



INVITATION TO BID

(This is not an order.)

CITY OF CLEVELAND

Division of Purchases & Supplies
601 Lakeside Avenue
Room 128
Cleveland, OH 44114

Buyer: Jules Gilliam
216-664-2621
jgilliam@city.cleveland.oh.us

Requestor: Ronald Little
216-664-4200
rlittle@cpp.org

Procurement Folder	RFB No.	RFB Description	
153159	RFB 2004 202500000000217	Wood Poles - May 2025	
RFB Closing Date/Time		Department/Division	Public Bid Opening Date/Time
May 12, 2025 3:00 PM		2004	May 12, 2025 3:00 PM

SCHEDULE OF EVENTS

Event Description			Event Date	
Group/ Line#	Commodity Description	Item Quantity/ UOM	Service Dates	Catalog Discount
1 / 1	35 Ft Class 3 Wood Poles	60.00000 / EA		

CPP # 444650

35' Wood Poles Class 3

*****Please See Attachment for Additional Details & Specifications*****

*****The Bid Must Be Submitted to: CityofClevelandbids@Clevelandohio.Gov - ONLY*****

Manufacturer Name: _____

Item/Product Number: _____

Number of Days for Delivery After Award: _____

*****PLEASE NOTE: Unit Costs MUST Include: Shipping & Handling and ANY Applicable Costs*****

*****Vendor MUST Submit Product & Warranty Information if Applicable with Bid Submission*****

*****Evaluation Method - Unit Price & Delivery Time Will Be Factored in the Evaluation Process to Determine Lowest & Best Bid Received*****

****MUST BE DELIVERED BY SELF LOADING TRUCK*****

*****VENDOR MUST BE AN AUTHORIZED DISTRIBUTOR OR MANUFACTURER OF THE PRODUCT. MUST SHOW PROOF OF DOING BUSINESS WITH A NAME DISTRIBUTOR WITHIN THE BID SUBMISSION*****

Ship To:	Vendor Response		
Eastside Service Ctr. E140th 743 E140 St. Cleveland, OH 44110	Unit Price	Extension	Delivery Days
	\$	\$	Day(s)



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May 12, 2025 3:00 PM			2004	May 12, 2025 3:00 PM	
Group/ Line#	Commodity Description		Item Quantity/ UOM	Service Dates	Catalog Discount
1 / 2	40 Ft Class 3 Wood Poles		4.00000 / EA		

CPP # 444750

40' Wood Poles Class 3

*****Please See Attachment for Additional Details & Specifications*****

*****The Bid Must Be Submitted to: CityofClevelandbids@Clevelandohio.Gov - ONLY*****

Manufacturer Name: _____

Item/Product Number: _____

Number of Days for Delivery After Award: _____

*****PLEASE NOTE: Unit Costs MUST Include: Shipping & Handling and ANY Applicable Costs*****

*****Vendor MUST Submit Product & Warranty Information if Applicable with Bid Submission*****

*****Evaluation Method - Unit Price & Delivery Time Will Be Factored in the Evaluation Process to Determine Lowest & Best Bid Received*****

*****MUST BE DELIVERED BY SELF LOADING TRUCK*****

*****VENDOR MUST BE AN AUTHORIZED DISTRIBUTOR OR MANUFACTURER OF THE PRODUCT. MUST SHOW PROOF OF DOING BUSINESS WITH A NAME DISTRIBUTOR WITHIN THE BID SUBMISSION*****

Ship To:	Vendor Response		
Eastside Service Ctr. E140th 743 E140 St. Cleveland, OH 44110	Unit Price	Extension	Delivery Days
	\$	\$	Day(s)



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May 12, 2025 3:00 PM			2004	May 12, 2025 3:00 PM	
Group/ Line#	Commodity Description		Item Quantity/ UOM	Service Dates	Catalog Discount
1 / 3	50 Ft Class 1 Wood Poles		2.00000 / EA		

CPP # 444950

50' Wood Poles Class 1

*****Please See Attachment for Additional Details & Specifications*****

*****The Bid Must Be Submitted to: CityofClevelandbids@Clevelandohio.Gov - ONLY*****

Manufacturer Name: _____

Item/Product Number: _____

Number of Days for Delivery After Award: _____

*****PLEASE NOTE: Unit Costs MUST Include: Shipping & Handling and ANY Applicable Costs*****

*****Vendor MUST Submit Product & Warranty Information if Applicable with Bid Submission*****

*****Evaluation Method - Unit Price & Delivery Time Will Be Factored in the Evaluation Process to Determine Lowest & Best Bid Received*****

*****MUST BE DELIVERED BY SELF LOADING TRUCK*****

*****VENDOR MUST BE AN AUTHORIZED DISTRIBUTOR OR MANUFACTURER OF THE PRODUCT. MUST SHOW PROOF OF DOING BUSINESS WITH A NAME DISTRIBUTOR WITHIN THE BID SUBMISSION*****

Ship To:

Eastside Service Ctr. E140th
743 E140 St.

Cleveland, OH 44110

Vendor Response

Unit Price	Extension	Delivery Days
\$	\$	Day(s)



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Group/ Line#	Commodity Description		Item Quantity/ UOM	Service Dates	Catalog Discount
1 / 4	55 Ft Class 3 Wood Poles		12.00000 / EA		

CPP # 445150

55' Wood Poles Class 3

*****Please See Attachment for Additional Details & Specifications*****

*****The Bid Must Be Submitted to: CityofClevelandbids@Clevelandohio.Gov - ONLY*****

Manufacturer Name: _____

Item/Product Number: _____

Number of Days for Delivery After Award: _____

*****PLEASE NOTE: Unit Costs MUST Include: Shipping & Handling and ANY Applicable Costs*****

*****Vendor MUST Submit Product & Warranty Information if Applicable with Bid Submission*****

*****Evaluation Method - Unit Price & Delivery Time Will Be Factored in the Evaluation Process to Determine Lowest & Best Bid Received*****

*****MUST BE DELIVERED BY SELF LOADING TRUCK*****

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Ship To:

Eastside Service Ctr. E140th
743 E140 St.

Cleveland, OH 44110

Vendor Response

Unit Price

Extension

Delivery Days

\$

\$

Day(s)



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601 Lakeside Avenue
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Group/ Line#	Commodity Description		Item Quantity/ UOM	Service Dates	Catalog Discount
1 / 5	70 Ft Class 1 Wood Poles		2.00000 / EA		

CPP # 445450

70' Wood Poles Class 1

*****Please See Attachment for Additional Details & Specifications*****

*****The Bid Must Be Submitted to: CityofClevelandbids@Clevelandohio.Gov - ONLY*****

Manufacturer Name: _____

Item/Product Number: _____

Number of Days for Delivery After Award: _____

*****PLEASE NOTE: Unit Costs MUST Include: Shipping & Handling and ANY Applicable Costs*****

*****Vendor MUST Submit Product & Warranty Information if Applicable with Bid Submission*****

*****Evaluation Method - Unit Price & Delivery Time Will Be Factored in the Evaluation Process to Determine Lowest & Best Bid Received*****

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Ship To:		Vendor Response		
Eastside Service Ctr. E140th 743 E140 St. Cleveland, OH 44110		Unit Price	Extension	Delivery Days
		\$	\$	Day(s)

Vendor Response	Vendor Total Amount for Items	Vendor Total Amount for Services	Payment Discount Offer	
	\$	\$	%	Day(s)



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TERMS OF DELIVERY

- Price quoted shall be F.O.B. delivered to the place designated on purchase order. No other terms will be acceptable.
- Delivery quoted must be stated in terms of work days after receipt of the order.
- All charges for shipping must be included within the Unit Price for each item quote unless otherwise designated by a separate line with a specified dollar amount inclusive of all shipping charges.
- No freight charges will be considered nor processed for payment unless apart of the original quote submitted prior to bid award.

EVALUATION CRITERIA

Group/ Line #	Evaluation Criteria Description	Response Type
1 / 1	Lowest and best bidder under Chapter 181 C.O.	NONE

BIDDER AGREES TO COMPLY WITH ALL TERMS AND CONDITIONS BELOW AND ON REVERSE SIDE OF THIS BID

Shipping/Freight Charges

ALL CHARGES FOR SHIPPING MUST BE INCLUDED WITHIN THE UNIT PRICE OF EACH QUOTE UNLESS OTHERWISE DESIGNATED BY A SEPARATE LINE ITEM WITH A SPECIFIED DOLLAR AMOUNT INCLUSIVE OF ALL SHIPPING CHARGES.
NO FREIGHT CHARGES WILL BE CONSIDERED NOR PROCESSED FOR PAYMENT UNLESS APART OF THE ORIGINAL QUOTE SUBMITTED PRIOR TO BID AWARD.

Call Buyer Only

Bidders must address all questions to the Buyer (See Above.) Do NOT contact the "Requestor." Contract only the Buyer listed above.

MSDS required

A Material Safety Data Sheet is required to be shipped with each specific applicable item on this PO.

No Price increase

This Purchase Order does not permit price increases.

Missing information

It is each bidder's individual responsibility to determine for themselves, in advance of bid submission, the accuracy and completeness of any and all information in an RFB. If a potential bidder does not notify the Division of Purchases and Supplies in advance of the bid opening date of any possible discrepancy then any such discrepancy or erratum cannot be the basis for a protest of award. Contact the Buyer immediately if there is a question of accuracy or completeness in these bid documents.



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BIDDER MUST COMPLETE & SIGN BELOW

NAME OF THE FIRM:		
STREET ADDRESS:		
CITY:	STATE:	ZIP CODE:
FED ID # / SSN #:		
PHONE NO.:	FAX NO.:	
EMAIL ADDRESS:		
PLEASE PRINT CONTACT NAME:		
AUTHORIZED SIGNATURE:		DATE:

All bids and related documents must be enclosed in a sealed envelope and marked with the RFB number.

RETURN BID TO: Division of Purchases & Supplies
601 Lakeside Ave
Room 128, City Hall
Cleveland, OH 44114

Effective Immediately: In accordance with Codified Ordinance 181.13 (I) the City shall receive competitive sealed bids through email. All City of Cleveland bids estimated to be less than 50K in value will be submitted and received electronically via email. All bids must be emailed to CityofClevelandbids@clevelandohio.gov. Upon receipt of your bid, you will receive a reply indicating your bid has been received.

Bidder's Instructions

See enclosed Terms & Conditions. Read and follow all terms and conditions of the bid.

Bids must be submitted to CityofClevelandbids@clevelandohio.gov, the Document ID Number and Buyer's Name must be identified in the email subject line. Also clearly state the Document ID Number, Bid Description, Buyer's Name and Closing Date.

Bids received after the Closing Date, Closing Time and sent to any other email address not identified in the Bidders Instruction cannot be considered.

Northern Ireland Affidavit must be completed, signed and included with each bid.

The bid must be submitted to: CityofClevelandbids@Clevelandohio.Gov

Bids received after the Closing Date, Closing Time and sent to any other email address not identified in the Bidders Instruction cannot be considered.

The bid documents must include:

- ☐ The Document ID Number and Buyers Name in email subject line
- ☐ PDF File of Request For Bid Form
- ☐ Terms & Conditions.
- ☐ Northern Ireland Affidavit.

Contact the Buyer immediately at the number on the Bid Form if you do not have all the required documents.

TERMS AND CONDITIONS

1. **Acceptance of Purchase Order.** This Purchase Order shall be effective when Seller executes it, otherwise indicates its acceptance, or delivers to the City of Cleveland any of the goods ordered herein or renders for the City any of the services ordered herein. If this Purchase Order has been issued by the City in response to an offer, then the issuance of this Purchase Order by the City shall constitute an acceptance of such offer subject to the express condition that the Seller assent to any additional or different terms contained herein. Any additional or different terms or conditions contained in any acknowledgement of the purchase by the Seller shall automatically be deemed objected to by the City and shall not be binding upon the City unless specifically accepted by the City in writing.
2. **Entire Agreement.** This order, the instructions to bidders, the Request for Bid, the Bid Schedule of Items, and any specification and/or other attachments, if any, incorporated hereby by reference, constitute the entire agreement between the parties and replaces and supersedes any prior or contemporaneous communications, representations, or agreements, whether oral or written with respect to such matter.
3. **Indemnification.** Seller shall indemnify, defend, and hold harmless the City, its officers, agents, and employees from all claims, demands, liabilities, losses, suits, cause of action, judgments, costs, and expenses, including attorneys' fees, arising, occurring, or allegedly arising or occurring from the personal injury, including death, property damage, including loss of use, or otherwise, to any person or the property of any person, including third parties and employees of any party, as a result of negligent or intentional act or omission of Seller or its agents, employees, subSellers or suppliers, in the furnishing of the goods covered by this PO, or because of any imperfection or defect in said goods, or based upon any claim of product liability of strict liability in tort, or because of the failure of such goods to be in accordance with the description of such goods as may appear in any catalog, analytical information report or other technical bulletin as is furnished or used by the City, or because of the failure of such goods to be produced in compliance with the requirements of this PO.
4. **Limit of Liability.** In no event shall the City be liable for anticipated profits, incidental or consequential damages, or penalties of any description. The City's liability on any claim arising out of or connected with or resulting from this contract or from the performance or breach thereof shall in no case exceed the price allocable to the goods or services or unit thereof which gives rise to the claim.
5. **Remedies.** The city's remedies shall be cumulative and remedies herein specified do not exclude any remedies allowed by law or in equity. Waiver of any breach shall not constitute waiver of any other breach of the same or any other provision. Acceptance of any items or payment therefore shall not waive any breach.
6. **Default.** Payment or acceptance of any items after the delivery date shall not constitute a waiver of the City's right to cancel this order with respect to subsequent deliveries. The City reserves the right to reasonable testing and inspection before payment or acceptance. The City's failure to inspect and accept or reject goods, materials, or articles shall not relieve Seller from liability for tender or delivery of nonconforming goods nor constitute a waiver of any of the City's rights or remedies for breach of contract. The City reserves the right to reject any or all items not in conformity with the specifications noted within this purchase order in any respect.
7. **F.O.B. Destination.** Freight terms are F.O.B. Destination, Freight Prepaid, unless otherwise approved in writing by the Commissioner of Purchases and Supplies.
8. **Non-Assignment.** Neither this contract, nor any interest herein, shall be assigned or subcontracted by the Seller except upon the prior written consent of the City.
9. **Patent, Trademark or Copyright Infringement.** Seller agrees to defend, entirely at its own expense, all claims, demands, and actions that may be asserted against the City for all alleged patent, trademark, and/or copyright infringement resulting from the use or resale of goods covered by the PO, and to indemnify and hold the City harmless against all costs, expenses, legal fees, and judgments related to such claims, demands, and actions.
10. **Timing.** Time is of the essence in this contract. Failure to deliver within the time specified shall entitle the City, in addition to any other rights or remedies, to cancel this order and purchase the goods elsewhere, in which event the Seller shall be responsible for any increase in cost.
11. **Implied Warranty.** In addition to its standard warranty, Seller warrants that all goods supplied will be free and clear of all liens and encumbrances, good and merchantable title being in the Seller. Upon receipt by Seller of payment, good and merchantable title will vest in the City. All goods will be free from any defects in design, materials or workmanship and will be of good and merchantable quality. All goods will conform to the City's specifications or the approved sample as the case may be, and will be fit for the known purposes for which purchased, and that Seller will not substitute anything without the City's written consent.
12. **Change Orders.** No changes in the PO, its prices, terms, conditions, length, or attachments are permitted, without the City's prior written approval.
13. **Cancellation.** The City shall have the right to cancel this order, or any undelivered portion of this order, without cause, and its liability for such cancellation shall be limited to Seller's actual cost for work and materials applicable solely to this order that have been expected when Seller receives notice of cancellation. The City may, at its option, cancel this order without liability to Seller (except for conforming shipments the City previously accepted) if Seller (a) ceases to exist, (b) becomes insolvent, (c) becomes the subject of bankruptcy or insolvency proceedings, or (d) commits a breach in the performance of any obligation under this agreement or of any other written agreement with the City of Cleveland.
14. **Compliance with Laws.** Seller shall comply with all federal, state, and local laws, ordinances, rules, and regulations in the manufacture and sale of the goods and performance of the services. Seller shall defend and hold the City harmless from any losses, damages, or costs arising from or caused in any way by Seller's actual or alleged violation of any federal, state, or local law, ordinance, rule or regulation.
15. **Access to Records.** Seller shall provide access to pertinent records relative to this contract/order for a period of three (3) years after the last receipt of payment is made under this contract/order, whichever occurs last.
16. **Material Safety Data Sheets:** Any substance delivered as a part of this order must be properly labeled in accordance with all applicable regulations and must be accompanied by a Material Safety Data sheet (MSDS).
17. **Venue.** Any dispute arising under this order not disposed of by agreement shall be decided by a court of competent jurisdiction in Cuyahoga County in the State of Ohio. Pending settlement on final decision of any dispute, Seller shall proceed diligently with the performance of this order in accordance with the City's direction. The Charter and Ordinance of the City of Cleveland shall govern.
18. **Tax.** Buyer is exempt from Federal and State taxes for tangible personal property. Sellers doing business with the Buyer may not be exempt from paying sales tax to their suppliers for materials to fulfill contractual obligations with the Buyer, nor shall any Seller be authorized to use the Buyer's Tax Exemption number in acquiring such materials, without the prior issuance of a signed Tax Exemption Certificate. A Tax Exemption Certificate is available upon written request.
19. **Documentation.** Seller shall clearly mark all documentation with the applicable valid PO number.
20. **Payment Terms.** Payment will be made in accordance with the terms on the face of this contract, or the Seller's invoice, whichever are more favorable to the City and payment date therefore shall be calculated from the receipt of invoice or receipt or final acceptance of the goods or services, whichever is later. All claims for money due or to become due from the City shall be subject to deduction or setoff by the City by reason of any counterclaim arising out of this or any other transaction with the Seller. The acceptance by the Seller of final payment shall operate as a full and complete release of the City. No payment for goods or services shall constitute acceptance of any defective or nonconforming goods or services by the city. Unless otherwise stated in the PO, the terms of payment shall be net 30 days from the receipt of a proper invoice. It shall be understood that the cash discount period, if any, to the City will date from receipt by the City of acceptable goods and invoice and not from date of invoice.
21. **Insurance.** Unless otherwise stated in the specifications, whenever labor is involved, the Seller shall procure and maintain insurance against claims for injuries to persons or damages to property, which may arise from or in connection with the services, materials, equipment and/or supplies provided to the City. The insurer(s) must be licensed for business in the State of Ohio and maintain an A.M.Best rating of no less than A: VII or be an insurer approved by the City. The Seller shall submit all required insurance certificates to the City before commencing work. The City is to be added to each policy as an additional insured. The Seller shall notify the City in writing at least 30 days before it cancels or reduces its insurance policy or coverage and immediately upon the Company's receipt of notice from the carrier of any cancellation or reduction of the coverage or policy. Seller must demonstrate the following minimum insurance coverage in accordance with the estimated value limits: 1) Purchases less than \$50,000: General Liability Insurance, with a \$500,000 combined single limit. 2) Purchases \$50,000 and over: General Liability Insurance with bodily injury and property damage limits of \$1,000,000 for each occurrence with a \$2,000,000 general aggregate and \$2,000,000 products and completed operations aggregate. Automobile Liability Insurance must be in effect for any owned, hired and non-owned vehicle used in the performance of the work, with bodily injury limits of \$1,000,000 for each person and \$1,000,000 for each accident, and with property damage limits of \$1,000,000 for each accident; OR \$1,000,000 combined single limits, including bodily injury and property damage. The above limits are the minimum acceptable and do not infer or place a limit on the liability of the Seller. The Seller's insurance shall be primary and any insurance or self-insurance maintained by the City shall be excess for the City and not contribute with the coverage maintained by the Seller.
22. **Workman's Compensation:** Whenever labor is involved, the Seller shall subscribe to and comply with the Workmen's Compensation Laws of the State of Ohio and pay such premiums as may be required there under and to save the City harmless from any and all liability arising from or under said act. He shall also furnish a copy of the official certificate or receipt showing the payments herein referred to before commencing any work.
23. **Authority to Bind.** All parties to this order agrees that the representatives named herein, including in all attachments, possess full and complete authority to bind said parties.
24. **Inspection and Acceptance.** No material received by the City pursuant to the purchase order issued under the terms and conditions of this bid document shall be deemed accepted until the City has had reasonable opportunity to inspect said material. All material which is discovered to be defective or which does not conform to any warranty of the Seller herein, upon initial inspection, or at any later time if the defects contained in the material were not reasonably ascertainable upon the initial inspection, may be returned at the Seller's expense for full credit or replacement. No goods returned as defective shall be replaced without written authorization from the Commissioner of Purchases and Supplies. Such return shall in no way affect the City's discount privileges. Such right to return, offered to the City arising from the City's receipt of defective goods, shall not exclude any other legal, equitable or contractual remedies the City may have therefore.
25. **Non-appropriation of Funds.** As with any other public entity, an Agreement, Contract, or issuance of Purchase Order by the City is contingent upon the legal availability of funding and the allocation of said funds. The City reserves the right to cancel any ongoing Agreement, Contract, or Purchase Order immediately, by giving written notice to the Seller, in the case of a failure by the appropriating body to appropriate funds or funding for the specific project, commodity or service.
26. **Equal Opportunity.** This Agreement is a "contract", and the Seller is a "contractor" within the meaning of Chapter 187 of the Codified Ordinances of Cleveland, Ohio 1976. During the term of this Purchase Order, the Seller shall comply with all terms, conditions and requirements imposed on a "contractor" in the Equal Opportunity Clause, Section 187.22(b) C.O., and herein made a part of this Agreement by reference. A complete copy of the Equal Opportunity Clause is available at the City of Cleveland website.

Subject: Submission of NORTHERN IRELAND FAIR EMPLOYMENT PRACTICES DISCLOSURE

Each bidder and/or appropriate parties should complete the DISCLOSURE and submit it with the bid, if possible. If not submitted with the bid, it must be completed and submitted to the Commissioner of Purchases and Supplies prior to any contract being awarded by the City. If a bidder or appropriate parties fail to complete and submit it, they shall not be eligible for a contract award.

NORTHERN IRELAND FAIR EMPLOYMENT PRACTICES DISCLOSURE

INSTRUCTIONS: Pursuant to Codified Ordinance Sec. 181.36, the information requested on this page must be supplied by all Contractors and any Subcontractors having more than a fifty percent (50%) interest in the proposed contract prior to any contract being awarded by the City of Cleveland. Any Contractor or Subcontractor who is deemed to have made a false statement shall be declared to have acted in default of its contract and shall be subject to the remedies for default contained in its contract. For failure to cure such a default, the Contractor or Subcontractor shall be automatically excluded from bidding for the supply of any goods or services for use by the City for a period of two years.

CHECK WHICHEVER IS APPLICABLE:

A. () The undersigned or any controlling shareholder,* subsidiary, or parent corporation of the undersigned is NOT ENGAGED IN ANY BUSINESS OR TRADING FOR PROFIT IN NORTHERN IRELAND. (If paragraph A. is checked, proceed to the signature line.)

B. () The undersigned or any controlling shareholder,* subsidiary, or parent corporation IS ENGAGED IN ANY BUSINESS OR TRADING FOR PROFIT IN NORTHERN IRELAND. (If paragraph B. is checked, please either check the stipulation contained in paragraph C. or attach documentation that shows that the undersigned has complied with the stipulation contained in paragraph C.

C. () The undersigned and all enterprises identified in paragraph B. are TAKING LAWFUL AND GOOD FAITH STEPS TO ENGAGE IN FAIR EMPLOYMENT PRACTICES WHICH ARE RELEVANT TO THE STANDARDS EMBODIED IN THE "MacBRIDE PRINCIPALS FOR FAIR EMPLOYMENT IN NORTHERN IRELAND." A copy of the MacBride Principles can be obtained from the Office of the Commissioner of Purchases and Supplies. In lieu of checking this paragraph, the undersigned must attach documentation which the undersigned believes shows compliance with the stipulation contained in this paragraph C.

Name of Contractor or Subcontractor
By: _____
Title: _____

*"Controlling shareholder" means any shareholder owning more than fifty percent (50%) of the stock in the corporation or more than twenty-five percent (25%) of the stock in the corporation if no other shareholder owns a larger share of stock in the corporation.



WAGE THEFT AND PAYROLL FRAUD DISCLOSURE

SUMMARY:

Bidders on certain City contracts, recipients of Assistance, and any of their prospective subcontractors must disclose any wage theft or payroll fraud violations over the last three years. Unless they receive a waiver from the City's Fair Wage Employment Board, violators are placed on the City's Adverse Determination List, which prevents them from entering into new contracts with or receiving Assistance from the City. This disclosure requirement and the waiver process are set forth in Chapter 190 of the Codified Ordinances of Cleveland, Ohio, 1976 ("Chapter 190").

INSTRUCTIONS:

Pursuant to Chapter 190, the information requested on this document must be provided by any person or entity bidding on or making a proposal for a Construction or Improvement Contract or a Service Contract, or applying for Assistance, and any of their prospective subcontractors.

Any person or entity that is deemed to have made a false statement shall be declared to have acted in default of its contract and shall be subject to the remedies for default contained in its contract.

DEFINITIONS:

"Adverse Determination" means a final action or adjudication that the person or entity in question has committed Wage Theft or Payroll Fraud and is further defined in Chapter 190.

"Assistance" means any form of City financial assistance, except for financial assistance provided for the development, rehabilitation or other means of providing residential housing. Assistance includes but is not limited to: grants; economic development loans; tax credits, incentives and abatements; subsidies; and bonds. Assistance does not include financial assistance which is received from another government or other entity with the City acting only as a conduit or fiscal agent for the funds, where the City exercises no control over the identity of any recipient or of the terms of the contract. Community Development Block Grant Funds are not considered conduit funds and, to the extent they otherwise qualify, are included as Assistance.

"Construction or Improvement Contract" means any contract entered into pursuant to Chapter 167 or Chapter 185 of the Codified Ordinances.

"Payroll Fraud" means concealing an entity's true payroll tax liability or other financial liability to a government agency from government licensing, regulatory or taxing agencies through misclassification of employees, failure to report or underreported



payment of wages, or executing a cash transaction while failing to maintain proper records of reporting and withholding.

“Service Contract” means any contract or subcontract between a person, business or corporation and the City of Cleveland that primarily involves the furnishing of services to the City (as opposed to the purchase of goods or other property or the leasing of property), and shall be limited to the following categories of services: food service, janitorial, security services, parking lot attendants, home health care, health care aides, waste management, automotive repair services, landscaping, towing contracts, building and maintenance services, carpentry, clerical services, urban forestry, housekeeping, street maintenance and repair, and sidewalk maintenance and repair. This includes services performed on City-owned premises including the following City-owned locations: airports, parking lots, municipal parks, recreational facilities, and City-owned buildings. Contracts that are primarily for the purchase of goods or other property are not considered Service Contracts.

“Wage Theft” means a violation of the Ohio Prompt Pay Statute, RC 4113.15; the Ohio Minimum Fair Wage Standards Act, RC Chapter 4111; Oh. Const. Art. II, Sec. 34a; RC Chapters 4109 or 4115; RC 4113.17, 4113.18, 4113.52 or 4113.61; or a violation of any substantially equivalent federal or state law; as any of these laws may be amended or superseded.

CHECK WHICHEVER IS APPLICABLE:

(A) (☐) The undersigned person or entity HAS NOT had any Adverse Determinations within the last three (3) years.

(B) (☐) The undersigned person or entity HAS had any Adverse Determinations within the last three (3) years.

If (B) is checked, then in an attachment(s) to this form, please disclose all Adverse Determinations within the last three (3) years.

Name of Person or Entity: _____

Signature: _____

Printed Name of Signatory: _____

Title of Signatory: _____

Date: _____

UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Utilities Service

BULLETIN 1728F-700

SUBJECT: RUS Specification for Wood Poles, Stubs and Anchor Logs

Incorporated by reference in 7 CFR Parts 1728 and 1755

TO: All RUS Electric Borrowers

EFFECTIVE DATE: Date of Approval

OFFICE OF PRIMARY INTEREST: Engineering Standards Branch, Electric Program

INSTRUCTIONS: This bulletin replaces RUS Bulletin 1728F-700, RUS Specification for Wood Poles, Stubs and Anchor Logs, issued May 2011. File with 7 CFR Part 1728 (Electric Borrowers).

AVAILABILITY: This bulletin can be accessed via the Internet at:
<http://www.rd.usda.gov/publications/regulations-guidelines/bulletins/electric>

PURPOSE: To describe: (1) The minimum acceptable quality of wood poles, stubs, and anchor logs permitted to be purchased by or for RUS borrowers; and (2) the plans of procurement under which these wood products may be purchased.

CHRISTOPHER
MCLEAN

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CHRISTOPHER MCLEAN
Date: 2021.09.09 08:22:59
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Christopher A. McLean,
Assistant Administrator,
Electric Program.

Date

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Poles
Specifications
Timber Products

ABBREVIATIONS

ACZA - Ammoniacal Copper Zinc Arsenate
ANSI - American National Standards Institute
ASTM - American Society for Testing and Materials
AWPA - American Wood Protection Association
CCA - Chromated Copper Arsenate
CuN - Copper Naphthenate
RUS - Rural Utilities Service
SPIB - Southern Pine Inspection Bureau
USDA - United States Department of Agriculture
WCLIB - West Coast Lumber Inspection Bureau

DEFINITIONS

Butt treated – poles that are only treated in the section of the pole in contact with the ground.

Certificate of compliance – a written certification by an authorized employee of the producer that the material shipped meets the requirements of this specification and any supplemental requirements specified in a purchase order from a borrower or the borrower's contractor.

Contractor – an organization retained by a RUS borrower to construct a power line in accordance with the contract under which the RUS borrower and contractor execute. The contractor agrees to provide and utilize only wood products that meet the requirements of this specification.

Independent inspection – refers to examination of material by a trained inspector employed by a commercial agency.

Inspection – an examination of material in sufficient detail to ensure conformity with all requirements of the specification under which it was purchased.

Producer – refers to the party who manufactures poles. In some cases the producer may also be the treating plant.

Purchaser – refers to either the RUS borrower or a contractor acting as a RUS borrower's agent, except where a part of the specification specifically refers to only the borrower or the contractor.

Quality control supervisor – refers to an employee of the producer designated to be responsible for quality control procedures carried out by said producer.

Reserve treated stock – treated material held in storage by a producer for purchase and immediate shipment to a borrower.

Supplier – term that may refer to the producer, the treater, or to a third party broker or distributorship involved in supplying RUS products to the borrowers.

Transmission poles – unless otherwise indicated, are any poles 50 feet or longer.

Treating charge – all the material treated in a cylinder at one time.

Treating plant – refers to the facility that applies the preservative treatment to the poles.

1 SCOPE

- a This specification describes the minimum acceptable quality of wood poles, stubs, telephone pedestal stubs, and anchor logs (hereinafter called poles, except where specifically referred to as stubs or anchor logs) purchased by or for RUS borrowers. Where there is conflict between this specification and any other specification referred to herein, this specification shall govern.
- b The requirements of this specification implement contractual provisions between RUS and borrowers receiving financial assistance from RUS. The contractual agreement between RUS and a RUS borrower requires the borrower to construct its system in accordance with RUS accepted plans and specifications. Each RUS electric and telecommunications borrower shall purchase only wood poles, stubs, and anchor logs produced in accordance with this specification. Each RUS electric or telecommunications borrower shall require a written confirmation from their selected contractor that all material utilized shall be produced in accordance with this specification.

2 RELATED SPECIFICATIONS

The following specifications may be considered as pertinent to this specification, subject to the restrictions in the paragraph under "Scope." All AWPAs references shall be those in effect in the 2020 AWPAs Book of Standards or latest version thereof.

- a ANSI O5.1.2017 - American National Standard Specifications and Dimensions for Wood Poles;
- b ASTM D9-20 - Standard Technology Relating to Wood and Wood Based Products;
- c Standard No. 17 Grading Rules for West Coast Lumber, West Coast Lumber Inspection Bureau, (2018);
- d Standard Grading Rules for Southern Pine Lumber, Southern Pine Inspection Bureau, (2014);
- e AWPAs U1-20- Use Category: System User Specification for Treated Wood
- f AWPAs T1-20- Use Category System: Processing and Treatment Standard
- g AWPAs M1-20 - Standards for the Purchase of Treated Wood Products
- h AWPAs M4-15 - Standard for the Care of Preservative-Treated Wood Products
- i AWPAs A6-20 - Method for the Determination of Oil-Type Preservatives and Water in Wood
- j AWPAs A7-19 - Standard Wet Ashing Procedure for Preparing Wood for Chemical Analysis

- k AWP A9-20 - Standard Method for Analysis of Treated Wood and Treating Solutions by X-ray Spectroscopy
- l AWP A30-18 Standard Method for the Determination of 4,5 Dichloro-2-n-octyl-4 -isothiazolin-3 one (DCOI) in Wood and Solutions by High Performance Liquid Chromatography

3 GENERAL STIPULATIONS

- a Quality control and inspection shall be in accordance with Bulletin 1728H-702, RUS Specification for Quality Control and Inspection of Timber Products. Provisions of this specification and ANSI O5.1, which are positive in their wording, shall not be interpreted or subjected to judgment by the quality control supervisor or a third party inspector. Judgment, although used by quality control personnel and independent inspectors, shall not be the basis for acceptance of material which does not conform to the minimum requirements of this specification.
- b Each purchase order shall contain a provision that requires the producer to comply with the provisions of this specification.
- c Purchase Plans. Plans which are acceptable for supplying poles under this specification include:
 - (1) Quality Assurance Plans: Under such plans, the producer furnishes poles conforming to this specification which have been inspected in accordance with the provisions of a RUS approved quality assurance plan. RUS borrower groups or agents for borrower groups endeavoring to operate Quality Assurance Plans shall submit their plans to the Chairman, Technical Standards Committee "A", Rural Utilities Service, 1400 Independence Ave, S.W., Stop 1569, Washington, DC 20250-1569. Written RUS approval of a submitted plan must be received from RUS before said plan can be implemented.
 - (2) Independent Inspection Plan: Under this plan, the producer furnishes poles meeting this specification, with all poles subsequently inspected by a qualified inspector.

The RUS borrower has the prerogative to contract directly with the agency for the inspection service. The borrower shall, where practical, select the inspection agency so that the inspector's continued employment is dependent only on performance acceptable to the borrower. The selected agency shall not subcontract the service to any other agency.
- d With the exception of reserve treated stock, all invoices for treated timber products shall be accompanied by a copy of the producer's Certificate of

Compliance and either a copy of the independent inspection report or a certificate confirming that the material was produced under a RUS approved quality assurance plan.

- e The method of inspection described in this section shall be used no matter which purchase plan timber products are purchased under.
- f Poles failing to conform to any provision covered by this specification shall not be shipped to the purchaser. The producer shall remove all brands, quality or inspection marks from any such material.
- g Poles shall be warranted to conform to this specification. Any pole found not in conformance with this specification, within 1 year from date of delivery to the purchaser, shall be promptly replaced by the producer.
- h Pole producers shall take out and maintain liability insurance for not less than \$1 million. Evidence of compliance shall be forwarded to RUS annually. The evidence shall be in the form of a dated certificate of insurance signed by a representative of the insurance company, that includes a provision that no changes in, or cancellation of said insurance will be made without prior written notice to the Chairman Technical Standards Committee "A", Rural Utilities Service, 1400 Independence Ave, S.W., Stop 1569, Washington, DC 20250-1569.

4 QUALITY CONTROL

- a It is the responsibility of each producer to maintain a functional internal quality control system. In addition to maintaining plant and yard conditions that do not promote decay, the following is considered to be mandatory requirements of any plant involved in the production of RUS white or treated materials:
 - (1) Quality control shall be the responsibility of an experienced, competent individual designated for that specific purpose (quality control supervisor), together with such staff as may be required. The quality control supervisor shall have the necessary training to carry out both the analytical and product inspection procedures detailed in this specification and shall verify each step in the production process before releasing white or treated material for verification of conformance by a third party inspector. No material shall be treated before it has been inspected in the white and has the required quality assurance/inspection marks placed in the tips.
 - (2) The quality control supervisor and the third party inspector shall each perform all examinations, tests, and required analytical work individually and independently. Neither shall rely on the other individual's results in the discharge of their duties.

- (3) Treating and inspection records for all RUS materials shall be maintained by the producer for a minimum of two years from the original date of treatment.
 - (4) Throughout the production process, the plant quality control supervisor shall withdraw all poles deemed non-conforming. Poles failing to meet all treatment requirements may be re-treated not more than twice, provided that the total allowable steaming times and temperatures are not exceeded. The producer shall promptly remove face brands/tags from all material found to be non-conforming, subject to the foregoing provision for re-treatment.
- b The producer shall provide the inspector with all supplemental customer specification requirements (drawings, etc.) contained in a purchase order received from a borrower.
 - c Providing "Treating Service Only" does not relieve the treating plant of any responsibilities associated with RUS poles being treated at said facility. The plant quality control supervisor shall verify that all poles are treated within 30 days of conditioning if kiln dried and within 10 days after being inspected in the white.
 - d The producer shall maintain its own properly staffed and equipped analytical laboratory or contract with an independent testing laboratory at or near the treating plant to provide the required analytical service. On a case-by-case basis, with written permission from RUS, a producer with more than one treatment facility may be allowed to use a central laboratory.

5 RESERVE TREATED STOCK

Reserve treated stock shall be subject to the following conditions:

- a Producers shall treat material for reserve treated stock under any of the purchase plans (paragraph 3 c) described in the specification.
- b No material treated with creosote, pentachlorophenol, DCOI or copper naphthenate shall be shipped for use on a RUS borrower's system later than 2 years following the original treatment date branded on the material, unless it complies as follows:
 - (1) The material shall be re-assayed by the producer. If conforming to preservative retention requirements, as shown in Table 8, it may be shipped. Re-assayed poles shall be identified on the sawed butt surface with a metal tag showing date of re-assay.
 - (2) If the re-assayed material fails to meet retention requirements and is less than two years from its original treatment date, the producer must retreat, re-assay and butt tag said material per the tagging requirements in 5.b.1.

(3) Waterborne treated poles need not be re-assayed.

c No pole shall be shipped to a RUS borrower more than two years after its original treatment date.

6 MATERIAL REQUIREMENTS (see Appendix A)

All poles shall conform to the material requirements shown in Appendix A.

7 PRESERVATIVES

Creosote, water-borne preservatives, pentachlorophenol, DCOI and copper naphthenate shall conform to current AWP Standard U1-20.

8 PRESERVATIVE TREATMENT

a Conditioning Prior to Treatment: All poles, except as stated below, shall be sterilized by heating the pith center of the pole for one hour, at not less than 150°F, unless stated otherwise.

(1) Treatment Group "A" poles (see Table 2, Appendix A of this bulletin) may be seasoned by natural air circulation. Extreme care shall be taken to ensure that air seasoned poles do not have pretreatment decay in them. (refer also to paragraph 5.b of Appendix A). Treatment Group "A" poles are not required to be sterilized

(2) Treatment Group "B", "C" and "D" poles from Table 2, Appendix A of this bulletin, shall be conditioned by Boulton drying, by the steam-vacuum process or by kiln drying. The Boulton drying process and steam vacuum process shall have the following limits:

(a) Boulton Drying:

Boulton Drying		
Species	Temperature °F	Duration (hours)
Green or partially seasoned Douglas - fir (coast)	220 max.	optional*
Western Larch	220 max.	optional*
* Duration of Boulton drying shall be counted from the time the wood surface is warmed to approximately 150°F.		

(b) Steam-Vacuum Process:

Steam (limits)		
Species	Temperature °F	Total Time ⁽⁴⁾ Max Hours
Southern Pine	245 max.	17 ⁽¹⁾ , 20 ⁽²⁾
Ponderosa Pine	240 max.	6 ⁽³⁾
<u>Notes:</u> 1. Pole classes nominally less than 37.5 inches in circumference at 6 feet from butt. 2. Pole classes nominally 37.5 inches or larger in circumference at 6 feet from butt. 3. See Appendix A, paragraph 4.2.4 for specific limitations. 4. Initial treatment steaming time plus any re-treatment steaming time, combined, shall not exceed these maximums.		

(c) Kiln Drying: See paragraph 4.2.3 of Appendix A for limitations.

- b Treatment (Pressure Process): All poles treated by this process shall be treated in a cycle in which the temperatures and pressures shown are not exceeded. These pressures and temperatures shall be recorded electronically, digitally or on a calibrated recording chart and shall be verified by visual observations of the direct reading gauges throughout the treating cycle by a qualified representative of the treating plant.

Pressure Process				
Species	Preservative Temperature in °F			Impregnation lb/in ²
	Creo. & Oil-borne	ACZA	CCA	
Western Red Cedar	220	150	120	100
Alaska Yellow Cedar	220	150	120	100
Jack & Red Pine	220	150	120	150
Douglas-fir (coast) & Western Larch	220	150	---	150
Southern Pine	220	150	120	200
Ponderosa (Western) Pine	220	150	120	200

All poles treated with waterborne preservatives shall use the full cell or modified full cell process as described in AWPAs Standard U1 except as modified by the provisions of ANSI O5.1.

- c Thermal Process -- Full-Length and Butt Treatment. Poles species shown in Table 8 may be treated by the Thermal process or Butt treated. AWPAs Standards U1, T1, M1 and M4 shall apply.

- (1) All poles treated by this process shall be adequately seasoned by natural and artificial methods prior to treatment so that specification requirements for penetration and retention are met.
- (2) The temperature of the preservative during the hot oil phase shall not exceed 230°F.

- d Results of Treatment

- (1) Penetration and retention of preservative shall be tested using borings taken at any point on the pole periphery approximately:
 - (a) 1 foot below nominal ground line of all butt treated poles.
 - (b) Six to twelve inches above the nominal ground line of western red cedar, Alaska yellow cedar and western larch poles.
 - (c) Within the zone one foot above to one foot below the brand on all other species of poles.
- (2) Retention of preservative shall be no less than that specified in Table 8.
- (3) Penetration of preservative, as determined in accordance with AWPAs Standard A3, shall not be less than that specified in Table 8 of Appendix A. Chrome Azurol S shall be used to determine penetration of copper containing preservatives, Penta-Check for penetration of penta and Red-O dye for penetration of DCOI, respectively. Penetration depth shall be measured along a boring from the outer end toward the inner end for a distance throughout which there is continuous preservative penetration, as indicated by evidence of preservative in each annual ring included.
 - (a) For Group A poles (Those poles with a circumference of less than 37.5 inches at 6 feet from butt):
 - (1) Bore 20 poles or 20 percent of the poles in the charge, whichever is greater. Accept all poles in the charge for penetration if every boring in the sample conforms. If any sample fails penetration, bore all poles in the charge.

- (2) If more than 15% of the poles in the charge are found to be nonconforming, the entire charge shall be retreated. If 15% or less are found to be nonconforming, remove and retreat only those that are nonconforming.
- (b) For Group B poles (Those poles with a circumference of 37.5 inches or greater at 6 feet from butt):
- (1) For Group B poles 45 feet and under, bore each pole in the charge. If more than 15% of these poles are found to be nonconforming, the entire charge shall be retreated. If 15% or less are found to be nonconforming, remove and retreat only those that are nonconforming.
 - (2) For Group B poles 50 feet and over, bore each pole twice at 90 degrees apart and accept only those poles conforming to penetration in both borings.
 - (3) When poles which have been deep incised or radial drilled are bored for penetration and retention testing, the borings shall be taken midway on a diagonal between an incision or hole in the next vertical row above or below.
 - (4) Non-conforming poles may be retreated only twice. The letter "R" shall be added to the original charge number in the butts of all poles that are retreated. Poles failing to meet treating requirements after two retreatments shall be permanently rejected and all brand and butt information removed. (See paragraph 9.e in Appendix A of this bulletin for branding information.)
- e All poles that are cutback after treatment shall be re-treated.
- (1) Creosote, Penta, DCOI and Copper Naphthenate. Total steaming time, both for initial treatment and re-treatment, is cumulative and shall not exceed the limits for steam found in paragraph 8.a(2)(b). Re-treatment of cutback or reserve treated stock poles shall be by submersion in preservative for not less than 10 minutes under 25 pounds per square inch gauge pressure or not less than 30 minutes at atmospheric pressure.
 - (2) Water-borne Preservatives: Poles which require re-treatment shall be air dried sufficiently to accept re-treatment. Re-treatment shall be within original treatment limitations. Re-treated poles shall conform fully to all the requirements of this specification; otherwise, they shall be permanently rejected.

9 DRAWINGS

The attached drawing W1.1G or M-20 in Appendix A shows in detail the standard framing (gains and bolt holes) for electric distribution poles ordered under this specification. Other distribution pole framings are shown in RUS specifications and drawings: Bulletin 1728F-803, Specifications and Drawings for 24.9/14.4 kV Line Construction and Bulletin 1728F-804, Specifications and Drawings for 12.5/7.2 kV Line Construction. Framing drawings for electric transmission poles are shown in Electric Transmission Specifications and Drawings: Bulletin 1728F-810, "Electric Transmission Specification and Drawings 34.5 through 69 kV" and Bulletin 1728F 811, "Electric Transmission Specifications and drawing 115 kV through 230 kV." Pole stub and anchor log dimensions are shown in the above specifications and drawings or Tables 9, 10 and 11 of Appendix A of this bulletin. The appropriate framing drawings shall be designated and provided by the purchaser.

10. DESTINATION INSPECTION

The RUS borrower shall have the prerogative to inspect materials at destination. All provisions of this specification shall apply to material inspected at destination. If a disagreement arises over conformance of materials received at destination, it shall be the responsibility of the supplier to attempt to resolve this matter with the purchaser.

11. PURCHASE OF RELATED SPECIFICATIONS AND STANDARDS

All ANSI and AWP standards may be purchased from:

American Wood Protection Association (AWPA)
P.O. Box 361784
Birmingham, Alabama 35236-1784
Telephone: (205)733-4077

Standard Grading Rules for Southern Pine Lumber may be purchased from:

Southern Pine Inspection Bureau
4709 Scenic Highway
Pensacola, Florida 32504-9094
Telephone: (850) 434-2611

Standard Grading Rules for West Coast Lumber may be purchased from:

West Coast Lumber Inspection Bureau
P.O. Box 23145
Portland, Oregon 97281
Telephone: (503) 639-0651

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APPENDIX A MATERIAL REQUIREMENTS

1 INTRODUCTION

The material specifications described in this section are primarily based on the ANSI O5.1 Specification and Dimensions (for Wood Poles). The purpose of this document is to describe the minimum acceptable quality of wood poles, stubs and anchor logs permitted to be purchased by or for RUS borrowers.

2 DEFINITIONS

The following definitions shall apply to the terms used in this standard:

Air Seasoning - Drying by the use of air where the air temperature is not more than 140°F either in the open or under cover.

Boulton Drying - Drying by heating in non-aqueous solution under vacuum.

Check - The lengthwise separation of the wood that usually extends across the rings of annual growth and commonly results from stresses set up in wood during seasoning.

Compression Wood - Abnormal wood formed on the lower side of branches and inclined trunks of softwood trees. Compression wood is identified by its relatively wide annual rings, usually eccentric; relatively large amount of summerwood, sometimes more than 50 percent of the width of the annual rings in which it occurs; and its lack of demarcation between springwood and summerwood in the same annual rings. Compression wood, compared with normal wood, shrinks excessively lengthwise.

Cross Break - A separation of the wood cells across the grain. Such breaks may be due to internal strains resulting from unequal longitudinal shrinkage or to external forces.

Dead Streak - An area, devoid of bark, resulting from progressive destruction of the growth cells of wood and bark at the edges of the streak. On a pole, a dead streak is characterized by a discolored weathered appearance and by lack of evidence of overgrowth along the edges of the deadened surface.

Decay - The decomposition of wood substance by fungi.

Decay, Advanced (or Typical) - The older stage of decay in which the destruction is readily recognized because the wood has become punky, soft and spongy, stringy, ring-shaked, pitted, crumbly, or, in poles not stored or rafted in water, is in a soggy condition. Decided discoloration or bleaching of the rotted wood is often apparent.

Decay, Incipient - The early stage of decay that has not proceeded far enough to soften or otherwise perceptibly impair the hardness of the wood. It is usually accompanied by a slight discoloration or bleaching of the wood. Incipient Decay can occur in living trees.

Decayed Knot - A knot containing decay. Two types of decayed knots are recognized.

Type I Knots containing soft or loose fibers (decay) which may extend the full length of the knot into the pole and which are associated with heart rot.

Type II Knots containing soft or loose fibers (decay) which are not associated with heart rot.

Face of Pole - The concave side of greatest curvature in poles with sweep in one plane and one direction, or the side of greatest curvature between groundline and top in poles having reverse or double sweep.

Ground Line Section - That portion of a pole between 1 foot above and 2 feet below the ground line, as defined in the pole dimension tables (see Tables 3 through 7). (For purposes of defining the ground line when incising or radial drilling, see paragraphs 9.7.1 and 9.7.2.)

Hollow Heart - A void in the heartwood caused by decay or insect attack.

Hollow Pith Center - A small hole at the pith center of the trunk or of a knot caused by disintegration of the pith (small soft core occurring in the structural center of a tree or branch).

Insect Damage - Damage resulting from the boring into the pole by insects or insect larvae. Scoring or channeling of the pole surface is not classed as insect damage.

Kiln Drying - Drying by the use of heated air in batch or progressive-type kilns.

Knot Cluster - Two or more knots grouped together as a unit, the fibers of the wood being deflected around the entire unit; distinct from the group of single knots in which each is a unit. A knot cluster shall be considered as a single knot.

Knot Diameter - The diameter of a knot on the surface of the pole measured in a direction at right angles to the lengthwise axis of the pole. The sapwood as well as the heartwood portion of a knot shall be included in the measurement.

NOTE: For a description of means for defining the limits of knots, see American National Standard Definitions of Terms Relating to Timber, ASTM D9-20.

Lot - A quantity of poles of like size, conditioning, and fabrication usually making up one treating charge.

Red Heart - A condition caused by a fungus, *Fomes pini*, that occurs in the living tree. It is characterized in the early stages of infection by a reddish or brownish color in the heartwood; known as "firm red heart." Later the wood of the living tree disintegrates (decays) in small, usually distinct, areas that develop into white-lined pockets.

Sap Stain - A discoloration of the sapwood, caused by the action of certain molds and fungi, that is not accompanied by softening or other disintegration of the wood.

Scar - A depression in the surface of the pole resulting from a wound where the living tree has not compartmentalized the wound and reestablished the normal cross section of the pole.

Scar, Turpentine Acid Face - An area in the lower portion of a southern pine pole where bark hack removal with acid applied has caused resin to flow. No removal of sapwood has occurred.

Scar, Turpentine Cat Face - A depression in the surface of a southern pine pole resulting from a wood hack into the sapwood, where the tree has not compartmentalized the wound and reestablished the normal cross section of the pole.

Shake - A separation along the grain, the greater part of which occurs between the rings of annual growth.

Shelling - Ring separation extending to the surface of round or sawn timber normally following the growth rings and often associated with limiting defects such as knots, compression wood or shake. Ring separation usually becomes more pronounced as the product dries and may be further aggravated by stress developed during horizontal lifting or loading.

Short Crook - A localized deviation from straightness which, within any section 5 feet or less in length, is more than 1/2 the mean diameter of the crooked section (see Fig. 1, Diagram 3).

Spiral-Grained (Twist-Grained) Wood - Wood in which the fibers take a spiral course about the trunk of a tree instead of a vertical course. The spiral may extend in a right-hand or left-hand direction around the tree trunk. Spiral grain is a form of cross grain.

Split - A lengthwise separation of the wood extending completely through the piece from one surface to another.

Steam Conditioning - Subjecting poles in a closed vessel to steam prior to treatment.

Sweep - Deviation of a pole from straightness (see Fig. 1, Diagrams 1 and 2, Exhibit A).

3 POLE CLASSES

Poles meeting the requirements of this standard are grouped in the classes identified in Tables 3 through 7 of this Appendix, based on their circumference measured 6 feet from the butt. Poles of a given class and length are designed to have approximately the same load carrying capacity regardless of species.

4 MATERIAL REQUIREMENTS: GENERAL

a Species:

(1) Poles. See Table 2, Appendix A.

(2) Pedestal Stubs

(a) All round pedestal stubs shall conform to material requirements for poles. Plywood peeler cores, and similar material where the sapwood has been largely removed, are not acceptable.

(b) All sawn stubs shall conform to the following material requirements:

All sawn stubs furnished under this specification shall be free of brashy wood, cross breaks, decay, insect holes larger than 3/32 of an inch, and dried to a moisture content of not more than 19 percent. The stubs shall be surfaced on four sides, shall meet additional requirements as shown on specification drawings, and shall be made of one of the following:

Coastal origin Douglas-fir conforming to provisions of No. 1 "Structural Joists and Planking," per paragraph 123b, of Standard 17, Grading Rules for West Coast Lumber.

Southern Yellow Pine conforming to the provision of No. 1 "Structural Joist and Planks" as per paragraph 312 of the Southern Pine Inspection Bureau (SPIB) Grading Rules.

b Conditioning, Seasoning, and Treatment Limitations:

(1) Air Seasoning: Air seasoning shall be in conformance with this specification for preservative treatment without developing pretreatment decay. Steaming before or after treatment is permitted for species in Treatment Group A. However, if such steaming is employed, the maximum temperature does not exceed 240°F. The total steaming time from the time steam is introduced into the cylinder, including both initial and final steam, shall not exceed 4 hours duration.

Pedestal stubs which are air-seasoned shall be checked to the heartwood. Their moisture content shall not exceed 25 percent at a depth of 1-1/2 inches or at the sapwood/heartwood line, whichever is less. All sawn pedestal stubs shall be dried to a moisture content of not more than 19 percent prior to treatment.

- (2) Boulton Drying Temperature: The temperature employed in Boulton drying poles of species listed under Treatment Group B of Table 2 shall not exceed 220°F. These poles may be steamed up to 240°F for a maximum time of 4 hours, but such steaming shall be limited to steaming after treatment.
- (3) Kiln Drying: Where kiln drying is employed on southern pine, ponderosa pine, red pine, jack pine, lodgepole pine, Douglas-fir (coast), and western larch, the maximum dry bulb temperature shall be increased gradually and shall not exceed 170°F (with the exception noted below). Where kiln drying is employed on western red cedar, the maximum dry bulb temperature shall be increased gradually and shall not exceed 160°F. In compartment kilns operating at temperatures up to 170°F, the maximum wet bulb depressions shall not exceed 50°F with the exception that during the first 24 hours there is no limitation on wet bulb depression. In progressive-type kilns operating at temperatures up to 170°F, the maximum wet bulb depression shall not exceed 50°F in the body of the kiln and 90°F at the entrance to the kiln. Exception: Drying over 170°F is permitted for southern pine, red pine, lodgepole pine, Douglas-fir (coast), and western larch species. The maximum dry bulb temperature shall not exceed 230°F for these species. For dry bulb temperatures over 200°F, the wet bulb depression shall be not less than 50°F with the exception that during the first 24 hours there is no limitation on wet bulb depression.

Temperature and humidity readings throughout the kiln shall be recorded on a recording chart and verified by observation of direct reading equipment. Gauges and recording equipment shall be calibrated annually.

- (4) Steam Conditioning: The steam temperature employed in steam conditioning for poles of species in Treatment Group C of Table 2 shall not exceed 245°F. The time duration for poles with specified circumferences 37.5 inches or less at 6 feet from the butt shall not exceed 17 hours. Poles with specified circumferences larger than 37.5 inches at 6 feet from the butt shall not exceed 20 hours.
- c Solvent Recovery. When poles of any species have been treated with a system using an organic solvent-based preservative solution, a solvent recovery cycle of not over 15 hours at a maximum temperature of 225°F is permitted, provided each pole has a moisture content of 25% or below before treatment when measured with a calibrated resistance-type moisture meter at 2 inches from the surface at mid-length.
- d Rate of Growth: The average rate of growth measured on the sawed butt surface in the outer 2 inches of poles having a circumference of 37.5 inches or less at 6 feet from the butt, and in the outer 3 inches of poles having a circumference of more than 37.5 inches at 6 feet from the butt, shall not be less than six rings per

inch. Exception: Poles with four and five rings per inch are acceptable if 50 percent or more summerwood is present.

For poles exhibiting a non-uniform growth rate around the circumference, the average growth rate shall be determined at the midpoint of the shortest arc between the point showing the fewest growth rings in the required zone and the point showing the most growth rings in the required zone.

If visual observation of the rate of growth in the butt surface is inconclusive, the referee method for making such a determination is as follows; ring count and summerwood determination is made on an increment core taken 6 feet from the butt directly above the location where the average rate of growth is indicated on the butt surface.

5 MATERIAL REQUIREMENTS: PROHIBITED DEFECTS

- a Cross breaks (cracks).
- b Decay, except as permitted for firm red heart in paragraph 6.a, defective butts in paragraph 7.d and decayed knots in paragraph 7.f of this Appendix. The presence of fungal fruiting bodies or mycelium on or in a piece of wood shall be considered as evidence of decay and the piece of wood shall be permanently rejected as nonconforming. In the absence of such visual signs of decay, if conditions such as surface softening or discoloration indicate the possibility of decay, a boring should be taken from the affected area and carefully examined by both the quality control supervisor and the third party inspector to determine if decay is present.
- c Dead streaks, except as permitted in paragraph 7.c in this Appendix.
- d Holes, other than drilled holes provided for in the specification, open or plugged, except holes for test purposes, which shall be plugged with treated plugs.
- e Hollow butts or tops, except as permitted under hollow pith centers and defective butts.
- f Marine borer damage.
- g Nails, spikes and other metals not specifically authorized by the purchaser.

6 MATERIAL REQUIREMENTS: PERMITTED DEFECTS

- a Firm Red Heart: Firm red heart not accompanied by softening or other disintegration (decay) of the wood is permitted.
- b Hollow Pith Centers: Hollow pith centers in tops or butts and in knots are permitted in poles that are to be given full-length treatment.

- c Sap Stain: Sap stain that is not accompanied by softening or other disintegration (decay) of the wood is permitted.
- d Scars: Turpentine acid face scars are permitted anywhere on the pole surface.

7 **MATERIAL REQUIREMENTS: LIMITED DEFECTS**

- a Bark Inclusions: Depressions containing bark inclusions shall not be more than 2 inches in depth, measured from the surface of the pole.
- b Compression Wood: The outer 1 inch of all poles shall be free from visible compression wood.
- c Dead Streaks: A single, sound dead streak is permitted in cedar, provided the greatest width of the streak is less than 1/4 of the circumference of the pole at the point of measurement.
- d Defective Butts: Hollowing in the butt caused by "splinter pulling" in felling the tree is permitted, provided that the area of such a hollow is less than 10 percent of the butt area. Hollow heart or decay, or both, is permitted in cedar poles only, provided the aggregate area of the hollow heart or decay, or both, does not exceed 10 percent of the entire butt area and does not occur closer than 2 inches to the side surface and provided that the depth of the hollow does not exceed 2 feet, measured from the butt surface.
- e Insect Damage: Insect damage, consisting of holes 1/16 inch or less in diameter, or surface scoring or channeling is permitted. All other forms of insect damage are prohibited, except those associated with hollow heart in cedar poles.
- f Knot: The diameter of any single knot and the sum of knot diameters in any 1-foot section shall not exceed the limits of Table 1. In determining the sum of knot diameters in any 1-foot section, only those knots with diameters over 0.5 inch whose pitch centers fall within the section shall be included in the sum; and the one-foot section shall be located so as to include the maximum number of knots, i.e., the most severe condition. Type II "decayed knots" are permitted.

TABLE 1 LIMITS of KNOT SIZES			
	Maximum Knot Sizes Permitted		
	Diameter of any single knot		Sum of diameters of all knots greater r than 0.5 inch in any 1-foot section
Length of Pole	Classes H6 to 3 (Inches)	Classes 4 to 10 (Inches)	All Classes
45 Feet and Shorter			
Lower Half of Length	3	2	1/3 of the average circumference of the same 1' section or 8", whichever is greater, but not to exceed 12" (Note 1)
Upper Half of Length	5	4	
50 Feet and Longer			
Lower Half of Length	4	4	1/3 of the average circumference of the same 1' section or 10", whichever is greater, but not to exceed 14" (Note 1)
Upper Half of Length	6	6	
Notes:			
1. Both upper and lower halves.			
2. See section 3 and Tables 3 through 7 of Appendix A for pole classes.			

g Scars (Cat Face): No pole shall have a scar or turpentine cat face (southern pine) located within 2 feet of the ground line. Turpentine scars need be trimmed only to the extent necessary for examination for evidence of fungus infection and insect damage. Other sound scars are permitted elsewhere on the pole surface, provided they are smoothly trimmed and do not interfere with the cutting of any gain and provided that:

- (1) The circumference at any point on trimmed surfaces located between the butt and 2 feet below the ground line is not less than the minimum circumference specified at 6 feet from the butt for the class and length of the pole; and
- (2) The depth of the trimmed scar is not more than 2 inches, if the diameter is 10 inches or less, or 1/5 the pole diameter at the location of the scar if the diameter is more than 10 inches.

h Shakes. Shakes in the butt surface which are not closer than 2 inches to the side surface of the pole are permitted, provided they do not extend to the ground line. Shakes or a combination of connected shakes which are closer than 2 inches to the side surface of the pole are permitted, provided they do not extend further than 2

feet from the butt surface and do not have an opening wider than 1/8 inch. Shakes in the top surface are permitted in poles that are to be given full-length preservative treatment, provided that the shake is not closer to the surface of the pole than the midpoint of a line extending from the pith to the surface (i.e., the shake is permitted if it is closer to the pith than to the surface of the pole).

i Shape: Poles shall be free from short crooks. A pole may have sweep subject to the following limitations:

- (1) Where sweep is in one plane and one direction only: For all poles species, a straight line joining the surface of the pole at the ground line and the edge of the pole at the top shall not be distant from the surface of the pole at any point by more than 1 inch for each 10 feet of length between these points. (See figure 1).
- (2) Where sweep is in two planes (double sweep), or in two directions in one plane (reverse sweep), a straight line connecting the midpoint at the ground line with the midpoint at the top shall not at any intermediate point pass through the surface of the pole (See figure 1, diagram 2).

j Shelling. Shelling on the surface of a pole shall be limited to no more than 1 inch in depth nor exceed 1/3 of the pole's circumference at the point of shelling.

k Spiral Grain: Spiral grain (twist grain) is permitted as follows:

Length of Pole (Feet)	Maximum Twist of Grain Permitted
30 and shorter	1 complete twist in any 10 ft.
35-45, inclusive	1 complete twist in any 16 ft.
50 and longer	1 complete twist in any 20 ft.

l Splits and Checks:

- (1) In the top: A split or a combination of two single checks (each check terminating at the pith center and separated by not less than 1/6 of the circumference) having one or both portions located in a vertical plane within 30 degrees of the top bolt hole shall not extend downward along the pole more than 6 inches. All other combinations of checks or a split shall not extend downward along the pole more than 12 inches. (Two checks of approximately the same width, each check terminating at the pith center and separated by 1/2 inch or less of wood fiber at any point on the pole circumference, shall be considered as a single continuous check.)
- (2) In the butt: A split or a combination of two single checks, as defined in 7.12.1, in its entirety, shall not extend upward along the pole more than 2 feet.

8 DIMENSIONS

For dimensions of particular species of poles, see Tables 3 through 7. For dimensions of stubs and anchor logs, see Tables 9, 10, and 11.

- a Length: Poles less than 50 feet in length shall not be more than 3 inches shorter or 6 inches longer than nominal length. Poles 50 feet or more in length shall not be more than 6 inches shorter or 12 inches longer than nominal length.

Length shall be measured between the extreme ends of the pole.

- b Circumference: The minimum circumferences at 6 feet from the butt and at the top, for each length and class of pole, are listed in Tables 3 through 7. The circumference at 6 feet from the butt of a pole shall not be more than 7 inches or 20 percent larger than specified minimum, whichever is greater. The top dimensional requirement shall apply at a point corresponding to the minimum length permitted for the pole. Since poles are classed in the green condition, a reduction of up to 2 percent in circumference anywhere is acceptable after conditioning.

- c Classification: The true circumference class shall be determined as follows: Measure the circumference at 6 feet from the butt. This dimension shall determine the true class of the pole, provided that its top (measured at the minimum length point) is large enough. Otherwise, the circumference at the top shall determine the true class, provided that the circumference at 6 feet from the butt does not exceed the specified minimum by more than 7 inches or 20 percent, whichever is greater.

9 MANUFACTURING REQUIREMENTS

- a Bark Removal: Outer bark shall be completely removed from all poles.

On all poles, no patch of inner bark more than 1 inch wide shall be left on the pole surface between the butt and 2 feet below the ground line. On poles that are to be given full-length treatment, no patch of inner bark larger than 1 inch wide and 6 inches long shall be left on the pole surface between the top and 2 feet (below the ground line).

NOTE: These provisions are intended to allow an occasional patch of bark and shall not be interpreted to allow numerous patches of bark.

- b Sawing: All poles shall be neatly sawed at the top and at the butt along a plane which shall not be out of square with the axis of the pole by more than 2 inches per foot of diameter of the sawed surface. Beveling at the edge of the sawed butt surface not more than 1/12 the butt diameter in width, or an equivalent area unsymmetrically located, is permitted. The sawed surface shall be smooth enough to allow the inspector's mark to be clear and legible after treatment.

- c Trimming. Branch stubs and completely or partially overgrown knots rising more than 1 inch above the pole surface shall be closely trimmed. Trimming may be done by shaving machine or by hand.
- d Shaving: If shaving is used, the depth of cut shall not be more than necessary to remove inner bark and to trim smoothly and closely all branch stubs and overgrown knots. There shall be no abrupt change in the contour of the pole surface between the ground line and the aboveground sections. The lower 2 feet of poles may be trimmed to remove wood fibers causing butt flare, provided sufficient sapwood remains to obtain customer's minimum penetration requirement.
- e Marking and Code Letters: The information in items (1) through (5) below shall be burn branded legibly and permanently on the pole face or included on a metal tag affixed thereto. The metal tag for the face of the pole shall be round, non-corrosive, tight-fitting, recessed 1/4 inch, and of such gauge to remain readable and last for the life of the pole. It shall be fastened with a barbed or serrated non-corrosive nail. The information in items (5) and (6) below shall be placed on the sawed butt surface. If desired by the producer or the purchaser, items (1), (3), and (4) below may also be placed on the sawed butt surface.
- (1) The treater's code or trademark*
 - (2) Independent inspection agency designation or quality assurance mark.
 - (3) Plant location and month and year of treatment.
 - (4) Code letters denoting the pole species, preservative, and required retention.
 - (5) The true circumference-class numeral and numerals showing the length of the pole.
 - (6) The charge number. (An "R" shall also be die-stamped, hammer-stamped or burn branded in the sawed butt surface of re-treated poles.)

NOTE: Broker or supplier's designation may also appear on pole, but shall be subordinate to the treater's code.

The code letters, not less than 5/8-inch high if burn branded, and not less than 1/8-inch high if on a metal tag, designating the pole species and preservative used, shall be as follows:

Pole Species	Code Letters
Cedar	
Alaska Yellow	YC
Western Red	WC
Douglas-fir (coast)	DF
Larch (western)	WL
Pine	
Jack	JP
Lodgepole	LP
Ponderosa	WP
Red (Norway)	NP
Southern Pine	
Loblolly	SP
Longleaf	
Shortleaf	
Slash	

Preservatives	Code Letters
Creosote	C
Pentachlorophenol-Petroleum (Heavy Solvent)	PA
DCOI	DA
Ammoniacal Copper Zinc Arsenate	SZ
Chromated Copper Arsenate	
Type A	SC
Type B	SJ
Type C	SK
Copper Naphthenate	N

For poles, the bottom of the brand or mark shall be placed squarely on the face of the pole and at 10 feet \pm 2 inches from the butt of poles 50 feet or less in length and at 14 feet \pm 2 inches from the butt of poles 55 feet or more in length or as otherwise specified in the purchase order. Anchor logs shall have the brand or mark at the midpoint and the designation for length and diameter (as prescribed in Table 10) on an end. For pedestal stubs the brand shall be placed 5 feet \pm 2 inches from the butt or end.

Example	Interpretation
HRL	Treater's Code or Trademark (e.g., Harry Roberts' Lumber Company)
XYZ	Independent Inspection Agency Designation or Quality Assurance Mark.
S5-08	Plant Location (e.g., Syracuse) Month and Year of Treatment (for example, May 2004)
SPC-9	Species and Preservative (e.g., southern pine, creosote) Retention (actual retention required by this specification)
5-35	Class and length (e.g., Class 5-35 foot pole)

f Framing

- (1) All poles and stubs should be bored, gained, and cut to length prior to final treatment. However, should special circumstances arise where additional framing may be required after treatment, all cut surfaces must subsequently be pressure treated or treated with preservative approved for use by AWP.
- (2) All framing shall be in accordance with the attached drawings or with the drawings which accompany the order. Anchor logs shall be bored as required by the order for them.
- (3) When gains are required on one side only, they shall be cut on the face of the pole, and the gained surfaces shall be in approximately parallel planes. Transmission poles (e.g., poles 50 feet or longer) may be treated undrilled.
- (4) Transmission poles may be bored before treatment for fumigation if designated in the purchase order.
- (5) Bolt holes in poles treated with water-borne preservatives shall be drilled to the maximum dimension permitted by the RUS standard drawings (i.e., 1/16 inch over the nominal size).
- (6) Anchor logs shall be bored as required by the order for them.
- (7) With the approval of the borrower, anti-splitting devices may be added to the pole tops.

g Incising. Incising or radial drilling shall be done in line with the length of the pole and shall be done cleanly to prevent tearing or excessive shattering of fibers.

- (1) Distribution Poles: Cedar distribution poles to be treated by the thermal process shall be ground line incised in the area from 2 feet above to 4 feet

below the designated ground line with a pattern and depth sufficient to insure uniform penetration of the total sapwood in the incised area.

- (2) Transmission Poles: Cedar transmission poles to be treated by the thermal process shall be ground line incised in the area from 2 feet above to 4 feet below the designated ground line, with a pattern and depth sufficient to insure uniform penetration of the total sapwood in the incised area. All Douglas-fir (coast) transmission poles (poles 50 feet or longer) shall be deep-incised or radial drilled to a minimum depth of 2 1/2 inches in the area from 2 feet above to 4 feet below the designated ground line. Deep incising or radial drilling shall be, as minimum spacing, applied in a 3x6-inch vertical diamond pattern. Radial drilled holes shall not exceed 5/16 inch in diameter.
- (3) Pedestal Stubs: The lengthwise surface of sawn Douglas-fir stubs shall be incised to a depth of approximately 0.4 inches in a pattern that insures uniform preservative penetration. Cedar and western larch stubs that are to be treated by the thermal process shall be incised in the groundline section in accordance with AWP Standards U1 and T1.
- (4) Should experience indicate the need for it, the purchaser may specify additional pole incising or radial drilling requirements, including the following:
 - (a) Through boring may be used as an alternative to deep incising or radial drilling.

DEEPER INCISING OR BORING SUGGESTIONS		
Length of Pole	DEEP RADIAL DRILLING PENETRATION	RADIAL DRILLING OR INCISING
50 through 65 feet	4.0 inches	2.5 inches
70 through 85 feet	4.5 inches	2.5 inches
90 feet or longer	5.0 inches	2.5 inches

10 STORAGE AND HANDLING

- a Storage. When it is necessary to hold poles in storage, they shall be stacked on treated or other nondecaying skids of such dimensions and so arranged as to support the poles without producing noticeable distortion of any of them. The height of the poles shall be limited to avoid damage to poles on the bottom layers.

Poles shall be piled and supported in such a manner that all poles are, at any point, at least 1 foot above the general ground level and any vegetation growing. No decayed wood shall be permitted to remain underneath or adjacent to stored poles. With the exception of short-term piling associated with normal manufacturing procedures, unseasoned poles shall not be dead piled at any time.

- b Handling: Poles shall not be dragged along the ground. Cant hooks, pole tongs, or other pointed tools shall not be applied to the ground line section of any pole.

- c Mechanical Damage: Poles are not acceptable if they contain indentations attributed to loading or handling slings that are 1/4 inch or more deep over 20 percent or more of the pole circumference, or more than 1/2 inch deep at any point. Other indentations or abrasions, for example, forklift damage, kiln sticker damage, chain-saw damage, etc., shall not be more than 1/10 the pole diameter at the point of damage up to a cumulative cross-sectional maximum of 1 inch. Such damage is permitted in an oversized section, where the excess of wood shall be taken into consideration in evaluating the effects of the damage. In any case, the remaining circumference shall meet or exceed the specification minimum.

TABLE 2 GENERAL REQUIREMENTS

Treatment Group	Genus Species	Fiber Stress (psi)
Treatment Group A (air seasoned)		
Cedar, western red	Thuja plicata	6000
Cedar, Alaska yellow	Chamaecyparis Nootkatensis	7400
Treatment Group B (Boulton drying)		
Douglas-fir, (coast)	Pseudotsuga Menziesii	8000
Larch, western	Larix occidentalis	8400
Treatment Group C (steam conditioned)		
Pine, southern Loblolly Longleaf Shortleaf Slash	Pinus taeda Pinus palustris Pinus echinata Pinus elliottii	8000
Treatment Group D (kiln drying)		
Cedar, western red	Thuja plicata	6000
Douglas-fir, (coast)	Pseudotsuga menziesii	8000
Larch, western	Larix occidentalis	8400
Pine, jack	Pinus banksiana	6600
Pine, lodgepole	Pinus contorta	6600
Pine, ponderosa	Pinus ponderosa	6000
Pine, red	Pinus resinosa	6600
Pine, southern Loblolly Longleaf Shortleaf Slash	Pinus taeda Pinus palustris Pinus echinata Pinus elliottii	8000

FIGURE 1 MEASUREMENTS OF SWEEP AND SHORT CROOK IN POLES

DIAGRAM 1 — MEASUREMENT OF SWEEP IN ONE PLANE AND ONE DIRECTION

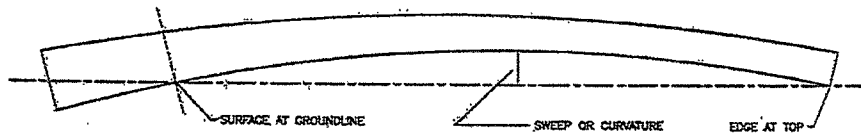


DIAGRAM 2 — MEASUREMENT OF SWEEP IN TWO PLANES (DOUBLE SWEEP)
OR IN TWO DIRECTION IN ONE PLANE (REVERSE SWEEP)

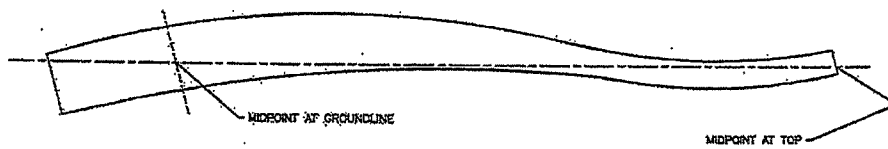
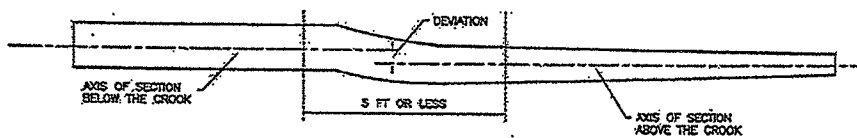
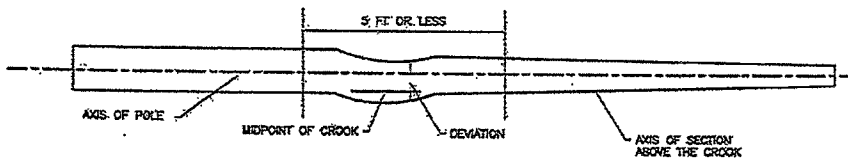


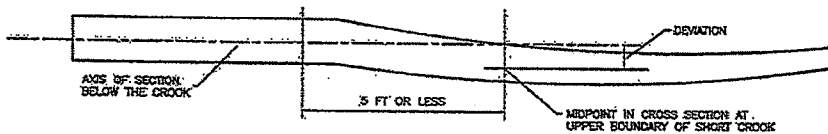
DIAGRAM 3 — MEASUREMENT OF SHORT CROOK (THREE CASES SHOWN)



CASE 1: WHERE THE REFERENCE AXES ARE APPROXIMATELY PARALLEL



CASE 2: WHERE AXES OF SECTIONS ABOVE AND BELOW THE CROOK
COINCIDE OR ARE PRACTICALLY COINCIDENT



CASE 3: WHERE AXIS OF SECTION ABOVE SHORT CROOK IS NOT PARALLEL
OR COINCIDENT WITH AXIS BELOW THE CROOK

TABLE 3: DIMENSIONS OF WESTERN RED CEDAR¹ AND PONDEROSA PINE
POLES

Class	H-6	H-5	H-4	H-3	H-2	H-1	1	2	3	4	5	6	7	9	10
Minimum Circumference at top (in.)	39	37	35	33	31	29	27	25	23	21	19	17	15	15	12
Length of pole (ft.)	Ground-line ² distance from butt (ft.)	Minimum circumference at 6 ft from butt (in.)													
20	4	-	-	-	-	-	33.5	31.5	29.5	27.0	25.0	23.0	21.5	18.5	15.0
25	5	-	-	-	-	-	37.0	34.5	32.5	30.0	28.0	25.5	24.0	20.5	16.5
30	5.5	-	-	-	-	-	40.0	37.5	35.0	32.5	30.0	28.0	26.0	22.0	-
35	6	-	-	-	-	48.0	45.5	42.5	40.0	37.5	34.5	32.0	30.0	27.5	-
40	6	-	-	56.5	53.5	51.0	48.0	45.0	42.5	39.5	36.5	34.0	31.5	-	-
45	6.5	64.5	62.0	59.0	56.0	53.5	50.5	47.5	44.5	41.5	38.5	36.0	33.0	-	-
50	7	67.0	64.5	61.5	58.5	55.5	52.5	49.5	46.5	43.5	40.0	37.5	-	-	-
55	7.5	70.0	67.0	64.0	61.0	57.5	54.5	51.5	48.5	45.0	42.0	-	-	-	-
60	8	72.0	69.0	66.0	63.0	59.5	56.5	53.5	50.0	46.5	43.5	-	-	-	-
65	8.5	74.5	71.5	68.0	65.0	61.5	58.5	55.0	51.5	48.0	45.0	-	-	-	-
70	9	76.5	73.5	70.0	67.0	63.5	60.0	56.5	53.0	49.5	46.0	-	-	-	-
75	9.5	78.5	75.5	72.0	68.5	65.0	61.5	58.0	54.5	51.0	-	-	-	-	-
80	10	80.5	77.0	74.0	70.5	67.0	63.0	59.5	56.0	52.0	-	-	-	-	-
85	10.5	82.5	79.0	75.5	72.0	68.5	64.5	61.0	57.0	53.5	-	-	-	-	-
90	11	84.5	81.0	77.0	73.5	70.0	66.0	62.5	58.5	54.5	-	-	-	-	-
95	11	86.0	82.5	79.0	75.0	71.5	67.5	63.5	59.5	-	-	-	-	-	-
100	11	87.5	84.0	80.5	76.5	72.5	69.0	65.0	61.0	-	-	-	-	-	-
105	12	89.5	85.5	82.0	78.0	74.0	70.0	66.0	62.0	-	-	-	-	-	-
110	12	91.0	87.0	83.5	79.5	75.5	71.5	67.5	63.0	-	-	-	-	-	-
115	12	92.5	88.5	84.5	80.5	76.5	72.5	68.5	64.0	-	-	-	-	-	-
120	12	94.0	90.0	86.0	82.0	78.0	74.0	69.5	65.0	-	-	-	-	-	-
125	12	95.5	91.5	87.5	83.0	79.0	75.0	70.5	66.0	-	-	-	-	-	-

NOTES:

1. Dimensions of H Classes are applicable for western red cedar only.
2. The figures in this column are intended for use only when a definition of groundline is necessary in order to apply requirements relating to scars, straightness, etc
3. Classes and lengths for which circumferences at 6 feet from the butt are listed in bold face type are the preferred standard sizes. Those shown in light type are included for engineering purposes only.

TABLE 4: DIMENSIONS OF JACK PINE, LODGEPOLE PINE, RED PINE, REDWOOD, SITKA SPRUCE, WESTERN FIR, AND WHITE SPRUCE POLES

Class		1	2	3	4	5	6	7	9	10
Minimum circumference at top (in.)		27	25	23	21	19	17	15	15	12
Length of Pole (ft.)	Groundline ⁽¹⁾ Distance From butt (ft.)	Minimum circumference at 6 ft. from butt (in.)								
20	4	32.5	30.5	28.5	26.5	24.5	22.5	21.0	18.0	14.5
25	5	36.0	33.5	31.0	29.0	27.0	25.0	23.0	20.0	15.5
30	5.5	39.0	36.5	34.0	31.5	29.0	27.0	25.0	21.0	-
35	6	41.5	38.5	36.0	33.5	31.0	28.5	26.5	-	-
40	6	44.0	41.0	38.0	35.5	33.0	30.5	-	-	-
45	6.5	46.0	43.0	40.0	37.0	34.5	32.0	-	-	-
50	7	48.0	45.0	42.0	39.0	36.0	-	-	-	-
55	7.5	49.5	46.5	43.5	40.5	-	-	-	-	-
60	8	51.5	48.0	45.0	42.0	-	-	-	-	-
65	8.5	53.0	49.5	46.0	43.0	-	-	-	-	-
70	9	54.5	51.0	47.5	44.5	-	-	-	-	-
75	9.5	56.0	52.5	49.0	-	-	-	-	-	-
80	10	57.5	54.0	50.5	-	-	-	-	-	-
85	10.5	58.5	55.0	51.5	-	-	-	-	-	-
90	11	60.0	56.5	52.5	-	-	-	-	-	-
95	11	61.5	57.5	-	-	-	-	-	-	-
100	11	62.5	58.5	-	-	-	-	-	-	-
105	12	63.5	60.0	-	-	-	-	-	-	-
110	12	65.0	61.0	-	-	-	-	-	-	-
115	12	66.0	62.0	-	-	-	-	-	-	-
120	12	67.0	63.0	-	-	-	-	-	-	-
125	12	68.0	64.0	-	-	-	-	-	-	-

NOTE - Classes and lengths for which circumferences at 6 feet from the butt are listed in boldface type are the preferred standard sizes. Those shown in light type are included for engineering purposes only.

¹⁾The figures in this column are intended for use only when a definition of groundline is necessary in order to apply requirements relating to scars, straightness, etc.

TABLE 5: DIMENSIONS OF ALASKA YELLOW CEDAR AND WEST HEMLOCK POLES

Class		H-6	H-5	H-4	H-3	H-2	H-1	1	2	3	4	5	6	7	9	10
Minimum Circumference at top (in.)		39	37	35	33	31	29	27	25	23	21	19	17	15	15	12
Length of pole (ft.)	Ground-line ^{b)} distance from butt	Minimum circumference at 6 ft from butt (in.)														
		20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
4	4	-	-	-	-	-	-	-	31.5	29.5	27.5	25.5	23.5	22.0	20.0	17.5
5	5	-	-	-	-	-	-	-	34.5	32.5	30.0	28.0	26.0	24.0	22.0	19.5
5.5	5.5	-	-	-	-	-	-	-	37.5	35.0	32.5	30.0	28.0	26.0	24.0	20.5
6	6	-	-	-	-	45.0	42.5	40.0	37.5	35.0	32.0	30.0	27.5	25.5	-	-
6	6	-	-	52.5	50.0	47.5	45.0	42.0	39.5	37.0	34.0	31.5	29.0	25.5	-	-
6.5	6.5	60.0	57.5	55.0	52.5	49.5	47.0	44.0	41.5	38.5	36.0	33.0	30.5	-	-	-
7	7	62.5	60.0	57.0	54.5	51.5	49.0	46.0	43.0	40.0	37.5	34.5	-	-	-	-
7.5	7.5	65.0	62.0	59.5	56.5	53.5	50.5	47.5	44.5	41.5	39.0	-	-	-	-	-
8	8	67.0	64.0	61.5	58.5	55.5	52.5	49.5	46.0	43.0	40.0	-	-	-	-	-
8.5	8.5	69.0	66.0	63.0	60.0	57.5	54.0	51.0	47.5	44.5	41.5	-	-	-	-	-
9	9	71.0	68.0	65.0	62.0	58.5	55.5	52.5	49.0	46.0	42.5	-	-	-	-	-
9.5	9.5	73.0	69.5	66.5	63.5	60.0	57.0	53.5	50.5	47.0	-	-	-	-	-	-
10	10	74.5	71.5	68.0	65.0	61.5	58.5	55.0	51.5	48.5	-	-	-	-	-	-
10.5	10.5	76.0	73.0	70.0	66.5	63.0	59.5	56.0	53.0	49.5	-	-	-	-	-	-
11	11	78.0	74.5	71.0	68.0	64.5	61.0	57.5	54.0	50.5	-	-	-	-	-	-
95	11	79.5	76.0	72.5	69.5	66.0	62.0	58.5	55.0	-	-	-	-	-	-	-
100	11	81.0	77.5	74.0	70.5	67.0	63.5	60.0	56.0	-	-	-	-	-	-	-
105	12	82.5	79.0	75.5	72.0	68.5	64.5	61.0	57.0	-	-	-	-	-	-	-
110	12	84.0	80.5	77.0	73.0	69.5	65.5	62.0	58.0	-	-	-	-	-	-	-
115	12	85.5	81.5	78.0	74.5	70.5	67.0	63.0	59.0	-	-	-	-	-	-	-
120	12	86.5	83.0	79.5	75.5	72.0	68.0	64.0	60.0	-	-	-	-	-	-	-
125	12	88.0	84.5	80.5	76.5	73.0	69.0	65.0	61.0	-	-	-	-	-	-	-

NOTE - Classes and lengths for which circumferences at 6 feet from the butt are listed in bold face type are the preferred standard sizes. Those shown in light type are included for engineering purposes only.
^{b)}The figures in this column are intended for use only when a definition of groundline is necessary in order to apply requirements

TABLE 6: DIMENSIONS OF DOUGLAS FIR (BOTH TYPES) AND SOUTHERN YELLOW PINE POLES

Class		H-6	H-5	H-4	H-3	H-2	H-1	1	2	3	4	5	6	7	9	10
Minimum Circumference		39	37	35	33	31	29	27	25	23	21	19	17	15	15	12
Length of pole (ft.)	Groundline ¹⁾ distance from butt (ft.)	Minimum circumference at 6 ft from butt (in.)														
		4	5	5.5	6	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11
20		-	-	-	-	-	-	-	31.0	29.0	27.0	25.0	23.0	21.0	19.5	17.5
25		-	-	-	-	-	-	-	33.5	31.5	29.5	27.5	25.5	23.0	21.5	19.5
30		-	-	-	-	-	-	-	36.5	34.0	32.0	29.5	27.5	25.0	23.5	20.5
35		-	-	-	-	-	-	-	39.0	36.5	34.0	31.5	29.0	27.0	25.0	-
40		-	-	-	-	-	-	-	41.5	38.5	36.0	33.5	31.0	28.5	-	-
45		-	-	-	-	-	-	-	43.5	40.5	37.5	35.0	32.5	30.0	-	-
50		58.5	56.0	53.5	51.0	48.5	46.0	43.5	40.5	39.0	36.5	34.0	-	-	-	-
55		61.0	58.5	55.5	53.0	50.5	48.5	45.5	42.0	39.0	38.0	-	-	-	-	-
60		63.5	60.5	58.0	55.0	52.0	49.5	46.5	43.5	40.5	39.0	-	-	-	-	-
65		65.5	62.5	59.5	57.0	54.0	51.0	48.0	45.0	42.0	39.0	-	-	-	-	-
70		67.5	64.5	61.5	58.5	55.5	52.5	49.5	46.5	43.5	40.5	-	-	-	-	-
75		69.0	66.5	63.5	60.5	57.0	54.0	51.0	48.0	45.0	41.5	-	-	-	-	-
80		71.0	68.0	65.0	62.0	59.0	55.5	52.5	49.0	46.0	-	-	-	-	-	-
85		72.5	69.5	66.5	63.5	60.0	57.0	54.0	50.5	47.0	-	-	-	-	-	-
90		74.5	71.5	68.0	65.0	61.5	58.5	55.0	51.5	48.0	-	-	-	-	-	-
95		76.0	73.0	69.5	66.5	63.0	59.5	56.0	53.0	49.0	-	-	-	-	-	-
100		77.5	74.5	71.0	67.5	64.5	61.0	57.0	54.0	-	-	-	-	-	-	-
105		79.0	76.0	72.5	69.0	65.5	62.0	58.5	55.0	-	-	-	-	-	-	-
110		80.5	77.0	74.0	70.5	67.0	63.0	59.5	56.0	-	-	-	-	-	-	-
115		82.0	78.5	75.0	71.5	68.0	64.5	60.5	57.0	-	-	-	-	-	-	-
120		83.5	80.0	76.5	72.5	69.0	65.5	61.5	58.0	-	-	-	-	-	-	-
125		85.0	81.0	77.5	74.0	70.0	66.5	62.5	59.0	-	-	-	-	-	-	-
		86.0	82.5	78.5	75.0	71.0	67.5	63.5	59.5	-	-	-	-	-	-	-

NOTE - Classes and lengths for which circumferences at 6 feet from the butt are listed in bold face type are the preferred standard sizes. Those shown in light type are included for engineering purposes only.

¹⁾ The figures in this column are intended for use only when a definition of groundline is necessary in order to apply requirements relating to scars, straightness, etc.

TABLE 7: DIMENSIONS OF WESTERN LARCH POLES

Class		H-6	H-5	H-4	H-3	H-2	H-1	1	2	3	4	5	6	7	9	10
Minimum Circumference at top (in.)		39	37	35	33	31	29	27	25	23	21	19	17	15	15	12
Length of pole (ft.)	Groundline ^{b)} distance from butt (ft.)	Minimum circumference at 6 ft from butt (in.)														
		20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
20	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	5.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	6.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	7	57.5	55.0	52.5	50.0	47.5	45.0	42.0	39.5	37.0	34.0	31.5	29.0	-	-	-
55	7.5	60.0	57.5	55.0	52.0	49.5	47.0	44.0	41.0	38.5	35.5	33.0	-	-	-	-
60	8	62.0	59.5	57.0	54.0	51.5	48.5	45.5	42.5	40.0	37.0	-	-	-	-	-
65	8.5	64.5	61.5	59.0	56.0	53.0	50.0	47.0	44.0	41.0	38.5	-	-	-	-	-
70	9	66.0	63.5	60.5	57.5	55.0	52.0	48.5	46.0	42.5	39.5	-	-	-	-	-
75	9.5	68.0	65.0	62.5	59.5	56.5	53.5	50.0	47.0	44.0	41.0	-	-	-	-	-
80	10	70.0	67.0	64.0	61.0	58.0	54.5	51.5	48.0	45.0	-	-	-	-	-	-
85	10.5	71.5	68.5	65.5	62.5	59.0	56.0	52.5	49.5	46.0	-	-	-	-	-	-
90	11	73.0	70.0	67.0	64.0	60.5	57.5	54.0	50.5	47.0	-	-	-	-	-	-
95	11	74.5	71.5	68.5	65.0	62.0	58.5	55.0	51.5	48.5	-	-	-	-	-	-
100	11	76.5	73.0	70.0	66.5	63.0	60.0	56.5	53.0	-	-	-	-	-	-	-
105	12	78.0	74.5	71.0	68.0	64.5	61.0	57.5	54.0	-	-	-	-	-	-	-
110	12	79.0	76.0	72.5	69.0	65.5	62.0	58.5	55.0	-	-	-	-	-	-	-
115	12	80.5	77.0	73.5	70.0	66.5	63.0	59.5	56.0	-	-	-	-	-	-	-
120	12	82.0	78.5	75.0	71.5	68.0	64.0	60.5	57.0	-	-	-	-	-	-	-
125	12	83.0	79.5	76.0	72.5	69.0	65.0	61.5	58.0	-	-	-	-	-	-	-
125	12	84.5	81.0	77.5	73.5	70.0	66.0	62.5	58.5	-	-	-	-	-	-	-

NOTE-- Classes and lengths for which circumferences at 6 feet from the butt are listed in bold face type are the preferred standard sizes. Those shown in light type are included for engineering purposes only.
^{b)}The figures in this column are intended for use only when a definition of groundline is necessary in order to apply requirements relating to scars, straightness, etc.

TABLE 8
TREATMENT AND RESULTS OF TREATMENT

		Preservative Treatments Minimum Retentions ^H (Pounds per Cubic Foot)					Assay Zone	Penetration		
Species	Area Use ^A	Creo- sote ^B	Penta ^C	DCOI-A	Water- borne ^D	CuN ^E	Inches from Surface	Inches from Surface		Percent of Sapwood
PRESSURE PROCESS - FULL LENGTH TREATMENT										
Southern Pine	1	9.0	0.45	0.15	0.60	0.080	0.50 to 2.0	3.50	or	90
Southern Pine	2	7.5	0.38	0.13	—	0.060	0.50 to 2.0	3.00	or	90
Douglas-fir ^{GLM}	1	12.0	0.60	0.20	0.60	0.095	0.25 to 1.0	0.75	and	85
Douglas-fir ^{GLM}	2	9.0	0.45	0.15	—	0.075	0.25 to 1.0	0.75	and	85
Ponderosa Pine ^G	1	9.0	0.45		0.60	—	0.50 to 2.0	3.50	or	90
Ponderosa Pine ^G	2	7.5	0.38		—	—	0.50 to 2.0	3.00 ^J	or	90
Red Pine	1	12.0	0.60	0.20	0.60	0.150	0.10 to 1.60	3.00	or	90
Red Pine	2	10.0	0.50	0.17	0.60	0.095	0.10 to 1.60	2.50	or	85
Jack Pine	2	12.0	0.60		0.60	—	0.10 to 0.75	1.50	or	85 ^K
Western Larch	2	18.0	0.80		0.60	—	0.10 to 0.60	0.50	and	100 ^L
Western Red Cedar	2	20.0	1.0	0.33	0.60	0.12	0.0 to 0.50	0.50	or	100
Lodgepole Pine	2	12.0	0.60		0.60	—	0.10 to 0.75	0.75	and	85
THERMAL PROCESS - FULL LENGTH TREATMENT										
Western Larch	2	20.0	0.80	—	—	—	0.0 to 0.50	0.50	and	85
Western Red Cedar	2	20.0	1.0	—	—	0.15	0.0 to 0.50	0.50	or	100
Alaska Yellow Cedar	2	20.0	1.0	—	—	0.15	0.0 to 0.50	0.50	or	100
THERMAL PROCESS - BUT TREATMENT										
Alaska Yellow Cedar	2 ^F	20.0	1.0	—	—	—	0.0 to 0.50	0.50	or	100
Western Red Cedar	2 ^F	20.0	1.0	—	—	—	0.0 to 0.50	0.50	or	100

	<p><u>Notes:</u></p> <p>A. Use Area 1- South of the 40th parallel of north latitude and east of the 95th meridian of west longitude, including the Gulf Coast of Texas. Use Area 2- Elsewhere than as defined for Use Area 1.</p> <p>B. Test By Toluene Extraction</p> <p>C. This retention for lime ignition or x-ray spectroscopy method. Copper pyridine method, which equals 90% of lime ignition results, is required when poles may have been in contact with salt water, and for all species native to the Pacific Region, unless it specifically states on the raw material invoice that the material has not been in contact with salt water or shown by analysis that there are no additional chlorides present in the wood before treating.</p> <p>D. Pressure Treatment Only</p> <p>E. In Decay Zone 5, shown in RUS Bulletin 1730B-121, minimum retentions are 0.130 PCF for Southern Pine and 0.150 PCF for Douglas-fir, for all poles within 50 miles of coastal waters.</p> <p>F. Allowed for use in low to moderate decay zones.</p> <p>G. Species native to the Pacific Coast region as per Agriculture Handbook 541 (1979).</p> <p>H. A reduction of 10 percent from the values shown above in any of the test zones is acceptable at destination within 6 months from the date of delivery.</p> <p>I. Coast type</p> <p>J. 3.5 inches of penetration for waterborne preservatives.</p> <p>K. 3.0 inches or 90% sapwood penetration for waterborne preservatives.</p> <p>L. Up to a maximum of 0.75 inches.</p> <p>M. A second (inner) assay zone is required for Douglas-fir transmission poles. The inner assay zone is 2.0" - 2.5" from the surface. The preservative retention in this inner zone must be at least 50% of the required retention for the standard assay zone.</p>
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TABLE 9
DIMENSION OF ELECTRIC STUBS

Lodge pole Pine, Red Pine, Jack Pine

Length of Stub (Feet)	Minimum Top Circumference * (Inches)						
	Class of Stub						
	1	2	3	4	5	6	7
10.5	37.0	34.5	32.0	29.5	27.0	25.0	22.5
11	39.5	37.5	34.0	31.5	29.5	26.5	24.0
11.5	42.0	39.0	36.0	33.5	31.0	28.5	26.0
12.5	43.5	40.5	37.5	34.5	32.0	29.5	27.0
13	45.5	42.5	39.5	36.5	33.5	31.0	28.5

*Maximum circumference not more than these figures plus 4 inches

Southern Pine, Douglas fir (coast) and Western Larch

Length of Stub (Feet)	Minimum Top Circumference * (Inches)						
	Class of Stub						
	1	2	3	4	5	6	7
10.5	36.0	33.5	31.0	28.5	26.0	24.5	22.5
11	38.0	35.5	33.0	30.0	28.0	25.5	23.5
11.5	40.0	37.5	35.0	32.0	29.5	27.0	25.0
12.5	42.0	39.5	36.5	34.0	31.0	28.5	26.5
13	43.5	40.5	37.5	35.0	32.0	29.5	27.0

*Maximum circumference not more than these figures plus 4 inches

TABLE 10
DIMENSIONS OF ANCHOR LOGS

Southern Pine, Lodgepole Pine, Red Pine,
Jack Pine, Douglas fir and Western Larch

	Log Designation					
	F2-1	F2-2	F2-3	F2-4	TA-2L	TA-4L
Log Length (Feet)	4.0	4.5	5.0	5.0	5.0	8.0
Minimum Diameter (Inches)	8.0	9.0	10.0	12.0	8.0	8.0

TABLE 11
TELEPHONE STUBS FOR MOUNTING BURIED PLANT TERMINAL HOUSINGS

Telephone Round Type Stubs

Dimensions: Top Diameter shall be 4 1/2" minimum. Butt Diameter shall be 5" minimum.

<u>Bid Limit</u> <u>Designation</u>	<u>Length</u>
BA-2	6'-6"
BA-3	8'-0"
BA-4	10'-0"
BA-5	13'-6"

Telephone Sawn Pedestal Stubs

Dimensions: Finished Minimum Cross-section of 3 1/2" x 4 1/2".

<u>Bid Limit</u> <u>Designation</u>	<u>Length</u>
BA-21	6'-6"
BA-22	8'-0"
BA-23	10'-0"

FIGURE 2 ELECTRIC POLE FRAMING DRAWINGS

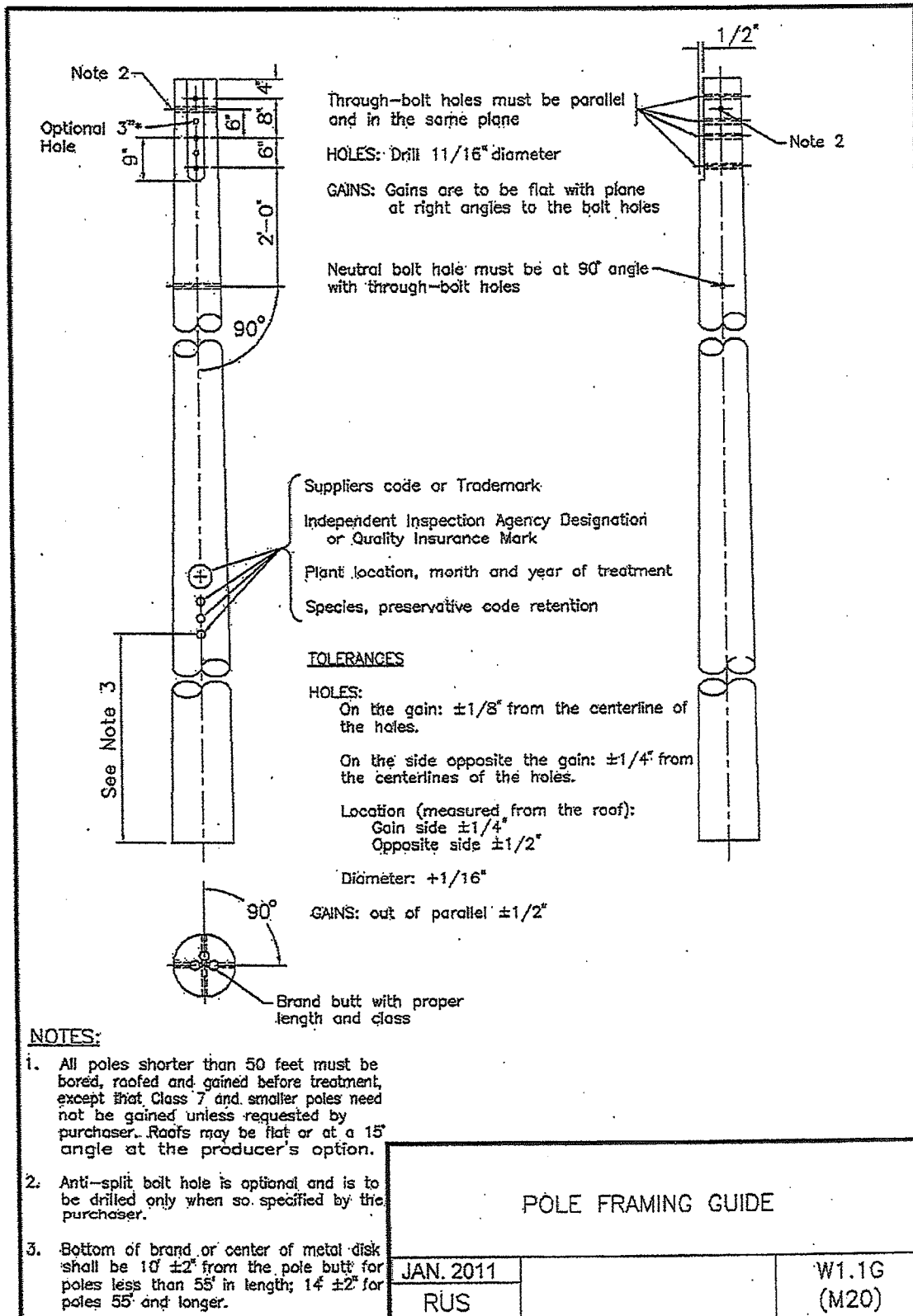
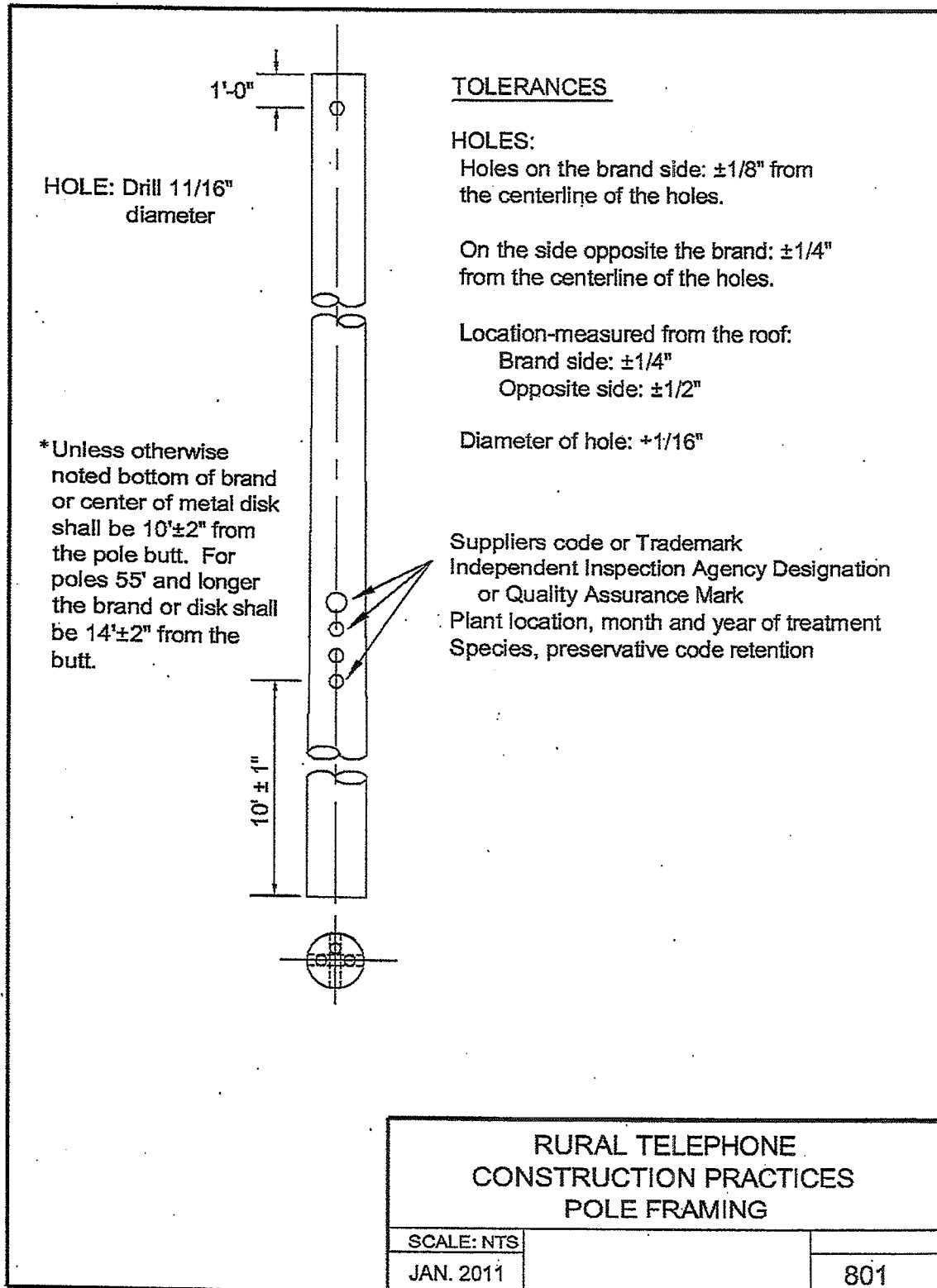


FIGURE 3 TELECOMMUNICATIONS POLE FRAMING DRAWING

METRIC CONVERSION FACTORS

TO CONVERT FROM	TO	MULTIPLY BY
Foot (ft)	meter (m)	0.3048
Inch (in)	centimeter	2.54
Pound per cubic foot (pcf) (lb/ft ³)	kilogram per cubic meter (kg/m ³)	16.01846
Pound per square inch (psi) (lb/in ²)	kilogram per square meter (kg/m ²)	703.0696
Degrees Fahrenheit (°F)	degrees Celsius (°C)	5/9(°F-32)