



City of Fitchburg
 Planning/Zoning Department
 5520 Lacy Road
 Fitchburg, WI 53711
 (608-270-4200)

ARCHITECTURAL & DESIGN REVIEW APPLICATION

Applicant/Contact Person: Madison Gas and Electric Company / John Drury

Address: P.O. Box 1231 **Phone Number of Contact Person:** _____

City, State, Zip Code: Madison, WI 53701-1231 **Email of Contact Person:** jdrury@mge.com

Project Address: 2961 S. Syene Road, Fitchburg, WI **Lot:** 1, CSM 11625 **Subdivision:** --

Project Type: **Multi-Family** **Commercial** **Industrial** **Install Utility Facilities** **Other**
 New **Addition**

Impervious Surface Ratio (ISR): _____ (City Standard: maximum 65% ISR)

All items listed below must be included with the application to be considered complete. If an item is not included with the application, the applicant must provide in writing the basis for not including it. Building and site plans submitted to the Fitchburg Plan Commission for architectural and design review shall contain the following information:

Site Data:

- 1. Lot or property dimensions.
- 2. Orientation (to north).
- 3. Adjacent highways, roads, drive, etc.
- 4. Existing natural features (rivers, ponds, wetlands).
- 5. Existing buildings and/or improvements.
- 6. Existing and proposed site drainage.
- 7. Utility plans, including main/lateral sizes and existing fire hydrants on site or within 300 feet of the site
- 8. ISR shall be indicated on all plans.
- 9. Stormwater management plans and details, including grading plan.
- 10. Lighting plan in footcandles and light fixture cut sheets.

Building:

- 1. Building size, configuration and orientation.
- 2. Distance from lot lines.
- 3. Distance from other buildings, improvements and natural features.
- 4. Location of well, septic tank, drainfield, etc. (if applicable)
- 5. Additional proposed additions or new structures, including trash/recycling enclosure(s).
- 6. Construction type (wood frame, structural steel, etc.).
- 7. Foundation type (full basement, slab on grade, etc.).
- 8. Number of levels.
- 9. Siding/exterior covering type, color, texture, etc.
- 10. Roof type (gable, hip, shed, flat, etc.) and pitch.
- 11. Roofing material type, color, texture, etc.
- 12. Exterior door and window location, size, type, etc.
- 13. Fire protection sprinklers or fire alarm systems.

Ingress, Egress, Parking:

- 1. Location of highway and road access points.
- 2. Location, size, configuration of drivers and walks.
- 3. Number, size, location of parking spaces.
- 4. Location of handicapped parking and accessible building entrances.
- 5. Bicycle rack(s).

Landscaping:

- 1. Location, species, size of existing trees, shrubs, and plantings.
- 2. Location, species, size of proposed plantings.
- 3. Location and size of all paved, seeded/sodded and gravelled areas.
- 4. Location of all retaining walls, fences, berms and other landscape features.

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

The preceding information is considered to be the minimum information for submission, and the City may require additional information for its review. Any interpretations provided by city officials as the result of submitting the attached information are based on the submitted plans, and any plan changes, may affect the interpretations.

It is the responsibility of the owner/applicant to insure compliance with all local and state requirements. The below signed applicant acknowledges the above information and hereby submits the attached information for the City's Architectural and Design Review Process.

Signed: _____ **Date:** _____
Applicant or Authorized Agent

***** Application shall be accompanied by one (1) sets of full-size plans, two (2) sets no larger than 11"x17", and one (1) pdf document of the complete submittal to planning@fitchburgwi.gov. Applications are due at least 4 weeks prior to the desired Plan Commission Meeting. The time frame assumes a complete set of plans is provided, and if it is not provided the Plan Commission date will be adjusted.**

FOR CITY USE ONLY

Date Received: _____ **Plan Commission Date:** _____

Comments:



January 17, 2022

Sent Via Email and U.S. Mail
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
Syene Substation in Fitchburg

Dear Ms. McNabola:

Madison Gas and Electric Company ("MGE") owns and operates the Syene Substation ("Substation") at 2961 South Syene Road, Fitchburg, Wisconsin (the "Substation"). When MGE constructed the Substation in 2005, the property was rezoned to R-R Rural Density District and the Substation was approved as a conditional use. 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

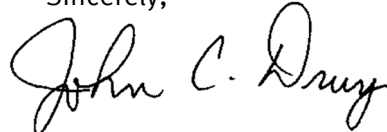
Page 2

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 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)
(Syene 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 the existing Syene Substation (the “Substation”) located at 2961 S. Syene Road, Fitchburg, Wisconsin (the “Site”). When MGE constructed the Substation in 2005, the Site was rezoned to R-R Rural Density District and the Substation was approved as a conditional use.

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 amend its conditional use for the Substation to allow 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 distributions 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; 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 conditional 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 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.

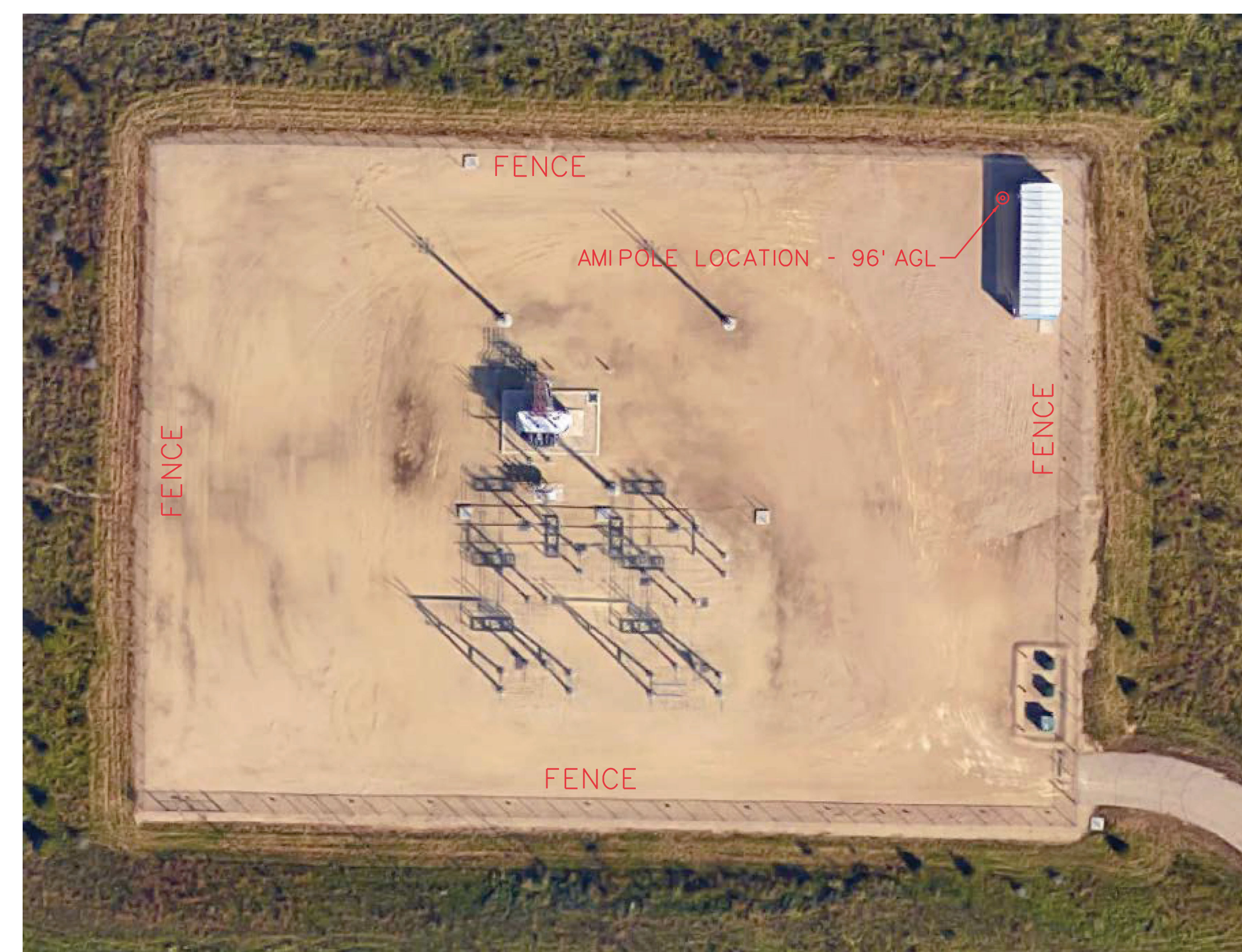
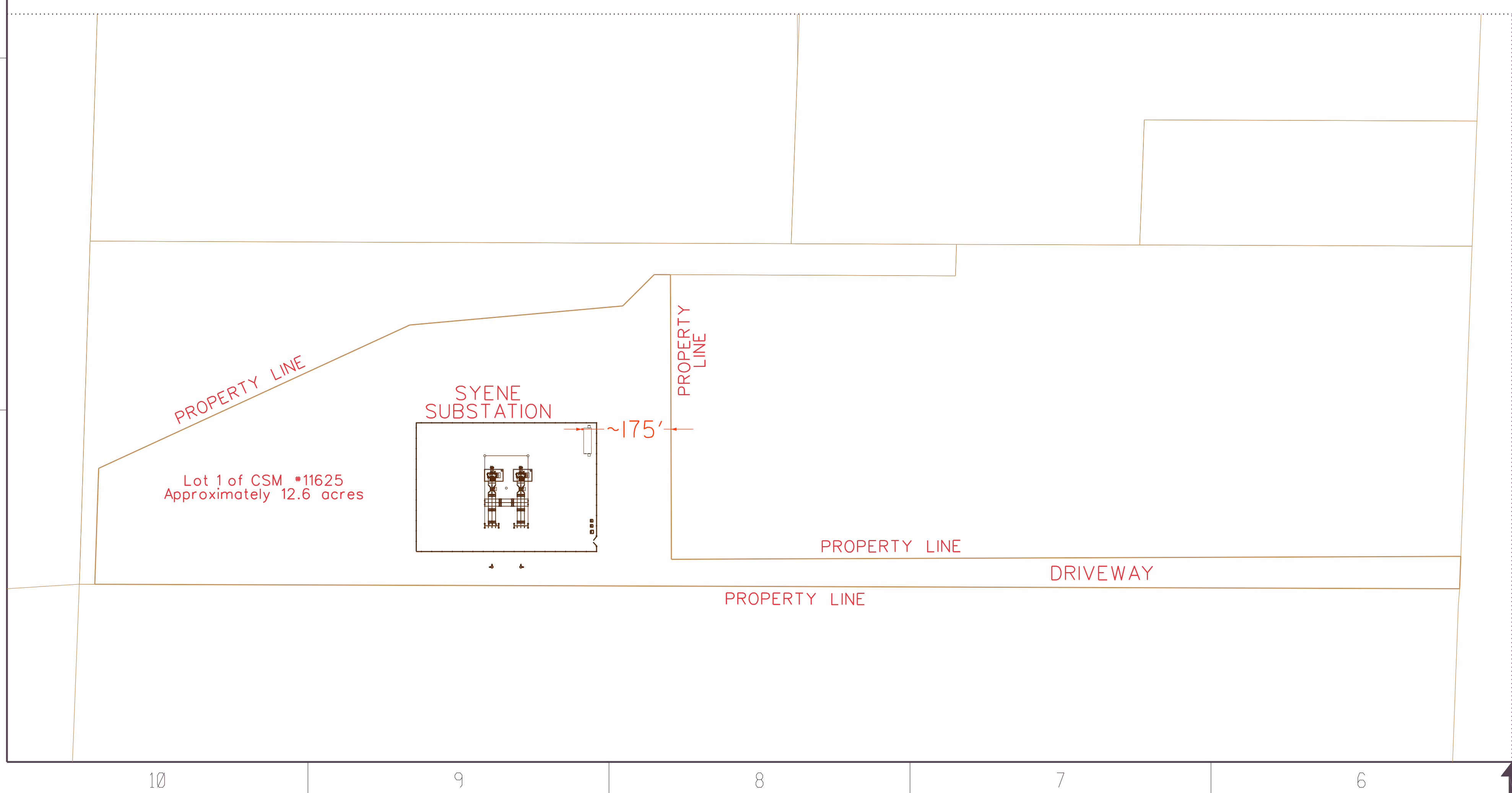
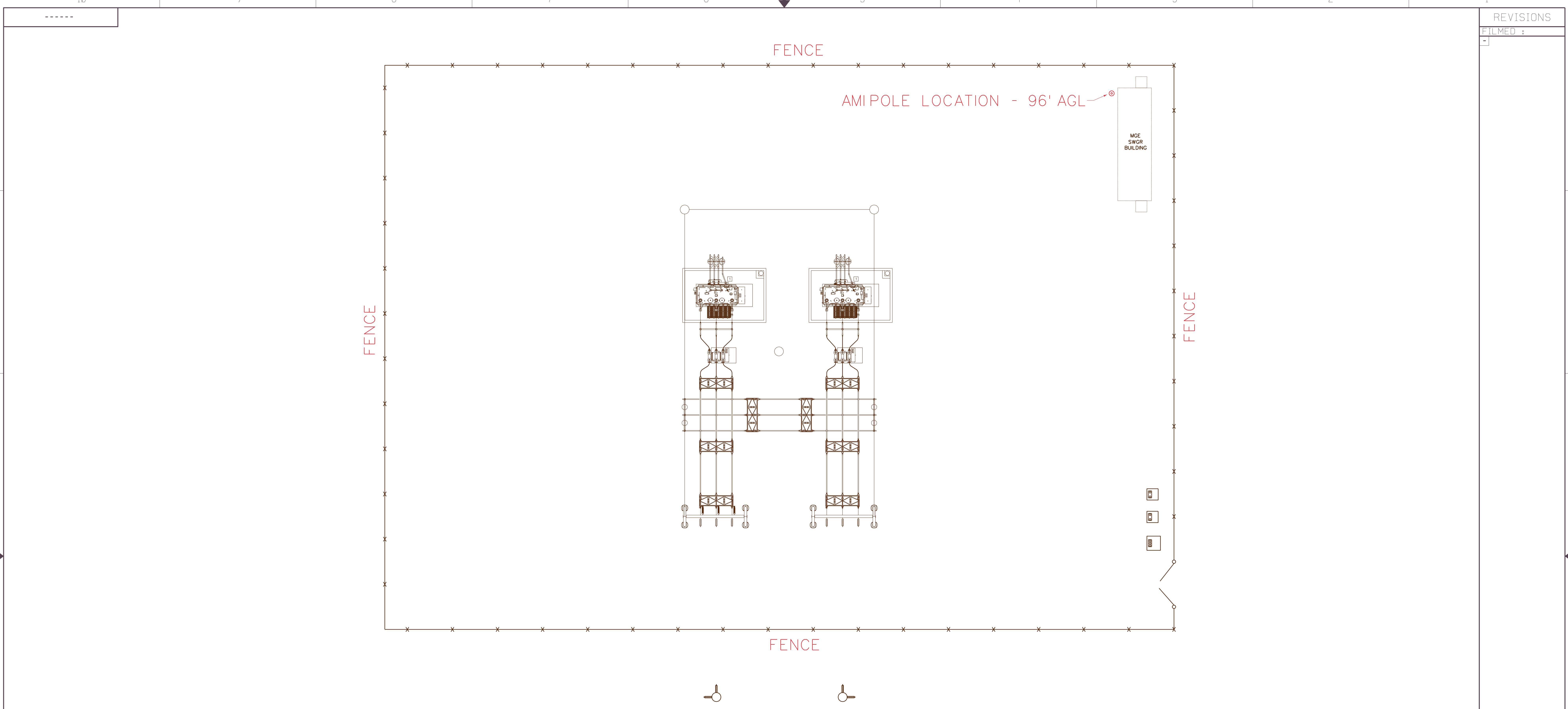
- a. MGE shall obtain and maintain all applicable approvals and permits necessary to install, maintain, and operate the Utility Facilities.
- b. While installing the Utility Facilities, MGE shall keep the Site and adjacent roads free of debris and dust.
- c. At the time the Utility Facilities permanently 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 Syene Substation

1. Site Plan
2. Certified Survey Map. No. 11625
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



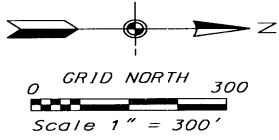
REVISIONS	
FILMED :	-

FILE:	DATE:	DRAWN ON MICRO CE	
SYENE SUBSTATION			
SYENE SUBSTATION SITE PLAN WITH PROPOSED AMIPOLE			
DESIGNED FOR:	DESIGNED BY:		
 MADISON GAS & ELECTRIC	 MADISON GAS and ELECTRIC COMPANY		
DRAWN BY:	DATE:	DESIGNED:	CHECKED:
JRE	1-11-22		
APPROVED:	DRAWING NO.	REV	
SCALE AS SHOWN	SYN-E401		

CERTIFIED SURVEY MAP

LOCATED IN THE SW1/4 AND SE1/4 OF THE SW 1/4 OF SECTION 2, T6N, R9E,
CITY OF FITCHBURG, DANE COUNTY, WISCONSIN.

W1/4 CORNER
SEC. 2, T6N, R9E



SW CORNER
SEC. 2, T6N, R9E
WISCONSIN STATE
PLANE COORDINATES
(SOUTH ZONE) ARE:
N 371,044.12
E 2,159,003.10
(NAD 27 DATUM)

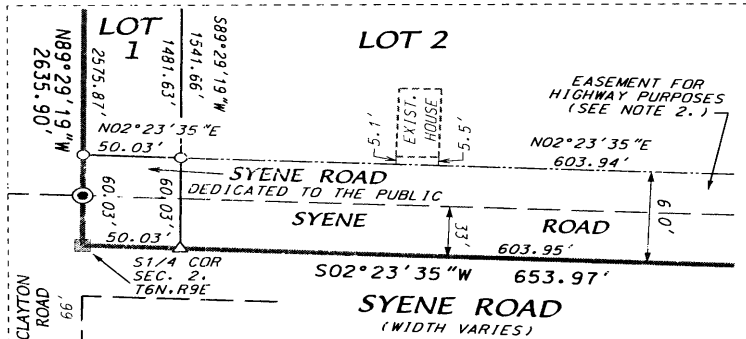
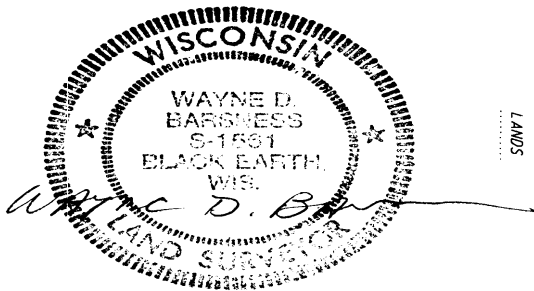
ENVIRONMENTAL CORRIDOR LINE	BEARING	DISTANCE
A-B	S89°29'19"E	617.23'
B-C	N56°28'00"W	342.00'
C-D	N67°39'00"W	224.00'
D-E	N15°24'00"W	122.00'
E-F	N42°40'00"E	146.00'
F-G	S25°41'00"W	43.00'
G-H	N82°36'27"E	68.47'
I-J	N89°29'19"W	758.96'
J-K	N56°28'00"W	237.00'
K-L	N67°39'00"W	220.00'
L-M	N54°55'00"W	141.00'
M-N	S70°53'34"W	214.45'

LEGEND

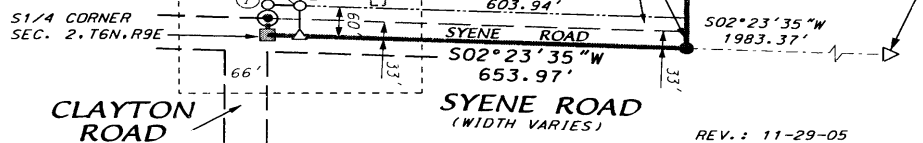
- FOUND 1" IRON PIPE
- ⊙ FOUND 3/4" SOLID ROUND IRON STAKE
- PLACED 3/4"x 24" SOLID ROUND IRON STAKE WEIGHING 1.50 lbs/ft.
- △ PLACED PK NAIL
- CONCRETE MONUMENT W/ BRASS CAP
- FOUND ALUMINUM MONUMENT
- ▭ EXISTING BUILDING
- ▨ ENVIRONMENTAL CORRIDOR

SURVEYED FOR:

Madison Gas & Electric Co.
120 S. Baldwin Street
Madison, WI 53703

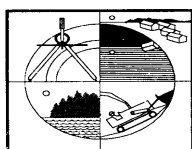


DETAIL
SCALE: 1" = 100'



REV.: 11-29-05
REV.: 11-21-05
REV.: 10-13-05
REV.: 8-31-05
REV.: 8-22-05

DATE: AUG. 1, 2005
F.N.: 05-07-107
C.S.M. NO. 11025
DOC. NO. 4141331
VOL. 71 SHEET 72



**D'ONOFRIO, KOTTKE
AND ASSOCIATES, INC.**

7530 WESTWARD WAY
MADISON, WISCONSIN 53717
TEL: 608-833-7530
FAX: 608-833-1089

CERTIFIED SURVEY MAP

NOTES:

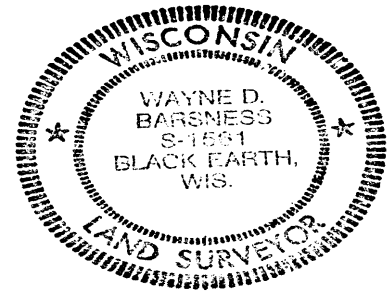
1. Lot 1 shall be restricted to electrical substation and open space use only, and no other permitted or conditional uses of the property under R-R zoning shall be allowed unless approved by the City of Fitchburg Plan Commission and Common Council.
2. The easement for highway purposes as depicted along the east side of Lot 2 of this Certified Survey Map shall be dedicated at no cost to the City of Fitchburg at the occurrence of any of the following circumstances:
 - a. Requested by the City due to public need for highway or utility expansion.
 - b. The house located on Lot 2 is razed.
 - c. The property is sold or ownership transferred.
 - d. A change in use of the property occurs.

SURVEYOR'S CERTIFICATE

I, Wayne D. Barsness, Registered Land Surveyor, S-1561, do hereby certify that this certified survey is in full compliance with Chapter 236.34 of the Wisconsin Statutes and the Subdivision Regulations of the City of Fitchburg, Wisconsin. I also certify that I have surveyed, divided and mapped the lands described herein and that the map is a correctly dimensioned representation in accordance with the information furnished.

Dated this 1ST day of AUGUST, 2005.

Wayne D. Barsness
Wayne D. Barsness, S-1561



LEGAL DESCRIPTION

A parcel of land located in the SW1/4 and SE1/4 of the SW1/4 of Section 2, T6N, R9E, City of Fitchburg, Dane County, Wisconsin, to-wit: Beginning at the south quarter corner of said Section 2; thence N89°29'19"W, along the southline of the SW1/4 of said Section 2, 2,635.90 feet; thence N02°07'26"E, 219.92 feet; thence N65°32'46"E, 653.67 feet; thence N85°10'17"E, 408.04 feet; thence N45°31'34"E, 84.71 feet; thence S89°29'24"E, 575.07 feet; thence N01°05'20"E, 60.01 feet; thence S89°29'24"E, 1,016.74 feet to the east line of the said SW1/4; thence S02°23'35"W, 653.97 feet to the point of beginning. Containing 33.40 acres.

OWNER'S CERTIFICATE

~~Richard W. McKeown~~ and Ardith D. McKeown, owners of the lands described in this Certified Survey Map, do hereby certify that we have caused the lands described on this Certified Survey Map to be surveyed, divided, mapped and dedicated as represented on this Certified Survey Map.

Dated this 7th day of December, 2005.

~~Richard W. McKeown~~

Ardith D. McKeown
Ardith D. McKeown

State of Wisconsin
County of Dane) S.S.

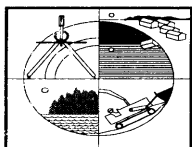
I, Dennis A. Ruskin, Notary Public, do hereby certify that I am before me this 7th day of December, 2005, the above named Richard W. McKeown and Ardith D. McKeown, to me known to be the persons who executed the foregoing instrument and acknowledged the same.

My Commission Expires: May 31, 2009

Dennis A. Ruskin
Notary Public, Dane County, Wisconsin
Dennis A. Ruskin



REV.: 11-29-05
REV.: 11-21-05
REV.: 10-13-05
REV.: 8-31-05
REV.: 8-22-05



D'ONOFRIO, KOTTKE
AND ASSOCIATES, INC.
7530 WESTWARD WAY
MADISON, WISCONSIN 53717
TEL: 608-833-7530
FAX: 608-833-1089

DATE: AUG. 1, 2005

F.N.: 05-07-107

C.S.M. NO. 11625

DOC. NO. 4141331

VOL. 71 SHEET 73

CERTIFIED SURVEY MAP

CONSENT OF OPTIONEE

Madison Gas & Electric Company, a corporation duly organized and existing under and by virtue of the laws of the State of Wisconsin, having an option on the lands within this Certified Survey Map do hereby consent to the above owner's certificate and to the surveying, dividing, mapping and dedication of the lands described on this Certified Survey Map.

Dated this 8th day of December, 2005

MADISON GAS AND ELECTRIC COMPANY

John M. Yogerst
John M. Yogerst, Assistant Vice President, Gas Operations

State of Wisconsin)
County of Dane) S.S.

Personally came before me this 8th day of December, 2005, the above named officer of Madison Gas & Electric Company, to me known to be such officer of said corporation, and acknowledged that they executed the foregoing instrument as such officer of the deed of said corporation by its authority.

My Commission expires: 03/30/08 *Michael J. Valcary*
Notary Public, Dane County, Wisconsin

CITY OF FITCHBURG APPROVAL

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

Dated this 8th day of December, 2005

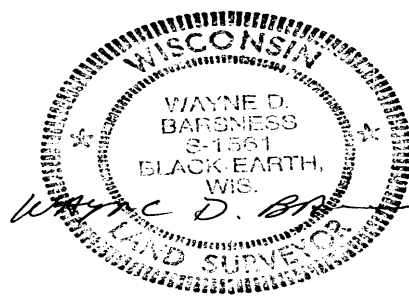
Ruth M. Becker
Ruth M. Becker, Clerk, City of Fitchburg

REGISTER OF DEEDS CERTIFICATE

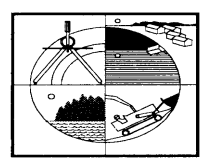
Received for recording this 8th day of December, 2005, at 2:59 o'clock P.M. and recorded in Volume 71 of Certified Survey MAPS

Pages 72, 73, 74 as Document No. 4141331

Jane Licht
Jane Licht, Dane County Register of Deeds



REV.: 11-29-05
REV.: 11-21-05
REV.: 10-13-05
REV.: 8-31-05
REV.: 8-22-05



D'ONOFRIO, KOTTKE
AND ASSOCIATES, INC.
7530 WESTWARD WAY
MADISON, WISCONSIN 53717
TEL: 608-833-7530
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DATE: AUG. 1, 2005
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VOL. 71 SHEET 74

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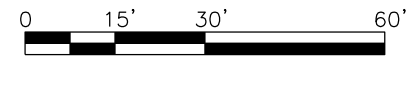
REVISIONS

AMI POLE LOCATION
96' AGL

VIEW TO NORTHWEST

DETENTION BASIN

BIKE PATH



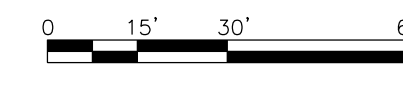
60' ATC
POLE

AMI POLE LOCATION
96' AGL

VIEW TO SOUTHWEST

DETENTION BASIN

BIKE PATH

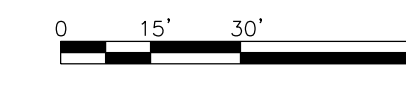



60' ATC
POLE

AMI POLE LOCATION
96' AGL

VIEW TO NORTH

BIKE PATH

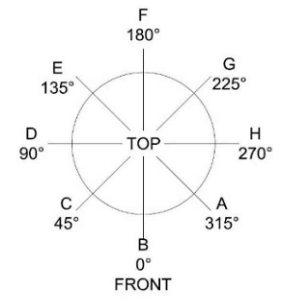
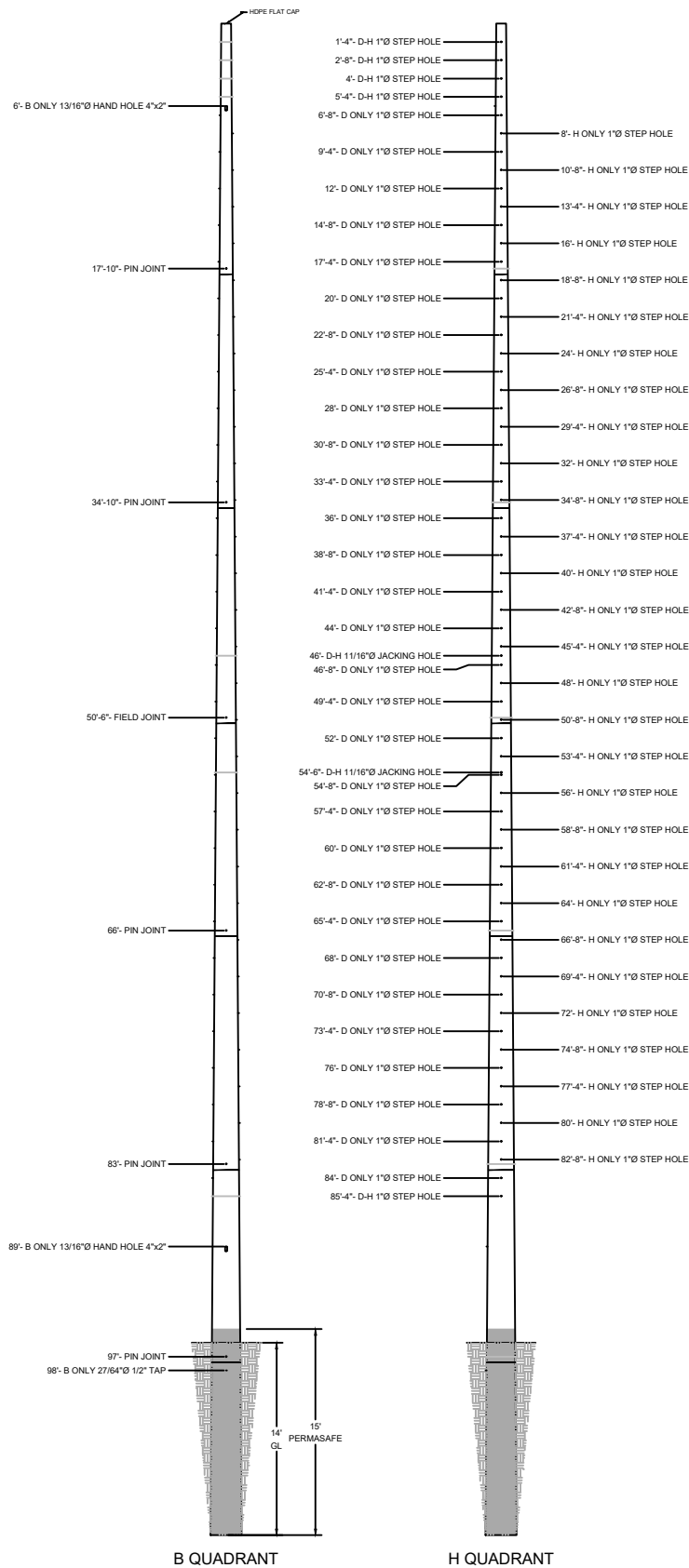


PLOT DATE:				SYENE SUBSTATION			
PLOT TIME:				ELEVATION PLAN WITH PROPOSED AMI POLE			
FILE NAME:				DESIGNED FOR:			
				 MADISON GAS and ELECTRIC COMPANY <small>MADISON GAS and ELECTRIC</small>			
DRAWN BY:	DATE:	DESIGNED:	CHECKED:				
JRE	1-11-22						
APPROVED:	DWG. NO.:			REV:			
---	---			---			
SCALE:							

10 9 8 7 6 5 4 3 2 1



Click to add a point



B QUADRANT

H QUADRANT

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.

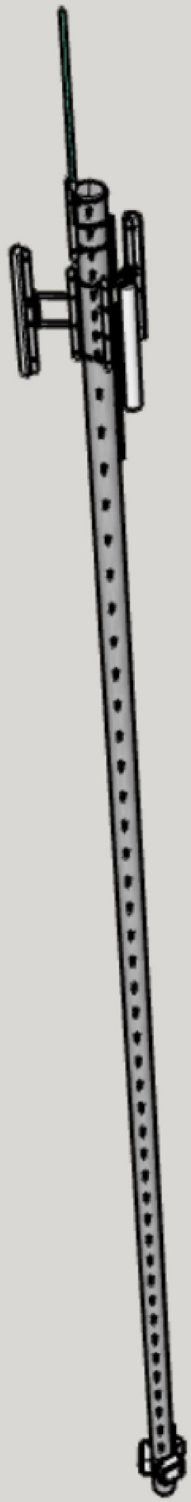


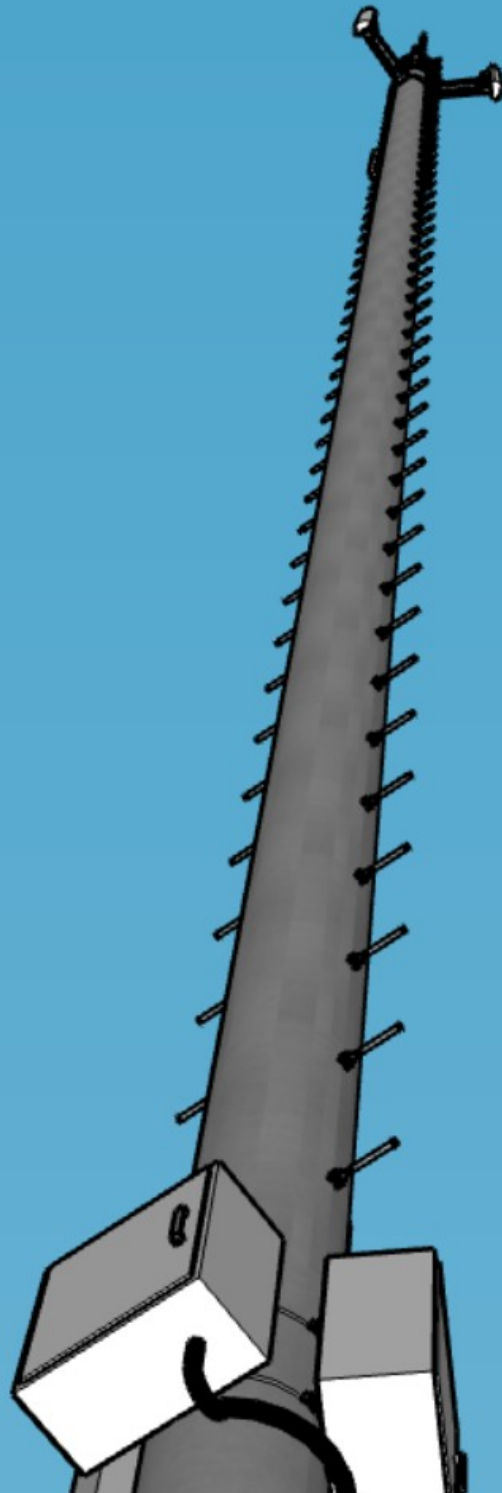


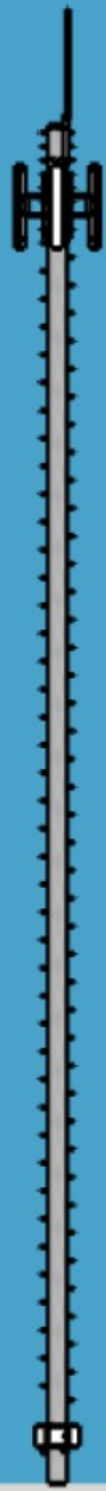
Pictured Above: Four jacking lugs are attached with bolts provided with the McWane jacking kit. Chain hoists are connected to jacking lugs and in position for section assembly. The 17" mark indicates the minimum section insertion amount the example pole and **will be clearly marked by the factory**. 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.







4250.09-875-Tx

Single Band | Omni Antenna | V-Pol | 360° | 9.0 dBd | Fixed Tilt | **With 25% NULL FILL**

Ordering Options		
When ordering, replace the "x" in the model number with the electrical downtilt. Select from the options listed below.		
Antenna with 0° fixed electrical downtilt	4250.09-875-T0	
Antenna with 3° fixed electrical downtilt	4250.09-875-T3	
Antenna with 6° fixed electrical downtilt	4250.09-875-T6	
Electrical Characteristics		
Frequency Range	790-960 MHz	
Input Impedance	50Ω	
VSWR	< 1.5:1	
H-Plane Ripple	< ±0.5 dB	
Input Power (Continuous)	480 Watts	
Peak Instantaneous Power (PIP)	25 kW	
Polarization	Vertical	
Gain	9.0 dBd (11.2 dBi)	
Horizontal Beamwidth (3 dB)	Omni-Directional	
Vertical Beamwidth (3 dB)	5.5° ±0.5°	
Lower Sidelobe Control (Null Fill)	25% (-12.4 dB)	
Intermodulation (3rd Order, 2x Tx @ 43 dBm)	-153 dBc	
Antistatic Protection	All metal parts DC Grounded (connector shows a DC short)	
Lightning Protection	Lightning current handling capability: 200 kA According to EN 62305-1 (Test Pulse 10/350 μs)	
Mechanical Characteristics		
Connector	7/16-DIN Female	
Construction Material	Antenna Base	Aluminium
	Shroud	GRP Tube 53 mm (2.1 in) Diameter
	Radiating Element	Brass
Mounting Section	Al. Tube 63.5 mm (2.5 in) Diameter x 350 mm (13.8 in) Length	
Dimensions (Length x Diameter)	3850 x 63.5 mm (151.6 x 2.5 in)	
Weight	8.5 kg (19 lbs)	
Wind Loading (@ 45ms ⁻¹)	309 N (69.5 lbf)	
Survival Wind Speed	300 km/h (186 mph)	
IP Rating	IP56	
Mounting Options	Part Number	Fits Pipe Diameter
All mounting bracket kits are ordered separately unless otherwise indicated.		
Parallel Bracket	2141.01.00.00	Fits Up to Ø120 mm (Ø4.7 in)



Quoted performance parameters are provided to offer typical, peak or range values only and may vary as a result of normal testing, manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to products may be made without notice.



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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SYN 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 Syene (SYN) substation (2961 S. Syene 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.

Similar MGE Facilities









**Soils &
Engineering
Services, Inc.**

August 16, 2021

Project 13392.3 R01

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

Subject: Geotechnical Exploration and Analyses Report
Proposed AMI/SCADA Mast
MG&E Syene Substation
2961 Syene 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

GEOTECHNICAL EXPLORATION AND ANALYSES REPORT

**PROPOSED AMI/SCADA MAST
MG&E SYENE SUBSTATION
2961 SYENE ROAD
CITY OF FITCHBURG
DANE COUNTY, WISCONSIN
SES Project Number 13392.3**

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

August 16, 2021



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- Notes and Legend Record for Boring Log Record
- Boring Log Record for Boring SY-1
- WDNR Well/Drillhole/Borehole Abandonment Form for Boring SY-1

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- Recommended Soil Design Parameters, 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 Syene Substation located at 2961 Syene 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 a total of four MG&E substations located in Dane County, Wisconsin. We completed the field work for all of these MG&E substations on July 12 and 13, 2021. 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 were also to submit one composite soil sample to a laboratory for chemical analyses for VOCs, semi-volatile organic compounds (SVOCs), and 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. We will provide a separate *Environmental Summary Report* presenting a summary of this environmental work completed for the four substations.

The subject of this report consists of the installation of a new AMI/SCADA mast at the Syene Substation. The subject project site is located approximately 1600 feet west of Syene Road. The access road to this substation is located approximately 50 feet north of the intersection of Syene Road and West Clayton Road. We understand this mast will consist of an unguaged 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 SY-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 SY-1 at the location as shown on the Location Sketches, Drawings 13392.3-1A and 13392.3-1B, enclosed in Appendix A.

B. Boring Elevation

Soils & Engineering Services, Inc. personnel determined the ground surface elevation at the location of Boring SY-1 using a surveying level and a leveling rod. We used the top of the concrete floor at the doorway located on the south side of the building located within the substation. 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 SY-1 to the following depth below ground surface and corresponding elevation:

Boring	Ground Surface Elevation (feet)	Bottom of Boring	
		Depth (feet-inch)	Elevation (feet)
SY-1	99.8	15'-8"	84.1333333333

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 SY-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 SY-1 consisted of fill material overlying native soil strata. The boring did encounter bedrock below the native soil within the depth drilled.

The fill material encountered by the boring consisted of 6 inches of brown fine POORLY-GRADED GRAVEL (GP) FILL over 12 inches of light brown fine SILTY SAND WITH GRAVEL (SM) FILL over 6½ feet of brown fine SILTY SAND (SM) FILL with trace gravel and trace LEAN CLAY (CL) lumps.

Below the fill material, Boring SY-1 encountered a native soil strata consisting of brown fine to medium SILTY SAND WITH GRAVEL (SM) GLACIAL TILL with trace to some gravel over light brown fine SILTY SAND (SM) with fine POORLY-GRADED SAND (SP) partings and lenses.

Below the native soil strata, Boring SY-1 encountered light brown slightly- to moderately-weathered DOLOMITE bedrock.

Please refer to the Boring Log Record enclosed in Appendix A for a further description of the fill material, native soil strata, and bedrock encountered at the location of Boring SY-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)	Dry and Caved Level	
		Depth (feet-inch)	Elevation (feet)
SY-1	99.8	12'-5"	87.4



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. LABORATORY AND FIELD TESTS

A. Laboratory Tests

We performed laboratory tests on selected split-barrel soil samples to determine the physical properties of the native soil strata encountered at the boring location. The laboratory tests that we performed on the selected material consisted of determining the moisture content (MC) and the percentage of soil particles passing the No. 200-mesh sieve (P_{200}).

We include the laboratory test results obtained for this report on the Boring Log Record enclosed in Appendix A. We used the results from the P_{200} test to confirm or modify the USCS soil identifications in general compliance with USCS classification procedures as defined in ASTM Designation D2487.

B. Field Test

The field test consisted of the performance of the standard penetration test (SPT).

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 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.

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

C. Test Results Discussion

The laboratory and 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 brown fine to medium SILTY SAND WITH GRAVEL (SM) GLACIAL TILL with trace to some gravel is in a moist relative moisture condition and in a loose state of relative density.
- The light brown fine SILTY SAND (SM) with fine POORLY-GRADED SAND (SP) partings and lenses is in a moist relative moisture condition and in a loose state of relative density.
- The light brown slightly- to moderately-weathered DOLOMITE bedrock is in a moist relative moisture condition and in a very dense state of relative density.

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

V. CONCLUSIONS

We offer the following comment regarding the soils and bedrock encountered by the boring:

- The granular FILL and native granular soil strata are considered to be of low strength.
- The DOLOMITE bedrock is considered to be of high 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 AMI/SCADA Mast for the MG&E Syene Substation located at 2961 Syene 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 and bedrock 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 and unconfined compressive strength information obtained from the soil boring, we computed the seismic site class for Boring SY-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 D, "stiff soil," in the vicinity of Boring SY-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 SY-1 to a depth of 20 feet and it encountered low to medium 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.¹

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 & 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

¹"Hazards by Location." *ATC Hazards by Location*, Applied Technology Council (ATC), 13 August 2021, <https://hazards.atcouncil.org/#/seismic?lat=43.01715593542405&lng=-89.40205079422606&address=>.



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 Syene Substation located at 2961 Syene 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 AMI/SCADA Mast for a new AMI/SCADA mast at the Syene 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 August 16, 2021, to **Madison Gas & Electric Company**.

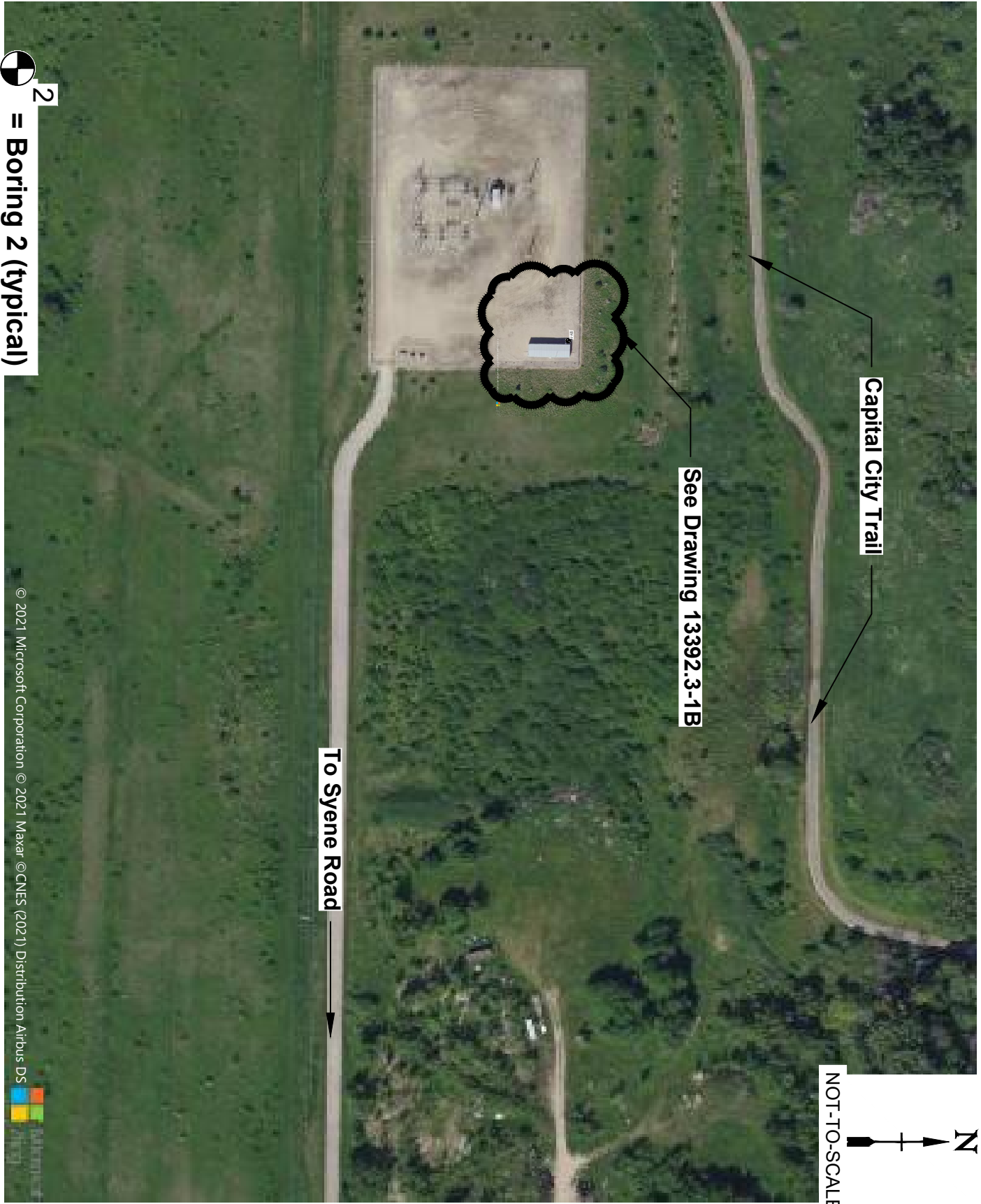


APPENDIX A

Appendix A Contents

- Location Sketches, Drawings 13392.3-1A and 13392.3-1B
- Notes and Legend Record for Boring Log Record
- Boring Log Record for Boring SY-1
- WDNR Well/Drillhole/Borehole Abandonment Form 3300-005 for Boring SY-1





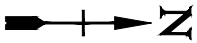
2
= Boring 2 (typical)

Capital City Trail

See Drawing 13392.3-1B

To Syene Road

NOT-TO-SCALE



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 1102 STEWART STREET
 MADISON, WISCONSIN 53713-4648
 Phone: 608-274-7600
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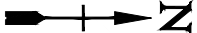
LOCATION SKETCH
 Proposed AMI/SCADA Mast
 MG&E Syene Substation
 6971 Century Avenue
 City of Middleton, Dane County, Wisconsin

DRAWING
 13392.3-1A




2
 = Boring 2 (typical)

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NOT-TO-SCALE




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

LOCATION SKETCH
 Proposed AMI/SCADA Mast
 MG&E Syene Substation
 6971 Century Avenue
 City of Middleton, Dane County, Wisconsin

DRAWING
 13392.3-1B

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

MC = Moisture Content, % moisture by weight
P₂₀₀ = % Passing the No. 200-mesh Sieve


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

SAMPLER TYPE LEGEND

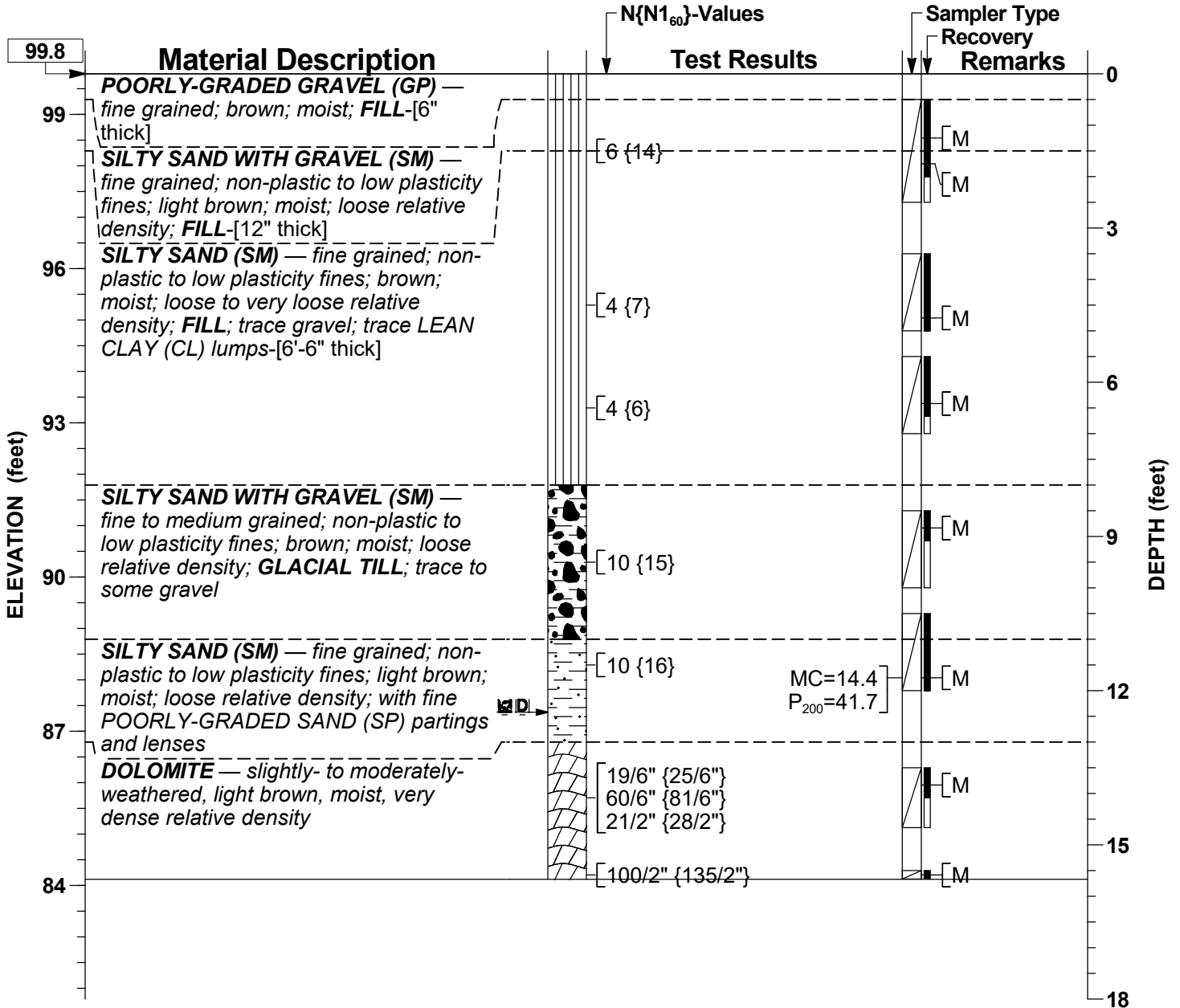
 2-inch-outside-diameter, split-barrel sampler

 <p>Soils & Engineering Services, Inc. 1102 STEWART STREET MADISON, WISCONSIN 53713-4648 Phone: (608) 274-7600 CONSULTING CIVIL ENGINEERS SINCE 1966</p>	<p>NOTES AND LEGEND RECORD Proposed AMI/SCADA Mast MG&E Syene Substation 2961 South Syene Road City of Fitchburg, Dane County, Wisconsin</p>	<p>13392.3</p>
---	---	----------------

General Location:

Boring SY-1

LATITUDE: —	LONGITUDE: —	COUNTY: Dane	SECTION: 2	CREW CHIEF: SWK	DRILL RIG: Geoprobe 7822DT	PAGE: 1 of 1
NORTHING: —	EASTING: —	TOWNSHIP: (Fitchburg) 6 N	¼: SW	LOG REVIEW: SLF	HAMMER TYPE (EFFICIENCY): Automatic (80%)	TOTAL DEPTH: 15'-8"
STATION: —	OFFSET: —	RANGE: 9 E	¼ ¼: SW	LOG QC: CMB	DATE STARTED: 07/12/2021	DATE COMPLETED: 07/12/2021



WATER LEVEL LEGEND	OTHER LEVEL LEGEND
12'-5" Dry at completion	12'-5" Caved at completion

DRILL METHOD	TOOL SIZE	CASING SIZE	DRILL FLUID	DEPTH FROM	DEPTH TO	HOLE DIA
HSA	2 1/4"	—	None	0'-0"	15'-7"	6.3"

SAMPLING METHOD(S): ASTM D1586

SURFACE PATCH: —

BACKFILL: Base Course, Auger Cuttings, Bentonite Chips, Caved Soil

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

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

BORING LOG RECORD
 Proposed AMI/SCADA Mast
 MG&E Syene Substation
 2961 South Syene Road
 City of Fitchburg, Dane County, Wisconsin

13392.3

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.

Verification Only of Fill and Seal

Route to:

Drinking Water Watershed/Wastewater Remediation/Redevelopment

Waste Management Other: _____

SES Project Number 13392.3

1. Well Location Information Boring Location Information				2. Facility / Owner Information			
County Dane		Boring Number SY-1		Facility Name Proposed AMI/SCADA Mast, MG&E Syene Substation			
Latitude / Longitude (Degrees and Minutes) _____		Format Code <input type="checkbox"/> DD <input type="checkbox"/> DDM		Method Code <input type="checkbox"/> GPS008 <input type="checkbox"/> SCR002 <input type="checkbox"/> OTH001		Facility ID (FID or PWS) NA	
1/4 1/4 SW 1/4 SW		Section 2		Township 6 N		Range 9 <input checked="" type="checkbox"/> E <input type="checkbox"/> W	
Well Street Address Boring 2961 South Syene Road				Original Well Owner NA			
Well City, Village or Town Boring City of Fitchburg/Civil Township of Fitchburg				Present Well Owner - Present Property Owner Unknown			
Subdivision Name				Well ZIP Code Boring		Mailing Address of Present Owner Madison Gas & Electric Company	
				City of Present Owner		State Zip Code	

Reason For Removal From Service
Soil Boring for GEOTECHNICAL sampling.

WI Unique Well # of Replacement Well
NA

3. Well / Drillhole / Borehole Information		4. Pump, Liner, Screen, Casing & Sealing Material	
<input type="checkbox"/> Monitoring Well <input type="checkbox"/> Water Well <input checked="" type="checkbox"/> Drillhole / Borehole		Pump and piping removed? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A Liner(s) removed? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A Screen removed? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A Casing left in place? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A Was casing cut off below surface? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A Did sealing material rise to surface? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A Did material settle after 24 hours? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A If yes, was hole retopped? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A If bentonite chips were used, were they hydrated with water from a known safe source? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Original Construction Date (mm/dd/yyyy) Boring Completion 07/12/2021 If a Well Construction Report is available, please attach. NA		Required Method of Placing Sealing Material <input type="checkbox"/> Conductor Pipe-Gravity <input type="checkbox"/> Conductor Pipe-Pumped <input checked="" type="checkbox"/> Screened & Poured (Bentonite Chips) <input type="checkbox"/> Other (Explain): _____	
Construction Type: <input checked="" type="checkbox"/> Drilled <input type="checkbox"/> Driven (Sandpoint) <input type="checkbox"/> Dug <input type="checkbox"/> Other (specify): _____		Sealings Materials <input type="checkbox"/> Neat Cement Grout <input type="checkbox"/> Concrete <input type="checkbox"/> Sand-Cement (Concrete) Grout <input checked="" type="checkbox"/> Bentonite Chips	
Formation Type: <input checked="" type="checkbox"/> Unconsolidated Formation <input type="checkbox"/> Bedrock		For monitoring wells and monitoring well boreholes only <input type="checkbox"/> Bentonite Chips <input type="checkbox"/> Bentonite - Cement Grout <input type="checkbox"/> Granular Bentonite <input type="checkbox"/> Bentonite - Sand Slurry	

Total Well Depth From Ground Surface (ft.) Boring 15.7		Casing Diameter (in.) NA	
Lower Drillhole Diameter (in.) 6.3		Casing Depth (ft.) NA	
Was well annular space grouted? NA <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown			
If yes, to what depth (feet)?		Depth to Water (Feet) Dry	

5. Material Used To Fill Well / Drillhole	From (Ft.)	To (Ft.)	No. Yards Sacks Sealant or Volume (circle one)	Mix Ratio or Mud Weight
Base Course	Surface	1.00	0.21 ft³	
Auger Cuttings	1.00	9.00	1.7 ft³	
Bentonite Chips	9.00	12.42	1 - 50 lb Bag	
Caved Soil	12.42	15.58	0.67 ft³	

6. Comments

NA = Not applicable to soil borings.

7. Supervision of Work				DNR Use Only	
Name of Person or Firm Doing Filling & Sealing SOILS & ENGINEERING SERVICES, INC.		License #	Date of Filling & Sealing (mm/dd/yyyy) 07/12/2021	Date Received	Noted By
Street or Route 1102 Stewart Street			Telephone Number (608) 274-7600	Comments	
City Madison	State WI	ZIP Code 53713	Signature of Person Doing Work <i>Craig M. Bower</i>	Date Signed 08/13/2021	

APPENDIX B

Appendix B Contents

- Recommended Soil Design Parameters, Table B-1



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

Proposed AMI/SCADA Mast
 MG&E Syene Substation
 2961 South Syene Road
 City of Fitchburg, Dane County, Wisconsin

Elevation (feet)	Material Type	Estimated Soil Parameters†				Drilled Shaft Values‡	
		Saturated Density, γ_s (pcf)	Moist Density, γ (pcf)	Angle of Internal Friction, ϕ (degrees)	Cohesion, c (psf)	Ultimate Skin Friction (psf)	Ultimate End Bearing (psf)
----- Boring SY-1 -----							
99.8 to 99.3	POORLY-GRADED GRAVEL (GP) — fine grained; brown; moist; FILL	117	110.0	30	0	50	0
99.3 to 98.3	SILTY SAND WITH GRAVEL (SM) — fine grained; non-plastic to low plasticity fines; light brown; moist; loose relative density; FILL	133	125.0	31	0	370	0
98.3 to 94.8	SILTY SAND (SM) — fine grained; non-plastic to low plasticity fines; brown; moist; loose to very loose relative density; FILL ; trace gravel; trace LEAN CLAY (CL) lumps	133	125.0	29	0	440	0
94.8 to 91.8		133	125.0	29	0	570	6,000
91.8 to 88.8	SILTY SAND WITH GRAVEL (SM) — fine to medium grained; non-plastic to low plasticity fines; brown; moist; loose relative density; GLACIAL TILL ; trace to some gravel	138	130.0	31	0	1,140	15,600
88.8 to 86.8	SILTY SAND (SM) — fine grained; non-plastic to low plasticity fines; light brown; moist; loose relative density; with fine POORLY-GRADED SAND (SP) partings and lenses	138	130.0	32	0	1,330	16,800
86.8 to 84.1	DOLOMITE — slightly- to moderately-weathered, light brown, moist, very dense relative density	154	145.0	45	0	2,570	60,000
----- End of Boring SY-1 @ Elevation 84.1 feet -----							

Table Notes

‡ The Saturated Density, 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	
SY-1	32	D	32	D	—	—	D

Recommend Site Class D (stiff soil) for proposed improvement(s) in the vicinity of Boring SY-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.

	Soils & Engineering Services, Inc. 1102 STEWART STREET MADISON, WISCONSIN 53713-4648 Phone: (608) 274-7600 CONSULTING CIVIL ENGINEERS SINCE 1966	SEISMIC SITE CLASS RECORD Proposed AMI/SCADA Mast MG&E Syene Substation 2961 South Syene Road City of Fitchburg, Dane County, Wisconsin	13392.3
	Printed on 8/13/2021		



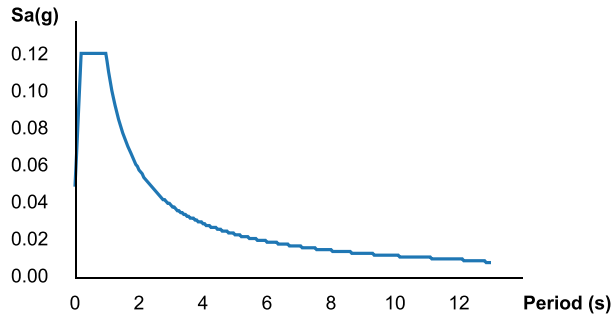
ATC Hazards by Location seismic information obtained from Applied Technology Council (ATC) website (<https://hazards.atcouncil.org>) on 13 August 2021.

Search Information

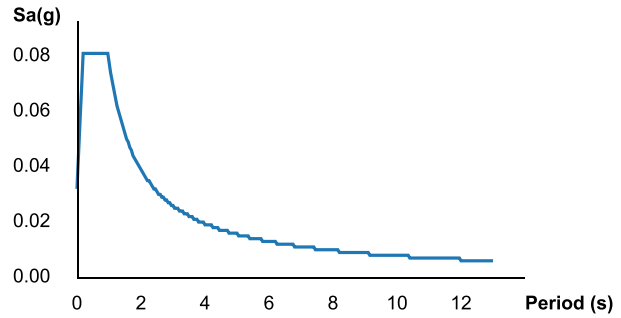
Coordinates: 43.01715593542405, -89.40205079422606
Elevation: 883 ft
Timestamp: 2021-08-13T19:30:56.832Z
Hazard Type: Seismic
Reference Document: ASCE7-16
Risk Category: III
Site Class: D



MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S _S	0.076	MCE _R ground motion (period=0.2s)
S ₁	0.049	MCE _R ground motion (period=1.0s)
S _{MS}	0.121	Site-modified spectral acceleration value
S _{M1}	0.117	Site-modified spectral acceleration value
S _{DS}	0.081	Numeric seismic design value at 0.2s SA
S _{D1}	0.078	Numeric seismic design value at 1.0s SA

Additional Information

Name	Value	Description
SDC	B	Seismic design category
F _a	1.6	Site amplification factor at 0.2s
F _v	2.4	Site amplification factor at 1.0s

CR _S	0.947	Coefficient of risk (0.2s)
CR ₁	0.873	Coefficient of risk (1.0s)
PGA	0.037	MCE _G peak ground acceleration
F _{PGA}	1.6	Site amplification factor at PGA
PGA _M	0.059	Site modified peak ground acceleration
T _L	12	Long-period transition period (s)
SsRT	0.076	Probabilistic risk-targeted ground motion (0.2s)
SsUH	0.08	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](#).

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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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