GENERAL NOTES

- THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL CONTRACT DOCUMENTS, & THE REQUIREMENTS OF THE RELEVANT BUILDING AUTHORITIES. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
- CONSTRUCTION FROM THESE DRAWINGS, AND THEIR ASSOCIATED CONSULTANTS' DRAWINGS, IS NOT TO COMMENCE UNTIL APPROVED BY THE LOCAL AUTHORITIES. 3.
- THIS PERFORMANCE SPECIFICATION DETAILS THE MINIMUM WORKMANSHIP STANDARDS & MATERIALS REQUIRED TO COMPLETE THE WORKS. IT IS NOT NECESSARILY SETOUT AND SURVEYOR PRESCRIPTIVE OF ALL ITEMS REQUIRED. THE CONTRACTOR SHALL COMPLY TO BEST INDUSTRY STANDARDS AS WELL AS ALL RELEVANT AUSTRALIAN STANDARDS.
- ALL DIMENSIONS ARE IN MILLIMETRES (MM), ALL LEVELS 2 ARE IN METRES (M) TO 0.0 C.D (CHART DATUM) APPROX -0.925M AUSTRALIAN HEIGHT DATUM (AHD).
- DO NOT OBTAIN DIMENSIONS BY SCALING FROM THESE DRAWINGS.ALL DIMENSIONS & MEASUREMENTS MUST BI VERIFIED ON SITE BY THE CONTRACTOR PRIOR TOTEMPORARY WORKS COMMENCING WORK.
- ANY DISCREPANCY BETWEEN THESE DRAWINGS AND ACTUAL CONDITIONS ON SITE SHALL BE REFERRED BY THE CONTRACTOR TO THE ENGINEER & WRITTEN INSTRUCTION, ORTAINED REFORE PROCEEDING WITH THE WORK
- ALL ABBREVIATIONS ARE IN ACCORDANCE WITH AS 1100 THE CONTRACTOR MUST FULLY FAMILIARIZE THEMSELVES WITH THE SITE AND THE SITE CONDITIONS, AND SHALL ALLOW FOR ALL CONSTRAINTS, TEMPORARY WORKS OF
- PROCEED SMOOTHLY AN INDUSTRY PRODUCT SPECIFIED MAY ONLY BE 1 SUBSTITUTED WITH AN EQUIVALENT PRODUCT IF FIRST APPROVED BY PRINCIPAL
- ALL MATERIALS USED SHALL BE NEW U.N.O.
- THE CONTRACTOR SHALL PROVIDE WRITTEN EVIDENCE THAT THE MATERIALS USED COMPLY WITH THE SPECIFICATION AND CONTRACT DOCUMENTS
- PROVIDE INDEPENDENT NATA CERTIFIED TIMBER GRADE REPORT ON ALL TIMBERS AND STEEL GRADES THE CONTRACTOR SHALL KEEP DETAILED RECORDS &
- RECEIPTS OF ALL ASPECTS AND STAGES OF WORK AND MATERIALS LISED & SUBMIT TO PRINCIPAL AS REQUESTED. THE CONTRACTOR SHALL BE DEEMED THE PRINCIPAL CONTRACTOR AND SHALL PROTECT ALL WORKERS AGAINST OHS RISK. ALL WORK SHALL BE CARIJED OUT IN
- ACCORDANCE WITH THE WHS ACT 2017 (NSW) DURING CONSTRUCTION THE CONTRACTOR SHALL 5 MAINTAIN THE STRUCTURE AND ANY ASSOCIATED EXCAVATIONS IN A STABLE & SAFE CONDITION & NO PART SHALL BE OVERSTRESSED.
- THE CONTRACTOR SHALL ESTABLISH BEFORE COMMENCING ANY WORK THE LOCATIONS OF ALL EXISTING SERVICES AFFECTED BY THE WORKS. CARRY OUT A DIAL-BEFORE-YOU-DIG.
- ADVISE THE SUPERINTENDENT IF THERE ARE ANY PREVIOUSLY UNKNOWN SERVICES THAT CAN BE 6. POTENTIALLY AFFECTED BY THE WORKS
- IN PARTICULAR SYDNEY WATER BOARD MAINS AND EXISTING STRUCTURES & SERVICES UNDERWATER CABLES
- ALL WORK SHALL BE DONE IN SUCH A WAY THAT ADEQUATELY PREVENTS MATERIAL OR POLLUTANTS FROM ENTERING HARBOUR
- PROVIDE PROPRIETARY SILT CURTAIN AROUND ALL EXCAVATION.
- REMOVE ALL CONSTRUCTION DERRIS FROM SITE AND LEAVE SITE CLEAN AND TIDY
- ALL EXCAVATED DEMOLISHED AND EXCESS MATERIAL 3 SHALL BE LAWFULLY DISPOSED OF BY THE CONTRACTOR AND ALL RECIEPTS FROM THE RESPECTIVE WASTE 4. MANAGEMENT STATIONS PROVIDED TO THE SUPERINTENDENT.

STANDARDS

- ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THIS SPECIFICATION AND THE RELEVANT CURRENT STANDARDS AUSTRALIA CODES, AND MONITORING DURING EXCAVATION THE BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES INCLUDING:
- THE NSW MARITIME ALITHORITY ENGINEERING STANDARDS & GUIDELINES FOR MARITIME STRUCTURES
- PWD DESIGN GUIDELINES FOR WHARVES & JETTIES 1990 AS 1170 LOADING CODE
- AS 4997 GUIDELINES FOR DESIGN MARITIME STRUCTURES 2

DESIGN PARAMETERS

- LIVE LOAD TO AS 3962 CL 4.1 FIXED WHARF LIVE LOAD = 5 KPA OR 4.5 KN PT LOAD HANDRAILS 0.75 KN/M IN ANY DIRECTION OR 0.6 KN PT LOAD.
- LIVE LOAD IS ASSUMED NOT TO APPLY THE STRUCTURE LINDER ADVERSE WEATHER CONDITIONS INCLUDING
- DESIGN WIND AND WAVE CONDITIONS. DESIGN WIND BASIC WIND VELOCITY REGION A. CATEGORY 2. R=50
- VR(50) = 41 M/S ULTIMATE, VDES = 37 M/S, QZ = 0.57 KPA THE MAXIMUM DESIGN WAVE FOR THIS SITE IS
- H = 3.0 M DESIGN WAVE LOAD ON FIXED STRUCTURES IS
- FWAVE = 10.0 KN/M DESIGN CURRENT AT SITE IS MAX VC = 2 KNOTS
- VESSELS ARE ASSUMED NOT TO BERTH THE TIDAL POOL
- ACCIDENTAL VESSEL STRIKE ALLOWANCE IS THAT THE TIDAL POOL STRUCTURE MAY LOCALLY BE DAMAGED

FORESHORE DATA

- THE DIGITAL DATA FOR THE FORESHORE LINES. PROPERTY BOUNDARIES & DIVISION OF WATERWAYS LINES SHOWN ON THESE DRAWINGS HAVE BEEN
- RMS DATA IS NOT NECESSARILY THE SAME AS THE LANDS. DEPARTMENT DATA AND THE CONTRACTOR SHALL CHECK FOR DISCREPANCIES AS APPROPRIATE HYDROGRAPHIC SURVEY DATA TO SITE MEASUREMENTS

- CONTRACTOR SHALL SET OUT ALL WORKS AND PILES USING A REGISTERED SURVEYOR CONTRACTOR SHALL RECORD ALL PILE SETS USING A REGISTERED SURVEYOR
- CONTRACTOR SHALL PROVIDE AN AS-BUILT SURVEY PLAN SHOWING THE STRUCTURE BY A REGISTERED SURVEYOR

ALL TEMPORARY WORKS AND PROPPING OF THE EXISTING STRUCTURE OR EXCAVATIONS SHALL BE TO THE CONTRACTOR'S DETAILS AND DESIGN ALL TEMPORARY WORKS, INCLUDING ASSESSMENT OF EXISTING STRUCTURE TO SUPPORT TEMPORARY PROPPING AND / OR DEMOLITION ACTIVITIES AND EQUIPMENT, ARE THE RESPONSIBILITY OF THE

CONTRACTOR. OTHER MEASURES REQUIRED ENABLING THE WORKS TO DEMOLITION

THE CONTRACTOR SHALL CARRY OUT ALL DEMOLITION ACTIVITIES, INCLUDING, BUT NOT LIMITED TO, THE PROTECTION OF THE PUBLIC, THE PROTECTION OF THE ADJOINING PREMISES AND TENANCIES, AND DEMOLITION METHODS, IN STRICT ACCORDANCE WITH THE AUSTRALIAN STANDARD AS 2601 - THE DEMOLITION OF STRUCTURES. AND ALL RELEVANT WORKCOVER GUIDELINES. CODES OF PRACTICE AND REQUIREMENTS AND ALL RELEVANT STATE AND LOCAL AUTHORITIES' REGULATIONS, SPECIFICATIONS AND REQUIREMENTS

CONTRACTOR MUST POSES A DEMOLITION LICENCE DISPOSE OF DEMOLISHED MATERIAL APPROPRIATELY. ALL COMPONENTS SPECIFIED FOR REUSE SHALL BE CAREFULLY REMOVED & STORED BY THE CONTRACTOR AND REMAIN THE PROPERTY OF THE PRINCIPAL AT ALL

ALL DEMOLISHED STRUCTURES SHALL BE FULLY REMOVED FROM THE SEABED AND FROM THE SITE INCLUDING PILE STLIMPS

IN ACCORDANCE WITH RMS REQUIREMENTS THE CONTRACTOR SHALL PROVIDE WRITTEN PROOF THAT A MINIMUM FORCE OF 50T APPLIED FOR 3 HOURS SHALL BE APPLIED TO ANY PILE STUMP IF THE STUMP CANNOT THEN BE REMOVED IT SHALL BE

CUT OFF A MINIMUM 500MM BELOW THE SEABED. PILES SHALL NOT BE CUT OFF AT SEARED WITHOUT WRITTEN PERMISSION OF THE SUPERINTENDENT

- THE CONTRACTOR SHALL MAKE GOOD ANY DAMAGE TO EXISTING PROPERTY & SERVICES RESULTING FROM CONSTRUCTION ACTIVITY.
- CONTRACTOR MUST ESTABLISH LOCATION AND EXTENT OF ALL EXISTING SERVICES INCLUDING UNDERGROUND SERVICES AND SEWER PIPELINES AND SUBMARINE CABLES AND THE LIKE PRIOR TO COMMENCEMENT ON SITE.
- CONTRACTOR SHALL CONDUCT A DIAL-BEFORE-YOU-DIG ANALYSIS OF THE SITE PRIOR TO ESTABLISHMENT
- PRIOR TO RELYING ON ANY EXISTING STRUCTURES, THE 8 SHALL CONFIRM THAT THE EXISTING STRUCTURE IS IN GOOD CONDITION, AND CAN SUPPORT THE
- SHOULD THE EXISTING STRUCTURE REQUIRE STRENGTHENING THEN A QUALIFIED STRUCTURAL ENGINEER SHALL BE ENGAGED TO PROVIDE WRITTEN INSTRUCTIONS ON REPAIRS

- THE BUILDER SHALL BE RESPONSIBLE FOR PROVIDING AND MAINTAINING ANY EXCAVATIONS IN A STABLE ADVERSELY AFFECTING WITHOUT SURROUNDING PROPERTIES INCLUDING STRUCTURES NECESSARY APPROVALS FOR SHORING AND ANCHORING
- THE CONTRACTOR SHALL CARRY OUT AN APPROPRIATLY THE CONTRACTOR SHALL CARRY OUT AN ACTION DETAILED DILAPIDATION SURVEY OF SURROUNDING 12. PILE RECORD PRO-FORMA SHALL BE 1 A4 PAGE PER PILE
- THE CONTRACTOR SHALL KEEP DETAILED PHOTOGRAPHIC 13. RECORD RECORD OF ALL STAGES OF WORKS & SUBMIT TO PRINCIPAL
- THE CONTRACTOR SHALL COMPLETE A SURVEY AFTER EXCAVATION BY A REGISTERED SURVEYOR CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY AND MAKE GOOD ANY DAMAGE CAUSED DURING

EXCAVATION WORKS.

- - CONTRACTOR 15. DRILLED SOCKET HOLES TO HAVE A DIAMETER LESS THAN 47. CUTTING TEETH WELDED TO THE BASE SHALL BE ANGLED 15° UP AGAINST FOUNDATION FOR ITS FULL DEPTH AND
 - 16. THE NOMINATED PILE DESIGN CAPACITIES AND EMBEDMENTS

17. SUPPLY PILES IN ONE CONTINUOUS LENGTH GEOTECHNICAL INFORMATION 18. PILES ARE NOT TO BE SPLICED UNLESS APPROVED BY

ENGINEER IN WRITING

NOT NECESSARILY REPRESENT THE ACTUAL FOUNDING

22. THE LENGTHS OF PILES SHALL BE DETERMINED BY THE

ROCK OR SEDIMENT TO ACHIEVE THE CAPACITIES.

VERTICAL PLAN

1H: 100V +/-50MM +/- 10MM

DEFECTIVE DAMAGED OR OUT OF POSITION SHALL BE

REMOVED AND REPLACEMENT PILES INSTALLED BY THE

25. JET TO 2.0M MAXIMUM OF THE DESIGN FOUNDATION LEVEL

32. WHERE INSUFFICIENT GEOTECHNICAL DATA CAN BE

OBTAINED BY THE CONTRACTOR TO SATISFY THE ENGINEER

THECONTRACTOR SHALL PROVIDE PDA DYNAMIC TESTING TO

33. ALL PILES SHALL BE DRIVEN TO A SET CALCULATED USING AN

PENETRATION IN MILLIMETRES PER TEN (10) BLOWS.

SELECTED AND RECORDED FOR EACH BLOW.

FINAL SET OF EACH PILE SHALL BE RECORDED AS THE

THAT THE GEOTECHNICAL CONDITIONS CAN BE DETERMINED.

UP AGAINST FOUNDATION FOR ITS FULL DEPTH AND

44 CONTRACTOR SHALL ALLOW TEETH BE PROVIDED TO ALL

LOCATION AS WELL AS OVERBURDEN CHARACTERISTICS

PRIOR TO INSTALLING THE FIRST PILE IN A PILE GROUP OF

46. DURING INSTALLATION THE RATE OF PROGRESS OF PILING IS

TO BE RECORDED SUCH THAT ANY SEAMS AND UNSUITABLE

LAYERS OF MATERIAL ARE IDENTIFIED THE PENETRATION

DISTANCE MAY THEN NEED TO BE ADJUSTED. REFER TO

TO RESULT IN A MAXIMUM DISTANCE 15 MM FROM THE

OUTSIDE OF THE PILE TO THE ROCK FACE

CUTOFF

FACTORS AND ALLOWANCES FOR WASTAGE

1.5M OF SEARED

LEVELS

ACHIEVE

PILE

ALL

JETTING PILES

ESCAPE

CONTRACTOR AT HIS COST

27. TO STABILISE SOIL AROUND PILE

THAT CAN DETERMINE A SET

THE SATISFACTION OF THE ENGINEER

THE LAST 2.0M

USED

IMPACT ENERGY VS CAPACITY

CIRCUMFERENCE

SCREWED IN PILES

LOCATIONS.

REQUIRED

SIMILAR PILES.

ENGINEER.

WRITTEN APPROVAL BY THE ENGINEER

- THE GEOTECHNICAL INFORMATION AVAILABLE AT THE TIME OF DESIGN WAS LIMITED.
- 2. ASSUMED CONDITIONS ARE BASED ON ANECDOTAL SURROUNDING HISTORICAL INFORMATION ONLY. THE CONTRACTOR SHALL MAKE THEIR OWN ASSESSMENT OF 20. THE FOUNDING LEVEL AT THE TOE OF THE PILES SHOWN ON
- THE GEOTECHNICAL CONDITIONS TO ENSURE THAT THE DESIGN PILE EMBEDMENTS AND LOADS ARE ACHIEVED CONTRACTOR SHALL ALSO ACHIEVE THE DESIGN SLEEVE
- 21. ALL SOCKETING / DRIVING DEPTHS TO BE MINIMUM. THE THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY IF GROUND CONDITIONS VARY FROM THOSE SHOWN ON THE DRAWINGS TO ALLOW EMBEDMENT TO BE DETERMINED.
- 6. ANY PILE LENGTHS SHOWN ON DRAWINGS ARE NOMINAL ONLY FOR INITIAL ESTIMATE AND FINAL LENGTH SHALL BE DETERMINED BY CONTRACTOR ON SITE.

FOUNDATIONS

FOUNDATIONS ARE DESIGNED FOR THE FOLLOWING

ALLOWABLE PRESSI			
ELEMENT	BEARING	SHAFT	LATERAL
	PRESSURE	ADHESIC	N CAPACITY
SLAB ON GROUND	100 KPA	N/A	NA
FOOTINGS ON SAND	100 KPA	NA	NA
FOOTINGS ON CLAY	150 KPA	NA	NA
FOOTINGS ON SHALE	400 KPA	NA	NA
FOOTINGS ON SANDSTON	NE650 KPA	NA	NA
PILES ON WEAK ROCK	1500 KPA	NA	NA
PILES ON			
GRADE 3 SANDSTONE	3500 KPA	350 KPA	1000 KPA .

- CLASS 3 SANDSTONE IS DESCRIBED AS MEDIUM STRONG AND SANDSTONE CORES CAN BE BROKEN BY HAND & EASIL 26. THEN DRIVE FINAL USING A DROP HAMMER SCORABLE BY KNIFE
- SOUND ROCK TO BE FREE OF DEFECTS OR SEAMS IN THE TOP 600MM AND WITH AGGREGATE THICKNESS OF SEAMS VIBRATING PILES BELOW THIS OF LESS THAN 50MM SAND MUST BE MEDIUM DENSE SAND WITH THE FOLLOWING WITHIN 2.0M OF THE FOUNDING LEVEL OF THE PILE.
- MINIMUM DESIGN CHARACTERISTICS: INTERNAL FRICTION ANGLE - 30 DEG - 18 KN/M3 DRY DENSITY ELASTIC MODULOUS ES - 75 MPA
- COHESIVE MATERIAL MUST BE STIFF TO FIRM WITH THE FOLLOWING MINIMUM DESIGN CHARACTERISTICS: UNDRAINED SHEAR STRENGTH CU > 35 KPA ELASTIC MODULOUS ES > 6 MPA THE CONTRACTOR MUST PROVIDE SUFFICIENT RECORDS

AND TO CERTIFY THAT THE FOUNDATION REQUIREMENTS HAVE BEEN ACHIEVED

PILING & PIERS

1. ALL PILING MATERIALS, SUPPLY & INSTALLATION SHALL BE TO $\underline{\textbf{DRIVEN PILES}}$

- AS 2159 SAA PILING CODE AND TO RMS REQUIREMENTS. 2. PILE SUPPLY TO COMPLY WITH AS 3818.3 AND AS 1163
- 3 ANY SITE INFORMATION IS LIMITED AND THE DESCRIPTIONS OF THE MATERIALS AND CONDITIONS ENCOUNTERED ON SITE
- 4. NO GUARANTEE IS GIVEN THAT THOSE MATERIALS ENCOUNTERED WILL NOT VARY THROUGHOUT THE SITE
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ASSESSING THE INFORMATION PROVIDED AND CONDUCTING ANY FURTHER INVESTIGATIONS HE MAY DEEM NECESSARY TO ENSURE PROPER FOUNDING OF THE PILES
- 6. PILE SETOUT TO BE BY A REGISTERED SURVEYOR BY CONTRACTOR
- 7 PILES TO BE INSTALLED LISING APPROPRIATE PLANT & TECHNIQUES USING AN EXPERIENCED AND SKILLED DRIVEN PILES USING HYDRAULIC HAMMER LICENCED CRANE OPERATOR WITH 10 YEARS EXPERIENCE.
- ANY PILE TO BE REMOVED SHALL BE FULLY REMOVED FROM 37. IPROVIDE AN APPROPRIATE RECORD OF EACH DRIVE SUCH 19. THE SEARED IN ACCORDANCE WITH THE RMS SPECIFICATION. TO PILE REMOVAL WHICH INCLUDES APPLYING 50T UPLIFT 38. PROVIDE THE RATED ENERGY AND WEIGHT OF THE UNIT FORCE OVER A 3 HOUR PERIOD
- PILES SHALL NOT BE CUT OFF AT SEABED UNLESS 39. PROVIDE THE AS USED ENERGY OF THE HAMMER PER BLOW APPROVED IN WRITING BY THE SUPERINTENDENT 40. MEASURE THE PILE DISPLACEMENT PER HIT.
- 10. CONTRACTOR TO PROVIDE DETAILS OF EQUIPMENT 41. ONE METHOD MAY BE TO USE CAPWAP / OR BERMINGHAM 1 PROPOSED TO REMOVE PILES AND PAST EXPERIENCE OF COMPLETING 50T PULL
- CONTRACTOR SHALL PROVIDE COMPREHENSIVE PILE DRILLED AND DRIVEN PILES RECORDS IN ACCORDANCE WITH NSW MARITIME 42. DRILLED SOCKET HOLES TO HAVE A DIAMETER LESS THAN REQUIREMENTS AND AS 2159 FOR EACH AND EVERY PILE INSTALLED AND SUFFICIENT TO SATISFY THE ENGINEER THAT THE FOUNDATION REQUIREMENTS HAVE BEEN ACHIEVED PILE EMBEDMENTS HAVE BEEN REACHED AND

THE DEPTH OF SEARED

DEPTH OF SILT / PILE PENETRATION UNDER OWN WEIGHT 45. CONTRACTOR TO CONDUCT AIR PROBE OR PILE TEST DRIVE DEPTH AND COMPOSITION OF OVERBURDEN TO ROCK. ANY SOFT OVERBURDEN SHALL NOT BE TAKEN INTO ACCOUNT FOR THE DRIVING DEPTH

DEPTH OF ROCK AND TYPE OF ROCK LENGTH OF ROCK POTT

14 MONITOR THE GROUND CONDITIONS DURING DRIVING AND THE ENGINEER IMMEDIATELY IF ANY GROUND CONDITIONS DIFFER FROM THOSE EXPECTED BY THE

- THE DIAMETER OF THE PILE TO ENSURE THAT PILE IS HARD CIRCUMFERENCE 48. ON COMPLETION OF DRILLING PILES ARE TO BE DRIVEN TO

STEEL PILES

- ALL STEEL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH AS 4100 19. WHERE APPROVED, NO SPLICE SHALL BE LOCATED WITHIN
- 2. PILES SHALL BE SUPPLIED, AND MANUFACTURED, IN ACCORDANCE WITH THE REQUIREMENTS OF AS 1163 FOR STRUCTURAL STEEL HOLLOW SECTIONS and as 1579. THE DRAWINGS ARE INDICATIVE ONLY THESE LEVELS DO
 - STEEL PILES (AND ATTACHMENTS) SHALL BE MADE FROM STEEL CIRCULAR HOLLOW SECTIONS MINIMUM GRADE 350
- CONTRACTOR SHALL PROVIDE TEST CERTIFICATES FOR THE STEEL GRADE SUPPLIED FOR EACH LENGTH. CONTRACTOR SHALL DETERMINE THE PILE LENGTHS INTO ... PILES SHALL NOT BE WELDED
 - NO PILE SPLICES SHALL BE ALLOWED TO PILES UNLESS. APPROVED BY ENGINEER IN WRITING.
 - WHERE ALLOWED IN WRITING ALL WELDS SHALL BE TESTED PER THE STEEL SPECIFICATION
- THE CONTRACTOR SHALL SUPPLY TEST CERTIFICATES AND 23. PILES SHALL BE SETOUT APPROPRIATELY & ACCURATELY TO 8 EVIDENCE SATISFACTORY TO THE SUPERINTENDENT THAT ALL MATERIALS OR PARTS CONFORM WITH THE TESTS REQUIRED BY THE STANDARD SPECIFICATIONS REFERRED.
- NO CONSTRUCTION ATTACHMENTS IN THE FORMS OF 22. ANY PILES FOUND TO BE BENT, BUCKLED OR OTHERWISE 9. BRACKETS WELDED OR BOLTED TO THE PILES SHALL BE PERMITTED EXCEPT BY WRITTEN PERMISSION FROM THE SUPERINTENDENT.
 - 10. ANY SUCH CONSTRUCTION ATTACHMENTS SHALL BE REMOVED AND MADE GOOD.
- 23. JETTING OF PILES SHALL NOT BE PERMITTED WITHOUT 11. INSPECTION DURING MANUFACTURE AND FABRICATION OF THE PILES WILL BE CARRIED OUT BY THE SUPERINTENDENT. 24. TIMBER PILES ARE V-ED OUT TO ALLOW THE WATER TO THE CONTRACTOR SHALL PROVIDE ACCESS AT ALL REASONABLE TIMES AND ALL FACILITIES NECESSARY FOR INSPECTION DURING MANUFACTURE AND ON COMPLETION.

HDPE SLEEVE TO STEEL PILES

- HDPE SHALL BE TAKEN TO MEAN HIGH DENSITY 28. VIBARATING PILES OF PILES SHALL NOT BE PERMITTED 2 POLYETHYLENE MINIMUM WALL THICKNESS 9.0mm HDPE ALL STEEL PILES TO BE FULLY PROTECTED BY HDPE
- SLEEVE DRIVEN 2.0 M INTO SEARED 29. VIBRATING PILES PROVIDES NO GEOTECHNICAL DATA THAT 3 DIAMETER OF SLEEVE TO SUIT STEEL PILE CAN BE USED TO DETERMINE SET OR GROUND CONDITIONS. CONTRACTOR SHALL ESTABLISH THE GROUND CONDITIONS
- 30. THE FINAL DRIVE SHALL BE COMPLETED USING A METHOD AND SLEEVE LENGTHS IN ADVANCE BY CONDUCTING AN AIR 2. PROVIDE LENGTH OF SLEEVES REQUIRED IN WRITING TO 31. PROVIDE THE 10 BLOW SET FOR EACH OF THE DRIVES ON 5.
 - SUPERINTENDENT IT IS THE CONTRACTOR RESPONSIBILITY TO ORDER THE CORRECT SLEEVE LENGTH BASED ON THEIR OWN SITE MEASUREMENTS AND AIR PROBE
- THAT PILE DESIGN CAPACITY HAS BEEN REACHED THEN ORDER THE SLEEVES LONGER THAN EXPECTED TO ACCOUNT FOR SITE CHANGES IN SEARED LEVELS AND THE PILE TO CONFIRM CAPACITY OF ALL VIBRATED PILES TO MATERIAL.
- DO NOT TO RELY ON THE DRAWINGS FOR MEASUREMENTS WHERE INSUFFICIENT OVERBURDEN IS FOUND THEN THE ENGINEER TO BE IMMEDIATELY NOTIFIED. AN AUGERED HOLE SHALL BE PROVIDED MINIMUM 600MM APPROPRIATE METHOD SUCH AS THE HILEY FORMULA. THE 10.
- THE HDPE SLEEVE SHALL BE FULLY AIR-SEALED BY PROVIDING A WELDED CAP ATOP THE PILE ARE BASED ON THE INFORMATION PROVIDED AND MAY VARY. 34. DETAILED SET RECORDS FOR THE WHOLE DRIVE SHALL BE

 MAINTAINED AND PROVIDED FOR EACH PILE. INCLUDING THE

 CAP FACTORY WELDED TO CORRECT LENGTH PRIOR TO
 - DELIVERY PENETRATION UNDER OWN WEIGHT AND SET FOR 10 BLOWS. CAP SHALL HAVE A FLAT TOP TO SIT BEAM ON. CAP SHALL 35. THE WEIGHT OF THE HAMMER SHALL BE PROVIDED IN
 - ACCORDANCE WITH AS2159 AND THE DROP HEIGHT 14. DO NOT PENETRATE THE HDPE SLEEVE TO INSTALL MOORING BARS OR EYES OR THE LIKE. 36. WHEN THE APPROVED SET IS ACHIEVED, TEN (10) MORE 15. CUT A 200Ø HOLE IN CAP TO ALLOW TO CONCRETE FILL PILE
 - BLOWS SHALL BE GIVEN TO THE PILE AND THE SET 16 BOLT SHALL PROTRUDE THROUGH PILE RECORDED, PROVIDED THAT, WHERE PRACTICAL REFUSAL IS 17. THIS HOLE SHALL BE FULLY SEALED AFTER PILING BY REACHED. THE ADDITIONAL DRIVING SHALL NOT DAMAGE INSTALLING A 250 SQUARE HDPE PLATE 10MM THICK WITH
 - LIBERAL SIKAFLEX TO SEAL. 18. IT IS NOT ACCEPTABLE TO SIT BEAM ON PILE HEAD WITHOUT THE WEI DED CAP OR HDPF WASHER WEDGE SLEEVE AS REQUIRED USING HDPE WEDGES TO ENSURE THAT THE ANULUS BETWEEN STEEL PILE AND

CONCRETE FILLED HDPE PILES

- REFER TO DETAILS ON DRAWING PILE DRIVING MONITOR TO RECORD INFORMATION ON 2 HDPE SLEEVE MINIMUM WALL THICKNESS 9.0MM HDPE CONTRACTOR SHALL ESTABLISH THE GROUND CONDITIONS AND DETERMINE SLEEVE LENGTHS IN ADVANCE
- PREPARE ROCK SURFACE LEVEL THE DIAMETER OF THE PILE TO ENSURE THAT PILE IS HARD 5. DRILL ALL REBAR CHEMSET HOLES AND OBTAIN APPROVAL BY ENGINEER IN WRITING
- CHEMSET IN BARS AND CURE HOLD DOWN HDPE SLEEVE BY NUT AT TOP OF CENTER 43. ROCK MAY OR MAY NOT BE ENCOUNTERED AT PILE BAR AND CLAMP BEAM
- 13. REMOVE / AIRLIFT ALL LOOSE SEABED MATERIAL FROM OUT OF THE PILE TO ACHIEVE A FIRM BASE TO CONCRETE TO BE APPROVED BY ENGINEER IN WRITING PILE ENDS TO ALLOW PILE TO BE SCREWED INTO ROCK IF CONCRETE FILL TO PILES SHALL BE INSTALLED BY TREMMIE
- INSTALL 50 MPA CONCRETE CONTINUOUS POUR TO ESTABLISH IF ROCK IS CLOSER TO SURFACE AT PILE 16. DO NOT PENETRATE THE HDPE SLEEVE TO INSTALL ANY ATTACHMENTS OR BOLTS.

SCOPE OF WORKS

THIS IS A GENERAL PERFORMANCE SPECIFICATION AND SCOPE OF WORKS ONLY AND DETAILS THE DESIRED FINISHED PRODUCT TO BE 1. ACHIEVED AND THE MINIMUM WORKMANSHIP, MATERIALS AND STANDARDS TO BE USED. IT SHOULD NOT BE REGARDED AS

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT ALL REQUIREMENTS ARE MET TO PROVIDE A FUNCTIONAL END RESULT

- PRELIMINARY WORKS INCLUDING PROGRAM AND CMF DEMOLISH EXISTING STRUCTURE AND DISPOSE LAWFULLY
- SUPPLY AND INSTALL PILES
- SUPPLY AND INSTALL S.S A4-80 BOLTS TO PILE HEADS AND
- CONCRETE FILL AIR PROBE DETERMINE LENGTH OF HDPF SLEEVES
- SUPPLY AND INSTALL HDPE SLEEVES AND CAPS GROUT FILL AND SEAL CAP WITH HDPE
- SUPPLY AND INSTALL TIMBER BEAMS AND SWIM PLATFORM PAINT BEAMS AND BLACKJACK ANY BOLT HOLES AND JOINS TO B. THIRD PARTY CERTIFICATION OF BOLTS
- 10 REMOVE AND RECONDITION AND REINSTALL 2 EXISTING LADDERS WITH NEW FIXTURES AND FITTINGS
- (SUPPLY AND INSTALL SEADRAGON NET AND ALL RIGGING AND HOLD POINTS MOORING LINES BY OTHERS)
- COMPLETE ALL OTHER WORKS AS SHOWN ON DRAWINGS AND SPECIFICATION
- MAKE GOOD ANY DAMAGE TO EXISTING COMPONENTS MADE DURING CONSTRUCTION.
- PROVIDE WRITTEN CERTIFICATE AND WORK AS EXECUTED DRAWINGS SHOWING ALL WORKS ARE COMPLETED ACCORDING TO DRAWING AND SPECIFICATION
- 15. OBTAIN ENGINEERS CERTIFICATE OF EXECUTED WORKS
- OBTAIN O.C FROM P.C.A RETURN AFTER 6 MONTHS AND TIGHTEN ALL BOLTS

CONSTRUCTION MANAGEMENT PLAN

CONTRACTOR SHALL PROVIDE A CMP FOR APPROVAL IN WRITING BY THE CLIENT INCLUDING:

- CONSTRUCTION METHODOLOGY METHODOLOGY TO PULL EXISTING PILES FROM THE
- SEABED AND NOT TO BE CUTOFF PROGRAMME OF WORKS TO ACCOMODATE ALI
- RESTRICTIONS IMPOSED AND ALLOW FOR WORK MAY AUGUST ONLY
- HOURS OF WORK 5 NOISE MINIMISATIONELAN
- COMMUNITY CONSULTATION PLAN
- A SCHEDULE OF WITNESS POINTS AND HOLD POINTS TO BE CERTIFIED BY THE ENGINEER. PROVIDE SAMPLE PILE RECORD PROFORMA IN WRITTEN
- FORMAT SIGNED, ALL PILE RECORD TO BE IN THIS FORMAT. LIST OF EXPERIENCED WHARF AND BRIDGE CARPENTERS
- TO BE USED ON THE PROPOSED WORKS AND QUALIFICATIONS 10. EQUIPMENT LIST TO BE UTILISED IN WORKS
- 11 BARGES PILE DRIVING RIGS CRANES WORKBOATS ETC.
- 12. ENVIRONMENTAL MANAGEMENT PLAN
- 13. SEAGRASS MANAGEMENT PLAN
- 14. SEAHORSE MANAGEMENT PLAN 15. PENGUIN MANAGEMENT PLAN
- 16. ASS MANAGEMENT PLAN
- 17. WASTE MANAGEMENT PLAN
- 18. TRAFFIC MANAGEMENT PLAN 19. HERITAGE MANAGEMENT PLAN
- 20. DETAILS OF ALL PRODUCTS USED INCLUDING MODEL NUMBERS AND SUPPLIER INFORMATION AND CONTACT
- DETAILS 21. QA MANAGEMENT PLAN

CONTRACT.

SPECIFICATION

QUALITY ASSURANCE

- THE CONTRACTOR SHALL IMPLEMENT A QA SYSTEM TO THE SUPERINTENDENTS REQUIREMENTS AND IN
- PRO-FORMAS SHALL BE SUBMITTED FOR APPROVAL TO THE SUPERINTENDENT
- RECORDS SHALL BE KEPT OF ALL STAGES AND ASPECTS OF THE WORK CONTRACTOR SHALL WEEKLY PROVIDE ALL WRITTEN
- RECORDS TO SUPERINTENDENT AT THE COMPLETION OF EACH STAGE OF THE WORKS THE CONTRACTOR SHALL CERTIFY THAT THOSE WORKS HAVE BEEN UNDERTAKEN AND COMPLETED IN ACCORDANCE WITH THE DRAWINGS, SPECIFICATIONS AND INSTRUCTIONS ISSUED DURING THE COURSE OF THE
- SATISFACTION OF THE ENGINEER AND THE P.C.A TO ALLOW FOR A CERTIFICATE OF EXECTUTED WORKS AND OCCUPATION CERTIFICATE TO BE ISSUED CONTRACTOR SHALL PROVIDE A CERTIFICATE THAT ALL WORKS HAVE BEEN COMPLETED TO THE RELEVANT

CONTRACTOR SHALL COMPLETE ALL WORKS TO THE

PREPARE AND SUBMIT AS BUILT DRAWINGS SHOWING THE FACILITY AS CONSTRUCTED INCLUDING ALL STRUCTURAL DETAILS.

DRAWINGS TO BE SIGNED BY CONTRACTOR AS IN

STANDARDS AND AS SHOWN ON THESE DRAWINGS AND

- COMPLIANCE WITH THIS SPECIFICATION AND LATEST DRAWINGS ISSUE REVISION CONTRACTOR SHALL PROVIDE A MAINTENANCE MANUA
- INCLUDING ALL MATERIALS CERTIFICATES ALL TEST CERTIFICATES
- 11. MAINTENANCE SCHEDULE

THE CONTRACTOR MUST UNDERTAKE APPROPRIATE INSPECTIONS AND TESTING TO DEMONSTRATE COMPLIANCE WITH THE REQUIREMENTS OF THE SPECIFICATION.

INSPECTIONS & TESTING

- WORK SHALL NOT BE APPROVED NOR PRACTICAL COMPLETION GIVEN WITHOUT ADEQUATE INSPECTION BY THE ENGINEER SUCH INSPECTION SHALL NOT RELIEVE THE CONTRACTOR FROM ANY OF HIS RESPONSIBILITIES UNDER THIS CONTRACT
- THE CONTRACTOR SHALL PERFORM ANY TESTS WHICH THE ENGINEER MAY REASONABLY DIRECT THE CONTRACTOR TO TO DEMONSTRAE THE INTREGITY, FUNCTIONALITY QUALITY OR STANDARD OF THE WORK.

WITNESS POINTS

- 5. CONTRACTOR MUST PROVIDE INFORMATING FOR WITNESS POINTS FOR ENGINEER REVIEW AS FOLLOWS:
- THIRD PARTY CERTIFICATION OF TIMBER
- C. CONCRETE TEST CERTIFICATES SUBMIT PROGRESSIVELY D. PILING RECORDS - SUBMIT EACH DAY

- 6. CONTRACTOR MUST GIVE ADEQUATE 24 HOUR NOTICE FOR HOLD POINTS FOR ENGINEER TO INSPECT THE FOLLOWIN MINIMUM STAGES:
- AIR PROBE TO ROCK BY CONTRACTOR TO ESTABLISH SLEEVE LENGTH WORKSHOP DRAWINGS BY CONTRACTOR AFTER INSTALLATION OF PILES AND SUBMISSION OF PILE DRIVING DATA
- G AFTER INSTALLATION OF PILE HEAD BOLTS
- H. AFTER TIMBER BEAMS ARE INSTALLED AFTER INSTALLATION OF EYEBOLTS AND TOP WIRES
- AFTER INSTALLATION OF NET AND CHAINS AS BUILT DRAWINGS AND CERTIFICATE BY CONTRACTOR
- ENGINEER CERTIFICATE M. PRIOR TO PRACTICAL COMPLETION
- N. CONTACT YOUR "PCA"(PRINCIPAL CERTIFYING AUTHORITY) AS TO REQUIREMENTS FOR 'MANDATORY CRITICAL STAGE INSPECTIONS.
- O. O.C BY PCA

DRAWING SCHEDULE

- S00 GENERAL NOTES AND SPECIFICATION
- S01 SPECIFICATION (CONT)
- S02 EXISTING SITE PLAN & DEMOLITION PLAN S10 GENERAL ARRANGEMENT
- S11 PLAN DETAILS
- S20 SECTIONS S30 FLEVATIONS
- S40 PILE DETAILS
- S41 PILE DETAILS
- S42 PILE DETAILS S50 SEANET DETAILS S51 SEANET DETAILS

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H TENDER

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

191019

LITTLE MANLY TIDAL POOL

STEVE FITZHENRY B.E

18.09072 A3

Land & Marine engineering consulting

NORTHERN BEACHES COUNCIL C/O MRS. TINE BIRKEMOSE

PROPOSED REFURBISHMENT

GENERAL NOTES & SPECIFICATION

S00 Н

MAINTENANCE INSTRUCTIONS

STRUCTURAL STEELWORK

- 1.0 ALL MATERIALS AND WORKMANSHIP MUST BE IN ACCORDANCE 1 VITH AS 4100 & ASCE STRUCTURAL STEEL FARRICATION AND
- WITH AS 4100. A ASSETS TROUTORAL STEEL PARTICALION AND ERECTION SPECIFICATION UNO ALL SHOP DRAWINGS ARE TO BE SUBMITTED TO THE ENGINEER FOR APPROVAL 7 DAYS BEFORE FABRICATION COMMENCES. FABRICATION MUST NOT COMMENCE WITHOUT ENGINEERS APPROVAL OF WORKSHOP DRAWINGS. 3.0 STEEL GRADE 350 U.N.O.
- ALL STEEL MUST BE IN ACCORDANCE WITH
- AS 3679 GRADE 300 FOR T OR I SECTIONS,
 AS 3679 GRADE 300 FOR T OR I SECTIONS,
 SOURCE SECTIONS,
 AL STEEL TO BE GALVANISED TO 600 GM2 TO AS1650 UNLESS
 OTHERWISE PROTECTED BY PAINT COATING OR HDPE SLEEVE
- FULLY SEALED TO OXYGEN
- FULLY SEALED TO OXYGEN.

 6.0 MINIMUM STEEL PLATE THICKNESS SHALL BE 8MM UNO.

 7.0 ALL GUSSET PLATES SHALL BE 8MM UNO.

 8.0 FABRICATION MUST COMPLY TO AS 4100 SECTION 14.

 9.0 ERECTION MUST COMPLY TO AS 4100 SECTION 15.

 10.0 THE FABRICATION AND ERECTION OF THE STEELWORK MUST.
- BE SUPERVISED BY A QUALIFIED ENGINEER. 11.0 CONTRACTOR TO PROVIDE ALL MATERIALS CLEATS AND TO
- DRILL ALL HOLES NECESSARY FOR FIXING THE STEEL IN PLACE WHETHER OR NOT SHOWN IN DRAWINGS

 12.0 ALL DIMENSIONS AND SETOUTS TO BE OBTAINED FROM
 ARCHITECTURAL DRAWINGS WHERE NOT INDICATED ON
- STRUCTURAL DRAWINGS.

 13.0 PROVIDE SEAL PLATES TO ALL HOLLOW SECTIONS, WITH
- 13.0 PROVIDE SEAL PLATES TO ALL HOLLOW SECTIONS, WITH
 BREATHER HOLES WHERE MEMBER IS TO BE GALVANIZED

 14.0 FREE ALL MEMBERS FROM TWISTS AND DISTORTIONS BEFORE
 AND AFTER WELDING.
 15. ALL S
 15.0 WHERE THE FABRICATOR PROVIDES A SPLICE FOR AN
 APPROVED REASON (EG. TRANSPORTATION) THE SPLICE
 SHALL BE COMPLETE PENETRATION BUTT WELDED (CATEGORY BOLTING)

 SPLAND ATTORTOLOGICAL PROVIDED AND AND ATTORTOLOGICAL PROPERTY. SP) AND TESTED AS SPECIFIED.

BOLTING STEELWORK

- ALL BOLTING TO AS 4100
 ALL BOLTS SHALL BE MINIMUM ØM20 GRADE 8.8/S UNO
 ALL BOLTS, NUTS WASHER TO BE HOT DIPPED GALVANIZED
- 4.0 NO CONNECTION SHALL HAVE LESS THAN 2 BOLTS UNO 5.0 BOLT DESIGNATION
- 5.0 BOLT DESIGNATION
 4.6/S COMMERCIAL BOLTS TO AS 1111 SNUG TIGHT TO AS 4100
 8.8/S HIGH STRENGTH STRUCTURAL BOLTS TO AS 1252 SNUG TIGHT
 8.8/TB HIGH STRENGTH STRUCTURAL BOLTS FULLY TENSIONED TO
 AS 4100 AS A BEARING JOINT
 2
- 8.8/TF HIGH STRENGTH STRUCTURAL BOLTS FULLY TENSIONED TO AS 4100 AS A FRICTION JOINT WITH FACING SURFACES
- 6.0 /TB AND /TF BOLTS TO BE INSTALLED IN ACCORDANCE WITH AS 4100 SECTION 15, USING APPROPRIATE LOAD INDICATING WASHERS USING EITHER THE PART TURN METHOD OR DIRECT TENSION INDICATOR METHOD.

ALL WELDING TO BE CARRIED OUT IN ACCORDANCE WITH

- ASTS54 BY SKILLED TRADESMEN.
 BUTT WELDS MUST BE FULL PENETRATION BUTT WELDS UNO 1.
 AND DEVELOP THE ULTIMATE TENSILE STRENGTH OF THE 2.
- MEMBER.
 FILLET WELDS SHALL BE CONTINUOUS WELDS 6 MM TYPE SP 3.
- USING E48XX ELECTRODES. SURFACES TO BE WELDED MUST BE SMOOTH, FREE OF ALL
- SURFACES 10 BE WILLIUED MUST BE SMOOTH, FREE OF ALL SCALE, RUST, GREASE, PAINT, SALT OR ANY OTHER FOREIGN 5. MATERIAL. CONTACT BEARING SURFACES MUST BE FLUSH WITH NO VOIDS UNDER.
 WELDING IS TO BE EXAMINED BY AN INDEPENDENT NATA TESTING AUTHORITY TO ACCORD TO THE COLL PAIN.

TESTING AUTHORITY TO AS2207 AS FOLLOWS. T SP VISUAL 100% OF LENGTH BUTT WELD SHOP VISUAL 100% OF LENGTH BUTT WELD SHOP NDT/ULTRASONIC 10% LENGTH T WELD SITE VISUAL 100% OF LENGTH
T WELD SITE VISUAL 100% OF LENGTH
T WELD SITE NDT/ULTRASONIC 20% LENGTH
WELD TEST RECORDS ARE TO BE MAINTAINED AND SUBMITTED BUTT WELD SITE BUTT WELD SITE TO THE SUPERINTENDENT

- THE SUPERINTENDENT MAY AT HIS DISCRETION MAY REQUIRE THE SUPERINI ENDENT MAY AT HIS DISCRETION MAY REQUIRE THAT THE CONTRACTOR CARRY QUIT TESTING OF WELDS BY RADIOGRAPHIC TESTING TO AS 2177.1 OR ADDITIONAL ULTRASONIC TESTING OR OTHER MEANS. ANY FURTHER TESTING REQUIRED AS A RESULT OF THE DISCOVERY OF A DEFECTIVE WELD SHALL BE CARRIED OUT AT THE CONTRACTOR'S EXPENSE. ANY WAITING TIME DUE TO CARDIVING CULT THE ADDIVING CULT THE ADVICE TESTS EVAIL BE AT THE
- CARRYING OUT THE ABOVE TESTS SHALL BE AT THE CONTRACTOR'S EXPENSE.
- DEFECTIVE PORTIONS OF WELDS SHALL BE REMOVED, RE-WELDED AND RE-INSPECTED. FULL RECORDS SHALL BE KEPT OF ALL REPAIRS. THE CONTRACTOR SHALL PROVIDE ACCESS AT ALL
- REASONABLE TIMES AND ALL FACILITIES NECESSARY FOR INSPECTION DURING MANUFACTURE AND ON COMPLETION. THE CONTRACTOR SHALL SUPPLY TEST CERTIFICATES AND EVIDENCE THAT ALL MATERIALS OR PARTS CONFORM WITH THE TESTS REQUIRED.

STAINLESS STEEL

- ALL MATERIALS SHALL BE SUPPLIED, MANUFACTURED & INSTALLED IN ACCORDANCE WITH AS1418, AS 4100; AS 1554; SUPPLY IN ACCORDANCE WITH ASTM A240 / 480 AND ASTM A276 CONFORM TO AUSTRALIAN STAINLESS REFERNCE MANUAL ISSUED BY THE AUSTRALIAN STAINLESS STEEL DEVELOPMENT ASSOCIATION ASSDA ALL STAINLESS STEEL SHALL BE 316 S MARINE GRADE
- WITH A PRE > 23.5 (PITTING RESISTANCE EQUIVALENT ALL WELDED STAINLESS STEEL SHALL BE GRADE 316 L FY = 205 MPa TO ASTM A955M
- WHERE STAINLESS STEEL IS TO BE SUBMERGED IN SALT WATER A MORE CORROSION RESISTANT GRADE SUPER DUPLEX 2205 (UNS 31803) SHALL BE USED
- PROTECT S.S DURING FABRICATION TO PREVENT DISCOLORATION BY IRON PARTICLES AND THE LIKE. PICKLE & PASSIVATE ALL S.S PLATES & SECTIONS.
- STORE S.S CLEAR OF THE GROUND AND AWAY FROM CONTACT WITH CARRON STEEL
- ALL SURFACES TO BE FINISHED TO A SURFACE ROUGHNESS RA < 0.5 WITH ONLY SILICON CARBIDE ABRASIVE GRIT OF 320
- THE SUPERINTENDENT MAY INSPECT ALL MATERIALS ARRIVING ON SITE WITH A ROUGHNESS METER TO ENSURE COMPLIANCE WITH THE Ra VALUES SPECIFIED. ANY REJECTED MATERIAL SHALL BE REPLACED AT THE CONTRACTORS EXPENSE
- ALL S.S WELDING SHALL BE 6MM TYPE SP USING AN "OVER ALLOYED ELECTRODE COMPATIBLE WITH THE STRENGTH GRADE F THE SECTION AT THE WELD.

- ALL SS FASTENERS SHALL BE MINIMUM CLASS 80 17. NO JOINT SHALL HAVE LESS THAN 2 FASTENERS
- S.S BOLTS TO BE GRADE 316 A4-80 MINIMUM M16 Ø LLN O
- PROVIDE MINIMUM 5 THREADS PAST NUT
- WASHERS SHALL BE MINIMUM 50 x 5 MM PL S.S 316 EITHER USE NYLOK NUTS OR TACK WELD OR OTHERWISE APPROPRIATELY SEIZE ALL STAINLESS STEEL NUTS TO THE BOLT TO PREVENT NUT COMING UNDONE OVER TIME
- 23. TO PREVENT "GAULING OR PICKUP", ALL STAINLESS STEEL FASTENERS AND ARE TO BE TREATED WITH "DURAL AC" OR EQUIVALENT NICKEL ANTI-SEIZE COMPOUND TO THE BOLT THREAD PRIOR TO FASTENING
- APPLY A LIGHT OIL TO PINS & BEARING SURFACES PRIOR TO INSTALLATION

CHEMSET BOLTS

- ALL CHEMSET BOLTS TO BE A4-80 GRADE
- MINIMUM M 24Ø S S ALL THREAD IN ROCK CHEMSET MIN 500mm
- CHEMSET SHALL BE HILTI HIT 500
- ENGINEER TO INSPECT EMBEDMENT PRIOR TO GROUTING

STRUCTURAL TIMBER - WHARF

- ALL TIMBER CONSTRUCTION TO RELEVANT CURRENT AUSTRALIAN STANDARDS - AS1720 TIMBER CODE; AS 2082 -GRADING OF TIMBER: AS 3660 PROTECTION OF BUILDINGS FROM SUBTERRAINIAN TERMITES.
- AS 1684 IS RELEVANT TO DOMESTIC CONSTRUCTION IN SHELTERED LOCATIONS. TIMBERWORK TO BE SUPPLIED, INSTALLED AND FINISHED TO 5.
- BEST PRACTICE FOR WHARF & BRIDGE CARPENTERY USING 6.
- PROVIDE INDEPENDENT QUALIFIED GRADING CERTIFICATE TO ALL TIMBER
- SHOULD ANY OF THE DELIVERED TIMBER RE FOLIND NOT ADEQUATE BY THE ENGINEER, IT WILL BE REJECTED AND THE CONTRACTOR SHALL REPLACE THE TIMBER AT THRIER OWN EXPENSE.
- ALL TIMBER TO BE JOINT GROUP J2 OR BETTER.
- ALL TIMBER BELOW THE TIDE ZONE DURABILITY CLASS 1 ALL TIMBER BEAMS SHALL BE STAMPED SHOWING GRADE AND TIMBER SPECIES
- PILES F22 H/W TURPENTINE UNSEASONED
- GAL RING TO HEAD AND FIRERGLASS CAPPED
- 12. BEAMS F17 TURPENTINE UNSEASONED HARDWOOD QUALIFIED WHARF CARPENTER SHALL SELECT BEAMS TO BE REASONABLY FREE OF HORIZONTAL SHRINKAGE CRACKING AND KNOT HOLES, KNOT HOLES GREATER THAN 30MM ARE NOT ACCEPTABLE. LARGE SHRINKAGE CRACKS / HEARTCHECKS > 500MM OR 5MM WIDE ARE NOT ACCEPTABLE
- 13. PAINT ALL TIMBER BEAMS IN THE TIDAL ZONE WITH 1 COAT OF CCN OIL AND 1 COAT OF BLACKJACK TO ALL SIDES AND ENDS AND DRILLED HOLES
 OREGON TO BE GRADE F7 WHERE SPECIFIED ONLY
- WHERE SPECIFIED EXPOSED SOFTWOOD TIMBER TO BE CCA TREATED RADIATA PINE (TO AS1604) REDRIED AFTER FULL IMPREGNATION
- HARDWOOD TO BE NON-ASH TYPE EUCALYPT FROM NSW OR
- ALL TIMBER TO BE STRAIGHT & FAIR & TRUE WITH NO DEFECTS THAT MAY AFFECT THE STRENGTH & SERVICABILITY OF THE MEMBER
- 18 CONTRACTOR TO PROVIDE ALL TIMBERS AND DETERMINE 19. FULL LENGTHS OF TIMBER SHALL BE USED. SPLICES SHALL
- ONLY BE MADE WHERE ALLOWED BY ENGINEER 20. JOINTS TO BE WELL FITTING AND SNUG FIT WITHOUT
- WEDGING OR PACKING FAYING SURFACES TO BE STRAIGHT & PARALLEL.
- 22. JOINTS ABOVE THE TIDAL ZONE SHALL BE NOTCHED 50MM TO 3 PILE & 25MM TO BEAM
- 23. JOINTS BELOW THE TZ TO BE NOTCHED 25MM ONLY STORE ALL TIMBER OFF GROUND TO AVOID DAMAGI
- PROVIDE STAINLESS STEEL NAILING PLATES TO ENDS OF ALL BEAMS BY PRYDA KNUCKLE NAILPLATES COVERING THE

WHOLE SECTION OF THE MEMBER LESS 25MM EACH SIDE

TIMBER DECKING

- DECKING ABOVE THE TIDAL ZONE 140 * 40mm KILN DRIED F27 IRONBARK DRESSED ALL ROUND AND ARRISSED
- 10. ALL DECKING IN TIDAL ZONE SHALL BE TURPENTINE F22 HARDWOOD 150 * 50 MM 11 NOTWITHSTANDING THE STRUCTURAL DECKING GRADE THE
- DECKING SHALL BE OF UNIFORM APPEARANCE OVER THE WHOLE OF THE DECKING AREA 12. PLANKS SHALL BE FREE OF KNOTS AND WANES > 10 MM Ø
- SELECT GRADED DISCARD ANY PLANKS WITH KNOTS WANES OR GUM POCKETS THAT MAY CAUSE TRIP HAZARDS OR
- CAUSE ROTTING OF THE PLANK 14. 5MM GAP BETWEEN SEASONED PLANKS
- 2MM GAP BETWEEN UNSEASONED PLANKS TIMBER DECKING TO BE FIXED TO TIMBER BEAMS USING 2 OFF 5MM Ø STAINLESS STEEL 316 BUGLE HEADED SCREWS
- WITH COUNTERSUNK HEADS @ 125 MM LONG. 17. PRE-DRILL HOLE 1MM Ø LESS THAN SCREW
- INSERT COPPER NAPTHENATE (CN) EMULSION INTO EACH HOLE PRIOR TO INSERTING SCREW
- 19. PROVIDE 1 LAYER OF CTS BITUMINOUS MALTHOID TO BE INSTALLED TOP OF EACH TIMBER BEAM & BENEATH DECKING 20. LAY PLANK WITH HEARTWOOD FACE DOWN TO PREVENT ROT
- DECKING SHALL BE EVEN & THE TOP CORNERS OF PLANKS SHALL BE LIGHTLY CHAMPHERED. MAXIMUM LEVEL DIFFERNCE BETWEEN ADJACENT PLANKS 2.0 MM
- AT CLIENTS INSTRUCTION WHERE DECK IS TO BE OILED PROVIDE 2 COATS INTERGRAIN TIMBER OIL NATURAL ANTISKID FOR WET TRAFFICABLE AREAS TO ALL SURFACES OF PLANKS & HOLES
- IN TIDAL ZONE WHERE TIMBER DECKING IS USED APPLY EPIREZ NON-SLIP WITH QUARTZ GRIP PER MANUFACTURERS SPECIFICATION

BOLTING TIMBER

- ALL BOLTING IN ACCORDANCE WITH AS 1684 AND AS1720
- ALL BOLTS TO BE GALVANIZED Ø M24 8.8 / S UNO NO CONNECTION SHALL HAVE LESS THAN 2 BOLTS UNO
- INSTALL BOLTS IN PRE-DRILLED HOLES 2MM Ø GREATER THAN THE BOLT DIAMETER.
- PROVIDE 50 *5 PL GAL WASHERS
 PROVIDE BOLTS OF ADEQUATE LENGTH TO LEAVE AT LEAST 5 THREADS PAST NUT
- BOLTS SHALL BE GIVEN MIN CLEARANCE OF 8 BOLT Ø TO END OF TIMBERS AND 4 Ø TO EDGES OF TIMBER. DO NOT USE ANY TIMBER WITH LOOSE KNOTS, SLOPING
- GRAIN OR OTHER DEFECTS WITHIN 100MM OF A CONNECTION THREAD ON BOLT SHALL NOT EXTEND >75MM INTO TIMBER &
- SHALL NOT PROTRUDE >2 BOLT Ø PAST NUT AND WASHER ALL BOLTS TO BE RECESSED INTO MEMBERS. ALL RECESSED BOLT HOLES IN TIMBER TO BE FILLED WITH
- EPOXY MIXED WITH BULKER TALC WITH A DOMED SURFACE 12. COACHBOLTS INSTALLED IN PRE-DRILLED HOLES 80% Ø BOLT
- ALL BOLTED CONNECTIONS TO BE INSPECTED AND RE-TIGHTENED BY CONTRACTOR AFTER 6 MONTHS

TIMBER PAINT

- ALL TIMBER SHALL BE PAINTED WITH A REPUTABLE EXTERIOR WEATHERPROOF PAINT 2 COATS PREPARE TIMBER BY
- ENSURE ALL HEARTWOOD LAYED FACE DOWN DO NOT PRESENT ANY BEAMS WITH MAJOR KNOTS - US
- SELECTED TIMBER BEAMS FILL ALL MINOR SWALES WITH BLACKJACK

EPIREZ NON SLIP SURFACING

ALL NON SLIP AREAS TO BE INSTALLED PER MANUFACTURERS SPECIFICATION

FILL ANY GAPS AND PAINT ALL ENDS

- PREPARE SURFACE BY WATER BLAST CLEAN
- APPLY COATINGS IN THE DRY NOT IN THE WET. THIS MAY REQUIRE COATING APPLICATION PRIOR TO INSTALLATION OF THE DECKING
- 4. APPLY PRIMER COAT EPIREZ 123 EPOXY SEALER / PRIMER
- APPLY FIRST COAT: EPIREZ SUPATUFF EPOXY H.D
- APPLY EPIREZ SIL CARB AGGREGATE 1 0MM Ø KOPPERS PILES - F27 DOUBLE TREATED ONLY IF SPECIFIED 7. APPLY SECOND COAT: EPIREZ SUPATUFF EPOXY H.D. COLOUR OF NON SLIP SURFACING IS TO BE ADVISED.

RECYCLED PLASTIC BEAMS

- ΕΩΙΙΙΛΑΙ ΕΝΤ
- F(SERVICEABILITY) = 3150 MPa
- E(ULTIMATE) = 1500 MPa NOT LINEAR TENSILE STRESS ALLOWABLE = 11.5 MPa BENDING STRESS ALLOWABLE FB(ULS) = 21 MPa

- 1. HDPE SHALL BE TAKEN TO MEAN HIGH DENSITY
- LISE WEAREX OR SOLIDLIR FOR HOPE APPLICATIONS USE POLYSTONE 7000 SR WHERE SHOWN FOR UHDPE APPLICATIONS

SIGNAGE

- FABRICATE 2 OFF PLASTIC SIGNS ENGRAVED WITH WORDS
- INFORM OF RISK TO LIFE AND INJURY

- PER NBC REQUIREMENTS TO EFFECTIVELY DETER PEOPLE FROM CLIMBING ON STRUCTURE BEAMS
- INSTALL BOTH SIGNS TO BEAM ENDS USING S.S 316 FIXINGS

THE PLASTIC BEAMS SHALL BE BY APR COMPOSITES OR

- THE BULK DENSITY = 1 T /M3
- THE DESIGN MATERIAL PROPERTIES SHALL BE MINIMUM
- CREEP FACTOR FOR LONG TERM DEFLECTION * 2.5
- SHEAR STRESS ALLOWABLE FS(uls) = 7 MPA TEAR OUT OF AN M12 COACHBOLT = 19.9 KN

HDPE BLOCKS

18. THE ENGINEER SHALL BE GIVEN 24 HOURS NOTICE FOR REINFORCEMENT INSPECTION AND CONCRETE SHALL NOT BE DELIVERED UNTIL FINAL APPROVAL OBTAINED

GROUT 19 ALL GROUT SHALL BE COMBEXTRALIW

DUE TO CONSTRUCTION LOADING.

APPLIED FINISHES

APPROVAL OF ENGINEER

20 OR SIKA GROUT UW

CONCRETE

ACCORDANCE WITH AS1379.

MAX AGG SIZE = 20 MM

F'C = 50 MPA

COVER = 70 MM

SLUMP = 80 MM

MAY BE VARIED.

CEMENT TYPE = MARINE

REINFORCEMENT AND CONCRETE.

MAX WATER: CEMENT RATIO = 0.4

CURING = 7 DAYS WET CURE

EXPOSURE CLASSIFICATION = C

CEMENT CONTENT = 470 KG/M3

DURABILITY AT 28 DAYS = 1000 COLOMBS

APPROVED BY ENGINEER IN WRITING.

ALL MATERIALS & WORKMANSHIP SHALL BE IN ACCORDANCE

SPECIFICATION DOCUMENT 1 SHALL APPLY TO FORMWORK,

PROJECT CONTROL TESTING SHALL BE CARRIED OUT TO AS3600

CONCRETE MIX DESIGNS TO BE SUBMITTED FOR REVIEW PRIOR

MAX SHRINKAGE STRAIN AT 56 DAYS 600E-6 UM TO AS1012.13

NO ADMIXTURES OR ASH CONTENT SHALL BE USED UNLESS

FOR STRENGTH AND SHRINKAGE ARE MANDATORY, OTHER

CONCRETE PLACED UNDER WATER TO BE POURED USING A

11. ALL CONCRETE SHALL BE COMPACTED USING MECHANICAL

12. FINISHED CONCRETE SHALL BE A DENSE HOMOGENOUS MASS, COMPLETELY FILLING THE FORMWORK & THOUROUGHLY EMBEDDING THE REINFORCEMENT AND FREE OF STONE

13 CONSTRUCTION SUPPORT PROPPING IS TO BE LEFT IN PLACE

14. CONCRETE FORMED SURFACES TO HAVE CLASS 2 FINISH TO

SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE WITHOUT THE PRIOR WRITTEN ENGINEERS APPROVAL.

AS3610 UNLESS ARCHITECTS SPECIFY OTHER 15. CONCRETE SIZES SHOWN DO NOT INCLUDE THICKNESS OF

WHERE NEEDED TO AVOID OVERSTRESSING THE STRUCTURE

PARAMETERS FOR THESE MIXES HAVE BEEN SUGGESTED BUT

FOR THESE CONCRETE MIXES THE REQUIREMENTS SPECIFIED

FROM AN APPROVED SOURCE.
ALL THE REQUIREMENTS OF THE ACSE CONCRETE

- 21. OR DENSO U/W
- 22. MINIMUM 50 MPa
- 23. APPLY IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATION

STEEL REINFORCEMENT

- 24 ALL REINFORCEMENT SHALL BE TO AS4671 2001
- 25. ALL REINFORCEMENT SHALL BE STRENGTH GRADE 500N UNO 26. ALL REINFORCEMENT SHALL BE GALVANISED TO 600 G/M2 TO 7
- 27. THE GALVANISING OF REINFORCING SHALL BE UNDERTAKEN AFTER ALL CUTTING, BENDING AND WELDING OF CAGES IS
- 28. REPAIR ANY DAMAGE TO GALVANISING OR CUTS FOLLOWING THE PREOCEEDURES IN AS4680.
- 29. DO NOT ACTIVATE ADJACENT STEELWORK BY CONTACT WITH THE GALVANISED REINFORCEMENT. 30. ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED AT
- 800MM CRS ON PLASTIC CHAIRS 31. LAPS AND SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN POSITIONS SHOWN OR OTHERWISE APPROVED IN
- WRITING BY THE ENGINEER. 32. TENSION LAP LENGTHS (MM) SHALL BE: N12 N16 N20 N24 N28 N32 N36 500 750 1000 1200 1450 1800 2150
- 33. FABRIC LAP SHALL BE SUCH THAT THE TWO OUTERMOST WIRES OF ONE SHEET OVERLAP THE TWO OUTERMOST WIRES OF THE OTHER SHEET BY 25MM MINIMUM 34. ENGINEER SHALL BE GIVEN 24 HOURS NOTICE FOR
- REINFORCEMENT INSPECTION 35. CONCRETE SHALL NOT BE POURED UNTIL FINAL APPROVAL

ANCHORS

- ITH AS3600 AND AS3610 CURRENT EDITION WITH AMENDMENTS, 1. 100 KG GAL DANFORTH ANCHORS TO BE USED EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS PER NSWM FORE AND AFT MOORING STUDY 1987 CL PREMIXED OR READYMIX CONCRETE SUPPLY SHALL BE IN
- 3.1.2; ADMIRALTY OFFICE (1959) COMPARITIVE TESTS BY THE BRITISH SERVICE MINISTRIES; AND VOL III OF THE PORTLAND CEMENT SHALL BE TYPE SLAND SHALL BE OBTAINED MANUAL OF SEAMANSHIP

TYPE	HORIZONTAL	HOLDING PULL	
	SAND	DEEP MUD	
CONCRETE BLOCK	0.6X	0.9X	
DANFORTH	15X	-	
SINGLE PICK MOORIN	G 4.5X	5.5X	
STOCKLESS	2.5X	3.5X	
CQR / PLOUGH	6.5X	-	
MPROVED ADMIRALT	Y 3.5X	-	
CHAIN < 2" Ø	1X	-	
CLIAINI > 2"0	0.67		

NOTE: ALL FACTORS ABOVE ARE MULTIPLIED BY THE WEIGHT

ROPES AND CORDAGE

- ROPE MATERIALS AND INSTALLATION SHALL BE IN ACCORDANCE WITH AS 4142 - FIBER ROPES
- MOORING PILE ROPE SHALL BE KINNEARS THREE STRAND HAWSER LAID POLYETHYLENE SILVER ROPE 24Ø MINIMUM BREAKING FORCE 51.7 KN
- MOORING BLOCK / ANCHOR RODE ROPE SHALL BE WHERE POSSIBLE ALL CONCRETE IS TO BE PLACED IN THE DRY. TYPE GREEN 28MM Ø * 3 STRAND SHIPS MOORING LINE MINIMUM BREAKING LOAD OF 94.6 KN
 - RODE LENGTH SHALL COMPLY TO CL 3.1.5 MSB FORE AND AFT MOORING STUDY 1987 - THE MINIMUM RODE LENGTH SHALL BE HALF THE LOW TIDE WATER DEPTH SPLICING OF SYNTHETIC FIBRE ROPES SHALL BE TO
 - AND TO THE ADMIRALTY SEAMANSHIP MANUAL SPLICING SHALL BE OVER A MINIMUM OF 5 TUCKS
 - MOORING RODE SHALL HAVE A GALVANISED HARD-EYE/ THIMBLE SPLICED AT EITHER END IN ACCORDANCE WITH

BEST INDUSTRY PRACTICE FOR RIGGING AND LIFTING,

USE ONLY GALVANIZED HEAVY DUTY GRADE THIMBLES SUITABLE FOR RIGGING AND LIFTING (NOT LIGHT GRADE 16. O HOLES CHASES OR EMBEDMENTS OF PIPES OTHER THAN THAT COMMERCIAL)

17. CONSTRUCTION JOINTS WHERE NOT SHOWN TO BE LOCATED TO ANCHOR CHAIN

- MOORING GROUND CHAIN SHALL BE STUDLINK CHAIN BALDT GRADE 1 CHAIN @ 1/2" Ø PROOF TEST 24 T / BREAK LOAD 34T WEIGHT PER 15 FATHOM SHOT (27.4M) = 491 KG WEIGHT / M LENGTH = 18 KG / M 8 LINKS PER L.M APPROX
- GAI VANISED MINIMUM 5M GROUND CHAIN EACH MOORING LINE
- LINI ESS NOMINATED OTHERWISE OTHER CHAINS MAY BE SUBMITTED TO ENGINEER FOR
- ANCHOR CHAINS MUST BE WELL BALANCED TO TAKE UP MOORING LINE LENGTH INCLUDING RODE MUST BE 3
- TIMES THE HIGH TIDE WATER DEPTH MINIMUM OR 15 M WHICHEVER GREATER ALL SHACKLES AND FIXTURES AND FITTINGS SHALL BE RATED AS FOR THE ATTACHING CHAIN MINIMUM. ALL PINS TO SHACKLES ETC SHALL BE SEIZED SO THEY
- CANNOT WORK LOOSE ALL CHAINS, RODES AND FIXING MUST BE INSPECTED

ANNUALLY FOR WEAR SHACKLES

- 10. ALL SHACKLES TO BE RATED MINIMUM 4.7T. SWL ALL CONNECTIONS TO BE SECURED BY SHACKLES.
- 12 LARGED-SHACKLE GALVANISED STEEL TO AS B278 13. SEIZE PINS SUCH THAT THEY CANNOT WORK LOOSE OVER

MOORING BALANCING

ADJUST CHAINS AS REQUIRED

- MOOR EVENLY AND BALANCED ON CHAINS TO TAKE UP
- CONTRACTOR TO RETURN TO SITE AS REQUIRED AND ADJUST PONTOON CHAINS AS REQUIRED TO ENSURE LOADS ARE BALANCED CONTRACTOR TO RETURN TO SITE AFTER 3 MONTHS AND

SEA NET



- THE SEA NET SHALL BE DESIGNED, SUPPLIED AND INSTALLED AND CERTIFIED BY SEADRAGON PTY LTD TO THE MINIMUM PERFORMANCE SPECIFICATION OF THESE DRAWINGS AND SPECIFICATION.
- PREDATOR PRO 150 MM WEAVE (10") BLUE / BLACK COLOUR 9Ø S.S WIRES WOVEN THROUGH THREAD
- HEAVY DUTY THREAD CUT RESISTANT
- CONTRACTOR SHALL HAVE AT LEAST 10 YEARS EXPERIENCE INSTALLING AND MAINTAINING SEAPOOL NETS HANG NET WITH WEAVE AT 45° TO ALLOW FOR EXPANSION
- SEANET MUST EFFECTIVELY PREVENT SHARKS FROM ENTERING THE ENCLOSURE
- SEADRAGON TO PROVIDE ALL S.S 316 EYEBOLTS AND INSTALL
- 10. PROVIDE ALL ROPES AND CORDAGE AND CHAINS AND SHACKLES AND ANCHORS
- BALANCE NET AND CHAINS AND ANCHORS EVENLY AND ENSURE NET WORKS AT ALL TIDES
- 12. ADJUST SEANET AFTER 1 MONTH
- 13. ADJUST SEANET AFTER 6 MONTHS

MAINTENANCE - CONTRACTOR

THE CONTRACTOR SHALL RETURN AS PART OF THESE WORKS AFTER 6 MONTHS AND TIGHTEN ALL BOLTS TO TIMBER WORK TO ENSURE THE JOINT IS TIGHT AFTER

MAINTENANCE - OWNER

- THE OWNER SHALL RECOGNISE THAT ALL MARINE STRUCTURES ARE ACTIVE AND IN CONSTANT MOTION BOATS AND FLOATING VESSELS MOVE IN THE WATER COLUMN AND WAVES AND CYCLIC LOADS IMPACT
- THE AS DRAWN STRUCTURES REQUIRE ACTIVE AND
- AN EXPERIENCED MANAGER TO BE RESPONSIBLE FOR ONGOING MONITOR BY REGULAR VISUAL INSPECTION KEEP ADEQUATE WRITTEN RECORDS OF INSPECTIONS
- CONDUCT THOROUGH VISUAL CHECK AFTER STORM EVENT FOR ANY DAMAGE AND REPORT TO ENGINEER FOR ASSESSMENT

PRELIMINARY NOT TO BE USED FOR CONSTRUCTION

H TENDER 191019

NORTHERN BEACHES COUNCIL

C/O MRS. TINE BIRKEMOSE

PROPOSED REFURBISHMENT LITTLE MANLY TIDAL POOL

SPECIFICATION (CONT)

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engineering consulting



















