



Invitation to Bid

The Board of County Commissioners, Wagoner County, Oklahoma is seeking sealed bids for the design and manufacture of a 300', 36" Face Guyed Tower. Erection drawings and complete installation drawings are to be submitted as part of the bid package.

Bid #25

Date Published: May 31 and June 7, 2012 (Wagoner Tribune)

Bidding Period Closing Date and Hour: June 22, 2012 @ 4:00 PM

Sealed Bid Opening Date and Hour: June 25, 2012 @ 9:00AM

Requesting Authority: Wagoner County E911

Bid submissions are to be addressed to:

**Attn: Wagoner County Purchasing Agent
P O Box 156
307 E Cherokee
Wagoner, OK 74477**

Please review the attached Terms and Conditions pertaining to the submission of this bid.

Please pay particular attention to item 1 of the Terms and Conditions. This item specifies how the bid envelopes are to be identified to prevent inadvertent or premature opening of sealed bids. Your compliance will ensure consideration of your bid by the awarding body. Late bids will not be considered.

Included in this packet is a Non-Collusion Affidavit which must be signed and submitted as part of the.

This packet contains:

1. Invitation to Bid
2. Terms and Conditions for Bidding
3. Affidavit of Non-Collusion
4. Specifications
5. Geotechnical Engineering Report
6. Bid Form

A handwritten signature in cursive script that reads "Carolyn M. Kusler".

Carolyn Kusler
Wagoner County Clerk
P O Box 156
Wagoner, OK 74477



TERMS AND CONDITIONS

THESE ITEMS APPLY TO AND BECOME A PART OF THE BID
NO EXCEPTIONS TO THESE TERMS AND CONDITIONS WILL BE CONSIDERED

1. Bids must be submitted on the included form only. Each bid shall be placed in a separate envelope. Be sure the envelope is completely and properly identified and sealed, showing the bid name and number in the lower left hand corner.
2. All bids shall be entered on the Bid Form enclosed or a copy thereof. Bids are to be typewritten or in ink. No bidder may withdraw his proposal for a period of thirty (30) days after the date and hour set for the opening of bids.
3. The bidder shall attach the manufacturer's name of the equipment or material to be furnished, type, model numbers, manufacturer's descriptive bulletins and specifications. All guarantees and warranties should be clearly stated. This data shall be in sufficient detail to describe accurately the equipment or material to be furnished. Manufacturer's specifications, in respect to the successful bidder, shall be considered as part of the contract with Wagoner County.
4. Any exceptions or deviations from written specifications shall be identified in writing and attached to the bid form.
5. The enclosed Non-Collusion Agreement MUST be returned with the bid.
6. Wagoner County reserves the right to reject any and all bids and to waive any technicalities in the bidding.
7. Direct purchase of certain items of equipment or material by Wagoner County is exempt from Federal Excise Tax and Oklahoma Sales Tax. In such cases, the bidder shall quote prices which do not include Federal Excise Tax and Oklahoma Sales Tax.
8. Bid must show number of days required for delivery under normal conditions. Contractor must keep the County advised at all times of the status of the order. For any exception to the delivery date as specified on this order, vendor shall give prior notification and obtain written approval from the Purchasing Agent. Default in promised delivery date, or failure to meet specifications, authorizes the County to purchase supplies elsewhere and charge the full increase of cost and handling to defaulting contractor.

9. Bidder agrees to defend and save Wagoner County from and against all demands, claims, costs expense, damage and judgments based upon infringement of any patent to goods specified in this order or the ordinary use or operation of such goods by the County or use or operation of such goods in accordance with the bidders' direction.
10. If the bid requires a written contract, the successful bidders shall execute a written contract with the County within ten (10) days after submission of the contracts to said bidder.
11. Each bidder must deposit, with the proposal, security in the amount of five percent (5%) of the base bid as a guarantee of good faith in the form of a Cashier's Check, or acceptable Bidder's Bond payable, without exception, to Wagoner County.
12. The awarded bidder will be required to furnish a Performance Bond, Statutory Bond, and Maintenance Bond.



AFFIDAVIT OF NON-COLLUSION

I, the undersigned, of lawful age, being first duly sworn on oath say that he (she) is the agent authorized by the bidder to submit the above bid. Affiant further states that the bidder has not been a party to any collusion among bidders in restraint of freedom of competition by agreement to bid at a fixed price or to refrain from bidding; or with any state official or employee as to quantity; quality or price in the prospective contract or any other terms of said prospective contract; or in any discussion between bidders and any state official concerning exchange of money or other thing of value for special consideration in the letting of a contract; that the bidder/contractor has not paid, given or donated or agreed to pay, give or donate to any officer or employee of the State of Oklahoma (or other entity) any money or other thing of value, either directly or indirectly in the procuring of the award of a contract pursuant to this bid.

(Typed/Printed)

Name: _____ Title: _____

Signature: _____

Firm: _____ Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

Subscribed and sworn before me this _____ day of _____, 200 _____.

Signature: Notary Public (Clerk or Judge)

My commission expires _____

(Official Seal)

Bid Specification

300' 36 Inch Face Guyed Tower

All Bidders must include estimated time of completion on manufacturing and shipping of the tower.

1) DESIGN SPECIFICATION

- a) Designed Per TIA / EIA 222 Rev G
- b) Structure Class II, Topographic Category 1, Exposure C
- c) 90 mph wind; 1" ice per Wagoner County, OK
- d) (2) Sinclair SE419-SF3PALDF-A90 antennas with 1-5/8" line @ 290'
- e) Dragonwave A-ANT-11G-4 Dish with CAT5 line @ 96'
- f) (9) 8' X 1' Cellular Panel antennas with 1-5/8" line @ 300'
- g) (9) 8' X 1' Cellular Panel antennas with 1-5/8" line @ 275'

2) MATERIALS INCLUDED

- a) 300'; 36" Face Guyed Tower
- b) 80% Guy Radius
- c) 50 ksi Solid Rod Legs
- d) 36 ksi Solid Rod Braces
- e) Hot Dip Galvanized Finish
- f) Anchor Shafts
- g) Guy wire and Hardware Kit
- h) Climb Braces on one Face
- i) Cable Type Safety Climb
- j) Two Pipe Mounts for mounting the following antenna Sinclair SE419-SF3PALDF-A90
- k) Pipe mount for mounting the following antenna Dragonwave A-ANT-11G-4 Dish
- l) Waveguide Clips on two faces
- m) Tower & Foundation design, approved by OK Professional Engineer
- n) Dual light kit
- o) Delivery to site included

3) APPLICABLE CODES AND STANDARDS

- a) The radio tower manufacture/supplier/contractor is responsible to conform to the current revision of all codes and standards as may be referred to in these specifications. All such referenced codes are, by such reference, incorporated into this Contract as is set forth herein in full. In the event of Conflict between this specification and the codes, standards, and specifications, the most stringent requirement shall govern.
- b) Codes and standards shall be the latest issue and/ or amendment thereto published at the date of the issue for bids. Codes and standards are abbreviated as follows:
 - i) ACI – American Concrete Institute
 - ii) AISC – American Institute of Steel Construction
 - iii) AISI – American Iron and Steel Institute
 - iv) ANSI – American National Standards Institute
 - v) ASTM – American Society of Testing and Materials
 - vi) AWS – American Welding Society
 - vii) CRSI – Concrete Reinforcing Steel Institute
 - viii) FAA – Federal Aviation Administration
 - ix) FCC – Federal Communications Commission
 - x) NEC – National Electrical Code
 - xi) NESC – National Electrical Safety Code
 - xii) UBC – Uniform Building Code
 - xiii) TIA – Telecommunications Industry Association
- c) The radio tower manufacturer/supplier/contractor shall follow the guidelines of the TIA-222-G Standard, “Structural Standard for Antenna Supporting Structures and Antennas”, and all other codes, standards and/or specifications referenced from TIA-222-G, including, but not limited to, the following:
 - i) AISC- Manual of Steel Construction
 - ii) AISC- Specification for Structural Joints using ASTM A325 or A490 Bolts
 - iii) AWS D1.1- Structural Welding Code
 - iv) FAA Advisory Circular #AC 70/7460 – Obstruction Marking and Lighting
 - v) NFPA 780-Standard for the Installation of Lightning Protection Systems
 - vi) FCC Rule and Regulations- Part 17- Construction, Marking, and Lighting of Antenna Structures
 - vii) ACI 318 – Building Code Requirements for Reinforced Concrete
 - viii) CRSI – Manual of Standard Practice
 - ix) ASTM A-36 – Carbon Structural Steel
 - x) ASTM A572- High-Strength Low-Alloy Columbium-Vanadium Structural Steel
 - xi) ASTM A-53-Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
 - xii) ASTM A-123-Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products
 - xiii) ASTM A-153- Zinc Coating(Hot-Dip) on Iron and Steel Hardware
 - xiv) ASTM B695- Coatings of Zinc Mechanically Deposited on Iron and Steel
 - xv) ASTM A-385-Providing High-Quality Zinc Coatings (Hot-Dip)

- xvi) ASTM A-307- Carbon Steel Bolts and Studs
- xvii) ASTM A-325- Structural Bolts, Steel; Heat Treated
- xviii) ASTM A-500- Cold- Formed Welded and Seamless Steel Structural Tubing in Rounds and Shapes
- xix) ASTM A-615- Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- xx) ASTM A-706-Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
- xxi) Portland Cement

4) SUBMITTALS

- a) The radio tower manufacturer/supplier/contractor shall provide submittals in accordance with this Section and their component and referenced subsections. Each submittal shall be complete, with all required information provided together at one time, and submitted in a sequence that allows Owner to have all of the information necessary for checking and approving a particular document at the time of the submittal. The Contractor shall be responsible for planning and making all submittals as necessary to avoid delays or conflicts in the work.
- b) The guyed tower shall be designed by or under the direct supervision of a registered Professional Engineer, specifically experienced in the design of antenna towers. All design and analysis, computations and installation drawings shall be certified and stamped by a licensed Professional Engineer, submitted to Owner and be successfully reviewed by Owner at least 30 days prior to fabrication of the tower
- c) Submittals for tower shall include:
 - i) Erection drawings indicating the dimensions and arrangements of the tower components.
 - ii) Specification sheets or details for all tower components
 - iii) Installation Certification by a Professional Engineer licensed in the State of Oklahoma.
 - iv) Design calculations by a Professional Engineer licensed in the State of Oklahoma.
 - v) Submittal for the tower shall also include:
 - vi) A complete and orderly summary of the tower stress analysis showing loading considerations, tower base reactions, member sizes, allowable stresses and maximum computed forces in members. Each analysis shall be certified by a Professional Engineer licensed in the State of Oklahoma with experience tower design.
 - vii) Complete installation drawings are required. The drawings must show all of the necessary pieces, their part number corresponding to the number stamped on the piece itself and the hardware sizes. To aid in installation it is necessary to note the weight of each section of tower. The installation drawings shall show the location of all antennas to be mounted and their side struts. The placement of antennas shall not be left to the judgment of installation crews.
 - viii) Complete foundation drawings are required to show the anchor bolt placement, size and placement of all reinforcing bars, and pier sizes. It is also necessary to show the size, grade and bending detail of each piece of reinforcing steel.
 - ix) A concrete mix design for tower foundations.
 - x) Before submitting drawings or other data to Owner, it shall be the sole responsibility of the Contractor to comprehensively and thoroughly check same for accuracy and full compliance with plans and specifications.
 - xi) Complete sets of tower assembly drawings (prints) shall be provided and shipped with the tower parts. Complete packing slips shall be provided. Prints of the installation drawings shall be placed in a moisture-proof bag with the material and hardware packing slips and secured to the tower material or crating. Provide at least five copies of each - at least two copies for the Owner

- xii) Where a specific material, process, or product is specified, and the Contractor desires to provide an improvement or equal, he shall submit a substitution request to Owner

5) TOWER LIGHTING

- a) The tower shall be provided with a dual lighting system that utilizes a intensity white daytime lighting system and a red night time obstruction lighting system. Obstruction lighting systems shall be provided and installed with the tower as required by the FAA. Refer to Advisory Circular AC 7017460-1K for requirements
- b) Lighting shall be activated and deactivated by photoelectric control
- c) All wire shall be copper type THW-MTW grade 600-volt insulation installed in galvanized rigid conduit. All electrical installation shall conform to the National electrical Code requirements for outdoor installation.

6) ANTENNA MOUNTS

- a) Pipe mounts shall be plumb in each axis unless specified otherwise
- b) Pipe Mounts shall be positioned to prevent the antenna feed horn assembly from being directly opposite a tower member. Pipe Mount Positioning shall not prevent direct waveguide installation to any antenna.
- c) Mounts and stiff arm support locations shall meet or exceed the standards specified by the antenna manufacturer in their latest installation bulletin.
- d) Azimuth adjustability shall be provided.

7) TOWER GROUNDING AND LIGHTING

- a) A galvanized steel lightning rod, with a minimum dimension of 5/8-inch diameter by 4ft long, shall be attached so as to extend a minimum of 18inches above the highest point of the tower, including all attachments.

8) PRODUCT HANDLING

- a) Packaging: All Materials shall be packaged to provide protection from damage during shipment.
- b) Marking: All equipment shall be appropriately marked regarding function, handling and storage.

9) SHIPPING

- a) All equipment shall be shipped in a manner that assures timely delivery and protection of materials. Any equipment damaged during shipment or delivery shall be rejected and repaired or replaced by the contractor, at Owner's discretion and at no additional cost to Owner
- b) No materials, goods or equipment shall be received or stored at the worksite nor installed or incorporated into the work without a successfully reviewed shop drawing submittal.
- c) Awarded Bidder is responsible for storage of equipment and materials until shipment date is established by a county representative or by the awarded bid winner for the erecting of the tower.

10) DELIVERY

- a) Upon delivery to the site, the equipment in this section shall be carefully unloaded and properly stored until installation. The equipment shall be handled and stored in strict accordance to manufacture's recommendations.

Geotechnical Engineering Report

Proposed 300-foot Guyed Tower

Locust Grove, Oklahoma

March 15, 2012

Terracon Project No. 04125044

Prepared for:

Wagoner County

Wagoner, Oklahoma

Prepared by:

Terracon Consultants, Inc.

Tulsa, Oklahoma

Offices Nationwide
Employee-Owned

Established in 1965
terracon.com

Terracon

Geotechnical ■ Environmental ■ Construction Materials ■ Facilities

March 15, 2012



Wagoner County
307 East Cherokee, 2nd Floor
Wagoner, OK 74467

Attn: Mr. Micheal Miller
P: [918] 485-7728
E: wagonercounty911@gmail.com

Re: Geotechnical Engineering Report
Proposed 300-foot Guyed Tower
Locust Grove, Oklahoma
Terracon Project No. 04125044

Dear Mr. Miller:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. This study was performed in general accordance with our Proposal No. P04120079, dated February 21, 2012. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning the design and construction of the communication tower foundation.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,

Terracon Consultants, Inc.

Cert. Of Auth. #CA-4531 exp. 6/30/13

Atefeh Fathi, E.I.
Project Manager

Conrad S. Koehler, P.E.
Oklahoma No. 20784



AF:CSK:tm

Enclosures
Addressee (3 via US Mail and 1 via email)



Terracon Consultants, Inc., 10920 East 56th Street, Tulsa, OK 74146
P [918] 250-0461 F [918] 250-4570

Geotechnical

Environmental

Construction Materials

Facilities

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Exhibit C-2	Unified Soil Classification
Exhibit C-3	General Notes – Description of Rock Properties

GEOTECHNICAL ENGINEERING REPORT PROPOSED 300-FOOT GUYED TOWER LOCUST GROVE, OKLAHOMA

Terracon Project No. 04125044
March 15, 2012

1.0 INTRODUCTION

This report presents the results of our geotechnical engineering services performed for the proposed guyed communication tower located at 37001 E0660 Road in Locust Grove, Oklahoma. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- subsurface soil and rock conditions
- foundation design and construction
- groundwater conditions
- seismic considerations

2.0 PROJECT INFORMATION

2.1 Project Description

ITEM	DESCRIPTION
Site layout	See Exhibit A, Figure A-3
Structures	300-foot guyed communication tower with guy anchors at approximate 120 degree angular separations.
Maximum loads	Unknown at this time
Grading	Minimum cuts and fills – assumed at less than 2 feet

2.2 Site Location and Description

ITEM	DESCRIPTION
Location	37001 E0660 Road, Locust Grove, Oklahoma
Existing Improvements	Undeveloped
Current ground cover	Grass
Existing topography	Relatively flat to gently sloping.

3.0 SUBSURFACE CONDITIONS

3.1 Typical Subsurface Profile

Specific conditions encountered at each boring location are indicated on the individual boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil and rock types; in-situ, the transition between materials may be gradual. Details for each of the borings can be found on the boring logs included in Appendix A of this report. Based on the results of the borings, subsurface conditions on the project site can be generalized as follows:

Description	Approximate Depth to Bottom of Stratum	Material Encountered	Consistency/Density
Surface	2 inches	Topsoil	N/A
Stratum 1	5 to 5.5 feet	Lean clay and lean to fat clay	Soft to very stiff
Stratum 2	Termination depth of the borings at 5.5 to 17.5 feet	Weathered sandstone and sandstone with varying amounts of clay and shale seams	Poorly cemented to cemented

Moisture content tests were conducted on selected samples and the test results are presented on the boring logs in Appendix A.

3.2 Groundwater

The boreholes were observed while drilling for the presence and level of groundwater. The depths where groundwater was encountered are shown on the table below.

Boring Number	Depth to Groundwater While Drilling (feet)	Depth to Groundwater After Boring (feet)
B-1	NE to rock coring at 7.5 ft.	-
B-2	NE	NE
B-3	NE to rock coring at 9 ft.	-
B-4	NE	NE

NE – Not Encountered

The groundwater level observations made during our exploration provide an indication of the groundwater conditions at the time the borings were drilled. Longer monitoring in piezometers or cased holes, sealed from the influence of surface water, would be required to evaluate longer-term groundwater conditions. During some periods of the year, perched water could be present at various depths. Fluctuations in groundwater levels should be

expected throughout the year depending upon variations in the amount of rainfall, runoff, evaporation, and other hydrological factors not apparent at the time the borings were performed.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Tower Foundation

Design recommendations for the tower foundation are presented in the following sections. We recommend the tower footing bear in the very stiff native clay encountered below depths of approximately 2 feet (in Boring B-1). The following values can be used for the design of new foundations.

4.1.1 Design Recommendations - Shallow Footing

DESCRIPTION	SHALLOW FOOTING
Net allowable bearing pressure ¹	3,000 psf
Minimum width	36 inches
Minimum embedment (depth below lowest final adjacent grade) ²	24 inches
Estimated total movement	1 inch or less
Allowable passive pressure ³	750 psf
Coefficient of sliding friction ⁴	0.30

1. Recommended bearing pressure is based on the footing bearing in the very stiff native clay that was encountered at borings at approximately 2 feet below the existing ground surface. The recommended net allowable bearing pressure is the pressure at the footing base elevation in excess of the minimum surrounding overburden pressure. A representative of the geotechnical engineer should observe footing excavations to verify that soils suitable for the design bearing pressure are encountered.
2. Minimum depth will provide frost protection for footings.
3. Allowable passive pressure value considers a factor of safety of about 2. Passive pressure value applies to undisturbed native clay or properly compacted fill. If formed footings are constructed, the space between the formed side of a footing and excavation sidewall should be cleaned of all loose material, debris, and water and backfilled with tested and approved, cohesive fill compacted to at least 95 percent of the material's standard Proctor dry density. Passive resistance should be neglected for the upper 2 feet of the soil below the final adjacent grade due to strength loss from freeze-thaw and shrink-swell.
4. Coefficient of friction value is an ultimate value and does not contain a factor of safety.

Uplift resistance for spread footing foundations may be computed as the sum of the weight of the foundation element and the weight of the soil overlying the foundation. We recommend using a soil unit weight of 110 pounds per cubic foot (pcf) for engineered fill overlying the

Geotechnical Engineering Report

Proposed 300-foot Guyed Tower ■ Locust Grove, Oklahoma
Mach 15, 2012 ■ Terracon Project No. 04125044



footing placed as described in this section of this report. We recommend a minimum factor of safety of 1.5 be used for uplift calculations.

4.1.2 Shallow Footing Foundation Construction Considerations

We recommend the base of all footing excavations be observed and evaluated by the geotechnical engineer prior to placing reinforcing steel and concrete. If unsuitable materials are encountered at the design bearing level, the footing should be extended deeper to encounter suitable soil or rock.

Care should be taken to prevent wetting or drying of the bearing materials during construction. Any extremely wet or dry material, or any loose or disturbed material in the bottom of the footing excavations, should be removed prior to placing concrete. The potential for wetting or drying of the bearing materials can be reduced by placing concrete as soon as possible after completing the footing excavation and evaluating the bearing strata.

4.2 Anchor Blocks

Anchor blocks used to restrain the tower are designed to resist both vertical (uplift) and horizontal components of tensile forces in the guy wires. Uplift forces are resisted by the dead weight of the anchor block and friction between the sides of the anchor block and surrounding soil/rock, provided the sides of the block are cast in direct contact with undisturbed natural materials. The horizontal component can be resisted by the passive pressure of soil/rock acting on the vertical side of the block facing the tower.

The following table presents allowable design criteria for the tower's anchor blocks. These values can be used to design of new anchor blocks. In the table, the allowable side friction and passive pressure values have safety factors of approximately 2. A factor of safety has not been applied to the undrained cohesion values. Design parameters shown in the table are applicable to the natural, undisturbed soils and rock, and should not be applied to disturbed materials or newly placed fill materials. Because soil strength varies due to frost action and moisture variations, we recommend neglecting passive and frictional resistances for the soils/rock within 3 feet of the ground surface.

Geotechnical Engineering Report

Proposed 300-foot Guyed Tower ■ Locust Grove, Oklahoma
 Mach 15, 2012 ■ Terracon Project No. 04125044



Boring No/ Depth (feet)	Unit Weight (pcf)	Allowable Side Friction ¹		Allowable Passive Pressure ¹		Estimated Shear Strength Parameters	
		Initial Value (psf)	Increase Per Foot of Depth (psf)	Initial Value (psf)	Increase Per Foot of Depth (psf)	Undrained Cohesion (psf)	Internal Friction Angle (degrees)
B-2							
0 – 3	110	---	---	---	---	---	---
3 – 5	110	150	---	500	---	500	0
5 – 10	120	1,500	---	8,000	---	---	38
B-3							
0 – 3	110	---	---	---	---	---	---
3 – 5.5	110	300	---	1,500	---	1,500	0
5.5 – 15	120	1,500	---	8,000	---	---	38
B-4							
0 – 3	110	---	---	---	---	---	---
3 – 4	110	300	---	1,500	---	1,500	0
4 – 5.5	120	2,000	---	15,000	---	---	38

1. The allowable passive pressure and skin friction are based on a rectangular pressure distribution for clay and bedrock. Because of the potential effects of shrink/swell, freeze/thaw, and drilling disturbance, the passive pressure and skin friction should be ignored for soil within 3 feet of the final adjacent grade.

If it is desired to use backfill materials to develop uplift resistance for anchor blocks, we recommend assuming a design soil unit weight not to exceed 110 pounds per cubic foot. This assumes the backfill above the anchor block will be compacted to at least 95 percent of the maximum laboratory dry unit weight determined according to the standard Proctor procedure (ASTM Specification D-698).

4.2.1 Anchor Block Construction Considerations

Sandstone bedrock was encountered at depths of about 5 feet below the existing surface. The sandstone will be difficult to excavate. Based on our experience, it should be feasible to excavate the sandstone using large, heavy-duty equipment fitted with rock excavation attachments. Special excavation techniques, such as the use of pneumatic hammers will be required for well-cemented seams and below auger refusal depths.

Anchor block excavations should be free of loose and disturbed material, debris, and water when concrete is placed. Concrete should be placed as soon as possible after excavation is completed to reduce the potential for wetting, drying, or disturbance of the soil and rock materials.

4.3 Seismic Considerations

Code Used	Site Classification
2006 International Building Code (IBC) ¹	C

1. In general accordance with the *2006 International Building Code*, Table 1613.5.2.

5.0 GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A
FIELD EXPLORATION

Geotechnical Engineering Report

Proposed 300-foot Guyed Tower ■ Wagoner County, Oklahoma
Mach 15, 2012 ■ Terracon Project No. 04125044

Terracon

Field Exploration Description

We drilled our borings near the tower center and guy anchor locations which were staked in the field by others. The borings were drilled with an ATV-mounted rotary drill rig using continuous flight augers to advance the boreholes. Samples of the soil encountered in the borings were obtained using the split barrel sampling procedure.

In the split-barrel sampling procedure, the number of blows required to advance a standard 2-inch O.D. split-barrel sampler the last 12 inches of the typical total 18-inch penetration by means of a 140-pound auto-hammer with a free fall of 30 inches, is the standard penetration resistance value (SPT-N). This value is used to estimate the in-situ relative density of cohesionless soils and consistency of cohesive soils and the hardness of rock.

An automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A significantly greater efficiency is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. This higher efficiency has an appreciable effect on the SPT-N value. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

Core samples of the bedrock were obtained with an NX-size diamond-bit core barrel at the boring. Rock quality designation (RQD) and percent recovery (REC) values were determined for each rock core run. The RQD is an index obtained by summing the lengths of recovered rock core pieces which are 4 inches in length or longer divided by the total length of core run. The RQD and REC values are shown on the boring log.

A field log of each boring was prepared by the drill crew. These logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. Final boring logs included with this report represent the engineer's interpretation of the field logs and include modifications based on laboratory observation and tests of the samples.



LEGEND	
	BORING LOCATION

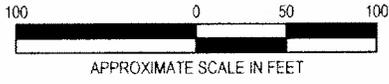


DIAGRAM IS FOR GENERAL LOCATION ONLY.
AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Mngr	AF
Drawn By	DC
Checked By	AF
Approved By	CSK

Project No	04125044
Scale	SEE BAR SCALE
File No	04125044
Date	MARCH 2012

Terracon
Consulting Engineers and Scientists

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BORING LOCATION PLAN
GEOTECHNICAL EXPLORATION
PROPOSED 300-FOOT GUYED TOWER
LOCUST GROVE, OKLAHOMA

EXHIBIT NO.	A-3
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LOG OF BORING NO. B-1

CLIENT Wagoner County			
SITE 37001 E0660 Road Locust Grove, Oklahoma		PROJECT 300-foot Guyed Tower	
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL
	Approx. Surface Elev.: 97.5 ft		
2	2" Topsoil LEAN CLAY with root hairs, mottled brown, medium stiff	95.5	CL
5	LEAN TO FAT CLAY mottled brown and olive-brown, very stiff	92.5	CL CH
5	SANDSTONE+ with shale seams, brown, cemented	5	HS
		5	3
		10	4
		10	5
		15	5
17.5	80		
BOTTOM OF BORING			
Auger refusal at 7.5 feet			
+Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	WD	AB	
WL	WD		
N/E to 7.5 ft WD			



BORING STARTED		3-1-12	
BORING COMPLETED		3-1-12	
RIG	ATV	FOREMAN	JT
APPROVED	CSK	JOB #	04125044

BOREHOLE BORING LOGS-5044 GPJ 2011 TULSA.GDT 3/15/12

LOG OF BORING NO. B-2

CLIENT Wagoner County		PROJECT 300-foot Guyed Tower														
SITE 37001 E0660 Road Locust Grove, Oklahoma																
GRAPHIC LOG		DESCRIPTION						SAMPLES		TESTS						
		Approx. Surface Elev.: 99 ft						DEPTH, ft.	USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SPT-N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED COMPRESSION, psf
2	97	2" Topsoil LEAN CLAY mottled brown and reddish-brown, medium stiff						—	CL	1	SS	11	4	19		
5	94	LEAN TO FAT CLAY mottled brown and olive-brown, medium stiff						—	CL CH	2	SS	12	5	32		
	5	WEATHERED SANDSTONE+ with clay seams, olive-brown and brown, poorly cemented						5	PA							
	10							89	10	10	10	10	PA	3	SS	10
	10	89	10	10	10	10	PA	4	SS	8	13/6" 50/3"	15				
		BOTTOM OF BORING Auger refusal at 10 feet +Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.														

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

BOREHOLE BORING LOGS-5044.GPJ 2011 TULSA.GDT 3/15/12

WATER LEVEL OBSERVATIONS, ft			Terracon		BORING STARTED		3-1-12			
WL	▽ N/E	WD			▽ N/E	AB	BORING COMPLETED		3-1-12	
WL	▽				▽		RIG	ATV	FOREMAN	JT
WL							APPROVED	CSK	JOB #	04125044

LOG OF BORING NO. B-3

CLIENT		Wagoner County		PROJECT		300-foot Guyed Tower						
SITE		37001 E0660 Road Locust Grove, Oklahoma										
GRAPHIC LOG	DESCRIPTION			DEPTH, ft.	SAMPLES			TESTS				
			Approx. Surface Elev.: 93.5 ft		USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SPT-N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED COMPRESSION, psf
2	2" Topsoil LEAN CLAY with root hairs, mottled brown, soft			91.5	CL	1	SS	8	3	19		
5.5	LEAN CLAY with sandstone seams, olive-brown and brown, very stiff			88	CL	2	SS	12	33	19		
15	WEATHERED SANDSTONE+ with clay seams, olive-brown and brown, poorly cemented (cemented sandstone seam at 9 feet)			78.5	CL	3	SS	6	20/6" 50/5"	10		
	BOTTOM OF BORING Auger refusal at 9 feet +Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.			15		4	SS	1	50/1"	8		
						5	DB	8%	RQD 0%			
						6	DB	100%	RQD 42%			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft			
WL	▽	WD	▽
			AB
WL	▽		▽
WL		N/E to 9 ft WD	



BORING STARTED		3-1-12	
BORING COMPLETED		3-1-12	
RIG	ATV	FOREMAN	JT
APPROVED	CSK	JOB #	04125044

BOREHOLE BORING LOGS-5044.GPJ 2011 TULSA.GDT 3/15/12

LOG OF BORING NO. B-4

CLIENT Wagoner County											
SITE 37001 E0660 Road Locust Grove, Oklahoma		PROJECT 300-foot Guyed Tower									
GRAPHIC LOG	DESCRIPTION	Approx. Surface Elev.: 100 ft	DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS		
					NUMBER	TYPE	RECOVERY, in.	SPT-N BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED COMPRESSION, psf
2	2" Topsoil LEAN CLAY with root hairs, brown, medium stiff	98		CL	1	SS	6	6	14		
4	LEAN TO FAT CLAY mottled olive-brown, very stiff	96		CL CH	2	SS	10	20	24		
5.5	SANDSTONE+ olive-brown, cemented	94.5	5	PA							
	BOTTOM OF BORING Auger refusal at 5.5 feet +Classification estimated from disturbed samples. Core samples and petrographic analysis may reveal other rock types.				3	SS	0	10/0"			

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

BOREHOLE BORING LOGS-5044.GPJ 2011.TUL.SA.GDT 3/15/12

WATER LEVEL OBSERVATIONS, ft			Terracon		BORING STARTED		3-1-12			
WL	▽ N/E	WD			▽ N/E	AB	BORING COMPLETED		3-1-12	
WL	▽				▽		RIG	ATV	FOREMAN	JT
WL							APPROVED	CSK	JOB #	04125044

APPENDIX B
LABORATORY TESTING

Geotechnical Engineering Report

Proposed 300-foot Guyed Tower ■ Wagoner County, Oklahoma
Mach 15, 2012 ■ Terracon Project No. 04125044



Laboratory Testing

Samples retrieved during the field exploration were taken to the laboratory for further observation by the project geotechnical engineer and were classified in accordance with the Unified Soil Classification System (USCS) described in Appendix A. The field descriptions were modified as necessary and an applicable laboratory testing program was formulated to determine engineering properties of the subsurface materials. The field descriptions were modified as necessary and an applicable laboratory testing program was formulated to determine engineering properties of the subsurface materials.

Laboratory tests were conducted on selected soil samples. The laboratory test results are presented on the boring logs next to the respective samples. Laboratory tests were performed in general accordance with the applicable ASTM, local or other accepted standards.

Selected soil samples obtained from the site were tested for the following engineering properties:

- Water content
- Unconfined compression test

APPENDIX C
SUPPORTING DOCUMENTS

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS: Split Spoon – 1- ³ / ₈ " I.D., 2" O.D., unless otherwise noted	HS: Hollow Stem Auger
ST: Thin-Walled Tube - 2" O.D., unless otherwise noted	PA: Power Auger
RS: Ring Sampler - 2.42" I.D., 3" O.D., unless otherwise noted	HA: Hand Auger
DB: Diamond Bit Coring - 4", N, B	RB: Rock Bit
BS: Bulk Sample or Auger Sample	WB: Wash Boring or Mud Rotary

The number of blows required to advance a standard 2-inch O.D. split-spoon sampler (SS) the last 12 inches of the total 18-inch penetration with a 140-pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value".

WATER LEVEL MEASUREMENT SYMBOLS:

WL: Water Level	WS: While Sampling	N/E: Not Encountered
WCI: Wet Cave in	WD: While Drilling	
DCI: Dry Cave in	BCR: Before Casing Removal	
AB: After Boring	ACR: After Casing Removal	

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. Groundwater levels at other times and other locations across the site could vary. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels may not be possible with only short-term observations.

DESCRIPTIVE SOIL CLASSIFICATION: Soil classification is based on the Unified Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

CONSISTENCY OF FINE-GRAINED SOILS

<u>Unconfined Compressive Strength, Qu, psf</u>	<u>Standard Penetration or N-value (SS) Blows/Ft.</u>	<u>Consistency</u>
< 500	<2	Very Soft
500 – 1,000	2-3	Soft
1,001 – 2,000	4-6	Medium Stiff
2,001 – 4,000	7-12	Stiff
4,001 – 8,000	13-26	Very Stiff
8,000+	26+	Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS

<u>Standard Penetration or N-value (SS) Blows/Ft.</u>	<u>Ring Sampler (RS) Blows/Ft.</u>	<u>Relative Density</u>
0 – 3	0-6	Very Loose
4 – 9	7-18	Loose
10 – 29	19-58	Medium Dense
30 – 49	59-98	Dense
50+	99+	Very Dense

RELATIVE PROPORTIONS OF SAND AND GRAVEL

<u>Descriptive Term(s) of other Constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 15
With	15 – 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

<u>Major Component of Sample</u>	<u>Particle Size</u>
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75 mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 Sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

<u>Descriptive Term(s) of other Constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 5
With	5 – 12
Modifiers	> 12

PLASTICITY DESCRIPTION

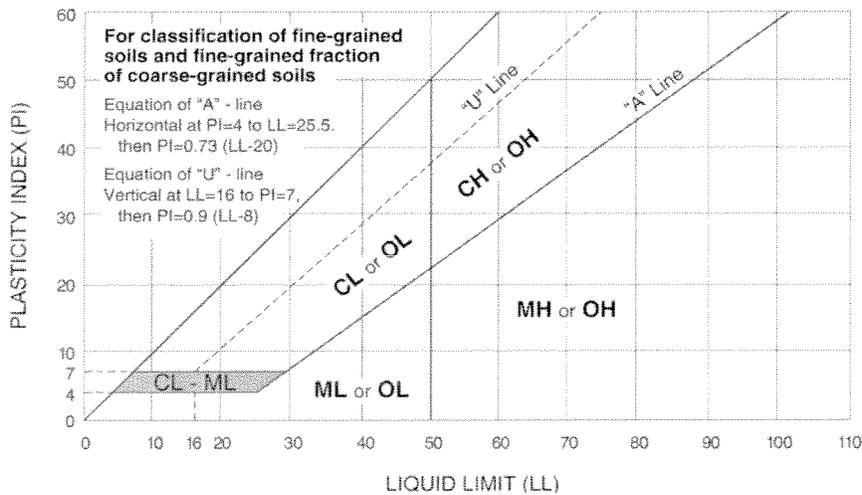
<u>Term</u>	<u>Plasticity Index</u>
Non-plastic	0
Low	1-10
Medium	11-30
High	30+

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification		
				Group Symbol	Group Name ^B	
Coarse Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	$Cu \geq 4$ and $1 \leq Cc \leq 3$ ^E	GW	Well-graded gravel ^F	
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH Fines classify as CL or CH	GP GM	Poorly graded gravel ^F Silty gravel ^{F,G,H}	
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E	SW	Well-graded sand ^I	
		Sands with Fines: More than 12% fines ^D	Fines classify as ML or MH Fines Classify as CL or CH	SP SM	Poorly graded sand ^I Silty sand ^{G,H,I}	
		Inorganic:	$PI > 7$ and plots on or above "A" line ^J $PI < 4$ or plots below "A" line ^J	CL ML	Lean clay ^{K,L,M} Silt ^{K,L,M}	
		Organic:	Liquid limit - oven dried Liquid limit - not dried	< 0.75	OL	Organic clay ^{K,L,M,N} Organic silt ^{K,L,M,O}
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	PI plots on or above "A" line PI plots below "A" line	CH MH	Fat clay ^{K,L,M} Elastic Silt ^{K,L,M}	
		Organic:	Liquid limit - oven dried Liquid limit - not dried	< 0.75	OH	Organic clay ^{K,L,M,P} Organic silt ^{K,L,M,Q}
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above "A" line PI plots below "A" line	CH MH	Fat clay ^{K,L,M} Elastic Silt ^{K,L,M}	
		Organic:	Liquid limit - oven dried Liquid limit - not dried	< 0.75	OH	Organic clay ^{K,L,M,P} Organic silt ^{K,L,M,Q}
		Highly organic soils: Primarily organic matter, dark in color, and organic odor			PT	Peat

- ^A Based on the material passing the 3-in. (75-mm) sieve
- ^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
- ^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
- ^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay
- ^E $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
- ^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.
- ^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

- ^H If fines are organic, add "with organic fines" to group name.
- ^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
- ^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
- ^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
- ^L If soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.
- ^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
- ^N $PI \geq 4$ and plots on or above "A" line.
- ^O $PI < 4$ or plots below "A" line.
- ^P PI plots on or above "A" line.
- ^Q PI plots below "A" line.



GENERAL NOTES

Sedimentary Rock Classification

DESCRIPTIVE ROCK CLASSIFICATION:

Sedimentary rocks are composed of cemented clay, silt and sand sized particles. The most common minerals are clay, quartz and calcite. Rock composed primarily of calcite is called limestone; rock of sand size grains is called sandstone, and rock of clay and silt size grains is called mudstone or claystone, siltstone, or shale. Modifiers such as shaly, sandy, dolomitic, calcareous, carbonaceous, etc. are used to describe various constituents. Examples: sandy shale; calcareous sandstone.

LIMESTONE	Light to dark colored, crystalline to fine-grained texture, composed of CaCO ₃ , reacts readily with HCl.
DOLOMITE	Light to dark colored, crystalline to fine-grained texture, composed of CaMg(CO ₃) ₂ , harder than limestone, reacts with HCl when powdered.
CHERT	Light to dark colored, very fine-grained texture, composed of micro-crystalline quartz (SiO ₂), brittle, breaks into angular fragments, will scratch glass.
SHALE	Very fine-grained texture, composed of consolidated silt or clay, bedded in thin layers. The unlaminated equivalent is frequently referred to as siltstone, claystone or mudstone.
SANDSTONE	Usually light colored, coarse to fine texture, composed of cemented sand size grains of quartz, feldspar, etc. Cement usually is silica but may be such minerals as calcite, iron-oxide, or some other carbonate.
CONGLOMERATE	Rounded rock fragments of variable mineralogy varying in size from near sand to boulder size but usually pebble to cobble size (½ inch to 6 inches). Cemented together with various cementing agents. Breccia is similar but composed of angular, fractured rock particles cemented together.

PHYSICAL PROPERTIES:

DEGREE OF WEATHERING

Slight	Slight decomposition of parent material on joints. May be color change.
Moderate	Some decomposition and color change throughout.
High	Rock highly decomposed, may be extremely broken.

BEDDING AND JOINT CHARACTERISTICS

Bed Thickness	Joint Spacing	Dimensions
Very Thick	Very Wide	> 10'
Thick	Wide	3' - 10'
Medium	Moderately Close	1' - 3'
Thin	Close	2" - 1'
Very Thin	Very Close	.4" - 2"
Laminated	—	.1" - .4"
Bedding Plane		A plane dividing sedimentary rocks of the same or different lithology.
Joint		Fracture in rock, generally more or less vertical or transverse to bedding, along which no appreciable movement has occurred.
Seam		Generally applies to bedding plane with an unspecified degree of weathering.

HARDNESS AND DEGREE OF CEMENTATION

Limestone and Dolomite:

Hard	Difficult to scratch with knife.
Moderately Hard	Can be scratched easily with knife, cannot be scratched with fingernail.
Soft	Can be scratched with fingernail.

Shale, Siltstone and Claystone

Hard	Can be scratched easily with knife, cannot be scratched with fingernail.
Moderately Hard	Can be scratched with fingernail.
Soft	Can be easily dented but not molded with fingers.

Sandstone and Conglomerate

Well Cemented	Capable of scratching a knife blade.
Cemented	Can be scratched with knife.
Poorly Cemented	Can be broken apart easily with fingers.

SOLUTION AND VOID CONDITIONS

Solid	Contains no voids.
Vuggy (Pitted)	Rock having small solution pits or cavities up to ½ inch diameter, frequently with a mineral lining.
Porous	Containing numerous voids, pores, or other openings, which may or may not interconnect.
Cavernous	Containing cavities or caverns, sometimes quite large.

Terracon



Wagoner County Clerk

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wagonercountyclerk@valornet.com



BID FORM

INVITATION FOR SEALED BIDS FOR THE DESIGN AND MANUFACTURE OF GUYED TOWER

DATE AND TIME OF OPENING: _____

Bidder agrees to furnish Wagoner County with ONE 300'; 36" FACE GUYED TOWER PER ATTACHED SPECIFICATIONS.

PRICE PER UNIT: \$ _____

The undersigned acknowledges receipt of the following Addenda. (Give number and date of each):

Delivery will be made in not more than _____ days after receipt of order.

I have examined the terms and specifications and instructions to bidders herein, and agree, provided I am awarded a contract, to provide the above described items for the sum shown in accordance with the terms and specifications stated herein. All deviations are in writing and attached hereto.

MUST BE SIGNED BY AUTHORIZED AGENT TO BE VALID

SIGNATURE: _____

PRINTED NAME: _____

TITLE: _____ FIRM NAME: _____

ADDRESS: _____

PHONE NO: _____ DATE: _____