New York State Electric & Gas Corporation

Columbia County Transmission Project

Exhibit E-1

Description of Proposed Transmission Facilities

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EXHIBIT E-1: DESCRIPTION OF PROPOSED TRANSMISSION FACILITIES

E-1.1 General

Basic Overview of Proposed Transmission Scheme

The proposed Project facilities and improvements include 11.1 miles of new 115-kV line, a new 115-kV switching station (Ghent Switching Station), and improvements at the existing Klinekill 115-kV/34.5-kV Substation. The new transmission lines will consist of a 2.5-mile line from the existing National Grid Trunk #15 115-kV transmission line, which will be cut and extended into Ghent Substation, and 8.6 miles of 115-kV transmission line (Circuit #726) from Ghent Switching Station to Klinekill Substation.

E-1.2 Circuit Information

E-1.2.1 Proposed 115-kV National Grid Trunk #15

The existing National Grid Trunk #15 115-kV transmission line that currently runs between the Hudson and Valkin Substations will need to be cut and looped into the new proposed Ghent Switching Station. This line will be built in both the Town of Ghent and Stockport with the majority of the line being in the Town of Ghent (2.0 miles out of 2.5 miles). The extension of Trunk #15 will require the circuit to be cut at a point approximately 2,100 feet north of Ghent Road in the Town of Stockport. Each new circuit will be extended to connect to the proposed Ghent Switching Station, thus creating two new circuits: Hudson to Ghent and Ghent to Valkin.

E-1.2.2 Proposed 115-kV Circuit #726

Circuit #726 will be built primarily on new right-of-way in the towns of Chatham and Ghent, but will share existing rights-of-way where it will be constructed parallel to the existing Craryville–Klinekill 115-kV Circuit #984. The majority of Circuit #726 (8.0 out of 8.6 miles) will be built in the Town of Ghent. It will parallel the east side of the existing Circuit #984 for its entire length in the Town of Chatham (0.5 miles) and for approximately 2.6 miles in the Town of Ghent. The remaining portion of Circuit #726 (5.5 miles) will be built on new right-of-way, not parallel to existing rights-of-way, in the Town of Ghent.

E-1.2.3 Right-of-Way Considerations

The proposed Ghent Switching Station will require acquisition of private property for the substation and access road(s). Additional easements will be required for the new 115-kV line as well as the extension of the National Grid Trunk #15 115-kV transmission line into the proposed Ghent Switching Station. The Environmental Management and Construction Plan (EM&CP) plan and profile drawings will identify any tree clearing rights agreements required before any construction.

E-1.3 Design Standards

The following design standards meet or exceed all requirements for electrical clearances and mechanical strength for Grade B Construction as set forth in the American National Standard, *National Electrical Safety Code* (ANSI C2, 2007 edition). The lines will be designed in accordance with the latest edition of the *National Electrical Safety Code* in effect at the time of design. Conductor-to-ground electrical clearances at short-time emergency (STE) New York Power Pool ratings will also meet or exceed those recommended in the above-named document.

LENGTH OF 115-kV TRANSMISSION	11.1 miles
LINE TO BE CONSTRUCTED	
TYPE OF CONSTRUCTION	
Single-Pole, Single-Circuit:	11.1 miles
DESIGN VOLTAGE	115-kV
OPERATING VOLTAGE	115-kV
CONDUCTOR	
Type, Material:	Pelican, Aluminum conductor, steel Reinforced (ACSR)
Size:	477 KCMIL,
Quantity:	3 per circuit, 1 per phase
Overall Diameter:	0.814 inches
Cross Sectional Area:	0.3955 inches
Rated Strength:	11,800 pounds
STATIC WIRE	

Type, Material:	AFL OPGW Centracore 48 Fibers CC-27/27/472
Diameter:	**0**.472"
Quantity:	1 per circuit
Rated Strength:	10,523 pounds

INSULATORS

Types:	Suspension and horizontal porcelain post
Color:	Gray

STRUCTURES – WOOD, SINGLE-POLE, SINGLE-CIRCUIT

Type:	Tangent suspension, Tangent dead-end Angle suspension, Angle dead-end
Material:	Douglas Fir, Western Red Cedar, Southern Yellow Pine
Typical Height Above Ground:	70 feet
Preservative Treatment:	Pentachlorophenol
Color:	Brown or green

FRAMING MATERIAL – WOOD, SINGLE-POLE STRUCTURES:

Components:	Davit arms
Material:	Steel
Preservative Treatment:	Galvanizing
Color:	Gray

STRUCTURES – STEEL, SINGLE-POLE, SINGLE-CIRCUIT

Type:	Tangent suspension, Tangent dead-end Angle suspension, Angle dead-end
Material:	Steel
Typical Height Above Ground:	90 feet
Preservative Treatment:	Galvanized
Color:	Gray

Design References

The design of transmission lines are in accordance with any applicable federal, state, and local codes and industry standards in effect at the issue of this design standard, unless stated otherwise. The industry codes and standards shall include but shall not be limited to the following:

- ANSI C2, The National Electric Safety Code 2007 (NESC)
- ASCE/SEI 48-05, Design of Steel Transmission Pole Structures
- ASCE 74, Guidelines for Electrical Transmission Lines Structural Loads
- ASCE 7, Design Loads for Buildings and Structures
- RUS Bulletin 1724E-200, Design Manual for High Voltage Transmission Lines

The following NYSEG standards will be used during design.

- NYSEG Transmission Standards Manual – September 1995 (As Applicable)

E-1.4 Foundation and Anchoring Details

The following drawings illustrate NYSEG's design standards for anchor, ground wire, and pole installation:

Figure E-1-1 Ground Wire Details at Ground Line and Pole Butt for Two or More Poles

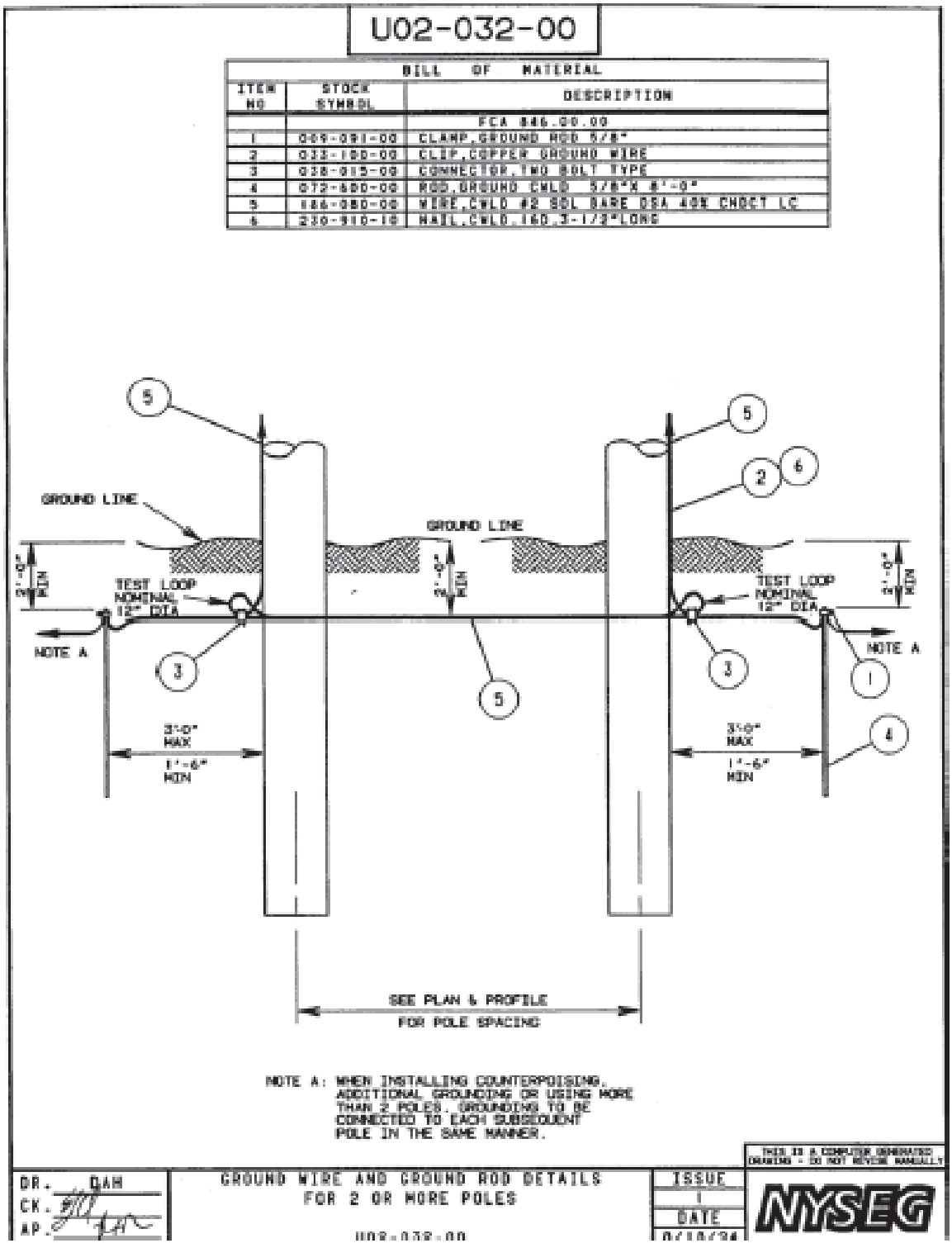


Figure E-1-2 Pole Foundation and Backfilling Details for Pole Class H1 and Larger

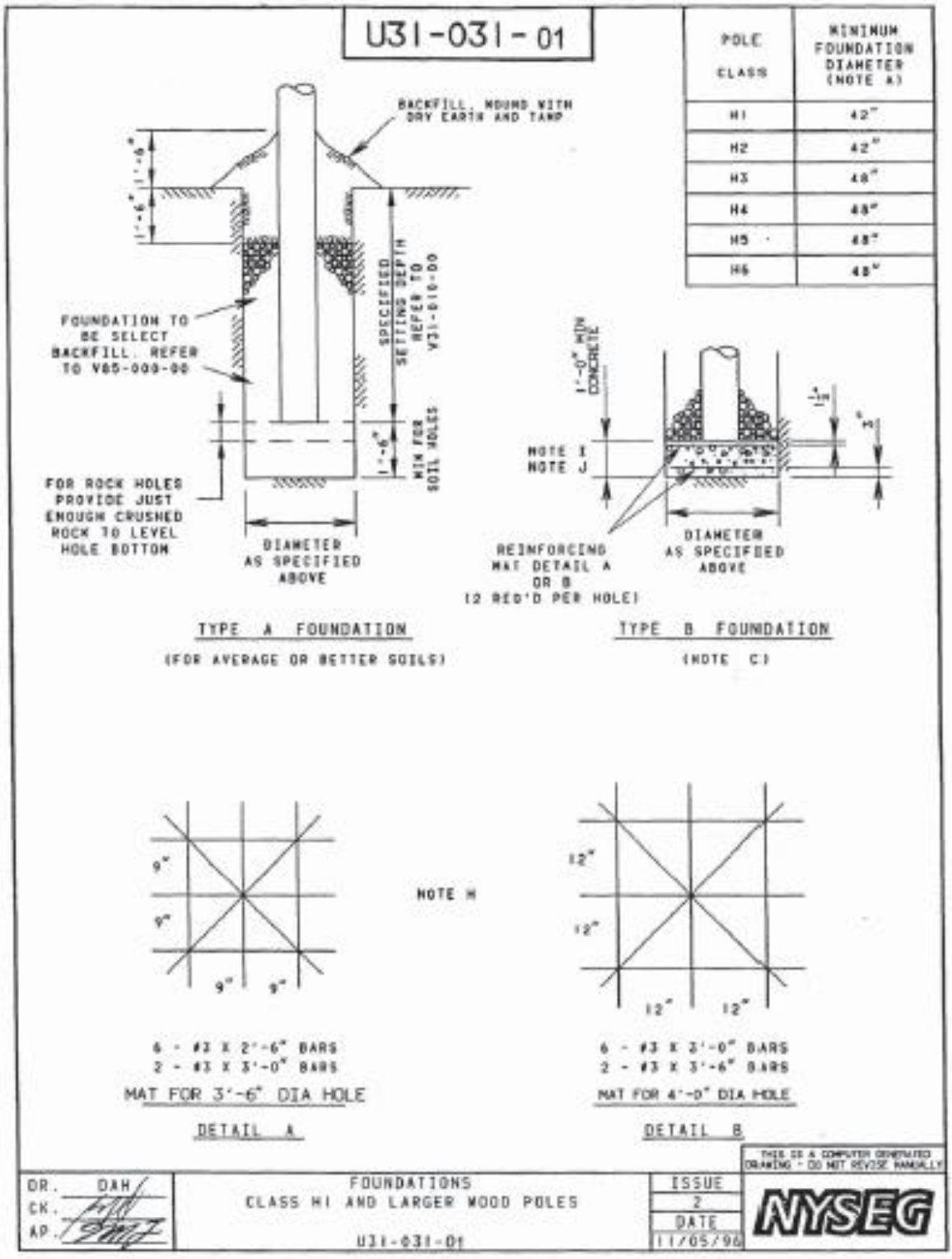
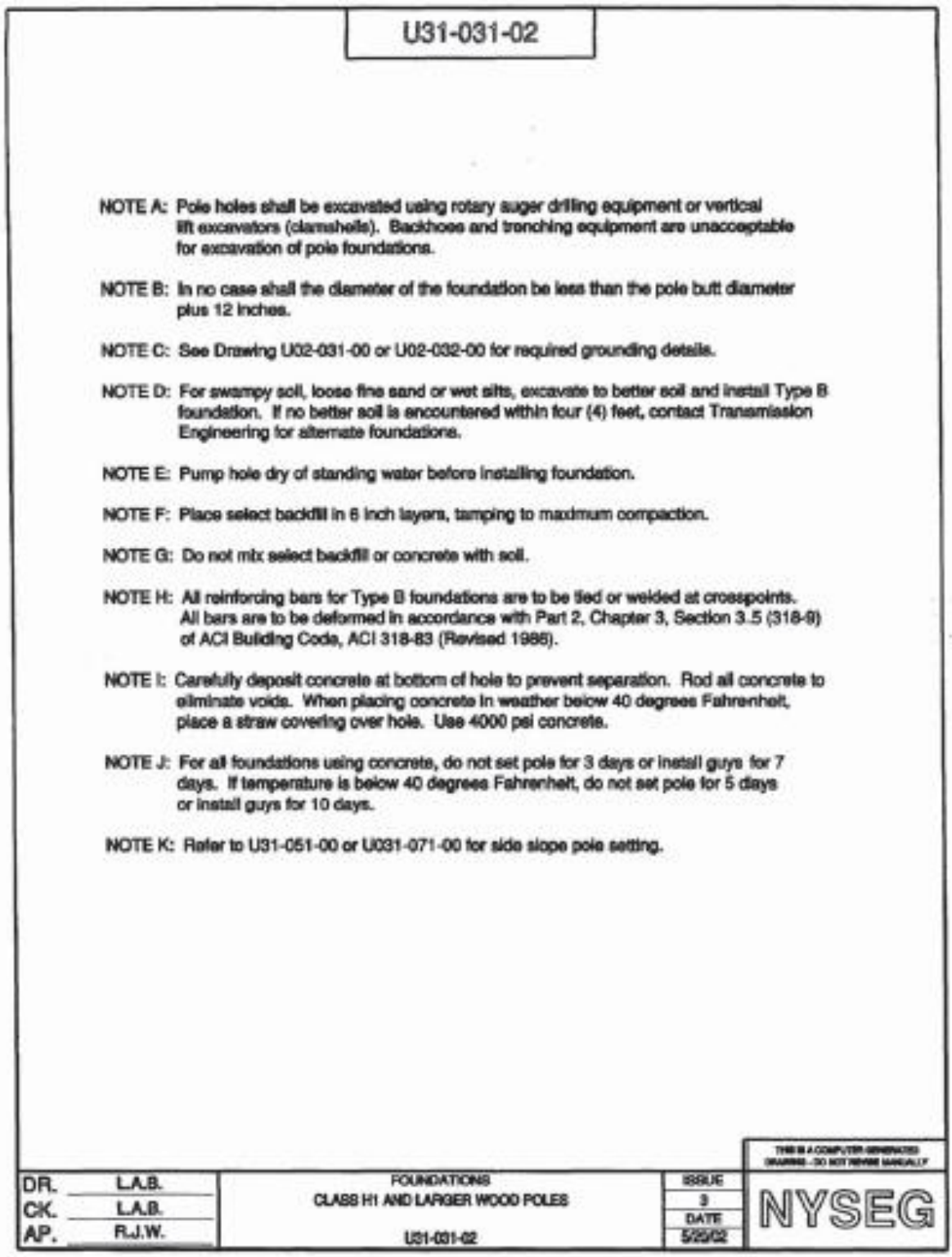


Figure E-1-3 Pole Foundation and Backfilling Details for Pole Class H1 and Larger



U31-031-02

NOTE A: Pole holes shall be excavated using rotary auger drilling equipment or vertical lift excavators (clamshells). Backhoes and trenching equipment are unacceptable for excavation of pole foundations.

NOTE B: In no case shall the diameter of the foundation be less than the pole butt diameter plus 12 inches.

NOTE C: See Drawing U02-031-00 or U02-032-00 for required grounding details.

NOTE D: For swampy soil, loose fine sand or wet silts, excavate to better soil and install Type B foundation. If no better soil is encountered within four (4) feet, contact Transmission Engineering for alternate foundations.

NOTE E: Pump hole dry of standing water before installing foundation.

NOTE F: Place select backfill in 6 inch layers, tamping to maximum compaction.

NOTE G: Do not mix select backfill or concrete with soil.

NOTE H: All reinforcing bars for Type B foundations are to be tied or welded at crosspoints. All bars are to be deformed in accordance with Part 2, Chapter 3, Section 3.5 (318-9) of ACI Building Code, ACI 318-83 (Revised 1986).

NOTE I: Carefully deposit concrete at bottom of hole to prevent separation. Rod all concrete to eliminate voids. When placing concrete in weather below 40 degrees Fahrenheit, place a straw covering over hole. Use 4000 psi concrete.

NOTE J: For all foundations using concrete, do not set pole for 3 days or install guys for 7 days. If temperature is below 40 degrees Fahrenheit, do not set pole for 5 days or install guys for 10 days.

NOTE K: Refer to U31-051-00 or U031-071-00 for side slope pole setting.

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DR. L.A.B. CK. L.A.B. AP. R.J.W.	FOUNDATIONS CLASS H1 AND LARGER WOOD POLES U31-031-02	ISSUE 3 DATE 5/29/02	NYSEG	

Figure E-1-4 Pole Foundation and Backfilling Details for Pole Class 1 and 2

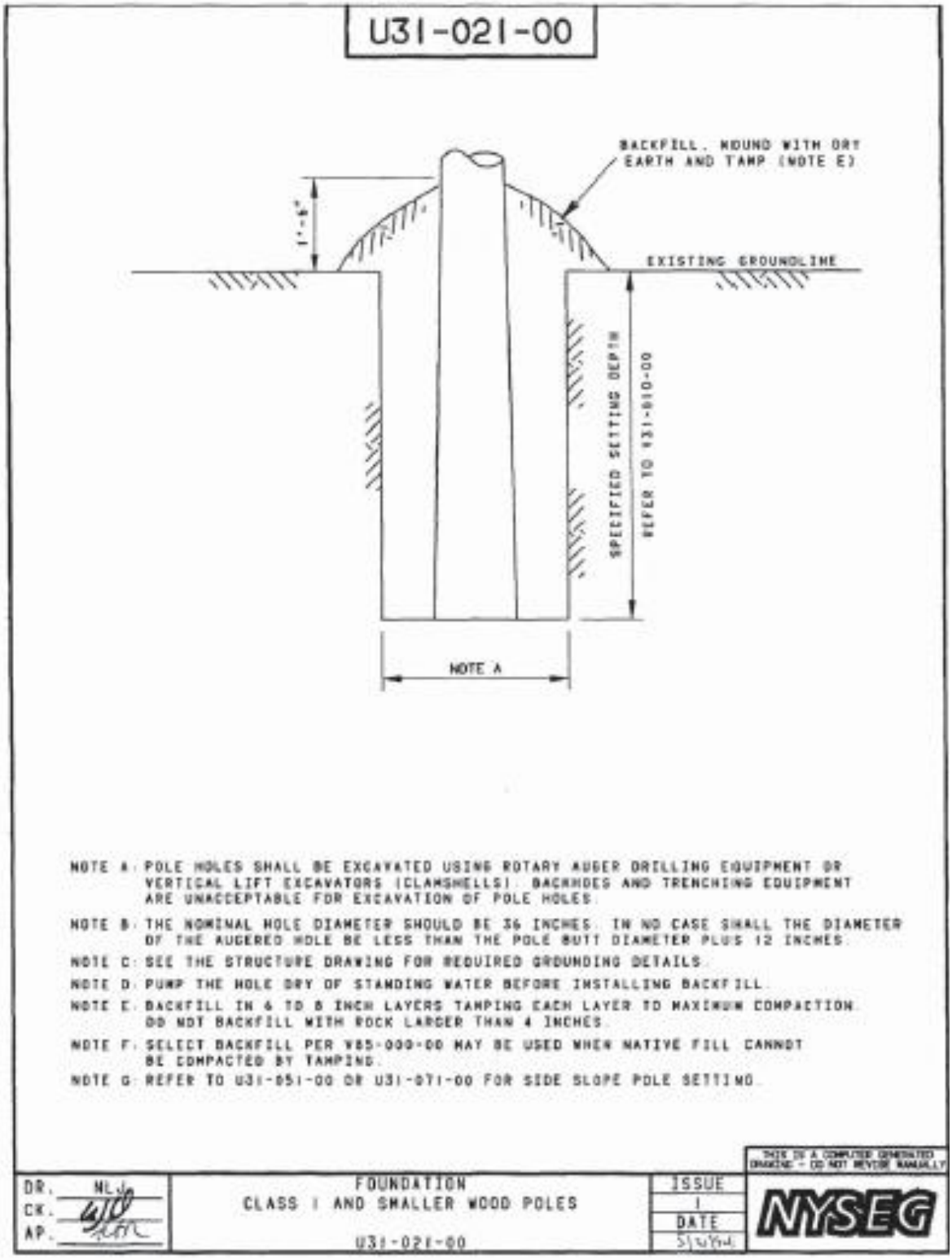
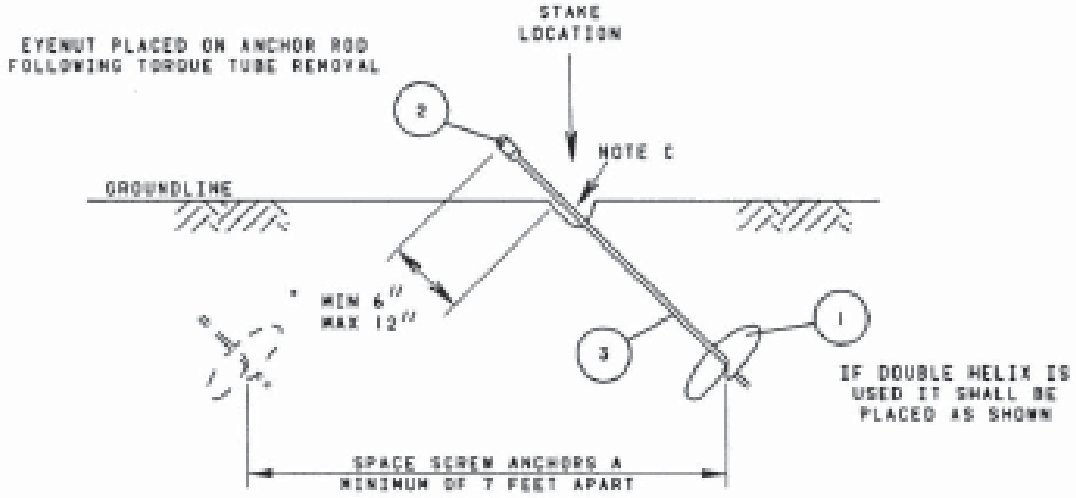


Figure E-1-5 Screw Anchor Installation Details

U11-051-00



CAUTION: 14 FEET OF TORQUE TUBE EXTENSIONS MAY BE DIFFICULT TO REMOVE FROM THE SOIL. CONSULT TRANSMISSION ENGINEERING IF MORE ANCHOR DEPTH IS REQUIRED. THE REQUIRED HIGH STRENGTH INSTALLATION TOOLING IS AVAILABLE THROUGH THE CORPORATE GARAGE.

NOTE A: THE REQUIRED INSTALLATION TOOLING FOR THIS ANCHOR IS AVAILABLE THROUGH THE CORPORATE GARAGE.

NOTE B: THE ANCHOR ROD SHALL BE SET IN ALIGNMENT WITH THE GUY STRAND. REFER TO THE STRUCTURE GUYING DETAIL ON THE PLAN & PROFILE TO CALCULATE THE GUY ANGLE.

NOTE C: DIG A SMALL HOLE AT THE ANCHOR ENTRY POINT TO PREVENT "WALKING".

NOTE D: IF THE GROUNDLINE SLOPES AWAY FROM THE POLE BEING ANCHORED, ANCHOR ROD EXTENSIONS SHALL BE USED TO OBTAIN THE REQUIRED ROD LENGTH. REFER TO U11-061-01. ROD EXTENSIONS MAY ALSO BE USED TO PASS THROUGH SOFT SOILS AND REACH FIRMER LAYERS.

NOTE E: IF GROUND CONDITIONS FORCE THE ROD LENGTH TO EXCEED 14 FEET, A DIFFERENT STYLE OF ANCHOR WILL HAVE TO BE USED. CONSULT TRANSMISSION ENGINEERING.

NOTE F: TORQUE AND DOWN-PRESSURE SHOULD BE CAREFULLY CONTROLLED DURING INSTALLATION TO AVOID HELIX DAMAGE OR CHURNING OF THE SOIL. THE APPLIED TORQUE AT ANY TIME DURING INSTALLATION SHALL NOT EXCEED THE MANUFACTURER'S RATING FOR THE ANCHOR AND TOOLING.

NOTE G: ALL GUY ANCHORS SHALL BE PULL TESTED. REFER TO U91-061-00.

NOTE H: REFER TO U01-011-00 IF GROUNDING IS REQUIRED.

NOTE J: REFER TO U11-061-01 FOR ROD LENGTH.

BILL OF MATERIAL

ITEM NO	QTY	STOCK SYMBOL	DESCRIPTION
			FCN 825.00 99
1	1	912-750-99	ANCHOR,SCREW 10" DIAMETER 10000 FT X LBS
2	1	941-860-00	EYENUT,SCREW ANCHOR
3	1	972-550-99	ROD,ANCHOR

DR. NLJ
CK.
AP.

SCREW ANCHOR INSTALLATION

U11-051-00

ISSUE 1
DATE 8/15/14

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Figure E-1-6 Screw Anchor Installation Details

U11-061-01

MINIMUM ROD LENGTH (FT) VERSUS GROUND SLOPE
FOR DRIVEN PLATE AND SCREW ANCHORS

GUY ANGLE	ANCHOR IS DOWNSLOPE FROM POLE TO 6.5 / 10	TO 4 / 10	TO 1.5 / 10	"LEVEL"	ANCHOR IS UPSLOPE FROM POLE TO 1.5 / 10	TO 4 / 10	TO 6.5 / 10
30°	7' ROD 3.5' EXT	7' ROD	7' ROD	7' ROD	7' ROD	7' ROD	7' ROD
35°	2-7' ROD	7' ROD 3.5' EXT	7' ROD	7' ROD	7' ROD	7' ROD	7' ROD
40°	2-7' ROD	7' ROD 3.5' EXT	7' ROD	7' ROD	7' ROD	7' ROD	7' ROD
45°		7' ROD 3.5' EXT	7' ROD	7' ROD	7' ROD	7' ROD	7' ROD
50°		2-7' ROD	7' ROD 3.5' EXT	7' ROD	7' ROD	7' ROD	7' ROD
55°			7' ROD 3.5' EXT	7' ROD 3.5' EXT	7' ROD	7' ROD	7' ROD

THIS TABLE IS BASED ON A MINIMUM ANCHOR DEPTH OF 4 FT. AS RECOMMENDED BY THE MANUFACTURERS

MINIMUM ROD LENGTH (FT) VERSUS GROUND SLOPE
FOR CROSSPLATE ANCHORS

	ANCHOR IS DOWNSLOPE FROM POLE TO 6.5 / 10	TO 4 / 10	TO 1.5 / 10	"LEVEL"	ANCHOR IS UPSLOPE FROM POLE TO 1.5 / 10	TO 4 / 10	TO 6.5 / 10
HOLE DEPTH	7.2'	6.5'	6'	6'	6'	6.5'	7.2'
GUY ANGLE 30°		10'ROD	8' ROD	8' ROD	8' ROD	8' ROD	8' ROD
35°			10' ROD	8' ROD	8' ROD	8' ROD	8' ROD
40°			10' ROD	10' ROD	8' ROD	8' ROD	8' ROD
45°				10' ROD	8' ROD	8' ROD	8' ROD
50°				10' ROD	10' ROD	8' ROD	8' ROD
55°					10' ROD	8' ROD	8' ROD

THIS TABLE IS BASED ON A MINIMUM ANCHOR DEPTH OF 6 FT. AS RECOMMENDED BY THE MANUFACTURERS

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CK.
AP.

ANCHOR ROD LENGTHS
PLATE & SCREW ANCHORS

U11-061-01

ISSUE 1
DATE 9/1/94

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Figure E-1-7 Screw Anchor Installation Details

U11-061-02

GUY ANGLE	ROD LENGTH	DIM "H"	SLOPE OF GROUND: 6.5 TO 4 / 10 — GUY DOWNHILL OF STRUCTURE	SLOPE OF GROUND: 4 / 10 TO 1.5 / 10 — GUY DOWNHILL OF STRUCTURE	SLOPE OF GROUND: 1.5 / 10 TO 1.5 / 10 — LEVEL GROUND	SLOPE OF GROUND: * TO 1.5 / 10 TO 4 / 10 — GUY UPHILL OF STRUCTURE
			DEPTH OF AUGURED HOLE DIM "D"			
30	15'	5'-6"	10'-0"	11'-6"	13'-0"	14'-0"
35	15'	6'-6"	-	11'-0"	12'-6"	14'-0"
	20'	9'-0"	10'-0"	-	-	-
40	15'	7'-6"	-	10'-0"	12'-0"	14'-0"
	20'	10'-0"	10'-0"	-	-	-
45	15'	8'-6"	-	10'-0"*	11'-6"	14'-0"
	20'	14'-6"	11'-6"	-	-	-

* GOOD ONLY FOR SLOPES UP TO 3/10

FROM 3/10 TO 5/10 USE 20' ROD AND DIMENSION "H" = 1'-0"

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DR. NL	ANCHOR ROD LENGTHS AUGER PILES	ISSUE 1
CK.	U11-061-02	DATE 9/15/94
AP.		NYSEG

Figure E-1-8 Screw Anchor Installation Details

U19-000-00

GUY ANCHOR PULL TEST PROCEDURE

All anchors shall be installed to the minimum tested holding strength stated on the guying detail. The holding strength shall be determined by a pull test of each anchor at each installation site (except Manta Ray anchors which are tested during load locking). Pull tests may be performed using either a bulldozer and a dynamometer, a Foresight Products hydraulic "load locker" powered by a portable hydraulic source, or equivalent method. The "load locker" is recommended due to the reduced amount of equipment and personnel required for each test. Refer to Foresight Products' "Manta Ray Equipment List and Installation Procedures" for detailed load locking (i.e. pull testing) procedure.

The test shall last three (3) minutes with no more than three (3) inches of movement, as measured along the anchor rod axis, while maintaining a load equal to the minimum tested holding strength stated on the guying detail as follows:

Assembly M: 17,000 lbs. ultimate strength rating

One (1) guy to each anchor - pull test anchor to 12,000 lbs.
Two (2) guys to each anchor - pull test anchor to 24,000 lbs.

Assembly HD: 36,000 lbs. ultimate strength rating

One (1) guy to each anchor - pull test anchor to 24,000 lbs.

For pull testing of anchors in unusual soil conditions (solid rock or swampy soils for example) contact Transmission Engineering for the appropriate pull test load.

For each anchor pull tested, a log shall be kept noting the following:

Date
Name of foreman
Equipment used
Type of anchor and size
Rod diameter and length
Load applied and creep over three minutes
Structure number
Line number

This information shall be recorded on drawing S-14,615

DR. JFC CK. AP.	Guy Anchor Pull Test Procedure U19-000-00	ISSUE 1 DATE 5/16/97	THIS IS A COMPUTER GENERATED DRAWING - DO NOT REVISE MANUALLY NYSEG