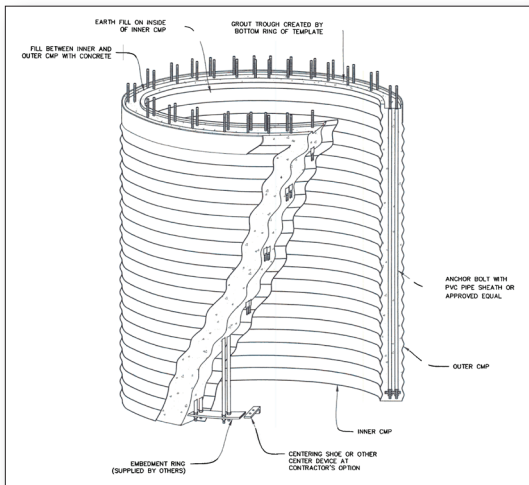


TENSIONLESS PIER FOUNDATION

Advantages

- Turbine sizes: 100 KW to 3 MW installed, with capacity for larger. Supports the largest turbines to date both in North America and internationally.
- Most efficient, **cost-effective** foundation solution – more than 6,000 installations
 - Typical and historical foundation savings in excess of 25% as compared to shallow foundations in various soil conditions
 - Most efficient utilization of time and resources
 - 3-6% reduction in total project development costs
- Well suited for varying soil conditions (See table A, page 2)
- Deep foundations are superior for seismically active zones, floodwater inundation, flood scour, frost depth, creeps and landslides
- Extended fatigue life characteristics due to post tensioning



MAP KEY	
PLOTS	
Red	= Tensionless Pier
Blue	= Rock Anchor
Black	= Soil Anchor
SHADES	
Green	= Good conditions
Blue	= Need further investigation
Red	= Not recommended



Site Conditions						
Site Conditions	Tensionless Pier Foundation (Deep)	Rock Anchor Foundation (Deep)	Soil Anchor Flight Auger (Deep)	Soil Anchor Auger Cast Pile (Deep)	Soil Anchor Helical (Deep)	Gravity Spread Foundation (Shallow)
Valley/Plains	B	Not Recommended	B	A	A	B
Hills	A	C	A	B	B	B
Mesa	A	A	D	Not Recommended	Not Recommended	B
Mountain	A	A	Not Recommended	Not Recommended	Not Recommended	C
Ground Conditions						
Hard Rock	A	A	Not Recommended	Not Recommended	Not Recommended	C
Soft Rock	A	A-	C	Not Recommended	D	B
Very Dense/Hard Soil	A	Not Recommended	A	D	C	B+
Soil with Boulders and Cobbles	A-	Not Recommended	Not Recommended	Not Recommended	Not Recommended	B
Soil Dry to Moist	A-	Not Recommended	A-	D	A	B
Silty Soil Dry to Moist	B+	Not Recommended	B+	B	A-	B-
Clay Soil Dry to Moist	A-	Not Recommended	C	D-	C	B
Granular Soil Shallow Ground Water	D	Not Recommended	D	B	B+	C+
Silty Soil Wet	D	Not Recommended	D	D	B	C+
Clay Soil Wet	C+	Not Recommended	D	D	B	B
Organic Soil	D	Not Recommended	C	B	B	C+
Combined Ground Conditions						
Soil Over Shallow Rock	A	A	Not Recommended	Not Recommended	Not Recommended	B
Soil Over Deep Rock	B+	C	D	Not Recommended	Not Recommended	B
Intermittent Soil and Rock	B+	A-	Not Recommended	Not Recommended	Not Recommended	B+
Landfill Over Rock	Not Recommended	A*	Not Recommended	Not Recommended	Not Recommended	D
Landfill Over Soil	Not Recommended	Not Recommended	Not Recommended	Not Recommended	A*	D
Mine Spoil	B	D	Not Recommended	Not Recommended	Not Recommended	C
Hazardous Conditions						
Seismic	A	A	A	A	A	D
Liquefaction	A	n/a	Not Recommended	A	A	Not Recommended
Flood Water Inundation	A	A	A	A	A	C
Flood Scour and Erosion	A	A	A	A	A	D
Storm Surge	A	A	A	A	A	D
Frost Depth	A	A	B+	B+	B+	C
Creeps and Landslide	C	D	D	C	C	Not Recommended
Water Sensitive Collapsible Soil (Loess)	A	Not Recommended	A	C	A	D
Remediation						
Stability/Tilt Pressure Grouting	B	B	B	B	B	C
Structural Concrete Addition Stability/Tilt	B	C	B	B	B	D
Anchor Addition Stability/Tilt	C	A	A	A	A	C
Corrosive Conditions	B	B	B	B	B	B
Longevity						
Fatigue Failure	A	B+	B	B	B	D
Post Tensioned by Horizontal Reinforcing	n/a	A	A	A	A	C

* Coupled with Compression Pipe Pile