ALL NEW ZEALAND LOCATIONS

STRUCTURAL WORKS - GENERIC DESIGN

CONTRACTOR AND TANK OWNER TO ENSURE TANKS ARE PLACED IN A POSITION THAT WILL NOT EXCEED: PAIR OF AXLE LOADS OF 120kN EACH. TRAFFIC COUNT LESS THAN 100 VEHICLES PER DAY & LOW SPEED ZONES.

JOB No.	DWG No.	TITLE	REV	DATE	DESCRIPTION
DT-02	CS-01	DRAWING SCHEDULE	1	5/12/2021	FOR CONSENT
DT-02	CS-02	STANDARD NOTES AND DETAILS (DURABILITY ZONE D)	1	5/12/2021	FOR CONSENT
DT-02	CS-03	TWO TANKS SIDE BY SIDE UNDER COMMERCIAL DRIVEWAY - NON EXPANSIVE SOILS	2	2/04/2022	REVISED FOR CONSENT
DT-02	CS-04	TWO TANKS SIDE BY SIDE UNDER COMMERCIAL DRIVEWAY - NON EXPANSIVE SOILS WITH GROUND ANCHORS	2	2/04/2022	REVISED FOR CONSENT
DT-02	CS-05	TWO TANKS SIDE BY SIDE UNDER COMMERCIAL DRIVEWAY - EXPANSIVE SOILS UP TO CLASS 'M'	2	2/04/2022	REVISED FOR CONSENT
DT-02	CS-06	TWO TANKS SIDE BY SIDE UNDER COMMERCIAL DRIVEWAY - EXPANSIVE SOILS UP TO CLASS 'M' WITH GROUND ANCHORS	2	2/04/2022	REVISED FOR CONSENT

UNDER COMMERCIAL DRIVEWAY, TWO TANKS SIDE BY SIDE INSTALLATION OF APD TANKS - MAX AXLE LOAD 120kN. ALL NEW ZEALAND LOCATIONS

NOTES:

CONTRACTOR TO CONFIRM ALL LEVELS AND DIMENSIONS AND LOCATE AND MARK ALL SERVICES & DRAINS ON SITE BEFORE COMMENCING WORK

CONTRACTOR TO FOLLOW MATERIAL SPECIFICATION AND LIMITS OF LOCATION WITH RELATION TO STRUCTURES AND RETAINING WALLS

CONTRACTOR TO NOTIFY A CHARTERED PROFESSIONAL ENGINEER IF ANY OF THE DESIGN REQUIREMENTS OUTLINED IN THIS DRAWING PACKAGE ARE NOT ACHIEVEABLE

MAXIMUM BURIED COVER DEPTH OVER TOP OF TANKS:
- 1200mm DIA - MAX. BURIED COVER IS 900mm, OR 1200mm FOR TANK WITH REINFORCED ENDS STANDARD RISER 650mm, CAN BE EXTENDED TO HIGHER ON REQUEST.
- 645mm, 800mm, 1000mm DIA - MAX. BURIED COVER IS 900mm. STANDARD RISER 350mm, CAN BE EXTENDED ON REQUEST.

IF YOU NEED TO BURY YOUR TANK DEEPER THAN ABOVE PLEASE CONTACT APD LTD FOR OTHER OPTIONS

DEFINITIONS:
UNO - UNLESS NOTED OTHERWISE

REFER TO STRUCTURAL SPECIFICATION SHEET FOR CONCRETE REINFORCING AND OTHER NOTES

SLAB DESIGNED FOR HN LOADS AS PER NZTA BRIDGE MANUAL SP/M/022 2014 SECTION 3.2 AND D1:

CONTRACTOR AND TANK OWNER TO ENSURE TANKS ARE PLACED IN A POSITION THAT WILL NOT EXCEED: PAIR OF AXLE LOADS OF 120kN EACH. TRAFFIC COUNT LESS THAN 100 VEHICLES PER DAY & LOW SPEED ZONES.

FOR CONSENT	05-12-21	1
REVISION:	DATE:	No.:

JOB TITLE:
UNDER COMMERCIAL DRIVEWAY, TWO TANKS SIDE BY SIDE (AXLE LOAD 120kN OR LESS) INSTALLATION OF APD TANKS

ADDRESS:
ALL NEW ZEALAND LOCATIONS

DRAWING TITLE:
DRAWING SCHEDULE

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ORIGINAL SHEET SIZE:	A3	JOB No:	DT-02
DRAWN:	RCE	DRAWING No:	CS-01
DATE:	OCT 2021	REVISION No:	1
DESIGN:	AG		
CHECKED:		SCALE: NTS	NTS

APD LTD
49 McLaughlins Road, Wiri, Auckland,
New Zealand
TEL: 00 64 9 263 7741
www.apd.co.nz

STANDARD NOTES:

DURABILITY ZONE D (NZS3604)

GENERAL:

THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL, GEOTECHNICAL AND OTHER CONSULTANTS DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ALL DISCREPANCIES SHALL BE REFERRED TO THE ENGINEER FOR DECISION BEFORE PROCEEDING WITH THE WORK.

ALL DIMENSIONS RELEVANT TO SETTING OUT AND OFF-SITE WORK SHALL BE VERIFIED BY THE CONTRACTOR BEFORE CONSTRUCTION AND FABRICATION IS COMMENCED. THE ENGINEERS DRAWINGS SHALL NOT BE SCALED.

DURING CONSTRUCTION THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE STABILITY OF THE STRUCTURE UNTIL ITS COMPLETION AND SHALL ENSURE THAT NO PART OF THE STRUCTURE IS OVERSTRESSED BY EXCESSIVE LOADING.

WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE RELEVANT NEW ZEALAND STANDARDS AND LOCAL AUTHORITY REGULATIONS, EXCEPT WHERE VARIED IN CONTRACT DOCUMENTS.

THE LOCATION, SIZE, AND DETAILS OF ALL PENETRATIONS, HOLES, ETC IN STRUCTURAL MEMBERS MUST BE APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION UNLESS OTHERWISE SHOWN ON STRUCTURAL DRAWINGS.

SUBSTITUTION FOR OR AMENDMENT OF SPECIFIED DETAILS OR MATERIALS SHALL NOT BE CARRIED OUT WITHOUT THE APPROVAL OF THE ENGINEER.

CONCRETE:

ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH NZS 3101:2006

NO HOLES CHASES OR EMBEDMENT OF PIPES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT THE APPROVAL OF THE ENGINEER.

CONSTRUCTION JOINTS SHALL BE PROPERLY FORMED AND USED ONLY WHERE SHOWN OR SPECIFICALLY APPROVED BY THE ENGINEER.

ALL CONCRETE TO BE MECHANICALLY VIBRATED AND CAREFULLY WORKED AROUND THE REINFORCEMENT AND INTO THE CORNERS OF THE FORMWORK.

MINIMUM COMPRESSIVE STRENGTHS OF CONCRETE AT 28 DAYS SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE:

ELEMENT	GRADE(MPa)
SITE CONCRETE	17.5
SLAB ON GRADE	30
SUSPENDED SLAB	30

ALL CONCRETE IS TO HAVE 15 x 15 CHAMFER TO ALL EXPOSED EDGES UNLESS NOTED OTHERWISE.

FINISHES TO CONCRETE TO BE IN ACCORDANCE WITH NZS 3114.

WATER / CEMENT RATIOS FOR CONCRETE USED IN SLABS ON GRADE SHALL NOT EXCEED 0.45.

REINFORCEMENT:

ALL REINFORCEMENT SHALL CONFORM TO AS/NZS 4671. ALL HOOK BARS AND BENDS SHALL BE MADE WITHOUT FRACTURE IN ACCORDANCE TO NZS 3101. GRADE 300 BARS MAY BE BENT ONCE ONLY.

ALL REINFORCEMENT SHALL BE AS FOLLOWS:

SYMBOL	TYPE - TO AS/NZS 4671
R	PLAIN BARS GRADE 300 MPa
D	DEFORMED BARS GRADE 300 MPa
HD	DEFORMED BARS GRADE 500 MPa - MA
HR	PLAIN BARS GRADE 500 MPa - MA
	MESH TO NZS 3421 (500 MPa)

* REINFORCEMENT SHALL BE CLASS E TO AS/NZS 4671 MANUFACTURED USING THE MICRO ALLOY PROCESS.

REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY AND NOT NECESSARILY IN TRUE PROJECTION.

CLEAR COVER TO REINFORCEMENT SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE ON THE DWGS. WHERE NOT SPECIFICALLY DESIGNATED COVER IS TO BE IN ACCORDANCE WITH NZS 3109.

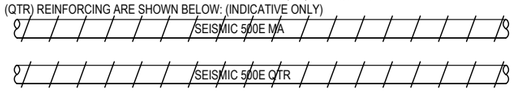
MEMBER	CAST AGAINST NOT EXPOSED TO WEATHER OR WATER	CAST AGAINST FORMWORK EXPOSED TO WEATHER OR WATER	CAST AGAINST GROUND (SEE NOTE BELOW)
STRIP FOOTINGS	N/A	50	75 *
SLABS	35	50	75 *

* WHERE THERE IS A PERMANENT IMPERMEABLE MEMBRANE BETWEEN CONCRETE AND GROUND USE 50mm COVER. FOR SITES WITHIN 500M OF MEAN HIGH WATER MARK INCREASE COVER BY 10mm.

NO REINFORCEMENT SPLICES SHALL BE MADE, OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS, WITHOUT THE PRIOR APPROVAL OF THE ENGINEER. MINIMUM LAP FOR FABRIC SHALL BE ONE MESH PLUS 50mm.

WELDING OF REINFORCEMENT IS NOT PERMITTED UNLESS SHOWN ON THE DRAWINGS OR APPROVED BY THE ENGINEER. WHERE WELDING OF REINFORCEMENT IS PERMITTED GRADE 500 STEEL SHALL NOT BE WELDED OR REBENT UNLESS IT IS CLEARLY MARKED AS MICRO ALLOY GRADE 500, QUENCHED AND TEMPERED STEEL SHALL NOT BE WELDED OR REBENT.

BAR MARKING FOR IDENTIFICATION OF MICRO ALLOY (MA) AND QUENCHED AND TEMPERED (QTR) REINFORCING ARE SHOWN BELOW: (INDICATIVE ONLY)



REINFORCEMENT SHALL BE ADEQUATELY FIXED AND SUPPORTED TO PREVENT IT SAGGING OR MOVING. MESH TO BE FULLY SUPPORTED ON PROPRIETARY CHAIRS.REFER TO SPECIFICATION FOR MINIMUM FIXING REQUIREMENTS.

THE MINIMUM CLEAR SPACING BETWEEN CONDUITS, CABLES, PIPES AND BARS SHALL BE AS REQUIRED BY NZS 3101 BUT NOT LESS THAN THREE DIAMETERS. CONDUITS IN SLABS ARE TO BE PLACED ABOVE BOTTOM REINFORCEMENT AND BELOW TOP REINFORCEMENT.

LEGEND USED FOR REINFORCEMENT LOCATION

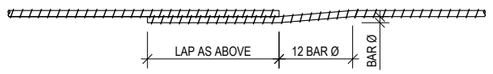
BS	BOTH SIDES
BB	BOTTOM BOTTOM
B	BOTTOM
TT	TOP TOP
T	TOP
EW	EACH WAY
EF	EACH FACE
NF	NEAR FACE
FF	FAR FACE
ABR	ALTERNATE BARS REVERSED

STANDARD SPLICE LAP LENGTHS FOR DEFORMED BARS:-

CONCRETE LAPS		
BAR SIZE DIA.	D GRADE 300	HD GRADE 500
10	400	600
12	450	750
16	600	1000
20	750	1200
25	900	1500
28	1100	1700
MESH	1 MESH SQ. + 50mm	

NOTE: FOR ROUND BARS SPLICE LAP LENGTH TO BE TWICE THE SPLICE LENGTH OF DEFORMED BARS.

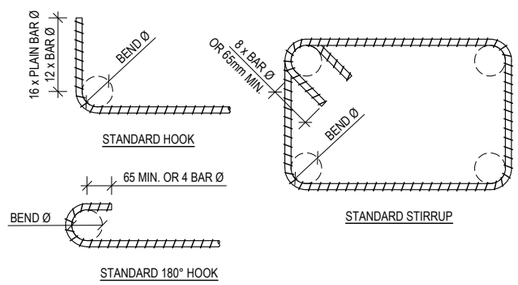
LAPS IN BEAMS & COLUMNS SHALL BE VIA AN OFFSET LAP CREATED BY CRANKING OF THE BAR AS SHOWN BELOW:



REVERSE COLD BENDING SHALL NOT BE CARRIED OUT ON-SITE. HOT BENDING MAY BE CARRIED OUT AT THE DISCRETION AND WITH THE WRITTEN APPROVAL OF THE ENGINEER. REFER TO SPECIFICATION FOR HEATING & HOT BENDING PROCEDURE.

COLD BENDING OF REINFORCEMENT SHALL BE IN ACCORDANCE WITH NZS 3109.

BENDS FOR ALL BARS EXCEPT STIRRUPS & TIES:-



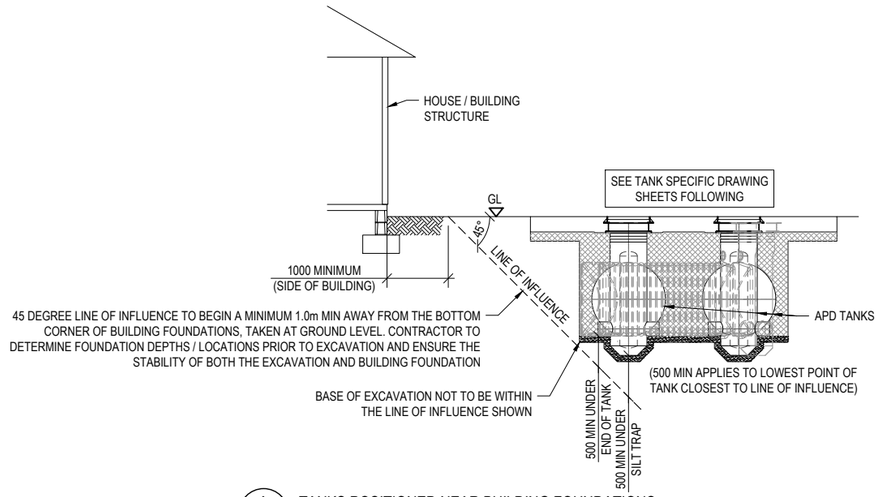
STEEL GRADE	BAR DIAMETER	MINIMUM BEND DIAMETER
300 & 500	6 to 20	5 BAR DIAMETERS
300 & 500	25 to 40	7 BAR DIAMETERS

FOUNDATIONS:

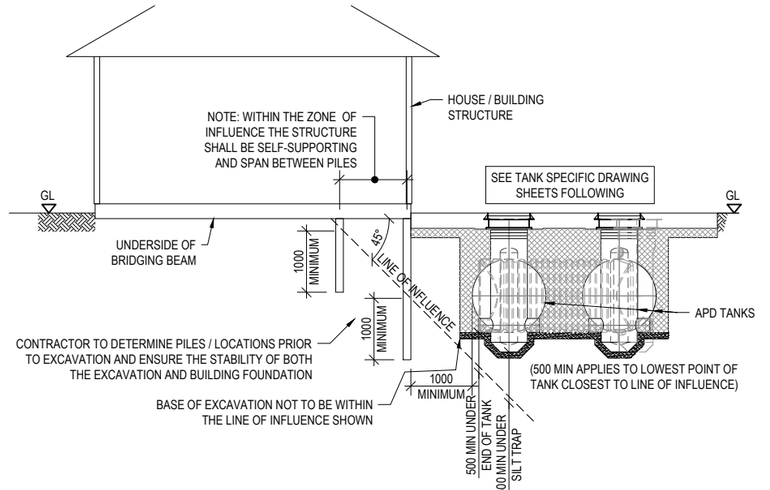
FOUNDATIONS ARE TO BE FOUNDED ON ORIGINAL UNDISTURBED GROUND, AT A MINIMUM DEPTH OF 600mm. BEFORE ANY CONCRETE IS PLACED THE SOILS SHALL BE VERIFIED TO BE 'GOOD GROUND' TO NZS3604.

50mm OF SITE CONCRETE MAY BE PLACED UNDER FOUNDATIONS TO CREATE A CLEAN SURFACE TO PLACE REINFORCING ON WHEN REQUIRED.

NOTE: IF THE TANK EXCAVATION DOES NOT COMPLY WITH THE REQUIREMENTS BELOW - CONTRACTOR TO NOTIFY CHARTERED PROFESSIONAL ENGINEER FOR A SITE SPECIFIC CONSULTATION

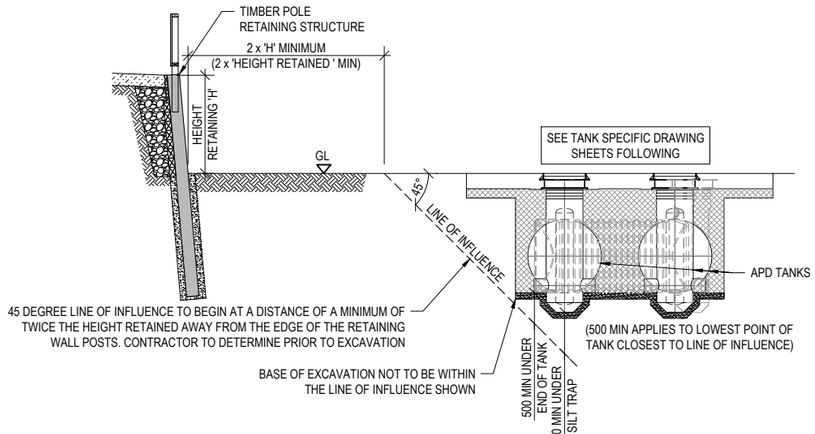


A - TANKS POSITIONED NEAR BUILDING FOUNDATIONS
SCALE NTS



B - TANKS POSITIONED NEAR PILED FOUNDATIONS
SCALE NTS

NOTE: REFER TO STORMWATER CODE OF PRACTICE DRAWING SW22.



C - TANKS POSITIONED BELOW TIMBER RETAINING WALL
SCALE NTS

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REVISION:	DATE:	No.:
FOR CONSENT	05-12-21	1

JOB TITLE:
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ADDRESS:
ALL NEW ZEALAND LOCATIONS

DRAWING TITLE:
STANDARD NOTES AND DETAILS (DURABILITY ZONE D)

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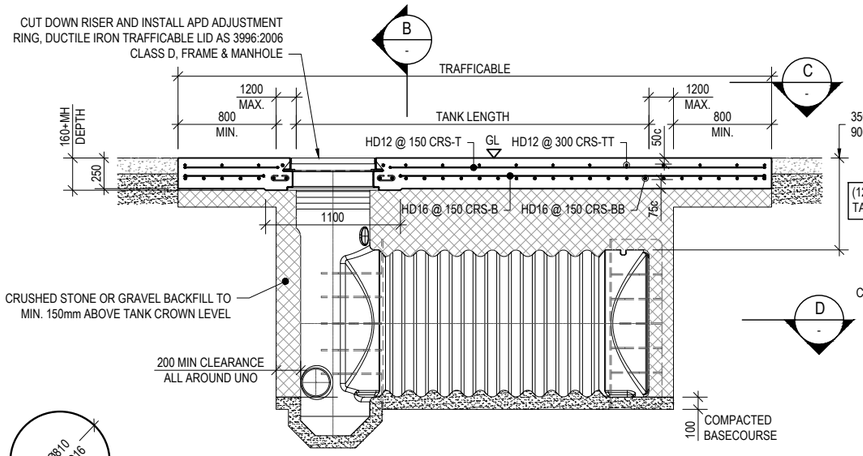
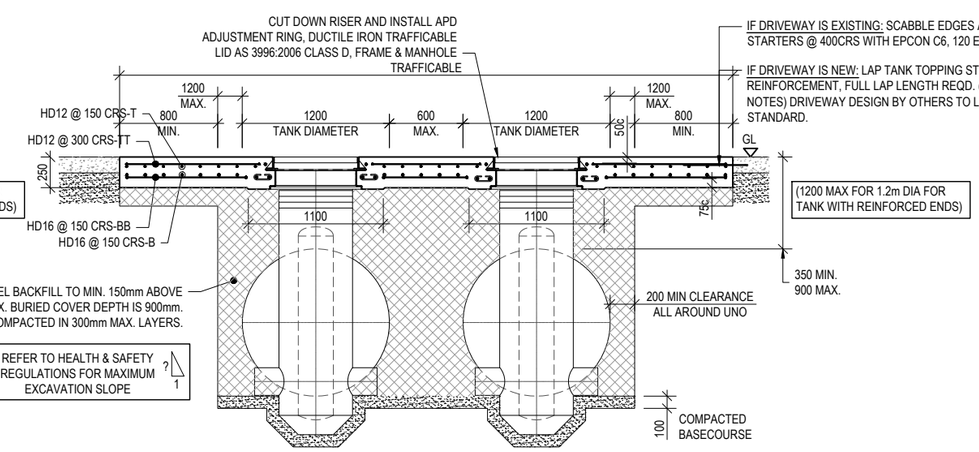
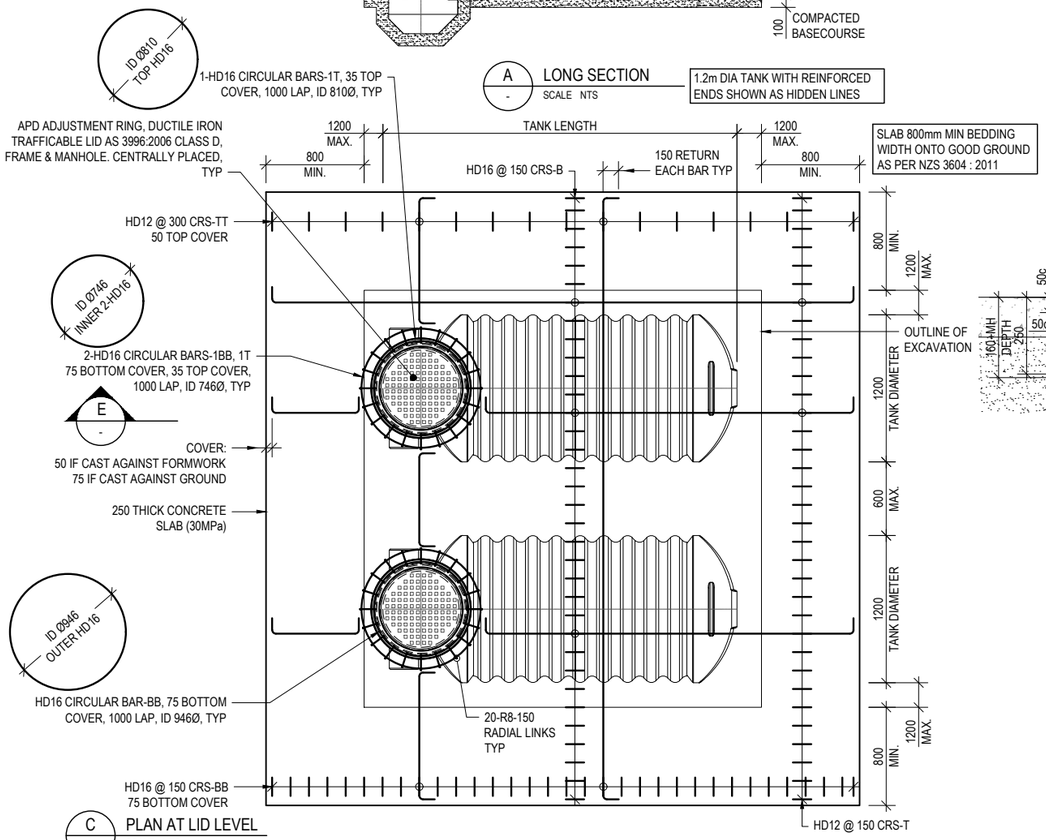


A - LONG SECTION
SCALE NTS

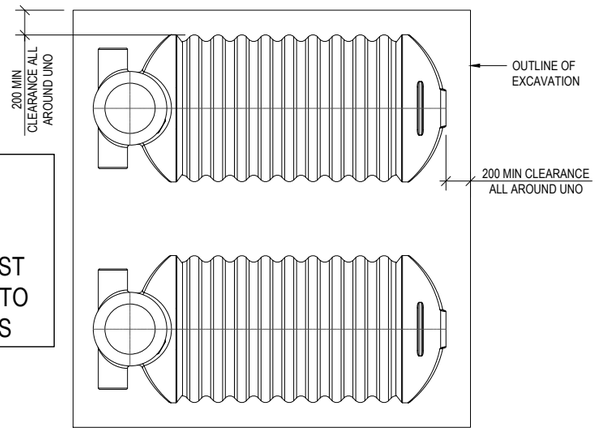
1.2m DIA TANK WITH REINFORCED ENDS SHOWN AS HIDDEN LINES



B - CROSS SECTION
SCALE NTS



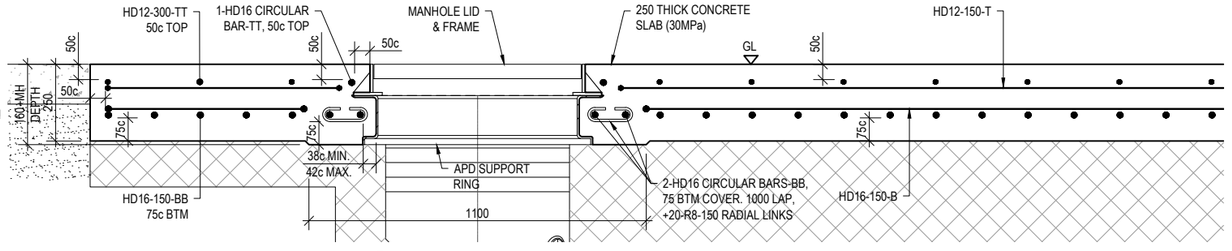
C - PLAN AT LID LEVEL
SCALE NTS



FOR MULTIPLE TANKS:
A GROUP OF THREE TANKS WITH MAX 600mm GAP BETWEEN THEM. THERE MUST BE A MINIMUM 6400mm GAP TO THE NEXT GROUP OF TANKS

D - PLAN AT BASE
SCALE NTS

NON-EXPANSIVE SOILS



E - SECTION THRU COLLAR
SCALE NTS

TANK LOCATION - PROXIMITY TO NEARBY STRUCTURES:

THE LOCATION OF THE TANK EXCAVATION IS THE RESPONSIBILITY OF THE CONTRACTOR AND THE TANK OWNER. THE CONTRACTOR IS TO FOLLOW THE LIMITATIONS OF THE DIAGRAMS SHOWN OR NOTIFY A CHARTERED PROFESSIONAL ENGINEER FOR A SITE SPECIFIC CONSULTATION.
THE CONTRACTOR IS TO ENSURE NEARBY FOUNDATIONS OF NEW AND / OR EXISTING STRUCTURES ARE NOT UNDERMINED BY THE EXCAVATION FOR THE TANK.

EXCAVATION CLEARANCE:

THE CONTRACTOR IS TO ENSURE A MINIMUM OF 200mm BETWEEN EDGE OF TANK AND EDGE OF EXCAVATION WALL AT THE NARROWEST LOCATION.

SOIL CONDITIONS:

THIS DESIGN ASSUMES SITE SOILS WILL MEET THE REQUIREMENTS OF NZS3604:2011 CLASSIFICATION OF 'GOOD GROUND'. THE CONTRACTOR IS TO CONFIRM THE SITE EXHIBITS THESE PROPERTIES OR NOTIFY A CHARTERED PROFESSIONAL ENGINEER FOR CONSULTATION. FOR IL2, 50 YEARS DESIGN LIFE, Z <= 0.4

TEMPORARY SUPPORT & SHORING:

TEMPORARY SUPPORT AND SHORING DURING EXCAVATION AND PREPARATION IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHOULD BE IN ACCORDANCE WITH HEALTH AND SAFETY AT WORK ACT 2015 (HSWA), THE HEALTH AND SAFETY AT WORK (GENERAL RISK AND WORKPLACE MANAGEMENT) REGULATIONS 2016 (GRWM REGULATIONS) AND THE HEALTH AND SAFETY IN EMPLOYMENT REGULATIONS 1995 (HSE REGULATIONS), REGULATION 24 FOR EXCAVATIONS WITH FACE MORE THAN 1.5m HIGH (AS BELOW):

1) SUBJECT TO SUBCLAUSE (2) OF THIS REGULATION, EVERY EMPLOYER SHALL TAKE ALL PRACTICABLE STEPS TO ENSURE THAT, WHERE ANY FACE OF ANY EXCAVATION IS MORE THAN 1.5m HIGH, THAT FACE IS SHORED.
2) SUBCLAUSE (1) OF THIS REGULATION DOES NOT APPLY WHERE:

a) THE FACE IS CUT BACK TO A SAFE SLOPE; OR
b) THE MATERIAL IN THE FACE IS OF PROVEN GOOD STANDING QUALITY UNDER ALL REASONABLY FORESEEABLE CONDITIONS OF WORK AND WEATHER; OR
c) BY REASON OF THE NATURE OF THE WORK AND THE POSITION OF ANY EMPLOYEE IN THE VICINITY, THERE IS NO DANGER TO ANY EMPLOYEE; OR
d) THE PROVISION OF SHORING IS IMPRACTICABLE OR UNREASONABLE BY REASON OF THE NATURE OF THE WORK AND THE EMPLOYER TAKES ALL PRACTICABLE STEPS TO ENSURE THAT OTHER PRECAUTIONS ARE TAKEN TO MAKE THE FACE AS SAFE AS POSSIBLE IN THE CIRCUMSTANCES.

3) EVERY EMPLOYER SHALL TAKE ALL PRACTICABLE STEPS TO ENSURE THAT ANY SHORING USED IN ANY EXCAVATION AT THE PLACE OF WORK:

a) CONSISTS OF MATERIALS THAT ARE SUITABLE FOR THE PURPOSE FOR WHICH THEY ARE TO BE USED, OF SOUND QUALITY, AND ADEQUATE STRENGTH FOR THE PARTICULAR USE; AND
b) HAS BRACING'S, JACKS, AND STRUTS THAT ARE SECURELY HELD TO PREVENT ACCIDENTAL DISPLACEMENT, AND PACKING'S AND WEDGES THAT ARE HELD BY NAILS OR SPIKES; AND
c) IS PLACED IN A PROPER MANNER BY A BY AN EXPERIENCED PERSON UNDER COMPETENT SUPERVISION; AND
d) IS NOT ALTERED, DISMANTLED. OR INTERFERED WITH EXCEPT ON THE INSTRUCTIONS OF THE EMPLOYER OR A REPRESENTATIVE OF THE EMPLOYER.

BACKFILL AND BASECOURSE:

BACKFILL AND BASECOURSE MATERIAL TO BE EITHER:

CRUSHED STONE OR GRAVEL: WASHED, WITH ANGULAR PARTICLE SIZES NO LARGER THAN 20mm WITH NO MORE THAN 5% PASSING A 2.36mm SIEVE. DRY DENSITY MUST NOT BE LESS THAN 1500 Kg / CUBIC METRE. APPROVED BACKFILL SHOULD NOT BE MIXED WITH SAND OR NATIVE SOILS AND SHOULD ALWAYS BE BROUGHT UP TO AT LEAST 150MM ABOVE TANK CROWN LEVEL. THE USE OF NON-SPECIFIED BACKFILL MATERIAL COULD RESULT IN TANK FAILURE. GAP20 IS ACCEPTABLE.

OR IF CRUSHED STONE OR GRAVEL IS NOT AVAILABLE, THEN SPECIFIC QUARRY AGGREGATE MIX OF
NATURALLY ROUNDED GRAVEL: CLEAN NATURALLY ROUNDED AGGREGATE WITH PARTICLE SIZES NO LARGER THAN 19mm WITH NO MORE THAN 5% PASSING A 2.36mm SIEVE. DRY DENSITY MUST NOT BE LESS THAN 1500 Kg / CUBIC METRE.

THE CONTRACTOR IS TO WORK IN MAXIMUM BACKFILL LIFTS OF 300mm. AFTER EACH LIFT, THE CONTRACTOR TO USE LONG HANDLED PROBE TO WORK THE BACKFILL MATERIAL UNDER THE ENTIRE LENGTH OF THE TANK AND WITHIN ANY RIBS. ALL VOIDS AND SPACES SHOULD BE FILLED TO ENSURE ADEQUATE SUPPORT OF TANK.

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JOB TITLE:
UNDER COMMERCIAL DRIVEWAY, TWO TANKS SIDE BY SIDE (AXLE LOAD 120kN OR LESS) INSTALLATION OF APD TANKS

ADDRESS:
ALL NEW ZEALAND LOCATIONS

DRAWING TITLE:
TANKS UNDER COMMERCIAL DRIVEWAY - NON EXPANSIVE SOILS

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APD LTD
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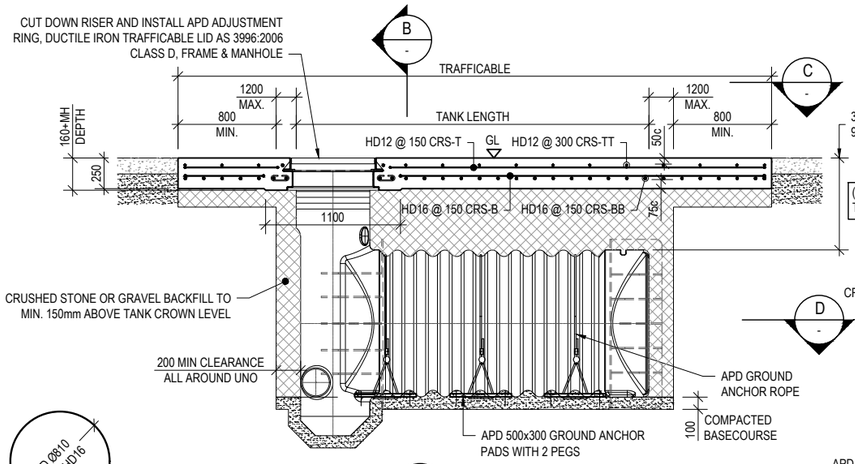
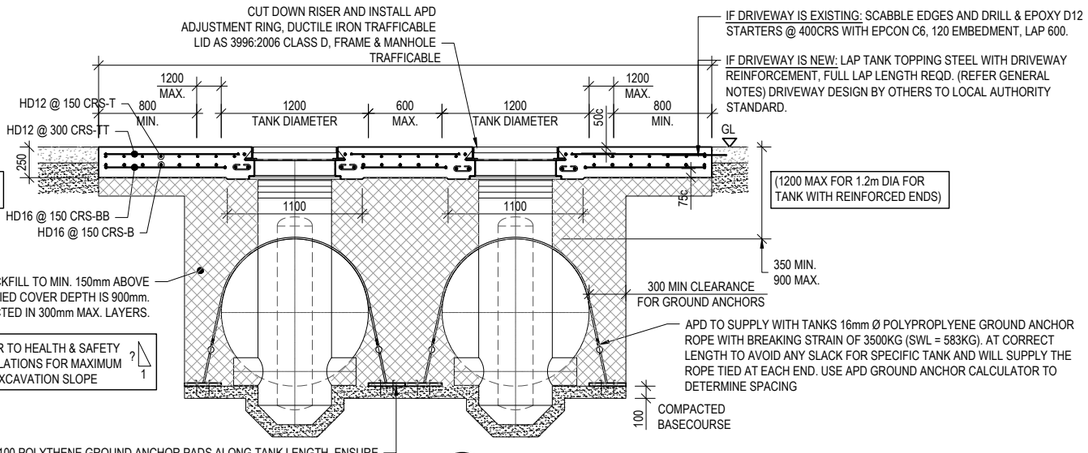


A - LONG SECTION
SCALE NTS

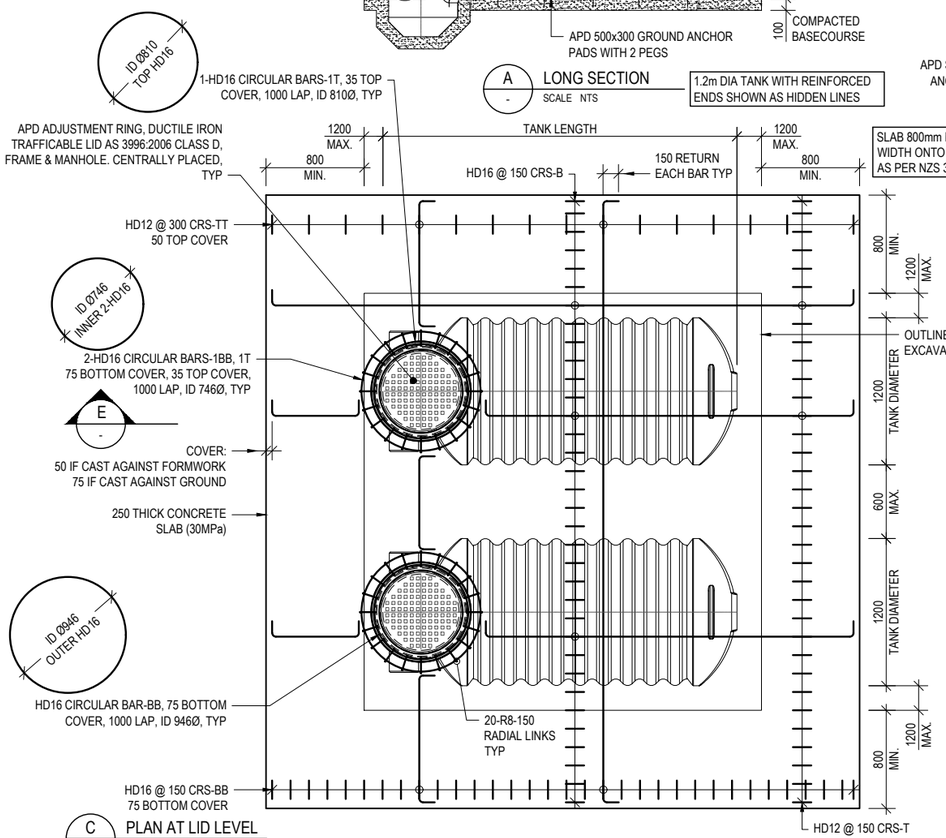
1.2m DIA TANK WITH REINFORCED ENDS SHOWN AS HIDDEN LINES



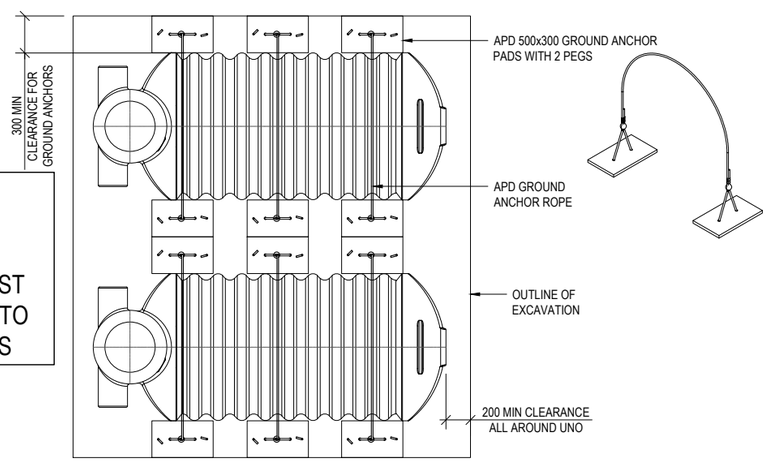
D
REFER TO HEALTH & SAFETY REGULATIONS FOR MAXIMUM EXCAVATION SLOPE
? 1

APD SUPPLIED 500x300x25 THICK PE100 POLYTHENE GROUND ANCHOR PADS ALONG TANK LENGTH. ENSURE ANCHOR IS LEVEL AND IS OUTSIDE THE LINE OF THE TANK DIAMETER. C/W 2 SECURING PEGS TO PREVENT PAD SLIPPAGE WHEN BACKFILLING. USE APD GROUND ANCHOR CALCULATOR TO DETERMINE SPACING

B - CROSS SECTION
SCALE NTS



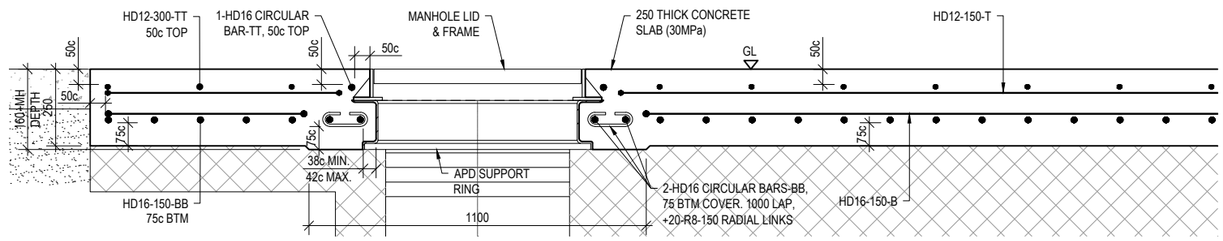
C - PLAN AT LID LEVEL
SCALE NTS



FOR MULTIPLE TANKS:
A GROUP OF THREE TANKS WITH MAX 600mm GAP BETWEEN THEM. THERE MUST BE A MINIMUM 6400mm GAP TO THE NEXT GROUP OF TANKS

D - PLAN AT BASE
SCALE NTS

NON-EXPANSIVE SOILS



E - SECTION THRU COLLAR
SCALE NTS

NOTE: USE THE APD GROUND ANCHOR CALCULATOR TO DETERMINE NUMBER, SPACING AND REQUIREMENT FOR GROUND ANCHORS. SITE SPECIFIC REPORTS OR WATER TABLE INFORMATION ARE REQUIRED TO PROVE THE NON-REQUIREMENT OF GROUND ANCHORS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR AND THE OWNER TO ENSURE CORRECT TANK INSTALLATION IN ACCORDANCE WITH THE APD LTD INSTALLATION GUIDES AND THESE DRAWINGS.

TANK LOCATION - PROXIMITY TO NEARBY STRUCTURES:

THE LOCATION OF THE TANK EXCAVATION IS THE RESPONSIBILITY OF THE CONTRACTOR AND THE TANK OWNER. THE CONTRACTOR IS TO FOLLOW THE LIMITATIONS OF THE DIAGRAMS SHOWN OR NOTIFY A CHARTERED PROFESSIONAL ENGINEER FOR A SITE SPECIFIC CONSULTATION.
THE CONTRACTOR IS TO ENSURE NEARBY FOUNDATIONS OF NEW AND / OR EXISTING STRUCTURES ARE NOT UNDERMINED BY THE EXCAVATION FOR THE TANK.

EXCAVATION CLEARANCE:

THE CONTRACTOR IS TO ENSURE A MINIMUM OF 200mm BETWEEN EDGE OF TANK AND EDGE OF EXCAVATION WALL AT THE NARROWEST LOCATION.

SOIL CONDITIONS:

THIS DESIGN ASSUMES SITE SOILS WILL MEET THE REQUIREMENTS OF NZS3604:2011 CLASSIFICATION OF 'GOOD GROUND'. THE CONTRACTOR IS TO CONFIRM THE SITE EXHIBITS THESE PROPERTIES OR NOTIFY A CHARTERED PROFESSIONAL ENGINEER FOR CONSULTATION. FOR IL2, 50 YEARS DESIGN LIFE, Z <= 0.4

TEMPORARY SUPPORT & SHORING:

TEMPORARY SUPPORT AND SHORING DURING EXCAVATION AND PREPARATION IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHOULD BE IN ACCORDANCE WITH HEALTH AND SAFETY AT WORK ACT 2015 (HSWA), THE HEALTH AND SAFETY AT WORK (GENERAL RISK AND WORKPLACE MANAGEMENT) REGULATIONS 2016 (GRWM REGULATIONS) AND THE HEALTH AND SAFETY IN EMPLOYMENT REGULATIONS 1995 (HSE REGULATIONS), REGULATION 24 FOR EXCAVATIONS WITH FACE MORE THAN 1.5m HIGH (AS BELOW):

1) SUBJECT TO SUBCLAUSE (2) OF THIS REGULATION, EVERY EMPLOYER SHALL TAKE ALL PRACTICABLE STEPS TO ENSURE THAT, WHERE ANY FACE OF ANY EXCAVATION IS MORE THAN 1.5m HIGH, THAT FACE IS SHORED.
2) SUBCLAUSE (1) OF THIS REGULATION DOES NOT APPLY WHERE:

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b) THE MATERIAL IN THE FACE IS OF PROVEN GOOD STANDING QUALITY UNDER ALL REASONABLY FORESEEABLE CONDITIONS OF WORK AND WEATHER; OR
c) BY REASON OF THE NATURE OF THE WORK AND THE POSITION OF ANY EMPLOYEE IN THE VICINITY, THERE IS NO DANGER TO ANY EMPLOYEE; OR
d) THE PROVISION OF SHORING IS IMPRACTICABLE OR UNREASONABLE BY REASON OF THE NATURE OF THE WORK AND THE EMPLOYER TAKES ALL PRACTICABLE STEPS TO ENSURE THAT OTHER PRECAUTIONS ARE TAKEN TO MAKE THE FACE AS SAFE AS POSSIBLE IN THE CIRCUMSTANCES.

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BACKFILL AND BASECOURSE:

BACKFILL AND BASECOURSE MATERIAL TO BE EITHER:

CRUSHED STONE OR GRAVEL: WASHED, WITH ANGULAR PARTICLE SIZES NO LARGER THAN 20mm WITH NO MORE THAN 5% PASSING A 2.36mm SIEVE. DRY DENSITY MUST NOT BE LESS THAN 1500 Kg / CUBIC METRE. APPROVED BACKFILL SHOULD NOT BE MIXED WITH SAND OR NATIVE SOILS AND SHOULD ALWAYS BE BROUGHT UP TO AT LEAST 150MM ABOVE TANK CROWN LEVEL. THE USE OF NON-SPECIFIED BACKFILL MATERIAL COULD RESULT IN TANK FAILURE. GAP20 IS ACCEPTABLE.

OR IF CRUSHED STONE OR GRAVEL IS NOT AVAILABLE, THEN SPECIFIC QUARRY AGGREGATE MIX OF
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CONTRACTOR TO FOLLOW MATERIAL SPECIFICATION AND LIMITS OF LOCATION WITH RELATION TO STRUCTURES AND RETAINING WALLS

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MAXIMUM BURIED COVER DEPTH OVER TOP OF TANKS:
- 1200mm DIA - MAX. BURIED COVER IS 900mm, OR 1200mm FOR TANK WITH REINFORCED ENDS
- STANDARD RISER 650mm, CAN BE EXTENDED TO HIGHER ON REQUEST.
- 645mm, 800mm, 1000mm DIA - MAX. BURIED COVER IS 900mm.
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REVISION:	DATE:	No.:
REVISED FOR CONSENT	01-04-22	2
FOR CONSENT	05-12-21	1

JOB TITLE:
UNDER COMMERCIAL DRIVEWAY, TWO TANKS SIDE BY SIDE (AXLE LOAD 120kN OR LESS) INSTALLATION OF APD TANKS

ADDRESS:
ALL NEW ZEALAND LOCATIONS

DRAWING TITLE:
TANKS UNDER COMMERCIAL DRIVEWAY - NON EXPANSIVE SOILS WITH GROUND ANCHORS

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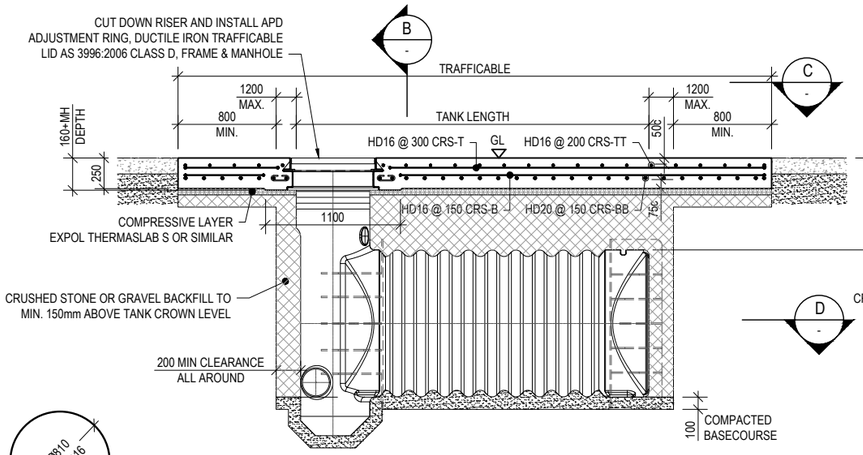
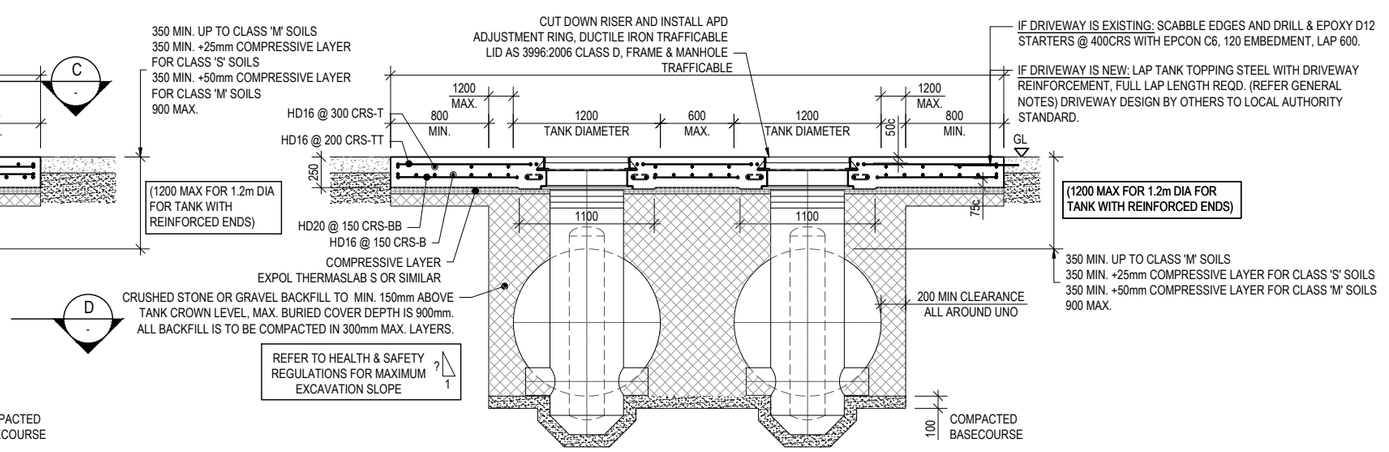
ORIGINAL SHEET SIZE:	A3	JOB No:	DT-02
DRAWN:	RCE	DRAWING No:	CS-04
DATE:	OCT 2021	REVISION No:	2
DESIGN:	AG	SCALE:	NTS NTS
CHECKED:			

APD LTD
49 McLaughlins Road, Wiri, Auckland, New Zealand
TEL: 00 64 9 263 7741
www.apd.co.nz

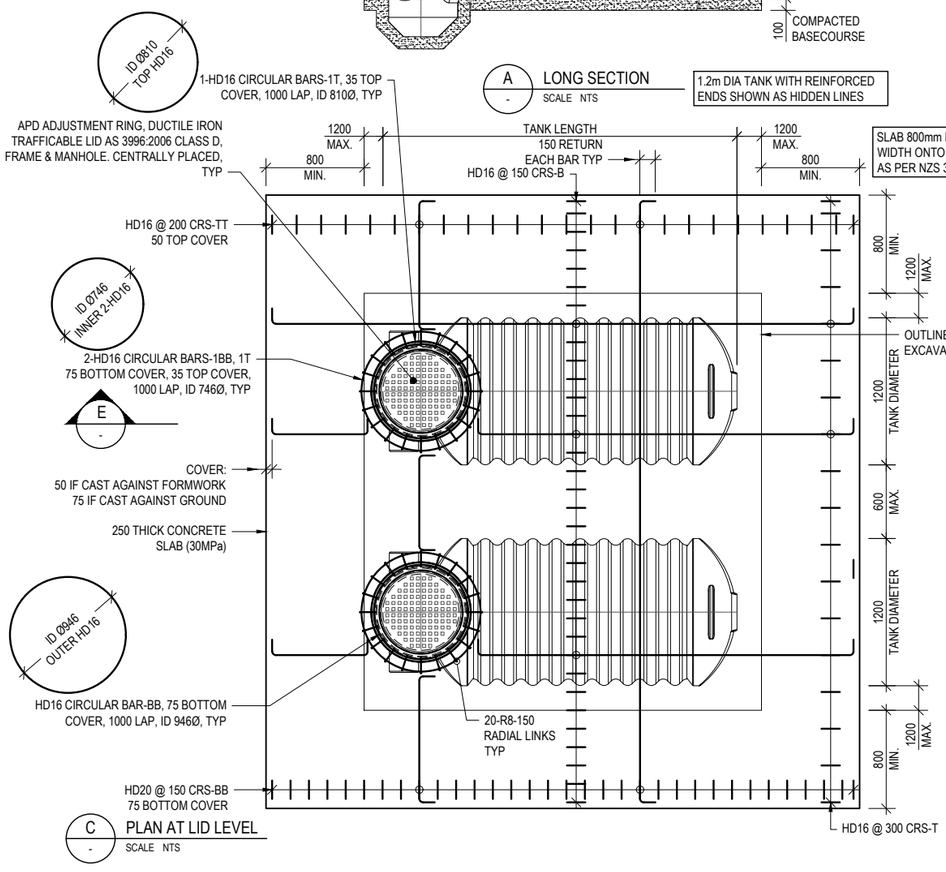




A - LONG SECTION — SCALE NTS

1.2m DIA TANK WITH REINFORCED ENDS SHOWN AS HIDDEN LINES

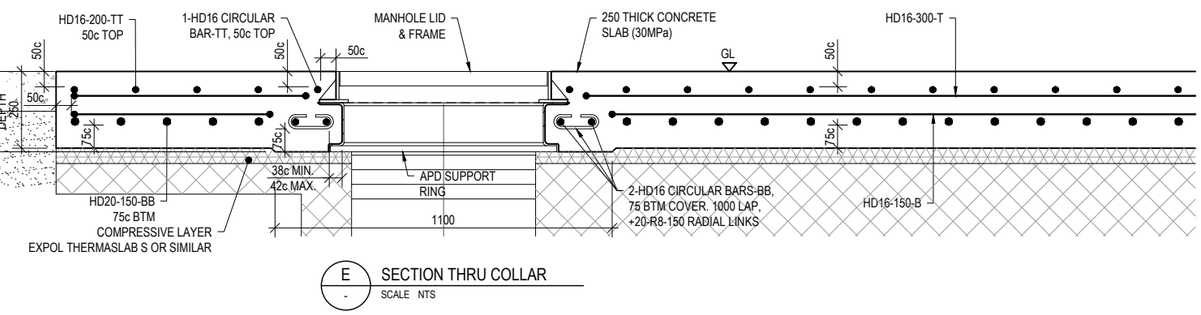
B - CROSS SECTION — SCALE NTS



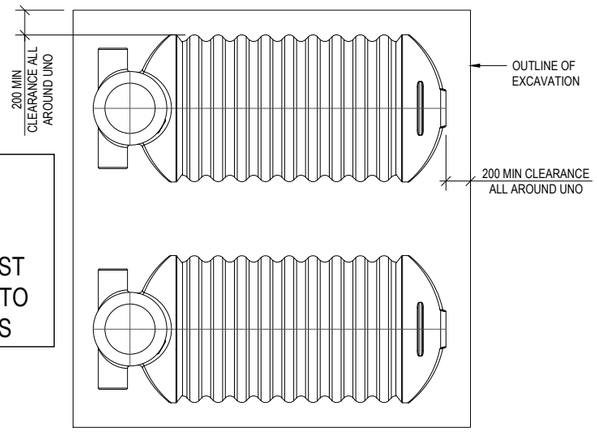
C - PLAN AT LID LEVEL — SCALE NTS

SLAB 800mm MIN BEDDING WIDTH ONTO GOOD GROUND AS PER NZS 3604 : 2011

EXPANSIVE SOILS UP TO CLASS M



E - SECTION THRU COLLAR — SCALE NTS



FOR MULTIPLE TANKS:
A GROUP OF THREE TANKS WITH MAX 600mm GAP BETWEEN THEM. THERE MUST BE A MINIMUM 6400mm GAP TO THE NEXT GROUP OF TANKS

D - PLAN AT BASE — SCALE NTS

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MAXIMUM BURIED COVER DEPTH OVER TOP OF TANKS:
- 1200mm DIA - MAX. BURIED COVER IS 900mm, OR 1200mm FOR TANK WITH REINFORCED ENDS STANDARD RISER 650mm, CAN BE EXTENDED TO HIGHER ON REQUEST.
- 645mm, 800mm, 1000mm DIA - MAX. BURIED COVER IS 900mm. STANDARD RISER 350mm, CAN BE EXTENDED ON REQUEST.

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UNO - UNLESS NOTED OTHERWISE

REFER TO STRUCTURAL SPECIFICATION SHEET FOR CONCRETE REINFORCING AND OTHER NOTES

SLAB DESIGNED FOR HN LOADS AS PER NZTA BRIDGE MANUAL SP/M/022 2014 SECTION 3.2 AND D1:

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UP TO AS2870 EXPANSIVITY CLASS M
FOR EXPANSIVE GROUND CLASS S ADD A 25mm COMPRESSIVE LAYER DIRECTLY UNDER THE CONCRETE DRIVEWAY SLAB.
FOR EXPANSIVE GROUND CLASS M ADD A 50mm COMPRESSIVE LAYER DIRECTLY UNDER THE CONCRETE DRIVEWAY SLAB.
COMMPRESSIVE LAYER EXAMPLE:
EXPOL THERMASLAB S OR SIMILAR

REVISION:	DATE:	No.:
REVISED FOR CONSENT	01-04-22	2
FOR CONSENT	05-12-21	1

JOB TITLE:
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ADDRESS:
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DRAWING TITLE:
TANKS UNDER COMMERCIAL DRIVEWAY - EXPANSIVE SOILS UP TO CLASS M

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ORIGINAL SHEET SIZE:	A3	JOB No:	DT-02
DRAWN:	RCE	DRAWING No:	CS-05
DATE:	OCT 2021	REVISION No:	2
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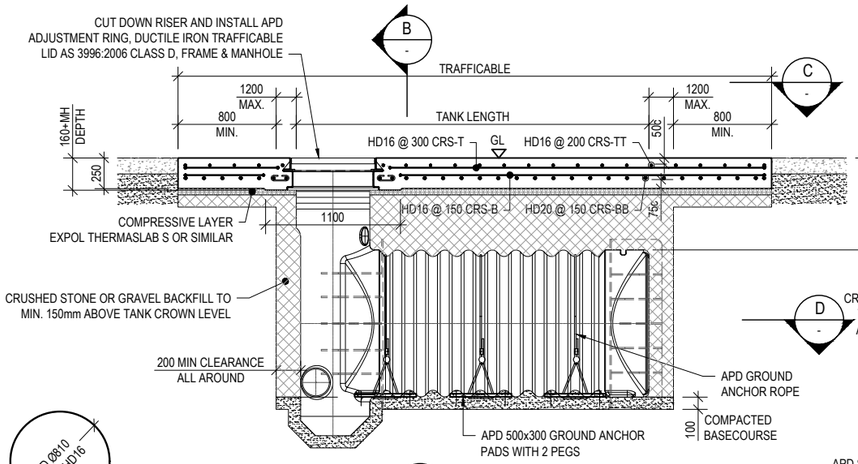
APD LTD
49 McLaughlins Road, Wiri, Auckland,
New Zealand
TEL: 00 64 9 263 7741
www.apd.co.nz



A LONG SECTION
SCALE NTS

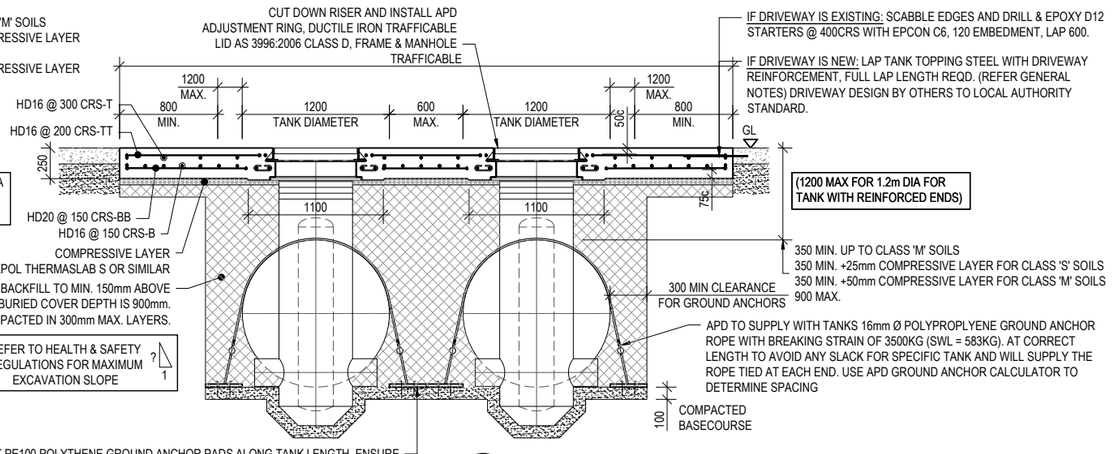
1.2m DIA TANK WITH REINFORCED ENDS SHOWN AS HIDDEN LINES

350 MIN. UP TO CLASS 'M' SOILS
350 MIN. +25mm COMPRESSIVE LAYER FOR CLASS 'S' SOILS
350 MIN. +50mm COMPRESSIVE LAYER FOR CLASS 'M' SOILS
900 MAX.

(1200 MAX FOR 1.2m DIA FOR TANK WITH REINFORCED ENDS)

D
CRUSHED STONE OR GRAVEL BACKFILL TO MIN. 150mm ABOVE TANK CROWN LEVEL, MAX. BURIED COVER DEPTH IS 900mm. ALL BACKFILL IS TO BE COMPACTED IN 300mm MAX. LAYERS.

REFER TO HEALTH & SAFETY REGULATIONS FOR MAXIMUM EXCAVATION SLOPE ? 1



IF DRIVEWAY IS EXISTING: SCABBLE EDGES AND DRILL & EPOXY D12 STARTERS @ 400CRS WITH EPCON C6, 120 EMBEDMENT, LAP 600.

IF DRIVEWAY IS NEW: LAP TANK TOPPING STEEL WITH DRIVEWAY REINFORCEMENT, FULL LAP LENGTH REQD. (REFER GENERAL NOTES) DRIVEWAY DESIGN BY OTHERS TO LOCAL AUTHORITY STANDARD.

(1200 MAX FOR 1.2m DIA FOR TANK WITH REINFORCED ENDS)

350 MIN. UP TO CLASS 'M' SOILS
350 MIN. +25mm COMPRESSIVE LAYER FOR CLASS 'S' SOILS
350 MIN. +50mm COMPRESSIVE LAYER FOR CLASS 'M' SOILS
900 MAX.

APD TO SUPPLY WITH TANKS 16mm Ø POLYPROPLYENE GROUND ANCHOR ROPE WITH BREAKING STRAIN OF 3500KG (SWL = 583KG). AT CORRECT LENGTH TO AVOID ANY SLACK FOR SPECIFIC TANK AND WILL SUPPLY THE ROPE TIED AT EACH END. USE APD GROUND ANCHOR CALCULATOR TO DETERMINE SPACING

APD SUPPLIED 500x300x25 THICK PE100 POLYTHENE GROUND ANCHOR PADS ALONG TANK LENGTH. ENSURE ANCHOR IS LEVEL AND IS OUTSIDE THE LINE OF THE TANK DIAMETER. C/W 2 SECURING PEGS TO PREVENT PAD SLIPPAGE WHEN BACKFILLING. USE APD GROUND ANCHOR CALCULATOR TO DETERMINE SPACING

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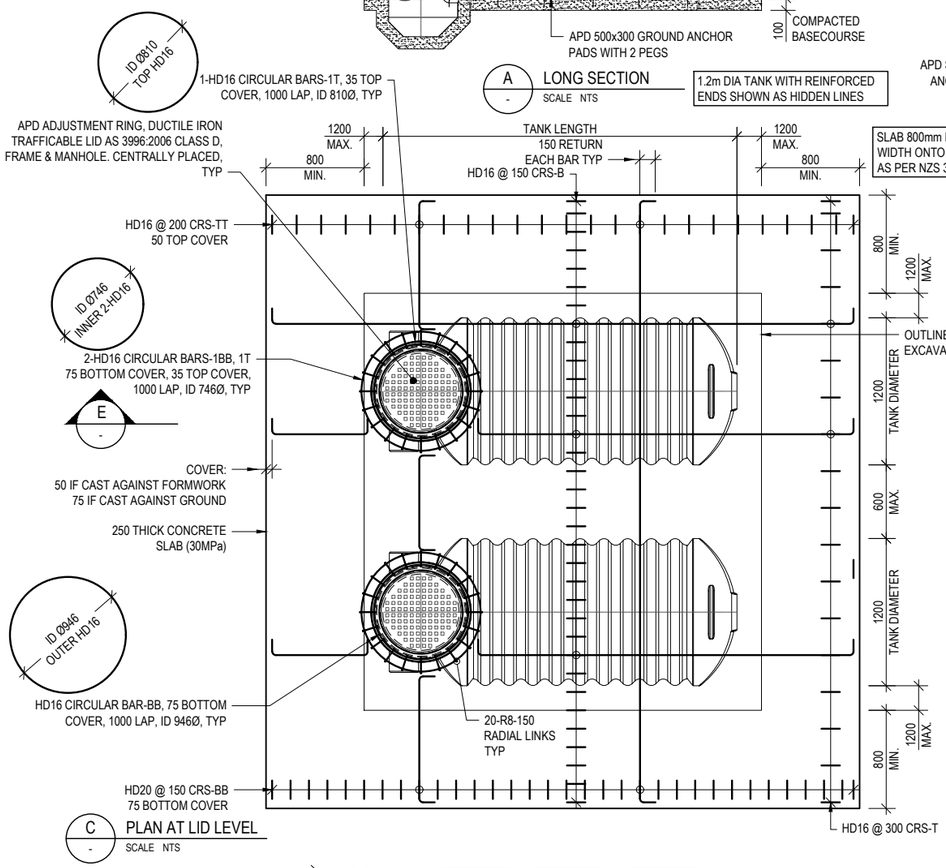
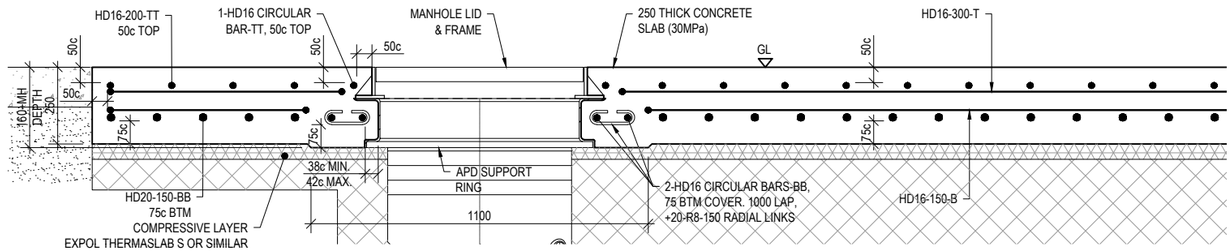


C PLAN AT LID LEVEL
SCALE NTS

SLAB 800mm MIN BEDDING WIDTH ONTO GOOD GROUND AS PER NZS 3604 : 2011

EXPANSIVE SOILS UP TO CLASS M



E SECTION THRU COLLAR
SCALE NTS

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TEMPORARY SUPPORT & SHORING:

TEMPORARY SUPPORT AND SHORING DURING EXCAVATION AND PREPARATION IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHOULD BE IN ACCORDANCE WITH HEALTH AND SAFETY AT WORK ACT 2015 (HSWA), THE HEALTH AND SAFETY AT WORK (GENERAL RISK AND WORKPLACE MANAGEMENT) REGULATIONS 2016 (GRWM REGULATIONS) AND THE HEALTH AND SAFETY IN EMPLOYMENT REGULATIONS 1995 (HSE REGULATIONS), REGULATION 24 FOR EXCAVATIONS WITH FACE MORE THAN 1.5m HIGH (AS BELOW):

1) SUBJECT TO SUBCLAUSE (2) OF THIS REGULATION, EVERY EMPLOYER SHALL TAKE ALL PRACTICABLE STEPS TO ENSURE THAT, WHERE ANY FACE OF ANY EXCAVATION IS MORE THAN 1.5m HIGH, THAT FACE IS SHORED.
2) SUBCLAUSE (1) OF THIS REGULATION DOES NOT APPLY WHERE:

a) THE FACE IS CUT BACK TO A SAFE SLOPE; OR
b) THE MATERIAL IN THE FACE IS OF PROVEN GOOD STANDING QUALITY UNDER ALL REASONABLY FORESEEABLE CONDITIONS OF WORK AND WEATHER; OR
c) BY REASON OF THE NATURE OF THE WORK AND THE POSITION OF ANY EMPLOYEE IN THE VICINITY, THERE IS NO DANGER TO ANY EMPLOYEE; OR
d) THE PROVISION OF SHORING IS IMPRACTICABLE OR UNREASONABLE BY REASON OF THE NATURE OF THE WORK AND THE EMPLOYER TAKES ALL PRACTICABLE STEPS TO ENSURE THAT OTHER PRECAUTIONS ARE TAKEN TO MAKE THE FACE AS SAFE AS POSSIBLE IN THE CIRCUMSTANCES.

3) EVERY EMPLOYER SHALL TAKE ALL PRACTICABLE STEPS TO ENSURE THAT ANY SHORING USED IN ANY EXCAVATION AT THE PLACE OF WORK:

a) CONSISTS OF MATERIALS THAT ARE SUITABLE FOR THE PURPOSE FOR WHICH THEY ARE TO BE USED, OF SOUND QUALITY, AND ADEQUATE STRENGTH FOR THE PARTICULAR USE; AND
b) HAS BRACING'S, JACKS, AND STRUTS THAT ARE SECURELY HELD TO PREVENT ACCIDENTAL DISPLACEMENT, AND PACKING'S AND WEDGES THAT ARE HELD BY NAILS OR SPIKES; AND
c) IS PLACED IN A PROPER MANNER BY A BY AN EXPERIENCED PERSON UNDER COMPETENT SUPERVISION; AND
d) IS NOT ALTERED, DISMANTLED. OR INTERFERED WITH EXCEPT ON THE INSTRUCTIONS OF THE EMPLOYER OR A REPRESENTATIVE OF THE EMPLOYER.

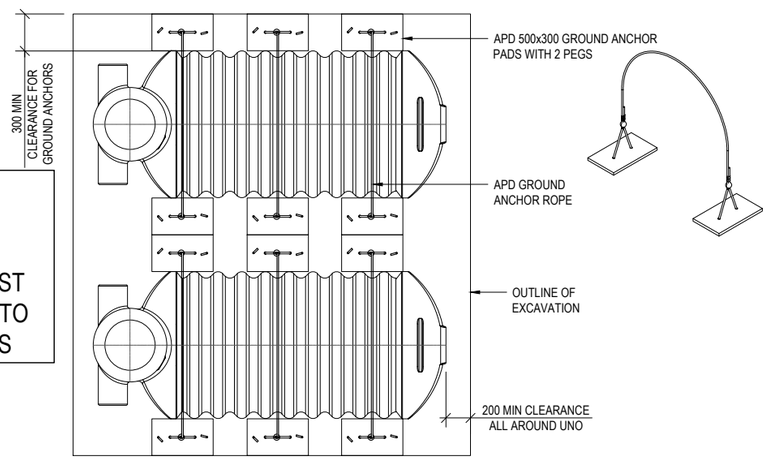
BACKFILL AND BASECOURSE:

BACKFILL AND BASECOURSE MATERIAL TO BE EITHER:

CRUSHED STONE OR GRAVEL: WASHED, WITH ANGULAR PARTICLE SIZES NO LARGER THAN 20mm WITH NO MORE THAN 5% PASSING A 2.36mm SIEVE. DRY DENSITY MUST NOT BE LESS THAN 1500 Kg / CUBIC METRE. APPROVED BACKFILL SHOULD NOT BE MIXED WITH SAND OR NATIVE SOILS AND SHOULD ALWAYS BE BROUGHT UP TO AT LEAST 150MM ABOVE TANK CROWN LEVEL. THE USE OF NON-SPECIFIED BACKFILL MATERIAL COULD RESULT IN TANK FAILURE. GAP20 IS ACCEPTABLE.

OR IF CRUSHED STONE OR GRAVEL IS NOT AVAILABLE, THEN SPECIFIC QUARRY AGGREGATE MIX OF
NATURALLY ROUNDED GRAVEL: CLEAN NATURALLY ROUNDED AGGREGATE WITH PARTICLE SIZES NO LARGER THAN 19mm WITH NO MORE THAN 5% PASSING A 2.36mm SIEVE. DRY DENSITY MUST NOT BE LESS THAN 1500 Kg / CUBIC METRE.

THE CONTRACTOR IS TO WORK IN MAXIMUM BACKFILL LIFTS OF 300mm. AFTER EACH LIFT, THE CONTRACTOR TO USE LONG HANDLED PROBE TO WORK THE BACKFILL MATERIAL UNDER THE ENTIRE LENGTH OF THE TANK AND WITHIN ANY RIBS. ALL VOIDS AND SPACES SHOULD BE FILLED TO ENSURE ADEQUATE SUPPORT OF TANK.



D PLAN AT BASE
SCALE NTS

FOR MULTIPLE TANKS:
A GROUP OF THREE TANKS WITH MAX 600mm GAP BETWEEN THEM. THERE MUST BE A MINIMUM 6400mm GAP TO THE NEXT GROUP OF TANKS

NOTES:

CONTRACTOR TO CONFIRM ALL LEVELS AND DIMENSIONS AND LOCATE AND MARK ALL SERVICES & DRAINS ON SITE BEFORE COMMENCING WORK

CONTRACTOR TO FOLLOW MATERIAL SPECIFICATION AND LIMITS OF LOCATION WITH RELATION TO STRUCTURES AND RETAINING WALLS

CONTRACTOR TO NOTIFY A CHARTERED PROFESSIONAL ENGINEER IF ANY OF THE DESIGN REQUIREMENTS OUTLINED IN THIS DRAWING PACKAGE ARE NOT ACHIEVEABLE

MAXIMUM BURIED COVER DEPTH OVER TOP OF TANKS:
- 1200mm DIA - MAX. BURIED COVER IS 900mm, OR 1200mm FOR TANK WITH REINFORCED ENDS
- STANDARD RISER 650mm, CAN BE EXTENDED TO HIGHER ON REQUEST.
- 645mm, 800mm, 1000mm DIA - MAX. BURIED COVER IS 900mm.
- STANDARD RISER 350mm, CAN BE EXTENDED ON REQUEST.

IF YOU NEED TO BURY YOUR TANK DEEPER THAN ABOVE PLEASE CONTACT APD LTD FOR OTHER OPTIONS

DEFINITIONS:
UNO - UNLESS NOTED OTHERWISE

REFER TO STRUCTURAL SPECIFICATION SHEET FOR CONCRETE REINFORCING AND OTHER NOTES

SLAB DESIGNED FOR HN LOADS AS PER NZTA BRIDGE MANUAL SP/M/022 2014 SECTION 3.2 AND D1:

CONTRACTOR AND TANK OWNER TO ENSURE TANK IS PLACED IN A POSITION THAT WILL NOT EXCEED: PAIR OF AXLE LOADS OF 120kN EACH. TRAFFIC COUNT LESS THAN 100 VEHICLES PER DAY & LOW SPEED ZONES.

UP TO AS2870 EXPANSIVITY CLASS M
FOR EXPANSIVE GROUND CLASS S ADD A 25mm COMPRESSIVE LAYER DIRECTLY UNDER THE CONCRETE DRIVEWAY SLAB.
FOR EXPANSIVE GROUND CLASS M ADD A 50mm COMPRESSIVE LAYER DIRECTLY UNDER THE CONCRETE DRIVEWAY SLAB.
COMMPRESSIVE LAYER EXAMPLE:
EXPOL THERMASLAB S OR SIMILAR

REVISION:	DATE:	No.:
REVISED FOR CONSENT	01-04-22	2
FOR CONSENT	05-12-21	1

JOB TITLE:
UNDER COMMERCIAL DRIVEWAY, TWO TANKS SIDE BY SIDE (AXLE LOAD 120kN OR LESS) INSTALLATION OF APD TANKS

ADDRESS:
ALL NEW ZEALAND LOCATIONS

DRAWING TITLE:
TANKS UNDER COMMERCIAL DRIVEWAY - EXPANSIVE SOILS UP TO CLASS M WITH GROUND ANCHORS

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ORIGINAL SHEET SIZE:	A3	JOB No:	DT-02
DRAWN:	RCE	DRAWING No:	CS-06
DATE:	OCT 2021	REVISION No:	2
DESIGN:	AG		
CHECKED:		SCALE:	NTS NTS

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