



TECHNICAL BULLETIN
TB-24-001

Title: Pole Guy Installation Standards Revision

Issue Date: 12/26/2024

Effective Date: 12/26/2024

Department: Distribution Standards and Materials

Addressed to:

Engineers, Designers, Consultants, Developers, Contractors, Master Electricians, Puerto Rico Electrical Contractors Association, Electrical Equipment Manufacturers, Electrical Engineers Institute, Electrical Engineers Society, Engineers and Surveyors Professional College, Master Electricians Professional College, Directors, Managers, Supervisors, Inspectors, and the public.

Approval:

Approved by:	Signature and Date:
<u>Ricardo Castro</u> Manager, Distribution Standards and Materials	 12/26/2024

Management Approval:

Approved by:	Signature and Date:
<u>Reinaldo Baretty</u> Director, System Standards and Records	 12/26/2024

This Bulletin annuls and replaces the following Bulletin(s): N/A

Referenced Documents

Document Number	Title	Version	Date
N/A	Standard no. E1-2 - <i>Montaje de Tensor a Tierra Línea Secundaria</i>	1	09/10/1985
4301.172	Standard no. E-1-2 - Pole Guy Installation for Secondary Lines	2	12/26/2024
4301.083	Standard no. E-1-2-3 - ½" Single Guy	4	04/29/2022
4301.083	Standard no. E-1-2-3 - Pole Guy Installation	5	01/23/2024
4301.083	Standard no. E-1-2-3 - Pole Guy Installation for Primary Lines	6	12/26/2024
4301.085	Standard no. E-2-1 - Span Guy Installation	3	01/23/2024
4301.085	Standard no. E-2-1 - Span Guy Installation	4	12/26/2024
N/A	Standard no. E2-2 - Montura para Tensor de Poste a Poste	N/A	11/11/1985
N/A	Standard no. F1-1 - Anclaje de Expansión	N/A	N/A
4301.087	Standard no. F-1-3 - Expansion Anchor	5	01/18/2024
4301.087	Standard no. F-1-3 - Expansion Anchor	6	12/26/2024

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1. Introduction

As the responsible entity, **LUMA Energy** establishes and updates the norms, standards, and regulations that guarantee the construction and installation of equipment in the transmission and distribution system. The regulations are adjusted according to the technological changes that affect our system through releases and technical bulletins. These documents provide immediate guidelines for the construction and installation of technical equipment.

To address the continually changing requirements related to technology, materials, construction, and operations, the electrical distribution standards require ongoing enhancements. As a result, specific standards for the installation of guys and anchors have been updated to align with current best practices and material efficiencies. An overview of the modifications made to these standards is included, along with the updated standards and their applicability.

2. Technical Norms or Provisions

The Puerto Rico Electric Power Authority (PREPA) document *Manual de Normas de Distribución Urbana*, published in 1986, includes the standard no. E1-2, *Montaje de Tensor a Tierra Línea Secundaria*, dated September 10, 1985. This standard was used for pole guy installation without insulators when only secondary lines were installed on the pole. The use of this standard was discontinued when the Overhead Electrical Distribution System Manual (the Manual), version 1, was released on June 14, 2022, and version 4 of standard no. E-1-2-3 was adopted. A new evaluation on this matter was conducted, and it was decided to adopt version 2 of standard no. E-1-2, Pole Guy Installation for Secondary Lines, document no. 4301.172, exclusively for the installation of guys on poles with only secondary lines.

As a result, version 5 of standard no. E-1-2-3, Pole Guy Installation, document no. 4301.083, dated January 23, 2024, which was used for guy installation on poles with primary, secondary, or both primary or secondary lines, will no longer be used for poles that support only

secondary lines. The capacity of the materials in standard no. E-1-2-3 exceeded the tension requirements for the installation of guys on poles with only secondary lines. For this reason, version 2 of standard no. E-1-2 was approved with the tension requirements for this type of installation. This change is expected to lead to a lower acquisition cost of materials compared to standard no. E-1-2-3.

Additionally, the guy attachment shown in standard no. E-1-2-3 has been replaced with two guy attachment alternatives that have the necessary capacity for primary lines: one attachment has 8-inch spacing between its holes, while the other has 12-inch spacing. This modification ensures that installations are suitable for any required pole face on poles with primary or both primary and secondary lines. Furthermore, as explained, this updated standard will no longer be used for poles with only secondary lines but will be applicable to poles with primary lines or both primary and secondary lines.

Version 5 of the Manual incorporated version 3 of standard no. E-2-1, Span Guy Installation, document no. 4301.085, dated January 23, 2024. This standard was used for span guy installation on poles with primary, secondary, or both primary and secondary lines. The addition of standard no. E-1-2 required modifications to the materials of standard no. E-2-1. Furthermore, the new version of standard no. E-2-1 specifies that the installation of the guy attached between the stub pole and the finish grade for poles with only secondary lines shall follow standard no. E-1-2. The guys for poles with primary or both primary and secondary lines will be installed in accordance with the updated standard no. E-1-2-3. Consequently, standard no. E-2-2, *Montura Para Tensor de Poste a Poste Línea Primaria*, included in the PREPA document *Manual de Normas de Distribución Urbana*, published in 1986, is being cancelled and substituted by the revised standard no. E-2-1.

Version 5 of the Manual includes version 5 of standard no. F-1-3, Expansion Anchor, document no. 4301.087, dated January 18, 2024. The materials specified in this standard are the 12-inch expansion anchor and the 1-inch by 10-foot anchor rod, both of which were used on poles with primary, secondary, or both primary and secondary lines. This standard has been revised to version 6, which now specifies the exclusive use of the 12-inch expansion anchor and the 1-inch by 10-foot anchor rod for primary lines or for both primary and secondary lines. Additionally, it introduces the 8-inch expansion anchor and the 5/8-inch by 7-foot anchor rod for use on poles that support only secondary lines. Consequently, standard no. F-1-1, *Anclaje de Expansión*, included in the PREPA document *Manual de Normas de Distribución Urbana*, dated 1986, is being cancelled and substituted by the revised standard no. F-1-3.

The new versions of the revised standards are included as appendixes to this bulletin.

3. **Appendixes**

- Standard no. E-1-2 (V2) – Pole Guy Installation for Secondary Lines
- Standard no. E-1-2-3 (V6) – Pole Guy Installation for Primary Lines
- Standard no. E-2-1 (V4) – Span Guy Installation
- Standard no. F-1-3 (V6) – Expansion Anchor



DISTRIBUTION ENGINEERING

OVERHEAD DISTRIBUTION STANDARDS

TITLE:

POLE GUY INSTALLATION FOR SECONDARY LINES
MAXIMUM VOLTAGE: 240 V

STANDARD NO. E-1-2 VERSION 2

DOCUMENT NO. 4301.172

PAGE 1 OF 2 DATE DEC 26, 2024

SUBMITTED LUIS R. SOTO LIC. 11658

REVIEWED IVETTE D. SANCHEZ LIC. 13837

APPROVED RICARDO CASTRO LIC. 12135

DIGITIZED EMILIO CUADRADO LIC. 3000

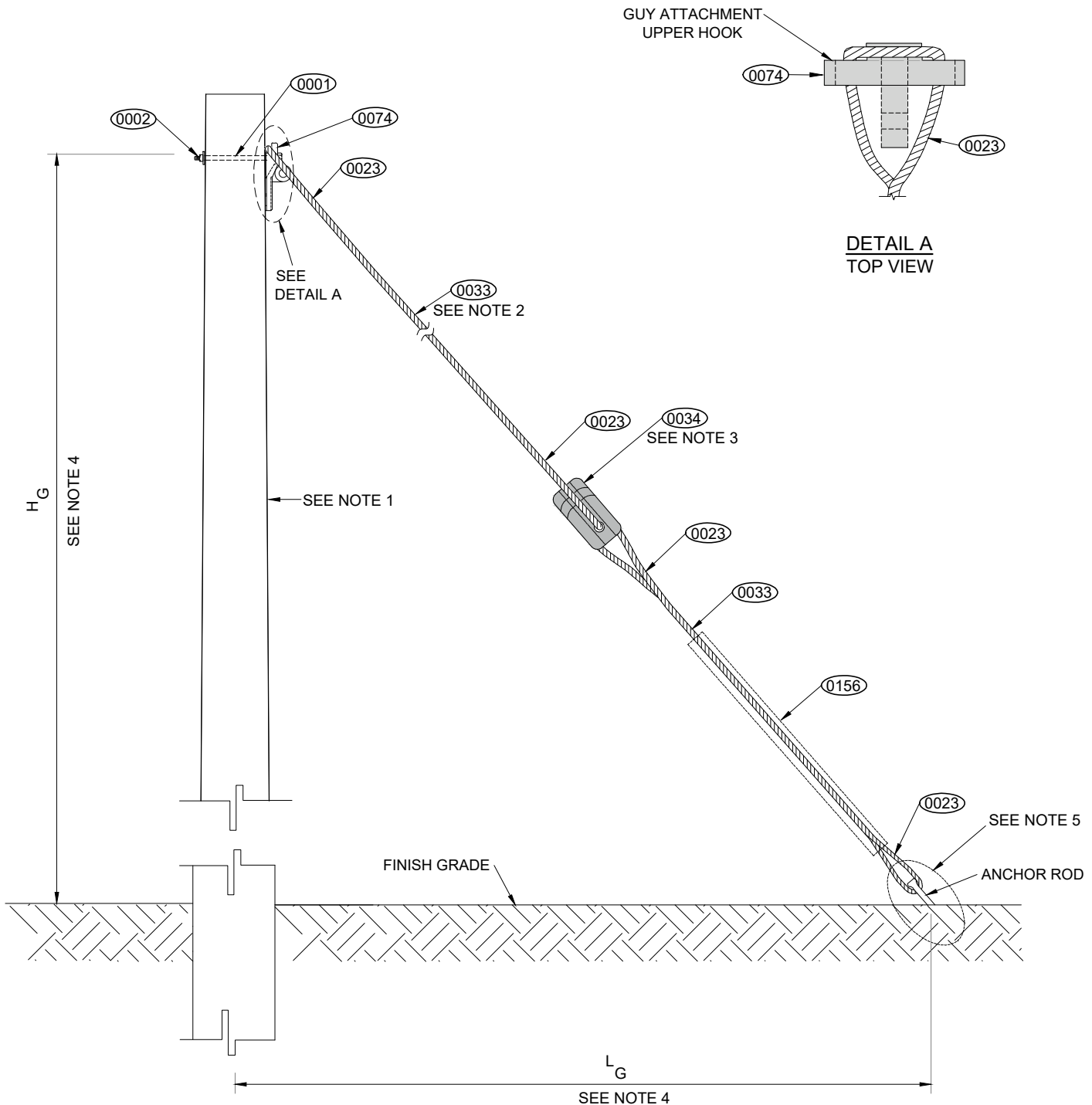


FIGURE 1

GUY INSTALLATION THROUGH THE GUY ATTACHMENT'S UPPER HOOK



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OVERHEAD DISTRIBUTION STANDARDS

TITLE: POLE GUY INSTALLATION FOR SECONDARY LINES MAXIMUM VOLTAGE: 240 V NOTES AND BILL OF MATERIAL	STANDARD NO. <u>E-1-2</u> VERSION <u>2</u>
	DOCUMENT NO. <u>4301.172</u>
	PAGE <u>2 OF 2</u> DATE <u>DEC 26, 2024</u>
	SUBMITTED <u>LUIS R. SOTO LIC. 11658</u>
	REVIEWED <u>IVETTE D. SANCHEZ LIC. 13837</u>
APPROVED <u>RICARDO CASTRO LIC. 12135</u>	
DIGITIZED <u>EMILIO CUADRADO LIC. 3000</u>	

MATERIALS			
NO.	GENERAL DESCRIPTION	WAREHOUSE ITEM	QTY.
0001	3/8" THROUGH BOLT	VARIES	1
0002	FLAT SQUARE WASHER	VARIES	1
0023	3/8" GUY GRIP	002-04214	AS REQ.
0033	3/8" GUY WIRE	046-00086	AS REQ.
0034	PORCELAIN GUY STRAIN INSULATOR	014-00209	AS REQ.
0074	GUY ATTACHMENT (21,000 LB)	002-00303	1
0156	GUY WIRE MARKER	002-02598	1

NOTES:

- THIS STANDARD APPLIES TO THE INSTALLATION OF GUYS ON POLES SUPPORTING ONLY SECONDARY LINES.
- THE LOAD SHALL BE EQUAL TO OR LESS THAN 90% OF THE GUY WIRE BREAKING STRENGTH.
 - 3/8" DIAMETER GUY WIRE:
RATED BREAKING STRENGTH IS 10,800 LB. LOAD SHALL NOT EXCEED 9,720 LB.
- THE QUANTITY OF PORCELAIN GUY STRAIN INSULATORS (ITEM 0034) REQUIRED TO PROVIDE ELECTRICAL ISOLATION AND SUPPORT FOR GUY WIRES SHALL BE DETERMINED BY THE ENGINEER TO ENSURE THAT, IF A GUY WIRE SLACKENS OR BREAKS, NO PART OF IT, UP TO A HEIGHT OF 8'-0" ABOVE THE FINISH GRADE, CAN BECOME ENERGIZED.
- REFER TO STANDARD NO. E-5 FOR DETAILS ON THE SELECTION OF GUYS.
- REFER TO THE APPLICABLE GUY ANCHORING INSTALLATION STANDARDS NO. F-1-3, F-5-1, OR F-6-1.



DISTRIBUTION ENGINEERING

OVERHEAD DISTRIBUTION STANDARDS

TITLE:

POLE GUY INSTALLATION FOR PRIMARY LINES MAXIMUM VOLTAGE: 13.2 KV

STANDARD NO. E-1-2-3 VERSION 6
DOCUMENT NO. 4301.083
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8" SPACING POLE FACE GUY ATTACHMENT OPTION

12" SPACING POLE FACE GUY ATTACHMENT OPTION

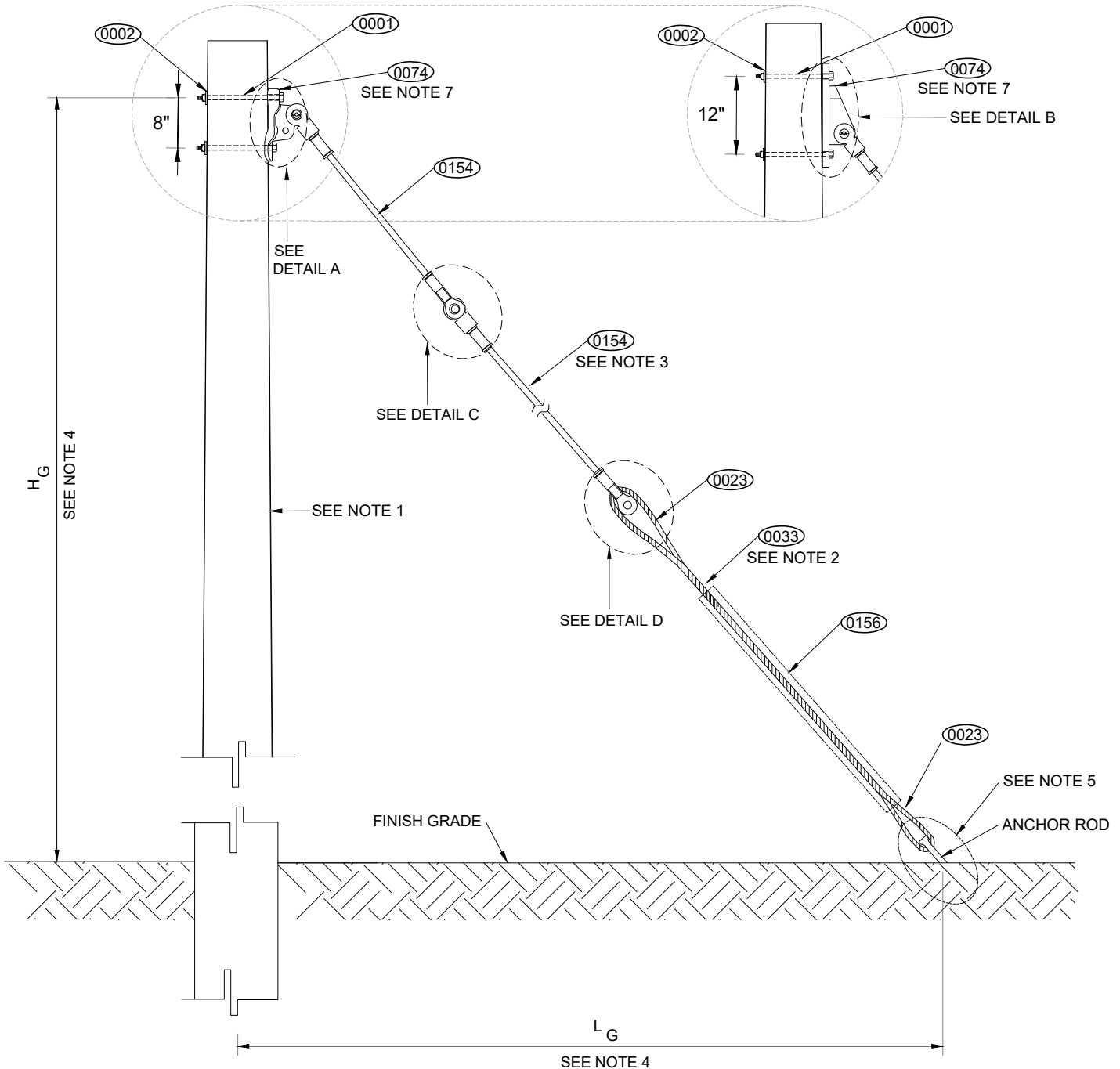


FIGURE 1
INSTALLATION WITH GUY ATTACHMENT (36,000 LB)



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OVERHEAD DISTRIBUTION STANDARDS

TITLE:

POLE GUY INSTALLATION FOR PRIMARY LINES MAXIMUM VOLTAGE: 13.2 KV

STANDARD NO. E-1-2-3 VERSION 6

DOCUMENT NO. 4301.083

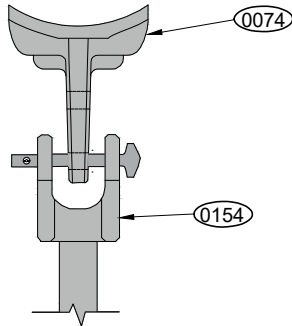
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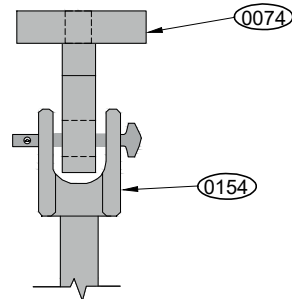
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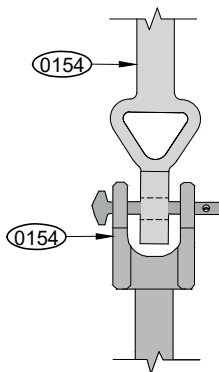
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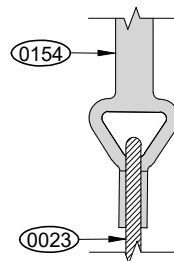
DETAIL A
TOP VIEW



DETAIL B
TOP VIEW



DETAIL C
TOP VIEW



DETAIL D
TOP VIEW



DISTRIBUTION ENGINEERING

OVERHEAD DISTRIBUTION STANDARDS

TITLE:

POLE GUY INSTALLATION FOR PRIMARY LINES
MAXIMUM VOLTAGE: 13.2 KV

STANDARD NO. E-1-2-3 VERSION 6

DOCUMENT NO. 4301.083

PAGE 3 OF 5 DATE DEC 26, 2024

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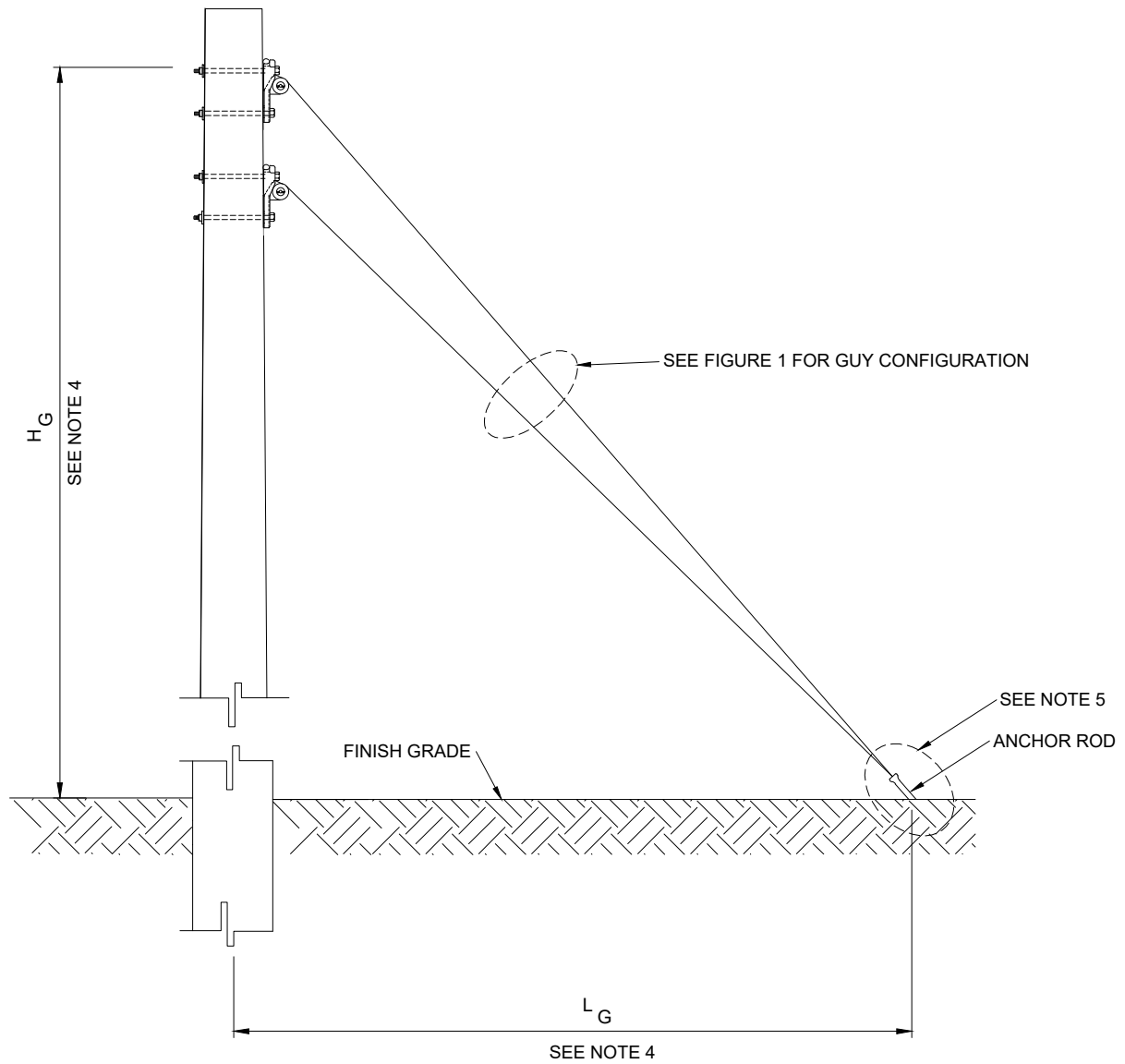


FIGURE 2
MULTIPLE GUYS ATTACHED TO A SINGLE ANCHOR ROD



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TITLE:

POLE GUY INSTALLATION FOR PRIMARY LINES
MAXIMUM VOLTAGE: 13.2 KV

STANDARD NO. E-1-2-3 VERSION 6
DOCUMENT NO. 4301.083
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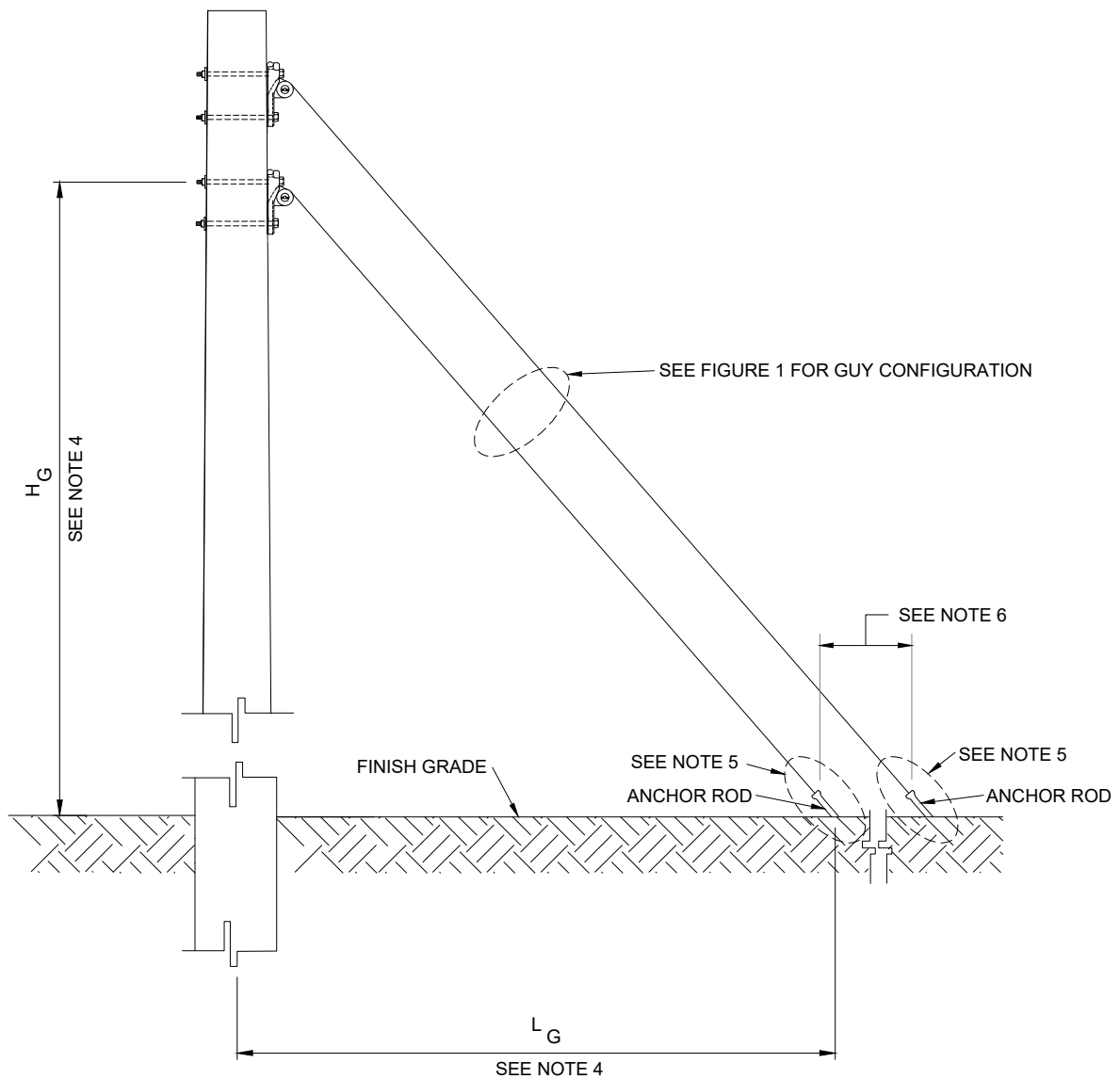


FIGURE 3
MULTIPLE GUYS ATTACHED TO INDIVIDUAL ANCHOR RODS



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OVERHEAD DISTRIBUTION STANDARDS

TITLE: POLE GUY INSTALLATION FOR PRIMARY LINES MAXIMUM VOLTAGE: 13.2 KV NOTES AND BILL OF MATERIAL	STANDARD NO. <u>E-1-2-3</u> VERSION <u>6</u>
	DOCUMENT NO. <u>4301.083</u>
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MATERIALS			
NO.	GENERAL DESCRIPTION	WAREHOUSE ITEM	QTY.
0001	¾" THROUGH BOLT	VARIES	AS REQ.
0002	FLAT SQUARE WASHER	VARIES	AS REQ.
0023	½" GUY GRIP	002-13736	AS REQ.
0033	½" GUY WIRE	046-00219	AS REQ.
0074	GUY ATTACHMENT (36,000 LB)	VARIES	AS REQ.
0154	FIBERGLASS GUY STRAIN INSULATOR	014-00720	AS REQ.
0156	GUY WIRE MARKER	002-02598	AS REQ.

NOTES:

- THIS STANDARD APPLIES TO THE INSTALLATION OF GUYS ON POLES SUPPORTING PRIMARY LINES OR BOTH PRIMARY AND SECONDARY LINES.
- THE LOAD SHALL BE EQUAL TO OR LESS THAN 90% OF THE GUY WIRE BREAKING STRENGTH.
 - 1/2" DIAMETER GUY WIRE:
RATED BREAKING STRENGTH IS 26,900 LB. LOAD SHALL NOT EXCEED 24,210 LB.
- THE QUANTITY OF FIBERGLASS GUY STRAIN INSULATORS (ITEM 0154) REQUIRED TO PROVIDE ELECTRICAL ISOLATION AND SUPPORT FOR GUY WIRES SHALL BE DETERMINED BY THE ENGINEER TO ENSURE THAT, IF A GUY WIRE SLACKENS OR BREAKS, NO PART OF IT, UP TO A HEIGHT OF 8'-0" ABOVE THE FINISH GRADE, CAN BECOME ENERGIZED.
- REFER TO STANDARD NO. E-5 FOR DETAILS ON THE SELECTION OF GUYS.
- REFER TO THE APPLICABLE GUY ANCHORING INSTALLATION STANDARDS NO. F-1-3, F-4-1, F-4-2, F-5-1, OR F-6-1. STANDARDS NO. F-4-1, F-4-2, OR F-5-1 APPLY WHERE MULTIPLE GUYS ATTACHED TO A SINGLE ANCHOR ROD ARE REQUIRED BY DESIGN.
- FOR A POLE SUPPORTED BY MULTIPLE GUY WIRES, WITH EACH WIRE ATTACHED TO AN INDIVIDUAL ANCHOR ROD, THE SPACING BETWEEN THE ANCHOR RODS SHOULD BE DETERMINED BY THE ENGINEER. THE MINIMUM RECOMMENDED SEPARATION BETWEEN ANCHOR RODS SHOULD BE 5'-0" IN SOIL AND 2'-0" IN ROCK, IN COMPLIANCE WITH ACCEPTED INDUSTRY GOOD PRACTICE.
- THE GUY ATTACHMENT (ITEM 0074) SHALL BE SELECTED ACCORDING TO THE POLE FACE SPACING OPTION CHOSEN FOR ITS INSTALLATION.



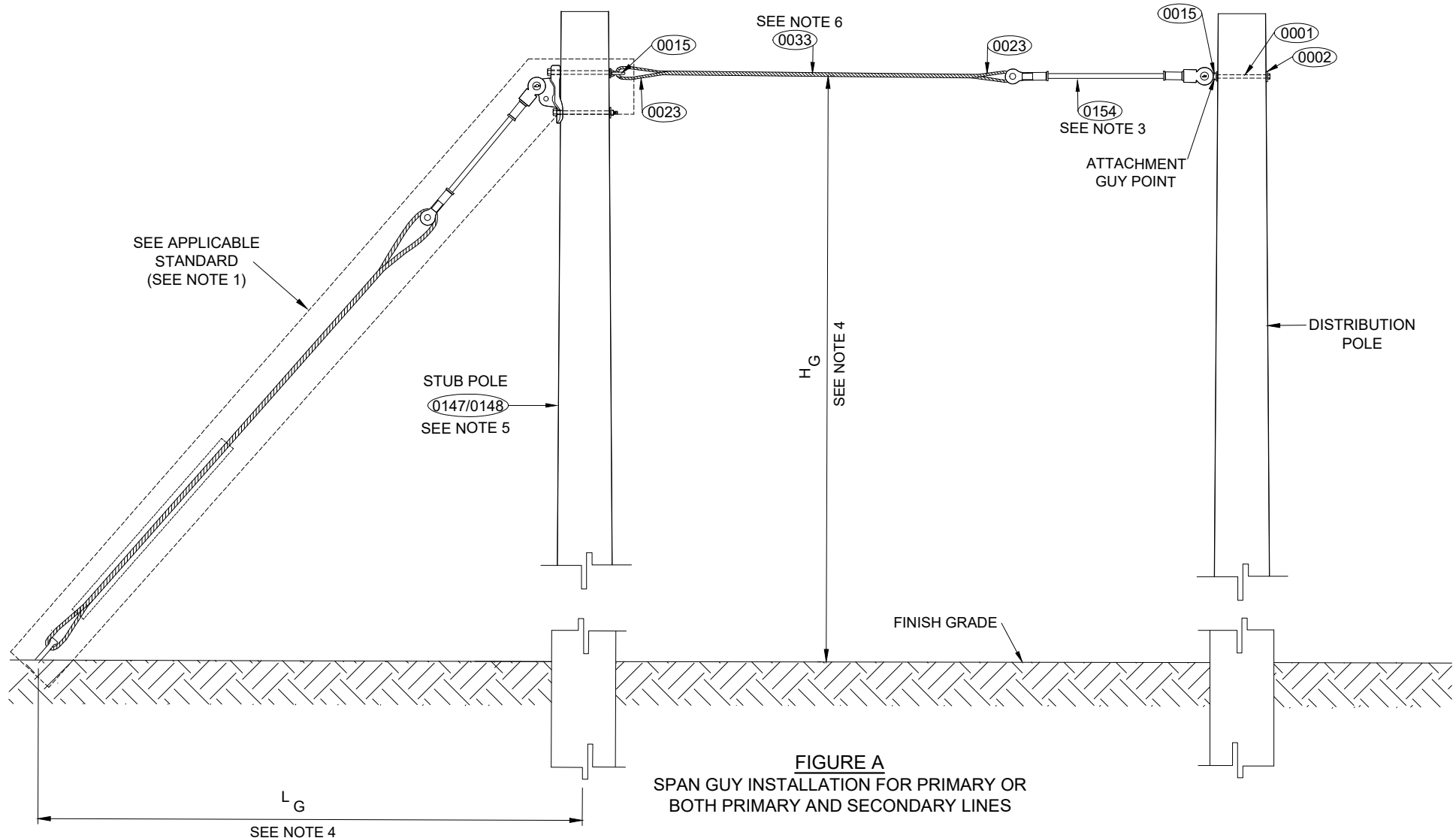
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OVERHEAD DISTRIBUTION STANDARDS

TITLE:

SPAN GUY INSTALLATION
MAXIMUM VOLTAGE: 13.2 KV

STANDARD NO. E-2-1 VERSION 4
DOCUMENT NO. 4301.085
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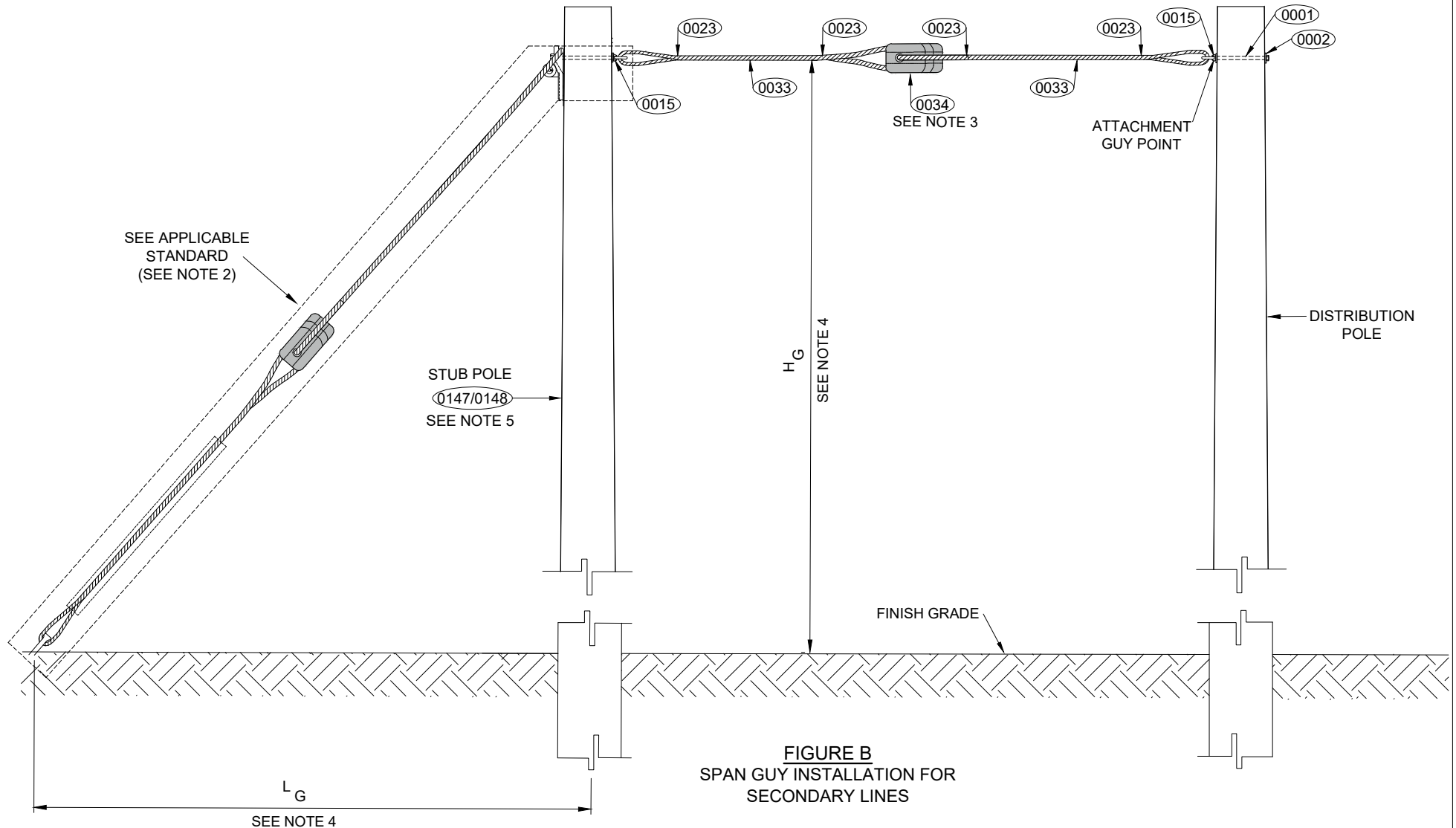
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TITLE:

SPAN GUY INSTALLATION
MAXIMUM VOLTAGE: 240 V

STANDARD NO. E-2-1 VERSION 4
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OVERHEAD DISTRIBUTION STANDARDS

TITLE: <p style="text-align: center;">SPAN GUY INSTALLATION NOTES AND BILL OF MATERIAL</p>	STANDARD NO. <u>E-2-1</u> VERSION <u>4</u> DOCUMENT NO. <u>4301.085</u> PAGE <u>3</u> OF <u>3</u> DATE <u>DEC 26, 2024</u> SUBMITTED <u>LUIS R. SOTO LIC. 11658</u> REVIEWED <u>IVETTE D. SANCHEZ LIC. 13837</u> APPROVED <u>RICARDO CASTRO LIC. 12135</u> DIGITIZED <u>EMILIO CUADRADO LIC. 3000</u>
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MATERIALS				
NO.	GENERAL DESCRIPTION	WAREHOUSE ITEM	"A" QTY.	"B" QTY.
0001	3/4" THROUGH BOLT	VARIES	1	-
	5/8" THROUGH BOLT	VARIES	-	1
0002	FLAT SQUARE WASHER	VARIES	2	2
0015	EYE NUT	002-85566	2	-
		002-04495	-	2
0023	3/8" GUY GRIP	002-04214	-	AS REQ.
	1/2" GUY GRIP	002-13736	AS REQ.	-
0033	3/8" GUY WIRE	046-00086	-	AS REQ.
	1/2" GUY WIRE	046-00219	AS REQ.	-
0034	PORCELAIN GUY STRAIN INSULATOR	014-00209	-	AS REQ.
0147/0148	CONCRETE, METAL OR COMPOSITE POLE	VARIES	1	1
0154	FIBERGLASS GUY STRAIN INSULATOR	014-00720	AS REQ.	-

NOTES:

1. REFER TO STANDARD NO. E-1-2-3 FOR DETAILS ON GUY INSTALLATION AND THE MATERIALS REQUIRED FOR POLES SUPPORTING PRIMARY LINES OR BOTH PRIMARY AND SECONDARY LINES.
2. REFER TO STANDARD NO. E-1-2 FOR DETAILS ON GUY INSTALLATION AND THE MATERIALS REQUIRED FOR POLES THAT SUPPORT ONLY SECONDARY LINES.
3. THE QUANTITY OF GUY STRAIN INSULATORS REQUIRED TO PROVIDE ELECTRICAL ISOLATION AND SUPPORT FOR GUY WIRES SHALL BE DETERMINED BY THE ENGINEER TO ENSURE THAT, IF A GUY WIRE SLACKENS OR BREAKS, NO PART OF IT, UP TO A HEIGHT OF 8'-0" ABOVE THE FINISH GRADE, CAN BECOME ENERGIZED.
4. REFER TO STANDARD NO. E-5 FOR DETAILS ON THE SELECTION OF GUYS.
5. THE PORTION OF THE STUB POLE ABOVE THE FINISH GRADE CAN BE EQUAL TO OR SHORTER THAN THE DISTANCE FROM THE DISTRIBUTION POLE'S ATTACHMENT GUY POINT TO THE FINISH GRADE, PROVIDED THAT THE MINIMUM HEIGHT OF THE STUB POLE IS 35'-0".
6. THE LOAD SHALL BE EQUAL TO OR LESS THAN 90% OF THE GUY WIRE BREAKING STRENGTH.
 - 1/2" DIAMETER GUY WIRE:
RATED BREAKING STRENGTH IS 26,900 LB. LOAD SHALL NOT EXCEED 24,210 LB.
 - 3/8" DIAMETER GUY WIRE:
RATED BREAKING STRENGTH IS 10,800 LB. LOAD SHALL NOT EXCEED 9,720 LB.



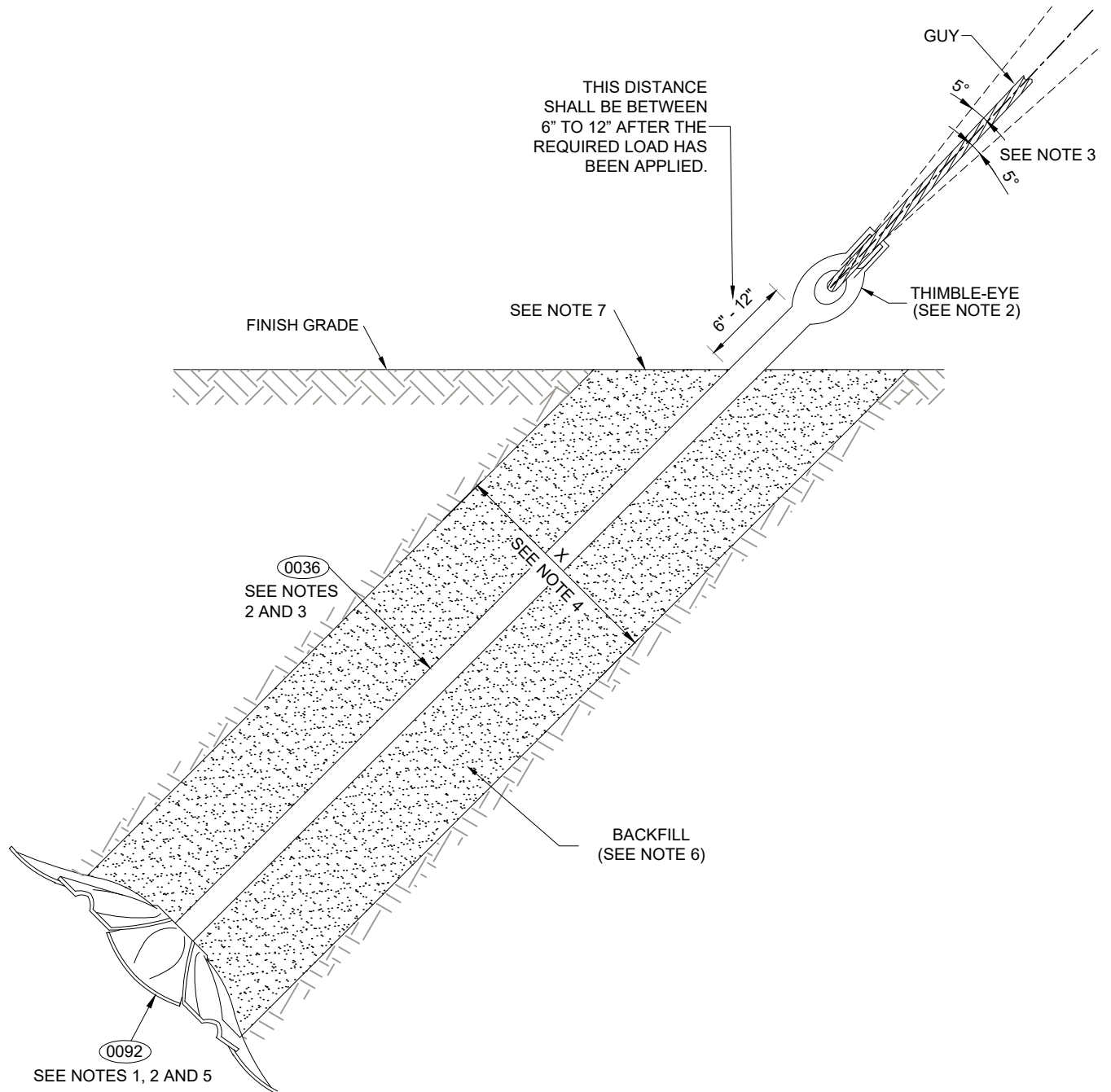
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OVERHEAD DISTRIBUTION STANDARDS

TITLE:

EXPANSION ANCHOR
MAXIMUM VOLTAGE: 13.2 KV

STANDARD NO. F-1-3 VERSION 6
DOCUMENT NO. 4301.087
PAGE 1 OF 2 DATE DEC 26, 2024
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VICTOR R. FEBRES LIC. 3412





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TITLE: EXPANSION ANCHOR MAXIMUM VOLTAGE: 13.2 KV NOTES AND BILL OF MATERIAL	STANDARD NO. <u>F-1-3</u> VERSION <u>6</u>
	DOCUMENT NO. <u>4301.087</u>
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ANCHOR HOLDING CAPACITY BY SOIL CLASSIFICATION			
CLASS	SOIL GENERAL DESCRIPTION	MAX. TENSION FORCE	
		8-WAY 8" ANCHOR	8-WAY 12" ANCHOR
3	DENSE CLAYED SAND, SAND, GRAVEL; VERY STIFF TO HARD SILTS AND CLAYS	26,500 LB	36,000 LB
4	MEDIUM DENSE SANDY GRAVEL; VERY STIFF TO HARD SILTS AND CLAYS	22,000 LB	34,000 LB
5	MEDIUM DENSE COARSE SAND AND SANDY GRAVELS; STIFF TO VERY STIFF SILTS AND CLAYS	18,000 LB	26,500 LB
6	LOOSE TO MEDIUM DENSE FINE TO COARSE SAND; FIRM TO STIFF CLAYS AND SILTS	15,000 LB	21,500 LB
7	LOOSE TO FINE SAND; ALLUVIUM; LOESS; SOFT-FIRM CLAYS; VARVED CLAYS; FILL	10,000 LB	16,000 LB

MATERIALS			
NO.	GENERAL DESCRIPTION	WAREHOUSE ITEM	QTY.
0036	THREADED THIMBLE-EYE GALVANIZED ANCHOR ROD	VARIES	1
0092	EXPANSION ANCHOR	VARIES	1

NOTES:

1. THE ANCHOR HOLDING CAPACITY, BASED ON SOIL CLASSIFICATION, SHALL BE GREATER THAN 90% OF THE GUY WIRE BREAKING STRENGTH. THE SOIL CLASSIFICATIONS ARE REFERENCED FROM RUS TECHNICAL BULLETIN 1724E-153.
2. FOR STANDARD NO. E-1-2-3, POLE GUY INSTALLATION FOR PRIMARY LINES, USE THE 8-WAY 12" EXPANDING ANCHOR AND A 1" x 10'-0" ANCHOR ROD. FOR STANDARD NO. E-1-2, POLE GUY INSTALLATION FOR SECONDARY LINES, USE THE 8-WAY 8" EXPANDING ANCHOR AND A 5/8" x 7'-0" ANCHOR ROD.
3. THE ANCHOR ROD SHALL BE ALIGNED WITHIN 5° WITH THE GUY LOAD.
4. THE SIZE OF THE HOLE SHALL BE SLIGHTLY LARGER THAN THE UNEXPANDED ANCHOR.
5. AFTER INSERTING AN EXPANSION ANCHOR TO THE PROPER DEPTH, IT SHALL BE COMPLETELY EXPANDED WITH A DRIVER OR TAMPING BAR.
6. SELECTED MATERIAL FOR BACKFILL COULD BE THE MATERIAL TAKEN FROM THE EXCAVATION IF IT IS FREE FROM SOFT AND DISINTEGRATED PIECES, CLAY, ORGANIC OR OTHER DELETERIOUS MATTER, OR A-2-4 MATERIAL. BACKFILL SHALL BE TAMPED OR COMPACTED EVERY 6" LAYERS.
7. THE SURROUNDING SURFACE OF THE EXPOSED PART OF THE ANCHOR ROD SHALL BE LEFT IN THE SAME OR BETTER CONDITION THAN IT WAS FOUND. THE REPLACEMENT OF PAVING, CURBS, AND SIDEWALKS SHALL BE DONE IN ACCORDANCE WITH MUNICIPAL OR STATE REQUIREMENTS.