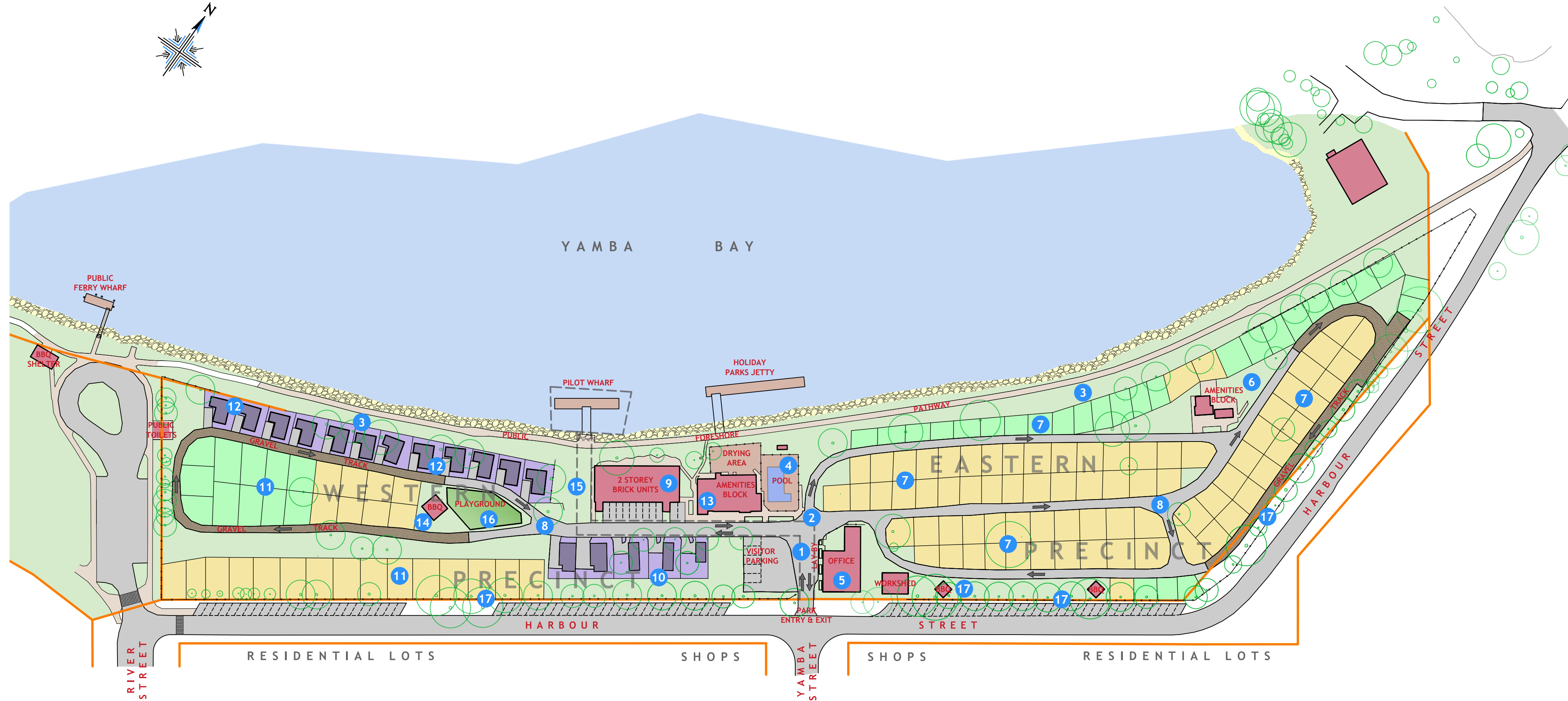




EXISTING ISSUES:

- 1 THE PARK ENTRANCE IS POORLY LOCATED CAUSING CONGESTION IN THE TOWN CENTRE. THE ENTRANCE ALSO RESTRICTS PUBLIC ACCESS TO THE YAMBA BAY FORESHORE. THERE IS POTENTIAL TO RELOCATE THE PARK ENTRY TO RIVER STREET.
- 2 THERE IS NO CLEAR PUBLIC CONNECTION BETWEEN YAMBA STREET AND THE YAMBA BAY FORESHORE.
- 3 THE BOUNDARY BETWEEN THE FORESHORE WALKWAY AND THE HOLIDAY PARK IS NOT CLEARLY DEFINED. SECURITY WITHIN THE PARK IS POOR.
- 4 THE POOL IS AT THE END OF ITS ECONOMIC LIFE AND IS POORLY LOCATED. USE OF THE POOL BY PEOPLE OTHER THAN HOLIDAY PARK GUESTS IS A PROBLEM.
- 5 THE MANAGERS RESIDENCE/RECEPTION BUILDING IS NEARING THE END OF ITS ECONOMIC LIFE. THE RECEPTION AREA AND WORKSHOP AREAS ARE TOO SMALL.
- 6 THE EASTERN AMENITY BUILDING IS A COLLECTION OF EN-SUITE BUILDINGS THAT DO NOT MEET THE NEEDS OF THE EASTERN PRECINCT. THE BUILDING NEEDS TO BE REPLACED WITH A NEW BUILDING WHICH MEETS THE NEEDS OF THIS PRECINCT.
- 7 THE EASTERN SITES ARE SMALL AND UNEVEN WITH LIMITED GRASS COVER. MANY SITES ARE NOT CONNECTED TO SERVICES.
- 8 THE CURRENT ROAD LAYOUT IS FUNCTIONAL, BUT THE CONDITION OF THE ROAD SURFACE IS POOR. STORMWATER DISPOSAL IS NOT MANAGED EFFECTIVELY THROUGHOUT THE PARK.
- 9 THE UNIT BLOCK IS AT THE END OF ITS ECONOMIC LIFE. THE 15 UNITS THAT ARE PROVIDED DO NOT MEET THE EXPECTATIONS OF THE CURRENT MARKET, AND HAVE VERY LOW OCCUPANCY. IT OCCUPIES A PRIME RIVERFRONT LOCATION THAT WOULD BE BETTER USED AS A HIGH QUALITY FAMILY ORIENTED CABIN PRECINCT.
- 10 THE CABINS NEAR THE PARK ENTRY DO NOT MEET CURRENT MARKET EXPECTATIONS. THEY OCCUPY A LARGE AREA IN THE CENTRAL PART OF THE PARK THAT WOULD BE BETTER USED AS A HIGH QUALITY FAMILY ORIENTED CABIN PRECINCT.
- 11 THE EXISTING SITES IN THE WESTERN PRECINCT ARE UNEVEN AND MANY ARE NOT CONNECTED TO SERVICES.
- 12 THE RIVERFRONT CABINS OCCUPY A PRIME LOCATION AND HAVE REASONABLE OCCUPANCY. THEY ARE IN NEED OF RENOVATION AND EXTENSION WHERE POSSIBLE.
- 13 THE MAIN AMENITY BUILDING, LAUNDRY AND DRYING AREA OCCUPY PRIME RIVERFRONT LOCATION. THE BUILDINGS ARE AT THE END OF THEIR ECONOMIC LIFE, AND NEED TO BE REPLACED WITH NEW BUILDING AWAY FROM THE FORESHORE.
- 14 COMMUNAL BBQ FACILITIES ARE LIMITED AND DATED. THERE IS NO CAMP KITCHEN FACILITIES FOR THE PARK.
- 15 VEHICLE ACCESS TO THE PILOT WHARF MUST BE MAINTAINED. THE PILOT ACTIVITIES ARE NOT COMPATIBLE WITH THE HOLIDAY PARK OR THE TOWN CENTRE LOCATION. CONSIDERATION SHOULD BE GIVEN TO RELOCATING THIS USE TO THE BOAT HARBOUR.
- 16 THE CHILDRENS PLAYGROUND IS IN POOR CONDITION AND REQUIRES REPLACEMENT.
- 17 THE BOUNDARY FENCE ALONG HARBOUR STREET REQUIRES SOME LANDSCAPING TO IMPROVE AESTHETICS.
- 18 THE CURRENT HOLIDAY PARK JETTY IS WELL USED. BUT USE OF THE JETTY BY PEOPLE OTHER THAN HOLIDAY PARK GUESTS IS A PROBLEM.

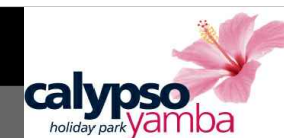
KEY:

- 38 SHORT TERM SITES (UN-POWERED)
- 98 SHORT TERM SITES (POWERED)
- 32 SHORT TERM SITES (CABINS & UNITS)
- 168 TOTAL SITES
- 5 VISITOR PARKING
- EXISTING VEGETATION

DRG TITLE: EXISTING SITE PLAN

JOB NAME: CALYPSO HOLIDAY PARK

0m 10m 20m 30m 40m 50m 60m 70m 80m 90m 100m



CLIENT: CLARENCE VALLEY COUNCIL

JOB No: 20.06

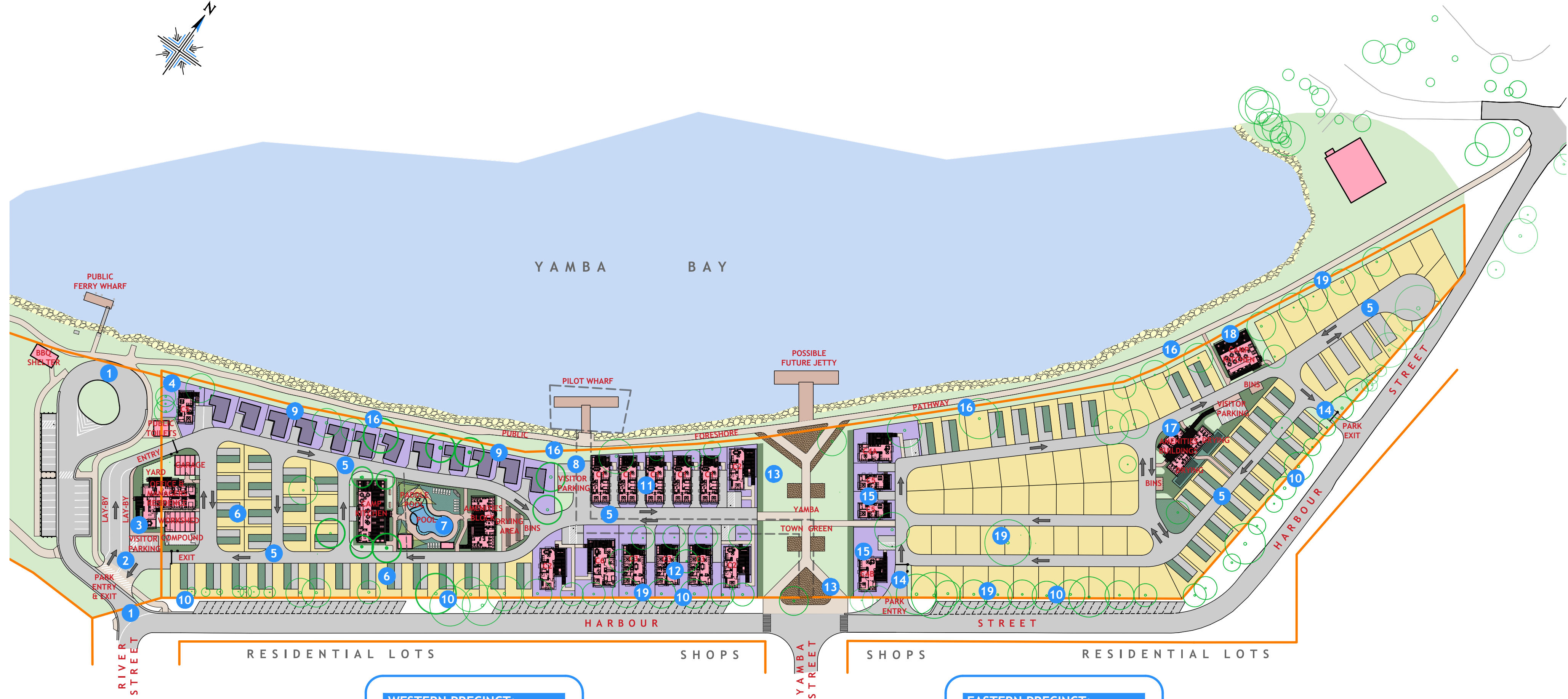
DATE: MARCH 2020

A2 SCALE: 1:1000

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DRG No:

C-01



WESTERN PRECINCT:

28	SHORT TERM SITES
25	SHORT TERM - CABINS SITES
53	TOTAL SITES

EASTERN PRECINCT:

76	SHORT TERM SITES
4	SHORT TERM - CABINS SITES
80	TOTAL SITES

PROPOSED IMPROVEMENTS:

- 1 CONSTRUCT A NEW PUBLIC ROADWAY, CARPARK AND LANDSCAPING IN FORD PARK SERVING THE FERRY WHARF. UTILISE THE TURN AROUND SECTION OF THE EXISTING ROADWAY AND RETAIN THE EXISTING PUBLIC TOILET BUILDING.
- 2 DEVELOP A NEW MAIN ENTRANCE FOR THE HOLIDAY PARK ON PART OF THE EXISTING PUBLIC ROAD WITH A FORECOURT CONFIGURATION AND VISITOR PARKING WHICH COMPLIES WITH THE REQUIREMENTS OF THE REGULATIONS. PROVIDE LANDSCAPING TO ENHANCE AESTHETICS OF THE NEW ENTRY AND INSTALL ENTRY/EXIT BOOMGATES TO MANAGE VEHICLE ACCESS INTO THE HOLIDAY PARK.
- 3 INSTALL A NEW RELOCATABLE BUILDING FOR THE OFFICE AND MANAGER'S RESIDENCE OF CONTEMPORARY DESIGN. PROVIDE AN ENCLOSED AREA AND WORKSHOP FOR PARK MAINTENANCE ACTIVITIES.
- 4 INSTALL A NEW RIVERFRONT HOLIDAY CABIN ON THE SITE ADJACENT TO THE NEW HOLIDAY PARK ENTRY.

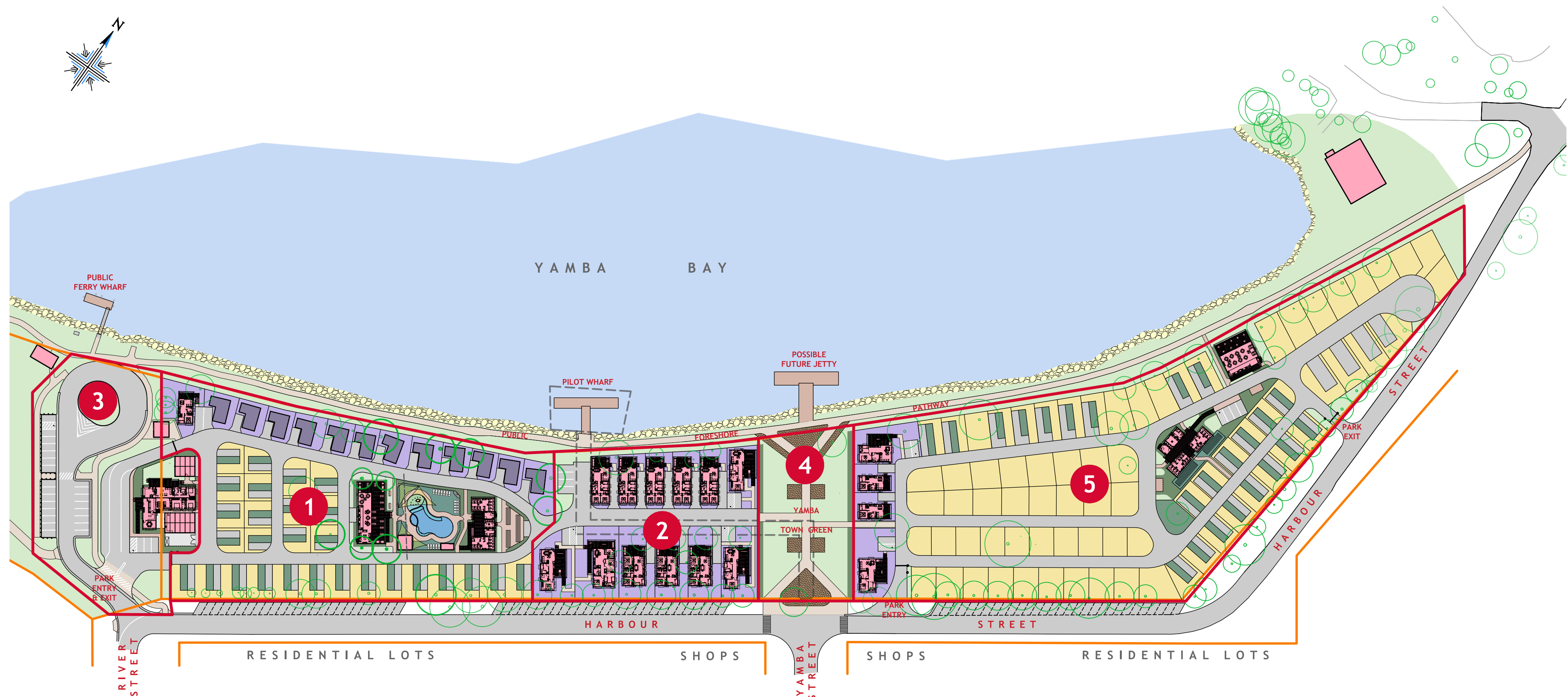
- 5 ALTER THE CURRENT INTERNAL ROAD AND SITE LAYOUT. PROVIDE A MIXED ONE WAY AND TWO WAY ROAD NETWORK WHICH SERVICES ALL SITES AND PROVIDES FOR FUNCTIONAL VEHICLE CIRCULATION. RESTORE/UPGRADE EXISTING ROADS WHERE POSSIBLE AND ENSURE EFFECTIVE DISPOSAL OF STORMWATER.
- 6 PROVIDE LARGE SHORT TERM SITES WHICH ARE ALL SERVICED WITH WATER, SEWER AND POWER.
- 7 CREATE A NEW CENTRAL RECREATION PRECINCT INCLUDING A NEW MAIN AMENITY BUILDING AND LAUNDRY, CLOTHES DRYING AREA, CAMP KITCHEN, POOL AND SPLASH PAD. PROVIDE SHADE, FENCING AND LANDSCAPING FOR THE POOL AREA AND SPLASH PAD.
- 8 MAINTAIN VEHICULAR ACCESS TO THE PILOT WHARF IN ACCORDANCE WITH EASEMENT REQUIREMENTS.
- 9 UPGRADE (12) EXISTING RIVERFRONT CABINS. EXTEND AND INSTALL COVERED DECKS WHERE POSSIBLE.

- 10 PROVIDE A 1M WIDE LANDSCAPE STRIP WITH LOW PLANTINGS INSIDE THE EXISTING FENCE ALONG HARBOUR STREET TO REDUCE VISUAL IMPACT OF THE FENCE AND PROVIDE SOME SCREENING TO SITES.
- 11 DEMOLISH EXISTING UNIT BLOCK, AMENITY BUILDING & LAUNDRY AND PROVIDE 6 NEW RIVERFRONT CABINS.
- 12 REMOVE EXISTING CABINS AND PROVIDE 6 NEW FAMILY CABINS BACKING ONTO HARBOUR STREET.
- 13 REMOVE THE EXISTING POOL, MANAGERS RESIDENCE/OFFICE BUILDING AND CARPARKING AND CONSTRUCT THE NEW 'YAMBA TOWN GREEN' PROVIDING PUBLIC ACCESS FROM YAMBA STREET THROUGH TO YAMBA BAY FORESHORE.
- 14 PROVIDE NEW VEHICLE ENTRY/EXIT TO THE EASTERN PRECINCT INCLUDING BOOMGATES TO MANAGE VEHICLE ACCESS INTO THE HOLIDAY PARK.
- 15 PROVIDE 4 NEW CABINS WITHIN THE NEW EASTERN PARK PRECINCT.

- 16 DEFINE THE BOUNDARY OF THE HOLIDAY PARK WITH LOW LEVEL LANDSCAPING AND FENCING. PROVIDE OPENINGS AT THE PILOT WHARF AND EASTERN CAMP KITCHEN WHICH FACILITATE PEDESTRIAN ACCESS TO THE RIVERSIDE WALKWAY.
- 17 DEMOLISH THE EXISTING EASTERN AMENITY BUILDING AND PROVIDE A NEW RELOCATABLE AMENITY BUILDING, LAUNDRY AND CLOTHES DRYING AREA.
- 18 INSTALL A NEW CAMP KITCHEN FOR THE EASTERN PRECINCT LOOKING OUT ONTO YAMBA BAY. CONNECT WITH PATHWAYS TO THE RIVERSIDE WALKWAY.
- 19 RETAIN EXISTING SIGNIFICANT VEGETATION AND CONSOLIDATE THE CHARACTER OF THE RESERVE AND THE HOLIDAY PARK THROUGH THE IMPLEMENTATION OF AN ONGOING PLANTING AND LANDSCAPING PROGRAM.

KEY:

104	SHORT TERM SITES
29	SHORT TERM - CABINS SITES
133	TOTAL SITES
9	VISITOR PARKING
●	EXISTING VEGETATION



STAGE 1 - WESTERN PRECINCT REDEVELOPMENT

- CONSTRUCT TEMPORARY CONSTRUCTION ACCESS FOR STAGE 1
- UPGRADE EXISTING RIVERFRONT CABINS
- INSTALL 1 NEW RIVERFRONT CABIN
- ELECTRICAL UPGRADE FOR WESTERN PRECINCT
- RECONSTRUCT INTERNAL ROADS
- PROVIDE NEW SERVICES TO SHORT TERM SITES
- INSTALL NEW AMENITY BUILDING AND DRYING AREA
- INSTALL NEW POOL, FENCING, SHADE & LANDSCAPE
- INSTALL NEW CAMP KITCHEN
- NORTHERN BOUNDARY FENCE AND LANDSCAPE

STAGE 2 - DEMOLITION & NEW CABIN PRECINCT

- DEMOLISH EXISTING BUILDINGS (UNIT BLOCK, LAUNDRY, AMENITY BUILDING)
- REMOVE EXISTING CABINS BEHIND UNIT BLOCK
- CONSTRUCT ROADWAY IN CABIN PRECINCT
- INSTALL 1 NEW DISABLED & 5 3BR RIVERFRONT CABINS
- INSTALL 3 NEW DISABLED & 3 3BR FAMILY CABINS
- NORTHERN BOUNDARY FENCE AND LANDSCAPE

STAGE 3 - FORD PARK CARPARK & PARK ENTRY PRECINCT

- CONSTRUCT NEW PUBLIC ROAD & CAR PARK - FORD PARK
- CONSTRUCT NEW PARK ENTRY ROAD & LAY-BYS
- INSTALL NEW CONCRETE FOOTPATHS
- INSTALL NEW RECEPTION/MANAGERS RESIDENCE BUILDING
- INSTALL NEW WORKSHOP, FENCE COMPOUND & HARDSTAND
- CONSTRUCT TEMPORARY ACCESS TO EASTERN PRECINCT
- INSTALL NEW BOOMGATE ENTRY/EXIT
- ENTRY PRECINCT LANDSCAPING, PATHS, LIGHTING

STAGE 4 - CONSTRUCT TOWN GREEN

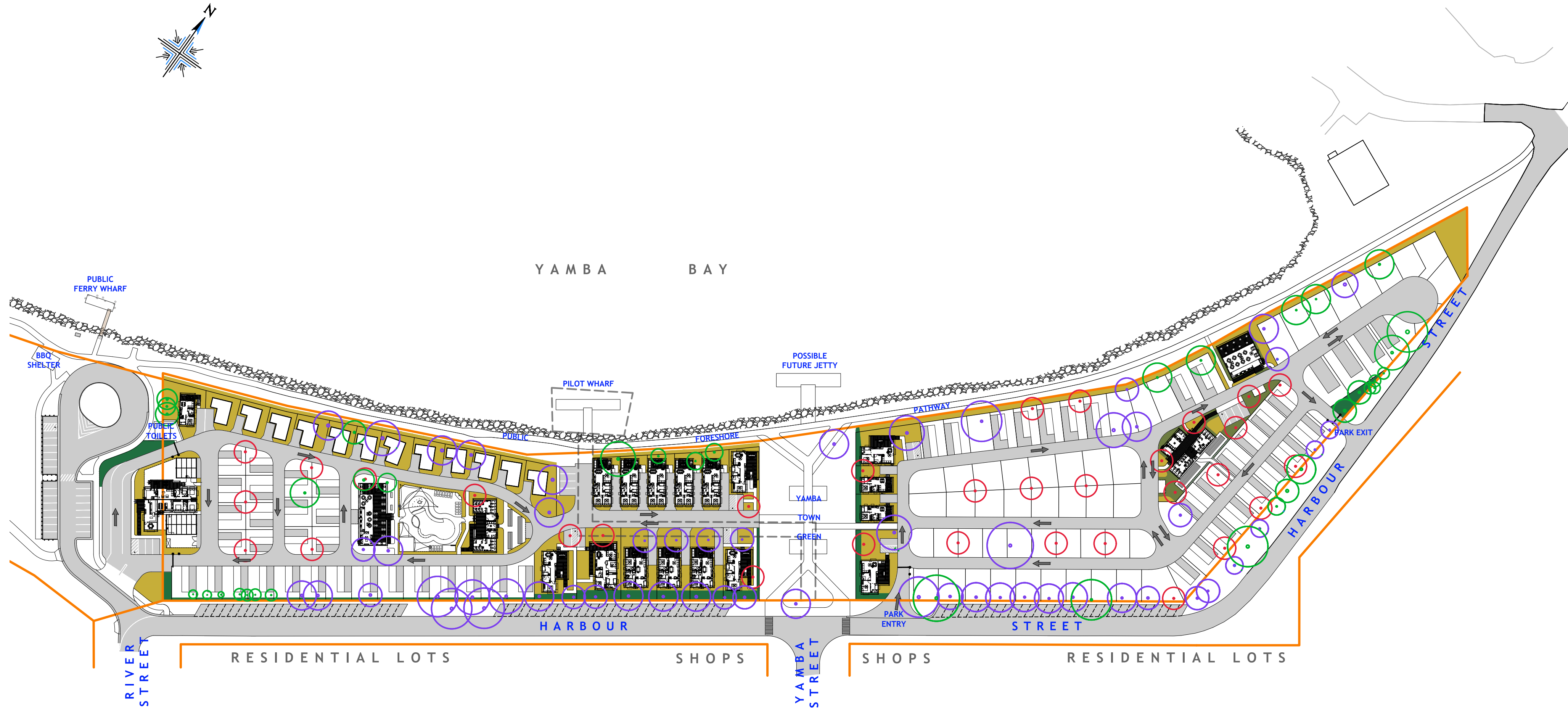
- DEMOLISH EXISTING BUILDINGS (RESIDENCE, SHEDS, POOL)
- REMOVE FUEL TANKS & REMEDIATE AREA
- CONSTRUCT PUBLIC TOWN GREEN AREA

STAGE 5 - EASTERN PRECINCT REDEVELOPMENT

- DEMOLISH EXISTING AMENITY BUILDING
- RECONSTRUCT INTERNAL ROADS & PARKING
- UPGRADE SERVICES TO EXISTING & NEW ST SITES
- INSTALL NEW AMENITY BUILDING & DRYING AREA
- INSTALL NEW CAMP KITCHEN
- INSTALL 4 NEW CABINS ON WESTERN END OF PRECINCT
- INSTALL NEW BOOMGATE ENTRY/EXIT
- NORTHERN BOUNDARY FENCE AND LANDSCAPE

KEY:

- 104 SHORT TERM SITES
- 29 SHORT TERM - CABINS SITES
- 133 TOTAL SITES
- 9 VISITOR PARKING
- EXISTING VEGETATION



CANOPY TREE PLANTING:
(INFILL PLANTING THROUGHOUT DEVELOPMENT)

- | | |
|--------------------------|--------------------------|
| BACKHOUSIA CITRIODORA | ... LEMON SCENTED MYRTLE |
| CUPANIOPSIS ANACARDIODES | ... TUCKEROO |
| HARPULLIA PENDULA | ... TULIPWOOD |
| SYZYGIIUM LUEHMANNII | ... RIBERRY |

SCREEN PLANTING:
(ALONG HARBOUR STREET FRONTAGE)

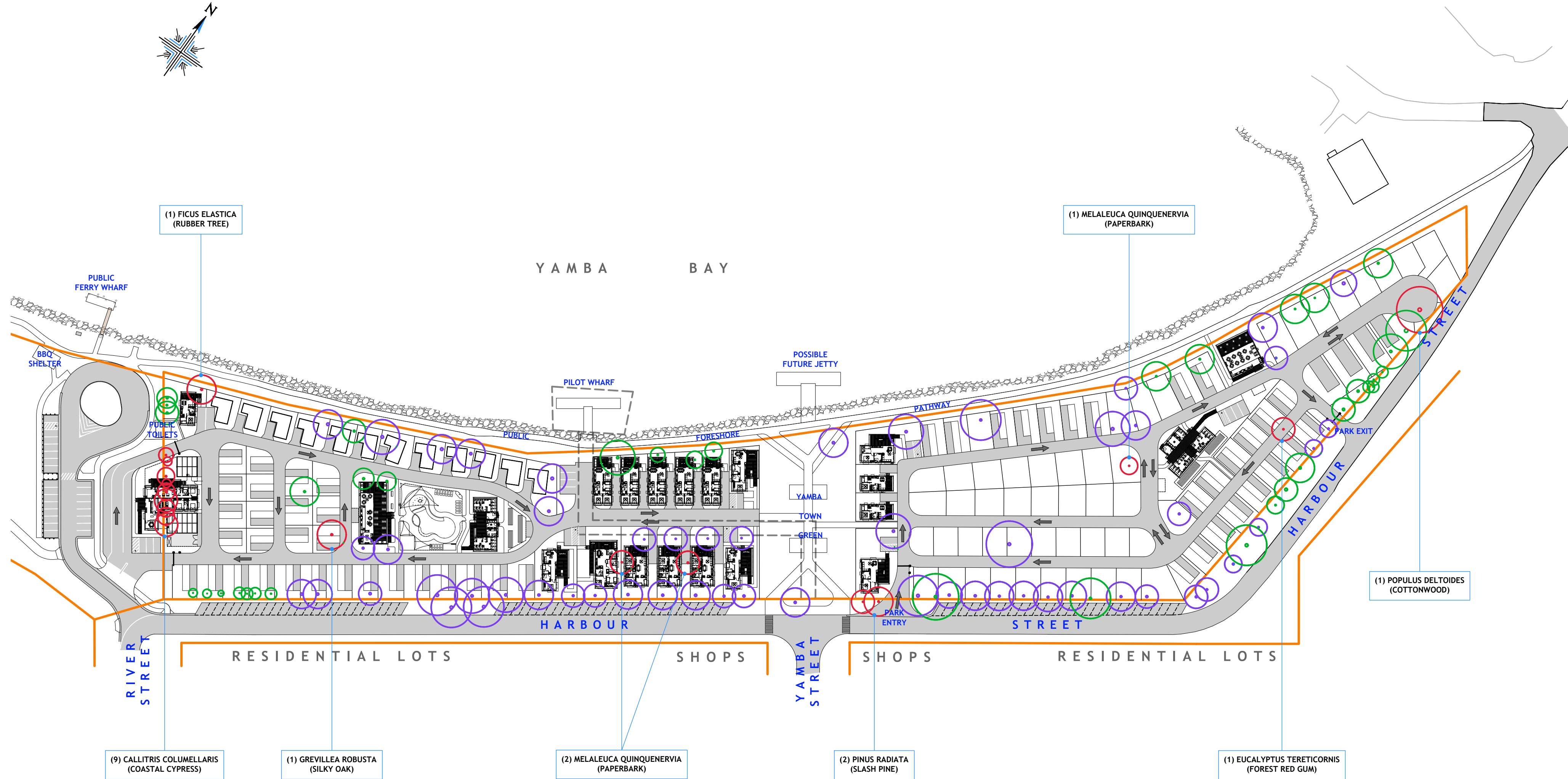
- | | |
|--------------------------|-------------------------|
| CALLITRIS COLUMELLARIS | ... COASTAL CYPRESS |
| CRYPTOCARYI TRIPLINERVIS | ... THREE VEINED LAUREL |
| SYZYGIIUM AUSTRALE | ... BRUSH CHERRY |

ORNAMENTAL PLANTING:
(AROUND BUILDINGS, COMMON AREAS & RIVERFRONT)

- | | |
|----------------------|----------------------|
| PANDANUS TECTORIUS | ... SCREW PINE |
| WESTRINGIA FRUTICOSA | ... COASTAL ROSEMARY |
| AUSTROMYRTUS DULCIS | ... MIDYIM |
| CRINUM PEDUNCULATUM | ... RIVER LILY |
| DIANELLA CAERULEA | ... BLUE FLAX LILY |
| LOMANDRA 'TANIKA' | ... MAT RUSH |

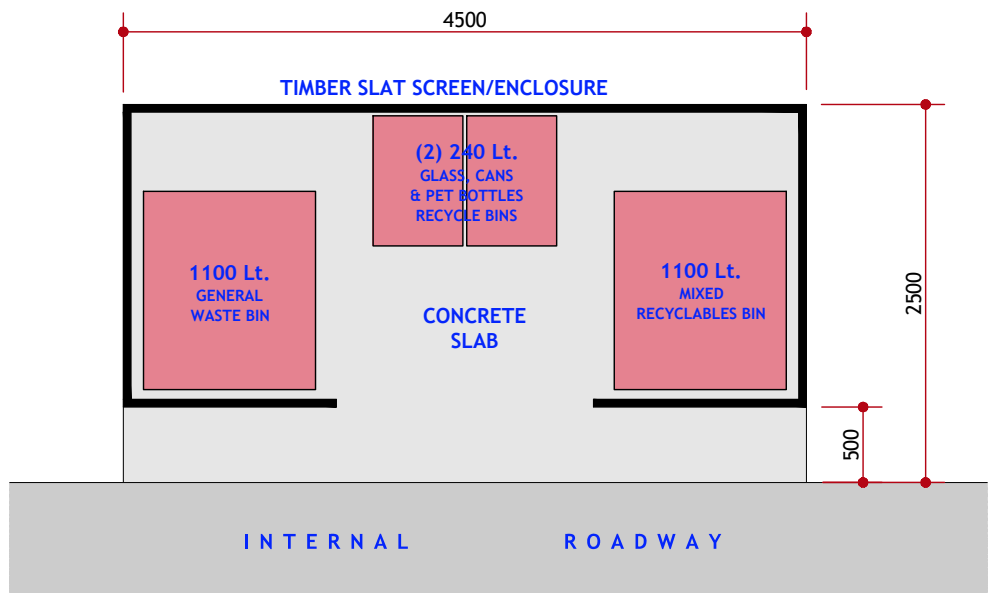
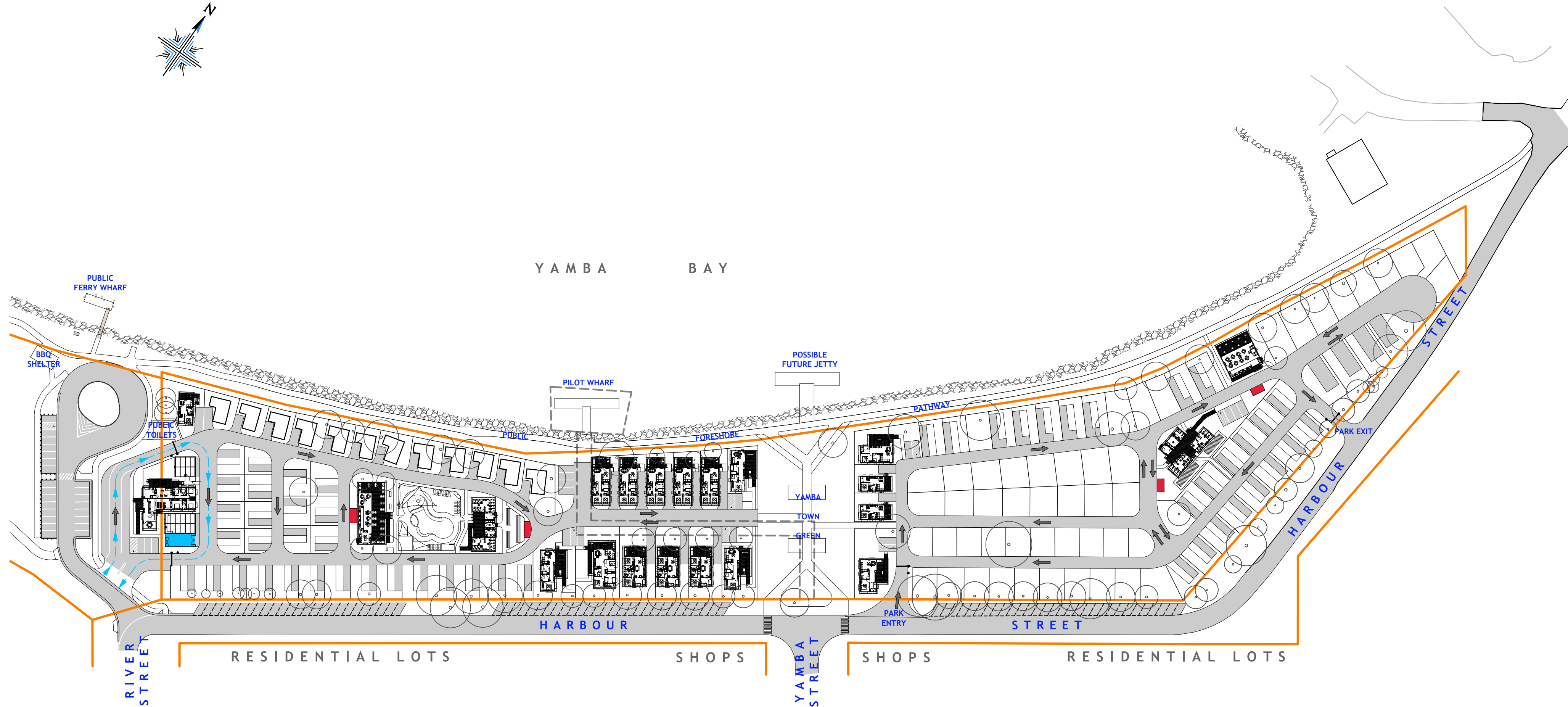
EXISTING VEGETATION:
(RETAINED WHERE SHOWN)

- EXISTING TREES OF VARIOUS SPECIES TO BE RETAINED
- ALL EXISTING NORFOLK ISLAND PINES TO BE RETAINED.



EXISTING TREE LEGEND:

- EXISTING TREES TO BE RETAINED (VARIOUS SPECIES)
- EXISTING TREES TO BE RETAINED (NORFOLK ISLAND PINES)
- EXISTING TREES TO BE REMOVED (VARIOUS SPECIES)



BIN STATION DETAIL
1:50

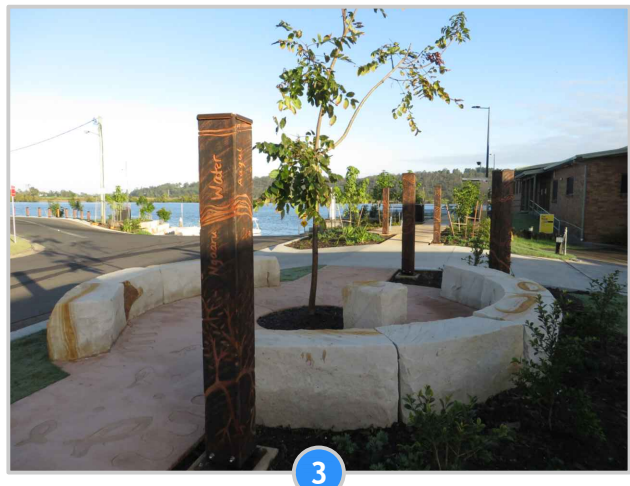
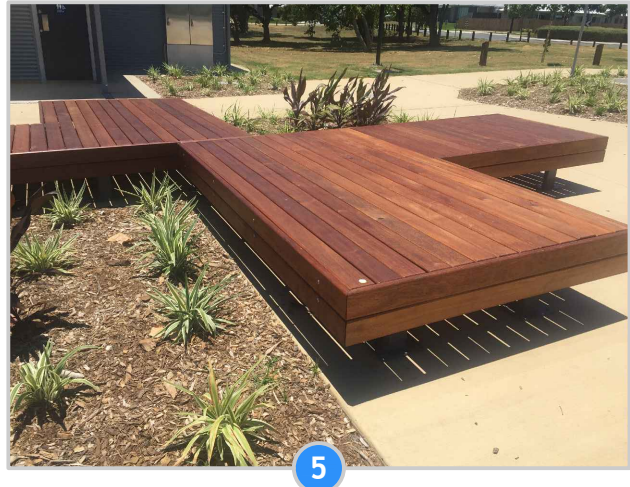
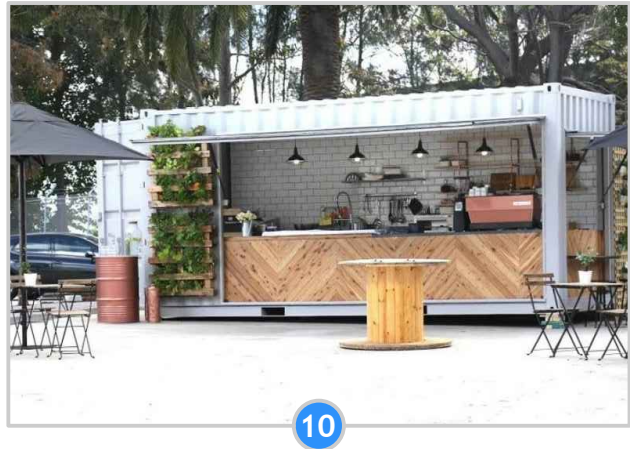
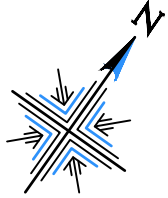
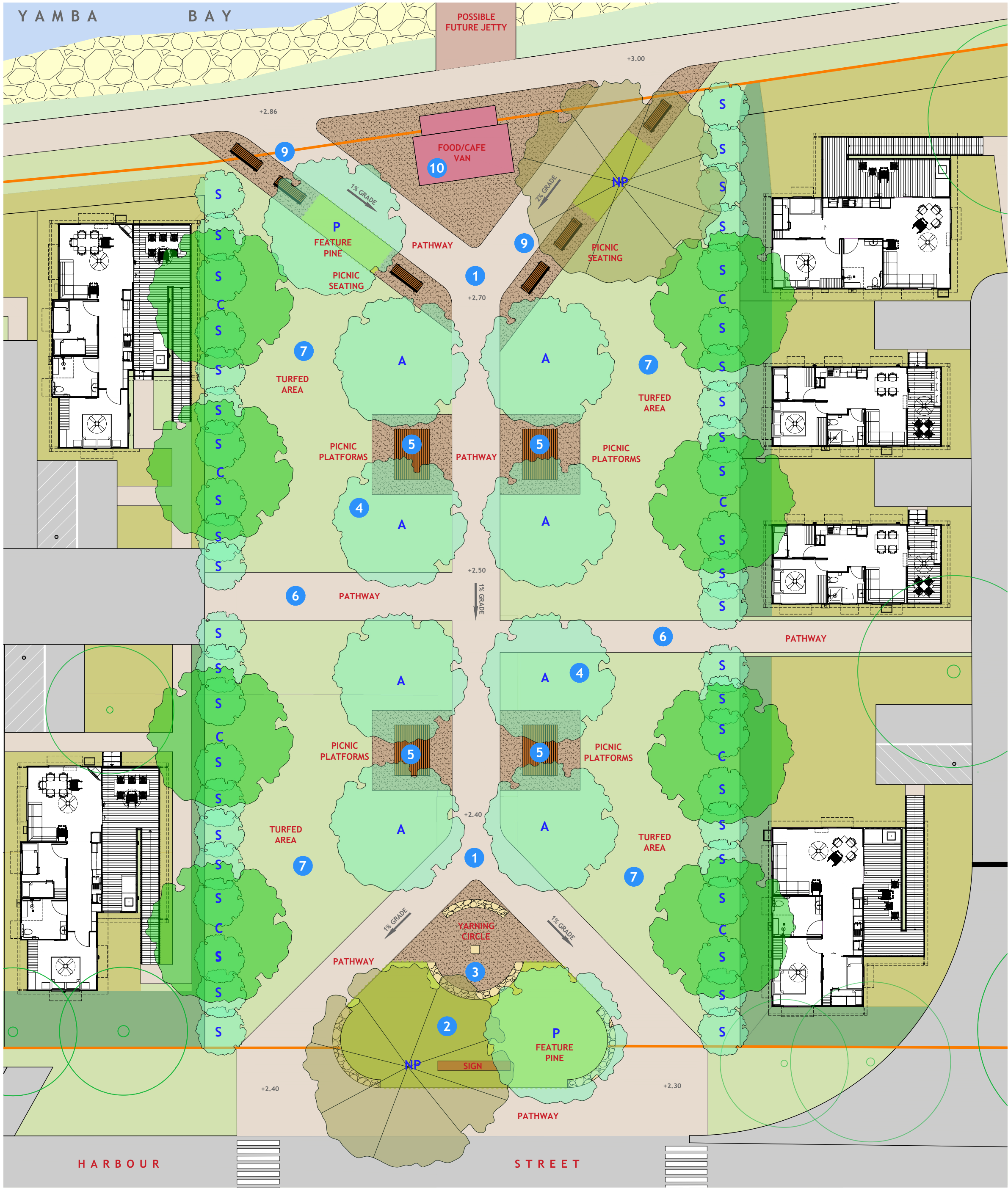
KEY:

(4) BIN STATIONS (4.5mx2.5m)
TIMBER SLAT SCREEN ENCLOSURE

(1) WASTE COMPOUND (10.5mx4.5m)
COLORBOND FENCED ENCLOSURE

PARK WASTE COLLECTION VEHICLE
TRAVEL PATH

NOTE:
BINS TO BE TRANSPORTED TO WASTE COMPOUND
VIA INTERNAL ROAD NETWORK



KEY:

- EXISTING NORFOLK ISLAND PINE
- PROPOSED TUCKEROO'S
- VARIED PROPOSED TREES "AS LABELED"
- SURROUNDING TURFED AREAS
- NEW LOW LEVEL PLANTING
- NEW CONCRETE PATHWAYS
- DECOMPOSED GRANITE
- EXISTING ROADS

PLANTING SCHEDULE:

TREE SPECIES:

A	ARAUCARIA HETEROPHYLLA....	NORFOLK ISLAND PINE (8)
C	CUPANIOPSIS ANACARDIODES....	TUCKEROO (8)
S	SYZYGIUM AUSTRALE....	BRUSH CHERRY (44)
P	PANDANUS PEDUNCULATUS....	SCREW PINE (2)
NP	ARAUCARIA HETEROPHYLLA....	BEXISTING NORFOLK ISLAND PINES (2)

LOW ORNAMENTAL PLANTING:

AUSTROMYRTUS DULCIS....	MIDYIM
CRINUM PEDUNCULATUM....	RIVER LILY
DIANELLA CAERULEA....	BLUE FLAX LILY
LOMANDRA TANIKAI....	MAT RUSH

NOTES:

- CENTRAL PATHWAY - CONNECTING YAMBA STREET TO YAMBA BAY. COLOURED CONCRETE, 3 METRES WIDE WITH LOW LEVEL LIGHTING CONTROLLED BY PE CELL. INCORPORATE YEAGL TOTEMS/STORIES AS APPROPRIATE. WHEELCHAIR ACCESSIBLE GRADES THROUGHOUT. SUITABLE FOR EMERGENCY VEHICLE ACCESS AND PILOT VEHICLE ACCESS UNTIL ALTERNATIVE EASEMENT IS CREATED.
- TOWN GREEN ENTRY STATEMENT - FEATURE NATIVE PLANTINGS (INCLUDING PANDANUS) AROUND EXISTING NORFOLK ISLAND PINE. SANDSTONE BLOCK EDGING PROVIDING CASUAL SEATING AND SANDSTONE PLACE SIGNAGE INCORPORATING YAEGL LANGUAGE, STORIES & TOTEMS AS APPROPRIATE.
- YARNING CIRCLE - SANDSTONE SEATING BLOCKS WITH DECOMPOSED GRANITE SURFACE.
- NORFOLK ISLAND PINE AVENUE - ADVANCED TREE PLANTINGS PROVIDING SHADE AND A STRONG VISUAL LINK TO THE YAMBA BAY FORESHORE.
- PICNIC PLATFORMS - 4 LOCATED ALONG EACH SIDE OF CENTRAL PATHWAY. LOCAL HARDWOOD STRUCTURES WITH DECOMPOSED GRANITE GROUND SURFACING.
- CALYPSO HOLIDAY PARK PATHWAY - COLOURED CONCRETE PATH CONNECTING EAST AND WEST PRECINCTS OF HOLIDAY PARK. PIN CODE GATE TO ACCESS EACH HOLIDAY PARK PRECINCT.
- GRASSED LAWNS - PROVIDING A FLEXIBLE OPEN SPACE FOR A VARIETY OF CASUAL AND STRUCTURED ACTIVITIES INCLUDING PICNICS, EVENTS, MARKETS, BUSKERS, SHOWS ETC. PROVIDE A POWER AND WATER CONNECTION POINT FOR EACH SIDE OF THE CENTRAL PATHWAY.
- SCREEN PLANTING TO HOLIDAY PARK - ADVANCED LILLY PILLY AND TUCKEROO PLANTINGS ALONG HOLIDAY PARK FENCE LINES FOR SCREENING, PRIVACY AND SHADE.
- CASUAL SEATING - 6 OVERLOOKING YAMBA BAY AND BENEATH EXISTING NORFOLK ISLAND PINE AND FEATURE PANDANUS PLANTING. ADJACENT TO FOOD/COFFEE VAN. LOCAL HARDWOOD CONSTRUCTION WITH DECOMPOSED GRANITE GROUND SURFACE.
- FOOD/COFFEE VAN - LEASE AREA FOR MOBILE FOOD VENDORS. OVERLOOKING YAMBA BAY FORESHORE WITH DECOMPOSED GRANITE GROUND SURFACE. PROVIDE POWER AND WATER CONNECTION POINT. VENDOR TO PROVIDE FURNITURE, SHADE & LANDSCAPE IN LICENCE AGREEMENT.



1. 2-storey brick unit block



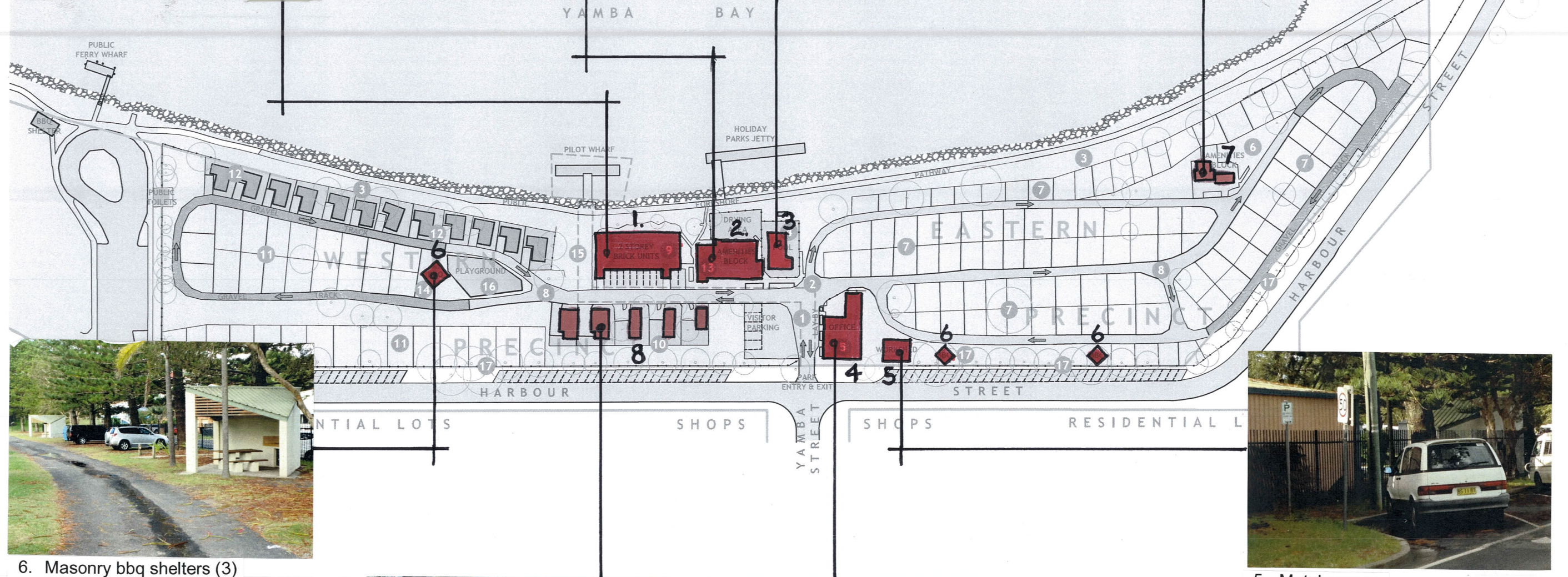
2. Brick amenity building



3. Concrete swimming pool



7. Eastern amenity building



6. Masonry bbq shelters (3)



5. Metal garage

BUILDINGS TO BE DEMOLISHED

1. 2-storey brick unit block
2. Brick amenity building
3. Concrete swimming pool
4. Park reception / managers residence
5. Metal garage
6. Masonry bbq shelters (3)



8. Tourist cabins (5)



4. Park reception / managers residence

RELOCATABLE BUILDINGS TO BE REMOVED

7. Eastern amenity building
8. Tourist cabins (5)

CALYPSO YAMBA HOLIDAY PARK DEMOLITION PLAN

0m 10m 20m 30m 40m 50m 60m 70m 80m 90m 100m

CLIENT: CLARENCE VALLEY COUNCIL

JOB No: 16.02

DATE: MARCH 2019

A2 SCALE: 1:1000

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DRG No: C-01



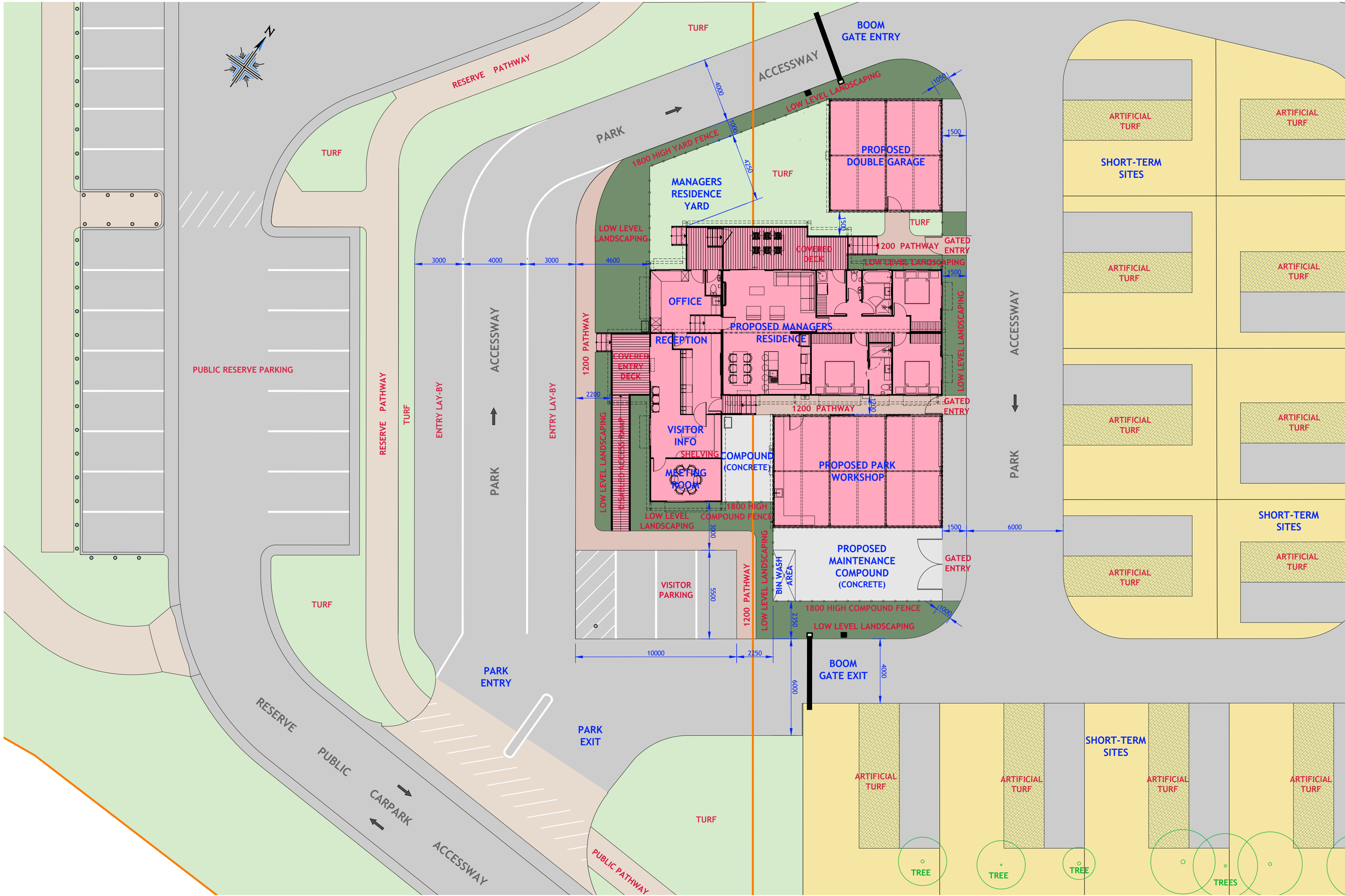
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A2 SCALE: 1.125

CPL-01

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DRG TITLE: PROPOSED DOUBLE GARAGE FLOOR PLAN

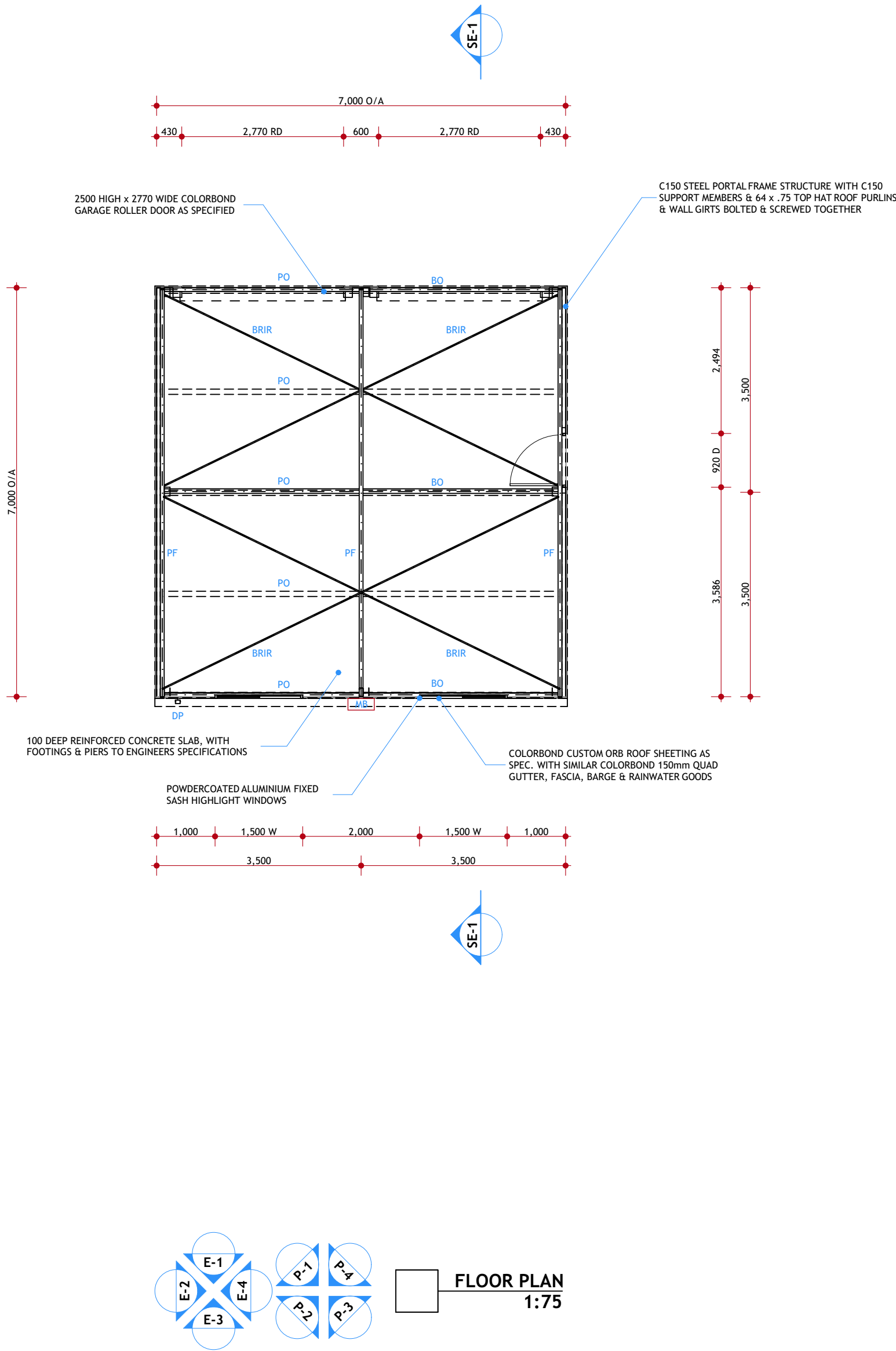
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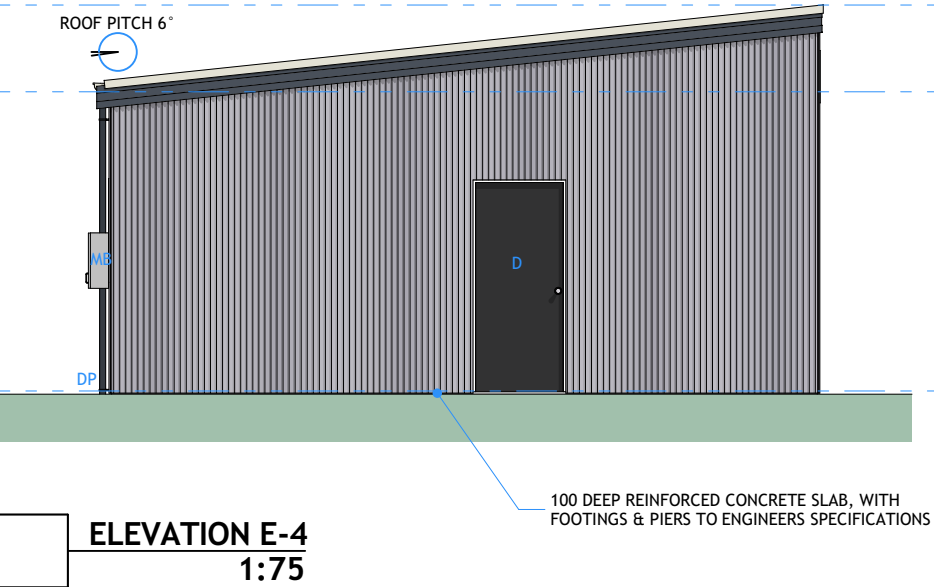
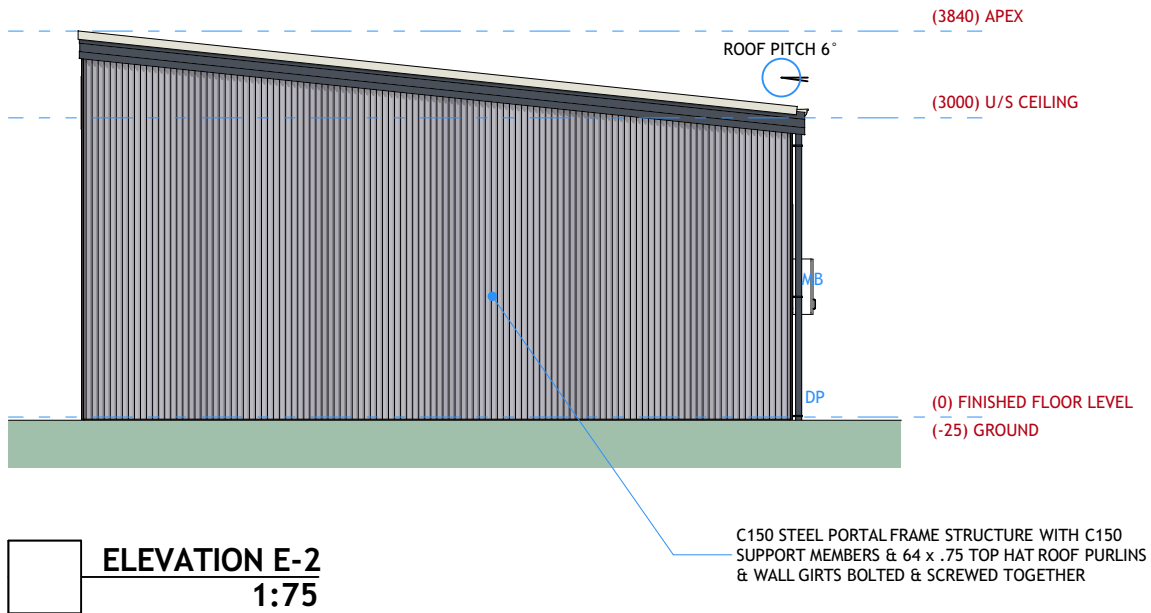
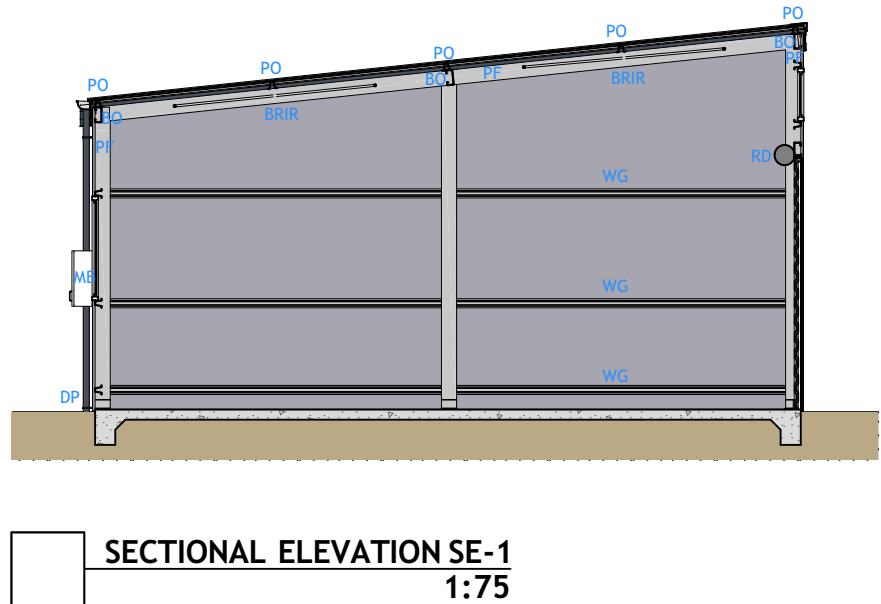
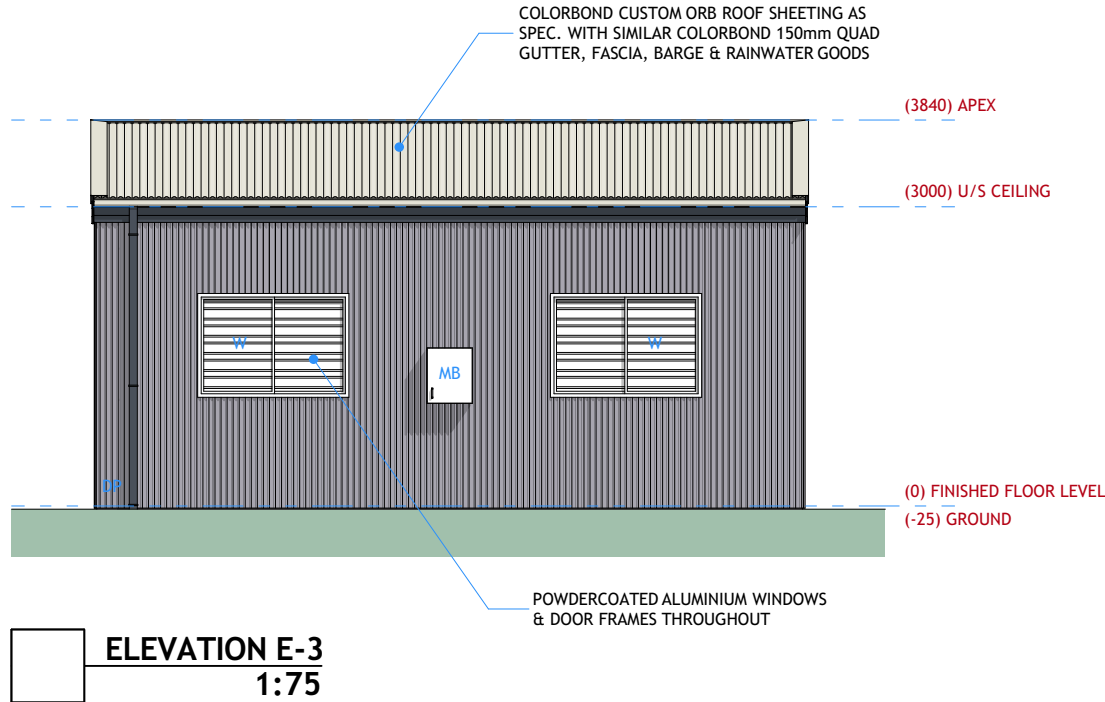
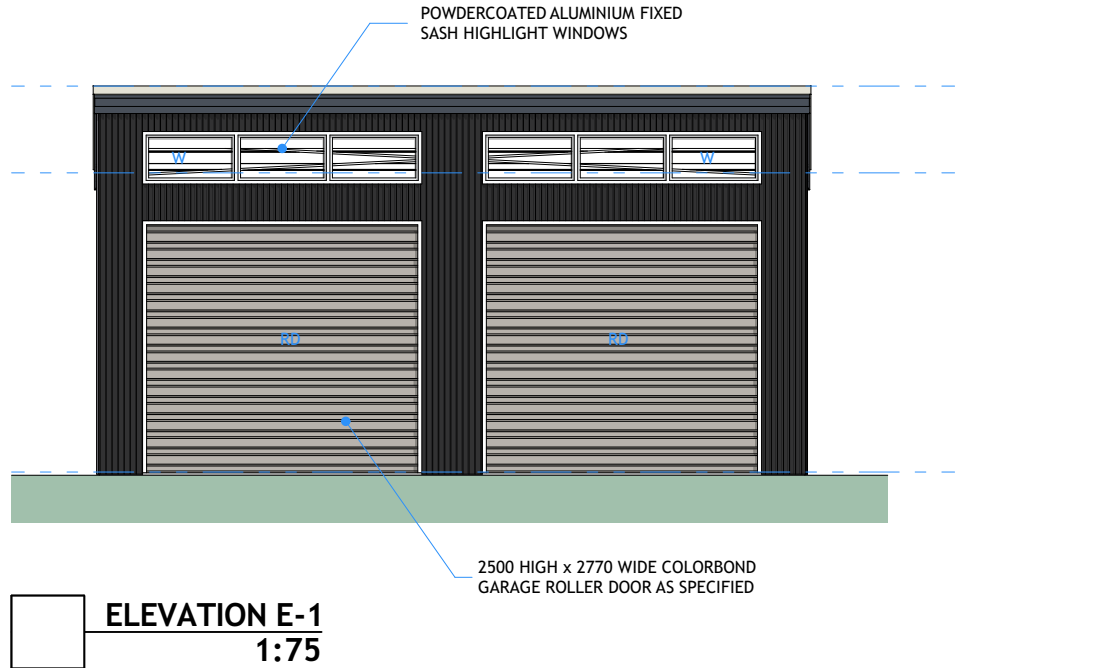


CLIENT: CLARENCE VALLEY COUNCIL	JOB No: 19.06
DATE: DEC 2019	A2 SCALE: AS NOTED



DRG No:
CA-01





GENERAL NOTES:

1. REGULATIONS
STRUCTURAL SOUNDNESS AND DESIGN GUST WIND SPEED. TO COMPLY WITH AS4600, AS3600 AND AS1170 1 TO 4 AS IMPORTANCE LEVEL 2 WITH A LIVE LOAD OF 0.25KPa AS "AIR LEAKY STRUCTURES" PROVIDING STABILITY WHEN OPENINGS ARE PREVALENT. BUILDER TO PROVIDE CERTIFICATION AS REQUIRED.
2. INSTALLATION & CONSTRUCTION OF CLASS 10A BUILDINGS TO COMPLY WITH ALL RELEVANT LOCAL GOVERNMENT CODES WITH ALL BRACING & REINFORCED CONCRETE SLABS TO BE TO ENGINEERS SPECIFICATION.
3. FRAME CONSTRUCTION-
THE FRAMING TO BE A COMBINATION OF C150 STEEL PORTAL FRAMES, SUPPORT MEMBERS & 64 x .75 TOP HAT ROOF PURLINS & WALL GIRTS BOLTED & SCREWED TOGETHER TO AS4671 - 2001 AND STRUCTURAL ENGINEERS DETAILS.
4. ROOF CLADDING-
TO BE COLOURBOND CUSTOM ORB IN SELECTED COLOUR.
5. ROOF DRAINAGE-
GUTTERS TO BE 150mm QUAD COLOURBOND WITH 100x75mm DOWN PIPES. ALL GUTTERS TO HAVE A MINIMUM FALL OF 1:200
6. EXTERNAL CLADDING-
TO BE A COMBINATION OF COLOURS IN AS INDICATED COLORBOND VERTICAL RUN CUSTOM ORB CLADDING.
7. WINDOWS:
TO BE TREND POWDER COATED ALUMINIUM FRAMED WITH GLAZING TO AS1288. SIZES A SCHEDULED.
8. FLOORING-
TO BE A 100 DEEP REINFORCED CONCRETE SLAB, WITH FOOTINGS & PIERS TO ENGINEERS SPECIFICATIONS
9. INTERNAL LINING-
GENERALLY WALLS WILL NOT BE LINED UNLESS REQUESTED BY CLIENT & WILL JUST BE EXPOSED STRUCTURAL MEMBERS & COLORBOND CLADDING.
10. FLOOR FINISH-
TO BE SEALED CONCRETE SLAB
11. HOT WATER SYSTEM-
TO BE GAS AS SPECIFIED.
12. ALL PROPRIETRY ITEMS AND MATERIALS TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
13. DO NOT SCALE FROM DRAWING. FIGURED DIMENSIONS SHALL BE READ IN REFERENCE SCALING.
14. ALL FIGURED DIMENSIONS ARE TO BE CHECKED BEFORE SETTING OUT AND ALL DISCREPANCIES OR INCONSISTENCIES ARE TO BE REPORTED TO I.S.D Pty. Ltd. FOR CORRECTION BEFORE CONSTRUCTION.
15. FOR GARAGE SITING REFER TO ENTRY PRECINCT LAYOUT PLAN

SPECIAL NOTE:

THE FITTINGS AND FIXTURES ALONG WITH THE COLOUR PALLETTE USED ON ALL PLANS ARE INDICATIVE AND ARE TO BE USED FOR BUILD AND LOCATION PURPOSES ONLY, PLEASE SEE SPECIFICATION FOR SPECIFIC INDIVIDUAL MATERIALS, COLOURS AND REQUIREMENTS.

CURRENT SHOWN COLOUR SCHEME USES STAINED NATURAL TIMBERS ALONG WITH PAINTED AND POWDERCOATED CURRENT COLORBOND COLOURS.

DOOR & COLOURBOND MINI ORB (DARK GREY 1 SIDE): **MONUMENT**
COLOURBOND MINI ORB (LIGHT GREY 3 SIDES): **BASALT**
GARAGE DOORS (CREAM): **DUNE**

REFERENCE KEY:

- BEAM OVER --- BO
BRACING IN ROOF --- BRIR
BENCH & CUPBOARDS UNDER --- BHCU
DOOR --- D
DOWNPIPE --- DP
HOT WATER SYSTEM GAS --- HWSG
METER BOX --- MB
PORTAL FRAME (C150) --- PF
RAINWATER TANK --- RWT
ROLLERDOOR --- RD
PURLIN OVER --- PO
WINDOW --- W
WALL GIRTS --- WG



☐ **PERSPECTIVE P-1**
(FRONT RIGHT VIEW)



☐ **PERSPECTIVE P-2**
(REAR LEFT VIEW)



☐ **PERSPECTIVE P-3**
(REAR RIGHT VIEW)



☐ **PERSPECTIVE P-4**
(FRONT LEFT VIEW)

DRG TITLE: PROPOSED DOUBLE GARAGE PERSPECTIVES

JOB NAME: CALYPSO HOLIDAY PARK - PROPOSED NEW BUILDINGS



CLIENT: CLARENCE VALLEY COUNCIL

JOB No: 19.06

DATE: DEC 2019

A2 SCALE: AS NOTED



DRG No:

CA-03

DRG TITLE: PROPOSED WORKSHOP FLOOR PLAN

JOB NAME: CALYPSO HOLIDAY PARK - PROPOSED NEW BUILDINGS



CLIENT: CLARENCE VALLEY COUNCIL

JOB No: 20.06

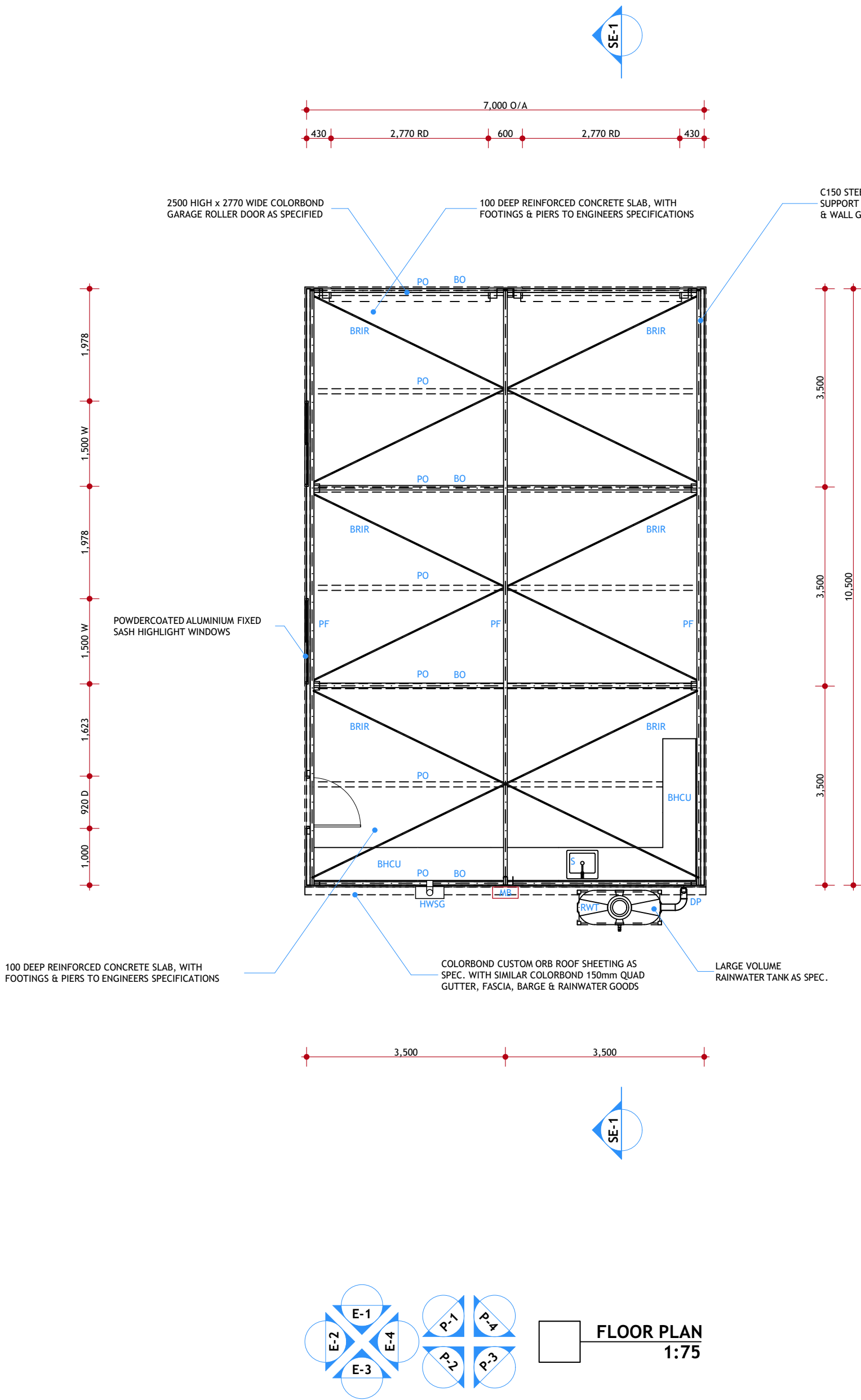
DATE: MARCH 2020

A2 SCALE: AS NOTED



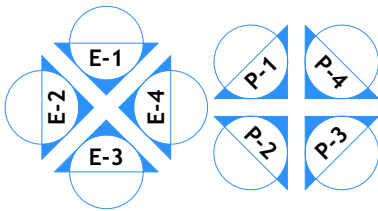
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CB-01

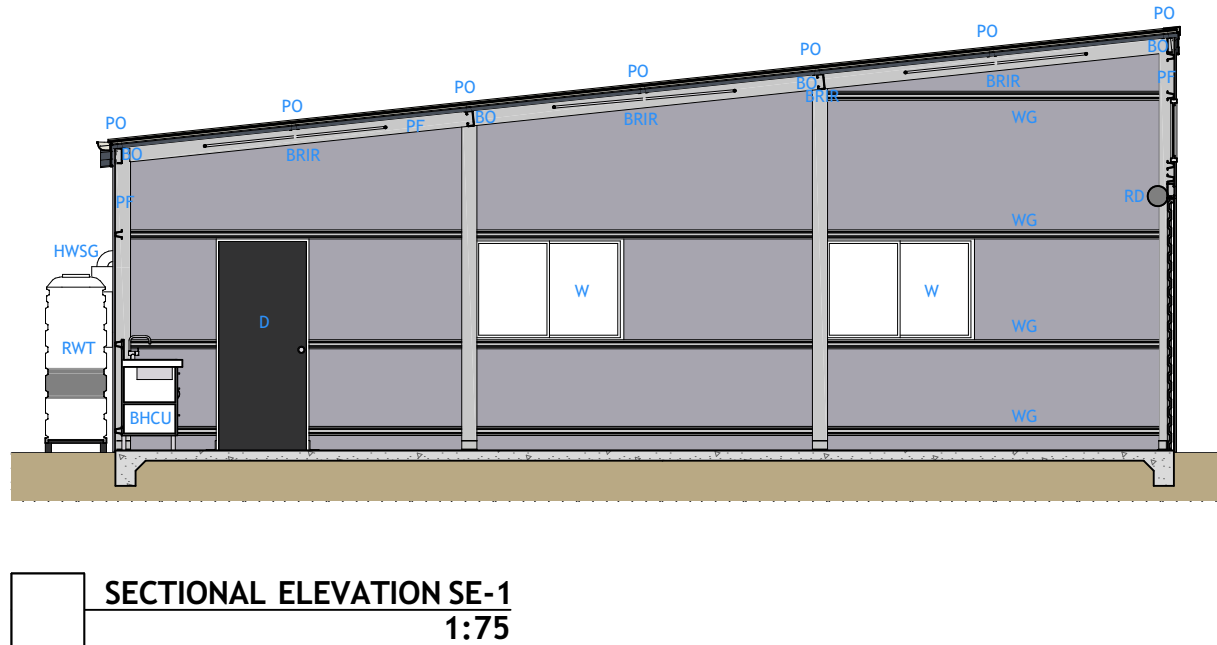
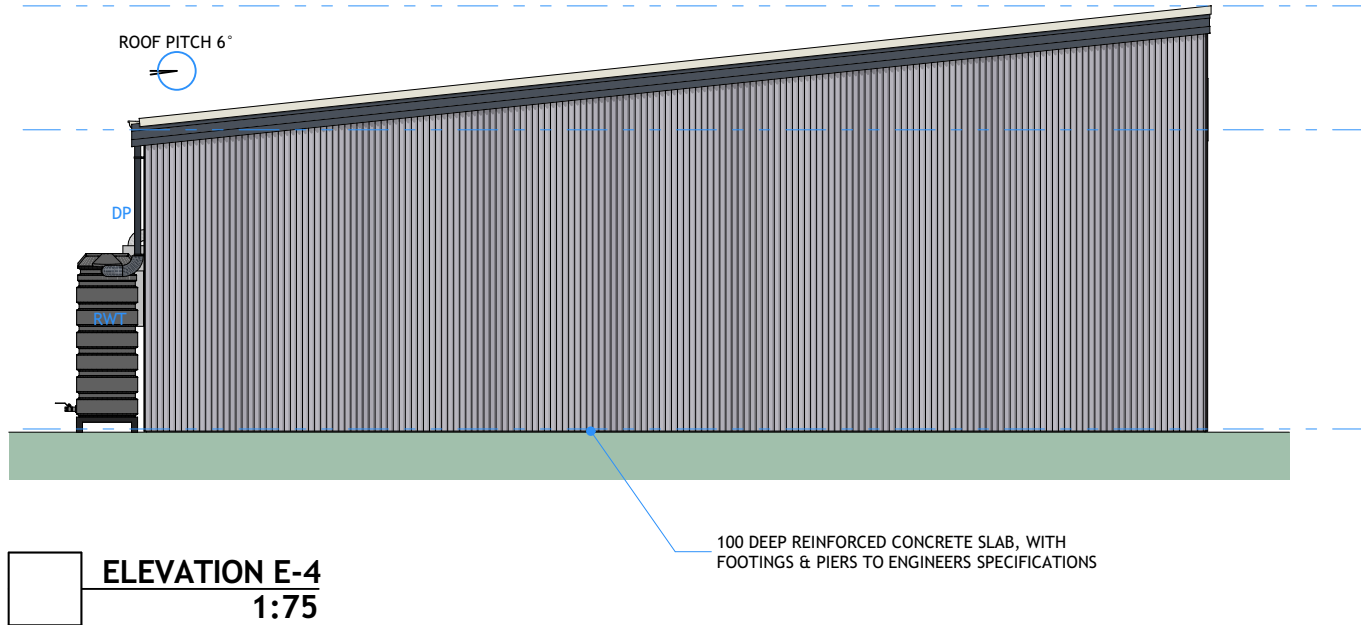
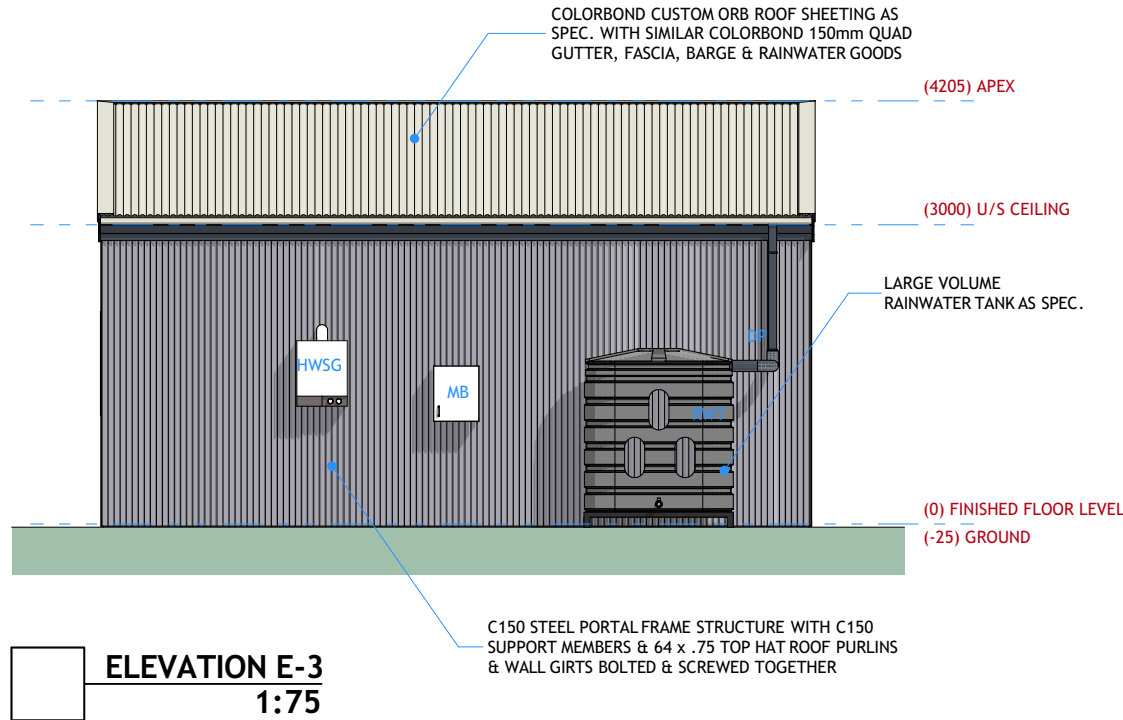
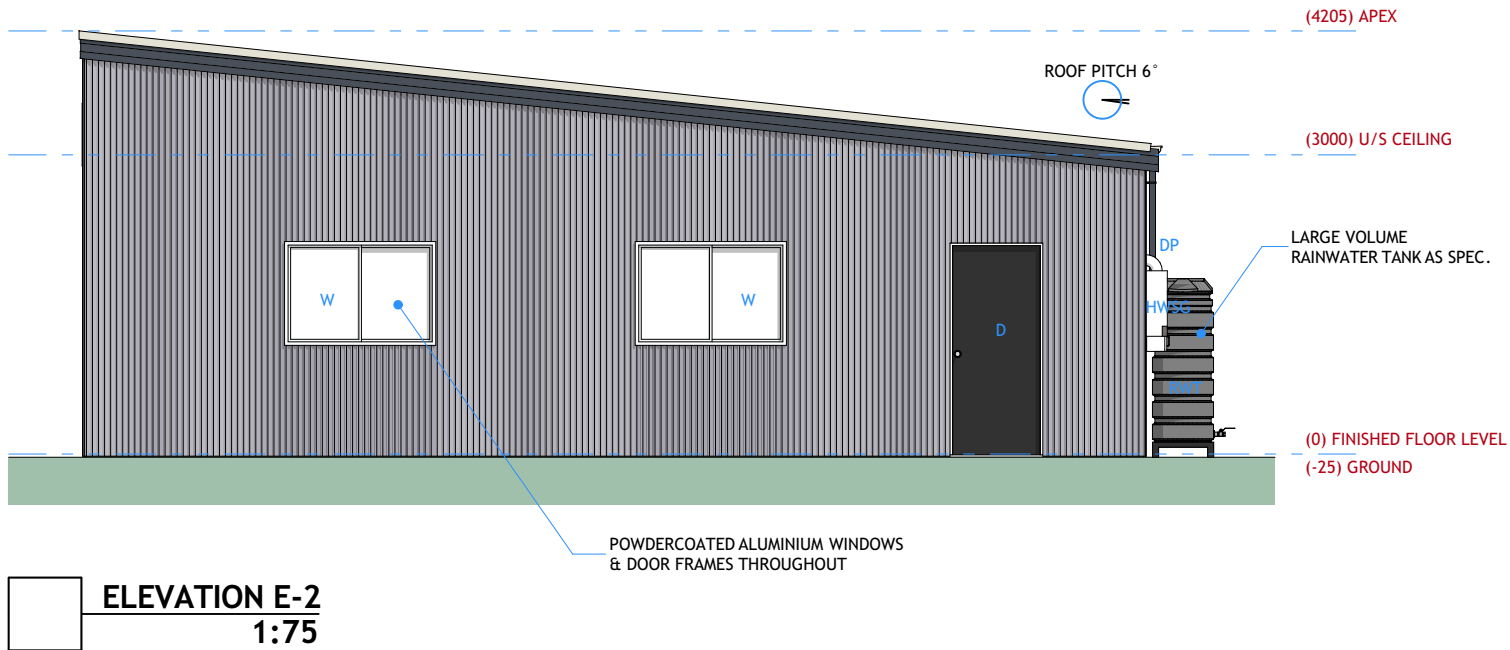
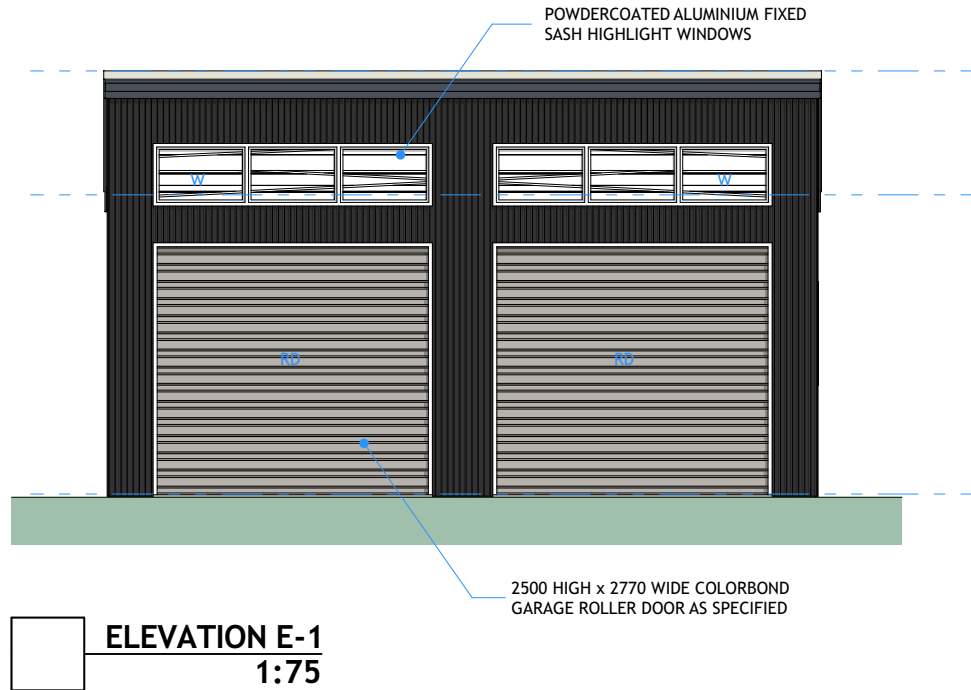


REFERENCE KEY:

BEAM OVER --- BO
BRACING IN ROOF --- BRIR
BENCH & CUPBOARDS UNDER --- BHCU
DOWNPIPE --- DP
HOT WATER SYSTEM GAS --- HWSG
METER BOX --- MB
PORTAL FRAME (C150) --- PF
RAINWATER TANK --- RWT
PURLIN OVER --- PO
STAINLESS STEEL SINK --- S



FLOOR PLAN
1:75



GENERAL NOTES:

1. REGULATIONS
STRUCTURAL SOUNDNESS AND DESIGN GUST WIND SPEED. TO COMPLY WITH AS4600, AS3600 AND AS1170 1 TO 4 AS IMPORTANCE LEVEL 2 WITH A LIVE LOAD OF 0.25KPa AS 'AIR LEAKY STRUCTURES' PROVIDING STABILITY WHEN OPENINGS ARE PREVALENT. BUILDER TO PROVIDE CERTIFICATION AS REQUIRED.
2. INSTALLATION & CONSTRUCTION OF CLASS 10A BUILDINGS TO COMPLY WITH ALL RELEVANT LOCAL GOVERNMENT CODES WITH ALL BRACING & REINFORCED CONCRETE SLABS TO BE TO ENGINEERS SPECIFICATION.
3. FRAME CONSTRUCTION-
THE FRAMING TO BE A COMBINATION OF C150 STEEL PORTAL FRAMES, SUPPORT MEMBERS & 64 x .75 TOP HAT ROOF PURLINS & WALL GIRTS BOLTED & SCREWED TOGETHER TO AS4671 - 2001 AND STRUCTURAL ENGINEERS DETAILS.
4. ROOF CLADDING-
TO BE COLOURBOND CUSTOM ORB IN SELECTED COLOUR.
5. ROOF DRAINAGE-
GUTTERS TO BE 150mm QUAD COLOURBOND WITH 100x75mm DOWN PIPES. ALL GUTTERS TO HAVE A MINIMUM FALL OF 1:200
6. EXTERNAL CLADDING-
TO BE A COMBINATION OF COLOURS IN AS INDICATED COLORBOND VERTICAL RUN CUSTOM ORB CLADDING.
7. WINDOWS-
TO BE TREND POWDER COATED ALUMINIUM FRAMED WITH GLAZING TO AS1288. SIZES A SCHEDULED.
8. FLOORING-
TO BE A 100 DEEP REINFORCED CONCRETE SLAB, WITH FOOTINGS & PIERS TO ENGINEERS SPECIFICATIONS
9. INTERNAL LINING-
GENERALLY WALLS WILL NOT BE LINED UNLESS REQUESTED BY CLIENT & WILL JUST BE EXPOSED STRUCTURAL MEMBERS & COLORBOND CLADDING.
10. FLOOR FINISH-
TO BE SEALED CONCRETE SLAB
11. HOT WATER SYSTEM-
TO BE GAS AS SPECIFIED.
12. ALL PROPRIETRY ITEMS AND MATERIALS TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
13. DO NOT SCALE FROM DRAWING. FIGURED DIMENSIONS SHALL BE READ IN REFERENCE SCALING.
14. ALL FIGURED DIMENSIONS ARE TO BE CHECKED BEFORE SETTING OUT AND ALL DISCREPANCIES OR INCONSISTENCIES ARE TO BE REPORTED TO I.S.D Pty. Ltd. FOR CORRECTION BEFORE CONSTRUCTION.
15. FOR WORKSHOP SITING REFER TO ENTRY PRECINCT LAYOUT PLAN

SPECIAL NOTE:

THE FITTINGS AND FIXTURES ALONG WITH THE COLOUR PALLETTE USED ON ALL PLANS ARE INDICATIVE AND ARE TO BE USED FOR BUILD AND LOCATION PURPOSES ONLY, PLEASE SEE SPECIFICATION FOR SPECIFIC INDIVIDUAL MATERIALS, COLOURS AND REQUIREMENTS.

CURRENT SHOWN COLOUR SCHEME USES STAINED NATURAL TIMBERS ALONG WITH PAINTED AND POWDERCOATED CURRENT COLORBOND COLOURS.

DOOR & COLOURBOND MINI ORB (DARK GREY 1 SIDE): **MONUMENT**
COLOURBOND MINI ORB (LIGHT GREY 3 SIDES): **BASALT**
GARAGE DOORS (CREAM): **DUNE**

REFERENCE KEY:

- BEAM OVER --- BO
BRACING IN ROOF --- BRIR
BENCH & CUPBOARDS UNDER --- BHCU
DOOR --- D
DOWNPIPE --- DP
HOT WATER SYSTEM GAS --- HWSC
METER BOX --- MB
PORTAL FRAME (C150) --- PF
RAINWATER TANK --- RWT
ROLLERDOOR --- RD
PURLIN OVER --- PO
WINDOW --- W
WALL GIRT --- WG



☐ **PERSPECTIVE P-1**
(FRONT RIGHT VIEW)



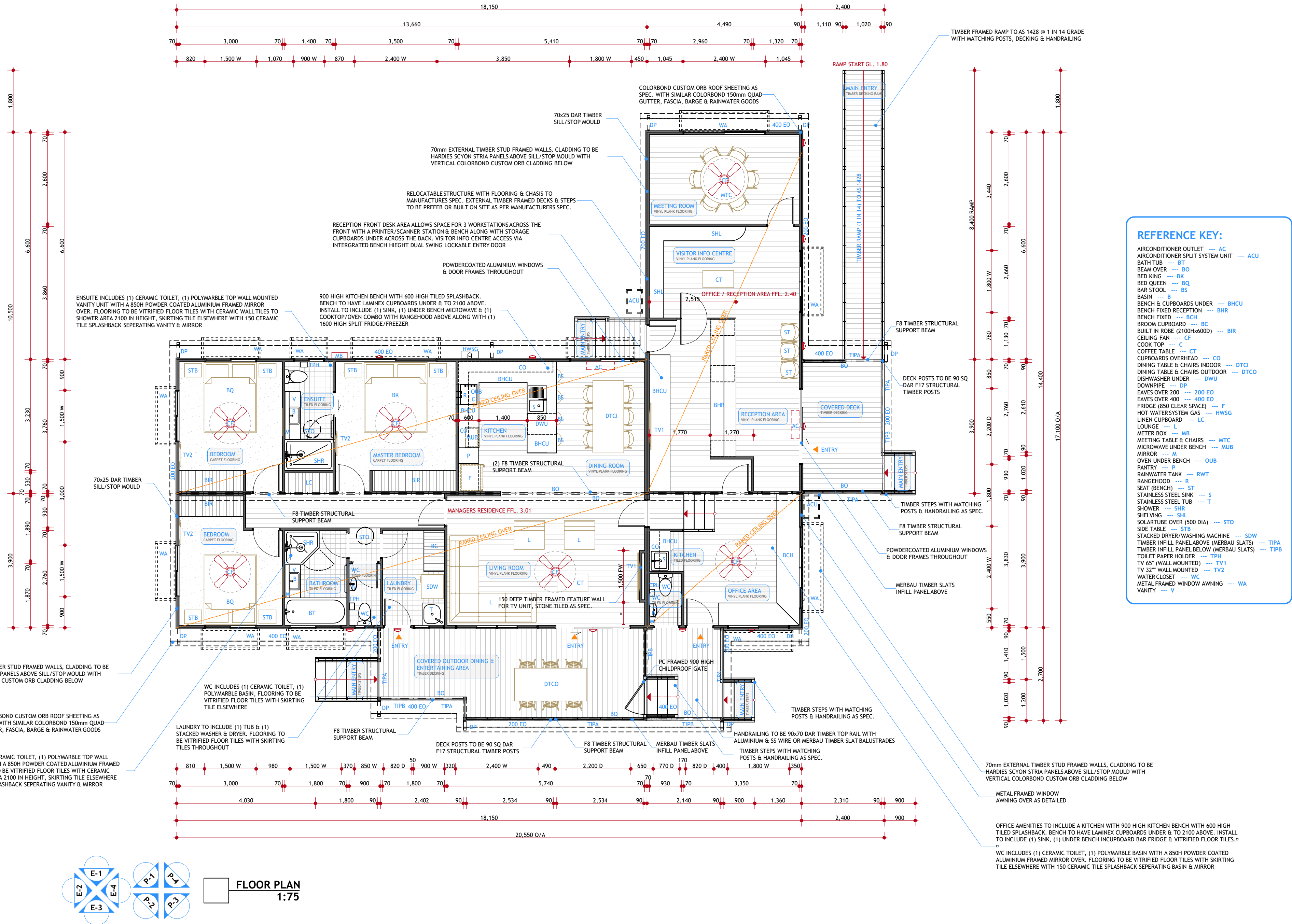
☐ **PERSPECTIVE P-2**
(REAR LEFT VIEW)



☐ **PERSPECTIVE P-3**
(REAR RIGHT VIEW)



☐ **PERSPECTIVE P-4**
(FRONT LEFT VIEW)



DRG TITLE: PROPOSED MANAGERS RESIDENCE & OFFICE/RECEPTION FLOOR PLAN

JOB NAME: CALYPSO HOLIDAY PARK - PROPOSED NEW BUILDINGS

CLIENT: CLARENCE VALLEY COUNCIL

JOB No: 20.06

DATE: MARCH 2020

A2 SCALE: AS NOTED

INTEGRATED
Site Design
PLANNING • DESIGN • MARKETING • MANAGEMENT

DRG No:

CC-01





PERSPECTIVE P-1
(REAR RIGHT VIEW)



PERSPECTIVE P-2
(FRONT LEFT VIEW)



PERSPECTIVE P-3
(FRONT RIGHT VIEW)



PERSPECTIVE P-4
(REAR LEFT VIEW)

DRG TITLE: PROPOSED MANAGERS RESIDENCE & OFFICE/RECEPTION PERSPECTIVES

JOB NAME: CALYPSO HOLIDAY PARK - PROPOSED NEW BUILDINGS



CLIENT: CLARENCE VALLEY COUNCIL

JOB No: 20.06

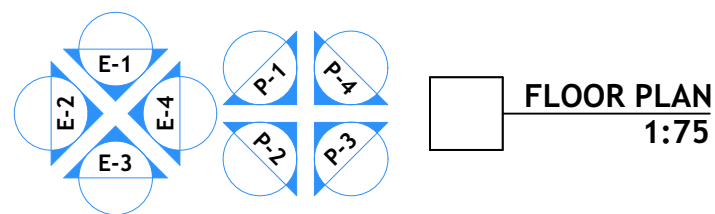
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A2 SCALE: AS NOTED

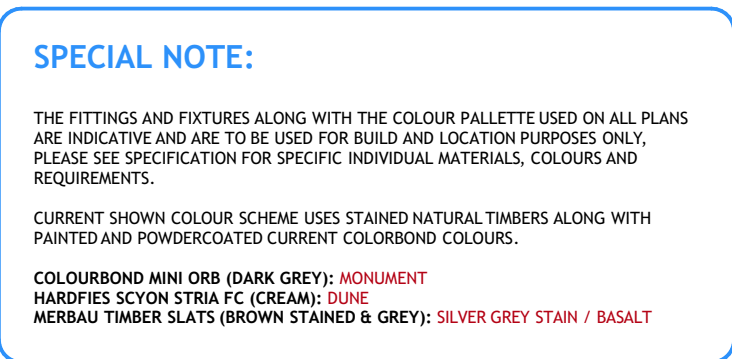


DRG No:

CC-03



AIRCONDITIONER SPLIT SYSTEM --- AC
AIRCONDITIONER SPLIT SYSTEM --- ACU
2) BARBEQUE & BENCH FIXED --- BBQB
BEAM OVER --- B
BENCH & CUPBOARDS UNDER --- BHCU
CEILING FAN --- CF
COOK TOP --- C
COFFEE TABLE --- CT
CUPBOARDS OVERHEAD --- CO
DINING TABLE & CHAIRS INDOR --- DTCI
DINING TABLE & CHAIRS OUTDOOR --- DTCO
DOWNPIPE --- DP
EAVES OVER 200 --- 200 EO
EAVES OVER --- EO
FRIDGE (850 CLEAR SPACE) --- F
HOT WATER SYSTEM GAS --- HWSG
LOUNGE --- L
METER BOX --- MB
MICROWAVE OVER BENCH --- MOB
RAINWATER TANK --- RWT
RAINWATER --- R
STAINLESS STEEL SINK --- S
SLAB INFL. PANEL ABOVE (MERBAU SLATS) --- TI
TIMBER INFL. PANEL BELOW (MERBAU SLATS) --- T
TV 65" (WALL MOUNTED) --- TV1





☐ **PERSPECTIVE P-1**
(FRONT RIGHT VIEW)



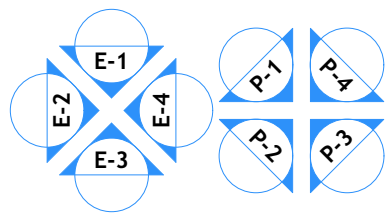
☐ **PERSPECTIVE P-2**
(REAR LEFT VIEW)



☐ **PERSPECTIVE P-3**
(REAR RIGHT VIEW)



☐ **PERSPECTIVE P-4**
(FRONT LEFT VIEW)



JOB NAME: CALYPSO HOLIDAY PARK - PROPOSED NEW BUILDINGS



Architectural section drawing of a building. The drawing shows a cross-section of the structure, including a laundry area with lockers and a storage area. The roof pitch is indicated as 10 degrees on the left and 4 degrees on the right. Various components are labeled with blue text: 'RV' (Refrigerator/Freezer), 'W' (Wall), 'D' (Door), 'DP' (Door Panel), 'HWSS' (Heavy Weight Steel Sheet), 'MB' (Medium Board), and 'D' (Door). The drawing also shows a 'LAUNDRY' area and a 'STORAGE' area. The building is shown with a concrete foundation and a metal roof.

1. REGULATIONS
STRUCTURAL SOUNDNESS AND DESIGN GUST WIND SPEED. TO COMPLY WITH DIVISION 4 OF THE LOCAL GOVERNMENT (MANUFACTURED HOME ESTATES, CARAVAN PARKS, CAMPING GROUNDS & MOVEABLE DWELLINGS) REGULATION 2005. BUILDER TO PROVIDE CERTIFICATION AS REQUIRED.
2. INSTALLATION TO COMPLY WITH DIVISION 4, SUBDIVISION 4 OF THE LOCAL GOVERNMENT. (MANUFACTURED HOME ESTATES, CARAVAN PARKS, CAMPING GROUNDS & MOVEABLE DWELLINGS) REGULATION 2005. BUILDER TO PROVIDE NECESSARY CERTIFICATION AND COMPLIANCE PLATES. FOUNDATIONS, FOOTINGS & TIEDOWNS TO MANUFACTURERS ENGINEERS SPECIFICATION.
3. ALL ASPECTS OF THE CONSTRUCTION OF THIS BUILDING TO COMPLY WITH THE RELEVANT PROVISIONS OF THE LOCAL GOVERNMENT. (MANUFACTURED HOME ESTATES, CARAVAN PARKS, CAMPING GROUNDS & MOVEABLE DWELLINGS) REGULATION 2005 AND ANY APPLICABLE CODE, REGULATION OR AUSTRALIAN STANDARD.
4. FRAME CONSTRUCTION-
THE FRAMING MAY BE OF EITHER TIMBER FRAMED TO AS1684 AND STRUCTURAL ENGINEERS DETAILS OR STEEL FRAMED TO AS1250 AND STRUCTURAL ENGINEERS DETAILS.
5. EXTERNAL DECKS & VERANDAH-
ARE TO BE STEEL FRAMED OR TREATED PINE FRAME WITH DECKING AS SPECIFIED
6. ROOF CLADDING-
TO BE COLOURBOND CUSTOM ORB IN SELECTED COLOUR. EAVES LINING IS TO BE HARDIES FLAT FC. SHEETING.
7. ROOF DRAINAGE-
GUTTERS TO BE 150mm QUAD COLOURBOND WITH 100x75mm DOWN PIPES. ALL GUTTERS TO HAVE A MINIMUM FALL OF 1:200
8. EXTERNAL CLADDING-
TO BE A COMBINATION AS INDICATED OF HARDIES "SCYON STRIA" FC SHEET, COLOURBOND VERTICAL RUN CUSTOM ORB & HORIZONTAL MERBAU TIMBER SLAT CLADDING.
9. WINDOWS:-
TO BE TREND POWDER COATED ALUMINIUM FRAMED WITH GLAZING TO AS1288. SIZES A SCHEDULED.
10. FLOORING:-
TO BE EITHER TONGUED AND GROOVED PARTICLE BOARD OR STRUCTURAL WATERPROOF PLYWOOD AS SPECIFIED. T & G 18mm thick SCYON TO WET AREAS.
11. INTERNAL LINING-
GENERALLY WALLS TO BE LINED WITH 10mm GYPOCK, WET AREA WALLS TO BE VILABOARD SHEETING.
12. FLOOR FINISH-
TO BE VITRIFIED CERAMIC TILES TO WET AREAS WITH TIMBER FLOORBOARDS ELSEWHERE.
13. STOP MOULDS, SILLS & FLASHINGS TO CLADDING-
CORNERS TO CLADDING MAY BE PURPOSE DESIGNED COLOURBOND STEEL TRIM. MAIN CLADDING MAY BE DRESSED OFF AT THE LOWER EDGE WITH A FORMED MATCHING FLASHING. ALL FIXINGS TO MATCH COLOUR OF CLADDING.
14. HOT WATER SYSTEM-
TO BE GAS AS SPECIFIED.
15. ALL PROPRIETARY ITEMS AND MATERIALS TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
16. NOT SCALE FROM DRAWING. FIGURED DIMENSIONS SHALL BE READ IN REFERENCE SCALING.
17. ALL FIGURED DIMENSIONS ARE TO BE CHECKED BEFORE SETTING OUT AND ALL DISCREPANCIES OR INCONSISTENCIES ARE TO BE REPORTED TO I.S.D Pty. Ltd. FOR CORRECTION BEFORE CONSTRUCTION.
18. FOR BUILDING SITING REFER TO CENTRAL PRECINCT LAYOUT PLAN
19. TEMPORARY WALLS OR BEAMS REQUIRED BY MANUFACTURER FOR TRANSPORTATION & OR MANUFACTURING PURPOSES OF STRUCTURE TO BE ACCOMMODATED WITHIN THE BUILDING DESIGN.
20. ALL TRANSITIONS TO FINISH FLOOR WITH ALL TILING & TIMBER DECKING AS WELL AS OVER ANY ENTRY / EXIT THRESHOLDS.

BEAM OVER --- BO
DOOR --- D
DOWNPIPE --- DP
HOT WATER SYSTEM GAS --- HWSG
METER BOX --- MB
RAINWATER TANK --- RWT
ROOF VENTILATOR --- RV
TIMBER INFILL PANEL ABOVE (MERBAU SLATS) --- TIPB
TIMBER INFILL PANEL BELOW (MERBAU SLATS) --- TIPB
TIMBER SKIRTING (MERBAU SLATS) --- TSK
WINDOW --- W

THE FITTINGS AND FIXTURES ALONG WITH THE COLOUR PALLETTE USED ON ALL PLANS ARE INDICATIVE AND ARE TO BE USED FOR BUILD AND LOCATION PURPOSES ONLY, PLEASE SEE SPECIFICATION FOR SPECIFIC INDIVIDUAL MATERIALS, COLOURS AND REQUIREMENTS.

CURRENT SHOWN COLOUR SCHEME USES STAINED NATURAL TIMBERS ALONG WITH PAINTED AND POWDERCOATED CURRENT COLORBOND COLOURS.

COLOURBOND MINI ORB (DARK GREY): **MONUMENT**
HARDIES SCYON STRIA FC (CREAM): **DUNE**
MERBAU TIMBER SLATS (BROWN STAINED & GREY): **SILVER GREY STAIN / BASALT**



PERSPECTIVE P-1
(REAR RIGHT VIEW)



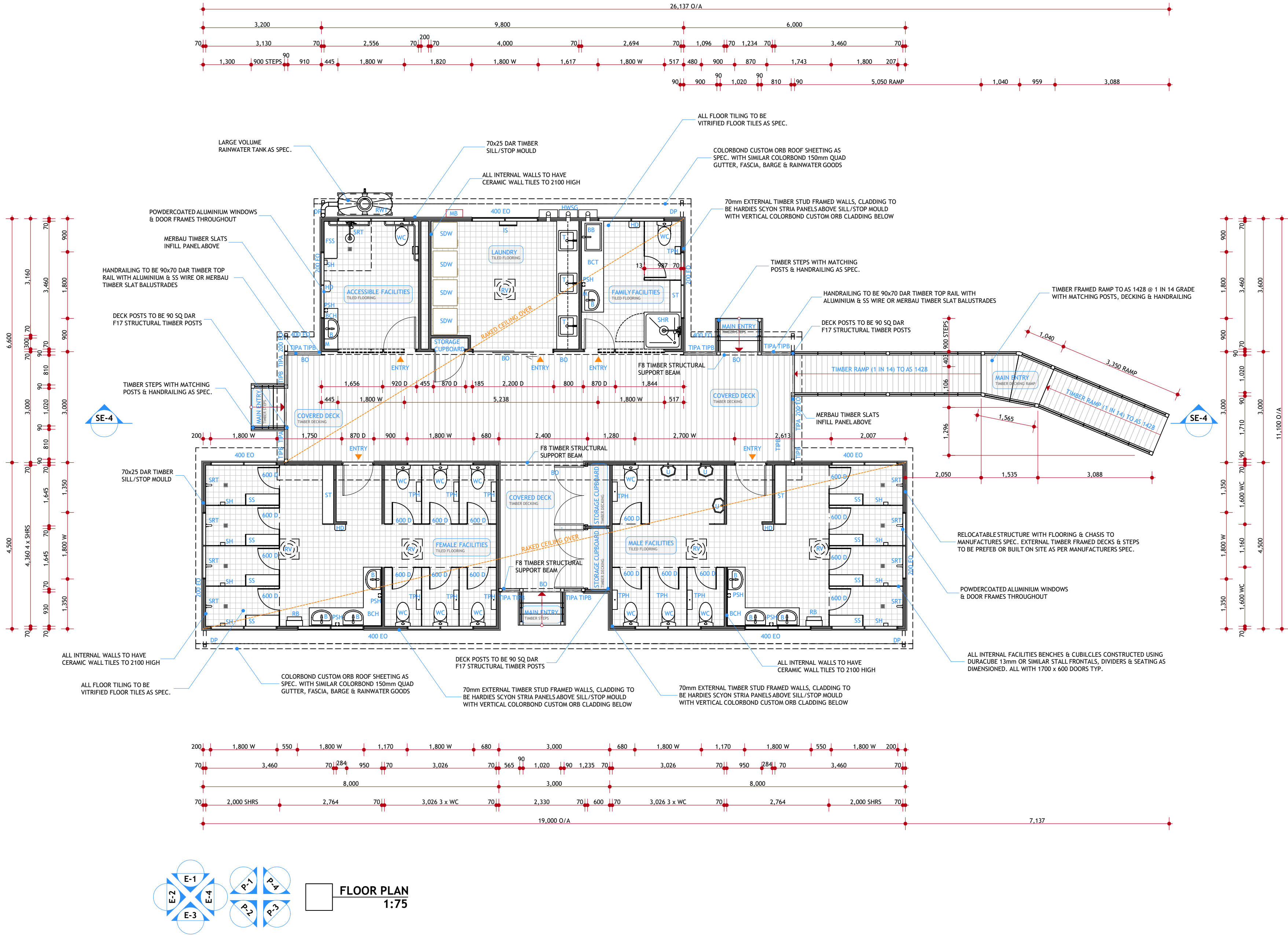
PERSPECTIVE P-2
(FRONT LEFT VIEW)



PERSPECTIVE P-3
(FRONT RIGHT VIEW)



PERSPECTIVE P-4
(REAR LEFT VIEW)



DRG TITLE: PROPOSED EASTERN PRECINCT AMENITIES FLOOR PLAN

JOB NAME: CALYPSO HOLIDAY PARK - PROPOSED NEW BUILDINGS



CLIENT: CLARENCE VALLEY COUNCIL

JOB No: 20.06

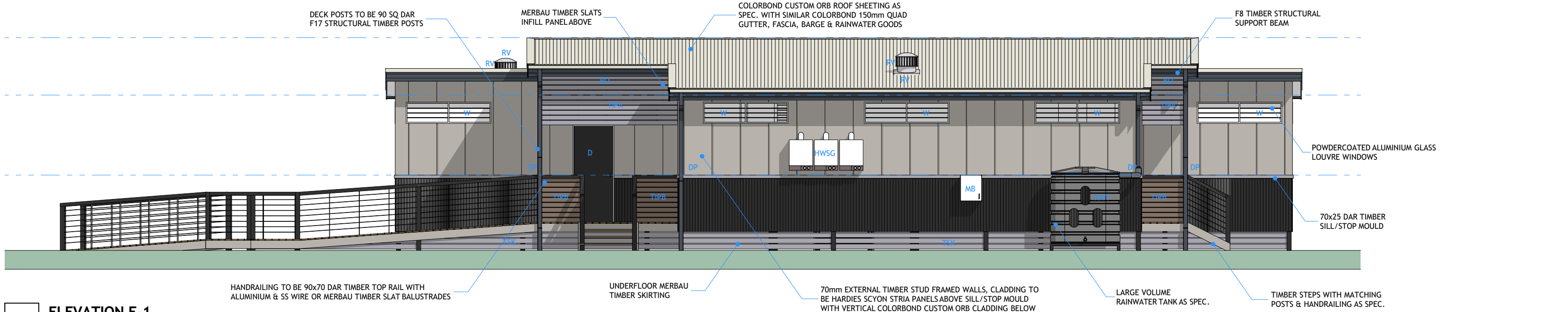
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A2 SCALE: AS NOTED

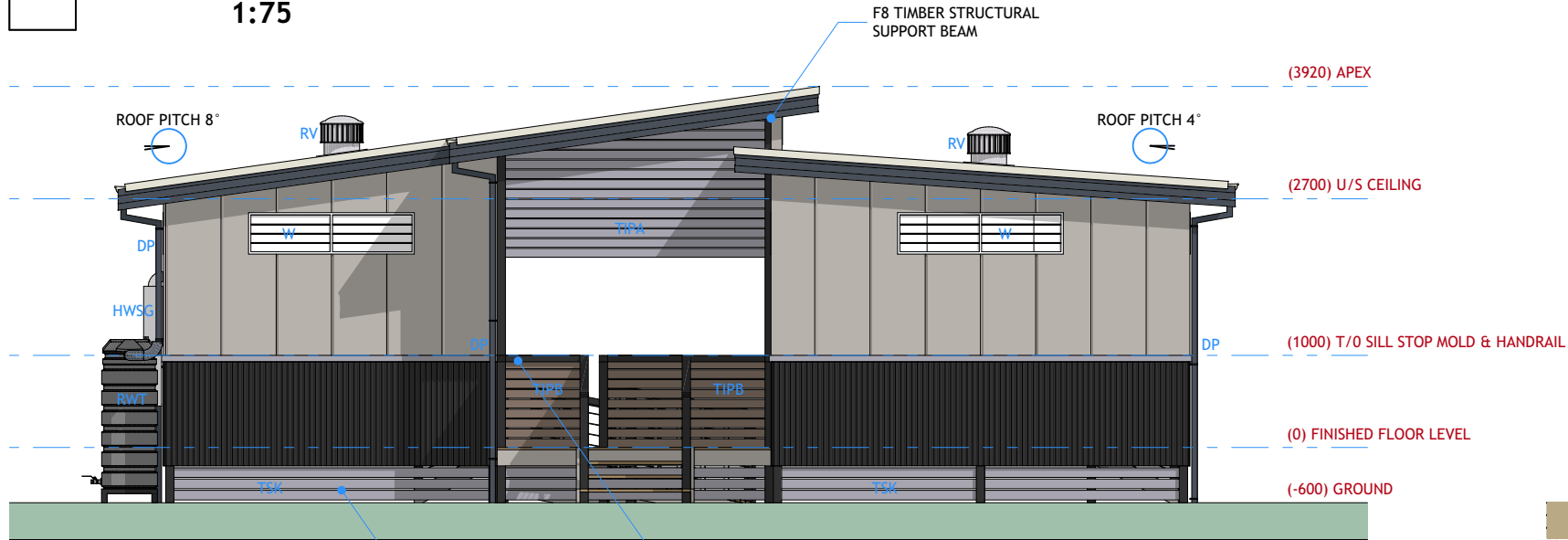


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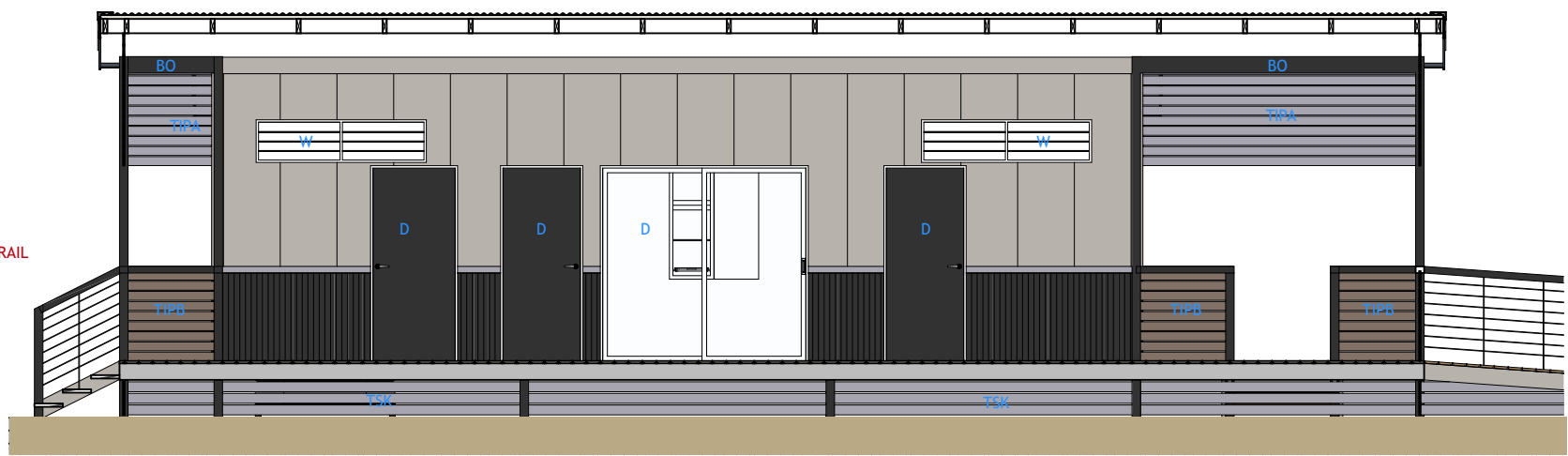
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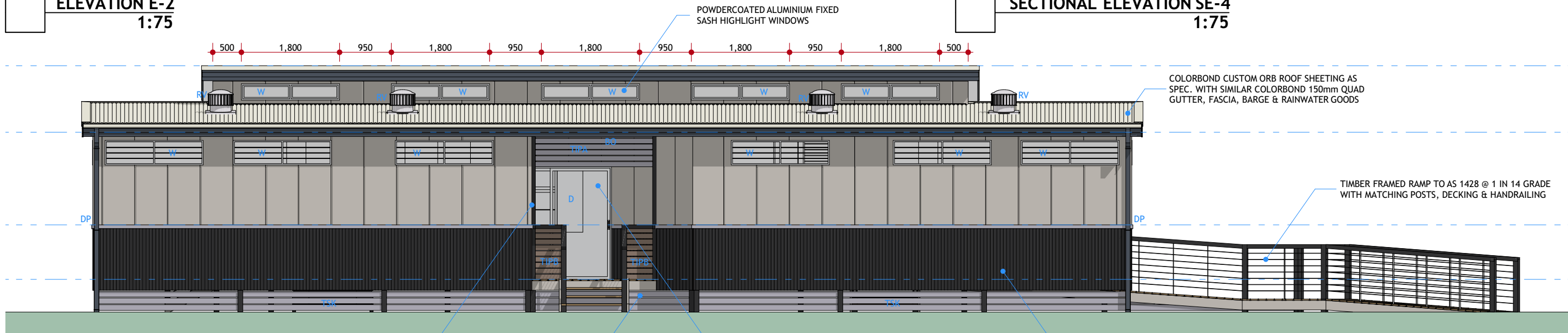
ELEVATION E-1
1:75



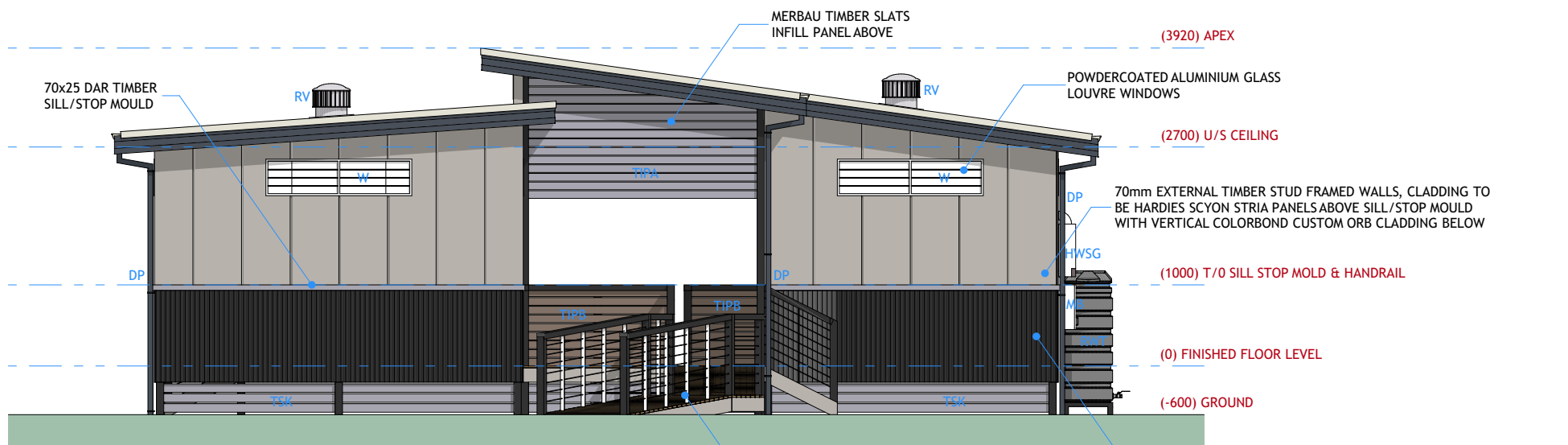
ELEVATION E-2
1:75



SECTIONAL ELEVATION SE-4
1:75



ELEVATION E-3
1:75



ELEVATION E-4
1:75

REFERENCE KEY:

BEAM OVER --- BO
DOOR --- D
DOWNPIPE --- DP
HOT WATER SYSTEM GAS --- HWSG
METER BOX --- MB
RAINWATER TANK --- RWT
ROOF VENTILATOR --- RV
TIMBER INFILL PANEL ABOVE (MERBAU SLATS) --- TIPB
TIMBER INFILL PANEL BELOW (MERBAU SLATS) --- TIPB
TIMBER SKIRTING (MERBAU SLATS) --- TSK
WINDOW --- W

GENERAL NOTES:

- REGULATIONS
STRUCTURAL SOUNDNESS AND DESIGN GUST WIND SPEED. TO COMPLY WITH DIVISION 4 OF THE LOCAL GOVERNMENT (MANUFACTURED HOME ESTATES, CARAVAN PARKS, CAMPING GROUNDS & MOVEABLE DWELLINGS) REGULATION 2005. BUILDER TO PROVIDE CERTIFICATION AS REQUIRED.
- INSTALLATION TO COMPLY WITH DIVISION 4, SUBDIVISION 4 OF THE LOCAL GOVERNMENT (MANUFACTURED HOME ESTATES, CARAVAN PARKS, CAMPING GROUNDS & MOVEABLE DWELLINGS) REGULATION 2005. BUILDER TO PROVIDE NECESSARY CERTIFICATION AND COMPLIANCE PLATES. FOUNDATIONS, FOOTINGS & TIEDOWNS TO MANUFACTURER'S ENGINEERS SPECIFICATION.
- ALL ASPECTS OF THE CONSTRUCTION OF THIS BUILDING TO COMPLY WITH THE RELEVANT PROVISIONS OF THE LOCAL GOVERNMENT (MANUFACTURED HOME ESTATES, CARAVAN PARKS, CAMPING GROUNDS & MOVEABLE DWELLINGS) REGULATION 2005 AND ANY APPLICABLE CODE, REGULATION OR AUSTRALIAN STANDARD.
- FRAME CONSTRUCTION-
THE FRAMING MAY BE OF EITHER TIMBER FRAMED TO AS1684 AND STRUCTURAL ENGINEERS DETAILS OR STEEL FRAMED TO AS1250 AND STRUCTURAL ENGINEERS DETAILS.
- EXTERNAL DECKS & VERANDAH-
ARE TO BE STEEL FRAMED OR TREATED PINE FRAME WITH DECKING AS SPECIFIED
- ROOF CLADDING-
TO BE COLOURBOND CUSTOM ORB IN SELECTED COLOUR. EAVES LINING IS TO BE HARDIES FLAT FC SHEETING.
- ROOF DRAINAGE-
GUTTERS TO BE 150mm QUAD COLOURBOND WITH 100x75mm DOWN PIPES. ALL GUTTERS TO HAVE A MINIMUM FALL OF 1:200
- EXTERNAL CLADDING-
TO BE A COMBINATION AS INDICATED OF HARDIES 'SCYON STRIA' FC SHEET, COLORBOND VERTICAL RUN CUSTOM ORB & HORIZONTAL MERBAU TIMBER SLAT CLADDING.
- WINDOWS:
TO BE TREND POWDER COATED ALUMINUM FRAMED WITH GLAZING TO AS1288. SIZES AS SCHEDULED.
- FLOORING-
TO BE EITHER TONGUED AND GROOVED PARTICLE BOARD OR STRUCTURAL WATERPROOF PLYWOOD AS SPECIFIED. T & G 18mm THICK SCYON TO WET AREAS.
- INTERNAL LINING-
GENERALLY WALLS TO BE LINED WITH 10mm GYPROCK, WET AREA WALLS TO BE VILLABOARD SHEETING.
- FLOOR FINISH-
TO BE VITRIFIED CERAMIC TILES TO WET AREAS WITH TIMBER FLOORBOARDS ELSEWHERE.
- STOP MOULDS, SILLS & FLASHINGS TO CLADDING-
CORNERS TO CLADDING MAY BE PURPOSE DESIGNED COLOURBOND STEEL TRIM. MAIN CLADDING MAY BE DRESSED OFF AT THE LOWER EDGE WITH A FORMED MATCHING FLASHING. ALL FIXINGS TO MATCH COLOUR OF CLADDING.
- HOT WATER SYSTEM-
TO BE GAS AS SPECIFIED.
- ALL PROPRIETARY ITEMS AND MATERIALS TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- DO NOT SCALE FROM DRAWING. FIGURED DIMENSIONS SHALL BE READ IN REFERENCE SCALING.
- ALL FIGURED DIMENSIONS ARE TO BE CHECKED BEFORE SETTING OUT AND ALL DISCREPANCIES OR INCONSISTENCIES ARE TO BE REPORTED TO I.S.D Pty. Ltd. FOR CORRECTION BEFORE CONSTRUCTION.
- FOR BUILDING SITING REFER TO EASTERN PRECINCT LAYOUT PLAN
- TEMPORARY WALLS OR BEAMS REQUIRED BY MANUFACTURER FOR TRANSPORTATION & OR MANUFACTURING PURPOSES OF STRUCTURE TO BE ACCOMMODATED WITHIN THE BUILDING DESIGN.
- ALL TRANSITIONS TO FINISH FLUSH BETWEEN ALL TILING & TIMBER DECKING AS WELL AS OVER ANY ENTRY / EXIT THRESHOLDS.

SPECIAL NOTE:

THE FITTINGS AND FIXTURES ALONG WITH THE COLOUR PALLETTE USED ON ALL PLANS ARE INDICATIVE AND ARE TO BE USED FOR BUILD AND LOCATION PURPOSES ONLY, PLEASE SEE SPECIFICATION FOR SPECIFIC INDIVIDUAL MATERIALS, COLOURS AND REQUIREMENTS.

CURRENT SHOWN COLOUR SCHEME USES STAINED NATURAL TIMBERS ALONG WITH PAINTED AND POWDERCOATED CURRENT COLORBOND COLOURS.

COLOURBOND MINI ORB (DARK GREY): MONUMENT
HARDIES SCYON STRIA FC (CREAM): DUNE
MERBAU TIMBER SLATS (BROWN STAINED & GREY): SILVER GREY STAIN / BASALT



☐ **PERSPECTIVE P-1**
(FRONT RIGHT VIEW)



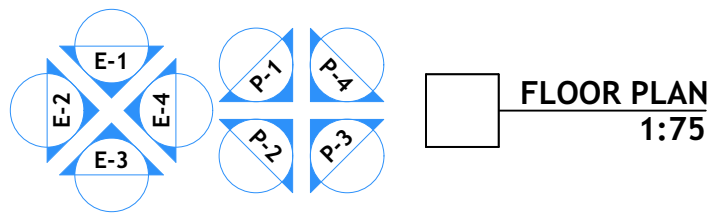
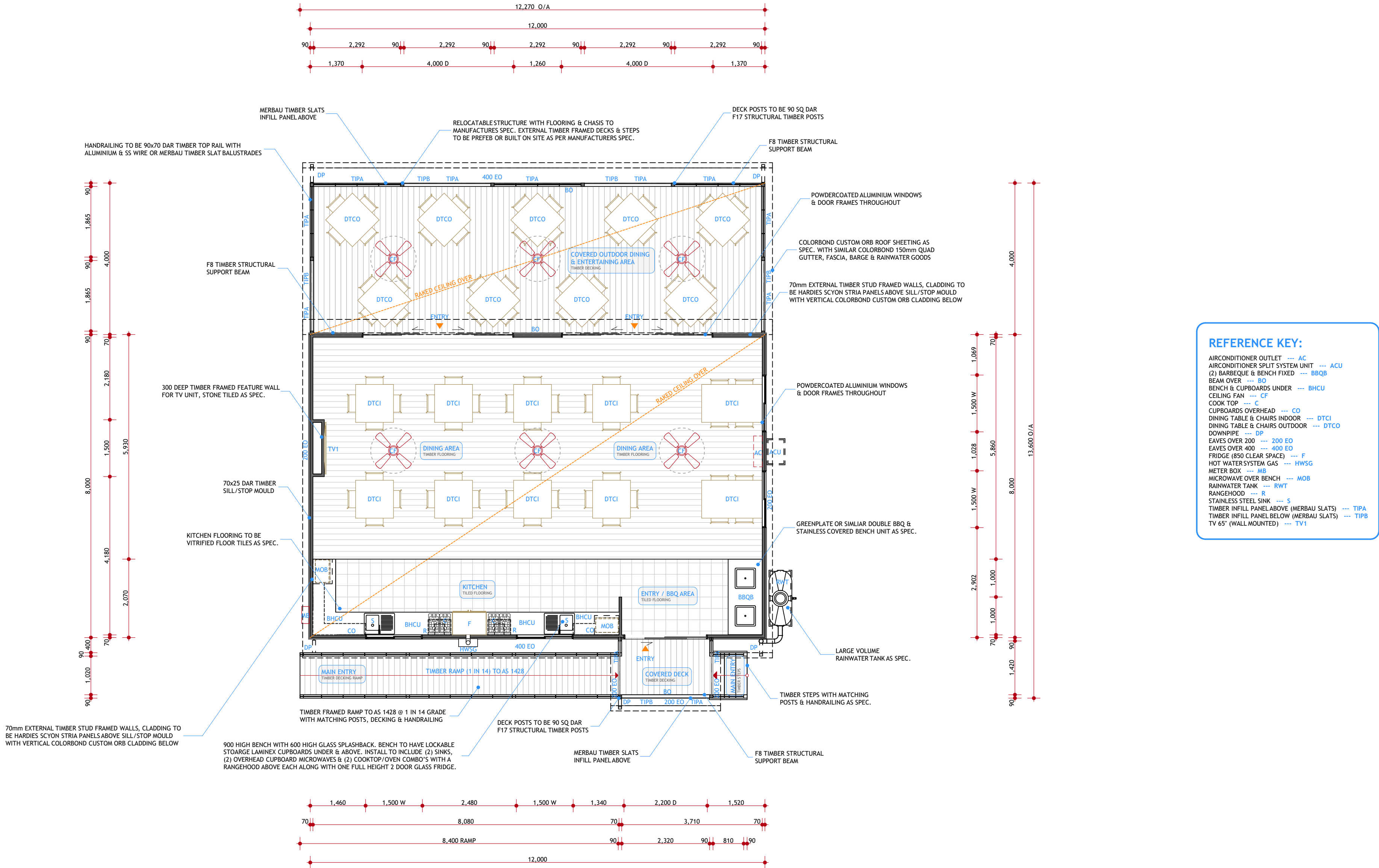
☐ **PERSPECTIVE P-2**
(REAR LEFT VIEW)



☐ **PERSPECTIVE P-3**
(REAR RIGHT VIEW)



☐ **PERSPECTIVE P-4**
(FRONT LEFT VIEW)







PERSPECTIVE P-1
(FRONT RIGHT VIEW)



PERSPECTIVE P-2
(REAR LEFT VIEW)



PERSPECTIVE P-3
(REAR RIGHT VIEW)



PERSPECTIVE P-4
(FRONT LEFT VIEW)

Proposed Swimming Pool

Surf Beach Holiday Park, Kiama, NSW.

Drawing Index

P001	Title & Index
P002	Notes Sheet 1 of 1
P003	Site Plan
P004	Pool General Arrangement
P005	Suggested Water Features

This drawing must not be scaled, only use figured dimensions

Issue P1	Description Preliminary	Drawn LC	Checked mrl	Date 18 Oct 2019	Consultant:	Lacus Structural, Civil and Aquatic Engineering Lacus Consulting Pty Ltd Info@LacusConsulting.com Ph: +61 (0) 422 969 199 PO Box 91,Highett, VIC 3190 ABN: 68 613 723 738	Client: INTEGRATED Site Design PLANNING • DESIGN • MARKETING • MANAGEMENT	Project: PROPOSED POOL & SPA CALYPSO HOLIDAY PARK, YAMBA, NSW	TITLE AND INDEX		
									PRELIMINARY NOT FOR CONSTRUCTION		
									Scale:		Date: 10/10/2019
									Project Number	Drawing Number	Revision
									L180122	P001	P1

L180122

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- GENERAL**
- These drawings shall be read in conjunction with all Lacus Consulting Pty Ltd, architectural and other consultant's documents, specifications and other written instructions as may be issued during the course of the contract.
 - For the purpose of these notes the following definitions shall apply;
 - Engineer: denotes an engineer employed by Lacus Consulting Pty Ltd
 - Consultant: denotes another consultant who is a part of the design team and is not an employee of Lacus Consulting Pty Ltd
 - Superintendent: denotes the party who oversees and/or directs the project
 - Client: denotes the party who has engaged the consultant team and the contractor to complete the project
 - Contractor: denotes the head contractor for the site and all of their subcontractors
 - Geotechnical engineer denotes: a geotechnical consultant involved in the project
 - Demolition and/or erection engineer: denotes a professional and insured engineer who is engaged by the contractor, at the contractor's expense, to advise on all demolition and temporary works required for the contractor to complete the construction
 - A copy of these drawings shall be kept on site during the construction period.
 - Any discrepancy on the drawings or between the drawings and/or the specification and/or the specified Australian Standards shall be referred to the engineer and a written instruction received prior to proceeding with the work. During tendering the tenderer shall assume the large/greater criteria in terms of cost in the absence of other instructions.
 - All materials and workmanship shall be in accordance with the requirements of the current Australian Standards, including all amendments, and the by-laws and ordinances of the relevant building authority, except where varied by the project specification.
 - The contractor shall verify all dimensions relevant to setting out site work on site before construction and fabrication. The engineer's drawings are not to be scaled. No responsibility will be taken by the engineer for dimensions obtained by scaling the drawings.
 - All substitutions must be presented at the time of tendering as a non-conforming tender submission. Substitutions are to be fully documented as to the advantage to the project they will bring in adopting the substitution. The design and specification of the substitution remains the responsibility of the contractor to ensure that the substitution is fit for purpose and full fills the required design life. Even when the engineer approves the use of a substitution, the responsibility of the substitution remains with the contractor.
 - During construction the contractor shall, at their own cost, engage an erection engineer;
 - who shall be responsible for maintaining the structure in a stable condition; ensuring no part shall be over-stressed during construction activities.
 - Who shall be responsible for the design and erection of all temporary works.
 - Who shall be responsible for the delivery, fabrication, construction and erection of all elements of the structure.
 - The structural drawings do not show all details of fixtures, inserts, sleeves, openings, etc. Required by the various trades. All such details, including openings for construction purposes, must be approved by the engineer before proceeding with construction. The contractor shall allow for additional support members where required.
 - Any damaged structural material shall be repaired or replaced to the engineer's satisfaction ensuring the original durability strength and serviceability characteristics are maintained.
 - Should additional services or changes to the structural documentation be requested by the contractor, the contractor shall be responsible for all associated consultant fees and expenses.
 - The contractor shall allow for the preparation and cost of detailed shop drawings. The contractor shall check and coordinate the shop drawings with all trades, other consultant documents and site conditions.
 - The engineer does not provide "as built" drawings for the structure that reflect the as built conditions at the completion of construction. Should the contractor request assistance from the engineer for production of "as built" drawings the contractor shall be responsible for all associated consultant fees and expenses.
 - The contractor shall engage a geotechnical engineer for the purpose of certifying the required ground conditions as nominated in the documents. The geotechnical engineer may be the same who prepared the geotechnical investigations for the consultant team or an independent geotechnical engineer.
 - The contractor shall engage an independent welding inspection and site supervision service to carry out all steelwork testing and examinations required by Australian Standards. Minimum steel examinations required by this contract are:
 - 100% visual weld inspections
 - 10% radiographic or ultrasonic weld inspections
 - 100% bolt tightening inspection after erection
 - The contractor shall engage a registered Building Practitioner (RBP)/Building certifier to carry out all site inspections, and to submit fortnightly reports to the contractor and superintendent for record. The building practitioner/certifier shall be a practicing structural engineer category/class civil engineer who is on the NER and is not involved with the day to day running of the project, who can demonstrate knowledge and experience in commercial buildings of similar type and size and who has been given written approval to carry out the inspections by the superintendent. All foundations, pre slab, concrete reinforcement, structural steel work, timber or metal framing are to be

inspected for compliance with structural documents, additional spot check of masonry tiles and mortar joints by the RBP/Building certifier to be included.

- Prior to commencing site works, the contractor shall confirm and locate all existing structures, services and other assets that may be affected by the works. The contractor shall seek direction from the engineer should any existing structures, services or assets be different to those shown on the consultant's documents.
- The design life of the works shall be 50 years or as otherwise agreed with the client. All materials and workmanship provided by the contractor shall ensure that the required design life is achieved.
- Should the contractor require Lacus Consulting Pty Ltd. To participate in an online centralized data management system such as aconex the contractor shall allow to pay all associated participation fees required by the service operator in their tender price. The contractor shall notify Lacus Consulting Pty Ltd in writing of this requirement during tendering of the project. Within three (3) months of practical completion of the project, the contractor shall provide free of charge to Lacus Consulting Pty Ltd a complete record of all data that Lacus Consulting Pty Ltd were able to access on the system during the project. Such data shall be provided in a common readable and searchable format and be recorded on cd, DVD or similar media.

DESIGN CRITERIA

- The superimposed dead and live loads shall be calculated in accordance with AS1170.1 and AS1170.0. Refer to the general arrangement drawings for specific load criteria.
- The wind loads shall be calculated in accordance with AS1170.2 and AS1170.0. The following criteria apply:

Ultimate Regional Wind Velocity (m/s) VR 1000	46
Serviceability Regional Wind Velocity (m/s) VS 20	37
Region	A5
Terrain Category	2.5
Topographical Multiplier	1
Structure Importance Level	1
Building Height (m)	<10m
- The earthquake loading shall be calculated in accordance with AS1170.4. The following design criteria apply;

Probability of exceedance	1/1000
Importance level	3
Probability Factor	1.25
Hazard Factor	0.09
Site subsoil Class	CC
Earthquake Design Category	II
Building Height (m)<10m	
- The minimum lateral resistance load of 2.5% of (G + Yc Q) for each level, shall be applied simultaneously at each level for a given direction, in accordance with AS1170.0.
- The general deflection limits are as follows:

ELEMENT	SERVICEABILITY PARAMETER	MAXIMUM DEFLECTION
Total Deflection	Mid Span	Span/250
Total Deflection	Cantilever	Span/125
Members supporting		
New Brittle Partitions	Mid span	Span/500
Members supporting		
New Brittle Partitions	Cantilever	Span/250
Members supporting		
Existing Brittle Partitions	Mid span	Span/100
Members supporting		
Existing Brittle Partitions	Cantilever	Span/500
Wind Load		
Steel Building		
Non-Brittle Finishes	Deflection at top	Span/150
Wind Load		
Steel Building Brittle Finishes	Deflection at top	Span/250
Horizontal deflection of Handrail Rails	Mid span	Span/240
Horizontal deflection of Handrail Rails	Mid span	Span/150

SITE SUPERVISION AND INSPECTION

- The contractor shall ensure a suitably qualified, registered building practitioner/Building certifier/Engineer who is on the Nation Engineers Register (NER), carries out all the required inspections, as specified by the building surveyor, to enable it to provide a certificate of compliance - construction at the conclusion of the works.
- The contractor shall give a minimum of two (2) working days' notice prior to inspections being required. Scheduled inspections should be canceled a minimum of four (4) working hours prior to the scheduled time if work will not be ready for inspection.

If an area of work is not completed at the scheduled time of inspection, or it is

defective and requires re-inspection, the re-inspection shall be at the contractor's expense.

Inspection times shall be between the engineer's working hours of 9am to 4pm Monday to Friday (excluding public holidays). Generally, no inspections shall be carried out on Saturdays, Sundays or public holidays except in emergency situations and by special booking arrangements (including provision for additional fees for the engineer).

- The contractor shall allow in their program a minimum period of ten (10) working days from receipt of the shop drawings by the engineer to approval of the drawings. Unless otherwise arranged, the drawings shall be submitted progressively in packages (relating to marking plans) so as to allow the engineer to check the drawings in a timely manner.

BULK EXCAVATION

- The contractor is to notify all service authorities and arrange for disconnection of services or supply as applicable including all cutting, disconnection or sealing off of services and drains as required. Services or supply lines that are to be retained shall remain undamaged and given all necessary protection.
- The bulk excavation shall be carried out to the bulk excavation profile on the drawings or to the underside of the structure, inclusive of subbase materials. The contractor shall verify any levels shown on the structural documents with the architectural documents. Any discrepancy shall be referred to the superintendent for direction.
- Unless authorised by the superintendent over-excavations shall not be claimed as variation. Such excess excavations shall be filled with 3% cement stabilised sand unless compacted backfilling is approved by the engineer.
- The contractor shall engage, at their own cost, their own geotechnical engineer to advise and inspect all groundworks, the contractor's geotechnical engineer shall provide site inspection reports/certification as deemed necessary by the building surveyor.
- The contractor shall provide all bracing necessary to retain earth banks, roads, pavements, walls and footings of adjoining properties and prevent caving and displacement of adjacent soil or structures. The contractor shall provide and design all necessary components of such bracing.
- All excavated material shall be removed from the site. This material shall not be used for leveling, filling excess excavations or backfilling behind retaining walls unless written approval has been obtained from the superintendent.
- Base of the bulk excavation shall be compacted to seal the top layers of clay and crowned to ensure all water sheds to swale drains.
- The contractor shall provide all pumps, temporary sumps and drains as may be necessary to maintain the excavation free of standing water at all times.
- Bulk excavation batters around the perimeter of the site are to be as shown below unless noted otherwise on the drawings or geotechnical report. Tops of batters are to be offset from the site boundary by and minimum of 1000mm, before grading to the base of the excavations at grades nominated in the geotechnical report.
- All ground unsuitable for the purposes of the works, shall be removed and filled with 3% cement stabilised sand or approved compacted backfilling as nominated by the geotechnical engineer.
- No variation will be approved for rectification of subgrades as a result of poor drainage and water management on site.

FOUNDATION

- The minimum safe bearing capacity of the foundation material is to be:

Pool Subgrade	100kPa
---------------	--------
- The contractor shall engage at their own cost their own geotechnical engineer to advise and inspect all groundworks, the contractors geotechnical engineer shall provide site inspection reports/certification as deemed necessary by the building surveyor.
- Before any reinforcement or concrete is placed, the safe bearing capacity of the ground is to be verified by the geotechnical engineer. Excavation shall continue until the required bearing capacity is found. Any over-excavation shall be backfilled with 15 MPa blinding concrete to the underside of the works.
- The depths to the underside of all footings within the documents are provisional only. After excavation, approval shall be obtained from the geotechnical engineer for the exposed founding material, prior to further work. All footings to be founded a minimum of 200mm into the founding material. Refer to the geotechnical report for further details.
- The foundation excavation is to be kept free of water at all times by bailing and pumping if necessary, particularly prior to concreting. Concrete shall not be placed in water. Where founding material and the base of foundation excavations has been damaged by water, all effected material is to be removed from the excavation and re-approved provided by the geotechnical engineer prior to pouring blinding concrete.
- Minimum 50mm concrete blinding shall be placed within 24hrs of excavation once approval has been given by geotechnical engineer.

CONCRETE

- All workmanship and materials shall be in accordance with AS3600 and the specification.
- Concrete sizes shown do not include finish and must not be reduced without the engineer's approval. Depths of beams are given first and include slab thickness. Slabs and beams are to be poured together and in accordance with AS3600 and the specification.
- Construction joints shall be properly formed and used only where shown or specifically approved by the engineer.
- All concrete shall be grade N32, normal density unless noted otherwise. Maximum aggregate size 20mm. Admixtures shall not be used without the

- prior approval of the engineer. Maximum basic shrinkage at 56 days shall be 650 micro strain.
- All cement is to be "GP" general purpose Portland cement or "GB" general purpose blended cement or type "SR" sulphate-resisting cement as required complying with AS3972 unless noted otherwise on the drawings. Extra rapid hardening super sulphated and high alumina cements shall not be used. The use of fly ash and/or silica fume as a cement substitute, other than that proportion allowed as part of the "GB" cement content will only be permitted as part of a designed concrete mix which has been approved in writing by the engineer.
 - External concrete elements shall be minimum grade S32 meeting the following requirements:
 - Minimum Portland cement content 400kg/m3 (no fly ash to be used)
 - Maximum water/cement ratio 0.5
 - Shrinkage limit 650 micro strain after 56 days
 - Chloride content to be restricted as per clause 4.9 of AS3600
 - No salts shall be added

External elements are those exposed to weather or water penetration, AS3600 exposure classification B1 unless noted otherwise.

- Swimming pools, water tanks, water retaining structures pool concourses and splash pad concrete elements shall be minimum grade S40 meeting the following requirements:
 - Minimum Portland cement content 350kg/m (no fly ash/slag to be used to reduce the cement content)
 - Maximum water/cement ratio 0.45
 - Shrinkage limit 650 micro strain after 56 days
 - Chloride content to be restricted as per clause 4.9 of AS3600
 - No salts shall be added
 - Total reactive Alkali content not greater than 3.0kg Na2O (equivalent) per cubic metre
 - Average compressive strength at the completion of curing not less than 75% of the specified fc ie 75% of 40MPa = 30MPa
 - Aggregate,
 - Pool general structure and concourses maximum 20mm
 - For pool walls and gutter maximum 16mm
 - Minimum concrete cover 50mm
 - Flyash and/or slag may be added to improve durability, workability and to reduce overall shrinkage, however is to be done so in addition to minimum cement content.

Swimming pools, water tanks, water retaining structures, pool concourses and splash pad concrete elements are those exposed to chlorinated pool water or water penetration, AS3735 and AS3600 exposure classification B2 unless noted otherwise.

- Concrete slump shall be a maximum of 80mm unless noted otherwise on the drawings.
- Free dropping of concrete from a height greater than 1000mm is not permitted.
- Camber to suspended slabs and beams shall be as noted on the drawings. No camber is required to post-tensioned slabs and beams unless noted on the documents.
- All exposed concrete corners to have 15mm chamfer unless noted otherwise
- No holes, chases or embedment of pipes other than those shown on the structural drawings shall be made in the concrete members without the prior approval of the engineer.
- All steel embedment's shall be hot dip galvanized.
- Concrete must be cured by an approved method in accordance with the specification for seven days after pouring.
- Concrete shall be separated from supporting masonry by two layers of malthoid or poly course (or an approved equivalent). Vertical faces of concrete shall be kept free of adjoining surfaces by 10mm thickness of Ableflex (or an approved equivalent). All non-loadbearing walls shall be kept clear of the underside of slabs and beams by 20mm unless noted otherwise.
- Brickwork must not be built on concrete slabs or beams until formwork supporting it has been removed.
- High frequency vibrators shall be used to compact all concrete.
- Surfaces receiving grout shall be left rough and free of laitance.
- Reinforcement is represented diagrammatically and not necessarily shown in true projection.
- Cover to reinforcement and concrete grade shall be as schedule below unless noted otherwise.
 - Cover is the clear distance between any reinforcing (including fitments) and the face of the structural element
 - All covers shall be maintained using approved bar chairs. In slabs bar chairs shall be at 800x800 mm minimum centres. Bar chairs shall be provided along the edges of all construction joints. Stop ends shall not be used to maintain covers.
- For all external surfaces, provide fully plastic bar chairs. Tie wire shall not be nailed to the forms. Reinforcing bars shall not be used to keep forms apart. Through tie system shall be used to tie forms.
- Provide an approved vapor barrier for slabs, beams and thickenings cast against the ground.
- Reinforcement notations;
N denotes deformed bars grade 500N to AS/NZS 4671
R denotes plain round bars grade 250N to AS/NZS 4671
SL, RL denotes hard-drawn wire reinforcing fabric grade 500L to

AS/NZS4671

The number immediately following the bar grade symbol represents the nominal bar diameter in millimetres. The figure following the fabric symbol is the reference number. Substitution of 500N reinforcing by 500L mesh is not permitted.

- Splices in reinforcement shall be made in the positions shown or as otherwise approved by the engineer. Grade 500N bars shall be lapped in accordance with the standard lap length table below, unless noted otherwise on the drawings. Minimum lap for all fabrics shall be the spacing of two transverse wires plus 25mm.
- Welding of reinforcement shall not be permitted without the written approval of engineer.
- All reinforcement shall be supported in its correct position on approved bar chairs at 1000mm maximum centres both ways, so as not to be displaced during concreting. Where required provide N16 support bars at 1000mm centres.
- Unless otherwise shown, provide N12-300 top & bottom both ways minimum tying steel where required, lapped S40mm at splices
- 3-N12 diagonal corner bars 1200mm long are required at all re-entrant corners in slabs and walls (1 set of 3 each face)
- Reinforcement set-out dimensions are related to column centrelines, quarter span points and beam edges unless noted otherwise.
- Reinforcement lengths indicated are in millimetres and are plan length only. Turn downs and cranks are not included in the dimension.
- Bars shown staggered on plan shall be placed alternately.
- Bars shall be evenly distributed over the width of the strip unless noted otherwise.
- Reinforcement shall not be cut or welded on site unless approved by the engineer. Bars conflicting with small holes and other minor penetrations less than 300mm long may be displaced laterally.
- Formwork shall be designed and constructed in accordance with AS3610. No concrete shall be placed until the formwork is inspected and certified by the formwork engineer at the contractor's expense.
- The class and colour of the concrete surface finish shall be as specified on the architectural drawings and/or the specification. Approval of the concrete mix does not absolve the contractor of the need to comply with the required concrete colour requirements.
- Back propping or an undisturbed formwork shall be used. Reshoring systems are not permitted
- Minimum formwork stripping times are as a guide in ambient temperatures between 12°c and 20°c as follows, provided the target concrete strength is achieved:
 - Vertical surfaces 2 days (fcm = 5 MPa)
 - Soffits of beams and slabs 6 days (fcm = 22 MPa)
 - Floor back propping 18 days (fcm = 28 MPa)

Fcm is the target concrete strength at the time unless noted otherwise.

Minimum of 3 levels of formwork and/or back prop supports are required, unless noted otherwise.

- Horizontal loads on formwork are to be resisted by the formwork bracing. Strutting of the formwork from the permanent structure to resist horizontal loads is not permitted.
- Creation of any penetrations into concrete (including for the installation of fixings and anchors) shall only be carried out via the use of equipment, procedures and materials that do not damage the embedded steelwork including reinforcement and /or post-tensioning cables.
- Where not nominated elsewhere the minimum concrete strengths at 28 days (fc) shall be as follows

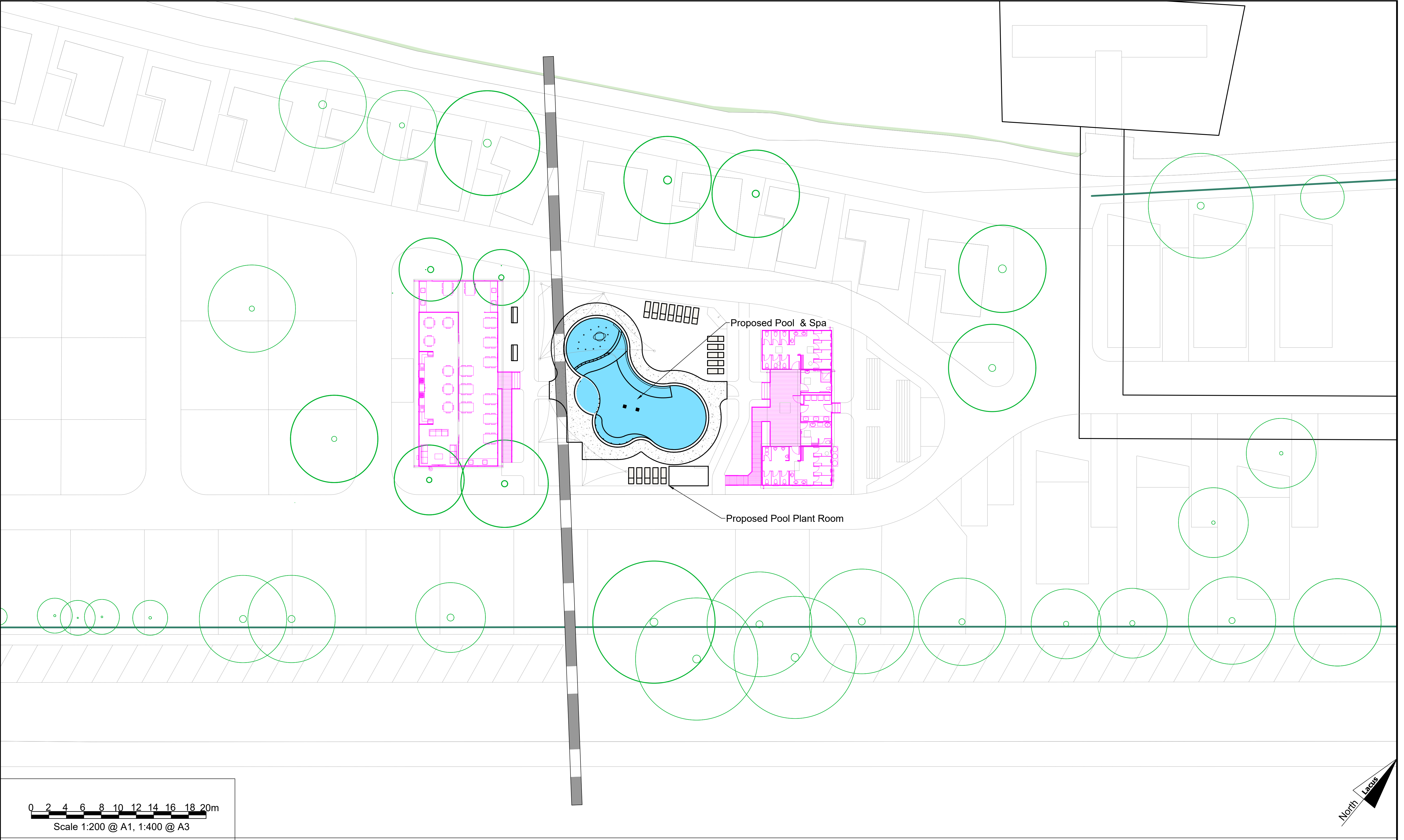
Element	Concrete Strength	Internal Cover	External Cover	Slump
Blinding	N15			80mm
Footings	N25	75mm	75mm	80mm
Bored Piers	N32	75mm	75mm	60mm
Walls	N32	30mm	40mm	80mm
Slabs on Ground	N32	30mm	40mm	80mm
Suspended Slabs	N32	30mm	40mm	80mm
Columns	N40	30mm	40mm	80mm
Beams	N32	30mm	40mm	80mm
Swimming Pools and Pool Concourses				
Refer note 7	S40	50mm	50mm	80mm

Issue P1	Description Preliminary	Drawn LC	Checked mrl	Date 18 Oct 2019	Consultant:	Lacus Structural, Civil and Aquatic Engineering Lacus Consulting Pty Ltd Info@LacusConsulting.com Ph: +61 (0) 422 969 199 PO Box 91,Highett, VIC 3190 ABN: 68 613 723 738	Client:  INTEGRATED Site Design PLANNING • DESIGN • MARKETING • MANAGEMENT	Project: PROPOSED POOL & SPA CALYPSO HOLIDAY PARK, YAMBA, NSW	NOTES SHEET 1 OF 2 PRELIMINARY NOT FOR CONSTRUCTION Scale: Date: 10/10/2019 Project Number Drawing Number Revision L180122 P002 P1		
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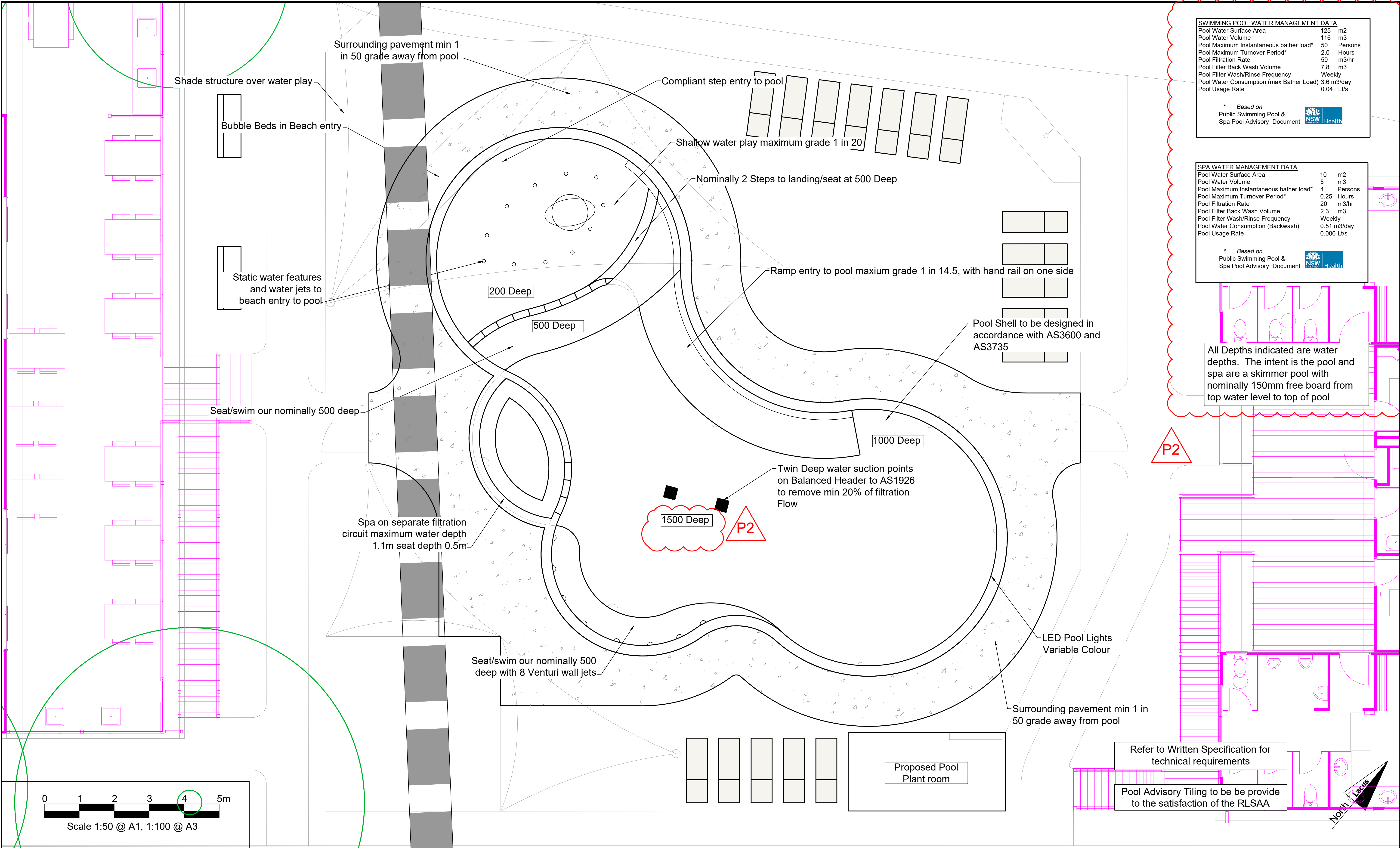
L180122



This drawing must not be scaled, only use figured dimensions										
Issue P1	Description Preliminary	Drawn LC	Checked mrl	Date 18 Oct 2019	Consultant:	Lacus Structural, Civil and Aquatic Engineering Lacus Consulting Pty Ltd Info@LacusConsulting.com Ph: +61 (0) 422 969 199 PO Box 91, Highett, VIC 3190 ABN: 68 613 723 738	Client:  INTEGRATED Site Design PLANNING • DESIGN • MARKETING • MANAGEMENT	Project: PROPOSED POOL & SPA CALYPSO HOLIDAY PARK, YAMBA, NSW	SITE PLAN	
					PRELIMINARY NOT FOR CONSTRUCTION					
					Scale:1: 200 @ A1		Date: 10/10/2019			
					Project Number L180122		Drawing Number P003		Revision P1	

L180122

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SWIMMING POOL WATER MANAGEMENT DATA		
Pool Water Surface Area	125	m2
Pool Water Volume	116	m3
Pool Maximum Instantaneous bather load*	50	Persons
Pool Maximum Turnover Period*	2.0	Hours
Pool Filtration Rate	59	m3/hr
Pool Filter Back Wash Volume	7.8	m3
Pool Filter Wash/Rinse Frequency	Weekly	
Pool Water Consumption (max Bather Load)	3.6	m3/day
Pool Usage Rate	0.04	Lt/s

* Based on
Public Swimming Pool &
Spa Pool Advisory Document



SPA WATER MANAGEMENT DATA		
Pool Water Surface Area	10	m2
Pool Water Volume	5	m3
Pool Maximum Instantaneous bather load*	4	Persons
Pool Maximum Turnover Period*	0.25	Hours
Pool Filtration Rate	20	m3/hr
Pool Filter Back Wash Volume	2.3	m3
Pool Filter Wash/Rinse Frequency	Weekly	
Pool Water Consumption (Backwash)	0.51	m3/day
Pool Usage Rate	0.006	Lt/s

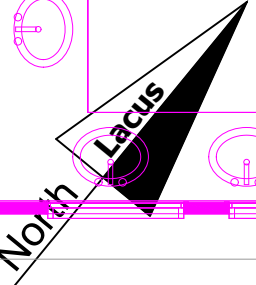
* Based on
Public Swimming Pool &
Spa Pool Advisory Document



All Depths indicated are water depths. The intent is the pool and spa are a skimmer pool with nominally 150mm free board from top water level to top of pool

P2

P2



This drawing must not be scaled, only use figured dimensions

Issue	Description	Drawn	Checked	Date
P1	Preliminary	LC	mrl	18 Oct 2019
P2	Preliminary	LC	mrl	01 April 2020

Consultant:

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PO Box 91, Highett, VIC 3190
ABN: 68 613 723 738

Client:

INTEGRATED

Site Design

PLANNING • DESIGN • MARKETING • MANAGEMENT

Project:

PROPOSED POOL & SPA

CALYPSO HOLIDAY PARK, YAMBA, NSW

POOL GENERAL ARRANGEMENT

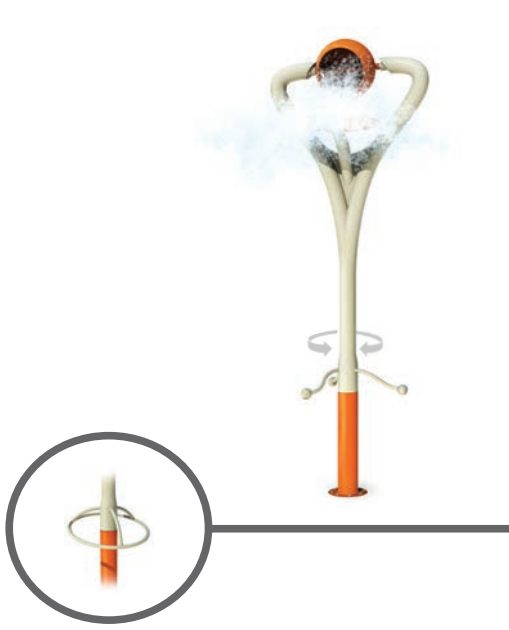
PRELIMINARY

NOT FOR CONSTRUCTION

Scale: 1: 50 @ A1	Date: 10/10/2019
Project Number L180122	Drawing Number P004
	Revision P2

L180122

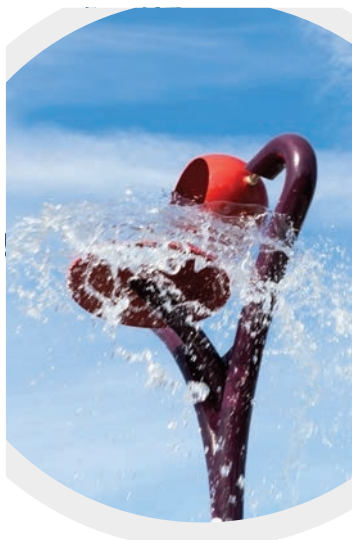
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Spin Splasher

ZONES DE JEU		
TOUT-PETIT	ENFANT	JEUNE
CARACTERISTIQUES SPECIALES		
INTERACTIF	MOVEMENT	SON
GAMME DE DEBIT (ENVIRO-HAUTE)		
5-10 GPM	19-38 LPM	
APPROXIMATION DE LA TAILLE		
GRANDEUR	11'3"	3441 mm
HAUTEUR	3'10"	1168 mm
ZONE D'ASPIRATION	Ø20"	Ø6096 mm
OPTIONS D'ANCRAGE		
DEX	INTEGRE	

Offert avec une poignée courbée ou ronde



Bloomin' Soaker 2

PLAY ZONES		
TODDLER	CHILD	YOUTH
SPECIAL FEATURES		
INTERACTIVE	MOVEMENT	SOUND
FLOW RANGE (ENVIRO-HIGH)		
20-40 GPM	76-151 LPM	
SIZE APPROXIMATION		
HEIGHT	10'0"	3204 mm
WIDTH	8'5"	2573 mm
SPRAY AREA	14' x 44'	7313 x 13411 mm
INSTALLATION OPTIONS		
DEX	EMBEDDED	



Sky-brella

PLAY ZONES		
TODDLER	CHILD	YOUTH
SPECIAL FEATURES		
INTERACTIVE	MOVEMENT	SOUND
FLOW RANGE (ENVIRO-HIGH)		
20-30 GPM	75-113 LPM	
SIZE APPROXIMATION		
HEIGHT	6'7"	2017 mm
WIDTH	Ø16"	4877 mm
INSTALLATION OPTIONS		
DEX	EMBEDDED	



Mega Soaker

ZONES DE JEU		
TOUT-PETIT	ENFANT	JEUNE
CARACTERISTIQUES SPECIALES		
INTERACTIF	MOVEMENT	SON
GAMME DE DEBIT (ENVIRO-HAUTE)		
40-50 GPM	150-190 LPM	
APPROXIMATION DE LA TAILLE		
GRANDEUR	17'7"	5366 mm
HAUTEUR	6'1"	1845 mm
ZONE D'ASPIRATION	30' x 40'	9144 x 12192 mm
OPTIONS D'ANCRAGE		
DEX	INTEGRE	



Rain Cap

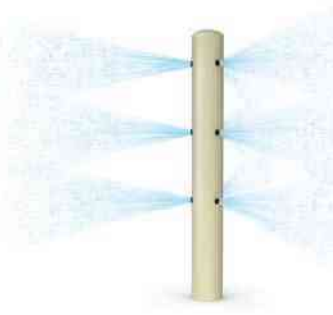
PLAY ZONES		
TODDLER	CHILD	YOUTH
SPECIAL FEATURES		
INTERACTIVE	MOVEMENT	SOUND
FLOW RANGE (ENVIRO-HIGH)		
5-35 GPM	20-120 LPM	
SIZE APPROXIMATION		
HEIGHT	9'10"	2997 mm
WIDTH	6'10"	2083 mm
SPRAY AREA	Ø16"	Ø4900 mm
INSTALLATION OPTIONS		
DEX	EMBEDDED	

Includes standard graphics



Mist Stick

PLAY ZONES		
TODDLER	CHILD	YOUTH
SPECIAL FEATURES		
INTERACTIVE	MOVEMENT	SOUND
FLOW RANGE (ENVIRO-HIGH)		
2-20 GPM	8-75 LPM	
SIZE APPROXIMATION		
HEIGHT	4'0"	1219 mm
WIDTH	Ø16"	Ø4900 mm
INSTALLATION OPTIONS		
DEX	EMBEDDED	



Crazy Hose

PLAY ZONES		
TODDLER	CHILD	YOUTH
SPECIAL FEATURES		
INTERACTIVE	MOVEMENT	SOUND
FLOW RANGE (ENVIRO-HIGH)		
2-20 GPM	8-75 LPM	
SIZE APPROXIMATION		
HEIGHT	10'1"	3073 mm
WIDTH	5'5"	1646 mm
SPRAY AREA	Ø14"	Ø3275 mm
INSTALLATION OPTIONS		
DEX	EMBEDDED	



Fun-brella

PLAY ZONES		
TODDLER	CHILD	YOUTH
SPECIAL FEATURES		
INTERACTIVE	MOVEMENT	SOUND
FLOW RANGE (ENVIRO-HIGH)		
20-30 GPM	75-113 LPM	
SIZE APPROXIMATION		
HEIGHT	8'4"	1013 mm
SPRAY AREA	Ø12"	Ø3050 mm
INSTALLATION OPTIONS		
DEX	EMBEDDED	



Wiggly Sr.

ZONES DE JEU		
TOUT-PETIT	ENFANT	JEUNE
CARACTERISTIQUES SPECIALES		
INTERACTIF	MOVEMENT	SON
GAMME DE DEBIT (ENVIRO-HAUTE)		
4-6 GPM	15-23 LPM	
APPROXIMATION DE LA TAILLE		
GRANDEUR	4'3"	1303 mm
HAUTEUR	20' x 30'	7225 x 10972 mm
OPTIONS D'ANCRAGE		
DEX	INTEGRE	



Wiggly

ZONES DE JEU		
TOUT-PETIT	ENFANT	JEUNE
CARACTERISTIQUES SPECIALES		
INTERACTIF	MOVEMENT	SON
GAMME DE DEBIT (ENVIRO-HAUTE)		
4-6 GPM	15-23 LPM	
APPROXIMATION DE LA TAILLE		
GRANDEUR	3'5"	966 mm
HAUTEUR	2'2" x 3'0"	6706 x 9144 mm
OPTIONS D'ANCRAGE		
DEX	INTEGRE	

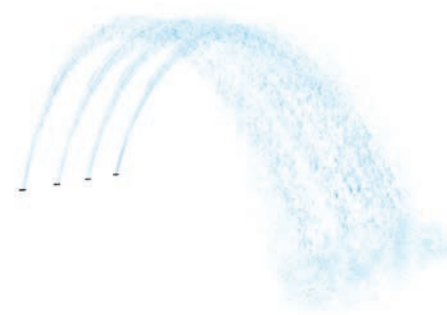


Wiggly Jr.

ZONES DE JEU		
TOUT-PETIT	ENFANT	JEUNE
CARACTERISTIQUES SPECIALES		
INTERACTIF	MOVEMENT	SON
GAMME DE DEBIT (ENVIRO-HAUTE)		
4-6 GPM	15-23 LPM	
APPROXIMATION DE LA TAILLE		
GRANDEUR	2'4"	716 mm
HAUTEUR	14' x 20'	4267 x 6096 mm
OPTIONS D'ANCRAGE		
DEX	INTEGRE	

Fountain Mountain

ZONES DE JEU		
TOUT-PETIT	ENFANT	JEUNE
CARACTERISTIQUES SPECIALES		
INTERACTIF	MOVEMENT	SON
GAMME DE DEBIT (ENVIRO-HAUTE)		
10-13 GPM	38-49 LPM	
APPROXIMATION DE LA TAILLE		
GRANDEUR	5'	1524 mm
HAUTEUR	Ø12"	Ø3058 mm

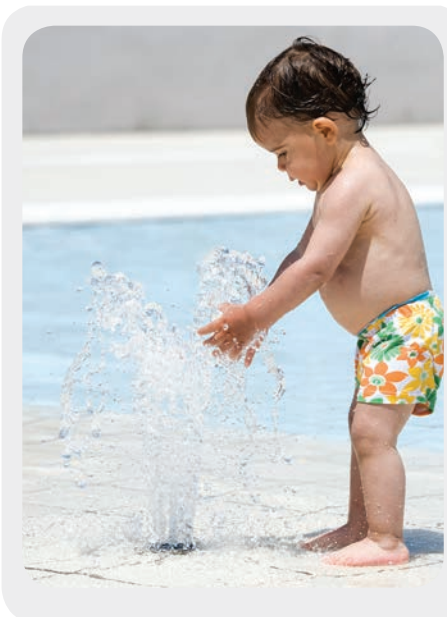


Spray Tunnel 4

ZONES DE JEU		
TOUT-PETIT	ENFANT	JEUNE
CARACTERISTIQUES SPECIALES		
INTERACTIF	MOVEMENT	SON
GAMME DE DEBIT (ENVIRO-HAUTE)		
10-24 GPM	Ø2-91 LPM	
APPROXIMATION DE LA TAILLE		
GRANDEUR	6'	1829 mm
HAUTEUR	14' x 12'	4267 x 3658 mm

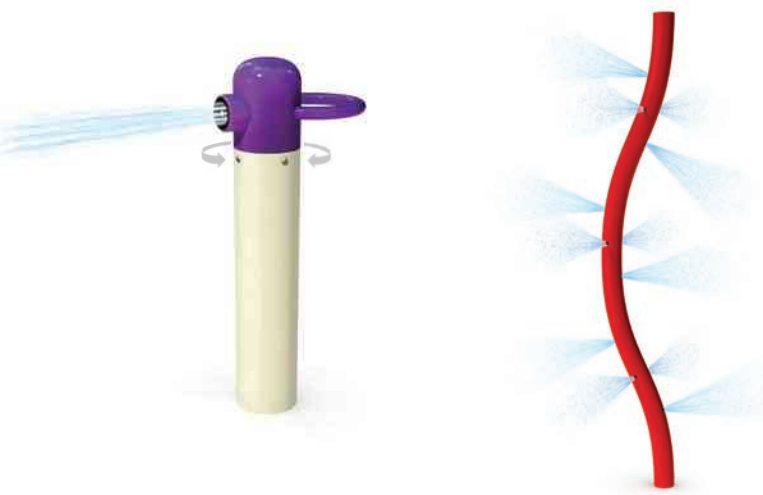
Monster 5

ZONES DE JEU		
TOUT-PETIT	ENFANT	JEUNE
CARACTERISTIQUES SPECIALES		
INTERACTIF	MOVEMENT	SON
DEBIT		
37 GPM	121 LPM	
APPROXIMATION DE LA TAILLE		
GRANDEUR	5'	1524 mm
HAUTEUR	Ø12"	Ø3058 mm



Splash Blaster

ZONES DE JEU		
TOUT-PETIT	ENFANT	JEUNE
CARACTERISTIQUES SPECIALES		
INTERACTIF	MOVEMENT	SON
GAMME DE DEBIT (ENVIRO-HAUTE)		
5-7 GPM	20-27 LPM	
APPROXIMATION DE LA TAILLE		
GRANDEUR	5'5"	1700 mm
HAUTEUR	15'	4572 mm
OPTIONS D'ANCRAGE		
DEX	INTEGRE	



Hula Post

ZONES DE JEU		
TOUT-PETIT	ENFANT	JEUNE
CARACTERISTIQUES SPECIALES		
INTERACTIF	MOVEMENT	SON
GAMME DE DEBIT (ENVIRO-HAUTE)		
2-20 GPM	8-75 LPM	
APPROXIMATION DE LA TAILLE		
GRANDEUR	10'0"	3232 mm
HAUTEUR	Ø20"	Ø6100 mm
OPTIONS D'ANCRAGE		
DEX	INTEGRE	

Water features depicted are suggestions only, Tenders are to submit with their tender a proposed feature layout and details. WaterPlay features have been used as an example, however, other manufactures such as Imagination Play, Vortex, Raindrop & Parkequip to list a few, may also be used.

This drawing must not be scaled, only use figured dimensions

Issue P1	Description Preliminary	Drawn LC	Checked mrl	Date 18 Oct 2019	Consultant:	Lacus Structural, Civil and Aquatic Engineering Lacus Consulting Pty Ltd Info@LacusConsulting.com Ph: +61 (0) 422 969 199 PO Box 91,Highett, VIC 3190 ABN: 68 613 723 738	INTEGRATED Site Design PLANNING • DESIGN • MARKETING • MANAGEMENT	Client:	Project:	PROPOSED POOL & SPA CALYPSO HOLIDAY PARK, YAMBA, NSW	SUGGESTED WATER FEATURES		
											PRELIMINARY NOT FOR CONSTRUCTION		
											Scale:1: 50 @ A1		Date: 10/10/2019
											Project Number	Drawing Number	Revision
											L180122	P005	P1

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Volume 1: Technical Specification General

Proposed Pool & Spa
Calypso Holiday Park Yamba

Prepared for: Clarence Valley Council

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Revision History: L180122-003-Sp-mrl Tech Spec Vol 1 General

Revision	Description	Dated	Author	Reviewed
P1	Preliminary Issue	18 October 2019	LC	mrl

INTRODUCTION

The purpose of this specification and associated drawings is to provide the design intent and the performance specifications for the proposed swimming pool & spa to be installed at Calypso Holiday Park Yamba NSW.

This technical specification contains the general requirements for the project and how the project is to be delivered. This specification forms a part of a set consisting of the following volumes. Each volume must be read in its entirety and in conjunction with the other volumes and the relevant drawing prepared for the project.

The full set of documents relevant to the project is detailed in the attached document transmittal.

Volumes that make up this specification include the following;

- Volume 1: Technical Specification, General
- Volume 2: Technical Specification, Pool and Tank Construction
- Volume 3: Technical Specification, Filtration and Pool Hydraulics (PWT)
- Volume 4: Technical Specification, Pool Finishes, Fittings and Furniture

Where reference is made to this specification, it shall mean referring to the requirements of all volumes.

ALTERNATIVE OFFERS

All tender submissions must include a tender offer conforming to the provisions of this specification. Alternative offers may be accepted providing they are accompanied by a conforming offer and that all alternatives are clearly identified and the advantages the alternatives bring to the project are clearly defined.

The requirements of this specification including all detailed design, documentation and the complete installation of the works shall be accepted by the contractor.

Within the specification, reference is made to acceptable brand names and suppliers to establish the required details and quality to be employed. Whilst "and or equivalent" will be considered, random brand substitutions are not permitted without submission, and written approval, all variations from the specified supply shall be detailed at the time of tender.

AQUATICS CONTRACTOR EXPERIENCE

Commercial swimming pool structures and filtration systems detailed in this specification are to be completed by Aquatics Contractors with proven experience in completing works of this nature. The following requirements are mandatory prerequisites for the Aquatics Contractors.

The contract works shall be undertaken by an Aquatics Contractor approved by the engineer with suitable experience with work of this type, specifically commercial pool water treatment systems, commercial pool shell and splash pad construction and tiling/finishing of commercial pools and splash pads.

At the time of tendering the Aquatics Contractor shall nominate their subcontractors and provide details of each subcontractor's experience with client referees, for the successful completion of the at least 3 No. commercial Aquatics facilities with a total construction value of over \$2M AUD.

The Aquatics Contractor shall also be capable of servicing the post completion works throughout the duration of the defects liability period under the contract and be able to attend site within 24 hours of notification in accordance with the defect liability requirements of this specification

LIMITATIONS OF RISK

These Specifications have been prepared in accordance with the agreement between Clarence Valley Council, Integrated Site Design and Lacus Consulting Pty. Ltd.

Within the limitations of the agreed upon scope of services, this work has been undertaken and performed in a professional manner, in accordance with generally accepted practices, using a degree of skill and care ordinarily exercised by members of its profession and consulting practice. No other warranty, expressed or implied, is made.

These Specifications are solely for the use of Clarence Valley Council, Integrated Site Design and any reliance on these documents by third parties shall be at such party's sole risk and may not contain sufficient information for purposes of other parties or for other uses. These Specifications shall only be presented in full and may not be used to support any other objective than those set out in the Specifications, except where written approval with comments are provided by Lacus Consulting Pty Ltd.

These Specifications relate only to the scope of works described within these Specifications.

To ensure its contextual integrity, the documents must be read in its entirety and should not be copied, distributed or referred to in part only.

GENERAL

All work including the quality and standard of all workmanship, materials and systems shall be in full compliance with all relevant Australian Standards and Statutory Regulations.

Where the specification or drawings nominate a higher quality or standard of workmanship and or materials than those nominated in the relevant Standards or Regulations; the contractor shall allow compliance with the higher or greater standard of workmanship or material. Any anomalies or discrepancies between the specification and drawings shall be reported to the engineer for clarification at the time of Tendering, where clarification is not requested the contractor shall allow for the more onerous, higher or greater standard within their submission.

Requirements with respect to program, insurances, payments, submissions, procedures, quality assurance, defects liability, warranty and other contract conditions in addition to the requirements of this specification shall be as detailed in the council contract and in this specification.

DEFINITIONS

For the purposes of this specification and the associated drawings, the following definitions shall apply;

Term	Meaning/Definition to be adopted
project	Proposed Swimming Pool at Surf Beach Holiday Park
council	Clarence Valley Council
client	Clarence Valley Council
superintendent	Clarence Valley Council
project manager	Clarence Valley Council
engineer	Lacus Consulting Pty Ltd or approved representative.
aquatics contractor	The contractor responsible for the Swimming Pool & Spa structures, hydraulics, and filtration and finishes and plant room structure
pool shell contractor	The sub-contractor to the Aquatics Contractor who is responsible for the pool shell and associated tanks
pool filtration and hydraulics contractor	The sub-contractor to the Aquatics Contractor who is responsible for the pool filtration and pool hydraulics
pool finishes contractor	The sub-contractor to the Aquatics Contractor who is responsible for the tiling and or painting of the pool shell and associated tanks
pool fittings contractor	The sub-contractor to the Aquatics Contractor who is responsible for the pool fittings
builder/head contractor	All building and civil work shall be provided under this contract by the builder/head contractor.
Approval, approved utility, authority	Approval in writing by the engineer local, state or commonwealth authorities, companies or bodies having jurisdiction over the work specified
provide	supply, install, test, commission and warrant the item or work specified.
drawings, specifications, design documents	the aquatic engineering technical specifications, drawings and all other documents provided for the project.
contract	all work in connection with this specification, drawings, design documents and contract including the formal written contract engagement between the contractor and head contractor and/or superintendent.
works	all work in connection with this specification, drawings, documents and contract.
pool water treatment	all work, equipment, services and systems in connection to pool water treatment services as detailed within the drawings, technical specifications, documents and contract.

SCOPE OF WORKS

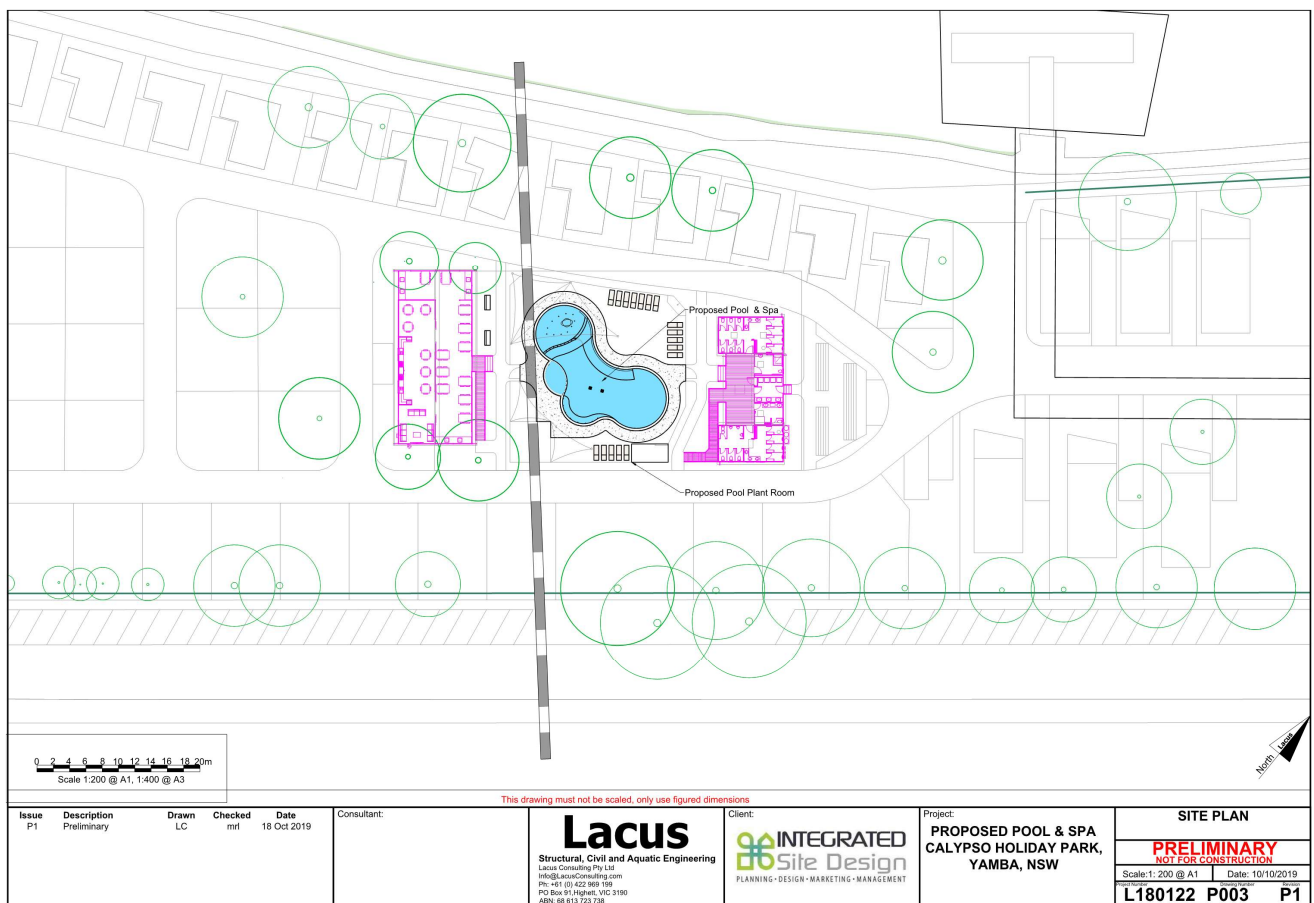
The scope of works to be provided includes the detailed design, documentation, calculation, compliance, supply, installation, testing, commissioning, authority approval, handover and guarantee of the following items;

SPECIFIC PROJECT REQUIREMENTS

Site attendance as a part of the tender process is essential to fully assess the required scope of work and to understand site specific conditions including access and existing connections.

This contract includes all building and civil work in connection with the upgrade works. A separate builder will not be engaged. All building and civil work required to complete the contract work shall be undertaken by the contractor.

The proposed location for the Swimming pool is as indicated in the image below



The contractors are to provide a submission for the design and construct contract that will provide

- The Swimming Pool, Spa and plant room, balance tanks and back wash holding tanks
- The swimming pool and spa will each have its own filtration system and water body
- The swimming pool is to be fully compliant with
 - NSW Health Public Swimming Pool and Spa Advisory Document and
 - Public Health Act 2010
 - Public Health Regulation 2012

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AQUATIC SCOPE OF WORKS

- Full Compliance with NCC 2019
- Make all applications and obtain all permits.
- Obtain all authority approvals.
- Provision of all warranties and guarantees as required by the superintendent.
- Co-ordination with all services, structural and architectural elements.
- Confirmation of all building levels and pipework invert levels.
- Preparation of co-ordinated shop drawings.
- Preparation of as-constructed drawings.
- Submission of samples and technical schedules.
- Provision for thermal expansion, contraction and deflection of all services and structural elements.
- Wrapping of all pipework cast-into concrete structures to provide isolation in accordance with manufacturers requirements.
- Waterproof sealing of all pipework penetrations.
- Provision of flexible couplings to all pipe work entering and existing concrete structures being directly related to the aquatics component or otherwise
- Excavation, trenching, backfilling and making good to existing and proposed surfaces.
- Hoisting and placing in position all equipment and building items as necessary.
- Painting, labelling and identification.
- Personal safety equipment including face shield, chemical gloves and apron in the plantroom.
- Safety shower and eyewash in the plantroom.
- Equipotential bonding in accordance with AS3000.
- Testing and commissioning.
- Staff training and handover.
- Operation and maintenance manuals.
- Implementation and maintenance of quality assurance systems and procedures.
- 18 months manufacturers servicing and maintenance.
- Refer to Speciation Volume 3 for detailed description of the pool water treatment system and splash pad operation

BUILDING AND CIVIL WORKS

- Arrange a geotechnical investigation suitable to confirm swimming pool, tanks and plant room designs
- Undertake a services location survey in the vicinity of the proposed works, prior to the commencement of the design work
- All demolition and removal of materials.
- All building and civil work in connection with the pool water treatment works.
- Excavation for concourse, pool, spa and plantroom shed base slab.
- Temporary fencing as necessary to provide a safe and secure enclosure for the excavation areas.
- Ground preparation for ground slabs.
- Compacted crushed rock base for ground slabs.
- Reinforced concrete slabs for pool concourse and plantroom shed.
- Pool water treatment plantroom signage for plantroom.
- HAZCHEM signage for plantroom shed.
- Making good to all existing surfaces including garden beds and grassed areas.
- Demolition works and clearing of the proposed location for the swimming pool and the new plant room

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- Internal finishing cleaning, surface preparation and lining of all sumps and tanks.
- Lining of balance tank where a balance tank is used
- All penetrations to structures, tanks, walls, including making good and watertight all pipe penetrations.
- Concourse Pavement repair and retexturing finishes to match existing.
- Service trenches, backfilling of pipe trenches, concrete encasements, making good.

DRAINAGE WORKS

- Backwash tank pump out systems with level controls including display of backwash storage Capacity where specified and alarms for high level.
- Plant room floor wastes
- Concourse to the swimming pool are to be graded to be free draining and stormwater picked up with grated pits plumbed to the existing stormwater system on site

PLUMBING WORKS

- Provide new potable water supply to proposed plant room
- Provide RPZD to potable water supply to isolated potable and non-potable water
- Provide Hose Cocks to plant room for the purpose of the plant wash downs, mixing water and to charge floor wastes
- Provide new combination safety shower and soft eyewash
- Supply and install stainless steel sink within the plant room with cold water supply
- Provide waste connection to the sink, floor wastes and back wash disposal

ELECTRICAL WORKS

- Construct new Sub-mains cables from the existing Mechanical Board providing 25% spare capacity
- Provide new pump control Panel within the swimming pool plant room with 25% spare capacity
- Construct all equipotential bonding of pool equipment and metal supports in the plantroom
- Construct power supply to all equipment
- All equipment controls and alarms

GENERAL REQUIREMENTS

APPROVAL

All work including submissions, procedures, equipment, materials, commissioning, drawings and manuals shall be provided to the approval of the Superintendent. The Superintendent may reject any work deemed not to be in compliance with the drawings, this specification, the design documents or contract.

Any work requiring rectification shall be rectified at the contractor's expense.

Co-ORDINATION

Co-ordinate all design documentation and the complete installation including all architectural, structural, civil and other services drawings.

AUTHORITIES AND STANDARDS

All design documentation and the complete installation of the works must fully comply with the requirements of all authorities and standards.

Notwithstanding the above, the particular reference documents for this project shall include but not be limited to the following standards, codes and guidelines;

ADWG	Australian Drinking Water Guidelines.
A79	Glossary of names for earthmoving and constructional plant;
AS1023	Low Voltage Switchgear and Control gear - Protection of Electric Motors.
AS1029	Low Voltage Contactors.
AS1170	Structural Design Actions.
AS1202	AC Motor Starters.
AS1289	Methods of testing soils for engineering purposes;
AS1318	Colour and Identification.
AS1345	Identification of Piping, Conduits.
AS1359	AC Motors - General Requirements.
AS1379	Specification and Supply Concrete.
AS1428	Design for Access and Mobility.
AS1431	Low Voltage Switchgear and Control gear - Control Circuit Devices and Switching Elements.
AS1478	Chemical admixtures for concrete
AS1478.1	Chemical Admixtures for Concrete, mortar and grout
AS1527	Two-part polysulphide-based sealing compounds for the building industry
AS1554	SAA Structural Steel Welding Code
AS1554.3	Welding of reinforcing steel
AS1664.1	Aluminium Structures - Limit State Design.
AS1664.2	Aluminium Structures - Allowable Stress Design.
AS1684	Residential Timber Frames Construction

AS1694	Code of practice for physical barriers used in protection of buildings against subterranean termites;
AS1720	Timber Structures
AS1838	Swimming Pools - Premoulded Fibre-Reinforced Plastics - Design and Fabrication.
AS1900	Flotation Aids for Water Familiarization and Swimming Tuition.
AS1926	Swimming Pool Safety
AS1939	Protection of Control Boards.
AS2032	Installation of PVC pipe Systems
AS2033	Installation of polyethylene pipe systems
AS2057	Protection of buildings from subterranean termites - Chemical treatment of soil for buildings under construction;
AS2129	Flanges for Pipes, Valves and Fittings.
AS2161.1	Contract for The Supply and Construction of a Swimming Pool or Spa
AS2184	Low Voltage Switchgear and Control gear - Moulded Case Circuit Breakers.
AS 2294	Protective structures for operators of earthmoving machines;
AS 2868	Classification of machinery for earthmoving, construction, surface mining, and agricultural purposes;
AS2312	Guide to The Protection of Structural Steel Against Atmospheric Corrosion by The Use of Protective Coatings.
AS2369	Materials for Solar Collectors for Swimming Pool Heating Series.
AS2416	Water Safety Signs and Beach Safety Flags.
AS2419.1	Fire Hydrant Installations. Part 1: System Design, Installation and Commissioning.
AS2535.1	Test Methods for Solar Collectors - Thermal Performance of Glazed Liquid Heating Collectors.
AS2441	Installation of Fire Hose Reels.
AS2566.1	Buried Flexible Pipelines – Structural Design.
AS2566.2	Buried Flexible Pipelines – Installation.
AS2610.1	Spa Pools - Public Spas.
AS2610.2	Spa Pools - Private Spas.
AS2758	Aggregates and rock for engineering purposes
AS2758.1	Concrete aggregates
AS2758.2	Aggregate for sprayed bituminous surface
AS2818	Guide to Swimming Pool Safety.
AS3000	SAA Wiring Rules.
AS3100	Approval and Test Specification - General Requirements for Electrical Equipment.
AS3112	Approval and Test Specification - Plugs and Socket-Outlets.
AS3136	Approval and Test Specification - Electrical Equipment for Spa-Baths and Spa and Swimming Pools.
AS3147	PVC Insulated Cables for Working Voltages Up to 0.6 KV.
AS3191	Electric Flexible Cords.
AS3198	Electric Cables - XPLE Insulated Cables - For Working Voltages 0.6/L KV.
AS3439.1	Low Voltage Switchgear and Control Gear Assemblies.
AS3500	National Plumbing and Drainage Code.
AS3600	Concrete Structures.
AS3610	Formwork for Concrete with supplements 1 and 2
AS3633	Private Swimming Pools - Water Quality.

AS3634	Solar Heating Systems for Swimming Pools.
AS3661	Slip Resistance of Pedestrian Surfaces.
AS3690	Installation of ABS pipe Systems
AS3700	Masonry Structures Code
AS3735	Concrete Structures for Retaining Liquids.
AS3780	The Storage and Handling of Corrosive Substances.
AS3833	The Storage and Handling of Mixed Classes Dangerous Goods in Packages and Intermediate Bulk Containers.
AS3958.1	Ceramic Tiles – Guide to Installation of Ceramic Tiles.
AS3958.2	Ceramic Tiles – Guide to The Selection of a Tiling System.
AS3972	Portland and blended cements
AS3974	Pipe Supports
AS3979	Hydrotherapy Pools.
AS3798	Guidelines on earthworks for commercial and residential developments;
AS4100	Steel Structures
AS4276	Water Microbiology Series.
AS4586	Slip Resistance Classification of New Pedestrian Surface Materials.
AS4600	Cold-Formed Steel Structures.
AS4663	Slip Resistance Measurement of Existing Pedestrian Surfaces.
AS4671	Steel Reinforcing Materials.
AS4685	Playground Equipment.
AS5102.1	Performance of Household Electrical Appliances - Swimming Pool Pumps Units - Energy Consumption and Performance
AS5102.2	Performance of Household Electrical Appliances - Swimming Pool Pumps Units - Energy Labelling and Minimum Energy Performance Standard Requirements
AS5200	Technical Specification for Plumbing and Drainage Products - Procedures for Certification of Plumbing and Drainage Products
AS5601	Gas Installations.
AS60204.1	Safety of Machinery—Electrical Equipment Machines.
AS6400	Water Efficient Products Rating and Labelling.
AS60227.5	Polyvinyl Chloride Insulated Cables of Rated Voltages Up to And Including 450/750 V - Flexible Cables (Cords).
AS60335.2.41	Household and Similar Electrical Appliances - Safety - Particular Requirements for Pumps.
AS60335.2.60	Household and Similar Electrical Appliances - Safety - Particular Requirements for Whirlpool Baths and Whirlpool Spas.
AS60529	Degrees of Protection Provided by Enclosures (IP Code).
AS61558.2.6	Safety of Power Transformers, Power Supplies, Reactors and Similar Products for Supply Voltages Up to 1,100 V.
AS ISO 13822	Basis for Design of Structures - Assessment of Existing Structures.
NCC	National Construction Code
BCA	Building Code of Australia.
DHS	Department of Human Services Requirements.
EPA	Environmental Protection Authority Requirements.
HB241	Water Management for Public Swimming Pools and Spas.
SR13	Health (Legionella) Regulations.
SR148	Plumbing Regulations.
SR79	Plumbing (Water and Energy Savings) Regulations.
WMG	Water Authority Water Metering Guidelines

REGULATIONS AND ACTS

- NSW Department of Health Code of Practice for Pool and Spa Pool, May 2010 (Draft) and 1996 Guidelines Department of Environment and Heritage Protection (DEHP)
- NSW Health Fact Sheet "Water Splash Pads in its current revision
- Public Health Act 2010
- Public Health Regulation 2012
- Dangerous Goods Regulations, 1989
- Occupational Health and Safety Authority Regulations of NSW
- Local Electricity Authority
- Local Gas Authority
- WorkCover NSW

In the event that the project Drawings and or Specifications are in conflict with any of the above references, the more conservative requirement shall take precedence.

Where any authority requires notice and/or approval, the contractor shall give such notice, make application for and obtain such approvals. The contractor shall obtain all permits within such time as to ensure that the works are not delayed.

CERTIFICATION AND STATUTORY REQUIREMENTS

When so requested, the Contractor shall provide evidence to the Superintendent that the contractor has satisfied the statutory requirements for the work about to be undertaken or the work presently being undertaken. Instructions may be provided that work not be undertaken (or completed) until such evidence is provided.

The contractor shall ensure that materials and equipment supplied, and all work methods selected shall comply with the Occupational Health and Safety requirements of the State of NSW.

INFORMATION TO TENDERERS

Tenderers shall make all necessary allowances for co-ordination, set-out, site establishment, delivery, transportation costs, import duty (where applicable), testing equipment, tools, overheads and profit. This shall include all necessary equipment, materials and associated services required for the complete and proper execution of the Contract.

The prices submitted with the Tender shall be deemed to be final and binding and as such shall form part of the Contract Documents. Claims based on errors and or omissions in the submitted Tender shall not be considered.

Canvassing of any member of the Owner, its staff and or Agents may liable a Tenderer to automatic disqualification.

ACCEPTANCE OF THE PROPOSED CONTRACTOR

The Tenderer shall include in his tender all required submissions by the contractor including priced tender schedules signed by the Contractor without the tenderers mark up and margins added.

During the tender evaluation, the proposed Contractor shall be assessed on the basis of price, conformity, contracting experience, project references, financial stability, technical ability and organisational skills. The Council and or their Agents reserve the right to reject any tender which:

- is submitted late;
- seeks to qualify acceptance of the Conditions of Tendering, General Conditions of Contract, Contract Details or Preliminary Clauses, or whose Proposals departs substantially from the technical Specifications and or Drawings;
- is a non-conforming submission submitted without the company of a conforming submission
- is incomplete, obscure, irregular or contains omissions and or erasures;
- omits to provide a completed Tender Return;
- proposes an unacceptable contractor
- contains (in the opinion of the Owner) amounts which are unreasonable; The Owner is not bound to accept the lowest tender. No reason for the rejection of a tender will be provided.
- does not comply with the requirements of, or which contains provisions not required by these Conditions, the General Conditions of Contract, Contract Details, Preliminary Clauses, Schedule of Prices, Specification, Drawings, Appendices, Annexes and Addenda.

DISCREPANCIES, OMISSIONS ETC.

It is the responsibility of the Contractor to verify all site dimensions and levels necessary for the correct operation of the system.

Revisions or corrections issued during the Tender period will be made only by notice of Addenda duly issued. Except for any such revisions or corrections, no one is authorised to amend any contract document during the Tender period.

Revisions or corrections issued during the time of Tender shall be covered by each Tenderer and shall become part of the Contract documents.

SUBMISSION OF SAMPLES

Samples shall be submitted to the Superintendent for approval prior to procurement. Contractor shall allow a minimum of 10 working days within their program for information to be reviewed and approved.

All samples shall be delivered to the Superintendent at Clarence Valley Council, or as advised otherwise.

The contractor shall allow for the Superintendent to maintain possession of all samples for the duration of the contract. No allowance shall be made by the contractor to use samples for the contract works. Contractor shall instigate, arrange and pay for collection of samples on the completion of the contract. All samples not collected within 1 months of practical completion being awarded will be disposed of without notice.

Samples shall include 1 No. of each of the following;

- Ball valves; metal and plastic.
- Butterfly valve.
- Solenoid valve.
- Pipe label.
- Equipment tag.
- Example of painted pipe work nominally Ø100mm x 300 long

ALTERNATIVE DESIGNS AND MATERIALS

All risk and responsibility in connection to designs and materials proposed by the contractor that differ from the as designed and as specified requirements shall be accepted by the contractor.

The engineer will not be responsible for the review, verification or acceptance of any alternatives proposed by the contractor.

SHOP DRAWINGS

Refer to individual volumes for required shop drawings to be submitted

AS-CONSTRUCTED DRAWINGS

The contractor shall provide as-constructed drawings detailing all services and equipment as they were installed to reflect an accurate representation of the actual installation.

As-constructed drawings shall be prepared at a minimum scale of 1:50 and include the following as a minimum;

- Pipework layouts including all valves and detailing all valve numbers
- Dimensioned structural penetrations.
- Plant layouts including details of services provided by other trades.
- Water treatment pipework schematics, Process and Identification drawings (**P&ID**)
- Electrical and control system wiring diagrams.
- Control panel cabinet details and component layout.
- Proprietary manufactured equipment details.
- Invert levels at all penetrations.
- Invert levels of all in-ground pipework.
- Pipe Expansion Joints.
- Pool and tanks Structure expansion joints, including details of water stops
- Method of pipe support
- Gradients of all pipes.
- Changes of grade.
- Installation and test dates for all in-ground services.
- Operational and critical tank levels to the balance tanks, backwash/waste tanks and relative level sensor heights and over flow heights

As Constructed Drawings shall be carefully and accurately prepared by competent draftsmen in electronic formats as directed by the Superintendent. Where an as-built condition requires a drawing to be amended all related drawings influenced by this amendment shall be similarly amended.

Approved as Constructed drawings shall be delivered to the superintendent in electronic and printed formats prior to the issue of the Certificate of Practical Completion

AS-CONSTRUCTED DRAWINGS FOR DISPLAY

Upon receiving approval of the relevant As Constructed drawings, the Contractor shall provide the following drawings as a minimum A1 drawing size, laminated, mounted to a suitable board and fixed to the plant room wall

- Plant layouts including details of services provided by other trades.
- Water treatment pipework schematics, Process and Identification drawings (**P&ID**)
- Operational and critical tank levels to the balance tanks, backwash/waste tanks and relative level sensor heights and over flow heights

A3 Laminated copies of the following drawings shall be provided and stored within the filtration control board

- Electrical and control system wiring diagrams.
- Control panel cabinet details and component layout.

Each drawing shall include the following information within the title block.

Project:	Project Title
Contract:	Pool Water Treatment Plant
Contractor:	<i>Name, address and telephone number of contractor</i>
Engineer:	Lacus Consulting Pty Ltd PO Box 91, Highett, Victoria 3190. T: +61 422 969 199
Date:	<i>Date of issue</i>

Lacus™ & Lacus Consulting Pty Ltd badges and AutoCAD Blocks will be provided to the successful Contractor to be included on the As Constructed Drawings

OPERATION AND MAINTENANCE MANUALS

The contractor shall provide operation and maintenance manuals to fully detail the complete operation and maintenance of the services provided.

The Contractor shall provide three (3) complete copies of an operating, maintenance and servicing manual for all the equipment supplied. The manuals shall be bound in approved hard covered folders (4 Ring PVC Cover Binder) as well as three soft copies on separate USB drives.

Each manual shall provide the following information clearly on the cover;

Project:	Project Title
Contract:	Pool Water Treatment Plant
Contractor:	<i>Name, address and telephone number of contractor</i>
Engineer:	<i>Design Engineer</i> <i>Address</i> <i>Phone Number</i>
Date:	<i>Date of issue</i>
Volume:	Volume No. 1 of 2 – Operation and Maintenance Manual Volume No. 2 of 2 – Manufacturers Literature

In general, the contents of the manuals shall be in the following format, each section is to be provided with a section divider with the relative title printed (not hand written). Subsections are to be provided under each section to distinguish between different systems, areas of plant and suppliers as appropriate.

Volume 1 of 2 – Operation and Maintenance

Section 1	Introduction Date of Contract Warranty Expiry Service Call Out Contacts
Section 2	General Description of Installation
Section 3	System Operation and Controls
Section 4	Water Chemistry System

Section 5	Commissioning Test Results System Set Points and Conditions to be Maintained
Section 6	Safety Procedures Storage of Chemicals Maintenance Procedures Maintenance Schedules
Section 7	Warranties and Certificates of Compliance
Section 8	As Constructed Drawings Register As Constructed Drawings

The Operation and Maintenance instructions shall include a lubrication plan detailing the following

- Location of all oiling and greasing points,
- shall show the frequency of attention and grades of oil and grease and the like,

The contractor shall prepare a program that captures all servicing and maintenance requirements of the all items of plant, the Program shall group items of plant and maintenance items on the following service periods

- daily
- weekly
- monthly
- bi-monthly
- quarterly
- half yearly
- annually
- Other

The program shall detail all regular routine operational maintenance work required and shall include all the information necessary for the proper servicing and maintenance of the plant, and results of commissioning and testing.

Volume 2 of 2 – Manufacturers Literature

Section 1	Equipment Technical Schedule
Section 2	Manufacturers Schedule and Contacts
Section 3	Pumps
Section 4	Filters

Section 5	Water Chemistry
Section 6	General (to be listed)
Section 7	Manual Valves Automated Valves Other Equipment

The Contractor shall also prepare the following diagrams and instructions, mounted under framed glass or in a laminated plastic protective covering, in positions to be nominated by the Superintendent.

- A schematic functional diagram showing all pipework, valves, valve numbers, fittings, major items of plant and drive interlocks and controls.
- Labelled Plant room layout, indicating pumps and plant relating back to the schematic functional diagram

The Contractor shall provide a log book suitable for recording operational maintenance. The log book shall provide a record in triplicate of each individual item of maintenance performed and have space for signatures of the Serviceman and a representative of the Owner. The log book shall be bound in an approved hard cover folder, contain sufficient pages and carbon paper to record all operational maintenance during the defects liability period and shall be kept in an approved conveniently located holder supplied and fixed by the Contractor.

STAFF TRAINING

At the completion of all work including commissioning and issue of as-constructed drawings and operation and maintenance manuals, the contractor shall perform staff training for the client's representatives. The training shall include a detailed verbal description of all systems together with a physical demonstration of all operating procedures as detailed in the operation and maintenance manuals.

The contractor shall allow for 3 No. separate training sessions.

PRACTICAL COMPLETION AND HANDOVER

Practical completion will only be awarded when the following has been complied with

- Completion of defect rectification,
- Completion of commissioning,
- Issue of approved as-constructed drawings,
- Issue of approved operation and maintenance manuals
- Completion of staff training
- Issue of a certificate of compliance issued to the superintendent for electrical work performed in connection with the contract.

DEFECTS LIABILITY AND WARRANTY

The contractor shall warrant the whole of the works against defective workmanship and materials and against non-compliance with specified performance or operation for the duration of the defects liability period as defined by the contract.

BREAKDOWN SERVICE

The Contractor shall provide a call-out service during normal working hours of every day during the Defects Liability period for attending to breakdowns within 24 hours of notification.

MAINTENANCE PERSONNEL

Personnel performing operational maintenance shall be fully experienced and properly equipped to carry out the maintenance work required.

EXTENT OF WARRANTY

All equipment and third-party warranties shall be extended to cover the duration of the defects and liability period.

If any works are to be rectified during the currency of the defect's liability period, the client may proceed to perform the work, or have it undertaken at the contractor's risk and expense.

If the contractor replaces any part of the works, the provisions of this section shall apply to the replaced part such that the full period of the defects liability period applies to the replaced part from the time it was replaced.

The contractor shall acknowledge that the facility must remain in operation whilst rectification work is undertaken. Should this not be achievable, the contractor shall advise the client of the particular instance in writing and receive written approval of acceptance prior to the commencement of any work.

ROUTINE MAINTENANCE

Routine maintenance (not day-to-day servicing) shall be undertaken by the contractor for a period of 12 months from the date of practical completion to preserve the warranty provided during the defect's liability period.

Routine maintenance shall be deemed as the equipment manufacturers specified maintenance instructions and as captured within the maintenance program provided under this contract and shall include but not be limited to the following;

Item to be Assessed	Interval
operation and calibration of all controls,	quarterly
operation and calibration of all pump sets,	quarterly
pump seals and bearings (noise, vibration and Heat)	quarterly
operation and calibration of all automatic valves,	quarterly
operation of all electrical switchgear,	quarterly
water chemistry control systems,	quarterly

As a part of the routine maintenance during the defects liability period, the contractor shall ensure that the day-to-day servicing and other duties undertaken by the pool operators are being performed in accordance with the instructions detailed in the operation and maintenance manual.

Following each visit, the contractor shall immediately notify the client, in writing, of any concerns they believe jeopardises the warranty.

The contractor shall notify the client in writing 7 No. days prior to each routine maintenance visit such that the maintenance work can be co-ordinated with facility's operational staff.

NATA TESTING

During the defects liability period the contractor shall arrange for 4 No. operational and pool water quality tests and inspections at least 2 of these tests and inspections shall occur while the pool is under full load/peak use

Testing shall be conducted by a laboratory NATA accredited to ISO/IEC 17025:2006 such as EML (Chem.) Pty Ltd or equivalent.

Testing shall verify, as a minimum:

- pH
- free chlorine
- combined chlorine
- total chlorine
- reserve alkalinity
- turbidity
- total dissolved solids
- conductivity
- free iron
- copper
- silver
- sulphate
- calcium hardness
- magnesium hardness
- Coliforms
- Pseudomonas aeruginosa

RECORDING

The Contractor shall record in the service log book all operational service and maintenance work performed. Each log sheet shall be signed by the serviceman responsible for the work and the Manager of the Centre to certify the record correct. One copy of each sheet shall be forwarded to the Superintendent, one shall be retained by the Contractor and the third shall remain on site in the log book. A separate column shall be used to indicate Defects Liability items and attendance.

APPENDIX A: DOCUMENT TRANSMITTAL

Transmittal

Lacus

[illegible]

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+61 422 969 199

Document Set ID: 2075333

Version: 1, Version Date: 30/04/2020

APPENDIX B: SCHEDULE OF HOLD AND WITNESS POINTS

The following schedule details the HOLD POINTS and WITNESS POINTS required for this project. A hold point is a stage/deliverable in the project where by an inspection/approval is required by the Superintendent, or the Superintendent's representative/consultant. Works cannot continue beyond a HOLD POINT until directed by the superintendent. A witness point is a stage in the project which is to be advised to the Superintendent to permit quality inspection and the like to occur, however the contractor may continue working through a witness point unless advised otherwise by the Superintendent.

The contractor shall advise the Superintendent of up and coming HOLD and WITNESS points to ensure they can be attended to in a timely manner. Minimum time permitted is 48 hours prior to the required inspection. The contractor shall allow in their program and full day for the inspection to occur/be completed.

To be completed before	HOLD/WITNESS	Stage/Deliverable
Prior to application if the bases screenings/blinding concrete	HOLD	Pool and balance tank excavation and subgrade Inspection by Geotechnical Engineer
Minimum 3 whole working days' notice to be provided of and intended pour	WITNESS	Water stop placement
Minimum 3 whole working days' notice to be provided of and intended pour	WITNESS	Formwork placement for slabs and walls
Minimum 3 whole working days' notice to be provided of and intended pour	WITNESS	Balance tank reinforcement and cover
Minimum 3 whole working days' notice to be provided of and intended pour	WITNESS	Preparation at construction joints prior to concrete pour
To be commenced no sooner than the pool and tank structures obtain their specified 28-day strength, 28 days from the last concrete pour within the pool/ tank structure	HOLD	Hydrostatic testing of pools, gutters and tanks
Tiling is Under way	WITNESS	To permit quality checks and random tile removal
Completion of tiling, grouting and joint preparation before mastic seal installation commences	HOLD	To permit all expansion and tile movement joints to be checked

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Pool complete and cleaned prior to commencement of filling	HOLD	To permit final defect inspection of the pool before filling
Commissioning of Pool	WITNESS	To permit review of final installation with water
Project complete and ready for hand over	HOLD	Final Inspection, before handing over to the client
Prior to submission of final progress claim	HOLD	Submit written letter of acceptance from pool finishes contractor that pool shell has been presented in and acceptable manner
Prior to submission of final progress claim	HOLD	Submit written letter of acceptance from pool hydraulics contractor that pool hydraulics has been presented in and acceptable manner

APPENDIX C – CONTRACTORS EXPERIENCE

Contractor		Project	Project Completion Date	Project Value	Referee	Referee Phone	Referee email
Aquatics Contractor	Project 1			\$			
	Project 2			\$			
	Project 3			\$			
Pool shell contractor	Project 1			\$			
	Project 2			\$			
	Project 3			\$			
Pool filtration and hydraulics contractor	Project 1			\$			
	Project 2			\$			
	Project 3			\$			
Pool finishes contractor	Project 1			\$			
	Project 2			\$			
	Project 3			\$			
Pool fittings contractor	Project 1			\$			
	Project 2			\$			
	Project 3			\$			

Volume 2: Technical Specification Pool Shell and Tank Construction

Proposed Pool & Spa
Calypso Holiday Park Yamba

Prepared for: Clarence Valley Council

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Contacts

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Revision History: L180122-004-Sp-mrl Tech Spec Vol 2 Pool & Tank Const

Revision	Description	Dated	Author	Reviewed
P1	Preliminary Issue	18 October 2019	LC	mrl

1 INTRODUCTION

The purpose of this specification and associated drawings is to provide the design intent and the performance specifications for the proposed swimming pool & spa to be installed at Calypso Holiday Park Yamba NSW.

This technical specification contains the pool and tank construction requirements for the project. This specification forms a part of a set consisting of the following volumes. Each volume must be read in its entirety and in conjunction with the other volumes and the relevant drawing prepared for the project.

Volumes that make up this specification include the following;

- Volume 1: Technical Specification, General
- Volume 2: Technical Specification, Pool and Tank Construction
- Volume 3: Technical Specification, Filtration and Pool Hydraulics (PWT)
- Volume 4: Technical Specification, Pool Finishes, Fittings and Furniture

Where reference is made to this specification, it shall mean referring to the requirements of all volumes.

2 POOL AND TANK CONSTRUCTION SCOPE OF WORKS

2.1 GENERAL

The Aquatic Services works comprises of works as shown with the relevant drawings, the relative technical specification as detailed in the Document Transmittal in Volume 1.

The scope of work is not necessarily limited to the works detailed within the documents and is deemed to include, the final design, manufacture, supply, delivery, installation, commissioning and maintenance during the defects liability period of the items of work within the documents, inclusive of preparation of shop drawings and As-constructed drawings, the instruction of operational personnel and servicing and maintenance of plant during the defects liability period including at least one complete start-up operation after a winter shutdown.

Where reference is made in the specification to pool is shall mean pool, spa & splash pad as appropriate

3 SCOPE OF WORKS

The works described in this part of the specification consists of but is not necessarily limited to the following: -

1. Co-ordination of pool & Spa, backwash tank and balance tank (where required) construction with existing site features, building footings and facilities and new and existing sub-surface services.
2. Excavation below building/Natural Ground Level (**NGL**) to nominated founding level for the new pools and tanks.
3. Inspection of pool foundation material / piling by Geotechnical Engineer. **HOLD POINT**
4. Prevent surface water runoff entering excavation.

5. Dewatering excavations as required during the construction period.
6. Prepare sub-grade to Geotechnical Engineers recommendations.
7. Maintain pool subgrade at all times, ensuring it is protected from excessive adverse changes in moisture and compaction.
8. Trim the excavation for all pool and tank profiles.
9. Dewater excavations from commencement of excavation until structures filled with water and fully commissioned. Noting; Subsoil drainage has only been provided to provide moisture control after completion of pools, full backfill and concourses etc. are constructed. Pool subsoil drainage systems are not designed to provide site de-watering.
10. Reinforcement and formwork for the tank structures.
11. Survey checks of pool set out, reinforcement and formwork.
12. Supply and install slurries, 650 microstrain concrete for the pools and tank structure, including joints, joint materials, thickenings, pool drains etc.
13. Install fittings and pipework, pool drain lines, supply lines and all reticulation.
14. Install starter bars, rebates, slip joints, anchors, grates, sumps, gutters and outlets.
15. Cure all concrete and take control tests that are lab and site cured.
16. Install equipotential bonding to AS3000 to all metal items.
17. Hydrostatically test the pool and tanks before any joints and finishes are installed. Manage the supply and disposal of the test water.
18. Supply and install all construction joints, pour joints within structures, slip joints for concourses.
19. Backfill, compact and test all pool and tank structures.
20. Provide all warranties in writing, especially tile supply and installation and joint supply materials, as built drawings to be stamped and dated.
21. Provide defect maintenance.

4 POOL & TANK CONSTRUCTION

4.1 EXCAVATION, FILLING AND COMPACTION FOR POOLS AND TANKS

4.1.1 General

These specification clauses apply in addition to any requirements noted on the drawings and other specification volumes.

Dewatering the site during pool construction works is entirely the responsibility of the Aquatics Contractor.

After completion of the pool concrete works the responsibility for dewatering the site rests with the head contractor.

The Aquatics contractor is required to set-out the pool in all respects so that the completed structure ready for tiling works and has been constructed in accordance with the selected tile modules for the pools regardless of indicative dimensions given for items such as climb-outs, step widths, pediment widths and the like.

The Head Contractor shall check all overall dimensions on site regardless of dimensions shown on the Drawings. The Head Contractor shall make good at his own expense any defect due to a discrepancy, which has not been brought to the notice of the Superintendent for clarification.

Parts not necessarily detailed on the Drawings shall be constructed in accordance with best practice for works of this class. Where it is obvious that a drawing illustrates only part of a given work of a number of items, the remainder shall be deemed to be repetitious and it shall be so constructed.

No concrete shall be placed until reinforcement, formwork, etc. has been inspected and approved by the Engineer and Formwork Engineer. The Contractor shall give the Engineer a minimum of three working days' notice before the Engineer is required to inspect the work.

The inspection will only be carried out when the work has been completed.

4.1.2 Authorities and Standards

All design documentation and the complete installation of the works must fully comply with the requirements of all authorities and standards.

Notwithstanding the above, the particular reference documents for this project shall include but not be limited to the standards, codes and guidelines listed in volume 1;

4.1.3 Definition of Terms

MDD:	The relative density of a test sample expressed as a percentage of the maximum dry density of the same material obtained by testing for maximum dry density in accordance with the procedures of AS 1289.E1.1 or AS 1289.E1.2.
MMDD:	The relative density of a test sample expressed as a percentage of the modified maximum dry density of the same material obtained by testing for modified maximum dry density in accordance with the procedures of AS 1289.E2.1 or AS1289.E2.2.
Rock:	Material which is found in ledges, masses, bedded deposits and/or conglomerate deposits so firmly cemented as to present all the characteristics of solid rock and which in the opinion of the Superintendent could only be removed by blasting, by pneumatic tools, or by wedges and sledge hammers if removed by hand, provided that floaters in trenches, foundations and similar excavations shall be classified and measured as rock only when their least dimension exceeds 600mm through or when their least volume exceeds 0.3m ³ . Rock also includes any concrete at or below ground level which is not shown on the drawings and otherwise complying with the definition of rock and/or any concrete slabs in excess of 200mm thickness
Subgrade:	The prepared and finished site material on which the structure and its various bedding layers are supported;
Subgrade level:	The finished level of the subgrade;
Topsoil:	Fertile, friable soil containing organic matter and reasonably free from subsoil, refuse, tree roots, noxious weeds, clay lumps and stones.
NATA	National Association of Testing Authorities. Where context permits, a laboratory certified by NATA to conduct the required class of tests.

4.1.4 Safety

Follow safe working practices at all times.

4.1.5 Protection of Personnel

(I) General

Erect suitable barriers to prevent unauthorized access to excavations, and to areas from where it is possible to fall into excavations or be at risk from machinery working on or in excavations.

(II) Site Personnel

Erect barriers around the perimeter of all excavations to prevent personnel from falling into the excavation.

No personnel must enter the excavation for any purpose unless the sides of the excavation are shored and propped to prevent any possibility of collapse of the sides of the excavation.

4.1.6 Protection of The Works

Ensure that the works and any existing structures on the Contract Site are protected from the effects of the excavation. Ensure suitable provision are made to ensure access to and from the site is not affected by inclement weather and poor site drainage.

4.1.7 Contractor to Form Own Conclusions

The Contractor must form his own conclusion as to the sub surface conditions and the cost of all works necessary to complete the construction of the works as detailed on the drawings and specified herein.

4.1.8 Construction Procedures

Construction procedures must be planned to minimize the exposure of personnel to working in and around the top of excavations. Suitable machinery must be used to reduce the need for personnel to work in excavations or trenches.

4.1.9 Work Scheduling

Work must be scheduled such that account is taken of the need for safe working practices and for the full shoring and bracing to be in place while personnel are working in excavations or trenches.

4.1.10 Excavation

Detailed trimming for the pools and balance tanks, and excavation for the external backwash tanks must be carried out as required for the construction of the works and as indicated on the drawings. Excavation includes all additional excavation below the bulk excavated level necessary for working spaces, forms, drainage packs, service trenches, waterproofing, and the like.

4.1.11 Materials as Found

Detailed excavation must be completed in the materials as found. All obstructions encountered during excavation must be demolished and removed from the site as necessary to permit construction of the works.

4.1.12 Datum and Setting Out

Set out the works to the established site datum. Any set out data requiring clarification must be confirmed in writing by the superintendent, before construction work commences.

Set out must be made from written dimensions only.

4.1.13 Assistance to The Project Superintendent

The Head Contractor shall provide all labour, materials and other assistance that the Superintendent may require at any time to carry out progress measurements, to check setting out or to inspect any part of the works, which for that purpose must be left clear and free of any obstruction or impediment.

The Head Contractor will not be relieved of his responsibilities under the contract on the grounds that any setting out has been checked by the Superintendent or his appointed representatives.

4.1.14 Engineered Fill

Supply, place, compact, and trim engineered fill as described in the pool works drawings and specifications.

4.1.15 Disposal of Excavated Material

All excavated materials become the property of the Contractor. Dispose of surplus material off site in approved locations.

4.1.16 Inspection

No work must be placed in excavations until the excavations have been inspected and accepted by the superintendent. All subgrades and founding material is to be inspected and approved as being suitable by the Geotechnical engineer at the contractor's expense.

4.1.17 Backfilling

Backfilling around pools and balance tanks may not be allowed in some circumstances.

Backfilling around pools and tanks will not be allowed in any situation where pool pipework or other types of pipework and services are clipped to, or supported off, pool walls or base slabs.

Under no circumstances where backfilling is allowed is any type of machine, tracked or wheeled, permitted to operate over the area being backfilled. Such action would excessively load the structure wall.

Where a pools and tanks are being constructed in a site with reactive soil types; use of excavated material for backfill in any areas approved to be backfilled is prohibited.

Where imported filling material is to be used for backfilling, if it is approved, details of the imported material proposed for use, shall be submitted to the superintendent for approval and approval subsequently received before the placing of any orders for this material takes place. No imported backfill material shall be placed in position prior to approval for its use, being received. **HOLD POINT**

4.2 EXISTING SERVICES

The Head Contractor is required to verify the position of any possible services and obstacles that could be encountered. If any lines are cut or damaged by the Head Contractor (or any of his subcontractors) these lines shall be repaired by the Head Contractor at his expense. In this instance, the Head Contractor shall be required to organize an approved repair with the responsible Authority so that the interruption shall be for the minimum practical time. The Head Contractor shall provide suitable notice of a likely interruption to all relevant parties.

5 SWIMMING POOL, SPA AND TANK CONCRETE

5.1 DOCUMENTS TO BE SUBMITTED BY THE CONTRACTOR

Tender documentation shall not be used for construction purposes. The Contractor shall submit the following documents for review by the Architect and the Engineer:

- Shop drawings
- Descriptive data
- Certificates
- Samples
- Test results
- Concrete mix Designs
- Concrete mix Design Independent review
- Construction Program / Proposed Sequence of works

The Contractor shall check and verify all critical site measurements. This information shall be provided at least two weeks before the programmed commencement.

The Contractor shall make corrections required by the Aquatic Engineer and Architect, and then supply a revised copy for the Architect's records. Any review of the above drawings shall not relieve the Contractor from responsibility for deviations from drawings or Specifications, nor shall it relieve him from responsibility for errors of any sort in shop drawings or schedules and the proper co-ordination of the Works.

5.2 NOTICE FOR INSPECTION

Prepared foundations shall not be filled or covered. Equally, concrete formwork and reinforcement shall not be filled or covered until formally inspected and approved. In order to facilitate such inspections, the Contractor shall notify the Engineer of the time at which foundations will be prepared, or formwork, or reinforcement completed, and such notice shall be given to him at least three full working days before the designated time. The Engineer shall make the inspection at the time as close as practicable to that designated in the aforesaid notice.

If the formwork, or reinforcement is approved, the work of concreting shall proceed forthwith. If the formwork or reinforcement is not approved, the Contractor is required to provide the engineer with a new notice when a further inspection can be carried out before the formwork or reinforcement can be concreted.

5.3 FINISHED TOLERANCES

The following tolerances shall apply (refer also to tolerances for tile laying): -

Balance and Backwash Tanks

- Internal dimensions +10mm -10mm
- Straightness (in any 3m) +5mm -5mm

Other Pools (not rectangular)

- Nominated dimensions +10mm -10mm
- Level of wet decks +1mm -1mm
- Cast in pipes - as above
- Joints, inlets, rebates +10mm -10mm
- Pool depths – as above
- Straighteners, walls joints etc: +3mm -3mm
- Joints
- Walls –
 - vertical +3mm -3mm
 - horizontal +3mm -3mm □
 - Tops of walls +1mm -1mm
- Pool floor +3mm -3mm
- Curved edges and walls +5mm -5mm
- Pool area +1% -1%

6 CONCRETE - SPECIFIC POOL REQUIREMENTS

6.1 GENERAL

The following requirements apply to the concrete required for the swimming pool structures, including all gutters, upstands, ledges, steps and balance tanks as shown on the tender drawings. All workmanship and materials shall be in accordance with AS3600 (current edition with amendments).

The supplier shall forward the mix design for approval in principle with the intent of this specification with respect to the mix in terms of acceptable admixtures and with the intent of this specification in terms of the performance requirements for strength and shrinkage. Such in principle approval does not remove the responsibility to ensure that the performance requirements are met. The mix design and the performance of the mix remains the sole responsibility of the supplier and Contractor. The Contractor shall arrange and pay full costs of an independent review of the concrete supplier's mix designs. The Contractor shall forward to the Engineer the confirmation that the mix designs conform to all the requirements of the specifications as confirmed by the independent reviewer

The independent reviewer shall be an expert in concrete mix design and be independent of the concrete supplier and Contractor. (An approved reviewer is BG&E Material Technologists.)

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The Portland cement Type used in the mix shall be SL. The proportions of aggregates, cement and water, shall be such as to produce a concrete, which complies with the following table of requirements: -

Element	Concrete Strength MPa	Minimum Cement Content Kg/m3	Maximum Aggregate Size	Maximum Water Cement Ratio	Maximum Drying Shrinkage at 56 Days microstrain
Pool balance tank Floors & General Structural	40	350	20	0.45	650 +/- 50
Pool walls, balance tank walls, gutters	40	350	14	0.45	650 +/- 50
Balance tank lids	40	350	20	0.45	650 +/- 50
Pool concourse slabs	40	350	20	0.45	650 +/- 50

Silica Fume and blast furnace slag may be added to the concrete mix to improve its strength/permeability properties and workability; however, its addition is not to be used to decrease the Cement content. That is silica fume and slag may be added however is to be done so in addition to the minimum cement content specified above.

No concrete shall have a slump less than 60mm or more than 100mm. Target slump shall be 80mm
Maximum shrinkage to be 600 ± 50 microstrain.

Exclude all breccia. All completed concrete shall be impervious to water.

No waterproofing additives shall be permitted in the concrete mix for any pool or pool tank structures.

The finished concrete must be dense, durable and highly impermeable.

Each of the constituent materials of the concrete shall be batched by separate weighing in a proper and competent manner with due allowance for moisture content of the aggregate. Mixing shall ensure a homogeneous, smooth appearance and uniformity in colour for the resulting mixture. The mixer shall be entirely discharged before recharging.

Concrete finishes for exposed surfaces shall meet the requirements of AS3610 Part 1.

Note: minimum cover to reinforcement shall be 50mm for all water face elements.

Mixing water for concrete must be fresh, clean, potable water that complies with AS 3600. Where local water supplies have a high mineral content or originates from underground bores, the water shall be tested, and its mineral content considered when the concrete mix design is being prepared. Alternatively, demineralised/rain water is to be used for mixing concrete.

6.1.1 Durability

Restrictions on chemical content in concrete must comply with AS 3600 Clause 4.9. Tests may be requested to be carried out without additional cost, to determine compliance with the code.

The total reactive alkali content in the concrete must not be greater than 3.0 kg of Na₂O (equivalent) per cubic metre determined in accordance with AS 2758.1.

6.1.2 Storage of Materials

All materials brought on to site must be securely and properly stored. Storage methods that may result in contamination or deterioration of the material stored must not be used.

Reinforcing bars and wire fabric must be stored up off the ground and in such a manner that it will not be contaminated in any way or subjected to corrosion.

Contractor shall be wholly responsible for protecting the work and the materials stored on the site. Take required measures to protect the work at times against fire, storm, theft, vandalism and other losses.

6.2 FORMWORK

Forms shall be substantial, rigid, well supported, water-tight and conform to the shape, lines and dimensions required of the finished concrete. They shall in every respect meet the requirements of AS3610. Forms must have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete and must have sufficient rigidity to maintain specified tolerances.

Forms for exposed surfaces shall be of mild steel or waterproof plywood sheets or other approved material. All form materials that are re-used shall be cleaned and subject to approval. All formwork shall be inspected and certified by an experienced structural engineer in formwork design prior to pouring concrete and the cost shall be borne by the Contractor. No metallic items such as bolts or fixings shall be left inside the concrete unless there is a concrete cover of 50mm.

Formwork shall not be stripped at times earlier than those given in AS3610. Formwork shall in every respect meet the requirements of AS3610 concerning concrete surfaces. The formwork shall be taped, and all joints sealed against slurry loss using foam rubber strips or other compressible sealing material. Chamfers are to be provided to all corners.

The design and engineering of the formwork, as well as its construction, remains the responsibility of the Contractor.

Timber formwork is to be used with in the balance tanks to support the balance tank lid. The contractor is to allow for the removal of this formwork from within the balance tanks which may require for it to be cut into section that cannot be re-used.

All formwork to be inspected by the Engineer or his agent before pouring.

Formwork Classes: Comply with AS3610 – 1990 Formwork for Concrete and as follows:

- Class 2 Formwork for all concrete surfaces except those back filled.
- Class 3 Formwork for footings, concrete surfaces against the ground and earth surfaces of retaining walls, piers.
- Class 3 Formwork for all balance tank structures that are back filled.

Curing shall commence immediately upon loosening and removal of wall formwork

6.3 REINFORCEMENT

6.3.1 General

All reinforcement supplied on this project shall be certified by the Australian Certification Authority for Reinforcing Steels (ACRS).

Reinforcement is to be supplied, fabricated and fixed in accordance with the Drawings and this Specification.

Refer discrepancies to the appropriate Consultant for decision before proceeding with the work. Be solely responsible for the supply, fabrication and placing of reinforcing steel. Remove reinforcement that does not comply with the requirements of this Specification and it is to be replaced to the satisfaction of the Aquatic Consultant.

All reinforcement must be readily identifiable as to size, grade and origin.

6.3.2 Surface Condition

Ensure that reinforcing is free from loose mill scale, rust, mud, oil, grease or other non-metallic coatings which would reduce the bond between the concrete and steel and is free from kinks or other defects, at the time of placing concrete.

When there is a delay between placing the reinforcement and pouring the concrete, the Engineer will require the Contractor to restore the reinforcement to a condition satisfactory to receive concrete.

6.3.3 Placement of Reinforcement and Bar Chairs

The type of bar chair is to be approved by the Aquatic Consultant before use and are not to introduce ferrous material within the specified cover zones. All chairs shall be placed to ensure that the required cover to reinforcement is maintained. For horizontal reinforcement chairs shall be placed under the lowest horizontal bar to maintain minim 50mm cover from the bottom face of the concrete pour however the placement of the chair is not to interfere with water stops. Bar chairs that prevent full and solid concrete are not to be used.

The minimum clear distance between parallel bars in a reinforcement layer shall be 50mm or 4 times the bar diameter, whichever is greater.

Where two mats of reinforcement are used in a wall or floor, the minimum distance between the parallel bars of one mat and the other mat shall be 40mm.

All tie wire shall be bent so as not to protrude into the cover zone.

Remove all loose ties wire and debris from form work prior to inspection by the engineer.

All dowels bars and covers shall be hot dip galvanised after cutting. All dowel bars shall have a minimum of 75mm cover to any external face.

6.4 PUMPING OF CONCRETE

The use of pumping equipment as a means of finally placing or depositing concrete is permitted. Once pumping is commenced the operations shall proceed continuously so as to avoid cold joints between placed sections.

A standby pump shall be present at all times during the construction of the pool shells.

6.5 EQUIPMENT FAILURE DURING PUMPING

In the event of breakdown in the equipment not exceeding 20 minutes during which time concrete cannot be placed the following procedures shall be carried out. The concrete already in place shall have the wet edges maintained by depositing small quantities of hand mixed concrete as previously specified placed by hand against the wet edges and vibrated into the mass.

Where atmospheric temperatures exceeds 40C the receiving hopper and lines shall be cleaned out and the concrete contained therein discarded. Where the atmospheric temperature does not exceed 18C, concrete in the receiving hopper and lines may be placed in the work on resumption of pumping. Where the atmospheric temperature lies between 18C and 40C the using or discarding of concrete shall be as directed.

In any case if initial setting of the concrete has begun in the hopper or discharge lines, the concrete shall be discarded. After each breakdown all lines shall be cleaned of concrete prior to resumption of pumping. Where delays occur longer than 20 minutes, the Contractor shall form construction joints in the locations and of a type approved.

If cessation of casting due to breakdown occurs at a location unsuitable for construction joints, the joints shall be located as directed. The Contractor shall remove such concrete already placed as will enable these joints to be formed satisfactorily where required. Concrete in delivery lines and hoppers for periods longer than 20 minutes shall be discarded.

During delays in delivery of concrete to the pump, concrete in the lines shall be pumped at approximately 10-minute intervals to ensure the concrete in the line is live. In hot weather conditions this pumping interval shall be reduced to five minutes.

6.6 FORM TIE BOLTS (IF USED)

Tie bolts shall be either the removable type or the type that is left in place and have a minimum depth of removable plastic cone of 70mm at each end shall be used. If necessary tie bolts are to be manufactured to the required wall thicknesses.

For the removeable type, the tie rod and the whole plastic sleeve is to be removed from the pool wall. Patching of the ties rod holes shall be to full depth and be such to provide a water tight seal.

Form tie bolt holes in pool structures shall be filled with Emaco S88C from BASF Construction Chemicals after initial coating of recess with Concrecive 2525. Place mortar into the cavity and ram into place while the Concrecive 2525 is tacky. Cure with Barra Emulsion AC.

Note: Optional materials are Nitobond EP and Renderoc HB70 by Parchem.

6.7 CAST IN PIPEWORK AND OTHER EMBEDDED ITEMS

Allow for allow for earthing all metal items to reinforcement as required by AS3000. Including but not limited too

1. Handrail sockets,
2. post sockets,
3. specialist fittings and
4. steel reinforcement

Cast all in pool plumbing as shown on the structural and filtration drawings. Co-ordinate all sizes and levels of encasement to plumbing. All pipes shall have a minimum of 100mm concrete cover. As necessary amend sizes of encasement indicated on the structural and filtration drawings and where required to accommodate falls, pipe sizes and minimum encasement requirements. Provide a minimum of N12 at 250 centres top and bottom, each way for all encasements or as shown on the drawings if greater than this.

Under no circumstances must the heat of hydration of the concrete exceed 60 degrees C where pipework is encased with concrete structures.

The Contractor is to take extreme care to protect all cast in pipework against damage. Filtered water return line risers in the pool floor are to be protected from accidental damage during the concrete placement due to impact from concrete delivery lines and concreters. Barriers and constant monitoring shall be employed to prevent damage to this critical part of the works. It is essential no concrete is allowed to enter the pipework at any time or any damage occurs to pipework. Pipes are to be kept under hydrostatic pressure of 100kPa minimum during the concrete pour and curing.

6.8 READY MIX CONCRETE

Ready mix concrete manufactured by an approved firm shall be used. The manufacture and transportation of the concrete shall conform to AS1379 and shall be such as to provide the concrete characteristics specified herein. The Contractor shall provide the Engineer with copies of the aggregate grading curves; mix design and the recent plant control test results for the particular grade of concrete to be used. Mix design for pumped concrete shall also be submitted to the Engineer 4 weeks prior to commencement of concrete works.

6.9 CONCRETE TESTING AND QUALITY

6.9.1 General - Acceptance Testing

All concrete testing shall be carried out in all respects with the provisions of AS1012 and 1379 and AS3600, as currently amended and any relevant N.A.T.A. regulations currently in force.

Before any concreting is commenced, the Proprietor will ensure that any testing done by the Contractor will conform with these requirements.

The Contractor shall pay the costs of all tests. The supply of testing equipment and suitable personnel to carry out the tests will be the responsibility of the Contractor. All test specimens are to be cured and broken at an approved N.A.T.A. laboratory.

All samples of concrete are to be obtained from a full flow of concrete at the truck discharge chute and shall be taken after 25% of the load and before 75% of the load has been discharged.

Compression test samples shall be taken at the rates set out in AS1012 and 1379 and AS3600 as currently amended as follows:

- One truck - one sample on all concrete supplied
- 2 to 5 trucks - two samples
- 6 to 10 trucks - three samples or a day's pour, whichever is the lesser.

Test samples shall in all cases be cylinders.

Each sample shall consist of four test cylinder specimens. The Superintendent may order an increase in this rate of testing if considered necessary.

One specimen shall be tested at seven (7) days while the other three shall be kept for testing at twenty-eight (28) days. The Contractor shall keep accurate records of all concrete tests made on site.

Consistency (Slump Test) samples shall be taken from each load or separately sampled where discharge is extended over a period of thirty minutes or more, all in accordance with AS1012 and 1379.

6.10 NOTICES, INSPECTIONS AND HOLD POINTS

The Contractor shall give the Superintendent 3 days' notice of his intention to pour each section of the work and shall only pour concrete following the Engineer's approval of excavation, formwork, reinforcing.

Hold Points shall include however not be limited to:

- Concrete mix design
- Shop drawings review
- Formwork placement for slabs and walls
- Balance tank reinforcement and cover
- Water stop placement
- Preparation at construction joints
- Hydrostatic testing of pools, gutters and tanks
- Surface preparation prior before tiling/membrane

A complete schedule of HOLD points has been included within the Appendices of this specification

6.11 DEPOSITING CONCRETE

Concrete must be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness within the section. Concrete must not be subjected to any procedure that will cause segregation.

Concrete shall not be placed in extremes of temperatures except as allowed in AS3600.

Concrete shall not be placed in water.

Concrete shall be conveyed from the mixer to the point of usage in suitable watertight containers.

The methods of transport and placing shall comply with AS3600 and AS1379.

The concrete to be placed in forms or slabs on ground shall be placed in approximately horizontal layers over the whole surface. Except with the approval of the appropriate Consultant, the dropping of the concrete through a height in excess of 1.2 metres, or the deposition of large quantities at any point and the moving or working of it alone the forms will not be permitted. In walls place neat wet cement slurry to the base joint immediately before concrete pour.

Any site mixed concrete not placed within 45 minutes of mixing, or ready mixed concrete not placed within two hours of mixing, or any concrete so stiff that it cannot be readily extracted from the agitator without adding water, or any concrete having taken an initial set, shall be discarded and removed from the job immediately, and be replaced by concrete conforming to this specification and corrected reduced workability, all at the Contractor's expense. On no account will extra water or any admixture be added to correct reduced workability.

No traffic shall pass over any fresh concrete except where such is duly protected against injury by boarding or other appropriate means.

Both mixer and chute shall be thoroughly cleaned after each use and shall be flushed with water before and after each use, this water being discharged to an acceptable area.

In order to minimize shrinkage effects of the concrete a certain minimum period of time is to elapse between adjacent pours of concrete at joints. For vertical joints in walls and horizontal joints in slabs the time delay shall not be less than 7 days.

6.12 THICK SECTIONS, HOT WEATHER PLACING & CURING REQUIREMENTS

Where ambient air temperature is greater than 30°C or thick sections of concrete are poured (greater than 375mm thick), it is the Contractors responsibility to limit high heat of hydration and thermal cracking which may include all or some of the following.

1. Use chilled water in the concrete mix
2. Place concrete very early morning or at night where ambient temperature is below 30°C and not exposed to the sun.
3. Keep the wall formwork cool by applying water to formwork and steel reinforcement before pour, and/or keep formwork adequately shaded. Remove all excess water prior to pour.
4. Apply aliphatic alcohol to floor surface immediately after finishing to keep surface from prematurely drying out and cracking.
5. Curing: the concrete shall be water cured immediately after finishing.
 - a. Apply wet hessian taped with plastic over all walls.
 - b. Apply wet hessian over floor and keep continuously wet for 14 days.
 - c. Importantly - protect concrete from drying out prematurely.
 - d. Do not use curing compounds.
6. The wall formwork should be stripped after 1 day from completion of concrete pour, but curing must not be interrupted so as to let the concrete be exposed to wind or sun and dry out prematurely. Under no circumstances must the heat of hydration exceed 60 degrees C where pipework is encased within concrete elements.

6.13 COMPACTION AND FINISHING OF IN-SITU PLACED CONCRETE

All concrete must be consolidated by vibration, spading, rodding or forking so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air pockets which may cause honeycombing, pitting, or planes of weakness.

Where the concrete is to have an as-cast finish, a full surface of mortar must be brought against the form by the vibration process, supplemented if necessary, by spading to work the course aggregate back from the formed surface.

During and immediately after placing, the freshly deposited concrete shall be thoroughly compacted with approved internal mechanical vibrators. Care shall be taken to prevent segregation. One vibrator shall be used for each four cubic metres or part thereof, placed per hour. The Contractor shall ensure that one standby mechanical vibrator additional to that specified above, is available on site. The Contractor shall have one person dedicated full time during the concrete placement to ensure adequate vibration of the concrete and finishing.

Care shall be taken to fill every part of the form and to force the concrete under and around the reinforcement without displacing it, to work the coarse aggregate from the face, and to remove all voids and air bubbles. It is critical to ensure adequate compaction of the concrete for the pool structure, particularly around water stops, walls, heavily reinforced sections, embedded items and gutters and where confinement of reinforcement requires particular attention and Contractors supervision to ensure fully compacted concrete.

Under no circumstances shall place concrete be shaken or disturbed after it has taken its initial set and any concrete so shaken or disturbed shall be removed from site.

At water stops thoroughly and systematically vibrate concrete in the vicinity of the joint, and to maximized intimate contact between concrete and water stop.

After first pour, clean unembedded water stop leg to ensure full contact of second concrete pour.

Remove laitance, spillage, form oil and dirt.

Any concrete that, after compaction and setting, is found to contain bony or honeycomb patches (other than slight surface blemishes) will be rejected.

The horizontal surfaces of the pools maybe finished with a wood float for ease of preparing the surface to accept tiling or a membrane, noting that it is desirable to construct the floor to the tolerances required for tiling without the need for rendering. If a steel trowelled finish is used additional preparation may be required prior to the application of the specified finishes

Accepted methods of preparation include but are not limit too:

1. grit blasting,
2. grinding or
3. very high-pressure water blasting (greater than 10000psi)

may be required to provide an acceptable finish to accept tiled or membrane finishes.

6.14 CONSTRUCTION JOINTS

Concrete surfaces that have become so rigid that new concrete cannot be incorporated integrally with that previously placed are defined as construction joints. The construction joint shall be level and smooth and aggregate exposed to produce a finish equivalent to CSP 8 (Scabbled) to ensure a good mechanical bond of the adjacent pour.

Construction joints shall be formed to the details and positions of the Drawings and where otherwise necessary to meet placing requirements. The positions of all construction joints not shown on the drawings shall be to the approval of the Engineer. Apply joint face with a retarder such as Preco H or vertical form face with Preco V by Parchem. Strip form the following day and remove retarded concrete by brushing or high-pressure water blast to expose aggregate face. If retarder has not been applied then prepare surface by high pressure water or grit blast or other approved means. Excessive scabbing shall be rejected.

When the placing of concrete is unexpectedly interrupted it may be necessary for the Contractor to provide an emergency construction joint. The location and construction of the joint shall be to the approval of the Engineer, but the strength of the structure shall not be impaired by such conditions.

Before any fresh concrete shall be placed on or against hardened concrete the surface of the hardened concrete shall have been prepared, have a centre water stop placed in the joint centre and thoroughly cleaned and a comprehensive cement slurry coat applied immediately before the pour.

6.15 MOVEMENT JOINTS

No reinforcement or embedded items other than sleeved pipework or sleeved dowels and water stops shall be permitted to cross movement joints.

6.16 CORED HOLES, FIXINGS AND PENETRATIONS

Where pipes pass through walls or a block out is left to allow future installation of the pipe. Place extra 2N12 bars that extend a minimum 600 past each side of the penetration, each facing diagonally around penetration, on each layer of steel.

All pipes through water retaining structures shall have a puddle flange welded to the pipe central in wall and 20x3mm Hydrotite (or approved Equivalent) seal applied to the pipe each side of the puddle flange.

Where pipes pass through water retaining walls and are poured in, the Pool Builder shall take all precautions necessary to prevent leakage. Concrete shall be well compacted when poured in around the pipe.

Pipe penetration openings for future pipe installation through water retaining structures wall shall be made good as follows:

- i. Thoroughly clean the pipe and scabble the concrete bonding surfaces.
- ii. Apply an approved epoxy-bonding agent to the surfaces to be bonded such as Nito Bond EP or Concresive 2525.
- iii. Dependent on the size and type of the opening, pack the opening while the Concresive 2525 is tacky with an approved proprietary mortar or epoxy grout. Emaco S88C is an approved material.
- iv. Cure surface with Barra Emulsion AC or equal.

Anchor bolts shall be 316 stainless steel and epoxy set. No dynabolts or tru- bolt type fixings are to be used. Seal all fixings with chlorine resistant silicone.

The Contractor shall submit shop drawings of all cored holes and penetrations for approval by the appropriate Consultant a minimum of 3 weeks prior to commencing this work. Under no circumstances shall holes be cut after construction of the wall unless additional steel has been accurately placed in the wall to ensure a minimum of 50mm cover is maintained when the hole is cored.

6.17 CURING

Requirements for curing must be strictly applied over a period of 7 days. Acceptable methods of curing include the following:

Immediately the screeding is done, spray on aliphatic alcohol (Masterkure 111CF). Repeat 2 hours later. This applies to all exposed concrete whether sprayed or poured.

Note: the aliphatic alcohol is for the purpose to delay the premature drying out of the concrete and is not a substitute for curing.

Continuous water spraying

Wet Hessian

Freshly finished surfaces shall be protected from rain, sun or injury until hard set has occurred. All concrete shall be cured for at least fourteen (14) days by being kept continually wet from the time it has hardened enough to withstand the effect of water. Water curing shall be by water sprays or water saturated covering such as hessian covered with taped plastic sheet. Do not use curing compounds.

6.18 RENDER

If the structure is out of level/tolerance do the following: -

- i. Survey walls/floor to obtain out of level.
- ii. Prepare affected areas with grinding, grit blasting, scrubbing, or scarify. Refer to Volume 4 finishes and fitting specification for surface preparation requirements
- iii. Water blast and sponge to remove all dust dirt or foreign matter to give a sand paper like surface (similar to 100 Grit) refer to Volume 4 for correct Concrete Surface Profile
- iv. Apply Latticrete 3701 with Latticrete 211 or 226 powders (depending on the depth) and screed strictly in accordance with the manufacturer's requirements. Renderers must be Latticrete approved.
- v. Any voids are to be opened up and packed with Concrese 2525/Emaco S88C as for filling tie bolt holes.

6.19 EARTH BONDING

All metallic items greater than 100mm in any dimension, within the pool and within a 3m distance from the pool water including pool plant, shall be equipotentially bonded in accordance with AS3000, this includes, but not limited to all deck hatches, lane rope, backstroke, false start anchors, grating angles, grab rails, handrails, structural steel and glazing sections and concrete reinforcement. All earthing is to be certified by a qualified electrician in writing in accordance with AS3000.

6.20 RECORDS

The Contractor shall maintain on site an up-to-date record of all concrete delivered to site. The following information concerning each concrete pour shall be kept in tabulated form and submitted to the Project Director on a monthly basis.

- a. Date and time
- b. Supplier and docket number
- c. Pump operator
- d. Concrete mix design details
- e. Volume of concrete poured
- f. Location of concrete pour, including exact areas sprayed
- g. Weather conditions - temperature, wind, etc.
- h. Location where tests were taken
- i. Malfunction of pumping/spraying equipment
- j. Location of unscheduled joints and their subsequent treatment

6.21 WATERSTOPS

Install Waterstops where shown surrounded by fully compacted concrete.

Hydrophilic

Waterstops are subject to approval and must be hydrophilic type, equivalent to Hydrotite and of a type recommended by the manufacturer for a particular application. Provide a minimum of 50 mm cover to any concrete face.

PVC Rear and Centre stops

Waterstops are subject to approval and must be extruded PVC complying with BS2571 Class 3 Compound Type G4.

All externally placed Waterstops (rear-guard type) must have nailing strips not less than 3 mm thick and 10 mm wide, located such that they do not impair the efficiency of the waterstop.

Centrally placed waterstops must have tying strips not less than 3 mm thick and 15 mm wide, with metal eyelets at not more than 300 mm spacing.

6.22 JOINT FILLERS

Joint fillers shall provide a compressible zone within a joint to allow minimum resistance to expansion or articulations of the structure on either side of the joint. Joint fillers for pools, balance tanks and between pools and concourse shall be compressed cork.

6.23 JOINT SEALANT

Joint sealants are subject to approval and must be non-toxic, warranted by the manufacturer suitable for use in chlorinated swimming pools and equivalent to the following:

Joints in pool concrete –Emerseal CR or Metz 20P.

Joint between pool and concourse - Emerseal CR or Metz 20P.

6.24 CRACK REPAIR

Any cracking and/or concrete defects shall be the responsibility of the contractor to rectify under the instructions of the Engineer. This could include epoxy, acrylate resin or polyurethane crack injection or other means such as cutting back and sealing with an approved repair material

7 WATERTIGHTNESS AND WATERPROOF TESTING

The Contractor shall test the pools, tanks and pipework for watertightness and waterproofness before applying membranes or any surface finishes to the pool or tanks. Seal all plumbing. Coat all cracks on the outside and inside before filling of the pool with three coats of Krystol or Xypex or as instructed by the Engineer. Cracks may require injection or other methods of repair to engineers' approval. The engineer is to inspect the rear of the pool and tanks during the water test and certify waterproofness, the Contractor shall repair all leaks under the direction of the engineer. All leaks shall be repaired so that no beading of water or wet spots when touched by hand or blotting paper is evident. The Contractor shall be responsible for waterproofness of the pool and tank structures and bear all costs for remedial works or crack sealing.

Hydrostatic testing is to be undertaken before the application render, tanking or any applied finishes.

Procedure: - The Contractor shall fill the structure to top of gutter inside wall with clean water and maintain the level for 7 days. Following this period, no further water shall be added, and the water level shall be monitored over a further 7-day period. Check the rain/evaporation with a bucket that is set into the pool water and filled with water to a set mark. The water level in the bucket should be about the same as the pool. and the bucket is to be secured to prevent it from floating away or over turning Note: the balance tank and gutter shall be empty when the pool is filled to the gutter lip, and the pool empty when balance tanks and gutters are tested. Each tank shall be tested separately the structure shall be deemed watertight if the water level remains within the lessor of (the average depth of the pool) /500 and 10mm from the commenced level over the 7-day test period allowing for evaporation. Any leaks shall be repaired so that no beading of water or wet spots when touched by hand or blotting paper is evident. If leaks are apparent, locate and repair with a Xypex patch or inject cracks or defective area is to be repaired as instructed by the engineer and keep water in pool 48 hrs min to facilitate the leak seal. Then repeat procedure with the balance and backwash tanks and gutters filled and pool empty. Refill the pool and tank structures and water test until no leakage is evident to the satisfaction of the Engineer and Superintendent.

The detailed requirements and procedure for the test are as follows:

1. The minimum age of the concrete in the structure under test must be 28 days before any filling with water is commenced, unless otherwise approved in writing, and all inlets and outlets must be plugged and sealed.
2. No backfilling against the structure must be carried out before the test has been completed satisfactorily.
3. The rate of filling must not exceed either of the following:
 - i. Maximum rise in water level of 0.250 metres in any 1 hour.
 - ii. Maximum rise in water level of 1.500 metres in 24 hours.
4. The test water level must be at the maximum height of the water retaining walls unless otherwise approved.
5. The soakage period, prior to commencing the test, must be 7 days at maximum test water level, unless otherwise approved.
6. The water test period must be for a continuous period of 7 days unless otherwise approved.
7. The watertightness of the structure must be deemed to be satisfactory if both of the following criteria are satisfied:
 - i. The water level over the 7-day test period does not drop by more than 1/500 of the average water depth of the structure under test, or 10 mm, whichever is the lesser. Allowance must be made for rainfall and evaporation.
 - ii. No visible signs of leakage or porosity are observed anywhere on the structure or in any of the pool underdrains.

8. The water level must be recorded to an accuracy of 10mm at the same hour each day during the soakage period and during the water test period.
9. Allowance for evaporation must be made by filling a water a bucket, at least 300mm in depth with open top, to within 75 mm of the top and anchoring this within the structure under test so that its position simulates the pool water surface under test. Any variation in level in the bucket be assumed to be the evaporation loss or rain gain.

All cracks and leaks detected must be repaired in accordance with the manufacturer's written instructions for the selected repair material or materials and made good to approval.

Typical repairs may include the following:

- Hair-line cracks less than 1mm in width, visible on outside of structure and showing dampness under test - clean crack and apply Xypex Concentrate to exterior face with structure while full of water.
- External cracks greater than 1mm in width showing dampness or flowing water under test – Chase out crack to a “key” about 25mm wide x 35mm depth, apply Xypex Patch and Plug mortar to flowing water then when flow has ceased, apply Xypex Concentrate and Modified Patch and Plug while structure still under test.
- Honeycomb areas – remove all loose and honeycombed material to expose sound concrete. Apply rapid set mortar to stop flowing water and then repair as for cracks greater than 1mm in width.
- The above repairs should be carried out within the first day of the 7day test period. Further testing of such repairs will then probably not be required.
- “Special areas” – significant leaks and large cracks or honeycombed areas may require additional treatment internally, such as chasing out of all defective concrete after the structure has been emptied (or by use of a prior approved polyurethane injection system). All repairs will then require additional hydrostatic testing and all repairs and retesting must be carried out by the Contractor at no additional cost.

7.1 HYDROSTATIC TESTING SUMMARY SHEET

To be completed for each Water body tested

Item	Water Retaining structure being tested	Criteria	Result	Complies with AS3735 Yes/No	Comments
1		All Concrete is at least 28days old and has obtained it 28-day design strength			Provide evidence /delivery docket of concrete pours. Note in cold areas the concrete design strength may take longer than 28 days. In such circumstances to contractor shall provide evidence of concrete strength obtained on site by testing site cured cylinders
2		Date Water body commenced being filled	Date		Provide image with date stamp
3		Date water body was full of water	Date		Provide image with date stamp. This is the commencement of the soak up period
4		Control buck is secured on the water body being tested			Provide image with date stamp. The bucket is to be in the water body to ensure it is the same temperature as the water body being tested.
5		Confirm the water body is being subjected to a uniform environment			This is to confirm the pool is not half roofed and half in the open, or there is water running into the pool of adjacent roofs. These conditions would void the test
6		Difference in height changes between bucket and water body			The difference in the water levels from their datum for the water body and the bucket must be within the (average depth of the water body)/500 or 10mm which ever figure is less
7		Date that a successful water test was complete	HOLD POINT		Provide clear images of each of the wall showing no signs of leakage. The images must all be date stamped. The water shall not be removed from the water body until written approval to do so has been provided by the Superintendent
8		Successful Hydrostatic test submitted to superintendent	Y/N Date		
9		Hydrostatic test accepted by Superintendent	Y/N Date		Superintendent to provide permission for water to be removed from the water body or otherwise

7.2 HYDROSTATIC TESTING RESULT SHEET

To be completed for each Water body tested

Item	Water body being tested	Date & Time	Distance from datum to TWL in water body	Distance from datum to TWL in water bucket	Difference	Is the difference less than the average depth/500 or 10mm	Comments
1							Soakage Period
2							Soakage Period
3							Soakage Period
4							Soakage Period
5							Soakage Period
6							Soakage Period
7							Soakage Period
8							Testing Period
9							Testing Period
10							Testing Period
11							Testing Period
12							Testing Period
13							Testing Period
14							Testing Period

Volume 3: Technical Specification Filtration and Pool Hydraulics

Proposed Pool & Spa
Calypso Holiday Park Yamba

Prepared for: Clarence Valley Council

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Revision	Description	Dated	Author	Reviewed
P1	Preliminary Issue	18 October 2019	LC	mrl

2 INTRODUCTION

The purpose of this specification and associated drawings is to provide the design intent and the performance specifications for the proposed swimming pool & spa to be installed at Calypso Holiday Park Yamba NSW.

This technical specification contains the filtration and pool hydraulics requirements for the project. This specification forms a part of a set consisting of the following volumes. Each volume must be read in its entirety and in conjunction with the other volumes and the relevant drawing prepared for the project.

Volumes that make up this specification include the following;

- Volume 1: Technical Specification, General
- Volume 2: Technical Specification, Pool and Tank Construction
- Volume 3: Technical Specification, Filtration and Pool Hydraulics (PWT)
- Volume 4: Technical Specification, Pool Finishes, Fittings and Furniture

Where reference is made to this specification, it shall mean referring to the requirements of all volumes.

3 AQUATICS SERVICES, FILTRATION AND POOL HYDRAULICS SCOPE WORKS

3.1 GENERAL

The Aquatic Services works comprises of works as shown with the relevant drawings, the relative technical specification as detailed in the Document Transmittal in Volume 1.

The scope of work is not necessarily limited to the works detailed within the documents and is deemed to include, the final design, manufacture, supply, delivery, installation, commissioning and maintenance during the defects liability period of the items of work within the documents, inclusive of preparation of shop drawings and As-constructed drawings, the instruction of operational personnel and servicing and maintenance of plant during the defects liability period including at least one complete start-up operation after a winter shutdown.

Where reference is made in the specification to pool is shall mean pool, spa & splash pad as appropriate

This specification provided the required for all hydraulic circuits within the pool system.

3.2 TECHNICAL DATA SUBMISSIONS

Complete technical data for all equipment and items listed in Appendix A shall be submitted to the engineer for approval prior to procurement. Contractor shall allow a minimum of 10 working days within their program for information to be reviewed and approved.

Submitted technical data shall include the following;

- Name of manufacturer.
- Country of manufacture.

- Model / code number.
- Duty / performance.
- Materials and finishes.
- Dimensional drawings.
- WaterMark approval verification where relevant.
- WELS rating verification where relevant.
- Process and instrumentation diagrams where relevant.
- Connected power load where relevant.
- Electrical circuitry drawings where relevant.
- PLC control logic where relevant.

3.3 WATER TREATMENT AND POOL HYDRAULICS SCOPE OF WORKS

The following items shall be incorporated in the final design and installation

1. Ensure that no ferrous material Cast iron, mild steel etc, is permitted to come n contract with pool water
2. Pools shall be provided with filters for the removal of particulate matter. The filters shall be either media such as sand, glass, zeolite or precoat type filters using perlite
3. Pools shall be sanitised with chlorine
4. Supply install and commissioning of all systems plant equipment.
5. Pressure and temperature gauges as later specified.
6. Construct “No-flow” switches in all pump discharge lines flow sensors also required in each secondary heating line.
7. Construct pool make-up, complete with backflow prevention device and all necessary ancillaries within plant room from valved cold-water service located in the plant room.
8. Construct Filtration Sub-Board (FSB) including termination of sub-mains cable, equipotential bonding cables and mechanical services interlock cable, provide ammeter, voltmeter and pump hours run meters for all pumps.
9. Construct field wiring of all equipment supplied under this contract, including cabling and conduiting to remote console panel and cabling to pump.
10. Construct field equipment –
 - a. electrodes float switches:
 - b. Backwash Tank - Level and alarm sensors and controls including cables and conduits and overflow pipe and corresponding alarm Storage volume indicator and pump system for backwash tank drainage and control the Backwash tank comprising Backwash pump shall be (1 off nominally 2L/s) submersible self-priming single speed motor pump set with suction strainer.
 - c. Supply and install the following level switches to control the pump
 - i. Extra Low-Level Alarm Pump power shut down
 - ii. Low level Pump off
 - iii. Pump on
 - iv. High level alarm
11. Supply and install the pump control board to indicate the backwash pump status
12. Construct Equipotential Bonding

Equipotential bonding of all items in the pool water plant reticulation systems required to be bonded to AS3000, these bonding cables will be supplied and installed by the Contractor. including termination and connection to earthing point in the panel. Where found, extend and connect existing bonding cables including those from pool reinforcement, pool fittings, furniture and concourse reinforcement if found.

13. Plant Commissioning
14. The Contractor shall construct Concrete Plinths for Pumps complete with vibration eliminators.
15. The Contractor shall construct Concrete Plinths for all other equipment and plant where necessary.

16. Construct corrosion resistant frames, fixings and supports for all pipework, equipment and control gear including associated equipotential bonding as necessary.
17. Where foot valves are positioned in tanks, flanged fitting are to be provided within pipe work to permit the foot valve to be removed from the tank without entering the tank
18. Contractor to submit shop drawings of all access covers and ladders for approval by the Superintendent.
19. Construct conduits and fittings and fixings which shall be of approved corrosion resistant materials.
20. Field wiring of all equipment supplied under this contract including cabling conduit to console panel and connecting cabling with wiring, controls, alarms, switching and control panels to pumps and other equipment.
21. Water chemistry control and dosing system to be fully automated with data storage ability to record and store water parameters
22. Make-up water assembly including water meter, solenoid valve and controls.
23. Field instruments including level transmitters, flow switches, flow transmitters and controls.
24. Relocation of existing electrical distribution board and power supply.
25. All electrical work in connection with the pool water treatment plants including all wiring, cabling, conduits and controls.
26. Water testing.

4 SHOP DRAWINGS

Shop drawings shall be provided by the contractor to allow detailed review by the engineer.

The contractor shall confirm all set outs and levels.

Shop drawings are to be submitted a minimum of 20 working days prior to

- (a) commencement of plant area construction as determined by the construction program, or
- (b) commencement of equipment manufacture, or
- (c) placing of firm orders for any components, whichever comes first.

All drawings shall be of A1 size unless approval is given otherwise

Shop drawings shall be prepared at a minimum scale of 1:50 and include the following as a minimum;

1. Plan layout of plant and equipment coordinated with the mechanical Contractors shop drawings.
2. elevations of equipment and pipework coordinated with the mechanical Contractors shop drawings
3. plan layout of pits, pipework, trenches, equipment plinths, conduit locations and other building items necessary for the housing and installation of the Filtration Plant and equipment.
4. sections of Filtration Plant Room indicated reduced levels of Plant Room floors and pits and the like. Sufficient sections shall be provided by the contractor to describe fully the building requirements for the filtration plant and equipment.
5. Plan layout and sections showing water, drainage and power requirements for the Filtration Plant and equipment, Expansion Joints, Gradients of all pipe
6. Concrete plinth or equipment skid setouts.
7. Flow Schematic diagrams accurately showing the Process and Instrumentation requirements for the Filtration Plant and equipment and depicting all termination points (for interfacing with other Sub-Contracts).
8. Details of electric motors
9. Valve numbers.
10. Details of paint finishes and colours for all items required to be painted.
11. Electrical Wiring and Control Diagrams
12. Single Line Diagrams - Switchboard

13. Schematic Wiring Diagrams - Switchboard
14. Instrumentation Wiring Diagrams iv. Control Logic Diagrams
15. Switchboard arrangement, panel cabinet details and component layout.
16. Full construction and layout details with details of
 - a. materials
 - b. confirmed dimensions.
 - c. Cable entry details.
17. A schedule of equipment, listing manufacturers and type numbers of each switchboard component.
18. Pipe and valve Painting specification prepared by Dulux, Wattle or equivalent

Wiring diagrams shall use symbols in accordance with AS 1102 but in any case, a complete symbols legend shall be provided.

Fuse and circuit breaker ratings, settings wire sizes and ranges of all timers and contact action of float switches, limit switches and the like shall be clearly indicated. All wires and terminals shall be numbered. All wiring shall be shown in full, even where identical control circuits are provided for different drives.

Metric dimensions shall be shown.

Should the Superintendent require additional information and/or drawings or any amendments to the previously submitted drawings, the Contractor shall supply in duplicate the additional information and/or drawings or amended drawings within a period of three weeks of being requested to do so.

Review of shop drawings by the engineer relates to the general principle of design only. Review of drawings will not relieve the contractor from any responsibility for the completion of the works in accordance with the requirements specified within the design documents or any other contract documents.

Where drawings are returned for amendment, they shall be amended and resubmitted until such time as the drawings are marked as satisfactory.

5 AS CONSTRUCTED DRAWINGS

Refer to Volume 1 for details of As Constructed Drawings

6 IDENTIFICATION, LABELLING AND PAINTING

All equipment, valves, fittings and pipework shall be identified, labelled and painted as specified and in accordance with AS1345 and AS2700

All exposed pipe work valves and equipment is to be painted by and approved paint system consisting a minimum and a primer prep coat, followed by two top coats. The paint system is to be prepared by Dulux, Wattle of approved equivalent. Where required separate paint specifications are to be submitted for item internal and external of the plant room.

All exposed pipe works is to be painted, Paint is to be applied continuously, with all clip removed. Painting around clips will not be accepted.

Colours to be adopted for pipe work and fittings are detailed below.

Stainless steel pipework, and pipework in void spaces does not need to be painted.

Following painting identification marking are to be applied to all pipe work clearly stating the contents of the pipe and indicating the direction of flow.

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Valves and fitting are to be provided with engraved Trefolyte labels/tags, the back-ground colour to be as per below and writing in a contrasting colour (white), Labels are to include an identification of the fitting and a reference number that relates to those in the as constructed documentation.

Labels are to be attached by stainless steel ball chain or key-ring.

Pool Water Treatment System	Pipe/Fitting/Valve Background & Label Colour
Soiled Water from pool to Plant	Green (Jade G21)
Filtered water from plant to pool	Blue (Bluebell B41)
Backwash	Brown (Brown X54)
Chemical Dosing	Purple (Lilac P23)
Common valves, pumps and other equipment	Black (Black N61)
Heated water circuits	Red (Signal Red R13)
Vents, breathers etc	Yellow (Sunflower Y15)

7 PROTECTION OF PIPE WORK FIXTURES AND EQUIPMENT

The contractor shall ensure all pipework, fixtures, equipment and finishes are provided with sufficient protection to prevent damage from construction activities, theft vandalism, weather etc, throughout the duration of the contract.

Any pipework, fixture or equipment that has been damaged by any party as a result of the contractor not providing sufficient protection shall be replaced or repaired at the contractor's expense.

The contractor shall be responsible for all damage that arises as a result of debris entering pipework and equipment and shall be rectified by the contractors at the contractor's expense.

8 NOISE AND VIBRATION

Noise and vibration generated by all systems are to be kept to a minimum and not exceed maximum values as required by the BCA, AS1055 and the acoustic Engineer.

Any pipework or equipment deemed to be causing excessive noise is to be rectified by the contractor at their own expense.

9 WATER HAMMER

The Contractor shall take all necessary precautions to prevent water hammer occurring in any system. Where water hammer occurs, the contractor shall rectify the water hammer at their own cost.

10 TESTING OF PIPELINES

All pool pipework completed under this contract shall be hydraulically tested to a pressure of 200kPa. The test pressure shall be held for 30 minutes without any loss in pressure.

All pipework cast into pool structures shall be tested prior, during and after concrete placement for the duration of the full curing period.

All test results shall be recorded, kept on site for the duration of the construction period and be included in the as-constructed documentation provided at the completion of the contract works

All cold-water potable service pipework shall be hydraulically tested to 0.7 MPa or to such other pressure required by the Water Supply Authority. Any failure/loss in pressure shall be made good and the pipework retested to approval, at the contractor's cost.

11 PIPEWORK, VALVES AND FITTINGS

11.1 PIPEWORK GENERAL

Drawings do not show all offsets for pipe work. Prior and during installation all pipes are to be thoroughly cleaned, opened ends are to be sealed at all time with a rigid end cap to prevent ingress of dirt and debris.

All pipework, equipment and systems shall be provided in accordance with manufacturer's instructions and referenced standards.

Pipe work sizes shall be such that suction velocities do not exceed 1.0m/s and discharge velocities do not exceed

Ø32 to Ø40	1.0m/s
------------	--------

Ø50to Ø80	1.5m/s
-----------	--------

For greater than Ø80mm	2.0m/s
------------------------	--------

Note all pipe losses are to be in accordance with NCC2019 J5.7

Where pipework is carrying heated water 30°C or more, all pipe works shall be provided with insulation in accordance with NCC2019 J5.8

11.2 UPVC PIPEWORK AND FITTINGS

Unplasticised-Polyvinylchloride (UPVC) pipework and fittings shall comply with the requirements of AS1477 for pressure applications, minimum class 12 up to and including Ø100mm. Class 9 pipe works is permitted for pipe work greater than Ø100mm Joints unless otherwise specified shall be of the socket formed solvent cement welded type.

Flanged joints shall be used for connecting all items of equipment and shall be of the loose ring type complete with EPDM gaskets and galvanised backing rings.

Bends and fittings shall be moulded type unless otherwise specified.

Couplings shall be provided to allow for thermal expansion and contraction.

11.3 ABS PIPEWORK AND FITTINGS

Acrylonitrile Butadiene Styrene (ABS) pipework and fittings shall comply with the requirements of AS3518 and AS3690 minimum Class 12.

Joints unless otherwise specified shall be of the socket formed solvent cement welded type.

Flanged joints shall be used for connecting all items of equipment and shall be of the loose ring type complete with EPDM gaskets and galvanised backing rings.

Bends and fittings shall be moulded type unless otherwise specified.

Couplings shall be provided to allow for thermal expansion and contraction.

11.4 STAINLESS STEEL

Stainless steel shall be Type 316 for general use and of Type 316L if in contact with pool water vapour. Contact with dissimilar metals shall be avoided and shall be prevented by means of isolation spacers and gaskets. Stainless steel to be minimum thickness of 1.2mm.

316L stainless steel connections of minimum 1,200mm length shall be provided for plate heat exchanger connections on the secondary pool heating circuits to dissipate excess heat should flow of pool water cease through the heat exchanger.

11.5 COPPER TUBING – (NOT TO BE USED FOR POOL WATER)

Copper tube shall be to Australian Standard AS.1432 -Type B:

All joints shall be silver soldered except where for ease of assembly pipes of 50 mm dia. and larger shall be flanged, and pipes less than 50 mm dia. shall be jointed with approved compression unions.

All joints in cold water lines shall be made with tested fittings in accordance with the requirements and regulations of the local statutory authority.

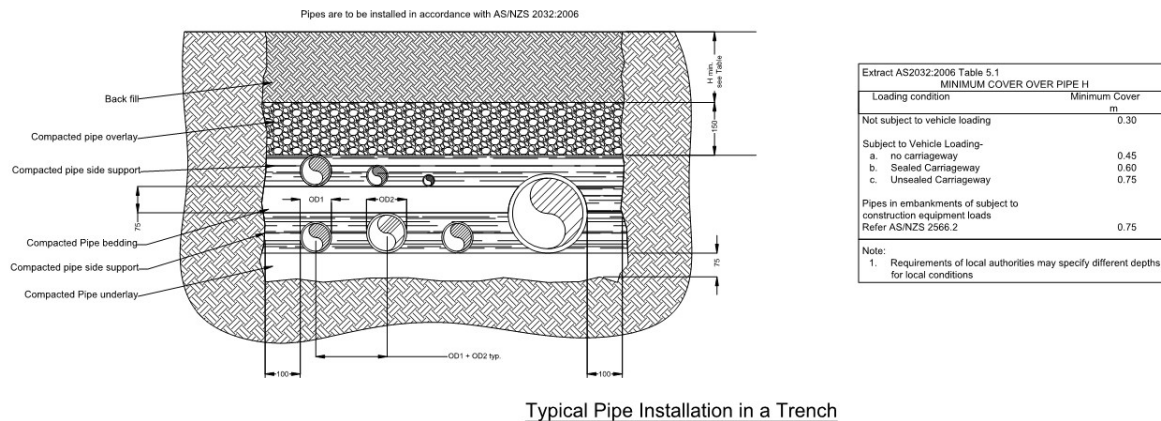
Copper pipework shall not be used for any pool water circuits.

11.6 EXCAVATION, BACKFILLING AND MAKING GOOD

All excavation and backfilling shall be performed in accordance with AS3500, AS/NZS 2032 and to Council requirements.

All underground services shall be provided with identification tape.

All tape must be joined and terminated in a manner to ensure electrical continuity and must be capable of identification with electronic pipe locating equipment.



11.7 PIPEWORK CAST IN CONCRETE

All pipework cast into concrete structures shall be wrapped with a compressible rubber lagging minimum 1 pipe diameter in to the concrete x 6mm thick at the point of entry and exiting from the concrete structure to provide support and prevent fatigue, in addition to the lagging the pipe is to be provided with a Wang Vari Gib Stainless (G316) steel flexible coupling at the concrete surface in accordance with the pipe manufactures details.

All pipework shall be pressure tested prior to and during concrete placement. The test shall be maintained for a minimum of 7 days after concrete placement.

All pipe work cast into pool shells, tanks and water retaining structures are to be provided with a 20x2mm Hydrotite seal applied each side of a welded puddle flange. A minimum of 50mm concrete cover to be maintained over the Hydrotite seal at all times.

No filtration pipe work is to be cast directly into building structures. Where filtration pipe work is to pass through building structures and suitable clearance hole is to be provided to avoid the building structure applying any load to the pipe work.

Where the filtration pipe is to penetrate the plant room floor slab the pipe is to be fully lagged through the slab to a thickness not less than 5% the pipe diameter using ableflex or similar, providing a void which can be mastic sealed when the finished are being completed to the plant room floor.

Where pipe works it to penetrate concrete/masonry/other structure that forms and fire/smoke compartment, the pipe is to be provided with s suitable firecollar/seal.

11.8 PIPEWORK FIXING SYSTEMS

Above ground all pipe works is to be supported in accordance AS2032 / AS3690 as appropriate with all pipe work within the plantroom to be supported from corrosion resistant frames and supports. Supports frames are to be Unistrut or Flexistrut and are to a be a minimum of hot dipped galvanised with cut ends and drilled holes protected with zinc rich cold galvanising. All fixings are to be hot

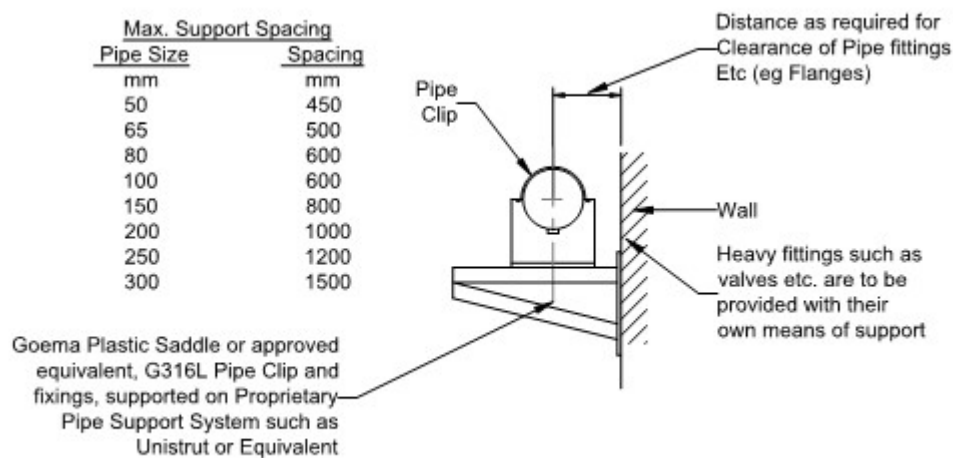
dipped galvanised. Pipe support brackets are to be corrosion resistant, nylon, polypropylene or hot dipped galvanised such as George Fischer type 060. All pipe works suspension and fitting to be capable of securing the pipework and associated fittings under service loads and to allow for thermal and building movements.

All pipework in the balance tank shall be fixed with 316L stainless steel fixings.

Suspend pipe works supports are not to be used in non-accessible voids and culverts

Direct contact of dissimilar metals shall be avoided. Flanges and connecting bolts shall be compatible with the connecting pipework material.

Pipe work in the grounds and service trenches to be supported and spaced in accordance with AS2032 / AS3690 as appropriate. Pipe work in the ground or in trenches to be back filled are not to be supported by suspended hangers prior to back filling.

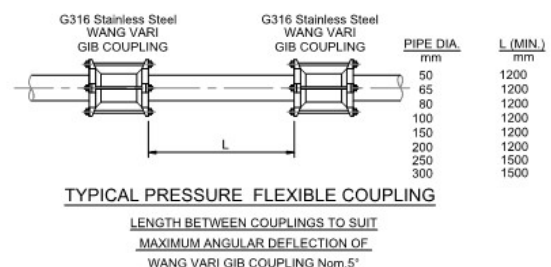
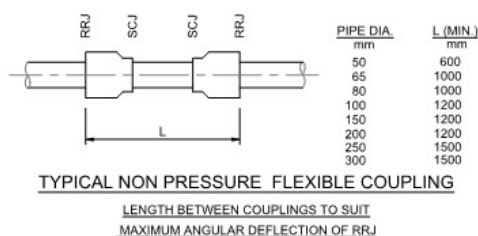


Typical Pipe Support

11.9 PIPE EXPANSION JOINTS

Pipe expansion joints shall be provided to the approval of the engineer and in accordance with the pipe manufacturer's requirements. Expansion joints shall be provided for pipework passing through or adjacent to structural construction or expansion joints.

Articulation joints are to be provided to all pipes at the interface where the pipe enters a concrete structure



11.10 VALVES, FITTINGS AND METERS

All valves and fittings shall be suitable for 1,000kPa working pressure or x1.5 the maximum operating pressure, whichever is greater.

All valves and accessories shall be installed in positions easily accessible for operation and maintenance from the plant room floor without the aid of step ladder or access platforms.

All valves provided to potable water (cold water) lines shall be tested and approved by the Local Authority and watermarked for use in water supplies.

Valves $\leq 150\text{mm}$ shall be operated by lever handles with 10-degree interval locks

Valves $>\text{Ø}150$ shall be operated by gearbox driven hand wheels.

11.10.1 Ball Valves – Plastic Pipework

Ball Valves shall be high quality “Safety Block” or similar shall only be used in pipe works up to Ø50mm

Ball valves shall be UPVC true union type with barrel union Solvent Welded Joints (**SWJ**) connections, PTFE seats, EPDM O-Rings and double O-Ring stem seals. Valve connections shall be compatible with the relevant pipework (UPVC valves to have ABS ends when installed in ABS pipework).

Compact type ball valves (direct glued without unions) will not be accepted.

11.10.2 Butterfly Valves – Plastic Pipework

Manual operating butterfly valves shall be UPVC wafer type with allowance for AS2129 table E standard bolt hole pattern, EPDM liner, stainless steel disc and stem with notch plate for lever handle/gear driven hand wheel equivalent to Keystone F990 series.

Mild steel, cast-iron and ferrous materials must not be used in the construction of any part that come in contact with pool water

11.10.3 Actuated Valves

Actuated valves shall be electrically actuated with 24VAC actuators or compressed air as appropriate, spring return and with position indicators. The valve body shall comply with the manual valve requirements of this specification.

Automatically operated valves up to Ø75 mm shall be of “All Valve Industries” or other approved manufacture in material trim suitable to the in-service conditions. Operators for butterfly valves and valves greater than Ø75 mm shall be of All Valve Industries manufacture or approved alternative.

All automatically operated valves shall be fitted with regulators to prevent fast operation and with return springs for fail-safe operation in the event of either partial or total plant shut-down or failure.

11.10.4 Gauges

All gauges shall be stainless steel bottom entry glycerine filled with minimum Ø80mm face and metric measurement in kilopascals (kPa) for pressure and degrees Celsius (°C) for temperature and shall be provided with a test certificates prior to installation. All pressure gauges shall be provided with petcocks to permit removal without interruption to the connecting system. All temperature gauges shall be provided with thermowells to permit removal without interruption to the connecting system.

Gauge points shall be provided, as follows:

- Suction side of each circulating pump. E.g. filter pumps, secondary heating pumps.
- Discharge side of each pump.
- Filter, at top and bottom of filter, i.e. 2 no. gauges per filter.
- Secondary flow and return pipes to each heat exchanger and primary heating system.
- Provide the following gauges where required:
 - Pressure, Normal type - 0 to 350 kPa range
 - Compound type, -100 kPa to +100kPa range
 - Temperature, Normal type - 0 to 50°C range

11.11 VENTS AND DRAINS

Supply and install adequately sized air relief vents at high points in the system, as appropriate and manual drains at low points. Provide suitable catch trays and drain piping from valves to drainage outlets and tundishes.

Vents shall discharge to waste with operating valve set at convenient operating level that is accessible from the plant room floor without the aid of a ladder or work platform.

Provide valved drain to all filters with discharge to drainage outlets and tundishes.

Provide minimum Ø50 mm valved flushing point to each pump suction line, immediately prior to the strainers and a priming connection to each circulating pump.

Provide air bleed petcocks on all pump suction lines downstream of isolating butterfly valves.

Provide 12 mm dia. sampling points complete with petcocks on:

- circulating pump discharge pipes
- filter outlets
- Strainer Screens
- Pre-Balance Tank
- Pre-pump Strainer
- Pre-Heater Circuit
- Post Heater Circuit
- Pre-chemical dosing point
- Post Chemical dosing point

Strainer chamber shall be fitted with a full gasket and easily removable clear viewing lid using a rim clamp, single crosshead bar with 2-point fixing or bolts hinged to the strainer casing. The lid shall be of sufficient thickness to withstand all in-service loads without crazing, stress cracking and degrading.

11.12 FLOW MEASUREMENT

Flows shall be monitored by means of a primary flow element and insertion type electromagnetic flow meter, with the meter readily visible by a person operating the flow rate control valve all flow meters shall be monitored by the BMS system

Flow sensors shall also be provided in the primary and secondary heating circuit for transmission via volt-free terminals of a 'flow-established' control signal to heating Sub-Board (for control of primary flow through heat exchanger).

"Flow-established":

Bypass valve on primary ready to modulate based on pool water temperature signals

"Flow ceased, or Flow not established":

Bypass valve on primary side in full "bypass" mode (i.e. no primary flow through heat exchanger).

11.13 No-Flow SWITCH

Provide an approved no-flow switch in the filtration circulation delivery line. The switch shall may be a paddle type and is to be sized for the respective pipeline, flow and socket fitting and shall be manufactured using materials suitable for contact with heated chlorinated pool water. This switch shall be used to turn-off the respective circulating pump in the event of no- flow condition and also to shut-down the respective chemical dosing and heating circuits.

11.14 TEMPERATURE MONITORING MEASUREMENT

Thermowells and temperature monitoring sensors are to be provided on the primary and secondary circuits of all heat exchangers and on the supply to and feed from solar heating circuits and are to provide temperature data to the PLC.

12 POOL WATER TREATMENT CONTROL PANEL (PCP)

The Pool water treatment Control Panel (PCP) shall be provided by the contractor and shall comply with the requirements of AS1136. All field wiring shall be in accordance with AS3000 be undertaken by a state qualified Tradesman.

The PCP shall be complete with all necessary circuit breakers, fuses, motor starters, timer's relays. Isolators, run & fault lights, cables, controls and all interlocks for the specified water treatment plant. Allowance is to also be made for all field wiring and equipotential bonding of all metal components in accordance with AS3000.

12.1 CONTROL FUNCTION

The PCP shall control the water treatment plant and be the master control for ancillary systems, including all pumps, equipment, valves, water make-up, water chemistry and heating systems.

The PCP shall provide the necessary switching and controls to fully operate the pool water treatment plant and ancillary systems.

The PCP shall be controlled by a dedicated Programmable Logic Controller (**PLC**) driven and shall provide all necessary logic functions. The PLC shall provide full flexibility of control including sequential starting and stopping, duty / standby change-overs, timers, counters etc.

A conventional emergency stop button in the form of a red physical latching mushroom type switch shall be provided on the front of the PCP.

The operator interface with the control system shall be via Touch Screen Display (**TSD**).

OR

The operator interface with the control system shall be via conventional panel mount switches.

All items of equipment shall be provided with run (green) and fault (red) indicators.

All equipment shall be provided with Tri-State (Auto/Off/Test) switches on the control panel and provide the following level of control;

Lacus

Test Mode -	Shall operate the item of equipment irrespective of program logic conditions with the exception of the emergency stop button which shall immediately isolate the item of equipment at all times.
Off Mode -	Shall immediately isolate the item of equipment at all times.
Auto Mode -	Shall operate the item of equipment with operational control determined by required field switching (e.g. flow switches, balance tank level switches etc.) and PLC logic.
Emergency Stop -	Shall immediately isolate all items of equipment at all times.
Alarm Buzzer and light-	Shall be located at the top on the side of the PCP and shall capable of being heard from anywhere throughout the plantroom. A flashing red indicator LED lamp shall be provided on the front of the PCP below the control panel. The lamp shall be activated when any alarm is registered or when the emergency stop is activated.

12.2 TOUCH SCREEN DISPLAY (TSD)

12.2.1 General Requirements

The PLC shall be operated by Touch Screen Display (TSD) (minimum size 7" The TSD shall control all water treatment plant routines and shall provide master control over the entire system, monitor and provide alerts for system generated alarms which are to be logged to the TSD. The log file shall be downloadable to a computer running standard Microsoft Office products.

Monitoring and functionality is to include by not be limited to the following;

- Display of water chemistry data transmitted from the auto controllers
- Total dissolved Solids
- Water system levels
- Water feature controls
- Pump control
- Flow switches
- Solenoid control
- Backwash/filter rinse tank levels
- Out of Range Alarms
- Peripheral equipment (UV monitoring and/or control)
- Pressure Differential Alarms
- Timeclock functions

12.2.2 Functional Requirements:

The TSD shall communicate to the controlling PLC via RS232/485 or Ethernet protocols and be compatible in signal and speed so as to not interfere with the PLC operation.

Graphical representation of the system processes shall be provided on the screen along with and graphical representation of all Tri-State (Auto/Off/Test) switches on the control panel and provide the following level of control;

Control switches shall be overlaid on the screen. Machine status shall be represented by dynamic graphical representations which shall indicate their state by changing colour from red (off state) to green (on state). The graphical representations shall be indicative of the relative equipment be represented i.e. image of a pump to represent a pump. The Home Page shall have the current time and date indicated. Engineering parameters that require alteration shall be password protected. (set- points, timers etc) in a tiered permission system, operational staff to have access to initial level, specialist service staff have more detailed access etc.

12.2.3 Technical Requirements:

- The TSD shall be 24 Volts DC.
- Communications shall be via RS232/485 or Ethernet
- Alarms shall be time and date stamped and recorded in the log and display on the home page
- The TSD shall be rated IP66 (face only)
- The TSD default screen saver shall be a “blank screen” and screen shall be reactivated by screen touch.
- Power, communications and fault status of the TSD shall be indicated by local LED indicators on or adjacent the TSD
- Programming shall be via a standard serial or USB connection to standard configurable Windows based PC
- The TSD shall use standard cables and drivers for the PLC and connection to service PC
- The TSD shall be a backlit LCD screen. The TDU shall incorporate a DSTN Passive Matrix 256 colour VGA 640 x 480-pixel LCD module (minimum)

12.3 SWITCHBOARD REQUIREMENTS

12.3.1 Manufacture

Deliver the Sub-Board to site completely prewired and including all switchboard components and including all equipment necessary for the satisfactory operation of the installation. Provide Sub-board with 25% spare space for future expansion.

Provide Sub-Board conforming to AS3439, Form 1 Construction with a fixed inner chassis on which all control fuses, circuit breakers, relays, timers, starters etc. are neatly arranged. Indicators, instruments, switches, push buttons, circuit breakers and designated timers on are to be flush mounted, or arranged to project through, the cubicle door.

Live terminals or wiring are not to be accessible to the operator with the door closed.

Segregate 240 Volt equipment from extra-low voltage equipment. House extra low voltage relays or timers which switch 240-volt circuits in the 240-volt zone. Arrange equipment in groups for each motor within each zone.

Arrange equipment in groups for each motor within each zone. Provide top entry for all cabling to the sub-board unless designated otherwise.

All panel face lights shall be LED type.

Relays shall be complete with integral light and latching test button.

Provide top entry for all cabling to Sub-Board unless noted otherwise.

A second earth bar shall be provided in the Sub-Board for equipotential bonding.

Electrical components are not to reduce the IP rating of the cabinet to less than IP54

12.3.2 Cabinet Construction

Provide enclosures arranged for front wiring access only and with IP54 protection. Note the final Installation is to have an IP54 protection rating electrical components are not to reduce the IP rating

Provide all doors with fully gasketed neoprene or approved equivalent seals held firmly in place by continuous metal retaining strips as well as adhesive.

Cabinet and doors and cable entry plates can be fabricated from mild steel, stainless steel or aluminium, providing the final remains corrosion and fault free for the warranty period specified in the Warranty Schedule.

Provide spin type door hinges allowing a minimum door swing of 165 degrees.

Secure all doors providing access to 240/415 V equipment and wiring using a "tool" access format.

Incorporate three-point fastening for doors larger than 700mm in height. Provide removable gland plates for cable entry.

Finish the Sub-Board interior surfaces and equipment chassis in gloss white and the exterior surfaces in light grey to AS.2700, Colour No. N35 unless otherwise directed by the project Superintendent. Avoid all damage which could result in rejection of the Sub-Board

12.3.3 Sub-Board Equipment Schedule

The control board required by these specifications shall satisfy the requirements of AS.1136 with an IP54 (AS.1939) rating. Size of each control board should allow room for 25% future expansion. Control board shall be inspected and tested before leaving the manufacturer's premises. No live terminals or wiring shall be accessible to the operator with the door closed. All doors providing access to 240/415-volt wiring shall be secured using a method acceptable to the local supply authority.

Allowance shall be made for a three-pole main isolator to interrupt power to the control board. This isolator shall be rated to isolate the full load of the board and shall be positioned 1750mm off floor level.

Components with the control board shall be DIN rail mounted. Wiring terminals shall be tunnel type. Where possible, the board shall be arranged for bottom entry with brass cable glands. Control switches and buttons shall comply with AS.1431. On/off switches shall be of the rotary type and shall be provided for each major item of plant including all pumps.

All control circuits with the exception of motor starters shall operate at extra low voltage.

All 240-volt equipment shall be segregated from extra low voltage equipment. Extra low voltage relays that switch 240-volt circuits shall be housed in the 240-volt zone.

Indicating lamps shall comply with AS.1431 and shall be of a green colour – green to indicate equipment is energized/ready and of a red colour for abnormal/fault. Lamps shall be Izumi TW Series with LHD-LED lamps approved or approval equal. Indicating lamps shall be supplied from a transformer type voltage reducing unit. Run and fault indicating lamps shall be provided for each major item of equipment including all pumps, with colours generally Green-Run; Red- Fault. Provide diode isolation for the lamp test circuit by using a diode array.

12.3.4 Wiring

Use PVC wiring ducts for all switchboard internal wiring. Colour code wiring in accordance with AS3000.

Use 0.6/1 kV grade, V75 thermal rating, PVC insulated stranded copper conductors, minimum conductor size 2.5 mm² for power wiring.

Use 0.6/1 kV grade, V75 thermal rating, PVC insulated stranded copper conductor, minimum conductor size 1.5mm² for control wiring.

Install all wiring in PVC wiring ducts having a minimum spare capacity of 30%.

Wire equipment mounted on doors with PVC insulated flexible conductors.

Use crimp pins or lugs on all terminations with no more than two (2) conductors at any single terminal.

Ensure that:

- I. No strands are cut during cable stripping and crimping; and
- II. No uninsulated conductor is exposed where the wire enters lugs.

Install rail-mounted, double-sided, tunnel-type terminal strips the minimum size to accommodate 4mm sq. cable manufactured from polyamide or suitable alternative in the boards with separate terminals for each incoming and outgoing control

Colours for wiring shall be:

- 240/415 AC supply: Red, White, Blue
- 240/415 Neutral: Black
- 24VAC: Brown, Grey (n)
- 24VDC: Purple, Pink (-)
- Volt Free Contact: Orange
- Earth: Green /Yellow

12.3.5 Control Voltages

Operate all control circuits, with the exception of motor starters, at extra low voltage (24 volts a.c. unless stated otherwise).

Take control supply for motor starters from the load side of the respective circuit breaker. Do not, under any circumstances, subject any control equipment associated with a particular motor to a second source of supply exceeding 32 Volts.

12.3.6 Neutral Links and Earth Bars

Provide separate neutral links and earth bars of either brass or copper adjacent to the incoming and outgoing terminal strips with sufficient suitably sized terminals for all internal and external earth or neutral connections plus a minimum of ten (20) percent spare terminals. Provide a separate terminal for each connection.

Connect all instrument cases, gland plates, transformer frames, panel doors (which include door mounted), equipment chassis and other exposed metal parts to the earth bar using PVC insulated copper earth wire of minimum size 2.5 mm²

The neutral link and earth bar will be connected to the main neutral link and main earth bar via neutral and earthing conductors in the Filtration Plant submains cable.

12.3.7 Main Switch and Isolator

Fit a three-pole suitably coordinated circuit breaker fitted with shunt trip mechanism to operate in the event of a plant room flood. This circuit breaker will interrupt the incoming supply and be rated to break the full load of the board. The operating handle will be available on the door adjacent to the power meter and positioned within 1750 mm of floor level.

12.3.8 Fuselinks and Fittings

Provide enclosed HRC type fuses complying with AS2005.

12.3.9 Circuit Breakers

Provide circuit breakers of the thermal-magnetic or thermal - hydraulic type

complying with AS 3111 and/or AS 2184, temperature-compensated for an ambient temperature range of 0° - 45°C. Toggles are to have trip-free action with positive indication of the "tripped" position.

Contacts must be of non-welding silver alloy and provide effective arc -control means, and all metal parts must be treated to ensure corrosion resistance throughout the life of the breaker.

Circuit breakers are to be suitable for both horizontal and vertical mounting. Fixing and wiring arrangements are to permit three single-pole breakers to be readily exchanged for one three-pole breaker and vice versa.

Multi-pole breakers have a common tripping mechanism arranged to trip all poles simultaneously for a fault on any pole.

Select ratings in accordance with the manufacturer's recommendations for the actual load with due allowance for motor starting conditions.

Symmetrical fault-current-breaking capacities are to equal or exceed the following minimum values:

- i. for sub-main isolators 18 kA (to be confirmed on site)
- ii. for final sub-circuit breakers 10 kA (to be confirmed on site)

12.3.10 Motor Starters

Provide motor starters complying with AS 3947.4.1 and classified as follows:

- Duty: Suitable for both Intermittent 12 starts per hour and Uninterrupted.
- Utilisation category: AC3
- Mechanical endurance: not less than 3 million cycles

In addition, provide starters for drives rated at greater than 7.5kW and up to 18.5kW that comply with the following requirements:

Provide automatic, open transition, star delta starters with transition time between opening of the star point contactor and closing of the delta contactor not less than 0.04 seconds, to minimise arcing and contact damage or soft starters selected for high duty.

For low-inertia pump loads where rapid deceleration follows loss of stator excitation, the transition time is not to exceed 0.1 seconds.

12.3.11 Motor Circuit Breakers

Protect motors against small sustained overloads by means of coordinated motor circuit breakers with elements connected in all three phases. The motor circuit breakers must compensate for changes in ambient temperature and be capable at a single thermal setting of disconnecting the motor from the supply at any load condition above 50% of full load whenever single phasing occurs.

Motor circuit breakers must be adjustable and suited to the full load current of the motor that they are to protect. Confirm motor full load current prior to installation and the final setting prior to commissioning. The Motor Circuit Breakers are to be manual reset type and are to be provided with a test facility.

12.3.12 RCDs

30 mA RCDs shall be provided as per AS 3000 for pool related equipment. VSDs shall be fed from type B 30 mA RCDs.

12.3.13 Voltmeters

The voltmeter shall be 75 mm square pattern flush mounting industrial grade M1 type and shall include a voltmeter selector switch and potential fuses. The voltmeter shall be scaled 0 to 500 volts and shall be of University Paton or Crompton Parkinson manufacture.

Voltmeters shall have a 90-degree deflection movement.

12.3.14 Ammeters

The ammeters shall be 75 mm square pattern industrial grade M1 type. They shall include phase selector switch with bridging contacts between positions.

Ammeters shall have a 90-degree deflection movement and shall be direct reading type up to 30 amps. For currents in excess of 30 amps, a current transformer shall be provided. These transformers shall be in addition to any protection transformers used.

Overload scales shall be provided to suit the motors provided.

Ammeters shall be of University Paton or Crompton Parkinson manufacture.

12.3.15 Lights

Provide indicator lights as required with LED lamps. Operational or fault indication shall generally be by the HMI indicating the status as follows,

Green- Run; Red- Off. Fault shall be indicated by the Alarm Banner at the base of the HMI Display.

12.3.16 Transformers and Power Supplies

Transformers and Power Supplies shall be continuously rated for 150% of the maximum load. The HMI shall be powered from a dedicated supply and have surge protection devices installed.

12.3.17 Hours Run Meters all pool Pumps

Hours run meters shall be panel mounted type of Siemens or University Paton manufacture with capacity to record to 9999.9 hours.

12.3.18 Timers

Provide electronic timers only. Pneumatic, dashpot or thermal type timers will not be accepted under any circumstances.

12.3.19 Relays

Provide heavy duty (block type) control relays with not less than 4 contacts rated at not less than 10 amps - 240 Volt.

12.3.20 Selector Switches

Provide selector switches of the flush mounting, rotary action type.

12.3.21 Switch plug on Filtration Sub-Board

Provide standard weatherproof 15-amp switch plug with integral GPO suitable for flush mounting.

12.3.22 Push Buttons

Provide panel mounted type push buttons with round operator and Ø22.5 mm mounting hole. Illuminated push button types shall be to approval.

12.3.23 Labels

All components shall be labelled with a permanent printed tag affixed mechanically to the component. Wiring shall be identified by a machine printed tube type sleeve. Door labels will be affixed with label pins and self-adhesive backing.

PLC wire numbers shall use the actual I/O number i.e. X for inputs and Y for outputs for identification.

12.3.24 Cooling

The cabinet shall be supplied with a cooling system. Thermal calculations may be requested to confirm the adequacy of the cooling system. The minimum requirement will be a 250mm fan and vent arrangement with 4 spare filters. The source of cooling air shall be free from excessive moisture and chemicals that will be detrimental to the sub-board and associated components.

12.3.25 Controls

Provide indication on sub board of all alarm and fault conditions with alarm resetting procedure for motor thermal overload achieved by resetting the respective overload relay and pressing the "Reset" button.

Emergency Stops must be hard wired to disconnect output devices

Base all control circuits on the "fail-safe" principle. In particular:

- I. Failure of relay or contactor coils, failure of contacts to close, or open circuit wiring must not, under any circumstances, lead to damage of other equipment or to unsafe operation of the plant.
- II. As far as possible, protection and alarm circuits are to be energised under normal conditions and are to be de-energised on fault.

13 EQUIPOTENTIAL BONDING

The contractor shall equipotentially bond all items of water treatment plant equipment in accordance with AS3000.

Supply and install equipotential bonding system for all equipment within the pool plant areas in accordance with the requirements of AS 3000. This will include but must not be limited to the bonding of water treatment pumps, heating pumps, UV unit, pool water plate heat exchangers together with all metal equipment, e.g. valves and strainers, in contact with the pool water.

The sub board must be connected to the installation main earth via the earth continuity conductors included in the sub-mains cable or by separate earthing conductors as appropriate.

Provide a second earth bar for equipotential bonding.

Earth all 415/240 V motors using the earth continuity conductor in the motor cable.

Individually connect all earthing conductors to the earth bar in the sub-board. Tee-offs or joints of any description in earthing conductors will not be permitted.

Provide Residual Current Device (RCD) protection to all motors of drives in contact with pool water.

Individual bonding cables are to be joined within and accessible junction box, with all cable permanently identified.

The contractor shall provide certification that all equipotential bonding has been performed as a part of the electrical certificate of compliance documentation. The certificate is to include all items such as pool side stainless steel fittings, pool and concourse reinforcement.

14 PUMPS

14.1 MAIN CIRCULATING PUMP SYSTEM FOR FILTRATION AND WATER FEATURES

The primary criteria for pump selection shall be durability, reliability, ease of installation and ease of maintenance. Spare parts are to be easily obtainable and generally classed as off the shelf products.

Supply and Install pump set complete with VFD control panel and pre-pump strainer. The pump shall be designed for easy removal of all wearing parts for inspection and maintenance.

Supply and install stainless steel anti-vortex suction inlet to suit the suction pipe. Shop drawing to be approved prior to supply and manufacture. Mark the design and operating points on the pump curve

The pool water recirculation pump shall be end suction, back pull-out, close coupled/long coupled pedestal mount, single stage centrifugal ISO 2858 set to maximum operating speed of nominally **1450rpm** and suitable for variable speed control.

The pump construction shall feature back pull out design and direct coupled to an electric motor mounted on a galvanised steel base plate and concrete plinth. Pumps shall be supplied with an eye bolt or lifting lugs easy removal of back plate.

Pumps shall be manufactured from zinc free bronze (AS 1565 - Designation 906D) of Grade 316 Stainless steel, with phosphor bronze impeller, Grade 431 stainless steel shaft, and mechanical seals that are suitable for a heated chlorinated pool water. Alternative construction materials may be acceptable where the entire internal surfaces of the pump casing and back plate in contact with pool water shall be of protected cast iron/bronze will be considered, if they are provided with a written, five-year warranty from the manufacture for use in swimming pool applications with chlorine concentrations up to 10.0 mg/L. This warranty (and any relevant conditions) shall be submitted at Tender. Under no circumstances shall un-coated cast iron pumps be used with the pool water hydraulics.

The pump castings shall be of uniform composition and thickness to effectively withstand all normal working and surge pressure. The impeller shall be securely keyed to the motor shaft which shall be robust to avoid vibration. The rotating assembly shall be statically and dynamically balanced. Pump impeller shall be selected so as not to be greater than 90% of the maximum diameter for that particular pump.

Motors shall be sized to suit the pump casing; not necessarily the selected impeller size. Pump selections and or any stated duty points provided within this tender package are provided purely for tender purposes. Recirculating pumps shall have a shut off head not exceeding 20 metres. It is the responsibility of the selected subcontractor to assess the hydraulic resistance of the system and to determine and commission the duty points accordingly.

Pump motors shall be squirrel cage induction motors with a totally enclosed fan cooled enclosure. Motors shall be insulated with Class E materials, impregnated to be suitable for "tropical" conditions. Motors shall have a maximum continuous rating in accordance with AS 1359 to develop the power required by the pump when running under any condition of discharge. When rating the motor, the ambient temperature of the cooling air shall be taken not to exceed 45°C.

The pump bearings shall be self-aligning ball or roller type, positively located on the shafts. Bearings shall be selected for an operating life of not less than 100,000 hours and fitted with lubricant restraining dust seals.

Manufacturer's pump curves are to be attached to the required tender return and allowance shall be made to factory test the recirculating pumps in accordance with AS-2417, Part 2, and Class C. Certificates of Performance are to be provided within the Operation & Maintenance Manuals. Pumps shall be installed in accordance with the manufacturer's Instructions and shall be complete with necessary isolating valves, flexible connections, eccentric inlet connector, concentric outlet

connector, vacuum gauge, pressure gauge, and (rubber in shear type) vibration pads, mounted on approved concrete plinths. Construct the required foot valve, anti-vortex plate and the pre-pump strainers from Grade 316L Stainless Steel.

The pre-pump strainers shall be equipped with quick action toggle bolts and a swing davit for easy access to a removable strainer basket. Allowance shall be made for the supply of a spare strainer basket. (protective suction screens are not required as they will be fitted to the gutters in the future). Drain pipes, adequately sized, shall be supplied with connections, to bleed all water from glands and air cocks to adjoining floor wastes.

The Impeller shall be statically and dynamically balanced on the shaft and accurately machined and fitted to reduce friction and leakage loss to a minimum. The pump shall be selected with an impeller diameter preferably not greater than 90% of the possible maximum diameter for that pump size.

Pump sets must be horizontal 1450rpm motor pump type complete with corrosion proofed galvanized support frames mounted on concrete plinths. Plinths must be supplied under all pumps and must be complete.

Pumps shall be "Flowserve", Davey, Southern Cross or approved equal

It shall be the Contractors responsibility to ensure that the pumps offered are compatible with the system characteristics. The pumps shall have adequate suction lift and shall operate entirely free of cavitation under all operating conditions. Pumps shall be selected from curves and not from tables and to be VFD compatible.

The VFD shall maintain the designed flow rate irrespective of the status of the filter between "filter clean" and "filter dirty" conditions.

The pump shall be provided with a flow switch in the discharge pipework to shut-down the pump if flow is not established or maintained for a period of 40 seconds after starting or during operation. A delay timer shall be utilized as a part of the PLC programming routine to avoid alarming as a result flow switch "fluttering" in the turbulent flow conditions often present in pump discharge pipework. The flow switch shall be provided between the pump and the isolation valve.

The Contractor shall be responsible for calculating system characteristics and ensuring that all equipment offered is fully compatible. Full details of system characteristics shall be provided prior to acceptance of Shop Drawings.

The main circulating pumps shall be type tested in the factory in accordance with AS.2417 part 3 and certificates of performance issued to the Superintendent.

The Plant shall be designed such that all valves are readily operable, and the strainer is accessible from the Plant Room floor. Platforms, elevated walkways, ladders and the like will not be permissible.

A clear access walkway shall be provided directly to the pool plant control panel, and clear access for maintenance to all equipment within the plant room to equipment manufacturers' recommendations.

14.2 ELECTRIC MOTORS

Provide electric motors designed manufactured and tested in accordance with the requirements of AS.1395.

Motor Types Motor types are to be as follows:

- Fixed-speed motors having rated outputs of 0.37 kW or greater are to be 415 volts, 3- phase, squirrel-cage induction motors.
- The motors are to be IC0141 or IC0041 cooled S1 duty to AS.1359 and are to be protected to IP66 as defined in AS.1939.
- Fixed-speed motors having rated outputs less than 0.37 kW may be either 240 volts, single-phase, or 415 volts, 3-phase squirrel-cage induction motors.

- The motors are to be IC0141 cooled S1 duty to AS.1359 and are to be protected to IP66 as defined in AS.1939.
- Submersible motors are to be 415-volt, 3 phase, and squirrel cage induction motors of IC0040 or IC0041 design in accordance with AS.1359, protected to IPX8.

Provide mounting and coupling details to suit the driven device. All motors shall be provided with RCD protection.

14.2.1 Output Rating

Provide motors having a maximum continuous rating (MCR) at least 10% in excess (i.e. Service Factor of 1.10) of the maximum input power required by the driven unit over the whole range of the driven unit's operating characteristic and capable of supplying their continuous rated output at any voltage in the range plus 5.0% to minus 10% of rated voltage and for any frequency in the range 50 Hz plus or minus 2.0%.

14.2.2 Speed

The rated speed of all motors is to suit the requirements of the driven units and is **not to exceed 1450 rpm** (nominal) unless specifically approved or otherwise specified.

14.2.3 Starting

Provide motors suitable for starting under full load conditions when coupled to the driven unit. The method of starting is Delta-star soft start type.

Ensure smooth, positive starting and acceleration in conjunction with the specified starting method used under all conditions of operation.

14.2.4 Connections

Provide a separate terminal for both ends of each winding.

14.2.5 Insulation and Temperature Rise

Provide an insulation class (other than for submersible motors) of not less than Class 130 (Class F) in accordance with AS.2768. The insulation class of submersible motors is not less than Class 155 (Class B) in accordance with AS.2768.

The temperature rise of the motor windings (by resistance method) is to be not greater than that applicable to the insulation Class in accordance with AS.1359, Part 32.

14.2.6 Earthing

Provide an earthing stud within the power supply terminal box.

14.2.7 Shaft

Provide a motor shaft manufactured from solid high-grade stainless steel as before specified and having a design safety factor of 2.5 unless noted otherwise.

14.2.8 Bearings and Bearing Housings

Fit motors with greased-for-life bearings having an L 10 Basic Rating Life in accordance with AS.2729 of 6000 x 106 revs at the maximum continuous rated output and speed.

14.2.9 Single Phase Motors

Provide single phase motors complying with appropriate requirements above and with the following additional requirements:

- Fit an inbuilt "phase shift" electrolytic capacitor and a separate "starting" winding (or other approved starting system) suited to Delta-star starting.
- Isolate the starting winding by means of an inbuilt speed switch which will operate when the motor approaches full speed.

- Pump shall be Grundfos or equal suitable for chlorinated water up to 10PPM and TDS of up to 2000ppm

15 FILTER VESSELS

Filter vessels shall be pressure type deep bed sand filters and shall include the following

- Bobbin wound fibreglass or laminated polyester construction.
- 1000mm media bed depth.
- Rated working pressure of 400 kPa.
- Australian AS2129 Table E flanged inlet and outlet connections with loose backing ring.
- Ø150mm sight glass at top media depth level.
- 420mm x 320mm lateral manhole.
- Lateral collector system and internal piping manifolds.
- External manual air bleed.
- Drain valve.
- Inlet and outlet differential pressure gauge indicator plate.
- Filters shall be sized with a maximum filtration flux of 25m³/m²/hr

The filter vessels must be supplied with a 2-year full manufacturer's warranty which shall include for the structural shell and all components of the filter vessel.

The contractor shall provide documentary evidence to the engineer that all filter vessel laterals were inspected, checked for tightness and fully intact prior to the addition of the filter media.

The filter vessel shall be filled with water above the filter outlet laterals prior to addition of the filter media or as directed by the manufacturer.

The filter media shall comprise of filter gravel 6/3 to nominally 100mm above the laterals followed by with 0.4 to 0.8mm (16/30) filter sand to operational level. Note that glass and Zeolite will also be considered

Pre-coat Ultra Fine filters will be considered as an alternative to the media filters providing the filter media is perlite. Pre-coat Ultra Fine filters shall be sized with a maximum filtration flux of 3.60m³/m²/hr

The contractor shall provide documentary evidence of the type and quantity of filter media proposed to the engineer for approval prior to filling.

Back washing velocities to be in accordance with the manufactures required and to provide and even fluidisation of the filter media.

Filter shells are to be supported on a concrete plinths.

16 CONTROLS

16.1 WATER QUALITY CONTROL

The water chemistry controls shall be in the form of a proprietary and complete factory assembled, wired and integrated package comprising all equipment and ancillaries' necessary for the safe and efficient control of the water chemistry parameters specified.

One manufacturer shall supply every item of the water chemistry packages including the method of control. Only proprietary integrated control shall be used. Software driven water chemistry control as a part of the PLC control system will not be accepted.

The water chemistry systems shall be fully electronic with constant LCD display in pH units for pH, and parts per million (ppm) for Chlorine.

Free chlorine shall be measured (hypochlorous acid), not converted ORP measurement, and shall be pH corrected to permit accurate measurement at varying pH levels.

16.2 MAKE-UP

Level sensing devices (within stilling tube) in the balance tank shall initiate pool make-up and provide both high and low-level alarm indication and plant shut-down in the event of critical low level. Operating levels shall be established and confirmed during final commissioning.

16.3 TANK LEVEL SENSORS

The following level sensors shall be constructed by the Contractor

Backwash Tank (Filter Rinse Tank):

- Level Electrodes Low level (backwash enabled) set 100mm above tank maximum sediment level.
- Green light illuminated at PCP labelled "BACKWASH OK"
- High-level set at 300mm below top of storage. Red light illuminated at PCP labelled "BACKWASH STORAGE HIGH LEVEL"

Balance Tank:

- Level Electrodes Low level (backwash enabled) set 100mm above tank invert. Green light illuminated at PCP labelled "Pump Well OK"
- High-level set at 300mm below top of storage. Red light illuminated at PCP labelled "PUMP WELL STORAGE HIGH LEVEL"

16.4 SYSTEM INTERLOCKS

16.4.1 Chemical Dosing

Chemical Dosing systems shall shut down if total plant shutdown or if a 'no-flow' condition occurs in the respective pool water circulation system (refer Process and Identification).

16.4.2 Heating Systems

Loss of flow in the pool systems and/or in secondary heating lines shall shut-off heating hot water to respective heat exchangers, via a signal cable to the Mechanical Sub –Board (cable by I Contractor). Modulation valve to switch to bypass

16.4.3 No-Flow

Failure to establish flow in any pump line shall shut down the respective pump until such time as flow has been established.

16.5 SWITCHES

All drives shall be capable of being started by switches located on the front of the PCP. Drives which are part of an automatic control or interlock loop shall be controlled from an AUTO/OFF/TEST switch located on the PCP.

Provide local isolators as required by Regulations and AS.3000.

17 WATER CHEMISTRY

The water chemistry system shall incorporate high and low limit alarms and sample flow monitoring. The water chemistry system shall be disabled if either the high or low limit alarms are activated or if the sample flow is isolated.

System control parameters shall include the following:

- | | |
|------------------------------|----------------------------|
| • pH | 0 - 14 pH |
| • Cl (free) | 0 – 10 ppm |
| • Control | Proportional band |
| • Dosing Pump Control Output | 0 to 200 pulses per minute |
| • Limits | High and low limit relays |

The pH and Cl probes shall be housed in a proprietary sample cell complete with flow indication and shall be continuously provided with pool water from the recirculation pump common discharge pipework. The sample line connection to the discharge pipework shall be provided with an isolation valve. The sample line connection at the sample cell shall be provided with a drain valve. The sample cell line shall discharge back into the balance tank.

The water chemistry system shall be interlocked such that chemical dosing is disabled when the pool water treatment plant is not in operation. This interlock shall be in the form of flow switch control in the water chemistry sample cell (to indicate no flow across the probes) and a physical interlock with the PCP. The PCP interlock shall disable (pause) the water chemistry instrument when the pool water treatment plant is not in operation however will continue to power and display the instruments measured value. Switching power on and off to the instrument will not be an accepted method of control.

18 SAFETY SIGNAGE AND PPE

Provide all required HAZCHEM signage in the plantroom and at building and site entry points. In addition to required HAZCHEM signage, the following sign shall be prominently displayed adjacent to the chemical dosing tank.

WARNING

**ALWAYS WEAR PERSONAL PROTECTION EQUIPMENT
WHEN HANDLING CHEMICALS REFER TO OPERATIONS MANUAL.
NO SMOKING. HIGHLY CORROSIVE.**

All MSDS and safety signage necessary for the delivery and administration of stored chemicals shall be provided in the plantroom.

Provide personal safety equipment including face shield, chemical gloves and apron in the plantroom.

19 DEFECTS

Any work, equipment, service or system found to be defective by testing, inspection, operation or otherwise shall be rectified at the contractor's expense.

Defective equipment supplied by a third party shall be the responsibility of the contractor.

Defects shall not be deemed as rectified until confirmed as rectified by the engineer.

20 COMMISSIONING

This part of the Specification sets out the requirements in regard to testing and commissioning of all plant and equipment installed under this Contract together with the instruction of the Owner's operating personnel.

All defects shall be rectified prior to commissioning. All equipment, services and systems shall be cleaned and inspected prior to final operation.

All labour, equipment, instruments and appliances required for testing and commissioning shall be furnished by the Contractor for the duration of the tests and are deemed to be included in the Contract.

The gauges, thermometers and other instruments specified as a permanent part of the installation may be used for testing purposes.

Test instruments shall be checked for accuracy by an approved laboratory and test certificates shall be submitted prior to site testing

Commissioning shall include the checking, operation and verification of the following;

- Safety sequences and interlocks.
- Calibration of controls and instruments.
- All services, systems and equipment.

- All heating systems.
- All water chemistry systems.
- All pressures and flows.
- All valves.

The commissioning of pump systems shall include the checking, operation and verification of the following;

- Start and stop functions.
- Deflection of pump mounts.
- Flow switch functions.
- Vibration isolation.
- Motor speeds and direction of rotation (for 3 phase motors).
- Inlet and outlet pressures and flows to duty point.
- Control interface.
- Duty / standby changeovers.

All services systems and equipment shall be operated continuously for a period of 2 weeks after commissioning to demonstrate the satisfactory operation of each system to the engineer and the project manager.

If the guaranteed accuracy of any part of the equipment is not attained, the Contractor shall make at his own cost such adjustments or replacements as may be necessary to ensure compliance with the requirements of this Specification. If such adjustments are not or cannot be made, the apparatus will not be accepted and shall be removed and replaced with equipment which does conform to the specified requirements at no extra cost.

20.1 SUPPLY OF CHEMICALS BY CONTRACTOR

After the initial fill, of all chemicals, will be supplied by the Contractor at no cost to the Owner for commissioning and for practical completion. All other chemicals required after plant start-up, commissioning and at practical completion shall be provided by the principal.

20.2 START UP AND OPERATING TESTS

When the installation of the plant is completed, the Contractor shall supply a competent technician to start up and run the plant for one week (5 days). Testing and adjustment of all plant and equipment shall be done in this period.

The Superintendent shall be advised of the start-up date at least 48 hours in advance. All necessary energy, water, gas and steam or fuel will be provided by the Owner. The pool vacuum cleaner will also be provided by the contractor. The Contractor shall balance the pool during filling and vacuum the pool once prior to plant start-up.

The technician shall fully instruct nominated representatives of the Owner in the operation, control and maintenance of the plant.

The guarantee period will start when the plant is taken over by the Owner at the end of a satisfactory instruction period and a written acceptance of such plant shall be furnished by the Owner to the Superintendent.

Under no circumstances shall any plant be started until all flow gauges and pressure gauges have been installed in approved locations.

20.3 LUBRICATION AND SETTING IN OPERATION

Before the testing or operation of any item of plant, each item of plant shall be fully charged with the correct grade of oil, grease or other lubricant as the case may be, all in accordance with the manufacturer's recommendations. All such initial charges of lubricant shall be supplied under this Contract. Carry out all necessary adjustments to equipment described in this Section of the Specification. The complete installation shall be handed over in complete and proper working order to the satisfaction of the Superintendent.

20.4 SPECIFIC PERFORMANCE TESTS

Test log sheets shall be prepared and submitted for approval prior to plant trials.

The tests shall be carried out immediately prior to the end of the Defects Liability Period and shall be satisfactorily completed before the Final Certificate will be issued.

The actual timing of these tests shall be confirmed with the Superintendent during the initial commissioning period.

Three (3) copies of all test results, properly recorded on approved log sheets shall be lodged with the Superintendent. Any charts from recorders used in the tests shall be photocopied and three copies submitted with the log sheets.

20.4.1 Pump Testing

Each pump shall be run individually and at the same time as the other pumps, and readings shall be taken to ascertain as far as practicable:

- Operating characteristics of all pumps.
- Power consumption of each pump.
- Noise levels of each drive read at 1 m distance from the drive.

20.4.2 Control Equipment

The normal operation of each item of equipment shall be adequately demonstrated. Fault conditions for each item of equipment shall be simulated and the correct operation of all safety devices and alarms shall be demonstrated.

Each set of thermal overloads shall be adjusted for the actual load of each motor. The overloads shall be demonstrated to function by trial setting below normal trip conditions. All alarm and safety devices shall be checked and tested.

Motor indicators shall be set to the normal current in the respective motors.

All motor currents and power consumption shall be recorded and scheduled.

Phase readings shall be tabulated against the name plate rating of the respective motor. Complete circuit checks (including all control gear and switchgear) of each cable termination, equipment ratings, cable ratings and circuit components, including dosing system. Earth continuity tests of all earth connections, from any exposed metal or equipment required by AS.3000 to be earthed, to the earth electrodes.

Insulation tests with a 1000 V Megger on all 415 phase to phase and 500 V Megger on all 240V

Phase to neutral mains, submains and sub circuit cables, bus bars and equipment. The Contractor shall ensure that all electronic equipment, meters and any equipment likely to fail under such tests are out of the circuit under test.

Operational checks of controls and power switchgear and wiring. This includes drive rotation, phase polarity and rotation, pressure switches and other field equipment, and the control system within the control panels where applicable.

20.4.3 Chemical Dosing

The operation of all items of chemical dosing shall be demonstrated, and tests shall be carried out to ascertain:

- Accuracy of all dosing pumps, metering tubes, etc.
- Power consumption of all items of equipment.

Test connection, monitoring operations and modification of set points via this connection. Supply all login information and passwords to enable the Owner's agent to carry out remote monitoring and control equipment remotely and Via the BMS system.

20.4.4 Filter Operation

The operation of all cycles of the filtration system shall be demonstrated, and tests shall be taken to ascertain:

Efficiency of filtration cycle -e.g.

Pressure readings before and after filters

- Immediately prior to backwash
- Immediately after backwash
- Turbidity photometer readings of:
 - Make-up water
 - Soiled water prior to filtration
 - Filtered water
 - Pool water at approved locations
- Efficiency of backwash cycle. E.g. time and flow required for effective backwash

20.4.5 Miscellaneous Equipment

All other items of plant installed shall be tested for satisfactory operation and compliance with the Specification.

20.4.6 Equipment Settings

After final acceptance of system balancing and testing of services described herein, the settings of all valves and other adjustment devices shall be permanently marked so that adjustment may be stored after subsequent disturbance.

No permanent marking shall be made before final acceptance.

20.4.7 Instruments

Each pressure gauge shall be removed, checked against a certified pressure gauge and recalibrated as necessary to read correctly at its normal working pressure.

21 POOL WATER QUALITY

The contractor shall be responsible for achieving, maintaining and confirming the following pool water chemistry parameters as a part of commissioning;

Chemical Parameter	Unit	Outdoor Pool	Outdoor Spa
pH	pH units	7.2 – 7.8	7.2 – 7.8
Free chlorine	mg/l	3.0 stabilised with Cyanuric acid other wise 2.0	4.0 stabilised with Cyanuric acid other wise 3.0
Combined chlorine	mg/l	<0.5	<0.5
Total chlorine	mg/l	<10	<10
Total Dissolved Solids	mg/l	<1,000 above supply otherwise <2000	<1,000 above supply otherwise <2000
Turbidity	NTU	<0.5	<0.5
Colour	SCU	<0.5	<0.5
Reserve Alkalinity	mg/l	80 to 120	80 to 120
Calcium Hardness	mg/l	80 to 150	80 to 150
Water Balance	LSI	-0.5<X<+0.5	-0.5<X<+0.5
Bacteriological Parameter			
Coliforms	/100ml	Not detectable	Not detectable
Pseudomonas aeruginosa	/100ml	Not detectable	Not detectable

On no account shall Total Chlorine be allowed to exceed 10 mg/L at any time during initial commissioning.

Lacus

Actual water quality criteria shall be determined during the commissioning stage so as to achieve a positive Langelier Saturation Index (approx. range +0.1 to +0.4) and shall be stated in the Operation Manual.

Three samples of mains water to be used in this pool shall be tested by the Contractor via a NATA approved laboratory for pH, chlorine (total), reserve alkalinity, turbidity, free iron, copper, calcium and magnesium hardness prior to the final filling of the pool. Such tests shall be carried out by a licensed testing laboratory in accordance with the procedures laid down in the 15th Edition of APHA Standard Methods and the results submitted prior to the final filling of the pool.

Volume 4: Technical Specification Pool and Tank Finishes, Fittings & Furniture

Proposed Pool & Spa
Calypso Holiday Park Yamba

Prepared for: Clarence Valley Council

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1 INTRODUCTION

The purpose of this specification and associated drawings is to provide the design intent and the performance specifications for the proposed swimming pool & spa to be installed at Calypso Holiday Park Yamba NSW.

This technical specification contains the pool tanks finishes fittings & furniture requirements for the project. This specification forms a part of a set consisting of the following volumes. Each volume must be read in its entirety and in conjunction with the other volumes and the relevant drawings prepared for the project.

Volumes that make up this specification include the following;

- Volume 1: Technical Specification, General
- Volume 2: Technical Specification, Pool and Tank Construction
- Volume 3: Technical Specification, Filtration and Pool Hydraulics (PWT)
- Volume 4: Technical Specification, Pool Finishes, Fittings and Furniture

Where reference is made to this specification, it shall mean referring to the requirements of all volumes.

2 POOL AND TANK FINISHES, FITTINGS & FURNITURE

2.1 GENERAL

This specification captures the requirement of the Pool and Tank finishes, Fitting and Furniture. Within the specification reference is made to acceptable brand names and suppliers to establish the required details and quality to be employed. Whilst "and or equivalent" will be considered, random brand substitutions are not permitted without submission and written approval, all variations from the specified supply shall be detailed at the time of tender.

3 TILING WORK

3.1 GENERAL

The extent of tiling is to be as per the Tender submission however as a minimum the pool shall be tiled on the water line to assist with cleaning and maintenance of the pool.

Allowance shall be made for the following scope of works: -

- Preparation of surface prior to tiling, sand or water blasting of the pool concrete surface to give ICRICSP3-4 (International Concrete Repair Institute) (course sandpaper nominally 60 Grit) finish.
- Supply of membranes, ceramic tiles and all adhesives, grouts, sealants; as per an acceptable tiling system refer to Appendix A for acceptable systems
- Laying of membrane, membrane reinforcement, crack suppression membrane, ceramic tiles, including all materials & joint sealants;
- Cleaning up, making good, provision of spare tiles.
- Before tiling the tile supplier, tile adhesive manufacturer and the tiling contractor/fixer and membrane installer where applicable, shall inspect the concrete surface and approve it fit for tiling on in writing. Prior to commencement of works. Written approvals are to be submitted to the superintendent prior to commencing tiling works.

The entire tiling system, including membrane, shall be warranted for the period stipulated in Appendix A, for material, supply, and labour. The warranty period shall commence from the Date of Practical Completion for the Works and shall be in accordance with the Contract warranty requirements. The warranty to the tile joints shall be warranted for the period stipulated in Appendix A. The tile supplier and installer shall provide a back to back warranty.

The tile supplier shall approve the tile fixing contractor, if not the same company.

The tiling warranty shall be for the complete system against any failure or defect due to faulty workmanship and/or materials. The guarantee shall cover the cost (or the damages) for all finishing materials and labour that is necessary to replace the entire work should the installation be proven to be defective and shall be made in writing by the pool tiling supplier and installer and the pool builder.

Pool tiling work comprises, but is not necessarily limited to, the following items:

PART A – SUPPLY

- Supply to on-site store of approved ceramic tiles.
- Supply of shop drawings and schedules of quantities and tile types.
- Supply to site of all tile bedding mortars, adhesives, grouts, sealants and the like necessary for a complete tiling works.

PART B – LAYING

- Inspection of pool construction works to ensure acceptable concrete and/or render finish for tiling.
- Acceptance in writing of pool structures for both dimensional correctness and standard of surface finish by the subcontractor before tiling.
- Preparation and wash-down of concrete to be tiled to give a clean-sandpaper rough finish.
- Handling from store, laying, jointing, cutting and clean-up of tiling.
- Build in around pool fittings installed by the pool subcontractor.
- Corners of raised ends to have half round tiles.

3.2 TILE TYPES

All tiles for the swimming pool shall be purpose made for the application. Tiles shall conform to the requirements laid down in the European Standard EN14411 A1 and B1 and be suitable for swimming pools and shall be capable of being laid directly on to the concrete pool substrate or onto cement render. All tiles shall have very low moisture absorption and low growth characteristics.

All quantities, including the quantities allowed for each tile type, shall be the responsibility of the pool subcontractor.

Expansion joints within the pool shall be carried through the tiling system and in major structural joints in the substrate. Expansion joints in the tiling are not necessarily required over reinforced pour joints in pool walls. Tile joints shall occur the full depth to substrate at maximum 4.5 m centres and where walls meet floors, and walls meet walls, and at construction joints where possible. Install crack suppression membrane over construction pour joints, any cracks and control joints in structure.

3.3 STANDARDS

Unless otherwise specified conform to the following standard specifications and codes for material and workmanship: -

AS3972	Portland Cement
AS3958.1	Ceramic Tiles - Guide to Installation
AS3958.2	Ceramic Tiles - Guide to System Selection
AS13007	Ceramic Tiles - Grouts and Adhesives
EN14411	Extruded Ceramic Tiles with Low Water Absorption ($E \leq 1\%$) Group A1b Pressed Ceramic Tiles with Low Water Absorption ($E \leq 1\%$) Group B1b

Water shall be clean drinking quality. Where bore water, or water with a high mineral content is proposed to be used, approval to do so is to be provided by the Adhesive system manufacturer in writing. The written approval is to be submitted to the superintendent prior to commencing works.

3.4 CLIMATIC CONDITIONS DURING TILING

Precautions should be taken to minimize the effects of extremes of temperature and wet weather on the tiling installation.

For external pools in hot conditions adequate shading must be provided so that the work is not carried out in direct sun. Allowance may be required to take steps such as refrigerating materials or working at night to avoid problems such as adhesive skinning. Extremely cold conditions may require heating arrangements. A clear statement of responsibility for weatherproofing on the project between main contractor and tiling installer is essential to ensure final tiling quality does not suffer.

Regardless of the precautions taken it is essential that no product is used outside the temperature range that is specified by that products manufacturer.

It is essential to protect from all extremes of climate during the whole fixing operation and for as long as possible after grouting has been completed. Rain can cause serious damage before or immediately after grouting, and very hot, dry exposure may impair the setting of fresh adhesive or grout.

3.5 SAMPLES

The Contractor shall supply samples for approval of all materials intended for use (including grout, tiles, adhesives, joints, etc.). A sample tiled area is to be prepared to demonstrate the level of workmanship for approval by the Superintendent. No materials are to be used in the Works until written approval has been gained from the Superintendent.

3.6 DIMENSIONAL TOLERANCES

Refer to the dimensional tolerance of the final product as specified previously within this specification

It is always best if the pool shell is constructed smooth, plumb, square and correct dimensions that allows for the direct application of the tiles to the structural concrete, however this can be difficult to achieve in practice therefore it is common for the walls to be set back to allow for a nominal 10mm of corrective render. Floors are usually finished to allow for direct application of tiles. They can however be set down to allow for a nominal 30mm thick screed if required.

Wet edges, steps, ramps and hob tops are usually left with a tile thickness plus 20-30mm set down so the tiler will build up to the required level with cementitious screed or thick bed fixing of tiles.

The following tolerances shall apply to the shell as built, prior to rendering or tile fixing.

3.6.1 Walls - Prior to Render

When using a 2m straight edge the maximum allowable deviation at any point from the design position is +/- 4mm. The maximum allowable thickness of corrective render shall be 25mm at any point without consulting the engineer. For areas requiring grinding of more than 3mm the engineer shall approve the reduction in cover to reinforcement prior to grinding commencing.

3.6.2 Walls - After Render

Walls after rendering should be constructed to pass the same standard as Finished Tiling (refer below).

3.6.3 Floors – prior to adhesive fix tiling

Floors shall be cast accurate such that at no point shall the nominated pool depths not be achievable. When using a 3m straight edge the maximum allowable deviation at any point from the design position shall be +/- 5mm

3.6.4 Set Down Areas – tiler to thick bed fix or screed

Set down areas shall allow an absolute minimum of 15mm and maximum of 40mm of screed/thick bedding beneath the tile. Particular note should be made in areas such as wet edges, hob edges where different thickness tile pieces are used. When using a 2m straight edge the maximum allowable deviation at any point from the design position is $\pm 4\text{mm}$

3.6.5 Finished Tiling

The finished pool tiling shall comply with the following tolerances:

- a. Water level – where pool tiles set the water level for the pool the required tolerance is $\pm 2\text{mm}$ from the design level anywhere within the pool. If the design level is to be changed for any reason approval of the designer must be obtained prior.
- b. Walls, Ramps, Hobs – when checked with a straight edge shall be true within a tolerance of $\pm 3\text{mm}$ in 2mm from the required plane.
- c. Floors –when checked with a straight edge shall be true within a tolerance of $\pm 4\text{mm}$ in 2mm from the required plane.
- d. Lipping – in any location the lippage between adjacent tiles shall not exceed 1.5mm.
- e. Concrete Surface Preparation

3.7 CONCRETE SURFACE PREPARATION

Prior to either waterproofing, rendering or tiling, the pool shell must be suitably prepared by either ultra-high-pressure water blasting (min 10,000psi), abrasive blasting, diamond grinding, needle gunning or other mechanical means to ensure the surface is clean and free from form oils, curing compounds, laitance and any foreign contaminants. Such treatment should be sufficient to expose any weak layers over entrapped air bubbles (egg-shelling) in formed walls, and leave the aggregate exposed to improve the bond of tile fixing material or render and providing an excellent key. The resulting surface profile is to match ICRICSP3-4 (International Concrete Repair Institute) which approximately equal to coarse sand paper.



CSP 3 - Light Shotblast



CSP 4 - Light Scarification

Any defects, cracks etc. exposed by this treatment must be repaired with materials suitable to accept tile adhesives or render. All spoil and fines must be thoroughly removed from the pool

3.7.1 Approval of prepared surface prior to commencing tiling

Before tiling to prepared surface is to be inspected and approved in writing by the following

- the tile supplier,
- tile adhesive/tiling system manufacturer
- the tiling contractor/fixer and
- membrane installer where applicable,
- The Aquatic Engineer

All written approvals shall be submitted in writing to the superintendent prior to commencing membrane/tiling.

Should any of the parties not be satisfied the surface has been prepared to a satisfactory level, the tiling contractor shall rectify the preparation at their own cost.

3.8 TILING SYSTEM

The term Tiling system refers to all components that make up to finished tiled surface and included but is not limited to

1. Concrete surface preparation
2. Primers and bonding agents as required
3. Renders and Screeds used to correct dimensional tolerances
4. Membranes if required
5. Tile adhesives
6. Tile grouts
7. Tile expansion joints
8. Joint sealants
9. Detailing or structural expansion joints through the tiled finishes

The term *tiling system* is used as there are a number of manufactures that will provide a tiling system, which consists of a number of their products, and when that system is used in accordance with their recommendations they will provide the designated warranties. These systems vary in their requirements and components and the systems should not be mixed which out written approval from the relative manufactures prior to doing so.

Appendix A provides details of accepted tiling systems and the warranties to be provided

3.8.1 Render and Screeds

These are used to bring the pool shell to the correct dimensions and tolerances to receive tiling. Therefore, survey references must be provided by the main contractor to allow for the correct thickness to be provided at any point.

Some systems will require a priming coat while others will use a splatter/dash coat.

All renders and screeds to be applied to the pool shell and surrounding structures are to be suitable for full immersion in pool water, alternative and membrane can be provided over the render/screed to protect it from the pool water. The make-up of the screed/render and membranes is to be accordance with proposed tiling system.

3.8.2 Membranes

A waterproof membrane is not mandatory. The pool has been designed as a water retaining structure in accordance with AS 3735-2001 Concrete structures for retaining liquid

Some tiling system recommend the use of a membrane to increase the flexibility of the binding medium between the tiles and the concrete structure. Where a system of this nature is proposed to be used the cost of the membrane is to be included in the cost of the tiling system

3.9 LAYING TILES

3.9.1 Walls and Floors

A 100% complete coverage of adhesive is essential for a long-term performance of the tiling system. To achieve this both “back buttering” and the “Tarver” method of laying is be used.

Back buttering of the tiles is essential to obtain complete coverage, as well as providing additional protection against adhesive “skinning”. Use of back buttering also will allow the use of smaller notched trowels meaning less tile adhesive pushing up through the joints between tiles leaving this free for selected grouts

The Tarver method was developed by Joe Tarver of the American National Tile Contractors Association (NTCA) to give the best possible adhesive coverage. This is based on the following technique.

- Comb the adhesive in one direction, perpendicular to one edge of the tiles.
- Push tile firmly into the adhesive bed, at its final location
- Move the tile perpendicular to the beads by a distance equal to two times the trowel notch size.
- Move the tile back to its final position.

Contractor is to remove random tiles at regular intervals and checked for adhesive coverage. Check 1 tile every 3-4 sq. m. If 100% coverage is not being achieved tile laying should cease until the laying procedure is corrected and the required adhesive coverage is achieved. The minimum allowable adhesive coverage allowed on the back of any one tile is 100%. The contractor is to allow for up to 2% of the tiles to be removed by the Superintendent/Aquatic Engineer, noting these may be removed after the adhesive has cure and the tiles have been grouted. The tiling contractor is to make good and reinstall the tiles where they have been removed at their own cost

Constant checks must be made to see whether a surface ‘skin’ has formed, in no circumstances shall tiles be applied over adhesive that has commenced to ‘skin’ over. Where ‘skinning’ has commenced, the adhesive shall be completely removed, discarded and fresh adhesive applied.

- Do not wet the adhesive when it has formed a 'skin' as an anti-adhesive film will be formed.
- Any surplus adhesive remaining on the face of the tiles or between the joints after fixing should be removed before it sets.

3.9.2 Wet Edges

These should be laid in an improved sand cement, or epoxy, thick bed mortar in accordance with the approved tiling system specification i.e. wet laid, without prior screeding.

Refer to the tiling system specification for details

3.10 TILES

The tiles shall be of a pre-approved manufacture/supply as specified in Appendix A. The main contractor shall place the order for the tiles as soon as possible the award of the main contract and after the approval of the shop drawings to allow sufficient time to secure overseas manufactured tiles. Imported items take typically 10-12 weeks if in stock in Germany, longer if requiring manufacture.

Tiles may be cut to suit pool and joint layout, however under no circumstances shall more than 20% of the tile be removed. I.e. minimum tile size is 80% of the original dimension. All cut edges are to be hidden in joints and/or stoned smooth

Depth marking and warning tiles shall be provided and meet requirement of Statutory Authorities and RLSSA.

3.11 JOINTS

Set out pool tiles to give uniform joint widths nominally 6mm wide. Joints are best widened to adjust set-out rather than reduced and should not be less than 4mm wide. Consider all tile types when determining set-out noting that finished size of different tile types can vary.

Fill the joints solid and flush. Clean off surplus grout.

For cement-based grouts - wash down when the grout has set.

The use of epoxy grouts is recommended for improved performance in swimming pools.

Epoxy Grout shall be a washable epoxy grout that is ultraviolet light colour stable can be used from one joint below the waterline to the outside of the pool tiling for additional colour stability against UV when lighter colour grouts are selected on external pools.

Cementitious grout if used must conform to the requirements of AS3958-1-2007 Appendix E for use in swimming pools (CG2WA).

3.11.1 Movement Joints

These are required at the following locations:

- i. Structural Movement Joints
 - a. where they are required to move in accordance with the structure and
- ii. Intermediate Movement Joints
 - a. at junction between floors and walls
 - b. at internal wall junctions
 - c. to divide tiled areas into bays typically 4.5m x 4.5m
 - d. At change in grade and plane

Intermediate Movement Joints shall be installed as follows:

- Depth Extend right through the tile adhesive and/or screed material to the concrete substrate. Movement joint locations shall be clear of all tile adhesive, grout, screed or render extending right through to the concrete pool shell.
- Width 6-10mm suit tile layout.

- Seal all tile movement joints at 4.0m centres and wall to floor and wall to wall joints with a high-quality flexible sealant, refer to appendix A for pre-approved suppliers, set over a backing rod. Placed strictly in accordance with the requirements of the supplier and obtain the required warranty from the manufacturer. The sealant is to be able to compress and stretch freely and shall adhere only to the side walls of the joint and not to the base.
- Refer to Appendix A for the required Warranty
- Material to be in accordance with Appendix A and to be used strictly in accordance with the latest TDS.

3.12 PROGRAMME

The minimum time intervals that should be allowed to elapse between successive stages are:

1. Between curing of the pool shell and rendering or screeding: 6 weeks;
2. Between completion of rendering and screeding and the commencement of tile fixing:
 - a. 3 weeks (new pools),
 - b. 2 weeks (old concrete shells);
3. Between completion of the tile fixing and commencement of grouting: 3 days;
4. Between completion of the grouting, movement joints and the filling of the pool: 3 weeks.

For additional information please refer to AS3958-1-2007 Table E1

3.13 FILLING AND HEATING

The rate of filling should not exceed 750mm per 24 Hours.

The heating rate should not exceed 0.25°C per Hour.

Please refer to AS3958-1-2007 Appendix E

3.14 SHOP DRAWINGS

Shop Drawing Requirement

1. Before final orders for tiles associated with this project are placed, a pdf of the factory shop or detail drawings of the tile layouts shall be submitted, complete with a full description of all proposed tile colours.
2. The shop drawing must be presented in colour to represent the colours proposed to be used
3. The drawings shall show the proposed layout of tiling works and shall include details of tiling at steps and other recesses, and the like.
4. The shop drawing shall indicate all cut tiles and confirm no tile is less than 80% its original dimension
5. The shop drawing must indicate all tile movement joints and pool expansion joints
6. If permission to use is given, one (1) copy of the drawings endorsed to that effect will be returned.
7. The Architect may require amendments to the drawings before permission to use is given.
8. The contractor shall not stockpile, manufacture, assemble or supply anything affected by such drawings, until authorization to proceed has been obtained.
9. Acceptance of shop drawings refers to general design only.
10. If errors, omissions and interferences are noticed, they will be brought to the Contractor's attention.
11. Acceptance of shop drawings will not in any way relieve the contractor from responsibility for errors, omission, and interferences or from the necessity of furnishing such workmanship and materials as may be required for the completion of the work in accordance with the Contract.

Detailed schedules of all tile types and quantities offered shall be submitted with the shop drawings including indicating an extra 5% of all tiles for storage by client as spare tiles.

3.15 DEPTH MARKER TILES

Provide the following depth marker tiles and 'do not dive' signage for incorporating into the pool tiles in accordance with the appropriate authority, RLSAA, and National Aquatic and Recreational Signage Manual (currently 3rd edition). in concourse and as depicted on the design drawings

Signs on ceramic tiles must be resistant to pool water, pool chemicals and not fade when exposed to UV light.

3.16 FALLS AND LEVELS

Grading: Grade floor tiling to even and correct falls are required. Make level junction with walls. Where falls are not required, lay level. Deviation: Maximum deviation of the finished floor level between points of contact under a 2m straight edge laid in any direction on an area of uniform grade +/- 2mm.

3.17 WARRANTIES

The tile and adhesive supply and tile fixing shall be carried out as one contract with only one point of responsibility.

Tiles are to be installed only by Sub-Contractors approved by the tile and adhesive manufacturers to ensure warranties are achieved.

3.18 COMPLETION

3.18.1 Spare Tiles

Provide spare matching tiles of each type, in quantity not less than 5.0%, to a minimum 20 pieces of the quantity installed, for future replacement purposes. For numeral tiles supply 20 pieces of blanks. Store spare tiles where directed by the superintendent.

3.18.2 Cleaning

Clean tiled surfaces using an appropriate tile cleaning agent and polish.

3.18.3 Maintenance Information

The Contractor shall provide all information relevant to the future maintenance of his work.

The information shall include maintenance instructions with available printed brochures and literature.

4 LINING TO POOL GUTTERS AND BALANCE TANKS

4.1 GENERAL

The purpose of the lining is to provide a separation layer between the pool water and the exposed concrete surfaces within the pool system. The lining is not intended to act as a water proof membrane however there may be times when a water proof membrane is used as a liner. For this specification the pool, pool gutters and balance tanks have been designed as water retaining structures as such the liner is to provide a separation.

The following areas are to be lined with

1. Soiled Water Gutters
2. Balance tanks
3. Soffits of balance Tanks

Allowance shall be made for the following scope of works: -

- Removal of all existing surface coatings, substandard render and membranes back to the concrete substrate;
- Preparation of surface prior to painting, sand or water blasting of the pool concrete surface to give ICRCSP2-3 (International Concrete Repair Institute) (medium sandpaper nominally 100 Grit) finish.
- Supply of membranes, primers pool paints and curing agents as per an acceptable lining system refer to Appendix A for acceptable systems
- Laying of membrane, membrane reinforcement, crack suppression membrane, painting, including all materials & joint sealants;
- Cleaning up, making good.
- Before application of the liner the supplier, and the lining contractor and membrane installer where applicable, shall inspect the concrete surface and approve it fit for application of the liner in writing and prior to commencement of works. Written approvals are to be submitted to the superintendent prior to commencing application of the liner.

The entire lining system, including membrane where applicable, shall be warranted for the period stipulated in Appendix A, for material, supply, and labour. The warranty period shall commence from the Date of Practical Completion for the Works and shall be in accordance with the Contract warranty requirements. The warranty to the pool expansion joints shall be warranted for the period stipulated in Appendix A. The lining supplier and lining applicator shall provide a back to back warranty.

The lining supplier shall approve the liner applying contractor, if not the same company.

The lining warranty shall be for the complete system against any failure or defect due to faulty workmanship and/or materials. The guarantee shall cover the cost (or the damages) for all finishing materials and labour that is necessary to replace the entire work should the installation be proven to be defective and shall be made in writing by the pool paint supplier and painting contractor and the pool builder.

4.2 CLIMATIC CONDITIONS DURING PAINTING

Precautions should be taken to minimize the effects of extremes of temperature and wet weather on the lining application and installation.

For external pools in hot conditions adequate shading must be provided so that the work is not carried out in direct sun. Allowance may be required to take steps such as refrigerating materials or working at night to avoid problems such as the liner skinning during application. Extremely cold conditions may require heating arrangements. A clear statement of responsibility for weatherproofing on the project between main contractor and painter is essential to ensure final liner quality does not suffer.

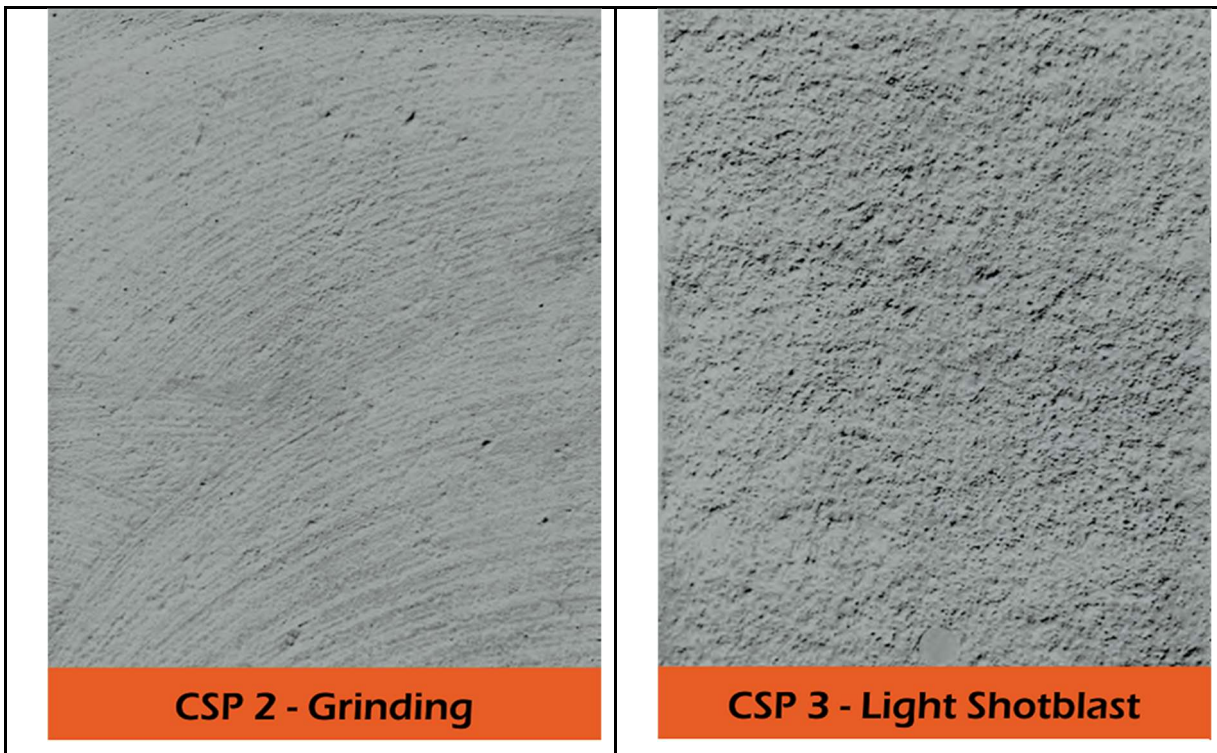
Regardless of the precautions taken it is essential that no product is used outside the temperature range that is specified by that products manufacturer.

Lacus

It is essential to protect from all extremes of climate during the whole painting operation and for as long as possible after curing of the paint has completed. Rain can cause serious damage before or immediately after application of the liner and very hot, dry exposure may cause premature curing of fresh liner requiring roughing of the surface prior to following coats.

4.3 CONCRETE SURFACE PREPARATION

Prior to either waterproofing, rendering or lining, the concrete must be suitably prepared by either ultra-high-pressure water blasting (min 10,000psi), abrasive blasting, diamond grinding, needle gunning or other mechanical means to ensure the surface is clean and free from form oils, curing compounds, laitance and any foreign contaminants. Such treatment should be sufficient to expose any weak layers over entrapped air bubbles (egg-shelling) in formed walls, and leave the aggregate exposed to improve the bond of tile fixing material or render and providing an excellent key. The resulting surface profile is to match ICRCSP2-3 (International Concrete Repair Institute) which approximately equal to coarse sand paper (100 grit).



The preparation is particularly important for pool concrete which can often be very high strength due to the requirements in AS 3735 Concrete Structures for Retaining Liquids, and hence it is imperative to ensure and good mechanical bond.

Any defects, cracks etc. exposed by this treatment must be repaired with materials suitable to accept tile adhesives or render. All spoil and fines must be thoroughly removed from the pool

4.3.1 Approval of Prepared Surface Prior to Commencing the Application of the Liner

Before applying the liner, the prepared surface is to be inspected and approved in writing by the following

- the Liner supplier,
- the liner applicator and
- membrane installer where applicable,
- The Aquatic Engineer

All written approvals shall be submitted in writing to the superintendent prior to commencing membrane/painting.

Should any of the parties not be satisfied the surface has been prepared to a satisfactory level, the lining contractor shall rectify the preparation at their own cost.

4.4 APPROVED COATING MATERIALS

Refer to appendix A for the approved coating/lining materials

The specification below is for Epigen 1311 Ultra and 1344 and is provided for guidance. All linings are to be installed strictly in accordance with the manufacture's specifications

Epigen 1311ULTRA	Epoxy Ultra High Build Coating – Skim Fair Coat
Epigen 1344	Epoxy High Build Coating - Finish

4.4.1 REMOVAL OF FOREIGN MATTER

All foreign matter including dirt, oil and grease shall be removed using suitable detergents.

4.4.2 Surface Preparation

Although many techniques exist for the preparation of surfaces of concrete prior to the application of the system, only three are noted here and it is the responsibility of the contractor to use appropriate techniques to achieve the requirement for profile and removal of all laitance.

All areas to be addressed shall be cleaned using a water-based degreaser to remove foreign materials including dirt, oil and grease beforehand.

There should not be present any sharp edges, burrs and other sharp surface irregularities, loose scale or cement, etc. All transitions and edges should be smooth.

4.4.3 Machine Grinding

Abrade by grinder all existing coating surfaces, and bare concrete, using grinders. This shall be supported by vacuum equipment to avoid dust contamination throughout the site.

Finished surfaces shall be porous but smooth.

4.4.4 HIGH PRESSURE JETTING

Water jet all internal surfaces of the concrete surfaces to achieve a clean, sound substrate. The extent of water blasting should encompass all surfaces to be coated and should utilise a pressure of such magnitude, as to ensure all loose concrete, existing coating, foreign matter, and associated spoilage is removed, leaving a profiled finish.

A nominal pressure of 10,000psi minimum is to be used only as a guide. Sufficiently high enough pressure should allow the use of wider fan with greater productivity.

Sharp edges, projections, and surface imperfections revealed after the treatment shall be removed by grinding.

4.4.5 Abrasive Blasting

Clean, new media, preferably non-metallic such as Garnet, shall be used at all times. The abrasive material to be used for blast cleaning shall be kept clean, dry and free of extraneous matter. Suitable traps and/or filters shall be fitted to compressed air lines to remove moisture and oil and shall be inspected daily.

All surfaces to be coated shall be abrasive blasted to reveal sound concrete. All surfaces shall be completely free of scale, rust, paint, soluble contaminants or other deleterious matter.

Sharp edges, projections, steel slivers and surface imperfections revealed by abrasive blasting shall be removed by grinding or other approved means, and the surface re blasted prior to the application of the coating.

4.4.6 Contamination

The Contractor shall take whatever measures are necessary to prevent contamination of the clean surface and applied coating.

4.5 COATING PROCEDURE

Concrete surfaces may be directly treated as required without rendering and correction. Application shall be by roller and trowel assist, and some roller “wetting” undertaken if the surface has retained moisture to be displaced.

4.5.1 Initial Application

All nominated areas shall have the Epigen 1311Ultra and then trowel finished to cover the pits and low spots of the concrete. If by hand application only, first application by trowel should be limited to less than 500 microns and the entire area skimmed to leave negligible product behind using steel trowel to bring the Epigen 1311Ultra into direct contact with the concrete filling any imperfections in the process.

The applied coating may be checked for pin holing and other similar occurrences however the system is designed to allow rapid installation with minimal reliance of subsequent inspection. Faults identified shall be clearly identified and the affected areas shall be prepared and re-instated in accordance with written instructions of the Coating Manufacturer.

4.5.2 Full Coat Application

All surfaces may then immediately be brought up to the desired DFT, minimum 500 microns with Epigen 1344. Do not apply finish if left for more than 24 hours after application of the Epigen 1311Ultra without re-preparing by abrasion the existing surfaces.

4.5.3 Special Requirements

The Contractor shall apply the protective coating in accordance with the manufacturer's final instructions, based on this Specification.

4.5.4 Curing

The Epigen is to be cured in Accordance with the manufacture's specification prior to filling the pool with water

5 POOL FIXTURES AND FITTINGS

5.1 GENERAL

The Contractor shall supply and install as necessary associated miscellaneous pool fittings and furniture as outlined below.

The specification and drawings refer to proprietary items, or approved equivalent. The items as such have been indicated as an acceptable standard for this work. Should the Contractor wish to use an alternative, this alternative product must be approved by the Superintendent for acceptance into the contract and alternatives shall be submitted at the time tendering for Review. All alternative must be submitted with and complying tender and a completed Request for Substitution form attached to this specification. The completed Request for Substitution form must evaluate the advantages the request item will bring to the project

5.2 BONDING

All metal inserts or fixtures shall be bonded to the equipotential bonding system in accordance with AS3000 Wiring Rules and to the approval of the Superintendent

5.3 METAL WORK

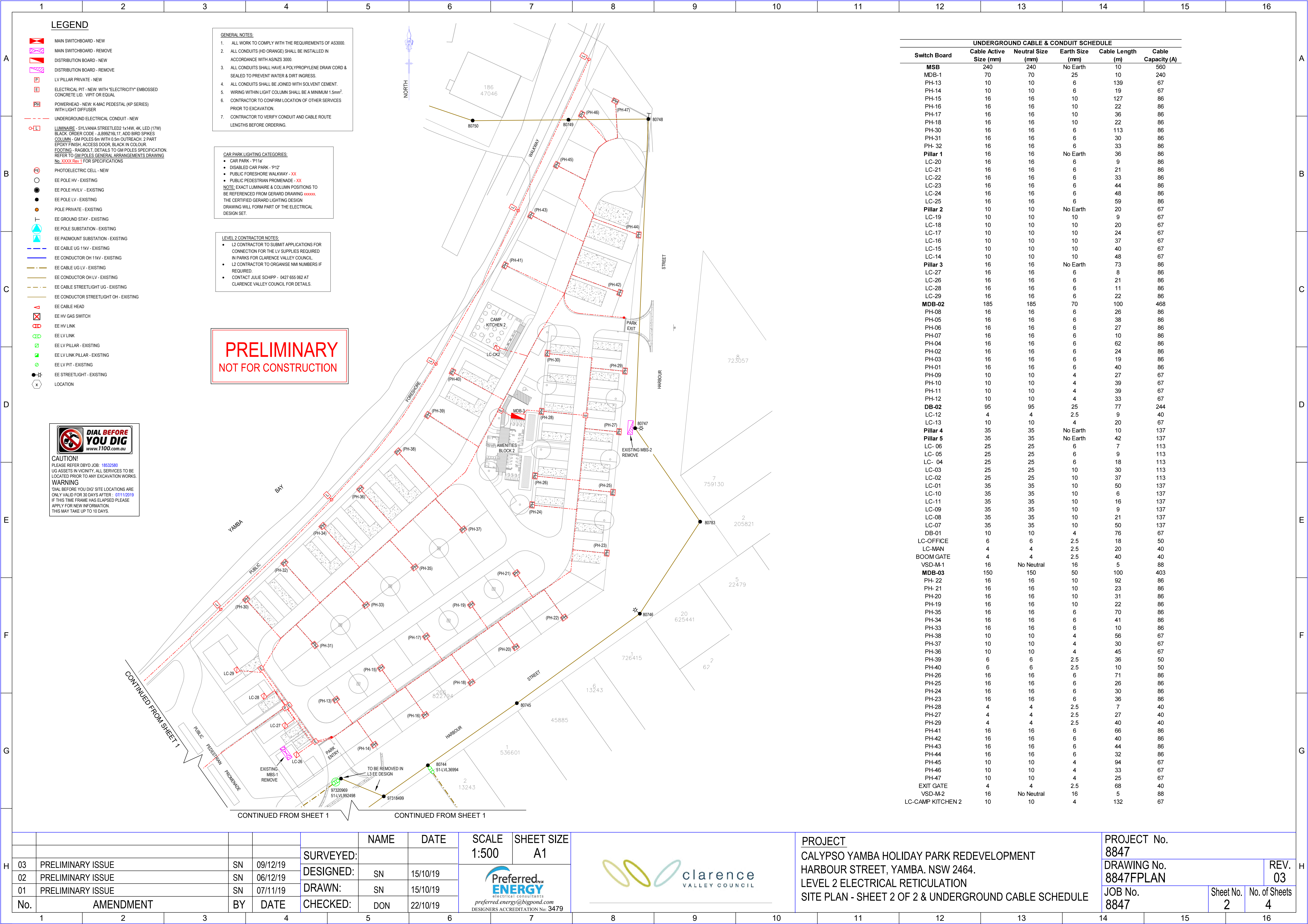
An approved fabricator that has specific experience with swimming pools shall undertake all stainless-steel metalwork work. Fabricated stainless steel items shall be fixed in place with fastenings and fixings that are galvanically compatible and matching in surface finish. All work shall conform to the requirements of the relevant Standards Association of Australia Codes. All metal work within the defined pool zone shall be equipotentially bonded in accordance with AS-3000 wiring rules.

The following materials and surface treatments shall be utilised unless specified otherwise elsewhere in this Specification: -

- i. Fittings comprising straps, brackets, anchor bolts, etc., where immersed in pool water or subject to periodic immersion or splashing by pool water - stainless steel 316 low carbon.
- ii. Other fittings not falling into category (I) above - hot dipped galvanized steel.
- iii. Handrails, grabrails and the like - stainless steel 316 low carbon with a #8 non-directional mirror polish. The use of repolished tube is permitted however the whole fabricated item is to be polished to a uniform finish. Polished items that oxidise at different rates to expose where the welds have been polished will be deemed as a claimable item under the supplier warranty

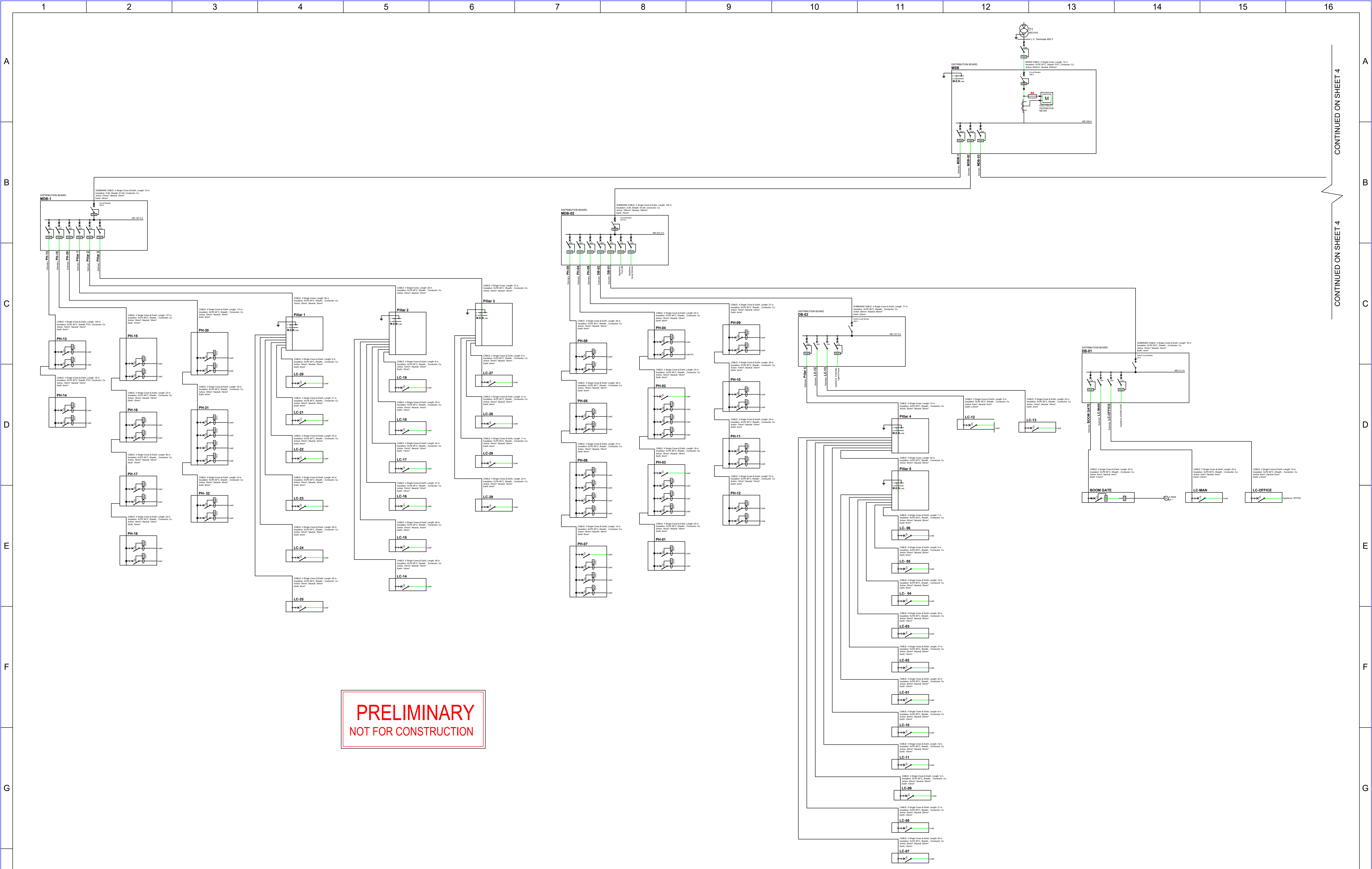
Tubular products shall not be bent more than 1.5 times the diameter of the tube. Mitred and fabricated corners are unacceptable. All welding shall be with a back purged TIG process with butt welded joints ground smooth and polished. Stainless steel components shall be passivated after fabrication. The Contractor shall submit shop drawings showing fabrication details and dimensions to the Superintendent for approval before any fabrication is commenced.

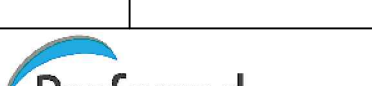
Provide suppliers material certificate for 316 stainless steel in accordance with ASTM A240. Prior to payment of first process claim.

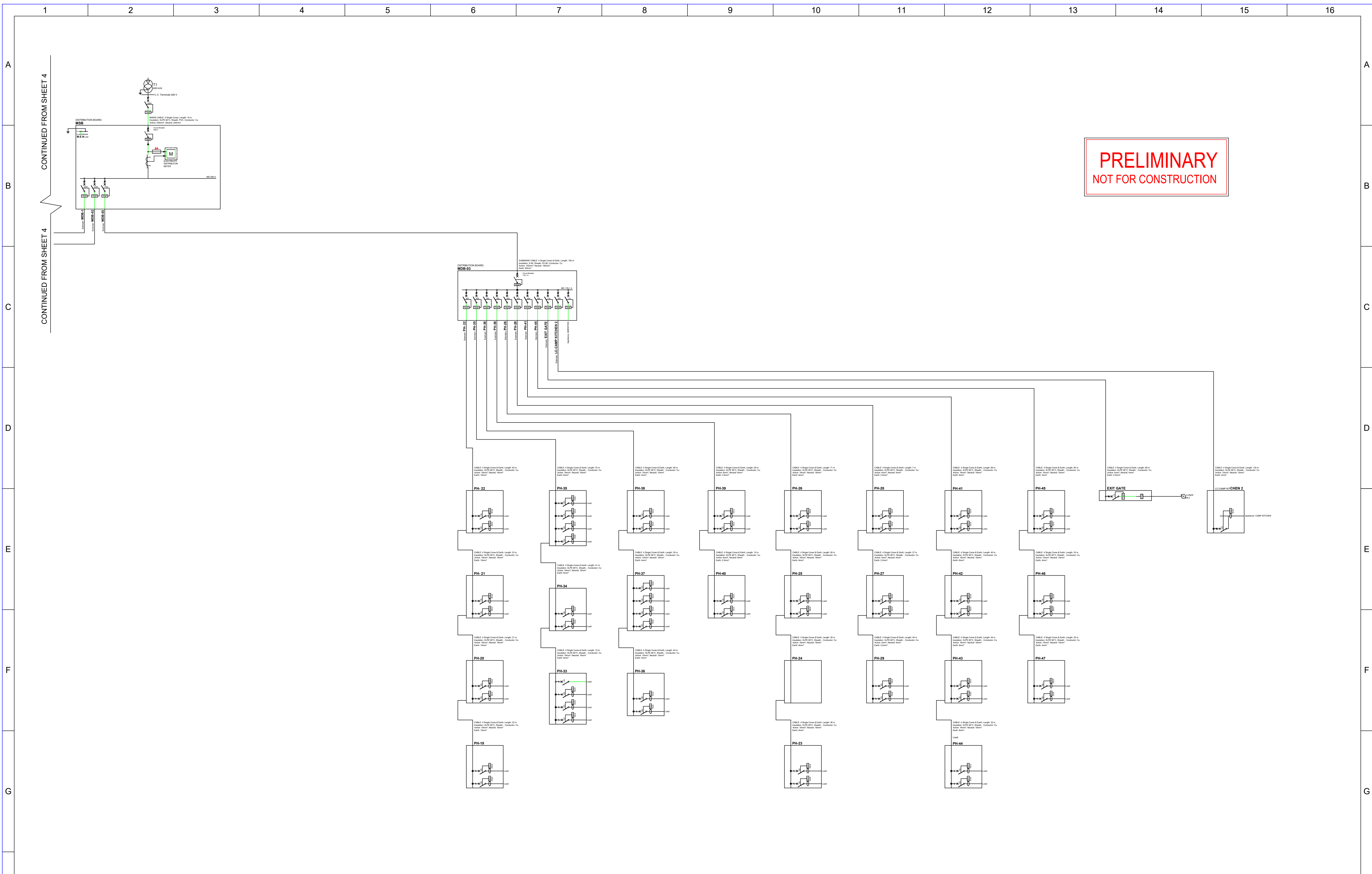


UNDERGROUND CABLE & CONDUIT SCHEDULE					
Switch Board	Cable Active Size (mm)	Neutral Size (mm)	Earth Size (mm)	Cable Length (m)	Cable Capacity (A)
MSB	240	240	No Earth	10	560
MDB-1	70	70	25	10	240
PH-13	10	10	6	139	67
PH-14	10	10	6	19	67
PH-15	16	16	10	127	86
PH-16	16	16	10	22	86
PH-17	16	16	10	36	86
PH-18	16	16	10	22	86
PH-30	16	16	6	113	86
PH-31	16	16	6	30	86
PH-32	16	16	6	33	86
Pillar 1	16	16	No Earth	36	86
LC-20	16	16	6	9	86
LC-21	16	16	6	21	86
LC-22	16	16	6	33	86
LC-23	16	16	6	44	86
LC-24	16	16	6	48	86
LC-25	16	16	6	59	86
Pillar 2	10	10	No Earth	20	67
LC-19	10	10	10	9	67
LC-18	10	10	10	20	67
LC-17	10	10	10	24	67
LC-16	10	10	10	37	67
LC-15	10	10	10	40	67
LC-14	10	10	10	48	67
Pillar 3	16	16	No Earth	73	86
LC-27	16	16	6	8	86
LC-26	16	16	6	21	86
LC-28	16	16	6	11	86
LC-29	16	16	6	22	86
MDB-02	185	185	70	100	468
PH-08	16	16	6	26	86
PH-05	16	16	6	38	86
PH-06	16	16	6	27	86
PH-07	16	16	6	10	86
PH-04	16	16	6	62	86
PH-02	16	16	6	24	86
PH-03	16	16	6	19	86
PH-01	16	16	6	40	86
PH-09	10	10	4	27	67
PH-10	10	10	4	39	67
PH-11	10	10	4	39	67
PH-12	10	10	4	33	67
DB-02	95	95	25	77	244
LC-12	4	4	2.5	9	40
LC-13	10	10	4	20	67
Pillar 4	35	35	No Earth	10	137
Pillar 5	35	35	No Earth	42	137
LC-06	25	25	6	7	113
LC-05	25	25	6	9	113
LC-04	25	25	6	18	113
LC-03	25	25	10	30	113
LC-02	25	25	10	37	113
LC-01	35	35	10	50	137
LC-10	35	35	10	6	137
LC-11	35	35	10	16	137
LC-09	35	35	10	9	137
LC-08	35	35	10	21	137
LC-07	35	35	10	50	137
DB-01	10	10	4	76	67
LC-OFFICE	6	6	2.5	18	50
LC-MAN	4	4	2.5	20	40
BOOM GATE	4	4	2.5	40	40
VSD-M-1	16	No Neutral	16	5	88
MDB-03	150	150	50	100	403
PH-22	16	16	10	92	86
PH-21	16	16	10	23	86
PH-20	16	16	10	31	86
PH-19	16	16	10	22	86
PH-35	16	16	6	70	86
PH-34	16	16	6	41	86
PH-33	16	16	6	10	86
PH-38	10	10	4	56	67
PH-37	10	10	4	30	67
PH-36	10	10	4	45	67
PH-39	6	6	2.5	36	50
PH-40	6	6	2.5	10	50
PH-26	16	16	6	71	86
PH-25	16	16	6	26	86
PH-24	16	16	6	30	86
PH-23	16	16	6	36	86
PH-28	4	4	2.5	7	40
PH-27	4	4	2.5	27	40
PH-29	4	4	2.5	40	40
PH-41	16	16	6	66	86
PH-42	16	16	6	40	86
PH-43	16	16	6	44	86
PH-44	16	16	6	32	86
PH-45	10	10	4	94	67
PH-46	10	10	4	33	67
PH-47	10	10	4	25	67
EXIT GATE	4	4	2.5	68	40
VSD-M-2	16	No Neutral	16	5	88
LC-CAMP KITCHEN 2	10	10	4	132	67

H					NAME	DATE	SCALE 1:500	SHEET SIZE A1		PROJECT CALYPSO YAMBA HOLIDAY PARK REDEVELOPMENT HARBOUR STREET, YAMBA. NSW 2464. LEVEL 2 ELECTRICAL RETICULATION SITE PLAN - SHEET 2 OF 2 & UNDERGROUND CABLE SCHEDULE	PROJECT No. 8847		
	03	PRELIMINARY ISSUE	SN	09/12/19	SURVEYED:		 preferred.energy@bigpond.com DESIGNERS ACCREDITATION No: 3479	DRAWING No. 8847FPLAN			REV. 03		
	02	PRELIMINARY ISSUE	SN	06/12/19	DESIGNED:	SN		15/10/19					
	01	PRELIMINARY ISSUE	SN	07/11/19	DRAWN:	SN		15/10/19					
	No.	AMENDMENT	BY	DATE	CHECKED:	DON		22/10/19			JOB No. 8847	Sheet No. 2	No. of Sheets 4

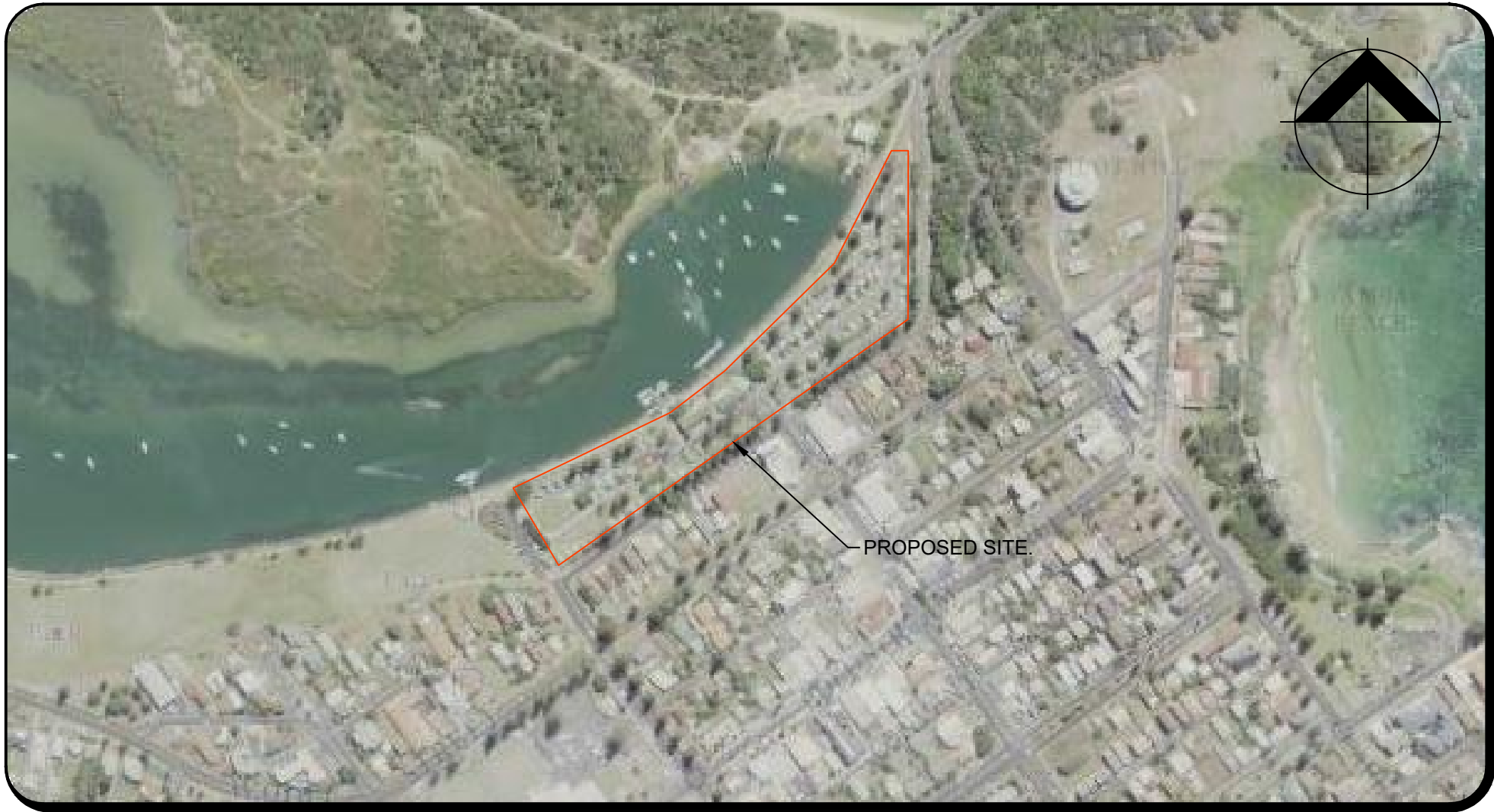


H					NAME	DATE	SCALE N.T.S.	SHEET SIZE A1		PROJECT CALYPSO YAMBA HOLIDAY PARK REDEVELOPMENT HARBOUR STREET, YAMBA. NSW 2464. LEVEL 2 ELECTRICAL RETICULATION SINGLE LINE DIAGRAMS - SHEET 1 OF 2	PROJECT No. 8847					
											DRAWING No. 8847FPLAN			REV. 03		
	03	PRELIMINARY ISSUE	SN	09/12/19	SURVEYED:											
	02	PRELIMINARY ISSUE	SN	06/12/19	DESIGNED:	SN	15/10/19									
	01	PRELIMINARY ISSUE	SN	07/11/19	DRAWN:	SN	15/10/19									
	No.	AMENDMENT		BY	DATE	CHECKED:	DON	22/10/19	 preferred.energy@bigpond.com DESIGNERS ACCREDITATION No: 3479		JOB No. 8847		Sheet No. 3	No. of Sheets 4		
	1	2	3	4	5	6	7	8		9	10	11	12	13	14	15



				NAME	DATE	SCALE N.T.S.	SHEET SIZE A1		PROJECT CALYPSO YAMBA HOLIDAY PARK REDEVELOPMENT HARBOUR STREET, YAMBA. NSW 2464. LEVEL 2 ELECTRICAL RETICULATION SINGLE LINE DIAGRAMS - SHEET 2 OF 2	PROJECT No. 8847			
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02	PRELIMINARY ISSUE	SN	06/12/19	DESIGNED:	SN					15/10/19			
01	PRELIMINARY ISSUE	SN	07/11/19	DRAWN:	SN					15/10/19			
No.	AMENDMENT	BY	DATE	CHECKED:	DON					22/10/19			
									JOB No. 8847		Sheet No. 4	No. of Sheets 4	

Locality Map



Calypso Holiday Park

Stage 2 - Redevelopment

For:  **Integrated Site Design**
PLANNING • DESIGN • MARKETING • MANAGEMENT

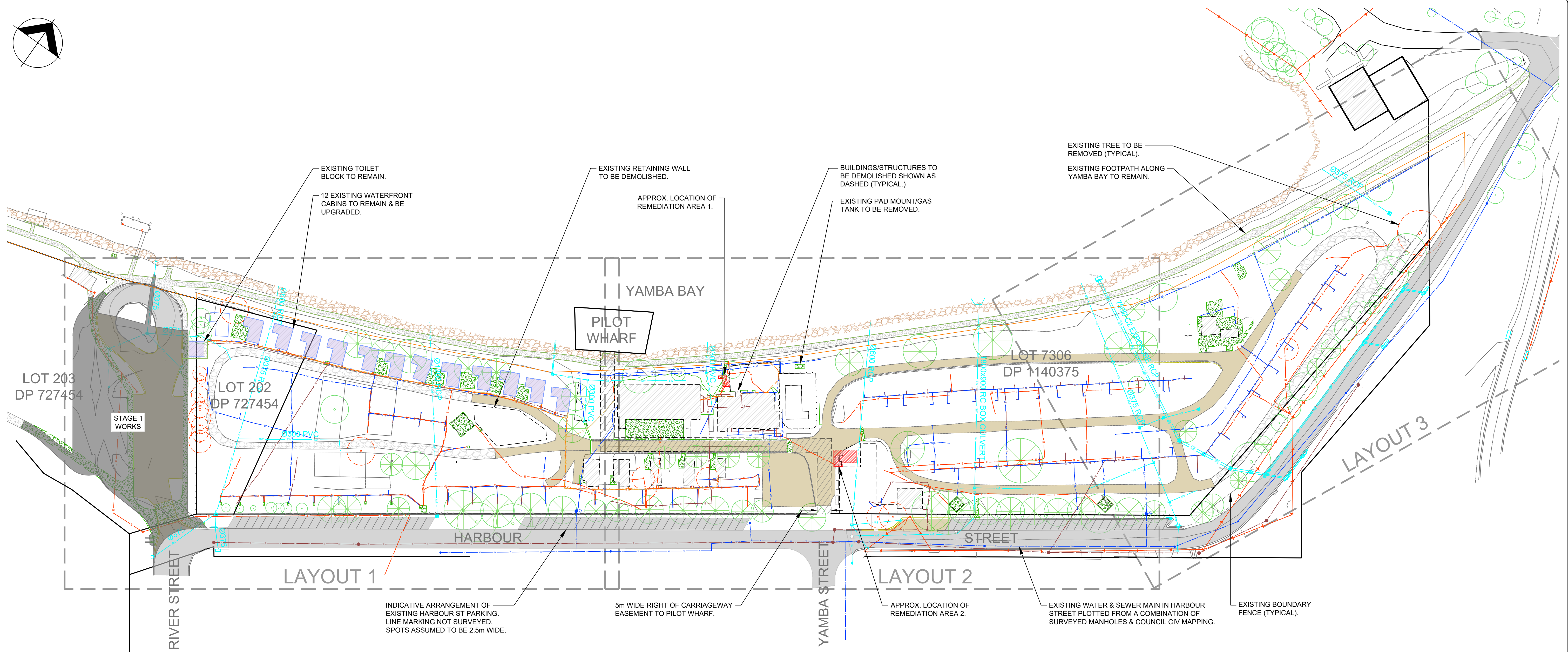
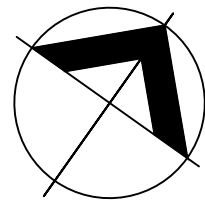
 **clarence**
VALLEY COUNCIL

ARDILL PAYNE
& P a r t n e r s
ENGINEERS PLANNERS SURVEYORS
ENVIRONMENTAL PROJECT MANAGEMENT

BALLINA 45 River Street Ph. 02 6686 3280
GUNNEDAH 285 Conadilly Street Ph. 02 6742 9955
A.B.N. 51 808 558 977 e-mail: info@ardillpayne.com.au

Drawing Schedule

Drawing	Sheet	Description
8847 -No. DA01	1 of 20	Stage 2 - Existing Site Layout Plan
8847 -No. DA02	2 of 20	Stage 2 - Road Layout Plan 1
8847 -No. DA03	3 of 20	Stage 2 - Road Layout Plan 2
8847 -No. DA04	4 of 20	Stage 2 - Road Layout Plan 3
8847 -No. DA05	5 of 20	Stage 2 - Road 1 Long Section
8847 -No. DA06	6 of 20	Stage 2 - Road 2, 3 & 4 Long Sections
8847 -No. DA07	7 of 20	Stage 2 - Road 5 Long Section & Typical Sections
8847 -No. DA08	8 of 20	Stage 2 - Road 7 Long Section
8847 -No. DA09	9 of 20	Stage 2 - Road 8 Long Section
8847 -No. DA10	10 of 20	Stage 2 - Road 9 & 10 Long Section
8847 -No. DA11	11 of 20	Stage 2 - Road 11 Long Section
8847 -No. DA12	12 of 20	Stage 2 - Stormwater Layout Plan 1
8847 -No. DA13	13 of 20	Stage 2 - Stormwater Layout Plan 2
8847 -No. DA14	14 of 20	Stage 2 - Stormwater Layout Plan 3
8847 -No. DA15	15 of 20	Stage 2 - Sewer Layout Plan 1
8847 -No. DA16	16 of 20	Stage 2 - Sewer Layout Plan 2
8847 -No. DA17	17 of 20	Stage 2 - Sewer Layout Plan 3
8847 -No. DA18	18 of 20	Stage 2 - Water & Gas Layout Plan 1
8847 -No. DA19	19 of 20	Stage 2 - Water & Gas Layout Plan 2
8847 -No. DA20	20 of 20	Stage 2 - Water & Gas Layout Plan 3



LEGEND

- EXISTING CONCRETE TO BE DEMOLISHED
- EXISTING PAVEMENT TO REMAIN
- EXISTING PAVEMENT/ACCESS ROAD TO BE DEMOLISHED
- EXISTING GRAVEL ACCESS ROAD TO BE DEMOLISHED
- EXISTING BUILDING TO REMAIN
- EXISTING FENCE TO BE DEMOLISHED
- SURVEYED SITE BOUNDARY
- EXISTING NORFOLK PINE
- EXISTING TREE
- EXISTING TREE TO BE REMOVED
- EXISTING STORMWATER PIPE
- EXISTING STORMWATER PIT
- EXISTING WATER SERVICE
- EXISTING SEWER SERVICE
- EXISTING UNDERGROUND POWER
- EXISTING OVERHEAD POWER
- EXISTING GAS SERVICE
- EXISTING COMMUNICATIONS

NOTES:

- INTERNAL SERVICES TO BE REMOVED AND REPLACED IN ACCORDANCE WITH SERVICE LAYOUT PLANS. ALL EX. COUNCIL STORMWATER MAINS & OUTLETS TO YAMBA BAY TO REMAIN.
- UNDERTAKE REMEDIATION OF FORMER UNDERGROUND PETROL STORAGE SYSTEMS (UPSS) AT AREAS 1 & 2 IN ACCORDANCE WITH REMEDIAL ACTION PLAN BY CAV/VANBA CONSULTING DATED JUNE 2013.

DRAFT

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Issue	Date	Description	App'd
03	06/02/20	Amended as per Council comments	APP
02	06/09/19	Issue for Council Comment	APP
01	13/08/19	Preliminary Issue	APP



Project: **Redevelopment of Calypso Holiday Park**

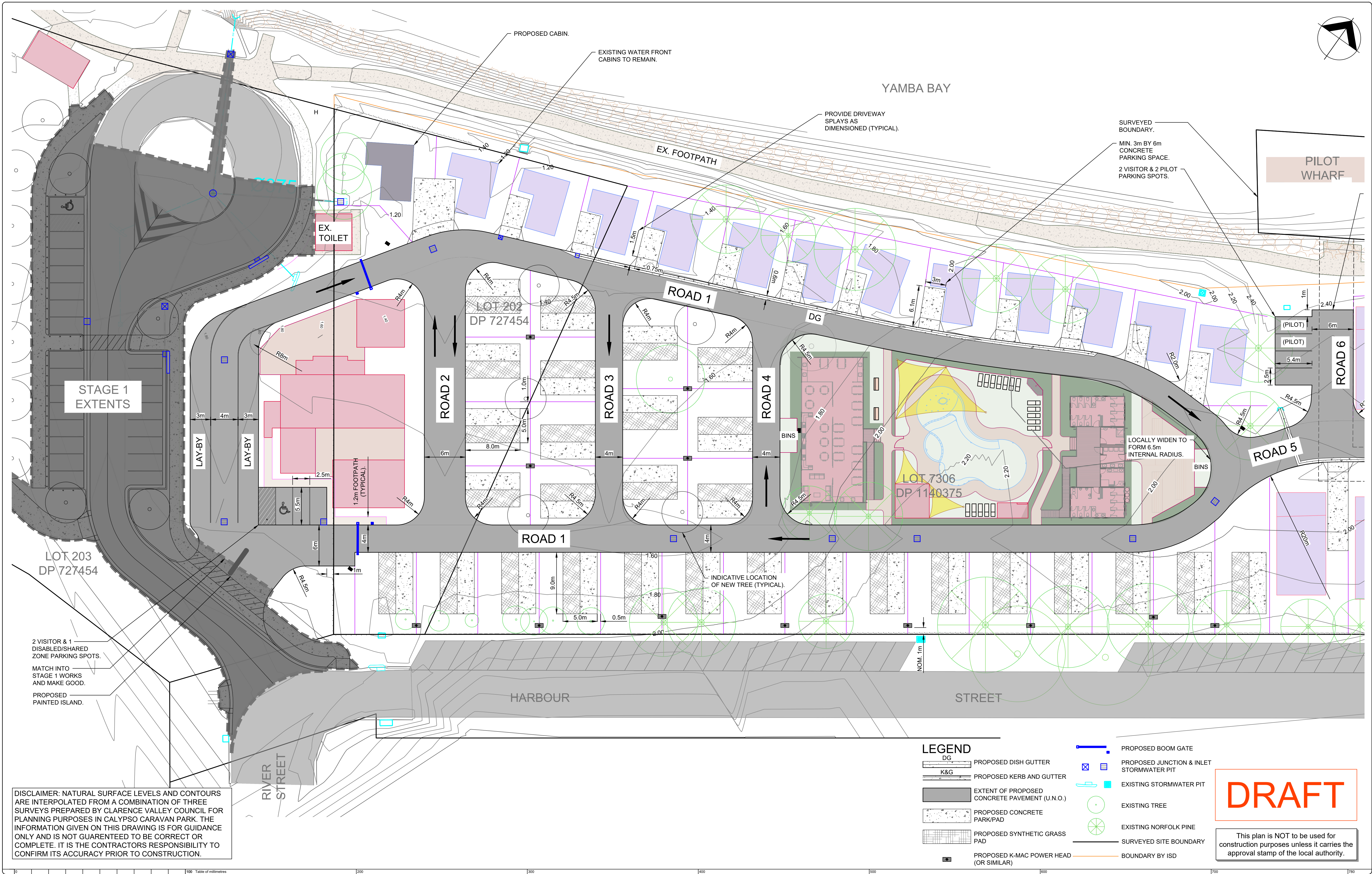
Title: **Stage 2 - Existing Site Layout Plan**

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ENVIRONMENTAL PROJECT MANAGEMENT
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GUNNEDAH 285 Conadilly Street Ph. 02 6742 9955
A.B.N. 51 808 558 977 e-mail: info@ardillpayne.com.au



Design	TB	Scale	1:700 @ A1, 1:1400 @ A3
Drawn	TB	Datum	AHD
Checked	TC	Drafting File	8847_Stage 2_Existing Site Layout.dwg
Approved	TC	Design File	8847_3D Model_APP Base
Date	15/07/19	Job No.	8847
Dwg No.	DA01	Issue	03



Issue	Date	Description	App'd
03	06/02/20	Amended as per Council comment	APP
02	06/09/19	Issued for Council Comment	APP
01	13/08/19	Preliminary Issue	APP

Client:

INTEGRATED Site Design

clarence VALLEY COUNCIL

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Project:

Redevelopment of Calypso Holiday Park

Title:

Stage 2 - Road Layout Plan 1

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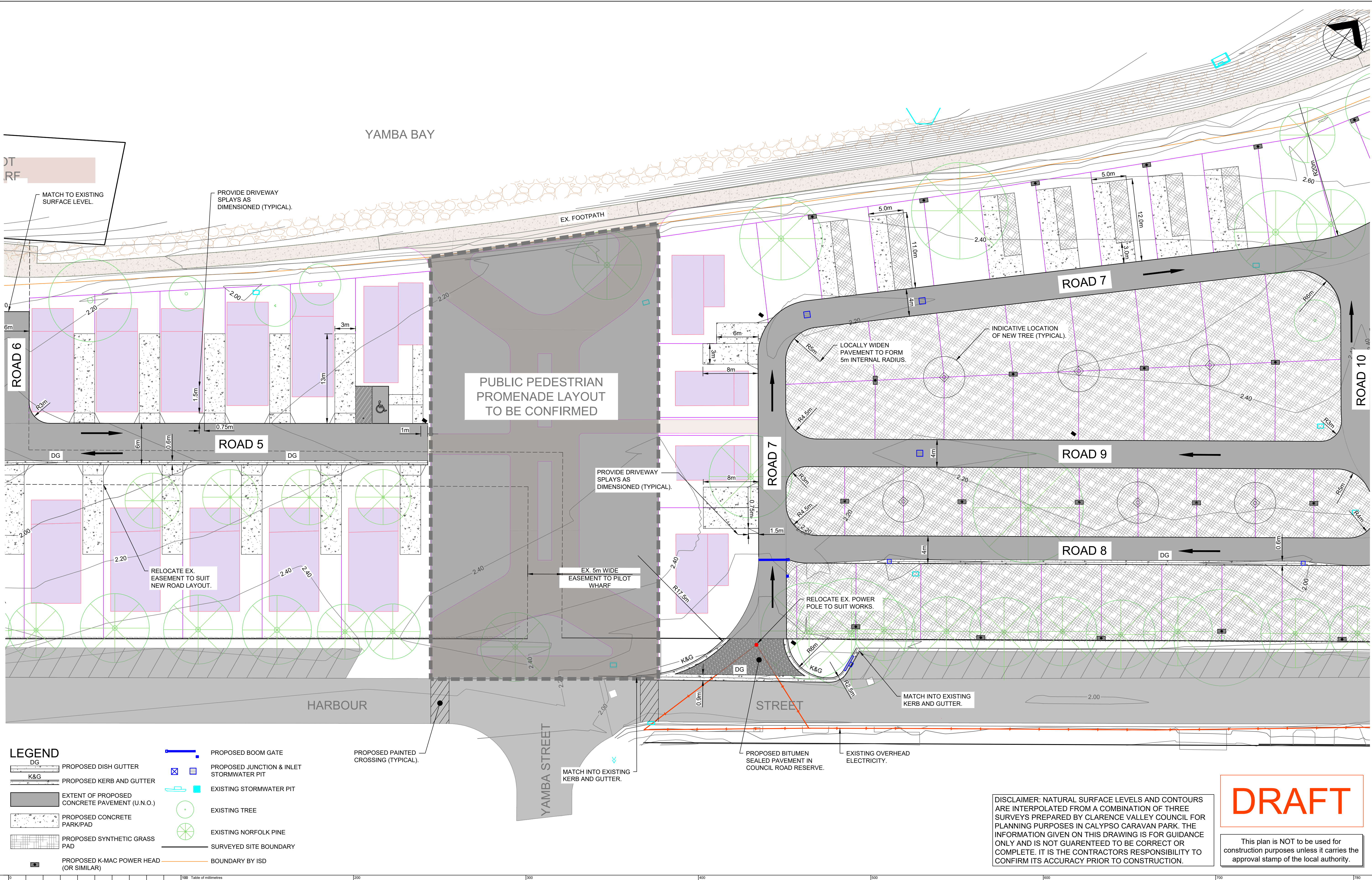
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A.B.N. 51 808 558 977 e-mail: info@ardillpayne.com.au

Design	TB	Scale	1:250 @ A1, 1:500 @ A3
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Checked	TC	Datum	AHD
Approved	TC	Drafting File	8847_Stage 2_Road Layout.dwg
Date	15/07/19	Design File	8847_3D Model_APP Base
Job No	8847	Dwg No.	DA02
		Issue	03



Issue	Date	Description	App'd
03	06/02/20	Amended as per Council comment	APP
02	06/09/19	Issued for Council Comment	APP
01	13/08/19	Preliminary Issue	APP

Client:

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Project:

Redevelopment of Calypso Holiday Park

Title:

Stage 2 - Road Layout Plan 2

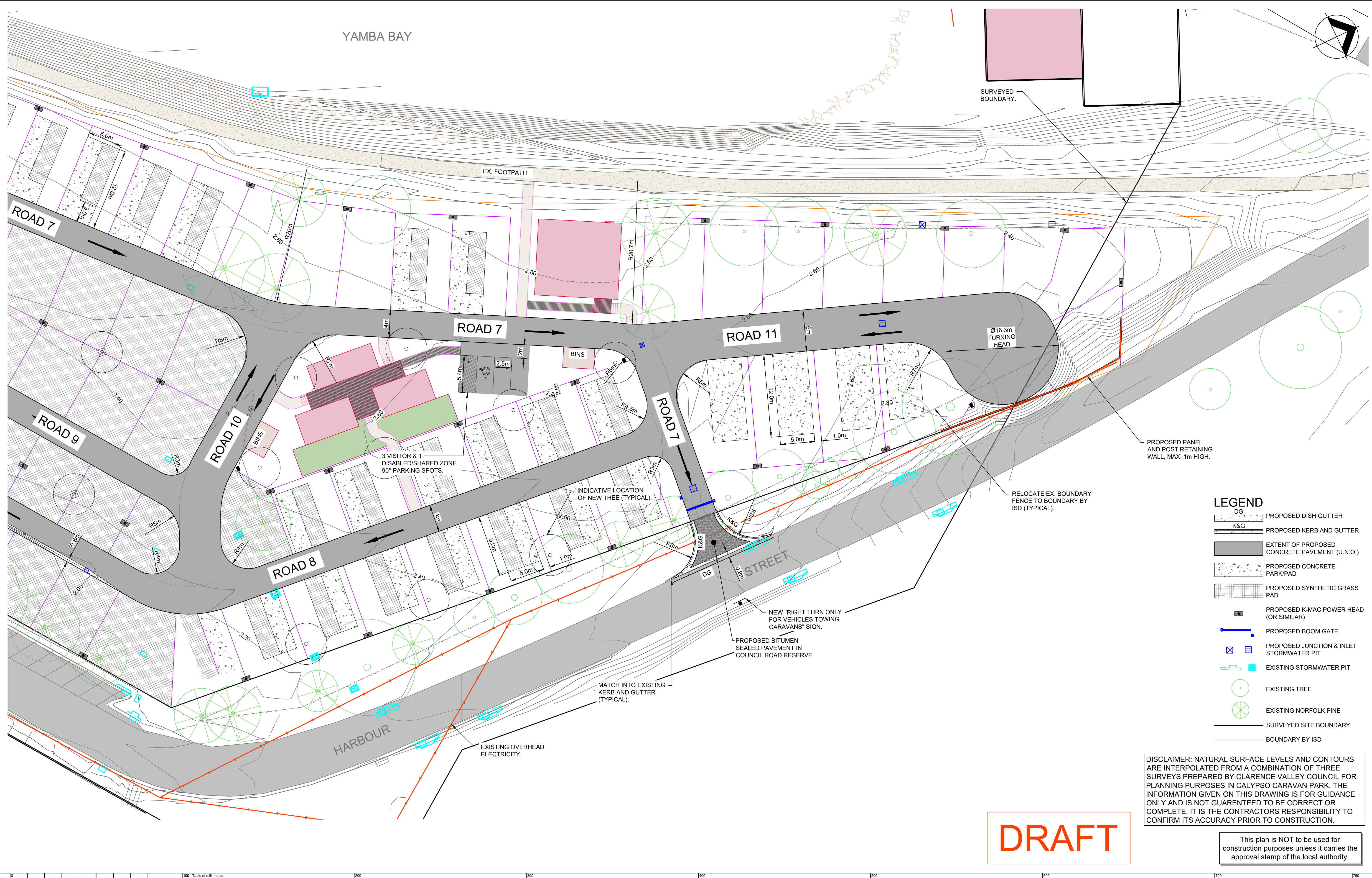
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Design	TB	Scale	1:250 @ A1, 1:500 @ A3
Drawn	TB	0	2.5 5 7.5 10 12.5
Checked	TC	Datum	AHD
Approved	TC	Drafting File	8847_Stage 2_Road Layout.dwg
Date	15/07/19	Design File	8847_3D Model_APP Base
Job No	8847	Dwg No.	DA03
		Issue	03



Issue	Date	Description	App'd
03	28/10/19	Amended as per Council Comment	APP
02	06/09/19	Issued for Council Comment	APP
01	13/08/19	Preliminary Issue	APP

Client:

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clarence
VALLEY COUNCIL

Project:

**Redevelopment of
Calypso Holiday Park**

Title:

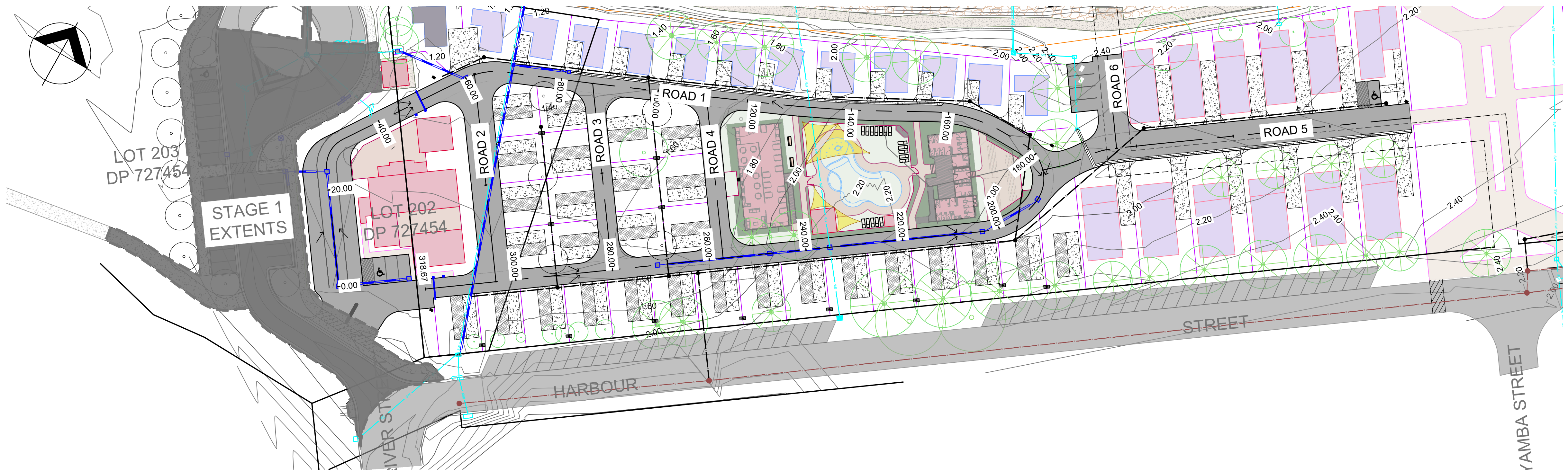
**Stage 2 - Road
Layout Plan 3**

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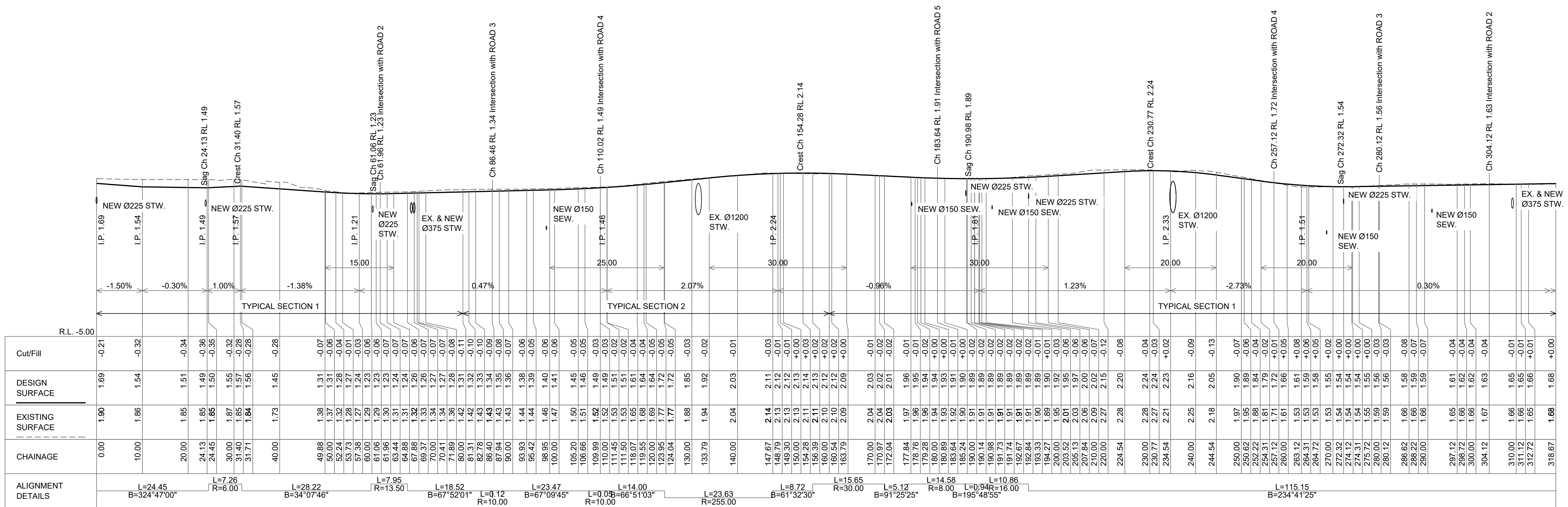
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Design	TB	Scale	1:250 @ A1, 1:500 @ A3
Drawn	TB	0	2.5 5 7.5 10 12.5
Checked	TC	Datum	AHD
Approved	TC	Drafting File	8847_Stage 2_Road Layout.dwg
Date	15/07/19	Design File	8847_3D Model_APP Base
Job No.	8847	Dwg No.	DA04
Issue			03



PLAN
SCALE 1:500



ROAD 1 CH 0.000 TO CH 320.280

SCALES: HORIZONTAL 1:500 VERTICAL 1:100

NOTE: REFER TO PLAN DA07 FOR TYPICAL CROSS SECTIONS.

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Issue	Date	Description	App'd
03	06/02/20	Amended as per Council comment	APP
02	06/09/19	Issued for Council Comment	APP
01	13/08/19	Preliminary Issue	APP



Client: Integrated Site Design
Redevelopment of Calypso Holiday Park

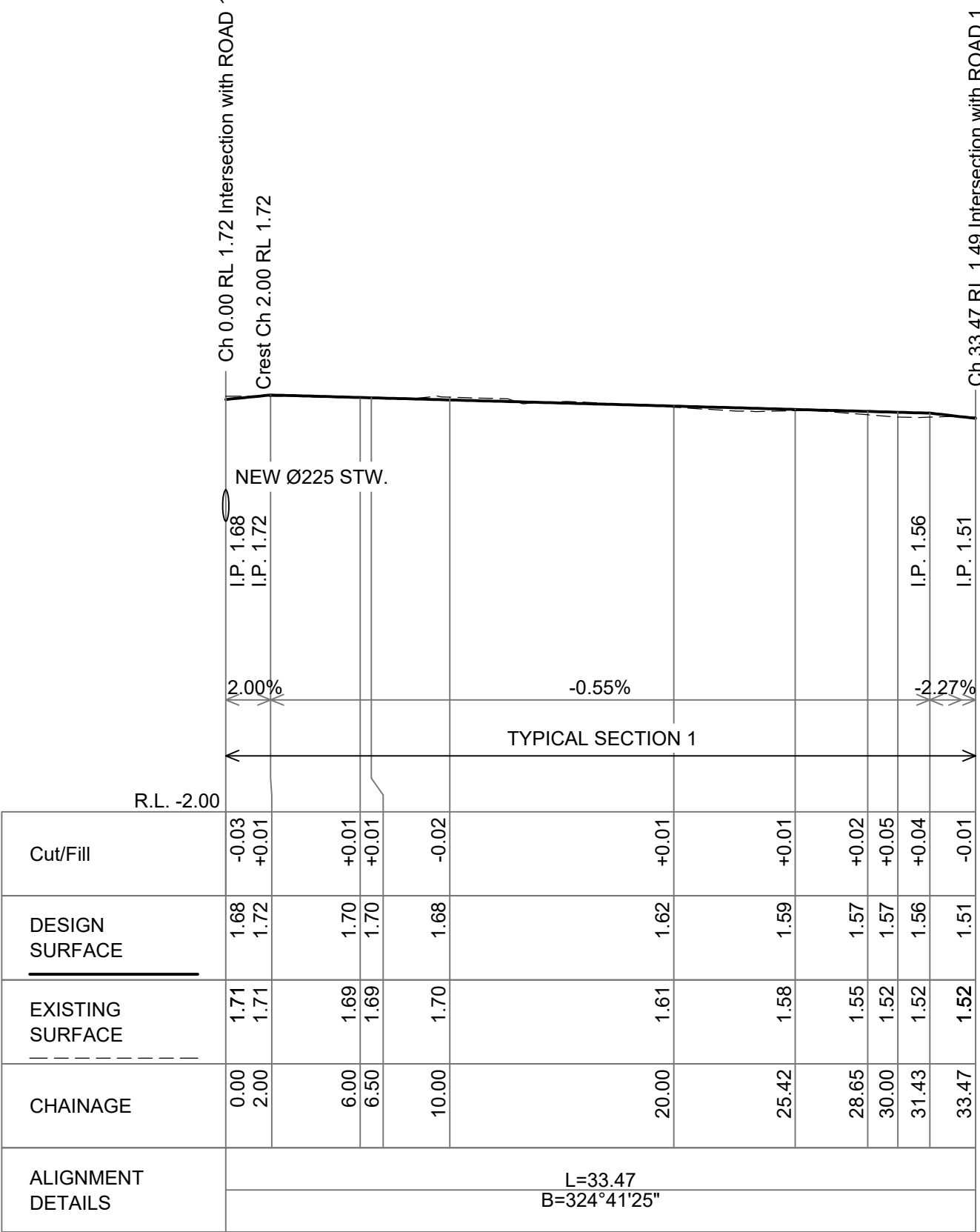
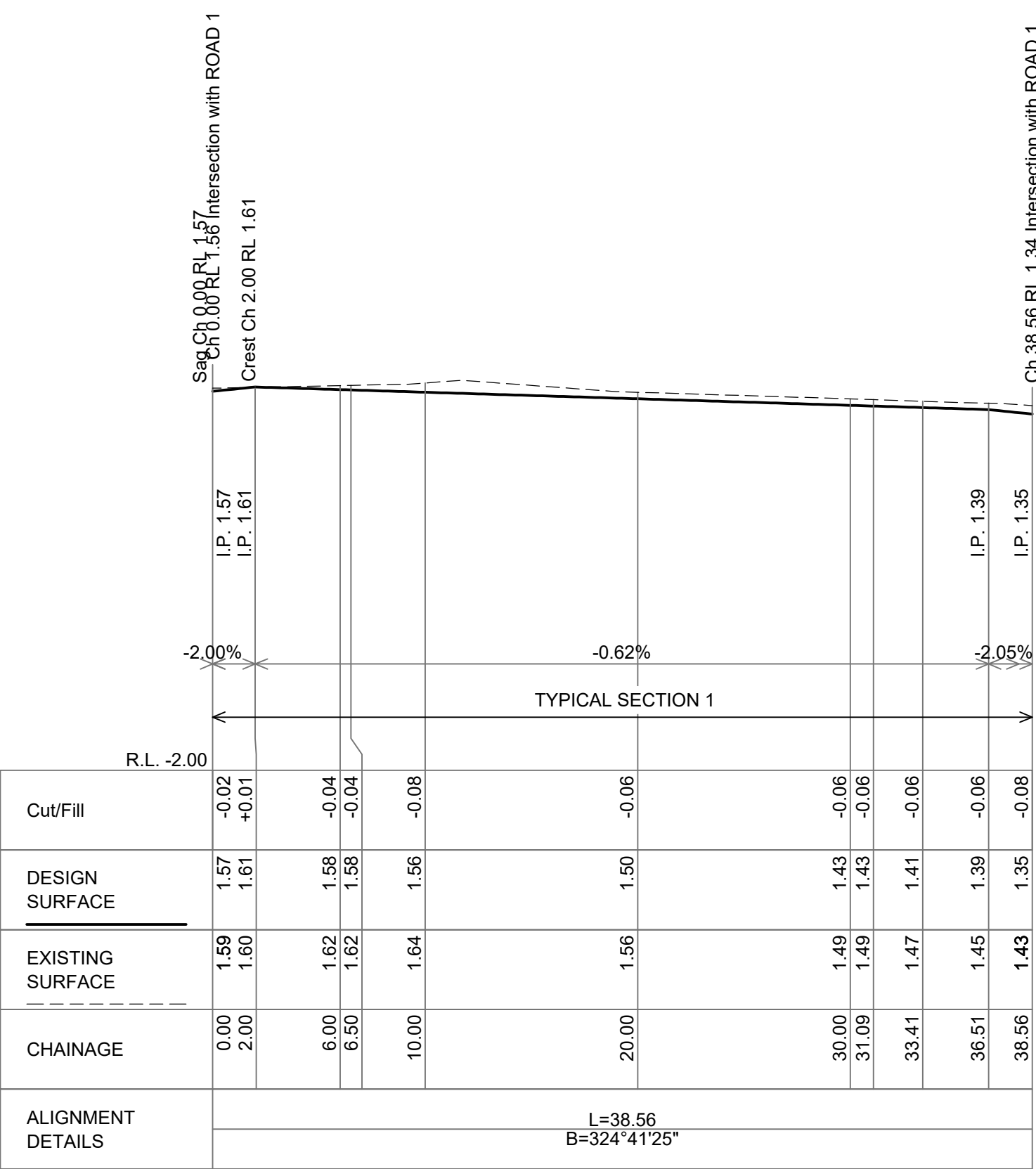
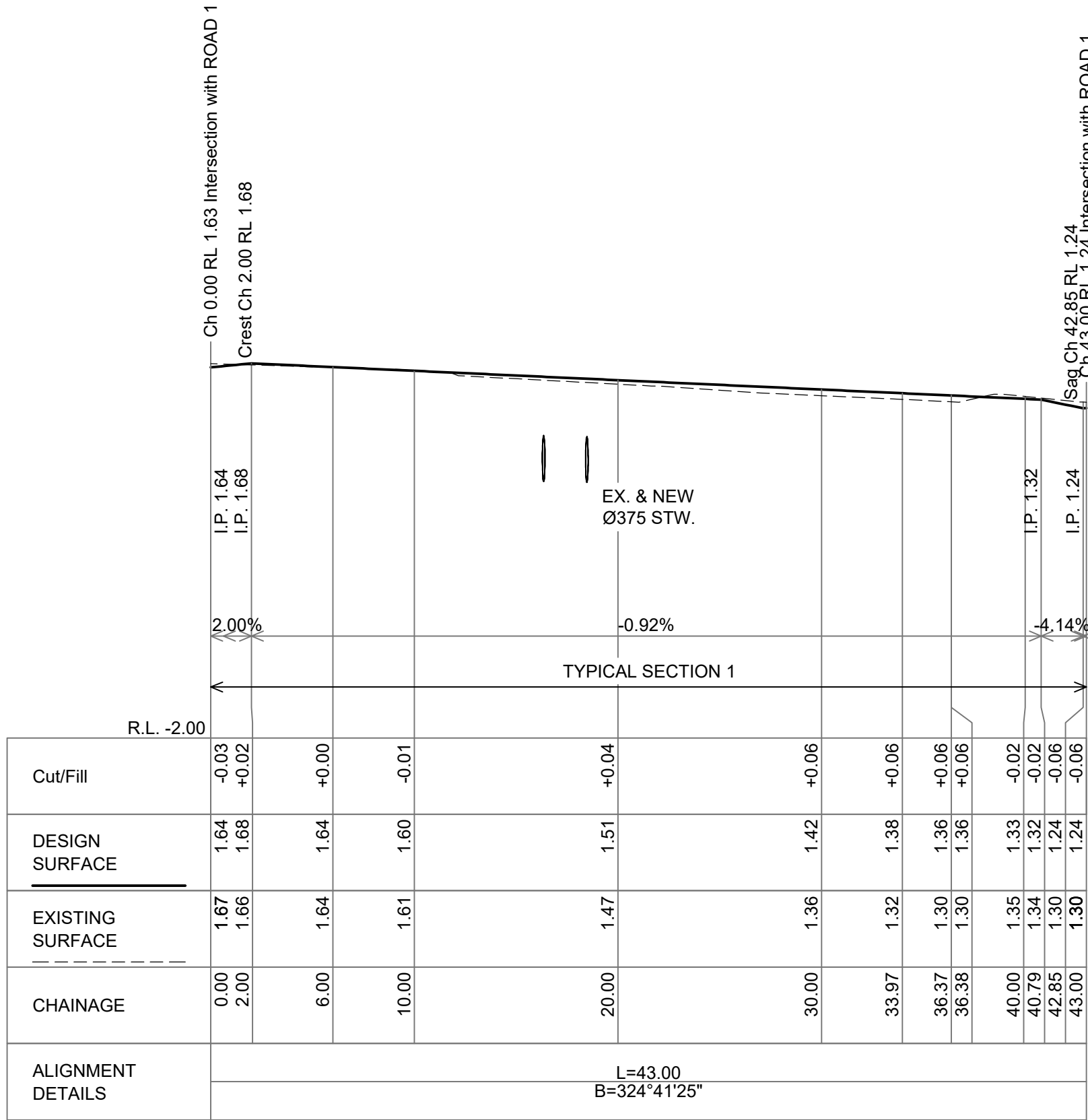
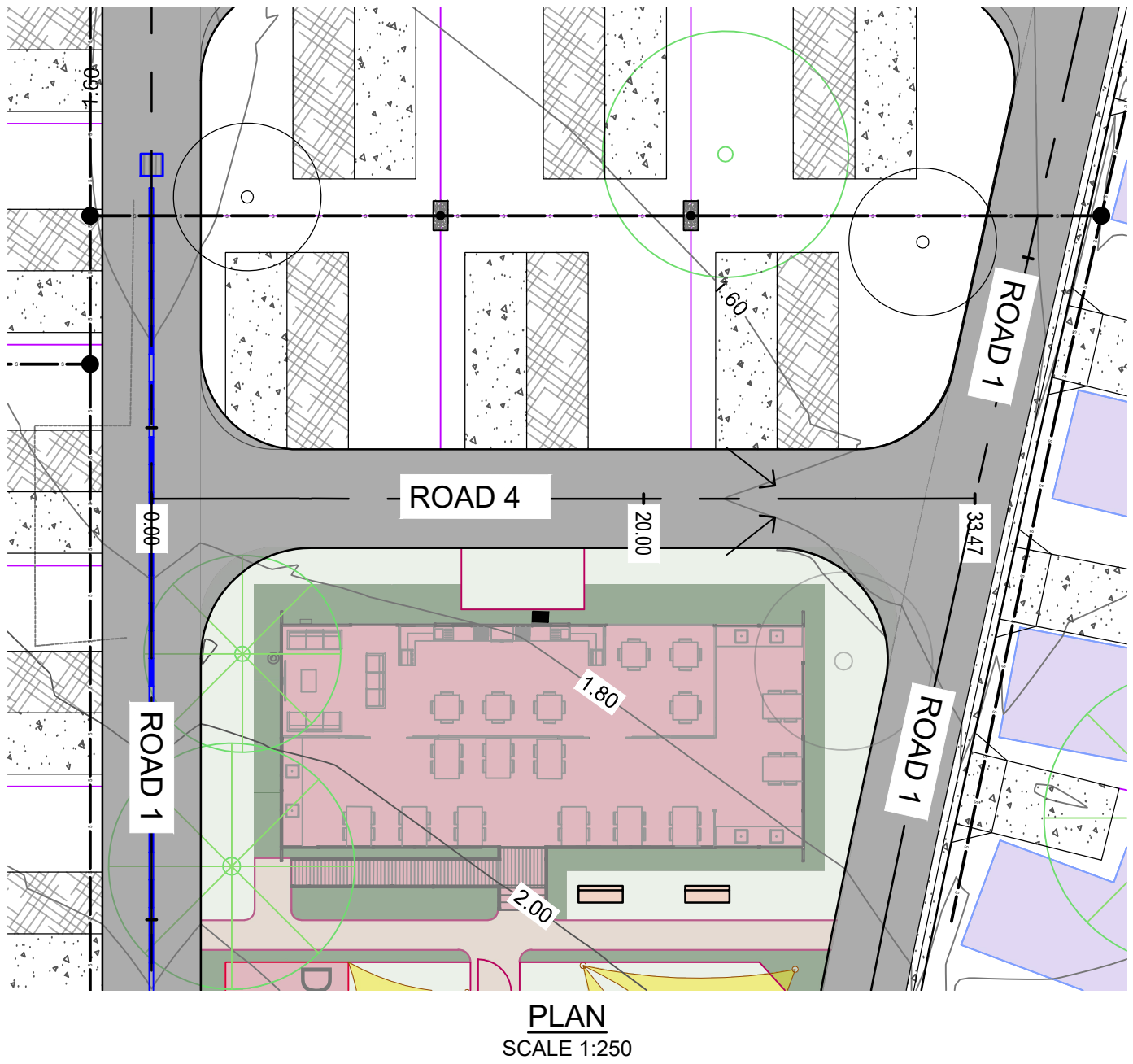
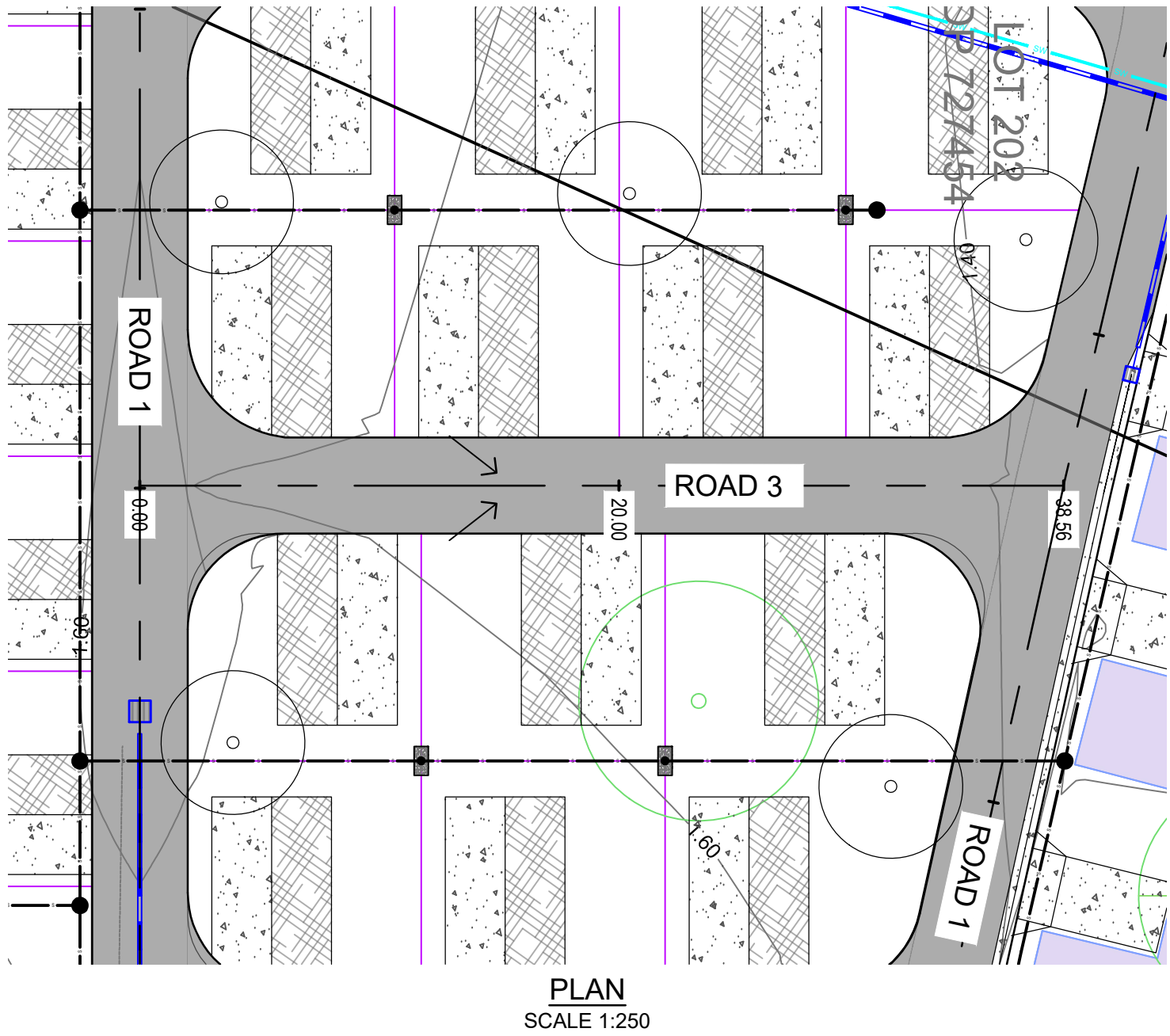
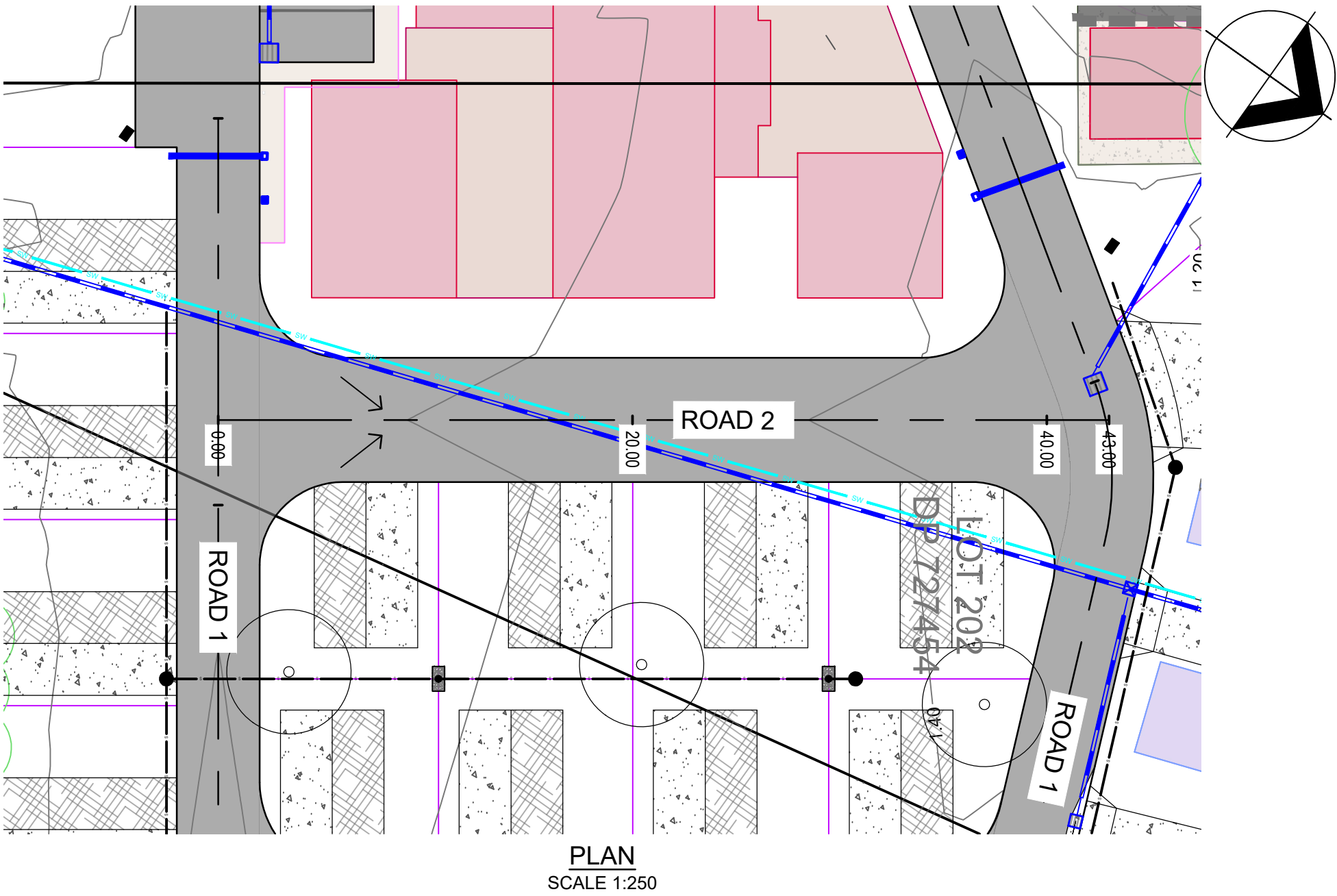
Title: Stage 2 - Road 1 Long Section

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Design	TB	Scale	Various - refer plan
Drawn	TB	Datum	AHD
Checked	TC	Drafting File	8847_Stage 2_Road Longsection.dwg
Approved	TC	Design File	8847_3D_Model_APP Base
Date	15/07/19	Job No.	8847
Dwg No.	DA05	Issue	03



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Issue	Date	Description	App'd
03	06/02/20	Amended as per Council comment	APP
02	06/09/19	Issued for Council Comment	APP
01	13/08/19	Preliminary Issue	APP

Client:

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Project:

Redevelopment of Calypso Holiday Park

Title:

Stage 2 - Road 2,3 & 4 Long Sections

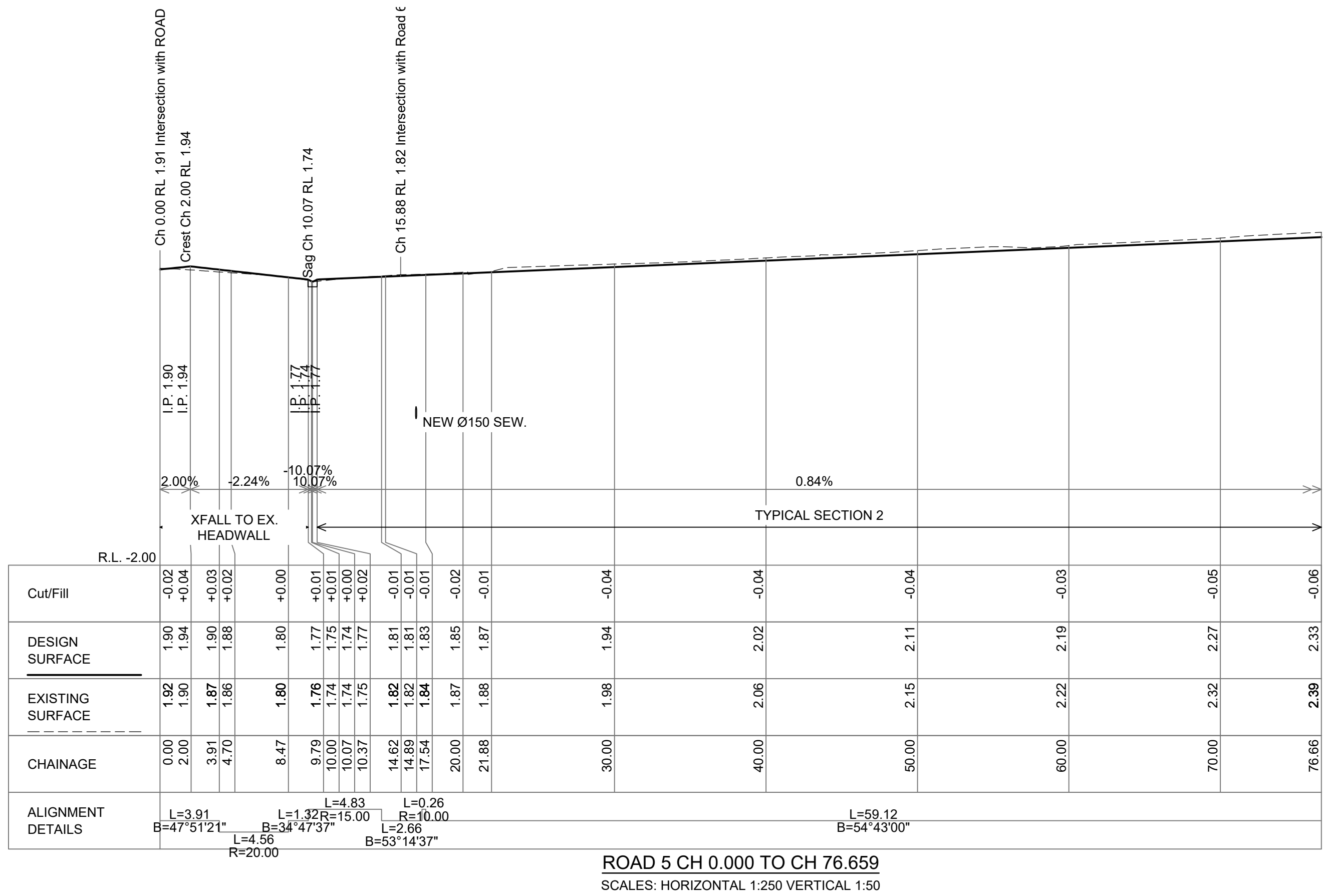
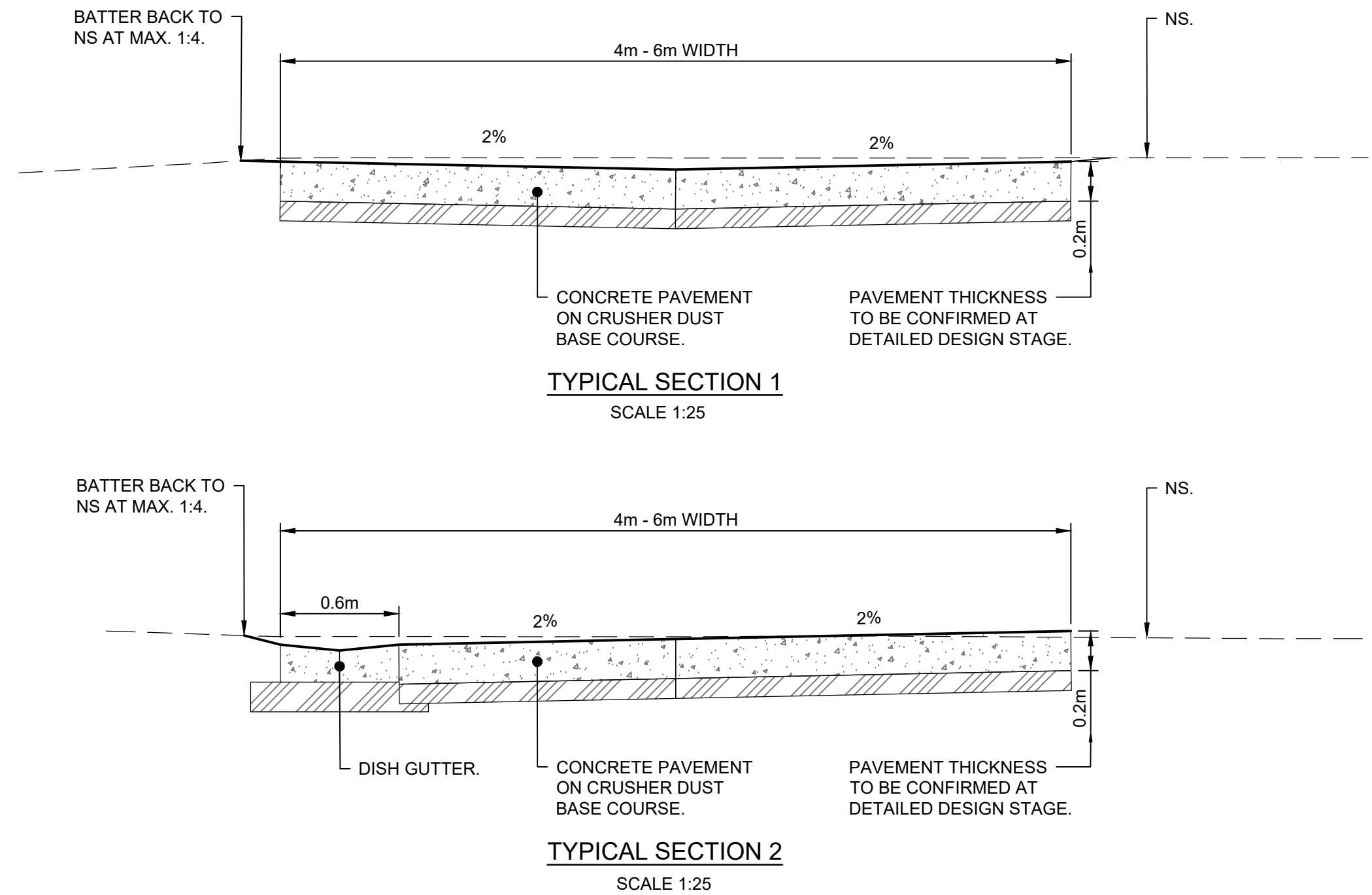
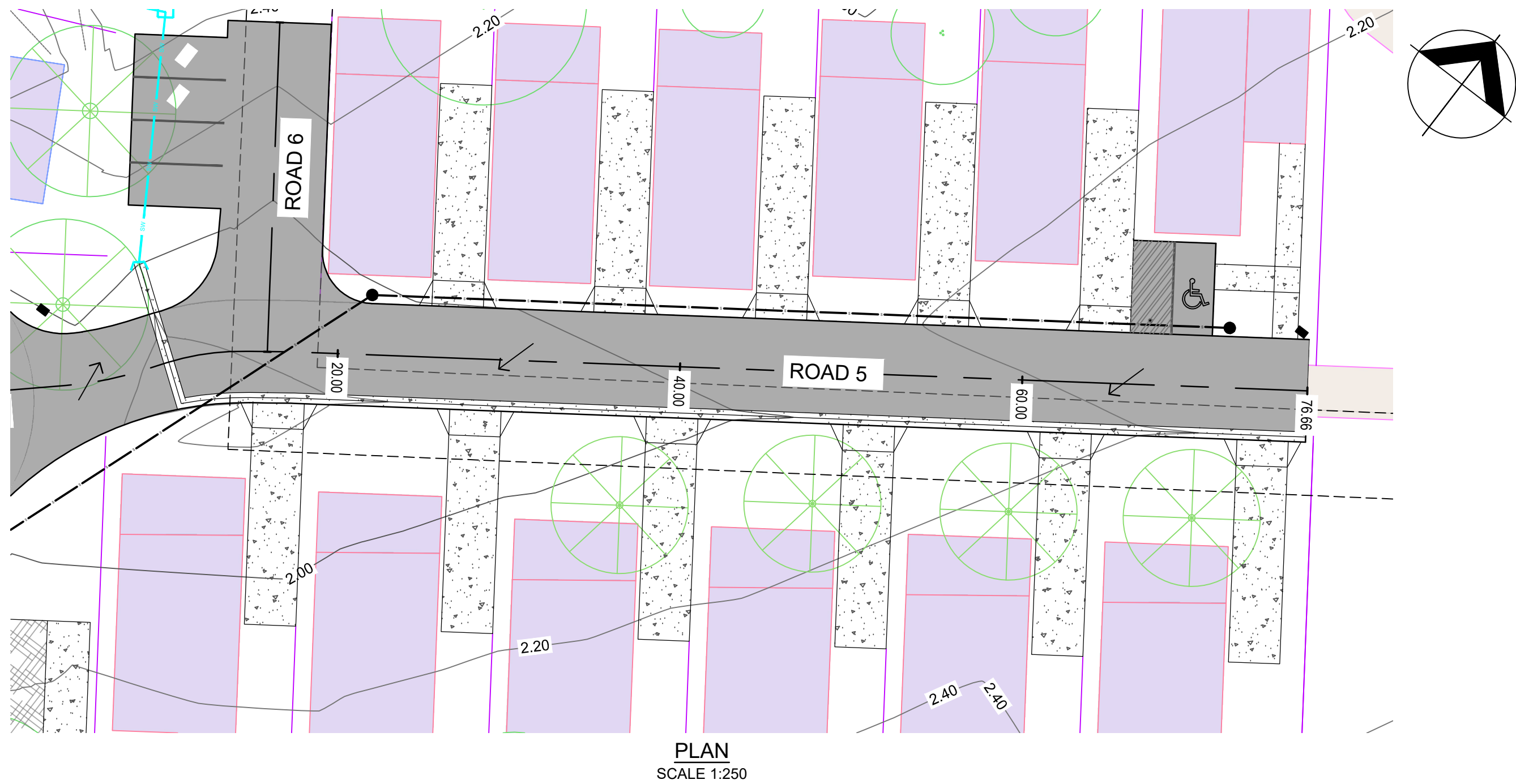
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Design	TB	Scale	Various - refer plan
Drawn	TB	Datum	AHD
Checked	TC	Drafting File	8847_Stage 2_Road Longsection.dwg
Approved	TC	Design File	8847_3D_Model_APP_Base
Date	15/07/19	Dwg No.	DA06
Job No.	8847	Issue	03



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Issue	Date	Description	App'd
03	06/02/20	Amended as per Council comment	APP
02	06/09/19	Issued for Council Comment	APP
01	13/08/19	Preliminary Issue	APP

Client:

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Project:

Redevelopment of
Calypso Holiday Park

Title:

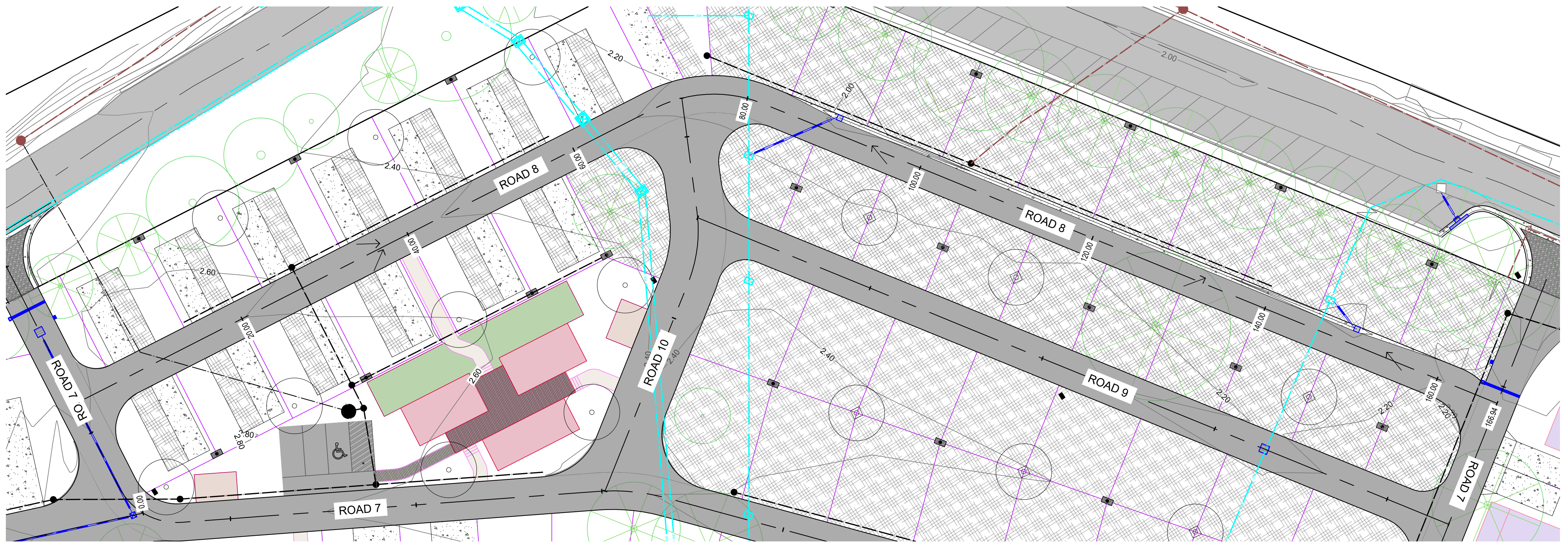
Stage 2 - Road 5
Long Section &
Typical Sections

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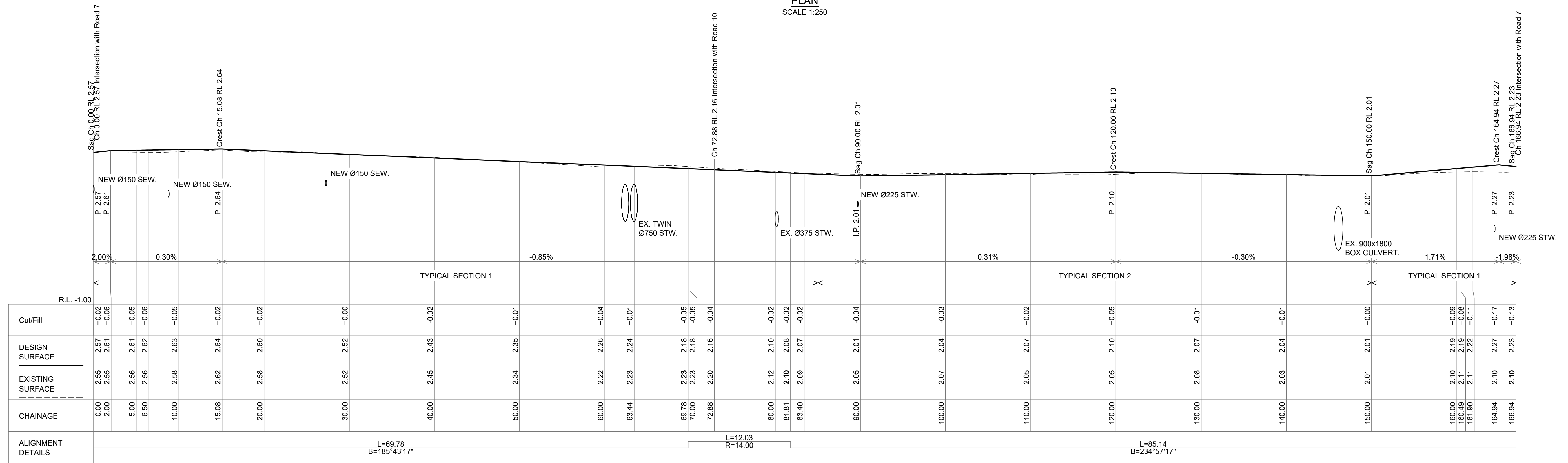
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Design	TB	Scale	Various - refer plan
Drawn	TB	Datum	AHD
Checked	TC	Drafting File	8847_Stage 2_Road Longsection.dwg
Approved	TC	Design File	8847_3D_Model_APP Base
Date	15/07/19	Job No.	8847
Dwg No.	DA07	Issue	03



PLAN
SCALE 1:250



ROAD 8 CH 0.000 TO CH 166.944

SCALES: HORIZONTAL 1:250 VERTICAL 1:50
NOTE: REFER TO PLAN DA07 FOR TYPICAL CROSS SECTIONS.

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Issue	Date	Description	App'd
03	06/02/20	Amended as per Council comment	APP
02	06/09/19	Issued for Council Comment	APP
01	13/08/19	Preliminary Issue	APP

Client:

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Project:

Redevelopment of
Calypso Holiday Park

Title:

Stage 2 - Road 8
Long Section

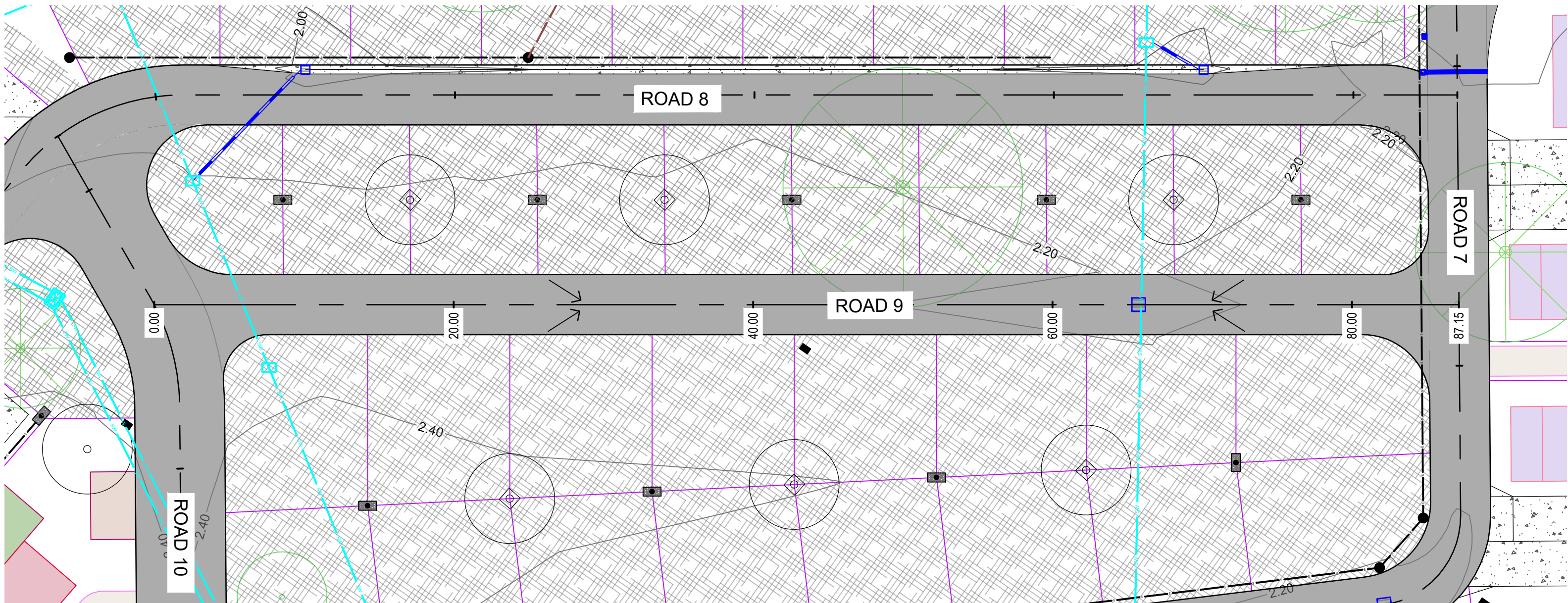
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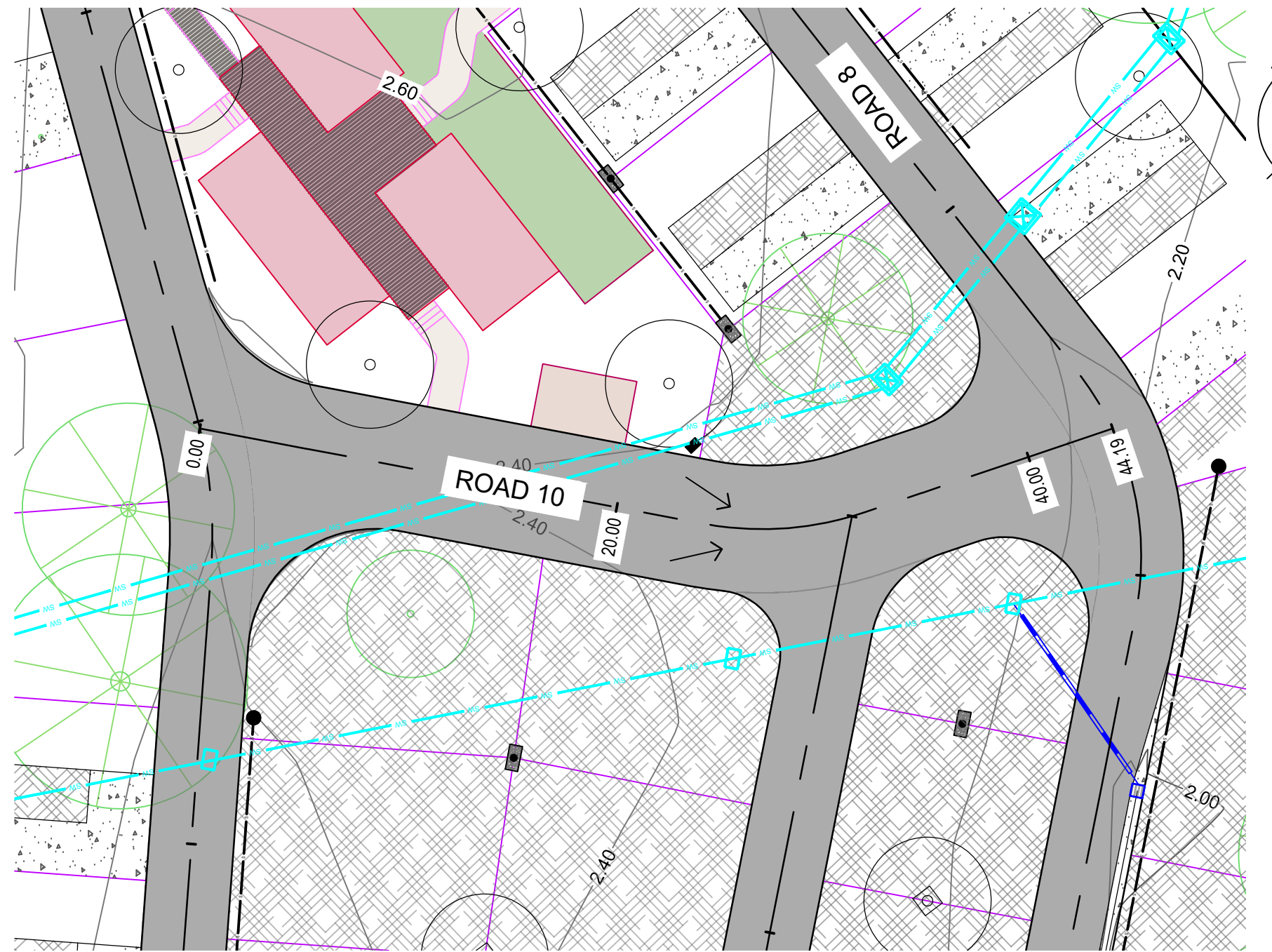
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A.B.N. 51 808 558 977 e-mail: info@ardillpayne.com.au



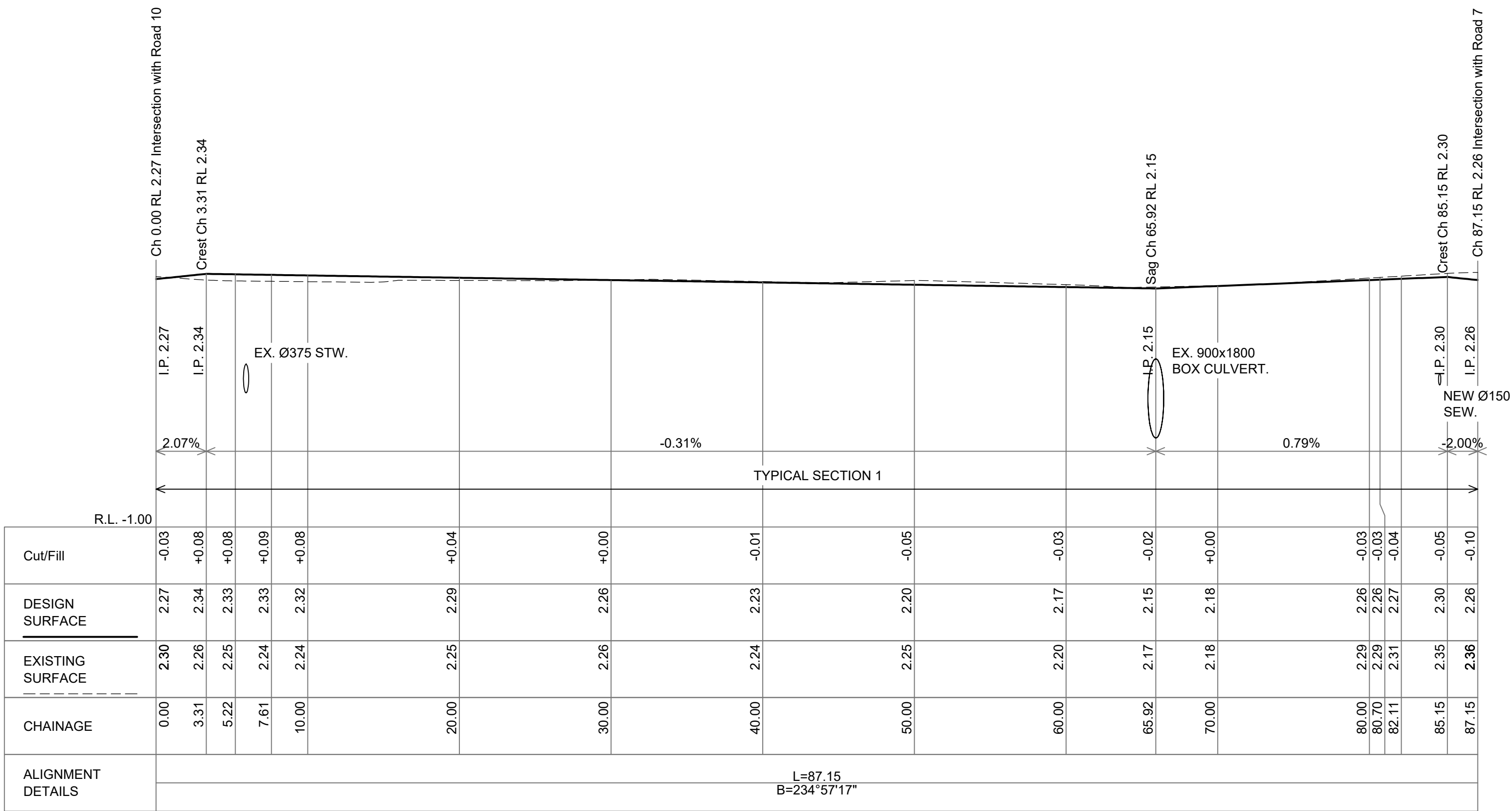
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Approved	TC	Design File	8847_3D Model_APP Base
Date	15/07/19	Dwg No.	DA09
Job No	8847	Issue	03



PLAN
SCALE 1:250

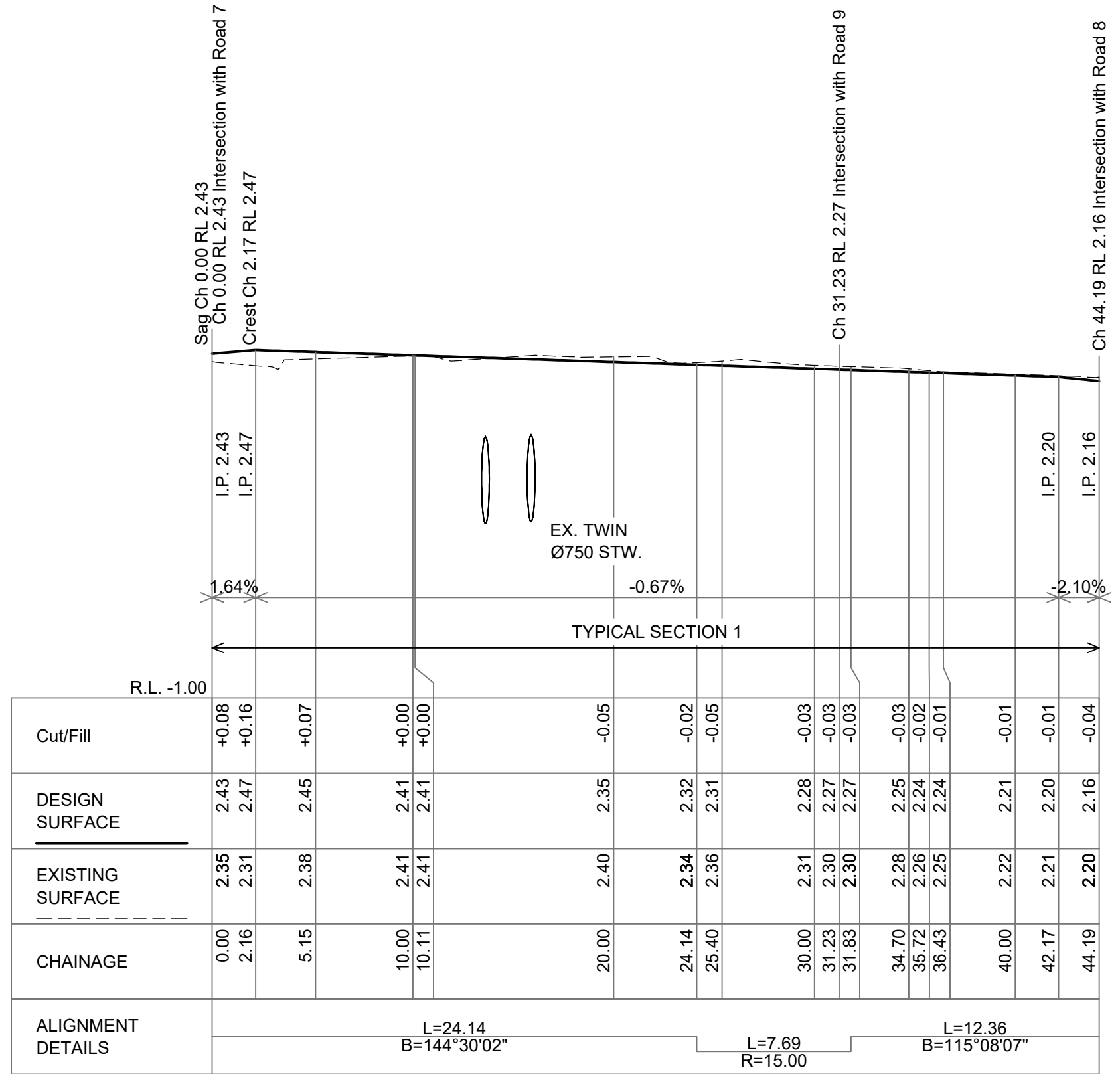


PLAN
SCALE 1:250



ROAD 9 CH 0.000 TO CH 87.147

Scale: Horizontal 1:250 Vertical 1:50
Note: Refer to Plan DA07 for typical cross sections.



ROAD 10 CH 0.000 TO CH 44.187

Scale: Horizontal 1:250 Vertical 1:50
Note: Refer to Plan DA07 for typical cross sections.

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Issue	Date	Description	App'd
03	06/02/20	Amended as per Council comment	APP
02	06/09/19	Issued for Council Comment	APP
01	13/08/19	Preliminary Issue	APP



Project:

Redevelopment of
Calypso Holiday Park

Title:

Stage 2 - Road 9 &
10 Long Sections

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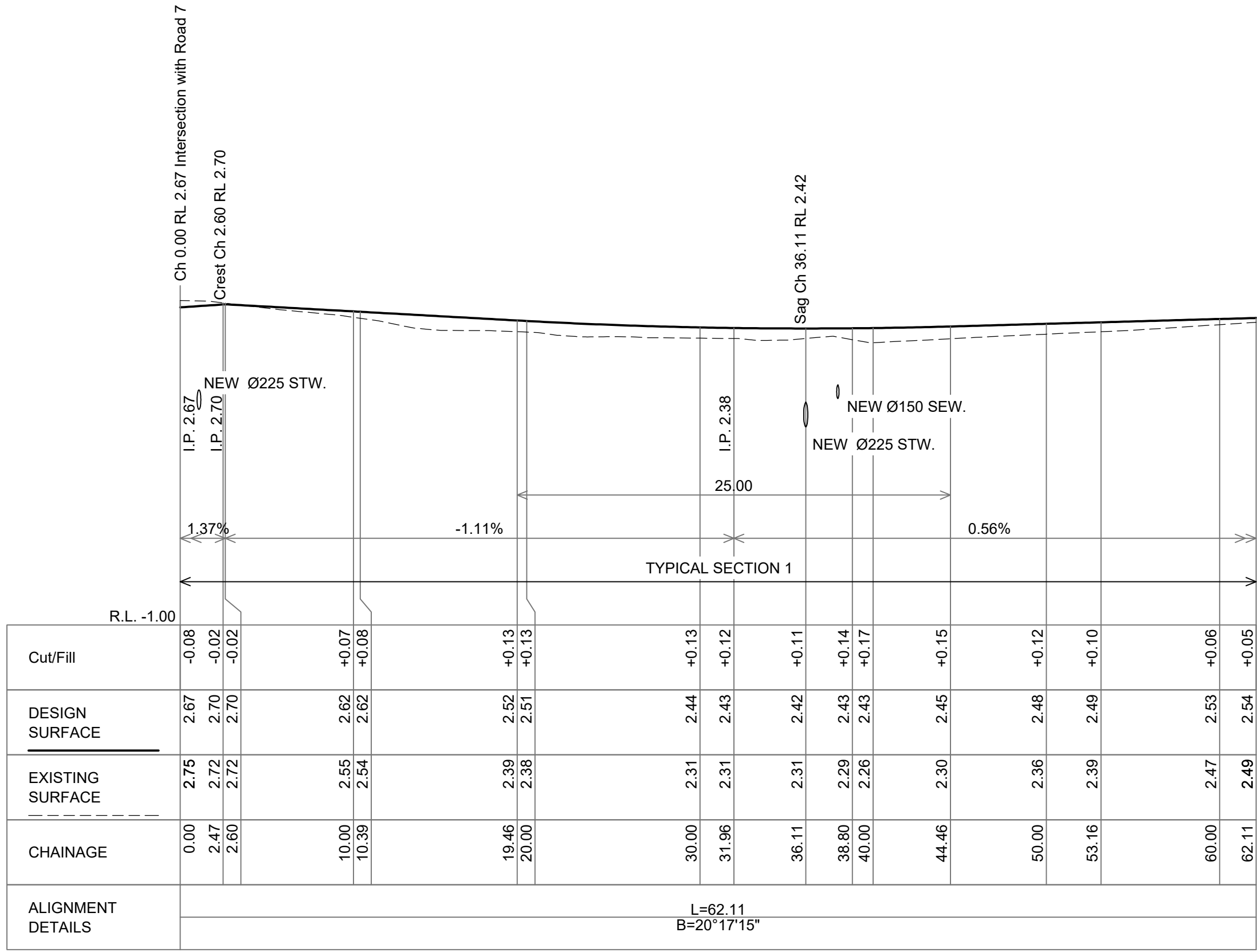
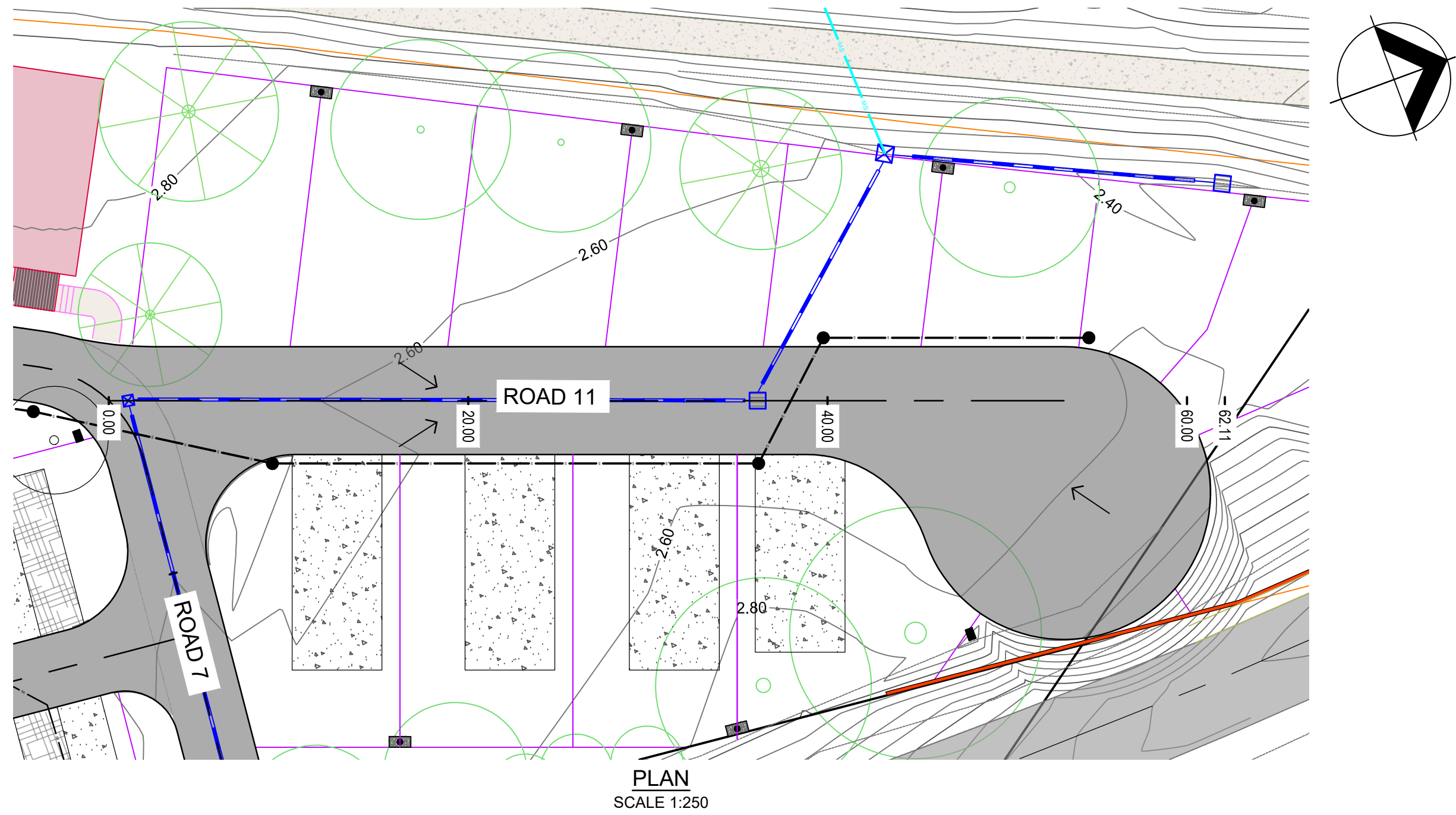
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Design	TB	Scale	Various - refer plan
Drawn	TB	Datum	AHD
Checked	TC	Drafting File	8847_Stage 2_Road Longsection.dwg
Approved	TC	Design File	8847_3D Model_APP Base
Date	15/07/19	Job No.	8847
Dwg No.	DA10	Issue	03



ROAD 11 CH 0.000 TO CH 62.105
SCALES: HORIZONTAL 1:250 VERTICAL 1:50
NOTE: REFER TO PLAN DA07 FOR TYPICAL CROSS SECTIONS.

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Issue	Date	Description	App'd
03	06/02/20	Amended as per Council comment	APP
02	06/09/19	Issued for Council Comment	APP
01	13/08/19	Preliminary Issue	APP

Client:

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Site Design
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clarence
VALLEY COUNCIL

Project:

Redevelopment of
Calypso Holiday Park

Title:

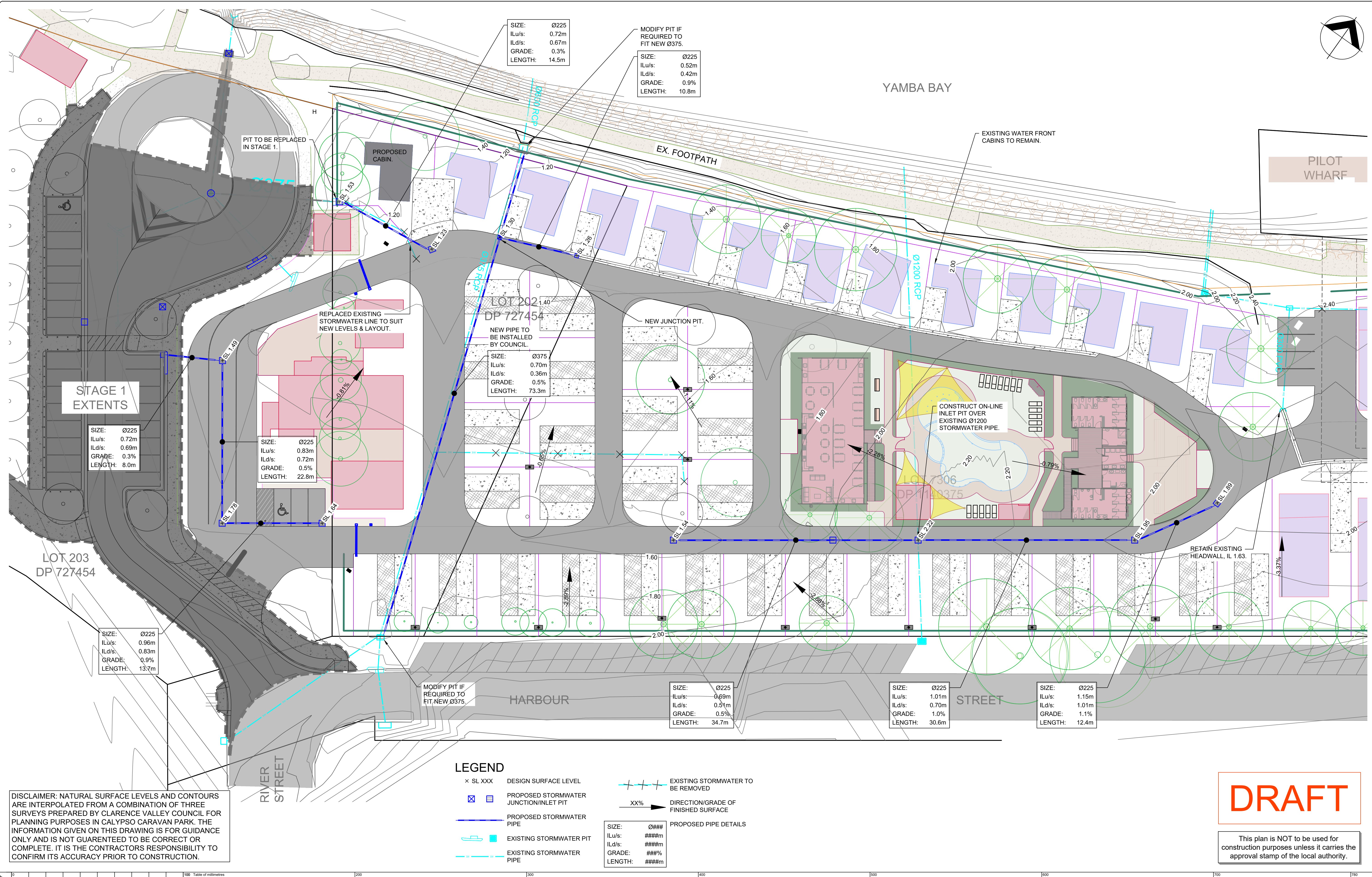
Stage 2 - Road 11
Long Section

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Design	TB	Scale	Various - refer plan
Drawn	TB	Datum	AHD
Checked	TC	Drafting File	8847_Stage 2_Road Longsection.dwg
Approved	TC	Design File	8847_3D Model_APP Base
Date	15/07/19	Job No.	8847
Dwg No.	DA11	Issue	03



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LEGEND

- × SL XXX DESIGN SURFACE LEVEL
- ☒ PROPOSED STORMWATER JUNCTION/INLET PIT
- PROPOSED STORMWATER PIPE
- EXISTING STORMWATER PIT
- EXISTING STORMWATER PIPE
- EXISTING STORMWATER TO BE REMOVED
- XX% → DIRECTION/GRADE OF FINISHED SURFACE
- PROPOSED PIPE DETAILS
 - SIZE: Ø###
 - ILu/s: #####m
 - ILD/s: #####m
 - GRADE: #####
 - LENGTH: #####m

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Issue	Date	Description	App'd
03	06/02/20	Amended as per Council comment	APP
02	06/09/19	Issued for Council Comment	APP
01	13/08/19	Preliminary Issue	APP



Client: **Redevelopment of Calypso Holiday Park**

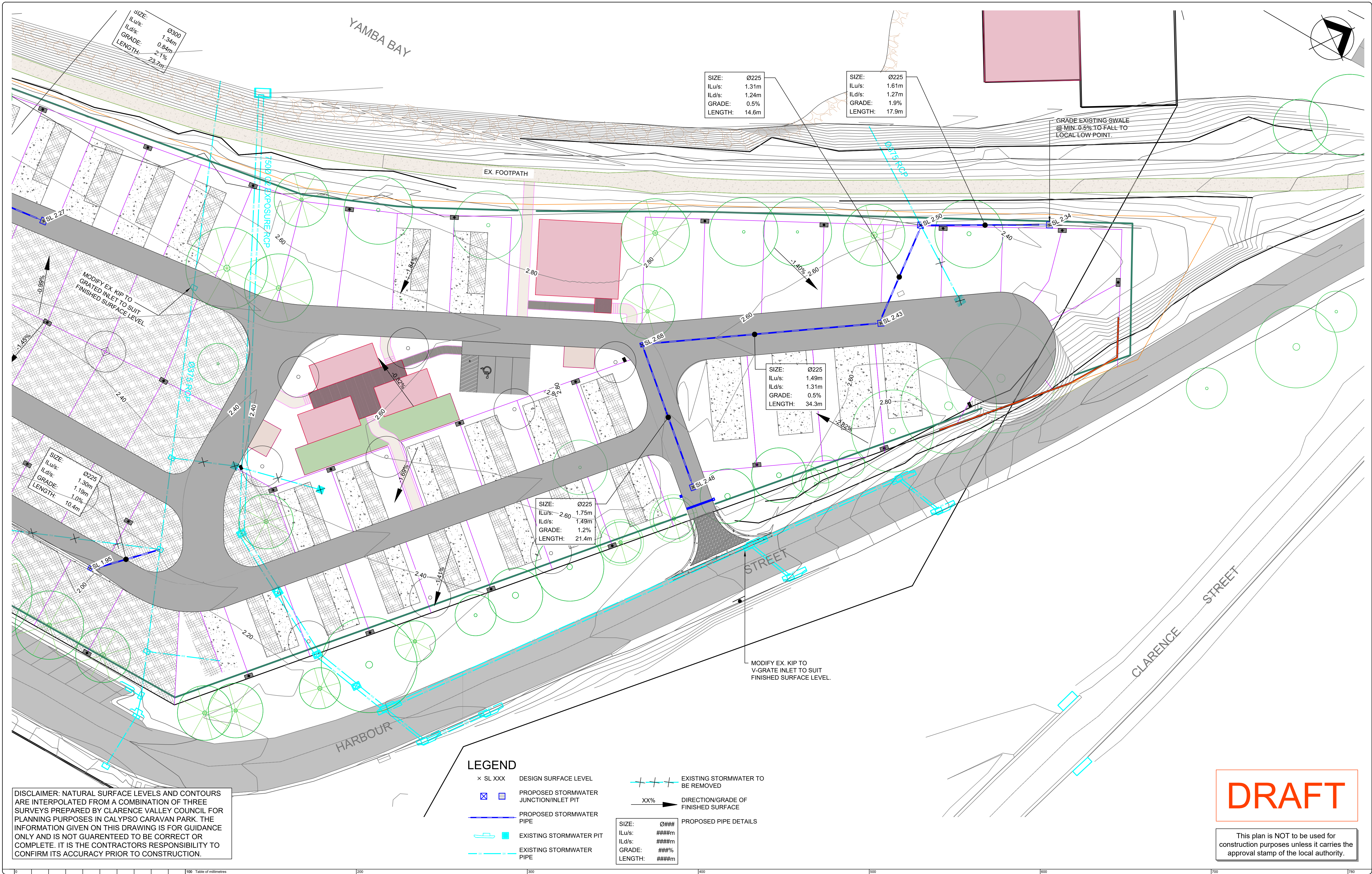
Title: **Stage 2 - Stormwater Layout Plan 1**

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A.B.N. 51 808 558 977 e-mail: info@ardillpayne.com.au



Design	TB	Scale	1:250 @ A1, 1:500 @ A3
Drawn	TB		
Checked	TC	Datum	AHD
Approved	TC	Drafting File	8847_Stage 2_Stormwater Layout Plan.dwg
Date	15/07/19	Design File	8847_3D_Model_APP Base
Job No	8847	Dwg No.	DA12
		Issue	03



Issue	Date	Description	App'd
03	06/02/20	Amended as per Council comment	APP
02	06/09/19	Issued for Council Comment	APP
01	13/08/19	Preliminary Issue	APP

Client:

INTEGRATED
Site Design
PLANNING • DESIGN • MARKETING • MANAGEMENT

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Project:

Redevelopment of Calypso Holiday Park

Title:

Stage 2 - Stormwater Layout Plan 3

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ENVIRONMENTAL PROJECT MANAGEMENT

BALLINA

45 River Street

Ph. 02 6686 3280

GUNNEDAH

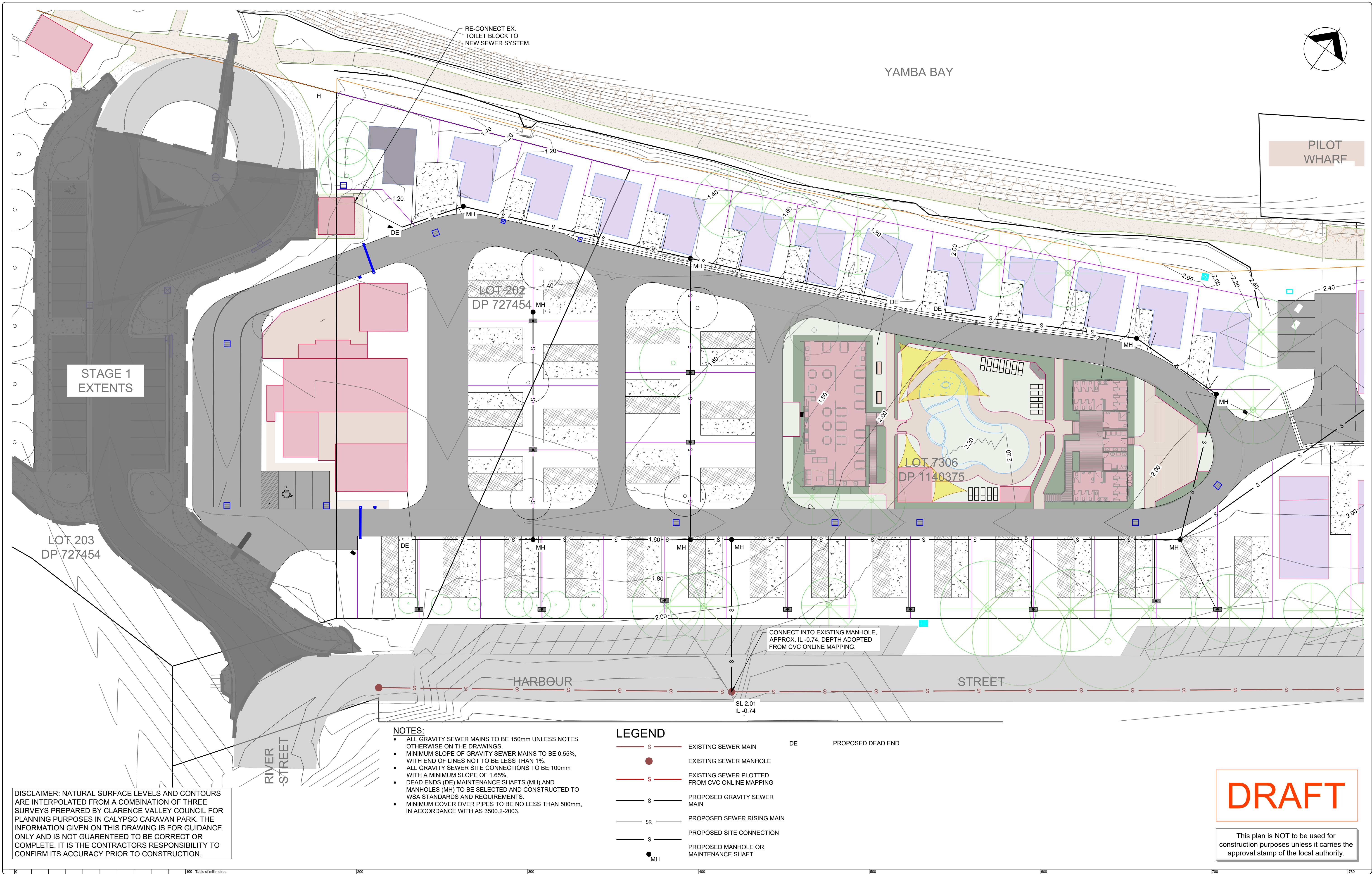
285 Conadilly Street

Ph. 02 6742 9955

A.B.N. 51 808 558 977

e-mail: info@ardillpayne.com.au

Design	TB	Scale	1:250 @ A1, 1:500 @ A3
Drawn	TB		0 2.5 5 7.5 10 12.5
Checked	TC	Datum	AHD
Approved	TC	Drafting File	8847_Stage 2_Stormwater Layout Plan.dwg
Date	15/07/19	Design File	8847_3D Model_APP Base
Job No.	8847	Dwg No.	DA14
		Issue	03



Issue	Date	Description	App'd
03	06/02/20	Amended as per Council comment	APP
02	06/09/19	Issued for Council Comment	APP
01	13/08/19	Preliminary Issue	APP

Client:

**INTEGRATED**
Site Design

**clarence**
VALLEY COUNCIL

PLANNING • DESIGN • MARKETING • MANAGEMENT

Project:

Redevelopment of Calypso Holiday Park

Title:

Stage 2 - Sewer Layout Plan 1

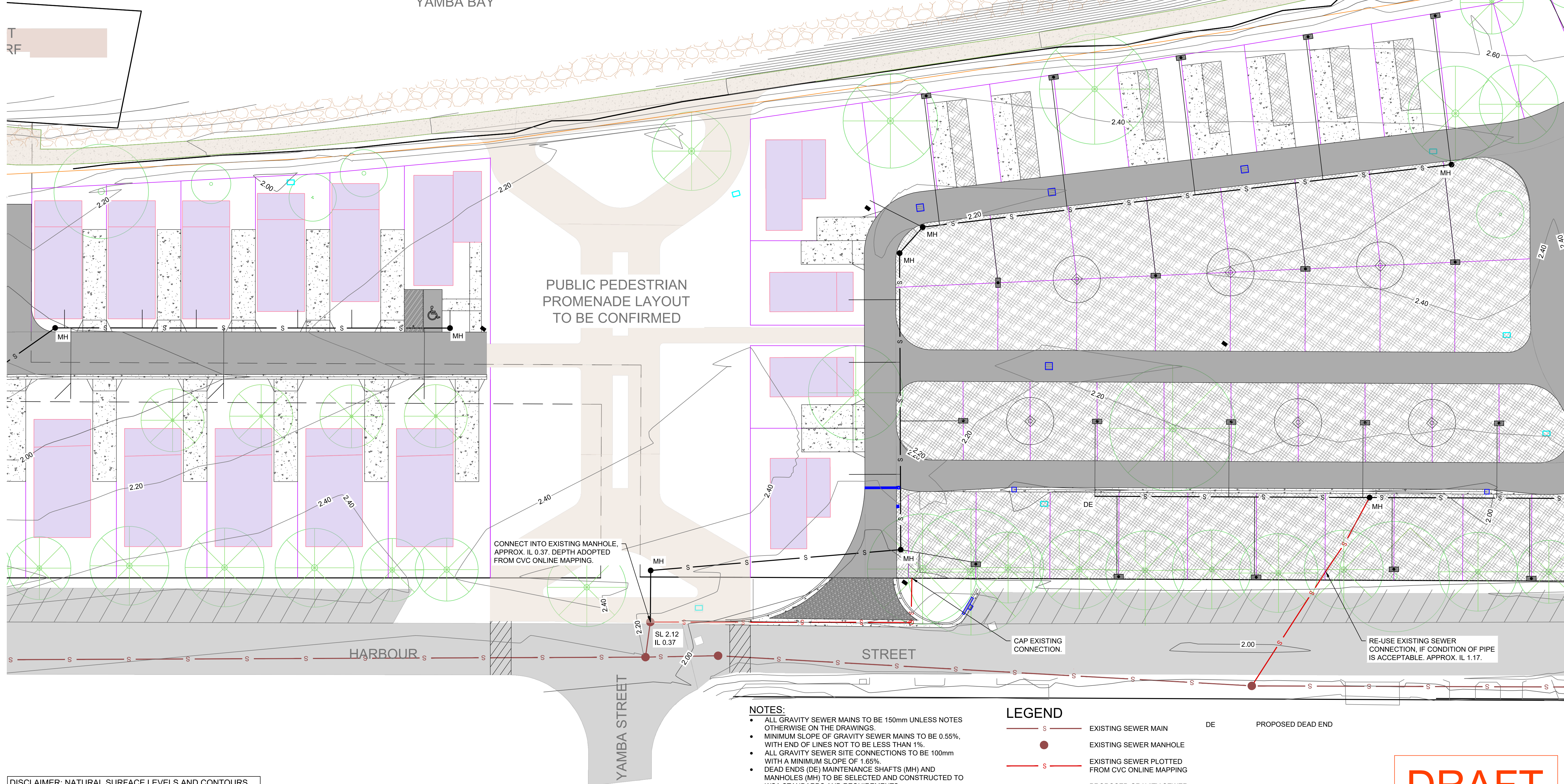
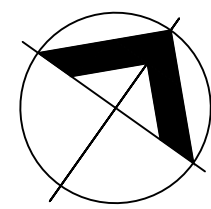
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Design	TB	Scale	1:250 @ A1, 1:500 @ A3
Drawn	TB		0 2.5 5 7.5 10 12.5
Checked	TC	Datum	AHD
Approved	TC	Drafting File	8847_Stage 2_Sewer Layout Plan.dwg
Date	15/07/19	Design File	8847_3D Model_APP Base
Job No.	8847	Dwg No.	DA15
		Issue	03



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- NOTES:
- ALL GRAVITY SEWER MAINS TO BE 150mm UNLESS NOTES OTHERWISE ON THE DRAWINGS.
 - MINIMUM SLOPE OF GRAVITY SEWER MAINS TO BE 0.55%, WITH END OF LINES NOT TO BE LESS THAN 1%.
 - ALL GRAVITY SEWER SITE CONNECTIONS TO BE 100mm WITH A MINIMUM SLOPE OF 1.65%.
 - DEAD ENDS (DE) MAINTENANCE SHAFTS (MH) AND MANHOLES (MH) TO BE SELECTED AND CONSTRUCTED TO VSA STANDARDS AND REQUIREMENTS.
 - MINIMUM COVER OVER PIPES TO BE NO LESS THAN 500mm, IN ACCORDANCE WITH AS 3500.2-2003.

- LEGEND
- S — EXISTING SEWER MAIN
 - EXISTING SEWER MANHOLE
 - S — EXISTING SEWER PLOTTED FROM CVC ONLINE MAPPING
 - S — PROPOSED GRAVITY SEWER MAIN
 - SR — PROPOSED SEWER RISING MAIN
 - S — PROPOSED SITE CONNECTION
 - MH — PROPOSED MANHOLE OR MAINTENANCE SHAFT
 - DE — PROPOSED DEAD END

DRAFT

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Issue	Date	Description	App'd
03	06/02/20	Amended as per Council comment	APP
02	06/09/19	Issued for Council Comment	APP
01	13/08/19	Preliminary Issue	APP



Project: **Redevelopment of Calypso Holiday Park**

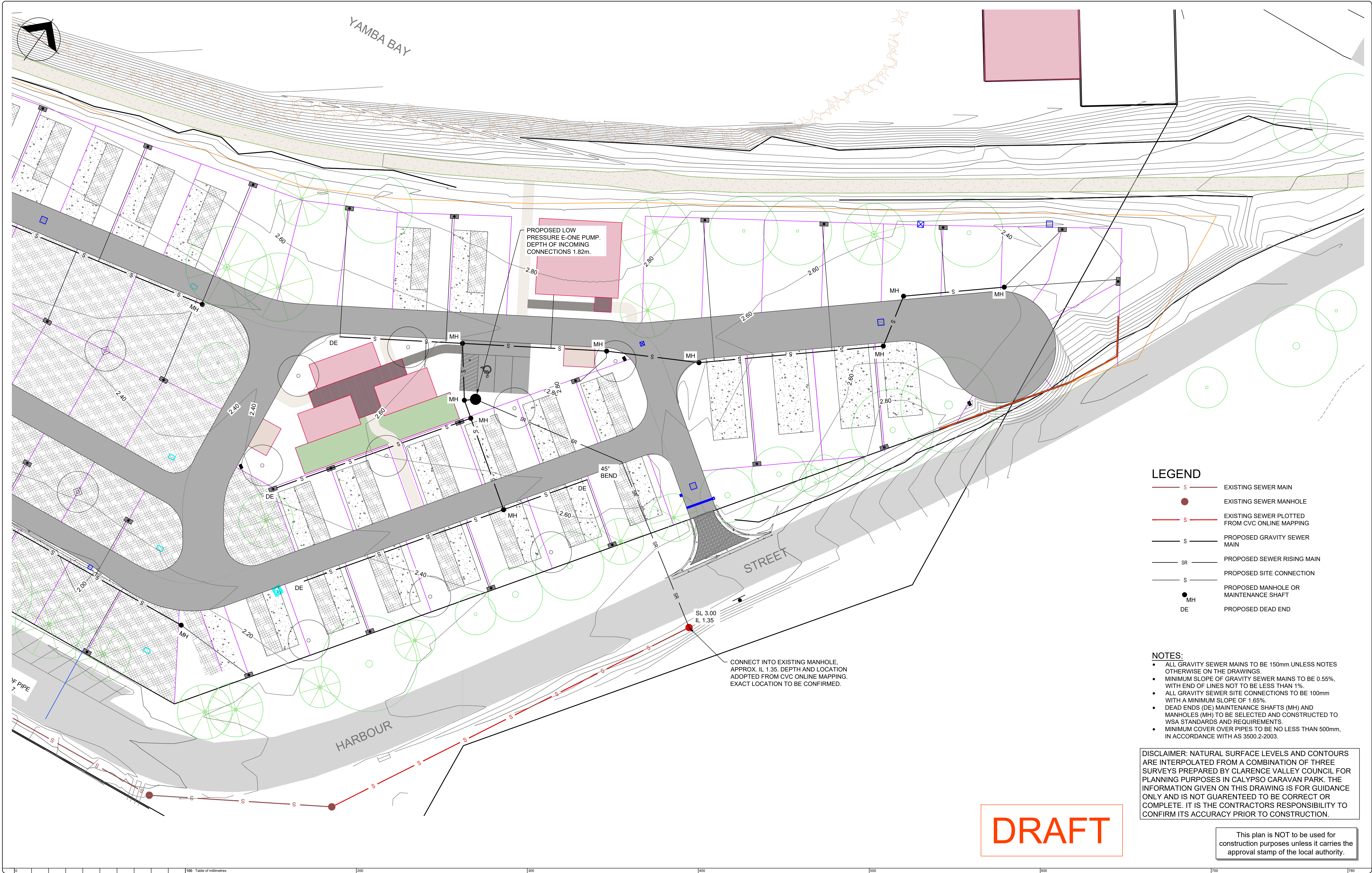
Title: **Stage 2 - Sewer Layout Plan 2**

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Design	TB	Scale	1:250 @ A1, 1:500 @ A3
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Checked	TC	Datum	AHD
Approved	TC	Drafting File	8847_Stage 2_Sewer Layout Plan.dwg
Date	15/07/19	Design File	8847_3D Model_APP Base
Job No	8847	Dwg No.	DA16
		Issue	03



LEGEND

- S EXISTING SEWER MAIN
- EXISTING SEWER MANHOLE
- S EXISTING SEWER PLOTTED FROM CVC ONLINE MAPPING
- S PROPOSED GRAVITY SEWER MAIN
- SR PROPOSED SEWER RISING MAIN
- S PROPOSED SITE CONNECTION
- MH PROPOSED MANHOLE OR MAINTENANCE SHAFT
- DE PROPOSED DEAD END

NOTES:

- ALL GRAVITY SEWER MAINS TO BE 150mm UNLESS NOTES OTHERWISE ON THE DRAWINGS.
- MINIMUM SLOPE OF GRAVITY SEWER MAINS TO BE 0.55%, WITH END OF LINES NOT TO BE LESS THAN 1%.
- ALL GRAVITY SEWER SITE CONNECTIONS TO BE 100mm WITH A MINIMUM SLOPE OF 1.65%.
- DEAD ENDS (DE) MAINTENANCE SHAFTS (MH) AND MANHOLES (MH) TO BE SELECTED AND CONSTRUCTED TO WSA STANDARDS AND REQUIREMENTS.
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Issue	Date	Description	App'd
03	06/02/20	Amended as per Council comment	APP
02	06/09/19	Issued for Council Comment	APP
01	13/08/19	Preliminary Issue	APP

Client:

INTEGRATED Site Design
PLANNING • DESIGN • MARKETING • MANAGEMENT

clareance VALLEY COUNCIL

Project:

Redevelopment of Calypso Holiday Park

Title:

Stage 2 - Sewer Layout Plan 3

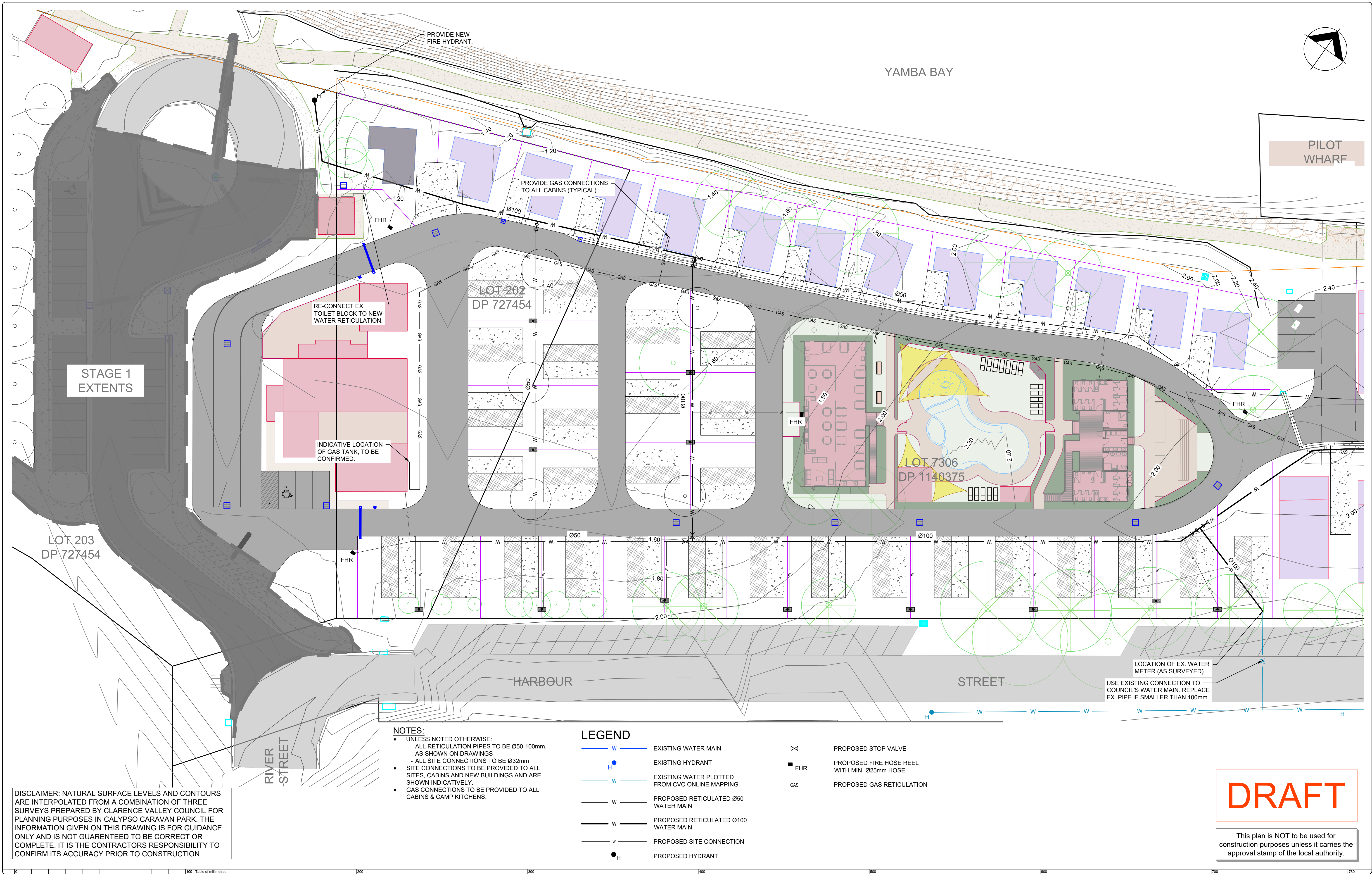
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Design	TB	Scale	1:250 @ A1, 1:500 @ A3
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Checked	TC	Datum	AHD
Approved	TC	Drafting File	8847_Stage 2_Sewer Layout Plan.dwg
Date	15/07/19	Design File	8847_3D_Model_APP Base
Job No.	8847	Dwg No.	DA17
		Issue	03



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03	06/02/20	Amended as per Council comment	APP
02	06/09/19	Issued for Council Comment	APP
01	13/08/19	Preliminary Issue	APP
Issue	Date	Description	App'd

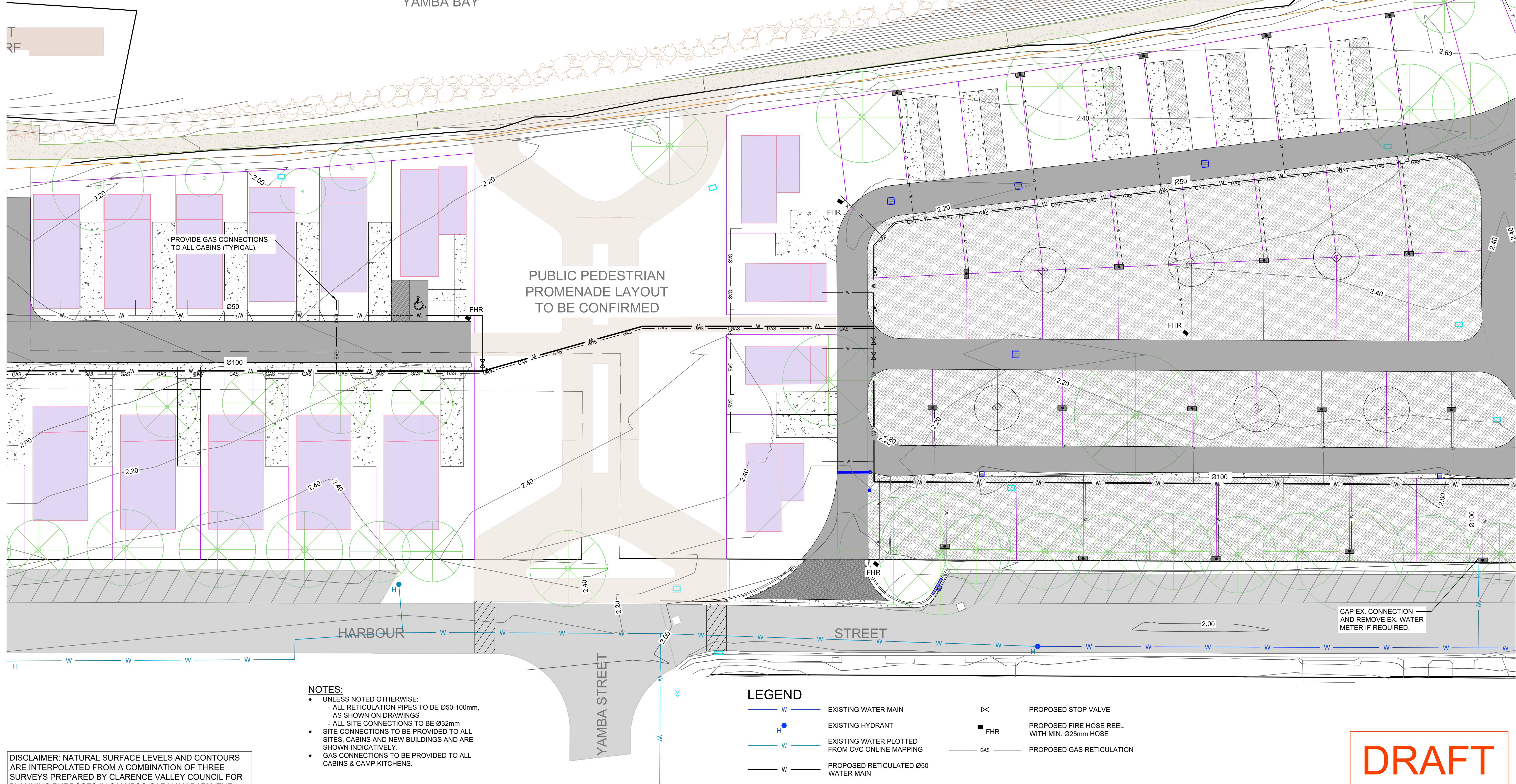
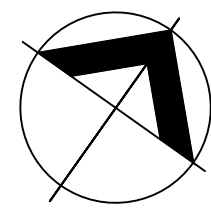
Client:	Integrated Site Design
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Project:	Redevelopment of Calypso Holiday Park
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Title:	Stage 2 - Water & Gas Layout Plan 1
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Design	TB	Scale	1:250 @ A1, 1:500 @ A3
Drawn	TB		
Checked	TC	Datum	AHD
Approved	TC	Drafting File	8847_Stage 2_Water Layout Plan.dwg
Date	15/07/19	Design File	8847_3D_Model_APP Base
Job No	8847	Dwg No.	DA18
		Issue	03



- NOTES:**
- UNLESS NOTED OTHERWISE:
 - ALL RETICULATION PIPES TO BE Ø50-100mm, AS SHOWN ON DRAWINGS
 - ALL SITE CONNECTIONS TO BE Ø32mm
 - SITE CONNECTIONS TO BE PROVIDED TO ALL SITES, CABINS AND NEW BUILDINGS AND ARE SHOWN INDICATIVELY.
 - GAS CONNECTIONS TO BE PROVIDED TO ALL CABINS & CAMP KITCHENS.

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- LEGEND**
- | | | | |
|--|--|--|--|
| | EXISTING WATER MAIN | | PROPOSED STOP VALVE |
| | EXISTING HYDRANT | | PROPOSED FIRE HOSE REEL WITH MIN. Ø25mm HOSE |
| | EXISTING WATER PLOTTED FROM CVC ONLINE MAPPING | | PROPOSED GAS RETICULATION |
| | PROPOSED RETICULATED Ø50 WATER MAIN | | |
| | PROPOSED RETICULATED Ø100 WATER MAIN | | |
| | PROPOSED SITE CONNECTION | | |
| | PROPOSED HYDRANT | | |

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Issue	Date	Description	App'd
03	06/02/20	Amended as per Council comment	APP
02	06/09/19	Issued for Council Comment	APP
01	13/08/19	Preliminary Issue	APP

Client: Integrated Site Design

Project: Redevelopment of Calypso Holiday Park

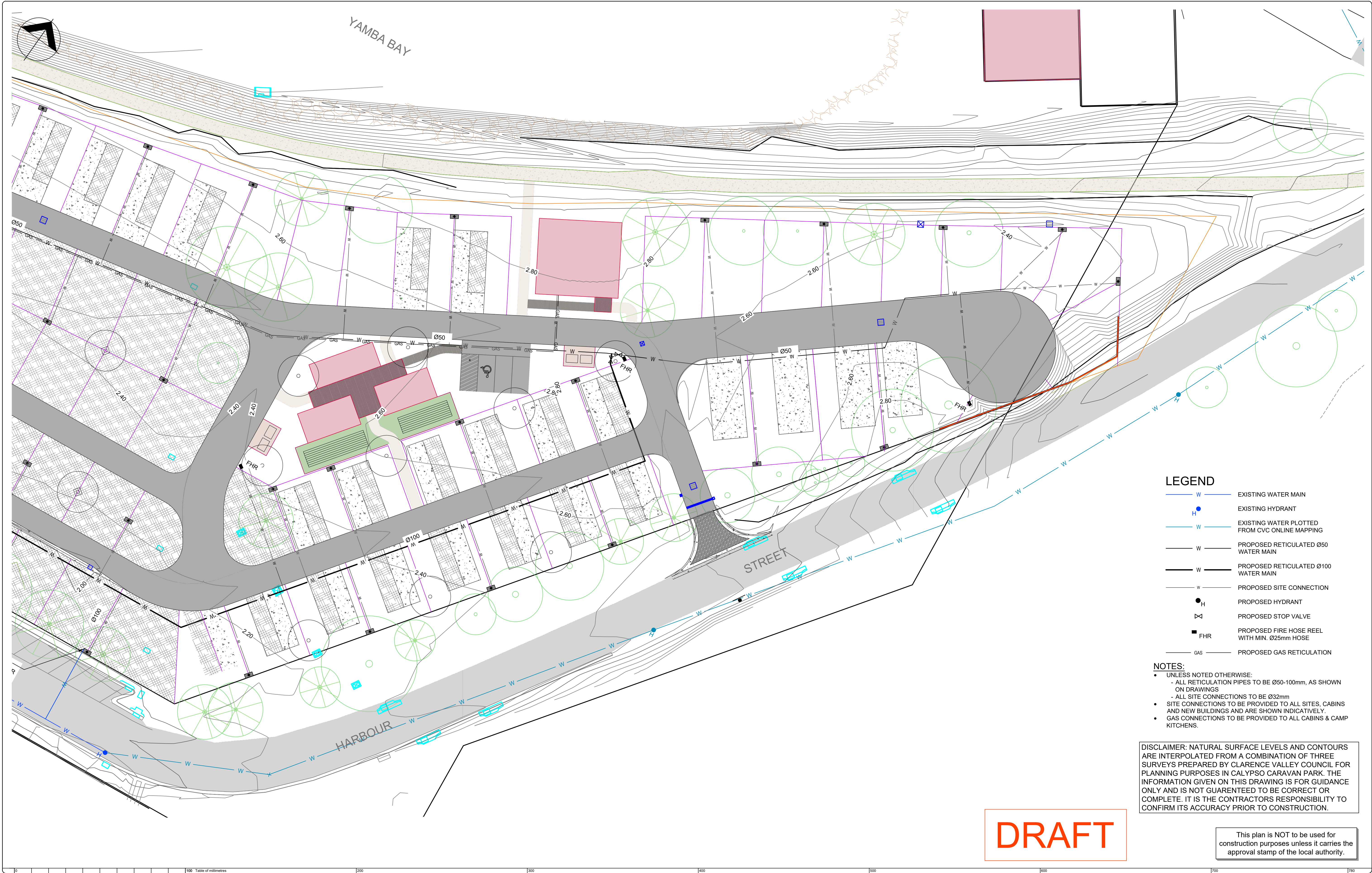
Title: Stage 2 - Water & Gas Layout Plan 2

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Design	TB	Scale	1:250 @ A1, 1:500 @ A3
Drawn	TB		0 2.5 5 7.5 10 12.5
Checked	TC	Datum	AHD
Approved	TC	Drafting File	8847_Stage 2_Water Layout Plan.dwg
Date	15/07/19	Design File	8847_3D Model_APP Base
Job No	8847	Dwg No.	DA19
		Issue	03



- LEGEND**
- W EXISTING WATER MAIN
 - H EXISTING HYDRANT
 - W EXISTING WATER PLOTTED FROM CVC ONLINE MAPPING
 - W PROPOSED RETICULATED Ø50 WATER MAIN
 - W PROPOSED RETICULATED Ø100 WATER MAIN
 - w PROPOSED SITE CONNECTION
 - H PROPOSED HYDRANT
 - W PROPOSED STOP VALVE
 - FHR PROPOSED FIRE HOSE REEL WITH MIN. Ø25mm HOSE
 - GAS PROPOSED GAS RETICULATION

- NOTES:**
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01	13/08/19	Preliminary Issue	APP



Project: **Redevelopment of Calypso Holiday Park**

Title: **Stage 2 - Water & Gas Layout Plan 3**

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Design	TB	Scale	1:250 @ A1, 1:500 @ A3
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Checked	TC	Datum	AHD
Approved	TC	Drafting File	8847_Stage 2_Water Layout Plan.dwg
Date	15/07/19	Design File	8847_3D Model_APP Base
Job No.	8847	Dwg No.	DA20
		Issue	03