	SS			FINE SAND-TRACE TO SOME SILT-TRACE DARK BROWN TOPSOIL AND WOOD-BROWN-MEDIUM DENSE-(SM)	
15	6	SS			ORGANIC SILT-TRACE FIBERS-BLACK-LOOSE-(OL)	
20	7	SS			FINE-MEDIUM SAND-TRACE SILT-GRAY-WET-MEDIUM DENSE-(SP)	
25	8	SS			FINE-COARSE SAND-TRACE TO SOME FINE GRAVEL-TRACE SILT-GRAYISH BROWN-WET-MEDIUM DENSE-(SW)	
26.5					END OF BORING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % · WATER CONTENT % · LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS			
W.L.	12'	W.S. ~~DRWD~~.	
W.L.	12' B.C.R.	9' A.C.R.	
W.L.			
	10' 4 DAYS AB		

25' NX CASING

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	1/31/67		
BORING COMPLETED	1/31/67		
RIG	ACKER	FOREMAN	DK
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M

LOG OF BORING NO. 22

OWNER	ARCHITECT - ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed Addition To Sewage Treatment Plant

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² — 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

STANDARD "N" PENETRATION (BLOWS/FT.) — 10 20 30 40 50

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
				SURFACE ELEVATION 1170.02	
	1	PA		DARK BROWN SILTY AND SANDY TOPSOIL-FROZEN	
	2	SS		FINE SAND-TRACE TO SOME SILT-LIGHT BROWN CHANGING TO WHITE AND BROWN AT 6'-MOIST-BECOMING WET AT 10'-MEDIUM DENSE-INDUSTRIAL FILL	
5	3	SS			
	4	SS			
10	5	SS			
15	6	SS		FINE-MEDIUM SAND-TRACE TO SOME SILT-RUSTY BROWN-WET-DENSE-(SM)	
20	7	SS		FINE-COARSE SAND-SOME FINE-MEDIUM GRAVEL-TRACE SILT-BROWN-WET-DENSE-(SW)	
25					
26.5	8	SS		END OF BORING	

25' NX CASING

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

WATER LEVEL OBSERVATIONS		
W.L.	10'	W.S. XXXXXX
W.L.	9' B.C.R.	7' A.C.R.
W.L.		
	8' 3 DAYS AB	

BORING STARTED	2/1/67		
BORING COMPLETED	2/1/67		
RIG	ACKER	FOREMAN	DK
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

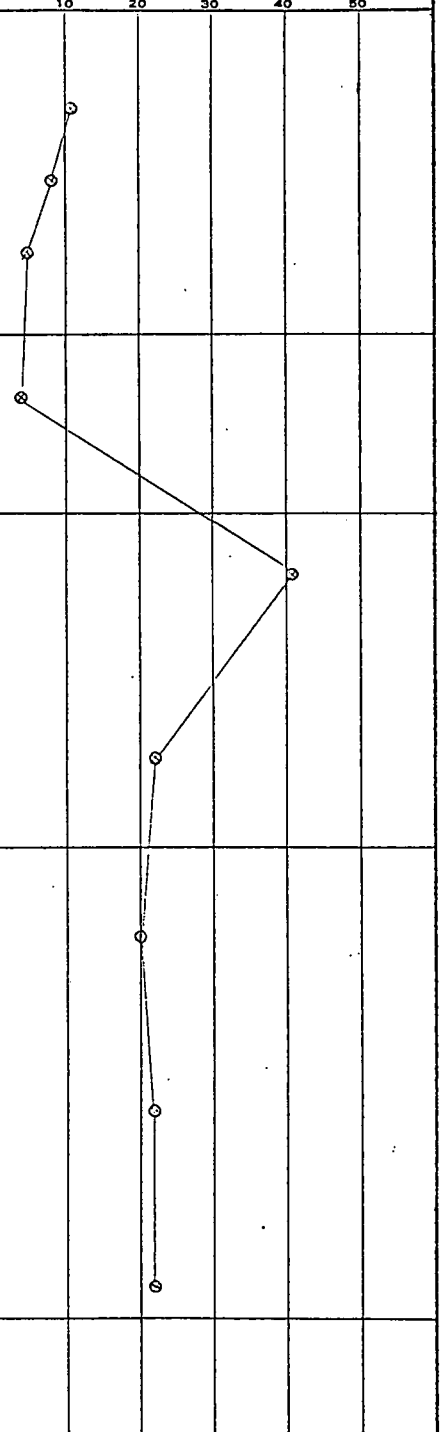
P.P. No. 8—1M

LOG OF BORING NO. 23

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed Addition To Sewage Treatment Plant

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
					SURFACE ELEVATION → 1170.16	
	1	SS			FINE SAND-TRACE TO SOME SILT AND MEDIUM SAND-LIGHT BROWN TRACE GREEN-MOIST-MEDIUM DENSE TO LOOSE-INDUSTRIAL FILL	
5	2	SS				
	3	SS				
10	4	SS			1" LAYERS OF GRAY FINE-MEDIUM SAND AND DARK GRAY ORGANIC SILT-LOOSE	
15	5	SS			FINE-COARSE SAND-TRACE TO SOME FINE-MEDIUM GRAVEL-TRACE SILT-BROWN AND GRAYISH BROWN-DENSE TO MEDIUM DENSE-(SW)	
20	6	SS				
25	7	SS			FINE-MEDIUM SAND-TRACE SILT-BROWN-WET-MEDIUM DENSE-(SP)	
30	8	SS				
35	9	SS				
36.5					END OF BORING 35' NX CASING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS			
W.L.	9'	W.S. ORXV.OX	
W.L.	9' B.C.R.	A.C.R.	
W.L.	CI AT 8' ACR		

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	2/4/67		
BORING COMPLETED	2/4/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M.

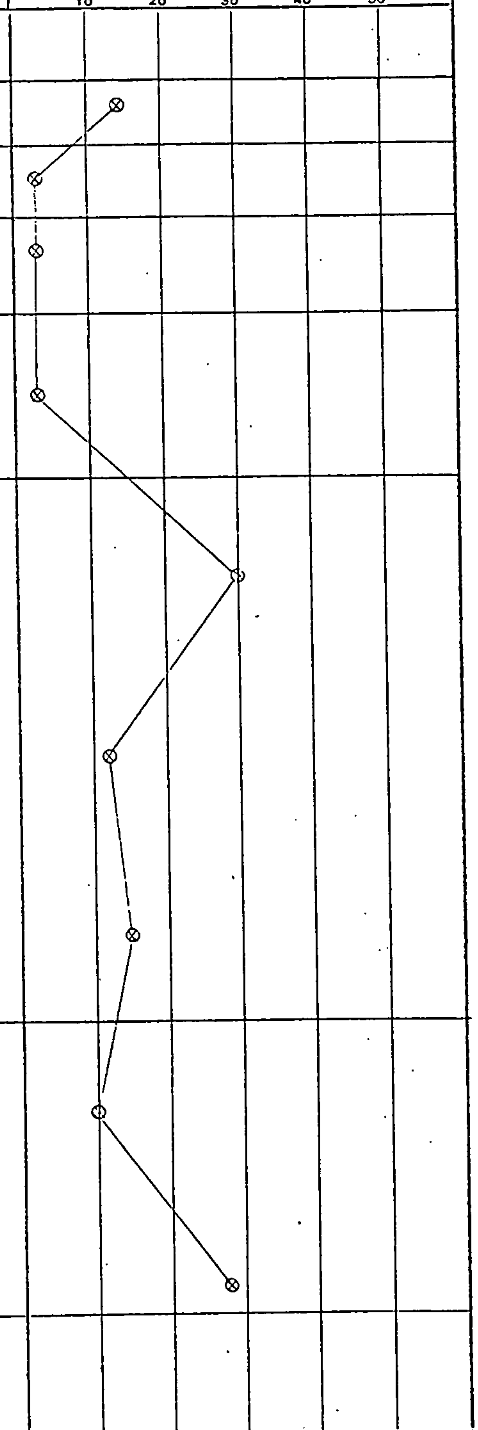
LOG OF BORING NO. 24

OWNER: City of Wausau	ARCHITECT-ENGINEER: Becher-Hoppe Engineers, Inc.
SITE: Wausau, Wisconsin	PROJECT NAME: Proposed Addition To Sewage Treatment Plant

SURFACE ELEVATION 1168.64

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² (1, 2, 3, 4, 5) — PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % — STANDARD "N" PENETRATION (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH / ELEVATION	SAMPLE NO.	TYPE SAMPLE	DESCRIPTION OF MATERIAL
	1	PA	FINE SAND-SOME SILT AND TOP-SOIL-BROWN AND DARK BROWN-FROZEN FILL
	2	SS	FINE SAND-TRACE TO SOME SILT-WHITE-MEDIUM DENSE-INDUSTRIAL FILL
5	3	SS	MEDIUM SAND-GREEN-LOOSE-INDUSTRIAL FILL
	4	SS	FINE SAND-SOME SILT-BROWN TRACE GREEN-WET-LOOSE-FILL
10	5	SS	FINE SAND-SOME SILT-TRACE WOOD-DARK GRAYISH BROWN-SLIGHTLY ORGANIC-WET-LOOSE-(SM-OL)
15	6	SS	FINE-COARSE SAND-TRACE TO SOME FINE-MEDIUM GRAVEL-TRACE SILT-BROWN-WET-MEDIUM DENSE-(SW)
20	7	SS	
25	8	SS	
30	9	SS	FINE-MEDIUM SAND-TRACE SILT-BROWN-MEDIUM DENSE-(SP)
35	10	SS	
36.5			END OF BORING 35' NX CASING



WATER LEVEL OBSERVATIONS		
W.L.	7'	W.S. OR W.D.
W.L.	8' B.C.R.	5' A.C.R.
W.L.		

SOIL TESTING SERVICES OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	2/4/67		
BORING COMPLETED	2/4/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M.

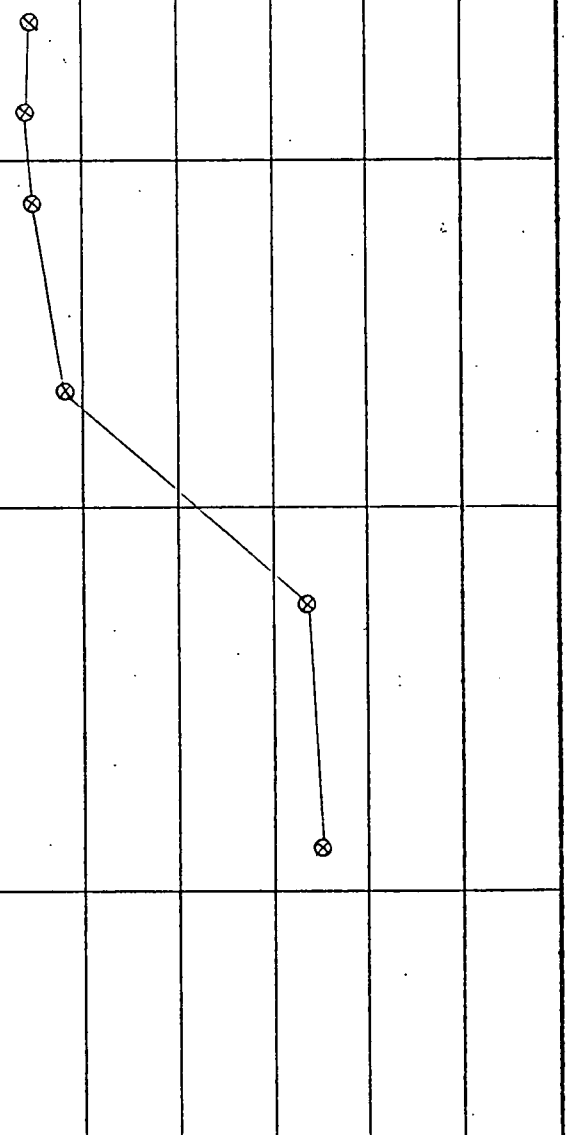
LOG OF BORING NO. 25

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed Addition to Sewage Treatment Plant

SURFACE ELEVATION 1169.52

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
	1	PA			FINE SAND-SOME SILT-DARK GRAY TRACE GRAY-FILL	
	2	SS			SAND, SILT, ASHES, AND CINDERS-DARK GRAY AND BLACK-LOOSE-FILL	
5	3	SS				
	4	SS			FINE SAND-TRACE TO SOME SILT AND CINDERS-TRACE GLASS AND WOOD-BLACK, DARK GRAY, AND DARK BROWN-LOOSE-FILL	
10	5	SS				
15	6	SS			FINE-COARSE SAND-SOME FINE-MEDIUM GRAVEL-TRACE GLASS AND METAL-GRAY BROWN AND DARK GRAYISH BROWN-DENSE-FILL	
20	7	SS				
21.5					END OF BORING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS			
W.L.	11'	W.S. XXXXXX	
W.L.	B.C.R.	A.C.R.	
W.L.	9' AB		

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	1/27/67		
BORING COMPLETED	1/27/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M

LOG OF BORING NO. 26

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed Addition To Sewage Treatment Plant

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
					SURFACE ELEVATION 1168.23 ±	
	1	SS			FINE SAND-TRACE TO SOME SILT-LIGHT BROWN-MEDIUM DENSE-INDUSTRIAL FILL	
5	2	SS			FINE-MEDIUM SAND-GRAY-FILL	
	2A				FINE SAND-TRACE TO SOME SILT-WHITE-INDUSTRIAL FILL	
	3	SS			FINE-MEDIUM SAND-TRACE SILT-GRAY-WET-LOOSE-FILL	
10	4	SS			ORGANIC SANDY SILT-DARK GRAY-LOOSE-(OL)	
15	5	SS			FINE-MEDIUM SAND-TRACE SILT-GRAY-WET-MEDIUM DENSE-(SP)	
20	6	SS			FINE-COARSE SAND-SOME FINE-COARSE GRAVEL-TRACE SILT-BROWN-WET-DENSE-(SW)	
25	7	SS			FINE-MEDIUM SAND-TRACE SILT-BROWN-WET-MEDIUM DENSE-(SP)	
30	8	SS				
35	9	SS				
35.5					END OF BORING 35' NX CASING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² — 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

STANDARD "N" PENETRATION (BLOWS/FT.) — 10 20 30 40 50

5/16"

WATER LEVEL OBSERVATIONS			
W.L.	W.S. OR W.D.		
W.L.	11' B.C.R.	3' A.C.R.	
W.L.			

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	2/3/67		
BORING COMPLETED	2/3/67		
RIG	W-6	FOREMAN	TM
DRAWN		APPROVED	WMP
JOB #	1878	SHEET	

P.P. No. 8—1M.

LOG OF BORING NO. 27

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed sewage treatment plant

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
					SURFACE ELEVATION	
	1	SS				
	2	SS			SILTY FINE SAND-TRACE CINDERS AT 6'-GRAY AND WHITE-MEDIUM	
5	3	SS			DENSE TO LOOSE-INDUSTRIAL FIL	
	4	SS				
10	5	SS				
	5A				FINE-MEDIUM SAND-SOME SILT-TRACE CLAY-BROWN-LOOSE-(SM)	
15					MEDIUM-COARSE SAND-TRACE GRAVEL AND SILT-BROWN-WET-MEDIUM	
	6	SS			DENSE-(SP)	
16.5						
					END OF BORING	
					15' NX CASING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²

1 2 3 4 5

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD "N" PENETRATION (BLOWS/FT.)

10 20 30 40 50

2/6"

WATER LEVEL OBSERVATIONS		
W.L.	6'	W.S. ~~OR XD.~~
W.L.	8' B.C.R.	8' A.C.R.
W.L.		

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

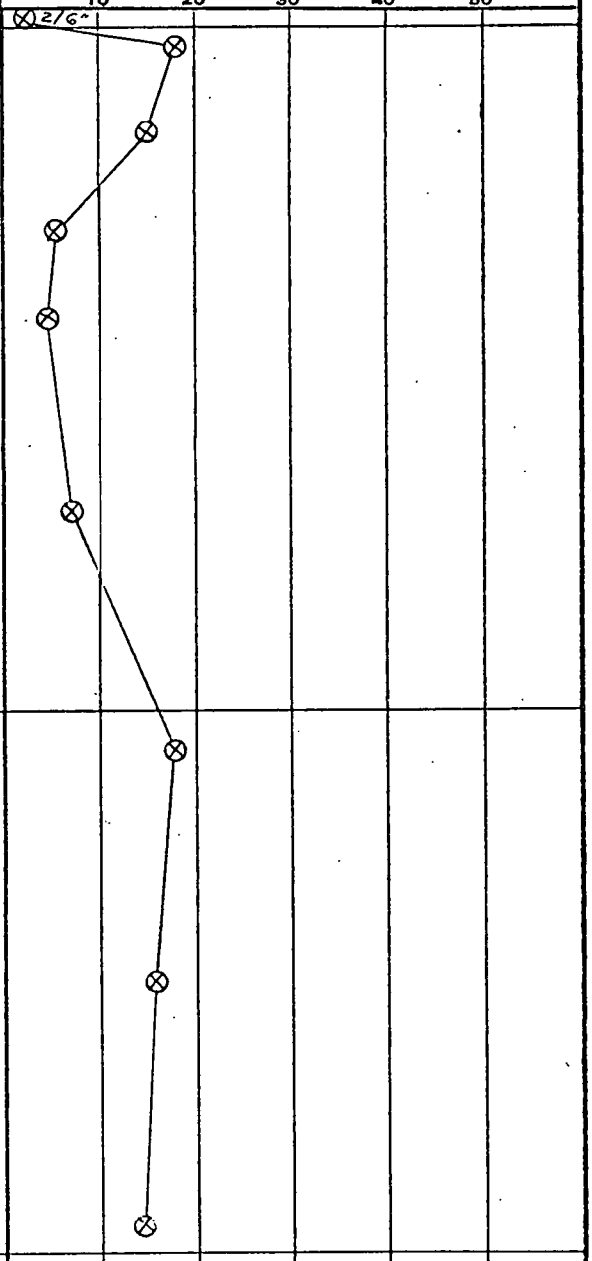
BORING STARTED	6/22/67		
BORING COMPLETED	6/22/67		
RIG	W-6	FOREMAN	TM
DRAWN	JP	APPROVED	WMP
JOB #	1878A	SHEET	

LOG OF BORING NO. 28

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed sewage treatment plant

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
SURFACE ELEVATION						
	1	SS			BLACK SILTY TOPSOIL-(OL)	
	1A					
	2	SS				
5	3	SS			SILTY FINE SAND-TRACE WOOD AT 4' AND 10'-GRAY-MEDIUM DENSE TO LOOSE-INDUSTRIAL FILL	
	4	SS				
10						
	5	SS				
15						
	6	SS			FINE-COARSE SAND-TRACE TO SOME FINE-MEDIUM GRAVEL-TRACE SILT-BROWN-WET-MEDIUM DENSE-(SW)	
20						
	7	SS				
25						
	8	SS				
26.5					END OF BORING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS			
W.L.	7.5'	W.S. ~~OR WAS~~	
W.L.	8' B.C.R.	8' A.C.R.	
W.L.			

25' NX CASING

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	6/22/67		
BORING COMPLETED	6/22/67		
RIG	W-6	FOREMAN	TM
DRAWN	JP	APPROVED	WMP
JOB #	1878A	SHEET	

No. 8

LOG OF BORING NO. 29

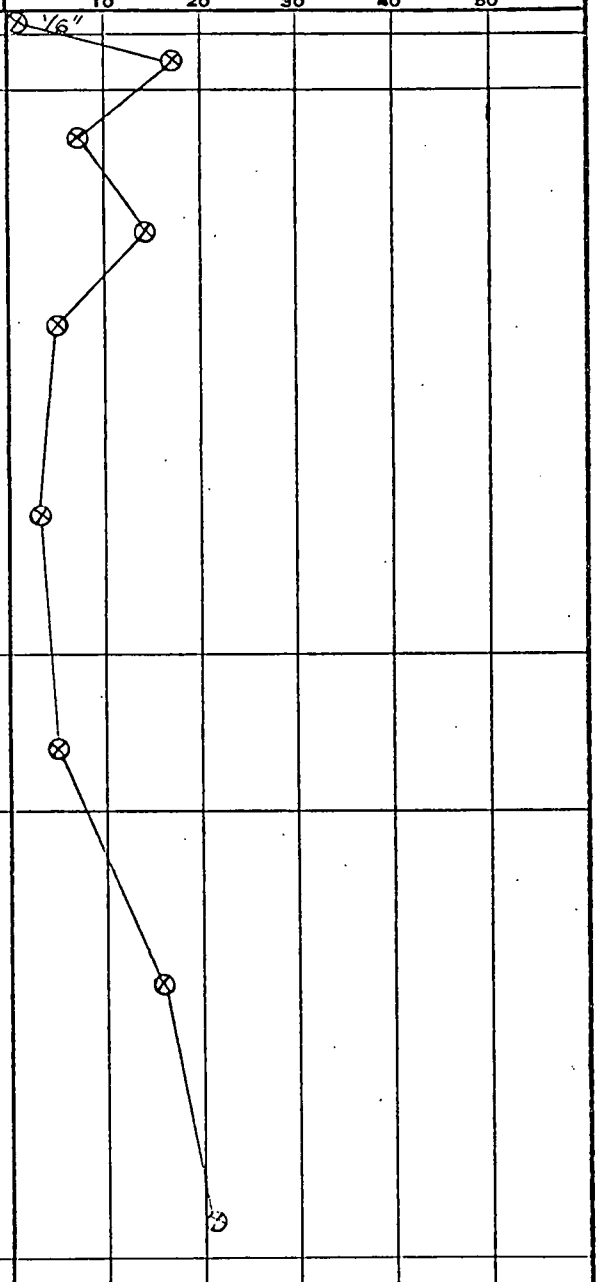
OWNER: City of Wausau	ARCHITECT-ENGINEER: Becher-Hoppe Engineers, Inc.
SITE: Wausau, Wisconsin	PROJECT NAME: Proposed sewage treatment plant

SURFACE ELEVATION 1169.69

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL
	1	SS			NOTE A
	1A				SILTY FINE SAND-GRAY-INDUSTRIAL FILL
	2	SS			SILTY SAND-TRACE GRAVEL, WOOD AND CINDERS-GRAY AND BLACK-PETROLEUM ODOR AT 4'-LOOSE-FILL
5	3	SS			
	4	SS			NOTE A FINE-MEDIUM SAND-TRACE GRAVEL BROWN-FILL
10	5	SS			
15	6	SS			FINE-MEDIUM SAND-TRACE TO SOME SILT-TRACE ROOTS AND METAL-BROWN TRACE DARK BROWN-LOOSE-FILL
20	7	SS			FINE-COARSE SAND-TRACE TO SOME FINE-MEDIUM GRAVEL-BROWN MEDIUM DENSE-(SW)
25	8	SS			
26.5					END OF BORING

UNIT DRY WT. LBS./FT.³

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS			
W.L.	8'	W.S. ~~OR WX~~	
W.L.	8' B.C.R.	8' A.C.R.	
W.L.			

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	6/22/67		
BORING COMPLETED	6/22/67		
RIG	W-6	FOREMAN	JG
DRAWN	JP	APPROVED	WMP
JOB #	1878A	SHEET	

No. 8

LOG OF BORING NO. 30

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed sewage treatment plant

SURFACE ELEVATION 1168.39

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² — 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

STANDARD "N" PENETRATION (BLOWS/FT.) — 10 20 30 40 50

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
	1	SS			SILTY FINE SAND-BROWN-FILL	
	1A					
	2	SS				
5	3	SS			SILTY FINE SAND-BECAME COARSER AT 6'-WHITE CHANGING TO GRAY-LOOSE-INDUSTRIAL FILL	
	4	SS				
10	5	SS				
15	6	SS			FINE-MEDIUM SAND-TRACE GRAVEL AND SILT-BROWN-MEDIUM DENSE TO DENSE-(SP)	
20	7	SS				
21.5					END OF BORING 20' NX CASING	

3/6"

WATER LEVEL OBSERVATIONS		
W.L.	7.5' W.S. ~~OR WX~~	
W.L.	9' B.C.R.	9' A.C.R.
W.L.		

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	6/22/67		
BORING COMPLETED	6/22/67		
RIG	W-6	FOREMAN	TM
DRAWN	JP	APPROVED	WMP
JOB #	1878A	SHEET	

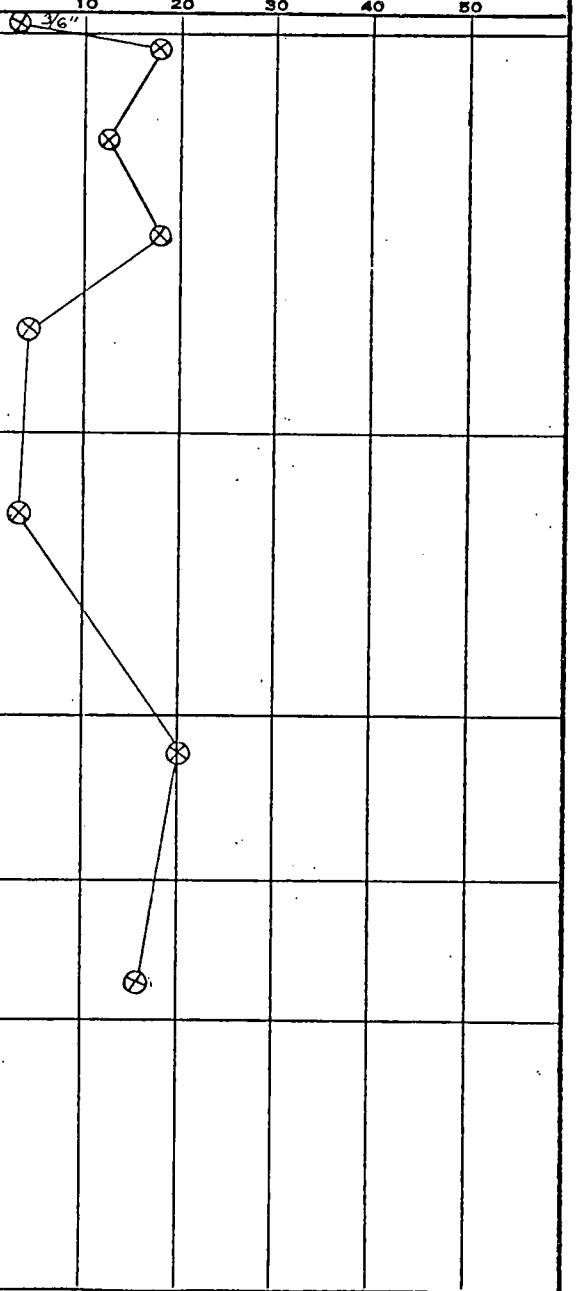
No. 8

LOG OF BORING NO. 31

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed sewage treatment plant

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
					SURFACE ELEVATION 1168.51	
	1	SS			SILTY FINE SAND-BROWN-FILL	
	1A					
	2	SS			SILTY FINE SAND-WHITE-MEDIUM DENSE TO LOOSE-INDUSTRIAL FILL	
5	3	SS				
	4	SS				
10	5	SS			FINE-MEDIUM SAND-TRACE SILT-BROWN AND GRAY-WET-LOOSE-(SP) 1" SEAM OF SLIGHTLY ORGANIC GRAY SILTY FINE SAND AT 10'	
15	6	SS			FINE-COARSE SAND-TRACE TO SOME GRAVEL-BROWN-MEDIUM DENSE-(SW)	
20	7	SS			FINE-MEDIUM SAND-TRACE SILT-BROWN-MEDIUM DENSE-(SP)	
21.5					END OF BORING 20' NX CASING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS			
W.L.	8.5'	~~W.S.~~ ~~O.R.~~ W.D.	
W.L.	9' B.C.R.	6' A.C.R.	
W.L.			

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	6/22/67		
BORING COMPLETED	6/22/67		
RIG	W-6	FOREMAN	TM
DRAWN	JP	APPROVED	WMP
JOB #	1878A	SHEET	

LOG OF BORING NO. 32

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed sewage treatment plant

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
SURFACE ELEVATION	1	SS			DARK BROWN SILTY TOPSOIL-(OL)	
	1A					
	2	SS			SILTY FINE SAND-GRAY AND WHITE-LOOSE-INDUSTRIAL FILL	
5	3	SS				
	4	SS				
	4A				SILTY FINE SAND-TRACE ROOTS-BROWN-WET-LOOSE-(SM)	
10					FINE-MEDIUM SAND-TRACE SILT-BROWN-WET-LOOSE-(SP)	
	5	SS				
15					FINE-COARSE SAND-SOME GRAVEL-TRACE SILT-BROWN-DENSE-(SW)	
	6	SS				
16.5					END OF BORING	
					15' NX CASING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50

1/6"

WATER LEVEL OBSERVATIONS		
W.L.	7'	W.S. ~~ORKD.~~
W.L.	8' B.C.R.	7' A.C.R.
W.L.		

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	6/22/67		
BORING COMPLETED	6/22/67		
RIG	W-6	FOREMAN	TM
DRAWN	JP	APPROVED	WMP
JOB #	1878A	SHEET	

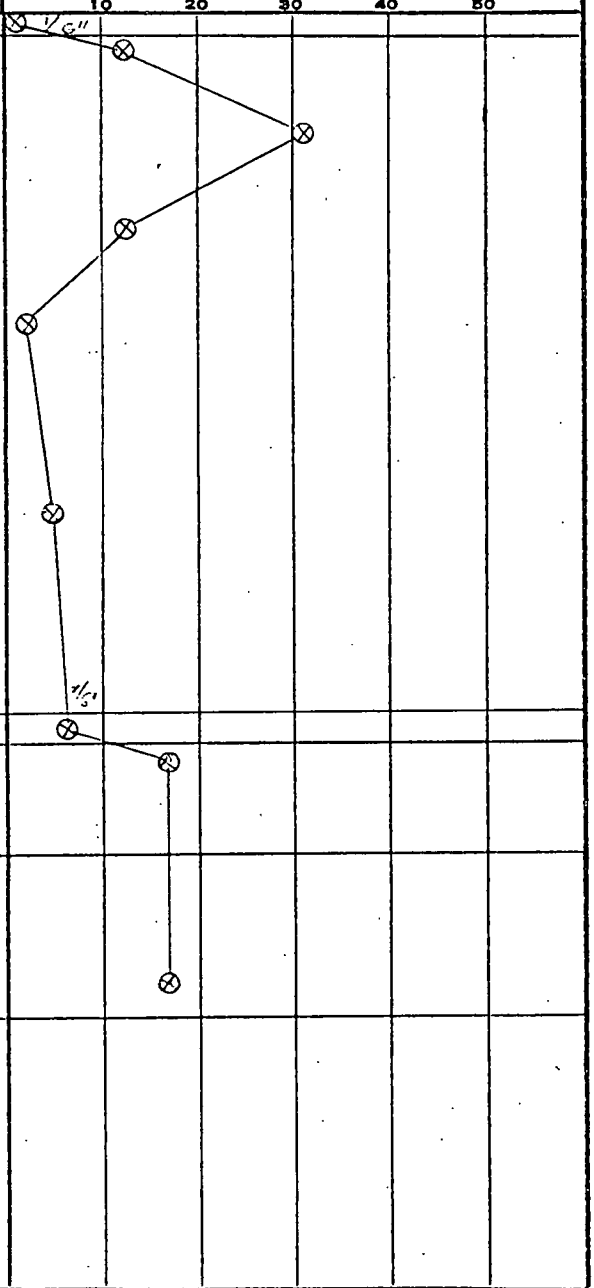
No. 8

LOG OF BORING NO. 33

OWNER: City of Wausau	ARCHITECT-ENGINEER: Becher-Hoppe Engineers, Inc.
SITE: Wausau, Wisconsin	PROJECT NAME: Proposed sewage treatment plant

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
					SURFACE ELEVATION ↓	
	1	SS			BLACK SANDY TOPSOIL-(OL)	
	1A					
	2	SS				
					SILTY FINE SAND-COARSE AT 6'-GRAY CHANGING TO WHITE-MEDIUM DENSE TO LOOSE-INDUSTRIAL FILL	
5	3	SS				
	4	SS				
10						
	5	SS				
15						
	6	SS			NOTE A	
	6A				FINE-MEDIUM SAND-TRACE SILT-GRAY-MEDIUM DENSE-(SP)	
20					FINE-COARSE SAND-SOME GRAVEL-TRACE SILT-BROWN-MEDIUM DENSE (SW)	
	7	SS				
21.5					NOTE A SILTY FINE SAND-TRACE FINE GRAVEL AND WOOD STEMS-DARK BROWN-SLIGHTLY ORGANIC-(SM-OL) END OF BORING 20' NX CASING	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS		
W.L.	7.5'	W.S. ~~XXXX~~
W.L.	9' B.C.R.	7.5' A.C.R.
W.L.		

SOIL TESTING SERVICES
OF WIS., INC.
ROUTE NO. 7—BAETEN ROAD
GREEN BAY, WISCONSIN

BORING STARTED	6/22/67		
BORING COMPLETED	6/22/67		
RIG	W-6	FOREMAN	TM
DRAWN	JP	APPROVED	WMP
JOB #	1878A	SHEET	

LOG OF BORING NO. 1 (34)

OWNER: City of Wausau

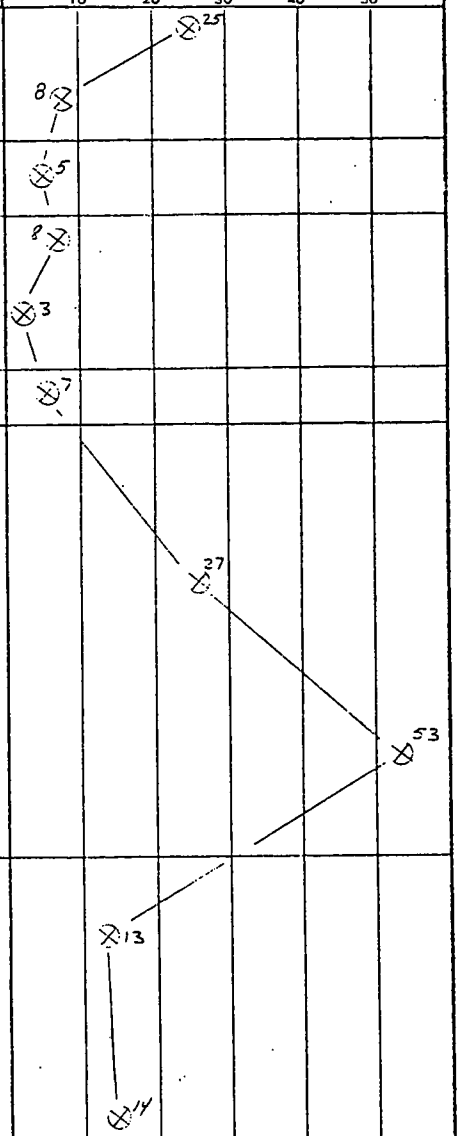
ARCHITECT-ENGINEER: Becher-Hoppe Engineers

SITE: Wausau Sewage Treatment Plant

PROJECT NAME: Plant Addition

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
					SURFACE ELEVATION 99.4	
	1	SS			Dark brown to black sand and gravel fill with glass, brick and cinders-loose to medium dense	
	2	SS				
5	3	SS			Dark brown silty fine sand-trace roots and fine gravel-probable fill-loose-(SM)	
	4	SS			White fine sand-trace roots-definite chemical odor-possible fill-loose-(SP)	
	5	SS				
10	6	SS			Dark brown silty topsoil with roots, trace to some sand at 11 feet-slight chemical odor-wet at 10.0 feet-loose	
15	7	SS			Dark brown to black silty fine to coarse sand and fine to medium gravel-medium dense to dense-wet-(GM)	
20	8	SS				
25	9	SS			Brown fine to medium sand-trace coarse sand, fine gravel and silt-medium dense-wet-(SP)	
30						
31.5	10	SS		1.5		
					End of Boring 30 feet of NX casing used Auger boring to 20.0 feet Wash water used below 20.0 feet	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS			
W.L.	10'	XXXX W.D.	
W.L.	11.1' B.C.R.	9' A.C.R.	
W.L.	7.8' WCI AB		

SOIL TESTING SERVICES
OF WIS., INC.
GREEN BAY, WISCONSIN
540 LAMBEAU ST.

BORING STARTED	10-3-74		
BORING COMPLETED	10-3-74		
RIG 22		FOREMAN	JG
DRAWN		APPROVED	TKD
JOB # 5340		SHEET	

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

88S-81671

LOG OF BORING NO. 2 (35)

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers
SITE Wausau Sewage Treatment Plant	**PROJECT NAME** Plant Addition

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² (1 2 3 4 5) · PLASTIC LIMIT % · WATER CONTENT % · LIQUID LIMIT % · STANDARD "N" PENETRATION (BLOWS/FT.) (10 20 30 40 50)
					SURFACE ELEVATION 99.6		
	1	SS			Dark brown and gray silty fine sand fill with brick, glass and cinders		21
	2	SS					9/6"
	2A	SS					10
5	3	SS			White fine sand-trace silt-damp at 8.0 feet-probable fill-(SP) loose		8
	4	SS					5
	5	SS					3
10	6	SS			Black topsoil with roots-trace sand-wet		5/5"
	6A	SS			Dark brown to black fine sand-trace roots, silt and gravel-wet-(SP)		13
15	7	SS			Gray brown silty fine to medium sand-trace fine to medium gravel-wet-(SM)		23
20	8	SS			Dark brown silty fine to coarse sand and gravel-wet-(GM)		39
25	9	SS			Gray brown fine to coarse sand-trace fine to medium gravel and silt-wet-(SW)		16
30	10	SS			Brown fine sand-trace silt-medium dense-wet-(SP)		12
31.5					End of Boring 30 feet NX Casing used Auger boring to 15.0 feet Wash water used below 15.0 feet		

WATER LEVEL OBSERVATIONS			
W.L.	9.0'	XXXX W.D.	
W.L.	10.5' B.C.R.	10.5' A.C.R.	
W.L.	10.5' AB		

SOIL TESTING SERVICES
OF WIS., INC.
GREEN BAY, WISCONSIN
540 LAMBEAU ST.

BORING STARTED	10-4-74		
BORING COMPLETED	10-4-74		
RIG	22	FOREMAN	JG
DRAWN		APPROVED	TKD
JOB #	6348	SHEET	

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BDS-81671

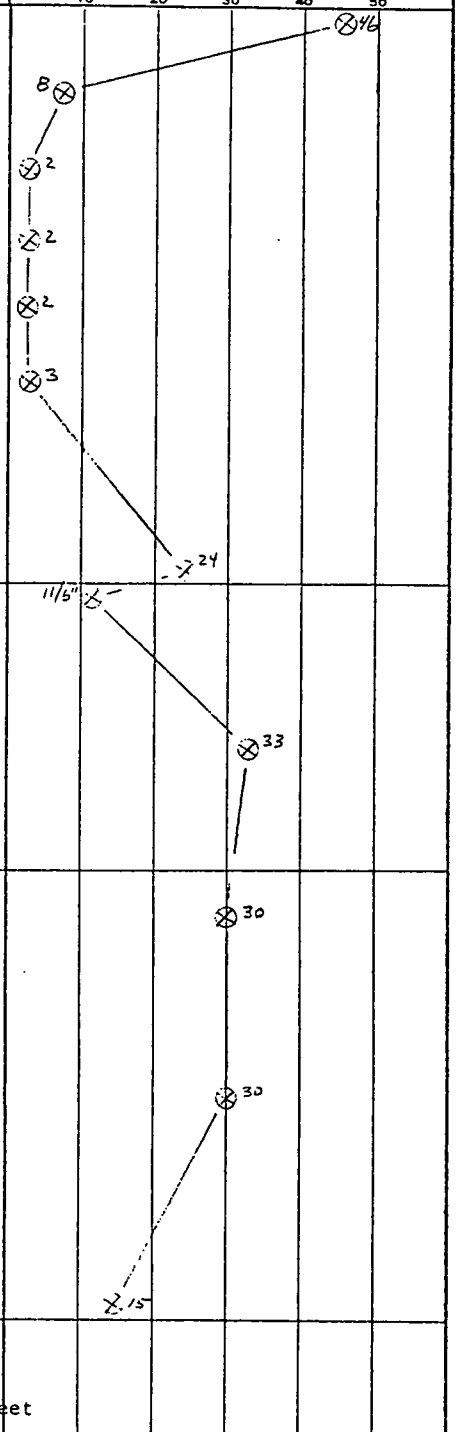
LOG OF BORING NO. 3 (36)

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers
SITE Wausau Sewage Treatment Plant	**PROJECT NAME** Plant Addition

SURFACE ELEVATION 99.0

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
	1	SS			Miscellaneous fill composed of sand, gravel, glass, brick, cinders, etc.-wet and definite chemical odor at 10.0 feet-loose to dense	
	2	SS				
5	3	SS				
	4	SS				
	5	SS				
10	6	SS				
15	7	SS				
	7A	SS				
20	8	SS			Dark brown to black fine to coarse sand and gravel-trace shells at 16.0 feet-trace silt-wet-medium dense to dense-(GP)	
25	9	SS			Brown fine sand-trace silt-wet-medium dense-(SP)	
30	10	SS	W.S.			
35	11	SS	W.S.			
36.5					End of Boring 35 feet of NX Casing used Auger boring to 15.0 feet Wash water used below 15.0 feet	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS			
W.L.	9.5'	W.S. ~~XXXX~~ W.D.	
W.L.	10.2' B.C.R.	5' A.C.R.	
W.L.	WCI 7.6' AB		

SOIL TESTING SERVICES
OF WIS., INC.
GREEN BAY, WISCONSIN
540 LAMBEAU ST.

BORING STARTED	10-4-74		
BORING COMPLETED	10-4-74		
RIG	22	FOREMAN	JG
DRAWN		APPROVED	TKD
JOB #	6348	SHEET	

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BB5-81671

LOG OF BORING NO. 4 (37)

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers
SITE	**PROJECT NAME**
Wausau Sewage Treatment Plant	Plant Addition

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² (1, 2, 3, 4, 5)
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.) (10, 20, 30, 40, 50)

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³	STANDARD "N" PENETRATION (BLOWS/FT.)
					SURFACE ELEVATION 99.0		
	1	SS			Miscellaneous fill composed of sand, gravel, glass, brick, cinders, etc.-wet at 10.0 feet		47
	2	SS					19
5	3	SS					4
	4	SS					2
	5	SS					5
10	6	SS					4
15	7	SS					7/5"
	7A	SS			Brown fine to coarse sand and gravel-trace silt-wet-medium dense to dense-(GW)		28
20	8	SS			Dark brown to black silty fine sand and gravel-wet-dense-(GM)		35
25	9	SS			Brown fine sand-trace silt and gravel-wet-medium dense-(SP)		19
30	10	SS		W			20
35	11	SS		W			10
36.5					End of Boring 35 feet of NX Casing used Auger boring to 15.0 feet Wash water used below 15.0 feet		

WATER LEVEL OBSERVATIONS			
W.L.	9.0'	W.S. XXXXX	
W.L.	9.5' B.C.R.		A.C.R.
W.L.	WCI 8.6' AB		
	9.0' 24 hrs. AB		

SOIL TESTING SERVICES
OF WIS., INC.
GREEN BAY, WISCONSIN
540 LAMBEAU ST.

BORING STARTED	10-3-74		
BORING COMPLETED	10-3-74		
RIG	22	FOREMAN	JG
DRAWN		APPROVED	TKD
JOB #	6348	SHEET	

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BBS-81671

LOG OF BORING NO. 1

OWNER
City of Wausau

ARCHITECT-ENGINEER
Becher-Hoppe Engineers, Inc.

SITE
Wausau, Wisconsin

PROJECT NAME
Proposed Incinerator Building Addition

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
					SURFACE ELEVATION 1169.4	
		FI				
	1	SS			Light yellow fine to very fine sand-trace silt-loose-(SP-Fill)	
	2	SS			Gray brown fine sand fill,trace silt-medium dense to loose-(SP-Fill)	
5	3	SS				
	4	SS				
	4A	SS			Gray brown to brown silty fine sand,trace clay,roots-loose-saturated-(SM-ML-Fill)	
	5	SS				
	5A	SS				
10					White fine to medium sand fill, trace silt,roots-loose-(SP-Fill)	
	6	SS				
	7	SS				
15					Brown to gray brown fine to medium sand,trace silt-slightly organic loose-(SP)	
	8	SS				
	8A	SS			Gray brown sandy slightly organic silt,trace roots,clay-medium dense-(ML)	
	8B	SS			Brown fine to medium sand,trace fine to medium gravel,silt-medium dense-saturated-(SP)	
20					Brown fine to coarse sand,trace fine to medium gravel,silt-dense-saturated-(SW)	
21.5	9	SS				
					End of Boring	
					Power auger used for entire boring	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50

8
11
7
7
2/6"
6
6/6"
4
12
2/6"
6/6"
6/6"
38

□ Organic content, % of dry weight

WATER LEVEL OBSERVATIONS		
W.L.	12.5'	W.S. XXXXX
W.L.	B.C.R.	A.C.R.
W.L.	10' 24 hours AB	
	16' cave in AB	

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	4-14-75		
BORING COMPLETED	4-14-75		
RIG	W-15	FOREMAN	SN
DRAWN	HHH	APPROVED	TKD
JOB #	6600	SHEET	

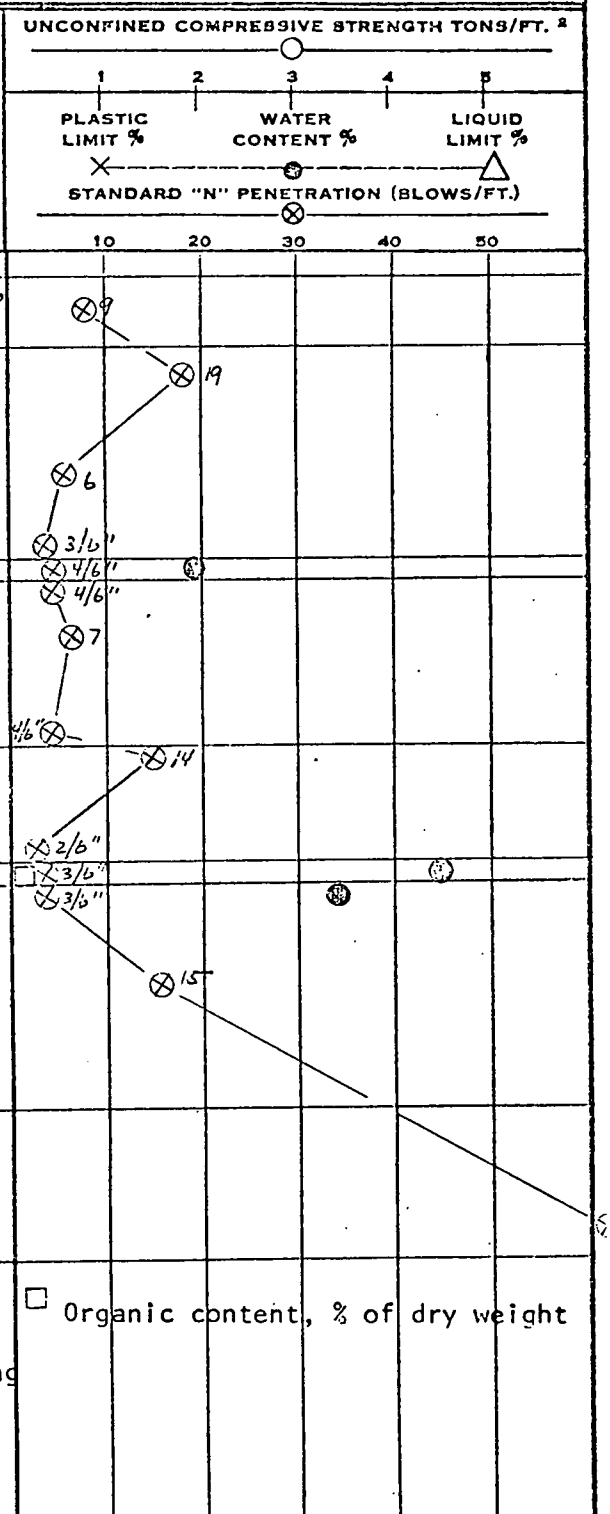
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BBS-81471

LOG OF BORING NO. 2

OWNER	ARCHITECT-ENGINEER
City of Wausau	Becher-Hoppe Engineers, Inc.
SITE	**PROJECT NAME**
Wausau, Wisconsin	Proposed Incinerator Building Addition

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
					SURFACE ELEVATION 1169.1	
		FT			Topsoil-no sample obtained	
	1	SS			White fine to very fine sand fill, trace silt-medium dense-(SP-Fill)	
	2	SS			Gray brown fine to medium sand, trace silt-medium dense to loose-(SP-Fill)	
5	3	SS				
	4	SS				
	4A	SS			Light brown sandy silt fill, trace roots, clay-saturated-loose-(ML-Fill)	
	4B	SS				
	5	SS			White fine to very fine sand, trace silt-loose-(SP-Fill)	
10						
	6	SS				
	6A	SS			Dark brown fine to medium sand with trace to some dark brown silty sandy topsoil, trace roots-medium dense-(SP)	
	7	SS				
	7A	SS			Brown to gray brown sandy silt, trace roots-slightly organic loose-(ML)	
	7B	SS				
15						
	8	SS			Brown fine to medium sand, trace fine to medium gravel and silt-loose to medium dense-saturated-(SP)	
20						
	9	SS			Brown fine to coarse sand, trace fine to medium gravel, silt-very dense-saturated-(SW)	
21.5						
					End of Boring	
					Power auger used for entire boring	



□ Organic content, % of dry weight

WATER LEVEL OBSERVATIONS		
W.L.	13.5'	W.S. XXXX
W.L.	B.C.R.	A.C.R.
W.L.	13' AB	
	11.5' 24 hours AB	

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	4-15-75		
BORING COMPLETED	4-15-75		
RIG	W-15	FOREMAN	SN
DRAWN	HHH	APPROVED	TKD
JOB #	6600	SHEET	

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BBS-81471

LOG OF BORING NO. 3

OWNER: City of Wausau	ARCHITECT-ENGINEER: Becher-Hoppe Engineers, Inc.
SITE: Wausau, Wisconsin	PROJECT NAME: Proposed Incinerator Building Addition

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % / STANDARD "N" PENETRATION (BLOWS/FT.)
SURFACE ELEVATION 1169.1							1 2 3 4 5 — 10 20 30 40 50
		FT			Topsoil-no sample obtained		
	1	SS			White fine to very fine sand fill-trace silt-loose-(SP-Fill)		6
	2	SS					6
	2A	SS			Gray brown fine to medium sand fill, trace silt-loose-(SP-Fill)		4/6"
	3	SS					3
5	3A	SS			Light brown sandy silt fill, trace roots-saturated-loose-(ML-Fill)		1/6"
	4	SS					5
	4A	SS			White fine sand fill, trace silt-loose-moist-(SP-Fill)		6/6"
	5	SS					6
10							4
	6	SS					
	7	SS			Brown fine to medium sand, trace silt, gravel-medium dense to loose-saturated-(SP)		13
15							7
	8	SS					
	8A	SS					6/6"
					Brown fine to coarse sand, trace silt and fine to medium gravel-medium dense to dense-saturated-(SW)		
20							
21.5	9	SS					39
					End of Boring		
					Power auger used for entire boring		

WATER LEVEL OBSERVATIONS		
W.L.	13'	W.S. OR W.D.
W.L.	B.C.R.	A.C.R.
W.L.	12.5' AB	
	13.9' 24 hours AB	

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	4-15-75		
BORING COMPLETED	4-15-75		
RIG	W-15	FOREMAN	SN
DRAWN	HHH	APPROVED	TKD
JOB #	6600	SHEET	

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BBS-81471

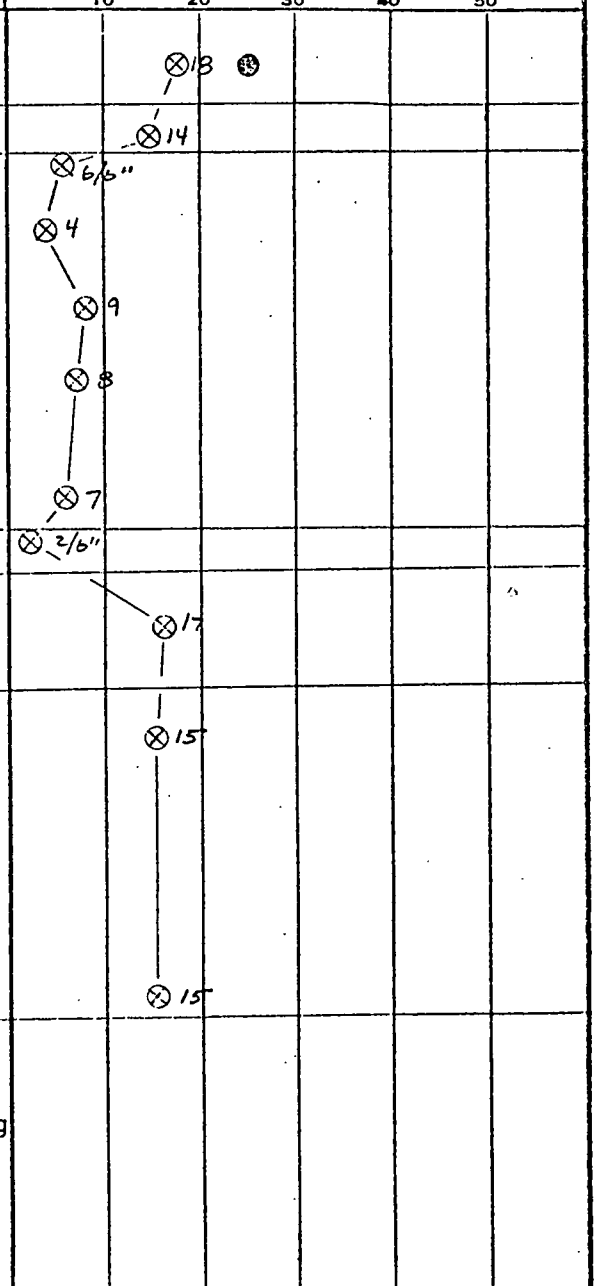
LOG OF BORING NO. 4

OWNER: City of Wausau	ARCHITECT-ENGINEER: Becher-Hoppe Engineers, Inc.
SITE: Wausau, Wisconsin	PROJECT NAME: Proposed Incinerator Building Addition

SURFACE ELEVATION 1168.8

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
		FT				
	1	SS			Brown silt fill-trace clay, sand-medium dense-(ML-Fill)	
	2	SS			Gray brown fine sand fill, trace silt-medium dense-(SP-Fill)	
	2A	SS				
5	3	SS			White fine sand fill, trace silt-loose to medium dense-(SP-Fill)	
	4	SS				
	5	SS				
10	6	SS				
	6A	SS			Dark brown fine sand, trace silt-loose-(SP)	
	7	SS			Brown fine to medium sand, trace silt and fine to medium gravel-medium dense-saturated-(SP)	
15	8	SS			Brown fine to coarse sand, trace silt and fine to medium gravel-medium dense-(SW)	
20	9	SS				
21.5					End of Boring Power auger used for entire boring	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²
1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %
STANDARD "N" PENETRATION (BLOWS/FT.)
10 20 30 40 50



WATER LEVEL OBSERVATIONS		
W.L.	13'	W.S. XXXXX.
W.L.	B.C.R.	A.C.R.
W.L.	13' AB	
	13' Cave in AB	

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	4-15-75		
BORING COMPLETED	4-15-75		
RIG	W-15	FOREMAN	SN
DRAWN	HHH	APPROVED	
JOB #	6600	SHEET	

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BBS-81471

LOG OF TEST BORING

JOB NO. 8100-88-0640 VERTICAL SCALE 1" = 5' BORING NO. 38

PROJECT PROPOSED WASTE WATER TREATMENT PLANT FACILITIES, WAUSAU, WISCONSIN

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1171.26')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L./P.L.	Qu
	FILL, Sand, with silt, a little gravel, fine grained, brown, moist, layers of silty sand (see #1)	FILL	20		1	SB				
2	FILL, Sand, fine grained, brownish white, moist, lenses of silty sand at 2 to 3½ feet		13		2	SB				
			6		3	SB				MA
7½	FILL, Sand, fine to medium grained, brown, moist		5		4	SB				
10	SILTY SAND, fine grained, brown, waterbearing, very loose (SM)	COARSE ALLUVIUM	1	▼	5	SB				
			3		6	SB				MA
14½	SAND, with gravel to a little gravel, cobbles, fine to medium grained, brown to gray, waterbearing, loose to very dense (SP)		8		7	SB				
			38		8	SB				
			19		9	SB				
			16		10	SB				
31	END OF BORING									
	#1 - at ½ to 1 foot, a 3" layer of asphalt at the surface									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
5-5	12:10	13½'	12'	12'	to	11'
5-5	13:06	31'	12'	31'	to	NMR
					to	
					to	

START 5-5-88 COMPLETE 5-5-88

METHOD @13:06

3¼" HSA 0' to 12'

DM 12' to 29½'

CREW CHIEF Wellner

twin city testing corporation

SE-2 (77-B)-5

LOG OF TEST BORING

JOB NO. 8100-88-0640 VERTICAL SCALE 1" = 5' BORING NO. 39

PROJECT PROPOSED WASTE WATER TREATMENT PLANT FACILITIES, WAUSAU, WISCONSIN

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1171.17')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L./P.L.	Qu
1½	FILL, Silty Sand, with gravel, brown and black, a 3" layer (see #1)	FILL	21		1	SB				
	FILL, Sand, a little gravel at 4½ to 6 feet, fine grained, brownish white, moist		7		2	SB				
			23		3	SB				
			4		4	SB				
9½	SILTY SAND, a little gravel and organic material, brown and black, moist to waterbearing, loose (SM)	COARSE ALLUVIUM	5	▼	5	SB				
12	SAND, with organic silt, with gravel at 14½ to 16 feet, fine to medium grained, grayish brown and black, waterbearing, very loose, layers of silty sand at 14½ to 16 feet (SP-SM)		2		6	SB				
			1		7	SB				
17	SILTY SAND, with gravel, cobbles, medium to coarse grained, gray and black, waterbearing, dense (SM)		16		8	SB				
24½	GRAVEL, with sand, cobbles, gray, waterbearing, medium dense (GP)		12		9	SB				
26	SAND, with gravel, medium to coarse grained, brown, waterbearing, medium dense (SP)									
			10		10	SB				
31	END OF BORING									
	#1 - of asphalt at the surface									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
5-5	10:30	13½'	12'	12'	to	11½'
5-5	11:12	31'	12'	31'	to	NMR
					to	
					to	

START 5-5-88 COMPLETE 5-5-88

METHOD @ 11:12

3¼" HSA 0' to 12'

DM 12' to 29½'

CREW CHIEF Wellner

twin city testing corporation

SE-2 (77-B)-5

LOG OF TEST BORING

JOB NO. 8100-88-0640 VERTICAL SCALE 1" = 5' BORING NO. 40

PROJECT PROPOSED WASTE WATER TREATMENT PLANT FACILITIES, WAUSAU, WISCONSIN

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1171.19')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L./P.L.	Qu
	FILL, Silty Sand, a little gravel, brown, moist, a 3" layer of silty sand, with organic fines at the surface	FILL	11		1	SB				
3	FILL, Sand, fine grained, brownish white, moist		25		2	SB				
			14		3	SB				
7½	FILL, Silty Sand, with gravel, brown, moist to wet		13		4	SB				
			5	▼	5	SB				
12	SAND, a trace of organic material, fine grained, brown, waterbearing, very loose (SP)	COARSE ALLUVIUM	2		6	SB				
15	SAND, with gravel, cobbles, fine to medium grained, brown, waterbearing, dense (SP)		16		7	SB				
			16		8	SB				
26	SAND, fine to medium grained, brown, waterbearing, dense (SP)		19		9	SB				
			18		10	SB				
31½	END OF BORING									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
5-5	08:07	13½'	12'	12'	to	11½'
5-5	09:10	31'	12'	31'	to	NMR
					to	
					to	

START 5-5-88 COMPLETE 5-5-88

METHOD @ 09:10

3¼" HSA 0' to 12'

DM 12' to 29½'

CREW CHIEF Wellner

twin city testing corporation

LOG OF TEST BORING

JOB NO. 8100-88-0640 VERTICAL SCALE 1" = 5' BORING NO. 41

PROJECT PROPOSED WASTE WATER TREATMENT PLANT FACILITIES, WAUSAU, WISCONSIN

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1174.85')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L./P.L.	Qu
	FILL, Silty Sand, with gravel, brown, moist, a 3" layer of silty sand with organic fines at the surface	FILL	9		1	SB				
2	FILL, Sand, fine grained, brownish white, moist to waterbearing		11		2	SB				
			15		3	SB				
7	FILL, Sand, fine grained, brownish white, moist to waterbearing		31		4	SB				
			19		5	SB				
12½	ORGANIC SILT, black, soft (OL)	FINE ALLUVIUM	2		6	SB				
14½	SILTY SAND, with organic fines, brown, waterbearing, very loose (SM)	COARSE ALLUVIUM	4		7	SB				
19½	SILTY SAND, reddish brown, water-bearing, very loose (SM)		4		8	SB				
25	SILTY SAND, with gravel, cobbles, medium to coarse grained, brown, waterbearing, dense (SM)		20		9	SB				
29½	SAND, fine to medium grained, brown, waterbearing, dense (SP)		18		10	SB				
31½	END OF BORING									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
5-4	18:40	16'	14½'	14½'	to	None
5-4	19:04	31½'	14½'	31½'	to	NMR
					to	
					to	

START 5-4-88 COMPLETE 5-4-88

METHOD @19:04

3¼" HSA 0' to 14½'

DM 14½' to 29½'

CREW CHIEF Wellner

twin city testing corporation

SE-2 (77-B)-5

LOG OF TEST BORING

JOB NO. 8100-88-0640 VERTICAL SCALE 1" = 5' BORING NO. 42

PROJECT PROPOSED WASTE WATER TREATMENT PLANT FACILITIES, WAUSAU, WISCONSIN

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1170.92')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L. / P.L.	Qu
1	FILL, Silty Sand, with organic fines and gravel, brown, moist	FILL	8		1	SB				
2	FILL, Silty Sand, fine grained, gray, moist									
	FILL, Silty Sand, with gravel, brown, moist		2		2	SB				
4½	FILL, Silty Sand, with gravel, organic material, glass, brown, gray and black, organic odor, moist to waterbearing		16		3	SB				
			8		4	SB				
10	SILTY SAND, with organic fines, dark gray, waterbearing, medium dense to very loose, layers of sandy organic silt at 9½' to 11' (SM)	COARSE ALLUVIUM	9	▼	5	SB				
			3		6	SB				MA
			4		7	SB				
17	SILTY SAND, with gravel, cobbles, medium to coarse grained, grayish brown, waterbearing, dense (SM)		22		8	SB				
24½	SAND, with gravel at 24½' to 26', fine to medium grained, brown, waterbearing, medium dense (SP)		12		9	SB				
			10		10	SB				
31½	END OF BORING									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
5-4	13:13	11'	9½'	9½'	to	9½'
5-4	14:21	31½'	12'	31½'	to	NMR
					to	
					to	

START 5-4-88 COMPLETE 5-4-88

METHOD @ 14:21

3¼' HSA 0' to 12'

DM 12' to 29½'

CREW CHIEF Wellner

twin city testing corporation

SE-2 (77-B)-5

LOG OF TEST BORING

JOB NO. 8100-88-0640 VERTICAL SCALE 1" = 5' BORING NO. 43

PROJECT PROPOSED WASTE WATER TREATMENT PLANT FACILITIES, WAUSAU, WISCONSIN

SURFACE ELEVATION 1172.54'

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L./P.L.	Qu
2	FILL, Silty Sand, a little gravel, brown and black to grayish brown, moist, a 5" layer of silty (see #1)	FILL			1	SB				
4½	FILL, Silty Sand, a little gravel, brown, moist		14		2	SB				
7½	FILL, Sand, fine grained, brownish white, moist		11		3	SB				
10½	FILL, Sand, fine to medium grained, brownish white to green, moist		10		4	SB				
14½	SILTY SAND, gray, wet to water-bearing, loose, layers of lean clay with roots (SM)	COARSE ALLUVIUM	6	▼	5	SB				
17	SILT, roots, black, soft (ML)	FINE ALLUVIUM	7		6	SB				
26½	SILTY SAND, with gravel, cobbles, medium to coarse grained, brown and gray, waterbearing, very dense (SM)	COARSE ALLUVIUM	1		7	SB				
31½	SAND, a little gravel, fine to medium grained, grayish brown, waterbearing, medium dense (SP)		36		8	SB				
	END OF BORING		33		9	SB				
	#1 - sand with organic fines at the surface		12		10	SB				

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
5-4	11:23	13½'	12'	12'	to	11½'
5-4	12:24	31½'	12'	31½'	to	None
					to	
					to	

START 5-4-88 COMPLETE 5-4-88

METHOD 3¼" HSA 0' to 12' @ 12:24

DM 12' to 29½'

CREW CHIEF Wellner

twin city testing corporation

SE-2 (77-B)-5

LOG OF TEST BORING

JOB NO. 8100-88-0640 VERTICAL SCALE 1" = 5' BORING NO. 44

PROJECT PROPOSED WASTE WATER TREATMENT PLANT FACILITIES, WAUSAU, WISCONSIN

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1170.30')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L./P.L.	Qu
8"	FILL, Silty Sand, (see #1)	FILL								
	FILL, Silty Sand, with gravel, cinders, wood, gray, brown and black, moist		6		1	SB				
			4		2	SB				
			5		3	SB				
			6	▼	4	SB				
9½	SILTY SAND, with organic fines, a little gravel, black, waterbearing, very loose, layers of sandy organic silt at 9½' to 11' (SM)	COARSE ALLUVIUM	4		5	SB				
			4		6	SB				
14½	SILTY SAND, with gravel, cobbles, medium to coarse grained, gray and black, waterbearing, dense (SM)		18		7	SB				
			23		8	SB				MA
23	SAND, a little gravel, fine to medium grained, brown, waterbearing, dense to medium dense (SP)		19		9	SB				
			13		10	SB				MA
31½	END OF BORING									
	#1 - with organic fines, a little gravel, gray and black, moist									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
5-4	15:11	11'	9½'	9½'	to	9½'
5-4	15:16	13½'	12'	12'	to	12'
5-4	16:05	31½'	12'	31½'	to	NMR
					to	

START 5-4-88 COMPLETE 5-4-88

METHOD @16:05

3¼" HSA 0' to 12'

DM 12' to 29½'

CREW CHIEF Wellner

twin city testing corporation

SE-2 (77-8)-5

LOG OF TEST BORING

JOB NO. 8100-88-0640 VERTICAL SCALE 1" = 5' BORING NO. 45

PROJECT PROPOSED WASTE WATER TREATMENT PLANT FACILITIES, WAUSAU, WISCONSIN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L. P.L.	Qu
	SURFACE ELEVATION 1170.65'									
	FILL, Silty Sand, a little gravel, brown and black, moist, a 2" layer of silty sand with organic (see #1)	FILL	4		1	SB				
2	FILL, Silty Sand, with gravel, concrete, glass, moist to water-bearing		40	▼	2	SB				
			14		3	SB				
7	SANDY ORGANIC SILT, a little gravel at 12' to 13½', roots, organic odor, black, soft to medium (OL)	FINE ALLUVIUM	1		4	SB				
			1		5	SB				
			8		6	SB				
15	SILTY SAND, with organic fines and gravel, gray and black, (see #2)	COARSE ALLUVIUM	4		7	SB				
17	SILTY SAND, with gravel, cobbles, medium to coarse grained, grayish brown, waterbearing, dense (SM)		18		8	SB				
24½	SAND, fine to medium grained, grayish brown, waterbearing, dense to medium dense (SP)		16		9	SB				
			13		10	SB NSR				
31	END OF BORING #1 - fines at the surface #2 - waterbearing, very loose (SM)									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
5-4	09:10	6'	4½'	4½'	to	4½'
5-4	09:41	13½'	12'	12'	to	11½'
5-4	10:29	31'	12'	31'	to	NMR
					to	

START 5-4-88 COMPLETE 5-4-88

METHOD @ 10:29

3¼" HSA 0' to 12'

DM 12' to 29½'

CREW CHIEF Wellner

twin city testing corporation

SE-2 (77-B)-5

LOG OF TEST BORING

JOB NO. 8100-88-0640 VERTICAL SCALE 1" = 5' BORING NO. 46

PROJECT PROPOSED WASTE WATER TREATMENT PLANT FACILITIES, WAUSAU, WISCONSIN

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1171.05')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L. / P.L.	Qu
	FILL, Silty Sand, with gravel, brown and black, moist, a 3" layer of silty sand with organic fines at the surface	FILL	10		1	SB				
2	FILL, Silty Sand, with gravel, glass, gray and black, moist to waterbearing		31		2	SB				
			13		3	SB				
			1	▼	4	SB				
			1		5	SB NSR				
12	FILL, Silty Sand, a little gravel to with gravel, wood, metal, organic odor, black, waterbearing		5		6	SB				
			2		7	SB				
17	SILTY SAND, with gravel, cobbles, medium to coarse grained, grayish brown, waterbearing, dense (SM)	COARSE ALLUVIUM	16		8	SB				
24½	SAND, with organic silt, a little gravel, gray, waterbearing, medium dense (SP-SM)		9		9	SB				
			11		10	SB NSR				
34½	SAND, a little gravel, fine to medium grained, gray, waterbearing, medium dense (SP)		12		11	SB NSR				
36½	END OF BORING									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
5-3	17:50	11'	9½'	9½'	to	9½'
5-4	07:32	13½'	12'	12'	to	10½'
5-4	08:35	36½'	12'	36½'	to	NMR
					to	

START 5-3-88 COMPLETE 5-4-88

METHOD @ 08:35

3¼" HSA 0' to 12'

DM 12' to 34½'

CREW CHIEF Wellner

twin city testing corporation

SE-2 (77-B)-5

LOG OF TEST BORING

JOB NO. 8100-88-0640 VERTICAL SCALE 1" = 5' BORING NO. 47

PROJECT PROPOSED WASTE WATER TREATMENT PLANT FACILITIES, WAUSAU, WISCONSIN

SURFACE ELEVATION 1173.68'

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L./P.L.	Qu
	FILL, Silty Sand, with organic fines and gravel, brown, moist	FILL	10		1	SB				
2	FILL, Silty Sand, a little gravel, cinders, brown, moist		19		2	SB				
4½	FILL, Sand, fine grained, brownish white, moist		18		3	SB				
			35		4	SB				
			12		5	SB				
12	SAND, a trace of organic material, fine to medium grained, (see #1)	COARSE ALLUVIUM	3	▼	6	SB				
13½	SILTY SAND, with organic fines, black, waterbearing, very loose, layers of sandy organic silt at 14½ to 16 feet (SM)		4		7	SB				MA
17½	SILTY SAND, with gravel, cobbles at 23 to 31 feet, grayish brown, waterbearing, loose to dense (SM)		6		8	SB				
			18		9	SB				
29½	SAND, fine to medium grained, brown, waterbearing, dense (SP)		19		10	SB				MA
31	END OF BORING									
	#1 - waterbearing, very loose (SP)									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
5-4	16:40	13½'	12'	12'	to	12'
5-4	17:42	31'	12'	31'	to	NMR
					to	
					to	

START 5-4-88 COMPLETE 5-4-88

METHOD @ 17:42

3¼" HSA 0' to 12'

DM 12' to 29½'

CREW CHIEF Wellner

twin city testing

LOG OF TEST BORING

JOB NO. 8100-88-0640 VERTICAL SCALE 1" = 5' BORING NO. 48

PROJECT PROPOSED WASTE WATER TREATMENT PLANT FACILITY, WAUSAU, WISCONSIN

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1168.79')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L. / P.L.	Qu
	FILL, Silty Sand, with organic fines and gravel, brown and black, moist	FILL	11		1	SB				
2½	FILL, Sand, fine to medium grained, gray to reddish brown, moist		5		2	SB				
4½	FILL, Sand, fine grained, brownish white, brown and green, moist		7		3	SB				MA
7½	SILTY SAND, with organic fines, roots, black, moist to waterbearing, very loose (SM)	COARSE ALLUVIUM	2	▼	4	SB				
			1		5	SB NSR				
12	SILTY SAND, a little gravel, gray to brown, waterbearing, medium dense (SM)		11		6	SB				
15	SAND, cobbles, fine grained, brown and gray, waterbearing, loose (SP)		7		7	SB				
19½	SAND, with gravel, fine to medium grained, grayish brown, (see #1)		27		8	SB				
21	END OF BORING #1 - waterbearing, dense									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
5-3	16:10	11'	9½'	9½'	to	9½'
5-3	17:00	21'	12'	21'	to	NMR
					to	
					to	

START 5-3-88 COMPLETE 5-3-88

METHOD @ 17:00

3¼" HSA 0' to 12'

DM 12' to 19½'

CREW CHIEF Wellner

twin city testing corporation

SE-2 (77-B)-5

LOG OF TEST BORING

JOB NO. 8100-88-0640 VERTICAL SCALE 1" = 5' BORING NO. 49

PROJECT PROPOSED WASTE WATER TREATMENT PLANT FACILITY, WAUSAU, WISCONSIN

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1169.30')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L./P.L.	Qu
	FILL, Silty Sand, with gravel, dark brown, moist, a 3" layer of silty sand with organic fines at the surface	FILL	15		1	SB				
2	FILL, Silty Sand, with gravel, cinders, glass, black, white and green, moist		10		2	SB				
			2		3	SB				
7	ORGANIC SILT, black and brown, soft (OL)	FINE ALLUVIUM	2		4	SB				
9½	SILTY SAND, with organic fines, roots, black, waterbearing, very loose (SM)	COARSE ALLUVIUM	1	▼	5	SB				
13	SAND, with organic silt, a little gravel, fine grained, (see #1)		5		6	SB				
14½	SILTY SAND, with gravel, medium to coarse grained, grayish brown, waterberaing, dense to very dense (SM)		20		7	SB				
21			34		8	SB				
	END OF BORING #1 - dark gray, waterbearing, loose (SP-SM)									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
5-3	15:00	13½'	12'	12'	to	10'
5-3	15:35	21'	19½'	21'	to	NMR
					to	
					to	

START 5-3-88 COMPLETE 5-3-88

METHOD @ 15:35

3½" HSA 0' to 12'

DM 12' to 19½'

CREW CHIEF Wellner

twin city testing corporation

SF-2 (77-B)-5

LOG OF TEST BORING

JOB NO. 8100-88-0640 VERTICAL SCALE 1" = 5' BORING NO. 50

PROJECT PROPOSED WASTE WATER TREATMENT PLANT FACILITIES, WAUSAU, WISCONSIN

SURFACE ELEVATION 1170.64'

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L. / P.L.	Qu
½	FILL, Silty Sand, (see #1)	FILL	18		1	SB				
1	FILL, Silty Sand, (see #2)									
	FILL, Sand, fine grained, brownish white, moist, lenses of gravel and cinders at 5½'		10		2	SB				
			4		3	SB				
7½	SILTY SAND, with gravel, dark brown, moist, very loose (SM)	COARSE	4		4	SB				
10½	SAND, fine to medium grained, brown, waterbearing, loose (SP)		7	▼	5	SB				
			6		6	SB				
16	SAND, with silt and gravel, cobbles, medium to coarse grained, brown, waterbearing, dense (SP-SM)		29		7	SB				
19½	SAND, with gravel, fine to medium grained, brown, waterbearing, medium dense (SP)		11		8	SB				
21½	END OF BORING									
	#1 - with organic fines, black, moist									
	#2 - with gravel, brown, moist									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
5-5	14:30	13½'	12'	12'	to	11'
5-5	14:50	21½'	12'	21½'	to	NMR
5-5	14:50	21½'	PVC 18'	18'	to	NMR
					to	

START 5-5-88 COMPLETE 5-5-88

METHOD @ 14:50

3¼" HSA 0' to 12'

DM 12' to 19½'

CREW CHIEF Wellner

twin city testing corporation

SE-2 (77-B)-5

LOG OF TEST BORING

JOB NO. 8100-88-0640 VERTICAL SCALE 1" = 5' BORING NO. 51

PROJECT PROPOSED WASTE WATER TREATMENT PLANT FACILITIES, WAUSAU, WISCONSIN

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1170.90')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L. / P.L.	Qu
	FILL, Silty Sand, with gravel, cinders, glass, brown, moist, a 2" layer of silty sand with organic fines at the surface	FILL	8		1	SB				
			4		2	SB				
4½	FILL, Sand, concrete, fine to medium grained,, gray, moist		35		3	SB				
7	FILL, Silty Sand, fine grained, brownish white, wet to waterbearing		3		4	SB				
9½	SAND, with silt and gravel, roots, gray and black, waterbearing, medium dense (SP-SM)	COARSE ALLUVIUM	10	▼	5	SB				
12	SAND, with gravel, medium grained, gray, waterbearing, medium dense (SP)		9		6	SB				
14½	SAND, with silt, roots, fine to medium grained, gray, very loose (SP-SM)		4		7	SB				
16½	SILTY SAND, with gravel, cobbles, medium to coarse grained, grayish brown, waterbearing, dense (SM)		25		8	SB				
21	END OF BORING									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
5-5	15:45	13½'	12'	12'	to	11'
					to	
					to	
					to	

START 5-5-88 COMPLETE 5-5-88

METHOD @ 16:20

3¼" HSA 0' to 19½'

CREW CHIEF Wellner

twin city testing corporation

SE-2 (77-8)-5

GENERAL NOTES

DRILLING AND SAMPLING SYMBOLS

SYMBOL	DEFINITION
HSA	3 1/4" I.D. Hollow Stem Auger
_FA	4", 6" or 10" Diameter Flight Auger
_HA	2", 4" or 6" Hand Auger
_DC	2 1/2", 4", 5" or 6" Steel Drive Casing
_RC	Size A, B, or N Rotary Casing
PD	Pipe Drill or Cleanout Tube
CS	Continuous Split Barrel Sampling
DM	Drilling Mud
JW	Jetting Water
SB	2" O.D. Split Barrel Sample
_L	2 1/2" or 3 1/2" O.D. SB Liner Sample
_T	2" or 3" Thin Walled Tube Sample
3TP	3" Thin Walled Tube (Pitcher Sampler)
_TO	2" or 3" Thin Walled Tube (Osterberg Sampler)
W	Wash Sample
B	Bag Sample
P	Test Pit Sample
_Q	BQ, NQ, or PQ Wireline System
_X	AX, BX, or NX Double Tube Barrel
CR	Core Recovery - Percent
NSR	No Sample Recovered, classification based on action of drilling equipment and/or material noted in drilling fluid or on sampling bit.
NMR	No Measurement Recorded, primarily due to presence of drilling or coring fluid.
▼	Water Level Symbol

TEST SYMBOLS

SYMBOL	DEFINITION
W	Water Content - % of Dry Wt. - ASTM D 2216
D	Dry Density - Pounds Per Cubic Foot
LL, PL	Liquid and Plastic Limit - ASTM D 4318

Additional Insertions in Last Column

Qu	Unconfined Comp. Strength-psf - ASTM D 2166
Pq	Penetrometer Reading - Tons/Square Foot
Ts	Torvane Reading - Tons/Square Foot
G	Specific Gravity - ASTM D 854
SL	Shrinkage Limits - ASTM D 427
OC	Organic Content - Combustion Method
SP	Swell Pressure - Tons/Square Foot
PS	Percent Swell
FS	Free Swell - Percent
pH	Hydrogen Ion Content, Meter Method
SC	Sulfate Content - Parts/Million, same as mg/L
CC	Chloride Content - Parts/Million, same as mg/L
C*	One Dimensional Consolidation - ASTM D 2435
Qc*	Triaxial Compression
D.S.*	Direct Shear - ASTM D 3080
K*	Coefficient of Permeability - cm/sec
D*	Dispersion Test
DH*	Double Hydrometer - ASTM D 4221
MA*	Particle Size Analysis - ASTM D 422
R	Laboratory Resistivity, in ohm - cm - ASTM G 57
E*	Pressuremeter Deformation Modulus - TSF
PM*	Pressuremeter Test
VS*	Field Vane Shear - ASTM D 2573
IR*	Infiltrometer Test - ASTM D 3385
RQD	Rock Quality Designation - Percent

* See attached data sheet or graph

WATER LEVEL

Water levels shown on the boring logs are the levels measured in the borings at the time and under the conditions indicated. In sand, the indicated levels may be considered reliable ground water levels. In clay soil, it may not be possible to determine the ground water level within the normal time required for test borings, except where lenses or layers of more pervious waterbearing soil are present. Even then, an extended period of time may be necessary to reach equilibrium. Therefore, the position of the water level symbol for cohesive or mixed texture soils may not indicate the true level of the ground water table. Perched water refers to water above an impervious layer, thus impeded in reaching the water table. The available water level information is given at the bottom of the log sheet.

DESCRIPTIVE TERMINOLOGY

DENSITY TERM	"N" VALUE	CONSISTENCY TERM
Very Loose	0-4	Soft
Loose	5-8	Medium
Medium Dense	9-15	Rather Stiff
Dense	16-30	Stiff
Very Dense	Over 30	Very Stiff

Standard "N" Penetration: Blows Per Foot of a 140 Pound Hammer Falling 30 inches on a 2 inch OD Split Barrel Sampler

Lamination	Up to 1/2" thick stratum
Layer	1/2" to 6" thick stratum
Lens	1/2" to 6" discontinous stratum, pocket
Varved	Alternating laminations of clay, silt and /or fine grained sand, or colors thereof
Dry	Powdery, no noticeable water
Moist	Below saturation
Wet	Saturated, above liquid limit
Waterbearing	Pervious soil below water

RELATIVE GRAVEL PROPORTIONS

CONDITION	TERM	RANGE
Coarse Grained Soils	A little gravel	2 - 14%
	With gravel	15 - 49%
Fine Grained Soils		
15-29% + No. 200	A little gravel	2 - 7%
15-29% + No. 200	With gravel	8 - 29%
30% + No. 200	A little gravel	2 - 14%
30% + No. 200	With gravel	15 - 24%
30% + No. 200	Gravelly	16 - 49%

RELATIVE SIZES

Boulder	Over 12"
Cobble	3" - 12"
Gravel	
Coarse	3/4" - 3"
Fine	#4 - 3/4"
Sand	
Coarse	#4 - #10
Medium	#10 - #40
Fine	#40 - #200
Silt & Clay	- #200, Based on Plasticity

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES
ASTM Designation: D 2487 - 83
(Based on Unified Soil Classification System)

		Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]		Soil Classification	
				Group Symbol	Group Name[B]
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	$Cu \geq 4$ and $1 \leq Cc \leq 3^E$	GW	Well graded gravel[F]
			$Cu < 4$ and/or $1 > Cc > 3^E$	GP	Poorly graded gravel[F]
		Gravels with Fines More than 12% fines[C]	Fines classify as ML or MH	GM	Silty gravel[F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel[F,G,H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[D]	$Cu \geq 6$ and $1 \leq Cc \leq 3^E$	SW	Well-graded sand[I]
			$Cu < 6$ and/or $1 > Cc > 3^E$	SP	Poorly graded sand[I]
		Sands with Fines More than 12% fines[D]	Fines classify as ML or MH	SM	Silty sand[G,H,I]
			Fines classify as CL or CH	SC	Clayey sand[G,H,I]
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K,L,M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K,L,M]
		organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OL	Organic clay[K,L,M,N] Organic silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay[K,L,M]
			PI plots below "A" line	MH	Elastic silt[K,L,M]
		organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OH	Organic clay[K,L,M,P] Organic silt[K,L,M,O]
Highly organic soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay

[D] Sands with 5 to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥30% plus no. 200, predominantly sand, add "sandy" to to group name.

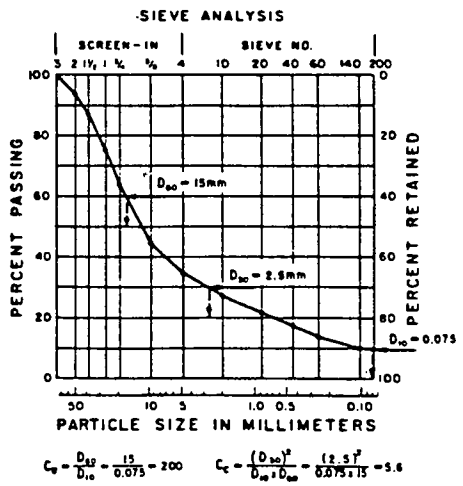
[M] If soil contains ≥30% plus No. 200, predominantly gravel, add "gravelly" to group name.

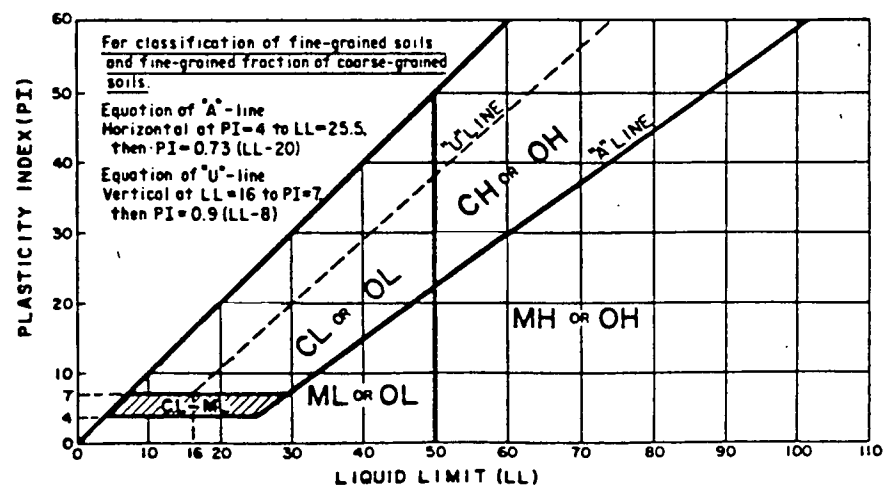
[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

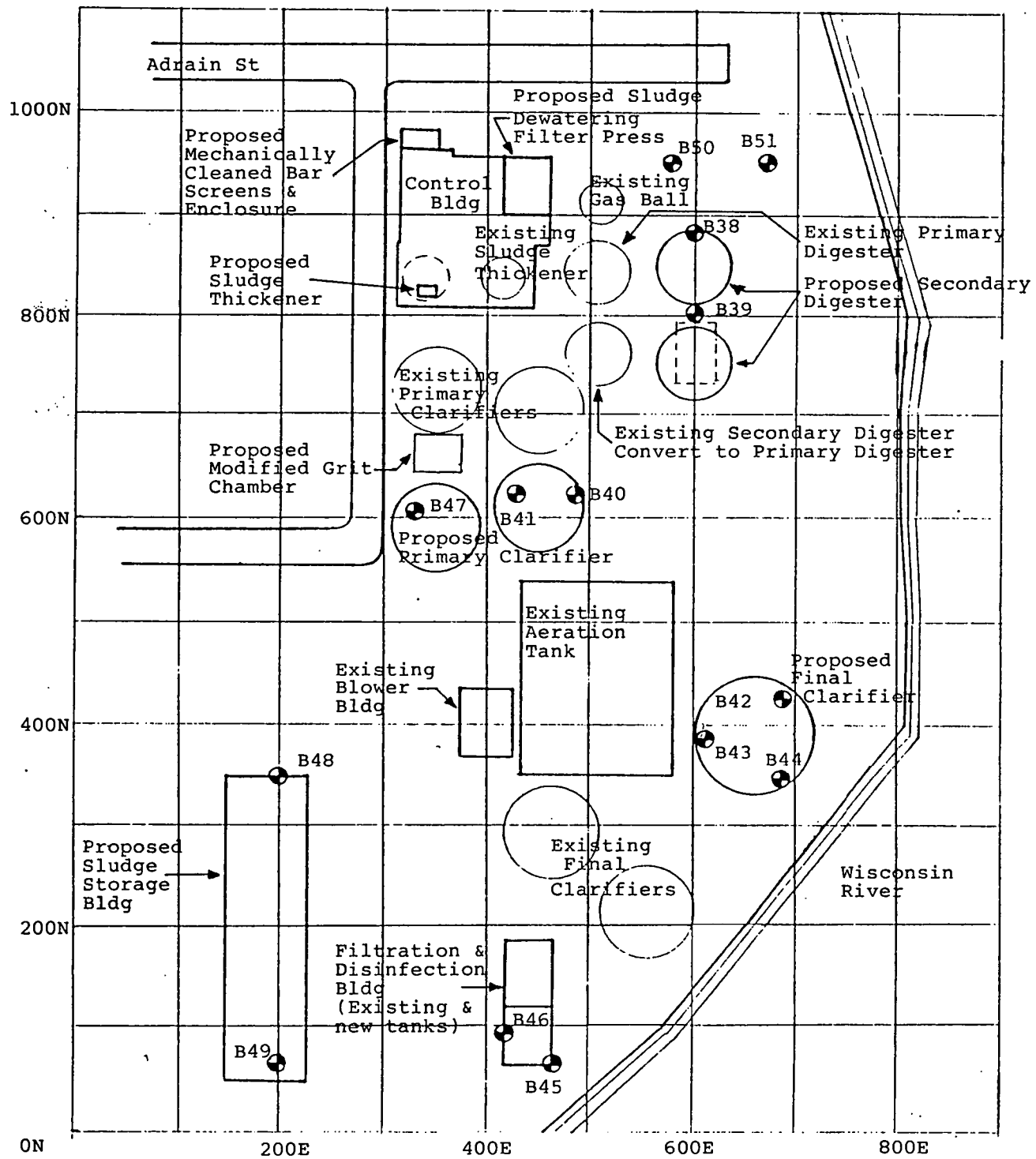
[Q] PI plots below "A" line.





twin city testing corporation

WASTEWATER TREATMENT FACILITIES
WAUSAU, WI



: Denotes Soil Boring Locations

May 12, 1988	JOB NO. 8100-88-640	SCALE: N/A	DRAWN BY TR	CHECKED BY

REPORT OF MECHANICAL ANALYSIS

PROJECT: WASTEWATER TREATMENT FACILITIES
WAUSAU, WI

INVOICE NO: 8100-88-640

Boring No.	48	38	42	47
Sample No.	3	6	6	7
Sample Type	SB	SB	SB	SB
Depth (ft)	4½-6	12-13½	12-13½	14½-16
Unified Soil Classification	SILTY SAND	SILTY SAND	SILTY SAND	SILTY SAND
USCS Symbol	SM	SM	SM	SM
Sieve Size	PERCENT PASSING			
½"				
3/8"		100		
#4		100	100	
#10	100	98	100	100
#40	86	92	76	97
#100	38	26	28	51
#200	18	13	16	29

REPORT OF MECHANICAL ANALYSIS

PROJECT: WASTEWATER TREATMENT FACILITIES
WAUSAU, WI

INVOICE NO: 8100-88-640

Boring No.	38	44	44	47
Sample No.	3	8	10	10
Sample Type	SP	SP	SP	SP
Depth (ft)	4½-6	19½-21	39½-31½	29½-31½
Unified Soil Classification	SILTY SAND fine grained	GRAVEL w/ SAND	SAND, Fine to Medium grained	SAND, Fine to Medium grained
USCS Symbol	SM	GP	SP	SP
Sieve Size	PERCENT PASSING			
1½"		100		
1"		81		
3/4"		61		
½"		47		
3/8"		42	100	
#4		26	100	
#10	100	14	99	199
#40	83	5	64	64
#100	32	2.3	3	4.7
#200	13	1.9	1.6	2.0

Appendix F

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: OW-101
PROJECT NAME: Wausau Wastewater Treatment Plant Expansion	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1172.23

SURFACE ELEVATION +1169.98

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
5					See Log of Boring OW-101A for soil description							
10												
15												
18.5					End of Boring Boring advanced to 18.5 feet with hollow stem auger 2 inch PVC monitoring well installed at 18.0 feet							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

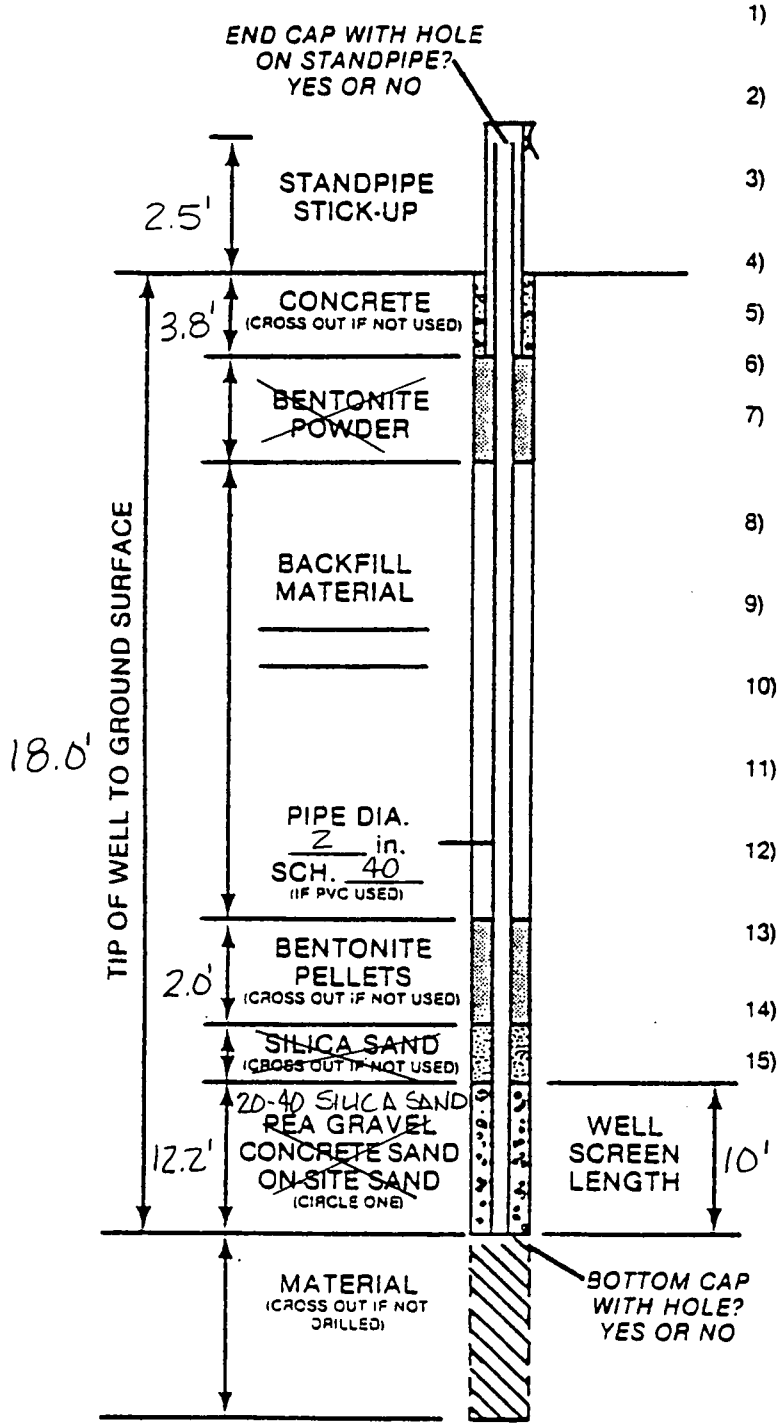
WL		BCR		ACR	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME
11.48	6-28-89				

BORING STARTED 6-20-89	STS OFFICE 540 Lambeau Street Green Bay, WI 54303
BORING COMPLETED 6-20-89	DRAWN BY JJT SHEET 1 OF 1
RIG WI Test Drilling	
FOREMAN DZ	APP'D. BY RCK STS JOB NO. 16970A

BL: 5-983

STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



1) TYPE OF PIPE?
(PVC,) GALVANIZED, STAINLESS, OTHER _____

2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, (THREADED,) OTHER _____

3) TYPE OF WELL SCREEN
(PVC,) GALVANIZED, STAINLESS, OTHER _____

4) SCREEN SIZE 0.01

5) INSTALLED PROTECTOR PIPE W/LOCK? (YES) OR NO

6) WAS SOLVENT USED? YES OR (NO)

7) WAS DRILLING MUD USED?
SOLID AUGER, (HOLLOW STEM AUGER)
WATER, REVERT, BENTONITE

8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR NO N/A

9) HOW WAS WELL DEVELOPED?
BAILING, (PUMPING,) SURGING, COMPRESSED AIR

10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., 30 min., OTHER 1 hr

11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 30 gal

12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, (OPAQUE)

13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, (TURBID,) OPAQUE

14) DID THE WATER SMELL? (YES) OR NO

15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
9.4 Ft. or DRY

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. OW-101 DATE INSTALLED 6-20-89 DRILL RIG WI TEST DRILL INC.

DRILLER D.Z. DRILL CREW _____

JOB/CLIENT CITY OF WAUSAU WASTE WATER TREATMENT PLANT EXPANSION STS JOB No. 16970 A

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: OW-101A
PROJECT NAME: Wausau Wastewater Treatment Plant Expansion	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1171.94

SURFACE ELEVATION +1169.89

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
5	1	SS			Fill: Dark gray silty sand - trace of glass fragments - trace of organics - trace of gravel (13.0-18.0 feet) - moist to wet - very loose to medium dense	3						
10	2	SS				3						
15	3	SS				17						
20	4	SS			Brown fine to coarse sandy gravel (GP) - trace of silt - wet - dense - till	36						
25	5	SS			Brown fine to medium sand (SP) - trace of coarse sand (43.0-48.0 feet) - trace of gravel (23.0-28.0 feet, 38.0-43.0 feet) - wet - medium dense to extremely dense - outwash	11						
30	6	SS				15						
35	7	SS				11						
40	8	SS				60						
45					Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL		BCR		9.0'	ACR
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

BORING STARTED 6-20-89	STS OFFICE 540 Lambeau Street, Green Bay, WI 54303
BORING COMPLETED 6-20-89	DRAWN BY JJT / SHEET 1 OF 2
RIG WI Test Drilling	
FOREMAN DZ	APP'D. BY RAM / STS JOB NO. 16970A

BL: 5-983

STS Consultants Ltd.

OWNER: City of Wausau

PROJECT NAME: Wausau Wastewater Treatment Plant Expansion

SITE LOCATION: Wausau, Wisconsin

LOG OF BORING NUMBER: OW-101A Continued

ENGINEER: Becher-Hoppe, Inc.

WELL INSTALLATION
TOP STANDPIPE EL. + 1171.94

SURFACE ELEVATION +1169.89

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
	9	SS			Brown fine to medium sand (SP) - trace of coarse sand (43.0-48.0 feet) - trace of gravel (23.0-28.0 feet, 38.0-43.0 feet) - wet - medium dense to extremely dense - outwash	23						
50	10	SS		LS		95						
55												
56.5	11	SS		LS		23						
					End of Boring Boring advanced to 18.5 feet using hollow stem auger Boring advanced from 18.5 to 56.5 feet using roller bit and wash water 55.0 feet of HW casing used 2 inch PVC monitoring well installed at 54.3 feet							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR		9.0' ACR		
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

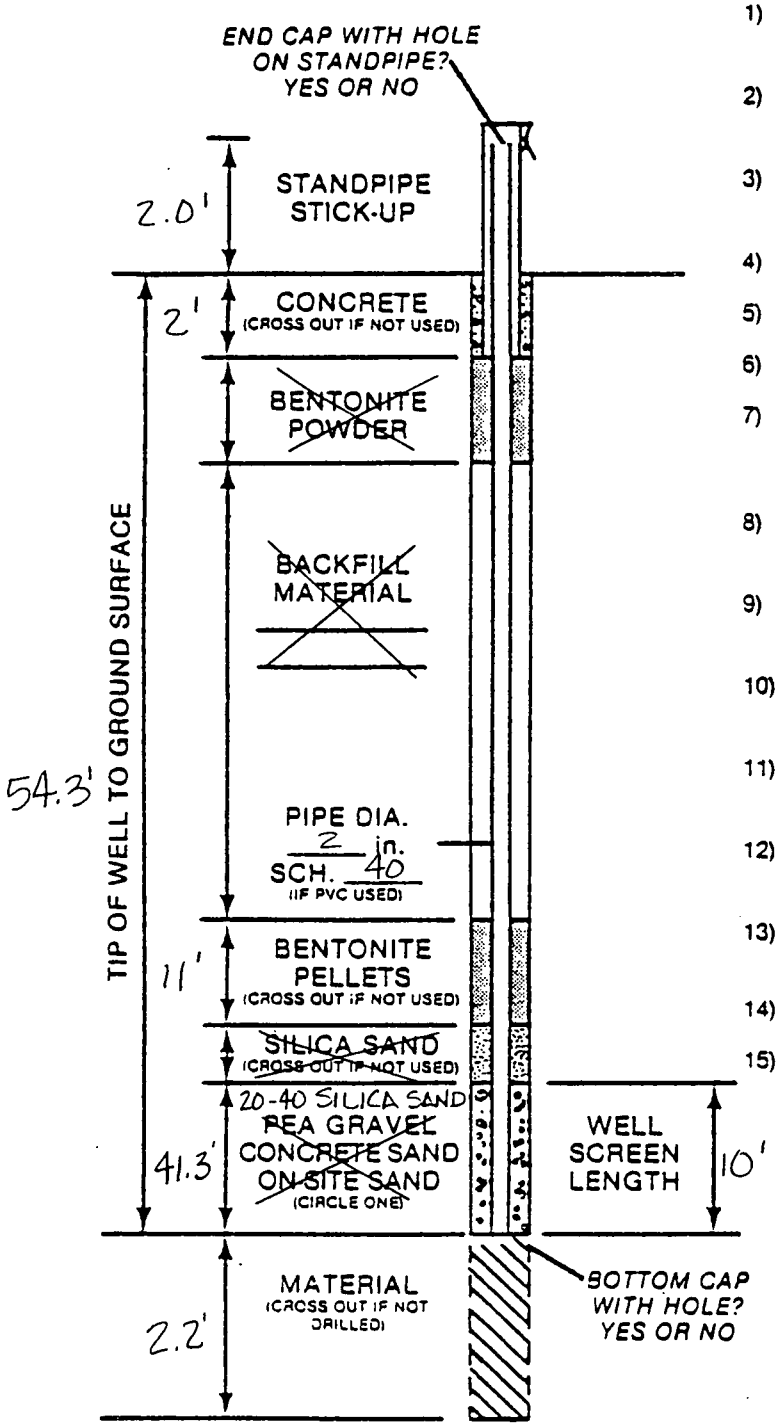
BORING STARTED 6-20-89
BORING COMPLETED 6-20-89
RIG WI Test Drilling
FOREMAN DZ

STS OFFICE 540 Lambeau Street, Green Bay, WI 54303
DRAWN BY JJT
SHEET 2 OF 2
APP'D. BY RAM
STS JOB NO. 16970A

BL: 5-983

STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



1) TYPE OF PIPE?
(PVC), GALVANIZED, STAINLESS, OTHER _____

2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, (THREADED), OTHER _____

3) TYPE OF WELL SCREEN
(PVC), GALVANIZED, STAINLESS, OTHER _____

4) SCREEN SIZE 0.01

5) INSTALLED PROTECTOR PIPE W/LOCK? (YES) OR NO

6) WAS SOLVENT USED? YES OR NO

7) WAS DRILLING MUD USED?
SOLID AUGER, (HOLLOW STEM AUGER), (WATER), REVERT, BENTONITE

8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR NO N/A

9) HOW WAS WELL DEVELOPED?
BAILING, (PUMPING), SURGING, COMPRESSED AIR

10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., 30 min., OTHER 1.4 hr

11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 140 gal

12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, (OPAQUE)

13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, TURBID, OPAQUE

14) DID THE WATER SMELL? YES OR NO N/A

15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
9.3 Ft. or DRY

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. OW-101A DATE INSTALLED 6-20-89 DRILL RIG WI. TEST DRILL INC.

DRILLER DZ DRILL CREW _____

JOB/CLIENT CITY OF WAUSAU WASTE WATER TREATMENT PLANT EXPANSION STS JOB No. 16970A

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: OW-102
PROJECT NAME: Wausau Wastewater Treatment Plant Expansion	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1169.61

SURFACE ELEVATION 1170.31

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					2" bituminous concrete - 3" gravelly base course							
5	1	SS			Fill: Brownish gray silty fine sand - trace of coarse sand, gravel, cinders and organic matter - dry to moist - loose	4						
10	2	SS				4						
15	3	SS			Fill: Dark gray silty coarse sand and fine gravel - trace of glass and masonry fragments - wet - medium dense to very dense	13						
20	4	SS				70						
25	5	SS			Brown medium sand (SP) - moist to wet - loose to dense - outwash	8						
30	6	SS				13						
35	7	SS				15						
40	8	SS		LS		10						
45					Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR		9.5'	ACR	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME
8.90	6-28-89				

BORING STARTED	6-21-89
BORING COMPLETED	6-21-89
RIG	WI Test Drilling
FOREMAN	DZ

STS OFFICE	540 Lambeau Street Green Bay, WI 54303
DRAWN BY	JJT
SHEET	1 OF 3
APP'D. BY	RCK
STS JOB NO.	16970A

BL: 5-983

STS Consultants Ltd.

OWNER City of Wausau	**LOG OF BORING NUMBER** OW-102 Continued
PROJECT NAME Wausau Wastewater Treatment Plant Expansion	**ENGINEER** Becher-Hoppe, Inc.
SITE LOCATION Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1169.61

SURFACE ELEVATION 1170.31

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
	9	SS		LS		16						
50	10	SS				8						
55	11	SS		LS		18						
60					Brown medium sand (SP) - moist to wet - loose to dense - outwash							
	12	SS		LS		18						
65	13	SS				37						
70	14	SS				18						
75	15	SS				48						
80	16	SS		LS		72						
85	17	SS		LS	Light brown fine to medium sand (SP) - with trace of silt - wet - very dense - outwash	56						
90					Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL		8CR		9.5'	ACR
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME
8.90	6-28-89				

BORING STARTED 6-21-89	STS OFFICE 540 Lambeau Street Green Bay, WI 54303
BORING COMPLETED 6-22-89	DRAWN BY JJT / SHEET 2 OF 3
RIG WI Test Drilling	
FOREMAN DZ	APP'D. BY RCK / STS JOB NO. 16970A

BL: 5-983

STS Consultants Ltd.

OWNER	LOG OF BORING NUMBER
City of Wausau	OW-102 Continued
PROJECT NAME	**ENGINEER**
Wausau Wastewater Treatment Plant Expansion	Becher-Hoppe, Inc.

SITE LOCATION Wausau, Wisconsin

WELL INSTALLATION
TOP STANDPIPE EL. + 1169.61

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					SURFACE ELEVATION 1170.31							
	18	SS			Light gray fine to coarse sand (SP) - trace of silt and gravel - wet - extremely dense - outwash	140						
95 / 95.5	19	SS			Brown fine to coarse sandy gravel (GP) - trace of silt - wet - extremely dense - weathered granitic bedrock	100/6"						
					End of Boring Boring advanced to 95.5 feet with roller bit and wash water 70.0 feet of HW casing used 2 inch monitoring well installed at 55.0 feet							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	9.5'	BCR			ACR
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME
8.90	6-28-89				

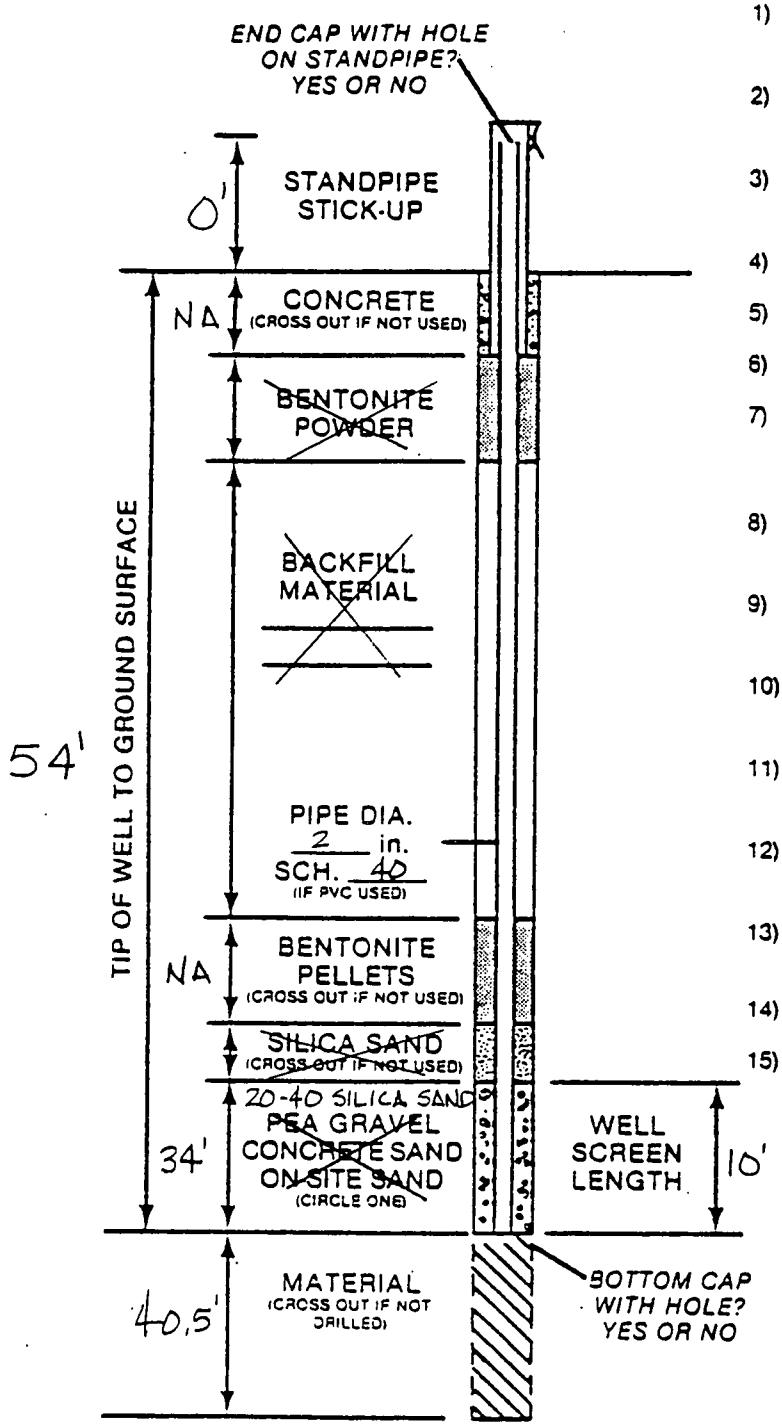
BORING STARTED	6-21-89
BORING COMPLETED	6-21-89
RIG	WI Test Drilling
FOREMAN	DZ

STS OFFICE	540 Lambeau Street Green Bay, WI 54303
DRAWN BY	JJT
SHEET	3 OF 3
APP'D. BY	RCK
STS JOB NO.	16970A

BL: 5-983

STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



1) TYPE OF PIPE?
(PVC,) GALVANIZED, STAINLESS, OTHER _____

2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, (THREADED,) OTHER _____

3) TYPE OF WELL SCREEN
(PVC,) GALVANIZED, STAINLESS, OTHER _____

4) SCREEN SIZE 0.01

5) INSTALLED PROTECTOR PIPE ~~W/LOCK?~~ (YES) OR NO

6) WAS SOLVENT USED? YES OR (NO)

7) WAS DRILLING MUD USED?
SOLID AUGER, HOLLOW STEM AUGER,
(WATER,) REVERT, BENTONITE

8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR NO N/A

9) HOW WAS WELL DEVELOPED?
BAILING, (PUMPING,) SURGING, COMPRESSED AIR

10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., 30 min., OTHER 1.0 hr

11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 140 gal

12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, (TURBID,) OPAQUE

13) WATER CLARITY AFTER DEVELOPMENT?
(CLEAR,) TURBID, OPAQUE

14) DID THE WATER SMELL? YES OR NO N/A

15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
9.5' Ft. or DRY

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. OW-102 DATE INSTALLED 6-23-89 DRILL RIG WI. TEST DRILL INC.

DRILLER D.Z. DRILL CREW _____

JOB/CLIENT CITY OF WAUSAU WASTE WATER TREATMENT PLANT EXPANSION STS JOB No. 16970A

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: OW-103
PROJECT NAME: Wausau Wastewater Treatment Plant Expansion	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1169.92

SURFACE ELEVATION 1171.76

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
5	1	SS			Fill: Dark gray silty sand - trace fragments of glass and cinders - moist - very loose	1						
10	2	SS			Fill: Black organic silt and sand ~~mixture~~ - moist - loose (0.2 feet of peat at 11.3 feet)	4						
15	3	SS			Fill: Dark grayish brown fine to coarse sand - a little gravel - trace of masonry fragments - wet - medium dense	22						
20	4	SS				37						
					Fill: Grayish brown fine to medium sand - a little gravel - trace of silt - moist to wet - dense							
25	5	SS			Fill: Gray medium to coarse sand - trace of silt and trace of glass fragments-wet-very dense	63						
30	6	SS			Light brown fine to medium sand (SP) - moist to wet - loose to very dense - outwash	7						
35	7	SS				13						
40	8	SS				22						
45					Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL		BCR			ACR
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME
11.08	6-28-89				

BORING STARTED	6-20-89
BORING COMPLETED	6-20-89
RIG	WI Test Drilling
FOREMAN	PD
STS OFFICE	540 Lambeau Street, Green Bay, WI 54303
DRAWN BY	JJT
SHEET	1 OF 2
APP'D. BY	RCK
STS JOB NO.	16970A

BL: 5-963

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: OW-103 Continued
PROJECT NAME: Wausau Wastewater Treatment Plant Expansion	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1169.92

SURFACE ELEVATION 1171.76

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
	9	SS				70						
50	10	SS		LS	Light brown fine to medium sand (SP) - moist to wet - loose to very dense - outwash	26						
55												
56.5	11	SS		LS		36						
					End of Boring Boring advanced to 25.0 feet with hollow stem auger Boring advanced from 25.0 to 56.5 feet with roller bit and wash water 55.0 feet of HW casing used 2 inch PVC monitoring well installed at 55.3 feet							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL			BCR			ACR
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	
11.08	6-28-89					

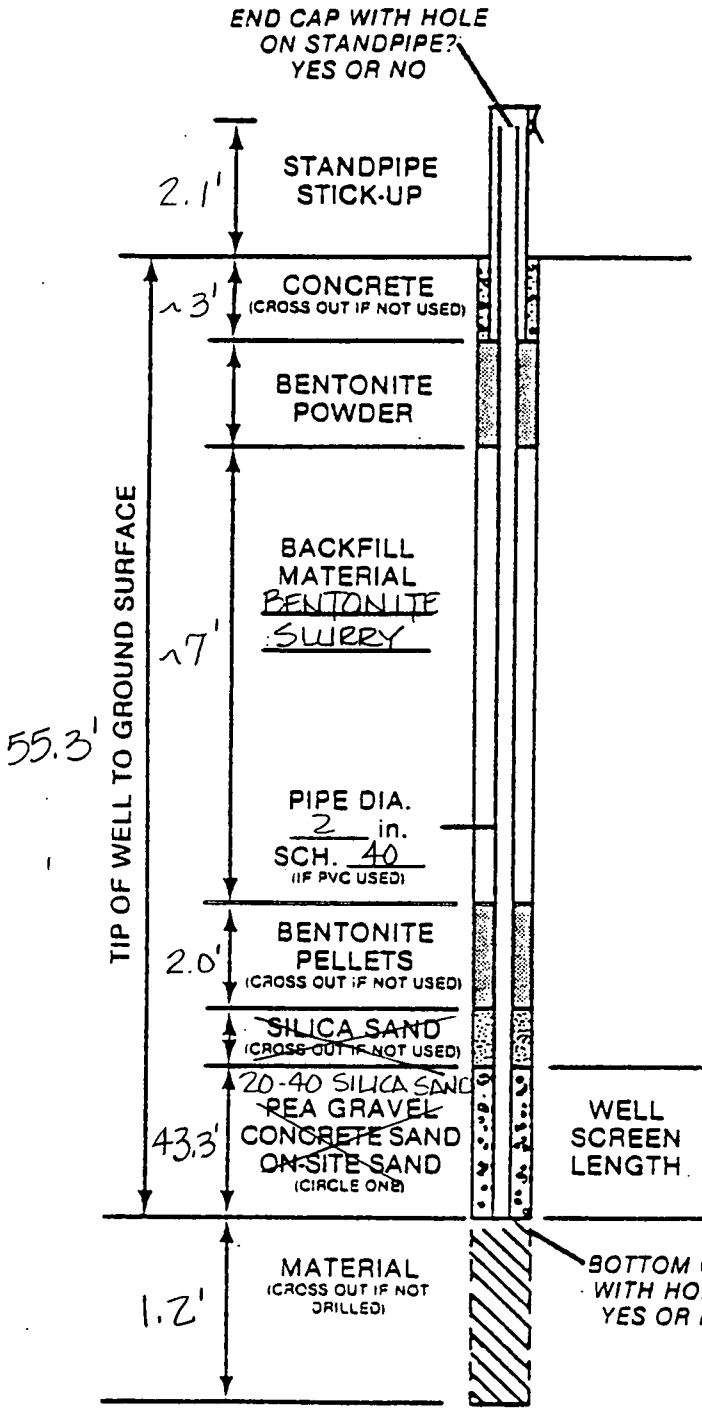
BORING STARTED	6-20-89
BORING COMPLETED	6-20-89
RIG	WI Test Drilling
FOREMAN	PD

STS OFFICE	540 Lambeau Street Green Bay, WI 54303
DRAWN BY	JJT
SHEET	2 OF 2
APP'D. BY	RCK
STS JOB NO.	16970A

BL: 5-983

STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



1) TYPE OF PIPE?
(PVC), GALVANIZED, STAINLESS, OTHER _____

2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, (THREADED), OTHER _____

3) TYPE OF WELL SCREEN
(PVC), GALVANIZED, STAINLESS, OTHER _____

4) SCREEN SIZE 0.01

5) INSTALLED PROTECTOR PIPE W/LOCK? (YES) OR NO

6) WAS SOLVENT USED? YES OR (NO)

7) WAS DRILLING MUD USED?
SOLID AUGER, (HOLLOW STEM AUGER), (WATER), REVERT, BENTONITE

8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR NO N/A

9) HOW WAS WELL DEVELOPED?
BAILING, (PUMPING), SURGING, COMPRESSED AIR

10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., 30 min., OTHER 1.5 hr

11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 140 gal

12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, (OPAQUE)

13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, (TURBID), OPAQUE

14) DID THE WATER SMELL? YES OR NO N/A

15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
8.9' Ft. or DRY

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. OW-103 DATE INSTALLED 6-21-89 DRILL RIG WI. TEST DRILL INC.

DRILLER P.D. DRILL CREW _____

JOB/CLIENT CITY OF WAUSAU WASTE WATER TREATMENT PLANT EXPANSION STS JOB No. 16970A

STS Consultants Ltd.

OWNER	LOG OF BORING NUMBER
City of Wausau	OW-104
PROJECT NAME	**ENGINEER**
Wausau Wastewater Treatment Plant Expansion	Becher-Hoppe, Inc.

SITE LOCATION Wausau, Wisconsin

WELL INSTALLATION
TOP STANDPIPE EL. + 1171.41

SURFACE ELEVATION 1170.50

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					Topsoil							
5	1	SS			Fill: Dark brown silt - trace of glass fragments - moist - loose.	3						
10	2	SS			Fill: Black medium sand - trace of glass fragments - trace of organics (13.0-18.0 feet) - wet - loose to medium dense faint petroleum odor in Sample 3	7						
15	3	SS				16						
20	4	SS			Dark brown silty gravel (GM) - a little coarse sand - trace of medium sand - wet - medium dense - till	23						
25	5	SS				42						
30	6	SS			Brown fine to medium sand (SP) - trace of coarse sand (23.0-53.0 feet) - wet - medium dense to dense - outwash - organic odor in Sample 7	39						
35	7	SS				20						
40	8	SS				39						
45					Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL		BCR			ACR
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

BORING STARTED	6-21-89
BORING COMPLETED	6-21-89
RIG	WI Test Drilling
FOREMAN	PD

STS OFFICE	540 Lambeau Street Green Bay, WI 54303
DRAWN BY	JJT
SHEET	1 OF 2
APP'D. BY	RAM
STS JOB NO.	16790A

BL: 5-983

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: OW-104 Continued
PROJECT NAME: Wausau Wastewater Treatment Plant Expansion	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1171.41

SURFACE ELEVATION +1169.50

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
	9	SS				32						
50					Brown fine to medium sand (SP) - trace of coarse sand (23.0-53.0 feet) - wet - medium dense to dense - outwash - organic odor in Sample 7							
	10	SS				36						
55												
56.5	11	SS		LS		33						
					End of Boring Boring advanced to 20.0 feet using hollow stem auger Boring advanced from 20.0 to 56.5 feet using roller bit and wash water 55.0 feet of HW casing used 2 inch PVC monitoring well installed at 55.0 feet							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL			BCR			ACR
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	

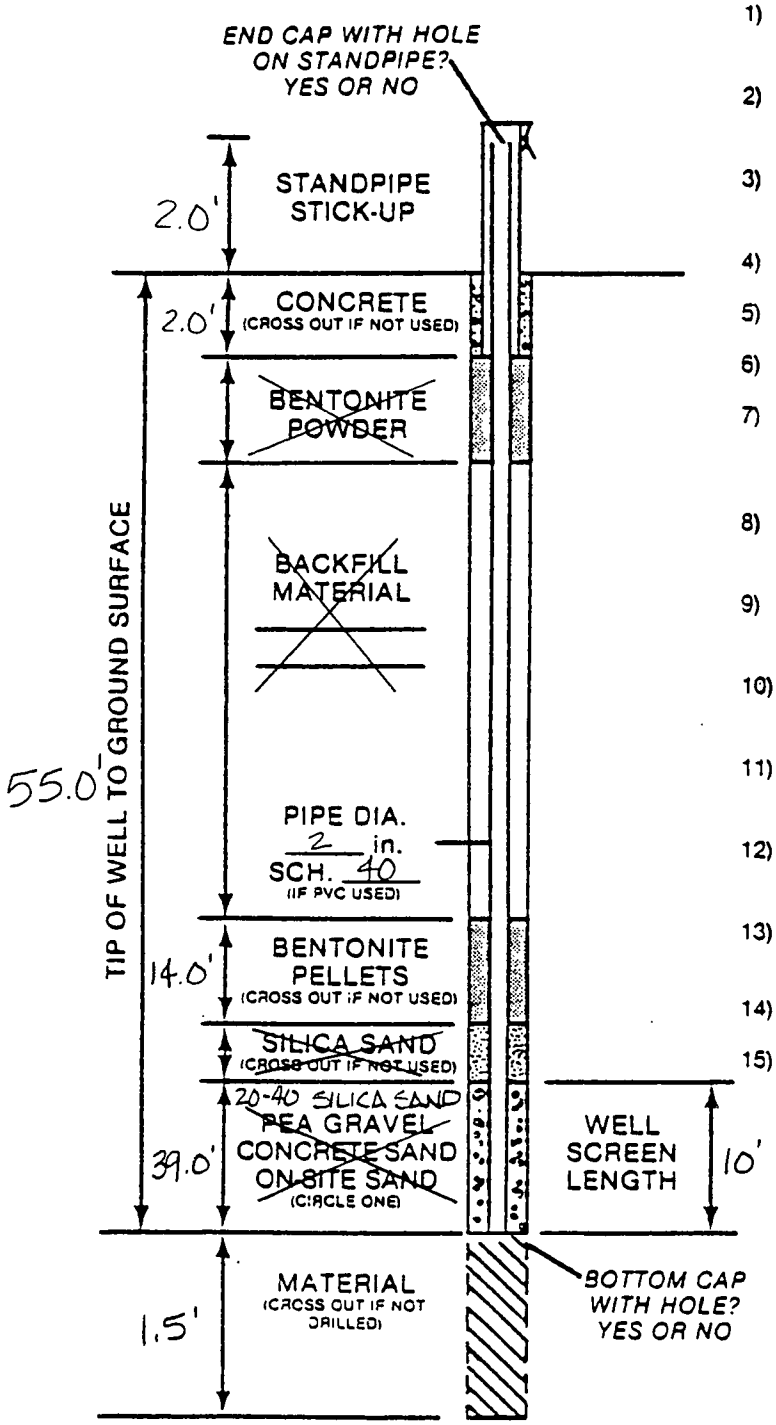
BORING STARTED	6-21-89
BORING COMPLETED	6-21-89
RIG	WI Test Drilling
FOREMAN	PD

STS OFFICE	540 Lambeau Street Green Bay, WI 54303
DRAWN BY	JJT
SHEET	2 OF 2
APP'D. BY	RAM
STS JOB NO.	16790A

BL: 5-983

STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



1) TYPE OF PIPE?
(PVC) GALVANIZED, STAINLESS, OTHER _____

2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, (THREADED) OTHER _____

3) TYPE OF WELL SCREEN
(PVC) GALVANIZED, STAINLESS, OTHER _____

4) SCREEN SIZE 0.01

5) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO

6) WAS SOLVENT USED? YES OR NO

7) WAS DRILLING MUD USED?
SOLID AUGER, (HOLLOW STEM AUGER), (WATER), REVERT, BENTONITE

8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR NO N/A

9) HOW WAS WELL DEVELOPED?
BAILING, (PUMPING), SURGING, COMPRESSED AIR

10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., 30 min., OTHER 1.4 hr

11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 140 gal

12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, (OPAQUE)

13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, (TURBID), OPAQUE

14) DID THE WATER SMELL? YES OR NO N/A

15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
9.0 Ft. or DRY

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. OW-104 DATE INSTALLED 6-22-89 DRILL RIG WI. TEST DRILL INC

DRILLER P.D. DRILL CREW _____

JOB/CLIENT CITY OF WAUSAU WASTEWATER TREATMENT PLANT EXPANSION STS JOB No. 16970 A

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: OW-105
PROJECT NAME: Wausau Wastewater Treatment Plant Expansion	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1172.53

SURFACE ELEVATION +1170.60

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					0.1' asphalt - 0.1-0.2' gravelly base course							
5	1	SS			Fill: White fine sand - moist - loose	4						
10	2	SS			Possible Fill: Dark brown silty fine to medium sand - wet - loose	3						
15	3	SS			Brown fine to medium sand (SP) - a little coarse sand - wet - medium dense - outwash	10						
20	4	SS			Brown fine to coarse sandy gravel (GP) - trace of silt - wet - medium dense - till	19						
25	5	SS			Brown medium to coarse sand (SP) - trace of fine sand - wet - medium dense - outwash	14						
30	6	SS			Brown fine to medium sand (SP) - a little coarse sand (28.0-43.0 feet) - wet - medium dense - outwash	4						
35	7	SS				21						
40	8	SS				22						
45					Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL			BCR		ACR
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

BORING STARTED	6-23-89
BORING COMPLETED	6-23-89
RIG	WI Test Drilling
FOREMAN	PD

STS OFFICE	540 Lambeau Street Green Bay, WI 54303
DRAWN BY	JJT
SHEET	1 OF 2
D. BY	RAM
STS JOB NO.	16970A

BL: 5-983

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: OW-105 Continued
PROJECT NAME: Wausau Wastewater Treatment Plant Expansion	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1172.53

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					SURFACE ELEVATION +1170.60							
46.5	9	SS			Brown fine to medium sand (SP)-a little coarse sand (28.0-43.0 feet)-wet-medium dense-outwash	33						
					End of Boring Boring advanced to 46.5 feet using roller bit and wash water 45.0 feet of HW casing used 2 inch PVC monitoring well installed at 44.4 feet							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL			BCR		ACR
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

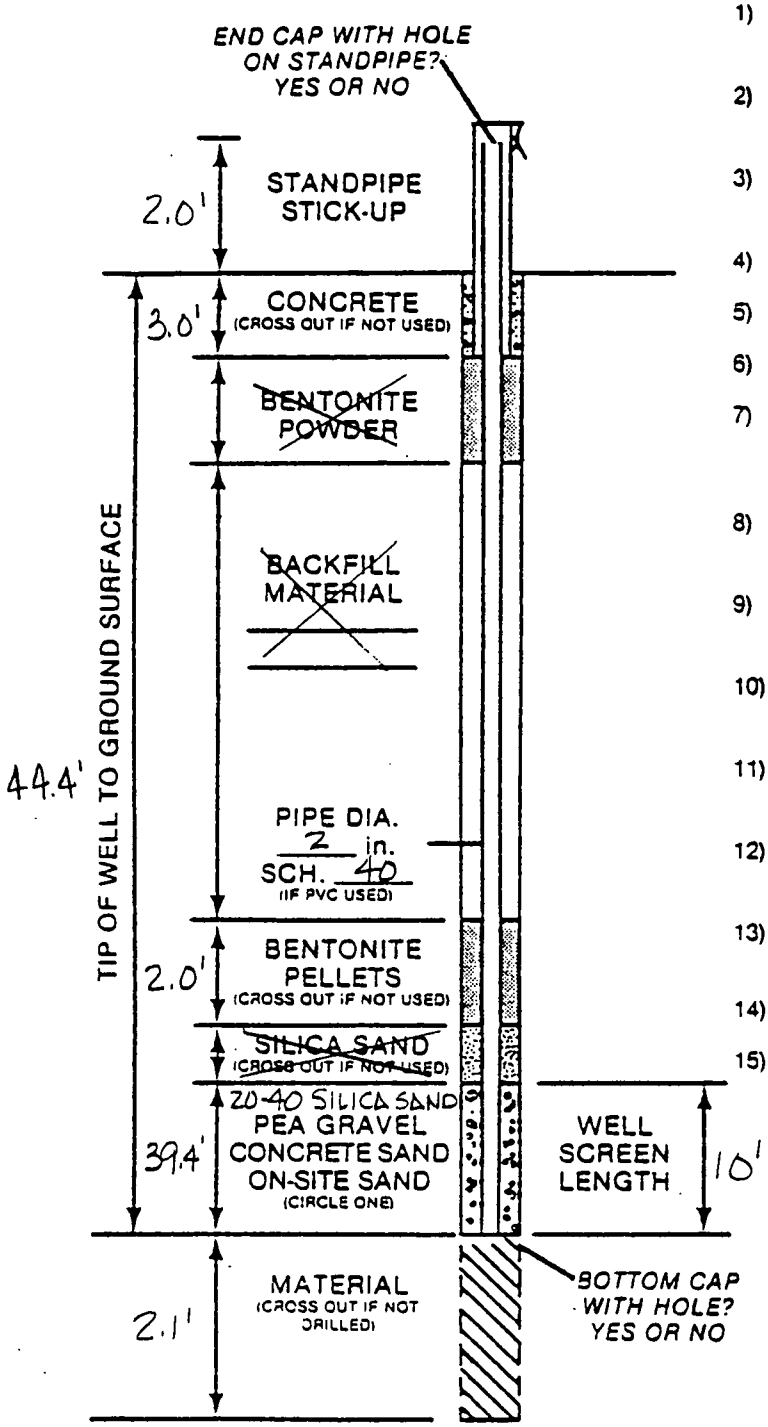
BORING STARTED	6-23-89
BORING COMPLETED	6-23-89
RIG	WI Test Drilling
FOREMAN	PD

STS OFFICE	540 Lambeau Street Green Bay, WI 54303
DRAWN BY	JJT
SHEET	2 OF 2
APP'D. BY	RAM
STS JOB NO.	16970A

BL: 5-983

STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



1) TYPE OF PIPE?
(PVC), GALVANIZED, STAINLESS, OTHER _____

2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, (THREADED), OTHER _____

3) TYPE OF WELL SCREEN
(PVC), GALVANIZED, STAINLESS, OTHER _____

4) SCREEN SIZE 0.010

5) INSTALLED PROTECTOR PIPE W/LOCK? (YES) OR NO

6) WAS SOLVENT USED? YES OR NO

7) WAS DRILLING MUD USED?
SOLID AUGER, HOLLOW STEM AUGER, (WATER), REVERT, BENTONITE

8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR NO N A

9) HOW WAS WELL DEVELOPED?
BAILING, (PUMPING), SURGING, COMPRESSED AIR

10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., 30 min., OTHER _____

11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 140 gal

12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, OPAQUE N/A

13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, TURBID, OPAQUE N/A

14) DID THE WATER SMELL? YES OR NO

15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
N/A Ft. or DRY

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. OW-105 DATE INSTALLED 6-23-89 DRILL RIG WI. TEST DRILL INC.

DRILLER P.D. DRILL CREW _____

JOB/CLIENT CITY OF WALSALL WASTE WATER TREATMENT PLANT EXPANSION STS JOB No. 16970A

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: OW-106
PROJECT NAME: Wausau Wastewater Treatment Plant Expansion	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1166.43

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
SURFACE ELEVATION					0.1' asphalt - 0.1' gravelly base course							
	1	SS				34						
	2	SS			Fill: White fine sand - moist - loose to dense	9						
5	3	SS				12						
	3A	SS			Possible fill: Brown fine to medium sand, trace of gravel - moist - medium dense							
	4	SS				4						
					Grayish black organic silt (OL) - trace of fine to coarse sand, trace of gravel - wet - loose							
10	5	SS			Brown fine to coarse sandy gravel (GP) - trace of silt - wet - dense - till	31						
	6	SS				56						
15												
16.5	7	SS				40						
					End of Boring Boring advanced to 16.5 feet using hollow stem auger 2 inch PVC monitoring well installed at 16.5 feet							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL		BCR			6.3' ACR
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

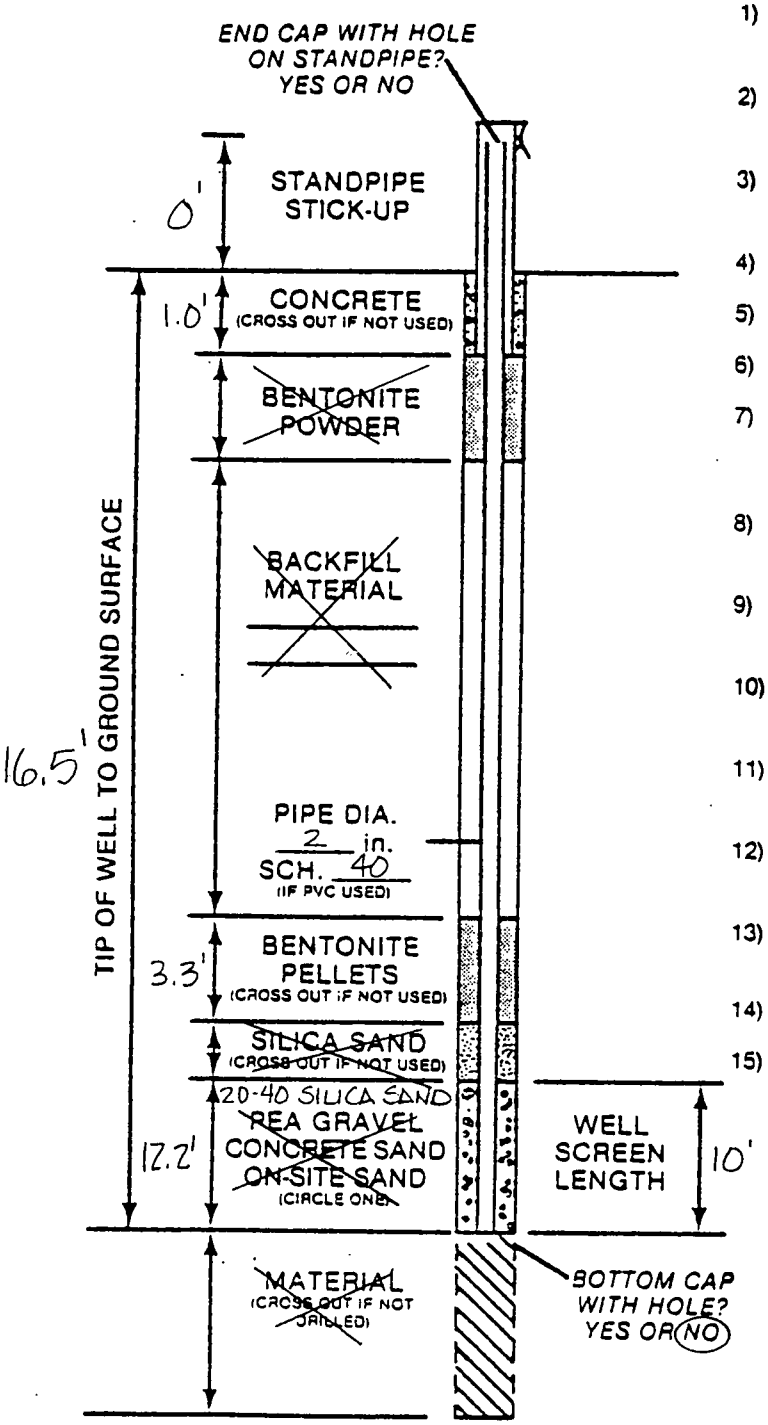
BORING STARTED	6-22-89
BORING COMPLETED	6-22-89
RIG	WI Test Drilling
FOREMAN	PD

STS OFFICE	540 Lambeau Street Green Bay, WI 54303
DRAWN BY	JJT
SHEET	1 OF 1
APP'D. BY	RAM
STS JOB NO.	16970A

BL: 5-983

STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



1) TYPE OF PIPE?
(PVC), GALVANIZED, STAINLESS, OTHER _____

2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, (THREADED), OTHER _____

3) TYPE OF WELL SCREEN
(PVC), GALVANIZED, STAINLESS, OTHER _____

4) SCREEN SIZE 0.01

5) INSTALLED PROTECTOR PIPE ~~W/LOCK~~? (YES) OR NO

6) WAS SOLVENT USED? YES OR (NO)

7) WAS DRILLING MUD USED? NO
SOLID AUGER, (HOLLOW STEM AUGER),
WATER, REVERT, BENTONITE

8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR NO N/A

9) HOW WAS WELL DEVELOPED?
BAILING, (PUMPING), SURGING, COMPRESSED AIR

10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., 30 min., OTHER 1 hr

11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 15 gal

12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, (TURBID), OPAQUE

13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, (TURBID), OPAQUE

14) DID THE WATER SMELL? YES OR NO

15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
6.5' Ft. or DRY

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. OW-106 DATE INSTALLED 6-22-89 DRILL RIG WI. TEST DRILL INC.

DRILLER P.D. DRILL CREW _____

JOB/CLIENT CITY OF WAUSAU WASTE WATER TREATMENT PLANT EXPANSION STS JOB No. 16970A

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: OW-107
PROJECT NAME: Wausau Wastewater Treatment Plant Expansion	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau, Wisconsin	

WELL INSTALLATION TOP STANDPIPE EL. + 1169.40

SURFACE ELEVATION 1167.40

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					2" topsoil							
5	1	SS			Possible fill: White to light brown fine to medium sand - dry - medium dense	16						
10	2	SS			Fill: Brown fine to medium sand (SP) a little gravel - trace of silt - wet - medium dense	23						
15	3	SS			Fill: White brown and black mottled fine to medium sand (SP) a little gravel - trace of brick fragments - wet - very dense	20						
20	4	SS			Brown fine to coarse sand (SP) - trace of gravel - wet - dense - outwash	37						
25	5	SS				10						
30	6	SS		LS	Brown medium sand (SP) - trace of coarse sand (34.0-43.0 feet) - trace of gravel (38.0-43.0 feet) - wet - medium dense - outwash	12						
35	7	SS				23						
40	8	SS				24						
45					Brown medium sand (SP) - trace of fine sand - wet - medium dense							
					Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL		BCR		10.7' ACR	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

BORING STARTED	6-23-89	STS OFFICE	540 Lambeau Street Green Bay, WI 54303
BORING COMPLETED	6-23-89	DRAWN BY JJT	SHEET 1 OF 2
RIG	WI Test Drilling		
FOREMAN	MM	APP'D. BY RAM	STS JOB NO. 16970A

BL: 5-983

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: OW-107 Continued
PROJECT NAME: Wausau Wastewater Treatment Plant Expansion	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1169.40

SURFACE ELEVATION 1167.40

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
	9	SS				29						
50	10	SS			Brown medium sand (SP) - trace of fine sand - wet - medium dense outwash	23						
55	11	SS		LS		10						
60	12	SS		LS		18						
65	13	SS			Gray silty clay (CL) - trace of fine sand - wet - hard - till	55						
70	14	SS			Grayish brown fine to coarse sandy silty gravel (GM) - wet - extremely dense - till	103						
75	15	SS			Reddish brown medium to coarse sand (SP-SM) - a little gravel - extremely dense - till	99						
80	16	SS				108						
83.5					End of Boring Boring advanced to 20.0 feet using hollow stem auger Boring advanced from 20.0 to 83.5 feet using roller bit and wash water							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL		BCR		10.7'	ACR
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

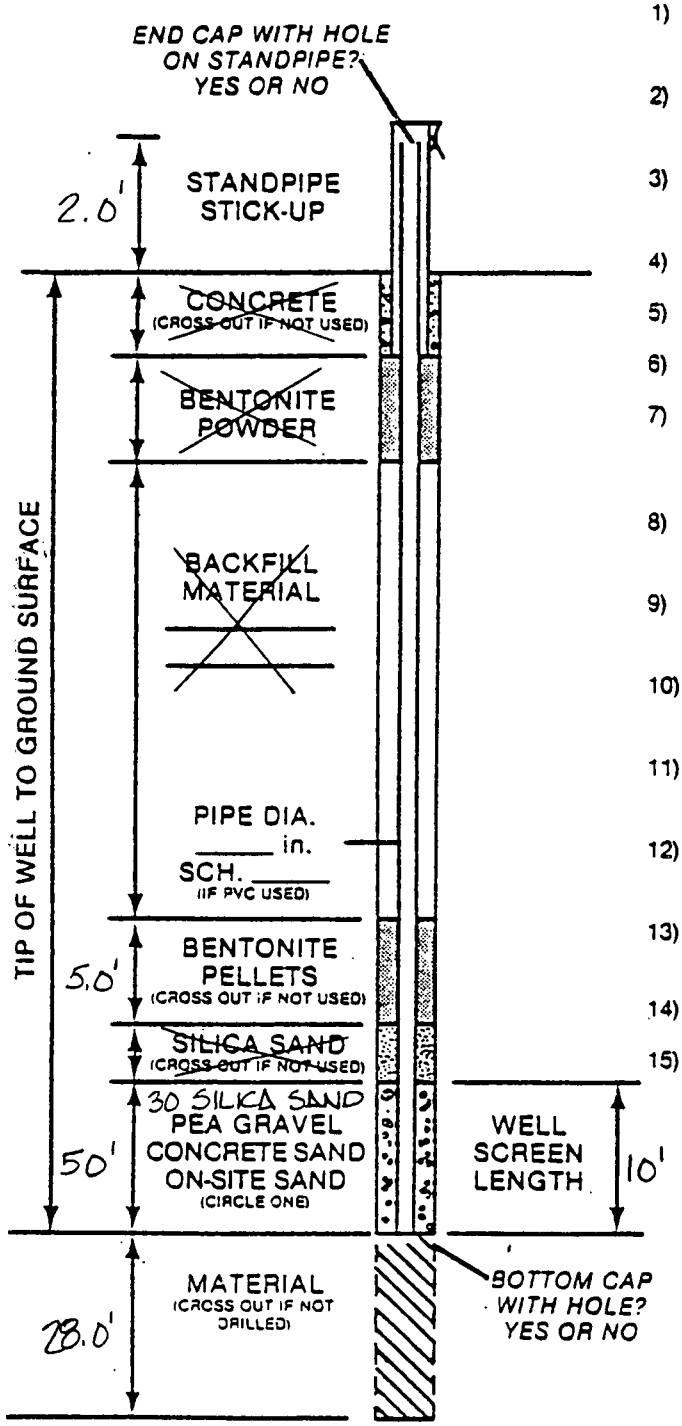
BORING STARTED	6-23-89
BORING COMPLETED	6-23-89
RIG	WI Test Drilling
FOREMAN	MM

STS OFFICE	540 Lambeau Street Green Bay, WI 54303
DRAWN BY	JJT
SHEET	2 OF 2
APP'D. BY	RAM
STS JOB NO.	16970A

BL: 5-983

STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



1) TYPE OF PIPE?
(PVC,) GALVANIZED, STAINLESS, OTHER _____

2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, (THREADED,) OTHER _____

3) TYPE OF WELL SCREEN
(PVC,) GALVANIZED, STAINLESS, OTHER _____

4) SCREEN SIZE 0.01

5) INSTALLED PROTECTOR PIPE W/LOCK? (YES) OR NO

6) WAS SOLVENT USED? YES OR (NO)

7) WAS DRILLING MUD USED?
SOLID AUGER, (HOLLOW STEM AUGER,) (WATER,) REVERT, BENTONITE

8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR NO N/A

9) HOW WAS WELL DEVELOPED?
BAILING, (PUMPING,) SURGING, COMPRESSED AIR

10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., 30 min., OTHER 1 hr

11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 140 gal

12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, (TURBID,) OPAQUE

13) WATER CLARITY AFTER DEVELOPMENT?
(CLEAR,) TURBID, OPAQUE

14) DID THE WATER SMELL? YES OR NO N/A

15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
10.6 Ft. or DRY

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. OW-107 DATE INSTALLED 6-23-89 DRILL RIG WI. TEST DRILL INC.

DRILLER D.Z. DRILL CREW _____

JOB/CLIENT CITY OF WALSALL WASTE WATER TREATMENT PLANT STS JOB No. 16970A

STS Consultants Ltd.

OWNER City of Wausau	**LOG OF BORING NUMBER** OW-108
PROJECT NAME Wausau Wastewater Treatment Plant Expansion	**ENGINEER** Becher-Hoppe, Inc.
SITE LOCATION Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1171.68

SURFACE ELEVATION +1169.82

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					Topsoil							
	1	SS			Fill: Black fine to coarse sandy silt - trace of glass, trace of wood, trace of gravel (4.5-7.0 feet) -	2						
5	2	SS				3						
	3	SS			Fill: Black fine to coarse sandy silty clay - trace of gravel, trace of glass fragments - petroleum odor	8						
10	4	SS			Fill: Mottled black and brown fine to coarse sand, trace of silt, trace of gravel, trace of rubber fragments - wet - loose	9						
	5	SS			Fill: Black fine to coarse sandy gravel - trace of organics, trace of glass fragments - wet - loose	9						
15	6	SS			Fill: Mottled black and brown silty gravelly sand - a little organics - trace of metal and rubber fragments - wet - medium dense	10						
19					End of Boring Boring advanced to 19.0 feet using hollow stem auger 2 inch PVC monitoring well installed at 18.0 feet							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

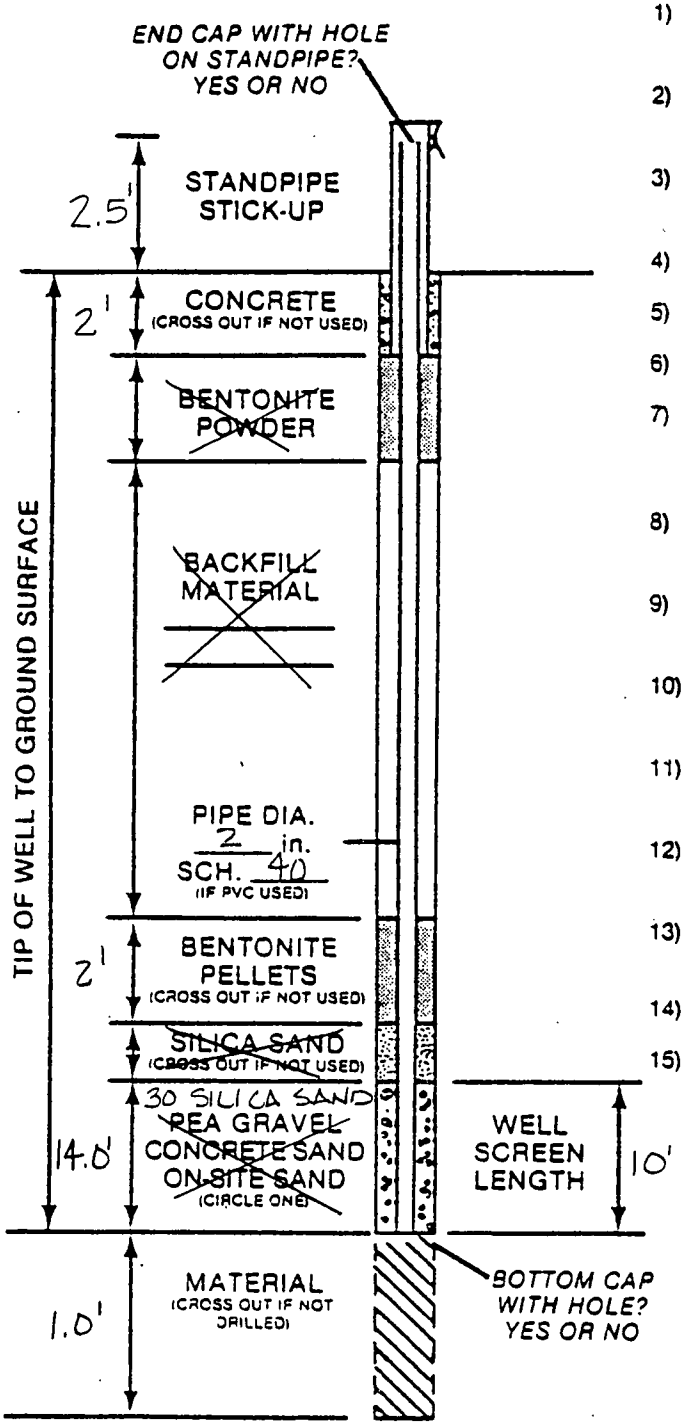
WL			BCR			8.5' ACR
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	

BORING STARTED	6-24-89	STS OFFICE	540 Lambeau Street
BORING COMPLETED	6-24-89	DRAWN BY	JJT
RIG	WI Test Drilling	SHEET	1 OF 1
FOREMAN	MK	APP'D. BY	RAM
		STS JOB NO.	16970A

BL: 5-983

STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



1) TYPE OF PIPE?
(PVC) GALVANIZED, STAINLESS, OTHER _____

2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, (THREADED) OTHER _____

3) TYPE OF WELL SCREEN
(PVC) GALVANIZED, STAINLESS, OTHER _____

4) SCREEN SIZE 0.01

5) INSTALLED PROTECTOR PIPE W/LOCK? (YES) OR NO

6) WAS SOLVENT USED? YES OR (NO)

7) WAS DRILLING MUD USED? No
SOLID AUGER, (HOLLOW STEM AUGER)
WATER, REVERT, BENTONITE

8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR NO N/A

9) HOW WAS WELL DEVELOPED?
BAILING, (PUMPING) SURGING, COMPRESSED AIR

10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., 30 min., OTHER 1 hr.

11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 15 gal.

12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, (OPAQUE)

13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, TURBID, (OPAQUE)

14) DID THE WATER SMELL? YES OR NO

15) WATER LEVEL SUMMARY N/A

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
17.4 Ft. or DRY

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. OW-108 DATE INSTALLED 6-24-89 DRILL RIG WI. TEST DRILL INC.

DRILLER D.Z. DRILL CREW _____

JOB/CLIENT CITY OF WAUSAU WASTE WATER TREATMENT PLANT EXPANSION STS JOB No. 16970A

STS Consultants Ltd.

OWNER	LOG OF BORING NUMBER
City of Wausau	OW-109
PROJECT NAME	**ENGINEER**
Wausau Wastewater Treatment Plant Expansion	Becher-Hoppe, Inc.

SITE LOCATION Wausau, Wisconsin

WELL INSTALLATION
TOP STANDPIPE EL. + 1170.70

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					SURFACE ELEVATION							
					Asphalt							
	1	SS			Fill: White to light brown fine sand - wet at 4.5 feet - medium dense	24						
5	2	SS				16						
	3	SS			Dark brown fine to medium sand (SM) - some organic silt - moist - loose - alluvium	3						
10	4	SS			Dark brown silty fine sand (SM) - wet - loose - alluvium	2						
	5	SS				2						
15	6	SS			Brown fine to coarse sandy gravel (GP) - trace of silt - wet - loose to dense - till	31						
19					End of Boring Boring advanced to 19.0 feet using hollow stem auger 2 inch PVC monitoring well installed at 18.1 feet							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL		BCR		9.0'	ACR
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

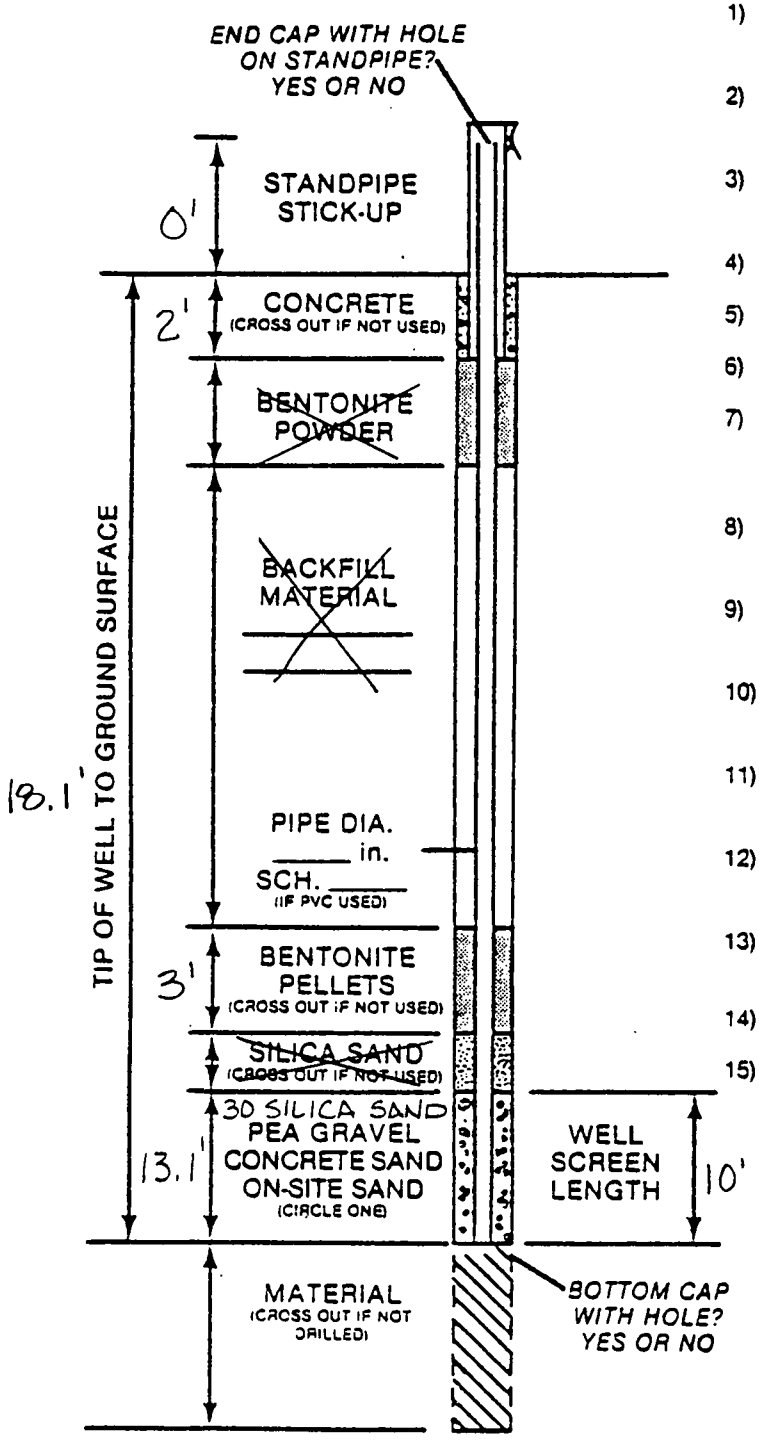
BORING STARTED	6-24-89
BORING COMPLETED	6-24-89
RIG	WI Test Drilling
FOREMAN	MK

STS OFFICE	540 Lambeau Street Green Bay, WI 54303
DRAWN BY	JJT
SHEET	1 OF 1
APP'D. BY	RAM
STS JOB NO.	16970A

BL: 5-983

STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



1) TYPE OF PIPE?
(PVC), GALVANIZED, STAINLESS, OTHER _____

2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, (THREADED), OTHER _____

3) TYPE OF WELL SCREEN
(PVC), GALVANIZED, STAINLESS, OTHER _____

4) SCREEN SIZE 0.01

5) INSTALLED PROTECTOR PIPE ~~W/LOCK~~? (YES) OR NO

6) WAS SOLVENT USED? YES OR (NO)

7) WAS DRILLING MUD USED?
SOLID AUGER, (HOLLOW STEM AUGER)
WATER, REVERT, BENTONITE

8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR NO N/A

9) HOW WAS WELL DEVELOPED?
BAILING, (PUMPING), SURGING, COMPRESSED AIR

10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., 30 min., OTHER 1 hr

11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 70 gal.

12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, (OPAQUE)

13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, (TURBID), OPAQUE

14) DID THE WATER SMELL? YES OR NO N/A

15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
10.7 Ft. or DRY

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. OW-109 DATE INSTALLED 6-24-89 DRILL RIG WI. TEST DRILL INC.

DRILLER D.Z. DRILL CREW _____

JOB/CLIENT CITY OF WAUSAU WASTE WATER TREATMENT PLANT EXPANSION STS JOB No. 16970A

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: OW-110
PROJECT NAME: Wausau Wastewater Treatment Plant Expansion	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1172.21

SURFACE ELEVATION +1170.32

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
	1	SS			Fill: Dark brown silty medium to coarse sand - trace of glass, cinders and brick - moist - wet at 6.5 feet - very loose to medium dense	16						
5	2	SS				4						
	3	SS				3						
10	4	SS			Fill: Dark brown silty medium to coarse sand - some organics - loose -	5						
13	5	SS				7						
18.6					End of Boring Boring advanced to 18.6 feet using hollow stem auger 2 inch PVC monitoring well installed at 18.6 feet							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

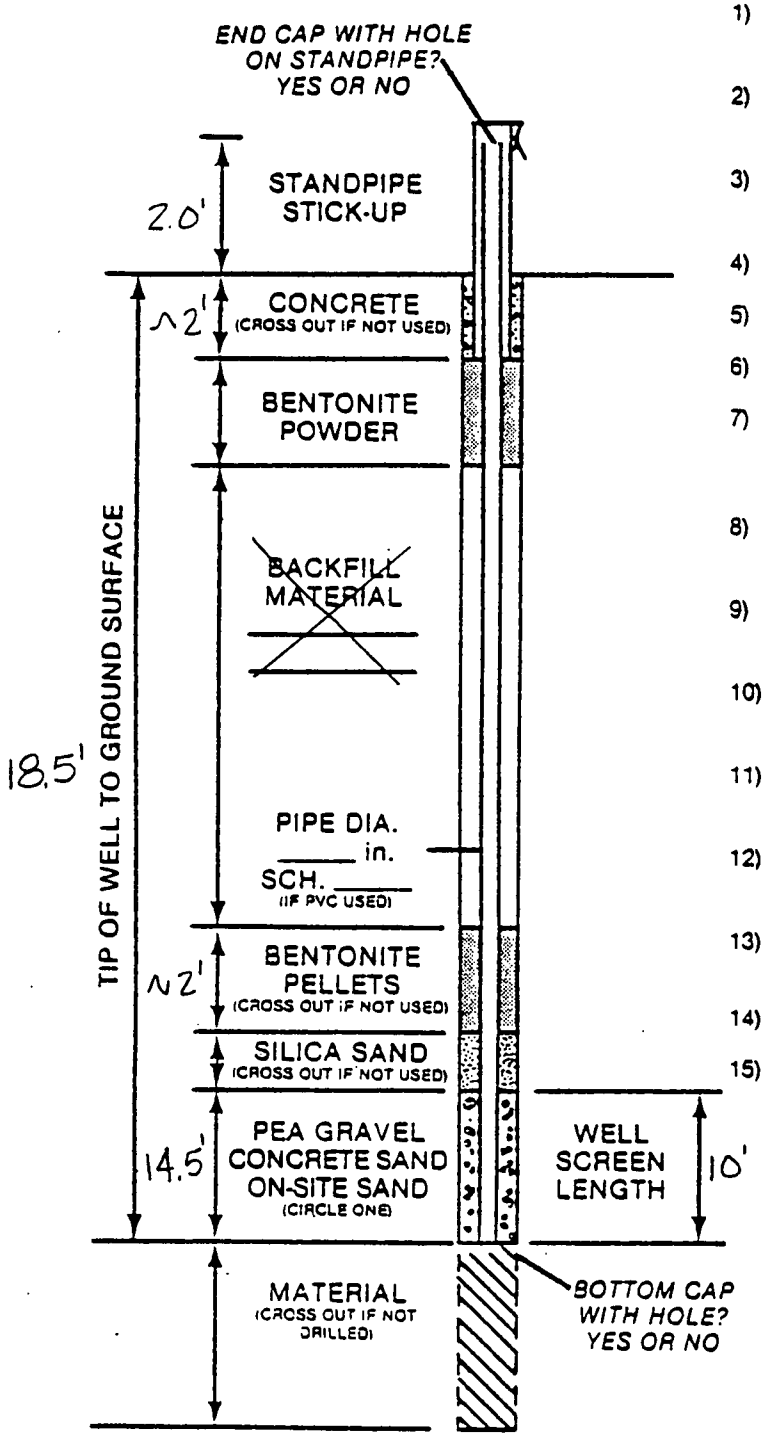
WL	BCR		8.0' ACR		
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

BORING STARTED 6-24-89	STS OFFICE 540 Lambeau Street, Green Bay, WI 54303
BORING COMPLETED 6-24-89	DRAWN BY JJT / SHEET 1 OF 1
RIG WI Test Drilling	APP'D. BY RAM / STS JOB NO. 16970A
FOREMAN CB	

BL: 5-983

STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



1) TYPE OF PIPE?
(PVC) GALVANIZED, STAINLESS, OTHER ____

2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, (THREADED), OTHER ____

3) TYPE OF WELL SCREEN
(PVC), GALVANIZED, STAINLESS, OTHER ____

4) SCREEN SIZE 0.01

5) INSTALLED PROTECTOR PIPE W/LOCK? (YES) OR NO

6) WAS SOLVENT USED? YES OR (NO)

7) WAS DRILLING MUD USED?
SOLID AUGER, (HOLLOW STEM AUGER)
WATER, REVERT, BENTONITE

8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR NO N/A

9) HOW WAS WELL DEVELOPED?
BAILING, (PUMPING), SURGING; COMPRESSED AIR

10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., 30 min., OTHER 1 hr

11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 15 gal.

12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, (OPAQUE)

13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, TURBID, (OPAQUE)

14) DID THE WATER SMELL? YES OR NO N/A

15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
17.0 Ft. or DRY

2) OTHER MEASUREMENTS:

DATE ____, ____ Ft. FROM T, ST. PIPE

DATE ____, ____ Ft. FROM T, ST. PIPE

DATE ____, ____ Ft. FROM T, ST. PIPE

DATE ____, ____ Ft. FROM T, ST. PIPE

Well No. OW-110 DATE INSTALLED 6-24-89 DRILL RIG WI. TEST DRILL INC.

DRILLER C.B. DRILL CREW ____

JOB/CLIENT CITY OF WAUSAU WASTE WATER TREATMENT PLANT EXPANSION STS JOB No. 16970A

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR BECHER-HOPPE WWTP

LOCATION Wausau, WI Elev.

Job No. 1823

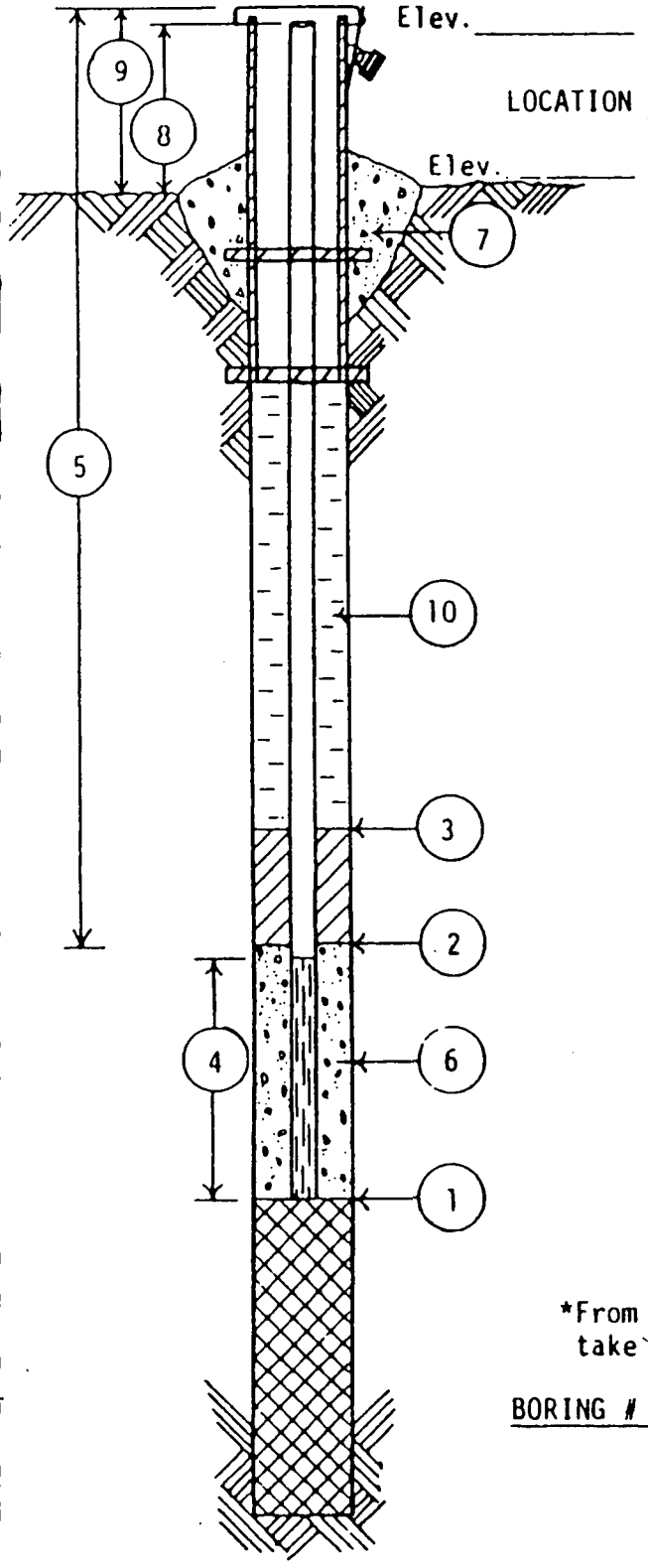
Boring No. OW-111

GROUND WATER	While drilling	9.0'	Time after drilling		
	Before casing removal		Depth to water	6.0'	
	After casing removal		Depth to cave-in		

Start 7-22-89
Unit B-45
Chief C.B.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe / Weight / Drop	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						TOPSOIL						4¼ HSA
						Rd. Brn. Fine SAND						
						Hit Some M-Gravel						
						F-M Brn. SAND w/F-C Gravels						
						E.O.B. @ 16.0' Well Set @ 9.0'						

WELL DETAIL INFORMATION SHEET



JOB NO. 1823

BORING NO. OW-111

DATE 7-20-89

CHIEF C.B.

LOCATION WWTP Wausau, WI

All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.

(1) DEPTH TO BOTTOM OF WELL POINT OR SLOTTED PIPE 9.0 FEET.

(2) DEPTH OF BOTTOM OF SEAL (if installed) 3.0 FEET.

(3) DEPTH TO TOP OF SEAL (if installed) 1.5 FEET.

(4) LENGTH OF WELL POINT, (PVC WELL SCREEN) OR SLOTTED PIPE 5.0 FEET. (Circle One)

(5) TOTAL LENGTH OF PIPE 3.5 FEET @ 2 IN. DIAMETER.

(6) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE #30 Flint Sand.

(7) CONCRETE CAP, (YES) NO (Circle One)

(8) HEIGHT OF WELL CASING BELOW GROUND 0.5 FEET.

(9) PROTECTIVE CASING? (YES) NO (Circle One)
HEIGHT ABOVE GROUND Flush Mount.
LOCKING CAP? (YES) NO (Circle One)

(10) TYPE OF BACKFILL: Hole Plug

WATER LEVEL CHECKS

*From top of casing, if protective casing higher, take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS

WISCONSIN TEST DRILLING

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR BECHER-HOPPE WWTP

LOCATION Wausau, WI Elev.

Job No. 1823

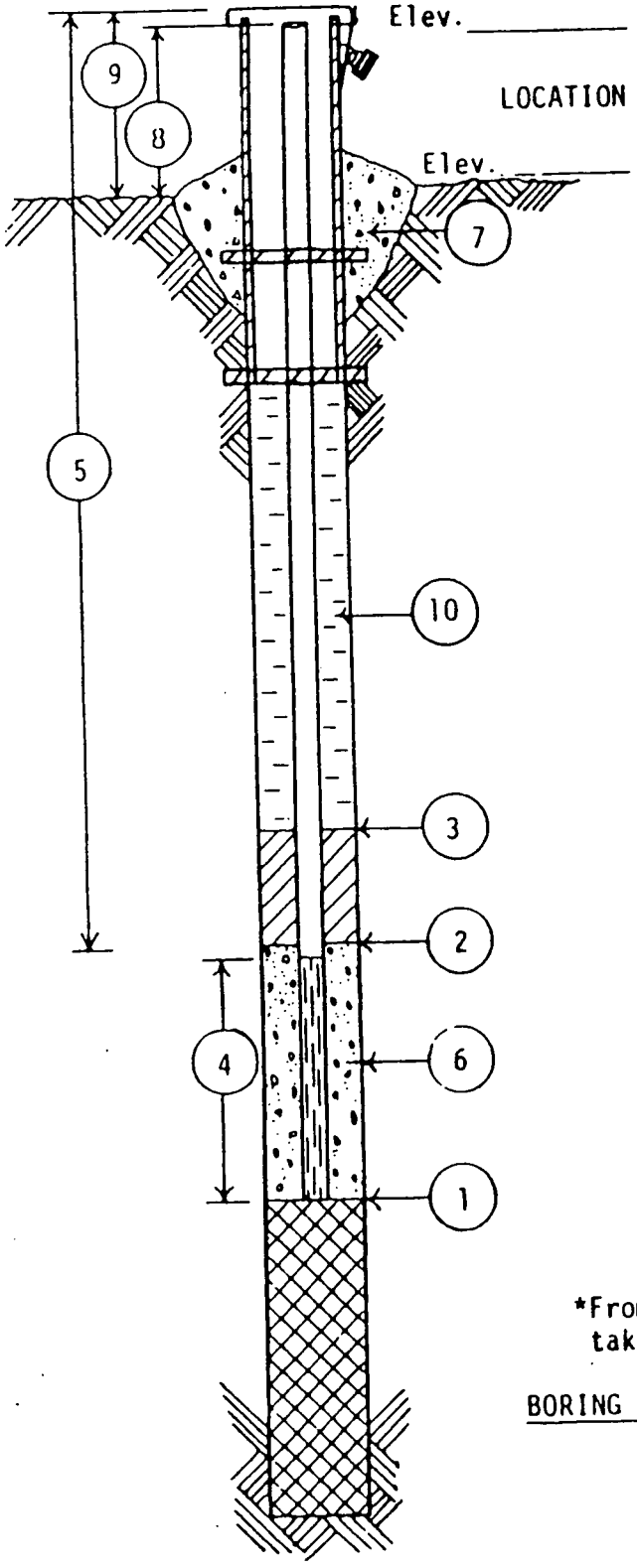
Boring No. OW-112

GROUND WATER	While drilling		Time after drilling	
	Before casing removal		Depth to water	6.6'
	After casing removal		Depth to cave-in	

Start 7-20-89
Unit B-45
Chief C.B.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe / Weight / Drop	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						TOPSOIL						4¼ HSA
						Rd. Brn. Fine SAND						
						F-C Gravel Layer						
						E.O.B. @ 11.6'						
						Well Set @ 9.6'						

WELL DETAIL INFORMATION SHEET



JOB NO. 1823

BORING NO. OW-112

DATE 7-20-89

CHIEF C.B.

LOCATION WWTP Wausau, WI

All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.

(1) DEPTH TO BOTTOM OF WELL POINT OR SLOTTED PIPE 9.6 FEET.

(2) DEPTH OF BOTTOM OF SEAL (if installed) 3.0 FEET.

(3) DEPTH TO TOP OF SEAL (if installed) 2.0 FEET.

(4) LENGTH OF WELL POINT, (PVC WELL SCREEN) OR SLOTTED PIPE 5.0 FEET. (Circle One)

(5) TOTAL LENGTH OF PIPE 4.1 FEET @ 2 IN. DIAMETER.

(6) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE #30 Flint Sand.

(7) CONCRETE CAP, (YES) NO (Circle One)

(8) HEIGHT OF WELL CASING ~~ABOVE~~ BELOW GROUND 0.5 FEET.

(9) PROTECTIVE CASING? (YES) NO (Circle One)
HEIGHT ABOVE GROUND Flush Mount.
LOCKING CAP? (YES) NO (Circle One)

(10) TYPE OF BACKFILL: Hole Plug

WATER LEVEL CHECKS

*From top of casing, if protective casing higher, take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS

WISCONSIN TEST DRILLING

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR BECHER-HOPPE WWTP

LOCATION Wausau, WI Elev.

Job No. 1823

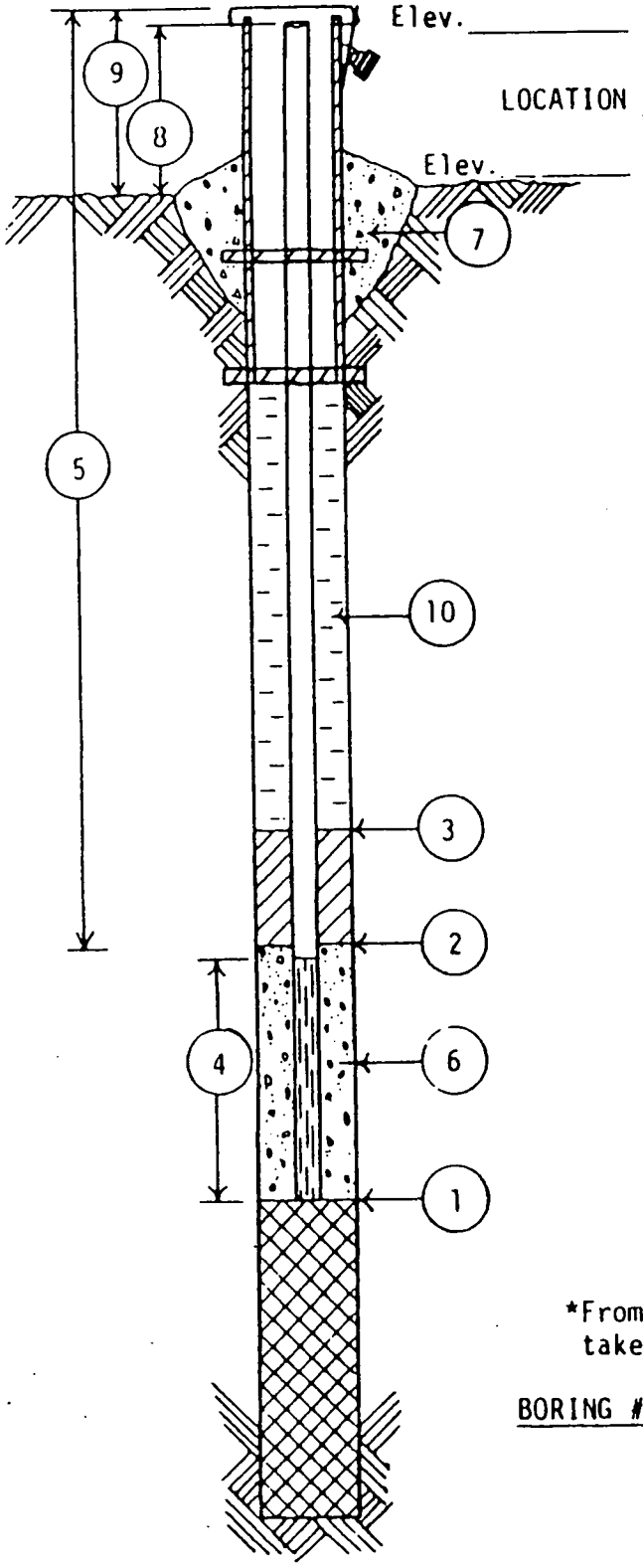
Boring No. OW-113

GROUND WATER	While drilling	10.0'	Time after drilling		Start 7-20-89
	Before casing removal		Depth to water		Unit B-45
	After casing removal		Depth to cave-in	10.3'	Chief C.B.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight Drop	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						Rotten GRANITE						4¼ HSA
						F-C Brn. SAND						
						F-C Brn. SAND w/F-C Gravels & Cobbles						
						E.O.B. @ 14.0' Well Set @ 13.4'						

5 10 15 20 25 30 35 40 45 50

WELL DETAIL INFORMATION SHEET



JOB NO. 1823

BORING NO. OW-113

DATE 7-20-89

CHIEF C.B.

LOCATION WWTP Wausau, WI

All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.

(1) DEPTH TO BOTTOM OF WELL POINT OR SLOTTED PIPE 13.4 FEET.

(2) DEPTH OF BOTTOM OF SEAL (if installed) 3.0 FEET.

(3) DEPTH TO TOP OF SEAL (if installed) 2.0 FEET.

(4) LENGTH OF WELL POINT, (PVC WELL SCREEN) OR SLOTTED PIPE 5.0 FEET. (Circle One)

(5) TOTAL LENGTH OF PIPE 7.9 FEET @ 2 IN. DIAMETER.

(6) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE #30 Flint Sand.

(7) CONCRETE CAP, (YES) NO (Circle One)

(8) HEIGHT OF WELL CASING ~~ABOVE~~ BELOW GROUND 0.5 FEET.

(9) PROTECTIVE CASING? (YES) NO (Circle One)
HEIGHT ABOVE GROUND Flush Mount.
LOCKING CAP? (YES) NO (Circle One)

(10) TYPE OF BACKFILL: Hole Plug

WATER LEVEL CHECKS

*From top of casing, if protective casing higher, take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS

WISCONSIN TEST DRILLING

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR BECHER-HOPPE WWTP

LOCATION Wausau, WI Elev.

Job No. 1823

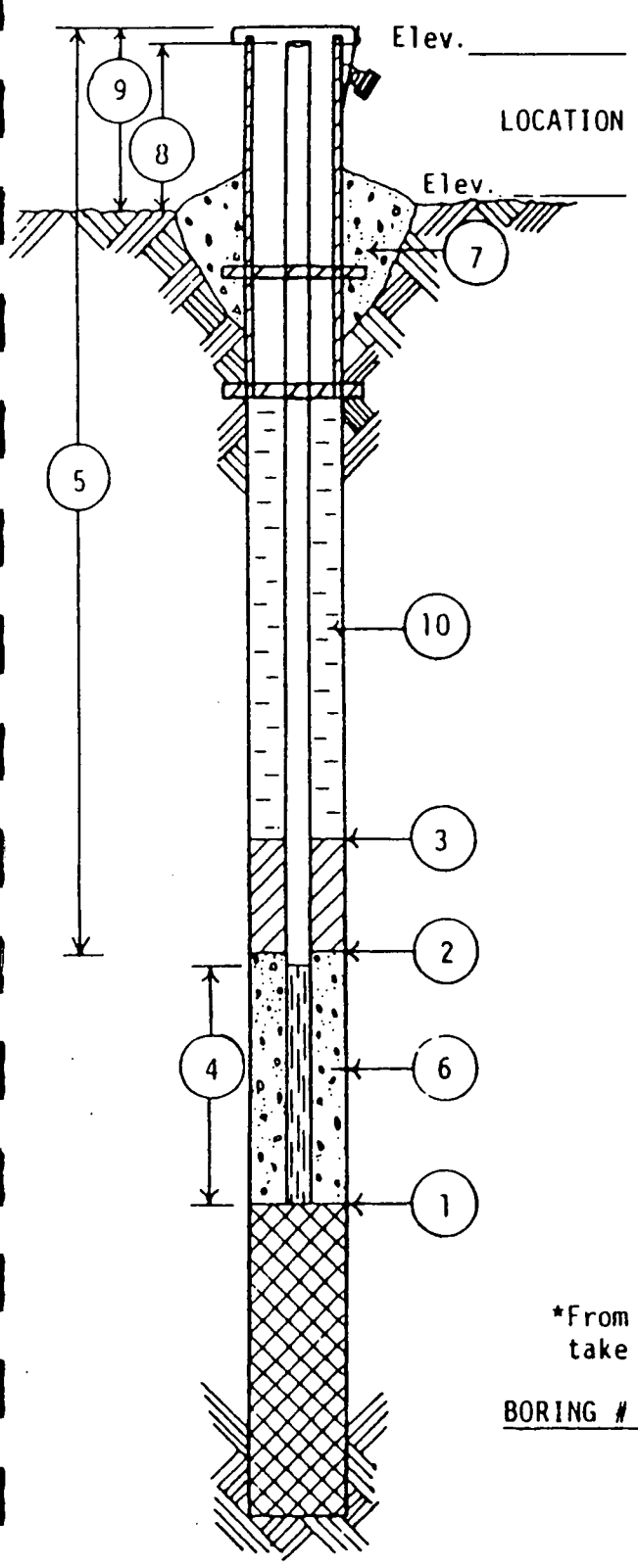
Boring No. OW-114

GROUND WATER: While drilling 11.0' | Before casing removal | After casing removal | Time after drilling | Depth to water | Depth to cave-in

Start 7-20-89
Unit B-45
Chief C.B.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe / Weight / Drop	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						Brn. F-M SAND						4¼ HSA
						Rd. Brn. F-SAND						
						F-C GRAVEL w/Cobbles						
						10.0'						
						Lt. Brn. F-M SAND, Trc. Gravel						
						E.O.B. @ 15.6'						
						Well Set @ 14.5'						

WELL DETAIL INFORMATION SHEET



JOB NO. 1823

BORING NO. OW-114

DATE 7-20-89

CHIEF C.B.

LOCATION WWTP Wausau, WI

All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.

(1) DEPTH TO BOTTOM OF WELL POINT OR SLOTTED PIPE 14.5 FEET.

(2) DEPTH OF BOTTOM OF SEAL (if installed) 4.2 FEET.

(3) DEPTH TO TOP OF SEAL (if installed) 1.5 FEET.

(4) LENGTH OF WELL POINT, (PVC WELL SCREEN) OR SLOTTED PIPE 5.0 FEET. (Circle One)

(5) TOTAL LENGTH OF PIPE 9.0 FEET @ 2 IN. DIAMETER.

(6) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE #30 Flint Sand.

(7) CONCRETE CAP, (YES) NO (Circle One)

(8) HEIGHT OF WELL CASING ~~ABOVE~~ BELOW GROUND 0.5 FEET.

(9) PROTECTIVE CASING? (YES) NO (Circle One)
HEIGHT ABOVE GROUND Flush Mount.
LOCKING CAP? (YES) NO (Circle One)

(10) TYPE OF BACKFILL: Hole Plug

WATER LEVEL CHECKS

*From top of casing, if protective casing higher, take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS

WISCONSIN TEST DRILLING

WISCONSIN TEST DRILLING, INC. — **FIELD BORING LOG**

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR BECHER-HOPPE WWTP

LOCATION Wausau, WI Elev.

Job No. 1823

Boring No. OW-115

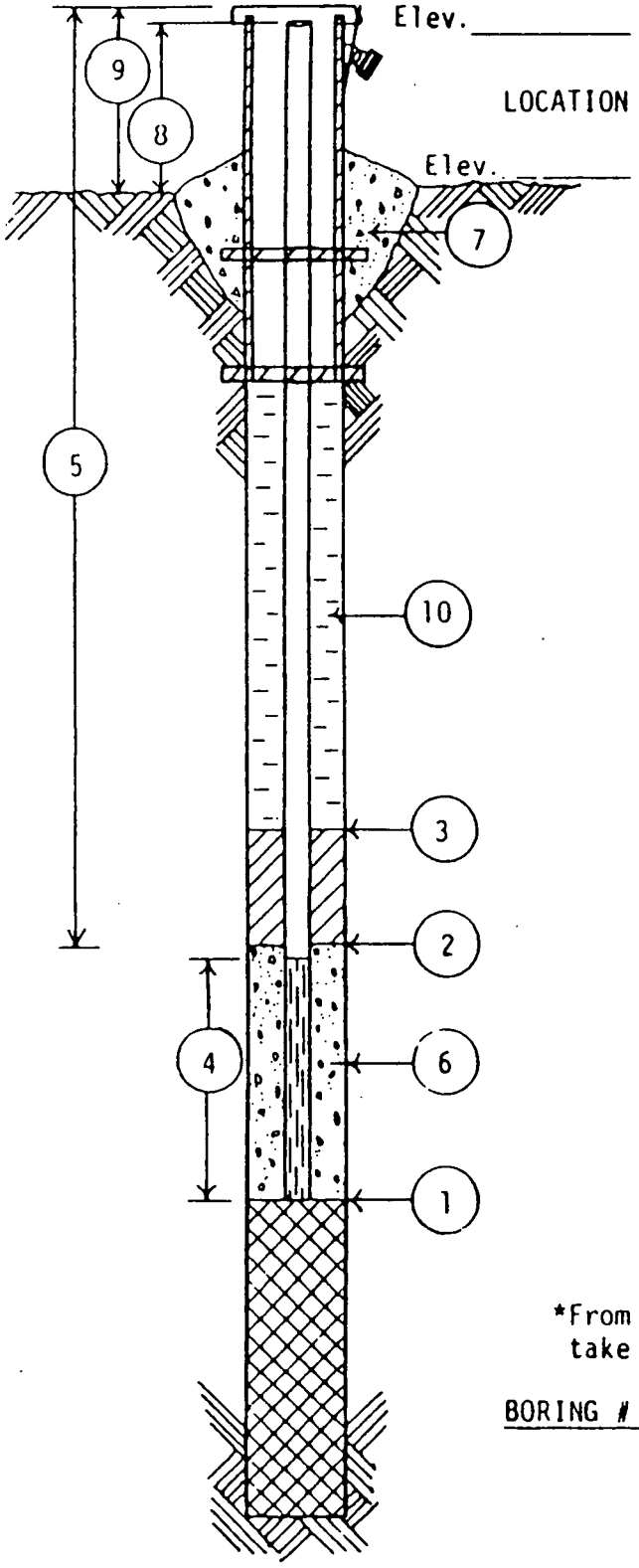
GROUND WATER	While drilling		Time after drilling	½ hr.	
	Before casing removal		Depth to water	11.2'	
	After casing removal		Depth to cave-in		

Start 7-21-89
Unit 805
Chief L.E.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight Drop	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						TOPSOIL 0.6' Dk. Brn. Silty SAND						4¼ HSA
						Rd. To Brn. M-F SAND w/Gravel, Trc. Cobbles						
						E.O.B. @ 18.0' Well Set @ 14.6'						

5 10 15 20 25 30 35 40 45 50

WELL DETAIL INFORMATION SHEET



JOB NO. 1823

BORING NO. OW-115

DATE 7-21-89

CHIEF L.E.

LOCATION WWTP Wausau, WI

All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.

(1) DEPTH TO BOTTOM OF WELL POINT OR SLOTTED PIPE 14.6 FEET.

(2) DEPTH OF BOTTOM OF SEAL (if installed) 6.5 FEET.

(3) DEPTH TO TOP OF SEAL (if installed) 1.0 FEET.

(4) LENGTH OF WELL POINT, (PVC WELL SCREEN) OR SLOTTED PIPE 5.0 FEET. (Circle One)

(5) TOTAL LENGTH OF PIPE 11.6 FEET @ 2 IN. DIAMETER.

(6) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE #30 Flint Sand .

(7) CONCRETE CAP, (YES) NO (Circle One)

(8) HEIGHT OF WELL CASING ABOVE GROUND 2.0 FEET.

(9) PROTECTIVE CASING? (YES) NO (Circle One)
HEIGHT ABOVE GROUND 2.1 .
LOCKING CAP? (YES) NO (Circle One)

(10) TYPE OF BACKFILL: Bentonite Powder

WATER LEVEL CHECKS

*From top of casing, if protective casing higher, take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS

WISCONSIN TEST DRILLING

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR BECHER-HOPPE WWTP

LOCATION Wausau, WI Elev.

Job No. 1823

Boring No. OW-116

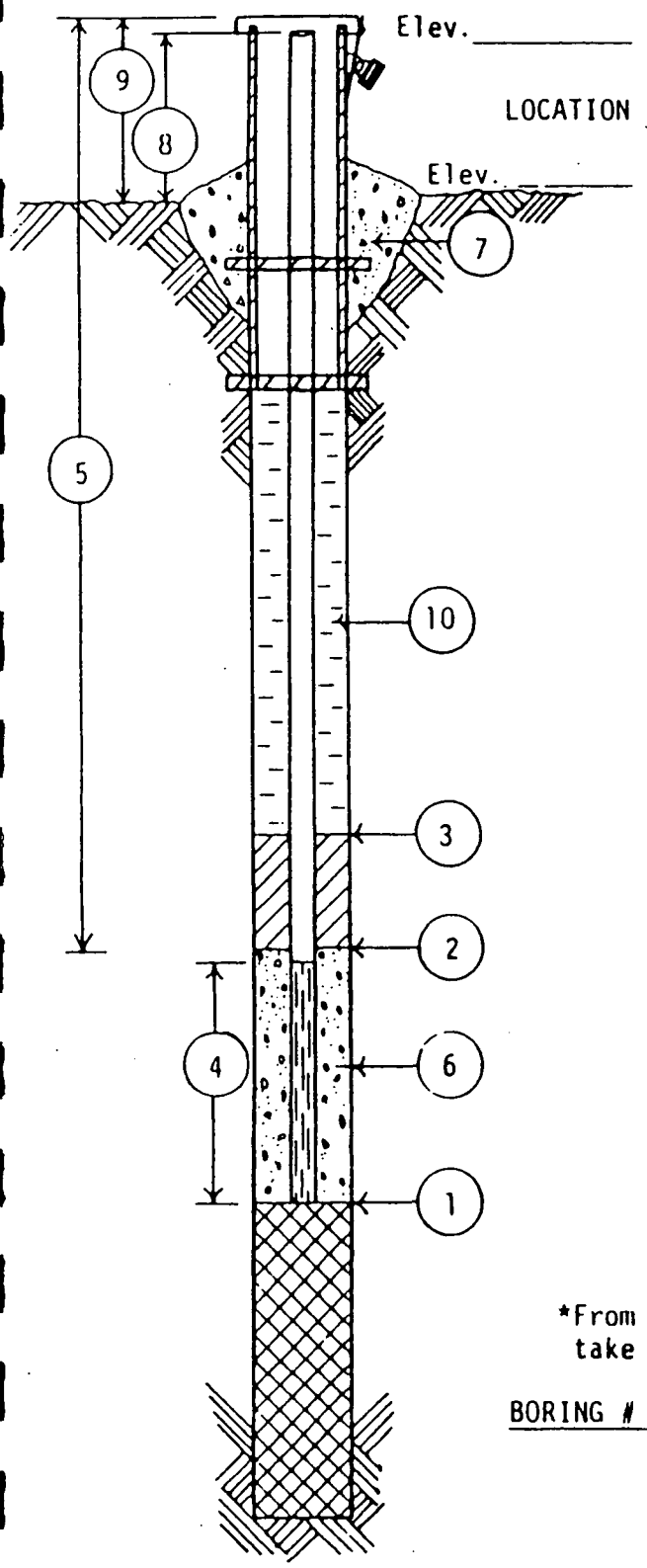
GROUND WATER	While drilling	7.8'	Time after drilling	¼ hr.	
	Before casing removal		Depth to water	7.8'	
	After casing removal		Depth to cave-in		

Start 7-21-89
Unit 813
Chief M.M.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight Drop	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						Blind Drill						4¼ HSA
						E.O.B. @ 13.5' Well Set @ 11.0'						

5 10 15 20 25 30 35 40 45 50

WELL DETAIL INFORMATION SHEET



JOB NO. 1823

BORING NO. OW-116

DATE 7-21-89

CHIEF M.M.

LOCATION WWTP Wausau, WI

All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.

(1) DEPTH TO BOTTOM OF WELL POINT OR SLOTTED PIPE 11.0 FEET.

(2) DEPTH OF BOTTOM OF SEAL (if installed) 4.0 FEET.

(3) DEPTH TO TOP OF SEAL (if installed) 2.0 FEET.

(4) LENGTH OF WELL POINT, (PVC WELL SCREEN), OR SLOTTED PIPE 5.0 FEET. (Circle One)

(5) TOTAL LENGTH OF PIPE 6.0 FEET @ 2 IN. DIAMETER.

(6) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE #30 Flint Sand .

(7) CONCRETE CAP, (YES) NO (Circle One)

(8) HEIGHT OF WELL CASING ABOVE GROUND 0.0 FEET.

(9) PROTECTIVE CASING? (YES) NO (Circle One)
HEIGHT ABOVE GROUND Flush Mount .
LOCKING CAP? YES (NO) (Circle One)

(10) TYPE OF BACKFILL: Hole Plug

WATER LEVEL CHECKS

*From top of casing, if protective casing higher, take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS

WISCONSIN TEST DRILLING

WISCONSIN TEST DRILLING, INC. — **FIELD BORING LOG** — Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR BECHER-HOPPE WWTP

LOCATION Wausau, WI Elev.

Job No. 1823

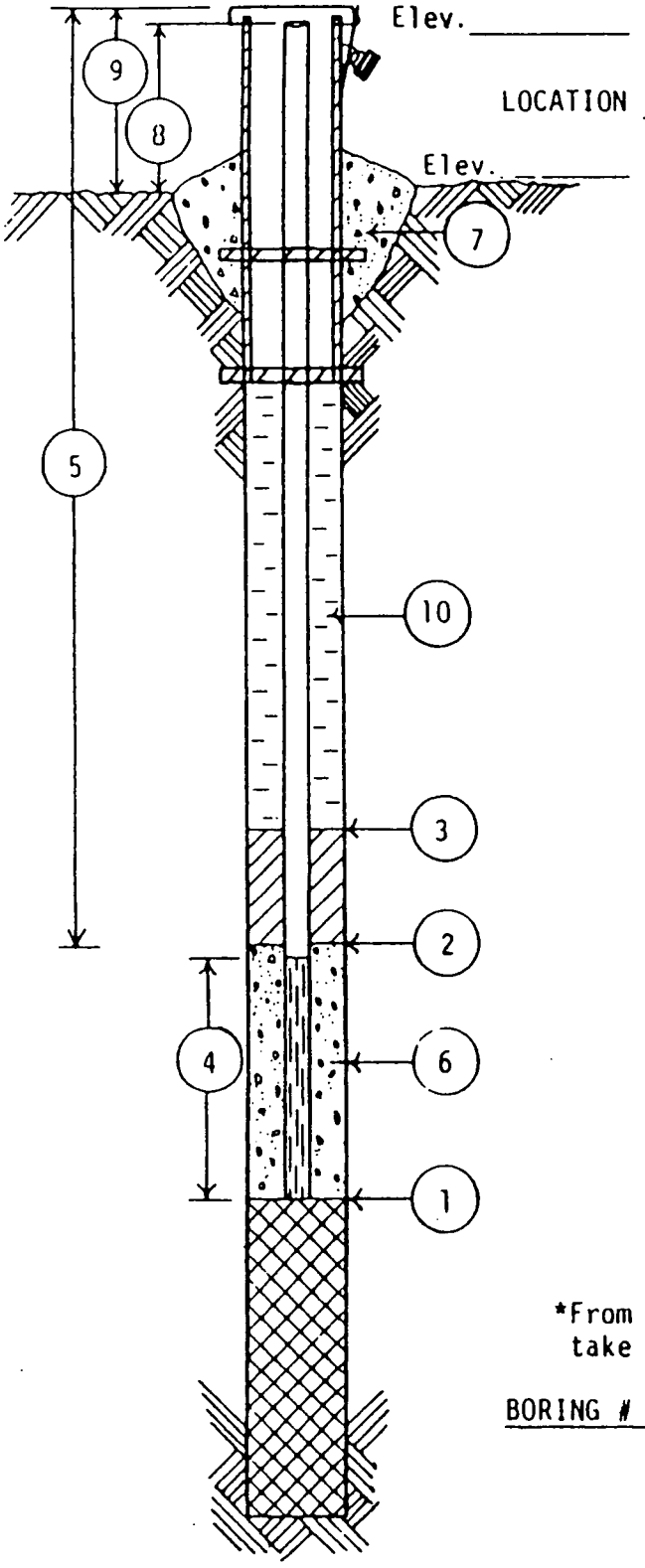
Boring No. OW-117

GROUND WATER	While drilling		Time after drilling	¼ hr. / 1 hr.
	Before casing removal		Depth to water	8.0' / 7.8'
	After casing removal		Depth to cave-in	

Start 7-21-89
Unit 805
Chief L.E.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe / Weight / Drop	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						TOPSOIL 0.9' Dk. Brn. Silty SAND						4¼ HSA
						Rd. to Brn. M-F SAND						
						Cobble Area 8.5'						
						Rd. to Brn. M-F SAND w/Gravel						
						E.O.B. @ 15.0' Well Set @ 10.8'						

WELL DETAIL INFORMATION SHEET



JOB NO. 1823

BORING NO. OW-117

DATE 7-21-89

CHIEF L.E.

LOCATION WWTP Wausau, WI

All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.

(1) DEPTH TO BOTTOM OF WELL POINT OR SLOTTED PIPE 10.8 FEET.

(2) DEPTH OF BOTTOM OF SEAL (if installed) 3.8 FEET.

(3) DEPTH TO TOP OF SEAL (if installed) 1.0 FEET.

(4) LENGTH OF WELL POINT, (PVC WELL SCREEN), OR SLOTTED PIPE 5.0 FEET. (Circle One)

(5) TOTAL LENGTH OF PIPE 7.8 FEET @ 2 IN. DIAMETER.

(6) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE #30 Flint Sand.

(7) CONCRETE CAP, (YES) NO (Circle One)

(8) HEIGHT OF WELL CASING ABOVE GROUND 2.0 FEET.

(9) PROTECTIVE CASING? (YES) NO (Circle One)
HEIGHT ABOVE GROUND 2.1.
LOCKING CAP? YES (NO) (Circle One)

(10) TYPE OF BACKFILL: Bentonite Powder

WATER LEVEL CHECKS

*From top of casing, if protective casing higher, take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS

WISCONSIN TEST DRILLING

STS Consultants Ltd.

OWNER City of Wausau	**LOG OF BORING NUMBER** OW-201
PROJECT NAME Well Installations	**ENGINEER** Becher-Hoppe, Inc.
SITE LOCATION Wausau Wastewater Treatment Plant, Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1173.59

SURFACE ELEVATION 1171.1

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
	1	SS			Fill: Dark brown (7.5 3/4) to very dark grayish brown (10YR 3/2) silty sand (SM) and cinders - trace of gravel, metal and glass fragments - very loose to medium dense	10						
5	2	SS				4						
10	3	SS				2						
15	4	SS			Fill: Brown to dark brown (10YR 4/3) fine to medium sand (SP) - trace of gravel and glass fragments - very loose to loose	2						
20	5	SS			Fill: Very dark gray (10YR 3/1) silty sand and gravel (GM) and glass fragments - medium dense	24						
25					Fill: Very dark gray (10YR 3/1) silty sand (SM) - trace of gravel - roots - medium dense							
26.5	6	SS				18						
					End of Boring Boring advanced from 0.0 to 25.0 feet with 4.25" ID hollow stem auger Installed 2 inch PVC monitoring well at 21.0 feet with protector pipe							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL					
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

BORING STARTED	9-5-89
BORING COMPLETED	9-5-89
RIG	WTD D-50
FOREMAN	PD

STS OFFICE	540 Lambeau Street Green Bay, WI 54303
DRAWN BY JJT	SHEET 1 OF 1
APP'D. BY MDS	STS JOB NO. 17289XF

BL: 5-983

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: B-201
PROJECT NAME: Well Installations	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau Wastewater Treatment Plant, Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + _____

SURFACE ELEVATION

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
5					No sampling - see Boring OW-201 log for soil description							
10												
15												
20												
25												
30	1	SS			Dark variegated medium to coarse gravelly sand and sandy gravel (SW-GW) - medium dense	22						
35	2	SS				21						
40	3	SS			Dark grayish brown (10YR 4/2) fine silty sand (SM) - medium dense to very dense	20						
45					Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL					
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

BORING STARTED	9-5-89	STS OFFICE	540 Lambeau Street, Green Bay, WI 54303
BORING COMPLETED	9-5-89		
RIG	WTD D-50	DRAWN BY JJT	SHEET 1 OF 1
FOREMAN	PD	APP'D. BY MDS	STS JOB NO. 17289XF

BL: 5-983

STS Consultants Ltd.

OWNER City of Wausau	**LOG OF BORING NUMBER** B-201 Continued
PROJECT NAME Well Installations	**ENGINEER** Becher-Hoppe, Inc.
SITE LOCATION Wausau Wastewater Treatment Plant, Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. +

SURFACE ELEVATION

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
	4	SS			Dark grayish brown (10YR 4/2) fine silty sand (SM) - medium dense to very dense	75						
50												
51.5	5	SS				39						
					End of Boring Boring advanced from 0.0 to 50.0 feet with roller bit Used 50.0 feet of HW casing Grouted borehole to surface with cement-bentonite slurry							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

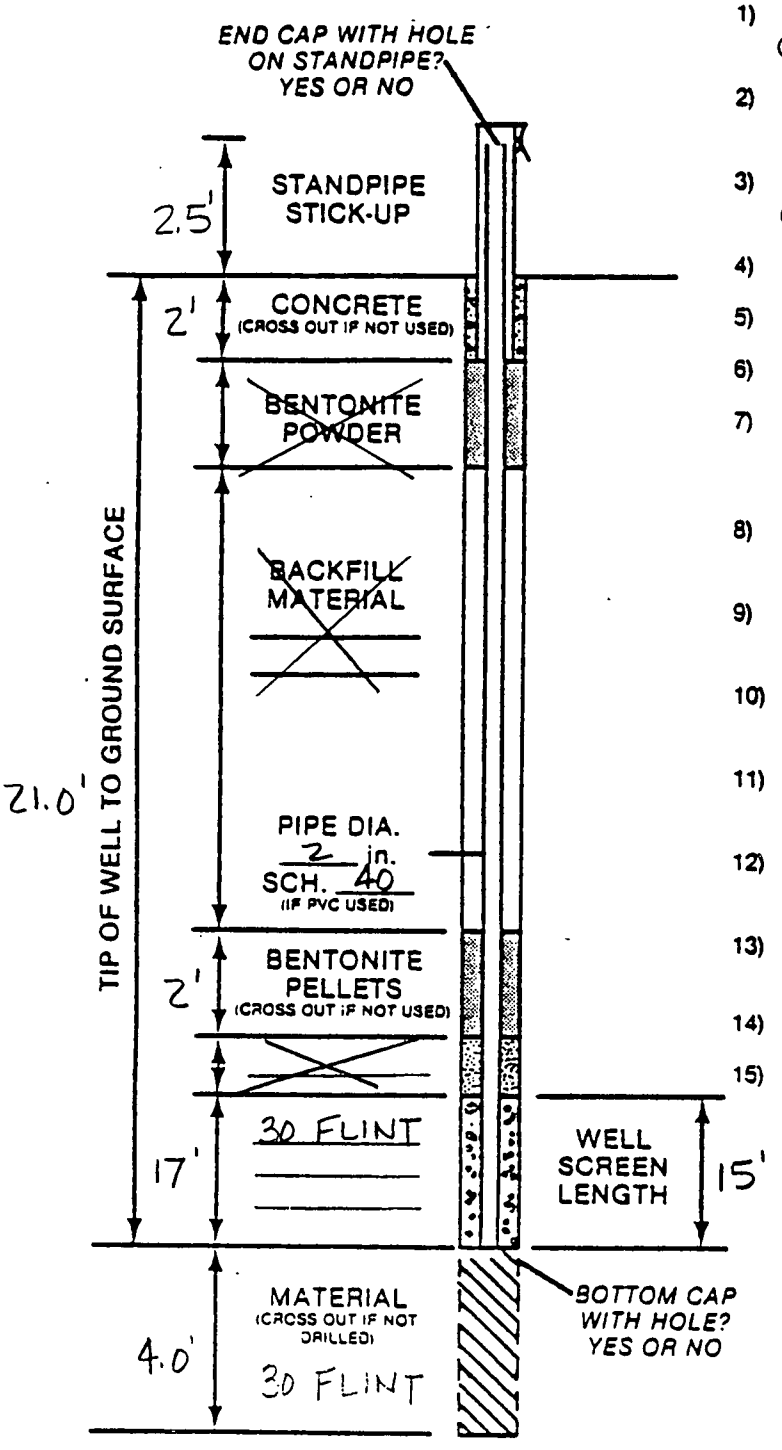
WL					
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

BORING STARTED	9-5-89	STS OFFICE	540 Lambeau Street Green Bay, WI 54303
BORING COMPLETED	9-5-89		
RIG	WTD D-50	DRAWN BY JJT	SHEET 2 OF 2
FOREMAN	PD	APP'D. BY MDS	STS JOB NO. 17289XF

BL: 5-983

STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



1) TYPE OF PIPE?
(PVC,) GALVANIZED, STAINLESS, OTHER _____

2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, (THREADED,) OTHER _____

3) TYPE OF WELL SCREEN
(PVC,) GALVANIZED, STAINLESS, OTHER _____

4) SCREEN SIZE 0.010 in.

5) INSTALLED PROTECTOR PIPE W/LOCK? (YES) OR NO

6) WAS SOLVENT USED? YES OR (NO)

7) WAS DRILLING MUD USED?
SOLID AUGER, (HOLLOW STEM AUGER,)
WATER, REVERT, BENTONITE

8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR (NO)

9) HOW WAS WELL DEVELOPED?
BAILING, (PUMPING,) SURGING, COMPRESSED AIR

10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., (30 min.,) OTHER _____

11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 75 gal.

12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, OPAQUE

13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, TURBID, OPAQUE

14) DID THE WATER SMELL? YES OR NO

15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
21.7 Ft. or DRY

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. OW-201 DATE INSTALLED 9-6-89 DRILL RIG WI. TEST DRILL #813 D-50

DRILLER PRD DRILL CREW JF

JOB/CLIENT WAUSAU WASTEWATER TREATMENT PLANT STS JOB No. 17289 XF

STS Consultants Ltd.

OWNER City of Wausau	**LOG OF BORING NUMBER** OW-202
PROJECT NAME Well Installations	**ENGINEER** Becher-Hoppe, Inc.

SITE LOCATION Wausau Wastewater Treatment Plant, Wausau, Wisconsin

WELL INSTALLATION
TOP STANDPIPE EL. + 1170.51

SURFACE ELEVATION 1168.1

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
	1	SS			Fill: Dark brown (10YR 3/3) fine sand (SP) - a little silt - trace of gravel - loose to medium dense	7						
5	2	SS				4						
10	3	SS			Very dark gray (5Y 3/1) organic silt (OL) and very fine sand (SP) - trace of gravel - very loose to dense	2						
15	4	SS				38						
19					Dark brown (10YR 4/3-3/3) fine to medium sand (SP) - a little gravel - dense							
					End of Boring Boring advanced from 0.0 to 19.0 feet with 4.25" hollow stem auger Installed 2 inch PVC monitoring well at 16.0 feet with protector pipe							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL 11.0' WD					
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

BORING STARTED	9-6-89	STS OFFICE	540 Lambeau Street Green Bay, WI 54303
BORING COMPLETED	9-7-89	DRAWN BY JJT	SHEET 1 OF 1
RIG	WTD D-50		
FOREMAN	PD	APP'D. BY MDS	STS JOB NO. 17289XF

BL: 5-983

STS Consultants Ltd.

OWNER City of Wausau	**LOG OF BORING NUMBER** OW-202A
PROJECT NAME Well Installations	**ENGINEER** Becher-Hoppe, Inc.
SITE LOCATION Wausau Wastewater Treatment Plant, Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1170.51

SURFACE ELEVATION 1167.9

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
5					No sampling - see Boring OW-202 and B-202 logs for soil description							
10												
15												
20												
25												
30												
35												
40												
45					Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL 11.0' WD					
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

BORING STARTED 9-18-89	STS OFFICE 540 Lambeau Street, Green Bay, WI 54303
BORING COMPLETED 9-18-89	DRAWN BY JJB / SHEET 1 OF 2
RIG WTD D-50	
FOREMAN PD	APP'D. BY VW / STS JOB NO. 17289XF

BL: 5-983

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: OW-202A Continued
PROJECT NAME: Well Installations	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau Wastewater Treatment Plant, Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1170.51

SURFACE ELEVATION 1167.9

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
50					No sampling - see Boring OW-202 and B-202 logs for soil description							
55					End of Boring Boring advanced from 0.0 to 55.0 feet with 4.25" hollow stem auger 2 inch PVC piezometer installed at 53.0 feet							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL 11.0' WD

WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

BORING STARTED	9-18-89
BORING COMPLETED	9-18-89
RIG	WTD D-50
FOREMAN	PD

STS OFFICE	540 Lambeau Street, Green Bay, WI 54303
DRAWN BY	JJT
SHEET	1 OF 2
APP'D. BY	VW
STS JOB NO.	17289XF

BL: 5-983

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: B-202
PROJECT NAME: Well Installations	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau Wastewater Treatment Plant, Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + _____

DESCRIPTION OF MATERIAL

SURFACE ELEVATION

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
5					No sampling - see Boring DW-202 log for soil description							
10												
15												
20	1	SS										
25	2	SS			Dark brown (10YR 4/4-3/3) fine to medium sand (SP) - a little gravel - decreasing grain size with depth - medium dense to dense	28						
30	3	SS				21						
35	4	SS				17						
40	5	SS				38						
45					Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	WD				
10.3'					
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

BORING STARTED	9-7-89	STS OFFICE	540 Lambeau Street, Green Bay, WI 54303
BORING COMPLETED	9-7-89	DRAWN BY JJT	SHEET 1 OF 2
RIG	WTD D-50		
FOREMAN	PD	APP'D. BY MDS	STS JOB NO. 17289XF

BL: 5-983

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: B-202 Continued
PROJECT NAME: Well Installations	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau Wastewater Treatment Plant, Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. +

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					SURFACE ELEVATION							
	6	SS				25						
50												
	7	SS		*		35						
					Dark brown (10YR 4/4-3/3) fine to medium sand (SP) - a little gravel - decreasing grain size with depth - medium dense to dense							
55												
	8	SS										
60												
	9	SS				15						
65												
	10	SS				33						
70												
	11	SS			Very dark gray (5Y 3/1) clayey silt (ML) - a little sand - medium dense to dense	30						
75	12	SS			Dark gray (5Y 4/1) silty clayey fine sand (SM-SC)- dense	34						
					End of Boring Boring advanced from 0.0 to 73.0 feet with roller bit Used 73.0 feet of HW casing Grouted borehole to surface with cement-bentonite slurry * Wash Sample							

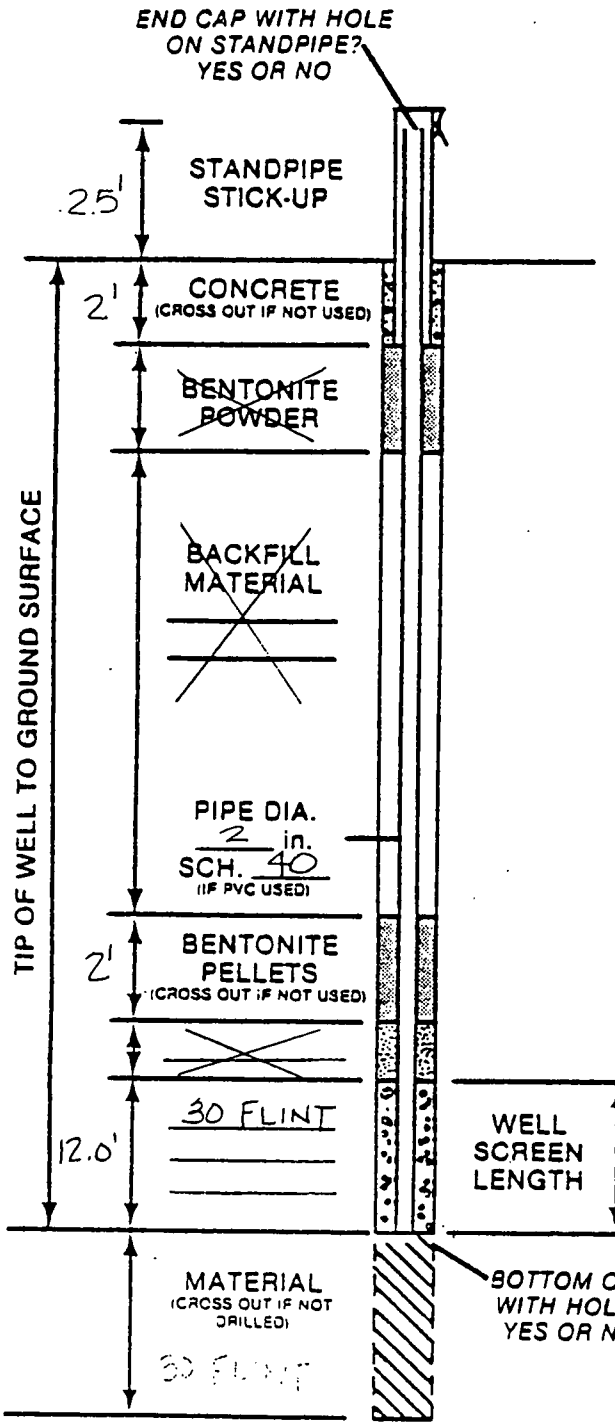
The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	10.3'	WD				BORING STARTED	9-7-89	STS OFFICE	540 Lambeau Street Green Bay, WI 54303
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED	9-7-89	DRAWN BY	JJT
						RIG	WTD D-50	SHEET	2 OF 2
						FOREMAN	PD	APP'D. BY	MDS
								STS JOB NO.	17289XF

BL: 5-983

STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



1) TYPE OF PIPE?
(PVC,) GALVANIZED, STAINLESS, OTHER _____

2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, (THREADED,) OTHER _____

3) TYPE OF WELL SCREEN
(PVC,) GALVANIZED, STAINLESS, OTHER _____

4) SCREEN SIZE 0.010 inch

5) INSTALLED PROTECTOR PIPE W/LOCK? (YES) OR NO

6) WAS SOLVENT USED? YES OR (NO)

7) WAS DRILLING MUD USED?
SOLID AUGER, (HOLLOW STEM AUGER,)
WATER, REVERT, BENTONITE

8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR (NO)

9) HOW WAS WELL DEVELOPED?
BAILING, (PUMPING,) SURGING, COMPRESSED AIR

10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., (30 min.,) OTHER _____

11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 25 gal.

12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, OPAQUE

13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, TURBID, OPAQUE

14) DID THE WATER SMELL? YES OR NO

15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
_____ Ft. or (DRY)

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

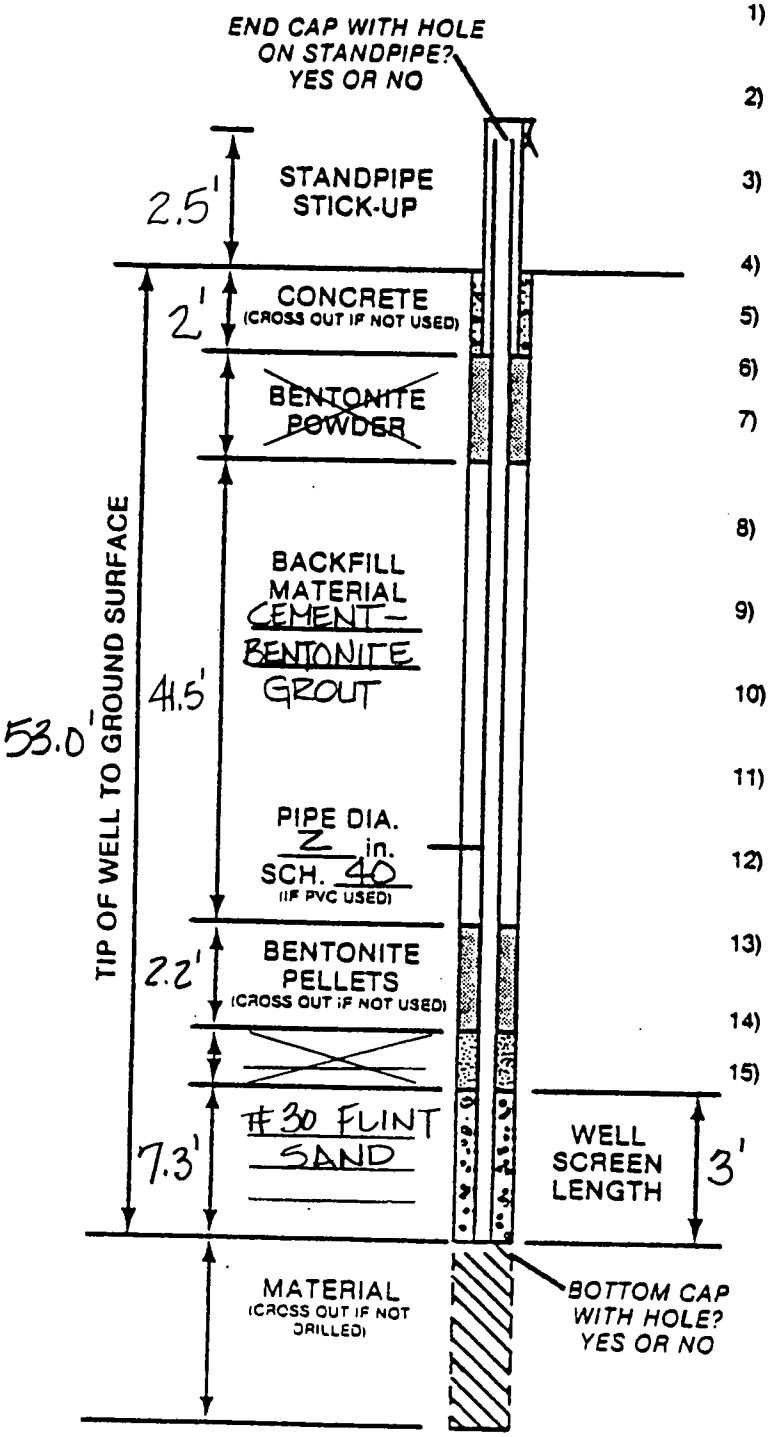
Well No. OW-202 DATE INSTALLED 9-7-89 DRILL RIG WI. TEST DRILL #813 D-50

DRILLER PRD DRILL CREW JP

JOB/CLIENT WAUSAU WASTE WATER TREATMENT PLANT STS JOB No. 17289 XF

STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



1) TYPE OF PIPE?
(PVC,) GALVANIZED, STAINLESS, OTHER _____

2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, (THREADED,) OTHER _____

3) TYPE OF WELL SCREEN
(PVC,) GALVANIZED, STAINLESS, OTHER _____

4) SCREEN SIZE 0.010 in

5) INSTALLED PROTECTOR PIPE W/LOCK? (YES) OR NO

6) WAS SOLVENT USED? YES OR (NO)

7) WAS DRILLING MUD USED?
SOLID AUGER, (HOLLOW STEM AUGER,)
WATER, REVERT, BENTONITE

8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR (NO)

9) HOW WAS WELL DEVELOPED?
BAILING, (PUMPING) SURGING, COMPRESSED AIR

10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., (30 min.) OTHER _____

11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 135 gal.

12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, OPAQUE

13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, TURBID, OPAQUE

14) DID THE WATER SMELL? YES OR NO

15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
12.8 Ft. or DRY

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. OW-202A DATE INSTALLED 9-9-89 DRILL RIG WI. TEST DRILL D-50

DRILLER R.D DRILL CREW JP

JOB/CLIENT WASTEWASTE TREATMENT PLANT STS JOB No. 17289XF

CITY OF WAUSAU, WI.

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: OW-203
PROJECT NAME: Well Installations	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau Wastewater Treatment Plant, Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1168.33

SURFACE ELEVATION 1166.0

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
	1	SS			Strong brown (7.5YR 5/6) fine sand (SP) - medium dense	22						
5	2	SS			Reddish brown (5YR 4/3) fine to coarse sand (SP) - with trace of silt and fine to medium gravel - dense	35						
10	3	SS			Reddish brown (5YR 4/3) medium to coarse sand (SP) - with some fine to medium gravel - very dense	55						
15	4	SS										
17					Possible bedrock - driller's observation	100/5"						
					End of Boring Boring advanced from 0.0 to 17.0 feet with 4.25" hollow stem auger 2 inch PVC monitoring well installed at 15.0 feet							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL 5.5' WD

WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

BORING STARTED 9-7-89	STS OFFICE 540 Lambeau Street, Green Bay, WI 54303
BORING COMPLETED 9-7-89	DRAWN BY JJT / SHEET 1 OF 1
RIG WTD D-50	APP'D. BY VW / STS JOB NO. 17289XF
FOREMAN JP	

BL: 5-983

STS Consultants Ltd.

OWNER City of Wausau	**LOG OF BORING NUMBER** B-203
PROJECT NAME Well Installations	**ENGINEER** Becher-Hoppe, Inc.
SITE LOCATION Wausau Wastewater Treatment Plant Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + _____

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					SURFACE ELEVATION							
5					No sampling - see Boring OW-203 log for soil description							
10												
15												
20					Weathered bedrock changes to competent bedrock with depth - driller's observation							
25	Run #1	DB NX			Dark green mafic igneous rock - possible hornblende bearing pyroxenite - phaneritic subhedral texture - hard - no weathering of rock mass - some weathering of fracture faces - trace of calcic plagioclase and pyrite							
26					Run No. 1 — Depth 21.0-26.0' — Recovery 85% — RQD 76% — Fracture Frequency 0.8/ft.							
					End of Boring Bornig advanced from 0.0 to 21.0 feet with 4.25" hollow stem auger Bornig advanced from 21.0 to 26.0 fet with NX diamond bit core barrel and wash water HW casing driven to 20.0 feet Boring grouted with cement-bentonite grout							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

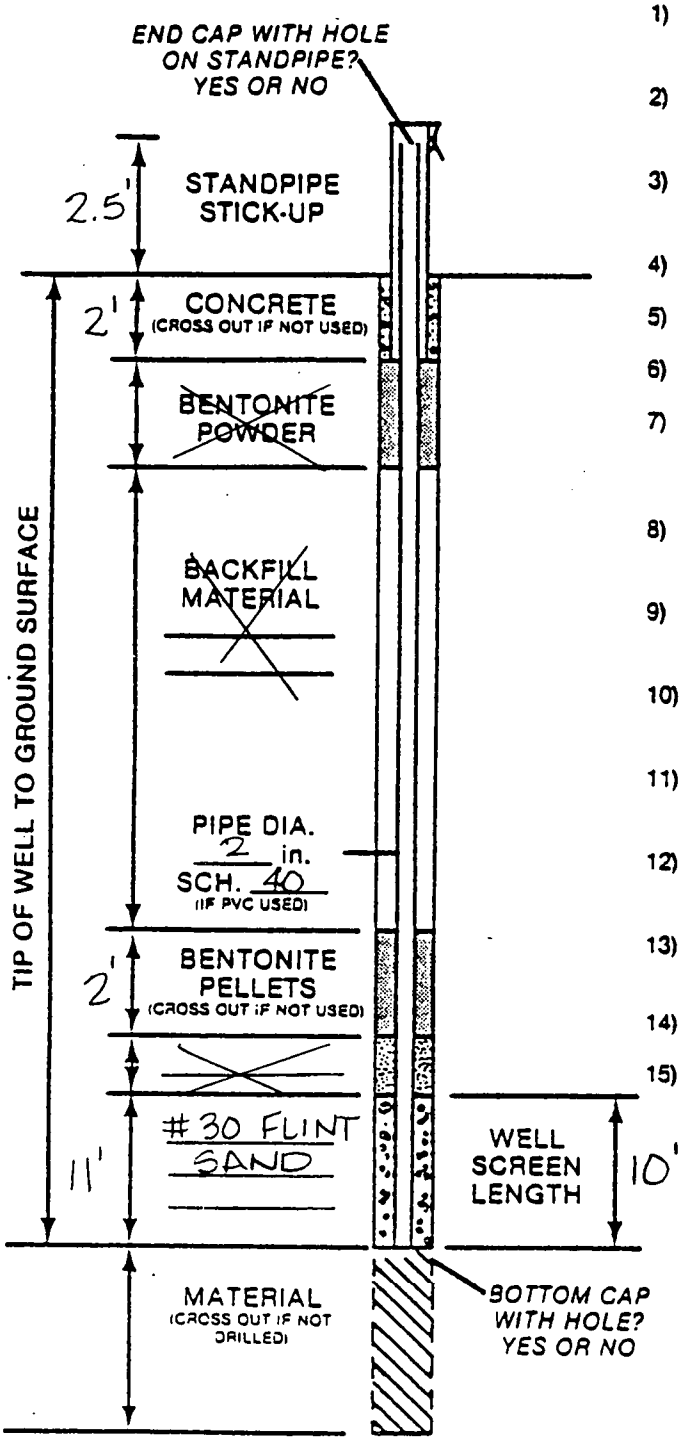
WL					
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

BORING STARTED	9-11-89	STS OFFICE	540 Lambeau Street Green Bay, WI 54303
BORING COMPLETED	9-11-89	DRAWN BY JJT	SHEET 1 OF 1
RIG	WTD D-50		
FOREMAN	PD	APP'D. BY VW	STS JOB NO. 17289XF

BL: 5-983

STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



1) TYPE OF PIPE?
(PVC,) GALVANIZED, STAINLESS, OTHER _____

2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, (THREADED,) OTHER _____

3) TYPE OF WELL SCREEN
(PVC,) GALVANIZED, STAINLESS, OTHER _____

4) SCREEN SIZE 0.010 in

5) INSTALLED PROTECTOR PIPE W/LOCK? (YES) OR NO

6) WAS SOLVENT USED? YES OR (NO)

7) WAS DRILLING MUD USED?
SOLID AUGER, (HOLLOW STEM AUGER,)
WATER, REVERT, BENTONITE

8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR (NO)

9) HOW WAS WELL DEVELOPED?
BAILING, (PUMPING,) SURGING, COMPRESSED AIR

10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., (30 min.,) OTHER _____

11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 150 gal.

12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, OPAQUE

13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, TURBID, OPAQUE

14) DID THE WATER SMELL? YES OR NO

15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
8.5 Ft. or DRY

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. OW-203 DATE INSTALLED 9-9-89 DRILL RIG WI. TEST DRILL D-50

DRILLER P.D. DRILL CREW J.P.

JOB/CLIENT WASTE WATER TREATMENT PLANT STS JOB No. 17289XF
CITY OF WAUSAU, WI.

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: OW-204
PROJECT NAME: Well Installations	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau Wastewater Treatment Plant, Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1171.34

SURFACE ELEVATION 1168.9

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
	1	SS			Fill: Light gray (10YR 7/2) to brownish yellow (10YR 6/6) fine to medium sand (SP) - medium dense	15						
5	2	SS				10						
10	3	SS			Fill: Very dark gray (10YR 3/1) silt (ML) - trace of sand - loose - peat layer observed from 15.8 to 16.0 feet	5						
15	4	SS				12						
					Fill: Very dark grayish brown (10YR 3/2) fine to coarse gravelly sand (SW) - medium dense							
20	5	SS			Fill: Dark brown (10YR 3/3) medium sand (SP) - some gravel - trace of silt - some blue sand grains - very dense to extremely dense	77						
22					End of Boring Boring advanced from 0.0 to 22.0 feet with 4.25" ID hollow stem auger Installed 2 inch PVC monitoring well at 21.0 feet with protector pipe							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	11.0'	WD				
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	

BORING STARTED	9-6-89
BORING COMPLETED	9-7-89
RIG	WTD D-50
FOREMAN	PD

STS OFFICE	540 Lambeau Street, Green Bay, WI 54303
DRAWN BY	JJT
SHEET	1 OF 1
APP'D. BY	MDS
STS JOB NO.	17289XF

BL: 5-983

STS Consultants Ltd.

OWNER	LOG OF BORING NUMBER
City of Wausau	B-204
PROJECT NAME	**ENGINEER**
Well Installations	Becher-Hoppe, Inc.

SITE LOCATION Wausau Wastewater Treatment Plant, Wausau, Wisconsin

WELL INSTALLATION
TOP STANDPIPE EL. + _____

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
SURFACE ELEVATION												
5					No sampling - see Boring OW-204 log for soil description							
10												
15												
20												
25	1	SS			Dark brown (10YR 3/4-4/3) fine to medium sand (SP) - trace of gravel - trace of silt - loose to very dense	6						
30	2	SS				24						
35	3	SS				38						
40	4	SS				15						
45					Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	13.5'	AB				
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	

BORING STARTED	9-6-89
BORING COMPLETED	9-6-89
RIG	WTD D-50
FOREMAN	PD

STS OFFICE	540 Lambeau Street, Green Bay, WI 54303
DRAWN BY	JJT
SHEET	1 OF 2
APP'D. BY	MDS
STS JOB NO.	17289XF

BL: 5-983

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: B-204 Continued
PROJECT NAME: Well Installations	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau Wastewater Treatment Plant, Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. +

DESCRIPTION OF MATERIAL

SURFACE ELEVATION

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
	5	SS			Dark brown (10YR 3/4-4/3) fine to medium sand (SP) - trace of gravel - trace of silt - loose to very dense	50						
50												
51.5	6	SS				48						
					End of Boring Boring advanced from 0.0 to 50.0 feet with 3.25" ID hollow stem auger Grouted borehole to surface with cement-bentonite slurry							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

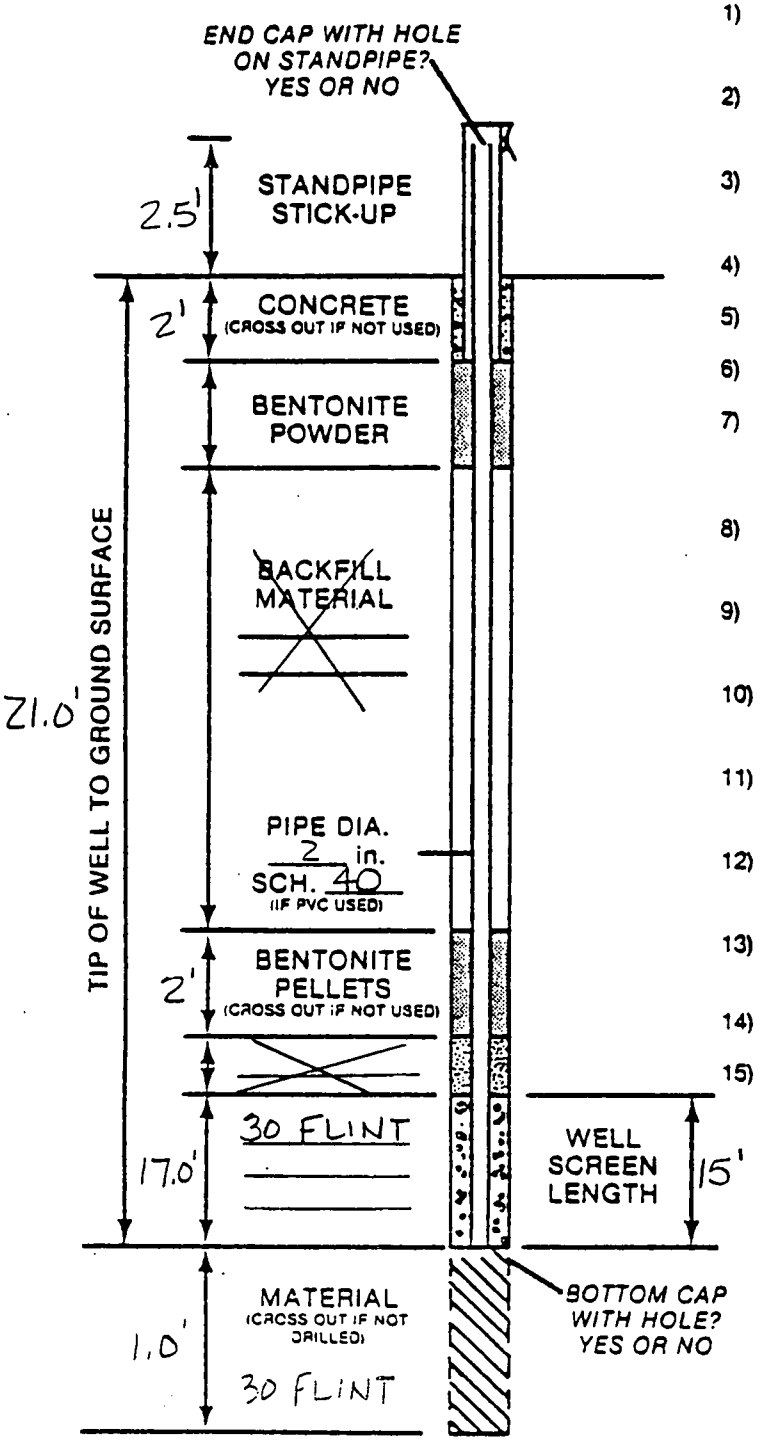
WL 13.5' AB					
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

BORING STARTED 9-6-89	STS OFFICE 540 Lambeau Street, Green Bay, WI 54303
BORING COMPLETED 9-6-89	DRAWN BY JJT / SHEET 2 OF 2
RIG WTD D-50	APP'D. BY MDS / STS JOB NO. 17289XF
FOREMAN PD	

BL: 5-983

STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



1) TYPE OF PIPE?
(PVC), GALVANIZED, STAINLESS, OTHER _____

2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, (THREADED), OTHER _____

3) TYPE OF WELL SCREEN
(PVC), GALVANIZED, STAINLESS, OTHER _____

4) SCREEN SIZE 0.010 inch

5) INSTALLED PROTECTOR PIPE W/LOCK? (YES) OR NO

6) WAS SOLVENT USED? YES OR (NO)

7) WAS DRILLING MUD USED?
SOLID AUGER, (HOLLOW STEM AUGER), WATER, REVERT, BENTONITE

8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR (NO)

9) HOW WAS WELL DEVELOPED?
BAILING, (PUMPING), SURGING, COMPRESSED AIR

10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., (30 min.), OTHER _____

11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 95 gal.

12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, OPAQUE

13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, TURBID, OPAQUE

14) DID THE WATER SMELL? YES OR NO

15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
16 Ft. or DRY

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. OW-204 DATE INSTALLED 9-7-89 DRILL RIG Wis. TEST DRILL #813 D-50

DRILLER PRD DRILL CREW JF

JOB/CLIENT WAUSAU WASTEWATER TREATMENT PLANT STS JOB No. 17289XF

STS Consultants Ltd.

OWNER City of Wausau	**LOG OF BORING NUMBER** OW-205
PROJECT NAME Well Installations	**ENGINEER** Becher-Hoppe, Inc.
SITE LOCATION Wausau Wastewater Treatment Plant, Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + 1168.18

SURFACE ELEVATION 1166.5

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
	1	SS			Fill: Light yellowish brown (10YR 6/4) medium sand (SP) - trace of silt - medium dense	22						
5	2	SS			Fill: Green and red fine to medium sand (SP) - loose ,	4						
10	3	SS			Dark brown (10YR 3/3) fine to medium sand (SP) with dark gray (5Y 4/1) silt (ML) seams - loose to medium dense	12						
15	4	SS				16						
17.5					End of Boring Boring advanced from 0.0 to 17.5 feet with 4.25" hollow stem auger Installed 2 inch PVC monitoring well at 16.0 feet with protector pipe							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	10.0'	WD			
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

BORING STARTED	9-7-89
BORING COMPLETED	9-7-89
RIG	WTD D-50
FOREMAN	JP

STS OFFICE	540 Lambeau Street, Green Bay, WI 54303
DRAWN BY	JJT
SHEET	1 OF 1
APP'D. BY	MDS
STS JOB NO.	17289XF

BL: 5-983

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: B-205
PROJECT NAME: Well Installations	ENGINEER: Becher-Hoppe, Inc.

SITE LOCATION: Wausau Wastewater Treatment Plant, Wausau, Wisconsin

WELL INSTALLATION
TOP STANDPIPE EL. + _____

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
SURFACE ELEVATION												
5					No sampling - see Boring OW-205 log for soil description							
10												
15												
20												
25	1	SS				11						
	2	SS				27						
30	3	SS			Dark brown (10YR 3/3) fine to medium sand (SP) - trace of gravel - decreasing grain size with depth - loose to dense	3						
35	4	SS				45						
40	5	SS				49						
45					Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL					
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

BORING STARTED 9-7-89	STS OFFICE 540 Lambeau Street, Green Bay, WI 54303
BORING COMPLETED 9-7-89	DRAWN BY JJT / SHEET 1 OF 2
RIG WTD D-50	APP'D. BY MDS / STS JOB NO. 17289XF
FOREMAN JP	

BL: 5-983

STS Consultants Ltd.

OWNER: City of Wausau	LOG OF BORING NUMBER: B-205 Continued
PROJECT NAME: Well Installations	ENGINEER: Becher-Hoppe, Inc.
SITE LOCATION: Wausau Wastewater Treatment Plant, Wausau, Wisconsin	

WELL INSTALLATION
TOP STANDPIPE EL. + _____

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, N (B/FT)	UNCONFINED COMPRESSIVE STRENGTH, Qp (TONS/FT²)	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					SURFACE ELEVATION							
	6	SS			Dark brown (10YR 3/3) fine to medium sand (SP) - trace of gravel - decreasing grain size with depth - loose to dense	47						
50					Dark yellowish brown (10YR 4/4) to dark brown (10YR 3/3) fine to medium gravelly sand (SP) - dense to very dense							
51.5	7	SS				52						
					End of Boring Boring advanced from 0.0 to 51.5 feet with 3.25" hollow stem auger Grouted borehole to surface with cement-bentonite slurry							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

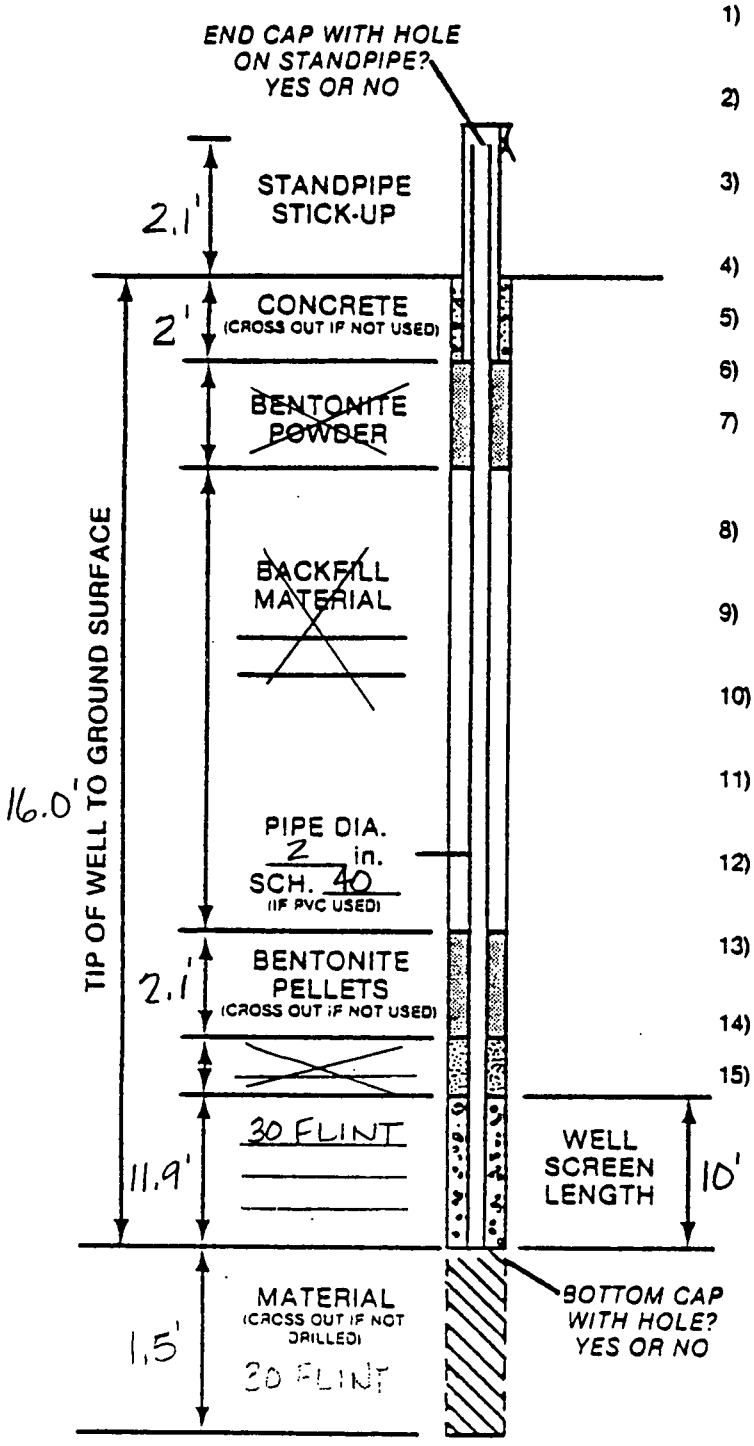
WL					
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME

BORING STARTED 9-7-89	STS OFFICE 540 Lambeau Street, Green Bay, WI 54303
BORING COMPLETED 9-7-89	DRAWN BY JJT / SHEET 2 OF 2
RIG WTD D-50	
FOREMAN JP	APP'D. BY MDS / STS JOB NO. 17289XF

BL: 5-983

STS Consultants Ltd.

FIELD WELL INSTALLATION DIAGRAM



1) TYPE OF PIPE?
(PVC), GALVANIZED, STAINLESS, OTHER _____

2) TYPE OF PIPE JOINTS?
BELLED, COUPLINGS, (THREADED), OTHER _____

3) TYPE OF WELL SCREEN
(PVC), GALVANIZED, STAINLESS, OTHER _____

4) SCREEN SIZE 0.010 IN.

5) INSTALLED PROTECTOR PIPE W/LOCK? (YES) OR NO

6) WAS SOLVENT USED? YES OR (NO)

7) WAS DRILLING MUD USED?
SOLID AUGER, (HOLLOW STEM AUGER), WATER, REVERT, BENTONITE

8) DID STANDPIPE COME UP WHEN CASING WAS PULLED?
YES OR (NO)

9) HOW WAS WELL DEVELOPED?
BAILING, (PUMPING), SURGING, COMPRESSED AIR

10) TIME SPENT FOR WELL DEVELOPMENT?
5 min., 15 min., (30 min.), OTHER _____

11) APPROXIMATE WATER VOLUME REMOVED OR ADDED?
5 gal., 10 gal., 15 gal., OTHER 135 gal.

12) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, OPAQUE

13) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, TURBID, OPAQUE

14) DID THE WATER SMELL? YES OR NO

15) WATER LEVEL SUMMARY

1) DEPTH FROM T. STANDPIPE AFTER DEVELOPMENT?
9.6 Ft. or DRY

2) OTHER MEASUREMENTS:

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

DATE _____, _____ Ft. FROM T, ST. PIPE

Well No. OW-205 DATE INSTALLED 9-7-89 DRILL RIG WIS. TEST DRILL #814 D-50

DRILLER JP DRILL CREW _____

JOB/CLIENT WAUSAU WASTEWATER TREATMENT PLANT STS JOB No. 17289 XF

STS General Notes

STS CONSULTANTS, LTD.

DRILLING & SAMPLING SYMBOLS:

SS : Split Spoon-1 3/8" I.D., 2" O.D. Unless otherwise noted
ST : Shelby Tube-2" O.D., Unless otherwise noted
PA : Power Auger
DB : Diamond Bit-NX, BX, AX
AS : Auger Sample
JS : Jar Sample
VS : Vane Shear
OS : Osterberg Sampler-3" Shelby Tube
HS : Hollow Stem Auger
WS : Wash Sample
FT : Fish Tail
RB : Rock Bit
BS : Bulk Sample
PM : Pressuremeter Test, In-Situ
GS : Giddings Sampler

Standard "N" Penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch O.D. split spoon sampler, except where otherwise noted.

WATER LEVEL MEASUREMENT SYMBOLS:

WL : Water Level
WS : While Sampling
WD : While Drilling
AB : After Boring
WCI : Wet Cave In
DCI : Dry Cave In
BCR : Before Casing Removal
ACR : After Casing Removal

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable groundwater levels. In impervious soils, the accurate determination of groundwater elevations may not be possible, even after several days of observations; additional evidence of groundwater elevations must be sought.

GRADATION DESCRIPTION & TERMINOLOGY:

Coarse Grained or Granular Soils have more than 50% of their dry weight retained on a #200 sieve; they are described as: boulders, cobbles, gravel or sand. Fine Grained soils have less than 50% of their dry weight retained on a #200 sieve; they are described as: clays or clayey silts if they are cohesive and silts if they are non-cohesive. In addition to gradation, granular soils are defined on the basis of their relative in-place density and fine grained soils on the basis of their strength or consistency and their plasticity.

Major Component Of Sample	Size Range	Description Of Components Also Present in Sample	Percent Of Dry Weight
Boulders	Over 8 in. (200 mm)	Trace	1-9
Cobbles	8 inches to 3 inches (200 mm to 75 mm)	Little	10-19
Gravel	3 inches to #4 sieve (75 mm to 4.76 mm)	Some	20-34
Sand	#4 to #200 sieve (4.76 mm to 0.074 mm)	And	35-50
Silt	Passing #200 sieve (0.074 mm to 0.005 mm)		
Clay	Smaller than 0.005 mm		

CONSISTENCY OF COHESIVE SOILS:

Unconfined Compressive Strength, Qu, tsf	Consistency
0.25	Very Soft
0.25-0.49	Soft
0.50-0.99	Medium (Firm)
1.00-1.99	Stiff
2.00-3.99	Very Stiff
4.00-8.00	Hard
>8.00	Very Hard

RELATIVE DENSITY OF GRANULAR SOILS:

N-Blows per ft.	Relative Density
0-3	Very Loose
4-9	Loose
10-29	Medium Dense
30-49	Dense
50-80	Very Dense
>80	Extremely Dense