REI
CIVIL & ENVIRONMENTAL ENGINEERING, SURVEYING

October 26, 2015

Wisconsin Department of Natural Resources
Attn: Greer Lundquist
107 Sutliff Avenue
Rhinelander, WI 54501

Subject:

Well Installation Proposal
Tower Standard Service
14267 State Highway 70 W
Lac du Flambeau, WI 54538
BRRTS: 03-64-127899
PECFA: 54538-9517-67

Dear Greer,

REI Engineering, Inc. (REI) is hereby submitting a Well Installation Proposal and cost estimate for the above referenced site. This proposal is based on the scope of work (SOW) outlined during the October 22, 2015 meeting at the Wisconsin Department of Natural Resources (WDNR) Northern Region Office in Rhinelander, WI. This meeting was attended by members of the WDNR, United States Environmental Protection Agency (USEPA) and Lac du Flambeau Band of Lake Superior Chippewa Tribe.

This scope of work proposal calls for the installation of seven (7) well nests each consisting of a stand-alone monitoring well and a stand-alone piezometer. The monitoring wells are proposed to be installed to a depth of 15 feet with a 10' foot screen. REI is requesting a variance to NR 141.11 as the depth to groundwater may be less than seven (7) feet in the proposed locations. Piezometer depths range from 25 feet to 45 feet and will be constructed with five (5) foot screen lengths. See enclosed figure for proposed well placements.

REI intends on overseeing the well installation the week of November 2nd, 2015. REI will be contracting two (2) separate drilling contractors to complete the proposed SOW concurrently to reduce the overall time required to complete the proposed work. One drilling contractor will advance the monitoring wells using the Usual and Customary fee schedule. The other drilling contractor has provided a quote to install the piezometers. REI will field screen and log the soil during the installation of the monitoring wells and will also field screen and attempt to log the soil cuttings in the blind drilled piezometer borings.

A breakdown of proposed Usual and Customary (U&C) charges is as follows:

- Sample collection: 34 wells (2 rounds each of the 7 proposed monitoring wells, 7 proposed piezometers and 3 previously installed monitoring wells). Samples will be analyzed for

VOC's, nitrate, sulfate and dissolved iron. Based on analytical results, analytical parameters may be adjusted down for the second proposed sampling event.

- REI will arrange for the proper disposal of the investigative waste generated during this SOW including soil cuttings, recovered decontamination liquids, development water and purge water.

- Monitoring well and piezometer installation as previously described

- Survey the 7 proposed wells, 7 proposed piezometers and 3 existing wells into a common datum

- REI will ensure all padlocks for the 14 proposed wells and 3 existing wells are all keyed alike and will provide keys to other as requested.

The attached Variance to the U&C Schedule includes the following:

- Surcharges to the U&C allowable maximum rates due to known difficult drilling conditions

- Decontamination pad for cleaning the drilling augers and recovering the wash water

- REI time to oversee the well installation, development and surveying activities

- Geolocate the previously installed borehole (BH) locations to ensure accurate placements on the base map.

Hydraulic conductivity testing of the wells is not proposed at this time. A recommendation for performing hydraulic conductivity will be provided following the second proposed sampling event. REI has included the drilling proposal for the piezometers from Gestra Engineering, Inc. along with a spreadsheet detailed the costs for the items not covered in the U & C schedule.

REI has also included methods and procedures for the proposed activities.

If you have any comments, please contact our office at (715) 675-9784 or electronically at dlarsen@reiengineering.com.

Sincerely,
REI Engineering, Inc.

David Larsen, P.G.
Hydrogeologist / Project Manager

cc: William Kozak, 8760 W Squaw Lake Road, Lac du Flambeau, WI 54538

Attachments A/S

Variance Request
Tower Standard
Well Installation

Unit Costs are based on present values on above listed date

Cat #	Description	Units	Quantity	Unit Cost	Event	Events	Total Cost	Subtotal
	Commodity							
	Blind Drilling Surcharge (0-25')	ft	175	$3.00	$525.00	1	$525.00	
	Blind Drilling Surcharge (25-50')	ft	100	$5.00	$500.00	1	$500.00	
	Anticipated Additional Drill Crew Site Time	hr	30	$60.00	$1,800.00	1	$1,800.00	
	Decontamination Pad	ea	1	$1,500.00	$1,500.00	1	$1,500.00	
							Total	**$4,325.00**
	Well Installation							
	Project Manager - well installation prep	hr	10	$104.44	$1,044.40	1	$1,044.40	
	Project Manager	hr	50	$104.44	$5,222.00	1	$5,222.00	
	Soil Boring Logs (0.25 hr/boring)	hr	3.5	$87.00	$304.50	1	$304.50	
							Total	**$6,570.90**
	Project Management							
	Contractor Scheduling	hr	4	$104.44	$417.76	1	$417.76	
	Post SOW Completion Regulatory Discussion	hr	30	$104.44	$3,133.20	1	$3,133.20	
	Principal	hr	5	$127.65	$638.25	1	$638.25	
							Total	**$4,189.21**
	Geolocate Soil Borings							
	Project Manager	hr	3	$104.44	$313.32	1	$313.32	
	Surveyor and equipment	hr	6	$90.00	$540.00	1	$540.00	
	Travel Time (surveyor)	hr	3	$72.00	$216.00	1	$216.00	
	Mileage (surveyor)	mi	165	$0.62	$102.30	1	$102.30	
	CAD	hr	12	$63.83	$765.96	1	$765.96	
	Administrative	hr	10	$40.62	$406.20	1	$406.20	
							Total	**$2,343.78**
	Well Development							
	Project Manager	hr	10	$104.44	$1,044.40	1	$1,044.40	
	Staff Scientists (2)	hr	50	$87.04	$4,352.00	1	$4,352.00	
	Well Development Forms	hr	3.5	$87.04	$304.64	1	$304.64	
							Total	**$5,701.04**
	Equipment and Supplies							
	PID	ea	5	$75.00	$375.00	1	$375.00	
	Development Pump (per well - MW)	ea	7	$30.00	$210.00	1	$210.00	
	Development Pump (per well - PZ)	ea	7	$50.00	$350.00	1	$350.00	
	Development Tubing	ea	425	$0.40	$170.00	1	$170.00	
	Water Level Indicator	ea	5	$25.00	$125.00	1	$125.00	
	Decon Water	ea	6	$9.50	$57.00	1	$57.00	
	Bailer	ea	5.5	$14.00	$77.00	1	$77.00	
	Bailer Rope	ea	0.1	$425.00	$42.50	1	$42.50	
							Total	**$1,406.50**
	Total						**Total**	**$24,536.43**

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Usual and Customary Standardized Invoice #18
July 2015 - January 2016

RR-047A

PECFA #: 54538-9514-67
BRRT's #: 03-64-127899
Site Name: Tower Standard
Site Address: 14267 Hwy 70, Lac du Flambeau

Vendor Name: REI
Invoice #:
Invoice Date: 10-21-15 SOW Request
Check #:

U&C Total	$	41,728.10
Variance to U&C Total	$	24,536.43
Grand Total	$	66,264.53

TASK	TASK DESCRIPTION	SERVICES	ACTIVITY CODE	ACTIVITY REFERENCE CODE DESCRIPTION	UNIT	MAX UNIT COST	UNITS	TOTAL MAX
1	GW Sampling		GS05	Sample Collection	Well	$ 69.00	34	$ 2,346.00
1	GW Sampling		GS10	Incremental Sample Collection (natural attenuation)	Well	$ 45.40	34	$ 1,543.60
1	GW Sampling		GS25	Primary Mob/Demob	Site	$ 598.20	3	$ 1,794.60
4	Waste Disposal	Consultant	WD05	Consultant Coordination	Site	$ 130.60	3	$ 391.80
4	Waste Disposal	Commodity	WD10	GW Sample and/or Purge	Drum	$ 40.10	35	$ 1,403.50
4	Waste Disposal	Commodity	WD15	Drill Cuttings	Drum	$ 103.00	35	$ 3,605.00
4	Waste Disposal	Commodity	WD25	Primary Mob/Demob	Site	$ 274.00	5	$ 1,370.00
10	Initial Site Survey	Consultant	IS10	Subsequent Surveys	Well	$ 104.90	17	$ 1,783.30
13.a	Drilling In Unconsolidated Soils - With Soil Sampling	Consultant	DR20	Primary Mob/Demob	Site	$ 564.80	2	$ 1,129.60
13.d	Drilling In Unconsolidated Soils - With Soil Sampling	Commodity	DR45	0 - 25 ft bgs	Ft	$ 15.90	105	$ 1,669.50
13.e	Drilling In Unconsolidated Soils - Without Soil And/Or GW Sampling	Commodity	DR60	Drilling in Unconsolidated Soils	Ft	$ 11.40	275	$ 3,135.00
14	Monitoring Well Installation	Commodity	MWI15	2 inch PVC Casing	Ft	$ 15.90	380	$ 6,042.00
15	Misc. Drilling Activities & Supplies		MDT05	Drill Rig Mob/Demob	Mob/Demob	$ 917.50	2	$ 1,835.00
15	Misc. Drilling Activities & Supplies		MDT10	Well Cover/flushmount	Each	$ 193.00	12	$ 2,316.00
15	Misc. Drilling Activities & Supplies		MDT15	Stickup Well Cover	Each	$ 156.10	2	$ 312.20
15	Misc. Drilling Activities & Supplies		MDT21	Drum, 55 gal. DOT steel	Each	$ 52.50	70	$ 3,675.00
15	Misc. Drilling Activities & Supplies		MDT25	Commodity Service Provider Per Diem (drilling and direct push)	Person	$ 193.60	16	$ 3,097.60
15	Misc. Drilling Activities & Supplies		MDT45	Padlocks	Each	$ 7.60	17	$ 129.20
31	Consultant Overnight Per Diem		COPD05	Overnight	Night	$ 108.30	4	$ 433.20
33	Schedule Of Laboratory Maximums	Commodity		Laboratory (see task 33 total on Lab Schedule)	Lab Schedule	Lab Schedule	136	$ 3,352.40
36	Change Order Request		COR05	Change Order Request (cost cap exceedance requests)	Change Order	$ 363.60	1	$ 363.60
Variance	Well Installation, Development and Survey				Variance	$24,536.43	1	$24,536.43

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Usual and Customary Standardized Invoice #18
July 2015 - January 2016

RR-047A

TOTAL LAB CHARGES	$ 3,352.40	TASK 33	136	$ 3,352.40	TASK 24	0	$ -

MATRIX	REF CODE	REIMBURSABLE ANALYTE	UNITS	MAX COST	SAMPLES	TOTAL
AIR	A1	Benzene	SAMPLE	$ 42.80		$ -
AIR	A2	BETX	SAMPLE	$ 47.10		$ -
AIR	A3	GRO	SAMPLE	$ 43.90		$ -
AIR	A4	VOC's	SAMPLE	$ 68.50		$ -
WATER	W1	GRO/PVOC	SAMPLE	$ 27.80		$ -
WATER	W2	PVOC	SAMPLE	$ 25.70		$ -
WATER	W3	PVOC + 1,2 DCA	SAMPLE	$ 41.70		$ -
WATER	W4	PVOC + Naphthalene	SAMPLE	$ 28.90		$ -
WATER	W5	VOC	SAMPLE	$ 68.50		$ -
WATER	W6	PAH	SAMPLE	$ 69.50		$ -
WATER	W7	Lead	SAMPLE	$ 11.80		$ -
WATER	W8	Cadmium	SAMPLE	$ 12.90		$ -
WATER	W9	Hardness	SAMPLE	$ 11.80		$ -
WATER	W10	BOD, Total	SAMPLE	$ 22.50		$ -
WATER	W11	Nitrate	SAMPLE	$ 10.70	34	$ 363.80
WATER	W12	Total Kjeldahl	SAMPLE	$ 19.30		$ -
WATER	W13	Ammonia	SAMPLE	$ 16.10		$ -
WATER	W14	Sulfate	SAMPLE	$ 9.70	34	$ 329.80
WATER	W15	Iron	SAMPLE	$ 9.70	34	$ 329.80
WATER	W16	Manganese	SAMPLE	$ 9.70		$ -
WATER	W17	Alkalinity	SAMPLE	$ 9.70		$ -
WATER	W18	methane	SAMPLE	$ 43.90		$ -
WATER	W19	Phosphorous	SAMPLE	$ 17.20		$ -
WATER	W20	VOC Method 524.2	SAMPLE	$ 167.90		$ -
WATER	W21	EDB Method 504	SAMPLE	$ 90.90		$ -
SOILS	S1	GRO	SAMPLE	$ 23.60		$ -
SOILS	S2	DRO	SAMPLE	$ 28.90		$ -
SOILS	S3	GRO/PVOC	SAMPLE	$ 26.80		$ -
SOILS	S4	PVOC	SAMPLE	$ 24.60		$ -
SOILS	S5	PVOC + 1,2 DCA + Naphthalene	SAMPLE	$ 47.10		$ -
SOILS	S6	PVOC + Naphthalene	SAMPLE	$ 34.30		$ -
SOILS	S7	VOC	SAMPLE	$ 68.50	34	$ 2,329.00
SOILS	S8	SPLP Extraction VOC only	SAMPLE	$ 48.20		$ -
SOILS	S9	PAH	SAMPLE	$ 69.50		$ -
SOILS	S10	Lead	SAMPLE	$ 11.80		$ -
SOILS	S11	Cadmium	SAMPLE	$ 13.90		$ -
SOILS	S12	Free Liquid	SAMPLE	$ 10.70		$ -
SOILS	S13	Flash Point	SAMPLE	$ 24.60		$ -

MAX COST	SAMPLES	TOTAL
$ 23.60		$ -
$ 28.90		$ -
$ 26.80		$ -
$ 24.60		$ -
$ 47.10		$ -
$ 34.30		$ -
$ 68.50		$ -
$ 48.20		$ -
$ 69.50		$ -
$ 11.80		$ -
	TASK 24 TOTAL	$ -

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MATRIX	REF CODE	REIMBURSABLE ANALYTE	UNITS	MAX COST	SAMPLES	TOTAL
SOILS	S14	Grain Size - dry	SAMPLE	$ 40.70	$	-
SOILS	S15	Grain Size - wet	SAMPLE	$ 54.60	$	-
SOILS	S16	Bulk Density	SAMPLE	$ 12.90	$	-
SOILS	S17	Permeability	SAMPLE	$ 39.60	$	-
SOILS	S18	Nitrogen as Total Kjeldahl	SAMPLE	$ 19.30	$	-
SOILS	S19	Nitrogen as Ammonia	SAMPLE	$ 16.10	$	-
SOILS	S20	% Organic Matter	SAMPLE	$ 27.80	$	-
SOILS	S21	TOC as NPOC	SAMPLE	$ 54.60	$	-
SOILS	S22	Soil Moisture Content	SAMPLE	$ 6.50	$	-
SOILS	S23	Air Filled Porosity	SAMPLE	$ 24.60	$	-
SOILS	S24	% Total Solids	SAMPLE	$ 6.50	$	-
SOILS	S25	Field Capacity	SAMPLE	$ 26.80	$	-
SOILS	S26	TCLP Lead	SAMPLE	$ 79.20	$	-
SOILS	S27	Cation Exchange (Ca, MG, & K)	SAMPLE	$ 25.70	$	-
SOILS	S28	TCLP Cadmium	SAMPLE	$ 79.20	$	-
SOILS	S29	TCLP Benzene	SAMPLE	$ 79.20	$	-
LNAPL	LFPS01	Viscosity + Density Interfacial tension I (LNAPL/water [dyne/cm]) Interfacial tension II (LNAPL/air [dyne/cm]) Interfacial tension III (water/air) [dyne/cm])	SAMPLE	$ 534.60	$	-
					TASK 33 TOTAL $	**3,352.40**

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GESTRA Engineering, Inc.
191 W. Edgerton Ave.
Milwaukee, WI 53207
(414) 933-7444
Fax (414) 933-7844

Breakdown of Contract Drilling Services

Project: Lac du Flambeau, Wi
Quote To: REI Engineering
Date: 10/15/2015 Attn: Dave Larsen P.G.
Site Location: Hwy 70 & CTY D

Usual and Customary Standard Rates					
Mobilization	Each	1	$917.50	$917.50	Assumes all borings are truck accessible.
SPT Drilling (0'-25')	Feet	0	$15.90	$0.00	7 Wells/Piezometers blind drilled to 40'.
Blind Drilling (0-25')	Feet	175	$11.40	$1,995.00	
Blind Drilling (25-50')	Feet	105	$11.40	$1,197.00	
Blind Drilling (50-75')	Feet	0	$11.40	$0.00	
Monitoring Well Installation	Feet	280	$15.90	$4,452.00	
Per Diem	Person	12	$193.60	$2,323.20	3 Man Crew
Protective Covers	Feet	7	$193.60	$1,355.20	
D.O.T. Drums	Feet	15	$52.50	$787.50	
Total Estimated Usual and Customary Fees:				**$13,026.90**	

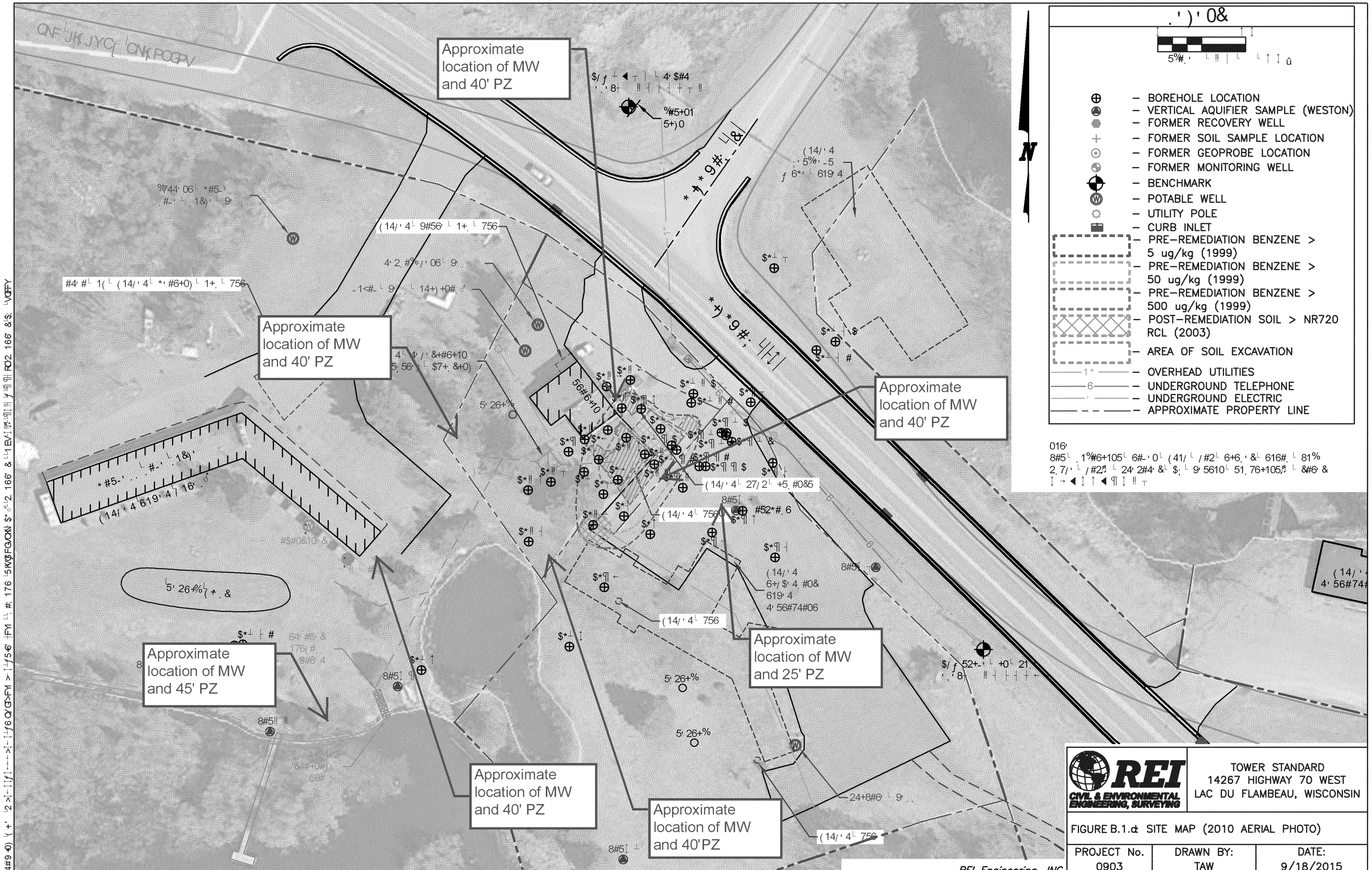
Charges to be applied in addition to Usual and Customary Standard Rates					
Mobilization	Each	0	$917.50	$0.00	Additional mobilization fee due to length of project. A mobilization fee shall be charged for each week on site.
Blind Drilling (0-25')	Feet	175	$3.00	$525.00	Additional per foot fee to be charged due to known difficult drilling on project site.
Blind Drilling (25-50')	Feet	105	$5.00	$525.00	
Blind Drilling (50-75')	Feet	0	$8.00	$0.00	
Grouting of Piezometers	Feet	0	$3.00	$0.00	Additional fee for using grout in place of chips.
Drill Crew hourly increase	Hourly	30	$60.00	$1,800.00	Due to added time spent with difficult drilling and three man crew.
Abandonment w/ liquid grout	Feet	0	$8.75	$0.00	If needed.
Matts for lawn protection	Use	0	$150.00	$0.00	additional fee for up to 50' of matting. $20.00 per additional 8 feet if needed.
4 1/4 HD Auger replacement	Each	0	$450.00	$0.00	Cost to replace one five foot section of damaged auger with new.
4 1/4 HD Auger cutting head	Each	0	$650.00	$0.00	Cost to replace damaged cutting head with new.
Washing out heaving sands	Each	0	$150.00	$0.00	If heaving sands need to be cleared from augers prior to well or piezometer placement.
Containment of wash water	per boring	0	$100.00	$0.00	Cost to contain washout water. Does not include drums.
Drilling Restarts	Each	0	$150.00	$0.00	To be applied if boring has to be offset and started over due to cobles and boulders or rubble. This fee is in addition to the lineal footage rate
Equipment Decontamination	Boring	0	$75.00	$0.00	Additional decontamination due to grouting.
Decontamination Pad	Each	1	$1,500.00	$1,500.00	Includes Set-up and take down.
Skid Loader Rental	Week	0	$1,850.00	$0.00	Includes mobilizations of loader
Spoil Clean Up	per boring	0	$100.00	$0.00	Cost to move soils and place in dumpster provided by client. Provide visqueen cover of dumpster when not in use.
			Total	**$4,350.00**	

Total Estimated Drilling Services

$17,376.90

This quotation is an estimate and is not a lump sum. GESTRA reserves the right to charge for services as performed according to our current fee schedule. To initiate services, GESTRA requires written acceptance of a formal proposal or purchase order with mutually agreeable terms and conditions.

Quotation Prepared By:
Timothy R. Winkler, Drilling Manager.
Print Name and Position



REI CIVIL & ENVIRONMENTAL ENGINEERING, SURVEYING

TOWER STANDARD
14267 HIGHWAY 70 WEST
LAC DU FLAMBEAU, WISCONSIN

FIGURE B.1.d: SITE MAP (2010 AERIAL PHOTO)

PROJECT No.	DRAWN BY:	DATE:
0903	TAW	9/18/2015

METHODS AND PROCEDURES

FOR

SOIL SAMPLING USING HOLLOW STEM AUGERS

Soil sampling was done in accordance with **ASTM:D1586-84**. Using this procedure, a 2 inch **OD**, 2 foot long split barrel sampler was driven into the soil by a 140 pound weight falling 30 inches. After an initial set of 6 inches, the number of blows required to drive the sampler an additional 12 inches is known as the penetration resistance or N value. The N value is an index of the relative density of cohesionless soils and the consistency of cohesive soils.

As the samples were obtained in the field, they were visually and manually classified by the field geologist/technician in accordance with **ASTM:D2488-84**. Representative portions of the samples were returned to the laboratory for further examination and for verification of the field classification. Logs of the borings were filled out indicating the depth and identification of the various strata, the N value, water level information and pertinent information regarding the method of maintaining and advancing the borings.

Soil samples recovered by the split spoon were divided into two portions. One portion was prepared for laboratory analysis. The other portion was placed into a clean one quart Ziploc bag. A headspace analysis was then conducted on this latter portion.

HEADSPACE ANALYSIS

The soils were scanned with a RAE photoionization detector equipped with a 10.6 eV lamp and calibrated for direct reading in units of Total Organic Vapors using an isobutylene standard. A Ziploc bag was filled two-thirds of the volume with the sample. The bags were sealed and shaken vigorously before headspace development. Headspace development is allowing the sample to rest for at least ten minutes before scanning. When ambient temperatures were below 60 degrees F, soil samples were allowed to warm for a minimum of 10 minutes in a heated environment prior to headspace development. The Ziploc bag was punctured with the probe and a reading was taken.

SAMPLING AND CHAIN OF CUSTODY

Soil samples were c ollected from a spilt barrel sampler and placed in laboratory prepared glass vials and placed directly into a cooler pending delivery to the laboratory. Latex gloves were worn during all sample collection procedures.

Upon completion of a sample, a chain of custody log was initiated. The chain of custody record included the following information: project name, work order number, shipped by, shipped to, sampling point, location, field ID number, date and time taken, sample type, number of containers, analysis required, sampler (s) signature (s), etc. As few people as possible handled the samples.

SURVEYING

Grade elevations of borings were surveyed to the nearest 0.1 foot and were tied to a USGS benchmark.

DECONTAMINATION

Sampling equipment were decontamin ated prior to sampling. Augers were steam cleaned on plastic and split spoons were cleaned after every sample taken.

METHODS AND PROCEDURES

FOR

MONITORING WELL INSTALLATION AND GROUNDWATER SAMPLING

The water table monitoring wells consist of pipe joint threaded, two inch by ten feet long schedule 40 PVC (#10 slot) with 2 inch schedule 40 PVC riser. After the screen and riser pipe were set, a sand filter pack was placed around the screen to a depth 3 feet above the top of the screen, capped by a 2 foot fine sand layer, covered with a bentonite seal, annular space seal and surface seal. A protective casing did enclose the PVC riser pipe.

Monitoring wells were installed in accordance with Wisconsin Administrative Code NR 141 regulations. The WDNR "Monitoring Well Construction Form 4400 -113A" were completed in accordance with NR 144 and NR 147.

The wells were developed b y bailing or pumping to establish a reliable intercept with the surrounding formation. At least ten well volumes were removed or bailed until the wells were sediment free. If the well was bailed dry, a minimum of 3 volumes were taken. The WDNR "Monitoring Well Development Form 4400-113B" was completed for each well.

WATER LEVEL

Groundwater level measurements were obtained by using an electronic measuring device which indicated when a probe is in contact by lowering the probe into the well until the inst rument indicated that the water surface has been encountered, and the distance from the top of the well to the probe was measured. All measurements were reported to the nearest 0.01 foot.

SAMPLING AND CHAIN OF CUSTODY

Water samples were collected using disposable bottom loading plastic bailers. Prior to sampling, the wells were purged. At least 4 well volumes were removed before sampling to ensure collection of a representative sample. If the well was purged dry, it was allowed to recharge and then it was sampled.

Samples were taken from the middle section of the bailer and placed in laboratory prepared bottles. Samples were labeled and placed in a cooler to be preserved at approximately 4 degrees C. Samples were accompanied by Chain of Custody records.

Upon completion of a sample, a chain of custody log was initiated. The chain of custody record included the following information: project name, work order number, shipped by, shipped to, sampling point, location, field ID number, date and time taken , sample type, number of containers, analysis required, sampler (s) signature (s), etc. As few people as possible handled the samples.

SURVEYING

Grade elevations of monitoring wells were surveyed to the nearest 0.1 foot and top of riser elevations were s urveyed to the nearest 0.01 for monitoring wells. Elevations were tied to a USGS benchmark.

DECONTAMINATION

Sampling equipment was decontaminated prior to sampling. The water level measuring device was washed before it was placed into each well using di stilled water and Alconox cleaning detergent. Latex gloves were worn during all sample collection procedures and were changed between the collection of each of the water samples from each monitoring well.

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