


R 16.005365 1/24/22  
\$480.00 RB

 <p>City of Fitchburg Planning/Zoning Department 5520 Lacy Road Fitchburg, WI 53711 (608) 270-4200</p>	<b>CONDITIONAL USE PERMIT APPLICATION (AMENDMENT)</b>
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The undersigned owner, or owner's authorized agent, of property herein described hereby applies for a conditional use permit for the following described property:

1. **Location of Property:** Oakridge Substation, 2413 S. Fish Hatchery Road, Fitchburg, Wisconsin  
**Street Address:** \_\_\_\_\_  
**Legal Description - (Metes & Bounds, or Lot No. And Plat):** Lot 1 of CSM No. 12499 recorded in the Dane County Register of Deeds as Document No. 4449656 on July 10, 2008

\*\*\*Also submit in electronic format (MS WORD or plain text) by email to: [PLANNING@FITCHBURGWI.GOV](mailto:PLANNING@FITCHBURGWI.GOV)

2. **Current Use of Property:** Oakridge Substation (existing approved conditional use)  
3. **Proposed Use of Property:** Addition of Advanced Metering Infrastructure ("AMI") utility facilities at Substation  
4. **Proposed Development Schedule:** Anticipate beginning installation in mid-February, 2022  
5. **Zoning District:** R-R Rural Density District  
6. **Future Land Use Plan Classification:** R-D Rural Development

\*\*\*Pursuant to Section 22-3(b) of the Fitchburg Zoning Ordinance, all Conditional Use Permits shall be consistent with the currently adopted City of Fitchburg Comprehensive Plan.

\*\*\*Attach three (3) copies of a site plan which shows any proposed land divisions, plus vehicular access points and the location and size of all existing and proposed structures and parking areas. Two (2) of the three (3) copies shall be no larger than 11" x 17". Submit one (1) pdf document of the entire submittal to [planning@fitchburgwi.gov](mailto:planning@fitchburgwi.gov).

Additional information may be requested.

**Type of Residential Development (If Applicable):** N/A  
**No. of Dwelling Units by Bedroom:** 1 BR  2 BR  3 BR  4 or More   
**No. Of Parking Stalls:** No changes

**Type of Non-residential Development (If Applicable):** \_\_\_\_\_  
**Proposed Hours of Operation:** No changes **No. Of Employees:** No changes  
**Floor Area:** N/A **No. Of Parking Stalls:** N/A

**Sewer:** Municipal  Private  **Water:** Municipal  Private

**Current Owner of Property:** American Transmission Company / Applicant: Madison Gas and Electric Company

**Address:** 133 S. Blair Street **Phone No:** \_\_\_\_\_

**Contact Person:** John Drury, Senior Business Development Manager

**Email:** jdrury@mge.com

**Address:** \_\_\_\_\_ **Phone No:** \_\_\_\_\_

**Respectfully Submitted By:** John C Drury

Owner's or Authorized Agent's Signature

**\*\* It is highly recommended that an applicant hold at least one neighborhood meeting prior to submitting an CUP application to identify any concerns or issues of surrounding residents.**

PLEASE NOTE - Applicants shall be responsible for legal or outside consultant costs incurred by the City. Submissions shall be made at least four (4) weeks prior to desired plan commission meeting.

**For City Use Only:** **Date Received:** 1/18/22 **Publish:** \_\_\_\_\_

**Ordinance Section No.** \_\_\_\_\_ **Fee Paid:** \$480

**Permit Request No.** CU-2429-22



Madison Gas and Electric Company

P.O. Box 1231

Madison, WI 53701-1231

608-252-7000

your community energy company

January 17, 2022

***Sent Via Email and U.S. Mail***  
***[lisa.mcnabola@fitchburgwi.gov](mailto:lisa.mcnabola@fitchburgwi.gov)***

Ms. Lisa McNabola  
Interim City Planner/Zoning Administrator  
City of Fitchburg  
5520 Lacy Road  
Fitchburg WI 53711

Subject: Madison Gas and Electric Company Installation of Advanced Metering Infrastructure at the  
Oak Ridge Substation in Fitchburg

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Dear Ms. McNabola:

Madison Gas and Electric Company ("MGE") owns and operates electrical distribution equipment in the Oak Ridge Substation ("Substation") at 2413 South Fish Hatchery Road, Fitchburg, Wisconsin (the "Substation"). The Substation site and other equipment in the Substation are owned by the American Transmission Company. MGE is beginning the process of installing an advanced metering infrastructure ("AMI") system across its service territory in order to improve customer service and utility system operations for all its customers including its customers in Fitchburg. MGE intends to install AMI facilities inside the fence at the Substation consisting of a pole, base station, and antenna (the "Utility Facilities").

Pursuant to Sections 22-224 and 22-640 of the Fitchburg Code of Ordinances, MGE is applying for an amendment to its existing conditional use to allow the installation of the Utility Facilities at the Substation. Pursuant to Sections 22-605 and 22-606 of the Fitchburg Code of Ordinances, MGE is also applying for Architectural Design Review approval.

Enclosed please find the following:

- Conditional Use Permit Application (Amendment)
- Architectural and Design Review Application
- Addendum to Conditional Use Permit Application and Architectural Design Review Application
- Site Plan and Additional Materials for the Applications
- Check in the amount of \$480 for the Conditional Use Permit application fee

Ms. Lisa McNabola

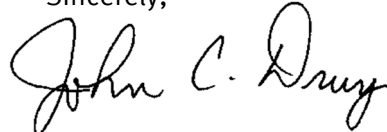
Page 2

January 17, 2022

We hope to have these applications acted on by the City Plan Commission at its meeting on February 15, 2022.

Please do not hesitate to contact me at 252-7081 or [jdrury@mge.com](mailto:jdrury@mge.com) if you have any questions or need additional information. Thank you.

Sincerely,

A handwritten signature in black ink that reads "John C. Drury". The signature is written in a cursive style with a large, looped initial "J".

John C. Drury

Senior Business Development Manager

bjb/Enclosures

cc: Greg Murray, Director Legal Services, MGE (via email)  
Valerie Zisman, City Attorney, City of Fitchburg (via email)

**Addendum to CUP Application and  
Architectural Design Review Application (Amendment)  
(Oakridge Substation)**

This Addendum to CUP Application and Architectural Design Review Application is attached to and a part of the applications submitted by Madison Gas and Electric Company (“MGE”).

MGE owns and operates electrical distribution equipment in the existing Oakridge Substation (the “Substation”) located at 2413 S. Fish Hatchery Road, Fitchburg, Wisconsin (the “Site”). The Site and other equipment in the Substation is owned by the American Transmission Company. The Site is zoned to R-R Rural Density District.

MGE intends to install advanced metering infrastructure (“AMI”) facilities inside the Substation fence consisting of a monopole, base station, and antenna (the “Utility Facilities”). The height of the monopole is approximately 96 feet high. The height of the monopole and antenna is approximately 105 feet high.

Pursuant to Sections 22-224 and 22-640 of the Fitchburg Code of Ordinances, MGE asks to be issued a Conditional Use Permit for the installation and operation of the Utility Facilities.

Section I of this Addendum will provide background on the AMI system and Utility Facilities. Section II of this Addendum will address the general standards specified in Section 22-640(c) of the Fitchburg Code of Ordinances. Section III of this Addendum will address the provisions of Section 22-224 of the Fitchburg Code of Ordinances. Section IV of this Addendum proposes a number of conditions of approval on the installation and operation of the Utility Facilities. Finally, Section V of this Addendum will address Architectural Design Review.

**I. Background on AMI System and the Utility Facilities.**

MGE is beginning the process of installing an AMI system across its service territory in order to improve customer service and utility system operations. The AMI system will collect interval usage data from advanced two-way gas and electric meters via a fixed network system. The AMI system will provide MGE with data regarding electric and gas usage and support improvements in customer service and billing processes. The AMI system will also support additional features and functionality related to system operation, outage management, power quality, voltage monitoring, remote meter reading, tamper detection, gas leak detection, electric meter hot socket detection, and advanced analytics for monitoring the operation of MGE’s distribution systems. Other Wisconsin Utilities, such as Wisconsin Power and Light, have either installed or are in the process of installing AMI systems in their service territories.

The components of the AMI system include advanced gas and electric meters owned by MGE and located on the property of MGE customers, communication infrastructure, software, modules, monopoles, base stations, and antennas. The base stations and antennas are the components of the AMI system that communicate with MGE’s advanced meters and MGE

headquarters. The base station and antenna portion of the AMI system will be attached to the monopole MGE intends to install inside the substation fence at the Substation. The monopole is not required to have lights or a beacon and does not require FAA approval.

The AMI system conveys only data, not voice or video communications. MGE does not charge its customers a separate fee or charge for the conveyance of data over the AMI system. The AMI system does not provide cell phone, mobile service, or telecommunication service to the public. The AMI system is simply one part of MGE's utility infrastructure needed to provide safe and reliable gas and electric service to its customers, including residents of the City of Fitchburg. Despite the fact that the Utility Facilities include a monopole and antenna, it is akin to any other piece of utility distribution equipment. It is possible the monopole will be used for other utility purposes such as the addition of equipment for a supervisory control and data acquisition ("SCADA") system which would help MGE monitor its electrical distribution system. MGE does not intend to lease space on the monopole or allow telecommunication providers or mobile service providers to place equipment on the monopole. The monopole will only be used by MGE for MGE utility purposes.

The installation and operation of the Utility Facilities will not substantively change how the existing Substation operates. The operation of the Utility Facilities do not require storage, outdoor lighting, speakers, or signage. The operation of the Utility Facilities will not require the construction or installation of an equipment building, shelter, cabinet, or back-up generator, and will not generate trash, traffic, noise, light, additional storm water runoff, or dust. The Utility Facilities will not: require the installation of another driveway; require sewer or water as the Utility Facilities do not require indoor plumbing; or significantly change how the existing Substation is maintained and operated. Finally, the AMI System will operate on a secure and licensed radio bandwidth so there will be no issues with other radio operators, such as fire or law enforcement operators. Sensus, the company providing the AMI System and related services, provides a spectrum protected by the FCC as a primary-use license spectrum in both the upstream and downstream directions.

## **II. General Standards Specified in Section 22-640(c).**

The installation and operation of the Utility Facilities meets the general standards specified in Section 22-640(c) of the Fitchburg Code of Ordinances.

- a. That the establishment, maintenance, or operation of the Utility Facilities will not be detrimental to or endanger the public health, safety, morals, comfort or general welfare.**

The installation and operation of the Utility Facilities will not be detrimental to, or endanger the public health, safety, comfort, or general welfare because the Utility Facilities will be installed in an existing distribution substation that has previously been approved as a conditional use. The impact on the existing use is very modest. The operation of the Utility Facilities will not generate noise, light, odors, dust, storm water

runoff, refuse, or traffic. In fact, the installation and operation of the Utility Facilities will improve the public health, safety, and general welfare because it will help MGE provide safe and reliable gas and electric service to Fitchburg residents while not requiring or impacting additional public services.

- b. That the Utility Facilities will not be injurious to the use and enjoyment of other property in the immediate vicinity for the purposes already permitted, nor substantially diminish and impair property values within the neighborhood.**

The Utility Facilities will not be injurious to the use and enjoyment of other property in the area because they will be a modest additional component of the existing Substation (that already includes overhead transmission poles and lines). The operation of the Utility Facilities will not generate noise, light, odors, dust, storm water runoff, refuse, or traffic. The Site is not adjacent to residential development.

- c. That the installation of the Utility Facilities will not impede the normal and orderly development and improvement of the surrounding property for uses permitted in the district.**

Because the Utility Facilities will be installed in an existing substation already approved as a conditional use, they will have no adverse impact on the normal and orderly development and improvements of the surrounding properties for their current or future permitted uses. The Utility Facilities will not encroach physically or otherwise change the character of adjoining future property uses and will be installed with sufficient setbacks to further mitigate any potential adverse effects.

- d. That adequate utilities, access road, drainage, and/or necessary facilities have been or are being provided.**

All existing utilities, access, and other facilities needed to support the installation and operation of the Utility Facilities are already in place. There will be no additional burden on City services such as sewer and water.

- e. That adequate measures have been or will be taken to provide ingress and egress so designed as to minimize traffic congestion in the public streets.**

The operation of the Utility Facilities does not require on-site employees and therefore will not significantly change vehicle access to the Substation. There will be no associated traffic congestion in the public streets.

- f. That the conditional use shall, in all other respects, conform to the applicable regulations of the district in which it is located.**

The Site is zoned R-R Rural Density and the existing Substation is an approved conditional use. With the approval of the CUP Application and the Architectural and Design Review Application, MGE believes the Utility Facilities will conform to the applicable zoning requirements.

### **III. Section 22-224 Utility and Governmental Facilities.**

Pursuant to Sections 22-207 and 22-57 of the zoning code, utility and governmental facilities are a conditional use in the R-R Rural Density District. Section 22-224 of the zoning code specifies how utility and governmental facilities, including wireless facilities, are treated in residential districts and provides as follows:

#### **Sec. 22-224. - Utility and governmental facilities.**

(a) Conditional use approval shall be required for utility and governmental facilities that involve any of the following, individually or in combination:

(1) Installation or removal or significant modification of major utility facilities including any wireless facilities. Major means primary system facilities (interceptors, mains, pumping stations, principal pipelines, substations, new structures, housing equipment and the like).

(2) Acquisition, development or significant modification or removal of municipal facilities, municipal buildings or structures, yards or sites for storage, transfer, waste management, installation or modification of roads.

(3) Utility and governmental agencies are encouraged to submit system plans to the city for review and comment, including periodic update submissions, so that individual facility reviews can occur in a planning framework.

(4) In submitting either system plans or facility plans, applicants shall identify the necessity of the facility. Where the city is legally entitled to require full conditional use review and approval, the full conditional use review procedure shall occur.

(b) Visible utility and governmental facilities shall be sited, designed and screened so as to be reasonably compatible with the appearance of the surrounding areas.

(c) The zoning administrator shall be responsible for determining what specific facilities are subject to this section.

(Ord. No. 2010-O-09, § 22.39(8), 10-12-2010)

In this situation, even though the Utilities Facilities will be installed in an existing Substation is approved as a conditional use, MGE wants to follow the City's conditional use process specified in Sections 22-224(a)(1) and (4) with regard to the Utility Facilities in order to provide the City with the opportunity to understand the AMI system and the Utility Facilities and allow MGE to address any City concerns. The location of the Utility Facilities in the existing Substation means they will be reasonably compatible with the appearance of the Substation and the surrounding areas.

**IV. Proposed Conditions.**

- a. MGE shall obtain and maintain all applicable approvals and permits necessary to install, maintain, and operate the Utility Facilities.
- b. While installing the Utility Facilities, MGE shall keep the Site and adjacent roads free of debris and dust.
- c. At the time the Utility Facilities permanently cease to operate, MGE shall remove the Utility Facilities and restore the Site to substantially the same condition as it existing prior to the installation of the Utility Facilities.
- d. The monopole shall only be used by MGE for MGE utility purposes.

**V. Architectural and Design Review.**

Pursuant to Sections 22-605, 22-606, and 22-607 of the Fitchburg Code of Ordinances, MGE is submitting a site plan and additional materials showing and describing the Utility Facilities. The Utility Facilities consist of only a monopole, base station, and antenna. The operation of the Utility Facilities does not require a building, additional access, parking, walks, lighting, sewer or water. It is not anticipated that the Utility Facilities will impact natural features or existing draining patterns.

## **Site Plan and Additional Materials for MGE's Installation of Utility Facilities at the Oakridge Substation**

1. Site Plan
2. Certified Survey Map. No. 12499
3. Elevation View of the Substation and Utility Facilities
4. Site Aerial
5. Pole Specifications with Dimensions
6. Pole Assembly Details
7. Diagrams of Monopole, Base Station, and Antenna
8. Specifications of Antenna
9. Specifications of Base Station
10. Project Work Overview
11. Grounding Plan
12. Photographs of the Utility Facilities recently installed in other MGE substations
13. Geotechnical Report

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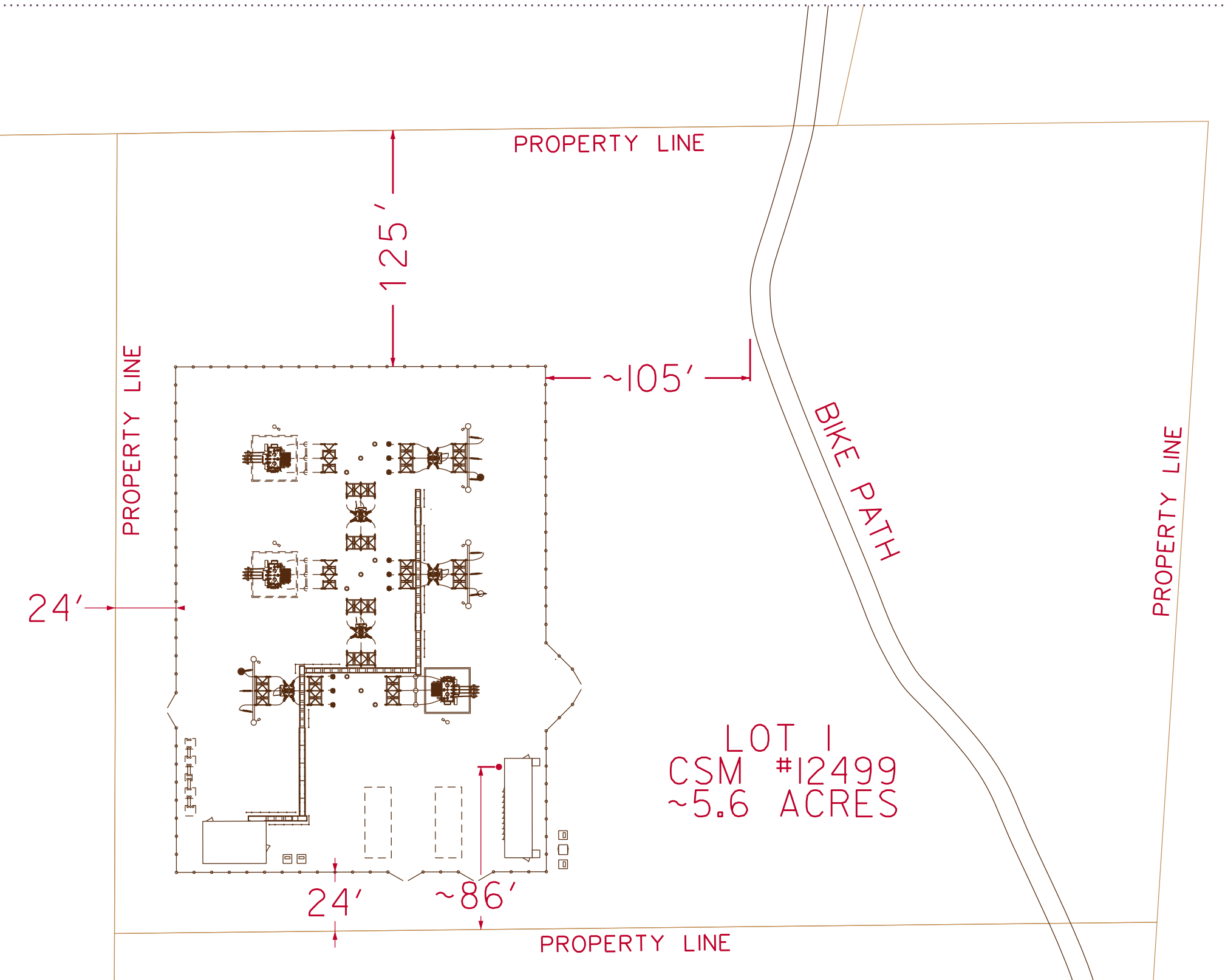
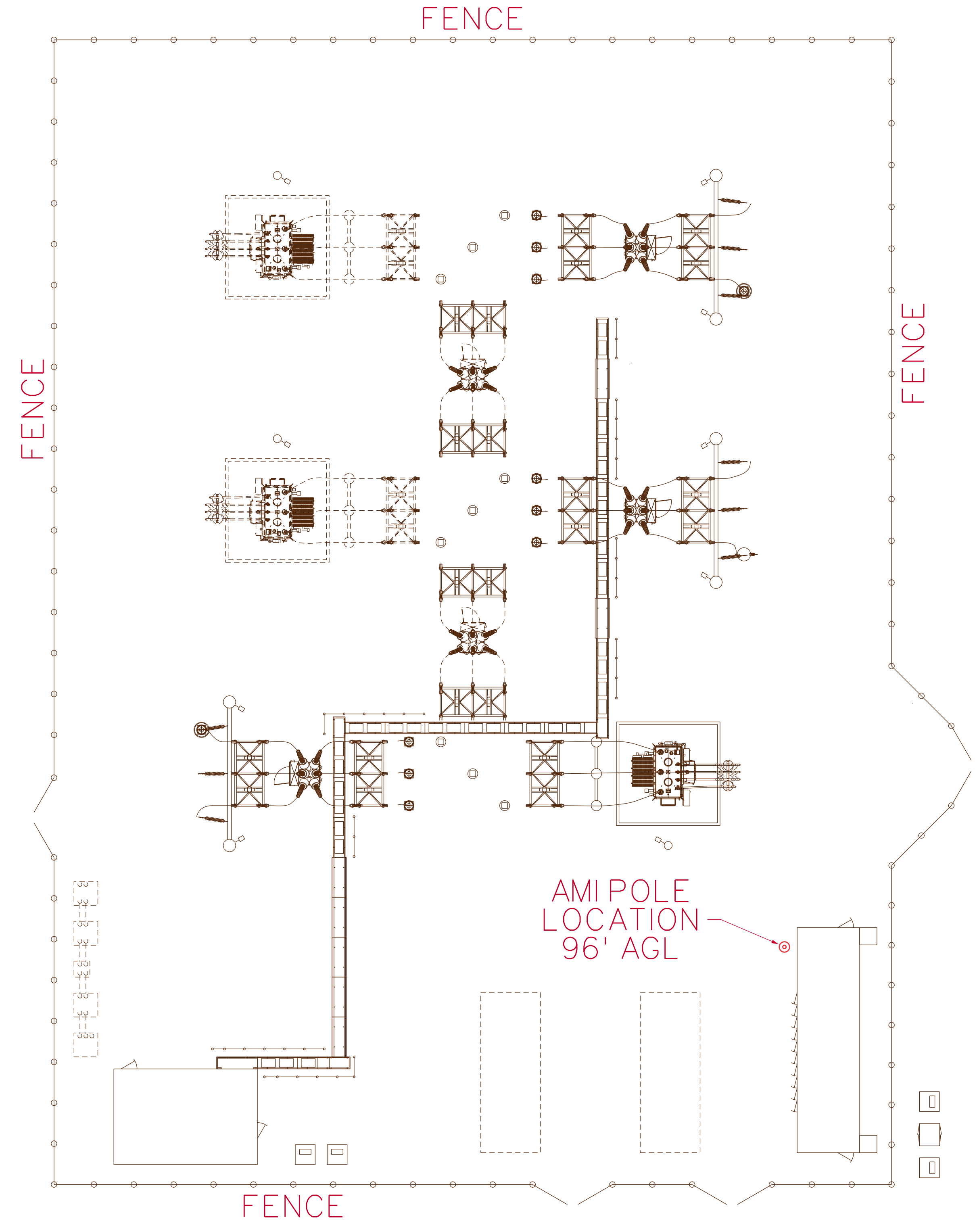
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REVISIONS

FILMED :

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FILE DATE:		DRAWN ON MICRO CE	
<b>OAK RIDGE SUBSTATION</b>			
<b>SUBSTATION SITE PLAN WITH PROPOSED AMI POLE</b>			
DESIGNED FOR <b>mg&amp;e.</b> MADISON GAS & ELECTRIC		MADISON GAS and ELECTRIC COMPANY MADISON - WISCONSIN	
DESIGNED BY:			
DRAWN BY	DATE	DESIGNED	CHECKED
JRE	1-14-22		
APPROVED:		DRAWING NO.	REV
SCALE AS SHOWN			

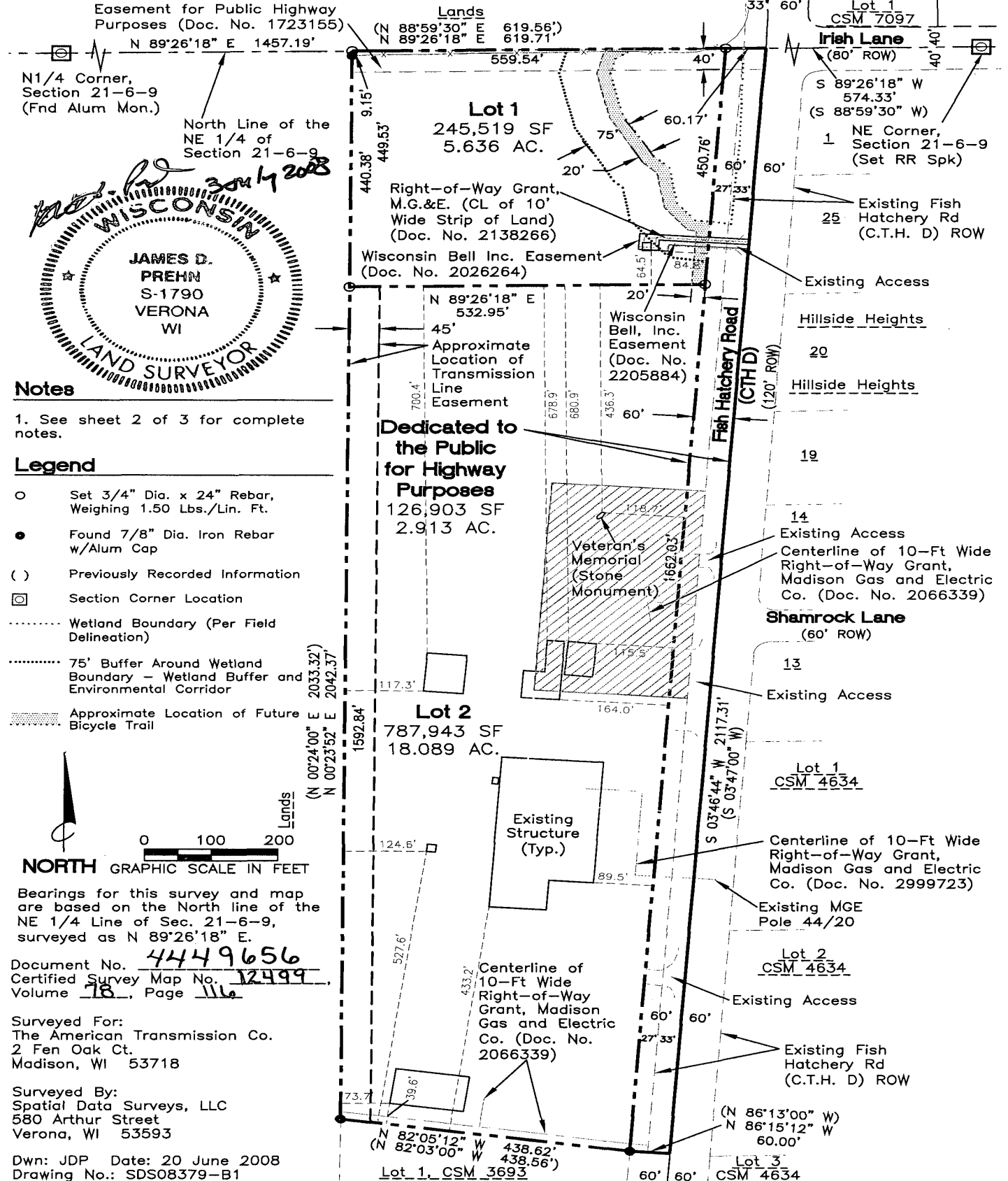


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DANE COUNTY  
REGISTER OF DEEDS

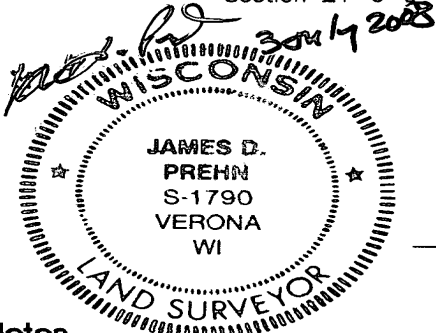
# CERTIFIED SURVEY MAP

Prt of the E 1/2 of the NE 1/4 of Section 21, T6N, R9E, City of Fitchburg, Dane County, Wisconsin



N1/4 Corner,  
Section 21-6-9  
(Fnd Alum Mon.)

North Line of the  
NE 1/4 of  
Section 21-6-9



## Notes

1. See sheet 2 of 3 for complete notes.

## Legend

- Set 3/4" Dia. x 24" Rebar, Weighing 1.50 Lbs./Lin. Ft.
- Found 7/8" Dia. Iron Rebar w/Alum Cap
- ( ) Previously Recorded Information
- ⊠ Section Corner Location
- ..... Wetland Boundary (Per Field Delineation)
- ..... 75' Buffer Around Wetland Boundary - Wetland Buffer and Environmental Corridor
- ..... Approximate Location of Future Bicycle Trail



0 100 200  
GRAPHIC SCALE IN FEET

Bearings for this survey and map are based on the North line of the NE 1/4 Line of Sec. 21-6-9, surveyed as N 89°26'18" E.

Document No. 4449656  
Certified Survey Map No. 12499  
Volume 18, Page 116

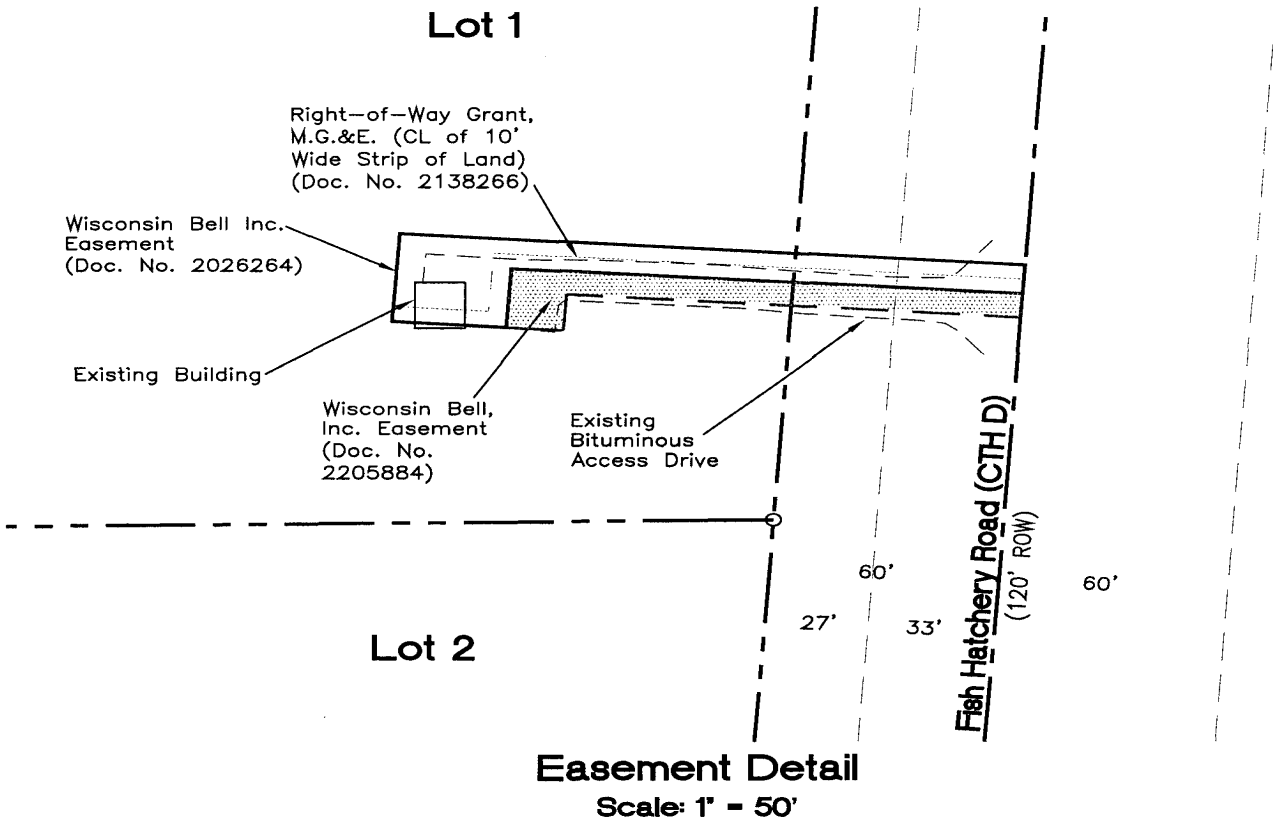
Surveyed For:  
The American Transmission Co.  
2 Fen Oak Ct.  
Madison, WI 53718

Surveyed By:  
Spatial Data Surveys, LLC  
580 Arthur Street  
Verona, WI 53593

Dwn: JDP Date: 20 June 2008  
Drawing No.: SDS08379-B1  
Sheet No.: 1 of 3

# CERTIFIED SURVEY MAP

Prt of the E 1/2 of the NE 1/4 of Section 21, T6N, R9E, City of Fitchburg, Dane County, Wisconsin



**Notes**

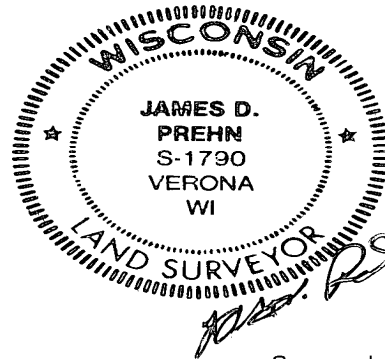
1. This survey is subject to any and all easements and agreements, both recorded and unrecorded.
2. The disturbance of a survey stake by anyone is in violation of Section 236.32 of Wisconsin Statutes.
3. County Trunk Highway D is a controlled access highway pursuant to Chapter 30, Dane Co. Ordinances. There is no vehicular access to County Trunk Highway "D" from this CSM except at the existing driveway accesses.
4. No impervious surfaces are allowed within the wetland buffer except those that are mutually agreed upon for public shared-use paths.

**Existing Zoning/Setbacks (May 2008)**

Lot 1 and 2 (except cross-hatched area):  
 Zoning: A-T District Transitional Agriculture  
 Setbacks;  
 Front: 35 feet  
 Side: 10 feet  
 Side (abutting public street): 30 feet  
 Rear: 50 feet

Lot 2 cross-hatched area:

Zoning: R-L District  
 Setbacks;  
 Front: 30 feet  
 Side: 10 feet  
 Rear: 35 feet



Surveyed For:  
 The American Transmission Co.  
 2 Fen Oak Ct.  
 Madison, WI 53718

Surveyed By:  
 Spatial Data Surveys, LLC  
 580 Arthur Street  
 Verona, WI 53593

Document No. 4449656  
 Certified Survey Map No. 12499  
 Volume 78, Page 117

Dwn: JDP Date: 20 June 2008  
 Drawing No.: SDS08379-B2  
 Sheet No.: 2 of 3

# CERTIFIED SURVEY MAP

Prt of the E 1/2 of the NE 1/4 of Section 21, T6N, R9E, City of Fitchburg, Dane County, Wisconsin

## Legal Description:

Part of the East 1/2 of the Northeast 1/4 of Section 21, T6N, R9E, City of Fitchburg, Dane County, Wisconsin, more particularly described as follows;

Commencing at a railroad spike at the Northeast 1/4 Corner of said Section 21;

Thence along the north line of the Northeast 1/4 of said Section 21, S 89°26'18" W, 574.33 feet to the point of beginning in the centerline of Fish Hatchery Road (C.T.H. D);

Thence along said centerline, S 03°46'44" W, 2117.31 feet;

Thence N 86°15'12" W, 60.00 feet to a 7/8" diameter iron rebar with aluminum cap in the westerly right-of-way line of said Fish Hatchery Road (C.T.H. D);

Thence N 82°05'12" W, 438.62 feet a 7/8" diameter iron rebar with aluminum cap;

Thence N 00°23'52" E, 2042.37 feet a 3/4" diameter iron rebar in the north line of the Northeast 1/4 of said Section 21;

Thence along said north line, N 89°26'18" E, 619.71 feet to the point of beginning.

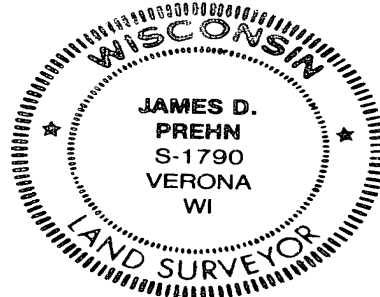
Said parcel contains 1,160,365 square feet or 26.638 acres subject to recorded and unrecorded restrictions, reservations, rights-of-way and easements.

## Surveyor's Certificate:

I, James D. Prehn, Wisconsin Registered Land Surveyor, S-1790, hereby certify that this survey is in compliance with Chapter 236.34 of Wisconsin Statutes. I also certify that I have surveyed and mapped the lands described on this Certified Survey Map, and that this map is a correct representation in accordance with the information provided to me.

James D. Prehn  
James D. Prehn, S-1790

3 July 2008  
Date



## City of Fitchburg Certificate:

This Certified Survey, including any dedications shown thereon, has been duly filed with and approved by the City Council of the City of Fitchburg, Dane County, Wisconsin.

Linda Cory  
Linda Cory, City Clerk

7-8-08  
Date

## Owner's Certificate:

As owner I hereby certify that I have caused the lands described on this Certified Survey Map to be surveyed, divided, and mapped as shown.

State of Wisconsin)  
County of Dane ) Personally came before  
me this 8th day of July, 2008 the  
above-named owner, to me known to be the  
person who executed the foregoing instrument  
and acknowledged the same.

Thomas Anderson  
City of Fitchburg

Patricia A. Anderson

Notary Public, Dane County, Wisconsin  
My Commission expires 12-4-2011

## Dane County Register of Deeds Certificate:

Received for recording this 10<sup>th</sup> day of July, 2008 at 3:40 o'clock P.M and recorded in Volume 78 of Dane County Certified Survey Maps, on Pages 116, and 117, and 118.

Kristi Chlebowski by Shelly Sehofer, deputy  
Dane County Register of Deeds

Document No. 4449656  
Certified Survey Map No. 12499  
Volume 78, Page 118

Surveyed For:  
The American Transmission Co.  
2 Fen Oak Ct.  
Madison, WI 53718

Surveyed By:  
Spatial Data Surveys, LLC  
580 Arthur Street  
Verona, WI 53593

Dwn: JDP Date: 20 June 2008  
Drawing No.: SDS08379-B3  
Sheet No.: 3 of 3

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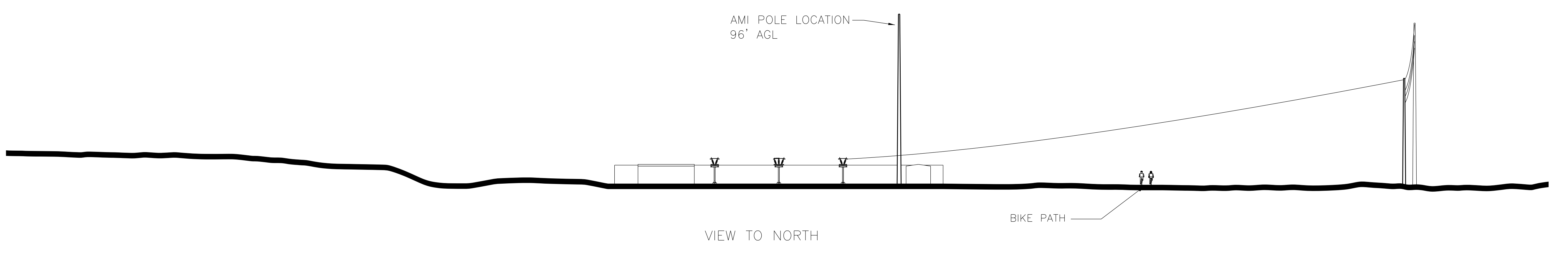
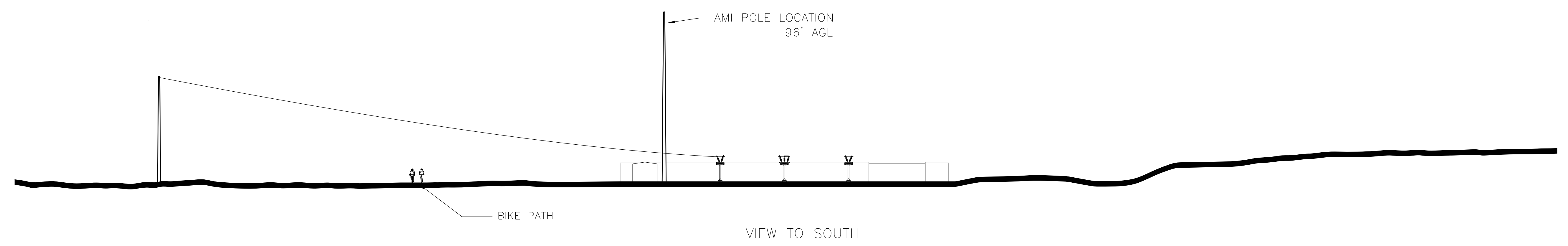
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PLOT DATE:							
PLOT TIME:							
FILE NAME:							
OAK RIDGE SUBSTATION							
ELEVATION PLAN WITH PROPOSED AMI POLE							
DESIGNED FOR:				MADISON GAS and ELECTRIC COMPANY			
<b>mg&amp;e.</b>				MADISON GAS and ELECTRIC COMPANY			
DRAWN BY:		DATE:		DESIGNED BY:		CHECKED BY:	
JRE		1-14-22		WJSON		WJSON	
APPROVED:		DWG. NO.:		SCALE:		REV.:	
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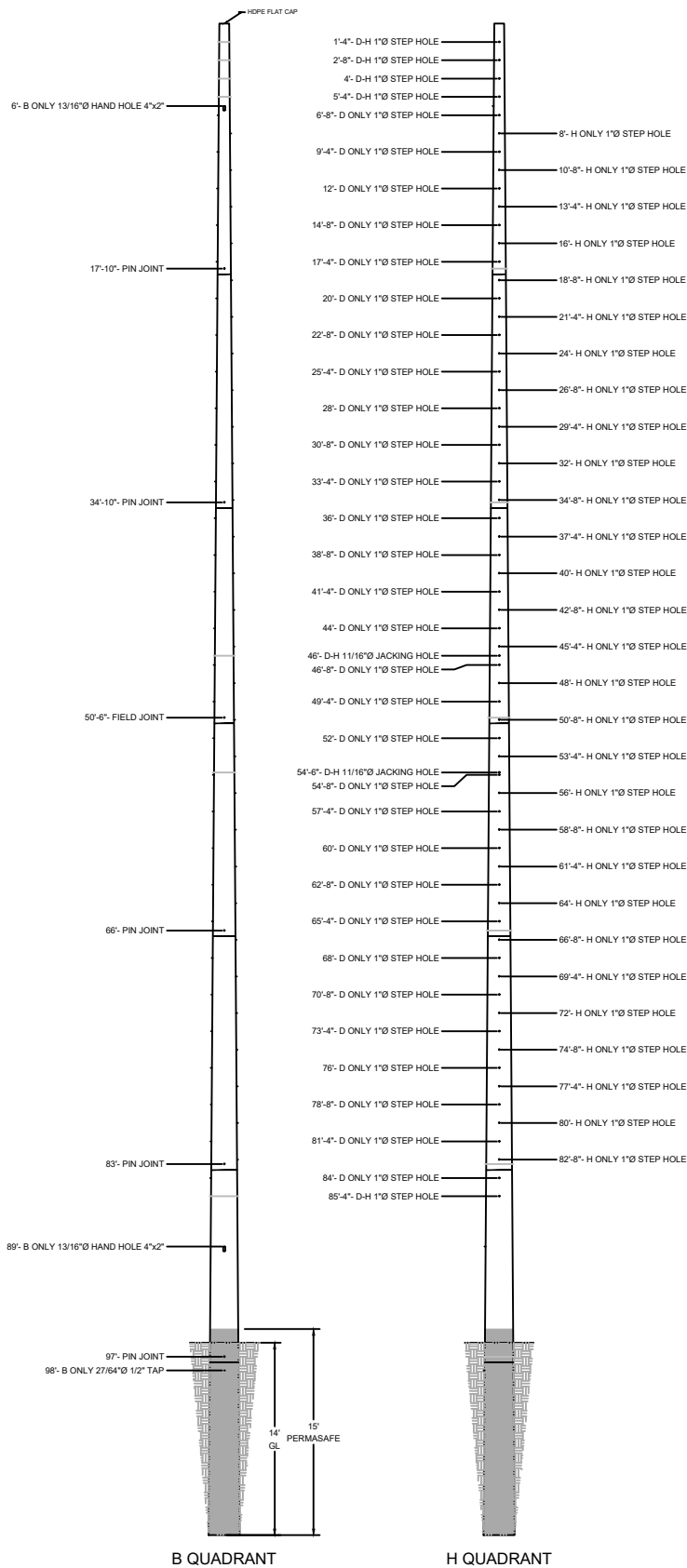
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25.7 MINIMUM INSERTION AT FIELD JOINT

POLE SPECS			
TIP LOAD (KIPS)	4.16	GL CAPACITY (KIP-FT)	391.0
TIP DIAMETER (IN)	8.7	APPROX. BASE DIAMETER (IN)	27.1
WEIGHT (LBS)	8003	2 PIECE POLE	Yes
GROUND PLATES:	No	HOLE PLUGS:	No



CLASS:	H2	DWG# 1648A	
QUANTITY:	9		
LENGTH:	110	FINISH:	Gray
CAP:	HDPE Flat		
DRAWN BY:	LNB	NOT TO SCALE	REVISION
DRAWN ON:	10-20-2020		

# Field Assembly Instructions

The following are guidelines for field assembly of two-piece McWane poles.

Respective company and equipment guidelines should be followed. Assembly equipment required include a McWane Poles jacking kit, two chain hoists, a drill, 11/16" drill bit, two wrenches, and water-based lubricant. A 5/8" through-bolt and nut are provided with each two piece pole by McWane Poles to mechanically secure the slip joint. Jacking Kits are available for purchase from McWane Poles. Jacking Kit contents include four jacking lugs, and two 5/8" bolts. Jacking kits are reusable.

## Assembly Steps:

- Step 1: Attach four (4) jacking lugs to pole sections at 11/16 hole locations with 5/8" bolts (included in jacking kit).
- Step 2: Align pole sections, making sure quadrants are aligned. The tip of inserting section should be elevated slightly to go into the receiving section.
- Step 3: Connect two chain hoists to jacking lugs.
- Step 4: Jack pole sections together with two chain hoists simultaneously. Sections should be jacked with a force equal to the anticipated axial load, and overlap distance shall be at least equal to 1.5 times the inside diameter of the bottom of the receiving section. Ensure minimal gap between adjoining sections.  
**Note: Insertion depth could be greater than specified minimum insertion depth depending on pole class.**
- Step 5: Drill through the inserted section at hole locations provided in receiving section. Remove pilot bit from hole saw bit to avoid breaking pilot bit when drilling hole for through-bolt.
- Step 6: Insert through-bolt through holes in section overlap and tighten nut.

## Helpful Tips:

- Perform section insertion with pole in the horizontal position if possible.
- Field assembly may affect specified pre-drilled hole measurement on the bottom section of the structure depending on the amount of overlap of sections.

The example below is of the assembly of a Class I 65' pole assembly.

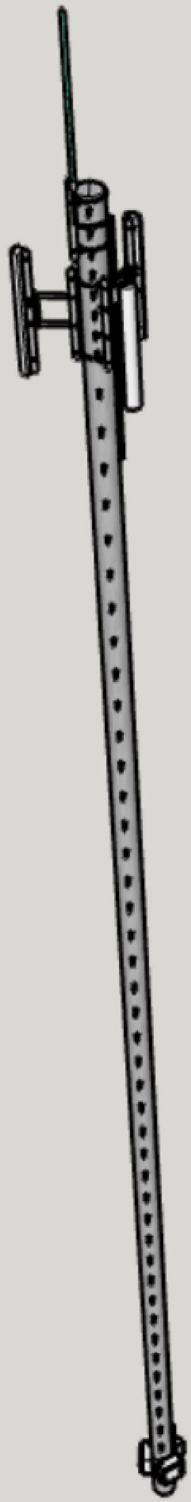


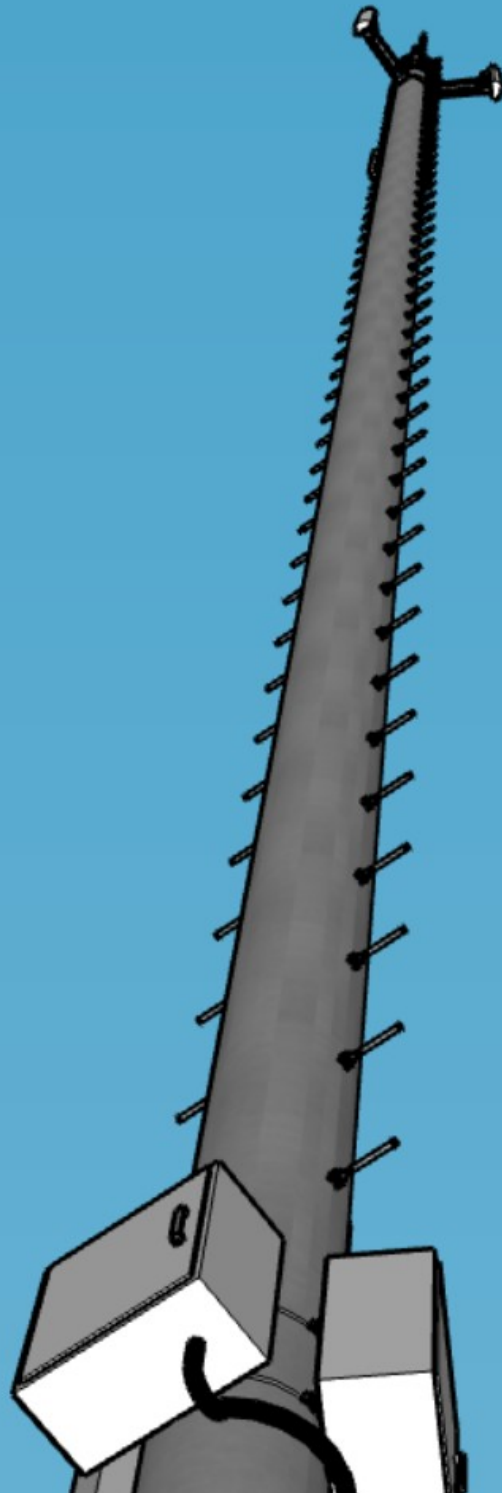


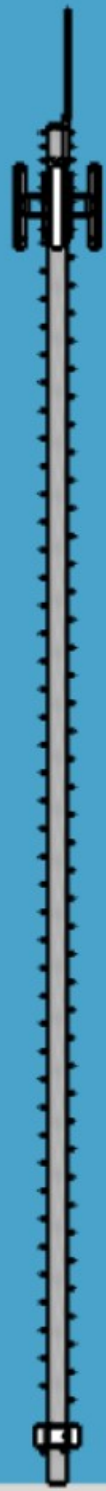
Pictured Above: Four jacking lugs are attached with bolts provided with the McWane jacking kit. Chain hoists are connected to jacking lugs and in position for section assembly. The 17" mark indicates the minimum section insertion amount the example pole and **will be clearly marked by the factory**. The minimum insertion amount will vary based upon pole length and section number. The inserting section should be inserted to the minimum overlap mark and to the anticipated axial load.



Pictured Above: The inserting section reaches the minimum of 17" for the C1 65'. The through-bolt hole in the receiving section can be seen three inches from the joint.







# DB589-Y

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1-port omni antenna, 890–960 MHz, 360° HPBW, fixed electrical tilt, fits on 38–51 mm (1-1/2 to 2 in) OD pipe

- Light weight, low profile omnidirectional antenna ideal for low to moderate gain applications
- Integral dual purpose mount allows top or side mounting

## General Specifications

<b>Antenna Type</b>	Omni
<b>Band</b>	Single band
<b>Color</b>	Horizon blue
<b>Grounding Type</b>	RF connector inner conductor and body grounded to reflector and mounting bracket
<b>Performance Note</b>	Outdoor usage
<b>Radome Material</b>	Fiberglass, UV resistant
<b>Radiator Material</b>	Brass
<b>RF Connector Interface</b>	N Female
<b>RF Connector Location</b>	Bottom
<b>RF Connector Quantity, low band</b>	1
<b>RF Connector Quantity, total</b>	1

## Dimensions

<b>Length</b>	2794 mm   110 in
<b>Outer Diameter</b>	38.1 mm   1.5 in

## Electrical Specifications

<b>Impedance</b>	50 ohm
<b>Operating Frequency Band</b>	890 – 960 MHz
<b>Polarization</b>	Vertical

## Electrical Specifications

<b>Frequency Band, MHz</b>	<b>890–960</b>
<b>Gain, dBi</b>	11.1
<b>Beamwidth, Horizontal,</b>	360

# DB589-Y

---

## degrees

<b>Beamwidth, Vertical, degrees</b>	9
<b>Beam Tilt, degrees</b>	0
<b>VSWR   Return loss, dB</b>	1.5   14.0
<b>PIM, 5th Order, 2 x 20 W, dBc</b>	-153
<b>Input Power per Port, maximum, watts</b>	400

## Mechanical Specifications

<b>Wind Loading at Velocity, maximum</b>	176.1 N @ 100 mph   39.6 lbf @ 100 mph
<b>Wind Speed, maximum</b>	201 km/h   124.896 mph

## Packaging and Weights

<b>Included</b>	V-bolts
<b>Net Weight, without mounting kit</b>	5.2 kg   11.464 lb

## Regulatory Compliance/Certifications

<b>Agency</b>	<b>Classification</b>
CHINA-ROHS	Below maximum concentration value
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system
REACH-SVHC	Compliant as per SVHC revision on <a href="http://www.commscope.com/ProductCompliance">www.commscope.com/ProductCompliance</a>
ROHS	Compliant



## \* Footnotes

<b>Performance Note</b>	Severe environmental conditions may degrade optimum performance
-------------------------	---



## FlexNet M400B2 Base Station

### Compact Point-to-Multipoint Base Station

The Sensus FlexNet® M400B2 Base Station offers a strategic communications option for public service providers with endpoints deployed in remote or densely populated areas.

The efficient transceiver can transmit and receive in a 200kHz band of spectrum. 200kHz enables more dedicated channels, resulting in higher network capacity, allowing more granular data and more channels of data. And the Sensus FlexNet communication network delivers double the transmit power of competitive systems over primary-use licensed spectrum – ensuring reliability for mission critical applications.

The tower-based architecture enables reliable communication of status and usage information with fewer access points than other network architectures. These compact, efficient base stations fit in space-constrained environments and require no air conditioning.

#### Licensed Radio Spectrum

In North America, FCC/IC protected primary-use spectrum avoids competition with other wireless services, interference from other radio devices and the risk of being taken over by emergency service providers.

#### Fewer Access Points

Our point-to-multipoint architecture directly connects base stations to endpoints over large geographic areas – greatly reducing the number of network backhaul connections as well as O&M costs.

#### Resilient Network Design

Sensus Base Stations continue to provide real time data during outages and emergencies because of eight hour plus battery backup – enabling better workforce management and faster service restoration.

#### Small Footprint

Flexible pole or wall-mounting options enable strategic deployment with a discreet appearance.

#### Industry Leading Security

Sensus has achieved GE/Wurldtech™ Achilles® communications certification for critical infrastructure security against cyber threats.

#### FEATURES

- GPS receiver for time synchronization
- Duplexer for single antenna
- IP-addressable power supply with hot-swap capability
- 8-hour battery backup
- Alarms and reporting capability
- Backhaul via Ethernet/IP
- Heated battery for cold weather environments
- Modular construction for easy serviceability

#### APPLICATIONS

- Two-way Advanced Meter Infrastructure (AMI)
- Distribution Automation (DA)
- Demand Response (DR)
- Home Area Networks (HAN)
- Sensus VantagePoint® Lighting Control

# FlexNet® M400B2 Base Station

## Compact Point-to-Multipoint Base Station



### PROPERTIES

Receive bandwidth	200 KHz
Transceivers	Single
Spectrum	Licensed 900 MHz PCS/MAS
Duplexing	Single transmit Sixteen receivers - simultaneous/dedicated
Applications	Single
Expandability	No
Compatibility	SNMP
FlexNet	Requires RNI 3.x or newer

### ENCLOSURES - OUTDOOR - POLE/WALL MOUNT

Height	22" (55.9 cm)
Width x Depth	22" (55.9 cm) x 10.5" (26.7 cm)
Capacity	One transceiver
Temperature	-40° to +122° F (-40° to +50° C)
Voltage	120 VAC
Battery backup	8 hours
NEMA rating	4
Air conditioned	No



Xylem.com | Sensus.com

**SENSUS** | 637 Davis Drive | Morrisville, NC 27560 | 800.638.3748

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# OKG AMI Pole Installation Design Summary Document

## Project Overview:

As part of MGE's AMI network deployment, we would like to install a 100' AGL steel pole within Oakridge (OKG) substation (2413 S. Fish Hatchery Rd, Fitchburg, WI).

This pole would be located adjacent to the existing MGE control house. The pole is 110' length, ductile iron construction, 9" top diameter, 27" bottom diameter, 8000 lbs. weight.

Climbing pegs and a 10' fiberglass crossarm will be installed on the pole and a 4' ice bridge will be extended horizontally from the MGE control house to the pole. AC power will be pulled across to power up the AMI equipment mounted at the bottom of the pole. A 100" antenna will be mounted to the top of the pole on a fiberglass crossarm.

## Foundations/Installation:

Soils & Engineering, Inc will perform a soil boring at the proposed pole location. They will also perform geotechnical and environmental analysis of the soil and will be consulted should pole installation questions arise.

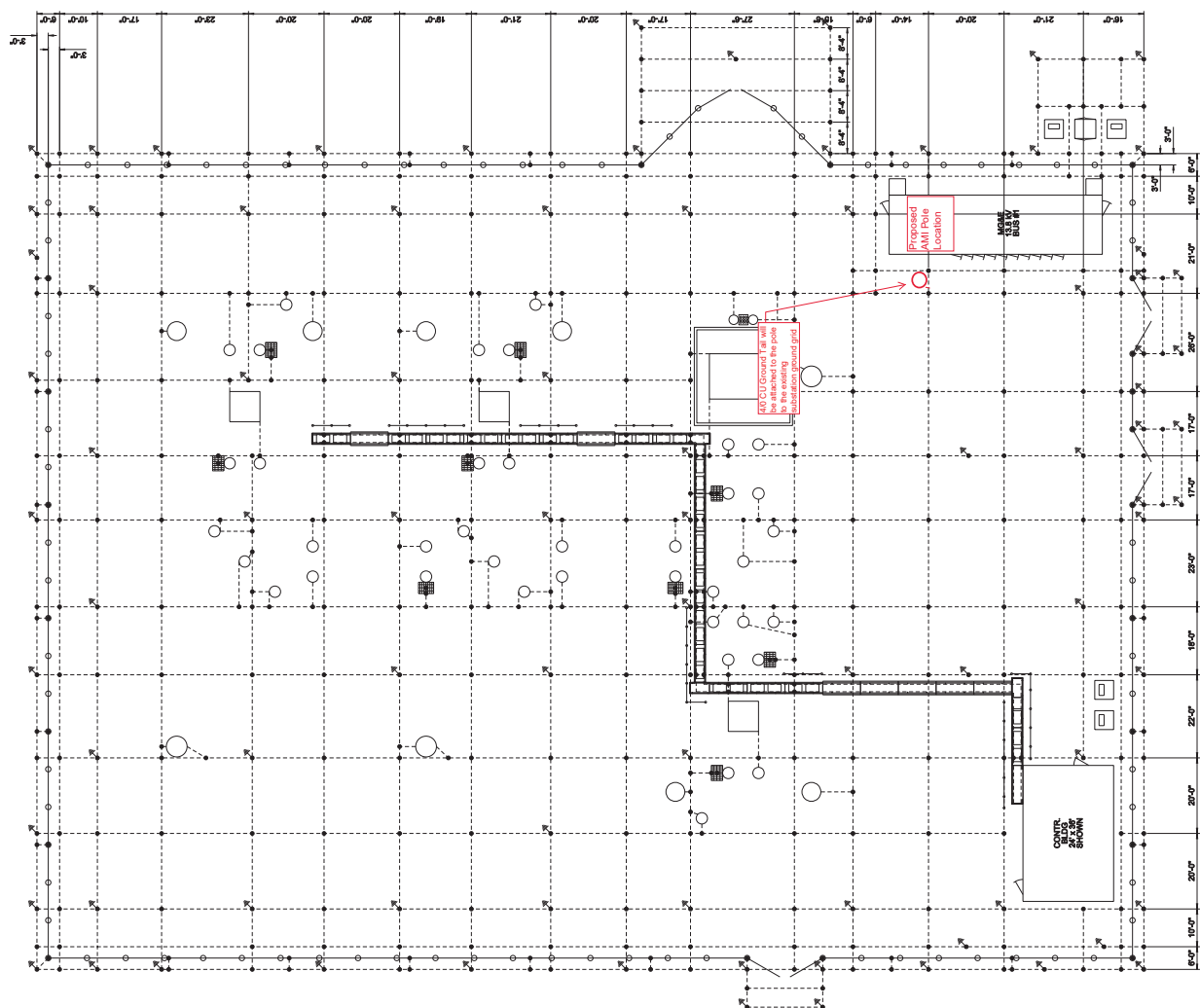
MGE is planning on a 42" diameter hole dug 14' into native soil with a pressure digger. A 42" galvanized culvert will be inserted and spun into the hole. Pole will be inserted, centered and made vertical. The hole will be backfilled and mechanically tamped with a fine and coarse gravel mixture. This design may be modified based on the Soils & Engineering recommendation.

The pole will be connected to the existing ground grid with a 4/0 CU ground tail 18" below grade.

Hooper will be assembling and installing the pole, MGE will handle the wiring and Sensus will handle the AMI equipment installation.

## Schedule:

March 2022 construction – To be confirmed.



2008 GROUNDING GRID DESIGN DATA

Program Used: CDESS/AMLT

Soil Layer Data (Summer)	Soil Layer Data (Winter)
Resistivity (ohm-meters)	Resistivity (ohm-meters)
Thickness (feet)	Thickness (feet)
1st 6.3	1st 5
2nd 38.4	2nd 15
3rd 250.6	3rd infinite
	infinite

**SURFACE ROCK RESISTIVITY:** Split Factor: 100%

Resistivity: 3000 ohm-meter # Transmission Statics Modeled: 0

Depth: 6 inches # Distribution Neutral Modeled: 0

Fault Current	Calculated Max. Potentials (volts) (winter)	Allowable Potentials (volts) (winter)
Maximum: 11.6 kA	354	2564
Design: 11.6 kA	Step	354
Duration: 30 cycles (0.3 sec.)	Tough	846

Grid resistance: Calculated: 0.73

Measured:

# Transmission Statics Tied Into Grid: 0

# Distribution Neutrals Tied Into Grid: 0

- LEGEND**
- #40 CU
  - GROUND ROD - 50P16-0"
  - GROUND CONNECTION
  - ▬ GROUNDING GRATE

**GENERAL NOTES:**

1. BILL OF MATERIALS FOR GROUNDING
2. ALL TALLS SHALL EXTEND AT LEAST 8' ABOVE TOP OF CONCRETE UNLESS OTHERWISE NOTED.

ARC  
AMERICAN RIDGE SUBSTATION COMPANY

**GROUNDING PLAN**

**OAK RIDGE SUBSTATION**

DRAWING NO. **OKG-03-03**

DATE: 11/18/11

REV	DATE	ISSUE	BY	CHK'D
1	07/14/09	AS BUILT REV 0	BLS	JFR
0	08/08/09	ISSUE FOR CONSTRUCTION	BLS	JFR
			SWAN	ECI
			ECI	ECI
			ECI	ECI
			ECI	ECI

AMERICAN RIDGE SUBSTATION COMPANY  
10000 W. WOODBRIDGE AVENUE  
DALLAS, TEXAS 75244  
TEL: 972.382.1000  
WWW.ARC-CORP.COM

Similar facilities installed by MGE









**Soils &  
Engineering  
Services, Inc.**

October 22, 2021

Project 13392.8 R01

Mr. Michael J. Lashua, PE  
Madison Gas & Electric Company  
632 Railroad Street  
Madison, Wisconsin 53703

Subject: Geotechnical Exploration and Analyses Report  
Proposed Communication Pole  
MG&E Oak Ridge Substation  
2413 South Fish Hatchery Road  
City of Fitchburg  
Dane County, Wisconsin

Dear Mr. Lashua:

We have completed the requested exploration consisting of the performance of one boring and associated laboratory testing and geotechnical engineering analyses. The purpose of the boring was to obtain information about the soil, bedrock, and water conditions at the boring location. We present our findings and our comments and recommendations in the enclosed *Geotechnical Exploration and Analyses Report* for the subject project.

Respectfully submitted,

**SOILS & ENGINEERING SERVICES, INC.**

Craig M. Bower, P.E.

CMB:DER:cmb

Enclosure

Delivered by email: [mlashua@mge.com](mailto:mlashua@mge.com)

# GEOTECHNICAL EXPLORATION AND ANALYSES REPORT

**PROPOSED COMMUNICATION POLE  
MG&E OAK RIDGE SUBSTATION  
2413 SOUTH FISH HATCHERY ROAD  
CITY OF FITCHBURG  
DANE COUNTY, WISCONSIN  
SES Project Number 13392.8**

Prepared By

Soils & Engineering Services, Inc.  
1102 Stewart Street  
Madison, Wisconsin 53713-4648  
phone: (608) 274-7600  
e-mail: soils@soils.ws

Craig M. Bower, P.E.



Submitted To

Madison Gas & Electric Company  
632 Railroad Street  
Madison, Wisconsin 53703  
Phone: (608) 252-7246

Mr. Michael J. Lashua, PE

October 22, 2021



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#### Appendix A

- Location Sketches, Drawings 13392.8-1A and 13392.8-1B
- Notes and Legend Record for Boring Log Record
- Boring Log Record for Boring OR-1
- WDNR Well/Drillhole/Borehole Abandonment Form for Boring OR-1

#### Appendix B

- Recommended Soil Design Parameters and Drilled Shaft Values, Table B-1

#### Appendix C

- Seismic Site Class Record
- ATC "Hazards by Location" Information Printout

#### Appendix D

- *Important Information about This Geotechnical-Engineering Report advisory*



## I. INTRODUCTION

This *Geotechnical Exploration and Analyses Report* summarizes the findings of the geotechnical exploration, laboratory tests, and geotechnical engineering analyses performed for the design and installation of a new AMI/SCADA mast at the Oak Ridge Substation located at 2413 South Fish Hatchery Road in the City of Fitchburg in Dane County, Wisconsin. We completed this work under the general direction of Madison Gas & Electric Company (MG&E) who established the general scope of the work.

The intent of this report is to: (1) convey the geotechnical information obtained from one boring; (2) present the results of laboratory and field tests; (3) provide the results of our geotechnical engineering analyses; and (4) present our comments and recommendations for the design and construction of the proposed improvements. We recommend Madison Gas & Electric Company employ Soils & Engineering Services, Inc. (SES) to make observations and perform tests at the time of excavation and construction of the proposed improvements to verify the subsurface conditions encountered by the exploration performed, and to validate our comments, analyses, and recommendations presented in this report for the subject improvements.

## II. PROJECT DESCRIPTION

The subject mast construction described herein is a part of the planned AMI/SCADA mast installation at MG&E substations located in Dane County, Wisconsin. We completed the field work for four of these MG&E substations on September 28 and 29, 2021. This is the second series of four substations where we have completed explorations. As requested, we will provide a separate *Geotechnical Exploration and Analyses Report* for each of the four substations.

As part of the field work at the four substations, we were requested to screen the recovered soil samples for volatile organic compounds (VOCs) using a photoionization detector (PID). We include the PID results on the Boring Log Records included with the *Geotechnical Exploration and Analyses Report* for each of the four substations.

We were also requested to submit one composite soil sample to a laboratory for chemical analyses for VOCs, semi-volatile organic compounds (SVOCs), metals using toxicity characteristic leachate procedure (TCLP), diesel range organics (DRO), and polychlorinated biphenyls (PCBs) from the soils between the ground surface and a depth of approximately 4 feet at each substation site. To create the composite soil sample, we performed one to two direct push borings adjacent to the geotechnical boring at each of the four substations. We will provide the results of the chemical analyses completed for the four substations in a separate transmittal.

The subject of this report consists of the installation of a new AMI/SCADA mast at the Oak Ridge Substation. The subject project site is located approximately 375 feet south of the intersection of Irish Lane and South Fish Hatchery Road. We understand this mast will consist of an unguayed 110-foot long wood pole installed 13.5 feet below-grade.



We understand the wood pole will be installed in a 4-foot-diameter augered hole extended to the design depth. Depending upon the final design, the installed pole in the augered hole will be backfilled with compacted gravel or concrete. If needed, a 4-foot-diameter culvert may be installed into the drill hole.

### III. GEOTECHNICAL EXPLORATION

The geotechnical field exploration consisted of the performance of one boring (designated Boring OR-1). We present the results of this geotechnical field exploration on the Boring Log Record enclosed in Appendix A. The Boring Log Record presents the subsurface stratigraphy and related information obtained by the boring. We provide information pertinent to the Boring Log Record on the Notes and Legend Record enclosed in Appendix A.

#### A. Boring Location

We located Boring OR-1 at the staked location as shown on the Location Sketches, Drawings 13392.8-1A and 13392.8-1B, enclosed in Appendix A. We understand the boring location was staked by MG&E personnel.

#### B. Boring Elevation

Soils & Engineering Services, Inc. personnel determined the ground surface elevation at the location of Boring OR-1 using a surveying level and a leveling rod. We used the top of the concrete floor slab for the building located east of the boring location within the substation. We show the approximate benchmark location on the Location Sketch enclosed in Appendix A. This benchmark has an assumed elevation of 100.0 feet.

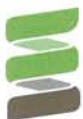
We include the ground surface elevation for the boring on the Boring Log Record enclosed in Appendix A. The Boring Log Record is plotted with depth and elevation scales for reference.

#### C. Drilling and Sampling Procedures

We drilled and sampled Boring OR-1 to the following depth below ground surface and corresponding elevation:

Boring	Ground Surface Elevation (feet)	Bottom of Boring	
		Depth (feet-inch)	Elevation (feet)
OR-1	99.6	25'-0"	74.6

We used a Geoprobe 7822DT drill rig mounted on a rubber-tracked carrier to complete the boring. We used 2¼-inch-inside-diameter HSA for the boring to maintain an open borehole as we advanced the borehole of the boring to the termination depth. We



obtained soil samples at 2- to 3-foot intervals starting at the ground surface and continued to termination depth of the boring. We performed this sampling using a 2-inch-outside-diameter split-barrel sampler according to ASTM Designation D1586.

We visually identified the recovered soils in general compliance with the Unified Soil Classification System (USCS) identification procedures as defined in ASTM Designation D2488.

Please refer to the Boring Log Record enclosed in Appendix A for additional information regarding the drilling and sampling of Boring OR-1.

#### D. Borehole Abandonment

We abandoned the borehole in compliance with the State of Wisconsin Administrative Code Chapters following the removal of the drilling tools and HSA. Please refer to the WDNR Well/Drillhole/Borehole Abandonment Form 3300-005 enclosed in Appendix A for specifics regarding the abandonment of the boring completed.

#### E. Subsurface Stratigraphy

The soil stratigraphy encountered at Boring OR-1 consisted of fill material over topsoil overlying native soil strata. The boring did not encounter bedrock below the native soil within the depth drilled.

The fill material over topsoil encountered by the boring consisted of 5 feet of brown fine SILTY GRAVEL WITH SAND (GM) FILL mixed with occasional dark brown LEAN CLAY (CL) over 23 inches of very dark brown LEAN CLAY (CL) TOPSOIL.

Below the fill material over topsoil, Boring OR-1 encountered a native soil strata consisting of light grayish-brown LEAN CLAY (CL) over gray, brown, and dark brown LEAN CLAY (CL) stratified with fine SILTY SAND (SM) seams and layers over brown fine to medium POORLY-GRADED SAND WITH GRAVEL (SP).

Please refer to the Boring Log Record enclosed in Appendix A for a further description of the fill material, topsoil, and native soil strata encountered at the location of Boring OR-1.

#### F. Subsurface Water

Our drilling crew found the borehole of the boring to be caved and dry at the completion of the drilling and sampling of the boring. We present the caved level depth and respective elevation obtained for the boring as follows:



Boring	Ground Surface Elevation (feet)	Caved Level	
		Depth (feet-inch)	Elevation (feet)
OR-1	99.6	22'-2"	77.4

We expect the subsurface (groundwater) levels to fluctuate as influenced by precipitation, snowmelt, surface water runoff, and other hydrological and hydrogeological factors. The groundwater levels at the time of construction of the subject project may be higher or lower than the groundwater levels encountered on the day that we performed the boring.

#### IV. FIELD TESTS

The field tests consisted of the performance of the standard penetration test (SPT) and photoionization detector (PID) screening.

We performed the SPT during the sampling procedure at the boring. It consists of driving the split-barrel sampler up to 18 inches with a 140-pound hammer weight falling 30 inches. From the SPT, we obtain the N-value which is the sum of the number of blows required to drive the split-barrel sampler the last 12 inches or portion thereof as noted on the Boring Log Record. We correct the N-value for hammer efficiency  $\{N_{60}\text{-value}\}$  and normalize it to an effective overburden pressure at 1-atmosphere  $\{(N_1)_{60}\text{-value}\}$  based on estimated densities for the soils and bedrock encountered by the boring.

As requested, we performed the PID screening during the sampling procedure at the boring. Our drilling crew placed material recovered by the split-barrel sampler at each sampling depth into plastic zip-top bags for use in VOCs screening. They agitated the soil to be screened and allowed the soil to stand for at least 15 minutes at 70 Fahrenheit before screening. We used a MiniRae 3000 PID equipped with a 10.6 electron volt lamp to screen soil samples obtained during the boring operations. Our drilling crew recorded PID readings ranging from 0.4 to 1.0 equivalent units of isobutylene calibration gas. Our drilling crew did not detect any odors emitting from the samples obtained or the auger cuttings. Our scope of services does not include an evaluation of the PID results.

We include the N-value,  $N_{60}$ -value,  $(N_1)_{60}$ -value, and PID field test results obtained for this report on the Boring Log Record enclosed in Appendix A.

##### A. Test Results Discussion

The field tests indicated the following:

- The granular FILL is in a moist relative moisture condition and in a very loose to loose state of relative density.



- The buried very dark brown LEAN CLAY (CL) TOPSOIL is in a moist relative moisture condition and of medium consistency.
- The light grayish-brown mottled LEAN CLAY (CL) is in a moist relative moisture condition and of very stiff consistency.
- The gray, brown, and dark brown LEAN CLAY (CL) stratified with fine SILTY SAND (SM) seams and layers is in a moist relative moisture condition and of medium consistency.
- The brown fine POORLY-GRADED SAND WITH GRAVEL (SP) is in a moist relative moisture condition and in a medium dense state of relative density.

We utilized the field tests results in our evaluation of the soils for the determination of soil design parameters, and to provide comments and recommendations for the design and construction of the subject project.

## V. CONCLUSIONS

We offer the following comments regarding the soils encountered by the boring:

- The granular FILL and buried TOPSOIL are considered to be of low strength.
- The light grayish-brown mottled (CL) is of moderate strength.
- The gray, brown, and dark brown LEAN CLAY (CL) stratified with fine SILTY SAND (SM) seams and layers is of low to moderate strength.
- The native granular soil stratum is considered to be of moderate strength.

Based on the soil information obtained, construction of the proposed mast is feasible.

## VI. COMMENTS AND RECOMMENDATIONS

Based on the boring information and the results of the laboratory tests performed, we offer the following comments and recommendations regarding the design and construction of the Proposed Communication Pole for the MG&E Oak Ridge Substation located at 2413 South Fish Hatchery Road in the City of Fitchburg, Dane County, Wisconsin.

### A. Design Soil Parameters

We recommend the density, friction angle, cohesion, skin friction, and end bearing parameters presented in Table B-1 enclosed in Appendix B for the soil strata encountered by the boring.



## B. Augering

Caving of the granular FILL and native soil strata into the augered hole is anticipated to occur. We recommend that temporary steel casing be used to maintain an open borehole so that the subject pole can be installed.

## C. Cold Weather Fill Material Placement

During cold weather conditions, we recommend the pole backfill material not be deposited over or against frozen soil, either frozen native soil or frozen fill material. Also, backfill materials to be placed and compacted should not be frozen or contain snow or ice.

## D. Lateral and Vertical Support of Existing Improvements

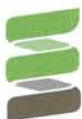
To maintain the stability of existing improvements (e.g. structures, apron pavement, sidewalks, utilities, etc.), the soil supporting these existing improvements should be properly retained at all times. We recommend the project engineer review the foundation grades corresponding to nearby existing structures with respect to the proposed excavation depths for the proposed improvements to determine if the existing structures or utility lines may be affected by the excavations that are accomplished for this project. If any excavation accomplished for the proposed improvements will intersect a 1½H:1V line extending down and away from the exterior limits of the existing improvements (such as building foundations or paved areas), then it may be necessary to underpin the existing structures or provide a suitable earth retaining method (such as steel sheetpiling or soil nailing) to support the existing improvements. This work should be completed prior to any excavation extending below the level of the improvement being protected.

## E. Site Grading Recommendations

As groundwater can cause problems with construction, so can surface water from precipitation runoff if allowed to accumulate within the construction area. The contractor should grade the site to drain surface water away from the construction areas. Water accumulations in the construction area should be promptly removed. Any soil softened, loosened or disturbed by water should be excavated, removed and replaced with compacted granular fill material or coarse crushed stone. Temporary surface water diversion structures, such as ditches and berms, could be constructed in areas where surface water drainage into the work area is encountered.

## F. Seismic Site Classification

The Wisconsin Commercial Building Code specifies the Seismic Site Class for a building site be determined using the procedures defined in Chapter 20 of ASCE Standard 7. The latest version of this ASCE standard is dated 2016. In ASCE 7-16 Chapter 20, the upper 100 feet of subsurface profile is used to determine the Seismic Site Class. Where



site-specific subsurface profile data are not available to a depth of 100 feet, appropriate soil properties are permitted to be estimated by the registered design professional preparing the soil exploration report based on known geologic conditions.

Per Mr. Steve Dobratz, Section Chief, Division of Industry Services, State of Wisconsin Department of Safety and Professional Services, the site profile starts at the existing or proposed ground surface for the proposed structure. Additionally, the use of soil improvements below a structure does not necessarily increase the seismic site class for the site since the soils surrounding the site have not been improved.

Using the SPT information obtained from the soil boring, we computed the seismic site class for Boring OR-1 using the procedures described in Chapter 20 of ASCE Standard 7-16. As defined in Chapter 20, the softest soil profile classification controls the seismic site class for a site. Based on our computations, we determined the subsurface stratification beneath the subject pole site meet the criteria for Site Class E, "soft clay soil," in the vicinity of Boring OR-1. We include our seismic site class calculation results obtained for this report on the Seismic Site Class Record enclosed in Appendix C. We extended Boring OR-1 to a depth of 25 feet and it encountered predominantly low strength granular soils. Higher site classifications may be possible, but would require the performance of shear wave analyses.

Assuming the subject structure meets the definition for seismic Risk Category III, we provide additional site-specific seismic parameters in the Applied Technology Council (ATC) "Hazards by Location" Information Printout enclosed in Appendix C.<sup>1</sup>

#### G. Cold Weather Construction

Construction during cold weather (late fall, winter and early spring) requires special considerations. The soil which will be supporting foundation elements should not be frozen at the time of construction. We recommend that a means of preventing the soil from freezing be implemented at the time of excavation, during backfilling operations, or after fill material is placed to the design elevation. To prevent the soil from freezing, various materials are available, such as a thick layer of straw or insulation blankets which should be placed on the soil after excavation to the design grade and prior to the placement of concrete for foundation elements. An alternative method is to provide a heated enclosure for the area under construction.

We recommend that concrete for foundation elements not be placed on frozen soil. If the soil becomes frozen prior to the placement of concrete, either the frozen soil should be excavated and replaced with compacted granular fill material or crushed stone, or a means of thawing the frozen soil should be implemented followed by re-compaction of the bearing soil. The bearing soils should then be observed and tested by Soils &

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<sup>1</sup>"Hazards by Location." *ATC Hazards by Location*, Applied Technology Council (ATC), 20 October 2021, <https://hazards.atcouncil.org/#!/seismic?lat=42.985948251196675&lng=-89.4305939658844&address=>.



Engineering Services, Inc. to verify the suitability of the soil for support of the concrete. Any forms or reinforcing steel should be warmed prior to the placement of the concrete.

At the time of placement of fresh concrete for foundation elements, the concrete should be protected against freezing for a minimum of 7 days, and possibly longer depending on the design strength of the concrete. Insulation blankets or heated enclosures should be used to protect the fresh concrete against freezing. The use of concrete forms or plastic sheeting as methods of protecting fresh concrete is not acceptable as these methods do **not** provide any protection against freezing. We recommend the procedures presented in American Concrete Institute's (ACI) document titled "Recommended Practices for Cold Weather Concreting" (ACI 306) be used for placing and protecting concrete during cold weather.

#### H. Project Safety

Safety precautions, such as those required by OSHA and the Wisconsin Department of Safety and Professional Services, should be followed throughout the entire construction of the proposed project. They include, but are not limited to, the proper sloping and/or support of excavation sidewalls and adjacent embankments, roadways, access ramps, sidewalks, utility lines, towers, and/or buildings.

## VII. CLOSING COMMENTS

Soils & Engineering Services, Inc. prepared this report for the exclusive use of Madison Gas & Electric Company to aid in the design of the proposed construction of a new AMI/SCADA mast at the Oak Ridge Substation located at 2413 South Fish Hatchery Road in the City of Fitchburg in Dane County, Wisconsin. The recommendations in this report are based on the project information provided to our office. Soils & Engineering Services, Inc. should review any changes in the nature, design, or location of the proposed improvements after submittal of this *Geotechnical Exploration and Analyses Report* to revise the recommendations in the report, if necessary. The nature and extent of soil, bedrock, or groundwater variations between the boring locations may not become evident until the time of excavation or construction of the subject project. If soil, bedrock, or groundwater variations are evident at the time of excavation or construction, it will be necessary for Soils & Engineering Services, Inc. to re-evaluate the soil, bedrock, and groundwater, and other site conditions, which may result in revision of our recommendations in this report.

Please read the *Important Information about This Geotechnical-Engineering Report* advisory sheet enclosed in Appendix D which provides comments about how to interpret and use this *Geotechnical Exploration and Analyses Report* for the Proposed Communication Pole for a new AMI/SCADA mast at the Oak Ridge Substation project.

Soils & Engineering Services, Inc. should review the final design and specification documents for this project to verify that our recommendations regarding the proposed improvements are interpreted correctly and implemented in the design of the subject project as they are intended.



We recommend that Soils & Engineering Services, Inc. be present at the time of construction to observe compliance with the design concept and specifications, and to provide recommendations to modify the design if subsurface conditions differ from those anticipated prior to construction. It is important that the exposed soil strength, degree of compaction, and other soil properties required be confirmed and/or determined at the time of excavation and construction activities for the subject project.

The recommendations provided in this report are based on our identification/classification and interpretation of the soils, bedrock, and other information given on the Boring Log Record, and may not be based solely on the contents of the driller's field logs.

Soils & Engineering Services, Inc. prepared this report for the subject project in accordance with generally accepted geotechnical engineering practices at this time. Soils & Engineering Services, Inc. offers no other expressed or implied warranty.

Soils & Engineering Services, Inc. will store the soil samples obtained from the boring performed for this project for a period of 60 calendar days after the date of this report. Please advise us if we should extend this period.

We recommend that this *Geotechnical Exploration and Analyses Report*, in its entirety, be made available to bidding contractors or subcontractors for information purposes. The Appendices, Boring Log Record, and/or other attachments referenced in this report should not be separated from the text of this report. This report should be considered invalid if used for purposes other than those described herein.

**Soils & Engineering Services, Inc.** respectfully submits this *Geotechnical Exploration and Analyses Report*, dated October 22, 2021, to **Madison Gas & Electric Company**.



# APPENDIX A

## Appendix A Contents

- Location Sketches, Drawings 13392.8-1A and 13392.8-1B
- Notes and Legend Record for Boring Log Record
- Boring Log Record for Boring OR-1
- WDNR Well/Drillhole/Borehole Abandonment Form 3300-005 for Boring OR-1






N  
↑  
+  
↓  
NOT-TO-SCALE

Irish Lane

See Drawing 13392.8-1B

South Fish Hatchery Road

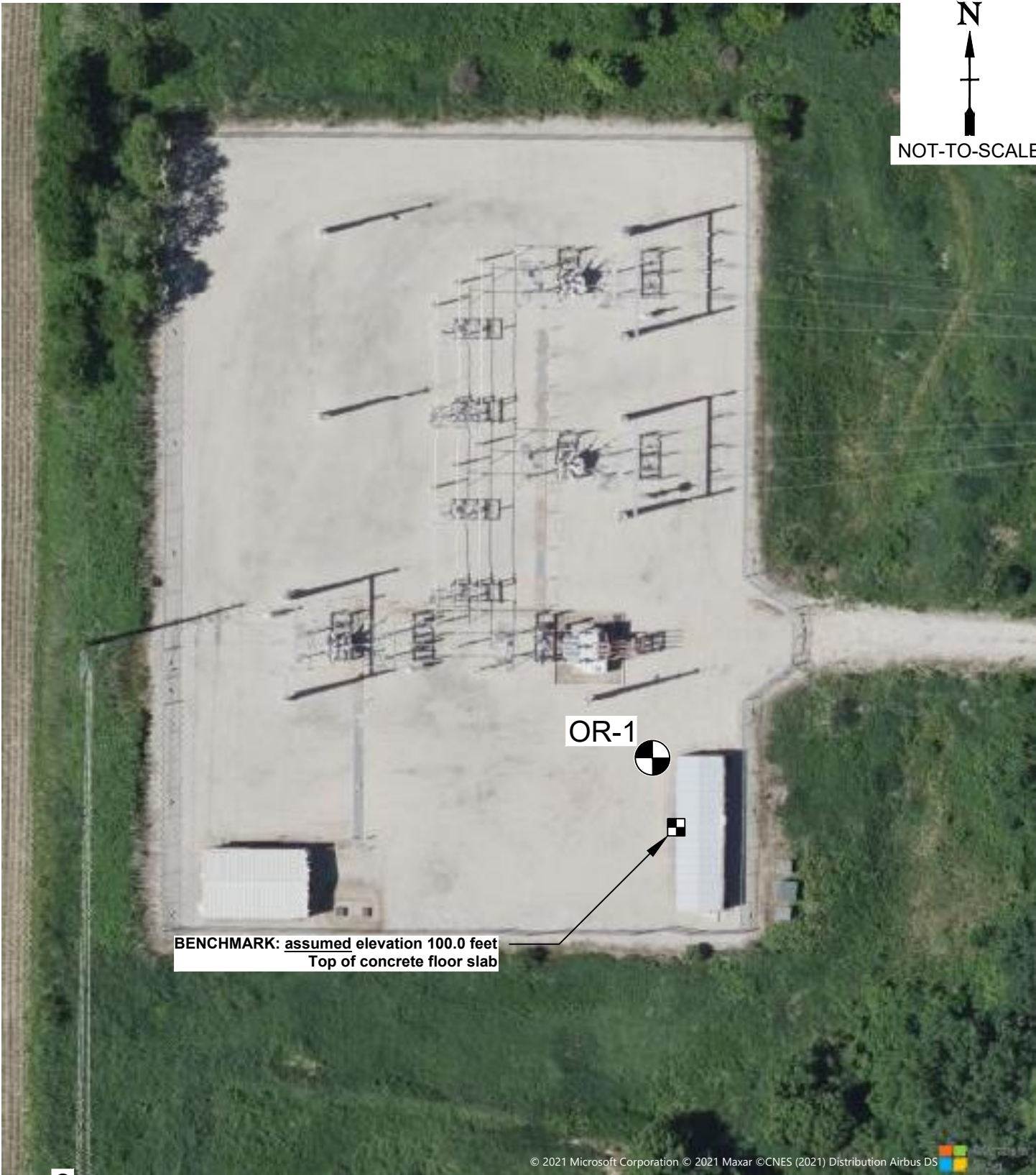
© 2021 Microsoft Corporation © 2021 Maxar © CNES (2021) Distribution Airbus DS

 **= Boring 2 (typical)**

 **Soils & Engineering Services, Inc.**  
 1102 STEWART STREET  
 MADISON, WISCONSIN 53713-4648  
 Phone: 608-274-7600  
 CONSULTING CIVIL ENGINEERS SINCE 1966

**LOCATION SKETCH**  
 Proposed Communication Pole  
 MG&E Oak Ridge Substation  
 2413 South Fish Hatchery Road  
 City of Fitchburg, Dane County, Wisconsin

DRAWING  
 13392.8-1A



N  
↑  
+  
↓  
NOT-TO-SCALE

OR-1

BENCHMARK: assumed elevation 100.0 feet  
Top of concrete floor slab

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<sup>2</sup>  
= Boring 2 (typical)

 **Soils & Engineering Services, Inc.**  
1102 STEWART STREET  
MADISON, WISCONSIN 53713-4648  
Phone: 608-274-7600  
CONSULTING CIVIL ENGINEERS SINCE 1966

**LOCATION SKETCH**  
Proposed Communication Pole  
MG&E Oak Ridge Substation  
2413 South Fish Hatchery Road  
City of Fitchburg, Dane County, Wisconsin

DRAWING  
13392.8-1B

NOTES

1. The boundary lines between different subsurface strata, as shown on the Boring Log Record, are approximate and may be gradual.
2. The boring field log contains a description of the subsurface conditions between samples based on the equipment performance and the cuttings returned to the ground surface. The Boring Log Record contains the description of the subsurface conditions as interpreted by a geotechnical engineer and/or a geologist after review of the boring field logs and subsurface samples and/or laboratory test results.
3. We define "Caved Level" as the depth below the existing ground surface at a boring location where material has collapsed into the borehole following removal of the drilling tools.
4. We define "Water Level" as the depth below the existing ground surface at a boring location to the level of water in the open borehole at the time indicated unless otherwise defined on the Boring Log Record.
5. We define "at completion" for a boring as being the time when our drilling crew has completed the removal of all drilling tools from the borehole.
6. The Notes and Legend Record and the Boring Log Record are a part of the Geotechnical-Engineering Report. The Geotechnical-Engineering Report should be included in the bidding or reference documents.

RELATIVE PERCENTAGE TERMS

no	0%
trace	<5%
few	5 to <10%
little	10 to <30%
some	30 to < 50%

TEST RESULTS LEGEND

q<sub>p</sub> = Penetrometer reading, <sup>ton</sup>/<sub>ft<sup>2</sup></sub>

RELATIVE MOISTURE TERMS AT TIME OF SAMPLING

Frozen or F = Frozen material  
 Dry = Dusty, dry to touch, absence of moisture  
 Moist or M = Damp to touch, no visible water  
 Wet or W = Visible free water


DRILLING METHODS LEGEND


HSA = Continuous flight hollow-stem augers

REMARKS LEGEND

PID = Photoionization Detector Reading, equivalent units of isobutylene calibration gas

SAMPLER TYPE LEGEND

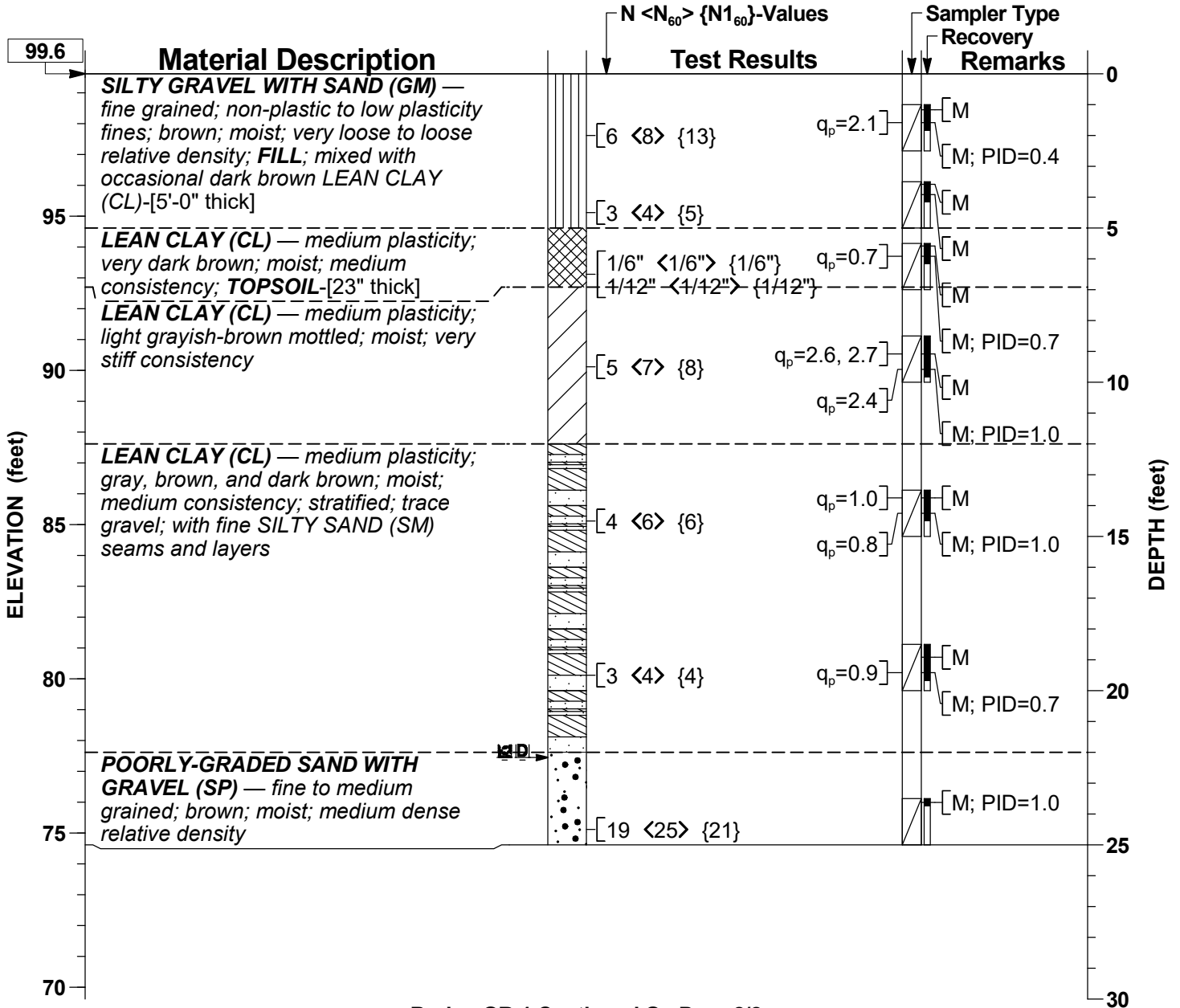
 2-inch-outside-diameter, split-barrel sampler

 <p><b>Soils &amp; Engineering Services, Inc.</b>                  1102 STEWART STREET                  MADISON, WISCONSIN 53713-4648                  Phone: (608) 274-7600                  CONSULTING CIVIL ENGINEERS SINCE 1966</p>	<p><b>NOTES AND LEGEND RECORD</b>                  Proposed Communication Pole                  MG&amp;E Oak Ridge Substation                  2413 South Fish Hatchery Road                  City of Fitchburg, Dane County, Wisconsin</p>	13392.8
--	---	---------

General Location:

# Boring OR-1

LATITUDE: —	LONGITUDE: —	COUNTY: <b>Dane</b>	SECTION: <b>21</b>	CREW CHIEF: <b>SWK</b>	DRILL RIG: <b>Geoprobe 7822DT</b>	PAGE: <b>1 of 2</b>
NORTHING: —	EASTING: —	TOWNSHIP: <b>(Fitchburg) 6 N</b>	¼: <b>NE</b>	LOG REVIEW: <b>CMB</b>	HAMMER TYPE (EFFICIENCY): <b>Automatic (80%)</b>	TOTAL DEPTH: <b>25'-0"</b>
STATION: —	OFFSET: —	RANGE: <b>9 E</b>	¼ ¼: <b>NE</b>	LOG QC: <b>CMB</b>	DATE STARTED: <b>09/29/2021</b>	DATE COMPLETED: <b>09/29/2021</b>



Boring OR-1 Continued On Page 2/2

WATER LEVEL LEGEND	OTHER LEVEL LEGEND
22'-2" Dry at completion	22'-2" Caved at completion

DRILL METHOD	TOOL SIZE	CASING SIZE	DRILL FLUID	DEPTH FROM	DEPTH TO	HOLE DIA
HSA	2 1/4"	—	None	0'-0"	20'-0"	6.3"

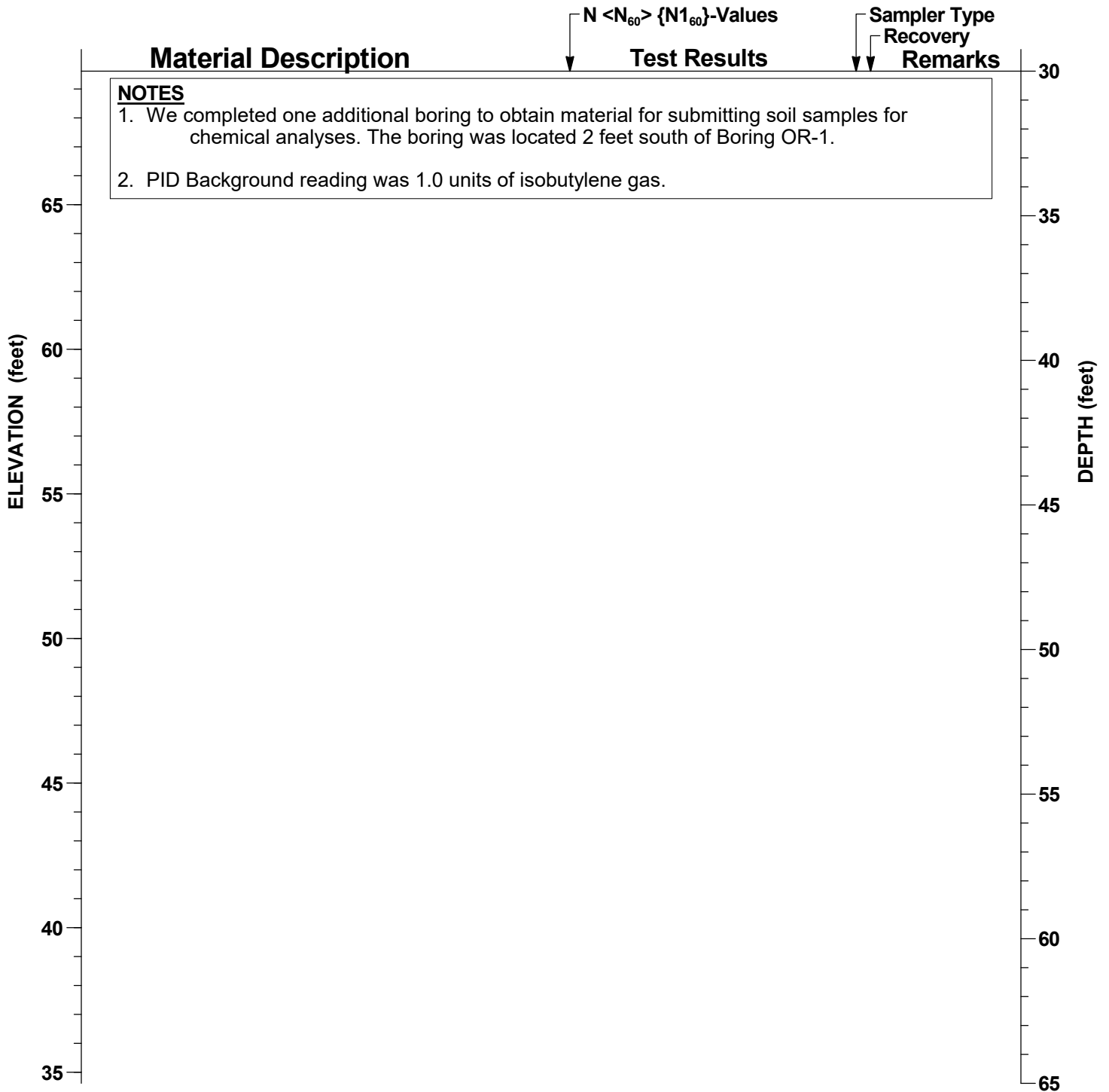
SAMPLING METHOD(S): ASTM D1586

SURFACE PATCH: —


BACKFILL: Gravel, Bentonite Chips, Caved Soil

The Notes and Legend Record is considered a part of this Boring Log Record.

<p><b>Soils &amp; Engineering Services, Inc.</b> 1102 STEWART STREET MADISON, WISCONSIN 53713-4648 Phone: (608) 274-7600 CONSULTING CIVIL ENGINEERS SINCE 1966</p>	<p><b>BORING LOG RECORD</b> Proposed Communication Pole MG&amp;E Oak Ridge Substation 2413 South Fish Hatchery Road City of Fitchburg, Dane County, Wisconsin</p>	13392.8
	<p>Printed on 10/20/2021</p>	



The Notes and Legend Record is considered a part of this Boring Log Record.

	<p><b>Soils &amp; Engineering Services, Inc.</b></p>	<p><b>BORING LOG RECORD</b>                  Proposed Communication Pole                  MG&amp;E Oak Ridge Substation                  2413 South Fish Hatchery Road                  City of Fitchburg, Dane County, Wisconsin</p>	13392.8
	<p>1102 STEWART STREET                  MADISON, WISCONSIN 53713-4648                  Phone: (608) 274-7600</p>		
	<p>CONSULTING CIVIL ENGINEERS SINCE 1966</p>		

**Notice:** Completion of this report is required by chs. 160, 281, 283, 289, 291-293, 295, and 299, Wis. Stats., and ch. NR 141 and 812, Wis. Adm. Code. In accordance with chs. 281, 289, 291-293, 295, and 299, Wis. Stats., failure to file this form may result in a forfeiture of between \$10-25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. Return form to the appropriate DNR office and bureau. See instructions on reverse for more information.

**Route to:**

Verification Only of Fill and Seal

Drinking Water

Watershed/Wastewater

Remediation/Redevelopment

Waste Management

Other: \_\_\_\_\_

**SES Project Number 13392.8**

**1. Well Location Information Boring Location Information**

County **Dane** Boring Number **OR-1**

Latitude / Longitude (Degrees and Minutes) \_\_\_\_\_  
 Format Code  DD  GPS008  
 DDM  SCR002  
 OTH001

1/4 1/4 **NE** 1/4 **NE** Section **21** Township **6 N** Range **9**  E  W  
 or Gov't Lot # \_\_\_\_\_

Well Street Address Boring **2413 South Fish Hatchery Road**

Well City, Village or Town Boring **City of Fitchburg/Civil Township of Fitchburg** Well ZIP Code Boring \_\_\_\_\_  
 Subdivision Name Lot # \_\_\_\_\_

Reason For Removal From Service **Soil Boring for GEOTECHNICAL sampling.** WI Unique Well # of Replacement Well **NA**

**3. Well / Drillhole / Borehole Information**

Monitoring Well  Water Well  Drillhole / Borehole  
 Original Construction Date (mm/dd/yyyy) Boring Completion **09/29/2021**  
 If a Well Construction Report is available, please attach. **NA**

Construction Type:  
 Drilled  Driven (Sandpoint)  Dug  
 Other (specify): \_\_\_\_\_

Formation Type:  
 Unconsolidated Formation  Bedrock

Total Well Depth From Ground Surface (ft.) Boring **25.0** Casing Diameter (in.) **NA**

Lower Drillhole Diameter (in.) **6.3** Casing Depth (ft.) **NA**

Was well annular space grouted? **NA**  Yes  No  Unknown

If yes, to what depth (feet)? \_\_\_\_\_ Depth to Water (Feet) **Dry**

**2. Facility / Owner Information**

Facility Name **Proposed Communication Pole, MG&E Oak Ridge Substation**

Facility ID (FID or PWS) **NA**

License/Permit/Monitoring No **NA**

Original Well Owner **NA**

Present Well Owner **Present Property Owner**  
**Unknown**

Mailing Address of Present Owner \_\_\_\_\_  
 City of Present Owner \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_

**4. Pump, Liner, Screen, Casing & Sealing Material**

Pump and piping removed?  Yes  No  N/A  
 Liner(s) removed?  Yes  No  N/A  
 Screen removed?  Yes  No  N/A  
 Casing left in place?  Yes  No  N/A  
 Was casing cut off below surface?  Yes  No  N/A  
 Did sealing material rise to surface?  Yes  No  N/A  
 Did material settle after 24 hours?  Yes  No  N/A  
 If yes, was hole retopped?  Yes  No  N/A  
 If bentonite chips were used, were they hydrated with water from a known safe source?  Yes  No  N/A

Required Method of Placing Sealing Material  
 Conductor Pipe-Gravity  Conductor Pipe-Pumped  
 Screened & Poured (Bentonite Chips)  Other (Explain): \_\_\_\_\_

Sealings Materials  
 Neat Cement Grout  Concrete  
 Sand-Cement (Concrete) Grout  Bentonite Chips  
 For monitoring wells and monitoring well boreholes only  
 Bentonite Chips  Bentonite - Cement Grout  
 Granular Bentonite  Bentonite - Sand Slurry

**5. Material Used To Fill Well / Drillhole**

	From (Ft.)	To (Ft.)	No. Yards <del>Sacks Sealant</del> or Volume (Circle one)	Mix Ratio or Mud Weight
<b>Gravel</b>	<b>Surface</b>	<b>1.00</b>	<b>0.21 ft<sup>3</sup></b>	
<b>Bentonite Chips</b>	<b>1.00</b>	<b>22.17</b>	<b>5.5 - 50 lb Bags</b>	
<b>Caved Soil</b>	<b>22.17</b>	<b>25.00</b>	<b>0.60 ft<sup>3</sup></b>	

**6. Comments**

NA = Not applicable to soil borings.

**7. Supervision of Work**

				DNR Use Only	
Name of Person or Firm Doing Filling & Sealing	License #	Date of Filling & Sealing (mm/dd/yyyy)	Date Received	Noted By	
<b>SOILS &amp; ENGINEERING SERVICES, INC.</b>		<b>09/29/2021</b>			
Street or Route	Telephone Number		Comments		
<b>1102 Stewart Street</b>	<b>(608) 274-7600</b>				
City	State	ZIP Code	Signature of Person Doing Work		Date Signed
<b>Madison</b>	<b>WI</b>	<b>53713</b>	<i>Craig M. Bower</i>		<b>10/20/2021</b>

# APPENDIX B

## Appendix B Contents

- Recommended Soil Design Parameters and Drilled Shaft Values, Table B-1



**Table B-1: RECOMMENDED SOIL DESIGN PARAMETERS AND DRILLED SHAFT VALUES**

Proposed Communication Pole  
 MG&E Oak Ridge Substation  
 2413 South Fish Hatchery Road  
 City of Fitchburg, Dane County, Wisconsin

Elevation (feet)	Material Type	Estimated Soil Parameters†			Drilled Shaft Values‡	
		Moist Density, $\gamma$ (pcf)	Angle of Internal Friction, $\phi$ (degrees)	Cohesion, c (psf)	Ultimate Skin Friction (psf)	Ultimate End Bearing (psf)
----- Boring OR-1 -----						
99.6 to 94.6	<b>SILTY GRAVEL WITH SAND (GM)</b> — fine grained; non-plastic to low plasticity fines; brown; moist; very loose to loose relative density; <b>FILL</b> ; mixed with occasional dark brown <b>LEAN CLAY (CL)</b>	120.0	30	0	330	0
94.6 to 92.7	<b>LEAN CLAY (CL)</b> — medium plasticity; very dark brown; moist; medium consistency; <b>TOPSOIL</b>	125.0	0	700	390	5,100
92.7 to 87.6	<b>LEAN CLAY (CL)</b> — medium plasticity; light grayish-brown mottled; moist; very stiff consistency	130.0	0	2500	1,380	19,000
87.6 to 77.6	<b>LEAN CLAY (CL)</b> — medium plasticity; gray, brown, and dark brown; moist; medium consistency; stratified; trace gravel; with fine <b>SILTY SAND (SM)</b> seams and layers	130.0	0	900	500	7,300
77.6 to 74.6	<b>POORLY-GRADED SAND WITH GRAVEL (SP)</b> — fine to medium grained; brown; moist; medium dense relative density	120.0	33	0	1,550	30,000
----- End of Boring OR-1 @ Elevation 74.6 feet -----						

Table Notes

‡ The Moist Density, Angle of Internal Friction, and Cohesion values presented above are estimated averages for each of the soil strata encountered at the indicated boring.  
 † The provided Ultimate Skin Friction and Ultimate End Bearing Drilled Shaft Values are the average computed values for each of the soil strata encountered at the indicated boring. Please see the report for recommended adjustments to these values.

Table Abbreviations and Symbols

pcf = pounds per cubic foot.      psf = pounds per square foot.



# APPENDIX C

## Appendix C Contents

- Seismic Site Class Record
- ATC "Hazards by Location" Information Printout




Boring	Method 2		Method 3				Site Class For Boring
	Avg N-value	Site Class	Avg N-value	Site Class	Avg $s_u$ (tsf)	Site Class	
OR-1	9	E	16	D	0.5	D	E

Recommend Site Class E (soft clay soil) for proposed improvement(s) in the vicinity of Boring OR-1.

ASCE Standard 7-16 Site Class Definitions		
Site Class	Method 2 All Soil Criteria Method 3 Granular Soil Criteria	Method 3 Cohesive Soil Criteria
A: Hard Rock	Shear Wave Analyses Required	Shear Wave Analyses Required
B: Rock	Shear Wave Analyses Required	Shear Wave Analyses Required
C: very dense soil and soft rock	Avg N > 50	Avg $s_u$ > 1.0 tsf
D: stiff soil	$15 \leq \text{Avg N} \leq 50$	$0.5 \text{ tsf} \leq \text{Avg } s_u \leq 1.0 \text{ tsf}$
E: soft clay soil	Avg N < 15	Avg $s_u$ < 0.5 tsf
F: Soils vulnerable to potential failure or collapse under seismic loading, such as liquefiable soils, quick and highly sensitive clays, and collapsible weakly cemented soils. See ASCE 7-16 Chapter 20 for additional criteria and exceptions.		

Note: Per ASCE 7-16 Chapter 20, the softest seismic site class from Methods 2 and 3 is applied to a boring subsurface profile. Additionally, the softest seismic site class from an individual boring within a group of borings for a specific improvement is used for that improvement.

	<p><b>Soils &amp; Engineering Services, Inc.</b>  1102 STEWART STREET  MADISON, WISCONSIN 53713-4648  Phone: (608) 274-7600  CONSULTING CIVIL ENGINEERS SINCE 1966</p>	<p><b>SEISMIC SITE CLASS RECORD</b>  Proposed Communication Pole  MG&amp;E Oak Ridge Substation  2413 South Fish Hatchery Road  City of Fitchburg, Dane County, Wisconsin</p>	13392.8
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Hazards by Location

ATC Hazards by Location seismic information obtained from Applied Technology Council (ATC) website (<https://hazards.atcouncil.org>) on 20 October 2021.

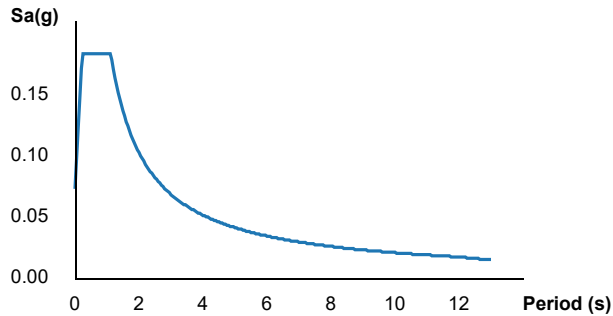
### Search Information

**Coordinates:** 42.985948251196675, -89.4305939658844  
**Elevation:** 1033 ft  
**Timestamp:** 2021-10-20T19:50:00.490Z  
**Hazard Type:** Seismic  
**Reference Document:** ASCE7-16  
**Risk Category:** II  
**Site Class:** E

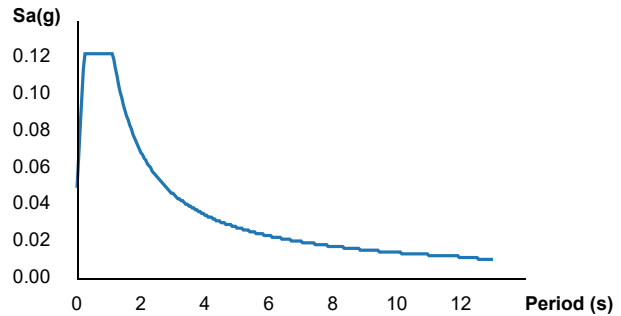


Map data ©2021 Imagery ©2021, Maxar Technologies, USDA Farm Service Agency

### MCER Horizontal Response Spectrum



### Design Horizontal Response Spectrum



### Basic Parameters

Name	Value	Description
$S_S$	0.076	MCE <sub>R</sub> ground motion (period=0.2s)
$S_1$	0.049	MCE <sub>R</sub> ground motion (period=1.0s)
$S_{MS}$	0.184	Site-modified spectral acceleration value
$S_{M1}$	0.205	Site-modified spectral acceleration value
$S_{DS}$	0.122	Numeric seismic design value at 0.2s SA
$S_{D1}$	0.137	Numeric seismic design value at 1.0s SA

### Additional Information

Name	Value	Description
SDC	C	Seismic design category
$F_a$	2.4	Site amplification factor at 0.2s
$F_v$	4.2	Site amplification factor at 1.0s
$CR_S$	0.947	Coefficient of risk (0.2s)

CR <sub>1</sub>	0.874	Coefficient of risk (1.0s)
PGA	0.037	MCE <sub>G</sub> peak ground acceleration
F <sub>PGA</sub>	2.4	Site amplification factor at PGA
PGA <sub>M</sub>	0.089	Site modified peak ground acceleration
T <sub>L</sub>	12	Long-period transition period (s)
SsRT	0.076	Probabilistic risk-targeted ground motion (0.2s)
SsUH	0.081	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.049	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.056	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.6	Factored deterministic acceleration value (1.0s)
PGAd	0.5	Factored deterministic acceleration value (PGA)

*The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.*

## Disclaimer

Hazard loads are provided by the U.S. Geological Survey [Seismic Design Web Services](#).

While the information presented on this website is believed to be correct, ATC and its sponsors and contributors assume no responsibility or liability for its accuracy. The material presented in the report should not be used or relied upon for any specific application without competent examination and verification of its accuracy, suitability and applicability by engineers or other licensed professionals. ATC does not intend that the use of this information replace the sound judgment of such competent professionals, having experience and knowledge in the field of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the results of the report provided by this website. Users of the information from this website assume all liability arising from such use. Use of the output of this website does not imply approval by the governing building code bodies responsible for building code approval and interpretation for the building site described by latitude/longitude location in the report.

# APPENDIX D

## Appendix D Contents

- *Important Information about This Geotechnical-Engineering Report advisory*



# Important Information about This

# Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

**The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.**

## Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

## Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer

will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it.* A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

## Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

## You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

### Most of the “Findings” Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site’s subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

### This Report’s Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

### This Report Could Be Misinterpreted

Other design professionals’ misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals’ plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

### Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note*

*conspicuously that you’ve included the material for information purposes only.* To avoid misunderstanding, you may also want to note that “informational purposes” means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

### Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled “limitations,” many of these provisions indicate where geotechnical engineers’ responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

### Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a “phase-one” or “phase-two” environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

### Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer’s services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer’s recommendations will not of itself be sufficient to prevent moisture infiltration.* **Confront the risk of moisture infiltration** by including building-envelope or mold specialists on the design team. **Geotechnical engineers are not building-envelope or mold specialists.**



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