1.0 SCOPE

This specification covers the procurement, design, manufacture, installation and certification of steel screw piles and shall be read in conjunction with the job specific Construction Drawings and the Piletech Pile Design Summary.

This document sets out default requirements. In some instances these requirements will be modified to suit particular projects. These modifications will be identified on either Drawings or within the Piletech Pile Design Summary. The order of precedence shall be:

1. Piletech Design Summary
2. Construction Drawings
3. Piletech Screw Pile Specification

2.0 ROLES AND RESPONSIBILITIES

The roles and responsibilities pertinent to this specification are summarised below:

2.1 Engineer (Clients Advisor/Representative)

The “Engineer” shall be responsible for providing sufficient information to the Pile Designer to allow the design of the screw piles to the required performance requirements. As a minimum, the information shall include the following:

- Design life, structure importance level and specific durability requirements.
- Providing piling RL with respect to current ground levels.
• Compression, tension and lateral structural loads at each individual pile location including all relevant raw loads or load combinations in accordance with NZS1170.
• Pile performance requirements, specifically the maximum permissible deflection or displacement of the pile under serviceability and ultimate limit state loading.
• Design documentation relevant to the screw pile design such as geotechnical report(s), architectural and structural drawings or structural design calculations.
• Identify any ground effects that may impart additional load on the screw pile foundations. This may include alterations in groundwater, ground settlement or seismic hazards.
• Any specific tolerance requirements outside of default tolerance of AS2159.
• Specific material and test requirements outside of the default requirements of this specification.
• Any specific requirement for pre-construction or during production load testing and acceptance criteria for testing.
• Identify the need for a peer review of the pile design.

The Engineer shall be responsible for undertaking the following:

a) Review of the Piling Contractor’s methodology for executing any pre-construction or during production load testing.
b) Review of the Piling Contractor’s methodology for executing the installation of the screw piles, ie the Pile Design Report.
c) Review of the Pile Designers screw pile design specifically the interface of the screw pile and superstructure design to ensure cohesive design parameters and properties.

2.2 Piling Contractor

The Piling Contractor shall be responsible for constructing and installing the screw piles in accordance with the Piletech Pile Design Summary, Construction Drawings and this Specification. The Piling Contractor shall be responsible for preparing a Producer Statement – Construction (PS-3).

The Piling Contractor shall be responsible for ensuring that all plant and equipment used for the project is safe and reliable, and capable of delivering the necessary torque for the screw pile design requirements.

The Piling Contractor shall be responsible for ensuring appropriate and trained personnel are provided for the management and installation of the screw piles.

The Piling Contractor shall commission the Pile Designer.

2.3 Pile Designer

The Pile Designer shall be a Chartered Professional Engineer (CPEng) trained and suitably experienced in screw pile design. The Pile Designer shall be responsible for the design of the screw pile system, including but not limited to:

a) Interpretation and inference of the geotechnical information available.
b) The geotechnical and structural design of each element of the screw pile in accordance with this specification (allowing for installation and design loads on the screw pile).
c) The design of the screw pile to superstructure/foundation connection (if within their design scope).
d) Durability of the screw pile elements.
e) The pile capacity and performance for all relevant load cases.
f) Determination of appropriate design references if requirements fall outside of this standard specification.

The Pile Designer shall also be responsible for:

a) Providing a Design Producer Statement (PS-1) by a Chartered Professional Engineer (CPEng) experienced in the design of screw pile foundations.
b) Producing a Pile Design Report (Piletech Pile Design Summary) outlining the assumptions and requirements of their design which shall accompany their Producer Statement - Design (PS-1).
c) Commission a peer reviewer for the pile design (PS-2) by a Chartered Professional Engineer (CPEng) experienced in the design of screw pile foundations, if required. It is the responsibility of the Pile Designer to ensure adequate experience of the peer reviewer in screw pile design and construction.
d) Monitor the screw pile installation and load testing at a frequency which shall be at the discretion of the Pile Designer.
e) Provide a Construction Review Producer Statement (PS-4).

3.0 STANDARD SPECIFICATIONS

This specification shall be read in conjunction with the following Standards, which are deemed to form part of this Specification. In the event of this Specification being at variance with any provision of these Standards, the requirements of this Specification and Construction Drawings shall take precedence. Reference to any Standard shall mean the latest edition of the standard and shall include any amendments thereto and any Standard in substitution thereof. All design, materials and workmanship shall comply with these Standards unless expressly noted otherwise.

Primary Standard:

• AS 2159 – Pile design and installation

Secondary Standards:

• AS 1163 – Structural steel hollow sections
• API5L – API Specification for line pipe 5L
• AS/NZS 1170 – Loadings standard
• AS/NZS 1554 – Welding of steel structures
• NZS 3101 – Concrete structures
• NZS 3404 – Steel structures
• NZS 3104 – Specification for concrete production
• NZS 3109 – Concrete construction
• AS/NZS 3678 – Structural steel – hot-rolled plates, floorplates and slabs
• AS/NZS 4671 – Steel reinforcing materials
• AS/NZS 2980 – Qualification of welders for fusion welding of steels
• NZS 4781 – Code of practice for safety in welding and cutting
• AS 4100 – Steel Structures
• AS 3978 – Non-destructive testing – Visual inspection of metal products and components
Other Standards or Guidelines may include:

- MBIE/NZGS Earthquake geotechnical engineering practice – Module 4
- NZ Building Code Verification Method B1/VM4
- IPENZ Practice Note 28: Screw piles: Guidelines for design, construction and installation
- NZTA bridge manual
- Eurocode 4

## 4.0 PILE DESIGN

### 4.1 General

Pile design shall comply primarily with AS 2159 and the New Zealand Building Code and all standards mentioned above.

The pile design shall take account of all applicable permanent or temporary loading conditions, such as but not limited to; gravity loads, seismic loads, tension loads, lateral loads, wind loads, snow loads, hydrostatic loads, torsional loads and negative skin friction effects combined in accordance with NZS 1170 Loading Standard.

An appropriate geotechnical reduction factor shall be determined using the risk assessment procedures of AS2159 unless determined otherwise by the Pile Designer.

### 4.2 Ground Conditions

Ground conditions are to be assessed using all available geotechnical information. Geotechnical conditions and assumptions are to be established considering recommendations from the geotechnical report as well as the Pile Designers past experience with screw piles in similar materials. The Pile Designer should draw upon past load testing where possible to support their geotechnical design assumptions.

### 4.3 Pile Shaft

The pile shaft shall be designed to suit the required axial and shear loads and moments for both in service loads and installation stresses.

The shaft shall be designed for the combined effects of axial loading and moment in accordance with AS 4100, or Eurocode 4 where concrete infill is present. Alternative analysis using software packages such as L-Pile may also be appropriate.

Consideration should be given to any allowed section loss due to corrosion.

Where applicable, consideration of the effects of eccentric loading or buckling mode of failure shall be considered.

### 4.4 Helices

The helix steel grade, diameter, thickness and pitch shall be calculated and designed to suit the applied loads, loading conditions and the specific geotechnical substrata. The helix shall be designed with consideration to both structural and geotechnical capacity to ensure both installation and the design loads can be achieved. In particular the soil pressure distribution due to helix flexure should be considered.
Geotechnical and structural design of the helix shall be in accordance with PJ Yttrup and Abramson “Ultimate Strength of Screw Piles in Sand” (Australians Geomechanics Society Vol 38, No1, March 2003) unless otherwise noted.

The helices shall be sized as to minimise the risk of spinning (where the penetration rate drops below 1 pitch per revolution causing a column of disturbed soil).

4.5 Joints (Splices)
Splices shall be designed to ensure the transfer of the required installation and permanent loads, which may include moments.

Joints can be welded, pinned or mechanical connections. Splices shall take account of potential corrosion effects for the design life of the structure. Water ingress and durability impacts shall be considered if pinned or mechanical connections are specified.

4.6 Welds
All welds associated with the screw pile, including the helix welds and splices, shall be designed as Structural Purpose (SP) category for Grade E48XX (grade 480MPa electrode) consumables suitable for seismic conditions as per the manufacturers recommendations. The size of weld should take account of potential corrosion effects for the design life of the structure.

The Pile Designer shall detail the type of weld (butt weld or fillet weld), the size of the weld (leg length for fillet welds) and the joint type in accordance with AS/NZS 1554.

4.7 Durability
The screw piles shall have sufficient durability to be able to withstand the design loads over a minimum of 50 years lifetime, unless specified otherwise by the Engineer, in accordance with the NZ Building Code. For unprotected steel, the Pile Designer shall consider the long term corrosion rate in accordance with either AS2159, NZS3404 or HERA Report No. 46 (October 1998).

If adopting AS2159 durability design, in the absence of detailed soil test data or a geotechnical engineer’s recommendation, a ‘Moderate’ exposure classification shall be taken for the exposure classification for steel piles in soil.

Where helices are founded in soils at depths where free oxygen is very low, the long term corrosion rate can be halved for helix design.

The Pile Designer may use any combination of surface coatings, sacrificial steel thickness and/or cathodic protection to ensure durability requirements are met. Where protective coatings are used, and the coating life cannot be ensured to be 50 years, the Pile Designer shall make an allowance for section loss after the coating is lost. Installation effects on surface coatings shall also be considered.

4.8 Pile to Foundation Connection
Where the pile to foundation connection falls within the design scope of the Pile Designer, the Pile Designer shall design the connection to transfer all axial loads, shear loads and moments. The Pile Designer may adopt either a pinned, partially fixed, or fully fixed pile head connection to the foundation. This would need to correspond to the requirements of the lateral design of the pile.
Where moment transfer is required between the pile and foundation, the Engineer [Structural] will need to confirm that the ground beams/superstructure can accommodate the moments as provided by the Pile Designer.

In general, the design of the connection shall be in accordance with NZS3101. Where there is reliance on concrete bond to CHS this shall be designed in accordance with Eurocode 4, Section 6.7.4.3.

Where steel annulus are used to transfer axial loads or moments these must be structurally designed to take account of the flexural strength of the steel plate.

Alternative connections such as shear studs, dowel bars or bolts may be used as detailed by the Pile Designer.

4.9 Pile Embedment Length
The design pile lengths shall be correlated and confirmed with respect to the available site specific geotechnical information including but not limited to liquefaction, strata suitability and necessary separation from softer layers that may affect pile performance or stiffness.

Piles shall be designed to overcome all potential failure modes such as cone pull-out, compressive or tensile bearing failure, compressive or tensile punching failure or the effects of a change in material properties resulting from seismic activity or changes in water table.

Pile grouping effects shall also be considered in the above analysis.

4.10 Pile Design Report and Certification
The Pile Designer shall produce a Pile Design Report (Piletech Pile Design Summary) detailing:

a) Design Loads
b) Durability design
c) Applicable standards and reference documents (ie Geotechnical report, drawings, etc.)
d) Geotechnical strength reduction factors
e) Load testing requirements
f) Founding stratum and design soil properties
g) Design methodology and how specific loads such as seismic, lateral and settlement are addressed
h) Estimated pile length
i) Pile splice details
j) Connection design between pile and foundation

This Pile Design Report shall accompany a Design Producer Statement (PS1) for submission to the Engineer and local authority.

4.11 Liability
The Pile Designer shall carry Professional Indemnity Insurance for the sum of $1,000,000.
5.0 MATERIALS

5.1 Pile Shaft
The pile shaft shall be manufactured from steel circular hollow section (CHS) and shall comply with API5L (minimum grade X52) and AS1163 (minimum grade C350) unless otherwise specified by the Pile Designer.

In addition to the tolerance requirements of the above specifications, CHS procured under this specification must have a wall thickness tolerance of ±5% of specified wall thickness.

In addition to the mechanical testing requirements of the above specifications, CHS procured under this specification must have tensile testing performed in both the transverse and longitudinal directions for pipes with outside diameter (D) greater than 168mm.

Testing and compliance certificates from the manufacturer of the CHS must be maintained on record and be presented upon request. Pipe used on the project must be able to be related back to a specific Heat number as detailed on a Mill Certificate.

5.2 Helices
Helices should be manufactured from steel plate compliant to AS/NZS 3678 with a minimum specified steel grade of 350MPa, and no greater than 500MPa.

5.3 Concrete
Infill concrete, where specified by the Pile Designer, shall have a default minimum 28 day strength of 30MPa unless detailed otherwise by the Pile Designer. Concrete shall be sourced from a certified batching plant.

Slump tests or cylinder samples may be required at the discretion of the Pile Designer.

5.4 Pile End Plugs or other plates
Pile toe end plugs or other plates should be manufactured from steel plate compliant to AS/NZS 3678 with a minimum specified steel grade of 350MPa.

5.5 Bolts, Studs, Pins
All bolts, studs or pins shall be compliant to AS/NZS 1111 and 1112 with a minimum specified steel grade 8.8.

5.6 Reinforcing Steel
Reinforcement bars shall be either Grade 300E or Grade 500E to AS/NZS 4671 as designated in the Construction Drawings or Pile Design Report. All reinforcing bars shall be deformed bar unless otherwise noted.

6.0 MANUFACTURE

6.1 Fabrication
Sections forming the pile shaft shall be of the sizes and wall thickness indicated on the Construction Drawings or in the Pile Design Report.

Where CHS is to be cut using a mechanical saw. Cuts are to be straight and at an angle as specified in the Construction Drawings or Pile Design Report ±1%. The height difference between any low and high point in the cut must not exceed 5mm.
Components must be manufactured such that they fit well together without excessive gapping. As a maximum, the gap must not exceed the root gap tolerance of the appropriate weld procedure for a given welded joint.

6.2 Welding

All welding required in the manufacture of the screw piles must be of the type and size specified in the Construction Drawings or Pile Design Report.

Welded joints shall be welded in accordance with the requirements of AS/NZS 1554. All joints shall:

   a) Be of the type and size specified in the Construction Drawings or Pile Design Report.
   b) Be performed using an appropriate Weld Procedure Specification (WPS) approved by the Pile Designer
   c) Be performed by a welder holding appropriate and current qualification certificates for the size and type of weld being undertaken in accordance with either AS/NZS 1554 or AS/NZS 2980
   d) Have all welds undertaken on permanent pile features (helices and spliced joints) inspected by an independant 3rd party weld inspector with appropriate qualifications required under AS/NZS 1554 and at a frequency and type as described in Section 8 of NZS 3404 – Part 1.

All weld inspection records must be compiled and provided to the Pile Designer at the completion of the project, including welder qualification records and 3rd party testing reports.

Welding consumables must be Grade E48XX (grade 480MPa electrode) consumables suitable for seismic conditions as per the manufacturers recommendations and as approved by the Pile Designer.

Prior to welding, the surfaces to be welded must be clean, free from grease or residue and cut and retained at the appropriate positions as required by the Weld Procedure Specification.

6.3 Helices

Helices are to be manufactured to the size and plate thickness provided in the Construction Drawings or Pile Design Report.

Helices are to be mechanically pressed by suitable means to ensure a true helix is formed which meets the following criteria:

   a) The pitch at the inside and outside of the helix must be equal (±4% of flange width but no greater than 10mm)
   b) The gradient of the spiral should be constant
   c) Any radial measurement across the helix should be perpendicular to the shaft (±4% of flange width but no greater than 10mm)

When multiple helices are welded to a shaft, the plates shall be spaced at a multiple of the helix pitch.
6.4 Handling and Storage
All operations such as handling, transporting, lifting and pitching of materials shall be carried out in such a manner as to prevent damage to the materials and/or their coatings.

CHS should be stored and stacked on suitable supports on firm ground, in a manner which will eliminate excessive handling stresses or other damage.

Any materials that result in damage or permanent stress must not be used in pile manufacture.

6.5 Material Test Reports
The Piling Contractor must ensure that all piles or pile components are fabricated from materials that have traceable records which indicate the origins, chemistry and mechanical properties of the steel or other materials.

Where required to prove compliance of material standards, material test certificates to the relevant Standards shall be provided prior to installation of production screw piles.

7.0 INSTALLATION
7.1 General
Pile installation shall generally comply with AS 2159.

7.2 Equipment
Installation equipment shall be selected that is capable of safely and accurately installing the designed pile in the given conditions. It shall be capable of applying installation torque equal to the torque required to meet the pile design loads and installation torque requirements and shall be capable of applying downward pressure and torque simultaneously.

The hydraulic torque pile driving head must have clockwise and anti-clockwise rotational capabilities. The hydraulic torque pile driver shall be a rotary type motor with equal forward and reverse torque capabilities.

The installation equipment must have a mechanism for continual monitoring of the torque being applied to the pile. The torque monitoring system shall be either part of or an independent device in-line with the installation unit. Hydraulic relationships to torque may be used, but must be calibrated with electronic torque transducers periodically to ensure pressure to torque relationship. Machine settings and torque heads must be kept the same as their calibrated state. Should machine settings or plant setup change, recalibration with an electronic torque transducer would be required.

Calibration of this device should be performed on a regular basis to ensure proper performance and consistent output results. Calibration records should be available for inspection by the Engineer or Pile Designer on request.

All equipment must be capable of safely delivering the design torque and lifting requirements. All securing hardware, pins, locking pins and other installation elements must be properly located, and capable of restraining all possible torsional, axial and bending moment forces applied during pile installation and compliant in all respects with the appropriate safely standards ruling construction plant and equipment within the workspace.
Operators should be appropriately trained in the installation of screw piles. If not using a torque transducer, operators must not restrict the full flow of hydraulic oil to the torque head.

7.3 Installation Tolerances
The Piling Contractor shall make all necessary provisions to the installation procedure, installation, initial positioning and inclination of piles as to achieve installation of the piles within the specified tolerances as per Section 7.2 of AS2159:2009 unless otherwise stated in the Construction Drawings or Pile Design Report or instruction from the Engineer. For **vertical** piles the tolerance shall be:

- Pile heads shall be within ±75mm in plan location shown on drawings
- Pile heads shall be within ±20mm of vertical level shown on drawings
- Piles shall not be more than 4% angle from vertical.

A reference system shall be utilised for each pile to monitor and determine pile location during installation and as a final ‘as built’ record.

If records show that piles have been installed outside of specified tolerances, the Piling Contractor shall provide the Pile Designer and Engineer with details of measures to be adopted to enable the piles to comply with the specification. Forcible correction of laterally displaced piles shall not be made, unless the Piling Contractor can demonstrate that the strength, integrity and durability performance of the pile will not be adversely affected.

7.4 Welding and Weld Testing
Welded joints shall be welded in accordance with the requirements of AS/NZS 1554. All joints shall:

a) Be of the type and size specified in the Construction Drawings or Pile Design Report.
b) Be performed using an appropriate Weld Procedure Specification (WPS) approved by the Pile Designer
c) Be performed by a welder holding appropriate and current qualification certificates for the size and type of weld being undertaken in accordance with either AS/NZS 1554 or AS/NZS 2980
d) Have the welds inspected by an independant 3rd party weld inspector with appropriate qualifications required under AS/NZS 1554 and at a frequency and type as described in Section 8 of NZS 3404 – Part 1.

All weld inspection records must be compiled and provided to the Pile Designer at the completion of the project, including welder qualification records and 3rd party testing reports.

Welding consumables must be Grade E48XX (grade 480MPa electrode) consumables suitable for seismic conditions as per the manufacturers recommendations and as approved by the Pile Designer.

Prior to welding, the surfaces to be welded must be clean, free from grease or residue and cut and retained at the appropriate positions as required by the Weld Procedure Specification.
7.5 Pile Records
Pile installation records shall include, but not be limited to, the following:

- Contract Name/Project Name/Client Name
- Project Location
- Pile Reference Number
- Pile description (shaft and helix size)
- Pile load details
- Installation torque requirements (or installation pressures as appropriate)
- Length and embedment of pile
- Installation torques at set intervals (usually 0.5m) as agreed with the Pile Designer
- Installation equipment used (eg Excavator and torque head used)
- Date of installation
- Piling Operator
- Installed position relative to design position and inclination of pile
- Specific operators notes, eg. if pile is not on pitch (vertical displacement per revolution of pile is less than helix gate)

7.6 Penetration Rate
The rate of penetration should be monitored throughout the installation of the pile. Where a pile is not penetrating at a rate close to one helix pitch per revolution of the pile, the Pile Designer shall be notified. The depths at which this occurs should be noted on the installation records.

7.7 Concrete Placement
Where applicable, the pile shaft shall be filled with concrete to the strength and requirements as described in the Construction Drawings or Pile Design Report. Concrete shall in general be supplied and installed in accordance with NZS 3109. Concrete shall be delivered using either a line or a boom pump, but can be delivered directly from the truck where required.

Prior to concrete being poured in a pile, the pile must be checked to ensure no water or debris are in the base of the pile shaft. If water or debris is in the pile shaft this shall be removed prior to pouring concrete. The Pile Designer should be notified if any water has entered the pile shaft during construction.

Concrete dockets shall be retained and presented to the Pile Designer / Engineer as evidence of conformance to the specification.

Where concrete testing is required, samples shall be taken at site from the back of the truck. Sampling from the batching plant may be acceptable at the discretion of the Pile Designer. All sampling/testing is to be undertaken by a qualified technician provided by the Concrete Supplier.

7.8 Reinforcing Steel Placement
Where applicable, reinforcing steel shall be placed in accordance with the details on the Construction Drawings or Pile Design Report. Reinforcing steel shall be installed in accordance with the requirements of NZS 3109.
Critical dimensions such as spacing between bars, edge distance of bars to CHS and upstand of bars into foundation must be adhered to with positional tolerances of ±10mm.

Steel reinforcing must be clean and free of grease or dirt prior to placement.

Steel certificates should be obtained from the reinforcing supplier as evidence of the steel grade and quality. These should be provided to the Pile Designer and Engineer.

7.9 Certification
The Piling Contractor shall provide a Construction Producer Statement (PS-3). Appropriate evidence of material certificates, installation records and inspections must accompany the PS-3 and be presented to the Pile Designer and Engineer.

The Pile Designer shall review the construction documentation for conformance with the Pile Design, Construction Drawings and Specification and shall provide a Construction Review Producer Statement (PS-4). Where items of the construction are found to be unsatisfactory they are to be rectified to the satisfaction of the Pile Designer and/or Engineer prior to issuing the PS-4.

7.10 Supervision / Inspections
The Piling Contractor shall provide the opportunity for the Pile Designer or Engineer to witness or inspect any element of work as it progresses. Particular items such as load testing or concrete pouring shall be notified to the Pile Designer.

7.11 Installation Criteria / Signoff
Pile installation criteria shall be specified by the Pile Designer. All piles upon installation shall be referred to the Pile Designer for conformance with their design and ‘sign off’ of the pile. Only the Pile Designer, or delegate of, shall approve piles as conforming. Only piles approved as conforming shall be progressed to concrete filling and handover to the client.

7.12 Unforseeable Ground Conditions
Where ground conditions differ from that expected from the Geotechnical Report or any other relevant geotechnical information provided, the Piling Contractor shall immediately provide notice of the ground conditions to the Pile Designer. The Piling Contractor may also need to notify the Engineer if a Variation or Extension of Time were to be sought for the unforeseeable ground condition.

7.13 Handling and Storage
All operations such as handling, transporting, lifting and pitching of materials shall be carried out in such a manner as to prevent damage to the materials and/or their coatings.

CHS should be stored and stacked on suitable supports on firm ground, in a manner which will eliminate excessive handling stresses or other damage.

Any materials that result in damage or permanent stress must not be used in pile manufacture.

8.0 LOAD TESTING
Load tests may be called for by the Pile Designer to verify design assumptions and pile performance or to validate the use of less conservative geotechnical reduction factors. The
Pile Designer shall provide detail on the maximum test loads and sequence of loads to be tested to the Piling Contractor to set up and perform the test(s).

8.1 Procedure
The test procedure shall be in general accordance with AS 2159, Section 8. The piling Contractor shall provide a method statement for the load testing to the Pile Designer for approval. The method statement shall contain the following information:

a) The programme of testing, detailing the timing and sequence of each load test
b) The general arrangement of testing equipment.
c) Details of the measuring equipment at the head and toe of the pile.
d) Confirmation of the available load and stroke of the testing apparatus.

The test shall use load cells where possible, but may use hydraulic pressure comparisons at the discretion of the Pile Designer. If hydraulic pressure is to be used then it shall be done so with a calibrated gauge and system.

8.2 Test Acceptance
Test acceptance, unless otherwise documented in the Construction Drawings or Pile Design Report, shall be as per AS 2159. The test results shall be forwarded to the Pile Designer and the Engineer for their approval of the test results.

9.0 PROTECTION OF EXISTING SERVICES/STRUCTURES
The Piling Contractor shall take all care to ensure that no damage is caused by any of the piling works to any existing structure, property or service.

10.0 COMPLETION
10.1 General
On completion of the piling works, the Piling Contractor shall leave the site and the Contract Works clean and ready for immediate use by following trades. The Piling Contractor shall remove all offcuts and debris.

10.2 Certification
The Piling Contractor shall provide the Engineer with a full suite of applicable producer statements including Design Producer Statement, Design Review Producer Statement, Construction Producer Statement and Construction Review Producer Statement.