



Boone County Purchasing
613 E. Ash Street, Room 110
Columbia, Mo 65201

REQUEST FOR BID (RFB)

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Bid Data

Bid Number: **72-05NOV15**
Commodity Title: **Tower Foundation and Site Work for Battle School**

DIRECT ANY BID FORMAT OR SUBMISSION QUESTIONS TO PURCHASING DEPT.

Bid Submission Address and Deadline

Day/Date: Thursday, November 5, 2015
Time: 1:00 p.m. (Bids received after this time will be returned unopened)
Location/Mail Address: Boone County Purchasing Department
Boone County Annex Building
613 E. Ash, Room 110
Columbia, Mo 65201
Directions: Annex Building is located at corner of 7th & Ash St.

Bid Opening

Day/Date: Thursday, November 5, 2015
Time: 1:30 p.m., Central Time
Location/Address: Boone County Government Center
Commission Chambers
801 E. Walnut Street
Columbia, MO 65201

Bid Contents

1.0: Introduction and General Conditions of Bidding
2.0: Primary Specifications
3.0: Response Presentation and Review
4.0: Response Form
Attachments: Statement of Bidder's Qualifications
Standard Terms and Conditions
Instructions for House Bill 1549
Work Authorization Certification
Individual Bidder Affidavits
Debarment Form
Anti-Collusion Statement

Bid Contents, continued

Signature & Identify of Bidder

Bidder's Acknowledgement

Annual Wage Order #22, dated 10/20/15

Affidavit of Compliance with OSHA

Affidavit of Compliance with Prevailing Wage Law

"No Bid" Response Form

1. Introduction and General Conditions of Bidding

1.1. INVITATION – The County of Boone, through its Purchasing Department, invites responses, which offer to provide the goods and/or services identified on the title page, and described in greater detail in Section 2.

1.2. DEFINITIONS

County – This term refers to the County of Boone, a duly organized public entity. It may also be used as a pronoun for various subsets of the County organization, including, as the context will indicate:

Purchasing – The Purchasing Department, including its Purchasing Director and staff.

Department/s or Office/s – The County Department/s or Office/s for which this Bid is prepared, and which will be the end user/s of the goods and/or services sought.

Designee – The County employee/s assigned as your primary contact/s for interaction regarding Contract performance.

Bidder / Contractor / Supplier – These terms refer generally to businesses having some sort of relations to or with us. The term may apply differently to different classes of entities, as the context will indicate.

Bidder – Any business entity submitting a response to this Bid. Suppliers, which may be invited to respond, or which express interest in this bid, but which do not submit a response, have no obligations with respect to the bid requirements.

Contractor – The Bidder whose response to this bid is found by Purchasing to meet the best interests of the County. The Contractor will be selected for award, and will enter into a Contract for provision of the goods and/or services described in the Bid.

Supplier – All business/entities which may provide the subject goods and/or services.

Bid – This entire document, including attachments. A Bid may be used to solicit various kinds of information. The kind of information this Bid seeks is indicated by the title appearing at the top of the first page. A “Request for Bid” is used when the need is well defined. A “Request for Proposal” is used when the County will consider solutions, which may vary significantly from each other or from the County’s initial expectations.

Response – The written, sealed document submitted according to the Bid instructions.

1.3. BID CLARIFICATION – Questions regarding this Bid should be directed in writing, preferably by e-mail, to the Purchasing Department. Answers, citing the question asked but not identifying the questioner, will be distributed simultaneously to all known prospective Bidders. Note: written requirements in the Bid or its Addenda are binding, but any oral communications between County and Bidder are not.

1.4. Bidder Responsibility – The Bidder is expected to be thoroughly familiar with all specifications and requirements of this Bid. Bidder’s failure or omission to examine any relevant form, article, site or document will not relieve them from any obligation regarding this Bid. By submitting a Response, Bidder is presumed to concur with all terms, conditions and specifications of this Bid.

1.5. Bid Addendum – If it becomes evident that this Bid must be amended, the Purchasing Department will issue a formal written Addendum to all known prospective Bidders. If necessary, a new due date will be established.

1.6. AWARD – Award will be made to the Bidder/s whose offer/s provide the greatest value to the County from the standpoint of suitability to purpose, quality, service, previous experience, price, lifecycle cost, ability to deliver, or for any other reason deemed by Purchasing to be in the best interest of the County. Thus, the result will not be determined by price alone. The County will be seeking the least costly outcome that meets the County needs as interpreted by the County.

1.7. CONTRACT EXECUTION – This Bid and the Contractor’s Response will be made part of any resultant Contract and will be incorporated in the Contract as set forth, verbatim.

Precedence – In the event of contradictions or conflicts between the provisions of the documents comprising this Contract, they will be resolved by giving precedence in the following order:

- 1) the provisions of the Contract (as it may be amended);
- 2) the provisions of the Bid;
- 3) the provisions of the Bidder's Response.

1.8. COMPLIANCE WITH STANDARD TERMS AND CONDITIONS – Bidder agrees to be bound by the County's standard "boilerplate" terms and conditions for Contracts, a sample of which is attached to this Bid.

2. Primary Specifications

ITEMS TO BE PROVIDED

1.00 GENERAL

1.01 These specifications describe construction work associated with the installation of a new communication facility at the rear of Battle Elementary School, 2600 Battle Avenue, Columbia, MO. The work will consist of the following general components:

- Extending a crushed rock base service drive approximately 150'
- Installing a large drilled concrete pier for a monopole tower foundation
- Installing an LP tank concrete pad
- Installing a shelter step
- Performing minor site grading and trenching
- Restoring site grading to conditions prior to construction work
- Installing gravel over a vegetation barrier around the shelter, tower, and compound area

1.02 Two versions of the tower foundation design are provided by Sabre Industries, the tower fabricator. County shall only accept the single deep drilled pier option for this site.

1.03 Vendor shall provide all materials, services, machinery, and labor to perform the described work.

1.04 All work will adhere to any pertinent standard construction requirements established and published by County of Boone.

1.05 County will be responsible for obtaining local zoning clearances and construction permit.

1.06 Vendor will be responsible for obtaining all permits required for his specific work tasks.

1.07 Following work each day, Vendor will leave the site clear of construction debris, excess material, and unused supplies or equipment, including paper, plastic, metal cans, shipping crates, shipping boxes or any rubbish resulting from the work. Vendor's work site shall be protected from trip and fall hazards.

1.08 Vendor will have free access to the tower site but Vendor will coordinate site access and all work with County's representative.

1.09 Prior to start of work, Vendor must furnish list of all personnel who will be working at site. These personnel must satisfy background checking as required by Columbia Public Schools.

1.10 A special inspector paid by Vendor and chosen by Vendor from an approved list established by Boone County Resource Management shall be responsible for work as specified below:

- Inspecting reinforcing steel, steel cage fabrication, steel placement, and steel embedment within concrete.

- Inspecting concrete delivery, handling, and placement.

- Collecting concrete samples and conducting strength testing as follows:

- One cylinder for 7-day test
- Three cylinders for 28-day test

One cylinder for reserve
Cylinders shall be taken from first mixer load and every third mixer thereafter

1.11 Vendor shall be responsible for coordinating all required inspections. Failure to complete special inspections or regulatory construction inspections shall be grounds for County to reject work and any claims for payment from Vendor.

1.12 Vendor shall furnish copy of delivery ticket for each separate mixer load of material from concrete plant to County's representative or with final invoice.

1.13 Vendor must arrange for portable electrical power if needed for the work.

1.14 Concrete mix to include crushed rock meeting MoDOT aggregate specifications.

2.00 DESIGN

2.01 Refer to drawings ME1 and C1 for general site orientation, tower location, and site construction details.

2.02 Additional information:

Fencing by others

Tower erection by others

Waveguide bridge, antenna, and feedline installation by others

2.03 Refer to drawings from Sabre Industries for details of the tower foundation.

2.04 Refer to the geotechnical report from Crockett Engineering for subsurface conditions.

2.05 Vendor shall work cooperatively with County's representative in preparation of site for installation of additional grounding system. Vendor to provide trenching and backfill for connection of ground conductors to tower foundation steel, tower grounding grid, fence corner posts, and LP tank. Work by others to Cadweld ground wires to reinforcing steel must occur prior to placing concrete.

2.06 Refer to drawing ME1 for construction details of 4' x 9' generator pad.

3.00 CONSTRUCTION

3.01 Construction requirements, General:

3.01.a Vertical foundation and piers shall be made in one continuous pour.

3.01.b All forms and reinforcing shall be approved by regulatory inspector.

3.01.c All debris, mud, water, etc. shall be removed from within forms prior to depositing concrete.

3.01.d Maximum free drop of concrete during placement shall be 12 feet.

3.01.e Concrete shall be discharged from mixer and placed in a manner which requires minimum handling. Moving from point of deposit to final position shall be by shoveling.

3.01.f Freshly deposited concrete shall be vibrated or handled so that forms will be completely filled (no honey-combing) and concrete surface will have a neat and workmanlike appearance.

3.01.g Concrete shall be maintained in a moist condition for seven days after placement and protected from injury by rain, elevated temperature, or flowing water.

3.01.h Copies of all delivery receipts for concrete material shall be forwarded to Owner.

3.01.i Excavation shall be backfilled as soon as practicable but only AFTER inspection of foundation by Owner. Backfill shall be free from extraneous material. It shall be placed in layers not more than ten inches except that finish material shall not exceed layers of six inches. Backfill shall be compacted to density comparable to adjacent, undisturbed earth.

3.01.j Reinforcing steel shall be new and free from loose rust or scale, grease, dirt or other coatings which will destroy or reduce bond. A tight film of rust or mill scale will not be considered objectionable.

3.01.k Concrete shall achieve specified strength in 28 days.

3.02 Construction requirements, tower foundation:

3.02.a Vendor shall unload and stow tower anchor bolts and anchor bolt template following arrival of shipment by carrier for Sabre Industries, such shipment coordinated by County's representative.

3.02.b Anchor bolts shall be accurately positioned with template.

ANCHOR BOLTS MUST BE VERTICAL AND THE EXPOSED ENDS FOR ALL BOLTS SHALL LIE IN A LEVEL PLANE. IMPROPERLY SET ANCHOR BOLTS SHALL BE CAUSE FOR REJECTION OF THE ENTIRE FOUNDATION AND ANY CLAIM BY VENDOR FOR COMPENSATION OR EXTRA WORK.

3.02.c Any exposed threads of bolts or rods shall be kept covered and free of concrete.

3.02.d Any damage to the galvanizing will be touched up with Z.R.C. Cold Galvanizing Compound or approved equivalent.

3.02.e Top of foundation shall be level. Top surface shall be smooth finished with edges finished with 3/4" chamfer.

3.03 Construction requirements, LP tank pad:

3.03.a Top of foundation shall be level. Top surface shall be smooth finished with edges finished with 3/4" chamfer.

3.03.b Top of LP tank pad shall be at least eight inches above finish grade ground level.

3.04 Clay and topsoil spoils from pier and pad excavation may be placed on the property due west of Battle Elementary School across Battle Avenue. Access to the site shall be coordinated in advance with Mr. Rob Woverton of St. Charles Road Development at 573-999-6551. Any drilled rock 'plugs' or mixed material with stone or cobbles of 3" diameter or larger must be removed from site.

3.05 Vendor may not clean out concrete mixers at site.

3.06 Shelter, shelter grounding, electrical service lines and generator pad are already installed at site. Damage to existing facilities and equipment at site shall be the sole responsibility of Vendor.

3.07 Vendor responsible to repair any damage to gravel service road from construction traffic associated with work under this specification.

4.00 ATTACHMENTS

- 4.01 All attachments shall be considered a part of this specification.
- 4.02 The following drawings and documents are included for use by Vendor:
ME1, C1 from County permit packet
Tower Foundation Design, Sabre Industries
Geotechnical Report, Crockett Engineering

5.00 Debarment and Suspension: By submission of its Bid Response, Vendor agrees to comply with the provisions of Executive Order 12549, regarding Debarment and Suspension. Specifically, the Vendor certifies that neither he/she nor their principals are 1.) presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by a Federal department or agency, 2) have not within a three year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property; 3.) are not presently indicted for or otherwise criminally or civilly charged by a government entity with commission of any of the offenses stated above and 4.) have not within a three year period preceding this bid had one or more public transactions terminated for cause or default.

6.00 Certification of Non-Resident/Foreign Contractors: If the Contractor is a foreign corporation or nonresident Contractor, it is agreed that the Contractor shall procure and maintain during the life of this contract:

- A. A certificate of authority to transact business in the State of Missouri from the Secretary of State, unless exempt pursuant to the provisions of Section 351.572 RSMo.
- B. A certificate from the Missouri Director of Revenue evidencing compliance with transient employer financial assurance law, unless exempt pursuant to the provisions of Section 285.230 RSMo.

7.00 Insurance Requirements - The Contractor shall not commence work under this contract until they have obtained all insurance required under this paragraph and the Certificate of Insurance has been approved by the County, nor shall the Contractor allow any subcontractor to commence work on their subcontract until all similar insurance required of subcontractor has been so obtained and approved. All policies shall be in amounts, form and companies satisfactory to the County which must carry an A-6 or better rating as listed in the A.M. Best or equivalent rating guide. Insurance limits indicated below may be lowered at the discretion of the County.

- A. Employers Liability and Workers Compensation Insurance** - The Contractor shall take out and maintain during the life of this contract, **Employers Liability and Workers Compensation Insurance** for all of its employees employed at the site of work, and in case any work is sublet, the Contractor shall require the subcontractor similarly to provide Workers Compensation Insurance for all of the latter's employees unless such employees are covered by the protection afforded by the Contractor. Workers Compensation coverage shall meet Missouri statutory limits. Employers Liability limits shall be \$500,000.00 each employee, \$500,000.00 each accident, and \$500,000.00 policy limit. In case any class of employees engaged in hazardous work under this Contract at the site of the work is not protected under the Workers Compensation Statute, the Contractor shall provide and shall cause each subcontractor to provide Employers Liability Insurance for the protection of their employees not otherwise protected.

- B. Commercial General Liability Insurance** - The Contractor shall take out and maintain during the life of this contract, such commercial general liability insurance as shall protect it and any subcontractor performing work covered by this contract, from claims for damages for personal injury including accidental death, as well as from claims for property damages, which may arise from operations under this contract, whether such operations be by themselves or for any subcontractor or by anyone directly or indirectly employed by them. The amounts of insurance shall be not less than \$3,000,000.00 combined single limit for any one occurrence covering both bodily injury and property damage, including accidental death. If the Contract involves any underground/digging operations, the general liability certificate shall include X, C, and U (Explosion, Collapse, and Underground) coverage. If providing Commercial General Liability Insurance, then the Proof of Coverage of Insurance shall also be included.
- C.** Contractor may satisfy the minimum liability limits required for Commercial General Liability or Business Auto Liability under an Umbrella or Excess Liability policy. There is no minimum per occurrence limit of liability under the umbrella or Excess Liability; however, the Annual Aggregate limit shall not be less than the highest "Each Occurrence" limit for either Commercial General Liability or Business Auto Liability. Contractor agrees to endorse the County as an Additional Insured on the umbrella or Excess Liability, unless the Certificate of Insurance state the Umbrella or Excess Liability provides coverage on a "Follow-Form" basis.
- D. Business Automobile Liability** – The Contractor shall maintain during the life of this contract, automobile liability insurance in the amount of not less than \$3,000,000.00 combined single limit for any one occurrence, covering both bodily injury, including accidental death, and property damage, to protect themselves from any and all claims arising from the use of the Contractor's own automobiles, teams and trucks; hired automobiles, teams and trucks; non-owned and both on and off the site of work.
- E. Subcontractors:** Contractor shall cause each Subcontractor to purchase and maintain insurance of the types and amounts specified herein. Limits of such coverage may be reduced only upon written agreement of County. Contractor shall provide to County copies of certificates of insurance evidencing coverage for each Subcontractor. Subcontractors' commercial general liability and business automobile liability insurance shall name County as Additional Insured and have the Waiver of Subrogation endorsements added.
- F. Proof of Carriage of Insurance** - The Contractor shall furnish the County with Certificate(s) of Insurance which name the County as additional insured in an amount as required in this contract, contain a description of the project or work to be performed and provided for Commercial General Liability, Business Auto Liability, and Umbrella or Excess Liability (not on Workers Compensation). The Certificate of Insurance shall provide that there will be no cancellation, non-renewal or reduction of coverage without 30 days prior written notice to the Owner. In addition, such insurance shall be on an occurrence basis and shall remain in effect until such time as the County has made final acceptance of the services provided.
- G. INDEMNITY AGREEMENT:** To the fullest extent permitted by law, Contractor shall indemnify, hold harmless and defend the County, its directors, officers, agents, and employees from and against all claims, damages, losses and expenses (including but not limited to attorney's fees) arising by reason of any act or failure to act, negligent or otherwise, of Contractor, of any subcontractor (meaning anyone, including but not limited to consultants having a contract with contractor or a subcontract for part of the services), of anyone directly or indirectly employed by contractor or by any subcontractor, or of anyone for whose acts the contractor or its subcontractor may be liable, in connection with providing these services. This provision does not, however,

require contractor to indemnify, hold harmless, or defend the County of Boone from its own negligence.

- H. Failure to maintain the required insurance in force may be cause for contract termination. In the event the Agency/Service fails to maintain and keep in force the required insurance or to obtain coverage from its subcontractors, the County shall have the right to cancel and terminate the contract without notice.

8.00 Sales/Use Tax Exemption: County will provide the Contractor with a completed Missouri Project Exemption and Missouri Tax Exemption letter for Boone County, Missouri and the Contractor shall be responsible for furnishing the exemption certificate and tax exemption letter to all authorized sub-contractors and suppliers providing materials incorporated in the work. All invoices issued for purchases for such materials, supplies and taxable rentals shall be in the name of Boone County and contain the project number assigned by Boone County for the contract awarded. It shall be the responsibility of the Contractor to insure that no sales or use taxes are included in the invoices and that the County pays no sales/use taxes from which it is exempt. The Contractor shall be responsible for obtaining revised exemption certificates and revised expiration dates if the work extends beyond the estimated project completion date or a certificate expiration date. The Contractor shall also be responsible for retaining a copy of the project exemption certificate for a period of five years and for compliance with all other terms and conditions of section 144.062 RSMo. Not otherwise herein specified. The Contractor agrees not to use or permit others to use the project exemption certificate for taxable purchases of materials or rentals and supplies not directly incorporated into or used in the work to which it applies and agrees to indemnify and hold the County harmless from all losses, expenses and costs including litigation expenses and attorney fees resulting from the unauthorized use of such project exemption certificates.

9.00 Warranty & Guarantee - Contractor warrants and guarantees to Owner that all work will be in accordance with the Contract Documents and will not be defective. All materials provided by the Contractor shall be new material of high quality which shall give long life and reliable operation. The workmanship shall be of high quality in every detail. Prompt notice of all defects shall be given to Contractor. All defective work, whether or not in place, may be rejected, corrected, or accepted as follows:

Correction or Removal of Defective Work- If required by Owner, Contractor shall promptly, as directed, either correct all defective Work, whether or not fabricated, installed or completed, or if the Work has been rejected by County Department Designee, remove it from the site and replace it with non-defective Work. Contractor shall bear all direct, indirect, and consequential costs of such correction or removal (including but not limited to fees and charges of engineers, architects, attorneys, and other professionals made necessary thereby).

One Year Correction Period- If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions, either correct such defective Work, or if it has been rejected by Owner, remove it from the site and replace it with non-defective Work. If Contractor does not promptly comply with the terms of such instructions or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work removed and replaced and all direct, indirect, and consequential costs of removal and replacement (including but not limited to fees and charges of engineers, architects, attorneys, and other professionals) will be paid by the Contractor. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications or by Written Amendment.

10.00 Prevailing Wage: Contractor agrees that it will pay not less than the prevailing hourly rate of wages to all workmen performing work under the Contract in accordance with the prevailing wage determination issued by the Division of Labor Standards of the Department of Labor and Industrial Relations for the State of Missouri and as maintained on file with the Boone County Purchasing Department. The Contractor shall comply with all requirements of the prevailing wage law of Missouri, Revised Statutes of Missouri, Sections 290.210 to 290.340, including the latest amendments thereto. The prevailing wage law does not prohibit payment of more than the prevailing rate of wages nor does it limit the hours of work which may be performed by any worker in any particular period of time. The Contractor further agrees that it shall forfeit as a penalty to the County of Boone the sum of \$100.00 for each workman employed for each calendar day or portion thereof such workman is paid less than the stipulated rates set forth in the prevailing wage determination for the project for any work done under this contract by the Contractor pursuant to the provisions of Section 290.250 RSMo. The Contractor further agrees that he will abide by all provisions of the prevailing wage law as set forth in Chapter 290 RSMo and rules and regulations issued thereunder and that any penalties assessed may be withheld from sums due to the Contractor by the Owner.

The Contractor and all Subcontractors shall be required to submit to the designated representative of the County using department, certified copies of labor payrolls and statements of compliance (Form WH-347) for each week that work is in progress. If work is temporarily suspended, the last payroll shall be marked appropriately to note that it will be the last payroll until work is resumed.

Contractor shall be responsible for the submittal of payrolls and certifications for all subcontractors. Contractor shall keep an accurate record showing the names, occupations, and crafts of all workers employed, together with the number of hours worked by each worker and the actual wages paid to each worker. At all reasonable hours, such records shall be open to inspection by the representatives of Industrial Commission of Missouri and the County. The payroll records shall not be destroyed or removed from the State for at least one year after completion of the work.

The County will check payrolls, with the following checks being made to insure proper labor compliance:

- a. The employee's full name as shown on his/her social security card, his address and Employee I.D. number shall be entered on each payroll.
- b. Check the payroll for correct employee classification.
- c. Check payroll for correct hourly wage and, if applicable, correct overtime hourly rate.
- d. Check the daily and weekly hours worked in each classification including actual overtime hours worked (not adjusted hours).
- e. All deductions are shown in the net wage shown. The Form WH-437 is to be used if fringe benefits are paid into established programs. However, if fringe benefits are paid in cash to the employee, the amount shall be indicated on the payroll.
- f. All checking by the County will be made in red pencil and initialed by the checker.
- g. Final payroll will be marked "Final" or "last Payroll".
- h. A record of all payrolls will be maintained by the County.

Throughout the life of the Contract, a copy of the wage determination and the rules promulgated by the Industrial Commission of Missouri shall be displayed in at least one conspicuous place on the project under a heading NOTICE with the heading in letters at least one inch high.

After completion of the work and before final payment can be made under this contract, the Contractor must file with the County an affidavit stating that they have fully complied with the provisions and requirements of the prevailing wage law of Missouri, Sections 290.210 to 290.340 RSMo. The prevailing

wage rate determination made by the Industrial Commission of Missouri is reproduced verbatim and is applicable to this contract whenever Boone County provides to Contractor a project which is determined to be applicable to prevailing wage law

11.00 EXTRA AND/OR ADDITIONAL WORK AND CHANGES: If any extra and/or additional work is to be done or any change in the plans and specifications is deemed necessary, the County may issue to the Contractor a written change order directing that such extra and/or additional work be done or that such change be made, and the Contract shall be modified accordingly. Compensation to the Contractor will be calculated as an addition to or deduction from the Contract price, based upon such written terms as may be established by the owner, either (a) by an acceptable lump sum proposal of the Contractor, (b) on a cost-plus limited basis not to exceed a specified limit, or (c) on basis of bid or mutually agreed upon unit prices. In the event that none of the foregoing methods are agreed upon with the Contractor, the County may perform the work with its own forces or under separate contract with another contractor.

12.00 DISCHARGE OF EMPLOYEES: Any employee of the Contractor who is stationed at the site of the work and should prove to be quarrelsome, dishonest, incompetent or inexperienced, or should not work for the good of the job shall, upon written notice from the County, be removed by the Contractor and replaced by an employee with proper qualifications.

13.00 SUBCONTRACTORS, SUPPLIERS AND OTHERS- Contractor shall not employ any Subcontractor, Supplier, or other person or organization (including those acceptable to Owner as indicated below), whether initially or as a substitute, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other person or organization to furnish or perform any of the Work against whom the Contractor has a reasonable objection.

If the Owner requires identity of certain Subcontractors, Suppliers, or other persons or organizations (including those who are to furnish the principal items of material and equipment) to be submitted to Owner in advance of the specified date prior to the Effective Date of the Agreement for acceptance by Owner and if Contractor has submitted a list thereof in accordance with the project Specifications, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the bidding documents or the Contract Documents) of any such Subcontractor, Supplier, or other person or organization so identified may be revoked on the basis of reasonable objection after due investigation, in which case Contractor shall submit an acceptable substitute, the Contract Price will be increased by the difference in the cost occasioned by such substitution and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by Owner of any such Subcontractor, Supplier, or other person or organization shall constitute a waiver of any right of Owner to reject defective Work.

14.00 ACCIDENT PREVENTION: Precaution shall be exercised at all times for the protection of persons (including employees) and property. The safety provisions of applicable laws, building and construction codes shall be observed. Machinery, equipment, and all hazards shall be guarded or eliminated in accordance with the safety provisions of the Manual of Accident Prevention in Construction, 8th Edition, 1999, published by the Associated General Contractors of America, to the extent that such provisions are not in contravention of applicable laws. Current standards of the Occupational Safety and Health Act shall be applied, as well as the requirements contained within the current MUTCD.

15.00 LEGAL REQUIREMENTS: The Contractor shall do all work in such manner as to comply with all County ordinances, and laws of the County, State, and Nation as apply to the work herein outlined.

The Contractor shall also obtain all necessary licenses and permits and keep necessary records as required.

16.00 EQUAL OPPORTUNITY: The County of Boone is an equal opportunity affirmative action employer, pursuant to federal and state law, and all respondents submitting bids shall be considered to be EEO/AA employers in compliance with federal and state laws, unless otherwise stipulated by the bidders herein.

The Contractor agrees that he will comply with all federal and state laws and regulations and local ordinances and that he will comply and cause each of his subcontractors, and directives pertaining to nondiscrimination against any person on the grounds of race, color, religion, creed, sex, age, ancestry, or national origin in connection with this Contract, including procurement of materials and lease of equipment; therefore, in accordance with the special provisions on that subject attached hereto, incorporated in and made a part of the Contract.

17.00 DOMESTIC PURCHASING POLICY: Contractors are encouraged to select and use materials manufactured, assembled, or produced in the United States in the performance of this contract whenever the quality and price are comparable with other goods. By submission of this bid, the vendor certifies that they are in compliance with section 34.353 and, if applicable, section 34.359 (“Missouri Domestic Products Procurement Act”) of the Revised Statutes of Missouri, 1987.

18.00 TRANSIENT EMPLOYERS: Every transient employer, as defined in Section 285.230 RSMo, must post in a prominent and easily accessible place at the work site a clearly legible copy of the following: (1) the notice of registration for employer withholding issued to such transient employer by the director of revenue; (2) proof of coverage for workers' compensation insurance or self-insurance signed by the transient employer and verified by the department of revenue through the records of the division of workers' compensation; and (3) the notice of registration for unemployment insurance issued to such transient employer by the division of employment security. Any transient employer failing to comply with these requirements shall, under Section 285.234 RSMo, be liable for a penalty of five hundred dollars per day until the notices required by this section are posted as required by law.

19.00 PROTECTION OF WORK: The Contractor shall take all necessary steps to protect his own workers, the utility personnel, and the public from unnecessary danger or hazard during the prosecution of this work. Danger signs, warning signs, flares, lanterns, railings, barriers, sheeting, shoring, etc, shall be erected to prevent accidents from construction, falling objects, rotating machinery, electric lines and other conditions which might prevent unusual hazard.

20.00 OVERHEAD LINE PROTECTION: The Contractor is aware of the provisions of the Overhead Power Line Safety Act, 319.075 to 319.090 RSMo, and agrees to comply with the provisions thereof. Contractor understands that it is their duty to notify any utility operating high voltage overhead lines and make appropriate arrangements with said utility if the performance of contract would cause any activity within ten feet of any high voltage overhead line. To the fullest extent permitted by law, Contractor shall indemnify, hold harmless and defend the County, its directors, officers, agents, and employees from and against all claims, damages, losses and expenses (including but not limited to attorney’s fees) arising by reason of any act or failure to act, negligent or otherwise, of Contractor, of any subcontractor (meaning anyone, including but not limited to consultants having a contract with contractor or a subcontract for part of the services), of anyone directly or indirectly employed by contractor or by any subcontractor, or of anyone for whose acts the contractor or its subcontractor may be liable, in connection with any claims arising under the Overhead Power Line Safety Act. Contractor expressly waives any action for Contribution against the County on behalf of the Contractor, any subcontractor (meaning anyone, including but not limited to consultants having a contract with contractor or a subcontract for part of the

services), anyone directly or indirectly employed by contractor or by any subcontractor, or of anyone for whose acts the contractor or its subcontractor may be liable, and agrees to provide a copy of this waiver to any party affected by this provision.

21.00 OSHA PROGRAM REQUIREMENTS: The Contractor is familiar with the requirements of 292.675 RSMo. The Contractor shall provide a ten-hour Occupational Safety and Health Administration (OSHA) construction safety program for their on-site employees, subcontractors, or others acting on behalf of Contractor on-site which meets the requirements of 292.675 RSMo.

The Contractor and each subcontractor shall keep accurate records of those employees who are working on-site and a record of each such employee's completion of the OSHA program, and certify compliance by affidavit at the conclusion of the project.

The Contractor shall forfeit as a penalty to the County the sum of Two Thousand Five Hundred Dollars (\$2,500.00) plus One Hundred Dollars (\$100.00) for each employee employed by the Contractor or subcontractor, for each calendar day, or portion thereof, such employee is found to be employed in violation of 292.675 RSMo. Said amounts shall be withheld from all sums and amounts due under this provision when making payments to the Contractor.

22.00 BONDS: If Bidder's bid response is \$50,000 or greater, the following bonds are required:

Performance Bond and Labor and Material Payment Bond: Upon award of the Contract, the successful Contractor shall furnish a Performance Bond and a Labor and Material Payment Bond, each in an amount equal to the full Contract price, guaranteeing faithful compliance with all requirements of the Contract Documents and complete fulfillment of the Contract, and payment of all labor, material, and other bills made in carrying out this Contract.

Bid Bond: A Bid Bond or Certified Check made payable to Boone County, in the amount of 5% of the Base Bid shall accompany the proposal response as a guarantee that the Offeror, if awarded the Contract, will furnish a satisfactory Performance and Payment Bond; execute the contract; and proceed with the work. Upon failure to do so, the Respondent shall forfeit the deposit or amount of the Bid Bond as liquidated damages, and no mistakes or errors on the part of the Respondent shall excuse the Respondent or entitle the Respondent to a return of the deposit or Bid Bond.

23.00 PAYMENT: This will be a lump sum payment contract upon acceptance by Boone County. Contractor must submit an invoice and charges must only include prices listed in the vendor's bid response. No additional fees or taxes shall be included as additional charges. The County's purchase order must appear on the invoice. The County agrees to pay the invoice within thirty (30) days from receipt of a correct invoice and all other required documents.

24.00 INVOICES: Invoices should be submitted to Boone County Joint Communications, Attn: Pat Schreiner for payment 30 days after receipt of a correct and valid invoice. The billing address is Boone County Joint Communications, 17 N 7th Street, Suite A, Columbia, MO 65201.

25.00 Bid Clarification: Any questions or clarifications concerning bid documents should be addressed in writing, PRIOR TO BID OPENING, to Melinda Bobbitt, Director of Purchasing, 613 E. Ash Street, Room 110, Columbia, Missouri 65201. Phone: (573) 886-4391 Fax: (573) 886-4390 or Email: mbobbitt@boonecountymmo.org.

3. Response Presentation and Review

- 3.1. **RESPONSE CONTENT** – In order to enable direct comparison of competing Responses, Bidder must submit Response in strict conformity to the requirements stated herein. Failure to adhere to all requirements may result in Bidder's Response being disqualified as non-responsive. All Responses must be submitted using the provided Response Sheet. Every question must be answered and if not applicable, the section must contain "N/A". Manufacturer's published specifications for the items requested shall be included with the response.
- 3.2. **SUBMITTAL OF RESPONSES** – Responses MUST be received by the date and time notes on the title page under "Bid Submission Information and Deadline". NO EXCEPTIONS. The County is not responsible for late or incorrect deliveries from the US Postal Service or any other mail carrier.
- 3.3. **Advice of Award** – If you wish to be advised of the outcome of this Bid, the results may be viewed on the County's web page at www.showmeboone.com.
- 3.4. **BID OPENING** – On the date and time and at the location specified on the title page, all Responses will be opened in public. Brief summary information from each will be read aloud, and any person present will be allowed, under supervision, to scan any Response. In the event only one bid is received by the date and time of the bid opening, County reserves the right to not open the bid and extend the Closing Date for the purpose of inviting bid responses from more vendors in the interest of establishing competition.
- 3.5. **Removal from Vendor Database** – If any prospective Bidder currently in our Vendor Database to whom the Bid was sent elects not to submit a Response and fails to reply in writing stating reason for not bidding, that Bidder's name may be removed from our database. Other reasons for removal include unwillingness or inability to show financial responsibility, reported poor performance, unsatisfactory service, or repeated inability to meet delivery requirements.
- 3.6. **RESPONSE CLARIFICATION** – The County reserves the right to request additional written or oral information from Bidders in order to obtain clarification of their Responses.
- 3.7. **Rejection or Correction of Responses** – The County reserves the right to reject any or all Responses. Minor irregularities or informalities in any Response which are immaterial or inconsequential in nature, and are neither affected by law nor at substantial variance with Bid conditions, may be waived at our discretion whenever it is determined to be in the County's best interest.
- 3.8. **EVALUATION PROCESS** – The County's sole purpose in the evaluation process is to determine from among the Responses received which one is best suited to meet the County's needs at the lowest possible cost. Any final analysis or weighted point score does not imply that one Bidder is superior to another, but simply that in our judgment the Contract selected appears to offer the best overall solution for our current and anticipated needs at the lowest possible cost.
- 3.9. **Method of Evaluation** – The County will evaluate submitted Responses in relation to all aspects of this Bid.
- 3.10. **Acceptability** – The County reserves the sole right to determine whether goods and/or services offered are acceptable for County use.
- 3.11. **Endurance of Pricing** – Bidder's pricing must be held until contract execution or 60 days, whichever comes first.

4. Response Form

Company Name: _____
Address: _____
City/Zip: _____
Phone Number: _____
E-Mail: _____
Fax Number: _____

Federal Tax I.D. _____
() Corporation
() Partnership - Name _____
() Individual/Proprietorship - Individual Name _____
() Other (Specify) _____

4.00 PRICING

4.01. Radio Tower Foundation and Site Work for Battle School per the requirements stated herein.

_____ DOLLARS and _____ CENTS
(Quoted cost in print)
\$/LUMP SUM

4.02. Work will begin on project _____ days after receipt of Notice to Proceed.

4.03 Work will be completed _____ days after receipt of Notice to Proceed.

4.04. Subcontracting: If Vendor proposes to use subcontractors for this work, list the names of the firms and the work to be assigned in spaces below.

Table with 2 columns: Subcontractor Name/Address, Work Assigned. Includes blank lines for entry.

4.05. Return with your bid response the following:

- Any addenda
Response Form
Statement of Bidder's Qualifications
Work Authorization Certification
Debarment Certification
Anti-Collusion Statement
Signature and Identity of Bidder
Bidder's Acknowledgment
Bid Bond (if bid response is \$50,000 or more)

4.05. The undersigned offers to furnish and deliver the articles or services as specified at the prices and terms stated and in strict accordance with all requirements contained in the Request for Bid which have been read and understood, and all of which are made part of this order. By submission of this bid, the vendor certifies that they are in compliance with Section 34.353 and, if applicable, Section 34.359 (Missouri Domestic Products Procurement Act) of the Revised Statutes of Missouri.

Authorized Representative (Sign By Hand): _____ Date: _____

Print Name and Title of Authorized Representative:



Boone County Purchasing
613 E. Ash, Room 110
Columbia, MO 65201

Standard Terms and Conditions

Melinda Bobbitt, CPPO, CPPB, Director of Purchasing
Phone: (573) 886-4391 – Fax: (573) 886-4390

1. Contractor shall comply with all applicable federal, state, and local laws and failure to do so, in County's sole discretion, shall give County the right to terminate this Contract.
2. Responses shall include all charges for packing, delivery, installation, etc., (unless otherwise specified) to the Boone County Department identified in the Request for Bid and/or Proposal.
3. The Boone County Commission has the right to accept or reject any part or parts of all bids, to waive technicalities, and to accept the offer the County Commission considers the most advantageous to the County. Boone County reserves the right to award this bid on an item-by-item basis, or an "all or none" basis, whichever is in the best interest of the County.
4. Bidders must use the bid forms provided for the purpose of submitting bids, must return the bid and bid sheets comprised in this bid, give the unit price, extended totals, and sign the bid. The Purchasing Director reserves the right, when only one bid has been received by the bid closing date, to delay the opening of bids to another date and time in order to revise specifications and/or establish further competition for the commodity or service required. The one (1) bid received will be retained unopened until the new Closing date, or at request of bidder, returned unopened for re-submittal at the new date and time of bid closing.
5. When products or materials of any particular producer or manufacturer are mentioned in our specifications, such products or materials are intended to be descriptive of type or quality and not restricted to those mentioned.
6. Do not include Federal Excise Tax or Sales and Use Taxes in bid process, as law exempts the County from them.
7. The delivery date shall be stated in definite terms, as it will be taken into consideration in awarding the bid.
8. The County Commission reserves the right to cancel all or any part of orders if delivery is not made or work is not started as guaranteed. In case of delay, the Contractor must notify the Purchasing Department.
9. In case of default by the Contractor, the County of Boone will procure the articles or services from other sources and hold the Bidder responsible for any excess cost occasioned thereby.
10. Failure to deliver as guaranteed may disqualify Bidder from future bidding.
11. Prices must be as stated in units of quantity specified, and must be firm. Bids qualified by escalator clauses may not be considered unless specified in the bid specifications.

12. No bid transmitted by fax machine or e-mail will be accepted.
13. The County of Boone, Missouri expressly denies responsibility for, or ownership of any item purchased until same is delivered to the County and is accepted by the County.
14. The County reserves the right to award to one or multiple respondents. The County also reserves the right to not award any item or group of items if the services can be obtained from a state or other governmental entities contract under more favorable terms.
15. The County, from time to time, uses federal grant funds for the procurement of goods and services. Accordingly, the provider of goods and/or services shall comply with federal laws, rules and regulations applicable to the funds used by the County for said procurement, and contract clauses required by the federal government in such circumstances are incorporated herein by reference. These clauses can generally be found in the Federal Transit Administration's Best Practices Procurement Manual – Appendix A. Any questions regarding the applicability of federal clauses to a particular bid should be directed to the Purchasing Department prior to bid opening.
16. In the event of a discrepancy between a unit price and an extended line item price, the unit price shall govern.
17. Should an audit of Contractor's invoices during the term of the Agreement, and any renewals thereof, indicate that the County has remitted payment on invoices that constitute an over-charging to the County above the pricing terms agreed to herein, the Contractor shall issue a refund check to the County for any over-charges within 30-days of being notified of the same.
18. **For all titled vehicles and equipment the dealer must use the actual delivery date to the County on all transfer documents** including the Certificate of Origin (COO,) Manufacturer's Statement of Origin (MSO,) Bill of Sale (BOS,) and Application for Title.
19. **Equipment and serial and model numbers** - The contractor is strongly encouraged to include equipment serial and model numbers for all amounts invoiced to the County. If equipment serial and model numbers are not provided on the face of the invoice, such information may be required by the County before issuing payment.

STATEMENT OF BIDDER'S QUALIFICATIONS

Each bidder for the work included in the specifications and plans and the Contract Documents shall submit with their bid the data requested in the following schedule of information. This data must be included in and made a part of each bid document and be contained in the sealed envelope. Failure to comply with this instruction may be regarded as justification for rejecting the Contractor's proposal.

1. Name of Bidder: _____
2. Business Address: _____
3. When Organized: _____
4. When Incorporated: _____
5. List federal tax identification number: _____
If not incorporated, state type of business (sole proprietor, partnership, or other) _____
6. Number of years engaged in business under present firm name: _____
7. If you have done business under a different name, please give name and business location under that name: _____
8. Percent of work done by own staff: _____
9. Have you ever failed to complete any work awarded to your company? If so, where and why? _____
10. Have you ever defaulted on a contract? _____ If so, give _____
11. List of contracts completed within the last three years for work similar in scope to that described in this bid, including value of each. _____
12. List of projects currently in progress: _____

*** Attach additional sheets as necessary ***

INSTRUCTIONS FOR COMPLIANCE WITH HOUSE BILL 1549

House Bill 1549 addresses the Department of Homeland Security's and the Social Security Administration's E-Verify Program (Employment Eligibility Verification Program) that requires the County to verify "lawful presence" of individuals when we contract for work/service; verify that contractor has programs to verify lawful presence of their employees when contracts exceed \$5,000; and a requirement for OSHA safety training for public works projects.

The County is required to obtain certification that the bidder awarded the attached contract participates in a federal work authorization program. To obtain additional information on the Department of Homeland Security's E-Verify program, go to:

<http://www.uscis.gov/portal/site/uscis/menuitem.eb1d4c2a3e5b9ac89243c6a7543f6d1a/?vgnextoid=75bce2e261405110VgnVCM1000004718190aRCRD&vgnextchannel=75bce2e261405110VgnVCM1000004718190aRCRD>

Please complete and return form *Work Authorization Certification Pursuant to 285.530 RSMo* if your contract amount is in excess of \$5,000. **Attach to this form the first and last page of the *E-Verify Memorandum of Understanding* that you completed when enrolling.**

CERTIFICATION OF INDIVIDUAL BIDDER

Pursuant to Section 208.009 RSMo, any person applying for or receiving any grant, contract, loan, retirement, welfare, health benefit, post secondary education, scholarship, disability benefit, housing benefit or food assistance who is over 18 must verify their lawful presence in the United States. Please indicate compliance below. Note: A parent or guardian applying for a public benefit on behalf of a child who is citizen or permanent resident need not comply.

- ____1. I have provided a copy of documents showing citizenship or lawful presence in the United States. (Such proof may be a Missouri driver’s license, U.S. passport, birth certificate, or immigration documents). Note: If the applicant is an alien, verification of lawful presence must occur prior to receiving a public benefit.

- ____2. I do not have the above documents, but provide an affidavit (copy attached) which may allow for temporary 90 day qualification.

- ____3. I have provided a completed application for a birth certificate pending in the State of _____. Qualification shall terminate upon receipt of the birth certificate or determination that a birth certificate does not exist because I am not a United States citizen.

Applicant

Date

Printed Name

AFFIDAVIT
(Only Required for Individual Bidder Certification Option #2)

State of Missouri)
)SS.
County of _____)

I, the undersigned, being at least eighteen years of age, swear upon my oath that I am either a United States citizen or am classified by the United States government as being lawfully admitted for permanent residence.

Date

Signature

Social Security Number
or Other Federal I.D. Number

Printed Name

On the date above written _____ appeared before me and swore that the facts contained in the foregoing affidavit are true according to his/her best knowledge, information and belief.

Notary Public

My Commission Expires:

(Please complete and return with Bid)

Certification Regarding
Debarment, Suspension, Ineligibility and Voluntary Exclusion
Lower Tier Covered Transactions

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 29 CFR Part 98 Section 98.510, Participants' responsibilities. The regulations were published as Part VII of the May 26, 1988, Federal Register (pages 19160-19211).

(BEFORE COMPLETING CERTIFICATION, READ INSTRUCTIONS FOR CERTIFICATION)

- (1) The prospective recipient of Federal assistance funds certifies, by submission of this proposal, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.
- (2) Where the prospective recipient of Federal assistance funds is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Name and Title of Authorized Representative

Signature

Date

ANTI-COLLUSION STATEMENT

STATE OF MISSOURI

COUNTY OF _____

_____, being first duly sworn, deposes and

says that he is _____

(Title of Person Signing)

of _____

(Name of Bidder)

that all statements made and facts set out in the proposal for the above project are true and correct; and the bidder (person, firm, association, or corporation making said bid) has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with said bid or any contract which may result from its acceptance.

Affiant further certifies that bidder is not financially interested in, or financially affiliated with, any other bidder for the above project

By _____ By ____

By _____

Sworn to before me this _____ day of _____, 20 _____

Notary Public

My Commission Expires _____

SIGNATURE AND IDENTITY OF BIDDER

The undersigned states that the correct LEGAL NAME and ADDRESS of (1) the individual Bidder, (2) each partner or joint venture (whether individuals or corporations, and whether doing business under fictitious name), or (3) the corporation (with the state in which it is incorporated) are shown below; that (if not signing with the intention of binding himself to become the responsible and sole Contractor) he is the agent of, and duly authorized in writing to sign for the Bidder or Bidders; and that he is signing and executing this (as indicated in the proper spaces below) as the proposal of a:

sole individual partnership joint venture
 corporation, incorporated under laws of the state of _____

Dated _____, 20 _____

Name of individual, all partners, or joint venturers:

Address of each:

_____	_____
_____	_____
_____	_____
_____	_____

Address of principal place of business in doing business under the name of:

 (If using a fictitious name, show this name above in addition to legal names.)

 (If a corporation – show its name above)

ATTEST:

 (Secretary)

 (Title)

NOTE: If the Bidder is doing business under a FICTITIOUS NAME, the Proposal shall be executed in the legal name of the individual, partners, joint venturers, or corporation, with the legal address shown, and the REGISTRATION OF FICTITIOUS NAME filed with the Secretary of State, as required by Section 417.200 to 417.230, RS Mo. shall be attached. If the Bidder is a CORPORATION NOT ORGANIZED UNDER THE LAWS OF MISSOURI, it shall procure a CERTIFICATE OF AUTHORITY TO DO BUSINESS IN MISSOURI, as required by Section 351.570 and following, RS Mo. A CERTIFIED COPY of such Registration of Fictitious Name or Certificate of Authority to do Business in Missouri shall be filed with the Engineer.

BIDDER'S ACKNOWLEDGMENT

(Complete and fill out all parts applicable, and strike out all parts not applicable.)

State of _____ County of _____

On this _____ day of _____, 20 _____

before me appeared _____ to me personally known, who, being by me first duly sworn, did say that he executed the foregoing Proposal with full knowledge and understanding of all its terms and provisions and of the plans and specifications; that the correct legal name and address of the Bidder (including those of all partners of joint ventures if fully and correctly set out above; that all statements made therein by or for the Bidder are true; and (if a sole individual) acknowledged that he executed the same as his free act and deed.

(if a partnership or joint venture) acknowledged that his executed same, with written authority from, and as the free act and deed of, all said partners or joint ventures.

(if a corporation) that he is the _____
President or other agent

of _____; that the above Proposal was signed and sealed in behalf of said corporation by authority of its board of directors; and he acknowledged said proposal to be the free act and deed of said corporation.

Witness my hand and seal at, _____ the day and year first above written. (SEAL)

Notary Public

My Commission expires _____, 20 _____.

(To be returned at end of project)

AFFIDAVIT OF COMPLIANCE WITH THE PREVAILING WAGE LAW

Before me, the undersigned Notary Public, in and for the County of _____

State of _____, personally came and appeared (name and title)

_____ of the (name of company)

_____ (a corporation) (a partnership) (a proprietorship)

and after being duly sworn did depose and say that all provisions and requirements set out in Chapter 290 Sections 290.210 through and including 290.340, Missouri Revised Statutes, pertaining to the payment of wages to workmen employed on public works projects have been fully satisfied and there has been no exception to the full and complete compliance with said provisions and requirements and with Wage Determination NO. _____ issued by the Division of Labor Standards on the _____ day of _____ 20____, in carrying out the Contract and work in connection with

(name of project) _____ located at

(name of institution) _____ in _____ County,

Missouri and completed on the _____ day of _____, 20_____.

Signature

Subscribed and sworn to me this _____ day of _____, 20_____.

My commission expires _____, 20_____.

Notary Public



“No Bid” Response Form

Boone County Purchasing
613 E. Ash, Room 110
Columbia, MO 65201

Melinda Bobbitt, Director of Purchasing
(573) 886-4391 – Fax: (573) 886-4390

“NO BID RESPONSE FORM”

**NOTE: COMPLETE AND RETURN THIS FORM ONLY IF YOU DO NOT WANT TO
SUBMIT A BID**

If you do not wish to respond to this bid request, but would like to remain on the Boone County vendor list for this service/commodity, please remove form and return to the Purchasing Department by mail or fax.

If you would like to FAX this “No Bid” Response Form to our office, the FAX number is (573) 886-4390.

**Bid: 72-10NOV15 – RADIO TOWER FOUNDATION AND SITE WORK FOR
BATTLE SCHOOL**

Business Name: _____

Address: _____

Telephone: _____

Contact: _____

Date: _____

Reason(s) for not bidding:

Missouri

Division of Labor Standards

WAGE AND HOUR SECTION



JEREMIAH W. (JAY) NIXON, Governor

Annual Wage Order No. 22

Section 010

BOONE COUNTY

In accordance with Section 290.262 RSMo 2000, within thirty (30) days after a certified copy of this Annual Wage Order has been filed with the Secretary of State as indicated below, any person who may be affected by this Annual Wage Order may object by filing an objection in triplicate with the Labor and Industrial Relations Commission, P.O. Box 599, Jefferson City, MO 65102-0599. Such objections must set forth in writing the specific grounds of objection. Each objection shall certify that a copy has been furnished to the Division of Labor Standards, P.O. Box 449, Jefferson City, MO 65102-0449 pursuant to 8 CSR 20-5.010(1). A certified copy of the Annual Wage Order has been filed with the Secretary of State of Missouri.

Original Signed by

John E. Lindsey, Director
Division of Labor Standards

This Is A True And Accurate Copy Which Was Filed With The Secretary of State: **March 10, 2015**

Last Date Objections May Be Filed: **April 9, 2015**

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	** Date of Increase	*	Basic Hourly Rates	Over-Time Schedule	Holiday Schedule	Total Fringe Benefits
Asbestos Worker (H & F) Insulator			\$32.06	55	60	\$20.71
Boilermaker	8/15		\$34.76	57	7	\$28.00
Bricklayer and Stone Mason	6/15		\$28.95	59	7	\$16.25
Carpenter	6/15		\$24.75	60	15	\$15.55
Cement Mason	6/15		\$26.83	9	3	\$11.95
Communication Technician	6/15		\$31.35	28	7	\$12.70 + 13%
Electrician (Inside Wireman)	6/15		\$31.35	28	7	\$12.70 + 13%
Electrician (Outside-Line Construction/Lineman)	9/15		\$42.52	43	45	\$5.00 + 36.5%
Lineman Operator	9/15		\$36.70	43	45	\$5.00 + 36.5%
Groundman	9/15		\$28.38	43	45	\$5.00 + 36.5%
Elevator Constructor		a	\$44.37	26	54	\$28.385
Glazier	10/15		\$26.57	122	76	\$11.33
Ironworker	8/15		\$28.41	11	8	\$24.04
Laborer (Building):						
General			\$21.71	42	44	\$12.84
First Semi-Skilled			\$23.71	42	44	\$12.84
Second Semi-Skilled			\$22.71	42	44	\$12.84
Lather			USE CARPENTER RATE			
Linoleum Layer and Cutter	6/15		\$24.63	60	15	\$15.55
Marble Mason	10/15		\$21.66	124	74	\$12.68
Marble Finisher	10/15		\$14.14	124	74	\$9.08
Millwright	6/15		\$25.75	60	15	\$15.55
Operating Engineer						
Group I	6/15		\$28.66	86	66	\$24.01
Group II	6/15		\$28.66	86	66	\$24.01
Group III	6/15		\$27.41	86	66	\$24.01
Group III-A	6/15		\$28.66	86	66	\$24.01
Group IV	6/15		\$26.43	86	66	\$24.01
Group V	6/15		\$29.36	86	66	\$24.01
Painter	6/15		\$22.94	18	7	\$11.33
Pile Driver	6/15		\$25.75	60	15	\$15.55
Pipe Fitter	7/15	b	\$37.00	91	69	\$26.68
Plasterer	6/15		\$25.40	94	5	\$12.00
Plumber	7/15	b	\$37.00	91	69	\$26.68
Roofer \ Waterproofer	10/15		\$29.30	12	4	\$14.87
Sheet Metal Worker	7/15		\$31.14	40	23	\$16.24
Sprinkler Fitter - Fire Protection	6/15		\$32.39	33	19	\$19.05
Terrazzo Worker			\$28.73	124	74	\$14.38
Terrazzo Finisher			\$18.68	124	74	\$14.38
Tile Setter	10/15		\$21.66	124	74	\$12.68
Tile Finisher	10/15		\$14.14	124	74	\$9.08
Traffic Control Service Driver			\$26.415	22	55	\$9.045
Truck Driver-Teamster						
Group I			\$25.30	101	5	\$10.70
Group II			\$25.95	101	5	\$10.70
Group III			\$25.45	101	5	\$10.70
Group IV			\$25.95	101	5	\$10.70

Fringe Benefit Percentage is of the Basic Hourly Rate

**Annual Incremental Increase

**REPLACEMENT PAGE
BOONE COUNTY
BUILDING CONSTRUCTION OVERTIME SCHEDULE**

FED: Minimum requirement per Fair Labor Standards Act means time and one-half (1 ½) shall be paid for all work in excess of forty (40) hours per work week.

NO. 9: Means the regular workday starting time of 8:00 a.m. (and resulting quitting time of 4:30 p.m.) may be moved forward to 6:00 a.m. or delayed one hour to 9:00 a.m. All work performed in excess of the regular work day and on Saturday shall be compensated at one and one-half (1½) times the regular pay. In the event time is lost during the work week due to weather conditions, the Employer may schedule work on the following Saturday at straight time. All work accomplished on Sunday and holidays shall be compensated for at double the regular rate of wages. The work week shall be Monday through Friday, except for midweek holidays.

NO. 11: Means eight (8) hours shall constitute a day's work, with the starting time to be established between 6:00 a.m. and 8:00 a.m. from Monday to Friday. Time and one-half (1½) shall be paid for first two (2) hours of overtime Monday through Friday and the first eight (8) hours on Saturday. All other overtime hours Monday through Saturday shall be paid at double (2) time rate. Double (2) time shall be paid for all time on Sunday and recognized holidays or the days observed in lieu of these holidays.

NO. 12: Means the work week shall commence on Monday at 12:01 a.m. and shall continue through the following Friday, inclusive of each week. All work performed by employees anywhere in excess of forty (40) hours in one (1) work week, shall be paid for at the rate of one and one-half (1½) times the regular hourly wage scale. All work performed within the regular working hours which shall consist of a ten (10) hour work day except in emergency situations. Overtime work and Saturday work shall be paid at one and one-half (1½) times the regular hourly rate. Work on recognized holidays and Sundays shall be paid at two (2) times the regular hourly rate.

NO. 18: Means the regular work day shall be eight (8) hours. Working hours are from six (6) hours before Noon (12:00) to six (6) hours after Noon (12:00). The regular work week shall be forty (40) hours, beginning between 6:00 a.m. and 12:00 Noon on Monday and ending between 1:00 p.m. and 6:00 p.m. on Friday. Saturday will be paid at time and one-half (1½). Sunday and Holidays shall be paid at double (2) time. Saturday can be a make-up day if the weather has forced a day off, but only in the week of the day being lost. Any time before six (6) hours before Noon or six (6) hours after Noon will be paid at time and one-half (1½).

NO. 22: Means a regular work week of forty (40) hours will start on Monday and end on Friday. The regular work day shall be either eight (8) or ten (10) hours. If a crew is prevented from working forty (40) hours Monday through Friday, or any part thereof by reason of inclement weather, Saturday or any part thereof may be worked as a make-up day at the straight time rate. Employees who are part of a regular crew on a make-up day, notwithstanding the fact that they may not have been employed the entire week, shall work Saturday at the straight time rate. A workday is to begin between 6:00 a.m. and 9:00 a.m. However, the project starting time may be advanced or delayed if mutually agreed to by the interest parties. For all time worked on recognized holidays, or days observed as such, double (2) time shall be paid.

NO. 26: Means that the regular working day shall consist of eight (8) hours worked between 6:00 a.m., and 5:00 p.m., five (5) days per week, Monday to Friday, inclusive. Hours of work at each jobsite shall be those established by the general contractor and worked by the majority of trades. (The above working hours may be changed by mutual agreement). Work performed on Construction Work on Saturdays, Sundays and before and after the regular working day on Monday to Friday, inclusive, shall be classified as overtime, and paid for at double (2) the rate of single time. The employer may establish hours worked on a jobsite for a four (4) ten (10) hour day work week at straight time pay for construction work; the regular working day shall consist of ten (10) hours worked consecutively, between 6:00 a.m. and 6:00 p.m., four (4) days per week, Monday to Thursday, inclusive. Any work performed on Friday, Saturday, Sunday and holidays, and before and after the regular working day on Monday to Thursday where a four (4) ten (10) hour day workweek has been established, will be paid at two times (2) the single time rate of pay. The rate of pay for all work performed on holidays shall be at two times (2) the single time rate of pay.

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NO. 28: Means a regular workday shall consist of eight (8) hours between 7:00 a.m. and 5:30 p.m., with at least a thirty (30) minute period to be taken for lunch. Five (5) days a week, Monday through Friday inclusive, shall constitute a work week. The Employer has the option for a workday/workweek of four (4) ten (10) hour days (4-10's) provided:

- The project must be for a minimum of four (4) consecutive days.
- Starting time may be within one (1) hour either side of 8:00 a.m.
- Work week must begin on either a Monday or Tuesday: If a holiday falls within that week it shall be a consecutive work day. (Alternate: If a holiday falls in the middle of a week, then the regular eight (8) hour schedule may be implemented).
- Any time worked in excess of any ten (10) hour work day (in a 4-10 hour work week) shall be at the appropriate overtime rate.

All work outside of the regular working hours as provided, Monday through Saturday, shall be paid at one & one-half (1½) times the employee's regular rate of pay. All work performed from 12:00 a.m. Sunday through 8:00 a.m. Monday and recognized holidays shall be paid at double (2) the straight time hourly rate of pay. Should employees work in excess of twelve (12) consecutive hours they shall be paid double time (2X) for all time after twelve (12) hours. Shift work performed between the hours of 4:30 p.m. and 12:30 a.m. (second shift) shall receive eight (8) hours pay at the regular hourly rate of pay plus ten (10%) percent for seven and one-half (7½) hours work. Shift work performed between the hours of 12:30 a.m. and 8:00 a.m. (third shift) shall receive eight (8) hours pay at the regular hourly rate of pay plus fifteen (15%) percent for seven (7) hours work. A lunch period of thirty (30) minutes shall be allowed on each shift. All overtime work required after the completion of a regular shift shall be paid at one and one-half (1½) times the shift hourly rate.

NO. 33: Means the standard work day and week shall be eight (8) consecutive hours of work between the hours of 6:00 a.m. and 6:00 p.m., excluding the lunch period Monday through Friday, or shall conform to the practice on the job site. Four (4) days at ten (10) hours a day may be worked at straight time, Monday through Friday and need not be consecutive. All overtime, except for Sundays and holidays shall be at the rate of time and one-half (1½). Overtime worked on Sundays and holidays shall be at double (2) time.

NO. 40: Means the regular working week shall consist of five (5) consecutive (8) hour days' labor on the job beginning with Monday and ending with Friday of each week. Four (4) 10-hour days may constitute the regular work week. The regular working day shall consist of eight (8) hours labor on the job beginning as early as 6:00 a.m. and ending as late as 5:30 p.m. All full or part time labor performed during such hours shall be recognized as regular working hours and paid for at the regular hourly rate. All hours worked on Saturday and all hours worked in excess of eight (8) hours but not more than twelve (12) hours during the regular working week shall be paid for at time and one-half (1½) the regular hourly rate. All hours worked on Sundays and holidays and all hours worked in excess of twelve (12) hours during the regular working day shall be paid at two (2) times the regular hourly rate. In the event of rain, snow, cold or excessively windy weather on a regular working day, Saturday may be designated as a "make-up" day. Saturday may also be designated as a "make-up" day, for an employee who has missed a day of work for personal or other reasons. Pay for "make-up" days shall be at regular rates.

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NO. 42: Means eight (8) hours between the hours of 8:00 a.m. and 4:30 p.m. shall constitute a work day. The starting time may be advanced one (1) or two (2) hours. Employees shall have a lunch period of thirty (30) minutes. The Employer may provide a lunch period of one (1) hour, and in that event, the workday shall commence at 8:00 a.m. and end at 5:00 p.m. The workweek shall commence at 8:00 a.m. on Monday and shall end at 4:30 p.m. on Friday (or 5:00 p.m. on Friday if the Employer grants a lunch period of one (1) hour), or as adjusted by starting time change as stated above. All work performed before 8:00 a.m. and after 4:30 p.m. (or 5:00 p.m. where one (1) hour lunch is granted for lunch) or as adjusted by starting time change as stated above or on Saturday, except as herein provided, shall be compensated at one and one-half (1½) times the regular hourly rate of pay for the work performed. All work performed on Sunday and on recognized holidays shall be compensated at double (2) the regular hourly rate of pay for the work performed. When working a five 8-hour day schedule and an Employer is prevented from working forty (40) hours, Monday through Friday, or any part thereof by reason of inclement weather (rain or mud), Saturday or any part thereof may be worked as a make-up day at the straight time rate. The Employer shall have the option of working five eight (8) hour days or four ten (10) hour days Monday through Friday. If an Employer elects to work five (5) eight (8) hour days during any work week, hours worked more than eight (8) per day or forty (40) hours per week shall be paid at time and one-half (1½) the hourly rate Monday through Friday. If an Employer elects to work four (4) ten (10) hour days in any week, work performed more than ten (10) hours per day or forty (40) hours per week shall be paid at time and one-half (1½) the hourly rate Monday through Friday. If an Employer is working ten (10) hour days and loses a day due to inclement weather, they may work ten (10) hours Friday at straight time. All hours worked over the forty (40) hours Monday through Friday will be paid at time and one-half (1½) overtime rate. Overtime shall be computed at half-hour intervals. Shift Work: Two (2) or three (3) shifts shall be permitted, provided such shifts are scheduled for a minimum of three (3) consecutive days. The second shift shall begin at 4:30 p.m. and end at 12:30 a.m. with one-half (1/2) hour for lunch between 7:30 p.m. and 9:00 p.m. and shall received eighty (8) hours' pay. The third shift shall begin at 12:30 a.m. and end at 8:00 a.m. with one-half (1/2) hour for lunch between 3:30 a.m. and 5:00 a.m. and shall received (8) hour's; pay. There shall be at least one (1) foreman on each shift on jobs where more than one shift is employed, provided that there are two (2) or more employees on second and on the third shifts. All shifts shall arrange to interchange working hours at the end of each week. When three shifts are used, the applicable rate must be paid from Saturday at 8:00 a.m. until the following Monday at 8:00 a.m. When three shifts are employed, the second and third shifts shall contain at least one-half (1/2) as many employees as the first shift.

NO. 43: Eight (8) hours shall constitute a work day between the hours of 7:00 a.m. and 4:30 p.m. Forty (40) hours within five (5) days, Monday through Friday inclusive, shall constitute the work week. Work performed in the 9th and 10th hour, Monday through Friday, shall be paid at time and one-half (1½) the regular straight time rate of pay. Contractor has the option to pay two (2) hours per day at the time and one-half (1½) the regular straight time rate of pay between the hours of 6:00 a.m. and 5:30 p.m., Monday through Friday. Work performed outside the regularly scheduled working hours and on Saturdays, Sundays and recognized legal holidays, or days celebrated as such, shall be paid for at the rate of double (2) time.

NO. 55: Means the regular work day shall be eight (8) hours between 6:00 a.m. and 4:30 p.m. The first two (2) hours of work performed in excess of the eight (8) hour work day, Monday through Friday, and the first ten (10) hours of work on Saturday, shall be paid at one & one-half (1½) times the straight time rate. All work performed on Sunday, observed holidays and in excess of ten (10) hours a day, Monday through Saturday, shall be paid at double (2) the straight time rate.

NO. 57: Means eight (8) hours per day shall constitute a day's work and forty (40) hours per week, Monday through Friday, shall constitute a week's work. The regular starting time shall be 8:00 a.m. If a second or third shift is used, the regular starting time of the second shift shall be 4:30 p.m. and the regular starting period for the third shift shall be 12:30 a.m. These times may be adjusted by the employer. The day shift shall work a regular eight (8) hours shift as outlined above. Employees working a second shift shall receive an additional \$0.25 above the regular hourly rate and perform seven and one-half (7½) hours work for eight (8) hours pay. Third shift employees shall be paid an additional \$0.50 above the regular hourly rate and work seven (7) hours for eight (8) hours pay. When circumstances warrant, the Employer may change the regular workweek to four (4) ten-hour days at the regular time rate of pay. All time worked before and after the established workday of eight (8) hours, Monday through Friday, and all time worked on Saturday shall be paid at the rate of time and one-half (1½) except in cases where work is part of an employee's regular Friday shift. All time worked on Sunday and recognized holidays shall be paid at the double (2) time rate of pay except in cases where work is part of an employee's previous day's shift. For all overtime hours worked \$26.71 of the fringe benefits portion of the prevailing wage shall be paid at the same overtime rate at which the cash portion of the prevailing wage is to be paid. The remaining \$1.29 of the fringe benefit portion of the prevailing wage may be paid at straight time.

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NO. 59: Means that except as herein provided, eight (8) hours a day shall constitute a standard work day, and forty (40) hours per week shall constitute a week's work. All time worked outside of the standard eight (8) hour work day and on Saturday shall be classified as overtime and paid the rate of time and one-half (1½). All time worked on Sunday and holidays shall be classified as overtime and paid at the rate of double (2) time. The Employer has the option of working either five (5) eight hour days or four (4) ten hour days to constitute a normal forty (40) hour work week. When the four (4) ten-hour work week is in effect, the standard work day shall be consecutive ten (10) hour periods between the hours of 6:30 a.m. and 6:30 p.m. Forty (40) hours per week shall constitute a week's work, Monday through Thursday, inclusive. In the event the job is down for any reason beyond the Employer's control, then Friday and/or Saturday may, at the option of the Employer, be worked as a make-up day; straight time not to exceed ten (10) hours or forty (40) hours per week. When the five day eight (8) hour work week is in effect, forty (40) hours per week shall constitute a week's work, Monday through Friday, inclusive. In the event the job is down for any reason beyond the Employer's control, then Saturday may, at the option of the Employer, be worked as a make-up day; straight time not to exceed eight (8) hours or forty (40) hours per week. The regular starting time (and resulting quitting time) may be moved to 6:00 a.m. or delayed to 9:00 a.m. Make-up days shall not be utilized for days lost due to holidays.

NO. 60: Means the Employer shall have the option of working five 8-hour days or four 10-hour days Monday through Friday. If an Employer elects to work five 8-hour days during any work week, hours worked more than eight (8) per day or forty (40) per week shall be paid at time and one-half (1½) the hourly wage rate plus fringe benefits Monday through Friday. **SATURDAY MAKE-UP DAY:** If an Employer is prevented from working forty (40) hours, Monday through Friday, or any part thereof by reason of inclement weather (rain or mud), Saturday or any part thereof may be worked as a make-up day at the straight time rate. It is agreed by the parties that the make-up day is not to be used to make up time lost due to recognized holidays. If an Employer elects to work four 10-hour days, between the hours of 6:30 a.m. and 6:30 p.m. in any week, work performed more than ten (10) hours per day or forty (40) hours per week shall be paid at time and one half (1½) the hourly wage rate plus fringe benefits Monday through Friday. If an Employer is working 10-hour days and loses a day due to inclement weather, the Employer may work ten (10) hours on Friday at straight time. All hours worked over the forty (40) hours Monday through Friday will be paid at time and one-half (1½) the hourly wage rate plus fringe benefits. All Millwright work performed in excess of the regular work day and on Saturday shall be compensated for at time and one-half (1½) the regular Millwright hourly wage rate plus fringe benefits. The regular work day starting at 8:00 a.m. (and resulting quitting time of 4:30 p.m.) may be moved forward to 6:00 a.m. or delayed one (1) hour to 9:00 a.m. All work accomplished on Sundays and recognized holidays, or days observed as recognized holidays, shall be compensated for at double (2) the regular hourly rate of wages plus fringe benefits. **NOTE:** All overtime is computed on the hourly wage rate plus an amount equal to the fringe benefits.

NO. 86: The regular workday shall consist of eight (8) consecutive hours, exclusive of a thirty (30) minute lunch period, with pay at the straight time rate with all hours in excess of eight (8) hours in any one day to be paid at the applicable overtime rate at time and one-half (1½). The regular workday shall begin between the hours of 6:00 a.m. and 8:00 a.m. The Employer may have the option to schedule the work week from Monday through Thursday at ten (10) hours per day at the straight time rate of pay with all hours in excess of ten (10) hours in any one day to be paid at the applicable overtime rate at time and one-half (1½). If the Employer elects to work from Monday through Thursday and is stopped due to inclement weather, holiday or other conditions beyond the control of the Employer, they shall have the option to work Friday at the straight time rate of pay to complete the forty (40) hours for the workweek. All overtime work performed on Monday through Saturday shall be paid at time and one-half (1½) the hourly rate. Fringe benefits shall be paid at the one and one half the hourly rate. All work performed on Sundays and recognized holidays shall be paid at double (2) the hourly rate. Fringe benefits shall be paid at double the hourly rate. Shifts may be established when considered necessary by the Employer. Shift hours and rates will be as follows. If shifts are established, work on the First Shift will begin between 6:00 a.m. and 9:00 a.m. and consist of eight (8) hours of work plus one-half hour unpaid lunch. Hours worked during the first shift will be paid at the straight time rate of pay. The second shift shall start eight hours after the start of the first shift and consist of eight (8) hours of work plus one-half hour unpaid lunch. Work on the second shift will begin between 2:00 p.m. and 5:00 p.m. and be paid the straight time rate plus \$2.50 per hour. The third shift shall start eight hours after the start of the second shift and consist of eight (8) hours plus one-half hour unpaid lunch. Work on the third shift will begin between 10:00 p.m. and 1:00 a.m. and be paid the straight time rate plus \$3.50 per hour. The additional amounts that are to be paid are only applicable when working shifts. Shifts that begin on Saturday morning through those shifts which end on Sunday morning will be paid at time and one-half these rates. Shifts that begin on Sunday morning through those shifts which end on Monday morning will be paid at double time these rates.

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NO. 87: Means eight (8) hours starting between 6:00 a.m. and 8:00 a.m. and ending between 2:30 p.m. and 4:30 p.m. at the Employers discretion shall constitute a day's work. Any work prior to 6:00 a.m. or after eight (8) hours shall be paid at the overtime rate. Five (5) days from Monday through Friday inclusive shall constitute a regular work week. All hours before and after these regular hours shall be considered overtime and shall be paid for at the rate of double (2) time. All work on Saturday and Sunday shall be paid at double (2) the prevailing scale of wages.

NO. 91: Means eight (8) hours shall constitute a day's work commencing at 7:00 a.m. and ending at 3:30 p.m., allowing one-half (½) hour for lunch. The option exists for the Employer to use a flexible starting time between the hours of 6:00 a.m. and 9:00 a.m. The regular workweek shall consist of forty (40) hours of five (5) workdays, Monday through Friday. The workweek may consist of four (4) ten (10) hour days from Monday through Thursday, with Friday as a make-up day. If the make-up day is a holiday, the employee shall be paid at the double (2) time rate. The employees shall be paid time and one-half (1½) for work performed on Saturdays, before the regular starting time or after the regular quitting time or over eight (8) hours per work day (unless working a 10-hour work day, then time and one-half (1½) is paid for work performed over ten (10) hours a day) or over forty (40) hours per work week. Work performed on Sundays and recognized holidays shall be paid at the double (2) time rate of pay. **SHIFT WORK:** When it is necessary for the project to operate in shifts, there will be three (3) eight (8) hour shifts commencing at 8:00 a.m. Shift work must continue for a period of not less than three (3) consecutive work days, two (2) days which must be regular work days (Monday through Friday). In the event the second or third shift of any regular work day shall fall into a Saturday or a holiday, such extension into a Saturday or holiday shall be considered as part of the previous workday and employees shall be paid at the regular shift rate. The first day shift shall work a regular eight (8) hour day at regular rates. The second shift shall be eight (8) hours regular time pay plus \$2.50 per hour premium for eight (8) hours work. Third shift will be for eight (8) hours regular time pay plus \$3.00 per hour premium for eight (8) hours work.

NO. 94: Means eight (8) hours shall constitute a day's work between the hours of 8:00 a.m. and 5:00 p.m. The regular workday starting time of 8:00 a.m. (and resulting quitting time of 4:30 p.m.) may be moved forward to 6:00 a.m. or delayed one (1) hour to 9:00 a.m. All work performed in excess of the regular work day and on Saturday shall be compensated at one and one-half (1½) times the regular pay. In the event time is lost during the work week due to weather conditions, the Employer may schedule work on the following Saturday at straight time. All work accomplished on Sunday and holidays shall be compensated at double the regular rate of wages.

NO. 101: Means that except as provided below, eight (8) hours a day shall constitute a standard work day, and forty (40) hours per week shall constitute a week's work, which shall begin on Monday and end on Friday. All time worked outside of the standard work day and on Saturday shall be classified as overtime and paid the rate of time and one-half (1½) (except as herein provided). All time worked on Sunday and recognized holidays shall be classified as overtime and paid at the rate of double (2) time. The regular starting time of 8:00 a.m. (and resulting quitting time of 4:30 p.m.) may be moved forward to 6:00 a.m. or delayed one (1) hour to 9:00 a.m. The Employer has the option of working either five (5) eight-hour days or four (4) ten-hour days to constitute a normal forty (40) hour work week. When a four (4) ten-hour day work week is in effect, the standard work day shall be consecutive ten (10) hour periods between the hours of 6:30 a.m. and 6:30 p.m. Forty (40) hours per week shall constitute a week's work Monday through Thursday, inclusive. In the event the job is down for any reason beyond the Employer's control, then Friday and/or Saturday may, at the option of the Employer, be worked as a make-up day; straight time not to exceed ten (10) hours per day or forty (40) hours per week. Starting time will be designated by the employer. When the five (5) day eight (8) hour work week is in effect, forty (40) hours per week shall constitute a week's work, Monday through Friday, inclusive. In the event the job is down for any reason beyond the Employer's control, then Saturday may, at the option of the Employer, be worked as a make-up day; straight time not to exceed eight (8) hours per day or forty (40) hours per week. Make-up days shall not be utilized for days lost due to holidays.

NO. 122: Means forty (40) hours between Monday and Friday shall constitute the normal work week. Work shall be scheduled between the hours of 6:00 a.m. and 6:30 p.m., with one-half hour for lunch. Work in excess of eight (8) hours per day and forty (40) hours per week, and on Saturdays, shall be paid at the rate of one and one-half times the normal rate. Due to inclement weather during the week, Saturday shall be a voluntary make up day.

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NO. 124: Means eight (8) hours shall constitute a day's work on all classes of work between the hours of 6:00 a.m. and 5:30 p.m., Monday through Friday. The pay for time worked during these hours shall be at the regular wage rate. The regular workweek shall be Monday through Friday. Employment from 4:30 p.m. to 12:00 midnight, Monday through Friday, shall be paid for at one and one-half (1½) times the regular hourly rate. From 12:00 midnight until 8:00 a.m. on any day shall be paid for at twice the regular hourly rate. All time worked on Sundays and the recognized holidays shall be paid at the rate of double (2) time. It is understood that forty (40) hours shall constitute a regular workweek, (5-8's) Sunday Midnight through Friday Midnight, understanding anything over eight (8) hours is one and one-half (1½) times the hourly wage rate.

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HOLIDAY SCHEDULE – BUILDING CONSTRUCTION**

NO. 3: All work done on New Year's Day, Decoration Day, July 4th, Labor Day, Veteran's Day, Thanksgiving and Christmas shall be compensated at the double (2) time rate of pay. When any of these holidays fall on a Sunday, the following Monday shall be observed.

NO. 4: All work done on New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving and Christmas Day shall be paid at the double time rate of pay. If any of the above holidays fall on Sunday, Monday will be observed as the recognized holiday. If any of the above holidays fall on Saturday, Friday will be observed as the recognized holiday.

NO. 5: All work that shall be done on New Year's Day, Memorial Day, Fourth of July, Labor Day, Veteran's Day, Thanksgiving Day, and Christmas Day shall be paid at the double (2) time rate of pay.

NO. 7: The following days are assigned days and are recognized as holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, and Christmas Day. If a holiday falls on a Sunday, it shall be observed on the following Monday. If a holiday falls on a Saturday, it shall be observed on the preceding Friday. No work shall be performed on Labor Day except in case of jeopardy to work under construction. This is applied to protect Labor Day. When a holiday falls during the normal workweek, Monday through Friday, it shall be counted as eight (8) hours toward the forty (40) hour week. However, no reimbursement for these eight (8) hours is to be paid to the workman unless worked. If workman are required to work the above enumerated holidays or days observed as such, or on Sunday, they shall receive double (2) the regular rate of pay for such work.

NO. 8: All work performed on New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, and Christmas Day, or the days observed in lieu of these holidays, shall be paid at the double time rate of pay.

NO. 15: All work accomplished on the recognized holidays of New Year's Day, Decoration Day (Memorial Day), Independence Day (Fourth of July), Labor Day, Veteran's Day, Thanksgiving Day and Christmas Day, or days observed as these named holidays, shall be compensated for at double (2) the regular hourly rate of wages plus fringe benefits. If a holiday falls on Saturday, it shall be observed on the preceding Friday. If a holiday falls on a Sunday, it shall be observed on the following Monday. No work shall be performed on Labor Day, Christmas Day, Decoration Day or Independence Day except to preserve life or property.

NO. 19: All work done on New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day shall be paid at the double time rate of pay. The employee may take off Friday following Thanksgiving Day. However, the employee shall notify his or her Foreman, General Foreman or Superintendent on the Wednesday preceding Thanksgiving Day. When one of the above holidays falls on Sunday, the following Monday shall be considered a holiday and all work performed on either day shall be at the double (2) time rate. When one of the holidays falls on Saturday, the preceding Friday shall be considered a holiday and all work performed on either day shall be at the double (2) time rate.

NO. 23: All work done on New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, Christmas Day and Sundays shall be recognized holidays and shall be paid at the double time rate of pay. When a holiday falls on Sunday, the following Monday shall be considered a holiday. When a holiday falls on Saturday, Friday is recognized as a holiday.

NO. 31: All work done on New Year's Day, Presidents Day, Good Friday, Memorial Day, Fourth of July, Labor Day, Veteran's Day, Thanksgiving Day, Friday after Thanksgiving Day, Christmas Day, and Employee's Birthday shall be paid at the double time rate of pay. If a holiday falls on Sunday, the following Monday will be observed as the recognized holiday. If a holiday falls on Saturday, the preceding Friday will be observed as the recognized holiday.

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NO. 44: All work done on New Year's Day, Memorial Day, Independence Day, Veteran's Day, Thanksgiving Day, and Christmas Day shall be paid at the double time rate of pay. If a holiday falls on a Sunday, it shall be observed on the Monday following. If a holiday falls on a Saturday, it shall be observed on the preceding Friday. No work shall be performed on these days except in emergency to protect life or property. All work performed on these holidays shall be compensated at double the regular hourly rate for the work performed. Overtime shall be computed at half-hour intervals.

NO. 45: All work performed on New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the day after Thanksgiving, the day before Christmas, and Christmas Day, shall be paid at the double time rate of pay.

NO. 54: All work performed on New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the Friday after Thanksgiving Day, and Christmas Day shall be paid at the double (2) time rate of pay. When a holiday falls on Saturday, it shall be observed on Friday. When a holiday falls on Sunday, it shall be observed on Monday.

NO. 55: The following days are recognized as holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. If a holiday falls on a Sunday, it shall be observed on the following Monday. No work shall be performed on Labor Day except in case of jeopardy to work under construction. This rule is applied to protect Labor Day. When a holiday falls during the normal work week, Monday through Friday, it shall be counted as eight (8) hours toward the forty (40) hour week; however, no reimbursement for this eight (8) hours is to be paid the workmen unless worked. An Employer working a four (4) day, ten (10) hour schedule may use Friday as a make up day when an observed holiday occurs during the work week. Employees have the option to work that make up day. If workmen are required to work the above enumerated holidays, or days observed as such, they shall receive double (2) the regular rate of pay for such work.

NO. 60: All work performed on New Year's Day, Armistice Day (Veteran's Day), Decoration Day (Memorial Day), Independence Day (Fourth of July), Thanksgiving Day and Christmas Day shall be paid at the double time rate of pay. No work shall be performed on Labor Day except when triple (3) time is paid. When a holiday falls on Saturday, Friday will be observed as the holiday. When a holiday falls on Sunday, the following Monday shall be observed as the holiday.

NO. 66: All work performed on Sundays and the following recognized holidays, or the days observed as such, of New Year's Day, Decoration Day, Fourth of July, Labor Day, Veteran's Day, Thanksgiving Day and Christmas Day, shall be paid at double (2) the hourly rate plus an amount equal to the hourly Total Indicated Fringe Benefits. Whenever any such holidays fall on a Sunday, the following Monday shall be observed as a holiday.

NO. 69: All work performed on New Year's Day, Memorial Day, July Fourth, Labor Day, Veteran's Day, Thanksgiving Day or Christmas Day shall be compensated at double (2) their straight-time hourly rate of pay. Friday after Thanksgiving and the day before Christmas are also holidays, however, if the employer chooses to work the normal work hours on these days, the employee will be paid at straight -time rate of pay. If a holiday falls on a Saturday, the holiday will be observed on Saturday; if a holiday falls on a Sunday, the holiday will be observed on the following Monday.

NO. 74: All work performed on New Year's Day, Memorial Day, Fourth of July, Labor Day, Veteran's Day, Thanksgiving Day and Christmas Day, shall be paid at double (2) time of the hourly rate of pay. In the event one of the above holiday's falls on Saturday, the holiday shall be celebrated on Saturday. If the holiday falls on Sunday, the holiday will be celebrated on Monday.

NO. 76: Work performed on Holidays shall be paid at the rate of two times the normal rate. Holidays are: New Years Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Day after Thanksgiving, Christmas Day. If a holiday falls on a Sunday, it shall be celebrated on the following Monday, if it falls on Saturday, it shall be celebrated on the preceding Friday.

OCCUPATIONAL TITLE	* Date of Increase	Basic Hourly Rates	Over-Time Schedule	Holiday Schedule	Total Fringe Benefits
Carpenter	6/15	\$30.41	23	16	\$15.55
Electrician (Outside-Line Construction)\Lineman)	9/15	\$42.52	9	12	\$5.00 + 36.5%
Lineman Operator	9/15	\$36.70	9	12	\$5.00 + 36.5%
Lineman - Tree Trimmer	10/15	\$23.90	32	31	\$9.73 + 3%
Groundman	9/15	\$28.38	9	12	\$5.00 + 36.5%
Groundman - Tree Trimmer	10/15	\$17.64	32	31	\$7.72 + 3%
Laborer					
General Laborer	6/15	\$27.36	2	4	\$12.82
Skilled Laborer	6/15	\$27.36	2	4	\$12.82
Millwright	6/15	\$30.41	23	16	\$15.55
Operating Engineer					
Group I	6/15	\$27.74	21	5	\$23.91
Group II	6/15	\$27.39	21	5	\$23.91
Group III	6/15	\$27.19	21	5	\$23.91
Group IV	6/15	\$23.54	21	5	\$23.91
Oiler-Driver	6/15	\$23.54	21	5	\$23.91
Pile Driver	6/15	\$30.41	23	16	\$15.55
Traffic Control Service Driver		\$26.415	28	27	\$9.045
Truck Driver-Teamster					
Group I	6/15	\$28.87	25	21	\$12.05
Group II	6/15	\$29.03	25	21	\$12.05
Group III	6/15	\$29.02	25	21	\$12.05
Group IV	6/15	\$29.14	25	21	\$12.05

Use Heavy Construction Rates on Highway and Heavy construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(3).

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

If a worker is performing work on a heavy construction project within an occupational title that is not listed on the Heavy Construction Rate Sheet, use the rate for that occupational title as shown on the Building Construction Rate sheet.

**REPLACEMENT PAGE
BOONE COUNTY
OVERTIME SCHEDULE - HEAVY CONSTRUCTION**

FED: Minimum requirement per Fair Labor Standards Act means time and one-half (1 ½) shall be paid for all work in excess of forty (40) hours per work week.

NO. 2: Means a regular workweek shall be forty (40) hours and will start on Monday and end on Friday. The Employer shall have the option of working five 8-hour days or four 10-hour days Monday through Friday. If an Employer elects to work five 8-hour days during any workweek, hours worked more than eight (8) per day or 40 per week shall be paid at time and one-half the hourly rate Monday through Friday. If an Employer elects to work four 10-hour days in a week, work performed more than ten (10) hours per day or 40 hours per week shall be paid at time and one-half the hourly rate Monday through Friday. When working a five 8-hour day schedule and an Employer is prevented from working forty (40) hours Monday through Friday, or any part thereof, by reason of inclement weather, Saturday or any part thereof may be worked as a make-up day at the straight time rate. If an Employer is working a four 10-hour day schedule and loses a day due to inclement weather, he may work 10 hours Friday at straight time. All hours worked over the 40 hours Monday through Friday will be paid at 1 ½ overtime rate. A workday shift is to begin at the option of the Employer, between 6:00 a.m. and not later than 9:00 a.m. However, the project starting time may be advanced or delayed if required. If workmen are required to work the enumerated holidays or days observed as such or Sundays, they shall receive double (2) the regular rate of pay for such work. Overtime shall be computed at one-half (1/2) hour intervals. Shift: The Contractor may elect to work one, two or three shifts on any work. When operating on more than one shift, the shifts shall be known as the day shift, swing shift, and graveyard shift as such terms are recognized in the industry. When two shifts are worked on any operation, the shifts will consist of eight (8) or ten (10) hours exclusive of lunchtime. When three shifts are worked the first day or day shift will consist of eight (8) hours exclusive of lunchtime. The second or swing shift shall consist of seven and one-half (7 1/2) hours work for eight hours pay, exclusive of lunchtime, and the third or the graveyard shift shall consist of seven (7) hours work for eight (8) hours pay, exclusive of the lunchtime. All time in excess of normal shifts shall be considered overtime. Multiple shift (the two or three shift) operation will not be construed on the entire project if at anytime it is deemed advisable and necessary for the Employer to multiple shift a specific operation. However, no shift shall be started between midnight and six a.m. except the graveyard shift on a three-shift operation, or except in an unusual or emergency situation. If an Employer starts a shift between midnight and 6 a.m. except the graveyard shift on a three-shift operation, he shall reimburse all employees for the entire shift at the double time rate. Completion of the second shift on a two-shift operation or completion of the graveyard shift on a three-shift operation that carries over into Saturday morning, shall be at the straight time rate. Overtime shall be computed at ½ hour intervals.

NO. 9: Eight (8) hours shall constitute a work day between the hours of 7:00 a.m. and 4:30 p.m. Forty (40) hours within five (5) days, Monday through Friday inclusive, shall constitute the work week. Work performed in the 9th and 10th hour, Monday through Friday, shall be paid at time and one-half (1½) the regular straight time rate of pay. Contractor has the option to pay two (2) hours per day at the time and one-half (1½) the regular straight time rate of pay between the hours of 6:00 a.m. and 5:30 p.m., Monday through Friday. Work performed in the first eight (8) hours on Saturday shall be paid at the rate of one and eight tenths (1.8) the regular straight time rate. Work performed outside these hours and on Sundays and recognized legal holidays, or days celebrated as such, shall be paid for at the rate of double (2) time.

NO. 21: Means the regular workday for which employees shall be compensated at straight time hourly rate of pay shall, unless otherwise provided for, begin at 8:00 a.m. and end at 4:30 p.m. However, the project starting time may be advanced or delayed at the discretion of the Employer. At the discretion of the Employer, when working a five (5) day eight (8) hour schedule, Saturday may be used for a make-up day. If an Employer is prohibited from working on a holiday, that employer may work the following Saturday at the straight time rate. However, the Employer may have the option to schedule his work from Monday through Thursday at ten (10) hours per day at the straight time rate of pay with all hours in excess of ten (10) hours in any one day to be paid at the applicable overtime rate. If the Employer elects to work from Monday through Thursday and is stopped due to circumstances beyond his control, he shall have the option to work Friday or Saturday at the straight time rate of pay to complete his forty (40) hours. If an Employer is prohibited from working on a holiday, that Employer may work the following Friday or Saturday at the straight time rate. Overtime will be at one and one-half (1½) times the regular rate. If workmen are required to work the enumerated holidays or days observed as such, or Sundays, they shall receive double (2) the regular rate of pay for such work.

**REPLACEMENT PAGE
BOONE COUNTY
OVERTIME SCHEDULE - HEAVY CONSTRUCTION**

NO. 23: Means the regular workweek shall start on Monday and end on Friday, except where the Employer elects to work Monday through Thursday, (10) hours per day. All work over ten (10) hours in a day or forty (40) hours in a week shall be at the overtime rate of one and one-half (1½) times the regular hourly rate. The regular workday shall be either eight (8) or ten (10) hours. If a job can't work forty (40) hours Monday through Friday because of inclement weather or other conditions beyond the control of the Employer, Friday or Saturday may be worked as a make-up day at straight time (if working 4-10's). Saturday may be worked as a make-up day at straight time (if working 5-8's). An Employer, who is working a four (4) ten (10) hour day work schedule may use Friday as a make-up day when a workday is lost due to a holiday. A workday is to begin at the option of the Employer but not later than 11:00 a.m. except when inclement weather, requirements of the owner or other conditions beyond the reasonable control of the Employer prevent work. Except as worked as a make-up day, time on Saturday shall be worked at one and one-half (1½) times the regular rate. Work performed on Sunday shall be paid at two (2) times the regular rate. Work performed on recognized holidays or days observed as such, shall also be paid at the double (2) time rate of pay. **For all overtime hours worked during the week or on Saturday \$14.55 of the fringe benefits portion of the prevailing wage shall be paid at time and one-half (1½). For all overtime hours worked on Sundays or recognized holidays \$14.55 of the fringe benefits portion of the prevailing wage shall be paid double time. The remaining \$.50 of the fringe benefit portion of the prevailing wage shall be paid at straight time.**

NO. 25: Means a regular work week of forty (40) hours, starting on Monday and ending on Friday. The regular work day shall be either eight (8) or ten (10) hours. If a crew is prevented from working forty (40) hours Monday through Friday, or any part thereof by reason of inclement weather, Saturday or any part thereof maybe worked as a make-up day at the straight time rate. Employees who are part of a regular crew on a make-up day, notwithstanding the fact that they may not have been employed the entire week, shall work Saturday at the straight time rate. A work day is to begin between 6:00 a.m. and 9:00 a.m. However, the project starting time maybe advanced or delayed if mutually agreed to by the interest parties. All hours worked on recognized holidays, or days observed as such, double (2) time shall be paid.

NO. 28: Means a regular work week of forty (40) hours will start on Monday and end on Friday. The regular work day shall be either eight (8) or ten (10) hours. If a crew is prevented from working forty (40) hours Monday through Friday, or any part thereof by reason of inclement weather, Saturday or any part thereof may be worked as a make-up day at the straight time rate. Employees who are part of a regular crew on a make-up day, notwithstanding the fact that they may not have been employed the entire week, shall work Saturday at the straight time rate. A workday is to begin between 6:00 a.m. and 9:00 a.m. However, the project starting time may be advanced or delayed if mutually agreed to by the interest parties. For all time worked on recognized holidays, or days observed as such, double (2) time shall be paid.

NO. 32: Means the overtime rate shall be time and one-half the regular rate for work over forty (40) hours per week. Sundays and Holidays shall be paid at double the straight time rate.

**BOONE COUNTY
HOLIDAY SCHEDULE – HEAVY CONSTRUCTION**

NO. 4: All work performed on New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day, or observed as such, shall be paid at the double time rate of pay. When a Holiday falls on a Sunday, Monday shall be observed. No work shall be performed on Labor Day, except in case of jeopardy to life or property. This is applied to protect Labor Day.

NO. 5: The following days are recognized as holidays: New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day and Christmas Day. If a holiday falls on a Sunday, it shall be observed on the following Monday. If a holiday falls on a Saturday, it shall be observed on the preceding Friday. No work shall be performed on Labor Day except in case of jeopardy to work under construction. This rule is applied to protect Labor Day. When a holiday falls during the normal work week, Monday through Friday, it shall be counted as eight (8) hours toward a forty (40) hour week; however, no reimbursement for this eight (8) hours is to be paid the workman unless worked. If workmen are required to work the above recognized holidays or days observed as such, or Sundays, they shall receive double (2) the regular rate of pay for such work. The above shall apply to the four 10's Monday through Friday work week. The ten (10) hours shall be applied to the forty (40) hour work week.

NO. 12: All work performed on New Year's Day, Memorial Day, Fourth of July, Labor Day, Veteran's Day, Thanksgiving Day, Christmas Day, or days celebrated as such, shall be paid at the double time rate of pay. When one of the foregoing holidays falls on Sunday, it shall be celebrated on the following Monday. When one of the foregoing holidays falls on Saturday, it shall be celebrated on the Friday before the holiday.

NO. 16: The following days are recognized as holidays: New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day and Christmas Day. If a holiday falls on Sunday, it shall be observed on the following Monday. If a holiday falls on Saturday, it shall be observed on the preceding Friday. No work shall be performed on Labor Day except in case of jeopardy to work under construction. This rule is applied to protect Labor Day. When a holiday falls during the normal work week, Monday through Friday, it shall be counted as eight (8) hours toward the forty (40) hour week; however, no reimbursement for this eight (8) hours is to be paid to the worker unless worked. If workers are required to work the above recognized holidays or days observed as such, they shall receive double (2) the regular rate of pay for such work.

NO. 21: The following days are recognized as holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. If a holiday falls on a Sunday, it shall be observed on the following Monday. No work shall be performed on Labor Day except in case of jeopardy to work under construction. This rule is applied to protect Labor Day. When a holiday falls during the normal work week, Monday through Friday, it shall be counted as eight (8) hours toward the forty (40) hour week; however, no reimbursement for this eight (8) hours is to be paid the workman unless worked. An Employer working a four (4) day, ten (10) hour schedule may use Friday as a make-up day when an observed holiday occurs during the work week. Employees have the option to work that make-up day. If workmen are required to work the above enumerated holidays, or days observed as such, they shall receive double (2) the regular rate of pay for such work.

NO. 27: The following days are recognized as holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. If a holiday falls on a Sunday, it shall be observed on the following Monday. No work shall be performed on Labor Day except in case of jeopardy to work under construction. This rule is applied to protect Labor Day. When a holiday falls during the normal work week, Monday through Friday, it shall be counted as eight (8) hours toward the forty (40) hour week; however, no reimbursement for this eight (8) hours is to be paid the workmen unless worked. An Employer working a four (4) day, ten (10) hour schedule may use Friday as a make up day when an observed holiday occurs during the work week. Employees have the option to work that make up day. If workmen are required to work the above enumerated holidays, or days observed as such, they shall receive double (2) the regular rate of pay for such work.

NO. 31: All work performed on New Year's Day, Presidents' Day, Veterans' Day, Good Friday, Decoration Day, Fourth of July, Labor Day, Christmas Eve Day, Christmas Day, Thanksgiving Day and Day after Thanksgiving or days celebrated for the same.



GEOTECHNICAL ENGINEERING REPORT
FOR
COLUMBIA/BOONE COUNTY
JOINT COMMUNICATIONS

911 MONOPLE RADIO TOWER
COLUMBIA, MISSOURI

JULY 20, 2015

Crockett GTL Project Number: G15046

CROCKETT

GEOTECHNICAL - TESTING LAB

500 Big Bear Boulevard
Columbia, Missouri 65202
(573) 447-3981

July 20, 2015

Joint Communications Radio Network
609 E Walnut Street
Columbia, MO 65201

Attn: Mr. Dave Dunford

Re: Geotechnical Engineering Report
911 Monopole Radio Tower
Columbia, Missouri
Crockett GTL Project Number: G15046

Dear Mr. Dunford:

Crockett Geotechnical - Testing Lab (Crockett GTL) has completed the geotechnical engineering services for the referenced project. This report should be read in its entirety. This report presents the results of our field explorations, laboratory testing, and recommendations for design and construction of the referenced project.

We appreciate the opportunity to be of service and look forward to working with you during the construction phase of this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,



Shane Steinman, E.I.
Project Manager



Eric H. Lidholm, P.E.
Principal Engineer
Missouri: E-23265



Enclosures

cc: 1 - Client (.PDF)
1 - File

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APPENDIX

- Site Location Map
- Boring Location Plan
- Boring Log
- Boring Log Legend and Nomenclature

Geotechnical Engineering Report
911 Monopole Radio Tower
Columbia, Missouri
Crockett GTL Project Number: G15046
July 20, 2015

1 INTRODUCTION

Crockett Geotechnical - Testing Lab (CGTL) has conducted a geotechnical exploration for the proposed development. The purpose of our exploration was to:

- characterize and evaluate the subsurface conditions,
- provide design and construction recommendations for:
 - earthwork
 - foundations
 - seismic considerations

2 SITE AND PROJECT INFORMATION

2.1 SITE LOCATION AND DESCRIPTION

Item	Description
Location	This site is located near the southeastern corner of the Elliot Battle Elementary School property located at 2600 Battle Avenue in the city of Columbia, Missouri.
Approximate GPS Coordinates	Latitude: 38.974681° Longitude: -92.221980°
Existing improvements	This tower site is undeveloped.
Current ground cover	Recently graded. Mostly bare soil and some weeds.
Existing topography	Relatively level.

2.2 PROJECT DESCRIPTION

Item	Description
Proposed structures	Monopole Tower, 180 feet tall Possible equipment building

Item	Description
Estimated loads (assumed)	Vertical: 40 kips Shear: 30 kips Moment: 3,600 k-ft Uplift: N/A
Grading (approximate)	For this proposal we have assumed site grading to consist of less than approximately 5 feet of cut and fill.
Cut and fill slopes	Final slopes are assumed to be no steeper than 3H:1V (Horizontal to Vertical)
Free-standing retaining walls	None.
Below grade areas	None.

3 SUBSURFACE CONDITIONS

3.1 FIELD EXPLORATION AND LABORATORY TESTING

One (1) boring was drilled for this project at the approximate location indicated on the Boring Location Plan included in the Appendix of this report. The boring location was designated and staked by Boone County. The ground surface elevation indicated on the boring log is approximate and was obtained from Boone County [Parcel Viewer](#) using the terrain feature. The boring elevation was rounded to the nearest foot. The location and elevation of the boring should be considered accurate only to the degree implied by the means and methods used to define them.

The boring was drilled with a track mounted CME-45 drill rig. Representative samples were obtained using thin-walled tube sampling procedures. The samples were tagged for identification, sealed to reduce moisture loss, and taken to our laboratory for further examination, testing, and classification. Information provided on the boring log attached to this report includes soil descriptions, consistency evaluations, boring depth, sampling intervals, and groundwater conditions. The boring was backfilled with auger cuttings prior to the drill crew leaving the site.

The field log was prepared by the drill crew. The final boring log included with this report represents the engineer's interpretation of the field log and includes modifications based upon laboratory tests and observation made of the samples. The descriptions of the soil on the final boring log is in general accordance with the Unified Soil Classification System which is included in the Appendix of this report.

Detailed information regarding the material encountered and the results of field sampling and laboratory testing are shown on the Boring Log included in the Appendix of this report.

3.2 ENCOUNTERED SUBSURFACE CONDITIONS

Lean to fat clay was encountered from the ground surface to a depth of approximately 7 feet at the boring location. The lean to fat clay was stiff to very stiff in consistency. Underlying the lean to fat clay was fat clay which extended to a depth of approximately 10 feet.

Underlying the lean to fat clay and fat clay was lean to fat clay that was visually identified as glacial drift. The glacial drift was very stiff to hard in consistency and extended to boring termination depth of 50 feet.

Detailed descriptions of the encountered materials are listed on the boring log included in the Appendix of this report. Strata lines indicate the approximate location of changes in material types. The transition between material types may be gradual.

3.3 GROUNDWATER

Groundwater was encountered at a depth of 28 feet while drilling, 32 feet at the completion of drilling, and at 30 feet ½ hour after the completion of drilling. Once groundwater was encountered, the water level remained fairly constant and rapidly filled between each sampling interval.

Pockets, lenses, and stringers of sand were encountered in the glacial soils found in the vicinity of the referenced project. These sand pockets are normally discontinuous and often contain water of variable quality and quantity. These sand pockets may be encountered during foundation excavation.

Groundwater levels depend on seasonal and climatic variations, and other factors not evident at the time the boring was performed, and may be present at different levels in the future. Therefore, groundwater levels during construction or at other times in the life of the structure may be at different levels than those indicated on the boring logs. In addition, without extended periods of observation in piezometers or observation wells, accurate groundwater level measurements may not be possible, particularly in low permeability soils.

The borehole was backfilled prior to departing the project site. Groundwater records are indicated on the boring log included in the Appendix of this report.

4 GEOTECHNICAL RECOMMENDATIONS

4.1 EARTHWORK

At the completion of stripping and grubbing, we recommend the exposed subgrade be thoroughly evaluated before the start of any fill operations. We recommend the geotechnical engineer be retained to evaluate the bearing material for the foundations and subgrade soils. Subsurface conditions, as identified by the field and laboratory testing programs have been reviewed and evaluated with respect to the proposed project plans known to us at this time.

4.1.1 Site Preparation

All existing utility backfill, and any otherwise unsuitable material should be removed from the construction areas prior to placing structural fill. After stripping and grubbing, the site should be proofrolled to aid in locating loose or soft areas. Proofrolling can be performed with a loaded tandem axle dump truck. Soft, wet, dry and low-density soil should be removed or be moisture conditioned and recompacted in place as structural fill prior to placing new structural fill.

Where fill is placed on existing slopes steeper than 5H:1V, benches should be cut into the existing slopes prior to fill placement. The benches should have a vertical face height of 1 to 3 feet and should be cut wide enough to accommodate the compaction equipment. We recommend structural fill slopes be overfilled and then cut back to develop an adequately compacted slope face.

4.1.2 Structural Fill Requirements

Compacted structural fill should consist of approved materials free of organic matter and debris. Frozen material should not be used and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted for evaluation prior to use.

Structural Fill Requirements		
Material Type	USCS Classification	Acceptable Uses
Lean Clay and Clayey Sand	CL & SC (LL<40)	All locations
Lean to Fat Clay	CL-CH (40<LL<50)	>24 inches below slabs on grade unless PI<23
Fat Clay	CH (LL≥50+)	>24 inches below slabs on grade
Well Graded Granular 1. MoDOT Type V or similar	GM	All locations

Structural Fill Requirements		
	CL CL-CH (40<LL<50 & PI<23)	All locations
Low Volume Change Material ^{1,2}	1. Similar to MoDOT Type 1 crushed limestone aggregate, limestone screenings, or granular material such as sand, gravel or crushed stone containing at least 18% low plasticity fines. 2. Low plasticity cohesive soil or granular soil having at least 18% low plasticity fines.	
Soil Fill Lift Thickness	9 inches or less when using heavy self-propelled compaction equipment 6-inches or less when using hand guided or light self-propelled equipment	
Soil Compaction Requirements ¹	95% of standard Proctor dry density (ASTM D-698) 1. We recommend the engineered fill be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.	
Compaction Moisture Content Requirements <ul style="list-style-type: none"> • Cohesive • Granular 	From standard Proctor optimum moisture content (OMC) to 4% above the standard Proctor OMC. Workable moisture content. Shall not pump when proofrolled	

4.1.3 Grading and Drainage

Final surrounding grades should be sloped away from the structure on all sides to prevent ponding of water. Collected water should discharge at least 10 feet beyond the footprint of the tower support structure.

4.1.4 Earthwork Construction

In periods of dry weather, the surficial soils may be of sufficient strength to allow fill construction on the stripped and grubbed ground surface. However, unstable subgrade conditions could develop if the soils are wet or subjected to repetitive construction traffic. Should unstable subgrade conditions be encountered, stabilization measures will need to be employed.

Upon completion of filling and grading, care should be taken to maintain the subgrade moisture content prior to construction of floor slabs and pavements. Construction traffic over the completed subgrade should be avoided to the extent practical. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. If the

subgrade should become frozen, desiccated, saturated, or disturbed, the affected material should be removed or these materials should be scarified, moisture conditioned, and recompacted prior to floor slab and pavement construction.

The geotechnical engineer should be retained during the construction phase of the project to observe earthwork/fill placement and to perform necessary tests and observations during subgrade preparation; proof-rolling; placement and compaction of controlled compacted fills; backfilling of excavations into the completed subgrade, and just prior to construction of building floor slabs.

4.1.5 Temporary Excavations

The Occupational Safety and Health Administration (OSHA) has developed regulations to provide for the safety of workers entering excavations. Temporary excavations will probably be required during grading operations. All operations should be performed under the supervision of qualified site personnel in accordance with OSHA Excavation and Trench Safety Standards.

4.2 FOUNDATION RECOMMENDATIONS

The subsurface data obtained from the boring was analyzed to evaluate potential foundation design alternatives. It is our professional opinion the self-support tower can be supported by either a shallow, spread footing foundation system or by a drilled pier foundation system bearing within the native clay. The equipment building can be supported by a shallow foundation system bearing on stiff native clay or compacted structural fill. Design recommendations and construction considerations for shallow foundations follow:

4.2.1 Shallow Foundation Design Recommendations

Shallow Foundation Design Recommendations	
Net allowable bearing pressure ¹ <ul style="list-style-type: none"> • From 0 to 3 Feet • From 3 to 13 Feet • Deeper than 13 Feet 1. Net allowable bearing pressure is based on a factor of safety of 3.0.	Ignore 3,000 psf 5,500 psf
Allowable overstress for transient loads (i.e. snow, wind, seismic)	33%

Shallow Foundation Design Recommendations	
Ultimate passive pressure (equivalent fluid pressure) ^{1,2,3} 1. The sides of the spread footing foundation excavations must be nearly vertical and the concrete should be placed neat against the vertical faces for the passive earth pressure values to be valid. 2. Passive resistance in the frost zone should be neglected. 3. Some movement of the footing will be required to mobilize resistance from passive pressure and sliding friction.	270 pcf
Coefficient of sliding friction	0.32
Minimum embedment below finished grade for frost protection	30 inches
Approximate Settlement ¹ <ul style="list-style-type: none"> • Total • Differential 1. Foundation settlement will depend upon the variations within the subsurface soil profile, the tower's structural loading conditions, the embedment depth of the footings, the thickness of compacted fill (if any), and the quality of the earthwork operations.	< 1 inch < ¾ inch

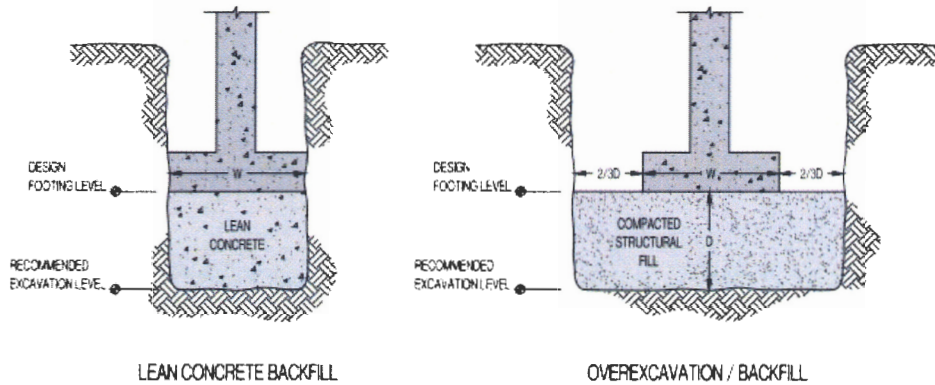
Uplift resistance for spread footing foundations may be computed as the sum of the effective weight of the foundation element and the effective weight of the soil overlying the foundation. We recommend using a soil unit weight of 120 pounds per cubic foot (pcf) for structural fill overlying the footing placed as described in this section of this report. A unit weight of 150 pcf could be used for reinforced footing concrete. We recommend a minimum factor of safety of 1.5 be utilized for uplift calculations.

4.2.2 Shallow Foundation Construction Considerations

The base of all foundation excavations should be free of water and loose soil and rock prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Should the soil at the foundation bearing level become excessively dry, disturbed, saturated, or frozen the affected soil should be removed prior to placing concrete. Place a lean concrete mud-mat over the bearing soils if the excavations must remain open over night or for an extended period of time. It is recommended the geotechnical engineer be retained to observe and test the soil foundation bearing materials.

Although groundwater was not encountered at or above the anticipated shallow foundation bearing elevation, it may be encountered during foundation excavation. In addition, some surface and/or perched groundwater may enter foundation excavations during construction. It is anticipated any water entering foundation excavations from these sources can be removed using sump pumps or gravity drainage.

If unsuitable bearing soils are encountered in footing excavations, the excavations should be extended deeper to suitable soils and the footings should bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. The footings could also bear on properly compacted backfill extending down to the suitable soils. Overexcavation for compacted backfill placement below footings should extend laterally beyond all edges of the footings at least 8 inches per foot of overexcavation depth below footing base elevation. The overexcavation should then be backfilled up to the footing base elevation with well graded granular material placed in lifts of 9 inches or less in loose thickness and compacted to at least 98 percent of the material's maximum standard effort maximum dry density (ASTM D 698). The lean concrete backfill and overexcavation-and-backfill procedures are described in the diagram below.



NOTE:
 EXCAVATIONS IN SKETCHES SHOWN VERTICAL FOR CONVENIENCE. EXCAVATIONS SHOULD BE SLOPED AS NECESSARY FOR SAFETY.

4.2.3 Drilled Pier Foundation Design Recommendations

The proposed structure can be founded on straight shaft drilled piers bearing in suitable glacial drift. The design parameters provided in the following table are based on the results of field and laboratory testing, published values, and our past experience with similar soil conditions.

Drilled Pier Design Parameters						
Approximate Depth (feet) ¹	Allowable Skin Friction (psf) ²	Allowable End Bearing Pressure (psf) ³	Allowable Passive Pressure (psf) ²	Cohesion (psf)	Strain ϵ_{50} (in./in) ⁴	Lateral Subgrade Modulus (pci) ⁴
0 - 3	Ignore	Ignore	Ignore	Ignore	Ignore	Ignore

Drilled Pier Design Parameters						
Approximate Depth (feet) ¹	Allowable Skin Friction (psf) ²	Allowable End Bearing Pressure (psf) ³	Allowable Passive Pressure (psf) ²	Cohesion (psf)	Strain ϵ_{50} (in./in) ⁴	Lateral Subgrade Modulus (pci) ⁴
3 – 13	250	NR ⁵	1,250	1,250	0.009	370
13 – 30	600	7,500 ³	3,000	3,000	0.005	1,000
> 30	500	7,500 ³	2,500	2,500	0.006	830
1. A moist unit weight of 125 pcf can be used for soil above groundwater An effective unit weight of 63 pcf can be used for soil below groundwater CGTL should observe pier excavations to evaluate whether conditions are consistent with those encountered in our boring. 2. The skin friction and passive pressure values are based on a constant (rectangular) pressure distribution for cohesive soils and bedrock. Skin friction and passive pressure should be neglected within 3 feet of the final grade. Allowable skin friction based on a FOS=3.0. 3. Minimum pier length of 4 diameters required. CGTL should be contacted if the pier length is less than four times the pier diameter as modifications to our design parameters may be warranted. Allowable end bearing based on a FOS=3.0. 4. Lateral subgrade modulus and strain values are to be utilized with LPILE software. 5. NR = Not Recommended						

Drilled piers should have a minimum shaft diameter of 30 inches. The above-indicated cohesion values are ultimate values without factors of safety. The end bearing, skin friction, and passive resistance are allowable parameters with factors of safety. The values given in the above table are based on our boring and past experience with similar material types.

4.2.4 Drilled Pier Foundation Construction Considerations

Pier drilling through the upper native soils is not expected to be difficult based upon the material encountered in the boring. However, special drilling techniques may be required to penetrate potential gravel and cobble zones that could be encountered in the glacial drift materials. The contractor should be aware boulders, although not encountered in our boring, are sometimes present within glacial drift in this area.

Groundwater was encountered in the boring while drilling with the solid stem augers and the groundwater rapidly filled the borehole between each sampling interval. Groundwater should be anticipated during future pier drilling and the contractor should be prepared to handle wet drilling conditions.

Temporary casing may be needed to advance drilled pier excavations. Temporary casing should also be installed when personnel enter the shafts to clean and/or test the bearing surface.

For proper performance of the drilled pier foundation system, it is critical for the bottom of pier excavations to be cleaned of any water and loose material prior to placing reinforcing steel and concrete. A minimum shaft diameter of at least 30 inches is required for entry of construction and testing personnel, and to facilitate clean-out and possible dewatering of the pier excavation.

Concrete should be placed soon after excavating to minimize bearing surface disturbance. Any water accumulating in the pier excavation should be pumped from the excavation or the water level should be allowed to stabilize and then concrete should be placed using the tremie method.

If concrete will be placed as the temporary casing is being removed, we recommend the concrete mixture be designed with a slump of about 5 to 7 inches to reduce the potential for arching when removing the casing. While removing the casing from a pier excavation during concrete placement, the concrete inside the casing should be maintained at a sufficient level to resist any earth and hydrostatic pressures outside the casing during the entire casing removal procedure.

We recommend a CGTL engineer or their representative be present on a full-time basis during drilling activities to evaluate the materials removed from the drilled pier excavations to determine when adequate capacity has been developed, to observe the base of the drilled pier to determine that the cuttings have been adequately removed, and also to observe the concreting techniques.

Although obvious signs of harmful gases such as methane, carbon monoxide, etc., were not noted in the boring during the geotechnical drilling operations, gas could be encountered in the drilled shaft excavations during construction. The contractor should check for gas and/or oxygen deficiency prior to any workers entering the excavation for observation and manual cleanup.

4.3 SEISMIC CONSIDERATIONS

The 2012 International Building Code requires the average properties in the upper 100 feet of the subsurface profile a site profile determination extending a depth of 100 feet for seismic site classification. The drilling scope performed for this project had one boring that extended to a maximum depth of approximately 50.0 feet.

Seismic Site Classification	
Code Used	2012 International Building Code (IBC)
Site Classification	D

Additional exploration to greater depths could be considered to confirm the conditions below the current depth of exploration. Alternatively, a geophysical exploration could be utilized in order to attempt to justify a more favorable seismic site class.

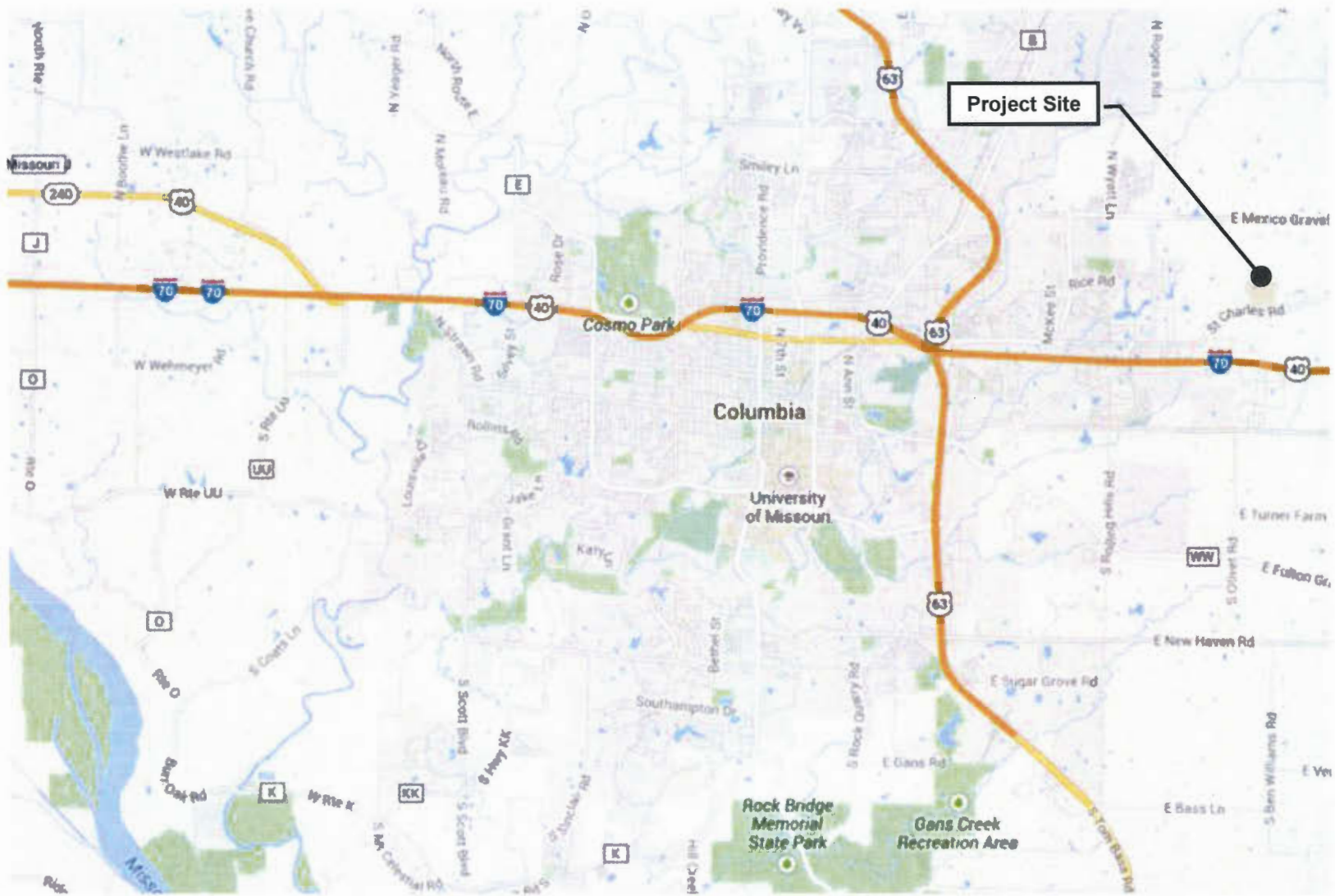
5 GENERAL COMMENTS

The recommendations provided herein are for the exclusive use of our client. Our recommendations are specific only to the project described herein and are not meant to supersede more stringent requirements of local ordinances or codes. The recommendations are based on subsurface information obtained at our boring locations, sample locations, our understanding of the project as described in this report, and geotechnical engineering practice consistent with the current standard of care. No warranty is expressed or implied. CGTL should be contacted if conditions encountered are not consistent with those described.

CGTL should be provided with a set of final plans and specifications, once they are available, to review whether our recommendations have been understood and applied correctly and to assess the need for additional exploration or analysis. Failure to provide these documents to CGTL may nullify some or all of the recommendations provide herein. In addition, any changes in the planned project or changes in site conditions may require revised or additional recommendations on our part.

The final part of our geotechnical service should consist of direct observation during construction to observe that conditions actually encountered are consistent with those described in this report and to assess the appropriateness of the analyses and recommendations contained herein. CGTL cannot assume liability or responsibility for the adequacy of recommendations without being retained to observe construction.

APPENDIX



PROJECT NO.: G15046

SITE LOCATION MAP

911 MONOPLE RADIO TOWER COLUMBIA, MISSOURI

Prepared By:
CROCKETT
GEOTECHNICAL TESTING LAB
 500 Big Bear Blvd.
 Columbia, MO 65202
 573-447-3981
www.CrockettGTL.com



PROJECT NO: G15046

BORING LOCATION PLAN

911 MONOPOLE RADIO TOWER
COLUMBIA, MISSOURI

Prepared By:

CROCKETT
GEOTECHNICAL • TESTING LAB

500 Big Bear Blvd.
Columbia, MO 65202
573-447-3981
www.CrockettGTL.com

Crockett Geotechnical - Testing Lab
 500 Big Bear Boulevard
 Columbia, MO 65202
 Telephone: 573-447-3981



CLIENT Columbia/Boone County Joint Communications **PROJECT NAME** 911 Monopole Radio Tower
PROJECT NUMBER G15046 **PROJECT LOCATION** Columbia, Missouri
DATE STARTED 7/14/15 **COMPLETED** 7/14/15 **GROUND ELEVATION** 860 ft **HOLE SIZE** 4"
DRILLING CONTRACTOR IPES **GROUND WATER LEVELS:**
DRILLING METHOD 4" SSA ▽ **AT TIME OF DRILLING** 28.00 ft / Elev 832.00 ft
LOGGED BY Friedman **CHECKED BY** Lidholm ▽ **AT END OF DRILLING** 32.00 ft / Elev 828.00 ft
NOTES Borehole backfilled upon completion ▽ **0.5hrs AFTER DRILLING** 30.00 ft / Elev 830.00 ft

SAMPLE LENGTH REPORT - LAT-LONG TEMPLATE.GDT - 7/20/15 15:44 - C:\SERVER FILES\GEO\GEO\G15046 - 911 SELF SUPPORT RADIO TOWER\G15046.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY LENGTH	BLOW COUNTS (N VALUE)	POCKET PEN. (psf)	UNC. COMP. (psf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS		
										LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0												
		LEAN TO FAT CLAY: Brown and gray, trace rust stains, trace lignite, trace gravel, stiff to very stiff	ST 1	12		4500		104	22			
			ST 2	15		8000	4250	107	21			
7.0		853.0	ST 3	14		2500	2500	92	30			
		FAT CLAY: Dark brown to brown, trace gravel, stiff	ST 4	10		2500		100	22			
10.0		850.0										
		LEAN TO FAT CLAY Brown and gray, trace lignite, trace gravel, trace sandy, occasional sandy zones, very stiff to hard (Glacial Drift)	ST 5	20		6500		104	23			
			ST 6	20		7500	5920	112	18			
			ST 7	23		7000		115	18			
			ST 8	24		7000	6550	111	19			
			ST 9	19		5000		103	23			
			ST 10	24		6000	3840	107	23			
		--: becomes dark gray to gray	ST 11	24		5500		110	20			
		--: becomes brown to light brown, trace gray, sandy clay to clayey sand	ST 12	22		8000			27			
50		50.0										

No Refusal
 Bottom of borehole at 50.0 feet.

BORING LOG LEGEND AND NOMENCLATURE

Sample Type	Description
AU	Auger sample, disturbed, obtained from auger cuttings
NR	No recovery or lost sample
RC	Rock core, diamond core bit, nominal 2-inch diameter rock sample (ASTM D 2113)
ST	Thin walled (Shelby) tube sample, relatively undisturbed (ASTM D 1587)
SPT	Split spoon sample, disturbed (ASTM D 1586)
VA	Shear vane (ASYM D 2753)

Grain Size Terminology	
Boulders	Larger than 12-inches
Cobbles	3-inches to 12-inches
Gravel	Retained on #4 sieve to 3-inches
Sand	Retained on #200 sieve but passes #4 sieve
Silt or Clay	Passes #200 sieve

Descriptor	Relative Proportion of Sand and Gravel	Relative Proportion of Fines
Trace	Less than 15% by dry weight	Less than 5% by dry weight
With	15% to 30% by dry weight	5% to 12% by dry weight
Modifier	More than 30% by dry weight	More than 12% by dry weight

Relative Density of Coarse grained Soils	
Descriptive Term	SPT N-Value, Blows/Foot
Very Loose	0 - 3
Loose	4 - 9
Medium Dense	10 - 29
Dense	30 - 49
Very Dense	50+

Consistency of Fine Grained Soils		
Descriptive Term	SPT N-Value, Blows/Foot	Unconfined Compressive Strength, psf
Very Soft	0 - 2	0 - 500
Soft	2 - 3	500 - 1,000
Medium	4 - 9	1,000 - 2,000
Stiff	10 - 29	2,000 - 4,000
Very Stiff	30 - 49	4,000 - 8,000
Hard	50+	8,000+

USCS Soil Classification System						
Major Divisions			Group Symbol	Group Name		
coarse grained soils more than 50% retained on #200 sieve	gravel >50% of coarse fraction retained on #4 (4.75 mm) sieve	clean gravel <5% small than #200 sieve	GW		well-graded gravel, fine to coarse gravel	
		gravel with >12% fines	GP		poorly graded gravel	
		sand >50% of coarse fraction passes #4 (4.75 mm) sieve	clean sand		GM	silty gravel
			sand with >12% fines		GC	clayey gravel
	SW	well-graded sand, fine to coarse sand				
	SP	poorly graded sand				
	SM	silty sand				
	fine grained soils more than 50% passes #200 sieve	silt and clay liquid limit < 50	inorganic	ML		silt
CL				clay		
silt and clay liquid limit ≥ 50		inorganic	OL	organic silt, organic clay		
			MH	silt of high plasticity, elastic silt		
		organic	CH	clay of high plasticity, fat clay		
			OH	organic clay, organic silt		
highly organic soils			PT		peat	

Weathering	Description of Rock Properties
Fresh	No discoloration. Not oxidized.
Slightly weathered	Discoloration or oxidation of most surfaces but at short distance from fractures
Moderately weathered	Discoloration or oxidation extends from fractures, usually throughout. All fractured surfaces are oxidized or discolored.
Severely weathered	Discoloration or oxidation throughout. All fractured surfaces are oxidized or discolored. Surfaces are friable.
Decomposed	Resembles a soil. Partial or complete remnant rock structure may be present.

Rock Quality Designator (RQD)	
RQD, %	Rock Quality
90 - 100	Excellent
75 - 90	Good
50 - 75	Fair
25 - 50	Poor
0 - 25	Very poor

Joint, Bedding, and Foliation Spacing in Rock		
Spacing	Joints	Bedding/Foliation
< 2-inches	Very close	Very thin
2-inches - 1-foot	Close	Thin
1-foot - 3-feet	Moderately Close	Medium
3-feet - 10-feet	Wide	Thick
> 10-feet	Very Wide	Very thick



Structural Design Report
170' Monopole
Site: Battle School, MO

Prepared for: BOONE COUNTY
by: Sabre Towers & Poles™

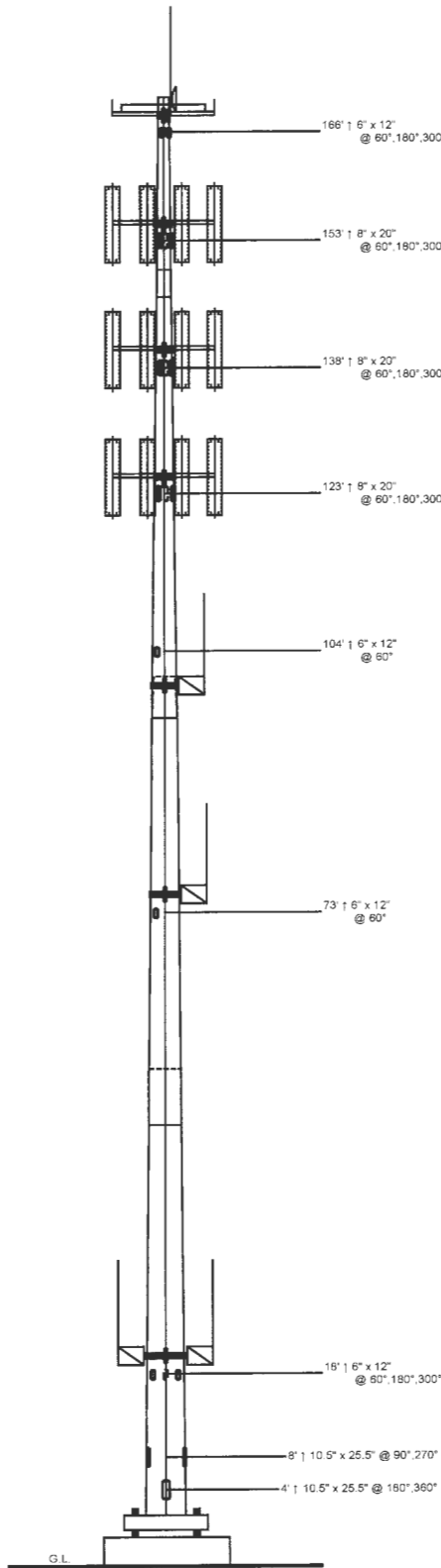
Job Number: 130727

October 22, 2015

Monopole Profile.....	1
Foundation Design Summary (Option 1).....	2
Foundation Design Summary (Option 2).....	3
Pole Calculations.....	4-14
Foundation Calculations.....	15-24



Section	1	2	3	4
Length (ft)	53'-3"	53'-6"	53'-6"	23'-9"
Number Of Sides	18			
Thickness (in)	7/16"	6'-9"	5/16"	1/4"
Lap Splice (ft)		5'-0"		
Top Diameter (in)	45.11"	33.42"	21.01"	16"
Bottom Diameter (in)	59.43"	47.8"	35.39"	22.38"
Taper (in/ft)				
Grade	0.2688	A572-65		
Weight (lbs)	15750	10792	5660	1531
Overall Steel Height (ft)		169		



Designed Appurtenance Loading

Elev	Description	Tx-Line
181	(1) ATC-GD1V40	(2) 7/8"
170	(3) DB222s	(3) 7/8"
170	(1) SP3-5.2	(1) 5/8"
170	(6) 20" x 20" x 5" Junction Boxes	(6) 1/2"
168	Flush Mount (Monopole Only)	
168	(1) Dish Mount (Monopole Only) - Pipe Mount (up to 6' Dish)	
168	L.P. Platform (Monopole Only) - 12' w/ Handrail	
155	L.P. Platform (Monopole Only) - 12'	
155	(3) Tower Top Amplifiers	(3) 1 5/8"
155	(12) 5960110s	(12) 1 5/8"
140	L.P. Platform (Monopole Only) - 12'	
140	(3) Tower Top Amplifiers	(3) 1 5/8"
140	(12) 5960110s	(12) 1 5/8"
125	L.P. Platform (Monopole Only) - 12'	
125	(3) Tower Top Amplifiers	(3) 1 5/8"
125	(12) 5960110s	(12) 1 5/8"
111	(1) ATC-GD1V40	(2) 7/8"
100	3ft Sidearm	
86	(1) ATC-GD1V40	(2) 7/8"
75	3ft Sidearm	
31.62	(3) DB224s	(3) 1/2"
20	(3) 3ft Sidearms	

Load Case Reactions

Description	Axial (kips)	Shear (kips)	Moment (ft-k)	Deflection (ft)	Sway (deg)
3s Gusted Wind	63.07	48.51	6082.13	15.54	10.68
3s Gusted Wind 0.9 Dead	47.31	48.57	5982.56	15.17	10.39
3s Gusted Wind&Ice	106.02	12.74	1745.25	4.85	3.48
Service Loads	52.48	10.49	1311	3.43	2.32

Base Plate Dimensions

Shape	Diameter	Thickness	Bolt Circle	Bolt Qty	Bolt Diameter
Round	72.25"	2.25"	66.5"	18	2.25"

Anchor Bolt Dimensions

Length	Diameter	Hole Diameter	Weight	Type	Finish
84"	2.25"	2.625"	2179.8	A615-75	Galv-18"

Material List

Display	Value
A	3' - 3"

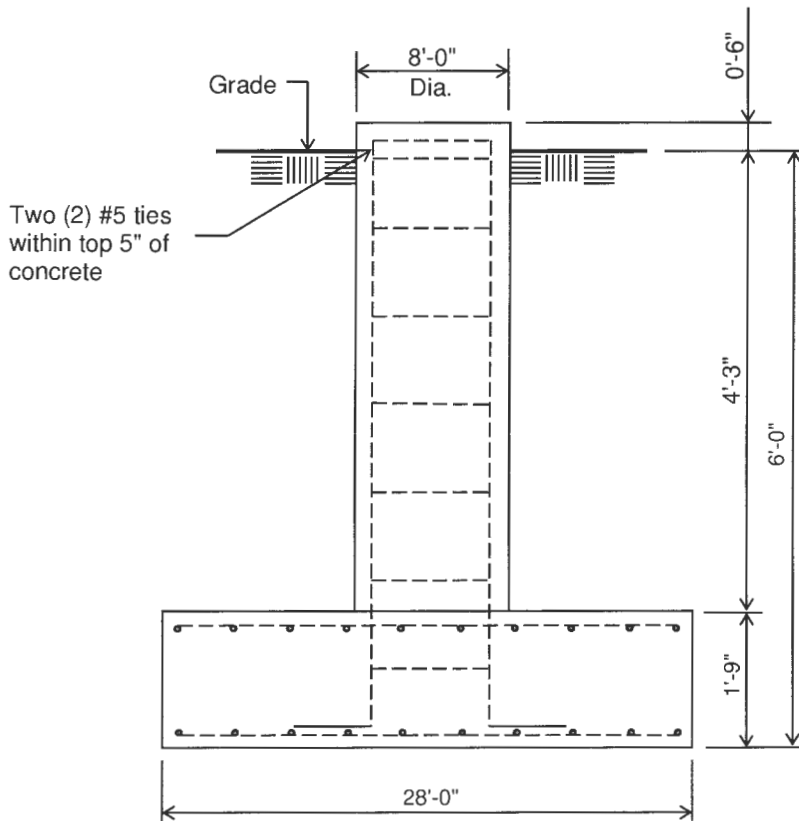
Notes

- 1) Antenna Feed Lines Run Inside Pole
- 2) All dimensions are above ground level, unless otherwise specified.
- 3) Weights shown are estimates. Final weights may vary.
- 4) The Monopole was designed for a basic wind speed of 90 mph with 0" of radial ice, and 40 mph with 1" of radial ice, in accordance with ANSI/TIA-222-G, Structure Class III, Exposure Category C, Topographic Category 1.
- 5) Full Height Step Bolts

	Sabre Communications Corporation 7101 Southbridge Drive P.O. Box 658 Sioux City, IA 51102-0658 Phone: (712) 258-6690 Fax: (712) 279-0814	Job: 130727 Customer: BOONE COUNTY Site Name: Battle School, MO Description: 170' Monopole Date: 10/22/2015	By: BD
	<small>Information contained herein is the sole property of Sabre Communications Corporation, constitutes a trade secret as defined by Iowa Code Ch. 550 and shall not be reproduced, copied or used in whole or part for any purpose whatsoever without the prior written consent of Sabre Communications Corporation.</small>		

Customer: BOONE COUNTY
Site: Battle School, MO

170' Monopole at
90 mph Wind with no ice and 40 mph Wind with 1 in. Ice per ANSI/TIA-222-G.
Antenna Loading per Page 1



ELEVATION VIEW
(59.66 Cu. Yds.)
(1 REQUIRED; NOT TO SCALE)

Notes:

- 1). Concrete shall have a minimum 28-day compressive strength of 4500 PSI, in accordance with ACI 318-05
- 2). Rebar to conform to ASTM specification A615 Grade 60.
- 3). All rebar to have a minimum of 3" concrete cover.
- 4). All exposed concrete corners to be chamfered 3/4".
- 5). The foundation design is based on the geotechnical report by Crockett, Project No. G15046, dated July 20, 2015
- 6). See the geotechnical report for compaction requirements, if specified.
- 7). The foundation is based on the following factored loads:
Moment (kip-ft) = 6082.13
Axial (kips) = 63.07
Shear (kips) = 48.51

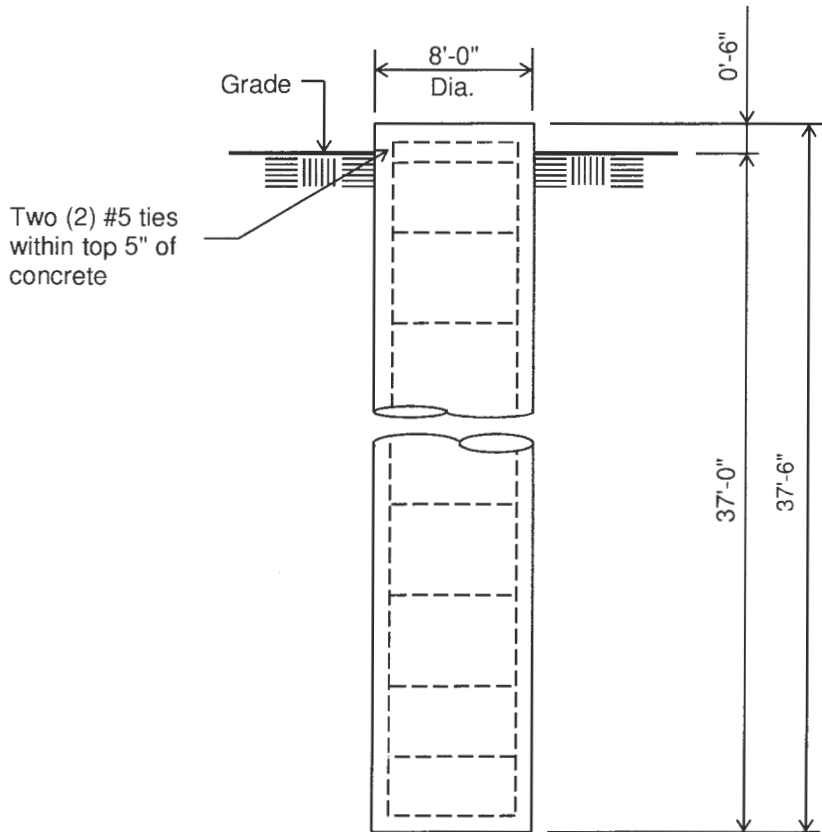
Rebar Schedule per Pad and Pier	
Pier	(38) #9 vertical rebar w/ hooks at bottom w/ #5 ties, two within top 5" of top of pier then 12" C/C
Pad	(55) #8 horizontal rebar evenly spaced each way top and bottom (220 total)

8). 4.25 ft of soil cover is required over the entire area of the foundation slab.

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Customer: BOONE COUNTY
Site: Battle School, MO

170' Monopole at
90 mph Wind with no ice and 40 mph Wind with 1 in. Ice per ANSI/TIA-222-G.
Antenna Loading per Page 1



Two (2) #5 ties
within top 5" of
concrete

Notes:

- 1). Concrete shall have a minimum 28-day compressive strength of 4000 PSI, in accordance with ACI 318-05.
- 2). Rebars to conform to ASTM specification A615 Grade 60.
- 3). All rebar to have a minimum of 3" concrete cover.
- 4). All exposed concrete corners to be chamfered 3/4".
- 5). The foundation design is based on the geotechnical report by Crockett, Project No. G15046, dated July 20, 2015
- 6). See the geotechnical report for drilled pier installation requirements, if specified.
- 7). The foundation is based on the following factored loads:
Moment (kip-ft) = 6082.13
Axial (kips) = 63.07
Shear (kips) = 48.51

ELEVATION VIEW
(69.81 Cu. Yds. each)
(1 REQUIRED; NOT TO SCALE)

Rebar Schedule per Pier	
Pier	(38) #10 vertical rebar w/#5 ties, two within top 5" of pier then 7" C/C

=====

(USA) - Monopole Spatial Analysis (c)2015 Guymast Inc.

Tel:(416)736-7453 Fax:(416)736-4372 Web:www.guymast.com

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170' Monopole / Battle School, MO

* All pole diameters shown on the following pages are across corners.
See profile drawing for widths across flats.

=====

POLE GEOMETRY

=====

ELEV ft	SECTION NAME	No.of SIDES	OUTSIDE DIAM in	THICK- NESS in	RESISTANCES		SPLICE TYPE	...OVERLAP...	
					♦*Pn kip	♦*Mn ft-kip		LENGTH ft	RATIO
169.0			16.25	0.250	928.5	298.5			
	A	18	21.83	0.250	1252.9	545.6			
148.5			21.83	0.250	1252.9	545.6			
	A/B	18	22.23	0.312	1590.2	701.3	SLIP	3.25	1.78
145.2			22.23	0.312	1590.2	701.3			
	B	18	34.56	0.312	2435.1	1686.9			
100.0			34.56	0.312	2435.1	1686.9			
	B/C	18	35.31	0.438	3542.6	2490.3	SLIP	5.00	1.73
95.0			35.31	0.438	3542.6	2490.3			
	C	18	46.68	0.438	4648.5	4346.7			
53.2			46.68	0.438	4648.5	4346.7			
	C/D	18	47.67	0.438	4720.5	4508.5	SLIP	6.75	1.73
46.5			47.67	0.438	4720.5	4508.5			
	D	18	60.34	0.438	5551.5	6739.0			
0.0									

=====

POLE ASSEMBLY

=====

SECTION NAME	BASE ELEV ft	.....BOLTS NUMBER	AT BASE TYPE	OF SECTION DIAM in	STRENGTH ksi	THREADS IN SHEAR PLANE	CALC BASE ELEV ft
B	95.000	0	A325	0.00	92.0	0	95.000
C	46.500	0	A325	0.00	92.0	0	46.500
D	0.000	0	A325	0.00	92.0	0	0.000

=====

POLE SECTIONS

=====

SECTION NAME	No.of SIDES	LENGTH ft	OUTSIDE DIAMETER		THICK- NESS in	MAT- ERIAL ID	FLANGE.ID		FLANGE.WELD ..GROUP.ID..	
			BOT * in	TOP * in			BOT	TOP	BOT	TOP
A	18	23.75	22.73	16.25	0.250	1	0	0	0	0
B	18	53.50	35.94	21.33	0.312	2	0	0	0	0
C	18	53.50	48.54	33.94	0.438	3	0	0	0	0
D	18	53.25	60.34	45.81	0.438	4	0	0	0	0

* - Diameter of circumscribed circle

=====

MATERIAL TYPES

=====

TYPE OF SHAPE	TYPE NO	NO OF ELEM.	ORIENT & deg	HEIGHT in	WIDTH in	.THICKNESS.		IRREGULARITY .PROJECTION. % OF ORIENT AREA	
						WEB in	FLANGE in		
PL	1	1	0.0	22.73	0.25	0.250	0.250	0.00	0.0
PL	2	1	0.0	35.94	0.31	0.312	0.312	0.00	0.0
PL	3	1	0.0	48.54	0.44	0.438	0.438	0.00	0.0
PL	4	1	0.0	60.34	0.44	0.438	0.438	0.00	0.0

& - with respect to vertical

MATERIAL PROPERTIES

=====

MATERIAL TYPE NO.	ELASTIC MODULUS ksi	UNIT WEIGHT pcf	.. STRENGTH .. Fu ksi Fy ksi		THERMAL COEFFICIENT /deg
1	29000.0	490.0	80.0	65.0	0.00001170
2	29000.0	490.0	80.0	65.0	0.00001170
3	29000.0	490.0	80.0	65.0	0.00001170
4	29000.0	490.0	80.0	65.0	0.00001170

* Only 3 condition(s) shown in full
 * Some concentrated wind loads may have been derived from full-scale wind tunnel testing

=====

LOADING CONDITION A

90 mph wind with no ice. wind Azimuth: 0°

LOADS ON POLE

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LOAD TYPE	ELEV ft	APPLY.. RADIUS ft	LOAD.. AZI	LOAD AZIFORCES.....	MOMENTS.....	
					HORIZ kip	DOWN kip	VERTICAL ft-kip	TORSNAL ft-kip
C	180.000	0.00	0.0	0.0	0.0000	0.2333	0.0000	0.0000
C	180.000	0.00	0.0	0.0	0.6332	0.2966	0.0000	0.0000
C	169.000	0.00	0.0	0.0	0.0000	0.1860	0.0000	0.0000
C	169.000	0.00	0.0	0.0	2.4134	0.6512	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.0000	0.1303	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.0056	0.2904	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.0000	0.8056	0.0000	0.0000
C	167.000	0.00	0.0	0.0	1.4465	2.0208	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.0225	0.2316	0.0000	0.0000
C	154.000	0.00	0.0	0.0	0.0000	2.8829	0.0000	0.0000
C	154.000	0.00	0.0	0.0	8.5458	3.9504	0.0000	0.0000
C	139.000	0.00	0.0	0.0	0.0000	2.6021	0.0000	0.0000
C	139.000	0.00	0.0	0.0	8.3646	3.9504	0.0000	0.0000
C	124.000	0.00	0.0	0.0	0.0000	2.3213	0.0000	0.0000
C	124.000	0.00	0.0	0.0	8.1674	3.9504	0.0000	0.0000
C	110.000	0.00	0.0	0.0	0.0000	0.1426	0.0000	0.0000
C	110.000	0.00	0.0	0.0	0.5590	0.2966	0.0000	0.0000
C	99.000	0.00	0.0	0.0	0.2718	0.4116	0.0000	0.0000
C	85.000	0.00	0.0	0.0	0.0000	0.1102	0.0000	0.0000
C	85.000	0.00	0.0	0.0	0.5298	0.2966	0.0000	0.0000
C	74.000	0.00	0.0	0.0	0.2558	0.5760	0.0000	0.0000
C	30.620	0.00	0.0	0.0	0.0000	0.0441	0.0000	0.0000
C	30.620	0.00	0.0	0.0	0.5805	0.2383	0.0000	0.0000
C	19.000	0.00	0.0	0.0	0.3079	0.9360	0.0000	0.0000
D	169.000	0.00	180.0	0.0	0.0523	0.0541	0.0000	0.0000
D	148.500	0.00	180.0	0.0	0.0625	0.0659	0.0000	0.0000
D	148.500	0.00	180.0	0.0	0.0661	0.1561	0.0000	0.0000
D	145.250	0.00	180.0	0.0	0.0661	0.1561	0.0000	0.0000
D	145.250	0.00	180.0	0.0	0.0711	0.0958	0.0000	0.0000
D	130.167	0.00	180.0	0.0	0.0711	0.0958	0.0000	0.0000
D	130.167	0.00	180.0	0.0	0.0812	0.1120	0.0000	0.0000
D	115.083	0.00	180.0	0.0	0.0812	0.1120	0.0000	0.0000
D	115.083	0.00	180.0	0.0	0.0904	0.1283	0.0000	0.0000
D	100.000	0.00	180.0	0.0	0.0904	0.1283	0.0000	0.0000
D	100.000	0.00	180.0	0.0	0.0961	0.3303	0.0000	0.0000
D	95.000	0.00	180.0	0.0	0.0961	0.3303	0.0000	0.0000
D	95.000	0.00	180.0	0.0	0.0992	0.2055	0.0000	0.0000
D	81.083	0.00	180.0	0.0	0.0992	0.2055	0.0000	0.0000
D	81.083	0.00	180.0	0.0	0.1055	0.2265	0.0000	0.0000
D	67.167	0.00	180.0	0.0	0.1055	0.2265	0.0000	0.0000
D	67.167	0.00	180.0	0.0	0.1104	0.2475	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.1104	0.2475	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.1129	0.5219	0.0000	0.0000
D	46.500	0.00	180.0	0.0	0.1129	0.5219	0.0000	0.0000
D	46.500	0.00	180.0	0.0	0.1119	0.2727	0.0000	0.0000
D	34.875	0.00	180.0	0.0	0.1119	0.2727	0.0000	0.0000
D	34.875	0.00	180.0	0.0	0.1112	0.2902	0.0000	0.0000
D	23.250	0.00	180.0	0.0	0.1112	0.2902	0.0000	0.0000
D	23.250	0.00	180.0	0.0	0.1064	0.3078	0.0000	0.0000
D	11.625	0.00	180.0	0.0	0.1064	0.3078	0.0000	0.0000
D	11.625	0.00	180.0	0.0	0.1079	0.3254	0.0000	0.0000
D	0.000	0.00	180.0	0.0	0.1079	0.3254	0.0000	0.0000

ANTENNA LOADING

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.....ANTENNA.....	ATTACHMENT	ANTENNA FORCES.....					
TYPE	ELEV	AZI	RAD	AZI	AXIAL	SHEAR	GRAVITY	TORSION
	ft		ft		kip	kip	kip	ft-kip

STD 169.0 0.0 1.4 0.0 0.62 0.00 130727 0.08 0.00

LOADING CONDITION M

90 mph wind with no ice. wind Azimuth: 0°

LOADS ON POLE

LOAD TYPE	ELEV ft	APPLY. RADIUS ft	LOAD. AZI	AT AZI	LOAD AZI	.....FORCES.....		.....MOMENTS.....	
						HORIZ kip	DOWN kip	VERTICAL ft-kip	TORSNAL ft-kip
C	180.000	0.00	0.0	0.0	0.0	0.0000	0.1750	0.0000	0.0000
C	180.000	0.00	0.0	0.0	0.0	0.6332	0.2225	0.0000	0.0000
C	169.000	0.00	0.0	0.0	0.0	0.0000	0.1395	0.0000	0.0000
C	169.000	0.00	0.0	0.0	0.0	2.4134	0.4884	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.0	0.0000	0.0977	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.0	0.0056	0.2178	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.0	0.0000	0.6042	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.0	1.4465	1.5156	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.0	0.0225	0.1737	0.0000	0.0000
C	154.000	0.00	0.0	0.0	0.0	0.0000	2.1622	0.0000	0.0000
C	154.000	0.00	0.0	0.0	0.0	8.5458	2.9628	0.0000	0.0000
C	139.000	0.00	0.0	0.0	0.0	0.0000	1.9516	0.0000	0.0000
C	139.000	0.00	0.0	0.0	0.0	8.3646	2.9628	0.0000	0.0000
C	124.000	0.00	0.0	0.0	0.0	0.0000	1.7410	0.0000	0.0000
C	124.000	0.00	0.0	0.0	0.0	8.1674	2.9628	0.0000	0.0000
C	110.000	0.00	0.0	0.0	0.0	0.0000	0.1069	0.0000	0.0000
C	110.000	0.00	0.0	0.0	0.0	0.5590	0.2225	0.0000	0.0000
C	99.000	0.00	0.0	0.0	0.0	0.2718	0.3087	0.0000	0.0000
C	85.000	0.00	0.0	0.0	0.0	0.0000	0.0826	0.0000	0.0000
C	85.000	0.00	0.0	0.0	0.0	0.5298	0.2225	0.0000	0.0000
C	74.000	0.00	0.0	0.0	0.0	0.2558	0.4320	0.0000	0.0000
C	30.620	0.00	0.0	0.0	0.0	0.0000	0.0331	0.0000	0.0000
C	30.620	0.00	0.0	0.0	0.0	0.5805	0.1787	0.0000	0.0000
C	19.000	0.00	0.0	0.0	0.0	0.3079	0.7020	0.0000	0.0000
D	169.000	0.00	180.0	0.0	0.0	0.0523	0.0406	0.0000	0.0000
D	148.500	0.00	180.0	0.0	0.0	0.0625	0.0494	0.0000	0.0000
D	148.500	0.00	180.0	0.0	0.0	0.0661	0.1171	0.0000	0.0000
D	145.250	0.00	180.0	0.0	0.0	0.0661	0.1171	0.0000	0.0000
D	145.250	0.00	180.0	0.0	0.0	0.0711	0.0718	0.0000	0.0000
D	130.167	0.00	180.0	0.0	0.0	0.0711	0.0718	0.0000	0.0000
D	130.167	0.00	180.0	0.0	0.0	0.0812	0.0840	0.0000	0.0000
D	115.083	0.00	180.0	0.0	0.0	0.0812	0.0840	0.0000	0.0000
D	115.083	0.00	180.0	0.0	0.0	0.0904	0.0962	0.0000	0.0000
D	100.000	0.00	180.0	0.0	0.0	0.0904	0.0962	0.0000	0.0000
D	100.000	0.00	180.0	0.0	0.0	0.0961	0.2478	0.0000	0.0000
D	95.000	0.00	180.0	0.0	0.0	0.0961	0.2478	0.0000	0.0000
D	95.000	0.00	180.0	0.0	0.0	0.0992	0.1541	0.0000	0.0000
D	81.083	0.00	180.0	0.0	0.0	0.0992	0.1541	0.0000	0.0000
D	81.083	0.00	180.0	0.0	0.0	0.1055	0.1699	0.0000	0.0000
D	67.167	0.00	180.0	0.0	0.0	0.1055	0.1699	0.0000	0.0000
D	67.167	0.00	180.0	0.0	0.0	0.1104	0.1856	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0	0.1104	0.1856	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0	0.1129	0.3914	0.0000	0.0000
D	46.500	0.00	180.0	0.0	0.0	0.1129	0.3914	0.0000	0.0000
D	46.500	0.00	180.0	0.0	0.0	0.1119	0.2045	0.0000	0.0000
D	34.875	0.00	180.0	0.0	0.0	0.1119	0.2045	0.0000	0.0000
D	34.875	0.00	180.0	0.0	0.0	0.1112	0.2177	0.0000	0.0000
D	23.250	0.00	180.0	0.0	0.0	0.1112	0.2177	0.0000	0.0000
D	23.250	0.00	180.0	0.0	0.0	0.1064	0.2309	0.0000	0.0000
D	11.625	0.00	180.0	0.0	0.0	0.1064	0.2309	0.0000	0.0000
D	11.625	0.00	180.0	0.0	0.0	0.1079	0.2440	0.0000	0.0000
D	0.000	0.00	180.0	0.0	0.0	0.1079	0.2440	0.0000	0.0000

ANTENNA LOADING

.....ANTENNA..... TYPE	ELEV ft	AZI	ATTACHMENT		.....ANTENNA FORCES.....			
			RAD ft	AZI	AXIAL kip	SHEAR kip	GRAVITY kip	TORSION ft-kip
STD	169.0	0.0	1.4	0.0	0.62	0.00	0.06	0.00

LOADING CONDITION Y

40 mph wind with 1 ice. wind Azimuth: 0°

LOADS ON POLE

LOAD TYPE	ELEV ft	APPLY. RADIUS ft	LOAD. AZI	AT AZI	LOAD AZI	.....FORCES.....		.....MOMENTS.....	
						HORIZ kip	DOWN kip	VERTICAL ft-kip	TORSNAL ft-kip
C	180.000	0.00	0.0	0.0	0.0	0.0000	0.2333	0.0000	0.0000
C	180.000	0.00	0.0	0.0	0.0	0.5126	0.8894	0.0000	0.0000

130727								
C	169.000	0.00	0.0	0.0	0.0000	0.6567	0.0000	0.0000
C	169.000	0.00	0.0	0.0	0.9317	1.5525	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.0000	0.1303	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.0006	0.3139	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.0000	0.8056	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.6909	2.8985	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.0167	0.2316	0.0000	0.0000
C	154.000	0.00	0.0	0.0	0.0000	2.8829	0.0000	0.0000
C	154.000	0.00	0.0	0.0	1.8751	8.8764	0.0000	0.0000
C	139.000	0.00	0.0	0.0	0.0000	2.6021	0.0000	0.0000
C	139.000	0.00	0.0	0.0	1.8258	8.8265	0.0000	0.0000
C	124.000	0.00	0.0	0.0	0.0000	2.3213	0.0000	0.0000
C	124.000	0.00	0.0	0.0	1.7726	8.7716	0.0000	0.0000
C	110.000	0.00	0.0	0.0	0.0000	0.1426	0.0000	0.0000
C	110.000	0.00	0.0	0.0	0.4388	0.8611	0.0000	0.0000
C	99.000	0.00	0.0	0.0	0.0721	0.6909	0.0000	0.0000
C	85.000	0.00	0.0	0.0	0.0000	0.1102	0.0000	0.0000
C	85.000	0.00	0.0	0.0	0.4068	0.8469	0.0000	0.0000
C	74.000	0.00	0.0	0.0	0.0663	0.8474	0.0000	0.0000
C	30.620	0.00	0.0	0.0	0.0000	0.0441	0.0000	0.0000
C	30.620	0.00	0.0	0.0	0.3239	1.0001	0.0000	0.0000
C	19.000	0.00	0.0	0.0	0.0716	1.6494	0.0000	0.0000
D	169.000	0.00	180.0	0.0	0.0139	0.1264	0.0000	0.0000
D	162.167	0.00	180.0	0.0	0.0139	0.1264	0.0000	0.0000
D	162.167	0.00	180.0	0.0	0.0149	0.1386	0.0000	0.0000
D	155.333	0.00	180.0	0.0	0.0149	0.1386	0.0000	0.0000
D	155.333	0.00	180.0	0.0	0.0158	0.1507	0.0000	0.0000
D	148.500	0.00	180.0	0.0	0.0158	0.1507	0.0000	0.0000
D	148.500	0.00	180.0	0.0	0.0165	0.2455	0.0000	0.0000
D	145.250	0.00	180.0	0.0	0.0165	0.2455	0.0000	0.0000
D	145.250	0.00	180.0	0.0	0.0174	0.1916	0.0000	0.0000
D	130.167	0.00	180.0	0.0	0.0174	0.1916	0.0000	0.0000
D	130.167	0.00	180.0	0.0	0.0193	0.2209	0.0000	0.0000
D	115.083	0.00	180.0	0.0	0.0193	0.2209	0.0000	0.0000
D	115.083	0.00	180.0	0.0	0.0210	0.2498	0.0000	0.0000
D	100.000	0.00	180.0	0.0	0.0210	0.2498	0.0000	0.0000
D	100.000	0.00	180.0	0.0	0.0220	0.4600	0.0000	0.0000
D	95.000	0.00	180.0	0.0	0.0220	0.4600	0.0000	0.0000
D	95.000	0.00	180.0	0.0	0.0226	0.3403	0.0000	0.0000
D	81.083	0.00	180.0	0.0	0.0226	0.3403	0.0000	0.0000
D	81.083	0.00	180.0	0.0	0.0237	0.3715	0.0000	0.0000
D	67.167	0.00	180.0	0.0	0.0237	0.3715	0.0000	0.0000
D	67.167	0.00	180.0	0.0	0.0245	0.4017	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0245	0.4017	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0248	0.6821	0.0000	0.0000
D	46.500	0.00	180.0	0.0	0.0248	0.6821	0.0000	0.0000
D	46.500	0.00	180.0	0.0	0.0246	0.4351	0.0000	0.0000
D	11.625	0.00	180.0	0.0	0.0230	0.4754	0.0000	0.0000
D	11.625	0.00	180.0	0.0	0.0229	0.4842	0.0000	0.0000
D	0.000	0.00	180.0	0.0	0.0229	0.4842	0.0000	0.0000

ANTENNA LOADING

.....ANTENNA.....	ATTACHMENT		.....ANTENNA FORCES.....					
TYPE	ELEV	AZI	RAD	AZI	AXIAL	SHEAR	GRAVITY	TORSION
	ft		ft		kip	kip	kip	ft-kip
STD	169.0	0.0	1.4	0.0	0.09	0.00	0.31	0.00

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170' Monopole / Battle School, MO

MAXIMUM POLE DEFORMATIONS CALCULATED(w.r.t. wind direction)

MAST ELEV ft	.....DEFLECTIONS (ft).....			.....ROTATIONS (deg).....		
	HORIZONTAL ALONG	ACROSS	DOWN	TILT ALONG	ACROSS	TWIST
169.0	15.54A	-0.39w	2.04A	10.68A	-0.33w	-0.02w
162.2	14.31A	-0.36w	1.81A	10.59A	-0.32w	-0.02w
155.3	13.10A	-0.32w	1.59A	10.39A	-0.30w	-0.02w
148.5	11.92A	-0.29w	1.38A	10.10A	-0.28w	-0.01w
145.2	11.36A	-0.27w	1.28A	9.94A	-0.28w	-0.01w
130.2	8.94A	-0.20w	0.88A	8.95A	-0.23w	-0.01w

				130727		
115.1	6.79A	-0.15w	0.57A	7.65A	-0.18w	-0.01w
100.0	5.00A	-0.11w	0.35A	6.19A	-0.14w	0.00w
95.0	4.48A	-0.10w	0.29A	5.84A	-0.13w	0.00w
81.1	3.19A	-0.07w	0.18A	4.83A	-0.11w	0.00w
67.2	2.14A	-0.04w	0.10A	3.87A	-0.08w	0.00w
53.2	1.32A	-0.03w	0.05A	2.98A	-0.06w	0.00w
46.5	0.99A	-0.02w	0.03A	2.56A	-0.05w	0.00w
34.9	0.55A	-0.01w	0.01A	1.86A	-0.04w	0.00K
23.2	0.24A	0.00w	0.00A	1.20A	-0.02w	0.00K
11.6	0.06A	0.00w	0.00A	0.58A	-0.01w	0.00K
0.0	0.00A	0.00A	0.00A	0.00A	0.00A	0.00A

MAXIMUM ANTENNA ROTATIONS

ELEV ft	ANT AZI deg	ANT TYPE	.... BEAM DEFLECTIONS (deg)			TOTAL
			ROLL	YAW	PITCH	
169.0	0.0	STD	10.410 D	0.878 C	10.685 A	10.685 A

MAXIMUM POLE FORCES CALCULATED(w.r.t. to wind direction)

MAST ELEV ft	TOTAL AXIAL kip	SHEAR.w.r.t.WIND.DIR		MOMENT.w.r.t.WIND.DIR		TORSION ft-kip
		ALONG kip	ACROSS kip	ALONG ft-kip	ACROSS ft-kip	
169.0	3.65 c	3.66 A	0.52 O	-7.08 G	-0.43 h	-0.42 U
162.2	8.89 c	5.50 A	0.52 O	-44.17 A	3.50 K	0.51 C
155.3	9.84 c	5.90 A	0.52 C	-88.47 A	-7.12 C	0.97 C
148.5	22.63 c	14.86 A	0.52 O	-187.90 A	10.88 K	1.22 C
145.2	23.43 Z	15.13 X	-0.56 W	-242.27 A	12.68 K	1.31 C
130.2	37.75 a	24.61 A	-0.65 W	-588.62 A	22.92 W	-1.64 W
115.1	52.17 c	33.95 A	-0.71 W	-1087.42 A	34.26 W	-1.79 W
100.0	56.94 c	35.88 A	-0.72 W	-1662.87 A	45.74 W	-1.84 W
95.0	59.93 c	36.72 M	-0.67 W	-1859.57 A	49.29 W	-1.84 W
81.1	65.62 c	38.55 M	-0.74 W	-2421.76 A	59.99 W	-1.89 W
67.2	71.63 a	40.34 M	-0.74 W	-3007.62 A	70.79 W	-1.94 W
53.2	77.22 a	41.87 M	-0.73 W	-3611.64 A	81.44 W	-1.97 W
46.5	81.82 a	42.61 M	-0.74 W	-3910.67 A	86.56 W	-1.98 W
34.9	86.96 a	43.89 M	-0.72 W	-4434.10 A	95.15 W	-1.99 W

130727

23.2	93.29 a	45.77 M	-0.71 W	-4971.19 A	103.63 W	-1.99 W
	93.29 a	45.78 M	-0.73 W	-4971.19 A	103.64 W	-1.99 W
11.6	100.39 a	47.32 M	-0.73 W	-5522.04 A	112.22 W	2.08 K
	100.39 a	47.32 M	-0.72 W	-5522.04 A	112.21 W	2.08 K
	106.02 a	48.57 M	-0.72 W	-6082.13 A	120.67 W	2.11 K
base reaction	106.02 a	-48.57 M	0.72 W	6082.13 A	-120.67 W	-2.11 K

COMPLIANCE WITH 4.8.2 & 4.5.4

ELEV ft	AXIAL	BENDING	SHEAR + TORSIONAL	TOTAL	SATISFIED	D/t(w/t)	MAX ALLOWED
169.00	0.00c	0.02G	0.01A	0.03G	YES	9.52A	45.2
162.17	0.01c	0.12A	0.01A	0.12A	YES	10.82A	45.2
155.33	0.01c	0.19A	0.01A	0.20A	YES	12.11A	45.2
148.50	0.02c	0.34A	0.02A	0.35A	YES	13.41A	45.2
145.25	0.01Z	0.28A	0.02X	0.29A	YES	10.37A	45.2
130.17	0.01Z	0.33A	0.02X	0.34A	YES	10.87A	45.2
115.08	0.01a	0.35A	0.02A	0.35A	YES	10.59A	45.2
100.00	0.02a	0.59A	0.03A	0.61A	YES	12.87A	45.2
95.00	0.02c	0.59A	0.03A	0.61A	YES	12.87A	45.2
81.08	0.02c	0.82A	0.03A	0.83A	YES	15.16A	45.2
67.17	0.02c	0.82A	0.03A	0.83A	YES	15.16A	45.2
53.25	0.02c	0.99A	0.03A	1.00A	YES	17.45A	45.2
46.50	0.02c	0.70A	0.02M	0.71A	YES	11.96A	45.2
34.87	0.02c	0.72A	0.02M	0.73A	YES	12.50A	45.2
23.25	0.02c	0.75A	0.02M	0.76A	YES	12.25A	45.2
11.62	0.02c	0.79A	0.02M	0.80A	YES	13.76A	45.2
0.00	0.02a	0.79A	0.02M	0.80A	YES	13.76A	45.2
	0.02a	0.81A	0.02M	0.82A	YES	15.26A	45.2
	0.02a	0.81A	0.02M	0.82A	YES	15.26A	45.2
	0.02a	0.83A	0.02M	0.84A	YES	16.77A	45.2
	0.02a	0.83A	0.02M	0.84A	YES	16.77A	45.2
	0.02a	0.84A	0.02M	0.85A	YES	17.50A	45.2
	0.02a	0.87A	0.02M	0.88A	YES	17.15A	45.2
	0.02a	0.88A	0.02M	0.89A	YES	18.41A	45.2
	0.02a	0.88A	0.02M	0.89A	YES	18.41A	45.2
	0.02a	0.89A	0.02M	0.90A	YES	19.67A	45.2
	0.02a	0.89A	0.02M	0.90A	YES	19.67A	45.2
	0.02a	0.90A	0.02M	0.91A	YES	20.93A	45.2
	0.02a	0.90A	0.02M	0.91A	YES	20.93A	45.2
	0.02a	0.90A	0.02M	0.91A	YES	22.19A	45.2

MAXIMUM LOADS ONTO FOUNDATION(w.r.t. wind direction)

DOWN kip	SHEAR.w.r.t.WIND.DIR ALONG kip	WIND.DIR ACROSS kip	MOMENT.w.r.t.WIND.DIR ALONG ft-kip	WIND.DIR ACROSS ft-kip	TORSION ft-kip
106.02	48.57	-0.72	-6082.13	120.67	2.11

=====
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170' Monopole / Battle School, MO

 ***** Service Load Condition *****

* Only 1 condition(s) shown in full
 * Some concentrated wind loads may have been derived from full-scale wind tunnel testing

LOADING CONDITION A =====

60 mph wind with no ice. wind Azimuth: 0°

LOADS ON POLE
 =====

LOAD TYPE	ELEV ft	APPLY... RADIUS ft	LOAD..AT AZI	LOAD AZI	.....FORCES.....		.....MOMENTS.....	
					HORIZ kip	DOWN kip	VERTICAL ft-kip	TORSNAL ft-kip
C	180.000	0.00	0.0	0.0	0.0000	0.1944	0.0000	0.0000
C	180.000	0.00	0.0	0.0	0.1369	0.2472	0.0000	0.0000
C	169.000	0.00	0.0	0.0	0.0000	0.1550	0.0000	0.0000
C	169.000	0.00	0.0	0.0	0.5216	0.5427	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.0000	0.1085	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.0012	0.2420	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.0000	0.6713	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.3126	1.6840	0.0000	0.0000
C	167.000	0.00	0.0	0.0	0.0049	0.1930	0.0000	0.0000
C	154.000	0.00	0.0	0.0	0.0000	2.4024	0.0000	0.0000
C	154.000	0.00	0.0	0.0	1.8469	3.2920	0.0000	0.0000
C	139.000	0.00	0.0	0.0	0.0000	2.1684	0.0000	0.0000
C	139.000	0.00	0.0	0.0	1.8078	3.2920	0.0000	0.0000
C	124.000	0.00	0.0	0.0	0.0000	1.9344	0.0000	0.0000
C	124.000	0.00	0.0	0.0	1.7651	3.2920	0.0000	0.0000
C	110.000	0.00	0.0	0.0	0.0000	0.1188	0.0000	0.0000
C	110.000	0.00	0.0	0.0	0.1208	0.2472	0.0000	0.0000
C	99.000	0.00	0.0	0.0	0.0587	0.3430	0.0000	0.0000
C	85.000	0.00	0.0	0.0	0.0000	0.0918	0.0000	0.0000
C	85.000	0.00	0.0	0.0	0.1145	0.2472	0.0000	0.0000
C	74.000	0.00	0.0	0.0	0.0553	0.4800	0.0000	0.0000
C	30.620	0.00	0.0	0.0	0.0000	0.0367	0.0000	0.0000
C	30.620	0.00	0.0	0.0	0.1254	0.1986	0.0000	0.0000
C	19.000	0.00	0.0	0.0	0.0665	0.7800	0.0000	0.0000
D	169.000	0.00	180.0	0.0	0.0113	0.0451	0.0000	0.0000
D	148.500	0.00	180.0	0.0	0.0135	0.0549	0.0000	0.0000
D	148.500	0.00	180.0	0.0	0.0143	0.1301	0.0000	0.0000
D	145.250	0.00	180.0	0.0	0.0143	0.1301	0.0000	0.0000
D	145.250	0.00	180.0	0.0	0.0154	0.0798	0.0000	0.0000
D	130.167	0.00	180.0	0.0	0.0154	0.0798	0.0000	0.0000
D	130.167	0.00	180.0	0.0	0.0175	0.0934	0.0000	0.0000
D	115.083	0.00	180.0	0.0	0.0175	0.0934	0.0000	0.0000
D	115.083	0.00	180.0	0.0	0.0195	0.1069	0.0000	0.0000
D	100.000	0.00	180.0	0.0	0.0195	0.1069	0.0000	0.0000
D	100.000	0.00	180.0	0.0	0.0208	0.2753	0.0000	0.0000
D	95.000	0.00	180.0	0.0	0.0208	0.2753	0.0000	0.0000
D	95.000	0.00	180.0	0.0	0.0214	0.1713	0.0000	0.0000
D	81.083	0.00	180.0	0.0	0.0214	0.1713	0.0000	0.0000
D	81.083	0.00	180.0	0.0	0.0228	0.1888	0.0000	0.0000
D	67.167	0.00	180.0	0.0	0.0228	0.1888	0.0000	0.0000
D	67.167	0.00	180.0	0.0	0.0239	0.2062	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0239	0.2062	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0244	0.4349	0.0000	0.0000
D	46.500	0.00	180.0	0.0	0.0244	0.4349	0.0000	0.0000
D	46.500	0.00	180.0	0.0	0.0242	0.2272	0.0000	0.0000
D	34.875	0.00	180.0	0.0	0.0242	0.2272	0.0000	0.0000
D	34.875	0.00	180.0	0.0	0.0240	0.2419	0.0000	0.0000
D	23.250	0.00	180.0	0.0	0.0240	0.2419	0.0000	0.0000
D	23.250	0.00	180.0	0.0	0.0230	0.2565	0.0000	0.0000
D	11.625	0.00	180.0	0.0	0.0230	0.2565	0.0000	0.0000
D	11.625	0.00	180.0	0.0	0.0233	0.2712	0.0000	0.0000
D	0.000	0.00	180.0	0.0	0.0233	0.2712	0.0000	0.0000

ANTENNA LOADING

.....ANTENNA.....	ATTACHMENT		.....ANTENNA FORCES.....		.....ANTENNA FORCES.....		.....ANTENNA FORCES.....	
TYPE	ELEV	AZI	RAD	AZI	AXIAL	SHEAR	GRAVITY	TORSION
	ft		ft		kip	kip	kip	ft-kip
STD	169.0	0.0	1.4	0.0	0.13	0.00	0.06	0.00

MAXIMUM POLE DEFORMATIONS CALCULATED(w.r.t. wind direction)

MAST ELEV ft	.....DEFLECTIONS (ft).....			.....ROTATIONS (deg).....		
	HORIZONTAL ALONG	ACROSS	DOWN	TILT ALONG	ACROSS	TWIST
169.0	3.43A	0.08C	0.10A	2.32A	0.07C	0.00E
162.2	3.15A	0.07C	0.09A	2.30A	0.07C	0.00E
155.3	2.88A	0.06C	0.08A	2.26A	0.06C	0.00E
148.5	2.62A	0.06C	0.07A	2.19A	0.06C	0.00E
145.2	2.49A	0.05C	0.06A	2.16A	0.06C	0.00E
130.2	1.95A	0.04C	0.04A	1.94A	0.05C	0.00E
115.1	1.48A	0.03C	0.03A	1.66A	0.04C	0.00E
100.0	1.08A	0.02C	0.02A	1.34A	0.03C	0.00E
95.0	0.97A	0.02C	0.02A	1.26A	0.03C	0.00E
81.1	0.69A	0.01C	0.01A	1.04A	0.02C	0.00E
67.2	0.46A	0.01C	0.01A	0.83A	0.02C	0.00E
53.2	0.28A	0.01C	0.00A	0.64A	0.01C	0.00E
46.5	0.21A	0.00C	0.00A	0.55A	0.01C	0.00E
34.9	0.12A	0.00C	0.00A	0.40A	0.01C	0.00E
23.2	0.05A	0.00C	0.00A	0.26A	0.00C	0.00E
11.6	0.01A	0.00C	0.00L	0.12A	0.00C	0.00E
0.0	0.00A	0.00A	0.00A	0.00A	0.00A	0.00A

MAXIMUM ANTENNA ROTATIONS

ELEV ft	ANT AZI deg	ANT TYPE	.... BEAM DEFLECTIONS (deg)			
			ROLL	YAW	PITCH	TOTAL
169.0	0.0	STD	2.253 D	0.042 C	2.324 A	2.324 A

MAXIMUM POLE FORCES CALCULATED(w.r.t. to wind direction)

MAST ELEV ft	TOTAL AXIAL kip	SHEAR.w.r.t.WIND.DIR		MOMENT.w.r.t.WIND.DIR		TORSION ft-kip
		ALONG kip	ACROSS kip	ALONG ft-kip	ACROSS ft-kip	
169.0	1.20 C	0.79 A	0.11 C	-1.60 G	0.09 D	-0.09 I
162.2	4.42 C	1.19 A	0.11 C	-9.57 A	-0.72 C	0.09 E
155.3	4.42 D	1.19 A	-0.11 K	-9.57 A	-0.73 C	0.09 E
148.5	4.76 D	1.28 A	-0.11 K	-19.25 A	1.52 K	0.09 E
145.2	4.77 L	1.27 A	0.11 C	-19.24 A	1.53 K	0.09 E
130.2	10.82 L	3.21 A	0.11 C	-40.91 A	-2.37 C	0.09 E
121.6	10.83 L	3.21 L	0.11 C	-40.92 A	-2.37 C	0.09 E
115.1	11.25 L	3.26 L	0.11 C	-52.79 A	-2.76 C	0.09 E
108.5	11.25 E	3.26 A	0.13 C	-52.83 A	-2.77 C	0.09 E
100.0	17.92 E	5.30 A	0.13 C	-127.83 A	-5.00 C	0.09 E
95.0	17.91 L	5.31 A	0.13 C	-127.83 A	-5.00 C	0.09 E
81.1	24.55 L	7.34 A	0.13 C	-235.90 A	-7.26 C	0.10 E

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115.1	24.55 L	7.34 A	0.13 C	-235.89 A	-7.26 C	0.10 E
	26.53 L	7.76 A	0.13 C	-360.08 A	-9.50 C	0.11 E
100.0	26.53 L	7.75 A	0.13 C	-360.08 A	-9.50 C	0.11 E
	28.25 L	7.91 A	0.13 C	-402.40 A	-10.23 C	0.11 E
95.0	28.25 L	7.91 A	0.12 C	-402.41 A	-10.24 C	0.11 E
	30.97 L	8.33 A	0.12 C	-523.27 A	-12.05 C	0.12 E
81.1	30.97 L	8.33 A	0.12 C	-523.27 A	-12.06 C	0.12 E
	34.07 L	8.70 A	0.12 C	-649.08 A	-13.85 C	0.12 E
67.2	34.07 L	8.70 A	0.12 C	-649.08 A	-13.85 C	0.12 E
	36.94 L	9.03 A	0.12 C	-778.78 A	-15.61 C	0.13 E
53.2	36.94 L	9.03 A	0.12 C	-778.78 A	-15.60 C	0.13 E
	39.88 L	9.20 A	0.12 C	-842.98 A	-16.44 C	0.13 E
46.5	39.88 L	9.20 A	0.12 C	-843.00 A	-16.45 C	0.13 E
	42.52 L	9.48 A	0.12 C	-955.52 A	-17.88 C	0.13 E
34.9	42.52 L	9.48 A	0.12 C	-955.52 A	-17.88 C	0.13 E
	45.57 L	9.88 A	0.12 C	-1071.21 A	-19.28 C	0.13 E
23.2	45.57 L	9.89 A	0.12 C	-1071.21 A	-19.28 C	0.13 E
	49.33 L	10.22 A	0.12 C	-1190.00 A	-20.68 C	0.13 E
11.6	49.33 L	10.22 A	0.12 C	-1190.00 A	-20.68 C	0.13 E
	52.48 L	10.49 A	0.12 C	-1311.00 A	-22.05 C	0.13 E

base	52.48 L	-10.49 A	-0.12 C	1311.00 A	22.05 C	-0.13 E
reaction						

COMPLIANCE WITH 4.8.2 & 4.5.4
=====

ELEV ft	AXIAL	BENDING	SHEAR + TORSIONAL	TOTAL	SATISFIED	D/t(w/t)	MAX ALLOWED
169.00	0.00C	0.01G	0.00A	0.01G	YES	9.52A	45.2
	0.00C	0.03A	0.00A	0.03A	YES	10.82A	45.2
162.17	0.00D	0.03A	0.00A	0.03A	YES	10.82A	45.2
	0.00D	0.04A	0.00A	0.05A	YES	12.11A	45.2
155.33	0.00L	0.04A	0.00A	0.05A	YES	12.11A	45.2
	0.01L	0.07A	0.01A	0.08A	YES	13.41A	45.2
148.50	0.01L	0.06A	0.00L	0.07A	YES	10.37A	45.2
	0.01L	0.07A	0.00L	0.08A	YES	10.87A	45.2
145.25	0.01E	0.08A	0.00A	0.08A	YES	10.59A	45.2
	0.01E	0.13A	0.01A	0.14A	YES	12.87A	45.2
130.17	0.01L	0.13A	0.01A	0.14A	YES	12.87A	45.2
	0.01L	0.18A	0.01A	0.19A	YES	15.16A	45.2
115.08	0.01L	0.18A	0.01A	0.19A	YES	15.16A	45.2
	0.01L	0.21A	0.01A	0.22A	YES	17.45A	45.2
100.00	0.01L	0.15A	0.00A	0.16A	YES	11.96A	45.2
	0.01L	0.16A	0.00A	0.16A	YES	12.50A	45.2
95.00	0.01L	0.16A	0.00A	0.17A	YES	12.25A	45.2
	0.01L	0.17A	0.00A	0.18A	YES	13.76A	45.2
81.08	0.01L	0.17A	0.00A	0.18A	YES	13.76A	45.2
	0.01L	0.18A	0.00A	0.18A	YES	15.26A	45.2
67.17	0.01L	0.18A	0.00A	0.18A	YES	15.26A	45.2
	0.01L	0.18A	0.00A	0.19A	YES	16.77A	45.2

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53.25	0.01L	0.18A	0.00A	0.19A	YES	16.77A	45.2
46.50	0.01L	0.18A	0.00A	0.19A	YES	17.50A	45.2
	0.01L	0.19A	0.00A	0.20A	YES	17.15A	45.2
34.87	0.01L	0.19A	0.00A	0.20A	YES	18.41A	45.2
	0.01L	0.19A	0.00A	0.20A	YES	18.41A	45.2
23.25	0.01L	0.19A	0.00A	0.20A	YES	19.67A	45.2
	0.01L	0.19A	0.00A	0.20A	YES	19.67A	45.2
11.62	0.01L	0.19A	0.00A	0.20A	YES	20.93A	45.2
	0.01L	0.19A	0.00A	0.20A	YES	20.93A	45.2
0.00	0.01L	0.19A	0.00A	0.20A	YES	22.19A	45.2

MAXIMUM LOADS ONTO FOUNDATION(w.r.t. wind direction)

DOWN	SHEAR.w.r.t.WIND.DIR	MOMENT.w.r.t.WIND.DIR	TORSION
kip	ALONG kip	ACROSS kip	ALONG ft-kip
	ACROSS kip	ALONG ft-kip	ACROSS ft-kip
52.48	10.49	0.12	-1311.00
L	A	C	A
			-22.05
			C
			0.13
			E

Round Base Plate and Anchor Rods, per ANSI/TIA 222-G

Pole Data

Diameter: 59.430 in (flat to flat)
Thickness: 0.4375 in
Yield (Fy): 65 ksi
of Sides: 18 "0" IF Round
Strength (Fu): 80 ksi

Reactions

Moment, Mu: 6082.13 ft-kips
Axial, Pu: 63.07 kips
Shear, Vu: 48.51 kips

Anchor Rod Data

Quantity: 18
Diameter: 2.25 in
Rod Material: A615
Strength (Fu): 100 ksi
Yield (Fy): 75 ksi
BC Diam. (in): 66.5 BC Override:

Anchor Rod Results

Maximum Rod (Pu+ Vu/η): 252.8 Kips
Allowable Φ *Rnt: 260.0 Kips (per 4.9.9)
Anchor Rod Interaction Ratio: **97.2% Pass**

Plate Data

Diameter (in): 72.25 Dia. Override:
Thickness: 2.25 in
Yield (Fy): 50 ksi
Eff Width/Rod: 10.48 in
Drain Hole: 2.625 in. diameter
Drain Location: 27.5 in. center of pole to center of drain hole
Center Hole: 47 in. diameter

Base Plate Results

Base Plate (Mu/Z): 42.0 ksi
Allowable Φ *Fy: 45.0 ksi (per AISC)
Base Plate Interaction Ratio: **93.4% Pass**

MAT FOUNDATION DESIGN BY SABRE TOWERS & POLES

170' Monopole BOONE COUNTY Battle School, MO (130727) 10-22-15 BD

Overall Loads:

Factored Moment (ft-kips)	6082.13
Factored Axial (kips)	63.07
Factored Shear (kips)	48.51
Bearing Design Strength (ksf)	4.5
Water Table Below Grade (ft)	28
Width of Mat (ft)	28
Thickness of Mat (ft)	1.75
Depth to Bottom of Slab (ft)	6
Quantity of Bolts in Bolt Circle	18
Bolt Circle Diameter (in)	66.5
Top of Concrete to Top of Bottom Threads (in)	60
Diameter of Pier (ft)	8
Ht. of Pier Above Ground (ft)	0.5
Ht. of Pier Below Ground (ft)	4.25
Quantity of Bars in Mat	55
Bar Diameter in Mat (in)	1
Area of Bars in Mat (in ²)	43.20
Spacing of Bars in Mat (in)	6.09
Quantity of Bars Pier	38
Bar Diameter in Pier (in)	1.128
Tie Bar Diameter in Pier (in)	0.625
Spacing of Ties (in)	12
Area of Bars in Pier (in ²)	37.97
Spacing of Bars in Pier (in)	7.24
f'c (ksi)	4.5
fy (ksi)	60
Unit Wt. of Soil (kcf)	0.12
Unit Wt. of Concrete (kcf)	0.15

Max. Net Bearing Press. (ksf)	4.22
Allowable Bearing Pressure (ksf)	3.00
Safety Factor	2.00
Ultimate Bearing Pressure (ksf)	6.00
Bearing Φ_s	0.75

Minimum Pier Diameter (ft)	7.04
Equivalent Square b (ft)	7.09

Recommended Spacing (in)	6 to 12
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Minimum Pier A_s (in ²)	36.19
Recommended Spacing (in)	6 to 12

Volume of Concrete (yd³) 59.66

Two-Way Shear Action:

Average d (in)	17
ϕV_c (kips)	1347.4
$\phi V_c = \phi(2 + 4/\beta_c)f'_c{}^{1/2}b_o d$	2064.7
$\phi V_c = \phi(\alpha_s d/b_o + 2)f'_c{}^{1/2}b_o d$	1347.4
$\phi V_c = \phi 4f'_c{}^{1/2}b_o d$	1376.5
Shear perimeter, b_o (in)	355.00
β_c	1

V_u (kips)	104.9
--------------	-------

One-Way Shear:

ϕV_c (kips)	651.4
-------------------	-------

V_u (kips)	409.7
--------------	-------

Stability:

Overturning Design Strength (ft-k)	8421.6
------------------------------------	--------

Total Applied M (ft-k)	6397.4
------------------------	--------

Pier Design:

ϕV_n (kips)	844.5	V_u (kips)	48.5
$\phi V_c = \phi 2(1 + N_u / (2000 A_g)) f'_c{}^{1/2} b_w d$	844.5		
V_s (kips)	0.0	*** $V_s \text{ max} = 4 f'_c{}^{1/2} b_w d$ (kips)	1978.3
Maximum Spacing (in)	7.62	(Only if Shear Ties are Required)	
Actual Hook Development (in)	16.00	Req'd Hook Development l_{dh} (in)	14.12
		*** Ref. To Spacing Requirements ACI 11.5.4.3	

Flexure in Slab:

ϕM_n (ft-kips)	3108.6	M_u (ft-kips)	3084.0
a (in)	2.02		
Steel Ratio	0.00756		
β_1	0.825		
Maximum Steel Ratio (ρ_t)	0.0197		
Minimum Steel Ratio	0.0018		
Rebar Development in Pad (in)	122.46	Required Development in Pad (in)	26.57

Condition	1 is OK, 0 Fails
Maximum Soil Bearing Pressure	1
Pier Area of Steel	1
Pier Shear	1
Interaction Diagram Visual Check	1
Two-Way Shear Action	1
One-Way Shear Action	1
Overturning	1
Flexure	1
Steel Ratio	1
Length of Development in Pad	1
Hook Development	1

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Lpile Plus for windows, Version 2013-07.005

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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Files Used for Analysis

Path to file locations: C:\Progra~2\Ensoft\Lpile2013\
Name of input data file: 130727.lp7d
Name of output report file: 130727.lp7o
Name of plot output file: 130727.lp7p
Name of runtime message file: 130727.lp7r

Date and Time of Analysis

Date: October 22, 2015 Time: 14:29:47

Problem Title

170' Monopole BOONE COUNTY Battle School, MO (130727) 10-22-15 BD

Job Number:

Client:

Engineer:

Description:

Program Options and Settings

Engineering Units of Input Data and Computations:
- Engineering units are US Customary Units (pounds, feet, inches)

Analysis Control Options:
- Maximum number of iterations allowed = 300
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in
- Number of pile increments = 100

Loading Type and Number of Cycles of Loading:
- Static loading specified

Computational Options:
- Use unfactored loads in computations (conventional analysis)
- Compute pile response under loading and nonlinear bending properties of pile
(only if nonlinear pile properties are input)
- Use of p-y modification factors for p-y curves not selected
- Loading by lateral soil movements acting on pile not selected
- Input of shear resistance at the pile tip not selected
- Computation of pile-head foundation stiffness matrix not selected
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:
- No p-y curves to be computed and reported for user-specified depths
- Values of pile-head deflection, bending moment, shear force, and
soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 3

 Pile Structural Properties and Geometry

Total number of pile sections = 1
 Total length of pile = 37.50 ft
 Depth of ground surface below top of pile = 0.50 ft
 Pile diameter values used for p-y curve computations are defined using 2 points.
 p-y curves are computed using pile diameter values interpolated with depth over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	96.0000000
2	37.50000	96.0000000

 Input Structural Properties:

Pile Section No. 1:

Section Type = Drilled Shaft (Bored Pile)
 Section Length = 37.50000 ft
 Section Diameter = 96.00000 in

 Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
 = 0.000 radians
 Pile Batter Angle = 0.000 degrees
 = 0.000 radians

 Soil and Rock Layering Information

The soil profile is modelled using 5 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 0.50000 ft
 Distance from top of pile to bottom of layer = 3.50000 ft
 Effective unit weight at top of layer = 124.93440 pcf
 Effective unit weight at bottom of layer = 124.93440 pcf
 Undrained cohesion at top of layer = 14.40000 psf
 Undrained cohesion at bottom of layer = 14.40000 psf
 Epsilon-50 at top of layer = 0.10000
 Epsilon-50 at bottom of layer = 0.10000

Layer 2 is stiff clay without free water

Distance from top of pile to top of layer = 3.50000 ft
 Distance from top of pile to bottom of layer = 13.50000 ft
 Effective unit weight at top of layer = 124.93440 pcf
 Effective unit weight at bottom of layer = 124.93440 pcf
 Undrained cohesion at top of layer = 1249.92000 psf
 Undrained cohesion at bottom of layer = 1249.92000 psf
 Epsilon-50 at top of layer = 0.00900
 Epsilon-50 at bottom of layer = 0.00900

Layer 3 is stiff clay without free water

Distance from top of pile to top of layer = 13.50000 ft
 Distance from top of pile to bottom of layer = 28.50000 ft
 Effective unit weight at top of layer = 124.93440 pcf
 Effective unit weight at bottom of layer = 124.93440 pcf
 Undrained cohesion at top of layer = 2999.52000 psf
 Undrained cohesion at bottom of layer = 2999.52000 psf
 Epsilon-50 at top of layer = 0.00500
 Epsilon-50 at bottom of layer = 0.00500

Layer 4 is stiff clay without free water

Distance from top of pile to top of layer = 28.50000 ft
 Distance from top of pile to bottom of layer = 30.50000 ft
 Effective unit weight at top of layer = 62.55360 pcf
 Effective unit weight at bottom of layer = 62.55360 pcf
 Undrained cohesion at top of layer = 2999.52000 psf
 Undrained cohesion at bottom of layer = 2999.52000 psf
 Epsilon-50 at top of layer = 0.00500
 Epsilon-50 at bottom of layer = 0.00500

Layer 5 is stiff clay without free water

Distance from top of pile to top of layer	=	30.50000	ft
Distance from top of pile to bottom of layer	=	50.50000	ft
Effective unit weight at top of layer	=	62.55360	pcf
Effective unit weight at bottom of layer	=	62.55360	pcf
Undrained cohesion at top of layer	=	2499.84000	psf
Undrained cohesion at bottom of layer	=	2499.84000	psf
Epsilon-50 at top of layer	=	0.00600	
Epsilon-50 at bottom of layer	=	0.00600	

(Depth of lowest soil layer extends 13.00 ft below pile tip)

 Summary of Soil Properties

Layer Num.	Layer Soil Type (p-y Curve Criteria)	Layer Depth ft	Effective Unit wt. pcf	Undrained Cohesion psf	Strain Factor Epsilon 50
1	Soft Clay	0.500	124.934	14.400	0.10000
		3.500	124.934	14.400	0.10000
2	Stiff Clay w/o Free Water	3.500	124.934	1249.920	0.00900
		13.500	124.934	1249.920	0.00900
3	Stiff Clay w/o Free Water	13.500	124.934	2999.520	0.00500
		28.500	124.934	2999.520	0.00500
4	Stiff Clay w/o Free Water	28.500	62.554	2999.520	0.00500
		30.500	62.554	2999.520	0.00500
5	Stiff Clay w/o Free Water	30.500	62.554	2499.840	0.00600
		50.500	62.554	2499.840	0.00600

 Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

 Pile-head Loading and Pile-head Fixity Conditions

Number of Loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y vs. Pile Length
1	1	V = 64680. lbs	M = 97314080. in-lbs	84093.	No

V = perpendicular shear force applied to pile head
 M = bending moment applied to pile head
 y = lateral deflection relative to pile axis
 S = pile slope relative to original pile batter angle
 R = rotational stiffness applied to pile head
 Axial thrust is assumed to be acting axially for all pile batter angles.

 Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Drilled Shaft (Bored Pile):

Length of Section	=	37.50000	ft
Shaft Diameter	=	96.00000	in
Concrete Cover Thickness	=	3.62419	in
Number of Reinforcing Bars	=	38	bars
Yield Stress of Reinforcing Bars	=	60000.	psi
Modulus of Elasticity of Reinforcing Bars	=	29000000.	psi
Gross Area of Shaft	=	7238.22947	sq. in.
Total Area of Reinforcing Steel	=	48.26000	sq. in.
Area Ratio of Steel Reinforcement	=	0.67	percent
Edge-to-Edge Bar Spacing	=	5.95417	in
Maximum Concrete Aggregate Size	=	0.75000	in
Ratio of Bar Spacing to Aggregate Size	=	7.94	
Offset of Center of Rebar Cage from Center of Pile	=	0.0000	in

Axial Structural Capacities:

Nom. Axial Structural Capacity = $0.85 F_c A_c + F_y A_s$ = 27341.497 kips

Tensile Load for Cracking of Concrete = 130727.lpo
 = -3151.843 kips
 Nominal Axial Tensile Capacity = -2895.600 kips

Reinforcing Bar Dimensions and Positions Used in Computations:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
1	1.27000	1.27000	43.74081	0.00000
2	1.27000	1.27000	43.14424	7.19950
3	1.27000	1.27000	41.37081	14.20262
4	1.27000	1.27000	38.46889	20.81832
5	1.27000	1.27000	34.51764	26.86616
6	1.27000	1.27000	29.62484	32.18116
7	1.27000	1.27000	23.92396	36.61834
8	1.27000	1.27000	17.57048	40.05667
9	1.27000	1.27000	10.73773	42.40235
10	1.27000	1.27000	3.61209	43.59141
11	1.27000	1.27000	-3.61209	43.59141
12	1.27000	1.27000	-10.73773	42.40235
13	1.27000	1.27000	-17.57048	40.05667
14	1.27000	1.27000	-23.92396	36.61834
15	1.27000	1.27000	-29.62484	32.18116
16	1.27000	1.27000	-34.51764	26.86616
17	1.27000	1.27000	-38.46889	20.81832
18	1.27000	1.27000	-41.37081	14.20262
19	1.27000	1.27000	-43.14424	7.19950
20	1.27000	1.27000	-43.74081	0.00000
21	1.27000	1.27000	-43.14424	-7.19950
22	1.27000	1.27000	-41.37081	-14.20262
23	1.27000	1.27000	-38.46889	-20.81832
24	1.27000	1.27000	-34.51764	-26.86616
25	1.27000	1.27000	-29.62484	-32.18116
26	1.27000	1.27000	-23.92396	-36.61834
27	1.27000	1.27000	-17.57048	-40.05667
28	1.27000	1.27000	-10.73773	-42.40235
29	1.27000	1.27000	-3.61209	-43.59141
30	1.27000	1.27000	3.61209	-43.59141
31	1.27000	1.27000	10.73773	-42.40235
32	1.27000	1.27000	17.57048	-40.05667
33	1.27000	1.27000	23.92396	-36.61834
34	1.27000	1.27000	29.62484	-32.18116
35	1.27000	1.27000	34.51764	-26.86616
36	1.27000	1.27000	38.46889	-20.81832
37	1.27000	1.27000	41.37081	-14.20262
38	1.27000	1.27000	43.14424	-7.19950

NOTE: The positions of the above rebars were computed by LPile

Minimum spacing between any two bars not equal to zero = 5.95417 inches between Bars 26 and 27
 Spacing to aggregate size ratio = 7.93890

Concrete Properties:

Compressive Strength of Concrete = 4000.00000 psi
 Modulus of Elasticity of Concrete = 3604997. psi
 Modulus of Rupture of Concrete = -474.34164 psi
 Compression Strain at Peak Stress = 0.00189
 Tensile Strain at Fracture of Concrete = -0.0001154
 Maximum Coarse Aggregate Size = 0.75000 in

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	84.093

Definitions of Run Messages and Notes:

C = concrete in section has cracked in tension.
 Y = stress in reinforcing steel has reached yield stress.
 T = ACI 318-08 criteria for tension-controlled section met, tensile strain in reinforcement exceeds 0.005 while simultaneously compressive strain in concrete more than 0.003. See ACI 318-08, Section 10.3.4.
 Z = depth of tensile zone in concrete section is less than 10 percent of section depth.

Bending Stiffness (EI) = Computed Bending Moment / Curvature.
 Position of neutral axis is measured from edge of compression side of pile.
 Compressive stresses and strains are positive in sign.
 Tensile stresses and strains are negative in sign.

Axial Thrust Force = 84.093 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in ²	Depth to N Axis in	Max Comp Strain in/in	Max Tens Strain in/in	Max Concrete Stress ksi	Max Steel Stress ksi	Run Msg
-----	-----	-----	-----	-----	-----	-----	-----	-----

0.000000313	5867.7942909	18776941731.	56.4651367	0.0000176	-0.0000124	0.0738567	0.5073653
0.000000625	11707.	18731597466.	52.2461914	0.0000327	-0.0000273	0.1360415	0.9382622
0.000000938	17517.	18685054549.	50.8399826	0.0000477	-0.0000423	0.1977304	1.3691620
0.000001250	23298.	18638208298.	50.1369322	0.0000627	-0.0000573	0.2589231	1.8000638
0.000001563	29049.	18591240321.	49.7151409	0.0000777	-0.0000723	0.3196196	2.2309673
0.000001875	34770.	18544211435.	49.4339789	0.0000927	-0.0000873	0.3798200	2.6618726
0.000002188	40463.	18497147716.	49.2331760	0.0001077	-0.0001023	0.4395242	3.0927796
0.000002500	40463.	16185004252.	25.2740319	0.0000632	-0.0001768	0.2585700	-5.0928327
0.000002813	40463.	14386670446.	24.7915823	0.0000697	-0.0002003	0.2847397	-5.7687866
0.000003125	40463.	12948003401.	24.4032900	0.0000763	-0.0002237	0.3107878	-6.4449518
0.000003438	40463.	11770912183.	24.0746360	0.0000828	-0.0002472	0.3365915	-7.1222097
0.000003750	40463.	10790002835.	23.8017042	0.0000893	-0.0002707	0.3623189	-7.7993647
0.000004063	40463.	9960002617.	23.5716380	0.0000958	-0.0002942	0.3879700	-8.4764164
0.000004375	40463.	9248573858.	23.3681732	0.0001022	-0.0003178	0.4134202	-9.1542630
0.000004688	40463.	8632002268.	23.1904303	0.0001087	-0.0003413	0.4387541	-9.8323009
0.000005000	40463.	8092502126.	23.0356385	0.0001152	-0.0003648	0.4640129	-10.5102324
0.000005313	40463.	7616472589.	22.8997496	0.0001217	-0.0003883	0.4891963	-11.1880573
0.000005625	40463.	7193335223.	22.7796151	0.0001281	-0.0004119	0.5143043	-11.8657753
0.000005938	40463.	6814738632.	22.6727491	0.0001346	-0.0004354	0.5393369	-12.5433860
0.000006250	40463.	6474001701.	22.5771631	0.0001411	-0.0004589	0.5642938	-13.2208892
0.000006563	40463.	6165715905.	22.4877390	0.0001476	-0.0004824	0.5890847	-13.8989521
0.000006875	40463.	5885456092.	22.4062098	0.0001540	-0.0005060	0.6137796	-14.5770619
0.000007188	40463.	5629566696.	22.3323079	0.0001605	-0.0005295	0.6383999	-15.2550596
0.000007500	40463.	5395001417.	22.2650815	0.0001670	-0.0005530	0.6629453	-15.9329448
0.000007813	40463.	5179201361.	22.2037310	0.0001735	-0.0005765	0.6874158	-16.6107172
0.000008125	40463.	4980001308.	22.1475801	0.0001799	-0.0006001	0.7118112	-17.2883764
0.000008438	40463.	4795556815.	22.0960524	0.0001864	-0.0006236	0.7361315	-17.9659222
0.000008750	40463.	4624286929.	22.0486539	0.0001929	-0.0006471	0.7603765	-18.6433540
0.000009063	40463.	4464828759.	22.0049589	0.0001994	-0.0006706	0.7845460	-19.3206717
0.000009375	40463.	4316001134.	21.9645983	0.0002059	-0.0006941	0.8086401	-19.9978748
0.000009688	40463.	4176775291.	21.9272507	0.0002124	-0.0007176	0.8326585	-20.6749630
0.000010000	40463.	4046251063.	21.8926349	0.0002189	-0.0007411	0.8566011	-21.3519359
0.000010313	40463.	3923637394.	21.8605038	0.0002254	-0.0007646	0.8804678	-22.0287931
0.000010625	40463.	3808236295.	21.8306393	0.0002320	-0.0007880	0.9042585	-22.7055342
0.000010938	40463.	3699429543.	21.8028483	0.0002385	-0.0008115	0.9279730	-23.3821590
0.000011250	40463.	3596667612.	21.7769592	0.0002450	-0.0008350	0.9516113	-24.0586670
0.000011563	40463.	3499460379.	21.7528188	0.0002515	-0.0008585	0.9751732	-24.7350579
0.000011875	40463.	3407369316.	21.7302903	0.0002580	-0.0008820	0.9986585	-25.4113313
0.000012188	40463.	3320000872.	21.7092506	0.0002646	-0.0009054	1.0220672	-26.0874867
0.000012500	40463.	3158049610.	21.6712062	0.0002711	-0.0009289	1.0686542	-27.4394424
0.000012813	40463.	3012153313.	21.6379228	0.0002777	-0.0009523	1.1149329	-28.7909219
0.000013125	40463.	2995178129.	21.6087732	0.0002842	-0.0009758	1.1609026	-30.1419221
0.000013438	40463.	2987581207.	21.5878111	0.0002908	-0.0010000	1.2065153	-31.4928219
0.000013750	40463.	2980486451.	21.5687811	0.0002973	-0.0010242	1.2517972	-32.8434037
0.000014063	40463.	2973836468.	21.5502050	0.0003039	-0.0010484	1.2967706	-34.1934731
0.000014375	40463.	2967582059.	21.5318784	0.0003104	-0.0010726	1.3414346	-35.5430265
0.000014688	40463.	2961681378.	21.5145417	0.0003169	-0.0010968	1.3857879	-36.8920606
0.000015000	40463.	2956097778.	21.4979657	0.0003234	-0.0011210	1.4298296	-38.2405707
0.000015313	40463.	2950799575.	21.4826349	0.0003300	-0.0011452	1.4735583	-39.5885538
0.000015625	40463.	2945759102.	21.4681240	0.0003365	-0.0011694	1.5169731	-40.9360059
0.000015938	40463.	2940952091.	21.4543417	0.0003430	-0.0011936	1.5600726	-42.2829232
0.000016250	40463.	2936357169.	21.4414886	0.0003495	-0.0012178	1.6028558	-43.6293019
0.000016563	40463.	2931955431.	21.4296393	0.0003560	-0.0012420	1.6453215	-44.9751380
0.000016875	40463.	2927730100.	21.4187903	0.0003625	-0.0012662	1.6874685	-46.3204274
0.000017188	40463.	2923666230.	21.4089903	0.0003690	-0.0012904	1.7292955	-47.6651662
0.000017500	40463.	2919750466.	21.4002903	0.0003755	-0.0013146	1.7708013	-49.0093502
0.000017813	40463.	2915970833.	21.3926393	0.0003820	-0.0013388	1.8119848	-50.3529753
0.000018125	40463.	2912316564.	21.3859883	0.0003885	-0.0013630	1.8528446	-51.6960372
0.000018438	40463.	2908777950.	21.3793373	0.0003950	-0.0013872	1.8933795	-53.0385317
0.000018750	40463.	2905346214.	21.3726863	0.0004015	-0.0014114	1.9335883	-54.3804544
0.000019063	40463.	2902013397.	21.3660353	0.0004080	-0.0014356	1.9734696	-55.7218010
0.000019375	40463.	2898772269.	21.3593843	0.0004145	-0.0014598	2.0130222	-57.0625670
0.000019688	40463.	2895616244.	21.3527333	0.0004210	-0.0014840	2.0522446	-58.4027478
0.000020000	40463.	2892539309.	21.3460823	0.0004275	-0.0015082	2.0911357	-59.7423389
0.000020313	40463.	2889535964.	21.3394313	0.0004340	-0.0015324	2.1296940	-61.0820000
0.000020625	40463.	2884128197.	21.3327803	0.0004405	-0.0015566	2.1679181	-62.4216611
0.000020938	40463.	2870472224.	21.3261293	0.0004470	-0.0015808	2.2052797	-63.7613222
0.000021250	40463.	2852650788.	21.3194783	0.0004535	-0.0016050	2.2404794	-65.1010000
0.000021563	40463.	2830916915.	21.3128273	0.0004600	-0.0016292	2.2743289	-66.4406777
0.000021875	40463.	2808380713.	21.3061763	0.0004665	-0.0016534	2.3068219	-67.7803554
0.000022188	40463.	2784693632.	21.3000000	0.0004730	-0.0016776	2.3386620	-69.1200331
0.000022500	40463.	2758363712.	21.2938237	0.0004795	-0.0017018	2.3697409	-70.4597108
0.000022813	40463.	2732434914.	21.2876474	0.0004860	-0.0017260	2.3996675	-71.8000000
0.000023125	40463.	2707271080.	21.2814711	0.0004925	-0.0017502	2.4292086	-73.1400000
0.000023438	40463.	2680611856.	21.2752948	0.0004990	-0.0017744	2.4584663	-74.4800000
0.000023750	40463.	2652446487.	21.2691185	0.0005055	-0.0017986	2.4868142	-75.8200000
0.000024063	40463.	2625119970.	21.2629422	0.0005120	-0.0018228	2.5142389	-77.1600000
0.000024375	40463.	2598694888.	21.2567659	0.0005185	-0.0018470	2.5414092	-78.5000000
0.000024688	40463.	2492119435.	21.2505896	0.0005250	-0.0018712	2.5683562	-79.8400000
0.000025000	40463.	2391396547.	21.2444133	0.0005315	-0.0018954	2.6707610	-81.1800000
0.000025313	40463.	2292656096.	21.2382370	0.0005380	-0.0019196	2.7662096	-82.5200000
0.000025625	40463.	2202143733.	21.2320607	0.0005445	-0.0019438	2.8547024	-83.8600000
0.000025938	40463.	2117369226.	21.2258844	0.0005510	-0.0019680	2.9393267	-85.2000000
0.000026250	40463.	2035606576.	21.2197081	0.0005575	-0.0019922	3.0191806	-86.5400000
0.000026563	40463.	1961232827.	21.2135318	0.0005640	-0.0020164	3.0923071	-87.8800000
0.000026875	40463.	1893006959.	21.2073555	0.0005705	-0.0020406	3.1628436	-89.2200000
0.000027188	40463.	1825741951.	21.2011792	0.0005770	-0.0020648	3.2305940	-90.5600000
0.000027500	40463.	1763471226.	21.1950029	0.0005835	-0.0020890	3.2927200	-91.9000000
0.000027813	40463.	1705854471.	21.1888266	0.0005900	-0.0021132	3.3513087	-93.2400000
0.000028125	40463.	1652472150.	21.1826503	0.0005965	-0.0021374	3.4069552	-94.5800000
0.000028438	40463.	1601960340.	21.1764740	0.0006030	-0.0021616	3.4602857	-95.9200000
0.000028750	40463.	1553056541.	21.1702977	0.0006095	-0.0021858	3.5105371	-97.2600000
0.000029063	40463.	1507094389.	21.1641214	0.0006160	-0.0022100	3.5569807	-98.6000000
0.000029375	40463.	1463861797.	21.1579451	0.0006225	-0.0022342	3.6010086	-100.0000000
0.000029688	40463.	1423308656.	21.1517688	0.0006290	-0.0022584	3.6415627	-101.3400000
0.000030000	40463.	1385189925.	21.1455925	0.0006355	-0.0022826	3.6800069	-102.6800000
0.000030313	40463.			0.0006420	-0.0023068	3.7165089	-104.0200000

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0.0000847	114266.	1349269236.	17.1943415	0.0014561	-0.0066739	3.7508397	-60.0000000	CY
0.0000872	114675.	1315273071.	17.0751858	0.0014887	-0.0068813	3.7829655	-60.0000000	CY
0.0000897	114959.	1281767540.	16.9483073	0.0015201	-0.0070899	3.8116911	-60.0000000	CY
0.0000922	115231.	1249966875.	16.8283798	0.0015514	-0.0072986	3.8383839	-60.0000000	CY
0.0000947	115489.	1219681154.	16.7066216	0.0015819	-0.0075081	3.8624302	-60.0000000	CY
0.0000972	115740.	1190895649.	16.5892980	0.0016123	-0.0077177	3.8844126	-60.0000000	CY
0.0000997	115990.	1163533805.	16.4788557	0.0016427	-0.0079273	3.9045477	-60.0000000	CY
0.0001022	116237.	1137490804.	16.3748016	0.0016733	-0.0081367	3.9228166	-60.0000000	CY
0.0001047	116483.	1112671839.	16.2766900	0.0017040	-0.0083460	3.9392001	-60.0000000	CY
0.0001072	116726.	1088990938.	16.1841172	0.0017347	-0.0085553	3.9536784	-60.0000000	CY
0.0001097	116967.	1066369960.	16.0967167	0.0017656	-0.0087644	3.9662316	-60.0000000	CY
0.0001122	117207.	1044737725.	16.0141550	0.0017966	-0.0089734	3.9768391	-60.0000000	CY
0.0001147	117430.	1023912042.	15.9341230	0.0018274	-0.0091826	3.9854213	-60.0000000	CY
0.0001172	117604.	1003551449.	15.8514499	0.0018576	-0.0093924	3.9918910	-60.0000000	CY
0.0001197	117762.	983913458.	15.7644129	0.0018868	-0.0096032	3.9963579	-60.0000000	CY
0.0001222	117895.	964872241.	15.6768497	0.0019155	-0.0098145	3.9990279	-60.0000000	CY
0.0001247	118027.	946582017.	15.5935843	0.0019443	-0.0100257	3.9999964	-60.0000000	CY
0.0001272	118156.	928990396.	15.5146824	0.0019733	-0.0102367	3.9918632	-60.0000000	CY
0.0001297	118284.	912065654.	15.4395538	0.0020023	-0.0104477	3.9943800	-60.0000000	CY
0.0001322	118410.	895770360.	15.3679704	0.0020315	-0.0106585	3.9977065	-60.0000000	CY
0.0001347	118534.	880069284.	15.2997436	0.0020607	-0.0108693	3.9995709	-60.0000000	CY
0.0001372	118657.	864926573.	15.2348358	0.0020900	-0.0110800	3.9980536	-60.0000000	CY
0.0001522	119358.	784284249.	14.9048037	0.0022683	-0.0123417	3.9947316	60.0000000	CY
0.0001672	119919.	717274041.	14.6075504	0.0024422	-0.0136078	3.9999619	60.0000000	CY
0.0001822	120253.	660049527.	14.3353960	0.0026117	-0.0148783	3.9957353	60.0000000	CY
0.0001972	120544.	611314909.	14.1118341	0.0027827	-0.0161473	3.9860306	60.0000000	CY
0.0002122	120817.	569387806.	13.9297284	0.0029557	-0.0174143	3.9970866	60.0000000	CY
0.0002272	121019.	532682783.	13.7669720	0.0031277	-0.0186823	3.9868749	60.0000000	CYT
0.0002422	121194.	500414822.	13.6363417	0.0033026	-0.0199474	3.9898604	60.0000000	CYT
0.0002572	121339.	471793455.	13.5359216	0.0034813	-0.0212087	3.9998909	60.0000000	CYT
0.0002722	121402.	446024847.	13.4468361	0.0036601	-0.0224699	3.9763792	60.0000000	CYT
0.0002872	121454.	422908081.	13.3693898	0.0038395	-0.0237305	3.9852614	60.0000000	CYT

Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1

Moment values interpolated at maximum compressive strain = 0.003 or maximum developed moment if pile fails at smaller strains.

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip	Max. Comp. Strain
1	84.093	120868.967	0.00300000

Note note that the values of moment capacity in the table above are not factored by a strength reduction factor (phi-factor).

In ACI 318-08, the value of the strength reduction factor depends on whether the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.70).

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to ACI 318-08, Section 9.3.2.2 or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding bending stiffnesses computed for common resistance factor values used for reinforced concrete sections.

Axial Load No.	Resistance Factor for Moment	Nominal Moment Capacity in-kip	Ultimate (Factored) Axial Thrust kips	Ultimate (Factored) Moment Capacity in-kip	Bending Stiffness at Ult. Mom. Cap. kip-in ²
1	0.65	120868.967	54.661	78564.826	2899233457.034
1	0.70	120868.967	58.865	84608.276	2887461693.667
1	0.75	120868.967	63.070	90651.725	2802156928.171

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (Loading Type 1)

Shear force at pile head = 64680.0 lbs
 Applied moment at pile head = 97314080.0 in-lbs
 Axial thrust load on pile head = 84093.3 lbs

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in ²	Soil Res. p lb/in	Soil Spr. Es ^{*h} lb/inch	Distrib. Lat. Load lb/inch
0.00	3.4998	97314080.	64680.	-0.0175	0.000	2.565E+12	0.000	0.000	0.000
1.125	3.2668	98206585.	64575.	-0.0170	0.000	2.524E+12	-20.8928	28.7794	0.000
2.250	3.0410	99095365.	64281.	-0.0165	0.000	2.482E+12	-21.6980	32.1079	0.000
3.375	2.8225	99979580.	63992.	-0.0159	0.000	2.436E+12	-21.1653	33.7446	0.000
4.500	2.6114	1.008E+08	48572.	-0.0154	0.000	2.397E+12	-1387.8033	2391.4573	0.000
5.625	2.4080	1.013E+08	29492.	-0.0148	0.000	2.363E+12	-1438.1960	2687.6266	0.000
6.750	2.2124	1.016E+08	9759.1670	-0.0142	0.000	2.345E+12	-1484.6616	3019.7313	0.000
7.875	2.0247	1.016E+08	-10574.	-0.0136	0.000	2.344E+12	-1527.0431	3393.8567	0.000
9.000	1.8449	1.013E+08	-31451.	-0.0130	0.000	2.361E+12	-1565.1533	3817.5636	0.000

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10.125	1.6730	1.008E+08	-52812.	-0.0125	0.000	2.396E+12	-1598.7619	4300.4207	0.000
11.250	1.5086	99949213.	-74595.	-0.0119	0.000	2.438E+12	-1627.5802	4854.7737	0.000
12.375	1.3518	98806388.	-96732.	-0.0113	0.000	2.497E+12	-1651.2454	5496.8594	0.000
13.500	1.2022	97362093.	-120955.	-0.0108	0.000	2.563E+12	-2470.8616	9249.1336	0.000
14.625	1.0594	95442401.	-167945.	-0.0103	0.000	2.647E+12	-3681.1594	15636.	0.000
15.750	0.9233	92851450.	-217556.	-0.009853	0.000	2.739E+12	-3666.4373	17870.	0.000
16.875	0.7933	89591989.	-266862.	-0.009410	0.000	2.826E+12	-3635.5987	20623.	0.000
18.000	0.6691	85669716.	-315625.	-0.008996	0.000	2.884E+12	-3585.3217	24113.	0.000
19.125	0.5503	81093887.	-363551.	-0.008606	0.000	2.895E+12	-3510.7643	28708.	0.000
20.250	0.4366	75878218.	-410265.	-0.008240	0.000	2.904E+12	-3404.4285	35086.	0.000
21.375	0.3277	70042287.	-455260.	-0.007902	0.000	2.916E+12	-3253.4495	44674.	0.000
22.500	0.2232	63613968.	-497779.	-0.007593	0.000	2.931E+12	-3032.4272	61144.	0.000
23.625	0.1226	56634377.	-536513.	-0.007317	0.000	2.950E+12	-2676.8139	98264.	0.000
24.750	0.0255	49171575.	-568074.	-0.007075	0.000	2.974E+12	-1852.3259	327002.	0.000
25.875	-0.0686	41549275.	-551549.	-0.006870	0.000	3.007E+12	2429.7068	159403.	0.000
27.000	-0.1608	34352380.	-514035.	-0.006817	0.000	1.855E+13	3077.3364	86121.	0.000
28.125	-0.2527	27713885.	-469361.	-0.006794	0.000	1.860E+13	3524.7709	62777.	0.000
29.250	-0.3443	21711247.	-420282.	-0.006776	0.000	1.865E+13	3792.7822	49578.	0.000
30.375	-0.4356	16399261.	-366973.	-0.006763	0.000	1.869E+13	4100.0337	42352.	0.000
31.500	-0.5269	11801529.	-315815.	-0.006752	0.000	1.873E+13	3821.9325	32644.	0.000
32.625	-0.6180	7900116.	-262690.	-0.006745	0.000	1.875E+13	4046.3059	29465.	0.000
33.750	-0.7090	4735978.	-206620.	-0.006741	0.000	1.878E+13	4258.8563	27031.	0.000
34.875	-0.8000	2347893.	-147743.	-0.006738	0.000	1.878E+13	4462.5114	25102.	0.000
36.000	-0.8909	773006.	-86165.	-0.006737	0.000	1.878E+13	4659.2774	23533.	0.000
37.125	-0.9819	47198.	-21969.	-0.006737	0.000	1.878E+13	4850.5863	22230.	0.000

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 1:

Pile-head deflection = 3.4997503 inches
 Computed slope at pile head = -0.0175097 radians
 Maximum bending moment = 101643311. inch-lbs
 Maximum shear force = -569294. lbs
 Depth of maximum bending moment = 7.5000000 feet below pile head
 Depth of maximum shear force = 25.1250000 feet below pile head
 Number of iterations = 74
 Number of zero deflection points = 1

 Summary of Pile Response(s)

Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
 Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
 Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
 Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
 Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load No.	Pile-head Condition 1 V(lbs) or y(inches)	Pile-head Condition 2 M or in-lb/rad.	Axial Loading lbs	Pile-head Deflection inches	Maximum Moment in Pile in-lbs	Maximum Shear in Pile lbs	Pile-head Rotation radians
1	1	V = 64680.	M = 97314080.	84093.	3.49975031	101643311.	-569294.	-0.01750968

The analysis ended normally.

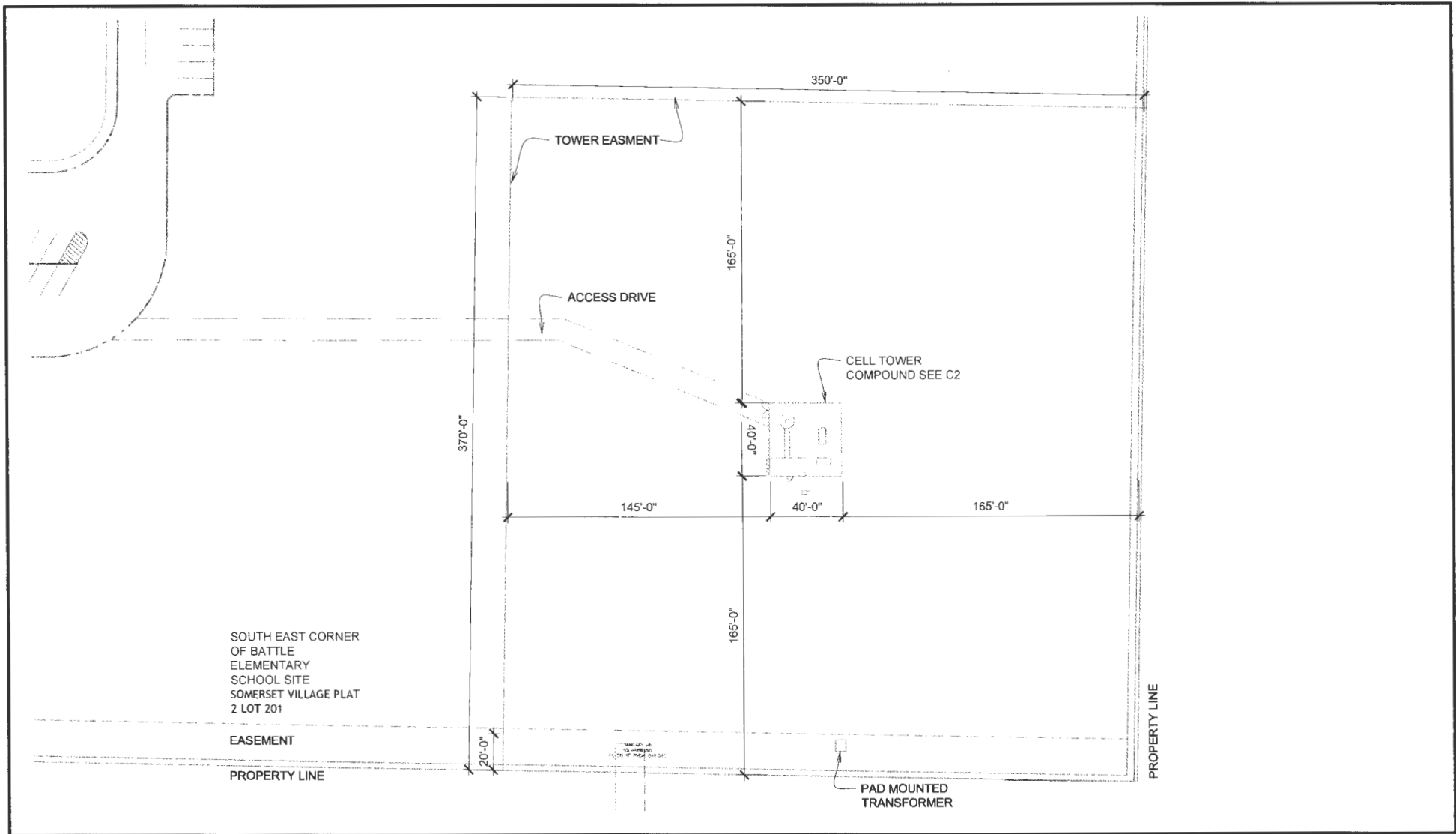
1805.7.2.1 (2006 IBC) & 1807.3.2.1 (2009 IBC & 2012 IBC)

$$d = A/2*(1+(1+(4.36*h/A))^0.5)$$

Monopole

Moment (ft-k)	6082.13
Shear (k)	48.5
Caisson Diameter, b (ft)	8
Caisson Height Above Ground (ft)	0.5
Caisson Height Below Ground (ft)	30
Lateral soil pressure per foot (lb/ft ³)	270

Applied lateral force, P (lbs)	48510
Dist. from ground to application of P, h (ft)	125.88
A = 2.34*P/(S1*b)	5.26
Min. Depth of Embedment Required, d (ft)	29.61



TOWER SITE PLAN

SCALE: 1" = 50'-0"

PROJECT COLUMBIA PUBLIC SCHOOLS - BATTLE ELEMENTARY SCHOOL TOWER

DRAWING NO.	C1
DATE	07/13/15