



mainroads
WESTERN AUSTRALIA

SPECIFICATION 812

BORED PILES (WITHOUT PERMANENT CASING)

Copyright MAIN ROADS Western Australia

REVISION REGISTER			
Clause Number	Description of Revision	Authorised By	Issue Date
812.04	Notice Period for the Release of Hold Points revised in terms of Business Days.	SCO/SDSE	19/10/2020
812.07	'Each pile' changed to 'every other pile or every 15 m ³ of concrete whichever comes first'	SDSE	11/05/2018
812.02	Redundant AS 1579, AS/NZS 3679.1, AS 3679.2 and Specification 302 removed	SDSE	05/09/2017
812.07	Self-compacting concrete added Permission for using admixtures deleted 'Every truck' changed to 'each pile' 'AS 1012' changed to 'AS 1012.3.5' Additional concrete samples added Measured slump values deleted Slump flow requirements added		
812.37	Clause 1 – rephrased Clause 2 added for number of piles required for testing		
812.38	Testing requirement amended		
Whole document	Reformatted	SCO	26/04/2017
Whole document	Complete review and update	A/SDSE	17/03/2015
812.02	Deleted reference to AS 2203.1:1990 and AS/NZS 1553.1:1995 Inserted references to Welding Consumables Standards AS/NZS 17632:2006, 17634:2006, 18276:2006 and 4855:2007	SDSE	14/08/2009
Whole document	Complete revision of Issue 1.0 to new format	MCP	01/08/2006

CONTENTS

Clause	Page No
GENERAL	5
812.01 Scope.....	5
812.02 References	5
812.03 Competency of Piling Contractor	6
812.04 Pile Installation Plan	6
812.05 NOT USED	7
MATERIALS	7
812.06 General	7
812.07 Concrete	7
812.08 Reinforcement	8
812.09 Steel Pile Casings.....	8
812.10 Drilling Fluid	9
812.11 – 812.24 NOT USED	9
OPERATIONS	9
812.25 General	10
812.26 Transportation, Handling and Storage of Steel Casings.....	10
812.27 Set Out.....	10
812.28 Boring and Excavation.....	10
812.29 Cleaning and Inspection of Borehole.....	11
812.30 Placement of Reinforcement	12
812.31 Concreting	12
812.32 Casing Extraction.....	13
812.33 Pile Cut-Off	13
812.34 Pile Installation Records	13
812.35 Tolerances on Piles	13
PILE TESTING	14
812.36 General	14
812.37 Integrity Testing	14
812.38 Pile Dynamic Load Testing	15
812.39 Static Load Testing	15
812.40 – 812.80 NOT USED	15
AS BUILT AND HANDOVER REQUIREMENTS	15
812.81 – 812.90 NOT USED	15
CONTRACT SPECIFIC REQUIREMENTS	15
812.91 – 812.99 NOT USED	15

ANNEXURE 812A	16
Pile Installation Record.....	16

SPECIFICATION 812
BORED PILES
(WITHOUT PERMANENT CASING)

GENERAL

812.01 SCOPE

1. The work under this specification consists of non-displacement cast in situ bored reinforced concrete piles without permanent casing.
2. This Specification does not cover grouted piles.

812.02 REFERENCES

1. Australian Standards, MAIN ROADS Western Australia Standards and MAIN ROADS Western Australia Test Methods are referred to in abbreviated form (e.g. AS 1234, MRS 67-08-43 or WA 123). For convenience, the full titles are given below:

Australian Standards

AS 1012	Methods of Testing Concrete
AS 1012.3.5	Methods of testing concrete - Determination of properties related to the consistency of concrete - Slump flow, T500 and J-ring test
AS 1478	Chemical Admixtures for Concrete, Mortar and Grout
AS 2159	Piling - Design and Installation
AS 2177	Non-destructive Testing - Radiography of Welded Butt Joints in Metal
AS 2207	Non-destructive Testing - Ultrasonic Testing of Fusion Welded Joints in Carbon and Low Alloy Steel
AS 3582	Supplementary Cementitious Materials
AS 5100	Bridge Design

Australian/New Zealand Standards

AS/NZS 1554.1	Structural Steel Welding - Welding of Steel Structures
AS/NZS 3678	Structural Steel - Hot-rolled Plates, Floorplates and Slabs
AS/NZS 4855	Welding Consumables – Covered Electrodes for Manual Metal Arc Welding of Non-alloy and Fine Grain Steels - Classification

- AS/NZS ISO 17632 Welding Consumables – Tubular Cored Electrodes for Gas Shielded and Non-gas Shielded Metal Arc Welding of Non-alloy and Fine Grain Steels – Classification
- AS/NZS ISO 17634 Welding Consumables – Tubular Cored Electrodes for Gas Shielded Metal Arc Welding of Creep-Resisting Steels - Classification
- AS/NZS ISO 18276 Welding Consumables – Tubular Cored Electrodes for Gas Shielded and Non-gas Shielded Metal Arc Welding of High-Strength Steels – Classification

MAIN ROADS Specifications

Specification 801 EXCAVATION AND BACKFILL FOR STRUCTURES

Specification 820 CONCRETE FOR STRUCTURES

Specification 822 STEEL REINFORCEMENT

Other References

- ASTM D4381 Standard Test Method for Sand Content by Volume of Bentonitic Slurries
- ASTM D5891 Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners
- ASTM D6910 Standard Test Method for Marsh Funnel Viscosity of Clay Construction Slurries

812.03 COMPETENCY OF PILING CONTRACTOR

- 1. Prior to award of piling contract, the Piling Contractor shall submit to the Principal or delegated authority evidence of past projects in the construction of bored piles. Reference to successful completion of projects with similar pile sizes in similar soil conditions using the proposed equipment and procedures should be included. **Past projects**
- 2. The Piling Contractor shall provide evidence that all piling operators on the project have adequate training in producing good quality bored piles in similar ground conditions to those anticipated at the site. **Operator competency**
- 3. The Piling Contractor shall provide for the duration of the piling operations, a full-time supervisor with a minimum of 10-year experience in the construction of bored piles. **Supervision**

812.04 PILE INSTALLATION PLAN

- 1. **At least 20 business days prior to commencing installation of piles, the Piling Contractor must supply to the Principal or delegated authority full details of the proposed installation plan together with a certification by an experienced engineer for approval to commence.** **HOLD POINT**

2. The installation plan shall include as a minimum but not limited to the following items:
 - a. Methodology of drilling, controlling and testing.
 - b. Material including bore holes support and mix design for concrete.
 - c. Mix designs for concrete to be used on the project, including aggregate grading curve, slump loss vs. time curves and strength development vs. time curves for mixes.
 - d. Methodology of concrete placement and process in place to avoid concrete contamination during its placement.
 - e. The frequency of testing and the method and procedure of sampling of drilling fluid.
 - f. A plan of sequence of pile installation so as to ensure adequate concrete strength is obtained before commencing drilling for adjacent piles.
 - g. Proposed recording forms to be used during construction and testing.
 - h. Contingency plans for equipment failures during drilling, reinforcement installation or concrete operations, or the interrupted construction process.
 - i. Methodology to ensure pile and pile reinforcement location and battering tolerance are met.
 - j. Details of the proposed integrity test and load test methods, including a method statement of how the test will be carried out and details of the record sheets proposed for monitoring results.
 - k. Contingency plans for remediation and for piles deeper than design drawings.

812.05 NOT USED

MATERIALS

812.06 GENERAL

1. Materials used in the construction of bored piles, dimensions and details of the piles must be in accordance with the requirements shown on the drawings.

812.07 CONCRETE

Concrete

1. Except as modified below, concrete used for piling shall be self-compacting in accordance with Specification 820 CONCRETE FOR STRUCTURES, which specifies minimum strength and other requirements for the concrete classes as nominated in the drawings to achieve the required durability. For bored piles the provisions of this clause override any conflicting requirements of Specification 820.

2. The Piling Contractor shall ensure that the proposed concrete mix design suits the proposed method of construction.
3. Mix design shall be submitted to the Principal or delegated authority in accordance with Clause 812.04.2.c) for approval.
4. The Piling Contractor shall arrange to have a trial mix in the presence of the Principal or delegated authority prior to the commencement of fieldwork. The trial mix shall be carried out in accordance to the design mix submitted to the Principal or delegated authority.
5. Concrete samples must be obtained from every other pile or every 15 m³ of concrete whichever comes first at the time of discharging into the pile shaft or the pump hopper, and must be tested for consistency and temperature in accordance with AS 1012.3.5. Additional samples may be required at the discretion of the Principal or delegated authority at times corresponding to reinforcement cage installation.
6. The slump flow for self-compacting concrete shall be in accordance with Specification 820 CONCRETE FOR STRUCTURES.
7. Concrete samples for strength testing must be taken from the discharge into the pile shaft or concrete pump hopper and tested in accordance with AS1012.
8. If the concrete samples as tested fail to satisfy the criteria as prescribed in the specifications or standards, the piles shall be rejected and the Piling Contractor shall undertake all necessary remedy to the approval of the Principal or delegated authority at no cost to the Principal.

812.08 REINFORCEMENT

Reinforcement

1. Reinforcement must be in accordance with Specification 822 STEEL REINFORCEMENT.

812.09 STEEL PILE CASINGS

Steel Pile Casings

1. Where a temporary steel casing is required, it shall be designed, supplied and fabricated by the Piling Contractor.
2. The internal diameter of the casing shall be not less than the specified pile diameter and the straightness tolerance of any portion, and of the completed length, shall be 1/100 of the length.
3. The dimensions and quality of the casing shall be adequate to withstand all possible stresses which it will subject to during handling and construction, including preventing concrete within the pile shaft from squeezing out or soil squeezing in and displacing each other.
4. The casings shall be fabricated in lengths that allow the casings to be extended should ground conditions dictate.
5. The casings shall be of uniform cross section throughout and free from internal projection and encrusted concrete which might prevent the proper formation of piles. The joints of casings shall be reasonably watertight.

6. If the temporary casing is damaged during the construction, and as a result the proper formation of the pile is prevented, such a casing shall be withdrawn before concrete is placed, and necessary remedy works shall be carried out to the approval of the Principal or delegated authority to continue the construction.

812.10 DRILLING FLUID

Drilling Fluid

1. The proposed drilling fluid mix must be included in the pile installation plan and submitted to the Principal or delegated authority as required by Clause 812.04.
2. Unless specified otherwise by the manufacturer, bentonite slurry properties shall comply with follows:
 - a. The density measured using a mud balance shall be about 1.12 g/ml.
 - b. The Marsh viscosity (946ml) tested in accordance with ASTM D6910 shall be 40±10 seconds.
 - c. pH value measured using a pH meter shall be between 8 to 11 inclusive.
 - d. The sand content tested in accordance with ASTM D4381 shall be less than 5%.
 - e. Fluid loss tested in accordance with ASTM D5891 shall be less than 18 ml/30 mins.
3. Properties of drilling fluid other than bentonite shall be submitted to the Principal or delegated authority for approval.
4. The frequency of testing and the method and procedure of sampling shall be proposed by the Piling Contractor and submitted to the Principal or delegated authority together with the pile installation plan for approval as required by Clause 812.04. As a minimum, the drilling fluid shall be tested for:
 - a. Fresh drilling fluid;
 - b. Drilling fluid taken from the bottom of bore hole before concreting;
 - c. Circulated drilling fluid after desanding; and
 - d. Drilling fluid left in the bore holes for more than 12 hours.
5. The circulated drilling fluid may be re used given that the tested properties fall within the range as specified above.

812.11 – 812.24 NOT USED

OPERATIONS

812.25 GENERAL

1. An adequate site surface must be provided as a safe working platform for piling equipment.
2. Piles must be constructed in accordance with the installation procedure for non-displacement piles in AS 2159.
3. Piles shall be installed using appropriate boring and installation equipment capable of producing the required outcome. All necessary installation equipment shall be available on site prior to commencement of piling.
4. The Contractor's attention is drawn to the varied nature of the foundation material as indicated by the borehole log drawings and the potential to intersect ground water during the installation of the piles.
5. Ensure that installation of piles is timed so that other construction activities will not occur within vicinity that could dislodge or damage the concrete of the piles prior to the pile concrete strength reaching 20MPa.

Installation

812.26 TRANSPORTATION, HANDLING AND STORAGE OF STEEL CASINGS

Transport, Handling and Storage

1. The methods of transport, handling and storage shall be such as to prevent any damage to the steel pile casings, such as the result of impact, deflection or the application of load.
2. Any steel casings damaged or distorted in excess of the specified tolerances prior to or during pile installation shall be replaced at no cost to the Principal.

812.27 SET OUT

Set Out

1. All piles need to be set out in accordance with design requirements and appropriate procedures shall be taken to protect adjacent services, structures and piles.
2. Check the horizontal position and verticality/batter angle of the piling / drilling rig prior to the construction of each pile.
3. The piling Contractor shall sequence the works in such a way as to provide sufficient distance between piles to ensure that adjacent piles are not damaged during drilling and construction of subsequent piles.
4. Locate construction equipment at sufficient distance from the pile being drilled and from recently constructed piles to avoid any displacement of the concrete column caused by the load of the equipment.
5. **Confirm set out of all piles before commencing installation.**

HOLD POINT

812.28 BORING AND EXCAVATION

1. The piling rig must be capable of installing piles to the depth as shown on the approved drawings with provision for contingencies.
2. Boring and excavation shall be such as to keep over-break to a minimum.

3. The side of all boreholes shall be kept intact and no loose material shall be permitted to fall into the bottom of the boreholes.
4. The borehole shall be filled with drilling fluid to a level to sufficiently stabilise the borehole. If drilling fluid alone is not sufficient to prevent the ground water from intrusion or the borehole side walls from collapse, a steel casing of appropriate size and length shall be used in conjunction with the drilling fluid to support the side of the borehole.
5. If a temporary casing is required to stabilise the borehole, it shall be extended beyond the unstable strata for one meter or more to prevent the inflow of soil and the formation of cavities in the surrounding ground.
6. If a temporary casing is damaged during installation in a manner which prevents the proper formation of the pile, such a casing shall be withdrawn from the borehole and repaired if necessary, or other measure to be taken to the approval of the Principal or the delegated authority to continue the construction of the pile.
7. The pile toe shall be founded at the levels shown on the Drawings.
8. During the installation process, if any of the following scenarios occur, the Principal or the delegated authority shall determine the need for further deepening of the pile shaft:
 - a. The pile excavation refuses at a level above the specified toe level;
 - b. Where the distance between the bottom of the steel casing which is going to be left in place and the toe level is less than the minimum socked length shown on the drawings;
 - c. The ground condition varies from that assumed at design stage or as shown in borehole logs completed during geotechnical investigation.
9. **If additional excavation is ordered to continue, the Principal or the delegated authority shall decide when the founding level is satisfactory, and the pile shaft can be prepared for concreting.**

HOLD POINT

812.29 CLEANING AND INSPECTION OF BOREHOLE

1. Upon completion of boring, the pile holes shall be cleaned of all loose, disturbed soil and sediment soil to expose a firm base of undisturbed material using a suitable and effective method to be approved by the Principal or the delegated authority.
2. **Where practicable, all boreholes shall be inspected for their full length prior to concreting to ensure the cleaning has been properly carried out; the sides are able to remain stable during subsequent installation of reinforcement cage and concreting operations; and the verticality and position of the boreholes meet the specified tolerances.**
3. The Piling Contractor shall provide all necessary apparatus for the inspection to be carried out safely.

HOLD POINT

812.30 PLACEMENT OF REINFORCEMENT

1. **The reinforcement cage shall be free from oil, rust or debris and straight. It shall not be placed until inspected and accepted by the Principal or delegated authority.**
2. Reinforcement must be carefully aligned as shown on the drawings to allow the satisfactory construction of the pile caps.
3. Spacer skids with contact width of not less than 35mm must be used for the installation of reinforcement to ensure maintenance of cover requirements as specified on the drawings. Not less than 4 spacer skids shall be provided evenly around the perimeter of the pile at a vertical spacing of not less than 2 meters.
4. Reinforcement cages and spacers shall be sufficiently robust to withstand the forces during lifting, placing of the concrete and extraction of temporary casings.
5. The cage shall be kept vertical or at the required batter angle (if applicable) during installation.
6. In addition to any weld details shown in the approved drawings, welding of reinforcement is required to form a robust cage. Each ligature must be connected to at least one main bar, and each main bar to at least one ligature to form electrical connectivity to allow for future cathodic protection.
7. If the reinforcement cage cannot be placed to the specified depth, the cage must be removed and the pile re-drilled.

HOLD POINT

812.31 CONCRETING

1. Immediately after the completion of boring, approval to commence concreting shall be sought and, when this has been obtained, concreting shall start forthwith.
2. Placing and compaction of concrete shall be in accordance with Specification 820 CONCRETE FOR STRUCTURES.
3. Concreting must be continuous to achieve monolith from the top to the base of the pile, without segregation and free of entrapped debris.
4. Concreting shall be continued to 300 mm above the designed pile cut off level to ensure any contaminated concrete is removed. A temporary casing may be required to achieve the concreting level.
5. Any ground water must be displaced during concreting operations.
6. The volume of concrete used in the pile shall be determined to an accuracy of 5% and recorded. The measured volume of concrete placed in any pile shall be not less than 105% of the nominal volume of the pile.

Concreting

7. If the recorded volume of the concrete placed in the borehole indicates a possible necking, the Piling Contractor shall propose and carry out appropriate tests and measures to demonstrate the adequacy of the pile, or appropriate remedy work to the approval of the Principal or delegated authority.

812.32 CASING EXTRACTION

1. Withdraw of any temporary casing shall be carried out whilst the concrete still fluid and has a slump close to that while concreting so that no concrete is lifted.
2. When casings are withdrawn as concreting proceeds, a sufficient head of concrete shall be maintained to prevent the entry of ground water. Concrete shall be placed continuously as the casing is extracted until the desired head of concrete is obtained.
3. Temporary casings may be left in place provided that the designed geotechnical capacity (i.e. provided by bond between rock and concrete) is not compromised in any way by the steel casings left in place and the minimum cover to reinforcement specified on the drawings is satisfied.
4. If a temporary casing is left in place, any lifting lugs or other attachments shall be removed and any gaps between the casing and the sides of excavations shall be filled with sand which shall be compacted by flooding.

812.33 PILE CUT-OFF

1. The Piling Contractor shall trim the tops of pile to elevations indicated on the design drawings prior to construction of the pile caps. All contaminated and weak concrete or laitance must be removed to expose sound concrete over the full cross sectional area of the pile during trimming.
2. Piles must not be trimmed earlier than 24 hours after casting the concrete.

812.34 PILE INSTALLATION RECORDS

1. The Piling Contractor must maintain accurate records for each pile constructed. These records must include data shown at Annexure 812A.
2. The records for each pile must be provided to the Principal or delegated authority within 24 hours of the completion of the pile.

Annexure 812A

812.35 TOLERANCES ON PILES

Tolerances

1. Piles shall comply with the following tolerances:
 - a. Variation from specified position in plan unless otherwise specified: $\pm 75\text{mm}$
 - b. Deviation of pier piles from pier centreline: $\pm 50\text{mm}$
 - c. Variation from vertical/design batter in a 3 m template unless otherwise specified $\pm 30\text{mm}$

812.38 PILE DYNAMIC LOAD TESTING

1. The Piling Contractor must carry out pile dynamic load testing and analysis on all piles nominated on the drawings or by the Principal or delegated authority on site. Pile dynamic load testing will be carried out on a minimum of 10% of all bored piles, but not less than 2 per bridge.
2. Additional dynamic load testing must also be carried out on piles in the event that pile toe levels vary by more than 2 metres from the test pile.
3. Pile dynamic testing and reporting shall be carried out in accordance with AS 2159 including Appendix B – High Strain Dynamic Pile Testing
4. The Piling Contractor shall design and construct pile head extension required to prevent damage to the pile. Pile dynamic testing shall be carried out after the pile concrete has gained sufficient strength to prevent damage under the required hammer impact, and not less than 20 MPa unless otherwise specified on the drawings.
5. The Piling Contractor shall provide all the appropriate pile driving equipment including hammer, crane and pile driving rig, and all instrumentation, hardware and software to carry out the dynamic testing.
6. The Piling Contractor shall be responsible for the testing data analysis (and calibration with static load tests if applicable) and demonstrate the maximum mobilised shaft and end bearing resistance.
7. The Piling Contractor shall include details of all the equipment and instruments applied for the test including hammer mass and rated energy in his method statement as required by Clause 812.04.2 j).

PDA Testing

812.39 STATIC LOAD TESTING

1. Static load testing and reporting shall be carried out on the piles as nominated on the drawings or by the Principal or delegated authority on site.
2. Static load testing and reporting shall be carried out in accordance with AS 2159 including Appendix A – Static Load Test, unless otherwise specified.

Static Load Testing

812.40 – 812.80 NOT USED

AS BUILT AND HANDOVER REQUIREMENTS

812.81 – 812.90 NOT USED

CONTRACT SPECIFIC REQUIREMENTS

812.91 – 812.99 NOT USED

ANNEXURE 812A

PILE INSTALLATION RECORD

STRUCTURE DATE

POSITION IN STRUCTURE CONTRACT NO

PILE NO CONTRACTOR

GROUND R L

EQUIPMENT USED

.....

EXCAVATION LOG

Depth (m)	Material Description	Depth (m)	Material Description	Depth (m)	Material Description
0.250		5.250		10.250	
0.500		5.500		10.500	
0.750		5.750		10.750	
1.000		6.000		11.000	
1.250		6.250		11.250	
1.500		6.500		11.500	
1.750		6.750		11.750	
2.000		7.000		12.000	
2.250		7.250		12.250	
2.500		7.500		12.500	
2.750		7.750		12.750	
3.000		8.000		13.000	
3.250		8.250		13.250	
3.500		8.500		13.500	
3.750		8.750		13.750	

4.000		9.000		14.000	
4.250		9.250		14.250	
4.500		9.500		14.500	
4.750		9.750		14.750	
5.000		10.000		15.000	

CASING DETAIL TOP R L VOLUME OF USED CONCRETE

BOTTOM R L.....

PILE TOE R L

DETAILS FOR PAYMENT

.....LENGTH OF CASING

.....LENGTH BETWEEN TOE AND EXISTING GROUND LEVEL

.....
SIGNED BY CONTRACTOR

.....
SIGNED BY MAIN ROADS

MAIN ROADS WESTERN AUSTRALIA	
FILE NO	DRAWING NUMBER

GUIDANCE NOTES

FOR REFERENCE ONLY – DELETE GUIDANCE NOTES FROM FINAL DOCUMENT

1. All edits to downloaded Specifications shall be made using *Track Changes*, to clearly show added/deleted text.
 2. If **all** information relating to a clause is deleted, the clause number should be retained and the words “**NOT USED**” should be inserted.
 3. The proposed documents with tracked changes shall be submitted to the Project Manager for review, prior to printing the final batch of documents. When this final printing is carried out, the tracked changes option is to be turned off.
 4. Before printing accept all changes in the document, turn off *Track Changes* and refresh the Table of Contents.
 5. The Custodian of this specification is the Structures Design and Standards Engineer.
-

NONE AT THIS TIME

CONTRACT SPECIFIC REQUIREMENTS

The following clauses are to be placed under the CONTRACT SPECIFIC REQUIREMENTS, as required. After inserting the clause, change the clause number and heading to style “H2 SP” so it appears in the Table of Contents.

XXX.XX SUB HEADING (H2 SP)

1. Insert text (Main Table SP)

Keyword SP

2. Insert text (Main Table SP)

XXX.XX SUB HEADING (H2 SP)

1. Insert text (Main Table SP)

2. Insert text (Main Table SP)

AMENDMENT CHECKLIST

Specification No. **812** Title: **BORED PILES** Revision No: _____

Project Manager: _____ Signature: _____ Date: _____

Checked by: _____ Signature: _____ Date: _____

Contract No: _____ Contract Description: _____

ITEM	DESCRIPTION	SIGN OFF
<i>Note: All changes/amendments must be shown in Tracked Changes mode until approved.</i>		
1.	Project Manager has reviewed Specification and identified Additions and Amendments.	
2.	CONTRACT SPECIFIC REQUIREMENTS addressed? Contract specific materials, products, clauses added? (Refer Specification Guidance Notes for guidance).	
3.	Any unlisted materials/products proposed and approved by the Project Manager? If "Yes" provide details at 16.	
4.	Standard clauses amended? MUST SEEK approval from Manager Commercial.	
5.	Clause deletes shows as " NOT USED ".	
6.	Appropriate INSPECTION AND TESTING parameters included in Spec 201 (Text Methods, Minimum Testing Frequencies verified).	
7.	ANNEXURES completed (refer Specification Guidance Notes).	
8.	HANDOVER and AS BUILT requirements addressed.	
9.	Main Roads QS has approved changes to SMM .	
10.	Project Manager certifies completed Specification reflects intent of the design.	
11.	Completed Specification – independent verification arranged by Project Manager.	
12.	Project Manager's review completed.	
13.	SPECIFICATION GUIDANCE NOTES deleted.	
14.	TABLE OF CONTENTS updated.	
15.	FOOTER updated with Document No., Contract No. and Contract Name.	
16.	Supporting information prepared and submitted to Project Manager.	
Further action necessary:		

Signed: _____ (*Project Manager*) Date: _____