2015 CIVIL ENGINEERING DESIGN PROJECT

NORTH TERRACE DRAINAGE DESIGN

HYDRO FUTURE CONSULTING DRAWINGS

HYDRO FUTURE CONSULTING	DATE: 4.6.15	PROJECT: NORTH TERRACE DRAINAGE DESIGN			
		AUTHOR: FERGUS HAMILTON	DRG. No: HF-000	Approved By / Date: ANW/4.6.15	A3
		SCALE: -	CLIENT: Tonkin Consulting	SHEET 1 of 1	

SCHEDULE OF DRAWINGS

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HF-102 Long Section - DRAINS Output / Major Storm
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HF-104 Pit to Pipe Location
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HF-105B Bioretention Outlet Pipe Connection to the Designed Stormwater Pipe, Ch50
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HF-413B Concrete Slab Details for Rainwater Tank
HF-413C Concrete Slab Details for Rainwater Tank
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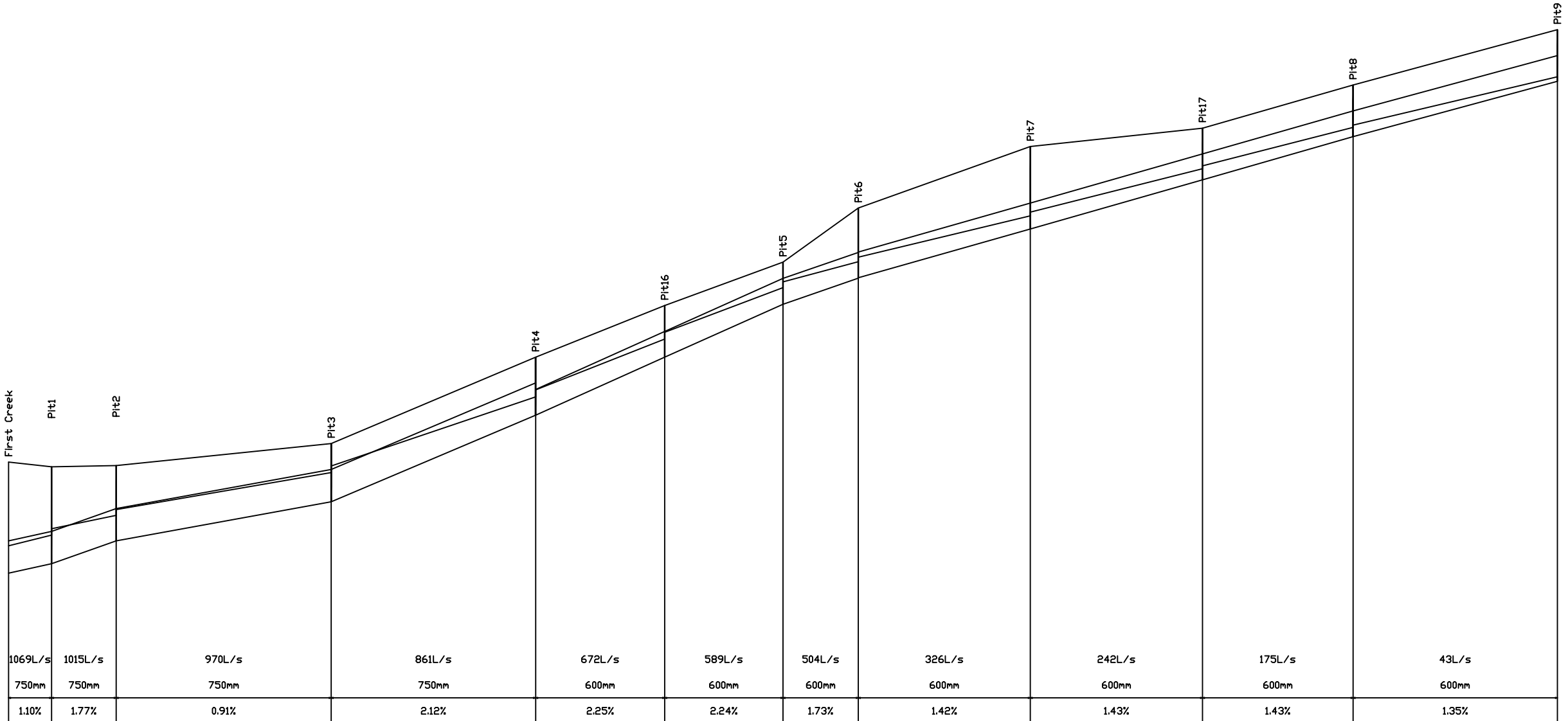
HF-414C Sandstone Arch Culvert - Dowel Connection
HF-414D Sandstone Arch Culvert - RC Details
HF-415 Timber Structure Support For Arch Culvert

HYDRO FUTURE CONSULTING

DRAWING TITLE: SCHEDULE OF DRAWINGS
DATE: 4.6.15
PROJECT: NORTH TERRACE DRAINAGE DESIGN
AUTHOR: FERGUS HAMILTON
DRG. No: HF-001
Approved By / Date: 7.6.15
A3
SCALE: -
CLIENT: Tonkin Consulting
SHEET 1 of 1



	1069L/s	1015L/s	970L/s	861L/s	672L/s	589L/s	504L/s	326L/s	242L/s	175L/s	43L/s
	750mm	750mm	750mm	750mm	600mm	600mm	600mm	600mm	600mm	600mm	600mm
	1.10%	1.77%	0.91%	2.12%	2.25%	2.24%	1.73%	1.42%	1.43%	1.43%	1.35%
	Datum El. 30										
HGL	35.034	35.283 / 35.432	35.741 / 35.878	36.738 / 36.889	38.496 / 38.658	39.843 / 40.000	41.035 / 41.172	41.637 / 41.745	42.706 / 42.790	43.800 / 43.869	44.760 / 44.815
Surface Level	36.98	36.87	36.9	37.411	39.421	40.62	41.63	42.885	44.315	44.744	45.745
Invert Level	34.400	34.620 / 35.150	35.150	36.061	38.071	39.420	40.650	41.256 / 41.265	42.400	43.544	44.545
Chainage	0	20	50	150	245	305	360	395	475	555	625

45.940
47.032
45.832
720

DRAWING TITLE:
LONGSECTION - DRAINS OUTPUT/ MINOR STORM

HYDRO FUTURE CONSULTING

DATE: 27.5.15

PROJECT:
NORTH TERRACE DRAINAGE DESIGN

AUTHOR: A WICKRAMARATNE

DRG. No: HF-101

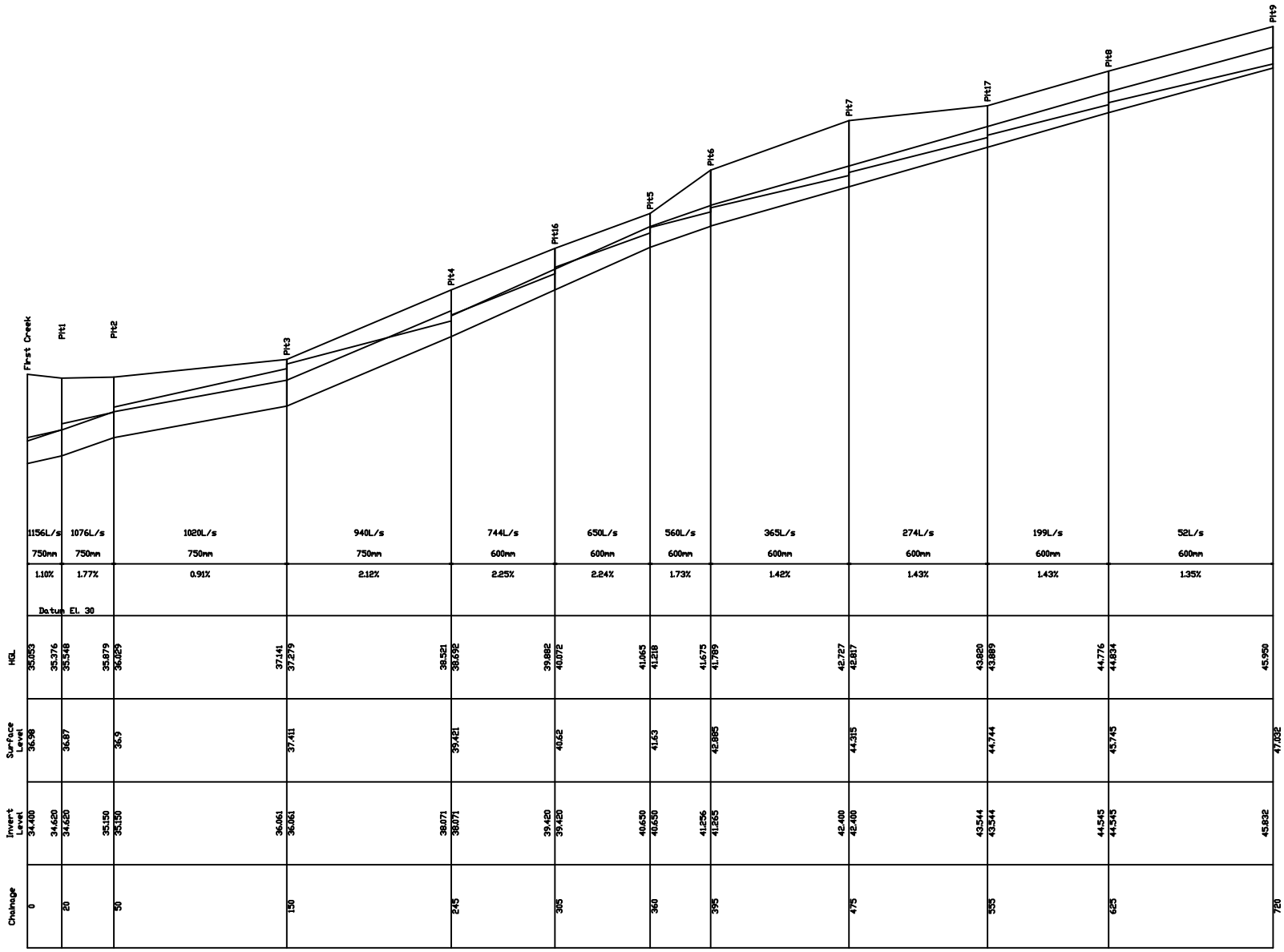
Approved By / Date: ANW/1.6.15

SCALE: 1:1540

CLIENT: Tonkin Consulting

SHEET 1 of 1

A3



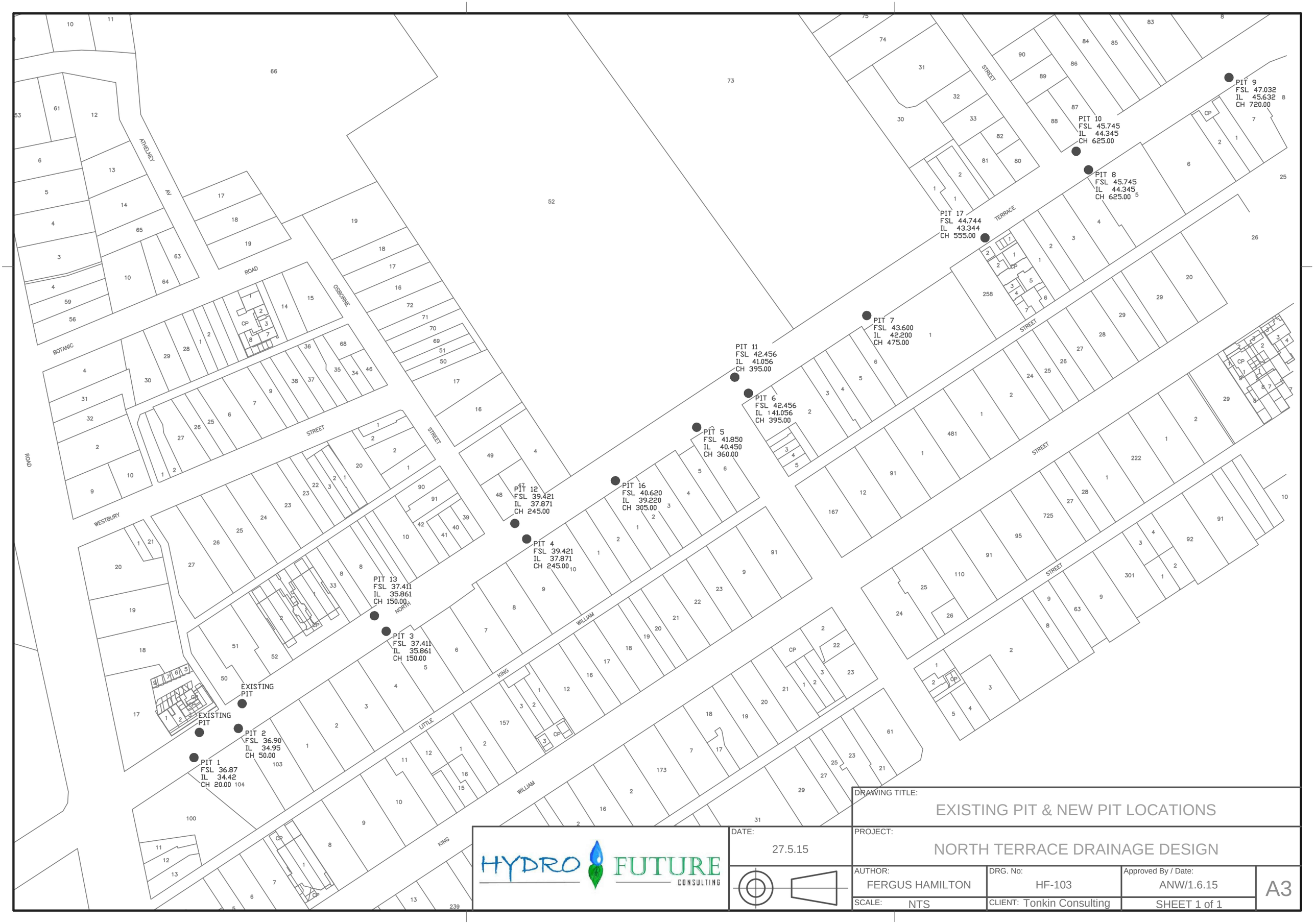
DRAWING TITLE:
LONGSECTION - DRAINS OUTPUT/ MAJOR STORM

HYDRO FUTURE CONSULTING

DATE: 27.5.15

PROJECT:
NORTH TERRACE DRAINAGE DESIGN

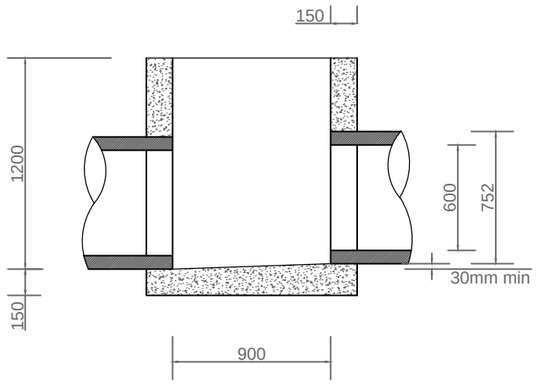
AUTHOR:	DRG. No:	Approved By / Date:	
A WICKRAMARATNE	HF-102	ANW/1.6.15	A3
SCALE: 1:1540	CLIENT: Tonkin Consulting	SHEET 1 of 1	



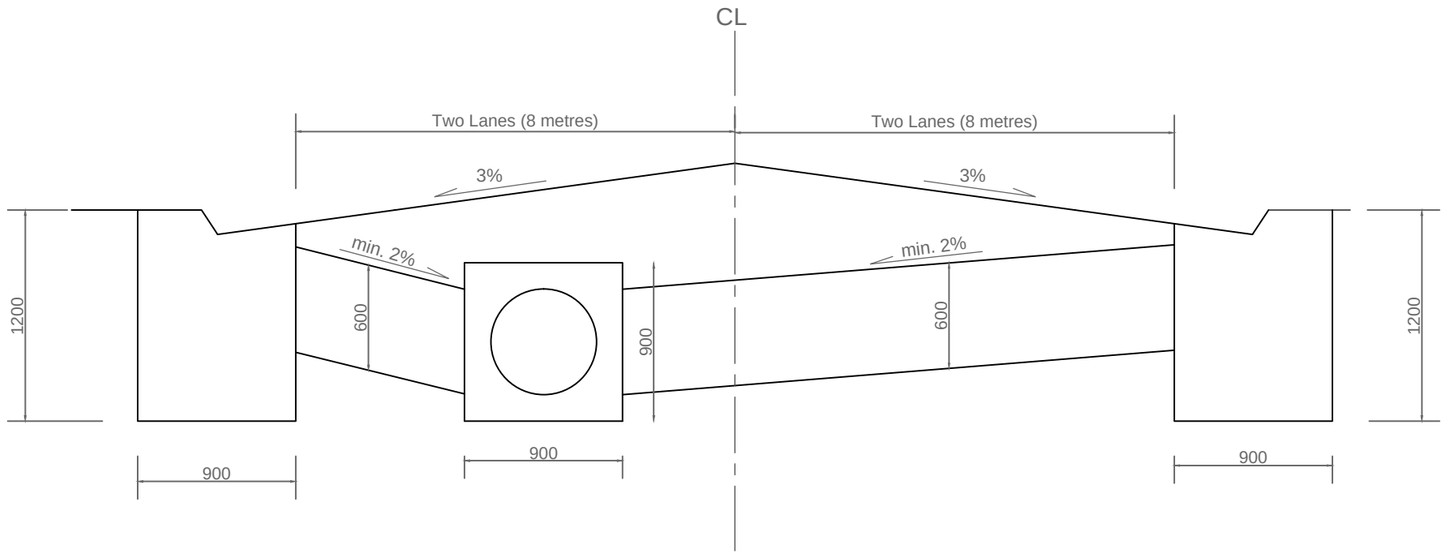
HYDRO FUTURE CONSULTING

DRAWING TITLE: EXISTING PIT & NEW PIT LOCATIONS			
DATE: 27.5.15	PROJECT: NORTH TERRACE DRAINAGE DESIGN		
	AUTHOR: FERGUS HAMILTON	DRG. No: HF-103	Approved By / Date: ANW/1.6.15
	SCALE: NTS	CLIENT: Tonkin Consulting	SHEET 1 of 1

A3



Pipe to Pit Connection



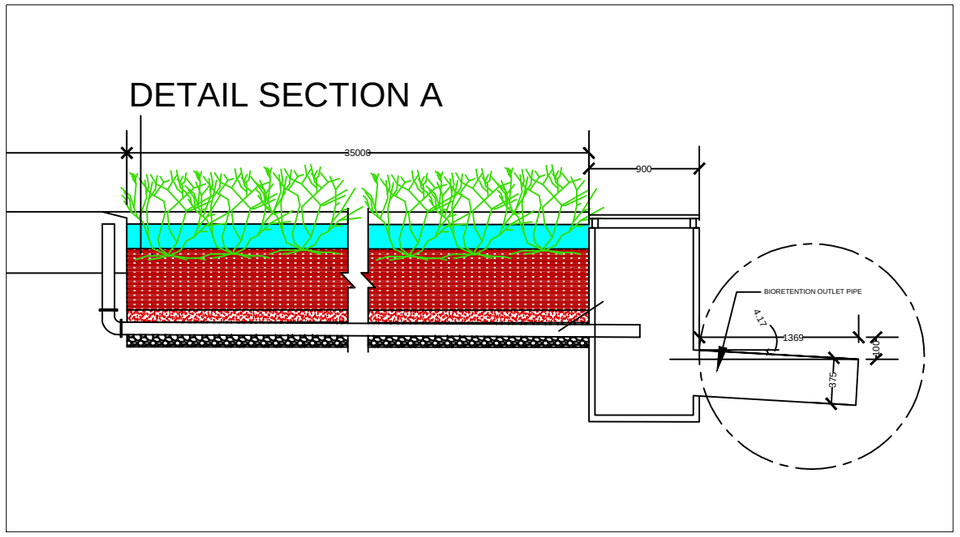
Cross Section at Chainage 100

Note: 1) Drainage pipe wall thickness = 76 mm.
2) Concrete pipe inner diameter = 600 mm.
3) Pit wall thickness = 150 mm.

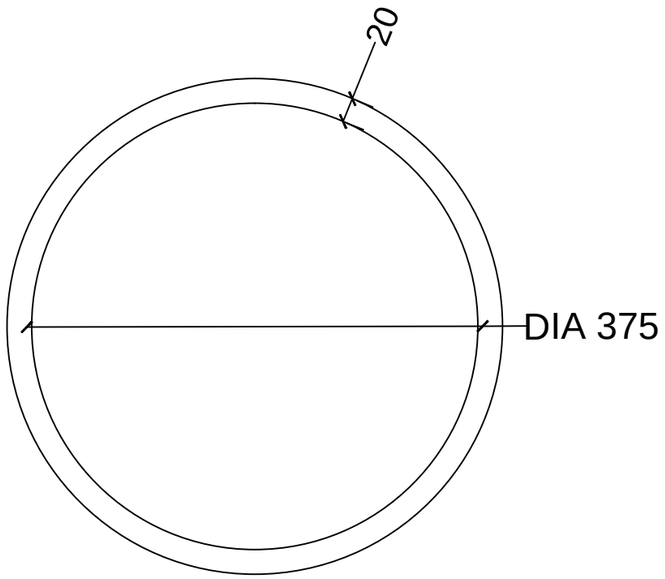
Note: At all other pit to pipe connection locations, pits will be 900mm in depth.

HYDRO FUTURE CONSULTING

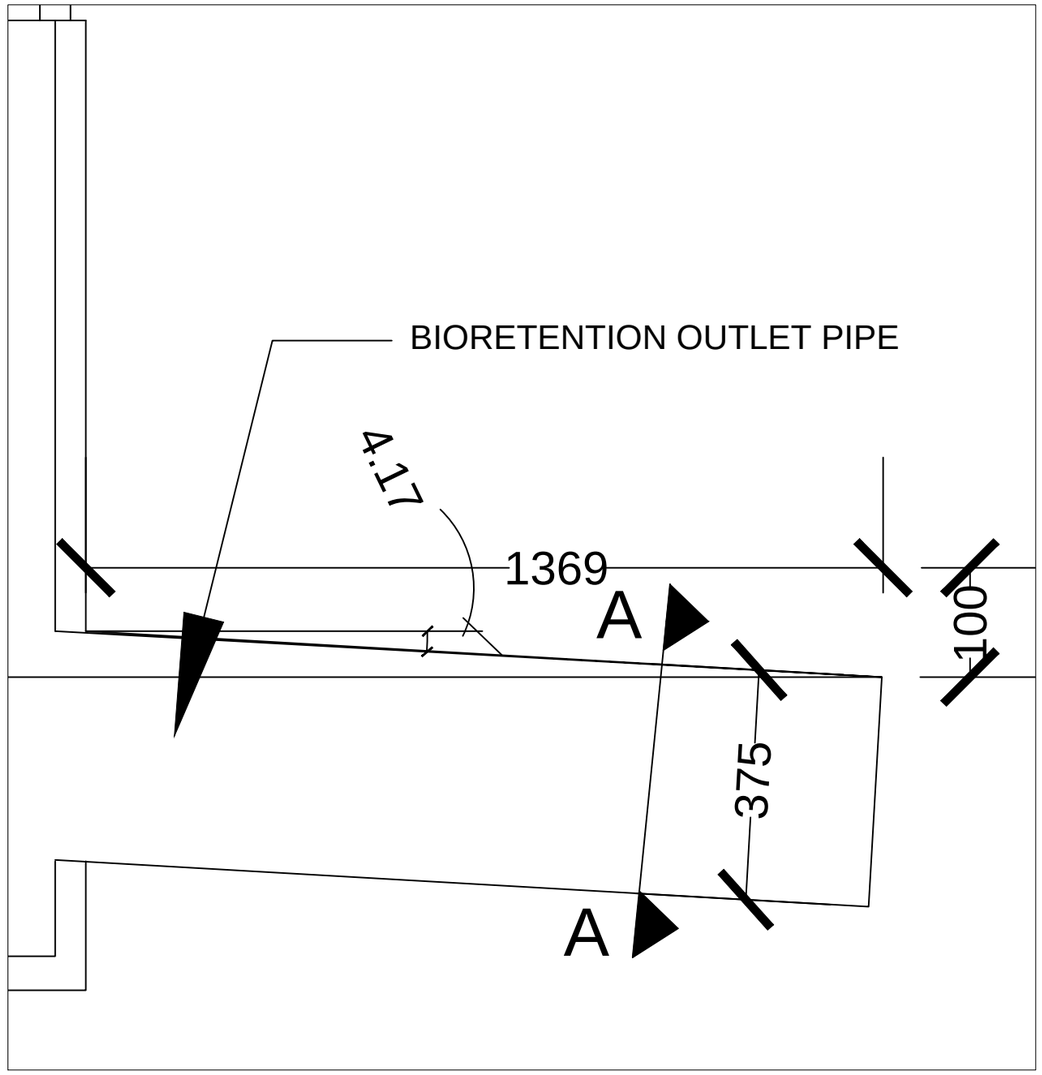
DRAWING TITLE: PIT TO PIPE CONNECTION				
DATE: 04.06.15	PROJECT: NORTH TERRACE DRAINAGE DESIGN			
	AUTHOR: MOHSEN ALNAMI	DRG. No: HF - 104	Approved By / Date: ANW / 4.6.15	A3
	SCALE: 1:25	CLIENT: Tonkin Consulting	SHEET 1 of 1	



SECTION OUTLET PIPE
scale: 1: 50



SECTION A-A
scale: 1: 5



DETAIL SECTION A
scale: 1:10

HYDRO FUTURE CONSULTING

DRAWING TITLE: BIORETENTION 1 OUTLET PIPE PLAN VIEW

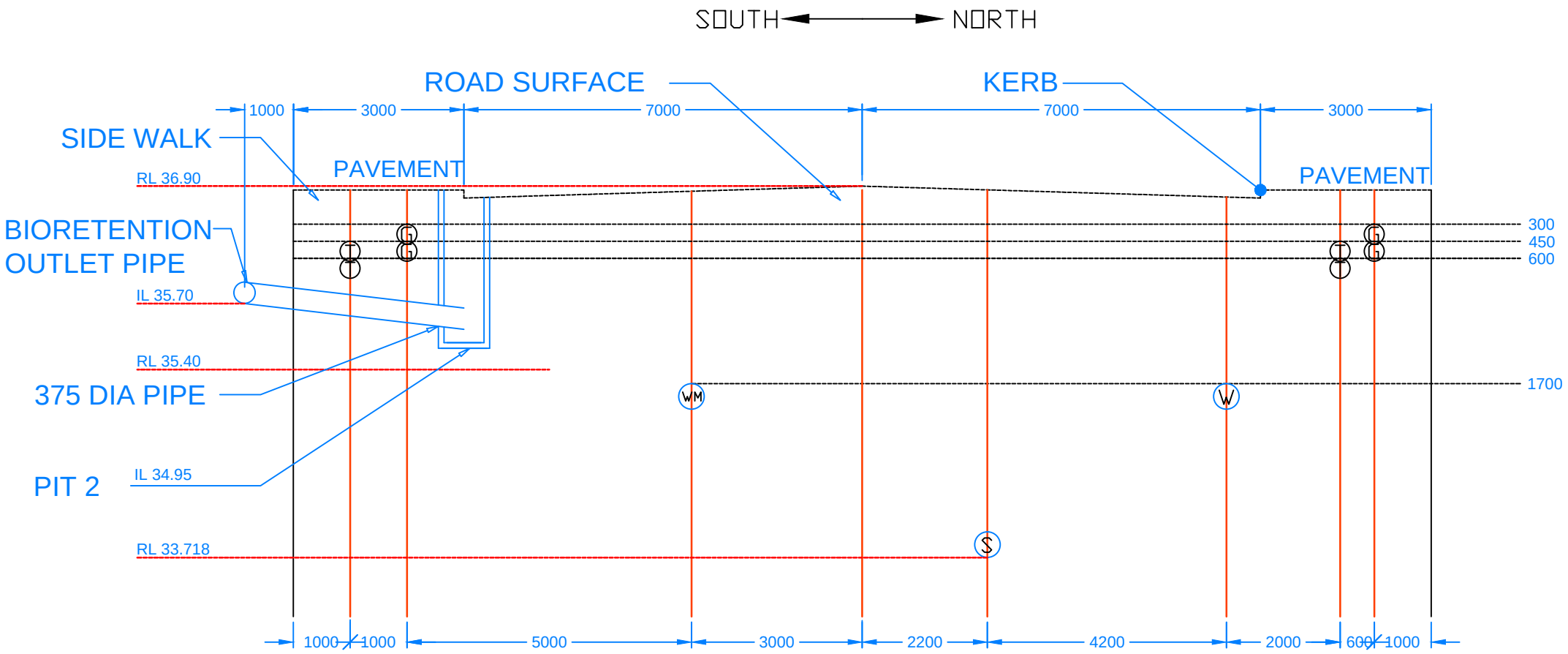
DATE: 03.06.15

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: H ALZAMEL | DRG. No: HF-105A | Approved By / Date: ANW/3.6.15

SCALE: AS SHOWN | CLIENT: Tonkin Consulting | SHEET 1 of 2

A3



BIORETENTION OUTLET CONNECTION SECTION

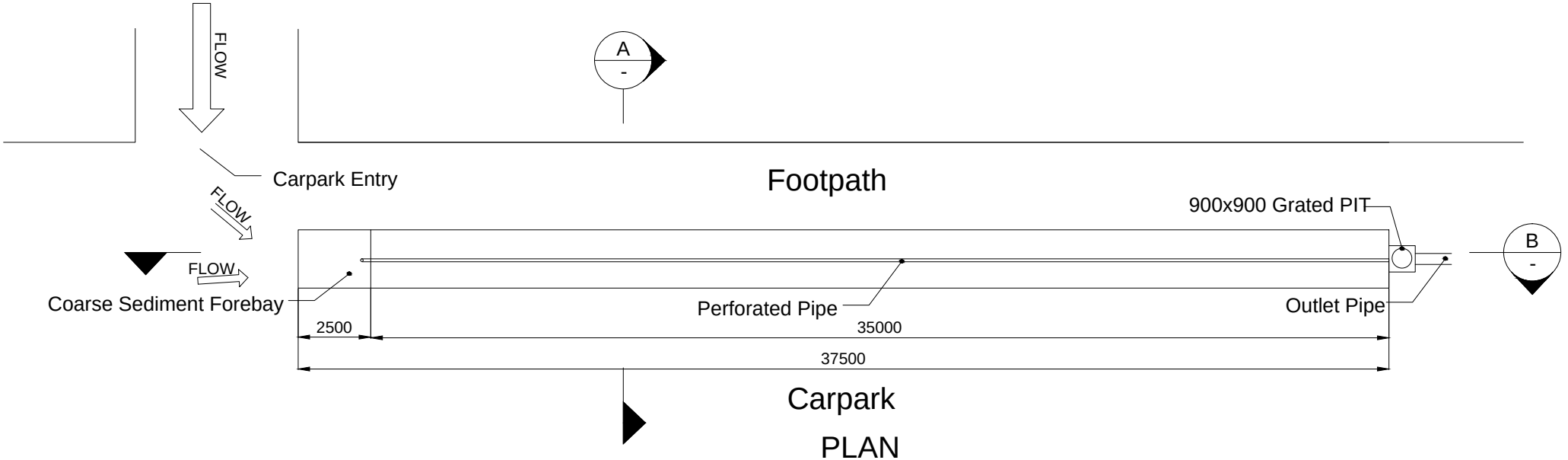
Legend

- Existing Gas Pipe
- Telecommunications Cable
- Existing Water Main
- Existing Sewer
- Existing Water
- New SW Pipe

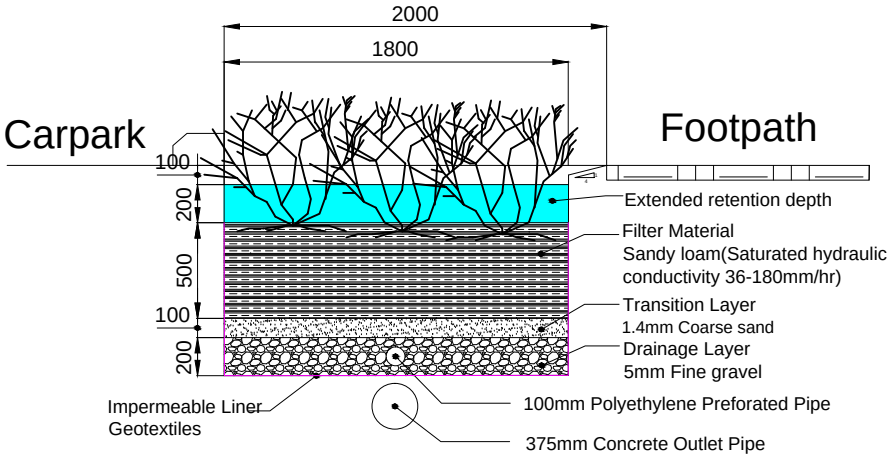
HYDRO FUTURE CONSULTING

DATE: 03.06.15	TITLE: BIORETENTION OUTLET PIPE CONNECTION TO THE DESIGNED STORMWATER PIPE; CHAINAGE 50		
	AUTHOR: H ALZAMEL	DRG. No: HF-105B	Approved By / Date: ANW - 3.6.15
	SCALE: 1:75	CLIENT: Tonkin Consulting	SHEET 2 of 2

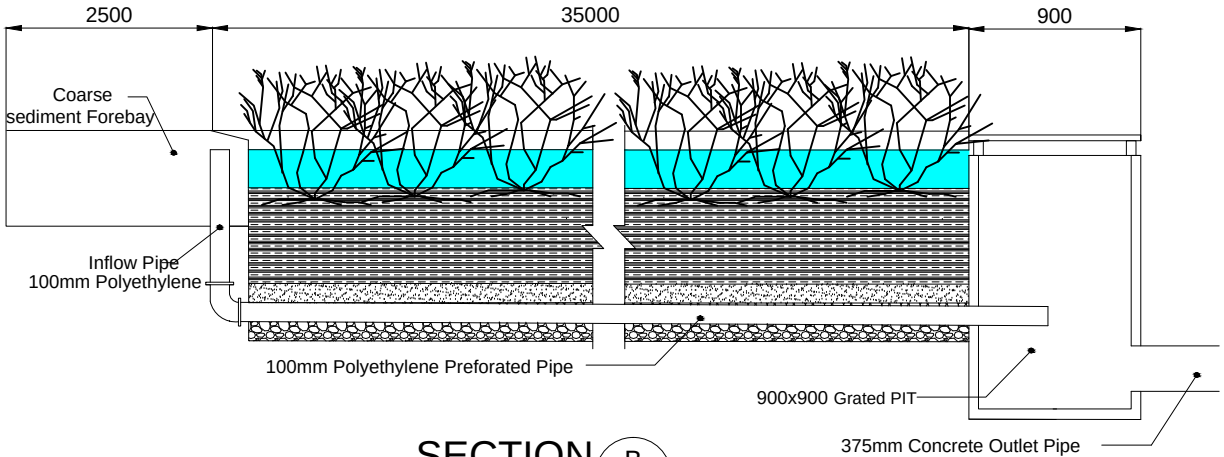
A3



PLAN
1:100



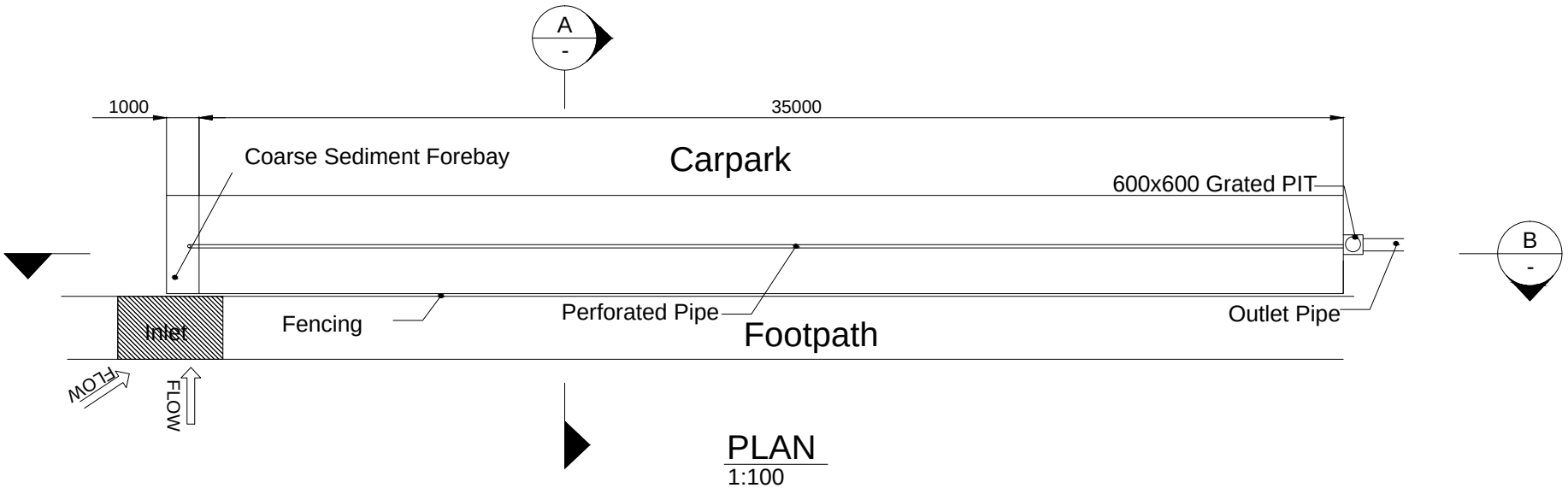
SECTION A
1:20



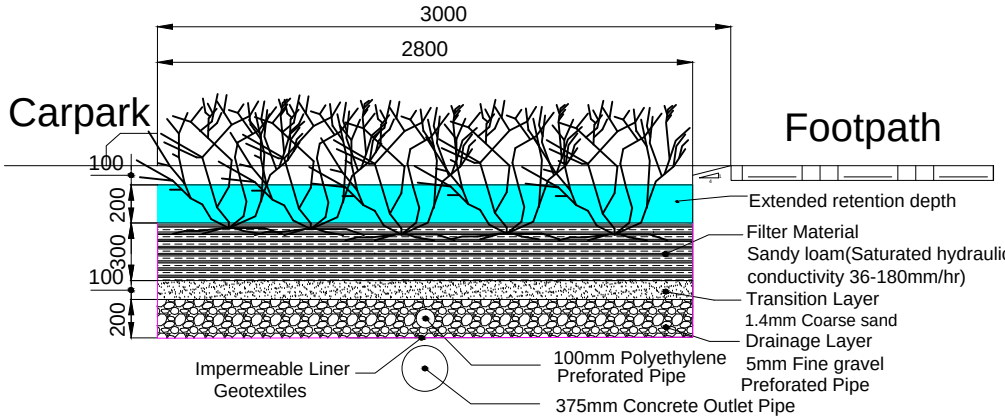
SECTION B
1:20

NOTE: The unit in this drawing is mm.

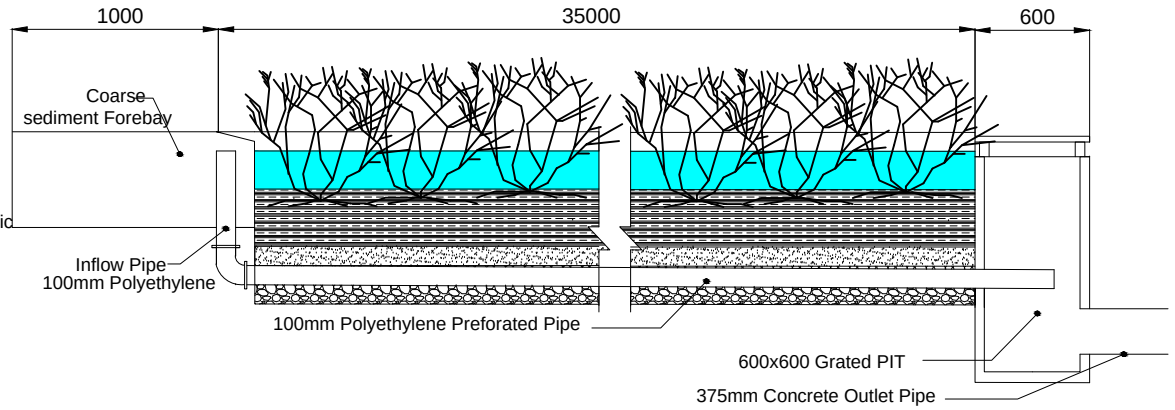
HYDRO FUTURE CONSULTING	DRAWING TITLE: BIORETENTION BASIN1			
DATE: 02.06.2015	PROJECT: NORTH TERRACE DRAINAGE DESIGN			
	AUTHOR: Mengliu Feng	DRG. No: HF-106A	Approved By / Date: ANW/02.06.2015	A3
	SCALE: As shown	CLIENT: Tonkin Consulting	SHEET 1 of 1	



PLAN
1:100



SECTION A
1:20



SECTION B
1:20

NOTE: The unit in this drawing is mm.

DRAWING TITLE: BIORETENTION BASIN2

HYDRO FUTURE CONSULTING

DATE: 02.06.2015

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: Mengliu Feng

DRG. No: HF-106B

Approved By / Date: ANW/02.06.2015

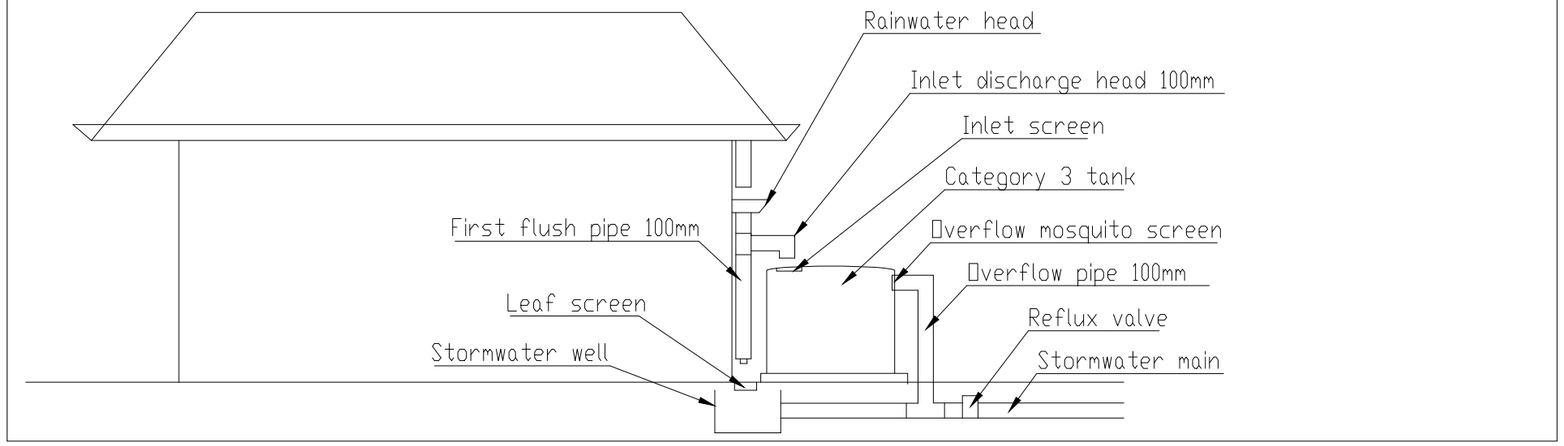
A3

SCALE: As shown

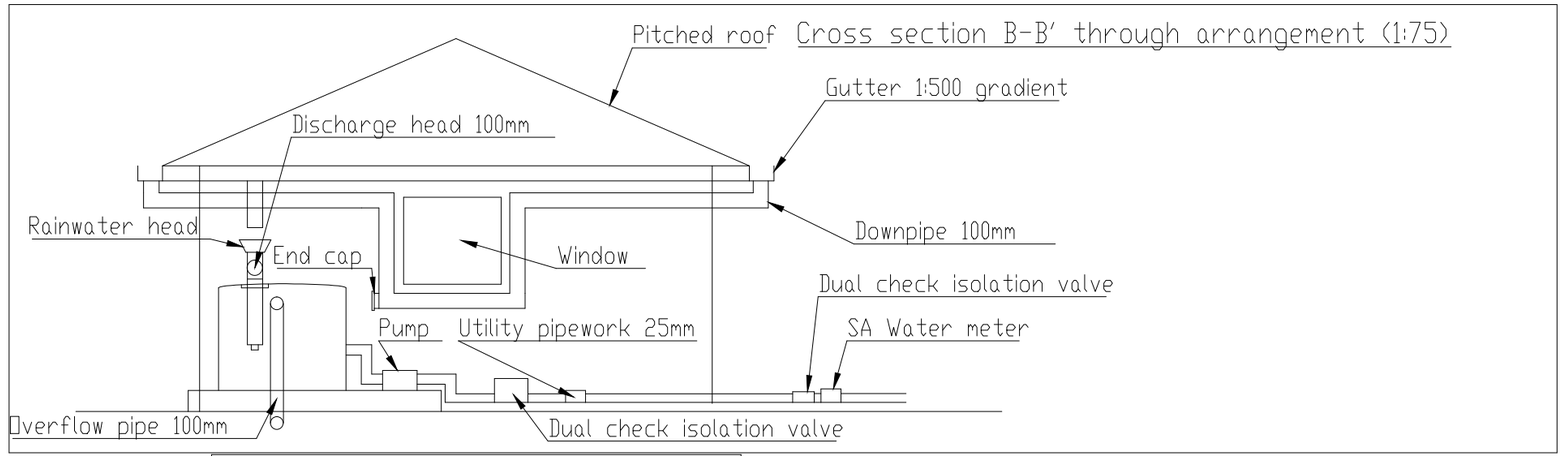
CLIENT: Tonkin Consulting

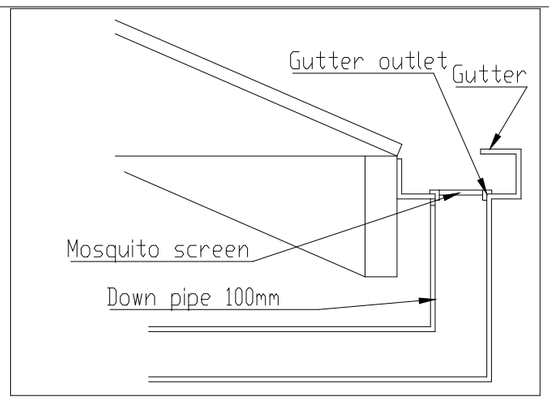
SHEET 1 of 1

Cross section A-A' through arrangement (1:75)



Cross section B-B' through arrangement (1:75)





HYDRO FUTURE CONSULTING

DRAWING TITLE: RAINWATER HARVEST SYSTEM

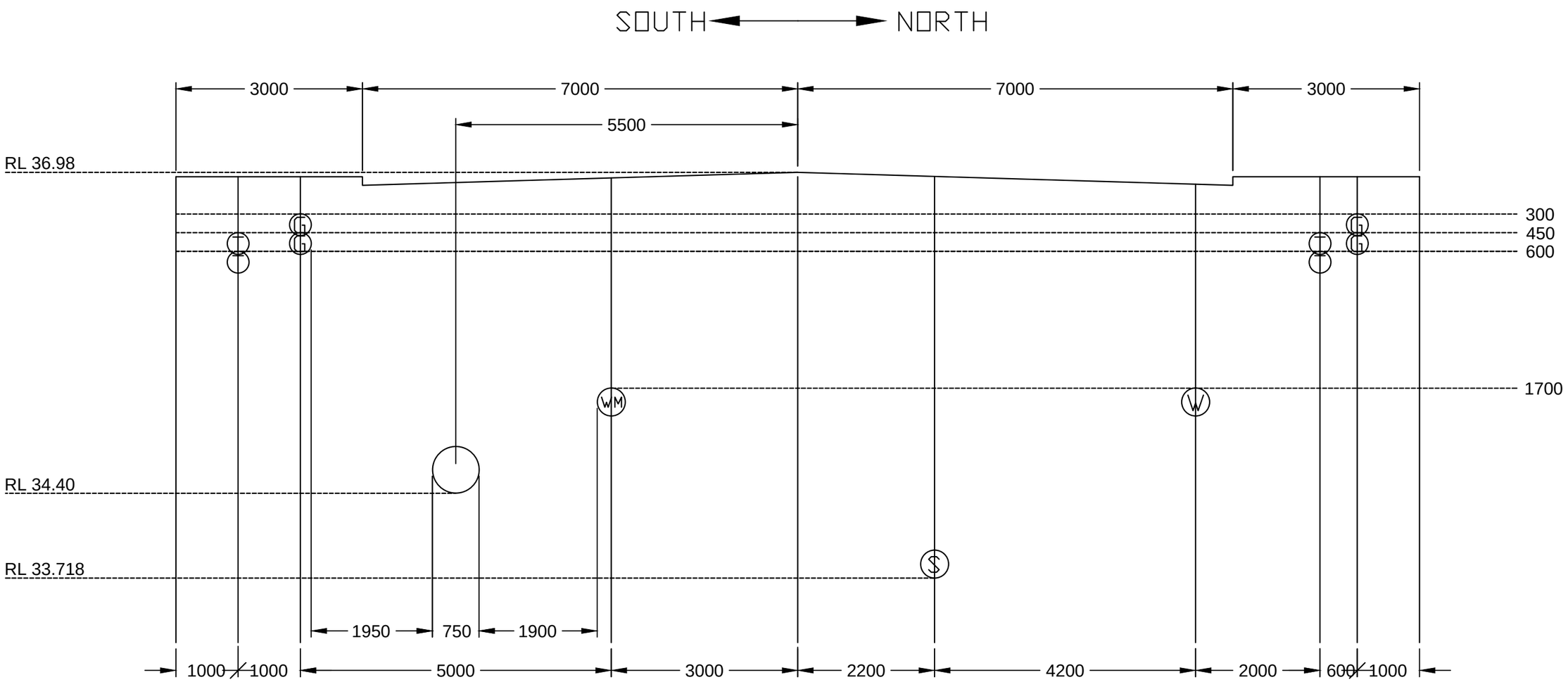
DATE: 3.6.15

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: Tri Ly Nguyen | DRG. No: HF-107 | Approved By / Date: ANW/3-6

SCALE: As specified | CLIENT: Tonkin Consulting | SHEET 1 of 1

A3



NORTH TERRACE CROSS SECTION AT FIRST CREEK

Notes

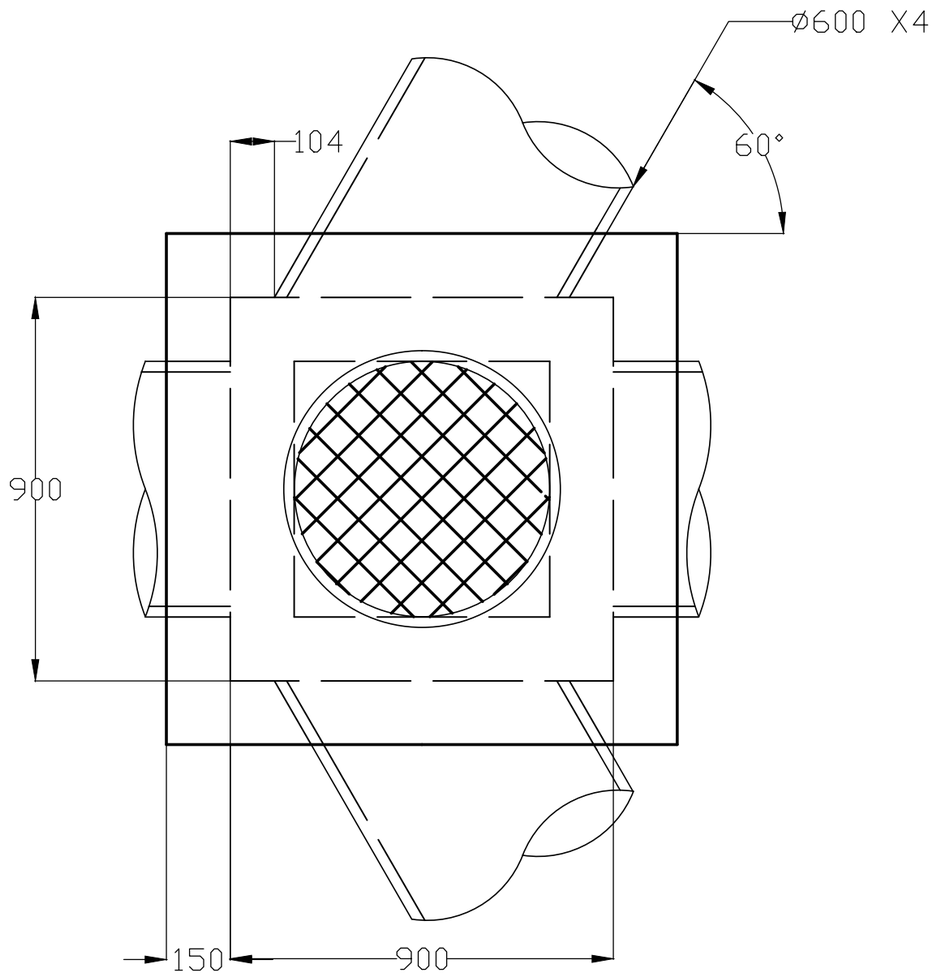
- All dimensions are in millimeters.
- Road crossfall assumed to be 3%.
- Telecommunication cables and Gas lines may vary in depth.
- Horizontal Scale - 1:50
- Vertical Exaggeration - x2

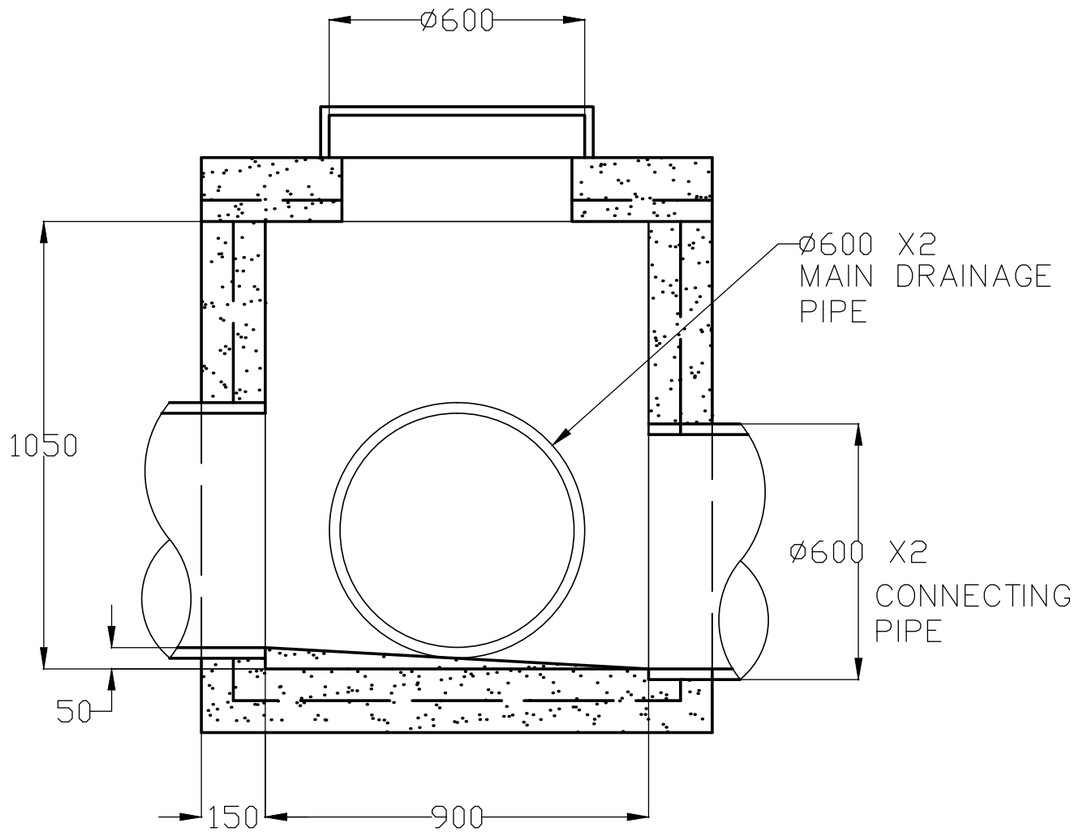
Legend

- Existing Gas Pipe
- Telecommunications Cable
- Existing Water Main
- Existing Sewer
- Existing Water
- New SW Pipe

HYDRO FUTURE CONSULTING

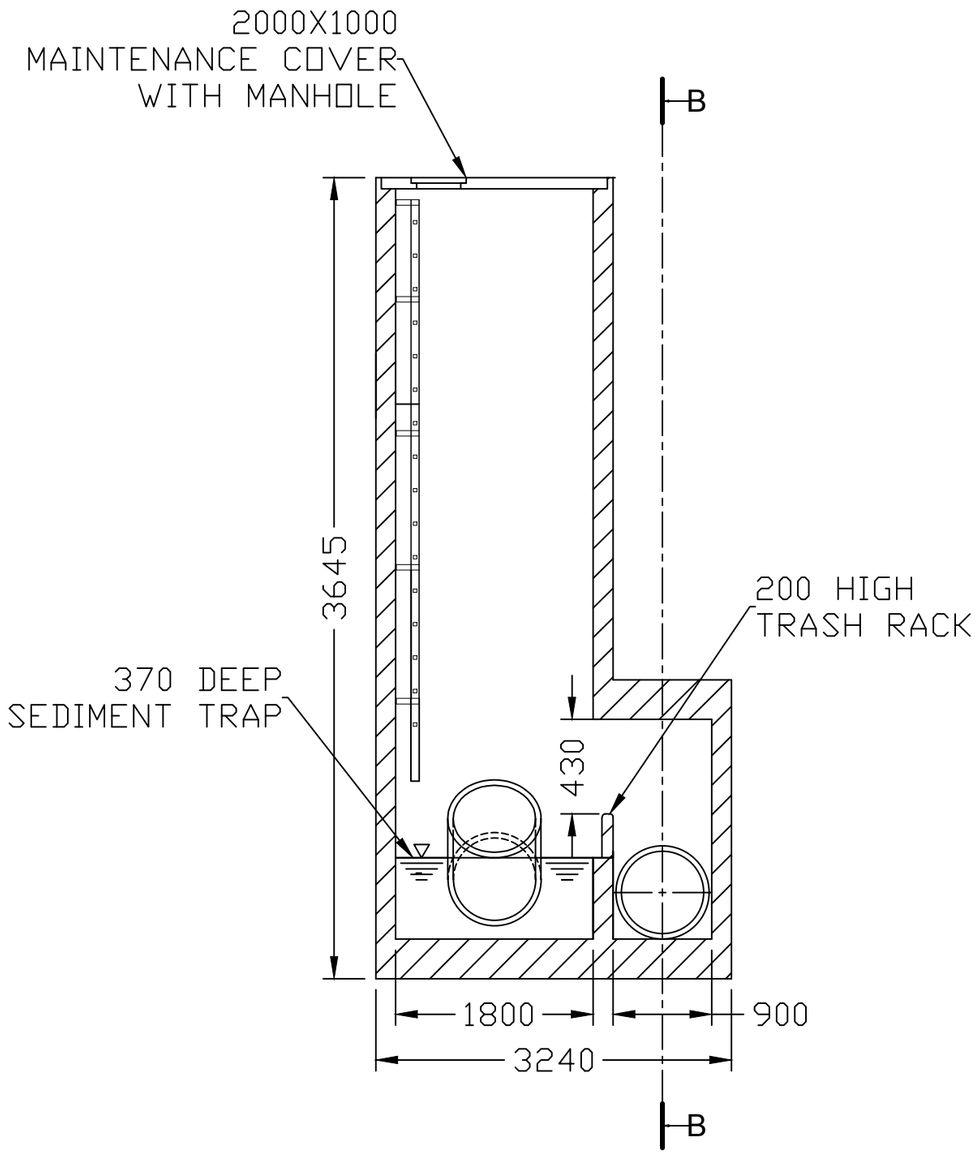
DATE: 15.5.15	TITLE: EXISTING SERVICES & NEW PIPE LOCATION DIAGRAM			
	AUTHOR: FERGUS HAMILTON	DRG. No: HF - 108	Approved By / Date: AW / 15.5.15	A3
	SCALE: 1:50	CLIENT: Tonkin Consulting	SHEET 1 of 1	



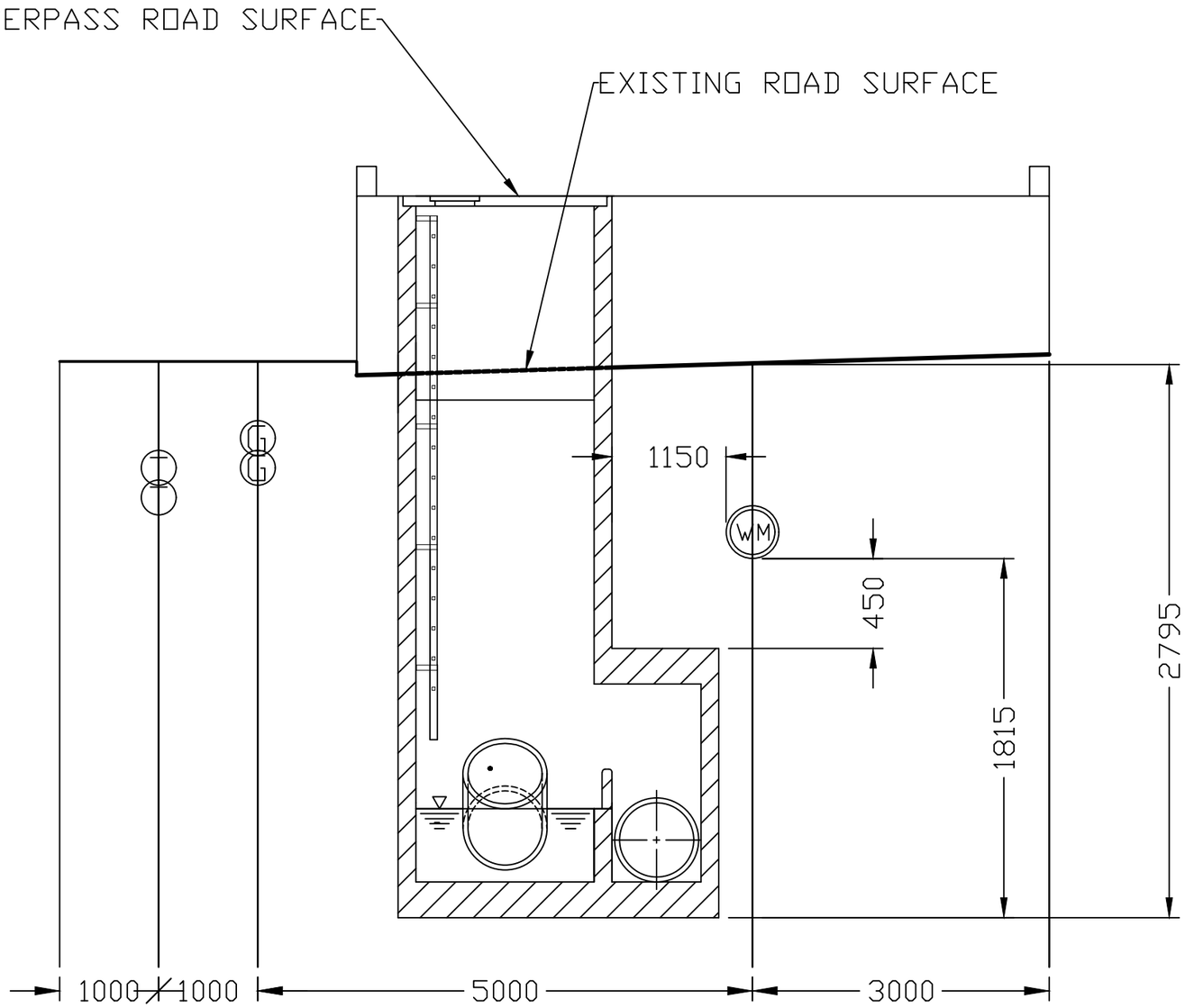


NOTE: ALL THE UNITS ARE IN MM UNLESS OTHERWISE SPECIFIED

HYDRO FUTURE CONSULTING	DRAWING TITLE: JUNCTION BOX CONNECTION			
DATE: 02.06.15	PROJECT: NORTH TERRACE DRAINAGE DESIGN			
	AUTHOR: A.WICKRAMARATNE	DRG. No: HF-109	Approved By / Date: ANW/ 2.6.15	A3
	SCALE: 1:10	CLIENT: Tonkin Consulting	SHEET 1 of 1	



FRONT VIEW DETAIL
SECTION A-A
of SHEET 2
Scale 1:40



LOCATION UNDER NORTH TERRACE
AND PROXIMITY TO SERVICES
Scale 1:40

Notes

- All dimensions are in millimeters
- Vertical Exaggeration - x2 (dimensions all to scale)
- 180mm wall thickness unless notified otherwise
- Inlet Pipe Invert Level before GPT = 34.49
- Inlet Pipe Invert Level inside GPT = 34.60
- Outlet Pipe Invert Level = 34.43

HYDRO FUTURE CONSULTING

DATE: 27.5.15

DRAWING TITLE: GROSS POLLUTANT TRAP DESIGN

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: C SOMERVILLE

DRG. No: HF-201A

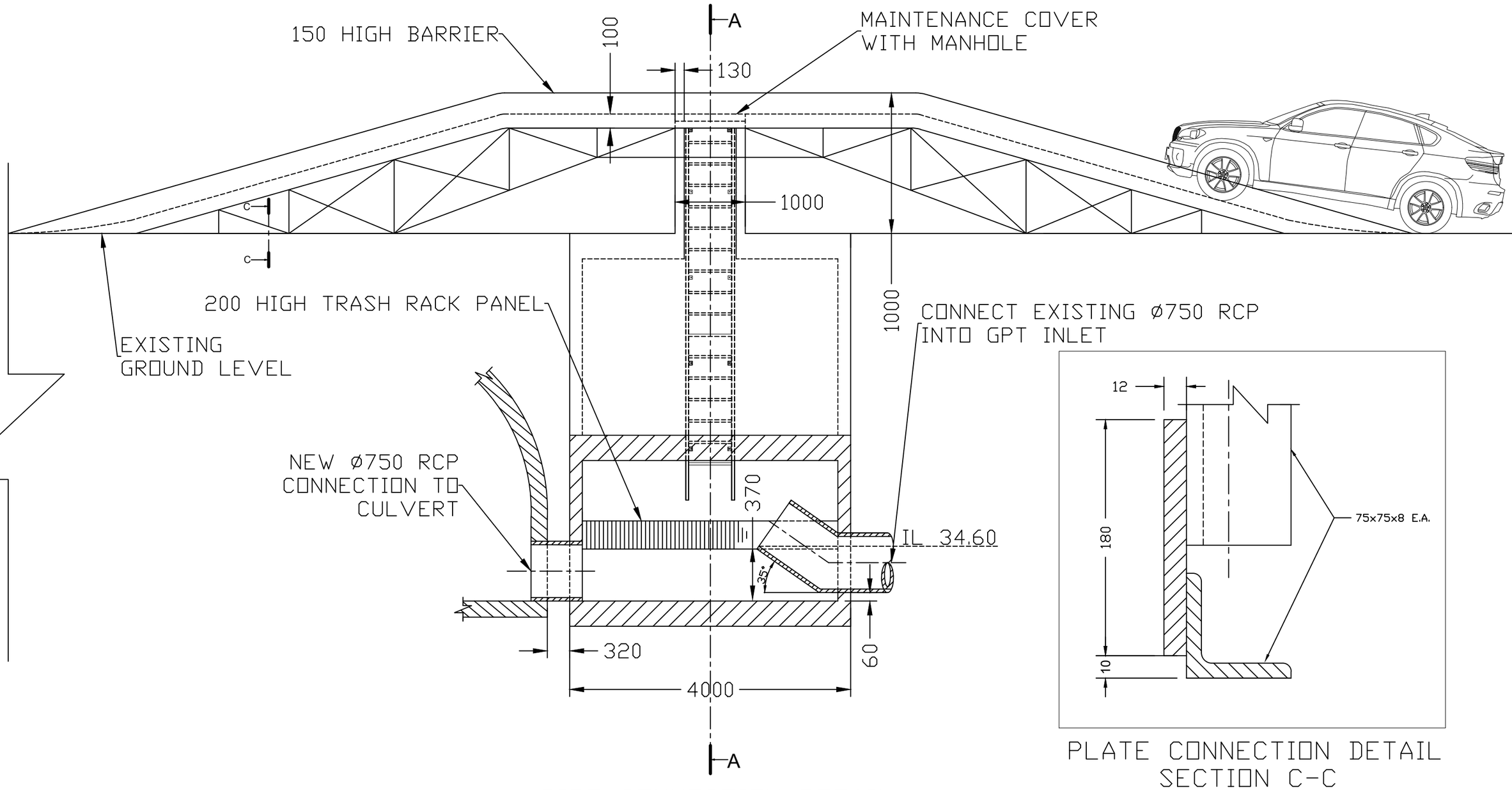
Approved By / Date: M CUI / 30.5.15

SCALE: 1:40

CLIENT: Tonkin Consulting

SHEET 1 of 2

A3



PIPE CONNECTION DETAIL
SECTION B-B
of SHEET 1
Scale 1:40

PLATE CONNECTION DETAIL
SECTION C-C
Scale 1:30

Notes

- All dimensions are in millimeters
- Vertical Exaggeration - x2 (except for pipes)
- 180mm wall thickness unless notified otherwise
- Plate connection typical for all

HYDRO FUTURE CONSULTING

DRAWING TITLE: GROSS POLLUTANT TRAP DESIGN SIDE VIEW

DATE: 27.5.15

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: C SOMERVILLE

DRG. No: HF-201B

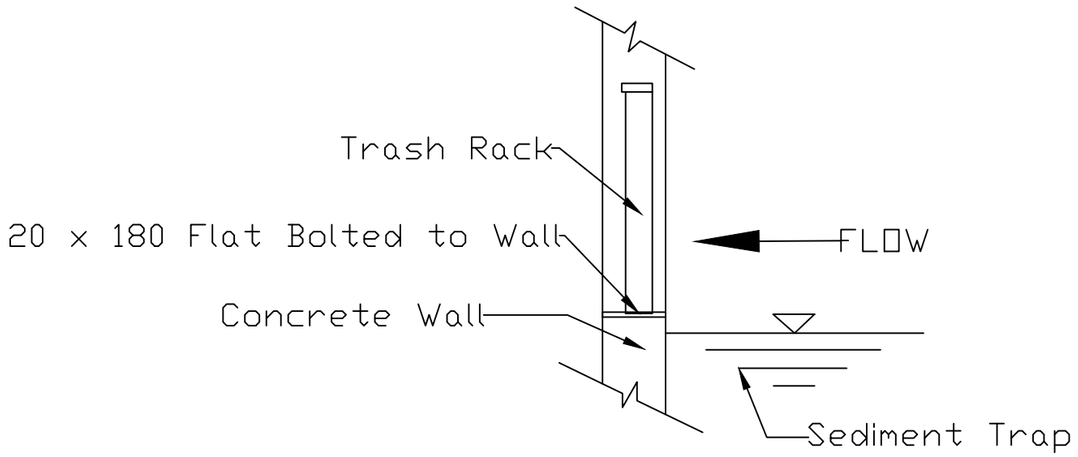
Approved By / Date: M CUI / 30.5.2015

SCALE: Varies

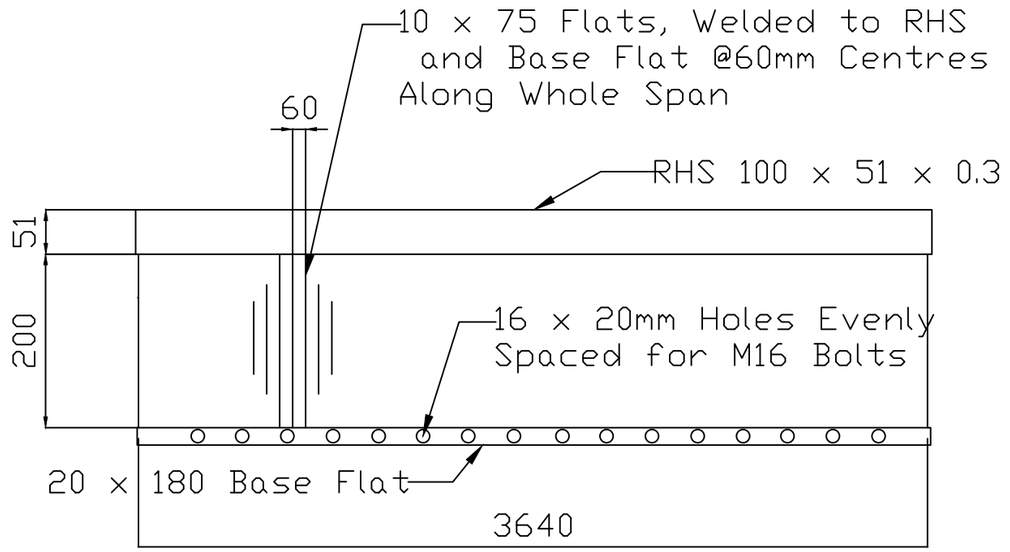
CLIENT: Tonkin Consulting

SHEET 2 of 2

A3



Section View



Plan View

Notes

*All dimensions in mm

*Plan View drawn to scale

*Vertical scale x4 exaggerated

*Section View not drawn to scale

*Bolt holes not drawn to scale

*M16 bolt holes are for bolts placed in plane with the page, i.e bolted from top of Base Flat into concrete wall as mentioned in section view

HYDRO FUTURE CONSULTING

DRAWING TITLE: TRASH RACK SECTION AND PLAN VIEW-

DATE: 03-06-15

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: MATT TURNER

DRG. No: HF-202

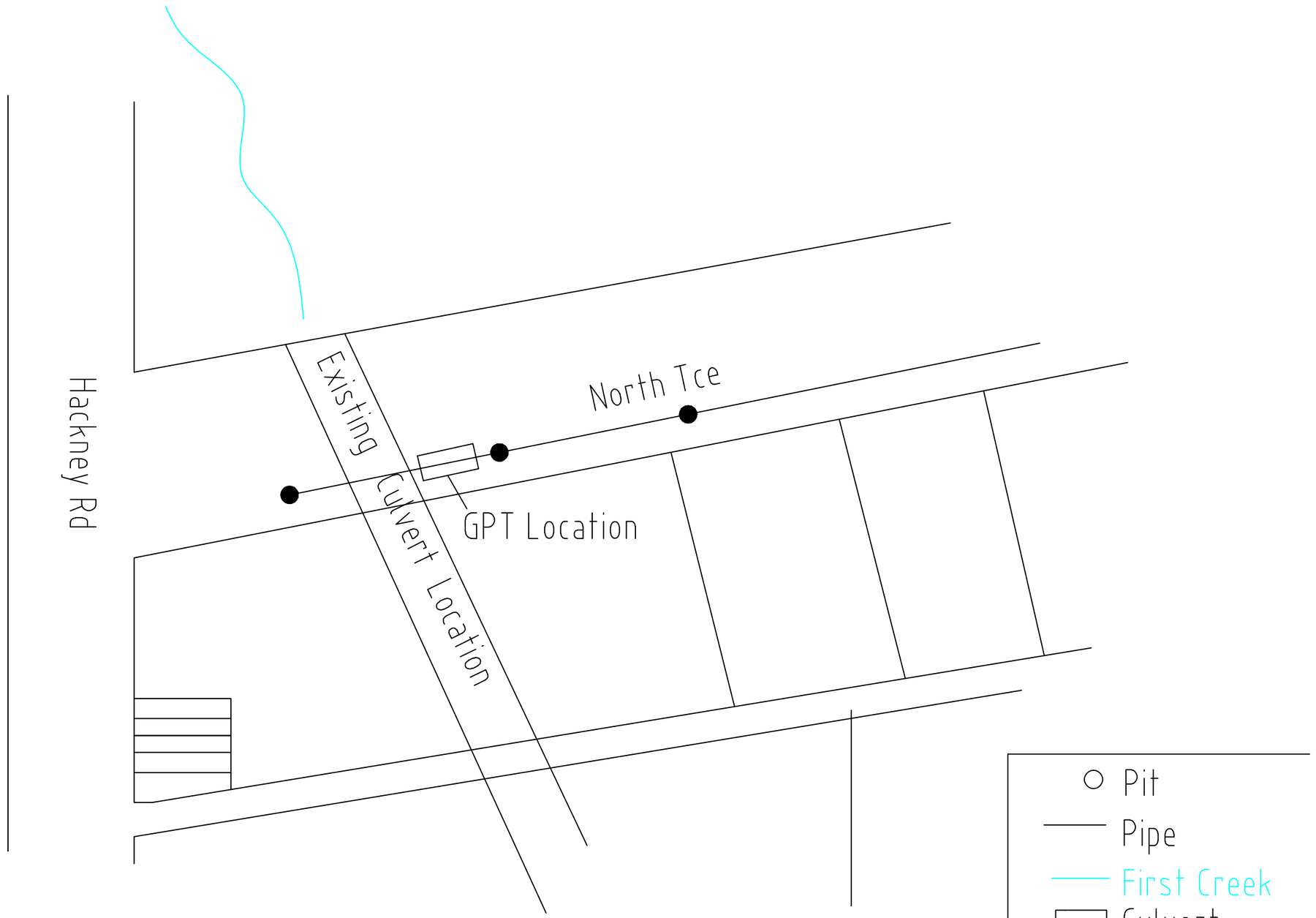
Approved By / Date: MC/03-06-15

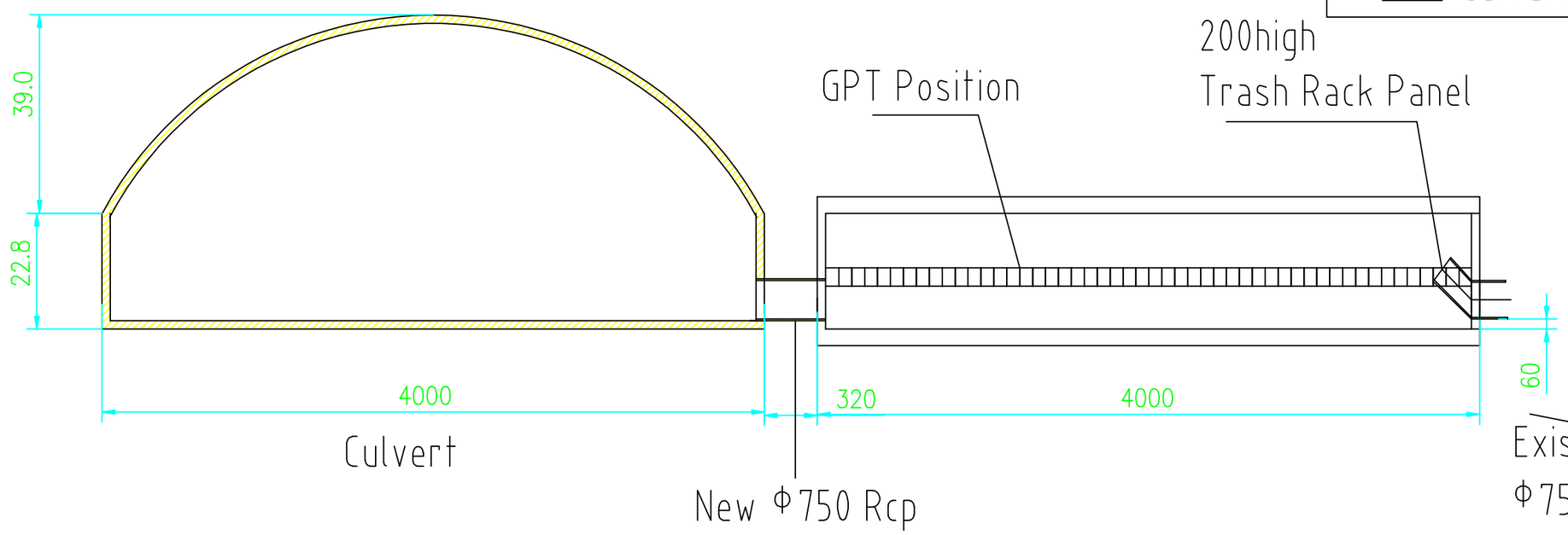
SCALE: 1:30

CLIENT: Tonkin Consulting

SHEET 1 of 1

A3



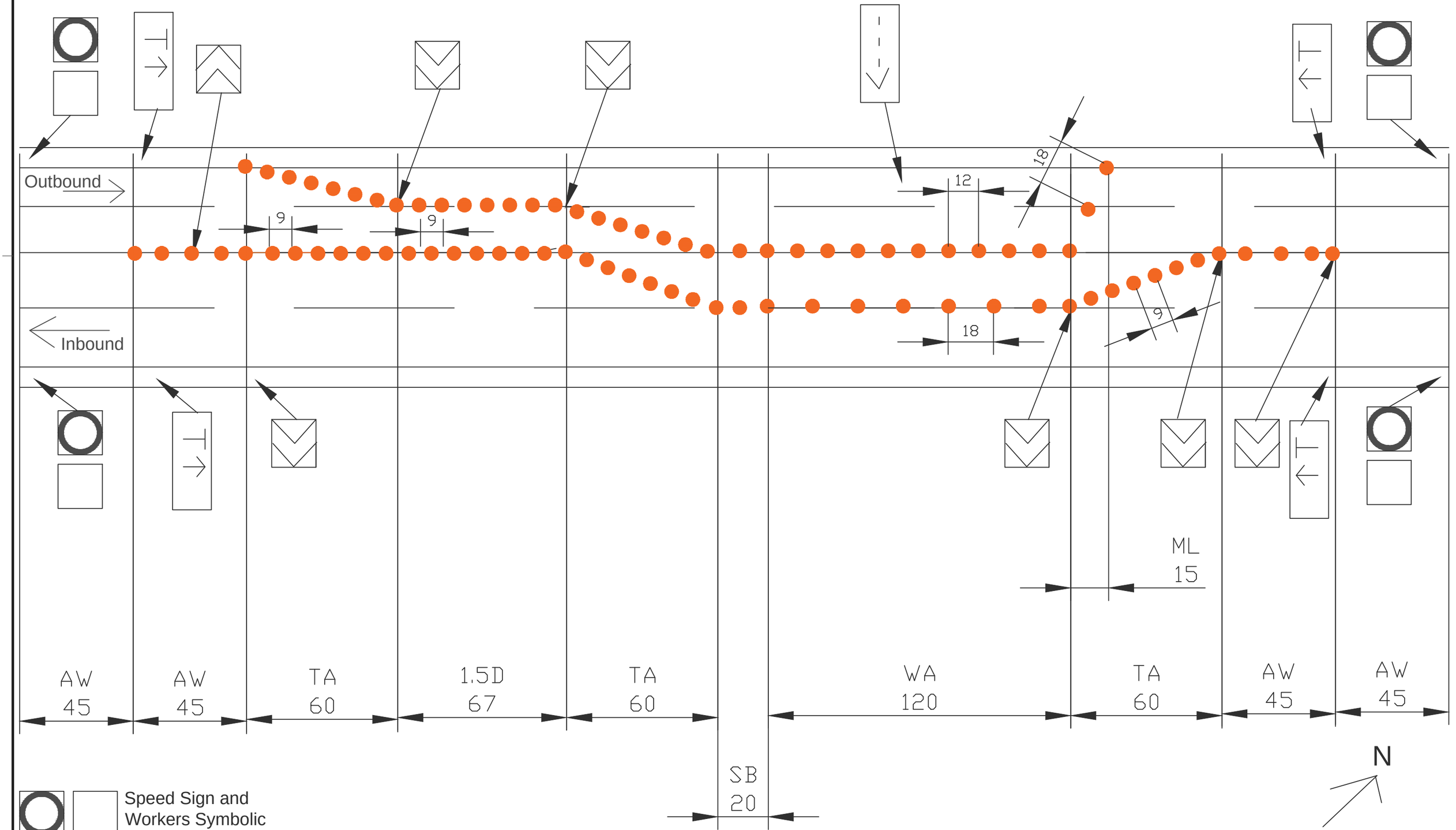


GPT is installed at the outlet of the main stormwater pipe at the down stream end, and before the Culvert

HYDRO FUTURE CONSULTING

DRAWING TITLE: GPT Position			
DATE: 03.06.15	PROJECT: NORTH TERRACE DRAINAGE DESIGN		
	AUTHOR: Minghao Cui	DRG. No: HF-203	Approved By / Date: MC 03/06/2015
	SCALE: 1:40	CLIENT: Tonkin Consulting	SHEET 1 of 1

A3



Speed Sign and Workers Symbolic

Lane Closure

Indicating Vehicle

Direction Arrow

Cone

HYDRO FUTURE CONSULTING

DRAWING TITLE: TRAFFIC MANAGEMENT PLAN - CONTRA FLOW, 2 LANES CLOSED OOUTBOUND

DATE: 1.06.15

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: LISA HUTCHINSON

DRG. No: HF-301

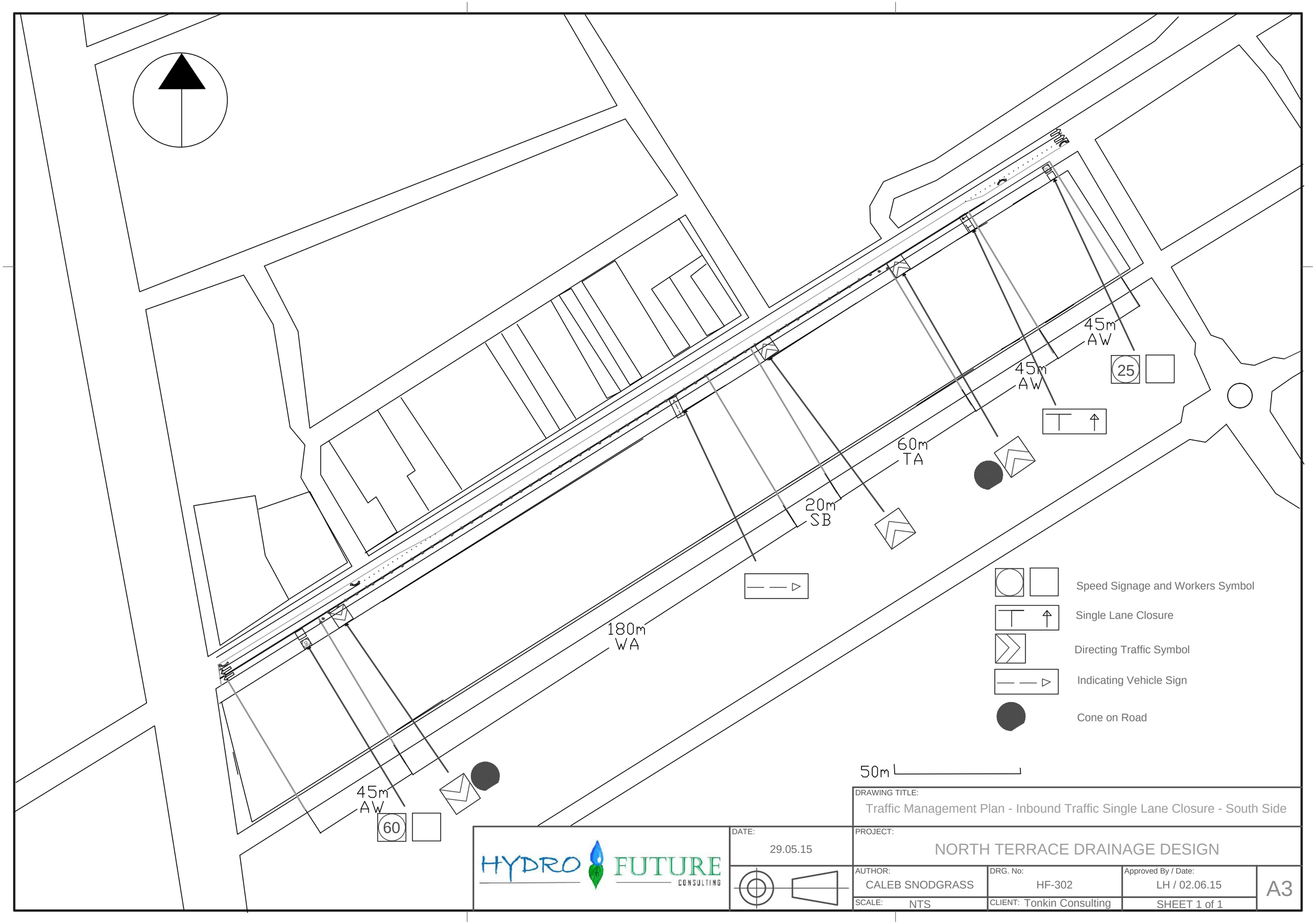
Approved By / Date: LH / 01.06.2015

A3

SCALE: NTS

CLIENT: Tonkin Consulting

SHEET 1 of 1

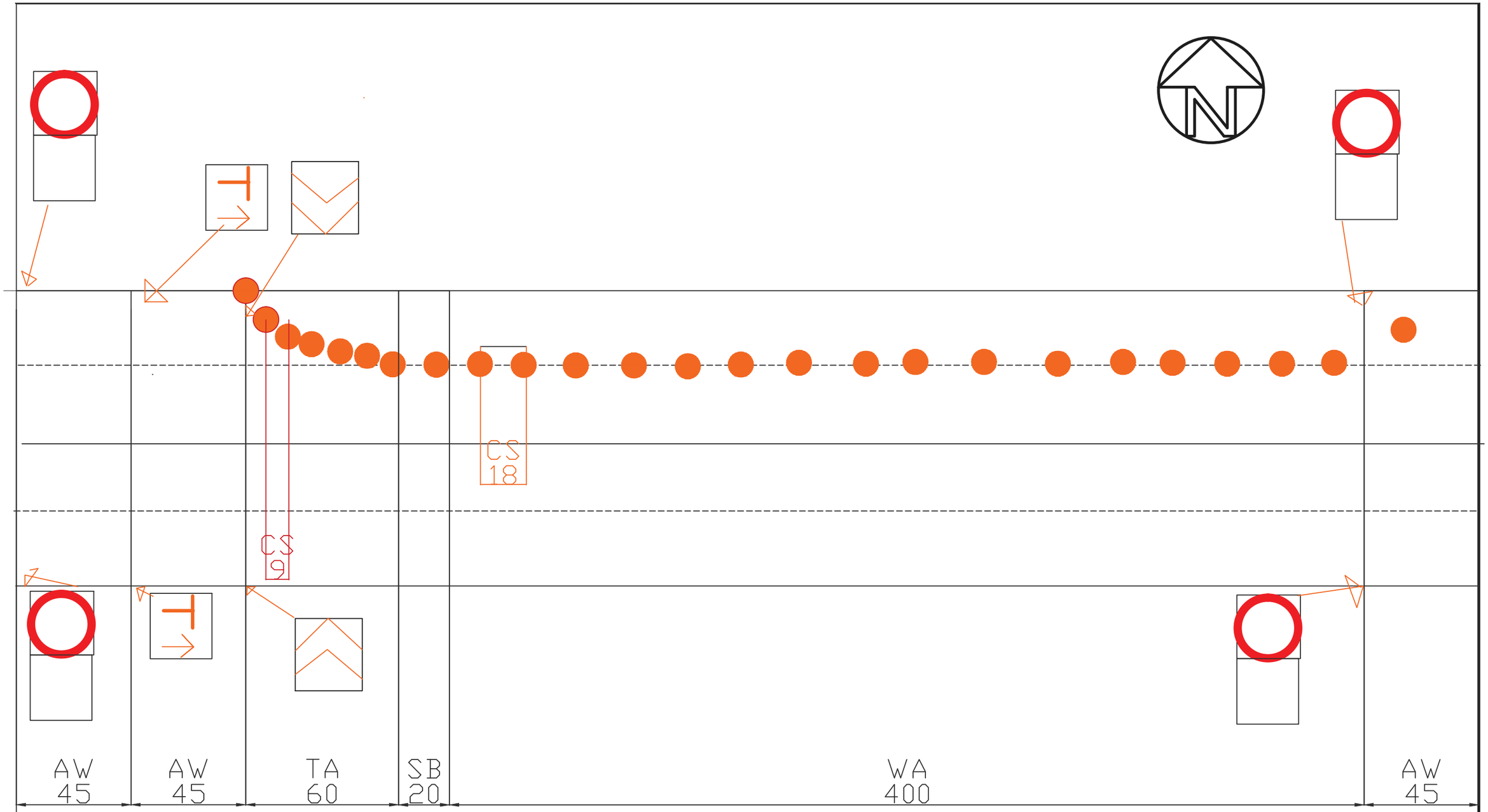


DRAWING TITLE: Traffic Management Plan - Inbound Traffic Single Lane Closure - South Side

HYDRO FUTURE CONSULTING

DATE: 29.05.15	PROJECT: NORTH TERRACE DRAINAGE DESIGN		
AUTHOR: CALEB SNODGRASS	DRG. No: HF-302	Approved By / Date: LH / 02.06.15	A3
SCALE: NTS	CLIENT: Tonkin Consulting	SHEET 1 of 1	

HACKNEY ROAD/NORTH TERRACE INTERSECTION



Speed sign and workers symbolic

Direction Arrow

Lane Closure

Cone

DRAWING TITLE: NORTH TERRACE OUTBOUND TRAFFIC LANE CLOSURE

DATE: 2.06.15

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: VASILI HOIMES

DRG. No: HF - 303

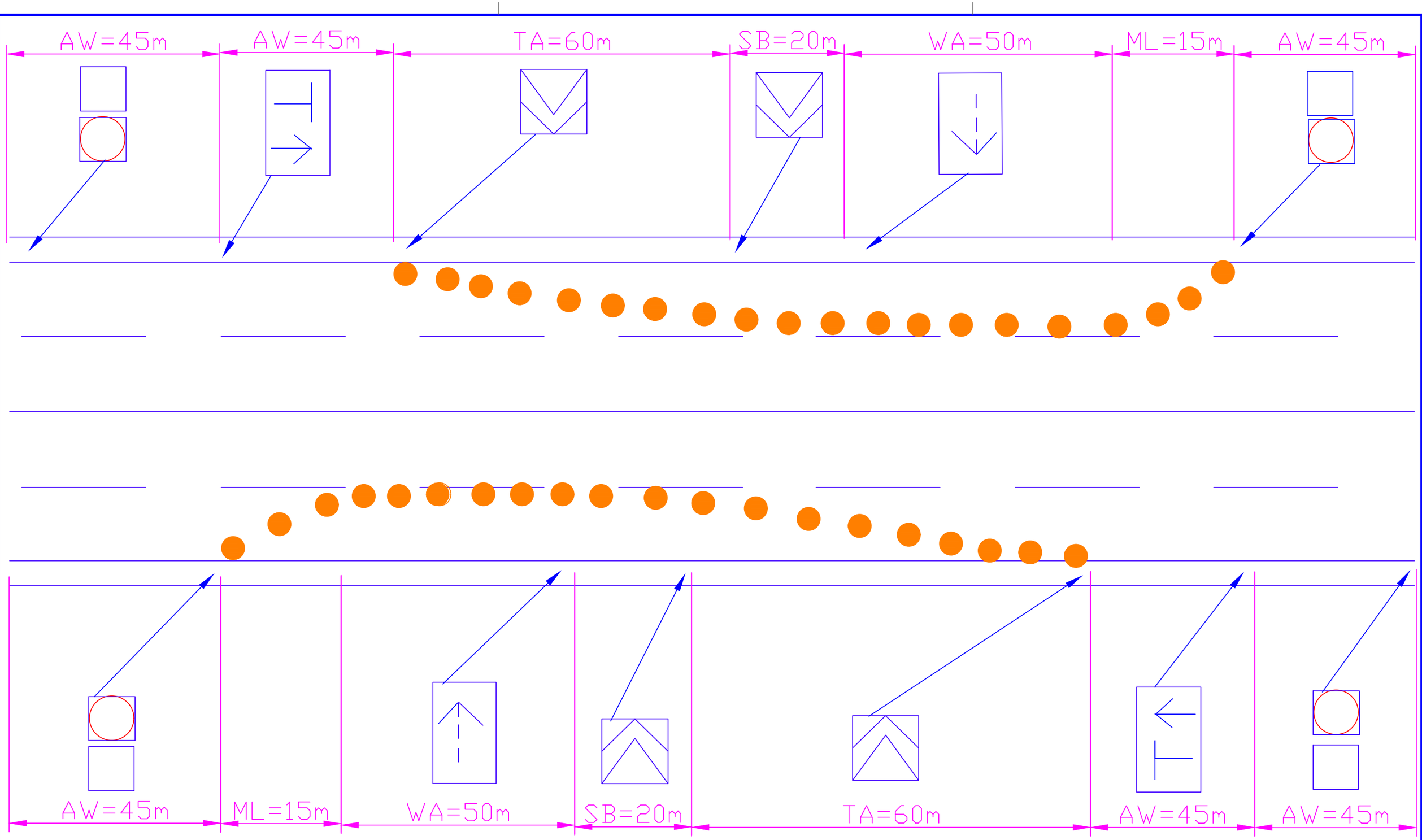
Approved By / Date: L.H / 02.06.15

SCALE: NTS

CLIENT: Tonkin Consulting

SHEET 1 of 1

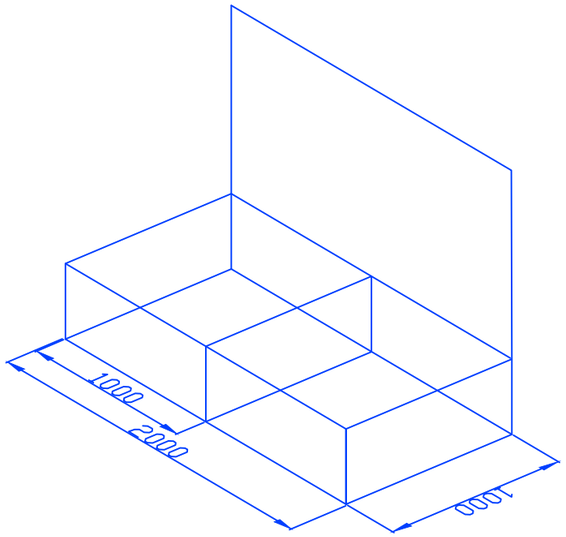
A3



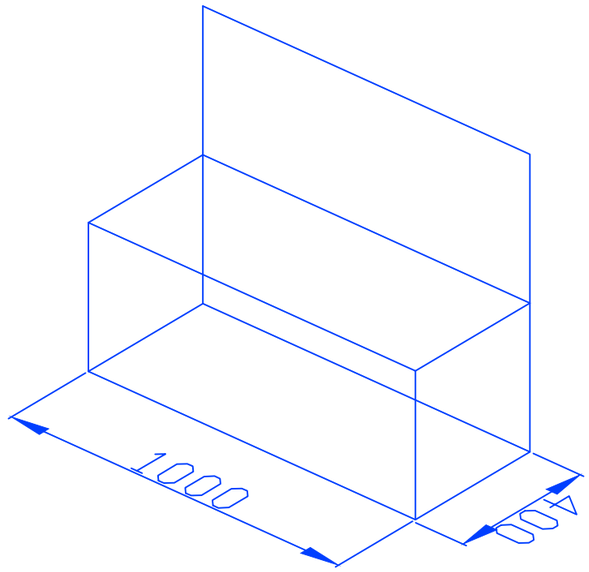
HYDRO FUTURE CONSULTING

DRAWING TITLE: TRAFFIC MANAGEMENT PLAN - CONTROL FLOW 2 LANE CLOSED - EACH SIDE			
DATE: 01.06.15	PROJECT: NORTH TERRACE DRAINAGE DESIGN		
AUTHOR: Anna Dai	DRG. No: HF-304	Approved By / Date: LH 02/06/2015	A3
SCALE: NTS	CLIENT: Tonkin Consulting	SHEET 1 of 1	

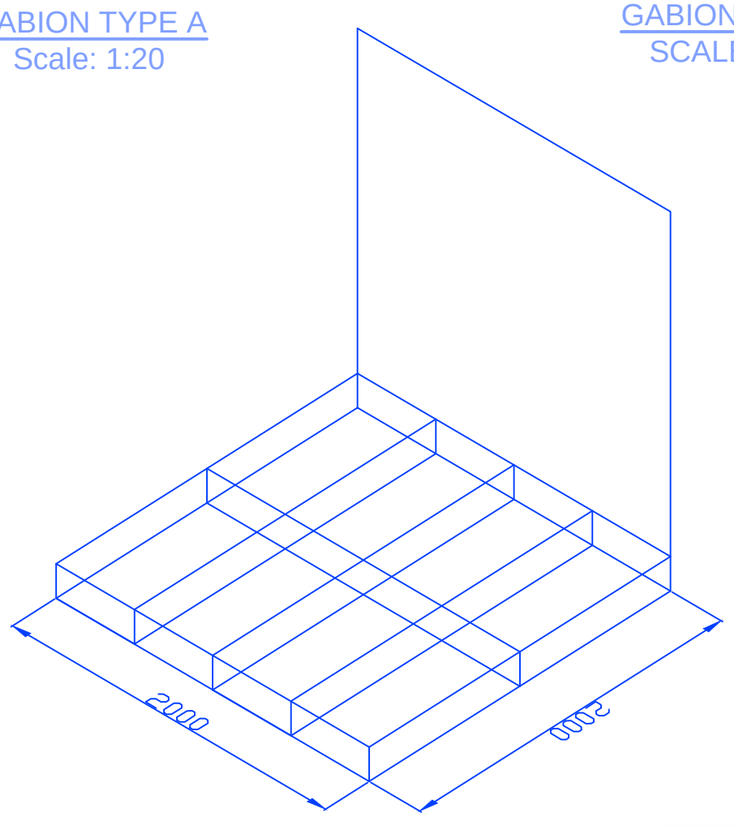
GABIONS WITH DIAPHRAGMS



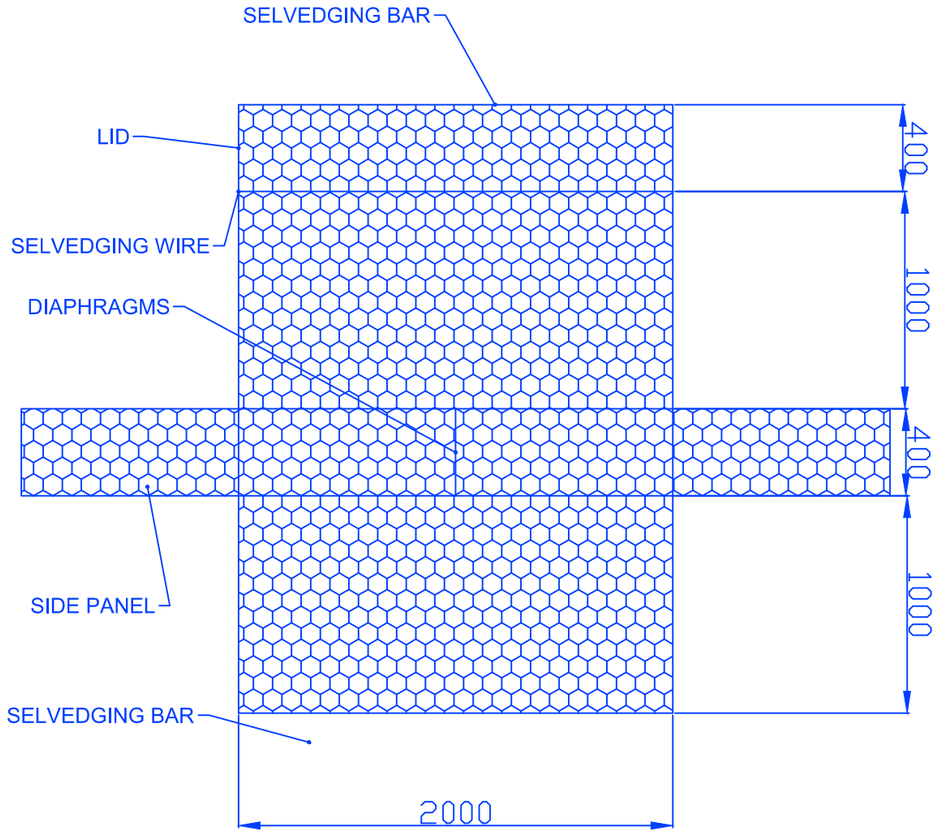
GABION TYPE A
Scale: 1:20



GABION TYPE B
SCALE: 1:10



GABION MATRESS
SCALE: 1:20



OPEN GABION BOX - TYPE A
SCALE: 1:20

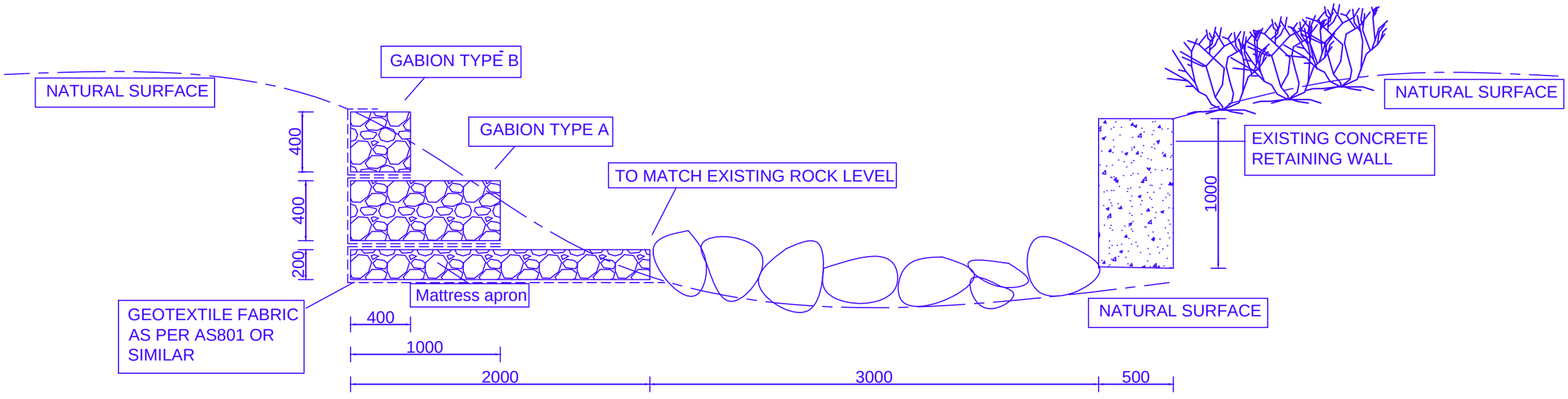
HYDRO FUTURE CONSULTING

DRAWING TITLE: GABIONS WITH DIAPHRAGMS			
DATE: 02.06.15	PROJECT: NORTH TERRACE DRAINAGE DESIGN		
	AUTHOR: SARAH HARTLAND	DRG. No: HF-401	Approved By / Date: DA / 02.06.15
	SCALE: AS SHOWN	CLIENT: Tonkin Consulting	SHEET 1 of 1

A3

NOTES:

1. ALL DIMENSIONS IN MM
2. CUT FLOOR TO BE INSPECTED AND CONFIRMED BY GEOTECHNICAL ENGINEER
3. SET OUT OF GABION WALL TO BE CONFIRMED BY GEOTECHNICAL ENGINEER PRIOR TO FILLING OF BASKETS
4. BASKET SHALL BE 'MACCAFERRI' TYPE MANUFACTURED FROM DOUBLE TWIST HEXAGONAL WOVEN WIRE OF NOMINAL 80MM X 100MM MESH WITH 3.4MM SELVEDGE WIRE AND 2.7MM MESH WIRE, COMPLETE WITH DIAPHRAGM AT 1000MM CENTRES
5. GABION ROCK WALL FILLING SHALL BE A DENSE, HARD, DURABLE, CLEAN SANDSTONE FREE FROM WEATHERING, DEGREDATRION AND CHEMICAL ALTERATION. ROCK TO BE WELL GRADED BETWEEN 100MM AND 250MM, WITH NOT MORE THAN 5% BY MASS FINER THAN 75MM ROCK SHOULD BE ANGULAR WITH A MINIMUM SPECIFIC GRAVITY OF 2.3
6. INTERNAL BRACING WIRES ARE TO BE APPLIED AT A FREQUENCY OF 4 PER SQUARE METRE - IN TWO EQUALLY DISTRIBUTED ROWS PER 1000M GABION BASKET ROW IN HEIGHT
7. PROFAB AS 801 GEOFABRIC TO BE PROVIDED TO BACK AND UNDERSIDE OF GABION BASKETS WHERE IN CONTACT WITH SOIL. ALL HAND STONE ON EXPOSED FACES OF GABION BASKETS ARE TO BE HAND MANIPULATED TO ENSURE MAXIMUM POSSIBLE DENSITY. IDEALLY SELECTING LARGEST FACE HAND STONE TOO BE PACKED FLUSH AGAINST GABION BASKET ON EXPOSED FACE



DRAWING TITLE: GABION RETAINING WALL - TYPICAL CROSS SECTION

HYDRO FUTURE CONSULTING

DATE: 01.06.15

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: HUGH BURGER

DRG. No: HF-402

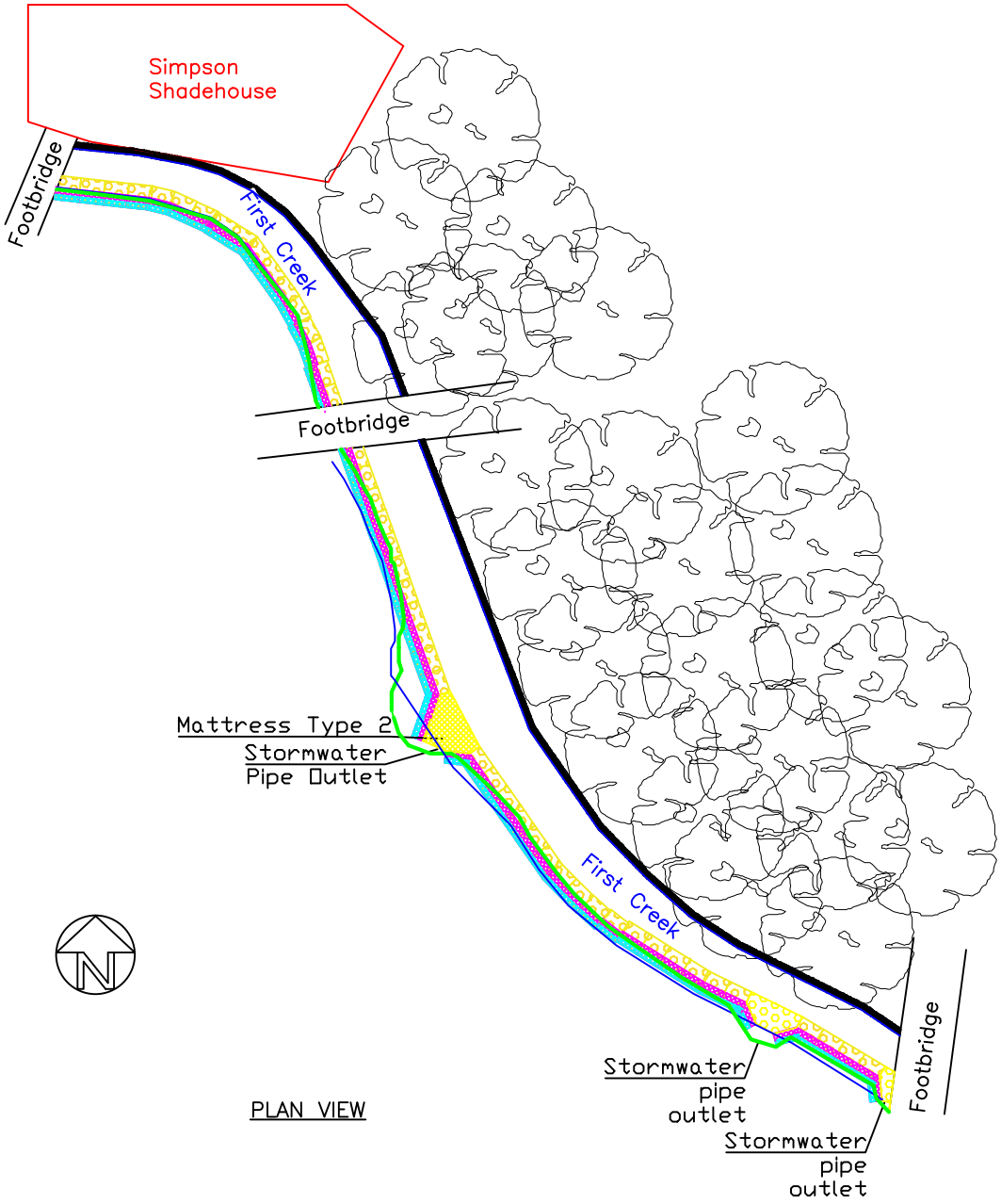
Approved By / Date: DAVID ARGENT / 02.06.15

SCALE: 1:20

CLIENT: Tonkin Consulting

SHEET 1 of 1

A3



PLAN VIEW

NOTES – GABION RETAINING WALL

1. CUT FLOOR TO BE INSPECTED AND CONFIRMED BY GEOTECHNICAL ENGINEER
2. SET OUT OF GABION WALL TO BE CONFIRMED ONSITE BY GEOTECHNICAL ENGINEER PRIOR TO FILLING OF BASKETS
3. BASKET SHALL BE 'MACCAFERRI' TYPE MANUFACTURED FROM DOUBLE TWIST HEXAGONAL WOVEN WIRE MESH OF NOMINAL 80x100mm MESH WITH 3.4mm SELVEDGE WIRE AND 2.7mm MESH WIRE, COMPLETE WITH DIAPHRAGM AT 1m CENTRES
4. GABION ROCK FILLING SHALL BE A DENSE, HARD, DURABLE, CLEAN SANDSTONE FREE FROM WEATHERING , DEGRADATION AND CHEMICAL ALTERATION. ROCK TO BE WELL GRADED BETWEEN 100mm AND 250mm, WITH NOT MORE THAN 5% BY MASS FINER THAN 75mm. ROCK SHOULD BE ANGULAR WITH A MINIMUM SPECIFIC GRAVITY OF 2.3
5. INTERNAL BRACING WIRES ARE TO BE APPLIED AT A FREQUENCY OF 4 PER m2/ IN TWO EQUALLY DISTRIBUTED ROWS PER 1m GABION BASKET ROW IN HEIGHT
6. PROFAB AS 801 GEOFABRIC TO BE PROVIDED TO BACK AND UNDERSIDE OF GABION BASKETS WHERE IN CONTACT WITH SOIL.
7. ALL HAND STONE ON EXPOSED FACES OF GABION BASKETS ARE TO BE HAND MANIPULATED TO ENSURE MAXIMUM POSSIBLE DENSITY. IDEALLY SELECTING LARGEST FACE HAND STONE TO BE PACKED FLUSH AGAINST GABION BASKET ON EXPOSED FACE

LEGEND	
CREEK	
SCOUR LEVEL	
TREE	
GABION MATRESS	
GABION BASKET TYPE A	
GABION BASKET TYPE B	
EXISTING CONCRETE RETAINING WALL	

HYDRO FUTURE CONSULTING

DRAWING TITLE: FIRST CREEK GABION RETAINING WALL

DATE: 1.6.15

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: D Argent

DRG. No: HF-403

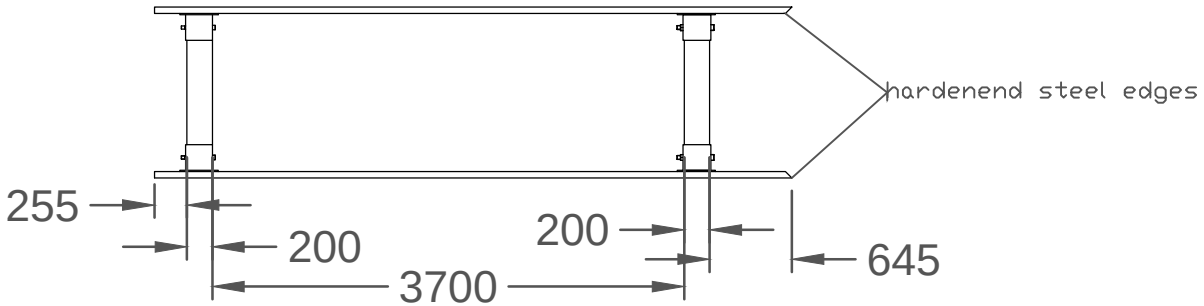
Approved By / Date: D Argent 2/6/15

SCALE: 1:300

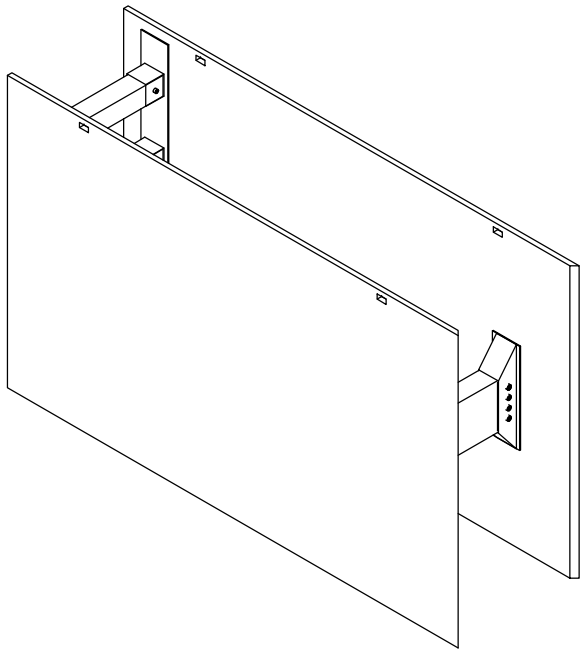
CLIENT: Tonkin Consulting

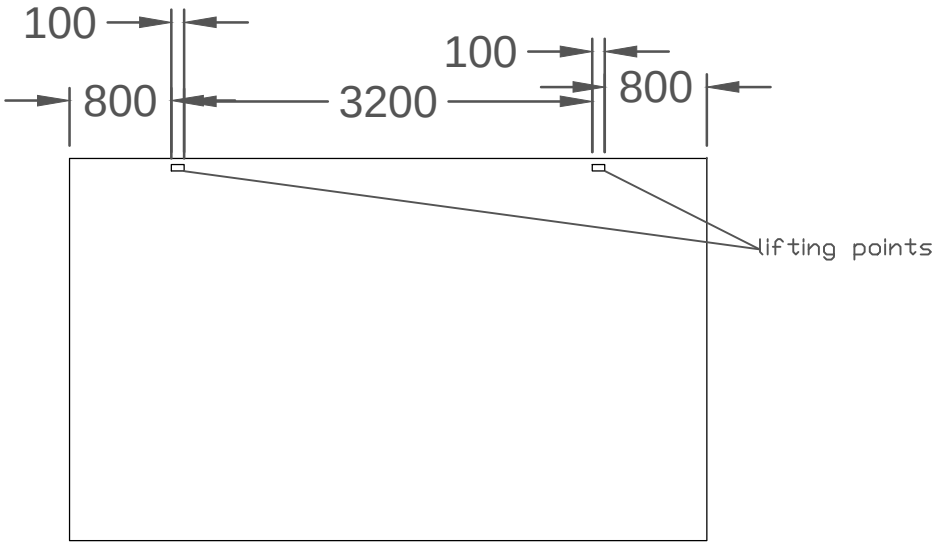
SHEET 1 of 1

A3

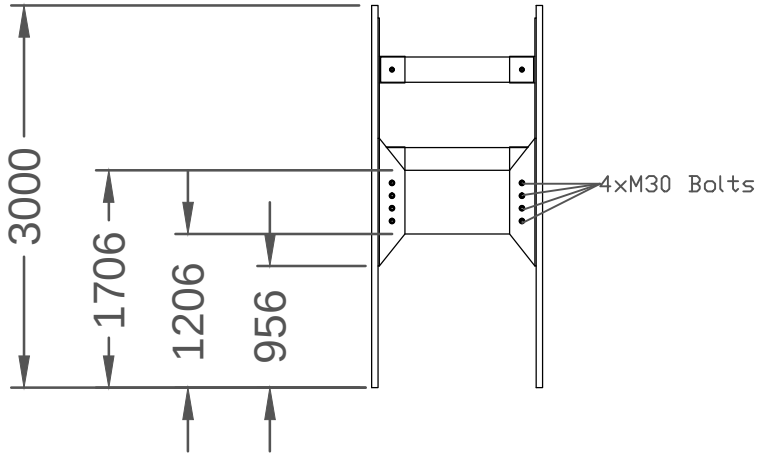


TOP





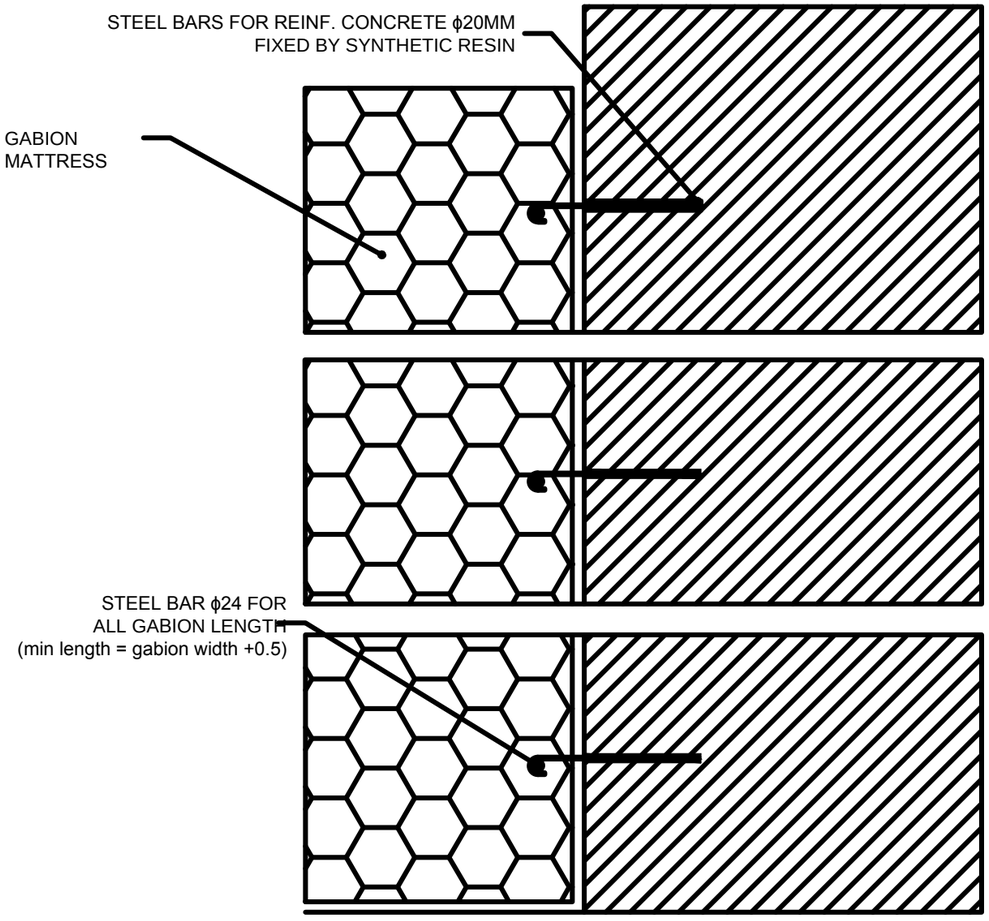
SIDE



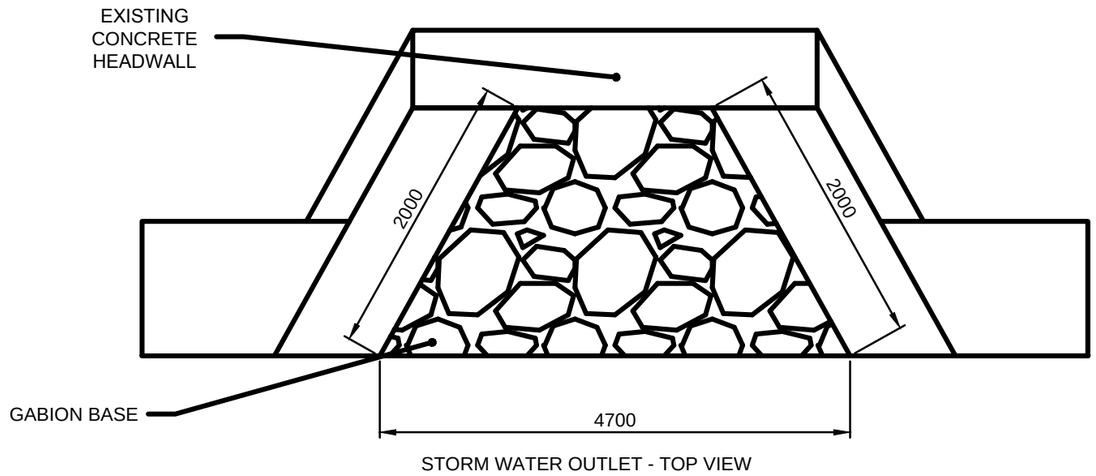
FRONT

HYDRO FUTURE CONSULTING	DATE: 2.06.15	DRAWING TITLE: TRENCH SHIELDING - DRAG BOX		
		PROJECT: NORTH TERRACE DRAINAGE DESIGN		
		AUTHOR: D Argent	DRG. No: HF-404	Approved By / Date: D Argent
		SCALE: 1:30	CLIENT: Tonkin Consulting	SHEET 1 of 1

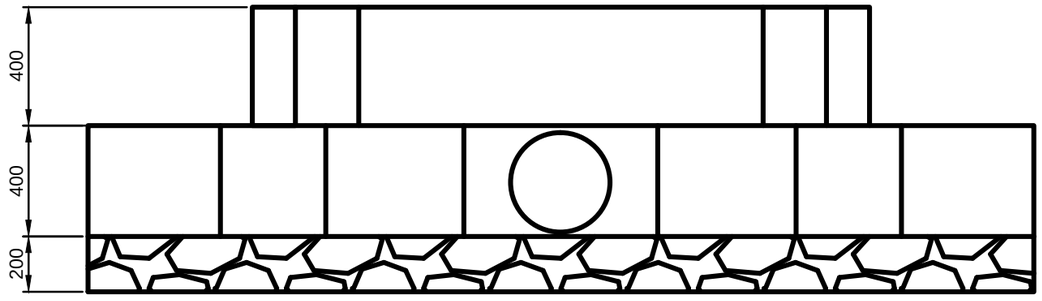
A3



DETAIL OF ANCHORAGE BETWEEN
GABION AND
EXISTING CONCRETE STRUCTURE



STORM WATER OUTLET - TOP VIEW



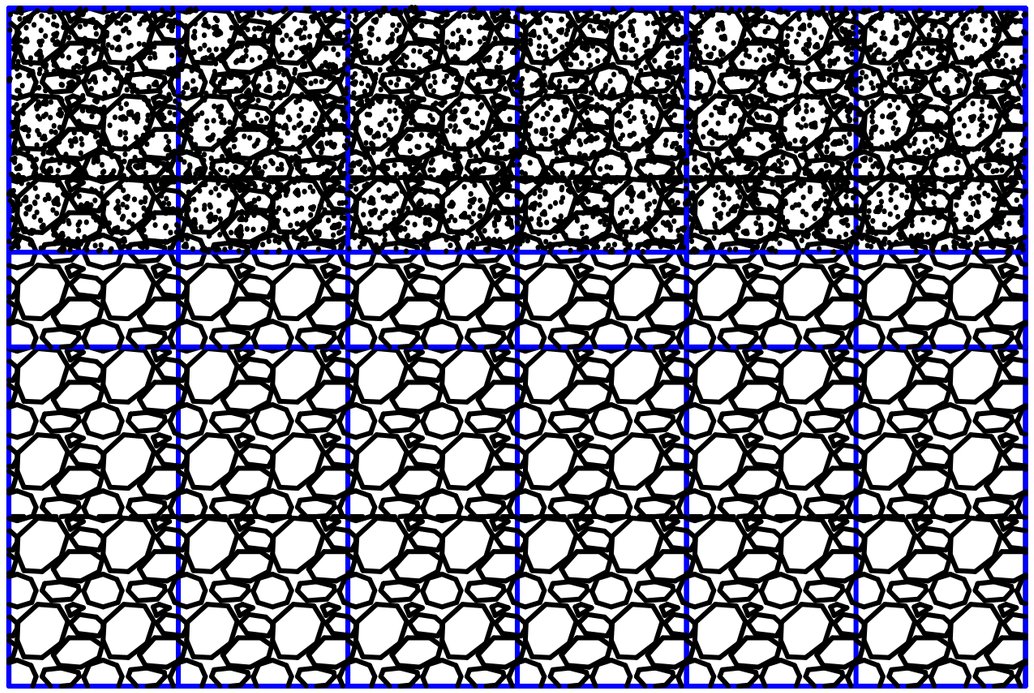
STORM WATER OUTLET - FRONT VIEW

DRAWING TITLE: GABION ANCHORAGE SYSTEM AND OYTLET

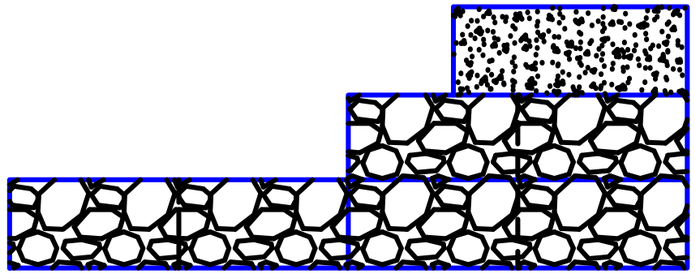
HYDRO FUTURE CONSULTING

DATE: 31.05.15	PROJECT: NORTH TERRACE DRAINAGE DESIGN		
	AUTHOR: YISHI HE	DRG. No: HF-405	Approved By / Date: D ARGENT 4/6/15
	SCALE: 1:100	CLIENT: Tonkin Consulting	SHEET 1 of 1

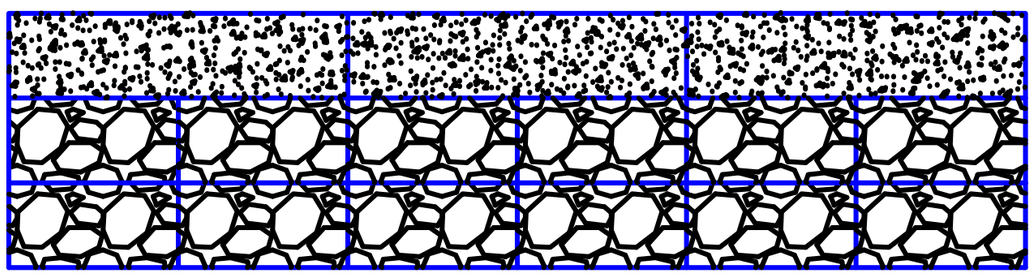
A3



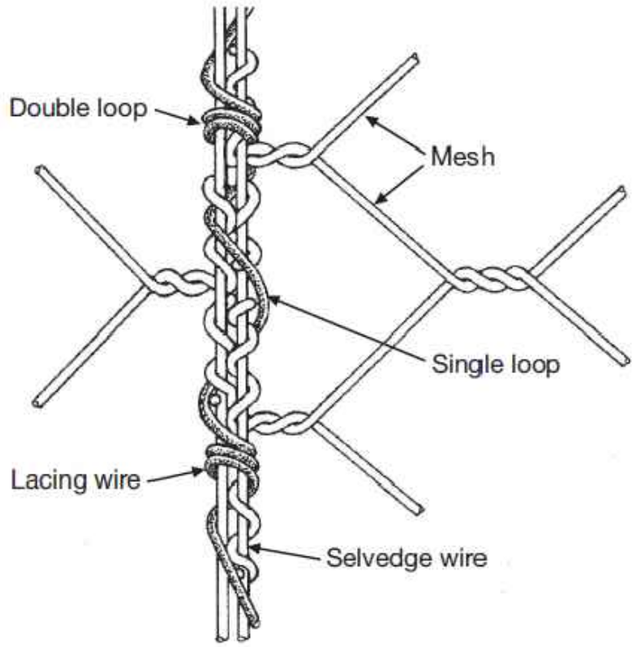
Gabion Assembly - Top View



Gabion Assembly - Side View



Gabion Assembly - Front View



Gabion and Mattress lacing technique

NOTES:
GABIONS SHALL BE CONNECTED TOGETHER AND ALIGNED BEFORE FILLING THE BASKETS WITH ROCK.

ALL CONNECTIONS (PANEL-TO-PANEL AND BASKET-TO-BASKET) SHALL BE ALREADY CARRIED OUT.

THE BASKET PIECES SHOULD BE PULLED RIGHTLY TOGETHER DURING THE TYING OPERATION.

GABION SHALL BE PLACED FRONT TO FRONT AND BACK TO BACK IN ORDER TO EXPEDITE THE STONE FILLING AND LID LACING OPERATION.

FOR EASY OF ALIGNMENT A FRAME MAY BE ATTACHED TO THE EMPTY UNITS AND PULLED TO MAKE SURE THAT THE UNITS ARE PROPERLY STRAIGHTENED.

HYDRO FUTURE CONSULTING

DRAWING TITLE: GABION ASSEMBLY

DATE: 31.05.15

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: XIAOXIAN HE

DRG. No: HF-406

Approved By / Date: -

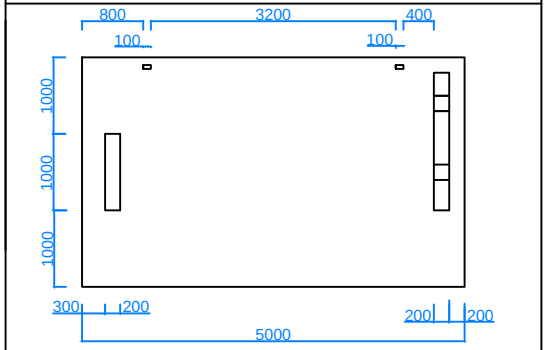
SCALE: 1:100

CLIENT: Tonkin Consulting

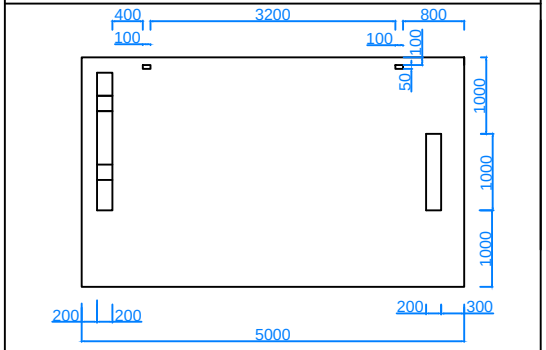
SHEET 1 of 1

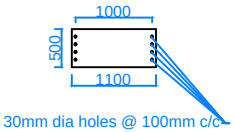
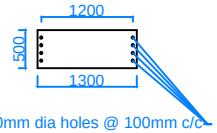
A3

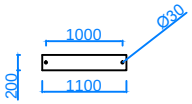
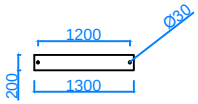
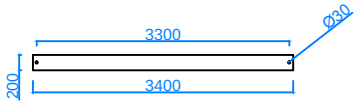
DBX - PNL 5LH
5m Base Panel - Left Handed



DBX - PNL 5RH
5m Base Panel - Right Handed



FS-51100 ext width 1100	FS-51300 ext width 1300	FS-53400 ext width 3400
		
30mm dia holes @ 100mm c/c	30mm dia holes @ 100mm c/c	30mm dia holes @ 100mm c/c

RS-51100 ext width 1100	RS-51300 ext width 1300	RS-53400 ext width 3400
		

HYDRO FUTURE CONSULTING

DRAWING TITLE: TRENCH BOX DIMENSIONS

DATE: 03.June.15

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: BADER ALMASOUD

DRG. No: HF - 407

Approved By / Date: D ARGENT 4/6/15

SCALE: 1:50

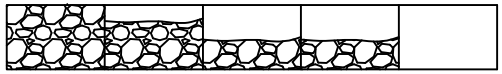
CLIENT: Tonkin Consulting

SHEET 1 of 1

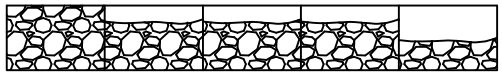
A3

Rock to fill gabions shall be hard, angular to round,durable and of such quality that they shall not disintegrate on exposure to water or weathering during the life of the structure. the commended dimensions of rock to fill gabions shall be 100-200mm

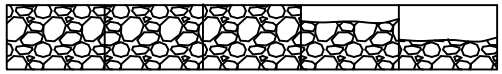
Phase 1



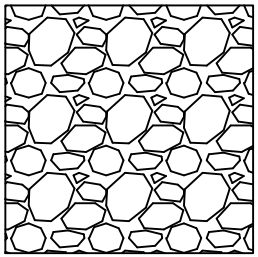
Phase 2

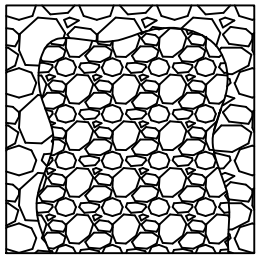


Phase 3



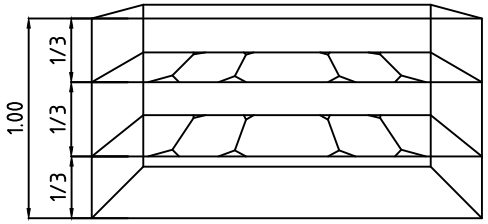
rock shall be placed in 0.30m lifts for 1m high gabions, and 0.23m lifts for 0.4m high gabions. the fill layer shall never be more than 0.30m higher than any adjoining cell





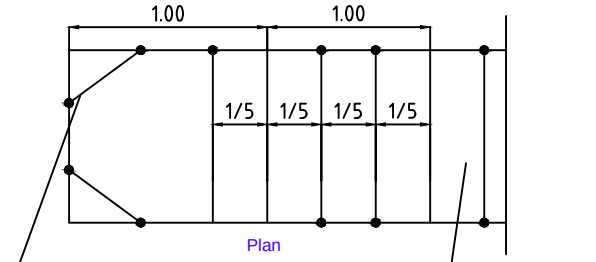
sufficient hand manipulation of the rock shall be performed to minimize voids and achieve a maximum density of rock in the gabion. the rock in exposed vertical faces shall be hand placed to reduce voids on the outer face

n 4 each 1 square meter



Front view

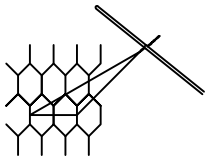
stiffeners or internal cross ties shall be installed as indicated connecting the front and back faces of any supported or exposed face at the vertical third points for a gabions 1m high, as the cell is being filled



Plan

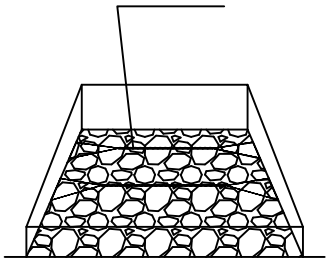
cross tie at end of structure

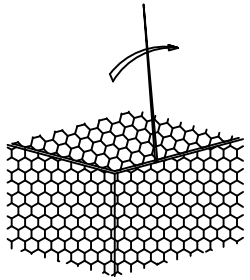
Next Gabion



Cross tie tensioning

Cross tie





when more than one vertical layer of gabions is installed, units shall be overfilled approximately 0.025 to 0.04m to allow for natural settlement. the top surface shall be smoothly leveled, minimizing voids, ensure that diaphragm top are accessible for connecting

HYDRO FUTURE CONSULTING

DRAWING TITLE: GABION RETAINING WALL - FILLING

DATE: 03.06.15

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: JIANAN LI

DRG. No: HF- 408

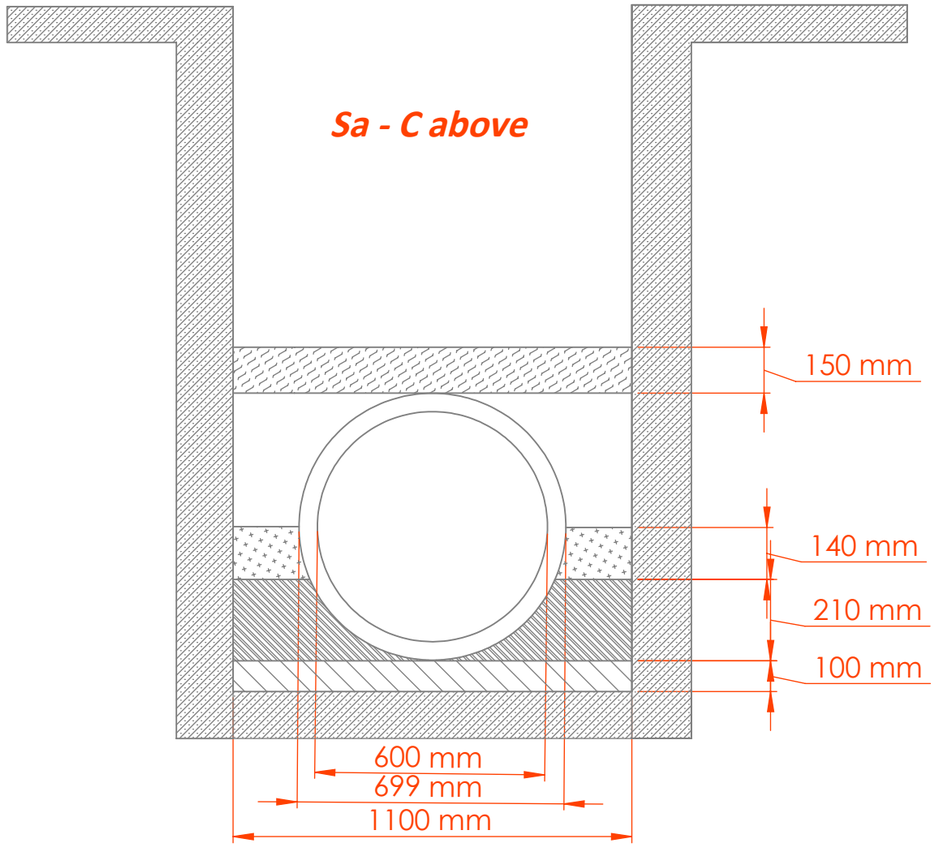
Approved By / Date: D ARGENT 3/6/15

SCALE: NTS

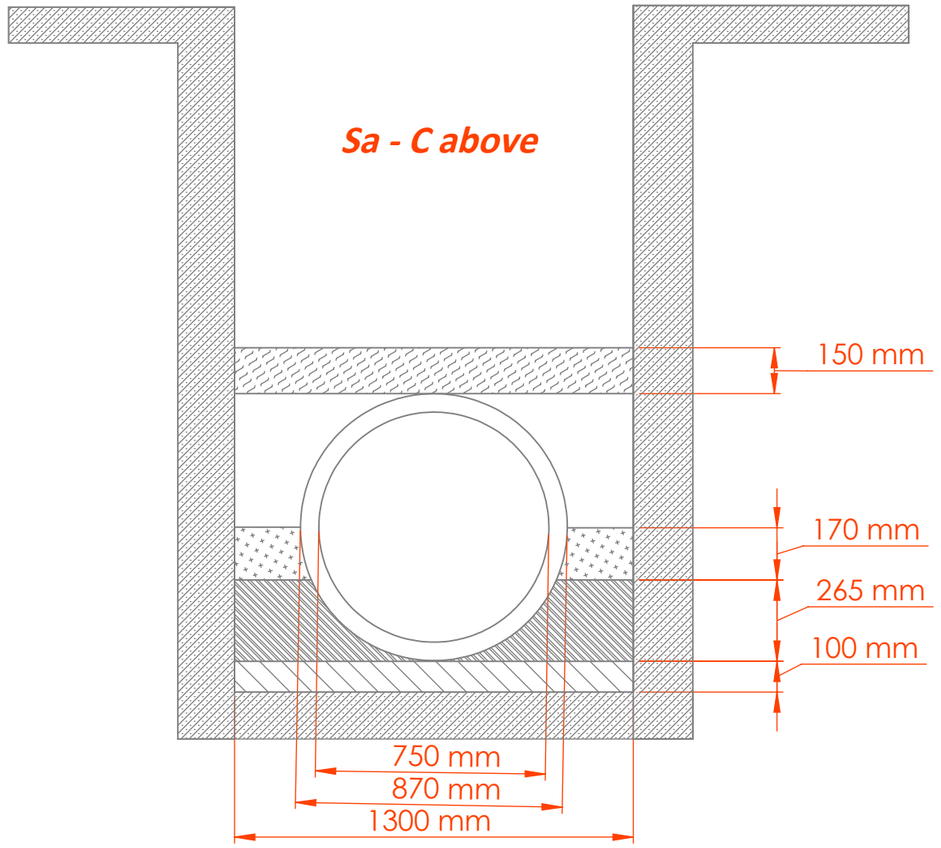
CLIENT: Tonkin Consulting

SHEET 1 of 1

A3



600 mm Pipe Bedding Support



750 mm Pipe Bedding Support

Material grading Requirements								
% Passing								
Sieve Size (mm)	75	19.0	9.5	2.36	0.6	0.3	0.15	0.075
Bed &Haunch zone	100	100	100	100-50	90-20	60-10	25-0	10-0
Side Zones	100	100	100	100-50	50-15	50-15	50-15	25-0

Legend

Bed Zone. Side Zone.

Haunch Zone. Overlay Zone

HYDRO FUTURE CONSULTING

DATE: 2 - 6 - 15

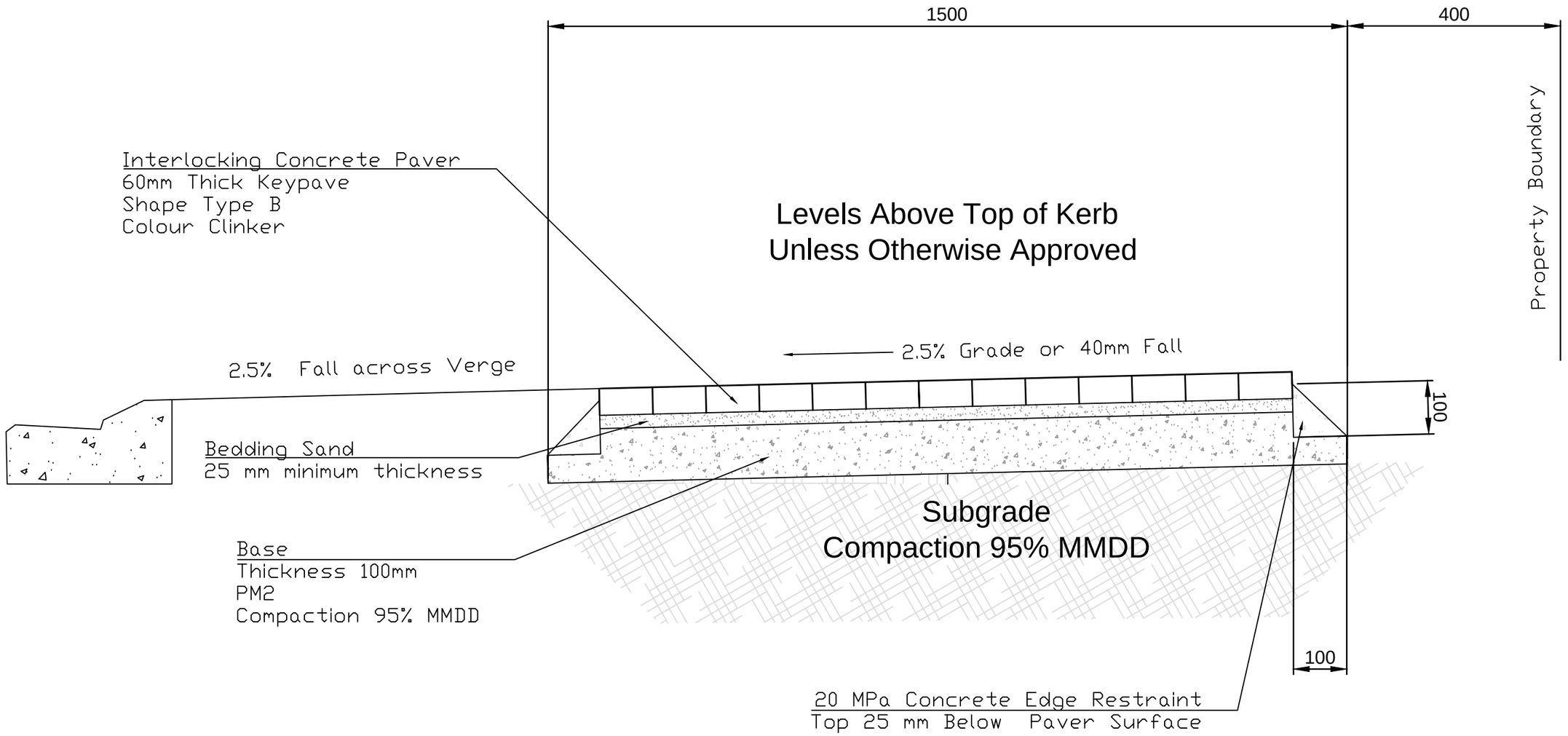
DRAWING TITLE: Pipe Support - HS2

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: Nasser | DRG. No: HF - 409 | Approved By / Date: David Argent 2-6-15

SCALE: 1:1.5 | CLIENT: Tonkin Consulting | SHEET 1 of 1

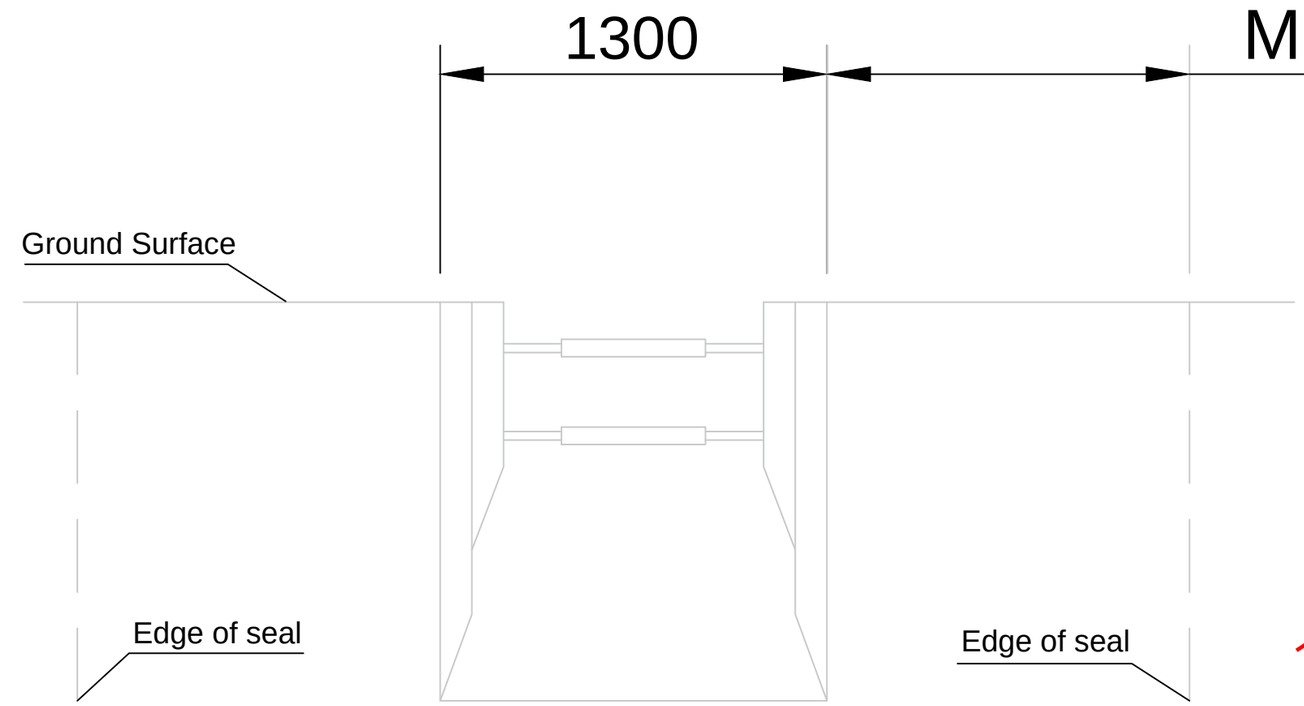
A3



All dimensions are in mm unless stated otherwise

HYDRO FUTURE CONSULTING	DATE: 06.15	DRAWING TITLE: BRICK PAVED FOOTPATH DETAILS FOR TYPICAL RESIDENTIAL STREETS		
		PROJECT: NORTH TERRACE DRAINAGE DESIGN		
		AUTHOR: Eriny Abdelraouf	DRG. No: HF-410	Approved By / Date: David Argent 2/6/15
		SCALE: 1: 6	CLIENT: Tonkin Consulting	SHEET 1 of 1

A3



Section View A-A

Plan View

DRAWING TITLE: MINIMUM SURFACING REINSTATEMENT REQUIREMENTS

HYDRO FUTURE CONSULTING

DATE: 31.05.15

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: ZEDONG ZHANG

DRG. No: HF-411

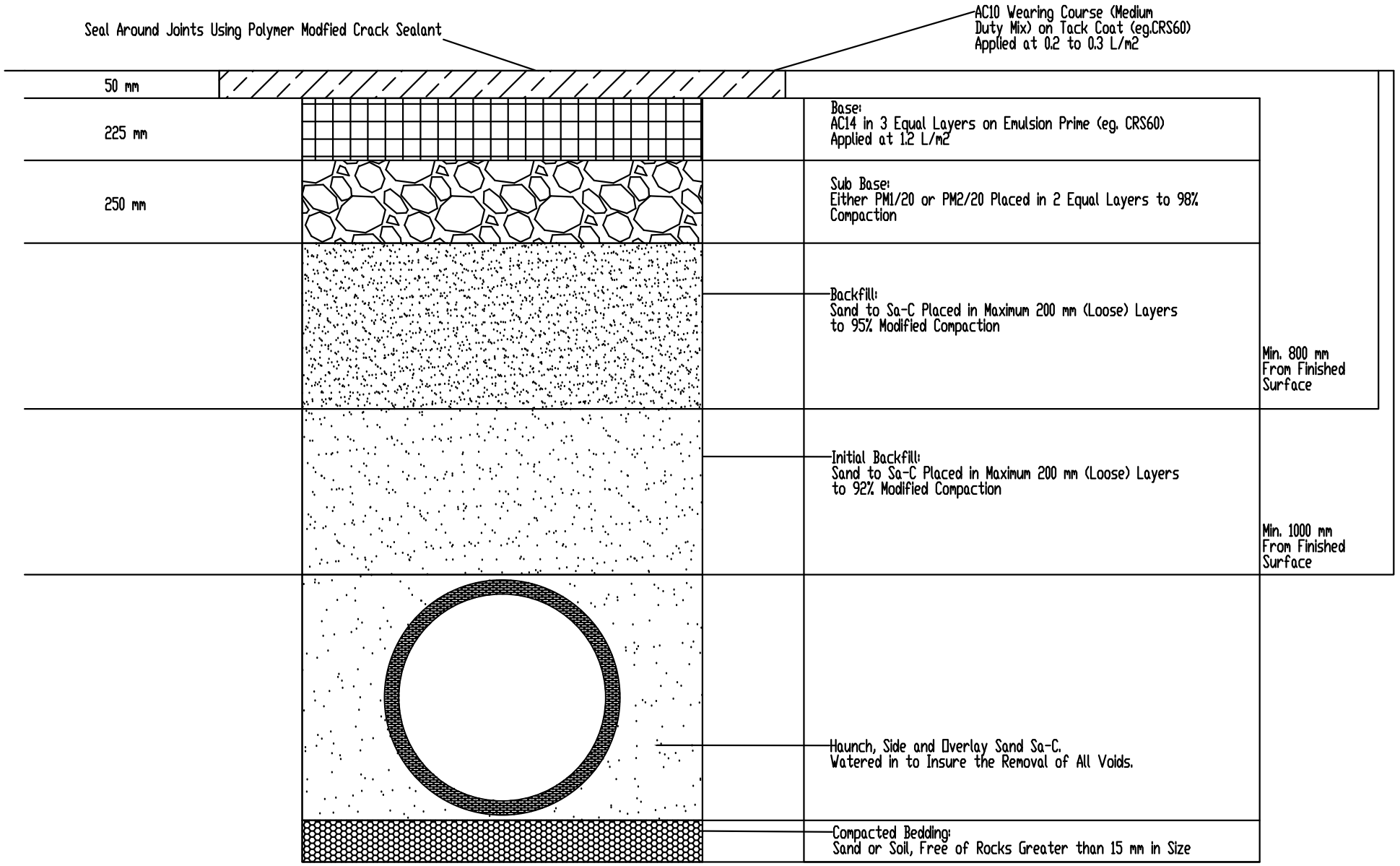
Approved By / Date: D ARGENT 2/6/15

A3

SCALE: 1:100

CLIENT: Tonkin Consulting

SHEET 1 of 1



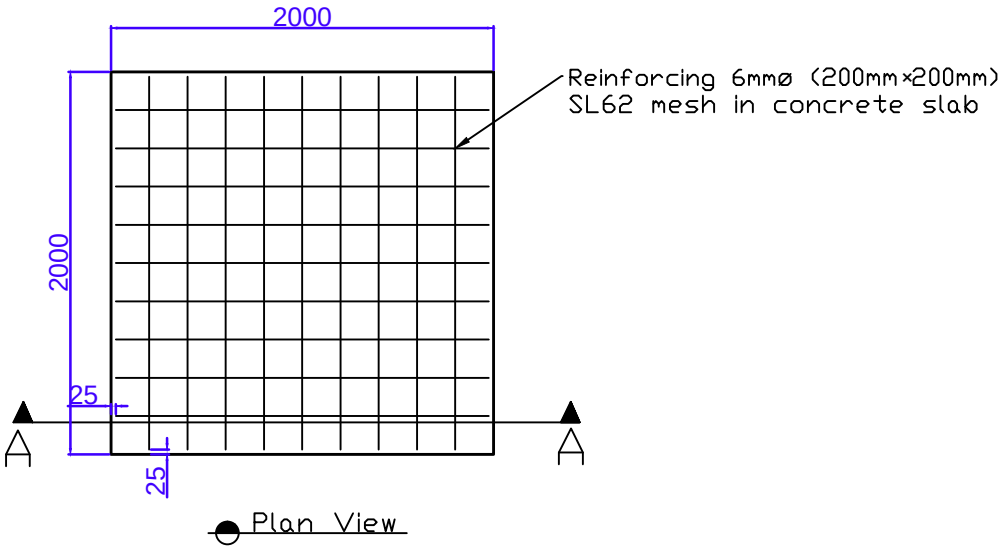
DRAWING TITLE:
PAVEMENT REINSTATEMENT CONFIGURATION

HYDRO FUTURE CONSULTING

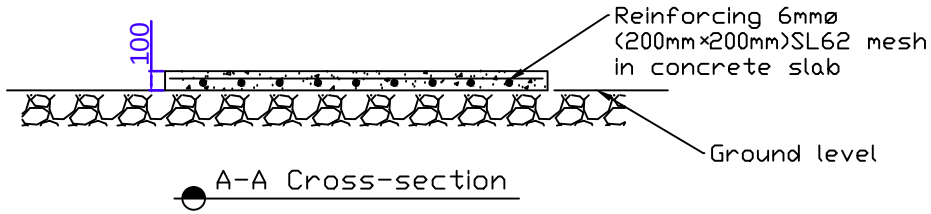
DATE: 2.6.15

PROJECT:
NORTH TERRACE DRAINAGE DESIGN

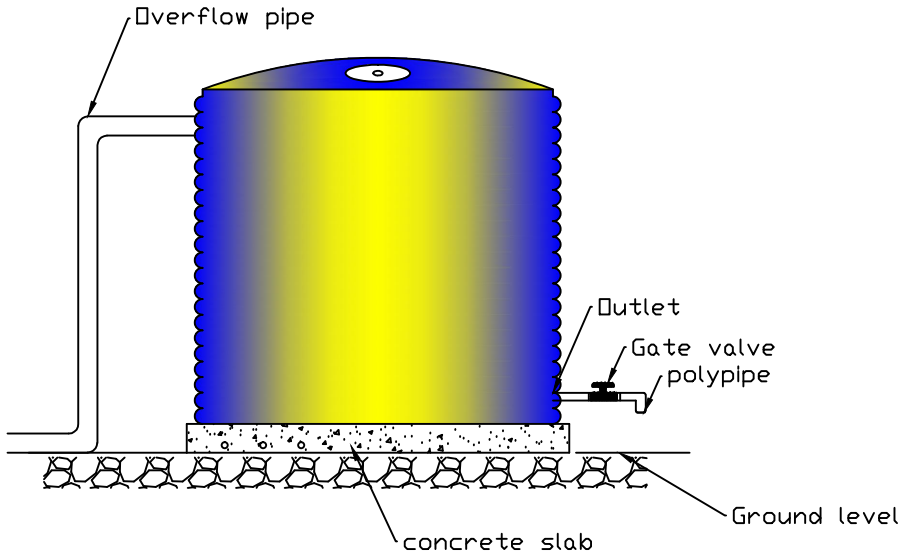
AUTHOR:	DRG. No:	Approved By / Date:	
M BOKHAMSEEN	HF-412	D ARGENT 2/6/15	A3
SCALE: NTS	CLIENT: Tonkin Consulting	SHEET 1 of 1	



Plan View



A-A Cross-section



Specified dimensions	
Tanks	
Volume	4000 L
Diameter	1.83 m
Height	1.75 m
Tank Base	
Elevation above ground	100 mm
Plan	2.00m × 2.00m
Slab	2.00m×2.00m×100mm
Reinforcing bar	6mmØ SL62 mesh

HYDRO FUTURE CONSULTING

DRAWING TITLE: CONCRETE SLAB DETAILING FOR RAINWATER TANK

DATE: 2/6/2015

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: SAEED KAREVAN

DRG. No: HF- 413A

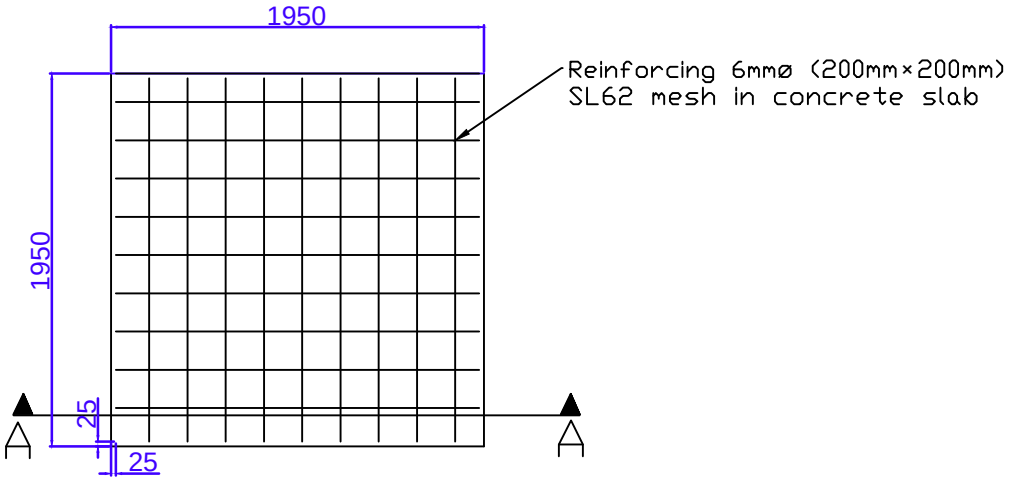
Approved By / Date: DA 2/6/2015

SCALE: 1:20

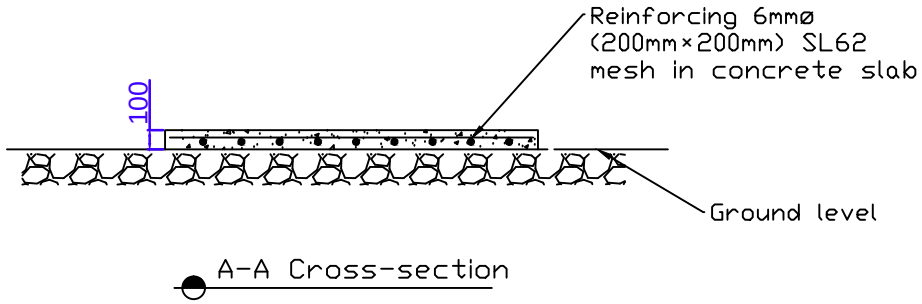
CLIENT: Tonkin Consulting

SHEET 1 of 1

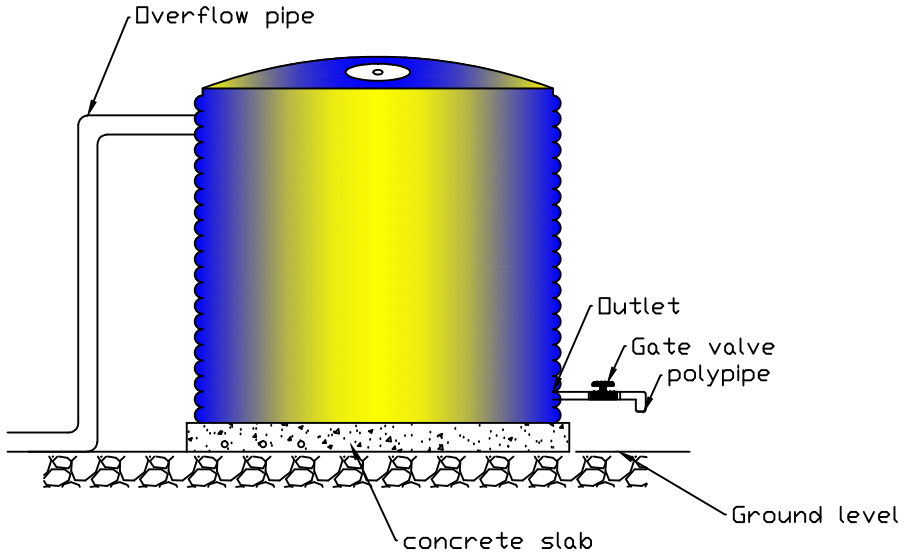
A3



Plan View



A-A Cross-section



Specified dimensions	
Tanks	
Volume	5500 L
Diameter	1.80 m
Height	2.30 m
Tank Base	
Elevation above ground	100 mm
Plan	1.95m × 1.95m
Slab	1.95m×1.95m×100mm
Reinforcing bar	6mmØ SL62 mesh

HYDRO FUTURE CONSULTING

DRAWING TITLE: CONCRETE SLAB DETAILING FOR RAINWATER TANK

DATE: 3/6/2015

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: SAEED KAREVAN

DRG. No: HF- 413B

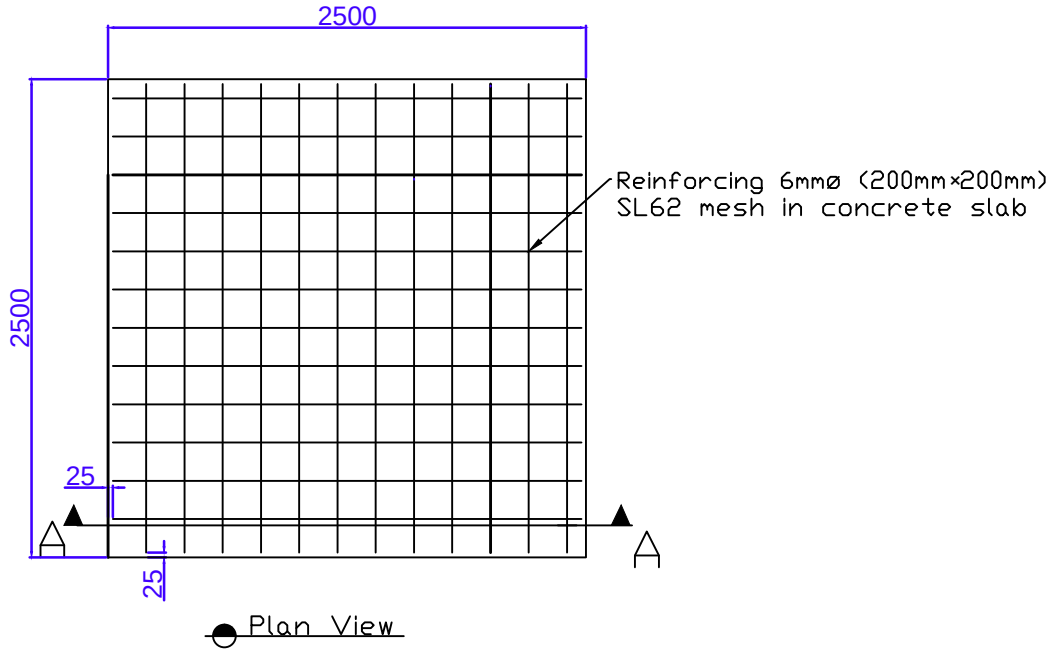
Approved By / Date: DA 2/06/2015

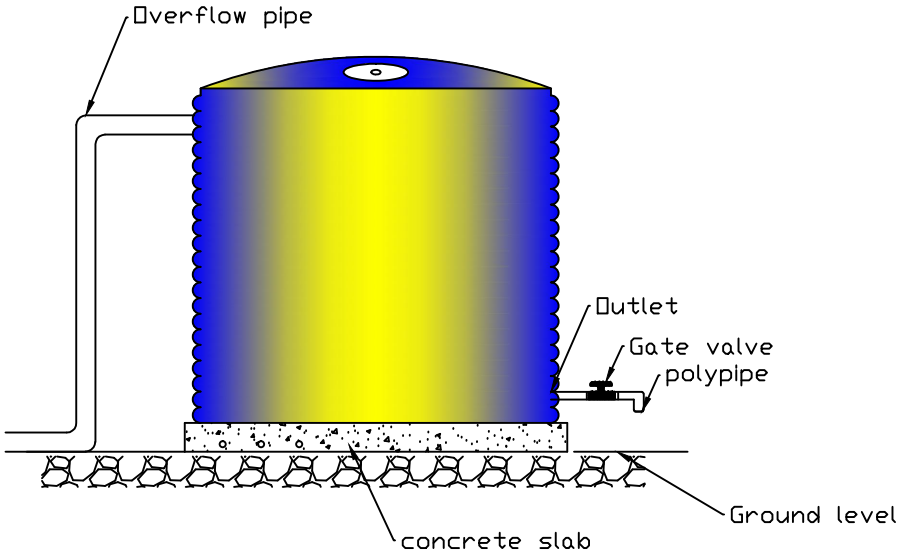
SCALE: 1:20

CLIENT: Tonkin Consulting

SHEET 2 of 1

A3





Specified dimensions	
Tanks	
Volume	8000 L
Diameter	2.35 m
Height	2.20 m
Tank Base	
Elevation above ground	100 mm
Plan	2.50m × 2.50m
Slab	2.50m×2.50m×100mm
Reinforcing bar	6mm Ø SL62 mesh

HYDRO FUTURE CONSULTING

DRAWING TITLE: CONCRETE SLAB DETAILING FOR RAINWATER TANK

DATE: 2/6/2015

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: SAEED KAREVAN

DRG. No: HF- 413C

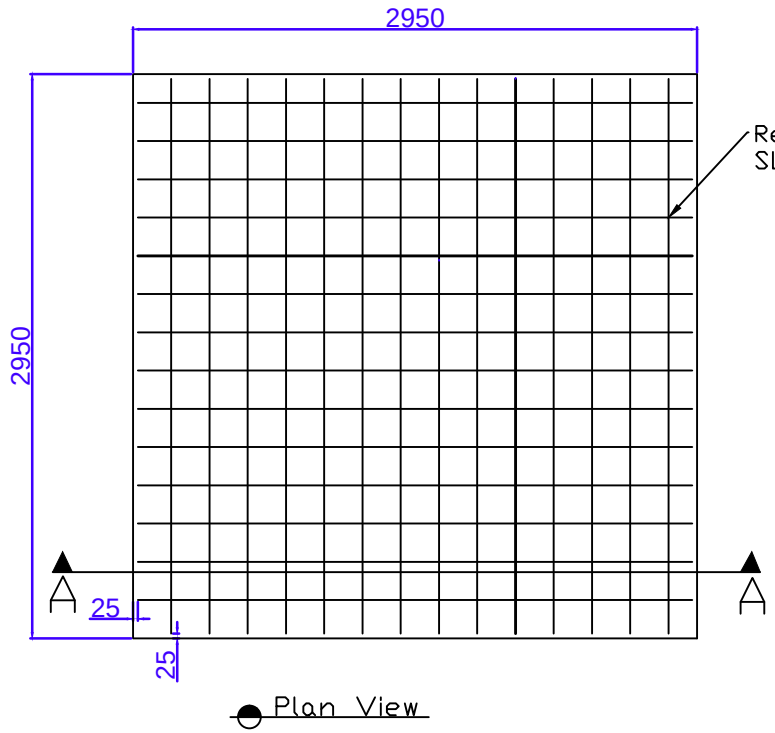
Approved By / Date: DA 2/06/2015

SCALE: 1:20

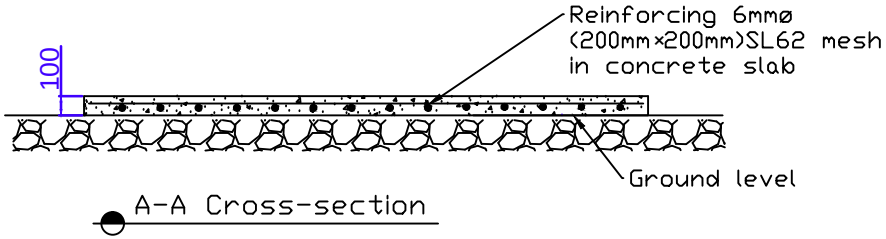
CLIENT: Tonkin Consulting

SHEET 3 of 1

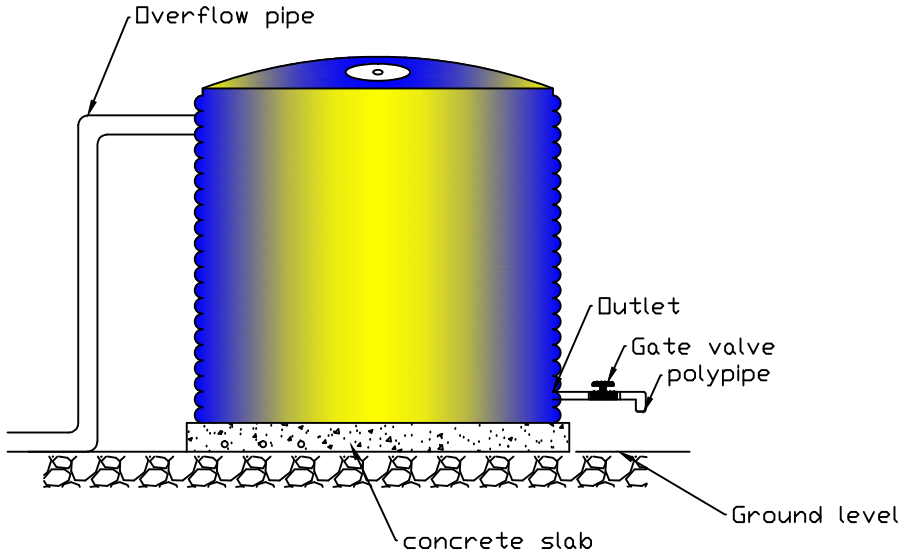
A3



Plan View



A-A Cross-section



Specified dimensions	
Tanks	
Volume	9500 L
Diameter	3.09 m
Height	1.58 m
Tank Base	
Elevation above ground	100 mm
Plan	2.95m × 2.95m
Slab	2.95m×2.95m×100mm
Reinforcing bar	6mmØ SL62 mesh

HYDRO FUTURE CONSULTING

DRAWING TITLE: CONCRETE SLAB DETAILING FOR RAINWATER TANK

DATE: 2/6/2015

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: SAEED KAREVAN

DRG. No: HF- 413D

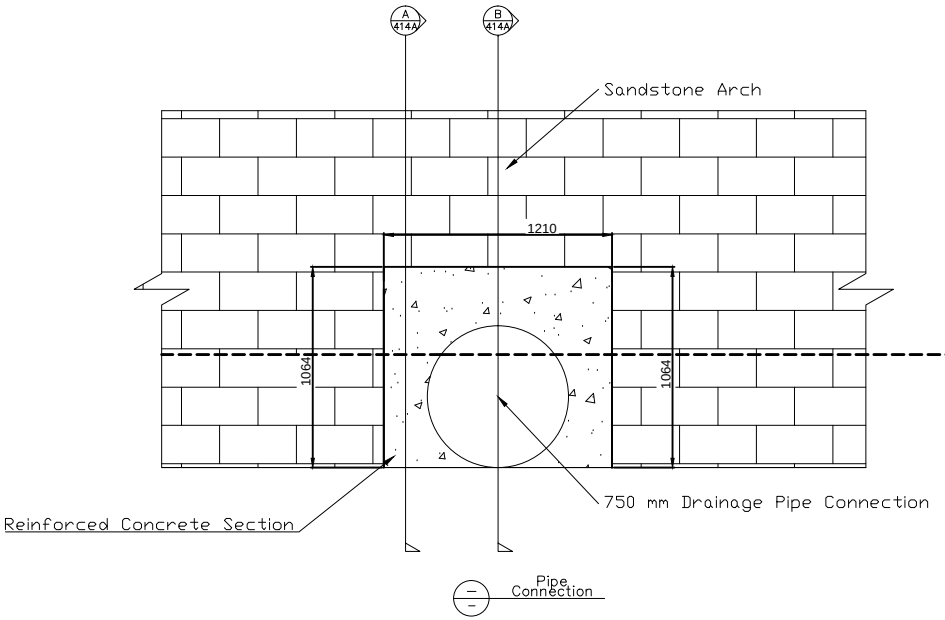
Approved By / Date: DA 2/06/2015

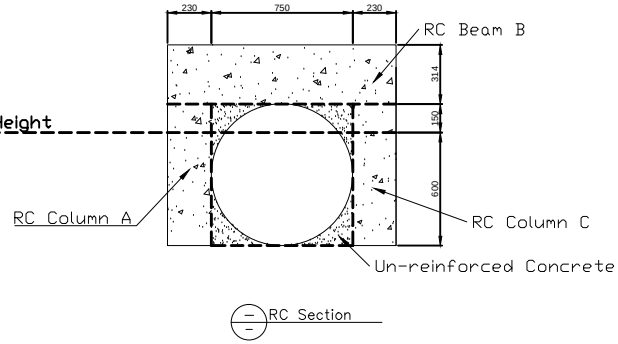
SCALE: 1:20

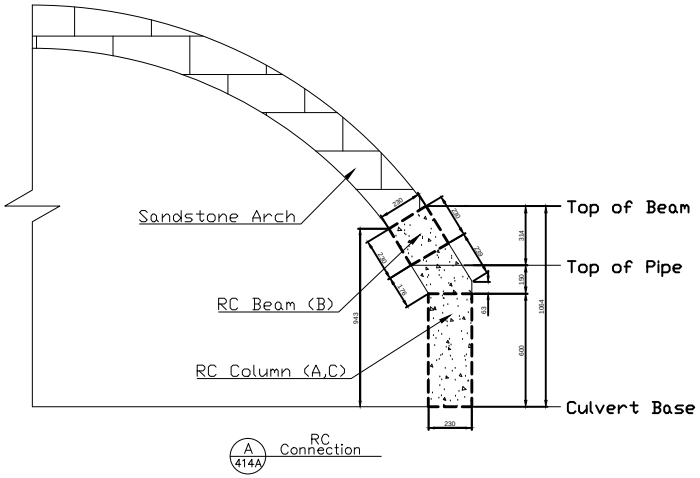
CLIENT: Tonkin Consulting

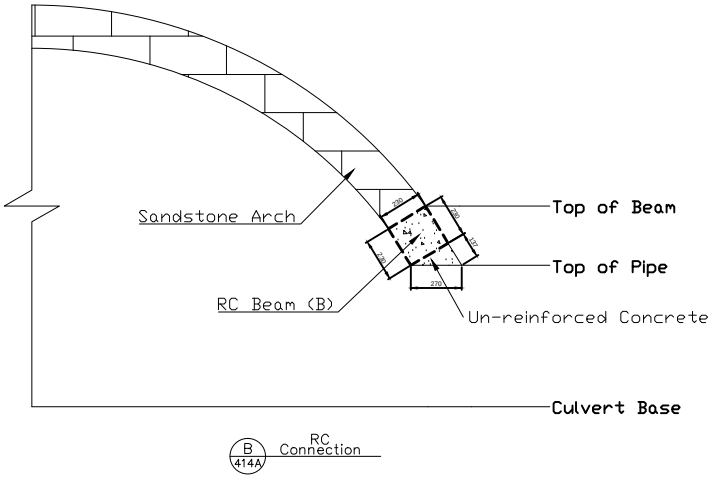
SHEET 4 of 1

A3





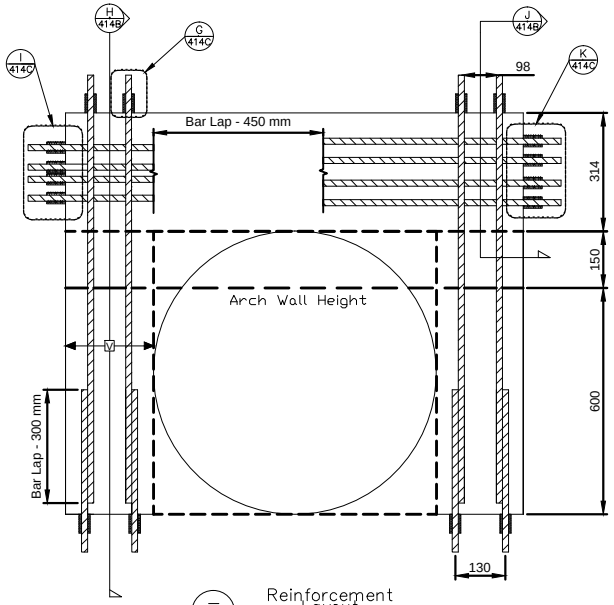




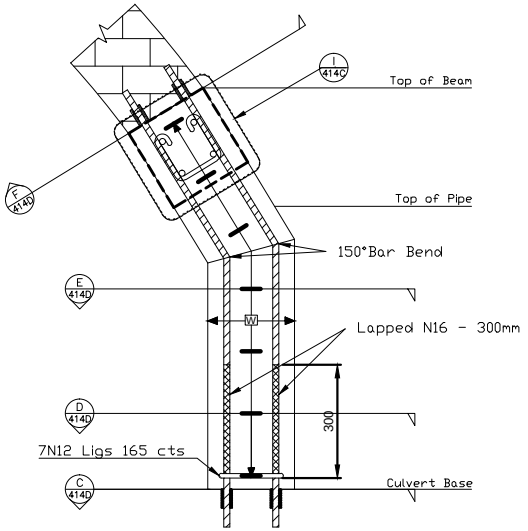
NOTES:
- Grade N40 Concrete to be used.
- Concrete between the beam column and pipe does not contain any reinforcement.

HYDRO FUTURE CONSULTING

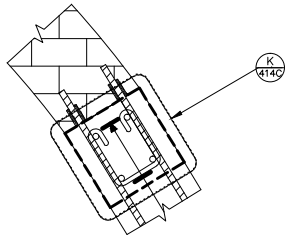
DRAWING TITLE: SANDSTONE ARCH CONNECTION DETAILS			
DATE: 02.06.15	PROJECT: NORTH TERRACE DRAINAGE DESIGN		
AUTHOR: Jeremy Bemmerl	DRG. No: HF-414A	Approved By / Date: D ARGENT 3/6/15	A3
SCALE: 1:20	CLIENT: Tonkin Consulting	SHEET 1 of 4	



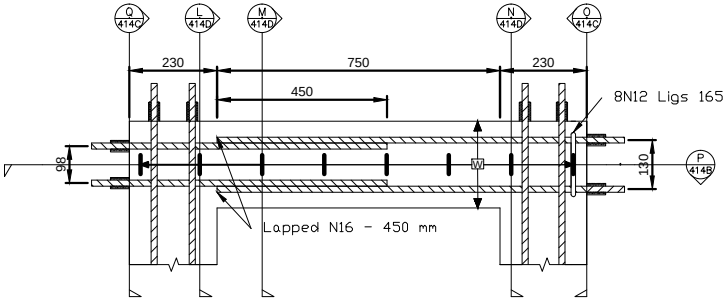
Reinforcement Layout
1:10



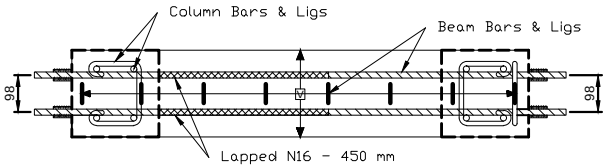
H 414B Column A
1:10



J 414B Column C
1:10



Beam Reinforcment
1:10



P 414B Beam Section
1:10

DRAWING TITLE: SANDSTONE ARCH CONNECTION -REINFORCEMENT

HYDRO FUTURE CONSULTING

DATE: 02.06.15

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: Jeremy Bemmerl

DRG. No: HF-414B

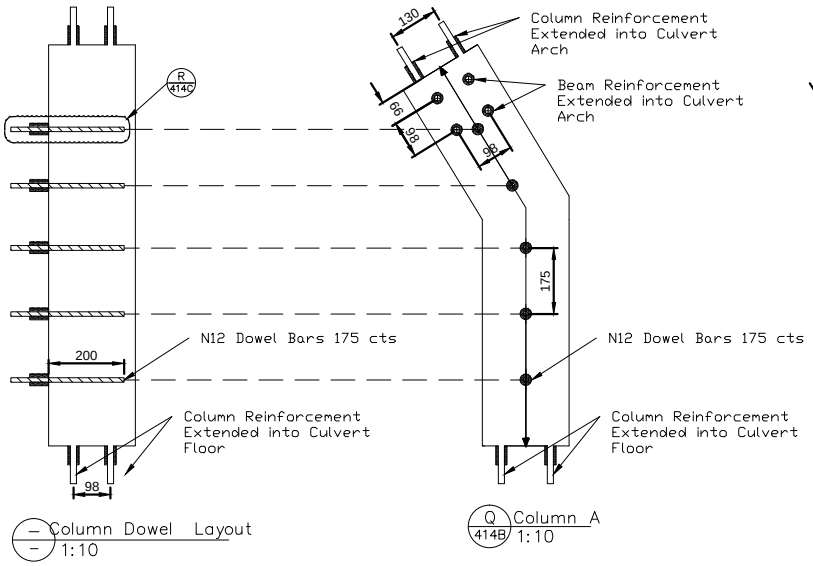
Approved By / Date: D ARGENT 3/6/15

A3

SCALE: 1:10

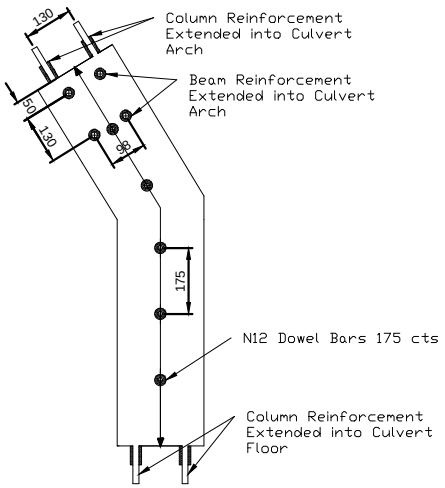
CLIENT: Tonkin Consulting

SHEET 2 of 4

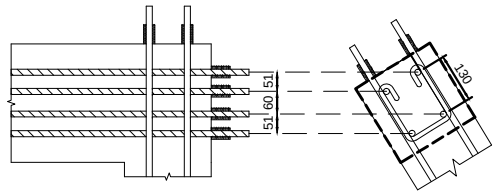


Column Dowel Layout
1:10

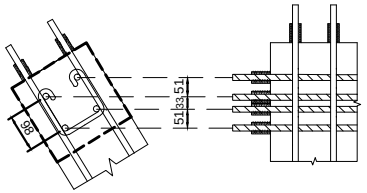
Q 414B Column A
1:10



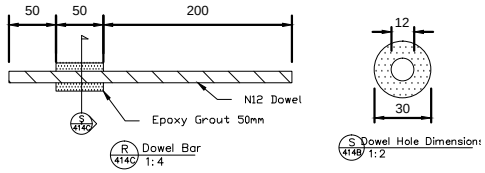
O 414B Column C
1:10



K 414B Beam Right Connections
1:10

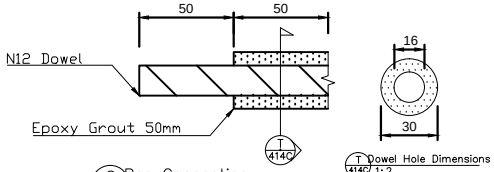


I 414B Beam Left Connections
1:10



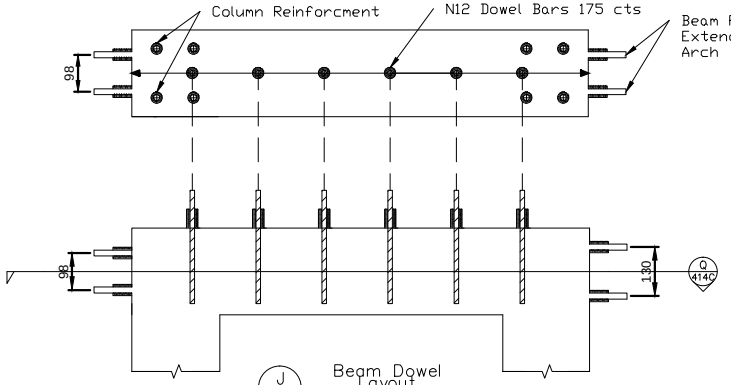
R 414C Dowel Bar
1:4

S 414B Dowel Hole Dimensions
1:2



G 414B Reo Connection
1:2

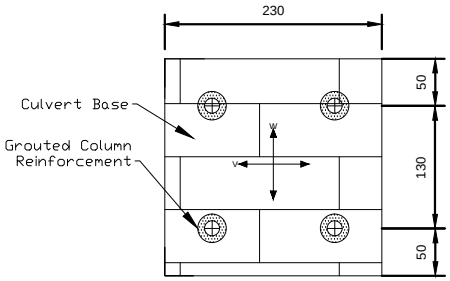
T 414C Dowel Hole Dimensions
1:2



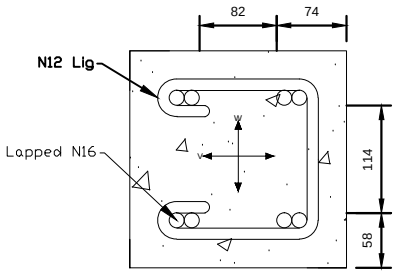
J 414B Beam Dowel Layout
1:10

DRAWING TITLE: SANDSTONE ARCH CULVERT - DOWEL CONNECTION			
HYDRO FUTURE CONSULTING	DATE: 02.06.15	PROJECT: NORTH TERRACE DRAINAGE DESIGN	
	AUTHOR: Jeremy Bemmerl	DRG. No: HF-414C	Approved By / Date: D ARGENT 3/6/15
	SCALE: 1:10	CLIENT: Tonkin Consulting	SHEET 3 of 4

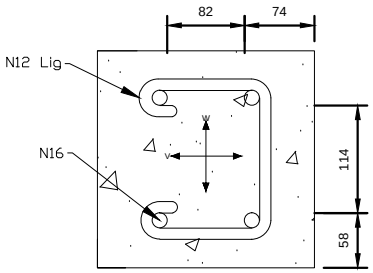
A3



C 414B Column Base 1:4



D 414B Column Reo Lap 1:4



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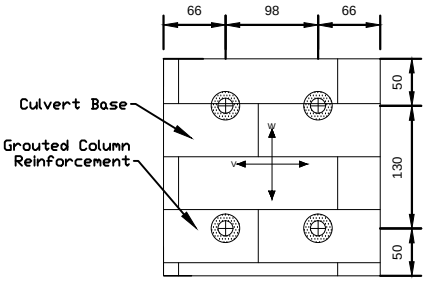
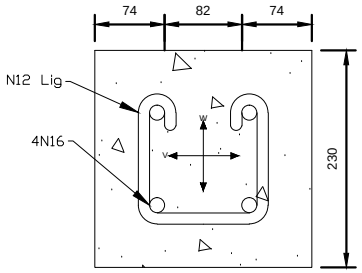
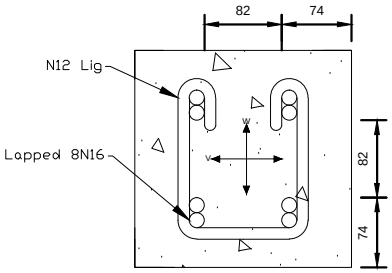


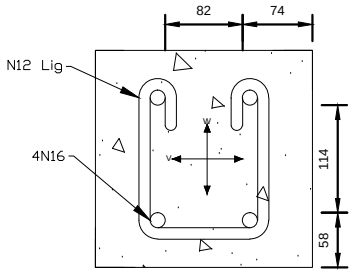
F 414B Column Top 1:4



L 414B Beam Reo 1:4



M 414B Beam Reo Lap 1:4



N 414B Beam Reo 1:4

HYDRO FUTURE CONSULTING

DRAWING TITLE: SANDSTONE ARCH CULVERT - RC DETAILS

DATE: 02.06.15

PROJECT: NORTH TERRACE DRAINAGE DESIGN

AUTHOR: Jeremy Bemmerl

DRG. No: HF-414D

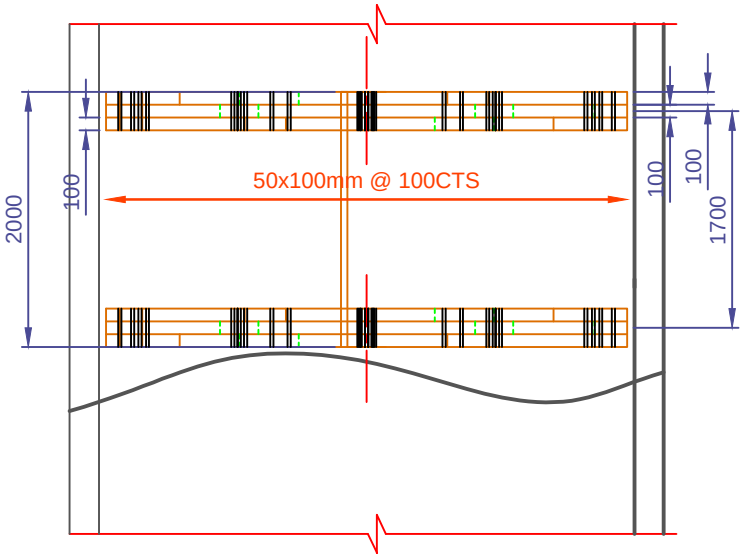
Approved By / Date: D ARGENT 3/6/15

A3

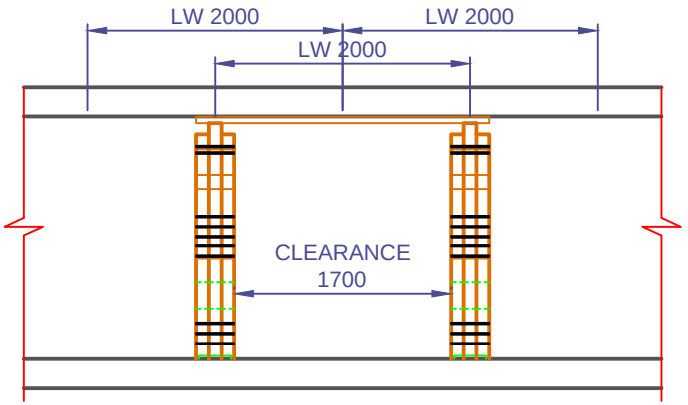
SCALE: 1:4

CLIENT: Tonkin Consulting

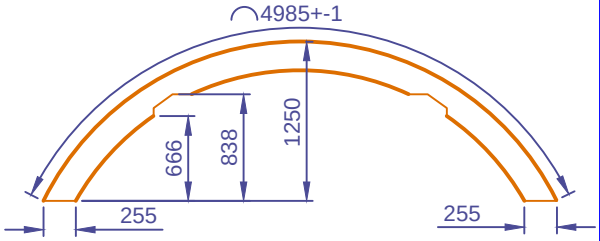
SHEET 4 of 4



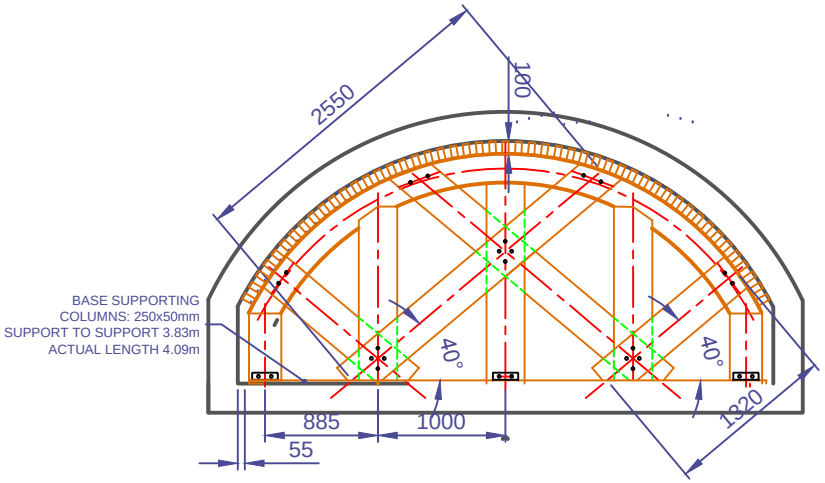
TOP VIEW - TIMBER SUPPORT FRAME 1 AND 2



SIDE VIEW - TIMBER SUPPORT FRAME 1 AND 2

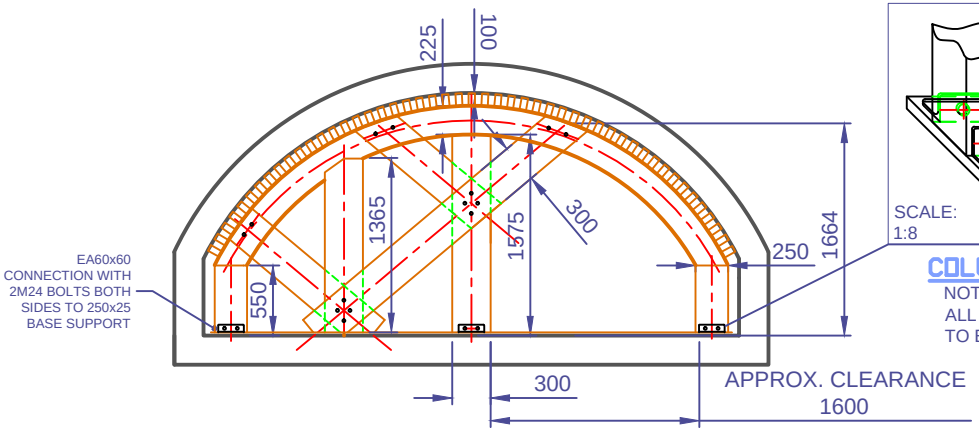


TIMBER ARCH MEMBER SPECIFICATION



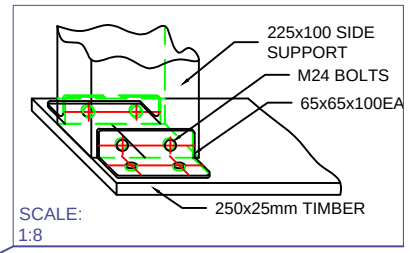
FRONT VIEW - TIMBER SUPPORT FRAME 1

NOTES:
INTERNAL TIMBER MEMBERS CONNECTED TO ARCH VIA 2-M24 BOLTS, MEMBERS ARE TO BE FLUSHED TO ARCH SURFACE.
INTERNAL MEMBERS ARE TO BE CONNECTED VIA 4-M24 BOLTS
PURLIN SPACING IS 100CTS
BASE CONNECTION VIA 2x65x65x100EA FOR EACH SUPPORT
CONNECTION BOLTS - 4xM24
ALL TIMBER MEMBERS ARE WITHIN + OR - 1mm TOLERANCE



FRONT VIEW - TIMBER SUPPORT FRAME 2

NOTES:
INTERNAL TIMBER MEMBERS CONNECTED TO ARCH VIA 2-M24 BOLTS, MEMBERS ARE TO BE FLUSHED TO ARCH SURFACE.
INTERNAL MEMBERS ARE TO BE CONNECTED VIA 4-M24 BOLTS. PURLIN SPACING IS 100CTS
BASE CONNECTION VIA 2x65x65x100EA FOR EACH SUPPORT
CONNECTION BOLTS - 4xM24



COLUMN TO BASE DETAIL

NOTES:
ALL COLUMN TO BASE CONNECTIONS TO BE MADE USING 4M24 BOLTS

HYDRO FUTURE CONSULTING

DRAWING TITLE: TIMBER STRUCTURE SUPPORT FOR ARCH CULVERT				
DATE: 01.06.15	PROJECT: NORTH TERRACE DRAINAGE DESIGN			
	AUTHOR: MICHAEL RENKO	DRG. No: HF-405	Approved By / Date: David Argent 06/05/2015	A3
	SCALE: 1:30	CLIENT: Tonkin Consulting	SHEET 1 of 1	