



SPECIFICATION MS-0454-2022

REVISION 4

(Supersedes Specification MS-0454-2019)

INSPECTION AND TREATMENT OF WOOD POLES IN SERVICE

March 10, 2022

TABLE OF CONTENTS

<u>SECTION</u>	<u>TITLE</u>	<u>PAGE</u>
	<u>SECTION 1</u>	
	<u>INTRODUCTION</u>	
1.1	Inspection and Treatment of Wood Poles in Service	1-1
	<u>SECTION 2</u>	
	<u>INSPECTION METHODOLOGY</u>	
2.1	Inspection Action Codes (IACs)	2-1
2.2	Recommended Action Codes (RACs)	2-2
	<u>SECTION 3</u>	
	<u>VISUAL INSPECTIONS</u>	
3.1	General Note	3-1
3.2	Visual Methodology	3-1
3.3	Additional Visual Damage Not Requiring Pole Replacement	3-3

TABLE OF CONTENTS

<u>SECTION</u>	<u>TITLE</u>	<u>PAGE</u>
<u>SECTION 4</u>		
<u>INTRUSIVE INSPECTIONS</u>		
4.1	General Notes and Requirements for All Types of Intrusive Inspections	4-1
4.2	Intrusive Inspection Methodology Details	4-3
4.3	Boring Methodology	4-5
<u>SECTION 5</u>		
<u>SPECIALIZED POLES</u>		
5.1	RPIN Inspections (Repaired Poles – IAC 6A)	5-1
5.2	“Through-Boring” Pole Inspection (IAC 7A)	5-5
5.3	Temporary Wood Stub Inspection	5-7
5.4	Pole Test Inspections	5-7
5.5	Poles Set in Culvert/Caisson	5-8
<u>SECTION 6</u>		
<u>POLES WITH DETERIORATION</u>		
6.1	General Notes and Requirements for Poles with Deterioration	6-1
6.2	Methodology	6-1
6.3	Repair Methodology	6-2
<u>SECTION 7</u>		
<u>INSPECTION MARKINGS</u>		
7.1	Pole Tags, Replace Pole	7-1
7.2	Pole Tags, Inspection and Treatment Type (Butterfly Tags)	7-2
<u>SECTION 8</u>		
<u>POLE TREATMENT</u>		
8.1	General	8-1
8.2	Details	8-1
8.3	Treating “Partial” and “Full Treatment” Inspected Poles	8-3
8.4	Treating “Sound and Bore” Inspected Poles	8-4

TABLE OF CONTENTS

APPENDICES

Appendix 1	Definitions	A-1
------------	-------------	-----

END OF TABLE OF CONTENTS

SECTION 1

INTRODUCTION

1.1 INSPECTION AND TREATMENT OF WOOD POLES IN SERVICE

The Edison Intrusive Wood Pole Inspection Program is intended to meet the intrusive inspection requirements and schedules as mandated by General Order 165 and CAL ISO by inspecting the entire Edison wood pole system. The program includes visual and intrusive inspections designed to detect damage and/or decay in order to identify and prioritize poles needing replacement.

END OF SECTION 1

SECTION 2

INSPECTION METHODOLOGY

2.1 INSPECTION ACTION CODES (IACs)

All Edison wood poles shall be inspected utilizing one of the following inspection methodologies in accordance with their appropriate inspection cycles, beginning with a visual inspection as described below:

TABLE 2-1
INSPECTION ACTION CODE

CODE GROUP - EZ-INSPA	INTRUSIVE POLE INSPECTION ACTION
CODES	SHORT TEXT FOR CODE
1A	Visual – New pole less than ten (10) years old
1C	Visual – Repole/Mod Pole (Automatic one-year replacement)
1F	Visual – Asbestos Fire Wrap (Automatic one-year replacement)
2A	Partial Dig (Intrusive Inspection)
3A	Unable to Inspect – No Access
3B	Unable to Inspect – Obstructed
3C	Unable to Inspect – Removed Pole (DNE)
3D	Unable to Inspect – Any Non-Wood Pole
3E	Unable to Inspect – Conductor Attached to Tree
3F	Unable to Inspect – Incomplete Location Information
3G	Unable to Inspect – Located in Substation
4A	Full Treatment (Intrusive Inspection)
5A	Sound and Bore (Intrusive Inspection)
6A	RPIN Inspections (Repaired Poles)
7A	Through-Bored Pole Inspections

INSPECTION METHODOLOGY

2.2 RECOMMENDED ACTION CODES (RACs)

As a result of a pole inspection, the appropriate required action (Replace, Steel Stub, or Pass Inspection) will be assigned from the table below.

TABLE 2-2
RAC (PRIORITY) SYSTEM

CODE GROUP - EZ-RECMA R/A CODE	INTRUSIVE POLE RECOMMENDED ACTION*
1	Replace Pole - Priority 1 (72 hours)
2	Replace Pole - Priority 2 (1 year)
3	Replace Pole - Priority 2 (2 years)
4	Replace Pole - Priority 2 (3 years)
5	Steel Stub - Priority 2C (3 years)
6	Fiberwrap - Priority 2C (3 years) – idle program
7	SAM - Priority 2A (1 year) – idle program
8	SAM - Priority 2C (3 years) – idle program
9	Replace Bands – Pass RPIN Inspection (3 year)
10	Pass - Intrusive Pole Inspection (Priority 3)

*Recommended action code timelines may be accelerated based program need.

END OF SECTION 2

SECTION 3

VISUAL INSPECTIONS

3.1 GENERAL NOTE

Visual inspections will be performed on **all** wood poles prior to performing the intrusive inspection. When the visual inspection has been completed and the pole is **not** any of the IAC 1s, proceed to Section 4 – Intrusive Inspections.

3.2 VISUAL METHODOLOGY

- A. Visual inspection shall include determination of prior reinforcement/restoration, inspection history, and circumference at ground-line. Pole characteristics (Class, Pole height, Species, Initial Treatment, Reinforcement Type, and Inspection History) should be recorded if legible brand is present.
- B. Pole shall receive a visual inspection from the pole top to ground-line, from four (4) points, each 90 degrees apart (four (4) quadrants).
- C. The visual inspection shall identify conditions that could have high safety risk to the public/workers, property, or environment and would require immediate replacement of the pole or repair of attachments or equipment on the pole.
 - 1. When visually assessing the pole greater than 6 feet above ground-line, see Table 3-1, Typical Discrepancies for Visual Rejects Greater than 6 Feet Above Ground-line.
 - 2. When visually assessing the pole up to 6 feet above ground-line, physical measurement will need to be taken and inputted in to an SCE-approved damage calculator to determine the RSM.
- D. Poles shall be “sounded” if evidence of voids and/or mechanical/insect damage is detected during sounding, suspect areas shall be intrusively inspected with 9/16-inch diameter boring.
 - 1. Inspection boring must pass 2/3 the diameter of the pole, but not closer than 2 inches from the opposite side.
- E. For poles meeting the description of IAC 1A, if no safety risk conditions are found and no voids identified via sounding or visual observation, leave Recommended Action blank, no further action is required. If pole has visual reject criteria and/or a void is found during sounding, proceed to Section 4 – Intrusive Inspections.

VISUAL INSPECTIONS

TABLE 3-1
TYPICAL DISCREPANCIES FOR VISUAL REJECTS GREATER THAN 6 FEET ABOVE GROUND-LINE

RECOMMENDED ACTION CODE	TIME FRAME/ ACTION	SPLIT OR DECAY IN POLE	HOLE/BORING DAMAGE – ANIMAL, BIRD OR INSECT (DRY-WOOD TERMITES)	EXTERIOR DAMAGE – COMPRESSION/FIRE/ ANIMAL/MECHANICAL
RAC-1	Immediate – Replace within 72 hours	<ul style="list-style-type: none"> Split or decay damage causing unstable structure. Failure imminent. 	<ul style="list-style-type: none"> Hole/boring damage causing unstable structure. Failure imminent. 	<ul style="list-style-type: none"> Exterior damage causing unstable structure. Failure imminent. Cross Break.
RAC-2	Urgent – Replace within 1 year	<ul style="list-style-type: none"> Split or decay allows light through pole. Split or decay at critical attachment; bolt pulling through pole. 	<ul style="list-style-type: none"> Hole allows light through pole. Hole > 2" diameter and extends past center. Holes > 2" diameter within 18" vertical at high stress area. <p>Note: Holes more than 12" above the uppermost attachment will not be grounds for rejecting the pole.</p>	Exterior damage > 2" depth and > 1/4 pole circumference (1 quadrant).
RAC-3	Advanced Degradation – Replace within 2 years	<ul style="list-style-type: none"> Split within 6" of critical attachment, not pulling through. Decay within 6" of critical attachment, not pulling through. 	<ul style="list-style-type: none"> Hole > 2" diameter with possible cavity in high stress area. Three or more holes > 2" diameter within 18" vertical. 	Exterior damage 1" to 2" depth and > 1/4 pole circumference (1 quadrant).
RAC-4	Moderate Degradation – Replace within 3 years		<ul style="list-style-type: none"> Hole < 2" diameter with possible cavity 	<ul style="list-style-type: none"> Exterior damage 1" to 2" depth and 2" to 1/4 pole circumference (1 quadrant). Extensive top damage > 6" above all critical attachments.

Notes:

1. Critical Attachment – Examples: guy fixture, cross-arm through-bolt, insulator through-bolt, or equipment through-bolt.

VISUAL INSPECTIONS

2. Examples of holes (Woodpecker) in high stress areas.



FIGURE 3-1

Visual Reference for Woodpecker Holes in High Stress Areas

3. The picture below shows a starter hole created by a woodpecker causing minor damage with avenue for moisture to flow out of entrance pocket.



FIGURE 3-2

Damage Caused by Woodpecker Hole

3.3 ADDITIONAL VISUAL DAMAGE NOT REQUIRING POLE REPLACEMENT

Inspector shall make immediate notification to the Edison Program Manager if dangerous or imminent failure situations or conditions are identified during visual inspection (Inspector shall provide pictures when required by Edison).

END OF SECTION 3

SECTION 4

INTRUSIVE INSPECTIONS

4.1 GENERAL NOTES AND REQUIREMENTS FOR ALL TYPES OF INTRUSIVE INSPECTIONS

- A. All intrusive inspection types will include a full visual inspection prior to boring (see Section 3 – Visual Inspections).
- B. Plugs – Edison-Approved – All inspection and treatment borings shall be plugged with:
 - 1. Scotty Replug:
 - a. Type A13F – White (7/8-inch diameter borings)
 - b. Type A9 – White (9/16-inch diameter borings)
 - 2. Genics Inc.:
 - a. PO No. - 30789 White (7/8-inch diameter borings)
 - b. PO No. - 30749 White (9/16-inch diameter borings)
 - 3. Poles Inc.:
 - a. S2R2 7/8" – P1174 White (7/8-inch diameter borings)
 - b. S2R 2 9/16" – P1182 White (9/16-inch diameter borings)
- C. Deteriorated pole software program – The Remaining Section Modulus (RSM) will be determined through use of a deteriorated pole software program that must be approved by Edison's Wood Product specialists (i.e., D-Calc). All RSM percentages shall be rounded down to the nearest whole number (i.e., 98.3% = 98, or 96.7% = 96%).
 - 1. The following software applications are SCE-approved:
 - a. Engineering Data Management (EDM) - D-Calc, deterioration software (PREFERRED).
 - b. SPIDA Software – SpidaCalc, Pole Loading Software

INTRUSIVE INSPECTIONS

D. Inspecting Previously Intrusively Inspected Wood Poles:

1. When performing an inspection and three (3) or more existing borings are present at ground-line, add one (1) additional 9/16-inch diameter inspection boring 6 inches above ground-line (AGL), see Section 4.3.2 – Ground-line (GL) Borings.

E. Inspecting FR Wrapped Wood Poles:

1. Inspect all FR wrapped wood poles using the same procedure for non-wrapped poles.
2. Should a FR wrapped pole require an inspection as part of its regular cycled time, follow the steps outlined below to expose the wood for new and existing borings.
 - a. Identify where the boring is to be placed in the wood pole.
 - b. Use the utility knife or tin snips to shear 3" vertically and horizontally from the boring location, creating an "L" cut in the fire wrap.
 - c. Push the cut fire mesh back along the triangular pattern, allowing for exposure of the wood pole.
 - d. Insert the boring. Once completed and plugged, pull the flap over the plugged boring to cover any exposed wood.
 - e. Use a nail or staple, minimum 2" long, to fasten the slit back onto the wood pole to ensure long-term hold.

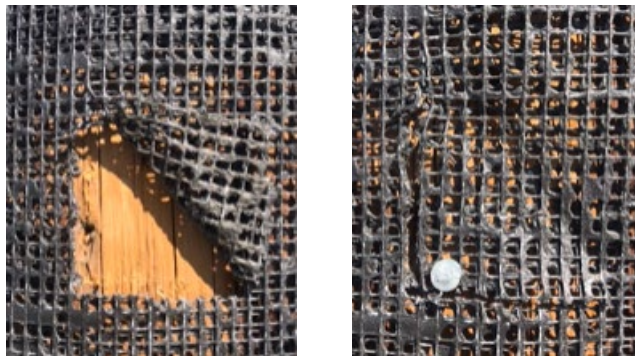


FIGURE 4-1
"L" Cut Reference for Wrapped Pole Inspections

INTRUSIVE INSPECTIONS

- F. It is important to use the shell thickness measurements to validate the depth of the void based on a 45-degree angle, to convert to an RSM.
- G. Drill cautiously to avoid all other borings and/or checks when adding new 9/16-inch borings.

4.2 INTRUSIVE INSPECTION METHODOLOGY DETAILS

4.2.1 PARTIAL DIG INSPECTION (IAC 2A)

A. General Notes and Requirements for Partial Dig Inspections

- 1. Poles set in dirt will receive a partial dig inspection, except the following:
 - a. Gas poles and “push poles” (see Section 4.2.2 – Full Treatment Inspection).
 - b. Poles with “Through-boring” pattern (see Section 5.2 – “Through-Boring” Pole Inspection).
 - c. Previously restored poles (see Section 5.1 – RPIN Inspections).

B. Partial Dig Methodology

- 1. Excavate a minimum of one (1) quadrant around the pole to 20 inches in depth.
- 2. If the pole surface below ground line does not exhibit external decay, proceed to Section 4.3.1 – Below Ground-line (BGL) Excavation and Boring.
- 3. If the pole surface below ground-line (BGL) exhibits external decay or shell rot, proceed to Section 4.2.2 – Full Treatment Inspection (IAC 4A).

4.2.2 FULL TREATMENT INSPECTION

A. Criteria to Perform Full Treatment Inspection

- 1. Gas pole or push pole set in dirt, or

INTRUSIVE INSPECTIONS

2. If a partial dig inspection reveals external decay

B. Full Treatment Methodology

1. Excavate 360 degrees around the pole to 20 inches in depth.
 - a. Poles with obstructions must have a minimum 2/3 of the pole's circumference excavated. If pole cannot be excavated at this minimum, pole is an auto reject RAC 2 unless a higher priority is identified as a result of the internal inspection.
2. If pole does not exhibit external decay, bore holes in accordance with Section 4.3.1 – Below Ground-line (BGL) Excavation and Boring.
3. If the pole exhibits decay or shell rot:
 - a. Remove all external decay down to 20 inches in depth.
 - b. Calculate the RSM based on the external decay.
 - c. Bore holes in accordance with Section 4.3.1 – Below Ground-line (BGL) Excavation and Boring.

4.2.3 SOUND AND BORE INSPECTION (IAC 5A)

A. Criteria to Perform Sound and Bore Inspection

Includes all wood poles set in concrete, asphalt, rock, or where excavation cannot be performed, and where a “through-boring” pattern is not present.

B. Sound and Bore Methodology

1. Two (2) ground-line borings are required to be drilled, 90 degrees apart; first boring shall be 2 to 3 inches from the largest check.
2. Bore in accordance with Section 4.3.2 – Ground-line (GL) Borings.
3. Designate all gas poles and push poles set in asphalt or concrete as Recommended Action RAC 2 unless higher priority is identified as a result of ground-line boring.

INTRUSIVE INSPECTIONS

4.3 BORING METHODOLOGY4.3.1 BELOW GROUND-LINE (BGL) EXCAVATION AND BORINGA. BGL General

1. All soil, sod, flowers, and shrubs shall be placed on a tarp during removal and excavation. Sod, flowers, and shrubs shall be carefully replaced after backfilling.
2. When digging is required, excavation shall be to a depth of 20 inches BGL to adequately check the shell for decay and accommodate the required new boring at a 45-degree angle.
3. All inspection borings will be a 9/16-inch diameter auger bit drilled to the specified depths listed in Table 4-1, Boring Depth Requirements at 45 degrees.
4. The ONLY exception to the 20-inch depth requirement is when obstructions BGL are present, e.g., rock, pipes, and excessive root system.
 - a. If obstructions BGL are present, the second excavation and boring shall be performed up to 180 degrees from the first.
 - b. Contractor shall provide a mark (indicator) at ground-line (GL) to identify the location of the excavation/boring.
5. After completion of inspection, the soil shall be replaced around the pole to a maximum height of 3 inches above normal grade.
 - a. All wood chips/shavings from borings may be placed in excavated hole.
 - b. One-half of the excavation shall be backfilled, then tamped; after initial tamping, the remainder of the dirt shall be placed in the hole and tamped.

Note: Inspector shall make notes explaining any deviations from the required specification.

INTRUSIVE INSPECTIONS

B. BGL Boring Procedure

1. Inspector shall clean the surface of the wood exposed in the excavation by brushing or scraping the pole with tools and methods approved by Edison Wood Products Specialists—axes shall not be used to scrape soil away from the pole.
2. Drill a new boring between 3 and 4 inches to the right or left of the largest check at a depth between 8 and 10 inches BGL.
3. A 9/16-inch diameter boring shall be drilled downward at a 45-degree angle past the center of the pole to the specified depths listed in Table 4-1, Boring Depth Requirements at 45 degrees.

TABLE 4-1
BORING DEPTH REQUIREMENTS AT 45 DEGREES

POLE CIRCUMFERENCE (INCHES)	RECOMMENDED AUGER BIT LENGTH (INCHES)	BORING DEPTH REQUIREMENT (INCHES)
≤ 38	12	8.50
39 - 48	18	14.75
≥ 49	18	18

4. Inspection borings shall be probed with a shell gauge to determine the presence and extent of void(s).
5. The RSM shall be determined and documented.
6. If there are no voids BGL, proceed to Section 4.3.2 – Ground-line (GL) Borings.
7. If a void is detected, excavate 90 degrees from the first boring and drill a second 9/16-inch boring at a 45-degree angle past the center of the pole to the specified boring depths listed in Table 4-1, Boring Depth Requirements at 45 degrees. Drill cautiously to avoid the first boring's path.
8. The RSM shall be determined for the second BGL boring.
9. Record the lesser of the two RSM values for the BGL record.

INTRUSIVE INSPECTIONS

10. Proceed to Section 4.3.2 – Ground-line (GL) Borings.

4.3.2 GROUND-LINE (GL) BORINGS

- A. New inspection borings will be 9/16-inch diameter auger bit on all poles drilled to the specified depths listed in Table 4-1, Boring Depth Requirements at 45 degrees.
- B. If the pole **does not have any existing borings**, Partial Dig (IAC 2A) and Full Treatment (IAC 4A) inspections will require one (1) new boring. Sound and Bore (IAC 5A) inspections will require two (2) borings 90 degrees apart.
 - 1. Sound and Bore (IAC 5A) Inspection: Drill a new boring between 3 and 4 inches to the right or left of the largest check. Second boring shall be bored 90 degrees from the first.
 - 2. Partial Digs (IAC 2A) and Full Treatment (IAC 4A) inspections: The first GL borings shall be drilled 90 degrees from the first BGL boring. If a void is detected, a second 9/16-inch inspection boring shall be bored 90 degrees from the first drilled inspection boring.
- C. If two (2) borings or less exist at GL, add one (1) additional 9/16-inch diameter inspection boring at GL on an un-bored quadrant (90 and 120 degrees adjacent from existing boring).
 - 1. For Sound and Bore (IAC 5A) inspections, efforts shall be made to remove two (2) of the previously installed plugs in addition to adding the one (1) new 9/16-inch inspection boring at GL to determine the condition of the wood structure.
 - 2. Partial Digs (IAC 2A) and Full Treatment (IAC 4A) inspections: If a void is detected, a second 9/16-inch inspection boring, 6 inches AGL shall be bored 90 degrees from the first drilled inspection boring.
- D. If three (3) or more existing borings are present at GL, add one (1) additional 9/16-inch diameter inspection boring 6 inches AGL, between 3 and 4 inches to the right or left of the largest check.
 - 1. For Sound and Bore (IAC 5A) inspections, efforts shall be made to remove two (2) of the previously installed plugs in addition to adding the one (1) new 9/16-inch inspection boring 6 inches AGL to determine the condition of the wood structure.

INTRUSIVE INSPECTIONS

2. Partial Digs (IAC 2A) and Full Treatment (IAC 4A) inspections: If a void is detected, a second 9/16-inch inspection boring, 6 inches AGL shall be bored 90 degrees from the first drilled inspection boring.
- E. Inspection borings shall be probed with a shell gauge to determine the presence and extent of void(s).
- F. The RSM shall be determined and documented.
- G. Record the lesser of the two RSM values for the ground-line record.
- H. If any internal RSM (BGL or GL) is < 88%, proceed to Section 6 – Poles with Deterioration. Only exception are “Penta-Cellon,” “Penta-Dow,” and “push-poles” set in concrete or asphalt. See Section 4.2.3 – Sound and Bore Inspection.

END OF SECTION 4

SECTION 5

SPECIALIZED POLES

5.1 RPIN INSPECTIONS (REPAIRED POLES – IAC 6A)

A. General Notes and Requirements for Intrusive Inspection and Treatment of Restored Poles

1. Includes all poles with Steel Stub or Fiberglass Wrap restoration systems.
2. Inspectors shall evaluate the quality of the restoration system as well as the quality of the wood pole.
3. All gas treated poles with a steel stub or fiberglass wrap shall be tagged as R2 with a Recommended Action Code 2 (RAC 2) – Urgent.
4. All new inspection borings shall be 9/16-inch auger bit drilled to a minimum 2/3 the diameter of the pole, but not closer than two inches from opposite side.
5. Inspection boring shall be probed with a shell gauge to determine the presence and extent of void(s). The RSM shall be determined.

5.1.1 STEEL STUBBED POLES

Steel stub poles with compression failure (wall of pole collapsing usually around the bands or at ground-line) shall be tagged as R2 with a Recommended Action Code 2 (RAC 2) – Urgent.

Poles that have loose and/or missing bands that 'Pass' the intrusive inspection shall be reported as Recommended Action Code RAC 9.

A. Steps 1 and 2 – Inspecting Top of Steel Stub and Upper Bands

1. Horizontally bore three inches above top of steel stub and two inches above the top of both upper bands.
 - a. If both inspection boring is free of void, proceed to Step 3.

SPECIALIZED POLES

- b. If lowest RSM is:
 - i. Between 68% to 99% or is 100% with void, designate as RAC 3 and tag the pole as an R2. No other borings are necessary.
 - ii. Between 23% to < 68%, designate the pole as RAC 2 and tag the pole as an R2. No other borings are necessary.
 - iii. Less than 23%, designate as RAC 1 and immediately make required notifications. No other borings are necessary.

B. Step 3 – Inspection of Lower Bands

1. If there are no voids, proceed to Step 3 – Inspection at Ground-line.
2. If a void is detected and the remaining shell thickness is:
 - a. Less than 2-1/2 inches, designate as RAC 2 and tag the pole with an R2. No other borings or treatments are necessary.
 - b. Greater than or equal to 2-1/2 inches, drill a second 9/16-inch boring 90 degrees to the right or the left. Drill cautiously to avoid existing borings.
3. If second shell thickness is greater than 2-1/2 inches, proceed to Step 4 – Inspection at Ground-line.

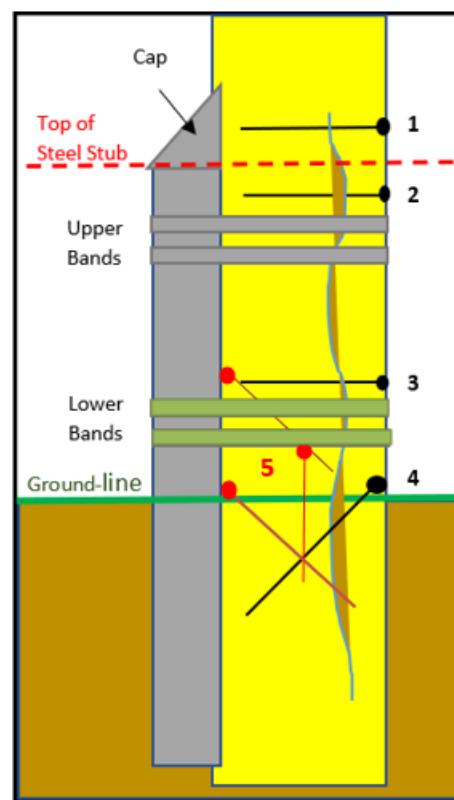


FIGURE 5-1
Steel Stubbed Pole Diagram

C. Step 4 – Inspection at Ground-line

1. Inspection boring shall be drilled downward at a 45-degree angle past the center of the pole to the specified depths listed in Table 5-1, Boring Depth Requirements at 45 degrees.

SPECIALIZED POLES

- a. If RSM at Ground-line is:
 - i. Greater than or equal to 45%, proceed to Step 5 – Internal Treatment.
 - ii. Less than 45%, designate with RAC 3 and tag the pole with an R2.

D. Step 5 – Internal Treatment (For “Pass” Candidates only)

1. Treat all four new inspection borings with SCE-approved glycol borate preservative.
2. In addition, re-treat all existing borings at ground-line up to two feet above ground-line with SCE-approved glycol borate preservative.

TABLE 5-1BORING DEPTH REQUIREMENTS AT 45 DEGREES

POLE CIRCUMFERENCE (INCHES)	RECOMMENDED AUGER BIT LENGTH (INCHES)	BORING DEPTH REQUIREMENT (INCHES)
≤ 38	12	8.50
39 - 48	18	14.75
≥ 49	18	18

5.1.2 FIBERGLASS-ENCASED POLES

- A. Check for the following conditions of the fiberglass encasement system:
 1. Material delaminating
 2. Material splitting
 3. Separation from wood -in two quadrants
- B. If any of the conditions are found, designate the pole as a replacement candidate with a Recommended Action Code RAC 2 and tag the pole with an R2. No other borings or treatments are necessary.

SPECIALIZED POLES

C. Fiberglass Encasement/Wrap Inspection Process

1. Step 1 – Inspecting Top of Fiberglass Encasement/Wrap
 - a. Horizontally bore 3 inches above top of fiberglass encasement/wrap.
 - b. If boring is free of void, proceed to Step 2.
 - i. If RSM is between 68% to 99% or is 100% with void, designate as RAC 3 and tag the pole as an R2. No other borings are necessary.
 - ii. If RSM is between 23% to 68%, designate the pole as RAC 2 and tag the pole as an R2. No other borings are necessary.
 - iii. If RSM is less than 23%, designate as RAC 1 and immediately make required notifications. No other borings are necessary.

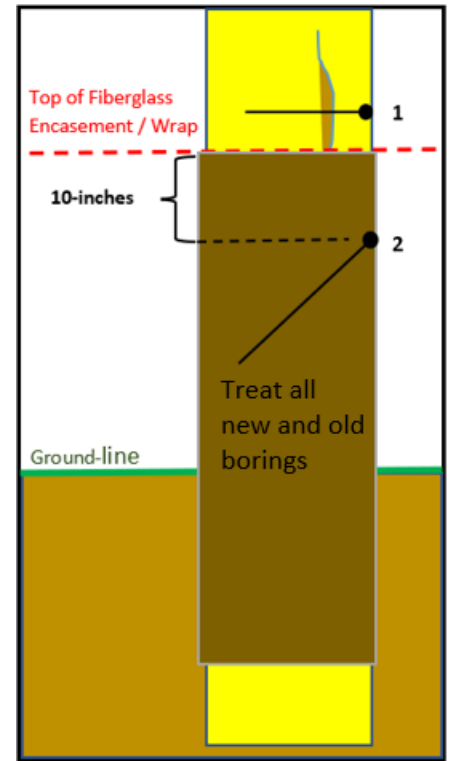


FIGURE 5-2
Fiberglass Encasement/Wrap Diagram

2. Step 2 – Boring in Fiberglass Encasement
 - a. A new boring shall be drilled 10 inches below the top of the encasement (wrap) at a 45-degree angle passing the center of the pole to the specified depths listed in Table 5-1, Boring Depth Requirements at 45 degrees.
 - b. If RSM in fiberglass encasement is greater than or equal to 67%, proceed to Step 3 – Internal Treatment.
 - c. If RSM in fiberglass encasement is less than 67%, designate as a replacement candidate with RAC 3 and tag the pole with an R2.

SPECIALIZED POLES

3. Step 3 – Internal Treatment Fiberglass Encasement

Treat all borings (new and old) with SCE-approved glycol borate preservative.

5.2 "THROUGH-BORING" POLE INSPECTION (IAC 7A)5.2.1 GENERAL NOTES FOR THROUGH-BORING POLE INSPECTION

- A. To determine whether the pole is through-bored, a pattern of 1/2-inch holes usually extending 18"–24" above ground line will be visible (see Figure 5-3 below). The holes will be drilled in a diagonal pattern that extends through the pole.

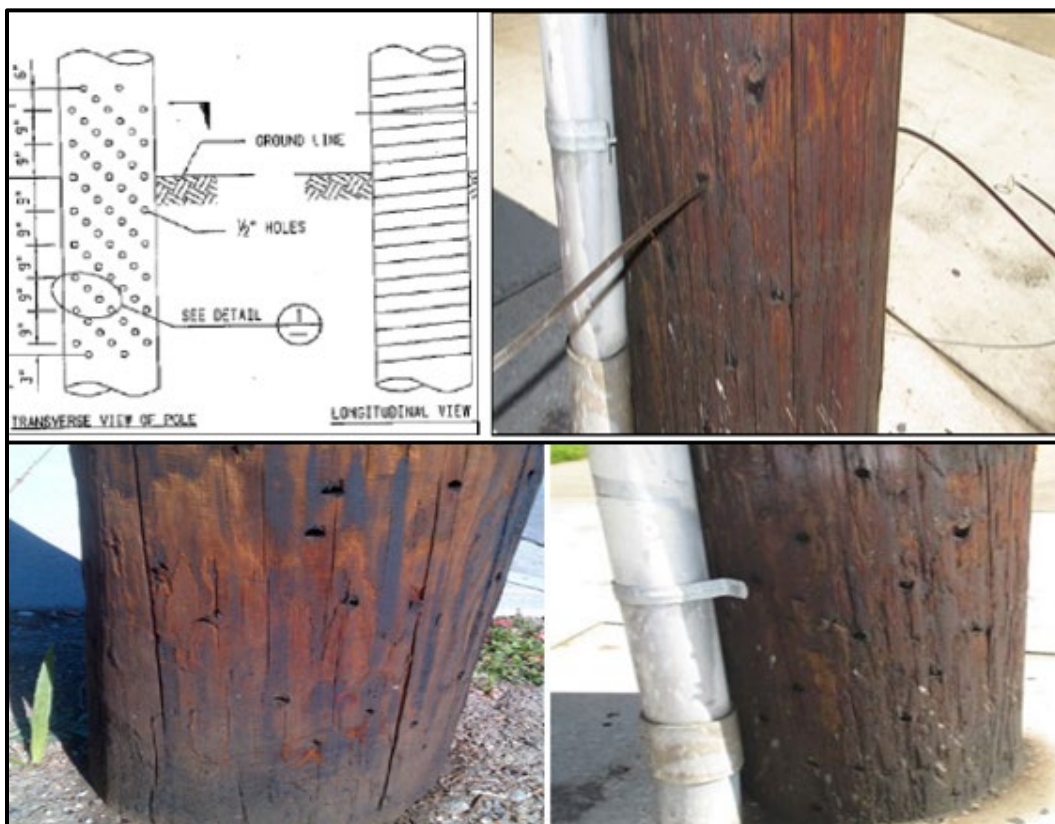


FIGURE 5-3
Through-Bored Pole Pattern Example

SPECIALIZED POLES

- B. Southern California Edison has purchased Douglas-fir poles with the Through-boring pattern from:
 - 1. 1992 to 1995
 - 2. 2004 to current
- C. The pattern has only been used on poles 40 to 120 feet in length.
- D. Through-bored poles are always Douglas fir.
- E. These holes are not to be considered damage to the pole.

5.2.2 INSPECTION METHODOLOGY

All new inspection borings shall be 9/16-inch auger bit drilled to a minimum 2/3 the diameter of the pole, but not closer than two inches from opposite side.

Inspection boring shall be probed with a shell gauge to determine the presence and extent of void(s). The RSM shall be determined.

- A. Horizontally bore six inches above the top of the Through-boring pattern.
 - 1. If the calculated RSM = 100%, the pole passes, proceed to Section 5.2.2B – Internal Treatment of Through-bored Poles.
 - 2. If a void is detected resulting in an RSM < 100%, bore a second 9/16-inch horizontal hole 90 degrees from the first boring, slightly above the height of the first boring. Caution shall be taken to avoid intersecting the first boring.
 - 3. If lowest RSM is:
 - a. Greater than or equal to 88%, the pole passes. Proceed to 5.2.2.B – Internal Treatment
 - b. If the lesser of the two (2) RSM values is < 88%, proceed to Table 6-1 and apply the appropriate RAC based on RSM values.

Note: No borings shall be made within the through-bore pattern. If borings are accidentally made in the through-bored zone, notification must be made to the Intrusive Program Manager and Edison's Structural Asset Engineering Pole Specialist.

SPECIALIZED POLES

B. Internal Treatment of Through-bored Poles

Treat all borings (new and old) with SCE-approved glycol borate preservative.

5.3 TEMPORARY WOOD STUB INSPECTION

Designate all temporary wood pole stubs as Recommended Action RAC 2, unless higher priority is identified as a result of Intrusive inspection.

The temporary wood pole stub shall get a partial dig (IAC 2A) inspection if set in dirt or a Sound and Bore (IAC 5A) inspection if set in asphalt or concrete.

5.4 POLE TEST INSPECTIONS

On February 5, 2014, the California Public Utilities Commission (CPUC) adopted Decision 14-02-015, which revised General Order (GO) 95 Section IV Rule 44.2. The revised rule states, "For wood structures more than 15 years old, the loading calculation shall incorporate the results of intrusive inspections performed within the previous 5 years." This rule requires Southern California Edison (SCE) and all entities attaching to a pole that is ≥ 15 years old to ensure that an intrusive inspection has been performed within the last five years when adding facilities that increase the load on the pole by more than 5% per installation or 10% over a 12-month span.

5.4.1 INSPECTION METHODOLOGY

- A. Step 1 – Validate that the pole needs to be intrusively inspected according to the following criteria:
 - 1. The pole is more than 15 years old.
 - 2. An intrusive inspection has not been performed within five (5) years
 - 3. If the pole is determined to be greater than 15 years in-service and the pole has not received an intrusive inspection in the last five years, proceed to Step 2.
 - 4. If the pole is less than 15 years in-service or has received an intrusive inspection within the last 5 years, complete a visual inspection and turn the pole back to the contract manager as a 1A inspection with details validating your findings.

SPECIALIZED POLES

B. Step 2 – Intrusive Inspection

1. Inspect all Pole Test issued poles that have been previously inspected with the same methodology in Section 4 without adding any new borings. Every effort should be made to re-use existing drill and treatment holes on Pole Test inspections.

5.5 POLES SET IN CULVERT/CAISSON

If inspector encounters a pole in-service in a culvert/caisson that is:

A. Culvert/Caisson is between GL – 6 inches Above Ground-line (AGL)

1. If pole is through bored, proceed to Section 5.2 - “Through Boring” Pole Inspection (IAC 7A).
2. Proceed to Section 4.2.3 – Sound and Bore Inspection and inspect the pole.

B. Culvert/Caisson is greater than 6 inches AGL to 4 feet AGL

1. Culvert/Caisson filled with:
 - a. Concrete – Proceed to Section 4.2.3 – Sound and Bore Inspection and inspect the pole.
 - b. Hollow, sand, aggregate – Inspect pole as Inspection Action Code 1C – Visual Repole/Mod Pole and reject the pole as an Advanced Deterioration ‘R2’ with a Recommended Action Code 2.

C. Culvert/Caisson is greater than 4 feet AGL

1. If inspector can determine what the fill material is:
 - a. Concrete – Record pole as an Inspection Action Code 3B – Unable to Inspect – Obstructed
 - b. Hollow, sand, aggregate – Inspect pole as Inspection Action Code 1C – Visual Repole/Mod Pole and reject the pole as an Advanced Deterioration ‘R2’ with a Recommended Action Code 2.
 - c. Unable to determine – Record pole as an Inspection Action Code 3B – Unable to Inspect – Obstructed

END OF SECTION 5

SECTION 6

POLES WITH DETERIORATION

6.1 GENERAL NOTES AND REQUIREMENTS FOR POLES WITH DETERIORATION

- A. All poles with a calculated RSM value less than 50% shall be candidates for replacement.
- B. All poles with the lowest calculated RSM value greater than or equal to 88% pass. Proceed to Section 8 – Pole Treatment.
- C. Inspector shall use the lowest RSM value from the current Edison-approved “deteriorated pole” software for the purpose of determining the Recommended Action Code priority for replacement. Inspector shall report all RSM values calculated.
- D. Inspector shall identify all poles with exterior decay pocket(s) larger than 1-inch in width located at GL or below ground-line (BGL) level, with an average shell thickness < 0.5 inches (on the same plane, at two (2) separate quadrants) as a RAC 1 (Priority 1) pole replacement.
- E. Inspector shall follow procedure “Instructions for Reporting RAC 1 poles” in the Statement of Work.

6.2 METHODOLOGY

- A. If evidence of voids and/or insect damage is detected during sounding; suspect areas shall be intrusively inspected with a 9/16-inch diameter boring.
 - 1. Inspection boring must pass 2/3 the diameter of the pole, but not closer than 2 inches from the opposite side.
- B. If sounding detects no evidence of voids, or if boring is free of a void, identify and tag the pole as a replacement candidate with a Recommended Action Code based on the lesser of the BGL or GL inspection as identified in Table 6-1, Remaining Section Modulus (RSM) and Recommended Action Code (RAC).
- C. If void is detected, identify and tag the pole as a replacement candidate with the lowest Recommended Action Code based on all of the inspections performed (e.g., sounding boring, BGL or GL inspections) as identified in Table 6-1, Remaining Section Modulus (RSM) and Recommended Action Code (RAC).

POLES WITH DETERIORATION

- D. Place R2 tag on the road side of the pole, approximately 7 to 8 feet above ground-line.

TABLE 6-1
REMAINING SECTION MODULUS (RSM) AND RECOMMENDED ACTION CODE (RAC)
NON-REPAIRED POLES ONLY

POLE LENGTH (FEET)	RAC 1 REPLACE (72 HOURS)	RAC 2 REPLACE (1 YEAR)	RAC 3 REPLACE (2 YEARS)	RAC 4 REPLACE (3 YEARS)	RAC 5 REPAIR (3 YEARS)
25 – 35	≤ 34%	35% – 79%	80% to 100% with void	—	—
40 – 120	≤ 23%	24% – 36%	37% – 45%	> 46% – 50%	≥ 50% – 87%

- E. If the smallest recorded RSM value at GL or BGL is still greater than or equal to 50% and is less than 88%, the wood pole has Moderate Degradation.
1. If the pole is one of the following structure types listed below (with a void), reject the pole as “Moderate Degradation” with a Recommended Action Code 4 (3 year replacement). If not a prohibited structure type, proceed to Section 6.3 – Pole Repair Methodology.
 - i. All freeway and railroad crossing poles
 - ii. All push poles (Brace structure only)
 - iii. All Penta-Cellon and Dow-Penta treated poles
 - iv. All poles with PTX
 - v. All poles located within a public or private school
 - vi. All dead-end poles without a guy wire
 - vii. All poles greater than or equal to 90 feet in length

6.3 POLE REPAIR METHODOLOGY

Poles with “Moderate Degradation” and identified as “Steel Stub” candidates (“S” tag) with a Recommended Action Code 5, shall be inspected utilizing the Methodology listed below:

- A. All above ground-line (AGL) borings shall be drilled horizontally and not drilled on an angle.
- B. All borings shall be plugged with Edison-approved plastic plugs regardless of location of drilled hole.

POLES WITH DETERIORATION

- C. Candidates shall have continuous 1/3 (120 degrees) of the pole unobstructed from ground-line to 10-feet above ground-line (excluding ground wire and molding). The unobstructed sections shall have a minimum 6 inches of clearance suitable to set truss.

6.3.1 POLE REPAIR CRITERIA

A. General

1. All AGL borings shall be drilled horizontally between 3 and 4 inches to the right or left of the largest check.
2. 9/16-inch diameter boring shall pass 2/3 of the diameter of the pole, but not closer than 2 inches from the opposite side.
3. The remaining “**Shell Thickness**” shall be determined.
4. All borings shall be plugged with Edison-approved plastic plugs regardless of location of drilled hole.

B. 24-inch AGL Inspection Boring

1. If boring is free of a void, proceed to Section 6.3.1C – 54-inch AGL Inspection Boring.
2. If void is detected with a shell thickness less than 3 inches on either side of the pole, reject the pole with a RAC 4. Place one “R2” tag on the road side of the pole. No other borings or treatment are necessary.
3. If void is detected with a shell thickness greater than or equal to 3 inches on both sides of the pole, drill a second 9/16-inch boring 90 degrees to the right or the left. Drill cautiously to avoid existing borings.
 - a. If shell thickness is greater than or equal to 3 inches, proceed to Section 6.3.1C – 54-inch AGL Inspection Boring.
 - b. If shell thickness is less than 3 inches, reject pole with a “Moderate Degradation” with a Recommended Action Code 4. Place one “R2” tag on the road side of the pole. No other borings or treatment are necessary.

POLES WITH DETERIORATION

C. 54-inch AGL Inspection Boring

1. If the boring at 54 inches AGL is free of void, the pole is a candidate for a “Steel Stub” (RAC 5). Place one “S” tag on the road side of the pole. Proceed to Section 8 – Pole Treatment.
2. If void is detected, reject the pole with a “Moderate Degradation” with a RAC 4. Place one “R2” tag on the road side of the pole. No other borings or treatment are necessary.

END OF SECTION 6

INSPECTION MARKINGS

“X,” or “SAM” tag (see figures below), remove the previous tag. The only tag remaining on the pole should reflect the most recent inspection results.

7.2 POLE TAGS, INSPECTION, AND TREATMENT TYPE (BUTTERFLY TAGS)

- A. Inspection tags (see figures below) shall be minimum of 1-inch in diameter, round in shape and include the following:
1. Contractor’s Name.
 2. Year of Inspection.
 3. If only a visual inspection is performed, a tag with the word “Visual” shall be attached below the inspection disk.
- B. Treatment tags shall include the following, where applicable:
1. Inspector’s Name.
 2. Year treated.
 3. Type of fumigant and insecticide.
 4. Type of internal treatment.

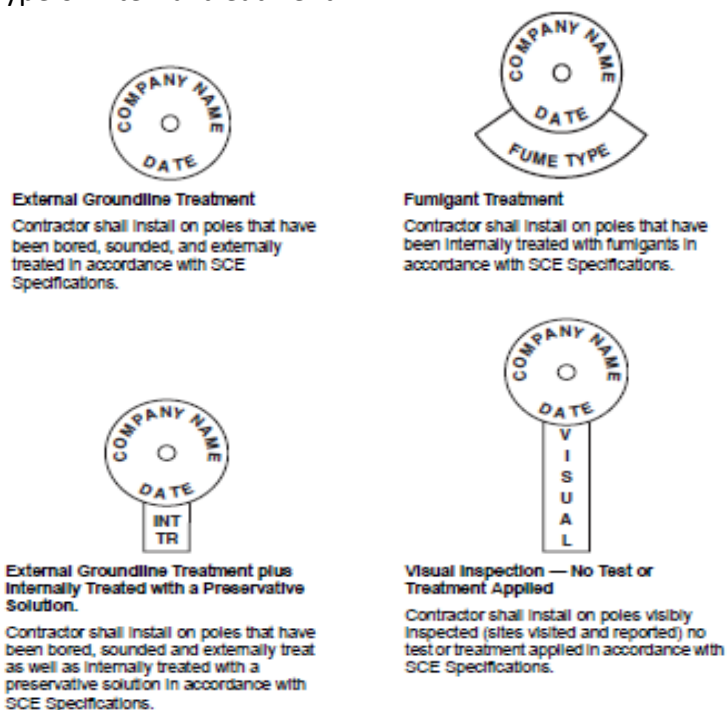


FIGURE 7-2
Inspection and Treatment Tag Practices

END OF SECTION 7

SECTION 8

POLE TREATMENT

8.1 GENERAL

- A. Quantity and depth of borings to be treated are based on the ground-line circumference.
- B. A 9/16-inch diameter boring shall be drilled downward at a 45-degree angle past the center of the pole to the specified depths listed in Table 8-1, Boring Requirements at 45 Degrees, Partial and Full Treatment Inspections and Table 8-2, Boring Requirements at 45 Degrees, Sound and Bore Inspections.
- C. Care shall be taken to avoid going through the pole or seasoning checks. If a check is crossed, then an additional boring shall be made in sound wood for application of the preservative.
- D. Granular fumigant found when re-treating existing treatment borings shall be broken up using a suitable probe allowing new preservative to be added.
- E. Boron rods or cobra rods found when re-treating existing treatment borings shall be crushed, maximizing the rods' surface area for new preservative contact.
- F. "Steel Stub Candidates" and poles that pass with a void (greater than 88%) shall be treated.
 - 1. Flood the void with the approved internal treatment (not to exceed one gallon).
 - 2. Take precaution to ensure the chemical is contained within the pole.

8.2 DETAILS

8.2.1 INTERNAL TREATMENT (FOR "PASS" CANDIDATES ONLY)

- A. Approved Glycol Borate Preservatives:
 - 1. Jecta
- B. Injection Application

POLE TREATMENT

1. Vendors will be responsible for developing and getting the injection applicator.
 - a. The injection applicator needs to be able to inject the preservative cleanly from the bottom of boring to 1 inch from top without excessive air pockets on un-obstructed borings.
 - b. Care shall be taken to maintain a clean and safe application process.

8.2.2 EXTERNAL TREATMENT

Externally treat any gas pole set in dirt that passes both the external and intrusive inspections.

A. Approved Preservatives

1. CuB 20
Product Order No. 13403
2. WP 101 – Pro

B. Preservative Application

1. Inspector shall clean the surface of the wood exposed in the excavation by brushing or scraping the pole with a broom, wire brush, shovel, or scraping bar. Axes will not be used to scrape soil away from the pole.
2. Pole surface shall be treated from ground-line to a minimum of 20 inches below ground-line. Preservative wrap applications shall be used as recommended by the Manufacturer.
3. The external wrap will not extend more than 2 inches above ground-line.

8.2.3 THINNING INSTRUCTIONS FOR JECTA PRODUCTS

If the product is too thick to apply internally then it is possible to thin the product with water to bring it to a consistency that allows for easier application. Applicator needs to exercise caution during this process and should never exceed a maximum of **8 ounces** of added water per gallon of Jecta.

POLE TREATMENT

- A. Based off the thickness and volume of the product, start with **2 fluid ounces (1/4 cup)** of water and mix the water into the product thoroughly for a minimum of 2 minutes.
1. Incrementally increase the volume of water by 2 ounces at a time and mix thoroughly at each addition to work the water into the chemical. Continue to mix until a desired consistency is achieved.

8.3 TREATING "PARTIAL" AND "FULL TREATMENT" INSPECTED POLES

TABLE 8-1
BORING REQUIREMENTS AT 45 DEGREES, PARTIAL AND FULL TREATMENT INSPECTIONS

POLE CIRCUMFERENCE (INCHES)	BORING DEPTH REQUIREMENT (INCHES)	NUMBER OF TREATMENT BORINGS REQUIRED BGL ¹	BORING LOCATIONS (INCHES BGL)	NUMBER OF TREATMENT BORINGS @ GL ² and AGL ³	BORING LOCATIONS (INCHES @ GL & AGL)
≤ 38	8.5	2	9 & 14	3	GL, 6, & 12
39 - 48	14.75	3	4, 9, & 14	3	GL, 6, & 12
≥ 49	18	3	4, 9, & 14	4	2 @ GL, 6, & 12

1. BGL, Below Ground-line
2. GL, Ground-line
3. AGL, Above Ground-line

A. Treating the Pole Below Ground-line (BGL)

1. Treat the new 9/16-inch inspection boring added during inspection (Section 4.3.1B – BGL Boring Procedure).
2. All existing exposed below ground-line borings (location may vary due to previous inspection methodologies) shall be treated with a minimum one ounce of preservative (top the borings off if existing treatments are still present).
 - a. If the pole does not have any existing borings BGL, a new 9/16-inch boring shall be added 5 inches to the right or left and 5 inches below from the first treatment boring (approximately 14 inches BGL).
3. Poles with GL circumference greater than 39 inches shall have a second new 9/16-inch treatment boring.
 - a. Add new 9/16-inch boring 5 inches to the right or left and 5 inches up

POLE TREATMENT

from the first treatment boring (approximately 4 inches BGL).

B. Treating Pole at Ground-line (GL) and Above Ground-line (AGL)

1. Treat the new 9/16-inch inspection boring added during inspection (Section 4.3.2 – Ground-line Borings).
2. All exposed existing GL and AGL borings up to one foot (location may vary due to previous inspection methodologies) shall be treated with a minimum one ounce of preservative (top the borings off if existing treatments are still present).
 - a. If the pole does not have any existing borings at GL and/or AGL, a new 9/16-inch boring shall be added 90 degrees to the right or left and 6 inches above the first treatment boring. The third treatment boring shall be added 90 degrees to the right or left and 6 inches above the second treatment boring.
 - b. Poles with GL circumference ≥ 49 inches shall have fourth treatment boring located 90 degrees from the GL inspection boring in the opposite direction from the 6-inch AGL treatment boring. This could be a previous inspection/treatment boring or a new 9/16-inch treatment boring

8.4 TREATING “SOUND AND BORE” INSPECTED POLES

TABLE 8-2

BORING REQUIREMENTS AT 45 DEGREES, SOUND AND BORE INSPECTIONS

POLE CIRCUMFERENCE (INCHES)	BORING DEPTH REQUIREMENT (INCHES)	NUMBER OF TREATMENT BORINGS @ GL ² and AGL ³	BORING LOCATIONS (INCHES @ GL & AGL)
≤ 38	8.5	4	2 @ GL, 6, 12
39 - 48	14.75	5	3 @ GL, 6, 12
≥ 49	18	5	3 @ GL, 6, 12

A. Treating Pole at Ground-line (GL) and Above Ground-line (AGL)

1. Treat the new 9/16-inch inspection boring added during inspection (Section 4.3.2 Ground-line Borings).

POLE TREATMENT

2. All exposed existing GL and AGL borings up to one foot (locations may vary due to previous inspection methodologies) shall be treated with a minimum one ounce of preservative (top the borings off).
 - i. If the pole does not have any existing borings, or enough to meet the minimum number of treatment borings, start by treating both new 9/16-inch inspection borings added during inspection (Section 4.3.2 Ground-line Borings).
 - ii. The additional treatment borings required AGL shall continue to spiral the pole start 90 degrees from the second inspection boring and be placed on the appropriate plan specified in Table 8-3.
3. If obstructions exist on the pole making it unable to treat with 3 borings at GL for poles > 39 inches, stagger the borings appropriately and add a new boring at 18 inches AGL to meet the minimum number of borings required.

END OF SECTION 8

APPENDIX

APPENDIX 1

DEFINITIONS

Abandoned Facilities – Structures with no Edison conductors or equipment.

AGL – Above Ground-line.

BGL – Below Ground-line.

Boring – The process of using a manual or power drill to breach the exterior of a pole primarily to provide access for the internal examination of the pole and secondarily to create a reservoir for remedial chemical application.

Boring Clearances – A minimum clearance of 1 foot shall be required to perform the intrusive inspection on a minimum of two (2) quadrants of the pole.

Brand or Medallion – Poles set between approximately 1950 and 1980 are physically branded (burned). Typically, poles set after 1980 are marked with a metal medallion. Brand or medallion is commonly located on the gain side of the pole.

The following information is included in both the brand and the medallion:

- Manufacturer
- Manufacturer's Location
- Original Treatment and Date
- Pole Length
- Pole Class
- Wood Species

Check – (See Radial Check)

Compression Wood – Abnormal wood formed on the lower side of branches and inclined trunks of softwood trees. It is identified by its relatively wide annual rings, sometimes more than 50 percent of the width of the annual rings in which it occurs. Compression wood excessively shrinks lengthwise. Refer to examples in Section 3.2.

Critical Attachment – Examples include guy fixture, cross-arm through-bolt, insulator through-bolt, or equipment through-bolt. Pole damage near these attachments may mandate pole replacement (see Section 3.2).

APPENDIX 1 – DEFINITIONS

Fumigant/Insecticide – A chemical that resists or prevents the further attack from decay fungi or insects. Shall be applied internally in a wood pole.

Gain – A cut in a round pole to allow a square crossarm to fit snugly.

Gas Pole – Pole marked with “Penta-Cellon” [brand mark G] or “Penta-Dow” [brand mark MP or PD].

GL – Ground-line – Point where the pole penetrates the soil, concrete, or asphalt.

High Stress Area – 18 inches above and/or below the point of attachment of equipment, primary or secondary conductors, communication lines, guying attachment point, etc. Does not include service drops.

Inspection Cycles – Cycle 1 – Poles intrusively inspected 1984 to 2006
 Cycle 2 – Poles intrusively inspected 2007 to current

Internal Rot – Degradation of the inner portion of a wood pole caused by decay, fungi, or insect attack.

Mechanical Damage – Exterior damage caused by an outside force such as vehicles and farm equipment.

Push Poles – Poles that are supporting another structure.

Radial Check or Check – A longitudinal separation of wood fiber along the grain that develops as a pole dries, which may expose the inner wood to insects or fungus attack. The presence of fecal matter/frass in a check shall not be considered for a replacement candidate.

Recommended Action Code (RAC) – Action required (Replace Pole, Steel Stub, or Pass Inspection) as a result of an Intrusive Inspection.

Restored Pole – A repair intended to extend the life of a deteriorated pole, e.g., mod pole, repole, steel stub, fiberglass wrap.

Repaired Pole Inspection (RPIN) – Inspection of all poles with Steel Stub or Fiberglass Wrap restoration systems only.

Shell Gauge/Shell Thickness Indicator – Tool approved by Edison Wood Products Specialist to measure shell thickness of a wood pole to calculate RSM. All shell gauges shall have increment

APPENDIX 1 – DEFINITIONS

values every 1/2-inch up to the 3-inch scale mark.

Shell Rot – Degradation of the outer shell of a wood pole. This usually occurs below ground-line.

Shell Thickness – The measurement of “solid/good” wood from the outer surface of a wood pole to the outer edge of an internal void, if one exists.

Sounding – The act of striking a hammer or other suitable device on the surface of the pole beginning at ground-line on all four (4) quadrants (360 degrees) in order to identify internal decay pockets or insect damage. Sounding should continue approximately every 2 feet up to 8 feet above ground-line. The inspector shall listen for evidence of internal voids and shall watch for the dislocation of material from seasoning checks.

Split – A split or a combination of two (2) single checks having one or both portions located in a vertical plane on the pole.

Starter Hole – A shallow hole created by a woodpecker or other animal/insect.

Transmission Pole – A pole with transmission facilities, with or without distribution underbuild, or a guy stub pole that supports a transmission pole. All others are distribution poles