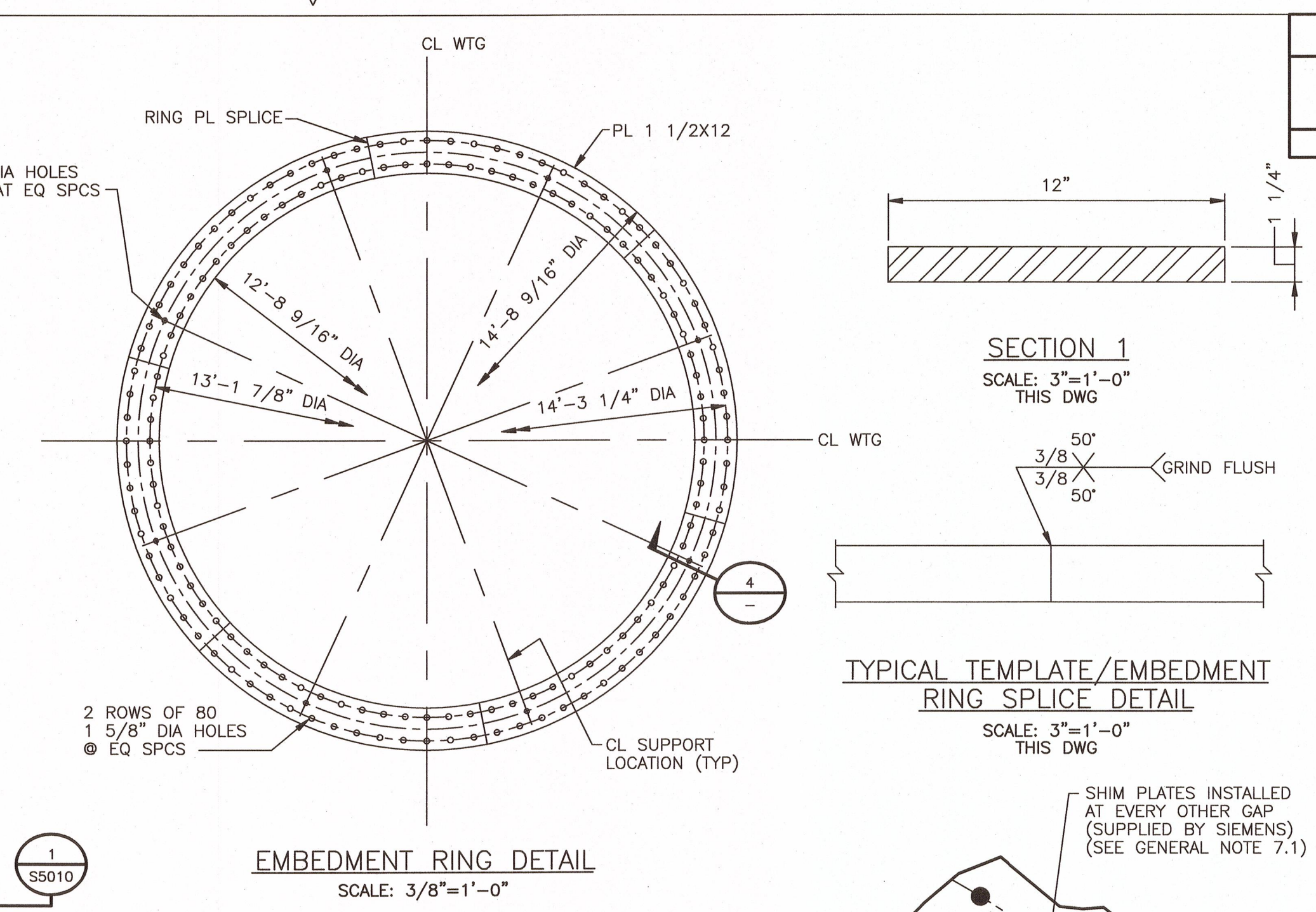
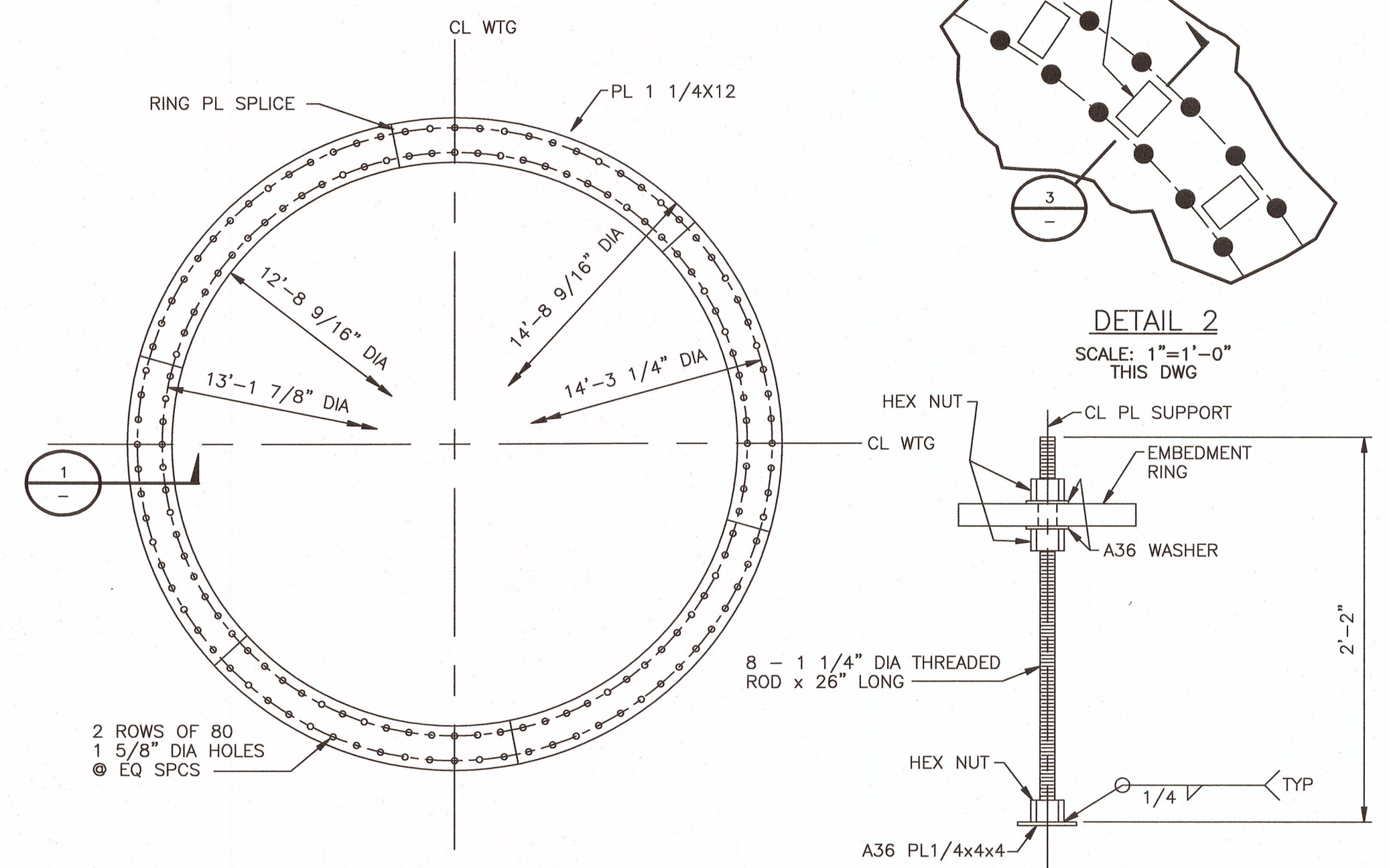


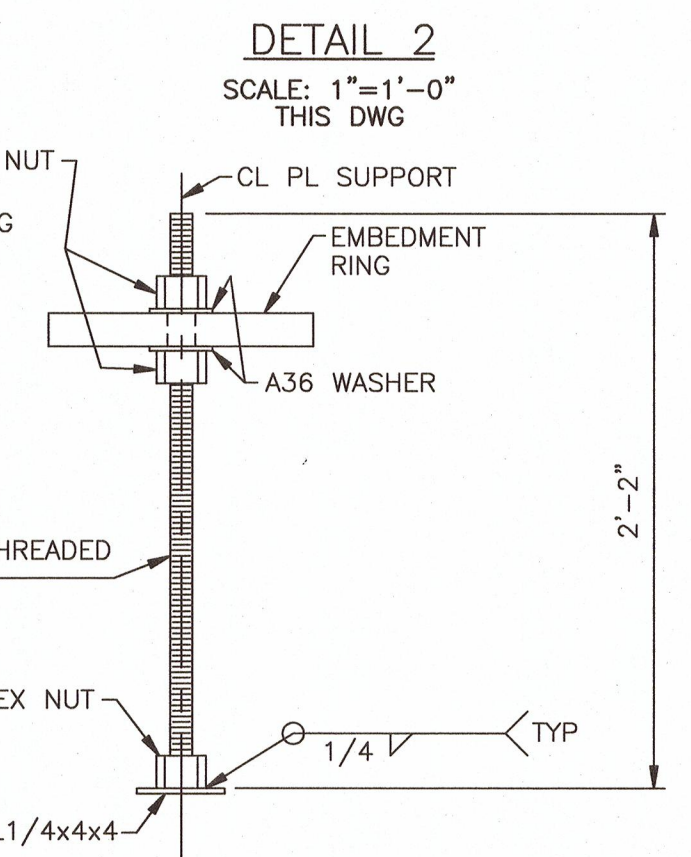
WIND TURBINE GENERATOR (WTG) FOUNDATION PLAN
SCALE: 3/16"=1'-0"



EMBEDMENT RING DETAIL
SCALE: 3/8"=1'-0"



TEMPLATE RING DETAIL
SCALE: 3/8"=1'-0"



SECTION 4 ANCHOR BOLT TEMPLATE SUPPORT DETAIL
SCALE: 1 1/2"=1'-0"

FOUNDATION BOQ TABLE				
FOUNDATION ID	CONCRETE QTY (CY)	ESTIMATED FORMWORK (SQ FT)	ESTIMATED REINFORCING (TONS)	REMARKS
WTG FOUNDATION	452	670	60	-

- NOTES FOR FOUNDATION BOQ TABLE:
1. CONCRETE QUANTITIES ARE "NEAT" QUANTITIES.
 2. QUANTITIES INDICATED ARE FOR CONSTRUCTION PLANNING PURPOSES ONLY. ALL QUANTITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO PURCHASING MATERIALS FOR CONCRETE PLACEMENT.
 3. REINFORCING STEEL QUANTITIES ARE ESTIMATED AND DO NOT INCLUDE ACCESSORIES SUCH AS REBAR CHAIRS.
 4. FOUNDATION ID LEGEND

BUILDING AND DESIGN CODES	
INTERNATIONAL BUILDING CODE, INTERNATIONAL CODE COUNCIL, IBC 2006	
BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE, AMERICAN CONCRETE INSTITUTE, ACI 318-08	

WIND TURBINE AND TOWER	
MANUFACTURER: SIEMENS	
MODEL: SWT-3.0-101-DD	
POWER OUTPUT: 3.0 MW	
TOWER HUB HEIGHT: 260.8 FT. (79.5M)	

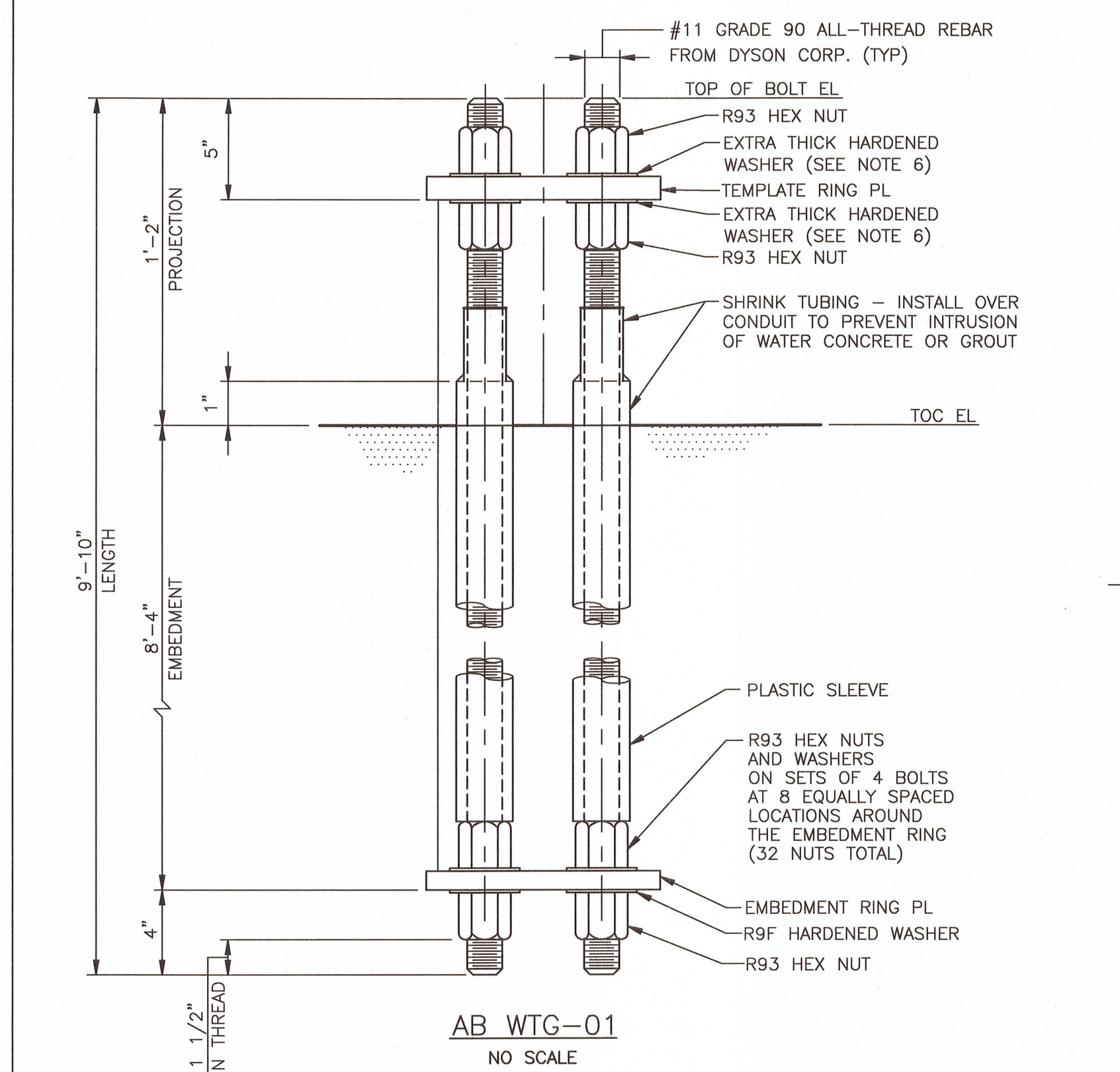
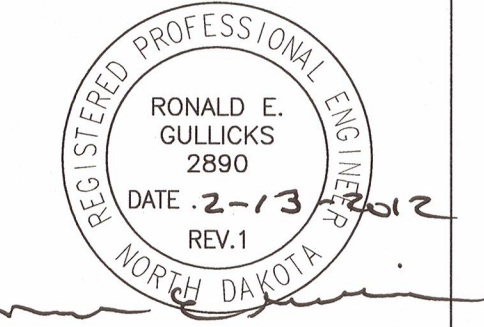
DESIGN SERVICE LOADS	
UNFACTORED LOADS FOR WIND CLASS IEC-S (SPECIAL)	
NORMAL OPERATING CASE:	
OVERTURNING MOMENT: M = 45,800 KNM	= 33,778 K-FT
HORIZONTAL BASE SHEAR: Q = 670 KN	= 151 K
VERTICAL TOWER LOAD: N = 2,900 KN	= 652 K (DOWN)
EXTREME WIND CASE - HIGHEST OVERTURNING MOMENT LOADS:	
OVERTURNING MOMENT: M = 62,500 KNM	= 46,094 K-FT
HORIZONTAL BASE SHEAR: Q = 860 KN	= 193 K
VERTICAL TOWER LOAD: N = 2,900 KN	= 652 K (DOWN)

DESIGN DATA	
MIN. 28-DAY COMPRESSIVE STRENGTH FOR BASE MAT:	5,000 PSI
MIN. 28-DAY COMPRESSIVE STRENGTH OF THE PEDESTAL:	5,000 PSI
MIN. COMPRESSIVE STRENGTH OF THE GROUT:	6,800 PSI AT 3 DAYS AND 10,000 PSI AT 28 DAYS
MIN. YIELD STRENGTH OF THE REINFORCEMENT:	60,000 PSI
MIN. YIELD STRENGTH OF THE EMBEDMENT AND TEMPLATE RING PLATES:	36 KSI
MIN. STRENGTH OF THE ANCHOR RODS:	TENSILE STRENGTH: 120 KSI
	YIELD STRENGTH: 90 KSI
MIN. POST-TENSION FORCE APPLIED TO ANCHOR BOLTS:	90 K
ALLOWABLE SOIL BEARING PRESSURE:	9,000 PSF
MIN. TOTAL VOLUME OF CONCRETE:	452 CU YDS

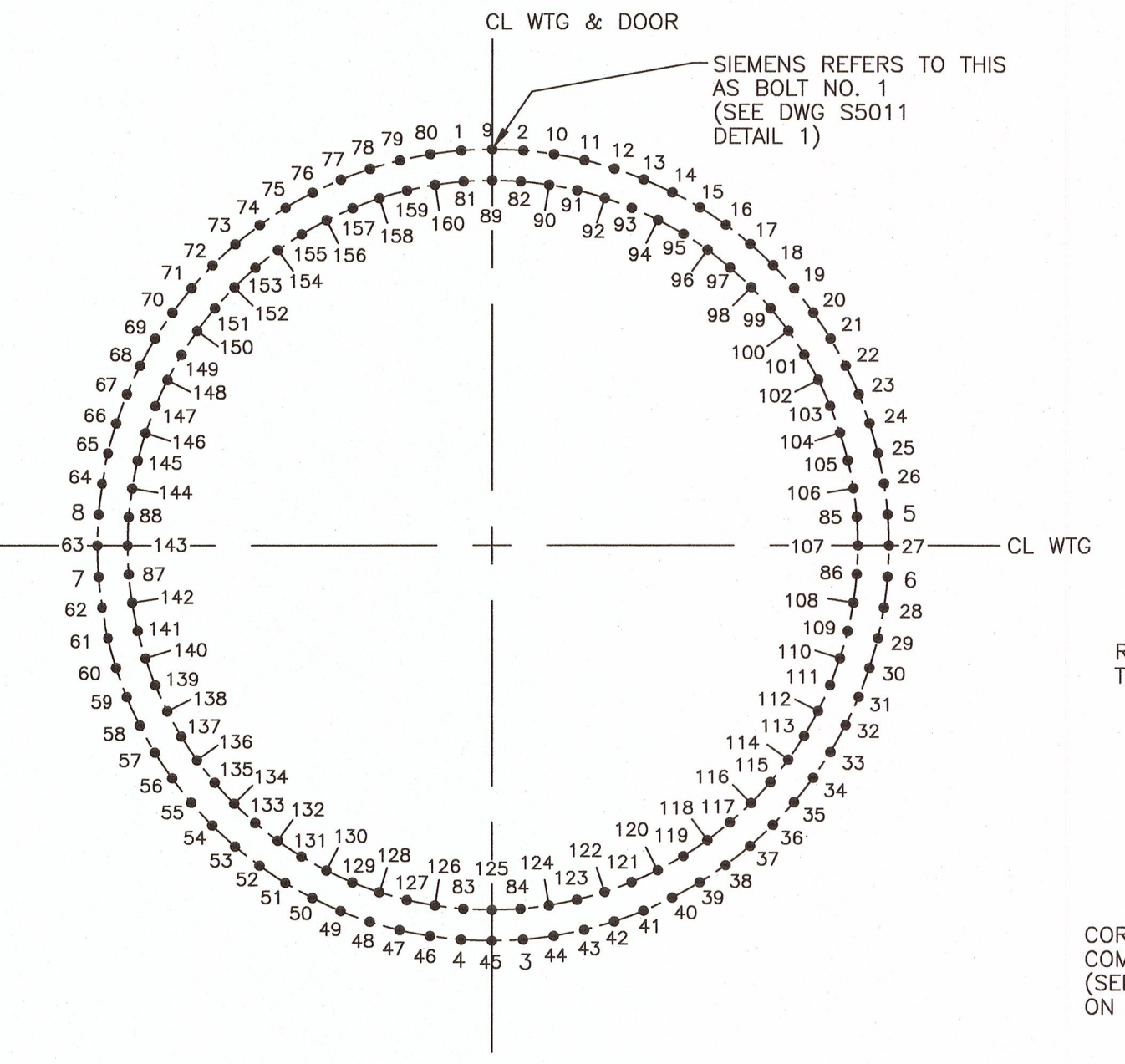
REFERENCE DOCUMENTS	
1. SIEMENS, "FOUNDATION LOADS SWT-3.0-101-DD", 79.5M HH.	

ABBREVIATIONS			
AB	ANCHOR BOLT	MAX	MAXIMUM
BC	BOLT CIRCLE	MIN	MINIMUM
CL	CENTER LINE	PL	PLATE
CLR	CLEAR	REINF	REINFORCING
CTR	CENTERS	REQD	REQUIRED
DET	DETAIL	SPCS	SPACES
DIM	DIMENSION	STD	STANDARD
DIA, Ø	DIAMETER	T&B	TOP AND BOTTOM
DWG	DRAWING	TOB EL	TOP OF BOLT ELEVATION
EA	EACH	TOC EL	TOP OF CONCRETE ELEVATION
EF	EACH FACE	TYP	TYPICAL
EL	ELEVATION	UNO	UNLESS NOTED OTHERWISE
EW	EACH WAY	WTG	WIND TURBINE GENERATOR
EQ	EQUAL		
FLG	FLANGE		
FS	FAR SIDE		
FDN	FOUNDATION		

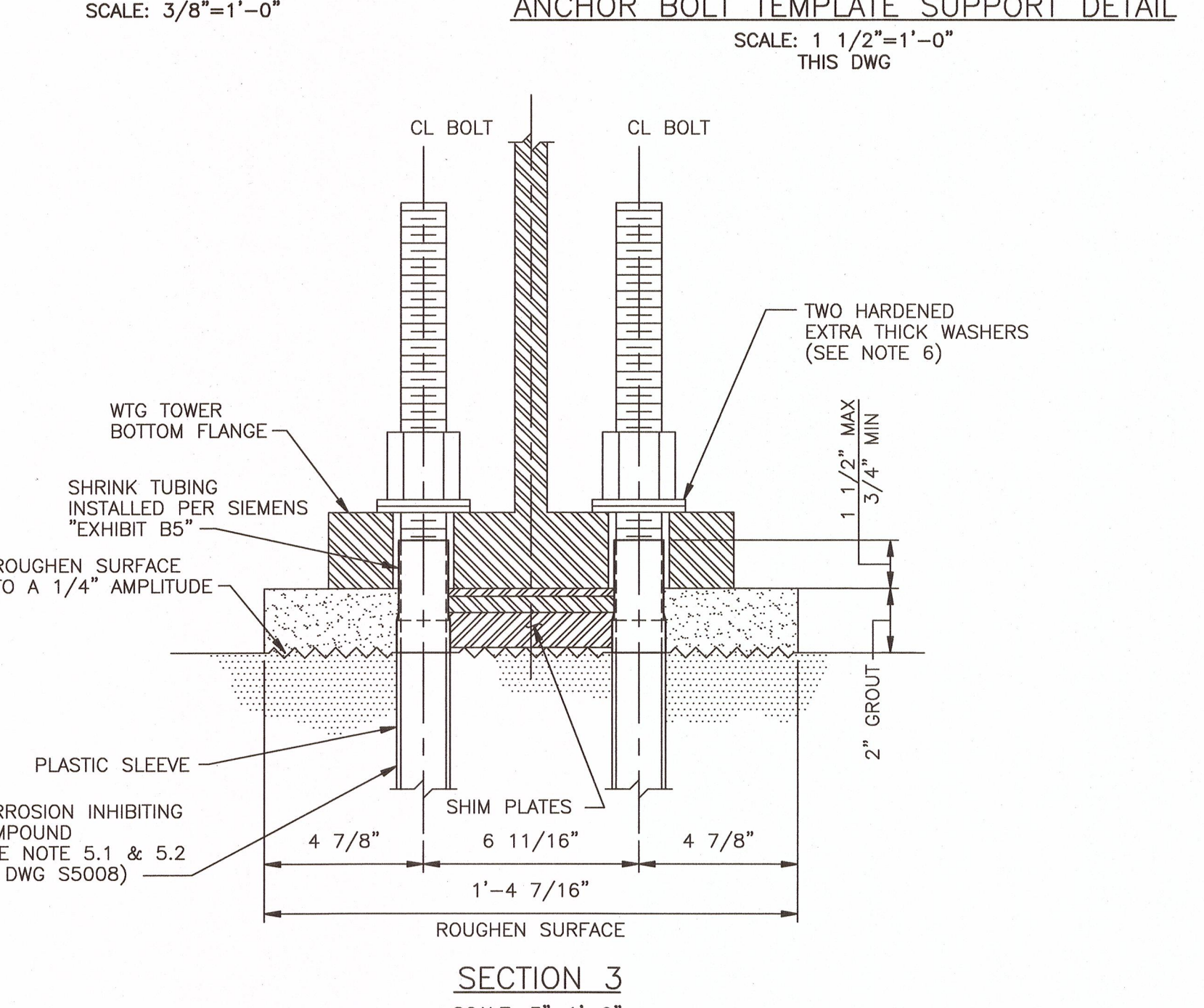
- NOTES
1. FOR SPECIFICATIONS AND GENERAL NOTES SEE DRAWING 1TGU-S5008.
 2. THE STANDARD FOUNDATION SHOWN ON THIS DRAWING IS FOR ALL WTG FOUNDATIONS (PHASE 1B).
 3. SEE ELECTRICAL DRAWINGS FOR GROUNDING SYSTEM AND ELECTRICAL CONDUIT LAYOUT.
 4. ALL CONCRETE WORK SHALL CONFORM TO ACI 318-08.
 5. THE BASE MAT SHALL BEAR ON FIRM TO HARD UNIFORM MATERIALS ON A LEVEL SURFACE. REFER TO NOTE 2.1 ON DRAWING S5008 FOR ACCEPTABLE BEARING MATERIALS. SUBGRADE MUST BE APPROVED BY THE PURCHASER'S REPRESENTATIVE.
 6. TWO HARDENED EXTRA THICK WASHERS SHALL BE INSTALLED AT EACH ANCHOR BOLT. WASHERS SHALL HAVE AN OD=3" AND ID=1 5/8" WITH NOMINAL THICKNESS OF 5/16". WASHERS SHALL BE FABRICATED FROM MATERIAL WITH A MIN YIELD STRENGTH OF Fy=50 KSI.



AB WTG-01
NO SCALE



BOLT TIGHTENING SEQUENCE (ONLY)
SCALE: 3/8"=1'-0"



SECTION 3
SCALE: 3"=1'-0"

NO.	DATE	REVISION DESCRIPTION	BY	APPROVED	NO.	DATE	REVISION DESCRIPTION	BY	APPROVED
1	2-9-12	CONSTRUCTION REVISIONS, W.O.#17480	NJC		0	03-09-11	ISSUED APPROVED FOR CONSTRUCTION	SPJ	SJD

BLACK & VEATCH CORPORATION
I HEREBY CERTIFY THAT THIS DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF NORTH DAKOTA.
SIGNED: RONALD E. GULLICKS, JR.
DATE: 3/19/12
MINNAPROJECT DRAWING NUMBER: 165233-1TGU-S5009

MINNESOTA POWER
BISON WIND GENERATING FACILITY
NEW SALEM, ND

BISON WIND ENERGY PROJECT PHASE 1B WIND TURBINE FOUNDATION PLAN, SECTIONS, & DETAILS		SHEET	REV. 1
		165233-1TGU-S5009	